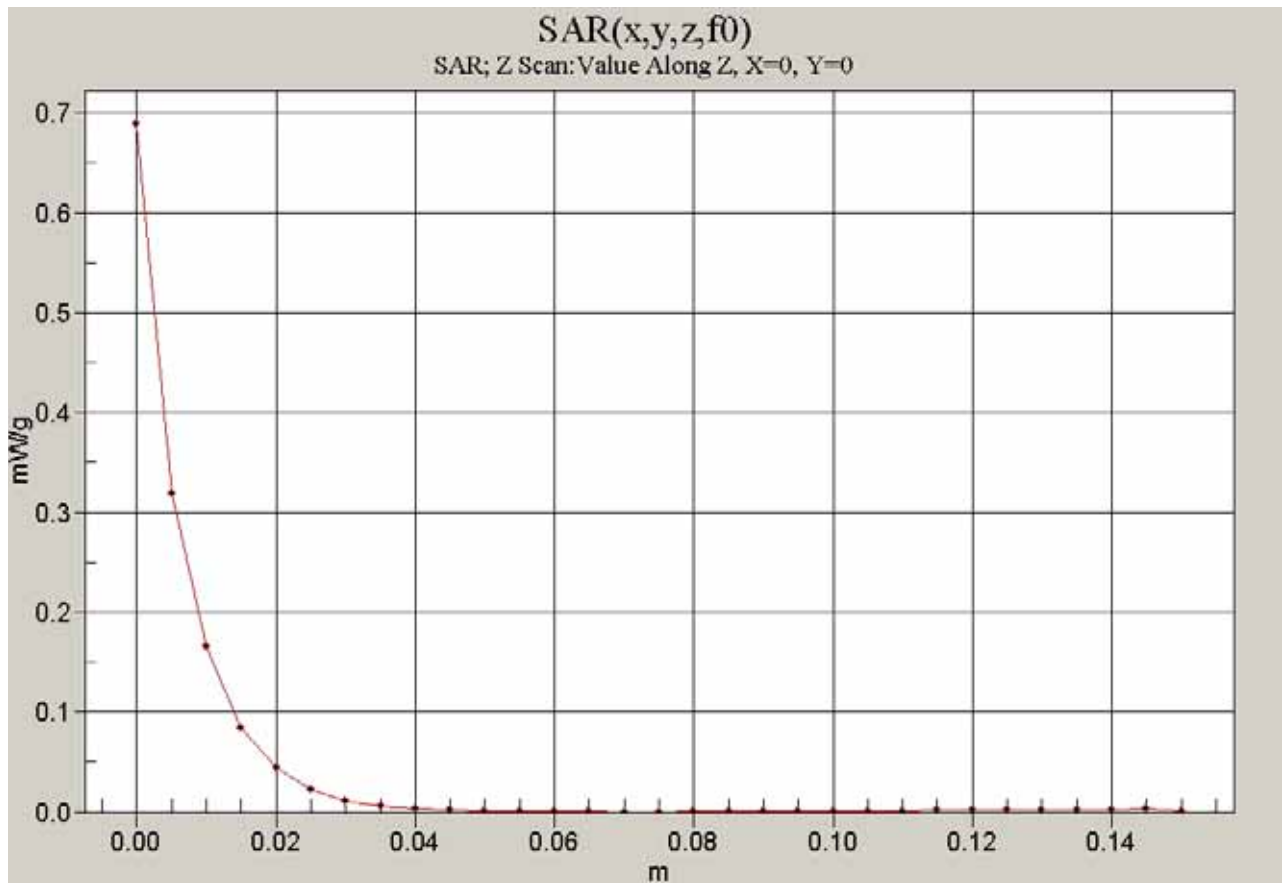


Z Scan



Date: 2011-05-09

Test Laboratory: SGS Korea (Gunpo Laboratory)
 File Name: [WLAN_LE.dad](#)

DUT: LG-P690; Type: Mobile Phone; Serial: 012KPLC904872
 Program Name: WLAN_Head

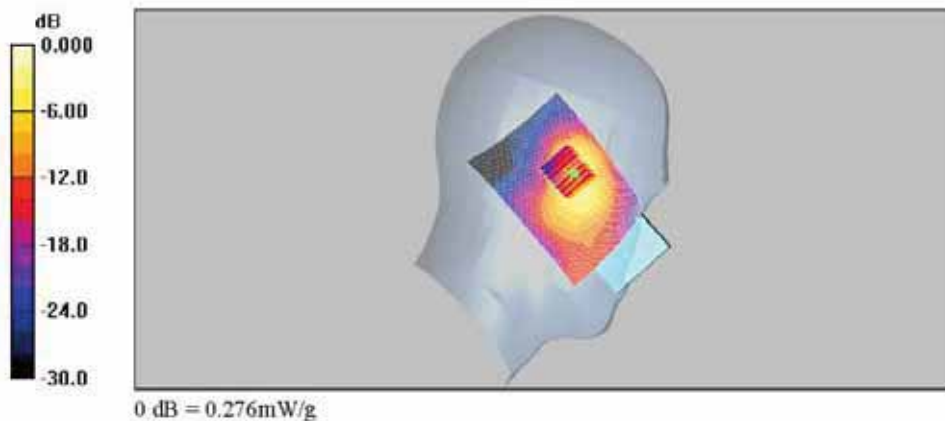
Communication System: WLAN; Frequency: 2437 MHz; Duty Cycle: 1:1
 Medium parameters used: $f = 2437$ MHz; $\sigma = 1.84$ mho/m; $\epsilon_r = 37.7$; $\rho = 1000$ kg/m³
 Phantom section: Left Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1782; ConvF(4.37, 4.37, 4.37); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2011-01-27
- Phantom: SAM MIC #2000-93 with CRP; Type: SAM MIC #2000-93; Serial: TP-1299
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WLAN_LE_Mid_Tilt/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
 Maximum value of SAR (interpolated) = 0.254 mW/g

