



## SAR EVALUATION REPORT

IEEE Std 1528-2013  
IEC/IEEE 62209-1528:2020

*For*  
**Low Power Digital Device Transmitter**

FCC ID: **IPH-04883**  
Model Name: **A04883**

Report Number: **R15485855-S13**  
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Revision History

| Rev. | Date       | Revisions     | Revised By |
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| V1   | 2024-09-24 | Initial Issue | --         |
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|      |            |               |            |

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## 1. Attestation of Test Results

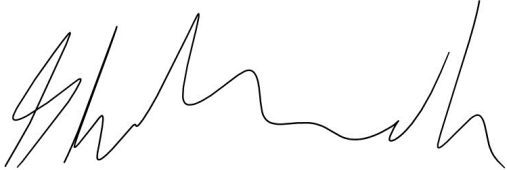
|                                               |                                                                                         |       |
|-----------------------------------------------|-----------------------------------------------------------------------------------------|-------|
| Applicant Name                                | Garmin International Inc                                                                |       |
| FCC ID                                        | IPH-04883                                                                               |       |
| Model Name                                    | A04883                                                                                  |       |
| Applicable Standards                          | Published RF exposure KDB procedures.<br>IEEE Std 1528-2013<br>IEC/IEEE 62209-1528:2020 |       |
| Exposure Category                             | SAR Limits (W/Kg)                                                                       |       |
|                                               | Extremities (hands, wrists, ankles, etc.)<br>(10g of tissue)                            |       |
| General population /<br>Uncontrolled exposure | 4                                                                                       |       |
| RF Exposure Conditions                        | Equipment Class - Highest Reported SAR (W/kg)                                           |       |
|                                               | DSS                                                                                     | DXX   |
| Extremity                                     | 0.067                                                                                   | 0.000 |
| Simultaneous TX                               | 0.067                                                                                   | 0.067 |
| Date Tested                                   | 2024-09-16                                                                              |       |
| Test Results                                  | Pass                                                                                    |       |

UL LLC tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested can demonstrate compliance with the requirements as documented in this report.

This report contains data provided by the customer which can impact the validity of results. UL LLC is only responsible for the validity of results after the integration of the data provided by the customer.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to ensure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not considered unless noted otherwise.

This document may not be altered or revised in any way unless done so by UL LLC and all revisions are noted in the revisions section. Any alteration of this document not carried out by UL LLC will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by A2LA, NIST, or any agency of the U.S. Government, or any agency of the U.S. government.

|                                                                                     |                                                                                      |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| Approved & Released By:                                                             | Prepared By:                                                                         |
|  |  |
| Richard Jankovics<br>Staff Engineer<br>UL LLC                                       | Sarah Kuhaneck<br>Engineer Project Associate<br>UL LLC                               |

## 2. Test Specification, Methods and Procedures

The tests documented in this report were performed in accordance with FCC 47 CFR § 2.1093, IEEE 1528-2013, IEC/IEEE 62209-1528:2020, the following FCC Published RF exposure [KDB](#) procedures:

- 447498 D01 General RF Exposure Guidance v06
- 447498 D03 Supplement C Cross-Reference v01
- 865664 D02 RF Exposure Reporting v01r02

In addition to the above, the following information was used:

- TCB Workshop October 2016; RF Exposure Procedures (DUT Holder Perturbations)
- TCB Workshop April 2019; RF Exposure Procedures (Tissue Simulating Liquids (TSL))

3. Facilities and Accreditation

UL LLC is accredited by A2LA, cert. # 0751.06 for all testing performed within the scope of this report. Testing was performed at the locations noted below.

The test sites and measurement facilities used to collect data are located at 2800 Perimeter Park Dr, Morrisville, NC, USA.

