



| Engineering Test Report No. 2202429-01   |   |
|--|---|
| Report Date  | December 15, 2022   |
| Manufacturer Name  | Chamberlain Group, LLC  |
| Manufacturer Address   | 300 Windsor Drive<br>Oak Brook, IL 60523  |
| Product Name<br>Model No.  | Residential Jackshaft Opener<br>RJOA MPP  |
| Date Received  | November 23, 2022   |
| Test Dates   | November 28, 2022 through December 9, 2022  |
| Specifications   | 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<br>FCC Reg. Number: 269750<br>IC Reg. Number: 2987A<br>CAB Identifier: US0107  |
| Signature  | MARK E. LONGINOTTI  |
| Tested by  | Mark E. Longinotti  |
| Signature  | Raymond J. Klouda   |
| Approved by  | Raymond J. Klouda,<br>Registered Professional Engineer of Illinois – 44894  |
| PO Number  | 4900084893  |
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## 1. Report Revision History

| Revision | Date        | Description   |
|----------|-------------|---|
| -        | 16 DEC 2022 | Initial Release of Engineering Test Report No. 2202429-01 |

## 2. Introduction

### 2.1. Scope of Tests

This document presents the results of a series of RF emissions tests that were performed on the Chamberlain Group, LLC Residential Jackshaft Opener (hereinafter referred to as the Equipment Under Test (EUT)). The EUT was manufactured and submitted for testing by Chamberlain Group, LLC located in Oak Brook, 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 Innovation, Science, and Economic Development Canada 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 EUTs were identified as follows:

| EUT Identification              |  |
|---------------------------------|--|
| Test Item #1                    |  |
| Product Description             | Residential Jackshaft Opener   |
| Model/Part No.                  | RJOA MPP   |
| Serial No.                      | Antenna Conducted Sample 1   |
| Size of EUT                     | 54 cm x 18.5 cm x 16.5 cm  |
| Software/Firmware Version       | Ver 7.1 (126A0582-phoenix_rtl_mp_litepoint_image_v7.1.bin)                           |
| Device Type                     | Digitally Modulated Transmission Device  |
| Band of Operation               | 2400 – 2483.5MHz   |
| Modulation Type                 | QPSK, BPSK, 64-QAM   |
| Antenna Type                    | integrated meandered inverted F PCB antenna  |
| Antenna Gain (dBi) <sup>1</sup> | -1dBi  |
| Conducted Output Power          | 802.11b: 20.7dBm (117.5mW)<br>802.11g: 24.9dBm (309mW)<br>802.11n: 23.9dBm (245.5mW) |
| 6dB Bandwidth                   | 802.11b: 8.5MHz<br>802.11g: 16.6MHz<br>802.11n: 17.85MHz                             |
| Occupied Bandwidth (99% CBW)    | 802.11b: 14.0MHz<br>802.11g: 16.6MHz<br>802.11n: 17.8MHz                             |
| Emission Classification         | 802.11b: 14G0G1D<br>802.11g: 16G6G1D<br>802.11n: 17G8G1D                             |
| Test Item #2                    |  |
| Product Description             | Residential Jackshaft Opener   |
| Model/Part No.                  | RJOA MPP   |
| Serial No.                      | Radiated Sample 2  |
| Size of EUT                     | 54 cm x 18.5 cm x 16.5 cm  |
| Software/Firmware Version       | Ver 7.1 (126A0582-phoenix_rtl_mp_litepoint_image_v7.1.bin)                           |
| Device Type                     | Digitally Modulated Transmission Device  |

|                                 |  |
|---------------------------------|--|
| Band of Operation               | 2400 – 2483.5MHz   |
| Modulation Type                 | QPSK, BPSK, 64-QAM   |
| Antenna Type                    | integrated meandered inverted F PCB antenna  |
| Antenna Gain (dBi) <sup>1</sup> | -1dBi  |
| EIRP                            | 802.11b: 22.6dBm (182mW)<br>802.11g: 23.7dBm (234.4mW)<br>802.11n: 24.6dBm (288.4mW) |
| Emission Classification         | 802.11b: 14G1G1D<br>802.11g: 16G6G1D<br>802.11n: 17G8G1D                             |

Note 1 – Antenna gain is supplied by the manufacturer and Elite is not responsible for the accuracy of the antenna gain.

The EUTs listed above were used throughout the test series.

### 3. Power Input

The EUTs obtained 115V 60Hz power via a 3 wire, 1.75 meter long, unshielded power cord.

### 4. Grounding

The EUTs were connected to ground through the third wire of its input power cord.

### 5. Support Equipment

The EUTs were submitted for testing along with the following support equipment:

| Description                | Model #            |
|----------------------------|--------------------|
| Automatic Garage Door Lock | 001D8875           |
| Smart Control Panel        | 880LMW             |
| Safety Reversing Sensors   | 041-0136           |
| Laptop Computer            | Dell Latitude 7480 |

### 6. Interconnect Leads

The following interconnect cables were submitted with the test item:

| Item      | Description                                       |
|-----------|---|
| USB Cable | Connects laptop to EUT                            |
| 2 wires   | Used to connect Automatic Garage Door Lock to EUT |
| 2 wires   | Used to connect Smart Control Panel to EUT        |
| 4 wires   | Used to Connect Safety Reversing Sensors to EUT   |

### 7. Modifications Made to the EUT

No modifications were made to the EUTs during the testing.

### 8. Modes of Operation

The EUTs and all peripheral equipment were energized. The units were programmed to transmit in one of the following modes:

| Mode           | Description  |
|----------------|--|
| 802.11b 11Mbps | - 2412MHz, Power Setting = 94<br>- 2437MHz, Power Setting = 93<br>- 2462MHz, Power Setting = 93    |
| 802.11g 54Mbps | - 2412MHz, Power Setting = 103<br>- 2437MHz, Power Setting = 102<br>- 2462MHz, Power Setting = 101 |
| 802.11n MCS7   | - 2412MHz, Power Setting = 99<br>- 2437MHz, Power Setting = 98<br>- 2462MHz, Power Setting = 97    |

### 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
- ANSI C63.10-2013, "American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices"
- Federal Communications Commission Office of Engineering and Technology Laboratory Division, Guidance For Compliance Measurements On Digital Transmission Systems, Frequency Hopping Spread Spectrum System, and Hybrid System Devices Operating Under Section 15.247 April 2, 2019 KDB 558074 D01v05r02
- RSS-Gen Issue 5, February 2021, Amendment 2, Innovation, Science, and Economic Development Canada, "General Requirements for Compliance of Radio Apparatus"
- RSS-247 Issue 2, February 2017, "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 Chamberlain Group, 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, 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°C   |
| Relative Humidity    | 23%    |
| Atmospheric Pressure | 1017mb |

### 13. Summary

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

| Test Description                           | Requirements               | Test Method      | S/N                              | Results  |
|--|----------------------------|------------------|----------------------------------|----------|
| Transmitter Conducted Emissions (AC Mains) | FCC 15.107<br>ISED RSS-GEN | ANSI C63.4:2014  | Radiated<br>Sample 2             | Conforms |
| 6dB Bandwidth                              | FCC 15.107<br>ISED RSS-GEN | ANSI C63.10:2013 | Antenna<br>Conducted<br>Sample 1 | Conforms |
| 99% Bandwidth                              | FCC 15.107<br>ISED RSS-GEN | ANSI C63.10:2013 | Antenna<br>Conducted<br>Sample 1 | ---      |
| Output Power                               | FCC 15.107<br>ISED RSS-GEN | ANSI C63.10:2013 | Antenna<br>Conducted<br>Sample 1 | Conforms |
| Power Spectral Density                     | FCC 15.247<br>ISED RSS-247 | ANSI C63.10:2013 | Antenna<br>Conducted<br>Sample 1 | Conforms |
| Low Band Edge                              | FCC 15.247<br>ISED RSS-247 | ANSI C63.10:2013 | Antenna<br>Conducted<br>Sample 1 | Conforms |
| Duty Cycle Correction Factor               | FCC 15.247<br>ISED RSS-247 | ANSI C63.10:2013 | Antenna<br>Conducted<br>Sample 1 | ---      |
| EIRP                                       | FCC 15.247<br>ISED RSS-247 | ANSI C63.10:2013 | Radiated<br>Sample 2             | Conforms |
| Spurious Radiated Emissions                | FCC 15.247<br>ISED RSS-247 | ANSI C63.10:2013 | Radiated<br>Sample 2             | Conforms |
| High Band Edge                             | FCC 15.247<br>ISED RSS-247 | ANSI C63.10:2013 | Radiated<br>Sample 2             | Conforms |

#### 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).

$$\text{Formula 1: } VL \text{ (dB}\mu\text{V)} = \text{MTR (dB}\mu\text{V)} + \text{CF (dB)}.$$

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.

$$\text{Formula 1: } FS \text{ (dB}\mu\text{V/m)} = \text{MTR (dB}\mu\text{V)} + \text{AF (dB/m)} + \text{CF (dB)} + (- \text{PA (dB)}) + \text{DC (dB)}$$

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

$$\text{Formula 2: } FS \text{ (\}\mu\text{V/m)} = \text{AntiLog } [(\text{FS (dB}\mu\text{V/m)})/20]$$

#### 15. Statement of Conformity

The Chamberlain Group, LLC Residential Jackshaft Openers, Model No. RJOA MPP, 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 EUTs on the test date specified. Any electrical or mechanical modifications made to the EUTs subsequent to the specified test date will serve to invalidate the data and void this certification.



