Celltech
Testing and Engineering Services Lab

Test Report Serial Number:	45461887 R2.0
Test Report Date:	22 August 2023
Project Number:	1635

SAR Test Report - Class IV Permissive Change

Applicant:

clarius

Clarius Mobile Health Corp
205-2980 Virtual Way
Vancouver, BC, V5M 4X3
Canada

Maximum Reported 1g SAR			
FCC	DTS BODY/HEAD:	<0.1	W/kg
	NII BODY/HEAD:	<0.1	
General Pop. Limit:		1.60	
Maximum Reported 10g SAR			
FCC	DTS Extremity:	0.41	W/kg
	NII Extremity:	0.28	
General Pop. Limit:		4.00	

FCC ID:
2AWLS-CUSMOD1

Product Model Number / HVIN
CUSMOD1

Product Name / PMN
Clarius Module

In Accordance With:

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

Approved By:

Ben Hewson, President
Celltech Labs Inc.
21-364 Lougheed Rd.
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Canada

ilac-MRA ACCREDITED
Test Lab Certificate: 2470.01

Industry Canada
IC Registration 3874A

FC
FCC Registration: CA3874

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1.0 DOCUMENT CONTROL

Revision History				
Samples Tested By:	Ben Hewson, Trevor Whillock	**Date(s) of Evaluation:**		26 Jun -28 Jun, 2023
Report Prepared By:	Art Voss, P.Eng.	**Report Reviewed By:**		Ben Hewson
Report Revision	**Description of Revision**	**Revised Section**	**Revised By**	**Revision Date**
0.1	Draft	n/a	Ben Hewson	13 July 2023
1.0	Initial Release	n/a	Ben Hewson	17 July 2023
2.0	Revised DUT Information	C, 2	Art Voss	22 August 2023
	Included Head Configuration	10		

2.0 CLIENT AND DEVICE INFORMATION

Client Information	
Applicant Name	**Clarius Mobile Health Corp**
Applicant Address	205-2980 Virtual Way
	Vancouver, BC, V5M 4X3
	Canada
DUT Information	
Device Identifier(s):	**FCC ID:** **2AWLS-CUSMOD1**
Module Product Marketing Name / PMN:	Clarius Module
Module Model Number / HVIN:	CUSMOD1
Host Marketing Name / HMN:	PAL HD3
FCC Equipment Class:	Digital Transmission System (DTS) FCC Part 15
	Spread Spectrum Transmitter (DSS) FCC Part 15
	Unlicensed National Information Infrastructure (NII) FCC Part 15
	Limited Modular Approval
Transmit Frequency Range:	DTS, Spread Spectrum/Digital Device: 2412-2462MHz
	DTS, Spread Spectrum/Digital Device: 2402-2480MHz
	DSS, Spread Spectrum/Digital Device: 2402-2480MHz
	U-NII, WiFi Device: 5180-5320MHz, 5745-5825MHz
Number of Channels:	Programmable
Manuf. Max. Rated Output Power:	DTS, Spread Spectrum/Digital Device: 2412-2462MHz: **23.7dBm (0.2432W)**
	DTS, Spread Spectrum/Digital Device: 2402-2480MHz: **7.0dBm (0.0049W)**
	DSS, Spread Spectrum/Digital Device: 2402-2480MHz: **11.6dBm (0.0146W)**
	U-NII, WiFi Device: 5180-5320MHz: **17dBm (0.0525W)**
	U-NII, WiFi Device: 5745-5825MHz: **18.4dBm (0.0698W)**
DUT Power Source:	Rechargeable Li-Ion,
Deviation(s) from standard/procedure:	None
Modification of DUT:	None

3.0 SCOPE OF EVALUATION

This Certification Report was prepared on behalf of:

Clarius Mobile Health Corp

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

Equipment Description

The CUSMOD1 is a certified single module containing 2.4GHz and 5GHz WiFi and 2.4GHz BlueTooth transmitters. The module is currently integrated into the following host model numbers/HVINs:

L7 HD, L7VET HD

C3 HD, C3VET HD

C7 HD, C7VET HD

L5 HD, L20 HD

EC7 HD, PA HD

L7 HD3, L7VET HD3

C3 HD3, C3VET HD3

C7 HD3, C7VET HD3

L5 HD3, L20 HD3

EC7 HD3, PA HD3

3DC3

The module is being integrated into the following host model numbers/HVINs:

PAL HD3

The Clarius HD3 Series hosts *(Equipment)* are portable Medical and Veterinarian ultrasound devices which stream video data via WiFi to another WiFi connected device. The *Equipment* is handheld by the operator while in contact with a patient. The *Equipment* ceases to transmit when the ultrasound transducer element is no longer in contact with the patient. Since the *Equipment* is both handheld (the operator) and in contact with the body (the patient), two RF exposure conditions exist, Extremity and Body. The separation distance between the radiating element and the patient is no less than 100mm. The BlueTooth transmitter is used for a very brief credential and configuration exchange lasting no longer than 10 seconds after which it no longer transmits. The WiFi and Bluetooth transmitters do not simultaneous transmit. The 2.4GHz WiFi and 5GHz WiFi transmitters do not simultaneously transmit.

The Clarius HD3 Series hosts *(Equipment)* are all identical in all aspects of RF circuitry, transmit power, antenna configuration and physical size with the exception of the ultrasound transducer element. The Clarius HD3 Series hosts vary from the HD Series hosts as follows:

Form Factor: The HD3 Series is slightly different than the HD Series.

Battery: The HD3 Series battery is integrated into the device, the HD Series battery was removable.

Antenna: The HD3 Series antenna has modified from the HD Series to improve efficiency while maintaining the same gain.

Note: The CUSMOD1 module has not modified in any manner.

Application:
This is an application for a Class II Permissive Change to add the above PAL HD3 to the existing module grant.

Regulatory Requirement:

As per FCC KDB 178919 D01v06r04 - Permissive Change Policy and FCC 47 CFR §2.1093, an RF Exposure (SAR) evaluation report is required for this *Equipment* and the results of the RF Exposure (SAR) evaluation appear in this report.

Scope:

The scope of this evaluation is to evaluate the SAR for intended use applications. It will include evaluation of the 2.4 GHz and 5GHz WiFi transmitter for all required RF exposure configurations. The SAR Test Plan includes the evaluation of the *Equipment* in an "Extremity" configuration including all surfaces of the *Equipment* as intended for use by the operator. The SAR Test Plan also includes evaluation of the *Equipment* in the "Body" configuration in its intended use while in contact with the patient.

The SAR Test Plan developed for this evaluation is based on the required test channels and configurations which produce the highest worst case SAR from previous evaluations and where applicable, SAR test reduction and/or SAR test exclusion may be utilized. The *Equipment* will be evaluated for SAR at the maximum output power level, preset by the manufacturer and in accordance with the procedures described in IEC/IEEE 62209-1528, FCC KDB 865646, 447498, 248227 and RSS 102.

4.0 NORMATIVE REFERENCES

Normative References*	
ANSI / ISO 17025:2017	General Requirements for competence of testing and calibration laboratories
FCC CFR Title 47 Part 2	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)
IEC International Standard /IEEE International Committee on Electromagnetic Safety	
IEC/IEEE 62209-1528	Measurement procedure for the assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Part 1528; Human models, instrumentation, and procedures (Frequency range of 4 MHz to 10 GHz)
FCC KDB	
KDB 865664 D01v01r04	SAR Measurement Requirements for 100MHz to 6GHz
FCC KDB	
KDB 447498 D01v06	Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies
FCC KDB	
KDB 248227 D01v02r02	SAR Guidance for IEEE 802.11 (Wi-Fi) Transmitters
* When the issue number or issue date is omitted, the latest version is assumed.	

