Celltech
Testing and Engineering Services Lab

Test Report Serial Number:	45461636 R3.0
Test Report Date:	22 March 2022
Project Number:	1576

SAR Test Report - New Filing

Applicant:

Group PRESIDENT ELECTRONICS USA

President Electonics USA
1007 Collier Center Way
Naples, FL 341100
USA

Maximum *reported* 1g SAR		
HEAD:	0.14	W/kg
BODY:	0.23	
General Pop. Limit:	1.60	

FCC ID: **2AEOCPC209**

IC Registration Number:

Product Model Number / HVIN: **RANDY II FCC**

Product Name / PMN: **RANDY II FCC**

In Accordance With:

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

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

Approved By:

Ben Hewson, President
Celltech Labs Inc.
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Canada

ilac-MRA ACCREDITED
Test Lab Certificate: 2470.01

Industry Canada
IC Registration 3874A

FC
FCC Registration: 714830

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1.0 DOCUMENT CONTROL

Revision History			
Samples Tested By:	Trevor Whillock	**Date(s) of Evaluation:**	21 - 23 December, 2020
Samples Tested By:	Ben Hewson	**Date(s) of Evaluation:**	13 October 2021
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	Art Voss	28 February 2022
1.0	Initial Release	n/a	Art Voss	2 March 2022
2.0	Corrected Header Table 10.2	10.0	Art Voss	4 March 2022
3.0	Revised RF Exposure Requirements	3.0	Art Voss	22 March 2022

2.0 CLIENT AND DEVICE INFORMATION

Client Information		
Applicant Name (FCC)	**President Electronics USA**	
Applicant Address (FCC)	1007 Collier Center Way	
	Naples, FL, 34110	
	USA	
DUT Information		
Device Identifier(s):	**FCC ID:**	**2AEOCPC209**
	IC ID:	
Device Type:	Portable Handheld & Mobile AM/FM CBRS Transceiver	
Device Model(s) / HVIN:	RANDY II FCC	
Device Marketing Name / PMN:	RANDY II FCC	
Firmware Version ID Number / FVIN:	-	
Host Marketing Name / HMN:	-	
Test Sample Serial No.:	T/A Sample #1	
Equipment Class (FCC):	Licensed Non-Broadcast Transmitter Held to Face (TNF)	
Transmit Frequency Range:	26.965 - 27.405 MHz	
Test Channels:	40	
Manuf. Max. Rated Output Power:	1W & 4W, (30dBm & 36dBm)	
Manuf. Max. Rated BW/Data Rate:	8.0kHz	
Antenna Make and Model:	Detachable Flex or External Whip	
Antenna Type and Gain:	0dBi Typical, 3dBi Max	
Modulation:	AM, FM	
Mode:	Simplex	
DUT Power Source:	7.4VDC Rechargeable Li-Ion	
DUT Dimensions [HxWxD] (mm)	152 x 66.5 x 37	
Deviation(s) from standard/procedure:	None	
Modification of DUT:	None	

3.0 SCOPE OF EVALUATION

Preface:

This Certification Report was prepared on behalf of:

President Electronics USA

,(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.

Device:

The RANDY II FCC is Portable Handheld and Mobile 1W/4W, AM or FM CBRS transceiver. With a detachable antenna, it can be configured as a stand-alone portable handheld device or connected to an external vehicular mounted antenna for mobile applications. This *Equipment* can transmit at a user configurable 1W or 4W transmitter power. The RANDY II FCC is identical in all respects to the RANDY FCC (AM only), FCC ID: 2AEOCPC207 with the exception that the FM transceiver section of the RANDY FCC was not enable for North American operation. The RANDY FCC was evaluated for EMC and SAR in December of 2020 and the results of those evaluations are incorporated into the EMC and SAR reports for this filing. The RANDY II FCC is also identical in all respects to the RANDY III (AM and FM) which is the European variant. The RANDY III was evaluated for SAR in October 2021 and the results of that evaluation appear in the SAR report for this filing.

Certification Requirement:

In accordance with FCC 47 CFR Part 2, Subpart J, this *Equipment* is subject to certification to FCC 47 CFR Part 95, Subpart D. In addition, this *Equipment* is subject to a Suppliers Declaration of Conformity (SDoC) in accordance with FCC 47 CFR §15.101.

RF Exposure Requirement:

The *Equipment* capable of operating as a Portable or as a Mobile device. The *Equipment* is supplied with a detachable TNC whip antenna as well as a TNC to UHF adapter for connection to an external antenna. As per FCC 47 CFR §2.1091, §2.1093, RF Exposure evaluations (SAR - Portable, MPE - Mobile) are required for this *Equipment.* When the supplied whip antenna is used for portable applications, the requirements of this SAR report apply. When the *Equipment* is connected to an external antenna for mobile applications, the requirements of the accompanying MPE report apply. This *Equipment* is capable of Voice Activated Transmission (VOX), a 75% transmit duty factor applies.

Application:

This is an application for a new FCC certification.

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)
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 D01v07	Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies
FCC KDB	
KDB 643646 D01v01r03	SAR Test Reduction Considerations for Occupational PTT Radios
IEC International Standard /IEEE International Committee on Electromagnetic Safety	
IEC/IEEE 62209-1528-2020:	Measurement procudeure for the assessment of sepcific absorption rate of human expoure to radio frequency fields from hand-held and body-mounted wireless communication devices - Part 1528; Human models, insturmentation, and procedures (Frequency range of 4 MHz to 10 GHz)
* 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:	Model / HVIN:	
President Electronics USA	RANDY II FCC	
Standard(s) Applied:	**Measurement Procedure(s):**	
FCC 47 CFR §2.1093 Health Canada's Safety Code 6	FCC KDB 865664, FCC KDB 447498, Industry Canada RSS-102 Issue 5 IEEE Standard 1528-2013, IEC 62209-2, IEC/IEEE 62209-1528:2020	
Reason For Issue:	**Use Group:**	**Limits Applied:**
[X] New Certification	[x] General Population / Uncontrolled	[x] 1.6W/kg - 1g Volume
[ ] Class I Permissive Change		[ ] 8.0W/kg - 1g Volume
[ ] Class II Permissive Change	[ ] Occupational / Controlled	[ ] 4.0W/kg - 10g Volume
Reason for Change:		**Date(s) Evaluated:**
Original Filing		December 21-23, 2020 13 October 2021

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.

