MOTOROLA SOLUTIONS

MS ISO/IEC 17025 TESTING SAMM No. 0826

ACCREDITED CERTIFICATE 2518.05

DECLARATION OF COMPLIANCE SAR ASSESSMENT Part 1 of 2

Motorola Solutions Inc.
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Date of Report: 9/11/2021
Report Revision: C

Responsible Engineer:	Puteri Alifah Ilyana Binti Nor Rahim (EME Engineer)
Report Author:	Puteri Alifah Ilyana Binti Nor Rahim (EME Engineer)
Date/s Tested:	6/14/2021-6/27/2021, 7/6/2021, 7/12/2021, 7/17/2021-7/19/2021, 9/9/2021-9/11/2021
Manufacturer:	Motorola Solutions Inc.
DUT Description:	Handheld Portable – MTP8550Ex UHF FKP ATEX PT951NPEEx, MTP8500Ex UHF LKP ATEX PT951NMEEx
Test TX mode(s):	MSPD (6:9), SSPD (1:4), TEDS, Bluetooth, Bluetooth LE
Max. Power output:	1.55W (MSPD, SSPD), 0.537W (TEDS), 6.3mW (Bluetooth), 1.6mW (Bluetooth LE)
Nominal Power:	1.40W (MSPD, SSPD), 0.446W (TEDS), 2.0mW (Bluetooth), 1.12mW (Bluetooth LE)
Tx Frequency Bands:	350 – 470 MHz; Bluetooth/Bluetooth LE 2.402 – 2.480 GHz
Signaling type:	TDMA, PI/4DQPSK & QAM, TEDS, FHSS
Model(s) Tested:	AZH17PCH6TZ5AN (PMUE4817A)
Model(s) Certified:	AZH17PCH6TZ5AN (PMUE4817A), AZH16PCF6TZ5AN (PMUE4803A)
Serial Number(s):	123TXF0132
Classification:	Occupational/Controlled
Applicant Name:	Motorola Solutions Inc.
Applicant Address:	800 West Sunrise Boulevard, Fort Lauderdale, Florida 33322
FCC ID:	AZ489FT7145; 450 – 470 MHz This report contains results that are immaterial for FCC equipment approval, which are clearly identified.
IC:	109U-89FT7145; 406.125 – 430 MHz; 450 – 470 MHz This report contains results that are immaterial for ISED equipment approval, which are clearly identified.
ISED Test Site registration:	24843
FCC Test Firm Registration Number:	823256

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).

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.

Sun Hock Saw
Approved Signatory
Approval Date: 9/11/2021

Part 1 of 2

APPENDICES

Part 2 of 2

APPENDICES

Report Revision History

Date	Revision	Comments
7/19/2021	A	Initial release
8/18/2021	B	Report Amended
9/11/2021	C	Amend the ISED part

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 AZH17PCH6TZ5AN (PMUE4817A). This device is classified as Occupational/Controlled.

2.0 FCC SAR Summary

Table 1

Equipment Class	Frequency band (MHz)	Max Calc at Body (W/kg)	Max Calc at Face (W/kg)	Max Calc at Head (W/kg)
		1g-SAR	1g-SAR	1g-SAR
TNF	450-470MHz	1.87	0.16	0.90
*DSS	2402-2480MHz	NA	NA	NA
**Simultaneous Results		NA	NA	NA

**Results not required per KDB (refer to sections 13.5 and 14.0)

3.0 Abbreviations / Definitions

BT: Bluetooth
CNR: Calibration Not Required
DQPSK: Differential Quadrature Phase-Shift Keying
DUT: Device Under Test
EME: Electromagnetic Energy
GFSK: Gaussian Frequency-Shift Keying
LMR: Land Mobile Radio
MSPD: Multi Slot Packed Data
SSPD: Single Slot Packet Data
TEDS: Tetra Enhanced Data Service
DSP: Digital Signal Processor
PI/4DQPSK: Π/4 Differential Quadrature Phase Shift Keying
NA: Not Applicable
PTT: Push to Talk
RSM: Remote Speaker Microphone
SAR: Specific Absorption Rate
TDMA: Time Division Multiple Access
TNF: Licensed Non-Broadcast Transmitter Held to Face

Audio accessories: These accessories allow communication while the DUT is worn 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.

- IEC62209-1 (2016) Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)
- Federal Communications Commission, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radio frequency Electromagnetic Fields", OET Bulletin 65, FCC, Washington, D.C.: 1997.
- IEEE 1528 (2013), Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
- American National Standards Institute (ANSI) / Institute of Electrical and Electronics Engineers (IEEE) C95. 1-1992
- Institute of Electrical and Electronics Engineers (IEEE) C95.1-2005
- International Commission on Non-Ionizing Radiation Protection (ICNIRP) 1998
- 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. 303 of July 2, 2002 "Regulation of the limitation of exposure to electrical, magnetic, and electromagnetic fields in the radio frequency range between 9 kHz and 300 GHz." and "Attachment to resolution # 303 from July 2, 2002"
- IEC62209-2 Edition 1.0 2010-03, Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures – Part 2: Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz).

