# Attachment 1. – SAR Test Plots

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| Test Laboratory: | HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD |
| EUT Type: | Tri-Band GSM Phone(GSM850/ DCS1800/ PCS1900) |
| | GPRS Class 8 and GPRS mode class B(GPRS and GSM, but not simultaneously) |
| Liquid Temperature: | 21.5 ℃ |
| Ambient Temperature: | 21.7 ℃ |
| Test Date: | Mar.05, 2007 |

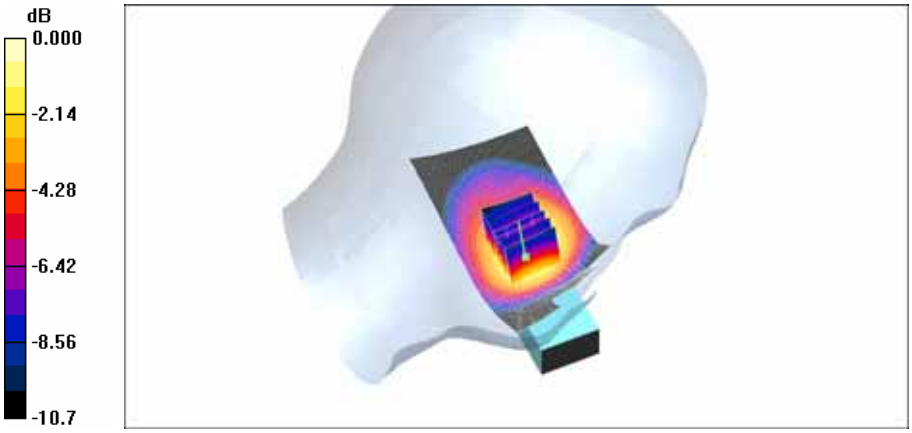
Communication System: GSM 850; Frequency: 824.2 MHz;Duty Cycle: 1:8.3

Medium parameters used: f = 825 MHz; $\sigma$ = 0.863 mho/m; $\varepsilon_r$ = 40.8; $\rho$ = 1000 kg/m$^3$
Phantom section: Left Section ;Measurement SW: DASY4, V4.7 Build 53

DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(6.85, 6.85, 6.85); Calibrated: 2006-03-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn614; Calibrated: 2006-08-22
- Phantom: SAM 835/900 MHz; Type: SAM

**Left touch 128/Area Scan (51x101x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.428 mW/g

**Left touch 128/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.6 V/m; Power Drift = -0.100 dB
Peak SAR (extrapolated) = 0.554 W/kg
**SAR(1 g) = 0.374 mW/g; SAR(10 g) = 0.249 mW/g**
Maximum value of SAR (measured) = 0.393 mW/g




0 dB = 0.393mW/g

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|---|---|
| Test Laboratory: | HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD |
| EUT Type: | Tri-Band GSM Phone(GSM850/ DCS1800/ PCS1900) |
| | GPRS Class 8 and GPRS mode class B(GPRS and GSM, but not simultaneously) |
| Liquid Temperature: | 21.5 ℃ |
| Ambient Temperature: | 21.7 ℃ |
| Test Date: | Mar.05, 2007 |

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

Medium parameters used (interpolated): f = 836.6 MHz; $\sigma$ = 0.875 mho/m; $\varepsilon_r$ = 40.7; $\rho$ = 1000 kg/m$^3$
Phantom section: Left Section ;Measurement SW: DASY4, V4.7 Build 53

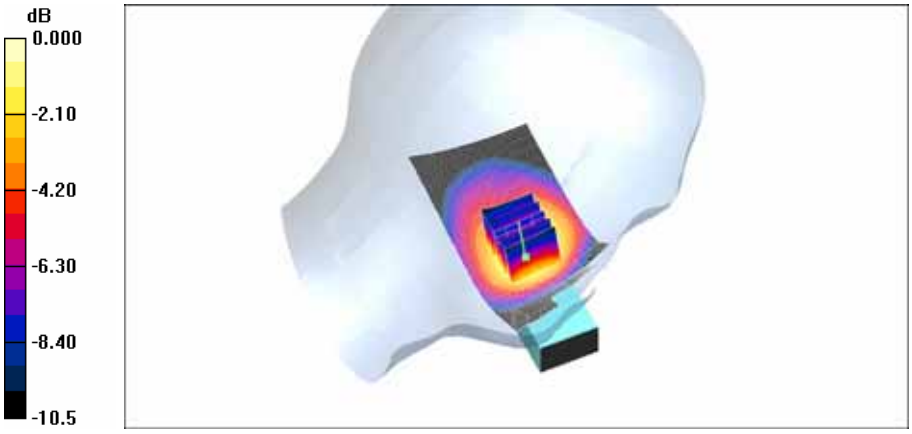
DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(6.85, 6.85, 6.85); Calibrated: 2006-03-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn614; Calibrated: 2006-08-22
- Phantom: SAM 835/900 MHz; Type: SAM

**Left touch 190/Area Scan (51x101x1):** Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.482 mW/g

**Left touch 190/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.3 V/m; Power Drift = -0.201 dB
Peak SAR (extrapolated) = 0.620 W/kg
**SAR(1 g) = 0.417 mW/g; SAR(10 g) = 0.279 mW/g**

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.439 mW/g




0 dB = 0.439mW/g

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|---|---|
| Test Laboratory: | HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD |
| EUT Type: | Tri-Band GSM Phone(GSM850/ DCS1800/ PCS1900) |
| | GPRS Class 8 and GPRS mode class B(GPRS and GSM, but not simultaneously) |
| Liquid Temperature: | 21.5 ℃ |
| Ambient Temperature: | 21.7 ℃ |
| Test Date: | Mar.05, 2007 |

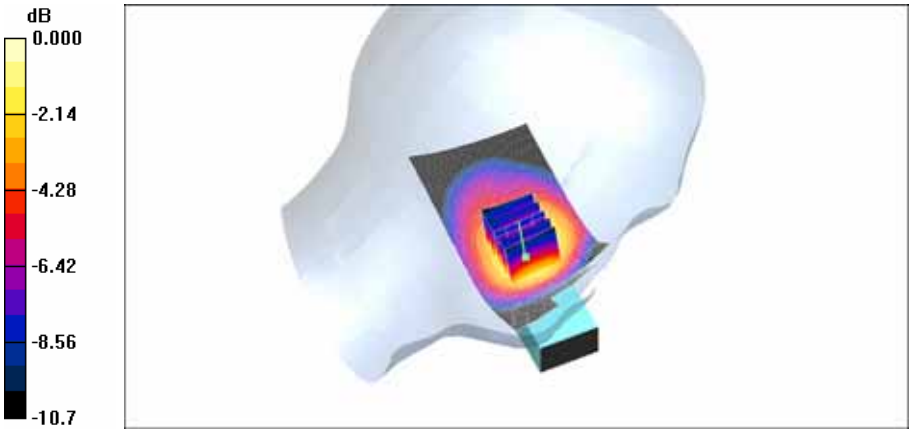
Communication System: GSM 850; Frequency: 848.8 MHz;Duty Cycle: 1:8.3

Medium parameters used: f = 850 MHz; $\sigma$ = 0.887 mho/m; $\varepsilon_r$ = 40.7; $\rho$ = 1000 kg/m$^3$
Phantom section: Left Section ;Measurement SW: DASY4, V4.7 Build 53

DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(6.85, 6.85, 6.85); Calibrated: 2006-03-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn614; Calibrated: 2006-08-22
- Phantom: SAM 835/900 MHz; Type: SAM

**Left touch 251/Area Scan (51x101x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.384 mW/g

**Left touch 251/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.0 V/m; Power Drift = 0.040 dB
Peak SAR (extrapolated) = 0.505 W/kg
**SAR(1 g) = 0.340 mW/g; SAR(10 g) = 0.227 mW/g**
Maximum value of SAR (measured) = 0.360 mW/g




0 dB = 0.360mW/g

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| Test Laboratory: | HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD |
| EUT Type: | Tri-Band GSM Phone(GSM850/ DCS1800/ PCS1900) |
| | GPRS Class 8 and GPRS mode class B(GPRS and GSM, but not simultaneously) |
| Liquid Temperature: | 21.5 ℃ |
| Ambient Temperature: | 21.7 ℃ |
| Test Date: | Mar.05, 2007 |

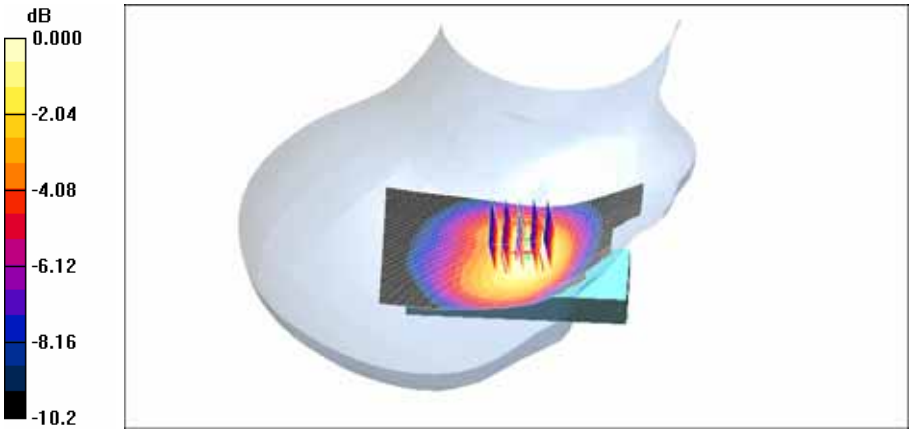
Communication System: GSM 850; Frequency: 824.2 MHz;Duty Cycle: 1:8.3

Medium parameters used: f = 825 MHz; $\sigma$ = 0.863 mho/m; $\varepsilon_r$ = 40.8; $\rho$ = 1000 kg/$m^3$
Phantom section: Right Section ;Measurement SW: DASY4, V4.7 Build 53

DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(6.85, 6.85, 6.85); Calibrated: 2006-03-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn614; Calibrated: 2006-08-22
- Phantom: SAM 835/900 MHz; Type: SAM

**Right touch 128/Area Scan (51x101x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.413 mW/g

**Right touch 128/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.3 V/m; Power Drift = -0.080 dB
Peak SAR (extrapolated) = 0.552 W/kg
**SAR(1 g) = 0.374 mW/g; SAR(10 g) = 0.255 mW/g**
Maximum value of SAR (measured) = 0.398 mW/g




0 dB = 0.398mW/g

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| Test Laboratory: | HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD |
| EUT Type: | Tri-Band GSM Phone(GSM850/ DCS1800/ PCS1900) |
| | GPRS Class 8 and GPRS mode class B(GPRS and GSM, but not simultaneously) |
| Liquid Temperature: | 21.5 ℃ |
| Ambient Temperature: | 21.7 ℃ |
| Test Date: | Mar.05, 2007 |

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

Medium parameters used (interpolated): f = 836.6 MHz; $\sigma$ = 0.875 mho/m; $\varepsilon_r$ = 40.7; $\rho$ = 1000 kg/m$^3$
Phantom section: Right Section ;Measurement SW: DASY4, V4.7 Build 53

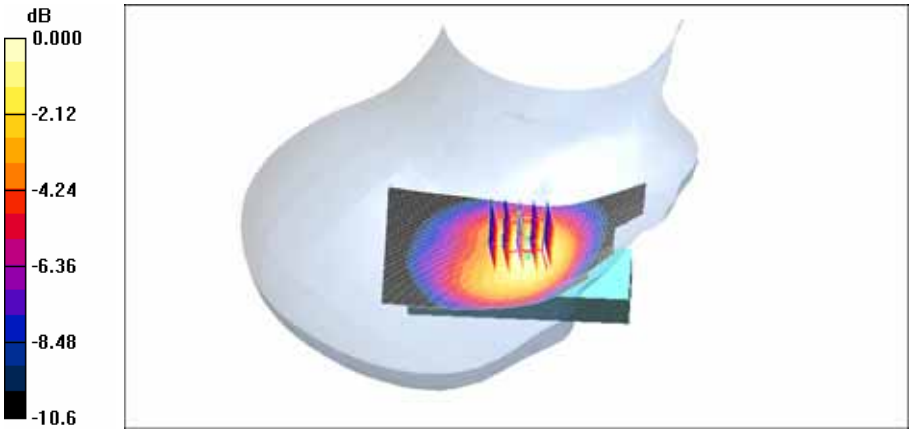
DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(6.85, 6.85, 6.85); Calibrated: 2006-03-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn614; Calibrated: 2006-08-22
- Phantom: SAM 835/900 MHz; Type: SAM

**Right touch 190/Area Scan (51x101x1):** Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.445 mW/g

**Right touch 190/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.6 V/m; Power Drift = -0.008 dB
Peak SAR (extrapolated) = 0.599 W/kg
**SAR(1 g) = 0.406 mW/g; SAR(10 g) = 0.274 mW/g**