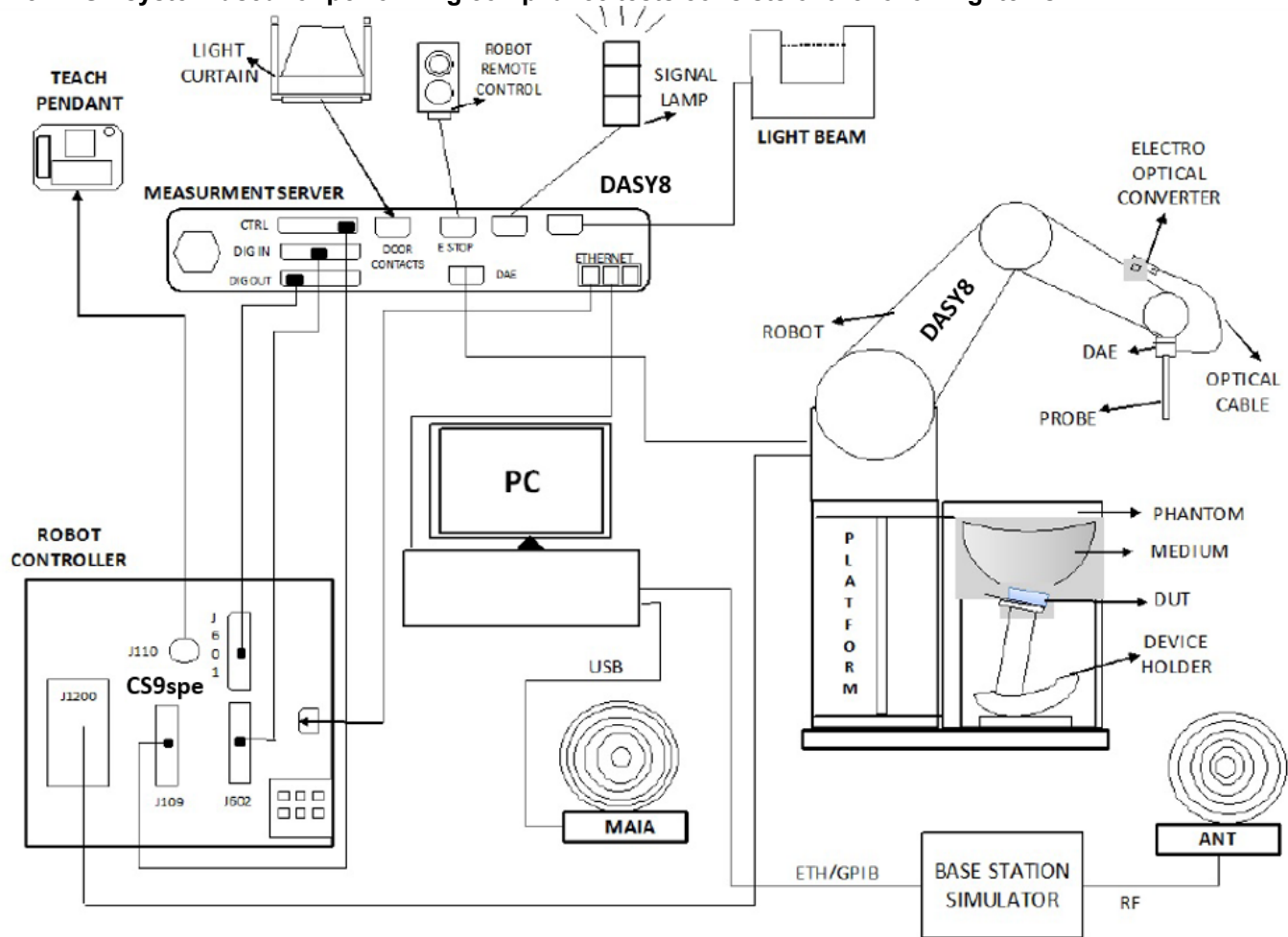
- SAR Lab 1A

|                                     | Address                                                                      | ISED CABID | ISED Company Number | FCC Registration |
|-------------------------------------|------------------------------------------------------------------------------|------------|---------------------|------------------|
| <input type="checkbox"/>            | Building:<br>12 Laboratory Dr<br>RTP, NC 27709, U.S.A                        | US0067     | 2180C               | 825374           |
| <input checked="" type="checkbox"/> | Building:<br>2800 Perimeter Park Dr. Suite B<br>Morrisville, NC 27560, U.S.A | US0067     | 27265               | 825374           |

## 4. SAR Measurement System & Test Equipment

### 4.1. SAR Measurement System

The DASY system used for performing compliance tests consists of the following items:



- A standard high precision 6-axis robot with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic Field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running Win10 and the DASY8<sup>1</sup> software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.

<sup>1</sup> DASY8 software used: DASY16.4.0 and older generations.

## 4.2. SAR Scan Procedures

### Step 1: Power Reference Measurement

The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. The minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. The minimum distance of probe sensors to surface is 2.1 mm. This distance cannot be smaller than the distance of sensor calibration points to probe tip as defined in the probe properties.

### Step 2: Area Scan

The Area Scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot. The sophisticated interpolation routines implemented in DASY software can find the maximum locations even in relatively coarse grids. When an Area Scan has measured all reachable points, it computes the field maximal found in the scanned area, within a range of the global maximum. The range (in dB) is specified in the standards for compliance testing. For example, a 2 dB range is required in IEC/IEEE 62209-1528, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan). If only one Zoom Scan follows the Area Scan, then only the absolute maximum will be taken as reference. For cases where multiple maximums are detected, the number of Zoom Scans has to be increased accordingly.

