DASY/EASY - Parameters of Probe: EX3DV4 - SN:7364

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unct. (k=2)
150	52.3	0.76	12.95	12.95	12.95	0.00	1.00	± 13.3 %
300	45.3	0.87	11.95	11.95	11.95	0.10	1.10	± 13.3 %
450	43.5	0.87	10.72	10.72	10.72	0.15	1.10	± 13.3 %
750	41.9	0.89	10.01	10.01	10.01	0.29	1.08	± 12.0 %
900	41.5	0.97	9.26	9.26	9.26	0.24	1.23	± 12.0 %
1810	40.0	1.40	7.93	7.93	7.93	0.33	0.80	± 12.0 %
1900	40.0	1.40	7.93	7.93	7.93	0.35	0.80	± 12.0 %
2450	39.2	1.80	7.18	7.18	7.18	0.27	0.98	± 12.0 %
2600	39.0	1.96	6.93	6.93	6.93	0.34	0.93	± 12.0 %
5200	36.0	4.66	5.22	5.22	5.22	0.35	1.80	± 13.1 %
5300	35.9	4.76	5.00	5.00	5.00	0.35	1.80	± 13.1 %
5500	35.6	4.96	4.75	4.75	4.75	0.40	1.80	± 13.1 %
5600	35.5	5.07	4.64	4.64	4.64	0.40	1.80	± 13.1 %
5800	35.3	5.27	4.52	4.52	4.52	0.40	1.80	± 13.1 %

[C] Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

DASY/EASY - Parameters of Probe: EX3DV4 - SN:7364

Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unct. (k=2)
150	61.9	0.80	12.28	12.28	12.28	0.00	1.00	± 13.3 %
300	58.2	0.92	11.24	11.24	11.24	0.08	1.10	± 13.3 %
450	56.7	0.94	11.02	11.02	11.02	0.09	1.10	± 13.3 %
750	55.5	0.96	9.42	9.42	9.42	0.27	1.06	± 12.0 %
900	55.0	1.05	9.20	9.20	9.20	0.27	1.22	± 12.0 %
1810	53.3	1.52	7.75	7.75	7.75	0.43	0.85	± 12.0 %
1900	53.3	1.52	7.57	7.57	7.57	0.47	0.80	± 12.0 %
2450	52.7	1.95	7.33	7.33	7.33	0.35	0.90	± 12.0 %
2600	52.5	2.16	7.17	7.17	7.17	0.31	0.95	± 12.0 %
5200	49.0	5.30	4.52	4.52	4.52	0.45	1.90	± 13.1 %
5300	48.9	5.42	4.29	4.29	4.29	0.45	1.90	± 13.1 %
5500	48.6	5.65	3.92	3.92	3.92	0.50	1.90	± 13.1 %
5600	48.5	5.77	3.74	3.74	3.74	0.50	1.90	± 13.1 %
5800	48.2	6.00	4.06	4.06	4.06	0.50	1.90	± 13.1 %

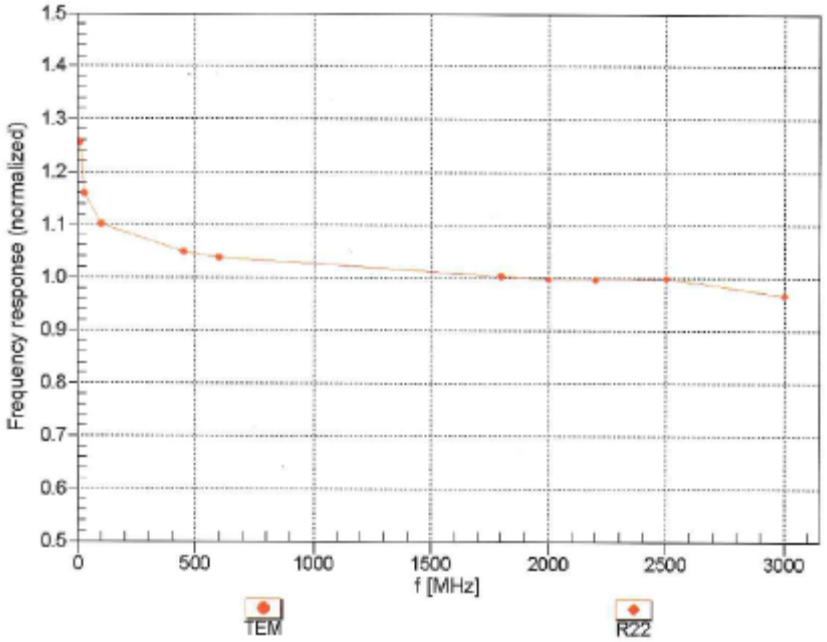
[C] Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

EX3DV4– SN:7364 June 23, 2015

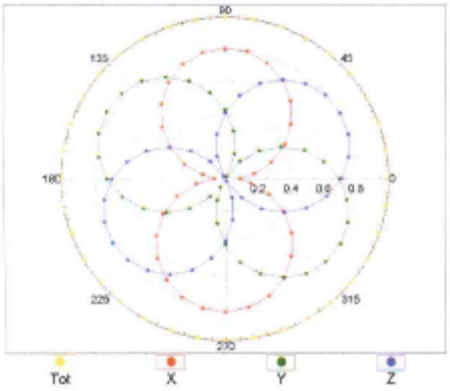
Frequency Response of E-Field
(TEM-Cell:ifi110 EXX, Waveguide: R22)



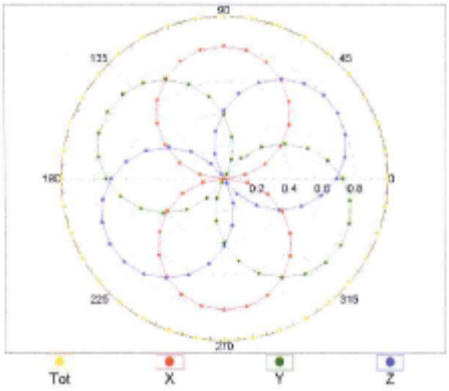
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