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.441 mW/g




0 dB = 0.441mW/g

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| Test Laboratory: | HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD |
| EUT Type: | Tri-Band GSM Phone(GSM850/ DCS1800/ PCS1900) |
| | GPRS Class 8 and GPRS mode class B(GPRS and GSM, but not simultaneously) |
| Liquid Temperature: | 21.5 ℃ |
| Ambient Temperature: | 21.7 ℃ |
| Test Date: | Mar.05, 2007 |

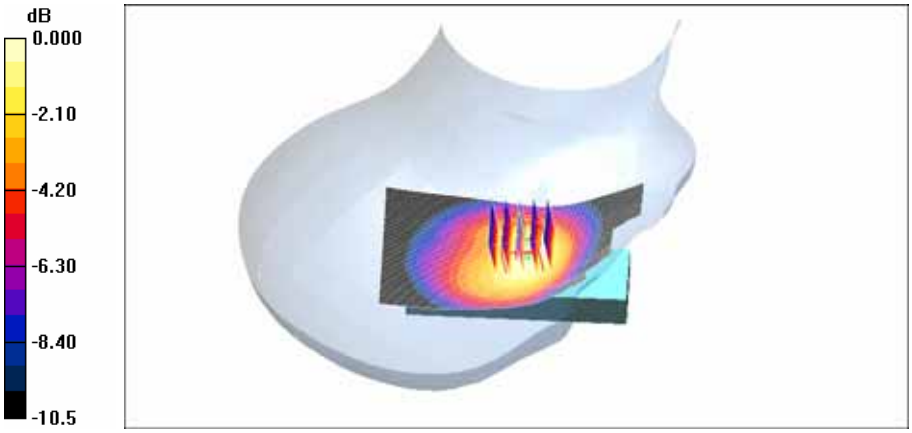
Communication System: GSM 850; Frequency: 848.8 MHz;Duty Cycle: 1:8.3

Medium parameters used: f = 850 MHz; $\sigma$ = 0.887 mho/m; $\varepsilon_r$ = 40.7; $\rho$ = 1000 kg/$m^3$
Phantom section: Right Section ;Measurement SW: DASY4, V4.7 Build 53

DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(6.85, 6.85, 6.85); Calibrated: 2006-03-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn614; Calibrated: 2006-08-22
- Phantom: SAM 835/900 MHz; Type: SAM

**Right touch 251/Area Scan (51x101x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.391 mW/g

**Right touch 251/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.2 V/m; Power Drift = 0.064 dB
Peak SAR (extrapolated) = 0.528 W/kg
**SAR(1 g) = 0.357 mW/g; SAR(10 g) = 0.243 mW/g**
Maximum value of SAR (measured) = 0.384 mW/g




0 dB = 0.384mW/g

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| Test Laboratory: | HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD |
| EUT Type: | Tri-Band GSM Phone(GSM850/ DCS1800/ PCS1900) |
| | GPRS Class 8 and GPRS mode class B(GPRS and GSM, but not simultaneously) |
| Liquid Temperature: | 21.5 ℃ |
| Ambient Temperature: | 21.7 ℃ |
| Test Date: | Mar.05, 2007 |

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

Medium parameters used (interpolated): f = 836.6 MHz; $\sigma$ = 0.875 mho/m; $\varepsilon_r$ = 40.7; $\rho$ = 1000 kg/m$^3$
Phantom section: Left Section ;Measurement SW: DASY4, V4.7 Build 53

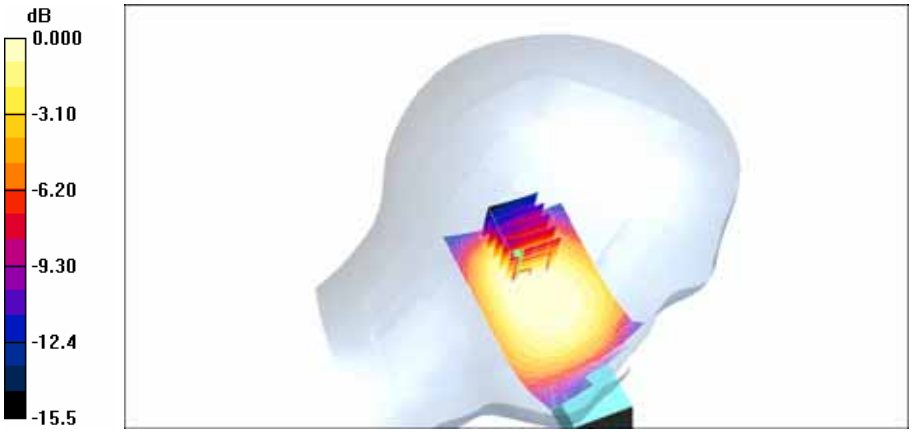
DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(6.85, 6.85, 6.85); Calibrated: 2006-03-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn614; Calibrated: 2006-08-22
- Phantom: SAM 835/900 MHz; Type: SAM

**Left tilt 190/Area Scan (51x101x1):** Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.203 mW/g

**Left tilt 190/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.5 V/m; Power Drift = -0.020 dB
Peak SAR (extrapolated) = 0.278 W/kg
**SAR(1 g) = 0.170 mW/g; SAR(10 g) = 0.111 mW/g**

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.189 mW/g




0 dB = 0.189mW/g

| | |
|---|---|
| Test Laboratory: | HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD |
| EUT Type: | Tri-Band GSM Phone(GSM850/ DCS1800/ PCS1900) |
| | GPRS Class 8 and GPRS mode class B(GPRS and GSM, but not simultaneously) |
| Liquid Temperature: | 21.5 ℃ |
| Ambient Temperature: | 21.7 ℃ |
| Test Date: | Mar.05, 2007 |

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

Medium parameters used (interpolated): f = 836.6 MHz; $\sigma$ = 0.875 mho/m; $\varepsilon_r$ = 40.7; $\rho$ = 1000 kg/m$^3$
Phantom section: Right Section ;Measurement SW: DASY4, V4.7 Build 53

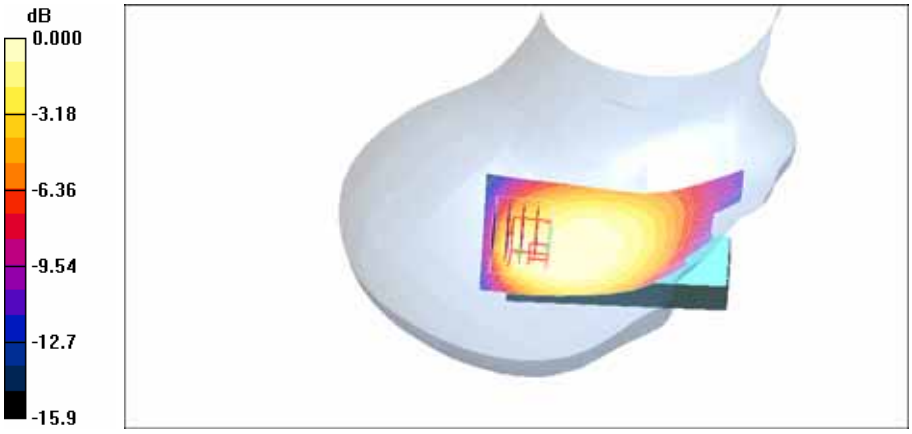
DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(6.85, 6.85, 6.85); Calibrated: 2006-03-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn614; Calibrated: 2006-08-22
- Phantom: SAM 835/900 MHz; Type: SAM

**Right tilt 190/Area Scan (51x101x1):** Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.237 mW/g

**Right tilt 190/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.2 V/m; Power Drift = -0.078 dB
Peak SAR (extrapolated) = 0.388 W/kg
**SAR(1 g) = 0.192 mW/g; SAR(10 g) = 0.121 mW/g**

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.212 mW/g




0 dB = 0.212mW/g

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|---|---|
| Test Laboratory: | HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD |
| EUT Type: | Tri-Band GSM Phone(GSM850/ DCS1800/ PCS1900) |
| | GPRS Class 8 and GPRS mode class B(GPRS and GSM, but not simultaneously) |
| Liquid Temperature: | 21.6 ℃ |
| Ambient Temperature: | 21.8 ℃ |
| Test Date: | Mar.06, 2007 |

Communication System: GSM 1900; Frequency: 1850.2 MHz;Duty Cycle: 1:8.3

Medium parameters used (interpolated): f = 1850.2 MHz; $\sigma$ = 1.39 mho/m; $\varepsilon_r$ = 39.5; $\rho$ = 1000 kg/m$^3$
Phantom section: Left Section ;Measurement SW: DASY4, V4.7 Build 53

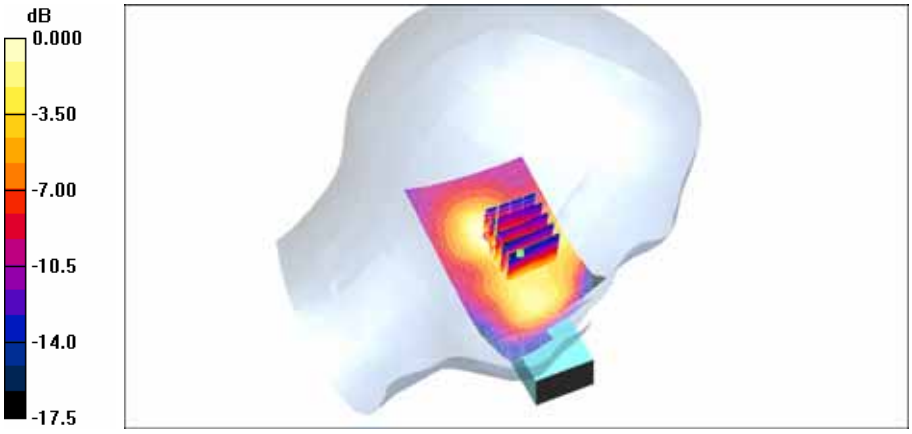
DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(5.16, 5.16, 5.16); Calibrated: 2006-03-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn614; Calibrated: 2006-08-22
- Phantom: SAM 1800/1900 MHz; Type: SAM

**Left touch 512/Area Scan (51x101x1):** Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.209 mW/g

**Left touch 512/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.0 V/m; Power Drift = -0.011 dB
Peak SAR (extrapolated) = 0.323 W/kg
**SAR(1 g) = 0.183 mW/g; SAR(10 g) = 0.104 mW/g**

Info: Interpolated medium parameters used for SAR evaluation.
aximum value of SAR (measured) = 0.203 mW/g




0 dB = 0.203mW/g

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|---|---|
| Test Laboratory: | HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD |
| EUT Type: | Tri-Band GSM Phone(GSM850/ DCS1800/ PCS1900) |
| | GPRS Class 8 and GPRS mode class B(GPRS and GSM, but not simultaneously) |
| Liquid Temperature: | 21.6 ℃ |
| Ambient Temperature: | 21.8 ℃ |
| Test Date: | Mar.06, 2007 |

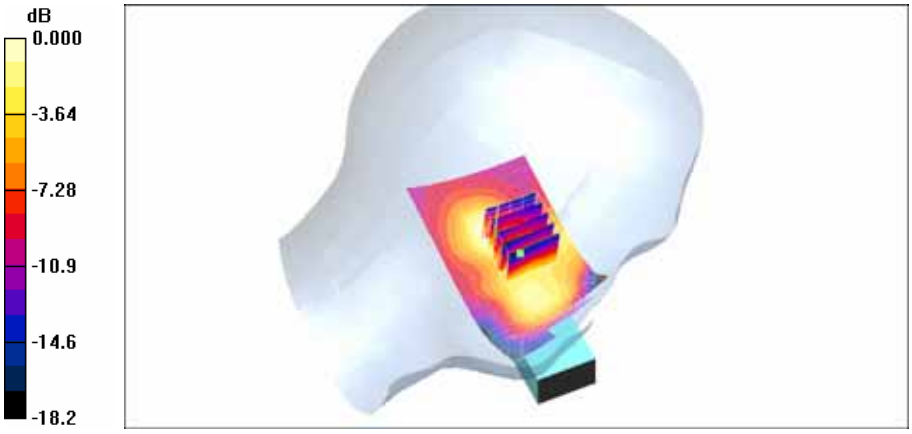
Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3

Medium parameters used: f = 1880 MHz; $\sigma$ = 1.42 mho/m; $\varepsilon_r$ = 39.4; $\rho$ = 1000 kg/m$^3$
Phantom section: Left Section ;Measurement SW: DASY4, V4.7 Build 53

DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(5.16, 5.16, 5.16); Calibrated: 2006-03-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn614; Calibrated: 2006-08-22
- Phantom: SAM 1800/1900 MHz; Type: SAM

