DASY5 Validation Report for Head TSL

Date/Time: 22.03.2010 10:17:58

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: HSL900
Medium parameters used: f = 835 MHz; σ = 0.91 mho/m; ε_r = 42.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.04, 6.04, 6.04); Calibrated: 26.06.2009

- Sensor-Surface: 3mm (Mechanical Surface Detection)

- Electronics: DAE4 Sn601; Calibrated: 02.03.2010

- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001

- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Pin=250 mW /d=15mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement
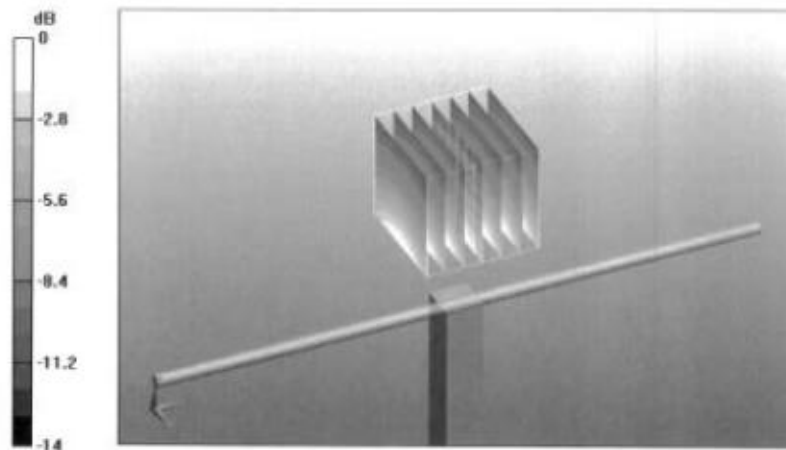grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.5 V/m; Power Drift = 0.00691 dB
Peak SAR (extrapolated) = 3.63 W/kg
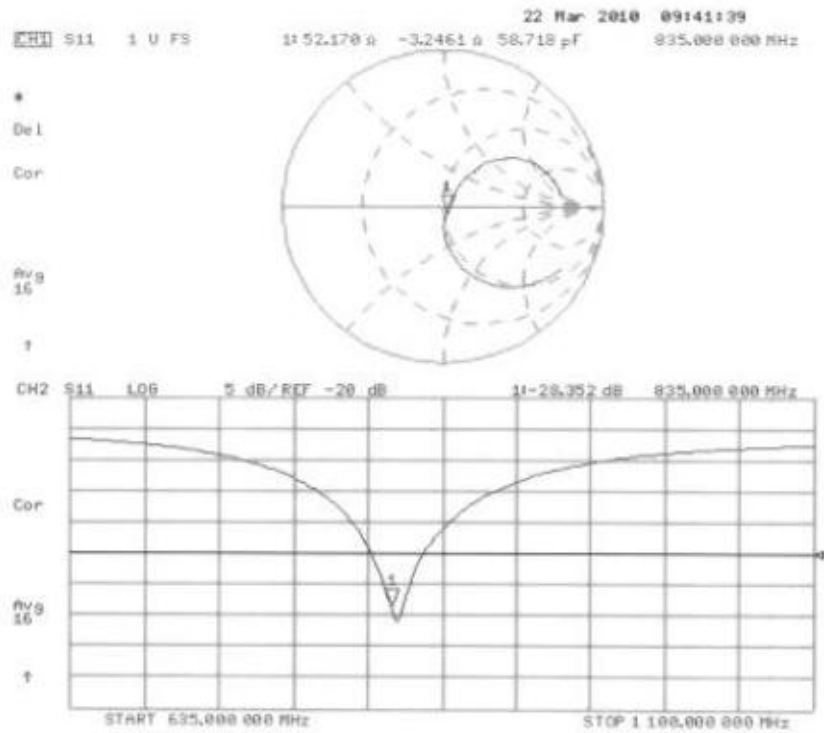**SAR(1 g) = 2.43 mW/g; SAR(10 g) = 1.58 mW/g**
Maximum value of SAR (measured) = 2.84 mW/g

0 dB = 2.84mW/g

Impedance Measurement Plot for Head TSL

SPORTON INTERNATIONAL INC.

DASY5 Validation Report for Body

Date/Time: 22.03.2010 14:07:53

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: MSL900
Medium parameters used: f = 835 MHz; σ = 1.01 mho/m; ε_r = 55.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.97, 5.97, 5.97); Calibrated: 26.06.2009

- Sensor-Surface: 3mm (Mechanical Surface Detection)

- Electronics: DAE4 Sn601; Calibrated: 02.03.2010

- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001

- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Pin250 mW /d=15mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement
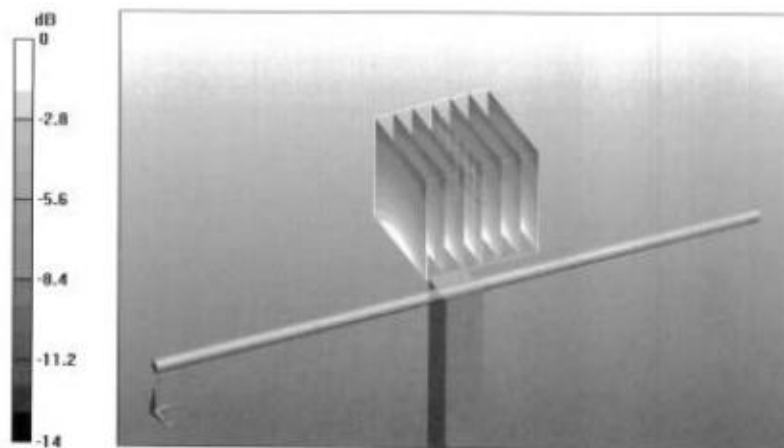grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 55.6 V/m; Power Drift = 0.011 dB
Peak SAR (extrapolated) = 3.73 W/kg
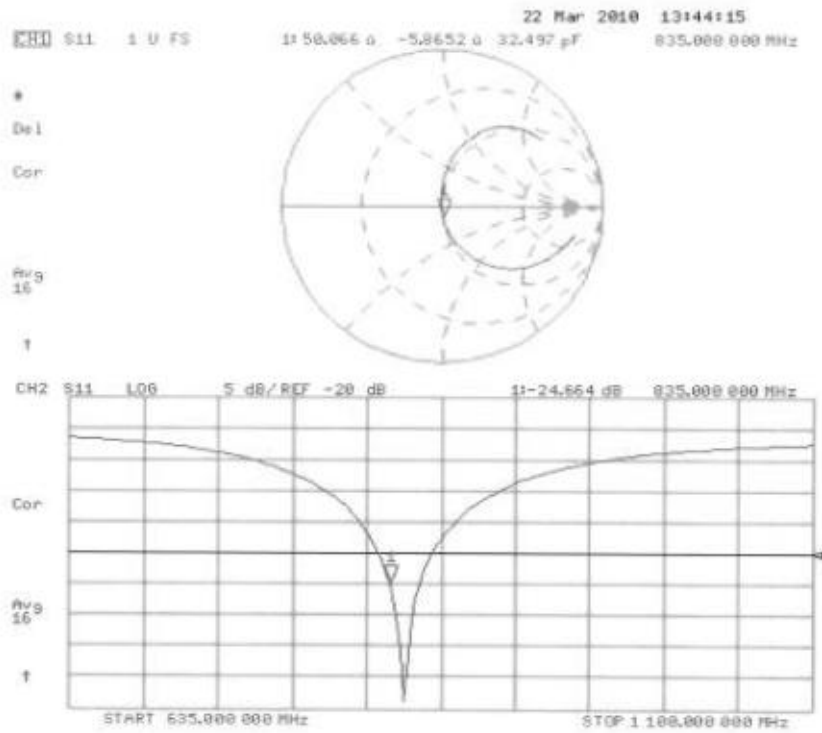**SAR(1 g) = 2.53 mW/g; SAR(10 g) = 1.66 mW/g**
Maximum value of SAR (measured) = 2.94 mW/g

0 dB = 2.94mW/g

Impedance Measurement Plot for Body TSL

22 Mar 2010 13:44:15

CH1 S11 1 U FS   1: 50.066 Ω -5.8652 Ω 32.497 pF   835.000 000 MHz

*
Del

Cor

Avg
16

↑

CH2 S11   LOG   5 dB/ REF -20 dB   1:-24.664 dB   835.000 000 MHz

Cor

Avg
16

↑

START 635.000 000 MHz   STOP 1 100.000 000 MHz

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Accreditation No.: **SCS 108**