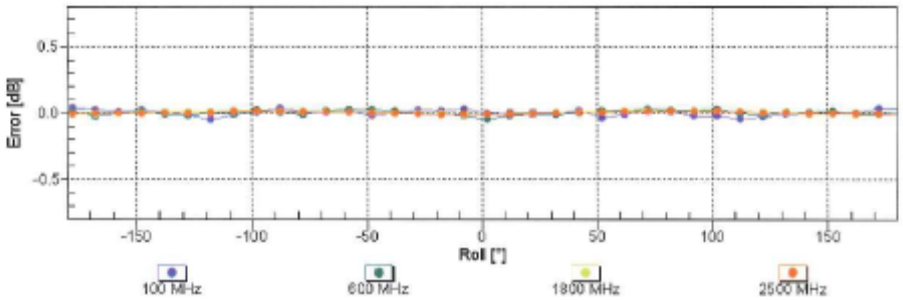
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



f=1800 MHz,R22

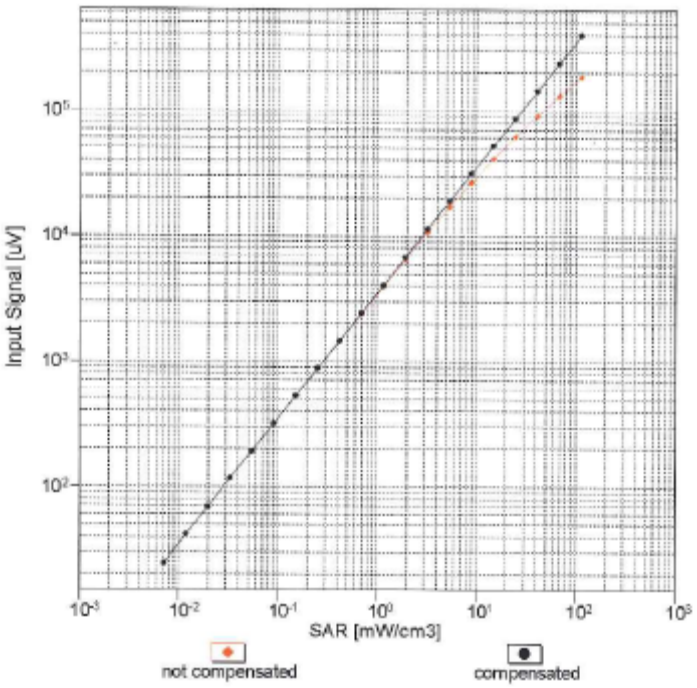


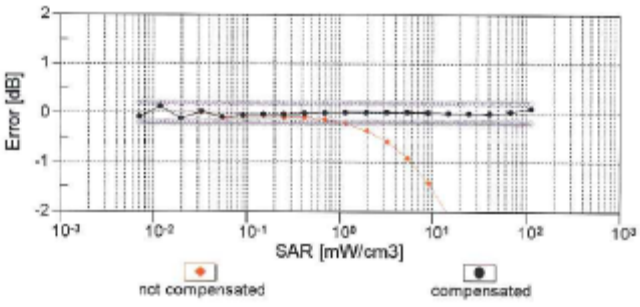


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR$_{head}$)

(TEM cell , f_{eval}= 1900 MHz)

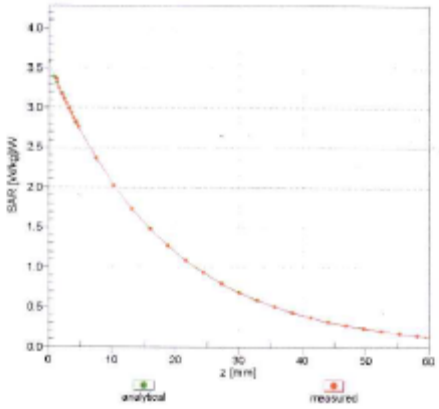




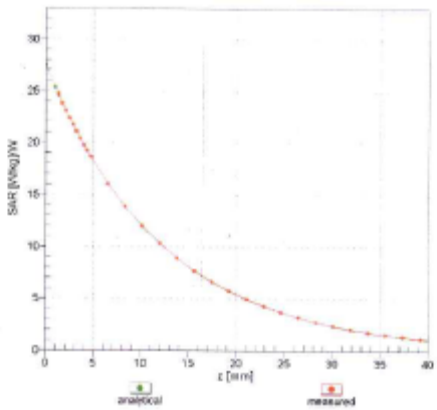
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 900 MHz,WGLS R9 (H_convF)

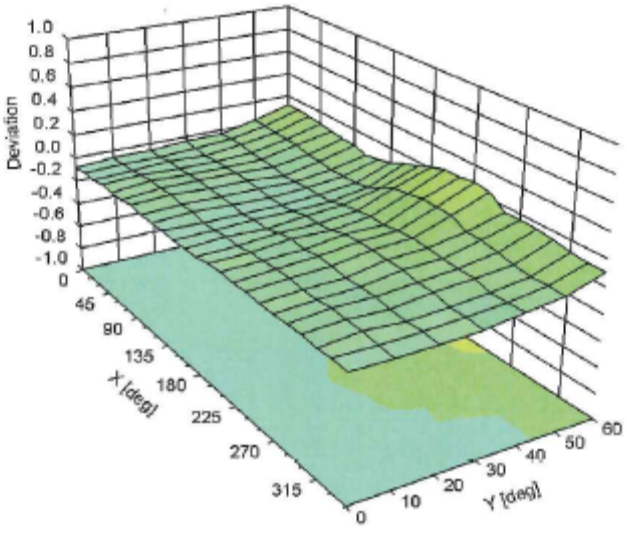


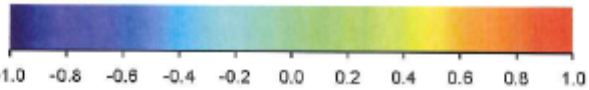
f = 1810 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz





Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

DASY/EASY - Parameters of Probe: EX3DV4 - SN:7364

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	132.1
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm

Appendix C
Dipole Calibration Certificates

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

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

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

Accreditation No.: **SCS 0108**

Client **Motorola Solutions MY**

Certificate No: **D450V3-1053_Mar15**

CALIBRATION CERTIFICATE

Object	D450V3 - SN:1053
Calibration procedure(s)	QA CAL-15.v8 Calibration procedure for dipole validation kits below 700 MHz
Calibration date:	March 17, 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	03-Apr-14 (No. 217-01911)	Apr-15
Power sensor E4412A	MY41498087	03-Apr-14 (No. 217-01911)	Apr-15
Reference 3 dB Attenuator	SN: S5054 (3c)	03-Apr-14 (No. 217-01915)	Apr-15
Reference 20 dB Attenuator	SN: S5058 (20k)	03-Apr-14 (No. 217-01918)	Apr-15
Type-N mismatch combination	SN: 5047.2 / 06327	03-Apr-14 (No. 217-01921)	Apr-15
Reference Probe ET3DV6	SN: 1507	30-Dec-14 (No. ET3-1507_Dec14)	Dec-15
DAE4	SN: 654	30-Jun-14 (No. DAE4-654_Jun14)	Jun-15

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-14)	In house check: Oct-15

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

Issued: March 17, 2015

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

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

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

Accreditation No.: SCS 0108

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "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) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

d) 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	43.9 ± 6 %	0.88 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 W input power	1.12 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**4.45 W/kg ± 18.1 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 W input power	0.747 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**2.97 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	56.7 ± 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 W input power	1.13 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**4.41 W/kg ± 18.1 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 W input power	0.746 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**2.92 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	57.2 Ω - 2.2 jΩ
Return Loss	- 23.1 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	55.2 Ω - 5.3 jΩ
Return Loss	- 23.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.350 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: 17.03.2015

Test Laboratory: SPEAG, Zurich, Switzerland

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

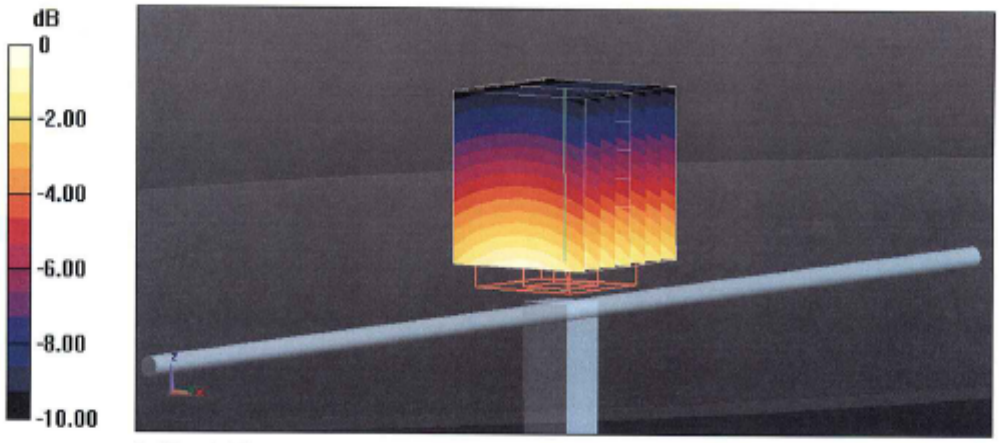
Communication System: UID 0 - CW; Frequency: 450 MHz
Medium parameters used: f = 450 MHz; σ = 0.88 S/m; ε_r = 43.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

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: 30.06.2014
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP:1003
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

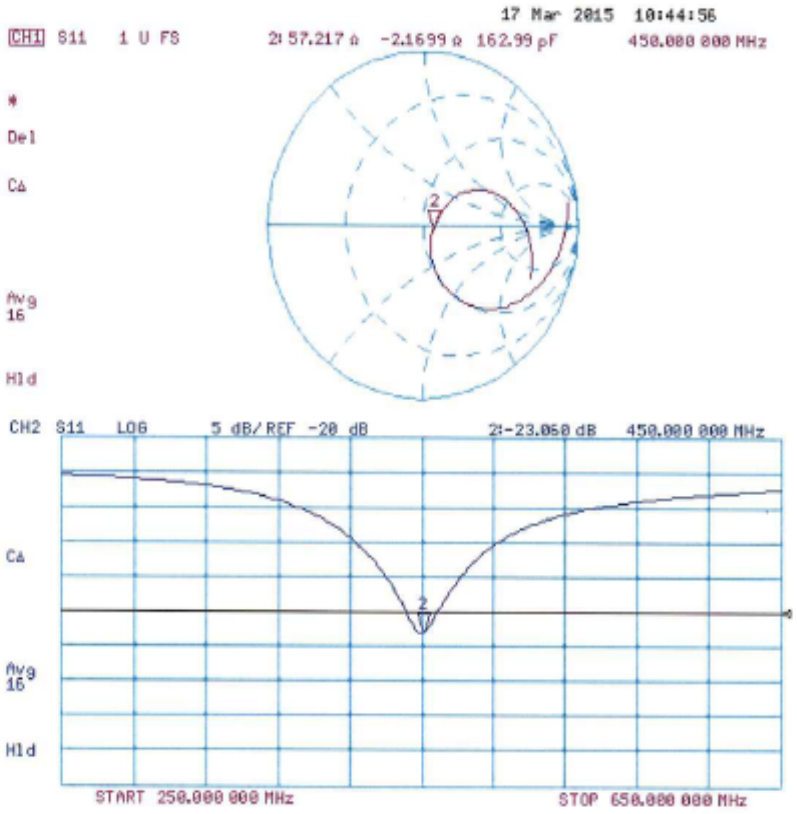
Dipole Calibration for Head Tissue/d=15mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 38.88 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 1.61 W/kg
SAR(1 g) = 1.12 W/kg; SAR(10 g) = 0.747 W/kg
Maximum value of SAR (measured) = 1.20 W/kg



0 dB = 1.20 W/kg = 0.79 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 17.03.2015

