| Engineering Test Report No. 2301324-01 Rev. A | | |
|---|---|---|
| Report Date | November 15, 2023 | |
| Manufacturer Name | Snap Diagnostics LLC | |
| Manufacturer Address | 616 Atrium Drive, Ste. 100<br>Vernon Hills, IL 60061 | |
| Test Item Name<br>Model No. | Snap Diagnostics Sleep Apnea Monitor<br>910000 | |
| Date Received | September 18, 2023 | |
| Test Dates | September 18 – 20 and October 6 – 9, 2023 | |
| Specifications | FCC “Code of Federal Regulations” Title 47, Part 15, Subpart B<br>FCC "Code of Federal Regulations" Title 47 Part 15, Subpart C, Section 15.247<br>Innovation, Science, and Economic Development Canada, RSS-GEN<br>Innovation, Science, and Economic Development Canada, RSS-247 | |
| Test Facility | Elite Electronic Engineering, Inc.<br>1516 Centre Circle,<br>Downers Grove, IL 60515 | FCC Reg. Number: 269750<br>IC Reg. Number: 2987A<br>CAB Identifier: US0107 |
| Signature | Nathaniel Bouchie | Tylar Jozefczyk |
| Tested by | Nathaniel Bouchie | Tylar Jozefczyk |
| Signature | Raymond J Klouda | |
| Approved by | Raymond J. Klouda,<br>Registered Professional Engineer of Illinois – 44894 | |
| PO Number | 3947 | |



Elite Electronic Engineering Incorporated certifies that the information contained in this report was obtained under conditions which meet or exceed those specified in the FCC "Code of Federal Regulations" Title 47 Part 15, Subpart C, Section 15.247 and Innovation, Science, and Economic Development Canada, RSS-247 test specifications. The data presented in this test report pertains to the EUT on the test dates specified. Any electrical or mechanical modifications made to the EUT subsequent to the specified test date will serve to invalidate the data and void this certification. This report must not be used to claim product certification, approval, or endorsement by A2LA, NIST, or any agency of the Federal Government.

## Table of Contents

# 1. Report Revision History

| Revision | Date | Description |
|---|---|---|
| – | 16 NOV 2023 | Initial Release of Engineering Test Report No. 2301324-01 Rev. A |
| A | 30 NOV 2023 by TMJ | - Throughout report: Engineering Test Report Number updated from 2301324-01 to 2301324-01 Rev. A.<br>- Throughout report: Updated manufacturer name from Garrett Technologies, Inc to Snap Diagnostics LLC.<br>- Page 1: Address updated from “1955 Techny Rd, Ste One, Northbrook, IL 60062” to 616 Atrium Drive, Ste. 100, Vernon Hills, IL 60061”.<br>- Section 2.1: Replaced Northbrook with Vernon Hills. |

# 2. Introduction

## 2.1. Scope of Tests

This document presents the results of a series of RF emissions tests that were performed on the Snap Diagnostics LLC Snap Diagnostics Sleep Apnea Monitor (hereinafter referred to as the Equipment Under Test (EUT)). The EUT was manufactured and submitted for testing by Snap Diagnostics LLC located in Vernon Hills, IL.

## 2.2. Purpose

The test series was performed to determine if the EUT meets the RF emission requirements of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart C, §15.247 for a Digital Modulation intentional radiator operating within the 2400 – 2483.5MHz band.

The test series was also performed to determine if the EUT meets the RF emission requirements of the Innovation, Science, and Economic Development Canada Radio Standards Specification RSS-Gen and Radio Standards Specification RSS-247 for a Digital Modulation intentional radiator operating within the 2400 – 2483.5MHz band.

Testing was performed in accordance with ANSI C63.10-2013.

## 2.3. Identification of the EUT

The EUT was identified as follows and used throughout the test series:

| EUT Identification | |
|---|---|
| Product Description | Snap Diagnostics Sleep Apnea Monitor |
| Model/Part No. | 910000 |
| Serial No. | DV1-02 |
| Size of EUT | 4cm x 14cm |
| Software/Firmware Version | 99.01.16 |
| Device Type | Digitally Modulated Transmission Device |
| Band of Operation | 2400 – 2483.5MHz |
| Modulation Type | Bluetooth |
| Antenna Type | Chip |
| Antenna Gain (dBi) [1] | 0.5 |
| Max EIRP | 0.91mW (-0.39dBm) |
| Rated Output Power | 0dBm |
| 6dB Bandwidth | 1.18MHz |
| Occupied Bandwidth (99% CBW) | 2.09MHz |
| Emission Classification | 2M09F1D |

# 3. Power Input

The EUT was powered by 3.8VDC from an internal rechargeable battery. When the EUT was charging, it was powered by 120VAC 60Hz from a USB-C power adapter.

# 4. Grounding

The EUT was not connected to ground.

# 5. Support Equipment

No support equipment was used during the tests.

# 6. Interconnect Leads

No interconnect leads were used during the tests.

## 7. Modifications Made to the EUT

No modifications were made to the EUT during the testing.

## 8. Modes of Operation

The EUT and all peripheral equipment were energized. The unit was programmed to transmit in one of the following modes:

| Mode | Description |
|---|---|
| Charging + BLE Tx | The EUT was powered on and connected to the charger. The EUT was then set to transmit at 2402MHz. |
| Tx | The EUT was powered on and set to transmit at one of the following frequencies:<br>- 2402MHz<br>- 2462MHz<br>- 2480MHz |

## 9. Test Specifications

The tests were performed to selected portions of, and in accordance with, the test specifications.

- Federal Communications Commission "Code of Federal Regulations", Title 47, Chapter I, Subchapter A, Part 15, Subpart C – “Intentional Radiators”
- ANSI C63.4-2014 – "American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz"
- ANSI C63.10-2013 – "American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices”
- KDB 558074 D01 v05r02, April 2, 2019 – “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”
- Radio Standard Specification RSS-Gen Issue 5, February 2021, Amendment 2 – “General Requirements for Compliance of Radio Apparatus”
- RSS-247 Issue 3, August 2023 – “Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and License-Exempt Local Area Network (LE-LAN) Devices”

## 10. Test Plan

No test plan was provided. Instructions were provided by personnel from Snap Diagnostics LLC and used in conjunction with the FCC "Code of Federal Regulations" Title 47 Part 15, Subpart C, Section 15.247, Innovation, Science, and Economic Development Canada, RSS-247, ANSI C63.4-2014 , and ANSI C63.10-2013 specifications.

## 11. Deviation, Additions to, or Exclusions from Test Specifications

There were no deviations, additions to, or exclusions from the test specifications during this test series.

## 12. Laboratory Conditions

The ambient parameters of the laboratory during testing were as follows:

| Ambient Parameters | Value |
|---|---|
| Temperature | 22.9°C |
| Relative Humidity | 45% |
| Atmospheric Pressure | 982.05mb |

## 13. Summary

The following EMC tests were performed and the results are shown below:

| Test Description | Requirements | Test Method | Results |
|---|---|---|---|
| Transmitter Conducted Emissions (AC Mains) | FCC 15.107<br>RSS-GEN | ANSI C63.10:2013 | Conforms |
| 6dB Bandwidth | FCC 15.247<br>RSS-247 | ANSI C63.10:2013 | Conforms |
| Occupied Bandwidth (99%) | FCC 15.247<br>RSS-247 | ANSI C63.10:2013 | Conforms |
| Effective Isotropic Radiated Power (EIRP) | FCC 15.247<br>RSS-247 | ANSI C63.10:2013 | Conforms |
| Case Spurious Radiated Emissions | FCC 15.247<br>RSS-247 | ANSI C63.10:2013 | Conforms |
| Band-Edge Compliance | FCC 15.247<br>RSS-247 | ANSI C63.10:2013 | Conforms |
| Power Spectral Density | FCC 15.247<br>RSS-247 | ANSI C63.10:2013 | Conforms |
| Note 1: Per the FCC "Code of Federal Regulations" Title 47, Subchapter A, Part 15, Subpart B, Section 15.101(b), receivers operating above 960MHz are exempt from complying with the technical provisions of §15.5. | | | |

## 14. Sample Calculations

For Powerline Conducted Emissions:

The resultant voltage level (VL) is a summation in decibels (dB) of the receiver meter reading (MTR) and the cable loss factor (CF).

Formula 1: VL (dBµV) = MTR (dBµV) + CF (dB).

For Radiated Emissions:

The resultant field strength (FS) is a summation in decibels (dB) of the receiver meter reading (MTR), the antenna correction factor (AF), and the cable loss factor (CF). If an external preamplifier is used, the total is reduced by its gain (-PA). If a distance correction (DC) is required, it is added to the total.

Formula 1: FS (dBµV/m) = MTR (dBµV) + AF (dB/m) + CF (dB) + (- PA (dB)) + DC (dB)

To convert the Field Strength dBµV/m term to µV/m, the dBµV/m is first divided by 20. The Base 10 AntiLog is taken of this quotient. The result is the Field Strength value in µV/m terms.

Formula 2: FS (µV/m) = AntiLog [(FS (dBµV/m))/20]

