



#### SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref. ACR. 329.9.21.BES.A

#### 7.1 HEAD LIQUID MEASUREMENT

| Frequency<br>MHz | Relative per       | Relative permittivity $(\epsilon_{r}')$ |                    | ity (σ) S/m |
|------------------|--------------------|---|--------------------|-------------|
|                  | required           | measured                                | required           | measured    |
| 300              | 45.3 <b>±10</b> %  |   | 0.87 <b>±</b> 10 % |             |
| 450              | 43.5 <b>±10</b> %  |   | 0.87 <b>±</b> 10 % |             |
| 750              | 41.9 <b>±</b> 10 % |   | 0.89 <b>±</b> 10 % |             |
| 835              | 41.5 <b>±</b> 10 % | 39.9                                    | 0.90 ±10 %         | 0.91        |
| 900              | 41.5 <b>±</b> 10 % |   | 0.97 <b>±</b> 10 % |             |
| 1450             | 40.5 <b>±</b> 10 % |   | 1.20 <b>±</b> 10 % |             |
| 1500             | 40.4 <b>±</b> 10 % |   | 1.23 <b>±</b> 10 % |             |
| 1640             | 40.2 <b>±10</b> %  |   | 1.31 <b>±</b> 10 % |             |
| 1750             | 40.1 <b>±</b> 10 % |   | 1.37 <b>±</b> 10 % |             |
| 1800             | 40.0 <b>±10</b> %  |   | 1.40 <b>±</b> 10 % |             |
| 1900             | 40.0 <b>±</b> 10 % |   | 1.40 <b>±</b> 10 % |             |
| 1950             | 40.0 <b>±</b> 10 % |   | 1.40 ±10 %         |             |
| 2000             | 40.0 ±10 %         |   | 1.40 ±10 %         |             |
| 2100             | 39.8 <b>±10</b> %  |   | 1.49 <b>±</b> 10 % |             |
| 2300             | 39.5 <b>±10</b> %  |   | 1.67 <b>±</b> 10 % |             |
| 2450             | 39.2 <b>±10</b> %  |   | 1.80 ±10 %         |             |
| 2600             | 39.0 <b>±10</b> %  |   | 1.96 ±10 %         |             |
| 3000             | 38.5 <b>±1</b> 0 % |   | 2.40 <b>±</b> 10 % |             |
| 3300             | 38.2 <b>±1</b> 0 % |   | 2.71 <b>±</b> 10 % |             |
| 3500             | 37.9 <b>±10</b> %  |   | 2.91 <b>±</b> 10 % |             |
| 3700             | 37.7 ±10 %         | 1                                       | 3.12 <b>±</b> 10 % |             |
| 3900             | 37.5 <b>±10</b> %  |   | 3.32 <b>±10</b> %  |             |
| 4200             | 37.1 <b>±10</b> %  |   | 3.63 <b>±</b> 10 % |             |
| 4600             | 36.7 <b>±10</b> %  |   | 4.04 <b>±</b> 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': 39.9 sigma: 0.91 |
| Distance between dipole center and liquid | 15.0 mm                                    |
| Area scan resolution                      | dx=8mm/dy=8mm                              |
| Zoon Scan Resolution                      | dx=8mm/dy=8mm/dz=5mm                       |
| Frequency                                 | 835 MHz                                    |
| Input power                               | 20 dBm                                     |
| Liquid Temperature                        | 20 +/- 1 °C                                |
| Lab Temperature                           | 20 +/- 1 °C                                |
| Lab Humidity                              | 30-70 %                                    |

| Frequency<br>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             | 10.01 (1.00) | 6.22     | 6.32 (0.63 |
| 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             |              | 20.5     |            |
| 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             |                  |              | 143      |            |
| 3500             | 67.1             |              | 25       |            |
| 3700             | 67.4             |              | 24.2     |            |
| 3900             | E-1              |              | 2        |            |
| 4200             | 1.0              |              | 17.1     |            |
| 4600             |                  |              | 181      |            |
| 4900             | -                |              | 380      |            |