WLAN_LE_Mid_Tilt/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
 Reference Value = 4.37 V/m; Power Drift = -0.174 dB
 Peak SAR (extrapolated) = 0.540 W/kg
SAR(1 g) = 0.246 mW/g; SAR(10 g) = 0.116 mW/g
 Maximum value of SAR (measured) = 0.276 mW/g



Date: 2011-05-09

Test Laboratory: SGS Korea (Gunpo Laboratory)
 File Name: [WLAN_RE.dad](#)

DUT: LG-P690; Type: Mobile Phone; Serial: 012KPLC904872
 Program Name: WLAN_Head

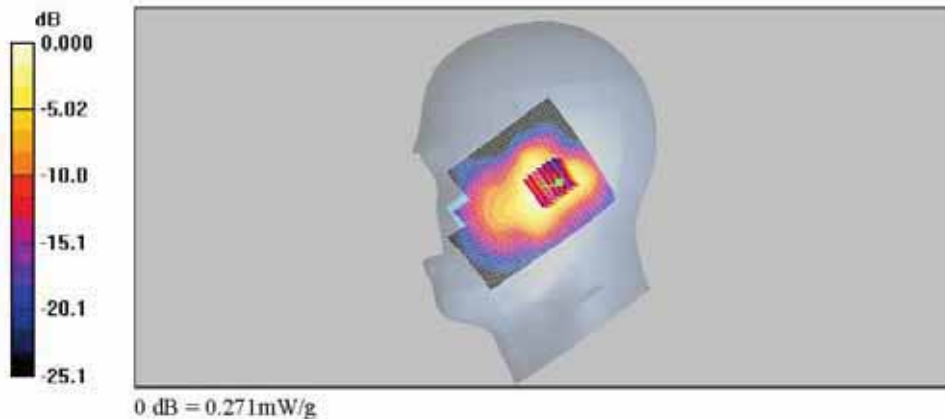
Communication System: WLAN; Frequency: 2437 MHz; Duty Cycle: 1:1
 Medium parameters used: $f = 2437$ MHz; $\sigma = 1.84$ mho/m; $\epsilon_r = 37.7$; $\rho = 1000$ kg/m³
 Phantom section: Right Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1782; ConvF(4.37, 4.37, 4.37); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2011-01-27
- Phantom: SAM MIC #2000-93 with CRP; Type: SAM MIC #2000-93; Serial: TP-1299
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WLAN_RE_Mid_Cheek/Area Scan (71x91x1): Measurement grid: dx=15mm, dy=15mm
 Maximum value of SAR (interpolated) = 0.285 mW/g

WLAN_RE_Mid_Cheek/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
 Reference Value = 5.78 V/m; Power Drift = -0.163 dB
 Peak SAR (extrapolated) = 0.547 W/kg
SAR(1 g) = 0.251 mW/g; SAR(10 g) = 0.135 mW/g
 Maximum value of SAR (measured) = 0.271 mW/g



Date: 2011-05-09

Test Laboratory: SGS Korea (Gunpo Laboratory)
 File Name: [WLAN_RE.dad](#)

DUT: LG-P690; Type: Mobile Phone; Serial: 012KPLC904872
 Program Name: WLAN_Head

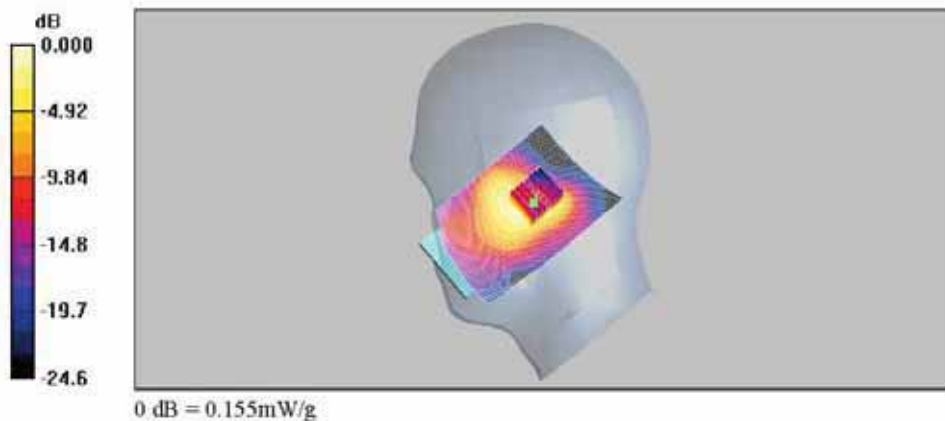
Communication System: WLAN; Frequency: 2437 MHz; Duty Cycle: 1:1
 Medium parameters used: $f = 2437$ MHz; $\sigma = 1.84$ mho/m; $\epsilon_r = 37.7$; $\rho = 1000$ kg/m³
 Phantom section: Right Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1782; ConvF(4.37, 4.37, 4.37); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2011-01-27
- Phantom: SAM MIC #2000-93 with CRP; Type: SAM MIC #2000-93; Serial: TP-1299
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WLAN_RE_Mid_Tilt/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
 Maximum value of SAR (interpolated) = 0.159 mW/g

WLAN_RE_Mid_Tilt/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
 Reference Value = 5.04 V/m; Power Drift = 0.155 dB
 Peak SAR (extrapolated) = 0.313 W/kg
SAR(1 g) = 0.141 mW/g; SAR(10 g) = 0.071 mW/g
 Maximum value of SAR (measured) = 0.155 mW/g



WLAN Body SAR Test

Date: 2011-05-09

Test Laboratory: SGS Korea (Gunpo Laboratory)
 File Name: [WLAN_Body_Front.da4](#)