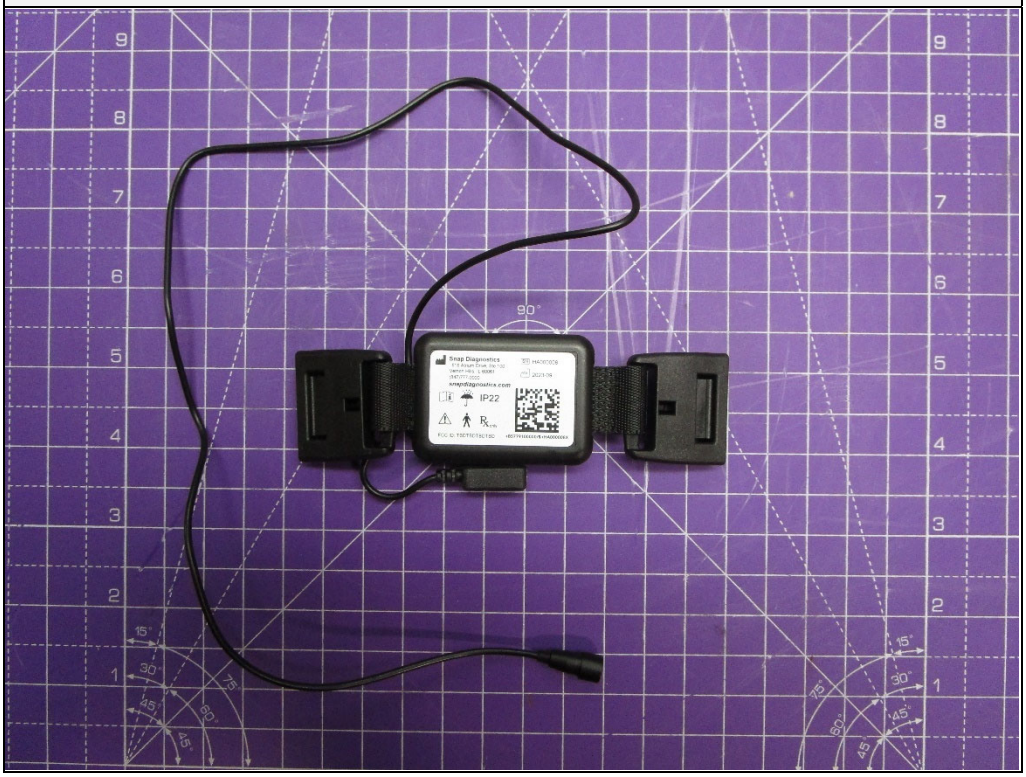
## 15. Statement of Conformity

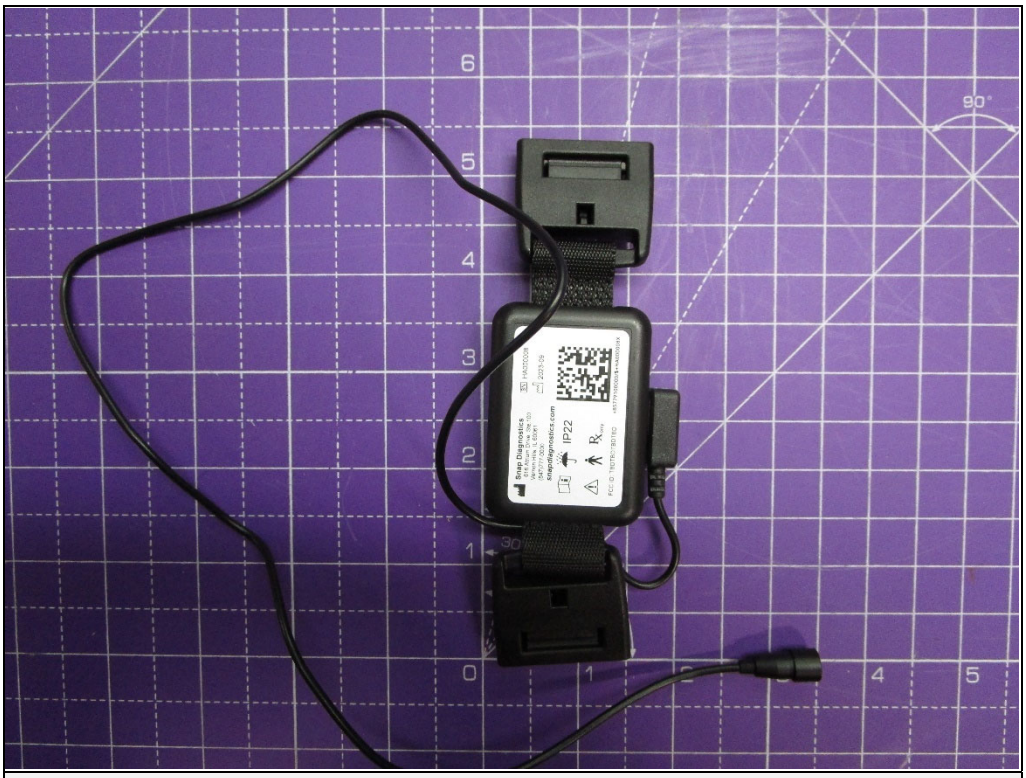
The Snap Diagnostics LLC Snap Diagnostics Sleep Apnea Monitor (Model No. 910000, Serial No. DV1-02) did fully conform to the selected requirements of FCC "Code of Federal Regulations" Title 47 Part 15, Subpart C, Section 15.247 and Innovation, Science, and Economic Development Canada, RSS-247.

## 16. Certification

Elite Electronic Engineering Incorporated certifies that the information contained in this report was obtained under conditions which meet or exceed those specified in the FCC "Code of Federal Regulations" Title 47 Part 15, Subpart C, Section 15.247 and Innovation, Science, and Economic Development Canada, RSS-247 test specifications. The data presented in this test report pertains to the EUT on the test date specified. Any electrical or mechanical modifications made to the EUT subsequent to the specified test date will serve to invalidate the data and void this certification.

## 17. Photographs of EUT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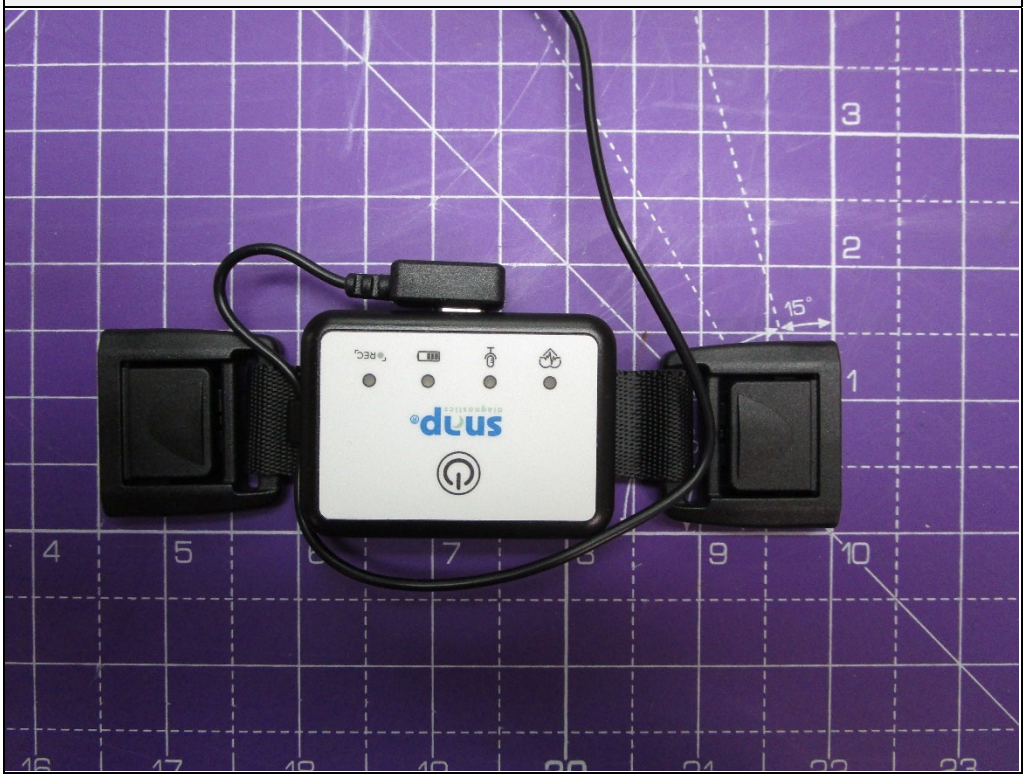
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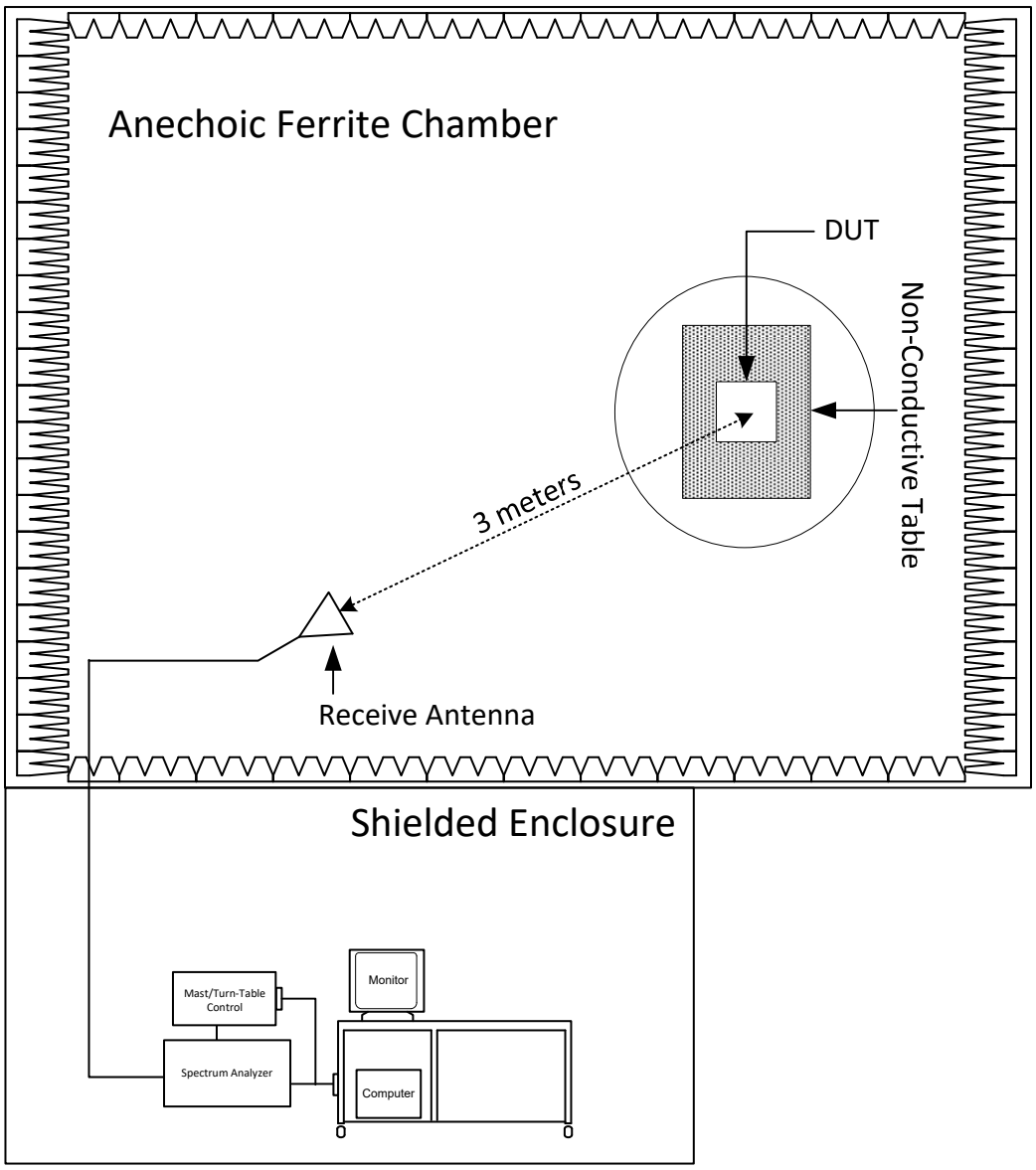
## 18. Equipment List

