# TEST REPORT

## Test Report No. : UL-RPT-RP14370604-116A

| | | |
|---|---|---|
| **Manufacturer** | : | Sound Devices LLC |
| **Model No.** | : | 9295W with 28255.000 Antenna |
| **FCC ID** | : | 2AKLX-9295W |
| **Test Standard(s)** | : | Antenna Gain Measurement<br>(Derived from FCC Part 15.247(b)(3)) |

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2. The results in this report apply only to the sample(s) tested.
3. The sample tested is in compliance with the above standard(s).
4. The test results in this report are traceable to the national or international standards.
5. Version 2.0 supersedes all previous versions.

**Date of Issue:** 02 November 2022

**Checked by:**

Ben Mercer
Lead Project Engineer, Radio Laboratory

**Company Signatory:**

Sarah Williams
RF Operations Leader, Radio Laboratory

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**UL International (UK) Ltd**

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## Customer Information

| | |
|---|---|
| **Company Name:** | Sound Devices LLC |
| **Address:** | PO Box 576,<br>E7556 State Rd 23-33,<br>Reedsburg,<br>WI 53959,<br>United States |

## Report Revision History

| Version Number | Issue Date | Revision Details | Revised By |
|---|---|---|---|
| 1.0 | 27/10/2022 | Initial Version | Ben Mercer |
| 2.0 | 02/11/2022 | Implemented TCB feedback | Ben Mercer |

# Table of Contents

# 1. Attestation of Test Results

## 1.1. Description of EUT

The Equipment Under Test was a professional (body-worn) miniature microphone transmitter operating in the 902 MHz to 928 MHz frequency band including a ¼ wavelength whip antenna.

## 1.2. General Information

| | |
|---|---|
| **Specification Reference:** | 47CFR15.247 |
| **Specification Title:** | Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Intentional Radiators) – Section 15.247 |
| **Site Registration:** | 685609 |
| **Lab. Designation No.:** | UK2011 |
| **Location of Testing:** | Unit 3 Horizon, Wade Road, Kingsland Business Park, Basingstoke, Hampshire, G24 8AH, United Kingdom |
| **Test Dates:** | 14 October 2022 to 21 October 2022 |

## 1.3. Summary of Test Results

| FCC Reference (47CFR) | Measurement |
|---|---|
| Part 15.247(b)(3) / ANSI C63.10 Annex G | Antenna Gain |

**Results:**

| Frequency (MHz) | Conducted Output Power (dBm) | Radiated Output Power (dBm) | Antenna Gain (dBd) | Antenna Gain (dBi) |
|---|---|---|---|---|
| 902.400 | 27.47 | 28.79 | 1.32 | 3.47 |
| 915.000 | 27.41 | 27.43 | 0.02 | 2.17 |
| 927.600 | 27.70 | 28.09 | 0.39 | 2.54 |

**Notes:**

1. Antenna gain in dBd was calculated in accordance with ANSI C63.10 G.3:

$$ERP = P_T + G_T - L_C$$

Rearranged to: $G_T = ERP + L_C - P_T$

LC is ignored since there is no cable connected between transmitter and antenna.

2. Antenna gain in dBi was calculated in accordance with ANSI C63.10 G.4:

$$G_T(dBd) = G_T(dBi) – 2.15\ dB$$

Rearranged to: $G_T(dBi) = G_T(dBd) + 2.15\ dB$

## 1.4. Deviations from the Test Specification

For the measurements contained within this test report, there were no deviations from, additions to, or exclusions from the test specification identified above.

# 2. Summary of Testing

## 2.1. Facilities and Accreditation

The test site and measurement facilities used to collect data are located at Unit 3 Horizon, Wade Road, Kingsland Business Park, Basingstoke, Hampshire, RG24 8AH, United Kingdom. The following table identifies which facilities were utilised for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

| | |
|---|---|
| Site 1 | |
| Site 2 | |
| Site 17 | X |

UL International (UK) Ltd is accredited by UKAS. The tests reported herein have been performed in accordance with its terms of accreditation.

