| | *Name* | *Function* | *Date* | *Signature* |
|---|---|---|---|---|
| *Prepared by :* | Pedro Ruiz | Measurement Responsible | 12/20/2023 | |
| *Checked & approved by:* | Jérôme Luc | Technical Manager | 12/20/2023 | |
| *Authorized by:* | Yann Toutain | Laboratory Director | 12/21/2023 | |

Yann Toutain ID

Signature numérique de Yann Toutain ID
Date : 2023.12.21 10:43:53 +01'00'

| | *Customer Name* |
|---|---|
| *Distribution :* | Shenzhen STS Test Services Co., Ltd. |

| *Issue* | *Name* | *Date* | *Modifications* |
|---|---|---|---|
| A | Pedro Ruiz | 12/20/2023 | Initial release |
| | | | |
| | | | |
| | | | |



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# TABLE OF CONTENTS

1 Introduction ..... 4
2 Device Under Test ..... 4
3 Product Description ..... 4
3.1 General Information ..... 4
4 Measurement Method ..... 5
4.1 Mechanical Requirements ..... 5
4.2 S11 parameter Requirements ..... 5
4.3 SAR Requirements ..... 5
5 Measurement Uncertainty ..... 5
5.1 Mechanical dimensions ..... 5
5.2 S11 Parameter ..... 5
5.3 SAR ..... 5
6 Calibration Results ..... 6
6.1 Mechanical Dimensions ..... 6
6.2 S11 parameter ..... 6
6.3 SAR ..... 7
7 List of Equipment ..... 9


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# 1 INTRODUCTION

This document contains a summary of the requirements set forth by the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards for reference dipoles used for SAR measurement system validations and the measurements that were performed to verify that the product complies with the fore mentioned standards.

# 2 DEVICE UNDER TEST

| Device Under Test | |
|---|---|
| Device Type | COMOSAR 1800 MHz REFERENCE DIPOLE |
| Manufacturer | MVG |
| Model | SID1800 |
| Serial Number | 5023-DIP1G800-747 |
| Product Condition (new / used) | New |

# 3 PRODUCT DESCRIPTION

## 3.1 GENERAL INFORMATION

MVG's COMOSAR Validation Dipoles are built in accordance to the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards. The product is designed for use with the COMOSAR test bench only.

**Figure 1** – *MVG COMOSAR Validation Dipole*



*Template_ACR.DDD.N.YY.MVGB.ISSUE_SAR Reference Dipole vL*
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# 4 MEASUREMENT METHOD

## 4.1 MECHANICAL REQUIREMENTS

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards specify the mechanical components and dimensions of the validation dipoles, with the dimension's frequency and phantom shell thickness dependent. The COMOSAR test bench employs a 2 mm phantom shell thickness therefore the dipoles sold for use with the COMOSAR test bench comply with the requirements set forth for a 2 mm phantom shell thickness. A direct method is used with a ISO17025 calibrated caliper.

## 4.2 S11 PARAMETER REQUIREMENTS

The dipole used for SAR system validation measurements and checks must have a S11 of -20 dB or better. The S11 measurement shall be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. A direct method is used with a network analyser and its calibration kit, both with a valid ISO17025 calibration.

## 4.3 SAR REQUIREMENTS

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards provide requirements for reference dipoles used for system validation measurements. The following measurements were performed to verify that the product complies with the fore-mentioned standards.

# 5 MEASUREMENT UNCERTAINTY

## 5.1 MECHANICAL DIMENSIONS

For the measurement in the range 0-300mm, the estimated expanded uncertainty (k=2) in calibration for the dimension measurement in mm is +/-0.20 mm with respect to measurement conditions.

For the measurement in the range 300-450mm, the estimated expanded uncertainty (k=2) in calibration for the dimension measurement in mm is +/-0.44 mm with respect to measurement conditions.

## 5.2 S11 PARAMETER

The estimated expanded uncertainty (k=2) in calibration for the S11 parameter in linear is +/-0.08 with respect to measurement conditions.

## 5.3 SAR

The guidelines outlined in the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards were followed to generate the measurement uncertainty for validation measurements.

The estimated expanded uncertainty (k=2) in calibration for the 1g and 10g SAR measurement in W/kg is +/-19% with respect to measurement conditions.


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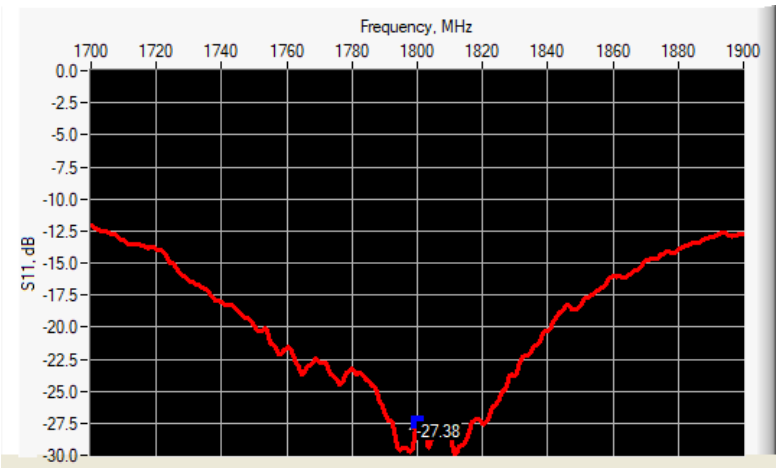
# 6 CALIBRATION RESULTS

