Appendix 1

SAR distribution comparisons for System Accuracy Verifications

System Accuracy Verification Measurements for Head SAR Measurements

Date/Time: 12/12/2012 7:49:29 AM

Test Laboratory: Motorola Mobility - 835MHz System Performance Check

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:422TR;
Procedure Notes: Input Power = 200 mW Refl.Pwr = -25.60 dB
Sim.Temp@meas = 20.7C Sim.Temp@SPC = 20.7C Room Temp @ SPC = 21.1C
Communication System: _CW - Dipole; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: VALIDATION - HEAD tissue; Medium parameters used (interpolated): f = 835 MHz; σ = 0.921 mho/m; ε_r = 40.865; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3184; ConvF(6.15, 6.15, 6.15); Calibrated: 4/25/2012;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn378; Calibrated: 4/11/2012
- Phantom: R#1 - Sugar SAM (extended range), Rev.2 (24-Feb-12); Type: SAM v4.0; Serial: TP-1156; Phantom section: Flat Section
- Measurement SW: DASY52, Version 52.8 (3); SEMCAD X Version 14.6.6 (6824)

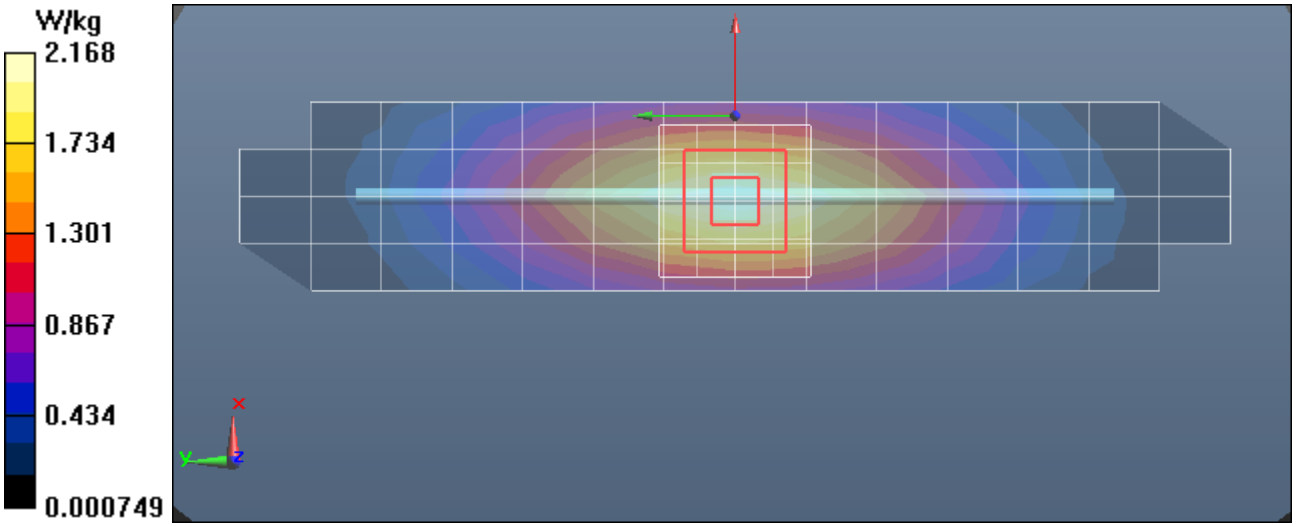
DASY5, SAM - System Performance Check Template, Rev.3 (4-Dec-12)/Daily SPC Check/fastSAR, Dipole Area Scan (5x15x1): Measurement grid: dx=10mm, dy=15mm.

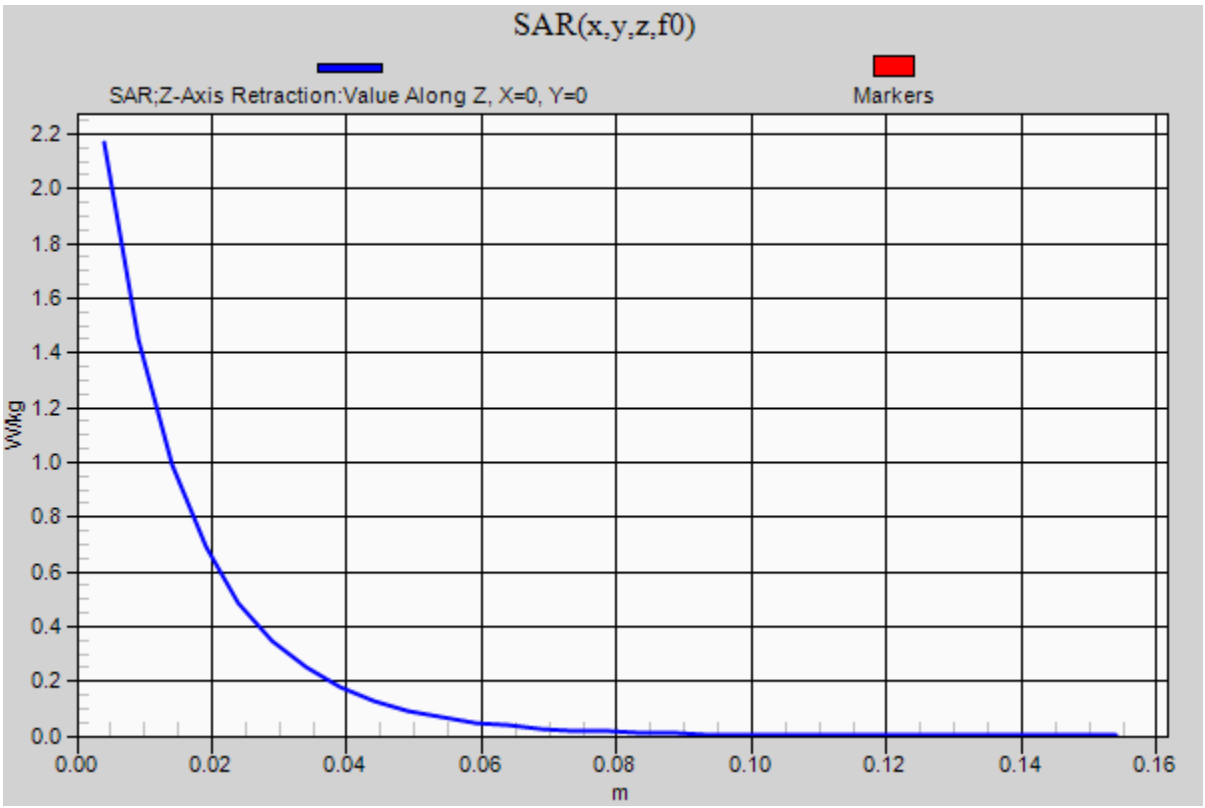
Maximum value of SAR (measured) = 2.16 W/kg

DASY5, SAM - System Performance Check Template, Rev.3 (4-Dec-12)/Daily SPC Check/CUBE SAR, 5x5x7 (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 49.212 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 2.965 mW/g
SAR(1 g) = 1.96 mW/g; SAR(10 g) = 1.29 mW/g (SAR corrected for target medium)

DASY5, SAM - System Performance Check Template, Rev.3 (4-Dec-12)/Daily SPC Check/Z-Axis Retraction (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm


W/kg
2.168
1.734
1.301
0.867
0.434
0.000749
x
y
z


SAR(x,y,z,f0)
SAR;Z-Axis Retraction:Value Along Z, X=0, Y=0
Markers
W/kg
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
m

System Accuracy Verification Measurements for Body SAR Measurements

Test Laboratory: Motorola Mobility - 835MHz System Performance Check

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:422TR;
Procedure Notes: Input Power = 200 mW Refl.Pwr = -22.3 dB
Sim.Temp@meas = 19.7 Sim.Temp@SPC = 19.7 Room Temp @ SPC = 20.6
Communication System: _CW - Dipole; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: VALIDATION - BODY tissue; Medium parameters used (interpolated): f = 835 MHz; σ = 0.98 mho/m; ε_r = 52.596; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3184; ConvF(6.19, 6.19, 6.19); Calibrated: 4/25/2012;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn378; Calibrated: 4/11/2012
- Phantom: R#-1, Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a; Phantom section: Center Section
- Measurement SW: DASY52, Version 52.8 (3); SEMCAD X Version 14.6.6 (6824)

