MOTOROLA SOLUTIONS

MS ISO/IEC 17025 TESTING SAMM No. 0826

CERTIFICATE 2518.05

DECLARATION OF COMPLIANCE SAR ASSESSMENT PCII Report Part 1 of 2

Motorola Solutions Inc.
EME Test Laboratory
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Date of Report: 08/04/2021
Report Revision: A

Responsible Engineer:	Puteri Alifah Ilyana Binti Nor Rahim (EME Engineer)
Report Author:	Puteri Alifah Ilyana Binti Nor Rahim (EME Engineer)
Date/s Tested:	6/22/2021-6/23/2021, 6/25/2021 - 6/28/2021, 7/15/2021-7/16/2021, 8/4/2021
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
Nominal Power:	Refer to Table 3
Tx Frequency Bands:	Refer to Table 3
Signaling type:	FM, TDMA, FHSS, DSSS and OFDM
Model(s) Tested:	AAH90ZDU9RH1AN (PMUE5674B)
Model(s) Certified:	AAH90ZDU9RH1AN (PMUE5674B)
Serial Number(s):	734TXK0049, 734TXK0077
Classification:	Occupational/Controlled
Applicant Name:	Motorola Solutions Inc.
Applicant Address:	8000 West Sunrise Boulevard, Fort Lauderdale, Florida 33322
FCC ID:	AZ489FT7133; LMR 406.125-512 MHz; LTE; WLAN 2.4 GHz; WLAN 5GHz, Bluetooth and Bluetooth LE This report contains results that are immaterial for FCC equipment approval, which are clearly identified.
IC:	109U-89FT7133 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: 16/08/2021

Part 1 of 2

APPENDICES

Part 2 of 2

APPENDICES

Report Revision History

Date	Revision	Comments
08/04/2021	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 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 (PMUE5674B) due to changes made which involving the BOM changes including VCO, Micro Processor and SW change.

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	406.125-512	2.74	2.79
PCF	LTE B2	0.205	0.096
	LTE B4	0.185	0.133
	LTE B5	0.197[1]	0.140[1]
	LTE B7	0.124[2]	0.054[2]
	LTE B12	0.161	0.159
	LTE B13	0.210[3]	0.140[3]
	LTE B14	0.218[4]	0.168[4]
	LTE B30	0.111[5]	0.038
	LTE B48	0.088[6]	0.105[6]
DTS	2.4 GHz	0.044	0.016
NII	5.0 GHz	0.002	0.002
*DSS	BT	NA	NA
Highest Simultaneous Transmission SAR	Sum of SAR (W/kg)	2.96	2.96

Notes:

"*"Results not required per KDB (refer to sections 13.4 and 14.1)
LTE Band 17 covered within band 12 (refer to Part 2 section 7.7)
[1] New highest SAR value at LTE B5 for Body and Face are 0.197 and 0.140 W/kg compared to previous on file SAR value of 0.148 and 0.106 W/kg respectively.
[2] New highest SAR value at LTE B7 for Body and Face are 0.124 and 0.054 W/kg compared to previous on file SAR value of 0.101 and 0.0.039 W/kg respectively.
[3] New highest SAR value at LTE B13 for Body and Face are 0.210 and 0.140 W/kg compared to previous on file SAR value of 0.113 and 0.086 W/kg respectively.
[4] New highest SAR value at LTE B14 for Body and Face are 0.218 and 0.168 W/kg compared to previous on file SAR value of 0.091 and 0.092 W/kg respectively.
[5] New highest SAR value at LTE B30 for Body is 0.111 W/kg compared to previous on file SAR value of 0.066 W/kg.
[6] New highest SAR value at LTE B48 for Body and Face are 0.088 and 0.105 W/kg compared to previous on file SAR value of 0.059 and 0.042 W/kg respectively.

3.0 Abbreviations / Definitions

BT: Bluetooth
CNR: Calibration Not Required
CW: Continuous Wave
DSS: Direct Spread Spectrum
DTS: Digital Transmission System
DUT: Device Under Test
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
PCF: PCS Licensed Transmitter Held to Face
PSM: Public Safety Microphone
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

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 – 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.

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
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 Optional Accessories and Test Criteria

This device is offered with optional accessories. The following sections identify the test criteria and details for each accessory category applicable for this PCII filing only. Detail listing of all approved offered accessories available in the original filing report.

7.1 Antennas

These are antennas applicable for this PCII filing. The Table below lists its descriptions.

