

ANNEX F: D5GHzV2 Dipole Calibration Certificate



Client

TA(Shanghai)

Certificate No:

Z20-60080

Report No.: R2006A0398-S1

CALIBRATION CERTIFICATE

E-mail: cttl@chinattl.com

Object

D5GHzV2 - SN: 1151

http://www.chinattl.cn

Calibration Procedure(s)

FF-Z11-003-01

Calibration Procedures for dipole validation kits

Calibration date:

Feburary 27, 2020

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 NRP2 | 106276 | 11-Apr-19 (CTTL, No.J19X02605) | Apr-20 |
| Power sensor NRP6A | 101369 | 11-Apr-19 (CTTL, No.J19X02605) | Apr-20 |
| ReferenceProbe EX3DV4 | SN 3846 | 25-Mar-19(CTTL-SPEAG,No.Z19-60064) | Mar-20 |
| DAE4 | SN 1555 | 22-Aug-19(CTTL-SPEAG,No.Z19-60295) | Aug-20 |
| Secondary Standards | ID# | Cal Date(Calibrated by, Certificate No.) | Scheduled Calibration |
| Signal Generator E4438C | MY49071430 | 10-Feb-20 (CTTL, No.J20X00516) | Feb-21 |
| NetworkAnalyzerE5071C | MY46110673 | 10-Feb-20 (CTTL, No.J20X00515) | Feb-21 |
| | | | |

Calibrated by:

Name Function

Zhao Jing SAR Test Engineer

Reviewed by:

Lin Hao SAR Test Engineer

Approved by:

Qi Dianyuan SAR Project Leader

Issued: Feburary 29, 2019

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

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Glossary:

TSL tissue simulating liquid
ConvF sensitivity in TSL / NORMx,y,z
N/A not applicable or not measured

Calibration is Performed According to the Following Standards:

- a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- b) IEC 62209-1, "Measurement procedure for assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices- Part 1: Device used next to the ear (Frequency range of 300MHz to 6GHz)", July 2016
- c) IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
- d) KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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%.

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Measurement Conditions

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

| DASY Version | DASY52 | V52.10.4 |
|------------------------------|--|----------------------------------|
| Extrapolation | Advanced Extrapolation | 71 |
| Phantom | Triple Flat Phantom 5.1C | |
| Distance Dipole Center - TSL | 10 mm | with Spacer |
| Zoom Scan Resolution | dx, dy = 4 mm, dz = 1.4 mm | Graded Ratio = 1.4 (Z direction) |
| Frequency | 5250 MHz ± 1 MHz 5600 MHz ± 1 MHz 5750 MHz ± 1 MHz | |

Head TSL parameters at 5250 MHz

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|-----------------|--------------|------------------|
| Nominal Head TSL parameters | 22.0 °C | 35.9 | 4.71 mho/m |
| Measured Head TSL parameters | (22.0 ± 0.2) °C | 36.9 ± 6 % | 4.59 mho/m ± 6 % |
| Head TSL temperature change during test | <1.0 °C | | |

SAR result with Head TSL at 5250 MHz

| SAR averaged over 1 cm^3 (1 g) of Head TSL | Condition | |
|---|--------------------|--------------------------|
| SAR measured | 100 mW input power | 7.76 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | 78.0 W/kg ± 24.4 % (k=2) |
| SAR averaged over 10 cm ³ (10 g) of Head TSL | Condition | |
| SAR measured | 100 mW input power | 2.22 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | 22.3 W/kg ± 24.2 % (k=2) |

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Head TSL parameters at 5600 MHz

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|-----------------|--------------|------------------|
| Nominal Head TSL parameters | 22.0 °C | 35.5 | 5.07 mho/m |
| Measured Head TSL parameters | (22.0 ± 0.2) °C | 36.3 ± 6 % | 4.96 mho/m ± 6 % |
| Head TSL temperature change during test | <1.0 °C | | |