## 6.1 MECHANICAL DIMENSIONS

| L mm | | h mm | | d mm | |
|---|---|---|---|---|---|
| **Measured** | **Required** | **Measured** | **Required** | **Measured** | **Required** |
| 72.40 | 72.00 +/- 2% | 42.03 | 41.70 +/- 2% | 3.59 | 3.60 +/- 2% |

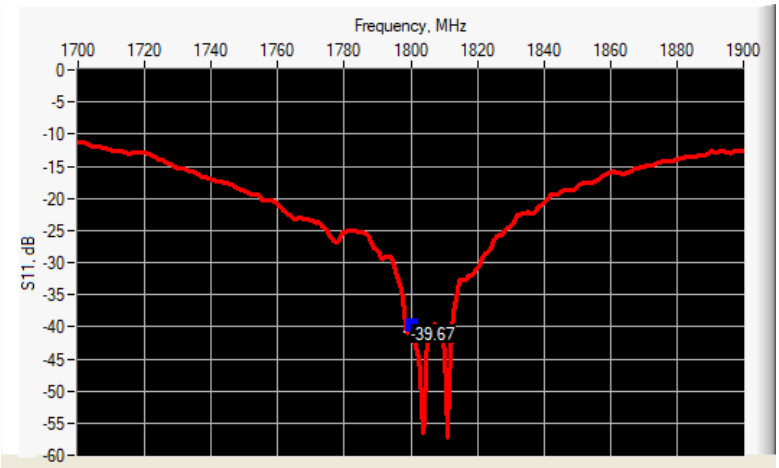
## 6.2 S11 PARAMETER

### 6.2.1 S11 parameter in Head Liquid




| Frequency (MHz) | S11 parameter (dB) | Requirement (dB) | Impedance |
|---|---|---|---|
| 1800 | -27.38 | -20 | 50.2Ω + 4.3jΩ |

### 6.2.2 S11 parameter in Body Liquid




| Frequency (MHz) | S11 parameter (dB) | Requirement (dB) | Impedance |
|---|---|---|---|
| 1800 | -39.67 | -20 | 51.0Ω + 0.0jΩ |



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## 6.3 SAR

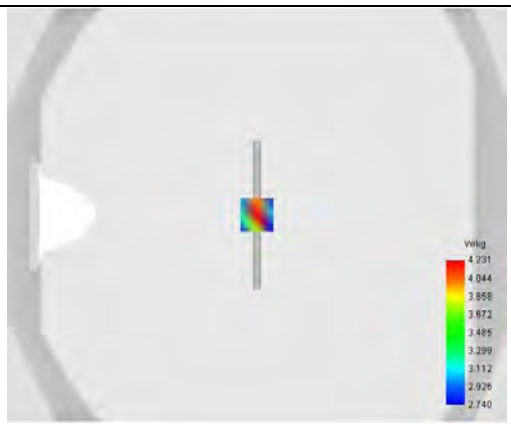
The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards state that the system validation measurements must be performed using a reference dipole meeting the fore mentioned return loss and mechanical dimension requirements. The validation measurement must be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. Per the standards, the dipole shall be positioned below the bottom of the phantom, with the dipole length centered and parallel to the longest dimension of the flat phantom, with the top surface of the dipole at the described distance from the bottom surface of the phantom.

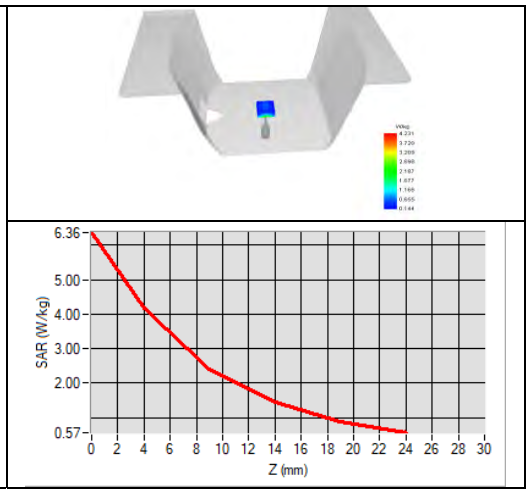
### 6.3.1 SAR with Head Liquid

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards state that the system validation measurements should produce the SAR values shown below (for phantom thickness of 2 mm), within the uncertainty for the system validation. All SAR values are normalized to 1 W forward power. In bracket, the measured SAR is given with the used input power.

| | |
|---|---|
| Software | OPENSAR V5 |
| Phantom | SN 13/09 SAM68 |
| Probe | SN 41/18 EPGO333 |
| Liquid | Head Liquid Values: eps' : 43.5 sigma : 1.40 |
| Distance between dipole center and liquid | 10.0 mm |
| Area scan resolution | dx=8mm/dy=8mm |
| Zoon Scan Resolution | dx=8mm/dy=8mm/dz=5mm |
| Frequency | 1800 MHz |
| Input power | 20 dBm |
| Liquid Temperature | 20 +/- 1 °C |
| Lab Temperature | 20 +/- 1 °C |
| Lab Humidity | 30-70 % |

| **Frequency** | **1g SAR (W/kg)** | | | **10g SAR (W/kg)** | | |
|---|---|---|---|---|---|---|
| | **Measured** | **Measured normalized to 1W** | **Target normalized to 1W** | **Measured** | **Measured normalized to 1W** | **Target normalized to 1W** |
| 1800 MHz | 3.80 | 37.95 | 38.40 | 2.05 | 20.49 | 20.10 |



