



SMM 826

DECLARATION OF COMPLIANCE SAR ASSESSMENT PCII Report

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Date of Report: 11/18/2022
Report Revision: B

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Report Author: Hoe Kean Loon (EME Engineer)
Manufacturer: Motorola Solutions Inc.
DUT Description: Handheld Portable – MOTOTRBO ION 400-512 MHz 4W LTE CBRS GNSS BT WiFi
Test TX mode(s): FM; LTE; WLAN
Max. Power output: Refer to Table 3
Tx Frequency Bands: Refer to Table 3
Signaling type: FM, TDMA, FHSS, DSSS and OFDM
Model(s) Certified: AAH90ZDU9RH1AN (PMUE5674A) & AAH90ZDU9RH1AN (PMUE5674B)
Firmware Version: D02.22.03.0054 (BP), D00.02.80 (AP)
Classification: Occupational/Controlled
Applicant Name: Motorola Solutions Inc.
Applicant Address: 8000 West Sunrise Boulevard, Fort Lauderdale, Florida 33322
FCC ID: AZ489FT7133
IC: 109U-89FT7133
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.


Tey Pei Loo
 (Approved Signatory)
 Approval Date: 11/18/2022

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Report Revision History

Date	Revision	Comments
10/31/2022	A	Initial release
11/18/2022	B	Update Table 1 in Section 2 for Simultaneous and Hot Spot modes.

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 AAH90ZDU9RH1AN (PMUE5674A) and AAH90ZDU9RH1AN (PMUE5674B). This device is classified as Occupational/Controlled. The information herein is to show evidence of Class II Permissive Change compliance for handheld portable model number AAH90ZDU9RH1AN (PMUE5674A) and AAH90ZDU9RH1AN (PMUE5674B) due to additional hotspot capability added to device.

2.0 FCC SAR Summary

The SAR summary in Table 1 below consists of the highest SAR results for each technology from the initial filing and PCII filing (Report ID: P18058-EME-00079 & P18058-EME-00104).

Table 1

Equipment Class	Frequency band (MHz)	Max Calc at Body (W/kg)	Max Calc at Face (W/kg)	Max Calc at Body (W/kg) Hot Spot mode	Max Calc at Face (W/kg) Hot Spot mode
		1g-SAR	1g-SAR	1g-SAR	1g-SAR
TNF	406.125-512	2.99	3.41	2.99	3.41
PCF	LTE B2	0.237	0.117	0.237	0.117
	LTE B4	0.305	0.151	0.305	0.151
	LTE B5	0.197	0.140	0.197	0.140
	LTE B7	0.124	0.054	0.124	0.054
	LTE B12	0.230	0.226	0.230	0.226
	LTE B13	0.210	0.140	0.210	0.140
	LTE B14	0.218	0.168	0.218	0.168
	LTE B30	0.111	0.038	0.111	0.038
	LTE B48	0.088	0.105	0.088	0.105
DTS	2.4 GHz	0.046	0.017	0.046	0.017
NII	5.0 GHz	0.014	0.0106	0.014	0.0106
*DSS	BT	NA	NA	NA	NA
Highest Simultaneous Transmission SAR	Sum of SAR (W/kg)	3.30	3.64	3.34¹	3.65¹

Notes:

“*”Results not required per KDB (refer to sections 13.4 and 14.1)

¹ New highest SAR value for Simultaneous Transmission at the Body & Face are 3.34 & 3.65 W/kg compared to previous on file SAR value of 3.28 and 3.64 W/kg respectively.

3.0 Abbreviations / Definitions

BT: Bluetooth

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

QPSK: Quadrature Pulse Shift Key

SAR: Specific Absorption Rate

TDMA: Time Division Multiple Access

TNF: Licensed Non-Broadcast Transmitter Held to Face

16QAM: 16 State Quadrature Amplitude Modulation

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 – 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 either frequency modulation (FM) with 100% transmit duty cycle or TDMA signals with maximum of 50% transmit duty cycle. For conservative assessment, FM signal was tested. It also contains LTE and WLAN technologies for data application, Bluetooth 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 a Class 1 Bluetooth device which is a Frequency Hopping Spread Spectrum (FHSS) technology. The Bluetooth radio modem is used to wireless link audio accessories. The maximum actual transmission duty cycle is imposed by the Bluetooth standard. The maximum duty cycle for BT is 77.44% and BT LE is 86%.

The intended operating positions are “at the face” with the DUT at least 2.5 cm 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. Hotspot mode is also applicable for this device. The intended operating position for hotspot mode includes both body and face configurations.