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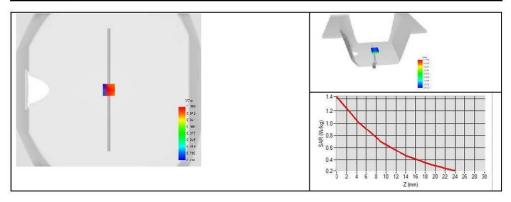
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#### 7.3 BODY LIQUID MEASUREMENT

| Frequency<br>MHz | Relative permittivity $(s_r)$ |                    | Conductivity (σ) S/m |          |
|------------------|-------------------------------|--------------------|----------------------|----------|
|                  | required                      | measured           | required             | measured |
| 150              | 61.9 <b>±</b> 10 %            |                    | 0.80 ±10 %           |          |
| 300              | 58.2 <b>±10</b> %             |                    | 0.92 <b>±</b> 10 %   |          |
| 450              | 56.7 <b>±10</b> %             |                    | 0.94 ±10 %           |          |
| 750              | 55.5 <b>±1</b> 0 %            |                    | 0.96 <b>±</b> 10 %   |          |
| 835              | 55.2 <b>±10</b> %             | 52.3               | 0.97 <b>±</b> 10 %   | 0.94     |
| 900              | 55.0 <b>±10</b> %             |                    | 1.05 ±10 %           |          |
| 915              | 55.0 <b>±1</b> 0 %            |                    | 1.06 <b>±</b> 10 %   |          |
| 1450             | 54.0 <b>±1</b> 0 %            |                    | 1.30 ±10 %           |          |
| 1610             | 53.8 <b>±</b> 10 %            |                    | 1.40 <b>±</b> 10 %   |          |
| 1800             | 53.3 <b>±10</b> %             |                    | 1.52 ±10 %           |          |
| 1900             | 53.3 <b>±1</b> 0 %            |                    | 1.52 ±10 %           |          |
| 2000             | 53.3 <b>±10</b> %             |                    | 1.52 <b>±</b> 10 %   |          |
| 2100             | 53.2 <b>±10</b> %             |                    | 1.62 ±10 %           |          |
| 2300             | 52.9 <b>±</b> 10 %            |                    | 1.81 ±10 %           |          |
| 2450             | 52.7 <b>±</b> 10 %            |                    | 1.95 ±10 %           |          |
| 2600             | 52.5 <b>±1</b> 0 %            | 52.5 <b>±</b> 10 % |                      |          |
| 3000             | 52.0 <b>±</b> 10 %            | 52.0 <b>±</b> 10 % |                      |          |
| 3300             | 51.6 <b>±</b> 10 %            | 51.6 <b>±</b> 10 % |                      |          |
| 3500             | 51.3 <b>±</b> 10 %            |                    | 3.31 <b>±</b> 10 %   |          |
| 3700             | 51.0 <b>±</b> 10 %            |                    | 3.55 <b>±</b> 10 %   |          |
| 3900             | 50.8 ±10 %                    |                    | 3.78 <b>±</b> 10 %   | 5        |
| 4200             | 50.4 <b>±</b> 10 %            |                    | 4.13 ±10 %           |          |
| 4600             | 49.8 <b>±</b> 10 %            |                    | 4.60 <b>±</b> 10 %   |          |
| 4900             | 49.4 <b>±</b> 10 %            |                    | 4.95 <b>±</b> 10 %   |          |
| 5200             | 49.0 <b>±10</b> %             | 49.0 <b>±10</b> %  |                      |          |
| 5300             | 48.9 <b>±10</b> %             | 48.9 <b>±10</b> %  |                      |          |
| 5400             | 48.7 <b>±10</b> %             | 48.7 <b>±10</b> %  |                      |          |
| 5500             | 48.6 <b>±10</b> %             |                    | 5.65 <b>±10</b> %    |          |
| 5600             | 48.5 <b>±10</b> %             |                    | 5.77 <b>±10</b> %    |          |
| 5800             | 48.2 <b>±10</b> %             |                    | 6.00 <b>±10</b> %    |          |

