



ESTECH Co., Ltd.

Rm.1015, World Venture Center II,
426-5, Gasan-dong, Geumcheon-gu,
Seoul, 153-803, Korea

TEL: 82-2-867-3201
FAX: 82-2-867-3204

APPENDIX C : SAR Test Data

**ESTECH Co., Ltd.**

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TEL: 82-2-867-3201
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– GSM850

Date: 2007-07-27

Test Laboratory: ESTECH

LEFT TOUCH 190 SLIDE DOWN

DUT: VK160; Type: SLIDE TYPE; Serial: NONE

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium parameters used: $f = 836.8 \text{ MHz}$; $\sigma = 0.919 \text{ mho/m}$; $\epsilon_r = 43$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(6.42, 6.42, 6.42); Calibrated: 2006-10-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2007-04-23
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 23 °C, Humidity : 46%

Area Scan (41x61x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 0.214 mW/g

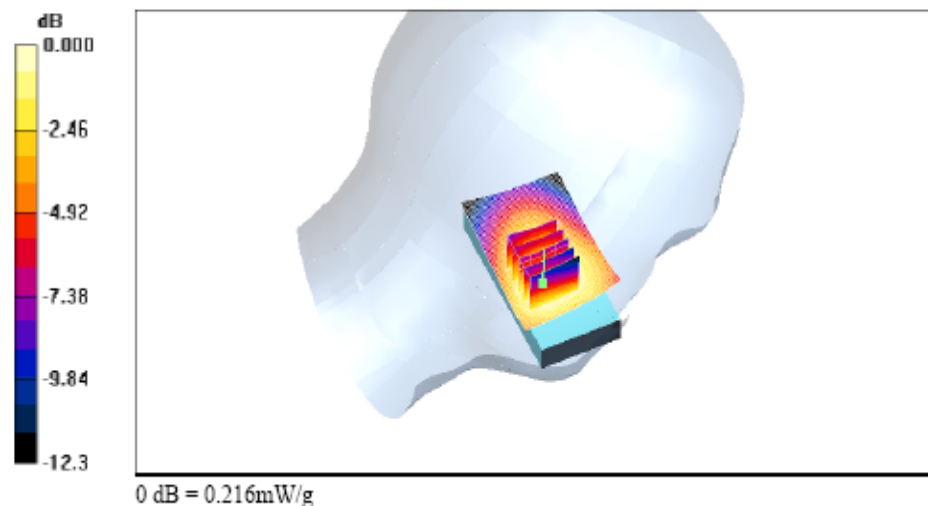
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

Reference Value = 7.09 V/m; Power Drift = 0.008 dB

Peak SAR (extrapolated) = 0.268 W/kg

SAR(1 g) = 0.206 mW/g

Maximum value of SAR (measured) = 0.216 mW/g



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Date: 2007-07-27

Test Laboratory: ESTECH

LEFT TOUCH 190 SLIDE UP

DUT: VK160 ; Type: SLIDE TYPE; Serial: NONE

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium parameters used: $f = 836.8$ MHz; $\sigma = 0.919$ mho/m; $\epsilon_r = 43$; $\rho = 1000$ kg/m³

Phantom section: Left Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(6.42, 6.42, 6.42); Calibrated: 2006-10-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2007-04-23
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 23°C, Humidity : 46%

Area Scan (41x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.123 mW/g

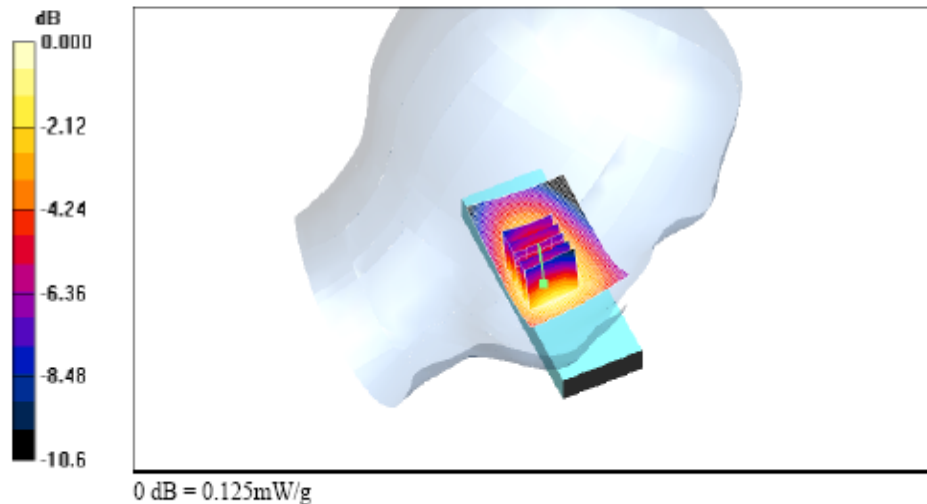
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 4.91 V/m; Power Drift = -0.024 dB

Peak SAR (extrapolated) = 0.155 W/kg

SAR(1 g) = 0.119 mW/g

Maximum value of SAR (measured) = 0.125 mW/g



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Test Laboratory: ESTECH

RIGHT TOUCH 190 SLIDE DOWN

DUT: VK160; Type: SLIDE TYPE; Serial: NONE

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium parameters used: $f = 836.8$ MHz; $\sigma = 0.919$ mho/m; $\epsilon_r = 43$; $\rho = 1000$ kg/m³

Phantom section: Right Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(6.42, 6.42, 6.42); Calibrated: 2006-10-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2007-04-23
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 23 °C, Humidity : 46%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.267 mW/g

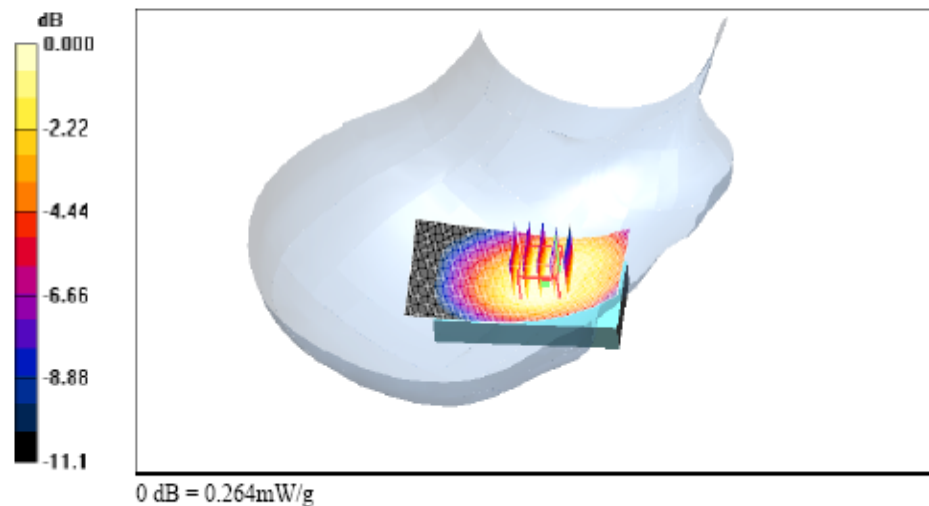
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 7.78 V/m; Power Drift = -0.096 dB

Peak SAR (extrapolated) = 0.339 W/kg

SAR(1 g) = 0.250 mW/g

Maximum value of SAR (measured) = 0.264 mW/g



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RIGHT TOUCH 190 SLIDE DOWN

DUT: VK160; Type: SLIDE TYPE; Serial: NONE

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3

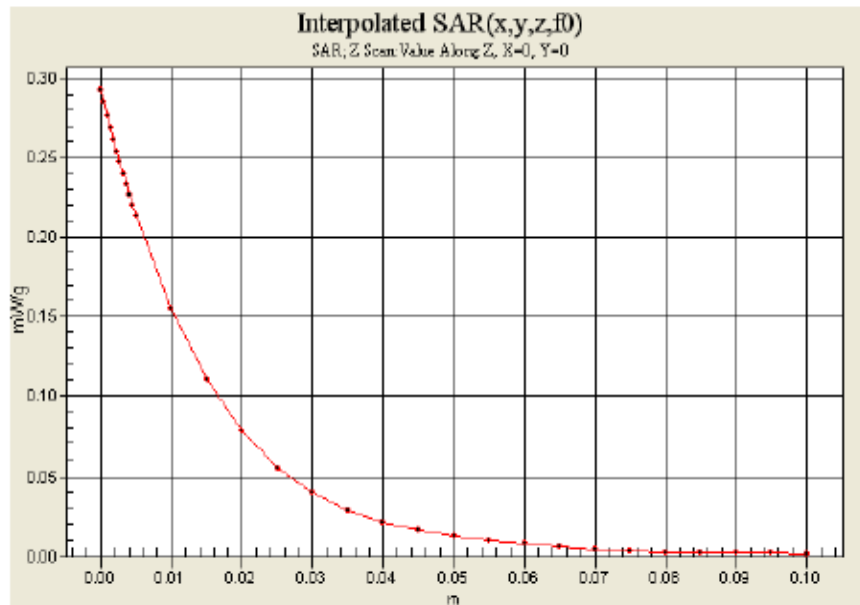
Medium parameters used: $f = 836.8$ MHz; $\sigma = 0.919$ mho/m; $\epsilon_r = 43$; $\rho = 1000$ kg/m³

Phantom section: Right Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(6.42, 6.42, 6.42); Calibrated: 2006-10-17
- Sensor-Surface: 4mm (Mechanical Surface Detection) Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn551; Calibrated: 2007-04-23
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 23°C, Humidity : 46%





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Date: 2007-07-27

Test Laboratory: ESTECH

RIGHT TOUCH 190 BT SLIDE DOWN

DUT: VK160; Type: SLIDE TYPE; Serial: NONE

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium parameters used: $f = 836.8$ MHz; $\sigma = 0.919$ mho/m; $\epsilon_r = 43$; $\rho = 1000$ kg/m³

Phantom section: Right Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(6.42, 6.42, 6.42); Calibrated: 2006-10-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2007-04-23
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 23 °C, Humidity : 46%

Area Scan (41x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.290 mW/g

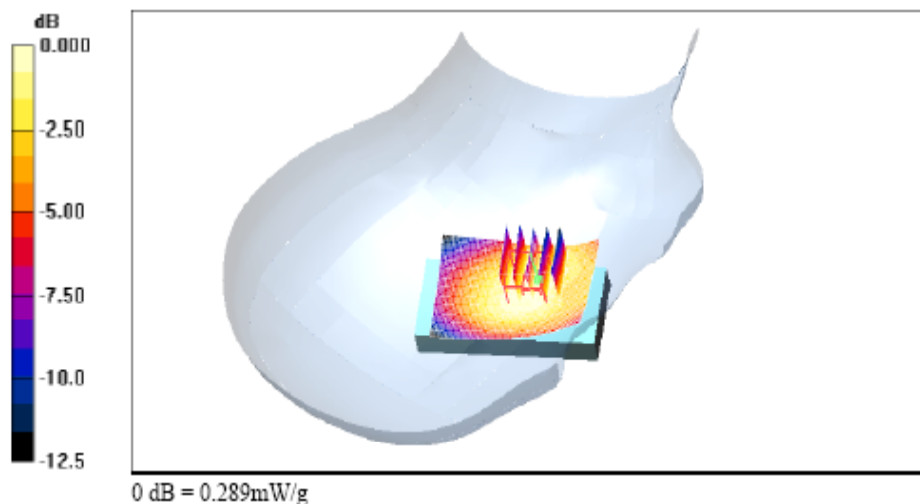
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 7.35 V/m; Power Drift = 0.092 dB

Peak SAR (extrapolated) = 0.374 W/kg

SAR(1 g) = 0.273 mW/g

Maximum value of SAR (measured) = 0.289 mW/g



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Test Laboratory: ESTECH

RIGHT TOUCH 190 SLIDE UP

DUT: VK160 ; Type: SLIDE TYPE; Serial: NONE

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium parameters used: $f = 836.8$ MHz; $\sigma = 0.919$ mho/m; $\epsilon_r = 43$; $\rho = 1000$ kg/m³

Phantom section: Right Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(6.42, 6.42, 6.42); Calibrated: 2006-10-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2007-04-23
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 23 °C, Humidity : 46%

Area Scan (41x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.125 mW/g

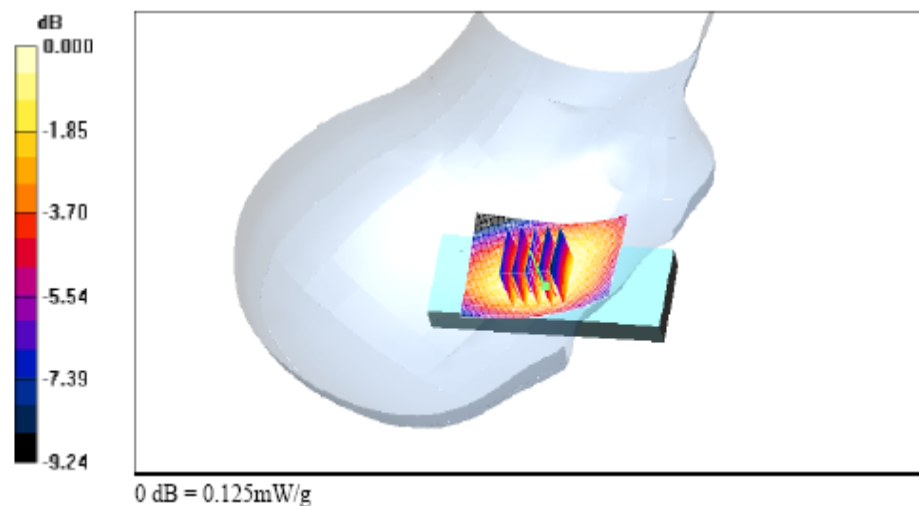
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 5.60 V/m; Power Drift = -0.001 dB

Peak SAR (extrapolated) = 0.149 W/kg

SAR(1 g) = 0.117 mW/g

Maximum value of SAR (measured) = 0.125 mW/g



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LEFT TILT 190 SLIDE DOWN

DUT: VK160; Type: SLIDE TYPE; Serial: NONE

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium parameters used: $f = 836.8$ MHz; $\sigma = 0.919$ mho/m; $\epsilon_r = 43$; $\rho = 1000$ kg/m³

Phantom section: Left Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(6.42, 6.42, 6.42); Calibrated: 2006-10-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2007-04-23
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 23°C, Humidity : 46%

