

## 14. CALIBRATION CERTIFICATES

The following pages include the probe calibration used to evaluate HAC for the DUT.

|                                        |                                                                                     |                                                                     |                                                                                       |                                        |
|----------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| <b>FCC ID:</b> A3LSCHR610              |  | <b>HAC (RF EMISSIONS) TEST REPORT</b>                               |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>HAC Filename:</b><br>0705110426.A3L | <b>Test Dates:</b><br>May 15 - 17, 2007                                             | <b>EUT Type:</b><br>Cellular/PCS CDMA Phone with Bluetooth and EvDO |                                                                                       | Page 35 of 70                          |



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The Swiss Accreditation Service is one of the signatories to the EA  
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **PC Test**

Certificate No: **ER3-2335\_Jul06**

## CALIBRATION CERTIFICATE

Object **ER3DV6 - SN:2335**

Calibration procedure(s) **QA CAL-02.v4  
Calibration procedure for E-field probes optimized for close near field  
evaluations in air**

Calibration date: **July 10, 2006**

Condition of the calibrated item **In Tolerance**

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

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

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards          | ID #            | Cal Date (Calibrated by, Certificate No.) | Scheduled Calibration |
|----------------------------|-----------------|-------------------------------------------|-----------------------|
| Power meter E4419B         | GB41293874      | 5-Apr-06 (METAS, No. 251-00557)           | Apr-07                |
| Power sensor E4412A        | MY41495277      | 5-Apr-06 (METAS, No. 251-00557)           | Apr-07                |
| Power sensor E4412A        | MY41498087      | 5-Apr-06 (METAS, No. 251-00557)           | Apr-07                |
| Reference 3 dB Attenuator  | SN: S5054 (3c)  | 11-Aug-05 (METAS, No. 251-00499)          | Aug-06                |
| Reference 20 dB Attenuator | SN: S5086 (20b) | 4-Apr-06 (METAS, No. 251-00558)           | Apr-07                |
| Reference 30 dB Attenuator | SN: S5129 (30b) | 11-Aug-05 (METAS, No. 251-00500)          | Aug-06                |
| Reference Probe ER3DV6     | SN: 2328        | 3-Oct-05 (SPEAG, No. ER3-2328_Oct05)      | Oct-06                |
| DAE4                       | SN: 654         | 2-Feb-06 (SPEAG, No. DAE4-654_Feb06)      | Feb-07                |

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

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

Issued: July 10, 2006

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Certificate No: ER3-2335\_Jul06

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|                                 |                                  |                                                              |  |                                 |
|---------------------------------|----------------------------------|--------------------------------------------------------------|--|---------------------------------|
| FCC ID: A3LSCHR610              |                                  | HAC (RF EMISSIONS) TEST REPORT                               |  | Reviewed by:<br>Quality Manager |
| HAC Filename:<br>0705110426.A3L | Test Dates:<br>May 15 - 17, 2007 | EUT Type:<br>Cellular/PCS CDMA Phone with Bluetooth and EvDO |  | Page 36 of 70                   |

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



**S** Schweizerischer Kalibrierdienst  
**C** Service suisse d'étalonnage  
**S** Servizio svizzero di taratura  
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 The Swiss Accreditation Service is one of the signatories to the EA  
 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

**Glossary:**

**NORM<sub>x,y,z</sub>** sensitivity in free space  
**DCP** diode compression point  
**Polarization  $\phi$**   $\phi$  rotation around probe axis  
**Polarization  $\vartheta$**   $\vartheta$  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  
**Connector Angle** information used in DASY system to align probe sensor X to the robot coordinate system

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

- a) IEEE Std 1309-1996, "IEEE Standard for calibration of electromagnetic field sensors and probes, excluding antennas, from 9 kHz to 40 GHz", 1996.

**Methods Applied and Interpretation of Parameters:**

- **NORM<sub>x,y,z</sub>**: Assessed for E-field polarization  $\vartheta = 0$  for XY sensors and  $\vartheta = 90$  for Z sensor ( $f \leq 900$  MHz in TEM-cell;  $f > 1800$  MHz: R22 waveguide).
- **NORM(f)<sub>x,y,z</sub>** = **NORM<sub>x,y,z</sub>** \* *frequency\_response* (see Frequency Response Chart).
- **DCP<sub>x,y,z</sub>**: DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency.
- **Spherical isotropy (3D deviation from isotropy)**: in a locally homogeneous field realized using an open waveguide setup.
- **Sensor Offset**: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- **Connector Angle**: The angle is assessed using the information gained by determining the **NORM<sub>x</sub>** (no uncertainty required).

Certificate No: ER3-2335\_Jul06

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|                                        |                                                                                     |                                                                     |                                                                                       |                                        |
|----------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| <b>FCC ID:</b> A3LSCHR610              |  | <b>HAC (RF EMISSIONS) TEST REPORT</b>                               |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>HAC Filename:</b><br>0705110426.A3L | <b>Test Dates:</b><br>May 15 - 17, 2007                                             | <b>EUT Type:</b><br>Cellular/PCS CDMA Phone with Bluetooth and EvDO |                                                                                       | Page 37 of 70                          |

# Probe ER3DV6

## SN:2335

Manufactured: May 31, 2006  
Calibrated: July 10, 2006

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

|                                        |                                                                                     |                                                                     |                                                                                       |                                        |
|----------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| <b>FCC ID:</b> A3LSCHR610              |  | <b>HAC (RF EMISSIONS) TEST REPORT</b>                               |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>HAC Filename:</b><br>0705110426.A3L | <b>Test Dates:</b><br>May 15 - 17, 2007                                             | <b>EUT Type:</b><br>Cellular/PCS CDMA Phone with Bluetooth and EvDO |                                                                                       | Page 38 of 70                          |

**DASY - Parameters of Probe: ER3DV6 SN:2335**

| Sensitivity in Free Space [ $\mu\text{V}/(\text{V/m})^2$ ] |                                           | Diode Compression <sup>A</sup> |              |
|------------------------------------------------------------|-------------------------------------------|--------------------------------|--------------|
| NormX                                                      | <b>1.62 <math>\pm</math> 10.1 % (k=2)</b> | DCP X                          | <b>93 mV</b> |
| NormY                                                      | <b>1.67 <math>\pm</math> 10.1 % (k=2)</b> | DCP Y                          | <b>93 mV</b> |
| NormZ                                                      | <b>1.90 <math>\pm</math> 10.1 % (k=2)</b> | DCP Z                          | <b>95 mV</b> |

## Frequency Correction

|   |            |
|---|------------|
| X | <b>0.0</b> |
| Y | <b>0.0</b> |
| Z | <b>0.0</b> |

## Sensor Offset (Probe Tip to Sensor Center)

|   |               |
|---|---------------|
| X | <b>2.5 mm</b> |
| Y | <b>2.5 mm</b> |
| Z | <b>2.5 mm</b> |

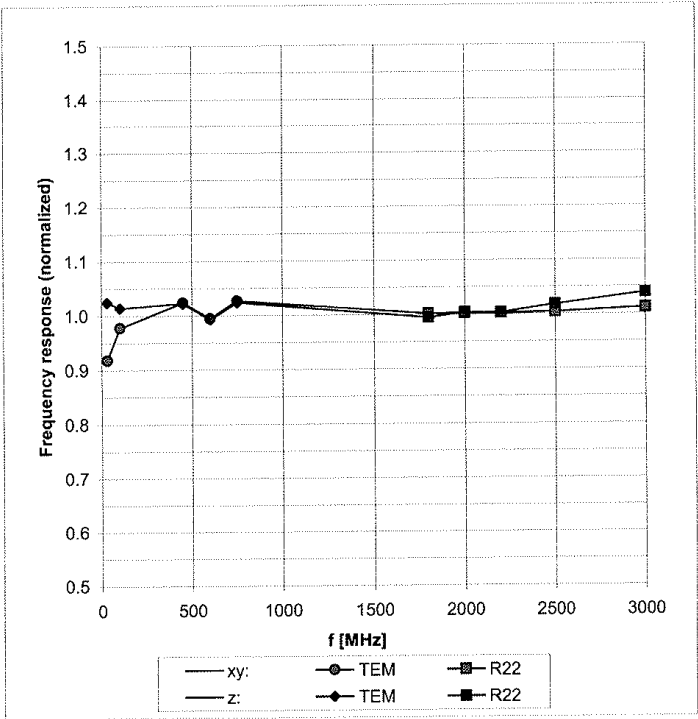
Connector Angle **69 °**

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%.

<sup>A</sup> numerical linearization parameter: uncertainty not required

|                                 |                                                                                                                                                                                                                 |                                                              |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|
| FCC ID: A3LSCHR610              |  <b>HAC (RF EMISSIONS) TEST REPORT</b>  | Reviewed by:<br>Quality Manager                              |
| HAC Filename:<br>0705110426.A3L | Test Dates:<br>May 15 - 17, 2007                                                                                                                                                                                | EUT Type:<br>Cellular/PCS CDMA Phone with Bluetooth and EvDO |
| Page 39 of 70                   |                                                                                                                                                                                                                 |                                                              |

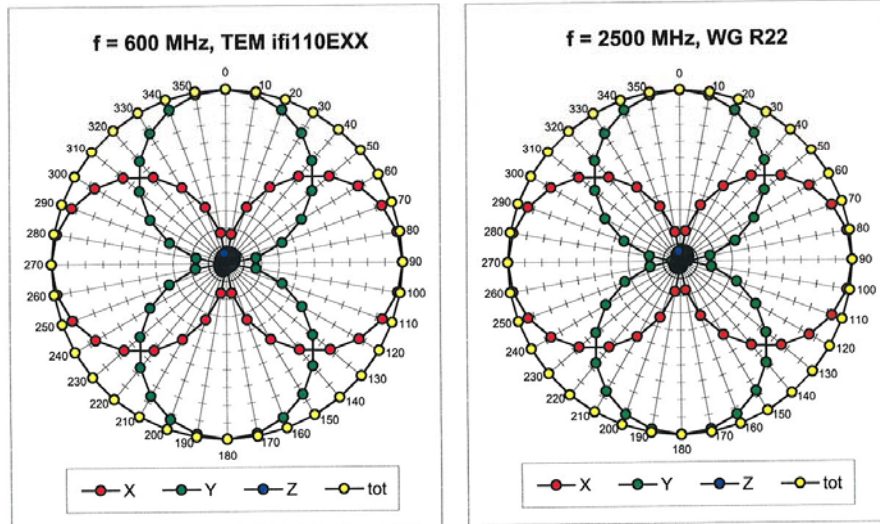
Frequency Response of E-Field  
(TEM-Cell:ifi110 EXX, Waveguide R22)