Area Scan Parameters extracted from KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz

|                                                                                                        | $\leq 3$ GHz                                                                                                                                                                                                                                                           | $> 3$ GHz                                              |
|--------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|
| Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface | $5 \pm 1$ mm                                                                                                                                                                                                                                                           | $\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5$ mm     |
| Maximum probe angle from probe axis to phantom surface normal at the measurement location              | $30^\circ \pm 1^\circ$                                                                                                                                                                                                                                                 | $20^\circ \pm 1^\circ$                                 |
| Maximum area scan spatial resolution: $\Delta x_{\text{Area}}, \Delta y_{\text{Area}}$                 | $\leq 2$ GHz: $\leq 15$ mm<br>$2 - 3$ GHz: $\leq 12$ mm                                                                                                                                                                                                                | $3 - 4$ GHz: $\leq 12$ mm<br>$4 - 6$ GHz: $\leq 10$ mm |
|                                                                                                        | When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be $\leq$ the corresponding x or y dimension of the test device with at least one measurement point on the test device. |                                                        |

**Step 3: Zoom Scan**

Zoom Scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. The Zoom Scan measures points (refer to table below) within a cube whose base faces are centered on the maxima found in a preceding area scan job within the same procedure. When the measurement is done, the Zoom Scan evaluates the averaged SAR for 1 g and 10 g and displays these values next to the job's label.

Zoom Scan Parameters extracted from KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz

|                                                                                                                                                                                                                                                                                                             |                                           |                                                                                             | $\leq 3$ GHz                                         | $> 3$ GHz                                                                     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|---------------------------------------------------------------------------------------------|------------------------------------------------------|-------------------------------------------------------------------------------|
| Maximum zoom scan spatial resolution: $\Delta x_{\text{Zoom}}, \Delta y_{\text{Zoom}}$                                                                                                                                                                                                                      |                                           |                                                                                             | $\leq 2$ GHz: $\leq 8$ mm<br>2 – 3 GHz: $\leq 5$ mm* | 3 – 4 GHz: $\leq 5$ mm*<br>4 – 6 GHz: $\leq 4$ mm*                            |
| Maximum zoom scan spatial resolution, normal to phantom surface                                                                                                                                                                                                                                             | uniform grid: $\Delta z_{\text{Zoom}}(n)$ |                                                                                             | $\leq 5$ mm                                          | 3 – 4 GHz: $\leq 4$ mm<br>4 – 5 GHz: $\leq 3$ mm<br>5 – 6 GHz: $\leq 2$ mm    |
|                                                                                                                                                                                                                                                                                                             | graded grid                               | $\Delta z_{\text{Zoom}}(1)$ : between 1 <sup>st</sup> two points closest to phantom surface | $\leq 4$ mm                                          | 3 – 4 GHz: $\leq 3$ mm<br>4 – 5 GHz: $\leq 2.5$ mm<br>5 – 6 GHz: $\leq 2$ mm  |
|                                                                                                                                                                                                                                                                                                             |                                           | $\Delta z_{\text{Zoom}}(n>1)$ : between subsequent points                                   | $\leq 1.5 \cdot \Delta z_{\text{Zoom}}(n-1)$         |                                                                               |
| Minimum zoom scan volume                                                                                                                                                                                                                                                                                    | x, y, z                                   |                                                                                             | $\geq 30$ mm                                         | 3 – 4 GHz: $\geq 28$ mm<br>4 – 5 GHz: $\geq 25$ mm<br>5 – 6 GHz: $\geq 22$ mm |
| Note: $\delta$ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.                                                                                                                                                           |                                           |                                                                                             |                                                      |                                                                               |
| * When zoom scan is required and the <i>reported</i> SAR from the <i>area scan based 1-g SAR estimation</i> procedures of KDB 447498 is $\leq 1.4$ W/kg, $\leq 8$ mm, $\leq 7$ mm and $\leq 5$ mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz. |                                           |                                                                                             |                                                      |                                                                               |

**Step 4: Power drift measurement**

The Power Drift Measurement measures the field at the same location as the most recent power reference measurement within the same procedure, and with the same settings. The Power Drift Measurement gives the field difference in dB from the reading conducted within the last Power Reference Measurement. This allows a user to monitor the power drift of the device under test within a batch process. The measurement procedure is the same as Step 1.

### 4.3. Test Equipment

The measuring equipment used to perform the tests documented in this report has been calibrated in accordance with the manufacturers' recommendations, and is traceable to recognized national standards.

#### Dielectric Property Measurements

| Name of Equipment | Manufacturer      | Type/Model   | Serial No. | Cal. Date  | Cal. Due Date |
|-------------------|-------------------|--------------|------------|------------|---------------|
| Network Analyzer  | Keysight          | E5063A       | MY54100681 | 2024-07-31 | 2025-07-31    |
| Dielectric Probe  | SPEAG             | DAKS-12      | 1037       | 2024-03-11 | 2025-03-11    |
| Shorting Block    | SPEAG             | DAK-12 Short | 2044       | 2024-03-11 | 2025-03-11    |
| Thermometer       | Fisher Scientific | 15-078-181   | 181705017  | 2023-03-30 | 2025-03-30    |

| Name of Equipment         | Manufacturer    | Type/Model | Serial No. | Cal. Date  | Cal. Due Date |
|---------------------------|-----------------|------------|------------|------------|---------------|
| Signal Generator          | Keysight        | N5181A     | MY50140788 | 2024-08-01 | 2025-08-01    |
| 3-Path Diode Power Sensor | Rohde & Schwarz | NRP8S      | 112236     | 2024-07-12 | 2025-07-12    |
| 3-Path Diode Power Sensor | Rohde & Schwarz | NRP8S      | 112237     | 2024-07-12 | 2025-07-12    |
| Dual Directional Coupler  | Werlatone       | C5100-10   | 92249      |            | N/A           |