Table 4

Antenna No.	Antenna Models	Description	Selected for test	Tested
1	PMAE4071A	UHF STUBBY ANTENNA 470 – 527 MHz; ¼ wave, 1.15 dBi	Yes	Yes
2	AN000350A01	UHF STUBBY ANTENNA (400-450 MHz), 60mm, FERRULE; ¼ wave, 1.27 dBi	Yes	Yes
3	AN000343A01	LTE LOW BAND MAIN ANTENNA LB: 0.699 - 0.960 GHz, B48 3.55-3.75 GHz; ¼ wave, LB: 1.15dBi, Band 48: 1.5dBi	Yes	Yes
4	AN000345A01	BT/WIFI ANTENNA 2.4- 2.48 GHz, 5.15 - 5.85 GHz; ¼ wave, 2.4GHz: 1.14dBi, 5GHz: 1.58dBi	Yes	Yes
5	AN000346A01	LTE MID-HIGH BAND MAIN ANTENNA MB/HB:1.7 - 2.7 GHz; ¼ wave, 2.84 dBi	Yes	Yes

7.2 Batteries

There are three batteries applicable for this PCII filing. The Table below lists their descriptions.

Table 5

Battery No.	Battery Models	Description	Selected for test	Tested
1	PMNN4803A	BATTERY PACK,BATTERY PACK,IMPRES GEN2, Li-ion, IP68, 2820T	Yes	Yes
2	PMNN4804A	BATTERY PACK,BATTERY PACK,IMPRES GEN2, Li-ion, IP68, 2900T, TIA4950	Yes	Yes
3	PMNN4805A	BATTERY PACK,BATTERY PACK,IMPRES GEN2, LIION,IP68, 4400T, TIA4950	Yes	Yes

7.3 Body worn Accessories

These are the body worn applicable for this PCII filing. The Table below lists their descriptions.

Table 6

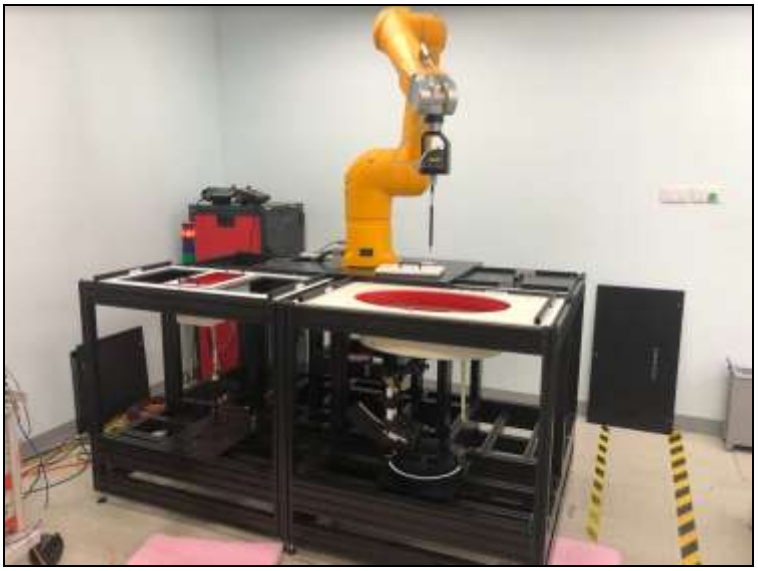
Body worn No.	Body worn Models	Description	Selected for test	Tested	Comments
1	PMLN4651A	BELT CLIP 2	Yes	Yes	Tested with PMLN8126A
2	PMLN7008A	CARRY ACCESSORY-BELT CLIP,2.5-INCH BELT CLIP	Yes	Yes	Tested with PMLN8126A
3	PMLN5407A	2.5" REPLACEMENT SWIVEL BELT LOOP	Yes	Yes	Tested with PMLN8127A
4	PMLN8126A	CARRY ACCESSORY-HOLSTER, PLASTIC CARRY HOLSTER WITH BELT CLIP	Yes	Yes	Tested with PMLN4651A and PMLN7008A
5	PMLN8127A	CARRY ACCESSORY-HOLSTER, PLASTIC CARRY HOLSTER WITH BELT LOOP	Yes	Yes	Tested with PMLN5407A and PMLN5409A

7.4 Audio Accessories

No audio accessories are applicable for this PCII filing.