- FCC KDB – 643646 D01 SAR Test for PTT Radios v01r03
- FCC KDB – 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04
- FCC KDB – 865664 D02 RF Exposure Reporting v01r02
- FCC KDB – 447498 D01 General RF Exposure Guidance v06
- 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 dispatch, phone and Packet data modes. It uses three digital technologies: PI/4DQPSK, QAM and Time Division Multiple Access (TDMA).

PI/4DQPSK is a modulation technique that transmits information by altering the phase of the radio frequency (RF) signal. Data is converted into complex symbols, which alter the RF signal and transmit the information. When the signal is received, the change in phase is converted back into symbols and then into the original data. The system can accommodate 4-voice / Data channels in the standard 25 kHz channel as used on the two-way radio. The system can accommodate 4- Data channels in the standard 25 kHz or 50 kHz channels as used on the two-way radio. Time Division Multiple Access (TDMA) is used to allocate portions of the RF signal by dividing time into four slots, one for each unit. Time allocation enables each unit to transmit its voice information without interference from other transmitting units. Transmission from a unit or base station is accommodated in time-slot lengths of 15 milliseconds and frame lengths of 60 milliseconds.

The TDMA technique requires sophisticated algorithms and a digital signal processor (DSP) to perform voice compressions/decompressions and RF modulation/demodulation. The radios can be used by transmitting Multi Slot Packed Data (MSPD) with 6:9 (66.67 %) duty cycle for data mode. Single Slot Packed Data (SSPD) with 1:4 (25%) duty cycles and TEDS with 68:71 (95.8%) duty cycle for voice transmission at maximum transmits power.

This device also incorporates Bluetooth 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 standard. The maximum duty cycle for BT is 50%. Simultaneous transmission can occur between the BT and primary transmitter. Refer to section 14.0 Simultaneous Transmission Exclusion.

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

Table 3

Band (MHz)	Duty Cycle (%)	Max Power (W)
350-470 MHz	25 (SSPD) / 66.67 (MSPD)	1.55
Bluetooth LE (2402.2480MHz)	100	0.0016
Bluetooth (2402.2480MHz)	100	0.0063
TEDS (350-470MHz)	95.8	0.537

The intended operating positions are “against the head” in phone mode, “in front of the face” in PTT mode with the DUT at least 2.5cm from the mouth, and “against the body” in data, phone or PTT mode 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

There are two removable antennas and one internal BT antenna offered for this product. The Table below lists their descriptions

Table 4

Antenna No.	Antenna Model	Description	Selected for test	Tested
1	PMAE4096A	Stubby Antenna, 380-430MHz, ¼ Wave, -1.0 dBi	Yes	Yes
2	PMAE4097A	Whip Antenna, 350-470MHz, ¼ Wave, 0.5 dBi	Yes	Yes
3	AN000066A01	Bluetooth Loop Antenna, 2402-2480 MHz, ½ Wave, 2.15dBi	No	No

7.2 Battery

There is one battery offered for this product. The Table below lists their descriptions.

Table 5

Battery No.	Battery Models	Description	Selected for test	Tested	Comments
1	NNTN8570C	Impress battery Lithium Ion, IECEX/ATEX IP66/67 1250T	Yes	Yes	

7.3 Body worn Accessories

All body worn accessories were considered. The Table below lists the body worn accessories, and body worn accessory descriptions.

Table 6

Body Worn No.	Body Worn Models	Description	Selected for test	Tested	Comments
1	HLN6602A	Universal chest pack	Yes	Yes	
2	RLN4815A	Radio pack	Yes	Yes	
3	PMLN7195A	Hard leather case with 2.5" belt loop	No	No	By similarity to PMLN7268A
4	PMLN7268A	Hard leather case with 3" belt loop	Yes	Yes	Tested with NTN5243A
5	PMLN6086A	Belt clip 2.5”	Yes	Yes	
6	GMDN0386A	Peter Jones Klick Fast sew on dock	Yes	Yes	Tested with PMLN5004B
7	GMDN0547A	Peter Jones Klick Fast double tongue tag dock	No	No	Non-metallic and further distance compared to GMDN0445AA
8	GMDN0445AC	Peter Jones Klick Fast 50mm belt loop with dock	Yes	Yes	Tested with PMLN5004B
9	WALN4307A	Peter Jones Klick Fast retro fitting garment with easy screw-to-fit dock	Yes	Yes	Tested with PMLN5004B
10	GMDN0566AC	Peter Jones Klick Fast belt loop with mounting dock (50mm)	Yes	Yes	Tested with PMLN5004B
11	GMDN0445AA	Peter Jones Klick Fast snap on tag dock	Yes	Yes	Tested with PMLN5004B
12	NTN5243A	Carry case Shoulder strap	Yes	Yes	Tested with PMLN7268A
13	PMLN5004B	Shoulder wearing device	Yes	Yes	Tested with Peter Jones Klick Fast docks, GMDN0386A, GMDN0445AC, WALN4307A, GMDN0566AC, GMDN0445AA
14	GMDN0497A	Peter Jones Klick Fast belt dock 38mm	No	No	Non-metallic and further distance compared to GMDN0386A
15	GMLN4488A	Peter Jones Klick Fast belt dock (50mm)	No	No	Non-metallic and further distance compared to GMDN0386A