SAR result with Head TSL at 5600 MHz

| SAR averaged over 1 cm^3 (1 g) of Head TSL | Condition | |
|---|--------------------|--------------------------|
| SAR measured | 100 mW input power | 8.02 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | 80.5 W/kg ± 24.4 % (k=2) |
| SAR averaged over 10 cm ³ (10 g) of Head TSL | Condition | |
| SAR measured | 100 mW input power | 2.29 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | 23.0 W/kg ± 24.2 % (k=2) |

Head TSL parameters at 5750 MHz

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|-----------------|--------------|------------------|
| Nominal Head TSL parameters | 22.0 °C | 35.4 | 5.22 mho/m |
| Measured Head TSL parameters | (22.0 ± 0.2) °C | 36.1 ± 6 % | 5.12 mho/m ± 6 % |
| Head TSL temperature change during test | <1.0 °C | | |

SAR result with Head TSL at 5750 MHz

| SAR averaged over 1 cm ³ (1 g) of Head TSL | Condition | |
|---|--------------------|--------------------------|
| SAR measured | 100 mW input power | 7.72 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | 77.4 W/kg ± 24.4 % (k=2) |
| SAR averaged over 10 cm ³ (10 g) of Head TSL | Condition | |
| SAR measured | 100 mW input power | 2.18 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | 21.9 W/kg ± 24.2 % (k=2) |

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Body TSL parameters at 5250 MHz
The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|-----------------|--------------|------------------|
| Nominal Body TSL parameters | 22.0 °C | 48.9 | 5.36 mho/m |
| Measured Body TSL parameters | (22.0 ± 0.2) °C | 48.1 ± 6 % | 5.27 mho/m ± 6 % |
| Body TSL temperature change during test | <1.0 °C | | |

SAR result with Body TSL at 5250 MHz

| SAR averaged over 1 cm ³ (1 g) of Body TSL | Condition | |
|---|--------------------|--------------------------|
| SAR measured | 100 mW input power | 7.37 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | 73.4 W/kg ± 24.4 % (k=2) |
| SAR averaged over 10 cm ³ (10 g) of Body TSL | Condition | |
| SAR measured | 100 mW input power | 2.09 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | 20.8 W/kg ± 24.2 % (k=2) |

Body TSL parameters at 5600 MHz

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|-----------------|--------------|------------------|
| Nominal Body TSL parameters | 22.0 °C | 48.5 | 5.77 mho/m |
| Measured Body TSL parameters | (22.0 ± 0.2) °C | 47.4 ± 6 % | 5.74 mho/m ± 6 % |
| Body TSL temperature change during test | <1.0 °C | | |

SAR result with Body TSL at 5600 MHz

| SAR averaged over 1 cm ³ (1 g) of Body TSL | Condition | |
|---|--------------------|--------------------------|
| SAR measured | 100 mW input power | 7.78 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | 77.4 W/kg ± 24.4 % (k=2) |
| SAR averaged over 10 cm ³ (10 g) of Body TSL | Condition | |
| SAR measured | 100 mW input power | 2.21 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | 22.0 W/kg ± 24.2 % (k=2) |

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Body TSL parameters at 5750 MHz

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|-----------------|--------------|------------------|
| Nominal Body TSL parameters | 22.0 °C | 48.3 | 5.94 mho/m |
| Measured Body TSL parameters | (22.0 ± 0.2) °C | 47.1 ± 6 % | 5.96 mho/m ± 6 % |
| Body TSL temperature change during test | <1.0 °C | | |

SAR result with Body TSL at 5750 MHz

| SAR averaged over 1 cm^3 (1 g) of Body TSL | Condition | |
|---|--------------------|--------------------------|
| SAR measured | 100 mW input power | 7.38 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | 73.5 W/kg ± 24.4 % (k=2) |
| SAR averaged over 10 cm ³ (10 g) of Body TSL | Condition | |
| SAR measured | 100 mW input power | 2.07 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | 20.6 W/kg ± 24.2 % (k=2) |

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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL at 5250 MHz

| Impedance, transformed to feed point | 52.4Ω - 6.47jΩ | |
|--------------------------------------|----------------|--|
| Return Loss | - 23.4dB | |

