MOTOROLA SOLUTIONS

SAMM 826

CERTIFICATE 2518.05

DECLARATION OF COMPLIANCE SAR ASSESSMENT Part 1 of 2

Motorola Solutions Inc.
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Date of Report: **10/24/2024**
Report Revision: **A**

Responsible Engineer:	Alfred Hoe Kean Loon (EME Senior Engineer)
Report Author:	Alfred Hoe Kean Loon (EME Senior Engineer)
Date/s Tested:	09/30//2024 – 10/18/2024
Manufacturer:	Motorola Solutions Malaysia Sdn Bhd. Plot 2A, Medan Bayan Lepas, Mukim 12 SWD, 11900 Bayan Lepas, Penang, Malaysia
Manufacturer Location:	Handheld Portable – APX N70 Single Band VHF Portable Radio, Model 4.5
DUT Description:	CW (PTT), WLAN2.4GHz, WLAN5GHz, LTE, NFC
Test TX mode(s):	Refer table 3
Max. Power output:	Refer table 3
Tx Frequency Bands:	Refer table 3
Signaling type:	Refer table 3
Model(s) Tested:	H35KET9PW8AN
Model(s) Certified: (HVIN/PMN)	Refer section 1.0 Introduction
Serial Number(s):	022TAT1894
Classification:	Occupational/Controlled Environment
Applicant Name:	Motorola Solutions Inc.
Applicant Address:	Plot 2A, Medan Bayan Lepas Mukim, 12 SWD, 11900 Bayan Lepas, Penang, Malaysia
Firmware Version (FVIN):	D04.18.53
FCC ID:	AZ489FT7149 Add the following when applicable - This report contains results that are immaterial for FCC equipment approval, which are clearly identified.
FCC Test Firm Registration Number:	823256
IC ID:	109U-89FT7149 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 6)

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. The results and statements contained in this report pertain only to the device(s) evaluated.

Saw Sun Hock (Approval Signatory)
Approved Date: 10/25/2024

Part 1 of 2

APPENDICES

A Measurement Uncertainty Budget
B Probe Calibration Certificates
C Dipole Calibration Certificates
D SAR Summary Results Table for FCC PAG review

Part 2 of 2

APPENDICES

D System Verification Check Scans
E DUT Scans
F Shorten Scan of Highest SAR Configuration
G DUT Test Position Photos
H DUT, Body worn and audio accessories Photos

Report Revision History

Date	Revision	Comments
10/24/2024	A	Initial release

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 H35KET9PW8AN. The information herein is to show evidence of Class II Permissive Change compliance based on the SAR evaluation of Antenna Redesign (Inductor, Antenna element & Tuning table) and Transmitter layout change. This device is classify as Occupational/Controlled Environment and model certified is lists as below:

Models	Hardware Version ID Number (HVIN)	Product Marketing Name (PMN)	Description
H35KET9PW8AN	H35KET9PW8AN	APX N70	APX N70 VHF MODEL 4.5 PORTABLE
H35KET9PW8AN-H	H35KET9PW8AN-H	APX N70	APX N70 VHF MODEL 4.5 PORTABLE (UL Model)

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)	2.66[1]	2.36[2]
PCF	LTE B12	0.091	0.057
	LTE B13	0.081	0.064
	LTE B14	0.102	0.068
	LTE B4	0.019	0.287[3]
	LTE B2	0.025	0.188[4]
*DSS	2402-2480MHz (Bluetooth)	N/A	N/A
DTS	2412-2462MHz (WLAN 2.4GHz)	0.035	0.253[5]
NII	5180 – 5825MHz (WLAN 5GHz)	0.036	0.677
Highest Simultaneous Results		2.76[6]	3.04[7]

Note:

[1 & 2] indicates the new reported SAR value at LMR. Previous filed reported SAR value at LMR for body & face are 1.91 & 1.62 W/kg.

[3]indicates the new reported SAR value at LTE B4. Previous filed reported SAR value for face are 0.202 W/kg.

[4]indicates the new reported SAR value at LTE B2. Previous filed reported SAR value for face are 0.146 W/kg.

[5]indicates the new reported SAR value at WLAN 2.4GHz. Previous filed reported SAR value for face are 0.217 W/kg.