Client | **Auden** | Certificate No: **D1800V2-2d052_Jun10**

CALIBRATION CERTIFICATE

Object	D1800V2 - SN: 2d052
Calibration procedure(s)	QA CAL-05.v7 Calibration procedure for dipole validation kits
Calibration date:	June 15, 2010

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	06-Oct-09 (No. 217-01086)	Oct-10
Power sensor HP 8481A	US37292783	06-Oct-09 (No. 217-01086)	Oct-10
Reference 20 dB Attenuator	SN: 5086 (20g)	30-Mar-10 (No. 217-01158)	Mar-11
Type-N mismatch combination	SN: 5047.2 / 06327	30-Mar-10 (No. 217-01162)	Mar-11
Reference Probe ES3DV3	SN: 3205	30-Apr-10 (No. ES3-3205_Apr10)	Apr-11
DAE4	SN: 601	10-Jun-10 (No. DAE4-601_Jun10)	Jun-11

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

	Name	Function	Signature
Calibrated by:	Dimce Iliev	Laboratory Technician	*D. Iiev*
Approved by:	Katja Pokovic	Technical Manager	

Issued: June 16, 2010

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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) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
   c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:
   d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:
   - *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
   - *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
   - *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
   - *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
   - *SAR measured:* SAR measured at the stated antenna input power.
   - *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
   - *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

Certificate No: D1800V2-2d052_Jun10   Page 2 of 9

Measurement Conditions

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

DASY Version	DASY5	V52.2
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	1800 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	39.8 ± 6 %	1.38 mho/m ± 6 %
Head TSL temperature during test	(22.5 ± 0.2) °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.64 mW / g
SAR normalized	normalized to 1W	38.6 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**38.8 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.08 mW / g
SAR normalized	normalized to 1W	20.3 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**20.4 mW /g ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	53.5 ± 6 %	1.48 mho/m ± 6 %
Body TSL temperature during test	(22.0 ± 0.2) °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.56 mW / g
SAR normalized	normalized to 1W	38.2 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**38.9 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.17 mW / g
SAR normalized	normalized to 1W	20.7 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**20.9 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	46.5 Ω - 4.9 jΩ
Return Loss	- 24.0 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	43.5 Ω - 5.0 jΩ
Return Loss	- 21.1 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.215 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 05, 2002

Impedance Measurement Plot for Head TSL


```
                                          15 Jun 2010  08:33:52
CH1  S11   1 U FS        1: 46.482 Ω  -4.9473 Ω  17.872 pF    1 800.000 000 MHz

 *
 De1

 Cor

 Avg
 16


CH2  S11   LOG     5 dB/REF -20 dB        1:-24.037 dB   1 800.000 000 MHz

 Cor

 Avg
 16

    START 1 600.000 000 MHz              STOP 2 100.000 000 MHz
```

DASY5 Validation Report for Body

Date/Time: 15.06.2010 12:04:36

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN:2d052

Communication System: CW; Frequency: 1800 MHz; Duty Cycle: 1:1
Medium: MSL U11 BB
Medium parameters used: f = 1800 MHz; σ = 1.48 mho/m; ε_r = 53.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.74, 4.74, 4.74); Calibrated: 30.04.2010

- Sensor-Surface: 3mm (Mechanical Surface Detection)

- Electronics: DAE4 Sn601; Calibrated: 10.06.2010

- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002

- Measurement SW: DASY52, V52.2 Build 0, Version 52.2.0 (163)

- Postprocessing SW: SEMCAD X, V14.2 Build 2, Version 14.2.2 (1685)
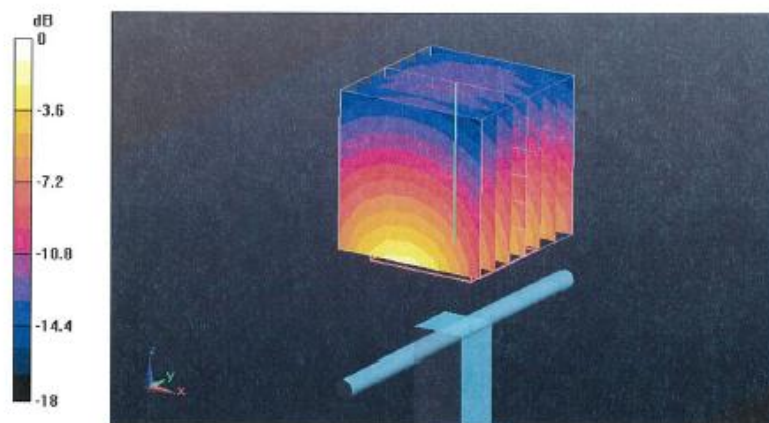
Pin250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement
grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 94.1 V/m; Power Drift = 0.018 dB
Peak SAR (extrapolated) = 16.1 W/kg
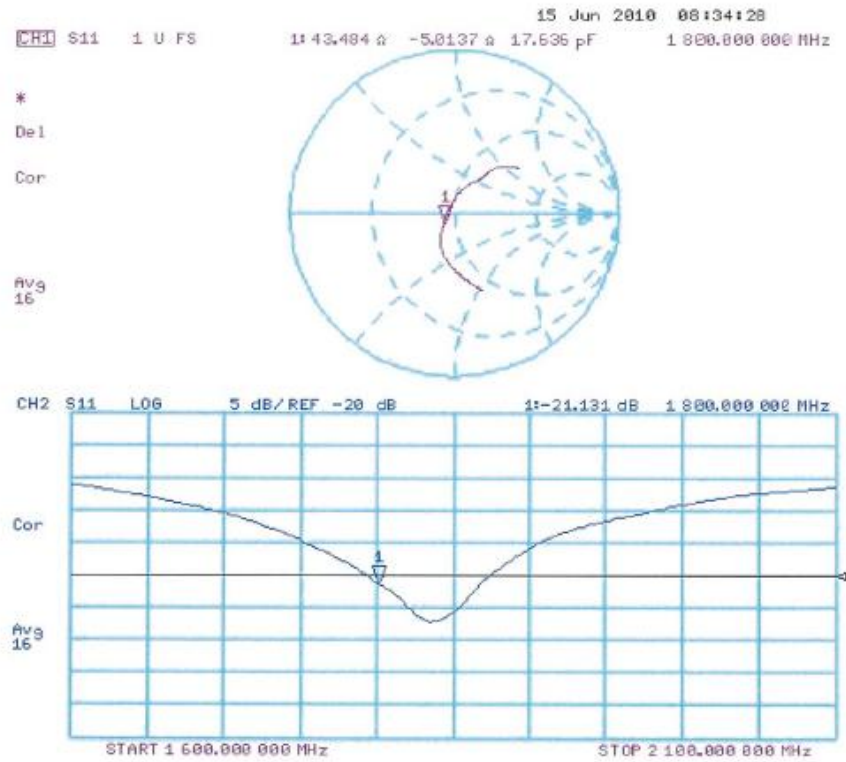**SAR(1 g) = 9.56 mW/g; SAR(10 g) = 5.17 mW/g**
Maximum value of SAR (measured) = 11.8 mW/g

0 dB = 11.8mW/g

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Impedance Measurement Plot for Body TSL

15 Jun 2010 08:34:28

CH1 S11   1 U FS   1: 43.484 Ω -5.0137 Ω 17.535 pF   1 800.000 000 MHz

*
Del
Cor

Avg
16

CH2 S11   LOG   5 dB/REF -20 dB   1:-21.131 dB   1 800.000 000 MHz

Cor

Avg
16

START 1 600.000 000 MHz   STOP 2 100.000 000 MHz

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Accreditation No.: **SCS 108**

Client   **Sporton (Auden)**

Certificate No: **D1900V2-5d041_Mar10**

CALIBRATION CERTIFICATE

Object	D1900V2 - SN: 5d041
Calibration procedure(s)	QA CAL-05.v7 Calibration procedure for dipole validation kits
Calibration date:	March 23, 2010

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	06-Oct-09 (No. 217-01086)	Oct-10
Power sensor HP 8481A	US37292783	06-Oct-09 (No. 217-01086)	Oct-10
Reference 20 dB Attenuator	SN: 5086 (20g)	31-Mar-09 (No. 217-01025)	Mar-10
Type-N mismatch combination	SN: 5047.2 / 06327	31-Mar-09 (No. 217-01029)	Mar-10
Reference Probe ES3DV3	SN: 3205	26-Jun-09 (No. ES3-3205_Jun09)	Jun-10
DAE4	SN: 601	02-Mar-10 (No. DAE4-601_Mar10)	Mar-11

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

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

Issued: March 23, 2010

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

c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.

- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.

- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.

- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.

- *SAR measured:* SAR measured at the stated antenna input power.

- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.

- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

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

DASY Version	DASY5	V5.2
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	41.1 ± 6 %	1.45 mho/m ± 6 %
Head TSL temperature during test	(21.5 ± 0.2) °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	10.1 mW / g
SAR normalized	normalized to 1W	40.4 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**39.8 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.25 mW / g
SAR normalized	normalized to 1W	21.0 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**20.9 mW /g ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.9 ± 6 %	1.58 mho/m ± 6 %
Body TSL temperature during test	(21.5 ± 0.2) °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	10.4 mW / g
SAR normalized	normalized to 1W	41.6 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**40.0 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.57 mW / g
SAR normalized	normalized to 1W	22.3 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**22.1 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.9 Ω + 5.9 jΩ
Return Loss	- 24.6 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.3 Ω + 5.7 jΩ
Return Loss	- 23.1 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.202 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	July 04, 2003

DASY5 Validation Report for Head TSL

Date/Time: 23.03.2010 12:03:30

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 U11 BB
Medium parameters used: f = 1900 MHz; σ = 1.45 mho/m; ε_r = 41.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.09, 5.09, 5.09); Calibrated: 26.06.2009

- Sensor-Surface: 3mm (Mechanical Surface Detection)

- Electronics: DAE4 Sn601; Calibrated: 02.03.2010

- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001

- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement
grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.8 V/m; Power Drift = 0.040 dB
Peak SAR (extrapolated) = 18.4 W/kg
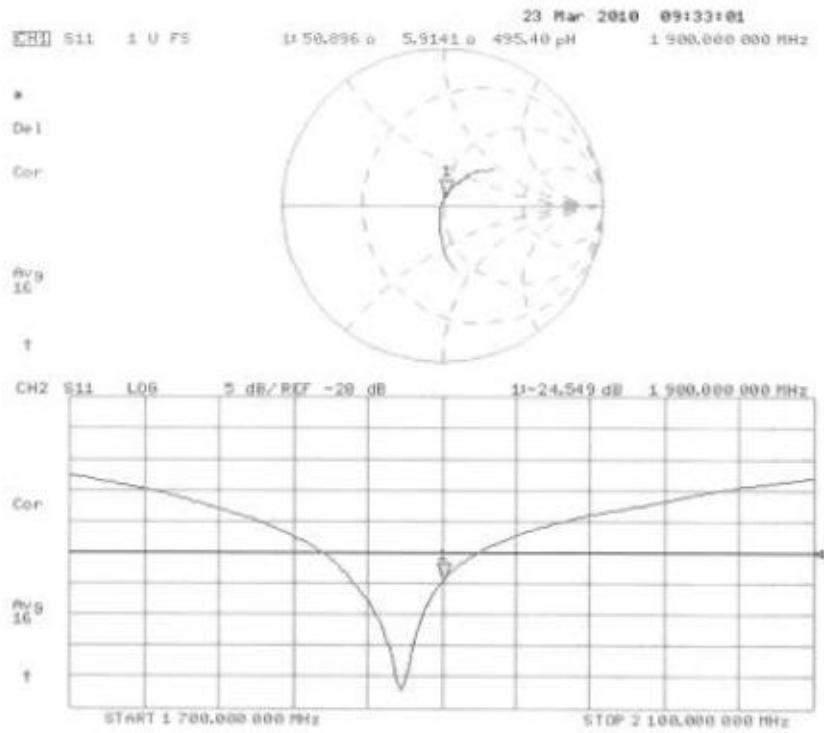**SAR(1 g) = 10.1 mW/g; SAR(10 g) = 5.25 mW/g**
Maximum value of SAR (measured) = 12.7 mW/g
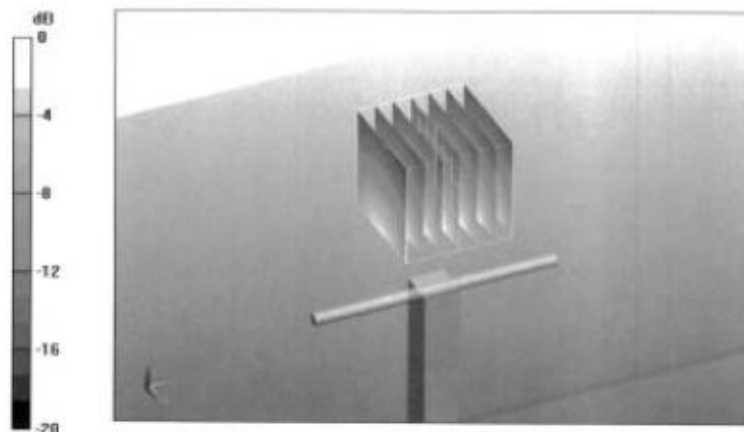
0 dB = 12.7mW/g

Impedance Measurement Plot for Head TSL

SPORTON INTERNATIONAL INC.

DASY5 Validation Report for Body

Date/Time: 17.03.2010 12:43:32

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: MSL U11 BB
Medium parameters used: f = 1900 MHz; σ = 1.58 mho/m; ε_r = 55; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.59, 4.59, 4.59); Calibrated: 26.06.2009

- Sensor-Surface: 3mm (Mechanical Surface Detection)

- Electronics: DAE4 Sn601; Calibrated: 02.03.2010

- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002

- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

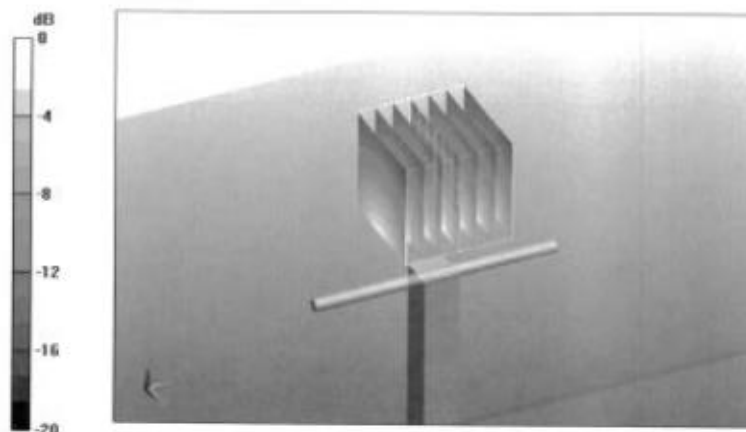**Pin250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0:** Measurement
grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.1 V/m; Power Drift = 0.017 dB
Peak SAR (extrapolated) = 17.5 W/kg
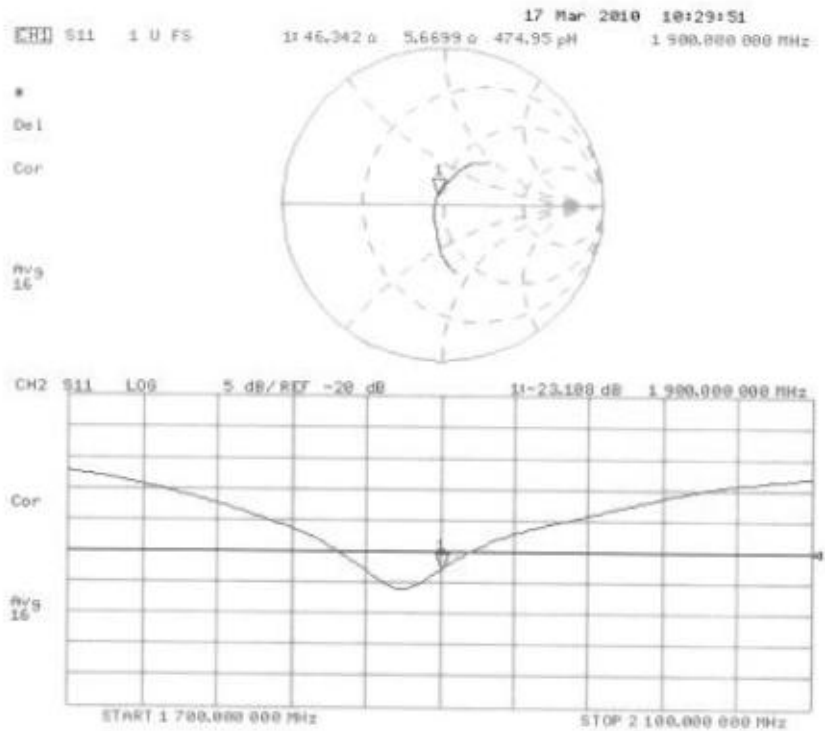**SAR(1 g) = 10.4 mW/g; SAR(10 g) = 5.57 mW/g**
Maximum value of SAR (measured) = 13.1 mW/g