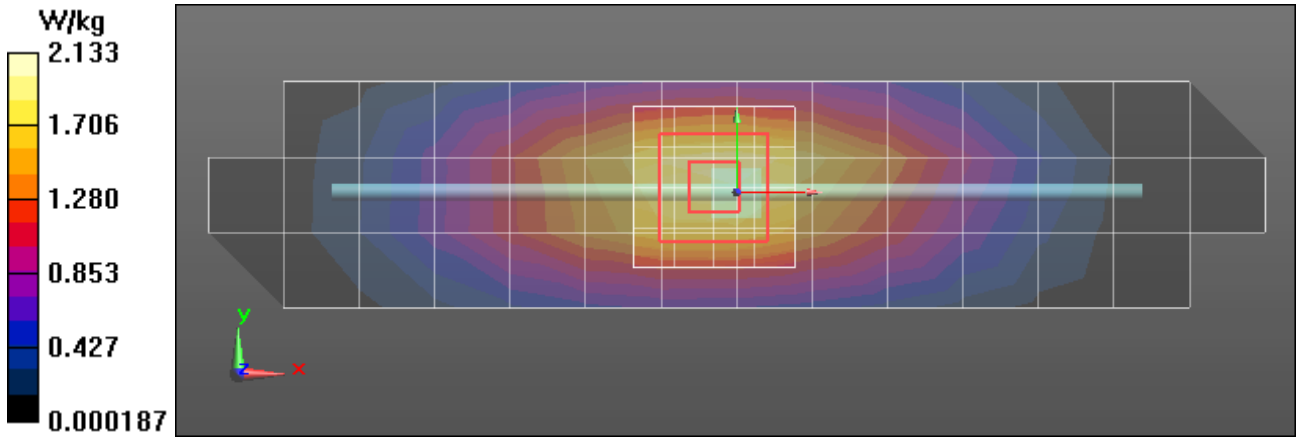
DASY5, Triple Flat System Performance Check Template - Rev.4 (4-Dec-12)/Daily SPC Check/fastSAR, Dipole Area Scan (4x15x1): Measurement grid: dx=15mm, dy=15mm

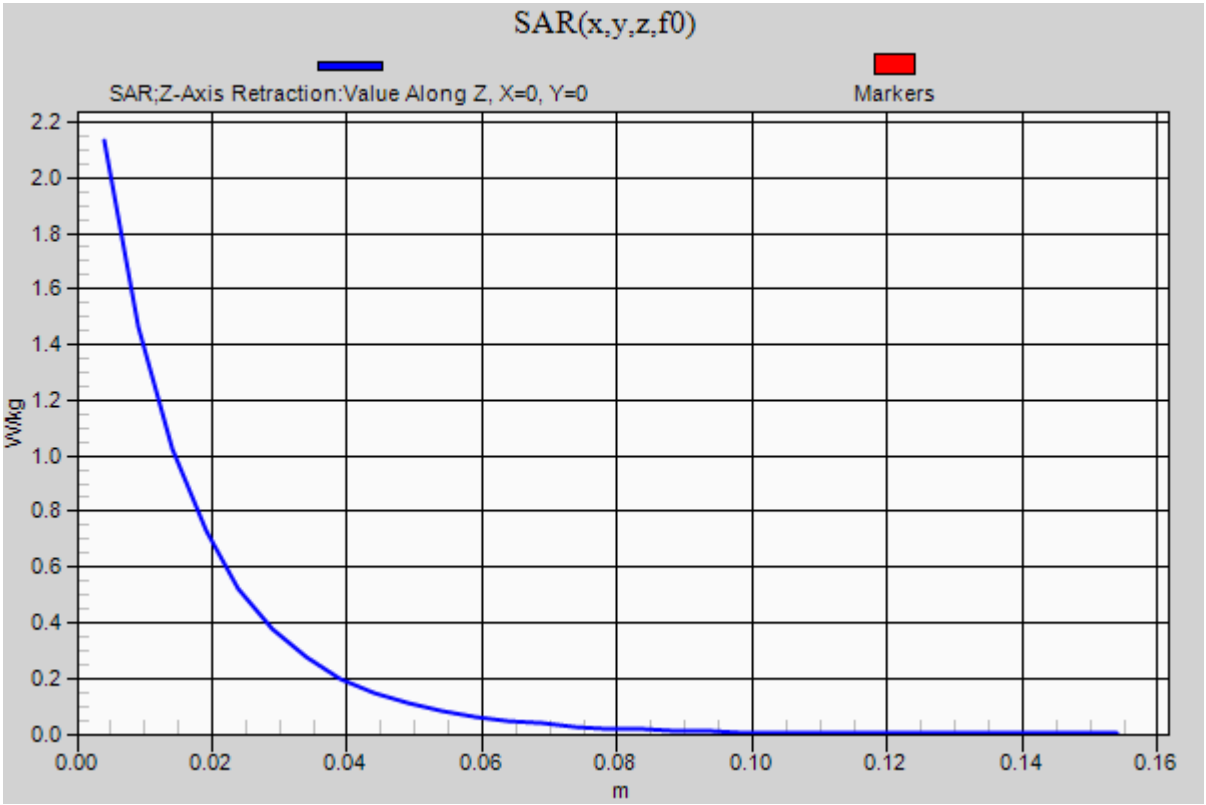
Maximum value of SAR (measured) = 1.95 W/kg

DASY5, Triple Flat System Performance Check Template - Rev.4 (4-Dec-12)/Daily SPC Check/CUBE SAR, 5x5x7 (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 47.148 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 2.878 mW/g
SAR(1 g) = 1.95 mW/g; SAR(10 g) = 1.3 mW/g (SAR corrected for target medium)
Maximum value of SAR (measured) = 2.15 W/kg

DASY5, Triple Flat System Performance Check Template - Rev.4 (4-Dec-12)/Daily SPC Check/Z-Axis Retraction (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm




SAR(x,y,z,f0)
SAR;Z-Axis Retraction:Value Along Z, X=0, Y=0
Markers
W/kg
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
m

Appendix 2

SAR distribution plots for Head Adjacent Test Results

Date/Time: 12/12/2012 2:32:01 PM

Test Laboratory: Motorola Mobility - iDEN 800 Cheek

Serial: 364BNW1S4H; FCC ID: IHDP56NB1
Procedure Notes: Battery Model #: SNN5874A DEVICE POSITION: Cheek, Flip Open
Communication System: _iDEN 1:3 or 2:6; Frequency: 815.51 MHz; Communication System Channel Number: 2; Duty Cycle: 1:2.99985
Medium: HEAD tissue; Medium parameters used (interpolated): f = 815.51 MHz; σ = 0.901 mho/m; ε_r = 41.115; ρ = 1000 kg/m^3

DASY4 Configuration:

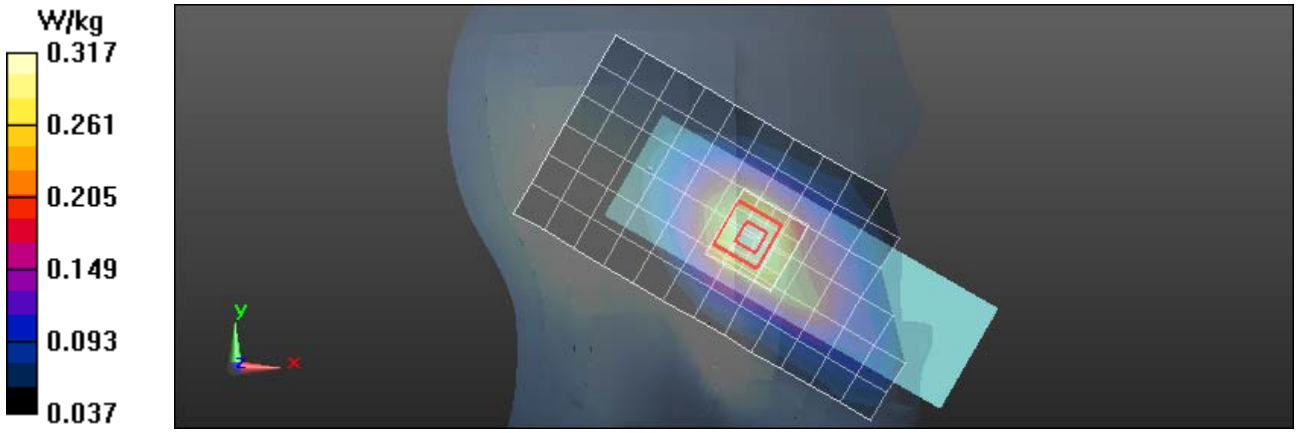
- Probe: ES3DV3 - SN3184; ConvF(6.15, 6.15, 6.15); Calibrated: 4/25/2012;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn378; Calibrated: 4/11/2012
- Phantom: R#1 - Sugar SAM (extended range), Rev.2 (24-Feb-12); Type: SAM v4.0; Serial: TP-1156; Phantom section: Left Section
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

DASY5, SAM - Phone against Left Head Template, Rev.5 (13-Nov-12)/Left Head Template/15mm, Area Scan - NOT for 2450 FCC TA... (7x17x1):

Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.314 W/kg

DASY5, SAM - Phone against Left Head Template, Rev.5 (13-Nov-12)/Left Head Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0: Measurement grid:

dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.137 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 0.381 mW/g
SAR(1 g) = 0.299 mW/g; SAR(10 g) = 0.220 mW/g (SAR corrected for target medium)
Maximum value of SAR (measured) = 0.317 W/kg



Test Laboratory: Motorola Mobility - iDEN 800 Tilt

Serial: 364BNW1S4H; FCC ID: IHDP56NB1
Procedure Notes: Battery Model #: SNN5874A DEVICE POSITION: TILT, Flip Open
Communication System: _iDEN 1:3 or 2:6; Frequency: 815.51 MHz; Communication System Channel Number: 2; Duty Cycle: 1:2.99985
Medium: HEAD tissue; Medium parameters used (interpolated): f = 815.51 MHz; σ = 0.901 mho/m; ε_r = 41.115; ρ = 1000 kg/m^3

DASY4 Configuration:

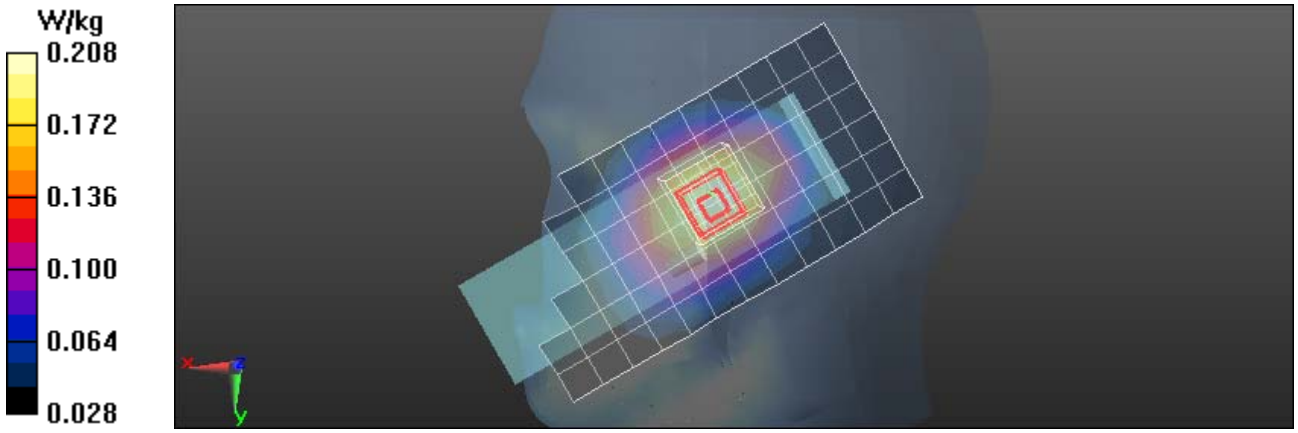
- Probe: ES3DV3 - SN3184; ConvF(6.15, 6.15, 6.15); Calibrated: 4/25/2012;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn378; Calibrated: 4/11/2012
- Phantom: R#1 - Sugar SAM (extended range), Rev.2 (24-Feb-12); Type: SAM v4.0; Serial: TP-1156; Phantom section: Right Section
- Measurement SW: DASY52, Version 52.8 (3); SEMCAD X Version 14.6.6 (6824)

DASY5, SAM - Phone against RIGHT head template - Rev.3 (13-Nov-12)/Right Head Template/15mm, Area Scan - Not for 2450 FCC TA... (7x17x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.207 W/kg

DASY5, SAM - Phone against RIGHT head template - Rev.3 (13-Nov-12)/Right Head Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.937 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.254 mW/g
SAR(1 g) = 0.202 mW/g; SAR(10 g) = 0.151 mW/g (SAR corrected for target medium)
Maximum value of SAR (measured) = 0.208 W/kg



Appendix 3

SAR distribution plots for Dispatch/Push-to-Talk Test Results

Date/Time: 12/12/2012 5:05:23 PM

Test Laboratory: Motorola Mobility - iDEN 800 Push-To-Talk

Serial: 364BNW1S4H; FCC ID: IHDP56NB1
Procedure Notes: Battery Model #: SNN5874A DEVICE POSITION: PUSH TO TALK, FRONT OF PHONE 25MM FROM FLAT PHANTOM WITH HEAD SIMULANT (Flip Open)
Communication System: _iDEN 1:6; Frequency: 815.51 MHz; Communication System Channel Number: 2; Duty Cycle: 1:6.00067
Medium: HEAD tissue; Medium parameters used (interpolated): f = 815.51 MHz; σ = 0.901 mho/m; ε_r = 41.115; ρ = 1000 kg/m^3

DASY4 Configuration:

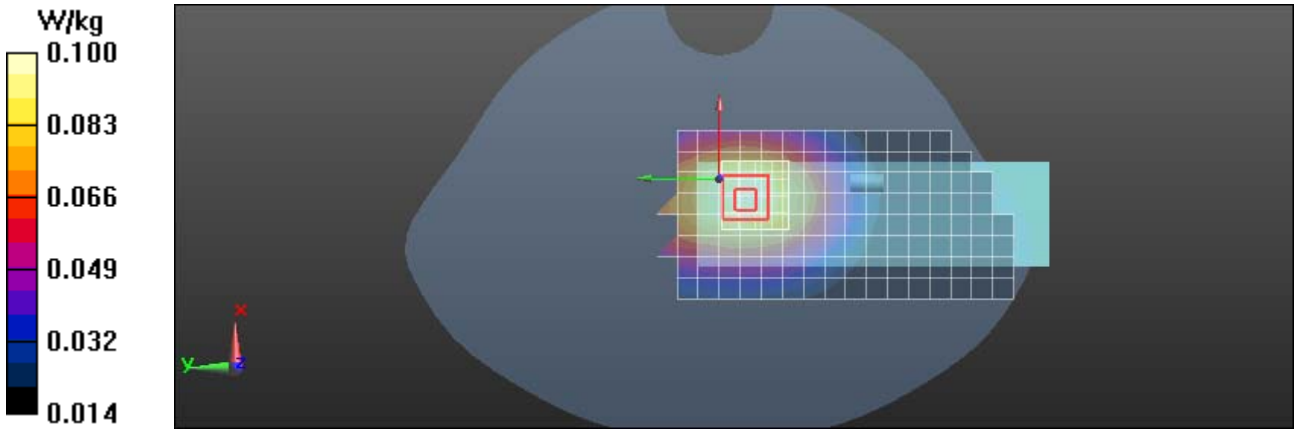
- Probe: ES3DV3 - SN3184; ConvF(6.15, 6.15, 6.15); Calibrated: 4/25/2012;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn378; Calibrated: 4/11/2012
- Phantom: R#1 - Sugar SAM (extended range), Rev.2 (24-Feb-12); Type: SAM v4.0; Serial: TP-1156; Phantom section: Flat Section
- Measurement SW: DASY52, Version 52.8 (3); SEMCAD X Version 14.6.6 (6824)