[6 & 7] indicates the new simultaneous transmission SAR. Previous filed reported SAR value for body & face are 2.01 & 2.30 W/kg.

3.0 Abbreviations / Definitions

BT:	Bluetooth
CNR:	Calibration Not Required
CW:	Continuous Wave
DSS	Part 15 Spread Spectrum Transmitter
DUT:	Device Under Test
DTS	Digital Transmission System
EME:	Electromagnetic Energy
FHSS:	Frequency Hopping Spread Spectrum
FM:	Frequency Modulation
LMR:	Land Mobile Radio
LTE:	Long Term Evolution
NA:	Not Applicable
OFDM:	Orthogonal Frequency Division Multiplexing
PTT:	Push to Talk
QPSK:	Quadrature Pulse Shift Key
RB:	Resource Blocks
RSM:	Remote Speaker Microphone
SAR:	Specific Absorption Rate
TDMA:	Time Division Multiple Access
TNF:	Licensed Non-Broadcast Transmitter Held to Face
16QAM:	16 State Quadrature Amplitude Modulation
NFC:	Near Field Communication

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.

- 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 6) – 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 – 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 – 941225 D05 SAR for LTE Devices v02r05
- FCC KDB – 941225 D01 3G SAR Procedures v03r01
- 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, LTE technologies 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 Bluetooth imposes the maximum actual transmission duty cycle.

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 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 (%)	Conducted (Average Detector) Max Power
LMR	136-174	FM	*50	6.6 W
WLAN 802.11 b (22 MHz)	2412-2462	DSSS	99.97	141.25 mW
(1)WLAN 802.11 g (20 MHz)		OFDM	99.80	89.1 mW
(1)WLAN 802.11 n (20 MHz)			94.36	
(1)WLAN 802.11 n (40 MHz)	2422-2452		99.80	
WLAN 802.11 a (20 MHz)	5180-5825	OFDM	99.80	(UNII-1, UNII-2A, UNII-2C, UNII-3) 79.43mW
WLAN 802.11 n/ac (20 MHz)			95.59	(UNII-1, UNII-2A, UNII-2C, UNII-3) 79.43mW

Note –
* includes 50% PTT operation

Table 3 (Continued)

Technologies	Band (MHz)	Transmission	Duty Cycle (%)	Conducted (Average Detector) Max Power
WLAN 802.11 n/ac (40 MHz)	5180-5825	OFDM	99.60	(UNII-1) 79.43mW (Chn 38 – 19.95mW) (UNII-2A) 79.43mW (Chn 62 – 15.84mW) (UNII-2C) 79.43mW(Chn 104 – 31.62mW (UNII-3) 79.43mW
[4]WLAN 802.11 ac (80 MHz)			96.15	(UNII-1) 19.95mW (UNII-2A) 10mW (UNII-2C) 79.43mW (Chn 106 - 19.95mW) (UNII-3) 79.43mW
LTE Band 2	1850-1910	QPSK, 16QAM	100	252 mW
LTE Band 4	1710-1755	QPSK, 16QAM	100	
LTE Band 12	699-716	QPSK, 16QAM	100	
LTE Band 13	777-787	QPSK, 16QAM	100	
LTE Band 14	788-798	QPSK, 16QAM	100	
LTE Band 17	704-716	QPSK, 16QAM	100	
NFC	13.56	NFC	100	35 mW
BT 1.5	2400-2485	GFSK	78	19.95 mW
BT LE	2400-2485	GFSK	62.68	5.01 mW

Note –
EME tested WLAN 2.4 GHz 802.11b (22MHz) at 141.25 mW (Highest max conducted average power as stated in the table above). The new power of WLAN 802.11b/g/n will be implement in Production unit are 802.11b is 56.2 mW, 802.11g/n (20MHz) is 44.6 mW and 802.11n (40MHz) is 56.2 mW for Low and Mid channel while 28.2 mW for High channel.

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 accessories applicable for this PCII filing. All accessories please refer to previous filing. Refer to Exhibit 7B for antenna separation distances.