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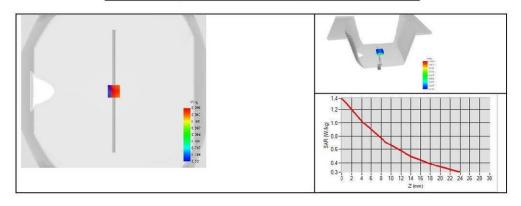
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#### 7.4 SAR MEASUREMENT RESULT WITH BODY LIQUID

| Software                                  | OPENSAR V5                                 |
|---|--|
| Phantom                                   | SN 13/09 SAM68                             |
| Probe                                     | SN 41/18 EPGO333                           |
| Liquid                                    | Body Liquid Values: eps': 52.3 sigma: 0.94 |
| Distance between dipole center and liquid | 15.0 mm                                    |
| Area scan resolution                      | dx=8mm/dy=8mm                              |
| Zoon Scan Resolution                      | dx=8mm/dy=8mm/dz=5mm                       |
| Frequency                                 | 835 MHz                                    |
| Input power                               | 20 dBm                                     |
| Liquid Temperature                        | 20 +/- 1 °C                                |
| Lab Temperature                           | 20 +/- 1 °C                                |
| Lab Humidity                              | 30-70 %                                    |

| Frequency<br>MHz | 1 g SAR (W/kg/W) | 10 g SAR (W/kg/W) |
|------------------|------------------|-------------------|
|                  | measured         | measured          |
| 835              | 9.70 (0.97)      | 6.32 (0.63)       |



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## LIST OF EQUIPMENT

|                                       | Equipment Summary Sheet    |                    |   |   |
|---------------------------------------|----------------------------|--------------------|---|---|
| Equipment<br>Description              | Manufacturer /<br>Model    | Identification No. | Current<br>Calibration Date                   | Next Calibration<br>Date                      |
| SAM Phantom                           | MVG                        | SN 13/09 SAM68     | Validated. No cal<br>required.                | Validated. No cal<br>required.                |
| COMOSAR Test Bench                    | Version 3                  | NA                 | Validated. No cal<br>required.                | Validated. No cal<br>required.                |
| Network Analyzer                      | Rohde & Schwarz<br>ZVM     | 100203             | 08/2021                                       | 08/2024                                       |
| Network Analyzer                      | Agilent 8753ES             | MY40003210         | 10/2022                                       | 10/2025                                       |
| Network Analyzer –<br>Calibration kit | Rohde & Schwarz<br>ZV-Z235 | 101223             | 05/2012                                       | 05/2025                                       |
| Network Analyzer –<br>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                                       | 10/2025                                       |
| Multimeter                            | Keithley 2000              | 1160271            | 02/2023                                       | 02/2026                                       |
| Signal Generator                      | Rohde & Schwarz<br>SMB     | 106589             | 04/2022                                       | 04/2025                                       |
| 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                           | Rohde & Schwarz<br>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<br>Sensor      | Testo 184 H1               | 44225320           | 06/2021                                       | 06/2024                                       |

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# **SAR Reference Dipole Calibration Report**

Ref: ACR.329.12.21.BES.A

# SHENZHEN BCTC TECHNOLOGY CO., LTD.

1~2/ F, NO. B FACTORY BUILDING, PENGZHOU INDUSTRIAL PARK, FUYUAN 1ST ROAD,
TANGWEI COMMUNITY, FUHAI STREET, BAO'AN DISTRICT, SHENZHEN, GUANGDONG, CHINA MVG COMOSAR REFERENCE DIPOLE

FREQUENCY: 1900 MHZ SERIAL NO.: SN 47/21 DIP 1G900-624

Calibrated at MVG

Z.I. de la pointe du diable

Technopôle Brest Iroise – 295 avenue Alexis de Rochon

29280 PLOUZANE - FRANCE

Calibration date: 11/25/2021



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.