DUT: LG-P690; Type: Mobile Phone; Serial: 012KPLC904872
 Program Name: WLAN_Body

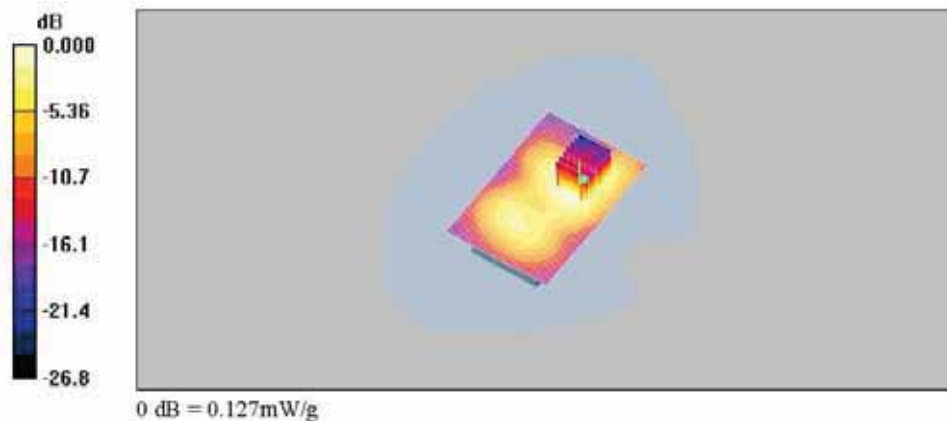
Communication System: WLAN; Frequency: 2437 MHz; Duty Cycle: 1:1
 Medium parameters used: $f = 2437 \text{ MHz}$; $\sigma = 1.96 \text{ mho/m}$; $\epsilon_r = 50.2$; $\rho = 1000 \text{ kg/m}^3$
 Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1782; ConvF(3.94, 3.94, 3.94); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2011-01-27
- Phantom: SAM MIC #2000-93 with CRP; Type: SAM MIC #2000-93; Serial: TP-1299
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WLAN_Body_11b_Front_Mid/Area Scan (61x91x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$
 Maximum value of SAR (interpolated) = 0.131 mW/g

WLAN_Body_11b_Front_Mid/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$
 Reference Value = 4.85 V/m; Power Drift = 0.017 dB
 Peak SAR (extrapolated) = 0.286 W/kg
 SAR(1 g) = 0.122 mW/g; SAR(10 g) = 0.065 mW/g
 Maximum value of SAR (measured) = 0.127 mW/g



Date: 2011-05-09

Test Laboratory: SGS Korea (Gunpo Laboratory)
 File Name: WLAN_Body_Back.d4

DUT: LG-P690; Type: Mobile Phone; Serial: 012KPLC904872
 Program Name: WLAN_Body

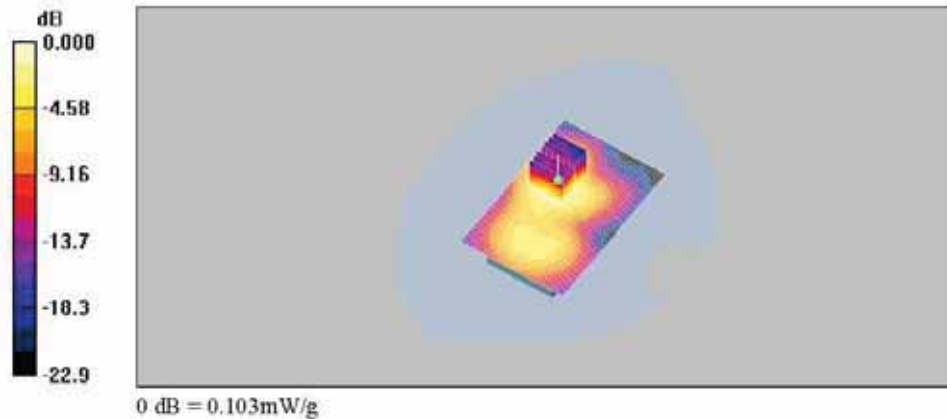
Communication System: WLAN; Frequency: 2412 MHz; Duty Cycle: 1:1
 Medium parameters used: $f = 2412 \text{ MHz}$; $\sigma = 1.93 \text{ mho/m}$; $\epsilon_r = 50.3$; $\rho = 1000 \text{ kg/m}^3$
 Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1782; ConvF(3.94, 3.94, 3.94); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2011-01-27
- Phantom: SAM MIC #2000-93 with CRP; Type: SAM MIC #2000-93; Serial: TP-1299
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WLAN_Body_11b_Back_Low/Area Scan (61x91x1): Measurement grid: $dx=15\text{mm}$,
 $dy=15\text{mm}$
 Maximum value of SAR (interpolated) = 0.105 mW/g

WLAN_Body_11b_Back_Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$,
 $dy=5\text{mm}$, $dz=5\text{mm}$
 Reference Value = 4.48 V/m; Power Drift = 0.031 dB
 Peak SAR (extrapolated) = 0.213 W/kg
 SAR(1 g) = 0.098 mW/g; SAR(10 g) = 0.052 mW/g
 Maximum value of SAR (measured) = 0.103 mW/g



Date: 2011-05-09

Test Laboratory: SGS Korea (Gunpo Laboratory)
 File Name: [WLAN_Body_Back.d4](#)

