MOTOROLA SOLUTIONS

MS ISO/IEC 17025
TESTING
SAMM No.0826

DECLARATION OF COMPLIANCE SAR ASSESSMENT Part 2 of 3

Motorola Solutions Inc
EME Test Laboratory
Motorola Solutions Malaysia Sdn Bhd (Innoplex) (455657-H)
Plot 2A, Medan Bayan Lepas,
Mukim 12 SWD, 11900 Bayan Lepas Penang, Malaysia.

Date of Report: 05/25/2018
Report Revision: B

Responsible Engineer:	Veeramani Veerapan
Report Author:	Veeramani Veerapan
Date/s Tested:	11/14/2017 – 4/24/2018
Manufacturer:	Motorola Solutions Inc.
DUT Description:	Handheld Portable - APX8000H ST U/V/7_800 M3.5 Black (Standard Top Control, Black 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/n)
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/n)
Tx Frequency Bands:	LMR 136-174 MHz, 380-520 MHz, 762-805 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 (PNUW1036A / KNUW1036A)
Model(s) Certified:	H91TGD9PW8AN (PNUW1035A / KNUW1035A; PNUW1041A / KNUW1041A) H91TGD9PW9AN (PNUW1036A / KNUW1036A; PNUW1042A / KNUW1042A)
Serial Number(s):	673TTV0841, 673TTV0848, 673TTV1050
Classification:	Occupational/Controlled
FCC ID:	AZ489FT7111; 150.8-173.4 MHz, 406.1-512 MHz, 764-775 MHz, 794-824 MHz, 851-869 MHz. This report contains results that are immaterial for FCC equipment approval, which are clearly identified.
IC ID:	109U-89FT7111; 138- 174 MHz, 406.1-430 MHz, 450-470 MHz, 764-775 MHz, 794-824 MHz, 851-869 MHz. This report contains results that are immaterial for ISED equipment approval, which are clearly identified.
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 Nguk Ing
Digitally signed by Tiong Nguk Ing
Date: 2018.05.29 15:16:54 +08'00'

Tiong Nguk Ing
Deputy Technical Manager (Approved Signatory)
Approval Date: 5/29/2018

APPENDIX C
Dipole Calibration Certificate

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

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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: 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

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 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

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

Issued: November 9, 2016

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Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

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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 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 cm³ (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 cm³ (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 cm³ (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 cm³ (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

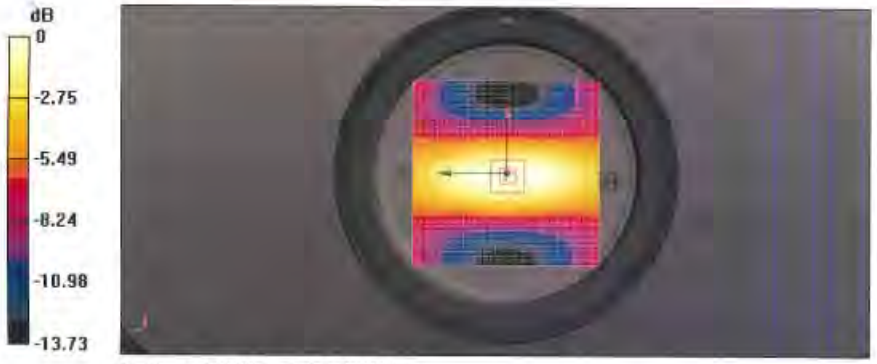
Communication System: UID 0 - CW; Frequency: 150 MHz
Medium parameters used: f = 150 MHz; σ = 0.75 S/m; ε_r = 50.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

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)

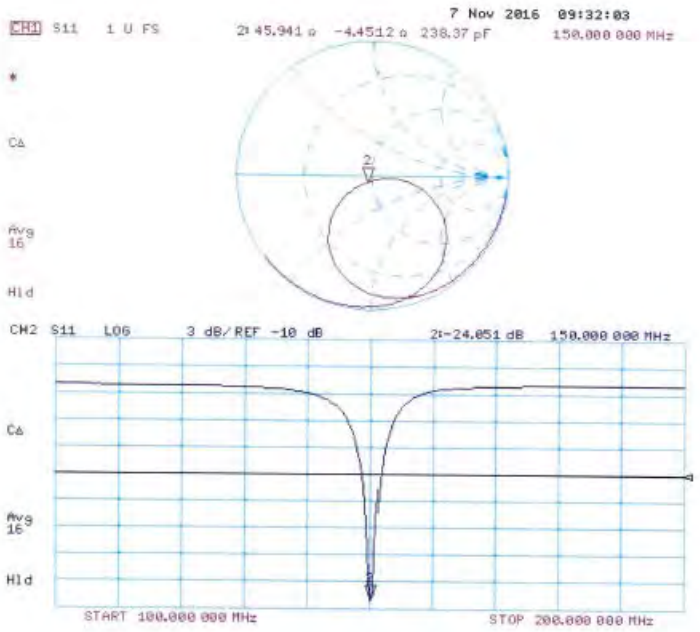
CLA Calibration for HSL-LF Tissue/CLA150, touch configuration, Pin=1W/Area Scan (81x81x1):
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 5.16 W/kg

CLA Calibration for HSL-LF Tissue/CLA150, touch configuration, Pin=1W/Zoom Scan, dist=1.4mm (8x10x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
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



0 dB = 5.16 W/kg = 7.13 dBW/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

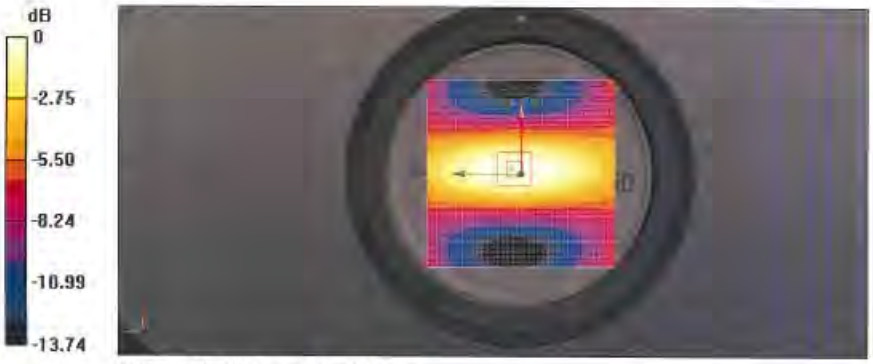
Communication System: UID 0 - CW; Frequency: 150 MHz
Medium parameters used: f = 150 MHz; σ = 0.82 S/m; ε_r = 61.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

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)

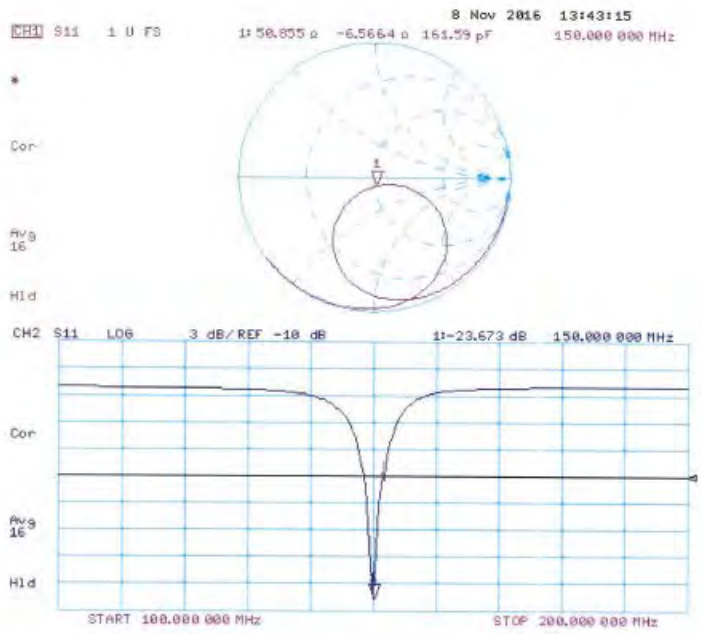
CLA Calibration for MSL-LF Tissue/CLA150, touch configuration, Pin=1W/Area Scan (81x81x1):
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 5.45 W/kg

CLA Calibration for MSL-LF Tissue/CLA150, touch configuration, Pin=1W/Zoom Scan, dist=1.4mm (8x10x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
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



0 dB = 5.45 W/kg = 7.36 dBW/kg

Impedance Measurement Plot for Body TSL



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Accreditation No.: SCS 0108

Client Motorola EME

Certificate No: D450V3-1077_Nov15

CALIBRATION CERTIFICATE

Object	D450V3 - SN: 1077
Calibration procedure(s)	QA CAL-15.v8 Calibration procedure for dipole validation kits below 700 MHz
Calibration date:	November 25, 2015

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 E4419B	GB41293874	01-Apr-15 (No. 217-02128)	Mar-16
Power sensor E4412A	MY41498087	01-Apr-15 (No. 217-02128)	Mar-16
Reference 3 dB Attenuator	SN: S5054 (3c)	01-Apr-15 (No. 217-02129)	Mar-16
Reference 20 dB Attenuator	SN: S5058 (20k)	01-Apr-15 (No. 217-02131)	Mar-16
Type-N mismatch combination	SN: 5047.2 / 06327	01-Apr-15 (No. 217-02134)	Mar-16
Reference Probe ET3DV6	SN: 1507	30-Dec-14 (No. ET3-1507_Dec14)	Dec-15
DAE4	SN: 654	08-Jul-15 (No. DAE4-654_Jul15)	Jul-16

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	04-Aug-99 (in house check Apr-13)	In house check: Apr-16
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-15)	In house check: Oct-16

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

Issued: November 25, 2015

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

Certificate No: D450V3-1077_Nov15 Page 1 of 8

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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	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	44.0 ± 6 %	0.89 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	1.16 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	0.777 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**3.07 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	56.3 ± 6 %	0.95 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	1.14 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**4.52 W/kg ± 18.1 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	0.749 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**2.97 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	58.1 Ω - 2.3 jΩ
Return Loss	- 22.1 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	55.0 Ω - 6.8 jΩ
Return Loss	- 21.9 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.349 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	June 24, 2010

DASY5 Validation Report for Head TSL

Date: 25.11.2015

Test Laboratory: SPEAG, Zurich, Switzerland

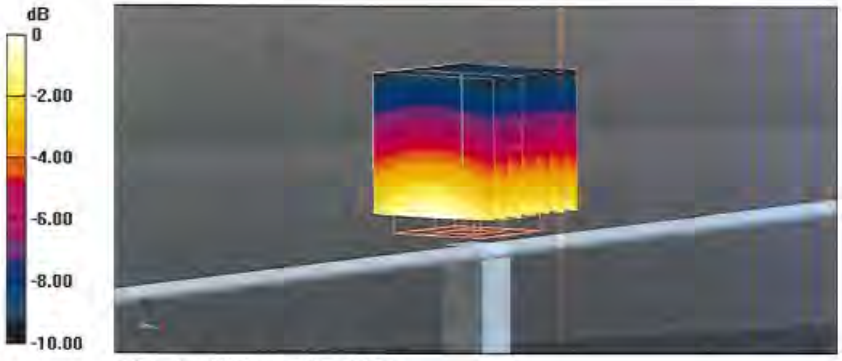
DUT: Dipole 450 MHz; Type: D450V3; Serial: D450V3 - SN: 1077

Communication System: UID 0 - CW; Frequency: 450 MHz
Medium parameters used: f = 450 MHz; σ = 0.89 S/m; ε_r = 44; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

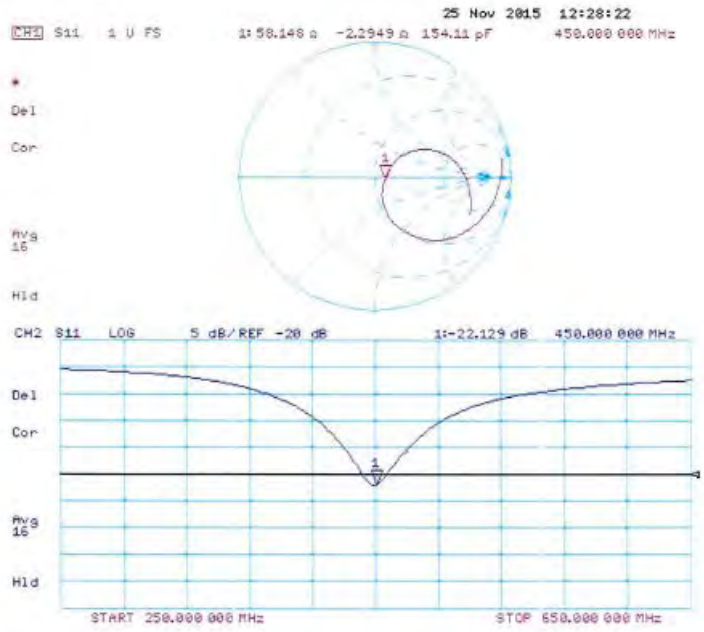
- Probe: ET3DV6 - SN1507; ConvF(6.58, 6.58, 6.58); Calibrated: 30.12.2014;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn654; Calibrated: 08.07.2015
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP:1003
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Head Tissue/d=15mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 39.43 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 1.67 W/kg
SAR(1 g) = 1.16 W/kg; SAR(10 g) = 0.777 W/kg
Maximum value of SAR (measured) = 1.25 W/kg



0 dB = 1.25 W/kg = 0.97 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 25.11.2015

Test Laboratory: SPEAG, Zurich, Switzerland

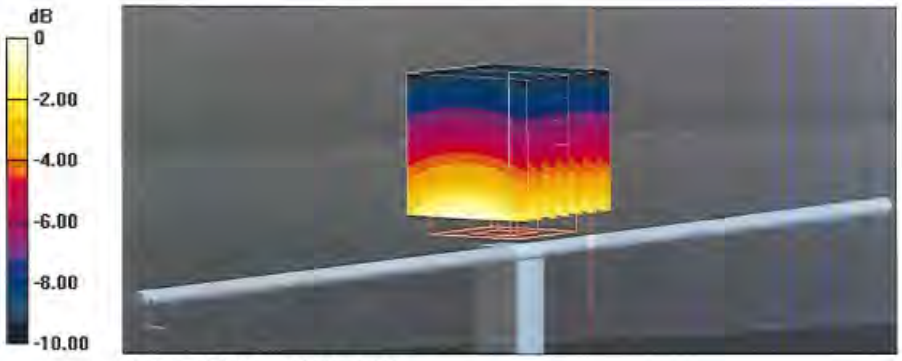
DUT: Dipole 450 MHz; Type: D450V3; Serial: D450V3 - SN: 1077

Communication System: UID 0 - CW; Frequency: 450 MHz
Medium parameters used: f = 450 MHz; σ = 0.95 S/m; ε_r = 56.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

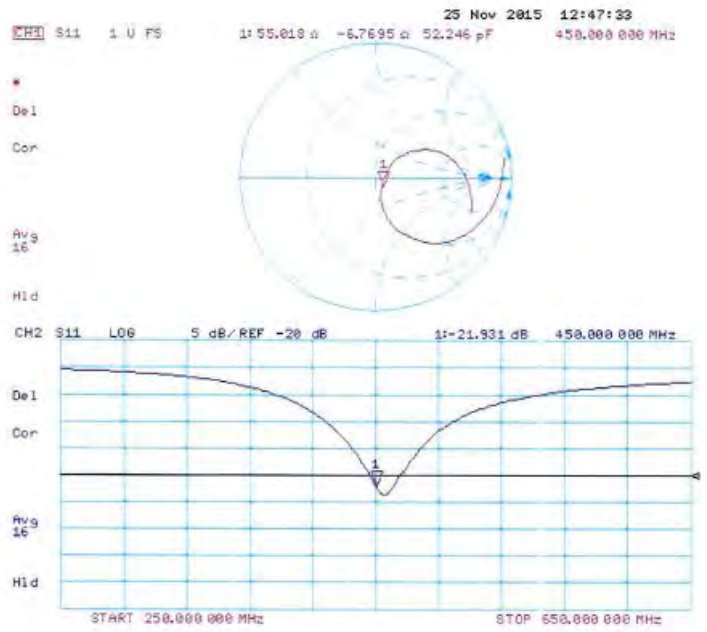
- Probe: ET3DV6 - SN1507; ConvF(7.05, 7.05, 7.05); Calibrated: 30.12.2014;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn654; Calibrated: 08.07.2015
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP:1003
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Body Tissue/d=15mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 36.74 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 1.80 W/kg
SAR(1 g) = 1.14 W/kg; SAR(10 g) = 0.749 W/kg
Maximum value of SAR (measured) = 1.22 W/kg



0 dB = 1.22 W/kg = 0.86 dBW/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

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	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 jΩ
Return Loss	- 21.6 dB

Antenna Parameters with Body TSL

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

General Antenna Parameters and Design

Electrical Delay (one direction)	1.349 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: 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 MHz; σ = 0.87 S/m; ε_r = 43.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

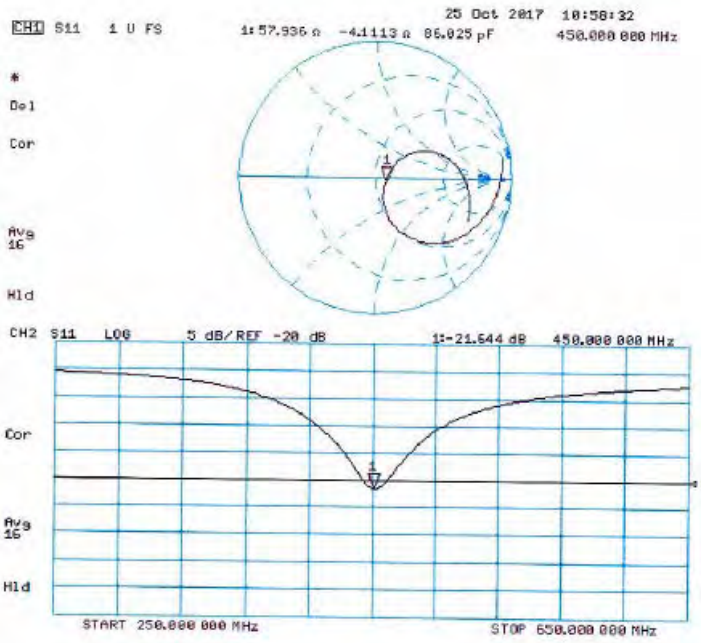
DASY52 Configuration:

- Probe: EX3DV4 - SN3877; ConvF(10.5, 10.5, 10.5); 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=15mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
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

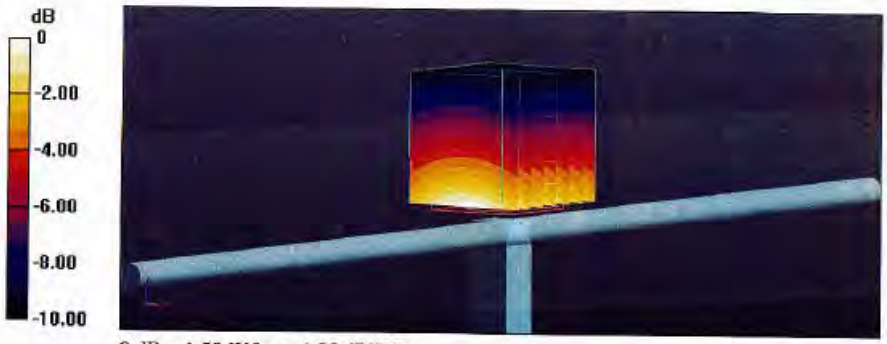
DUT: Dipole 450 MHz D450V3; Type: D450V3; Serial: D450V3 - SN:1054

Communication System: UID 0 - CW; Frequency: 450 MHz
Medium parameters used: f = 450 MHz; σ = 0.93 S/m; ε_r = 55.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

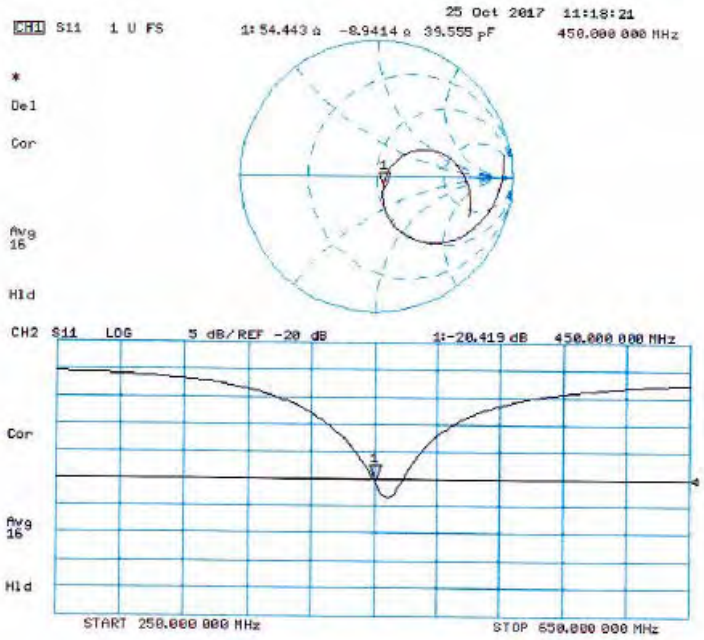
- Probe: EX3DV4 - SN3877; ConvF(10.7, 10.7, 10.7); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn654; Calibrated: 24.07.2017
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP:1003
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

