



DECLARATION OF COMPLIANCE SAR ASSESSMENT Part 2 of 2

Motorola Solutions Inc.
EME Test Laboratory
 Motorola Solutions Malaysia Sdn Bhd (Innoplex)
 Plot 2A, Medan Bayan Lepas,
 Mukim 12 SWD 11900 Bayan Lepas Penang, Malaysia.

Date of Report: 10/17/2018
Report Revision: C

Responsible Engineer: Veeramani Veerapan
Report Author: Veeramani Veerapan
Date/s Tested: 08/30/2018- 09/27/2018
Manufacturer: Motorola Solutions Inc.
DUT Description: Handheld Portable - APX8000HXE ST U/V/7_800 M3.5 GRN (with XE Top Control, Green Impact Housing, M3.5 Full Keypad)
Test TX mode(s): CW (PTT), Bluetooth, and WLAN 802.11b/g/n
Max. Power output: 6.6 W (VHF), 5.7 W (UHF), 2.99 W (700 MHz band), 3.6 W (800 MHz band), 10 mW (Bluetooth), 28.3 mW (802.11b), 11.2 mW (802.11g)
Nominal Power: 6.0 W (VHF), 5.0 W (UHF), 2.5 W (700 MHz band), 3.0 W (800 MHz band), 10 mW (Bluetooth), 28.3 mW (802.11b), 11.2 mW (802.11g)
Tx Frequency Bands: LMR 136-174 MHz, 380-520 MHz, 762-806 MHz, 806-870 MHz; Bluetooth 2402-2480 MHz; WLAN 2400-2483.5 MHz
Signaling type: FM, TDMA, FHSS (Bluetooth), 802.11b/g/n (WLAN)
Model(s) Tested: H91TGD9PW9AN (PNUW1038A/KNUW1038A)
Model(s) Certified: H91TGD9PW9AN (PNUW1038A / KNUW1038A), NUW1038
 H91TGD9PW8AN (PNUW1037A / KNUW1037A), NUW1037
Serial Number(s): 673TUP1971 & 673TUP1965
Classification: Occupational/Controlled
FCC ID: AZ489FT7111; 150.8-173.4 MHz, 406.1-512 MHz, 764-775 MHz, 794-824 MHz, 851-869 MHz
IC: 109U-89FT7111; 138-174 MHz, 406-430 MHz, 450-470 MHz, 768-776 MHz, 798-824 MHz, 851-869 MHz
ISED Test Site registration: 109AK
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 ISED 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. 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
Tiong Nguk Ing
Deputy Technical Manager (Approved Signatory)
Approval Date: 10/17/2018

Appendix C

Dipole Calibration Certificates

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



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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **Motorola Solutions MY**

Certificate No: **CLA150-4010_Nov16**

CALIBRATION CERTIFICATE			
Object	CLA150 - SN: 4010		
Calibration procedure(s)	QA CAL-15.v8 Calibration procedure for system validation sources below 700 MHz		
Calibration date:	November 08, 2016		
<p>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.</p> <p>All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.</p> <p>Calibration Equipment used (M&TE critical for calibration)</p>			
Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	06-Apr-16 (No. 217-02288/02289)	Apr-17
Power sensor NRP-Z91	SN: 103244	06-Apr-16 (No. 217-02288)	Apr-17
Power sensor NRP-Z91	SN: 103245	06-Apr-16 (No. 217-02289)	Apr-17
Reference 30 dB Attenuator	SN: 5129 (30b)	05-Apr-16 (No. 217-02294)	Apr-17
Type-N mismatch combination	SN: 5047.2 / 06327	05-Apr-16 (No. 217-02295)	Apr-17
Reference Probe EX3DV4	SN: 3877	31-Dec-15 (No. EX3-3877_Dec15)	Dec-16
DAE4	SN: 654	12-Aug-16 (No. DAE4-654_Aug16)	Aug-17
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (No. 217-02285/02284)	In house check: Jun-18
Power sensor E4412A	SN: MY41498087	06-Apr-16 (No. 217-02285)	In house check: Jun-18
Power sensor E4412A	SN: 000110210	06-Apr-16 (No. 217-02284)	In house check: Jun-18
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-16)	In house check: Jun-18
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-16)	In house check: Oct-17
Calibrated by:	Name Jeton Kastrati	Function Laboratory Technician	Signature
Approved by:	Name Katja Pokovic	Technical Manager	Signature
			Issued: November 9, 2016
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.			

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Zeughausstrasse 43, 8004 Zurich, Switzerland



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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, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- 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 source is mounted in a touch configuration below the center marking of the flat phantom.
- *Return Loss:* This parameter is measured with the source positioned under the liquid filled phantom (as described in the measurement condition clause). The Return Loss ensures low reflected power. 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	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	ELI4 Flat Phantom	Shell thickness: 2 ± 0.2 mm
EUT Positioning	Touch Position	
Zoom Scan Resolution	dx, dy = 4.0 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	150 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	52.3	0.76 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	50.1 ± 6 %	0.75 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	1 W input power	3.69 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	3.69 W/kg ± 18.4 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	1 W input power	2.45 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	2.46 W/kg ± 18.0 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	61.9	0.80 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	61.4 ± 6 %	0.82 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	1 W input power	3.86 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	3.78 W/kg ± 18.4 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	1 W input power	2.56 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	2.51 W/kg ± 18.0 % (k=2)

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	45.9 Ω - 4.5 jΩ
Return Loss	- 24.1 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	50.9 Ω - 6.6 jΩ
Return Loss	- 23.7 dB

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	April 15, 2014

DASY5 Validation Report for Head TSL

Date: 07.11.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: CLA-150; Type: CLA-150; Serial: 4010

Communication System: UID 0 - CW; Frequency: 150 MHz
 Medium parameters used: $f = 150 \text{ MHz}$; $\sigma = 0.75 \text{ S/m}$; $\epsilon_r = 50.1$; $\rho = 1000 \text{ kg/m}^3$
 Phantom section: Flat Section
 Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

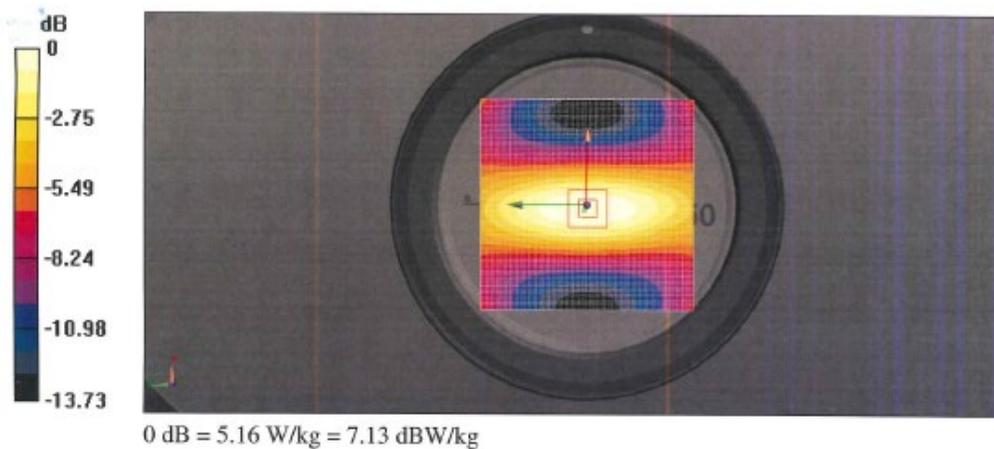
- Probe: EX3DV4 - SN3877; ConvF(12.02, 12.02, 12.02); Calibrated: 31.12.2015;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn654; Calibrated: 12.08.2016
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP:1003
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

CLA Calibration for HSL-LF Tissue/CLA150, touch configuration, Pin=1W/Area Scan (81x81x1):

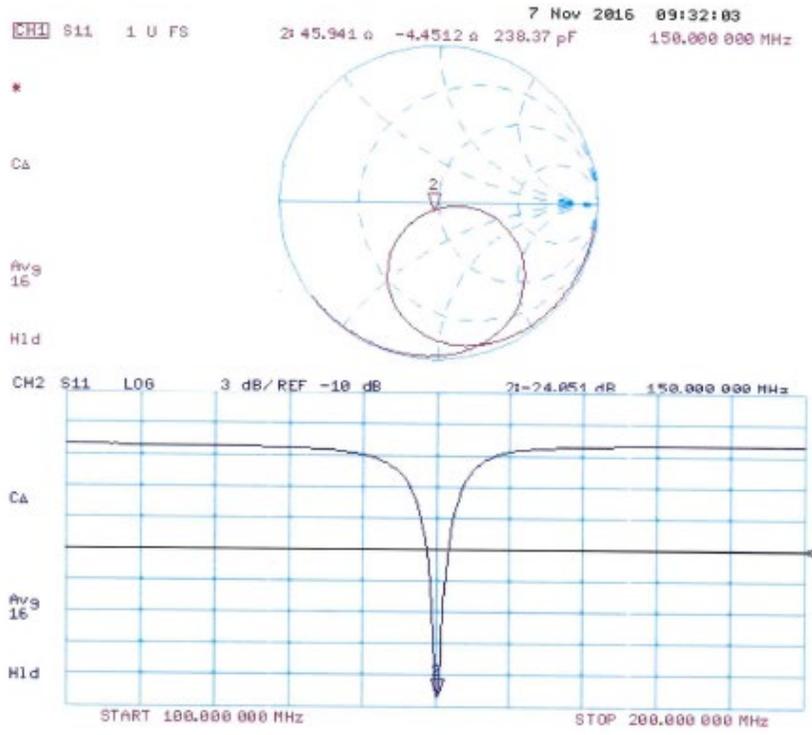
Interpolated grid: $dx=1.500 \text{ mm}$, $dy=1.500 \text{ mm}$
 Maximum value of SAR (interpolated) = 5.16 W/kg

CLA Calibration for HSL-LF Tissue/CLA150, touch configuration, Pin=1W/Zoom Scan,

dist=1.4mm (8x10x7)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=1.4\text{mm}$
 Reference Value = 82.42 V/m; Power Drift = -0.02 dB
 Peak SAR (extrapolated) = 6.93 W/kg
SAR(1 g) = 3.69 W/kg; SAR(10 g) = 2.45 W/kg
 Maximum value of SAR (measured) = 5.16 W/kg



Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 08.11.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: CLA-150; Type: CLA-150; Serial: 4010

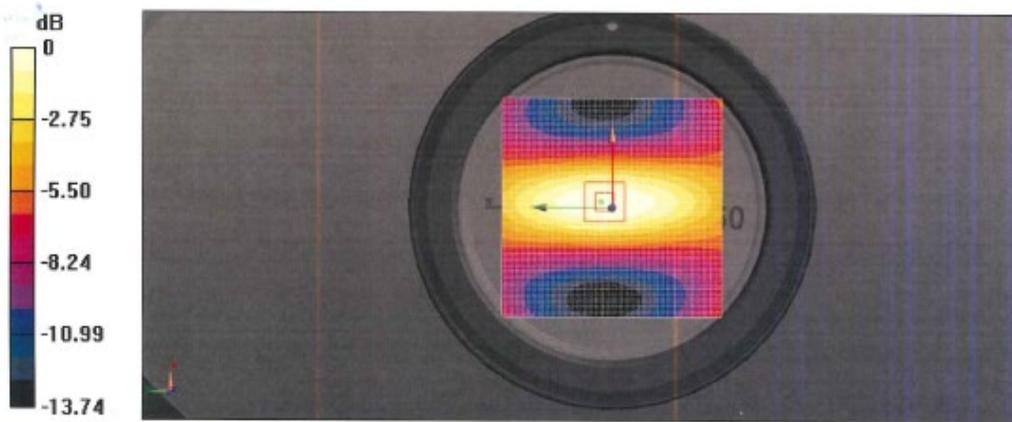
Communication System: UID 0 - CW; Frequency: 150 MHz
 Medium parameters used: $f = 150 \text{ MHz}$; $\sigma = 0.82 \text{ S/m}$; $\epsilon_r = 61.4$; $\rho = 1000 \text{ kg/m}^3$
 Phantom section: Flat Section
 Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

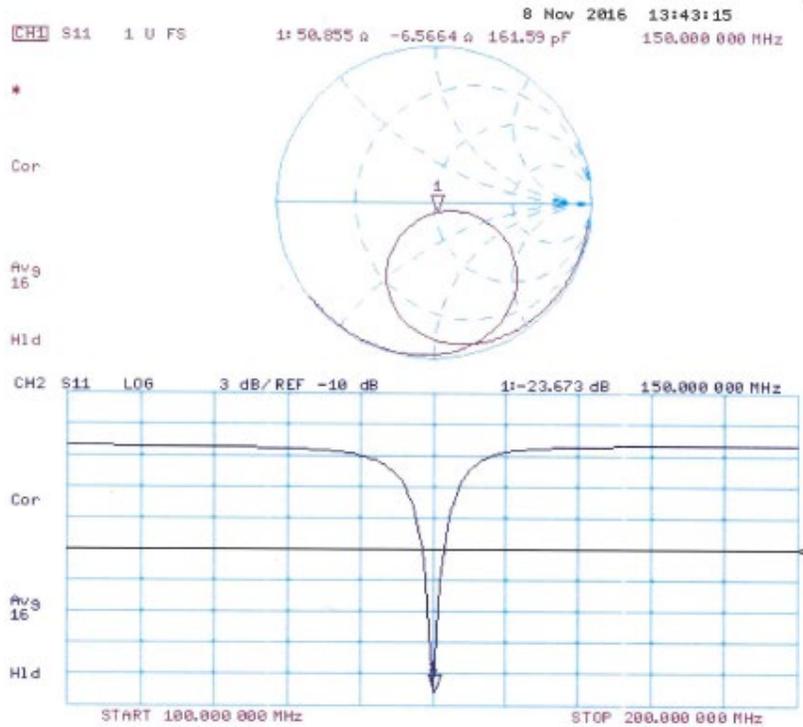
- Probe: EX3DV4 - SN3877; ConvF(11.44, 11.44, 11.44); Calibrated: 31.12.2015;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn654; Calibrated: 12.08.2016
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP:1003
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

CLA Calibration for MSL-LF Tissue/CLA150, touch configuration, Pin=1W/Area Scan (81x81x1):
 Interpolated grid: $dx=1.500 \text{ mm}$, $dy=1.500 \text{ mm}$
 Maximum value of SAR (interpolated) = 5.45 W/kg

CLA Calibration for MSL-LF Tissue/CLA150, touch configuration, Pin=1W/Zoom Scan, dist=1.4mm (8x10x7)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=1.4\text{mm}$
 Reference Value = 80.49 V/m; Power Drift = -0.09 dB
 Peak SAR (extrapolated) = 7.18 W/kg
SAR(1 g) = 3.86 W/kg; SAR(10 g) = 2.56 W/kg
 Maximum value of SAR (measured) = 5.38 W/kg



Impedance Measurement Plot for Body TSL



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Accreditation No.: **SCS 0108**