DASY5, SAM Flat Phone Template - Rev.2 (4-Dec-12)/SAM Phone Against Flat Section/Area Scan (10mm) (31x23x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 0.0996 W/kg

DASY5, SAM Flat Phone Template - Rev.2 (4-Dec-12)/SAM Phone Against Flat Section/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 10.487 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 0.127 mW/g
SAR(1 g) = 0.095 mW/g; SAR(10 g) = 0.070 mW/g (SAR corrected for target medium)
Maximum value of SAR (measured) = 0.100 W/kg



Appendix 4

SAR distribution plots for Body Worn Test Results

Test Laboratory: Motorola Mobility - iDEN 800 Body Worn

Serial: 364BNW1S4H; FCC ID: IHDP56NB1
Procedure Notes: Battery Model #: BP6X SNN5874A Accessory Model #: 01017484002;
Test Configuration: PACKET DATA MODE BODY WORN, FRONT OF PHONE WITH HOLSTER (closed)
Communication System: _iDEN Data; Frequency: 815.51 MHz; Communication System Channel Number: 2; Duty Cycle: 1:1.50003
Medium: BODY tissue; Medium parameters used (interpolated): f = 815.51 MHz; σ = 0.979 mho/m; ε_r = 53.434; ρ = 1000 kg/m^3

DASY4 Configuration:

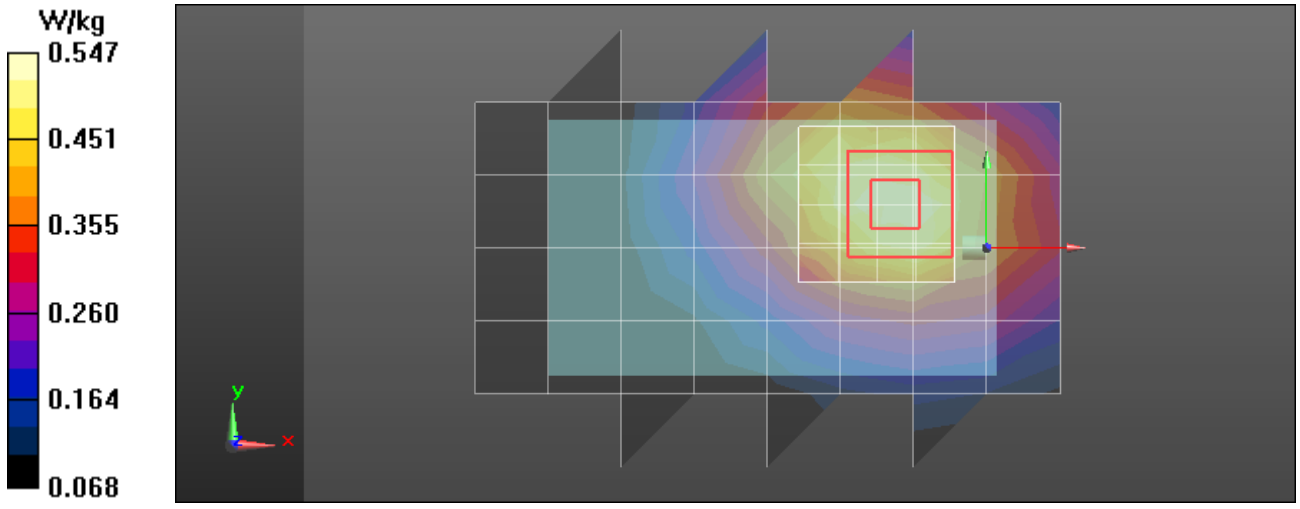
- Probe: ES3DV3 - SN3184; ConvF(6.19, 6.19, 6.19); Calibrated: 4/25/2012;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn378; Calibrated: 4/11/2012
- Phantom: R#-1, Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a; Phantom section: Center Section
- Measurement SW: DASY52, Version 52.8 (3);

DASY5, Triple Flat Phone Template - Rev.7 (13-Dec-12)/Triple Flat Phone Template/Area Scan (15mm), not for EDGES, not for FCC 2450 TA... (19x11x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.521 W/kg

DASY5, Triple Flat Phone Template - Rev.7 (13-Dec-12)/Triple Flat Phone Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 22.779 V/m; Power Drift = -0.16 dB
Peak SAR (extrapolated) = 0.728 mW/g
SAR(1 g) = 0.515 mW/g; SAR(10 g) = 0.374 mW/g (SAR corrected for target medium)
Maximum value of SAR (measured) = 0.547 W/kg



Appendix 5

Measurement Uncertainty Budget

Uncertainty Budget for Device Under Test, for 735 MHz to 3 GHz

a	*b*	*c*	*d*	*e = f(d,k)*	*f*	*g*	*h = c x f / e*	*i = c x g / e*	*k*
Uncertainty Component	Description IEEE1528(2003) / IEC62209-1(2005)	**Tol. (± %)**	**Prob Dist**	**Div.**	**c_i (1 g)**	**c_i (10 g)**	**1 g u_i (±%)**	**10 g u_i (±%)**	**v_i**
Measurement System									
Probe Calibration [ES3DV3]	E.2.1 / 7.2.1	6.0	N	1.00	1	1	6.0	6.0	∞
Axial Isotropy	E.2.2 / 7.2.1.2	4.7	R	1.73	0.707	0.707	1.9	1.9	∞
Hemispherical Isotropy	E.2.2 / 7.2.1.2	9.6	R	1.73	0.707	0.707	3.9	3.9	∞
Boundary Effect	E.2.3 / 7.2.1.5	1.0	R	1.73	1	1	0.6	0.6	∞
Linearity	E.2.4 / 7.2.1.3	4.7	R	1.73	1	1	2.7	2.7	∞
System Detection Limits	E.2.5 / 7.2.1.4	1.0	R	1.73	1	1	0.6	0.6	∞
Readout Electronics	E.2.6 / 7.2.1.6	0.3	N	1.00	1	1	0.3	0.3	∞
Response Time	E.2.7 / 7.2.1.7	1.1	R	1.73	1	1	0.6	0.6	∞
Integration Time	E.2.8 / 7.2.1.8	1.1	R	1.73	1	1	0.6	0.6	∞
RF Ambient Conditions - Noise	E.6.1 / 7.2.3.6	3.0	R	1.73	1	1	1.7	1.7	∞
RF Ambient Conditions - Reflections	E.6.1 / 7.2.3.6	3.0	R	1.73	1	1	1.7	1.7	∞
Probe Positioner Mech. Tolerance	E.6.2 / 7.2.2.1	0.4	R	1.73	1	1	0.2	0.2	∞
Probe Positioning w.r.t Phantom	E.6.3 / 7.2.2.3	1.4	R	1.73	1	1	0.8	0.8	∞
Max. SAR Evaluation (ext., int., avg.)	E.5 / 7.2.4	3.4	R	1.73	1	1	2.0	2.0	∞
Test sample Related									
Test Sample Positioning	E.4.2 / 7.2.2.4	3.4	N	1.00	1	1	3.4	3.4	79
Device Holder Uncertainty	E.4.1 / 7.2.2.4.2	4.5	N	1.00	1	1	4.5	4.5	11
SAR drift	6.6.2 / 7.2.3.5	0.0	R	1.73	1	1	0.0	0.0	∞
Phantom and Tissue Parameters									
Phantom Uncertainty	E.3.1 / 7.2.2.2	4.0	R	1.73	1	1	2.3	2.3	∞
Liquid Conductivity (target)	E.3.2 / 7.2.3.3	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity (measurement)	E.3.3 / 7.2.3.3	2.5	N	1.00	0.64	0.43	1.6	1.1	6
Liquid Permittivity (target)	E.3.2 / 7.2.3.4	5.0	R	1.73	0.6	0.49	1.7	1.4	∞
Liquid Permittivity (measurement)	E.3.2 / 7.2.3.4	2.3	N	1.00	0.6	0.49	1.4	1.1	6
Combined Standard Uncertainty			RSS				11	11	372
Expanded Uncertainty (95% CONFIDENCE LEVEL)			*k*=2				22	22	