Dipole Calibration for Body Tissue/d=15mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
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



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

Impedance Measurement Plot for Body TSL



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Accreditation No.: SCS 0108

Client Motorola EME

Certificate No: D750V3-1098_Nov15

CALIBRATION CERTIFICATE

Object	D750V3 - SN: 1098
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	November 24, 2015

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 EPM-442A	GB37480704	07-Oct-15 (No. 217-02222)	Oct-16
Power sensor HP 8481A	US37292783	07-Oct-15 (No. 217-02222)	Oct-16
Power sensor HP 8481A	MY41092317	07-Oct-15 (No. 217-02223)	Oct-16
Reference 20 dB Attenuator	SN: 5058 (20k)	01-Apr-15 (No. 217-02131)	Mar-16
Type-N mismatch combination	SN: 5047.2 / 06327	01-Apr-15 (No. 217-02134)	Mar-16
Reference Probe EX3DV4	SN: 7349	30-Dec-14 (No. EX3-7349_Dec14)	Dec-15
DAE4	SN: 601	17-Aug-15 (No. DAE4-601_Aug15)	Aug-16

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100972	15-Jun-15 (in house check Jun-15)	In house check: Jun-16
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-15)	In house check: Oct-16

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

Issued: November 24, 2015

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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	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.9	0.89 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	42.8 ± 6 %	0.90 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	2.06 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**8.21 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.35 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.38 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	55.5	0.96 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	55.9 ± 6 %	0.97 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	2.23 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**8.86 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.48 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**5.89 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	53.0 Ω - 2.8 jΩ
Return Loss	- 26.0 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	49.3 Ω - 4.5 jΩ
Return Loss	- 26.7 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.031 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	July 05, 2013

DASY5 Validation Report for Head TSL

Date: 24.11.2015

Test Laboratory: SPEAG, Zurich, Switzerland

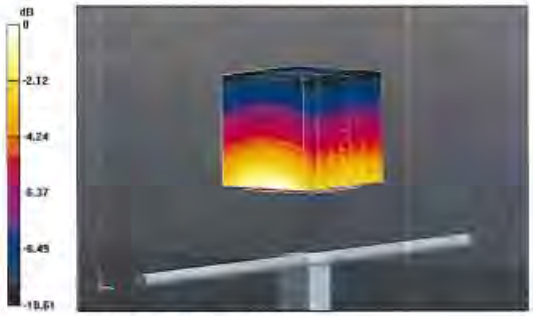
DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1098

Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.9 S/m; ε_r = 42.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

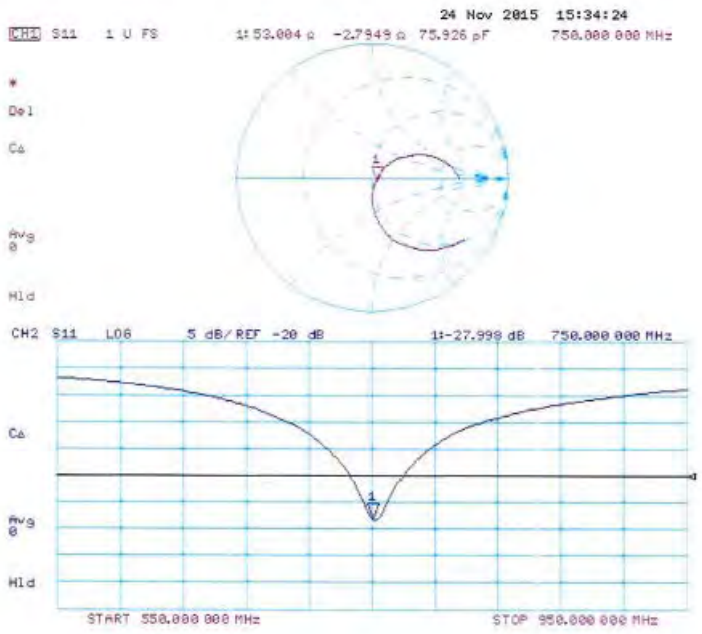
- Probe: EX3DV4 - SN7349; ConvF(10.1, 10.1, 10.1); Calibrated: 30.12.2014;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 17.08.2015
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 58.25 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 3.11 W/kg
SAR(1 g) = 2.06 W/kg; SAR(10 g) = 1.35 W/kg
Maximum value of SAR (measured) = 2.77 W/kg



0 dB = 2.77 W/kg = 4.42 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 24.11.2015

Test Laboratory: SPEAG, Zurich, Switzerland

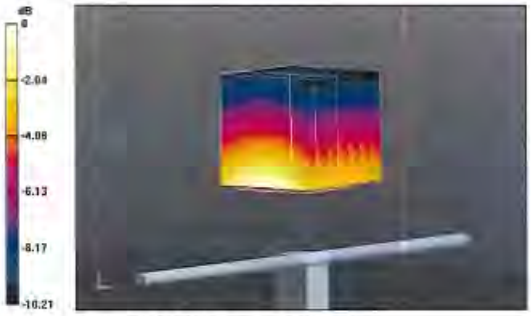
DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1098

Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.97 S/m; ε_r = 55.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

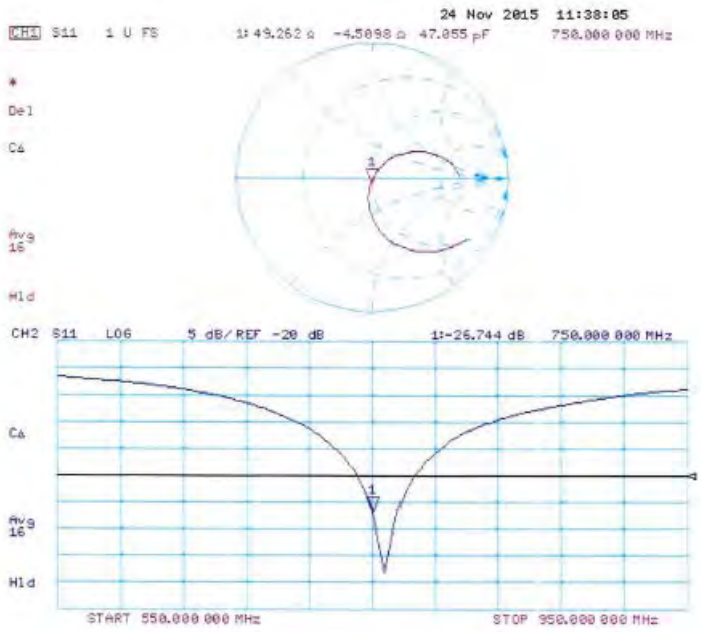
- Probe: EX3DV4 - SN7349; ConvF(9.61, 9.61, 9.61); Calibrated: 30.12.2014;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 17.08.2015
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.88 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 3.27 W/kg
SAR(1 g) = 2.23 W/kg; SAR(10 g) = 1.48 W/kg
Maximum value of SAR (measured) = 2.92 W/kg



0 dB = 2.92 W/kg = 4.65 dBW/kg

Impedance Measurement Plot for Body TSL



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Accreditation No.: SCS 0108

Client **Motorola Solutions MY** **Certificate No: D750V3-1142_Oct17**

CALIBRATION CERTIFICATE

Object	D750V3 - SN:1142
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	October 12, 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: 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	31-May-17 (No. EX3-7349_May17)	May-18
DAE4	SN: 601	28-Mar-17 (No. DAE4-601_Mar17)	Mar-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:	Leif Klysner	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: October 13, 2017

Calibration Laboratory of
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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	750 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.9	0.89 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.9 ± 6 %	0.90 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	2.11 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**8.32 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.36 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.38 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	55.5	0.96 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.6 ± 6 %	0.98 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	2.17 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**8.51 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.42 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**5.59 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	55.5 Ω - 1.7 jΩ
Return Loss	- 25.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	49.7 Ω - 5.0 jΩ
Return Loss	- 25.9 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.034 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	January 28, 2015

DASY5 Validation Report for Head TSL

Date: 12.10.2017

Test Laboratory: SPEAG, Zurich, Switzerland

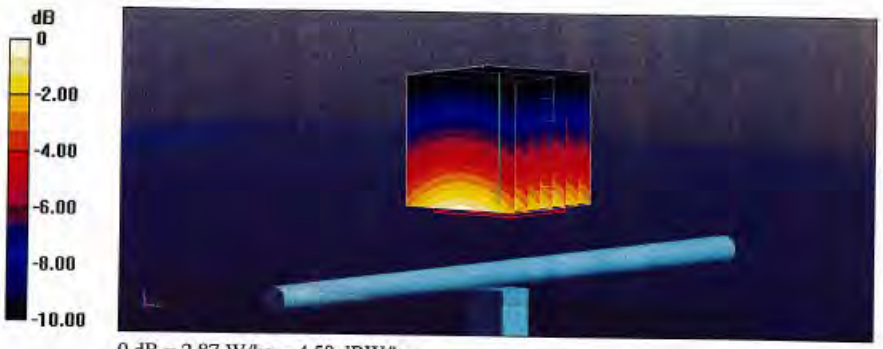
DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1142

Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.9 S/m; ε_r = 40.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

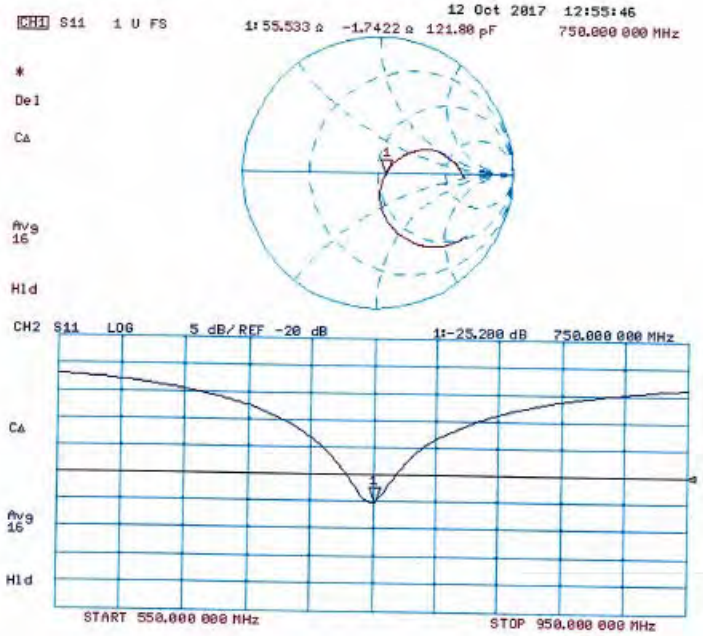
- Probe: EX3DV4 - SN7349; ConvF(10.49, 10.49, 10.49); Calibrated: 31.05.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 58.72 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 3.29 W/kg
SAR(1 g) = 2.11 W/kg; SAR(10 g) = 1.36 W/kg
Maximum value of SAR (measured) = 2.87 W/kg



0 dB = 2.87 W/kg = 4.58 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 12.10.2017

Test Laboratory: SPEAG, Zurich, Switzerland

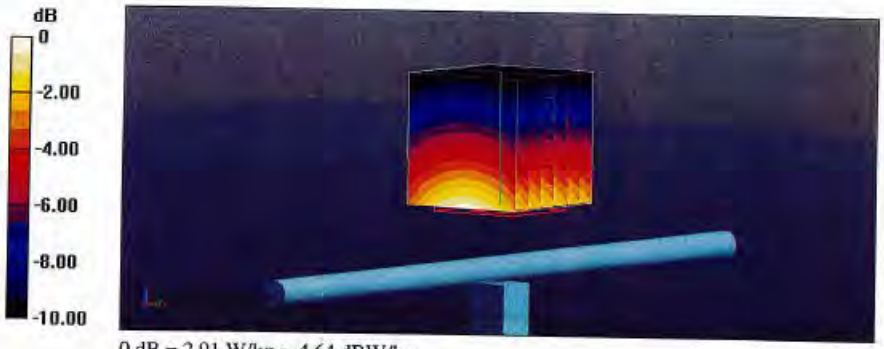
DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1142

Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.98 S/m; ε_r = 54.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

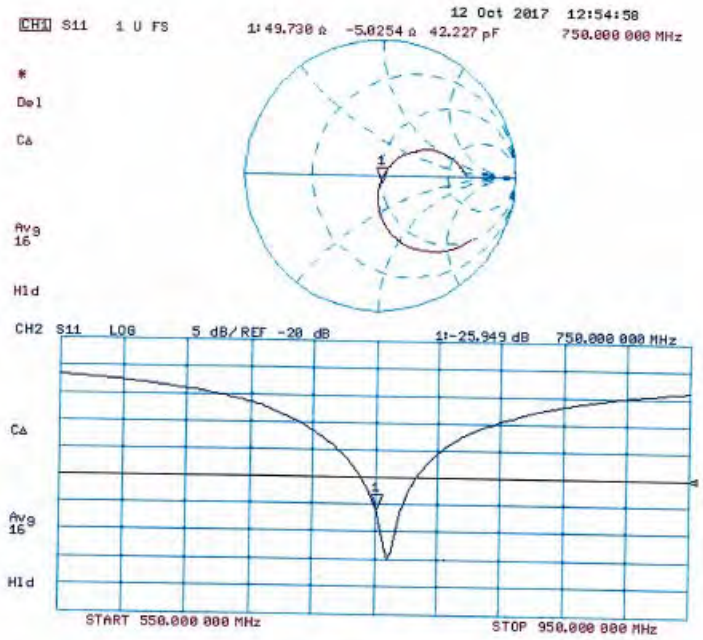
- Probe: EX3DV4 - SN7349; ConvF(10.35, 10.35, 10.35); Calibrated: 31.05.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 4.9 (Back); Type: QD 00R P49 AA; Serial: 1005
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.32 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 3.29 W/kg
SAR(1 g) = 2.17 W/kg; SAR(10 g) = 1.42 W/kg
Maximum value of SAR (measured) = 2.91 W/kg



0 dB = 2.91 W/kg = 4.64 dBW/kg

Impedance Measurement Plot for Body TSL



Certificate No: D750V3-1142_Oct17 Page 8 of 8

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Accreditation No.: **SCS 0108**

Client **Motorola Solutions MY** Certificate No: **D900V2-1d026_Jan17**

CALIBRATION CERTIFICATE

Object	D900V2 - SN:1d026
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	January 18, 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: 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-16)	In house check: Oct-17

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

Issued: January 20, 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	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	900 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	0.97 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.2 ± 6 %	0.94 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	2.66 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**10.9 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.70 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**6.92 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	55.0	1.05 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	53.8 ± 6 %	1.02 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	2.71 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**11.0 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.75 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**7.10 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	50.6 Ω - 0.2 jΩ
Return Loss	- 43.5 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.7 Ω - 2.3 jΩ
Return Loss	- 27.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.395 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	February 08, 2005

DASY5 Validation Report for Head TSL

Date: 16.01.2017

Test Laboratory: SPEAG, Zurich, Switzerland

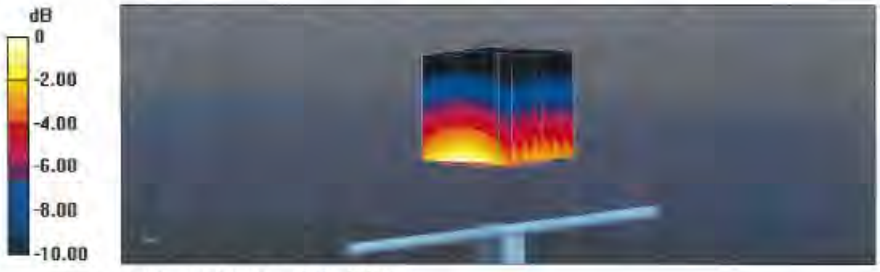
DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN:1d026

Communication System: UID 0 - CW; Frequency: 900 MHz
Medium parameters used: f = 900 MHz; σ = 0.94 S/m; ε_r = 41.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

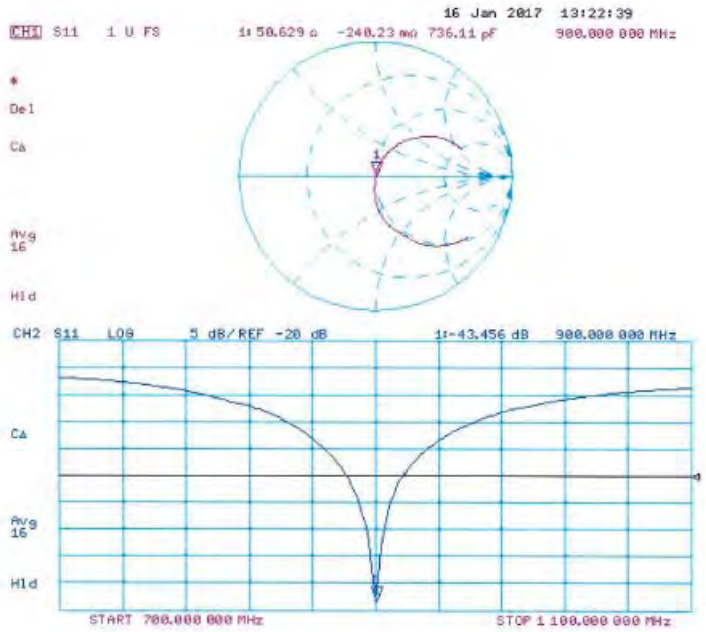
- Probe: EX3DV4 - SN7349; ConvF(9.7, 9.7, 9.7); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.01.2017
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 64.94 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 4.18 W/kg
SAR(1 g) = 2.66 W/kg; SAR(10 g) = 1.7 W/kg
Maximum value of SAR (measured) = 3.63 W/kg



0 dB = 3.63 W/kg = 5.60 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 18.01.2017

Test Laboratory: SPEAG, Zurich, Switzerland

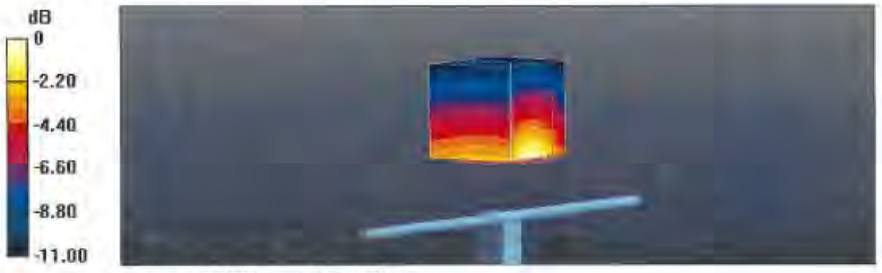
DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN:1d026

Communication System: UID 0 - CW; Frequency: 900 MHz
Medium parameters used: f = 900 MHz; σ = 1.02 S/m; ε_r = 53.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

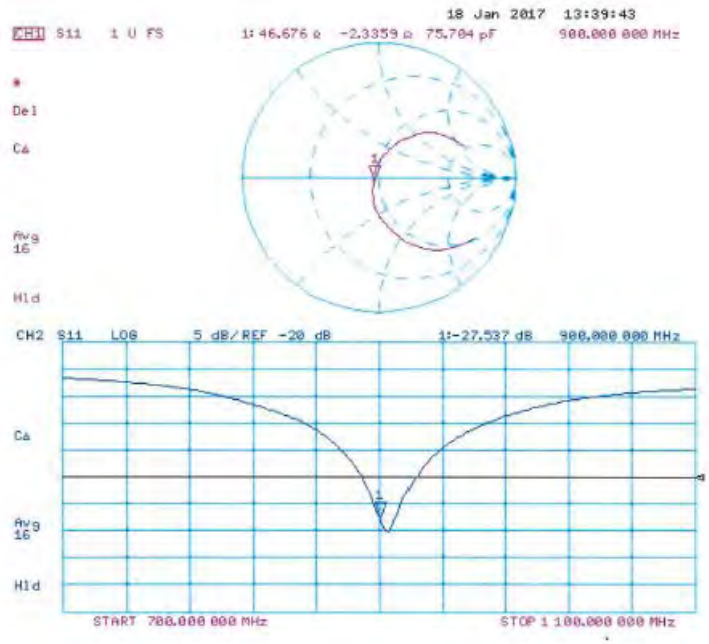
- Probe: EX3DV4 - SN7349; ConvF(9.64, 9.64, 9.64); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.01.2017
- Phantom: Flat Phantom 4.9 (Back); Type: QD 00R P49 AA; Serial: 1005
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 62.82 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 4.11 W/kg
SAR(1 g) = 2.71 W/kg; SAR(10 g) = 1.75 W/kg
Maximum value of SAR (measured) = 3.63 W/kg



0 dB = 3.63 W/kg = 5.60 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: 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-16)	In house check: Oct-17

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

Issued: February 15, 2017

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

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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 cm³ (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 cm³ (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 cm³ (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 cm³ (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