Client **Motorola Solutions MY**

Certificate No: **D450V3-1054_Oct17**

CALIBRATION CERTIFICATE

Object **D450V3 - SN:1054**

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

Calibration date: **October 25, 2017**

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-17 (No. 217-02521/02522)	Apr-18
Power sensor NRP-Z91	SN: 103244	04-Apr-17 (No. 217-02521)	Apr-18
Power sensor NRP-Z91	SN: 103245	04-Apr-17 (No. 217-02522)	Apr-18
Reference 20 dB Attenuator	SN: 5277 (20x)	07-Apr-17 (No. 217-02528)	Apr-18
Type-N mismatch combination	SN: 5047.2 / 06327	07-Apr-17 (No. 217-02529)	Apr-18
Reference Probe EX3DV4	SN: 3877	31-Dec-16 (No. EX3-3877_Dec16)	Dec-17
DAE4	SN: 654	24-Jul-17 (No. DAE4-654_Jul17)	Jul-18
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (No. 217-02285/02284)	In house check: Jun-18
Power sensor E4412A	SN: MY41498087	06-Apr-16 (No. 217-02285)	In house check: Jun-18
Power sensor E4412A	SN: 000110210	06-Apr-16 (No. 217-02284)	In house check: Jun-18
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-16)	In house check: Jun-18
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-17)	In house check: Oct-18

Calibrated by:	Name Jeton Kastrati	Function Laboratory Technician	Signature
Approved by:	Name Katja Pokovic	Technical Manager	

Issued: October 25, 2017

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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	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	43.5 ± 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	1.12 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	4.48 W/kg ± 18.1 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	0.750 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	3.00 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	55.2 ± 6 %	0.93 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	1.14 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	4.57 W/kg ± 18.1 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	0.759 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	57.9 Ω - 4.1 j Ω
Return Loss	- 21.6 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	54.4 Ω - 8.9 j Ω
Return Loss	- 20.4 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.349 ns
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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: 25.10.2017

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW; Frequency: 450 MHz

Medium parameters used: $f = 450 \text{ MHz}$; $\sigma = 0.87 \text{ S/m}$; $\epsilon_r = 43.5$; $\rho = 1000 \text{ kg/m}^3$

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); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn654; Calibrated: 24.07.2017
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP:1003
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

Dipole Calibration for Head Tissue/ $d=15\text{mm}$, $P_{in}=250\text{mW}$ /Zoom Scan (7x7x7)/Cube 0:

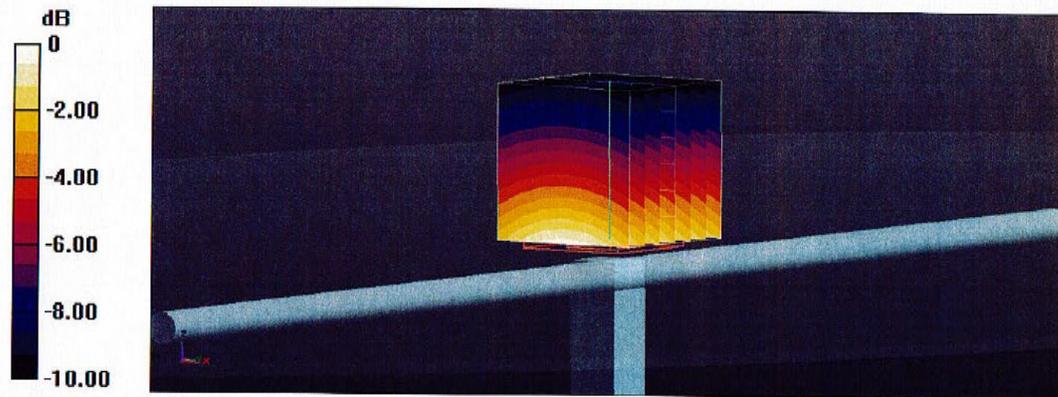
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 43.28 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 1.74 W/kg

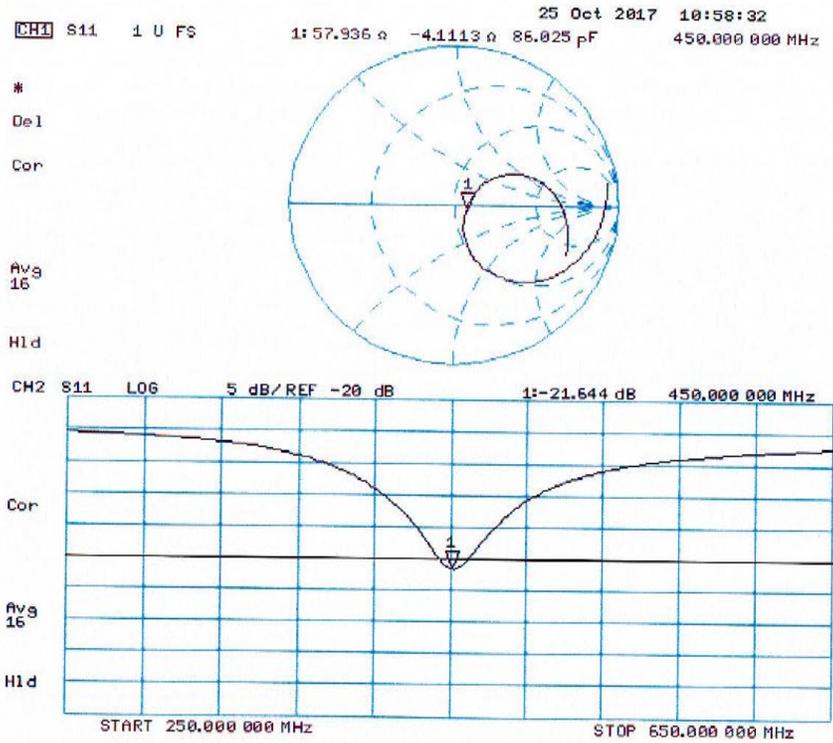
SAR(1 g) = 1.12 W/kg; SAR(10 g) = 0.750 W/kg

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: 25.10.2017

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW; Frequency: 450 MHz

Medium parameters used: $f = 450 \text{ MHz}$; $\sigma = 0.93 \text{ S/m}$; $\epsilon_r = 55.2$; $\rho = 1000 \text{ kg/m}^3$

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); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn654; Calibrated: 24.07.2017
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP:1003
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

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

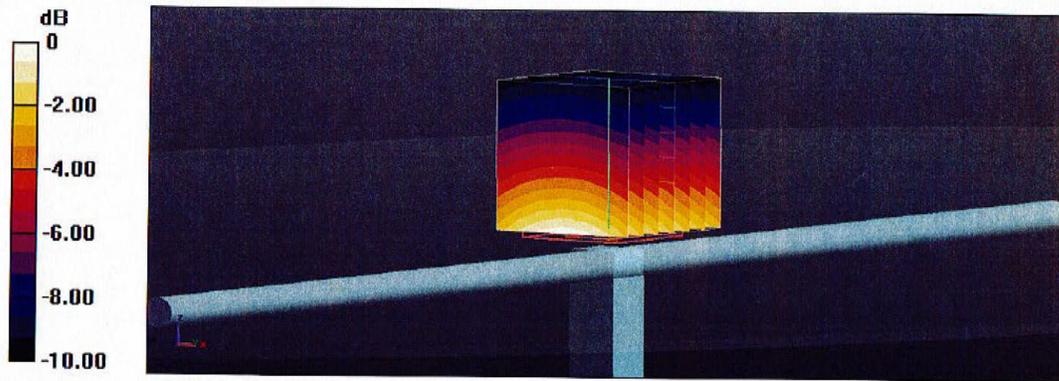
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 42.19 V/m; Power Drift = -0.05dB

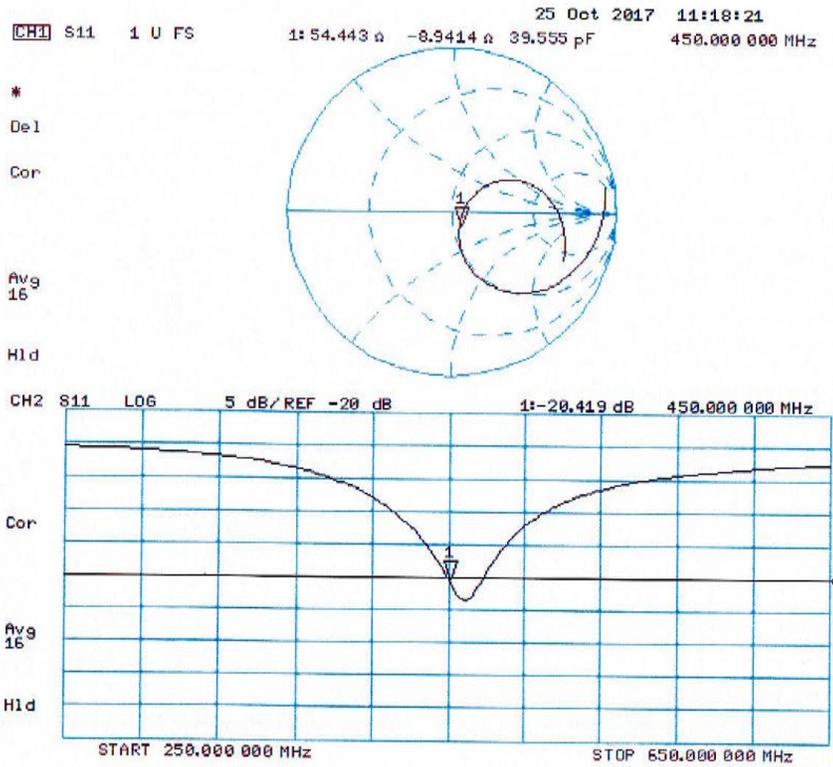
Peak SAR (extrapolated) = 1.76 W/kg

SAR(1 g) = 1.14 W/kg; SAR(10 g) = 0.759 W/kg

Maximum value of SAR (measured) = 1.53 W/kg



Impedance Measurement Plot for Body TSL



**Calibration Laboratory of
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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **Motorola Solutions MY**

Certificate No: **D835V2-4d029_Jan18**

CALIBRATION CERTIFICATE

Object: **D835V2 - SN:4d029**

Calibration procedure(s): **QA CAL-05.v9
Calibration procedure for dipole validation kits above 700 MHz**

Calibration date: **January 08, 2018** *+ 2 yrs cal*

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-17 (No. 217-02521/02522)	Apr-18
Power sensor NRP-Z91	SN: 103244	04-Apr-17 (No. 217-02521)	Apr-18
Power sensor NRP-Z91	SN: 103245	04-Apr-17 (No. 217-02522)	Apr-18
Reference 20 dB Attenuator	SN: 5058 (20k)	07-Apr-17 (No. 217-02528)	Apr-18
Type-N mismatch combination	SN: 5047.2 / 06327	07-Apr-17 (No. 217-02529)	Apr-18
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

Calibrated by:	Name Michael Weber	Function Laboratory Technician	Signature <i>[Signature]</i>
Approved by:	Name Katja Pokovic	Function Technical Manager	Signature <i>[Signature]</i>

Issued: January 9, 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	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.7 ± 6 %	0.92 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	2.45 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	9.60 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.58 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	6.22 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	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.8 ± 6 %	0.99 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	2.46 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	9.67 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.61 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	6.36 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	51.8 Ω - 3.4 jΩ
Return Loss	- 28.5 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.7 Ω - 7.8 jΩ
Return Loss	- 21.7 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.387 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 17, 2004

DASY5 Validation Report for Head TSL

Date: 08.01.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d029

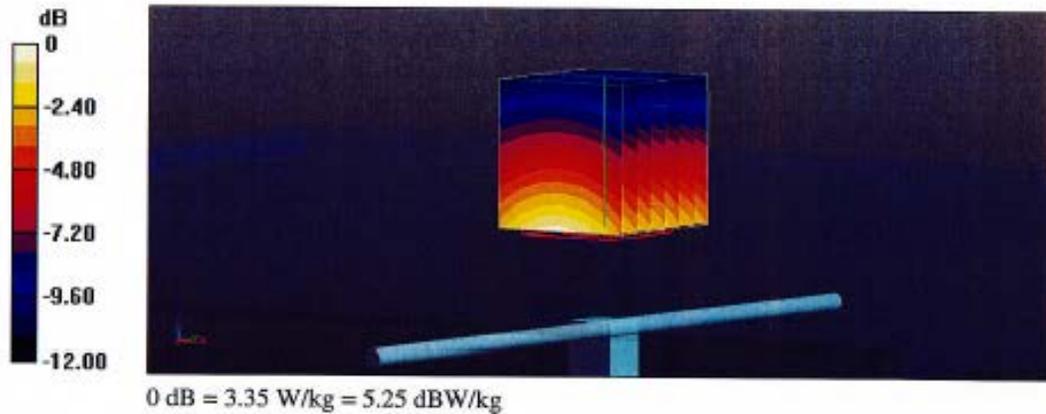
Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.92 \text{ S/m}$; $\epsilon_r = 40.7$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

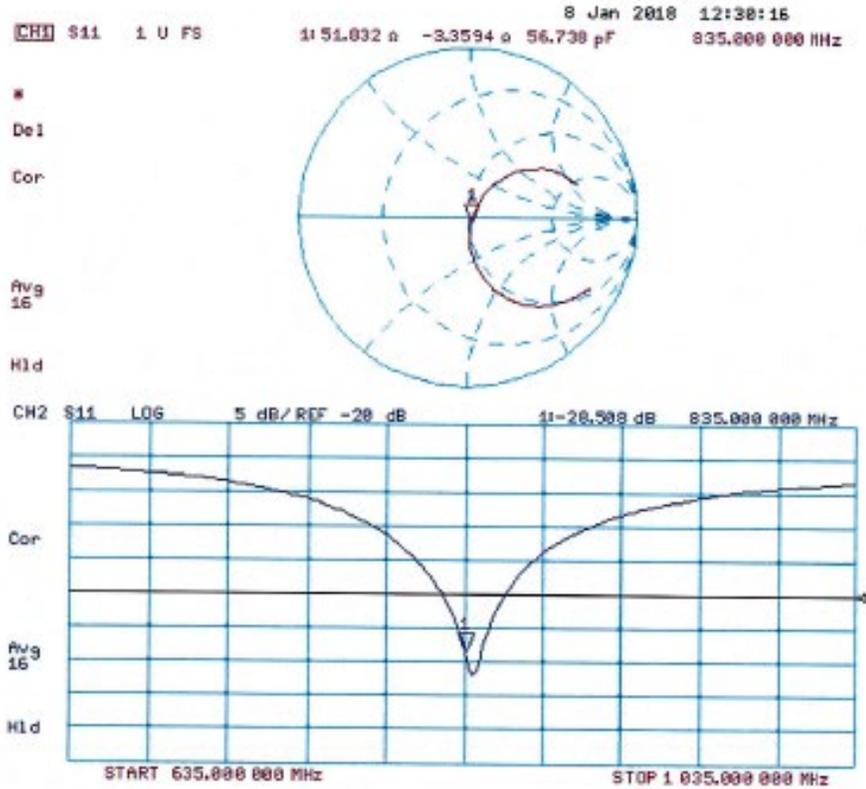
- Probe: EX3DV4 - SN7349; ConvF(9.9, 9.9, 9.9); Calibrated: 30.12.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 4,9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