28 February 2022
Date

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 P1 (Lithium-ion Battery)

Conducted Power Measurement Results:								
Channel Number	Frequency (MHz)	Power Setting	Modulation	Measured Power [P_{Meas}] (dBm)	Measured Power [P_{Meas}] (dBmW	Limit [P_{Lim}] (dBm)	Limit [P_{Lim}] (W)	Margin (dB)
1	26.97	1W	AM	29.850	0.97	36	4.0	6.2
19	27.19			29.990	1.00			6.0
40	27.41			30.080	1.02			5.9
1	26.97		FM	29.530	0.90			6.5
19	27.19			29.710	0.94			6.3
40	27.41			29.940	0.99			6.1
1	26.97	4W	AM	35.300	3.39			0.7
19	27.19			35.460	3.52			0.5
40	27.41			35.540	3.58			0.5
1	26.97		FM	35.700	3.72			0.3
19	27.19			35.860	3.85			0.1
40	27.41			36.000	3.98			0.0
					Result:			Complies

Conducted Margin = P_{Limit} - P_{Meas}

*The rated power and tolerance are stated for typical transmission modes. Some modes may produce lower than rated conducted power levels. Power measurements taken across the various channels did not produce levels in excess of the Rated Power plus Tolerance. SAR was evaluated using AM and FM mode at the Maximum output power level setting and produced the most conservative SAR. The *reported* SAR was not scaled down.

NOTE: The above test data reflects conducted power measurement from the Conducted sample. The SAR test sample had slightly different conducted power values and are identified in the SAR Report Data.

8.0 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**

KDB 447498: $N_C = \text{RoundUp}\{[100(F_{HIGH} - F_{LOW})/Fc]^{0.5} \times (F_C/100)^{0.2}\}$

IEC 62209-1: $N_C = 2 \times \{\text{RoundUp}[10(F_{HIGH} - F_{LOW})/F_C]\} + 1$

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

9.0 ACCESSORIES EVALUATED

Table 9.1 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	–	Flexible Antenna	n/a	n/a	Y	Y
Battery Accessory						
P1	–	Lithium-ion Rechargeable Battery	n/a	n/a	Y	Y
P2	–	DC Pow er Supply w ith Litium-ion Rechargeable Battery	n/a	n/a	Y	Y
Body-Worn Accessory						
B1	–	Plastic Belt-Clip	n/a	n/a	Y	Y
Audio Accessory						
A1	–	Speaker-Microphone (Repersentative Sample)	n/a	n/a	Y	Y

10.0 SAR MEASUREMENT SUMMARY

Table 10.1: Measured Results – BODY

Measured SAR Results (1g) - BODY Configuration (FCC/ISED)														
Date	Plot ID	DUT Model	Test Frequency (*MHz*)	Modulation	Accessories: Antenna ID	Accessories: Battery ID	Accessories: Body ID	Accessories: Audio ID	DUT Spacing: DUT (*mm*)	DUT Spacing: Antenna (*mm*)	Conducted Power (*dBm*)	Measured SAR (10g): 100% DC (*W/kg*)	Measured SAR (10g): 75% DC (*W/kg*)	SAR* Drift (*dB*)
BODY														
22 DEC 2020	B1	RANDY II FCC	26.965	AM	T1	P1	B1	A1	0	39	35.37	0.029	0.022	-0.410
22 DEC 2020	B2	RANDY II FCC	27.185	AM	T1	P1	B1	A1	0	39	35.58	0.015	0.011	-1.200
22 DEC 2020	B3	RANDY II FCC	27.405	AM	T1	P1	B1	A1	0	39	35.64	0.017	0.013	-0.290
23 DEC 2020	B2	RANDY II FCC	27.185	AM	T1	P1	B1	A1	0	39	35.58	0.013	0.010	-0.030
13 Oct 2021	B5	RANDY II FCC	26.965	FM	T1	P1	B1	A1	0	39	35.37	0.240	0.180	-0.190
13 Oct 2021	B6	RANDY II FCC	27.405	FM	T1	P1	B1	A1	0	39	35.64	0.014	0.011	-0.420
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			

Table 10.2: Measured Results – FACE

Measured SAR Results (1g) - FACE Configuration (FCC/ISED)														
Date	Plot ID	DUT Model	Test Frequency (*MHz*)	Modulation	Accessories: Antenna ID	Accessories: Battery ID	Accessories: Body ID	Accessories: Audio ID	DUT Spacing: DUT (*mm*)	DUT Spacing: Antenna (*mm*)	Conducted Power (*dBm*)	Measured SAR (10g): 100% DC (*W/kg*)	Measured SAR (10g): 75% DC (*W/kg*)	SAR* Drift (*dB*)
FACE														
21 DEC 2020	F1	RANDY II FCC	26.965	AM	T1	P1	n/a	n/a	25	50	35.37	0.028	0.021	-0.080
22 DEC 2020	F2	RANDY II FCC	27.405	AM	T1	P1	n/a	n/a	25	50	35.64	0.144	0.108	-0.260
23 DEC 2020	F3	RANDY II FCC	27.185	AM	T1	P1	n/a	n/a	25	50	35.58	0.010	0.008	-0.520
22 DEC 2020	F4	RANDY II FCC	27.405	AM	T1	P2	n/a	n/a	25	50	35.64	0.061	0.046	-0.570
13 Oct 2021	F5	RANDY II FCC	26.965	FM	T1	P1	n/a	n/a	25	50	35.37	0.124	0.093	-0.150
13 Oct 2021	F6	RANDY II FCC	27.405	FM	T1	P1	n/a	n/a	25	50	35.64	0.012	0.009	0.600
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			

11.0 SCALING OF MAXIMUM MEASURE SAR

Table 11.1 SAR Scaling

Scaling of Maximum Measured SAR (1g)					
Measured Parameters		Configuration			
		Face	Body	Head	
Plot ID		F2	B5		
Maximum Measured SAR_M		0.108	0.180		(W/kg)
Frequency		27.405	26.965		(MHz)
Power Drift		-0.570	-0.190		(dB)
Conducted Power		35.640	35.370		(dBm)
Fluid Deviation from Target					
Δe	Permitivity	2.44%	-4.33%		
Δσ	Conductivity	-8.00%	2.17%		

Fluid Sensitivity Calculation (1g)			IEC 62209-2 Annex F		
Delta SAR = Ce * Δe + Cσ * Δσ					(F.1)
$Ce = (-0.0007854*f^3) + (0.009402*f^2) - (0.02742*f) - 0.2026$					(F.2)
$C\sigma = (0.009804*f^3) - (0.08661*f^2) + (0.02981*f) + 0.7829$					(F.3)
f	Frequency (GHz)	0.027405	0.026965		
Ce		-0.203	-0.203		
Cσ		0.784	0.784		
Ce * Δe		-0.005	-0.006		
Cσ * Δσ		-0.063	-0.063		
ΔSAR		-0.068 (3)	-0.069 (3)		(%)