| Eq ID | Equipment Description | Manufacturer | Model No. | Serial No. | Frequency Range | Cal Date | Due Date |
|---|---|---|---|---|---|---|---|
| APW3 | PREAMPLIFIER | PLANAR ELECTRONICS | PE2-35-120-5R0-10-12 | PL2924 | 1GHZ-20GHZ | 3/10/2023 | 3/10/2024 |
| CDX9 | COMPUTER | ELITE | WORKSTATION | | | N/A | |
| CDZ4 | LAB WORKSTATION | ELITE | LWS-10 | | WINDOWS 10 | CNR | |
| GRB0 | 1MHZ, LISN SIGNAL CHECKER | ELITE | LISNCHKR1M | 1 | 1MHZ | 12/6/2022 | 12/6/2024 |
| NSDS1 | UNIVERSAL SPHERICAL DIPOLE SOURCE | AET | USDS-H | AET-1116 | | NOTE 1 | |
| NTA2 | BILOG ANTENNA | TESEQ | 6112D | 28040 | 25-1000MHz | 5/19/2022 | 5/19/2024 |
| NTA3 | BILOG ANTENNA | TESEQ | 6112D | 32853 | 25-1000MHz | 11/17/2022 | 11/17/2024 |
| NWQ0 | DOUBLE RIDGED WAVEGUIDE ANTENNA | ETS LINDGREN | 3117 | 66657 | 1GHZ-18GHZ | 6/13/2022 | 6/13/2024 |
| PHA0 | MAGNETIC FIELD PROBE | ELECTRO-METRICS | EM-6882 | 134 | 22-230MHZ | NOTE 1 | |
| PLF1 | CISPR16 50UH LISN | ELITE | CISPR16/70A | 001 | .15-30MHz | 4/7/2023 | 4/7/2024 |
| PLF3 | CISPR16 50UH LISN | ELITE | CISPR16/70A | 003 | .15-30MHz | 4/7/2023 | 4/7/2024 |
| R21F | 3M ANECHOIC CHAMBER NSA | EMC TEST SYSTEMS | 3M ANECHOIC | | 30MHZ-18GHZ | 3/1/2023 | 3/1/2024 |
| RBE0 | EMI ANALYZER | ROHDE & SCHWARZ | ESU26 | 100095 | 20Hz-26GHz | 4/27/2023 | 4/27/2024 |
| RBG2 | EMI ANALYZER | ROHDE & SCHWARZ | ESW44 | 101591 | 2HZ-44GHZ | 4/10/2023 | 4/10/2024 |
| RBG3 | EMI ANALYZER | ROHDE & SCHWARZ | ESW44 | 101592 | 2HZ-44GHZ | 11/11/2022 | 12/11/2023 |
| SHC2 | Power Supplies | HENGFU | HF60W-SL-24 | A11372702 | 24V | NOTE 1 | |
| T1E14 | 10DB 25W ATTENUATOR | WEINSCHEL | 46-10-43 | CM5690 | DC-18GHZ | 5/18/2022 | 5/18/2024 |
| T1ED | 10DB 25W ATTENUATOR | WEINSCHEL | 46-10-34 | BN2320 | DC-18GHZ | 1/6/2022 | 1/6/2024 |
| VBR8 | CISPR EN FCC CE VOLTAGE.exe | | | | | N/A | |
| VBV2 | CISPR EN FCC ICES RE.EXE | ELITE | CISPR EN FCC ICES RE.EXE | --- | --- | N/A | |
| WKA1 | SOFTWARE, UNIVERSAL RCV EMI | ELITE | UNIV_RCV_EMI | 1 | --- | I/O | |
| XLTS | 5W, 50 OHM TERMINATION | JFW INDUSTRIES | 50T-052 | --- | DC-2GHZ | 1/5/2022 | 1/5/2024 |
| XPR0 | HIGH PASS FILTER | K&L MICROWAVE | 11SH10-4800/X20000 | 001 | 4.8-20GHZ | 9/14/2023 | 9/14/2025 |

N/A: Not Applicable I/O: Initial Only CNR: Calibration Not Required
NOTE 1: For the purpose of this test, the equipment was calibrated over the specified frequency range, pulse rate, or modulation prior to the test or monitored by a calibrated instrument.

## 19. Block Diagram of Test Setup




Radiated Measurements Test Setup

## 20. Transmitter Conducted Emissions (AC Mains)

| Test Information | |
|---|---|
| Manufacturer | Snap Diagnostics LLC |
| Product | Snap Diagnostics Sleep Apnea Monitor |
| Model No. | 910000 |
| Serial No. | DV1-02 |
| Mode | Charging + BLE Tx |

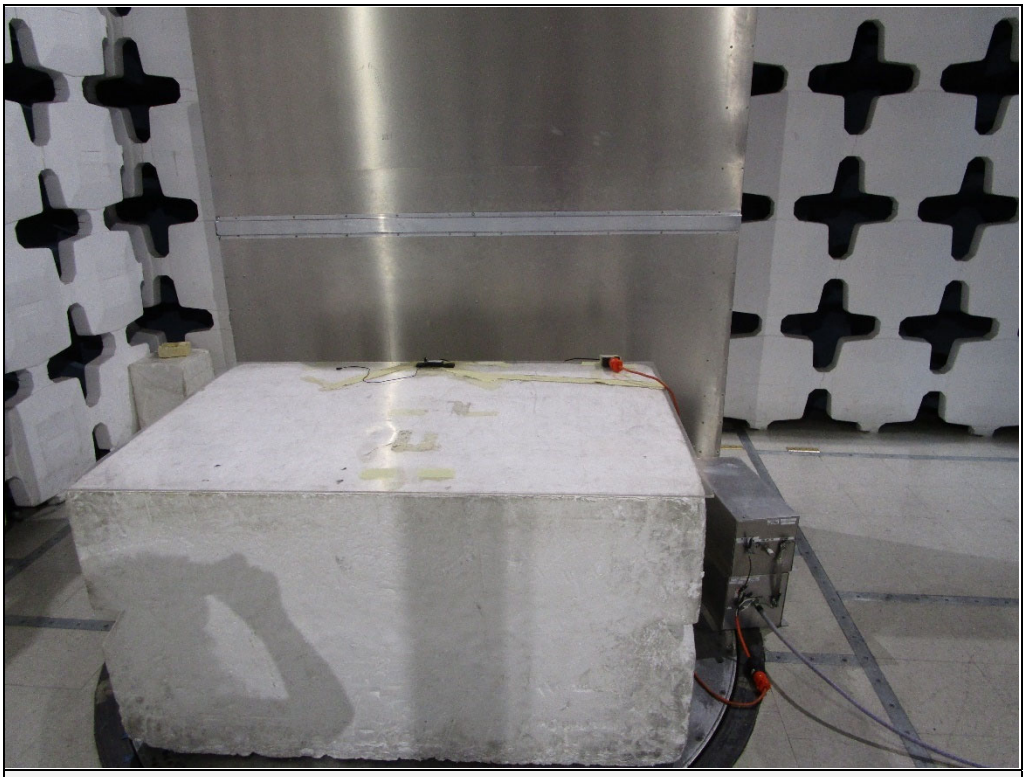
| Test Setup Details | |
|---|---|
| Setup Format | Tabletop |
| Height of Support | N/A |
| Type of Test Site | Semi-Anechoic Chamber |
| Test Site Used | R21F |
| Notes | |

| Measurement Uncertainty | |
|---|---|
| Measurement Type | Expanded Measurement Uncertainty |
| Conducted disturbance (mains port) (150 kHz – 30 MHz) | 2.7 |

| Requirements |
|---|
| All radio frequency voltages on the power lines for any frequency or frequencies of an intentional radiator shall not exceed the limits in the following table: |

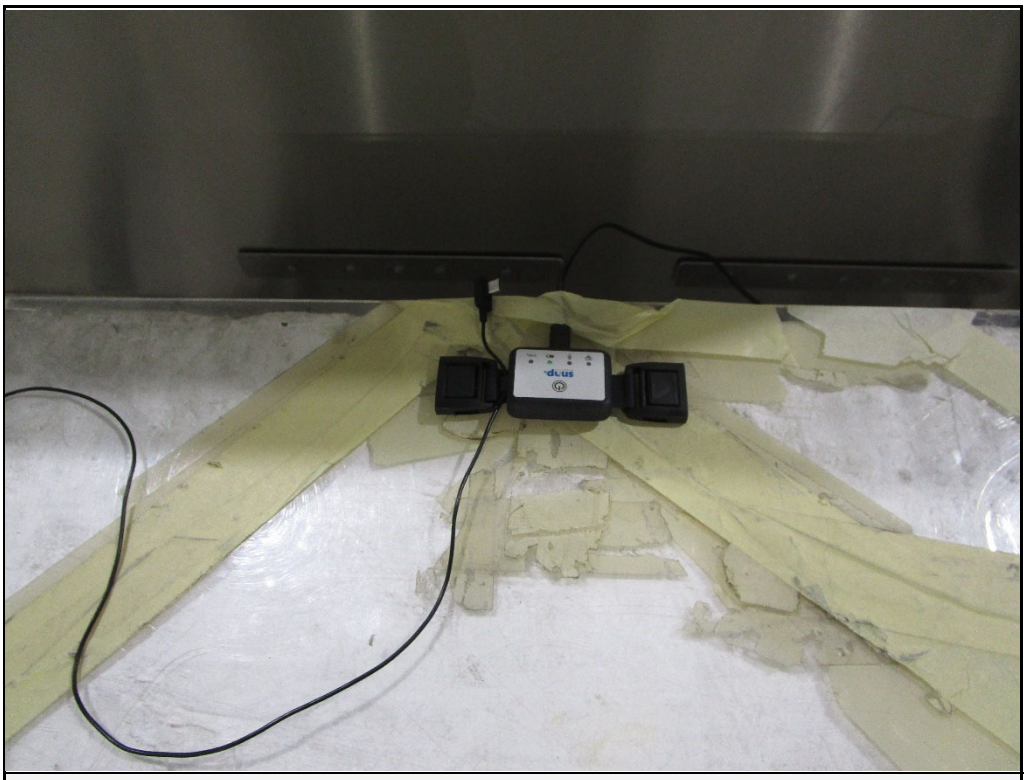
| Transmitter Conducted Emissions Limits | | |
|---|---|---|
| Frequency of Emission (MHz) | Conducted Limits (dBµV) | |
| | Quasi-peak | Average |
| 0.15 – 0.5 | 66 – 56* | 56 – 46* |
| 0.5 – 5 | 56 | 46 |
| 5 – 30 | 60 | 50 |
| * The lower limit shall apply at the transition frequencies. | | |

| Procedure |
| --- |
| The interference on each power lead of the EUT was measured by connecting the measuring equipment to the appropriate meter terminal of the Line Impedance Stabilization Network (LISN). The meter terminal of the LISN not under test was terminated with 50 ohms.<br>1) The EUT was operated in the Tx mode.<br>2) Measurements were first made on the 120VAC high line.<br>3) The frequency range from 150kHz to 30MHz was broken up into smaller frequency sub-bands.<br>4) Conducted emissions measurements were taken on the first frequency sub-band using a peak detector.<br>5) The data thus obtained was then searched by the computer for the highest levels. Any emissions levels that were within 10dB of the average limit were then measured again using both a quasi-peak detector and an average detector. (If no peak readings were within 10dB of the average limit, quasi-peak and average readings were taken on the highest emissions levels measured during the peak detector scan.)<br>6) Steps (4) and (5) were repeated for the remainder of the frequency sub-bands until the entire frequency range from 150kHz to 30MHz was investigated. The peak trace was automatically plotted. The plot also shows quasi-peak and average readings that were taken on discrete frequencies. A table showing the quasi-peak and average readings was also generated. This tabular data compares the quasi-peak and average conducted emissions to the applicable conducted emissions limits. The resultant voltage level (VL) is a summation in decibels (dB) of the receiver meter reading (MTR) and the cable loss factor (CF).<br>Formula 1: VL (dBµV) = MTR (dBµV) + CF (dB)<br>7) Steps (3) through (6) were repeated on the 120VAC return line. |