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#### SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR 329.12.21.BES.A

|               | Name         | Function            | Date       | Signature    |
|---------------|--------------|---------------------|------------|--------------|
| Prepared by:  | Jérôme Luc   | Technical Manager   | 11/25/2021 | JES          |
| Checked by :  | Jérôme Luc   | Technical Manager   | 11/25/2021 | JES          |
| Approved by : | Yann Toutain | Laboratory Director | 11/25/2021 | Gann TOUTAAN |

2021.11.25 11:54:31 +01'00'

|                | Customer Name                           |
|----------------|---|
| Distribution : | Shenzhen BCTC<br>Technology Co.,<br>Ltd |

| Issue | Name       | Date       | Modifications   |
|-------|------------|------------|-----------------|
| A     | Jérôme Luc | 11/25/2021 | Initial release |
|       |            |            |                 |
|       |            |            |                 |
|       |            |            |                 |

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#### 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.

#### DEVICE UNDER TEST 2

| Device Under Test              |                                   |  |
|--------------------------------|-----------------------------------|--|
| Device Type                    | COMOSAR 1900 MHz REFERENCE DIPOLE |  |
| Manufacturer                   | MVG                               |  |
| Model                          | SID1900                           |  |
| Serial Number                  | SN 47/21 DIP 1G900-624            |  |
| Product Condition (new / used) | New                               |  |

#### PRODUCT DESCRIPTION 3

#### **GENERAL INFORMATION** 3.1

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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#### 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.

#### 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                            |

#### 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 <u>VALIDATION MEASUREMENT</u>

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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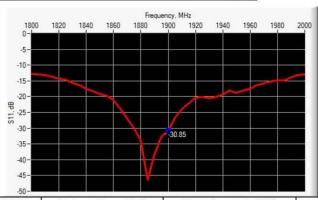
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| Scan Volume | Expanded Uncertainty |
|-------------|----------------------|
| 1 g         | 19 % (SAR)           |
| 10 g        | 19 % (SAR)           |

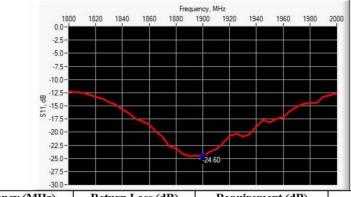
#### 6 CALIBRATION MEASUREMENT RESULTS

## 6.1 RETURN LOSS AND IMPEDANCE IN HEAD LIQUID



| Frequency (MHz) | Return Loss (dB) | Requirement (dB) | Impedance                   |
|-----------------|------------------|------------------|-----------------------------|
| 1900            | -30.85           | -20              | $51.9 \Omega + 2.2 j\Omega$ |

## 6.2 RETURN LOSS AND IMPEDANCE IN BODY LIQUID



|   | Frequency (MHz) | Return Loss (dB) | Requirement (dB) | Impedance                   |
|---|-----------------|------------------|------------------|-----------------------------|
| ſ | 1900            | -24.60           | -20              | $45.9 \Omega + 4.2 i\Omega$ |