8.0 Description of Test System

Dasy 5 (52.10.4.1527)



Dasy 6 (6.14.0.959)

8.1 Descriptions of Robotics/Probes/Readout Electronics

Table 7

Dosimetric System type	System version	DAE type	Probe Type
Schmid & Partner Engineering AG SPEAG DASY5	52.10.4.1527	DAE4	EX3DV4 (E-Field)
Schmid & Partner Engineering AG SPEAG DASY6	6.14.0.959	DAE4	EX3DV4 (E-Field)

The DASY5™ and DASY6™ systems are operated per the instructions in the DASY5™ and DASY6™ Users Manual. The complete manual is available directly

from SPEAG™. All measurement equipment used to assess SAR compliance was calibrated according to ISO/IEC 17025 A2LA guidelines. Section 9.0 presents additional test equipment information. Appendices A and B 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 8

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 9. 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 9

Ingredients	450MHz	750MHz	835MHz	1800MHz	1900MHz	2300MHz
	Head	Head	Head	Head	Head	Head
Sugar	56.0	57.0	57.0	NA	NA	NA
Diacetin	0	0	NA	51.5	51.5	51.0
De ionized Water	39.1	40.12	40.45	47.82	48.03	48.75
Salt	3.8	1.78	1.45	0.58	0.37	0.15
HEC	1	1	1	NA	NA	NA
Bact.	0.1	0.1	0.1	0.1	0.1	0.1

Table 9 (Continued)

Ingredients	2450MHz	2600MHz	3500MHz(1)	3700MHz(1)	5GHz (1)
	Head	Head	Head	Head	Head
Sugar	NA	NA	NA	NA	NA
Diacetin	51.0	51.0	NA	NA	NA
De ionized -Water	48.75	48.75	NA	NA	NA
Salt	0.15	0.15	NA	NA	NA
HEC	NA	NA	NA	NA	NA
Bact.	0.1	0.1	NA	NA	NA

Note: (1) SPEAG provides Motorola proprietary stimulant ingredients.

9.0 Test Equipment

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

Table 10

Equipment Type	Model Number	Serial Number	Calibration Date	Calibration Due Date
SPEAG Probe	EX3DV4	7594	12/10/2020	12/10/2021
SPEAG Probe	EX3DV4	7533	4/19/2021	4/19/2022
SPEAG DAE	DAE3	374	4/8/2021	4/8/2022
SPEAG DAE	DAE3	1488	4/7/2021	4/7/2022
Dielectric Assessment Kit	DAK-3.5	1120	8/12/2020	8/12/2021
Network Analyzer	E5071B	MY42403147	12/1/2020	12/1/2021
Amplifier	50W100D	0357646	CNR	CNR
Amplifier	5S1G4	312988	CNR	CNR
Amplifier	5S4G11	312664	CNR	CNR
Bi-Directional Coupler	3020A	41935	8/21/2020	8/21/2021
*Bi-Directional Coupler	3022	77115	7/9/2020	7/9/2021
Bi-Directional Coupler	3022	81640	7/8/2021	7/8/2022
Power Meter	E4418B	GB40206480	11/25/2020	11/25/2021
*Power Meter	E4418B	MY45107917	7/1/2019	7/1/2021
Power Meter	E4416A	MY50001037	8/30/2019	8/30/2021
Power Meter	E4419B	GB42420608	11/27/2020	11/27/2021
Power Sensor	E9301B	MY41495594	5/29/2021	5/29/2022
Power Sensor	8481B	MY41091243	11/3/2020	11/3/2021
Power Sensor	E4412A	MY61060015	4/21/2021	4/21/2022

Table 10 (Continued)

Equipment Type	Model Number	Serial Number	Calibration Date	Calibration Due Date
*Power Sensor	E4412A	MY60100004	6/24/2020	6/24/2021
Vector Signal Generator	E4438C	MY47272101	10/29/2019	10/29/2021
Vector Signal Generator	E4438C	MY42081753	9/5/2019	9/5/2021
Temperature & Huminidity Logger	DSB	16398306	11/24/2020	11/24/2021
Temperature Probe	80PK-22	6032017	11/25/2020	11/25/2021
Temperature Probe	80PK-22	05032017	12/3/2020	12/3/2021
Thermometer	HH806AU	80307	11/25/2020	11/25/2021
Thermometer	HH202A	35881	12/3/2020	12/3/2021
POWER SOURCE	SE UMS 160 CA	4251	5/14/2021	5/14/2022
SPEAG DIPOLE	D450V3	1054	3/11/2019	3/11/2022
SPEAG DIPOLE	D750V3	1142	11/20/2019	11/20/2022
SPEAG DIPOLE	D835V2	4D030	10/15/2018	10/15/2021
SPEAG DIPOLE	D1800V2	278	2/20/2020	2/20/2023
SPEAG DIPOLE	D1900V2	5D065	10/30/2019	10/30/2022
SPEAG DIPOLE	D2300V2	1007	2/27/2019	2/27/2022
SPEAG DIPOLE	D2450V2	703	10/16/2018	10/16/2021
SPEAG DIPOLE	D2600V2	1002	4/9/2019	4/9/2022
SPEAG DIPOLE	D3500V2	1008	10/18/2018	10/18/2021
SPEAG DIPOLE	D3700V2	1028	9/6/2018	9/6/2021
SPEAG DIPOLE	D5GHzV2	1027	1/31/2020	1/31/2023
WIDEBAND RADIO COMMUNICATION TESTER	CMW500	153170	11/10/2020	11/10/2022