Test Setup for RF Conducted Emissions (AC Mains)

Test Setup for RF Conducted Emissions (AC Mains)



Test Setup for RF Conducted Emissions (AC Mains)

# FCC Part 15 Subpart B 2017-2022 Conducted Emissions Test

## Significant Emissions Data

VBR8 09/15/2023

| | | |
|---|---|---|
| Manufacturer | : | Snap Diagnostics LLC |
| Model | : | 910000 |
| DUT Revision | : | 1.0 |
| Serial Number | : | DV1-02 |
| DUT Mode | : | Charging + BLE Tx |
| Line Tested | : | 120VAC 60HZ High Line |
| Scan Step Time [ms] | : | 30 |
| Meas. Threshold [dB] | : | -10 |
| Notes | : | |
| Test Engineer | : | J. Jonas |
| Limit | : | Class B |
| Test Date | : | Oct 10, 2023 12:52:29 PM |
| Data Filter | : | Up to 80 maximum levels detected with 6 dB level excursion threshold over 10 dB margin below limit |

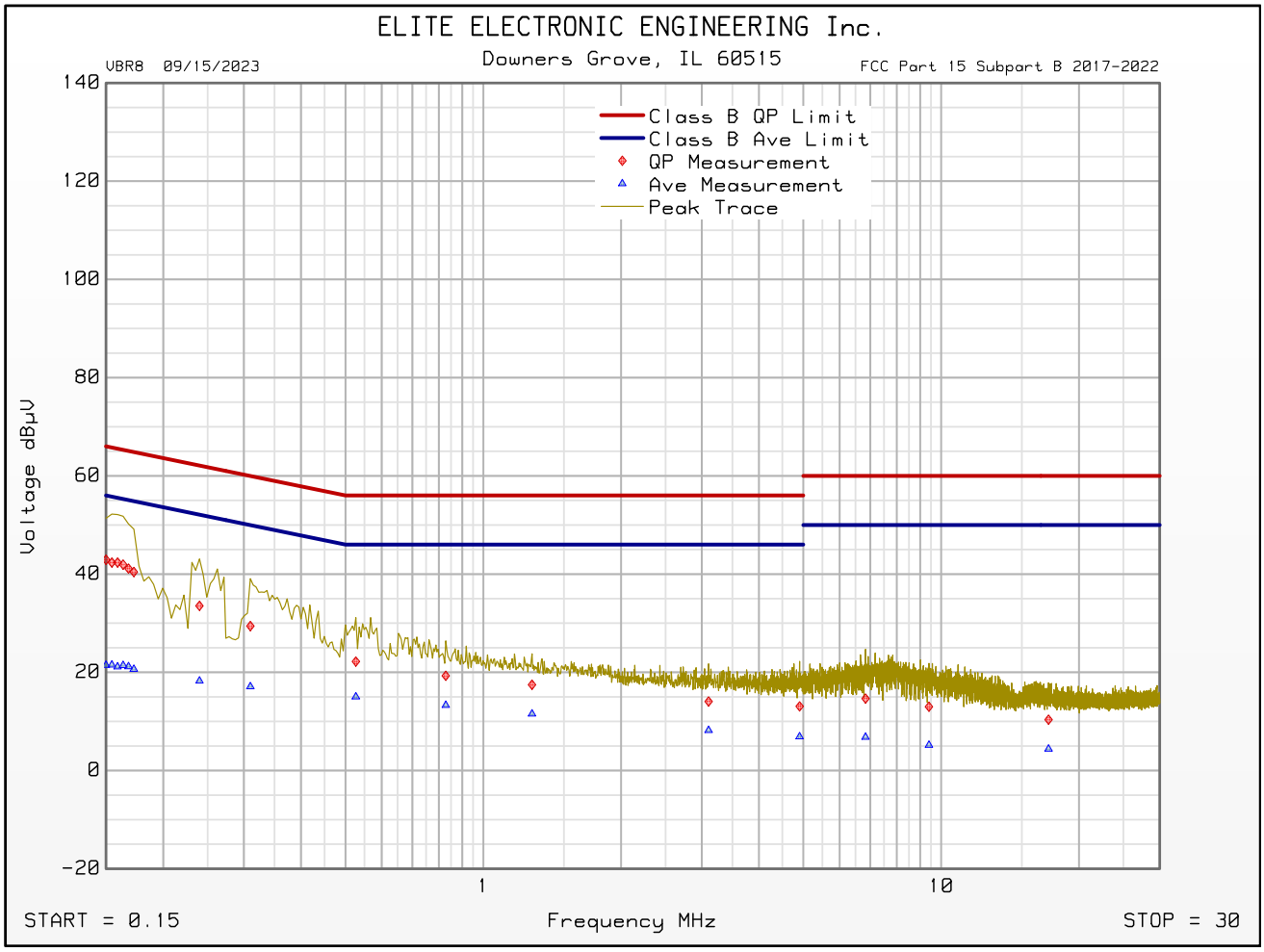
| Freq MHz | Quasi-peak Level dBµV | Quasi-peak Limit dBµV | Excessive Quasi-peak Emissions | Average Level dBµV | Average Limit dBµV | Excessive Average Emissions |
|---|---|---|---|---|---|---|
| 0.150 | 42.9 | 66.0 | | 21.5 | 56.0 | |
| 0.310 | 29.4 | 60.0 | | 17.1 | 50.0 | |
| 0.527 | 22.2 | 56.0 | | 15.0 | 46.0 | |
| 0.828 | 19.3 | 56.0 | | 13.3 | 46.0 | |
| 1.278 | 17.5 | 56.0 | | 11.5 | 46.0 | |
| 3.105 | 14.1 | 56.0 | | 8.2 | 46.0 | |
| 4.907 | 13.1 | 56.0 | | 6.9 | 46.0 | |
| 6.836 | 14.7 | 60.0 | | 6.8 | 50.0 | |
| 9.401 | 13.0 | 60.0 | | 5.2 | 50.0 | |
| 17.158 | 10.4 | 60.0 | | 4.4 | 50.0 | |

# FCC Part 15 Subpart B 2017-2022 Conducted Emissions Test

## Cumulative Data

VBR8 09/15/2023

| | | |
|---|---|---|
| Manufacturer | : | Snap Diagnostics LLC |
| Model | : | 910000 |
| DUT Revision | : | 1.0 |
| Serial Number | : | DV1-02 |
| DUT Mode | : | Charging + BLE Tx |
| Line Tested | : | 120VAC 60HZ High Line |
| Scan Step Time [ms] | : | 30 |
| Meas. Threshold [dB] | : | -10 |
| Notes | : | |
| Test Engineer | : | J. Jonas |
| Limit | : | Class B |
| Test Date | : | Oct 10, 2023 12:52:29 PM |




Emissions Meet QP Limit
Emissions Meet Ave Limit

# FCC Part 15 Subpart B 2017-2022 Conducted Emissions Test

## Significant Emissions Data

VBR8 09/15/2023

| | | |
|---|---|---|
| Manufacturer | : | Snap Diagnostics LLC |
| Model | : | 910000 |
| DUT Revision | : | 1.0 |
| Serial Number | : | DV1-02 |
| DUT Mode | : | Charging + BLE Tx |
| Line Tested | : | 120VAC 60HZ Neutral Line |
| Scan Step Time [ms] | : | 30 |
| Meas. Threshold [dB] | : | -10 |
| Notes | : | |
| Test Engineer | : | J. Jonas |
| Limit | : | Class B |
| Test Date | : | Oct 10, 2023 12:59:24 PM |
| Data Filter | : | Up to 80 maximum levels detected with 6 dB level excursion threshold over 10 dB margin below limit |

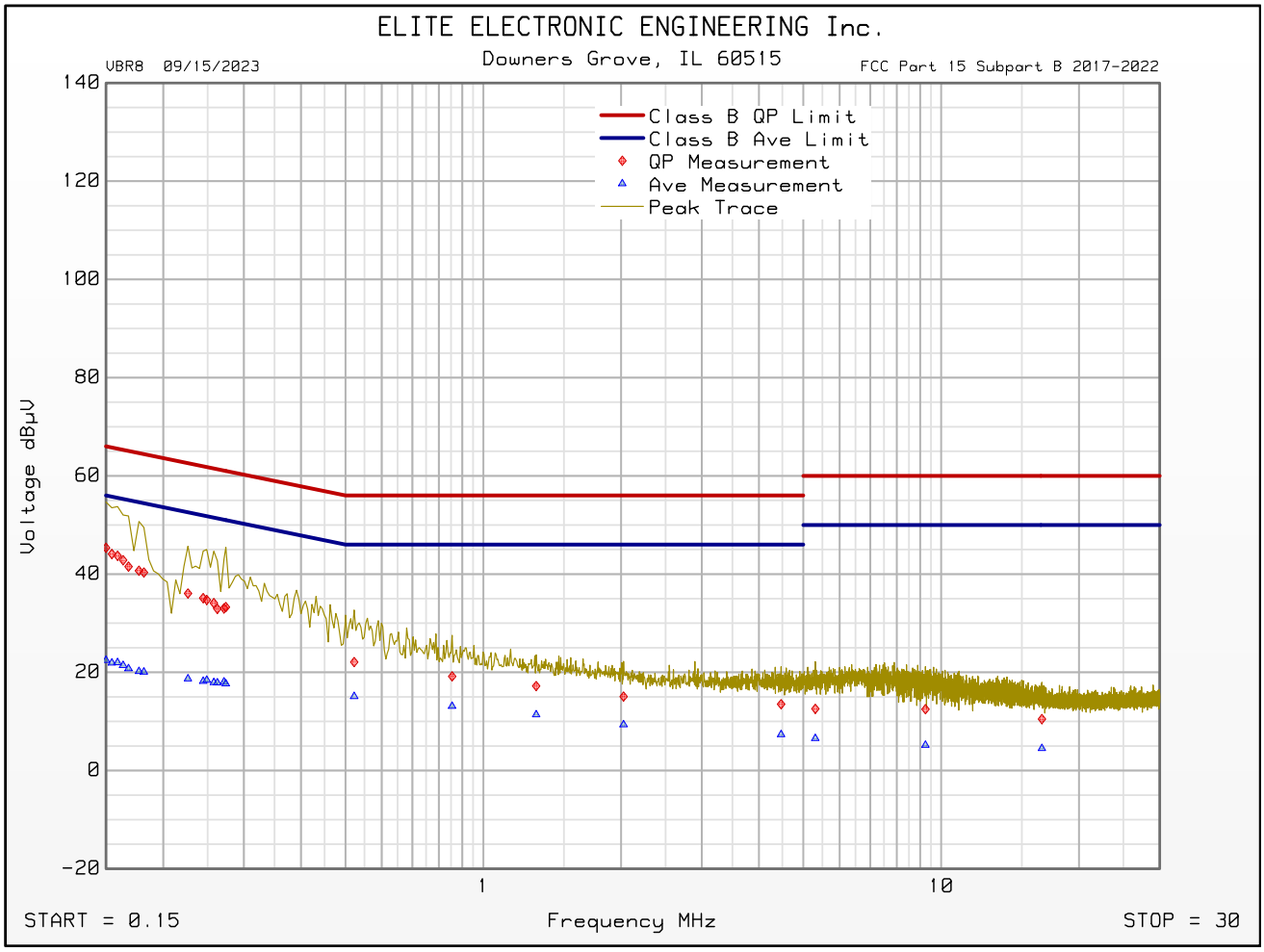
| Freq MHz | Quasi-peak Level dBµV | Quasi-peak Limit dBµV | Excessive Quasi-peak Emissions | Average Level dBµV | Average Limit dBµV | Excessive Average Emissions |
|---|---|---|---|---|---|---|
| 0.150 | 45.4 | 66.0 | | 22.5 | 56.0 | |
| 0.274 | 33.3 | 61.0 | | 17.7 | 51.0 | |
| 0.523 | 22.1 | 56.0 | | 15.1 | 46.0 | |
| 0.855 | 19.2 | 56.0 | | 13.1 | 46.0 | |
| 1.305 | 17.2 | 56.0 | | 11.4 | 46.0 | |
| 2.025 | 15.1 | 56.0 | | 9.3 | 46.0 | |
| 4.471 | 13.5 | 56.0 | | 7.3 | 46.0 | |
| 5.311 | 12.6 | 60.0 | | 6.6 | 50.0 | |
| 9.239 | 12.5 | 60.0 | | 5.2 | 50.0 | |
| 16.591 | 10.5 | 60.0 | | 4.5 | 50.0 | |

