MOTOROLA SOLUTIONS

MS ISO/IEC 17025 TESTING SAMM No. 0826

ACCREDITED CERTIFICATE 2518.05

DECLARATION OF COMPLIANCE SAR ASSESSMENT Part 1 of 2

Motorola Solutions Inc.
EME Test Laboratory
Motorola Solutions Malaysia Sdn Bhd
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Date of Report: 07/15/2020
Report Revision: A

Responsible Engineer:	Goh Jue Yie (EME Engineer)
Report Author:	Goh Jue Yie (EME Engineer)
Date/s Tested:	02/10/2020-02/21/2020, 02/24/2020-02/28/2020, 03/01/2020, 04/29/2020, 05/01/2020, 05/20/2020, 07/08/2020-07/10/2020, 07/14/2020-07/15/2020
Manufacturer:	Motorola Solutions Inc.
DUT Description:	Handheld Portable –403-512 MHz 4W FKP GNSS BT WiFi GOB
Test TX mode(s):	CW (PTT), Bluetooth, and WLAN 802.11b/g/n
Max. Power output:	4.8 W (UHF band), 10.0 mW (Bluetooth), 22.4 mW (802.11b), 8.3 mW (802.11g), 12.6 mW(802.11n)
Nominal Power:	4.0 W (UHF band), 8.9 mW (Bluetooth), 16.6 mW (802.11b), 6.6 mW (802.11g), 10 mW(802.11n)
Tx Frequency Bands:	LMR 403-512 MHz; Bluetooth 2.402-2.480 GHz; WLAN 2.412-2.484 GHz
Signaling type:	FM, FHSS (Bluetooth), 802.11b/g/n (WLAN)
Model(s) Tested:	AAH56RDN9RA1AN (PMUE3675D) (IC MODEL: PMUE3675DBCNAA)
Model(s) Certified:	AAH56RDN9RA1AN (PMUE3675D) (IC MODEL: PMUE3675DBCNAA), AAH56RDC9RA1AN (PMUE3681D) (IC MODEL: PMUE3681DBANAA), AAH56RDC9WA1AN (PMUE3681D) (IC MODEL: PMUE3681DBANKA), AAH56RDN9WA1AN (PMUE3675D) (IC MODEL: PMUE3675DBCNKA)
Serial Number(s):	871TWB3879, 871TWB3878, 871TWB3881
Classification:	Occupational/Controlled
Applicant Name:	Motorola Solutions Inc.
Applicant Address:	8000 West Sunrise Boulevard, Fort Lauderdale, Florida 33322
FCC ID:	AZ489FT7128; LMR 406.1-512 MHz, Bluetooth 2.402-2.480 GHz, WLAN 2.412-2.462 GHz This report contains results that are immaterial for FCC equipment approval, which are clearly identified.
IC:	109U-89FT7128 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.

Tiong Nguk Ing
Digitally signed by Tiong Nguk Ing
Date: 2020.07.23 10:01:31 +08'00'

Tiong Nguk Ing
Deputy Technical Manager (Approved Signatory)
Approval Date: 7/22/2020

Part 1 of 2

Part 2 of 2

Report Revision History

Date	Revision	Comments
07/15/2020	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 AAH56RDN9RA1AN (PMUE3675D) (IC MODEL: PMUE3675DBCNAA). This device is classified as Occupational/Controlled.

2.0 FCC SAR Summary

Table 1

Equipment Class	Frequency band (MHz)	Max Calc at Body (W/kg)	Max Calc at Face (W/kg)
		1g-SAR	1g-SAR
TNF	406.1-512 MHz (LMR)	6.51	3.95
*DSS	2402-2480 MHz	NA	NA
DTS	2412-2462 MHz	0.031	0.027
Simultaneous Results		6.54	3.98

*Results not required per KDB (refer to sections 13.6 and 14.0)

3.0 Abbreviations / Definitions

BT: Bluetooth
CNR: Calibration Not Required
CW: Continuous Wave
DSS: Direct Spread Spectrum
DUT: Device Under Test
EME: Electromagnetic Energy
FHSS: Frequency Hopping Spread Spectrum
FM: Frequency Modulation
LMR: Land Mobile Radio
NA: Not Applicable
PTT: Push to Talk
RSM: Remote Speaker Microphone
SAR: Specific Absorption Rate
TNF: Licensed Non-Broadcast Transmitter Held to Face

Audio accessories: These accessories allow communication while the DUT is worn 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 – 248227 D01 802.11 Wi-Fi SAR v02r02

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). This device also contains WLAN technology for data capabilities over 802.11b/g/n wireless networks and Bluetooth technology for short range wireless devices.

The LMR band in this device operates 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 these devices.

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%. Refer to section 14.0 Simultaneous Transmission Exclusion.

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

Radio Type	Band (MHz)	Transmission	Duty Cycle (%)	Max Power (W)
LMR	403-512 (Note1)	FM	*50	4.80
BT	2402-2480	FHSS	77	0.01
WLAN	2412-2484	802.11b	99.8	0.0224
WLAN	2412-2484	802.11g	99.2	0.0083
WLAN	2412-2484	802.11n	99.1	0.0126

Notes:
(1) This hardware capable to operate up to 527 MHz, thus additional testing cover at 512-527 MHz for other regions market in section 13.7
(2) * includes 50% PTT operation

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

7.0 Optional Accessories and Test Criteria

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

7.1 Antennas

There are optional removable antennas and one internal WiFi/BT antenna offered for these products. The Table below lists their descriptions.

Table 4

Antenna No	Antenna Models	Description	Selected for test	Tested
1	PMAE4069A	UHF Stubby antenna, 400-450MHz, ¼ wave, 1.15 dBi	Yes	Yes
2	PMAE4070A	UHF Stubby antenna, 440-490MHz, ¼ wave, 1.15 dBi	Yes	Yes
3	PMAE4071A	UHF Stubby antenna, 470-527MHz, ¼ wave, 1.15 dBi	Yes	Yes
4	PMAE4079A	UHF Slim Whip antenna, 400-527MHz, ¼ wave, 2.15 dBi	Yes	Yes
5	0104039J80	IFA Bluetooth / WiFi antenna, 2400-2484MHz, ¼ wave, -4 dBi	Yes	Yes; only for WLAN

7.2 Batteries

There are optional batteries offered for these products. The Table below lists their descriptions.

Table 5

Battery No.	Battery Models	Description	Selected for test	Tested	Comments
1	NNTN8129A	IMPRES Hi-Cap Li-Ion FM Battery 2300M2350T	Yes	Yes	
2	NNTN8560A	IMPRES Hi-Cap Li-Ion 2500 mAh Battery Submersible (IP57), Intrinsically Safe (TIA4950) 2300M2500T	Yes	Yes	
3	PMNN4406BR	Battery Standard IP67 Li-Ion 1500M 1600T	Yes	Yes	
4	PMNN4407BR	IMPRES Li-Ion, 1650 mAh Slim Battery 1600M1650T	Yes	Yes	
5	PMNN4409BR	IMPRES Hi-Cap Li-Ion Non-FM, 2150 mAh Battery 2150M225T	Yes	Yes	
6	PMNN4412A	Battery Standard IP67 NiMH 1300M1400T	Yes	Yes	
7	PMNN4435AR	Li-Mn 1400 mAh Low Temp -30c Battery Submersible (IP57)	Yes	Yes	
8	PMNN4448AR	Battery IMPRES Standard IP67 Li-Ion 2700M2800T	Yes	Yes	

Table 5 (Continued)

Battery No.	Battery Models	Description	Selected for test	Tested	Comments
9	PMNN4463A	Battery Li-Ion IP57 2000M	Yes	Yes	
10	PMNN4488A	Belize/Andorra UHC + Vibrator 2950M3000T	Yes	Yes	Only compatible with PMLN7296A
11	PMNN4489A	Belize TIA4950 IMPRES High Cap Li-Ion Battery 2850M2900T	Yes	Yes	
12	PMNN4491B	Battery IMPRES Li-Ion IP67 1850T	Yes	Yes	Default battery for body testing
13	PMNN4493A	Belize Non-TIA High Cap LV Li-Ion Battery 2950M3000T	Yes	Yes	Default battery for face testing
14	PMNN4525B	Battery Li-Ion 2000T IP68	Yes	Yes	
15	PMNN4543A	Battery Li-Ion IP68 2450T	Yes	Yes	
16	PMNN4544A	Battery IMPRES Li-Ion IP68 2450T	Yes	Yes	
17	PMNN4512A	Battery IMPRES IP67 Li-Ion 2150T (De-moto)	No	No	By similarity to PMNN4463A, only removed logo
18	PMNN4548A	Belize De-Moto 2450 mAh S10 to 3006 cells	No	No	By similarity to PMNN4543A, only removed logo

7.3 Body worn Accessories

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

Table 6

Body worn No.	Body worn Models	Description	Selected for test	Tested	Comments
1	HLN6602A	Chest Pack	Yes	Yes	
2	NTN5243A	Carrying Strap	Yes	Yes	Tested with PMLN5844A, PMLN5838A, PMLN5840A
3	PMLN4651A	Belt Clip 2 Inch	Yes	Yes	.
4	PMLN5838A	Hard Leather CC 3inch Fix FKP	Yes	Yes	Tested with NTN5243A
5	PMLN5840A	Hard Leather CC 3inch SWL FKP	Yes	Yes	Tested with NTN5243A
6	PMLN5844A	Nylon CC 3inch Fix FKP	Yes	Yes	Tested with NTN5243A and RLN6488A with RLN6487A
7	PMLN7008A	2.5 Inch Belt Clip	Yes	Yes	
8	PMLN7296A	Vibrating Belt Clip	Yes	Yes	Only compatible with battery PMNN4488A
9	RLN4570A	Break-A-Way Chest Pack	Yes	Yes	
10	RLN4815A	Radio Pack Universal Radiopak & Utility Case	Yes	Yes	
11	RLN6487A	Leather Radio Strap - XL	Yes	Yes	Tested with RLN6488A & PMLN5844A.
12	RLN6488A	Anti-Sway Strap Leather Radio Strap	Yes	Yes	Tested with RLN6487A & PMLN5844A
13	PMLN5842A	Hard Leather CC 2.5inch SWL FKP	No	No	By similarity to PMLN5840A
14	PMLN5839A	Hard Leather Case With 3 Inch Fixed Belt Loop - No Display	No	No	By similarity to PMLN5838A
15	PMLN5843A	Hard Leather Case With 2.5 Inch Swivel Belt Loop - No Display	No	No	By similarity to PMLN5840A
16	PMLN5845A	Nylon Case With 3 Inch Fixed Belt Loop - No Display	No	No	By similarity to PMLN5844A

Table 6 (Continued)

Body worn No.	Body worn Models	Description	Selected for test	Tested	Comments
17	PMLN5846A	Hard Leather Case With 3 Inch Swivel Belt Loop - No Display	No	No	By similarity to PMLN5840A
18	RLN4295A	Small Clip Epaulet Strap	No	No	Small Clip, epaulet strap worn on the shoulder to hold a RSM
19	RLN6486A	Leather Radio Strap	No	No	By similarity to RLN6487A

7.4 Audio Accessories

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

Table 7

Audio No.	Audio Acc. Models	Description	Selected for test	Tested	Comments
1	PMMN4024A	Remote Speaker Microphone	Yes	Yes	Default Audio
2	NNTN8383B	IMPRES INC RSM, Audio Jack	Yes	Yes	Tested with RMN4056B
3	NNTN8383BN	Audio Accessory-Remote Speaker Microphone, IMPRES Inc_B RSM, Audio Jack	Yes	Yes	
4	NNTN8459A	1 Wire Surveillance Kit With Translucent Tube, Black	Yes	Yes	
5	PMLN5096B	D-Style Earset	Yes	Yes	
6	PMLN5097A	IMPRES 3 Wire Surveillance-Black	Yes	Yes	
7	PMLN5102A	Ultra Lite Headset	Yes	Yes	
8	PMLN5106A	IMPRES 3 Wire Surveillance-Beige	Yes	Yes	
9	PMLN5275C	Heavy Duty Headset	Yes	Yes	
10	PMLN5973A	Ear receiver with Inline Mic/PTT, Magone	Yes	Yes	
11	PMLN5974A	LT WT HS with Boom Mic & PTT	Yes	Yes	
12	PMLN5975A	Swivel Earpiece W Mic/PTT	Yes	Yes	
13	PMLN5976A	Earset W Boom Mic/PTT	Yes	Yes	
14	PMLN5979A	Breeze HS W Boom Mic & PTT	Yes	Yes	
15	PMLN6095A	PTT Nexus Adapter For Mt Series Headsets	Yes	Yes	Tested with RMN4053B
16	PMLN6123A	IMPRES s 3 Wire W/ Trans Tube-Blk	Yes	Yes	
17	PMLN6129A	IMPRES 2 Wire W/Trans Tube-Blk	Yes	Yes	
18	PMLN6765A	Tactical GCAI PTT/VoX Interface Module	Yes	Yes	Tested with PMLN6767A and PMLN6833A
19	PMLN6767A	Tactical Remote Body PTT (For Use With Interface Module Pmln6827)	Yes	Yes	Tested with PMLN6765A and PMLN6833A
20	PMLN6853A	Next Gen Bth Heavy Duty Headset GCAI TIA4950	Yes	Yes	

Table 7 (Continued)

Audio No.	Audio Acc. Models	Description	Selected for test	Tested	Comments
21	PMMN4050ASP01	IMPRES Large RSM With Earjack, Noise Canceling	Yes	Yes	
22	PMMN4099CL	Audio Accessory-Remote Speaker Microphone,IP68 Remote Speaker Microphone,3.5mm,Ul	Yes	Yes	
23	PMMN4119B	IMPRES Omni RSM Short Cbl/Nex/3.5	Yes	Yes	
24	RLN5880A	IMPRES 2 Wire Surveillance - Black	Yes	Yes	
25	RMN4053B	Tactical pro Series Hard Hat Headset With Nexus Connector	Yes	Yes	Tested with PMLN6095A
26	RMN4056B	Ht Series Listen Only Over-The-Head Headset With 3.5mm Threaded Connector	Yes	Yes	Tested with NNTN8383B
27	RMN5137B	Direct Lead Headset UL Headband	Yes	Yes	
28	RMN5058A	Core Lightweight Headset W/PTT & Vox	Yes	Yes	
29	PMLN6833A	Tactical Heavy-Duty Temple Transducer With Noise Cancelling Boom Microphone	Yes	Yes	Tested with PMLN6765A and PMLN6767A
30	NNTN8382B	IMPRES Inc RSM, IP57	No	No	By Similarity to PMMN4024A
31	PMLN5111A	IMPRES 3 Wire Surveillance Kit With Translucent Tube- Black Long Cord. One Programmable Button.	No	No	By similarity to PMLN5097A
32	PMLN5112A	IMPRES 3 Wire Surveillance Kit With Translucent Tube- Black Long Cord. One Programmable Button.	No	No	By similarity to PMLN5097A
33	PMLN6069A	Earbud W Inline Mic/PTT	No	No	By similarity to PMLN5973A
34	PMLN6124A	IMPRES 3 Wire W/ Trans Tube-Beidge	No	No	By similarity to PMLN6123A
35	PMLN6127A	IMPRES 2 Wire Surveillance -Blk	No	No	By similarity to PMLN6129A
36	PMLN6128A	IMPRES 2 Wire Surveillance-Bge	No	No	By similarity to PMLN6129A
37	PMLN6130A	IMPRES 2 Wire W/Trans Tube-Beidge	No	No	By similarity to PMLN6129A
38	PMLN6827A	PTT Interface Module	No	No	By similarity to PMLN6765A
39	PMLN6830A	Tactical Remote PTT Ring Switch	No	No	By similarity to PMLN6767A
40	PMLN6852A	Next Gen BTH Heavy Duty Headset GCAI	No	No	By similarity to PMLN6853A
41	PMMN4102B_GRN	Accessory Kit, IMPRES Anc RSM Ul/Long Cbl/Nex/3.5/Green	No	No	By Similarity to PMMN4024A
42	PMMN4025A	IMPRES Remote Speaker Mic	No	No	By similarity to PMMN4024A
43	PMMN4040A	Submersible Remote Speaker Mic	No	No	By similarity to PMMN4024A
44	PMMN4046A	IMPRES Large RSM W/ Volume, Emergency, Programmable Button, IP57	No	No	By similarity to PMMN4024A
46	PMMN4102B	IMPRES Anc RSM Ul/Long Cbl/Nex/3.5	No	No	By similarity to PMMN4024A

Table 7 (Continued)

Audio No.	Audio Acc. Models	Description	Selected for test	Tested	Comments
47	PMMN4113A	Accessory Kit,Impres Omni RSM Long Cbl/Nex/3.5	No	No	By similarity with PMMN4024A
48	RLN5881A	IMPRES 2 Wire Surveillance - Beige	No	No	By similarity to RLN5880A
49	RLN5882A	IMPRES 2 Wire, Black, Long Cord	No	No	By similarity to RLN5880A
50	RLN5883A	IMPRES 2 Wire, Beige, Long Cord	No	No	By similarity to RLN5880A
51	RLN6477A	Mt Series Neckband Headset With Nexus Connector	No	No	By similarity to RMN4053B
52	RMN4051B	Mt Series Hard Hat Attached Headset With Nexus Connector	No	No	By similarity to RMN4053B
53	RMN4052A	Tacticalpro Series Over-The-Head Headset With Nexus Connector	No	No	By similarity to RMN4053B
54	RMN4057B	Ht Series Listen Only Hard Hat Headset With 3.5mm Threaded Connector	No	No	By similarity to PMN4056B
55	RMN5132A	Ht Series Listen Only Neckband Headset With 3.5mm Non Threaded Connector	No	No	By similarity to RMN4055B
56	RMN5133A	Ht Series Listen Only Hard Hat Headset With 3.5mm Non Threaded Connector	No	No	By similarity to RMN4055B
57	RMN5135A	Tactical pro Series Neckband Headset With Nexus Connector	No	No	By similarity to RMN4053B
58	RMN5138B	Direct Lead Headset Ul Neckband	No	No	By similarity to RMN5137B
59	RMN5139B	Direct Lead Helmet UL Mounted	No	No	By similarity to RMN5137B
60	PMLN7466A	Otto OTH Headset GCAI Connector (Non-TIA)	No	No	By similarity to PMLN6853A
61	PMLN7467A	Otto OTH Headset GCAI Connector (TIA)	No	No	By similarity to PMLN6853A
62	PMMN4024AL	Remote Speaker Microphone	No	No	By similarity to PMMN4099CL
63	PMLN5101A	IMPRES Temple Transducer	No	No	By similarity to RMN5058A
64	PMMN4083A	IMPRES Large RSM APX IP68 Delta T (Gcai)	No	No	By Similarity to PMMN4024A
65	PMMN4099B	IP68 Remote Speaker Microphone	No	No	By Similarity to PMMN4024A
66	PMMN4025AL	IMPRES Remote Speaker Mic	No	No	By similarity to PMMN4099CL
67	PMMN4040AL	Submersible Remote Speaker Mic	No	No	By similarity to PMMN4099CL
68	PMMN4046AL	IMPRES Large Rsm W/ Volume, Emergency, Programmable Button, IP57	No	No	By similarity to PMMN4099CL
69	PMMN4050AL	IMPRES Large RSM With Earjack, Noise Canceling	No	No	By similarity to PMMN4099CL
70	PMMN4102BORG	IMPRES Anc Remote Speaker Microphone (Orange)	No	No	By similarity with PMMN4024A
71	PMMN4102A	Active Noise Cancelling Remote Speaker Microphone	No	No	By similarity to PMMN4024A

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	52.10.2.1495; 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. The E-field probe first scans a coarse grid over a large area inside the phantom in order to locate the interpolated maximum SAR distribution. After the coarse scan measurement, the probe is automatically moved to a position at the interpolated maximum. The subsequent scan can directly use this position as reference for the cube evaluations.

8.2 Description of Phantom(s)

Table 9

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

8.3 Description of Simulated Tissue

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

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

Simulated Tissue Composition (percent by mass)

Table 10

Ingredients	450MHz	2450MHz
Sugar	56.0	0
Diacetin	0	51.0
De ionized –Water	39.1	48.75
Salt	3.8	0.15
HEC	1.0	0
Bact.	0.1	0.1

9.0 Additional Test Equipment

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

Table 11

Equipment Type	Model Number	Serial Number	Calibration Date	Calibration Due Date
Speag Probe	EX3DV4	7486	10/24/2019	10/24/2020
Speag Probe	EX3DV4	7511	10/24/2019	10/24/2020
Speag Probe	EX3DV4	7534	7/25/2019	7/25/2020
Speag Probe	EX3DV4	7533	11/6/2019	11/6/2020
Speag DAE	DAE4	1488	7/23/2019	7/23/2020
Speag DAE	DAE4	850	10/16/2019	10/16/2020
Speag DAE	DAE4	729	10/16/2019	10/16/2020
Speag DAE	DAE4	374	7/17/2019	7/17/2020
Amplifier Power	10W1000C	312859	CNR	CNR
Amplifier Power	50W 1000A	14715	CNR	CNR
Amplifier Power	5S1G4	312988	CNR	CNR
Amplifier Power	5S1G4	313326	CNR	CNR
Power Meter	E4418B	MY45100911	8/30/2019	8/30/2021
Power Meter	E4418B	MY45100739	12/9/2019	12/9/2020
Power Meter	E4419B	MY45103725	6/10/2019	6/10/2021
Power Meter	E4416A	MY50001037	8/30/2019	8/30/2021
Power Meter	E4418B	MY45107917	7/1/2019	7/1/2021
Power Sensor	E9301B	MY50290001	5/6/2019	5/6/2020*
Power Sensor	E9301B	MY55210003	4/26/2019	4/26/2020*
Power Sensor	E4412A	US38488023	3/24/2019	3/24/2020*
Power Sensor	8481B	3318A10982	2/5/2020	2/5/2021
Power Sensor	8481B	MY41091243	12/17/2019	12/17/2020
Power Sensor	8481B	3318A10982	2/5/2020	2/5/2021
Power Sensor	E4412A	US38488023	4/23/2020	4/23/2021
Power Sensor	E9301B	MY50280001	4/22/2020	4/22/2021
Power Sensor	E9301B	MY55210006	4/22/2020	4/22/2021
Bi-Directional Coupler	3020A	40295	9/12/2019	9/12/2020
Bi-Directional Coupler	3022	81640	9/22/2019	9/22/2020
Bi-Directional Coupler	3022	77114	8/22/2019	8/22/2020
Vector Signal Generator	E4438C	MY42081753	9/5/2019	9/5/2021
Vector Signal Generator	E4438C	MY47272101	10/29/2019	10/29/2021
Data Logger	DSB	16326820	11/20/2019	11/20/2020
Thermometer	1523	3492108	5/3/2019	5/3/2020*
Thermometer	HH202A	35881	12/24/2019	12/24/2020
Temperature Probe	PR-10-3-100-1/4-6-E	WNWR020579	7/6/2019	7/6/2020*
Temperature Probe	80PK-22	05032017	12/24/2019	12/24/2020
Network Analyzer	E5071B	MY42403218	9/13/2019	9/13/2020
Network Analyzer	E5071B	MY42403147	12/27/2019	12/27/2020
Dielectric Assessment Kit	DAK-3.5	1120	7/11/2019	7/11/2020*
Dielectric Assessment Kit	DAK-3.5	1156	2/25/2020	2/25/2021

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

Table 11 (Continued)

Equipment Type	Model Number	Serial Number	Calibration Date	Calibration Due Date
Speag Dipole	D450V3	1053	10/19/2018	10/19/2020
Speag Dipole	D450V3	1054	3/11/2019	3/11/2021
Speag Dipole	D2450V2	703	10/16/2018	10/16/2020
Speag Dipole	D2450V2	782	2/20/2020	2/20/2023
Speag Dipole	D2450V2	781	4/11/2018	4/11/2020*

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

10.0 SAR Measurement System Validation and Verification

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

10.1 System Validation

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

Table 12

Dates	Probe Calibration Point		Probe SN	Measured Tissue Parameters		Validation		
				σ	ϵ_r	Sensitivity	Linearity	Isotropy
CW								
07/11/2019	Body	450	7486	0.96	53.9	Pass	Pass	Pass
07/11/2019	Head	450		0.85	43.4	Pass	Pass	Pass
11/27/2019	Body	450	7511	0.93	54.8	Pass	Pass	Pass
11/27/2019	Head	450		0.89	42.3	Pass	Pass	Pass
WLAN								
11/13/2019	Body	2450	7486	1.99	47.8	Pass	Pass	Pass
11/15/2019	Head	2450		1.75	36.0	Pass	Pass	Pass
09/19/2019	Body	2450	7534	1.91	48.8	Pass	Pass	Pass
09/18/2019	Head	2450		1.89	36.0	Pass	Pass	Pass
11/24/2019	Body	2450	7511	2.03	48.5	Pass	Pass	Pass
11/25/2019	Head	2450		1.84	35.3	Pass	Pass	Pass
12/09/2019	Body	2450	7533	2.02	50.8	Pass	Pass	Pass
11/26/2019	Head	2450		1.87	35.3	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 E includes DASY plots for each day during the SAR assessment. The Table below summarizes the daily system check results used for the SAR assessment.

