

Date : 2007/9/29

#### Body\_WCDMA Ch4233\_Keypad Down with 1.5cm Gap\_RMC 144K

#### DUT: 792103

Communication System: WCDMA; Frequency: 846.6 MHz;Duty Cycle: 1:1 Medium: MSL\_850 Medium parameters used: f = 847 MHz;  $\sigma = 0.981$  mho/m;  $\epsilon_r = 54.3$ ;  $\rho = 1000$  kg/m<sup>3</sup> Ambient Temperature : 22.6 °C; Liquid Temperature : 21.3 °C

#### DASY4 Configuration:

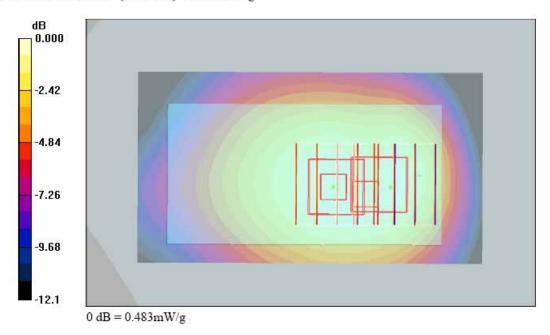
- Probe: ET3DV6 - SN1787; ConvF(6.1, 6.1, 6.1); Calibrated: 2007/8/28

- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn577; Calibrated: 2006/11/21
- Phantom: SAM-B; Type: QD 000 P40 C; Serial: TP-1383
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 176

Ch4233/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (interpolated) = 0.493 mW/g

Ch4233/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 20.4 V/m; Power Drift = 0.005 dB Peak SAR (extrapolated) = 0.594 W/kg SAR(1 g) = 0.470 mW/g; SAR(10 g) = 0.340 mW/g Maximum value of SAR (measured) = 0.500 mW/g

Ch4233/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 20.4 V/m; Power Drift = 0.005 dB Peak SAR (extrapolated) = 0.593 W/kg SAR(1 g) = 0.438 mW/g; SAR(10 g) = 0.305 mW/g Maximum value of SAR (measured) = 0.483 mW/g





Date : 2007/9/29

#### Body\_WCDMA Ch4182\_Keypad Down with 1.5cm Gap\_RMC 384K

#### DUT: 792103

Communication System: WCDMA; Frequency: 836.4 MHz;Duty Cycle: 1:1 Medium: MSL\_850 Medium parameters used: f = 836.4 MHz;  $\sigma = 0.97$  mho/m;  $\epsilon_r = 54.4$ ;  $\rho = 1000$  kg/m<sup>3</sup> Ambient Temperature : 22.6 °C; Liquid Temperature : 21.3 °C

#### DASY4 Configuration:

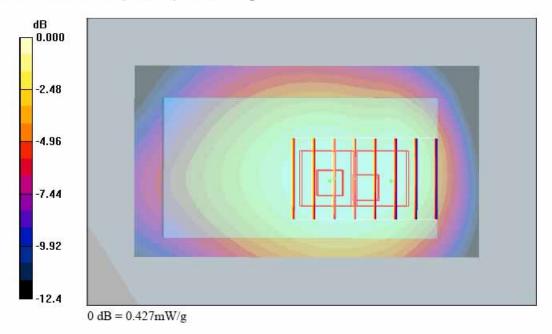
- Probe: ET3DV6 - SN1787; ConvF(6.1, 6.1, 6.1); Calibrated: 2007/8/28

- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn577; Calibrated: 2006/11/21
- Phantom: SAM-B; Type: QD 000 P40 C; Serial: TP-1383
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 176

Ch4182/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (interpolated) = 0.448 mW/g

Ch4182/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 19.5 V/m; Power Drift = 0.015 dB Peak SAR (extrapolated) = 0.529 W/kg SAR(1 g) = 0.419 mW/g; SAR(10 g) = 0.304 mW/g Maximum value of SAR (measured) = 0.445 mW/g

Ch4182/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 19.5 V/m; Power Drift = 0.015 dB Peak SAR (extrapolated) = 0.521 W/kg SAR(1 g) = 0.384 mW/g; SAR(10 g) = 0.267 mW/g Maximum value of SAR (measured) = 0.427 mW/g





Date : 2007/9/29

#### Body\_WCDMA Ch4182\_Keypad Down with 1.5cm Gap\_RMC 12.2K+HSDPA

#### DUT: 792103

Communication System: WCDMA; Frequency: 836.4 MHz;Duty Cycle: 1:1 Medium: MSL\_850 Medium parameters used: f = 836.4 MHz;  $\sigma = 0.97$  mho/m;  $\epsilon_r = 54.4$ ;  $\rho = 1000$  kg/m<sup>3</sup> Ambient Temperature : 22.6 °C; Liquid Temperature : 21.3 °C

#### DASY4 Configuration:

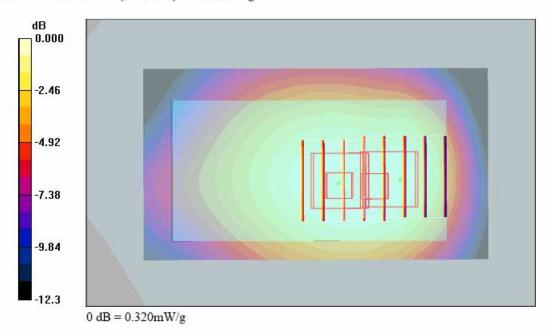
- Probe: ET3DV6 - SN1787; ConvF(6.1, 6.1, 6.1); Calibrated: 2007/8/28

- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn577; Calibrated: 2006/11/21
- Phantom: SAM-B; Type: QD 000 P40 C; Serial: TP-1383
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 176

Ch4182/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (interpolated) = 0.341 mW/g

Ch4182/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 17.0 V/m; Power Drift = -0.070 dB Peak SAR (extrapolated) = 0.397 W/kg SAR(1 g) = 0.317 mW/g; SAR(10 g) = 0.231 mW/g Maximum value of SAR (measured) = 0.336 mW/g

Ch4182/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 17.0 V/m; Power Drift = -0.070 dB Peak SAR (extrapolated) = 0.393 W/kg SAR(1 g) = 0.292 mW/g; SAR(10 g) = 0.203 mW/g Maximum value of SAR (measured) = 0.320 mW/g





Date : 2007/9/29

#### Body\_WCDMA Ch4233\_Keypad Down with 1.5cm Gap\_RMC 144K\_BT On

#### DUT: 792103

Communication System: WCDMA; Frequency: 846.6 MHz;Duty Cycle: 1:1 Medium: MSL\_850 Medium parameters used: f = 847 MHz;  $\sigma = 0.981$  mho/m;  $\epsilon_r = 54.3$ ;  $\rho = 1000$  kg/m<sup>3</sup> Ambient Temperature : 22.6 °C; Liquid Temperature : 21.3 °C

#### DASY4 Configuration:

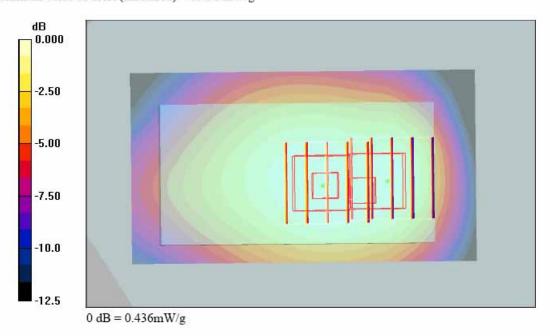
- Probe: ET3DV6 - SN1787; ConvF(6.1, 6.1, 6.1); Calibrated: 2007/8/28

- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn577; Calibrated: 2006/11/21
- Phantom: SAM-B; Type: QD 000 P40 C; Serial: TP-1383
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 176

Ch4233/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (interpolated) = 0.463 mW/g

Ch4233/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 19.7 V/m; Power Drift = -0.087 dB Peak SAR (extrapolated) = 0.561 W/kg SAR(1 g) = 0.441 mW/g; SAR(10 g) = 0.319 mW/g Maximum value of SAR (measured) = 0.474 mW/g

Ch4233/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 19.7 V/m; Power Drift = -0.087 dB Peak SAR (extrapolated) = 0.542 W/kg SAR(1 g) = 0.388 mW/g; SAR(10 g) = 0.267 mW/g Maximum value of SAR (measured) = 0.436 mW/g





Date: 2007/10/13

#### Left Cheek\_GSM850 Ch251\_Close Mode\_2D

#### DUT: 790604

Communication System: GSM850; Frequency: 848.8 MHz;Duty Cycle: 1:8.3 Medium: HSL\_850 Medium parameters used: f = 849 MHz;  $\sigma = 0.913$  mho/m;  $\varepsilon_r = 40.3$ ;  $\rho = 1000$  kg/m<sup>3</sup> Ambient Temperature : 22.9 °C; Liquid Temperature : 21.3 °C

#### DASY4 Configuration:

- Probe: ET3DV6 - SN1787; ConvF(6.58, 6.58, 6.58); Calibrated: 2007/8/28

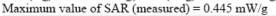
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn577; Calibrated: 2006/11/21
- Phantom: SAM-A; Type: QD 000 P40 C; Serial: TP-1303
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

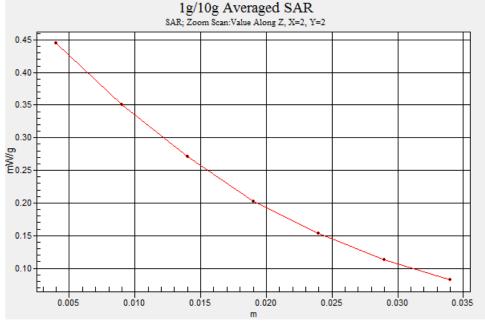
Ch251/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (interpolated) = 0.497 mW/g

Ch251/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 17.6 V/m; Power Drift = -0.152 dB

Peak SAR (extrapolated) = 0.536 W/kg

SAR(1 g) = 0.421 mW/g; SAR(10 g) = 0.308 mW/g









Date: 2007/10/14

#### Left Tilted\_PCS Ch810\_Close Mode\_2D

#### DUT: 792103

Communication System: PCS; Frequency: 1909.8 MHz;Duty Cycle: 1:8.3 Medium: HSL\_1900 Medium parameters used: f = 1910 MHz;  $\sigma = 1.42$  mho/m;  $\epsilon_r = 39.6$ ;  $\rho = 1000$  kg/m<sup>3</sup> Ambient Temperature : 22.4 °C; Liquid Temperature : 21.2 °C