7.1 Antennas

Table 4

Antenna No.	Antenna Models	Description	Selected for test	Tested
1	*AN000414A01	VHF ¼ Wave Antenna (136-174MHz), -10dBi gain	Yes	Yes
2	AN000413A01	Antenna LTE Main, Low Band, Mid Band 699 - 2155 MHz, 699-716MHz (-2.9dBi), 777-787MHz (-1.5dBi), 788-798MHz (-1.7dBi), 1850-1910MHz (1.1dBi), 1710-1755MHz (1.9dBi)	Yes	Yes
3	AN000413A03	Antenna Wifi/BT 2400 - 2480MHz, 5150 - 5850 MHz, 2412MHz (0.10dBi), 2437MHz (0.20dBi), 2462MHz (0.40dBi), 2402MHz (0.60dBi), 2438MHz (0.60dBi), 2480MHz (1.10dBi), 5180MHz (4.60dBi), 5500MHz (3.30dBi), 5825MHz (3.10dBi)	Yes	Yes

Note: * Antenna Redesign (Inductor, Antenna element & Tuning table)

7.2 Battery

Table 5

Battery No.	Battery Models	Description	Selected for test	Tested
1	PMNN4816A	Standard 3200mAh (new 18650 Li-Ion cell) Non-UL battery	Yes	Yes
2	PMNN4817A	High Capacity 4400mAH (using RN 2170 Li-Ion cell) Non-UL battery	Yes	Yes
3	PMNN4818A	UL 3650mAH (using RN 2170 Li-Ion cell) UL battery	Yes	Yes

7.3 Body worn Accessories

Table 6

Body worn No.	Body worn Models	Description	Selected for test	Tested
1	PMLN8374A	Hybrid Case (Similar to APX NEXT)	Yes	Yes
2	PMLN8507A	Carry Accessory - Belt clip, APX N70 2.5" belt clip	Yes	Yes
3	PMLN5409A	3" replacement belt loop	Yes	Yes
4	PMLN8371A	Aloha Standard plastic carry holster	Yes	Yes
5	PMLN8373A	Hybrid Case (Similar to APX NEXT)	Yes	Yes
6	PMLN8374A	Hybrid Case (Similar to APX NEXT)	Yes	Yes
7	PMLN8508A	Carry Accessory - Belt clip, APX N70 3" belt clip	Yes	Yes

7.4 Audio Accessories

Table 7

Audio No.	Audio Acc. Models	Description	Selected for test	Tested
1	PMMN4128A	UL RM 780 Gcai mini RSM , wind porting RSM with buttons	Yes	Yes

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	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

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. 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 Head	750MHz(1) Head	1800MHz (1) Head	2450MHz (1) Head	5Hz (1) Head
Sugar	55.4	NA	NA	NA	NA
Diacetin	NA	NA	NA	NA	NA
De ionized -Water	38.35	NA	NA	NA	NA
Salt	5.15	NA	NA	NA	NA
HEC	1	NA	NA	NA	NA
Bact.	0.1	NA	NA	NA	NA

Note: (1) SPEAG provides Motorola proprietary stimulant ingredients for the 750MHz, 1800MHz, 2450GHz and 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	7486	01/19/2024	01/19/2027
Speag Probe	EX3DV4	7882	06/25/2024	06/25/2024
Speag DAE	DAE4	684	02/22/2022	02/22/2022
Speag DAE	DAE4	850	04/14/2022	04/14/2025
POWER AMPLIFIER	50W 1000A	14715	CNR	CNR
AMPLIFIER	5S1G4	312988	CNR	CNR
AMPLIFIER	5S4G11	312663	CNR	CNR
VECTOR SIGNAL GENERATOR	E4438C	MY45091270	10/31/2023	10/31/2024
VECTOR SIGNAL GENERATOR	E4438C	MY47272101	11/25/2023	11/25/2024
BI-DIRECTIONAL COUPLER	3020A	41935	8/20/2024	8/20/2025
BI-DIRECTIONAL COUPLER	3022	81640	6/13/2024	6/13/2025
BI-DIRECTIONAL COUPLER	3024	61182	6/13/2024	6/13/2025
POWER METER	E4419B	MY45103725	7/18/2024	7/18/2025
POWER METER	E4416A	MY50001037	9/6/2024	9/6/2025
POWER METER	E4417A	GB41292245	12/9/2023	12/9/2024
POWER METER	E4419B	GB42420608	12/10/2023	12/10/2024
POWER SENSOR	E9301B	MY41495594	11/2/2023	11/2/2024
POWER SENSOR	E4412A	US38488023	5/31/2024	5/31/2025
POWER SENSOR	E4412A	MY61060011	4/29/2024	4/29/2025
POWER SENSOR	E4412A	MY61050006	4/29/2024	4/29/2025
DATA LOGGER	DSB	16326820	11/26/2023	11/26/2024
DATA LOGGER	DSB	16326831	11/26/2023	11/26/2024
DATA LOGGER	DSB	16398306	12/31/2023	12/31/2024
THERMOMETER	HH806AU	080307	12/15/2023	12/15/2024
TEMPERATURE PROBE	80PK-22	06032017	12/15/2023	12/15/2024