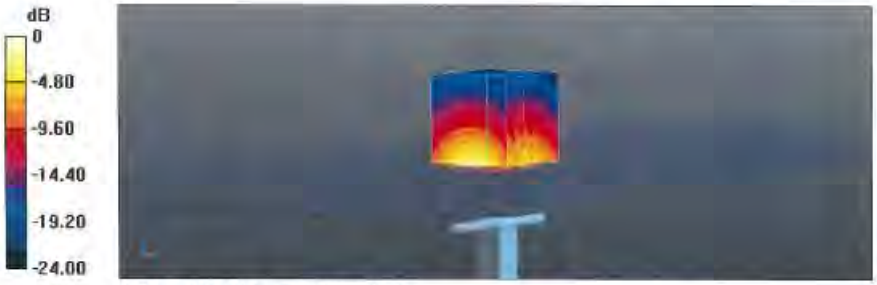
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:782

Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.87 S/m; ε_r = 37.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

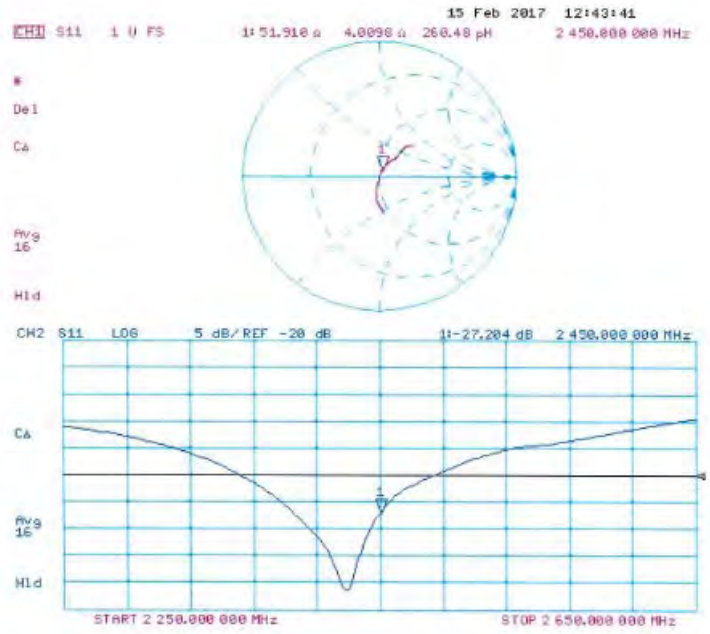
- Probe: EX3DV4 - SN7349; ConvF(7.72, 7.72, 7.72); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.01.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7331)

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



0 dB = 22.8 W/kg = 13.58 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 15.02.2017

Test Laboratory: SPEAG, Zurich, Switzerland

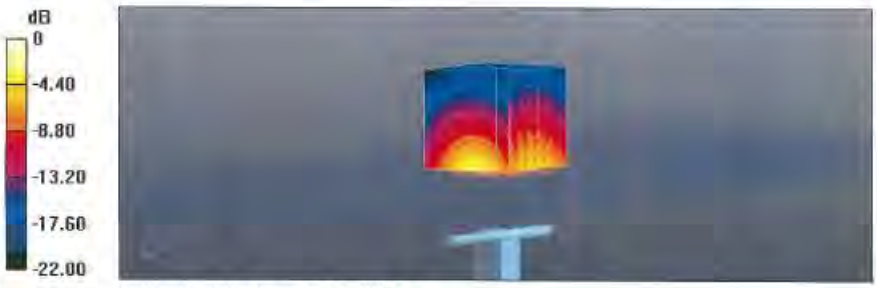
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:782

Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 2.02 S/m; ε_r = 51.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

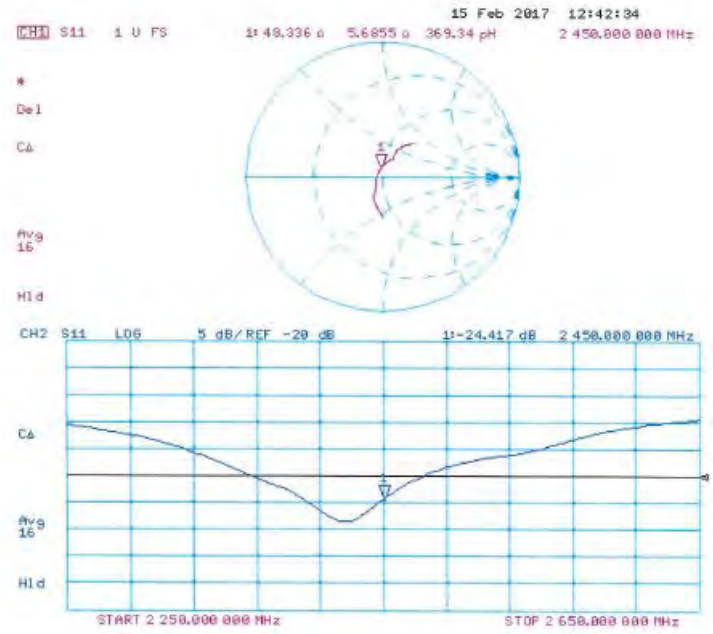
- Probe: EX3DV4 - SN7349; ConvF(7.79, 7.79, 7.79); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.01.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7331)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
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



0 dB = 20.6 W/kg = 13.14 dBW/kg

Impedance Measurement Plot for Body TSL



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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

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

Issued: January 9, 2018

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Zeughausstrasse 43, 8004 Zurich, Switzerland

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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 cm³ (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 cm³ (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 cm³ (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 cm³ (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

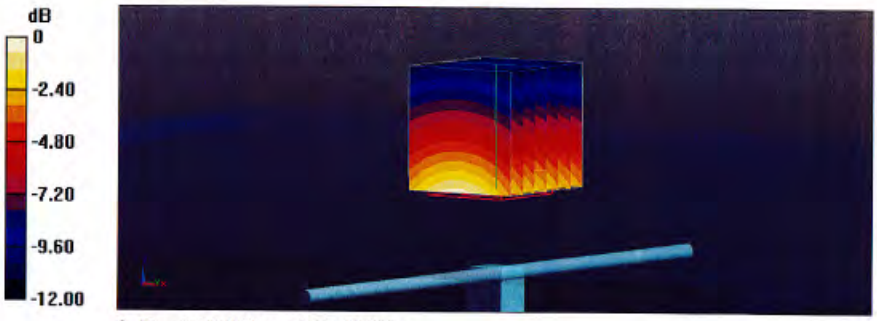
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d029

Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.92 S/m; ε_r = 40.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

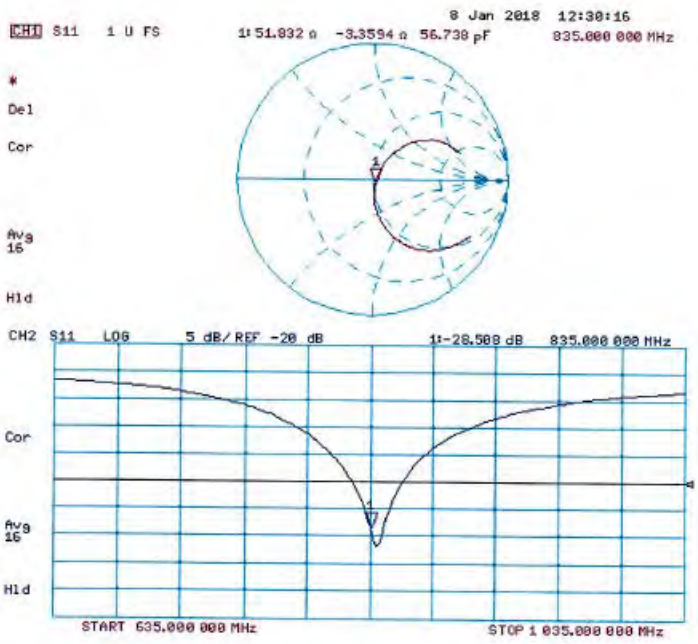
- Probe: EX3DV4 - SN7349; ConvF(9.9, 9.9, 9.9); Calibrated: 30.12.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
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



0 dB = 3.35 W/kg = 5.25 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 08.01.2018

Test Laboratory: SPEAG, Zurich, Switzerland

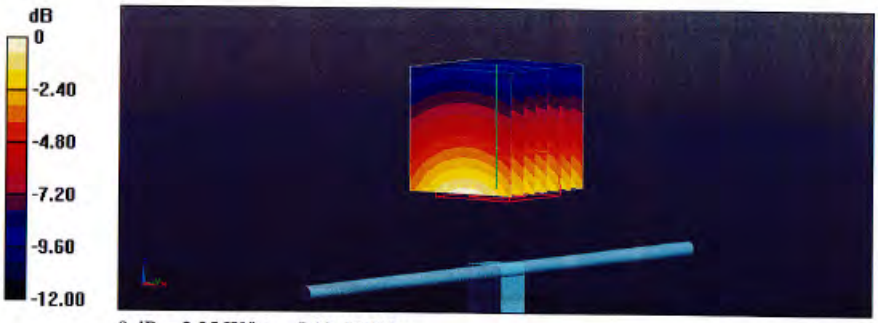
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d029

Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.99 S/m; ε_r = 54.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

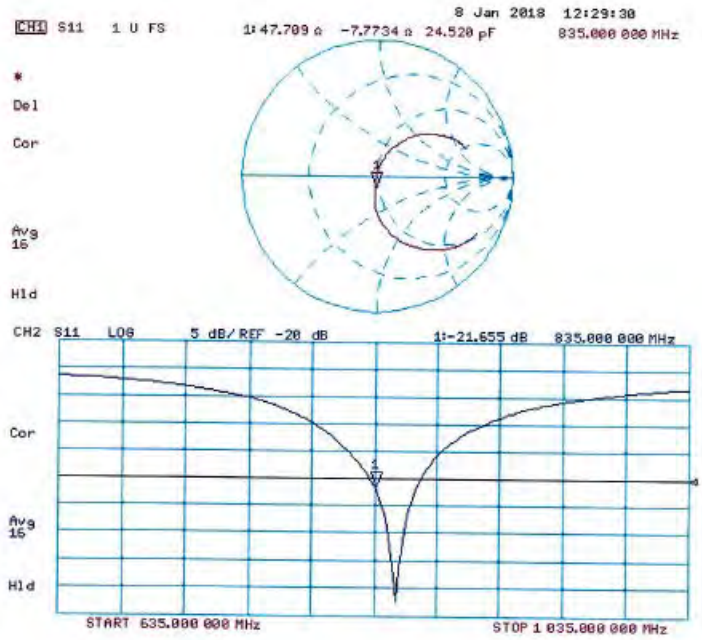
- Probe: EX3DV4 - SN7349; ConvF(10.05, 10.05, 10.05); Calibrated: 30.12.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 4.9 (Back); Type: QD 00R P49 AA; Serial: 1005
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
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



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 jΩ	dB	real Ω	imag jΩ	dB
12/15/16	48.67	4.80	-25.98	51.29	2.50	-31.07
12/15/17	48.37	5.26	-24.97	50.97	3.34	-29.04

Dipole D450V3 (SN 1077)	Head			Body		
	Impedance		Return Loss	Impedance		Return Loss
Date Measured	real Ω	imag jΩ	dB	real Ω	imag jΩ	dB
06/28/2016	58.87	-2.93	-22.48	50.59	-6.61	-22.25
12/01/2016	59.08	-2.93	-22.65	51.05	-7.45	-22.63

Dipole D750V3 (SN 1098)	Head			Body		
	Impedance		Return Loss	Impedance		Return Loss
Date Measured	real Ω	imag jΩ	dB	real Ω	imag jΩ	dB
06/24/2016	47.61	-2.13	-28.03	49.37	-2.23	-26.10
10/30/2016	48.81	-2.69	-27.25	47.99	-1.98	-30.77

Dipole D900V2 (SN 1d026)	Head			Body		
	Impedance		Return Loss	Impedance		Return Loss
Date Measured	real Ω	imag jΩ	dB	real Ω	imag jΩ	dB
03/09/2017	51.01	-0.46	-38.70	48.23	3.50	-27.73
02/27/2018	50.00	0.61	-44.37	48.22	2.37	-29.83

Dipole D2450V2 (SN 782)	Head			Body		
	Impedance		Return Loss	Impedance		Return Loss
Date Measured	real Ω	imag jΩ	dB	real Ω	imag jΩ	dB
02/15/2017	49.12	3.10	-29.06	47.40	6.47	-22.92
01/11/2018	47.93	4.21	-26.41	47.22	6.23	-23.09

APPENDIX D
System Verification Check Scans

Motorola Solutions, Inc. EME Laboratory

Date/Time: 11/20/2017 5:05:44 PM

Robot#: DASY5-PG-1 | Run#: ZR(AN)-SYSP-150B-171120-09
Dipole Model# CLA-150
Phantom#: ELI5 1150
Tissue Temp: 21.3 (C)
Serial#: 4010
Test Freq: 150.0000 (MHz)
Start Power: 1000 (mW)
Rotation (1D): 0.21 dB
Adjusted SAR (1W): 4.11 mW/g (1g)

Comments:

Duty Cycle: 1:1, Medium parameters used: f = 150 MHz; σ = 0.81 S/m; ε_r = 63.3; ρ = 1000 kg/m^3
Probe: EX3DV4 - SN3735, , Frequency: 150 MHz, ConvF(11.23, 11.23, 11.23); Calibrated: 3/10/2017
Electronics: DAE4 Sn1488, Calibrated: 2/14/2017

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

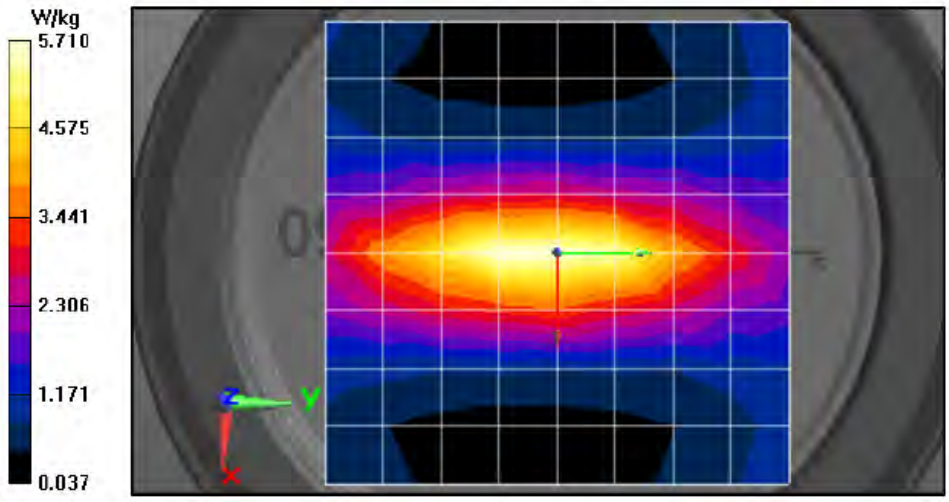
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 84.75 V/m; Power Drift = -0.05 dB
Fast SAR: SAR(1 g) = 4.83 W/kg; SAR(10 g) = 3.44 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 5.91 W/kg

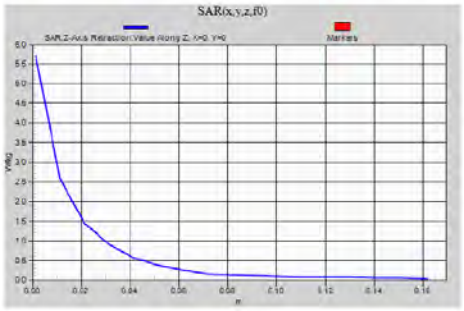
Below 2 GHz-Rev.2/System Performance Check/0-Degree Cube (5x5x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 84.75 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 6.83 W/kg
SAR(1 g) = 4.11 W/kg; SAR(10 g) = 2.73 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 5.72 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) = 5.71 W/kg





Motorola Solutions, Inc. EME Laboratory

Date/Time: 11/22/2017 2:09:22 PM

Robot#: DASY5-PG-1 | Run#:	ZR(AN)-SYSP-150B-171122-13
Dipole Model#	CLA-150
Phantom#:	ELI5 1150
Tissue Temp:	20.8 (C)
Serial#:	4010
Test Freq:	150.0000 (MHz)
Start Power:	1000 (mW)
Rotation (1D):	0.22 dB
Adjusted SAR (1W):	4.11 mW/g (1g)

Comments:

Duty Cycle: 1:1, Medium parameters used: f = 150 MHz; σ = 0.78 S/m; ε_r = 63.7; ρ = 1000 kg/m^3
Probe: EX3DV4 - SN3735, , Frequency: 150 MHz, ConvF(11.23, 11.23, 11.23); Calibrated: 3/10/2017
Electronics: DAE4 Sn1488, Calibrated: 2/14/2017

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

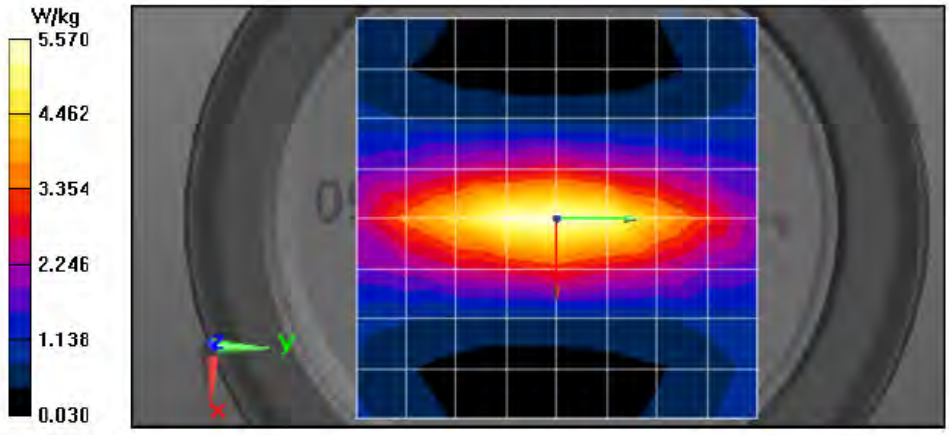
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 84.24 V/m; Power Drift = -0.02 dB
Fast SAR: SAR(1 g) = 4.81 W/kg; SAR(10 g) = 3.43 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 5.68 W/kg

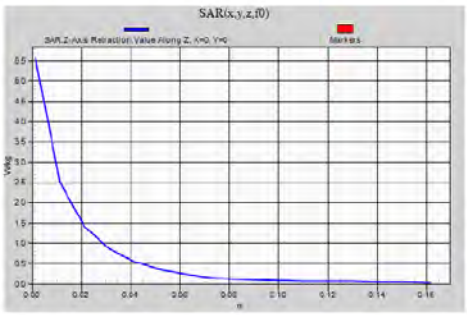
Below 2 GHz-Rev.2/System Performance Check/0-Degree Cube (5x6x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 84.24 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 6.62 W/kg
SAR(1 g) = 4.11 W/kg; SAR(10 g) = 2.71 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 5.53 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: 11/21/2017 10:16:28 AM

Robot#: DASY5-PG-1 | Run#:	ZR(AN)-SYSP-150H-171121-10
Dipole Model#	CLA-150
Phantom#:	ELI4 1022
Tissue Temp:	20.9 (C)
Serial#:	4010
Test Freq:	150.0000 (MHz)
Start Power:	1000 (mW)
Rotation (1D):	0.21 dB
Adjusted SAR (1W):	3.73 mW/g (1g)

Comments:

Duty Cycle: 1:1, Medium parameters used: f = 150 MHz; σ = 0.76 S/m; e_r = 54.1; ρ = 1000 kg/m^3
Probe: EX3DV4 - SN3735, , Frequency: 150 MHz, ConvF(11.79, 11.79, 11.79); Calibrated: 3/10/2017
Electronics: DAE4 Sn1488, Calibrated: 2/14/2017

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

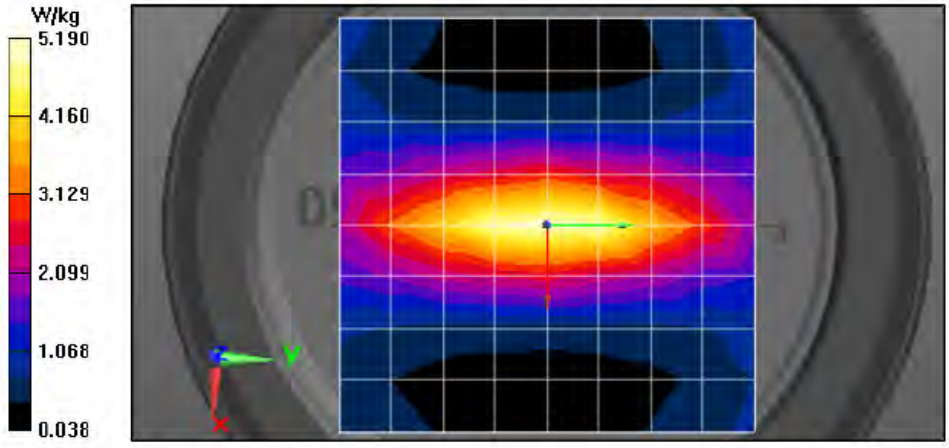
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 81.71 V/m; Power Drift = -0.01 dB
Fast SAR: SAR(1 g) = 4.3 W/kg; SAR(10 g) = 3.09 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 5.22 W/kg