#### Lab Equipment

| Name of Equipment            | Manufacturer    | Type/Model | Serial No. | Cal. Date  | Cal. Due Date |
|------------------------------|-----------------|------------|------------|------------|---------------|
| E-Field Probe                | SPEAG           | EX3DV4     | 7710       | 2024-01-16 | 2025-01-16    |
| Data Acquisition Electronics | SPEAG           | DAE4       | 1715       | 2024-02-12 | 2025-02-12    |
| System Validation Dipole     | SPEAG           | CLA13      | 1017       | 2024-03-07 | 2025-03-07    |
| Environmental Indicator      | Control Company | 06-662-4   | 240072459  | 2024-01-24 | 2026-01-24    |

## 5. Measurement Uncertainty

Per KDB 865664 D01, when the highest measured 1-g SAR within a frequency band is  $< 1.5$  W/kg and the measured 10-g SAR within a frequency band is  $< 3.75$  W/kg. The expanded SAR measurement uncertainty must be  $\leq 30\%$ , for a confidence interval of  $k = 2$ . If these conditions are met, extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval.

Therefore, the measurement uncertainty is not required.

6. Device Under Test (DUT) Information

6.1. DUT Description

|                         |                                                                                                                  |                       |
|-------------------------|------------------------------------------------------------------------------------------------------------------|-----------------------|
| Device Dimension        | Overall (Length x Width x Thickness): 57 mm x 52 mm x 15 mm<br>This is a an extremity wrist-worn wearable device |                       |
| Back Cover              | The Back Cover is not removable                                                                                  |                       |
| Battery Options         | The rechargeable battery is not user accessible.                                                                 |                       |
| Test sample information | S/N<br>477207650                                                                                                 | Notes<br>Radiated NFC |
| Hardware Version        | A04883                                                                                                           |                       |
| Software Version        | 408                                                                                                              |                       |

6.2. Wireless Technologies

| Wireless technologies | Frequency bands | Operating mode | Duty Cycle used for SAR testing |
|-----------------------|-----------------|----------------|---------------------------------|
| Bluetooth             | 2.4 GHz         | LE             | N/A <sup>2</sup>                |
| ANT/ANT+              | 2.4 GHz         | GFSK           | N/A <sup>2</sup>                |
| NFC                   | 13.56 MHz       | Type A/B       | 100% (Type A) <sup>1</sup>      |

Notes:

1. Duty cycle for NFC is referenced from §9.3
2. Measured Duty Cycle is not required due to SAR test exemption.

## 7. RF Exposure Conditions (Test Configurations)

Refer to “SAR Photos and Ant locations” Appendix for the specific details of the antenna-to-antenna and antenna-to-edge(s) distances.

| Wireless technologies | RF Exposure Conditions | DUT-to-User Separation | Test Position | Antenna-to-edge/surface | SAR Required | Note |
|-----------------------|------------------------|------------------------|---------------|-------------------------|--------------|------|
| Bluetooth LE          | Extremity              | 0                      | Back          | N/A                     | No           | 1    |
| ANT/ANT+              | Extremity              | 0                      | Back          | N/A                     | No           | 1    |
| NFC                   | Extremity              | 0                      | Back          | N/A                     | Yes          |      |

### Notes:

SAR is not required per KDB 447498 D01 §4.2.3

### SAR Test Exclusion Calculations for WLAN

#### Antennas < 50mm to adjacent edges

| Tx Interface | Frequency (MHz) | Output Power |    | Separation Distances (mm) | Calculated Threshold Value |
|--------------|-----------------|--------------|----|---------------------------|----------------------------|
|              |                 | dBm          | mW | Back                      | Back                       |
| Bluetooth LE | 2480            | 6.00         | 4  | 0                         | 1.3<br>-EXEMPT-            |
| ANT/ANT+     | 2480            | 6.00         | 4  | 0                         | 1.3<br>-EXEMPT-            |

### Note(s):

According to KDB 447498, if the calculated threshold value is >7.5 then SAR testing is required.

## 8. Dielectric Property Measurements & System Check

### 8.1. Dielectric Property Measurements

The temperature of the tissue-equivalent medium used during measurement must also be within 18°C to 25°C and within  $\pm 2^\circ\text{C}$  of the temperature when the tissue parameters are characterized.