7.4 Audio Accessories

All audio accessories were considered. The Table below lists the offered audio accessories and their descriptions. Exhibit 7B illustrates photos of the tested audio accessories.

Table 7

Audio No.	Audio Acc. Models	Description	Selected for test	Tested	Comments
1	PMMN4067B	ATEX CSA Remote Speaker Microphone (RSM)	Yes	Yes	Default Audio
2	PMLN6087A	Heavy Duty Headset with over the head headband and boom mic; connects to Peltor PTT Adapter	Yes	No	Per KDB provisions test not required.
3	PMLN6090A	Tactical heavy duty headset with over the head headband with vol control connects to Peltor PTT Adapter	Yes	No	Per KDB provisions test not required.
4	PMLN6089A	Peltor Tactical Heavy- Duty Headset Boom Mic	Yes	No	Per KDB provisions test not required.
5	PMLN6803A	ATEX Small PTT Adapter	Yes	No	Per KDB provisions test not required.
6	RMN5123A	Savox HC1 Headset Atex	Yes	No	Per KDB provisions test not required.
7	GMMN4580A	Savox HC2 dual headset Atex	Yes	No	Per KDB provisions test not required.
8	PMLN7257A	Savox CC440 (new version of Savox)	Yes	No	Per KDB provisions test not required.
9	PMLN6092A	Heavy Duty Headset with helmet attachment and boom mic; connects to Peltor PTT Adapter	Yes	No	Per KDB provisions test not required.
10	PMLN6333A	Twin cup Heavy duty headset with helmet attachment boom mic connects to Peltor PTT Adapter	Yes	No	Per KDB provisions test not required.
11	PMLN7188B	ATEX 3.5mm Jack earpiece with Trans Tube	Yes	No	Per KDB provisions test not required.
12	PMMN4093A	ATEX DSP Noise Cancelling RSM	Yes	No	Per KDB provisions test not required.
13	PMMN4101A	Remote Speaker Microphone, ANC RSM EX	Yes	No	Per KDB provisions test not required.
14	PMMN4109A	Nextex OMNI RSM	No	No	By similarity to PMMN4093A
15	PMLN7531A	Peltor high attenuation headset with boom mic, neckband	No	No	By similarity to PMLN6087A.
16	PMLN7535A	Peltor tactical XP headset with boom mic, neckband	No	No	By similarity to PMLN6090A.
17	GMDN8948A	HELMET HEADSET SCORPION ATEX 165MM FOR PMMN4093	Yes	No	Per KDB provisions test not required.
18	GMDN8949A	HELMET HEADSET SCORPION ATEX 215MM FOR PMMN4093	Yes	No	Per KDB provisions test not required.

8.0 Description of 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	52.10.4.1527	DAE3; 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. Section 9.0 presents additional test equipment information. Appendices B and C present the applicable calibration certificates. The E-field probe first scans a coarse grid over a large area inside the phantom in order to locate the interpolated maximum SAR distribution. After the coarse scan measurement, the probe is automatically moved to a position at the interpolated maximum. The subsequent scan can directly use this position as reference for the cube evaluations.

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	2mm +/- 0.2mm	Wood	< 0.05
SAM	NA	300MHz -6GHz; Er = < 5, Loss Tangent = ≤0.05	Human Model			
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	450MHz
	Head
Sugar	56.0
De-ionized Water	39.10
Salt	3.8
HEC	1.0
Bact.	0.1