Note - * Equipment used for test dates prior to equipment 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 A, B & C 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 11

Dates	Probe Calibration Point		Probe SN	Measured Tissue Parameters		Validation		
				σ	ϵ_r	Sensitivity	Linearity	Isotropy
CW								
3/10/2021	Head	450	7594	0.84	41.50	Pass	Pass	Pass
3/16/2021	Head	2450		1.80	35.30	Pass	Pass	Pass
4/7/2021	Head	5250		4.25	33.60	Pass	Pass	Pass
4/21/2021	Head	5500		4.50	32.90	Pass	Pass	Pass
4/21/2021	Head	5750		4.72	32.60	Pass	Pass	Pass

Table 11 (Continued)

Dates	Probe Calibration Point		Probe SN	Measured Tissue Parameters		Validation		
				σ	ϵ_r	Sensitivity	Linearity	Isotropy
5/10/2021	Head	750	7533	0.88	41.60	Pass	Pass	Pass
5/11/2021	Head	835		0.94	41.40	Pass	Pass	Pass
6/1/2021	Head	1800		1.39	38.90	Pass	Pass	Pass
6/3/2021	Head	1900		1.39	38.00	Pass	Pass	Pass
5/25/2021	Head	2300		1.73	36.40	Pass	Pass	Pass
5/23/2021	Head	2450		1.89	39.60	Pass	Pass	Pass
5/24/2021	Head	2600		2.03	35.20	Pass	Pass	Pass
6/1/2021	Head	3500		2.74	39.00	Pass	Pass	Pass
6/1/2021	Head	3700		2.89	38.70	Pass	Pass	Pass
WLAN								
3/22/2021	Head	2450	7594	1.88	35.40	Pass	Pass	Pass
5/5/2021	Head	5250		4.34	36.59	Pass	Pass	Pass
5/5/2021	Head	5500		4.59	36.33	Pass	Pass	Pass
5/6/2021	Head	5750		4.86	38.31	Pass	Pass	Pass
LTE								
5/20/2021	Head	750 (1 RB)	7533	0.86	41.80	Pass	Pass	Pass
5/20/2021	Head	750 (50% RB)		0.86	41.80	Pass	Pass	Pass
5/20/2021	Head	750 (100% RB)		0.86	41.80	Pass	Pass	Pass
5/20/2021	Head	835 (1 RB)		0.94	40.80	Pass	Pass	Pass
5/20/2021	Head	835 (50% RB)		0.94	40.80	Pass	Pass	Pass
5/20/2021	Head	835 (100% RB)		0.94	40.80	Pass	Pass	Pass
6/2/2021	Head	1800 (1 RB)		1.39	38.90	Pass	Pass	Pass
6/2/2021	Head	1800 (50% RB)		1.39	38.90	Pass	Pass	Pass
6/2/2021	Head	1800 (100% RB)		1.39	38.90	Pass	Pass	Pass
6/3/2021	Head	1900 (1 RB)		1.39	38.00	Pass	Pass	Pass
6/3/2021	Head	1900 (50% RB)		1.39	38.00	Pass	Pass	Pass
6/3/2021	Head	1900 (100% RB)		1.39	38.00	Pass	Pass	Pass
5/25/2021	Head	2300 (1 RB)		1.73	36.40	Pass	Pass	Pass
5/26/2021	Head	2300 (50% RB)		1.73	36.40	Pass	Pass	Pass
5/26/2021	Head	2300 (100% RB)		1.73	36.40	Pass	Pass	Pass
5/24/2021	Head	2600 (1 RB)		2.03	35.20	Pass	Pass	Pass
5/24/2021	Head	2600 (50% RB)		2.03	35.20	Pass	Pass	Pass
5/24/2021	Head	2600 (100% RB)		2.03	35.20	Pass	Pass	Pass

Table 11 (Continued)

Dates	Probe Calibration Point		Probe SN	Measured Tissue Parameters		Validation		
				σ	ϵ_r	Sensitivity	Linearity	Isotropy
6/1/2021	Head	3500 (1 RB)	7533	2.74	39.00	Pass	Pass	Pass
6/1/2021	Head	3500 (50% RB)		2.74	39.00	Pass	Pass	Pass
6/1/2021	Head	3500 (100% RB)		2.74	39.00	Pass	Pass	Pass
6/1/2021	Head	3700 (1 RB)		2.89	38.70	Pass	Pass	Pass
6/1/2021	Head	3700 (50% RB)		2.89	38.70	Pass	Pass	Pass
6/1/2021	Head	3700 (100% RB)		2.89	38.70	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 C 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 12