17. Photographs of EUT





### 18. Equipment List

| Eq ID | Equipment Description           | Manufacturer       | Model No.                | Serial No.  | Frequency Range | Cal Date   | Due Date   |
|-------|---------------------------------|--------------------|--------------------------|-------------|-----------------|------------|------------|
| APW0  | PREAMPLIFIER                    | PLANAR ELECTRONICS | PE2-30-20G20R6G          | PL2926/0646 | 20GHZ-26.5GHZ   | 9/21/2022  | 9/21/2023  |
| APW14 | PREAMPLIFIER                    | PLANAR             | PE2-35-120-5R0-10-12-SFF | PL22671     | 1-20GHZ         | 9/21/2022  | 9/21/2023  |
| CDX7  | COMPUTER                        | ELITE              | WORKSTATION              |             |                 | N/A        |            |
| CDZ3  | LAB WORKSTATION                 | ELITE              | LWS-10                   |             | WINDOWS 10      | CNR        |            |
| GSFB  | OSP120 BASE UNIT                | ROHDE & SCHWARZ    | OSP120                   | 101246      | ---             | 5/11/2021  | 5/11/2023  |
| GSFE  | OSP120                          | ROHDE & SCHWARZ    | OSP120                   | 101288      | .01-40GHZ       | 6/11/2021  | 6/11/2023  |
| NHG1  | STANDARD GAIN HORN ANTENNA      | NARDA              | 638                      | ---         | 18-26.5GHZ      | NOTE 1     |            |
| NTA3  | BILOG ANTENNA                   | TESEQ              | 6112D                    | 32853       | 25-1000MHZ      | 11/17/2022 | 11/17/2024 |
| NWQ2  | DOUBLE RIDGED WAVEGUIDE ANTENNA | ETS LINDGREN       | 3117                     | 66659       | 1GHZ-18GHZ      | 4/27/2022  | 4/27/2024  |
| PLF2  | CISPR16 50UH LISN               | ELITE              | CISPR16/70A              | 002         | .15-30MHz       | 4/5/2022   | 4/5/2023   |
| PLF4  | CISPR16 50UH LISN               | ELITE              | CISPR16/70A              | 003         | .15-30MHz       | 4/5/2022   | 4/5/2023   |
| RBE0  | EMI ANALYZER                    | ROHDE & SCHWARZ    | ESU26                    | 100095      | 20Hz-26GHZ      | 3/7/2022   | 3/7/2023   |
| RBG2  | EMI ANALYZER                    | ROHDE & SCHWARZ    | ESW44                    | 101591      | 2HZ-44GHZ       | 3/31/2022  | 3/31/2023  |
| RBG3  | EMI ANALYZER                    | ROHDE & SCHWARZ    | ESW44                    | 101592      | 2HZ-44GHZ       | 4/7/2022   | 4/7/2023   |
| SES0  | 24VDC POWER SUPPLY              | P-TRANS            | FS-32024-1M              | 001         | 18-27VDC        | NOTE 1     |            |
| T1E16 | 10DB 25W ATTENUATOR             | WEINSCHTEL         | 46-10-43                 | CM5685      | DC-18GHZ        | 5/18/2022  | 5/18/2024  |
| T1E8  | 10DB 25W ATTENUATOR             | WEINSCHTEL         | 46-10-34                 | BH7996      | DC-18GHZ        | 1/12/2022  | 1/12/2024  |
| VBR8  | CISPR EN FCC CE VOLTAGE.exe     |                    |                          |             |                 | N/A        |            |
| WKA1  | SOFTWARE, UNIVERSAL RCV EMI     | ELITE              | UNIV_RCV_EMI             | 1           | ---             | I/O        |            |
| XOB2  | ADAPTER                         | HEWLETT PACKARD    | K281C,012                | 09407       | 18-26.5GHZ      | NOTE 1     |            |
| XPQ4  | HIGH PASS FILTER                | K&L MICROWAVE      | 11SH10-4800/X20000-O/O   | 1           | 4.8-20GHZ       | 9/7/2021   | 9/7/2023   |

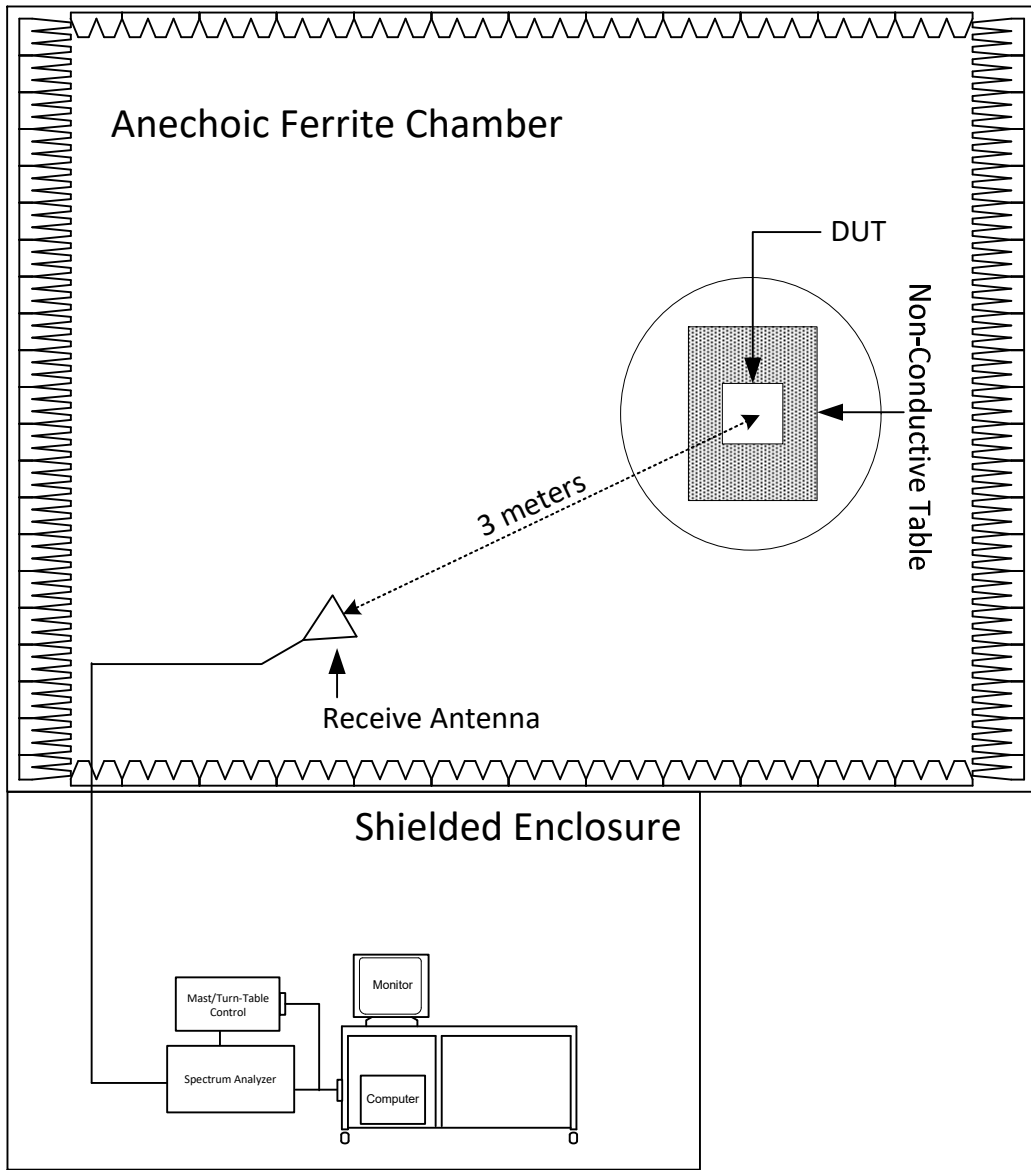
N/A: Not Applicable

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     | Chamberlain Group, LLC                           |
| Product          | Residential Jackshaft Opener                     |
| Model No.        | RJOA MPP   |
| Serial No.       | Radiated Sample 2                                |
| Mode             | Transmit at 2437MHz, 802.11b, 11MBPS, power = 93 |

| Test Setup Details                          |                    |
|---|--------------------|
| Setup Format                                | Tabletop           |
| Height of Support (For Floor Standing only) | N/A                |
| Type of Test Site                           | Shielded Enclosure |
| Test Site Used                              | Room #23S          |
| 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 to 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.

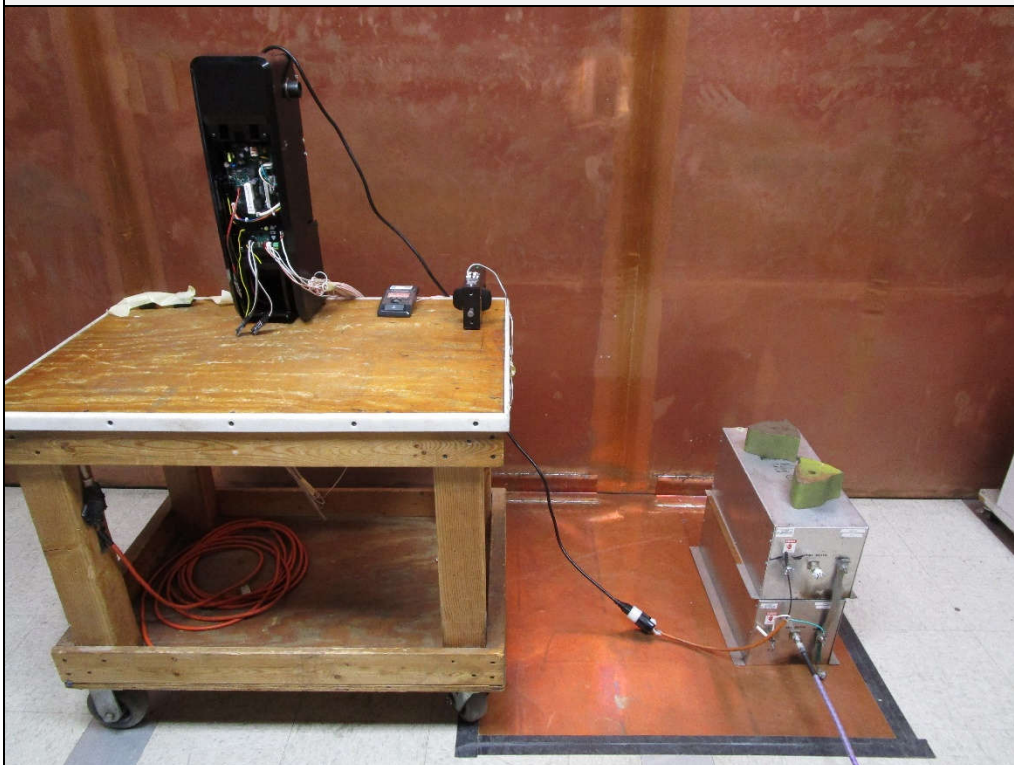
- 1) The EUT was operated in the Transmit at 2437MHz, 802.11b, 11MBPS, power = 93 mode.
- 2) Measurements were first made on the 120V, 60Hz high line.
- 3) The frequency range from 150kHz to 30MHz was broken up into smaller frequency sub-bands.
- 4) Conducted emissions measurements were taken on the first frequency sub-band using a peak detector.
- 5) The data thus obtained was then searched by the computer for the highest levels. Any emissions levels that were within 3dB of the average limit were then measured again using both a quasi-peak detector and an average detector. (If no peak readings were within 3dB of the average limit, quasi-peak and average readings were taken on the highest emissions levels measured during the peak detector scan.)
- 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).

$$\text{Formula 1: } VL \text{ (dB}\mu\text{V)} = \text{MTR (dB}\mu\text{V)} + \text{CF (dB)}$$

- 7) Steps (3) through (6) were repeated on the 120V, 60Hz return line.