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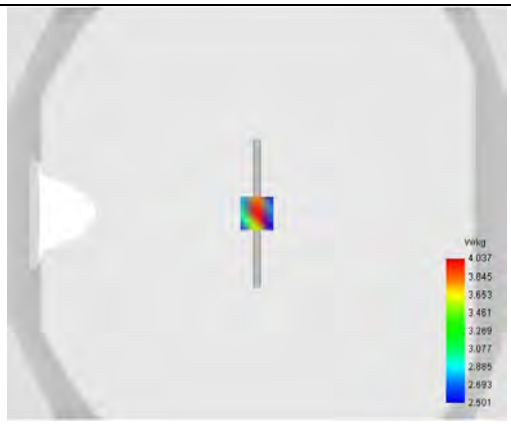
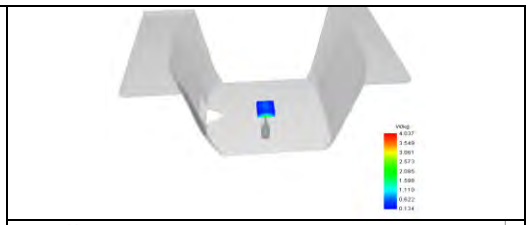
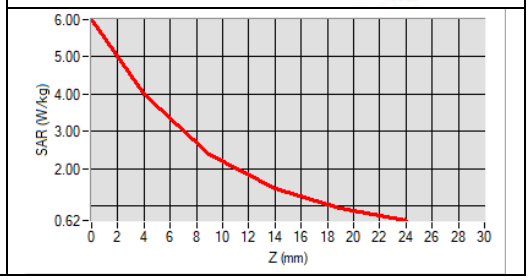
### 6.3.2 SAR with Body Liquid

| | |
|---|---|
| Software | OPENSAR V5 |
| Phantom | SN 13/09 SAM68 |
| Probe | SN 41/18 EPGO333 |
| Liquid | Body Liquid Values: eps' : 52.9 sigma : 1.40 |
| Distance between dipole center and liquid | 10.0 mm |
| Area scan resolution | dx=8mm/dy=8mm |
| Zoon Scan Resolution | dx=8mm/dy=8mm/dz=5mm |
| Frequency | 1800 |
| Input power | 20 dBm |
| Liquid Temperature | 20 +/- 1 °C |
| Lab Temperature | 20 +/- 1 °C |
| Lab Humidity | 30-70 % |

| **Frequency** | **1g SAR (W/kg)** | | | **10g SAR (W/kg)** | | |
|---|---|---|---|---|---|---|
| | **Measured** | **Measured normalized to 1W** | **Target normalized to 1W** | **Measured** | **Measured normalized to 1W** | **Target normalized to 1W** |
| 1800 MHz | 3.64 | 36.38 | 38.50 | 1.98 | 19.82 | 20.30 |





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# 7 LIST OF EQUIPMENT

| Equipment Summary Sheet | | | | |
|---|---|---|---|---|
| **Equipment Description** | **Manufacturer / Model** | **Identification No.** | **Current Calibration Date** | **Next Calibration Date** |
| SAM Phantom | MVG | SN 13/09 SAM68 | Validated. No cal required. | Validated. No cal required. |
| COMOSAR Test Bench | Version 3 | NA | Validated. No cal required. | Validated. No cal required. |
| Network Analyzer | Rohde & Schwarz ZVM | 100203 | 08/2021 | 08/2024 |
| Network Analyzer – Calibration kit | Rohde & Schwarz ZV-Z235 | 101223 | 07/2022 | 07/2025 |
| Network Analyzer – Calibration kit | HP 85033D | 3423A08186 | 06/2021 | 06/2027 |
| Calipers | Mitutoyo | SN 0009732 | 11/2022 | 11/2025 |
| Reference Probe | MVG | 3523-EPGO-429 | 11/2023 | 11/2024 |
| Multimeter | Keithley 2000 | 4013982 | 02/2023 | 02/2026 |
| Signal Generator | Rohde & Schwarz SMB | 106589 | 03/2022 | 03/2025 |
| Amplifier | MVG | MODU-023-C-0002 | Characterized prior to test. No cal required. | Characterized prior to test. No cal required. |
| Power Meter | NI-USB 5680 | 170100013 | 06/2021 | 06/2024 |
| Power Meter | Keysight U2000A | SN: MY62340002 | 10/2022 | 10/2025 |
| Directional Coupler | Krytar 158020 | 131467 | Characterized prior to test. No cal required. | Characterized prior to test. No cal required. |
| Temperature / Humidity Sensor | Testo 184 H1 | 44225320 | 06/2021 | 06/2024 |



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# SAR Reference Dipole Calibration Report

Ref : ACR.42.9.23.BES.A

## SHENZHEN STS TEST SERVICES CO., LTD.

**1/F., BUILDING B, ZHUOKE SCIENCE PARK,No.190, CHONGQINGROAD,FUYONG STREET, BAO' AN DISTRICT, SHENZHEN,GUANGDONG,CHINA**