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#### MECHANICAL DIMENSIONS

| Frequency MHz | Ln                  | nm       | hm                 | m        | d r                | nm        |
|---------------|---------------------|----------|--------------------|----------|--------------------|-----------|
|               | required            | measured | required           | measured | required           | m easured |
| 300           | 420.0 <b>±1 %</b> . |          | 250.0 <b>±1 %.</b> |          | 6.35 <b>±1 %.</b>  |           |
| 450           | 290.0 <b>±1 %.</b>  |          | 166.7 ±1 %.        |          | 6.35 <b>±1 %</b> . |           |
| 750           | 176.0 ±1 %.         |          | 100.0 <b>±1 %.</b> |          | 6.35 <b>±1 %</b> . |           |
| 835           | 161.0 <b>±1 %.</b>  |          | 89.8 <b>±1 %.</b>  |          | 3.6 <b>±1 %.</b>   |           |
| 900           | 149.0 <b>±1 %.</b>  |          | 83.3 <b>±1 %.</b>  |          | 3.6 <b>±1 %.</b>   |           |
| 1450          | 89.1 <b>±1 %.</b>   |          | 51.7 <b>±1 %.</b>  |          | 3.6 <b>±1 %.</b>   |           |
| 1500          | 86.2 <b>±1 %.</b>   |          | 50.0 <b>±1 %.</b>  |          | 3.6 <b>±1 %.</b>   |           |
| 1640          | 79.0 <b>±1 %.</b>   |          | 45.7 ±1 %.         |          | 3.6 <b>±1 %.</b>   |           |
| 1750          | 75.2 ±1 %.          |          | 42.9 <b>±1 %.</b>  |          | 3.6 <b>±1 %.</b>   |           |
| 1800          | 72.0 <b>±1 %.</b>   |          | 41.7 <b>±1 %.</b>  | 1        | 3.6 <b>±1 %.</b>   |           |
| 1900          | 68.0 <b>±1 %.</b>   | 67.97    | 39.5 <b>±1 %.</b>  | 39.61    | 3.6 <b>±1 %.</b>   | 3.60      |
| 1950          | 66.3 <b>±1 %.</b>   |          | 38.5 <b>±1 %.</b>  |          | 3.6 <b>±1 %</b> .  |           |
| 2000          | 64.5 <b>±1 %.</b>   | 5        | 37.5 <b>±1 %.</b>  |          | 3.6 <b>±1 %.</b>   |           |
| 2100          | 61.0 <b>±1 %</b> .  |          | 35.7 <b>±1 %</b> . |          | 3.6 <b>±1 %.</b>   |           |
| 2300          | 55.5 <b>±1 %.</b>   |          | 32.6 <b>±1</b> %.  |          | 3.6 <b>±1 %.</b>   |           |
| 2450          | 51.5 <b>±1 %.</b>   |          | 30.4 <b>±1 %.</b>  |          | 3.6 <b>±1 %</b> .  |           |
| 2600          | 48.5 <b>±1 %.</b>   | 9        | 28.8 <b>±1 %.</b>  |          | 3.6 <b>±1 %.</b>   |           |
| 3000          | 41.5 <b>±1 %.</b>   |          | 25.0 <b>±1 %.</b>  |          | 3.6 <b>±1 %.</b>   |           |
| 3300          | 9                   | 5        | 9                  |          | 45                 |           |
| 3500          | 37.0 <b>±1 %.</b>   |          | 26.4 <b>±1 %.</b>  |          | 3.6 <b>±1 %.</b>   |           |
| 3700          | 34.7 <b>±1 %</b> .  |          | 26.4 ±1 %.         |          | 3.6 <b>±1</b> %.   |           |
| 3900          | ŭ                   |          | 2                  |          | 22                 |           |
| 4200          |                     | 9        | ā                  |          |                    |           |
| 4600          | В                   | ò        |                    |          | æ                  |           |
| 4900          | æ                   | 4        | E                  |          | =                  |           |

### 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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#### SAR REFERENCE DIPOLE CALIBRATION REPORT

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#### 7.1 HEAD LIQUID MEASUREMENT