Table 11 (Continued)

Equipment Type	Model Number	Serial Number	Calibration Date	Calibration Due Date
TEMPERATURE PROBE	80PK-22	06032017	12/15/2023	12/15/2024
NETWORK ANALYZER	E5071B	MY42403147	6/6/2024	6/6/2025
THERMOMETER	HH202A	35881	1/17/2024	1/17/2025
TEMPERATURE PROBE	80PK-22	05032017	12/28/2023	12/28/2024
DIELECTRIC ASSESSMENT KIT	DAK-3.5	1156	4/8/2024	4/8/2025
DIELECTRIC ASSESSMENT KIT	DAK-12	1069	4/8/2024	4/8/2025
SPEAG DIPOLE	CLA150	4016	1/6/2023	1/6/2026
SPEAG DIPOLE	D2450V2	782	7/16/2022	7/16/2025
SPEAG DIPOLE	D5GHzV2	1022	4/11/2024	4/11/2027
SPEAG DIPOLE	D1800V2	278	1/16/2023	1/16/2026

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								
04/05/2024	Head	150	7486	0.79	51.03	Pass	Pass	Pass
07/09/2024	Head	150	7882	0.77	50.08	Pass	Pass	Pass
WLAN								
04/15/2024	Head	2450	7486	1.83	42.90	Pass	Pass	Pass
07/15/2024	Head	2450	7882	1.84	38.68	Pass	Pass	Pass
07/15/2024		5250		4.51	25.06	Pass	Pass	Pass
07/16/2024		5600		4.89	34.48	Pass	Pass	Pass
07/16/2024		5800		5.11	34.14	Pass	Pass	Pass
LTE								
04/04/2024	Head	835	7486	0.94	40.80	Pass	Pass	Pass
08/02/2024	Head	750	7882	0.86	41.89	Pass	Pass	Pass
08/02/2024		835		0.86	42.60	Pass	Pass	Pass
08/02/2024		1800		1.37	42.45	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 with the largest deviation from the qualified source SAR target for each dipole (Bold). 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	Deviation (%)
7486	IEEE/IEC Head	SPEAG CLA150 / 4016	3.77 ± 10%	3.40	3.40	09/30/2024@	**-9.80**
				4.12	4.12	10/03/2024	9.30
7882				3.91	3.91	10/10/2024	3.70
				3.88	3.88	10/18/2024	2.90
7486	IEEE/IEC Head	SPEAG 2450-782e	52.8± 10%	1.68	53.16	10/01/2024@	**0.70**
7882	IEEE/IEC Head	SPEAG 2450-703e	52.3± 10%	1.73	52.3	10/12/2024	**-2.7**
7882	IEEE/IEC Head	SPEAG 5250 / 1022e	79.1± 10%	7.96	79.6	10/12/2024	0.60
				7.35	73.5	10/05/2024	-7.10
		SPEAG 5600 / 1022e	81.9± 10%	7.71	77.1	10/13/2024	-5.90
				7.55	75.5	10/12/2024@	**-7.80**
		SPEAG 5800 / 1022e	79.7± 10%	8.31	83.1	10/15/2024	4.30
7486	IEEE/IEC Head	SPEAG 835-4d029e	9.79± 10%	0.314	9.94	10/01/2024@	**1.50**
7882	IEEE/IEC Head	SPEAG 750-1142e	8.46± 10%	0.274	8.67	10/10/2024	**2.50**
		SPEAG 1800-278e	37.6± 10%	1.27	40.19	10/11/2024	6.90
				1.28	40.51	10/11/2024	**7.70**