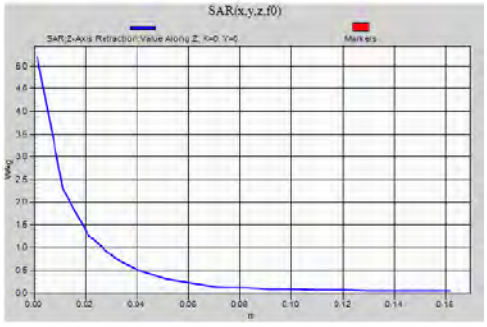
Below 2 GHz-Rev.2/System Performance Check/0-Degree Cube (5x6x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 81.71 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 6.22 W/kg
SAR(1 g) = 3.73 W/kg; SAR(10 g) = 2.44 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 5.22 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) = 5.19 W/kg





Motorola Solutions, Inc. EME Laboratory
Date/Time: 11/22/2017 10:21:01 AM

Robot#: DASY5-PG-1 | Run#: ZR(AN)-SYSP-150H-171122-10
Dipole Model# CLA-150
Phantom#: ELI4 1022
Tissue Temp: 20.1 (C)
Serial#: 4010
Test Freq: 150.0000 (MHz)
Start Power: 1000 (mW)
Rotation (1D): 0.22 dB
Adjusted SAR (1W): 3.92 mW/g (1g)

Comments:

Duty Cycle: 1:1, Medium parameters used: f = 150 MHz; σ = 0.73 S/m; ε_r = 54.6; ρ = 1000 kg/m^3
Probe: EX3DV4 - SN3735, , Frequency: 150 MHz, ConvF(11.79, 11.79, 11.79); Calibrated: 3/10/2017
Electronics: DAE4 Sn1488, Calibrated: 2/14/2017

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

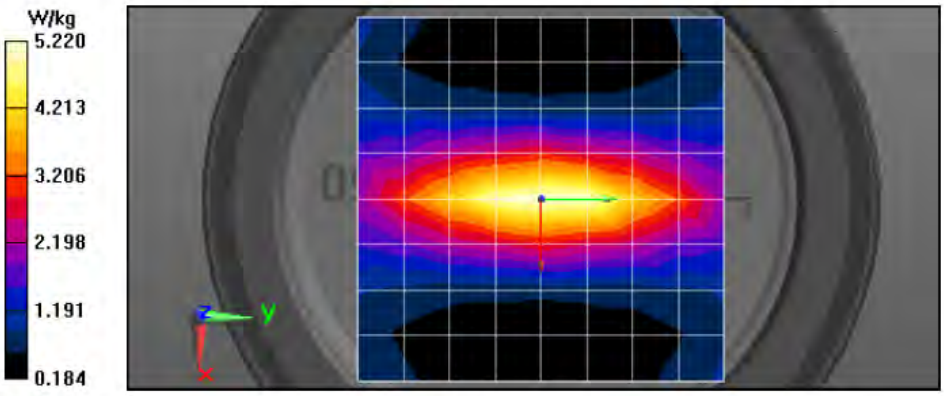
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 87.74 V/m; Power Drift = -0.07 dB
Fast SAR: SAR(1 g) = 4.6 W/kg; SAR(10 g) = 3.28 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 5.38 W/kg

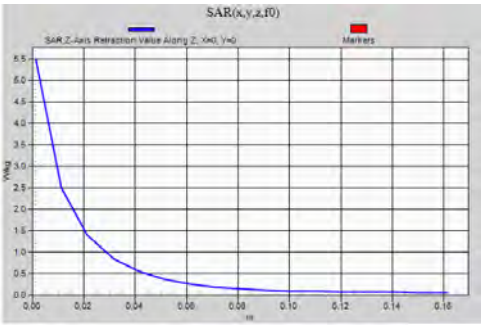
Below 2 GHz-Rev.2/System Performance Check/0-Degree Cube (5x6x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 87.74 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 6.17 W/kg
SAR(1 g) = 3.92 W/kg; SAR(10 g) = 2.58 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 5.20 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) = 5.49 W/kg





Motorola Solutions, Inc. EME Laboratory
Date/Time: 2/7/2018 3:26:53 PM

Robot#: DASY5-PG-3 | Run#: ZR(ZZ)-SYSP-150H-180207-08
Dipole Model# CLA-150
Phantom#: ELI4 1022
Tissue Temp: 21.8 (C)
Serial#: 4010
Test Freq: 150.0000 (MHz)
Start Power: 1000 (mW)
Rotation (1D): 0.140 dB
Adjusted SAR (1W): 3.84 mW/g (1g)

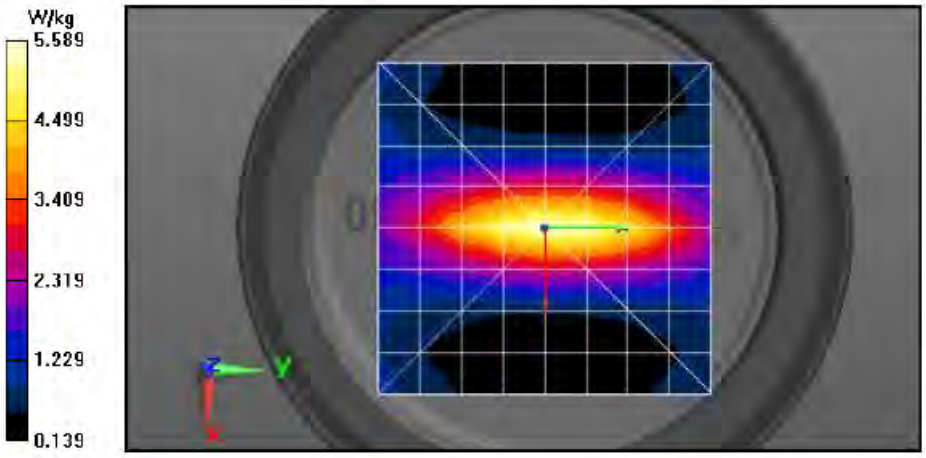
Comments:

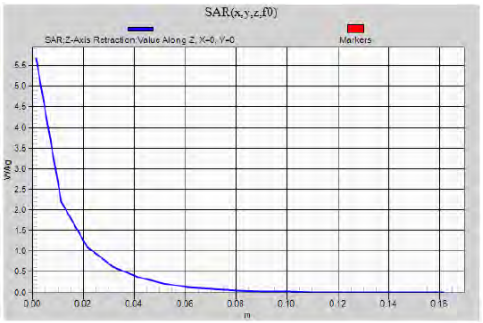
Duty Cycle: 1:1, Medium parameters used: f = 150 MHz; σ = 0.76 S/m; ε_r = 50.2; ρ = 1000 kg/m^3
Probe: EX3DV4 - SN3612, , Frequency: 150 MHz, ConvF(10.17, 10.17, 10.17); Calibrated: 5/17/2017
Electronics: DAE4 Sn1294, Calibrated: 5/23/2017

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 = 85.60 V/m; Power Drift = -0.08 dB
Fast SAR: SAR(1 g) = 4.65 W/kg; SAR(10 g) = 3.29 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 5.72 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 = 85.60 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 7.02 W/kg
SAR(1 g) = 3.84 W/kg; SAR(10 g) = 2.45 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 5.61 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) = 5.67 W/kg





Motorola Solutions, Inc. EME Laboratory

Date/Time: 11/14/2017 10:30:07 AM

Robot#: DASY5-PG-1 | Run#:	FD-SYSP-450B-171114-10
Dipole Model#	D450V3
Phantom#:	ELI4 1016
Tissue Temp:	21.5 (C)
Serial#:	1077
Test Freq:	450.0000 (MHz)
Start Power:	250 (mW)
Rotation (1D):	0.210 dB
Adjusted SAR (1W):	4.92 mW/g (1g)

Comments:

Duty Cycle: 1:1, Medium parameters used: f = 450 MHz; σ = 0.92 S/m; ε_r = 55.5; ρ = 1000 kg/m^3
Probe: EX3DV4 - SN3735, , Frequency: 450 MHz, ConvF(10.56, 10.56, 10.56); Calibrated: 3/10/2017
Electronics: DAE4 Sn1488, Calibrated: 2/14/2017

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

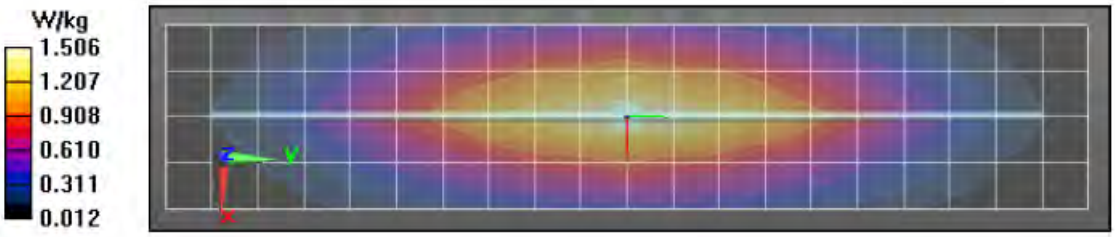
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 40.63 V/m; Power Drift = -0.01 dB
Fast SAR: SAR(1 g) = 1.28 W/kg; SAR(10 g) = 0.888 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 1.53 W/kg

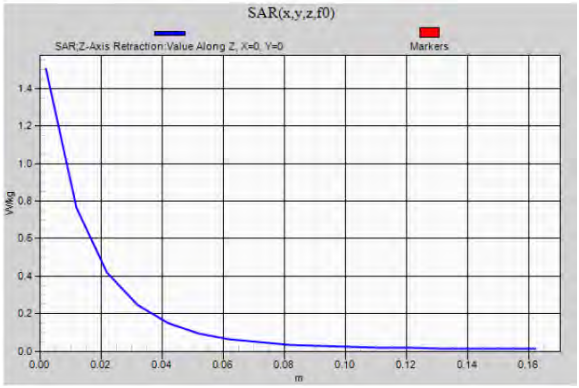
Below 2 GHz-Rev.2/System Performance Check/0-Degree Cube (5x6x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 40.63 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 1.74 W/kg
SAR(1 g) = 1.23 W/kg; SAR(10 g) = 0.845 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: 11/15/2017 5:13:08 PM

Robot#: DASY5-PG-1 | Run#:	AZ-SYSP-450B-171115-17
Dipole Model#	D450V3
Phantom#:	ELI4 1016
Tissue Temp:	21.1(C)
Serial#:	1077
Test Freq:	450.0000 (MHz)
Start Power:	250 (mW)
Rotation (1D):	0.220 dB
Adjusted SAR (1W):	4.72 mW/g (1g)

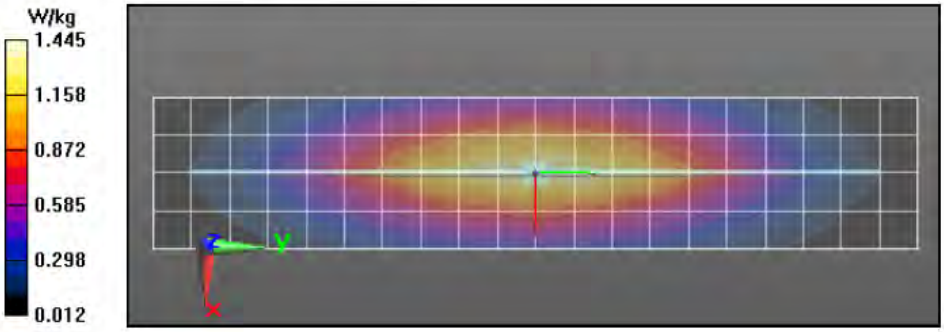
Comments: UHF1

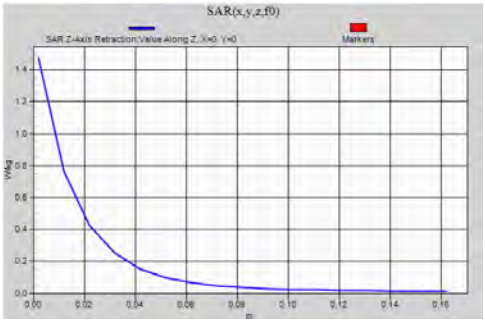
Duty Cycle: 1:1, Medium parameters used: f = 450 MHz; σ = 0.95 S/m; ε_r = 55.6; ρ = 1000 kg/m^3
Probe: EX3DV4 - SN3735, , Frequency: 450 MHz, ConvF(10.56, 10.56, 10.56); Calibrated: 3/10/2017
Electronics: DAE4 Sn1488, Calibrated: 2/14/2017

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 = 39.17 V/m; Power Drift = 0.11 dB
Fast SAR: SAR(1 g) = 1.19 W/kg; SAR(10 g) = 0.829 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 1.46 W/kg

Below 2 GHz-Rev.2/System Performance Check/0-Degree Cube (5x6x7)/Cube 0:
Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 39.17 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 1.70 W/kg
SAR(1 g) = 1.18 W/kg; SAR(10 g) = 0.821 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 1.48 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) = 1.47 W/kg





Motorola Solutions, Inc. EME Laboratory
Date/Time: 11/15/2017 10:39:04 AM

Robot#: DASY5-PG-1 | Run#: AZ(BL)-SYSP-450B-171115-11
Dipole Model# D450V3
Phantom#: ELI4 1016
Tissue Temp: 19.9 (C)
Serial#: 1077
Test Freq: 450.0000 (MHz)
Start Power: 250 (mW)
Rotation (1D): 0.210 dB
Adjusted SAR (1W): 4.64 mW/g (1g)

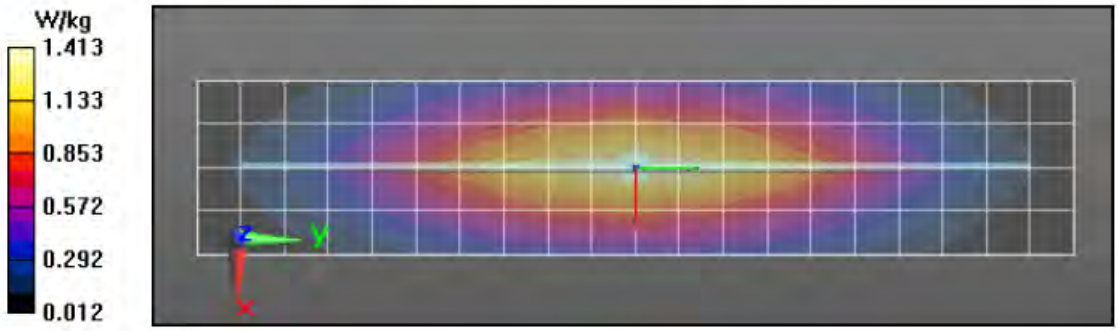
Comments: Sysp UHF2

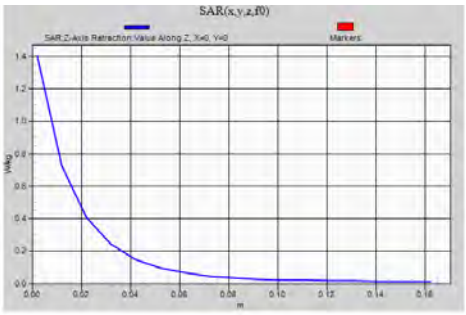
Duty Cycle: 1:1, Medium parameters used: f = 450 MHz; σ = 0.91 S/m; ε_r = 55.2; ρ = 1000 kg/m^3
Probe: EX3DV4 - SN3735, , Frequency: 450 MHz, ConvF(10.56, 10.56, 10.56); Calibrated: 3/10/2017
Electronics: DAE4 Sn1488, Calibrated: 2/14/2017

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 = 39.35 V/m; Power Drift = 0.01 dB
Fast SAR: SAR(1 g) = 1.2 W/kg; SAR(10 g) = 0.836 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 1.43 W/kg

Below 2 GHz-Rev.2/System Performance Check/0-Degree Cube (5x6x7)/Cube 0:
Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 39.35 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 1.61 W/kg
SAR(1 g) = 1.16 W/kg; SAR(10 g) = 0.803 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 1.40 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: 11/20/2017 9:59:23 AM

Robot#: DASY5-PG-1 | Run#:	TLC(AN)-SYSP-450B-171120-02
Dipole Model#	D450V3
Phantom#:	ELI4 1016
Tissue Temp:	20.3 (C)
Serial#:	1077
Test Freq:	450.0000 (MHz)
Start Power:	250 (mW)
Rotation (1D):	0.21 dB
Adjusted SAR (1W):	4.80 mW/g (1g)

Comments:

Duty Cycle: 1:1, Medium parameters used: f = 450 MHz; σ = 0.92 S/m; ε_r = 54.7; ρ = 1000 kg/m^3
Probe: EX3DV4 - SN3735, , Frequency: 450 MHz, ConvF(10.56, 10.56, 10.56); Calibrated: 3/10/2017
Electronics: DAE4 Sn1488, Calibrated: 2/14/2017

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

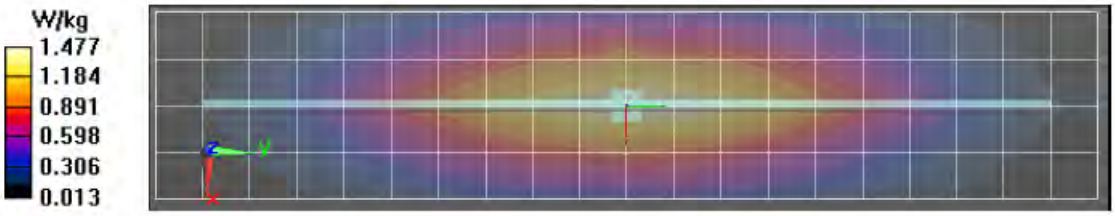
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 40.06 V/m; Power Drift = -0.02 dB
Fast SAR: SAR(1 g) = 1.24 W/kg; SAR(10 g) = 0.863 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 1.49 W/kg

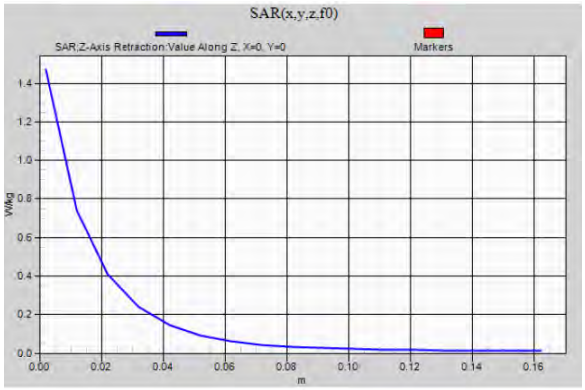
Below 2 GHz-Rev.2/System Performance Check/0-Degree Cube (5x6x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 40.06 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 1.71 W/kg
SAR(1 g) = 1.2 W/kg; SAR(10 g) = 0.823 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 1.47 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: 11/22/2017 8:48:03 PM

Robot#: DASY5-PG-1 | Run#:	AZ-SYSP-450B-171122-20
Dipole Model#	D450V3
Phantom#:	ELI4 1103
Tissue Temp:	22.1 (C)
Serial#:	1077
Test Freq:	450.0000 (MHz)
Start Power:	250 (mW)
Rotation (1D):	0.19 dB
Adjusted SAR (1W):	4.80 mW/g (1g)

Comments:

Duty Cycle: 1:1, Medium parameters used: f = 450 MHz; σ = 0.97 S/m; ε_r = 54.6; ρ = 1000 kg/m^3
Probe: EX3DV4 - SN3735, , Frequency: 450 MHz, ConvF(10.56, 10.56, 10.56); Calibrated: 3/10/2017
Electronics: DAE4 Sn1488, Calibrated: 2/14/2017

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

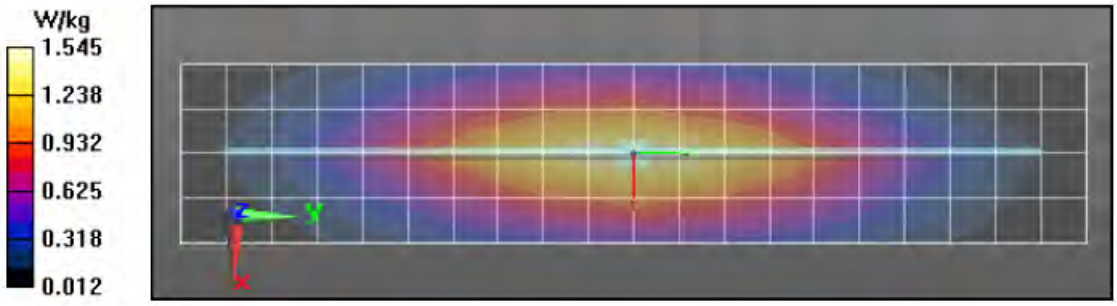
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 39.66 V/m; Power Drift = 0.01 dB
Fast SAR: SAR(1 g) = 1.24 W/kg; SAR(10 g) = 0.869 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 1.56 W/kg