Appendix 6

Probe Calibration Certificate

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
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 108

Client **Motorola MDb**

Certificate No: ES3-3184_Apr12

CALIBRATION CERTIFICATE

Object: ES3DV3 - SN:3184

Calibration procedure(s): QA CAL-01.v8, QA CAL-23.v4, QA CAL-25.v4
Calibration procedure for dosimetric E-field probes

Calibration date: April 25, 2012

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	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Reference 30 dB Attenuator	SN: S5129 (30b)	27-Mar-12 (No. 217-01532)	Apr-13
Reference Probe ES3DV2	SN: 3013	29-Dec-11 (No. ES3-3013_Dec11)	Dec-12
DAE4	SN: 660	10-Jan-12 (No. DAE4-660_Jan12)	Jan-13
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

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

Issued: April 25, 2012

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
Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS) **Accreditation No.: SCS 108**
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
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

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *PAR:* PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- *Ax,y,z; Bx,y,z; Cx,y,z, VRx,y,z*: *A, B, C* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. *VR* is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe ES3DV3

SN:3184

Manufactured: August 19, 2008
Calibrated: April 25, 2012

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3184

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	1.24	1.38	1.25	± 10.1 %
DCP (mV)[B]	101.9	99.5	100.6	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc[E] (k=2)
0	CW	0.00	X	0.00	0.00	1.00	158.6	±3.0 %
			Y	0.00	0.00	1.00	163.2	
			Z	0.00	0.00	1.00	156.8	

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%.

[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Pages 5 and 6).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3184

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	Depth (mm)	Unct. (k=2)
750	41.9	0.89	6.38	6.38	6.38	0.24	2.29	± 12.0 %
835	41.5	0.90	6.15	6.15	6.15	0.70	1.20	± 12.0 %
1810	40.0	1.40	5.48	5.48	5.48	0.80	1.28	± 12.0 %
1950	40.0	1.40	5.19	5.19	5.19	0.65	1.38	± 12.0 %
2450	39.2	1.80	4.61	4.61	4.61	0.80	1.32	± 12.0 %
2600	39.0	1.96	4.40	4.40	4.40	0.80	1.35	± 12.0 %

[C] Frequency validity 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.
[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.

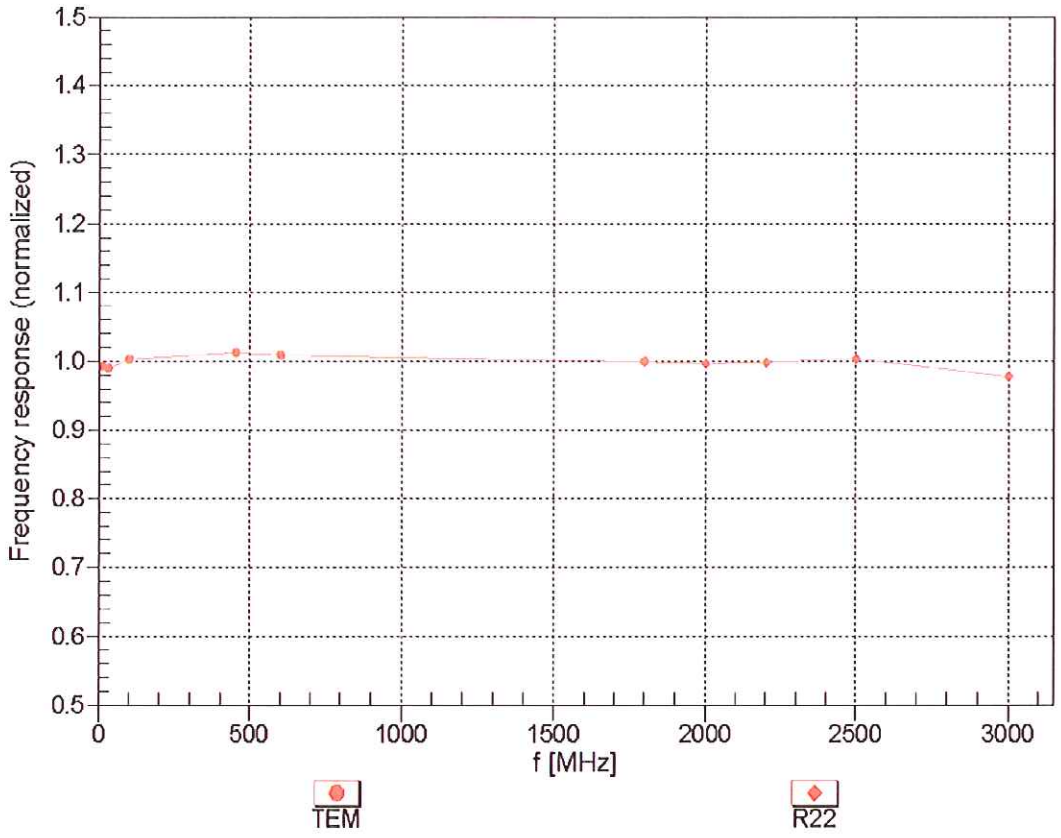
DASY/EASY - Parameters of Probe: ES3DV3 - SN:3184

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	Depth (mm)	Unct. (k=2)
750	55.5	0.96	6.28	6.28	6.28	0.53	1.40	± 12.0 %
835	55.2	0.97	6.19	6.19	6.19	0.53	1.40	± 12.0 %
1810	53.3	1.52	4.88	4.88	4.88	0.55	1.49	± 12.0 %
1950	53.3	1.52	4.87	4.87	4.87	0.53	1.57	± 12.0 %
2450	52.7	1.95	4.33	4.33	4.33	0.80	0.96	± 12.0 %
2600	52.5	2.16	4.13	4.13	4.13	0.80	0.99	± 12.0 %

[C] Frequency validity 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.
[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.

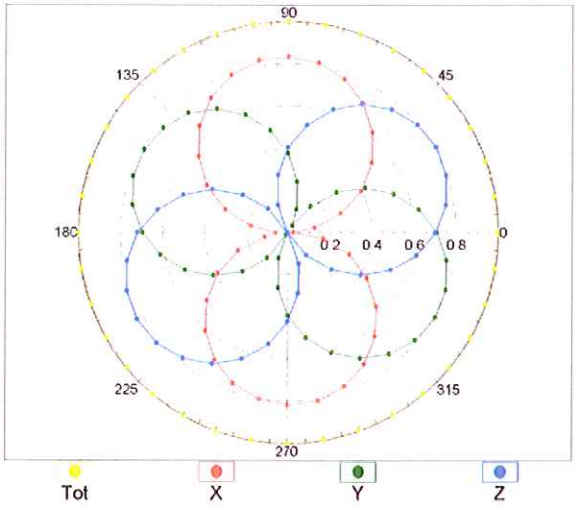
Frequency Response of E-Field
(TEM-Cell:ifi110 EXX, Waveguide: R22)



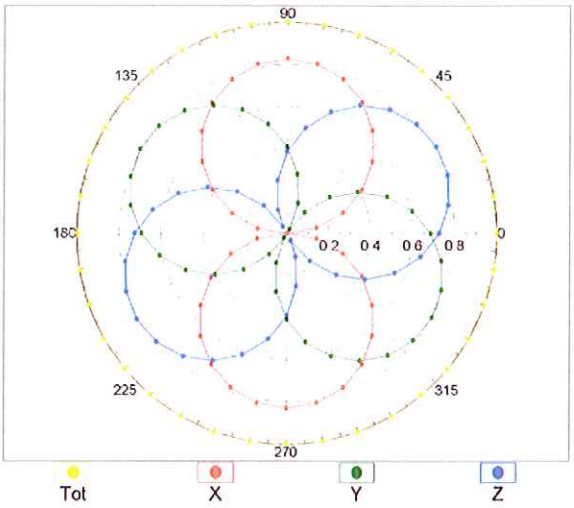
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