Manufacturer's Tuneup Tolerance				
Measured Conducted Power	35.640	35.370		(dBm)
Rated Conducted Power	36.000	36.000		(dBm)
ΔP	-0.360	-0.630		(dB)

SAR Adjustment for Fluid Sensitivity				
$SAR_1 = SAR_M * \Delta SAR$	0.115	0.192		(W/kg)

SAR Adjustment for Tuneup Tolerance				
$SAR_2 = SAR_1 + [\Delta P]$	0.125	0.222		(W/kg)

SAR Adjustment for Drift				
$SAR_3 = SAR_2 + Drift$	0.142	0.232		(W/kg)

reported SAR				
SAR_3	**0.14**	**0.23**		(W/kg)

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

NOTES to Table 11.0
(1) Scaling of the Maximum Measured SAR is based on the highest, 100% duty cycle, Face, Body and/or Head SAR measured of ALL test channels, configurations and accessories used during THIS evaluation. The Measured Fluid Deviation parameters apply only to deviation of the tissue equivalent fluids used at the frequencies which produced the highest measured SAR. The Measured Conducted Power applies to the Conducted Power measured at the frequencies producing the highest Face and Body SAR. The Measured Drift is the SAR drift associated with that specific SAR measurement. The Reported SAR is the accumulation of all SAR Adjustments from the applicable Steps 1 through 4. The Plot ID is for indentification of the SAR Measurement Plots in Annex A of this report. NOTE: Some of the scaling factors in Steps 1 through 4 may not apply and are identified by light gray text.
Step 1
Per IEC-62209-1 and FCC KDB 865664. Scaling required only when Measured Fluid Deviation is greater than 5%. If the Measured Fluid Deviation is greater than 5%, Table 10.1 will be shown and will indicate the SAR scaling factor in percent (%). SAR is MULTIPLIED by this scaling factor only when the scaling factor is positive (+).
Step 2
Per KDB 447498. Scaling required only when the difference (Delta) between the Measured Conducted Power and the Manufacturer's Rated Conducted Power is (-) Negative. The absolute value of Delta is ADDED to the SAR.
Step 3
Per 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.

12.0 SAR EXPOSURE LIMITS

Table 12.1 Exposure Limits

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

13.0 DETAILS OF SAR EVALUATION

Table 13.1 Day Log

DAY LOG								
Date	Ambient Temp (°C)	Fluid Temp (°C)	Relative Humidity (%)	Barometric Pressure (kPa)	Fluid Dielectric	SPC	Test	Task
21-Dec-20	24	24.5	24%	100.0	X	X	X	30H Fluids & SPC, SAR Test
22-Dec-20	24	24.4	23%	103.1			X	30H SAR Test
23-Dec-20	24	24.4	23%	103.8			X	30H SAR Test
13-Oct-21	28	22.8	24%	101.6	X	X	X	Fluids, SPC & 30H SAR Test

Per IEEE1528 Test series was started within 24 hours and completed within 48 hours of Fluid Parameter Measurement

13.2 DUT Setup and Configuration

DUT Setup and Configuration
Overview
The RANDY II FCC was evaluated for SAR in the *Body* and *Face* configuration at the maximum conducted output power level, preset by the manufacturer, with a fully charged battery in unmodulated continuous transmit operation (AM/FM mode at 100% duty cycle) with the transmit key continuously depressed. For a Push-To-Talk (PTT) device with VOX enabled operation, a 75% duty cycle compensation for the *reported SAR* was used, as per FCC KDB 447498. The test procedures outlined in FCC KDB 447498, FCC KDB 865664, ISED RSS-102 and IEC/IEEE 62209-1528 were used throughout the evaluation of this device.

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
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.

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 ±1.0°C throughout the test series. TSL analysis and SPC were repeated when the Active TSL use exceeded 84 hours. 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, ± 50MHz for frequencies ≤ 300MHz and ± 20MHz for frequencies ≤ 30MHz 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 ≤ 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 14.1 Measurement Uncertainty

UNCERTAINTY BUDGET FOR DEVICE EVALUATION (IEEE 1528-2013 Table 9)									
Source of Uncertainty	**IEEE 1528 Section**	**Toler ±%**	**Prob Dist**	**Div**	**c_i**	**c_i**	**Stand Unct ±%**	**Stand Unct ±%**	**V_i or V_{eff}**
Measurement System					**(1g)**	**(10g)**	**(1g)**	**(10g)**	
EX3DV4 Probe Calibration** (*k*=1)	E.2.1	6.7	N	1	1	1	**6.7**	**6.7**	∞
Axial Isotropy** (*k*=1)	E.2.2	0.6	R	√3	0.7	0.7	**0.2**	**0.2**	∞
Hemispherical Isotropy** (*k*=1)	E.2.2	3.2	R	√3	0.7	0.7	**1.3**	**1.3**	∞
Boundary Effect*	E.2.3	1.0	R	√3	1	1	0.6	0.6	∞
Linearity** (*k*=1)	E.2.4	**0.5**	R	√3	1	1	**0.3**	**0.3**	∞
System Detection Limits*	E.2.4	1.0	R	√3	1	1	0.6	0.6	∞
Modulation Response** (*k*=1)	E.2.5	**8.3**	R	√3	1	1	**4.8**	**4.8**	∞
Readout Electronics*	E.2.6	0.3	N	1	1	1	0.3	0.3	∞
Response Time*	E.2.7	0.8	R	√3	1	1	0.5	0.5	∞
Integration Time*	E.2.8	2.6	R	√3	1	1	1.5	1.5	∞
RF Ambient Conditions - Noise	E.6.1	**0.0**	R	√3	1	1	0.0	0.0	**10**
RF Ambient Conditions - Reflection	E.6.1	**0.0**	R	√3	1	1	0.0	0.0	**10**
Probe Positioner Mechanical Tolerance*	E.6.2	0.0	R	√3	1	1	0.0	0.0	∞
Probe Positioning wrt Phantom Shell*	E.6.3	0.4	R	√3	1	1	0.2	0.2	∞
Post-processing*	E.5	2.0	R	√3	1	1	1.2	1.2	∞
Test Sample Related									
Test Sample Positioning	E.4.2	**2.2**	N	1	1	1	2.2	2.2	**5**
Device Holder Uncertainty*	E.4.1	3.6	N	1	1	1	3.6	3.6	∞
SAR Drift Measurement[2]	E.2.9	0.0	R	√3	1	1	0.0	0.0	∞
SAR Power Scaling[3]	E.6.5	0.0	R	√3	1	1	0.0	0.0	∞
Phantom and Tissue Parameters									
Phantom Uncertainty*	E.3.1	6.1	R	√3	1	1	3.5	3.5	∞
SAR Correction Uncertainty	E.3.2	**1.6**	N	1	1	0.84	1.6	1.3	∞
Liquid Conductivity (measurement)	E.3.3	**5.0**	N	1	0.78	0.71	3.9	3.6	**10**
Liquid Permittivity (measurement)	E.3.3	**5.0**	N	1	0.23	0.26	1.2	1.3	**10**
Liquid Conductivity (Temperature)	E.3.2	**0.4**	R	√3	0.78	0.71	0.2	0.2	**10**
Liquid Permittivity Temperature)	E.3.2	**0.2**	R	√3	0.23	0.26	0.0	0.0	**10**
Effective Degrees of Freedom[1]								**V_{eff} =**	**1141**
Combined Standard Uncertainty			**RSS**				**11.1**	**11.0**	
Expanded Uncertainty (95% Confidence Interval)			**k=2**				**22.2**	**21.9**	
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%.