Area Scan (41x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.100 mW/g

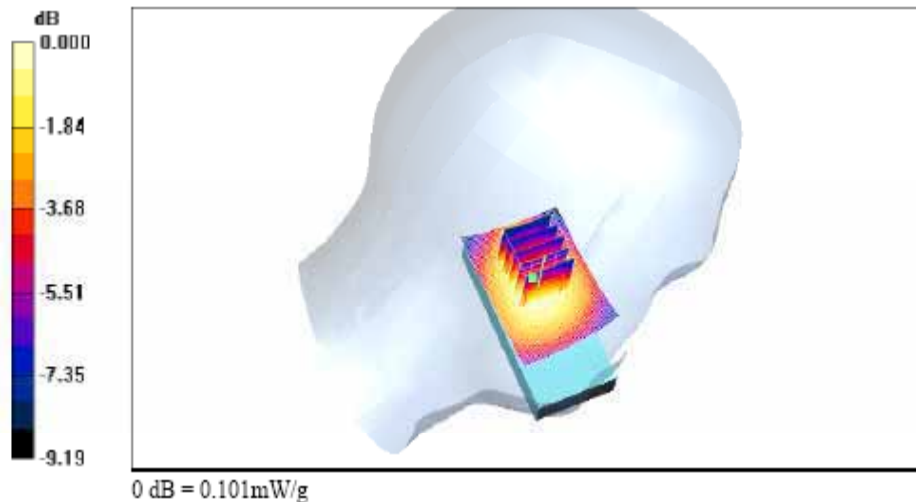
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 7.97 V/m; Power Drift = 0.005 dB

Peak SAR (extrapolated) = 0.123 W/kg

SAR(1 g) = 0.096 mW/g

Maximum value of SAR (measured) = 0.101 mW/g



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LEFT TILT 190 SLIDE UP

DUT: VK160 ; Type: SLIDE TYPE; Serial: NONE

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium parameters used: $f = 836.8 \text{ MHz}$; $\sigma = 0.919 \text{ mho/m}$; $\epsilon_r = 43$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(6.42, 6.42, 6.42); Calibrated: 2006-10-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2007-04-23
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 23°C, Humidity : 46%

Area Scan (41x61x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 0.057 mW/g

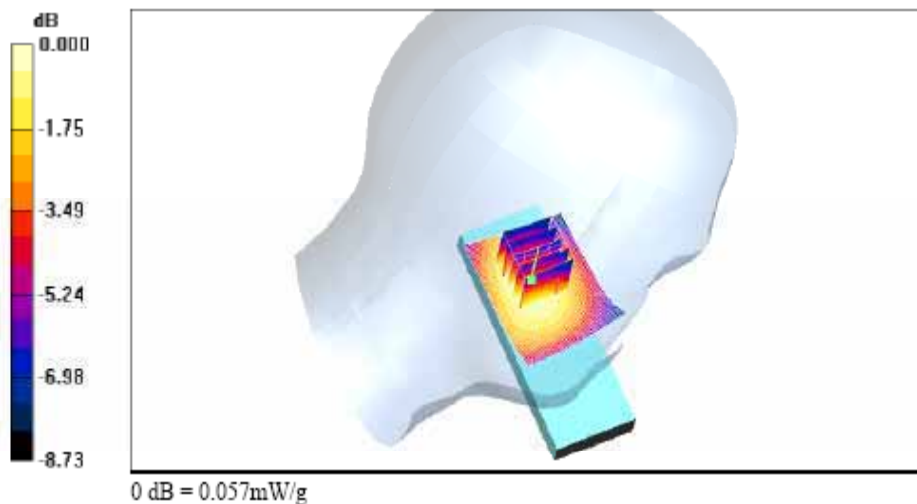
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

Reference Value = 5.40 V/m; Power Drift = 0.094 dB

Peak SAR (extrapolated) = 0.069 W/kg

SAR(1 g) = 0.054 mW/g

Maximum value of SAR (measured) = 0.057 mW/g





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Test Laboratory: ESTECH

RIGHT TILT 190 SLIDE DOWN

DUT: VK160; Type: SLIDE TYPE; Serial: NONE

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium parameters used: $f = 836.8$ MHz; $\sigma = 0.919$ mho/m; $\epsilon_r = 43$; $\rho = 1000$ kg/m³

Phantom section: Right Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(6.42, 6.42, 6.42); Calibrated: 2006-10-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2007-04-23
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 23 °C, Humidity : 46%

Area Scan (41x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.118 mW/g

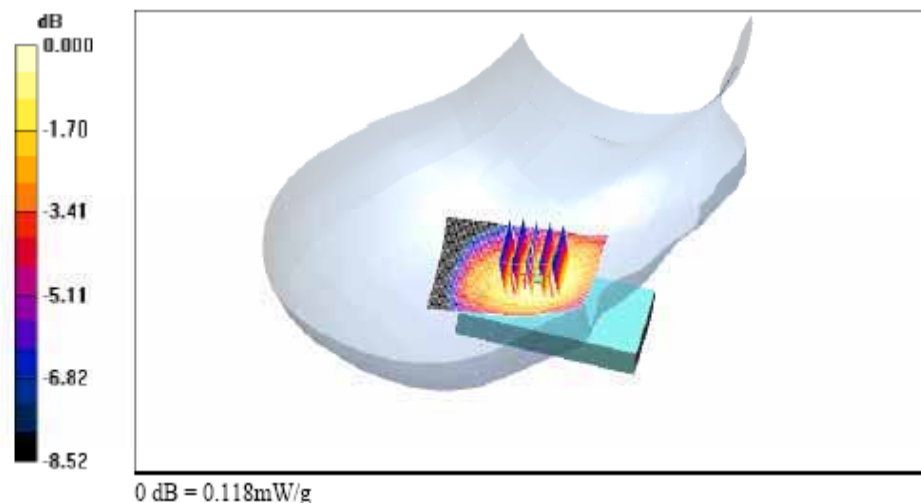
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 8.12 V/m; Power Drift = 0.095 dB

Peak SAR (extrapolated) = 0.140 W/kg

SAR(1 g) = 0.112 mW/g

Maximum value of SAR (measured) = 0.118 mW/g



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Test Laboratory: ESTECH

RIGHT TILT 190 SLIDE UP

DUT: VK160 ; Type: SLIDE TYPE; Serial: NONE

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium parameters used: $f = 836.8$ MHz; $\sigma = 0.919$ mho/m; $\epsilon_r = 43$; $\rho = 1000$ kg/m³

Phantom section: Right Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(6.42, 6.42, 6.42); Calibrated: 2006-10-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2007-04-23
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 22 °C, Humidity : 46%

Area Scan (41x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.080 mW/g

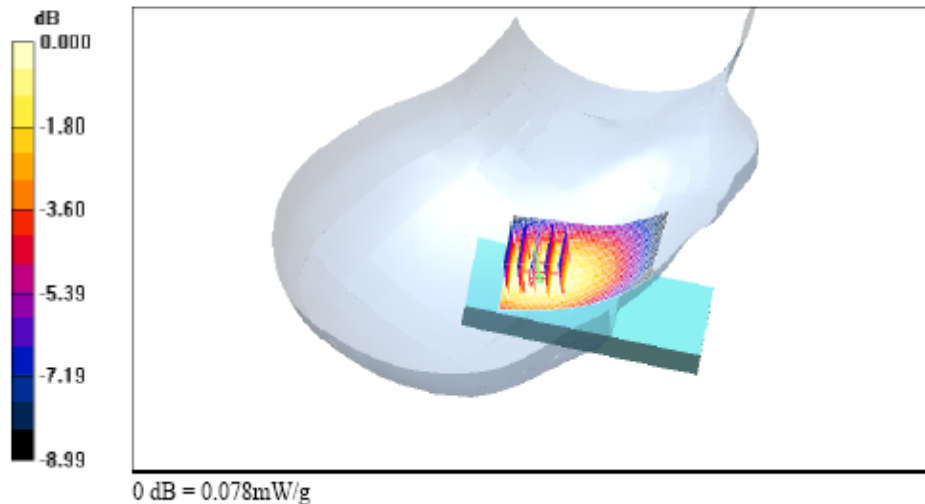
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 6.51 V/m; Power Drift = -0.012 dB

Peak SAR (extrapolated) = 0.095 W/kg

SAR(1 g) = 0.074 mW/g; SAR(10 g) = 0.055 mW/g

Maximum value of SAR (measured) = 0.078 mW/g



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Test Laboratory: ESTECH

BODY FRONT 190 SLIDE UP

DUT: VK160 ; Type: SLIDE TYPE; Serial: NONE

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium parameters used: $f = 836.8$ MHz; $\sigma = 0.952$ mho/m; $\epsilon_r = 52.8$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(6.32, 6.32, 6.32); Calibrated: 2006-10-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2007-04-23
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 23°C, Humidity : 46%

Area Scan (41x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.091 mW/g

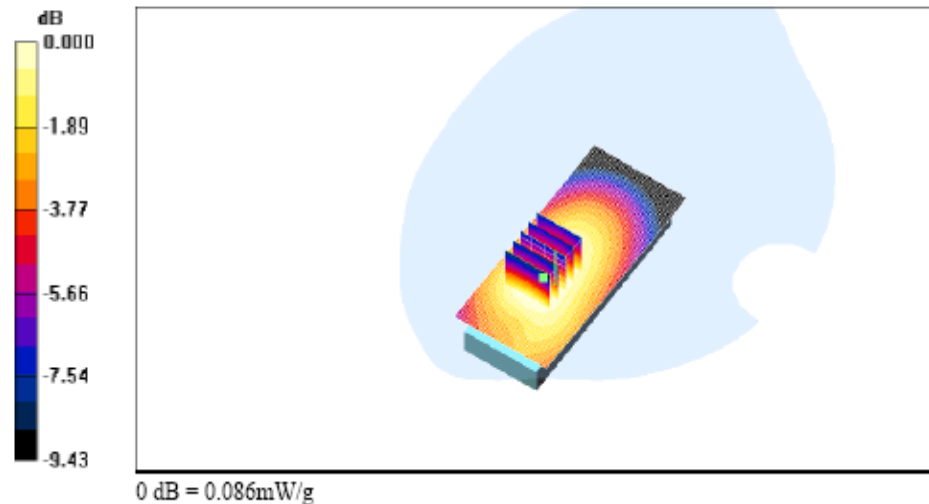
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 4.47 V/m; Power Drift = -0.068 dB

Peak SAR (extrapolated) = 0.106 W/kg

SAR(1 g) = 0.082 mW/g

Maximum value of SAR (measured) = 0.086 mW/g



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Test Laboratory: ESTECH

BODY FRONT 190 SLIDE DOWN

DUT: VK160; Type: SLIDE TYPE; Serial: NONE

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium parameters used: $f = 836.8 \text{ MHz}$; $\sigma = 0.952 \text{ mho/m}$; $\epsilon_r = 52.8$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(6.32, 6.32, 6.32); Calibrated: 2006-10-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2007-04-23
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 23°C, Humidity : 46%

Area Scan (41x61x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 0.241 mW/g

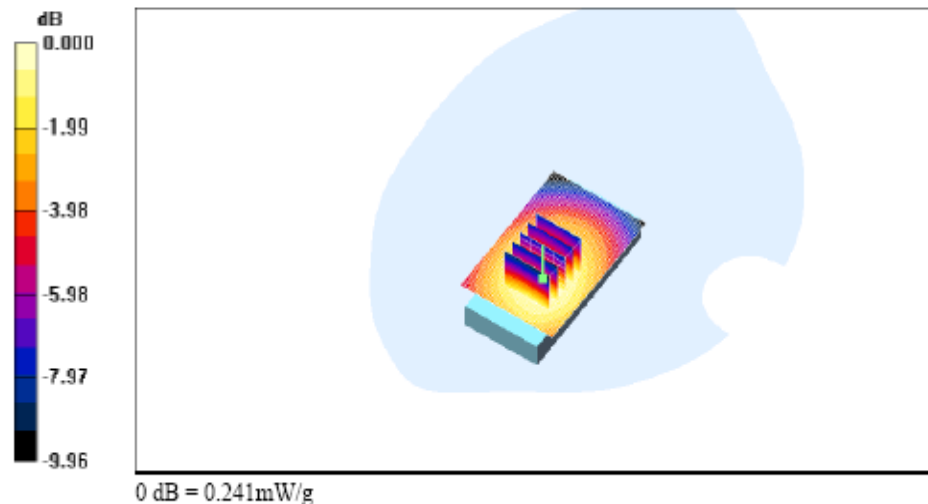
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

Reference Value = 7.49 V/m; Power Drift = -0.033 dB

Peak SAR (extrapolated) = 0.298 W/kg

SAR(1 g) = 0.227 mW/g

Maximum value of SAR (measured) = 0.241 mW/g



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Date: 2007-07-27

Test Laboratory: ESTECH

BODY REAR 190 SLIDE UP

DUT: VK160 ; Type: SLIDE TYPE; Serial: NONE

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium parameters used: $f = 836.8$ MHz; $\sigma = 0.952$ mho/m; $\epsilon_r = 52.8$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(6.32, 6.32, 6.32); Calibrated: 2006-10-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2007-04-23
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 22°C, Humidity : 46%

Area Scan (41x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.126 mW/g

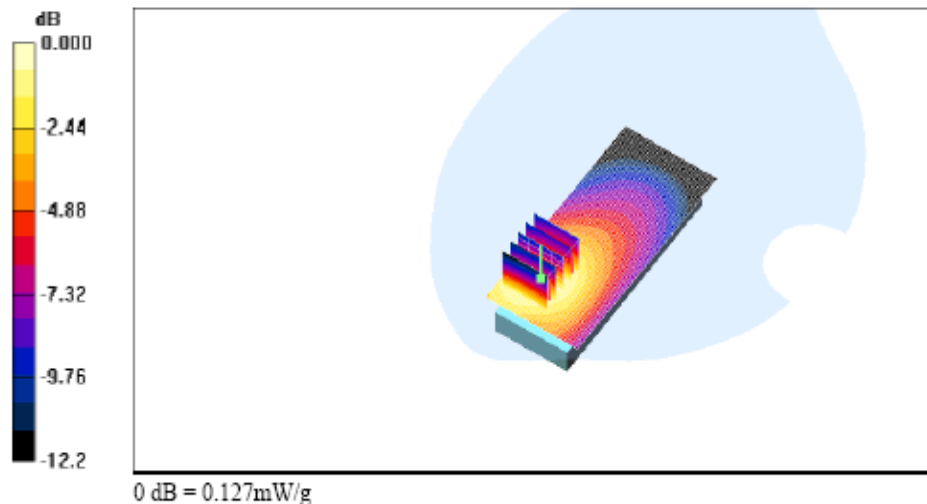
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 3.44 V/m; Power Drift = 0.031 dB