## 2.2. Methods and Procedures

| | |
|---|---|
| **Reference:** | ANSI C63.10-2013 |
| **Title:** | American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices |
| **Reference:** | KDB 558074 D01 15.247 Meas Guidance v05r02, April 2, 2019 |
| **Title:** | Guidance for Compliance Measurements on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid System Devices Operating Under Section 15.247 of the FCC Rules |

## 2.3. Measurement Uncertainty & Decision Rule

### Overview

No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently the result of a measurement is only an approximation to the value of the measurand (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

### Decision Rule

The decision rule applied is based upon the accuracy method criteria. The measurement uncertainty is met and the result is considered in conformance with the requirement criteria if the observed value is within the prescribed limit.

### Measurement Uncertainty

The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor such that a confidence level of approximately 95% is maintained. For the purposes of this document “approximately” is interpreted as meaning “effectively” or “for most practical purposes”.

| Measurement Type | Range | Confidence Level (%) | Calculated Uncertainty |
|---|---|---|---|
| Maximum Peak Output Power (Conducted) | 902 MHz to 928 MHz | 95% | ±1.13 dB |
| Maximum Peak Output Power (Radiated) | 902 MHz to 928 MHz | 95% | ±3.3 dB |

The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty the published guidance of the appropriate accreditation body is followed.

## 2.4. Test and Measurement Equipment

### Test Equipment Used for Conducted Tests

| Asset No. | Instrument | Manufacturer | Type No. | Serial No. | Date Calibration Due | Cal. Interval (Months) |
|---|---|---|---|---|---|---|
| M2003 | Thermohygrometer | Testo | 608-H1 | 45046641 | 09 Dec 2022 | 12 |
| M1874 | Test Receiver | Rhode & Schwarz | ESU26 | 100553 | 09 May 2023 | 12 |
| G217350 | Vector Signal Generator | Rhode & Schwarz | SMM100A | 101777 | 04 Apr 2025 | 36 |
| A2946 | Attenuator | AtlanTecRF | AN18W5-20 | 208146#1 | Calibrated Before use | - |

### Test Equipment Used for Transmitter Radiated Emissions Tests

| Asset No. | Instrument | Manufacturer | Type No. | Serial No. | Date Calibration Due | Cal. Interval (Months) |
|---|---|---|---|---|---|---|
| K0017 | 3m RSE Chamber | Rainford | N/A | N/A | 26 Oct 2022 | 12 |
| M2003 | Thermohygrometer | Testo | 608-H1 | 45046641 | 09 Dec 2022 | 12 |
| M1874 | Test Receiver | Rhode & Schwarz | ESU26 | 100553 | 09 May 2023 | 12 |
| A3167 | Pre Amplifier | Com Power | PAM-103 | 18020010 | 20 Oct 2022 | 12 |
| A2916 | Attenuator | AtlanTecRF | AN18W5-10 | 832827#2 | 26 Jan 2023 | 12 |
| A3161 | Antenna | Chase | CBL6111D | 50859 | 03 May 2023 | 12 |

# 3. Equipment Under Test (EUT)

## 3.1. Identification of Equipment Under Test (EUT)

| | |
|---|---|
| **Brand Name:** | A20-MINI |
| **Model Name or Number:** | 9295W with 28255.000 |
| **Test Sample Serial Number:** | GE9922164002 |
| **Hardware Version:** | 5 |
| **Firmware Version:** | 7.00.6158 |
| **FCC ID:** | 2AKLX-9295W |

## 3.2. Modifications Incorporated in the EUT

No modifications were applied to the EUT during testing.