5.0 STATEMENT OF COMPLIANCE

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

Applicant:	Date(s) Evaluated:
Clarius Mobile Health Corp	26 Jun - 28 Jun, 2023
Module Product Name / PMN:	**Module Product Model Number / HVIN:**
Clarius Module	CUSMOD1
Host Marketing Name / HMN:	**Host Product Model Number / HVIN:**
PAL HD3	
Standard(s) Applied:	
FCC 47 CFR §2.1093 Health Canada's Safety Code 6	
Measurement Procedures:	
FCC KDB 865664, FCC KDB 447498, FCC KDB 247228 Industry Canada RSS-102 Issue 5 IEC/IEEE Standard 62209-1528	
Use Group:	**Limits Applied:**
[X] General Population / User Unaware	[X] 1.6W/kg - 1g Volume - Body
[ ] Occupational / User Aware	[X] 4.0W/kg - 10g Volume - Extremity
Reason for Issue:	
[ ] New Certification	[X] Class II Permissive Change
Reason for Change:	
Revise Grant to Add Host Model Variant PAL HD3	

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.
13 July 2023
Date

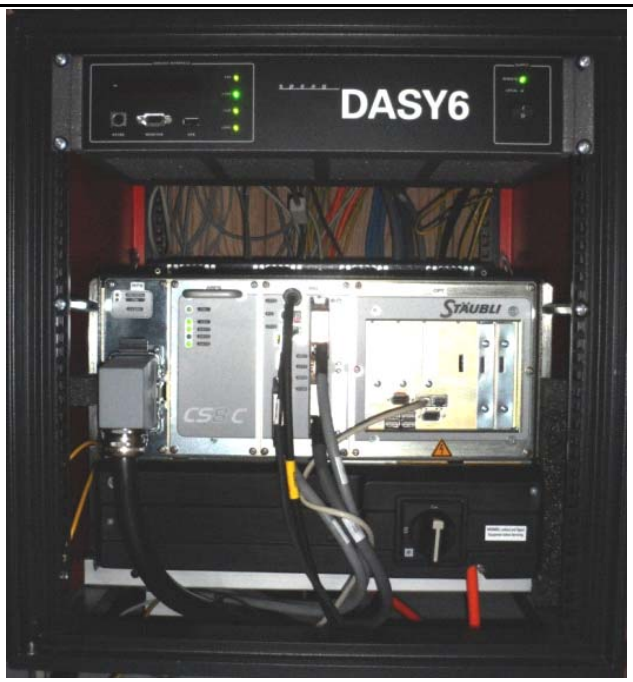
PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
A. F. VOSS
31327

6.0 SAR MEASUREMENT SYSTEM

SAR Measurement System

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

DASY 6 SAR System with SAM Phantom



DASY 6 Measurement Controller

7.0 RF CONDUCTED POWER MEASUREMENT

Table 7.1 Conducted Power Measurements

Conducted Power Measurements						
Channel	Frequency (MHz)	Measured Power (dBm)	Rated Power (dBm)	Rated Power (W)	Delta (dBm)	SAR Test Channel (Y/N)
1	2412	23.7	23.7	0.234	0	Y
6	2437	23.7	23.7	0.234	0	Y
11	2462	23.7	23.7	0.234	0	Y
13	2472	23.7	23.7	0.234	0	Y
36	5180	17.0	17.0	0.053	0	Y
44	5220	17.0	17.0	0.053	0	Y
48	5240	17.0	17.0	0.053	0	Y
149	5745	18.4	18.4	0.070	0	Y
157	5785	18.4	18.4	0.070	0	Y
165	5825	18.4	18.4	0.070	0	Y

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

8.0 NUMBER OF TEST CHANNELS (N_C)

SAR was evaluated on the worst case channels from previous evaluations or channels which exhibit high SAR.

BT/BLE SAR Test Evaluation: The BT/BLE transmitter meets the SAR test exclusion. See Section 11.0

NOTE: This device is not capable of simultaneous transmission between the BT/BLE and WiFi transmitters or the 2.4GHz and 5GHz WiFi transmitters.

9.0 ACCESSORIES EVALUATED

Manufacturer's Accessories Tested - See Addendums for Complete Manufacturer's List

Test Report ID Number	Manufacturer's Part Number	Description	SAR Evaluated
Miscelaneous			
-	FANHD3012109	Clip-On Fan	X

10.0 SAR MEASUREMENT SUMMARY

Table 10.1: Measured Results – Extremity, 2.4 and 5GHz Bands

Measured 10g SAR Results - EXTREMITY Configuration																
Date	Plot ID	Test Frequency (MHz)	DUT Configuration					Spacing		Measured SAR (W/kg)	SAR Drift (dB)	Delta Power (dB)	Crest Factor (n)	Fluid Sensitivity (n)	Duty Factor (%)	reported SAR (W/kg)
			Pos	Mode	BW	Mod	BR	DUT (mm)	Antenna (mm)							
6/27/2023	E100	2437	Front*	802.11b	20	DSSS	1 mbps	0	n/a	0.000	0.000	0.000	1.000	1.000	100.000	0.000
6/27/2023	E101	2437	Back	802.11b	20	DSSS	1 mbps	0	n/a	0.412	1.370	0.000	1.000	1.000	100.000	0.412
6/27/2023	E102	2437	Left	802.11b	20	DSSS	1 mbps	0	n/a	0.004	3.680	0.000	1.000	1.000	100.000	0.004
6/27/2023	E103	2437	Right	802.11b	20	DSSS	1 mbps	0	n/a	0.003	0.000	0.000	1.000	1.000	100.000	0.003
6/27/2023	E104	2437	Top*	802.11b	20	DSSS	1 mbps	0	n/a	0.000	0.590	0.000	1.000	1.000	100.000	0.000
6/28/2023	E105	5200	Back	U-NII 1	20	OFDM	MCS8	0	n/a	0.277	1.840	0.000	1.000	1.000	100.000	0.277
6/28/2023	E106	5825	Back	U-NII 3	20	OFDM	MCS8	0	n/a	0.114	6.820	0.000	1.000	1.000	100.000	0.114
Applicable SAR Limit								Use Group				Limit				

Table 10.2: Measured Results – Body/Head 2.4 and 5GHz Bands

Measured 1g SAR Results - BODY/HEAD Configuration																
Date	Plot ID	Test Frequency (MHz)	DUT Configuration					Spacing		Measured SAR (W/kg)	SAR Drift (dB)	Delta Power (dB)	Crest Factor (n)	Fluid Sensitivity (n)	Duty Factor (%)	reported SAR (W/kg)
			Pos	Mode	BW	Mod	BR	DUT (mm)	Antenna (mm)							
6/27/2023	B100	2437	Tip*	802.11b	20	DSSS	1 mbps	0	n/a	0.000	0.000	0.000	1.000	1.000	100.000	0.000
6/28/2023	B101	5200	Tip*	U-NII 1	20	OFDM	MCS8	0	n/a	0.000	0.000	0.000	1.000	1.000	100.000	0.000
6/28/2023	B102	5825	Tip*	U-NII 3	20	OFDM	MCS8	0	n/a	0.000	0.000	0.000	1.000	1.000	100.000	0.000
Applicable SAR Limit								Use Group				Limit				
FCC CFR 2.1093			Health Canada Safety Code 6					General Population/User Unaware				1.6 W/kg				

* Due to extremely low SAR, these tests failed to complete

11.0 SCALING OF MAXIMUM MEASURED SAR

Table 11.1 SAR Scaling, Extremity

Scaling of Maximum Measured SAR (10g)					
Measured Parameters		Configuration			
		Extremity	Extremity		
Plot ID		E101	E105		
Maximum Measured SAR_M		0.412	0.277		(W/kg)
Frequency		2437	5200		(MHz)
Drift	Power Drift	1.370 (1)	1.840 (1)		(dB)
Conducted Power		37.700	17.000		(dBm)
DC	Transmit Duty Cycle	100.000	100.0		(%)
Fluid Deviation from Target					
Δe	Permitivity	-8.05%	-8.86%		
Δσ	Conductivity	3.53%	6.45%		

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

Fluid Sensitivity Calculation (10g)			IEC/IEEE 62209-1528 7.8.2		
Delta SAR = Ce * Δe + Cσ * Δσ					(8)
$Ce = (0.003456*f^3) - (0.03531*f^2) + (0.07675*f) - 0.186$					(11)
$Cσ = (0.004479*f^3) - (0.01586*f^2) - (0.1972*f) + 0.7717$					(12)
f	Frequency (GHz)	2.437	5.2		
Ce		-0.159	-0.256		
Cσ		0.262	-0.053		
Ce * Δe		0.013	0.023		
Cσ * Δσ		0.009	-0.003		
ΔSAR		0.022 (3)	0.019 (3)		(%)

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

Manufacturer's Tuneup Tolerance				
Measured Conducted Power	37.700	17.000		(dBm)
Rated Conducted Power	37.700	17.000		(dBm)
ΔP	0.000 (4)	0.000 (4)		(dB)

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

Crest Factor				
Transmit Duty Cycle (DC)	100.000	100.0		(%)
CF (1/DC)	1.000 (5)	1.00 ###		

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

SAR Adjustment for Fluid Sensitivity				
$SAR_1 = SAR_M$ X [ΔSAR]	0.412	0.277		(W/kg)
SAR Adjustment for Tuneup Tolerance				
$SAR_2 = SAR_1 + [ΔP]$	0.412	0.277		(W/kg)
SAR Adjustment for Drift				
$SAR_3 = SAR_2 + [Drift]$	0.412	0.277		(W/kg)
SAR Adjustment for Crest Factor				
$SAR_4 = SAR_3$ x [CF]	0.412	0.277		(W/kg)
***reported* 10g SAR**				
SAR_4	**0.41**	**0.28**		(W/kg)

SAR Body measurements as per table 10.2, were extremely low and the tests failed to complete. and SAR scaling is not possible or meaningful. In such cases SAR is reported as < 0.1 W/kg.