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
7594	IEEE / IEC Head	SPEAG D450V3 / 1054	4.57 +/- 10%	1.10	4.40	6/22/2021
		SPEAG D2450V2 / 703	52.90 +/- 10%	13.20	52.80	6/23/2021#
		SPEAG D5GHzV2_ 5250MHz / 1027	80.60 +/- 10%	7.66	76.60	6/23/2021
		SPEAG D5GHzV2_ 5500MHz / 1027	83.30 +/- 10%	7.95	79.50	6/23/2021#
		SPEAG D5GHzV2_ 5600MHz / 1027	83.60 +/- 10%	8.12	81.20	6/23/2021#
		SPEAG D5GHzV2_ 5750MHz / 1027	79.70 +/- 10%	8.29	82.90	6/23/2021#
7533	IEEE / IEC Head	SPEAG D750V3 / 1142	8.52 +/- 10%	2.21	8.84	6/25/2021#
		SPEAG D835V3 / 4D030	9.55 +/- 10%	2.39	9.56	6/26/2021#
		SPEAG D1800V2 / 278	38.70 +/- 10%	9.86	39.44	6/26/2021#

Table 12 (Continued)

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
7533	IEEE / IEC Head	SPEAG D1900V2 / 5D065	40.50 +/- 10%	10.20	40.80	6/26/2021
				10.10	40.40	6/27/2021#
		SPEAG D2300V2 / 1007	48.40 +/- 10%	12.70	50.80	6/27/2021#
		SPEAG D2600V2 / 1002	56.10 +/- 10%	14.30	57.20	6/28/2021#
				14.40	57.60	8/4/2021
		SPEAG D3500V2 / 1008	64.60 +/- 10%	2.18	68.99	7/15/2021
		SPEAG D3700V2 / 1028	71.00 +/- 10%	7.02	70.20	6/26/2021#
				2.20	69.62	7/15/2021

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 13

Frequency (MHz)	Tissue Type	Conductivity Target (S/m)	Dielectric Constant Target	Conductivity Meas. (S/m)	Dielectric Constant Meas.	Tested Date
450	IEEE/IEC Head	0.87 (0.83-0.91)	43.50 (41.30-45.70)	0.88	41.65	6/22/2021
470		0.87 (0.83-0.91)	43.40 (41.20-45.60)	0.90	41.24	6/22/2021
708		0.89 (0.84-0.93)	42.10 (40.00-44.20)	0.85	42.50	6/25/2021#
750		0.89 (0.85-0.93)	41.90 (39.80-44.00)	0.89	41.90	6/25/2021
782		0.89 (0.85-0.94)	41.70 (39.70-43.80)	0.92	41.50	6/25/2021#
793		0.90 (0.85-0.94)	41.70 (39.60-43.80)	0.93	41.30	6/25/2021#
835		0.90 (0.86-0.95)	41.50 (39.40-43.60)	0.94	41.20	6/25/2021#
837		0.90 (0.86-0.95)	41.50 (39.40-43.60)	0.94	41.20	6/25/2021#
1733		1.36 (1.29-1.43)	40.10 (38.10-42.10)	1.32	40.70	6/26/2021#
1800		1.40 (1.33-1.47)	40.00 (38.00-42.00)	1.38	40.30	6/26/2021
1880		1.40 (1.33-1.47)	40.00 (38.00-42.00)	1.42	39.50	6/26/2021
				1.44	38.90	6/27/2021
1900		1.40 (1.33-1.47)	40.00 (38.00-42.00)	1.44	39.40	6/26/2021
				1.46	38.80	6/27/2021
2300		1.67 (1.59-1.75)	39.50 (35.60-43.50)	1.74	38.10	6/27/2021

Table 13 (Continued)