Table 13

Probe Serial #	Tissue Type	Dipole Kit / Serial #	Ref SAR @ 1W (W/kg)	System Check Results Measured (W/kg)	System Check Test Results when normalized to 1W (W/kg)	Tested Date
7486	IEEE/IEC Head	SPEAG D450V3 / 1053	4.57 +/- 10%	1.20	4.80	#2/9/2020
				1.23	4.92	#2/10/2020
				1.21	4.84	#2/11/2020
				1.21	4.84	#2/12/2020
				1.20	4.80	#2/13/2020
				1.22	4.88	#2/14/2020
				1.19	4.76	2/16/2020
				1.20	4.80	#2/17/2020
				1.20	4.80	#2/18/2020
				1.20	4.80	#2/19/2020
				1.24	4.96	#2/20/2020
				1.21	4.84	#2/21/2020
				1.20	4.80	#2/24/2020
				1.23	4.92	#2/25/2020
				1.23	4.92	#2/26/2020
				1.22	4.88	#2/27/2020
				1.22	4.88	#2/28/2020
				1.21	4.84	3/1/2020
				1.22	4.88	#3/2/2020
				1.22	4.88	#3/3/2020
				1.23	4.92	#3/4/2020
				1.11	4.44	3/5/2020
				1.20	4.80	3/6/2020
7511	IEEE/IEC Head	SPEAG D450V3 / 1054	4.57 +/- 10%	1.15	4.60	#4/29/2020
		SPEAG D450V3 / 1053	4.57 +/- 10%	1.15	4.60	#7/8/2020
				1.11	4.44	#7/9/2020
				1.16	4.64	#7/10/2020
				1.11	4.44	#7/12/2020
				1.11	4.44	#7/14/2020
		SPEAG D2450V2 / 703	52.9 +/- 10%	12.80	51.20	5/20/2020
7534	IEEE/IEC Head	SPEAG D2450V2 / 781	51.3 +/- 10%	13.10	52.40	#3/3/2020
				13.10	52.40	3/5/2020
7486	IEEE/IEC Head	SPEAG D2450V2 / 703	52.9 +/- 10%	13.80	55.20	#4/29/2020
				14.10	56.40	#4/30/2020
				13.30	53.20	#5/1/2020
				13.00	52.00	#5/3/2020
				13.40	53.60	#5/4/2020
7533	IEEE/IEC Head	SPEAG D2450V2 / 782	54.4 +/- 10%	12.90	50.80	#7/9/2020
				13.00	52.00	#7/10/2020
				12.40	49.60	#7/12/2020
				12.70	50.80	#7/14/2020

#System verification covered for next test day (within 24 hours)

10.3 Equivalent Tissue Test Results

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

Table 14

Frequency (MHz)	Tissue Type	Conductivity Target (S/m)	Dielectric Constant Target	Conductivity Meas. (S/m)	Dielectric Constant Meas.	Tested Date
403	IEEE/ IEC Head	0.87 (0.83-0.91)	44.1 (41.9-46.3)	0.83	44.1	#4/29/2020
406	IEEE/ IEC Head	0.87 (0.83-0.91)	44.0 (41.8-46.2)	0.84	42.9	2/14/2020
				0.83	45.0	#2/20/2020
				0.83	45.8	2/27/2020
422	IEEE/ IEC Head	0.87 (0.83-0.91)	43.8 (41.6-46.0)	0.85	42.6	#2/13/2020
				0.85	44.7	#2/20/2020
				0.85	45.4	2/27/2020
435	IEEE/ IEC Head	0.87 (0.83-0.91)	43.7 (41.5-45.9)	0.86	44.1	2/4/2020
				0.86	44.9	2/6/2020
				0.86	44.5	2/7/2020
				0.85	44.1	#2/9/2020
				0.85	43.2	#2/11/2020
				0.86	42.3	#2/13/2020
				0.85	43.9	#2/17/2020
				0.85	42.5	#2/18/2020
				0.85	44.7	#2/19/2020
				0.86	44.4	2/20/2020
				0.84	44.4	#2/21/2020
				0.86	44.5	#2/24/2020
				0.86	45.1	#2/25/2020
				0.86	44.9	#2/26/2020
				0.86	45.1	#2/27/2020
				0.85	44.6	3/1/2020
				0.85	45.0	3/4/2020
				0.86	43.5	5/4/2020
				0.88	43.4	#7/8/2020
				0.87	42.6	#7/9/2020
				0.86	43.2	#7/12/2020
				0.87	42.8	#7/14/2020
440	IEEE/ IEC Head	0.87 (0.83-0.91)	43.6 (41.4-45.8)	0.86	44.0	#2/9/2020
				0.86	43.0	#2/11/2020
				0.86	43.0	2/14/2020
				0.86	43.8	#2/17/2020
				0.86	42.4	#2/18/2020
				0.86	44.6	#2/19/2020
				0.86	44.3	#2/20/2020
				0.86	45.0	2/27/2020

Tissue sheet date cover next testing day (within 24 hrs)

Table 14 (Continued)

Frequency (MHz)	Tissue Type	Conductivity Target (S/m)	Dielectric Constant Target	Conductivity Meas. (S/m)	Dielectric Constant Meas.	Tested Date
441	IEEE/ IEC Head	0.87 (0.83-0.91)	43.6 (41.4-45.8)	0.86	43.8	#2/17/2020
				0.86	42.4	#2/18/2020
				0.86	44.6	#2/19/2020
				0.85	44.3	2/21/2020
				0.87	44.4	#2/24/2020
				0.86	44.9	#2/25/2020
				0.86	44.7	#2/26/2020
				0.84	43.7	5/4/2020
450	IEEE/ IEC Head	0.87 (0.83-0.91)	43.5 (41.3-45.7)	0.87	43.8	2/4/2020
				0.87	44.1	2/5/2020
				0.87	44.5	2/6/2020
				0.87	44.2	2/7/2020
				0.87	43.8	2/9/2020
				0.87	44.0	2/10/2020
				0.87	42.7	2/11/2020
				0.87	42.7	2/12/2020
				0.88	42.0	2/13/2020
				0.87	42.8	2/14/2020
				0.87	44.0	2/16/2020
				0.87	43.6	2/17/2020
				0.86	42.1	2/18/2020
				0.87	44.4	2/19/2020
				0.87	44.1	2/20/2020
				0.86	44.1	2/21/2020
				0.87	44.2	2/24/2020
				0.87	44.8	2/25/2020
				0.87	44.5	2/26/2020
				0.87	44.8	2/27/2020
				0.86	44.9	2/28/2020
				0.86	44.3	3/1/2020
				0.87	44.7	3/2/2020
				0.87	44.1	3/3/2020
				0.87	44.7	3/4/2020
				0.87	44.7	3/5/2020
				0.85	44.4	3/6/2020
				0.87	43.1	#4/29/2020
				0.89	43.1	#7/8/2020
				0.89	42.3	#7/9/2020
				0.88	42.3	#7/10/2020
				0.88	42.9	#7/12/2020
				0.88	42.5	#7/14/2020

Tissue sheet date cover next testing day (within 24 hrs)

Table 14 (Continued)

Frequency (MHz)	Tissue Type	Conductivity Target (S/m)	Dielectric Constant Target	Conductivity Meas. (S/m)	Dielectric Constant Meas.	Tested Date
458	IEEE/ IEC Head	0.87 (0.83-0.91)	43.5 (41.3-45.6)	0.88	43.6	#2/4/2020
				0.88	44.4	2/6/2020
				0.88	44.0	2/7/2020
				0.88	43.6	#2/9/2020
				0.88	43.9	#2/10/2020
				0.87	42.6	#2/11/2020
				0.88	44.1	#2/12/2020
				0.88	41.8	#2/13/2020
				0.88	42.6	2/14/2020
				0.87	43.5	2/17/2020
				0.88	44.0	#2/20/2020
				0.86	43.9	2/21/2020
				0.88	44.0	#2/24/2020
				0.88	44.6	#2/25/2020
				0.88	44.4	#2/26/2020
				0.87	44.8	#2/27/2020
				0.87	44.2	#3/1/2020
				0.87	44.5	3/4/2020
				0.87	43.1	5/4/2020
				0.90	42.9	#7/8/2020
				0.89	42.1	#7/9/2020
				0.88	42.7	#7/12/2020
				0.88	42.3	#7/14/2020
470	IEEE/ IEC Head	0.87 (0.83-0.91)	43.4 (41.2-45.6)	0.89	43.4	#2/4/2020
				0.89	43.7	2/5/2020
				0.89	44.1	#2/6/2020
				0.89	43.7	#2/7/2020
				0.89	43.4	#2/9/2020
				0.89	43.6	#2/10/2020
				0.88	42.3	#2/11/2020
				0.89	43.6	2/16/2020
				0.88	43.2	#2/17/2020
				0.88	41.7	#2/18/2020
				0.88	44.0	#2/19/2020
				0.89	43.7	#2/20/2020
				0.88	43.6	2/21/2020
				0.89	43.7	#2/24/2020
				0.89	44.3	#2/25/2020
				0.89	44.1	#2/26/2020
				0.88	44.3	#2/27/2020
				0.88	44.5	#2/28/2020
				0.88	43.9	#3/1/2020
				0.89	44.3	#3/2/2020
				0.89	43.7	#3/3/2020
				0.88	44.3	#3/4/2020

Tissue sheet date cover next testing day (within 24 hrs)

Table 14 (Continued)

Frequency (MHz)	Tissue Type	Conductivity Target (S/m)	Dielectric Constant Target	Conductivity Meas. (S/m)	Dielectric Constant Meas.	Tested Date
470	IEEE/ IEC Head	0.87 (0.83-0.91)	43.4 (41.2-45.6)	0.89	44.4	3/5/2020
				0.89	42.7	#4/29/2020
				0.91	42.7	#7/8/2020
				0.90	41.9	#7/9/2020
				0.90	41.9	#7/10/2020
				0.89	42.5	#7/12/2020
				0.90	42.1	#7/14/2020
475	IEEE/ IEC Head	0.87 (0.83-0.92)	43.4 (41.2-45.5)	0.89	43.3	#2/9/2020
				0.89	42.2	#2/11/2020
				0.89	42.3	2/14/2020
				0.88	43.1	2/17/2020
				0.89	43.6	#2/20/2020
				0.88	43.5	2/21/2020
				0.89	44.2	2/27/2020
484	IEEE/ IEC Head	0.87 (0.83-0.92)	43.3 (41.2-45.5)	0.90	43.1	#2/9/2020
				0.89	43.6	2/16/2020
				0.90	43.5	#2/20/2020
				0.90	44.1	2/27/2020
				0.90	43.5	3/3/2020
				0.90	44.0	3/4/2020
490	IEEE/ IEC Head	0.87 (0.83-0.92)	43.3 (41.1-45.5)	0.90	43.0	#2/9/2020
				0.90	42.0	#2/11/2020
				0.90	42.1	#2/14/2020
				0.91	43.4	#2/20/2020
				0.90	43.9	2/27/2020
496	IEEE/ IEC Head	0.87 (0.83-0.92)	43.3 (41.1-45.4)	0.91	43.2	2/7/2020
				0.91	42.9	#2/9/2020
				0.91	42.0	#2/11/2020
				0.91	43.1	2/16/2020
				0.90	42.8	2/17/2020
				0.91	43.3	#2/20/2020
				0.90	43.1	2/21/2020
				0.91	43.8	#2/27/2020
				0.90	43.5	3/1/2020
				0.91	43.8	3/4/2020
				0.92	41.9	#7/12/2020
				0.92	42.0	#7/14/2020
512	IEEE/ IEC Head	0.87 (0.83-0.92)	43.2 (41-45.3)	0.91	42.5	2/17/2020
				0.91	42.9	2/21/2020
519	IEEE/ IEC Head	0.87 (0.83-0.92)	43.1 (41-45.3)	0.91	43.0	3/6/2020
				0.91	42.1	#4/29/2020
527	IEEE/ IEC Head	0.88 (0.83-0.92)	43.1 (40.9-45.2)	0.92	42.9	3/6/2020
				0.92	42.0	#4/29/2020

Tissue sheet date cover next testing day (within 24 hrs)

Table 14 (Continued)

Frequency (MHz)	Tissue Type	Conductivity Target (S/m)	Dielectric Constant Target	Conductivity Meas. (S/m)	Dielectric Constant Meas.	Tested Date
2412	IEEE/ IEC Head	1.77 (1.68-1.86)	39.2 (35.3-43.2)	1.79	36.2	#3/3/2020
				1.84	35.6	#3/5/2020
				1.85	36.1	#4/29/2020
				1.83	35.6	#4/30/2020
				1.82	35.6	#5/1/2020
				1.74	37.5	#5/4/2020
				1.77	35.5	5/14/2020
				1.79	36.2	5/20/2020
				1.82	35.5	#7/9/2020
				1.82	35.6	#7/10/2020
				1.82	35.5	#7/12/2020
				1.82	37.4	#7/14/2020
2437	IEEE/ IEC Head	1.79 (1.70-1.88)	39.2 (35.3-43.1)	1.79	35.6	#5/3/2020
				1.84	35.4	#7/12/2020
2450	IEEE/ IEC Head	1.80 (1.71-1.89)	39.2 (35.3-43.1)	1.84	36.1	3/3/2020
				1.88	35.4	#3/5/2020
				1.89	35.9	4/29/2020
				1.87	35.5	4/30/2020
				1.86	35.5	5/1/2020
				1.80	35.5	5/3/2020
				1.78	37.4	#5/4/2020
				1.81	35.4	5/14/2020
				1.83	36.1	5/20/2020
				1.85	35.4	#7/9/2020
				1.86	35.5	#7/10/2020
				1.85	35.4	#7/12/2020
				1.85	37.3	#7/14/2020
2462	IEEE/ IEC Head	1.81 (1.72-1.90)	39.2 (35.3-43.1)	1.81	35.5	#5/3/2020
				1.87	35.3	#7/12/2020

Tissue sheet date cover next testing day (within 24 hrs)

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: 18.4 – 24.9˚C Avg. 21.6 ˚C
Tissue Temperature	18 – 25 ˚C	Range: 19.1-22.2˚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 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

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

12.2 DUT Configuration(s)

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

12.3 DUT Positioning Procedures

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

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 G includes a shortened scan to justify SAR scaling for drift. For this device the "Max Calc. 1g-SAR" are scaled using the following formula:

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

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

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

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

12.6 DUT Test Plan

The guidelines and requirements outlined in section 4.0 were used to assess compliance of this device. All modes of operation identified in section 6.0 were considered during the development of the test plan. All tests were performed in CW mode and 50% duty cycle was applied to PTT configurations in the final results.
WLAN tests were performed in 802.11b mode using a duty cycle of 99.80% with results scaled to 100%. Standalone and simultaneous BT testing were assessed in sections 13.6 and 14.0 per the guidelines of KDB 447498.

13.0 DUT Test Data

13.1 LMR assessments at the Body for 406.1-512.0 MHz band

Battery PMNN4491B was selected as the default battery for assessments at the Body because it is the thinnest battery (refer to Exhibit 7B for battery illustration). The default battery was used during conducted power measurements for all test channels within FCC allocated frequency range (406.1-512.0 MHz) which are listed in Table 17. The channel with the highest conducted power will be identified as the default channel per KDB 643646 (SAR Test for PTT Radios). SAR plots of the highest results per Table (bolded) are presented in Appendix F.

Table 17

Test Freq (MHz)	Power (W)
406.1250	4.720
422.3000	4.740
435.4000	4.800
440.0000	4.740
441.4000	4.720
450.0000	4.800
457.9000	4.800
470.0000	4.800
475.0000	4.780
484.0000	4.760
490.0000	4.730
496.2000	4.800
512.0000	4.660

Assessments at the Body with Body worn PMLN5838A w/ NTN5243A

DUT assessment with offered antennas, default battery and, default body worn accessory per KDB 643646. Optional batteries were tested per the requirements of KDB 643646. Refer to Table 17 for highest output power channel. SAR plots of the highest results per Table (bolded) are presented in Appendix F.

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#
PMAE4069A	PMNN4491B	PMLN5838A w/ NTN5243A	PMMN4024A	406.1250					
				422.3000					
				435.4000	4.69	-0.37	2.98	1.66	NZ-AB-200709-07#
				450.0000					
PMAE4070A				440.0000					
				457.9000	4.71	-0.36	3.60	1.99	NZ-AB-200709-08#
				475.0000					
				490.0000					
PMAE4071A				470.0000	4.76	-0.37	4.60	2.53	NZ-AB-200709-09#
				484.0000					
				496.2000					
				512.0000					
PMAE4079A				406.1250					
				422.3000					
				441.4000					
				457.9000	4.77	-0.38	3.06	1.68	NZ-AB-200709-10#
				475.0000					
				496.2000					
				512.0000					
Assessment of Additional Batteries									
PMAE4071A	NNTN8129A	PMLN5838A w/ NTN5243A	PMMN4024A	470.0000	4.70	-0.39	3.65	2.04	NZ-AB-200709-11#
	NNTN8560A				4.68	-0.40	4.15	2.33	NZ-AB-200709-12#
	PMNN4406BR				4.78	-0.36	4.13	2.25	NZ-AB-200709-13#
	PMNN4407BR				4.80	-0.44	4.72	**2.61**	NZ-AB-200709-14#
	PMNN4409BR				4.80	-0.37	4.03	2.19	NZ-AB-200709-15#
	PMNN4412A				4.80	-0.76	4.31	2.57	MA-AB-200709-18
	PMNN4435AR				4.78	-0.51	3.80	2.15	MA-AB-200709-20
	PMNN4448AR				4.80	-0.36	3.90	2.12	MA-AB-200710-01#
	PMNN4463A				4.80	-0.53	3.90	2.20	MA-AB-200710-02#
	PMNN4489A				4.75	-0.51	4.15	2.36	MA-AB-200710-04#
	PMNN4493A				4.80	-0.31	3.54	1.90	MA-AB-200710-05#
	PMNN4525B				4.80	-0.53	4.17	2.36	MA-AB-200710-06#
	PMNN4543A				4.79	-0.39	4.56	2.50	MA-AB-200710-07#
	PMNN4544A				4.76	-0.36	4.52	2.48	NZ-AB-200710-08#

Assessments at the Body with Body worn PMLN5840A w/ NTN5243A
DUT assessment with offered antennas, default battery and, optional body worn accessory per KDB 643646. Optional batteries were tested per the requirements of KDB 643646. Refer to Table 17 for highest output power channel. SAR plots of the highest results per Table (bolded) are presented in Appendix F.

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#
PMAE4069A	PMNN4491B	PMLN5840A w/o belt loop w/ NTN5243A	PMMN4024A	406.1250					
				422.3000					
				435.4000	4.76	-0.32	3.80	2.06	NZ-AB-200710-09#
				450.0000					
PMAE4070A				440.0000					
				457.9000	4.79	-0.40	4.60	2.53	NZ-AB-200710-11#
				475.0000					
				490.0000					
PMAE4071A				470.0000	4.80	-0.36	5.73	3.11	NZ-AB-200710-12#
				484.0000					
				496.2000					
				512.0000					
PMAE4079A				406.1250					
				422.3000					
				441.4000					
				457.9000	4.78	-0.38	3.72	2.04	NZ-AB-200710-13#
				475.0000					
				496.2000					
				512.0000					
Assessment of Additional Batteries									
PMAE4071A	NNTN8129A	PMLN5840A w/o belt loop w/ NTN5243A	PMMN4024A	470.0000	4.73	-0.45	4.77	2.68	NZ-AB-200710-14#
	NNTN8560A				4.71	-0.41	5.24	2.93	NZ-AB-200710-15#
	PMNN4406BR				4.80	-0.41	4.82	2.65	NZ-AB-200710-16#
	PMNN4407BR				4.78	-0.46	5.80	3.24	NZ-AB-200710-17#
	PMNN4409BR				4.80	-0.43	4.95	2.73	NZ-AB-200710-18#
	PMNN4412A				4.80	-0.70	5.74	**3.37**	MA-AB-200710-22#
	PMNN4435AR				4.78	-1.01	5.18	3.28	MA-AB-200710-20#
	PMNN4448AR				4.79	-0.40	5.69	3.13	MA-AB-200710-21#
	PMNN4463A				4.80	-0.62	4.86	2.80	MA-AB-200710-24
	PMNN4489A				4.75	-0.39	5.52	3.05	MA-AB-200710-26
	PMNN4493A				4.79	-0.38	5.14	2.81	MA-AB-200710-27
	PMNN4525B				4.80	-0.84	5.13	3.11	MA-AB-200711-01#
	PMNN4543A				4.78	-0.37	5.55	3.03	MA-AB-200711-02#
	PMNN4544A				4.77	-0.38	5.56	3.05	MA-AB-200711-03#

Assessments at the Body with Body worn PMLN5844A w/ NTN5243A

DUT assessment with offered antennas, default battery and, optional body worn accessory per KDB 643646. Optional batteries were tested per the requirements of KDB 643646. Refer to Table 17 for highest output power channel. SAR plots of the highest results per Table (bolded) are presented in Appendix F.