DUT: LG-P690; Type: Mobile Phone; Serial: 012KPLC904872
 Program Name: WLAN_Body

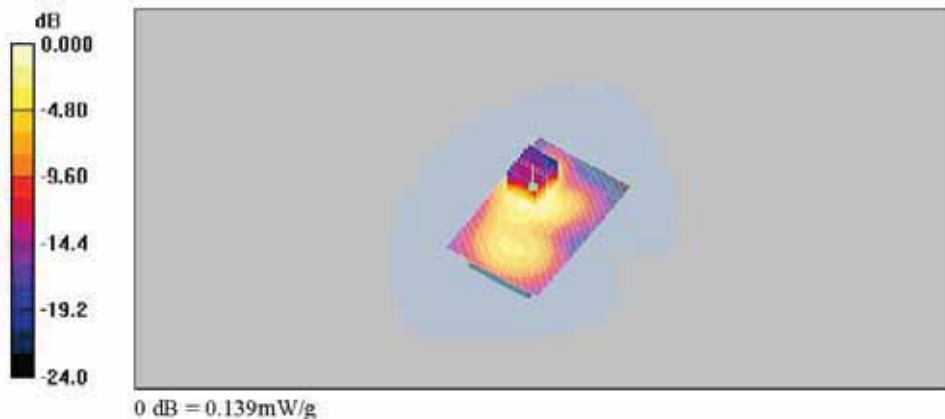
Communication System: WLAN; Frequency: 2437 MHz; Duty Cycle: 1:1
 Medium parameters used: $f = 2437$ MHz; $\sigma = 1.96$ mho/m; $\epsilon_r = 50.2$; $\rho = 1000$ kg/m³
 Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1782; ConvF(3.94, 3.94, 3.94); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2011-01-27
- Phantom: SAM MIC #2000-93 with CRP; Type: SAM MIC #2000-93; Serial: TP-1299
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WLAN_Body_11b_Back_Mid/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
 Maximum value of SAR (interpolated) = 0.136 mW/g

WLAN_Body_11b_Back_Mid/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
 Reference Value = 5.18 V/m; Power Drift = -0.002 dB
 Peak SAR (extrapolated) = 0.298 W/kg
 SAR(1 g) = 0.132 mW/g; SAR(10 g) = 0.069 mW/g
 Maximum value of SAR (measured) = 0.139 mW/g



Date: 2011-05-09

Test Laboratory: SGS Korea (Gunpo Laboratory)
 File Name: WLAN_Body_Back.d4

DUT: LG-P690; Type: Mobile Phone; Serial: 012KPLC904872
 Program Name: WLAN_Body

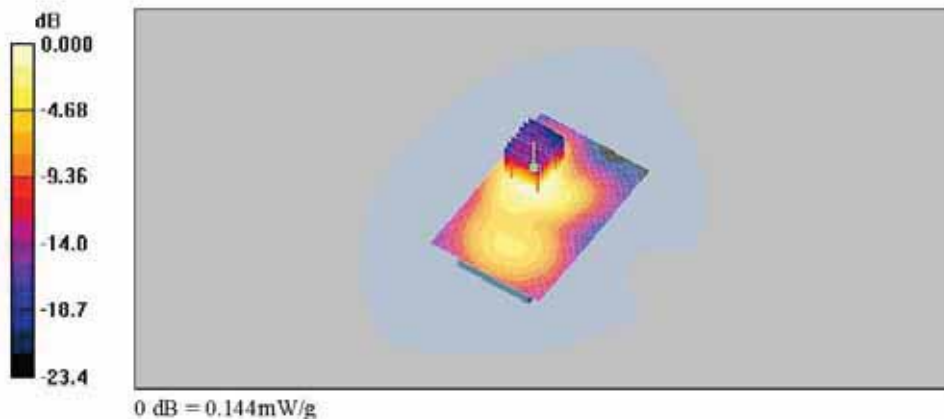
Communication System: WLAN; Frequency: 2462 MHz; Duty Cycle: 1:1
 Medium parameters used: $f = 2462$ MHz; $\sigma = 2.01$ mho/m; $\epsilon_r = 50.2$; $\rho = 1000$ kg/m³
 Phantom section: Flat Section

DASY4 Configuration:

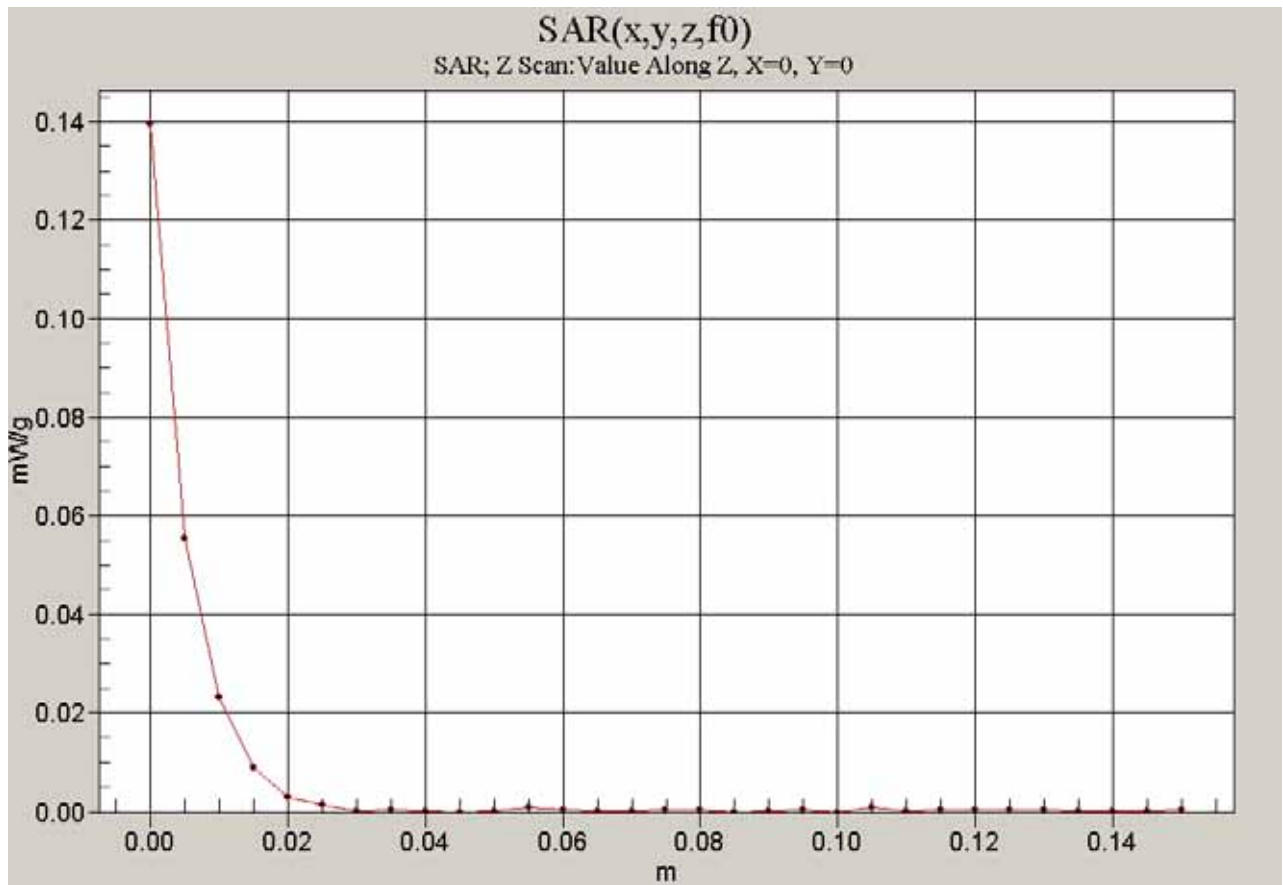
- Probe: ET3DV6 - SN1782; ConvF(3.94, 3.94, 3.94); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2011-01-27
- Phantom: SAM MIC #2000-93 with CRP; Type: SAM MIC #2000-93; Serial: TP-1299
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WLAN_Body_11b_Back_High/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
 Maximum value of SAR (interpolated) = 0.144 mW/g