#### DASY4 Configuration:

- Probe: ET3DV6 - SN1787; ConvF(5.16, 5.16, 5.16); Calibrated: 2007/8/28

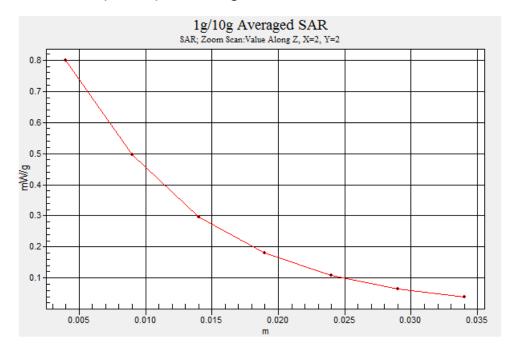
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn577; Calibrated: 2006/11/21
- Phantom: SAM-B; Type: QD 000 P40 C; Serial: TP-1383
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Ch810/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (interpolated) = 0.833 mW/g

Ch810/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 24.9 V/m; Power Drift = 0.057 dB Peak SAR (extrapolated) = 1.11 W/kg

SAR(1 g) = 0.728 mW/g; SAR(10 g) = 0.435 mW/g

Maximum value of SAR (measured) = 0.799 mW/g





Date: 2007/10/13

#### Right Cheek\_WCDMA Ch4182\_Close Mode\_2D

#### DUT: 792103

Communication System: WCDMA; Frequency: 836.4 MHz;Duty Cycle: 1:1 Medium: HSL\_850 Medium parameters used : f = 836.4 MHz;  $\sigma = 0.899$  mho/m;  $\epsilon_r = 40.4$ ;  $\rho = 1000$  kg/m<sup>3</sup> Ambient Temperature : 23.0 °C; Liquid Temperature : 21.3 °C

#### DASY4 Configuration:

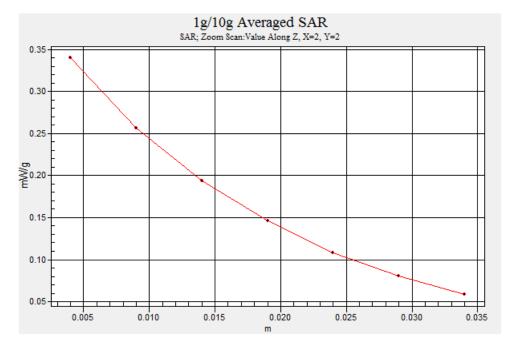
- Probe: ET3DV6 - SN1787; ConvF(6.58, 6.58, 6.58); Calibrated: 2007/8/28

- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn577; Calibrated: 2006/11/21
- Phantom: SAM-A; Type: QD 000 P40 C; Serial: TP-1303
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Ch4182/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.336 mW/g

Ch4182/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 15.5 V/m; Power Drift = 0.084 dB Peak SAR (extrapolated) = 0.450 W/kg SAR(1 g) = 0.321 mW/g; SAR(10 g) = 0.234 mW/g Maximum value of SAR (measured) = 0.340 mW/g





Date: 2007/10/12

#### Body\_GSM850 Ch251\_Keypad Down with 1.5cm Gap\_GPRS12\_2D

#### DUT: 792103

Communication System: GSM850; Frequency: 848.8 MHz;Duty Cycle: 1:2 Medium: MSL\_850 Medium parameters used: f = 849 MHz;  $\sigma = 0.983$  mho/m;  $\epsilon_r = 54.1$ ;  $\rho = 1000$  kg/m<sup>3</sup> Ambient Temperature : 22.6 °C; Liquid Temperature : 21.3 °C

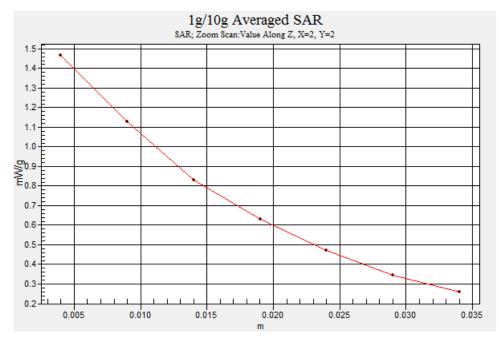
#### DASY4 Configuration:

- Probe: ET3DV6 - SN1787; ConvF(6.1, 6.1, 6.1); Calibrated: 2007/8/28

- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn577; Calibrated: 2006/11/21
- Phantom: SAM-B; Type: QD 000 P40 C; Serial: TP-1383
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Ch251/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (interpolated) = 1.52 mW/g

Ch251/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 34.9 V/m; Power Drift = -0.997 dB Peak SAR (extrapolated) = 1.77 W/kg SAR(1 g) = 1.39 mW/g; SAR(10 g) = 1 mW/g Maximum value of SAR (measured) = 1.46 mW/g







Test Laboratory: Sporton International Inc. SAR Testing Lab Date: 2007/10/12

#### Body\_PCS Ch512\_Keypad Down with 1.5cm Gap\_GPRS12\_2D

#### DUT: 792103

Communication System: PCS; Frequency: 1850.2 MHz;Duty Cycle: 1:2 Medium: MSL\_1900 Medium parameters used : f = 1850.2 MHz;  $\sigma = 1.45$  mho/m;  $\epsilon_r = 53.9$ ;  $\rho = 1000$  kg/m<sup>3</sup> Ambient Temperature : 23.1 °C; Liquid Temperature : 21.5 °C

#### DASY4 Configuration:

- Probe: ET3DV6 - SN1787; ConvF(4.68, 4.68, 4.68); Calibrated: 2007/8/28

- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn577; Calibrated: 2006/11/21

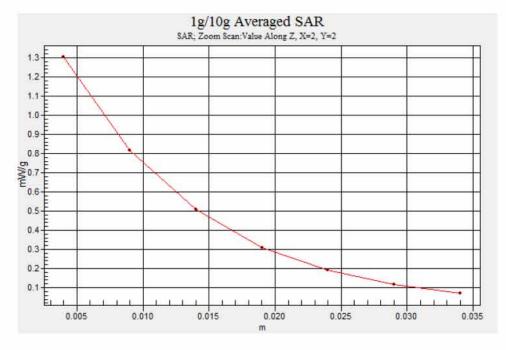
- Phantom: SAM-A; Type: QD 000 P40 C; Serial: TP-1303

- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Ch512/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.29 mW/g

Ch512/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 27.3 V/m; Power Drift = -0.096 dB Peak SAR (extrapolated) = 1.87 W/kg SAR(1 g) = 1.2 mW/g; SAR(10 g) = 0.736 mW/g Maximum value of SAR (measured) = 1.30 mW/g





Date : 2007/9/29

#### Body\_WCDMA Ch4233\_Keypad Down with 1.5cm Gap\_RMC 144K\_2D

#### DUT: 792103

Communication System: WCDMA; Frequency: 846.6 MHz;Duty Cycle: 1:1 Medium: MSL\_850 Medium parameters used: f = 847 MHz;  $\sigma = 0.981$  mho/m;  $\varepsilon_r = 54.3$ ;  $\rho = 1000$  kg/m<sup>3</sup> Ambient Temperature : 22.6 °C; Liquid Temperature : 21.3 °C

#### DASY4 Configuration:

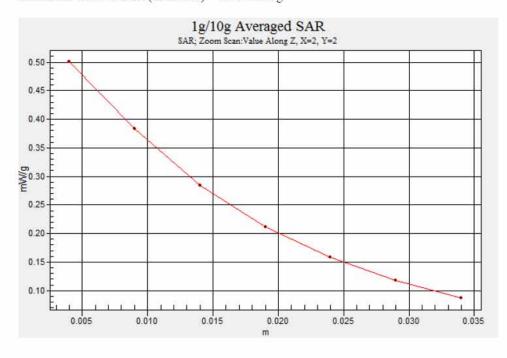
- Probe: ET3DV6 - SN1787; ConvF(6.1, 6.1, 6.1); Calibrated: 2007/8/28

- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn577; Calibrated: 2006/11/21
- Phantom: SAM-B; Type: QD 000 P40 C; Serial: TP-1383
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 176

Ch4233/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (interpolated) = 0.493 mW/g

Ch4233/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 20.4 V/m; Power Drift = 0.005 dB Peak SAR (extrapolated) = 0.594 W/kg SAR(1 g) = 0.470 mW/g; SAR(10 g) = 0.340 mW/g Maximum value of SAR (measured) = 0.500 mW/g

Ch4233/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 20.4 V/m; Power Drift = 0.005 dB Peak SAR (extrapolated) = 0.593 W/kg SAR(1 g) = 0.438 mW/g; SAR(10 g) = 0.305 mW/g Maximum value of SAR (measured) = 0.483 mW/g