**Left touch 661/Area Scan (51x101x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.183 mW/g

**Left touch 661/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.76 V/m; Power Drift = -0.014 dB
Peak SAR (extrapolated) = 0.287 W/kg
**SAR(1 g) = 0.168 mW/g; SAR(10 g) = 0.092 mW/g**
Maximum value of SAR (measured) = 0.191 mW/g




0 dB = 0.191mW/g

| | |
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| Test Laboratory: | HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD |
| EUT Type: | Tri-Band GSM Phone(GSM850/ DCS1800/ PCS1900) |
| | GPRS Class 8 and GPRS mode class B(GPRS and GSM, but not simultaneously) |
| Liquid Temperature: | 21.6 ℃ |
| Ambient Temperature: | 21.8 ℃ |
| Test Date: | Mar.06, 2007 |

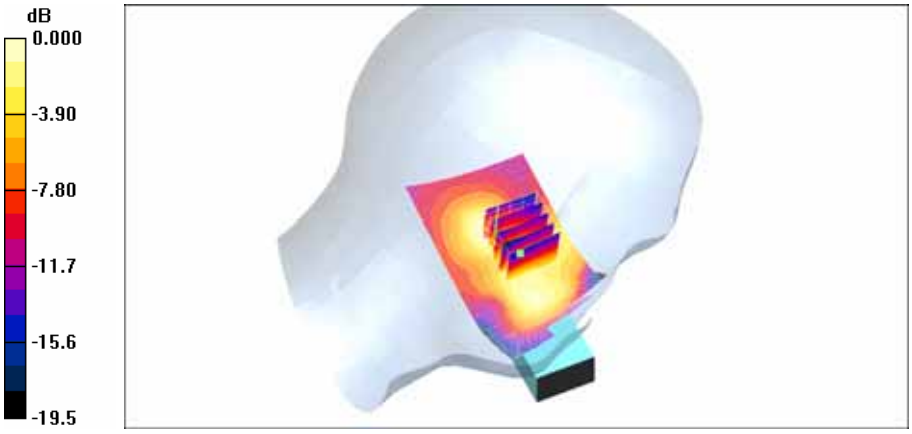
Communication System: GSM 1900; Frequency: 1909.8 MHz;Duty Cycle: 1:8.3

Medium parameters used: f = 1910 MHz; $\sigma$ = 1.45 mho/m; $\varepsilon_r$ = 39.3; $\rho$ = 1000 kg/m$^3$
Phantom section: Left Section ;Measurement SW: DASY4, V4.7 Build 53

DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(5.16, 5.16, 5.16); Calibrated: 2006-03-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn614; Calibrated: 2006-08-22
- Phantom: SAM 1800/1900 MHz; Type: SAM

**Left touch 810/Area Scan (51x101x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.101 mW/g

**Left touch 810/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.76 V/m; Power Drift = 0.048 dB
Peak SAR (extrapolated) = 0.156 W/kg
**SAR(1 g) = 0.093 mW/g; SAR(10 g) = 0.051 mW/g**
Maximum value of SAR (measured) = 0.105 mW/g




0 dB = 0.105mW/g

| | |
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| Test Laboratory: | HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD |
| EUT Type: | Tri-Band GSM Phone(GSM850/ DCS1800/ PCS1900) |
| | GPRS Class 8 and GPRS mode class B(GPRS and GSM, but not simultaneously) |
| Liquid Temperature: | 21.6 ℃ |
| Ambient Temperature: | 21.8 ℃ |
| Test Date: | Mar.06, 2007 |

Communication System: GSM 1900; Frequency: 1850.2 MHz;Duty Cycle: 1:8.3

Medium parameters used (interpolated): f = 1850.2 MHz; $\sigma$ = 1.39 mho/m; $\varepsilon_r$ = 39.5; $\rho$ = 1000 kg/m$^3$
Phantom section: Right Section ;Measurement SW: DASY4, V4.7 Build 53

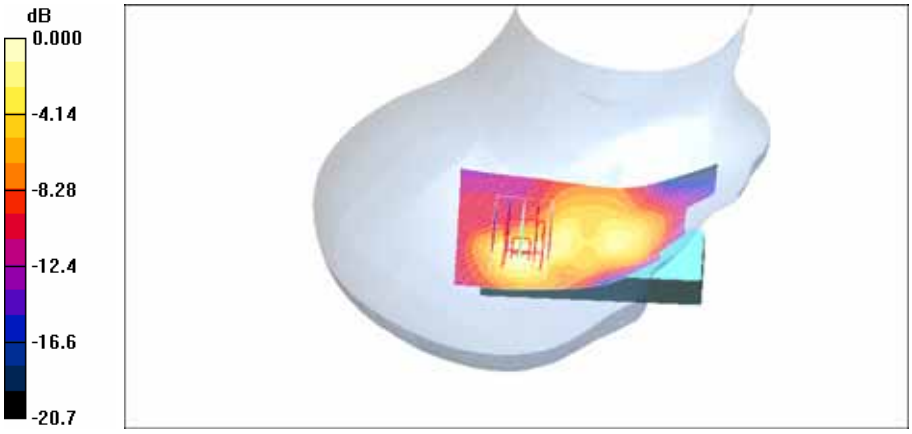
DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(5.16, 5.16, 5.16); Calibrated: 2006-03-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn614; Calibrated: 2006-08-22
- Phantom: SAM 1800/1900 MHz; Type: SAM

**Right touch 512/Area Scan (51x101x1):** Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.278 mW/g

**Right touch 512/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.7 V/m; Power Drift = 0.028 dB
Peak SAR (extrapolated) = 0.387 W/kg
**SAR(1 g) = 0.228 mW/g; SAR(10 g) = 0.120 mW/g**

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.258 mW/g




0 dB = 0.258mW/g

| | |
|---|---|
| Test Laboratory: | HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD |
| EUT Type: | Tri-Band GSM Phone(GSM850/ DCS1800/ PCS1900) |
| | GPRS Class 8 and GPRS mode class B(GPRS and GSM, but not simultaneously) |
| Liquid Temperature: | 21.6 ℃ |
| Ambient Temperature: | 21.8 ℃ |
| Test Date: | Mar.06, 2007 |

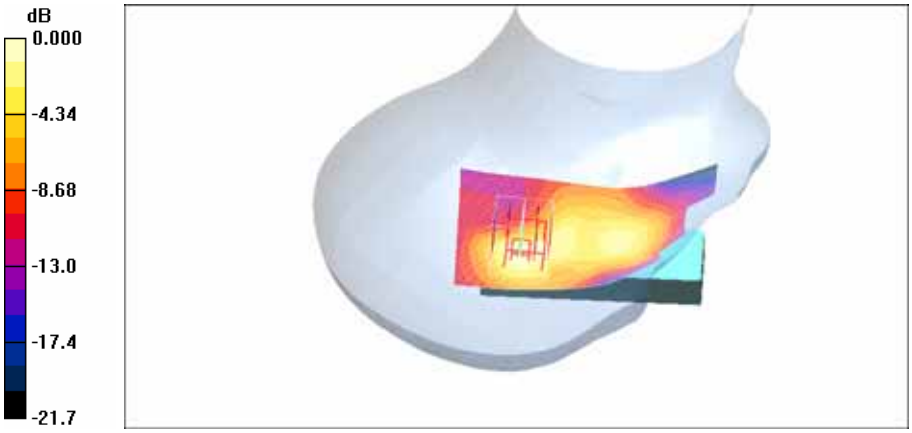
Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3

Medium parameters used: f = 1880 MHz; $\sigma$ = 1.42 mho/m; $\varepsilon_r$ = 39.4; $\rho$ = 1000 kg/$m^3$
Phantom section: Right Section ;Measurement SW: DASY4, V4.7 Build 53

DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(5.16, 5.16, 5.16); Calibrated: 2006-03-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn614; Calibrated: 2006-08-22
- Phantom: SAM 1800/1900 MHz; Type: SAM

**Right touch 661/Area Scan (51x101x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.250 mW/g

**Right touch 661/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.4 V/m; Power Drift = 0.026 dB
Peak SAR (extrapolated) = 0.349 W/kg
**SAR(1 g) = 0.206 mW/g; SAR(10 g) = 0.109 mW/g**
Maximum value of SAR (measured) = 0.233 mW/g




0 dB = 0.233mW/g

| | |
|---|---|
| Test Laboratory: | HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD |
| EUT Type: | Tri-Band GSM Phone(GSM850/ DCS1800/ PCS1900) |
| | GPRS Class 8 and GPRS mode class B(GPRS and GSM, but not simultaneously) |
| Liquid Temperature: | 21.6 ℃ |
| Ambient Temperature: | 21.8 ℃ |
| Test Date: | Mar.06, 2007 |

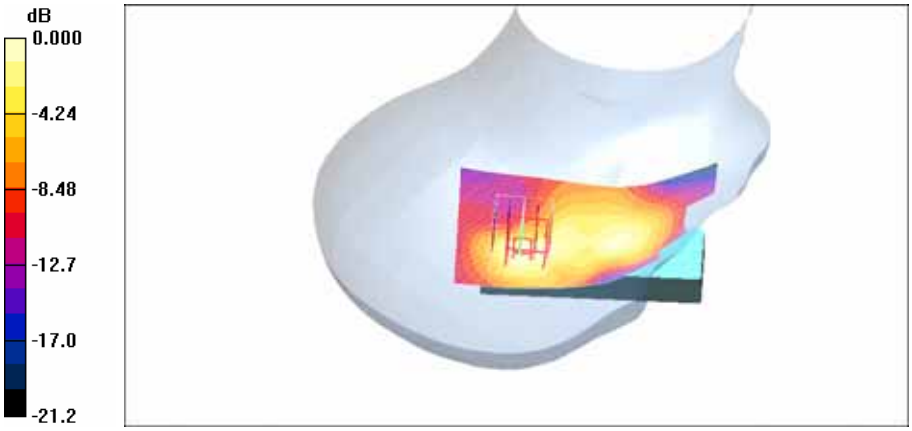
Communication System: GSM 1900; Frequency: 1909.8 MHz;Duty Cycle: 1:8.3

Medium parameters used: f = 1910 MHz; $\sigma$ = 1.45 mho/m; $\varepsilon_r$ = 39.3; $\rho$ = 1000 kg/$m^3$
Phantom section: Right Section ;Measurement SW: DASY4, V4.7 Build 53

DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(5.16, 5.16, 5.16); Calibrated: 2006-03-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn614; Calibrated: 2006-08-22
- Phantom: SAM 1800/1900 MHz; Type: SAM

**Right touch 810/Area Scan (51x101x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.133 mW/g

**Right touch 810/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.92 V/m; Power Drift = 0.021 dB
Peak SAR (extrapolated) = 0.181 W/kg
**SAR(1 g) = 0.108 mW/g; SAR(10 g) = 0.058 mW/g**
Maximum value of SAR (measured) = 0.120 mW/g




0 dB = 0.120mW/g

| | |
|---|---|
| Test Laboratory: | HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD |
| EUT Type: | Tri-Band GSM Phone(GSM850/ DCS1800/ PCS1900) |
| | GPRS Class 8 and GPRS mode class B(GPRS and GSM, but not simultaneously) |
| Liquid Temperature: | 21.6 ℃ |
| Ambient Temperature: | 21.8 ℃ |
| Test Date: | Mar.06, 2007 |

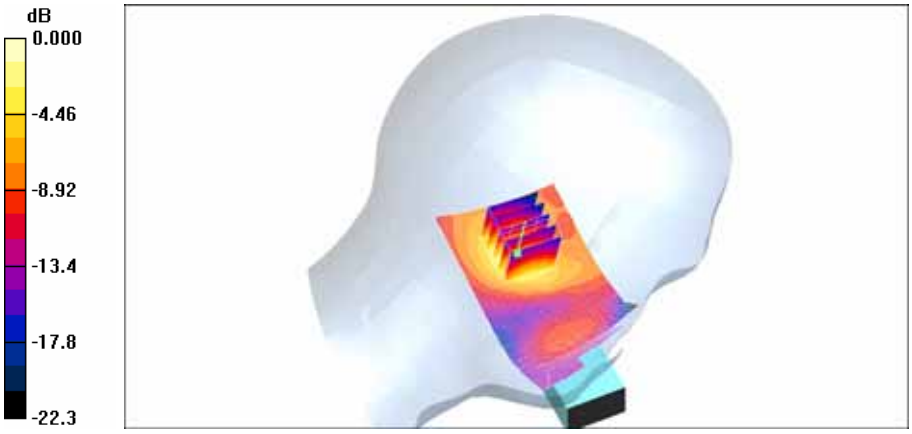
Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3

Medium parameters used: f = 1880 MHz; $\sigma$ = 1.42 mho/m; $\varepsilon_r$ = 39.4; $\rho$ = 1000 kg/m$^3$
Phantom section: Left Section ;Measurement SW: DASY4, V4.7 Build 53

DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(5.16, 5.16, 5.16); Calibrated: 2006-03-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn614; Calibrated: 2006-08-22
- Phantom: SAM 1800/1900 MHz; Type: SAM

**Left tilt 661/Area Scan (51x101x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.231 mW/g

**Left tilt 661/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.02 V/m; Power Drift = 0.022 dB
Peak SAR (extrapolated) = 0.357 W/kg
**SAR(1 g) = 0.212 mW/g; SAR(10 g) = 0.111 mW/g**
Maximum value of SAR (measured) = 0.237 mW/g




0 dB = 0.237mW/g

| | |
|---|---|
| Test Laboratory: | HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD |
| EUT Type: | Tri-Band GSM Phone(GSM850/ DCS1800/ PCS1900) |
| | GPRS Class 8 and GPRS mode class B(GPRS and GSM, but not simultaneously) |
| Liquid Temperature: | 21.6 ℃ |
| Ambient Temperature: | 21.8 ℃ |
| Test Date: | Mar.06, 2007 |

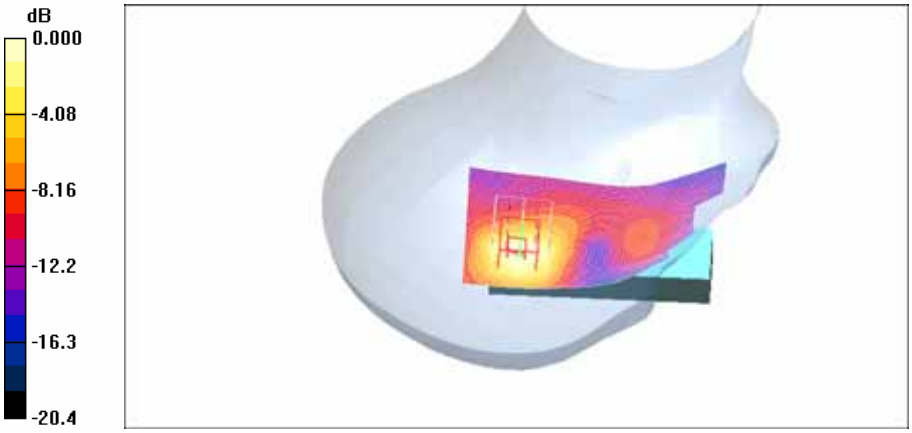
Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3

Medium parameters used: f = 1880 MHz; $\sigma$ = 1.42 mho/m; $\varepsilon_r$ = 39.4; $\rho$ = 1000 kg/m$^3$
Phantom section: Right Section ;Measurement SW: DASY4, V4.7 Build 53

DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(5.16, 5.16, 5.16); Calibrated: 2006-03-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn614; Calibrated: 2006-08-22
- Phantom: SAM 1800/1900 MHz; Type: SAM

**Right tilt 661/Area Scan (51x101x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.237 mW/g

**Right tilt 661/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.47 V/m; Power Drift = 0.011 dB
Peak SAR (extrapolated) = 0.332 W/kg
**SAR(1 g) = 0.200 mW/g; SAR(10 g) = 0.108 mW/g**
Maximum value of SAR (measured) = 0.220 mW/g




0 dB = 0.220mW/g

| | |
|---|---|
| Test Laboratory: | HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD |
| EUT Type: | Tri-Band GSM Phone(GSM850/ DCS1800/ PCS1900) |
| | GPRS Class 8 and GPRS mode class B(GPRS and GSM, but not simultaneously) |
| Liquid Temperature: | 21.5 ℃ |
| Ambient Temperature: | 21.7 ℃ |
| Test Date: | Mar.05, 2007 |

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

Medium parameters used (interpolated): f = 836.6 MHz; $\sigma$ = 0.99 mho/m; $\varepsilon_r$ = 53.4; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ;Measurement SW: DASY4, V4.7 Build 53

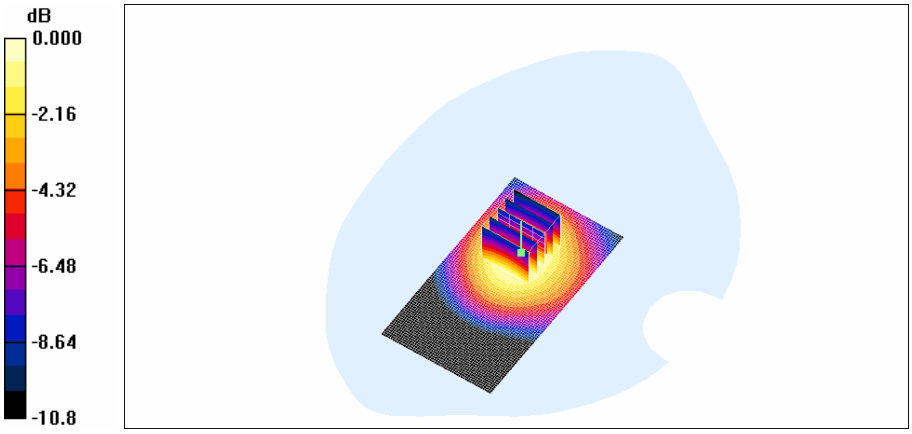
DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(6.42, 6.42, 6.42); Calibrated: 2006-03-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn614; Calibrated: 2006-08-22
- Phantom: SAM 835/900 MHz; Type: SAM

**GSM850 Body 190/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.166 mW/g

**GSM850 Body 190/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.3 V/m; Power Drift = -0.017 dB
Peak SAR (extrapolated) = 0.207 W/kg
**SAR(1 g) = 0.148 mW/g; SAR(10 g) = 0.101 mW/g**

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.158 mW/g




0 dB = 0.158mW/g

| | |
|---|---|
| Test Laboratory: | HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD |
| EUT Type: | Tri-Band GSM Phone(GSM850/ DCS1800/ PCS1900) |
| | GPRS Class 8 and GPRS mode class B(GPRS and GSM, but not simultaneously) |
| Liquid Temperature: | 21.5 ℃ |
| Ambient Temperature: | 21.7 ℃ |
| Test Date: | Mar.05, 2007 |
| Option | GPRS |

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

Medium parameters used (interpolated): f = 836.6 MHz; $\sigma$ = 0.99 mho/m; $\varepsilon_r$ = 53.4; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ;Measurement SW: DASY4, V4.7 Build 53

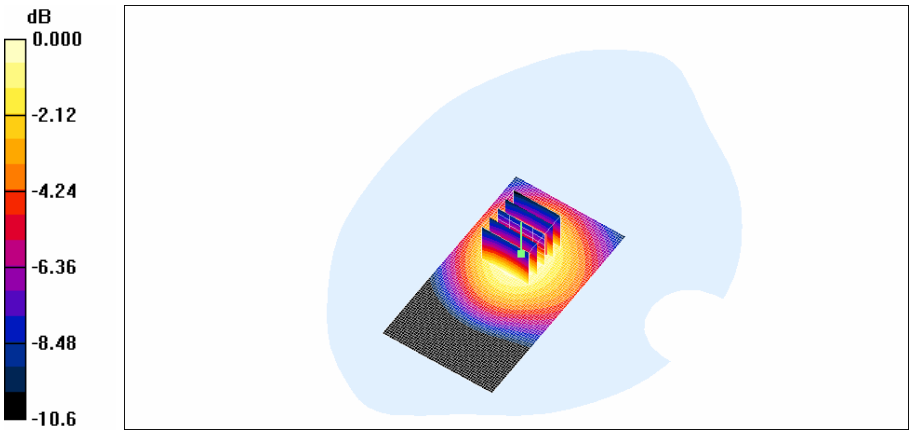
DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(6.42, 6.42, 6.42); Calibrated: 2006-03-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn614; Calibrated: 2006-08-22
- Phantom: SAM 835/900 MHz; Type: SAM

**GSM850 Body 190/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.144 mW/g

**GSM850 Body 190/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.5 V/m; Power Drift = -0.190 dB
Peak SAR (extrapolated) = 0.177 W/kg
**SAR(1 g) = 0.128 mW/g; SAR(10 g) = 0.088 mW/g**

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.137 mW/g




0 dB = 0.137mW/g

| | |
|---|---|
| Test Laboratory: | HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD |
| EUT Type: | Tri-Band GSM Phone(GSM850/ DCS1800/ PCS1900) |
| | GPRS Class 8 and GPRS mode class B(GPRS and GSM, but not simultaneously) |
| Liquid Temperature: | 21.6 ℃ |
| Ambient Temperature: | 21.8 ℃ |
| Test Date: | Mar.06, 2007 |

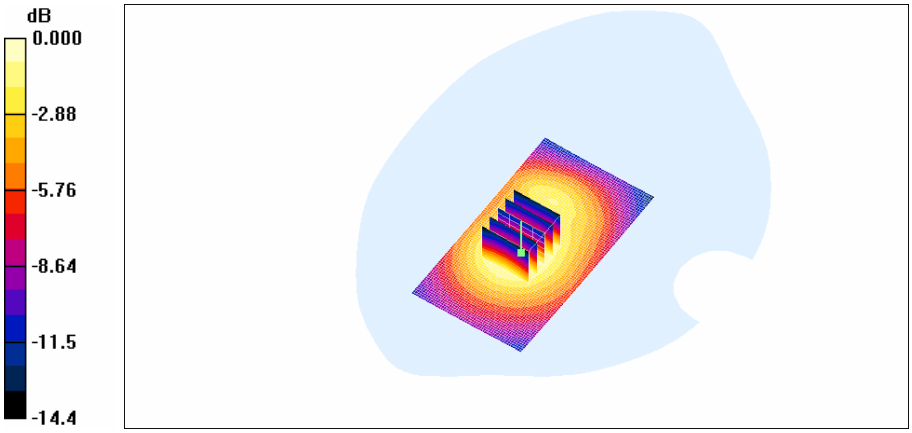
Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3

Medium parameters used: f = 1880 MHz; $\sigma$ = 1.55 mho/m; $\varepsilon_r$ = 52.1; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ;Measurement SW: DASY4, V4.7 Build 53

DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(4.63, 4.63, 4.63); Calibrated: 2006-03-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn614; Calibrated: 2006-08-22
- Phantom: SAM 1800/1900 MHz; Type: SAM

**GSM1900 Body 661/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.126 mW/g

**GSM1900 Body 661/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.95 V/m; Power Drift = -0.070 dB
Peak SAR (extrapolated) = 0.171 W/kg
**SAR(1 g) = 0.113 mW/g; SAR(10 g) = 0.071 mW/g**
Maximum value of SAR (measured) = 0.123 mW/g




0 dB = 0.123mW/g

| | |
|---|---|
| Test Laboratory: | HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD |
| EUT Type: | Tri-Band GSM Phone(GSM850/ DCS1800/ PCS1900) |
| | GPRS Class 8 and GPRS mode class B(GPRS and GSM, but not simultaneously) |
| Liquid Temperature: | 21.6 ℃ |
| Ambient Temperature: | 21.8 ℃ |
| Test Date: | Mar.06, 2007 |
| Option | GPRS |

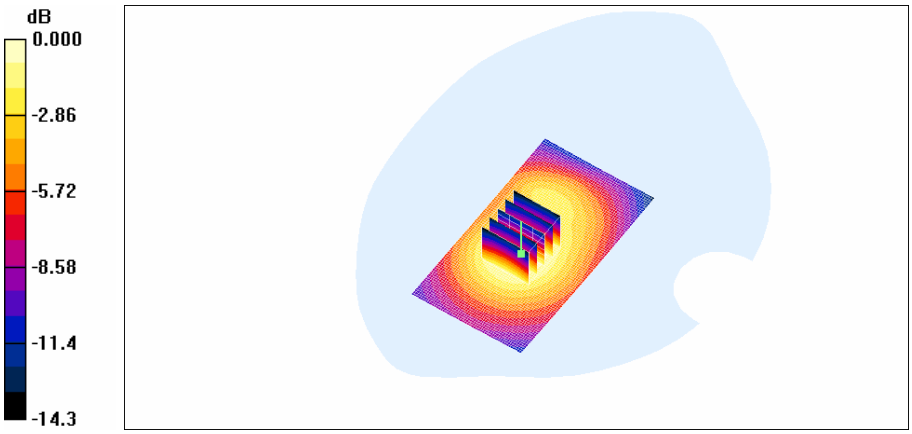
Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3

Medium parameters used: f = 1880 MHz; $\sigma$ = 1.55 mho/m; $\varepsilon_r$ = 52.1; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ;Measurement SW: DASY4, V4.7 Build 53

DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(4.63, 4.63, 4.63); Calibrated: 2006-03-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn614; Calibrated: 2006-08-22
- Phantom: SAM 1800/1900 MHz; Type: SAM

**GSM1900 Body 661/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.118 mW/g

**GSM1900 Body 661/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.51 V/m; Power Drift = 0.040 dB
Peak SAR (extrapolated) = 0.158 W/kg
**SAR(1 g) = 0.105 mW/g; SAR(10 g) = 0.066 mW/g**
Maximum value of SAR (measured) = 0.114 mW/g




