DECLARATION OF COMPLIANCE SAR ASSESSMENT Part 1 of 2

Motorola Solutions Inc.
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Date of Report: 08/04/2023
Report Revision: B

Responsible Engineer:	Alfred Hoe (EME Engineer)
Report Author:	Muhammad Zakwan Bin Zaidi (EME Senior technician)
Date/s Tested:	05/02/23-05/23/23, 05/25/23-06/13/23
Manufacturer:	Motorola Solutions Inc.
DUT Description:	Handheld Portable – APX N50 VHF MODEL 2 PORTABLE – APX N50 VHF HAZLOC MODEL 2 PORTABLE
Test TX mode(s):	FM, BT & WLAN
Max. Power output:	Refer table 3
Nominal Power:	Refer table 3
Tx Frequency Bands:	Refer table 3
Signaling type:	FM (LMR), 802.11b/g/n/a/ac (WLAN), FHSS (Bluetooth / Bluetooth LE)
Model(s) Tested:	H25KDF9PW6AN (PMUD1977A) & H25KDF9PW6AN-H (PMUD1977A)
Serial Number(s):	287TZH0132, 287TZH0121 & 287TZH0070
Classification:	Occupational/Controlled Environment
Firmware Version:	D30.81.19
Applicant Name:	Motorola Solutions Inc.
Applicant Address:	8000 West Sunrise Boulevard, Fort Lauderdale, Florida 33322
FCC ID:	AZ489FT7162 This report contains results that are immaterial for FCC equipment approval, which are clearly identified.
FCC Test Firm Registration Number:	823256
IC:	109U-89FT7162 This report contains results that are immaterial for ISED equipment approval, which are clearly identified.
ISED Test Site registration:	24843

The test results clearly demonstrate compliance with Occupational/Controlled RF Exposure limits of 8 W/kg averaged over 1 gram per the requirements of FCC 47 CFR § 2.1093 and RSS-102 (Issue 5)

Based on the information and the testing results provided herein, the undersigned certifies that when used as stated in the operating instructions supplied, said product complies with the national and international reference standards and guidelines listed in section 4.0 of this report (no deviation from standard methods).
This report shall not be reproduced without written approval from an officially designated representative of the Motorola Solutions Inc EME Laboratory.
I attest to the accuracy of the data and assume full responsibility for the completeness of these measurements. This reporting format is consistent with the suggested guidelines of the TIA TSB-150 December 2004. The results and statements contained in this report pertain only to the device(s) evaluated.

Saw Sun Hock (Approval Signatory)
Approval Date: 8/4/2023

Part 1 of 2

APPENDICES

Part 2 of 2

APPENDICES

Report Revision History

Date	Revision	Comments
07/18/2023	A	Initial release
08/04/2023	B	Update section 14.3.2 – Bluetooth Antenna gain from 0dBi to 1.4dBi

1.0 Introduction

This report details the utilization, test setup, test equipment, and test results of the Specific Absorption Rate (SAR) measurements performed at the Motorola Solutions Inc. EME Test Laboratory for handheld portable model number H25KDF9PW6AN (PMUD1977A) and H25KDF9PW6AN-H (PMUD1977A) are full evaluated at LMR. WLAN 2.4GHz and WLAN 5GHz are a variant model from reference model with H25UCF9PW6AN (PMUF1999A) & H15UCF9PW6AN (PMUF1998A), FCC ID: AZ489FT7161, IC ID: 109U89FT7161. These devices are classify as Occupational/Controlled Environment and model certified is list as below:

Model	Description
H15KDF9PW6AN (PMUD1976A)	APX N30 VHF MODEL 2 PORTABLE
H25KDF9PW6AN (PMUD1977A)	APX N50 VHF MODEL 2 PORTABLE
H25KDF9PW6AN-H (PMUD1977A)	APX N50 VHF HAZLOC MODEL 2 PORTABLE
H15KDF9PW6AN-H (PMUD1976A)	APX N30 VHF HAZLOC MODEL 2 PORTABLE

2.0 FCC SAR Summary

Table 1

Equipment Class	Frequency band (MHz)	Max Calc at Body (W/kg)	Max Calc at Face (W/kg)
		1g-SAR	1g-SAR
TNF	150.8-173.4MHz (LMR)	2.20	1.29
DTS	2412 – 2462 MHZ (WLAN 2.4 GHz)	0.087	0.024
NII	5180 – 5845 MHz (WLAN 5 GHz)	0.032	0.035
*DSS	2402-2480MHz	NA	NA
Simultaneous Results		2.29	1.33

*Results not required per KDB (refer to sections 14.3)

3.0 Abbreviations / Definitions

BT: Bluetooth
CNR: Calibration Not Required
CW: Continuous Wave
DSS: Direct Spread Spectrum
DUT: Device Under Test
EME: Electromagnetic Energy
FHSS: Frequency Hopping Spread Spectrum
FM: Frequency Modulation
NA: Not Applicable
LMR: Land Mobile Radio
OFDM: Orthogonal Frequency Division Multiplexing
GFSK: Gaussian Frequency-Shift Keying
PTT: Push to Talk
RSM: Remote Speaker Microphone
SAR: Specific Absorption Rate
TNF: Licensed Non-Broadcast Transmitter Held to Face
Audio accessories: These accessories allow communication while the DUT is worn standard on the body.

Body worn accessories: These accessories allow the DUT to be worn on the body of the user.

Maximum Power: Defined as the upper limit of the production line final test station.

4.0 Referenced Standards and Guidelines

This product is designed to comply with the following applicable national and international standards and guidelines.

- Federal Communications Commission, “Evaluating Compliance with FCC Guidelines for Human Exposure to Radio frequency Electromagnetic Fields”, OET Bulletin 65, FCC, Washington, D.C.: 1997.
- Institute of Electrical and Electronics Engineers (IEEE) C95.1-2019
- International Commission on Non-Ionizing Radiation Protection (ICNIRP) 2020
- Ministry of Health (Canada) Safety Code 6 (2015), Limits of Human Exposure to Radio frequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz
- RSS-102 (Issue 5) – Radio Frequency (RF) Exposure Compliance of Radio communication Apparatus (All Frequency Bands)
- Australian Communications Authority Radio communications (Electromagnetic Radiation - Human Exposure) Standard (2014)
- ANATEL, Brazil Regulatory Authority, Resolution No 700 of September 28, 2018 "Approves the Regulation on the Assessment of Human Exposure to Electric, Magnetic and Electromagnetic Fields Associated with the Operation of Radio communication Transmitting Stations.

- IEC/IEEE 62209-1528-2020- 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 – 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04
- FCC KDB – 865664 D02 RF Exposure Reporting v01r02
- FCC KDB – 447498 D04 Interim General RF Exposure Guidance v01
- FCC KDB – 643646 D01 SAR Test for PTT Radios v01r03
- FCC KDB – 248227 D01 802.11 Wi-Fi SAR v02r02
- FCC KDB – 648474 D04 Handset SAR v01r03

5.0 SAR Limits

Table 2

EXPOSURE LIMITS	SAR (W/kg)	
	(General Population / Uncontrolled Exposure Environment)	(Occupational / Controlled Exposure Environment)
Spatial Average - ANSI - (averaged over the whole body)	0.08	0.4
Spatial Peak - ANSI - (averaged over any 1-g of tissue)	1.6	8.0
Spatial Peak – ICNIRP/ANSI - (hands/wrists/feet/ankles averaged over 10-g)	4.0	20.0
Spatial Peak - ICNIRP - (Head and Trunk 10-g)	2.0	10.0

6.0 Description of Device Under Test (DUT)

This portable device operates in the LMR bands using frequency modulation (FM) incorporating traditional simplex two-way radio transmission protocol. This device also contains WLAN technology for data applications and Bluetooth technology for short range wireless devices.

The LMR bands in this device operate in a half duplex system. A half duplex system only allows the user to transmit or receive. This device cannot transmit and receive simultaneously. The user must stop transmitting in order to receive a signal or listen for a response, regardless of PTT button or use of voice activated audio accessories. This type of operation, along with the RF safety booklet, which instructs the user to transmit no more than 50% of the time, justifies the use of 50% duty factor for this device.

This device also incorporates GFSK Bluetooth transmission device which is a Frequency Hopping Spread Spectrum (FHSS) technology. The Bluetooth radio modem is used to wireless link audio accessories. The maximum actual transmission duty cycle is imposed by the Bluetooth. The maximum duty cycle for BT is 77%.

Table 3 below summarizes the technologies, bands, maximum duty cycles and maximum output powers. Maximum output powers are defined as upper limit of the production line final test station.