Antenna Parameters with Head TSL at 5600 MHz

| Impedance, transformed to feed point | 57.0Ω - 3.86jΩ | |
|--------------------------------------|----------------|--|
| Return Loss | - 22.6dB | |

Antenna Parameters with Head TSL at 5750 MHz

| Impedance, transformed to feed point | 55.9Ω + 0.16jΩ |
|--------------------------------------|----------------|
| Return Loss | - 25.0dB |

Antenna Parameters with Body TSL at 5250 MHz

| Impedance, transformed to feed point | 51.6Ω - 5.33jΩ | |
|--------------------------------------|----------------|-----|
| Return Loss | - 25.3dB | 100 |

Antenna Parameters with Body TSL at 5600 MHz

| Impedance, transformed to feed point | 57.6Ω - 2.15jΩ | |
|--------------------------------------|----------------|--|
| Return Loss | - 22.7dB | |

Antenna Parameters with Body TSL at 5750 MHz

| Impedance, transformed to feed point | 55.4Ω + 1.94jΩ | |
|--------------------------------------|----------------|--|
| Return Loss | - 25.2dB | |

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General Antenna Parameters and Design

| Florida I B. L. d | |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.066 ns |

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard. No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

| Manufactured by | SPEAG | |
|-----------------|-------|--|
|-----------------|-------|--|

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Date: 02.24.2020



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DASY5 Validation Report for Head TSL

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1151

Communication System: CW; Frequency: 5250 MHz, Frequency: 5600 MHz,

Frequency: 5750 MHz.

Medium parameters used: f = 5250 MHz; σ = 4.592 S/m; ϵ_r = 36.91; ρ = 1000 kg/m3, Medium parameters used: f = 5600 MHz; σ = 4.963 S/m; ϵ_r = 36.29; ρ = 1000 kg/m3, Medium parameters used: f = 5750 MHz; σ = 5.123 S/m; ϵ_r = 36.06; ρ = 1000 kg/m3,

Phantom section: Center Section

DASY5 Configuration:

- Probe: EX3DV4 SN3846; ConvF(5.4, 5.4, 5.4) @ 5250 MHz; ConvF(4.64, 4.64, 4.64) @ 5600 MHz; ConvF(4.92, 4.92, 4.92) @ 5750 MHz; Calibrated: 2019-03-25
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1555; Calibrated: 2019-08-22
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Dipole Calibration /Pin=100mW, d=10mm, f=5250 MHz/Zoom Scan,

dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 70.08 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 33.7 W/kg

SAR(1 g) = 7.76 W/kg; SAR(10 g) = 2.22 W/kg

Smallest distance from peaks to all points 3 dB below = 7.2 mm

Ratio of SAR at M2 to SAR at M1 = 63%

Maximum value of SAR (measured) = 18.7 W/kg

Dipole Calibration /Pin=100mW, d=10mm, f=5600 MHz/Zoom Scan,

dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 70.02 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 36.2 W/kg

SAR(1 g) = 8.02 W/kg; SAR(10 g) = 2.29 W/kg

Smallest distance from peaks to all points 3 dB below = 7.2 mm

Ratio of SAR at M2 to SAR at M1 = 61.4%

Maximum value of SAR (measured) = 19.7 W/kg

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Dipole Calibration /Pin=100mW, d=10mm, f=5750 MHz/Zoom Scan,

dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 68.01 V/m; Power Drift = -0.08 dB