0 dB = 13.1mW/g

Impedance Measurement Plot for Body TSL

17 Mar 2010 10:29:51

CH1 S11   1 U FS   1: 46.342 Ω   5.6699 Ω   474.95 pH   1 900.000 000 MHz

\#

Del

Cor

Avg
16

CH2 S11   LOG   5 dB/REF -20 dB   1: -23.188 dB   1 900.000 000 MHz

Cor

Avg
16

START 1 700.000 000 MHz   STOP 2 100.000 000 MHz

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Accreditation No.: **SCS 108**

Client	**Auden**	Certificate No: **DAE4-913_Nov10**

CALIBRATION CERTIFICATE

Object	DAE4 - SD 000 D04 BK - SN: 913
Calibration procedure(s)	QA CAL-06.v22 Calibration procedure for the data acquisition electronics (DAE)
Calibration date:	November 18, 2010

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Keithley Multimeter Type 2001	SN: 0810278	28-Sep-10 (No:10376)	Sep-11

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Calibrator Box V1.1	SE UMS 006 AB 1004	07-Jun-10 (in house check)	In house check: Jun-11

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

Issued: November 18, 2010

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Accreditation No.: SCS 108

Glossary

DAE	data acquisition electronics
Connector angle	information used in DASY system to align probe sensor X to the robot coordinate system.

Methods Applied and Interpretation of Parameters

- *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 as documented in the Appendix 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*: Typical value for information: 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 =	-1……..+3mV

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

Calibration Factors	X	Y	Z
High Range	404.184 ± 0.1% (k=2)	404.584 ± 0.1% (k=2)	405.128 ± 0.1% (k=2)
Low Range	3.97436 ± 0.7% (k=2)	4.02029 ± 0.7% (k=2)	4.02107 ± 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	169.5 ° ± 1 °

Appendix

1. DC Voltage Linearity

High Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	200000.1	-3.16	-0.00
Channel X	+ Input	20002.82	2.62	0.01
Channel X	- Input	-19998.55	0.95	-0.00
Channel Y	+ Input	200000.3	-1.86	-0.00
Channel Y	+ Input	20001.18	0.98	0.00
Channel Y	- Input	-20000.28	-0.88	0.00
Channel Z	+ Input	200000.3	-1.18	-0.00
Channel Z	+ Input	20000.48	0.48	0.00
Channel Z	- Input	-20002.84	-2.54	0.01

Low Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	2001.3	1.27	0.06
Channel X	+ Input	199.36	-0.74	-0.37
Channel X	- Input	-199.73	0.37	-0.19
Channel Y	+ Input	2000.0	-0.00	-0.00
Channel Y	+ Input	199.49	-0.41	-0.20
Channel Y	- Input	-201.67	-1.87	0.94
Channel Z	+ Input	2000.4	0.36	0.02
Channel Z	+ Input	199.35	-0.65	-0.32
Channel Z	- Input	-202.38	-2.48	1.24

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	-13.95	-16.22
	- 200	17.51	15.74
Channel Y	200	-7.99	-7.96
	- 200	6.46	6.09
Channel Z	200	7.83	7.59
	- 200	-10.45	-10.43

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	-	4.34	0.24
Channel Y	200	1.83	-	4.52
Channel Z	200	2.62	-0.19	-

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	15736	15737
Channel Y	15978	14708
Channel Z	16017	14960

5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec
Input 10MΩ

	Average (μV)	min. Offset (μV)	max. Offset (μV)	Std. Deviation (μV)
Channel X	0.11	-1.34	2.10	0.67
Channel Y	-0.60	-2.27	0.97	0.74
Channel Z	-0.85	-2.98	0.71	0.64

6. Input Offset Current

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

7. Input Resistance (Typical values for information)

	Zeroing (kOhm)	Measuring (MOhm)
Channel X	200	200
Channel Y	200	200
Channel Z	200	200

8. Low Battery Alarm Voltage (Typical values for information)

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

9. Power Consumption (Typical values for information)

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

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Client   **Sporton (Auden)**

Certificate No: ET3-1788_Sep10

CALIBRATION CERTIFICATE

Object	ET3DV6 - SN:1788
Calibration procedure(s)	QA CAL-01.v6, QA CAL-23.v3 and QA CAL-25.v2 Calibration procedure for dosimetric E-field probes
Calibration date:	September 21, 2010

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41495277	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41498087	1-Apr-10 (No. 217-01136)	Apr-11
Reference 3 dB Attenuator	SN: S5054 (3c)	30-Mar-10 (No. 217-01159)	Mar-11
Reference 20 dB Attenuator	SN: S5086 (20b)	30-Mar-10 (No. 217-01161)	Mar-11
Reference 30 dB Attenuator	SN: S5129 (30b)	30-Mar-10 (No. 217-01160)	Mar-11
Reference Probe ES3DV2	SN: 3013	30-Dec-09 (No. ES3-3013_Dec09)	Dec-10
DAE4	SN: 660	20-Apr-10 (No. DAE4-660_Apr10)	Apr-11

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-09)	In house check: Oct10

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: September 22, 2010

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Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

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

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

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z*: Assessed for E-field polarization $\vartheta = 0$ (f $\leq$ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not 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 with CW signal (no uncertainty required). DCP does not depend on frequency nor media.

- *Ax,y,z; Bx,y,z; Cx,y,z; VRx,y,z*: A, B, C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. *VR* is the maximum calibration range expressed in RMS voltage across the diode.

- *ConvF and Boundary Effect Parameters*: Assessed in flat phantom using E-field (or Temperature Transfer Standard for f $\leq$ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.

- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.

- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe ET3DV6

SN:1788

Manufactured:	May 28, 2003
Last calibrated:	September 23, 2009
Recalibrated:	September 21, 2010

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

ET3DV6 SN:1788

September 21, 2010

DASY/EASY - Parameters of Probe: ET3DV6 SN:1788

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm $(\mu V/(V/m)^2)^A$	1.76	1.69	1.76	± 10.1%
DCP $(mV)^B$	91.6	91.0	95.1	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dBuV	C	VR mV	Unc^E (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	300.0	± 1.5%
			Y	0.00	0.00	1.00	300.0	
			Z	0.00	0.00	1.00	300.0	

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

^{A} The uncertainties of NormX,Y,Z do not affect the E²-field uncertainty inside TSL, (see Pages 5 and 6).

^{B} Numerical linearization parameter: uncertainty not required.

^{E} Uncertainty is determined using the maximum deviation from linear response applying recatangular distribution and is expressed for the square of the field value.

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ET3DV6 SN:1788

September 21, 2010

DASY/EASY - Parameters of Probe: ET3DV6 SN:1788

Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz]	Validity [MHz]^c	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
835	± 50 / ± 100	41.5 ± 5%	0.90 ± 5%	6.23	6.23	6.23	0.41	2.32 ± 11.0%
900	± 50 / ± 100	41.5 ± 5%	0.97 ± 5%	6.11	6.11	6.11	0.29	2.85 ± 11.0%
1750	± 50 / ± 100	40.1 ± 5%	1.37 ± 5%	5.29	5.29	5.29	0.51	2.51 ± 11.0%
1900	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	5.03	5.03	5.03	0.66	2.25 ± 11.0%
2450	± 50 / ± 100	39.2 ± 5%	1.80 ± 5%	4.35	4.35	4.35	0.99	1.69 ± 11.0%

^{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.

