Test Laboratory: SGS Testing Korea
File Name: WLAN_Body.da4

**DUT: LG-P500h; Type: Mobile_Bar; Serial: 007KPQJ0810292**
**Program Name: WLAN_Body**

Communication System: WLAN; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2437 MHz; $\sigma$ = 1.98 mho/m; $\varepsilon_r$ = 50.5; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(4.07, 4.07, 4.07); Calibrated: 2010-04-28
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2009-12-09
- Phantom: SAM MIC #2000-93 with CRP; Type: SAM MIC #2000-93; Serial: TP-1299
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**WLAN_11g_Mid_Back/Area Scan (61x91x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.041 mW/g

**WLAN_11g_Mid_Back/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.11 V/m; Power Drift = -0.196 dB
Peak SAR (extrapolated) = 0.083 W/kg
**SAR(1 g) = 0.038 mW/g; SAR(10 g) = 0.021 mW/g**
Maximum value of SAR (measured) = 0.040 mW/g


0 dB = 0.040mW/g

# Appendix B

## Uncertainty Analysis

| a | b | c | d | e = f(d,k) | g | i = cxg/e | k |
|---|---|---|---|---|---|---|---|
| Uncertainty Component | Section in P1528 | Tol (%) | Prob . Dist. | Div. | Ci (1g) | 1g ui (%) | Vi (Veff) |
| Probe calibration | E.2.1 | 6.3 | N | 1 | 1 | 6.30 | ∞ |
| Axial isotropy | E.2.2 | 0.5 | R | 1.73 | 0.71 | 0.20 | ∞ |
| hemispherical isotropy | E.2.2 | 2.6 | R | 1.73 | 0.71 | 1.06 | ∞ |
| Boundary effect | E.2.3 | 0.8 | R | 1.73 | 1 | 0.46 | ∞ |
| Linearity | E.2.4 | 0.6 | R | 1.73 | 1 | 0.35 | ∞ |
| System detection limit | E.2.5 | 0.25 | R | 1.73 | 1 | 0.14 | ∞ |
| Readout electronics | E.2.6 | 0.3 | N | 1 | 1 | 0.30 | ∞ |
| Response time | E.2.7 | 0 | R | 1.73 | 1 | 0.00 | ∞ |
| Integration time | E.2.8 | 2.6 | R | 1.73 | 1 | 1.50 | ∞ |
| RF ambient Condition –Noise | E.6.1 | 3 | R | 1.73 | 1 | 1.73 | ∞ |
| RF ambient Condition – reflections | E.6.1 | 3 | R | 1.73 | 1 | 1.73 | ∞ |
| Probe positioning– mechanical tolerance | E.6.2 | 1.5 | R | 1.73 | 1 | 0.87 | ∞ |
| Probe positioning– with respect to phantom | E.6.3 | 2.9 | R | 1.73 | 1 | 1.67 | ∞ |
| Max. SAR evaluation | E.5.2 | 1 | R | 1.73 | 1 | 0.58 | ∞ |
| Test sample positioning | E.4.2 | 2.3 | N | 1 | 1 | 2.30 | 9 |
| Device holder uncertainty | E.4.1 | 3.6 | N | 1 | 1 | 3.60 | ∞ |
| Output power variation–SAR drift measurement | 6.62 | 5 | R | 1.73 | 1 | 2.89 | ∞ |
| Phantom uncertainty (shape and thickness tolerances) | E.3.1 | 4 | R | 1.73 | 1 | 2.31 | ∞ |
| Liquid conductivity – deviation from target values | E.3.2 | 5 | R | 1.73 | 0.64 | 1.85 | ∞ |
| Liquid conductivity – measurement uncertainty | E.3.2 | 1.2 | N | 1 | 0.64 | 0.77 | 5 |
| Liquid permittivity – deviation from target values | E.3.3 | 5 | R | 1.73 | 0.6 | 1.73 | ∞ |
| Liquid permittivity – measurement uncertainty | E.3.3 | 1.1 | N | 1 | 0.6 | 0.66 | 5 |
| Combined standard uncertainty | | | | RSS | | 9.63 | 2754 |
| Expanded uncertainty (95% CONFIDENCE INTERVAL) | | | | K=2 | | 19.27 | |