WLAN_Body_11b_Back_High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
 Reference Value = 5.53 V/m; Power Drift = -0.176 dB
 Peak SAR (extrapolated) = 0.308 W/kg
 SAR(1 g) = 0.137 mW/g; SAR(10 g) = 0.072 mW/g
 Maximum value of SAR (measured) = 0.144 mW/g



Z Scan



Date: 2011-05-09

Test Laboratory: SGS Korea (Gunpo Laboratory)
 File Name: [WLAN_Body_Right.da4](#)

DUT: LG-P690; Type: Mobile Phone; Serial: 012KPLC904872
 Program Name: WLAN_Body

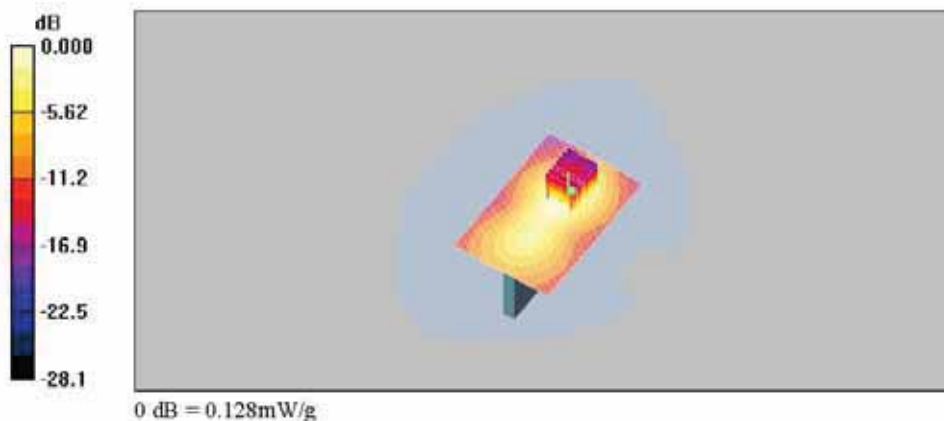
Communication System: WLAN; Frequency: 2437 MHz; Duty Cycle: 1:1
 Medium parameters used: $f = 2437$ MHz; $\sigma = 1.96$ mho/m; $\epsilon_r = 50.2$; $\rho = 1000$ kg/m³
 Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1782; ConvF(3.94, 3.94, 3.94); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2011-01-27
- Phantom: SAM MIC #2000-93 with CRP; Type: SAM MIC #2000-93; Serial: TP-1299
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WLAN_Body_11b_Right_Mid/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
 Maximum value of SAR (interpolated) = 0.132 mW/g

WLAN_Body_11b_Right_Mid/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
 Reference Value = 6.70 V/m; Power Drift = -0.065 dB
 Peak SAR (extrapolated) = 0.278 W/kg
 SAR(1 g) = 0.122 mW/g; SAR(10 g) = 0.064 mW/g
 Maximum value of SAR (measured) = 0.128 mW/g



Date: 2011-05-09

Test Laboratory: SGS Korea (Gunpo Laboratory)
 File Name: [WLAN_Body_Top.da4](#)