0 dB = 0.114mW/g

| | |
|---|---|
| Test Laboratory: | HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD |
| EUT Type: | Tri-Band GSM Phone(GSM850/ DCS1800/ PCS1900) |
| | GPRS Class 8 and GPRS mode class B(GPRS and GSM, but not simultaneously) |
| Liquid Temperature: | 21.5 ℃ |
| Ambient Temperature: | 21.7 ℃ |
| Test Date: | Mar.05, 2007 |

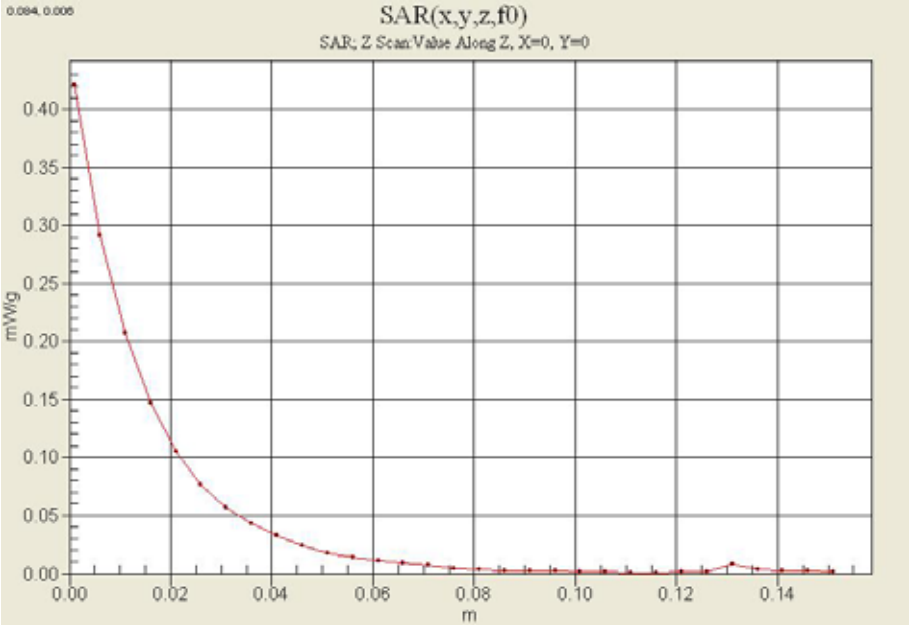
**DUT: BOOM; Type: Slide up; Serial: #1**
**Program Name: BOOM**

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium parameters used (interpolated): f = 836.6 MHz; $\sigma$ = 0.875 mho/m; $\varepsilon_r$ = 40.7; $\rho$ = 1000 kg/m$^3$
Phantom section: Left Section ;Measurement SW: DASY4, V4.7 Build 53

DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(6.85, 6.85, 6.85); Calibrated: 2006-03-23
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn614; Calibrated: 2006-08-22
- Phantom: SAM 835/900 MHz; Type: SAM

**Left touch 190/Z Scan (1x1x31):** Measurement grid: dx=20mm, dy=20mm, dz=5mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.422 mW/g



| | |
|---|---|
| Test Laboratory: | HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD |
| EUT Type: | Tri-Band GSM Phone(GSM850/ DCS1800/ PCS1900) |
| | GPRS Class 8 and GPRS mode class B(GPRS and GSM, but not simultaneously) |
| Liquid Temperature: | 21.5 ℃ |
| Ambient Temperature: | 21.7 ℃ |
| Test Date: | Mar.05, 2007 |

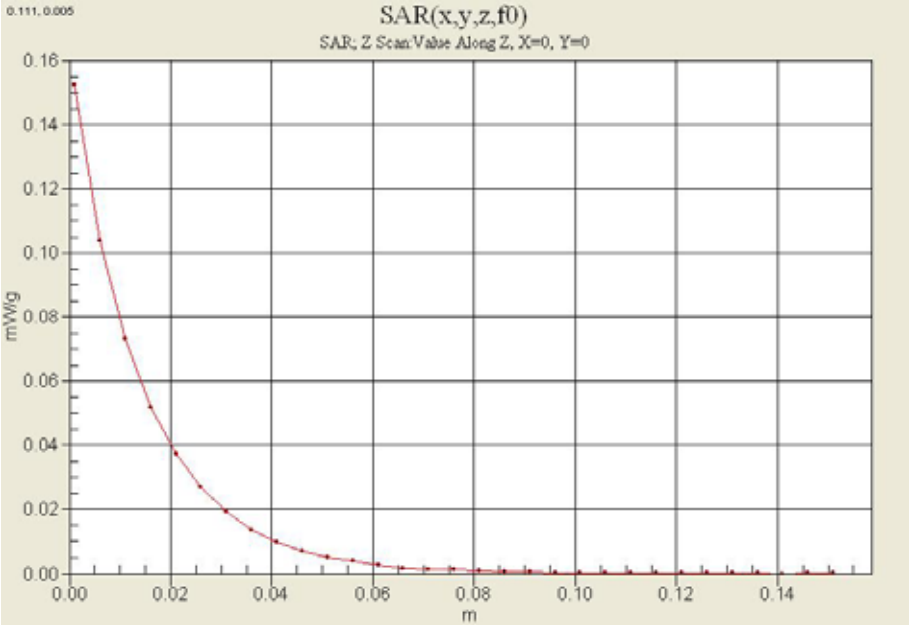
**DUT: BOOM (Body); Type: Slide down; Serial: #1**
**Program Name: BOOM**

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium parameters used (interpolated): f = 836.6 MHz; $\sigma$ = 0.99 mho/m; $\varepsilon_r$ = 53.4; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ;Measurement SW: DASY4, V4.7 Build 53

DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(6.42, 6.42, 6.42); Calibrated: 2006-03-23
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn614; Calibrated: 2006-08-22
- Phantom: SAM 835/900 MHz; Type: SAM

**GSM850 Body 190/Z Scan (1x1x31):** Measurement grid: dx=20mm, dy=20mm, dz=5mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.153 mW/g



| | |
|---|---|
| Test Laboratory: | HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD |
| EUT Type: | Tri-Band GSM Phone(GSM850/ DCS1800/ PCS1900) |
| | GPRS Class 8 and GPRS mode class B(GPRS and GSM, but not simultaneously) |
| Liquid Temperature: | 21.6 ℃ |
| Ambient Temperature: | 21.8 ℃ |
| Test Date: | Mar.06, 2007 |

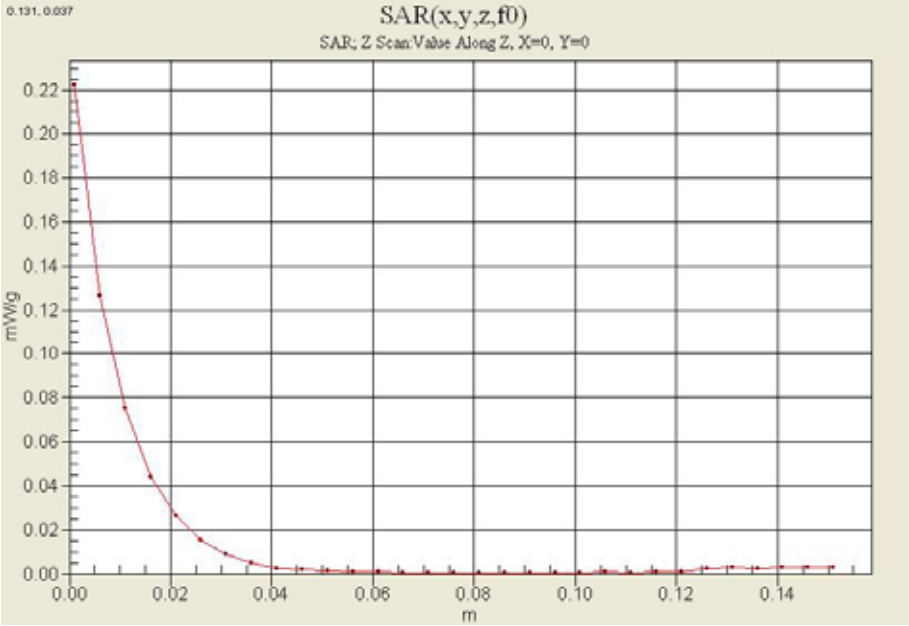
**DUT: BOOM; Type: Slide up; Serial: #1**
**Program Name: BOOM**

Communication System: GSM 1900; Frequency: 1850.2 MHz;Duty Cycle: 1:8.3
Medium parameters used (interpolated): f = 1850.2 MHz; $\sigma$ = 1.39 mho/m; $\varepsilon_r$ = 39.5; $\rho$ = 1000 kg/m$^3$
Phantom section: Right Section ;Measurement SW: DASY4, V4.7 Build 53

DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(5.16, 5.16, 5.16); Calibrated: 2006-03-23
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn614; Calibrated: 2006-08-22
- Phantom: SAM 1800/1900 MHz; Type: SAM

**Right touch 512/Z Scan (1x1x31):** Measurement grid: dx=20mm, dy=20mm, dz=5mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.222 mW/g



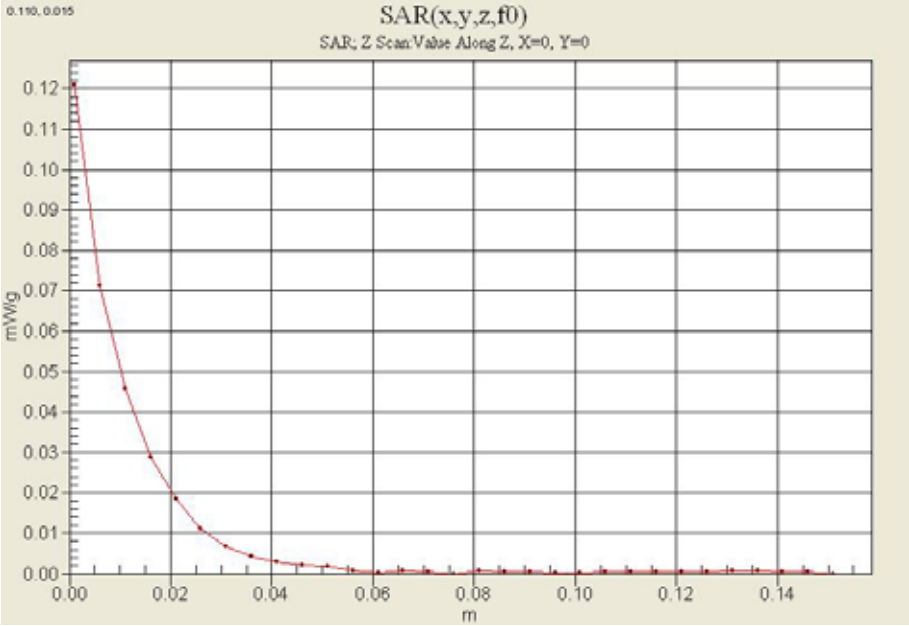
| | |
|---|---|
| Test Laboratory: | HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD |
| EUT Type: | Tri-Band GSM Phone(GSM850/ DCS1800/ PCS1900) |
| | GPRS Class 8 and GPRS mode class B(GPRS and GSM, but not simultaneously) |
| Liquid Temperature: | 21.6 ℃ |
| Ambient Temperature: | 21.8 ℃ |
| Test Date: | Mar.06, 2007 |

**DUT: BOOM (Body); Type: Slide down; Serial: #1**
**Program Name: BOOM**

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; $\sigma$ = 1.55 mho/m; $\varepsilon_r$ = 52.1; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ;Measurement SW: DASY4, V4.7 Build 53

DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(4.63, 4.63, 4.63); Calibrated: 2006-03-23
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn614; Calibrated: 2006-08-22
- Phantom: SAM 1800/1900 MHz; Type: SAM

**GSM1900 Body 661/Z Scan (1x1x31):** Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 0.121 mW/g



# Attachment 2. – Dipole Validation Plots

## ■ Validation Data (835 MHz Head)

Test Laboratory: HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD

Input Power 1W (30dBm)

Liquid Temp: 21.5

Test Date: Mar.05, 2007

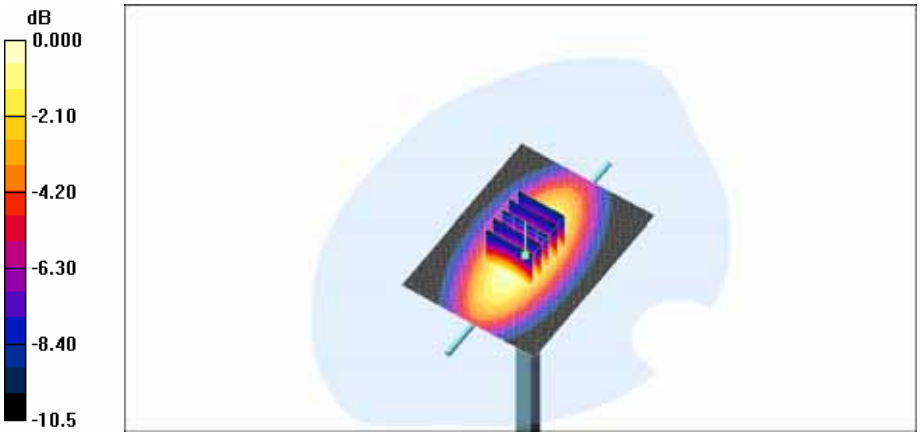
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1