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

[(*max. power of channel, including tune-up tolerance, mW*) / (*min. test separation distance, mm*)] X [√f(GHz)] ≤ 7.5 for 10-g SAR

[(14.6)/(25)] X [√2.480] = 0.92 ≤ 7.5

Where:
maximum power of channel, including tune-up tolerance, mW = 14.6 mW
minimum separation distance, mm = 25mm
f(GHz) = 2.480 GHz

Therefore; the BT/BLE Transmitter meets the SAR test exclusion criteria.

NOTE: This device is not capable of simultaneous transmission between the BT/BLE and WiFi transmitters.
Due to the nature of this device, WiFi and Bluetooth were evaluated for standalone SAR only.

NOTES to Table
Scaling of the Maximum Measured SAR is based on the highest Face, Body and/or Head SAR measured of ALL test channels, configurations and accessories used during THIS evaluation. The Measured Fluid Deviation parameters apply only to deviation of the tissue equivalent fluids used at the frequencies which produced the highest measured SAR. The Measured Conducted Power applies to the Conducted Power measured at the frequencies producing the highest Face, Body and/or Head SAR. The Measured Drift is the SAR drift associated with that specific SAR measurement. The Reported SAR is the accumulation of all SAR Adjustments from the applicable steps above. The Plot ID is for indentification of the SAR Measurement Plo(s) in the Annexes of this report. NOTE: Some of the scaling factors in Steps 1 through 4may not apply and are identified by grayed fields.
Step 1
Per IEC/IEEE 62209-1528, FCC KDB 865664, ISED RSS-102 and ISED Notice 2012-DRS0529 . Scaling required only when Measured Fluid Deviation is greater than 5%. If the Measured Fluid Deviation is greater than 5%, The above table will be shown and will indicate the SAR scaling factor in percent (%). SAR is MULTIPLIED by this scaling factor only when the scaling factor is positive (+).
Step 2
Per IEC/IEEE 62209-1528, FCC KDB 865664 and ISED RSS-102. Scaling required only when the difference (Delta) between the Measured Conducted Power and the Manufacturer's Rated Conducted Power is (-) Negative. The absolute value of Delta is ADDED to the SAR.
Step 3
Per IEC/IEEE 62209-1528, FCC KDB 865664 and ISED RSS-102. Scaling required only when Measured Drift is (-) Negative. The absolute value of Measured Drift is added to Reported.
Step 4
Per IEC/IEEE 62209-1528, FCC KDB 865664 and ISED RSS-102. When the transmit Duty Cyle (DC) is less than 100%, the *reported* SAR must be scaled to 100% by the Crest Factor (CF). CF = 1/DC where DC is in decimal.
Step 5
The Reported SAR is the Maximum Final Adjusted SAR from the applicable steps above and are reported on the cover page of this report.

12.0 SAR EXPOSURE LIMITS

Table 12.0 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.			

13.0 DETAILS OF SAR EVALUATION

13.1 Day Log

DAY LOG								
Date	Ambient Temp (°C)	Fluid Temp (°C)	Relative Humidity (%)	Barometric Pressure (kPa)	Fluid Dielectric	SPC	Test	Task
26-Jun-2023	23.8	23.6	42%	101.6	X	X	X	2450MHz
27-Jun-2023	23.3	23.8	39%	101.0			X	2450MHz
28-Jun-2023	24.3	23.6	39%	101.3	X	X	X	5250MHz
28-Jun-2023	24.7	23.6	37%	101.1	X	X	X	5750MHz

*Per IEC/IEEE 62209-1528 Test Series was started within 24 hours and completed within 48 hours of Fluid Parameter Measurements

13.2 DUT Setup and Configuration

DUT Setup and Configuration

Overview

The Clarius HD3 series scanners are a portable handheld Medical and Veterinarian Ultrasound scanner which streams video data via WiFi to another WiFi connected device. The device is intended to be handheld by the operator while it is in contact with a patient. The WiFi transmitter ceases to transmit once the transducer is no longer in contact with the patient. Since both Extremity and Body RF exposures exist, both configurations were evaluated.

The Clarius HD3 series scanners are identical in all aspects of RF circuitry, RF Transmit Power, Transmit Antenna, physical size and form factor with the exception of the Ultrasound Transducer element. This variant, the PAL HD3 was evaluated in Extremity SAR evaluation and for Body SAR. Extremity SAR was evaluated on all surfaces of the device that may be in contact with the practioner while performing a scan procedure, e.g. Front, Back, Left Side, Right Side, Top . Body SAR was evaluated for the Tip that would be in contact with the patient during a scan procedure. The worst case channel configuration in the 2.4GHz, 5250MHz and 5750MHz were used for the Body SAR channel configuration. The device has a clip on plastic Fan, which is not intregal to the operation of the device. The Fan extends the device from the phantom and as the device could be used without the Fan, the PAL HD3 was tested without the Fan in the most conservative SAR evaluation - closest to the phantom.

The device was configured to transmit at its highest output power at 100% transmit duty cycle, as set in the test-mode firmware, on each of the test channels identified in the SAR test plan.

Since in all cases the 1g SAR was less 0.1W/kg, SAR Test reduction was applied to the SAR Test Plan and only the worst case configurations were investigated further.

13.3 DUT Positioning

DUT Positioning
Positioning
The DUT Positioner was securely fastened to the Phantom Platform. Registration marks were placed on the DUT and the Positioner to ensure consistent positioning of the DUT for each test evaluation.
FACE Configuration
This device is not intended to be held to the face and was not tested in the FACE configuration.
BODY Configuration
The DUT was 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 surface.
HEAD Configuration
This device is not intended to be held to the ear and was not tested in the HEAD configuration.
Limb Worn Configuration
The DUT was positioned with the back side directly against the phantom surface with the strap opened to allow direct contact or 0mm of the DUT and watch band to the phantom surface.
Hand-Held Extremity Configuration
The DUT was positioned directly against the phantom surface to allow direct contact or 0mm of the DUT to the phantom surface.

13.4 General Procedures and Report

General Procedures and Reporting
General Procedures
The fluid dielectric parameters of the Active Tissue Simulating Liquid (TSL) were measured as described in this Section, recorded and entered into the DASY Measurement Server. Active meaning the TSL used during the SAR evaluation of the DUT. The temperature of the Active TSL was measured and recorded prior to performing a System Performance Check (SPC). An SPC was performed with the Active TSL prior to the start of the test series. The temperature of the Active TSL was measured throughout the day and the Active TSL temperature was maintained to ± 0.5°C. The Active TSL temperature was maintained to within ±2.0°C throughout the test series. The liquid parameters shall be measured within 24 hours before the start of a test series and if it takes longer than 48 hours, the liquid parameters shall also be measured at the end of the test series. An Area Scan exceeding the length and width of the DUT projection was performed and the locations of all maximas within 2dB of the Peak SAR recorded. A Zoom Scan centered over the Peak SAR location(s) was performed and the 1g and 10g SAR values recorded. The resolutions of the Area Scan and Zoom Scan are described in the Scan Resolution table(s) in this Section. A Power Reference Measurement was taken at the phantom reference point immediately prior to the Area Scan. A Power Drift measurement was taken at the phantom reference point immediately following the Zoom Scan to determine the power drift. A Z-Scan from the *Maximum Distance to Phantom Surface* to the fluid surface was performed following the power drift measurement.
Reporting
The 1g SAR, 10g SAR and power drift measurements are recorded in the SAR Measurement Summary tables in the SAR Measurement Summary Section of this report. The SAR values shown in the 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. In the Scaling of Maximum Measured SAR Section of this report, the highest measured SAR in the BODY configuration, within the entire scope of this assessment, are, when applicable, scaled for Fluid Sensitivity, Manufacturer's Tune-Up Tolerance, Simultaneous Transmission and Drift. With the exception of Duty Cycle correction/compensation, SAR values are ONLY scaled up, not down. The final results of this scaling is the *reported SAR* which appears on the Cover Page of this report.

13.5 Fluid Dielectric and Systems Performance Check

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

13.6 Scan Resolution 100MHz to 2GHz

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

13.7 Scan Resolution 2GHz to 3GHz

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

13.8 Scan Resolution 5GHz to 6GHz

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

14.0 MEASUREMENT UNCERTAINTIES

Table 14.0 Measurement Uncertainty

Measurement uncertainty table is not required per KDB 865664 D01 v01r04 section 2.8.2 page 12. SAR measurement uncertainty analysis is required in SAR reports only when the highest measured SAR in a frequency band is ≥ 1.5 W/kg for 1-g SAR. The equivalent ratio (1.5/1.6) should be applied to extremity and occupational exposure conditions. The highest reported SAR value is less than 1.5W/kg. Therefore, he measurement uncertainty table is not required.

15.0 FLUID DIELECTRIC PARAMETERS

****** Note ******

For fluid parameters outside the +/- 5% tolerance, SAR was adjusted in accordance with the Fluid Sensitivity requirements of IEC 62209-1528. See Section 11.0.