Test Setup for RF Conducted Emissions (AC Mains)



Test Setup for RF Conducted Emissions (AC Mains)

## FCC Part 15 Subpart C 2017-2022 Conducted Emissions Test Significant Emissions Data

VBR8 11/08/2022

Manufacturer : Chamberlain  
 Model : RJOA MPP  
 DUT Revision :  
 Serial Number : Radiated Sample 2  
 DUT Mode : Tx @ 914.75MHz, Realtek WiFi 802.11b 11MBPS, Ch. 6, power = 93  
 Line Tested : 120V, 60Hz high  
 Scan Step Time [ms] : 30  
 Meas. Threshold [dB] : -3  
 Notes : Security 3.0 BLE Tx @ 2402MHz power = 9dBm  
 Test Engineer : M. Longinotti  
 Limit : 15.207  
 Test Date : Nov 28, 2022 02:44:56 PM  
 Data Filter : Up to 80 maximum levels detected with 6 dB level excursion threshold over 3 dB margin below limit

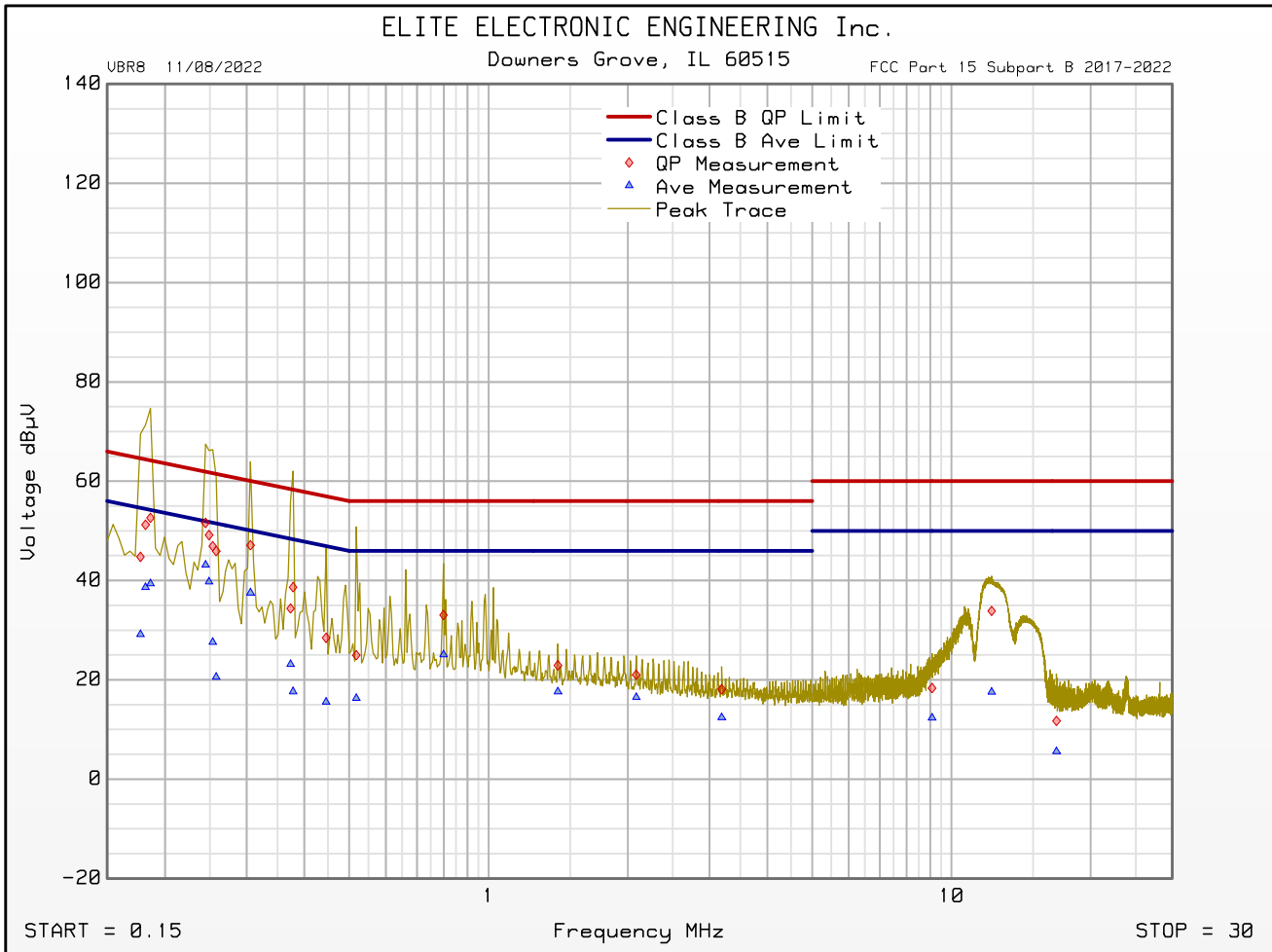
| Freq MHz | Quasi-peak Level dB $\mu$ V | Quasi-peak Limit dB $\mu$ V | Excessive Quasi-peak Emissions | Average Level dB $\mu$ V | Average Limit dB $\mu$ V | Excessive Average Emissions |
|----------|-----------------------------|-----------------------------|--------------------------------|--------------------------|--------------------------|-----------------------------|
| 0.245    | 51.6                        | 61.9                        |                                | 43.2                     | 51.9                     |                             |
| 0.306    | 47.1                        | 60.1                        |                                | 37.5                     | 50.1                     |                             |
| 0.518    | 25.0                        | 56.0                        |                                | 16.3                     | 46.0                     |                             |
| 0.799    | 33.1                        | 56.0                        |                                | 25.1                     | 46.0                     |                             |
| 1.412    | 22.9                        | 56.0                        |                                | 17.6                     | 46.0                     |                             |
| 2.084    | 21.0                        | 56.0                        |                                | 16.5                     | 46.0                     |                             |
| 3.190    | 18.1                        | 56.0                        |                                | 12.4                     | 46.0                     |                             |
| 9.077    | 18.3                        | 60.0                        |                                | 12.4                     | 50.0                     |                             |
| 12.213   | 33.9                        | 60.0                        |                                | 17.6                     | 50.0                     |                             |
| 16.867   | 11.7                        | 60.0                        |                                | 5.6                      | 50.0                     |                             |



# FCC Part 15 Subpart C 2017-2022 Conducted Emissions Test Cumulative Data

VBR8 11/08/2022

Manufacturer : Chamberlain  
 Model : RJOA MPP  
 DUT Revision :  
 Serial Number : Radiated Sample 2  
 DUT Mode : Tx @ 914.75MHz, Realtek WiFi 802.11b 11MBPS, Ch. 6, power = 93  
 Line Tested : 120V, 60Hz high  
 Scan Step Time [ms] : 30  
 Meas. Threshold [dB] : -3  
 Notes : Security 3.0 BLE Tx @ 2402MHz power = 9dBm  
 Test Engineer : M. Longinotti  
 Limit : 15.207  
 Test Date : Nov 28, 2022 02:44:56 PM



Emissions Meet QP Limit  
 Emissions Meet Ave Limit

## FCC Part 15 Subpart C 2017-2022 Conducted Emissions Test Significant Emissions Data

VBR8 11/08/2022

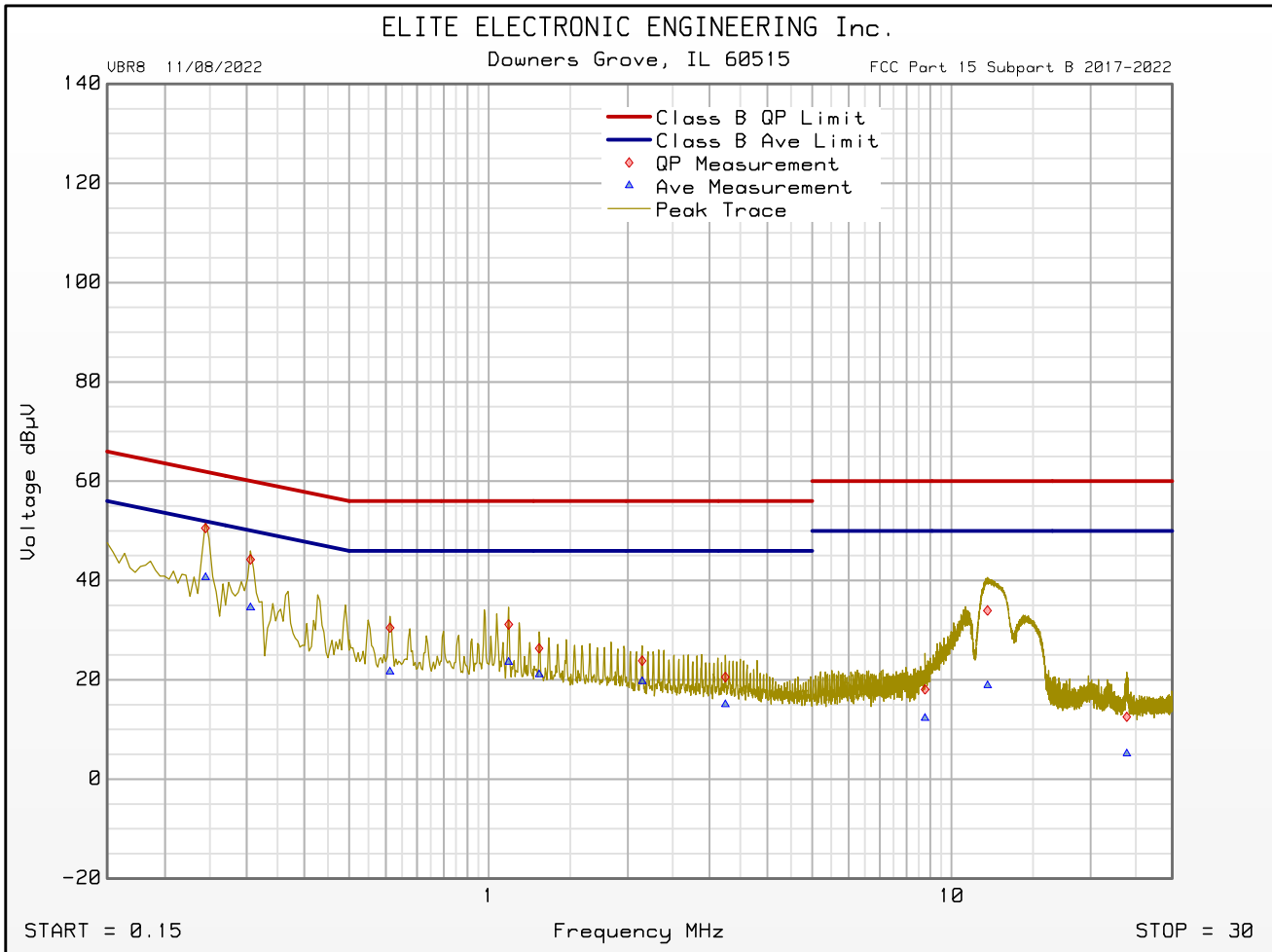
Manufacturer : Chamberlain  
 Model : RJOA MPP  
 DUT Revision :  
 Serial Number : Radiated Sample 2  
 DUT Mode : Tx @ 914.75MHz, Realtek WiFi 802.11b 11MBPS, Ch. 6, power = 93  
 Line Tested : 120V, 60Hz return  
 Scan Step Time [ms] : 30  
 Meas. Threshold [dB] : -3  
 Notes : Security 3.0 BLE Tx @ 2402MHz power = 9dBm  
 Test Engineer : M. Longinotti  
 Limit : 15.207  
 Test Date : Nov 28, 2022 02:50:26 PM  
 Data Filter : Up to 80 maximum levels detected with 6 dB level excursion threshold over 3 dB margin below limit