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DASY/EASY - Parameters of Probe: ET3DV6 SN:1788

Calibration Parameter Determined in Body Tissue Simulating Media

f [MHz]	Validity [MHz][c]	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
835	± 50 / ± 100	55.2 ± 5%	0.97 ± 5%	5.99	5.99	5.99	0.35	2.62 ± 11.0%
900	± 50 / ± 100	55.0 ± 5%	1.05 ± 5%	6.07	6.07	6.07	0.32	2.87 ± 11.0%
1750	± 50 / ± 100	53.4 ± 5%	1.49 ± 5%	4.67	4.67	4.67	0.61	3.09 ± 11.0%
1900	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	4.39	4.39	4.39	0.83	2.56 ± 11.0%
2450	± 50 / ± 100	52.7 ± 5%	1.95 ± 5%	4.04	4.04	4.04	0.99	1.40 ± 11.0%

[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:1788

September 21, 2010

Frequency Response of E-Field

(TEM-Cell:ifi110 EXX, Waveguide: R22)
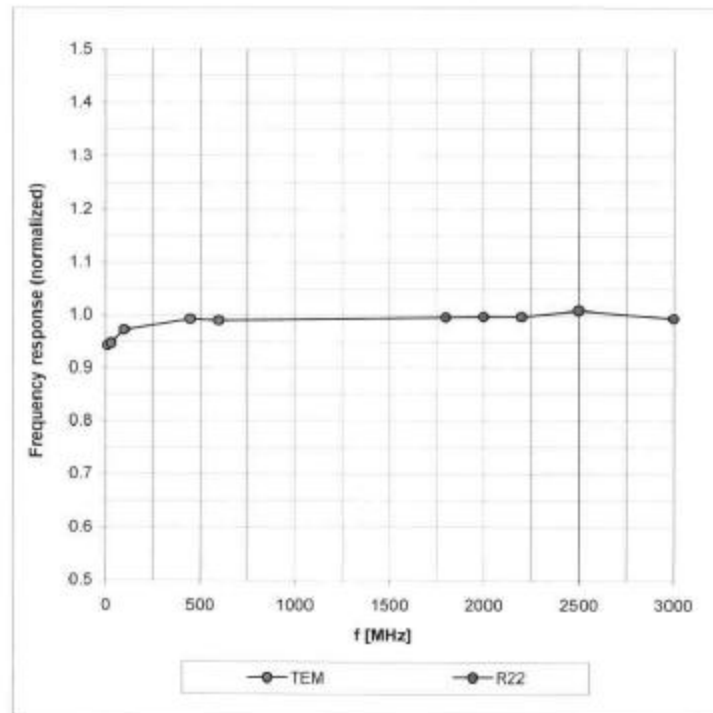
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

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ET3DV6 SN:1788

September 21, 2010

Receiving Pattern (ϕ), $\vartheta = 0°$

f = 600 MHz, TEM ifi110EXX

f = 1800 MHz, WG R22
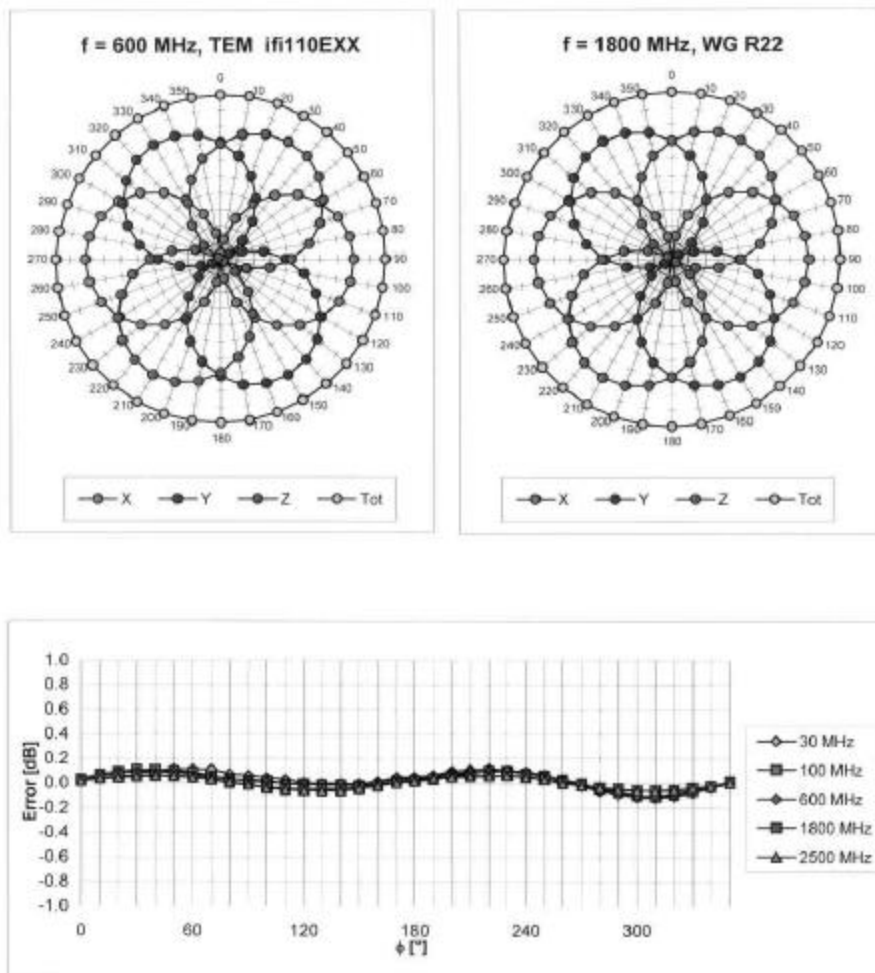
Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

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September 21, 2010

Dynamic Range f(SAR$_{head}$)
(Waveguide R22, f = 1800 MHz)
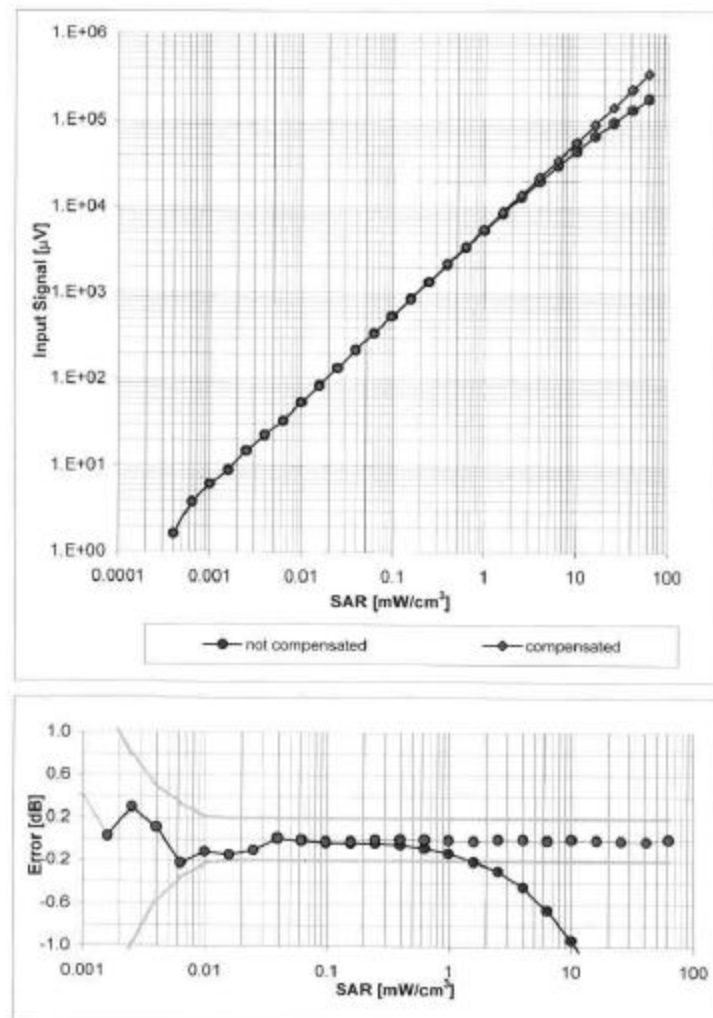
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

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Conversion Factor Assessment

f = 900 MHz, WGLS R9 (head)