Table 15.1 Fluid Dielectric Parameters 2450MHz HEAD TSL

****
Aprel Laboratory
Test Result for UIM Dielectric Parameter
Mon 26/Jun/2023 10:59:54
Freq Frequency(GHz)
FCC_eH FCC OET 65 Supplement C (June 2001) Limits for Head Epsilon
FCC_sH FCC OET 65 Supplement C (June 2001) Limits for Head Sigma
IEC/IEEE 62209-1528 Table 2
Test_e Epsilon of UIM
Test_s Sigma of UIM
****

Freq	FCC_eH	FCC_sH	Test_e	Test_s
2.4300	39.24	1.78	36.13	1.85
2.4400	39.22	1.79	36.04	1.85
2.4500	39.20	1.80	36.31	1.90

FLUID DIELECTRIC PARAMETERS								Fluid Sensitivity Calculation IEC/IEEE 62209-1528 7.8.2			
Date: 26-Jun-2023		Fluid Temp: 23.6		Frequency: 2450MHz		Tissue: Head		ΔSAR	ΔSAR	SAR Correction Factor (1)	
Freq (MHz)		Test ε	Test σ (S/m)	Target ε	Target σ (S/m)	Deviation Permittivity	Deviation Conductivity	1g	10g	1g	10g
2430.0000		36.1300	1.8500	39.2400	1.78	-7.93%	3.93%	0.037	0.023	1.000	1.000
2437.0000	*	36.0670	1.8500	39.2260	1.79	-8.05%	3.53%	0.035	0.022	1.000	1.000
2440.0000		36.0400	1.8500	39.2200	1.79	-8.11%	3.35%	0.034	0.022	1.000	1.000
2450.0000		36.3100	1.9000	39.2000	1.80	-7.37%	5.56%	0.043	0.026	1.000	1.000

*Channel Frequency Tested

Table 15.2 Fluid Dielectric Parameters 5250MHz HEAD TSL

****
Aprel Laboratory
Test Result for UIM Dielectric Parameter
Wed 28/Jun/2023 11:21:47
Freq Frequency(GHz)
FCC_eH FCC OET 65 Supplement C (June 2001) Limits for Head Epsilon
FCC_sH FCC OET 65 Supplement C (June 2001) Limits for Head Sigma
IEC/IEEE 62209-1528 Table 2
Test_e Epsilon of UIM
Test_s Sigma of UIM
****

Freq	FCC_eH	FCC_sH	Test_e	Test_s
5.2000	35.99	4.65	32.80	4.95
5.2500	35.93	4.71	32.64	5.03

FLUID DIELECTRIC PARAMETERS								Fluid Sensitivity Calculation IEC/IEEE 62209-1528 7.8.2			
Date: 28-Jun-2023		Fluid Temp: 23.6		Frequency: 5250MHz		Tissue: Head		ΔSAR	ΔSAR	SAR Correction Factor (1)	
Freq (MHz)		Test ε	Test σ (S/m)	Target ε	Target σ (S/m)	Deviation Permittivity	Deviation Conductivity	1g	10g	1g	10g
5200.0000	*	32.8000	4.9500	35.9900	4.65	-8.86%	6.45%	0.016	0.019	1.000	1.000
5250.0000		32.6400	5.0300	35.9300	4.71	-9.16%	6.79%	0.016	0.020	1.000	1.000

*Channel Frequency Tested

Table 15.3 Fluid Dielectric Parameters 5750MHz HEAD TSL

****
Aprel Laboratory
Test Result for UIM Dielectric Parameter
Wed 28/Jun/2023 11:34:15
Freq Frequency(GHz)
FCC_eH FCC OET 65 Supplement C (June 2001) Limits for Head Epsilon
FCC_sH FCC OET 65 Supplement C (June 2001) Limits for Head Sigma
IEC/IEEE 62209-1528 Table 2
Test_e Epsilon of UIM
Test_s Sigma of UIM
****

Freq	FCC_eH	FCC_sH	Test_e	Test_s
5.7500	35.36	5.22	32.18	5.64
5.8200	35.28	5.29	32.31	5.76
5.8300	35.27	5.30	32.06	5.70

29 FLUID DIELECTRIC PARAMETERS								Fluid Sensitivity Calculation IEC/IEEE 62209-1528 7.8.2			
Date: 28-Jun-2023		Fluid Temp: 23.7		Frequency: 5750MHz		Tissue: Head		ΔSAR	ΔSAR	SAR Correction Factor (1)	
Freq (MHz)		Test ε	Test σ (S/m)	Target ε	Target σ (S/m)	Deviation Permittivity	Deviation Conductivity	1g	10g	1g	10g
5750.0000		32.1800	5.6400	35.3600	5.22	-8.99%	8.05%	0.014	0.020	1.000	1.000
5820.0000		32.3100	5.7600	35.2800	5.29	-8.42%	8.88%	0.013	0.019	1.000	1.000
5825.0000	*	32.1850	5.7300	35.2750	5.30	-8.76%	8.22%	0.014	0.020	1.000	1.000
5830.0000		32.0600	5.7000	35.2700	5.30	-9.10%	7.55%	0.015	0.021	1.000	1.000

*Channel Frequency Tested

16.0 SYSTEM VERIFICATION TEST RESULTS

Table 16.1 System Verification Results 2450MHz HEAD TSL

System Verification Test Results					
Date		Frequency (MHz)	Validation Source		
			P/N		S/N
26-Jun-2023		2450	D2450V2		825
Fluid Type	Fluid Temp °C	Ambient Temp °C	Ambient Humidity (%)	Forward Power (mW)	Source Spacing (mm)
Head	23.6	24	42%	250	10
Fluid Parameters					
Permittivity			Conductivity		
Measured	Target	Deviation	Measured	Target	Deviation
36.31	39.20	-7.37%	1.90	1.80	5.56%
Measured SAR					
1 gram			10 gram		
Measured	Target	Deviation	Measured	Target	Deviation
13.00	13.18	-1.37%	5.88	6.01	-2.08%
Measured SAR Normalized to 1.0W					
1 gram			10 gram		
Normalized	Target	Deviation	Normalized	Target	Deviation
52.00	52.72	-1.36%	23.52	24.02	-2.06%

Prior to the SAR evaluations, system checks were performed on the planar section of the phantom and a SPEAG validation dipole in accordance with the procedures described in IEC/IEEE 62209-1528 and FCC KDB 846224,

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

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

The forward power applied was same forward power applied by the calibration lab during the calibration of this validation source.

Table 16.2 System Verification Results 5250MHz HEAD TSL

System Verification Test Results					
Date		Frequency (MHz)	Validation Source		
			P/N		S/N
28-Jun-2023		5250	D5GHzV2		1031
Fluid Type	Fluid Temp °C	Ambient Temp °C	Ambient Humidity (%)	Forward Power (mW)	Source Spacing (mm)
Head	23.6	24	39%	50	10
Fluid Parameters					
Permittivity			Conductivity		
Measured	Target	Deviation	Measured	Target	Deviation
32.64	35.93	-9.16%	5.03	4.71	6.79%
Measured SAR					
1 gram			10 gram		
Measured	Target	Deviation	Measured	Target	Deviation
3.77	3.97	-5.12%	1.09	1.15	-4.85%
Measured SAR Normalized to 1.0W					
1 gram			10 gram		
Normalized	Target	Deviation	Normalized	Target	Deviation
75.40	79.47	-5.12%	21.80	22.91	-4.85%

Prior to the SAR evaluations, system checks were performed on the planar section of the phantom and a SPEAG validation dipole in accordance with the procedures described in IEC/IEEE 62209-1528 and FCC KDB 846224,

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

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

The forward power applied was same forward power applied by the calibration lab during the calibration of this validation source.

Table 16.3 System Verification Results 5750MHz HEAD TSL

System Verification Test Results					
Date		Frequency (MHz)	Validation Source		
			P/N		S/N
28-Jun-2023		5750	D5GHzV2		1031
Fluid Type	Fluid Temp °C	Ambient Temp °C	Ambient Humidity (%)	Forward Power (mW)	Source Spacing (mm)
Head	23.6	25	37%	50	10
Fluid Parameters					
Permittivity			Conductivity		
Measured	Target	Deviation	Measured	Target	Deviation
32.18	35.36	-8.99%	5.64	5.22	8.05%
Measured SAR					
1 gram			10 gram		
Measured	Target	Deviation	Measured	Target	Deviation
3.86	3.78	2.20%	1.10	1.10	-0.05%
Measured SAR Normalized to 1.0W					
1 gram			10 gram		
Normalized	Target	Deviation	Normalized	Target	Deviation
77.20	75.54	2.20%	22.00	22.01	-0.05%

Prior to the SAR evaluations, system checks were performed on the planar section of the phantom and a SPEAG validation dipole in accordance with the procedures described in IEC/IEEE 62209-1528 and FCC KDB 846224,

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

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

The forward power applied was same forward power applied by the calibration lab during the calibration of this validation source.