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#
PMAE4069A	PMNN4491B	PMLN5844A w/ NTN5243A	PMMN4024A	406.1250					
				422.3000					
				435.4000	4.74	-0.19	5.16	2.73	MA-AB-200712-02
				450.0000					
PMAE4070A				440.0000					
				457.9000	4.76	-0.50	6.08	3.44	MA-AB-200712-03
				475.0000					
				490.0000					
PMAE4071A				470.0000	4.78	-0.46	6.53	3.64	MA-AB-200712-04
				484.0000					
				496.2000	4.80	-0.52	5.33	3.00	MA-AB-200712-06
				512.0000					
PMAE4079A				406.1250					
				422.3000					
				441.4000					
				457.9000	4.79	-0.42	5.35	2.95	MA-AB-200712-05
				475.0000					
				496.2000					
				512.0000					
Assessment of Additional Batteries									
PMAE4071A	NNTN8129A	PMLN5844A w/ NTN5243A	PMMN4024A	470.0000	4.77	-0.57	5.86	3.36	MA-AB-200712-07
	NNTN8560A				4.74	-0.42	6.63	3.70	MA-AB-200712-08
	PMNN4406BR				4.78	-0.53	5.75	3.26	MA-AB-200712-09
	PMNN4407BR				4.77	-0.54	6.84	**3.90**	MA-AB-200712-10
	PMNN4409BR				4.78	-0.47	6.06	3.39	MA-AB-200712-11
	PMNN4412A				4.80	-0.58	6.44	3.68	NZ-AB-200712-12
	PMNN4435AR				4.80	-0.47	6.58	3.67	NZ-AB-200712-13
	PMNN4448AR				4.79	-0.39	6.50	3.56	NZ-AB-200712-14
	PMNN4463A				4.80	-0.60	5.61	3.22	NZ-AB-200712-15
	PMNN4489A				4.70	-0.42	6.06	3.41	NZ-AB-200712-16
	PMNN4493A				4.80	-0.38	5.82	3.18	NZ(PT)-AB-200713-01#
	PMNN4525B				4.80	-0.55	5.81	3.30	NZ(PT)-AB-200713-02#
	PMNN4543A				4.80	-0.46	6.25	3.47	NZ(PT)-AB-200713-03#
	PMNN4544A				4.94	-0.41	6.44	3.54	NZ(PT)-AB-200713-04#

Assessments at the Body with Body worn PMLN4651A

DUT assessment with offered antennas, default battery and, optional body worn accessory per KDB 643646. Optional batteries were tested per the requirements of KDB 643646. Refer to Table 17 for highest output power channel. SAR plots of the highest results per Table (bolded) are presented in Appendix F.

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#
PMAE4069A	PMNN4491B	PMLN4651A	PMMN4024A	406.1250					
				422.3000					
				435.4000	4.80	-0.53	6.20	3.50	AM-AB-200210-05#
				450.0000					
PMAE4070A				440.0000	4.78	-0.41	5.10	2.81	AN-AB-200210-07#
				457.9000	4.78	-0.52	7.15	4.05	AM-AB-200210-06#
				475.0000	4.79	-0.45	6.32	3.51	AN-AB-200210-08#
				490.0000	4.80	-0.53	4.78	2.70	AN-AB-200210-09#
PMAE4071A				470.0000	4.77	-0.45	7.89	4.40	AN-AB-200210-10#
				484.0000	4.79	-0.56	7.28	4.15	AN-AB-200210-11#
				496.2000	4.80	-0.47	6.40	3.57	AN-AB-200210-12#
				512.0000					
PMAE4079A				406.1250					
				422.3000					
				441.4000					
				457.9000	4.80	-0.44	6.03	3.34	AN-AB-200210-13#
				475.0000					
				496.2000					
				512.0000					
Assessment of Additional Batteries									
PMAE4070A	NNTN8129A	PMLN4651A	PMMN4024A	457.9000	4.78	-0.44	6.41	3.56	AN-AB-200210-14#
PMAE4071A				470.0000	4.80	-0.47	6.52	3.63	AN-AB-200210-15#
PMAE4070A	NNTN8560A			457.9000	4.76	-0.42	7.21	4.00	AN-AB-200210-16#
PMAE4071A				470.0000	4.78	-0.38	7.41	4.06	AN-AB-200210-17#
PMAE4070A	PMNN4406BR			457.9000	4.78	-0.53	6.15	3.49	AN-AB-200210-18#
PMAE4071A				470.0000	4.78	-0.44	6.36	3.53	AN-AB-200210-19#
PMAE4070A	PMNN4407BR			457.9000	4.75	-0.62	8.20	4.78	AM-AB-200210-21
PMAE4071A				470.0000	4.79	-0.60	8.39	**4.83**	AM-AB-200210-22
PMAE4070A	PMNN4409BR			457.9000	4.79	-0.44	6.47	3.59	AM-AB-200210-23
PMAE4071A				470.0000	4.77	-0.48	5.47	3.07	AM-AB-200210-24
PMAE4070A	PMNN4412A			457.9000	4.78	-0.53	7.09	4.02	AM-AB-200210-25
PMAE4071A				470.0000	4.80	-0.61	7.22	4.15	AM-AB-200210-26
PMAE4070A	PMNN4435AR			457.9000	4.80	-0.72	6.16	3.64	AM-AB-200211-01#
PMAE4071A				470.0000	4.80	-0.86	6.41	3.91	AM-AB-200211-03#
PMAE4070A	PMNN4448AR			457.9000	4.78	-0.46	6.80	3.80	AM-AB-200211-04#
PMAE4071A				470.0000	4.80	-0.44	6.81	3.77	AM-AB-200211-05#

Table 21 (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#
Assessment of Additional Batteries									
PMAE4070A	PMNN4463A	PMLN4651A	PMMN4024A	457.9000	4.80	-0.65	6.05	3.51	AN(AR)-AB-200211-06#
PMAE4071A				470.0000	4.80	-0.64	5.55	3.22	AN(AR)-AB-200211-07#
PMAE4070A	PMNN4489A			457.9000	4.80	-0.68	6.53	3.82	AN(AR)-AB-200211-10#
PMAE4071A				470.0000	4.79	-0.64	7.51	4.36	AN(AR)-AB-200211-11#
PMAE4070A	PMNN4493A			457.9000	4.80	-0.47	6.14	3.42	AN(AR)-AB-200211-12#
PMAE4071A				470.0000	4.80	-0.34	6.31	3.41	AM-AB-200211-14
PMAE4070A	PMNN4525B			457.9000	4.80	-0.68	5.75	3.36	AM-AB-200211-15
PMAE4071A				470.0000	4.80	-0.68	6.40	3.74	AM-AB-200211-16
PMAE4070A	PMNN4543A			457.9000	4.78	-0.61	6.59	3.81	AM-AB-200211-17
PMAE4071A				470.0000	4.77	-0.62	6.67	3.87	AM-AB-200212-01#
PMAE4070A	PMNN4544A			457.9000	4.79	-0.53	6.58	3.72	AM-AB-200212-02#
PMAE4071A				470.0000	4.80	-0.67	6.85	4.00	AM-AB-200212-03#

Assessments at the Body with Body worn PMLN7008A

DUT assessment with offered antennas, default battery and, optional body worn accessory per KDB 643646. Optional batteries were tested per the requirements of KDB 643646. Refer to Table 17 for highest output power channel. SAR plots of the highest results per Table (bolded) are presented in Appendix F.

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#
PMAE4069A	PMNN4491B	PMLN7008A	PMMN4024A	406.1250					
				422.3000					
				435.4000	4.78	-0.51	6.02	3.40	AM-AB-200212-06#
				450.0000					
PMAE4070A				440.0000	4.80	-0.41	5.17	2.84	FAZ(AR)-AB-200212-08#
				457.9000	4.77	-0.49	7.43	4.18	FAZ-AB-200212-07#
				475.0000	4.80	-0.47	6.06	3.38	FAZ(AR)-AB-200212-09#
				490.0000	4.80	-0.58	4.66	2.66	FAZ(AR)-AB-200212-10#
PMAE4071A				470.0000	4.80	-0.51	6.54	3.68	FAZ(AR)-AB-200212-14#
				484.0000					
				496.2000	4.80	-0.55	6.42	3.64	FAZ(AR)-AB-200212-15#
				512.0000					
PMAE4079A				406.1250					
				422.3000					
				441.4000					
				457.9000	4.79	-0.49	6.15	3.45	AM-AB-200212-17
				475.0000					
				496.2000					
				512.0000					
Assessment of Additional Batteries									
PMAE4070A	NNTN8129A	PMLN7008A	PMMN4024A	457.9000	4.79	-0.50	6.27	3.52	AM-AB-200212-18
	NNTN8560A				4.77	-0.42	7.01	3.89	AM-AB-200212-19
	PMNN4406BR				4.80	-0.42	5.75	3.17	AM-AB-200212-20
	PMNN4407BR				4.80	-0.66	8.21	**4.78**	AM-AB-200212-21
	PMNN4409BR				4.80	-0.52	6.93	3.91	AM-AB-200212-22
	PMNN4412A				4.80	-0.46	6.79	3.77	AM-AB-200213-01#
	PMNN4435AR				4.80	-0.86	6.23	3.80	AM-AB-200213-02#
	PMNN4448AR				4.80	-0.55	6.56	3.72	AM-AB-200213-03#
	PMNN4463A				4.75	-0.83	5.74	3.51	AM-AB-200213-04#
	PMNN4489A				4.80	-0.44	6.68	3.70	AM-AB-200213-15
	PMNN4493A				4.80	-0.53	6.14	3.47	AM-AB-200213-16
	PMNN4525B				4.80	-0.69	5.98	3.50	AM-AB-200214-01#
	PMNN4543A				4.78	-0.60	6.73	3.88	AM-AB-200214-02#
	PMNN4544A				4.80	-0.64	6.69	3.88	AM-AB-200214-03#

Assessments at the Body with Body worn PMLN7296A

DUT assessment with offered antennas, default battery and, optional body worn accessory per KDB 643646. Optional batteries were tested per the requirements of KDB 643646. Refer to Table 17 for highest output power channel. SAR plots of the highest results per Table (bolded) are presented in Appendix F.

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#
PMAE4069A	PMNN4488A	PMLN7296A	PMMN4024A	406.1250	4.59	-0.54	4.52	2.68	IZ(AR)-AB-200227-15
				422.3000	4.70	-0.37	4.60	2.56	AN(AR)-AB-200227-13
				435.4000	4.77	-0.50	7.22	4.08	AM-AB-200214-09#
				450.0000	4.75	-0.61	4.94	2.87	AN(AR)-AB-200227-14
PMAE4070A				440.0000	4.70	-0.27	5.33	2.90	AM-AB-200227-17
				457.9000	4.77	-0.58	8.84	5.08	AM-AB-200227-16
				475.0000	4.73	-0.88	6.97	4.33	AM-AB-200227-18
				490.0000	4.78	-1.06	4.28	2.74	AM-AB-200227-19
PMAE4071A				470.0000	4.73	-0.72	8.94	**5.35**	AM-AB-200227-20
				484.0000	4.78	-0.73	7.60	4.51	AM-AB-200227-21
				496.2000	4.77	-1.08	5.14	3.32	AM-AB-200227-22
				512.0000					
PMAE4079A				406.1250					
				422.3000					
				441.4000					
				457.9000	4.79	-0.54	7.05	4.00	AM-AB-200227-23
				475.0000					
				496.2000	4.79	-0.48	3.83	2.14	AM-AB-200228-01#
				512.0000					

Assessments at the Body with Body worn HLN6602A

DUT assessment with offered antennas, default battery and, optional body worn accessory per KDB 643646. Optional batteries were tested per the requirements of KDB 643646. Refer to Table 17 for highest output power channel. SAR plots of the highest results per Table (bolded) are presented 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#
PMAE4069A	PMNN4491B	HLN6602A	PMMN4024A	406.1250	4.71	-0.39	5.23	2.92	AM-AB-200214-14
				422.3000	4.73	-0.24	6.11	3.28	AM-AB-200214-11#
				435.4000	4.78	-0.94	6.71	4.18	AM-AB-200214-10#
				450.0000	4.73	-0.41	5.09	2.84	AM-AB-200214-13
PMAE4070A				440.0000	4.78	-0.40	8.57	4.72	AM-AB-200214-16
				457.9000	4.80	-0.39	8.38	4.58	AM-AB-200214-15
				475.0000	4.80	-0.72	7.03	4.15	AM-AB-200214-17
				490.0000	4.80	-0.35	4.75	2.57	AM-AB-200215-02#
PMAE4071A				470.0000	4.80	-0.50	9.13	5.12	ZR(AR)-AB-200216-02
				484.0000	4.80	-0.55	7.96	4.52	ZR(AR)-AB-200216-03
				496.2000	4.80	-0.46	7.32	4.07	ZR(AR)-AB-200216-04
				512.0000	4.78	-0.97	6.44	4.04	AM-AB-200217-02
PMAE4079A				406.1250					
				422.3000					
				441.4000	4.80	-0.66	7.77	4.52	AM-AB-200217-04
				457.9000	4.80	-0.47	7.71	4.30	AM-AB-200217-03
				475.0000	4.80	-0.63	6.02	3.48	AM-AB-200217-05
				496.2000	4.80	-0.47	4.98	2.77	AM-AB-200217-06
				512.0000					
Assessment of Additional Batteries									
PMAE4069A	NNTN8129A	HLN6602A	PMMN4024A	435.4000	4.66	-0.52	6.19	3.59	AN(AR)-AB-200217-07
PMAE4070A				440.0000	4.73	-0.40	6.26	3.48	AN(AR)-AB-200217-08
PMAE4079A				441.4000	4.76	-0.38	6.70	3.69	AN(AR)-AB-200217-10
PMAE4071A				470.0000	4.80	-0.55	7.46	4.23	AN(AR)-AB-200217-09
PMAE4069A	NNTN8560A			435.4000	4.73	-0.42	5.86	3.28	AN(AR)-AB-200218-04#
PMAE4070A				440.0000	4.69	-0.28	6.97	3.80	AN(AR)-AB-200218-01#
PMAE4079A				441.4000	4.68	-0.66	6.62	3.95	AN(AR)-AB-200218-03#
PMAE4071A				470.0000	4.79	-0.47	8.38	4.68	AN(AR)-AB-200218-02#
PMAE4069A	PMNN4406BR			435.4000	4.80	-0.71	5.51	3.24	AN(AR)-AB-200218-05#
PMAE4070A				440.0000	4.80	-0.39	5.07	2.77	AM-AB-200218-06#
PMAE4079A				441.4000	4.80	-0.46	6.81	3.79	AM-AB-200218-08#
PMAE4071A				470.0000	4.80	-0.51	8.74	4.91	AM-AB-200218-07#
PMAE4069A	PMNN4407BR			435.4000	4.80	-0.59	7.24	4.15	AM-AB-200218-09#
PMAE4070A				440.0000	4.80	-0.35	8.62	4.67	AM-AB-200218-10#
PMAE4079A				441.4000	4.80	-0.49	8.36	4.68	AM-AB-200218-13
PMAE4071A				470.0000	4.80	-0.59	10.10	**5.78**	AM-AB-200218-11#

Table 24 (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#
Assessment of Additional Batteries									
PMAE4069A	PMNN4409BR	HLN6602A	PMMN4024A	435.4000	4.80	-0.70	5.88	3.45	AM-AB-200218-14
PMAE4070A				440.0000	4.80	-0.64	5.58	3.23	AM-AB-200218-15
PMAE4079A				441.4000	4.74	-0.49	7.04	3.99	AN(AR)-AB-200218-17
PMAE4071A				470.0000	4.80	-0.58	8.00	4.57	AM-AB-200218-16
PMAE4069A	PMNN4412A			435.4000	4.45	-0.58	5.59	3.45	AN(AR)-AB-200218-18
PMAE4070A				440.0000	4.73	-0.41	6.99	3.90	AN(AR)-AB-200219-01#
PMAE4079A				441.4000	4.80	-0.69	7.77	4.55	AN(AR)-AB-200219-04#
PMAE4071A				470.0000	4.80	-1.00	7.90	4.97	AN(AR)-AB-200219-02#
PMAE4069A	PMNN4435AR			435.4000	4.80	-1.01	4.96	3.13	AN(AR)-AB-200219-05#
PMAE4070A				440.0000	4.80	-0.32	6.27	3.37	AN(AR)-AB-200219-06#
PMAE4079A				441.4000	4.80	-0.86	5.93	3.61	AN(AR)-AB-200219-08#
PMAE4071A				470.0000	4.80	-0.94	7.27	4.51	AN(AR)-AB-200219-07#
PMAE4069A	PMNN4448AR			435.4000	4.76	-0.59	6.16	3.56	AM-AB-200219-09#
PMAE4070A				440.0000	4.79	-0.66	7.42	4.33	AM-AB-200219-10#
PMAE4079A				441.4000	4.80	-0.44	7.53	4.17	AM-AB-200219-12#
PMAE4071A				470.0000	4.80	-0.54	8.04	4.55	AM-AB-200219-11#
PMAE4069A	PMNN4463A			435.4000	4.80	-0.87	5.69	3.48	AM-AB-200219-13#
PMAE4070A				440.0000	4.80	-0.13	6.91	3.56	AM-AB-200219-14#
PMAE4079A				441.4000	4.80	-0.59	6.53	3.74	AM-AB-200219-16#
PMAE4071A				470.0000	4.80	-0.68	7.72	4.51	AM-AB-200219-15#
PMAE4069A	PMNN4489A			435.4000	4.53	-0.47	5.46	3.22	AN(AR)-AB-200219-22
PMAE4070A				440.0000	4.60	-0.31	6.46	3.62	AN(AR)-AB-200219-23
PMAE4079A				441.4000	4.38	-0.47	5.83	3.56	AN(AR)-AB-200219-25
PMAE4071A				470.0000	4.57	-0.49	7.32	4.30	AN(AR)-AB-200219-24
PMAE4069A	PMNN4493A			435.4000	4.76	-0.61	6.39	3.71	AN(AR)-AB-200220-01#
PMAE4070A				440.0000	4.71	-0.34	6.18	3.41	AN(AR)-AB-200220-02#
PMAE4079A				441.4000	4.68	-0.43	7.31	4.14	AN(AR)-AB-200220-04#
PMAE4071A				470.0000	4.78	-0.55	7.04	4.01	AN(AR)-AB-200220-03#
PMAE4069A	PMNN4525B			435.4000	4.80	-0.46	5.19	2.88	AN(AR)-AB-200220-05#
PMAE4070A				440.0000	4.80	-0.41	4.63	2.54	AN(AR)-AB-200220-06#
PMAE4079A				441.4000	4.80	-0.45	5.17	2.87	AM-AB-200220-08#
PMAE4071A				470.0000	4.80	-0.93	7.05	4.37	AM-AB-200220-07#
PMAE4069A	PMNN4543A			435.4000	4.80	-0.57	6.27	3.57	AM-AB-200220-09#
PMAE4070A				440.0000	4.80	-0.20	6.03	3.16	AM-AB-200220-10#
PMAE4079A				441.4000	4.80	-0.42	6.65	3.66	AM-AB-200220-12#
PMAE4071A				470.0000	4.80	-0.60	8.04	4.62	AM-AB-200220-11#
PMAE4069A	PMNN4544A			435.4000	4.80	-0.44	5.82	3.22	AM-AB-200220-13#
PMAE4070A				440.0000	4.80	-0.33	5.47	2.95	AM-AB-200220-14#
PMAE4079A				441.4000	4.80	-0.35	6.02	3.26	AM-AB-200220-16#
PMAE4071A				470.0000	4.80	-0.61	8.11	4.67	AM-AB-200220-15#

Assessments at the Body with Body worn RLN4570A

DUT assessment with offered antennas, default battery and, optional body worn accessory per KDB 643646. Optional batteries were tested per the requirements of KDB 643646. Refer to Table 17 for highest output power channel. SAR plots of the highest results per Table (bolded) are presented in Appendix F.

Table 25

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Run#
PMAE4069A	PMNN4491B	RLN4570A	PMMN4024A	406.1250	4.80	-0.91	5.94	3.66	AN(AR)-AB-200221-03#
				422.3000	4.80	-0.24	6.16	3.25	AN(AR)-AB-200221-01#
				435.4000	4.80	-0.53	8.54	4.82	AN(AR)-AB-200220-22
				450.0000	4.80	-0.43	6.06	3.35	AN(AR)-AB-200221-02#
PMAE4070A				440.0000	4.80	-0.40	8.21	4.50	AN(AR)-AB-200221-05#
				457.9000	4.80	-0.57	8.49	4.84	AN(AR)-AB-200221-04#
				475.0000	4.80	-0.50	7.25	4.07	AM-AB-200221-06#
				490.0000	4.80	-0.51	5.38	3.03	AM-AB-200221-07#
PMAE4071A				470.0000	4.80	-0.51	10.00	5.62	AM-AB-200221-08#
				484.0000	4.80	-0.79	7.84	4.70	AM-AB-200221-09#
				496.2000	4.80	-0.60	7.53	4.32	AM-AB-200221-10#
				512.0000	4.80	-0.61	6.76	3.89	ZR(AR)-AB-200221-12
PMAE4079A				406.1250					
				422.3000					
				441.4000	4.77	-0.46	8.12	4.54	AN(AR)-AB-200221-14
				457.9000	4.80	-0.51	7.52	4.23	AN(AR)-AB-200221-13
				475.0000	4.80	-0.49	6.30	3.53	AN(AR)-AB-200221-15
				496.2000	4.80	-0.52	5.44	3.07	AN(AR)-AB-200221-16
				512.0000					
Assessment of Additional Batteries									
PMAE4069A	NNTN8129A	RLN4570A	PMMN4024A	435.4000	4.69	-0.61	6.99	4.12	AN(AR)-AB-200221-17
PMAE4079A				441.4000	4.64	-0.59	6.88	4.08	AN(AR)-AB-200221-20
PMAE4070A				457.9000	4.73	-0.64	7.46	4.39	AN(AR)-AB-200221-18
PMAE4071A				470.0000	4.79	-0.67	7.50	4.38	AN(AR)-AB-200221-19
PMAE4069A	NNTN8560A			435.4000	4.63	-0.47	7.19	4.15	AN(AR)-AB-200222-01#
PMAE4079A				441.4000	4.59	-0.37	6.99	3.98	AN(AR)-AB-200224-07
PMAE4070A				457.9000	4.69	-0.53	7.88	4.56	AN(AR)-AB-200224-05
PMAE4071A				470.0000	4.74	-0.90	8.41	5.24	AN(AR)-AB-200224-06
PMAE4069A	PMNN4406BR			435.4000	4.80	-0.71	7.23	4.26	AN(AR)-AB-200224-08
PMAE4079A				441.4000	4.70	-0.63	6.75	3.98	FD(AR)-AB-200224-11
PMAE4070A				457.9000	4.80	-0.63	7.35	4.25	AN(AR)-AB-200224-09
PMAE4071A				470.0000	4.80	-0.59	7.52	4.31	FD(AR)-AB-200224-10
PMAE4069A	PMNN4407BR			435.4000	4.80	-0.68	8.46	4.95	AM-AB-200224-12
PMAE4079A				441.4000	4.78	-0.50	8.62	4.86	AM-AB-200224-15
PMAE4070A				457.9000	4.76	-0.69	9.31	5.50	AM-AB-200224-13
PMAE4071A				470.0000	4.75	-0.81	9.76	**5.94**	AM-AB-200224-14