# FCC Part 15 Subpart B 2017-2022 Conducted Emissions Test

## Cumulative Data

VBR8 09/15/2023

| | | |
|---|---|---|
| Manufacturer | : | Snap Diagnostics LLC |
| Model | : | 910000 |
| DUT Revision | : | 1.0 |
| Serial Number | : | DV1-02 |
| DUT Mode | : | Charging + BLE Tx |
| Line Tested | : | 120VAC 60HZ Neutral Line |
| Scan Step Time [ms] | : | 30 |
| Meas. Threshold [dB] | : | -10 |
| Notes | : | |
| Test Engineer | : | J. Jonas |
| Limit | : | Class B |
| Test Date | : | Oct 10, 2023 12:59:24 PM |




Emissions Meet QP Limit
Emissions Meet Ave Limit

# 21. 6dB Bandwidth

| EUT Information | |
|---|---|
| Manufacturer | Snap Diagnostics LLC |
| Product | Snap Diagnostics Sleep Apnea Monitor |
| Model No. | 910000 |
| Serial No. | DV1-02 |
| Mode | Tx |

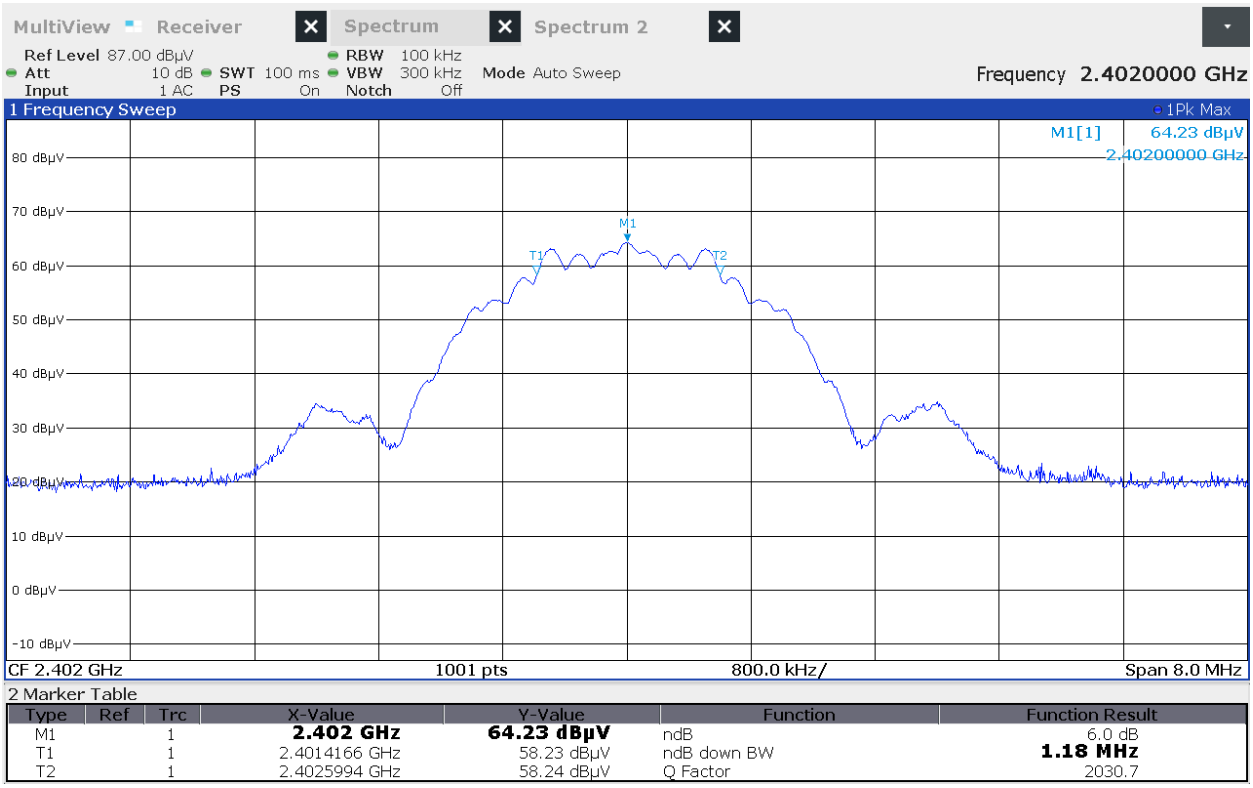
| Test Setup Details | |
|---|---|
| Setup Format | Tabletop |
| Height of Support | N/A |
| Measurement Method | Radiated |
| Type of Test Site | Tabletop |
| Test Site Used | R29F |
| Antenna Type Used | Field Probe |
| Notes | None |

| Measurement Uncertainty | |
|---|---|
| Measurement Type | Expanded Measurement Uncertainty |
| Radiated disturbance (electric field strength on an open area test site or alternative test site) (1 GHz – 6 GHz) | 3.1 |

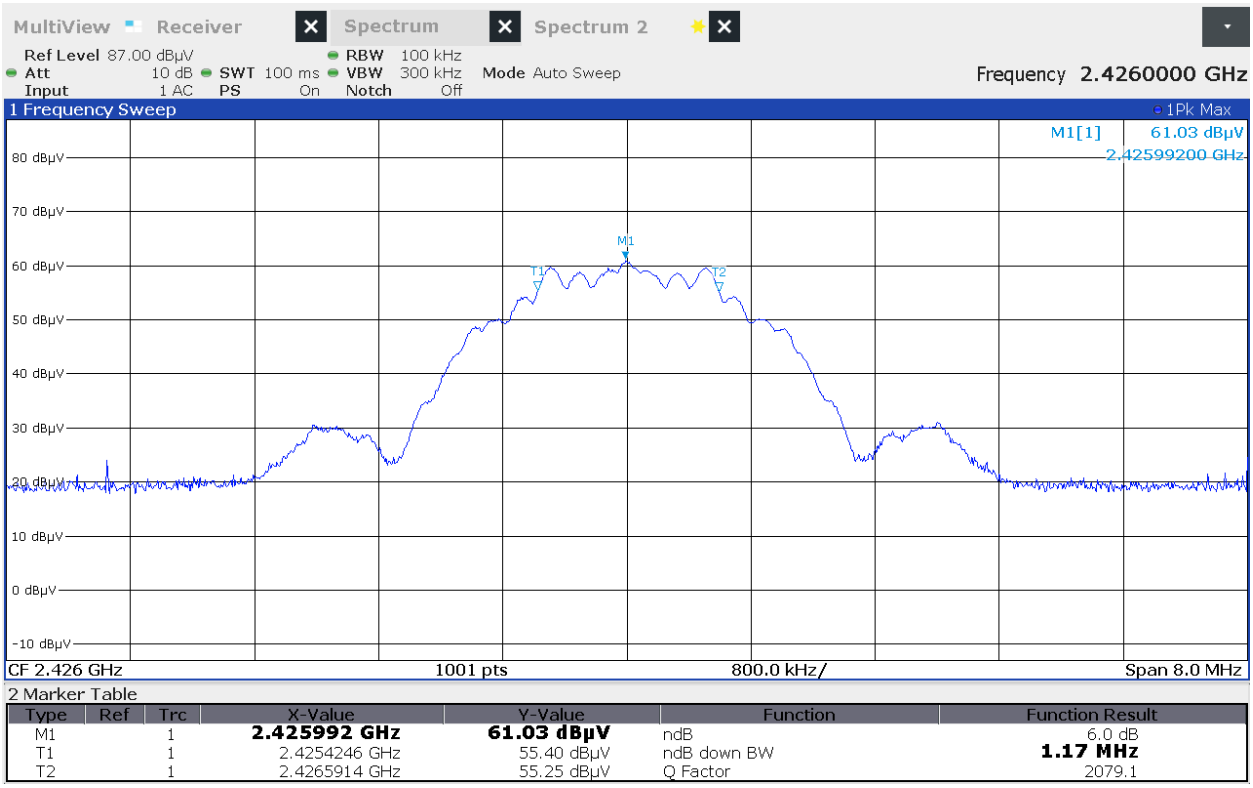
| Requirements |
|---|
| Systems using digital modulation techniques shall have a minimum 6dB bandwidth of 500kHz |

| Procedure |
|---|
| The EUT was setup inside a shielded enclosure. The EUT was allowed to transmit continuously.<br><br>The transmit channel was set separately to low, middle, and high channels. The resolution bandwidth (RBW) was set to 100kHz, the video bandwidth (VBW) was set to the same as or 3 times greater than the RBW, and the span was set to 3 times the RBW.<br><br>The 'Max-Hold' function was engaged. The analyzer was allowed to scan until the envelope of the transmitter bandwidth was defined. The analyzer's display was then screenshot and saved. |