Frequency (MHz)	Tissue Type	Conductivity Target (S/m)	Dielectric Constant Target	Conductivity Meas. (S/m)	Dielectric Constant Meas.	Tested Date
2310	IEEE/IEC Head	1.68 (1.59-1.76)	39.50 (35.50-43.40)	1.75	38.10	6/27/2021
2437		1.79 (1.70-1.88)	39.20 (35.30-43.10)	1.86	37.09	6/23/2021
2450		1.80 (1.71-1.89)	39.20 (35.30-43.10)	1.87	37.05	6/23/2021
2560		1.92 (1.82-2.01)	39.10 (35.10-43.00)	2.01	37.20	6/27/2021
2510		1.86 (1.77-1.96)	39.10 (35.20-43.00)	1.94	35.70	8/4/2021
2535		1.89 (1.80-1.99)	39.10 (35.20-43.00)	1.97	35.60	8/4/2021
2600		1.96 (1.86-2.06)	39.00 (35.10-42.90)	2.05	37.10	6/27/2021
				2.04	35.30	8/4/2021
3500		2.91 (2.62-3.20)	37.90 (34.10-41.70)	3.10	38.60	7/15/2021
3560		2.97 (2.68-3.27)	37.80 (34.10-41.60)	3.17	38.40	7/15/2021#
3603		3.02 (2.72-3.32)	37.80 (34.00-41.60)	3.21	38.20	7/15/2021#
3690		3.11 (2.80-3.42)	37.70 (33.90-41.50)	2.82	38.70	6/26/2021#
				3.31	37.90	7/15/2021#
3700		3.12 (2.81-3.43)	37.70 (33.90-41.50)	2.83	38.70	6/26/2021
				3.31	37.90	7/15/2021
5250		4.71 (4.24-5.18)	36.00 (32.40-39.50)	4.31	38.88	6/23/2021
5290		4.75 (4.28-5.23)	35.90 (32.30-39.50)	4.35	38.83	6/23/2021
5500		4.97 (4.47-5.46)	35.70 (32.10-39.20)	4.56	38.55	6/23/2021#
5530		5.00 (4.50-5.50)	35.60 (32.00-39.20)	4.60	38.51	6/23/2021#
5600		5.07 (4.56-5.58)	35.50 32.00-39.10)	4.67	38.42	6/23/2021#
5690		5.16 (4.64-5.68)	35.40 (31.90-39.00)	4.77	38.30	6/23/2021#
5750		5.22 (4.70-5.74)	35.40 (31.80-38.90)	4.84	38.21	6/23/2021
5775		5.25 (4.72-5.77)	35.30 (31.80-38.90)	4.86	38.18	6/23/2021

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^{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 14

	Target	Measured
Ambient Temperature	18 – 25 ˚C	Range: 18.3 – 22.40˚C Avg. 20.35 ˚C
Tissue Temperature	18 – 25 ˚C	Range: 19.2 – 22.1˚C Avg. 20.7 ˚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 15

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.			

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. KDB 941225 D05

was applied to LTE test configuration and KDB 248227 D01 applied to WLAN test configurations. CMW500 Communication Test set was used for LTE testing.

12.3 DUT Positioning Procedures

The positioning of the device for each body location is described below and illustrated in Exhibit 7B.

12.3.1 Body

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

12.3.2 Head

Not applicable.

12.3.3 Face

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

12.4 DUT Test Channels

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

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

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

12.5 SAR Result Scaling Methodology

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

13.0 DUT Test Data

13.1 Assessment for FCC at the Body

The changed radio part was assessed with the previous highest applicable configuration for each of the applicable technologies LMR, WLAN 2.4GHz, WLAN 5GHz and LTE. SAR plots of the highest results per technology (bolded) are presented in Appendix E.

Table 16

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#
LMR									
PMAE4071A	PMNN4805A	PMLN8126A w/ PMLN4651A	None (BT)	470.0000	4.66	-0.12	5.05	**2.67**	MA-AB-210622-11
WLAN 2.4GHz									
AN000345A01	PMNN4805A	PMLN8126A w/ PMLN7008A (DUT @ Front)	None	2437.0000	0.05	-0.14	0.036	**0.044**	AM(AR)-AB-210623-04
WLAN 5GHz (UNII-2A)									
AN000345A01	PMNN4805A	PMLN8126A w/ PMLN4651A (DUT @ Front)	None	5290.0000	0.02	1.12	0.001	0.001	MA-AB-210623-13

Table 16 (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 5GHz (UNII-2C)									
AN000345A01	PMNN4804A	PMLN8126A w/ PMLN4651A (DUT @ Front)	None	5530.0000	0.03	-1.64	0.001	0.002	AM(AR)-AB-210623-14
WLAN 5GHz (UNII-3)									
AN000345A01	PMNN4803A	PMLN8127A w/ PMLN5407A (DUT @ Front)	None	5775.0000	0.03	-1.37	0.001	**0.002**	AM(AR)-AB-210623-15
LTE Band 2									
AN000346A01	PMNN4803A	PMLN8126A w/ PMLN7008A (DUT @ Front)	None	1880.0000	0.31	-0.01	0.188	0.193	AMN-AB-210626-17
LTE Band 4									
AN000346A01	PMNN4803A	PMLN8126A w/ PMLN7008A (DUT @ Front)	None	1732.5000	0.26	0.05	0.154	0.185	AMN-AB-210627-02#
LTE Band 5									
AN000343A01	PMNN4804A	PMLN8126A w/ PMLN4651A (DUT @ Front)	None	836.5000	0.21	-0.10	0.162	0.197	AMN-AB-210626-09#
LTE Band 7									
AN000346A01	PMNN4805A	PMLN8126A w/ PMLN7008A (DUT @ Front)	None	2560.0000	0.16	-0.09	0.078	0.124	AR-AB-210628-02#
LTE Band 12									
AN000343A01	PMNN4805A	PMLN8126A w/ PMLN4651A (DUT @ Front)	None	707.5000	0.20	0.02	0.130	0.161	AMN-AB-210626-03#
LTE Band 13									
AN000343A01	PMNN4804A	PMLN8126A w/ PMLN4651A (DUT @ Front)	None	782.0000	0.19	0.00	0.161	0.210	AMN-AB-210626-01#