The dielectric parameters must be measured before the tissue-equivalent medium is used in a series of SAR measurements. The parameters should be re-measured after each 3 – 4 days of use; or earlier if the dielectric parameters can become out of tolerance; for example, when the parameters are marginal at the beginning of the measurement series.

Tissue dielectric parameters were measured at the low, middle and high frequency of each operating frequency range of the test device.

The dielectric constant ( $\epsilon_r$ ) and conductivity ( $\sigma$ ) of typical tissue-equivalent media recipes are expected to be within  $\pm 5\%$  of the required target values; but for SAR measurement systems that have implemented the SAR error compensation algorithms documented in IEC/IEEE 62209-1528:2020, to automatically compensate the measured SAR results for deviations between the measured and required tissue dielectric parameters, the tolerance for  $\epsilon_r$  and  $\sigma$  may be relaxed to  $\pm 10\%$ . This is limited to frequencies  $\leq 3$  GHz.

#### Tissue Dielectric Parameters IEC/IEEE 62209-1528

Table 2 – Dielectric properties of the tissue-equivalent medium

| Frequency<br>MHz | Real part of the<br>complex relative<br>permittivity, $\epsilon'_r$ | Conductivity, $\sigma$<br>S/m | Penetration depth<br>(E-field), $\delta$<br>mm |
|------------------|---------------------------------------------------------------------|-------------------------------|------------------------------------------------|
| 4                | 55,0                                                                | 0,75                          | 293,0                                          |
| 13               | 55,0                                                                | 0,75                          | 165,5                                          |
| 30               | 55,0                                                                | 0,75                          | 112,8                                          |
| 150              | 52,3                                                                | 0,76                          | 62,0                                           |
| 300              | 46,3                                                                | 0,87                          | 46,1                                           |
| 450              | 43,5                                                                | 0,87                          | 43,0                                           |
| 750              | 41,9                                                                | 0,89                          | 39,8                                           |
| 835              | 41,5                                                                | 0,90                          | 39,0                                           |
| 900              | 41,5                                                                | 0,97                          | 36,2                                           |
| 1 450            | 40,5                                                                | 1,20                          | 28,6                                           |
| 1 800            | 40,0                                                                | 1,40                          | 24,3                                           |
| 1 900            | 40,0                                                                | 1,40                          | 24,3                                           |
| 1 950            | 40,0                                                                | 1,40                          | 24,3                                           |
| 2 000            | 40,0                                                                | 1,40                          | 24,3                                           |
| 2 100            | 39,8                                                                | 1,49                          | 22,8                                           |
| 2 450            | 39,2                                                                | 1,80                          | 18,7                                           |
| 2 600            | 39,0                                                                | 1,96                          | 17,2                                           |
| 3 000            | 38,5                                                                | 2,40                          | 14,0                                           |
| 3 500            | 37,9                                                                | 2,91                          | 11,4                                           |
| 4 000            | 37,4                                                                | 3,43                          | 10,0                                           |
| 4 500            | 36,8                                                                | 3,94                          | 9,7                                            |
| 5 000            | 36,2                                                                | 4,45                          | 1,5                                            |
| 5 200            | 36,0                                                                | 4,66                          | 8,4                                            |
| 5 400            | 35,8                                                                | 4,86                          | 8,1                                            |
| 5 600            | 35,5                                                                | 5,07                          | 7,5                                            |
| 5 800            | 35,3                                                                | 5,27                          | 7,3                                            |
| 6 000            | 35,1                                                                | 5,48                          | 7,0                                            |
| 6 500            | 34,5                                                                | 6,07                          | 6,7                                            |
| 7 000            | 33,9                                                                | 6,65                          | 6,4                                            |
| 7 500            | 33,3                                                                | 7,24                          | 6,1                                            |
| 8 000            | 32,7                                                                | 7,84                          | 5,9                                            |
| 8 500            | 32,1                                                                | 8,46                          | 5,3                                            |
| 9 000            | 31,6                                                                | 9,08                          | 4,8                                            |
| 9 500            | 31,0                                                                | 9,71                          | 4,4                                            |
| 10 000           | 30,4                                                                | 10,40                         | 4,0                                            |

NOTE: For convenience, permittivity and conductivity values are linearly interpolated for frequencies that are not a part of the original data from Drossos et al. [2]. They are shown in italics in Table 2. The italicized values are linearly interpolated (below 5800 MHz) or extrapolated (above 5800 MHz) from the non-italicized values that are immediately above and below these values.