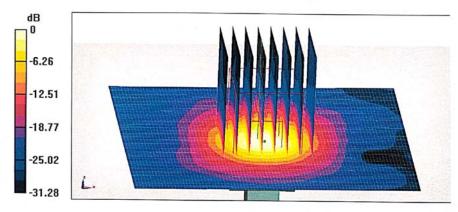
Peak SAR (extrapolated) = 37.0 W/kg

SAR(1 g) = 7.72 W/kg; SAR(10 g) = 2.18 W/kg

Smallest distance from peaks to all points 3 dB below = 7.2 mm

Ratio of SAR at M2 to SAR at M1 = 59.9%

Maximum value of SAR (measured) = 19.2 W/kg

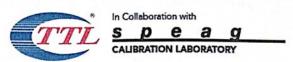


0 dB = 19.2 W/kg = 12.83 dBW/kg

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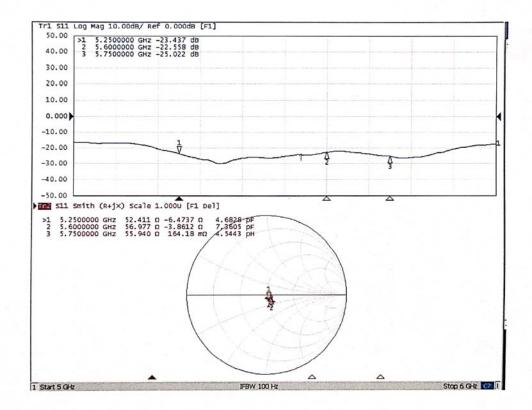
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Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL

Date: 02.27.2020

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1151

Communication System: CW; Frequency: 5250 MHz, Frequency: 5600 MHz,

Frequency: 5750 MHz,

Medium parameters used: f = 5250 MHz; σ = 5.267 S/m; ϵ r = 48.1; ρ = 1000 kg/m3, Medium parameters used: f = 5600 MHz; σ = 5.736 S/m; ϵ r = 47.44; ρ = 1000 kg/m3, Medium parameters used: f = 5750 MHz; σ = 5.963 S/m; ϵ r = 47.11; ρ = 1000 kg/m3,

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 SN3846; ConvF(5.01, 5.01, 5.01) @ 5250 MHz; ConvF(4.29, 4.29, 4.29) @ 5600 MHz; ConvF(4.32, 4.32, 4.32) @ 5750 MHz; Calibrated: 2019-03-25,
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1555; Calibrated: 2019-08-22
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Dipole Calibration /Pin=100mW, d=10mm, f=5250 MHz/Zoom Scan,

dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 62.50 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 30.1 W/kg

SAR(1 g) = 7.37 W/kg; SAR(10 g) = 2.09 W/kg

Smallest distance from peaks to all points 3 dB below = 7.2 mm

Ratio of SAR at M2 to SAR at M1 = 64.9%

Maximum value of SAR (measured) = 17.2 W/kg

Dipole Calibration /Pin=100mW, d=10mm, f=5600 MHz/Zoom Scan,

dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 63.00 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 33.3 W/kg

SAR(1 g) = 7.78 W/kg; SAR(10 g) = 2.21 W/kg

Smallest distance from peaks to all points 3 dB below = 7.2 mm

Ratio of SAR at M2 to SAR at M1 = 63.4%

Maximum value of SAR (measured) = 18.6 W/kg

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Dipole Calibration /Pin=100mW, d=10mm, f=5750 MHz/Zoom Scan,

dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

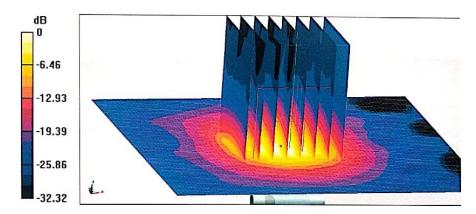
Reference Value = 62.00 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 33.5 W/kg

SAR(1 g) = 7.38 W/kg; SAR(10 g) = 2.07 W/kg

Smallest distance from peaks to all points 3 dB below = 7.2 mm

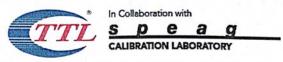
Ratio of SAR at M2 to SAR at M1 = 61.1% Maximum value of SAR (measured) = 17.8 W/kg