Table 3

Technologies	Band (MHz)	Transmission	Duty Cycle (%)	Nominal Power (W)	Max Power (W)
LMR	136-174	FM	*50	5.00	5.90
WLAN 802.11 b	2412-2462	DSSS, OFDM	98.86	0.0208	0.0398
WLAN 802.11 g	2412-2462	OFDM	96.88	0.0224 (CH 1 & 11) 0.04467 (CH 6)	0.03162 (CH 1 & 11) 0.05012 (CH 6)
WLAN 802.11 n	2412-2462	OFDM	98.01	0.0224 (CH 1 & 11) 0.03550 (CH 6)	0.03162 (CH 1 & 11) 0.05012 (CH 6)
WLAN 802.11 a (20 MHz)	5180-5825	OFDM	97.01	UNII-1, 2A, 2C: 0.0200 UNII-3: 0.0158 (Other Channels) UNII-3: 0.01585 (CH 64), 0.00562 (CH 100), 0.0708(CH 140)	UNII-1, 2A, 2C: 0.0282 UNII-3: 0.0224 (Other Channels) UNII-3: 0.0282 (CH 132), 0.0224 (CH 64) 0.00794 (CH 100) UNII-3: 0.0100 (CH 140)
WLAN 802.11 n (20 MHz)	5180-5825	OFDM	97.97	UNII-1, 2A, 2C, 3: 0.0158 (Other Channels) 0.00794 (CH 100 & CH140)	UNII-1, 2A, 2C, 3: 0.0224 (Other Channels) 0.01122 (CH 100)
WLAN 802.11 ac (20 MHz)	5180-5825	OFDM	97.97	UNII-1, 2A, 2C, 3: 0.0158 (Other Channels) 0.00794 (CH 100 & CH140)	UNII-1, 2A, 2C, 3: 0.0224 (Other Channels) 0.01122 (CH 100)
BT	2402-2480	GFSK	77	0.0100	0.01413
BT LE (1M)	2402-2480	GFSK	62.74	0.0501	0.00708

Note - * includes 50% PTT operation

The intended operating positions are “at the face” with the DUT at least 1 inch from the mouth, and “at the body” by means of the offered body worn accessories. Body worn audio and PTT operation is accomplished by means of optional remote accessories that are connected to the radio. Operation at the body without an audio accessory attached is possible by means of BT accessories.

7.0 Optional Accessories and Test Criteria

This device is offered with optional accessories. All accessories were individually evaluated during the test plan creation to determine if testing was required per the guidelines outlined in "SAR Test Reduction Considerations for Occupational PTT Radios" FCC KDB 643646 to assess compliance of this device. The following sections identify the test criteria and details for each accessory category. Refer to Exhibit 7B for antenna separation distances.

7.1 Antennas

Table 4

Antenna No.	Antenna Models	Description	Selected for test	Tested
1	AN000421A01	VHF Whip Antenna (136-174MHz), 18 cm, ¼ wavelength, -5 dBi gain	Yes	Yes
2	AN000410A01	Wifi/BTAntenna,2.4-2.48GHz, ¼wavelength, 2400-2480MHz (1.48dBi), 5.15-5.85GHz, 5150-5250MHz (4.88dBi).	Yes	Yes

7.2 Battery

Table 5

Battery No.	Battery Models	Description	Selected for test	Tested	Comments
1	PMNN4813A	BATT LIION IMPRES 2 IP68 2850T	Yes	Yes	
2	PMNN4815A	BATT LIION IMPRES 2 IP68 3200T	Yes	Yes	

7.3 Body worn Accessories

Table 6

Body worn No.	Body worn Models	Description	Selected for test	Tested	Comments
1	PMLN8369A	CARRY ACCESSORY-BELT CLIP,APX N30/APX N50 2.0 BELT CLIP	Yes	Yes	
2	PMLN8370A	CARRY ACCESSORY-BELT CLIP,APX N30/APX N50 2.5 BELT CLIP	Yes	Yes	

7.4 Audio Accessories

Table 7

Audio No.	Audio Acc. Models	Description	Selected for test	Tested	Comments
1	PMMN4128A	RM780 IMPRES WINDPORTING REMOTE SPEAKER MICROPHONE, LARGE (IP68)	Yes	Yes	Default Audio
2	NMN6274B	IMPRES XP RSM FOR APX W/ DUAL MIC NOISE SUPPRESSION, 3.5MM THRD JACK.	Yes	*No	Paired with PMLN8334A
3	PMLN6828A	ACCESSORY KIT,TACTICAL THROAT MICROPHONE	Yes	*No	Paired with PMLN6827A and PMLN8334A
4	PMLN6829A	TACTICAL EAR MICROPHONE	Yes	*No	Paired with PMLN6827A and PMLN8334A
5	PMLN8086A	OVER-THE-HEAD HEADSET	Yes	*No	
6	PMLN8265A	HEADBAND HEADSET W/ NEXUS	Yes	*No	Paired with PMLN8297A, PMMN4150A and PMMN4151A
7	PMLN8295A	2-WIRE SWIVEL LOUD AUDIO EARPIECE WITH EARTIP	Yes	*No	
8	PMLN8337A	1-WIRE SINGLE EARBUD WITH REMOVABLE EARHOOK LOUD AUDIO EARPIECE	Yes	*No	
9	PMLN8343A	3-WIRE SURVEILLANCE KIT WITH LOUD AUDIO TRANSLUCENT TUBE	Yes	*No	
10	PMMN4141A	AUDIO ACCESSORY-REMOTE SPEAKER MICROPHONE,XVP750 RSM	Yes	*No	
11	PMLN6827A	ACCESSORY KIT,TACTICAL GCAI PTT INTERFACE MODULE	Yes	*No	Paired with PMLN6828A, PMLN6829A and PMLN8334A
12	PMLN8297A	GCAI-MINI PTT NEXUS ADAPTER	Yes	*No	Paired with PMLN8265A
13	PMLN8334A	CABLES-ADAPTER CABLES,GCAI MINI TO GCAI CABLE ADAPTER, FOR APX	Yes	*No	Paired with PMLN6828A, PMLN6829A and PMLN6827A
14	PMMN4132A	ACCESSORY KIT,XVE500 REMOTE SPEAKER MIC, HIGH IMPACT GREEN WITH KNOB	Yes	*No	
15	PMMN4150A	NS750, REMOTE SPEAKER MICROPHONE,IMPRES OMNI WITH LARGE FRONT PTT,NEXUS,3.5MM (LONG CABLE)	Yes	*No	
16	PMMN4151A	NS750, REMOTE SPEAKER MICROPHONE,IMPRES OMNI WITH LARGE FRONT PTT,NEXUS,3.5MM (SHORT CABLE)	Yes	*No	

Note - * Intended for test. Per KDB provision tests not required.

Table 7 (Continued)

Audio No.	Audio Acc. Models	Description	Selected for test	Tested	Comments
17	PMMN4132A BLK	ACCESSORY KIT, XVE500 REMOTE SPEAKER MICROPHONE, BLACK WITH KNOB	No	No	By Similarity to PMLN4132A
18	PMMN4137A	ACCESSORY KIT, XVE500 REMOTE SPEAKER MICROPHONE, HIGH IMPACT GREEN, NO CHANNEL KNOB	No	No	By Similarity to PMLN4132A
19	PMMN4137A BLK	ACCESSORY KIT, XVE500 REMOTE SPEAKER MICROPHONE, BLACK, NO CHANNEL KNOB	No	No	By Similarity to PMLN4132A
20	PMLN8266A	NECKBAND HEADSET W/ NEXUS	No	No	By Similarity to PMLN8265A
21	PMLN8267A	HARDHAT HEADSET W/ NEXUS	No	No	By Similarity to PMLN8265A
22	NMN6271A	IMPRES XP RSM FOR APX W/ DUAL MIC NOISE SUPPRESSION.	No	No	By Similarity to NMN6274B
23	PMLN8085A	BEHIND-THE-HEAD HEADSET	No	No	By Similarity to PMLN8086A
24	PMLN8342A	2-WIRE SURVEILLANCE KIT WITH LOUD AUDIO TRANSLUCENT TUBE	No	No	By Similarity to PMLN8295A
25	PMLN8341A	1-WIRE SURVEILLANCE KIT WITH LOUD AUDIO TRANSLUCENT TUBE	No	No	By Similarity to PMLN8337A
26	PMMN4140A	RM760 IMPRES WINDPORTING REMOTE SPEAKER MICROPHONE, LARGE (IP68)	No	No	By Similarity to PMLN4128A
27	PMMN4142A	AUDIO ACCESSORY-REMOTE SPEAKER MICROPHONE,XVP730 RSM	No	No	By Similarity to PMLN4141A

Note - * Intended for test. Per KDB provision tests not required.

8.0 Description of Test System

DASY5™ Test System

DASY6™ Test System

8.1 Descriptions of Robotics/Probes/Readout Electronics

Table 8

Dosimetric System type	System version	DAE type	Probe Type
Schmid & Partner Engineering AG SPEAG DASY 5	V16.0.0.116	DAE4	EX3DV4 (E-Field)

The **DASY5™ system** is operated per the instructions in the DASY5™ Users Manual. The complete manual is available directly from SPEAG™. All measurement equipment used to assess SAR compliance was calibrated according to ISO/IEC 17025 A2LA guidelines. Appendices B and C present the applicable calibration certificates.

Table 8 (Continued)

Dosimetric System type	System version	DAE type	Probe Type
Schmid & Partner Engineering AG SPEAG DASY 6	V16.0.0.116	DAE4	EX3DV4 (E-Field)

The **DASY6™ system** is operated per the instructions in the DASY6™ Users Manual. The complete manual is available directly from SPEAG™. All measurement equipment used to assess SAR compliance was calibrated according to ISO/IEC 17025 A2LA guidelines. Appendices B and C present the applicable calibration certificates.

8.2 Description of Phantom(s)

Table 9

Phantom Type	Phantom(s) Used	Material Parameters	Phantom Dimensions LxWxD (mm)	Material Thickness (mm)	Support Structure Material	Loss Tangent (wood)
Triple Flat	NA	200MHz -6GHz; Er = 3-5, Loss Tangent = ≤0.05	280x175x175			
SAM	NA	300MHz -6GHz; Er = < 5, Loss Tangent = ≤0.05	Human Model	2mm +/- 0.2mm	Wood	< 0.05
Oval Flat	√	300MHz -6GHz; Er = 4+/- 1, Loss Tangent = ≤0.05	600x400x190			

8.3 Description of Simulated Tissue

The sugar based simulate tissue is produced by placing the correct measured amount of De-ionized water into a large container. Each of the dried ingredients are weighed and added to the water carefully to avoid clumping. If the solution has a high sugar concentration the water is pre-heated to aid in dissolving the ingredients. For Diacetin and similar type simulates, sugar and HEC ingredients are not needed. The solution is mixed thoroughly, covered, and allowed to sit overnight prior to use.