DUT: LG-P690; Type: Mobile Phone; Serial: 012KPLC904872
 Program Name: WLAN_Body

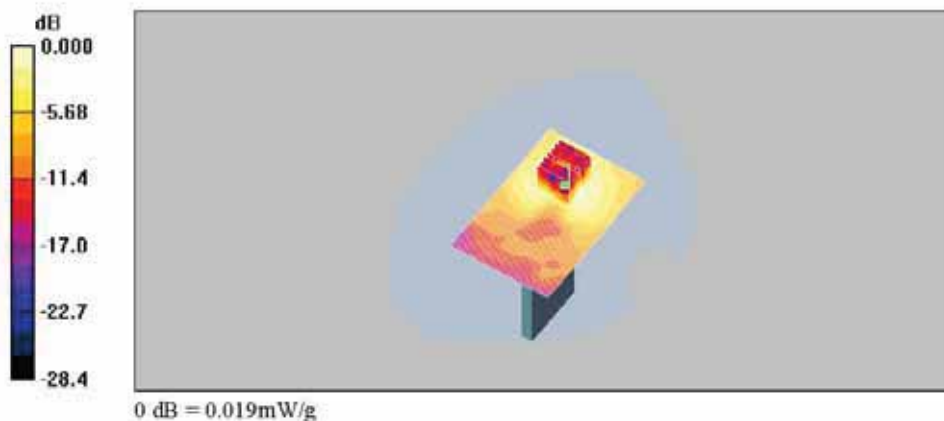
Communication System: WLAN; Frequency: 2437 MHz; Duty Cycle: 1:1
 Medium parameters used: $f = 2437$ MHz; $\sigma = 1.96$ mho/m; $\epsilon_r = 50.2$; $\rho = 1000$ kg/m³
 Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1782; ConvF(3.94, 3.94, 3.94); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2011-01-27
- Phantom: SAM MIC #2000-93 with CRP; Type: SAM MIC #2000-93; Serial: TP-1299
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WLAN_Body_11b_Top_Mid/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
 Maximum value of SAR (interpolated) = 0.019 mW/g

WLAN_Body_11b_Top_Mid/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
 Reference Value = 0.871 V/m; Power Drift = 0.078 dB
 Peak SAR (extrapolated) = 0.049 W/kg
 SAR(1 g) = 0.019 mW/g; SAR(10 g) = 0.00999 mW/g
 Maximum value of SAR (measured) = 0.019 mW/g



Appendix B

Uncertainty Analysis

a	b	c	d	e = f(d,k)	g	i = cxg/e	k
Uncertainty Component	Section in P1528	Tol (%)	Prob. Dist.	Div.	Ci (1g)	1g _{ui} (%)	Vi (Veff)
Probe calibration	E.2.1	6.3	N	1	1	6.30	∞
Axial isotropy	E.2.2	0.5	R	1.73	0.71	0.20	∞
hemispherical isotropy	E.2.2	2.6	R	1.73	0.71	1.06	∞
Boundary effect	E.2.3	0.8	R	1.73	1	0.46	∞
Linearity	E.2.4	0.6	R	1.73	1	0.35	∞
System detection limit	E.2.5	0.25	R	1.73	1	0.14	∞
Readout electronics	E.2.6	0.3	N	1	1	0.30	∞
Response time	E.2.7	0	R	1.73	1	0.00	∞
Integration time	E.2.8	2.6	R	1.73	1	1.50	∞
RF ambient Condition –Noise	E.6.1	3	R	1.73	1	1.73	∞
RF ambient Condition – reflections	E.6.1	3	R	1.73	1	1.73	∞
Probe positioning– mechanical tolerance	E.6.2	1.5	R	1.73	1	0.87	∞
Probe positioning– with respect to phantom	E.6.3	2.9	R	1.73	1	1.67	∞
Max. SAR evaluation	E.5.2	1	R	1.73	1	0.58	∞
Test sample positioning	E.4.2	2.3	N	1	1	2.30	9
Device holder uncertainty	E.4.1	3.6	N	1	1	3.60	∞
Output power variation–SAR drift measurement	6.62	5	R	1.73	1	2.89	∞
Phantom uncertainty (shape and thickness tolerances)	E.3.1	4	R	1.73	1	2.31	∞
Liquid conductivity – deviation from target values	E.3.2	5	R	1.73	0.64	1.85	∞
Liquid conductivity – measurement uncertainty	E.3.2	1.2	N	1	0.64	0.77	5
Liquid permittivity – deviation from target values	E.3.3	5	R	1.73	0.6	1.73	∞
Liquid permittivity – measurement uncertainty	E.3.3	1.1	N	1	0.6	0.66	5
Combined standard uncertainty				RSS		9.63	2754
Expanded uncertainty (95% CONFIDENCE INTERVAL)				K=2		19.27	



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Appendix C

Calibration Certificate

- PROBE

- DAE

- 835 MHz, 1900 MHz, 2450 MHz DIPOLE

- 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 **SGS (Dymstec)**

Certificate No: **ET3-1782_Apr11**

CALIBRATION CERTIFICATE

Object **ET3DV6 - SN:1782**

Calibration procedure(s) **QA CAL-01.v7, QA CAL-12.v6, QA CAL-23.v4, QA CAL-25.v3**
 Calibration procedure for dosimetric E-field probes

Calibration date: **April 14, 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 E4419B	GB41293874	31-Mar-11 (No. 217-01372)	Apr-12
Power sensor E4412A	MY41495277	31-Mar-11 (No. 217-01372)	Apr-12
Power sensor E4412A	MY41498067	31-Mar-11 (No. 217-01372)	Apr-12
Reference 3 dB Attenuator	SN: S5054 (3c)	29-Mar-11 (No. 217-01369)	Apr-12
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Reference 30 dB Attenuator	SN: S5129 (30b)	29-Mar-11 (No. 217-01370)	Apr-12
Reference Probe ES3DV2	SN: 3013	29-Dec-10 (No. ES3-3013_Dec10)	Dec-11
DAE4	SN: 854	23-Apr-10 (No. DAE4-654_Apr10)	Apr-11
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	
Issued: April 14, 2011			

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

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



S Schweizerischer Kalibrierdienst
S Service suisse d'étalonnage
C Servizio svizzero di taratura
S 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
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,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., $\theta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

- 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
- 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:

- NORM_{x,y,z}**: Assessed for E-field polarization $\theta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not affect the E²-field uncertainty inside TSL (see below ConvF).
- NORM(f)_{x,y,z}** = NORM_{x,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.
- DCP_{x,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
- A_{x,y,z}; B_{x,y,z}; C_{x,y,z}** are numerical linearization parameters in dB assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media.
- VR**: VR is the validity range of the calibration related to the average diode voltage or DAE voltage in mV.
- 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 NORM_{x,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.