Note: '@' indicates that system verification check covers next test day

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
138.0000	IEEE/ IEC Head	0.75 (0.71-0.79)	52.9 (50.2-55.5)	0.786	51.55	10/10/2024
150.0000	IEEE/ IEC Head	0.76 (0.72-0.80)	52.3 (49.7-54.9)	0.782	51.533	09/30/2024@
				0.738	50.673	10/03/2024
				0.795	50.567	10/10/2024
				0.735	50.257	10/18/2024
158.3000	IEEE/ IEC Head	0.77 (0.73-0.80)	51.9 (49.3-54.5)	0.788	51.145	09/30/2024@
				0.744	50.296	10/03/2024
				0.801	50.162	10/10/2024
				0.741	49.193	10/18/2023
173.4000	IEEE/ IEC Head	0.78 (0.74-0.82)	51.2 (48.6-53.8)	0.813	49.496	10/10/2024
2412.0000	IEEE/ IEC Head	1.77 (1.59-1.94)	39.3 (35.3-43.2)	1.608	39.782	10/12/2024
2450.0000	IEEE/ IEC Head	1.80 (1.62-1.98)	39.2 (35.3-43.1)	1.627	40.543	10/1/2024@
				1.635	39.723	10/12/2024
2437.0000	IEEE/ IEC Head	1.79 (1.61-1.97)	39.2 (35.3-43.1)	1.616	40.562	10/1/2024@
				1.627	39.745	10/12/2024
2462.000	IEEE/ IEC Head	1.81 (1.63-1.99)	39.2 (35.3-43.1)	1.644	39.708	10/12/2024
5250.0000	IEEE/ IEC Head	4.71 (4.24-5.18)	36.0 (32.4-39.5)	4.724	37.565	10/04/2024@
				4.310	32.930	10/12/2024@
				4.356	33.999	10/13/2024
5270.0000	IEEE/ IEC Head	4.71 (4.26-5.18)	35.9 (32.3-39.5)	4.742	37.534	10/04/2024@
				4.334	32.901	10/12/2024@
				4.377	33.967	10/13/2024

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
5600.0000	IEEE/ IEC Head	5.07 (4.56-5.58)	35.5 (32.0-39.1)	4.738	32.435	10/12/2024@
				4.736	33.397	10/13/2024
5610.0000	IEEE/ IEC Head	5.08 (4.57-5.59)	35.5 (31.9-39.0)	4.750	32.424	10/12/2024@
				4.747	33.383	10/13/2024
5775.0000	IEEE/ IEC Head	5.25 (4.72-5.77)	35.3 (31.8-38.9)	4.924	32.401	10/14/2024@
5800.0000	IEEE/ IEC Head	5.27 (4.74-5.80)	35.3 (31.8-38.8)	4.953	32.359	10/14/2024@
707.5000	IEEE/ IEC Head	0.89 (0.80-0.98)	42.1 (37.9-46.3)	0.825	39.529	10/10/2024
750.0000	IEEE/ IEC Head	0.89 (0.80-0.98)	41.9 (37.7-46.1)	0.840	39.397	10/10/2024
782.0000	IEEE/ IEC Head	0.89 (0.80-0.98)	41.7 (37.6-45.9)	0.851	39.331	10/10/2024
793.0000	IEEE/ IEC Head	0.90 (0.81-0.98)	41.7 (37.5-45.9)	0.841	39.064	10/01/2024
				0.855	39.311	10/10/2024
835.0000	IEEE/ IEC Head	0.90 (0.81-0.98)	41.7 (37.5-45.9)	0.856	38.934	10/01/2024@
1733.0000	IEEE/ IEC Head	1.36 (1.23-1.50)	40.1 (36.1-44.1)	1.241	41.717	10.01/2024
				1.269	37.993	10/10/2024@
1800.0000	IEEE/ IEC Head	1.40 (1.26-1.54)	40.0 (36.0-44.0)	1.218	41.623	10/01/2024
				1.273	38.340	10/11/2024
1860.0000	IEEE/ IEC Head	1.40 (1.26-1.54)	40.0 (36.0-44.0)	1.339	37.848	10/10/2024@
				1.306	38.249	10/11/2024
1880.0000	IEEE/ IEC Head	1.40 (1.26-1.54)	40.0 (36.0-44.0)	1.317	38.223	10/11/2024

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: 19.2 – 23.2˚C Avg. 21.29 ˚C
Tissue Temperature	18 – 25 ˚C	Range: 20.1 – 22.3˚C Avg. 21.05˚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. KDB 941225 was applied to LTE test configurations. KDB 282277 was applied to WLAN.