Test Report No : FA792103-1-2-02

# Appendix C – Calibration Data

ccredited by the Swiss Federal (			: SCS 108
he Swiss Accreditation Servic Iultilateral Agreement for the r			
lient Sporton (Aude	n)	Certificate No: D	835V2-499_Mar06
CALIBRATION	CERTIFICATE		
Dbject	D835V2 - SN: 49	9	again di Antonia ang
Calibration procedure(s)	QA CAL-05.v6 Calibration proce	dure for dipole validation kits	
			E Constant
Calibration date:	March 15, 2006		
Condition of the calibrated item	In Tolerance		
The measurements and the unce All calibrations have been condu	artainties with confidence protection of the closed laborator	onal standards, which realize the physical units of robability are given on the following pages and are y facility: environment temperature (22 ± 3)°C and	e part of the certificate.
The measurements and the unce All calibrations have been condu Calibration Equipment used (M&	artainties with confidence protocol and the closed laborator TE critical for calibration)	robability are given on the following pages and are y facility: environment temperature $(22 \pm 3)$ °C and	e part of the certificate. d humidity < 70%.
The measurements and the unce All calibrations have been conduin Calibration Equipment used (M& Primary Standards	artainties with confidence protected in the closed laborator TE critical for calibration)	robability are given on the following pages and are y facility: environment temperature (22 ± 3)°C and Cal Date (Calibrated by, Certificate No.)	e part of the certificate. d humidity < 70%. Scheduled Calibration
The measurements and the unce All calibrations have been conduin Calibration Equipment used (M& Primary Standards Power meter EPM-442A	artainties with confidence proceed in the closed laborator TE critical for calibration)	Cal Date (Calibrated by, Certificate No.) 04-Oct-05 (METAS, No. 251-00516)	e part of the certificate. d humidity < 70%. Scheduled Calibration Oct-06
The measurements and the unce All calibrations have been conduin Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A	artainties with confidence proceed in the closed laborator TE critical for calibration) ID # GB37480704 US37292783	Cal Date (Calibrated by, Certificate No.) 04-Oct-05 (METAS, No. 251-00516) 04-Oct-05 (METAS, No. 251-00516)	e part of the certificate. d humidity < 70%. Scheduled Calibration Oct-06 Oct-06
The measurements and the unce All calibrations have been conduin Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator	artainties with confidence proceed in the closed laborator TE critical for calibration)	Cal Date (Calibrated by, Certificate No.) 04-Oct-05 (METAS, No. 251-00516)	e part of the certificate. d humidity < 70%. Scheduled Calibration Oct-06
The measurements and the unce All calibrations have been conduin Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Reference 10 dB Attenuator	artainties with confidence pro- cted in the closed laborator TE critical for calibration) ID # GB37480704 US37292783 SN: 5086 (20g)	Cal Date (Calibrated by, Certificate No.) 04-Oct-05 (METAS, No. 251-00516) 04-Oct-05 (METAS, No. 251-00516) 11-Aug-05 (METAS, No. 251-00516)	e part of the certificate. d humidity < 70%. Scheduled Calibration Oct-06 Oct-06 Aug-06
The measurements and the unce All calibrations have been condu- Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 6481A Reference 20 dB Attenuator Reference 10 dB Attenuator Reference Probe ET3DV6	artainties with confidence pro- cted in the closed laborator TE critical for calibration) ID # GB37480704 US37292783 SN: 5086 (20g) SN: 5047.2 (10r)	Cal Date (Calibrated by, Certificate No.) 04-Oct-05 (METAS, No. 251-00516) 04-Oct-05 (METAS, No. 251-00516) 11-Aug-05 (METAS, No. 251-00498) 11-Aug-05 (METAS, No. 251-00498)	scheduled Calibration Oct-06 Oct-06 Aug-06 Aug-06
The measurements and the unce All calibrations have been conduin Calibration Equipment used (M& Primary Standards Power sensor HP 8481A Reference 20 dB Attenuator Reference 10 dB Attenuator Reference Probe ET3DV6 DAE4	artainties with confidence pro- cted in the closed laborator TE critical for calibration) ID # GB37480704 US37292783 SN: 5086 (20g) SN: 5047.2 (10r) SN 1507	Cal Date (Calibrated by, Certificate No.) 04-Oct-05 (METAS, No. 251-00516) 04-Oct-05 (METAS, No. 251-00516) 11-Aug-05 (METAS, No. 251-00498) 11-Aug-05 (METAS, No 251-00498) 28-Oct-05 (SPEAG, No. ET3-1507_Oct05)	e part of the certificate. d humidity < 70%. Scheduled Calibration Oct-06 Oct-06 Aug-06 Aug-06 Oct-06
The measurements and the unce All calibrations have been conduin Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Reference 10 dB Attenuator Reference Probe ET3DV6 DAE4 Secondary Standards	artainties with confidence pro- cted in the closed laborator TE critical for calibration) ID # GB37480704 US37292783 SN: 5086 (20g) SN: 5047.2 (10r) SN 1507 SN 601	Cal Date (Calibrated by, Certificate No.) 04-Oct-05 (METAS, No. 251-00516) 04-Oct-05 (METAS, No. 251-00516) 11-Aug-05 (METAS, No. 251-00498) 11-Aug-05 (METAS, No 251-00498) 28-Oct-05 (SPEAG, No. ET3-1507_Oct05) 15-Dec-05 (SPEAG, No. DAE4-601_Dec05)	e part of the certificate. d humidity < 70%. Scheduled Calibration Oct-06 Oct-06 Aug-06 Aug-06 Oct-06 Dec-06 Dec-06
The measurements and the unce All calibrations have been conduin Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Reference 10 dB Attenuator Reference Probe ET3DV6 DAE4 Secondary Standards Power sensor HP 8481A	artainties with confidence pro- cted in the closed laborator TE critical for calibration) ID # GB37480704 US37292783 SN: 5086 (20g) SN: 5047.2 (10r) SN 1507 SN 601 ID #	Cal Date (Calibrated by, Certificate No.) 04-Oct-05 (METAS, No. 251-00516) 04-Oct-05 (METAS, No. 251-00516) 04-Oct-05 (METAS, No. 251-00516) 11-Aug-05 (METAS, No 251-00498) 11-Aug-05 (METAS, No 251-00498) 28-Oct-05 (SPEAG, No. ET3-1507_Oct05) 15-Dec-05 (SPEAG, No. DAE4-601_Dec05) Check Date (in house)	e part of the certificate. d humidity < 70%. Scheduled Calibration Oct-06 Oct-06 Aug-06 Aug-06 Oct-06 Dec-06 Scheduled Check In house check: Not-07 In house check: Not-07
The measurements and the unce All calibrations have been conduin Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Reference 20 dB Attenuator Reference Probe ET3D\/6 DAE4 Secondary Standards Power sensor HP 8481A RF generator Agilent E4421B	artainties with confidence pro- cted in the closed laborator TE critical for calibration) ID # GB37480704 US37292783 SN: 5086 (20g) SN: 5047.2 (10r) SN 1507 SN 601 ID # MY41092317	Cal Date (Calibrated by, Certificate No.) 04-Oct-05 (METAS, No. 251-00516) 04-Oct-05 (METAS, No. 251-00516) 04-Oct-05 (METAS, No. 251-00516) 11-Aug-05 (METAS, No 251-00498) 11-Aug-05 (METAS, No 251-00498) 28-Oct-05 (SPEAG, No. ET3-1507_Oct05) 15-Dec-05 (SPEAG, No. DAE4-601_Dec05) Check Date (in house) 18-Oct-02 (SPEAG, in house check Oct-05)	e part of the certificate. d humidity < 70%. Scheduled Calibration Oct-06 Oct-06 Aug-06 Oct-06 Dec-06 Dec-06 Scheduled Check In house check, Oct-07
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The measurements and the unce All calibrations have been conduin Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Reference 20 dB Attenuator Reference 10 dB Attenuator Reference Probe ET3DV6 DAE4 Secondary Standards Power sensor HP 8481A RF generator Agilent E4421B Network Analyzer HP 8753E	artainties with confidence proceed in the closed laborator           TE critical for calibration)           ID #           GB37480704           US37292783           SN: 5086 (20g)           SN: 5086 (20g)           SN: 5047.2 (10r)           SN 1507           SN 601           ID #           MY41092317           MY41000875           US37390585 S4206           Name	Cal Date (Calibrated by, Certificate No.) 04-Oct-05 (METAS, No. 251-00516) 04-Oct-05 (METAS, No. 251-00516) 04-Oct-05 (METAS, No. 251-00516) 11-Aug-05 (METAS, No 251-00498) 11-Aug-05 (METAS, No 251-00498) 28-Oct-05 (SPEAG, No. ET3-1507_Oct05) 15-Dec-05 (SPEAG, No. DAE4-601_Dec05) Check Date (in house) 18-Oct-02 (SPEAG, in house check Nov-05) 18-Oct-01 (SPEAG, in house check Nov-05) Function	e part of the certificate. d humidity < 70%. Scheduled Calibration Oct-06 Oct-06 Aug-06 Oct-06 Dec-06 Scheduled Check In house check: Not-07 In house check: Not-07 In house check: Not-06 Signature
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Calibration Laboratory of Schmid & Partner Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland



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Accreditation No.: SCS 108

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

#### 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.

Certificate No: D835V2-499\_Mar06

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#### 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
Area Scan resolution	dx, dy = 15 mm	
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

#### Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	42.1 ± 6 %	0.94mho/m ± 6 %
Head TSL temperature during test	(22.2 ± 0.2) °C		

#### SAR result with Head TSL

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	condition	
SAR measured	250 mW input power	2.35 mW / g
SAR normalized	normalized to 1W	9.40 mW / g
SAR for nominal Head TSL parameters 1	normalized to 1W	9.24 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.53 mW / g
SAR normalized	normalized to 1W	6.12 mW / g
SAR for nominal Head TSL parameters 1	normalized to 1W	6.07 mW/g±16.5 % (k=2)

<sup>1</sup> Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

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#### Body TSL parameters

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	56.8±6%	0.98 mho/m ± 6 %
Body TSL temperature during test	(21.4 ± 0.2) °C		

#### SAR result with Body TSL

SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL	condition	
SAR measured	250 mW input power	2.45 mW / g
SAR normalized	normalized to 1W	9.80 mW / g
SAR for nominal Body TSL parameters 2	normalized to 1W	9.91 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.62 mW/g
SAR normalized	normalized to 1W	6.48 mW/g
SAR for nominal Body TSL parameters 2	normalized to 1W	6.55 mW / g ± 16.5 % (k=2)

<sup>2</sup> Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Certificate No: D835V2-499\_Mar06

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#### Appendix

#### Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.1 Ω - 2.9 jΩ
Return Loss	- 29.1 dB

#### Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.9 Ω - 5.1 JΩ	
Return Loss	- 24.9 dB	

#### General Antenna Parameters and Design

Electrical Delay (one direction)	1,391ns
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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	July 10, 2003

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#### DASY4 Validation Report for Head TSL

Date/Time: 15.03.2006 12:51:44

Test Laboratory: SPEAG, Zurich, Switzerland

#### DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:499

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1 Medium: HSL U10 BB; Medium parameters used: f = 835 MHz;  $\sigma = 0.942$  mho/m;  $\epsilon_r = 42.1$ ;  $\rho = 1000$  kg/m<sup>3</sup> Phantom section: Flat Section Measurement Standard: DASY4 (High Precision Assessment)

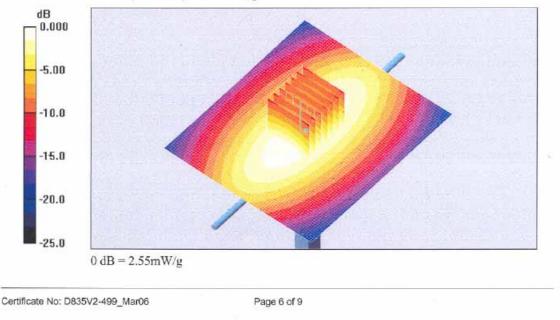
DASY4 Configuration:

- 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 14; Postprocessing SW: SEMCAD, V1.8 Build 165

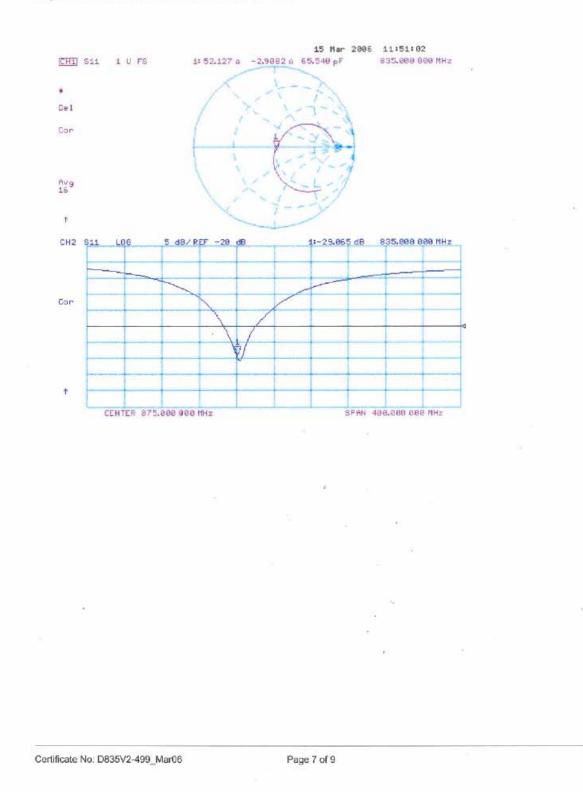
Pin = 250 mW; d = 10 mm/Area Scan (71x81x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (interpolated) = 2.54 mW/g

Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 53.7 V/m; Power Drift = -0.008 dB Peak SAR (extrapolated) = 3.53 W/kg SAR(1 g) = 2.35 mW/g; SAR(10 g) = 1.53 mW/g Maximum value of SAR (measured) = 2.55 mW/g







#### Impedance Measurement Plot for Head TSL



#### DASY4 Validation Report for Body TSL

Date/Time: 14.03.2006 12:37:15

Test Laboratory: SPEAG, Zurich, Switzerland

#### DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:499

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1 Medium: MSL U10; Medium parameters used: f = 835 MHz;  $\sigma = 0.972$  mho/m;  $\epsilon_r = 56.9$ ;  $\rho = 1000$  kg/m<sup>3</sup> Phantom section: Flat Section Measurement Standard: DASY4 (High Precision Assessment)

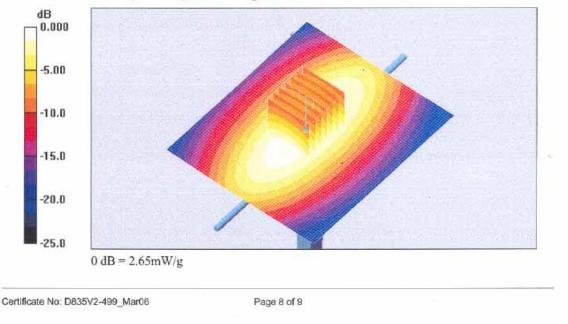
DASY4 Configuration:

- Probe: ET3DV6 SN1507 (HF); ConvF(5.84, 5.84, 5.84); 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 14; Postprocessing SW: SEMCAD, V1.8 Build 165

Pin = 250 mW; d = 10 mm/Area Scan (71x81x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (interpolated) = 2.63 mW/g

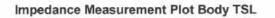
# Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

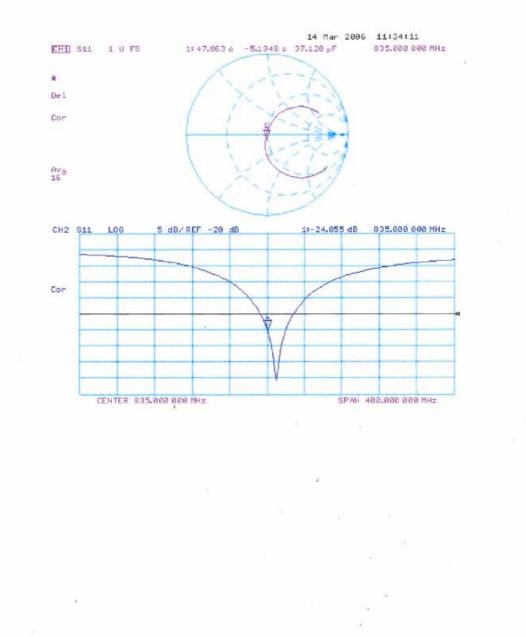
Reference Value = 53.3 V/m; Power Drift = 0.026 dBPeak SAR (extrapolated) = 3.51 W/kgSAR(1 g) = 2.45 mW/g; SAR(10 g) = 1.62 mW/gMaximum value of SAR (measured) = 2.65 mW/g





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Certificate No: D835V2-499\_Mar06

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



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

Accreditation No.: SCS 108

NO

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

Client Sporton (Auden)

Certificate No: D1900V2-5d041\_Mar06

Object	D1900V2 - SN: 5	d041	
Calibration procedure(s)	QA CAL-05.v6		
	Calibration proce	dure for dipole validation kits	
Calibration date:	March 21, 2006		
Condition of the calibrated item	In Tolerance		
he measurements and the unce	artainties with confidence p	onal standards, which realize the physical units of robability are given on the following pages and are	e part of the certificate.
Calibrations have been condu		ry facility: environment temperature (22 ± 3)°C and	a humidity < 70%.
Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
ower meter EPM-442A	GB37480704	04-Oct-05 (METAS, No. 251-00516)	Oct-06
ower sensor HP 8481A	US37292783	04-Oct-05 (METAS, No. 251-00516)	Oct-06
ference 20 dB Attenuator	SN: 5086 (20g)	11-Aug-05 (METAS, No 251-00498)	Aug-06
	SN: 5047.2 (10r)	11-Aug-05 (METAS, No 251-00498)	Aug-06
eference 10 dB Attenuator		ter mig an fine trial the set as test	Aug-00
eference 10 dB Attenuator eference Probe ET3DV6	SN: 1507	28-Oct-05 (SPEAG, No. ET3-1507_Oct05)	Oct-06
eference 10 dB Attenuator eference Probe ET3DV6		그 가슴에 걸 것 같은 것이 없는 것 것 것 같은 것이 가지 않는 것 같은 것이 있는 것 같아요.	0.0772-0223
eference 10 dB Attenuator eference Probe ET3DV6 AE4 econdary Standards	SN: 1507 SN: 601 ID #	28-Oct-05 (SPEAG, No. ET3-1507_Oct05)	Oct-06
eference 10 dB Attenuator eference Probe ET3DV6 AE4 econdary Standards ower sensor HP 8481A	SN: 1507 SN: 601 ID # MY41092317	28-Oct-05 (SPEAG, No. ET3-1507_Oct05) 15-Dec-05 (SPEAG, No. DAE4-601_Dec05)	Oct-06 Dec-06
eference 10 dB Attenuator eference Probe ET3DV6 AE4 econdary Standards ower sensor HP 8481A F generator Agilent E4421B	SN: 1507 SN: 601 ID # MY41092317 MY41000675	28-Oct-05 (SPEAG, No. ET3-1507_Oct05) 15-Dec-05 (SPEAG, No. DAE4-601_Dec05) Check Date (in house) 18-Oct-02 (SPEAG, in house check Oct-05) 11-May-05 (SPEAG, in house check Nov-05)	Oct-06 Dec-06 Scheduled Check In house check: Oct-07 In house check: Nov-07
eference 10 dB Attenuator eference Probe ET3DV6 AE4 econdary Standards ower sensor HP 8481A F generator Agilent E4421B	SN: 1507 SN: 601 ID # MY41092317	28-Oct-05 (SPEAG, No. ET3-1507_Oct05) 15-Dec-05 (SPEAG, No. DAE4-601_Dec05) Check Date (in house) 18-Oct-02 (SPEAG, in house check Oct-05)	Oct-06 Dec-06 Scheduled Check In house check: Oct-07
eference 10 dB Attenuator eference Probe ET3DV6 AE4 accordary Standards wer sensor HP 8481A F generator Agilent E4421B	SN: 1507 SN: 601 ID # MY41092317 MY41000675	28-Oct-05 (SPEAG, No. ET3-1507_Oct05) 15-Dec-05 (SPEAG, No. DAE4-601_Dec05) Check Date (in house) 18-Oct-02 (SPEAG, in house check Oct-05) 11-May-05 (SPEAG, in house check Nov-05)	Oct-06 Dec-06 Scheduled Check In house check: Oct-07 In house check: Nov-07
eference 10 dB Attenuator eference Probe ET3DV6 AE4 econdary Standards ower sensor HP 8481A # generator Agilent E4421B	SN: 1507 SN: 601 ID # MY41092317 MY41000675	28-Oct-05 (SPEAG, No. ET3-1507_Oct05) 15-Dec-05 (SPEAG, No. DAE4-601_Dec05) Check Date (in house) 18-Oct-02 (SPEAG, in house check Oct-05) 11-May-05 (SPEAG, in house check Nov-05) 18-Oct-01 (SPEAG, in house check Nov-05)	Oct-06 Dec-06 In house check: Oct-07 In house check: Nov-07 In house check: Nov-06
Reference 10 dB Attenuator Reference Probe ET3DV6 AE4 Becondary Standards Power sensor HP 8481A RF generator Agilent E4421B Jetwork Analyzer HP 8753E	SN: 1507 SN: 601 ID # MY41092317 MY41000675 US37390585 S4206	28-Oct-05 (SPEAG, No. ET3-1507_Oct05) 15-Dec-05 (SPEAG, No. DAE4-601_Dec05) Check Date (in house) 18-Oct-02 (SPEAG, in house check Oct-05) 11-May-05 (SPEAG, in house check Nov-05)	Oct-06 Dec-06 Scheduled Check In house check: Oct-07 In house check: Nov-07 In house check: Nov-06 Signature
Reference 10 GB Attenuator Reference Probe ET3DV6 DAE4 Secondary Standards Power sensor HP 8481A RF generator Agilent E4421B Network Analyzer HP 8753E - Calibrated by:	SN: 1507 SN: 601 ID # MY41092317 MY41000675 US37390585 S4206 Name	28-Oct-05 (SPEAG, No. ET3-1507_Oct05) 15-Dec-05 (SPEAG, No. DAE4-601_Dec05) Check Date (in house) 18-Oct-02 (SPEAG, in house check Oct-05) 11-May-05 (SPEAG, in house check Nov-05) 18-Oct-01 (SPEAG, in house check Nov-05) Function	Oct-06 Dec-06 Scheduled Check In house check: Oct-07 In house check: Nov-07 In house check: Nov-06 Signature
Reference 10 dB Attenuator Reference Probe ET3DV6 DAE4 Secondary Standards Power sensor HP 8481A RF generator Agilent E4421B Network Analyzer HP 8753E	SN: 1507 SN: 601 ID # MY41092317 MY41000675 US37390585 S4206 Name Judith Müller	28-Oct-05 (SPEAG, No. ET3-1507_Oct05) 15-Dec-05 (SPEAG, No. DAE4-601_Dec05) Check Date (in house) 18-Oct-02 (SPEAG, in house check Oct-05) 11-May-05 (SPEAG, in house check Nov-05) 18-Oct-01 (SPEAG, in house check Nov-05) Function Laboratory Technician	Oct-06 Dec-06 Scheduled Check In house check: Oct-07 In house check: Nov-06 In house check: Nov-06



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



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Swiss Calibration Service

Accreditation No.: SCS 108

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  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.