0 dB = 17.8 W/kg = 12.50 dBW/kg

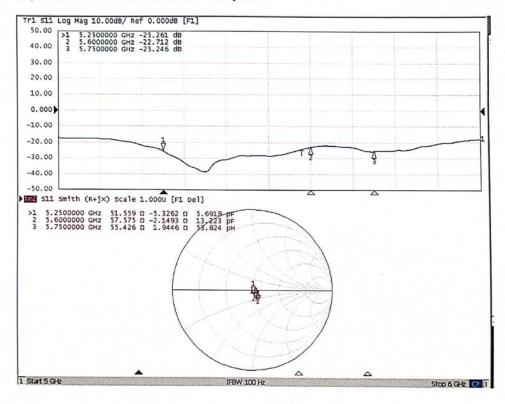
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Impedance Measurement Plot for Body TSL



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ANNEX G: DAE4 Calibration Certificate

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





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

Report No.: R2006A0398-S1

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 0108

| | | | o: DAE4-1317_Oct19 |
|---|--|---|--|
| CALIBRATION (| CERTIFICATE | | |
| Object | DAE4 - SD 000 D | 04 BM - SN: 1317 | |
| Calibration procedure(s) | QA CAL-06.v29 Calibration proced | dure for the data acquisition elec | ctronics (DAE) |
| Calibration date: | October 23, 2019 | | |
| This calibration codificate docum | ante the transphility to nation | nal standards, which realize the physical u | rite of managements (CD) |
| The measurements and the unce | ertainties with confidence pro | obability are given on the following pages a | nd are part of the certificate. |
| All calibrations have been conduc | cted in the closed laboratory | r facility: environment temperature (22 ± 3)° | C and humidity < 70%. |
| | | | |
| Calibration Equipment used (M& | TE critical for calibration) | | |
| Calibration Equipment used (M& | ID# | Cal Date (Certificate No.) | Scheduled Calibration |
| | Table 1000 1000 1000 1000 1000 1000 1000 10 | Cal Date (Certificate No.) 03-Sep-19 (No:25949) | Scheduled Calibration Sep-20 |
| Primary Standards | ID# | 03-Sep-19 (No:25949) | Sep-20 |
| Primary Standards Keithley Multimeter Type 2001 Secondary Standards Auto DAE Calibration Unit | ID # SN: 0810278 | | PERCHAPTER AND PERCHA |
| Primary Standards Keithley Multimeter Type 2001 | ID # SN: 0810278 ID # SE UWS 053 AA 1001 | 03-Sep-19 (No:25949) Check Date (in house) | Sep-20 Scheduled Check |
| Primary Standards Keithley Multimeter Type 2001 Secondary Standards Auto DAE Calibration Unit | ID # SN: 0810278 ID # SE UWS 053 AA 1001 | 03-Sep-19 (No:25949) Check Date (in house) 07-Jan-19 (in house check) | Sep-20 Scheduled Check In house check: Jan-20 |
| Primary Standards Keithley Multimeter Type 2001 Secondary Standards Auto DAE Calibration Unit | ID # SN: 0810278 ID # SE UWS 053 AA 1001 | 03-Sep-19 (No:25949) Check Date (in house) 07-Jan-19 (in house check) | Sep-20 Scheduled Check In house check: Jan-20 |
| Primary Standards Keithley Multimeter Type 2001 Secondary Standards Auto DAE Calibration Unit | ID # SN: 0810278 ID # SE UWS 053 AA 1001 SE UMS 006 AA 1002 | 03-Sep-19 (No:25949) Check Date (in house) 07-Jan-19 (in house check) 07-Jan-19 (in house check) | Sep-20 Scheduled Check In house check: Jan-20 In house check: Jan-20 |
| Primary Standards Keithley Multimeter Type 2001 Secondary Standards Auto DAE Calibration Unit Calibrator Box V2.1 | ID # SN: 0810278 ID # SE UWS 053 AA 1001 SE UMS 006 AA 1002 Name | 03-Sep-19 (No:25949) Check Date (in house) 07-Jan-19 (in house check) 07-Jan-19 (in house check) | Sep-20 Scheduled Check In house check: Jan-20 In house check: Jan-20 |

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

Report No.: R2006A0398-S1

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 0108

Glossary

DAE

data acquisition electronics

Connector angle

information used in DASY system to align probe sensor X to the robot

coordinate system.