Test Laboratory: SPEAG, Zurich, Switzerland

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

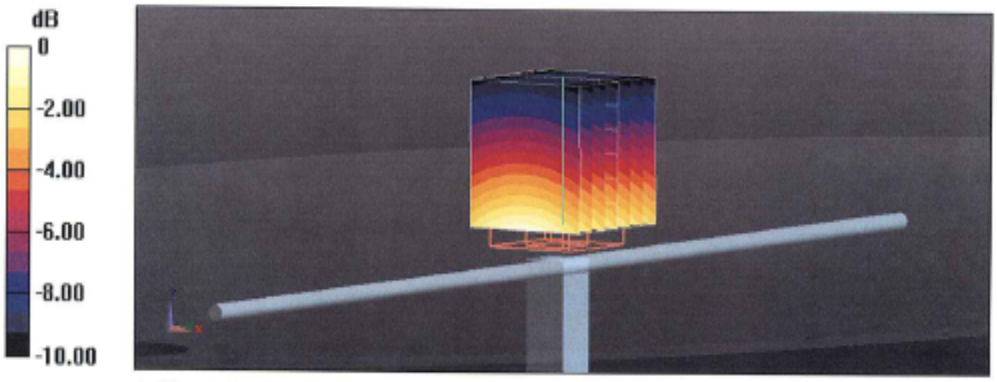
Communication System: UID 0 - CW; Frequency: 450 MHz
Medium parameters used: f = 450 MHz; σ = 0.97 S/m; ε_r = 56.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

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: 30.06.2014
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP:1003
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

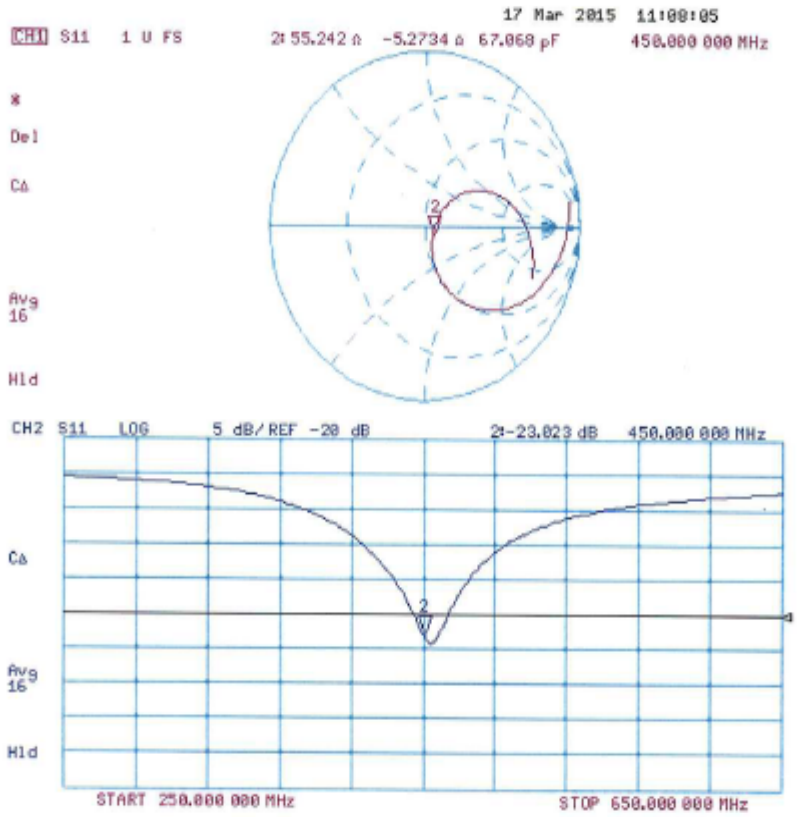
Dipole Calibration for Body Tissue/d=15mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 36.35 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 1.81 W/kg
SAR(1 g) = 1.13 W/kg; SAR(10 g) = 0.746 W/kg
Maximum value of SAR (measured) = 1.21 W/kg



0 dB = 1.21 W/kg = 0.83 dBW/kg

Impedance Measurement Plot for Body TSL



Dipole Data

As stated in KDB 865664, for dipole D450V3 (serial number 1053) exceed 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 D450V3 (SN 1053)	Head			Body		
	Impedance		Return Loss	Impedance		Return Loss
Date Measured	real Ω	imag jΩ	dB	real Ω	imag jΩ	dB
04/14/2015	57.17	-4.06	-22.30	54.88	-3.62	-24.79
02/15/2016	53.46	-5.59	-21.02	55.30	-5.51	-22.32

APPENDIX D
System Verification Check Scans

Motorola Solutions, Inc. EME Laboratory
Date/Time: 3/21/2016 3:18:38 PM

Robot#: DASY5-PG-2 | Run#: AZ-SYSP-450B-160321-03
Dipole Model# D450V3
Phantom#: ELI4 1050
Tissue Temp: 21.5 (C)
Serial#: 1053
Test Freq: 450.000 (MHz)
Start Power: 250 (mW)
Rotation (1D): 0.190 dB
Adjusted SAR (1W): 4.44 mW/g (1g)

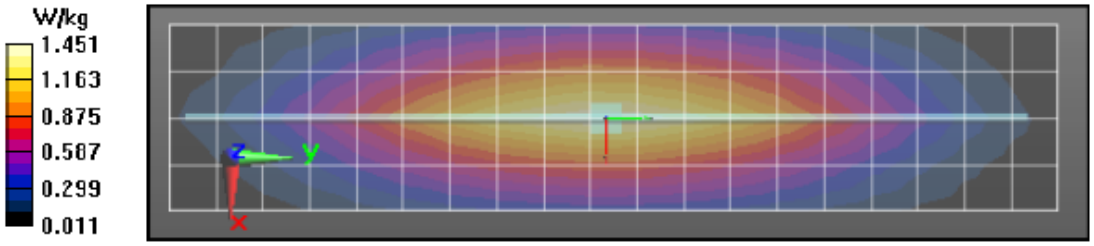
Comments:

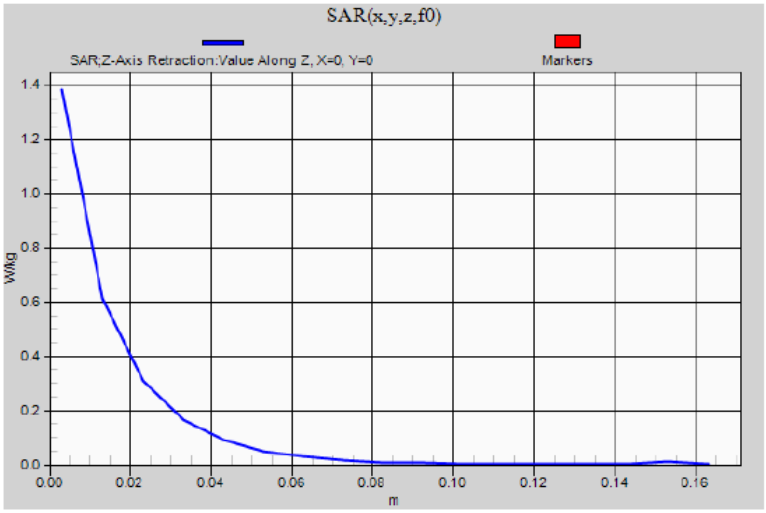
Duty Cycle: 1:1, Medium parameters used: f = 450 MHz; σ = 0.97 S/m; ε_r = 54.6; ρ = 1000 kg/m^3
Probe: EX3DV4 - SN7364, , Frequency: 450 MHz, ConvF(11.02, 11.02, 11.02); Calibrated: 6/23/2015
Electronics: DAE4 Sn1483, Calibrated: 6/16/2015

Below 2 GHz-Rev.2/System Performance Check/Dipole Area Scan 2 (41x191x1):
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 39.12 V/m; Power Drift = -0.02 dB
Fast SAR: SAR(1 g) = 1.17 W/kg; SAR(10 g) = 0.811 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 (5x5x7)/Cube 0:
Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 39.12 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 1.78 W/kg
SAR(1 g) = 1.11 W/kg; SAR(10 g) = 0.743 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: 3/22/2016 7:28:40 AM

Robot#: DASY5-PG-1 | Run#:	ZWS-SYSP-450B-160322-01
Dipole Model#	D450V3
Phantom#:	ELI4 1050
Tissue Temp:	21.3 (C)
Serial#:	1053
Test Freq:	450.000 (MHz)
Start Power:	250 (mW)
Rotation (1D):	0.044 dB
Adjusted SAR (1W):	4.40 mW/g (1g)

Comments:

Duty Cycle: 1:1, Medium parameters used: f = 450 MHz; σ = 0.91 S/m; ε_r = 55.5; ρ = 1000 kg/m^3
Probe: ES3DV3 - SN3122, , Frequency: 450 MHz, ConvF(6.78, 6.78, 6.78); Calibrated: 6/19/2015
Electronics: DAE4 Sn1488, Calibrated: 7/14/2015

Below 2 GHz-Rev.2/System Performance Check/Dipole Area Scan 2 (41x181x1):

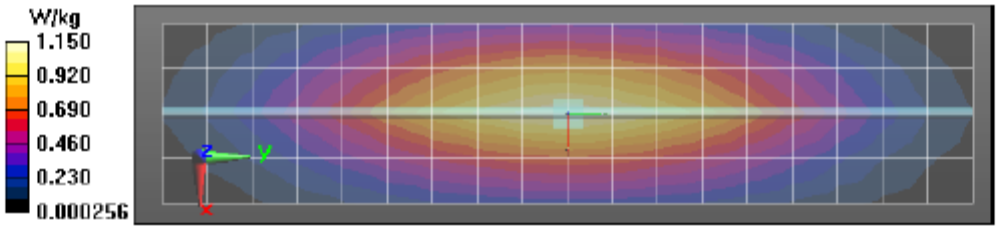
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 35.73 V/m; Power Drift = -0.01 dB
Fast SAR: SAR(1 g) = 1.1 W/kg; SAR(10 g) = 0.766 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 1.16 W/kg

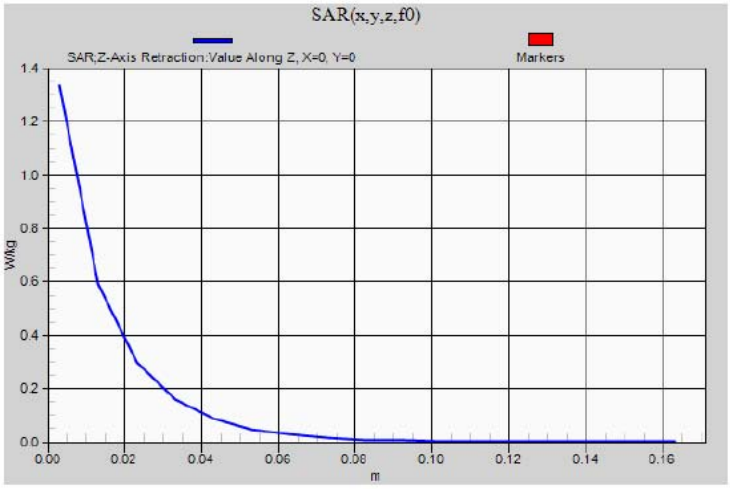
Below 2 GHz-Rev.2/System Performance Check/0-Degree Cube (5x5x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 35.73 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 1.66 W/kg
SAR(1 g) = 1.1 W/kg; SAR(10 g) = 0.732 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 1.16 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: 3/23/2016 6:43:56 AM

Robot#: DASY5-PG-1 | Run#:	ZWS-SYSP-450B-160323-01
Dipole Model#	D450V3
Phantom#:	ELI4 1050
Tissue Temp:	22.1 (C)
Serial#:	1053
Test Freq:	450.000 (MHz)
Start Power:	250 (mW)
Rotation (1D):	0.049 dB
Adjusted SAR (1W):	4.44 mW/g (1g)

Comments:

Duty Cycle: 1:1, Medium parameters used: f = 450 MHz; σ = 0.94 S/m; ε_r = 55.1; ρ = 1000 kg/m^3
Probe: ES3DV3 - SN3122, , Frequency: 450 MHz, ConvF(6.78, 6.78, 6.78); Calibrated: 6/19/2015
Electronics: DAE4 Sn1488, Calibrated: 7/14/2015

Below 2 GHz-Rev.2/System Performance Check/Dipole Area Scan 2 (41x181x1):