Peak SAR (extrapolated) = 0.169 W/kg

SAR(1 g) = 0.117 mW/g

Maximum value of SAR (measured) = 0.127 mW/g



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Date: 2007-07-27

Test Laboratory: ESTECH

BODY REAR 190 SLIDE DOWN

DUT: VK160; Type: SLIDE TYPE; Serial: NONE

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium parameters used: $f = 836.8$ MHz; $\sigma = 0.952$ mho/m; $\epsilon_r = 52.8$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DAS4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(6.32, 6.32, 6.32); Calibrated: 2006-10-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2007-04-23
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 23 °C, Humidity : 46%

Area Scan (41x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.327 mW/g

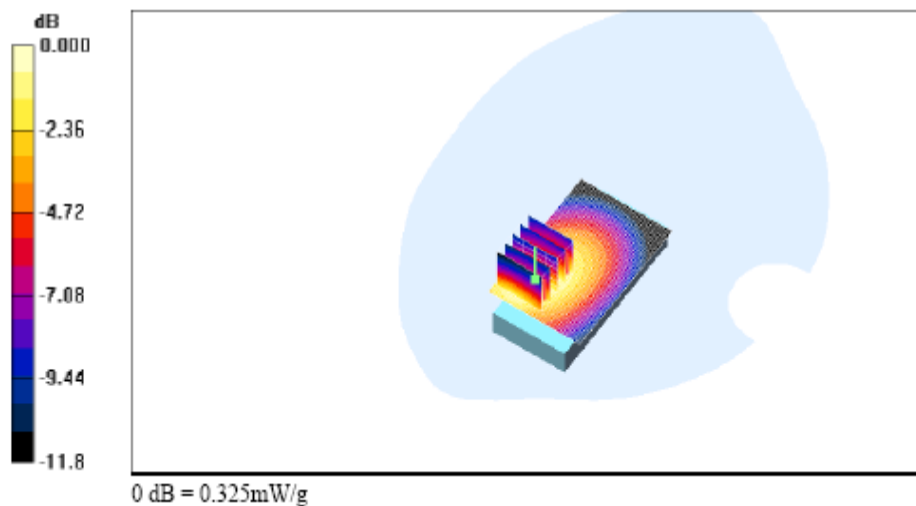
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 5.66 V/m; Power Drift = -0.068 dB

Peak SAR (extrapolated) = 0.431 W/kg

SAR(1 g) = 0.302 mW/g

Maximum value of SAR (measured) = 0.325 mW/g



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BODY REAR 190 SLIDE DOWN

DUT: VK160; Type: SLIDE TYPE; Serial: NONE

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3

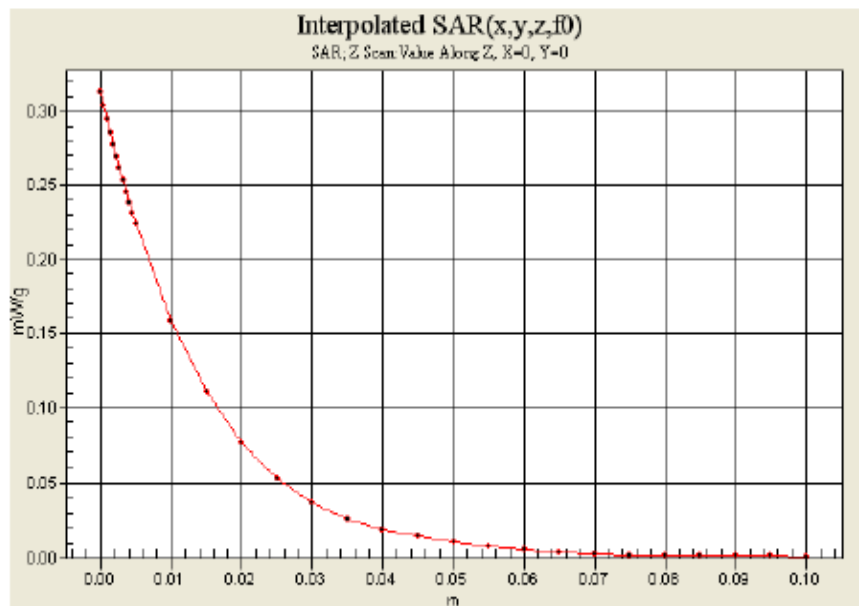
Medium parameters used: $f = 836.8$ MHz; $\sigma = 0.952$ mho/m; $\epsilon_r = 52.8$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(6.32, 6.32, 6.32); Calibrated: 2006-10-17
- Sensor-Surface: 4mm (Mechanical Surface Detection) Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn551; Calibrated: 2007-04-23
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 23°C, Humidity : 46%



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BODY RERA 190 SLIDE DOWN BT

DUT: VK160; Type: SLIDE TYPE; Serial: NONE

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium parameters used: $f = 836.8$ MHz; $\sigma = 0.952$ mho/m; $\epsilon_r = 52.8$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(6.32, 6.32, 6.32); Calibrated: 2006-10-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2007-04-23
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 23 °C, Humidity : 46%

Area Scan (41x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.271 mW/g

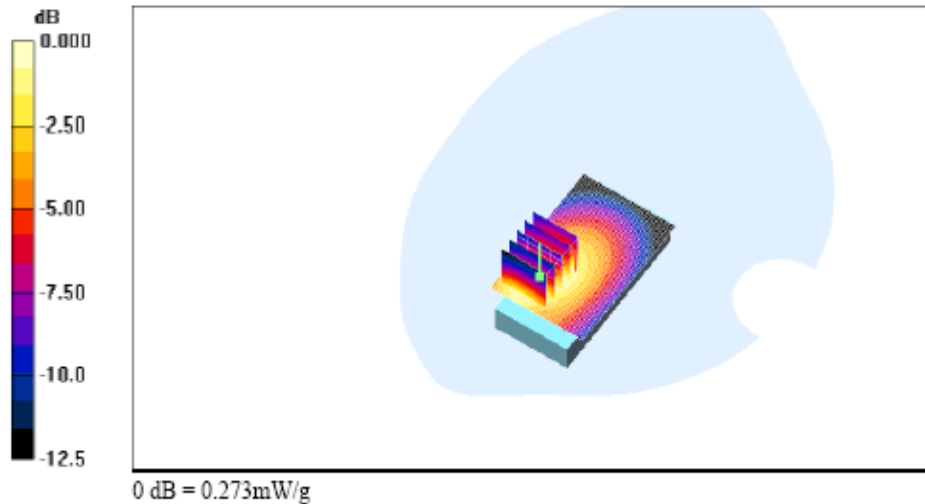
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 5.17 V/m; Power Drift = -0.081 dB

Peak SAR (extrapolated) = 0.370 W/kg

SAR(1 g) = 0.251 mW/g

Maximum value of SAR (measured) = 0.273 mW/g



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Test Laboratory: ESTECH

BODY RERA 190 SLIDE DOWN GPRS BT

DUT: VK160; Type: SLIDE TYPE; Serial: NONE

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:4.15

Medium parameters used: $f = 836.8$ MHz; $\sigma = 0.952$ mho/m; $\epsilon_r = 52.8$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(6.32, 6.32, 6.32); Calibrated: 2006-10-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2007-04-23
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 23°C, Humidity : 46%

Area Scan (41x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.251 mW/g

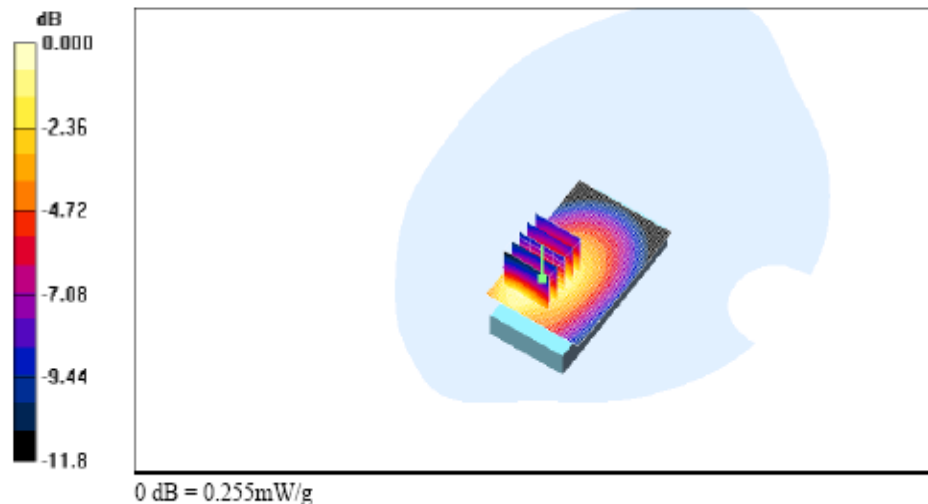
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 5.34 V/m; Power Drift = -0.105 dB

Peak SAR (extrapolated) = 0.342 W/kg

SAR(1 g) = 0.235 mW/g

Maximum value of SAR (measured) = 0.255 mW/g



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Date: 2007-07-27

Test Laboratory: ESTECH

CH661 LEFT TOUCH

DUT: VK160; Type: SLIDE TYPE; Serial: NONE

Communication System: GSM1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.42 \text{ mho/m}$; $\epsilon_r = 40$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(5.08, 5.08, 5.08); Calibrated: 2006-10-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: DAE not calibrated
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 23 °C, Humidity : 46%

Area Scan (41x61x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 0.331 mW/g

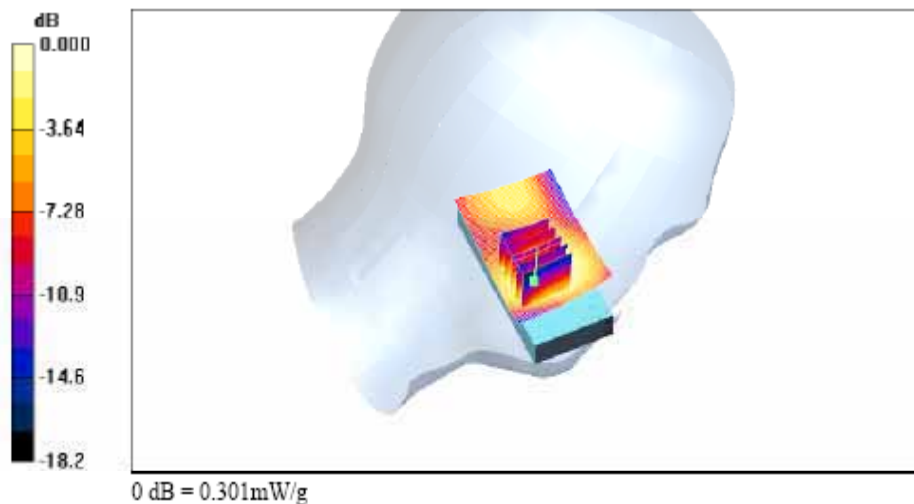
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

Reference Value = 10.8 V/m; Power Drift = -0.065 dB

Peak SAR (extrapolated) = 0.408 W/kg

SAR(1 g) = 0.279 mW/g

Maximum value of SAR (measured) = 0.301 mW/g



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CH661 LEFT TOUCH SLIDE UP

DUT: VK160 ; Type: SLIDE TYPE; Serial: NONE

Communication System: GSM1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.42$ mho/m; $\epsilon_r = 40$; $\rho = 1000$ kg/m³

Phantom section: Left Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(5.08, 5.08, 5.08); Calibrated: 2006-10-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: DAE not calibrated
- Phantom: SAM MIC 1800MHz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 23 °C, Humidity : 46%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.355 mW/g

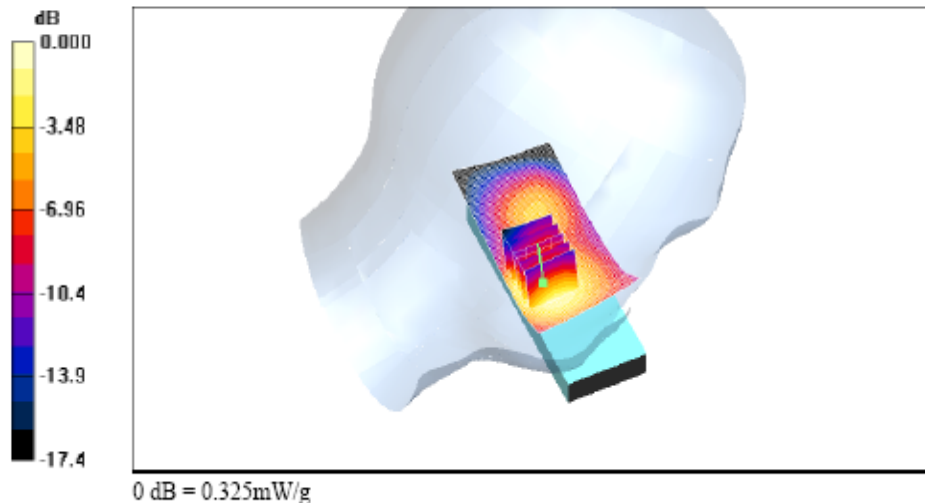
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 6.46 V/m; Power Drift = 0.096 dB

Peak SAR (extrapolated) = 0.452 W/kg

SAR(1 g) = 0.304 mW/g

Maximum value of SAR (measured) = 0.325 mW/g



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CH661 LEFT TOUCH SLIDE UP

DUT: VK160 ; Type: SLIDE TYPE; Serial: NONE

Communication System: GSM1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.42$ mho/m; $\epsilon_r = 40$; $\rho = 1000$ kg/m³

Phantom section: Left Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(5.08, 5.08, 5.08); Calibrated: 2006-10-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: DAE not calibrated
- Phantom: SAM MIC 1800MHz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 23 °C, Humidity : 46%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.355 mW/g