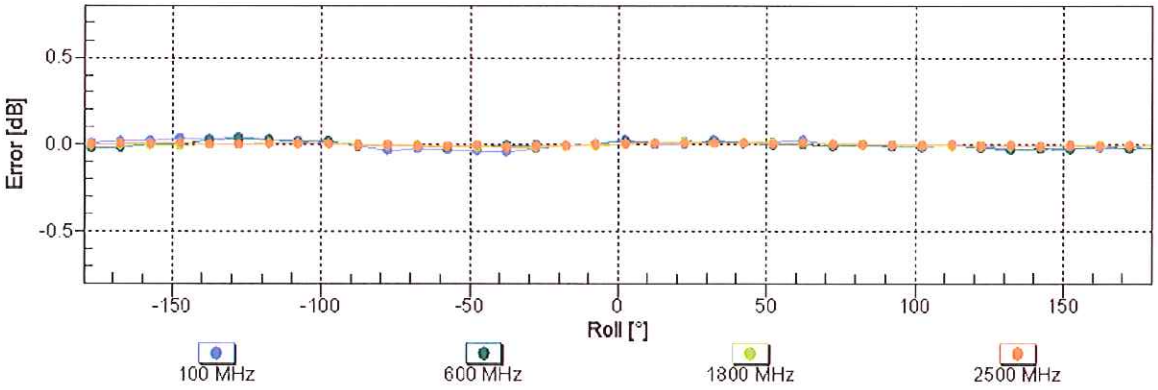
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



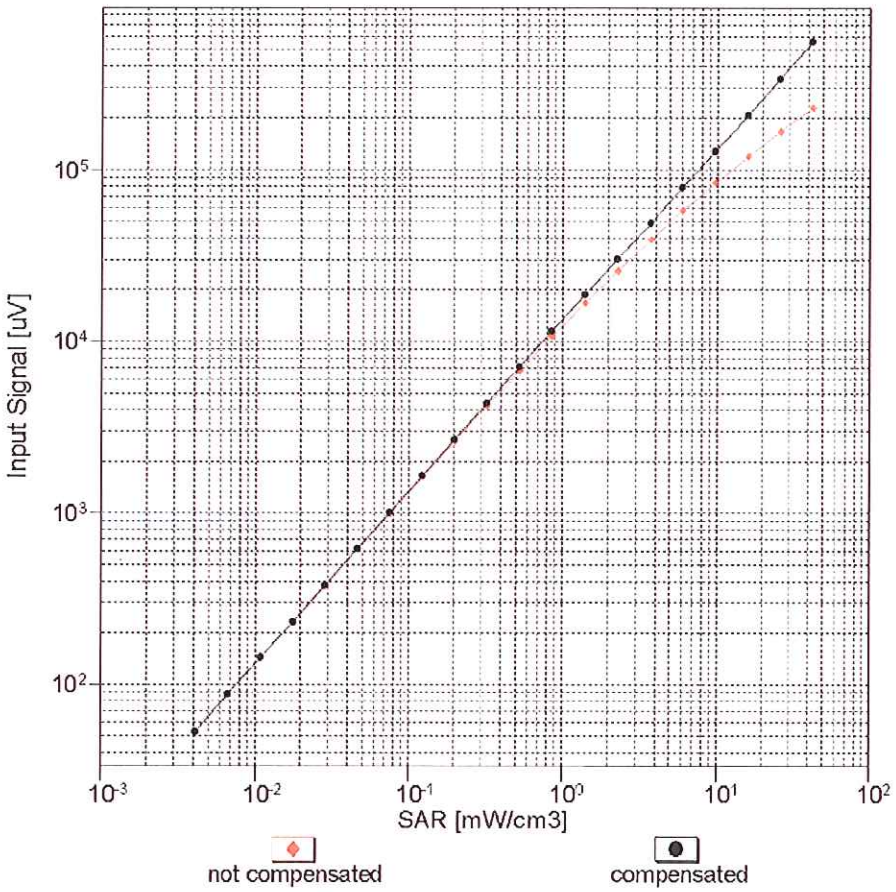
f=1800 MHz,R22

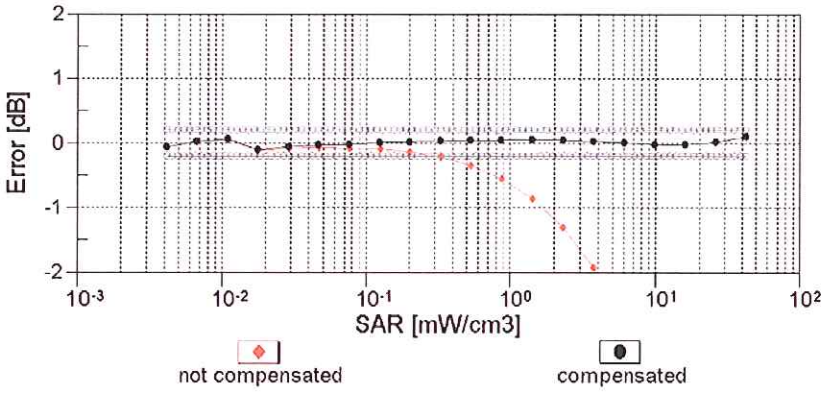




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})
(TEM cell , f = 900 MHz)

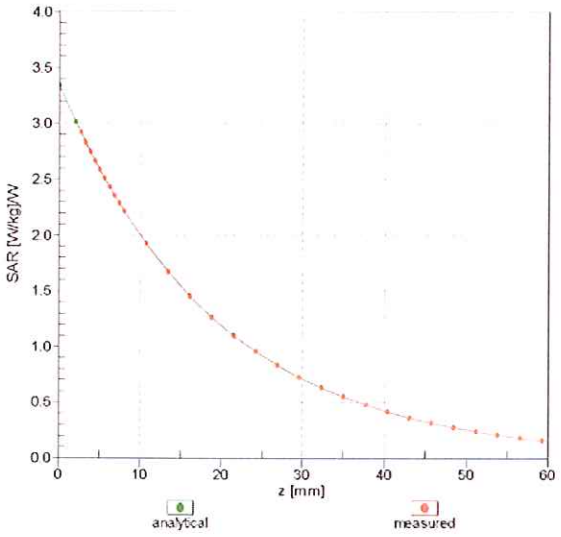




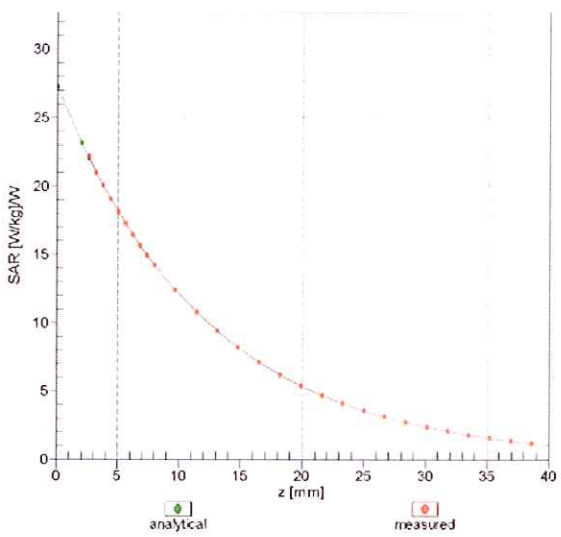
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 835 MHz,WGLS R9 (H_convF)