| Frequency<br>MHz | Relative per       | mittivity ( $\varepsilon_{r}$ ) | Conductiv          | ity (σ) S/m |
|------------------|--------------------|---------------------------------|--------------------|-------------|
|                  | required           | measured                        | required           | measured    |
| 300              | 45.3 <b>±10</b> %  |                                 | 0.87 <b>±</b> 10 % |             |
| 450              | 43.5 <b>±10</b> %  |                                 | 0.87 <b>±</b> 10 % |             |
| 750              | 41.9 <b>±</b> 10 % |                                 | 0.89 <b>±</b> 10 % |             |
| 835              | 41.5 ±10 %         |                                 | 0.90 ±10 %         |             |
| 900              | 41.5 <b>±</b> 10 % |                                 | 0.97 <b>±</b> 10 % |             |
| 1450             | 40.5 <b>±</b> 10 % |                                 | 1.20 <b>±</b> 10 % |             |
| 1500             | 40.4 <b>±</b> 10 % |                                 | 1.23 <b>±</b> 10 % |             |
| 1640             | 40.2 <b>±10</b> %  |                                 | 1.31 <b>±</b> 10 % |             |
| 1750             | 40.1 <b>±</b> 10 % |                                 | 1.37 <b>±</b> 10 % |             |
| 1800             | 40.0 <b>±10</b> %  | 10                              | 1.40 ±10 %         |             |
| 1900             | 40.0 <b>±</b> 10 % | 37.9                            | 1.40 ±10 %         | 1.43        |
| 1950             | 40.0 <b>±</b> 10 % |                                 | 1.40 ±10 %         |             |
| 2000             | 40.0 ±10 %         |                                 | 1.40 ±10 %         |             |
| 2100             | 39.8 <b>±10</b> %  |                                 | 1.49 <b>±</b> 10 % |             |
| 2300             | 39.5 <b>±1</b> 0 % |                                 | 1.67 <b>±</b> 10 % |             |
| 2450             | 39.2 <b>±1</b> 0 % |                                 | 1.80 ±10 %         |             |
| 2600             | 39.0 <b>±10</b> %  |                                 | 1.96 ±10 %         |             |
| 3000             | 38.5 <b>±1</b> 0 % |                                 | 2.40 <b>±</b> 10 % |             |
| 3300             | 38.2 <b>±1</b> 0 % |                                 | 2.71 <b>±</b> 10 % |             |
| 3500             | 37.9 <b>±10</b> %  |                                 | 2.91 <b>±</b> 10 % |             |
| 3700             | 37.7 ±10 %         | 1                               | 3.12 <b>±</b> 10 % |             |
| 3900             | 37.5 <b>±10</b> %  |                                 | 3.32 <b>±10</b> %  |             |
| 4200             | 37.1 <b>±10</b> %  |                                 | 3.63 <b>±</b> 10 % |             |
| 4600             | 36.7 <b>±10</b> %  |                                 | 4.04 <b>±</b> 10 % |             |
| 4900             | 36.3 ±10 %         |                                 | 4.35 <b>±</b> 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': 37.9 sigma: 1.43 |
| 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<br>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     | 2           |
| 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     | 41.26 (4.13) | 20.5     | 20.94 (2.09 |
| 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             |          |              | 120      |             |
| 3500             | 67.1     |              | 25       |             |
| 3700             | 67.4     |              | 24.2     |             |
| 3900             |          |              | (8)      |             |
| 4200             | 15.0     |              | 17.1     |             |
| 4600             |          |              | (#.)     |             |
| 4900             | -        |              | 180      |             |

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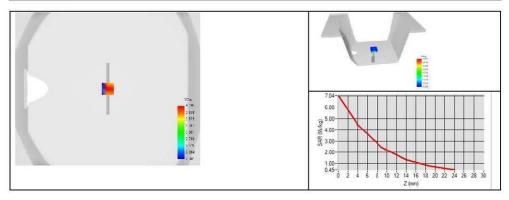
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### 7.3 BODY LIQUID MEASUREMENT