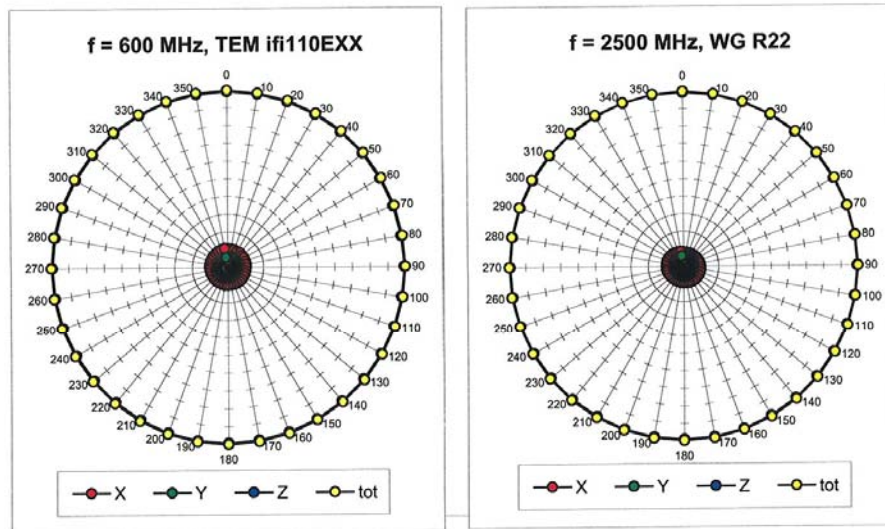
Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  ( $k=2$ )

|                                 |                                                                                                               |                                                              |                                                                                       |                                 |
|---------------------------------|---------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSCHR610              |  <b>PCTEST</b><br>wireless | HAC (RF EMISSIONS) TEST REPORT                               |  | Reviewed by:<br>Quality Manager |
| HAC Filename:<br>0705110426.A3L | Test Dates:<br>May 15 - 17, 2007                                                                              | EUT Type:<br>Cellular/PCS CDMA Phone with Bluetooth and EvDO |                                                                                       | Page 40 of 70                   |

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

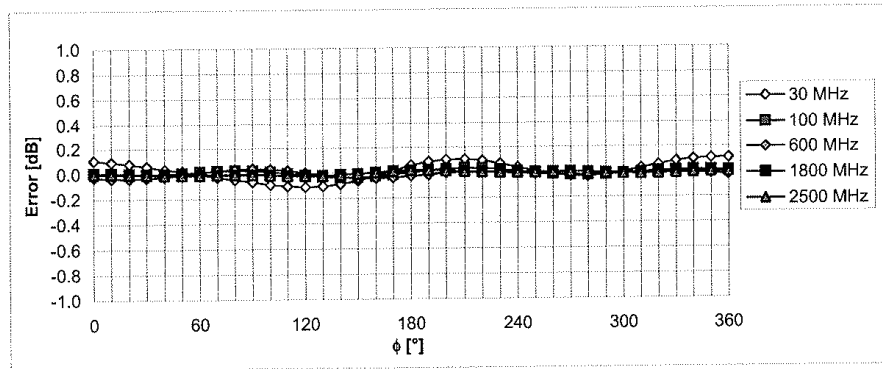


### Receiving Pattern ( $\phi$ ), $\vartheta = 90^\circ$



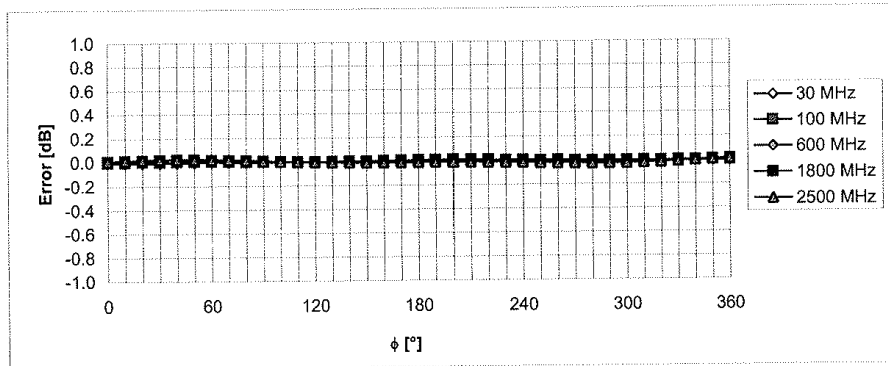
|                                 |                                                                                     |                                                              |                                                                                       |                                 |
|---------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSCHR610              |  | HAC (RF EMISSIONS) TEST REPORT                               |  | Reviewed by:<br>Quality Manager |
| HAC Filename:<br>0705110426.A3L | Test Dates:<br>May 15 - 17, 2007                                                    | EUT Type:<br>Cellular/PCS CDMA Phone with Bluetooth and EvDO |                                                                                       | Page 41 of 70                   |

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



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

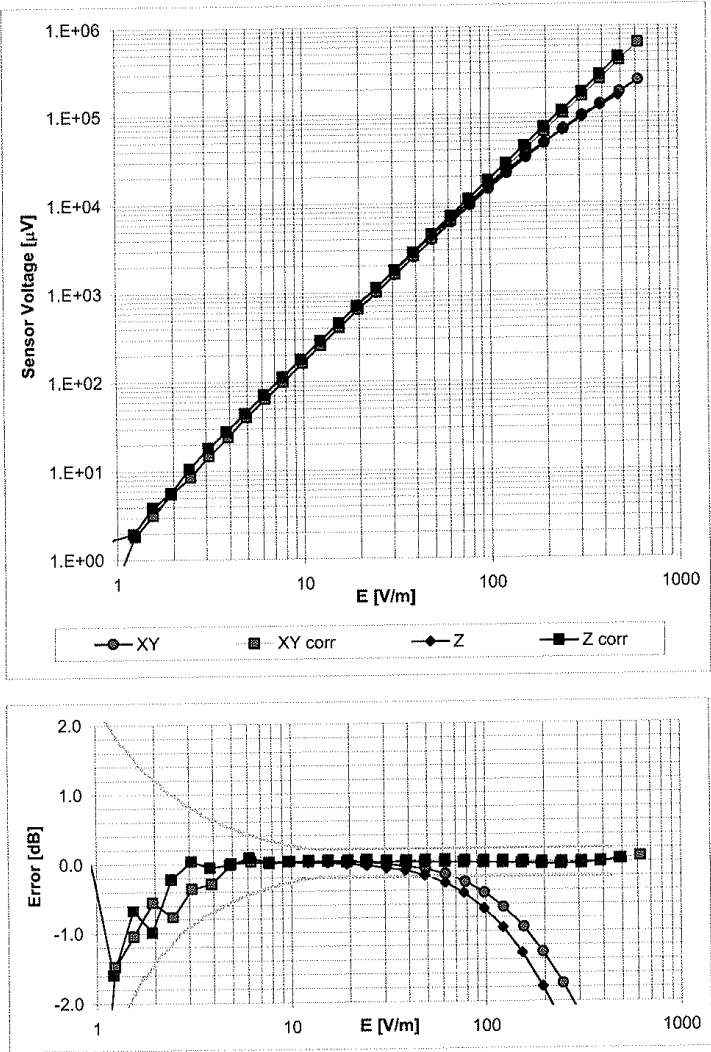
### Receiving Pattern ( $\phi$ ), $\vartheta = 90^\circ$



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

|                                 |                                                                                     |                                                              |                                                                                       |                                 |
|---------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSCHR610              |  | HAC (RF EMISSIONS) TEST REPORT                               |  | Reviewed by:<br>Quality Manager |
| HAC Filename:<br>0705110426.A3L | Test Dates:<br>May 15 - 17, 2007                                                    | EUT Type:<br>Cellular/PCS CDMA Phone with Bluetooth and EvDO |                                                                                       | Page 42 of 70                   |

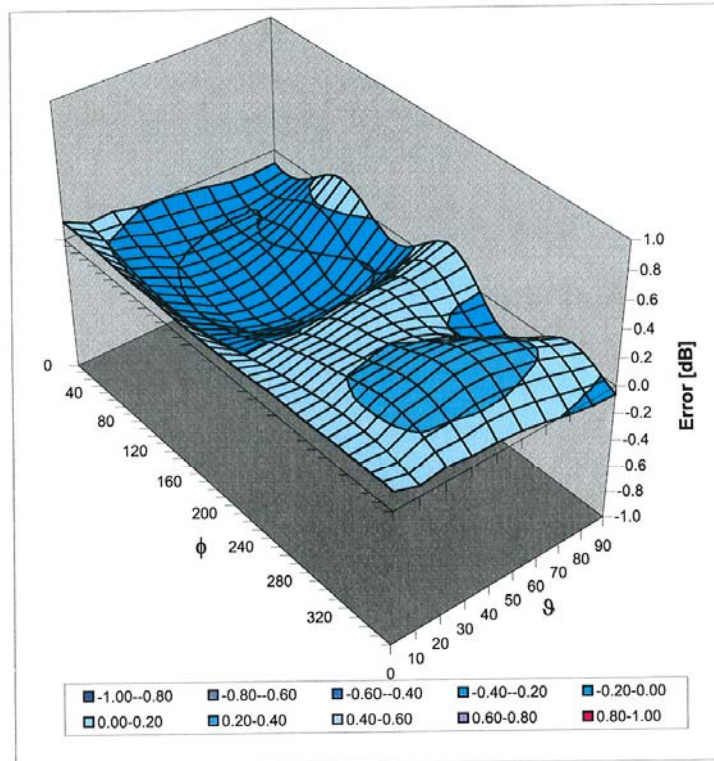
Dynamic Range f(E-field)  
(Waveguide R22, f = 1800 MHz)



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

|                                            |                                                                                                               |                                                              |                                                                                       |                                 |
|--------------------------------------------|---------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSCHR610                         |  <b>PCTEST</b><br>wireless | HAC (RF EMISSIONS) TEST REPORT                               |  | Reviewed by:<br>Quality Manager |
| HAC Filename:<br>0705110426.A3L            | Test Dates:<br>May 15 - 17, 2007                                                                              | EUT Type:<br>Cellular/PCS CDMA Phone with Bluetooth and EvDO |                                                                                       | Page 43 of 70                   |
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### Deviation from Isotropy in Air Error ( $\phi$ , $\theta$ ), $f = 900$ MHz



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

|                                 |                                                                                     |                                                              |                                                                                       |                                 |
|---------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
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| HAC Filename:<br>0705110426.A3L | Test Dates:<br>May 15 - 17, 2007                                                    | EUT Type:<br>Cellular/PCS CDMA Phone with Bluetooth and EvDO |                                                                                       | Page 44 of 70                   |



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Accreditation No.: **SCS 108**

Client **PC Test**

Certificate No: **H3-6170\_Oct06**

## CALIBRATION CERTIFICATE

Object **H3DV6 - SN:6170**

Calibration procedure(s) **QA CAL-03.v4  
Calibration procedure for H-field probes optimized for close near field  
evaluations in air**

Calibration date: **October 13, 2006**

Condition of the calibrated item **In Tolerance**

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

All calibrations have been conducted in the closed laboratory facility: environment temperature  $(22 \pm 3)^\circ\text{C}$  and humidity  $< 70\%$ .