Table 25 (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#
Assessment of Additional Batteries									
PMAE4069A	PMNN4409BR	RLN4570A	PMMN4024A	435.4000	4.80	-0.64	6.83	3.96	AM-AB-200224-16
PMAE4079A				441.4000	4.80	-0.46	7.04	3.91	AM-AB-200225-01#
PMAE4070A				457.9000	4.80	-0.54	7.57	4.29	AM-AB-200224-17
PMAE4071A				470.0000	4.78	-0.54	8.13	4.62	AM-AB-200224-18
PMAE4069A	PMNN4412A			435.4000	4.77	-0.75	6.72	4.02	AM-AB-200225-02#
PMAE4079A				441.4000	4.78	-0.70	8.06	4.75	AM-AB-200225-05#
PMAE4070A				457.9000	4.73	-0.38	8.97	4.97	AM-AB-200225-03#
PMAE4071A				470.0000	4.75	-0.58	8.26	4.77	AM-AB-200225-04#
PMAE4069A	PMNN4435AR			435.4000	4.80	-0.92	5.50	3.40	BL(AR)-AB-200225-06#
PMAE4079A				441.4000	4.80	-0.62	6.20	3.58	IZ(AR)-AB-200225-10
PMAE4070A				457.9000	4.80	-0.67	7.42	4.33	IZ(AR)-AB-200225-08
PMAE4071A				470.0000	4.80	-0.92	7.59	4.69	IZ(AR)-AB-200225-09
PMAE4069A	PMNN4448AR			435.4000	4.76	-0.52	6.71	3.81	IZ(AR)-AB-200225-11
PMAE4079A				441.4000	4.79	-0.47	7.46	4.16	IZ(AR)-AB-200225-14
PMAE4070A				457.9000	4.75	-0.42	7.65	4.26	IZ(AR)-AB-200225-12
PMAE4071A				470.0000	4.80	-0.49	8.29	4.64	IZ(AR)-AB-200225-13
PMAE4069A	PMNN4463A			435.4000	4.80	-0.74	6.40	3.79	IZ(AR)-AB-200225-15
PMAE4079A				441.4000	4.80	-0.58	6.52	3.73	AM-AB-200225-18
PMAE4070A				457.9000	4.80	-0.66	6.86	3.99	AM-AB-200225-16
PMAE4071A				470.0000	4.80	-0.63	7.87	4.55	AM-AB-200225-17
PMAE4069A	PMNN4489A			435.4000	4.80	-0.52	6.18	3.48	AM-AB-200226-01#
PMAE4079A				441.4000	4.80	-0.34	6.31	3.41	AM-AB-200226-04#
PMAE4070A				457.9000	4.80	-0.48	8.31	4.64	AM-AB-200226-02#
PMAE4071A				470.0000	4.80	-0.47	9.17	5.11	AM-AB-200226-03#
PMAE4069A	PMNN4493A			435.4000	4.80	-0.58	6.96	3.98	AM-AB-200226-05#
PMAE4079A				441.4000	4.80	-0.38	6.58	3.59	AN(AR)-AB-200226-08#
PMAE4070A				457.9000	4.80	-0.52	7.58	4.27	AM-AB-200226-06#
PMAE4071A				470.0000	4.80	-0.59	7.33	4.20	AN(AR)-AB-200226-07#
PMAE4069A	PMNN4525B			435.4000	4.80	-0.42	4.89	2.69	AN(AR)-AB-200226-10
PMAE4079A				441.4000	4.80	-0.33	4.99	2.69	AN(AR)-AB-200226-13
PMAE4070A				457.9000	4.80	-0.80	7.02	4.22	AN(AR)-AB-200226-11
PMAE4071A				470.0000	4.80	-0.70	7.07	4.15	AN(AR)-AB-200226-12
PMAE4069A	PMNN4543A			435.4000	4.80	-0.44	6.09	3.37	AN(AR)-AB-200226-14
PMAE4079A				441.4000	4.80	-0.44	6.37	3.52	AM-AB-200227-03#
PMAE4070A				457.9000	4.80	-0.64	7.75	4.49	AM-AB-200227-01#
PMAE4071A				470.0000	4.80	-0.60	8.36	4.80	AM-AB-200227-02#
PMAE4069A	PMNN4544A			435.4000	4.80	-0.40	5.50	3.02	AM-AB-200227-04#
PMAE4079A				441.4000	4.80	-0.42	5.31	2.92	AN(AR)-AB-200227-07#
PMAE4070A				457.9000	4.80	-0.62	7.76	4.48	AM-AB-200227-05#
PMAE4071A				470.0000	4.80	-0.61	8.45	4.86	AN(AR)-AB-200227-06#

Assessments at the Body with Body worn RLN4815A

DUT assessment with offered antennas, default battery and, optional body worn accessory per KDB 643646. Optional batteries were tested per the requirements of KDB 643646. Refer to Table 17 for highest output power channel. SAR plots of the highest results per Table (bolded) are presented in Appendix F.

Table 26

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Run#
PMAE4069A	PMNN4491B	RLN4815A	PMMN4024A	406.1250					
				422.3000					
				435.4000	4.79	-0.50	4.00	2.25	AM-AB-200228-02#
				450.0000					
PMAE4070A				440.0000					
				457.9000	4.80	-0.57	4.92	2.81	AM-AB-200228-03#
				475.0000					
				490.0000					
PMAE4071A				470.0000	4.73	-0.54	5.10	2.93	AM-AB-200228-04#
				484.0000					
				496.2000					
				512.0000					
PMAE4079A				406.1250					
				422.3000					
				441.4000					
				457.9000	4.76	-0.44	4.43	2.47	AN(AR)-AB-200228-05#
				475.0000					
				496.2000					
				512.0000					
Assessment of Additional Batteries									
PMAE4071A	NNTN8129A	RLN4815A	PMMN4024A	470.0000	4.59	-0.61	4.43	2.67	AN(AR)-AB-200228-07
	NNTN8560A				4.59	-0.47	5.15	3.00	AN(AR)-AB-200228-08
	PMNN4406BR				4.66	-0.58	4.69	2.76	AM-AB-200228-09
	PMNN4407BR				4.68	-0.57	5.75	**3.36**	AM-AB-200228-10
	PMNN4409BR				4.65	-0.58	4.50	2.65	AM-AB-200228-11
	PMNN4412A				4.65	-0.51	4.62	2.68	AM-AB-200228-12
	PMNN4435AR				4.70	-0.98	4.33	2.77	AM-AB-200228-13
	PMNN4448AR				4.77	-0.51	4.85	2.74	AM-AB-200229-01#
	PMNN4463A				4.77	-0.70	4.15	2.45	AM-AB-200229-02#
	PMNN4489A				4.54	-0.47	5.35	3.15	ZZ(AR)-AB-200301-02
	PMNN4493A				4.79	-0.51	5.01	2.82	ZZ(AR)-AB-200301-03
	PMNN4525B				4.76	-0.71	5.01	2.97	ZZ(AR)-AB-200301-04
	PMNN4543A				4.80	-0.47	5.63	3.14	ZZ(AR)-AB-200301-05
	PMNN4544A				4.80	-0.44	5.65	3.13	ZZ(AR)-AB-200301-06

Assessments at the Body with Body worn PMLN5844A w/ RLN6487A w/ RLN6488A

DUT assessment with offered antennas, default battery and, optional body worn accessory per KDB 643646. Optional batteries were tested per the requirements of KDB 643646. Refer to Table 17 for highest output power channel. SAR plots of the highest results per Table (bolded) are presented in Appendix F.

Table 27

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Run#
PMAE4069A	PMNN4491B	PMLN5844A w/ RLN6487A w/ RLN6488A	PMMN4024A	406.1250					
				422.3000					
				435.4000	4.70	-0.38	5.01	2.79	MA-AB-200714-02
				450.0000					
PMAE4070A				440.0000					
				457.9000	4.77	-0.51	5.89	3.33	MA-AB-200714-03
				475.0000					
				490.0000					
PMAE4071A				470.0000	4.80	-0.57	6.99	**3.99**	MA-AB-200714-04
				484.0000					
				496.2000	4.80	-0.49	5.55	3.11	MA-AB-200714-05
				512.0000					
PMAE4079A				406.1250					
				422.3000					
				441.4000					
				457.9000	4.80	-0.51	5.31	2.99	MA-AB-200714-06
				475.0000					
				496.2000					
				512.0000					
Assessment of Additional Batteries									
PMAE4071A	NNTN8129A	PMLN5844A w/ RLN6487A w/ RLN6488A	PMMN4024A	470.0000	4.75	-0.59	5.87	3.40	MA-AB-200714-08
	NNTN8560A				4.73	-0.49	6.77	3.85	MA-AB-200714-09
	PMNN4406BR				4.80	-0.50	5.34	3.00	MA-AB-200714-10
	PMNN4407BR				4.78	-0.47	6.49	3.63	MA-AB-200714-11
	PMNN4409BR				4.79	-0.38	5.72	3.13	MA-AB-200714-12
	PMNN4412A				4.80	-0.63	5.69	3.29	MA-AB-200714-13
	PMNN4435AR				4.79	-0.50	5.51	3.10	MA-AB-200714-14
	PMNN4448AR				4.80	-0.42	6.11	3.37	MA-AB-200714-15
	PMNN4463A				4.78	-0.47	5.98	3.35	MA-AB-200714-16
	PMNN4489A				4.76	-0.34	6.19	3.38	MA-AB-200714-17
	PMNN4493A				4.77	-0.30	5.80	3.13	NZ-AB-200715-01#
	PMNN4525B				4.80	-0.67	5.58	3.26	NZ-AB-200715-02#
	PMNN4543A				4.78	-0.44	6.22	3.46	NZ-AB-200715-03#
	PMNN4544A				4.80	-0.47	6.25	3.48	NZ-AB-200715-04#

Assessment at the Body with other audio accessories

Assessment of additional audio accessories per "KDB 643646 Body SAR Test Consideration for Audio Accessories without Built-in Antenna" Section 1, A. SAR plots of the highest results per Table (bolded) are presented in Appendix F.

Table 28

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Run#
PMAE4071A	PMNN4407BR	RLN4570A	NNTN8383B w/ RMN4056B	470.0000	4.80	-0.61	9.34	5.37	AM-AB-200302-20
			NNTN8383BN	470.0000	4.80	-0.73	9.25	5.47	AM-AB-200302-21
			NNTN8459A	470.0000	4.80	-0.65	9.33	5.42	AM-AB-200303-01#
			PMLN5096B	470.0000	4.80	-0.68	9.91	5.79	AM-AB-200303-02#
			PMLN5097A	470.0000	4.80	-0.62	9.39	5.42	AM-AB-200303-03#
			PMLN5102A	470.0000	4.80	-0.69	8.82	5.17	AM-AB-200303-05#
			PMLN5106A	470.0000	4.80	-0.71	8.45	4.98	AM-AB-200303-06#
			PMLN5275C	470.0000	4.80	-0.66	9.91	5.77	ZZ(AR)-AB-200303-07#
			PMLN5973A	470.0000	4.80	-0.55	9.20	5.22	ZZ(AR)-AB-200303-08#
			PMLN5974A	470.0000	4.80	-0.58	10.10	5.77	ZZ(AR)-AB-200303-10
			PMLN5975A	470.0000	4.80	-0.52	10.10	5.69	ZZ(AR)-AB-200303-11
			PMLN5976A	470.0000	4.80	-0.54	10.10	5.72	ZZ(AR)-AB-200303-12
			PMLN5979A	470.0000	4.80	-0.55	10.20	5.79	ZZ(AR)-AB-200303-13
			PMLN6095A w/ RMN4053B	470.0000	4.80	-0.56	8.92	5.07	ZZ(AR)-AB-200303-14
			PMLN6123A	470.0000	4.80	-0.61	10.00	5.75	ZZ(AR)-AB-200303-15
			PMLN6129A	470.0000	4.80	-0.64	9.96	5.77	AM-AB-200303-17
			PMLN6765A w/ PMLN6767A & PMLN6833A	470.0000	4.80	-0.65	10.70	**6.21**	AM-AB-200303-18
				484.0000	4.80	-0.54	8.72	4.94	AM-AB-200303-19
			PMLN6853A	470.0000	4.80	-0.62	9.49	5.47	AM-AB-200303-20
			PMMN4050ASP01	470.0000	4.80	-0.66	9.69	5.64	AM-AB-200303-21
			PMMN4099CL	470.0000	4.80	-0.61	9.06	5.21	AM-AB-200304-02#
			PMMN4119B	470.0000	4.80	-0.63	9.48	5.48	AM-AB-200304-04#
			RLN5880A	470.0000	4.80	-0.65	9.77	5.67	ZZ(AR)-AB-200304-05#
			RMN5137B	470.0000	4.80	-0.65	9.17	5.33	ZZ(AR)-AB-200304-06#
			RMN5058A	470.0000	4.80	-0.69	9.17	5.37	ZZ(AR)-AB-200304-11

Assessment of wireless BT configuration
Assessment using the overall highest SAR configuration at the body from above without an audio accessory attached. SAR plots of the highest results per Table (bolded) are presented in Appendix F.

Table 29

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	PMNN4407BR	RLN4570A	None	470.0000	4.80	-0.55	11.10	**6.30**	ZZ(AR)-AB-200304-09
				484.0000	4.80	-0.65	9.13	5.30	ZZ(AR)-AB-200304-10
				496.2000					
				512.0000					

13.2 WLAN assessments at the Body for 802.11b/g/n (2.412-2.462GHz)

The tables below represent the output power measurements for WLAN 2.4GHz 802.11b/g/n for assessments at the Body using battery PMNN4491B (refer to Exhibit 7B for battery illustration). These power measurements were used to determine the necessary modes for SAR testing according to KDB 248227 D01 SAR Measurement Procedures for 802.11a/b/g/ Transmitters.

The battery was used during conducted power measurements for all test channels within FCC allocated frequency range (2.412-2.462GHz) which are listed in Table 30. The channel with the highest conducted power will be identified as the default channel per KDB 643646 (SAR Test for PTT Radios). SAR plots of the highest results per Table (bolded) are presented in Appendix F.

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

Table 30

Mode	Channel #	Channel Frequency	Modulation	Battery: PMNN4491B	Antenna Max Power [mW]
				Antenna port[mW]	
802.11b (1Mbps)	1	2412	DSSS	18.00	22.40
	6	2437		18.00	
	11	2462		18.00	
802.11g (6Mbps)	1	2412	OFDM	7.00	8.30
	6	2437		7.00	
	11	2462		7.00	
802.11n (MCS0)	1	2412	OFDM	10.00	12.60
	6	2437		9.00	
	11	2462		9.00	

Assessments at the Body with all offered Body worn

DUT assessment with WLAN internal antenna, all offered batteries without any cable accessory attachment against phantom with all offered body worn. Refer to Table 30 for highest output power channel. SAR plots of the highest results per Table (bolded) are presented in Appendix F.

TABLE 31

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Run#
WLAN ant 0104039J80	PMNN4491B	PMLN5838A w/ NTN5243A	None	2412.0000	0.0180	0.17	0.005	0.006	ZZ-AB-200709-16
				2437.0000					
				2462.0000					
		PMLN58400A w/o belt loop w/ NTN5243A		2412.0000	0.0180	-0.32	0.003	0.004	ZZ-AB-200709-17
				2437.0000					
				2462.0000					
		PMLN5844A w/ NTN5243A		2412.0000	0.0180	0.08	0.016	0.020	ZZ-AB-200710-01#
				2437.0000					
				2462.0000					
		PMLN4651A		2412.0000	0.0180	-0.11	0.005	0.006	FD-AB-200305-03#
				2437.0000					
				2462.0000					
		PMLN7008A		2412.0000	0.0180	-0.01	0.004	0.005	BL-AB-200305-15#
				2437.0000					
				2462.0000					
	PMNN4488A	PMLN7296A		2412.0000	0.0180	-0.07	0.002	0.002	NZ-AB-200520-08
				2437.0000					
				2462.0000					
	PMNN4491B	HLN6602A		2412.0000	0.0180	-0.06	0.010	0.013	FAZ-AB-200304-09#
				2437.0000					
				2462.0000					
		RLN4570A		2412.0000	0.0180	0.14	0.008	0.010	FD-AB-200304-12#
				2437.0000					
				2462.0000					
		RLN4815A		2412.0000	0.0180	0.33	0.007	0.008	FD-AB-200304-13#
				2437.0000					
				2462.0000					
		PMLN5844A w/ RLN6487A w/ RLN6488A		2412.0000	0.0180	0.10	0.011	0.014	ZZ-AB-200710-02#
				2437.0000					
				2462.0000					

TABLE 31 (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#
Assessment of Additional Batteries									
PMAE4069A w/ internal WLAN ant 0104039J80	NNTN8129A	PMLN5844A w/ NTN5243A	None	2412.0000	0.0182	-0.24	0.021	0.027	BL(AR)-AB-200710-05#
	NNTN8560A				0.0181	-0.20	0.017	0.022	BL(AR)-AB-200710-06#
	PMNN4406BR				0.0180	-0.29	0.018	0.024	BL(AR)-AB-200710-07#
	PMNN4407BR				0.0183	-0.14	0.019	0.024	BL(AR)-AB-200710-08#
	PMNN4409BR				0.0173	-0.14	0.016	0.021	BL(AR)-AB-200710-09#
	PMNN4412A				0.0180	0.19	0.025	**0.031**	ZZ-AB-200714-07#
	PMNN4435AR				0.0172	0.07	0.020	0.026	ZZ-AB-200710-12
	PMNN4448AR				0.0177	0.10	0.019	0.024	ZZ-AB-200710-13
	PMNN4463A				0.0182	-0.08	0.021	0.026	ZZ-AB-200711-01#
	PMNN4489A				0.0183	0.40	0.021	0.026	ZZ-AB-200711-02#
	PMNN4493A				0.0178	0.39	0.013	0.016	ZZ-AB-200711-03#
	PMNN4525B				0.0176	-0.33	0.018	0.025	ZZ-AB-200711-04#
	PMNN4543A				0.0175	-0.32	0.010	0.014	ZZ-AB-200712-06
	PMNN4544A				0.0180	0.20	0.010	0.012	ZZ-AB-200712-03

13.3 LMR assessments at the Face for 406.1-512 MHz band

Battery PMNN4493A was selected as the default battery for assessments at the Face because it has the highest capacity (refer to Exhibit 7B for battery illustration). The default battery was used during conducted power measurements for all test channels within FCC allocated frequency range (406.1-512 MHz) which are listed in Table 32. The channel with the highest conducted power will be identified as the default channel per KDB 643646 (SAR Test for PTT Radios). SAR plots of the highest results per Table (bolded) are presented in Appendix F.

Table 32

Test Freq (MHz)	Power (W)
406.1250	4.65
422.3000	4.68
435.4000	4.72
440.0000	4.67
441.4000	4.72
450.0000	4.72
457.9000	4.78
470.0000	4.80
475.0000	4.77
484.0000	4.74
490.0000	4.70
496.2000	4.76
512.0000	4.72

DUT assessment with offered antennas, default battery with front of DUT positioned 2.5cm facing phantom per KDB 643646. Optional batteries were tested per the requirements of KDB 643646. Refer to Table 32 for highest output power channel. SAR plots of the highest results per Table (bolded) are presented in Appendix F.

Table 33

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Run#
PMAE4069A	PMNN4491B	@ front	None	406.1250					
				422.3000					
				435.4000	4.71	-0.42	6.02	3.38	ZZ(AR)-FACE-200304-12
				450.0000					
PMAE4070A				440.0000					
				457.9000	4.75	-0.38	3.53	1.95	AM-FACE-200304-13
				475.0000					
				490.0000					
PMAE4071A				470.0000	4.73	-0.39	6.73	3.74	AM-FACE-200304-14
				484.0000					
				496.2000	4.79	-0.34	4.44	2.41	AM-FACE-200304-15
				512.0000					
PMAE4079A				406.1250					
				422.3000					
				441.4000					
				457.9000	4.77	-0.38	5.47	3.00	AM-FACE-200304-16
				475.0000					
				496.2000					
				512.0000					
Assessment of Additional Batteries									
PMAE4071A	NNTN8129A	@ front	None	470.0000	4.80	-0.47	6.30	3.51	AM-FACE-200304-17
	NNTN8560A				4.73	-0.51	6.34	3.62	AM-FACE-200304-18
	PMNN4406BR				4.75	-0.36	5.93	3.26	AM-FACE-200304-19
	PMNN4407BR				4.75	-0.41	6.64	3.69	AM-FACE-200305-01#
	PMNN4409BR				4.78	-0.39	6.71	3.69	AM-FACE-200305-02#
	PMNN4412A				4.78	-0.35	6.17	3.36	AM-FACE-200305-03#
	PMNN4435AR				4.75	-0.75	6.51	3.91	ZZ(AR)-FACE-200305-04#
	PMNN4448AR				4.80	-0.40	7.21	**3.95**	ZZ(AR)-FACE-200305-05#
	PMNN4463A				4.77	-0.56	6.51	3.73	ZZ(AR)-FACE-200305-06#
	PMNN4488A				4.79	-0.27	6.95	3.71	ZZ(AR)-FACE-200305-07#
	PMNN4489A				4.80	-0.28	6.74	3.59	ZZ(AR)-FACE-200305-08#
	PMNN4491B				4.76	-0.30	6.76	3.65	ZZ(AR)-FACE-200305-10
	PMNN4525B				4.79	-0.58	6.64	3.80	ZZ(AR)-FACE-200305-11
	PMNN4543A				4.73	-0.38	6.80	3.77	ZZ(AR)-FACE-200305-12
	PMNN4544A				4.80	-0.36	6.99	3.80	ZZ(AR)-FACE-200305-13

13.4 WLAN assessments at the Face for 802.11b/g/n (2.412-2.462GHz)

The tables below represent the output power measurements for WLAN 2.4GHz 802.11b/g/n for assessments at the Face using battery PMNN4493A because it has the highest capacity (refer to Exhibit 7B for battery illustration). These power measurements were used to determine the necessary modes for SAR testing according to KDB 248227 D01 SAR Measurement Procedures for 802.11a/b/g/ Transmitters.

The battery was used during conducted power measurements for all test channels within FCC allocated frequency range (2.412-2.462GHz) which are listed in Table 34. The channel with the highest conducted power will be identified as the default channel per KDB 643646 (SAR Test for PTT Radios). SAR plots of the highest results per Table (bolded) are presented in Appendix F.

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

TABLE 34

Mode	Channel #	Channel Frequency	Modulation	Battery: PMNN4448A Antenna port[mW]	Antenna Max Power [mW]
802.11b (1Mbps)	1	2412	DSSS	19.00	22.40
	6	2437		18.00	
	11	2462		18.00	
802.11g (6Mbps)	1	2412	OFDM	7.00	8.30
	6	2437		7.00	
	11	2462		7.00	
802.11n (MCS0)	1	2412	OFDM	10.00	12.60
	6	2437		10.00	
	11	2462		9.00	

802.11b was chosen over 802.11 g & n for testing because it has the highest max power

DUT assessment with WLAN internal antenna using all offered batteries with front of the DUT 2.5 cm from the phantom. Refer to Table 34 for highest output power channel. SAR plots of the highest results per Table (bolded) are presented in Appendix F.

Table 35

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Run#
PMAE4069A w/ internal WLAN ant 0104039J80	PMNN4493A	@ front	None	2412.0000	0.0190	0.16	0.019	0.022	AM-FACE-200501-04#
				2437.0000					
				2462.0000					
Assessment of Additional Batteries									
WLAN ant 0104039J80	NNTN8129A	@ front	None	2412.0000	0.0190	0.12	0.019	0.022	AM-FACE-200501-05#
	NNTN8560A				0.0190	0.40	0.019	0.022	FAZ-FACE-200501-06#
	PMNN4406BR				0.0190	0.06	0.018	0.021	FAZ-FACE-200501-07#
	PMNN4407BR				0.0190	0.21	0.019	0.022	FAZ-FACE-200501-10
	PMNN4409BR				0.0190	0.10	0.019	0.022	FAZ-FACE-200501-11
	PMNN4412A				0.0190	0.09	0.023	**0.027**	AM-FACE-200505-02#
	PMNN4435AR				0.0190	0.35	0.018	0.021	FAZ-FACE-200501-13
	PMNN4448AR				0.0190	-0.03	0.019	0.023	AM-FACE-200501-14
	PMNN4463A				0.0190	0.03	0.019	0.022	AM-FACE-200501-15
	PMNN4488A				0.0190	0.05	0.019	0.022	AM-FACE-200501-16
	PMNN4489A				0.0190	0.19	0.020	0.024	AM-FACE-200502-01#
	PMNN4491B				0.0190	0.11	0.020	0.024	AM-FACE-200502-02#
	PMNN4525B				0.0190	0.04	0.019	0.022	AM-FACE-200502-03#
	PMNN4543A				0.0190	0.02	0.019	0.022	AM-FACE-200502-04#
	PMNN4544A				0.0190	0.42	0.020	0.024	AM-FACE-200502-05#

13.5 Assessment for Industry Canada

Based on the assessment results for body and face per KDB643646 D01, additional tests were not required for the Industry Canada frequency range (406.125-430 MHz) and (450-470 MHz) as the testing performed is in compliance with Industry Canada frequency range.