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

Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$
Reference Value = 63.29 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 3.83 W/kg
SAR(1 g) = 2.45 W/kg; SAR(10 g) = 1.58 W/kg
Maximum value of SAR (measured) = 3.35 W/kg



Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 08.01.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d029

Communication System: UID 0 - CW; Frequency: 835 MHz

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.99 \text{ S/m}$; $\epsilon_r = 54.8$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.05, 10.05, 10.05); Calibrated: 30.12.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 4.9 (Back); Type: QD 00R P49 AA; Serial: 1005
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

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

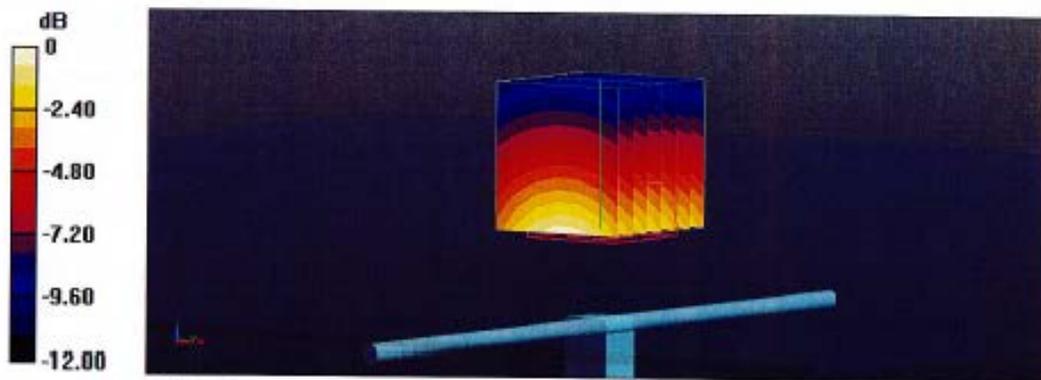
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 60.67 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 3.69 W/kg

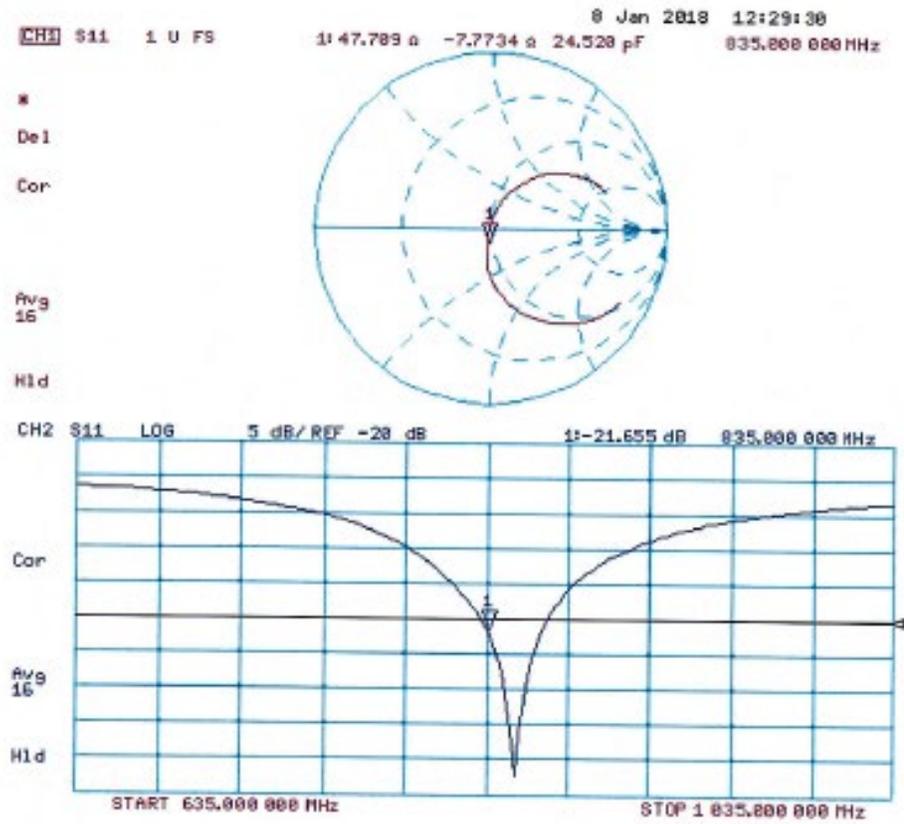
SAR(1 g) = 2.46 W/kg; SAR(10 g) = 1.61 W/kg

Maximum value of SAR (measured) = 3.25 W/kg



0 dB = 3.25 W/kg = 5.12 dBW/kg

Impedance Measurement Plot for Body TSL



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Accreditation No.: **SCS 0108**

Client **Motorola Solutions MY**

Certificate No: **D2450V2-782_Feb17**

CALIBRATION CERTIFICATE

Object: **D2450V2 - SN:782**

Calibration procedure(s): **QA CAL-05.v9
Calibration procedure for dipole validation kits above 700 MHz**

Calibration date: **February 15, 2017**

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	06-Apr-16 (No. 217-02288/02289)	Apr-17
Power sensor NRP-Z91	SN: 103244	06-Apr-16 (No. 217-02288)	Apr-17
Power sensor NRP-Z91	SN: 103245	06-Apr-16 (No. 217-02289)	Apr-17
Reference 20 dB Attenuator	SN: 5058 (20k)	05-Apr-16 (No. 217-02292)	Apr-17
Type-N mismatch combination	SN: 5047.2 / 06327	05-Apr-16 (No. 217-02295)	Apr-17
Reference Probe EX3DV4	SN: 7349	31-Dec-16 (No. EX3-7349_Dec16)	Dec-17
DAE4	SN: 601	04-Jan-17 (No. DAE4-601_Jan17)	Jan-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: 100079	15 Jun 16 (in house check Oct 16)	In house check: Oct 18
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-16)	In house check: Oct-17

Calibrated by:	Name: Johannes Kuridka	Function: Laboratory Technician	Signature:
Approved by:	Name: Katja Pokovic	Function: Technical Manager	Signature:

Issued: February 15, 2017

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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, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- 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	V52.8.8
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	37.5 ± 6 %	1.87 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	13.7 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	53.3 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.30 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	24.8 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	51.6 ± 6 %	2.02 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	12.9 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	50.5 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.94 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	23.5 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	51.9 Ω + 4.0 jΩ
Return Loss	- 27.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.3 Ω + 5.7 jΩ
Return Loss	- 24.4 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.151 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: 15.02.2017

Test Laboratory: SPEAG, Zurich, Switzerland

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

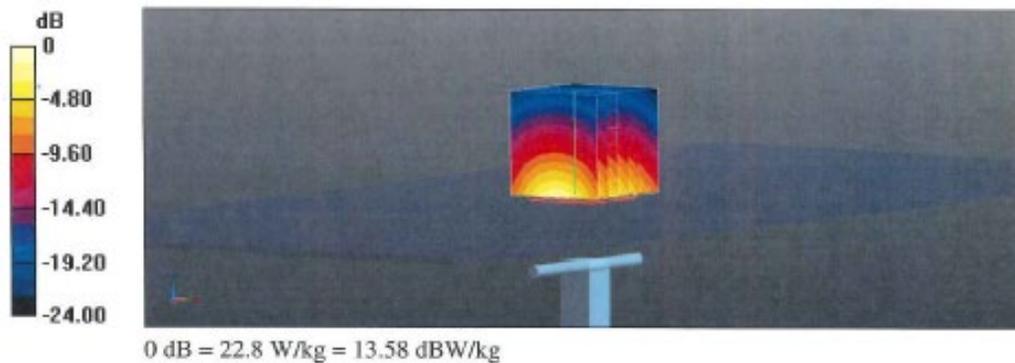
Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: $f = 2450$ MHz; $\sigma = 1.87$ S/m; $\epsilon_r = 37.5$; $\rho = 1000$ kg/m³
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

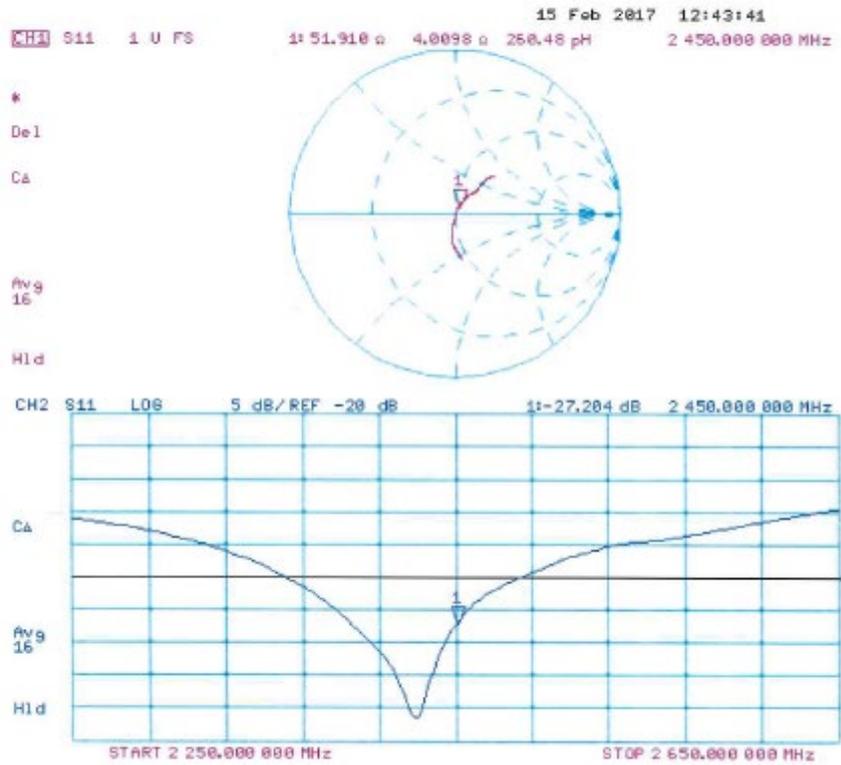
- Probe: EX3DV4 - SN7349; ConvF(7.72, 7.72, 7.72); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.01.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7331)

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 = 115.0 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 28.4 W/kg
SAR(1 g) = 13.7 W/kg; SAR(10 g) = 6.3 W/kg
Maximum value of SAR (measured) = 22.8 W/kg



Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 15.02.2017

Test Laboratory: SPEAG, Zurich, Switzerland

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

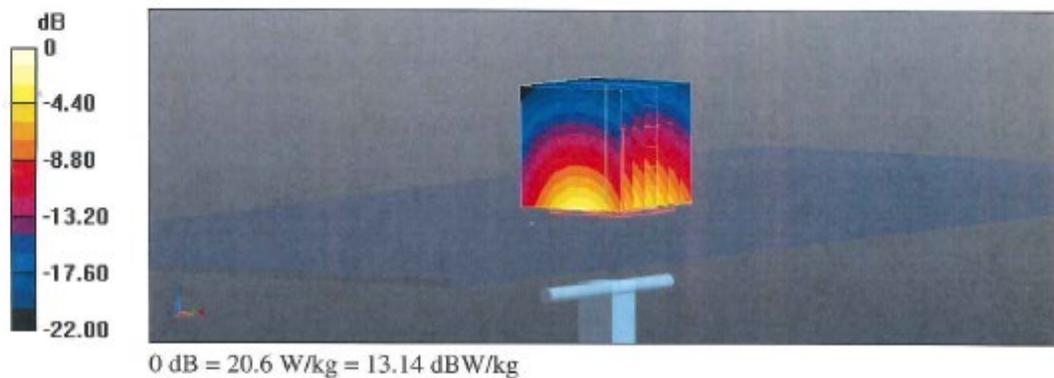
Communication System: UID 0 - CW; Frequency: 2450 MHz
 Medium parameters used: $f = 2450 \text{ MHz}$; $\sigma = 2.02 \text{ S/m}$; $\epsilon_r = 51.6$; $\rho = 1000 \text{ kg/m}^3$
 Phantom section: Flat Section
 Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

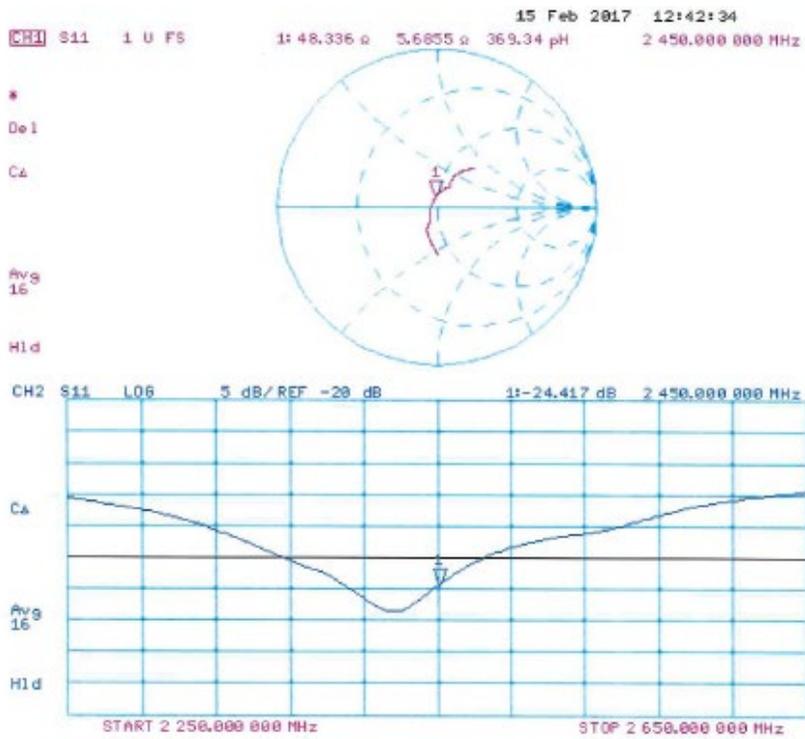
- Probe: EX3DV4 - SN7349; ConvF(7.79, 7.79, 7.79); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.01.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7331)

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

Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$
 Reference Value = 105.4 V/m; Power Drift = -0.09 dB
 Peak SAR (extrapolated) = 26.6 W/kg
SAR(1 g) = 12.9 W/kg; SAR(10 g) = 5.94 W/kg
 Maximum value of SAR (measured) = 20.6 W/kg



Impedance Measurement Plot for Body TSL



Dipole Data

As stated in KDB 865664, for dipole exceeded annual calibration, the test laboratory must ensure that the required supporting information and documentation are included in report to qualify for extended calibration interval.