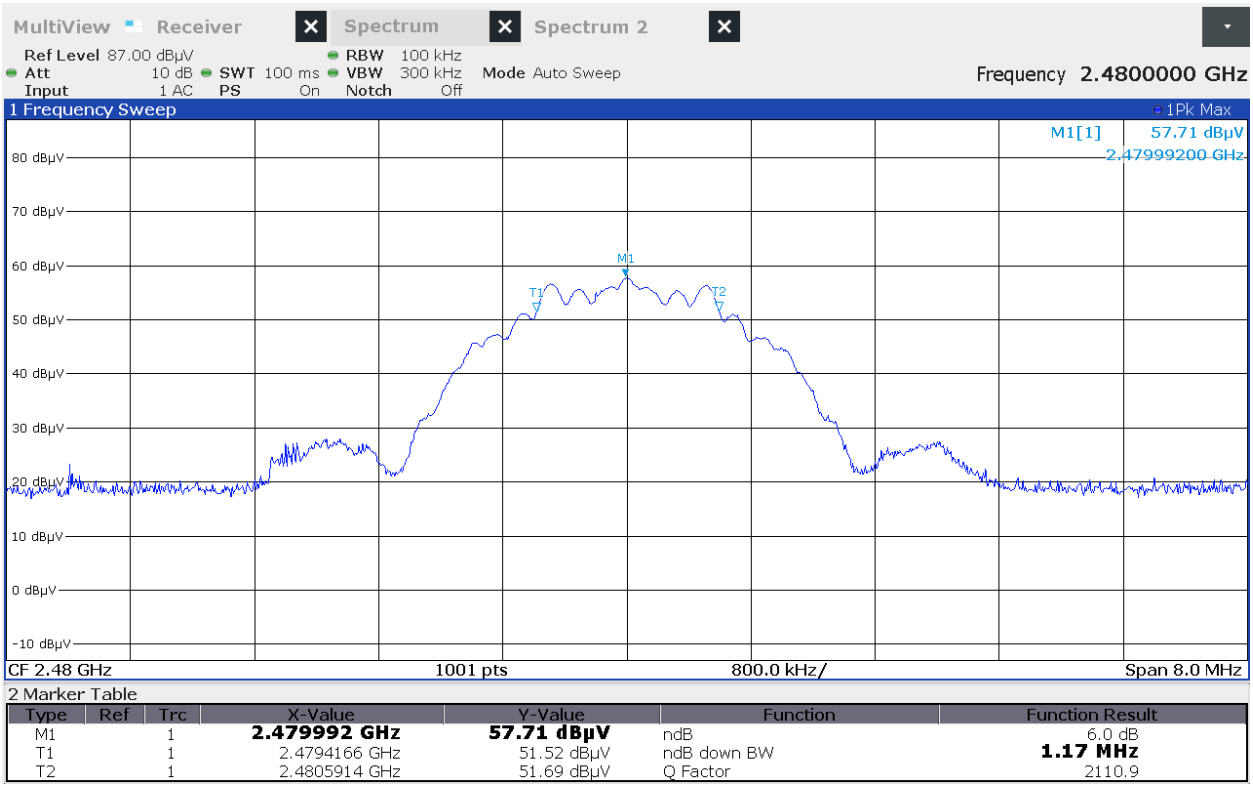
| Test Details | |
|---|---|
| Manufacturer | Snap Diagnostics LLC |
| EUT | Snap Diagnostics Sleep Apnea Monitor |
| Model No. | 910000 |
| Serial No. | DV1-02 |
| Mode | Tx |
| Frequency Tested | 2402MHz |
| Result | 6dB BW = 1.18MHz |
| Notes | None |



| Test Details | |
|---|---|
| Manufacturer | Snap Diagnostics LLC |
| EUT | Snap Diagnostics Sleep Apnea Monitor |
| Model No. | 910000 |
| Serial No. | DV1-02 |
| Mode | Tx |
| Frequency Tested | 2426MHz |
| Result | 6dB BW = 1.17MHz |
| Notes | |



| Test Details | |
|---|---|
| Manufacturer | Snap Diagnostics LLC |
| EUT | Snap Diagnostics Sleep Apnea Monitor |
| Model No. | 910000 |
| Serial No. | DV1-02 |
| Mode | Tx |
| Frequency Tested | 2480MHz |
| Result | 6dB BW = 1.17MHz |
| Notes | |



## 22. Occupied Bandwidth (99%)

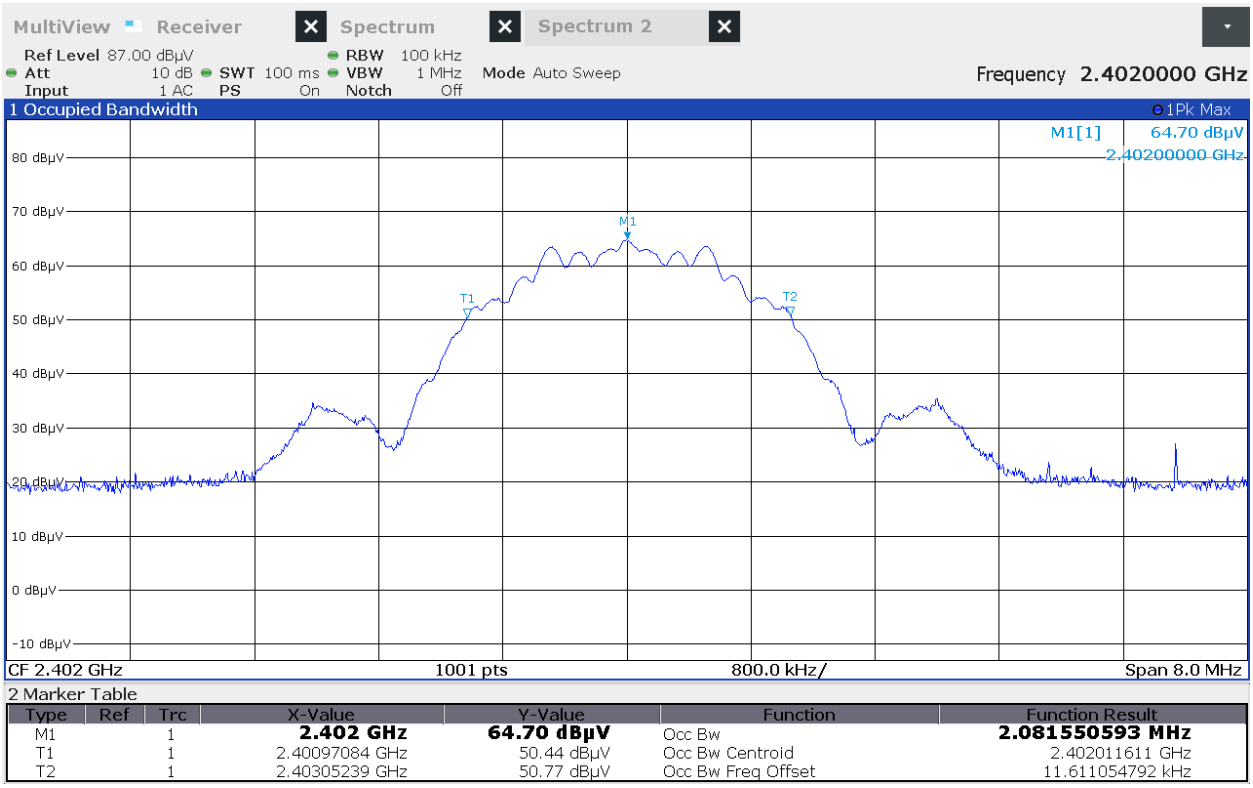
| EUT Information | |
|---|---|
| Manufacturer | Snap Diagnostics LLC |
| Product | Snap Diagnostics Sleep Apnea Monitor |
| Model No. | 910000 |
| Serial No. | DV1-02 |
| Mode | Tx |

| Test Setup Details | |
|---|---|
| Setup Format | Tabletop |
| Height of Support | N/A |
| Measurement Method | Radiated |
| Type of Test Site | Tabletop |
| Test Site Used | R29F |
| Antenna Type Used | Field Probe |
| Notes | None |

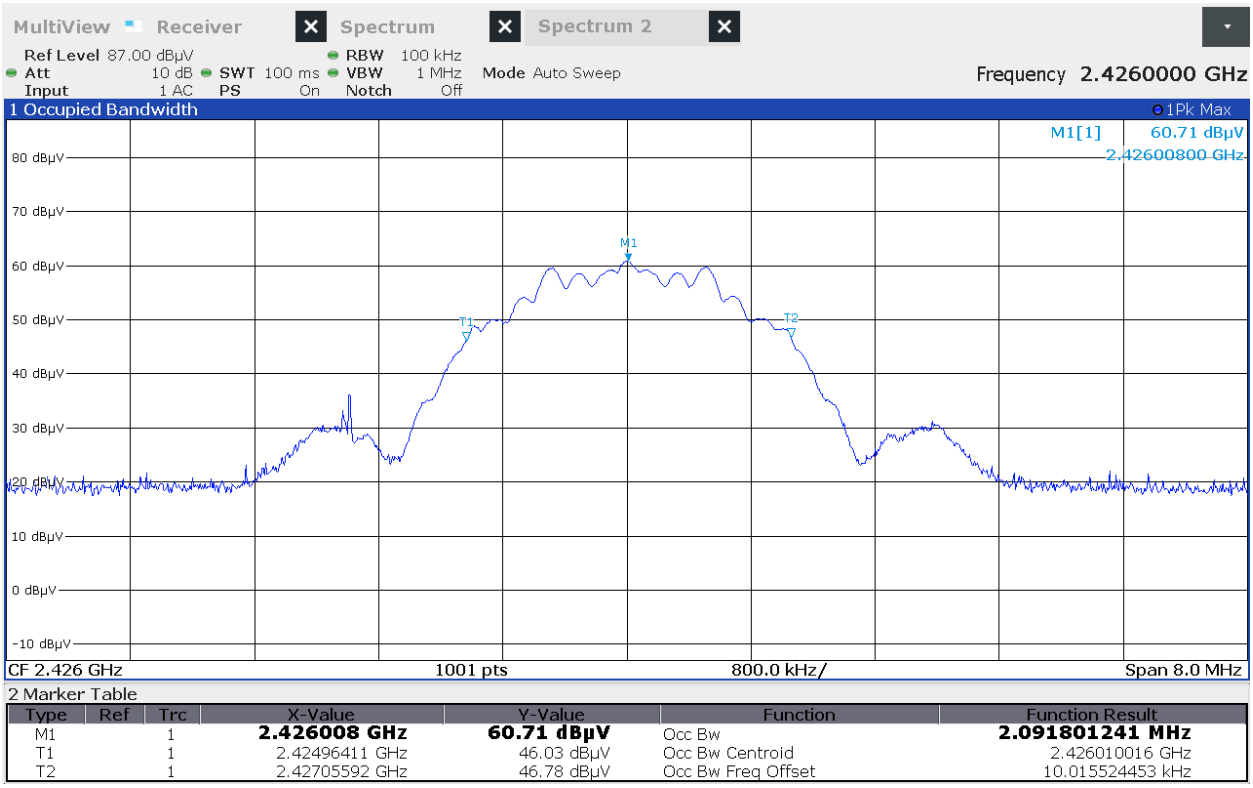
| Measurement Uncertainty | |
|---|---|
| Measurement Type | Expanded Measurement Uncertainty |
| Radiated disturbance (electric field strength on an open area test site or alternative test site) (1 GHz – 6 GHz) | 3.1 |

| Procedure |
|---|
| The EUT was setup inside a shielded chamber. The EUT was allowed to transmit continuously. The transmit channel was set separately to low, middle, and high channels. The resolution bandwidth (RBW) was set to 1% to 5% of the actual occupied / x dB bandwidth, the video bandwidth (VBW) was set 3 times greater than the RBW, and the span was set large enough to capture all products of the modulation process, including the emission skirts, around the carrier frequency.<br><br>The 'Max-Hold' function was engaged. The analyzer was allowed to scan until the envelope of the transmitter bandwidth was defined. The analyzer's display was plotted using a 'screen dump' utility. |