The simulated tissue mixture was mixed based on the Simulated Tissue Composition indicated in Table 10. During the daily testing of this product, the applicable mixture was used to measure the Di-electric parameters at each of the tested frequencies to verify that the Di-electric parameters were within the tolerance of the tissue specifications.

Simulated Tissue Composition (percent by mass)

Table 10

Ingredients	150MHz	2450MHz (1)	5GHz (1)
	Head	Head	Head
Sugar	57.0	NA	NA
Diacetin	0	NA	NA
De ionized – Water	40.45	NA	NA
Salt	1.45	NA	NA
HEC	1.0	NA	NA
Bact.	0.1	NA	NA

Note (1) SPEAG provides Motorola proprietary stimulant ingredients for the 5GHz band

9.0 Additional Test Equipment

The Table below lists additional test equipment used during the SAR assessment.

Table 11

Equipment Type	Model Number	Serial Number	Calibration Date	Calibration Due Date
SPEAG PROBE	EX3DV4	7511	06/18/21	06/18/24
SPEAG PROBE	EX3DV4	7519	02/28/22	02/28/25
SPEAG PROBE	EX3DV4	7486	06/18/22	06/18/25
SPEAG DAE	DAE4	729	06/09/21	06/09/24
SPEAG DAE	DAE4	684	02/22/22	02/22/25
SPEAG DAE	DAE4	850	04/14/22	04/14/23
POWER AMPLIFIER	50W100D	357646	CNR	CNR
POWER AMPLIFIER	5S1G4	312988	CNR	CNR
POWER AMPLIFIER	5S4G11	312664	CNR	CNR
POWER AMPLIFIER	50W100D	357646	CNR	CNR
VECTOR SIGNAL GENERATOR	E4438C	MY45091270	09/21/22	09/21/23
BI-DIRECTIONAL COUPLER	3020A	40295	06/30/22	06/30/23
BI-DIRECTIONAL COUPLER	3022	77115	07/20/22	07/20/23
BI-DIRECTIONAL COUPLER	3024	61182	06/30/22	06/30/23
BI-DIRECTIONAL COUPLER	3022	81640	06/29/22	06/29/23
POWER SENSOR	E9301B	MY50290001	06/08/22	06/08/23
POWER SENSOR	E4412A	MY61020016	08/17/22	08/17/23
POWER SENSOR	E9301B	MY50290001	06/08/22	06/08/23
POWER SENSOR	E4412A	MY61060011	04/10/23	04/10/24
POWER SENSOR	E4412A	MY61050006	04/12/23	04/12/24
POWER METER	E4419B	MY45103725	06/12/22	06/12/23*
POWER METER	E4418B	MY45107917	07/13/22	07/13/23
POWER METER	E4418B	MY45100911	08/08/22	08/08/23
POWER METER	E4417A	GB41292245	11/11/22	11/11/23
POWER SOURCE	SE UMS 160 CB	4302	11/10/22	11/10/23
DATA LOGGER	DSB	16398050	08/13/22	08/13/23
THERMOMETER	HH806AU	080307	11/28/22	11/28/23
TEMPERATURE PROBE	80PK-22	06032017	11/28/22	11/28/23
NETWORK ANALYZER	E5071B	MY42403218	09/24/22	09/24/23
DIELECTRIC ASSESSMENT KIT	DAK-3.5	1120	010/03/22	10/03/23
DIELECTRIC ASSESSMENT KIT	DAK-12	1051	10/17/22	10/17/23
DIGITAL THERMOMETER	1523	3492108	11/04/22	11/04/23
TEMPERATURE PROBE	PR-10L-4-100-1/4-6-BX	WNWR037791	11/04/22	11/04/23
SPEAG DIPOLE	CLA150	4005	07/07/21	07/07/24
SPEAG DIPOLE	D2450V2	781	10/13/21	10/13/24
SPEAG DIPOLE	D5GHZV2	1026	09/24/21	09/24/24
SPEAG DIPOLE	D5GHzV2	1027	02/10/22	02/10/25

Note: * Indicated equipment used for SAR assessment before calibration due date.

Table 11 (Continued)

Equipment Type	Model Number	Serial Number	Calibration Date	Calibration Due Date
POWER METER	E4419B	GB42420608	11/14/22	11/14/23
POWER SENSOR	E9301B	MY41495733	08/14/22	08/14/23
POWER SENSOR	NRP-Z11	121252	08/13/21	08/13/23

10.0 SAR Measurement System Validation and Verification

DASY output files of the probe/dipole calibration certificates and system verification test results are included in appendices B, C & D respectively.

10.1 System Validation

The SAR measurement system was validated according to procedures in KDB 865664. The validation status summary Table is below.

Table 12

Dates	Probe Calibration Point		Probe SN	Measured Tissue Parameters		Validation		
				σ	ϵ_r	Sensitivity	Linearity	Isotropy
CW								
09/22/22	Head	150	7511	0.73	51.8	Pass	Pass	Pass
06/27/22	Head	2450	7519	1.79	39.9	Pass	Pass	Pass
06/30/22	Head	5250	7519	4.44	34.3	Pass	Pass	Pass
06/01/22	Head	5600	7519	4.72	33.0	Pass	Pass	Pass
06/01/22	Head	5750	7519	4.88	32.8	Pass	Pass	Pass
05/01/22	Head	2450	7486	1.78	38.5	Pass	Pass	Pass
03/03/23	Head	5600	7486	4.75	33.9	Pass	Pass	Pass
03/04/23	Head	5750	7486	4.91	33.7	Pass	Pass	Pass
WLAN								
06/27/22	Head	2450	7519	1.79	39.9	Pass	Pass	Pass
06/30/22	Head	5250	7519	4.44	34.3	Pass	Pass	Pass
06/01/22	Head	5600	7519	4.72	33.0	Pass	Pass	Pass
06/01/22	Head	5750	7519	4.88	32.8	Pass	Pass	Pass
05/01/22	Head	2450	7486	1.78	38.5	Pass	Pass	Pass
03/03/23	Head	5250	7486	4.75	33.9	Pass	Pass	Pass
03/04/23	Head	5750	7486	4.91	33.7	Pass	Pass	Pass

10.2 System Verification

System verification checks were conducted each day during the SAR assessment. The results are normalized to 1W. Appendix D includes DASY plots for each day during the SAR assessment. The Table below summarizes the daily system check results used for the SAR assessment.

Table 13

Probe Serial #	Tissue Type	Dipole Kit / Serial #	Ref SAR @ 1W (W/kg)	System Check Results Measured (W/kg)	System Check Test Results when normalized to 1W (W/kg)	Tested Date
7511	IEEE/IEC Head	CLA150 / 4005	3.85 ± 10%	3.77	3.77	05/05/23@
				3.65	3.65	05/07/23
				4.02	4.02	05/26/23
				4.11	4.11	06/03/23
7519		SPEAG D2450V2 / 781	49.40 ± 10%	12.20	49.20	05/11/23
			52.70 ± 10%	1.70	53.80	05/12/23
		D5GHzV2_5250MHz / 1026	80.60 ± 10%	7.57	75.70	05/14/23
		SPEAG D5GHzV2_5250MHz / 1026	80.50 ± 10%	7.90	79.00	05/22/23
		SPEAG D5GHzV2_5600MHz / 1027	83.90 ± 10%	9.21	92.10	05/19/23
		SPEAG D5GHzV2_5600MHz / 1027	84.70 ± 10%	8.37	83.70	05/20/23
				9.06	90.60	05/29/23
				9.20	92.00	06/13/23
		D5GHzV2_5750MHz / 1027	80.90 ± 10%	7.58	75.80	05/23/23
7519		SPEAG D5GHzV2_5750MHz / 1027	80.90 ± 10%	8.39	83.90	05/30/23

Note: ‘@’ indicates that tissue test result covers next test day (within 24 hours)

10.3 Equivalent Tissue Test Results

Simulated tissue prepared for SAR measurements is measured daily and within 24 hours prior to actual SAR testing to verify that the tissue is within +/- 5% of target parameters at the center of the transmit band. This measurement is done using the applicable equipment indicated in section 9.0. The Table below summarizes the measured tissue parameters used for the SAR assessment.