## MVG COMOSAR REFERENCE DIPOLE

**FREQUENCY: 1900 MHZ**

**SERIAL NO.: SN 30/14 DIP1G900-333**

**Calibrated at MVG**

**Z.I. de la pointe du diable**

**Technopôle Brest Iroise – 295 avenue Alexis de Rochon**

**29280 PLOUZANE - FRANCE**

**Calibration date: 09/14/2023**

Accreditations #2-6789 and #2-6814
Scope available on www.cofrac.fr

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*Summary:*

This document presents the method and results from an accredited SAR reference dipole calibration performed in MVG using the COMOSAR test bench. All calibration results are traceable to national metrology institutions.

| | *Name* | *Function* | *Date* | *Signature* |
|---|---|---|---|---|
| *Prepared by :* | Jérôme Luc | Technical Manager | 9/14/2023 | |
| *Checked by :* | Jérôme Luc | Technical Manager | 9/14/2023 | |
| *Approved by :* | Yann Toutain | Laboratory Director | 9/14/2023 | Yann TOUTAIN 2023.09.14 14:51:06 +01'00' |

| | *Customer Name* |
|---|---|
| *Distribution :* | Shenzhen STS Test Services Co., Ltd. |

| *Issue* | *Name* | *Date* | *Modifications* |
|---|---|---|---|
| A | Jérôme Luc | 9/14/2023 | Initial release |
| | | | |
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# TABLE OF CONTENTS

1 Introduction ..... 4
2 Device Under Test ..... 4
3 Product Description ..... 4
3.1 General Information ..... 4
4 Measurement Method ..... 5
4.1 Return Loss Requirements ..... 5
4.2 Mechanical Requirements ..... 5
5 Measurement Uncertainty ..... 5
5.1 Return Loss ..... 5
5.2 Dimension Measurement ..... 5
5.3 Validation Measurement ..... 5
6 Calibration Measurement Results ..... 6
6.1 Return Loss and Impedance In Head Liquid ..... 6
6.2 Return Loss and Impedance In Body Liquid ..... 6
6.3 Mechanical Dimensions ..... 7
7 Validation measurement ..... 7
7.1 Head Liquid Measurement ..... 8
7.2 SAR Measurement Result With Head Liquid ..... 8
7.3 Body Liquid Measurement ..... 11
7.4 SAR Measurement Result With Body Liquid ..... 12
8 List of Equipment ..... 13


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# 1 INTRODUCTION

This document contains a summary of the requirements set forth by the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards for reference dipoles used for SAR measurement system validations and the measurements that were performed to verify that the product complies with the fore mentioned standards.

# 2 DEVICE UNDER TEST

| Device Under Test | |
|---|---|
| Device Type | COMOSAR 1900 MHz REFERENCE DIPOLE |
| Manufacturer | MVG |
| Model | SID1900 |
| Serial Number | SN 30/14 DIP1G900-333 |
| Product Condition (new / used) | New |

# 3 PRODUCT DESCRIPTION

## 3.1 GENERAL INFORMATION

MVG's COMOSAR Validation Dipoles are built in accordance to the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards. The product is designed for use with the COMOSAR test bench only.

**Figure 1** – *MVG COMOSAR Validation Dipole*



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# 4 MEASUREMENT METHOD

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards provide requirements for reference dipoles used for system validation measurements. The following measurements were performed to verify that the product complies with the fore mentioned standards.

## 4.1 RETURN LOSS REQUIREMENTS

The dipole used for SAR system validation measurements and checks must have a return loss of -20 dB or better. The return loss measurement shall be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. A direct method is used with a network analyser and its calibration kit, both with a valid ISO17025 calibration.

## 4.2 MECHANICAL REQUIREMENTS

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards specify the mechanical components and dimensions of the validation dipoles, with the dimension's frequency and phantom shell thickness dependent. The COMOSAR test bench employs a 2 mm phantom shell thickness therefore the dipoles sold for use with the COMOSAR test bench comply with the requirements set forth for a 2 mm phantom shell thickness. A direct method is used with a ISO17025 calibrated caliper.

# 5 MEASUREMENT UNCERTAINTY

All uncertainties listed below represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2, traceable to the Internationally Accepted Guides to Measurement Uncertainty.

## 5.1 RETURN LOSS

The following uncertainties apply to the return loss measurement:

| Frequency band | Expanded Uncertainty on Return Loss |
|---|---|
| 400-6000MHz | 0.08 LIN |

## 5.2 DIMENSION MEASUREMENT

The following uncertainties apply to the dimension measurements:

| Length (mm) | Expanded Uncertainty on Length |
|---|---|
| 0 - 300 | 0.20 mm |
| 300 - 450 | 0.44 mm |

## 5.3 VALIDATION MEASUREMENT

The guidelines outlined in the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards were followed to generate the measurement uncertainty for validation measurements.