| Freq MHz | Quasi-peak Level dB $\mu$ V | Quasi-peak Limit dB $\mu$ V | Excessive Quasi-peak Emissions | Average Level dB $\mu$ V | Average Limit dB $\mu$ V | Excessive Average Emissions |
|----------|-----------------------------|-----------------------------|--------------------------------|--------------------------|--------------------------|-----------------------------|
| 0.245    | 50.5                        | 61.9                        |                                | 40.6                     | 51.9                     |                             |
| 0.306    | 44.2                        | 60.1                        |                                | 34.5                     | 50.1                     |                             |
| 0.613    | 30.5                        | 56.0                        |                                | 21.6                     | 46.0                     |                             |
| 1.105    | 31.1                        | 56.0                        |                                | 23.6                     | 46.0                     |                             |
| 1.286    | 26.3                        | 56.0                        |                                | 21.1                     | 46.0                     |                             |
| 2.147    | 23.9                        | 56.0                        |                                | 19.7                     | 46.0                     |                             |
| 3.248    | 20.5                        | 56.0                        |                                | 15.1                     | 46.0                     |                             |
| 8.771    | 18.1                        | 60.0                        |                                | 12.3                     | 50.0                     |                             |
| 11.961   | 34.0                        | 60.0                        |                                | 18.9                     | 50.0                     |                             |
| 23.914   | 12.5                        | 60.0                        |                                | 5.1                      | 50.0                     |                             |

# FCC Part 15 Subpart C 2017-2022 Conducted Emissions Test Cumulative Data

VBR8 11/08/2022

Manufacturer : Chamberlain  
 Model : RJOA MPP  
 DUT Revision :  
 Serial Number : Radiated Sample 2  
 DUT Mode : Tx @ 914.75MHz, Realtek WiFi 802.11b 11MBPS, Ch. 6, power = 93  
 Line Tested : 120V, 60Hz return  
 Scan Step Time [ms] : 30  
 Meas. Threshold [dB] : -3  
 Notes : Security 3.0 BLE Tx @ 2402MHz power = 9dBm  
 Test Engineer : M. Longinotti  
 Limit : 15.207  
 Test Date : Nov 28, 2022 02:50:26 PM



Emissions Meet QP Limit  
 Emissions Meet Ave Limit

21. Antenna Port Conducted Emissions Tests

| Test Information |   |
|------------------|---|
| Manufacturer     | Chamberlain Group, LLC  |
| Product          | Residential Jackshaft Opener  |
| Model No.        | RJOA MPP  |
| Serial No.       | Antenna Conducted Sample 1  |
| Mode             | Transmit at 2412MHz, 802.11b, 11MBPS, power = 94<br>Transmit at 2437MHz, 802.11b, 11MBPS, power = 93<br>Transmit at 2462MHz, 802.11b, 11MBPS, power = 93<br>Transmit at 2412MHz, 802.11g, 54MBPS, power = 103<br>Transmit at 2437MHz, 802.11g, 54MBPS, power = 102<br>Transmit at 2462MHz, 802.11g, 54MBPS, power = 101<br>Transmit at 2412MHz, 802.11n, MCS7, power = 99<br>Transmit at 2437MHz, 802.11n, MCS7, power = 98<br>Transmit at 2462MHz, 802.11n, MCS7, power = 98 |

| Test Setup Details                             |           |
|--|-----------|
| Setup Format                                   | Tabletop  |
| Height of Support<br>(For Floor Standing only) | N/A       |
| Type of Test Site                              | EMC Bench |
| Note   | None      |

| Measurement Uncertainty           |                                  |
|-----------------------------------|----------------------------------|
| Measurement Type                  | Expanded Measurement Uncertainty |
| Occupied Channel Bandwidth        | ± 224kHz                         |
| Power Spectral Density            | ± 0.372Hz                        |
| RF Output Power, Conducted        | ± 0.349 dB                       |
| Unwanted Emissions, Conducted     | ± 1.39 dB                        |
| All Emissions Radiated Below 1GHz | ± 2.629 dB                       |
| All Emissions Radiated Above 1GHz | ± 2.710 dB                       |
| Temperature                       | ± 0.165°C                        |
| Humidity                          | ± 1.7% RH                        |
| DC and Low Frequency Voltages     | ± 0.115 Volts                    |
| Time                              | ± 0.05%                          |

| Requirements  |
|---|
| <p><u>6dB Bandwidth (DTS Bandwidth):</u></p> <p>Per FCC 15.247, Section (a)(2), and ISED RSS-247, Section 5.2(a), the minimum 6dB bandwidth shall be at least 500kHz for all systems using digital modulation techniques.</p>   |
| <p><u>99% Bandwidth:</u></p> <p>RSS-Gen requires the measurement of the 99% bandwidth (Occupied Bandwidth).</p>   |
| <p><u>Peak Conducted Output Power:</u></p> <p>Per FCC 15.247, Section (b)(3) and ISED RSS-247, Section 5.4(d), for systems using digital modulation, the maximum peak conducted output power shall not exceed 1 watt.</p>   |
| <p><u>Peak Power Spectral Density:</u></p> <p>Per FCC 15.247, Section (e), and ISED RSS-247, Section 5.2(b), for digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. If peak conducted output power was measured, the same method must be used to measure the power spectral density.</p>   |
| <p><u>Low Band Edge:</u></p> <p>Per FCC 15.247, Section (d) and ISED RSS-247, Section 5.5, in any 100 kHz bandwidth outside the frequency band in which the digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. Attenuation below the general limits specified in FCC 15.209, Section (a) and ISED RSS-Gen is not required.</p> |
| <p><u>Duty Cycle Correction Factor:</u></p> <p>Per ANSI C63.10, Section 11.6, duty cycle refers to the fraction of time over which the transmitter is ON and is transmitting at its maximum power control level.</p> <p>When continuous transmission cannot be achieved, measurement of the duty cycle can be used to measure the average power.</p>  |

| Procedures   |                                |                               |                     |                                |          |        |          |         |                    |          |                 |          |
|--|--------------------------------|-------------------------------|---------------------|--------------------------------|----------|--------|----------|---------|--------------------|----------|-----------------|----------|
| <p><u>6dB Bandwidth (DTS Bandwidth):</u></p> <p>C63.10-2013 Section 11.8 Option 1:</p> <p>a) The following settings were employed on the EMI Test Receiver:</p> <table style="margin-left: 40px;"> <tr> <td>1. Center Frequency =</td> <td>Transmit Frequency of the EUT</td> </tr> <tr> <td>2. Frequency Span =</td> <td>2 x Occupied Channel Bandwidth</td> </tr> <tr> <td>3. RBW =</td> <td>100kHz</td> </tr> <tr> <td>4. VBW =</td> <td>3 x RBW</td> </tr> <tr> <td>5. Detector Mode =</td> <td>Max Peak</td> </tr> <tr> <td>6. Trace Mode =</td> <td>Max Hold</td> </tr> </table> <p>b) Allow the trace to stabilize.</p> | 1. Center Frequency =          | Transmit Frequency of the EUT | 2. Frequency Span = | 2 x Occupied Channel Bandwidth | 3. RBW = | 100kHz | 4. VBW = | 3 x RBW | 5. Detector Mode = | Max Peak | 6. Trace Mode = | Max Hold |
| 1. Center Frequency =  | Transmit Frequency of the EUT  |                               |                     |                                |          |        |          |         |                    |          |                 |          |
| 2. Frequency Span =  | 2 x Occupied Channel Bandwidth |                               |                     |                                |          |        |          |         |                    |          |                 |          |
| 3. RBW =   | 100kHz                         |                               |                     |                                |          |        |          |         |                    |          |                 |          |
| 4. VBW =   | 3 x RBW                        |                               |                     |                                |          |        |          |         |                    |          |                 |          |
| 5. Detector Mode =   | Max Peak                       |                               |                     |                                |          |        |          |         |                    |          |                 |          |
| 6. Trace Mode =  | Max Hold                       |                               |                     |                                |          |        |          |         |                    |          |                 |          |

- c) Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).
- d) Determine the 6dB down amplitude.
- e) Place two markers, one at the lowest frequency and the other at the highest frequency of the envelope trace, such that each marker is at or slightly below the 6dB down amplitude determined in step d). If a marker is below this 6dB down amplitude value, then it shall be as close as possible to this value. The occupied bandwidth is the frequency difference between the two markers.