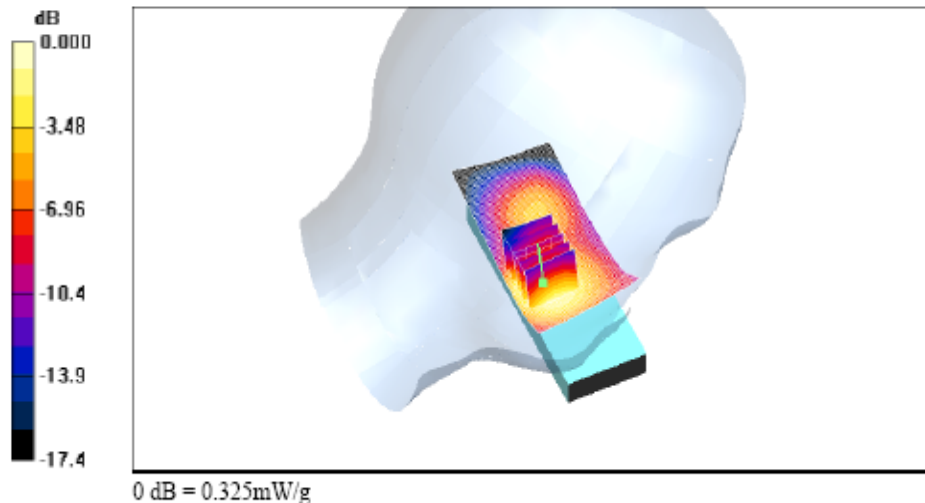
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 6.46 V/m; Power Drift = 0.096 dB

Peak SAR (extrapolated) = 0.452 W/kg

SAR(1 g) = 0.304 mW/g

Maximum value of SAR (measured) = 0.325 mW/g



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CH661 RIGHT TOUCH

DUT: VK160; Type: SLIDE TYPE; Serial: NONE

Communication System: GSM1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.42 \text{ mho/m}$; $\epsilon_r = 40$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(5.08, 5.08, 5.08); Calibrated: 2006-10-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: DAE not calibrated
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 23°C, Humidity : 46%

Area Scan (41x61x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 0.407 mW/g

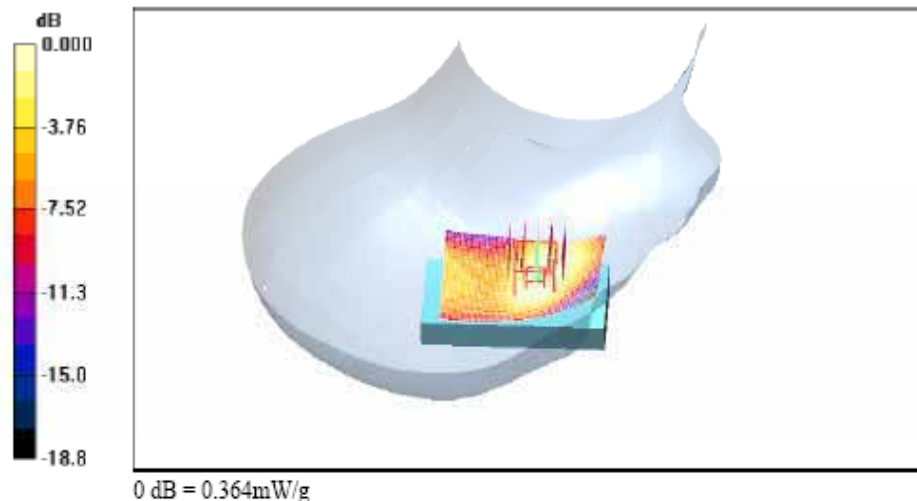
Unnamed procedure/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

Reference Value = 10.6 V/m; Power Drift = -0.132 dB

Peak SAR (extrapolated) = 0.519 W/kg

SAR(1 g) = 0.343 mW/g; SAR(10 g) = 0.214 mW/g

Maximum value of SAR (measured) = 0.364 mW/g



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CH661 RIGHT TOUCH BT

DUT: VK160; Type: SLIDE TYPE; Serial: NONE

Communication System: GSM1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.42$ mho/m; $\epsilon_r = 40$; $\rho = 1000$ kg/m³

Phantom section: Right Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(5.08, 5.08, 5.08); Calibrated: 2006-10-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: DAE not calibrated
- Phantom: SAM MIC 1800MHz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 23 °C, Humidity : 46%

Area Scan (41x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.229 mW/g

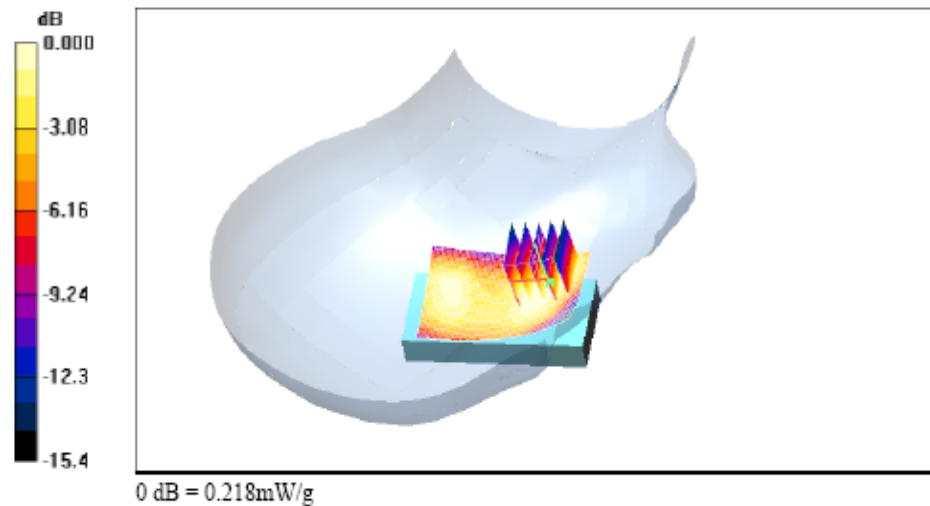
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 8.96 V/m; Power Drift = -0.142 dB

Peak SAR (extrapolated) = 0.331 W/kg

SAR(1 g) = 0.202 mW/g

Maximum value of SAR (measured) = 0.218 mW/g





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CH661 RIGHT TOUCH

DUT: VK160; Type: SLIDE TYPE; Serial: NONE

Communication System: GSM1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

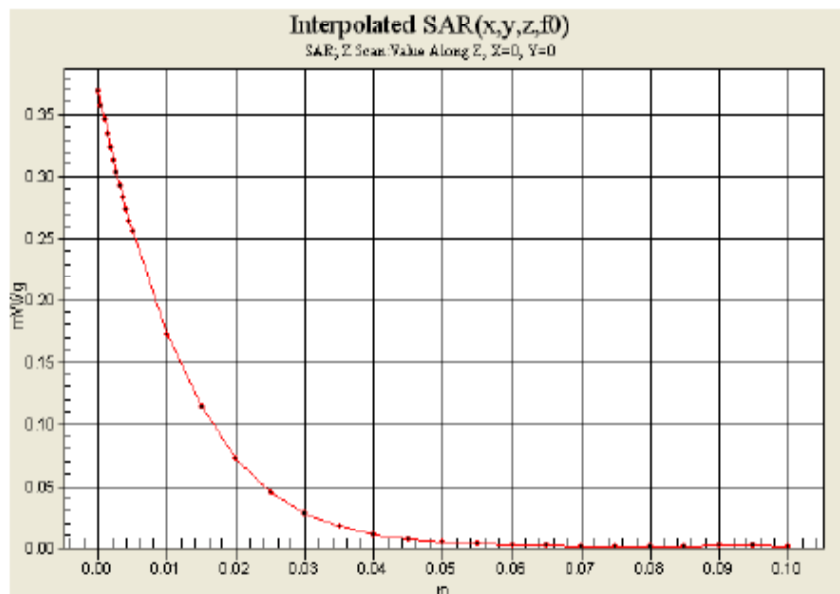
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.42$ mho/m; $\epsilon_r = 40$; $\rho = 1000$ kg/m³

Phantom section: Right Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(5.08, 5.08, 5.08); Calibrated: 2006-10-17
- Sensor-Surface: 4mm (Mechanical Surface Detection) Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn551; Calibrated: 2007-04-23
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 23 °C, Humidity : 46%



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Test Laboratory: ESTECH

CH661 RIGHT TOUCH SLIDE UP

DUT: VK160 ; Type: SLIDE TYPE; Serial: NONE

Communication System: GSM1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.42$ mho/m; $\epsilon_r = 40$; $\rho = 1000$ kg/m³

Phantom section: Right Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(5.08, 5.08, 5.08); Calibrated: 2006-10-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: DAE not calibrated
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 23 °C, Humidity : 46%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.282 mW/g

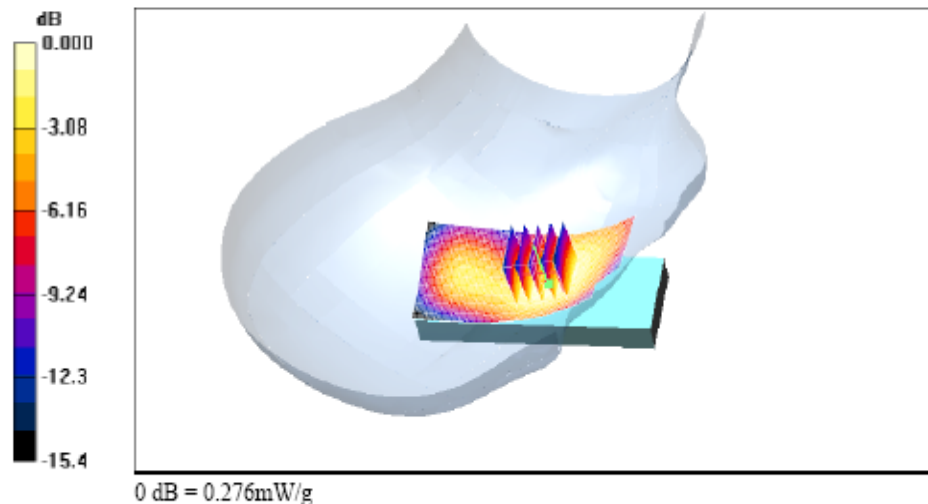
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 7.83 V/m; Power Drift = -0.100 dB

Peak SAR (extrapolated) = 0.375 W/kg

SAR(1 g) = 0.256 mW/g

Maximum value of SAR (measured) = 0.276 mW/g



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Test Laboratory: ESTECH

CH661 LEFT TILT

DUT: VK160; Type: SLIDE TYPE; Serial: NONE

Communication System: GSM1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.42$ mho/m; $\epsilon_r = 40$; $\rho = 1000$ kg/m³

Phantom section: Left Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(5.08, 5.08, 5.08); Calibrated: 2006-10-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2007-04-23
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 23 °C, Humidity : 46%

Area Scan (41x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.195 mW/g

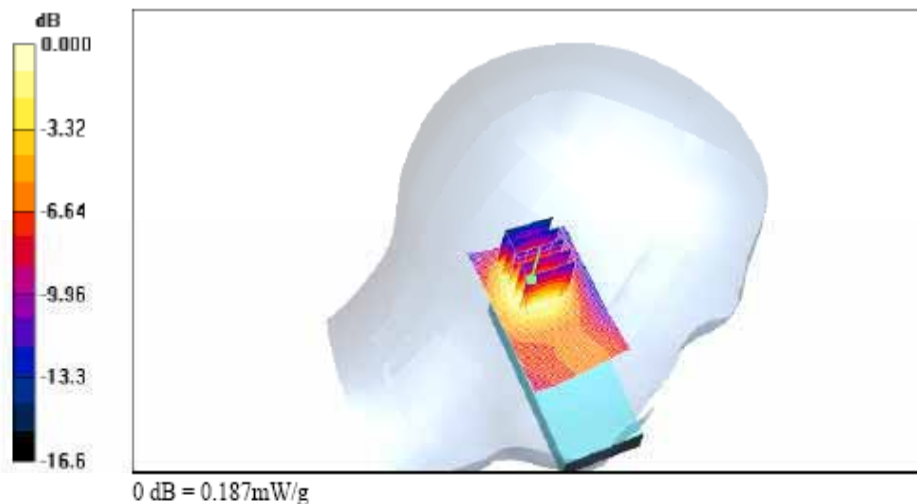
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 11.6 V/m; Power Drift = -0.099 dB

Peak SAR (extrapolated) = 0.257 W/kg

SAR(1 g) = 0.171 mW/g

Maximum value of SAR (measured) = 0.187 mW/g



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Test Laboratory: ESTECH

CH661 LEFT TILT SLIDE UP

DUT: VK160 ; Type: SLIDE TYPE; Serial: NONE

Communication System: GSM1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.42$ mho/m; $\epsilon_r = 40$; $\rho = 1000$ kg/m³

Phantom section: Left Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(5.08, 5.08, 5.08); Calibrated: 2006-10-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2007-04-23
- Phantom: SAM MIC 1800MHz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 23°C, Humidity : 46%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.176 mW/g

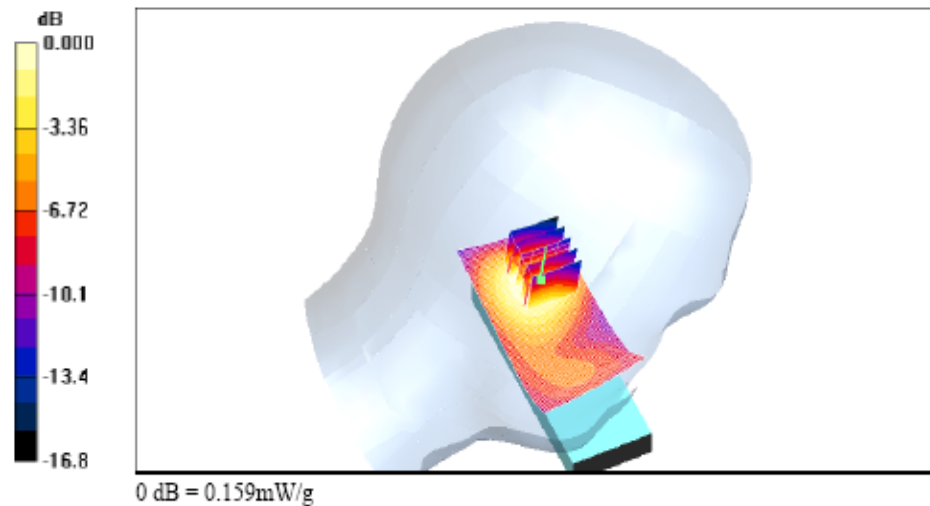
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 9.57 V/m; Power Drift = 0.110 dB