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 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 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, WLAN and LTE modes and 50% duty cycle was applied to PTT configurations in the final results.

Standalone and simultaneous BT testing were assessed in sections 13.14 and 14.0 per the guidelines of KDB 447498.

13.0 DUT Test Data

13.1 Assessments for FCC LMR

The DUT was assessed at the highest applicable configuration at the body found during the initial compliance assessment on filed with the FCC. SAR plots of the highest SAR results are present in Appendix E.

Table 17

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#
Highest Body Configuration									
AN000414A01	PMNN4818A	PMLN8374 w/ PMLN8507A	PMMN4128A	158.3000	6.45	0.03	5.19	**2.66**	ZIQ-AB-241003-10
Highest Face Configuration									
AN000414A01	PMNN4818A	Radio @ back	None	158.3000	6.60	0.19	4.72	**2.36**	DAN(ABE)-FACE-241001-02@

13.2 Assessments for FCC WLAN 2.4GHz

The DUT was assessed at the highest applicable configuration at the body found during the initial compliance assessment on filed with the FCC. SAR plots of the highest SAR results are 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#
Highest Body Configuration									
AN000413A03	PMNN4818A	PMLN8374A w/ PMLN5409A	None	2437.0000	0.123	-0.39	0.028	**0.035**	MHN-AB-241002-02@
Highest Face Configuration									
AN000413A03	PMNN4816A	Radio @ front 2.5cm	None	2437.0000	0.123	-0.13	0.214	**0.253**	MHN-FACE-241002-03@

13.3 Assessments for FCC WLAN 5GHz

The DUT was assessed at the highest applicable configuration at the body found during the initial compliance assessment on filed with the FCC. SAR plots of the highest SAR results are present 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#
WLAN 5GHz UNII-2A (5.25 – 5.35GHz)									
Highest Body Configuration									
AN000413A03	PMNN4816A	PMLN8371A w/ PMLN8507A	None	5270.0000	0.072	*-0.65	0.001	0.002	MFR-AB-241012-15
Highest Face Configuration									
AN000413A03	PMNN4816A	Radio @ front 2.5cm	None	5270.0000	0.072	-0.28	0.512	**0.604**	EMR-FACE-241005-03
WLAN 5GHz UNII-2C (5.47 – 5.725GHz)									
Highest Body Configuration									
AN000413A03	PMNN4816A	PMLN8371A w/ PMLN8507A	None	5610.0000	0.071	*-2.56	0.000	0.001	MFR-AB-241013-01@
Highest Face Configuration									
AN000413A03	PMNN4816A	Radio @ front 2.5cm	None	5610.0000	0.071	-0.20	0.282	0.342	MFR-FACE-241013-02@

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

Table 19 (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#
WLAN 5HHz UNII-3 (5.65 – 5.85GHz)									
Highest Body Configuration									
AN000413A03	PMNN4816A	PMLN8371A w/ PMLN8507A	None	5775.0000	0.079	0.32	0.015	**0.016**	MIN-AB-241015-05@
Highest Face Configuration									
AN000413A03	PMNN4816A	Radio @ front 2.5cm	None	5775.0000	0.079	-0.29	0.294	0.318	MIN-FACE-241015-06@