#### 99% Bandwidth:

C63.10-2013 section 6.9.3:

- a) The following settings were employed on the EMI Test Receiver:
  1. Center Frequency = Transmit Frequency of the EUT
  2. Frequency Span = Between 1.5 and 5 times the OBW
  3. RBW = Between 1% to 5% of the OBW
  4. VBW = Approximately 3 x RBW
  5. Detector Mode = Max Peak
  6. Trace Mode = Max Hold
- b) Allow the trace to stabilize.
- c) Use the 99% power bandwidth function of the EMI receiver.

#### Peak Conducted Output Power:

C63.10-2013 section 11.9.1.1:

- a) The following settings were employed on the EMI Test Receiver:
  1. Center Frequency = Transmit Frequency of the EUT
  2. RBW =  $\geq$  DTS Bandwidth
  3. VBW =  $\geq 3 \times$  RBW
  4. Span =  $\geq 3 \times$  RBW
  5. Sweep Time = Auto couple
  6. Detector Mode = Max Peak
  7. Trace Mode = Max Hold
- b) Allow the trace to stabilize.
- c) Use the peak marker function to determine the peak amplitude level.

#### Peak Power Spectral Density:

C63.10-20013 section 11.10.2:

- a) The following settings were employed on the EMI Test Receiver:
  1. Center Frequency = Transmit Frequency of the EUT
  2. Frequency Span = At least 1.5 times the OBW
  3. RBW =  $3\text{kHz} \leq \text{RBW} \leq 100\text{kHz}$
  4. VBW =  $\geq 3 \times$  RBW
  5. Detector Mode = Max Peak
  6. Sweep Time = Auto Couple
  7. Trace Mode = Max Hold
- b) Allow the trace to stabilize.

- c) Use the peak marker function to determine the maximum amplitude level within the RBW.
- d) If measured value exceeds requirement, then reduce RBW (but no less than 3kHz) and repeat.

Low Band Edge:

C63.10-2013 section 11.11:

a) Reference Level Measurement

1. Start Frequency = 2400MHz
2. Stop Frequency = 2483.5MHz
3. RBW = 100kHz
4. VBW =  $\geq 3 \times \text{RBW}$
5. Detector Mode = Max Peak
6. Trace Mode = Max Hold
7. Sweep Time = Auto

- b) Allow the trace to stabilize and use the peak marker function to determine the maximum level.

c) Emission Level Measurement

1. Start Frequency = 2310MHz
2. Stop Frequency = 2400MHz
3. RBW = 100kHz
4. VBW =  $\geq 3 \times \text{RBW}$
5. Detector Mode = Max Peak
6. Trace Mode = Max Hold
7. Sweep Time = Auto

- d) Allow the trace to stabilize and use the peak marker function to determine the maximum level.

- e) The two sweeps were combined and plotted.

- f) Ensure that the amplitude of all unwanted emissions are attenuated by at least 20dB.

Duty Cycle Correction Factor:

C63.10-2013 section 7.5 and 11.6

- a) The following settings were employed on the EMI Test Receiver:

1. Center Frequency = Transmit Frequency of the EUT
2. Frequency Span = 0Hz
3. RBW =  $\geq \text{OBW}$  if possible; otherwise set RBW as large as possible
4. VBW =  $\geq \text{RBW}$
5. Detector Mode = Peak or RMS
6. Number of Measurement Points  $\geq 2 \times \text{span/RBW}$

- b) Measure the ON and OFF times of the transmitted signal

$$\text{Duty Cycle (D)} = \frac{\text{ON TIME}}{(\text{ON TIME} + \text{OFF TIME})}$$

## 6dB Bandwidth



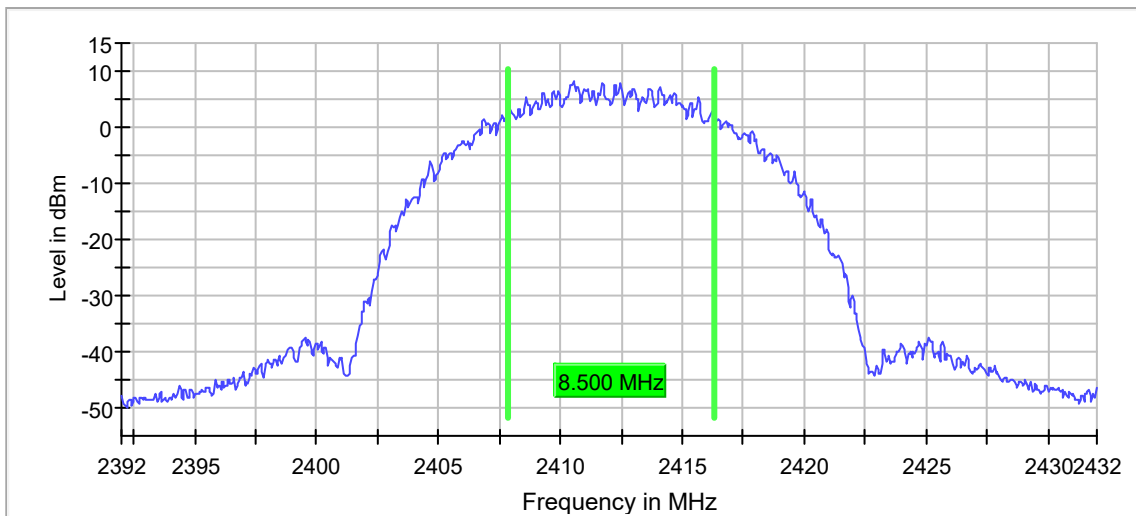
| EUT Information |  |
|-----------------|--|
| Manufacturer    | Chamberlain Group, LLC                           |
| Product         | Residential Jackshaft Opener                     |
| Model No.       | RJOA MPP   |
| Serial No.      | Antenna Conducted Sample 1                       |
| Mode            | Transmit at 2412MHz, 802.11b, 11MBPS, power = 94 |
| Date Tested     | November 29, 2022                                |

### 6 dB Bandwidth

| DUT Frequency (MHz) | Bandwidth (MHz) | Limit Min (MHz) | Limit Max (MHz) | Band Edge Left (MHz) | Band Edge Right (MHz) |
|---------------------|-----------------|-----------------|-----------------|----------------------|-----------------------|
| 2412.000000         | 8.500000        | 0.500000        | ---             | 2407.825000          | 2416.325000           |

(continuation of the "6 dB Bandwidth" table from column 6 ...)

| DUT Frequency (MHz) | Max Level (dBm) | Result |
|---------------------|-----------------|--------|
| 2412.000000         | 8.3             | PASS   |



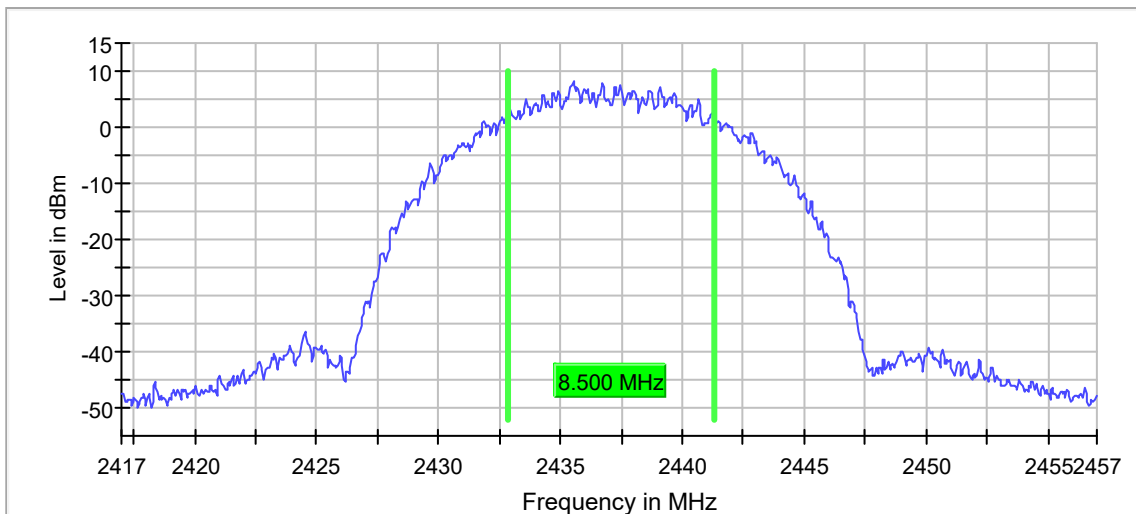
| EUT Information |  |
|-----------------|--|
| Manufacturer    | Chamberlain Group, LLC                           |
| Product         | Residential Jackshaft Opener                     |
| Model No.       | RJOA MPP   |
| Serial No.      | Antenna Conducted Sample 1                       |
| Mode            | Transmit at 2437MHz, 802.11b, 11MBPS, power = 93 |
| Date Tested     | November 29, 2022                                |

### 6 dB Bandwidth

| DUT Frequency (MHz) | Bandwidth (MHz) | Limit Min (MHz) | Limit Max (MHz) | Band Edge Left (MHz) | Band Edge Right (MHz) |
|---------------------|-----------------|-----------------|-----------------|----------------------|-----------------------|
| 2437.000000         | 8.500000        | 0.500000        | ---             | 2432.825000          | 2441.325000           |

(continuation of the "6 dB Bandwidth" table from column 6 ...)

| DUT Frequency (MHz) | Max Level (dBm) | Result |
|---------------------|-----------------|--------|
| 2437.000000         | 8.1             | PASS   |