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

Dipole CLA150 (SN 4010)	Head			Body		
	Impedance		Return Loss	Impedance		Return Loss
Date Measured	real Ω	imag $j\Omega$	dB	real Ω	imag $j\Omega$	dB
12/15/2016	48.67	4.80	-25.98	51.29	2.50	-31.07
12/15/2017	48.37	5.26	-24.97	50.97	3.34	-29.04

Dipole D2450V2 (SN 782)	Head			Body		
	Impedance		Return Loss	Impedance		Return Loss
Date Measured	real Ω	imag $j\Omega$	dB	real Ω	imag $j\Omega$	dB
03/15/17	49.12	3.10	-29.06	47.40	6.47	-22.92
01/11/18	47.93	4.21	-26.41	47.22	6.23	-23.09

Dipole D450V3 (Serial Number 1054) and Dipole D835V2 (Serial Number 4d029) do not exceed the annual calibration date, therefore further justification and validation for impedance and return loss are not required.

Appendix D

System Verification Check Scans

Motorola Solutions, Inc. EME Laboratory
 Date/Time: 9/7/2018 8:15:42 AM

Robot#: DASY5-PG-3 | Run#: AN-SYSP-150B-180907-02
 Dipole Model#: CLA-150
 Phantom#: ELI5 1150
 Tissue Temp: 21.7 (C)
 Serial#: 4010
 Test Freq: 150.0000 (MHz)
 Start Power: 1000 (mW)
 Rotation (1D): 0.057 dB
 Adjusted SAR (1W): 3.99 mW/g (1g)

Comments:

Duty Cycle: 1:1, Medium parameters used: $f = 150$ MHz; $\sigma = 0.8$ S/m; $\epsilon_r = 58.8$; $\rho = 1000$ kg/m³
 Probe: EX3DV4 - SN7486, Frequency: 150 MHz, ConvF(13.1, 13.1, 13.1); Calibrated: 3/20/2018
 Electronics: DAE4 Sn1488, Calibrated: 3/9/2018

Below 2 GHz-Rev.2/System Performance Check/Dipole Area Scan 2 (81x81x1):

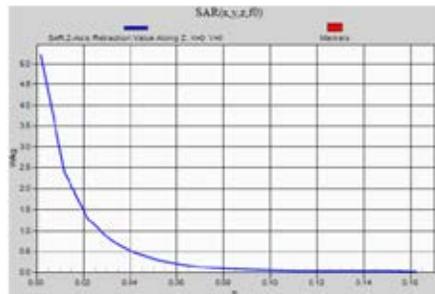
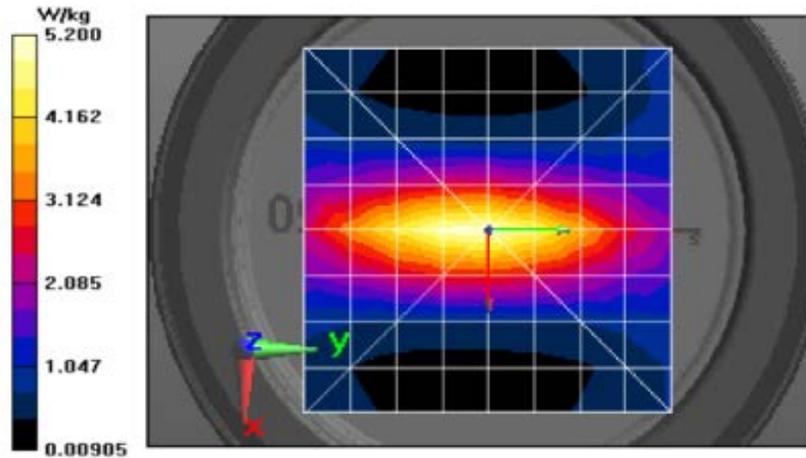
Interpolated grid: dx=1.500 mm, dy=1.500 mm
 Reference Value = 80.29 V/m; Power Drift = 0.03 dB
Fast SAR: SAR(1 g) = 4.43 W/kg; SAR(10 g) = 3.15 W/kg (SAR corrected for target medium)
 Maximum value of SAR (interpolated) = 5.28 W/kg

Below 2 GHz-Rev.2/System Performance Check/0-Degree Cube (5x5x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
 Reference Value = 80.29 V/m; Power Drift = 0.03 dB
 Peak SAR (extrapolated) = 6.41 W/kg
SAR(1 g) = 3.99 W/kg; SAR(10 g) = 2.64 W/kg (SAR corrected for target medium)
 Maximum value of SAR (measured) = 5.17 W/kg

Below 2 GHz-Rev.2/System Performance Check/Z-Axis Retraction (1x1x17): Measurement

grid: dx=20mm, dy=20mm, dz=10mm
 Maximum value of SAR (measured) = 5.20 W/kg



Motorola Solutions, Inc. EME Laboratory
Date/Time: 9/3/2018 9:26:54 AM

Robot#: DASY5-PG-3 | Run#: AN-SYSP-450B-180903-01
 Dipole Model# D450V3
 Phantom#: ELI4 1040
 Tissue Temp: 22.7 (C)
 Serial#: 1054
 Test Freq: 450.0000 (MHz)
 Start Power: 250 (mW)
 Rotation (ID): 0.049 dB
 Adjusted SAR (1W): 4.56 mW/g (1g)

Comments:

Duty Cycle: 1:1, Medium parameters used: $f = 450$ MHz; $\sigma = 0.93$ S/m; $\epsilon_r = 54.2$; $\rho = 1000$ kg/m³
 Probe: EX3DV4 - SN7486, , Frequency: 450 MHz, ConvF(11.68, 11.68, 11.68); Calibrated: 3/20/2018
 Electronics: DAE4 Sn1488, Calibrated: 3/9/2018

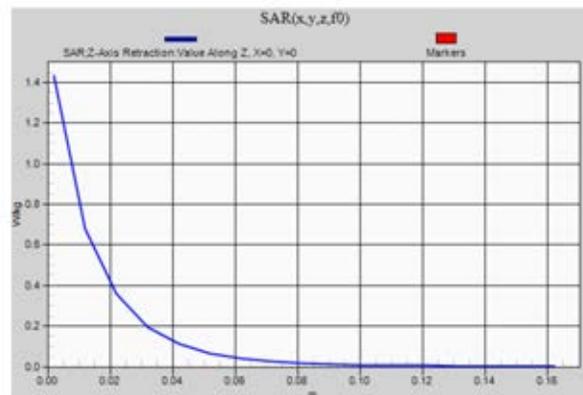
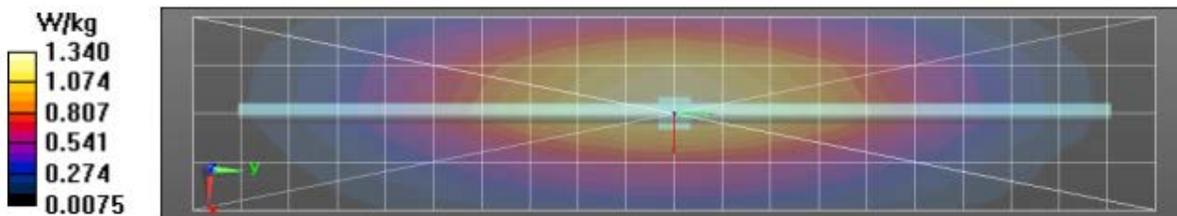
Below 2 GHz-Rev.2/System Performance Check/Dipole Area Scan 2 (41x201x1):

Interpolated grid: dx=1.500 mm, dy=1.500 mm
 Reference Value = 39.51 V/m; Power Drift = 0.00 dB
Fast SAR: SAR(1 g) = 1.17 W/kg; SAR(10 g) = 0.819 W/kg (SAR corrected for target medium)
 Maximum value of SAR (interpolated) = 1.41 W/kg

Below 2 GHz-Rev.2/System Performance Check/0-Degree Cube (5x5x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
 Reference Value = 39.51 V/m; Power Drift = 0.00 dB
 Peak SAR (extrapolated) = 1.70 W/kg
SAR(1 g) = 1.14 W/kg; SAR(10 g) = 0.772 W/kg (SAR corrected for target medium)
 Maximum value of SAR (measured) = 1.43 W/kg

Below 2 GHz-Rev.2/System Performance Check/Z-Axis Retraction (1x1x17): Measurement grid: dx=20mm, dy=20mm, dz=10mm



Motorola Solutions, Inc. EME Laboratory

Date/Time: 9/6/2018 11:20:32 AM

Robot#: DASY5-PG-3 | Run#: AN-SYSP-450B-180906-01
 Dipole Model# D450V3
 Phantom#: EL14 1109
 Tissue Temp: 21.8 (C)
 Serial#: 1054
 Test Freq: 450.0000 (MHz)
 Start Power: 250 (mW)
 Rotation (1D): 0.030 dB
 Adjusted SAR (1W): 4.56 mW/g (1g)

Comments:

Duty Cycle: 1:1, Medium parameters used: $f = 450$ MHz; $\sigma = 0.93$ S/m; $\epsilon_r = 54.2$; $\rho = 1000$ kg/m³
 Probe: EX3DV4 - SN7486, , Frequency: 450 MHz, ConvF(11.68, 11.68, 11.68); Calibrated: 3/20/2018
 Electronics: DAE4 Sn1488, Calibrated: 3/9/2018

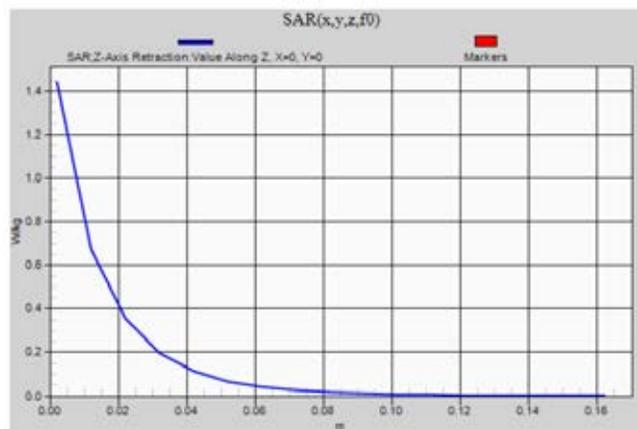
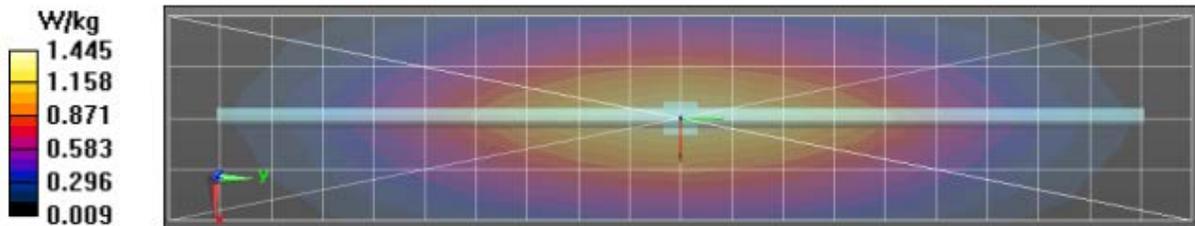
Below 2 GHz-Rev.2/System Performance Check/Dipole Area Scan 2 (41x201x1):

Interpolated grid: dx=1.500 mm, dy=1.500 mm
 Reference Value = 39.53 V/m; Power Drift = -0.02 dB
Fast SAR: SAR(1 g) = 1.19 W/kg; SAR(10 g) = 0.824 W/kg (SAR corrected for target medium)
 Maximum value of SAR (interpolated) = 1.44 W/kg

Below 2 GHz-Rev.2/System Performance Check/0-Degree Cube (5x5x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
 Reference Value = 39.53 V/m; Power Drift = -0.02 dB
 Peak SAR (extrapolated) = 1.72 W/kg
SAR(1 g) = 1.14 W/kg; SAR(10 g) = 0.769 W/kg (SAR corrected for target medium)

Below 2 GHz-Rev.2/System Performance Check/Z-Axis Retraction (1x1x17): Measurement grid: dx=20mm, dy=20mm, dz=10mm



Motorola Solutions, Inc. EME Laboratory
Date/Time: 9/19/2018 11:33:48 PM

Robot#: DASY5-PG-3 | Run#: FD-SYSP-450B-180919-04
 Dipole Model#: D450V3
 Phantom#: ELI4 1109
 Tissue Temp: 22.7 (C)
 Serial#: 1054
 Test Freq: 450.0000 (MHz)
 Start Power: 250 (mW)
 Rotation (1D): 0.034 dB
 Adjusted SAR (1W): 4.92 mW/g (1g)

Comments:

Duty Cycle: 1:1, Medium parameters used: $f = 450$ MHz; $\sigma = 0.95$ S/m; $\epsilon_r = 54.9$; $\rho = 1000$ kg/m³
 Probe: EX3DV4 - SN7486, Frequency: 450 MHz, ConvF(11.68, 11.68, 11.68); Calibrated: 3/20/2018
 Electronics: DAE4 Sn1488, Calibrated: 3/9/2018

Below 2 GHz-Rev.2/System Performance Check/Dipole Area Scan 2 (41x201x1):

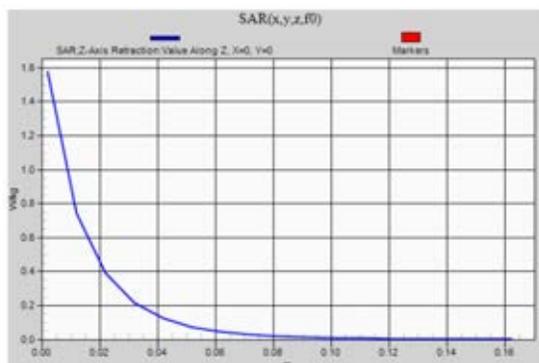
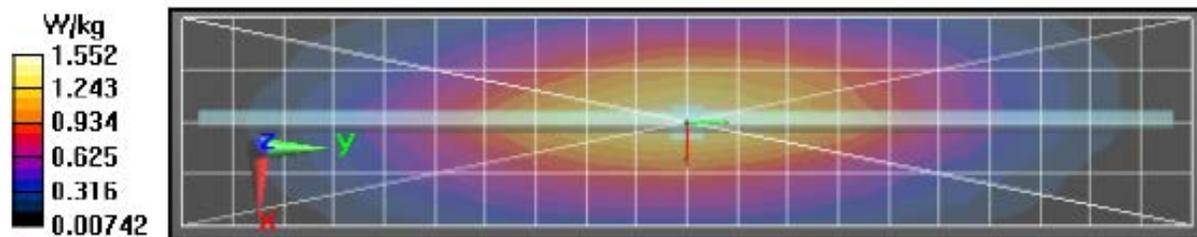
Interpolated grid: dx=1.500 mm, dy=1.500 mm
 Reference Value = 40.93 V/m; Power Drift = 0.02 dB
 Fast SAR: SAR(1 g) = 1.28 W/kg; SAR(10 g) = 0.885 W/kg (SAR corrected for target medium)
 Maximum value of SAR (interpolated) = 1.56 W/kg