| Frequency<br>MHz | Relative per       | mittivity $(\mathbf{s}_{r}')$ | Conductiv          | ity (σ) S/m |
|------------------|--------------------|-------------------------------|--------------------|-------------|
|                  | required           | measured                      | required           | measured    |
| 150              | 61.9 <b>±</b> 10 % |                               | 0.80 ±10 %         |             |
| 300              | 58.2 <b>±1</b> 0 % |                               | 0.92 <b>±</b> 10 % |             |
| 450              | 56.7 <b>±</b> 10 % |                               | 0.94 <b>±</b> 10 % |             |
| 750              | 55.5 <b>±10</b> %  |                               | 0.96 <b>±</b> 10 % |             |
| 835              | 55.2 <b>±10</b> %  |                               | 0.97 <b>±</b> 10 % |             |
| 900              | 55.0 <b>±10</b> %  |                               | 1.05 ±10 %         |             |
| 915              | 55.0 <b>±1</b> 0 % |                               | 1.06 <b>±</b> 10 % |             |
| 1450             | 54.0 <b>±</b> 10 % |                               | 1.30 ±10 %         |             |
| 1610             | 53.8 <b>±</b> 10 % |                               | 1.40 <b>±</b> 10 % |             |
| 1800             | 53.3 <b>±10</b> %  |                               | 1.52 ±10 %         |             |
| 1900             | 53.3 <b>±1</b> 0 % | 55.0                          | 1.52 ±10 %         | 1.57        |
| 2000             | 53.3 <b>±10</b> %  |                               | 1.52 <b>±</b> 10 % |             |
| 2100             | 53.2 <b>±10</b> %  |                               | 1.62 ±10 %         |             |
| 2300             | 52.9 <b>±</b> 10 % |                               | 1.81 ±10 %         |             |
| 2450             | 52.7 <b>±1</b> 0 % |                               | 1.95 <b>±</b> 10 % |             |
| 2600             | 52.5 <b>±1</b> 0 % |                               | 2.16 <b>±</b> 10 % |             |
| 3000             | 52.0 <b>±10</b> %  |                               | 2.73 <b>±</b> 10 % |             |
| 3300             | 51.6 <b>±</b> 10 % |                               | 3.08 <b>±</b> 10 % |             |
| 3500             | 51.3 <b>±</b> 10 % | 5                             | 3.31 <b>±</b> 10 % |             |
| 3700             | 51.0 <b>±</b> 10 % |                               | 3.55 <b>±</b> 10 % |             |
| 3900             | 50.8 ±10 %         |                               | 3.78 ±10 %         |             |
| 4200             | 50.4 <b>±10</b> %  |                               | 4.13 <b>±</b> 10 % |             |
| 4600             | 49.8 <b>±</b> 10 % |                               | 4.60 <b>±</b> 10 % |             |
| 4900             | 49.4 <b>±</b> 10 % |                               | 4.95 <b>±</b> 10 % |             |
| 5200             | 49.0 <b>±10</b> %  |                               | 5.30 <b>±10</b> %  |             |
| 5300             | 48.9 <b>±10</b> %  |                               | 5.42 <b>±10</b> %  |             |
| 5400             | 48.7 <b>±10</b> %  |                               | 5.53 <b>±10</b> %  |             |
| 5500             | 48.6 <b>±10</b> %  |                               | 5.65 <b>±10</b> %  |             |
| 5600             | 48.5 <b>±10</b> %  |                               | 5.77 <b>±10</b> %  |             |
| 5800             | 48.2 <b>±10</b> %  |                               | 6.00 <b>±10</b> %  |             |

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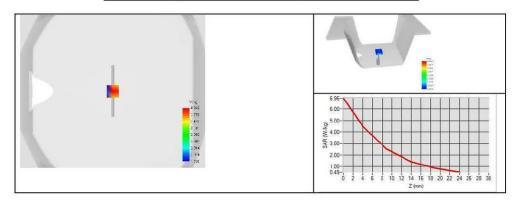
#### SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR 329.12.21.BES.A

#### 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': 55.0 sigma: 1.57 |
| 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<br>MHz | 1 g SAR (W/kg/W) | 10 g SAR (W/kg/W) |
|------------------|------------------|-------------------|
|                  | measured         | measured          |
| 1900             | 40.66 (4.07)     | 20.57 (2.06)      |