Medium parameters used: f = 835 MHz; $\sigma$ = 0.873 mho/m; $\varepsilon_r$ = 40.7; $\rho$ = 1000 kg/$m^3$
Phantom section: Left Section ;Measurement SW: DASY4, V4.7 Build 53

DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(6.85, 6.85, 6.85); Calibrated: 2006-03-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn614; Calibrated: 2006-08-22
- Phantom: SAM 835/900 MHz; Type: SAM

**Validatoin 835 MHz/Area Scan (61x81x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 10.4 mW/g

**Validatoin 835 MHz/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 113.0 V/m; Power Drift = -0.011 dB
Peak SAR (extrapolated) = 14.3 W/kg
**SAR(1 g) = 9.64 mW/g; SAR(10 g) = 6.31 mW/g**
Maximum value of SAR (measured) = 10.4 mW/g




0 dB = 10.4mW/g

# ■ Validation Data (1900 MHz Head)

Test Laboratory: HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD

Input Power 1W (30dBm)

Liquid Temp: 21.6

Test Date: Mar.06, 2007

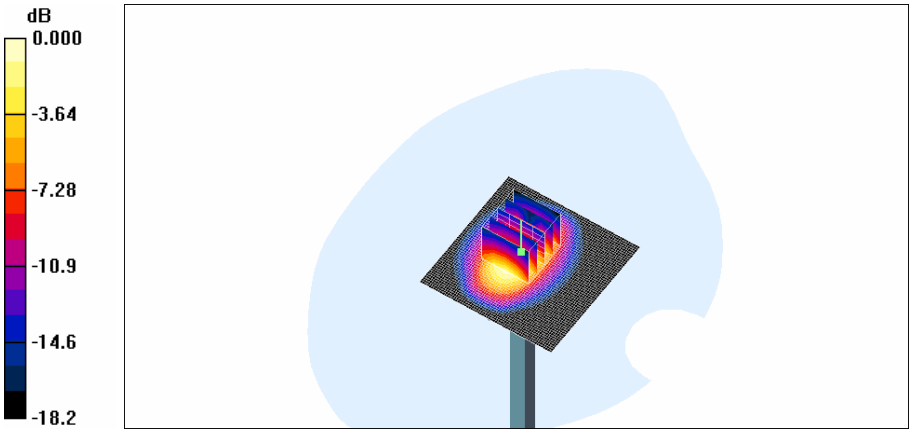
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1

Medium parameters used: f = 1900 MHz; $\sigma$ = 1.44 mho/m; $\varepsilon_r$ = 39.3; $\rho$ = 1000 kg/$m^3$
Phantom section: Flat Section ;Measurement SW: DASY4, V4.7 Build 53

DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(5.16, 5.16, 5.16); Calibrated: 2006-03-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn614; Calibrated: 2006-08-22
- Phantom: SAM 1800/1900 MHz; Type: SAM

**Validation 1900MHz/Area Scan (61x61x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 50.0 mW/g

**Validation 1900MHz/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 177.8 V/m; Power Drift = 0.004 dB
Peak SAR (extrapolated) = 74.5 W/kg
**SAR(1 g) = 41.1 mW/g; SAR(10 g) = 21.5 mW/g**
Maximum value of SAR (measured) = 45.7 mW/g




0 dB = 45.7mW/g

## ■ Dielectric Parameter (835 MHz Head)

| | |
|---|---|
| Title | BOOM |
| SubTitle | GSM850(Head) |
| Test Date | Mar.05, 2007 |

| Frequency | e' | e'' |
|---|---|---|
| 800000000.0000 | 41.1088 | 18.8272 |
| 805000000.0000 | 41.0320 | 18.8560 |
| 810000000.0000 | 40.9304 | 18.8270 |
| 815000000.0000 | 40.9098 | 18.7768 |
| 820000000.0000 | 40.8526 | 18.8060 |
| 825000000.0000 | 40.8319 | 18.8093 |
| 830000000.0000 | 40.7388 | 18.7955 |
| 835000000.0000 | 40.7218 | 18.7874 |
| 840000000.0000 | 40.6967 | 18.8232 |
| 845000000.0000 | 40.6964 | 18.7584 |
| 850000000.0000 | 40.6549 | 18.7676 |
| 855000000.0000 | 40.5586 | 18.7612 |
| 860000000.0000 | 40.5621 | 18.7782 |
| 865000000.0000 | 40.5353 | 18.7222 |
| 870000000.0000 | 40.4634 | 18.7199 |
| 875000000.0000 | 40.4432 | 18.7535 |
| 880000000.0000 | 40.3606 | 18.6893 |
| 885000000.0000 | 40.2633 | 18.6752 |
| 890000000.0000 | 40.2125 | 18.6630 |
| 895000000.0000 | 40.1402 | 18.6423 |
| 900000000.0000 | 40.0248 | 18.6052 |

## ■ Dielectric Parameter (835 MHz Body)

| | |
|---|---|
| Title | BOOM |
| SubTitle | GSM850(Body) |
| Test Date | Mar.05, 2007 |

| Frequency | e' | e'' |
|---|---|---|
| 800000000.0000 | 53.6924 | 21.4086 |
| 805000000.0000 | 53.6505 | 21.3991 |
| 810000000.0000 | 53.6232 | 21.3957 |
| 815000000.0000 | 53.5727 | 21.3557 |
| 820000000.0000 | 53.5121 | 21.3475 |
| 825000000.0000 | 53.4492 | 21.3293 |
| 830000000.0000 | 53.4257 | 21.3250 |
| 835000000.0000 | 53.3861 | 21.3043 |
| 840000000.0000 | 53.3264 | 21.2253 |
| 845000000.0000 | 53.3098 | 21.2625 |
| 850000000.0000 | 53.2956 | 21.2440 |
| 855000000.0000 | 53.2419 | 21.1750 |
| 860000000.0000 | 53.2137 | 21.1728 |
| 865000000.0000 | 53.1769 | 21.1737 |
| 870000000.0000 | 53.1234 | 21.1275 |
| 875000000.0000 | 53.1332 | 21.1058 |
| 880000000.0000 | 53.0819 | 21.0753 |
| 885000000.0000 | 53.0219 | 21.0749 |
| 890000000.0000 | 52.9718 | 21.0288 |
| 895000000.0000 | 52.9696 | 20.9962 |
| 900000000.0000 | 52.8841 | 21.0167 |

## ■ Dielectric Parameter (1900 MHz Head)

| | |
|---|---|
| Title | BOOM |
| SubTitle | GSM1900(Head) |
| Test Date | Mar.06, 2007 |

| Frequency | e' | e'' |
|---|---|---|
| 1800000000.0000 | 39.7860 | 13.4166 |
| 1810000000.0000 | 39.7156 | 13.4246 |
| 1820000000.0000 | 39.7076 | 13.4432 |
| 1830000000.0000 | 39.6423 | 13.4456 |
| 1840000000.0000 | 39.5947 | 13.4796 |
| 1850000000.0000 | 39.5171 | 13.4873 |
| 1860000000.0000 | 39.4369 | 13.5031 |
| 1870000000.0000 | 39.4011 | 13.5304 |
| 1880000000.0000 | 39.3901 | 13.5572 |
| 1890000000.0000 | 39.3452 | 13.5994 |
| 1900000000.0000 | 39.3171 | 13.6518 |
| 1910000000.0000 | 39.3194 | 13.6521 |
| 1920000000.0000 | 39.2552 | 13.6534 |
| 1930000000.0000 | 39.2257 | 13.6978 |
| 1940000000.0000 | 39.2008 | 13.7156 |
| 1950000000.0000 | 39.1362 | 13.7475 |
| 1960000000.0000 | 39.0552 | 13.7522 |
| 1970000000.0000 | 39.0154 | 13.7599 |
| 1980000000.0000 | 38.9484 | 13.8002 |
| 1990000000.0000 | 38.9271 | 13.8195 |
| 2000000000.0000 | 38.8965 | 13.8537 |

## ■ Dielectric Parameter (1900 MHz Body)

| | |
|---|---|
| Title | BOOM |
| SubTitle | GSM1900(Body) |
| Test Date | Mar.06, 2007 |

| Frequency | e' | e'' |
|---|---|---|
| 1800000000.0000 | 52.3679 | 14.4758 |
| 1810000000.000090.5085 | 52.2758 | 14.5186 |
| 1820000000.000090.2105 | 52.2557 | 14.5799 |
| 1830000000.000089.9645 | 52.2002 | 14.6394 |
| 1840000000.000089.7069 | 52.2001 | 14.6767 |
| 1850000000.000089.4492 | 52.1854 | 14.7447 |
| 1860000000.000089.2243 | 52.1615 | 14.7377 |
| 1870000000.000088.9154 | 52.1123 | 14.7821 |
| 1880000000.000088.6582 | 52.0773 | 14.8035 |
| 1890000000.000088.3845 | 52.0279 | 14.7986 |
| 1900000000.000088.0787 | 51.9693 | 14.8419 |
| 1910000000.000087.8275 | 51.8622 | 14.8610 |
| 1920000000.000087.5336 | 51.8157 | 14.9054 |
| 1930000000.000087.2954 | 51.7726 | 14.9474 |
| 1940000000.000087.0588 | 51.7514 | 14.9876 |
| 1950000000.000086.8323 | 51.7342 | 15.0066 |
| 1960000000.000086.5863 | 51.6943 | 15.0575 |
| 1970000000.000086.3708 | 51.6974 | 15.0868 |
| 1980000000.000086.1514 | 51.7216 | 15.1252 |
| 1990000000.000085.9538 | 51.6545 | 15.1523 |
| 2000000000.000085.7095 | 51.6337 | 85.4544 |

# Attachment 3. – Probe Calibration Data

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

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**Accreditation No.: SCS 108**

**Client** H-CT (Dymstec)

**Certificate No: ET3-1609_Mar06**

# CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | ET3DV6 - SN:1609 |
| Calibration procedure(s) | QA CAL-01.v5 and QA CAL-12.v4<br>Calibration procedure for dosimetric E-field probes |
| Calibration date: | March 23, 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 E4419B | GB41293874 | 3-May-05 (METAS, No. 251-00466) | May-06 |
| Power sensor E4412A | MY41495277 | 3-May-05 (METAS, No. 251-00466) | May-06 |
| Power sensor E4412A | MY41498087 | 3-May-05 (METAS, No. 251-00466) | May-06 |
| Reference 3 dB Attenuator | SN: S5054 (3c) | 11-Aug-05 (METAS, No. 251-00499) | Aug-06 |
| Reference 20 dB Attenuator | SN: S5086 (20b) | 3-May-05 (METAS, No. 251-00467) | May-06 |
| Reference 30 dB Attenuator | SN: S5129 (30b) | 11-Aug-05 (METAS, No. 251-00500) | Aug-06 |
| Reference Probe ES3DV2 | SN: 3013 | 2-Jan-06 (SPEAG, No. ES3-3013_Jan06) | Jan-07 |
| DAE4 | SN: 654 | 2-Feb-06 (SPEAG, No. DAE4-654_Feb06) | Feb-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 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Katja Pokovic | Technical Manager | |
| Approved by: | Niels Kuster | Quality Manager | |

Issued: March 23, 2006

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

Certificate No: ET3-1609_Mar06 Page 1 of 9

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**Accreditation No.: SCS 108**

**Glossary:**

| | |
|---|---|
| TSL | tissue simulating liquid |
| NORMx,y,z | sensitivity in free space |
| ConF | sensitivity in TSL / NORMx,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., ϑ = 0 is normal to probe axis |

**Calibration is Performed According to the Following Standards:**

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

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not effect the $E^2$-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep (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 ≤ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

# Probe ET3DV6

## SN:1609

| | |
|---|---|
| Manufactured: | July 27, 2001 |
| Last calibrated: | September 22, 2004 |
| Recalibrated: | March 23, 2006 |