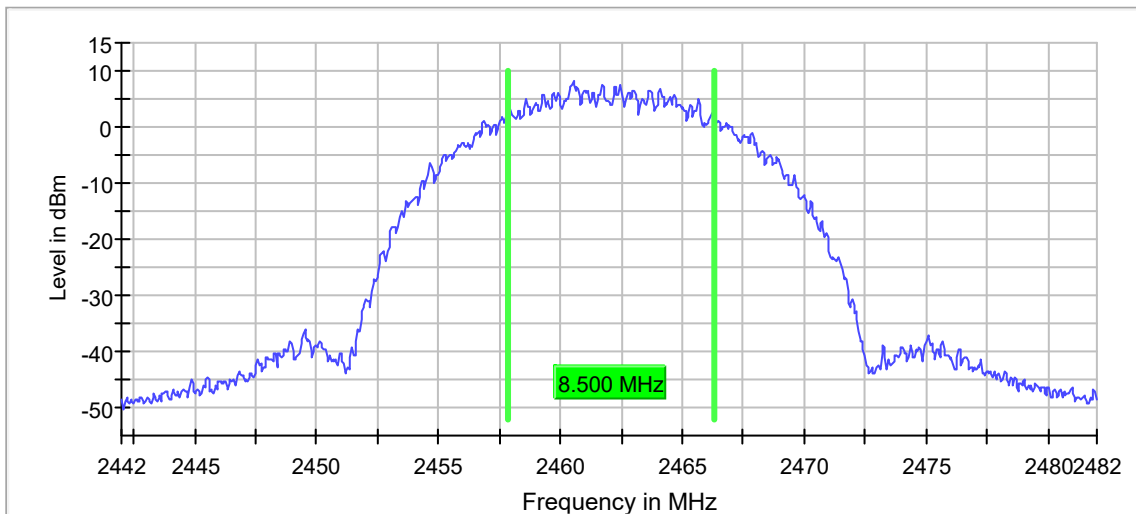
| EUT Information |  |
|-----------------|--|
| Manufacturer    | Chamberlain Group, LLC                           |
| Product         | Residential Jackshaft Opener                     |
| Model No.       | RJOA MPP   |
| Serial No.      | Antenna Conducted Sample 1                       |
| Mode            | Transmit at 2462MHz, 802.11b, 11MBPS, power = 93 |
| Date Tested     | November 29, 2022                                |

### 6 dB Bandwidth

| DUT Frequency (MHz) | Bandwidth (MHz) | Limit Min (MHz) | Limit Max (MHz) | Band Edge Left (MHz) | Band Edge Right (MHz) |
|---------------------|-----------------|-----------------|-----------------|----------------------|-----------------------|
| 2462.000000         | 8.500000        | 0.500000        | ---             | 2457.825000          | 2466.325000           |

(continuation of the "6 dB Bandwidth" table from column 6 ...)

| DUT Frequency (MHz) | Max Level (dBm) | Result |
|---------------------|-----------------|--------|
| 2462.000000         | 8.1             | PASS   |



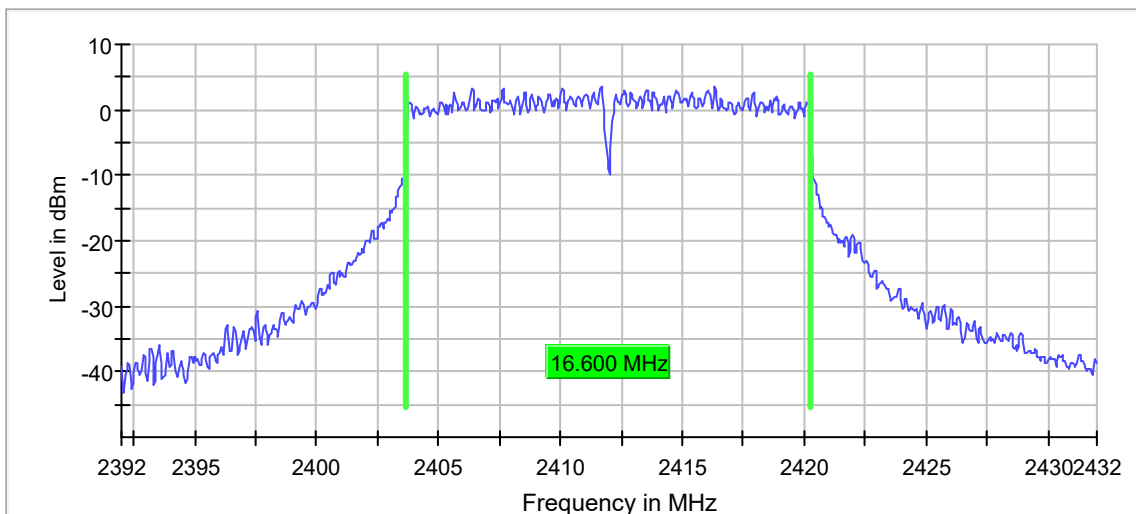
| EUT Information |   |
|-----------------|---|
| Manufacturer    | Chamberlain Group, LLC                            |
| Product         | Residential Jackshaft Opener                      |
| Model No.       | RJOA MPP  |
| Serial No.      | Antenna Conducted Sample 1                        |
| Mode            | Transmit at 2412MHz, 802.11g, 54MBPS, power = 103 |
| Date Tested     | November 29, 2022                                 |

### 6 dB Bandwidth

| DUT Frequency (MHz) | Bandwidth (MHz) | Limit Min (MHz) | Limit Max (MHz) | Band Edge Left (MHz) | Band Edge Right (MHz) |
|---------------------|-----------------|-----------------|-----------------|----------------------|-----------------------|
| 2412.000000         | 16.600000       | 0.500000        | ---             | 2403.675000          | 2420.275000           |

(continuation of the "6 dB Bandwidth" table from column 6 ...)

| DUT Frequency (MHz) | Max Level (dBm) | Result |
|---------------------|-----------------|--------|
| 2412.000000         | 3.5             | PASS   |



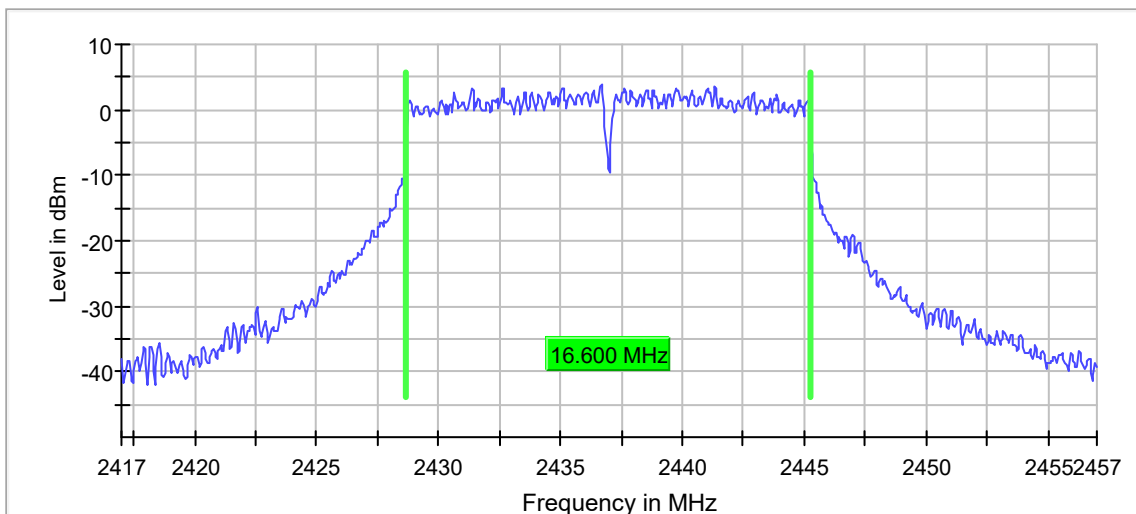
| EUT Information |   |
|-----------------|---|
| Manufacturer    | Chamberlain Group, LLC                            |
| Product         | Residential Jackshaft Opener                      |
| Model No.       | RJOA MPP  |
| Serial No.      | Antenna Conducted Sample 1                        |
| Mode            | Transmit at 2437MHz, 802.11g, 54MBPS, power = 102 |
| Date Tested     | November 29, 2022                                 |

### 6 dB Bandwidth

| DUT Frequency (MHz) | Bandwidth (MHz) | Limit Min (MHz) | Limit Max (MHz) | Band Edge Left (MHz) | Band Edge Right (MHz) |
|---------------------|-----------------|-----------------|-----------------|----------------------|-----------------------|
| 2437.000000         | 16.600000       | 0.500000        | ---             | 2428.675000          | 2445.275000           |

(continuation of the "6 dB Bandwidth" table from column 6 ...)

| DUT Frequency (MHz) | Max Level (dBm) | Result |
|---------------------|-----------------|--------|
| 2437.000000         | 3.8             | PASS   |



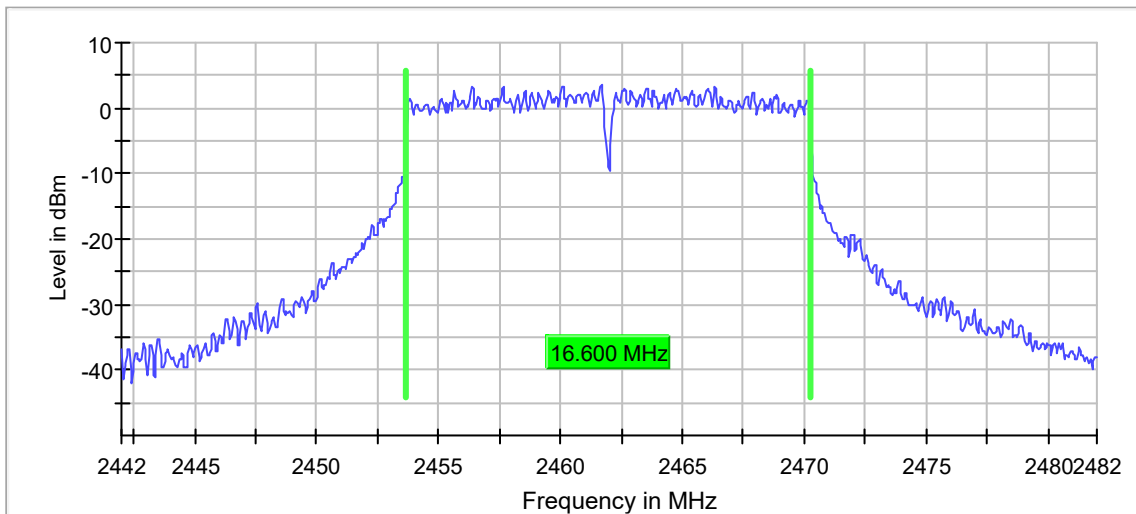
| EUT Information |   |
|-----------------|---|
| Manufacturer    | Chamberlain Group, LLC                            |
| Product         | Residential Jackshaft Opener                      |
| Model No.       | RJOA MPP  |
| Serial No.      | Antenna Conducted Sample 1                        |
| Mode            | Transmit at 2462MHz, 802.11g, 54MBPS, power = 101 |
| Date Tested     | November 29, 2022                                 |

### 6 dB Bandwidth

| DUT Frequency (MHz) | Bandwidth (MHz) | Limit Min (MHz) | Limit Max (MHz) | Band Edge Left (MHz) | Band Edge Right (MHz) |
|---------------------|-----------------|-----------------|-----------------|----------------------|-----------------------|
| 2462.000000         | 16.600000       | 0.500000        | ---             | 2453.675000          | 2470.275000           |