(2) The SAR Value is compensated for Drift

(3) SAR Power Scaling not Required

* Provided by SPEAG for DASY

Table 14.1 Calculation of Degrees of Freedom

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

15.0 FLUID DIELECTRIC PARAMETERS

Table 15.1 Fluid Dielectric Parameters 150MHz HEAD TSL

```
**********************************************************
                    Aprel Laboratory
          Test Result for UIM Dielectric Parameter
                 Mon 21/Dec/2020 17:54:24
                   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
                  Test_e  Epsilon  of  UIM
                    Test_s  Sigma of UIM
**********************************************************
        Freq          FCC_eH  FCC_sH  Test_e  Test_s
         0.0250         55.00   0.75    58.16   0.69
         0.0300         55.00   0.75    54.39   0.69
         0.0350         55.00   0.75    54.48   0.73
```

FLUID DIELECTRIC PARAMETERS							
Date:	21 Dec 2020	Fluid Temp:	24.5	Frequency:	30MHz	Tissue:	Head
Freq (MHz)		Test_e	Test_s	Target_e	Target_s	Deviation Permittivity	Deviation Conductivity
25.0000		58.1600	0.6900	55.000	0.75	5.75%	-8.00%
26.9650	*	56.6784	0.6900	55.000	0.75	3.05%	-8.00%
27.1850	*	56.5125	0.6900	55.000	0.75	2.75%	-8.00%
27.4050	*	56.3466	0.6900	55.000	0.75	2.45%	-8.00%
30.0000		54.3900	0.6900	55.000	0.75	-1.11%	-8.00%
35.0000		54.4800	0.7300	55.000	0.75	-0.95%	-2.67%

*Channel Frequency Tested

Table 15.2 Fluid Dielectric Parameters 150MHz HEAD TSL

****
Aprel Laboratory
Test Result for UIM Dielectric Parameter
Tue 12/Oct/2021 14:23:55
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
Test_e Epsilon of UIM
Test_s Sigma of UIM
****

Freq	FCC_eH	FCC_sH	Test_e	Test_s
0.0250	52.53	0.76	53.13	0.74
0.0300	52.30	0.76	51.50	0.75
0.0350	52.07	0.76	50.14	0.75

FLUID DIELECTRIC PARAMETERS							
Date:	12 Oct 2021	Fluid Temp:	22.2	Frequency:	150MHz	Tissue:	Head
Freq (MHz)		Test_e	Test_s	Target_e	Target_s	Deviation Permittivity	Deviation Conductivity
25.0000		53.1300	0.7400	55.0000	0.75	-3.40%	-1.33%
26.9650	*	52.6198	0.7337	55.0000	0.75	-4.33%	-2.17%
27.4050	*	51.6447	0.7280	55.0000	0.75	-6.10%	-2.93%
30.0000		51.5000	0.7200	55.0000	0.75	-6.36%	-4.00%
35.0000		50.1400	0.7100	55.0000	0.75	-8.84%	-5.33%

*Channel Frequency Tested

Fluid dielectric targets above and below 30MHz are not published. Deviation based on 30MHz target using 150 MHz Head TSL.

16.0 SYSTEM VERIFICATION TEST RESULTS

Table 16.1 System Verification Results 150MHz HEAD TSL

System Verification Test Results

Date		Frequency (MHz)	Validation Source		
			P/N		S/N
21 Dec 2020		30	CLA-30		1005
Fluid Type	Fluid Temp °C	Ambient Temp °C	Ambient Humidity (%)	Forward Power (mW)	Source Spacing (mm)
Head	24.5	24	24%	1000	0
Fluid Parameters					
Permittivity			Conductivity		
Measured	Target	Deviation	Measured	Target	Deviation
54.39	55.00	-1.11%	0.69	0.75	-8.00%
Measured SAR					
1 gram			10 gram		
Measured	Target	Deviation	Measured	Target	Deviation
1.20	1.25	4.00%	0.76	0.775	1.94%
Measured SAR Normalized to 1.0W					
1 gram			10 gram		
Normalized	Target	Deviation	Normalized	Target	Deviation
1.20	1.25	4.00%	0.76	0.775	1.94%

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.

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 150MHz HEAD TSL

System Verification Test Results					
Date		Frequency (MHz)	Validation Source		
			P/N		S/N
13 - Oct - 2021		30	CLA-30		1005
Fluid Type	Fluid Temp °C	Ambient Temp °C	Ambient Humidity (%)	Forward Power (mW)	Source Spacing (mm)
Head	22.8	28	24%	1000	0
Fluid Parameters					
Permittivity			Conductivity		
Measured	Target	Deviation	Measured	Target	Deviation
51.50	55.00	-6.36%	0.72	0.75	-4.00%
Measured SAR					
1 gram			10 gram		
Measured	Target	Deviation	Measured	Target	Deviation
1.16	1.25	-7.20%	0.73	0.775	-5.81%
Measured SAR Normalized to 1.0W					
1 gram			10 gram		
Normalized	Target	Deviation	Normalized	Target	Deviation
1.16	1.25	-7.20%	0.73	0.775	-5.81%

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.