As per ISED Notice 2016-DRS001, additional tests were required for the low, mid and high frequency channels for the configuration with the highest SAR value.

For LMR UHF band, the antenna from the highest SAR configuration has a frequency range of 470-527 MHz, so only 470MHz is performed.

Table 36

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Run#
Body (UHF)									
PMAE4071A	PMNN4407BR	RLN4570A	None	470.0000	4.80	-0.55	11.10	**6.30**	ZZ(AR)-AB-200304-09
Face (UHF)									
PMAE4071A	PMNN4448AR	@Front	None	470.0000	4.80	-0.40	7.21	**3.95**	ZZ(AR)-FACE-200305-05#
Body (WLAN)									
PMAE4069A w/ internal WLAN ant 0104039J80	PMNN4407BR	PMLN5844A w/ NTN5243A	None	2412.0000	0.0180	0.19	0.025	**0.031**	ZZ-AB-200714-07#
	PMNN4407BR			2437.0000	0.0180	0.01	0.010	0.012	ZZ-AB-200712-04
	PMNN4407BR			2462.0000	0.0180	-0.04	0.007	0.009	ZZ-AB-200712-05
Face (WLAN)									
PMAE4069A w/ internal WLAN ant 0104039J80	PMNN4412A	@ Front	None	2412.0000	0.0190	0.09	0.023	**0.027**	AM-FACE-200505-02#
	PMNN4412A			2437.0000	0.0190	-0.01	0.013	0.015	AM-FACE-200504-03#
	PMNN4412A			2462.0000	0.0190	0.07	0.014	0.017	AM-FACE-200504-04#

13.6 Assessment at the Bluetooth Band

13.6.1 FCC US Requirement

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

[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] *[$\sqrt{F_{(GHz)}}$] = 2.4, which is ≤ 3 for 1-g SAR

Where:

Max. power = 7.7mW (10.0mW*77.0% 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.

13.6.2 ISED 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:
= 10.0 mW * 77.0%
= 7.7 mW or 8.86 dBm

Equivalent isotropically radiated power (EIRP):
= Maximum conducted power, dBm + Antenna gain, dBi
= 8.86 dBm + (-4 dBi)
= 4.86 dBm or 3.06 mW
Higher output power level, maximum power 7.7 mW was below the threshold power level 20 mW. Hence SAR test was not required for Bluetooth band.

13.7 Assessment outside FCC part 90

Assessment of outside FCC Part 90 using the highest SAR configuration for each band from above. SAR plots of the highest results per Table (bolded) are presented in Appendix F.

Table 37

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Run#
Body									
PMAE4069A	PMNN4407BR	RLN4570A	NONE	403.0000	4.65	-0.51	7.20	4.18	NZ-AB-200429-02
PMAE4071A	PMNN4407BR	RLN4570A	NONE	519.5000	4.77	-0.47	9.73	5.46	ZZ(MA)-AB-200429-11
				527.0000	4.79	-0.60	10.90	**6.27**	ZZ(MA)-AB-200429-12
PMAE4079A	PMNN4407BR	RLN4570A	NONE	403.0000	4.64	-0.45	7.92	4.54	NZ-AB-200429-03
				519.5000	4.76	-0.55	7.64	4.37	ZZ(MA)-AB-200430-01#
				527.0000	4.80	-0.69	7.03	4.12	ZZ(MA)-AB-200430-02#
Face									
PMAE4069A	PMNN4448AR	@ Front	NONE	403.0000	4.68	-0.37	4.50	2.51	NZ-FACE-200429-07
PMAE4071A	PMNN4448AR	@ Front	NONE	519.5000	4.80	-0.32	5.25	2.83	AM-FACE-200306-04
				527.0000	4.80	-0.32	6.65	**3.58**	AM-FACE-200306-05
PMAE4079A	PMNN4448AR	@ Front	NONE	403.0000	4.67	-0.40	4.67	2.63	NZ-FACE-200429-08
				519.5000	4.80	-0.45	4.48	2.48	ZZ(MA)-FACE-200430-03#
				527.0000	4.79	-0.48	4.11	2.30	ZZ(MA)-FACE-200430-04#

13.8 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 G 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 38

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	PMNN4407BR	RLN4570A	None	470.0000	4.80	-0.21	12.40	**6.51**	NZ-AB-200430-15#

14.0 Simultaneous Transmission Exclusion for BT

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

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

Where:

X = 7.5 for 1g-SAR; 18.75 for 10g
Max. power = 7.7mW (10mW*77.0% duty cycle)
Min. test separation distance = 5mm for actual test separation < 5mm
F(GHz) = 2.48 GHz

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

15.0 Simultaneous Transmission between LMR and WLAN

This device uses a single transmitter module and antenna for both WLAN and BT. WLAN and BT cannot transmit simultaneously. The maximum sourced-based time-averaged output power for testing 802.11b is 22.4mW while the BT is 7.7mW. Therefore the measured SAR from 802.11b is used in conjunction with LMR for simultaneous results.

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

TABLE 39

		LMR Bands
	Freq. (MHz)	UHF (406.125-512 MHz)
WLAN Band	2412 - 2484	√

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 average SAR values found for this filing:

Table 40

Designator	Frequency band (MHz)	Max Calc at Body (W/kg)	Max Calc at Face (W/kg)
		1g-SAR	1g-SAR
FCC US			
LMR	406.1-512	6.51	3.95
WLAN	2412-2462	0.031	0.027
ISED Canada			
LMR	406.1-430; 450-470	6.51	3.95
WLAN	2412-2462	0.031	0.027
Overall			
LMR	403-527	6.51	3.95
WLAN	2412-2462	0.031	0.027

All results are scaled to the maximum output power.

The highest combined 1g-SAR results for simultaneous is indicated in the following Table:

Table 41

Designator	Frequency bands	Combined 1g-SAR (W/kg)
Body		
FCC	LMR (406.1-512MHz) and WLAN band	6.54
ISED	LMR (406.1-430MHz, 450-470MHz) and WLAN band	6.54
Overall	LMR (403-527MHz) and WLAN band	6.54
Face		
FCC	LMR (406.1-512MHz) and WLAN band	3.98
ISED	LMR (406.1-430MHz, 450-470MHz) and WLAN band	3.98
Overall	LMR (403-527MHz) and WLAN band	3.98

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

17.0 Variability Assessment

Per the guidelines in KDB 865664 SAR variability assessment is required because SAR results are above 4.0W/kg (Occupational).

The Table below includes test results of the original measurement(s), the repeated measurement(s), and the ratio (SAR_{high}/SAR_{low}) for the applicable test configuration(s).

Table 42

Run#	Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq. (MHz)	Adj Calc. 1g-SAR (W/kg)	Ratio	Comments
ZZ(AR)-AB-200304-09	PMAE4071A	PMNN4407BR	RLN4570A	None	470.0000	6.30	1.03	No additional repeated scans is required due to the Ratio (SAR_{high}/SAR_{low}) < 1.20
NZ-AB-200430-15#						6.51		

18.0 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 17025 a reported system uncertainty is required and therefore measurement uncertainty budget is included in Appendix A.

Appendix A
Measurement Uncertainty Budget

TABLE A.1: 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		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

TABLE A.2: Uncertainty Budget for Device Under Test, for 2450 MHz

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

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

TABLE A.3: Uncertainty Budget for System Validation (dipole & flat phantom) for 450MHz

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

TABLE A.4: Uncertainty Budget for System Validation (dipole & flat phantom) for 2450MHz

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

Appendix B
Dipole Calibration Certificates

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 0108

Client: Motorola Solutions MY

Certificate No: D450V3-1053_Oct18

CALIBRATION CERTIFICATE

Object: D450V3 - SN:1053

Calibration procedure(s): QA CAL-15.v8
Calibration procedure for dipole validation kits below 700 MHz

Calibration date: October 19, 2018

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-18 (No. 217-02672/02673)	Apr-19
Power sensor NRP-Z81	SN: 103244	04-Apr-18 (No. 217-02672)	Apr-19
Power sensor NRP-Z91	SN: 103245	04-Apr-18 (No. 217-02673)	Apr-19
Reference 20 dB Attenuator	SN: 5277 (20x)	04-Apr-18 (No. 217-02682)	Apr-19
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-18 (No. 217-02683)	Apr-19
Reference Probe EX3DV4	SN: 3877	30-Dec-17 (No. EX3-3877_Dec17)	Dec-18
DAE4	SN: 654	05-Jul-18 (No. DAE4-654_Jul18)	Jul-19

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	12-Jun-18 (No. 217-02285/02284)	In house check: Jun-20
Power sensor E4412A	SN: MY41498087	12-Jun-18 (No. 217-02285)	In house check: Jun-20
Power sensor E4412A	SN: 000110210	12-Jun-18 (No. 217-02284)	In house check: Jun-20
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-18)	In house check: Jun-20
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-18)	In house check: Oct-19

	Name	Function	Signature
Calibrated by:	Claudio Leubler	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: October 19, 2018

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 0108

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "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)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.10.2
Extrapolation	Advanced Extrapolation	
Phantom	ELI4 Flat Phantom	Shell thickness: 2 ± 0.2 mm
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	43.5	0.87 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	44.1 ± 6 %	0.87 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	---	---

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.14 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**4.57 W/kg ± 18.1 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	0.762 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**3.05 W/kg ± 17.6 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	56.7	0.94 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	55.5 ± 6 %	0.92 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	---	---

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	1.12 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**4.53 W/kg ± 18.1 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	0.753 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**3.05 W/kg ± 17.6 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	57.6 Ω - 4.4 jΩ
Return Loss	- 21.7 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	55.1 Ω - 7.0 jΩ
Return Loss	- 21.7 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.351 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	December 16, 2005

DASY5 Validation Report for Head TSL

Date: 19.10.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 450 MHz; Type: D450V3; Serial: D450V3 - SN:1053

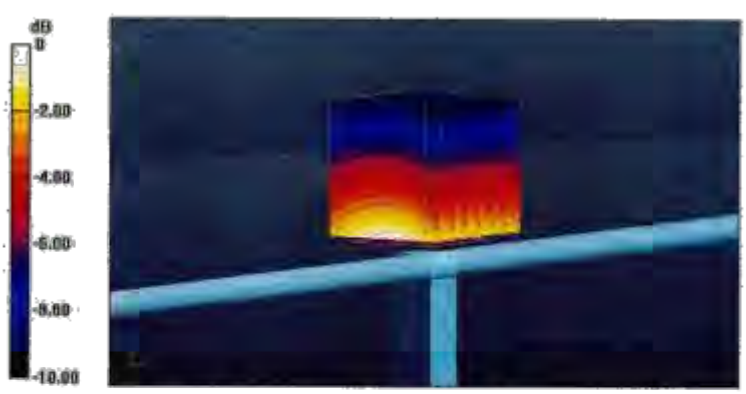
Communication System: UID 0 - CW; Frequency: 450 MHz
Medium parameters used: f = 450 MHz; $\sigma = 0.87$ S/m; $\varepsilon_r = 44.1$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN3877; ConvF(10.5, 10.5, 10.5) @ 450 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn654; Calibrated: 05.07.2018
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP:1003
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

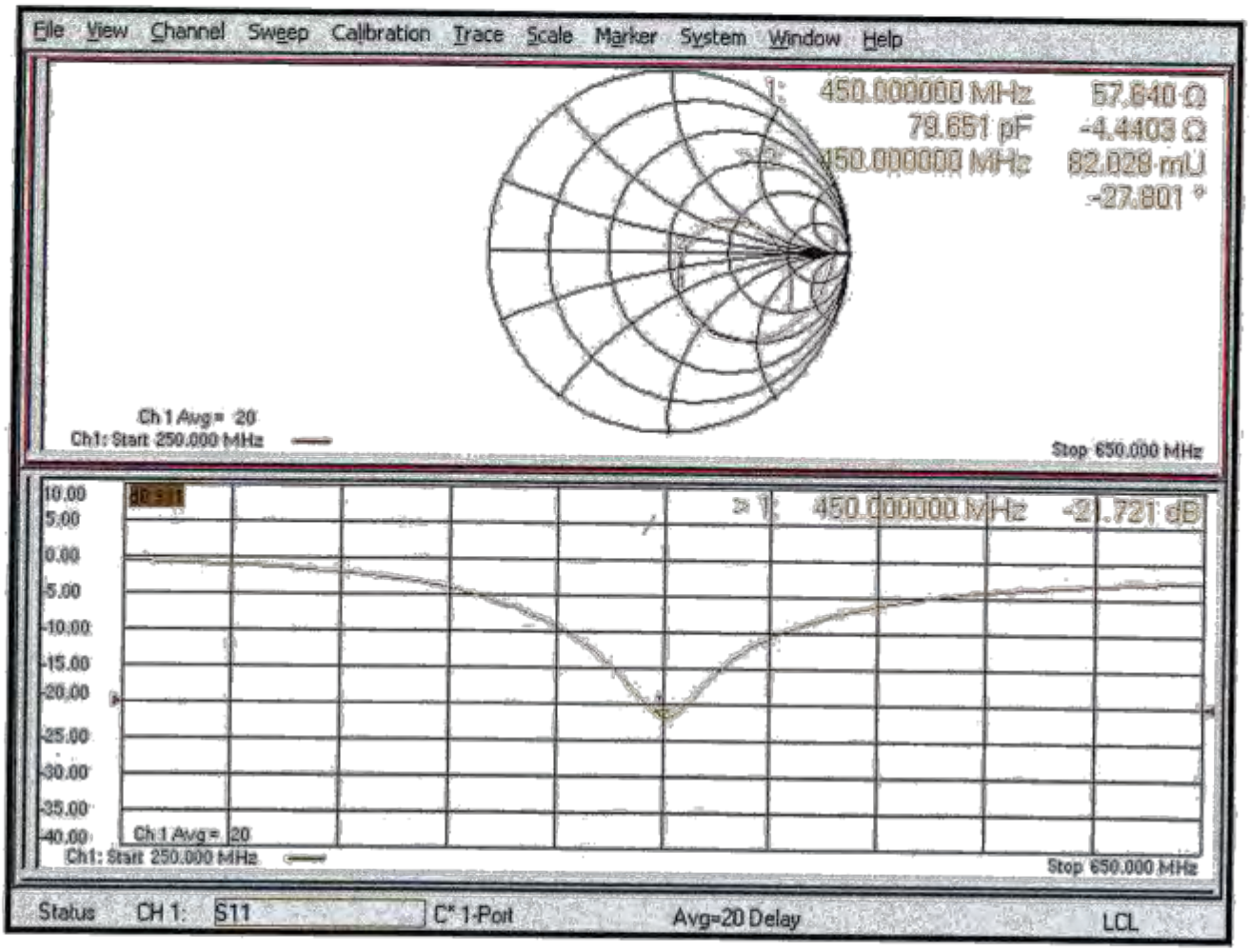
Dipole Calibration for Head Tissue/d=15mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 38.89 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 1.74 W/kg
SAR(1 g) = 1.14 W/kg; SAR(10 g) = 0.762 W/kg
Maximum value of SAR (measured) = 1.52 W/kg



0 dB = 1.52 W/kg = 1.82 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 19.10.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 450 MHz; Type: D450V3; Serial: D450V3 - SN:1053

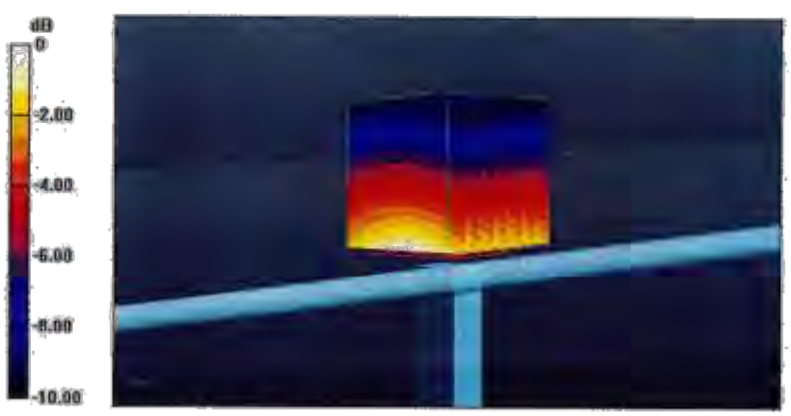
Communication System: UID 0 - CW; Frequency: 450 MHz
Medium parameters used: f = 450 MHz; $\sigma = 0.92$ S/m; $\varepsilon_r = 55.5$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN3877; ConvF(10.8, 10.8, 10.8) @ 450 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn654; Calibrated: 05.07.2018
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP:1003
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

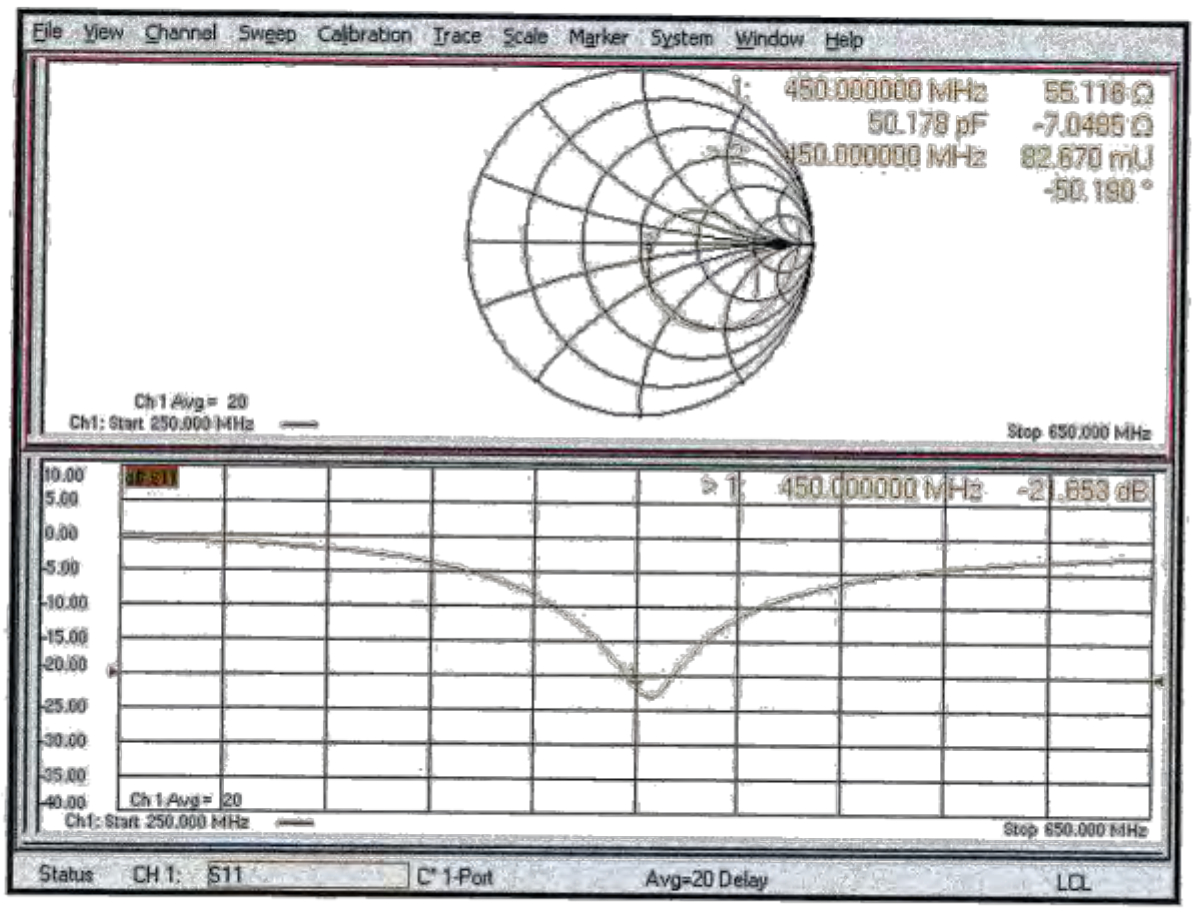
Dipole Calibration for Body Tissue/d=15mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 41.78 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 1.72 W/kg
SAR(1 g) = 1.12 W/kg; SAR(10 g) = 0.753 W/kg
Maximum value of SAR (measured) = 1.50 W/kg



0 dB = 1.50 W/kg = 1.76 dBW/kg

Impedance Measurement Plot for Body TSL



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Accreditation No.: SCS 0108

Client: Motorola Solutions MY

Certificate No: D450V3-1054_Mar19

CALIBRATION CERTIFICATE

Object: D450V3 - SN:1054

Calibration procedure(s): QA CAL-15.v9
Calibration Procedure for SAR Validation Sources below 700 MHz

Calibration date: March 11, 2019

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-18 (No. 217-02672/02673)	Apr-19
Power sensor NRP-Z91	SN: 103244	04-Apr-18 (No. 217-02672)	Apr-19
Power sensor NRP-Z91	SN: 103245	04-Apr-18 (No. 217-02673)	Apr-19
Reference 20 dB Attenuator	SN: 5277 (20x)	04-Apr-18 (No. 217-02682)	Apr-19
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-18 (No. 217-02683)	Apr-19
Reference Probe EX3DV4	SN: 3877	31-Dec-18 (No. EX3-3877_Dec18)	Dec-19
DAE4	SN: 654	05-Jul-18 (No. DAE4-654_Jul18)	Jul-19

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-18)	In house check: Jun-20
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-18)	In house check: Oct-19

	Name	Function	Signature
Calibrated by:	Claudio Leubler	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: March 11, 2019

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Accreditation No.: SCS 0108

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "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)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.10.2
Extrapolation	Advanced Extrapolation	
Phantom	ELI4 Flat Phantom	Shell thickness: 2 ± 0.2 mm
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	43.5	0.87 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	44.1 ± 6 %	0.87 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	---	---

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.14 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**4.57 W/kg ± 18.1 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	0.763 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**3.06 W/kg ± 17.6 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	56.7	0.94 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	55.7 ± 6 %	0.93 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	---	---

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	1.13 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**4.54 W/kg ± 18.1 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	0.762 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**3.06 W/kg ± 17.6 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	60.2 Ω - 0.4 jΩ
Return Loss	- 20.7 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	57.7 Ω - 3.6 jΩ
Return Loss	- 22.1 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.346 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG

DASY5 Validation Report for Head TSL

Date: 11.03.2019

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 450 MHz; Type: D450V3; Serial: D450V3 - SN:1054