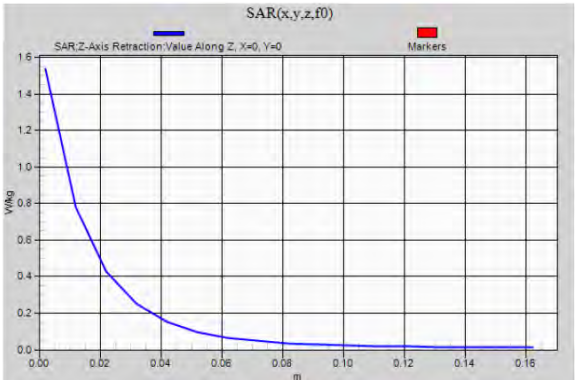
Below 2 GHz-Rev.2/System Performance Check/0-Degree Cube (6x7x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 39.66 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 1.77 W/kg
SAR(1 g) = 1.2 W/kg; SAR(10 g) = 0.827 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 1.53 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: 11/15/2017 11:32:44 PM

Robot#: DASY5-PG-1 | Run#: ZR-SYSP-450H-171115-25
Dipole Model# D450V3
Phantom#: ELI4 1109
Tissue Temp: 21.1 (C)
Serial#: 1077
Test Freq: 450.0000 (MHz)
Start Power: 250 (mW)
Rotation (1D): 0.2 dB
Adjusted SAR (1W): 4.68 mW/g (1g)

Comments:

Duty Cycle: 1:1, Medium parameters used: f = 450 MHz; σ = 0.87 S/m; ε_r = 43.7; ρ = 1000 kg/m^3
Probe: EX3DV4 - SN3735, , Frequency: 450 MHz, ConvF(10.37, 10.37, 10.37); Calibrated: 3/10/2017
Electronics: DAE4 Sn1488, Calibrated: 2/14/2017

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

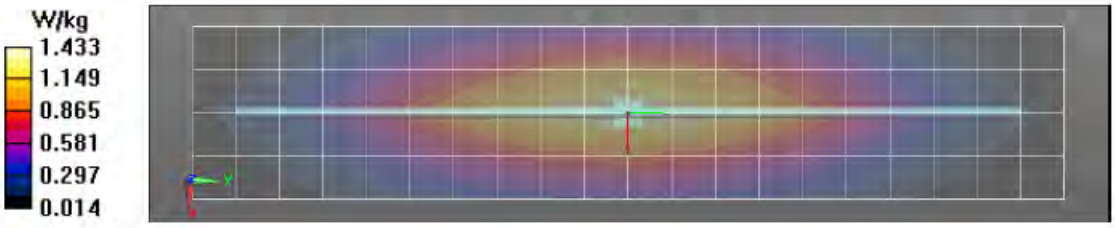
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 41.14 V/m; Power Drift = 0.00 dB
Fast SAR: SAR(1 g) = 1.2 W/kg; SAR(10 g) = 0.839 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 1.45 W/kg

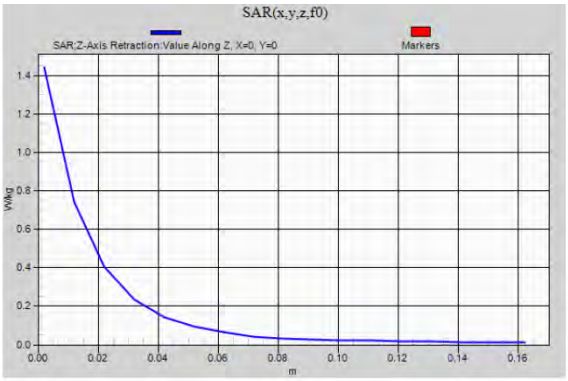
Below 2 GHz-Rev.2/System Performance Check/0-Degree Cube (5x6x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 41.14 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 1.64 W/kg
SAR(1 g) = 1.17 W/kg; SAR(10 g) = 0.807 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 1.44 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: 11/16/2017 8:41:35 PM

Robot#: DASY5-PG-1 | Run#:	ZR(AN)-SYSP-450H-171116-14
Dipole Model#	D450V3
Phantom#:	ELI4 1109
Tissue Temp:	21.3 (C)
Serial#:	1077
Test Freq:	450.0000 (MHz)
Start Power:	250 (mW)
Rotation (1D):	0.22 dB
Adjusted SAR (1W):	4.56 mW/g (1g)

Comments:

Duty Cycle: 1:1, Medium parameters used: f = 450 MHz; σ = 0.85 S/m; ε_r = 42.9; ρ = 1000 kg/m^3
Probe: EX3DV4 - SN3735, , Frequency: 450 MHz, ConvF(10.37, 10.37, 10.37); Calibrated: 3/10/2017
Electronics: DAE4 Sn1488, Calibrated: 2/14/2017

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

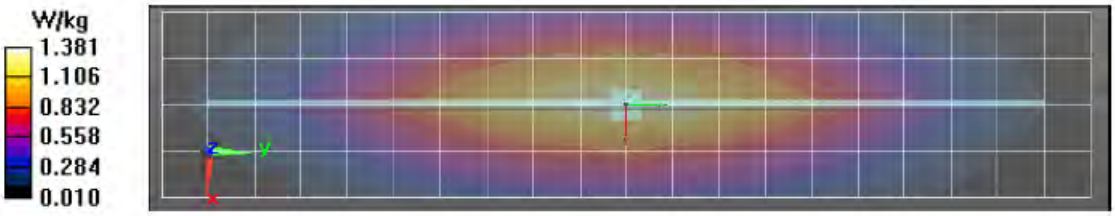
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 41.05 V/m; Power Drift = 0.00 dB
Fast SAR: SAR(1 g) = 1.17 W/kg; SAR(10 g) = 0.818 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 1.40 W/kg

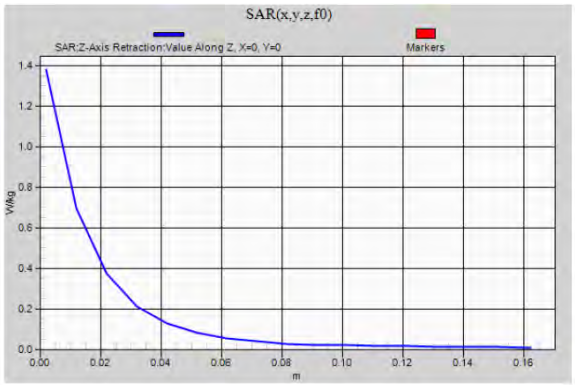
Below 2 GHz-Rev.2/System Performance Check/0-Degree Cube (5x6x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 41.05 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 1.57 W/kg
SAR(1 g) = 1.14 W/kg; SAR(10 g) = 0.777 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: 11/17/2017 8:22:27 PM

Robot#: DASY5-PG-1 | Run#:	ZR(AN)-SYSP-450H-171117-15
Dipole Model#	D450V3
Phantom#:	ELI4 1109
Tissue Temp:	21.7 (C)
Serial#:	1077
Test Freq:	450.0000 (MHz)
Start Power:	250 (mW)
Rotation (1D):	0.22 dB
Adjusted SAR (1W):	4.60 mW/g (1g)

Comments:

Duty Cycle: 1:1, Medium parameters used: f = 450 MHz; σ = 0.85 S/m; ε_r = 42.6; ρ = 1000 kg/m^3
Probe: EX3DV4 - SN3735, , Frequency: 450 MHz, ConvF(10.37, 10.37, 10.37); Calibrated: 3/10/2017
Electronics: DAE4 Sn1488, Calibrated: 2/14/2017

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

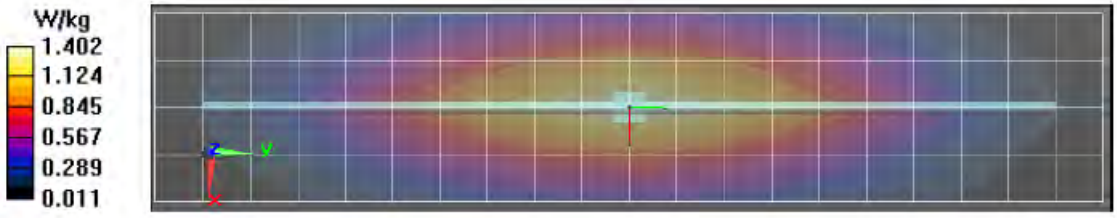
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 41.83 V/m; Power Drift = -0.14 dB
Fast SAR: SAR(1 g) = 1.19 W/kg; SAR(10 g) = 0.827 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 1.42 W/kg

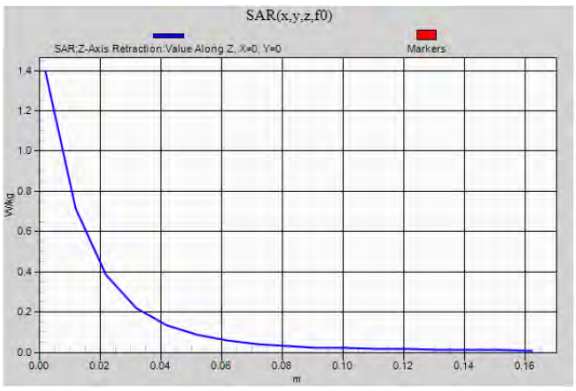
Below 2 GHz-Rev.2/System Performance Check/0-Degree Cube (5x6x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 41.83 V/m; Power Drift = -0.14 dB
Peak SAR (extrapolated) = 1.60 W/kg
SAR(1 g) = 1.15 W/kg; SAR(10 g) = 0.787 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: 11/19/2017 3:10:31 PM

Robot#: DASY5-PG-1 | Run#:	AZ-SYSP-450H-171119-09
Dipole Model#	D450V3
Phantom#:	ELI4 1109
Tissue Temp:	19.9 (C)
Serial#:	1077
Test Freq:	450.0000 (MHz)
Start Power:	250 (mW)
Rotation (1D):	0.210 dB
Adjusted SAR (1W):	4.68 mW/g (1g)

Comments:

Duty Cycle: 1:1, Medium parameters used: f = 450 MHz; σ = 0.85 S/m; ε_r = 43.8; ρ = 1000 kg/m^3
Probe: EX3DV4 - SN3735, , Frequency: 450 MHz, ConvF(10.37, 10.37, 10.37); Calibrated: 3/10/2017
Electronics: DAE4 Sn1488, Calibrated: 2/14/2017

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

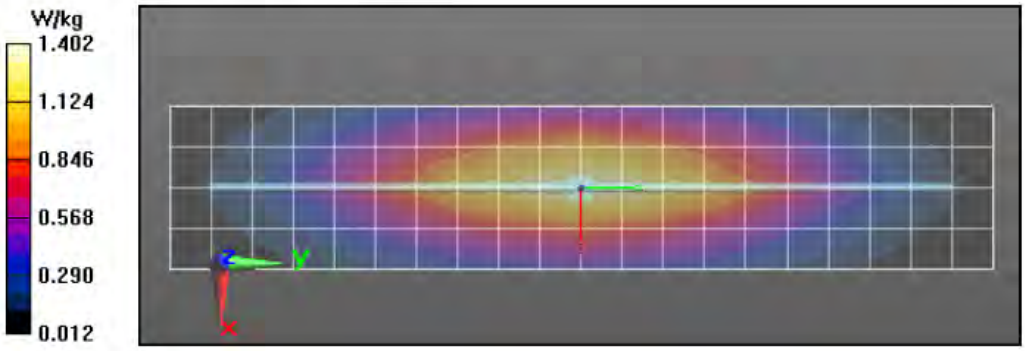
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 41.34 V/m; Power Drift = 0.01 dB
Fast SAR: SAR(1 g) = 1.2 W/kg; SAR(10 g) = 0.836 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 1.42 W/kg

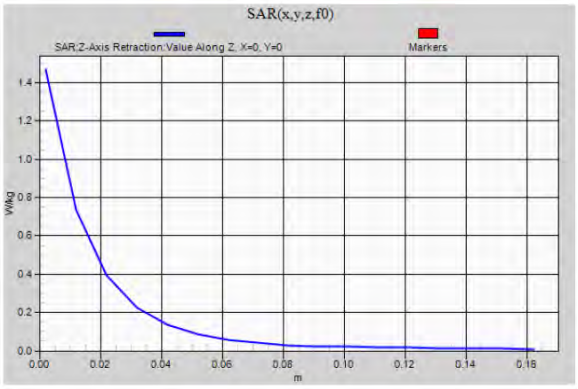
Below 2 GHz-Rev.2/System Performance Check/0-Degree Cube (5x6x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 41.34 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 1.62 W/kg
SAR(1 g) = 1.17 W/kg; SAR(10 g) = 0.805 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 1.42 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) = 1.41 W/kg





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Date/Time: 2/11/2018 4:33:21 PM

Robot#: DASY5-PG-3 | Run#:	FD-SYSP-450B-180211-08
Dipole Model#	D450V3
Phantom#:	ELI4 1103
Tissue Temp:	20.9 (C)
Serial#:	1054
Test Freq:	450.0000 (MHz)
Start Power:	250 (mW)
Rotation (1D):	0.110 dB
Adjusted SAR (1W):	4.68 mW/g (1g)

Comments:

Duty Cycle: 1:1, Medium parameters used: f = 450 MHz; σ = 0.93 S/m; ε_r = 54.1; ρ = 1000 kg/m^3
Probe: EX3DV4 - SN3612, , Frequency: 450 MHz, ConvF(9.35, 9.35, 9.35); Calibrated: 5/17/2017
Electronics: DAE4 Sn1294, Calibrated: 5/23/2017

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

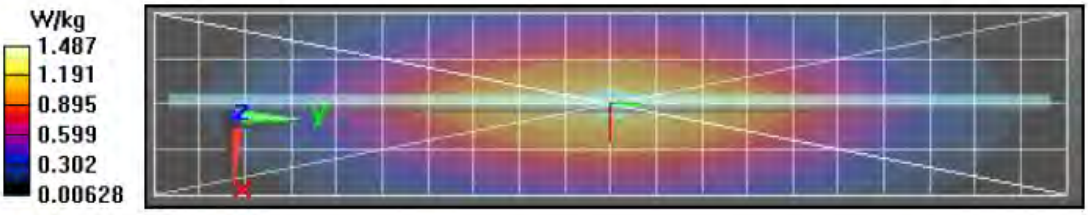
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 40.38 V/m; Power Drift = -0.08 dB
Fast SAR: SAR(1 g) = 1.23 W/kg; SAR(10 g) = 0.848 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 1.49 W/kg

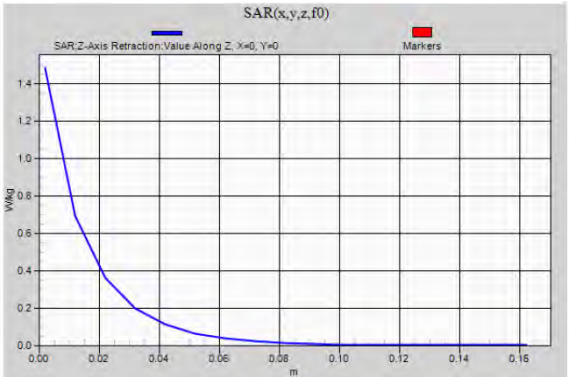
Below 2 GHz-Rev.2/System Performance Check/0-Degree Cube (5x5x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 40.38 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 1.77 W/kg
SAR(1 g) = 1.17 W/kg; SAR(10 g) = 0.791 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 1.48 W/kg

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

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





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Date/Time: 3/27/2018 11:34:28 PM

Robot#: DASY5-PG-3 | Run#:	ZR(ZZ)-SYSP-450B-180327-07
Dipole Model#	D450V3
Phantom#:	ELI4 1040
Tissue Temp:	21.0 (C)
Serial#:	1054
Test Freq:	450.0000 (MHz)
Start Power:	250 (mW)
Rotation (1D):	0.100 dB
Adjusted SAR (1W):	4.48 mW/g (1g)

Comments:

Duty Cycle: 1:1, Medium parameters used: f = 450 MHz; σ = 0.97 S/m; ε_r = 54.2; ρ = 1000 kg/m^3
Probe: EX3DV4 - SN3612, , Frequency: 450 MHz, ConvF(9.35, 9.35, 9.35); Calibrated: 5/17/2017
Electronics: DAE4 Sn1294, Calibrated: 5/23/2017

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

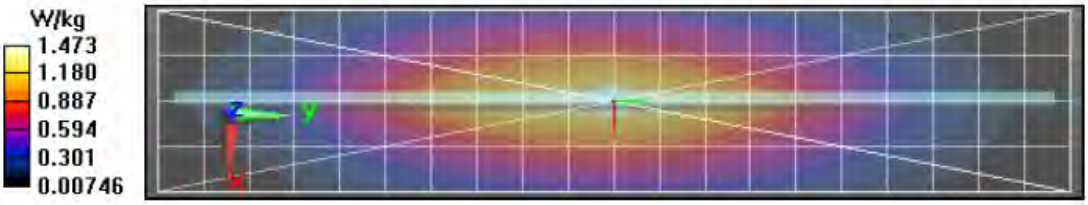
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 39.33 V/m; Power Drift = -0.02 dB
Fast SAR: SAR(1 g) = 1.18 W/kg; SAR(10 g) = 0.818 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 1.48 W/kg

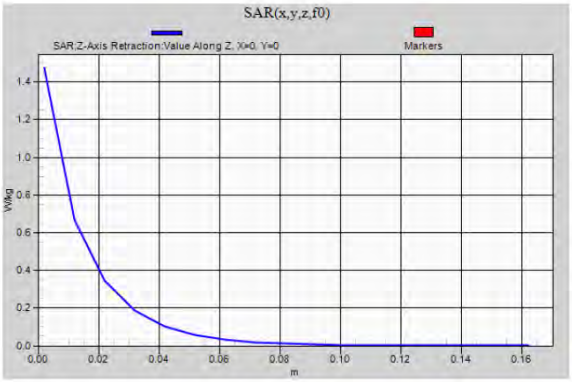
Below 2 GHz-Rev.2/System Performance Check/0-Degree Cube (5x5x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 39.33 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 1.78 W/kg
SAR(1 g) = 1.12 W/kg; SAR(10 g) = 0.754 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 1.48 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: 2/8/2018 10:52:49 PM

Robot#: DASY5-PG-3 | Run#:	FD-SYSP-450H-180208-13
Dipole Model#	D450V3
Phantom#:	ELI4 1050
Tissue Temp:	21.0 (C)
Serial#:	1054
Test Freq:	450.0000 (MHz)
Start Power:	250 (mW)
Rotation (1D):	0.100 dB
Adjusted SAR (1W):	4.76 mW/g (1g)

Comments:

Duty Cycle: 1:1, Medium parameters used: f = 450 MHz; σ = 0.85 S/m; ε_r = 42.7; ρ = 1000 kg/m^3
Probe: EX3DV4 - SN3612, , Frequency: 450 MHz, ConvF(9.25, 9.25, 9.25); Calibrated: 5/17/2017
Electronics: DAE4 Sn1294, Calibrated: 5/23/2017

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

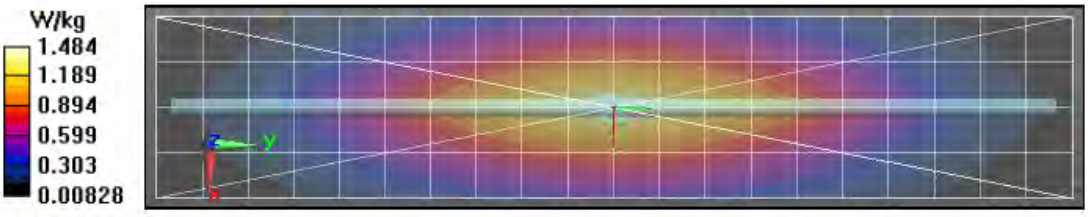
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 42.37 V/m; Power Drift = -0.03 dB
Fast SAR: SAR(1 g) = 1.24 W/kg; SAR(10 g) = 0.855 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 1.48 W/kg

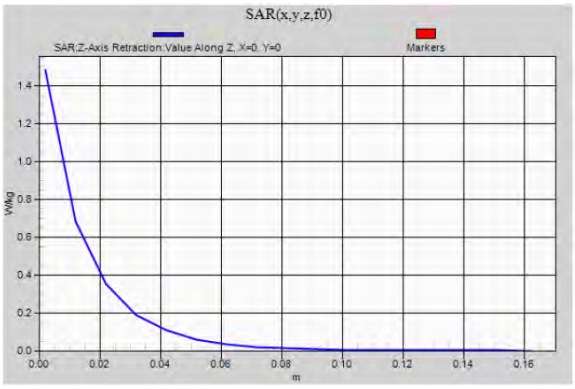
Below 2 GHz-Rev.2/System Performance Check/0-Degree Cube (5x5x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 42.37 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 1.78 W/kg
SAR(1 g) = 1.19 W/kg; SAR(10 g) = 0.797 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 1.49 W/kg