Table 14

Frequency (MHz)	Tissue Type	Conductivity Target (S/m)	Dielectric Constant Target	Conductivity Meas. (S/m)	Dielectric Constant Meas.	Tested Date
138	IEEE/ IEC Head	0.75 (0.71-0.79)	52.9 (50.2-55.5)	0.77	51.7	05/05/23@
144		0.76 (0.72-0.79)	52.6 (49.9-55.2)	0.77	51.3	05/05/23@
150		0.76 (0.72-0.8)	52.3 (49.7-54.9)	0.78	50.9	05/05/23@
				0.78	50.0	05/07/23
				0.79	52.6	05/26/23
				0.72	51.9	06/03/23
158		0.77 (0.73-0.8)	51.9 (49.3-54.5)	0.79	50.3	05/05/23@
				0.78	49.5	05/07/23
				0.73	51.5	06/03/23
166		0.77 (0.73-0.81)	51.6 (49-54.1)	0.79	49.8	05/05/23@
173		0.78 (0.74-0.82)	51.2 (48.7-53.8)	0.80	48.8	05/07/23
				0.81	51.6	05/26/23
2412		1.77 (1.68-1.86)	39.3 (35.3-43.2)	1.72	41.2	05/11/23
				1.78	38.8	05/12/23
2437		1.79 (1.7-1.88)	39.2 (35.3-43.1)	1.74	41.2	05/11/23
				1.80	38.8	05/12/23
2450		1.80 (1.71-1.89)	39.2 (35.3-43.1)	1.75	41.1	05/11/23
				1.81	38.8	05/12/23
2462		1.81 (1.72-1.9)	39.2 (35.3-43.1)	1.76	41.1	05/11/23
				1.82	38.7	05/12/23

Note: '@' indicates that tissue test result covers next test day (within 24 hours)

Table 14 (Continued)

Frequency (MHz)	Tissue Type	Conductivity Target (S/m)	Dielectric Constant Target	Conductivity Meas. (S/m)	Dielectric Constant Meas.	Tested Date
5250	IEEE/ IEC Head	4.71 (4.24-5.18)	36.0 (32.4-39.5)	4.47	38.2	05/14/23
				4.39	35.6	05/22/23
5260		4.72 (4.25-5.19)	35.9 (32.3-39.5)	4.48	38.2	05/14/23
5300		4.76 (4.28-5.24)	35.9 (32.3-39.5)	4.45	35.6	05/22/23
5320		4.78 (4.3-5.26)	35.9 (32.3-39.5)	4.47	35.5	05/22/23
5500		4.97 (4.47-5.46)	35.7 (32.1-39.2)	4.71	38.2	05/19/23
				4.51	36.3	05/20/23
5560		5.03 (4.53-5.53)	35.6 (32-39.1)	4.64	33.2	05/29/23
5600		5.07 (4.56-5.58)	35.5 (32-39.1)	4.78	37.5	05/19/23
				4.62	36.2	05/20/23
				4.68	33.1	05/29/23
				4.76	38.3	06/13/23
5640		5.11 (4.6-5.62)	35.5 (31.9-39)	4.72	33.0	05/29/23
				4.80	38.2	06/13/23
5660		5.13 (4.62-5.64)	35.4 (31.9-39)	4.84	37.4	05/19/23
				4.75	33.0	05/29/23
5745		5.22 (4.69-5.74)	35.4 (31.8-38.9)	4.82	36.1	05/23/23
				4.77	37.3	05/30/23
5750		5.22 (4.7-5.74)	35.4 (31.8-38.9)	4.82	36.1	05/23/23
				4.78	37.2	05/30/23
5825		5.3 (4.77-5.83)	35.3 (31.7-38.8)	4.90	35.9	05/23/23
				4.85	37.1	05/30/23

Note: ‘@’ indicates that tissue test result covers next test day (within 24 hours)

11.0 Environmental Test Conditions

The EME Laboratory's ambient environment is well controlled resulting in very stable simulated tissue temperature and therefore stable dielectric properties. Simulated tissue temperature is measured prior to each scan to insure it is within +/ - 2°C of the temperature at which the dielectric properties were determined. The liquid depth within the phantom used for measurements was at least 15cm. Additional precautions are routinely taken to ensure the stability of the simulated tissue such as covering the phantoms when scans are not actively in process in order to minimize evaporation. The lab environment is continuously monitored. The Table below presents the range and average environmental conditions during the SAR tests reported herein:

Table 15

	Target	Measured
Ambient Temperature	18 – 25 ˚C	Range: 21.3 – 23.4˚C Avg. 22.0 ˚C
Tissue Temperature	18 – 25 ˚C	Range: 20.7-22.6˚C Avg. 21.6˚C

Relative humidity target range is a recommended target

The EME Lab RF environment uses a Spectrum Analyzer to monitor for extraneous large signal RF contaminants that could possibly affect the test results. If such unwanted signals are discovered the SAR scans are repeated.

12.0 DUT Test Setup and Methodology

12.1 Measurements

SAR measurements were performed using the DASY system described in section 8.0 using zoom scans. Oval flat phantoms filled with applicable simulated tissue were used for body and face testing.

The Table below includes the step sizes and resolution of area and zoom scans per KDB 865664 requirements.

Table 16

<table>
<tr><th colspan="2">Description</th><th>≤ 3 GHz</th><th>> 3 GHz</th></tr>
<tr><td colspan="2">Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface</td><td>5 ± 1 mm</td><td>½·δ·ln(2) ± 0.5 mm</td></tr>
<tr><td colspan="2">Maximum probe angle from probe axis to phantom surface normal at the measurement location</td><td>30° ± 1°</td><td>20° ± 1°</td></tr>
<tr><td colspan="2" rowspan="2">Maximum area scan spatial resolution: ΔxArea, ΔyArea</td><td>≤ 2 GHz: ≤ 15 mm
2 – 3 GHz: ≤ 12 mm</td><td>3 – 4 GHz: ≤ 12 mm
4 – 6 GHz: ≤ 10 mm</td></tr>
<tr><td colspan="2">When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.</td></tr>
<tr><td colspan="2">Maximum zoom scan spatial resolution: ΔxZoom, ΔyZoom</td><td>≤ 2 GHz: ≤ 8 mm
2 – 3 GHz: ≤ 5 mm*</td><td>3 – 4 GHz: ≤ 5 mm*
4 – 6 GHz: ≤ 4 mm*</td></tr>
<tr><td>Maximum zoom scan spatial resolution, normal to phantom surface</td><td>uniform grid: ΔzZoom(n)</td><td>≤ 5 mm</td><td>3 – 4 GHz: ≤ 4 mm
4 – 5 GHz: ≤ 3 mm
5 – 6 GHz: ≤ 2 mm</td></tr>
<tr><td colspan="4">Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.
* When zoom scan is required and the reported SAR from the area scan based 1-g SAR estimation procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.</td></tr>
</table>

12.2 DUT Configuration(s)

The DUT is a portable device operational at the body and face as described in section 6.0 while using the applicable accessories listed in section 7.0. All accessories listed in section 7.0 of this report were considered when implementing the guidelines specified in KDB 643646.

12.3 DUT Positioning Procedures

The positioning of the device for each body location is described below and illustrated in Appendix G.

12.3.1 Body

The DUT was positioned in normal use configuration against the phantom with the offered body worn accessory as well as with and without the offered audio accessories as applicable.

12.3.2 Head

Not applicable.

12.3.3 Face

The DUT was positioned with its’ front and back sides separated 2.5cm from the phantom.

12.4 DUT Test Channels

The number of test channels was determined by using the following IEEE 1528 equation. The use of this equation produces the same or more test channels compared to the FCC KDB 447498 number of test channels formula.

$$N_c = 2 * roundup[10 * (f_{high} - f_{low}) / f_c] + 1$$

Where

N_c = Number of channels
F_{high} = Upper channel
F_{low} = Lower channel
F_c = Center channel

12.5 SAR Result Scaling Methodology

The calculated 1-gram and 10-gram averaged SAR results indicated as "Max Calc. 1g-SAR" in the data Tables is determined by scaling the measured SAR to account for power leveling variations and drift. Appendix F includes a shortened scan to justify SAR scaling for drift. For this device the "Max Calc. 1g-SAR are scaled using the following formula:

$$Max\_Calc = SAR\_meas \cdot 10^{\frac{-Drift}{10}} \cdot \frac{P\_\max}{P\_\text{int}} \cdot DC$$

P_max = Maximum Power (W)
P_int = Initial Power (W)
Drift = DASY drift results (dB)
SAR_meas = Measured 1-g or 10-g Avg. SAR (W/kg)
DC = Transmission mode duty cycle in % where applicable
50% duty cycle is applied for PTT operation

Note: for conservative results, the following are applied:
If P_int > P_max, then P_max/P_int = 1.
Drift = 1 for positive drift

Additional SAR scaling was applied using the methodologies outlined in FCC KDB 865664 using tissue sensitivity values. SAR was scaled for conditions where the tissue permittivity was measured above the nominal target and for tissue conductivity that was measured below the nominal target. Negative or reduced SAR scaling is not permitted.

12.6 DUT Test Plan

The guidelines and requirements outlined in section 4.0 were used to assess compliance of this device. All modes of operation identified in section 6.0 were considered during the development of the test plan. All tests were performed in CW and LTE modes and 50% duty cycle was applied to PTT configurations in the final results.

Standalone and simultaneous BT testing was assessed in sections 14.3 per the guidelines of KDB 447498.

13.0 DUT Test Data

13.1 LMR assessments at the Body for 150.8-173.4MHz band

Battery PMNN4813A was selected as the default battery for assessments at the Body because it is the thinnest battery (refer to Exhibit 7B for battery illustration). The default battery was used during conducted power measurements for all test channels within FCC allocated frequency range (150.8-173.4MHz) which are listed in Table 17. The channel with the highest conducted power will be identified as the default channel per KDB 643646 (SAR Test for PTT Radios). SAR plots of the highest results per Table (bolded) are presented in Appendix E.

Table 17

Test Freq (MHz)	Power (W)
150.8000	5.87
158.3000	5.87
165.9000	5.89
173.4000	5.89

Assessments at the Body with Body worn PMLN8369A

DUT assessment with offered antennas, default battery and, the above mentioned body worn accessory per KDB 643646. Optional batteries were test per the requirements of KDB 643646. Refer to Table 17 for highest output power channel. SAR plots of the highest results per Table (bolded) is present in Appendix E.