Peak SAR (extrapolated) = 0.219 W/kg

SAR(1 g) = 0.150 mW/g

Maximum value of SAR (measured) = 0.159 mW/g





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Test Laboratory: ESTECH

CH661 RIGHT TILT

DUT: VK160; Type: SLIDE TYPE; Serial: NONE

Communication System: GSM1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.42$ mho/m; $\epsilon_r = 40$; $\rho = 1000$ kg/m³

Phantom section: Right Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(5.08, 5.08, 5.08); Calibrated: 2006-10-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2007-04-23
- Phantom: SAM MIC 1800MHz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 23 °C, Humidity : 46%

Area Scan (41x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.207 mW/g

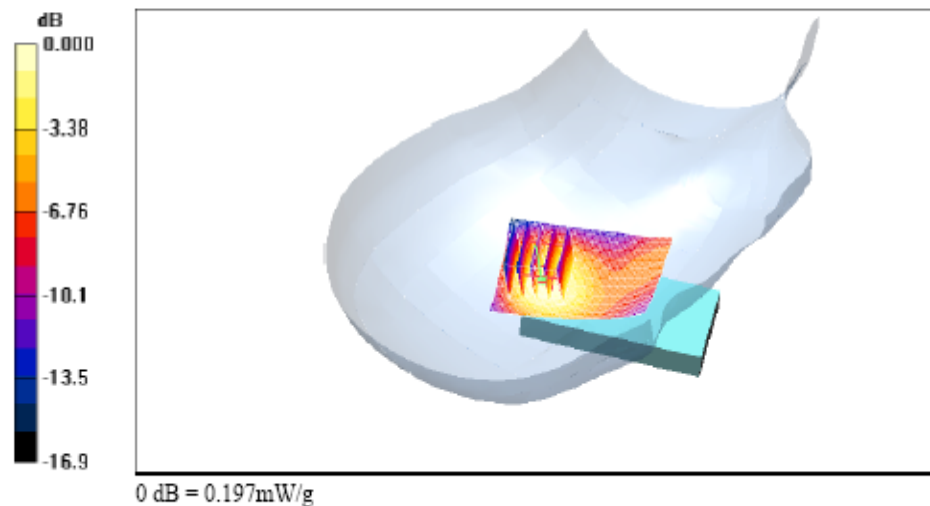
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 11.8 V/m; Power Drift = 0.026 dB

Peak SAR (extrapolated) = 0.278 W/kg

SAR(1 g) = 0.183 mW/g

Maximum value of SAR (measured) = 0.197 mW/g



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Test Laboratory: ESTECH

CH661 RIGHT TILT SLIDE UP

DUT: VK160 ; Type: SLIDE TYPE; Serial: NONE

Communication System: GSM1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.42$ mho/m; $\epsilon_r = 40$; $\rho = 1000$ kg/m³

Phantom section: Right Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(5.08, 5.08, 5.08); Calibrated: 2006-10-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: DAE not calibrated
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 23°C, Humidity : 46%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.204 mW/g

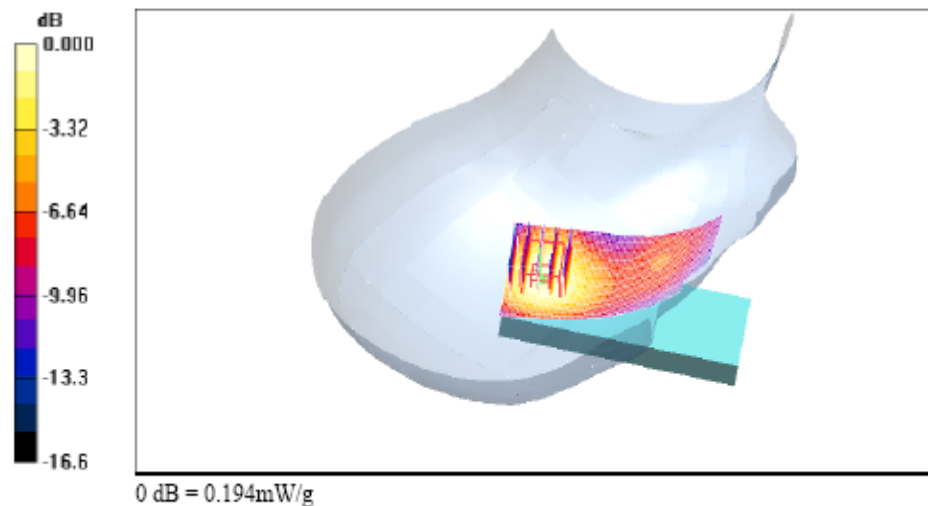
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 10.6 V/m; Power Drift = 0.135 dB

Peak SAR (extrapolated) = 0.278 W/kg

SAR(1 g) = 0.178 mW/g

Maximum value of SAR (measured) = 0.194 mW/g



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Seoul, 153-803, Korea

TEL: 82-2-867-3201
FAX: 82-2-867-3204

Date: 2007-07-27

Test Laboratory: ESTECH

CH661 BODY FRONT

DUT: VK160; Type: SLIDE TYPE; Serial: NONE

Communication System: GSM1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.52$ mho/m; $\epsilon_r = 53.7$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(4.65, 4.65, 4.65); Calibrated: 2006-10-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2007-04-23
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 23 °C, Humidity : 46%

Area Scan (41x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.101 mW/g

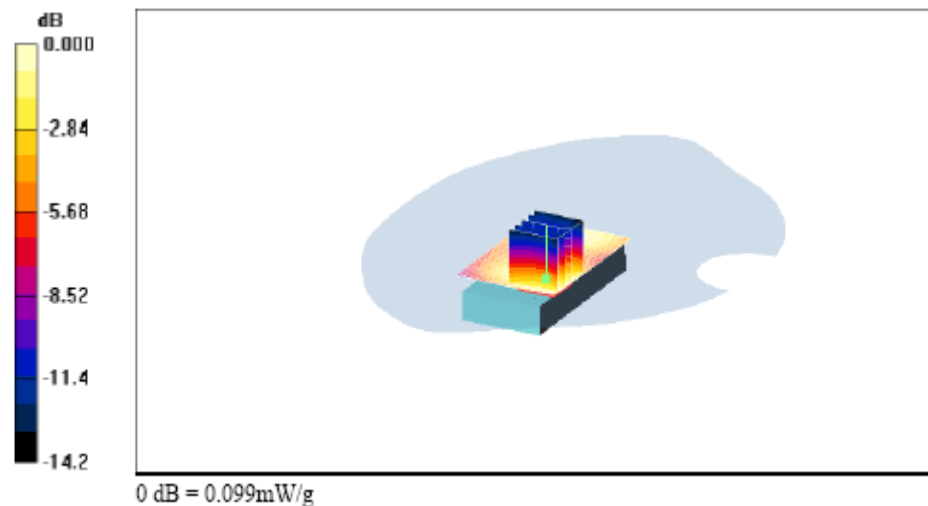
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 7.32 V/m; Power Drift = -0.091 dB

Peak SAR (extrapolated) = 0.147 W/kg

SAR(1 g) = 0.093 mW/g

Maximum value of SAR (measured) = 0.099 mW/g



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Test Laboratory: ESTECH

CH661 BODY FRONT UP

DUT: VK160 ; Type: SLIDE TYPE; Serial: NONE

Communication System: GSM1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.52$ mho/m; $\epsilon_r = 53.7$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(4.65, 4.65, 4.65); Calibrated: 2006-10-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2007-04-23
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 23 °C, Humidity : 46%

Area Scan (41x71x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.273 mW/g

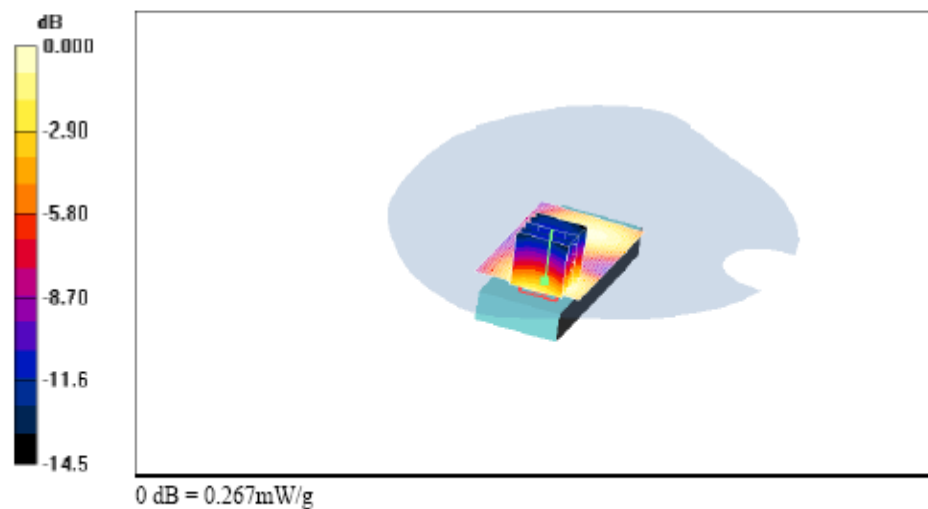
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 7.12 V/m; Power Drift = -0.045 dB

Peak SAR (extrapolated) = 0.382 W/kg

SAR(1 g) = 0.247 mW/g

Maximum value of SAR (measured) = 0.267 mW/g



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Date: 2007-07-27

Test Laboratory: ESTECH

CH661 BODY REAR

DUT: VK160; Type: SLIDE TYPE; Serial: NONE

Communication System: GSM1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.52$ mho/m; $\epsilon_r = 53.7$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(4.65, 4.65, 4.65); Calibrated: 2006-10-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2007-04-23
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 23℃, Humidity : 46%

Area Scan (41x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.323 mW/g

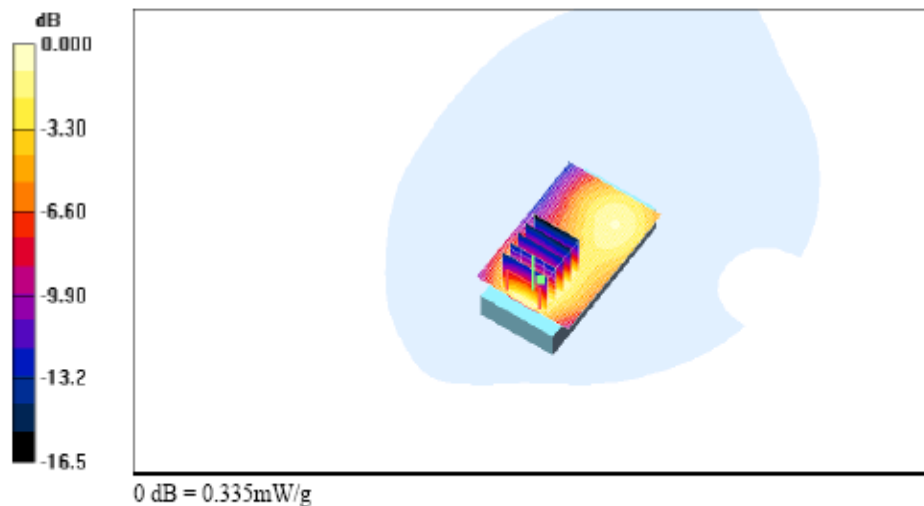
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 10.5 V/m; Power Drift = -0.096 dB

Peak SAR (extrapolated) = 0.539 W/kg

SAR(1 g) = 0.307 mW/g

Maximum value of SAR (measured) = 0.335 mW/g



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Date: 2007-07-27

Test Laboratory: ESTECH

CH661 BODY REAR UP

DUT: VK160 ; Type: SLIDE TYPE; Serial: NONE

Communication System: GSM1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.52$ mho/m; $\epsilon_r = 53.7$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(4.65, 4.65, 4.65); Calibrated: 2006-10-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2007-04-23
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 23°C, Humidity : 46%

Area Scan (41x71x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.372 mW/g

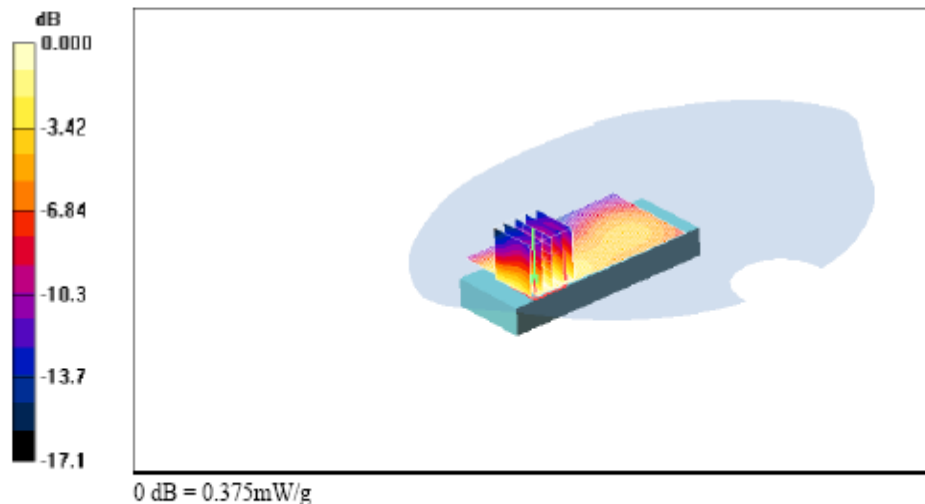
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 6.46 V/m; Power Drift = -0.046 dB