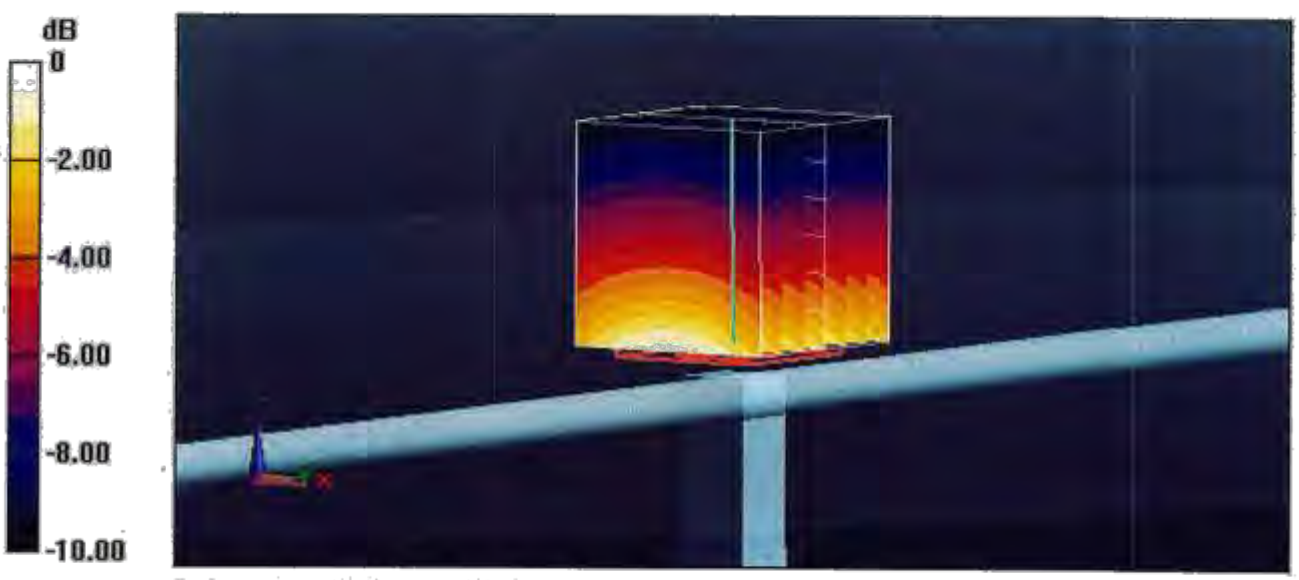
Communication System: UID 0 - CW; Frequency: 450 MHz
Medium parameters used: f = 450 MHz; $\sigma = 0.87$ S/m; $\varepsilon_r = 44.1$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN3877; ConvF(10.5, 10.5, 10.5) @ 450 MHz; Calibrated: 31.12.2018
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn654; Calibrated: 05.07.2018
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP:1003
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

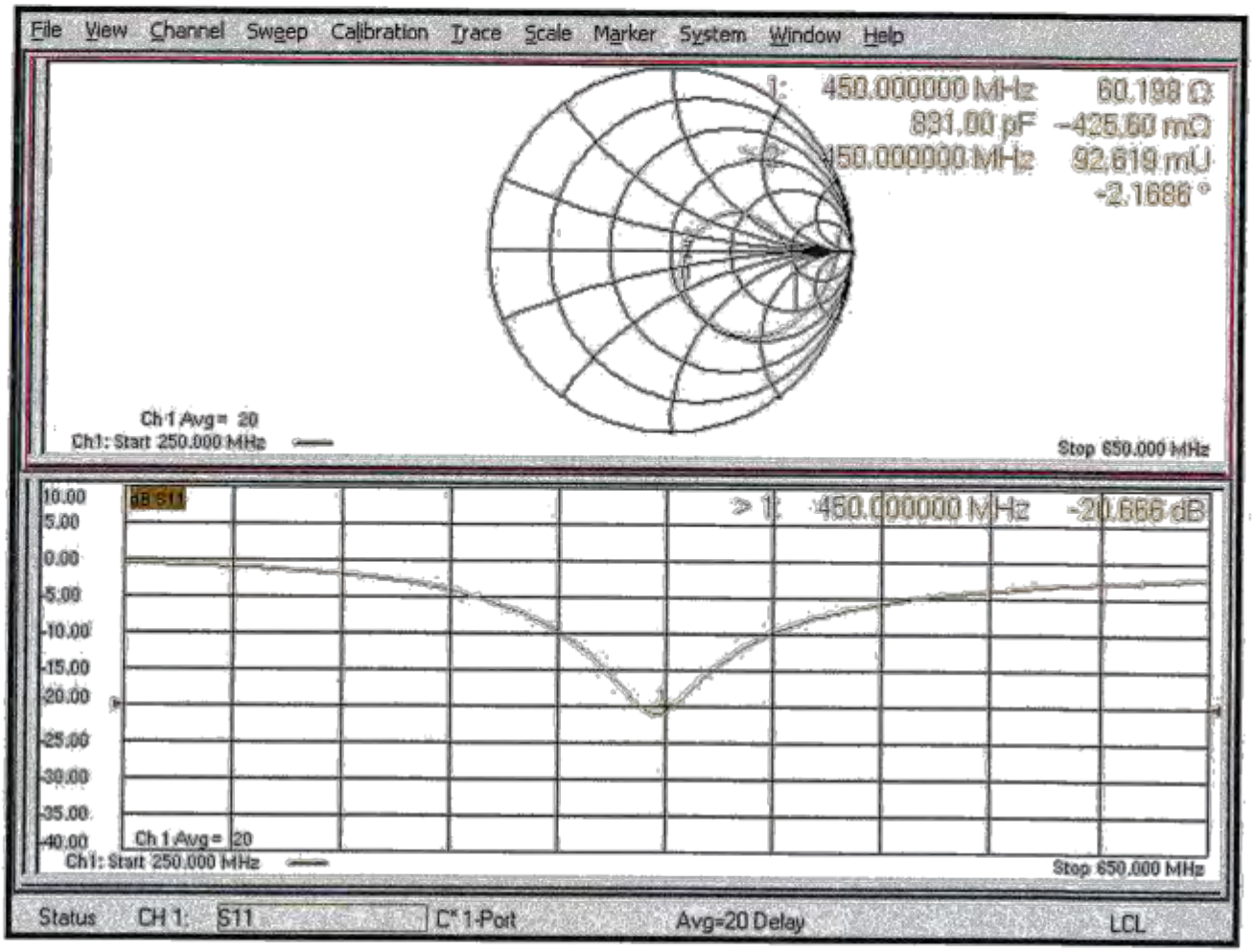
Dipole Calibration for Head Tissue/d=15mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 38.90 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 1.75 W/kg
SAR(1 g) = 1.14 W/kg; SAR(10 g) = 0.763 W/kg
Maximum value of SAR (measured) = 1.53 W/kg



0 dB = 1.53 W/kg = 1.85 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 11.03.2019

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 450 MHz; Type: D450V3; Serial: D450V3 - SN:1054

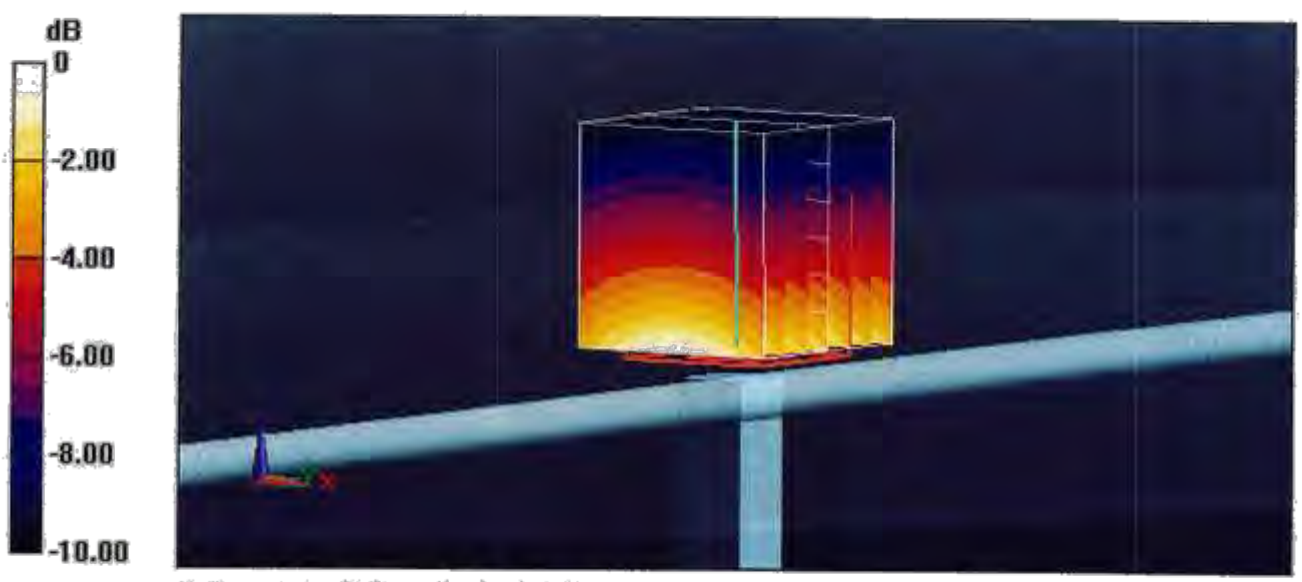
Communication System: UID 0 - CW; Frequency: 450 MHz
Medium parameters used: f = 450 MHz; $\sigma = 0.93$ S/m; $\varepsilon_r = 55.7$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN3877; ConvF(10.7, 10.7, 10.7) @ 450 MHz; Calibrated: 31.12.2018
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn654; Calibrated: 05.07.2018
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP:1003
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

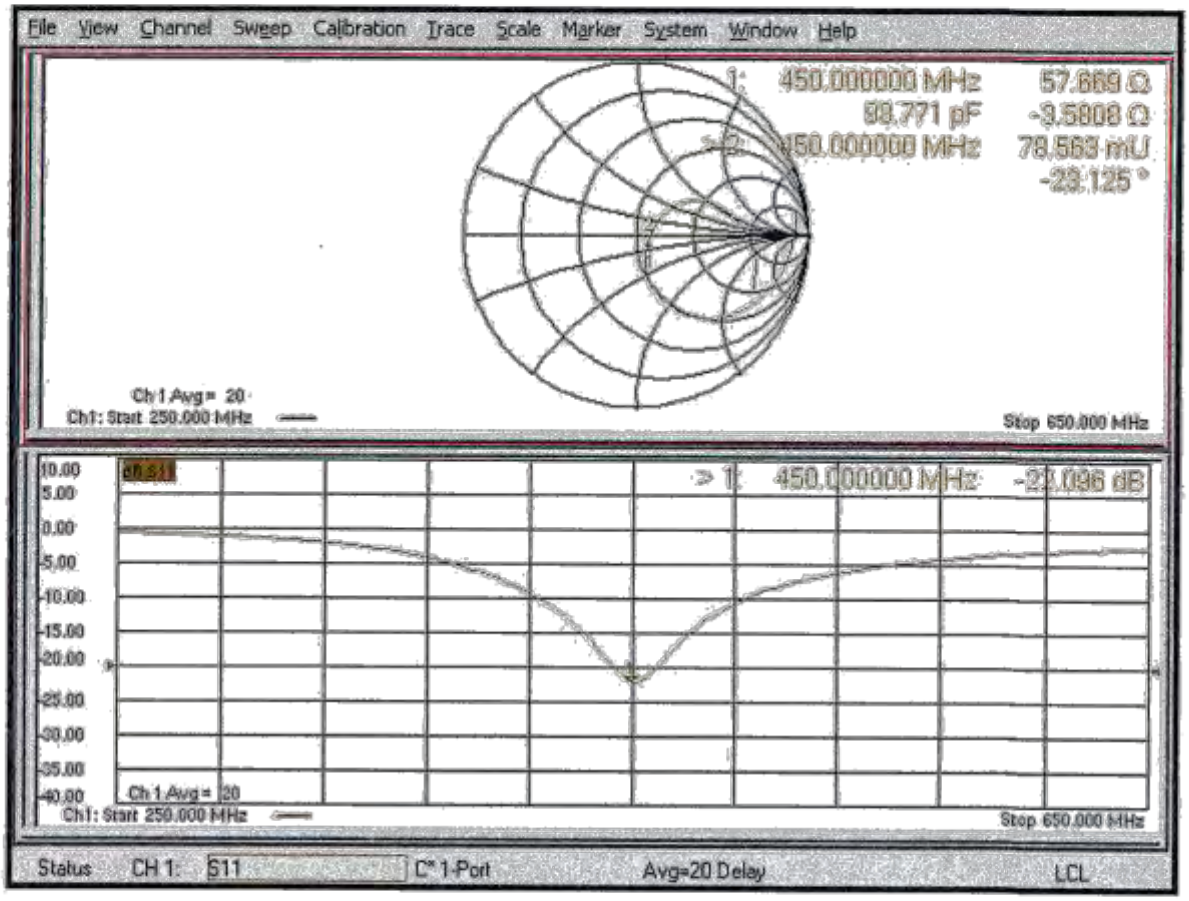
Dipole Calibration for Body Tissue/d=15mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 41.61 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 1.73 W/kg
SAR(1 g) = 1.13 W/kg; SAR(10 g) = 0.762 W/kg
Maximum value of SAR (measured) = 1.51 W/kg



0 dB = 1.51 W/kg = 1.79 dBW/kg

Impedance Measurement Plot for Body TSL



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Accreditation No.: **SCS 0108**

Client **Motorola Solutions MY** Certificate No: **D2450V2-781_Apr18**

CALIBRATION CERTIFICATE

Object	D2450V2 - SN:781
Calibration procedure(s)	QA CAL-05.v10 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	April 11, 2018

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-18 (No. 217-02672/02673)	Apr-19
Power sensor NRP-Z91	SN: 103244	04-Apr-18 (No. 217-02672)	Apr-19
Power sensor NRP-Z91	SN: 103245	04-Apr-18 (No. 217-02673)	Apr-19
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-18 (No. 217-02682)	Apr-19
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-18 (No. 217-02683)	Apr-19
Reference Probe EX3DV4	SN: 7349	30-Dec-17 (No. EX3-7349_Dec17)	Dec-18
DAE4	SN: 601	26-Oct-17 (No. DAE4-601_Oct17)	Oct-18

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-16)	In house check: Oct-18
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-17)	In house check: Oct-18

	Name	Function	Signature
Calibrated by:	Michael Weber	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: April 12, 2018

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Accreditation No.: SCS 0108

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "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)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.10.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	38.3 ± 6 %	1.86 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	---	---

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.1 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**51.3 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.09 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.1 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.5 ± 6 %	2.01 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	---	---

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	12.8 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**50.4 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.03 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**23.9 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.6 Ω + 3.8 jΩ
Return Loss	- 24.9 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	50.2 Ω + 6.1 jΩ
Return Loss	- 24.4 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.152 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	May 06, 2005

DASY5 Validation Report for Head TSL

Date: 11.04.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:781

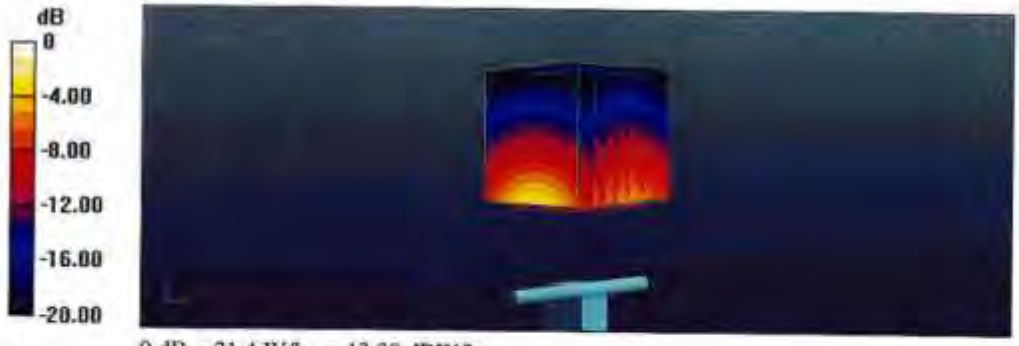
Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.86 S/m; ε_r = 38.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.88, 7.88, 7.88); Calibrated: 30.12.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

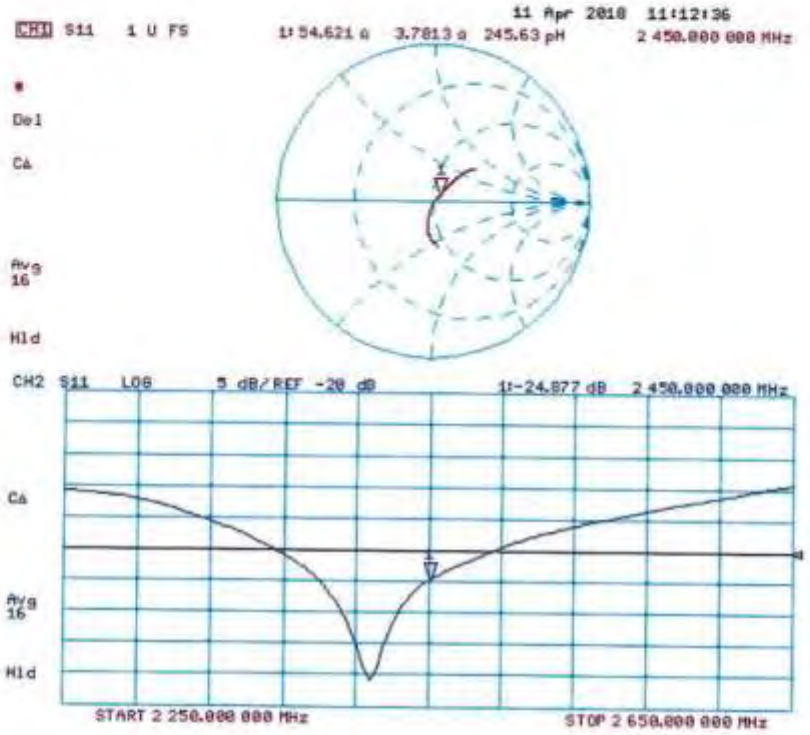
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 115.2 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 25.9 W/kg
SAR(1 g) = 13.1 W/kg; SAR(10 g) = 6.09 W/kg
Maximum value of SAR (measured) = 21.4 W/kg



0 dB = 21.4 W/kg = 13.30 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 11.04.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 781

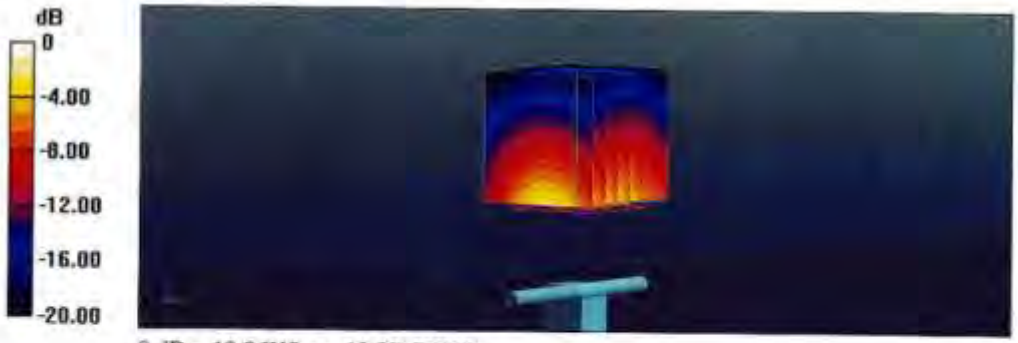
Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 2.01 S/m; ε_r = 52.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.01, 8.01, 8.01); Calibrated: 30.12.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

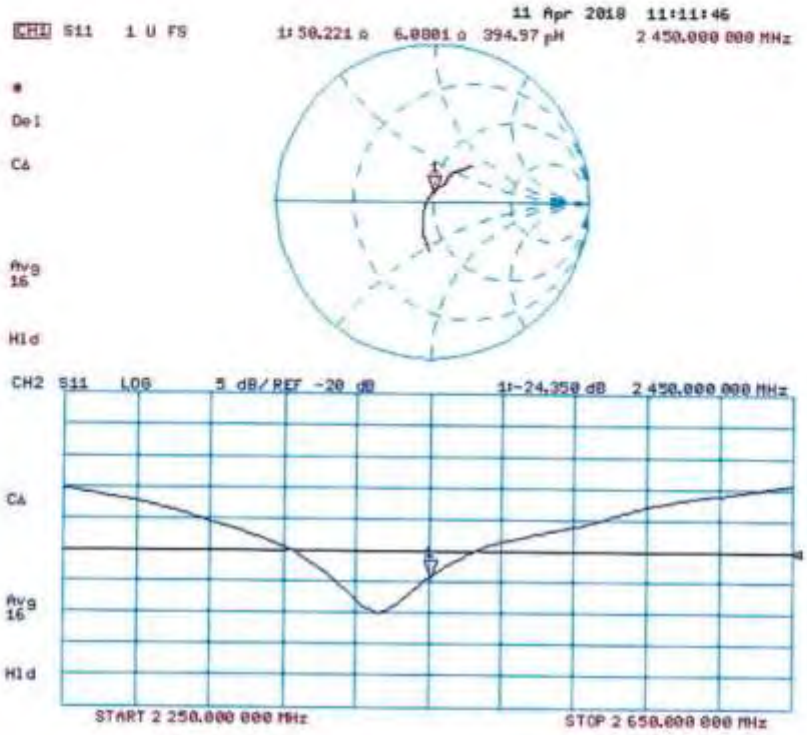
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 105.3 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 25.3 W/kg
SAR(1 g) = 12.8 W/kg; SAR(10 g) = 6.03 W/kg
Maximum value of SAR (measured) = 19.9 W/kg



0 dB = 19.9 W/kg = 12.99 dBW/kg

Impedance Measurement Plot for Body TSL



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Accreditation No.: **SCS 0108**

Client **Motorola Solutions MY**

Certificate No: **D2450V2-703_Oct18**

CALIBRATION CERTIFICATE

Object	D2450V2 - SN:703
Calibration procedure(s)	QA CAL-05.v10 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	October 16, 2018

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-18 (No. 217-02672/02673)	Apr-19
Power sensor NRP-Z91	SN: 103244	04-Apr-18 (No. 217-02672)	Apr-19
Power sensor NRP-Z91	SN: 103245	04-Apr-18 (No. 217-02673)	Apr-19
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-18 (No. 217-02682)	Apr-19
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-18 (No. 217-02683)	Apr-19
Reference Probe EX3DV4	SN: 7349	30-Dec-17 (No. EX3-7349_Dec17)	Dec-18
DAE4	SN: 601	04-Oct-18 (No. DAE4-601_Oct18)	Oct-19

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-18)	In house check: Oct-20
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-18)	In house check: Oct-19

	Name	Function	Signature
Calibrated by:	Michael Weber	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: October 16, 2018

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Accreditation No.: SCS 0108

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "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)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.10.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	37.8 ± 6 %	1.85 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	—	—

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.5 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**52.9 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.24 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.6 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	51.2 ± 6 %	2.01 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	—	—

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	12.7 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**49.7 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.91 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**23.3 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.5 Ω + 2.9 jΩ
Return Loss	- 25.8 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	50.3 Ω + 6.1 jΩ
Return Loss	- 24.3 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.146 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	March 22, 2001