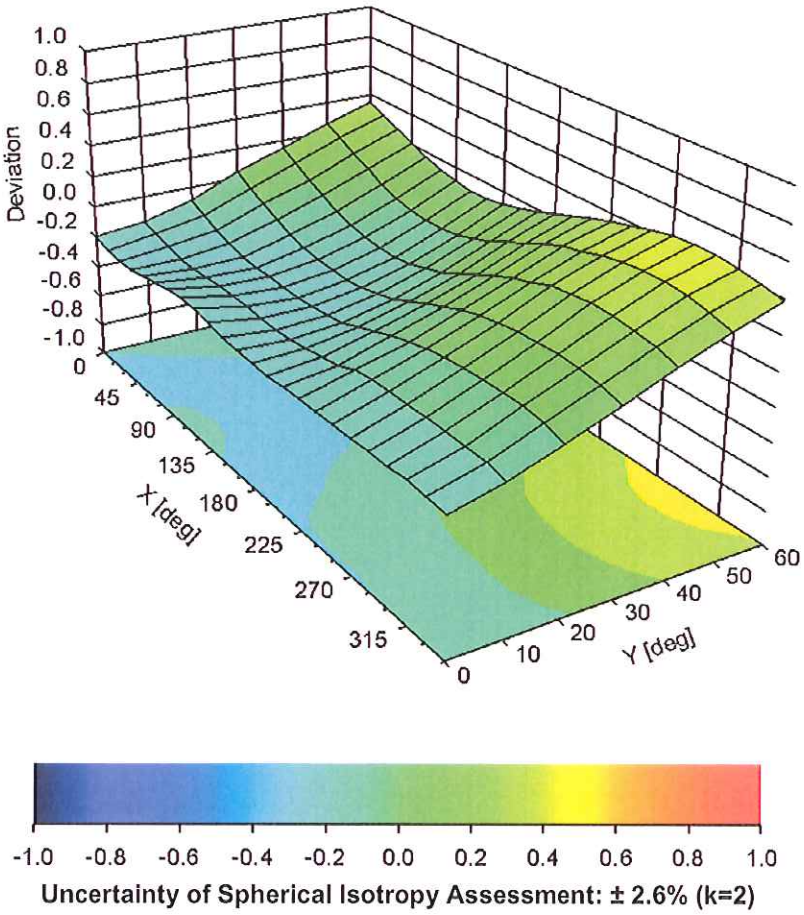


f = 1810 MHz,WGLS R22 (H_convF)



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: ES3DV3 - SN:3184

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	132.3
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	4 mm
Probe Tip to Sensor X Calibration Point	2 mm
Probe Tip to Sensor Y Calibration Point	2 mm
Probe Tip to Sensor Z Calibration Point	2 mm
Recommended Measurement Distance from Surface	3 mm

Appendix 7

Dipole Characterization Certificate

MOTOROLA MOBILITY, EME Laboratories

Extension of Dipole Calibration Interval

FCD-1954, Rev.2

Dipole SN: 422tr

Date of last external calibration: 3/18/2011

External calibration performed by: SPEAG

	Original Calibration Data: 3/18/2011	1st Extension Internal Verification: 3/8/2012	2nd Extension Internal Verification: <date>	Accept / Reject
Return loss (dB): *Verify < -20dB & within 20% of original*	-26.9	-23	-	Accept
Impedance, Real (Ω): *Verify within +/-5 Ω of original*	53.3	55	-	Accept
Impedance, Imaginary (Ω): *Verify within +/-5 Ω of original*	3.3	3.2	-	Accept

Conclusion:

Based on the requirements of KDB 50824 D02 Dipole SAR Validation Veritification v01, it has been concluded that the dipole identified above has qualified for extension of its calibration interval for one additional year. This review shall be repeated annually, but not to exceed a maximum 3 years from the most recent manufacturer's calibration.

First Extension Period:

Approved extension period: **1 Year**

Previous due date: 3/18/2012

NEW DUE DATE: **3/18/2013**

2 years from date of last external calibration

Authorized by: Marge Kaunas

Second Extension Period:

Approved extension period: **1 Year**

Previous due date:

NEW DUE DATE:

3 years from date of last external calibration

Authorized by:

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 108

Client Motorola MDb

Certificate No: D835V2-422_Mar11

CALIBRATION CERTIFICATE

Object	D835V2 - SN: 422
Calibration procedure(s)	QA CAL-05.v8 Calibration procedure for dipole validation kits
Calibration date:	March 18, 2011

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	06-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: 5086 (20g)	30-Mar-10 (No. 217-01158)	Mar-11
Type-N mismatch combination	SN: 5047.2 / 06327	30-Mar-10 (No. 217-01162)	Mar-11
Reference Probe ES3DV3	SN: 3205	30-Apr-10 (No. ES3-3205_Apr10)	Apr-11
DAE4	SN: 601	10-Jun-10 (No. DAE4-601_Jun10)	Jun-11

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

	Name	Function	Signature
Calibrated by:	Dimco Iliev	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: March 18, 2011

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 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
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) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

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.

Measurement Conditions

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

DASY Version	DASY5	V52.6.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V4.9	
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	41.0 ± 6 %	0.89 mho/m ± 6 %
Head TSL temperature during test	(22.0 ± 0.2) °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.32 mW / g
SAR normalized	normalized to 1W	9.28 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**9.33 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.52 mW / g
SAR normalized	normalized to 1W	6.08 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**6.11 mW /g ± 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	54.3 ± 6 %	0.99 mho/m ± 6 %
Body TSL temperature during test	(22.2 ± 0.2) °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.49 mW / g
SAR normalized	normalized to 1W	10.0 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**9.77 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.63 mW / g
SAR normalized	normalized to 1W	6.52 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**6.43 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.3 Ω + 3.3 jΩ
Return Loss	- 26.9 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.8 Ω + 1.8 jΩ
Return Loss	- 33.3 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.427 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.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Design Modification by End User

The dipole has been modified with Teflon Rings (TR) placed within identified markings close to the end of each dipole arm. Calibration has been performed with TR attached to the dipole.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	August 24, 2000

DASY5 Validation Report for Head TSL

Date/Time: 18.03.2011 10:31:11

Test Laboratory: SPEAG, Zurich, Switzerland

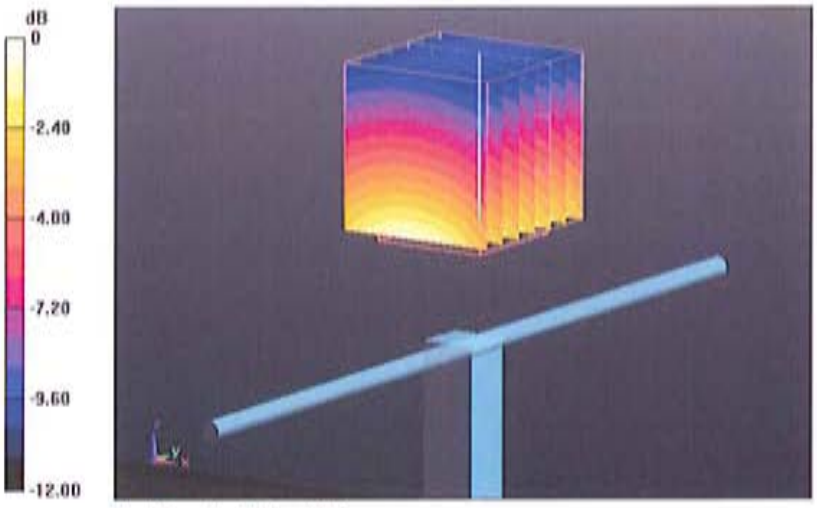
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:422

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: HSL900
Medium parameters used: f = 835 MHz; $\sigma = 0.89$ mho/m; $\varepsilon_r = 41$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