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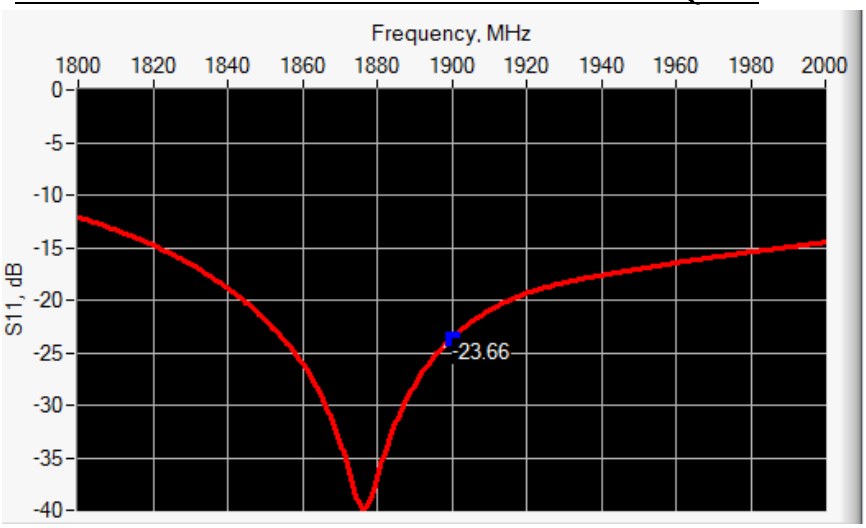
| Scan Volume | Expanded Uncertainty |
|---|---|
| 1 g | 20.3 % (SAR) |
| 10 g | 20.1 % (SAR) |

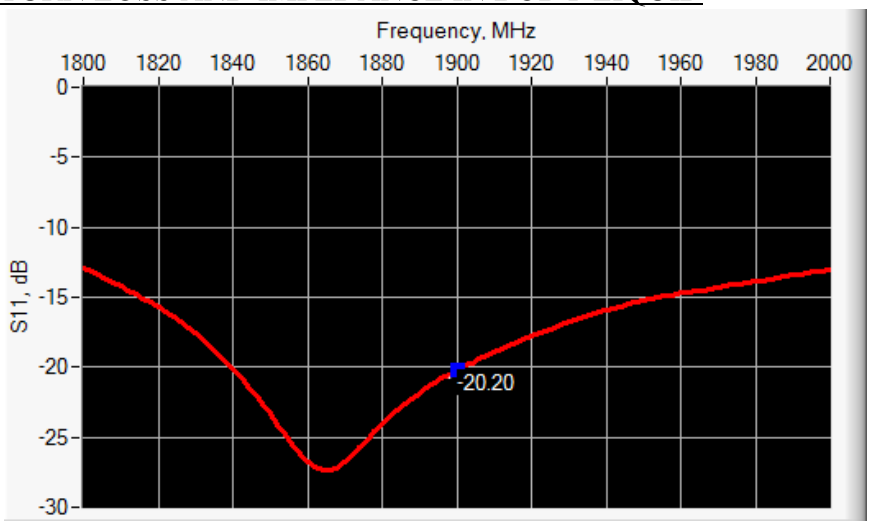
# 6 CALIBRATION MEASUREMENT RESULTS

## 6.1 RETURN LOSS AND IMPEDANCE IN HEAD LIQUID




| Frequency (MHz) | Return Loss (dB) | Requirement (dB) | Impedance |
|---|---|---|---|
| 1900 | -23.66 | -20 | 51.4 Ω + 6.4 jΩ |

## 6.2 RETURN LOSS AND IMPEDANCE IN BODY LIQUID




| Frequency (MHz) | Return Loss (dB) | Requirement (dB) | Impedance |
|---|---|---|---|
| 1900 | -20.20 | -20 | 48.7 Ω + 9.6 jΩ |



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## 6.3 MECHANICAL DIMENSIONS

| **Frequency** MHz | **L** mm | | **h** mm | | **d** mm | |
|---|---|---|---|---|---|---|
| | **required** | **measured** | **required** | **measured** | **required** | **measured** |
| 300 | 420.0 ±1 %. | | 250.0 ±1 %. | | 6.35 ±1 %. | |
| 450 | 290.0 ±1 %. | | 166.7 ±1 %. | | 6.35 ±1 %. | |
| 750 | 176.0 ±1 %. | | 100.0 ±1 %. | | 6.35 ±1 %. | |
| 835 | 161.0 ±1 %. | | 89.8 ±1 %. | | 3.6 ±1 %. | |
| 900 | 149.0 ±1 %. | | 83.3 ±1 %. | | 3.6 ±1 %. | |
| 1450 | 89.1 ±1 %. | | 51.7 ±1 %. | | 3.6 ±1 %. | |
| 1500 | 86.2 ±1 %. | | 50.0 ±1 %. | | 3.6 ±1 %. | |
| 1640 | 79.0 ±1 %. | | 45.7 ±1 %. | | 3.6 ±1 %. | |
| 1750 | 75.2 ±1 %. | | 42.9 ±1 %. | | 3.6 ±1 %. | |
| 1800 | 72.0 ±1 %. | | 41.7 ±1 %. | | 3.6 ±1 %. | |
| 1900 | 68.0 ±1 %. | 68.70 | 39.5 ±1 %. | 39.51 | 3.6 ±1 %. | 3.61 |
| 1950 | 66.3 ±1 %. | | 38.5 ±1 %. | | 3.6 ±1 %. | |
| 2000 | 64.5 ±1 %. | | 37.5 ±1 %. | | 3.6 ±1 %. | |
| 2100 | 61.0 ±1 %. | | 35.7 ±1 %. | | 3.6 ±1 %. | |
| 2300 | 55.5 ±1 %. | | 32.6 ±1 %. | | 3.6 ±1 %. | |
| 2450 | 51.5 ±1 %. | | 30.4 ±1 %. | | 3.6 ±1 %. | |
| 2600 | 48.5 ±1 %. | | 28.8 ±1 %. | | 3.6 ±1 %. | |
| 3000 | 41.5 ±1 %. | | 25.0 ±1 %. | | 3.6 ±1 %. | |
| 3300 | - | | - | | - | |
| 3500 | 37.0±1 %. | | 26.4 ±1 %. | | 3.6 ±1 %. | |
| 3700 | 34.7±1 %. | | 26.4 ±1 %. | | 3.6 ±1 %. | |
| 3900 | - | | - | | - | |
| 4200 | - | | - | | - | |
| 4600 | - | | - | | - | |
| 4900 | - | | - | | - | |