## 3.3. Additional Information Related to Testing

| | | |
|---|---|---|
| **Tested Technology:** | Short Range Device (Digital Transmission System) | |
| **Power Supply Requirement:** | Nominal | 3.6 VDC |
| **Type of Unit:** | Transceiver | |
| **Modulation:** | COFDM | |
| **Data Rate** | 1.339 Mbps | |
| **Transmit Frequency Range:** | 902 MHz to 928 MHz | |
| **Transmit Channels Tested:** | **Channel ID** | **Channel Frequency (MHz)** |
| | Bottom | 902.400 |
| | Middle | 915.000 |
| | Top | 927.600 |

## 3.4. Description of Available Antennas

The radio utilizes an external whip antenna with the maximum measured gain stated below. The measured conducted peak output power was subtracted from the measured peak ERP to obtain the antenna gain in dBd. The gain in dBi was calculated by adding 2.15 dB.

| Antenna Type | Model Number | Frequency Range (MHz) | Antenna Gain (dBd) | Antenna Gain (dBi) |
|---|---|---|---|---|
| ¼ Wavelength Whip | 28255.000 | 902.400 | 1.32 | 3.47 |
| | | 915.000 | 0.02 | 2.17 |
| | | 927.600 | 0.39 | 2.54 |

## 3.5. Description of Test Setup

### Support Equipment

The following support equipment was used to exercise the EUT during testing:

| | |
|---|---|
| **Description:** | Laptop PC |
| **Brand Name:** | HP |
| **Model Name or Number:** | Spectre Pro x360 |
| **Serial Number:** | 5CD6218MQ8 |

| | |
|---|---|
| **Description:** | Laptop PC |
| **Brand Name:** | Dell |
| **Model Name or Number:** | Precision M6800 |
| **Serial Number:** | 86BSM12 |

| | |
|---|---|
| **Description:** | Lavaliere Microphone |
| **Brand Name:** | Not marked or stated |
| **Model Name or Number:** | VT506WA-1934 |
| **Serial Number:** | Not marked or stated |

| | |
|---|---|
| **Description:** | USB-TTL Interface Cable |
| **Brand Name:** | Not marked or stated |
| **Model Name or Number:** | Not marked or stated |
| **Serial Number:** | Not marked or stated |

### Operating Modes

The EUT was tested in the following operating mode(s):

- Continuously transmitting at maximum power with a modulated carrier on bottom, middle and top channels as required.

### Configuration and Peripherals

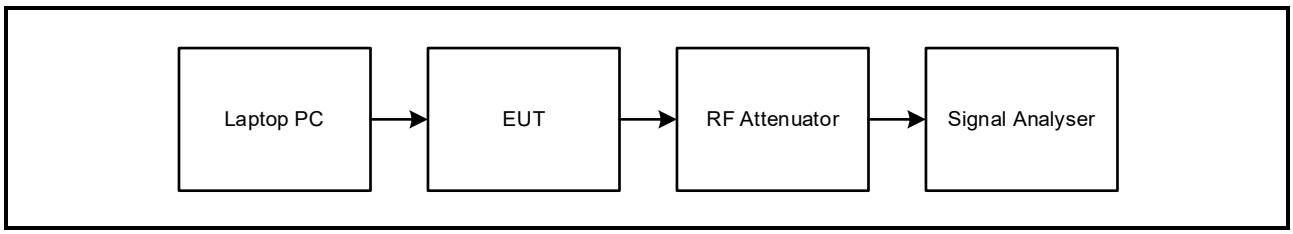
The EUT was tested in the following configuration(s):

- Controlled in test mode using a software application on the laptop PC supplied by the customer. The application was used to enable a continuous transmission and to select the test channels as required. The customer supplied a document containing the setup instructions ‘Set-Up_Instructions_v5.5.pdf. The laptop PC was connected to the EUT via USB-C cable.
- The power setting was set to 40 mW.
- Radiated peak output power tests were performed with the EUT in all 3 orientations. A lavaliere microphone was connected to the EUT.
- The EUT was powered from 3 x 1.5 V AAA alkaline batteries.
- The external whip antenna was removed to enable conducted measurements.