Table 16 (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#
LTE Band 14									
AN000343A01	PMNN4803A	PMLN8126A w/ PMLN7008A (DUT @ Front)	None	793.0000	0.19	-0.07	0.160	**0.218**	AMN-AB-210626-02#
LTE Band 30									
AN000346A01	PMNN4804A	PMLN8126A w/ PMLN7008A (DUT @ Front)	None	2310.0000	0.21	-0.28	0.087	0.111	AR-AB-210628-03#
LTE Band 48									
AN000343A01	PMNN4805A	PMLN8127A w/ PMLN5407A (DUT @ Front)	None	3690.0000	0.10	0.03	0.053	0.088	AMN-AB-210627-03#

13.2 Assessment at the Face

The changed radio part was assessed with the previous highest applicable configuration for each of the applicable technologies LMR, WLAN 2.4GHz, WLAN 5GHz and LTE. SAR plots of the highest results per technology (bolded) are presented 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#
LMR									
AN000350A01	PMNN4804A	DUT @ front	None	450.0000	4.38	-0.17	4.89	**2.79**	AM(AR)-FACE-210622-16
WLAN 2.4GHz									
AN000345A01	PMNN4805A	Front @ 2.5cm	None	2437.0000	0.05	-0.31	0.013	**0.016**	AM(AR)-FACE-210623-06
WLAN 5GHz (UNII-2A)									
AN000345A01	PMNN4805A	Front @ 2.5cm	None	5290.0000	0.02	-0.97	0.001	0.002	AM(AR)-FACE-210623-16
WLAN 5GHz (UNII-2C)									
AN000345A01	PMNN4804A	Front @ 2.5cm	None	5530.0000	0.03	-1.63	0.001	**0.002**	AM(AR)-FACE-210624-01#
WLAN 5GHz (UNII-3)									
AN000345A01	PMNN4804A	Front @ 2.5cm	None	5690.0000	0.03	-0.55	0.001	0.002	AM(AR)-FACE-210624-02#
LTE Band 2									
AN000346A01	PMNN4805A	Front @ 2.5cm	None	1880.0000	0.31	0.02	0.093	0.096	AMN-FACE-210626-18

Table 17 (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#
LTE Band 4									
AN000346A01	PMNN4805A	Front @ 2.5cm	None	1732.5000	0.26	0.11	0.111	0.133	AMN-FACE-210626-20
LTE Band 5									
AN000343A01	PMNN4805A	Front @ 2.5cm	None	836.5000	0.21	-0.05	0.116	0.140	AMN-FACE-210626-08#
LTE Band 7									
AN000346A01	PMNN4805A	Front @ 2.5cm	None	2560.0000	0.16	-0.01	0.030	0.046	AR-FACE-210628-04#
LTE Band 12									
AN000343A01	PMNN4805A	Front @ 2.5cm	None	707.5000	0.20	-0.05	0.127	0.159	AMN-FACE-210626-04#
LTE Band 13									
AN000343A01	PMNN4805A	Front @ 2.5cm	None	782.0000	0.19	-0.01	0.107	0.140	AMN-FACE-210626-05#
LTE Band 14									
AN000343A01	PMNN4805A	Front @ 2.5cm	None	793.0000	0.19	0.03	0.125	**0.168**	AMN-FACE-210626-06#
LTE Band 30									
AN000346A01	PMNN4805A	Front @ 2.5cm	None	2310.0000	0.21	0.18	0.032	0.038	AR-FACE-210628-05#
LTE Band 48									
AN000343A01	PMNN4805A	Front @ 2.5cm	None	3603.3000	0.11	-0.01	0.056	0.078	MA(BAD)-FACE-210626-14