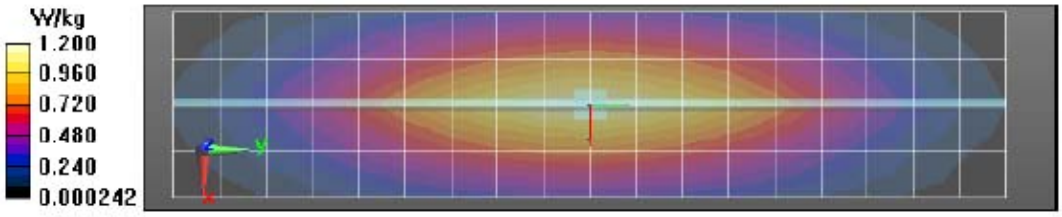
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 35.83 V/m; Power Drift = -0.01 dB
Fast SAR: SAR(1 g) = 1.12 W/kg; SAR(10 g) = 0.778 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 1.20 W/kg

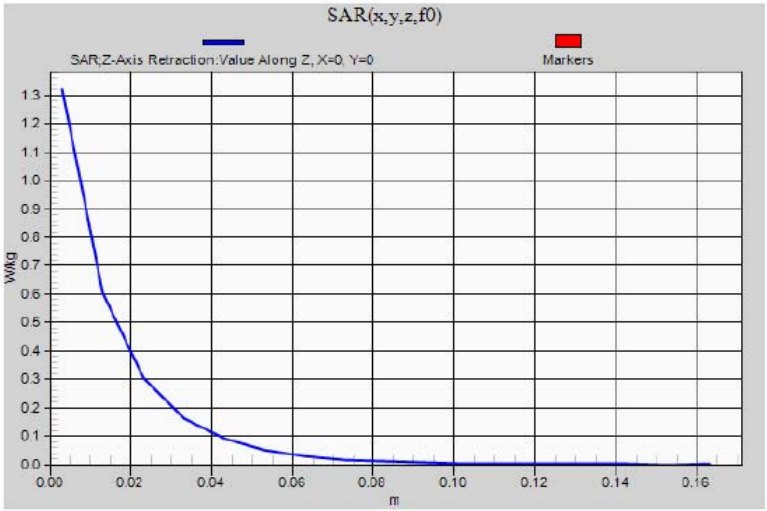
Below 2 GHz-Rev.2/System Performance Check/0-Degree Cube (5x5x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 35.83 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 1.72 W/kg
SAR(1 g) = 1.11 W/kg; SAR(10 g) = 0.742 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: 3/23/2016 8:54:49 AM

Robot#: DASY5-PG-1 | Run#:	ZWS-SYSP-450H-160323-04
Dipole Model#:	D450V3
Phantom#:	ELI5 1147
Tissue Temp:	21.6 (C)
Serial#:	1053
Test Freq:	450.000 (MHz)
Start Power:	250 (mW)
Rotation (1D):	0.044 dB
Adjusted SAR (1W):	4.40 mW/g (1g)

Comments:

Duty Cycle: 1:1, Medium parameters used: f = 450 MHz; σ = 0.84 S/m; ε_r = 42.1; ρ = 1000 kg/m^3
Probe: ES3DV3 - SN3122, , Frequency: 450 MHz, ConvF(6.79, 6.79, 6.79); Calibrated: 6/19/2015
Electronics: DAE4 Sn1488, Calibrated: 7/14/2015

Below 2 GHz-Rev.2/System Performance Check/Dipole Area Scan 2 (41x181x1):

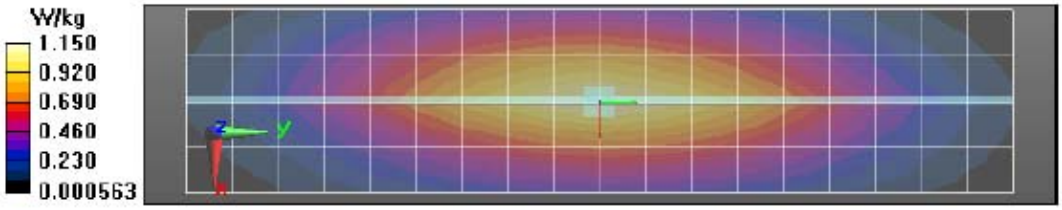
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 37.21 V/m; Power Drift = -0.02 dB
Fast SAR: SAR(1 g) = 1.09 W/kg; SAR(10 g) = 0.761 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 1.15 W/kg

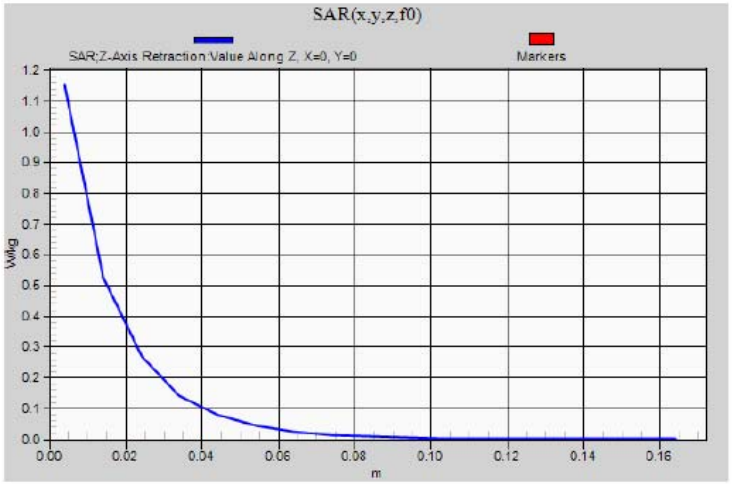
Below 2 GHz-Rev.2/System Performance Check/0-Degree Cube (5x5x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 37.21 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 1.65 W/kg
SAR(1 g) = 1.1 W/kg; SAR(10 g) = 0.727 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 1.15 W/kg

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

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





APPENDIX E
DUT Scans - (Shortened Scan and Highest SAR configurations)