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	7485	8/20/2020	8/20/2021
Speag Probe	EX3DV4	7533	4/19/2021	4/19/2022
Speag Probe	EX3DV4	7534	4/19/2021	4/19/2022
Speag Probe	EXDV4	7486	6/18/2021	6/18/2022
Speag DAE	DAE4	1488	4/7/2021	4/7/2022
*Speag DAE	DAE4	688	8/13/2020	8/13/2021
Speag DAE	DAE3	374	4/8/2021	4/8/2022
Speag DAE	DAE4	1598	4/8/2021	4/8/2022
*Bi-directional Coupler	3020A	41935	8/21/2020	8/21/2021
Bi-directional Coupler	3020A	41931	7/9/2020	7/9/2021
Power Amplifier	50W 1000A	14715	CNR	CNR
Power Meter	E4418B	MY45100739	12/3/2020	12/3/2021
*Power Meter	E4418B	MY45100911	8/30/2019	8/30/2021
Power Meter	E4419B	MY45103725	6/29/2021	6/29/2022
Power Sensor	E4412A	MY61050006	4/21/2021	4/21/2022
Power Sensor	E9301B	MY55210003	5/29/2021	5/29/2022
Power Sensor	E4412A	MY61060011	4/22/2021	4/22/2022
Power Sensor	E9301B	MY41495733	5/29/2021	5/29/2022
Thermometer	HH806AU	080307	11/25/2020	11/25/2021
Thermometer	HH202A	35881	12/3/2020	12/3/2021
Temperature Probe	80PK-22	06032017	11/25/2020	11/25/2021
Vector Signal Generator	E4438C	MY47272101	10/29/2019	10/29/2021
Vector Signal Generator	E4438C	MY42081753	8/27/2021	8/27/2022
*Data Logger	DSB	16398050	8/3/2020	8/3/2021
Data Logger	DSB	16398306	11/24/2020	11/24/2021
*Power Meter	E4416A	MY50001037	8/30/2019	8/30/2021
Power Meter	E4417A	GB41292245	11/27/2020	11/27/2021
Power Sensor	E9301B	MY50280001	4/7/2021	4/7/2022
*Dielectric Assessment Kit	DAK-3.5	1120	8/12/2020	8/12/2021
Dielectric Assessment Kit	DAK-3.5	1156	4/7/2021	4/7/2022
Network Analyzer	E5071B	MY42403147	12/1/2020	12/1/2021
Speag Dipole	D450V3	1054	3/11/2019	3/11/2022
Speag Dipole	D450V3	1053	10/19/2018	10/19/2021
Speag Dipole	D450V3	1077	7/9/2021	7/9/2024

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

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								
9/29/2020	Head	450	7485	0.85	41.4	Pass	Pass	Pass
5/8/2021	Head	450	7533	0.84	43.8	Pass	Pass	Pass
4/29/2021	Head	450	7534	0.86	44.1	Pass	Pass	Pass
7/8/2021	Head	450	7486	0.86	43.6	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
7485	IEEE/ IEC Head	SPEAG D450V3 / 1054	4.57 +/- 10%	1.13	4.52	6/14/2021
				1.17	4.68	6/16/2021#
				1.22	4.88	6/18/2021#
				1.08	4.32	6/19/2021#
				1.21	4.84	6/20/2021#
				1.21	4.84	6/21/2021#
				1.19	4.76	6/22/2021#
				1.17	4.68	6/24/2021
				1.22	4.88	6/26/2021#
				1.18	4.72	7/6/2021
7533		SPEAG D450V3 / 1053	4.57 +/- 10%	1.19	4.76	7/12/2021
7846		SPEAG D450V3 / 1077	4.63 +/- 10%	1.24	4.96	9/8/2021#
				1.25	5.00	9/9/2021#
				1.24	4.96	9/10/2021#
7534		SPEAG D450V3 / 1054	4.57 +/- 10%	1.23	4.92	7/17/2021#
				1.22	4.88	7/18/2021#
				1.23	4.92	7/19/2021#

"#" System verification covered for 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
406	IEEE/IEC Head	0.87 (0.83-0.91)	44.00 (41.80-46.20)	0.85	45.90	6/18/2021
				0.83	43.50	6/26/2021
				0.85	44.00	6/22/2021#
				0.85	44.3	6/24/2021
				0.83	44.0	9/8/2021#
				0.84	44.7	9/9/2021#
418		0.87 (0.83-0.91)	43.90 (41.70-46.10)	0.85	43.10	6/14/2021
				0.87	46.00	6/16/2021#
				0.83	45.40	6/17/2021#
				0.86	44.90	6/21/2021#
				0.86	43.70	6/22/2021
				0.85	43.2	6/26/2021#
				0.85	43.0	7/12/2021
				0.84	45.1	7/17/2021#
				0.84	43.7	9/8/2021#
				0.85	44.4	9/9/2021#
430		0.87 (0.83-0.91)	43.70 (41.60-45.90)	0.85	43.4	9/8/2021#
				0.86	44.1	9/9/2021#
450		0.87 (0.83-0.91)	43.50 (41.30-45.70)	0.88	42.50	6/14/2021
				0.90	45.30	6/16/2021#
				0.86	44.70	6/17/2021#
				0.89	45.00	6/18/2021
				0.89	44.90	6/19/2021#
				0.89	44.30	6/21/2021#
				0.89	43.0	6/22/2021#
				0.89	43.4	6/24/2021
				0.87	42.5	6/26/2021#
				0.88	44.9	7/6/2021
				0.88	42.3	7/12/2021
				0.87	44.4	7/17/2021#
				0.91	43.8	7/18/2021#
				0.87	42.9	9/8/2021#
				0.88	43.7	9/9/2021#
				0.86	42.6	9/10/2021#
				0.91	43.8	7/19/2021#