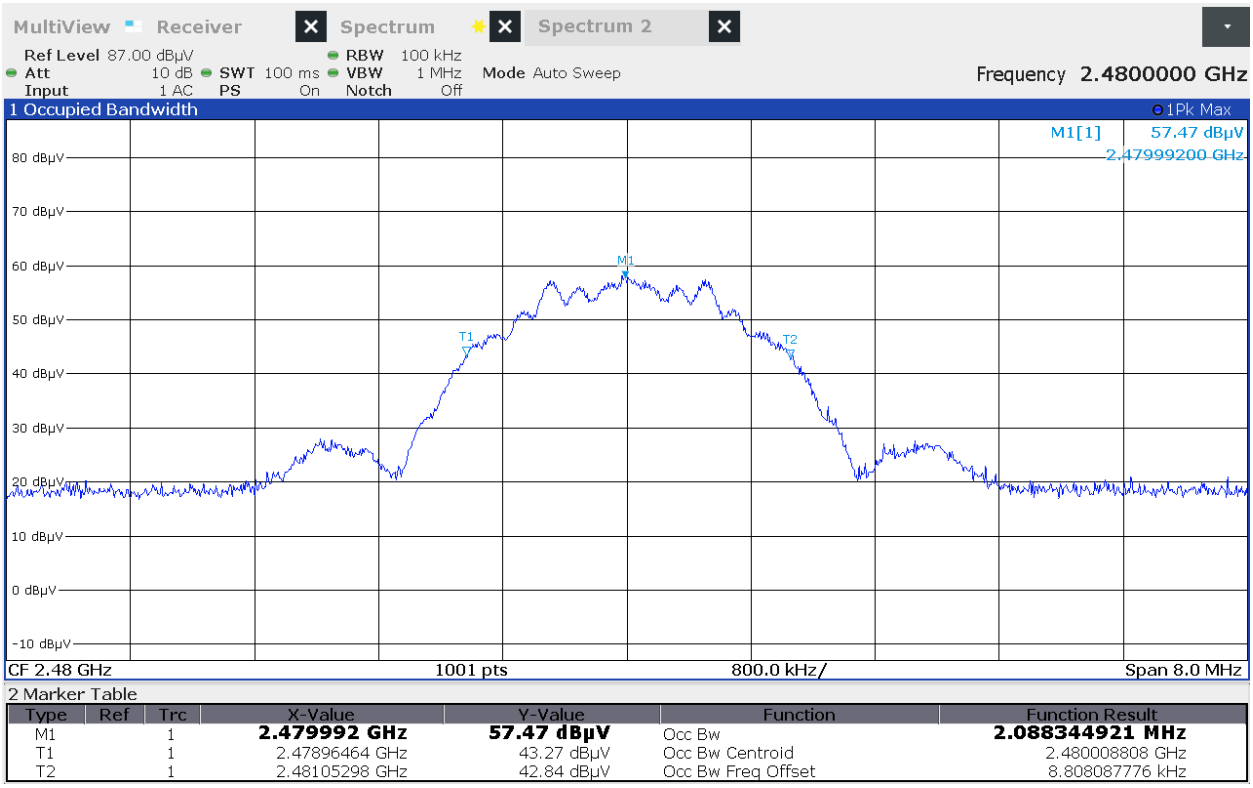
| Test Details | |
|---|---|
| Manufacturer | Snap Diagnostics LLC |
| EUT | Snap Diagnostics Sleep Apnea Monitor |
| Model No. | 910000 |
| Serial No. | DV1-02 |
| Mode | Tx |
| Frequency Tested | 2402MHz |
| Result | OBW = 2.08MHz |
| Notes | |



| Test Details | |
|---|---|
| Manufacturer | Snap Diagnostics LLC |
| EUT | Snap Diagnostics Sleep Apnea Monitor |
| Model No. | 910000 |
| Serial No. | DV1-02 |
| Mode | Tx |
| Frequency Tested | 2426MHz |
| Result | OBW = 2.09MHz |
| Notes | |



| Test Details | |
|---|---|
| Manufacturer | Snap Diagnostics LLC |
| EUT | Snap Diagnostics Sleep Apnea Monitor |
| Model No. | 910000 |
| Serial No. | DV1-02 |
| Mode | Tx |
| Frequency Tested | 2480MHz |
| Result | OBW = 2.08MHz |
| Notes | |



# 23. Effective Isotropic Radiated Power (EIRP)

| EUT Information | |
|---|---|
| Manufacturer | Snap Diagnostics LLC |
| Product | Snap Diagnostics Sleep Apnea Monitor |
| Model No. | 910000 |
| Serial No. | DV1-02 |
| Mode | Tx |

| Test Setup Details | |
|---|---|
| Setup Format | Tabletop |
| Height of Support | N/A |
| Measurement Method | Radiated |
| Type of Test Site | Semi-Anechoic Chamber |
| Test Site Used | R21F |
| Antenna Type Used | Above 1GHz: Double-ridged waveguide (or equivalent) |
| Notes | None |

| Measurement Uncertainty | |
|---|---|
| Measurement Type | Expanded Measurement Uncertainty |
| Radiated disturbance (electric field strength on an open area test site or alternative test site) (1 GHz – 6 GHz) | 3.1 |

| Requirements |
|---|
| The output power shall not exceed 4W (36dBm). |

| Procedure |
|---|
| The EUT was placed on the non-conductive stand and set to transmit. A double ridged waveguide antenna was placed at a test distance of 3 meters from the EUT. The resolution bandwidth (RBW) of the spectrum analyzer was set to greater than the 6dB bandwidth. The EUT was maximized for worst case emissions (or maximum output power) at the measuring antenna. The maximum meter reading was recorded. The peak power output was measured for the low, middle, and high channels.<br><br>The equivalent power was determined from the field intensity levels measured at 3 meters using the substitution method. To determine the emission power, a double ridged waveguide antenna was then set in place of the EUT and connected to a calibrated signal generator. The output of the signal generator was adjusted to match the received level at the spectrum analyzer. The signal level was recorded. The reading was then corrected to compensate for cable loss and antenna gain, as required. The peak power output was calculated for low, middle, and high hopping frequencies. |

| Test Details | |
|---|---|
| Manufacturer | Snap Diagnostics LLC |
| EUT | Snap Diagnostics Sleep Apnea Monitor |
| Model No. | 910000 |
| Serial No. | DV1-02 |
| Mode | Tx |
| Result | Max EIRP = 0.91W (-0.39dBm) |
| Notes | None |

| Freq (MHz) | Ant Pol | Wide BW Meter Reading (dBµV) | Matched Sig Gen Reading (dBm) | Equivalent Antenna Gain (dB) | Cable Loss (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| 2402.00 | H | 56.66 | -6.20 | 5.25 | 2.61 | -3.56 | 36.00 | -39.56 |
| | V | 54.61 | -7.60 | 5.25 | 2.61 | -4.96 | 36.00 | -40.96 |
| 2426.00 | H | 57.94 | -4.20 | 5.23 | 2.76 | -1.74 | 36.00 | -37.74 |
| | V | 52.32 | -10.70 | 5.23 | 2.76 | -8.24 | 36.00 | -44.24 |
| 2480.00 | H | 59.08 | -2.90 | 5.17 | 2.66 | -0.39 | 36.00 | -36.39 |
| | V | 56.01 | -5.90 | 5.17 | 2.66 | -3.39 | 36.00 | -39.39 |

## 24. Case Spurious Radiated Emissions

| EUT Information | |
|---|---|
| Manufacturer | Snap Diagnostics LLC |
| Product | Snap Diagnostics Sleep Apnea Monitor |
| Model No. | 910000 |
| Serial No. | DV1-02 |
| Mode | Tx |

| Test Setup Details | |
|---|---|
| Setup Format | Tabletop |
| Height of Support | N/A |
| Type of Test Site | Semi-Anechoic Chamber |
| Test Site Used | R21F |
| Antenna Types Used | Below 1GHz: Bilog<br>1 – 18GHz: Double-Ridged Waveguide (or equivalent)<br>Above 18GHz: Horn (or equivalent) |
| Notes | None |

| Measurement Uncertainty | |
|---|---|
| Measurement Type | Expanded Measurement Uncertainty |
| Radiated disturbance (electric field strength on an open area test site or alternative test site) (30 MHz – 1000 MHz) | 4.3 |
| Radiated disturbance (electric field strength on an open area test site or alternative test site) (1 GHz – 6 GHz) | 3.1 |
| Radiated disturbance (electric field strength on an open area test site or alternative test site) (6 GHz – 18 GHz) | 3.2 |
| Radiated disturbance (electric field strength on an open area test site or alternative test site) (18 GHz – 26.5 GHz) | 3.3 |

| Procedure |
|---|

Radiated measurements were performed in a 32ft. x 20ft. x 14ft. high shielded enclosure. The shielded enclosure prevents emissions from other sources, such as radio and TV stations from interfering with the measurements. All powerlines and signal lines entering the enclosure pass through filters on the enclosure wall. The powerline filters prevent extraneous signals from entering the enclosure on these leads.

Preliminary radiated emissions tests were performed to determine the emission characteristics of the EUT. For the preliminary test, a broadband measuring antenna was positioned at a 3-meter distance from the EUT. The entire frequency range from 30MHz to 25GHz was investigated using a peak detector function.

The final open field emission tests were then manually performed over the frequency range of 30MHz to 25GHz.