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards          | ID #            | Cal Date (Calibrated by, Certificate No.) | Scheduled Calibration |
|----------------------------|-----------------|-------------------------------------------|-----------------------|
| Power meter E4410S         | GB41293674      | 5-Apr-06 (METAS, No. 251-00557)           | Apr-07                |
| Power sensor E4412A        | MY41456277      | 5-Apr-06 (METAS, No. 251-00557)           | Apr-07                |
| Power sensor E4412A        | MY41456097      | 5-Apr-06 (METAS, No. 251-00557)           | Apr-07                |
| Reference 3 dB Attenuator  | SN: S5054 (30)  | 10-Aug-06 (METAS, No. 217-00662)          | Aug-07                |
| Reference 20 dB Attenuator | SN: S5008 (20b) | 4-Apr-06 (METAS, No. 251-00558)           | Apr-07                |
| Reference 30 dB Attenuator | SN: S5129 (30b) | 10-Aug-06 (METAS, No. 217-00663)          | Aug-07                |
| Reference Probe H3DV6      | SN: 6182        | 2-Oct-06 (SPEAG, No. H3-6182_Oct06)       | Oct-07                |
| DAE4                       | SN: 654         | 21-Jun-06 (SPEAG, No. DAE4-654_Jun06)     | Jun-07                |

| Secondary Standards       | ID #          | Check Date (in house)                    | Scheduled Check        |
|---------------------------|---------------|------------------------------------------|------------------------|
| RF generator HP 8648C     | LIS3642U01700 | 4-Aug-99 (SPEAG, in house check Nov-05)  | In house check: Nov-07 |
| Network Analyzer HP 8753E | US37350595    | 19-Oct-01 (SPEAG, in house check Nov-05) | In house check: Nov-06 |

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

Issued: October 13, 2006

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Certificate No: **H3-6170\_Oct06**

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|                                 |                                               |                                                              |  |                                 |
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| HAC Filename:<br>0705110426.A3L | Test Dates:<br>May 15 - 17, 2007              | EUT Type:<br>Cellular/PCS CDMA Phone with Bluetooth and EvDO |  | Page 45 of 70                   |

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



**S** Schweizerischer Kalibrierdienst  
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**S** Swiss Calibration Service

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Accreditation No.: **SCS 108**

**Glossary:**

**NORM<sub>x,y,z</sub>** sensitivity in free space  
**DCP** diode compression point  
**Polarization  $\phi$**   $\phi$  rotation around probe axis  
**Polarization  $\vartheta$**   $\vartheta$  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  
**Connector Angle** information used in DASY system to align probe sensor X to the robot coordinate system

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

- a) IEEE Std 1309-1996, "IEEE Standard for calibration of electromagnetic field sensors and probes, excluding antennas, from 9 kHz to 40 GHz", 1996.

**Methods Applied and Interpretation of Parameters:**

- **$X, Y, Z_{a0a1a2}$** : Assessed for E-field polarization  $\vartheta = 90$  for XY sensors and  $\vartheta = 0$  for Z sensor ( $f \leq 900$  MHz in TEM-cell;  $f > 1800$  MHz: R22 waveguide).
- **$X, Y, Z(f)_{a0a1a2}$** :  $X, Y, Z_{a0a1a2} \cdot \text{frequency\_response}$  (see Frequency Response Chart).
- **$DCP_{x,y,z}$** : DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency.
- **Spherical isotropy (3D deviation from isotropy)**: in a locally homogeneous field realized using an open waveguide setup.
- **Sensor Offset**: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- **Connector Angle**: The angle is assessed using the information gained by determining the  $X_{a0a1a2}$  (no uncertainty required).

|                                        |                                                                                     |                                                                     |                                                                                       |                                        |
|----------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| <b>FCC ID:</b> A3LSCHR610              |  | <b>HAC (RF EMISSIONS) TEST REPORT</b>                               |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>HAC Filename:</b><br>0705110426.A3L | <b>Test Dates:</b><br>May 15 - 17, 2007                                             | <b>EUT Type:</b><br>Cellular/PCS CDMA Phone with Bluetooth and EvDO |                                                                                       | Page 46 of 70                          |

# Probe H3DV6

## SN:6170

Manufactured: May 19, 2005  
Last calibrated: August 8, 2005  
Recalibrated: October 13, 2006

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

|                                        |                                                                                     |                                                                     |                                                                                       |                                        |
|----------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
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| <b>HAC Filename:</b><br>0705110426.A3L | <b>Test Dates:</b><br>May 15 - 17, 2007                                             | <b>EUT Type:</b><br>Cellular/PCS CDMA Phone with Bluetooth and EvDO |                                                                                       | Page 47 of 70                          |

**DASY - Parameters of Probe: H3DV6 SN:6170**Sensitivity in Free Space [A/m /  $\sqrt{\mu\text{V}}$ ]

|   | a0        | a1        | a2                          |
|---|-----------|-----------|-----------------------------|
| X | 2.487E-03 | 1.338E-4  | -3.851E-6 $\pm$ 5.1 % (k=2) |
| Y | 2.632E-03 | 1.667E-5  | -2.949E-5 $\pm$ 5.1 % (k=2) |
| Z | 2.952E-03 | -5.424E-5 | 2.407E-5 $\pm$ 5.1 % (k=2)  |

Diode Compression<sup>1</sup>

|       |       |
|-------|-------|
| DCP X | 85 mV |
| DCP Y | 85 mV |
| DCP Z | 86 mV |

Sensor Offset (Probe Tip to Sensor Center)

|   |        |
|---|--------|
| X | 3.0 mm |
| Y | 3.0 mm |
| Z | 3.0 mm |

Connector Angle -1 °

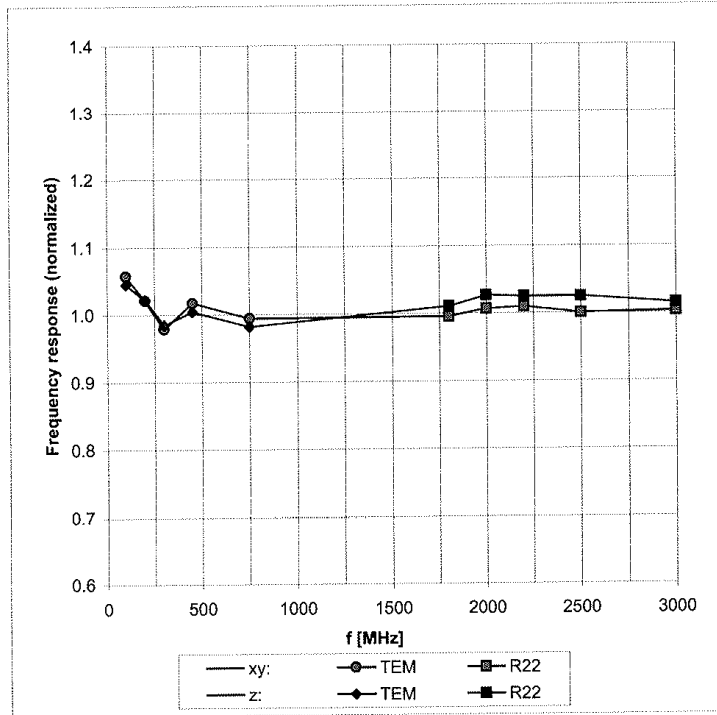
The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

<sup>1</sup> numerical linearization parameter; uncertainty not required

|                                 |                                                                                                                                   |                                                              |                                                                                       |                                 |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
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| HAC Filename:<br>0705110426.A3L | Test Dates:<br>May 15 - 17, 2007                                                                                                  | EUT Type:<br>Cellular/PCS CDMA Phone with Bluetooth and EvDO |                                                                                       | Page 48 of 70                   |

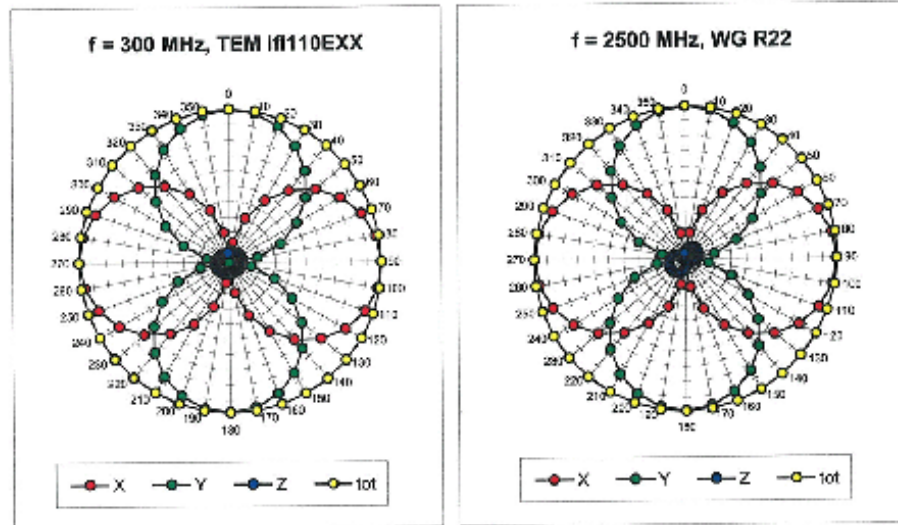
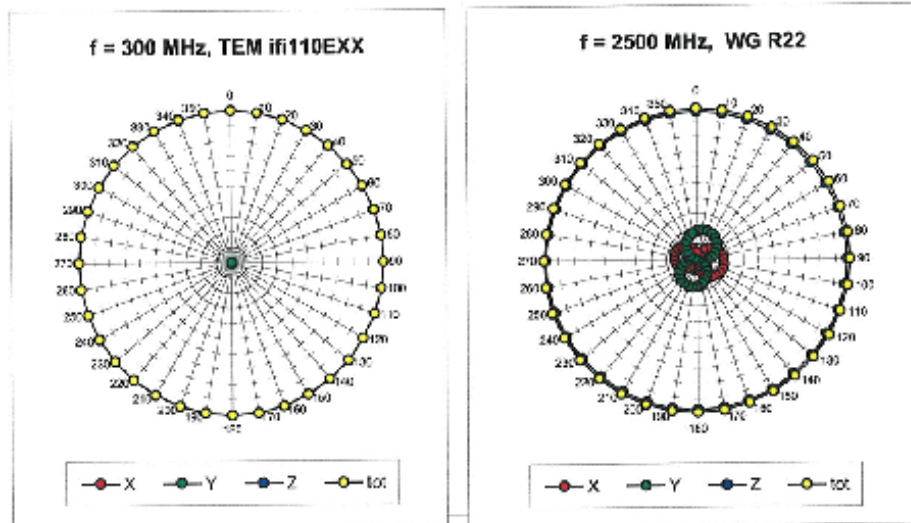
## Frequency Response of H-Field

