



# SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.178.8.20.MVGB.A

|      |            |      |            |      |
|------|------------|------|------------|------|
| 1750 | 40.1 ±10 % |      | 1.37 ±10 % |      |
| 1800 | 40.0 ±10 % |      | 1.40 ±10 % |      |
| 1900 | 40.0 ±10 % |      | 1.40 ±10 % |      |
| 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 % | 41.9 | 1.80 ±10 % | 1.88 |
| 2600 | 39.0 ±10 % |      | 1.96 ±10 % |      |
| 3000 | 38.5 ±10 % |      | 2.40 ±10 % |      |
| 3500 | 37.9 ±10 % |      | 2.91 ±10 % |      |

## 7.2 SAR MEASUREMENT RESULT WITH HEAD LIQUID

The IEEE Std. 1528 and CEI/IEC 62209 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 EPG0333                                     |
| Liquid                                    | Head Liquid Values: $\epsilon_p$ : 41.9 sigma : 1.88 |
| Distance between dipole center and liquid | 10.0 mm                                              |
| Area scan resolution                      | dx=8mm/dy=8mm                                        |
| Zoon Scan Resolution                      | dx=5mm/dy=5mm/dz=5mm                                 |
| Frequency                                 | 2450 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             |          | 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              |          |

Page: 8/11

**Template\_ACR.DDD.N.YY.MVGB.ISSUE\_SAR Reference Dipole vG**

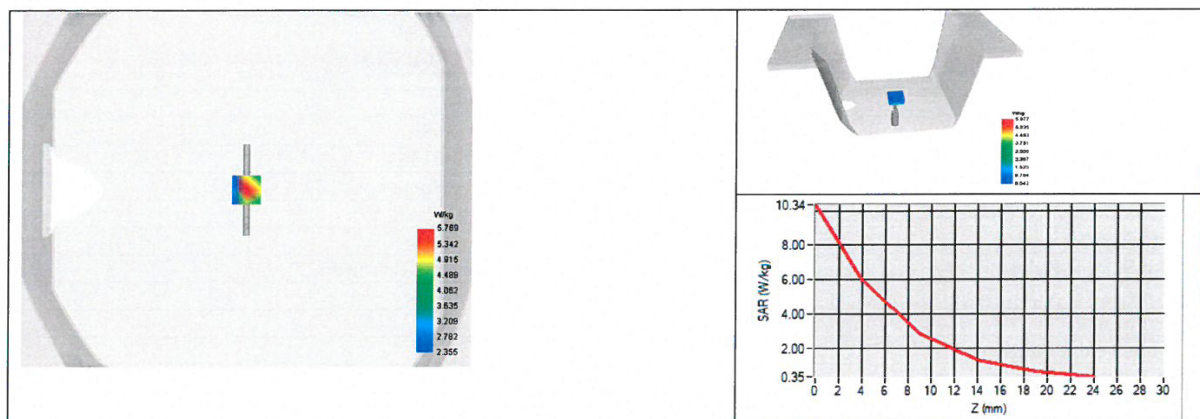
This document shall not be reproduced, except in full or in part, without the written approval of MVG. The information contained herein is to be used only for the purpose for which it is submitted and is not to be released in whole or part without written approval of MVG.



# SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.178.8.20.MVGB.A

|      |      |              |      |              |
|------|------|--------------|------|--------------|
| 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 | 53.71 (5.37) | 24   | 24.17 (2.42) |
| 2600 | 55.3 |              | 24.6 |              |
| 3000 | 63.8 |              | 25.7 |              |
| 3500 | 67.1 |              | 25   |              |
| 3700 | 67.4 |              | 24.2 |              |