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

ET3DV6 SN:1609 March 23, 2006

# DASY - Parameters of Probe: ET3DV6 SN:1609

## Sensitivity in Free Space[A] Diode Compression[B]

| | | | | |
|---|---|---|---|---|
| NormX | **1.88** ± 10.1% | $\mu V/(V/m)^2$ | DCP X | **95** mV |
| NormY | **1.84** ± 10.1% | $\mu V/(V/m)^2$ | DCP Y | **95** mV |
| NormZ | **1.84** ± 10.1% | $\mu V/(V/m)^2$ | DCP Z | **95** 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 | | **3.7 mm** | **4.7 mm** |
|---|---|---|---|
| $SAR_{be}$ [%] | Without Correction Algorithm | 8.3 | 4.4 |
| $SAR_{be}$ [%] | With Correction Algorithm | 0.1 | 0.1 |

**TSL** **1750 MHz** **Typical SAR gradient: 10 % per mm**

| Sensor Center to Phantom Surface Distance | | **3.7 mm** | **4.7 mm** |
|---|---|---|---|
| $SAR_{be}$ [%] | Without Correction Algorithm | 6.2 | 3.1 |
| $SAR_{be}$ [%] | With Correction Algorithm | 0.2 | 0.2 |

## Sensor Offset

| | |
|---|---|
| Probe Tip to Sensor Center | **2.7** 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%.**

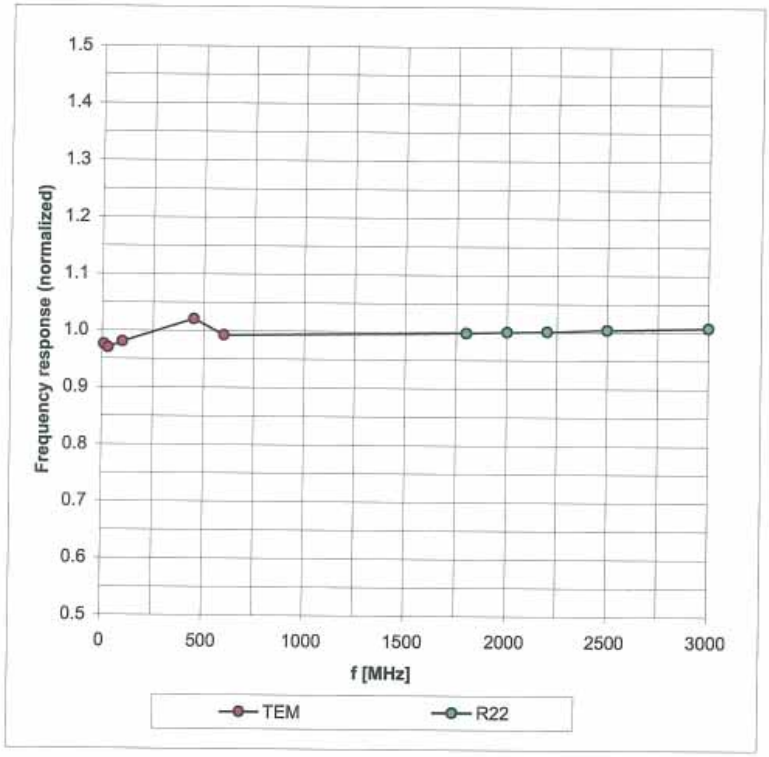
[A] The uncertainties of NormX,Y,Z do not affect the $E^2$-field uncertainty inside TSL (see Page 8).

[B] Numerical linearization parameter: uncertainty not required.

ET3DV6 SN:1609 March 23, 2006

## Frequency Response of E-Field

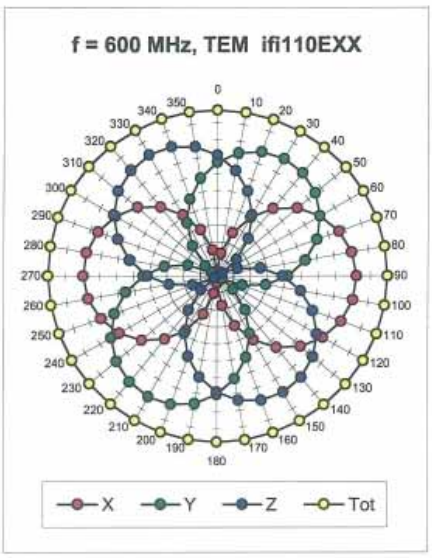
(TEM-Cell:ifi110 EXX, Waveguide: R22)

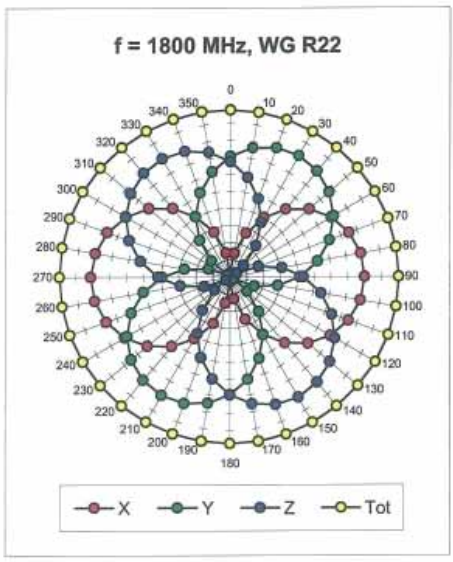


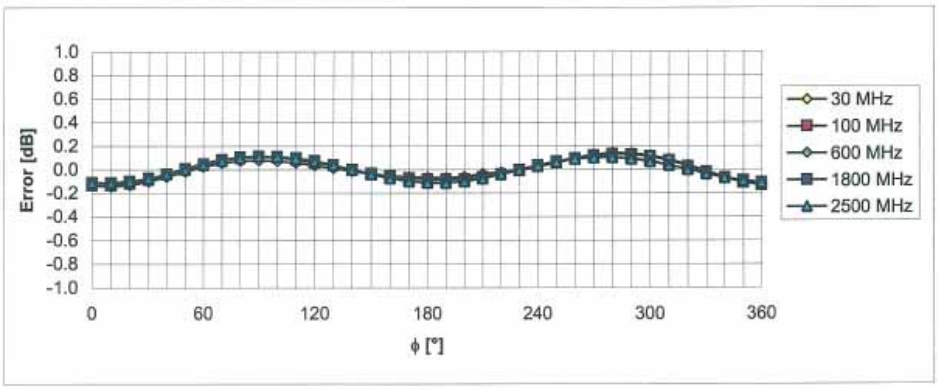

Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

ET3DV6 SN:1609 March 23, 2006

## Receiving Pattern ($\phi$), $\vartheta$ = 0°



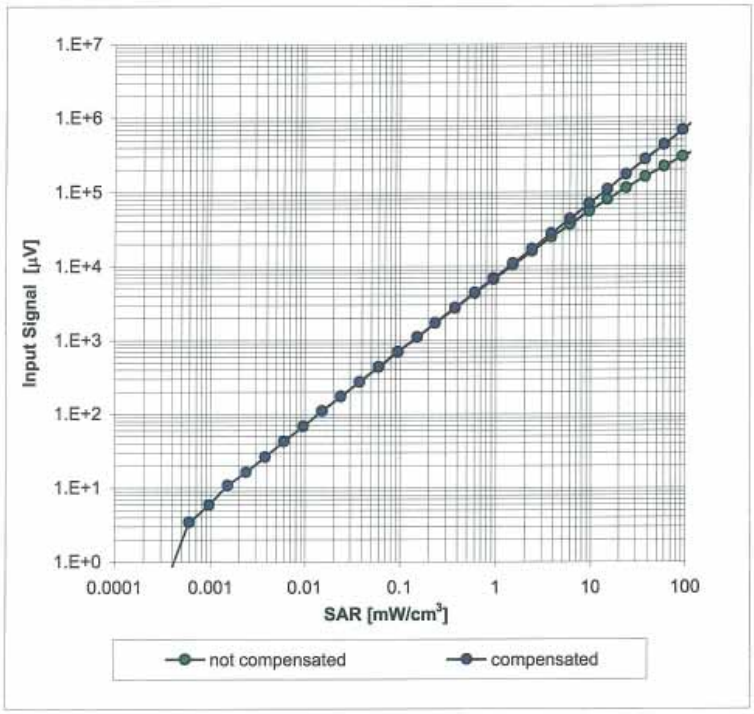



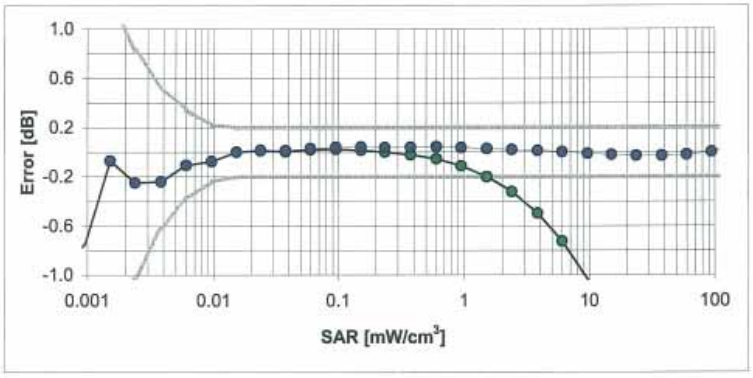

Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

ET3DV6 SN:1609 March 23, 2006

## Dynamic Range f($SAR_{head}$)

(Waveguide R22, f = 1800 MHz)

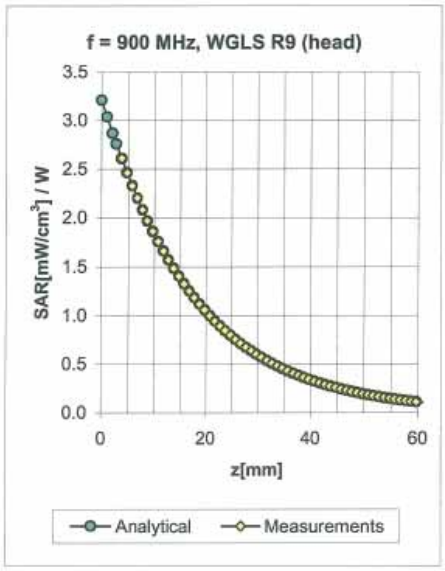


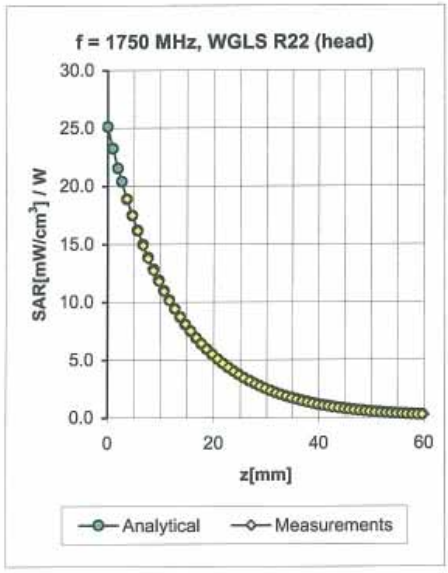




Uncertainty of Linearity Assessment: ± 0.6% (k=2)