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

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





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Date/Time: 2/9/2018 3:36:23 PM

Robot#: DASY5-PG-3 | Run#: ZR(ZZ)-SYSP-450H-180209-09
Dipole Model# D450V3
Phantom#: ELI4 1050
Tissue Temp: 21.0 (C)
Serial#: 1054
Test Freq: 450.0000 (MHz)
Start Power: 250 (mW)
Rotation (1D): 0.1 dB
Adjusted SAR (1W): 4.76 mW/g (1g)

Comments:

Duty Cycle: 1:1, Medium parameters used: f = 450 MHz; σ = 0.89 S/m; ε_r = 43.9; ρ = 1000 kg/m^3
Probe: EX3DV4 - SN3612, , Frequency: 450 MHz, ConvF(9.25, 9.25, 9.25); Calibrated: 5/17/2017
Electronics: DAE4 Sn1294, Calibrated: 5/23/2017

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

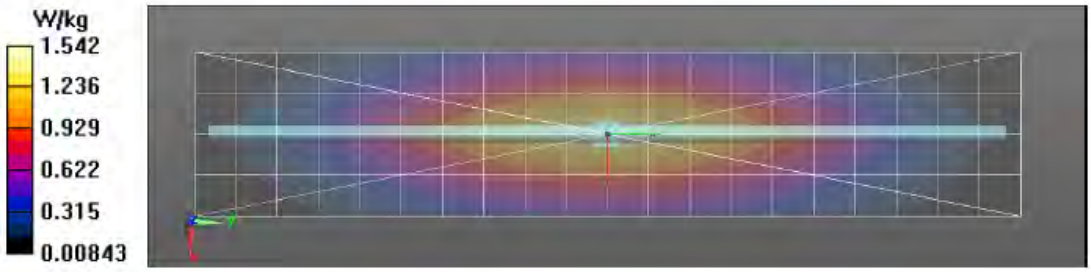
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 42.12 V/m; Power Drift = -0.02 dB
Fast SAR: SAR(1 g) = 1.25 W/kg; SAR(10 g) = 0.863 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 1.54 W/kg

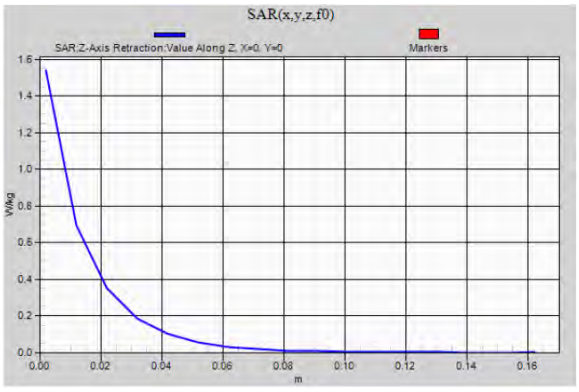
Below 2 GHz-Rev.2/System Performance Check/0-Degree Cube (5x5x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 42.12 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 1.85 W/kg
SAR(1 g) = 1.19 W/kg; SAR(10 g) = 0.793 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





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Date/Time: 2/11/2018 10:10:08 AM

Robot#: DASY5-PG-3 | Run#:	FD-SYSP-450H-180211-01
Dipole Model#	D450V3
Phantom#:	ELI4 1050
Tissue Temp:	21.0 (C)
Serial#:	1054
Test Freq:	450.0000 (MHz)
Start Power:	250 (mW)
Rotation (1D):	0.100 dB
Adjusted SAR (1W):	4.64 mW/g (1g)

Comments:

Duty Cycle: 1:1, Medium parameters used: f = 450 MHz; σ = 0.91 S/m; ε_r = 43.9; ρ = 1000 kg/m^3
Probe: EX3DV4 - SN3612, , Frequency: 450 MHz, ConvF(9.25, 9.25, 9.25); Calibrated: 5/17/2017
Electronics: DAE4 Sn1294, Calibrated: 5/23/2017

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

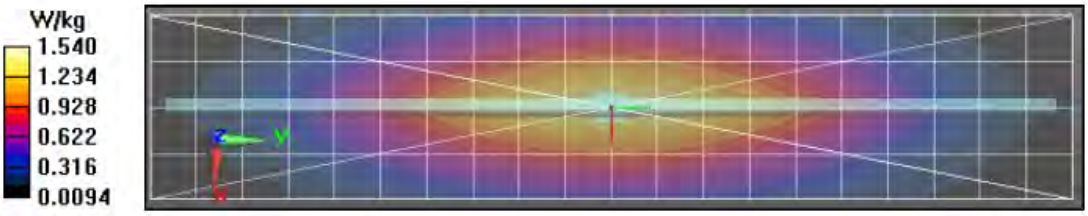
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 41.69 V/m; Power Drift = -0.04 dB
Fast SAR: SAR(1 g) = 1.23 W/kg; SAR(10 g) = 0.852 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 1.54 W/kg

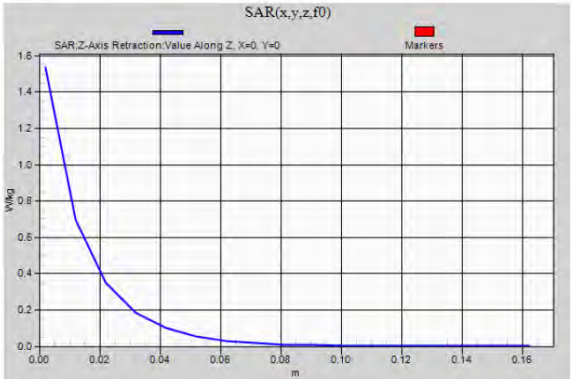
Below 2 GHz-Rev.2/System Performance Check/0-Degree Cube (5x5x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 41.69 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 1.83 W/kg
SAR(1 g) = 1.16 W/kg; SAR(10 g) = 0.781 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 1.53 W/kg

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

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





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Date/Time: 3/28/2018 4:40:32 PM

Robot#: DASY5-PG-3 | Run#:	FD-SYSP-450H-180328-04
Dipole Model#	D450V3
Phantom#:	ELI4 1050
Tissue Temp:	20.3 (C)
Serial#:	1054
Test Freq:	450.0000 (MHz)
Start Power:	250 (mW)
Rotation (1D):	0.096 dB
Adjusted SAR (1W):	4.52 mW/g (1g)

Comments:

Duty Cycle: 1:1, Medium parameters used: f = 450 MHz; σ = 0.9 S/m; ε_r = 42.3; ρ = 1000 kg/m^3
Probe: EX3DV4 - SN3612, , Frequency: 450 MHz, ConvF(9.25, 9.25, 9.25); Calibrated: 5/17/2017
Electronics: DAE4 Sn1294, Calibrated: 5/23/2017

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

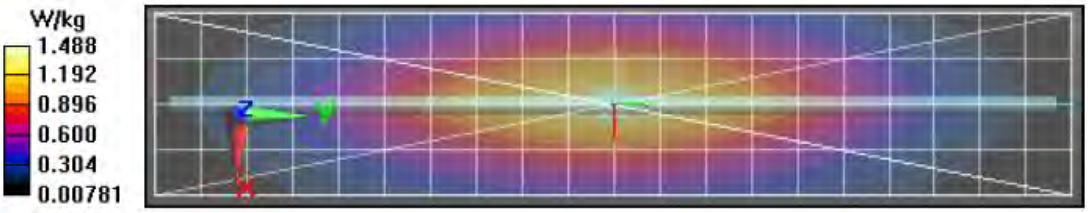
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 41.37 V/m; Power Drift = -0.04 dB
Fast SAR: SAR(1 g) = 1.19 W/kg; SAR(10 g) = 0.826 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 1.49 W/kg

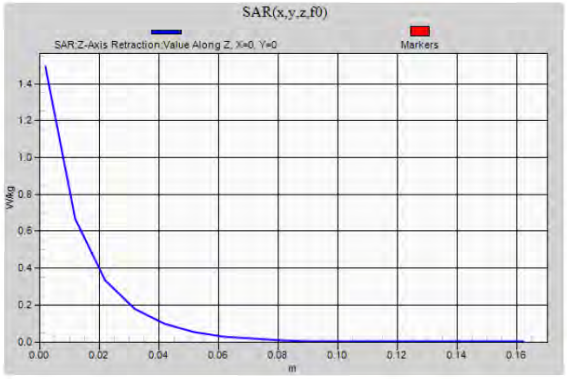
Below 2 GHz-Rev.2/System Performance Check/0-Degree Cube (5x5x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 41.37 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 1.79 W/kg
SAR(1 g) = 1.13 W/kg; SAR(10 g) = 0.756 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: 11/23/2017 12:50:51 AM

Robot#: DASY5-PG-1 | Run#:	AZ-SYSP-750B-171123-02
Dipole Model#	D750V3
Phantom#:	ELI4 1028
Tissue Temp:	21.1 (C)
Serial#:	1098
Test Freq:	750.0000 (MHz)
Start Power:	250 (mW)
Rotation (1D):	0.220 dB
Adjusted SAR (1W):	8.88 mW/g (1g)

Comments:

Duty Cycle: 1:1, Medium parameters used: f = 750 MHz; σ = 0.92 S/m; ε_r = 53.9; ρ = 1000 kg/m^3
Probe: EX3DV4 - SN3735, , Frequency: 750 MHz, ConvF(9.52, 9.52, 9.52); Calibrated: 3/10/2017
Electronics: DAE4 Sn1488, Calibrated: 2/14/2017

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

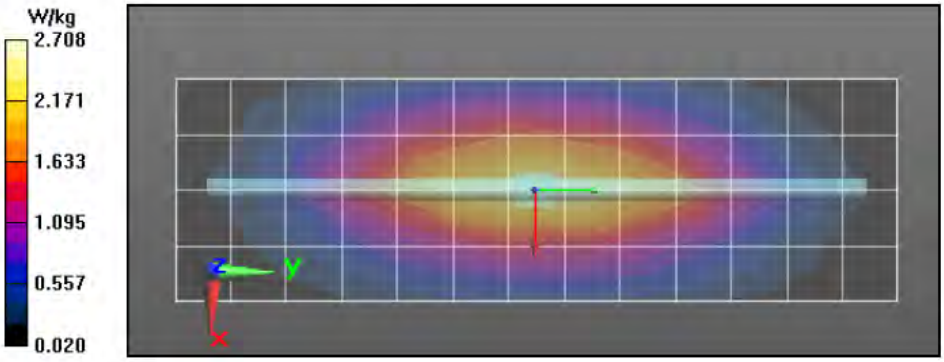
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 54.38 V/m; Power Drift = 0.04 dB
Fast SAR: SAR(1 g) = 2.25 W/kg; SAR(10 g) = 1.47 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 2.73 W/kg

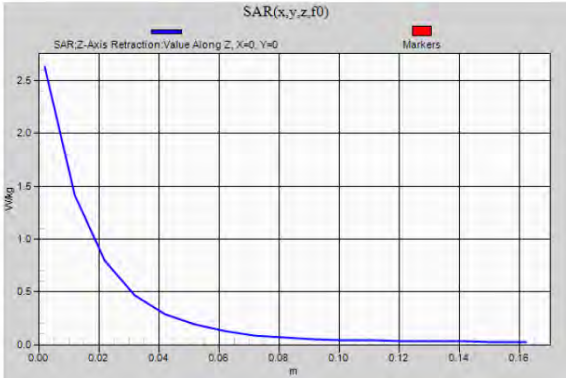
Below 2 GHz-Rev.2/System Performance Check/0-Degree Cube (5x6x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 54.38 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 2.94 W/kg
SAR(1 g) = 2.22 W/kg; SAR(10 g) = 1.53 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 2.62 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) = 2.63 W/kg





Motorola Solutions, Inc. EME Laboratory

Date/Time: 12/20/2017 1:37:17 AM

Robot#: DASY5-PG-1 | Run#:	ZR(AN)-SYSP-750B-171220-01
Dipole Model#	D750V3
Phantom#:	ELI4 1028
Tissue Temp:	21.3 (C)
Serial#:	1142
Test Freq:	750.0000 (MHz)
Start Power:	250 (mW)
Rotation (1D):	0.21 dB
Adjusted SAR (1W):	8.36 mW/g (1g)

Comments:

Duty Cycle: 1:1, Medium parameters used: f = 750 MHz; σ = 0.92 S/m; ε_r = 55; ρ = 1000 kg/m^3
Probe: EX3DV4 - SN3735, , Frequency: 750 MHz, ConvF(9.52, 9.52, 9.52); Calibrated: 3/10/2017
Electronics: DAE4 Sn1488, Calibrated: 2/14/2017

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

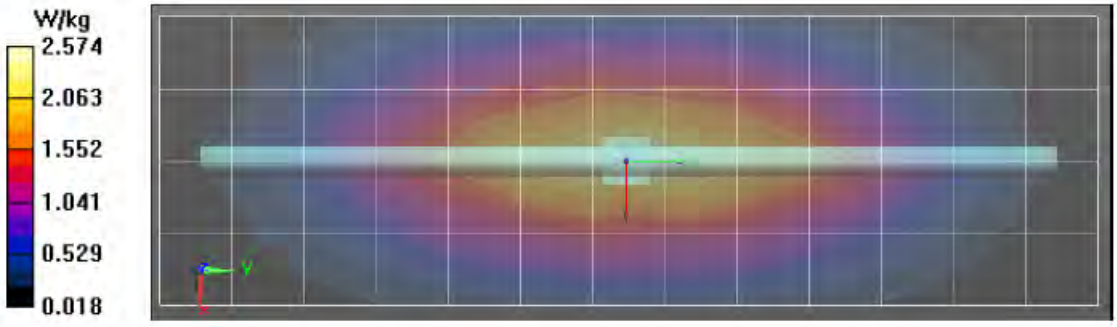
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 53.04 V/m; Power Drift = -0.07 dB
Fast SAR: SAR(1 g) = 2.14 W/kg; SAR(10 g) = 1.39 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 2.58 W/kg

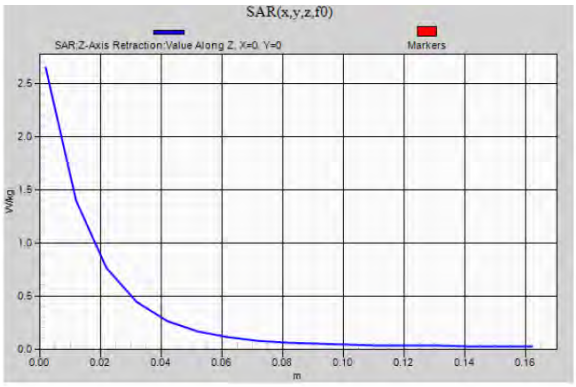
Below 2 GHz-Rev.2/System Performance Check/0-Degree Cube (5x6x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 53.04 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 2.70 W/kg
SAR(1 g) = 2.09 W/kg; SAR(10 g) = 1.44 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 2.44 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: 2/5/2018 8:51:59 AM

Robot#: DASY5-PG-1 | Run#:	ZR(AN)-SYSP-750B-180205-01
Dipole Model#	D750V3
Phantom#:	ELI4 1028
Tissue Temp:	21.4 (C)
Serial#:	1142
Test Freq:	750.0000 (MHz)
Start Power:	250 (mW)
Rotation (1D):	0.14 dB
Adjusted SAR (1W):	8.80 mW/g (1g)

Comments:

Duty Cycle: 1:1, Medium parameters used: f = 750 MHz; σ = 0.92 S/m; ε_r = 54.5; ρ = 1000 kg/m^3
Probe: EX3DV4 - SN3735, , Frequency: 750 MHz, ConvF(9.52, 9.52, 9.52); Calibrated: 3/10/2017
Electronics: DAE4 Sn1488, Calibrated: 2/14/2017

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

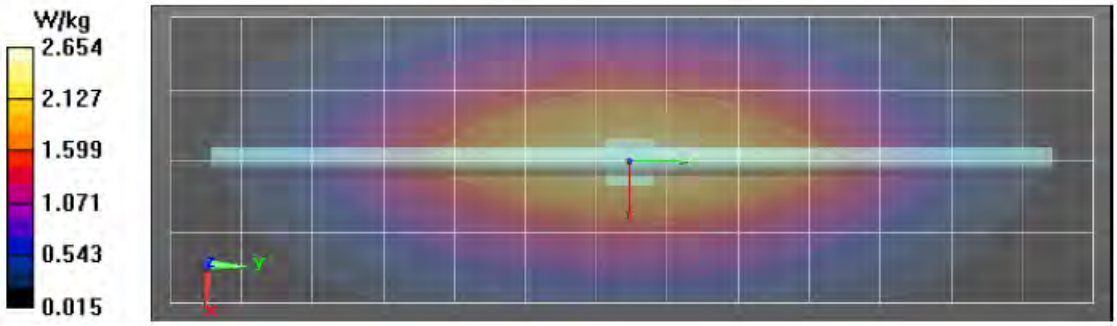
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 54.60 V/m; Power Drift = -0.01 dB
Fast SAR: SAR(1 g) = 2.23 W/kg; SAR(10 g) = 1.46 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 2.68 W/kg

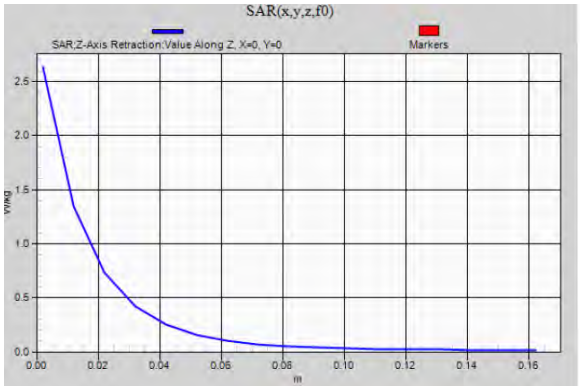
Below 2 GHz-Rev.2/System Performance Check/0-Degree Cube (5x6x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 54.60 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 3.02 W/kg
SAR(1 g) = 2.2 W/kg; SAR(10 g) = 1.49 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 2.64 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) = 2.63 W/kg





Motorola Solutions, Inc. EME Laboratory

Date/Time: 12/18/2017 8:54:55 AM

Robot#: DASY5-PG-1 | Run#:	AZ-SYSP-750H-171218-03
Dipole Model#	D750V3
Phantom#:	ELI4 1037
Tissue Temp:	19.7 (C)
Serial#:	1142
Test Freq:	750.0000 (MHz)
Start Power:	250 (mW)
Rotation (1D):	0.190 dB
Adjusted SAR (1W):	9.04 mW/g (1g)

Comments:

Duty Cycle: 1:1, Medium parameters used: f = 750 MHz; σ = 0.85 S/m; ε_r = 42; ρ = 1000 kg/m^3
Probe: EX3DV4 - SN3735, , Frequency: 750 MHz, ConvF(9.82, 9.82, 9.82); Calibrated: 3/10/2017
Electronics: DAE4 Sn1488, Calibrated: 2/14/2017

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

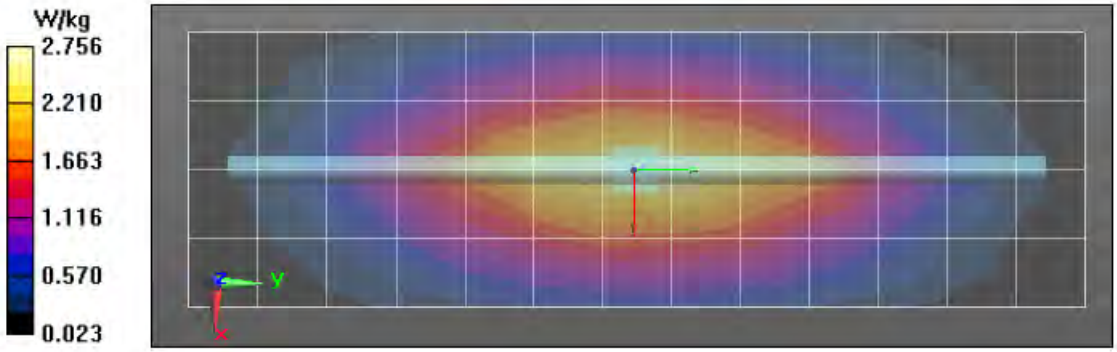
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 57.98 V/m; Power Drift = -0.14 dB
Fast SAR: SAR(1 g) = 2.3 W/kg; SAR(10 g) = 1.51 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 2.77 W/kg

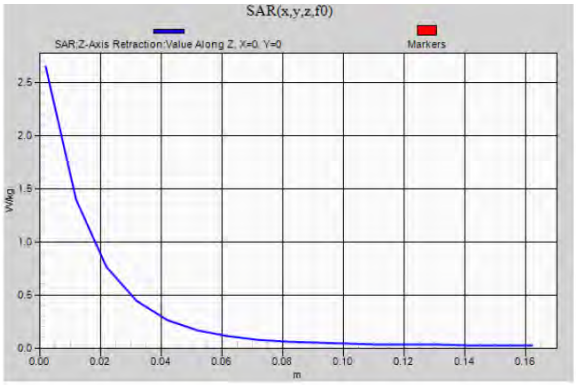
Below 2 GHz-Rev.2/System Performance Check/0-Degree Cube (5x6x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 57.98 V/m; Power Drift = -0.14 dB
Peak SAR (extrapolated) = 2.96 W/kg
SAR(1 g) = 2.26 W/kg; SAR(10 g) = 1.54 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 2.65 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: 12/19/2017 7:39:35 AM