DASY5 Validation Report for Head TSL

Date: 16.10.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:703

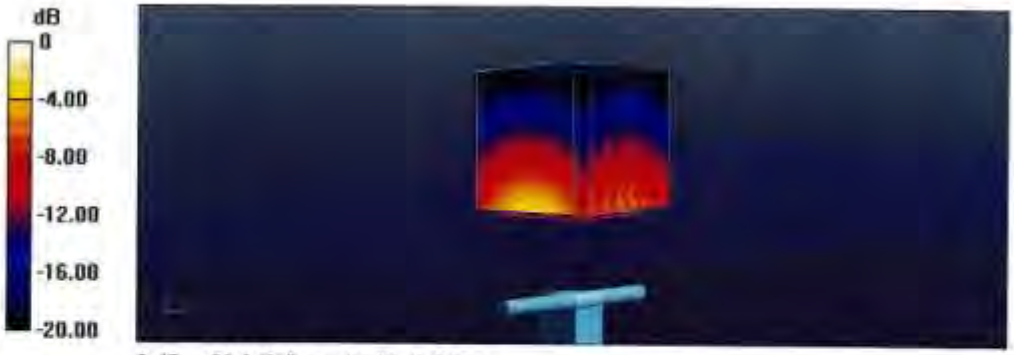
Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.85 S/m; ε_r = 37.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.88, 7.88, 7.88) @ 2450 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.10.2018
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

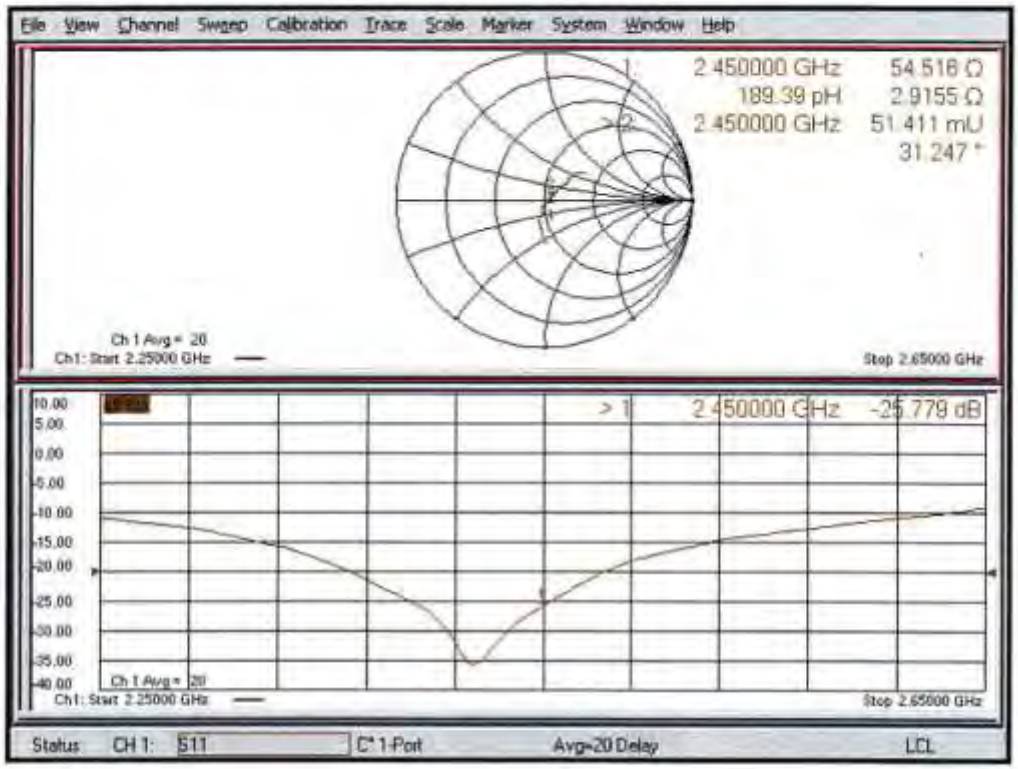
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 117.8 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 27.1 W/kg
SAR(1 g) = 13.5 W/kg; SAR(10 g) = 6.24 W/kg
Maximum value of SAR (measured) = 22.3 W/kg



0 dB = 22.3 W/kg = 13.48 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 16.10.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:703

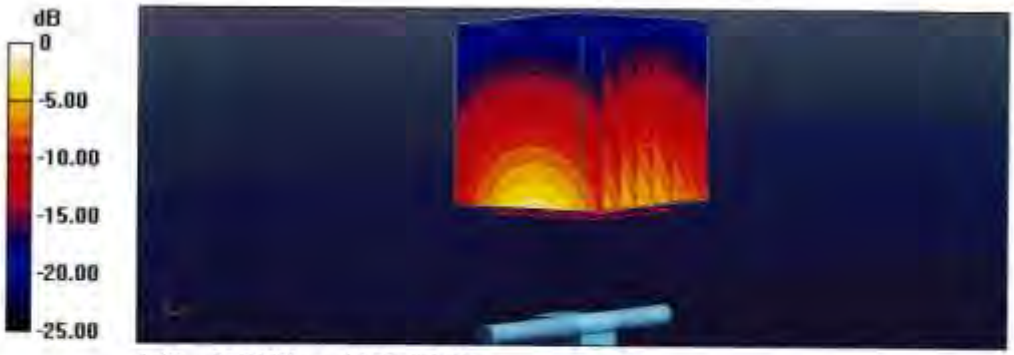
Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 2.01 S/m; ε_r = 51.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.01, 8.01, 8.01) @ 2450 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.10.2018
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

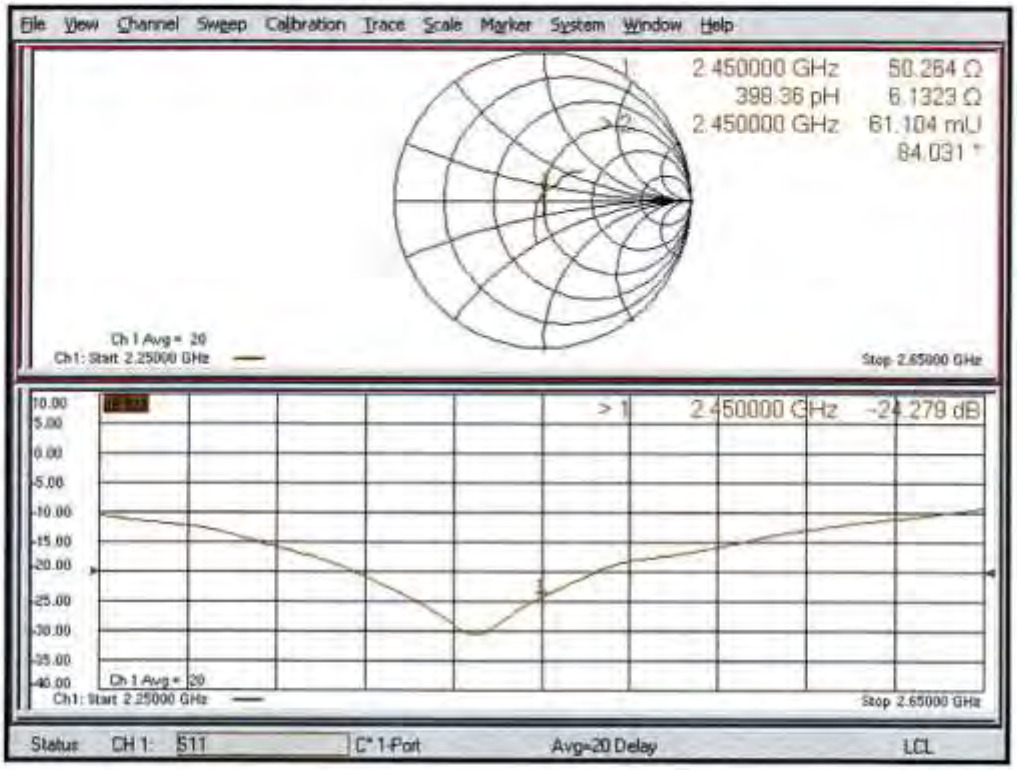
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 107.9 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 25.7 W/kg
SAR(1 g) = 12.7 W/kg; SAR(10 g) = 5.91 W/kg
Maximum value of SAR (measured) = 20.9 W/kg



0 dB = 20.9 W/kg = 13.20 dBW/kg

Impedance Measurement Plot for Body TSL



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Accreditation No.: SCS 0108

Client: Motorola Solutions MY

Certificate No: D2450V2-782_Feb20

CALIBRATION CERTIFICATE

Object: D2450V2 - SN:782

Calibration procedure(s): QA CAL-05.v11
Calibration Procedure for SAR Validation Sources between 0.7-3 GHz

Calibration date: February 20, 2020

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	03-Apr-19 (No. 217-02892/02893)	Apr-20
Power sensor NRP-Z91	SN: 103244	03-Apr-19 (No. 217-02892)	Apr-20
Power sensor NRP-Z91	SN: 103245	03-Apr-19 (No. 217-02893)	Apr-20
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-19 (No. 217-02894)	Apr-20
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-19 (No. 217-02895)	Apr-20
Reference Probe EX3DV4	SN: 7349	31-Dec-19 (No. EX3-7349_Dec19)	Dec-20
DAE4	SN: 601	27-Dec-19 (No. DAE4-601_Dec19)	Dec-20

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Feb-19)	In house check: Oct-20
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-18)	In house check: Oct-20
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-19)	In house check: Oct-20

	Name	Function	Signature
Calibrated by:	Leif Klysner	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: February 20, 2020

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Accreditation No.: **SCS 0108**

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "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)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	38.4 ± 6 %	1.86 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	---	---

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.9 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**54.4 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.41 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**25.3 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	51.4 ± 6 %	2.03 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	---	---

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	13.3 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**51.9 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.21 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**24.5 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.2 Ω + 3.8 jΩ
Return Loss	- 26.3 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	49.6 Ω + 5.9 jΩ
Return Loss	- 24.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.153 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG

DASY5 Validation Report for Head TSL

Date: 20.02.2020

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:782

Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.86 S/m; ε_r = 38.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

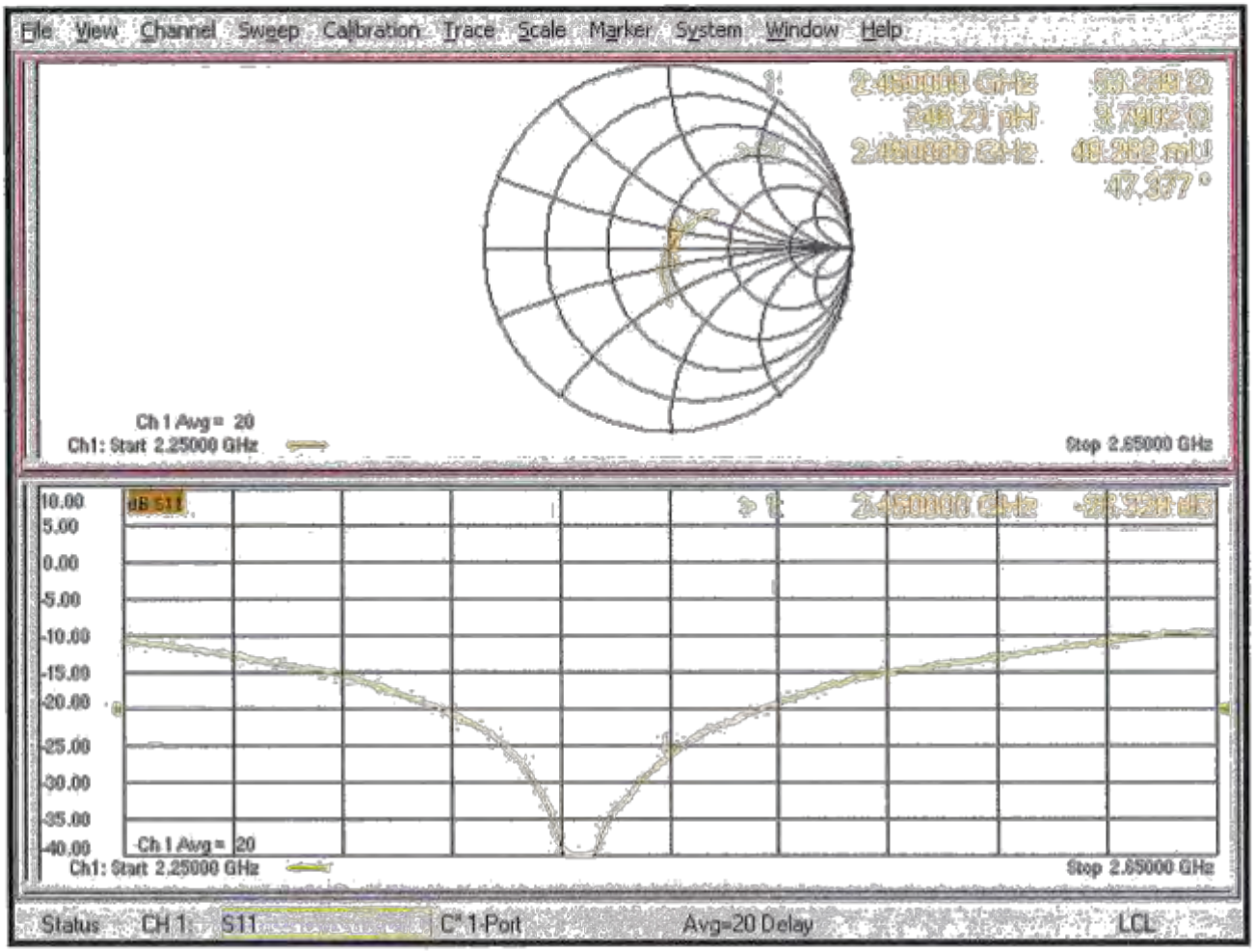
- Probe: EX3DV4 - SN7349; ConvF(7.98, 7.98, 7.98) @ 2450 MHz; Calibrated: 31.12.2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.12.2019
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 120.1 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 27.7 W/kg
SAR(1 g) = 13.9 W/kg; SAR(10 g) = 6.41 W/kg
Smallest distance from peaks to all points 3 dB below = 9 mm
Ratio of SAR at M2 to SAR at M1 = 50%
Maximum value of SAR (measured) = 23.0 W/kg

0 dB = 23.0 W/kg = 13.62 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 20.02.2020

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:782

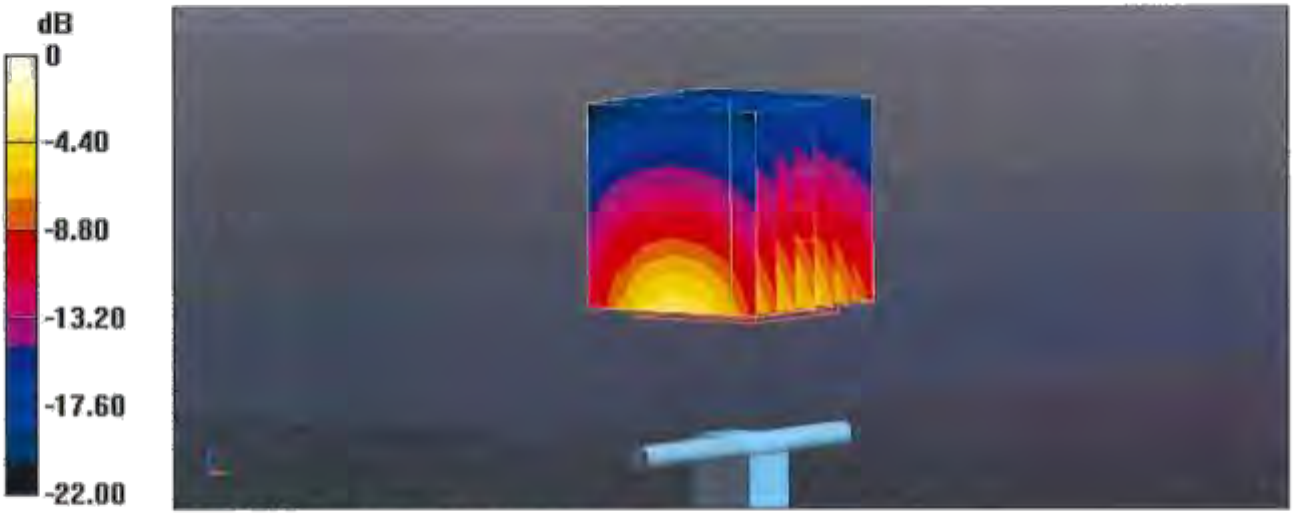
Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 2.03 S/m; ε_r = 51.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.02, 8.02, 8.02) @ 2450 MHz; Calibrated: 31.12.2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.12.2019
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

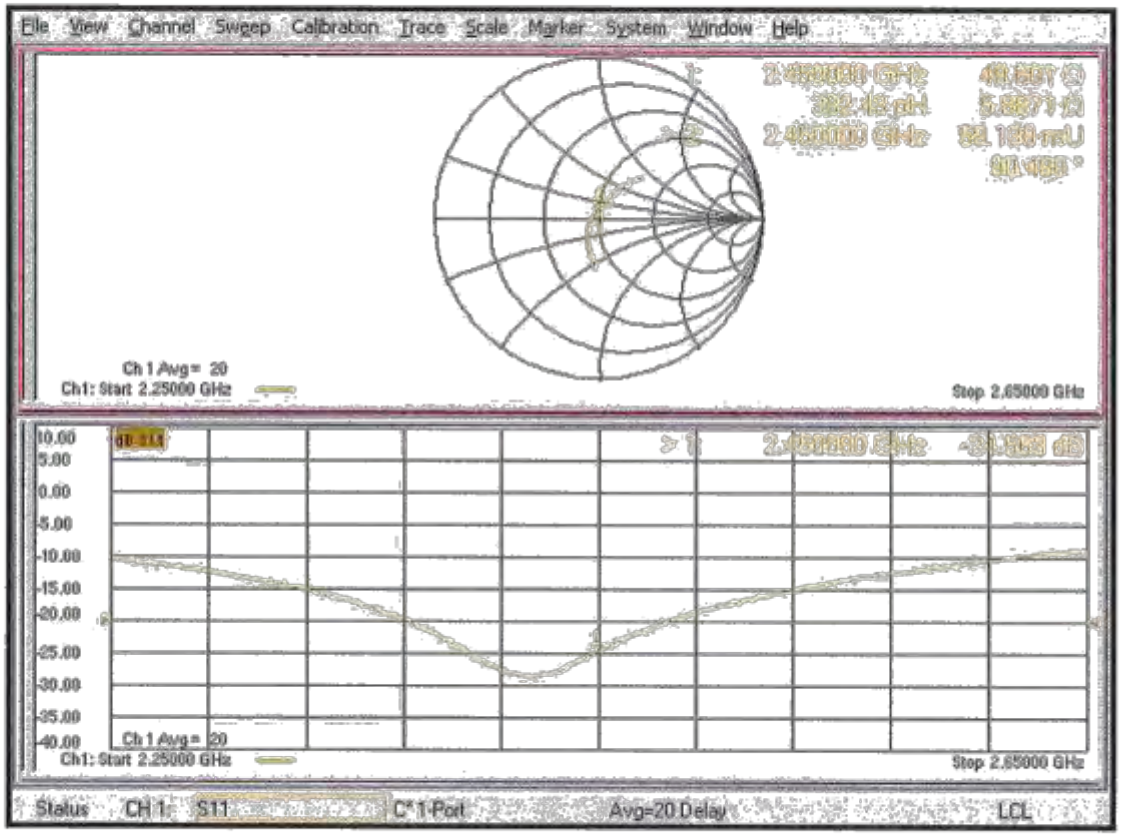
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 110.9 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 25.6 W/kg
SAR(1 g) = 13.3 W/kg; SAR(10 g) = 6.21 W/kg
Smallest distance from peaks to all points 3 dB below = 8.9 mm
Ratio of SAR at M2 to SAR at M1 = 52.9%
Maximum value of SAR (measured) = 21.6 W/kg



0 dB = 21.6 W/kg = 13.34 dBW/kg

Impedance Measurement Plot for Body TSL



Dipole Data

The table below includes dipole impedance and return loss measurement data measured by Motorola Solutions' EME lab. The results meet the requirements stated in KDB 865664.

Dipole 450-1053	Head			Body		
	Impedance		Return Loss	Impedance		Return Loss
Date Measured	real Ω	imag jΩ	dB	real Ω	imag jΩ	dB
11/8/2018	53.78	-7.39	-21.97	49.27	-7.93	-21.94
11/10/2019	53.95	-6.72	-22.49	49.84	-7.37	-22.74

Dipole 450-1054	Head			Body		
	Impedance		Return Loss	Impedance		Return Loss
Date Measured	real Ω	imag jΩ	dB	real Ω	imag jΩ	dB
4/8/2019	59.46	-4.57	-20.36	56.02	-6.09	-21.87
4/13/2020	57.08	-6.58	-20.38	56.08	-3.56	-24.43

Dipole 2450-703	Head			Body		
	Impedance		Return Loss	Impedance		Return Loss
Date Measured	real Ω	imag jΩ	dB	real Ω	imag jΩ	dB
12/20/2018	49.44	3.73	-28.42	48.61	5.62	-24.65
11/11/2019	51.11	3.82	-28.38	48.94	3.93	-28.04

Dipole 2450-781	Head			Body		
	Impedance		Return Loss	Impedance		Return Loss
Date Measured	real Ω	imag jΩ	dB	real Ω	imag jΩ	dB
5/24/2018	48.07	5.25	-24.89	49.10	4.53	-26.64
4/8/2019	52.92	4.26	-25.99	53.30	5.17	-24.53

Appendix C
SAR Summary Results Table for FCC PAG review

Table C.1 UHF SAR Summary Result

Table #	Body / Head / Face	Antenna No.	Battery No.	Body Worn No.	Audio No.	Front / Back	F1	F2	F3	F4	F5	F5	F6	F7	F8	F9	F10	F11	F12
							406.0125	422.3000	435.4000	440.0000	441.4000	450.0000	457.9000	470.0000	475.0000	484.0000	490.0000	496.2000	512.0000
18	Body	1	12	2,4	1	Back			1.66										
18	Body	2	12	2,4	1	Back							1.99						
18	Body	3	12	2,4	1	Back								2.53					
18	Body	4	12	2,4	1	Back							1.68						
18	Body	3	1	2,4	1	Back								2.04					
18	Body	3	2	2,4	1	Back								2.33					
18	Body	3	3	2,4	1	Back								2.25					
18	Body	3	4	2,4	1	Back								2.61					
18	Body	3	5	2,4	1	Back								2.19					
18	Body	3	6	2,4	1	Back								2.57					
18	Body	3	7	2,4	1	Back								2.15					
18	Body	3	8	2,4	1	Back								2.12					
18	Body	3	9	2,4	1	Back								2.20					
18	Body	3	11	2,4	1	Back								2.36					
18	Body	3	13	2,4	1	Back								1.90					
18	Body	3	14	2,4	1	Back								2.36					
18	Body	3	15	2,4	1	Back								2.50					
18	Body	3	16	2,4	1	Back								2.48					
19	Body	1	12	2,5	1	Back			2.06										
19	Body	2	12	2,5	1	Back							2.53						
19	Body	3	12	2,5	1	Back								3.11					
19	Body	4	12	2,5	1	Back							2.04						
19	Body	3	1	2,5	1	Back								2.68					
19	Body	3	2	2,5	1	Back								2.93					
19	Body	3	3	2,5	1	Back								2.65					
19	Body	3	4	2,5	1	Back								3.24					
19	Body	3	5	2,5	1	Back								2.73					
19	Body	3	6	2,5	1	Back								3.37					
19	Body	3	7	2,5	1	Back								3.28					
19	Body	3	8	2,5	1	Back								3.13					
19	Body	3	9	2,5	1	Back								2.80					
19	Body	3	11	2,5	1	Back								3.05					
19	Body	3	13	2,5	1	Back								2.81					
19	Body	3	14	2,5	1	Back								3.11					
19	Body	3	15	2,5	1	Back								3.03					
19	Body	3	16	2,5	1	Back								3.05					
20	Body	1	12	2,6	1	Back			2.73										
20	Body	2	12	2,6	1	Back							3.44						
20	Body	3	12	2,6	1	Back								3.64					
20	Body	3	12	2,6	1	Back												3.00	
20	Body	4	12	2,6	1	Back							2.95						