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ET3DV6 – SN:1782

April 14, 2011

Probe ET3DV6

SN:1782

Manufactured: April 15, 2003
Calibrated: April 14, 2011

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

ET3DV6- SN:1782

April 14, 2011

DASY/EASY - Parameters of Probe: ET3DV6 - SN:1782

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$) ^A	2.07	1.66	1.92	± 10.1 %
DCP (mV) ^B	96.4	96.6	97.6	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc ^C (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	111.1	±1.9 %
			Y	0.00	0.00	1.00	141.0	
			Z	0.00	0.00	1.00	145.1	

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 E²-field uncertainty inside TSL (see Pages 5 and 6).

^B Numerical linearization parameter; uncertainty not required.

^C Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

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DASY/EASY - Parameters of Probe: ET3DV6 - SN:1782

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)
450	43.5	0.87	6.89	6.89	6.89	0.21	2.29	± 13.4 %
835	41.5	0.90	6.22	6.22	6.22	0.88	1.63	± 12.0 %
1750	40.1	1.37	5.14	5.14	5.14	0.57	2.53	± 12.0 %
1900	40.0	1.40	4.95	4.95	4.95	0.58	2.54	± 12.0 %
2450	39.2	1.80	4.37	4.37	4.37	0.80	1.93	± 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.

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DASY/EASY - Parameters of Probe: ET3DV6- SN:1782

Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) ^c	Relative Permittivity ^e	Conductivity (S/m) ^e	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
450	56.7	0.94	7.49	7.49	7.49	0.16	2.34	± 13.4 %
835	55.2	0.97	6.03	6.03	6.03	0.85	1.72	± 12.0 %
1750	53.4	1.49	4.54	4.54	4.54	0.64	2.70	± 12.0 %
1900	53.3	1.52	4.34	4.34	4.34	0.63	2.57	± 12.0 %
2450	52.7	1.95	3.94	3.94	3.94	0.99	1.21	± 12.0 %

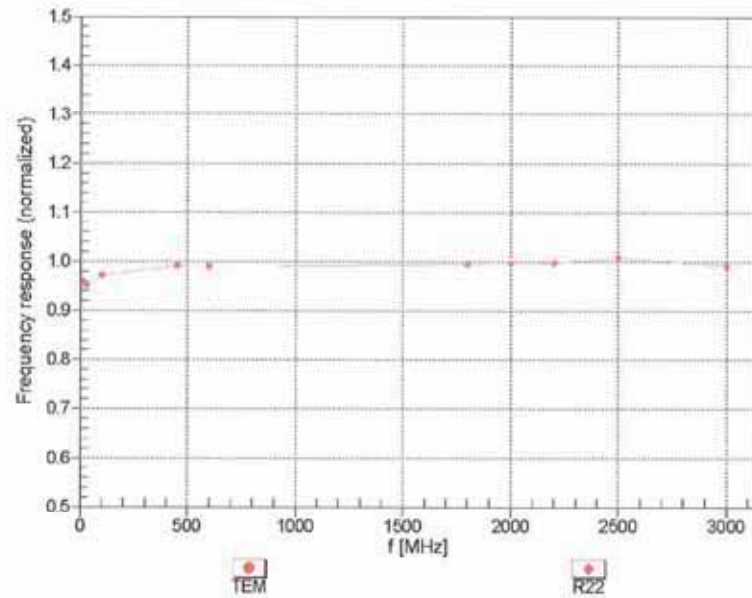
^c Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

^e 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.

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

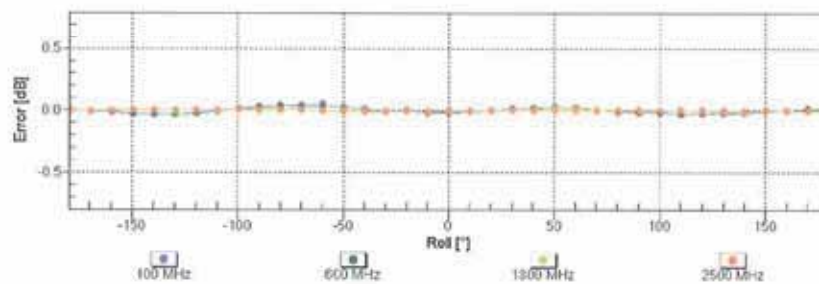
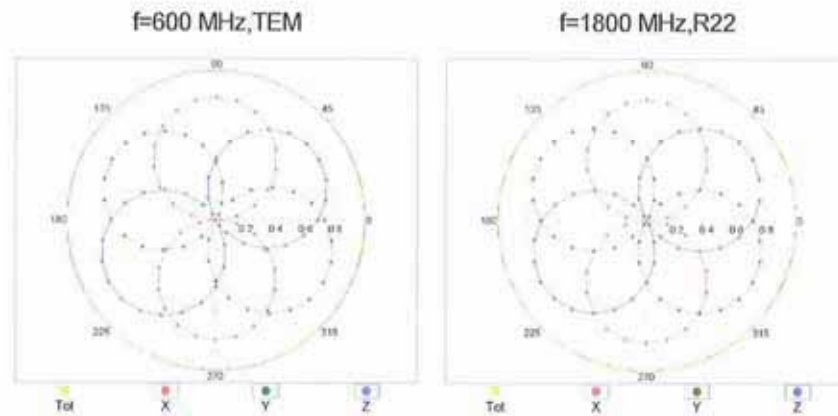


Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

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Receiving Pattern (ϕ), $\vartheta = 0^\circ$