Table 18

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Run#
AN000421A01	PMNN4813A	PMLN8369A	PMMN4128A	150.8000					
				158.3000					
				165.9000	5.75	-0.33	3.02	**1.67**	SAN-AB-230505-03
				173.4000					
Optional batteries									
AN000421A01	PMNN4815A	PMLN8369A	PMMN4128A	165.9000	5.89	-0.09	2.88	1.47	DAN-AB-230505-08

Assessments at the Body with Body worn PMLN8370A

DUT assessment with offered antennas, default battery and, optional body worn accessory per KDB 643646. Optional batteries were tested per the requirements of KDB 643646. Refer to Table 17 for highest output power channel.

Table 19

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Run#
AN000421A01	PMNN4813A	PMLN8370A	PMMN4128A	150.8000					
				158.3000					
				165.9000	5.77	-0.04	3.01	1.55	SAN-AB-230505-04
				173.4000					
Optional batteries									
AN000421A01	PMNN4815A	PMLN8370A	PMMN4128A	165.9000	5.89	-0.19	3.09	1.62	DAN-AB-230505-09

Assessment at the Body with other audio accessories

Assessment per "KDB 643646 Body SAR Test Consideration for Audio Accessories without Built-in Antenna; Sec 1, A. when overall < 4.0 W/kg, SAR tested for that audio accessory is not necessary." This was applicable to all remaining accessories.

Assessment of wireless BT configuration

Assessment using the overall highest SAR configuration at the body from above without an audio accessory attached.

Table 20

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Run#
AN000421A01	PMNN4813A	PMLN8369A	None	150.8000					
				158.3000					
				165.9000	5.87	-0.71	2.34	1.38	DAN-AB-230505-06
				173.4000					

13.2 LMR assessments at the Face for 150.8-173.4MHz band

Battery PMNN4815A was selected as the default battery for assessments at the Face because it has the highest capacity (refer to Exhibit 7B for battery illustration). The default battery was used during conducted power measurements for all test channels within FCC allocated frequency range (150.8-173.4MHz) which are listed in Table 21. The channel with the highest conducted power will be identified as the default channel per KDB 643646 (SAR Test for PTT Radios).

Table 21

Test Freq (MHz)	Power (W)
150.8000	5.86
158.3000	5.85
165.9000	5.88
173.4000	5.87

DUT assessment with offered antennas, default battery with front of DUT positioned 2.5cm facing phantom per KDB 643646. Optional batteries were tested per the requirements of KDB 643646. Refer to Table 61 for highest output power channel. SAR plots of the highest results per Table (bolded) is present in the Appendix E.

Table 22

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Run#
AN000421A01	PMNN4815A	None @ front	None	150.8000					
				158.3000					
				165.9000	5.89	-0.40	1.51	0.83	DAN-FACE-230505-07
				173.4000					
Optional batteries									
AN000421A01	PMNN4813A	None @ front	None	173.4000	5.87	-0.96	2.06	**1.29**	SAN-FACE-230507-13

13.3 Assessment for outside FCC Frequency range.

Assessment of outside FCC frequency range using highest SAR configuration from above. SAR plots of the highest results per Table (bolded) is present in the Appendix E.

Table 23

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Run#
Body									
AN000421A01	PMNN4813A	PMLN8369A	PMMN4128A	138.0000	5.89	-0.29	1.60	**0.86**	DAN-AB-230505-11
				144.4000	5.90	-1.02	0.66	0.42	DAN-AB-230506-01@
Face									
AN000421A01	PMNN4813A	None @ front	None	138.0000	5.89	-0.05	1.60	0.81	DAN-FACE-230506-03@
				144.4000	5.90	-0.40	1.83	**1.00**	DAN-FACE-230506-04@

13.4 Assessment for ISED, Canada

Based on the assessment results for body and face per KDB643646, additional tests were required for ISED, Canada frequency range (138-74MHz). The overall highest test configuration from 150.8-173.4MHz band was repeat with test frequencies 138.0125MHz and 144.4000MHz. The SAR results are in Table below.

Table 24

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Run#
Body									
AN000421A01	PMNN4813A	PMLN8369A	PMMN4128A	138.0000	5.89	-0.29	1.60	0.86	DAN-AB-230505-11
				144.4000	5.90	-1.02	0.66	0.42	DAN-AB-230506-01@
Face									
AN000421A01	PMNN4813A	None @ front	None	138.0000	5.89	-0.05	1.60	0.81	DAN-FACE-230506-03@
				144.4000	5.90	-0.40	1.83	1.00	DAN-FACE-230506-04@

As per ISED Notice 2016-DRS001, additional tests were required for the low, mid and high frequency channels for the configuration with the highest SAR value. The SAR results are in Table below. SAR plots of the highest results per Table (bolded) is present in the Appendix E.

Table 25

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Run#
Body									
AN000421A01	PMNN4813A	PMLN8369A	PMMN4128A	138.0000	5.89	-0.29	1.60	0.86	DAN-AB-230505-11
				158.3000	5.83	-0.10	4.06	**2.20**	AMF-AB-230507-07
				173.4000	5.90	-0.19	2.92	1.53	SAN-AB-230526-07
Face									
AN000421A01	PMNN4813A	None @ front	None	138.0000	5.89	-0.05	1.60	0.81	DAN-FACE-230506-03@
				158.3000	5.90	-0.01	1.38	0.69	AMF-FACE-230506-08@
				173.4000	5.87	-0.96	2.06	**1.29**	SAN-FACE-230507-13

14.0 DUT Test Data for WLAN

SAR test reduction is applied using the following criteria according to KDB 248227 D01:

a. For 2.4GHz 802.11 g/n SAR testing is not required when then highest reported SAR for DSSS is adjusted by ratio of OFDM to DSSS specified maximum output power and adjusted SAR is ≤1.2 W/kg.

b. U-NII-1 SAR testing not required when U-NII-2A band highest reported SAR for a test configuration is ≤1.2 W/kg.

c. For all positions/configurations, when reported SAR is >0.8W/kg, SAR is measured for these test positions/configurations on the subsequent next highest measured output power channel(s) until the reported SAR is ≤1.2 W/kg or all required test positions/configurations are tested.

14.1 Assessment for WLAN 2.4GHz (802.11 b/g/n) for FCC

Output Power Data

These power measurements were used to determine the necessary modes for SAR testing according to KDB 248227.

Table 26

Band	802.11	Ch. BW	Ch.	Freq. (MHz)	Measured conducted power (W)
2.4 GHz	b	20	1	2412	0.031
			6	2437	0.031
			11	2462	0.030
	g	20	1	2412	0.025
			6	2437	0.047
			11	2462	0.023
	n	20	1	2412	0.026
			6	2437	0.039
			11	2462	0.024

Table below indicated the SAR results that have performed based on previous highest configurations. SAR plots of the highest results per Table (bolded) is present in the Appendix E.

Table 27

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Run#
Body									
AN000410A01	PMNN4813A	PMLN8369A	None	2412.0000	0.052	-0.30	0.114	0.150	Previous Highest Configuration BAD-AB-220610-01#
AN000410A01	PMNN4813A	PMLN8369A	None	2412.0000	0.031	-0.18	0.053	**0.071**	MFR(MHN)-AB-230511-08

Table 27 (Continued)

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Run#
Face									
AN000410A01	PMNN4813A	Radio @ front 2.5cm	None	2412.0000	0.047	0.07	0.027	0.037	Previous Highest Configuration BL-FACE-220702-02
AN000410A01	PMNN4813A	Radio @ front 2.5cm	None	2412.0000	0.031	-0.21	0.018	**0.024**	IRA-FACE-230512-02

Assessments for ISED Canada

Based on the assessment results for body and face per KDB643646 D01, additional tests were not required for the Industry Canada frequency range (2412-2462 MHz) as the testing performed is in compliance with Industry Canada frequency range.

As per ISED Notice 2016-DRS001, additional tests were required for the low, mid and high frequency channels for the configuration with the highest SAR value. The SAR results are in Tables below. SAR plots of the highest results per Table (bolded) is present in the Appendix E.

Table 28

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Run#
WLAN 24GHz 802.11b									
Body									
AN000410A01	PMNN4813A	PMLN8369A	None	2412.0000	0.031	-0.18	0.053	0.071	MFR(MHN)-AB-230511-08
				2437.0000	0.031	-0.41	0.061	**0.087**	IRA-AB-230511-10
				2462.0000	0.030	-0.32	0.049	0.071	IRA-AB-230511-11
Face									
AN000410A01	PMNN4813A	Radio @ front 2.5cm	None	2412.0000	0.031	-0.21	0.018	**0.024**	IRA-FACE-230512-02
				2437.0000	0.031	0.56	0.013	0.017	MFR(MHN)-FACE-230512-05
				2462.0000	0.030	-0.02	0.007	0.010	MFR(MHN)-FACE-230512-07

14.2 Assessment for WLAN 5.0 GHz (802.11 a/n/ac) for FCC

Output Power Data

These power measurements were used to determine the necessary modes for SAR testing according to KDB 248227.

Table 29

Band	802.11	Ch. BW	Ch.	Freq. (MHz)	Measured conducted power (W)
U-NII-1 (5.15-5.25GHz)	a	20	36	5180	0.025
			40	5200	0.025
			44	5220	0.025
			48	5240	0.023
	n	20	36	5180	0.021
			40	5200	0.022
			44	5220	0.022
			48	5240	0.021
	ac	20	36	5180	0.017
			40	5200	0.018
			44	5220	0.018
			48	5240	0.017
U-NII-2A (5.25-5.35GHz)	a	20	52	5260	0.026
			56	5280	0.024
			60	5300	0.025
			64	5320	0.019
	n	20	52	5260	0.020
			56	5280	0.019
			60	5300	0.019
			64	5320	0.018
	ac	20	52	5260	0.016
			56	5280	0.015
			60	5300	0.016
			64	5320	0.015
			128	5640	0.016

Table 29 (Continued)

Band	802.11	Ch. BW	Ch.	Freq. (MHz)	Measured conducted power (W)
U-NII-2C (5.47-5.65 GHz)	a	20	100	5500	0.007
			112	5560	0.024
			116	5580	0.024
			128	5640	0.024
	n	20	100	5500	0.010
			112	5560	0.020
			116	5580	0.020
			128	5640	0.020
	ac	20	100	5500	0.008
			112	5560	0.017
			116	5580	0.016
U-NII-3 (5.65-5.85 GHz)	a	20	132	5660	0.024
			149	5745	0.019
			165	5825	0.018
	n	20	132	5660	0.020
			149	5745	0.020
			165	5825	0.018
	ac	20	132	5660	0.016
			149	5745	0.016
			165	5825	0.015

Table below indicated the SAR results that have performed based on previous highest configurations. SAR plots of the highest results per Table (bolded) is present in the Appendix E.