"#" System verification covered for 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
470	IEEE/IEC Head	0.87 (0.83-0.91)	43.40 (41.20-45.60)	0.91	42.50	6/22/2021#

"#" System verification covered for 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^{o}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: 20.10 – 21.91˚C Avg. 23.90˚C
Tissue Temperature	18 – 25 ˚C	Range: 20.00 – 21.80˚C Avg. 20.90˚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 disturbances 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

Description		≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface		5 ± 1 mm	½·δ·ln(2) ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location		30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: ΔxArea, ΔyArea		≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
		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.	
Maximum zoom scan spatial resolution: ΔxZoom, ΔyZoom		≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: ΔzZoom(n)	≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
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.			

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 the offered audio accessories as applicable.

12.3.2 Head

The DUT was placed against the right and left heads of the SAM phantom in the cheek touch and 15° tilt positions.

12.3.3 Face

The DUT was positioned with its' front side 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. For conservative assessment, MSPD 6:9 (66.7%) data transmission was tested for body exposure; SSPD 1:4 (25%) phone mode was tested for head exposure and SSPD 1:4 (25%) PTT mode was tested for face exposure. A 50% duty cycle was applied to PTT configurations in the final results.

Standalone and simultaneous BT testing were assessed in sections 13.8 and 14.0 per the guidelines of KDB 447498.

13.0 DUT Test Data

13.1 Assessments at the Body for 450 – 470 MHz

Conducted power measurements for channel within frequency range 450 – 470 MHz was measured and listed in Table 17. DUT assessment started at MSPD mode.

Table 17

Technology	Test Freq (MHz)	Power (W)
MSPD (Multiple slot packet Data)	450.0000	1.52
	460.0000	1.51
	470.0000	1.51
SSPD (Single slot packet Data)	450.0000	1.55
	460.0000	1.53
	470.0000	1.54

Assessments at the Body with Body worn HLN6602A (MSPD mode)
DUT assessment with offered antenna, default battery, offered body worn accessories and without accessories cable per KDB 643646. Refer to Table 17 for highest output power channel. SAR plots of the highest results per Table 18 (bolded) are presented 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#
PMAE4097A	NNTN8570C	HLN6602A	None	450.0000	1.50	-0.36	1.40	**1.57**	BL-AB-210614-10
				460.0000					
				470.0000					

Assessments at the Body with Body worn RLN4815A (MSPD mode)
DUT assessment with default antenna, default battery, offered body worn accessories and without accessories cable per KDB 643646. Refer to Table 17 for highest output power channel. SAR plots of the highest results per Table 19 (bolded) are presented in Appendix E.

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#
PMAE4097A	NNTN8570C	RLN4815A	None	450.0000	1.50	-0.40	0.85	**0.96**	BL-AB-210614-09
				460.0000					
				470.0000					

Assessments at the Body with Body worn PMLN6086A (MSPD mode)
DUT assessment with default antenna, default battery, offered body worn accessories and without accessories cable per KDB 643646. Refer to Table 17 for highest output power channel. SAR plots of the highest results per Table 20 (bolded) are presented in Appendix E.

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#
PMAE4097A	NNTN8570C	PMLN6086A	None	450.0000	1.47	-0.21	1.21	**1.34**	MA(FZ)-AB-210617-04#
				460.0000					
				470.0000					

Assessments at the Body with Body worn GMDN0386A w/ PMLN5004B (MSPD mode)
DUT assessment with default antenna, default battery, offered body worn accessories and without accessories cable per KDB 643646. Refer to Table 17 for highest output power channel. SAR plots of the highest results per Table 21 (bolded) are presented in Appendix E.