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## LIST OF EQUIPMENT

| Equipment Summary Sheet               |                            |                    |   |   |
|---------------------------------------|----------------------------|--------------------|---|---|
| Equipment<br>Description              | Manufacturer /<br>Model    | Identification No. | Current<br>Calibration Date                   | Next Calibration<br>Date                      |
| SAM Phantom                           | MVG                        | SN 13/09 SAM68     | Validated. No cal<br>required.                | Validated. No cal<br>required.                |
| COMOSAR Test Bench                    | Version 3                  | NA                 | Validated. No cal<br>required.                | Validated. No cal<br>required.                |
| Network Analyzer                      | Rohde & Schwarz<br>ZVM     | 100203             | 08/2021                                       | 08/2024                                       |
| Network Analyzer                      | Agilent 8753ES             | MY40003210         | 10/2022                                       | 10/2025                                       |
| Network Analyzer –<br>Calibration kit | Rohde & Schwarz<br>ZV-Z235 | 101223             | 05/2012                                       | 05/2025                                       |
| Network Analyzer –<br>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                                       | 10/2025                                       |
| Multimeter                            | Keithley 2000              | 1160271            | 02/2023                                       | 02/2026                                       |
| Signal Generator                      | Rohde & Schwarz<br>SMB     | 106589             | 04/2022                                       | 04/2025                                       |
| 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                           | Rohde & Schwarz<br>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<br>Sensor      | Testo 184 H1               | 44225320           | 06/2021                                       | 06/2024                                       |

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# 17. EUT Photographs

#### **EUT Front View**



## **EUT Back View**



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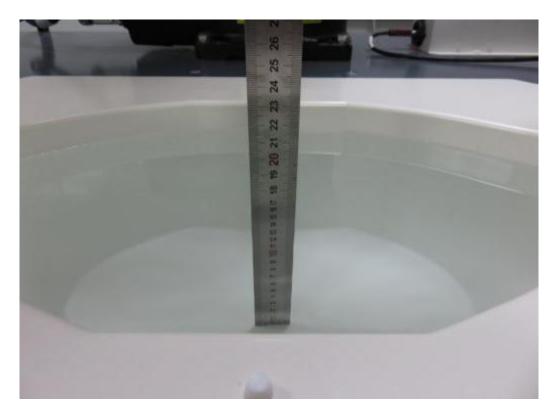
## **Antenna View**







# 18. Photographs Of The Liquid



Photograph of the depth in the Body Phantom (600-10000MHz, depth >15cm)

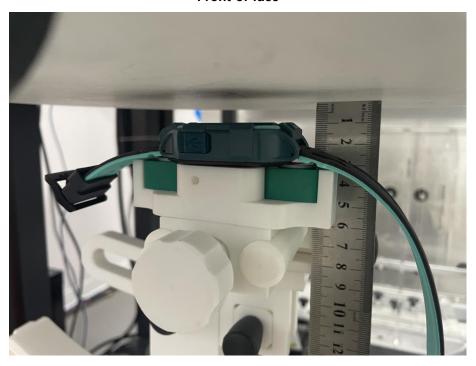


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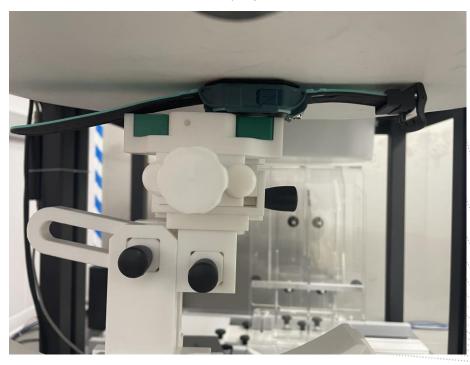


# 19. EUT Test Setup Photographs

## Front-of-face



Limb-worn



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# **STATEMENT**

- 1. The equipment lists are traceable to the national reference standards.
- 2. The test report can not be partially copied unless prior written approval is issued from our lab.
- 3. The test report is invalid without the "special seal for inspection and testing".
- 4. The test report is invalid without the signature of the approver.
- 5. The test process and test result is only related to the Unit Under Test.
- 6. Sample information is provided by the client and the laboratory is not responsible for its authenticity.
- 7. The quality system of our laboratory is in accordance with ISO/IEC17025.
- 8. If there is any objection to this test report, the client should inform issuing laboratory within 15 days from the date of receiving test report.

#### Address:

1-2/F., Building B, Pengzhou Industrial Park, No.158, Fuyuan 1st Road, Zhancheng, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China

TEL: 400-788-9558

P.C.: 518103

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\*\*\*\* END \*\*\*\*

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