Dielectric Property Measurements Results:

| SAR Lab | Date       | Tissue Type | Band (MHz) | Freq. (MHz) | Relative Permittivity ( $\epsilon_r$ ) |        |        | Conductivity ( $\sigma$ ) |        |        |
|---------|------------|-------------|------------|-------------|----------------------------------------|--------|--------|---------------------------|--------|--------|
|         |            |             |            |             | Measured                               | Target | Delta  | Measured                  | Target | Delta  |
| SAR 1A  | 2024-09-16 | Head        | 13         | 13          | 52.8                                   | 55.0   | -3.95% | 0.72                      | 0.75   | -4.48% |
|         |            |             |            | 12          | 52.8                                   | 55.0   | -3.96% | 0.72                      | 0.75   | -4.49% |
|         |            |             |            | 14          | 52.8                                   | 55.0   | -3.98% | 0.72                      | 0.75   | -4.47% |

## 8.2. System Check

SAR system verification is required to confirm measurement accuracy, according to the tissue dielectric media, probe calibration points and other system operating parameters required for measuring the SAR of a test device. The system verification must be performed for each frequency band and within the valid range of each probe calibration point required for testing the device. The same SAR probe(s) and tissue-equivalent media combinations used with each specific SAR system for system verification must be used for device testing. When multiple probe calibration points are required to cover substantially large transmission bands, independent system verifications are required for each probe calibration point. A system verification must be performed before each series of SAR measurements using the same probe calibration point and tissue-equivalent medium. Additional system verification should be considered according to the conditions of the tissue-equivalent medium and measured tissue dielectric parameters, typically every three to four days when the liquid parameters are re-measured or sooner when marginal liquid parameters are used at the beginning of a series of measurements.

### System Performance Check Measurement Conditions:

- The measurements were performed in the flat section of the TWIN SAM or ELI phantom, shell thickness:  $2.0 \pm 0.2$  mm (bottom plate) filled with Body or Head simulating liquid of the following parameters.
- The depth of tissue-equivalent liquid in a phantom must be  $\geq 15.0$  cm for SAR measurements  $\leq 3$  GHz and  $\geq 10.0$  cm for measurements  $> 3$  GHz.
- The DASY system with an E-Field Probe was used for the measurements.
- The dipole was mounted on the small tripod so that the dipole feed point was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10 mm (above 1 GHz) and 15 mm (below 1 GHz) from dipole center to the simulating liquid surface.
- The coarse grid with a grid spacing of 15 mm was aligned with the dipole.  
For 5 GHz band - The coarse grid with a grid spacing of 10 mm was aligned with the dipole.
- Special 7x7x7 (below 3 GHz) and/or 8x8x7 (above 3 GHz) fine cube was chosen for the cube.
- Distance between probe sensors and phantom surface was set to 3 mm.  
For 5 GHz band - Distance between probe sensors and phantom surface was set to 2.5 mm
- The dipole/CLA input power (forward power) was recorded.
- The results are normalized to 1 W input power.

System Check Results

The 1-g and 10-g SAR measured with a reference dipole, using the required tissue-equivalent medium at the test frequency, must be within  $\pm 10\%$  of the manufacturer calibrated dipole SAR target. Refer to Appendix B for the SAR System Check Plots.

| SAR Lab | Date       | Dipole Type & Serial Number | Dipole Cal. Due Date | Input Power (dBm) | Measured results for 1-g SAR |                  |                     |                  | Measured results for 10-g SAR |                  |                     |                  | Plot No. |
|---------|------------|-----------------------------|----------------------|-------------------|------------------------------|------------------|---------------------|------------------|-------------------------------|------------------|---------------------|------------------|----------|
|         |            |                             |                      |                   | Meas. Zoom Scan              | Normalize to 1 W | Target (Ref. Value) | Delta $\pm 10\%$ | Meas. Zoom Scan               | Normalize to 1 W | Target (Ref. Value) | Delta $\pm 10\%$ |          |
| 1A      | 2024-09-16 | CLA13 SN: 1017              | 2025-03-07           | 16.0              | 0.020                        | 0.502            | 0.548               | -8.33%           | 0.013                         | 0.327            | 0.342               | -4.52%           | 1        |

## 9. Conducted Output Power Measurements

### 9.1. Bluetooth LE

#### Maximum Output Power (Tune-up Limit) for Bluetooth LE

Maximum tune-up tolerance limit is 6 dBm. This power level qualifies for exclusion of SAR testing. Please refer to section 10.2. Standalone SAR Test Exclusion Considerations & Estimated SAR.

| Band              | Mode | Channel | Frequency (MHz) | Tune-up Power Limit (dBm) |
|-------------------|------|---------|-----------------|---------------------------|
| Bluetooth 2.4 GHz | LE   | 0       | 2402            | 6.0                       |
|                   |      | 19      | 2440            | 6.0                       |
|                   |      | 39      | 2480            | 6.0                       |

### 9.2. ANT/ANT+

#### Maximum Output Power (Tune-up Limit) for ANT/ANT+

Maximum tune-up tolerance limit is 6 dBm. This power level qualifies for exclusion of SAR testing. Please refer to section 10.2. Standalone SAR Test Exclusion Considerations & Estimated SAR.

| Band             | Mode | Frequency (MHz) | Tune-up Power Limit (dBm) |
|------------------|------|-----------------|---------------------------|
| ANT/ANT+ 2.4 GHz | GFSK | 2402            | 6.0                       |
|                  |      | 2440            | 6.0                       |
|                  |      | 2480            | 6.0                       |

9.3. NFC

Conducted output power cannot be measured for NFC, therefore a 2 dB scaling factor shall be used to account for potential variations between samples.