# 7 VALIDATION MEASUREMENT

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards state that the system validation measurements must be performed using a reference dipole meeting the fore mentioned return loss and mechanical dimension requirements. The validation measurement must be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. Per the standards, the dipole shall be positioned below the bottom of the phantom, with the dipole length centered and parallel to the longest dimension of the flat phantom, with the top surface of the dipole at the described distance from the bottom surface of the phantom.



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## 7.1 HEAD LIQUID MEASUREMENT

| Frequency MHz | Relative permittivity ($\varepsilon_r'$) | | Conductivity ($\sigma$) S/m | |
|---|---|---|---|---|
| | required | measured | required | measured |
| 300 | 45.3 ±10 % | | 0.87 ±10 % | |
| 450 | 43.5 ±10 % | | 0.87 ±10 % | |
| 750 | 41.9 ±10 % | | 0.89 ±10 % | |
| 835 | 41.5 ±10 % | | 0.90 ±10 % | |
| 900 | 41.5 ±10 % | | 0.97 ±10 % | |
| 1450 | 40.5 ±10 % | | 1.20 ±10 % | |
| 1500 | 40.4 ±10 % | | 1.23 ±10 % | |
| 1640 | 40.2 ±10 % | | 1.31 ±10 % | |
| 1750 | 40.1 ±10 % | | 1.37 ±10 % | |
| 1800 | 40.0 ±10 % | | 1.40 ±10 % | |
| 1900 | 40.0 ±10 % | 38.6 | 1.40 ±10 % | 1.34 |
| 1950 | 40.0 ±10 % | | 1.40 ±10 % | |
| 2000 | 40.0 ±10 % | | 1.40 ±10 % | |
| 2100 | 39.8 ±10 % | | 1.49 ±10 % | |
| 2300 | 39.5 ±10 % | | 1.67 ±10 % | |
| 2450 | 39.2 ±10 % | | 1.80 ±10 % | |
| 2600 | 39.0 ±10 % | | 1.96 ±10 % | |
| 3000 | 38.5 ±10 % | | 2.40 ±10 % | |
| 3300 | 38.2 ±10 % | | 2.71 ±10 % | |
| 3500 | 37.9 ±10 % | | 2.91 ±10 % | |
| 3700 | 37.7 ±10 % | | 3.12 ±10 % | |
| 3900 | 37.5 ±10 % | | 3.32 ±10 % | |
| 4200 | 37.1 ±10 % | | 3.63 ±10 % | |
| 4600 | 36.7 ±10 % | | 4.04 ±10 % | |
| 4900 | 36.3 ±10 % | | 4.35 ±10 % | |

## 7.2 SAR MEASUREMENT RESULT WITH HEAD LIQUID

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards state that the system validation measurements should produce the SAR values shown below (for phantom thickness of 2 mm), within the uncertainty for the system validation. All SAR values are normalized to 1 W forward power. In bracket, the measured SAR is given with the used input power.


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| | |
|---|---|
| Software | OPENSAR V5 |
| Phantom | SN 13/09 SAM68 |
| Probe | SN 41/18 EPGO333 |
| Liquid | Head Liquid Values: eps' : 38.4 sigma : 1.36 |
| Distance between dipole center and liquid | 10.0 mm |
| Area scan resolution | dx=8mm/dy=8mm |
| Zoon Scan Resolution | dx=8mm/dy=8mm/dz=5mm |
| Frequency | 1900 MHz |
| Input power | 20 dBm |
| Liquid Temperature | 20 +/- 1 °C |
| Lab Temperature | 20 +/- 1 °C |
| Lab Humidity | 30-70 % |

| **Frequency** MHz | **1 g SAR (W/kg/W)** | | **10 g SAR (W/kg/W)** | |
|---|---|---|---|---|
| | **required** | **measured** | **required** | **measured** |
| 300 | 2.85 | | 1.94 | |
| 450 | 4.58 | | 3.06 | |
| 750 | 8.49 | | 5.55 | |
| 835 | 9.56 | | 6.22 | |
| 900 | 10.9 | | 6.99 | |
| 1450 | 29 | | 16 | |
| 1500 | 30.5 | | 16.8 | |
| 1640 | 34.2 | | 18.4 | |
| 1750 | 36.4 | | 19.3 | |
| 1800 | 38.4 | | 20.1 | |
| 1900 | 39.7 | 39.84 (3.98) | 20.5 | 20.20 (2.02) |
| 1950 | 40.5 | | 20.9 | |
| 2000 | 41.1 | | 21.1 | |
| 2100 | 43.6 | | 21.9 | |
| 2300 | 48.7 | | 23.3 | |
| 2450 | 52.4 | | 24 | |
| 2600 | 55.3 | | 24.6 | |
| 3000 | 63.8 | | 25.7 | |
| 3300 | - | | - | |
| 3500 | 67.1 | | 25 | |
| 3700 | 67.4 | | 24.2 | |
| 3900 | - | | - | |
| 4200 | - | | - | |
| 4600 | - | | - | |
| 4900 | - | | - | |