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	Tissue Dielectrics		Validation Results		
							Permitivity	Conductivity	Sensitivity	Linearity	Isotropy
30	31-May-21	EX3DV4	3600	CLA-30	1005	Head	52.40	0.75	Pass	Pass	Pass
150	6-Nov-21	EX3DV4	3600	CLA-150	4007	Head	52.59	0.76	Pass	Pass	Pass
450	12-Aug-20	EX3DV4	3600	D450V3	1068	Head	43.64	0.84	Pass	Pass	Pass
750	21-Nov-21	EX3DV4	3600	D750V3	1061	Head	44.27	0.83	Pass	Pass	Pass
835	19-Nov-21	EX3DV4	3600	D835V2	4d075	Head	40.60	0.87	Pass	Pass	Pass
900	20-Aug-20	EX3DV4	3600	D900V2	045	Head	39.09	0.94	Pass	Pass	Pass
1640	12-Jun-21	EX3DV4	3600	1620-S-2	207-00102	Head	39.87	1.27	Pass	Pass	Pass
1800	25-Nov-21	EX3DV4	3600	D1800V2	247	Head	54.77	1.53	Pass	Pass	Pass
2450	29-Jun-21	EX3DV4	3600	D2450V2	825	Head	38.53	1.85	Pass	Pass	Pass
5250	25-May-21	EX3DV4	3600	D5GHzV2	1031	Head	33.74	4.9	Pass	Pass	Pass
5750	28-May-21	EX3DV4	3600	D5GHzV2	1031	Head	34.99	5.10	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.	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

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

EX3DV4 E-Field Probe

Phantom Specification

The ELI V5.0 phantom is an elliptical planar fiberglass shell phantom with a shell thickness of 2.0mm +/- .2mm at the planar area. This phantom conforms to OET Bulletin 65, Supplement C, IEEE 1528-2013, IEC 62209-1 and IEC 62209-2.

ELI Phantom

Device Positioner Specification

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

Device Positioner

19.0 TEST EQUIPMENT LIST

Table 19.1 Equipment List and Calibration, 2020

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	17-Mar-20	17-Mar-21
-EX3DV4 E-Field Probe	00213	3600	25-Mar-20	25-Mar-21
-CLA 30 Validation Dipole	00300	1005	18-Mar-20	18-Mar-23
ELI Phantom	00247	1234	CNR	CNR
SAM Phantom	00154	1033	CNR	CNR
HP 85070C Dielectric Probe Kit	00033	none	CNR	CNR
Gigatronics 8652A Power Meter	00007	1835801	26-Mar-19	26-Mar-22
Gigatronics 80701A Power Sensor	00186	1837002	COU	COU
Gigatronics 80334A Power Sensor	00237	1837001	26-Mar-19	26-Mar-22
HP 8753ET Network Analyzer	00134	US39170292	29-Dec-17	29-Dec-20
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
Traceable VWR Thermometer	00334	192385455	6-Aug-19	6-Aug-21
Kangaroo VWR Humidity/Thermometer	00334	192385455	5-Aug-19	6-Aug-22
Bipolar Power Supply 6299A	00086	1144A02155	CNR	CNR
DC-18G 10W 30db Attenuator	00102	-	COU	COU
R&S FSP40 Spectrum Analyzer	00241	100500	15-May-18	15-May-21
RF Cable-SMA	00311	-	CNR	CNR
HP Calibration Kit	00145	-	CNR	CNR

CNR = Calibration Not Required

SB=Stand By

COU = Calibrate on Use

Table 19.2 Equipment List and Calibration, 2021

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	22-Apr-21	22-Apr-22
-EX3DV4 E-Field Probe	00213	3600	20-Apr-21	20-Apr-22
-CLA 30 Validation Dipole	00300	1005	18-Mar-20	18-Mar-23
ELI Phantom	00247	1234	CNR	CNR
SAM Phantom	00154	1033	CNR	CNR
HP 85070C Dielectric Probe Kit	00033	none	CNR	CNR
Gigatronics 8652A Power Meter	00007	1835801	26-Mar-19	26-Mar-22
Gigatronics 80701A Power Sensor	00186	1837002	COU	COU
Gigatronics 80334A Power Sensor	00237	1837001	26-Mar-19	26-Mar-22
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
Kangaroo VWR Humidity/Thermometer	00334	192385455	5-Aug-19	6-Aug-22
Digital Multi Meter DMR-1800	00250	TE182	23-Jun-20	23-Jun-23
Bipolar Power Supply 6299A	00086	1144A02155	CNR	CNR
DC-18G 10W 30db Attenuator	00102	-	COU	COU
R&S FSP40 Spectrum Analyzer	00241	100500	9-Aug-21	9-Aug-24
HP 8566B Spectrum Analyzer	00051	2747A055100	29-Jun-20	29-Jun-23
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 20.1 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) **H**ydroxy**E**thyl-**C**ellulose: 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

DUT: CLA-30; Type: CLA-30; Serial: 1005
Procedure Name: SPC 30H Input=1.0W, Target=[1.25W/kg][.775W/kg]

Communication System: UID 0, CW (0); Frequency: 30 MHz;Duty Cycle: 1:1
Medium parameters used: f = 30 MHz; σ = 0.69 S/m; ε_r = 54.39; ρ = 1000 kg/m^3
Phantom section: Flat Section

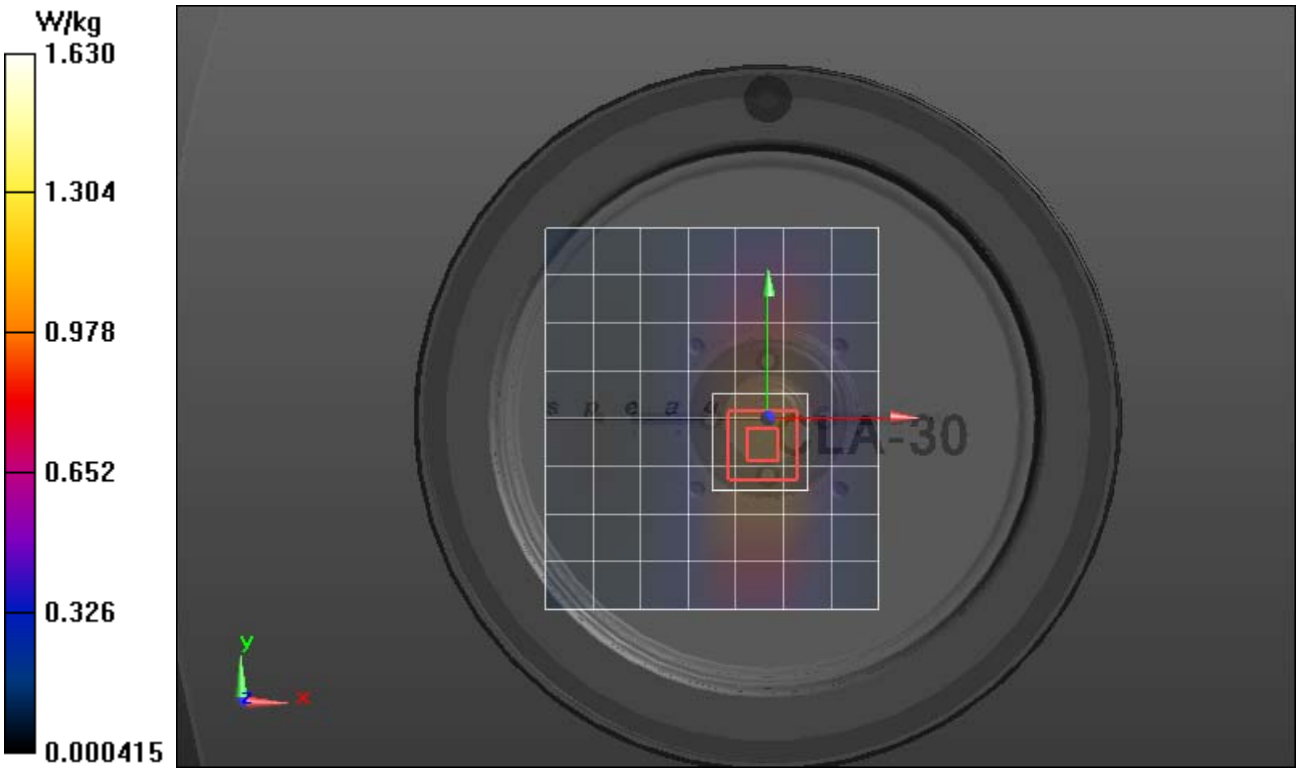
DASY5 Configuration:

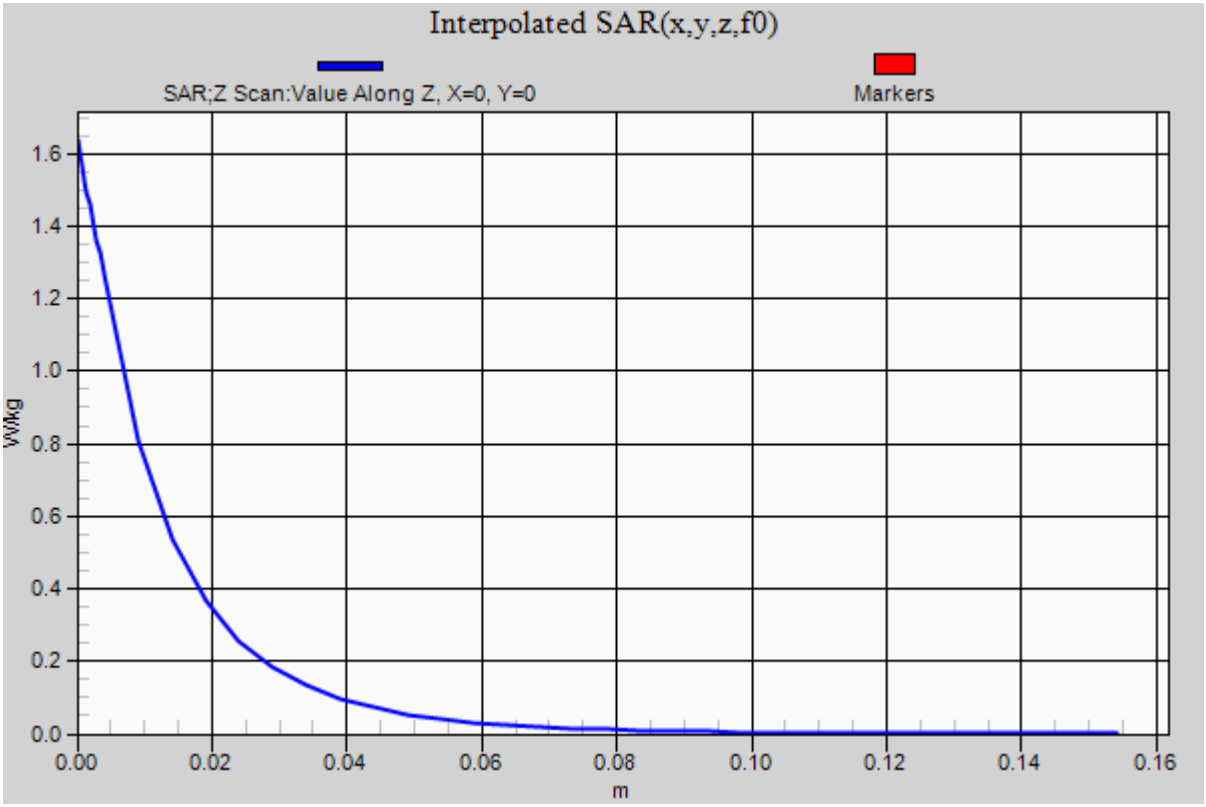
- Probe: EX3DV4 - SN3600; ConvF(12, 12, 12) @ 30 MHz; Calibrated: 3/25/2020
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 3/17/2020
- Phantom: ELI V5.0 (20deg probe tilt); Type: QD OVA 002 Ax; Serial: 1234
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

SPC 30H/SPC 30H Input=1.0W, Target=[1.25W/kg][.775W/kg]/Area Scan (8x9x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.13 W/kg

SPC 30H/SPC 30H Input=1.0W, Target=[1.25W/kg][.775W/kg]/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 42.84 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 1.94 W/kg
SAR(1 g) = 1.2 W/kg; SAR(10 g) = 0.756 W/kg
Smallest distance from peaks to all points 3 dB below = 16.8 mm
Ratio of SAR at M2 to SAR at M1 = 63.5%
Maximum value of SAR (measured) = 1.30 W/kg

SPC 30H/SPC 30H Input=1.0W, Target=[1.25W/kg][.775W/kg]/Z Scan (1x1x42): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Penetration depth = 12.24 (11.11, 13.33) [mm]
Maximum value of SAR (interpolated) = 1.63 W/kg


W/kg
1.630
1.304
0.978
0.652
0.326
0.000415
LA-30
y
x


Interpolated SAR(x,y,z,f0)
SAR;Z Scan:Value Along Z, X=0, Y=0
Markers
W/kg
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
m

DUT: CLA-30; Type: CLA-30; Serial: 1005
Procedure Name: SPC 30H Input=1.0W, Target=[1.125][1.25W/kg][1.375]

Communication System: UID 0, CW (0); Frequency: 30 MHz;Duty Cycle: 1:1
Medium parameters used: f = 30 MHz; σ = 0.75 S/m; ε_r = 51.5; ρ = 1000 kg/m^3
Phantom section: Flat Section