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	Tx Band (MHz)	Transmission	Duty Cycle (%)	Nominal Power (W)	Max Power (W)
LMR	400-512	FM	50 ^(note 1)	4.00	4.80
LTE Band 2	1850-1910	QPSK, 16QAM	100	0.252	0.317
LTE Band 4	1710-1755	QPSK, 16QAM	100	0.252	0.317
LTE Band 5	824-849	QPSK, 16QAM	100	0.200	0.252
LTE Band 7	2500-2570	QPSK, 16QAM	100	0.200	0.252
LTE Band 12	699-716	QPSK, 16QAM	100	0.200	0.252
LTE Band 13	777-787	QPSK, 16QAM	100	0.200	0.252

Table 3 (Continued)

Technologies	Tx Band (MHz)	Transmission	Duty Cycle (%)	Nominal Power (W)	Max Power (W)
LTE Band 14	788-798	QPSK, 16QAM	100	0.200	0.252
LTE Band 17	704-716	QPSK, 16QAM	100	0.200	0.252
LTE Band 30	2305-2315	QPSK, 16QAM	100	0.200	0.252
LTE Band 48 ^(note 2)	3550-3700	QPSK, 16QAM	63.33	0.200	0.252
Bluetooth	2400-2485	FHSS	77.44	0.004	0.0050
Bluetooth LE	2400-2485	FHSS	86.00	0.004	0.0050
WLAN 802.11 b	2412-2462	DSSS	98.77	0.03548	0.05623
WLAN 802.11 g / n (20 MHz)	2412-2462	OFDM	98.45 (802.11g) 98.34 (802.11 n)	0.03548	0.05623
WLAN 802.11 n (40 MHz)	2412-2462	OFDM	95.10	0.03548	0.05623
WLAN 802.11 a / n / ac (20 MHz)	5180-5825	OFDM	98.54 (802.11a) 98.39 (802.11 n) 98.35 (802.11 ac)	^(note 3) 0.01585 (5180-5350MHz) / 0.02512 (5470-5825MHz)	^(note 3) 0.02512 (5180-5350MHz) / 0.03981 (5470-5825MHz)
WLAN 802.11 n / ac (40 MHz)	5180-5825	OFDM	96.54 (802.11 n) 96.75 (802.11 ac)	^(note 4) 0.01585 (5180-5350MHz) / 0.03162 (5470-5825MHz)	^(note 4) 0.02512 (5180-5350MHz) / 0.03981 (5470-5825MHz)
WLAN 802.11 ac (80 MHz)	5180-5825	OFDM	93.09	^(note 5) 0.01585 (5180-5350MHz) / 0.02512 (5470-5825MHz)	^(note 5) 0.02512 (5180-5350MHz) / 0.03981 (5470-5825MHz)

Notes:

- (1) includes 50% PTT operation
- (2) For band 48, EME tested with radio without AMPR implementation (has higher power as stated in the table above). However, AMPR (with nominal power 0.118 W, maximum power 0.159 W) was implemented later for RF/EMC testing and this AMPR feature will be implemented for production units.
- (3) New power for PP vintage WLAN 802.11 a/n/ac (20MHz)
- (4) New power for PP vintage WLAN 802.11 n/ac (40MHz)
- (5) New power for PP vintage WLAN 802.11 ac (80MHz)

7.0 Simultaneous Transmissions

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

Table 4

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

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

7.1 Assessment for standalone and Simultaneous Transmission Exclusion for BT LE

As evaluated in the previous filing reports, assessments for standalone and simultaneous transmission for BT LE can be excluded for this device.

7.2 Simultaneous Transmission for LMR, WLAN 2.4GHz, WLAN 5GHz and LTE

Table 5

Exposure condition	Standalone SAR (W/kg)				Sum of SAR (W/kg)				
	LMR	2.4GHz	5GHz	LTE	LMR + 2.4GHz	LMR + 5GHz	LMR + LTE	LMR + Hotspot 2.4GHz + LTE	LMR + Hotspot 5GHz + LTE
Body Exposure	2.99	0.046	0.014	0.305	3.04	3.00	3.30	3.34	3.31
Face Exposure	3.41	0.017	0.0106	0.226	3.43	3.42	3.64	3.65	3.65

8.0 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 6

Frequency band (MHz)	Max Calc at Body (W/kg) Hot Spot mode	Max Calc at Face (W/kg) Hot Spot mode
	1g-SAR	1g-SAR
LMR (406.125-512)	2.99	3.41
WWAN (LTE)	0.305	0.226
WLAN 2.4 GHz	0.046	0.017
WLAN 5 GHz	0.014	0.0106
BT	NA	NA
Sum of SAR (W/kg)	3.34	3.65

All results are scaled to the maximum output power.

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 ISED RSS-102 (Issue 5).