# Appendix C

## Calibration Certificate

- **PROBE**
- **DAE**
- **835 MHz, 1900 MHz, 2450 MHz DIPOLE**

# - PROBE Calibration Certificate

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

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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** SGS-KES (Dymstec)

**Certificate No: ET3-1782_Apr10**

## CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | ET3DV6 - SN:1782 |
| Calibration procedure(s) | QA CAL-01.v6, QA CAL-12.v6, QA CAL-23.v3 and QA CAL-25.v2<br>Calibration procedure for dosimetric E-field probes |
| Calibration date: | April 28, 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 | 29-Sep-09 (No. DAE4-660_Sep09) | Sep-10 |

| 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: April 28, 2010

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

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**Accreditation No.: SCS 108**

## Glossary:

| | |
|---|---|
| TSL | tissue simulating liquid |
| 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 $\varphi$ | $\varphi$ 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 |

## 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:1782

| | |
|---|---|
| Manufactured: | April 15, 2003 |
| Last calibrated: | April 30, 2009 |
| Modified: | April 27, 2010 |
| Recalibrated: | April 28, 2010 |

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

ET3DV6 SN:1782 April 28, 2010

# DASY - Parameters of Probe: ET3DV6 SN:1782

## Basic Calibration Parameters

| | Sensor X | Sensor Y | Sensor Z | Unc (k=2) |
|---|---|---|---|---|
| Norm ($\mu V/(V/m)^2$)[A] | 2.01 | 1.74 | 1.86 | ± 10.1% |
| DCP (mV)[B] | 93.9 | 96.4 | 91.2 | |

## 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 $E^2$-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.

# DASY - Parameters of Probe: ET3DV6 SN:1782

## 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) |
|---|---|---|---|---|---|---|---|---|---|
| 450 | ± 50 / ± 100 | 43.5 ± 5% | 0.87 ± 5% | 6.67 | 6.67 | 6.67 | 0.19 | 2.19 | ± 13.3% |
| 835 | ± 50 / ± 100 | 41.9 ± 5% | 0.89 ± 5% | 6.26 | 6.26 | 6.26 | 0.51 | 2.05 | ± 11.0% |
| 1750 | ± 50 / ± 100 | 40.1 ± 5% | 1.37 ± 5% | 5.30 | 5.30 | 5.30 | 0.53 | 2.60 | ± 11.0% |
| 1900 | ± 50 / ± 100 | 40.0 ± 5% | 1.40 ± 5% | 5.04 | 5.04 | 5.04 | 0.69 | 2.24 | ± 11.0% |
| 2450 | ± 50 / ± 100 | 39.2 ± 5% | 1.80 ± 5% | 4.48 | 4.48 | 4.48 | 0.99 | 1.71 | ± 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:1782 April 28, 2010