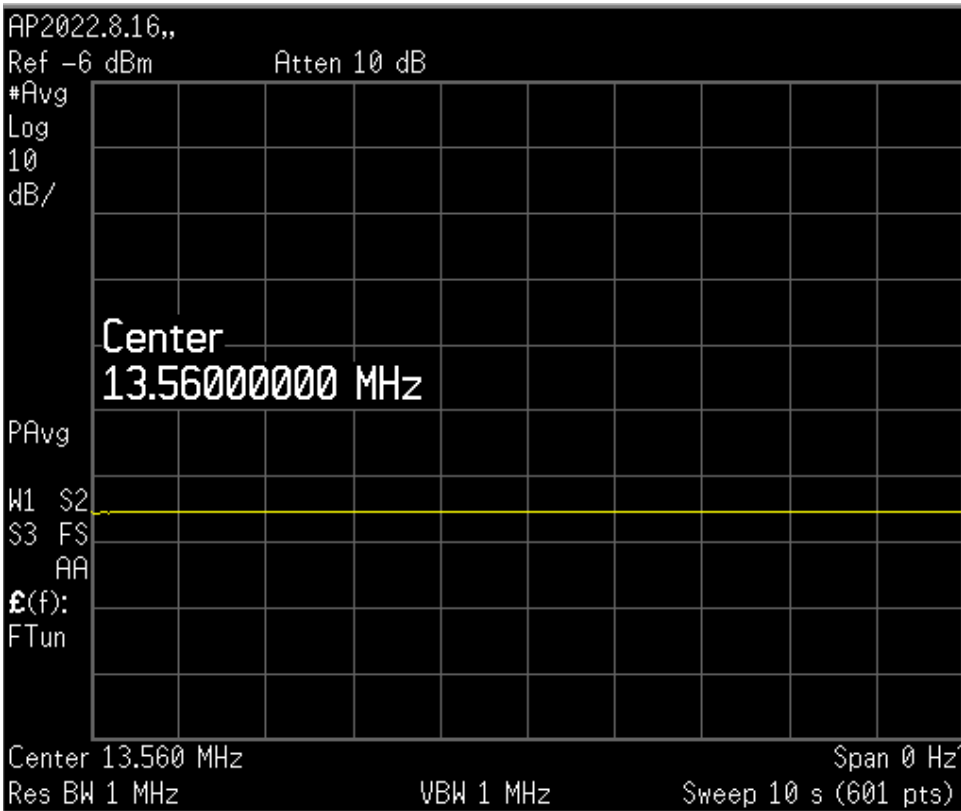
Duty Factor Measured Results

| Mode   | T on (ms) | Period (ms) | Duty Cycle | Crest Factor (1/duty cycle) |
|--------|-----------|-------------|------------|-----------------------------|
| Type A | 1.000     | 1.000       | 100.0%     | 1.00                        |

**Note(s):**  
Duty Cycle = (T on / period) \* 100%

Duty Cycle plots

Type A



## 10. Measured and Reported (Scaled) SAR Results

SAR Test Reduction criteria are as follows:

- Reported SAR(W/kg) for NFC = Measured SAR \* Tune-up scaling factor (2 dB)

### 10.1. NFC

| RF Exposure Conditions | Mode   | Dist. (mm) | Test Position | Freq. (MHz) | 10-g SAR (W/kg) |              | Plot No. |
|------------------------|--------|------------|---------------|-------------|-----------------|--------------|----------|
|                        |        |            |               |             | Meas.           | Scaled       |          |
| Extremity              | Type A | 0          | Back          | 13.56       | 0.000           | <b>0.000</b> | 1        |

#### Note(s):

Conducted output power measurements for NFC are not practical, therefore a 2 dB scaling factor shall be used to account for potential variations between samples.

### 10.2. Standalone SAR Test Exclusion Considerations & Estimated SAR

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances  $\leq 50$  mm are determined by:

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$ , for 1-g SAR and  $\leq 7.5$  for 10-g extremity SAR, where

- $f_{(\text{GHz})}$  is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison

The test exclusions are applicable only when the minimum test separation distance is  $\leq 50$  mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is  $< 5$  mm, a distance of 5 mm is applied to determine SAR test exclusion.