f = 1750 MHz, WGLS R22 (head)
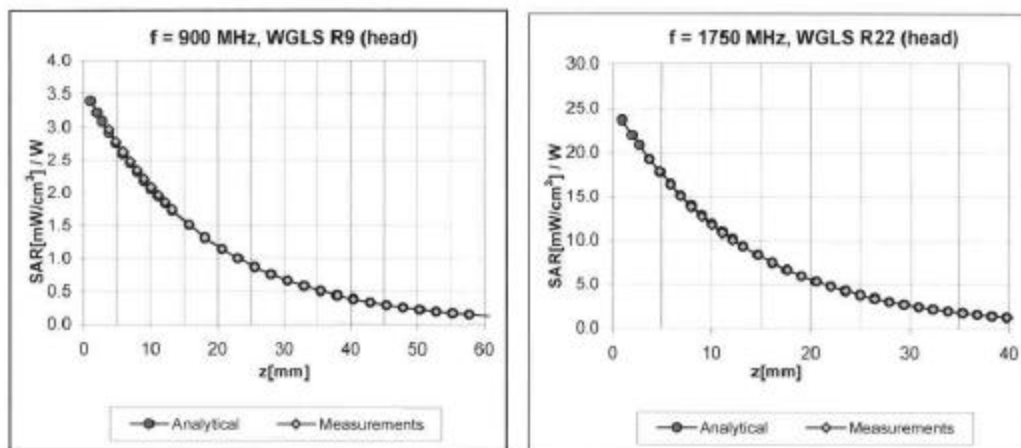
Deviation from Isotropy in HSL
Error (ϕ, ϑ), f = 900 MHz
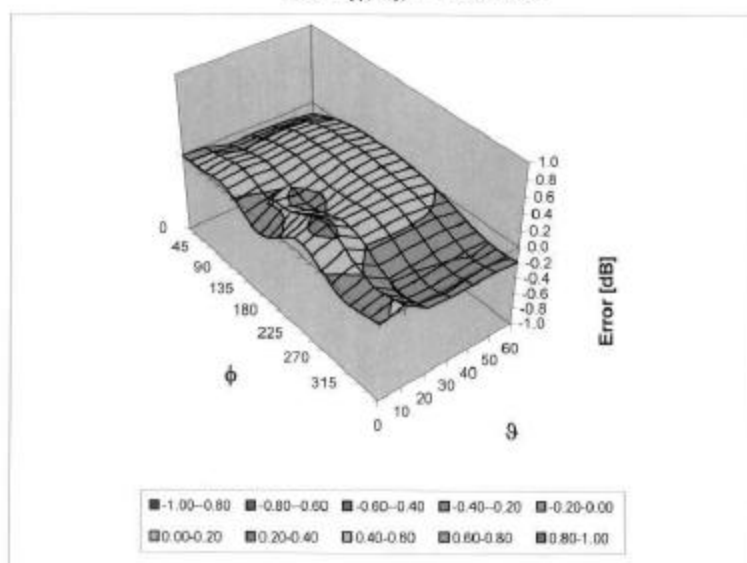
Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	6.8 mm
Probe Tip to Sensor X Calibration Point	2.7 mm
Probe Tip to Sensor Y Calibration Point	2.7 mm
Probe Tip to Sensor Z Calibration Point	2.7 mm
Recommended Measurement Distance from Surface	4 mm

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Appendix D.   Product Photos

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FAX : 886-3-328-4978
FCC ID : HD599EXLG

Page Number : D1 of D1
Report Issued Date : Mar. 04, 2011
Report Version : Rev. 01
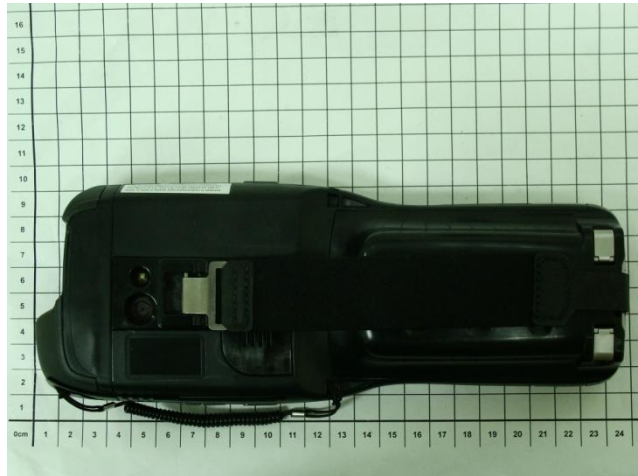
Appendix E. Test Setup Photos
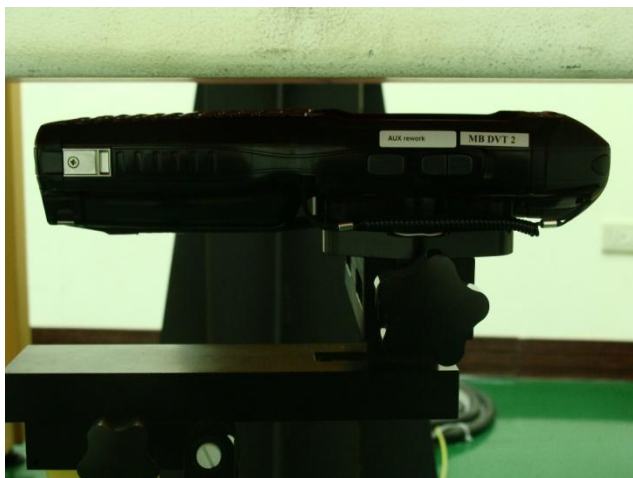
Face of the DUT with Phantom 1.5 cm Gap

Bottom of the DUT with Phantom 1.5 cm Gap
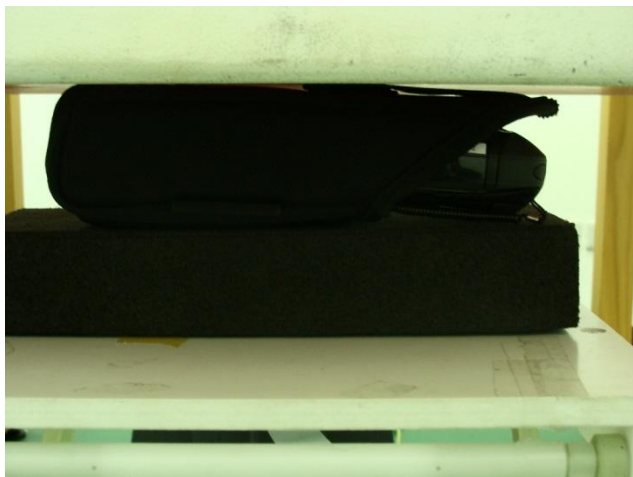
**Face of the DUT and
Holster with Phantom 0 cm Gap**

**Bottom of the DUT and
Holster with Phantom 0 cm Gap**

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Appendix F.   FCC 3G SAR Measurement Procedures for WCDMA

Conducted Output Power:

The EUT was tested according to the requirements of the FCC 3G procedures and the TS 34.121. The EUT's WCDMA and HSPA function is Release 6 version supporting HSDPA Category 8, and HSUPA Category 5. A detailed analysis of the output power for all WCDMA, HSPDA, and HSPA (HSUPA & HSDPA) modes is provided in the tables below. According to the FCC 3G procedures, handsets with both HSDPA and HSUPA should be tested according to Release 6 HSPA test procedures, and the function. Device was tested according to procedure KDB941225 - section Release 6 HSPA Data Devices as documented/evaluated in the following table.

WCDMA SAR Test mode - Conducted Power									
Mode	**Setup**	**Cell band (850)**			**AWS band (1700)**			**PCS band (1900)**		
		CH4132	CH4182	CH4233	CH1312	CH1413	CH1513	CH9262	CH9400	CH9538
		826.4 (MHz)	836.4 (MHz)	846.6 (MHz)	1712.4 (MHz)	1732.6 (MHz)	1752.6 (MHz)	1852.4 (MHz)	1880.0 (MHz)	1907.6 (MHz)
WCDMA	**RMC 12.2Kbps**	23.30	23.35	23.34	23.71	23.68	23.59	23.68	23.58	23.48
HSDPA	**Subtest 1**	23.10	23.02	23.11	22.06	22.40	22.81	23.56	23.39	23.42
	Subtest 2	23.06	23.14	23.20	23.25	23.44	23.35	23.55	23.44	23.28
	Subtest 3	22.59	22.68	22.74	22.79	22.89	22.87	23.00	22.96	22.78
	Subtest 4	22.66	22.58	22.65	22.95	23.10	22.81	23.01	22.93	22.85
HSUPA	**Subtest 1**	22.80	23.04	22.67	23.36	23.10	23.26	23.05	22.97	23.15
	Subtest 2	21.41	21.73	21.66	21.66	21.40	21.96	21.77	21.73	21.69
	Subtest 3	21.65	22.02	21.75	22.19	21.95	22.20	22.28	21.99	22.12
	Subtest 4	21.92	22.08	22.20	22.37	22.15	22.57	22.14	22.08	22.32
	Subtest 5	22.79	23.08	22.98	22.92	22.92	22.82	22.90	22.91	23.13

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TEL : 886-3-327-3456
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FCC ID : HD599EXLG

Page Number   : F1 of F7
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Report Version   : Rev. 01

WCDMA Setup Configuration:

    a.   The EUT was connected to Base Station referred to the drawing of Setup Configuration.

    b.   The RF path losses were compensated into the measurements.

    c.   A call was established between EUT and Base Station with following setting

        i.   Data rates: Varied from RMC 12.2Kbps

        ii.   RMC Test Loop = Loop Mode 1

        iii.   Power Ctrl Mode = All Up bits

    d.   The transmitted maximum output power was recorded.
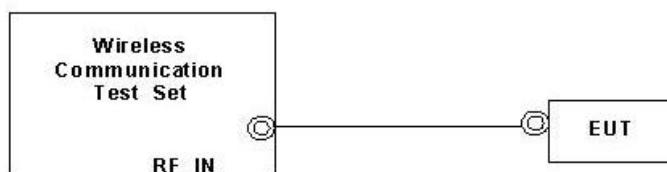
Setup Configuration