(continuation of the "6 dB Bandwidth" table from column 6 ...)

| DUT Frequency (MHz) | Max Level (dBm) | Result |
|---------------------|-----------------|--------|
| 2462.000000         | 3.6             | PASS   |



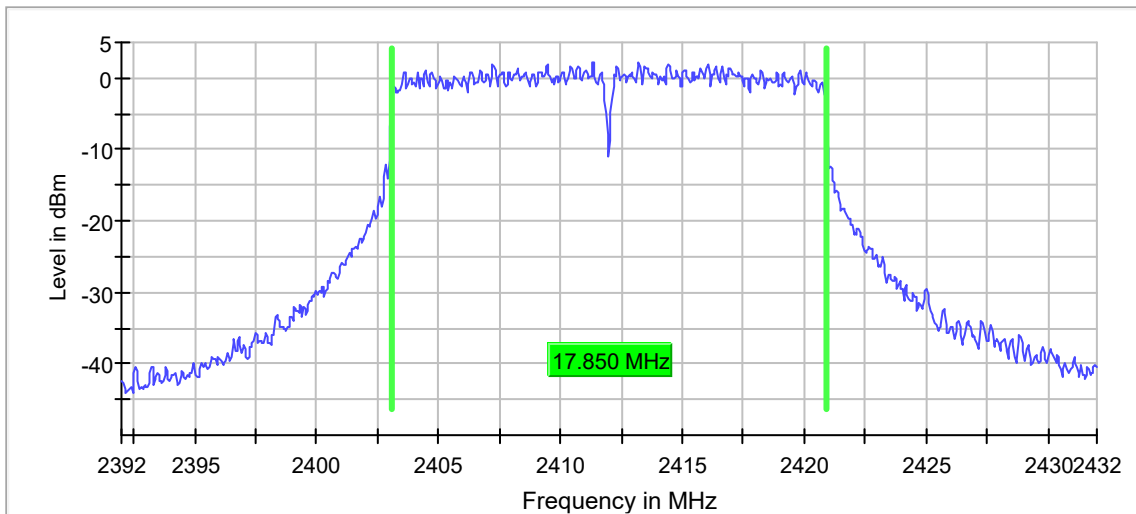
| EUT Information |  |
|-----------------|--|
| Manufacturer    | Chamberlain Group, LLC                         |
| Product         | Residential Jackshaft Opener                   |
| Model No.       | RJOA MPP                                       |
| Serial No.      | Antenna Conducted Sample 1                     |
| Mode            | Transmit at 2412MHz, 802.11n, MCS7, power = 99 |
| Date Tested     | November 29, 2022                              |

### 6 dB Bandwidth

| DUT Frequency (MHz) | Bandwidth (MHz) | Limit Min (MHz) | Limit Max (MHz) | Band Edge Left (MHz) | Band Edge Right (MHz) |
|---------------------|-----------------|-----------------|-----------------|----------------------|-----------------------|
| 2412.000000         | 17.850000       | 0.500000        | ---             | 2403.075000          | 2420.925000           |

(continuation of the "6 dB Bandwidth" table from column 6 ...)

| DUT Frequency (MHz) | Max Level (dBm) | Result |
|---------------------|-----------------|--------|
| 2412.000000         | 2.2             | PASS   |



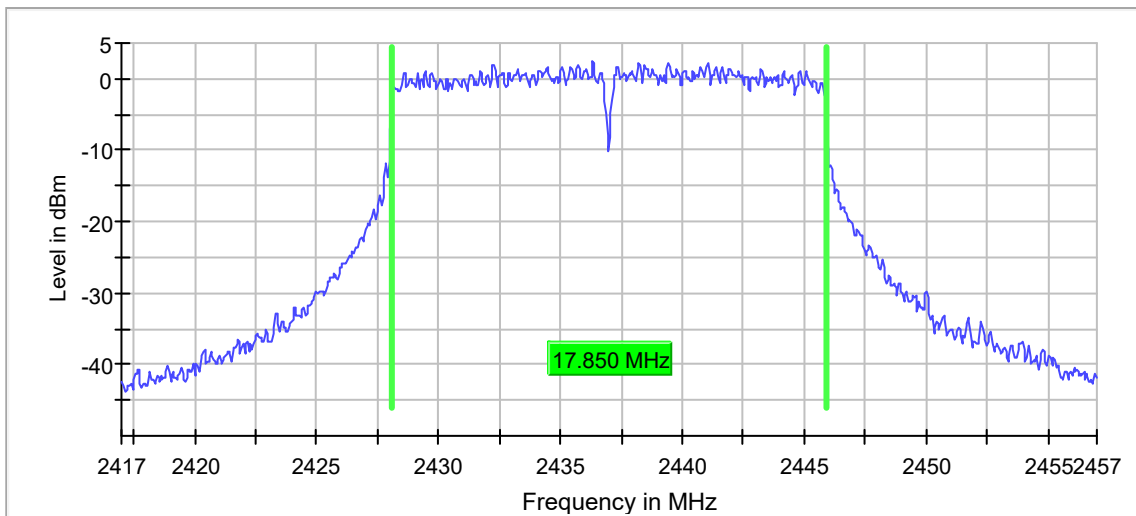
| EUT Information |  |
|-----------------|--|
| Manufacturer    | Chamberlain Group, LLC                         |
| Product         | Residential Jackshaft Opener                   |
| Model No.       | RJOA MPP                                       |
| Serial No.      | Antenna Conducted Sample 1                     |
| Mode            | Transmit at 2437MHz, 802.11n, MCS7, power = 98 |
| Date Tested     | November 29, 2022                              |

### 6 dB Bandwidth

| DUT Frequency (MHz) | Bandwidth (MHz) | Limit Min (MHz) | Limit Max (MHz) | Band Edge Left (MHz) | Band Edge Right (MHz) |
|---------------------|-----------------|-----------------|-----------------|----------------------|-----------------------|
| 2437.000000         | 17.850000       | 0.500000        | ---             | 2428.075000          | 2445.925000           |

(continuation of the "6 dB Bandwidth" table from column 6 ...)

| DUT Frequency (MHz) | Max Level (dBm) | Result |
|---------------------|-----------------|--------|
| 2437.000000         | 2.3             | PASS   |





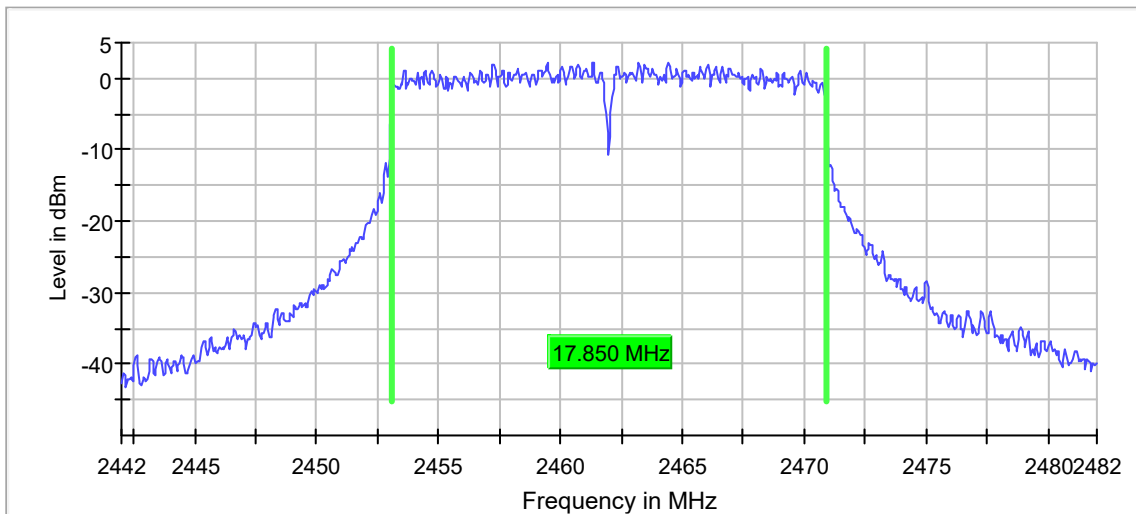
| EUT Information |  |
|-----------------|--|
| Manufacturer    | Chamberlain Group, LLC                         |
| Product         | Residential Jackshaft Opener                   |
| Model No.       | RJOA MPP                                       |
| Serial No.      | Antenna Conducted Sample 1                     |
| Mode            | Transmit at 2462MHz, 802.11n, MCS7, power = 98 |
| Date Tested     | November 29, 2022                              |

### 6 dB Bandwidth

| DUT Frequency (MHz) | Bandwidth (MHz) | Limit Min (MHz) | Limit Max (MHz) | Band Edge Left (MHz) | Band Edge Right (MHz) |
|---------------------|-----------------|-----------------|-----------------|----------------------|-----------------------|
| 2462.000000         | 17.850000       | 0.500000        | ---             | 2453.075000          | 2470.925000           |

(continuation of the "6 dB Bandwidth" table from column 6 ...)

| DUT Frequency (MHz) | Max Level (dBm) | Result |
|---------------------|-----------------|--------|
| 2462.000000         | 2.2             | PASS   |



## 99% Bandwidth

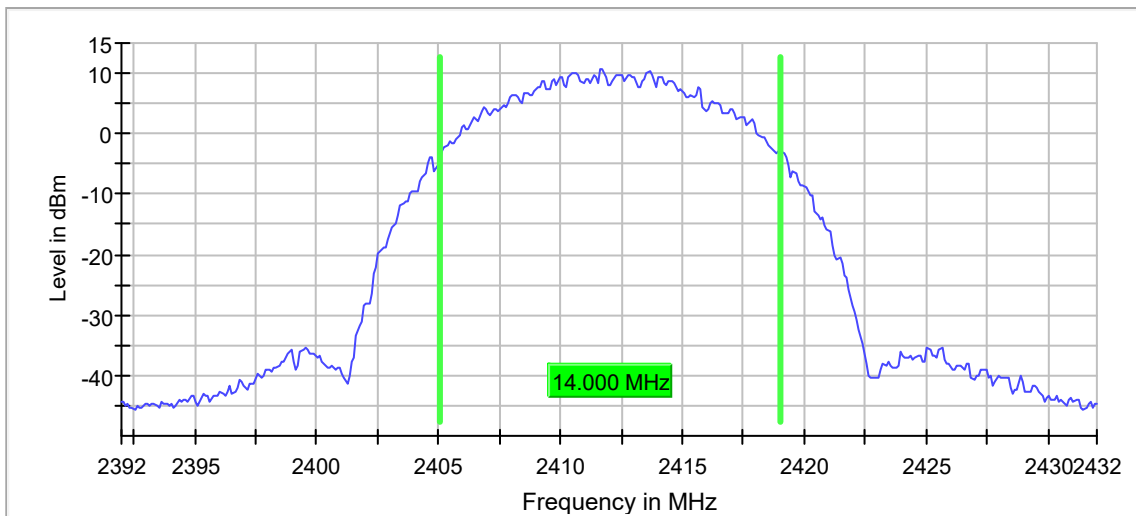
| EUT Information |  |
|-----------------|--|
| Manufacturer    | Chamberlain Group, LLC                           |
| Product         | Residential Jackshaft Opener                     |
| Model No.       | RJOA MPP   |
| Serial No.      | Antenna Conducted Sample 1                       |
| Mode            | Transmit at 2412MHz, 802.11b, 11MBPS, power = 94 |
| Date Tested     | November 29, 2022                                |