## Test Setup Diagrams

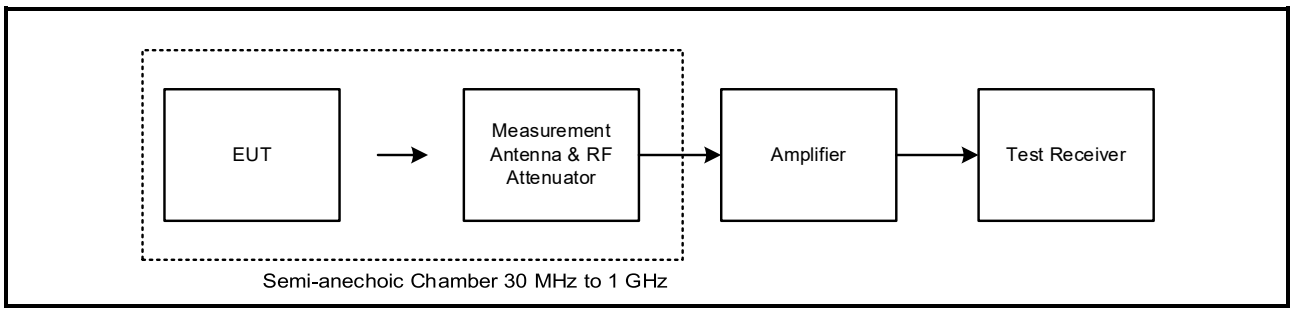
## Conducted Tests:

### Test Setup for Transmitter Conducted Peak Output Power




## Radiated Tests:

### Test Setup for Transmitter Radiated Peak Output Power



# 4. Test Results

## 4.1. Transmitter Maximum Peak Output Power (Conducted)

### Test Summary:

| | | | |
|---|---|---|---|
| **Test Engineer:** | Jose Bayona | **Test Date:** | 21 October 2022 |
| **Test Sample Serial Number:** | GE9922164002 | | |

| | |
|---|---|
| **FCC Reference:** | Part 15.247(b)(3) |
| **Test Method Used:** | FCC KDB 558074 Section 8.3.1.1 referencing<br>ANSI C63.10 Section 6.5 & 11.9.1.1 |

### Environmental Conditions:

| | |
|---|---|
| **Temperature (°C):** | 23 |
| **Relative Humidity (%):** | 43 |

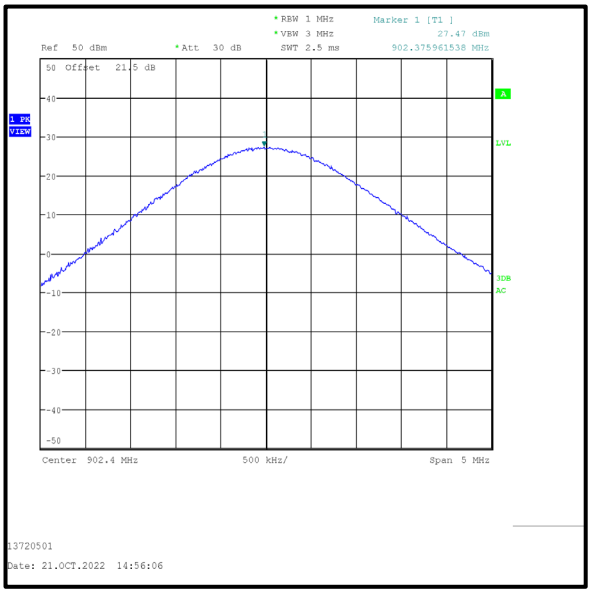
### Note(s):

1. Conducted power tests were performed using a signal analyser in accordance with ANSI C63.10 Section 11.9.1.1 with the RBW ≥ DTS bandwidth procedure.
2. The signal analyser resolution bandwidth was set to 1 MHz and video bandwidth of 3 MHz. A peak detector was used, sweep time was set to auto and trace mode was Max Hold. The span was set to 5 MHz. A marker was placed at the peak of the signal and the results recorded in the tables below.
3. The signal analyser was connected to the RF port on the EUT using suitable attenuation and RF cable. An RF level offset was entered on the signal analyser to compensate for the loss of the attenuator and RF cable.