Table 21

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#
PMAE4097A	NNTN8570C	GMDN0386A w/ PMLN5004B	None	450.0000	1.50	-0.15	1.02	**1.09**	BL-AB-210617-07#
				460.0000					
				470.0000					

Assessments at the Body with Body worn GMDN0445AC w/PMLN5004B (MSPD mode)
DUT assessment with default antenna, default battery, offered body worn accessories and without accessories cable per KDB 643646. Refer to Table 17 for highest output power channel. SAR plots of the highest results per Table 22 (bolded) are presented in 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#
PMAE4097A	NNTN8570C	GMDN0445AC w/PMLN5004B	None	450.0000	1.50	-0.22	0.71	**0.77**	BL-AB-210617-12#
				460.0000					
				470.0000					

Assessments at the Body with Body worn WALN4307A w/PMLN5004B (MSPD mode)

DUT assessment with default antenna, default battery, offered body worn accessories and without accessories cable per KDB 643646. Refer to Table 17 for highest output power channel. SAR plots of the highest results per Table 23 (bolded) are presented in 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#
PMAE4097A	NNTN8570C	WALN4307A w/PMLN5004B	None	450.0000	1.50	-0.24	0.84	**0.92**	BL-AB-210617-14#
				460.0000					
				470.0000					

Assessments at the Body with Body worn GMDN0566AC w/PMLN5004B (MSPD mode)

DUT assessment with default antenna, default battery, offered body worn accessories and without accessories cable per KDB 643646. Refer to Table 17 for highest output power channel. SAR plots of the highest results per Table 24 (bolded) are presented in Appendix E.

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#
PMAE4097A	NNTN8570C	GMDN0566AC w/PMLN5004B	None	450.0000	1.50	-0.43	1.41	**1.61**	BL-AB-210617-17#
				460.0000					
				470.0000					

Assessments at the Body with Body worn GMDN0445AA w/PMLN5004B (MSPD mode)

DUT assessment with default antenna, default battery, offered body worn accessories and without accessories cable per KDB 643646. Refer to Table 17 for highest output power channel. SAR plots of the highest results per Table 25 (bolded) are presented in 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#
PMAE4097A	NNTN8570C	GMDN0445AA w/PMLN5004B	None	450.0000	1.50	-0.30	0.82	**0.91**	BL-AB-210617-19#
				460.0000					
				470.0000					

Assessments at the Body with Body worn PMLN7268A w/ NTN5243A Back of radio w/o belt loop (MSPD mode)

DUT assessment with default antenna, default battery, offered body worn accessories and without accessories cable per KDB 643646. Refer to Table 17 for highest output power channel. SAR plots of the highest results per Table 26 (bolded) are presented in Appendix E.

Table 26

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#
PMAE4097A	NNTN8570C	PMLN7268A w/ NTN5243A Back of radio w/o belt loop	None	450.0000	1.51	-0.42	1.03	**1.16**	MFR-AB-210717-18
				460.0000					
				470.0000					

Assessment at the Body with audio accessory (SSPD mode)

DUT voice assessment using the overall highest SAR configuration at the body from above with default audio accessory attached. Additional testing in voice mode (SSPD) is not required per IEEE1528 because of lower "maximum sourced-based time averaged output power" as compared to data mode (MSPD). Where "maximum sourced-based time averaged output power" SSPD = 0.39W and MSPD = 1.03W. Assessment per "KDB 643646 Body SAR Test Consideration for Audio Accessories without Built-in Antenna; when overall < 4.0 W/kg, SAR tested for that audio accessory is not necessary." This was applicable to all remaining accessories.

SAR plots of the highest results per Table (bolded) are presented in 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#
PMAE4097A	NNTN8570C	GMDN0566AC w/PMLN5004B	PMMN4067B	450.0000	1.52	0.02	0.07	**0.04**	MFR-AB-210719-01#

Assessment of wireless BT configuration (SSPD mode)
Assessment using the overall highest SAR configuration at the body from above without an audio accessory attached. SAR plots of the highest results per Table (bolded) are presented in 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#
PMAE4097A	NNTN8570C	GMDN0566AC w/PMLN5004B	None	450.0000	1.51	-0.17	0.63	**0.34**	MFR-AB-210719-03

13.2 Assessments at the Face for 450 – 470 MHz

Battery NNTN8570C was used during conducted power measurements for all test channels within FCC allocated frequency range (450 – 470.0 MHz) which are listed in Table 29. The channel with the highest conducted power will be identified as the default channel per KDB 643646 (SAR Test for PTT Radios).

Table 29

Technology	Test Freq (MHz)	Power (W)
SSPD (Single slot packet Data)	450.0000	1.55
	460.0000	1.53
	470.0000	1.54

DUT assessment with offered antenna, default battery with front of DUT positioned 2.5cm facing phantom per KDB 643646. Refer to Table 29 for highest output power channel. SAR plots of the highest results per Table 30 (bolded) are presented in Appendix E

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#
PMAE4097A	NNTN8570C	DUT @ Front	None	450.0000	1.52	0.06	0.31	0.16	MA(FZ)-FACE-210622-11
				460.0000					
				470.0000					

13.3 LMR assessments at the Head for 450 – 470 MHz

Battery NNTN8570C was the default battery for assessments at the Head (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 (450 – 470 MHz) which are listed in Table 31. The channel with the highest conducted power will be identified as the default channel per KDB 643646 (SAR Test for PTT Radios).