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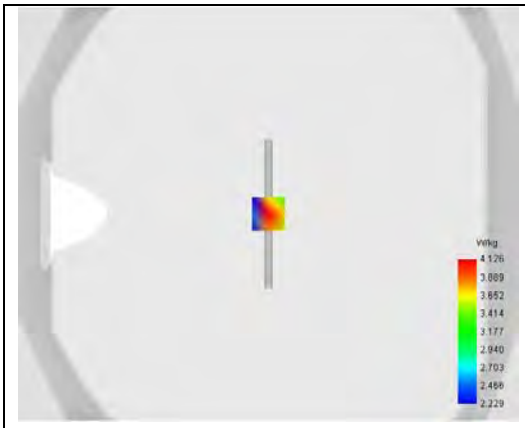


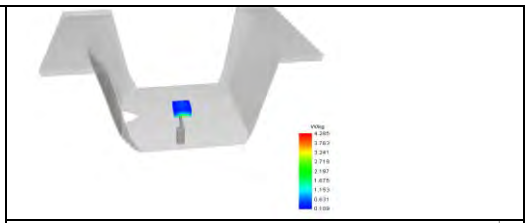

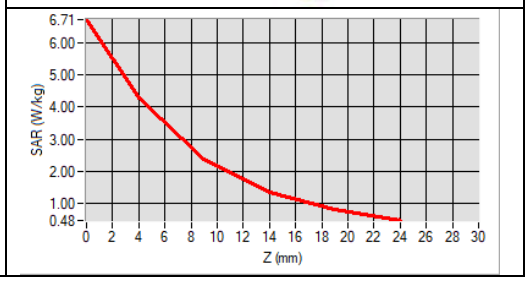




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## 7.3 BODY LIQUID MEASUREMENT

| Frequency MHz | Relative permittivity ($\varepsilon_r$') | | Conductivity ($\sigma$) S/m | |
|---|---|---|---|---|
| | required | measured | required | measured |
| 150 | 61.9 ±10 % | | 0.80 ±10 % | |
| 300 | 58.2 ±10 % | | 0.92 ±10 % | |
| 450 | 56.7 ±10 % | | 0.94 ±10 % | |
| 750 | 55.5 ±10 % | | 0.96 ±10 % | |
| 835 | 55.2 ±10 % | | 0.97 ±10 % | |
| 900 | 55.0 ±10 % | | 1.05 ±10 % | |
| 915 | 55.0 ±10 % | | 1.06 ±10 % | |
| 1450 | 54.0 ±10 % | | 1.30 ±10 % | |
| 1610 | 53.8 ±10 % | | 1.40 ±10 % | |
| 1800 | 53.3 ±10 % | | 1.52 ±10 % | |
| 1900 | 53.3 ±10 % | 55.3 | 1.52 ±10 % | 1.49 |
| 2000 | 53.3 ±10 % | | 1.52 ±10 % | |
| 2100 | 53.2 ±10 % | | 1.62 ±10 % | |
| 2300 | 52.9 ±10 % | | 1.81 ±10 % | |
| 2450 | 52.7 ±10 % | | 1.95 ±10 % | |
| 2600 | 52.5 ±10 % | | 2.16 ±10 % | |
| 3000 | 52.0 ±10 % | | 2.73 ±10 % | |
| 3300 | 51.6 ±10 % | | 3.08 ±10 % | |
| 3500 | 51.3 ±10 % | | 3.31 ±10 % | |
| 3700 | 51.0 ±10 % | | 3.55 ±10 % | |
| 3900 | 50.8 ±10 % | | 3.78 ±10 % | |
| 4200 | 50.4 ±10 % | | 4.13 ±10 % | |
| 4600 | 49.8 ±10 % | | 4.60 ±10 % | |
| 4900 | 49.4 ±10 % | | 4.95 ±10 % | |
| 5200 | 49.0 ±10 % | | 5.30 ±10 % | |
| 5300 | 48.9 ±10 % | | 5.42 ±10 % | |
| 5400 | 48.7 ±10 % | | 5.53 ±10 % | |
| 5500 | 48.6 ±10 % | | 5.65 ±10 % | |
| 5600 | 48.5 ±10 % | | 5.77 ±10 % | |
| 5800 | 48.2 ±10 % | | 6.00 ±10 % | |