# DASY - Parameters of Probe: ET3DV6 SN:1782

## Calibration Parameter Determined in Body Tissue Simulating Media

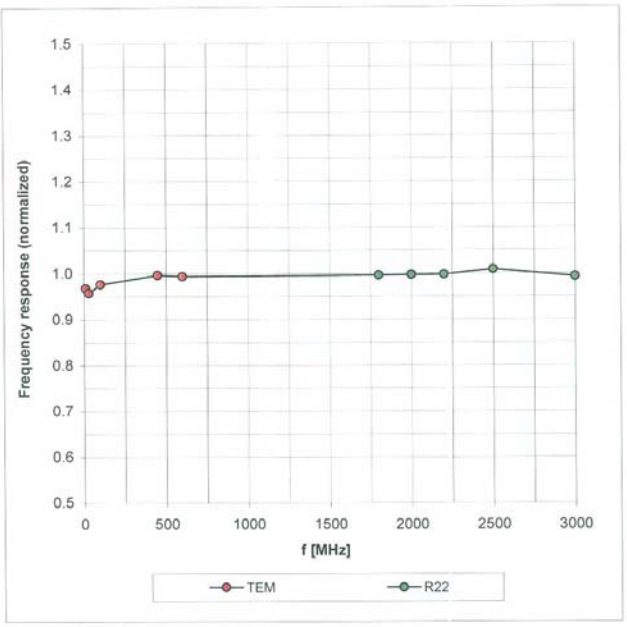
| f [MHz] | Validity [MHz][C] | Permittivity | Conductivity | ConvF X | ConvF Y | ConvF Z | Alpha | Depth Unc (k=2) |
|---|---|---|---|---|---|---|---|---|
| 450 | ± 50 / ± 100 | 56.7 ± 5% | 0.94 ± 5% | 7.53 | 7.53 | 7.53 | 0.15 | 2.33 ± 13.3% |
| 835 | ± 50 / ± 100 | 55.2 ± 5% | 0.97 ± 5% | 6.11 | 6.11 | 6.11 | 0.42 | 2.40 ± 11.0% |
| 1750 | ± 50 / ± 100 | 53.4 ± 5% | 1.49 ± 5% | 4.68 | 4.68 | 4.68 | 0.63 | 3.03 ± 11.0% |
| 1900 | ± 50 / ± 100 | 53.3 ± 5% | 1.52 ± 5% | 4.46 | 4.46 | 4.46 | 0.85 | 2.44 ± 11.0% |
| 2450 | ± 50 / ± 100 | 52.7 ± 5% | 1.95 ± 5% | 4.07 | 4.07 | 4.07 | 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:1782 April 28, 2010

## Frequency Response of E-Field

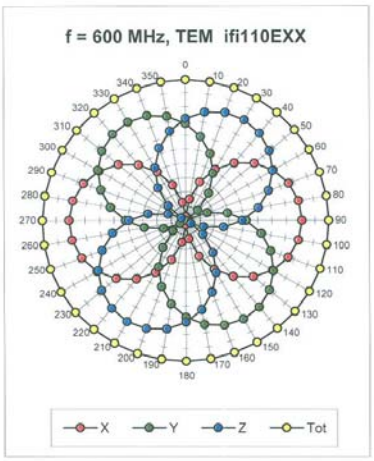
(TEM-Cell:ifi110 EXX, Waveguide: R22)