Below 2 GHz-Rev.2/System Performance Check/0-Degree Cube (5x5x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
 Reference Value = 40.93 V/m; Power Drift = 0.02 dB
 Peak SAR (extrapolated) = 1.88 W/kg
 SAR(1 g) = 1.23 W/kg; SAR(10 g) = 0.831 W/kg (SAR corrected for target medium)
 Maximum value of SAR (measured) = 1.57 W/kg

Below 2 GHz-Rev.2/System Performance Check/Z-Axis Retraction (1x1x17): Measurement

grid: dx=20mm, dy=20mm, dz=10mm
 Maximum value of SAR (measured) = 1.58 W/kg



Motorola Solutions, Inc. EME Laboratory

Date/Time: 9/21/2018 1:31:56 AM

Robot#: DASY5-PG-3 | Run#: FD-SYSP-450B-180921-01
 Dipole Model# D450V3
 Phantom#: ELI4 1109
 Tissue Temp: 21.4 (C)
 Serial#: 1054
 Test Freq: 450.0000 (MHz)
 Start Power: 250 (mW)
 Rotation (1D): 0.034 dB
 Adjusted SAR (1W): 4.64 mW/g (1g)

Comments:

Duty Cycle: 1:1, Medium parameters used: $f = 450$ MHz; $\sigma = 0.96$ S/m; $\epsilon_r = 54.7$; $\rho = 1000$ kg/m³
 Probe: EX3DV4 - SN7486, , Frequency: 450 MHz, ConvF(11.68, 11.68, 11.68); Calibrated: 3/20/2018
 Electronics: DAE4 Sn1488, Calibrated: 3/9/2018

Below 2 GHz-Rev.2/System Performance Check/Dipole Area Scan 2 (41x201x1):

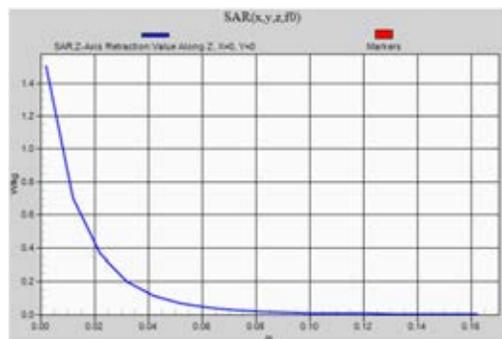
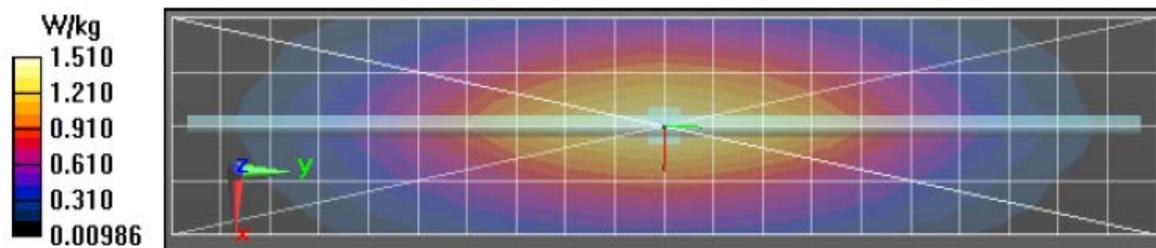
Interpolated grid: dx=1.500 mm, dy=1.500 mm
 Reference Value = 40.00 V/m; Power Drift = -0.03 dB
 Fast SAR: SAR(1 g) = 1.22 W/kg; SAR(10 g) = 0.846 W/kg (SAR corrected for target medium)
 Maximum value of SAR (interpolated) = 1.51 W/kg

Below 2 GHz-Rev.2/System Performance Check/0-Degree Cube (5x5x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
 Reference Value = 40.00 V/m; Power Drift = -0.03 dB
 Peak SAR (extrapolated) = 1.79 W/kg
 SAR(1 g) = 1.16 W/kg; SAR(10 g) = 0.786 W/kg (SAR corrected for target medium)
 Maximum value of SAR (measured) = 1.50 W/kg

Below 2 GHz-Rev.2/System Performance Check/Z-Axis Retraction (1x1x17): Measurement

grid: dx=20mm, dy=20mm, dz=10mm



Motorola Solutions, Inc. EME Laboratory
 Date/Time: 8/30/2018 2:10:20 AM

Robot#: DASY5-PG-3 | Run#: AN-SYSP-835B-180830-03#
 Dipole Model#: D835V2
 Phantom#: ELI4 1108
 Tissue Temp: 22.0 (C)
 Serial#: 4d029
 Test Freq: 835.0000 (MHz)
 Start Power: 250 (mW)
 Rotation (1D): 0.028 dB
 Adjusted SAR (1W): 9.84 mW/g (1g)

Comments:

Duty Cycle: 1:1, Medium parameters used: $f = 835$ MHz; $\sigma = 1.01$ S/m; $\epsilon_r = 53.4$; $\rho = 1000$ kg/m³
 Probe: EX3DV4 - SN7486, , Frequency: 835 MHz, ConvF(9.98, 9.98, 9.98); Calibrated: 3/20/2018
 Electronics: DAE4 Sn1488, Calibrated: 3/9/2018

Below 2 GHz-Rev.2/System Performance Check/Dipole Area Scan 2 (41x131x1):

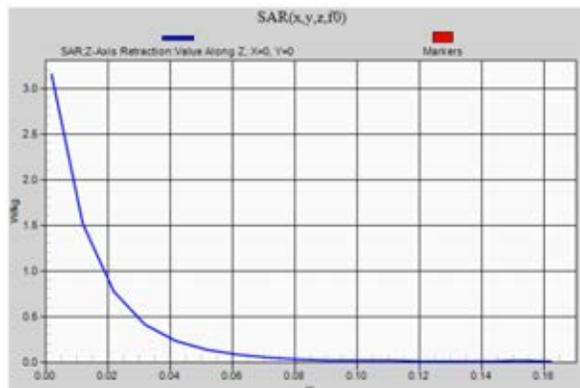
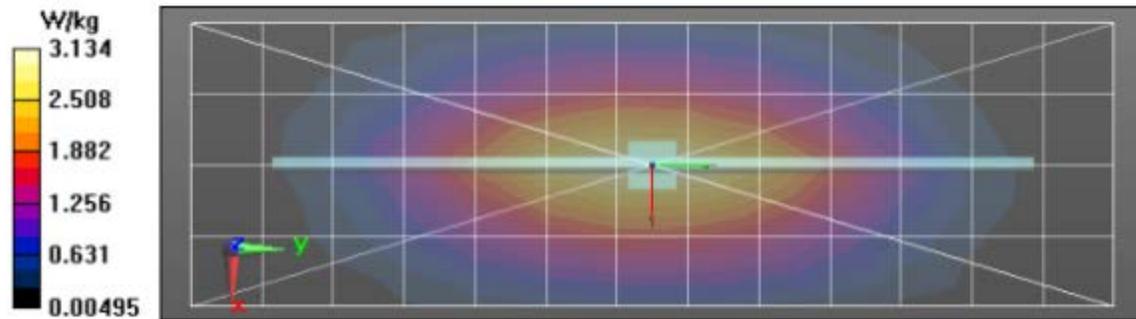
Interpolated grid: dx=1.500 mm, dy=1.500 mm
 Reference Value = 57.32 V/m; Power Drift = -0.05 dB
Fast SAR: SAR(1 g) = 2.48 W/kg; SAR(10 g) = 1.63 W/kg (SAR corrected for target medium)
 Maximum value of SAR (interpolated) = 3.17 W/kg

Below 2 GHz-Rev.2/System Performance Check/0-Degree Cube (5x5x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
 Reference Value = 57.32 V/m; Power Drift = -0.05 dB
 Peak SAR (extrapolated) = 3.65 W/kg
SAR(1 g) = 2.46 W/kg; SAR(10 g) = 1.64 W/kg (SAR corrected for target medium)
 Maximum value of SAR (measured) = 3.16 W/kg

Below 2 GHz-Rev.2/System Performance Check/Z-Axis Retraction (1x1x17): Measurement

grid: dx=20mm, dy=20mm, dz=10mm
 Maximum value of SAR (measured) = 3.15 W/kg



Motorola Solutions, Inc. EME Laboratory
Date/Time: 9/10/2018 8:36:21 AM

Robot#: DASY5-PG-3 | Run#: FD-SYSP-835B-180910-01
 Dipole Model#: D835V2
 Phantom#: ELI4 1028
 Tissue Temp: 22.0 (C)
 Serial#: 4d029
 Test Freq: 835.0000 (MHz)
 Start Power: 250 (mW)
 Rotation (1D): 0.044 dB
 Adjusted SAR (1W): 10.28 mW/g (1g)

Comments:

Duty Cycle: 1:1, Medium parameters used: $f = 835$ MHz; $\sigma = 1$ S/m; $\epsilon_r = 52.8$; $\rho = 1000$ kg/m³
 Probe: EX3DV4 - SN7486, Frequency: 835 MHz, ConvF(9.98, 9.98, 9.98); Calibrated: 3/20/2018
 Electronics: DAE4 Sn1488, Calibrated: 3/9/2018

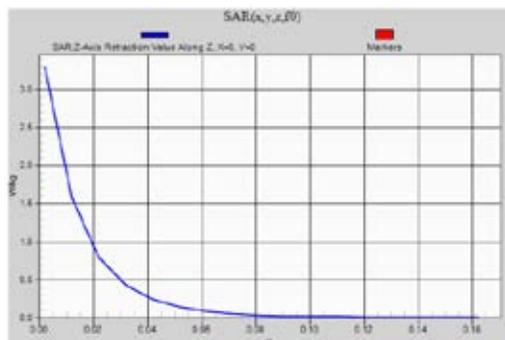
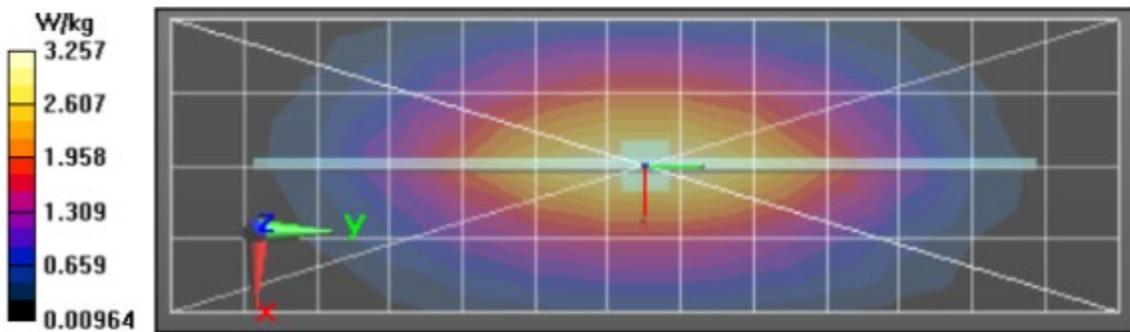
Below 2 GHz-Rev.2/System Performance Check/Dipole Area Scan 2 (41x131x1):

Interpolated grid: dx=1.500 mm, dy=1.500 mm
 Reference Value = 58.83 V/m; Power Drift = -0.04 dB
Fast SAR: SAR(1 g) = 2.6 W/kg; SAR(10 g) = 1.7 W/kg (SAR corrected for target medium)
 Maximum value of SAR (interpolated) = 3.31 W/kg

Below 2 GHz-Rev.2/System Performance Check/0-Degree Cube (5x5x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
 Reference Value = 58.83 V/m; Power Drift = -0.04 dB
 Peak SAR (extrapolated) = 3.80 W/kg
SAR(1 g) = 2.57 W/kg; SAR(10 g) = 1.71 W/kg (SAR corrected for target medium)
 Maximum value of SAR (measured) = 3.29 W/kg

Below 2 GHz-Rev.2/System Performance Check/Z-Axis Retraction (1x1x17): Measurement grid: dx=20mm, dy=20mm, dz=10mm



Motorola Solutions, Inc. EME Laboratory
Date/Time: 9/26/2018 2:59:43 PM

Robot#: DASY5-PG-3 | Run#: FD-SYSP-2450B-180926-01
 Dipole Model#: D2450V2
 Phantom#: ELI4 1090
 Tissue Temp: 21.8 (C)
 Serial#: 782
 Test Freq: 2450.0000 (MHz)
 Start Power: 250 (mW)
 Rotation (1D): 0.041 dB
 Adjusted SAR (1W): 53.20 mW/g (1g)

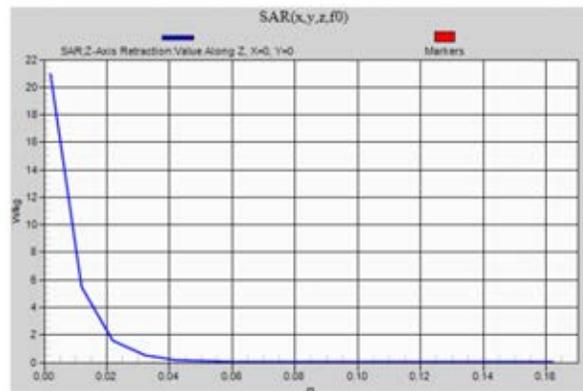
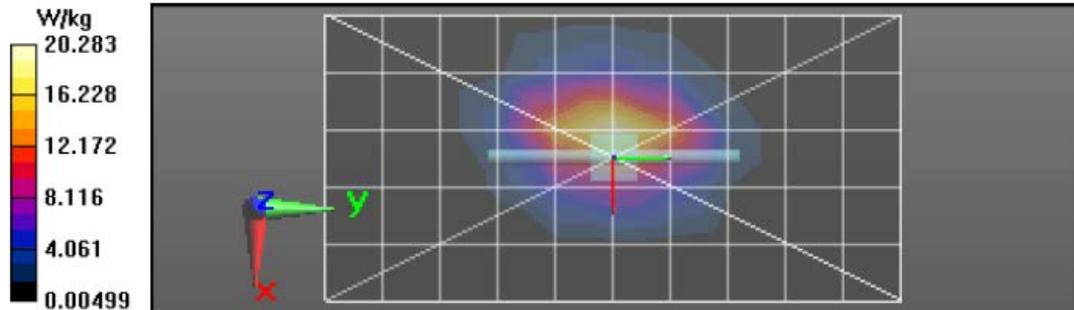
Comments:

Duty Cycle: 1:1, Medium parameters used: $f = 2450$ MHz; $\sigma = 1.96$ S/m; $\epsilon_r = 47.6$; $\rho = 1000$ kg/m³
 Probe: EX3DV4 - SN7486, Frequency: 2450 MHz, ConvF(7.77, 7.77, 7.77); Calibrated: 3/20/2018
 Electronics: DAE4 Sn1488, Calibrated: 3/9/2018