Assessments at the Body U-NII-2A (5.25-5.35GHz)

Table 30

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Run#
802.11a, 20MHz BW - Body									
AN000410A01	PMNN4813A	PMLN8369A	None	5260.0000	0.020	-0.44	0.029	0.048	Previous Highest Configuration MFR-AB-220212-08
AN000410A01	PMNN4813A	PMLN8369A	None	5260.0000	0.026	-0.04	0.028	**0.032**	ZIQ-AB-230514-03

Table 30 (Continued)

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Run#
802.11a, 20MHz BW - Face									
AN000410A01	PMNN4813A	Radio @ front 2.5cm	None	5260.0000	0.020	0.16	0.027	0.040	Previous Highest Configuration BL-FACE-220701-11
AN000410A01	PMNN4815A	Radio @ front 2.5cm	None	5260.0000	0.023	0.06	0.020	**0.025**	ZIQ-FACE-230516-06

Assessments at the Body U-NII-2C (5.47-5.65 GHz)

Table 31

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Run#
802.11a, 20MHz BW - Body									
AN000410A01	PMNN4813A	PMLN8370A	None	5640.0000	0.020	0.37	0.023	0.033	Previous Highest Configuration MFR-AB-220202-09#
AN000410A01	PMNN4813A	PMLN8370A	None	5640.0000	0.024	-0.035	0.014	**0.018**	SHM-AB-230613-07
802.11a, 20MHz BW - Face									
AN000410A01	PMNN4813A	Radio @ front 2.5cm	None	5640.0000	0.020	-0.018	0.037	0.056	Previous Highest Configuration SAN-FACE-220203-02#
AN000410A01	PMNN4815A	Radio @ front 2.5cm	None	5640.0000	0.023	-0.61	0.024	**0.035**	IRA-FACE-230521-07

Assessments at the Body U-NII-3 (5.65-5.85 GHz)

Table 32

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Run#
802.11a, 20MHz BW - Body									
AN000410A01	PMNN4813A	PMLN8370A	None	5660.0000	0.023	0.11	0.033	0.043	Previous Highest Configuration SAN-AB-220213-03#
AN000410A01	PMNN4813A	PMLN8370A	None	5660.0000	0.024	0.31	0.009	**0.011**	IRA-AB-230519-06
802.11a, 20MHz BW - Face									
AN000410A01	PMNN4813A	Radio @ front 2.5cm	None	5660.0000	0.023	-0.40	0.043	0.061	Previous Highest ConfigurationAF-FACE-220204-12
AN000410A01	PMNN4813A	Radio @ front 2.5cm	None	5660.0000	0.024	-0.34	0.023	**0.030**	BL-FACE-230529-08

Assessments for ISED Canada

Based on the assessment results for body and face per KDB643646 D01, additional tests were not required for the Industry Canada frequency range (U-NII-2A) as the testing performed is in compliance with Industry Canada frequency range.

As per ISED Notice 2016-DRS001, additional tests were required for the low, mid and high frequency channels for the configuration with the highest SAR value. The SAR results are in Tables below. SAR plots of the highest results per Table (bolded) is present in the Appendix E.

Assessments at the Body U-NII-2A (5.25-5.35GHz)

Table 33

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Run#
802.11a, 20MHz BW									
Body									
AN000410A01	PMNN4813A	PMLN8369A	None	5260.0000	0.026	-0.04	0.028	**0.032**	ZIQ-AB-230514-03
				5300.0000	0.025	0.02	0.018	0.021	MFR(MHN)-AB-230522-08
				5320.0000	0.019	0.24	0.012	0.018	ZIQ-AB-230522-09
Face									
AN000410A01	PMNN4813A	Radio @ front 2.5cm	None	5260.0000	0.023	0.06	0.020	**0.025**	ZIQ-FACE-230516-06
				5300.0000	0.025	0.33	0.015	0.018	ZIQ-FACE-230522-10
				5320.0000	0.019	-0.36	0.010	0.017	ZIQ-FACE-230522-11

Assessments at the Body U-NII-2C (5.47-5.65 GHz)

Table 34

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Run#
802.11a, 20MHz BW									
Body									
AN000410A01	PMNN4813A	PMLN8370A	None	5500.0000	0.007	-0.19	0.000	0.000*	IRA-AB-230519-07
				5560.0000	0.024	-0.27	0.011	0.014	EMR-AB-230529-10
				5640.0000	0.024	-0.35	0.014	**0.018**	SHM-AB-230613-07
Face`									
AN000410A01	PMNN4813A	Radio @ front 2.5cm	None	5500.0000	0.007	-0.87*	0.000	0.000*	ZIQ-FACE-230520-10
				5560.0000	0.024	0.22	0.013	0.015	BL-FACE-230529-07
				5640.0000	0.023	-0.61*	0.024	**0.035**	IRA-FACE-230521-07

Note: * Measured SAR value is low enough where a SAR drift measurement was not practical

Assessments at the Body U-NII-3 (5.65-5.85 GHz)

Table 35

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Run#
802.11a, 20MHz BW									
Body									
AN000410A01	PMNN4813A	PMLN8370A	None	5660.0000	0.024	0.31	0.009	**0.011**	IRA-AB-230519-06
				5745.0000	0.019	-1.44*	0.007	0.012	IRA-AB-230523-08
				5825.0000	0.018	0.00	0.000	0.000*	IRA-AB-230523-09
AN000410A01	PMNN4813A	Radio @ front 2.5cm	None	5660.0000	0.024	-0.34	0.023	**0.030**	BL-FACE-230529-08
				5745.0000	0.019	0.50*	0.017	0.020	SHM-FACE-230530-07
				5825.0000	0.018	-1.78*	0.011	0.021	SHM-FACE-230530-08

Note: * Measured SAR value is low enough where a SAR drift measurement was not practical

14.3 Assessment at the Bluetooth LE band

14.3.1 FCC Requirement

Per guidelines in KDB 447498 D04 Interim General RF Exposure Guidance v01, SAR-based thresholds are derived based on frequency, power and separation distance of the RF source.

The SAR-based exemption formula indicated below, applies for single fixed, mobile, and portable RF sources with available maximum time-averaged power or effective radiated power (ERP), whichever is greater, or less than or equal to the threshold *P*th (mW) refer to Table B.2.

*P*th (mW) = $ERP_{20cm}(\frac{d}{20})^x \; for \; distance \; d \leq 20 \; cm$

Where $x = -log10 \left(\frac{60}{ERP_{20}\sqrt{f}}\right)$

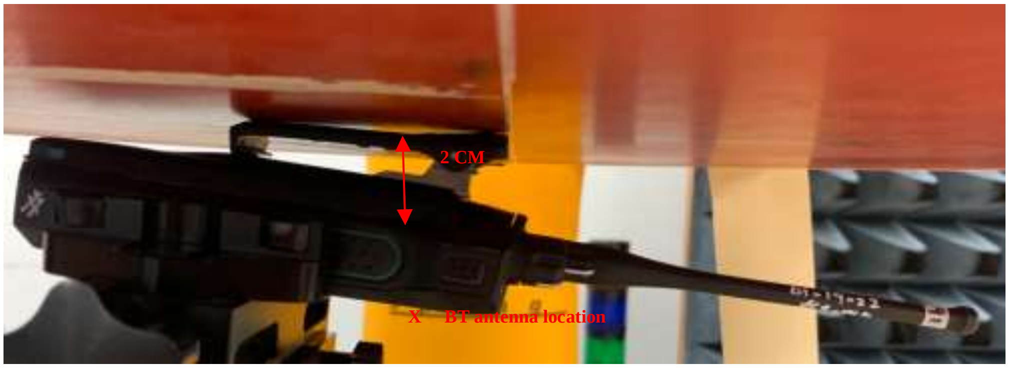
This method shall only be used at separation distances from 0.5 cm to 40 cm and at

frequencies from 0.3 GHz to 6 GHz (inclusive).

Table B.2—Example Power Thresholds (mW)

	Distance (mm)									
Frequency (MHz)	5	10	15	20	25	30	35	40	45	50
300	39	65	88	110	129	148	166	184	201	217
450	22	44	67	89	112	135	158	180	203	226
835	9	25	44	66	90	116	145	175	207	240
1900	3	12	26	44	66	92	122	157	195	236
2450	3	10	22	38	59	83	111	143	179	219
3600	2	8	18	32	49	71	96	125	158	195
5800	1	6	14	25	40	58	80	106	136	169

The closest separation distance from the outer housing (location of the antenna will be indicated in Ex7B) to the phantom is 2 cm with a belt clip, as indicated in the picture below.