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

13.6 Assessments for FCC LTE

The DUT was assessed at the highest applicable configuration at the body found during the initial compliance assessment on filed with the FCC. SAR plots of the highest SAR results are present 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#
Band 2 (1850 – 1910MHz)									
Highest Body Configuration									
AN000413A01	PMNN4817A	PMLN8374A w/ PMLN5409A	None	1880.0000	0.203	0.04	0.013	0.016	EMR-AB-241011-03@
Highest Face Configuration									
AN000413A01	PMNN4816A	Radio @ front 2.5cm	None	1860.0000	0.200	0.04	0.149	0.188	BL-FACE-241011-15
Band 4 (1710-1755 MHz)									
Highest Body Configuration									
AN000413A01	PMNN4816A	PMLN8372A w/ PMLN5409A	None	1732.5000	0.202	-0.15	0.015	0.019	EMR-AB-241011-02@
Highest Face Configuration									
AN000413A01	PMNN4816A	Radio @ front 2.5cm	None	1732.5000	0.202	-0.20	0.220	**0.287**	MHN-FACE-241001-05
Band 12 (699-716 MHz)									
Highest Body Configuration									
AN000413A01	PMNN4816A	PMLN8371A w/ PMLN8507A	None	707.5000	0.207	0.12	0.080	**0.097**	BL-AB-241010-09
Highest Face Configuration									
AN000413A01	PMNN4817A	Radio @ back 2.5cm	None	707.5000	0.207	-0.06	0.048	0.059	BL-FACE-241010-13

Table 20 (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#
Band 13 (777-787 MHz)									
Highest Body Configuration									
AN000413A01	PMNN4816A	PMLN8371A w/ PMLN8507A	None	782.0000	0.208	-0.14	0.063	0.079	BL-AB-241010-10
Highest Face Configuration									
AN000413A01	PMNN4816A	Radio @ back 2.5cm	None	782.0000	0.208	-0.44	0.054	0.072	BL-FACE-241010-11
Band 14 (788-798 MHz)									
Highest Body Configuration									
AN000413A01	PMNN4816A	PMLN8371A w/ PMLN8508A	None	793.0000	0.221	0.03	0.073	0.083	MFR(ABE)-AB-241001-11
Highest Face Configuration									
AN000413A01	PMNN4816A	Radio @ back 2.5cm	None	793.0000	0.221	-0.02	0.053	0.061	BL-FACE-241010-12

13.7 Assessments for ISED, Canada

Based on the assessment results for body and face per KDB643646, additional tests were not required for ISED, Canada frequency range as the testing performed is compliance with the Industry Canada frequency range.

LMR observed degradation on Body and Face configuration, while WLAN2.4GHz and LTE band 2 & band 4 observed degradation on Face configuration only. As per ISED Notice 2016-DRS001, additional tests were required the low, mid and high frequency channels for the highest configuration from Body and Face that previous original filing (exceeded on filed SAR value). The SAR results are in table below. SAR plots of the highest result for Body and Face (bolded) are present in Appendix E.

For LTE band 4 with overlapping channels, only the middle channel are select for testing.

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#
VHF 138.0000 – 173.4000 MHz (Body Configuration)									
AN000414A01	PMNN4818A	PMLN8374 w/ PMLN8507A	PMMN4128A	138.0000	6.58	-0.24	0.64	0.34	EMR-AB-241010-03
				158.3000	6.45	0.03	5.19	**2.66**	ZIQ-AB-241003-10
				173.4000	6.60	-0.08	1.13	0.58	EMR-AB-241010-05
VHF 138.0000 – 173.4000 MHz (Face Configuration)									
AN000414A01	PMNN4818A	Radio @ back	None	138.0000	6.50	-0.02	2.34	1.19	BL-FACE-241010-06
				158.3000	6.60	0.19	4.72	**2.36**	DAN(ABE)-FACE-241001-02@
				173.4000	6.48	-0.12	1.37	0.72	BL-FACE-241010-07

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#
WLAN 2.4GHz Face Configuration									
AN000413A03	PMNN4816A	Radio @ front 2.5cm	None	2412.0000	0.117	-0.25	0.193	0.247	BAD(MAN)-FACE-241012-08
				2437.0000	0.131	-0.13	0.214	**0.253**	MHN-FACE-241002-03@
				2462.0000	0.121	-0.12	0.192	0.231	BAD(MAN)-FACE-241012-09

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#
Band 2 (1850 – 1910MHz) Face Configuration									
AN000413A01	PMNN4816A	Radio @ front 2.5cm	None	1860.0000	0.200	0.04	0.149	**0.188**	BL-FACE-241011-15
				1880.0000	0.205	-0.18	0.141	0.181	EMR-FACE-241011-16
				1900.0000	0.207	0.01	0.135	0.164	EMR-FACE-241011-17

14.0 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 F 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 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#
AN000414A01	PMNN4818A	PMLN8374 w/ PMLN8507A	PMMN4128A	158.3000	6.40	0.04	5.16	**2.66**	BAD(MAN)-AB-241018-02