ET3DV6 SN:1609 March 23, 2006

# Conversion Factor Assessment



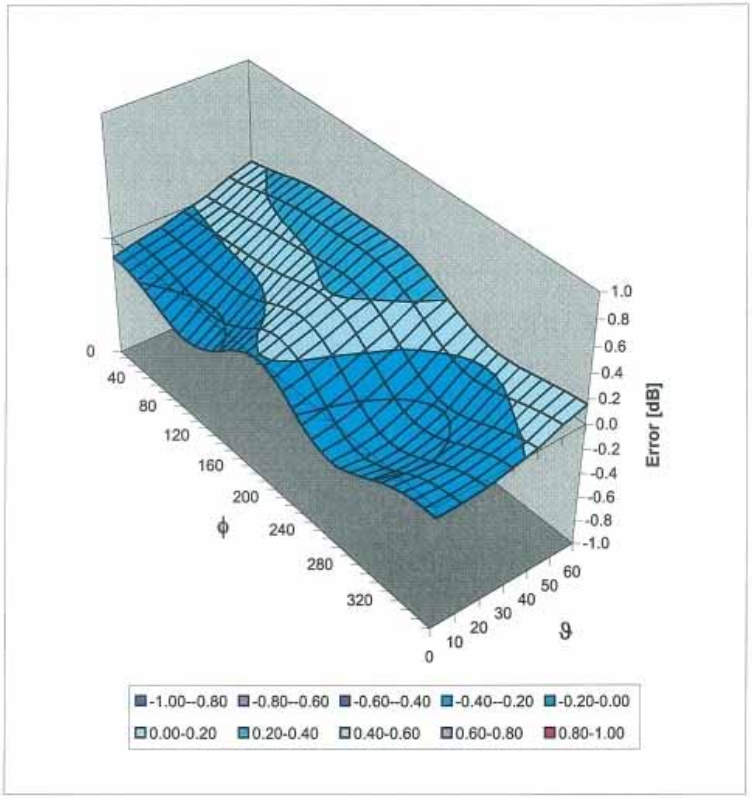

| f [MHz] | Validity [MHz][C] | TSL | Permittivity | Conductivity | Alpha | Depth | ConvF Uncertainty |
|---|---|---|---|---|---|---|---|
| 450 | ± 50 / ± 100 | Head | 43.5 ± 5% | 0.87 ± 5% | 0.27 | 3.19 | 6.82 ± 13.3% (k=2) |
| 835 | ± 50 / ± 100 | Head | 41.5 ± 5% | 0.90 ± 5% | 0.57 | 1.83 | 6.85 ± 11.0% (k=2) |
| 900 | ± 50 / ± 100 | Head | 41.5 ± 5% | 0.97 ± 5% | 0.59 | 1.81 | 6.53 ± 11.0% (k=2) |
| 1750 | ± 50 / ± 100 | Head | 40.1 ± 5% | 1.37 ± 5% | 0.48 | 2.69 | 5.46 ± 11.0% (k=2) |
| 1900 | ± 50 / ± 100 | Head | 40.0 ± 5% | 1.40 ± 5% | 0.52 | 2.45 | 5.16 ± 11.0% (k=2) |
| 1950 | ± 50 / ± 100 | Head | 40.0 ± 5% | 1.40 ± 5% | 0.52 | 2.43 | 5.08 ± 11.0% (k=2) |
| 2450 | ± 50 / ± 100 | Head | 39.2 ± 5% | 1.80 ± 5% | 0.60 | 2.30 | 4.50 ± 11.8% (k=2) |
| | | | | | | | |
| 450 | ± 50 / ± 100 | Body | 56.7 ± 5% | 0.94 ± 5% | 0.24 | 4.02 | 7.32 ± 13.3% (k=2) |
| 835 | ± 50 / ± 100 | Body | 55.2 ± 5% | 0.97 ± 5% | 0.47 | 2.06 | 6.42 ± 11.0% (k=2) |
| 1750 | ± 50 / ± 100 | Body | 53.4 ± 5% | 1.49 ± 5% | 0.53 | 2.59 | 4.80 ± 11.0% (k=2) |
| 1900 | ± 50 / ± 100 | Body | 53.3 ± 5% | 1.52 ± 5% | 0.70 | 2.19 | 4.63 ± 11.0% (k=2) |
| 2450 | ± 50 / ± 100 | Body | 52.7 ± 5% | 1.95 ± 5% | 0.62 | 2.21 | 4.17 ± 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.

ET3DV6 SN:1609 March 23, 2006

## Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz




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

# Attachment 4. – Dipole Calibration Data

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**Accreditation No.: SCS 108**

**Client** H-CT (Dymstec)

**Certificate No: D835V2-441_Aug06**

# CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | D835V2 - SN: 441 |
| Calibration procedure(s) | QA CAL-05.v6<br>Calibration procedure for dipole validation kits |
| Calibration date: | August 14, 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: | Claudio Leubler | Laboratory Technician | |
| Approved by: | Katja Pokovic | Technical Manager | |

Issued: August 17, 2006

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

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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:**

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

**Additional Documentation:**

d) DASY4 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.

## Appendix

### Antenna Parameters with Head TSL

| | |
|---|---|
| Impedance, transformed to feed point | 50.1 Ω - 6.7 jΩ |
| Return Loss | - 23.5 dB |

### General Antenna Parameters and Design

| | |
|---|---|
| Electrical Delay (one direction) | 1.376 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 09, 2001 |

## Appendix

### Antenna Parameters with Head TSL

| | |
|---|---|
| Impedance, transformed to feed point | 50.1 Ω - 6.7 jΩ |
| Return Loss | - 23.5 dB |

### General Antenna Parameters and Design

| | |
|---|---|
| Electrical Delay (one direction) | 1.376 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 09, 2001 |

## DASY4 Validation Report for Head TSL

Date/Time: 14.08.2006 13:00:04

Test Laboratory: SPEAG, Zurich, Switzerland

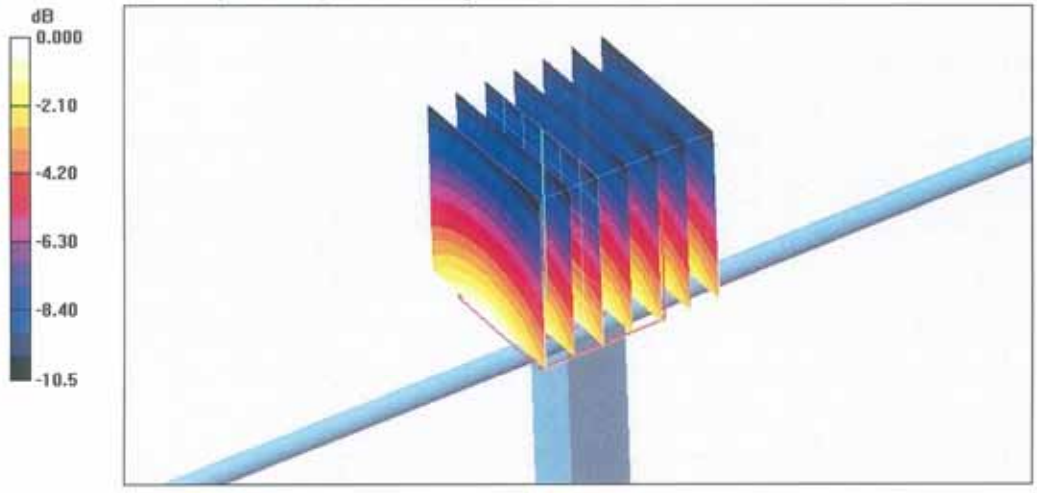
**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 441**

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: HSL900;
Medium parameters used: f = 835 MHz; $\sigma$ = 0.9 mho/m; $\varepsilon_r$ = 42.4; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

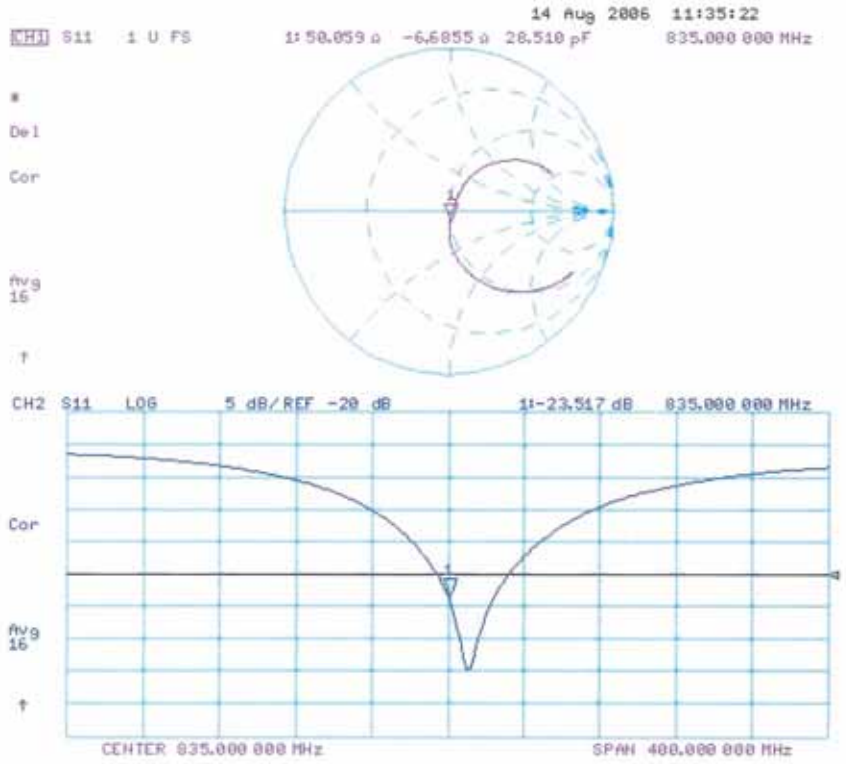
- Probe: ET3DV6 - SN1507 (HF); ConvF(6.09, 6.09, 6.09); Calibrated: 28.10.2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 15.12.2005
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; ;
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8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

**Pin = 250 mW; d = 15 mm/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 55.4 V/m; Power Drift = -0.067 dB
Peak SAR (extrapolated) = 3.50 W/kg
**SAR(1 g) = 2.35 mW/g; SAR(10 g) = 1.53 mW/g**
Maximum value of SAR (measured) = 2.53 mW/g




0 dB = 2.53mW/g

## Impedance Measurement Plot for Head TSL



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

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**Accreditation No.: SCS 108**

Client **H-CT (Dymstec)**

**Certificate No: D1900V2-5d032_Feb07**

# CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | D1900V2 - SN: 5d032 |
| Calibration procedure(s) | QA CAL-05.v6<br>Calibration procedure for dipole validation kits |
| Calibration date: | February 20, 2007 |
| 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 | 03-Oct-06 (METAS, No. 217-00608) | Oct-07 |
| Power sensor HP 8481A | US37292783 | 03-Oct-06 (METAS, No. 217-00608) | Oct-07 |
| 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 | 19-Oct-06 (SPEAG, No. ET3-1507_Oct06) | Oct-07 |
| DAE4 | SN 601 | 30-Jan-07 (SPEAG, No. DAE4-601_Jan07) | Jan-08 |

| 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 Oct-06) | In house check: Oct-07 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Mike Meili | Laboratory Technician | M. Meili |
| Approved by: | Katja Pokovic | Technical Manager | |

Issued: February 21, 2007

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

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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:**

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

**Additional Documentation:**

d) DASY4 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 ± 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 ± 0.2) °C | 38.8 ± 6 % | 1.43 mho/m ± 6 % |
| **Head TSL temperature during test** | (21.0 ± 0.2) °C | ---- | ---- |

## SAR result with Head TSL

| **SAR averaged over 1 cm$^3$ (1 g) of Head TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 9.55 mW / g |
| SAR normalized | normalized to 1W | 38.2 mW / g |
| SAR for nominal Head TSL parameters [1] | normalized to 1W | **37.2 mW / g ± 17.0 % (k=2)** |

| **SAR averaged over 10 cm$^3$ (10 g) of Head TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 5.03 mW / g |
| SAR normalized | normalized to 1W | 20.1mW / g |
| SAR for nominal Head TSL parameters [1] | normalized to 1W | **19.8 mW / g ± 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 | 53.5 Ω + 3.3 jΩ |
| Return Loss | - 26.6 dB |

### General Antenna Parameters and Design

| | |
|---|---|
| Electrical Delay (one direction) | 1.192 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 17, 2003 |

## DASY4 Validation Report for Head TSL

Date/Time: 20.02.2007 14:35:32

Test Laboratory: SPEAG, Zurich, Switzerland

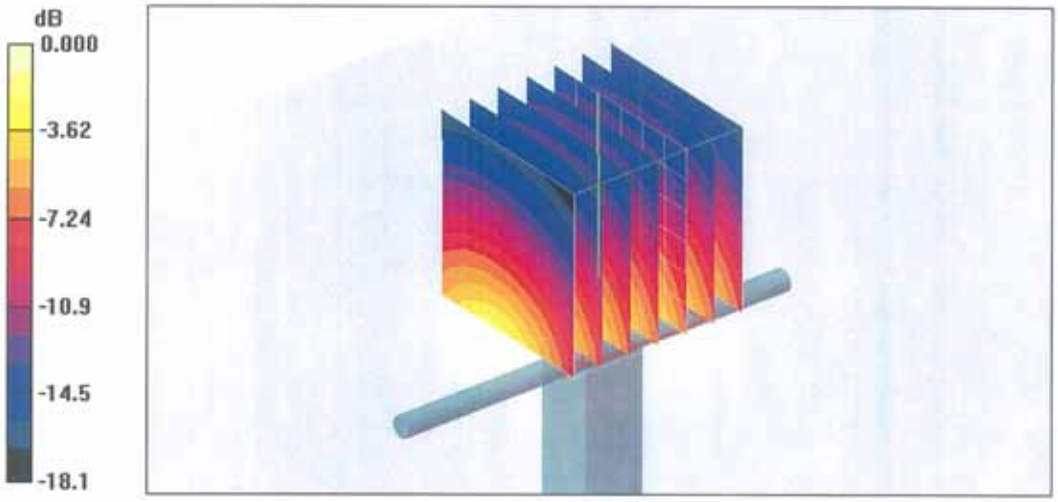
**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d032**

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: HSL U10 BB;
Medium parameters used: f = 1900 MHz; $\sigma$ = 1.43 mho/m; $\varepsilon_r$ = 38.9; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507 (HF); ConvF(4.97, 4.97, 4.97); Calibrated: 19.10.2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.01.2007
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0:**
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 90.3 V/m; Power Drift = 0.006 dB
Peak SAR (extrapolated) = 16.4 W/kg
**SAR(1 g) = 9.55 mW/g; SAR(10 g) = 5.03 mW/g**
Maximum value of SAR (measured) = 10.5 mW/g




0 dB = 10.5mW/g

## Impedance Measurement Plot for Head TSL