## 7.3 BODY LIQUID MEASUREMENT

| Frequency<br>MHz | Relative permittivity ( $\epsilon_r'$ ) |          | Conductivity ( $\sigma$ ) S/m |          |
|------------------|-----------------------------------------|----------|-------------------------------|----------|
|                  | required                                | measured | required                      | measured |
| 150              | 61.9 $\pm$ 10 %                         |          | 0.80 $\pm$ 10 %               |          |
| 300              | 58.2 $\pm$ 10 %                         |          | 0.92 $\pm$ 10 %               |          |
| 450              | 56.7 $\pm$ 10 %                         |          | 0.94 $\pm$ 10 %               |          |
| 750              | 55.5 $\pm$ 10 %                         |          | 0.96 $\pm$ 10 %               |          |
| 835              | 55.2 $\pm$ 10 %                         |          | 0.97 $\pm$ 10 %               |          |
| 900              | 55.0 $\pm$ 10 %                         |          | 1.05 $\pm$ 10 %               |          |
| 915              | 55.0 $\pm$ 10 %                         |          | 1.06 $\pm$ 10 %               |          |
| 1450             | 54.0 $\pm$ 10 %                         |          | 1.30 $\pm$ 10 %               |          |
| 1610             | 53.8 $\pm$ 10 %                         |          | 1.40 $\pm$ 10 %               |          |
| 1800             | 53.3 $\pm$ 10 %                         |          | 1.52 $\pm$ 10 %               |          |
| 1900             | 53.3 $\pm$ 10 %                         |          | 1.52 $\pm$ 10 %               |          |
| 2000             | 53.3 $\pm$ 10 %                         |          | 1.52 $\pm$ 10 %               |          |
| 2100             | 53.2 $\pm$ 10 %                         |          | 1.62 $\pm$ 10 %               |          |

Page: 9/11

Template\_ACR.DDD.N.YY.MVGB.ISSUE\_SAR Reference Dipole vG

This document shall not be reproduced, except in full or in part, without the written approval of MVG. The information contained herein is to be used only for the purpose for which it is submitted and is not to be released in whole or part without written approval of MVG.



# SAR REFERENCE DIPOLE CALIBRATION REPORT

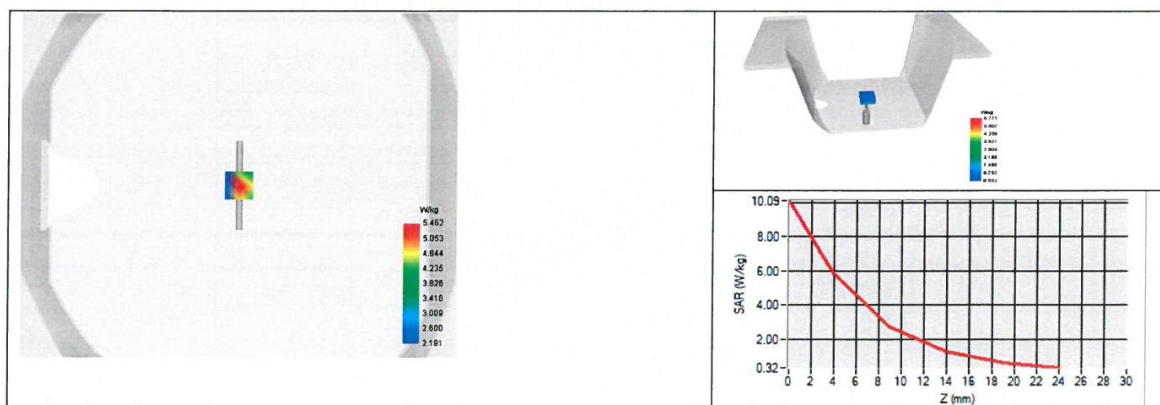
Ref: ACR.178.8.20.MVGB.A

|      |            |      |            |      |
|------|------------|------|------------|------|
| 2300 | 52.9 ±10 % |      | 1.81 ±10 % |      |
| 2450 | 52.7 ±10 % | 53.4 | 1.95 ±10 % | 2.14 |
| 2600 | 52.5 ±10 % |      | 2.16 ±10 % |      |
| 3000 | 52.0 ±10 % |      | 2.73 ±10 % |      |
| 3500 | 51.3 ±10 % |      | 3.31 ±10 % |      |
| 3700 | 51.0 ±10 % |      | 3.55 ±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 % |      |

## 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' : 53.4 sigma : 2.14 |
| Distance between dipole center and liquid | 10.0 mm                                      |
| Area scan resolution                      | dx=8mm/dy=8mm                                |
| Zoon Scan Resolution                      | dx=5mm/dy=5mm/dz=5mm                         |
| Frequency                                 | 2450 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          |
| 2450             | 54.83 (5.48)     | 23.59 (2.36)      |



Page: 10/11

*Template\_ACR.DDD.N.YY.MVGB.ISSUE\_SAR Reference Dipole vG*

This document shall not be reproduced, except in full or in part, without the written approval of MVG. The information contained herein is to be used only for the purpose for which it is submitted and is not to be released in whole or part without written approval of MVG.





## SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.178.8.20.MVGB.A

## 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             | 05/2019                                       | 05/2022                                       |
| Network Analyzer – Calibration kit | Rohde & Schwarz ZV-Z235 | 101223             | 05/2019                                       | 05/2022                                       |
| Calipers                           | Mitutoyo                | SN 0009732         | 10/2019                                       | 10/2022                                       |
| Reference Probe                    | MVG                     | EPGO333 SN 41/18   | 05/2020                                       | 05/2021                                       |
| Multimeter                         | Keithley 2000           | 1160271            | 02/2020                                       | 02/2023                                       |
| Signal Generator                   | Rohde & Schwarz SMB     | 106589             | 04/2019                                       | 04/2022                                       |
| Amplifier                          | Aethercomm              | SN 046             | Characterized prior to test. No cal required. | Characterized prior to test. No cal required. |
| Power Meter                        | NI-USB 5680             | 170100013          | 05/2019                                       | 05/2022                                       |
| Directional Coupler                | Narda 4216-20           | 01386              | Characterized prior to test. No cal required. | Characterized prior to test. No cal required. |
| Temperature / Humidity Sensor      | Control Company         | 150798832          | 11/2017                                       | 11/2020                                       |

Page: 11/11

*Template\_ACR.DDD.N.YY.MVGB.ISSUE\_SAR Reference Dipole vG*

*This document shall not be reproduced, except in full or in part, without the written approval of MVG. The information contained herein is to be used only for the purpose for which it is submitted and is not to be released in whole or part without written approval of MVG.*

## ANNEX D: Appendix D: SAR Test Setup

Photo 1: Measurement System SATIMO



Photo 2: Liquid deep(15cm)



Photo 3: Face upward 5mm



Photo 4: Back upward 5mm

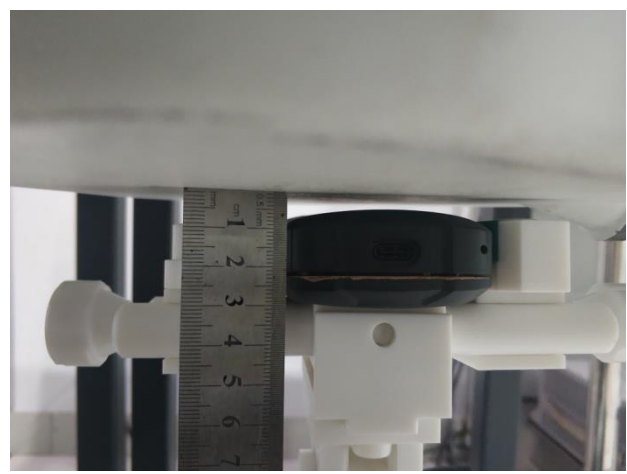


Photo 5: Bottom Side 5mm



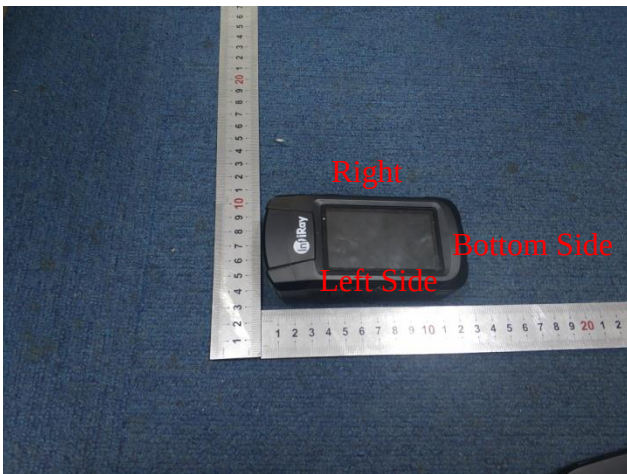
Photo 6: Left Side 5mm



Photo 7: Right Side 5mm



EUT Front View



EUT Back View



—End of the Report—