The BT LE maximum power of the device is 14.13 mW with 77% duty cycle, therefore the standalone Bluetooth LE transmitter operates at maximum time-averaged power:
= 14.13 mW * 77%
= 10.88 mW or 10.37 dBm

According to Table B.2, at the distance 20 mm, the power threshold, *P*th at frequency 2450 MHz is 38 mW.

Since the maximum time-averaged power of the device is lower than the power threshold, routine evaluation can be exempted.

14.3.2 ISED Canada Requirement

Based on RSS-102 Issue 5, exemption limits for SAR evaluation for controlled devices at Bluetooth frequency band with separation distance ≤ 5 mm was 20 mW.

Standalone Bluetooth LE transmitter operates at maximum time-averaged power:
= 14.13 mW * 77%
= 10.88 mW or 10.37 dBm

Equivalent isotropically radiated power (EIRP):
= Maximum conducted power, dBm + Antenna gain, dBi
= 10.37 dBm + (1.48 dBi)
= 11.85 dBm or 15.31 mW

Since the output power level, 15.31 mW is below the threshold power level of 20 mW, SAR test is not required for Bluetooth LE.

15.0 Shorten Scan Assessment

A "shortened" scan using the highest SAR configuration overall from above was performed to validate the SAR drift of the full DASY5™ coarse and zoom scans. Note that the shortened scan represents the zoom scan performance result; this is obtained by first running a coarse scan to find the peak area and then, using a newly charged battery, a zoom scan only was performed. The results of the shortened cube scan presented in Appendix D demonstrate that the scaling methodology used to determine the calculated SAR results presented herein are valid. The SAR result from the Table below is provided in Appendix F.

Table 36

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Run#
AN000421A01	PMNN4813A	PMLN8369A	PMMN4128A	158.3000	5.85	-0.06	3.83	**1.96**	DAN-AB-230603-10

16.0 Simultaneous Transmission

The Table below summarizes the simultaneous transmission conditions for this device.

Table 37

Exposure Conditions	Item	Capable Simultaneous Transmit Configurations
Body-Worn	1	LMR + WLAN 2.4 GHz
	2	LMR + WLAN 5 GHz
	3	LMR + BT
Face	1	LMR + WLAN 2.4 GHz
	2	LMR + WLAN 5 GHz
	3	LMR + BT

BT, WLAN 2.4 GHz and 5GHz are sharing the same antenna, only one technology to transmit at a single time.

16.1 Simultaneous transmission exclusion for BT LE

Per guidelines in KDB 447498 D04 Interim General RF Exposure Guidance v01, SAR-based exemption may be considered for test exemption for portable device exposure conditions; therefore, the following formula was used to determine exemption for simultaneous transmission:

$$[(P_i / P_{th}) + (Evaluated_k \,/\, Exposure\ Limit_k)] = 0.56, \text{ which is} < 1$$

where:
the available maximum time-averaged power (P_i)
= 10.88 mW (14.13 mW * 77% duty cycle)

the exemption threshold power (Pth) according to Table B.2 in 13.10 = 38 mW

the maximum reported SAR portable RF source k in the device from an existing evaluation ($Evaluated_k$) = 2.20 W/kg

the occupational/controlled specific absorption rate (SAR) limit for portable sources ($Exposure\ Limit_k$) = 8 W/kg

Per the result from the calculation above, simultaneous exclusion is applied and therefore SAR results are not reported herein.

16.2 Simultaneous Transmission for LMR, BT, WLAN 2.4GHz and 5GHz.

The Table below summarizes the simultaneous transmissions between LMR and WLAN bands.

Table 38

Exposure condition	Standalone SAR (W/kg)			Sum of SAR (W/kg)	
	LMR	2.4GHz	5GHz	LMR + 2.4GHz	LMR + 5GHz
Body worn Exposure	2.20	0.087	0.032	2.29	2.23
Face Exposure	1.29	0.024	0.035	1.31	1.33

The test results clearly demonstrate compliance with FCC Occupational/Controlled RF Exposure limits of 8 W/kg averaged over 1 gram per the requirements of FCC 47 CFR § 2.1093 and RSS-102 (Issue 5).

17.0 Results Summary

Based on the test guidelines from section 4.0 and satisfying frequencies within FCC bands and ISED Canada Frequency bands, the highest Operational Maximum Calculated 1-gram average SAR values found for this filing:

Table 39

Designator	Frequency band (MHz)	Max Calc at Body (W/kg)	Max Calc at Face (W/kg)
		1g-SAR	1g-SAR
FCC			
LMR	150.8-173.4	2.20	1.29
WLAN	2412-2462	0.087	0.024
	5180 - 5825	0.032	0.035
Simultaneous Results		2.29	1.33
ISED			
LMR	138-144 148-149.9 150.05-174	2.20	1.29
WLAN	2412-2462	0.094	0.024
	5180 - 5825	0.032	0.035
Simultaneous Results		2.29	1.33
Overall			
LMR	150.8-173.4	2.20	1.29
WLAN	2412-2472	0.094	0.024
	5180 - 5825	0.032	0.035
Simultaneous Results		2.29	1.33

All results are scaled to the maximum output power.

18.0 Variability Assessment

Per the guidelines in KDB 865664 SAR variability assessment is not required because SAR results are below 4.0W/kg (Occupational) or 0.8W/kg (General population) Choose applicable condition.

19.0 System Uncertainty

A system uncertainty analysis is not required for this report per KDB 865664 because the highest report SAR value for Occupational exposure is less than 7.5W/kg.

Per the guidelines of ISO/IEC 17025 a reported system uncertainty is required and therefore measurement uncertainty budget is included in Appendix A.

Appendix A

Measurement Uncertainty Budget

Uncertainty Budget for System Validation (dipole & flat phantom) for 150 MHz

a	*b*	*c*	*d*	*e = f(d,k)*	*f*	*g*	*h = c x f / e*	*i = c x g / e*	*k*
Uncertainty Component	IEEE 1528 section	**Tol. (± %)**	**Prob. Dist.**	**Div.**	c_i (1 g)	c_i (10 g)	**1 g** u_i (±%)	**10 g** u_i (±%)	v_i
Measurement System									
Probe Calibration	E.2.1	6.0	N	1.00	1	1	6.0	6.0	∞
Axial Isotropy	E.2.2	4.7	R	1.73	1	1	2.7	2.7	∞
Spherical Isotropy	E.2.2	9.6	R	1.73	0	0	0.0	0.0	∞
Boundary Effect	E.2.3	1.0	R	1.73	1	1	0.6	0.6	∞
Linearity	E.2.4	4.7	R	1.73	1	1	2.7	2.7	∞
System Detection Limits	E.2.5	1.0	R	1.73	1	1	0.6	0.6	∞
Readout Electronics	E.2.6	0.3	N	1.00	1	1	0.3	0.3	∞
Response Time	E.2.7	1.1	R	1.73	1	1	0.6	0.6	∞
Integration Time	E.2.8	0.0	R	1.73	1	1	0.0	0.0	∞
RF Ambient Conditions - Noise	E.6.1	3.0	R	1.73	1	1	1.7	1.7	∞
RF Ambient Conditions - Reflections	E.6.1	0.0	R	1.73	1	1	0.0	0.0	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.4	R	1.73	1	1	0.2	0.2	∞
Probe Positioning w.r.t. Phantom	E.6.3	1.4	R	1.73	1	1	0.8	0.8	∞
Max. SAR Evaluation (ext., int., avg.)	E.5	3.4	R	1.73	1	1	2.0	2.0	∞
Dipole									
Dipole Axis to Liquid Distance	8, E.4.2	2.0	R	1.73	1	1	1.2	1.2	∞
Input Power and SAR Drift Measurement	8, 6.6.2	5.0	R	1.73	1	1	2.9	2.9	∞
Phantom and Tissue Parameters									
Phantom Uncertainty	E.3.1	4.0	R	1.73	1	1	2.3	2.3	∞
Liquid Conductivity (target)	E.3.2	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity (measurement)	E.3.3	3.3	R	1.73	0.64	0.43	1.2	0.8	∞
Liquid Permittivity (target)	E.3.2	5.0	R	1.73	0.6	0.49	1.7	1.4	∞
Liquid Permittivity (measurement)	E.3.3	1.9	R	1.73	0.6	0.49	0.6	0.5	∞
Combined Standard Uncertainty			RSS				9	9	99999
Expanded Uncertainty (95% CONFIDENCE LEVEL)			*k*=2				18	17	

Notes for uncertainty budget Tables:
a) Column headings *a*-*k* are given for reference.
b) Tol. - tolerance in influence quantity.
c) Prob. Dist. – Probability distribution
d) N, R - normal, rectangular probability distributions
e) Div. - divisor used to translate tolerance into normally distributed standard uncertainty
f) *ci* - sensitivity coefficient that should be applied to convert the variability of the uncertainty component into a variability of SAR.
g) *ui* – SAR uncertainty
h) *vi* - degrees of freedom for standard uncertainty and effective degrees of freedom for the expanded uncertainty