17.0 SYSTEM VALIDATION SUMMARY

Table 17.1 System Validation Summary

System Validation Summary									
Frequency (MHz)	Validation Date	Probe Model	Probe S/N	Validation Source	Source S/N	Tissue	Validation Results		
							Sensitivity	Linearity	Isotropy
2450	21-Jun-23	EX3DV4	7826	D2450V2	825	Head	Pass	Pass	Pass
5250	28-Jun-23	EX3DV4	7826	D5GHzV2	1031	Head	Pass	Pass	Pass
5750	29-Jun-23	EX3DV4	7826	D5GHzV2	1031	Head	Pass	Pass	Pass

18.0 MEASUREMENT SYSTEM SPECIFICATIONS

Table 18.1 Measurement System Specifications

Measurement System Specification	
Specifications	
Positioner	Stäubli Unimation Corp. Robot Model: TX90XL
Repeatability	+/- 0.035 mm
No. of axis	6.0
Data Acquisition Electronic (DAE) System	
Cell Controller	
Processor	Intel(R) Core(TM) i7-7700
Clock Speed	3.60 GHz
Operating System	Windows 10 Professional
Data Converter	
Features	Signal Amplifier, multiplexer, A/D converter, and control logic
Software	Measurement Software: DASY6, V 6.4.0.12171 / DASY52 V10.2(1504)
	Postprocessing Software: SEMCAD X, V14.6.12(7470)
Connecting Lines	Optical downlink for data and status info., Optical uplink for commands and clock
DASY Measurement Server	
Function	Real-time data evaluation for field measurements and surface detection
Hardware	Intel ULV Celeron CPU 400 MHz; 128 MB chip disk; 128 MB RAM
Connections	COM1, COM2, DAE, Robot, Ethernet, Service Interface
E-Field Probe	
Model	EX3DV4
Serial No.	7826
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 (bottom plate)
Volume	> 30 Liter
Phantom	
Type	SAM Phantom
Shell Material	Fiberglass
Thickness	2mm +/- .2mm (6 ± 0.2 mm at ear point)
Volume	> 25 Liter
Phantom	
Type	MFP Planar Phantom
Shell Material	Fiberglass
Thickness	2mm +/- .2mm (bottom plate)
Volume	> 8 Liter

Table 18.1

Measurement System Specification (Continued)

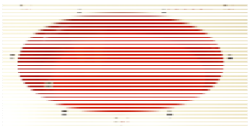
Probe Specification

Construction:	Symmetrical design with triangular core; Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents (e.g. DGBE)
Calibration:	ISO/IEC 17025
Frequency:	4 MHz - 10 GHz; Linearity: ± 0.2 dB (30 MHz - 10 GHz)
Directivity:	± 0.1 dB in TSL (rotation around probe axis) ± 0.3 dB in TSL (rotation normal to probe axis)
Dynamic Range:	10 µW/g to > 100 mW/g; Linearity: ± 0.2 dB (noise: typically <1 mW/g)
Dimensions:	Overall length: 337 mm; (tip: 20 mm) Tip diameter: 2.5 mm; Tip (body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm
Application:	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields); the only probe that enables compliance testing for frequencies up to 6 GHz with precision of better than 30%

EX3DV4 E-Field Probe

Phantom Specification

The ELI V5.0 phantom is an elliptical planar fiberglass shell phantom with a shell thickness of 2.0mm +/- .2mm at the planar area. This phantom conforms to OET Bulletin 65, Supplement C, IEC\IEEE 62209-1528.



ELI Phantom

Phantom Specification

The SAM V4.0 phantom is a flat planar fiberglass shell phantom with a shell thickness of 2.0mm +/- .2mm at the planar area. This phantom conforms to OET Bulletin 65, Supplement C, IEC\IEEE 62209-1528.

SAM Phantom

Phantom Specification

The MFP V5.1C phantom is a flat planar fiberglass shell phantom with a shell thickness of 2.0mm +/- .2mm at the planar area. This phantom conforms to OET Bulletin 65, Supplement C, IEC\IEEE 62209-1528.

MFP Phantom

Device Positioner Specification

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

Device Positioner

19.0 TEST EQUIPMENT LIST

Table 19.1 Equipment List and Calibration

Test Equipment List				
DESCRIPTION	ASSET NO.	SERIAL NO.	DATE CALIBRATED	CALIBRATION DUE
Schmid & Partner DASY 6 System	-	-	-	-
-DASY Measurement Server	00158	1078	CNR	CNR
-Robot	00046	599396-01	CNR	CNR
-DAE4	00019	353	18-Apr-23	18-Apr-24
-EX3DV4 E-Field Probe	00213	3600	20-Apr-22	20-Apr-25
-D2450V2 Validation Dipole	00219	825	27-Apr-21	27-Apr-24
-D5GHzV2 Validation Dipole	00126	1031	27-Apr-21	27-Apr-24
ELI Phantom	00247	1234	CNR	CNR
SAM Phantom	00154	1033	CNR	CNR
MFP Phantom	00355	1177/2	CNR	CNR
HP 85070C Dielectric Probe Kit	00033	none	CNR	CNR
Gigatronics 8652A Power Meter	00007	1835801	13-May-22	13-May-25
Gigatronics 80701A Power Sensor	00186	1837002	COU	COU
Gigatronics 80334A Power Sensor	00237	1837001	13-May-22	13-May-25
HP 8753ET Network Analyzer	00134	US39170292	6-Jan-21	6-Jan-24
Rohde & Schwarz SMR20 Signal Generator	00006	100104	11-Aug-20	11-Aug-23
Amplifier Research 10W1000C Power Amplifier	00041	27887	CNR	CNR
Amplifier Research 5S1G4 Power Amplifier	00106	26235	CNR	CNR
Narda Directional Coupler 3020A	00064	-	CNR	CNR
Bipolar Power Supply 6299A	00086	1144A02155	CNR	CNR
DC-18G 10W 30db Attenuator	00102	-	COU	COU
R&S FSP40 Spectrum Analyzer	00241	100500	10-Aug-21	10-Aug-24
RF Cable-SMA	00311	-	CNR	CNR
HP Calibration Kit	00145	-	CNR	CNR

CNR = Calibration Not Required

COU = Calibrate on Use

Note: Per KDB 865664, Dipoles are evaluated annually for return loss and impedance. The dipole's SAR target can only be assessed by the SAR equipment manufacturer and remains the target until the dipole is recalibrated by the manufacturer. The dipole's SAR is evaluated and compared to this target during each and every System Verification which is performed prior to and/or during each DUT SAR evaluation. The results of these verifications are shown in Section 16.0

20.0 FLUID COMPOSITION

Table 20.0 Fluid Composition 2450MHz HEAD TSL

Table 20.0			2450MHz Head	
Tissue Simulating Liquid (TSL) Composition				
Component by Percent Weight				
Water	Glycol	Salt(1)	HEC(2)	Bacteriacide(3)
52.0	48.0	0.0	0.0	0.0

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

Table 20.1 Fluid Composition 5Ghz HEAD TSL

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

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

APPENDIX A – SYSTEM VERIFICATION PLOTS

DUT: Dipole 2450 MHz D2450V2; Type: D2450V2; Serial: D2450V2 - SN:825
Procedure Name: SPC 2450H_Input=250mw, Target=[11.86]13.18][14.50]W/kg 2 2

Communication System: UID 0, CW (0); Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.9 S/m; ε_r = 36.31; ρ = 1000 kg/m^3
Phantom section: Left Section