Peak SAR (extrapolated) = 0.540 W/kg

SAR(1 g) = 0.349 mW/g

Maximum value of SAR (measured) = 0.375 mW/g



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Date: 2007-07-27

Test Laboratory: ESTECH

CH661 BODY REAR UP

DUT: VK160 ; Type: SLIDE TYPE; Serial: NONE

Communication System: GSM1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

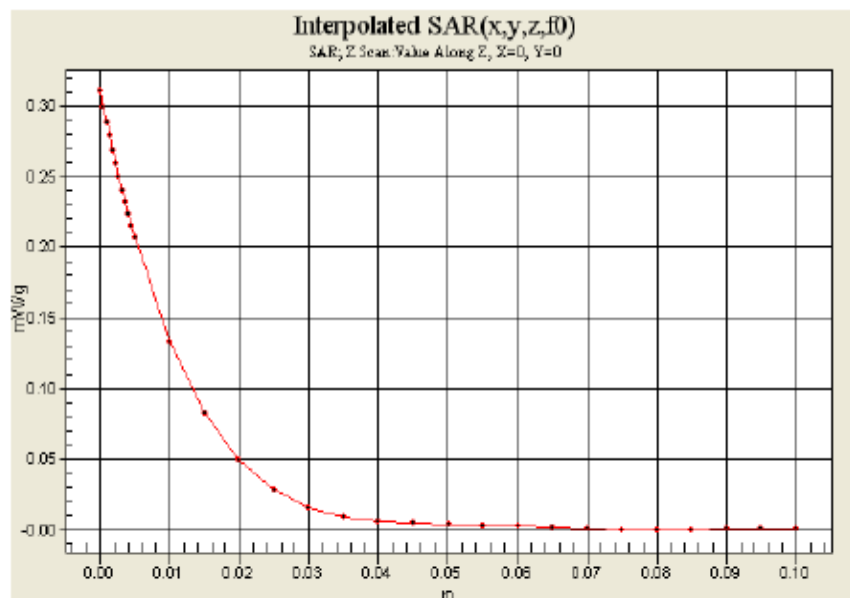
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.42$ mho/m; $\epsilon_r = 40$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(5.08, 5.08, 5.08); Calibrated: 2006-10-17
- Sensor-Surface: 4mm (Mechanical Surface Detection) Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn551; Calibrated: 2007-04-23
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 23 °C, Humidity : 46%



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Date: 2007-07-27

Test Laboratory: ESTECH

CH661 BODY REAR UP BT

DUT: VK160 ; Type: SLIDE TYPE; Serial: NONE

Communication System: GSM1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.42 \text{ mho/m}$; $\epsilon_r = 40$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(5.08, 5.08, 5.08); Calibrated: 2006-10-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2007-04-23
- Phantom: SAM MIC 1800MHz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 23 °C, Humidity : 46%

Area Scan (41x71x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 0.232 mW/g

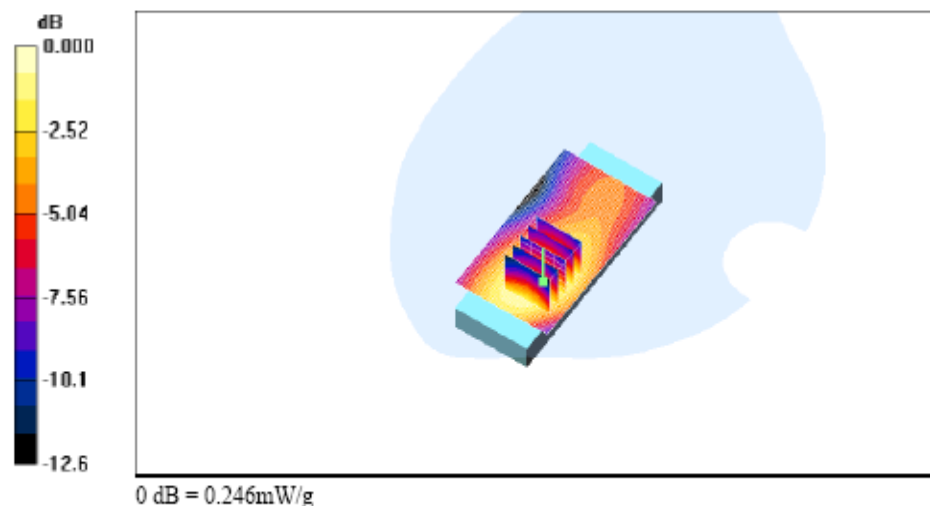
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

Reference Value = 6.99 V/m; Power Drift = -0.093 dB

Peak SAR (extrapolated) = 0.322 W/kg

SAR(1 g) = 0.230 mW/g

Maximum value of SAR (measured) = 0.246 mW/g



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FAX: 82-2-867-3204

Date: 2007-07-27

Test Laboratory: ESTECH

CH661 BODY REAR UP GPRS BT

DUT: VK160 ; Type: SLIDE TYPE; Serial: NONE

Communication System: GSM1900; Frequency: 1880 MHz; Duty Cycle: 1:4.15

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.42$ mho/m; $\epsilon_r = 40$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(5.08, 5.08, 5.08); Calibrated: 2006-10-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2007-04-23
- Phantom: SAM MIC 1800MHz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 23℃, Humidity : 46%

Area Scan (41x71x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.469 mW/g

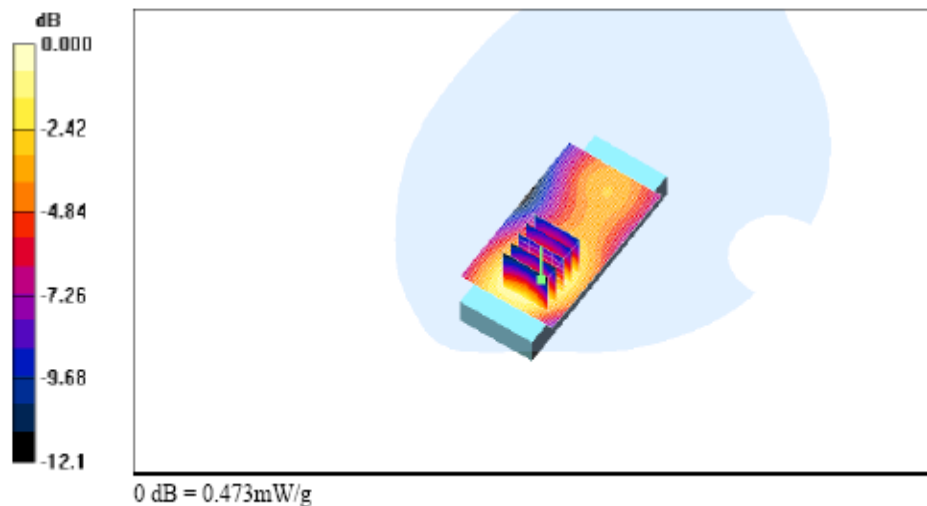
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 10.7 V/m; Power Drift = 0.139 dB

Peak SAR (extrapolated) = 0.626 W/kg

SAR(1 g) = 0.439 mW/g

Maximum value of SAR (measured) = 0.473 mW/g





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APPENDIX D : Calibration Certificates



Accredited by the Swiss Federal Office of Metrology and Accreditation
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 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **Estech (Dymstec)**

Certificate No: **D835V2-475_Sep06**

CALIBRATION CERTIFICATE

Object **D835V2 - SN: 475**

Calibration procedure(s) **QA CAL-05.v6**
Calibration procedure for dipole validation kits

Calibration date: **September 12, 2006**

Condition of the calibrated item **In Tolerance**

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 (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	04-Oct-05 (METAS, No. 251-00516)	Oct-06
Power sensor HP 8481A	US37292783	04-Oct-05 (METAS, No. 251-00516)	Oct-06
Reference 20 dB Attenuator	SN: 5086 (20g)	10-Aug-06 (METAS, No 217-00591)	Aug-07
Reference 10 dB Attenuator	SN: 5047.2 (10r)	10-Aug-06 (METAS, No 217-00591)	Aug-07
Reference Probe ET3DV6	SN 1507	28-Oct-05 (SPEAG, No. ET3-1507_Oct05)	Oct-06
DAE4	SN 601	15-Dec-05 (SPEAG, No. DAE4-601_Dec05)	Dec-06

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (SPEAG, in house check Oct-05)	In house check: Oct-07
RF generator Agilent E4421B	MY41000675	11-May-05 (SPEAG, in house check Nov-05)	In house check: Nov-07
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (SPEAG, in house check Nov-05)	In house check: Nov-06

	Name	Function	Signature
Calibrated by:	Mike Meili	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: September 13, 2006

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Accreditation No.: **SCS 108**

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:

- 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
- CENELEC EN 50361, "Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz - 3 GHz), July 2001
- 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:

- DASY4 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	DASY4	V4.7
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 $\pm$ 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 $\pm$ 0.2) °C	41.7 $\pm$ 6 %	0.89 mho/m $\pm$ 6 %
Head TSL temperature during test	(23.6 $\pm$ 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	2.29 mW / g
SAR normalized	normalized to 1W	9.16 mW / g
SAR for nominal Head TSL parameters ¹	normalized to 1W	9.25 mW / g $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.49 mW / g
SAR normalized	normalized to 1W	5.96 mW / g
SAR for nominal Head TSL parameters ¹	normalized to 1W	6.00 mW / g $\pm$ 16.5 % (k=2)

¹ Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.7 Ω - 0.5 j Ω
Return Loss	- 35.4 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.383 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.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	November 15, 2002

DASY4 Validation Report for Head TSL

Date/Time: 12.09.2006 18:38:05

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 475

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium: HSL 900 MHz;

Medium parameters used: $f = 835$ MHz; $\sigma = 0.893$ mho/m; $\epsilon_r = 42.3$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507 (HF); ConvF(6.09, 6.09, 6.09); Calibrated: 28.10.2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 15.12.2005
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Pin = 250 mW; d = 15 mm/Zoom Scan (7x7x7)/Cube 0:

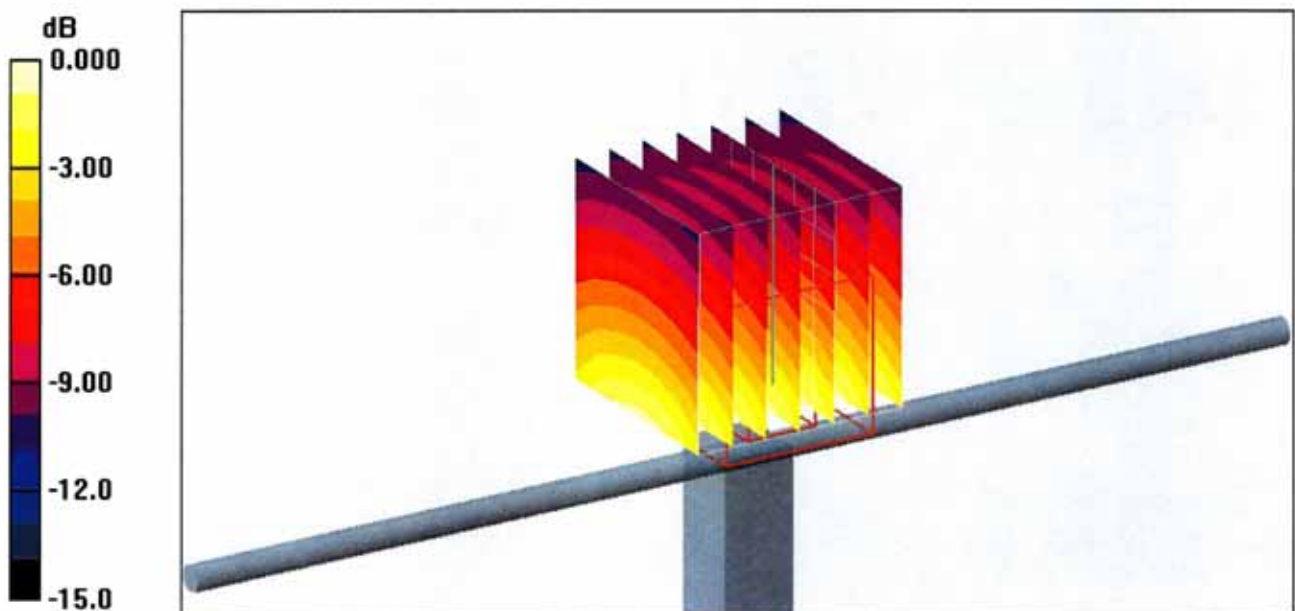
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 54.6 V/m; Power Drift = -0.033 dB

Peak SAR (extrapolated) = 3.41 W/kg

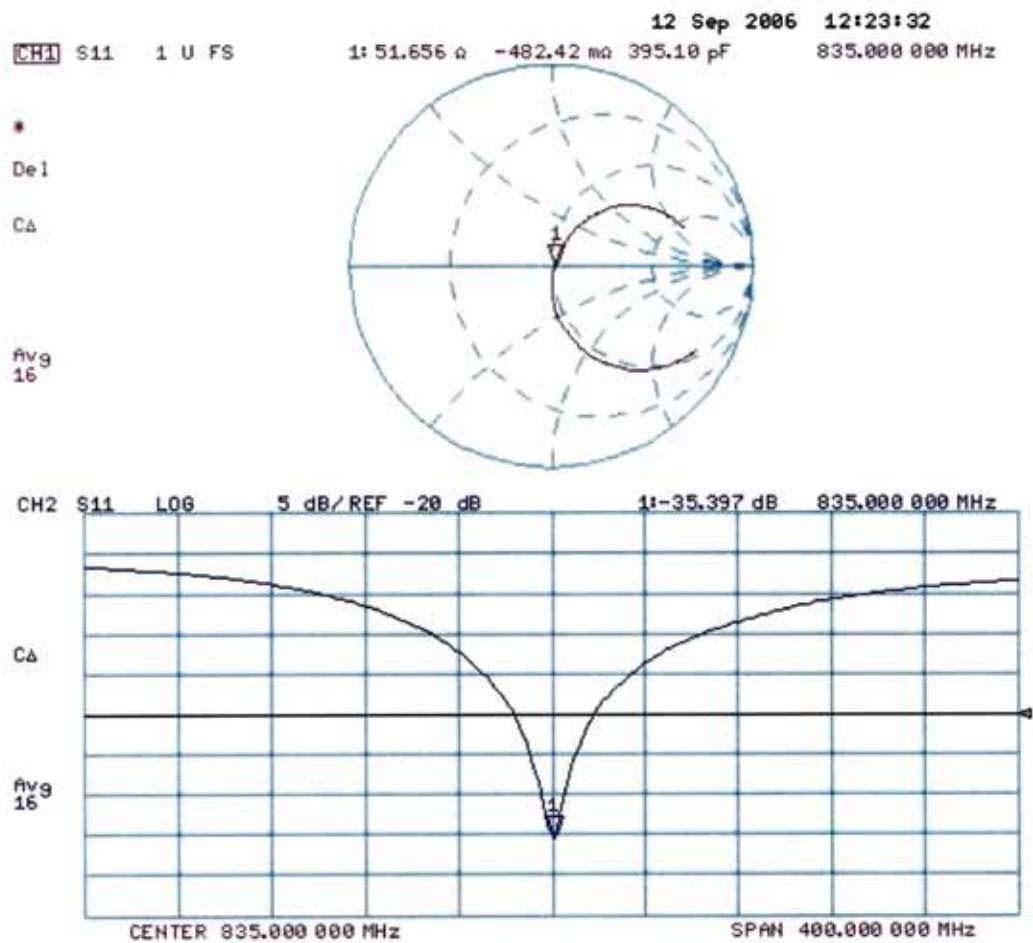
SAR(1 g) = 2.29 mW/g; SAR(10 g) = 1.49 mW/g