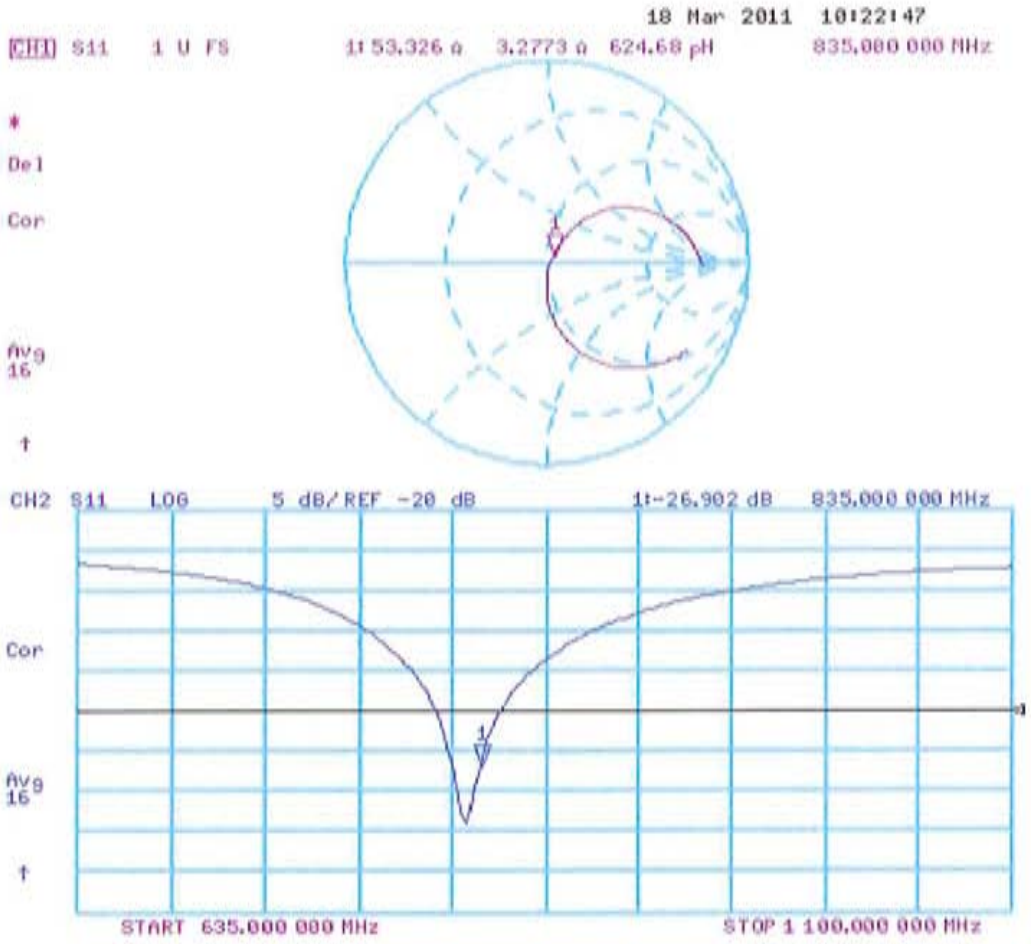
- Probe: ES3DV3 - SN3205; ConvF(6.03, 6.03, 6.03); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY52, V52.6.2 Build (424)
- Postprocessing SW: SEMCAD X, V14.4.4 Build (2829)

Pin=250 mW /d=15mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.580 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 3.476 W/kg
SAR(1 g) = 2.32 mW/g; SAR(10 g) = 1.52 mW/g
Maximum value of SAR (measured) = 2.692 mW/g



0 dB = 2.690mW/g

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date/Time: 16.03.2011 15:51:37

Test Laboratory: SPEAG, Zurich, Switzerland

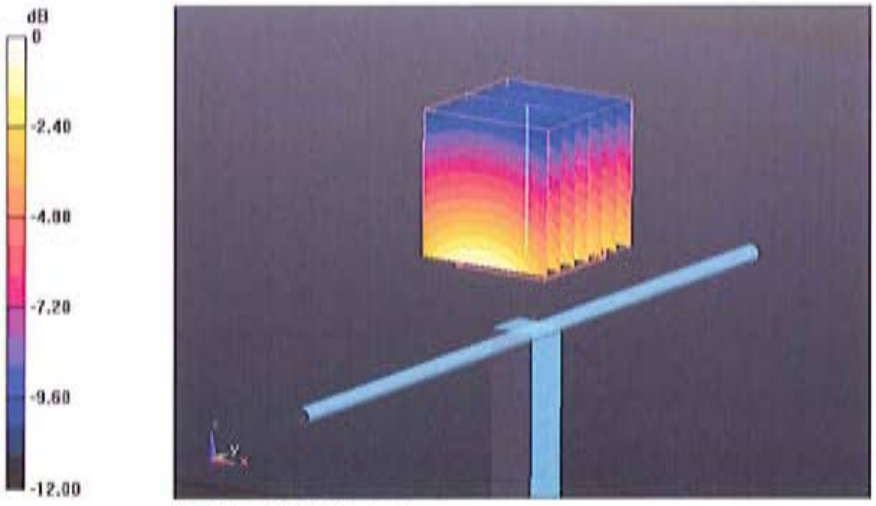
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:422

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: MSL900
Medium parameters used: f = 835 MHz; σ = 0.99 mho/m; ε_r = 54.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

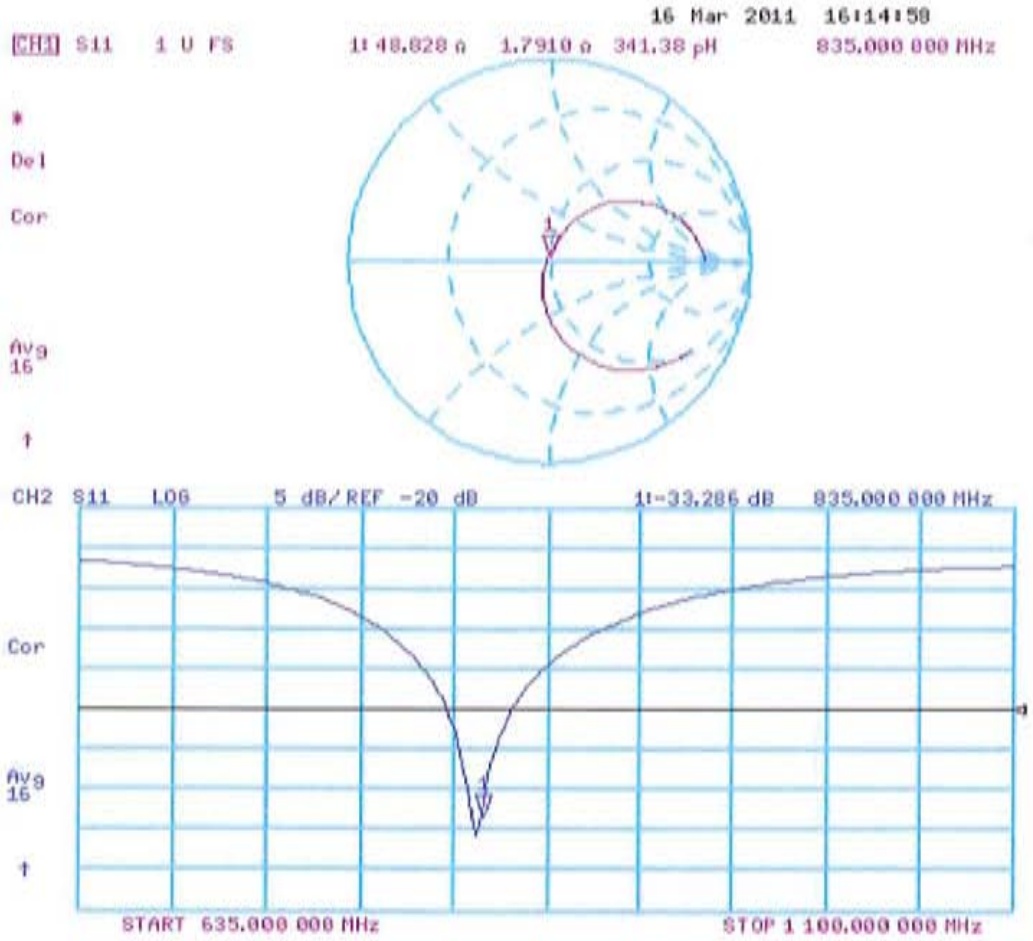
- Probe: ES3DV3 - SN3205; ConvF(5.86, 5.86, 5.86); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY52, V52.6.2 Build (424)
- Postprocessing SW: SEMCAD X, V14.4.4 Build (2829)

Pin=250 mW /d=15mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 55.816 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 3.673 W/kg
SAR(1 g) = 2.49 mW/g; SAR(10 g) = 1.63 mW/g
Maximum value of SAR (measured) = 2.900 mW/g



0 dB = 2.900mW/g

Impedance Measurement Plot for Body TSL



END OF REPORT