Date/Time: 6/26/2023 11:33:24 AM

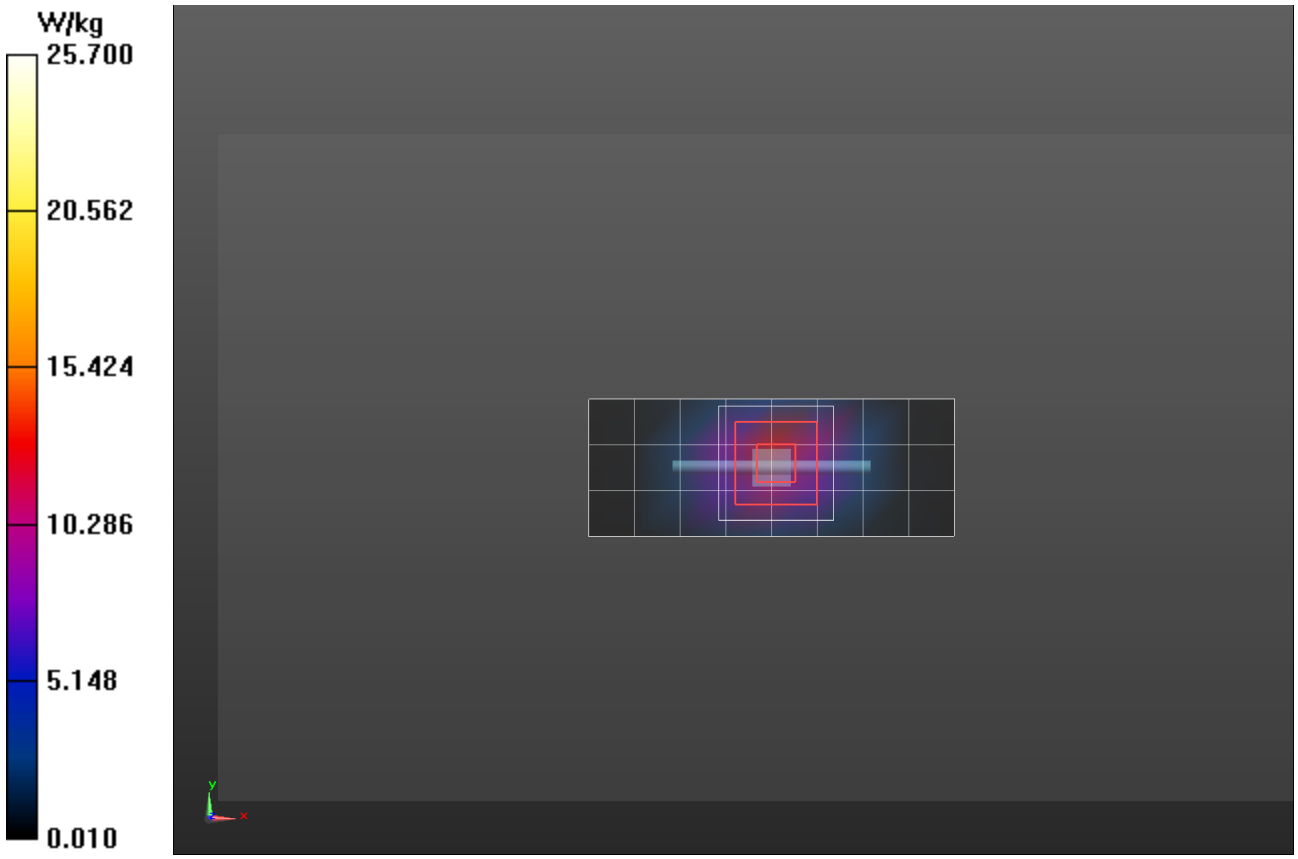
DASY5 Configuration:

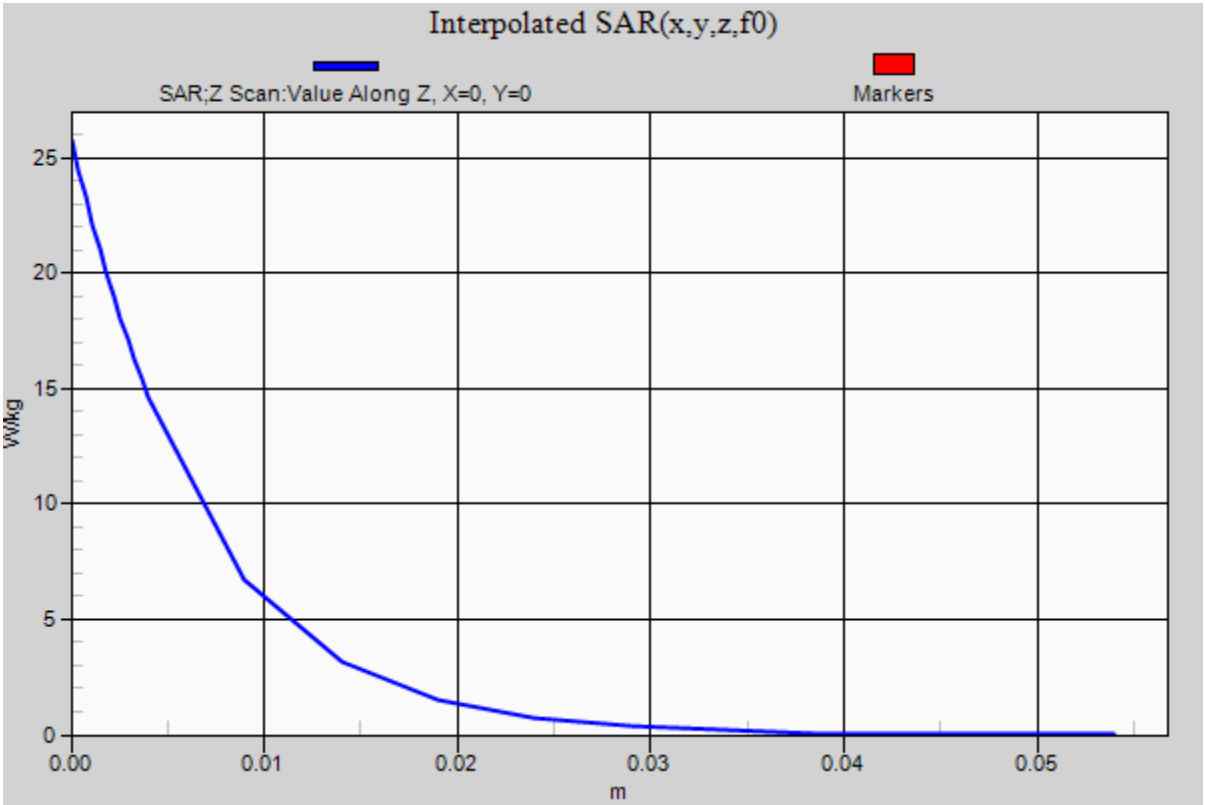
- Probe: EX3DV4 - SN7826; ConvF(7.91, 7.42, 7.62) @ 2450 MHz; Calibrated: 5/16/2023
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 4/18/2023
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: xxxx
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

SPC/SPC 2450H_Input=250mw, Target=[11.86]13.18][14.50]W/kg 2 2/Area Scan (9x4x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 12.8 W/kg

SPC/SPC 2450H_Input=250mw, Target=[11.86]13.18][14.50]W/kg 2 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 88.04 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 28.7 W/kg
SAR(1 g) = 13 W/kg; SAR(10 g) = 5.88 W/kg
Smallest distance from peaks to all points 3 dB below = 10.4 mm
Ratio of SAR at M2 to SAR at M1 = 46%
Maximum value of SAR (measured) = 14.8 W/kg

SPC/SPC 2450H_Input=250mw, Target=[11.86]13.18][14.50]W/kg 2 2/Z Scan (1x1x22): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Penetration depth = 6.670 (6.477, 6.737) [mm]
Maximum value of SAR (interpolated) = 25.7 W/kg


W/kg
25.700
20.562
15.424
10.286
5.148
0.010


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

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1031
Procedure Name: SPC 5250H Input=47 mw, Target= [3.36[3.74][4.11] Target=79.47W/kg@1000mw 3 2 2

Communication System: UID 0, CW (0); Frequency: 5250 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5250 MHz; σ = 5.03 S/m; ε_r = 32.64; ρ = 1000 kg/m^3
Phantom section: Left Section

Date/Time: 6/28/2023 12:54:27 PM

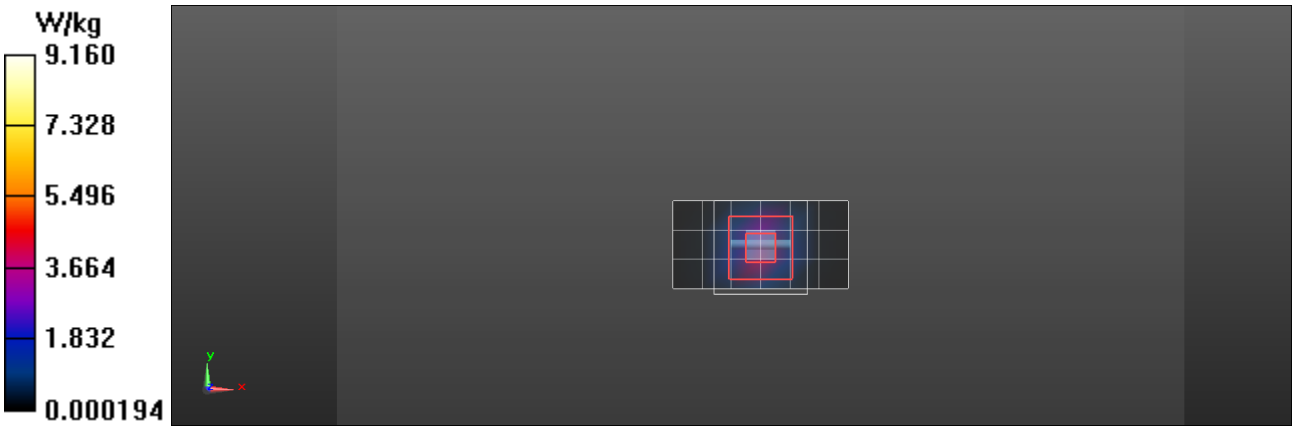
DASY5 Configuration:

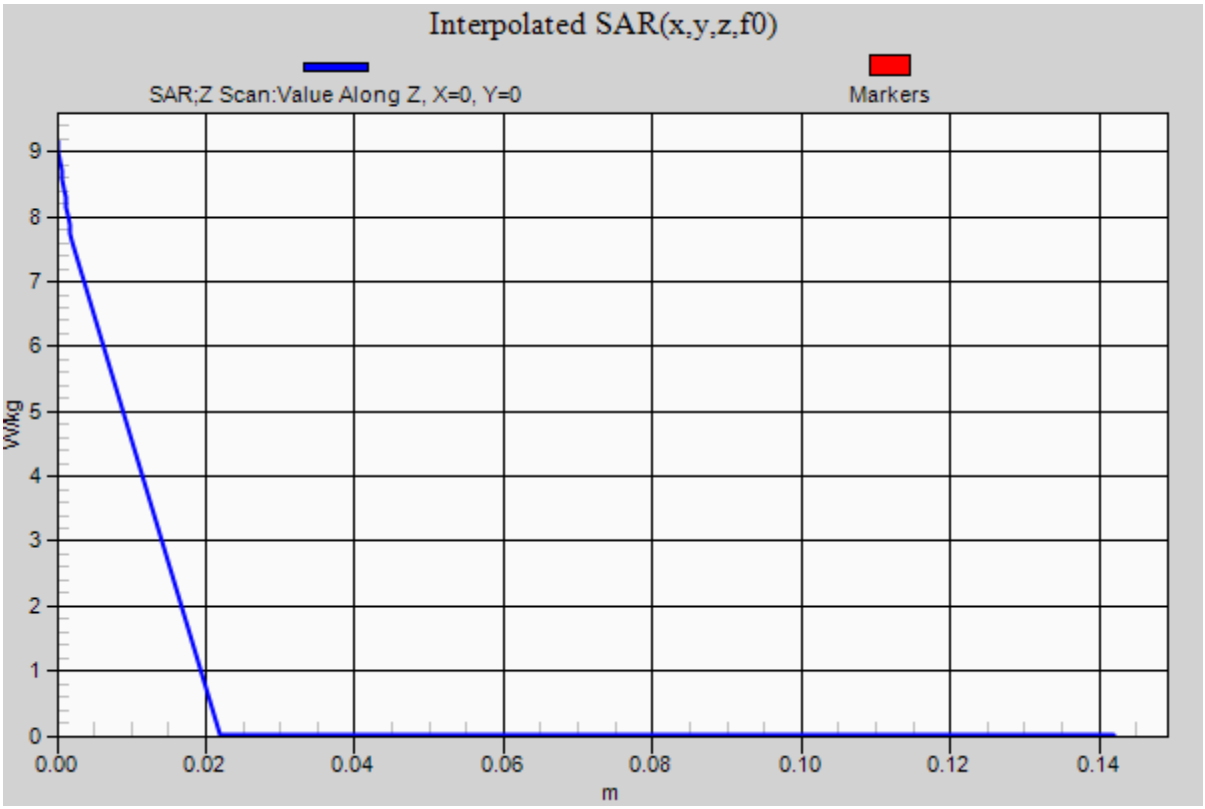
- Probe: EX3DV4 - SN7826; ConvF(5.59, 5.24, 5.42) @ 5250 MHz; Calibrated: 5/16/2023
- Sensor-Surface: 4mm (Mechanical Surface Detection), Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 4/18/2023
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: xxxx
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

SPC/SPC 5250H Input=47 mw, Target= [3.36[3.74][4.11] Target=79.47W/kg@1000mw 3 2 2/Area Scan (7x4x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 3.82 W/kg

SPC/SPC 5250H Input=47 mw, Target= [3.36[3.74][4.11] Target=79.47W/kg@1000mw 3 2 2/Zoom Scan (9x9x6)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 28.52 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 15.9 W/kg
SAR(1 g) = 3.77 W/kg; SAR(10 g) = 1.09 W/kg
Smallest distance from peaks to all points 3 dB below = 7.4 mm
Ratio of SAR at M2 to SAR at M1 = 53.3%
Maximum value of SAR (measured) = 7.93 W/kg

SPC/SPC 5250H Input=47 mw, Target= [3.36[3.74][4.11] Target=79.47W/kg@1000mw 3 2 2/Z Scan (1x1x19): Measurement grid: dx=20mm, dy=20mm, dz=20mm
Penetration depth = n/a (n/a, 2.978) [mm]
Maximum value of SAR (interpolated) = 9.16 W/kg





DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1031
Procedure Name: SPC 5750H Input=50mw, Target=[3.40][3.78][4.16], Target=75.54W/kg@1000 mw 2 2 2

Communication System: UID 0, CW (0); Frequency: 5750 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5750 MHz; σ = 5.64 S/m; ε_r = 32.18; ρ = 1000 kg/m^3
Phantom section: Left Section

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DASY5 Configuration:

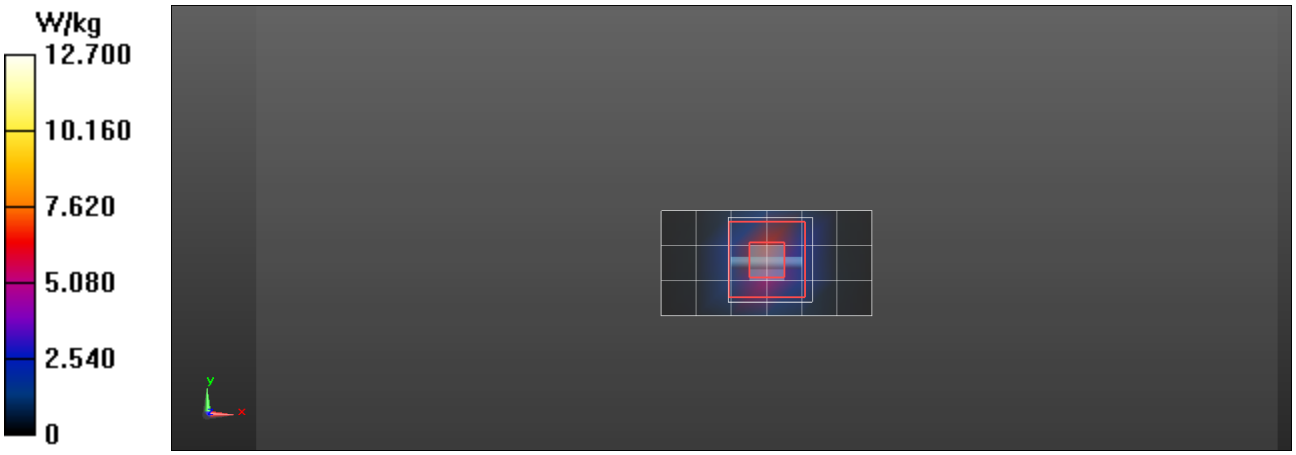
- Probe: EX3DV4 - SN7826; ConvF(5.14, 4.73, 4.93) @ 5750 MHz; Calibrated: 5/16/2023
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 4/18/2023
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: xxxx
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

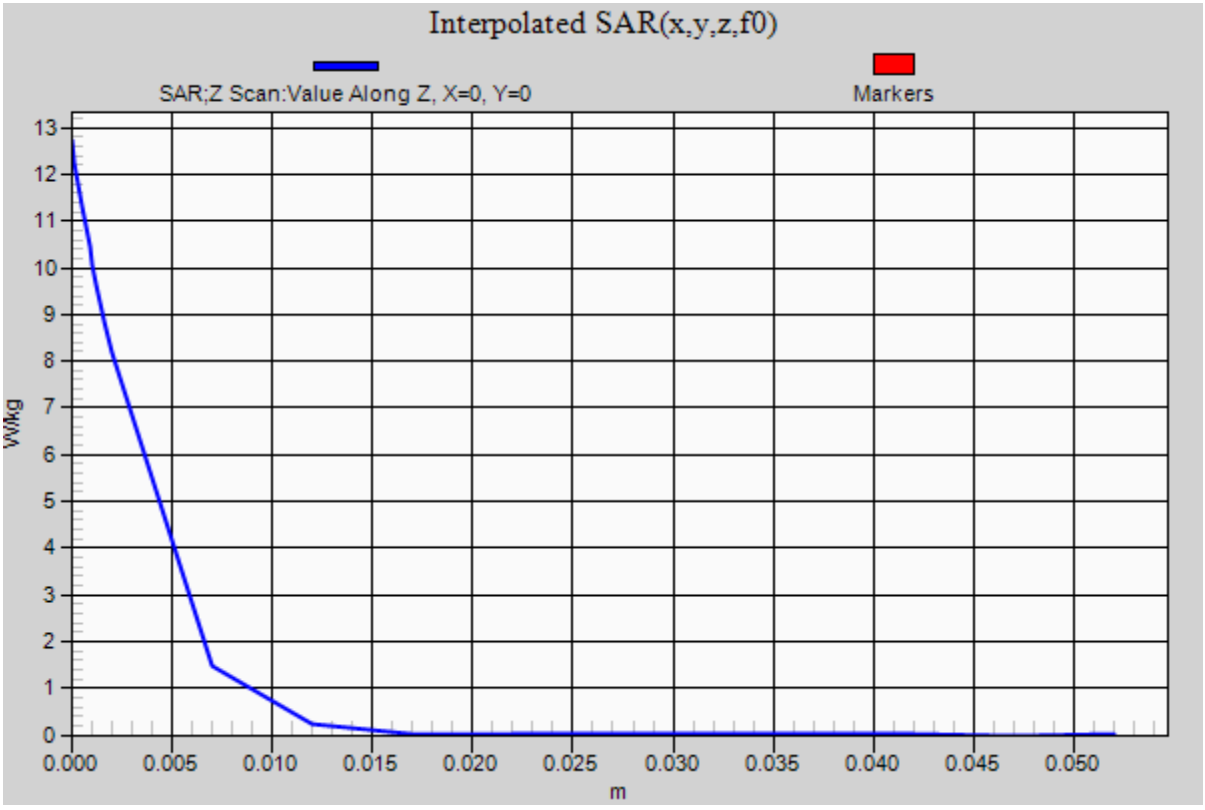
SPC/SPC 5750H Input=50mw, Target=[3.40][3.78][4.16], Target=75.54W/kg@1000 mw 2 2 2/Area Scan (7x4x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 6.53 W/kg