Certificate No: D1900V2-5d041\_Mar06

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#### 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
Area Scan resolution	dx, dy = 15 mm	
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	39.4 ± 6 %	1.42 mho/m ± 6 %
Head TSL temperature during test	(21.5 ± 0.2) °C		

#### SAR result with Head TSL

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	condition	
SAR measured	250 mW input power	9.75 mW / g
SAR normalized	normalized to 1W	39.0 mW / g
SAR for nominal Head TSL parameters 1	normalized to 1W	38.4 mW / g ± 17.0 % (k=2)
SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	5.17 mW / g
SAR normalized	normalized to 1W	20.7 mW / g
SAR for nominal Head TSL parameters 1	normalized to 1W	20.5 mW/g±16.5 % (k=2)

<sup>1</sup> Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Certificate No: D1900V2-5d041\_Mar06

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#### Body TSL parameters

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.7 ± 6 %	1.54 mho/m ± 6 %
Body TSL temperature during test	(21.6 ± 0.2) °C		

#### SAR result with Body TSL

SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	10.2 mW / g
SAR normalized	normalized to 1W	40.8 mW / g
SAR for nominal Body TSL parameters <sup>2</sup>	normalized to 1W	41.1 mW/g±17.0 % (k=2)
SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	condition	
SAR averaged over 10 cm (10 g) of Body ISL SAR measured	condition 250 mW input power	5.40 mW / g
	actionet.	5.40 mW / g 21.6 mW / g
SAR measured	250 mW input power	

<sup>2</sup> Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

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#### Appendix

#### Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.5 Ω + 5.1 jΩ	
Return Loss	- 24.8 dB	

#### Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.9 Ω + 6.3 jΩ	
Return Loss	- 23.4 dB	

#### General Antenna Parameters and Design

Electrical Delay (one direction)	1.200 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	July 4, 2003			

Certificate No: D1900V2-5d041\_Mar06

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#### DASY4 Validation Report for Head TSL

Date/Time: 14.03.2006 16:18:53

Test Laboratory: SPEAG, Zurich, Switzerland

#### DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d041

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1 Medium: HSL U10 BB; Medium parameters used: f = 1900 MHz;  $\sigma$  = 1.42 mho/m;  $\epsilon_r$  = 39.4;  $\rho$  = 1000 kg/m<sup>3</sup> Phantom section: Flat Section Measurement Standard: DASY4 (High Precision Assessment)

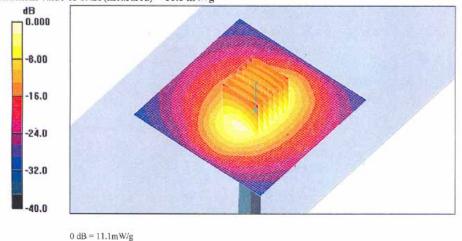
DASY4 Configuration:

- 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 14; Postprocessing SW: SEMCAD, V1.8 Build 165

Pin = 250 mW; d = 10 mm/Area Scan (71x71x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (interpolated) = 11.7 mW/g

Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 90.9 V/m; Power Drift = -0.093 dB Peak SAR (extrapolated) = 16.6 W/kg SAR(1 g) = 9.75 mW/g; SAR(10 g) = 5.17 mW/g Maximum value of SAR (measured) = 11.1 mW/g

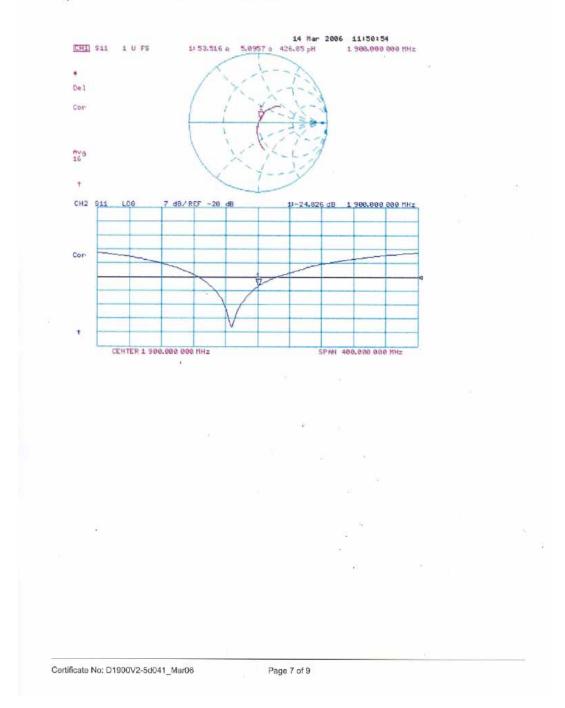


Certificate No: D1900V2-5d041\_Mar06

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#### Impedance Measurement Plot for Head TSL





#### DASY4 Validation Report for Body TSL

Date/Time: 21.03.2006 13:59:55

Test Laboratory: SPEAG, Zurich, Switzerland

#### DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d041

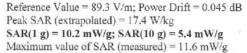
 $\begin{array}{l} Communication \ System: \ CW; \ Frequency: \ 1900 \ MHz; \ Duty \ Cycle: \ 1:1 \\ Medium: \ MSL \ U10; \\ Medium \ parameters \ used: \ f = 1900 \ MHz; \ \sigma = 1.54 \ mho/m; \ \epsilon_r = 54.7; \ \rho = 1000 \ kg/m^3 \\ Phantom \ section: \ Flat \ Section \\ Measurement \ Standard: \ DASY4 \ (High \ Precision \ Assessment) \\ \end{array}$ 

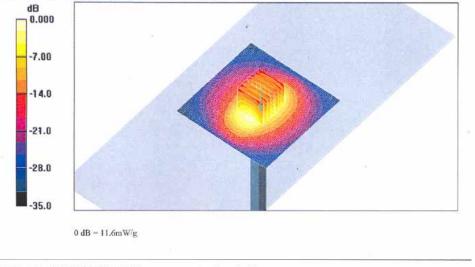
DASY4 Configuration:

- Probe: ET3DV6 SN1507 (HF); ConvF(4.3, 4.3, 4.3); 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, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161

**Pin = 250 mW; d = 10 mm/Area Scan (71x71x1):** Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (interpolated) = 11.8 mW/g

Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm



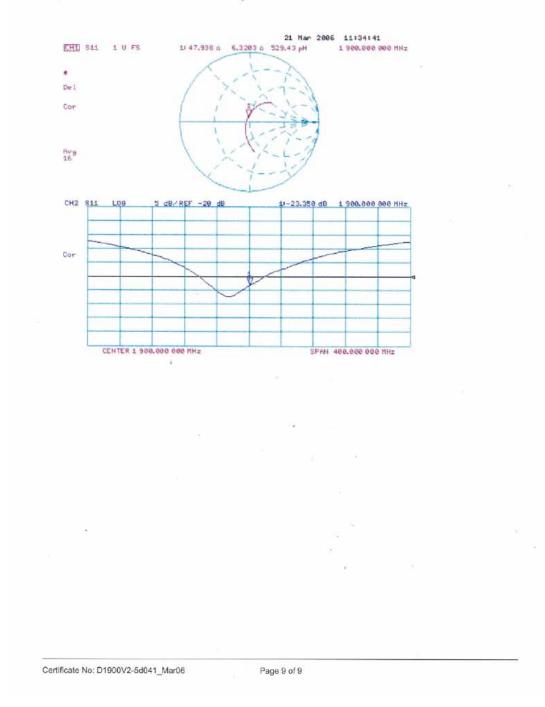


Certificate No: D1900V2-5d041\_Mar06

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#### Impedance Measurement Plot for Body TSL