(TEM-Cell:ifi110, Waveguide R22)



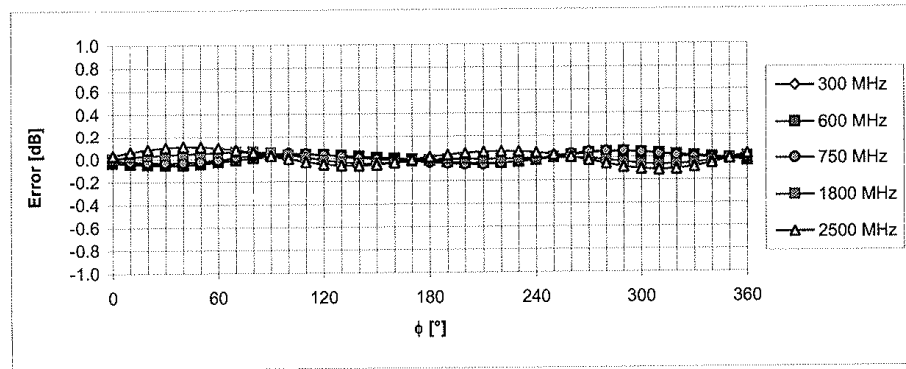
Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  ( $k=2$ )

|                                 |                                                                                                                                   |                                                              |                                                                                       |                                 |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSCHR610              |  <b>PCTEST</b><br>Engineering Laboratory, Inc. | HAC (RF EMISSIONS) TEST REPORT                               |  | Reviewed by:<br>Quality Manager |
| HAC Filename:<br>0705110426.A3L | Test Dates:<br>May 15 - 17, 2007                                                                                                  | EUT Type:<br>Cellular/PCS CDMA Phone with Bluetooth and EvDO |                                                                                       | Page 49 of 70                   |

Receiving Pattern ( $\phi$ ),  $\theta = 90^\circ$ Receiving Pattern ( $\phi$ ),  $\theta = 0^\circ$ 

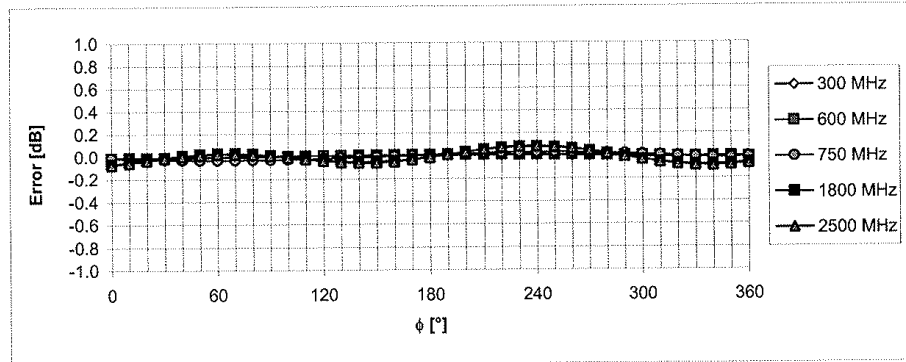
|                                 |                                                                                     |                                                              |                                                                                       |                                 |
|---------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
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| HAC Filename:<br>0705110426.A3L | Test Dates:<br>May 15 - 17, 2007                                                    | EUT Type:<br>Cellular/PCS CDMA Phone with Bluetooth and EvDO |                                                                                       | Page 50 of 70                   |

### Receiving Pattern ( $\phi$ ), $\vartheta = 90^\circ$



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

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

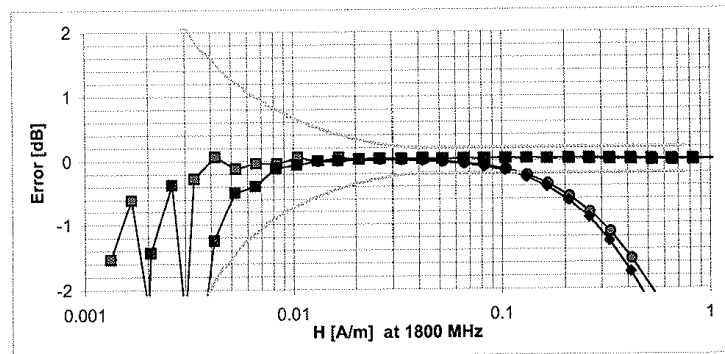
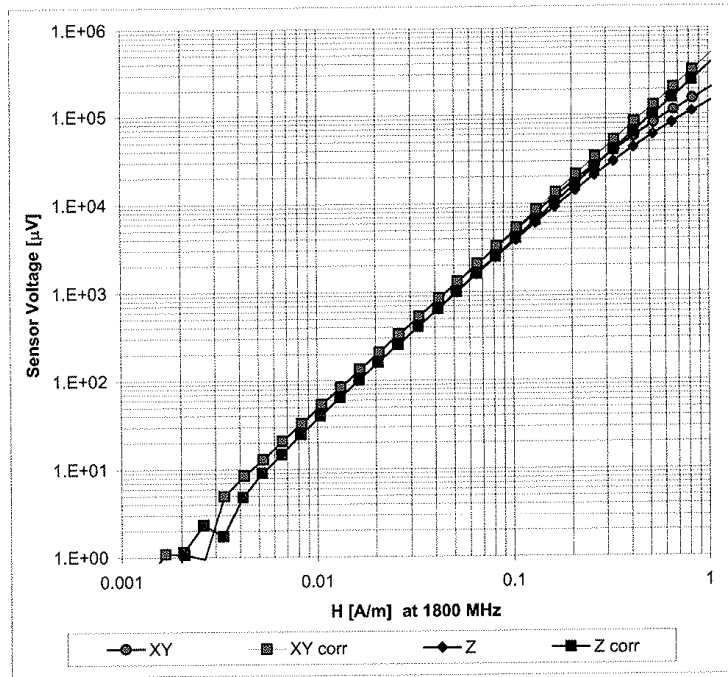


Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )

|                                 |                                                                                     |                                                              |                                                                                       |                                 |
|---------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSCHR610              |  | HAC (RF EMISSIONS) TEST REPORT                               |  | Reviewed by:<br>Quality Manager |
| HAC Filename:<br>0705110426.A3L | Test Dates:<br>May 15 - 17, 2007                                                    | EUT Type:<br>Cellular/PCS CDMA Phone with Bluetooth and EvDO |                                                                                       | Page 51 of 70                   |

# Dynamic Range f(H-field)

(Waveguide R22, f = 1800 MHz)



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

|                                 |                                                                                                               |                                                              |                                                                                       |                                 |
|---------------------------------|---------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSCHR610              |  <b>PCTEST</b><br>wireless | HAC (RF EMISSIONS) TEST REPORT                               |  | Reviewed by:<br>Quality Manager |
| HAC Filename:<br>0705110426.A3L | Test Dates:<br>May 15 - 17, 2007                                                                              | EUT Type:<br>Cellular/PCS CDMA Phone with Bluetooth and EvDO |                                                                                       | Page 52 of 70                   |



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

Accreditation No.: **SCS 108**

Client **PC Test**

Certificate No: **CD835V3-1082\_Jul06**

## CALIBRATION CERTIFICATE

Object **CD835V3 - SN: 1082**

Calibration procedure(s) **QA CAL-20.v4  
Calibration procedure for dipoles in air**

Calibration date: **July 17, 2006**

Condition of the calibrated item **In Tolerance**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).  
All calibrations have been conducted in the closed laboratory facility: environment temperature ( $22 \pm 3$ )°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards          | ID #             | Cal Date (Calibrated by, Certificate No.) | Scheduled Calibration  |
|----------------------------|------------------|-------------------------------------------|------------------------|
| Power meter EPM-442A       | GB37480704       | 04-Oct-05 (METAS, No. 251-00516)          | Oct-06                 |
| Power sensor HP 8481A      | US37292783       | 04-Oct-05 (METAS, No. 251-00516)          | Oct-06                 |
| Reference 20 dB Attenuator | SN: 5086 (20g)   | 11-Aug-05 (METAS, No 251-00498)           | Aug-06                 |
| Reference 10 dB Attenuator | SN: 5047.2 (10r) | 11-Aug-05 (METAS, No 251-00498)           | Aug-06                 |
| DAE4                       | SN: 660          | 1-Mar-06 (SPEAG, No. DAE4-660_Mar06)      | Calibration, Mar-07    |
| Probe ER3DV6               | SN: 2336         | 20-Dec-05 (SPEAG, No. ER3-2336_Dec05)     | Calibration, Dec-06    |
| Probe H3DV6                | SN: 6065         | 20-Dec-05 (SPEAG, No. H3-6065-Dec05)      | Calibration, Dec-06    |
| Secondary Standards        | ID #             | Check Date (in house)                     | Scheduled Check        |
| Power meter EPM-4419B      | GB43310788       | 12-Aug-03 (SPEAG, in house check Oct-05)  | In house check: Oct-06 |
| Power sensor HP 8481A      | MY41093312       | 10-Aug-03 (SPEAG, in house check Oct-05)  | In house check: Oct-07 |
| Power sensor HP 8481A      | MY41093315       | 10-Aug-03 (SPEAG, in house check Oct-05)  | In house check: Oct-06 |
| Network Analyzer HP 8753E  | US37390585       | 18-Oct-01 (SPEAG, in house check Nov-05)  | In house check: Nov-06 |
| RF generator R&S SMT06     | SN: 100005       | 26-Jul-04 (SPEAG, in house check Nov-05)  | In house check: Nov-07 |

|                |                            |                                   |                                |
|----------------|----------------------------|-----------------------------------|--------------------------------|
| Calibrated by: | Name<br><b>Mike Meili</b>  | Function<br>Laboratory Technician | Signature<br><i>M. Meili</i>   |
| Approved by:   | Name<br><b>Fin Bomholt</b> | Function<br>Technical Director    | Signature<br><i>F. Bomholt</i> |

Issued: July 18, 2006

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

Certificate No: CD835V3-1082\_Jul06

Page 1 of 6

|                                 |                                               |                                                              |  |                                 |
|---------------------------------|-----------------------------------------------|--------------------------------------------------------------|--|---------------------------------|
| FCC ID: A3LSCHR610              | <b>PCTEST</b><br>Engineering Laboratory, Inc. | <b>HAC (RF EMISSIONS) TEST REPORT</b>                        |  | Reviewed by:<br>Quality Manager |
| HAC Filename:<br>0705110426.A3L | Test Dates:<br>May 15 - 17, 2007              | EUT Type:<br>Cellular/PCS CDMA Phone with Bluetooth and EvDO |  | Page 53 of 70                   |



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The Swiss Accreditation Service is one of the signatories to the EA  
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

#### References

- [1] ANSI-PC63.19-2001 (Draft 3.x, 2005)  
American National Standard for Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids.