SPC/SPC 5750H Input=50mw, Target=[3.40][3.78][4.16], Target=75.54W/kg@1000 mw 2 2 2/Zoom Scan (7x7x6)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 26.72 V/m; Power Drift = 0.19 dB
Peak SAR (extrapolated) = 18.2 W/kg
SAR(1 g) = 3.86 W/kg; SAR(10 g) = 1.1 W/kg
Smallest distance from peaks to all points 3 dB below = 7.4 mm
Ratio of SAR at M2 to SAR at M1 = 49.9%

Maximum value of SAR (measured) = 8.34 W/kg

SPC/SPC 5750H Input=50mw, Target=[3.40][3.78][4.16], Target=75.54W/kg@1000 mw 2 2 2/Z Scan (1x1x22): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Penetration depth = 2.825 (2.938, 2.798) [mm]
Maximum value of SAR (interpolated) = 12.7 W/kg





APPENDIX B – MEASUREMENT PLOTS OF MAXIMUM MEASURED SAR

E101

DUT: PAL HD3; Type: Transmitter;
Procedure Name: E101 [PAL HD3] 2.4G WiFi -Back, Ch 6 (2437MHz)

Communication System: UID 0, CW (0); Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.85 S/m; ε_r = 36.067; ρ = 1000 kg/m^3
Phantom section: Left Section

Date/Time: 6/27/2023 11:05:38 AM

DASY5 Configuration:

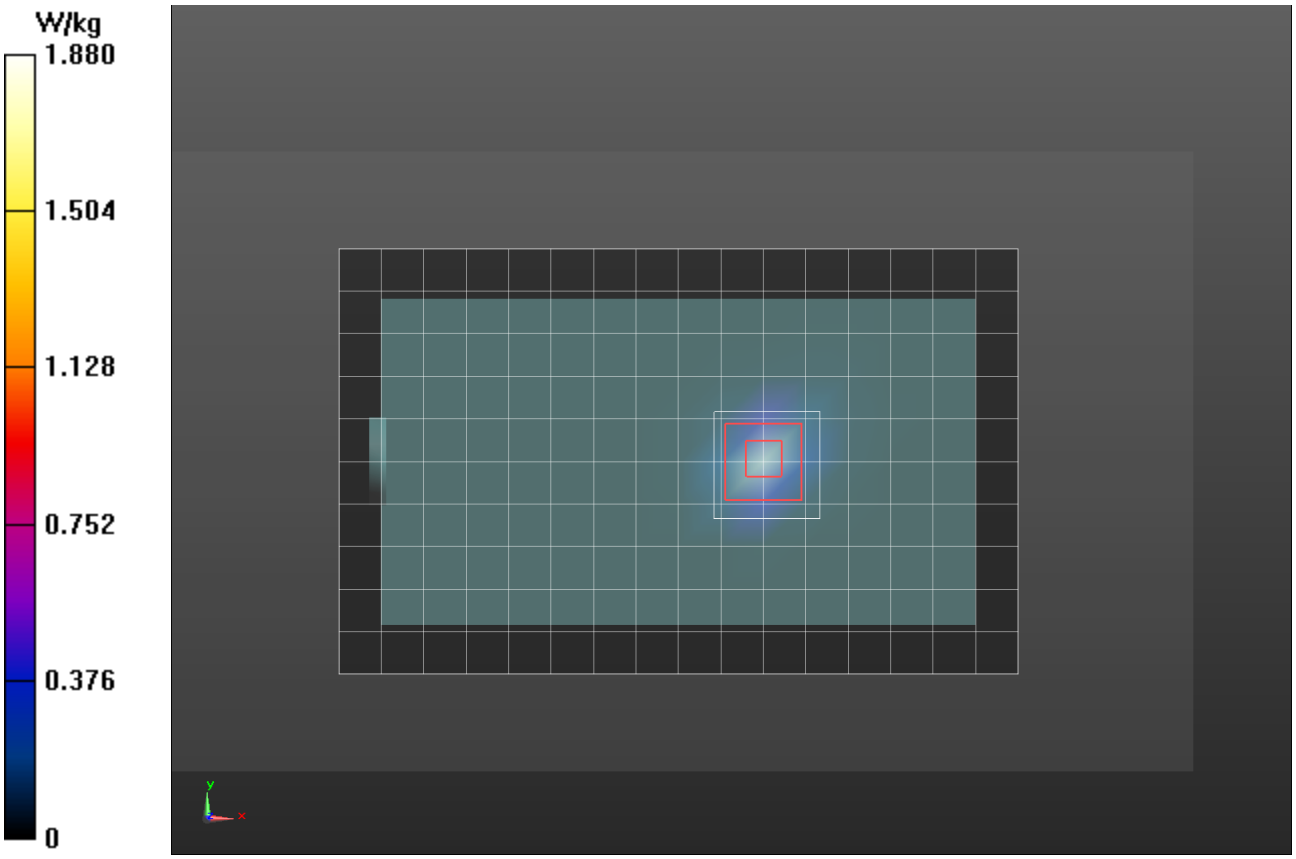
- Probe: EX3DV4 - SN7826; ConvF(7.91, 7.42, 7.62) @ 2437 MHz; Calibrated: 5/16/2023
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 4/18/2023
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx;
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

2450 H/E101 [PAL HD3] 2.4G WiFi -Back, Ch 6 (2437MHz)/Area Scan (17x11x1): Measurement grid: dx=12mm, dy=12mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.88 W/kg

2450 H/E101 [PAL HD3] 2.4G WiFi -Back, Ch 6 (2437MHz)/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=4mm
Reference Value = 2.937 V/m; Power Drift = 1.37 dB
Peak SAR (extrapolated) = 4.40 W/kg
SAR(1 g) = 1.36 W/kg; SAR(10 g) = 0.412 W/kg
Smallest distance from peaks to all points 3 dB below = 5.8 mm
Ratio of SAR at M2 to SAR at M1 = 47.5%

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.60 W/kg



E105

DUT: PAL HD3; Type: Transmitter;
Procedure Name: E105 [PAL HD3] 5G WiFi -Back, Ch40 (5200MHz)

Communication System: UID 0, CW (0); Frequency: 5200 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5200 MHz; σ = 4.95 S/m; ε_r = 32.8; ρ = 1000 kg/m^3
Phantom section: Left Section

Date/Time: 6/28/2023 2:56:54 PM

DASY5 Configuration:

- Probe: EX3DV4 - SN7826; ConvF(5.59, 5.24, 5.42) @ 5200 MHz; Calibrated: 5/16/2023
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 4/18/2023
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx;
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

5250 H/E105 [PAL HD3] 5G WiFi -Back, Ch40 (5200MHz)/Area Scan (19x11x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 1.76 W/kg

5250 H/E105 [PAL HD3] 5G WiFi -Back, Ch40 (5200MHz)/Zoom Scan (6x6x6)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=2mm
Reference Value = 2.375 V/m; Power Drift = 1.85 dB
Peak SAR (extrapolated) = 4.38 W/kg
SAR(1 g) = 1.16 W/kg; SAR(10 g) = 0.277 W/kg
Smallest distance from peaks to all points 3 dB below = 4.2 mm
Ratio of SAR at M2 to SAR at M1 = 53.5%

Maximum value of SAR (measured) = 1.48 W/kg

5250 H/E105 [PAL HD3] 5G WiFi -Back, Ch40 (5200MHz)/Z Scan (1x1x22): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Penetration depth = 2.533 (2.624, 2.019) [mm]
Maximum value of SAR (interpolated) = 3.39 W/kg