Date/Time: 10/13/2021 10:43:44 AM

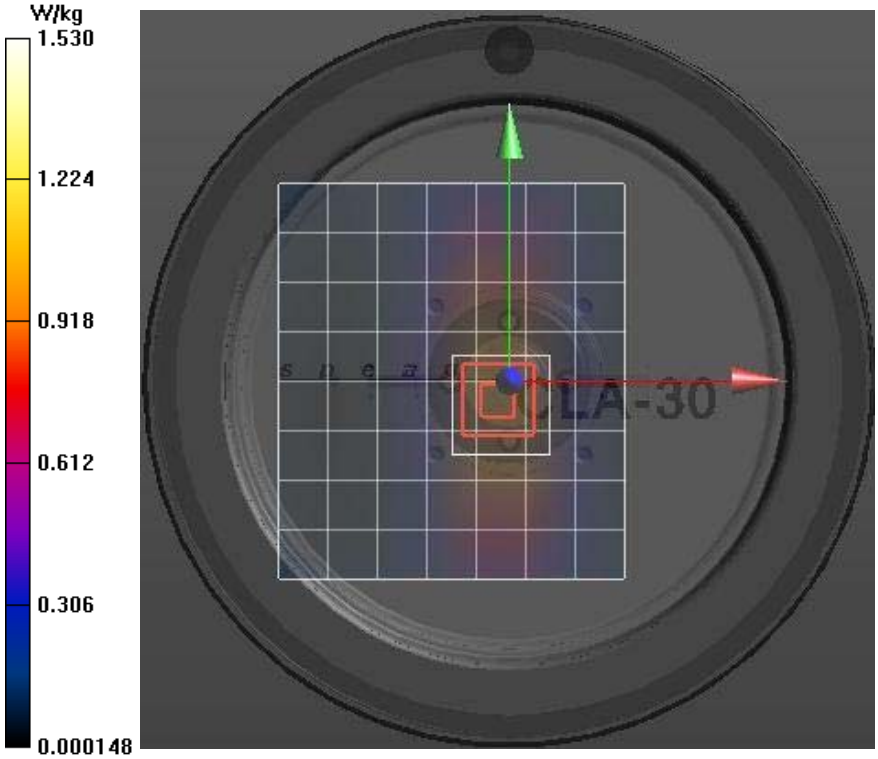
DASY5 Configuration:

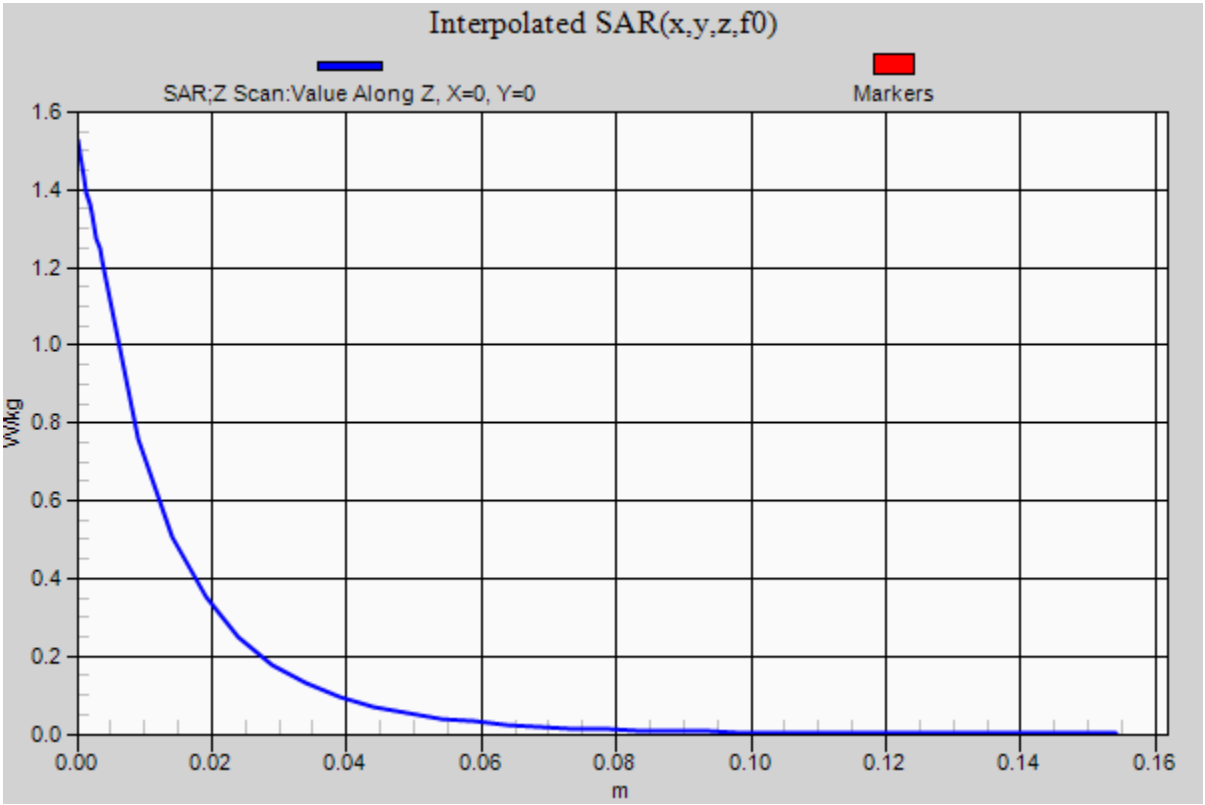
- Probe: EX3DV4 - SN3600; ConvF(12.08, 12.08, 12.08) @ 30 MHz; Calibrated: 4/28/2021
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 4/22/2021
- Phantom: ELI V5.0 (20deg probe tilt); Type: QD OVA 002 Ax; Serial: 1234
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

SPC 30H/SPC 30H Input=1.0W, Target=[1.125][1.25W/kg][1.375]/Area Scan (8x9x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.08 W/kg

SPC 30H/SPC 30H Input=1.0W, Target=[1.125][1.25W/kg][1.375]/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 40.43 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 1.89 W/kg
SAR(1 g) = 1.16 W/kg; SAR(10 g) = 0.728 W/kg
Smallest distance from peaks to all points 3 dB below = 17.5 mm
Ratio of SAR at M2 to SAR at M1 = 63.3%
Maximum value of SAR (measured) = 1.25 W/kg

SPC 30H/SPC 30H Input=1.0W, Target=[1.125][1.25W/kg][1.375]/Z Scan (1x1x42): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Penetration depth = 12.43 (11.18, 13.50) [mm]
Maximum value of SAR (interpolated) = 1.53 W/kg