#### Methods Applied and Interpretation of Parameters:

- **Coordinate System:** y-axis is in the direction of the dipole arms. z-axis is from the basis of the antenna (mounted on the table) towards its feed point between the two dipole arms. x-axis is normal to the other axes. In coincidence with standard [1], the measurement planes (probe sensor center) are selected to be at a distance of 10 mm above the top edge of the dipole arms.
- **Measurement Conditions:** Further details are available from the hardcopies at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated. The forward power to the dipole connector is set with a calibrated power meter connected and monitored with an auxiliary power meter connected to a directional coupler. While the dipole under test is connected, the forward power is adjusted to the same level.
- **Antenna Positioning:** The dipole is mounted on a HAC Test Arch phantom using the matching dipole positioner with the arms horizontal and the feeding cable coming from the floor. The measurements are performed in a shielded room with absorbers around the setup to reduce the reflections. It is verified before the mounting of the dipole under the Test Arch phantom, that its arms are perfectly in a line. It is installed on the HAC dipole positioner with its arms parallel below the dielectric reference wire and able to move elastically in vertical direction without changing its relative position to the top center of the Test Arch phantom. The vertical distance to the probe is adjusted after dipole mounting with a DASY4 Surface Check job. Before the measurement, the distance between phantom surface and probe tip is verified. The proper measurement distance is selected by choosing the matching section of the HAC Test Arch phantom with the proper device reference point (upper surface of the dipole) and the matching grid reference point (tip of the probe) considering the probe sensor offset. The vertical distance to the probe is essential for the accuracy.
- **Feed Point Impedance and Return Loss:** These parameters are measured using a HP 8753E Vector Network Analyzer. The impedance is specified at the SMA connector of the dipole. The influence of reflections was eliminated by applying the averaging function while moving the dipole in the air, at least 70cm away from any obstacles.
- **E-field distribution:** E field is measured in the x-y-plane with an isotropic ER3D-field probe with 100 mW forward power to the antenna feed point. In accordance with [1], the scan area is 20mm wide, its length exceeds the dipole arm length (180 or 90mm). The sensor center is 10 mm (in z) above the top of the dipole arms. Two 3D maxima are available near the end of the dipole arms. Assuming the dipole arms are perfectly in one line, the average of these two maxima (in subgrid 2 and subgrid 8) is determined to compensate for any non-parallelity to the measurement plane as well as the sensor displacement. The E-field value stated as calibration value represents the maximum of the interpolated 3D-E-field, 10mm above the dipole surface.
- **H-field distribution:** H-field is measured with an isotropic H-field probe with 100mW forward power to the antenna feed point, in the x-y-plane. The scan area and sensor distance is equivalent to the E-field scan. The maximum of the field is available at the center (subgrid 5) above the feed point. The H-field value stated as calibration value represents the maximum of the interpolated H-field, 10mm above the dipole surface at the feed point.

|                                        |                                               |                                                                     |  |                                        |
|----------------------------------------|-----------------------------------------------|---------------------------------------------------------------------|--|----------------------------------------|
| FCC ID: A3LSCHR610                     | <b>PCTEST</b><br>Engineering Laboratory, Inc. | <b>HAC (RF EMISSIONS) TEST REPORT</b>                               |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>HAC Filename:</b><br>0705110426.A3L | <b>Test Dates:</b><br>May 15 - 17, 2007       | <b>EUT Type:</b><br>Cellular/PCS CDMA Phone with Bluetooth and EvDO |  | Page 54 of 70                          |

## 1 Measurement Conditions

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

|                                           |                                       |                      |
|-------------------------------------------|---------------------------------------|----------------------|
| <b>DASY Version</b>                       | DASY4                                 | V4.7 B44             |
| <b>DASY PP Version</b>                    | SEMCAD                                | V1.8 B171            |
| <b>Phantom</b>                            | HAC Test Arch                         | SD HAC P01 BA, #1002 |
| <b>Distance Dipole Top - Probe Center</b> | 10 mm                                 |                      |
| <b>Scan resolution</b>                    | dx, dy = 5 mm                         | area = 20 x 180 mm   |
| <b>Frequency</b>                          | <b>835 MHz <math>\pm</math> 1 MHz</b> |                      |
| <b>Forward power at dipole connector</b>  | 20.0 dBm = 100mW                      |                      |
| <b>Input power drift</b>                  | < 0.05 dB                             |                      |

## 2 Maximum Field values

| <b>H-field 10 mm above dipole surface</b> | condition            | <b>interpolated maximum</b> |
|-------------------------------------------|----------------------|-----------------------------|
| Maximum measured                          | 100 mW forward power | <b>0.454 A/m</b>            |

Uncertainty for H-field measurement: 8.2% (k=2)

| <b>E-field 10 mm above dipole surface</b> | condition            | <b>Interpolated maximum</b> |
|-------------------------------------------|----------------------|-----------------------------|
| Maximum measured above high end           | 100 mW forward power | 172.3 V/m                   |
| Maximum measured above low end            | 100 mW forward power | 162.3 V/m                   |
| Averaged maximum above arm                | 100 mW forward power | <b>167.3 V/m</b>            |

Uncertainty for E-field measurement: 12.8% (k=2)

## 3 Appendix

### 3.1 Antenna Parameters

| <b>Frequency</b> | <b>Return Loss</b> | <b>Impedance</b>           |
|------------------|--------------------|----------------------------|
| 800 MHz          | 16.7 dB            | ( 43.5 – j12.2 ) Ohm       |
| <b>835 MHz</b>   | <b>27.6 dB</b>     | <b>( 51.3 + j4.0 ) Ohm</b> |
| 900 MHz          | 16.1 dB            | ( 57.4 – j15.4 ) Ohm       |
| 950 MHz          | 21.1 dB            | ( 44.3 + j6.0 ) Ohm        |
| 960 MHz          | 18.0 dB            | ( 49.0 + j12.6 ) Ohm       |

### 3.2 Antenna Design and Handling

The calibration dipole has a symmetric geometry with a built-in two stub matching network, which leads to the enhanced bandwidth.

The dipole is built of standard semirigid coaxial cable. The internal matching line is open ended. The antenna is therefore open for DC signals.

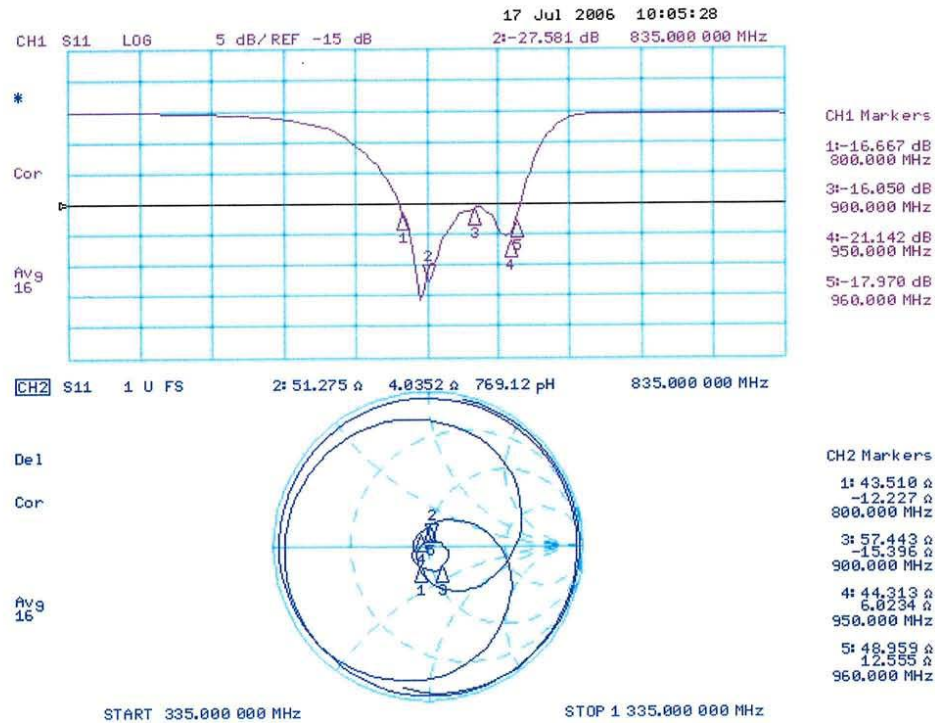
Do not apply force to dipole arms, as they are liable to bend. The soldered connections near the feedpoint may be damaged. After excessive mechanical stress or overheating, check the impedance characteristics to ensure that the internal matching network is not affected.