13.3 Additional assessment for ISED Canada

As per ISED Notice 2016-DRS001, additional tests only required the low, mid and high frequency channels for the highest configuration from Body and Face that previous original filing (exceeded 1 system uncertainty). The SAR results are in Table below. SAR plots of the highest result (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#
LTE									
Body									
Band 7									
AN000346A01	PMNN4805A	PMLN8126A w/ PMLN7008A (DUT @ Front)	None	2510.0000	0.18	-0.34	0.055	0.084	AMN-AB-210804-10
				2535.0000	0.17	-0.32	0.059	0.095	AMN-AB-210804-11
				2560.0000	0.16	-0.09	0.078	**0.124**	AR-AB-210628-02#
Band 48									
AN000343A01	PMNN4805A	PMLN8127A w/ PMLN5407A (DUT @ Front)	None	3560.0000	0.12	-0.20	0.057	0.082	MA(BAD)-AB-210716-01#
				3603.0000	0.12	0.07	0.054	0.070	MA(BAD)-AB-210716-02#
				3690.0000	0.10	0.03	0.053	**0.088**	AMN-AB-210627-03#
Face									
Band 7									
AN000346A01	PMNN4805A	Front @ 2.5cm	None	2510.0000	0.18	0.38	0.038	**0.054**	AMN-FACE-210804-13
				2535.0000	0.17	0.37	0.036	0.054	AMN-FACE-210804-12
				2560.0000	0.16	-0.01	0.030	0.046	AR-FACE-210628-04#
Band 48									
AN000343A01	PMNN4805A	Front @ 2.5cm	None	3560.0000	0.12	0.21	0.076	**0.105**	MA(BAD)-FACE-210716-05#
				3603.0000	0.11	-0.01	0.056	0.078	MA(BAD)-FACE-210626-14
				3690.0000	0.10	-0.29	0.053	0.094	MA(BAD)-FACE-210716-04#

Note:
1. Not applicable for LTE Band 5 with bandwidth 10 MHz as only one channel.
2. Not applicable for LTE Band 13 with bandwidth 10 MHz as only one channel
3. Not applicable for LTE Band 14 with bandwidth 10 MHz as only one channel.
4. Not applicable for LTE Band 30 with bandwidth 10 MHz as only one channel.

13.4 Assessment at the Bluetooth band

13.4.1 FCC 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)] *[$\sqrt{F_{(GHz)}}$] = 1.4 W/kg, which is ≤ 3 W/kg (1g)

Where:

Max. Power = 4.3 mW (5 mW*86 % 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.

13.4.2 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:
= 5 mW * 86 %
= 4.3 mW or 6.3 dBm

Equivalent isotropically radiated power (EIRP):
= Maximum conducted power, dBm + Antenna gain, dBi
= 6.3 dBm + 1.14 dBi
= 7.44 dBm or 5.55 mW

Higher output power level, Equivalent isotropically radiated power (EIRP)
5.55 mW was below the threshold power level 20 mW. Hence SAR test was not required for Bluetooth band.

13.5 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 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#
PMAE4071A	PMNN4805A	PMLN8126A w/ PMLN4651A	None (BT)	470.0000	4.62	-0.14	5.10	**2.74**	AM(AR)-AB-210622-18

14.0 Simultaneous Transmissions

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

Table 20

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
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

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

14.1 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] = 0.18 W/kg, which is ≤ 0.4 W/kg (1g)
Where:

X = 7.5 for 1g-SAR; 18.75 for 10g
Max. Power = 4.3 mW (5 mW*86% 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.

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

Table 21

Exposure condition	Standalone SAR (W/kg)				Sum of SAR (W/kg)		
	LMR	2.4GHz	5GHz	LTE	LMR + 2.4GHz	LMR + 5GHz	LMR + LTE
Body Exposure	2.74	0.044	0.002	0.218	2.78	2.74	2.96
Face Exposure	2.79	0.016	0.002	0.168	2.81	2.79	2.96

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 22

Frequency band (MHz)	Max Calc at Body (W/kg)	Max Calc at Face (W/kg)
	1g-SAR	1g-SAR
LMR (406.125-512)	2.74	2.79
WWAN (LTE)	0.218	0.168
WLAN 2.4 GHz	0.044	0.016
WLAN 5 GHz	0.002	0.002
BT	NA	NA
Sum of SAR (W/kg)	2.96	2.96

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).

16.0 Variability Assessment

Per the guidelines in KDB 865664 SAR variability assessment is not required for each frequency band with measured SAR results below 4.0 W/kg for occupational exposure condition.

17.0 System Uncertainty

A system uncertainty analysis 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 17025 a reported system uncertainty is required and therefore measurement uncertainty budget is included.

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	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	477
Expanded Uncertainty (95% CONFIDENCE LEVEL)			*k*=2				23	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 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	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 Device Under Test, for 750 MHz to 800MHz

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 750 MHz to 800MHz

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 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 3 GHz 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	6.6	N	1.00	1	1	6.6	6.6	∞
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				11	11	460
Expanded Uncertainty (95% CONFIDENCE LEVEL)			*k*=2				23	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 GHz to 6GHz

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	6.6	N	1.00	1	1	6.6	6.6	∞
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				9	9	99999
Expanded Uncertainty (95% CONFIDENCE LEVEL)			*k*=2				18	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