Table 31

Technology	Test Freq (MHz)	Power (W)
SSPD (Single slot packet Data)	450.0000	1.55
	460.0000	1.53
	470.0000	1.54

Assessment at the Left ear with Cheek Touch and 15° Tilt positions

Left ear position assessment with offered antennas and default battery with the DUT in both the cheek touch and tilt positions per KDB 643646. Optional batteries were tested per the requirements of KDB 643646. SAR plots of the highest results per Table 32 (bolded) are presented in Appendix E.

Table 32

Antenna	Battery	Carry Accessory/ Test position	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Run#
PMAE4097A	NNTN8570C	None, Touch	None	450.0000	1.55	-0.05	0.68	0.69	MA(FZ)-LEAR-210622-03#
				460.0000					
				470.0000					
		None, Tilt		450.0000	1.55	0.14	0.90	**0.90**	MA(FZ)-LEAR-210622-04#
				460.0000					
				470.0000					

Assessment at the Right ear with Cheek Touch and 15° Tilt positions
Right ear position assessment with offered antennas and default battery with the DUT in both the cheek touch and tilt positions per KDB 643646. Optional batteries were tested per the requirements of KDB 643646.SAR plots of the highest results per Table 33 (bolded) are presented in Appendix E.

Table 33

Antenna	Battery	Carry Accessory/ Test position	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Run#
PMAE4097A	NNTN8570C	None, Touch	None	450.0000	1.55	-0.02	0.65	0.65	MA(FZ)-REAR-210622-07#
				460.0000					
				470.0000					
		None, Tilt		450.0000	1.55	0.23	0.75	**0.75**	BL- REAR-210622-12
				460.0000					
				470.0000					

13.4 Assessments for ISED Canada

Based on the assessment results for body, head and face per KDB 643646, additional tests were required for ISED Canada frequency range (406.125 - 430.0MHz). Testing has performed in compliance with ISED Canada frequency range for band 450-470MHz. Conducted power measurements were measured and listed in Table 34.

Table 34

Technology	Test Freq (MHz)	Power (W)
MSPD (Multiple slot packet Data)	406.2000	1.44
	418.1000	1.50
	430.0000	1.49
SSPD (Single slot packet Data)	406.2000	1.48
	418.1000	1.54
	430.0000	1.53

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#
Body									
PMAE4096A	NNTN8570C	GMDN0566AC w/PMLN5004B	None	406.2000					
				418.1000	1.50	-0.20	1.85	2.00	BL-AB-210617-15#
				430.0000					
PMAE4097A				406.2000					
				418.1000	1.43	-026	2.10	2.42	FZ-AB-210909-03#
				430.0000					
Face									
PMAE4096A	NNTN8570C	DUT @ Front	None	406.2000					
				418.1000	1.50	0.13	0.37	0.19	AM(AF)-FACE-210618-07#
				430.0000					
PMAE4097A				406.2000					
				418.1000	1.43	0.05	0.45	0.24	FZ-FACE-210910-04#
				430.0000					
Head									
PMAE4096A	NNTN8570C	LEAR, Touch	None	406.2000					
				418.1000	1.55	-0.01	0.88	0.89	MA(FZ)-LEAR-210622-05#
				430.0000					
PMAE4097A		LEAR, Tilt		406.2000					
				418.1000	1.50	0.04	1.03	1.06	AF(MF)-LEAR-210910-07#
				430.0000					

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. SAR plots of the highest results per Table 36 (bolded) are presented in Appendix E.

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#
Body									
PMAE4097A	NNTN8570C	GMDN0566AC w/PMLN5004B	None	406.2000	1.45	-0.88	0.55	0.72	FZ-AB-210910-01#
				418.1000	1.43	-0.26	2.10	**2.42**	FZ-AB-210909-03#
				430.0000	1.50	-0.04	1.37	1.43	BL-AB-210909-05#
Face									
PMAE4097A	NNTN8570C	DUT @ Front	None	406.2000	1.45	0.01	0.48	**0.25**	FZ-FACE-210910-02#
				418.1000	1.43	0.05	0.45	0.24	FZ-FACE-210910-04#
				430.0000	1.50	0.09	0.40	0.21	FZ-FACE-210910-05#
Head									
PMAE4097A	NNTN8570C	LEAR, Tilt	None	406.2000	1.50	0.17	1.11	**1.15**	BL-LEAR-210623-01#
				418.1000	1.50	0.04	1.03	1.06	AF(MF)-LEAR-210910-07#
				430.0000	1.50	-0.05	1.00	1.04	AF(MF)-LEAR-210910-08#

13.5 Assessment at the Bluetooth band

13.5.1 FCC US Requirement

Per guidelines in KDB 447498, the following formula was used to determine the test exclusion for standalone Bluetooth transmitter;

[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] *[$\sqrt{F_{(GHz)}}$] = 1.0, which is ≤ 3 for 1-g SAR extremity

Where:

Max. Power = 3.15mW (6.30mW*50% duty cycle)
Min. test separation distance = 5mm for actual test separation < 5mm
F(GHz) = 2.48 GHz

Per the result from the calculation above, the standalone SAR assessment was not required for Bluetooth band. Therefore, SAR results for Bluetooth are not reported herein.