After long term use with 40W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

|                                        |                                                                                                                                   |                                                                     |                                                                                       |                                        |
|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| <b>FCC ID:</b> A3LSCHR610              |  <b>PCTEST</b><br>Engineering Laboratory, Inc. | <b>HAC (RF EMISSIONS) TEST REPORT</b>                               |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>HAC Filename:</b><br>0705110426.A3L | <b>Test Dates:</b><br>May 15 - 17, 2007                                                                                           | <b>EUT Type:</b><br>Cellular/PCS CDMA Phone with Bluetooth and EvDO |                                                                                       | Page 55 of 70                          |

### 3.3 Measurement Sheets

#### 3.3.1 Return Loss and Smith Chart



|                                 |                                                                                                                |                                                              |                                                                                       |                                 |
|---------------------------------|----------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSCHR610              |  <b>PCTEST</b><br>microwave | HAC (RF EMISSIONS) TEST REPORT                               |  | Reviewed by:<br>Quality Manager |
| HAC Filename:<br>0705110426.A3L | Test Dates:<br>May 15 - 17, 2007                                                                               | EUT Type:<br>Cellular/PCS CDMA Phone with Bluetooth and EvDO |                                                                                       | Page 56 of 70                   |

### 3.3.2 DASY4 H-field result

Date/Time: 7/17/2006 2:56:42 PM

Test Laboratory: SPEAG, Zurich, Switzerland  
File Name: [H\\_CD835\\_1082\\_060717.da4](#)

**DUT: HAC-Dipole 835 MHz; Type: D835V3; Serial: 1082**  
**Program Name: HAC H Dipole**

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1  
Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1$  kg/m<sup>3</sup>  
Phantom section: H Dipole Section

DASY4 Configuration:

- Probe: H3DV6 - SN6065; ; Calibrated: 12/20/2005
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn660; Calibrated: 3/1/2006
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1002
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**H Scan - Sensor Center 10mm above CD835 Dipole/Hearing Aid Compatibility Test (41x361x1): Measurement grid:**  
dx=5mm, dy=5mm

Maximum value of peak Total field = 0.454 A/m

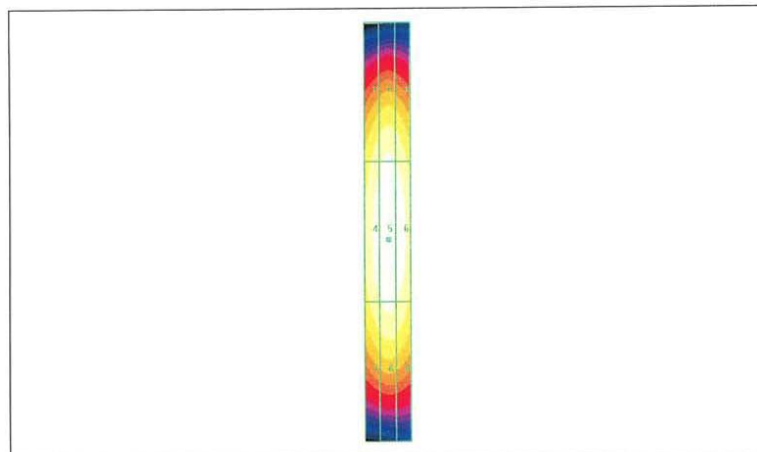
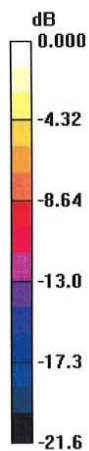
Probe Modulation Factor = 1.00

Reference Value = 0.482 A/m; Power Drift = -0.014 dB

**Hearing Aid Near-Field Category: M2 (AWF 0 dB)**

Peak H-field in A/m

| Grid 1 | Grid 2 | Grid 3 |
|--------|--------|--------|
| 0.372  | 0.402  | 0.386  |
| Grid 4 | Grid 5 | Grid 6 |
| 0.425  | 0.454  | 0.438  |
| Grid 7 | Grid 8 | Grid 9 |
| 0.379  | 0.404  | 0.388  |



0 dB = 0.454A/m

|                                        |                                               |                                                                     |                |                                        |
|----------------------------------------|-----------------------------------------------|---------------------------------------------------------------------|----------------|----------------------------------------|
| FCC ID: A3LSCHR610                     | <b>PCTEST</b><br>Engineering Laboratory, Inc. | <b>HAC (RF EMISSIONS) TEST REPORT</b>                               | <b>SAMSUNG</b> | <b>Reviewed by:</b><br>Quality Manager |
| <b>HAC Filename:</b><br>0705110426.A3L | <b>Test Dates:</b><br>May 15 - 17, 2007       | <b>EUT Type:</b><br>Cellular/PCS CDMA Phone with Bluetooth and EvDO |                | Page 57 of 70                          |

### 3.3.3 DASY4 E-Field result

Date/Time: 7/17/2006 11:50:47 AM

Test Laboratory: SPEAG, Zurich, Switzerland  
File Name: [E\\_CD835\\_1082\\_060717.da4](#)

**DUT: HAC-Dipole 835 MHz; Type: D835V3; Serial: 1082**  
**Program Name: HAC E Dipole**

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1  
Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: E Dipole Section

DASY4 Configuration:

- Probe: ER3DV6 - SN2336; ConvF(1, 1, 1); Calibrated: 12/20/2005
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn660; Calibrated: 3/1/2006
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1002
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**E Scan - Sensor Center 10mm above CD835 Dipole/Hearing Aid Compatibility Test (41x361x1): Measurement grid:**

dx=5mm, dy=5mm

Maximum value of peak Total field = 172.3 V/m

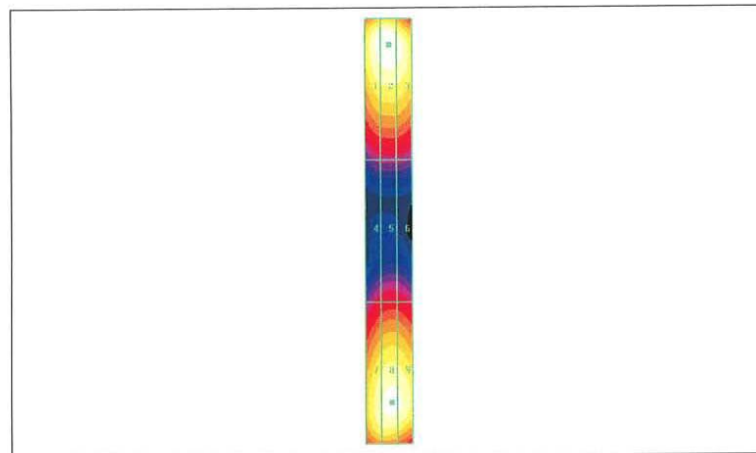
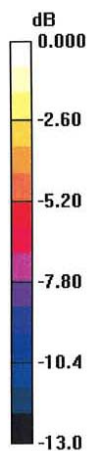
Probe Modulation Factor = 1.00

Reference Value = 122.7 V/m; Power Drift = -0.030 dB

**Hearing Aid Near-Field Category: M2 (AWF 0 dB)**

Peak E-field in V/m

|        |        |        |
|--------|--------|--------|
| Grid 1 | Grid 2 | Grid 3 |
| 166.8  | 172.3  | 165.8  |
| Grid 4 | Grid 5 | Grid 6 |
| 84.7   | 88.9   | 87.9   |
| Grid 7 | Grid 8 | Grid 9 |
| 154.6  | 162.3  | 160.4  |



0 dB = 172.3V/m

Certificate No: CD835V3-1082\_Jul06

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|                                        |                                               |                                                                     |  |                                        |
|----------------------------------------|-----------------------------------------------|---------------------------------------------------------------------|--|----------------------------------------|
| FCC ID: A3LSCHR610                     | <b>PCTEST</b><br>Engineering Laboratory, Inc. | <b>HAC (RF EMISSIONS) TEST REPORT</b>                               |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>HAC Filename:</b><br>0705110426.A3L | <b>Test Dates:</b><br>May 15 - 17, 2007       | <b>EUT Type:</b><br>Cellular/PCS CDMA Phone with Bluetooth and EvDO |  | Page 58 of 70                          |



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 The Swiss Accreditation Service is one of the signatories to the EA  
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Accreditation No.: **SCS 108**

Client **PC Test**

Certificate No: **CD1880V3-1064\_Jul06**

## CALIBRATION CERTIFICATE

Object **CD1880V3 - SN: 1064**

Calibration procedure(s) **QA CAL-20.v4**  
**Calibration procedure for dipoles in air**

Calibration date: **July 18, 2006**

Condition of the calibrated item **In Tolerance**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).  
 All calibrations have been conducted in the closed laboratory facility: environment temperature ( $22 \pm 3$ )°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards          | ID #             | Cal Date (Calibrated by, Certificate No.) | Scheduled Calibration  |
|----------------------------|------------------|-------------------------------------------|------------------------|
| Power meter EPM-442A       | GB37480704       | 04-Oct-05 (METAS, No. 251-00516)          | Oct-06                 |
| Power sensor HP 8481A      | US37292783       | 04-Oct-05 (METAS, No. 251-00516)          | Oct-06                 |
| Reference 20 dB Attenuator | SN: 5086 (20g)   | 11-Aug-05 (METAS, No 251-00498)           | Aug-06                 |
| Reference 10 dB Attenuator | SN: 5047.2 (10r) | 11-Aug-05 (METAS, No 251-00498)           | Aug-06                 |
| DAE4                       | SN: 660          | 1-Mar-06 (SPEAG, No. DAE4-660_Mar06)      | Calibration, Mar-07    |
| Probe ER3DV6               | SN: 2336         | 20-Dec-05 (SPEAG, No. ER3-2336_Dec05)     | Calibration, Dec-06    |
| Probe H3DV6                | SN: 6065         | 20-Dec-05 (SPEAG, No. H3-6065-Dec05)      | Calibration, Dec-06    |
| Secondary Standards        | ID #             | Check Date (in house)                     | Scheduled Check        |
| Power meter EPM-4419B      | GB43310788       | 12-Aug-03 (SPEAG, in house check Oct-05)  | In house check: Oct-06 |
| Power sensor HP 8481A      | MY41093312       | 10-Aug-03 (SPEAG, in house check Oct-05)  | In house check: Oct-07 |
| Power sensor HP 8481A      | MY41093315       | 10-Aug-03 (SPEAG, in house check Oct-05)  | In house check: Oct-06 |
| Network Analyzer HP 8753E  | US37390585       | 18-Oct-01 (SPEAG, in house check Nov-05)  | In house check: Nov-06 |
| RF generator R&S SMT06     | SN: 100005       | 26-Jul-04 (SPEAG, in house check Nov-05)  | In house check: Nov-07 |

Calibrated by: **Mike Meili** **Mike Meili** **Mike Meili**  
 Name Function Signature  
 Mike Meili Laboratory Technician

Approved by: **Fin Bomholt** **Fin Bomholt**  
 Name Function  
 Fin Bomholt Technical Director

Issued: July 20, 2006

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Certificate No: CD1880V3-1064\_Jul06

Page 1 of 6

|                                        |                                         |                                                                     |  |                                        |
|----------------------------------------|-----------------------------------------|---------------------------------------------------------------------|--|----------------------------------------|
| <b>FCC ID:</b> A3LSCHR610              | <b>PCTEST</b>                           | <b>HAC (RF EMISSIONS) TEST REPORT</b>                               |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>HAC Filename:</b><br>0705110426.A3L | <b>Test Dates:</b><br>May 15 - 17, 2007 | <b>EUT Type:</b><br>Cellular/PCS CDMA Phone with Bluetooth and EvDO |  | Page 59 of 70                          |



#### References

- [1] ANSI-PC63.19-2001 (Draft 3.x, 2005)  
American National Standard for Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids.