Test Report No : FA792103-1-2-02

Engineering AG eughausstrasse 43, 8004 Zurio	ch, Switzerland	HAC MRA	ervice suisse d'étalonnage ervizio svizzero di taratura wiss Calibration Service
corredited by the Swiss Federal he Swiss Accreditation Servic fultilateral Agreement for the r	e is one of the signator	ies to the EA	.: SCS 108
lient Sporton (Aude	a standard states and states to		T3-1787_Aug07
CALIBRATION	CERTIFICAT	E	
Object	ET3DV6 - SN:1	787	
Calibration procedure(s)	QA CAL-01.v6 Calibration proc	edure for dosimetric E-field probes	
Calibration date:	August 28, 200	7	
Condition of the calibrated item	In Tolerance		astanti suit -
The measurements and the unce	ertainties with confidence	tional standards, which realize the physical units of probability are given on the following pages and an ory facility: environment temperature $(22 \pm 3)^{\circ}$ C and	e part of the certificate.
The measurements and the unce	ertainties with confidence	probability are given on the following pages and an	e part of the certificate.
The measurements and the unce All calibrations have been condu Calibration Equipment used (M& Primary Standards	ertainties with confidence cted in the closed laborat TE critical for calibration)	probability are given on the following pages and an ory facility: environment temperature (22 ± 3)°C and Cal Date (Calibrated by, Certificate No.)	e part of the certificate. d humidity < 70%. Scheduled Calibration
The measurements and the unce All calibrations have been condu Calibration Equipment used (M& Primary Standards	ertainties with confidence cted in the closed laborat TE critical for calibration) ID # GB41293874	probability are given on the following pages and an ory facility: environment temperature (22 ± 3)°C and Cal Date (Calibrated by, Certificate No.) 29-Mar-07 (METAS, No. 217-00670)	e part of the certificate. d humidity < 70%. Scheduled Calibration Mar-08
The measurements and the unce All calibrations have been condu Calibration Equipment used (M& Primary Standards Power meter E44198 Power sensor E4412A	ertainties with confidence cted in the closed laborat TE critical for calibration) ID # GB41293874 MY41495277	probability are given on the following pages and an ory facility: environment temperature (22 ± 3)°C and Cal Date (Calibrated by, Certificate No.) 29-Mar-07 (METAS, No. 217-00670) 29-Mar-07 (METAS, No. 217-00670)	e part of the certificate. d humidity < 70%. Scheduled Calibration Mar-08 Mar-08
The measurements and the unce All calibrations have been condu Calibration Equipment used (M& Primary Standards Power meter E44198 Power sensor E4412A Power sensor E4412A	ettainties with confidence cted in the closed laborat TE critical for calibration) ID # GB41293874 MY41495277 MY41498087	probability are given on the following pages and an ory facility: environment temperature (22 ± 3)°C and Cal Date (Calibrated by, Certificate No.) 29-Mar-07 (METAS, No. 217-00670) 29-Mar-07 (METAS, No. 217-00670) 29-Mar-07 (METAS, No. 217-00670)	e part of the certificate. d humidity < 70%. Scheduled Calibration Mar-08 Mar-08 Mar-08
The measurements and the unce All calibrations have been condu Calibration Equipment used (M& Primary Standards Power meter E44198 Power sensor E4412A Reference 3 dB Attenuator	ettainties with confidence cted in the closed laborat TE critical for calibration) ID # GB41293874 MY41495277 MY41498087 SN: S5054 (3c)	probability are given on the following pages and an ory facility: environment temperature (22 ± 3)°C and Cal Date (Calibrated by, Certificate No.) 29-Mar-07 (METAS, No. 217-00670) 29-Mar-07 (METAS, No. 217-00670) 8-Aug-07 (METAS, No. 217-00670) 8-Aug-07 (METAS, No. 217-00719)	e part of the certificate. d humidity < 70%. Scheduled Calibration Mar-08 Mar-08 Mar-08 Aug-08
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The measurements and the unce All calibrations have been condu Calibration Equipment used (M& Primary Standards Power sensor E4412A Power sensor E4412A Power sensor E4412A Reference 3 dB Attenuator Reference 3 dB Attenuator Reference 30 dB Attenuator Reference Probe ES3DV2 DAE4 Secondary Standards	ertainties with confidence cled in the closed laborat TE critical for calibration) ID # GB41293874 MY41495277 MY41495087 SN: S5054 (3c) SN: S5054 (3c) SN: S5056 (20b) SN: S5129 (30b) SN: 3013 SN: 654	probability are given on the following pages and an ory facility: environment temperature (22 ± 3)°C and 29-Mar-07 (METAS, No. 217-00670) 29-Mar-07 (METAS, No. 217-00670) 29-Mar-07 (METAS, No. 217-00670) 8-Aug-07 (METAS, No. 217-00719) 29-Mar-07 (METAS, No. 217-00719) 29-Mar-07 (METAS, No. 217-0071) 8-Aug-07 (METAS, No. 217-00720) 4-Jan-07 (SPEAG, No. ES3-3013_Jan07) 20-Apr-07 (SPEAG, No. DAE4-654_Apr07)	e part of the certificate. d humidity < 70%. Scheduled Calibration Mar-08 Mar-08 Mar-08 Aug-08 Mar-08 Aug-08 Jan-08 Aug-08 Jan-08 Apr-08
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The measurements and the unce All calibrations have been condu Calibration Equipment used (M& Primary Standards Power sensor E44198 Power sensor E4412A Power sensor E4412A Reference 3 dB Attenuator Reference 30 dB Attenuator Reference Probe ES3DV2 DAE4 Secondary Standards RF generator HP 8648C Network Analyzer HP 8753E	ertainties with confidence cled in the closed laborat TE critical for calibration) ID # GB41293874 MY41495087 SN: S5054 (3c) SN: S5086 (20b) SN: S5129 (30b) SN: 654 ID # US3642U01700	probability are given on the following pages and an           ory facility: environment temperature (22 ± 3)°C and           29-Mar-07 (METAS, No. 217-00670)           8-Aug-07 (METAS, No. 217-00670)           8-Aug-07 (METAS, No. 217-00671)           8-Aug-07 (METAS, No. 217-00720)           4-Jan-07 (SPEAG, No. ES3-3013_Jan07)           20-Apr-07 (SPEAG, No. DAE4-654_Apr07)           Check Date (in house)           4-Aug-99 (SPEAG, in house check Nov-05)	e part of the certificate. d humidity < 70%. Scheduled Calibration Mar-08 Mar-08 Mar-08 Aug-08 Mar-08 Aug-08 Jan-08 Apr-08 Scheduled Check In house check: Nov-07
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The measurements and the unce All calibrations have been condu Calibration Equipment used (M& Primary Standards Power sensor E44198 Power sensor E4412A Power sensor E4412A Reference 3 dB Attenuator Reference 30 dB Attenuator Reference Probe ES3DV2 DAE4 Secondary Standards RF generator HP 8648C Network Analyzer HP 8753E	ertainties with confidence cted in the closed laborat TE critical for calibration) ID # GB41293874 MY41495277 MY41495087 SN: S5054 (3c) SN: S5054 (3c) SN: S5054 (3c) SN: S5054 (3c) SN: S5029 (30b) SN: S5129 (30b) SN: 3013 SN: 654 ID # US3642U01700 US37390585 Name	probability are given on the following pages and an ory facility: environment temperature (22 ± 3)°C and 29-Mar-07 (METAS, No. 217-00670) 29-Mar-07 (METAS, No. 217-00670) 29-Mar-07 (METAS, No. 217-00670) 8-Aug-07 (METAS, No. 217-00670) 8-Aug-07 (METAS, No. 217-00671) 8-Aug-07 (METAS, No. 217-00671) 8-Aug-07 (METAS, No. 217-00720) 4-Jan-07 (SPEAG, No. DAE4-654_Apr07) 20-Apr-07 (SPEAG, No. DAE4-654_Apr07) Check Date (in house) 4-Aug-99 (SPEAG, in house check Nov-05) 18-Oct-01 (SPEAG, in house check Oct-06) Function	e part of the certificate. d humidity < 70%. Scheduled Calibration Mar-08 Mar-08 Aug-08 Aug-08 Aug-08 Jan-08 Apr-08 Scheduled Check In house check: Nov-07 In house check: Oct-07

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



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

Accreditation No.: SCS 108

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

#### Glossary: TSL

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
Polarization $\phi$	φ rotation around probe axis
Polarization 9	$\vartheta$ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

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

- a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

#### Methods Applied and Interpretation of Parameters:

- NORMx,y,z: Assessed for E-field polarization 9 = 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<sup>2</sup>-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.

Certificate No: ET3-1787\_Aug07

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August 28, 2007

# Probe ET3DV6

# SN:1787

Manufactured: Last calibrated: Recalibrated: May 28, 2003 May 31, 2006 August 28, 2007

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

Certificate No: ET3-1787\_Aug07

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August 28, 2007

## DASY - Parameters of Probe: ET3DV6 SN:1787

Sensitivity in Free Space<sup>A</sup>

Diode Compression<sup>B</sup>

NormX	1.63 ± 10.1%	$\mu V/(V/m)^2$	DCP X	92 mV
NormY	1.66 ± 10.1%	μV/(V/m) <sup>2</sup>	DCP Y	96 mV
NormZ	2.08 ± 10.1%	μV/(V/m) <sup>2</sup>	DCP Z	91 mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

#### Boundary Effect

TSL

900 MHz Typical SAR gradient: 5 % per mm

Sensor Cente	er to Phantom Surface Distance	3.7 mm	4.7 mm
SAR <sub>be</sub> [%]	Without Correction Algorithm	4.7	2.0
SAR <sub>be</sub> [%]	With Correction Algorithm	0.1	0.0

#### 1810 MHz Typical SAR gradient: 10 % per mm

r to Phantom Surface Distance	3.7 mm	4.7 mm
Without Correction Algorithm	11.8	7.0
With Correction Algorithm	0.2	0.4
	Without Correction Algorithm	Without Correction Algorithm 11.8

Sensor Offset

TSL

Probe Tip to Sensor Center

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%.

2.7 mm

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

<sup>B</sup> Numerical linearization parameter: uncertainty not required.

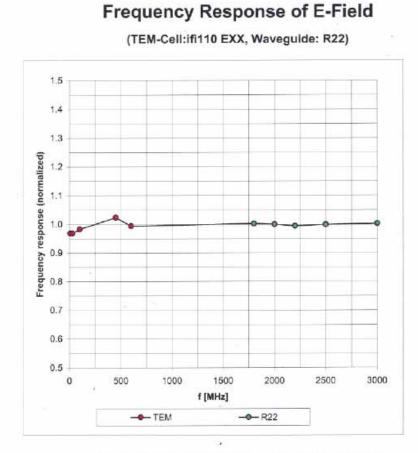
Certificate No: ET3-1787\_Aug07

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August 28, 2007



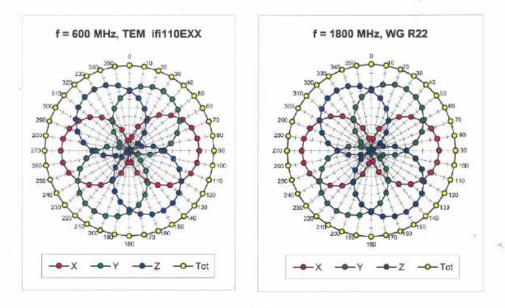
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

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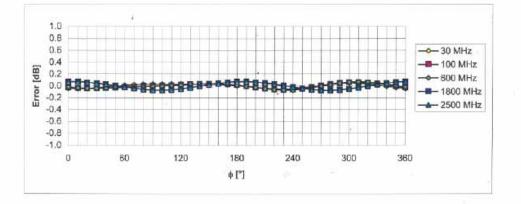
Page 5 of 9

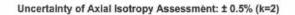


August 28, 2007



# Receiving Pattern ( $\phi$ ), $\vartheta = 0^{\circ}$





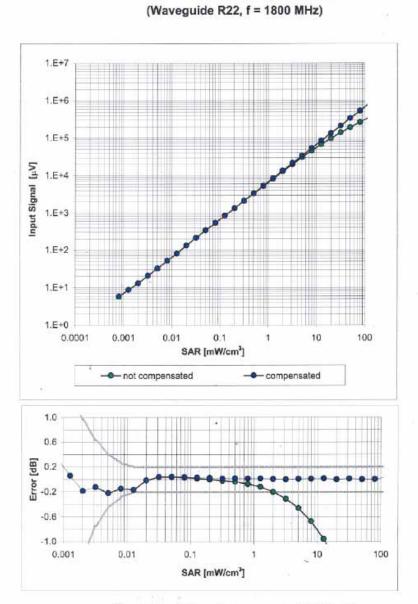
4

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August 28, 2007



Dynamic Range f(SAR<sub>head</sub>)

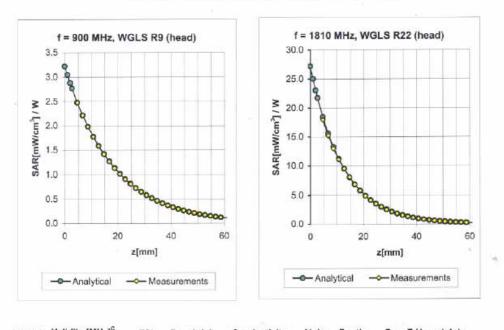
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

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### **Conversion Factor Assessment**

f [MHz]	Validity [MHz]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.32	2.42	6.58 ± 11.0% (k=2)
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.50	2.61	5.16 ± 11.0% (k=2)
2000	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.55	2.45	4.80 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.67	1.81	4.50 ± 11.8% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.36	, 2.52	6.10 ± 11.0% (k=2)
1810	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.61	2.56	4.68 ± 11.0% (k=2)
2000	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.60	2.40	4.30 ± 11.0% (k=2)
2450	$\pm$ 50 / $\pm$ 100	Body	52.7 ± 5%	1.95 ± 5%	0.65	2.15	4.02 ± 11.8% (k=2)

<sup>C</sup> 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.