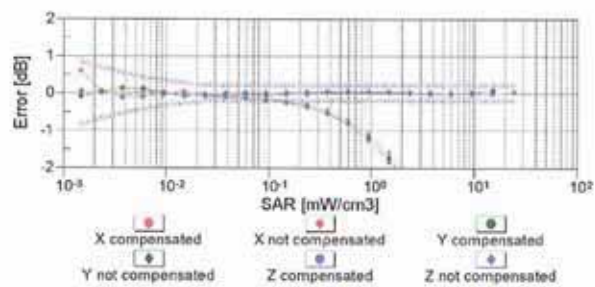
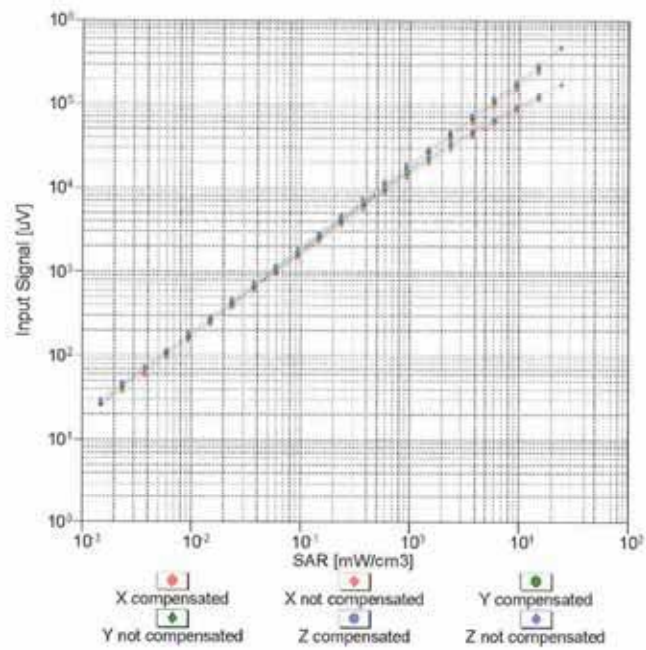


Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

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Dynamic Range $f(\text{SAR}_{\text{head}})$ (TEM cell, $f = 900 \text{ MHz}$)

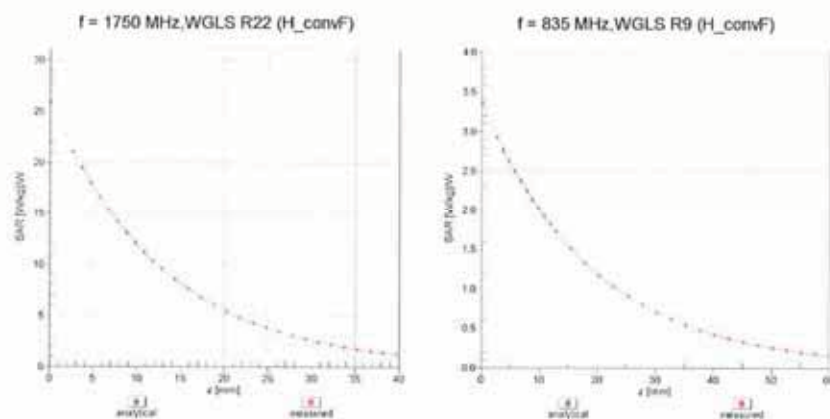


Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

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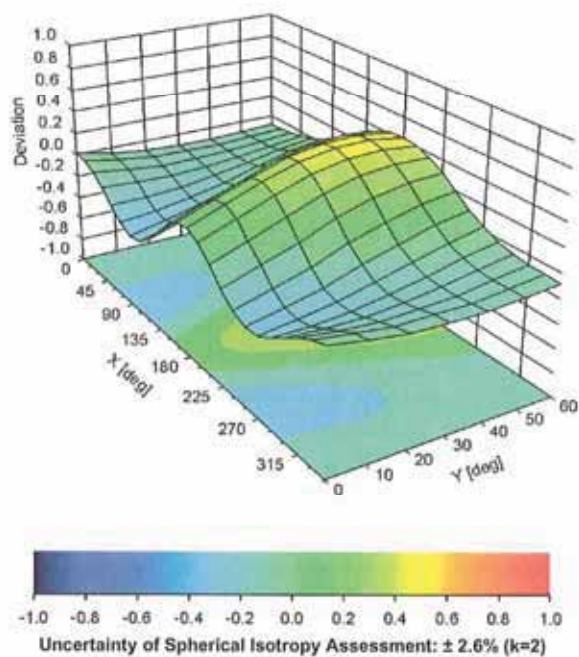
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Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (ϕ , θ), $f = 900$ MHz



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DASY/EASY - Parameters of Probe: ET3DV6 - SN:1782

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
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	6.8 mm
Probe Tip to Sensor X Calibration Point	2.7 mm
Probe Tip to Sensor Y Calibration Point	2.7 mm
Probe Tip to Sensor Z Calibration Point	2.7 mm
Recommended Measurement Distance from Surface	4 mm

-DAE Calibration Certificate

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



S Schweizerischer Kalibrierdienst
S 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 **SGS (Dymstec)**

Certificate No: **DAE3-567_Jan11**

CALIBRATION CERTIFICATE

Object **DAE3 - SD.000 D03 AA - SN: 567**

Calibration procedure(s) **QA CAL-06.v22
 Calibration procedure for the data acquisition electronics (DAE)**

Calibration date: **January 27, 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 $(22 \pm 3)^{\circ}\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Keithley Multimeter Type 2001	SN: 0810278	28-Sep-10 (No:10376)	Sep-11
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Calibrator Box V1.1	SE UMS 006 AB 1004	07-Jun-10 (in house check)	In house check: Jun-11

Calibrated by:	Name Andrea Guntli	Function Technician	Signature 
Approved by:	Name Fin Bornholt	Function R&D Director	Signature 

Issued: January 27, 2011

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