Shortened Scan of Highest SAR configuration

Motorola Solutions, Inc. EME Laboratory
Date/Time: 3/23/2016 7:57:36 AM

Robot#: DASY5-PG-1 | Run#: ZWS-AB-160323-03
Model#: PMUE5040A
Phantom#: ELI4 1050
Tissue Temp: 22.0 (C)
Serial#: 1651NP0013
Antenna: Fixed
Test Freq: 467.6375 (MHz)
Battery: PMNN4477A
Carry Acc: 1564028V01
Audio Acc: 53727B
Start Power: 0.539 (W)

Comments: Shorten Scan

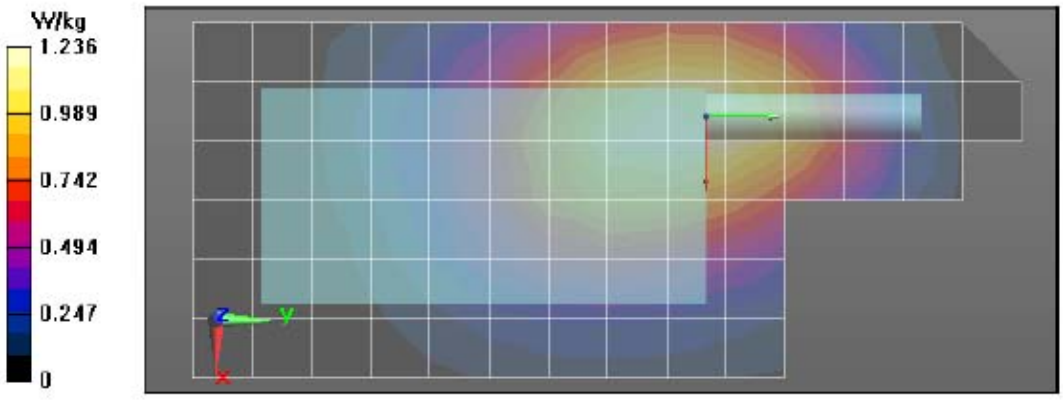
Duty Cycle: 1:1, Medium parameters used: f = 468 MHz; σ = 0.96 S/m; ε_r = 54.8; ρ = 1000 kg/m^3
Probe: ES3DV3 - SN3122, , Frequency: 467.637 MHz, ConvF(6.78, 6.78, 6.78); Calibrated: 6/19/2015
Electronics: DAE4 Sn1488, Calibrated: 7/14/2015

Below 2 GHz-Rev.2/Ab Scan/1-Area Scan (81x161x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 37.74 V/m; Power Drift = -0.45 dB
Fast SAR: SAR(1 g) = 1.12 W/kg; SAR(10 g) = 0.807 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 1.25 W/kg

Below 2 GHz-Rev.2/Ab Scan/2-Volume 2D Scan (41x41x1): Interpolated grid: dx=0.7500 mm, dy=0.7500 mm, dz=1.000 mm
Reference Value = 37.74 V/m; Power Drift = -0.52 dB
Fast SAR: SAR(1 g) = 1.09 W/kg; SAR(10 g) = 0.797 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 1.21 W/kg

Below 2 GHz-Rev.2/Ab Scan/4-Z-Axis Scan (1x1x17): Measurement grid: dx=20mm, dy=20mm, dz=10mm
Maximum value of SAR (measured) = 1.20 W/kg

Below 2 GHz-Rev.2/Ab Scan/3-Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 37.51 V/m; Power Drift = -0.41 dB
Peak SAR (extrapolated) = 1.64 W/kg
SAR(1 g) = 1.11 W/kg; SAR(10 g) = 0.785 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 1.26 W/kg



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

Scan Description	Referenced Table	Test Time (min.)	SAR 1g (W/kg)	SAR 10g (W/kg)
Shorten scan (zoom)	25	7	0.85	0.60
Full scan (area & zoom)	18	22	0.92	0.65

Highest Body SAR Configuration Results

Assessments at the Body for FRS band
Table 18

Motorola Solutions, Inc. EME Laboratory
Date/Time: 3/22/2016 6:25:53 PM

Robot#: DASY5-PG-1 | Run#:	ZR(KBK)-AB-160322-13
Model#:	PMUE5040A
Phantom#:	ELI4 1050
Tissue Temp:	20.1 (C)
Serial#:	1651NP0013
Antenna:	Fixed
Test Freq:	467.6375 (MHz)
Battery:	PMNN4477A
Carry Acc:	1564028V01
Audio Acc:	53727B
Start Power:	0.539 (W)

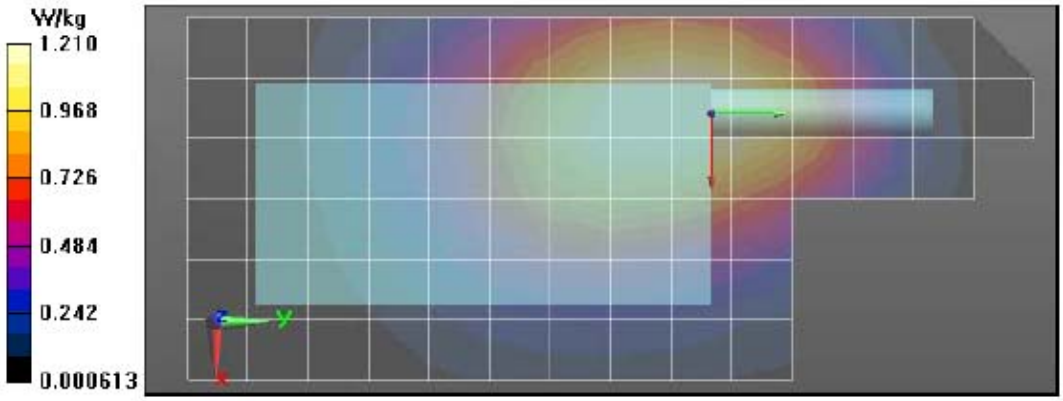
Comments:

Duty Cycle: 1:1, Medium parameters used: f = 468 MHz; σ = 0.92 S/m; ε_r = 55.2; ρ = 1000 kg/m^3
Probe: ES3DV3 - SN3122, , Frequency: 467.637 MHz, ConvF(6.78, 6.78, 6.78); Calibrated: 6/19/2015
Electronics: DAE4 Sn1488, Calibrated: 7/14/2015