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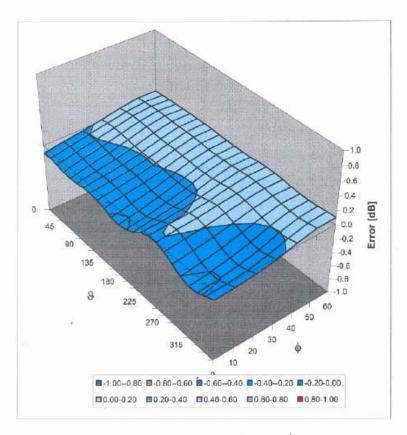
10

ET3DV6 SN:1787

August 28, 2007

## **Deviation from Isotropy in HSL**

Error (\, 9), f = 900 MHz



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

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Accredited by the Swiss Federal Off The Swiss Accreditation Service i	ten of Motorings and App		
Iultilateral Agreement for the rec	s one of the signatories	to the EA	o.: SCS 108
Illent Sporton (Auden)	N		DAE3-577_Nov06
CALIBRATION CI	ERTIFICATE		
Object	DAE3 - SD 000 D	03 AA - SN: 577	
Calibration procedure(s)	QA CAL-06.v12 Calibration proceed	dure for the data acquisition electr	onics (DAE)
Calibration date:	November 21, 20	06	
Condition of the calibrated item	In Tolerance		
	a 26.		
The measurements and the uncerta	ainties with confidence pro	nal standards, which realize the physical units obability are given on the following pages and $\alpha$ facility: environment temperature (22 ± 3)°C a	are part of the certificate.
The measurements and the uncerta All calibrations have been conducte Calibration Equipment used (M&TE	ainties with confidence pro ed in the closed laboratory critical for calibration)	obability are given on the following pages and a facility: environment temperature $(22\pm3)$ °C a	are part of the certificate. and humidity < 70%.
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The measurements and the uncerta All calibrations have been conducte Calibration Equipment used (M&TE Primary Standards Fluke Process Calibrator Type 702 Keithley Multimeter Type 2001	ainties with confidence pro- ed in the closed laboratory critical for calibration) ID # SN: 6295803 SN: 0810278	Cal Date (Calibrated by, Certificate No.) 13-Oct-06 (Elcal AG, No: 5478)	are part of the certificate. and humidity < 70%. Scheduled Calibration Oct-07 Oct-07
The measurements and the uncerta	ainties with confidence pro- ed in the closed laboratory critical for calibration) ID # SN: 6295803 SN: 0810278 ID #	Cal Date (Calibrated by, Certificate No.) 13-Oct-06 (Elcal AG, No: 5492)	are part of the certificate. and humidity < 70%. Scheduled Calibration Oct-07
The measurements and the uncerta All calibrations have been conducte Calibration Equipment used (M&TE Primary Standards Fluke Process Calibrator Type 702 Keithley Multimeter Type 2001 Secondary Standards	ainties with confidence pro- ed in the closed laboratory critical for calibration) ID # SN: 6295803 SN: 0810278 ID #	Cal Date (Calibrated by, Certificate No.) 13-Oct-06 (Elcal AG, No: 5492) 03-Oct-06 (Elcal AG, No: 5478) Check Date (in house)	are part of the certificate. and humidity < 70%. Scheduled Calibration Oct-07 Oct-07 Scheduled Check
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The measurements and the uncerta All calibrations have been conducte Calibration Equipment used (M&TE Primary Standards Fluke Process Calibrator Type 702 Keithley Multimeter Type 2001 Secondary Standards Calibrator Box V1.1	ainties with confidence pro- ed in the closed laboratory critical for calibration) ID # SN: 6295803 SN: 0810278 ID #	Cal Date (Calibrated by, Certificate No.) 13-Oct-06 (Elcal AG, No: 5492) 03-Oct-06 (Elcal AG, No: 5478) Check Date (in house) 15-Jun-06 (SPEAG, in house check) Function	are part of the certificate. and humidity < 70%. Scheduled Calibration Oct-07 Oct-07 Scheduled Check
The measurements and the uncerta All calibrations have been conducte Calibration Equipment used (M&TE Primary Standards Fluke Process Calibrator Type 702 Keithley Multimeter Type 2001 Secondary Standards Calibrator Box V1.1	ainties with confidence pro- ed in the closed laboratory critical for calibration) ID # SN: 6295803 SN: 0810278 ID # SE UMS 006 AB 1002	Cal Date (Calibrated by, Certificate No.) 13-Oct-06 (Elcal AG, No: 5492) 03-Oct-06 (Elcal AG, No: 5492) Check Date (in house) 15-Jun-06 (SPEAG, in house check)	are part of the certificate. and humidity < 70%. Scheduled Calibration Oct-07 Oct-07 Scheduled Check In house check Jun-07
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Calibration Laboratory of Schmid & Partner Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland



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

Accreditation No.: SCS 108

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#### Glossary

DAE Connector angle

r angle information used in DASY system to align probe sensor X to the robot coordinate system.

#### Methods Applied and Interpretation of Parameters

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

- DC Voltage Measurement: Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- Connector angle: The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The following parameters contain technical information as a result from the performance test and require no uncertainty.
- DC Voltage Measurement Linearity: Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.
- Common mode sensitivity: Influence of a positive or negative common mode voltage on the differential measurement.
- Channel separation: Influence of a voltage on the neighbor channels not subject to an input voltage.
- AD Converter Values with inputs shorted: Values on the internal AD converter corresponding to zero input voltage
- Input Offset Measurement: Output voltage and statistical results over a large number of zero voltage measurements.
- Input Offset Current: Typical value for information; Maximum channel input offset current, not considering the input resistance.
- Input resistance: DAE input resistance at the connector, during internal auto-zeroing and during measurement.
- Low Battery Alarm Voltage: Typical value for information. Below this voltage, a battery alarm signal is generated.
- Power consumption: Typical value for information. Supply currents in various operating modes.

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#### DC Voltage Measurement

 A/D - Converter Resolution nominal High Range:
 1LSB =
 6.1μV,
 full range =
 -100...+300 mV

 Low Range:
 1LSB =
 61nV,
 full range =
 -100...+3mV

 DASY measurement parameters:
 Auto Zero Time: 3 sec;
 Measuring time: 3 sec

Calibration Factors	x	Y	z
High Range	404.355 ± 0.1% (k=2)	403.806 ± 0.1% (k=2)	404.276 ± 0.1% (k=2)
Low Range	3.92854 ± 0.7% (k=2)	3.93862 ± 0.7% (k=2)	3.93591 ± 0.7% (k=2)

#### **Connector Angle**

	Alternative and the second second
Connector Angle to be used in DASY system	268 ° ± 1 °

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#### Appendix

1.	DC	Vol	tage	Linearity

High Range	Input (µV)	Reading (µV)	Error (%)
Channel X + Input	200000	199999.5	0.00
Channel X + Input	20000	20005.87	0.03
Channel X - Input	20000	-19998.71	-0.01
Channel Y + Input	200000	200000	0.00
Channel Y + Input	20000	20004.22	0.02
Channel Y - Input	20000	-20003.23	0.02
Channel Z + Input	200000	200000.6	0.00
Channel Z + Input	20000	20005.24	0.03
Channel Z - Input	20000	-20001.80	0.01

Low Range	Input (μV)	Reading (µV)	Error (%)
Channel X + Input	2000	1999.9	0.00
Channel X + Input	200	200.27	0.13
Channel X - Input	200	-200.73	0.36
Channel Y + Input	2000	2000.1	0.00
Channel Y + Input	200	199.22	-0.39
Channel Y - Input	~ 200	-200.86	0.43
Channel Z + Input	2000	1999.9	0.00
Channel Z + Input	200	199.28	-0.36
Channel Z - Input	200	-200.94	0.47

#### 2. Common mode sensitivity

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Common mode Input Voltage (mV)	High Range Average Reading (μV)	Low Range Average Reading (µV)
Channel X	200	14.24	12,49
	- 200	-12.13	-12.92
Channel Y	200	-6.51	-7.06
	- 200	6.05	5.81
Channel Z	200	1.09	0.86
	- 200	-2.86	-2.63

#### 3. Channel separation

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Input Voltage (mV)	Channel X (µV)	Channel Y (µV)	Channel Z (µV)
Channel X	200	3	2.51	0.09
Channel Y	200	0.43		3.37
Channel Z	200	-0.55	0.96	045

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#### 4. AD-Converter Values with inputs shorted

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	High Range (LSB)	Low Range (LSB)
Channel X	15970	16306
Channel Y	15851	16305
Channel Z	16208	17068

#### 5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec Input 10 M  $\!\Omega$ 

	Average (µV)	min. Offset (μV)	max. Offset (µV)	Std. Deviation (µV)
Channel X	-0.51	-1.55	0.47	0.50
Channel Y	-2.06	-4.32	-0.65	0.60
Channel Z	-1.63	-2.56	-0.15	0.35

#### 6. Input Offset Current

Nominal Input circuitry offset current on all channels: <25fA

#### 7. Input Resistance

	Zeroing (MOhm)	Measuring (MOhm)
Channel X	0.2000	199.8
Channel Y	0.2000	200.7
Channel Z	0.2000	199.8

#### 8. Low Battery Alarm Voltage (verified during pre test)

Typical values	Alarm Level (VDC)	
Supply (+ Vcc)	+7.9	
Supply (- Vcc)	-7.6	

#### 9. Power Consumption (verified during pre test)

Typical values	Switched off (mA)	Stand by (mA)	Transmitting (mA)	
Supply (+ Vcc)	+0.0	+6	+14	
Supply (- Vcc)	-0.01	-8	-9	

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Test Report No : FA792103-1-2-02