W/kg
1.530
1.224
0.918
0.612
0.306
0.000148


Interpolated SAR(x,y,z,f0)
SAR;Z Scan:Value Along Z, X=0, Y=0
Markers
W/kg
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
m

APPENDIX B – MEASUREMENT PLOTS OF MAXIMUM MEASURED SAR

Plot F2

DUT: President-RANDY (FCC & III); Type: PTT; Serial: Not Specified
Procedure Name: F3-President RANDY (FCC & III), 27.4050 MHz Face Config[25mm], Flexible Antenna, bat P1,

Communication System: UID 0, AM(0); Frequency: 27.185 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 27.185 MHz; σ = 0.69 S/m; ε_r = 56.513; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

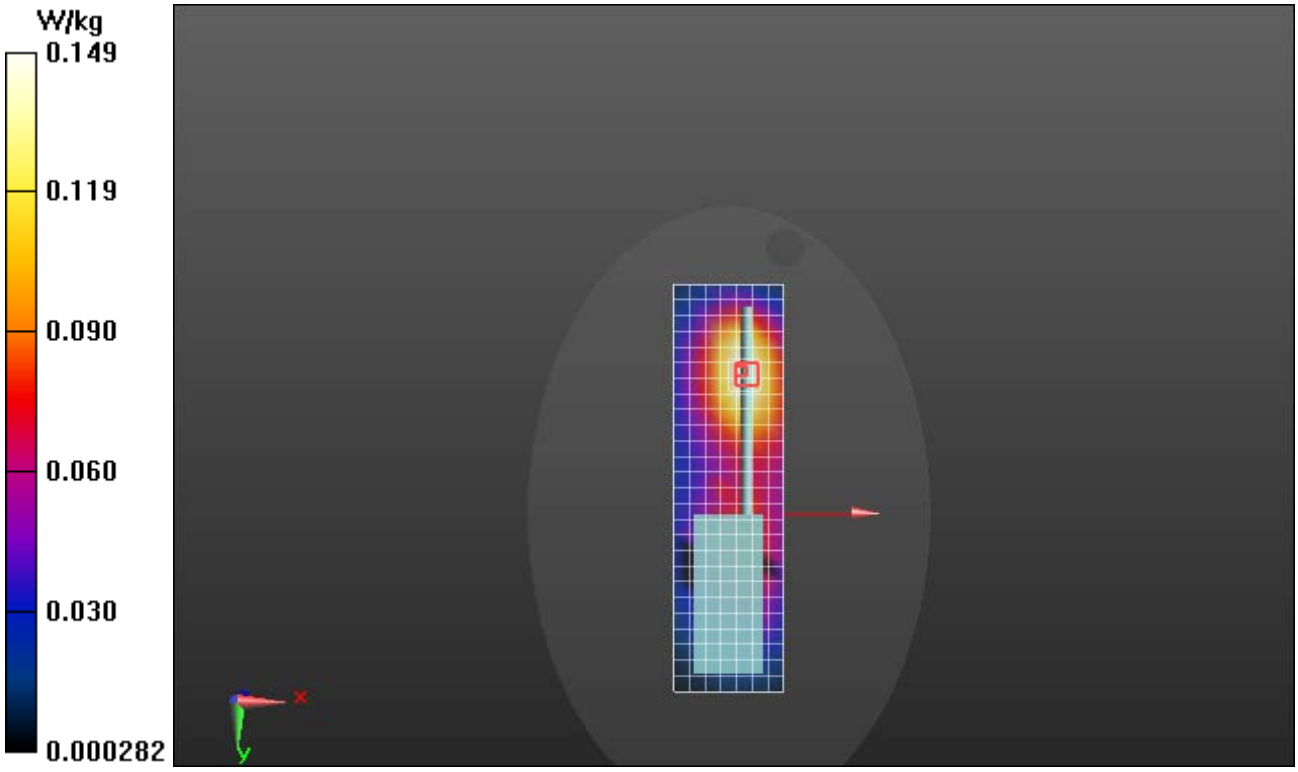
- Probe: EX3DV4 - SN3600; ConvF(12, 12, 12) @ 27.185 MHz; Calibrated: 3/25/2020
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 3/17/2020
- Phantom: ELI V5.0 (20deg probe tilt); Type: QD OVA 002 Ax; Serial: 1234
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

30H/F3-President RANDY (FCC & III), 27.4050 MHz Face Config[25mm], Flexible Antenna, bat P1,/Area Scan (8x27x1):
Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.151 W/kg

30H/F3-President RANDY (FCC & III), 27.4050 MHz Face Config[25mm], Flexible Antenna, bat P1,/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 10.74 V/m; Power Drift = -0.57 dB
Peak SAR (extrapolated) = 0.195 W/kg
SAR(1 g) = 0.144 W/kg; SAR(10 g) = 0.104 W/kg
Ratio of SAR at M2 to SAR at M1 = 74.7%

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.149 W/kg



Plot B5

DUT: President-RANDY (FCC & III); Type: PTT;
Procedure Name: B5-President RANDY (FCC & III), 26.565 MHz Body Config, Flexible Antenna, B1, A1,bat P1

Communication System: UID 0, FM (0); Frequency: 26.565 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 26.565 MHz; σ = 0.743 S/m; ε_r = 52.62; ρ = 1000 kg/m^3
Phantom section: Flat Section

Date/Time: 10/13/2021 7:35:32 PM

DASY5 Configuration:

- Probe: EX3DV4 - SN3600; ConvF(12.08, 12.08, 12.08) @ 26.565 MHz; Calibrated: 4/28/2021
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 4/22/2021
- Phantom: ELI V5.0 (20deg probe tilt); Type: QD OVA 002 Ax; Serial: 1234
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

30H/B5-President RANDY (FCC & III), 26.565 MHz Body Config, Flexible Antenna, B1, A1,bat P1/Area Scan (8x27x1):
Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.246 W/kg

30H/B5-President RANDY (FCC & III), 26.565 MHz Body Config, Flexible Antenna, B1, A1,bat P1/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 12.36 V/m; Power Drift = -0.19 dB
Peak SAR (extrapolated) = 0.329 W/kg
SAR(1 g) = 0.240 W/kg; SAR(10 g) = 0.177 W/kg
Smallest distance from peaks to all points 3 dB below = 6 mm
Ratio of SAR at M2 to SAR at M1 = 74.4%

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.248 W/kg

30H/B5-President RANDY (FCC & III), 26.565 MHz Body Config, Flexible Antenna, B1, A1,bat P1/Z Scan (1x1x42): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Info: Interpolated medium parameters used for SAR evaluation.
Penetration depth = 26.06 (22.68, 26.23) [mm]
Maximum value of SAR (interpolated) = 0.264 W/kg