When the standalone SAR test exclusion is applied to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion:

- $(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm}) \cdot [\sqrt{f_{(\text{GHz})}}/x]$  W/kg for test separation distances  $\leq 50$  mm; where  $x = 7.5$  for 1-g SAR, and  $x = 18.75$  for 10-g SAR.
- 0.4 W/kg for 1-g SAR and 1.0 W/kg for 10-g SAR, when the test separation distances is  $> 50$  mm.

| RF Air interface | RF Exposure Conditions | Frequency (GHz) | Max. tune-up tolerance Power |      | Min. test separation distance (mm) | SAR test exclusion Result* | Estimated 10-g SAR (W/kg) |
|------------------|------------------------|-----------------|------------------------------|------|------------------------------------|----------------------------|---------------------------|
|                  |                        |                 | (dBm)                        | (mW) |                                    |                            |                           |
| Bluetooth LE     | Extremity              | 2.480           | 6.0                          | 4    | 5                                  | 1.3                        | <b>0.067</b>              |
| ANT/ANT+         | Extremity              | 2.480           | 6.0                          | 4    | 5                                  | 1.3                        | <b>0.067</b>              |

#### Conclusion:

\*: The computed value is  $\leq 7.5$ ; therefore, this qualifies for Standalone SAR test exclusion.

## 11. Simultaneous Transmission Conditions

| RF Exposure Condition | Item | Capable Transmit Configurations |       |
|-----------------------|------|---------------------------------|-------|
| Extremity             | 1    | DSS                             | + DXX |

### 11.1. Simultaneous transmission SAR test exclusion considerations

KDB 447498 D01 General RF Exposure Guidance provides two procedures for determining simultaneous transmission SAR test exclusion: Sum of SAR and SAR to Peak Location Ratio (SPLSR)

#### Sum of SAR

To qualify for simultaneous transmission SAR test exclusion based upon Sum of SAR the sum of the reported standalone SARs for all simultaneously transmitting antennas shall be below the applicable standalone SAR limit. If the sum of the SARs is above the applicable limit then simultaneous transmission SAR test exclusion may still apply if the requirements of the SAR to Peak Location Ratio (SPLSR) evaluation are met.

### 11.2. Estimated SAR for Simultaneous Transmission SAR Analysis

#### Considerations for SAR estimation

- When standalone SAR test exclusion applies, standalone SAR must also be estimated to determine simultaneous transmission SAR test exclusion.
- Dedicated Host Approach criteria for SAR test exclusion is likewise applied to SAR estimation, with certain distinctions between test exclusion and SAR estimation:
  - When the separation distance from the antenna to an adjacent edge is  $\leq 5$  mm, a distance of 5 mm is applied for SAR estimation; this is the same between test exclusion and SAR estimation calculations.
  - When the separation distance from the antenna to an adjacent edge is  $> 5$  mm but  $\leq 50$  mm, the actual antenna-to-edge separation distance is applied for SAR estimation.
  - When the minimum test separation distance is  $> 50$  mm, the estimated SAR value is 0.4 W/kg
- Please refer to [Estimated SAR Tables](#) to see which test positions are inherently compliant as they consist of only estimated SAR values for all applicable transmitters and consequently will always have sum of SAR values  $< 1.2$  W/kg. Simultaneous transmission SAR analysis was therefore not performed for these test positions.

#### Estimated SAR for Bluetooth LE:

| RF Air interface | RF Exposure Conditions | Frequency (GHz) | Max. tune-up tolerance Power |      | Min. test separation distance (mm) | Estimated 10-g SAR (W/kg) |
|------------------|------------------------|-----------------|------------------------------|------|------------------------------------|---------------------------|
|                  |                        |                 | (dBm)                        | (mW) |                                    |                           |
| Bluetooth LE     | Extremity              | 2.480           | 6.0                          | 4    | 5                                  | 0.067                     |

#### Estimated SAR for Bluetooth LE:

| RF Air interface | RF Exposure Conditions | Frequency (GHz) | Max. tune-up tolerance Power |      | Min. test separation distance (mm) | Estimated 10-g SAR (W/kg) |
|------------------|------------------------|-----------------|------------------------------|------|------------------------------------|---------------------------|
|                  |                        |                 | (dBm)                        | (mW) |                                    |                           |
| ANT/ANT+         | Extremity              | 2.480           | 6.0                          | 4    | 5                                  | 0.067                     |

11.3. Sum of SAR for DSS & DXX

| RF Exposure conditions | Test Position | Standalone SAR (W/kg) |          |       | $\Sigma$ 1-g SAR (W/kg) |       |
|------------------------|---------------|-----------------------|----------|-------|-------------------------|-------|
|                        |               | 1                     | 2        | 2     | 1+3                     | 2+3   |
|                        |               | Bluetooth LE          | ANT/ANT+ | NFC   |                         |       |
| Extremity              | Back          | 0.067                 | 0.067    | 0.000 | 0.067                   | 0.067 |

## **Appendixes**

**Refer to separated files for the following appendixes.**

**Appendix A: SAR Setup Photos**

**Appendix B: SAR System Check Plots**

**Appendix C: SAR Highest Test Plots**

**Appendix D: SAR Tissue Ingredients**

**Appendix E: SAR Probe Certificates**

**Appendix F: SAR CLA Certificate**

**END OF REPORT**