HSDPA Setup Configuration:

a.   The EUT was connected to Base Station referred to the drawing of Setup Configuration.

b.   The RF path losses were compensated into the measurements.

c.   A call was established between EUT and Base Station with following setting:

     i.   Set Gain Factors (β_c and β_d) and parameters were set according to each

     ii.   Specific sub-test in the following table, C10.1.4, quoted from the TS 34.121

     iii.   Set RMC12.2Kbps + HSDPA mode.

     iv.   Set Cell Power = -86 dBm

     v.   Set HS-DSCH Configuration Type to FRC (H-set 1, QPSK)

     vi.   Select HSDPA Uplink Parameters

     vii.   Set DeltaACK, DeltaNACK and DeltaCQI = 8

     viii.   Set Ack-Nack Repetition Factor to 3

     ix.   Set CQI Feedback Cycle (k) to 4 ms

     x.   Set CQI Repetition Factor to 2

     xi.   Power Ctrl Mode = All Up bits

d.   The transmitted maximum output power was recorded.

Table C.10.1.4: β values for transmitter characteristics tests with HS-DPCCH

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note1, Note 2)	CM (dB) (Note 3)	MPR (dB) (Note 3)
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15 (Note 4)	15/15 (Note 4)	64	12/15 (Note 4)	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_c.

Note 2:   For the HS-DPCCH power mask requirement test in clause 5.2C, 5.7A, and the Error Vector Magnitude (EVM) with HS-DPCCH test in clause 5.13.1A, and HSDPA EVM with phase discontinuity in clause 5.13.1AA, Δ_{ACK} and Δ_{NACK} = 30/15 with β_{hs} = 30/15 * β_c, and Δ_{CQI} = 24/15 with β_{hs} = 24/15 * β_c.

Note 3:   CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.

Note 4:   For subtest 2 the β_c/β_d ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to β_c = 11/15 and β_d = 15/15.

Setup Configuration

SPORTON INTERNATIONAL INC.

TEL : 886-3-327-3456

FAX : 886-3-328-4978

FCC ID : HD599EXLG

Page Number   : F3 of F7

Report Issued Date   : Mar. 04, 2011

Report Version   : Rev. 01

HSPA (HSUPA & HSPDA) Setup Configuration:

a. The EUT was connected to Base Station referred to the drawing of Setup Configuration.

b. The RF path losses were compensated into the measurements.

c. A call was established between EUT and Base Station with following setting * :

   i. Call Configs = 5.2B, 5.9B, 5.10B, and 5.13.2B with QPSK

   ii. Set the Gain Factors (β_c and β_d) and parameters (AG Index) were set according to each specific sub-test in the following table, C11.1.3, quoted from the TS 34.121

   iii. Set Cell Power = -86 dBm

   iv. Set Channel Type = 12.2k + HSPA

   v. Set UE Target Power

   vi. Power Ctrl Mode= Alternating bits

   vii. Set and observe the E-TFCI

   viii. Confirm that E-TFCI is equal to the target E-TFCI of 75 for sub-test 1, and other subtest's E-TFCI

d. The transmitted maximum output power was recorded.

Table C.11.1.3: β values for transmitter characteristics tests with HS-DPCCH and E-DCH

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note1)	β_{ec}	β_{ed} (Note 5) (Note 6)	β_{ed} (SF)	β_{ed} (Codes)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 6)	E-TFCI
1	11/15 (Note 3)	15/15 (Note 3)	64	11/15 (Note 3)	22/15	209/225	1309/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed}1: 47/15 β_{ed}2: 47/15	4 4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15 (Note 4)	15/15 (Note 4)	64	15/15 (Note 4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_c .

Note 2: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH, HS- DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.

Note 3: For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to β_c = 10/15 and β_d = 15/15.

Note 4: For subtest 5 the β_c/β_d ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to β_c = 14/15 and β_d = 15/15.

Note 5: In case of testing by UE using E-DPDCH Physical Layer category 1, Sub-test 3 is omitted according to TS25.306 Table 5.1g.

Note 6: β_{ed} can not be set directly, it is set by Absolute Grant Value.

Setup Configuration

Note: For details settings in the Agilent 8960 test equipment, please refer to the user guide " HSUPA Measurement Guide with 8960 V7.5.0 Release 7 (2007-06) Ver.: v.02.18"

SPORTON INTERNATIONAL INC.

TEL : 886-3-327-3456

FAX : 886-3-328-4978

FCC ID : HD599EXLG

Page Number : F4 of F7

Report Issued Date : Mar. 04, 2011

Report Version : Rev. 01

```
                          Call Setup Screen
Call Control       Active Cell Operating Mode        Call Parms
                                                    Cell Power
 Channel          ┌──────── UE Information ────────┐  -86.00
(UARFCN) Info     │ IMSI:                          │
                  │ IMEI:                          │ dBm/3.84 MHz
                  │ Power Class:                   │ Channel Type
  Cell            └────────────────────────────────┘ 12.2k + HSPA
Parameters ▽      ┌── UE Expected Open Loop Transmit Power ──┐
                  │ Initial PRACH TX Power:   -11.70 dBm │ Paging Service
Generator         │ Initial DPCCH TX Power:    -0.56 dBm │  RB Test Mode
  Info            ├──────────────────────────┬───────────┤
                  │   Uplink Parameters      │   Value   │
                  ├──────────────────────────┼───────────┤
 Uplink           │ PRACH Preambles          │    64     ↑   HSPA
Parameters ▽      │ PRACH Ramping Cycles(MMAX)│   2      │  Parameters
                  │ Available Subchannels (Bit Mask)│000000000001│
  UE Rep          │ Uplink DPCH Scrambling Code│   0     │ 34.121 Preset
  Meas            │ Uplink DPCH Bc/Bd Control │  Manual  │ Call Configs ▽
                  │ Manual Uplink DPCH Bc     │    11    │
  Close           │ Manual Uplink DPCH Bd     │    15    │  Channel
  Menu            │ Maximum Uplink Transmit Power Level│21 dBm│(UARFCN) Parms
                  ┌──────────┬───────────────┬─────────────────┐
                  │          │  Active Cell  │ Sys Type: UTRA FDD│
                  │          │    Idle       │                 │
  2 of 4          │          │IntRef│Offset│ │                │  1 of 3
```

Example for HSPA Subtest 1, and other subtests following table, C11.1.3

(Gain Factors (β_c = 11 and β_d = 15))

```
                          Call Setup Screen
Call Control       Active Cell Operating Mode        Serving Grant
                                                    AG Mode
 Additional       ┌──────── UE Information ────────┐  Single Shot
  Screens         │ IMSI:                          │
                  │ IMEI:                          │
                  │ Power Class:                   │ Single Shot AG
  Cell            └────────────────────────────────┘ 20: (119/15)^2
Parameters ▽      ┌── UE Expected Open Loop Transmit Power ──┐
                  │ Initial PRACH TX Power:   -11.70 dBm │
                  │ Initial DPCCH TX Power:    -0.56 dBm │ Send Single Shot
Generator         ├──────────────────────────────────────┤  Absolute Grant
  Info            │       Call Processing Status          │
                  │ Current Service Type:    None         │
                  │ MM Status:     ┌─ Abs Single Shot AG ─┐ Send Relative
 Uplink           │ GMM State:     │Index 15: (67/15)^2  ↑│  Grant Up
Parameters ▽      │ Current DPCH   │Index 16: (75/15)^2   │
                  │                │Index 17: (84/15)^2   │
  UE Rep          ├── HSUPA In────│Index 18: (95/15)^2  ──│ Send Relative
  Meas            │ UE Rep E-DCH   │Index 19: (106/15)^2  │  Grant Down
                  │ Last Received  │Index 20: (119/15)^2  ↓│
Trig Output Setup │ Throughput:    └──────────────────────┘  ---- kbps
Sys Frame Clock   │ ACKs Transmitted        smitted:  ---- │  Return
                  ┌──────────┬───────────────┬─────────────────┐
                  │          │  Active Cell  │ Sys Type: UTRA FDD│
                  │          │    Idle       │                 │
  2 of 4          │          │IntRef│Offset│ │                │  1 of 2
```

Example: AG – Index = 20 for HSPA subtest 1

SPORTON INTERNATIONAL INC.