Robot#: DASY5-PG-1 | Run#:	AZ-SYSP-750H-171219-06
Dipole Model#	D750V3
Phantom#:	ELI4 1037
Tissue Temp:	19.6 (C)
Serial#:	1142
Test Freq:	750.0000 (MHz)
Start Power:	250 (mW)
Rotation (1D):	0.190 dB
Adjusted SAR (1W):	8.72 mW/g (1g)

Comments:

Duty Cycle: 1:1, Medium parameters used: f = 750 MHz; σ = 0.86 S/m; ε_r = 43.2; ρ = 1000 kg/m^3
Probe: EX3DV4 - SN3735, , Frequency: 750 MHz, ConvF(9.82, 9.82, 9.82); Calibrated: 3/10/2017
Electronics: DAE4 Sn1488, Calibrated: 2/14/2017

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

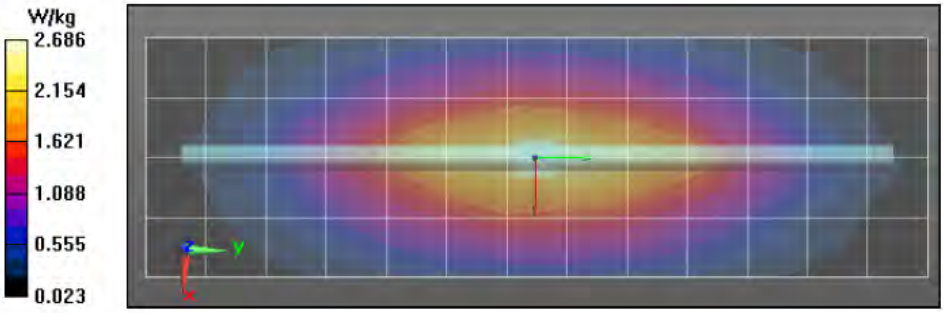
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 55.98 V/m; Power Drift = -0.03 dB
Fast SAR: SAR(1 g) = 2.23 W/kg; SAR(10 g) = 1.45 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 2.70 W/kg

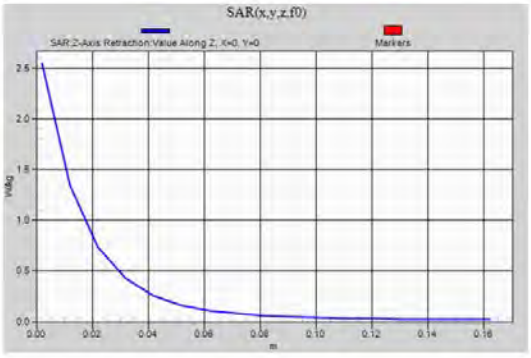
Below 2 GHz-Rev.2/System Performance Check/0-Degree Cube (5x6x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 55.98 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 2.87 W/kg
SAR(1 g) = 2.18 W/kg; SAR(10 g) = 1.48 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 2.56 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) = 2.55 W/kg





Motorola Solutions, Inc. EME Laboratory

Date/Time: 12/21/2017 2:29:30 AM

Robot#: DASY5-PG-1 | Run#:	ZR(AN)-SYSP-750H-171221-03
Dipole Model#	D750V3
Phantom#:	ELI4 1037
Tissue Temp:	20.6 (C)
Serial#:	1142
Test Freq:	750.0000 (MHz)
Start Power:	250 (mW)
Rotation (1D):	0.21 dB
Adjusted SAR (1W):	9.00 mW/g (1g)

Comments:

Duty Cycle: 1:1, Medium parameters used: f = 750 MHz; σ = 0.85 S/m; ε_r = 42.8; ρ = 1000 kg/m^3
Probe: EX3DV4 - SN3735, , Frequency: 750 MHz, ConvF(9.82, 9.82, 9.82); Calibrated: 3/10/2017
Electronics: DAE4 Sn1488, Calibrated: 2/14/2017

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

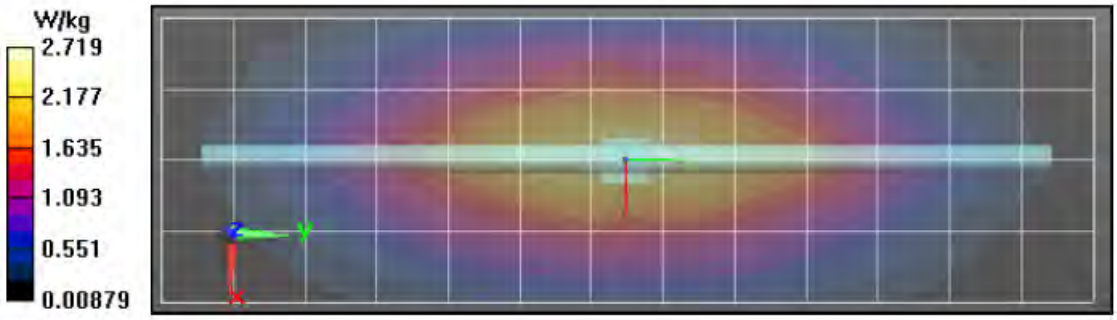
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 56.71 V/m; Power Drift = 0.01 dB
Fast SAR: SAR(1 g) = 2.29 W/kg; SAR(10 g) = 1.5 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 2.74 W/kg

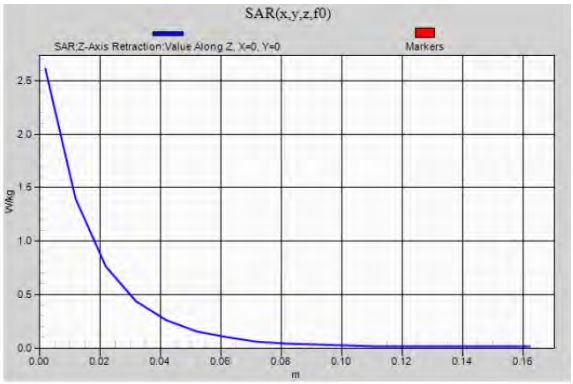
Below 2 GHz-Rev.2/System Performance Check/0-Degree Cube (5x6x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 56.71 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 2.91 W/kg
SAR(1 g) = 2.25 W/kg; SAR(10 g) = 1.53 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 2.62 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) = 2.61 W/kg





Motorola Solutions, Inc. EME Laboratory

Date/Time: 12/4/2017 10:35:50 PM

Robot#: DASY5-PG-3 | Run#:	ZR-SYSP-750H-171204-19
Dipole Model#	D750V3
Phantom#:	ELI4 1028
Tissue Temp:	21.2 (C)
Serial#:	1142
Test Freq:	750.0000 (MHz)
Start Power:	250 (mW)
Rotation (1D):	0.086 dB
Adjusted SAR (1W):	8.48 mW/g (1g)

Comments:

Duty Cycle: 1:1, Medium parameters used: f = 750 MHz; σ = 0.86 S/m; ε_r = 43.4; ρ = 1000 kg/m^3
Probe: EX3DV4 - SN3612, , Frequency: 750 MHz, ConvF(8.71, 8.71, 8.71); Calibrated: 5/17/2017
Electronics: DAE4 Sn1294, Calibrated: 5/23/2017

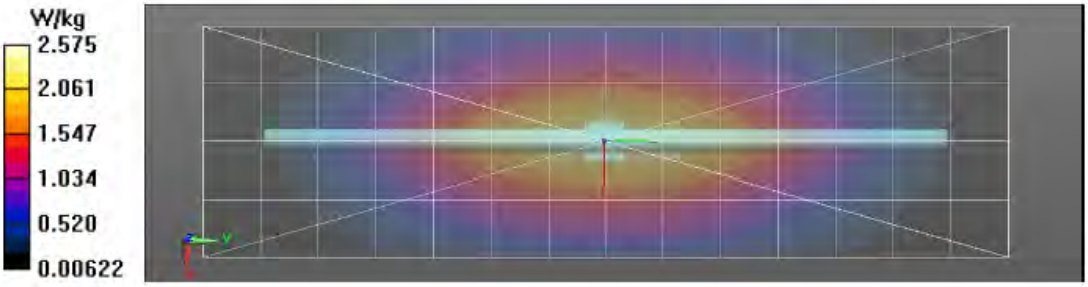
Below 2 GHz-Rev.2/System Performance Check/Dipole Area Scan 2 (41x141x1):

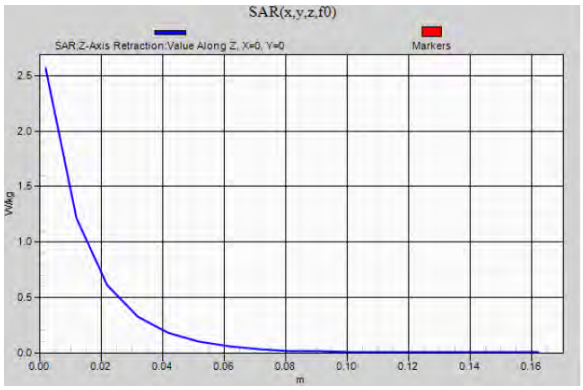
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 56.23 V/m; Power Drift = -0.03 dB
Fast SAR: SAR(1 g) = 2.15 W/kg; SAR(10 g) = 1.41 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 2.58 W/kg

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 = 56.23 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 2.98 W/kg
SAR(1 g) = 2.12 W/kg; SAR(10 g) = 1.4 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: 3/13/2018 3:47:02 PM

Robot#: DASY5-PG-3 | Run#: FD-SYSP-750H-180313-01
Dipole Model# D750V3
Phantom#: ELI4 1037
Tissue Temp: 20.5 (C)
Serial#: 1142
Test Freq: 750.0000 (MHz)
Start Power: 250 (mW)
Rotation (1D): 0.091 dB
Adjusted SAR (1W): 8.36 mW/g (1g)

Comments:

Duty Cycle: 1:1, Medium parameters used: f = 750 MHz; σ = 0.86 S/m; ε_r = 43.8; ρ = 1000 kg/m^3
Probe: EX3DV4 - SN3612, , Frequency: 750 MHz, ConvF(8.71, 8.71, 8.71); Calibrated: 5/17/2017
Electronics: DAE4 Sn1294, Calibrated: 5/23/2017

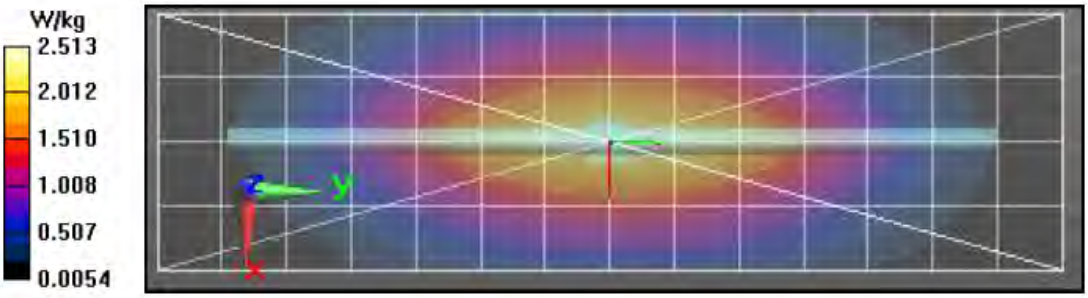
Below 2 GHz-Rev.2/System Performance Check/Dipole Area Scan 2 (41x141x1):

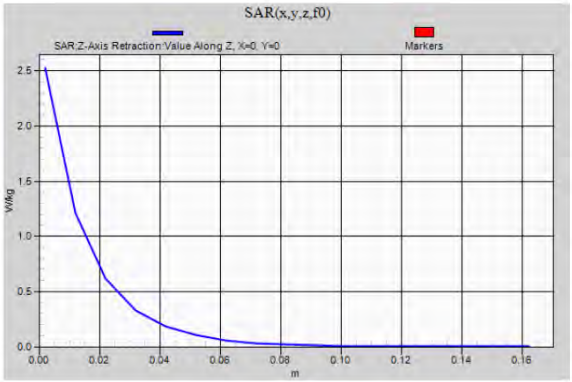
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 55.63 V/m; Power Drift = -0.01 dB
Fast SAR: SAR(1 g) = 2.11 W/kg; SAR(10 g) = 1.38 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 2.51 W/kg

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 = 55.63 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 2.92 W/kg
SAR(1 g) = 2.09 W/kg; SAR(10 g) = 1.39 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 2.52 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: 11/24/2017 12:32:10 AM

Robot#: DASY5-PG-1 | Run#:	AZ-SYSP-900B-171124-01
Dipole Model#	D900V2
Phantom#:	ELI4 1028
Tissue Temp:	21.1 (C)
Serial#:	1d026
Test Freq:	900.0000 (MHz)
Start Power:	250 (mW)
Rotation (1D):	0.250 dB
Adjusted SAR (1W):	10.60 mW/g (1g)

Comments:

Duty Cycle: 1:1, Medium parameters used: f = 900 MHz; σ = 1.06 S/m; ε_r = 52.4; ρ = 1000 kg/m^3
Probe: EX3DV4 - SN3735, , Frequency: 900 MHz, ConvF(9.19, 9.19, 9.19); Calibrated: 3/10/2017
Electronics: DAE4 Sn1488, Calibrated: 2/14/2017

Below 2 GHz-Rev.2/System Performance Check/Dipole Area Scan 2 (41x111x1):

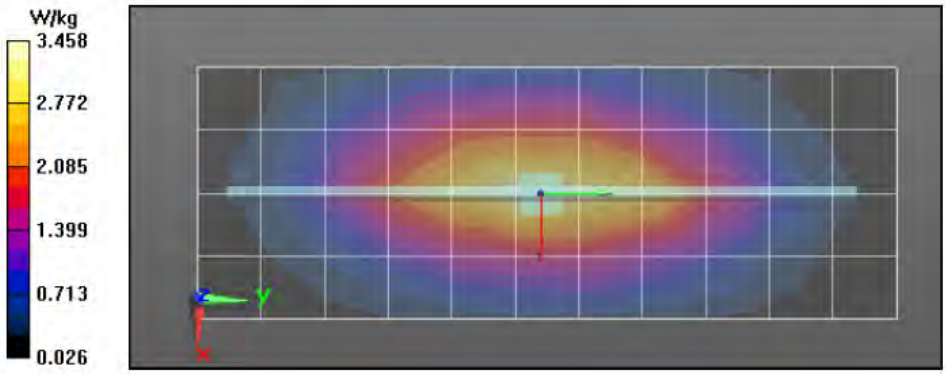
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 57.13 V/m; Power Drift = 0.01 dB
Fast SAR: SAR(1 g) = 2.72 W/kg; SAR(10 g) = 1.75 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 3.50 W/kg

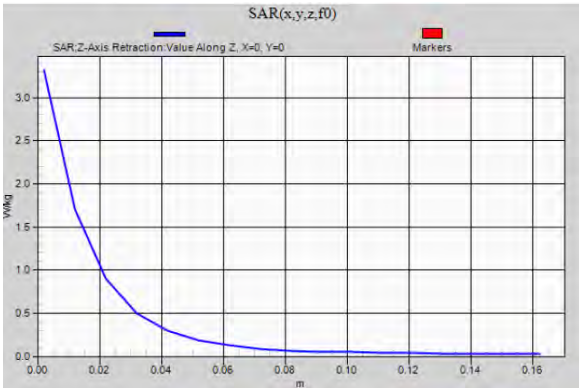
Below 2 GHz-Rev.2/System Performance Check/0-Degree Cube (5x6x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 57.13 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 3.74 W/kg
SAR(1 g) = 2.65 W/kg; SAR(10 g) = 1.78 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 3.32 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: 11/25/2017 12:54:36 AM

Robot#: DASY5-PG-1 | Run#:	AZ-SYSP-900B-171125-01
Dipole Model#	D900V2
Phantom#:	ELI4 1028
Tissue Temp:	20.6 (C)
Serial#:	1d026
Test Freq:	900.0000 (MHz)
Start Power:	250 (mW)
Rotation (1D):	0.240 dB
Adjusted SAR (1W):	10.72 mW/g (1g)

Comments:

Duty Cycle: 1:1, Medium parameters used: f = 900 MHz; σ = 1.09 S/m; ε_r = 52.5; ρ = 1000 kg/m^3
Probe: EX3DV4 - SN3735, , Frequency: 900 MHz, ConvF(9.19, 9.19, 9.19); Calibrated: 3/10/2017
Electronics: DAE4 Sn1488, Calibrated: 2/14/2017

Below 2 GHz-Rev.2/System Performance Check/Dipole Area Scan 2 (41x111x1):

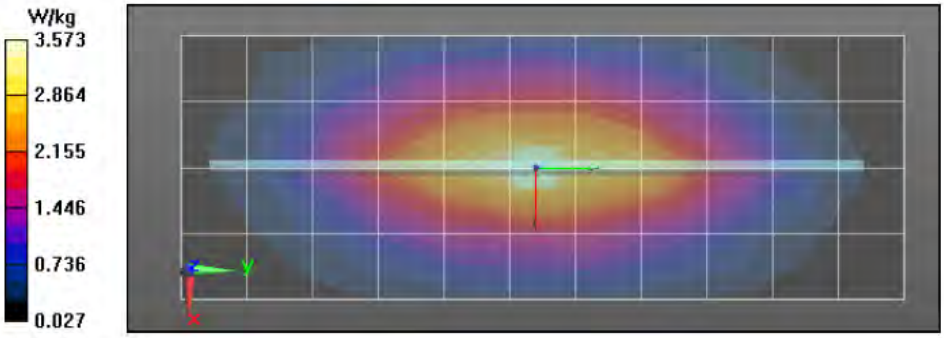
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 57.24 V/m; Power Drift = -0.01 dB
Fast SAR: SAR(1 g) = 2.75 W/kg; SAR(10 g) = 1.77 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 3.60 W/kg

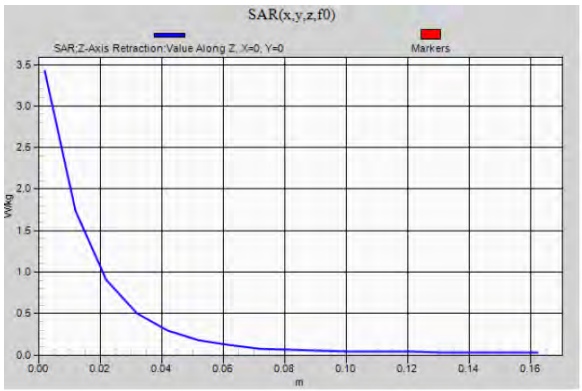
Below 2 GHz-Rev.2/System Performance Check/0-Degree Cube (5x6x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 57.24 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 3.90 W/kg
SAR(1 g) = 2.68 W/kg; SAR(10 g) = 1.79 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 3.43 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) = 3.42 W/kg





Motorola Solutions, Inc. EME Laboratory
Date/Time: 12/20/2017 11:23:08 PM

Robot#: DASY5-PG-1 | Run#:	ZR(AN)-SYSP-900B-171220-18
Dipole Model#	D900V2
Phantom#:	ELI4 1028
Tissue Temp:	20.3 (C)
Serial#:	1d026
Test Freq:	900.0000 (MHz)
Start Power:	250 (mW)
Rotation (1D):	0.22 dB
Adjusted SAR (1W):	10.68 mW/g (1g)

Comments:

Duty Cycle: 1:1, Medium parameters used: f = 900 MHz; σ = 1.08 S/m; ε_r = 53.5; ρ = 1000 kg/m^3
Probe: EX3DV4 - SN3735, , Frequency: 900 MHz, ConvF(9.19, 9.19, 9.19); Calibrated: 3/10/2017
Electronics: DAE4 Sn1488, Calibrated: 2/14/2017

Below 2 GHz-Rev.2/System Performance Check/Dipole Area Scan 2 (41x111x1):

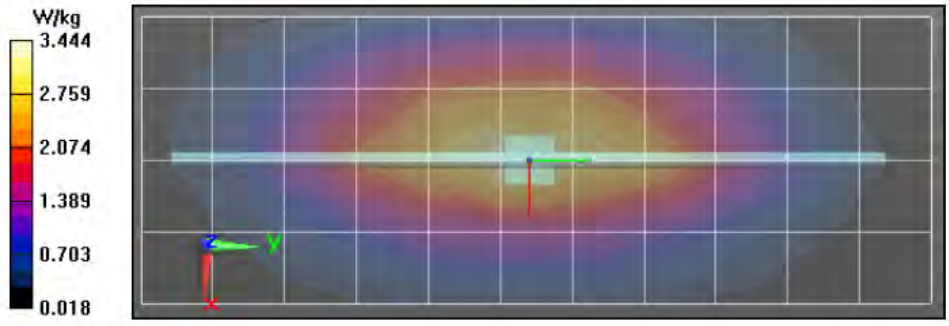
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 56.92 V/m; Power Drift = 0.03 dB
Fast SAR: SAR(1 g) = 2.73 W/kg; SAR(10 g) = 1.76 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 3.54 W/kg