Below 2 GHz-Rev.2/Ab Scan/1-Area Scan (81x161x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 39.53 V/m; Power Drift = -0.51 dB
Fast SAR: SAR(1 g) = 1.19 W/kg; SAR(10 g) = 0.854 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 1.32 W/kg

Below 2 GHz-Rev.2/Ab Scan/3-Zoom Scan (6x7x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 39.53 V/m; Power Drift = -0.76 dB
Peak SAR (extrapolated) = 1.62 W/kg
SAR(1 g) = 1.11 W/kg; SAR(10 g) = 0.782 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 1.25 W/kg

Below 2 GHz-Rev.2/Ab Scan/4-Z-Axis Scan (1x1x17): Measurement grid: dx=20mm, dy=20mm, dz=10mm
Maximum value of SAR (measured) = 1.21 W/kg



Highest Face SAR Configuration Results

Motorola Solutions, Inc. EME Laboratory
Date/Time: 3/23/2016 11:27:41 AM

Robot#: DASY5-PG-1 | Run#:	ZWS(KBK)-FACE-160323-08
Model#:	PMUE5040A
Phantom#:	ELI5 1147
Tissue Temp:	21.4 (C)
Serial#:	1651NP0013
Antenna:	Fixed
Test Freq:	467.6375 (MHz)
Battery:	3xAA Alkaline
Carry Acc:	None
Audio Acc:	None
Start Power:	0.625 (W)

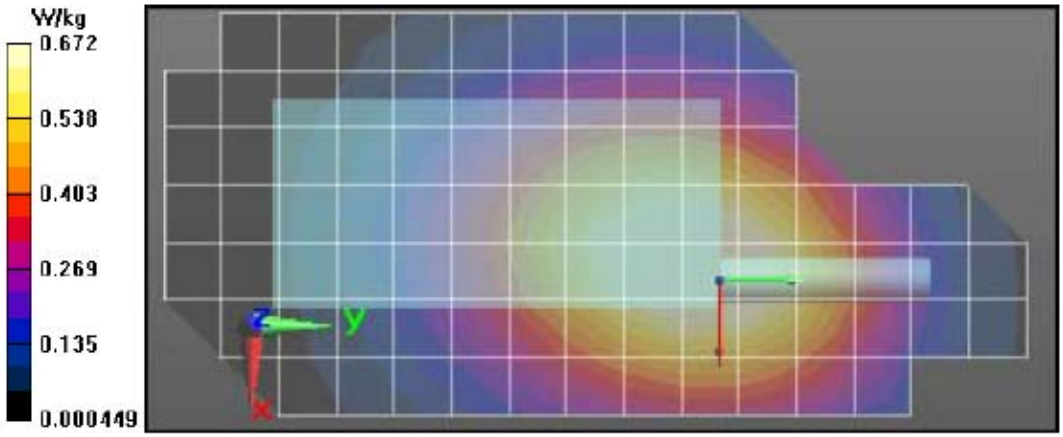
Comments:

Duty Cycle: 1:1, Medium parameters used: f = 468 MHz; σ = 0.85 S/m; ε_r = 41.8; ρ = 1000 kg/m^3
Probe: ES3DV3 - SN3122, , Frequency: 467.637 MHz, ConvF(6.79, 6.79, 6.79); Calibrated: 6/19/2015
Electronics: DAE4 Sn1488, Calibrated: 7/14/2015

Below 2 GHz-Rev.2/FACE Scan/1-Area Scan (91x161x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 31.25 V/m; Power Drift = -0.60 dB
Fast SAR: SAR(1 g) = 0.691 W/kg; SAR(10 g) = 0.501 W/kg (SAR corrected for target medium)
Maximum value of SAR (interpolated) = 0.767 W/kg

Below 2 GHz-Rev.2/FACE Scan/3-Zoom Scan (6x7x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 31.25 V/m; Power Drift = -0.88 dB
Peak SAR (extrapolated) = 0.890 W/kg
SAR(1 g) = 0.624 W/kg; SAR(10 g) = 0.446 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 0.702 W/kg

Below 2 GHz-Rev.2/FACE Scan/4-Z-Axis Scan (1x1x17): Measurement grid: dx=20mm, dy=20mm, dz=10mm
Maximum value of SAR (measured) = 0.672 W/kg

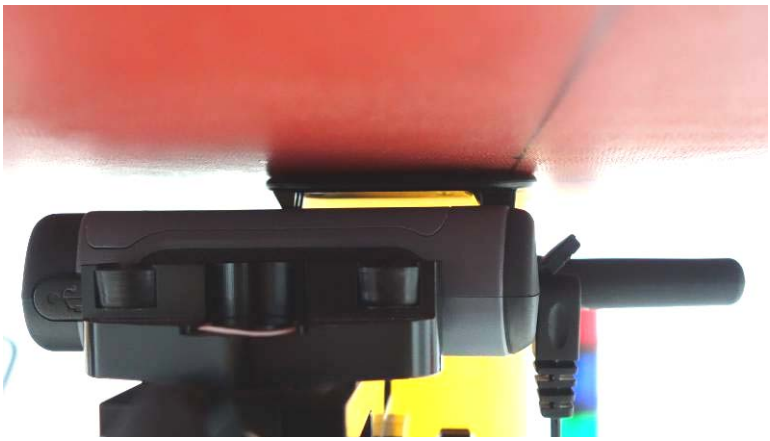


APPENDIX F
DUT Test Position Photos

1.0 Highest SAR Test Position per body location

1.1 Body

DUT with fixed antenna, offered battery PMNN4477A and body worn kit 1564028V01 against the phantom with an audio accessory 53727B attached. Same position used for other applicable offered battery and audio accessories.



Antenna kit #	Separation Distances (mm)		
	@ bottom surface of the DUT	@ antenna's base	@ antenna's tip
Fixed Antenna	9	17	19

1.2 Face

Front of DUT with fixed antenna and offered battery 3xAA Alkaline separated 2.5cm from the phantom without an audio accessory attached. Same position used for other applicable offered battery.

Antenna kit #	Separation Distances (mm)		
	@ bottom surface of the DUT	@ antenna's base	@ antenna's tip
Fixed Antenna	28	32	33