15.0 Simultaneous Transmission

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

Table 25

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

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

15.1 Simultaneous Transmission for LMR, BT, WLAN 2.4GHz and 5GHz

Table 26

Exposure condition	Standalone SAR (W/kg)				Sum of SAR (W/kg)		
	LMR	2.4GHz	5GHz	LTE	LMR + 2.4GHz	LMR + 5GHz	LMR + LTE
Body worn Exposure	2.66	0.035	0.036	0.102	2.70	2.70	2.76
Face Exposure	2.36	0.253	0.677	0.287	2.61	3.04	2.65

16.0 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 and 10-gram average SAR values found for this filing:

Table 27

Designator	Frequency band (MHz)	Max Calc at Body (W/kg)	Max Calc at Face (W/kg)
		1g-SAR	1g-SAR
FCC US			
LMR	150.8 – 173.4	2.66[1]	2.36[2]
LTE B12	699 – 716	0.091	0.057
LTE B13	777 – 787	0.081	0.064
LTE B14	788 - 798	0.102	0.068
LTE B4	1710 – 1755	0.019	0.287[3]
LTE B2	1850 - 1910	0.025	0.188[4]
WLAN 2.4 GHz	2412 - 2462	0.035	0.253[5]
WLAN 5 GHz	5180 - 5825	0.036	0.677
BT	2402 - 2480	N/A	N/A
Highest Simultaneous Transmission SAR	Sum of SAR (W/kg)	2.76[6]	3.04[7]
ISED Canada			
LMR	138 – 173.4	2.66[1]	2.36[2]
LTE B12	699 – 716	0.091	0.057
LTE B13	777 – 787	0.081	0.064
LTE B14	788 - 798	0.102	0.068
LTE B4	1710 – 1755	0.019	0.287[3]
LTE B2	1850 - 1910	0.025	0.188[4]
WLAN 2.4 GHz	2412 - 2462	0.035	0.253[5]
WLAN 5 GHz	5180 - 5825	0.036	0.677
BT	2402 - 2480	N/A	N/A
Highest Simultaneous Transmission SAR	Sum of SAR (W/kg)	2.76[6]	3.04[7]
Overall			
LMR	136 - 174	2.66[1]	2.36[2]
LTE B12	699 – 716	0.091	0.057
LTE B13	777 – 787	0.081	0.064
LTE B14	788 - 798	0.102	0.068
LTE B4	1710 – 1755	0.019	0.287[3]
LTE B2	1850 - 1910	0.025	0.188[4]
WLAN 2.4 GHz	2412 - 2462	0.035	0.253[5]
WLAN 5 GHz	5180 - 5825	0.036	0.677
BT	2402 - 2480	N/A	N/A
Highest Simultaneous Transmission SAR	Sum of SAR (W/kg)	2.76[6]	3.04[7]

Note:

[1 & 2] indicates the new reported SAR value at LMR. Previous filed reported SAR value at LMR for body & face are 1.91 & 1.62 W/kg.

[3]indicates the new reported SAR value at LTE B4. Previous filed reported SAR value for face are 0.202 W/kg.

[4]indicates the new reported SAR value at LTE B2. Previous filed reported SAR value for face are 0.146 W/kg.

[5]indicates the new reported SAR value at WLAN 2.4GHz. Previous filed reported SAR value for face are 0.217 W/kg.

[6 & 7] indicates the new simultaneous transmission SAR. Previous filed reported SAR value for body & face are 2.01 & 2.30 W/kg.

The test results clearly demonstrate compliance with FCC/ISED Occupational/Controlled RF Exposure limits of 8 W/kg averaged over 1 gram per the requirements of FCC 47 CFR § 2.1093 and ISED RSS-102 (Issue 6).

16.0 Variability Assessment

Per the guidelines in KDB 865664 SAR variability assessment is not required because SAR results are 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 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 Device Under Test, for 150MHz

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	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				12	11	482
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

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	6.7	N	1.00	1	1	6.7	6.7	∞
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				10	9	99999
Expanded Uncertainty (95% CONFIDENCE LEVEL)			*k*=2				19	18	

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 800 MHz to 3 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	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 Device Under Test, for 800 MHz to 3 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	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 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 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