#### Methods Applied and Interpretation of Parameters:

- **Coordinate System:** y-axis is in the direction of the dipole arms. z-axis is from the basis of the antenna (mounted on the table) towards its feed point between the two dipole arms. x-axis is normal to the other axes. In coincidence with standard [1], the measurement planes (probe sensor center) are selected to be at a distance of 10 mm above the top edge of the dipole arms.
- **Measurement Conditions:** Further details are available from the hardcopies at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated. The forward power to the dipole connector is set with a calibrated power meter connected and monitored with an auxiliary power meter connected to a directional coupler. While the dipole under test is connected, the forward power is adjusted to the same level.
- **Antenna Positioning:** The dipole is mounted on a HAC Test Arch phantom using the matching dipole positioner with the arms horizontal and the feeding cable coming from the floor. The measurements are performed in a shielded room with absorbers around the setup to reduce the reflections. It is verified before the mounting of the dipole under the Test Arch phantom, that its arms are perfectly in a line. It is installed on the HAC dipole positioner with its arms parallel below the dielectric reference wire and able to move elastically in vertical direction without changing its relative position to the top center of the Test Arch phantom. The vertical distance to the probe is adjusted after dipole mounting with a DASY4 Surface Check job. Before the measurement, the distance between phantom surface and probe tip is verified. The proper measurement distance is selected by choosing the matching section of the HAC Test Arch phantom with the proper device reference point (upper surface of the dipole) and the matching grid reference point (tip of the probe) considering the probe sensor offset. The vertical distance to the probe is essential for the accuracy.
- **Feed Point Impedance and Return Loss:** These parameters are measured using a HP 8753E Vector Network Analyzer. The impedance is specified at the SMA connector of the dipole. The influence of reflections was eliminating by applying the averaging function while moving the dipole in the air, at least 70cm away from any obstacles.
- **E- field distribution:** E field is measured in the x-y-plane with an isotropic ER3D-field probe with 100 mW forward power to the antenna feed point. In accordance with [1], the scan area is 20mm wide, its length exceeds the dipole arm length (180 or 90mm). The sensor center is 10 mm (in z) above the top of the dipole arms. Two 3D maxima are available near the end of the dipole arms. Assuming the dipole arms are perfectly in one line, the average of these two maxima (in subgrid 2 and subgrid 8) is determined to compensate for any non-parallelity to the measurement plane as well as the sensor displacement. The E-field value stated as calibration value represents the maximum of the interpolated 3D-E-field, 10mm above the dipole surface.
- **H-field distribution:** H-field is measured with an isotropic H-field probe with 100mW forward power to the antenna feed point, in the x-y-plane. The scan area and sensor distance is equivalent to the E-field scan. The maximum of the field is available at the center (subgrid 5) above the feed point. The H-field value stated as calibration value represents the maximum of the interpolated H-field, 10mm above the dipole surface at the feed point.

|                                        |                                                                                     |                                                                     |                                                                                       |                                        |
|----------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| <b>FCC ID:</b> A3LSCHR610              |  | <b>HAC (RF EMISSIONS) TEST REPORT</b>                               |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>HAC Filename:</b><br>0705110426.A3L | <b>Test Dates:</b><br>May 15 - 17, 2007                                             | <b>EUT Type:</b><br>Cellular/PCS CDMA Phone with Bluetooth and EvDO |                                                                                       | Page 60 of 70                          |

## 1 Measurement Conditions

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

|                                    |                      |                      |
|------------------------------------|----------------------|----------------------|
| DASY Version                       | DASY4                | V4.7B44              |
| DASY PP Version                    | SEMCAD               | V1.8 B171            |
| Phantom                            | HAC Test Arch        | SD HAC P01 BA, #1002 |
| Distance Dipole Top - Probe Center | 10 mm                |                      |
| Scan resolution                    | dx, dy = 5 mm        | area = 20 x 90 mm    |
| Frequency                          | 1880 MHz $\pm$ 1 MHz |                      |
| Forward power at dipole connector  | 20.0 dBm = 100mW     |                      |
| Input power drift                  | < 0.05 dB            |                      |

## 2 Maximum Field values

| H-field 10 mm above dipole surface | condition            | Interpolated maximum |
|------------------------------------|----------------------|----------------------|
| Maximum measured                   | 100 mW forward power | 0.451 A/m            |

Uncertainty for H-field measurement: 8.2% (k=2)

| E-field 10 mm above dipole surface | condition            | Interpolated maximum |
|------------------------------------|----------------------|----------------------|
| Maximum measured above high end    | 100 mW forward power | 137.9 V/m            |
| Maximum measured above low end     | 100 mW forward power | 131.3 V/m            |
| Averaged maximum above arm         | 100 mW forward power | 134.6 V/m            |

Uncertainty for E-field measurement: 12.8% (k=2)

## 3 Appendix

### 3.1 Antenna Parameters

| Frequency | Return Loss | Impedance           |
|-----------|-------------|---------------------|
| 1710 MHz  | 20.4 dB     | ( 49.1 + j9.5 ) Ohm |
| 1880 MHz  | 22.1 dB     | ( 50.7 + j7.9 ) Ohm |
| 1900 MHz  | 22.5 dB     | ( 52.6 + j7.2 ) Ohm |
| 1950 MHz  | 30.6 dB     | ( 53.0 - j0.3 ) Ohm |
| 2000 MHz  | 20.8 dB     | ( 41.8 + j1.7 ) Ohm |

### 3.2 Antenna Design and Handling

The calibration dipole has a symmetric geometry with a built-in two stub matching network, which leads to the enhanced bandwidth.

The dipole is built of standard semirigid coaxial cable. The internal matching line is open ended. The antenna is therefore open for DC signals.

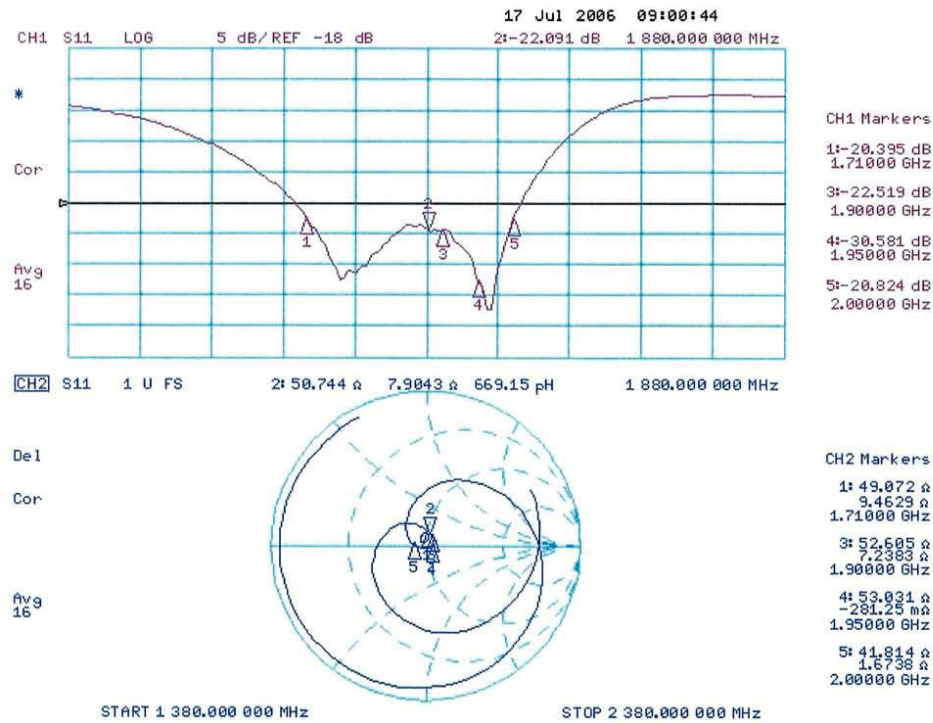
Do not apply force to dipole arms, as they are liable to bend. The soldered connections near the feedpoint may be damaged. After excessive mechanical stress or overheating, check the impedance characteristics to ensure that the internal matching network is not affected.

After long term use with 40W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

|                                 |                                                                                                                                   |                                                              |                                                                                       |                                 |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
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| HAC Filename:<br>0705110426.A3L | Test Dates:<br>May 15 - 17, 2007                                                                                                  | EUT Type:<br>Cellular/PCS CDMA Phone with Bluetooth and EvDO |                                                                                       | Page 61 of 70                   |

3.3 Measurement Sheets

3.3.1 Return Loss and Smith Chart



|                                 |                                                                                                                |                                                              |                                                                                       |                                 |
|---------------------------------|----------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
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| HAC Filename:<br>0705110426.A3L | Test Dates:<br>May 15 - 17, 2007                                                                               | EUT Type:<br>Cellular/PCS CDMA Phone with Bluetooth and EvDO |                                                                                       | Page 62 of 70                   |

### 3.3.2 DASY4 H-field result

Date/Time: 7/18/2006 10:16:29 AM

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: HAC Dipole 1880 MHz; Type: CD1880V3; Serial: 1064**

Communication System: CW; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: Air

Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1$  kg/m<sup>3</sup>

Phantom section: H Dipole Section

DASY4 Configuration:

- Probe: H3DV6 - SN6065; Calibrated: 12/20/2005
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn660; Calibrated: 3/1/2006
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1002
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**H Scan - Sensor Center 10mm above CD1880V3 Dipole/Hearing Aid Compatibility Test (41x181x1):**