1) For all harmonics not in the restricted bands, the following procedure was used:
   a) The field strength of the fundamental was measured using a double ridged waveguide antenna. The waveguide antenna was positioned at a 3-meter distance from the EUT. The EUT was placed on a 1.5-meter-high non-conductive stand. A peak detector with a resolution bandwidth of 100 kHz was used on the spectrum analyzer.
   b) The field strengths of all of the harmonics not in the restricted band were then measured using a double-ridged waveguide antenna. The waveguide antenna was positioned at a 3-meter distance from the EUT. The EUT was placed on a 1.5-meter-high non-conductive stand. A peak detector with a resolution bandwidth of 100kHz was used on the spectrum analyzer.
   c) To ensure that maximum or worst-case emission levels at the fundamental and harmonics were measured, the following steps were taken when measuring the fundamental emissions and the spurious emissions:
      i) The EUT was rotated so that all of its sides were exposed to the receiving antenna.
      ii) Since the measuring antenna is linearly polarized, both horizontal and vertical field components were measured.
      iii) The measuring antenna was raised and lowered for each antenna polarization to maximize the readings.
      iv) In instances where it was necessary to use a shortened cable between the measuring antenna and the spectrum analyzer, the measuring antenna was not raised or lowered to ensure maximized readings. Instead, the EUT was rotated through all axis to ensure the maximum readings were recorded for the EUT.
   d) All harmonics not in the restricted bands must be at least 20dB below levels measured at the fundamental. However, attenuation below the general limits specified in §15.209(a) is not required.
2) For all emissions in the restricted bands, the following procedure was used:
   a) The field strengths of all emissions below 1GHz were measured using a bi-log antenna. The bi-log antenna was positioned at a 3-meter distance from the EUT. The EUT was placed on an 80cm high non-conductive stand. A peak detector with a resolution bandwidth of 100kHz was used on the spectrum analyzer.
   b) The field strengths of all emissions above 1GHz were measured using a double-ridged waveguide antenna. The waveguide antenna was positioned at a 3-meter distance from the EUT. The EUT was placed on a 1.5-meter-high non-conductive stand. A peak detector with a resolution bandwidth of 1MHz was used on the spectrum analyzer.
   c) To ensure that maximum or worst-case emission levels were measured, the following steps were taken when taking all measurements:
      i) The EUT was rotated so that all of its sides were exposed to the receiving antenna.
      ii) Since the measuring antenna is linearly polarized, both horizontal and vertical field components

were measured.

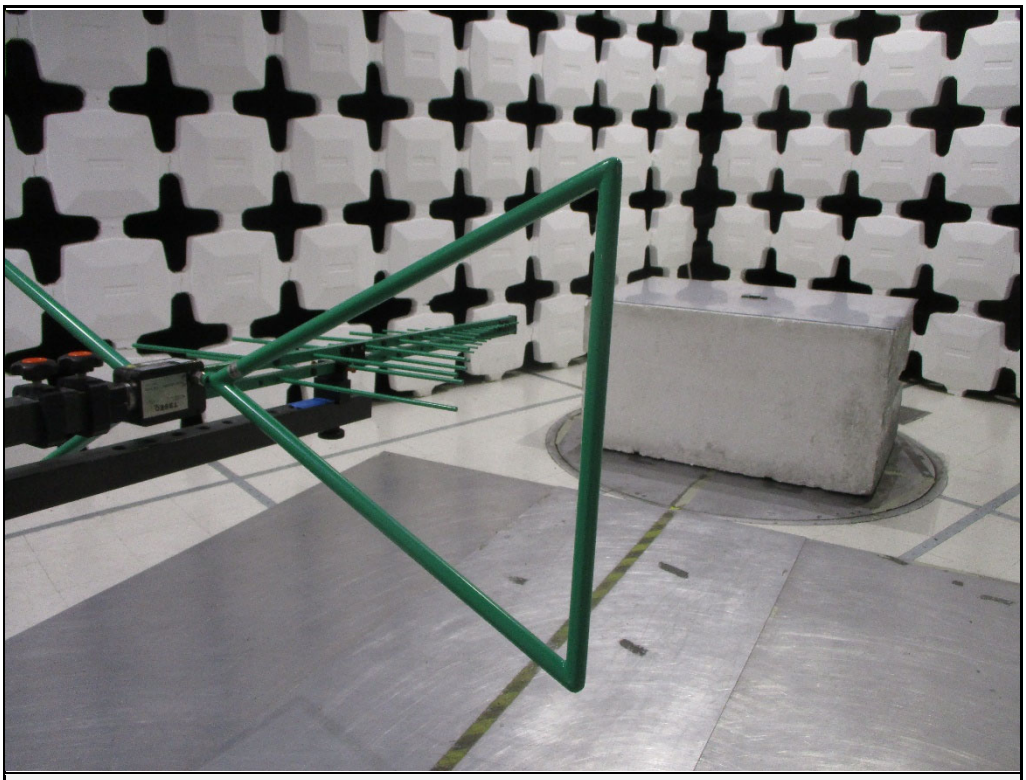
iii) The measuring antenna was raised and lowered for each antenna polarization to maximize the readings.

iv) In instances where it was necessary to use a shortened cable between the measuring antenna and the spectrum analyzer, the measuring antenna was not raised or lowered to ensure maximized readings. Instead, the EUT was rotated through all axis to ensure the maximum readings were recorded for the EUT.

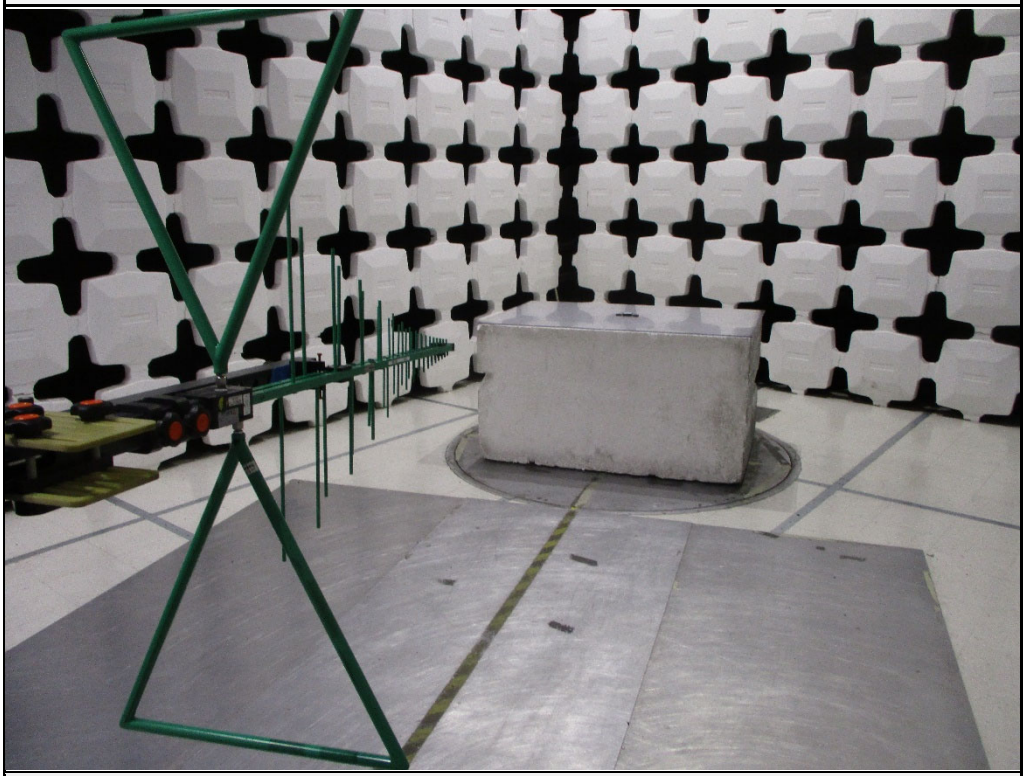
d) For all radiated emissions measurements below 1GHz, if the peak reading is below the limits listed in §15.209(a), no further measurements are required. If, however, the peak readings exceed the limits listed in §15.209(a), then the emissions are remeasured using a quasi-peak detector.

e) For all radiated emissions measurements above 1GHz, the peak readings must comply with the §15.35(b) limits. §15.35(b) states that when average radiated emissions measurements are specified, there also is a limit on the peak level of the radiated emissions. The limit on the peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. Therefore, all peak readings above 1GHz must be no greater than 20dB above the limits specified in §15.209(a).

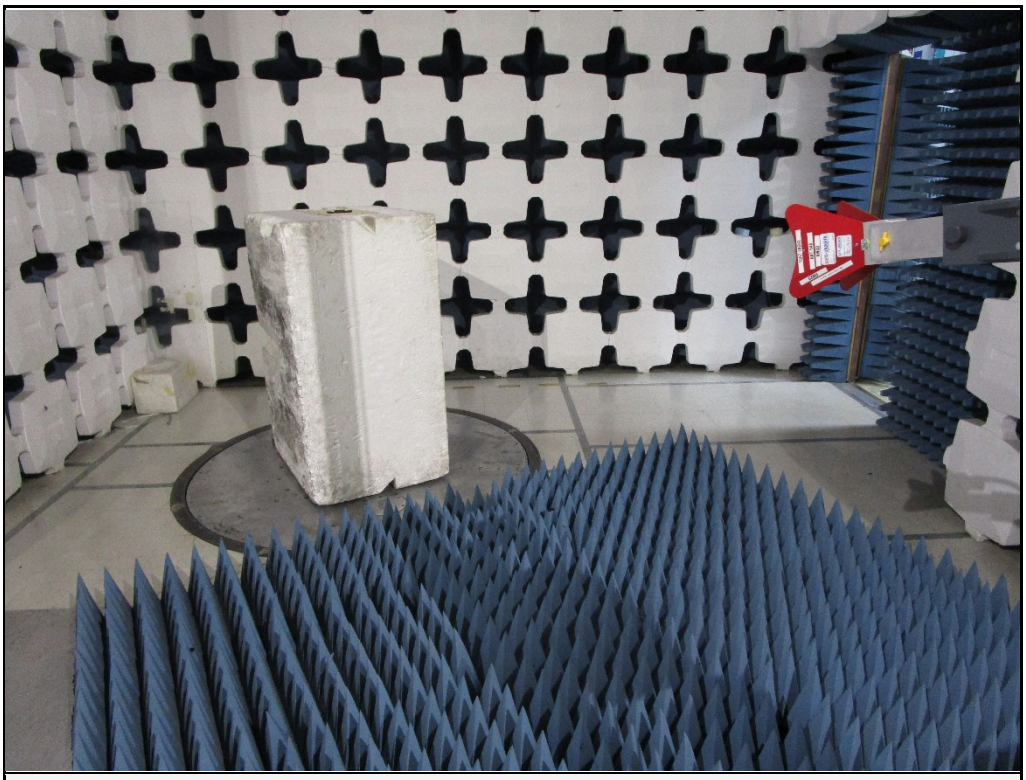
f) Next, for all radiated emissions measurements above 1GHz, the resolution bandwidth was set to 1MHz. The analyzer was set to linear mode with a 10Hz video bandwidth in order to simulate an average detector. An average reading was taken.



Test Setup for Spurious Radiated Emissions, 30 – 1000MHz – Antenna Polarization Horizontal



Test Setup for Spurious Radiated Emissions, 30 – 1000MHz – Antenna Polarization Vertical



Test Setup for Spurious Radiated Emissions, 1 – 18GHz – Antenna Polarization Horizontal

Test Setup for Spurious Radiated Emissions, 1 – 18GHz – Antenna Polarization Vertical