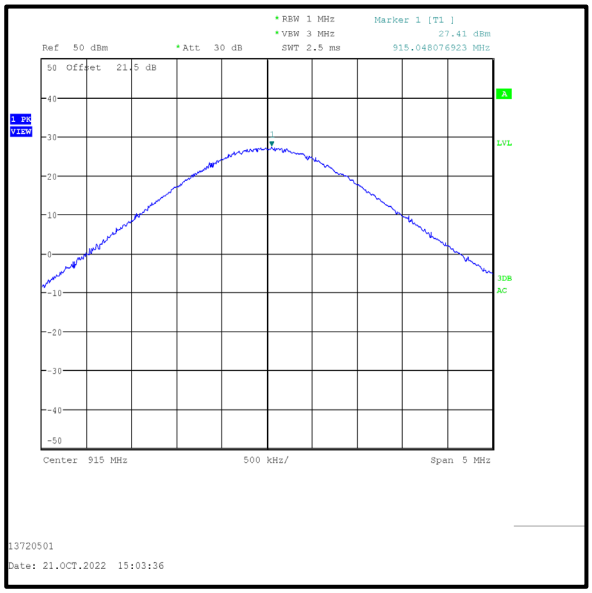
## Transmitter Maximum Peak Output Power (Conducted) (continued)

## Results:

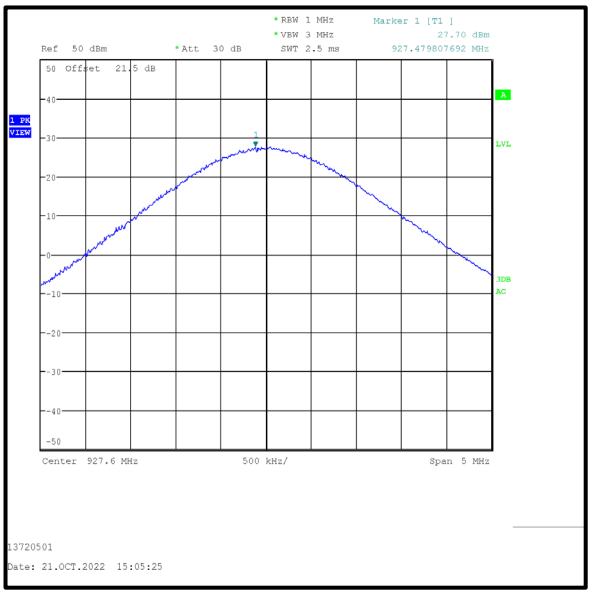
| Channel | Conducted Peak Power (dBm) |
|---|---|
| Bottom | 27.47 |
| Middle | 27.41 |
| Top | 27.70 |




**Bottom Channel**




**Middle Channel**




**Top Channel**

## 4.2. Transmitter Maximum Peak Output Power (Radiated)

### Test Summary:

| | | | |
|---|---|---|---|
| **Test Engineer:** | Jose Bayona | **Test Date:** | 14 October 2022 |
| **Test Sample Serial Number:** | GE9922164002 | | |

| | |
|---|---|
| **FCC Reference:** | Part 15.247(b)(3) |
| **Test Method Used:** | FCC KDB 558074 Section 8.3.1.1 referencing<br>ANSI C63.10 Section 6.5 & 11.9.1.1 |

### Environmental Conditions:

| | |
|---|---|
| **Temperature (°C):** | 23 |
| **Relative Humidity (%):** | 50 |