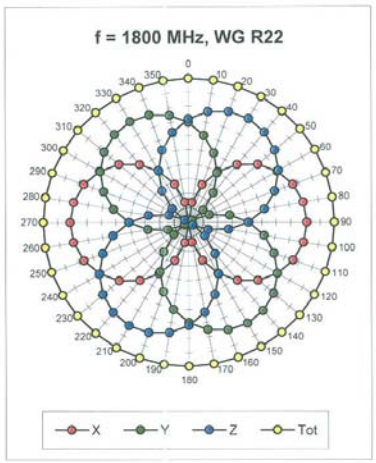


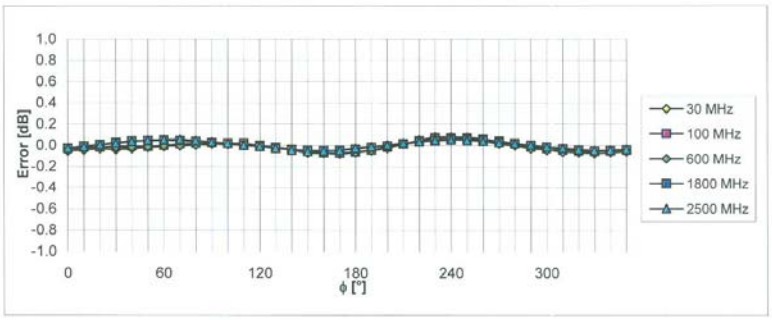

Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

ET3DV6 SN:1782 April 28, 2010

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



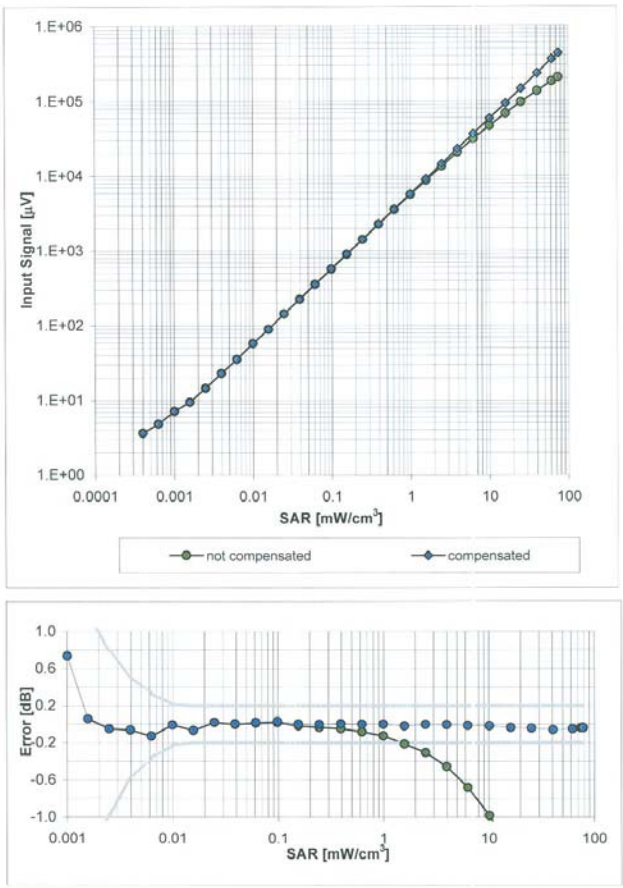




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

ET3DV6 SN:1782 April 28, 2010

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

(Waveguide R22, f = 1800 MHz)



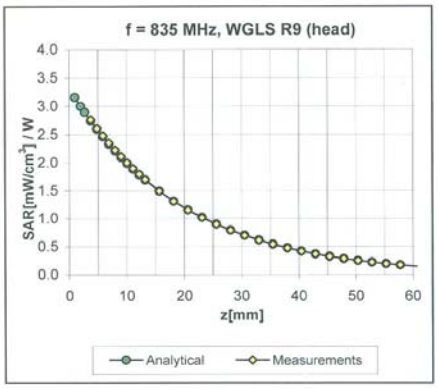


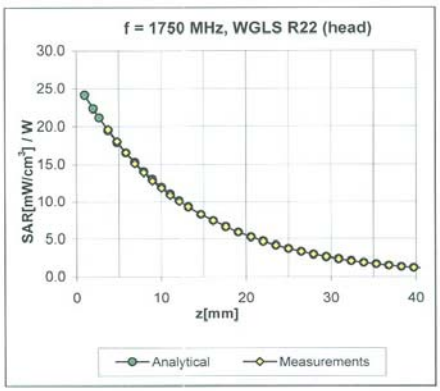


Uncertainty of Linearity Assessment: ± 0.6% (k=2)

ET3DV6 SN:1782 April 28, 2010

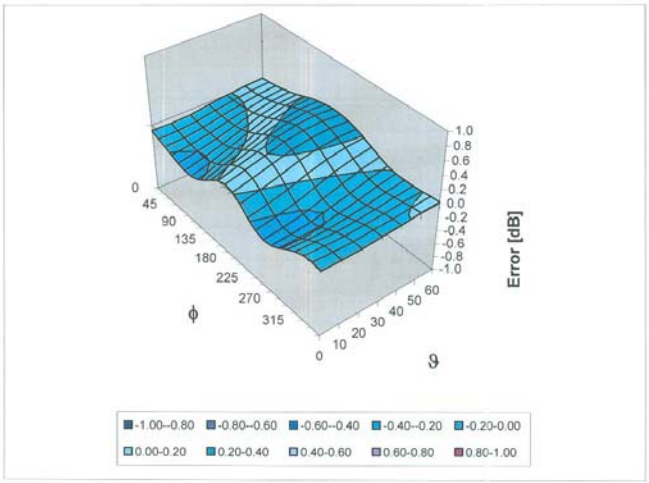
## Conversion Factor Assessment




## 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 |

# -DAE Calibration Certificate

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

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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 **SGS KES**

Certificate No: **DAE3-567_Dec09**

## CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | DAE3 - SD 000 D03 AA - SN: 567 |
| Calibration procedure(s) | QA CAL-06.v12<br>Calibration procedure for the data acquisition electronics (DAE) |
| Calibration date: | December 9, 2009 |