Maximum value of SAR (measured) = 2.48 mW/g



0 dB = 2.48mW/g

Impedance Measurement Plot for Head TSL





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 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **Estech (Dymstec)**

Certificate No: **D1900V2-5d058_Sep06**

CALIBRATION CERTIFICATE

Object **D1900V2 - SN: 5d058**

Calibration procedure(s) **QA CAL-05.v6**
Calibration procedure for dipole validation kits

Calibration date: **September 13, 2006**

Condition of the calibrated item **In Tolerance**

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 (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	04-Oct-05 (METAS, No. 251-00516)	Oct-06
Power sensor HP 8481A	US37292783	04-Oct-05 (METAS, No. 251-00516)	Oct-06
Reference 20 dB Attenuator	SN: 5086 (20g)	10-Aug-06 (METAS, No 217-00591)	Aug-07
Reference 10 dB Attenuator	SN: 5047.2 (10r)	10-Aug-06 (METAS, No 217-00591)	Aug-07
Reference Probe ET3DV6	SN: 1507	28-Oct-05 (SPEAG, No. ET3-1507_Oct05)	Oct-06
DAE4	SN: 601	15-Dec-05 (SPEAG, No. DAE4-601_Dec05)	Dec-06
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (SPEAG, in house check Oct-05)	In house check: Oct-07
RF generator Agilent E4421B	MY41000675	11-May-05 (SPEAG, in house check Nov-05)	In house check: Nov-07
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (SPEAG, in house check Nov-05)	In house check: Nov-06

Calibrated by: **Name** **Marcel Fehr** **Function** **Laboratory Technician**

Signature

Approved by: **Katja Pokovic** **Technical Manager**

Issued: September 20, 2006

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Accreditation No.: **SCS 108**

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:

- 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
- CENELEC EN 50361, "Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz - 3 GHz), July 2001
- 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:

- DASY4 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	DASY4	V4.7
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	38.6 $\pm$ 6 %	1.41 mho/m $\pm$ 6 %
Head TSL temperature during test	(22.4 $\pm$ 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	9.33 mW / g
SAR normalized	normalized to 1W	37.3 mW / g
SAR for nominal Head TSL parameters ¹	normalized to 1W	36.5 mW / g $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	4.95 mW / g
SAR normalized	normalized to 1W	19.8 mW / g
SAR for nominal Head TSL parameters ¹	normalized to 1W	19.5 mW / g $\pm$ 16.5 % (k=2)

¹ Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	$54.9\ \Omega + 3.4\ j\Omega$
Return Loss	- 24.9 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.202 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.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	March 19, 2004

DASY4 Validation Report for Head TSL

Date/Time: 13.09.2006 15:41:51

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d058

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: HSL U10 BB;

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.41$ mho/m; $\epsilon_r = 38.6$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507 (HF); ConvF(4.74, 4.74, 4.74); Calibrated: 28.10.2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 15.12.2005
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; ;
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0:

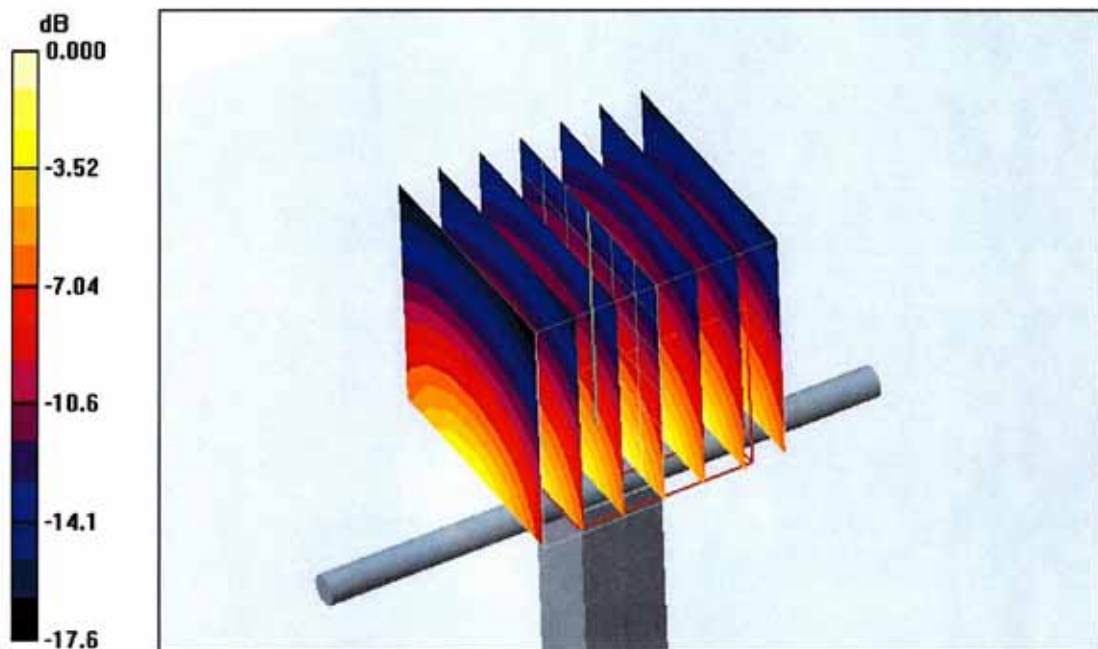
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 92.6 V/m; Power Drift = -0.015 dB

Peak SAR (extrapolated) = 15.8 W/kg

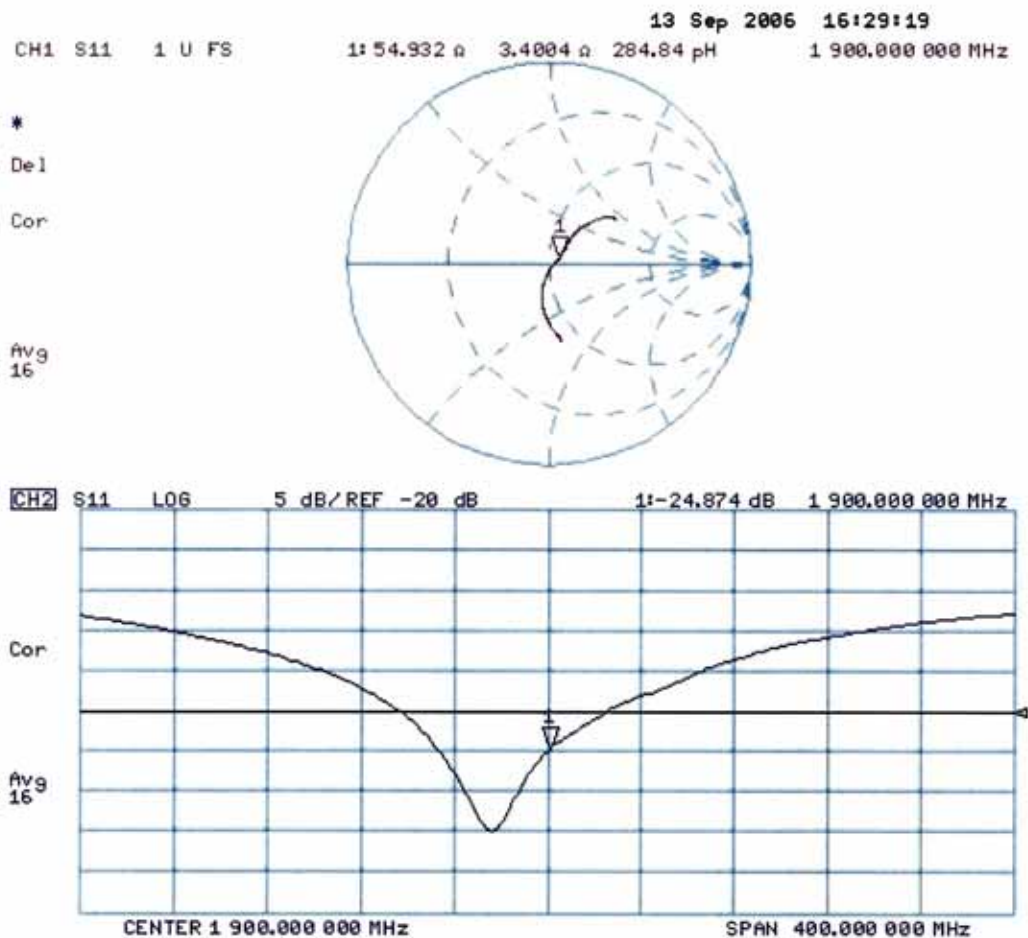
SAR(1 g) = 9.33 mW/g; SAR(10 g) = 4.95 mW/g

Maximum value of SAR (measured) = 10.5 mW/g



0 dB = 10.5mW/g

Impedance Measurement Plot for Head TSL



IMPORTANT NOTICE

USAGE OF PROBES IN ORGANIC SOLVENTS

Diethylene Glycol Monobutyl Ether (the basis for liquids above 1 GHz), as many other organic solvents, is a very effective softener for synthetic materials. These solvents can cause irreparable damage to certain SPEAG products, except those which are explicitly declared as compliant with organic solvents.

Compatible Probes:

- ET3DV6
- ET3DV6R
- ES3DVx
- EX3DVx
- ER3DV6
- H3DV6

Important Note for ET3DV6 Probes:

The ET3DV6 probes shall not be exposed to solvents longer than necessary for the measurements and shall be cleaned daily after use with warm water and stored dry.



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Schmid & Partner Engineering AG



Accredited by the Swiss Federal Office of Metrology and Accreditation
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 **Estech (Dymstec)**

Certificate No: **ES3-3123_Oct06**

CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3123**

Calibration procedure(s) **QA CAL-01.v5
Calibration procedure for dosimetric E-field probes**

Calibration date: **October 17, 2006**

Condition of the calibrated item **In Tolerance**

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 (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Power sensor E4412A	MY41495277	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Power sensor E4412A	MY41498087	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Reference 3 dB Attenuator	SN: S5054 (3c)	10-Aug-06 (METAS, No. 217-00592)	Aug-07
Reference 20 dB Attenuator	SN: S5086 (20b)	4-Apr-06 (METAS, No. 251-00558)	Apr-07
Reference 30 dB Attenuator	SN: S5129 (30b)	10-Aug-06 (METAS, No. 217-00593)	Aug-07
Reference Probe ES3DV2	SN: 3013	2-Jan-06 (SPEAG, No. ES3-3013_Jan06)	Jan-07
DAE4	SN: 654	21-Jun-06 (SPEAG, No. DAE4-654_Jun06)	Jun-07

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (SPEAG, in house check Nov-05)	In house check: Nov-07
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Nov-05)	In house check: Nov 06

Calibrated by: **Katja Pokovic** **Technical Manager**

Approved by: **Niels Kuster** **Quality Manager**

Issued: October 17, 2006

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



Glossary:

TSL	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
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:

- 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
- CENELEC EN 50361, "Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz - 3 GHz), July 2001

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}**: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ 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 effect 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 (no uncertainty required). DCP does not depend on frequency nor media.
- 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.

Probe ES3DV3

SN:3123

Manufactured:	July 11, 2006
Calibrated:	October 17, 2006

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ES3DV3 SN:3123

Sensitivity in Free Space^A

Diode Compression^B

NormX	1.31 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP X	96 mV
NormY	1.34 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP Y	94 mV
NormZ	1.10 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP Z	96 mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

Boundary Effect

TSL **900 MHz** **Typical SAR gradient: 5 % per mm**

Sensor Center to Phantom Surface Distance		3.0 mm	4.0 mm
SAR _{be} [%]	Without Correction Algorithm	5.7	2.3
SAR _{be} [%]	With Correction Algorithm	0.0	0.1

TSL **1810 MHz** **Typical SAR gradient: 10 % per mm**

Sensor Center to Phantom Surface Distance		3.0 mm	4.0 mm
SAR _{be} [%]	Without Correction Algorithm	3.8	1.5
SAR _{be} [%]	With Correction Algorithm	0.0	0.2

Sensor Offset

Probe Tip to Sensor Center **2.0 mm**

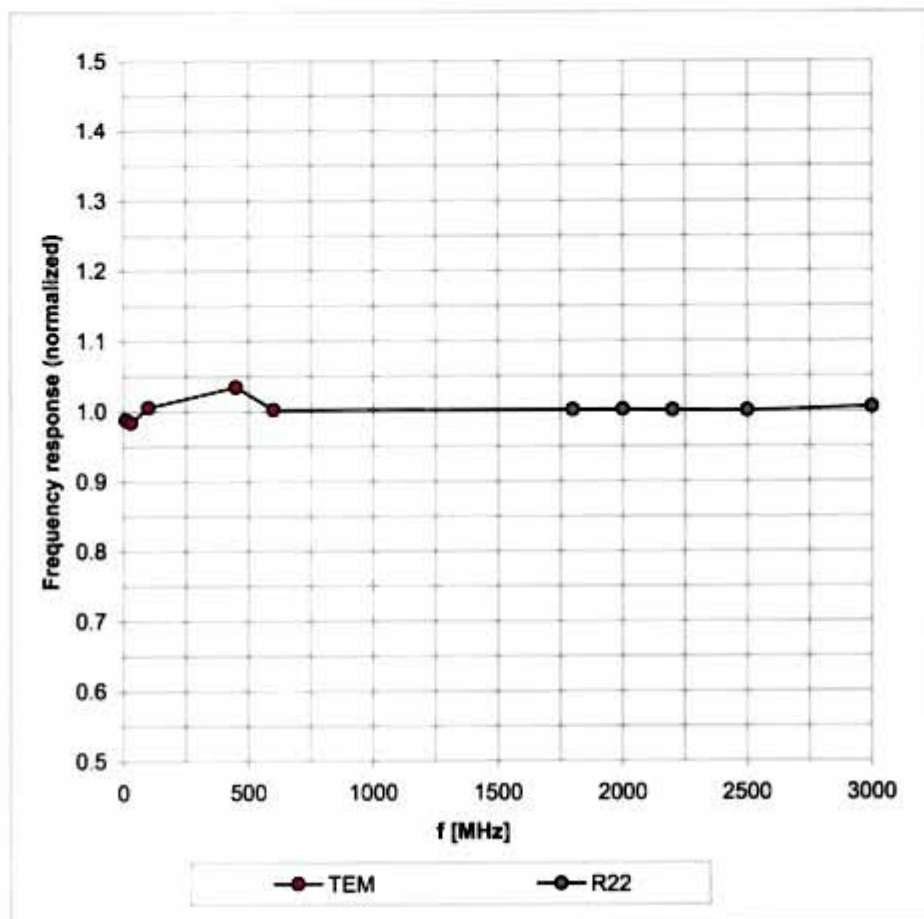
The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

^A The uncertainties of NormX,Y,Z do not affect the E²-field uncertainty inside TSL (see Page 8).