Methods Applied and Interpretation of Parameters

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

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DC Voltage Measurement

A/D - Converter Resolution nominal

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

| Calibration Factors | x | Υ | Z |
|---------------------|-----------------------|-----------------------|-----------------------|
| High Range | 403.804 ± 0.02% (k=2) | 404.568 ± 0.02% (k=2) | 403.927 ± 0.02% (k=2) |
| Low Range | 3.97954 ± 1.50% (k=2) | 3.99058 ± 1.50% (k=2) | 3.96919 ± 1.50% (k=2) |

Connector Angle

| Connector Angle to be used in DASY system | 332.5 ° ± 1 ° |
|---|---------------|
| | |

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Appendix (Additional assessments outside the scope of SCS0108)

1. DC Voltage Linearity

| High Range | | Reading (μV) | Difference (μV) | Error (%) |
|-------------|-------|--------------|-----------------|-----------|
| Channel X + | Input | 199993.97 | -1.61 | -0.00 |
| Channel X + | Input | 20003.68 | 1.67 | 0.01 |
| Channel X - | Input | -19999.35 | 1.95 | -0.01 |
| Channel Y + | Input | 199994.72 | -0.94 | -0.00 |
| Channel Y + | Input | 20001.93 | -0.03 | -0.00 |
| Channel Y - | Input | -19999.69 | 1.70 | -0.01 |
| Channel Z + | Input | 199995.14 | -0.83 | -0.00 |
| Channel Z + | Input | 20001.23 | -0.62 | -0.00 |
| Channel Z - | Input | -20001.59 | -0.08 | 0.00 |

| Low Range | Reading (μV) | Difference (μV) | Error (%) |
|-------------------|--------------|-----------------|-----------|
| Channel X + Input | 2000.92 | -0.47 | -0.02 |
| Channel X + Input | 202.45 | 0.76 | 0.37 |
| Channel X - Input | -197.45 | 0.81 | -0.41 |
| Channel Y + Input | 2000.30 | -0.94 | -0.05 |
| Channel Y + Input | 201.24 | -0.37 | -0.18 |
| Channel Y - Input | -198.12 | 0.14 | -0.07 |
| Channel Z + Input | 2000.71 | -0.42 | -0.02 |
| Channel Z + Input | 200.46 | -1.06 | -0.53 |
| Channel Z - Input | -198.55 | -0.18 | 0.09 |

2. Common mode sensitivity

| | Common mode Input Voltage (mV) | High Range Average Reading (μV) | Low Range Average Reading (μV) |
|-----------|-----------------------------------|------------------------------------|-----------------------------------|
| Channel X | 200 | 12.11 | 9.92 |
| | - 200 | -9.05 | -11.12 |
| Channel Y | 200 | 11.30 | 11.37 |
| | - 200 | -12.29 | -12.77 |
| Channel Z | 200 | 1.70 | 1.84 |
| | - 200 | -3.81 | -3.72 |

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 | 5 | 1.67 | -4.44 |
| Channel Y | 200 | 8.45 | - | 3.12 |
| Channel Z | 200 | 10.32 | 5.39 | - |

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4. AD-Converter Values with inputs shorted

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

| | High Range (LSB) | Low Range (LSB) |
|-----------|------------------|-----------------|
| Channel X | 15754 | 15950 |
| Channel Y | 16502 | 16801 |
| Channel Z | 16087 | 13971 |

5. Input Offset Measurement

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

| 3367 | Average (μV) | min. Offset (μV) | max. Offset (μV) | Std. Deviation (µV) |
|-----------|--------------|------------------|------------------|---------------------|
| Channel X | 0.94 | -0.24 | 2.94 | 0.49 |
| Channel Y | 0.26 | -1.03 | 1.33 | 0.51 |
| Channel Z | -1.40 | -2.82 | 0.02 | 0.54 |

6. Input Offset Current

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

7. Input Resistance (Typical values for information)

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

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

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

9. Power Consumption (Typical values for information)

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

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ANNEX H: The EUT Appearance

The EUT Appearance are submitted separately.

ANNEX I: Test Setup Photos

The Test Setup Photos are submitted separately.