13.5.2 ISED Canada Requirement

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

Standalone Bluetooth transmitter operates at

Maximum conducted power:
= 6.30 mW * 50%
= 3.15 mW or 4.98 dBm

Equivalent isotropically radiated power (EIRP):
= Maximum conducted power, dBm + Antenna gain, dBi
= 4.98 dBm + 2.15 dBi
=10.14 dBm or 10.30 mW

Higher output power level, maximum EIRP power 10.30 mW was below the threshold power level 20 mW. Hence SAR test was not required for Bluetooth band.

13.6 Shortened 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 D.

Table 37

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#
PMAE4097A	NNTN8570C	GMDN0566AC w/PMLN5004B	None	450.000	1.50	-0.51	1.61	1.87	AF-AB-210911-11#

14.0 Simultaneous Transmission Exclusion for BT

Per guidelines in KDB 447498, the following formula was used to determine the test exclusion to an antenna that transmits simultaneously with other antennas for test distances ≤ 50mm:

[(max. power of channel, including tune-up tolerance, mW)/ (min. test separation distance, mm)] *[√F(GHz)/X] = 0.32W/kg, which is ≤ 0.4 W/kg (1g)

Where:

X = 7.5 for 1g-SAR; 18.75 for 10g
Max. Power = 3.15mW (6.30mW*50% duty cycle)
Min. test separation distance = 5mm for actual test separation < 5mm
F (GHz) = 2.48 GHz

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

15.0 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 38

Designator	Frequency band (MHz)	Max Calc at Body (W/kg)	Max Calc at Face (W/kg)	Max Calc at Head (W/kg)
		1g-SAR	1g-SAR	1g-SAR
FCC US				
LMR	450 – 470	1.87	0.19	0.90
ISED Canada				
LMR	(406.125 – 430.0) (450.0 – 470.0)	2.42	0.25	1.15

All results are scaled to the maximum output power.

The test results clearly demonstrate compliance with FCC Occupational/Controlled RF Exposure limits of 8.0 W/kg averaged over 1 gram per the requirements of FCC 47 CFR § 2.1093 and RSS-102 (Issue 5).

16.0 Variability Assessment

Per the guidelines in KDB 865664 SAR variability assessment is not required because SAR results below 4.0W/kg (Occupational).

17.0 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 4.0W/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 Device Under Test, for 450 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	6.7	N	1.00	1	1	6.7	6.7	∞
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	E2.4	1.0	R	1.73	1	1	0.6	0.6	∞
Modulation Response	E2.5	9.6	R	1.73	1	1	5.5	5.5	∞
Readout Electronics	E.2.6	0.3	N	1.00	1	1	0.3	0.3	∞
Response Time	E.2.7	0.8	R	1.73	1	1	0.5	0.5	∞
Integration Time	E.2.8	2.6	R	1.73	1	1	1.5	1.5	∞
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	0.02	R	1.73	1	1	0.0	0.0	∞
Probe Positioning w.r.t Phantom	E.6.3	0.42	R	1.73	1	1	0.2	0.2	∞
Max. SAR Evaluation	E.5	2.0	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	E.2.9	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				13	12	711
Expanded Uncertainty (95% CONFIDENCE LEVEL)			*k*=2				25	25	

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 450 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	6.7	N	1.00	1	1	6.7	6.7	∞
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	E2.4	1.0	R	1.73	1	1	0.6	0.6	∞
Modulation Response	E2.5	0.0	R	1.73	1	1	0.0	0.0	∞
Readout Electronics	E.2.6	0.3	N	1.00	1	1	0.3	0.3	∞
Response Time	E.2.7	0.8	R	1.73	1	1	0.5	0.5	∞
Integration Time	E.2.8	2.6	R	1.73	1	1	1.5	1.5	∞
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	0.02	R	1.73	1	1	0.0	0.0	∞
Probe Positioning w.r.t Phantom	E.6.3	0.42	R	1.73	1	1	0.2	0.2	∞
Max. SAR Evaluation	E.5	2.0	R	1.73	1	1	1.2	1.2	∞
Dipole									
Dipole Axis to Liquid Distance	8, E.6.6	2.0	R	1.73	1	1	1.2	1.2	∞
Input Power and SAR Drift Measurement	8, 6.6.4	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				10	10	99999
Expanded Uncertainty (95% CONFIDENCE LEVEL)			*k*=2				21	20	

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