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

Maximum value of peak Total field = 0.451 A/m

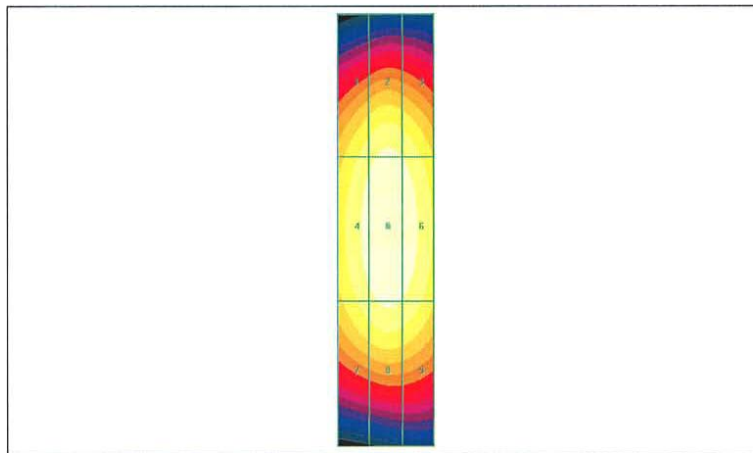
Probe Modulation Factor = 1.00

Reference Value = 0.476 A/m; Power Drift = -0.002 dB

**Hearing Aid Near-Field Category: M2 (AWF 0 dB)**

Peak H-field in A/m

|        |        |        |
|--------|--------|--------|
| Grid 1 | Grid 2 | Grid 3 |
| 0.389  | 0.417  | 0.402  |
| Grid 4 | Grid 5 | Grid 6 |
| 0.425  | 0.451  | 0.437  |
| Grid 7 | Grid 8 | Grid 9 |
| 0.387  | 0.412  | 0.398  |



0 dB = 0.451 A/m

Certificate No: CD1880V3-1064\_Jul06

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|                                        |                                                                                                                                   |                                                                     |                                                                                       |                                        |
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| <b>HAC Filename:</b><br>0705110426.A3L | <b>Test Dates:</b><br>May 15 - 17, 2007                                                                                           | <b>EUT Type:</b><br>Cellular/PCS CDMA Phone with Bluetooth and EvDO |                                                                                       | Page 63 of 70                          |

### 3.3.3 DASY4 E-Field result

Date/Time: 7/18/2006 11:51:17 AM

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: HAC Dipole 1880 MHz; Type: CD1880V3; Serial: 1064**

Communication System: CW; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: Air

Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: E Dipole Section

DASY4 Configuration:

- Probe: ER3DV6 - SN2336; ConvF(1, 1, 1); Calibrated: 12/20/2005
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn660; Calibrated: 3/1/2006
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1002
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**E Scan - Sensor Center 10mm above CD1880V3 Dipole/Hearing Aid Compatibility Test (41x181x1):**

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

Maximum value of peak Total field = 137.9 V/m

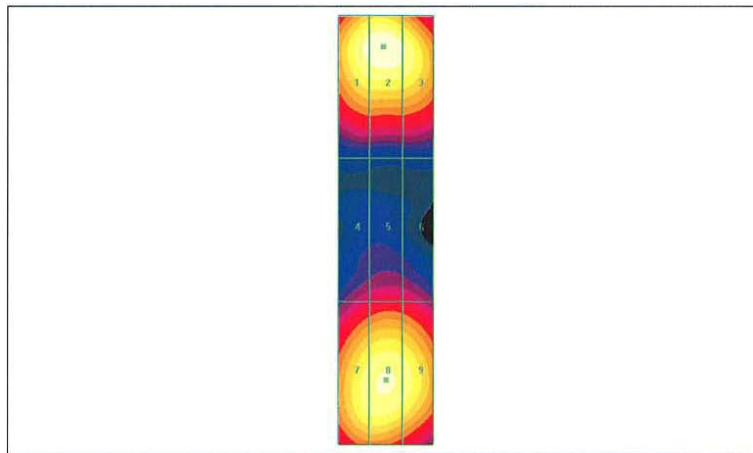
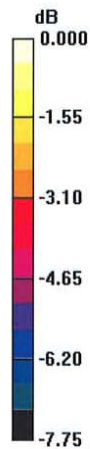
Probe Modulation Factor = 1.00

Reference Value = 132.3 V/m; Power Drift = 0.013 dB

**Hearing Aid Near-Field Category: M2 (AWF 0 dB)**

Peak E-field in V/m

|        |        |        |
|--------|--------|--------|
| Grid 1 | Grid 2 | Grid 3 |
| 134.7  | 137.9  | 131.1  |
| Grid 4 | Grid 5 | Grid 6 |
| 86.8   | 90.4   | 88.7   |
| Grid 7 | Grid 8 | Grid 9 |
| 128.1  | 131.3  | 127.7  |



0 dB = 137.9V/m

Certificate No: CD1880V3-1064\_Jul06

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|                                        |                                                                                                                                   |                                                                     |                                                                                       |                                        |
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## 15. CONCLUSION

The measurements indicate that the wireless communications device complies with the HAC limits specified in accordance with the ANSI C63.19 Standard and FCC WT Docket No. 01-309 RM-8658. Precise laboratory measures were taken to assure repeatability of the tests. The tested device complies with the requirements in respect to all parameters specific to the test. The test results and statements relate only to the item(s) tested.

Please note that the M-rating for this equipment only represents the field interference possible against a hypothetical and typical hearing aid. The measurement system and techniques presented in this evaluation are proposed in the ANSI standard as a means of best approximating wireless device compatibility with a hearing-aid. The literature is under continual re-construction.

|                                        |                                                                                                                     |                                                                     |                                                                                       |                                        |
|----------------------------------------|---------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
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## 16. REFERENCES

1. ANSI C63.19-2006 v3.12, American National Standard for Methods of Measurement of Compatibility between Wireless communication devices and Hearing Aids.", New York, NY, IEEE, January 2006
2. FCC Public Notice DA 06-1215, *Wireless Telecommunications Bureau and Office of Engineering and Technology Clarify Use of Revised Wireless Phone Hearing Aid Compatibility Standard*, June 6, 2006
3. Review Guidance for Reviewing Applications for Certification of 3G Devices, May/June 2006
4. Berger, H. S., "Compatibility Between Hearing Aids and Wireless Devices," Electronic Industries Forum, Boston, MA, May, 1997
5. Berger, H. S., "Hearing Aid and Cellular Phone Compatibility: Working Toward Solutions," Wireless Telephones and Hearing Aids: New Challenges for Audiology, Gallaudet University, Washington, D.C., May, 1997 (To be reprinted in the American Journal of Audiology).
6. Berger, H. S., "Hearing Aid Compatibility with Wireless Communications Devices," IEEE International Symposium on Electromagnetic Compatibility, Austin, TX, August, 1997.
7. Bronaugh, E. L., "Simplifying EMI Immunity (Susceptibility) Tests in TEM Cells," in the 1990 IEEE International Symposium on Electromagnetic Compatibility Symposium Record, Washington, D.C., August 1990, pp. 488-491
8. Byrne, D. and Dillon, H., The National Acoustics Laboratory (NAL) New Procedure for Selecting the Gain and Frequency Response of a Hearing Aid, Ear and Hearing 7:257-265, 1986.
9. Crawford, M. L., "Measurement of Electromagnetic Radiation from Electronic Equipment using TEM Transmission Cells," U.S. Department of Commerce, National Bureau of Standards, NBSIR 73-306, Feb. 1973.
10. Crawford, M. L., and Workman, J. L., "Using a TEM Cell for EMC Measurements of Electronic Equipment," U.S. Department of Commerce, National Bureau of Standards. Technical Note 1013, July 1981.
11. EHIMA GSM Project, Development phase, Project Report (1<sup>st</sup> part) Revision A. Technical-Audiological Laboratory and Telecom Denmark, October 1993.
12. EHIMA GSM Project, Development phase, Part II Project Report. Technical-Audiological Laboratory and Telecom Denmark, June 1994.
13. EHIMA GSM Project Final Report, Hearing Aids and GSM Mobile Telephones: Interference Problems, Methods of Measurement and Levels of Immunity. Technical-Audiological Laboratory and Telecom Denmark, 1995.
14. HAMPIS Report, Comparison of Mobile phone electromagnetic near field with an upscaled electromagnetic far field, using hearing aid as reference, 21 October 1999.

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15. Hearing Aids/GSM, Report from OTWIDAM, Technical-Audiological Laboratory and Telecom Denmark, April 1993.
16. IEEE 100, The Authoritative Dictionary of IEEE Standards Terms, Seventh Edition.
17. Joyner, K. H., et. al., Interference to Hearing Aids by the New Digital Mobile Telephone System, Global System for Mobile (GSM) Communication Standard, National Acoustic Laboratory, Australian Hearing Series, Sydney 1993.
18. Joyner, K. H., et. al., Interference to Hearing Aids by the Digital Mobile Telephone System, Global System for Mobile Communications (GSM), NAL Report #131, National Acoustic Laboratory, Australian Hearing Series, Sydney, 1995.
19. Kecker, W. T., Crawford, M. L., and Wilson, W. A., "Construction of a Transverse Electromagnetic Cell", U.S. Department of Commerce, National Bureau of Standards, Technical Note 1011, Nov. 1978.
20. Konigstein, D., and Hansen, D., "A New Family of TEM Cells with enlarged bandwidth and Optimized working Volume," in the Proceedings of the 7<sup>th</sup> International Symposium on EMC, Zurich, Switzerland, March 1987; 50:9, pp. 127-132.
21. Kuk, F., and Hjorstgaard, N. K., "Factors affecting interference from digital cellular telephones," Hearing Journal, 1997; 50:9, pp 32-34.
22. Ma, M. A., and Kanda, M., "Electromagnetic Compatibility and Interference Metrology," U.S. Department of Commerce, National Bureau of Standards, Technical Note 1099, July 1986, pp. 17-43.
23. Ma, M. A., Sreenivashiah, I. , and Chang, D. C., "A Method of Determining the Emission and Susceptibility Levels of Electrically Small Objects Using a TEM Cell," U.S. Department of Commerce, National Bureau of Standards, Technical Note 1040, July 1981.
24. McCandless, G. A., and Lyregaard, P. E., Prescription of Gain/Output (POGO) for Hearing Aids, Hearing Instruments 1:16-21, 1983
25. Skopec, M., "Hearing Aid Electromagnetic Interference from Digital Wireless Telephones, "IEEE Transactions on Rehabilitation Engineering, vol. 6, no. 2, pp. 235-239, June 1998.
26. Technical Report, GSM 05.90, GSM EMC Considerations, European Telecommunications Standards Institute, January 1993.
27. Victorian, T. A., "Digital Cellular Telephone Interference and Hearing Aid Compatibility—an Update," Hearing Journal 1998; 51:10, pp. 53-60
28. Wong, G. S. K., and Embleton, T. F. W., eds., AIP Handbook of Condenser Microphones: Theory, Calibration and Measurements, AIP Press.

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