TEL : 886-3-327-3456

FAX : 886-3-328-4978

FCC ID : HD599EXLG

Page Number : F5 of F7

Report Issued Date : Mar. 04, 2011

Report Version : Rev. 01

```
                        Call Setup Screen
┌─────────────┬───────────────────────────────────┬──────────────────┐
│ Screen Ctrl │      Recorded E-TFCI Information   │   E-TFCI Record  │
├─────────────┤                                    ├──────────────────┤
│             │                                    │ E-TFCI Rec Count │
│  Channel    │ ┌────────────────────────────────┐ ├──────────────────┤
│(UARFCN) Info│ │     E-TFCI Recording State     │ │       15         │
│             │ │             Idle               │ │                  │
├─────────────┤ └────────────────────────────────┘ ├──────────────────┤
│   HSPA      │                                    │ Start Recording  │
│ Information │ ┌────────────────────────────────┐ │ E-TFCI Values    │
│             │ │      Recorded E-TFCI Values    │ │                  │
├─────────────┤ │  1:  75  11:  75  21: ----  31: ----  41: ----│
│ E-TFCI      │ │  2:  75  12:  75  22: ----  32: ----  42: ----│
│ Recording   │ │  3:  75  13:  75  23: ----  33: ----  43: ----│
│ Information │ │  4:  75  14:  75  24: ----  34: ----  44: ----│
│             │ │  5:  75  15:  75  25: ----  35: ----  45: ----│
│             │ │  6:  75  16: ----  26: ----  36: ----  46: ----│ Send Step Up
│             │ │  7:  75  17: ----  27: ----  37: ----  47: ----│ TPC Bit Pattern
│             │ │  8:  75  18: ----  28: ----  38: ----  48: ----│
│             │ │  9:  75  19: ----  29: ----  39: ----  49: ----│
│  Clear      │ │ 10:  75  20: ----  30: ----  40: ----  50: ----│ Send Step Down
│  UE Info    │ │                                │ │ TPC Bit Pattern  │
│             │ │            15/15               │ │                  │
│  Return     │ └────────────────────────────────┘ │     Return       │
├─────────────┼────────────────────────────────────┼──────────────────┤
│             │ Background  Active Cell      Sys Type: UTRA FDD        │
│             │             Connected                                  │
│             │             IntRef Offset                              │
└─────────────┴────────────────────────────────────┴──────────────────┘
```

Example: Confirm that E-TFCI is equal to the target E-TFCI of 75 for sub-test 1

Reference:

[1]   941225 D01 SAR test for 3G devices v02, SAR Measurement Procedures for 3G Devices CDMA 2000/Ev-Do/WCDMA/HSDPA/HSPA Oct. 2007 Laboratory Division Office of Engineering and Technology Federal Communications Commission

[2.]   TS 34.121 Universal Mobile Telecommunications System (UMTS); Terminal Conformance Specification, Radio Transmission and Reception (FDD)

[3.]   HSUPA Measurement Guide with 8960 V7.5.0 Release 7 (2007-06) Ver.: v.02.18

Appendix G.   FCC 3G SAR Measurement Procedures for CDMA2000

Conducted Output Power:

The EUT was tested according to the requirements of the FCC 3G procedures and the 3.1.2.3.4.

A detailed analysis of the output power verification is provided as the table below:

| Function Type | Reverse Traffic Channel | Test Mode | Radio Configuration | | Service Option | Data Rates (kbps) | Power Control | Low Ch | Mid. Ch | High Ch |
			Forward Traffic Channel (Fwd)	Reverse Traffic Channel (Rvs)				1013	384	777
CDMA2000 Cellular	FCH	1	1	1	55	Full	All Up	23.75	23.92	23.79
		3	3	3	55	Full	All Up	23.76	23.85	23.75
		3	3	3	32	Full	All Up	23.74	23.73	23.73
	FCH+SCH	3	3	3	32	FCH:Full,SCH 9.6	All Up	23.75	23.78	23.72
	EVDO Rev.0	Subtype:0				RTAP 153.6	All Up	23.73	23.80	23.76
	EVDO Rev.A	Subtype:0				RETAP 4096	All Up	23.79	23.95	23.82

| Function Type | Reverse Traffic Channel | Test Mode | Radio Configuration | | Service Option | Data Rates (kbps) | Power Control | Low Ch | Mid. Ch | High Ch |
			Forward Traffic Channel (Fwd)	Reverse Traffic Channel (Rvs)				25	600	1175
CDMA2000 PCS	FCH	1	1	1	55	Full	All Up	23.97	23.83	23.67
		3	3	3	55	Full	All Up	23.98	23.85	23.65
		3	3	3	32	Full	All Up	23.93	23.83	23.64
	FCH+SCH	3	3	3	32	FCH:Full,SCH 9.6	All Up	23.96	23.84	23.63
	EVDO Rev.0	Subtype:0				RTAP 153.6	All Up	23.95	23.89	23.66
	EVDO Rev.A	Subtype:0				RETAP 4096	All Up	23.96	23.95	23.78

SPORTON INTERNATIONAL INC.
TEL : 886-3-327-3456
FAX : 886-3-328-4978
FCC ID : HD599EXLG

Page Number   : G1 of G6
Report Issued Date : Mar. 04, 2011
Report Version   : Rev. 01

CDMA2000 Setup Configuration:
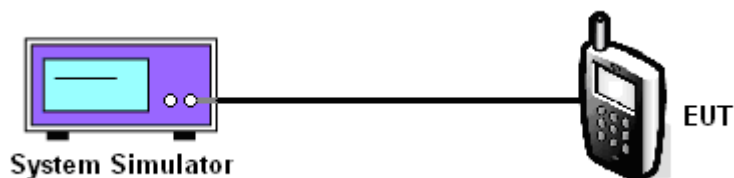
Setup Configuration

1. The EUT was connected to System Simulator, Agilent 8960. Refer to the drawing of Setup Configuration.
2. The RF path losses were compensated into the measurements.
3. A call was established between EUT and System Simulator with following setting:
   a. For 1xRTT, set the Radio Configuration and the Service Option
   b. For 1xEV-DO, set the Protocol Release and Data Rate
   c. Set the Power Control to All Up Bits
4. The transmitted maximum output power was recorded.

1xRTT setting for Radio Configuration 1 with Service Option 55

SPORTON INTERNATIONAL INC.
TEL : 886-3-327-3456
FAX : 886-3-328-4978
FCC ID : HD599EXLG

Page Number : G2 of G6
Report Issued Date : Mar. 04, 2011
Report Version : Rev. 01

1xRTT setting for Radio Configuration 3 with Service Option 55

1xRTT setting for Radio Configuration 3 with Service Option 32

1xEV-DO setting for Protocol Release (Rev.0 or Rev.A)

1xEV-DO setting for RTAP data rate (153.6 kbps)

Call Setup Screen		
Call Control	**Active Cell Operating Mode**	**Call Parms**

Call Control	Active Cell Operating Mode	Call Parms
Operating Mode		**Cell Power**
Active Cell	**Access Terminal Information (AT Reported)**	-86.00
	Session Seed:	dBm/1.23 MHz
	Hardware ID Type (Hex):	**Cell Band**
	Hardware ID (Hex):	US PCS
	Hardware ID (Decimal):	
	Access Terminal Information (AN Assigned)	
	UATI 024: ----	**Channel**
Start Data Connection	UATI Color Code: ----	1175
	MAC Index: ----	
	Application Configuration	
Close Session	Session Appl / R-Data Packet Size / Application	**Application Config**
	Enhanced Te 128 / AP	
	AT Directed 256 / %	**F-Traffic Format**
Handoff Setup	DRC Value Fi 512	4 (1024,2,128)
	ACK Channel 768	(307.2k, QPSK)
	ACK Channel 1024 / Capacity	**R-Data Pkt Size**
AT Max Power	Reverse Data 1536 / kbps	128
23 dBm/1.23MHz	Expected En	bits
	Active Cell / **Idle** / Sys Type: IS-856	
1 of 3	IntRef Offset / PLSub0 RETAP	1 of 3

1xEV-DO setting for RETAP data rate (4096 bits)

Reference:

[1]   SAR Measurement Procedures for 3G Devices CDMA 2000/Ev-Do/WCDMA/HSDPA, June 2006 Laboratory Division Office of Engineering and Technology Federal Communications Commission

[2]   3.1.2.3.4 Maximum RF Output Power 3GPP2 C.S0033-0 Version 2.0, Date: 12 December 2003 Recommended Minimum Performance Standards for cdma2000 High Rate Packet Data Access Terminal