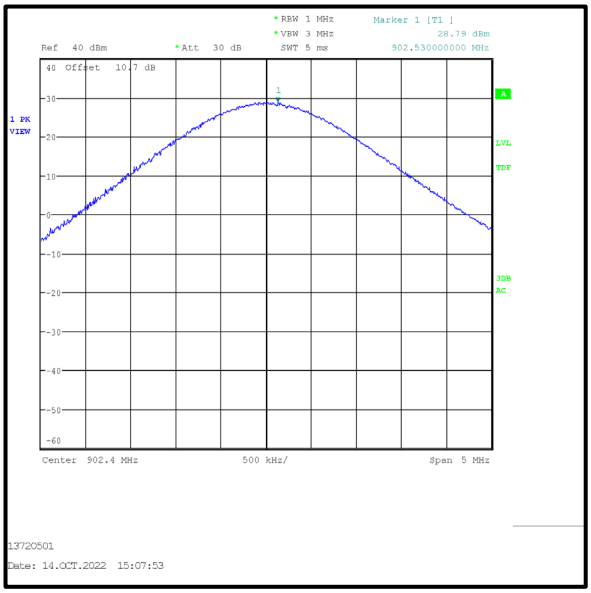
### Note(s):

1. Radiated power tests were performed using a signal analyser in accordance with ANSI C63.10 Section 11.9.1.1 with the RBW ≥ DTS bandwidth procedure.
2. The signal analyser resolution bandwidth was set to 1 MHz and video bandwidth of 3 MHz. A peak detector was used, sweep time was set to auto and trace mode was Max Hold. The span was set to 5 MHz. A marker was placed at the peak of the signal and the results recorded in the tables below.

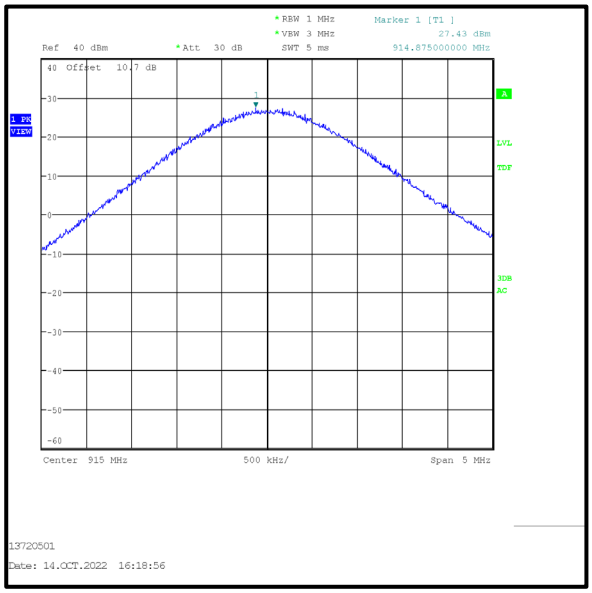
## Transmitter Maximum Peak Output Power (Radiated) (continued)

## Results:

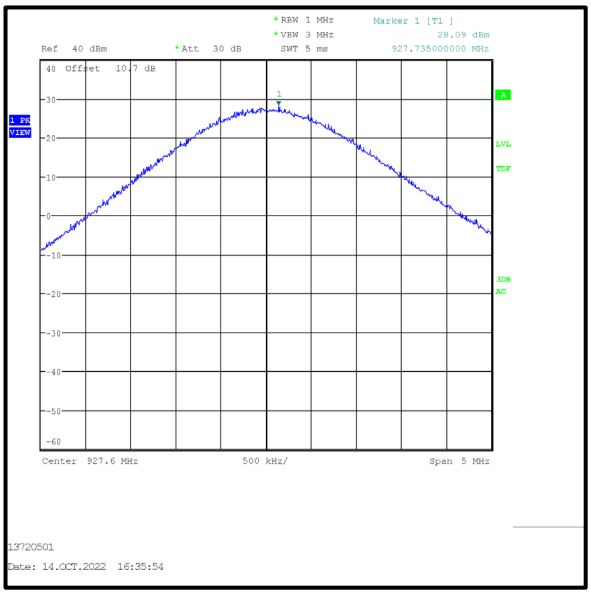
| Channel | Radiated Peak Power (dBm) |
|---|---|
| Bottom | 28.79 |
| Middle | 27.43 |
| Top | 28.09 |




**Bottom Channel**




**Middle Channel**




**Top Channel**

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