The Swiss Accreditation Servic	a is one of the sinester		: SCS 108
Multilateral Agreement for the r			
Cilent Sporton (Aude			T3-1787_Aug07
CALIBRATION	CEDTIEICAT	Contraction of the second s	
CALIBRATION	CERTIFICAT		CONTRACTOR OF THE
Otject	ET3DV6 - SN:1	787	Hard Story and
Calibration procedure(s)	QA CAL-01.v6 Calibration proc	edure for dosimetric E-field probes	
Calibration date:	August 28, 2007		17.02.32.10
Condition of the calibrated item	In Tolerance	A REAL PROPERTY OF	STATISTICS.
The measurements and the unce	stainties with confidence	tional standards, which realize the physical units of probability are given on the following pages and an ory facility: environment temperature (22 ± 3)°C and	e part of the certificate.
The measurements and the unce	etainties with confidence	probability are given on the following pages and an ory facility: environment temperature ( $22 \pm 3$ ) <sup>o</sup> C and	e part of the certificate.
The measurements and the unce All calibrations have been condu- Calibration Equipment used (MS)	intainties with confidence clod in the cleaed laborat TE critical for calibration)	probability are given on the following pages and an ory facility: environment temperature (22 $\pm$ 3)°C and	e part of the certificate. c humidity < 70%.
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The measurements and the unce All calibrations have been condu- Calibration Equipment used [M&' Primary Standards Power sensor E44198 Power sensor E4412A Power sensor E4412A Reference 3 dB Attenuator	Italinties with confidence ted in the closed laboral TE critical for calibration) ID # GB41293874 MY41495277 MY41495087 SN 55054 (3c)	probability are given on the following pages and an ory faolity: environment temperature (22 ± 3)°C and Cal Date (Calibrated by, Cartificate No.) 29-Mar-07 (METAS, No. 217-00670) 29-Mar-07 (METAS, No. 217-00670) 8-Aug-07 (METAS, No. 217-00719)	e part of the certificate. c humidity < 70%. Scheduled Calibration Mar-08 Mar-08 Mar-08 Mar-08 Aup-08
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The measurements and the unce All calibrations have been ecodur Calibration Equipment used (Má' Primary Standards Fower meter E44198 Power sensor E4412A Reference 24 BB Attenuator Reference 20 dB Attenuator Reference Probe ES3DV2 DAEs	rtainties with confidence cted in the closed laborat TE critical for calibration) ID # GB41293874 MY41495277 MY41495277 MY41495877 SN 55036 (20b) SN 55036 (20b) SN 55129 (30b) SN 3013 SN 654 ID #	probability are given on the following pages and an ony faolity: environment temperature (22 ± 3)°C and Cal Date (Calibrated by, Cartificate No.) 29-Mar-07 (METAS: No. 217-00670) 29-Mar-07 (METAS: No. 217-00670) 3-Aug-07 (METAS: No. 217-00719) 29-Mar-07 (METAS: No. 217-00719) 29-Mar-07 (METAS: No. 217-00719) 3-Aug-07 (METAS: No. 217-00719) 4-Jan-07 (SPEAG, No. ES3-3013, Jan07) 20-Apr-37 (SPEAG, No. DAE4-654_Apr07) Check Date (in house)	e part of the certificate. c humidity < 70%. Scheduled Calibration Mar-08 Mar-08 Mar-08 Mar-08 Mar-08 Aug-08 Aug-08 Jan-03 Apr-08 Scheduled Check
The measurements and the unce All calibrations have been condu- Calibration Equipment used (M&' Primary Standards Power sensor E44120 Power sensor E44120 Reference 3 dB Attenuator Reference 30 dB Attenuator Reference 20 dB Attenuator Reference Probe ES30V2 DAE4 Secondary Standards RF generator HP 8648C	rtainties with confidence cted in the closed laborat TE critical for calibration) ID # GB41293874 MY41495277 MY41495277 MY41495277 MY41495277 SN 55036 (20b) SN 55129 (30b) SN 55129 (30b) SN 3013 SY 654 ID # US3642001700	probability are given on the following pages and an ony facility: environment temperature (22 ± 3)°C and Cal Date (Calibrated by, Cartificate No.) 29-Mar-07 (METAS, No. 217-00670) 29-Mar-07 (METAS, No. 217-00670) 8-Aug-07 (METAS, No. 217-00670) 8-Aug-07 (METAS, No. 217-00671) 8-Aug-07 (METAS, No. 217-00671) 8-Aug-07 (METAS, No. 217-00671) 8-Aug-07 (METAS, No. 217-00720) 4-Jan-07 (SPEAG, No. DAE4-654_Apr07) 20-Apr-07 (SPEAG, No. DAE4-654_Apr07) Check Date (in house) 4-Aug-89 (SPEAG, in house check Nov-05)	e part of the certificate. c humidity < 70%. Scheduled Calibration Mar-08 Mar-08 Mar-08 Mar-08 Mar-08 Mar-08 Aup-08 Mar-08 Aup-08 Jan-03 Apr-08 Scheduled Check In house check: Nov-07
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Calibration Laboratory of Schmid & Partner Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland



Schweizerischer Kalibrierdienst Service suisse d'étalonnage Servizio svizzero di taratura Swiss Galibration Service

Accreditation No.: SCS 108

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Accredited by the Swiss Federal Office of Motrology and Accreditation The Swiss Accreditation Service is one of the algoritories to the EA Multilateral Agreement for the recognition of calibration certificates

Glossary:	
TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConF	sensitivity in TSL / NORMx.y,z
DCP	diode compression point
Polarization o	φ rotation around probe axis
Polarization 9	9 rotation around an axis that is in the plane normal to probe axis (at

#### 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

measurement center), i.e., 9 = 0 is normal to probe axis

 b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

#### Methods Applied and Interpretation of Parameters:

- NORMx,y,z: Assessed for E-field polarization 9 = 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<sup>2</sup>-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 fiat phantom exposed by a patch antenna.
- Sensor Offset: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

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# Probe ET3DV6

# SN:1787

Manufactured: Last calibrated: Recalibrated: May 28, 2003 May 31, 2006 August 28, 2007

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

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LISBICI	SN:1787					Augu
DASY	- Para	mete	rs of P	robe: ET3	DV6 SN:	1787
Sensitivi	ty in Free	e Spac	eA		Diode	Compres
No	vrmX	1.6	<b>3 ±</b> 10.1%	μV/(V/m) <sup>2</sup>	DCP X	92 m
No	Ymr	1.6	36 ± 10.1%	μV/(V/m) <sup>2</sup>	DCP Y	96 m
No	Smi	2.0	<b>08</b> ± 10.1%	$\mu V/(V/m)^2$	DCP Z	91 m
Sensitivi	ty in Tiss	ue Sin	nulating Li	quid (Convei	sion Factor	s)
Please see			9	•		
Boundar	y Effect					
TSL	90	0 MHz	Typical SA	R gradient: 5 %	per mm	
Se	nsor Center	to Phant	om Surface D	istance	3.7 mm	4.7 mm
SA	R <sub>te</sub> [%]	Withou	t Correction A	Jgorithm	4.7	2.0
SA	R <sub>to</sub> [%]	With C	orrection Algo	rithm	0.1	0.0
TSL	181	0 MHz	Typical SA	AR gradient: 10 %	6 per mm	
Se	nsor Center	to Phant	om Surface D	istance	3.7 mm	4.7 mm
SA	R <sub>be</sub> [%]	Withou	t Correction A	Jgorithm	11.8	7.0
SA	R <sub>br</sub> [%]	With C	orrection Algo	nthm ,	0.2	0.4
Sensor (	Offset			•		
Pro	obe Tip to S	ensor Cei	nter		2.7 mm	
The report	ted uncert	ainty of	measurem	ent is stated as	the standard	uncertainty
measuren	nent multi	plied by	the coverage	ge factor k=2, w of approximate	hich for a nor	

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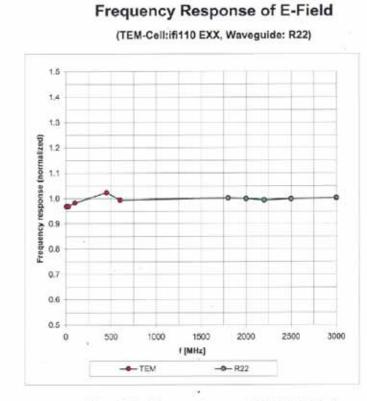
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Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

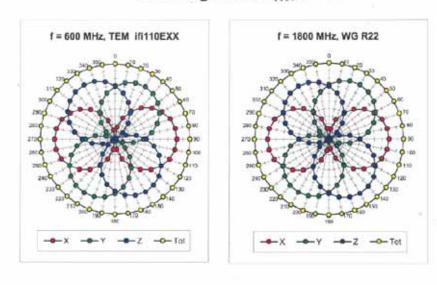
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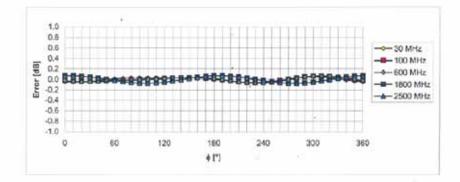


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### Receiving Pattern (\$), 9 = 0°



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

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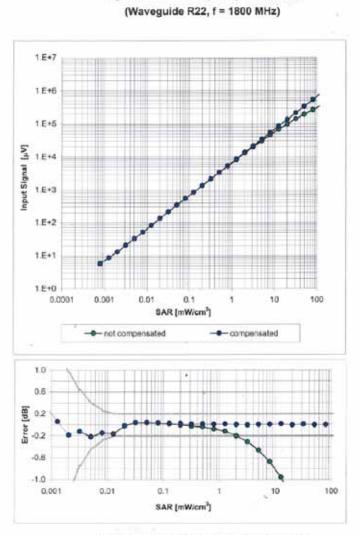
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Dynamic Range f(SAR<sub>head</sub>)

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

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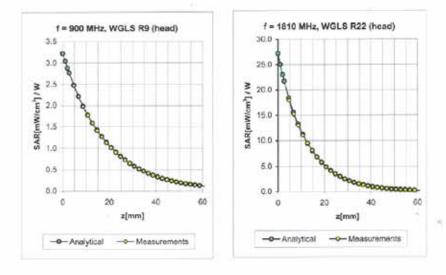
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#### **Conversion Factor Assessment**

f [MHz]	Validity [MHz] <sup>G</sup>	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.32	2.42	6.58 ± 11.0% (k=2)
1810	± 50 / ± 100 '	Head	40.0 ± 5%	1.40 ± 5%	0.50	2.61	5.18 ± 11.0% (k=2)
2000	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.55	2.45	4.80 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.67	1.81	4.50 ± 11.8% (k=2)
				. ×			
900	±50/±100	Body	55.0 ± 5%	1.05 ± 5%	0.36	2.52	6.10 ± 11.0% (k=2)
1810	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.61	2.58	4.68 ± 11.0% (k=2)
2000	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.60	2,40	4.30 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	$1.95\pm5\%$	0.65	2.15	4.02 ± 11.8% (k=2)

<sup>E</sup> 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.

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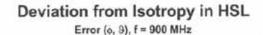
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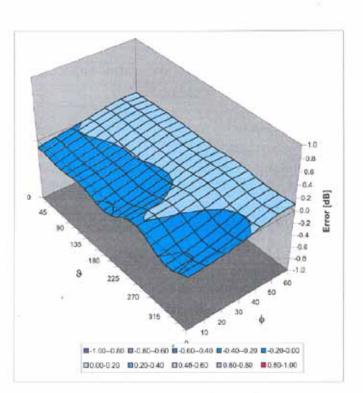




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#### Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

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