Uncertainty Budget for System Validation (dipole & flat phantom) for 3 to 6 GHz

a	*b*	*c*	*d*	*e = f(d,k)*	*f*	*g*	*h = c x f / e*	*i = c x g / e*	*k*
Uncertainty Component	**IEEE 1528 section**	**Tol. (± %)**	**Prob. Dist.**	**Div.**	**c_i (1 g)**	**c_i (10 g)**	**1 g u_i (±%)**	**10 g u_i (±%)**	**v_i**
Measurement System									
Probe Calibration	E.2.1	7.0	N	1.00	1	1	7.0	7.0	∞
Axial Isotropy	E.2.2	4.7	R	1.73	1	1	2.7	2.7	∞
Spherical Isotropy	E.2.2	9.6	R	1.73	0	0	0.0	0.0	∞
Boundary Effect	E.2.3	2.0	R	1.73	1	1	1.2	1.2	∞
Linearity	E.2.4	4.7	R	1.73	1	1	2.7	2.7	∞
System Detection Limits	E.2.5	1.0	R	1.73	1	1	0.6	0.6	∞
Readout Electronics	E.2.6	0.3	N	1.00	1	1	0.3	0.3	∞
Response Time	E.2.7	1.1	R	1.73	1	1	0.6	0.6	∞
Integration Time	E.2.8	0.0	R	1.73	1	1	0.0	0.0	∞
RF Ambient Conditions - Noise	E.6.1	3.0	R	1.73	1	1	1.7	1.7	∞
RF Ambient Conditions - Reflections	E.6.1	0.0	R	1.73	1	1	0.0	0.0	∞
Probe Positioner Mechanical Tolerance	E.6.2	1.0	R	1.73	1	1	0.6	0.6	∞
Probe Positioning w.r.t. Phantom	E.6.3	4.0	R	1.73	1	1	2.3	2.3	∞
Max. SAR Evaluation (ext., int., avg.)	E.5	2.1	R	1.73	1	1	1.2	1.2	∞
Dipole									
Dipole Axis to Liquid Distance	8, E.4.2	2.0	R	1.73	1	1	1.2	1.2	∞
Input Power and SAR Drift Measurement	8, 6.6.2	5.0	R	1.73	1	1	2.9	2.9	∞
Phantom and Tissue Parameters									
Phantom Uncertainty	E.3.1	4.0	R	1.73	1	1	2.3	2.3	∞
Dielectric Parameter Correction	--	1.4	N	1.00	1	0.79	1.4	1.1	∞
Liquid Conductivity (measurement)	E.3.3	3.3	R	1.73	0.64	0.43	1.2	0.8	∞
Liquid Permittivity (measurement)	E.3.3	1.9	R	1.73	0.6	0.49	0.6	0.5	∞
Combined Standard Uncertainty			RSS				10	10	99999
Expanded Uncertainty (95% CONFIDENCE LEVEL)			*k*=2				19	19	

Notes for uncertainty budget Tables:
a) Column headings *a*-*k* are given for reference.
b) Tol. - tolerance in influence quantity.
c) Prob. Dist. – Probability distribution
d) N, R - normal, rectangular probability distributions
e) Div. - divisor used to translate tolerance into normally distributed standard uncertainty
f) *ci* - sensitivity coefficient that should be applied to convert the variability of the uncertainty component into a variability of SAR.
g) *ui* – SAR uncertainty
h) *vi* - degrees of freedom for standard uncertainty and effective degrees of freedom for the expanded uncertainty

Uncertainty Budget for Device Under Test, for 100 MHz to 800 MHz

a	*b*	*c*	*d*	*e = f(d,k)*	*f*	*g*	*h = c x f / e*	*i = c x g / e*	*k*
Uncertainty Component	**IEEE 1528 section**	**Tol. (± %)**	**Prob Dist**	**Div.**	c_i (1 g)	c_i (10 g)	**1 g** u_i (±%)	**10 g** u_i (±%)	v_i
Measurement System									
Probe Calibration	E.2.1	6.0	N	1.00	1	1	6.0	6.0	∞
Axial Isotropy	E.2.2	4.7	R	1.73	0.707	0.707	1.9	1.9	∞
Hemispherical Isotropy	E.2.2	9.6	R	1.73	0.707	0.707	3.9	3.9	∞
Boundary Effect	E.2.3	1.0	R	1.73	1	1	0.6	0.6	∞
Linearity	E.2.4	4.7	R	1.73	1	1	2.7	2.7	∞
System Detection Limits	E.2.5	1.0	R	1.73	1	1	0.6	0.6	∞
Readout Electronics	E.2.6	0.3	N	1.00	1	1	0.3	0.3	∞
Response Time	E.2.7	1.1	R	1.73	1	1	0.6	0.6	∞
Integration Time	E.2.8	1.1	R	1.73	1	1	0.6	0.6	∞
RF Ambient Conditions - Noise	E.6.1	3.0	R	1.73	1	1	1.7	1.7	∞
RF Ambient Conditions - Reflections	E.6.1	0.0	R	1.73	1	1	0.0	0.0	∞
Probe Positioner Mech. Tolerance	E.6.2	0.4	R	1.73	1	1	0.2	0.2	∞
Probe Positioning w.r.t Phantom	E.6.3	1.4	R	1.73	1	1	0.8	0.8	∞
Max. SAR Evaluation (ext., int., avg.)	E.5	3.4	R	1.73	1	1	2.0	2.0	∞
Test sample Related									
Test Sample Positioning	E.4.2	3.2	N	1.00	1	1	3.2	3.2	29
Device Holder Uncertainty	E.4.1	4.0	N	1.00	1	1	4.0	4.0	8
SAR drift	6.6.2	5.0	R	1.73	1	1	2.9	2.9	∞
Phantom and Tissue Parameters									
Phantom Uncertainty	E.3.1	4.0	R	1.73	1	1	2.3	2.3	∞
Liquid Conductivity (target)	E.3.2	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity (measurement)	E.3.3	3.3	N	1.00	0.64	0.43	2.1	1.4	∞
Liquid Permittivity (target)	E.3.2	5.0	R	1.73	0.6	0.49	1.7	1.4	∞
Liquid Permittivity (measurement)	E.3.3	1.9	N	1.00	0.6	0.49	1.1	0.9	∞
Combined Standard Uncertainty			RSS				11	11	419
Expanded Uncertainty (95% CONFIDENCE LEVEL)			*k*=2				22	22	

Notes for uncertainty budget Tables:
a) Column headings *a*-*k* are given for reference.
b) Tol. - tolerance in influence quantity.
c) Prob. Dist. – Probability distribution
d) N, R - normal, rectangular probability distributions
e) Div. - divisor used to translate tolerance into normally distributed standard uncertainty
f) *ci* - sensitivity coefficient that should be applied to convert the variability of the uncertainty component into a variability of SAR.
g) *ui* – SAR uncertainty
h) *vi* - degrees of freedom for standard uncertainty and effective degrees of freedom for the expanded uncertainty

Uncertainty Budget for Device Under Test for 3 to 6 GHz

a	*b*	*c*	*d*	*e = f(d,k)*	*f*	*g*	*h = c x f / e*	*i = c x g / e*	*k*
Uncertainty Component	IEEE 1528 section	**Tol. (± %)**	**Prob Dist**	**Div.**	c_i (1 g)	c_i (10 g)	**1 g** u_i (±%)	**10 g** u_i (±%)	v_i
Measurement System									
Probe Calibration	E.2.1	7.0	N	1.00	1	1	7.0	7.0	∞
Axial Isotropy	E.2.2	4.7	R	1.73	0.707	0.707	1.9	1.9	∞
Hemispherical Isotropy	E.2.2	9.6	R	1.73	0.707	0.707	3.9	3.9	∞
Boundary Effect	E.2.3	2.0	R	1.73	1	1	1.2	1.2	∞
Linearity	E.2.4	4.7	R	1.73	1	1	2.7	2.7	∞
System Detection Limits	E.2.5	1.0	R	1.73	1	1	0.6	0.6	∞
Readout Electronics	E.2.6	0.3	N	1.00	1	1	0.3	0.3	∞
Response Time	E.2.7	1.1	R	1.73	1	1	0.6	0.6	∞
Integration Time	E.2.8	1.1	R	1.73	1	1	0.6	0.6	∞
RF Ambient Conditions - Noise	E.6.1	3.0	R	1.73	1	1	1.7	1.7	∞
RF Ambient Conditions - Reflections	E.6.1	0.0	R	1.73	1	1	0.0	0.0	∞
Probe Positioner Mech. Tolerance	E.6.2	1.0	R	1.73	1	1	0.6	0.6	∞
Probe Positioning w.r.t Phantom	E.6.3	4.0	R	1.73	1	1	2.3	2.3	∞
Max. SAR Evaluation (ext., int., avg.)	E.5	2.1	R	1.73	1	1	1.2	1.2	∞
Test sample Related									
Test Sample Positioning	E.4.2	3.2	N	1.00	1	1	3.2	3.2	29
Device Holder Uncertainty	E.4.1	4.0	N	1.00	1	1	4.0	4.0	8
SAR drift	6.6.2	5.0	R	1.73	1	1	2.9	2.9	∞
Phantom and Tissue Parameters									
Phantom Uncertainty	E.3.1	4.0	R	1.73	1	1	2.3	2.3	∞
Dielectric Parameter Correction	--	1.4	N	1.00	1	0.79	1.4	1.1	∞
Liquid Conductivity (measurement)	E.3.3	3.3	N	1.00	0.64	0.43	2.1	1.4	∞
Liquid Permittivity (measurement)	E.3.3	1.9	N	1.00	0.6	0.49	1.1	0.9	∞
Combined Standard Uncertainty			RSS				12	12	504
Expanded Uncertainty (95% CONFIDENCE LEVEL)			*k*=2				23	23	

Notes for uncertainty budget Tables:
a) Column headings *a*-*k* are given for reference.
b) Tol. - tolerance in influence quantity.
c) Prob. Dist. – Probability distribution
d) N, R - normal, rectangular probability distributions
e) Div. - divisor used to translate tolerance into normally distributed standard uncertainty
f) *ci* - sensitivity coefficient that should be applied to convert the variability of the uncertainty component into a variability of SAR.
g) *ui* – SAR uncertainty
h) *vi* - degrees of freedom for standard uncertainty and effective degrees of freedom for the expanded uncertainty