2-3 GHz-Rev.2/System Performance Check/Dipole Area Scan 2 (51x101x1): Interpolated
 grid: dx=1.200 mm, dy=1.200 mm
 Reference Value = 105.0 V/m; Power Drift = -0.07 dB
Fast SAR: SAR(1 g) = 13.6 W/kg; SAR(10 g) = 6.15 W/kg (SAR corrected for target medium)
 Maximum value of SAR (interpolated) = 20.8 W/kg

2-3 GHz-Rev.2/System Performance Check/0-Degree Cube (7x7x7)/Cube 0: Measurement
 grid: dx=5mm, dy=5mm, dz=5mm
 Reference Value = 105.0 V/m; Power Drift = -0.07 dB
 Peak SAR (extrapolated) = 27.8 W/kg
SAR(1 g) = 13.3 W/kg; SAR(10 g) = 6.21 W/kg (SAR corrected for target medium)
 Maximum value of SAR (measured) = 20.4 W/kg

2-3 GHz-Rev.2/System Performance Check/Z-Axis Retraction (1x1x17): Measurement grid:
 dx=20mm, dy=20mm, dz=10mm
 Maximum value of SAR (measured) = 21.0 W/kg



Appendix E
DUT Scans – (Shortened Scan and Highest SAR configurations)

Shortened Scan of Highest SAR configuration

Motorola Solutions, Inc. EME Laboratory

Date/Time: 9/6/2018 1:52:41 PM

Robot#: DASY5-PG-3 | Run#: AN-AB-180906-02
 Model#: PNUW1038A
 Phantom#: ELI4 1109
 Tissue Temp: 22.1 (C)
 Serial#: 673TUP1971
 Antenna: KT000026A01
 Test Freq: 465.5000 (MHz)
 Battery: PMNN4547A
 Carry Acc: PMLN7955A w/ RLN6486A w/ RLN6488A
 Audio Acc: BT(None)
 Start Power: 5.35 (W)

Comments: Shorten Scan

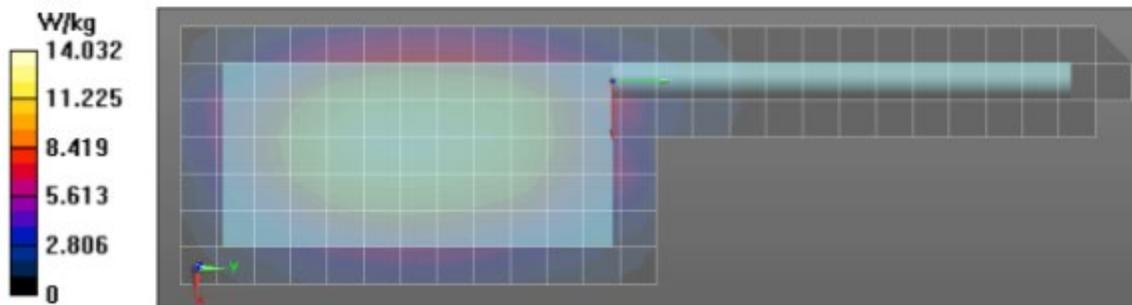
Duty Cycle: 1:1, Medium parameters used: $f = 466 \text{ MHz}$; $\sigma = 0.94 \text{ S/m}$; $\epsilon_r = 53.9$; $\rho = 1000 \text{ kg/m}^3$
 Probe: EX3DV4 - SN7486, , Frequency: 465.5 MHz, ConvF(11.68, 11.68, 11.68); Calibrated: 3/20/2018
 Electronics: DAE4 Sn1488, Calibrated: 3/9/2018

Below 2 GHz-Rev.2/Ab Scan/1-Area Scan (91x271x1): Interpolated grid: $dx=1.500 \text{ mm}$, $dy=1.500 \text{ mm}$
 Reference Value = 102.8 V/m; Power Drift = -0.35 dB
Fast SAR: SAR(1 g) = 11.8 W/kg; SAR(10 g) = 8.63 W/kg (SAR corrected for target medium)
 Maximum value of SAR (interpolated) = 14.1 W/kg

Below 2 GHz-Rev.2/Ab Scan/2-Volume 2D Scan (41x41x1): Interpolated grid: $dx=0.7500 \text{ mm}$,
 $dy=0.7500 \text{ mm}$, $dz=1.000 \text{ mm}$
 Reference Value = 102.8 V/m; Power Drift = -0.35 dB
Fast SAR: SAR(1 g) = 11.7 W/kg; SAR(10 g) = 8.66 W/kg (SAR corrected for target medium)
 Maximum value of SAR (interpolated) = 13.7 W/kg

Below 2 GHz-Rev.2/Ab Scan/3-Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$,
 $dy=7.5\text{mm}$, $dz=5\text{mm}$
 Reference Value = 124.3 V/m; Power Drift = -0.11 dB
 Peak SAR (extrapolated) = 15.8 W/kg
SAR(1 g) = 12.1 W/kg; SAR(10 g) = 9.2 W/kg (SAR corrected for target medium)
 Maximum value of SAR (measured) = 14.1 W/kg

Below 2 GHz-Rev.2/Ab Scan/4-Z-Axis Scan (1x1x17): Measurement grid: $dx=20\text{mm}$, $dy=20\text{mm}$,
 $dz=10\text{mm}$
 Maximum value of SAR (measured) = 13.5 W/kg



Shortened scan reflects highest SAR producing configuration and is compared to the full scan.

Scan Description	Referenced Table	Test Time (min.)	SAR 1g (W/kg)
Shorten scan (zoom)	22	8	6.61
Full scan (area & zoom)	19	40	6.59

Highest Body SAR configuration Results

Table – 16; VHF

Motorola Solutions, Inc. EME Laboratory

Date/Time: 9/7/2018 9:05:26 AM

Robot#: DASY5-PG-3 | Run#: AN-AB-180907-03
 Model#: PNUW1038A
 Phantom#: ELI5 1150
 Tissue Temp: 21.6 (C)
 Serial#: 673TUP1971
 Antenna: KT000026A01
 Test Freq: 150.8000 (MHz)
 Battery: PMNN4485A
 Carry Acc: PMLN7955A w/ RLN6486A w/ RLN6488A
 Audio Acc: BT(None)
 Start Power: 6.34 (W)

Comments:

Duty Cycle: 1:1, Medium parameters used: $f = 151 \text{ MHz}$; $\sigma = 0.8 \text{ S/m}$; $\epsilon_r = 58.8$; $\rho = 1000 \text{ kg/m}^3$
 Probe: EX3DV4 - SN7486, Frequency: 150.8 MHz, ConvF(13.1, 13.1, 13.1); Calibrated: 3/20/2018
 Electronics: DAE4 Sn1488, Calibrated: 3/9/2018

Below 2 GHz-Rev.2/Ab Scan/1-Area Scan (101x261x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Reference Value = 35.84 V/m; Power Drift = -0.35 dB
 Fast SAR: SAR(1 g) = 0.891 W/kg; SAR(10 g) = 0.679 W/kg (SAR corrected for target medium)
 Maximum value of SAR (interpolated) = 1.04 W/kg

Below 2 GHz-Rev.2/Ab Scan/3-Zoom Scan (7x6x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 35.84 V/m; Power Drift = -0.44 dB
 Peak SAR (extrapolated) = 1.18 W/kg
 SAR(1 g) = 0.846 W/kg; SAR(10 g) = 0.659 W/kg (SAR corrected for target medium)

Below 2 GHz-Rev.2/Ab Scan/4-Z-Axis Scan (1x1x17): Measurement grid: dx=20mm, dy=20mm, dz=10mm

Maximum value of SAR (measured) = 1.00 W/kg

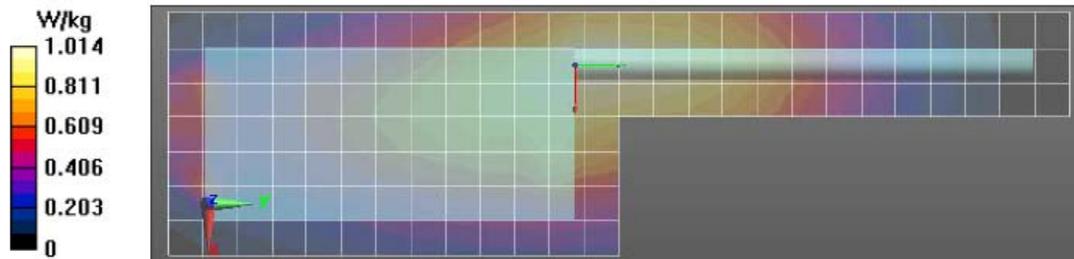


Table – 16; UHF1

Motorola Solutions, Inc. EME Laboratory
Date/Time: 9/20/2018 12:35:22 AM

Robot#: DASY5-PG-3 | Run#: FD-AB-180920-01#
Model#: PNUW1038A
Phantom#: ELI4 1109
Tissue Temp: 22.0 (C)
Serial#: 673TUP1971
Antenna: KT000026A01
Test Freq: 438.1000 (MHz)
Battery: PMNN4547A
Carry Acc: PMLN7955A w/ RLN6486A w/ RLN6488A
Audio Acc: BT(None)
Start Power: 5.31 (W)

Comments:

Duty Cycle: 1:1, Medium parameters used: f = 438 MHz; $\sigma = 0.94$ S/m; $\epsilon_r = 55$; $\rho = 1000$ kg/m³
Probe: EX3DV4 - SN7486, Frequency: 438.1 MHz, ConvF(11.68, 11.68, 11.68); Calibrated: 3/20/2018
Electronics: DAE4 Sn1488, Calibrated: 3/9/2018

Below 2 GHz-Rev.2/Ab Scan/1-Area Scan (101x281x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Reference Value = 87.76 V/m; Power Drift = -0.47 dB
Fast SAR: SAR(1 g) = 8.05 W/kg; SAR(10 g) = 5.9 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 9.55 W/kg

Below 2 GHz-Rev.2/Ab Scan/3-Zoom Scan (5x6x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 87.76 V/m; Power Drift = -0.57 dB
Peak SAR (extrapolated) = 10.1 W/kg
SAR(1 g) = 7.72 W/kg; SAR(10 g) = 5.89 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 8.99 W/kg

Below 2 GHz-Rev.2/Ab Scan/4-Z-Axis Scan (1x1x17): Measurement grid: dx=20mm, dy=20mm, dz=10mm

Maximum value of SAR (measured) = 8.85 W/kg

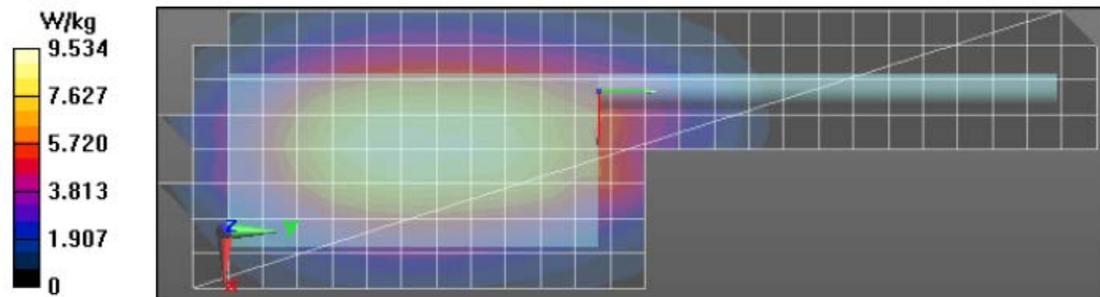


Table – 16: UHF2

Motorola Solutions, Inc. EME Laboratory
Date/Time: 9/3/2018 10:17:40 AM

Robot#: DASY5-PG-3 | Run#: AN-AB-180903-02
Model#: PNUW1038A
Phantom#: ELI4 1040
Tissue Temp: 22.5 (C)
Serial#: 673TUP1971
Antenna: KT000026A01
Test Freq: 450.0000 (MHz)
Battery: PMNN4547A
Carry Acc: PMLN7955A w/ RLN6486A w/ RLN6488A
Audio Acc: BT(None)
Start Power: 5.30 (W)

Comments:

Duty Cycle: 1:1, Medium parameters used: f = 450 MHz; $\sigma = 0.93$ S/m; $\epsilon_r = 54.2$; $\rho = 1000$ kg/m³
Probe: EX3DV4 - SN7486, Frequency: 450 MHz, ConvF(11.68, 11.68, 11.68); Calibrated: 3/20/2018
Electronics: DAE4 Sn1488, Calibrated: 3/9/2018

Below 2 GHz-Rev.2/Ab Scan/1-Area Scan (101x281x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Reference Value = 105.5 V/m; Power Drift = -0.31 dB
Fast SAR: SAR(1 g) = 11.1 W/kg; SAR(10 g) = 8.16 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 13.2 W/kg

Below 2 GHz-Rev.2/Ab Scan/3-Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 105.5 V/m; Power Drift = -0.35 dB
Peak SAR (extrapolated) = 14.3 W/kg
SAR(1 g) = 11 W/kg; SAR(10 g) = 8.38 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 12.8 W/kg

Below 2 GHz-Rev.2/Ab Scan/4-Z-Axis Scan (1x1x17): Measurement grid: dx=20mm, dy=20mm, dz=10mm

Maximum value of SAR (measured) = 12.7 W/kg

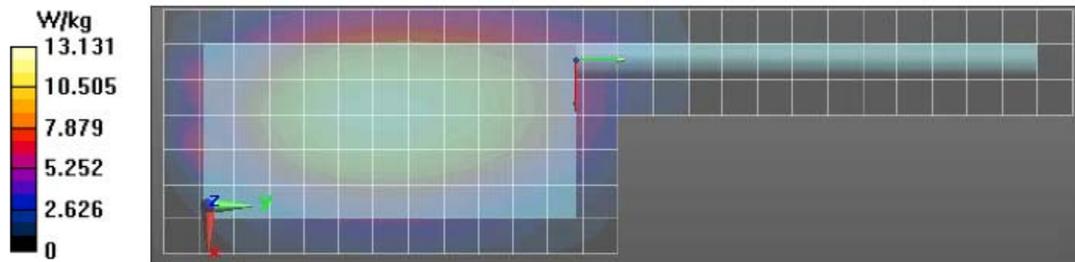


Table -16; 764-775 MHz

Motorola Solutions, Inc. EME Laboratory
Date/Time: 9/10/2018 9:55:49 AM

Robot#: DASY5-PG-3 | Run#: FD-AB-180910-02
 Model#: PNUW1038A
 Phantom#: ELI4 1028
 Tissue Temp: 21.7 (C)
 Serial#: 673TUP1971
 Antenna: NAR6595A
 Test Freq: 770.0000 (MHz)
 Battery: PMNN4485A
 Carry Acc: PMLN7955A w/ RLN6486A w/ RLN6488A
 Audio Acc: BT(None)
 Start Power: 2.66 (W)

Comments:

Duty Cycle: 1:1, Medium parameters used: $f = 770 \text{ MHz}$; $\sigma = 0.93 \text{ S/m}$; $\epsilon_r = 53.6$; $\rho = 1000 \text{ kg/m}^3$
 Probe: EX3DV4 - SN7486, Frequency: 770 MHz, ConvF(10.35, 10.35, 10.35); Calibrated: 3/20/2018
 Electronics: DAE4 Sn1488, Calibrated: 3/9/2018

Below 2 GHz-Rev.2/Ab Scan/1-Area Scan (91x201x1): Interpolated grid: $dx=1.500 \text{ mm}$, $dy=1.500 \text{ mm}$
 Reference Value = 60.33 V/m; Power Drift = -0.12 dB
 Fast SAR: SAR(1 g) = 3.53 W/kg; SAR(10 g) = 2.24 W/kg (SAR corrected for target medium)
 Maximum value of SAR (interpolated) = 4.45 W/kg

Below 2 GHz-Rev.2/Ab Scan/3-Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$,
 $dy=7.5\text{mm}$, $dz=5\text{mm}$
 Reference Value = 60.33 V/m; Power Drift = -0.15 dB
 Peak SAR (extrapolated) = 5.03 W/kg
 SAR(1 g) = 3.43 W/kg; SAR(10 g) = 2.28 W/kg (SAR corrected for target medium)
 Maximum value of SAR (measured) = 4.33 W/kg

Below 2 GHz-Rev.2/Ab Scan/4-Z-Axis Scan (1x1x17): Measurement grid: $dx=20\text{mm}$, $dy=20\text{mm}$,
 $dz=10\text{mm}$
 Maximum value of SAR (measured) = 4.31 W/kg

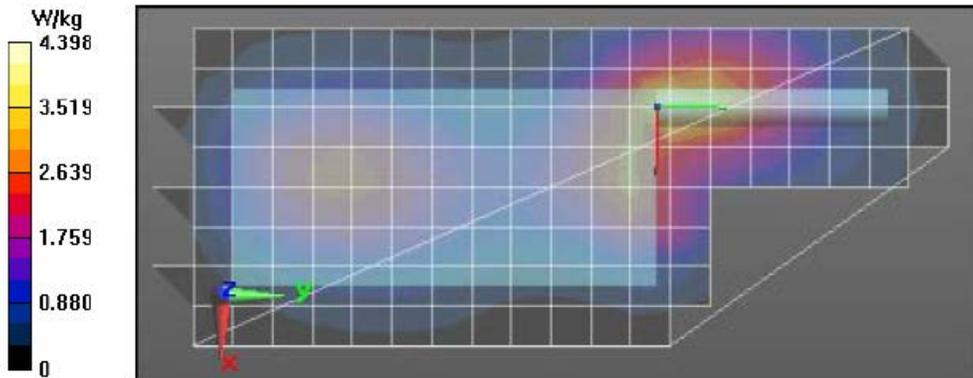


Table -16; 794-824 MHz

Motorola Solutions, Inc. EME Laboratory
Date/Time: 8/30/2018 8:28:10 AM

Robot#: DASY5-PG-3 | Run#: FD-AB-180830-05#
Model#: PNUW1038A
Phantom#: ELI4 1108
Tissue Temp: 21.0 (C)
Serial#: 673TUP1971
Antenna: NAR6595A
Test Freq: 823.9875 (MHz)
Battery: NNTN8930A
Carry Acc: PMLN7955A w/ RLN6486A w/ RLN6488A
Audio Acc: BT(None)
Start Power: 3.29 (W)

Comments:

Duty Cycle: 1:1, Medium parameters used: $f = 824 \text{ MHz}$; $\sigma = 1 \text{ S/m}$; $\epsilon_r = 53.5$; $\rho = 1000 \text{ kg/m}^3$
Probe: EX3DV4 - SN7486, Frequency: 823.987 MHz, ConvF(9.98, 9.98, 9.98); Calibrated: 3/20/2018
Electronics: DAE4 Sn1488, Calibrated: 3/9/2018

Below 2 GHz-Rev.2/Ab Scan/1-Area Scan (91x241x1): Interpolated grid: $dx=1.500 \text{ mm}$, $dy=1.500 \text{ mm}$
Reference Value = 57.37 V/m; Power Drift = -0.36 dB
Fast SAR: SAR(1 g) = 3.64 W/kg; SAR(10 g) = 2.42 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 4.56 W/kg

Below 2 GHz-Rev.2/Ab Scan/3-Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$,
 $dy=7.5\text{mm}$, $dz=5\text{mm}$
Reference Value = 57.37 V/m; Power Drift = -0.51 dB
Peak SAR (extrapolated) = 4.49 W/kg
SAR(1 g) = 3.52 W/kg; SAR(10 g) = 2.53 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 4.03 W/kg

Below 2 GHz-Rev.2/Ab Scan/4-Z-Axis Scan (1x1x17): Measurement grid: $dx=20\text{mm}$, $dy=20\text{mm}$,
 $dz=10\text{mm}$
Maximum value of SAR (measured) = 3.94 W/kg

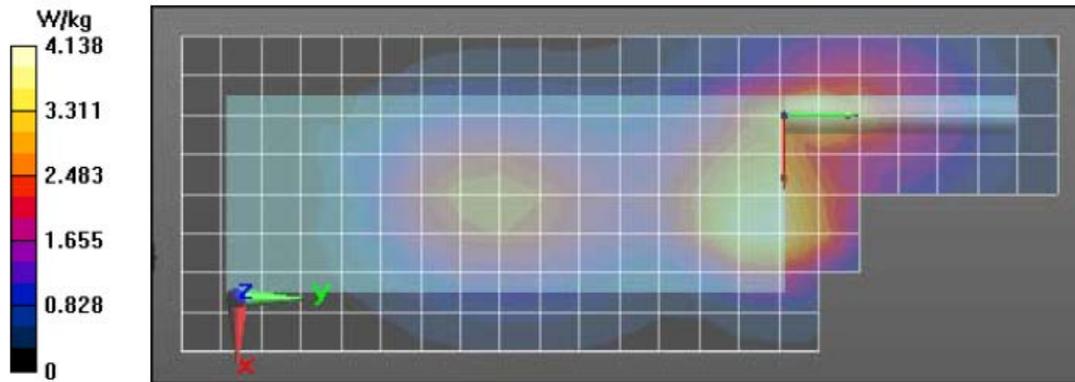


Table -16; 851-870 MHz

Motorola Solutions, Inc. EME Laboratory

Date/Time: 9/10/2018 1:49:51 PM

Robot#: DASY5-PG-3 | Run#: FD-AB-180910-07
 Model#: PNUW1038A
 Phantom#: ELI4 1028
 Tissue Temp: 21.6 (C)
 Serial#: 673TUP1971
 Antenna: NAR6595A
 Test Freq: 851.0125 (MHz)
 Battery: NNTN8930A
 Carry Acc: PMLN7955A w/ RLN6486A w/ RLN6488A
 Audio Acc: BT(None)
 Start Power: 3.28 (W)

Comments:

Duty Cycle: 1:1, Medium parameters used: $f = 851 \text{ MHz}$; $\sigma = 1.02 \text{ S/m}$; $\epsilon_r = 52.6$; $\rho = 1000 \text{ kg/m}^3$
 Probe: EX3DV4 - SN7486, , Frequency: 851.013 MHz, ConvF(9.98, 9.98, 9.98); Calibrated: 3/20/2018
 Electronics: DAE4 Sn1488, Calibrated: 3/9/2018

Below 2 GHz-Rev.2/Ab Scan/1-Area Scan (91x201x1): Interpolated grid: $dx=1.500 \text{ mm}$, $dy=1.500 \text{ mm}$
 Reference Value = 90.62 V/m; Power Drift = -0.83 dB
Fast SAR: SAR(1 g) = 7.44 W/kg; SAR(10 g) = 4.61 W/kg (SAR corrected for target medium)
 Maximum value of SAR (interpolated) = 9.77 W/kg

Below 2 GHz-Rev.2/Ab Scan/3-Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$,
 $dy=7.5\text{mm}$, $dz=5\text{mm}$
 Reference Value = 90.62 V/m; Power Drift = -0.91 dB
 Peak SAR (extrapolated) = 11.0 W/kg
SAR(1 g) = 7.09 W/kg; SAR(10 g) = 4.42 W/kg (SAR corrected for target medium)
 Maximum value of SAR (measured) = 9.20 W/kg

Below 2 GHz-Rev.2/Ab Scan/4-Z-Axis Scan (1x1x17): Measurement grid: $dx=20\text{mm}$, $dy=20\text{mm}$,
 $dz=10\text{mm}$
 Maximum value of SAR (measured) = 9.33 W/kg

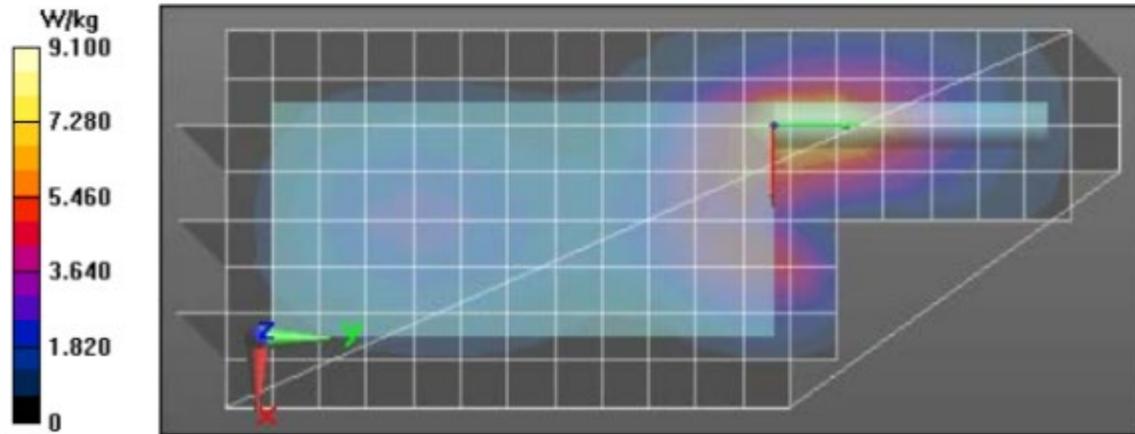


Table – 16; WiFi

Motorola Solutions, Inc. EME Laboratory

Date/Time: 9/26/2018 3:59:25 PM

Robot#: DASY5-PG-3 | Run#: FD-AB-180926-02
 Model#: PNUW1038A
 Phantom#: ELI4 1090
 Tissue Temp: 21.6 (C)
 Serial#: 673TUP1965
 Antenna: 84009370002 WiFi Ant
 Test Freq: 2412.000 (MHz)
 Battery: PMNN4547A
 Carry Acc: PMLN7955A w/ RLN6486A w/ RLN6488A
 Audio Acc: None
 Start Power: 0.0259 (W)

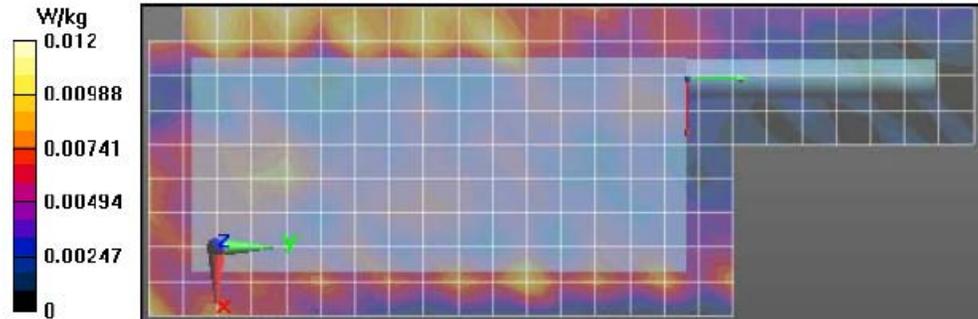
Comments: NA Region

Duty Cycle: 1:1.42561, Medium parameters used: $f = 2412$ MHz; $\sigma = 1.91$ S/m; $\epsilon_r = 47.7$; $\rho = 1000$ kg/m³
 Probe: EX3DV4 - SN7486, , Frequency: 2412 MHz, ConvF(7.77, 7.77, 7.77); Calibrated: 3/20/2018
 Electronics: DAE4 Sn1488, Calibrated: 3/9/2018

2-3 GHz-Rev.2/Ab Scan/1-Area Scan (111x261x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
 Reference Value = 1.007 V/m; Power Drift = 0.43 dB
 Fast SAR: SAR(1 g) = 0.015 W/kg; SAR(10 g) = 0.00461 W/kg (SAR corrected for target medium)

2-3 GHz-Rev.2/Ab Scan/3-Zoom Scan (9x9x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
 Reference Value = 1.007 V/m; Power Drift = 0.24 dB
 Peak SAR (extrapolated) = 0.0180 W/kg
 SAR(1 g) = 0.00459 W/kg; SAR(10 g) = 0.00221 W/kg (SAR corrected for target medium)
 Maximum value of SAR (measured) = 0.00758 W/kg

2-3 GHz-Rev.2/Ab Scan/4-Z-Axis Scan (1x1x17): Measurement grid: dx=20mm, dy=20mm, dz=10mm
 Maximum value of SAR (measured) = 0.00274 W/kg



Assessment for ISED, Canada (Body)

Table – 17; VHF

Motorola Solutions, Inc. EME Laboratory

Date/Time: 9/7/2018 11:18:41 AM

Robot#: DASY5-PG-3 | Run#: AN-AB-180907-05
 Model#: PNUW1038A
 Phantom#: ELI5 1150
 Tissue Temp: 21.7 (C)
 Serial#: 673TUP1971
 Antenna: KT000026A01
 Test Freq: 139.7000 (MHz)
 Battery: PMNN4485A
 Carry Acc: PMLN7955A w/ RLN6486A w/ RLN6488A
 Audio Acc: BT(None)
 Start Power: 6.36 (W)

Comments:

Duty Cycle: 1:1, Medium parameters used: $f = 140 \text{ MHz}$; $\sigma = 0.79 \text{ S/m}$; $\epsilon_r = 59.1$; $\rho = 1000 \text{ kg/m}^3$
 Probe: EX3DV4 - SN7486, , Frequency: 139.7 MHz, ConvF(13.1, 13.1, 13.1); Calibrated: 3/20/2018
 Electronics: DAE4 Sn1488, Calibrated: 3/9/2018

Below 2 GHz-Rev.2/Ab Scan/1-Area Scan (101x261x1): Interpolated grid: $dx=1.500 \text{ mm}$, $dy=1.500 \text{ mm}$

Reference Value = 53.00 V/m; Power Drift = -0.23 dB
Fast SAR: SAR(1 g) = 2.06 W/kg; SAR(10 g) = 1.57 W/kg (SAR corrected for target medium)
 Maximum value of SAR (interpolated) = 2.39 W/kg

Below 2 GHz-Rev.2/Ab Scan/3-Zoom Scan (7x6x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