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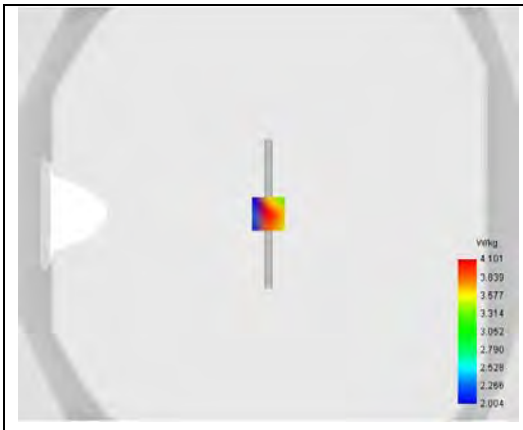
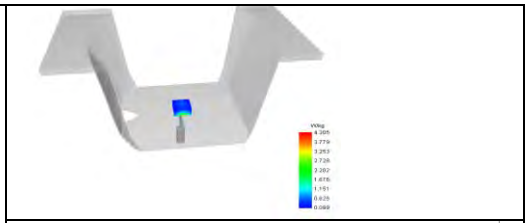
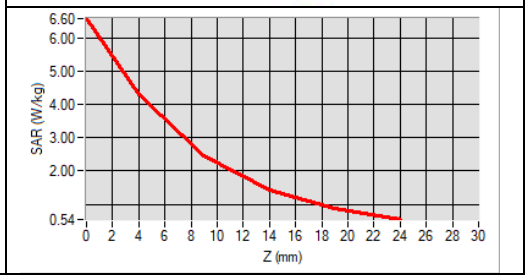
## 7.4 SAR MEASUREMENT RESULT WITH BODY LIQUID

| | |
|---|---|
| Software | OPENSAR V5 |
| Phantom | SN 13/09 SAM68 |
| Probe | SN 41/18 EPGO333 |
| Liquid | Body Liquid Values: eps' : 55.3 sigma : 1.49 |
| Distance between dipole center and liquid | 10.0 mm |
| Area scan resolution | dx=8mm/dy=8mm |
| Zoon Scan Resolution | dx=8mm/dy=8mm/dz=5mm |
| Frequency | 1900 MHz |
| Input power | 20 dBm |
| Liquid Temperature | 20 +/- 1 °C |
| Lab Temperature | 20 +/- 1 °C |
| Lab Humidity | 30-70 % |

| **Frequency** MHz | **1 g SAR (W/kg/W)** | **10 g SAR (W/kg/W)** |
|---|---|---|
| | **measured** | **measured** |
| 1900 | 43.33 (4.33) | 21.59 (2.16) |





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# 8 LIST OF EQUIPMENT

| Equipment Summary Sheet | | | | |
|---|---|---|---|---|
| **Equipment Description** | **Manufacturer / Model** | **Identification No.** | **Current Calibration Date** | **Next Calibration Date** |
| SAM Phantom | MVG | SN 13/09 SAM68 | Validated. No cal required. | Validated. No cal required. |
| COMOSAR Test Bench | Version 3 | NA | Validated. No cal required. | Validated. No cal required. |
| Network Analyzer | Rohde & Schwarz ZVM | 100203 | 08/2021 | 08/2024 |
| Network Analyzer | Agilent 8753ES | MY40003210 | 10/2022 | 10/2025 |
| Network Analyzer – Calibration kit | Rohde & Schwarz ZV-Z235 | 101223 | 05/2022 | 05/2025 |
| Network Analyzer – Calibration kit | HP 85033D | 3423A08186 | 06/2021 | 06/2027 |
| Calipers | Mitutoyo | SN 0009732 | 10/2022 | 10/2025 |
| Reference Probe | MVG | SN 41/18 EPGO333 | 10/2022 | 10/2023 |
| Multimeter | Keithley 2000 | 1160271 | 02/2023 | 02/2026 |
| Signal Generator | Rohde & Schwarz SMB | 106589 | 04/2022 | 04/2026 |
| Amplifier | MVG | MODU-023-C-0002 | Characterized prior to test. No cal required. | Characterized prior to test. No cal required. |
| Power Meter | NI-USB 5680 | 170100013 | 06/2021 | 06/2024 |
| Power Meter | Rohde & Schwarz NRVD | 832839-056 | 11/2022 | 11/2025 |
| Directional Coupler | Krytar 158020 | 131467 | Characterized prior to test. No cal required. | Characterized prior to test. No cal required. |
| Temperature / Humidity Sensor | Testo 184 H1 | 44225320 | 06/2021 | 06/2024 |



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In Collaboration with
CTTL speag
CALIBRATION LABORATORY

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E-mail: emf@caict.ac.cn http://www.caict.ac.cn

ilac-MRA CNAS 中国认可 国际互认 校准 CALIBRATION CNAS L0570 CAICT

Client: **STS (Shenzhen)** **Certificate No: 25J02Z000524**

# CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | DAE3 - SN: 428 |
| Calibration Procedure(s) | FF-Z11-002-01<br>Calibration Procedure for the Data Acquisition Electronics (DAEx) |
| Calibration date: | September 08, 2025 |

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)℃ and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID # | Cal Date(Calibrated by, Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Process Calibrator 753 | 1971018 | 11-Jun-25 (CTTL, No.25J02X004977) | Jun-26 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Yu Zongying | SAR Test Engineer | |
| Reviewed by: | Lin Jun | SAR Test Engineer | |
| Approved by: | Qi Dianyuan | SAR Project Leader | |

Issued: September 10, 2025

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

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E-mail: emf@caict.ac.cn http://www.caict.ac.cn

**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 report provide only calibration results for DAE, it does not contain other performance test results.