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 | 1-Oct-09 (No: 9055) | Oct-10 |
| **Secondary Standards** | **ID #** | **Check Date (in house)** | **Scheduled Check** |
| Calibrator Box V1.1 | SE UMS 006 AB 1004 | 05-Jun-09 (in house check) | In house check: Jun-10 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Dominique Steffen | Technician | |
| Approved by: | Fin Bomholt | R&D Director | i.V. |

Issued: December 9, 2009

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Multilateral Agreement for the recognition of calibration certificates

**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:* 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.

## 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 | 404.546 ± 0.1% (k=2) | 404.281 ± 0.1% (k=2) | 404.334 ± 0.1% (k=2) |
| Low Range | 3.96697 ± 0.7% (k=2) | 3.97066 ± 0.7% (k=2) | 3.95911 ± 0.7% (k=2) |

## Connector Angle

| | |
|---|---|
| **Connector Angle** to be used in DASY system | 7.5 ° ± 1 ° |

## Appendix

### 1. DC Voltage Linearity

| High Range | | Reading (μV) | Difference (μV) | Error (%) |
|---|---|---|---|---|
| Channel X | + Input | 200002.8 | -1.89 | -0.00 |
| Channel X | + Input | 19998.11 | -1.59 | -0.01 |
| Channel X | - Input | -19992.89 | 7.71 | -0.04 |
| Channel Y | + Input | 199957.5 | -46.16 | -0.02 |
| Channel Y | + Input | 19992.42 | -7.98 | -0.04 |
| Channel Y | - Input | -19994.34 | 4.96 | -0.02 |
| Channel Z | + Input | 199931.6 | -61.88 | -0.03 |
| Channel Z | + Input | 19990.70 | -8.50 | -0.04 |
| Channel Z | - Input | -19992.89 | -0.04 | -0.04 |

| Low Range | | Reading (μV) | Difference (μV) | Error (%) |
|---|---|---|---|---|
| Channel X | + Input | 2000.7 | 0.61 | 0.03 |
| Channel X | + Input | 199.14 | -0.86 | -0.43 |
| Channel X | - Input | -200.82 | -0.72 | 0.36 |
| Channel Y | + Input | 2000.0 | -0.11 | -0.01 |
| Channel Y | + Input | 198.97 | -1.13 | -0.56 |
| Channel Y | - Input | -201.08 | -1.18 | 0.59 |
| Channel Z | + Input | 1999.4 | -0.87 | -0.04 |
| Channel Z | + Input | 198.62 | -1.48 | -0.74 |
| Channel Z | - Input | -201.26 | -1.36 | 0.68 |

### 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 | 3.98 | 2.30 |
| | - 200 | -0.74 | -2.83 |
| Channel Y | 200 | -0.27 | -0.39 |
| | - 200 | -0.32 | -0.95 |
| Channel Z | 200 | 4.97 | 4.65 |
| | - 200 | -6.07 | -6.68 |

### 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 | - | 1.57 | -1.52 |
| Channel Y | 200 | 3.06 | - | 3.39 |
| Channel Z | 200 | 3.26 | -0.28 | - |

## 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 | 16355 | 16407 |
| Channel Y | 16166 | 16176 |
| Channel Z | 15925 | 16100 |

## 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 | -0.19 | -1.19 | 0.58 | 0.37 |
| Channel Y | -0.59 | -1.52 | 0.73 | 0.36 |
| Channel Z | -1.05 | -2.18 | -0.05 | 0.34 |

## 6. Input Offset Current

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

## 7. Input Resistance

| | Zeroing (MOhm) | Measuring (MOhm) |
|---|---|---|
| Channel X | 0.2000 | 203.2 |
| Channel Y | 0.1999 | 202.8 |
| Channel Z | 0.1999 | 201.0 |

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

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

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

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

# - 835 MHz Dipole Calibration Certificate

**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
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
**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 **SGS KES (Dymstec)** Certificate No: **D835V2-490_May10**

## CALIBRATION CERTIFICATE

Object D835V2 - SN: 490

Calibration procedure(s) QA CAL-05.v7
Calibration procedure for dipole validation kits

Calibration date: May 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 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 | 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: | Jeton Kastrati | Laboratory Technician | |
| Approved by: | Katja Pokovic | Technical Manager | |

Issued: May 21, 2010