Reference Value = 53.00 V/m; Power Drift = -0.29 dB
 Peak SAR (extrapolated) = 2.68 W/kg
SAR(1 g) = 1.95 W/kg; SAR(10 g) = 1.51 W/kg (SAR corrected for target medium)
 Maximum value of SAR (measured) = 2.32 W/kg

Below 2 GHz-Rev.2/Ab Scan/4-Z-Axis Scan (1x1x17): Measurement grid: $dx=20\text{mm}$, $dy=20\text{mm}$, $dz=10\text{mm}$

Maximum value of SAR (measured) = 2.30 W/kg

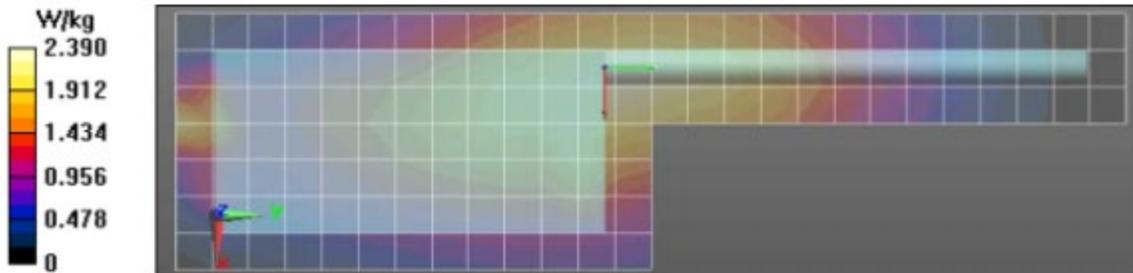


Table – 18; UHF1

Motorola Solutions, Inc. EME Laboratory

Date/Time: 9/21/2018 4:21:50 AM

Robot#: DASY5-PG-3 | Run#: FD-AB-180921-04
 Model#: PNUW1038A
 Phantom#: ELI4 1109
 Tissue Temp: 21.5 (C)
 Serial#: 673TUP1971
 Antenna: KT000026A01
 Test Freq: 470.0000 (MHz)
 Battery: PMNN4547A
 Carry Acc: PMLN7955A w/ RLN6486A w/ RLN6488A
 Audio Acc: BT(None)
 Start Power: 5.30 (W)

Comments:

Duty Cycle: 1:1, Medium parameters used: $f = 470$ MHz; $\sigma = 0.97$ S/m; $\epsilon_r = 54.4$; $\rho = 1000$ kg/m³
 Probe: EX3DV4 - SN7486, , Frequency: 470 MHz, ConvF(11.68, 11.68, 11.68); Calibrated: 3/20/2018
 Electronics: DAE4 Sn1488, Calibrated: 3/9/2018

Below 2 GHz-Rev.2/Ab Scan/1-Area Scan (101x281x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Reference Value = 98.33 V/m; Power Drift = -0.54 dB
Fast SAR: SAR(1 g) = 10.8 W/kg; SAR(10 g) = 7.85 W/kg (SAR corrected for target medium)
 Maximum value of SAR (interpolated) = 12.8 W/kg

Below 2 GHz-Rev.2/Ab Scan/3-Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 98.33 V/m; Power Drift = -0.53 dB
 Peak SAR (extrapolated) = 13.8 W/kg
SAR(1 g) = 10.5 W/kg; SAR(10 g) = 7.94 W/kg (SAR corrected for target medium)
 Maximum value of SAR (measured) = 12.3 W/kg

Below 2 GHz-Rev.2/Ab Scan/4-Z-Axis Scan (1x1x17): Measurement grid: dx=20mm, dy=20mm, dz=10mm

Maximum value of SAR (measured) = 12.2 W/kg

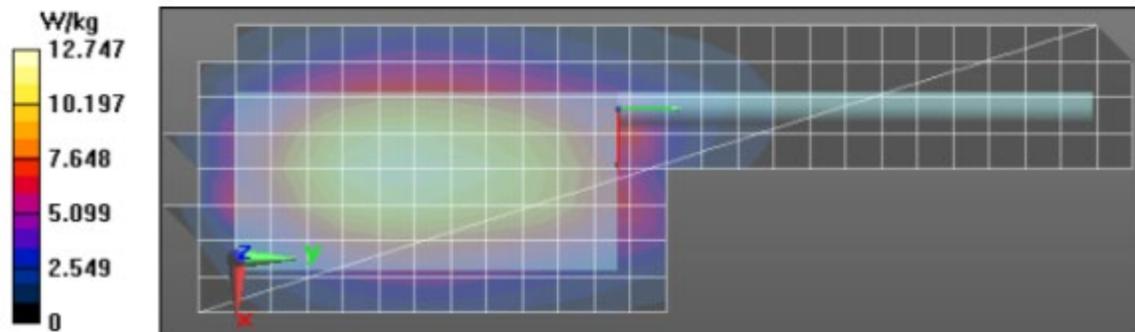


Table – 19; UHF2

Motorola Solutions, Inc. EME Laboratory

Date/Time: 9/4/2018 12:44:43 AM

Robot#: DASY5-PG-3 | Run#: FD-AB-180904-01#
 Model#: PNUW1038A
 Phantom#: ELI4 1109
 Tissue Temp: 21.7 (C)
 Serial#: 673TUP1971
 Antenna: KT000026A01
 Test Freq: 465.5000 (MHz)
 Battery: PMNN4547A
 Carry Acc: PMLN7955A w/ RLN6486A w/ RLN6488A
 Audio Acc: BT(None)
 Start Power: 5.34 (W)

Comments:

Duty Cycle: 1:1, Medium parameters used: f = 466 MHz; $\sigma = 0.95$ S/m; $\epsilon_r = 54.3$; $\rho = 1000$ kg/m³
 Probe: EX3DV4 - SN7486, Frequency: 465.5 MHz, ConvF(11.68, 11.68, 11.68); Calibrated: 3/20/2018
 Electronics: DAE4 Sn1488, Calibrated: 3/9/2018

Below 2 GHz-Rev.2/Ab Scan/1-Area Scan (91x271x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
 Reference Value = 106.0 V/m; Power Drift = -0.30 dB
 Fast SAR: SAR(1 g) = 11.6 W/kg; SAR(10 g) = 8.49 W/kg (SAR corrected for target medium)
 Maximum value of SAR (interpolated) = 13.8 W/kg

Below 2 GHz-Rev.2/Ab Scan/3-Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
 Reference Value = 106.0 V/m; Power Drift = -0.35 dB
 Peak SAR (extrapolated) = 14.9 W/kg
 SAR(1 g) = 11.4 W/kg; SAR(10 g) = 8.62 W/kg (SAR corrected for target medium)
 Maximum value of SAR (measured) = 13.3 W/kg

Below 2 GHz-Rev.2/Ab Scan/4-Z-Axis Scan (1x1x17): Measurement grid: dx=20mm, dy=20mm, dz=10mm
 Maximum value of SAR (measured) = 13.2 W/kg

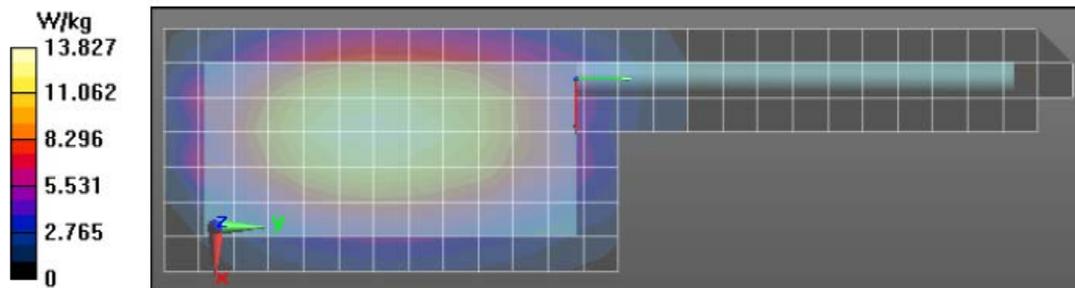


Table – 20; 7/800

Motorola Solutions, Inc. EME Laboratory
Date/Time: 9/10/2018 1:49:51 PM

Robot#: DASY5-PG-3 | Run#: FD-AB-180910-07
Model#: PNUW1038A
Phantom#: ELI4 1028
Tissue Temp: 21.6 (C)
Serial#: 673TUP1971
Antenna: NAR6595A
Test Freq: 851.0125 (MHz)
Battery: NNTN8930A
Carry Acc: PMLN7955A w/ RLN6486A w/ RLN6488A
Audio Acc: BT(None)
Start Power: 3.28 (W)

Comments:

Duty Cycle: 1:1, Medium parameters used: f = 851 MHz; $\sigma = 1.02 \text{ S/m}$; $\epsilon_r = 52.6$; $\rho = 1000 \text{ kg/m}^3$
Probe: EX3DV4 - SN7486, , Frequency: 851.013 MHz, ConvF(9.98, 9.98, 9.98); Calibrated: 3/20/2018
Electronics: DAE4 Sn1488, Calibrated: 3/9/2018

Below 2 GHz-Rev.2/Ab Scan/1-Area Scan (91x201x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 90.62 V/m; Power Drift = -0.83 dB
Fast SAR: SAR(1 g) = 7.44 W/kg; SAR(10 g) = 4.61 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 9.77 W/kg

Below 2 GHz-Rev.2/Ab Scan/3-Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm,
dy=7.5mm, dz=5mm
Reference Value = 90.62 V/m; Power Drift = -0.91 dB
Peak SAR (extrapolated) = 11.0 W/kg
SAR(1 g) = 7.09 W/kg; SAR(10 g) = 4.42 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 9.20 W/kg

Below 2 GHz-Rev.2/Ab Scan/4-Z-Axis Scan (1x1x17): Measurement grid: dx=20mm, dy=20mm,
dz=10mm
Maximum value of SAR (measured) = 9.33 W/kg

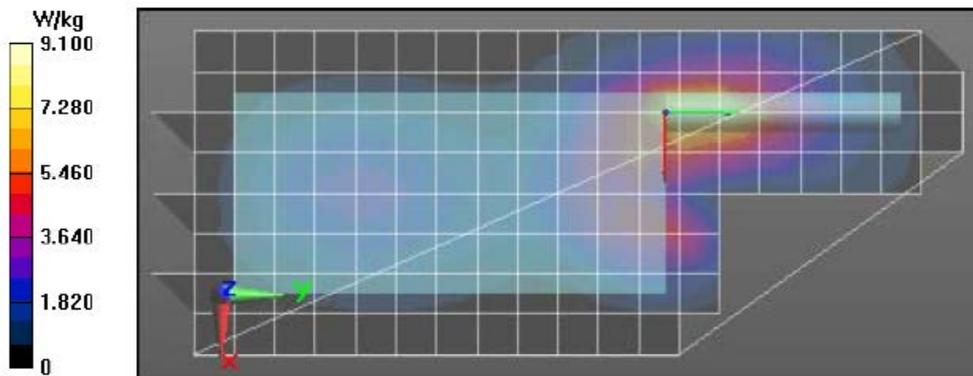


Table – 21; WiFi

Motorola Solutions, Inc. EME Laboratory
 Date/Time: 9/26/2018 10:57:47 PM

Robot#: DASY5-PG-3 | Run#: ZZ-AB-180926-07
 Model#: PNUW1038A
 Phantom#: ELI4 1090
 Tissue Temp: 21.4 (C)
 Serial#: 673TUP1965
 Antenna: 84009370002 WiFi Ant
 Test Freq: 2462.000 (MHz)
 Battery: PMNN4547A
 Carry Acc: PMLN7955A w/ RLN6486A w/ RLN6488A
 Audio Acc: None
 Start Power: 0.0259 (W)

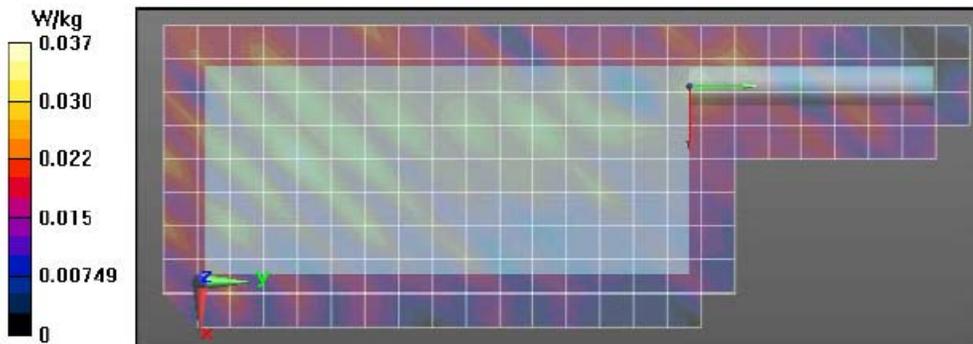
Comments: NA Region

Duty Cycle: 1:1.42561, Medium parameters used: $f = 2462$ MHz; $\sigma = 1.97$ S/m; $\epsilon_r = 47.6$; $\rho = 1000$ kg/m³
 Probe: EX3DV4 - SN7486, Frequency: 2462 MHz, ConvF(7.77, 7.77, 7.77); Calibrated: 3/20/2018
 Electronics: DAE4 Sn1488, Calibrated: 3/9/2018

2-3 GHz-Rev.2/Ab Scan/1-Area Scan (131x261x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
 Reference Value = 0.3760 V/m; Power Drift = 6.88 dB
 Fast SAR: SAR(1 g) = 0.032 W/kg; SAR(10 g) = 0.011 W/kg (SAR corrected for target medium)
 Maximum value of SAR (interpolated) = 0.0834 W/kg

2-3 GHz-Rev.2/Ab Scan/3-Zoom Scan (13x19x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
 Reference Value = 0.3760 V/m; Power Drift = 0.80 dB
 Peak SAR (extrapolated) = 0.0290 W/kg
 SAR(1 g) = 0.015 W/kg; SAR(10 g) = 0.00748 W/kg (SAR corrected for target medium)
 Maximum value of SAR (measured) = 0.0239 W/kg

2-3 GHz-Rev.2/Ab Scan/4-Z-Axis Scan (1x1x17): Measurement grid: dx=20mm, dy=20mm, dz=10mm
 Maximum value of SAR (measured) = 0.00866 W/kg



APPENDIX F
DUT Test Position Photos

1.0 Highest SAR Test Position per body location

1.1 Body

DUT with antenna KT000026A01 with offered battery PMNN4547A and body worn PMLN7955A with RLN6486A and RLN6488A against the phantom without an audio accessory attached. Same position used for the other applicable offered antenna, batteries with and without audio and internal WLAN antenna (without audio accessory attached).



Antenna kit #	Separation Distances (mm)		
	@ bottom surface of the DUT	@ antenna's base	@ antenna's tip
KT000026A01	0	35	60
NAR6595A	0	35	46

APPENDIX G
Body Worn Photos



PMLN7955A (Front View)

PMLN7955A (Back View)

PMLN7955A (Side View)



RLN6486A
(Strap used with PMLN7955A)



RLN6488A
(Strap used with PMLN7955A)