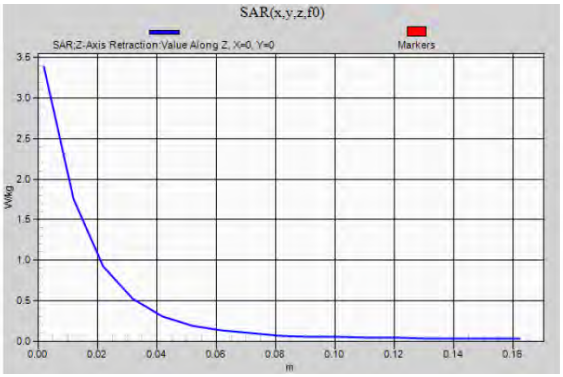
Below 2 GHz-Rev.2/System Performance Check/0-Degree Cube (5x7x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 56.92 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 3.79 W/kg
SAR(1 g) = 2.67 W/kg; SAR(10 g) = 1.8 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 3.37 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) = 3.39 W/kg





Motorola Solutions, Inc. EME Laboratory
Date/Time: 2/5/2018 9:37:30 AM

Robot#: DASY5-PG-1 | Run#: ZR(AN)-SYSP-900B-180205-02
Dipole Model# D900V2
Phantom#: ELI4 1028
Tissue Temp: 21.2 (C)
Serial#: 1d026
Test Freq: 900.0000 (MHz)
Start Power: 250 (mW)
Rotation (1D): 0.16 dB
Adjusted SAR (1W): 11.04 mW/g (1g)

Comments:

Duty Cycle: 1:1, Medium parameters used: f = 900 MHz; σ = 1.08 S/m; ε_r = 53; ρ = 1000 kg/m^3
Probe: EX3DV4 - SN3735, , Frequency: 900 MHz, ConvF(9.19, 9.19, 9.19); Calibrated: 3/10/2017
Electronics: DAE4 Sn1488, Calibrated: 2/14/2017

Below 2 GHz-Rev.2/System Performance Check/Dipole Area Scan 2 (41x111x1):

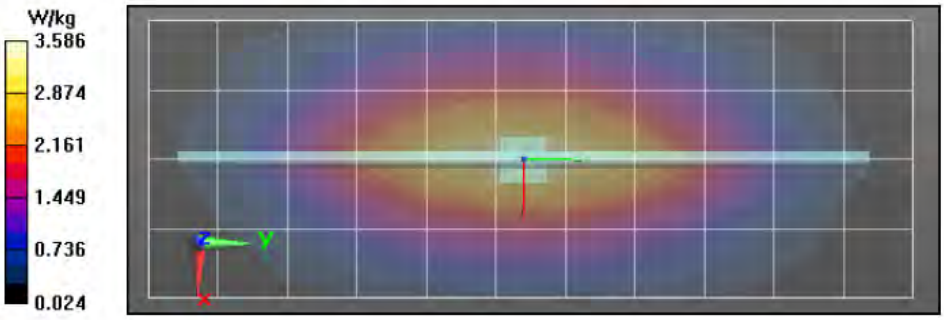
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 58.24 V/m; Power Drift = -0.02 dB
Fast SAR: SAR(1 g) = 2.8 W/kg; SAR(10 g) = 1.81 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 3.62 W/kg

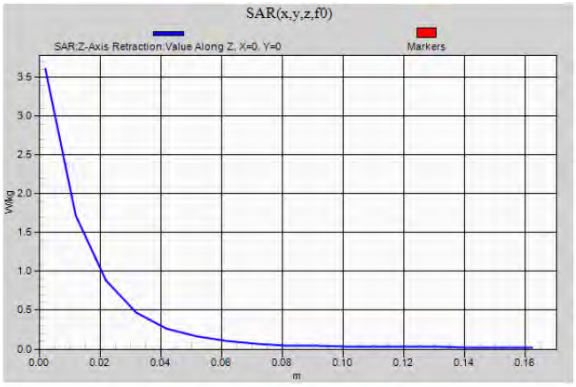
Below 2 GHz-Rev.2/System Performance Check/0-Degree Cube (5x7x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 58.24 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 4.15 W/kg
SAR(1 g) = 2.76 W/kg; SAR(10 g) = 1.82 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 3.56 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) = 3.61 W/kg





Motorola Solutions, Inc. EME Laboratory

Date/Time: 12/13/2017 10:44:06 PM

Robot#: DASY5-PG-1 | Run#: AZ-SYSP-900H-171213-15
Dipole Model# D900V2
Phantom#: ELI4 1037
Tissue Temp: 21.3 (C)
Serial#: 1d026
Test Freq: 900.0000 (MHz)
Start Power: 250 (mW)
Rotation (1D): 0.240 dB
Adjusted SAR (1W): 10.24 mW/g (1g)

Comments:

Duty Cycle: 1:1, Medium parameters used: f = 900 MHz; σ = 0.99 S/m; ε_r = 41; ρ = 1000 kg/m^3
Probe: EX3DV4 - SN3735, , Frequency: 900 MHz, ConvF(9.28, 9.28, 9.28); Calibrated: 3/10/2017
Electronics: DAE4 Sn1488, Calibrated: 2/14/2017

Below 2 GHz-Rev.2/System Performance Check/Dipole Area Scan 2 (41x111x1):

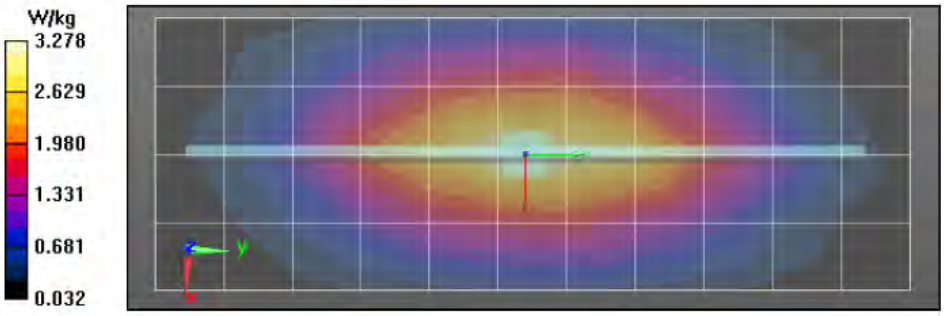
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 58.56 V/m; Power Drift = 0.03 dB
Fast SAR: SAR(1 g) = 2.6 W/kg; SAR(10 g) = 1.69 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 3.32 W/kg

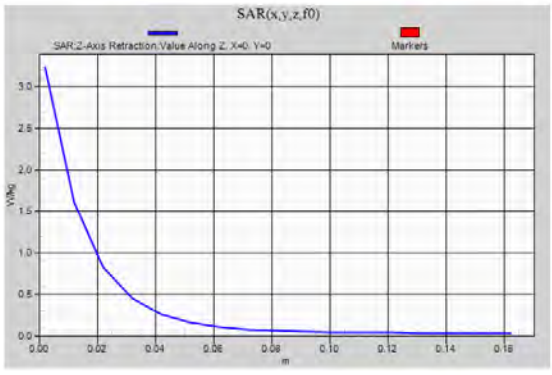
Below 2 GHz-Rev.2/System Performance Check/0-Degree Cube (5x6x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 58.56 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 3.64 W/kg
SAR(1 g) = 2.56 W/kg; SAR(10 g) = 1.7 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 3.21 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) = 3.24 W/kg





Motorola Solutions, Inc. EME Laboratory
Date/Time: 12/15/2017 12:47:15 AM

Robot#: DASY5-PG-1 | Run#:	AZ-SYSP-900H-171215-01#
Dipole Model#	D900V2
Phantom#:	ELI4 1037
Tissue Temp:	20.2 (C)
Serial#:	1d026
Test Freq:	900.0000 (MHz)
Start Power:	250 (mW)
Rotation (1D):	0.240 dB
Adjusted SAR (1W):	11.28 mW/g (1g)

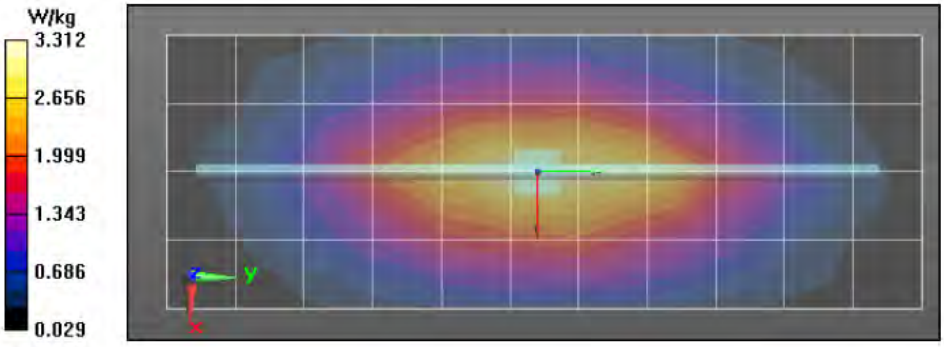
Comments:

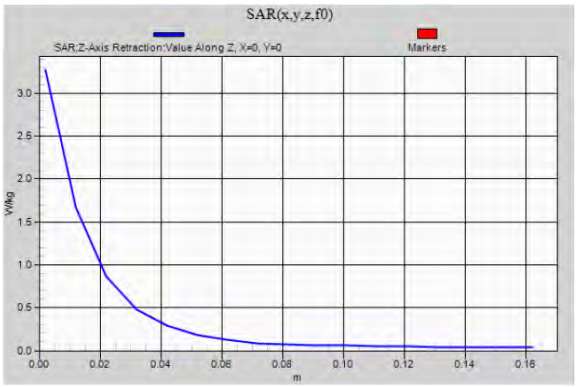
Duty Cycle: 1:1, Medium parameters used: f = 900 MHz; σ = 1 S/m; ε_r = 40.6; ρ = 1000 kg/m^3
Probe: EX3DV4 - SN3735, , Frequency: 900 MHz, ConvF(9.28, 9.28, 9.28); Calibrated: 3/10/2017
Electronics: DAE4 Sn1488, Calibrated: 2/14/2017

Below 2 GHz-Rev.2/System Performance Check/Dipole Area Scan 2 (41x111x1):
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 58.09 V/m; Power Drift = 0.06 dB
Fast SAR: SAR(1 g) = 2.6 W/kg; SAR(10 g) = 1.69 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 3.35 W/kg

Below 2 GHz-Rev.2/System Performance Check/0-Degree Cube (5x7x7)/Cube 0:
Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 58.09 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 3.97 W/kg
SAR(1 g) = 2.82 W/kg; SAR(10 g) = 1.89 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 3.54 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) = 3.27 W/kg





Motorola Solutions, Inc. EME Laboratory
Date/Time: 3/13/2018 4:42:36 PM

Robot#: DASY5-PG-3 | Run#: FD(LOH)-SYSP-900H-180313-02
Dipole Model# D900V3
Phantom#: ELI4 1037
Tissue Temp: 20.5 (C)
Serial#: 1d026
Test Freq: 900.0000 (MHz)
Start Power: 250 (mW)
Rotation (1D): 0.100 dB
Adjusted SAR (1W): 10.84 mW/g (1g)

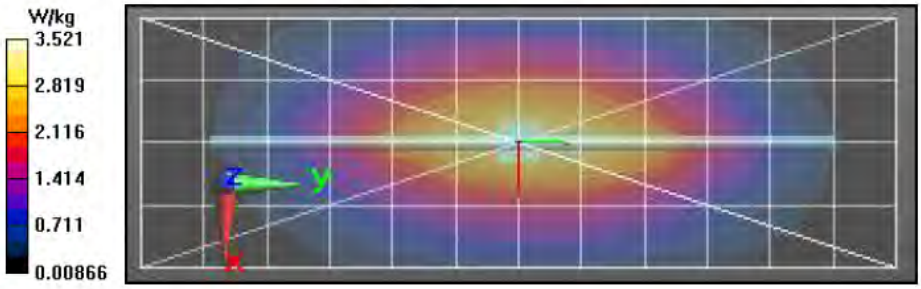
Comments:

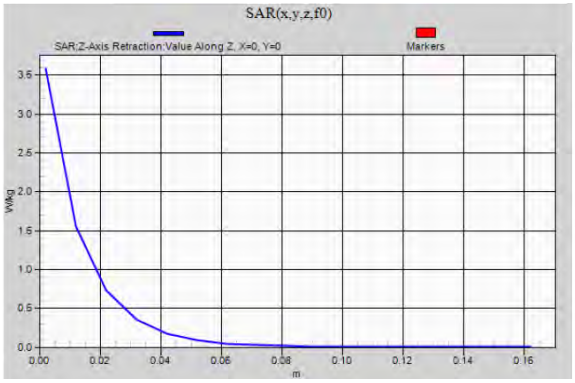
Duty Cycle: 1:1, Medium parameters used: f = 900 MHz; σ = 1.01 S/m; ε_r = 41.8; ρ = 1000 kg/m^3
Probe: EX3DV4 - SN3612, , Frequency: 900 MHz, ConvF(8.27, 8.27, 8.27); Calibrated: 5/17/2017
Electronics: DAE4 Sn1294, Calibrated: 5/23/2017

Below 2 GHz-Rev.2/System Performance Check/Dipole Area Scan 2 (41x121x1):
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 60.99 V/m; Power Drift = -0.06 dB
Fast SAR: SAR(1 g) = 2.76 W/kg; SAR(10 g) = 1.79 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 3.55 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 = 60.99 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 4.27 W/kg
SAR(1 g) = 2.71 W/kg; SAR(10 g) = 1.74 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 3.60 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) = 3.58 W/kg





Motorola Solutions, Inc. EME Laboratory

Date/Time: 3/1/2018 5:34:48 AM

Robot#: DASY5-PG-3 | Run#: ZR-SYSP-2450B-180301-03
Dipole Model# D2450V2
Phantom#: ELI5 1147
Tissue Temp: 20.5 (C)
Serial#: 782
Test Freq: 2450 (MHz)
Start Power: 250 (mW)
Rotation (1D): 0.086 dB
Adjusted SAR (1W): 53.60 mW/g (1g)

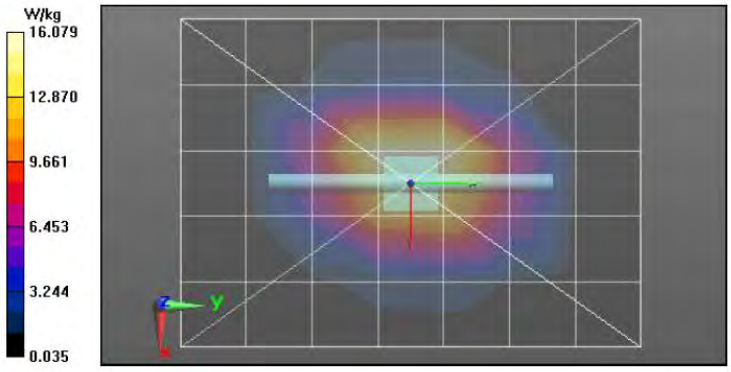
Comments:

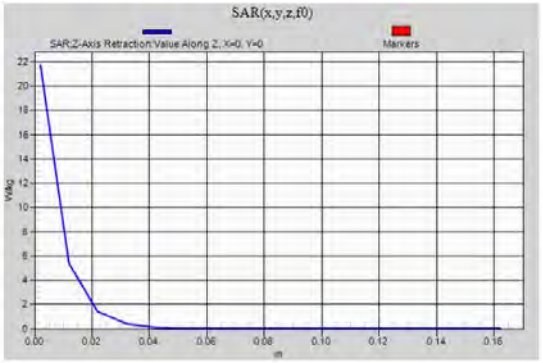
Duty Cycle: 1:1, Medium parameters used: f = 2450 MHz; σ = 2.03 S/m; ε_r = 48.1; ρ = 1000 kg/m^3
Probe: EX3DV4 - SN3612, , Frequency: 2450 MHz, ConvF(6.82, 6.82, 6.82); Calibrated: 5/17/2017
Electronics: DAE4 Sn1294, Calibrated: 5/23/2017

2-3 GHz-Rev.2/System Performance Check/Dipole Area Scan 2 (51x71x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Reference Value = 104.9 V/m; Power Drift = -0.05 dB
Fast SAR: SAR(1 g) = 14 W/kg; SAR(10 g) = 6.39 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 23.3 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 = 104.9 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 29.3 W/kg
SAR(1 g) = 13.4 W/kg; SAR(10 g) = 6.27 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 21.6 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) = 21.8 W/kg





Motorola Solutions, Inc. EME Laboratory

Date/Time: 3/5/2018 9:57:25 AM

Robot#: DASY5-PG-3 | Run#: ZR(ZZ)-SYSP-2450H-180305-01
Dipole Model# D2450V2
Phantom#: ELI4 1090
Tissue Temp: 20.9 (C)
Serial#: 782
Test Freq: 2450 (MHz)
Start Power: 250 (mW)
Rotation (1D): 0.099 dB
Adjusted SAR (1W): 55.60 mW/g (1g)

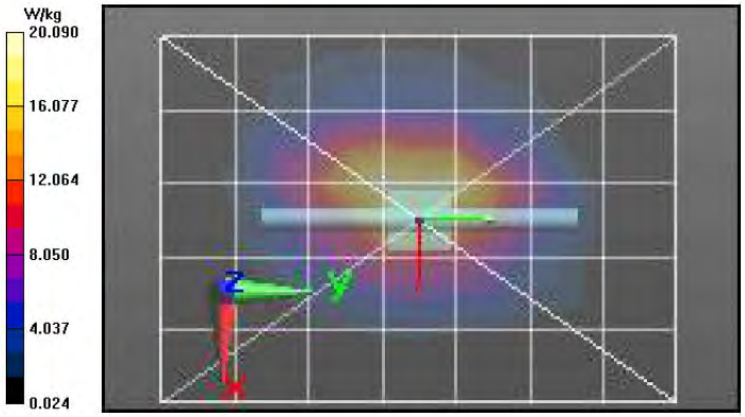
Comments:

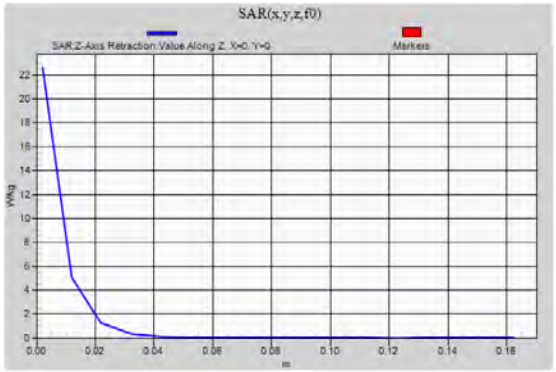
Duty Cycle: 1:1, Medium parameters used: f = 2450 MHz; σ = 1.88 S/m; ε_r = 35.8; ρ = 1000 kg/m^3
Probe: EX3DV4 - SN3612, , Frequency: 2450 MHz, ConvF(6.59, 6.59, 6.59); Calibrated: 5/17/2017
Electronics: DAE4 Sn1294, Calibrated: 5/23/2017

2-3 GHz-Rev.2/System Performance Check/Dipole Area Scan 2 (51x71x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Reference Value = 110.9 V/m; Power Drift = -0.10 dB
Fast SAR: SAR(1 g) = 14.9 W/kg; SAR(10 g) = 6.86 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 24.0 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 = 110.9 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 31.1 W/kg
SAR(1 g) = 13.9 W/kg; SAR(10 g) = 6.44 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 22.5 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) = 22.7 W/kg





Motorola Solutions, Inc. EME Laboratory

Date/Time: 4/24/2018 8:06:01 AM

Robot#: DASY5-PG-2 | Run#: LOH-SYSP-835B-180424-06#
Dipole Model# D835V2
Phantom#: ELI4 1103
Tissue Temp: 21.5 (C)
Serial#: 4d029
Test Freq: 835.0000 (MHz)
Start Power: 250 (mW)
Rotation (1D): 0.046dB
Adjusted SAR (1W): 10.28mW/g (1g)

Comments:

Duty Cycle: 1:1, Medium parameters used: f = 835 MHz; σ = 1 S/m; ε_r = 52.6; ρ = 1000 kg/m^3
Probe: EX3DV4 - SN7485, , Frequency: 835 MHz, ConvF(10.44, 10.44, 10.44); Calibrated: 1/17/2018
Electronics: DAE4 Sn688, Calibrated: 1/4/2018

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 = 58.76 V/m; Power Drift = 0.01 dB
Fast SAR: SAR(1 g) = 2.61 W/kg; SAR(10 g) = 1.71 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 3.33 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 = 58.76 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 3.87 W/kg
SAR(1 g) = 2.57 W/kg; SAR(10 g) = 1.7 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 3.32 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) = 3.33 W/kg