^B Numerical linearization parameter: uncertainty not required.

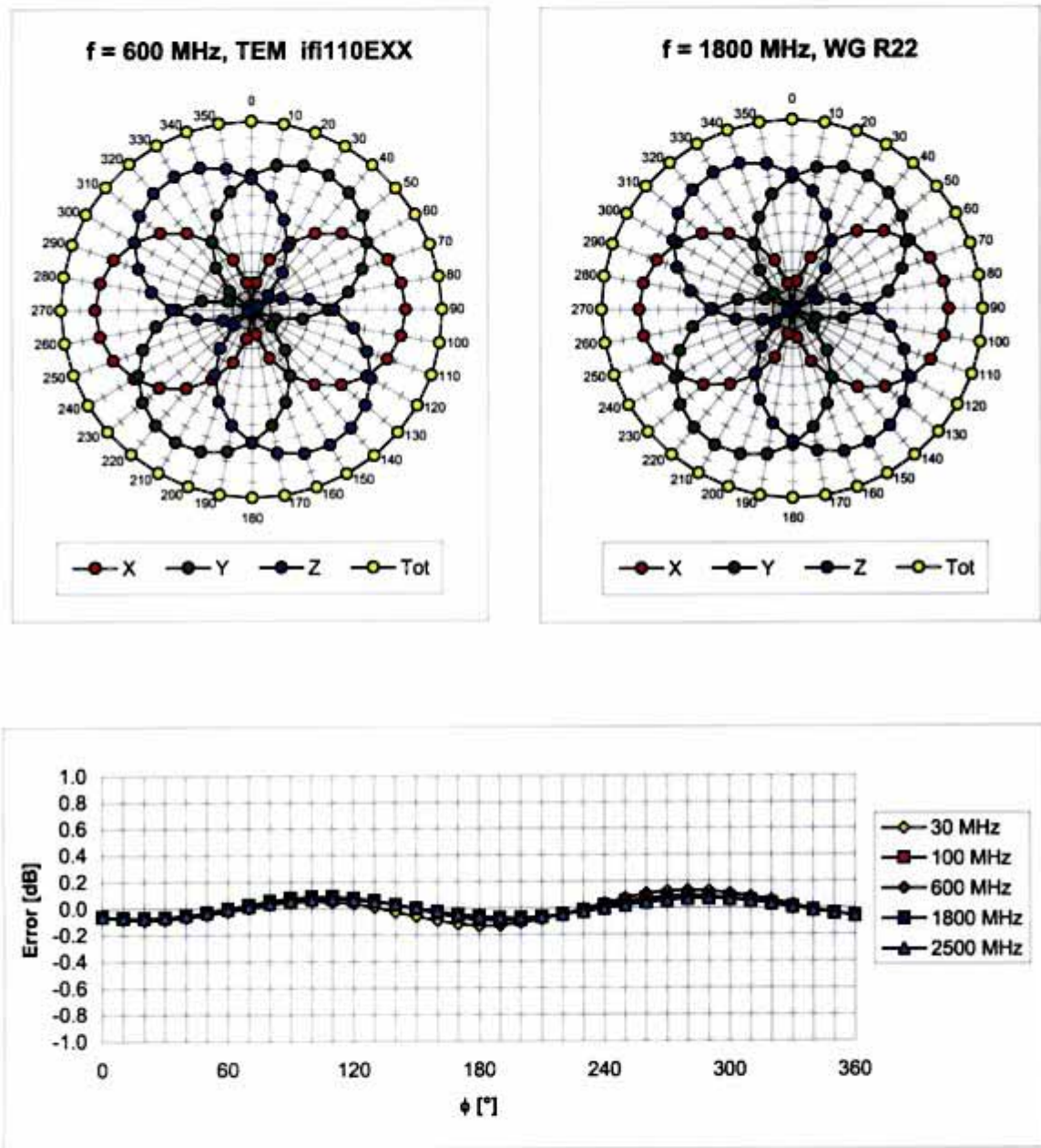
Frequency Response of E-Field

(TEM-Cell:ifi110 EXX, Waveguide: R22)



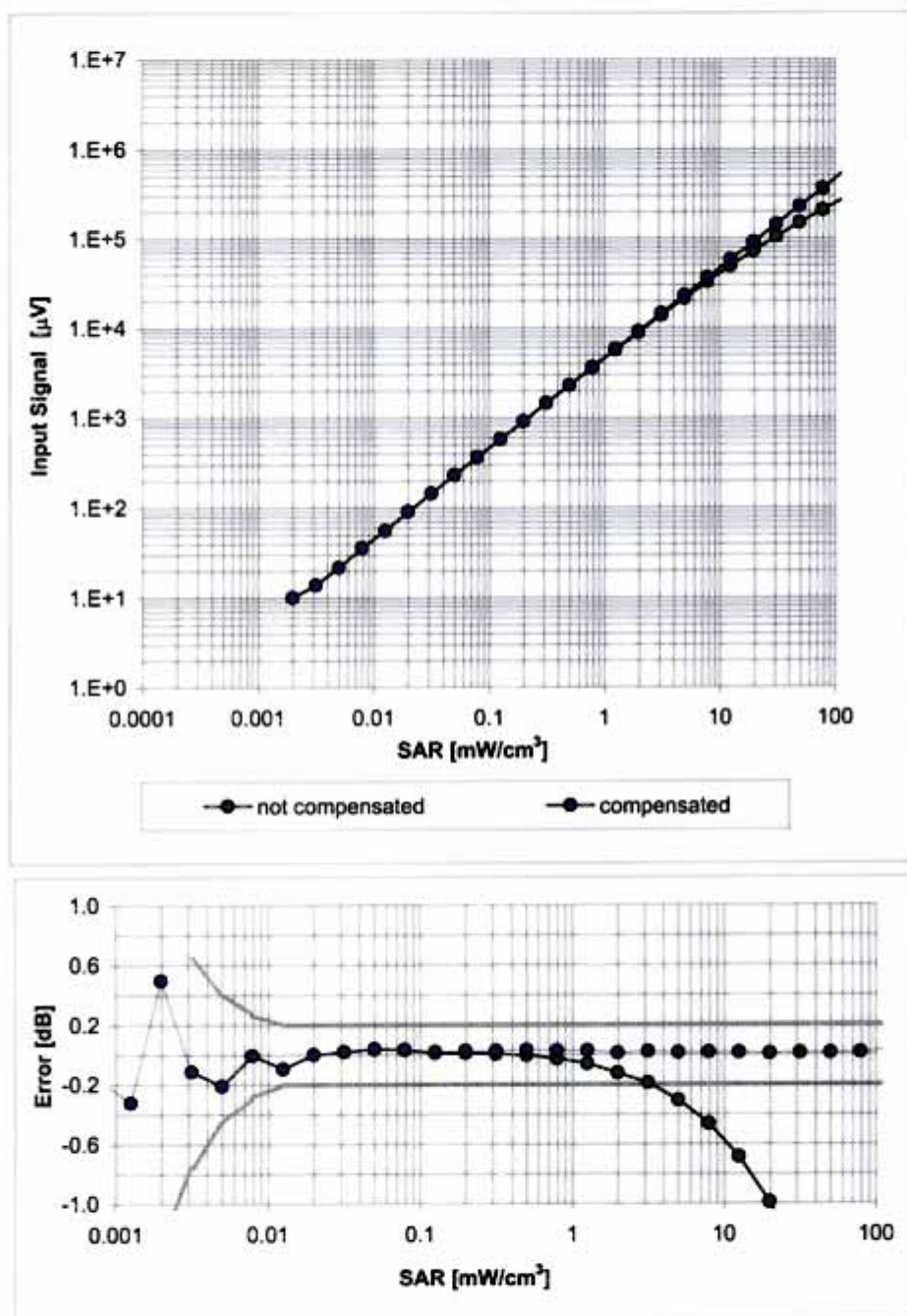
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

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



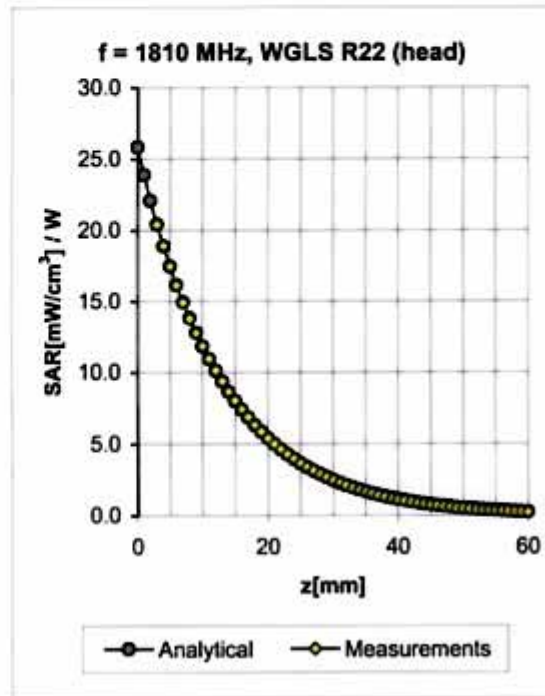
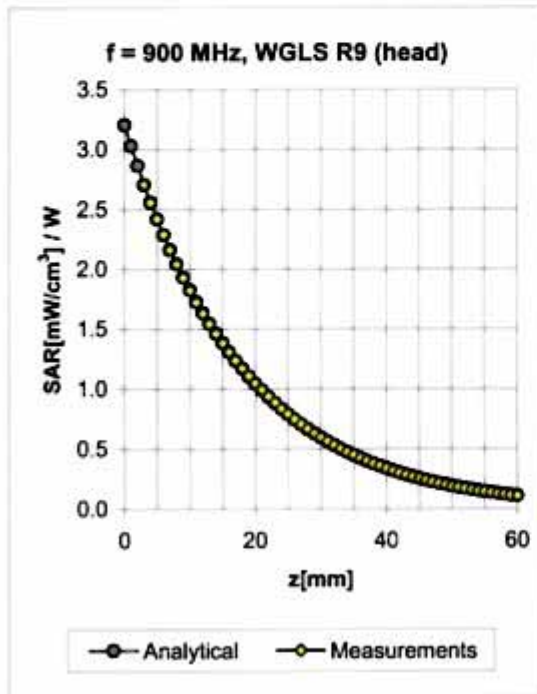
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

Dynamic Range $f(\text{SAR}_{\text{head}})$ (Waveguide R22, $f = 1800$ MHz)



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

Conversion Factor Assessment

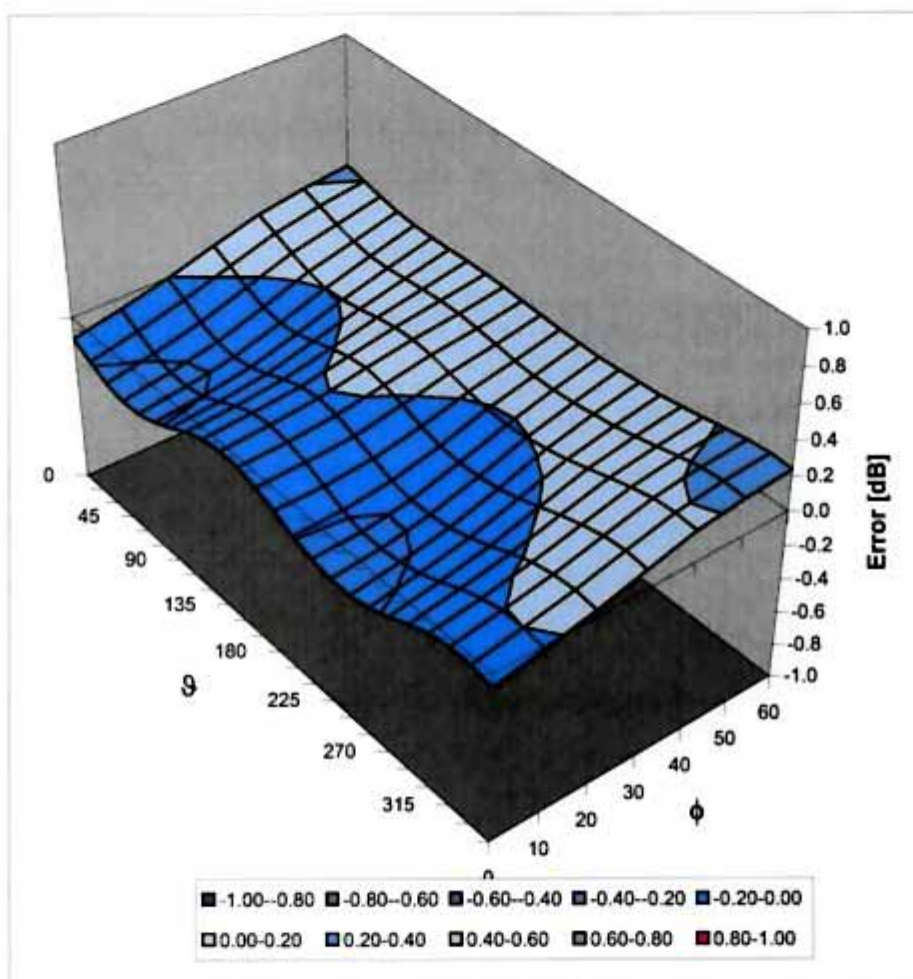


f [MHz]	Validity [MHz] ^c	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	1.00	1.09	6.42 ± 11.0% (k=2)
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.92	1.16	5.23 ± 11.0% (k=2)
1900	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.79	1.29	5.08 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.87	1.17	4.66 ± 11.8% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	1.00	1.17	6.32 ± 11.0% (k=2)
1810	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.85	1.26	4.81 ± 11.0% (k=2)
1900	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.75	1.37	4.65 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.87	0.91	4.32 ± 11.8% (k=2)

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

Deviation from Isotropy in HSL

Error (ϕ , θ), $f = 900$ MHz



Uncertainty of Spherical Isotropy Assessment: $\pm 2.6\%$ ($k=2$)