Table C.1 UHF SAR Summary Result (Continued)

Table #	Body / Head / Face	Antenna No.	Battery No.	Body Worn No.	Audio No.	Front / Back	F1	F2	F3	F4	F5	F5	F6	F7	F8	F9	F10	F11	F12
							406.0125	422.3000	435.4000	440.0000	441.4000	450.0000	457.9000	470.0000	475.0000	484.0000	490.0000	496.2000	512.0000
20	Body	3	1	2,6	1	Back								3.36					
20	Body	3	2	2,6	1	Back								3.70					
20	Body	3	3	2,6	1	Back								3.26					
20	Body	3	4	2,6	1	Back								3.90					
20	Body	3	5	2,6	1	Back								3.39					
20	Body	3	6	2,6	1	Back								3.68					
20	Body	3	7	2,6	1	Back								3.67					
20	Body	3	8	2,6	1	Back								3.56					
20	Body	3	9	2,6	1	Back								3.22					
20	Body	3	11	2,6	1	Back								3.41					
20	Body	3	13	2,6	1	Back								3.18					
20	Body	3	14	2,6	1	Back								3.30					
20	Body	3	15	2,6	1	Back								3.47					
20	Body	3	16	2,6	1	Back								3.54					
21	Body	1	12	3	1	Back			3.50										
21	Body	2	12	3	1	Back				2.81									
21	Body	2	12	3	1	Back							4.05						
21	Body	2	12	3	1	Back									3.51				
21	Body	2	12	3	1	Back											2.70		
21	Body	3	12	3	1	Back								4.40					
21	Body	3	12	3	1	Back										4.15			
21	Body	3	12	3	1	Back												3.57	
21	Body	4	12	3	1	Back							3.34						
21	Body	2	1	3	1	Back							3.56						
21	Body	3	1	3	1	Back								3.63					
21	Body	2	2	3	1	Back							4.00						
21	Body	3	2	3	1	Back								4.06					
21	Body	2	3	3	1	Back							3.49						
21	Body	3	3	3	1	Back								3.53					
21	Body	2	4	3	1	Back							4.78						
21	Body	3	4	3	1	Back								4.83					
21	Body	2	5	3	1	Back							3.59						
21	Body	3	5	3	1	Back								3.07					
21	Body	2	6	3	1	Back							4.02						
21	Body	3	6	3	1	Back								4.15					
21	Body	2	7	3	1	Back							3.64						
21	Body	3	7	3	1	Back								3.91					
21	Body	2	8	3	1	Back							3.80						
21	Body	3	8	3	1	Back								3.77					
21	Body	2	9	3	1	Back							3.51						
21	Body	3	9	3	1	Back								3.22					
21	Body	2	11	3	1	Back							3.82						
21	Body	2	11	3	1	Back								4.36					

Table C.1 UHF SAR Summary Result (Continued)

Table #	Body / Head / Face	Antenna No.	Battery No.	Body Worn No.	Audio No.	Front / Back	F1 406.0125	F2 422.3000	F3 435.4000	F4 440.0000	F5 441.4000	F5 450.0000	F6 457.9000	F7 470.0000	F8 475.0000	F9 484.0000	F10 490.0000	F11 496.2000	F12 512.0000
21	Body	2	13	3	1	Back							3.42						
21	Body	3	13	3	1	Back								3.41					
21	Body	2	14	3	1	Back							3.36						
21	Body	3	14	3	1	Back								3.74					
21	Body	2	15	3	1	Back							3.81						
21	Body	3	15	3	1	Back								3.87					
21	Body	2	16	3	1	Back							3.72						
21	Body	3	16	3	1	Back								4.00					
22	Body	1	12	3	1	Back			3.40										
22	Body	2	12	7	1	Back				2.84									
22	Body	2	12	7	1	Back							4.18						
22	Body	2	12	7	1	Back									3.38				
22	Body	2	12	7	1	Back											2.66		
22	Body	3	12	7	1	Back								3.68					
22	Body	3	12	7	1	Back												3.64	
22	Body	4	12	7	1	Back							3.45						
22	Body	2	1	7	1	Back							3.52						
22	Body	2	2	7	1	Back							3.89						
22	Body	2	3	7	1	Back							3.17						
22	Body	2	4	7	1	Back							4.78						
22	Body	2	5	7	1	Back							3.91						
22	Body	2	6	7	1	Back							3.77						
22	Body	2	7	7	1	Back							3.80						
22	Body	2	8	7	1	Back							3.72						
22	Body	2	9	7	1	Back							3.51						
22	Body	2	11	7	1	Back							3.70						
22	Body	2	13	7	1	Back							3.47						
22	Body	2	14	7	1	Back							3.50						
22	Body	2	15	7	1	Back							3.88						
22	Body	2	16	7	1	Back							3.88						
22	Body	2	17	7	1	Back							3.39						
23	Body	1	10	8	1	Back	2.68												
23	Body	1	10	8	1	Back		2.56											
23	Body	1	10	8	1	Back			4.08										
23	Body	1	10	8	1	Back						2.87							
23	Body	2	10	8	1	Back				2.90									
23	Body	2	10	8	1	Back							5.08						
23	Body	2	10	8	1	Back									4.33				
23	Body	2	10	8	1	Back											2.74		
23	Body	3	10	8	1	Back								5.32					
23	Body	3	10	8	1	Back										4.51			
23	Body	3	10	8	1	Back												3.32	
23	Body	4	10	8	1	Back							4.00						
23	Body	4	10	8	1	Back												2.14	

Table C.1 UHF SAR Summary Result (Continued)

Table #	Body / Head / Face	Antenna No.	Battery No.	Body Worn No.	Audio No.	Front / Back	F1	F2	F3	F4	F5	F5	F6	F7	F8	F9	F10	F11	F12
							406.0125	422.3000	435.4000	440.0000	441.4000	450.0000	457.9000	470.0000	475.0000	484.0000	490.0000	496.2000	512.0000
24	Body	1	12	1	1	Back	2.92												
24	Body	1	12	1	1	Back		3.28											
24	Body	1	12	1	1	Back			4.18										
24	Body	1	12	1	1	Back						2.84							
24	Body	2	12	1	1	Back				4.72									
24	Body	2	12	1	1	Back							4.58						
24	Body	2	12	1	1	Back									4.15				
24	Body	2	12	1	1	Back											2.57		
24	Body	3	12	1	1	Back								5.12					
24	Body	3	12	1	1	Back										4.52			
24	Body	3	12	1	1	Back												4.07	
24	Body	3	12	1	1	Back													4.04
24	Body	4	12	1	1	Back					4.52								
24	Body	4	12	1	1	Back							4.30						
24	Body	4	12	1	1	Back									3.48				
24	Body	4	12	1	1	Back												2.77	
24	Body	1	1	1	1	Back			3.59										
24	Body	2	1	1	1	Back				3.48									
24	Body	4	1	1	1	Back					3.69								
24	Body	3	1	1	1	Back								4.23					
24	Body	1	2	1	1	Back			3.28										
24	Body	2	2	1	1	Back				3.80									
24	Body	4	2	1	1	Back					3.95								
24	Body	3	2	1	1	Back								4.68					
24	Body	1	3	1	1	Back			3.24										
24	Body	2	3	1	1	Back				2.77									
24	Body	4	3	1	1	Back					3.79								
24	Body	3	3	1	1	Back								4.91					
24	Body	1	4	1	1	Back			4.15										
24	Body	2	4	1	1	Back				4.67									
24	Body	4	4	1	1	Back					5.68								
24	Body	3	4	1	1	Back								5.78					
24	Body	1	5	1	1	Back			3.45										
24	Body	2	5	1	1	Back				3.23									
24	Body	4	5	1	1	Back					3.99								
24	Body	3	5	1	1	Back								4.57					
24	Body	1	6	1	1	Back			3.45										
24	Body	2	6	1	1	Back				3.90									
24	Body	4	6	1	1	Back					4.55								
24	Body	3	6	1	1	Back								4.97					
24	Body	1	7	1	1	Back			3.13										
24	Body	2	7	1	1	Back				3.37									
24	Body	4	7	1	1	Back					3.61								
24	Body	3	7	1	1	Back								4.51					
24	Body	1	8	1	1	Back			3.56										
24	Body	2	8	1	1	Back				4.33									
24	Body	4	8	1	1	Back					4.17								
24	Body	3	8	1	1	Back								4.55					

Table C.1 UHF SAR Summary Result (Continued)

Table #	Body / Head / Face	Antenna No.	Battery No.	Body Worn No.	Audio No.	Front / Back	F1 406.0125	F2 422.3000	F3 435.4000	F4 440.0000	F5 441.4000	F5 450.0000	F6 457.9000	F7 470.0000	F8 475.0000	F9 484.0000	F10 490.0000	F11 496.2000	F12 512.0000
24	Body	1	9	1	1	Back			3.48										
24	Body	2	9	1	1	Back				3.56									
24	Body	4	9	1	1	Back					3.74								
24	Body	3	9	1	1	Back								4.51					
24	Body	1	11	1	1	Back			3.22										
24	Body	2	11	1	1	Back				3.62									
24	Body	4	11	1	1	Back					3.56								
24	Body	3	11	1	1	Back								4.30					
24	Body	1	13	1	1	Back			3.71										
24	Body	2	13	1	1	Back				3.41									
24	Body	4	13	1	1	Back					4.14								
24	Body	3	13	1	1	Back								4.01					
24	Body	1	14	1	1	Back			2.88										
24	Body	2	14	1	1	Back				2.54									
24	Body	4	14	1	1	Back					2.87								
24	Body	3	14	1	1	Back								4.37					
24	Body	1	15	1	1	Back			3.57										
24	Body	2	15	1	1	Back				3.16									
24	Body	4	15	1	1	Back					3.66								
24	Body	3	15	1	1	Back								4.62					
24	Body	1	16	1	1	Back			3.22										
24	Body	2	16	1	1	Back				2.95									
24	Body	4	16	1	1	Back					3.26								
24	Body	3	16	1	1	Back								4.67					
25	Body	1	12	9	1	Back	3.66												
25	Body	1	12	9	1	Back		3.25											
25	Body	1	12	9	1	Back			4.82										
25	Body	1	12	9	1	Back						3.35							
25	Body	2	12	9	1	Back				4.50									
25	Body	2	12	9	1	Back							4.84						
25	Body	2	12	9	1	Back									4.07				
25	Body	2	12	9	1	Back											3.03		
25	Body	3	12	9	1	Back								5.62					
25	Body	3	12	9	1	Back										4.70			
25	Body	3	12	9	1	Back												4.32	
25	Body	3	12	9	1	Back													3.89
25	Body	4	12	9	1	Back					4.54								
25	Body	4	12	9	1	Back							4.23						
25	Body	4	12	9	1	Back									3.53				
25	Body	4	12	9	1	Back												3.07	

Table C.1 UHF SAR Summary Result (Continued)

Table #	Body / Head / Face	Antenna No.	Battery No.	Body Worn No.	Audio No.	Front / Back	F1	F2	F3	F4	F5	F5	F6	F7	F8	F9	F10	F11	F12
							406.0125	422.3000	435.4000	440.0000	441.4000	450.0000	457.9000	470.0000	475.0000	484.0000	490.0000	496.2000	512.0000
25	Body	1	1	9	1	Back			4.12										
25	Body	4	1	9	1	Back					4.08								
25	Body	2	1	9	1	Back							4.39						
25	Body	3	1	9	1	Back								4.38					
25	Body	1	2	9	1	Back			4.15										
25	Body	4	2	9	1	Back					3.98								
25	Body	2	2	9	1	Back							4.56						
25	Body	3	2	9	1	Back								5.24					
25	Body	1	3	9	1	Back			4.26										
25	Body	4	3	9	1	Back					3.98								
25	Body	2	3	9	1	Back							4.25						
25	Body	3	3	9	1	Back								4.31					
25	Body	1	4	9	1	Back			4.95										
25	Body	4	4	9	1	Back					4.86								
25	Body	2	4	9	1	Back							5.50						
25	Body	3	4	9	1	Back								5.94					
25	Body	1	5	9	1	Back			3.96										
25	Body	4	5	9	1	Back					3.91								
25	Body	2	5	9	1	Back							4.29						
25	Body	3	5	9	1	Back								4.62					
25	Body	1	6	9	1	Back			4.02										
25	Body	4	6	9	1	Back					4.75								
25	Body	2	6	9	1	Back							4.97						
25	Body	3	6	9	1	Back								4.77					
25	Body	1	7	9	1	Back			3.40										
25	Body	4	7	9	1	Back					3.58								
25	Body	2	7	9	1	Back							4.33						
25	Body	3	7	9	1	Back								4.69					
25	Body	1	8	9	1	Back			3.81										
25	Body	4	8	9	1	Back					4.16								
25	Body	2	8	9	1	Back							4.26						
25	Body	3	8	9	1	Back								4.64					
25	Body	1	9	9	1	Back			3.79										
25	Body	2	9	9	1	Back					3.73								
25	Body	4	9	9	1	Back							3.99						
25	Body	3	9	9	1	Back								4.55					
25	Body	1	11	9	1	Back			3.48										
25	Body	2	11	9	1	Back					3.41								
25	Body	4	11	9	1	Back							4.64						
25	Body	3	11	9	1	Back								5.11					
25	Body	1	13	9	1	Back			3.98										
25	Body	2	13	9	1	Back					3.59								
25	Body	4	13	9	1	Back							4.27						
25	Body	3	13	9	1	Back								4.20					

Table C.1 UHF SAR Summary Result (Continued)

Table #	Body / Head / Face	Antenna No.	Battery No.	Body Worn No.	Audio No.	Front / Back	F1	F2	F3	F4	F5	F5	F6	F7	F8	F9	F10	F11	F12
							406.0125	422.3000	435.4000	440.0000	441.4000	450.0000	457.9000	470.0000	475.0000	484.0000	490.0000	496.2000	512.0000
25	Body	1	14	9	1	Back			2.69										
25	Body	4	14	9	1	Back					2.69								
25	Body	2	14	9	1	Back							4.22						
25	Body	3	14	9	1	Back								4.15					
25	Body	1	15	9	1	Back			3.37										
25	Body	4	15	9	1	Back					3.52								
25	Body	2	15	9	1	Back							4.49						
25	Body	3	15	9	1	Back								4.80					
25	Body	1	16	9	1	Back			3.02										
25	Body	4	16	9	1	Back					2.92								
25	Body	2	16	9	1	Back							4.48						
25	Body	3	16	9	1	Back								4.86					
26	Body	1	12	10	1	Back			2.25										
26	Body	2	12	10	1	Back							2.81						
26	Body	3	12	10	1	Back								2.93					
26	Body	4	12	10	1	Back								2.47					
26	Body	3	1	10	1	Back								2.67					
26	Body	3	2	10	1	Back								3.00					
26	Body	3	3	10	1	Back								2.76					
26	Body	3	4	10	1	Back								3.36					
26	Body	3	5	10	1	Back								2.65					
26	Body	3	6	10	1	Back								2.68					
26	Body	3	7	10	1	Back								2.77					
26	Body	3	8	10	1	Back								2.74					
26	Body	3	9	10	1	Back								2.45					
26	Body	3	11	10	1	Back								3.15					
26	Body	3	13	10	1	Back								2.82					
26	Body	3	14	10	1	Back								2.97					
26	Body	3	15	10	1	Back								3.14					
26	Body	3	16	10	1	Back								3.13					
27	Body	1	12	6,11,12	1	Back			2.79										
27	Body	2	12	6,11,12	1	Back							3.33						
27	Body	3	12	6,11,12	1	Back								3.99					
27	Body	3	12	6,11,12	1	Back												3.11	
27	Body	4	12	6,11,12	1	Back							2.99						
27	Body	3	1	6,11,12	1	Back								3.40					
27	Body	3	2	6,11,12	1	Back								3.85					
27	Body	3	3	6,11,12	1	Back								3.00					
27	Body	3	4	6,11,12	1	Back								3.63					

Table C.1 UHF SAR Summary Result (Continued)

Table #	Body / Head / Face	Antenna No.	Battery No.	Body Worn No.	Audio No.	Front / Back	F1	F2	F3	F4	F5	F5	F6	F7	F8	F9	F10	F11	F12
							406.0125	422.3000	435.4000	440.0000	441.4000	450.0000	457.9000	470.0000	475.0000	484.0000	490.0000	496.2000	512.0000
27	Body	3	5	6,11,12	1	Back								3.13					
27	Body	3	6	6,11,12	1	Back								3.29					
27	Body	3	7	6,11,12	1	Back								3.10					
27	Body	3	8	6,11,12	1	Back								3.37					
27	Body	3	9	6,11,12	1	Back								3.35					
27	Body	3	11	6,11,12	1	Back								3.38					
27	Body	3	13	6,11,12	1	Back								3.13					
27	Body	3	14	6,11,12	1	Back								3.26					
27	Body	3	15	6,11,12	1	Back								3.46					
27	Body	3	16	6,11,12	1	Back								3.48					
28	Body	3	4	9	2,32	Back								5.37					
28	Body	3	4	9	3	Back								5.47					
28	Body	3	4	9	4	Back								5.42					
28	Body	3	4	9	5	Back								5.79					
28	Body	3	4	9	6	Back								5.42					
28	Body	3	4	9	7	Back								5.03					
28	Body	3	4	9	8	Back								5.17					
28	Body	3	4	9	9	Back								4.98					
28	Body	3	4	9	10	Back								5.77					
28	Body	3	4	9	11	Back								5.22					
28	Body	3	4	9	12	Back								5.77					
28	Body	3	4	9	13	Back								5.69					
28	Body	3	4	9	14	Back								5.72					
28	Body	3	4	9	15	Back								5.79					
28	Body	3	4	9	16,30	Back								5.07					
28	Body	3	4	9	17	Back								5.75					
28	Body	3	4	9	18	Back								5.77					
28	Body	3	4	9	19,20,35	Back								6.21					
28	Body	3	4	9	19,20,35	Back										4.94			
28	Body	3	4	9	21	Back								5.47					
28	Body	3	4	9	22	Back								5.64					
28	Body	3	4	9	23	Back								5.63					
28	Body	3	4	9	24,31	Back								5.39					
28	Body	3	4	9	25	Back								5.81					
28	Body	3	4	9	26	Back								5.21					
28	Body	3	4	9	27	Back								4.96					
28	Body	3	4	9	28	Back								5.48					
28	Body	3	4	9	29	Back								5.67					
28	Body	3	4	9	33	Back								5.33					
28	Body	3	4	9	34	Back								5.38					
29	Body	3	4	9	None	Back								6.30					
29	Body	3	4	9	None	Back										5.30			
38	Body	3	4	9	None	Back								6.51					

Table C.1 WLAN SAR Summary Result (Continued)

Table #	Body / Head / Face	Antenna No.	Battery No.	Body Worn No.	Audio No.	Front / Back	F1	F2	F3
							2412	2437	2462
31	Body	5	12	2,4	None	Back	0.006		
31	Body	5	12	2,5	None	Back	0.004		
31	Body	5	12	2,6	None	Back	0.020		
31	Body	5	12	3	None	Back	0.006		
31	Body	5	12	7	None	Back	0.005		
31	Body	5	10	8	None	Back	0.002		
31	Body	5	12	1	None	Back	0.013		
31	Body	5	12	9	None	Back	0.010		
31	Body	5	12	10	None	Back	0.008		
31	Body	5	12	6,11,12	None	Back	0.014		
31	Body	5	1	9	None	Back	0.027		
31	Body	5	2	9	None	Back	0.022		
31	Body	5	3	9	None	Back	0.024		
31	Body	5	4	9	None	Back	0.024		
31	Body	5	5	9	None	Back	0.021		
31	Body	5	6	9	None	Back	0.031		
31	Body	5	7	9	None	Back	0.026		
31	Body	5	8	9	None	Back	0.024		
31	Body	5	9	9	None	Back	0.026		
31	Body	5	11	9	None	Back	0.026		
31	Body	5	13	9	None	Back	0.016		
31	Body	5	14	9	None	Back	0.025		
31	Body	5	15	9	None	Back	0.014		
31	Body	5	16	9	None	Back	0.012		
36	Body	5	4	9	None	Back		0.029	
36	Body	5	4	9	None	Back			0.021

Table C.1 UHF SAR Summary Result (Continued)

Table #	Body / Head / Face	Antenna No.	Battery No.	Body Worn No.	Audio No.	Front / Back	F1	F2	F3	F4	F5	F5	F6	F7	F8	F9	F10	F11	F12
							406.0125	422.3000	435.4000	440.0000	441.4000	450.0000	457.9000	470.0000	475.0000	484.0000	490.0000	496.2000	512.0000
33	Face	1	13	@Front	None	Front			3.38										
33	Face	2	13	@Front	None	Front							1.95						
33	Face	3	13	@Front	None	Front								3.94					
33	Face	3	13	@Front	None	Front												2.41	
33	Face	4	13	@Front	None	Front							3.00						
33	Face	3	1	@Front	None	Front								3.51					
33	Face	3	2	@Front	None	Front								3.62					
33	Face	3	3	@Front	None	Front								3.26					
33	Face	3	4	@Front	None	Front								3.69					
33	Face	3	5	@Front	None	Front								3.69					
33	Face	3	6	@Front	None	Front								3.36					
33	Face	3	7	@Front	None	Front								3.91					
33	Face	3	8	@Front	None	Front								3.95					
33	Face	3	9	@Front	None	Front								3.73					
33	Face	3	10	@Front	None	Front								3.71					
33	Face	3	11	@Front	None	Front								3.59					
33	Face	3	12	@Front	None	Front								3.65					
33	Face	3	14	@Front	None	Front								3.80					
33	Face	3	15	@Front	None	Front								3.77					
33	Face	3	16	@Front	None	Front								3.80					

Table C.1 WLAN SAR Summary Result (Continued)

Table #	Body / Head / Face	Antenna No.	Battery No.	Body Worn No.	Audio No.	Front / Back	F1	F2	F3
							2412	2437	2462
34	Face	5	13	@front	None	Front	0.022		
34	Face	5	1	@front	None	Front	0.022		
34	Face	5	2	@front	None	Front	0.022		
34	Face	5	3	@front	None	Front	0.021		
34	Face	5	4	@front	None	Front	0.022		
34	Face	5	5	@front	None	Front	0.022		
34	Face	5	6	@front	None	Front	0.027		
34	Face	5	7	@front	None	Front	0.021		
34	Face	5	8	@front	None	Front	0.023		
34	Face	5	9	@front	None	Front	0.022		
34	Face	5	10	@front	None	Front	0.022		
34	Face	5	11	@front	None	Front	0.024		
34	Face	5	12	@front	None	Front	0.024		
34	Face	5	14	@front	None	Front	0.022		
34	Face	5	15	@front	None	Front	0.022		
34	Face	5	16	@front	None	Front	0.024		
36	Face	5	6	@front	None	Front		0.015	
36	Face	5	6	@front	None	Front			0.017