### 99 % Bandwidth

| DUT Frequency (MHz) | Bandwidth (MHz) | Limit Min (MHz) | Limit Max (MHz) | Band Edge Left (MHz) | Band Edge Right (MHz) |
|---------------------|-----------------|-----------------|-----------------|----------------------|-----------------------|
| 2412.000000         | 14.000000       | ---             | ---             | 2405.050000          | 2419.050000           |

(continuation of the "99 % Bandwidth" table from column 6 ...)

| DUT Frequency (MHz) | Result |
|---------------------|--------|
| 2412.000000         | PASS   |



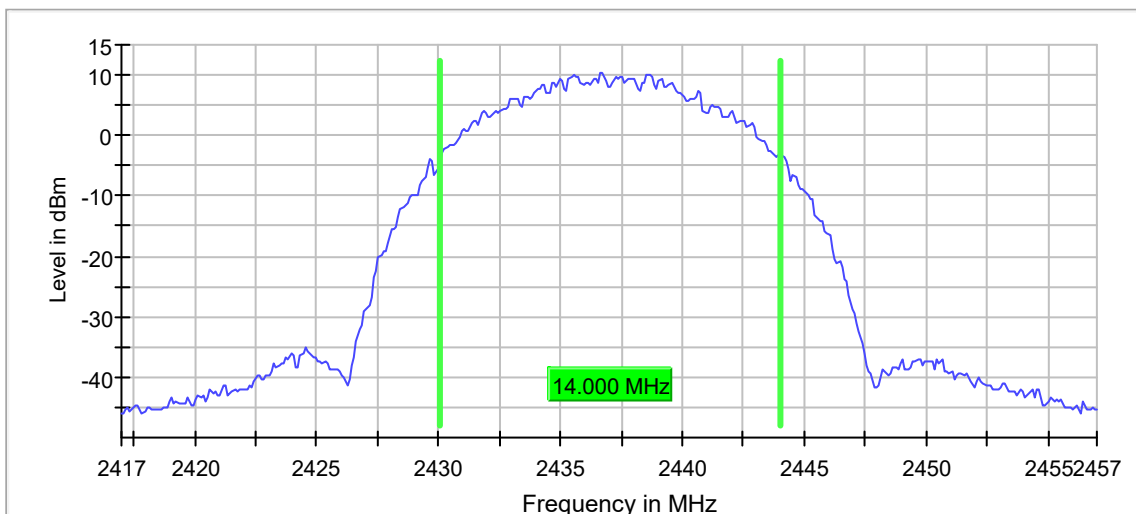
| EUT Information |  |
|-----------------|--|
| Manufacturer    | Chamberlain Group, LLC                           |
| Product         | Residential Jackshaft Opener                     |
| Model No.       | RJOA MPP   |
| Serial No.      | Antenna Conducted Sample 1                       |
| Mode            | Transmit at 2437MHz, 802.11b, 11MBPS, power = 93 |
| Date Tested     | November 29, 2022                                |

### 99 % Bandwidth

| DUT Frequency (MHz) | Bandwidth (MHz) | Limit Min (MHz) | Limit Max (MHz) | Band Edge Left (MHz) | Band Edge Right (MHz) |
|---------------------|-----------------|-----------------|-----------------|----------------------|-----------------------|
| 2437.000000         | 14.000000       | ---             | ---             | 2430.050000          | 2444.050000           |

(continuation of the "99 % Bandwidth" table from column 6 ...)

| DUT Frequency (MHz) | Result |
|---------------------|--------|
| 2437.000000         | PASS   |



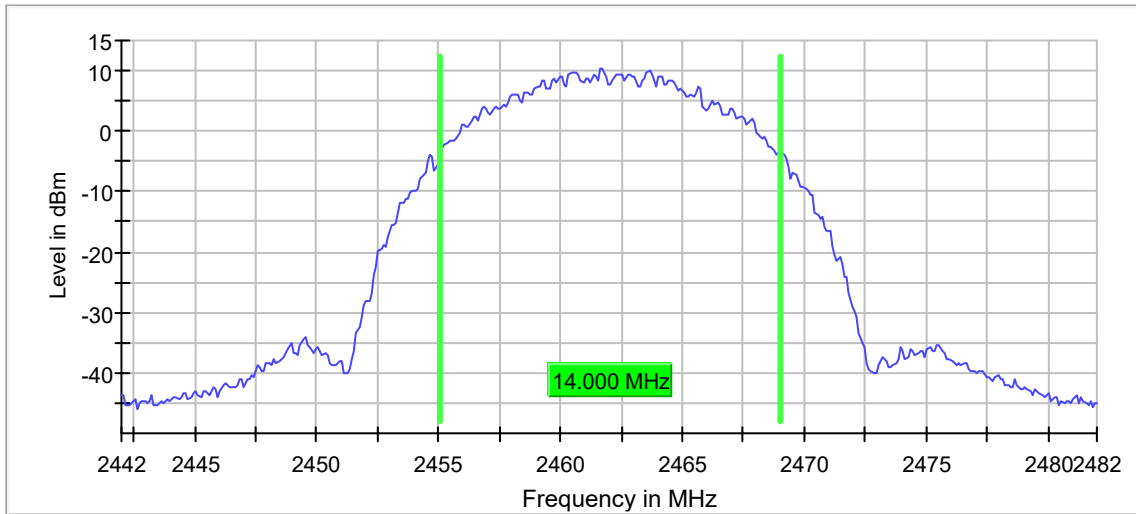
| EUT Information |  |
|-----------------|--|
| Manufacturer    | Chamberlain Group, LLC                           |
| Product         | Residential Jackshaft Opener                     |
| Model No.       | RJOA MPP   |
| Serial No.      | Antenna Conducted Sample 1                       |
| Mode            | Transmit at 2462MHz, 802.11b, 11MBPS, power = 93 |
| Date Tested     | November 29, 2022                                |

### 99 % Bandwidth

| DUT Frequency (MHz) | Bandwidth (MHz) | Limit Min (MHz) | Limit Max (MHz) | Band Edge Left (MHz) | Band Edge Right (MHz) |
|---------------------|-----------------|-----------------|-----------------|----------------------|-----------------------|
| 2462.000000         | 14.000000       | ---             | ---             | 2455.050000          | 2469.050000           |

(continuation of the "99 % Bandwidth" table from column 6 ...)

| DUT Frequency (MHz) | Result |
|---------------------|--------|
| 2462.000000         | PASS   |



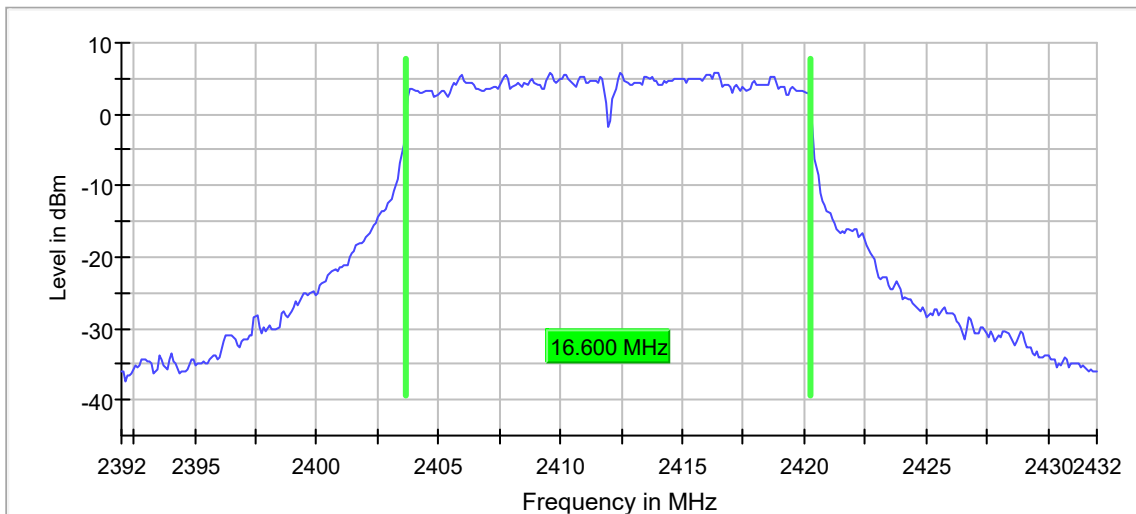
| EUT Information |   |
|-----------------|---|
| Manufacturer    | Chamberlain Group, LLC                            |
| Product         | Residential Jackshaft Opener                      |
| Model No.       | RJOA MPP  |
| Serial No.      | Antenna Conducted Sample 1                        |
| Mode            | Transmit at 2412MHz, 802.11g, 54MBPS, power = 103 |
| Date Tested     | November 29, 2022                                 |

### 99 % Bandwidth

| DUT Frequency (MHz) | Bandwidth (MHz) | Limit Min (MHz) | Limit Max (MHz) | Band Edge Left (MHz) | Band Edge Right (MHz) |
|---------------------|-----------------|-----------------|-----------------|----------------------|-----------------------|
| 2412.000000         | 16.600000       | ---             | ---             | 2403.650000          | 2420.250000           |

(continuation of the "99 % Bandwidth" table from column 6 ...)

| DUT Frequency (MHz) | Result |
|---------------------|--------|
| 2412.000000         | PASS   |



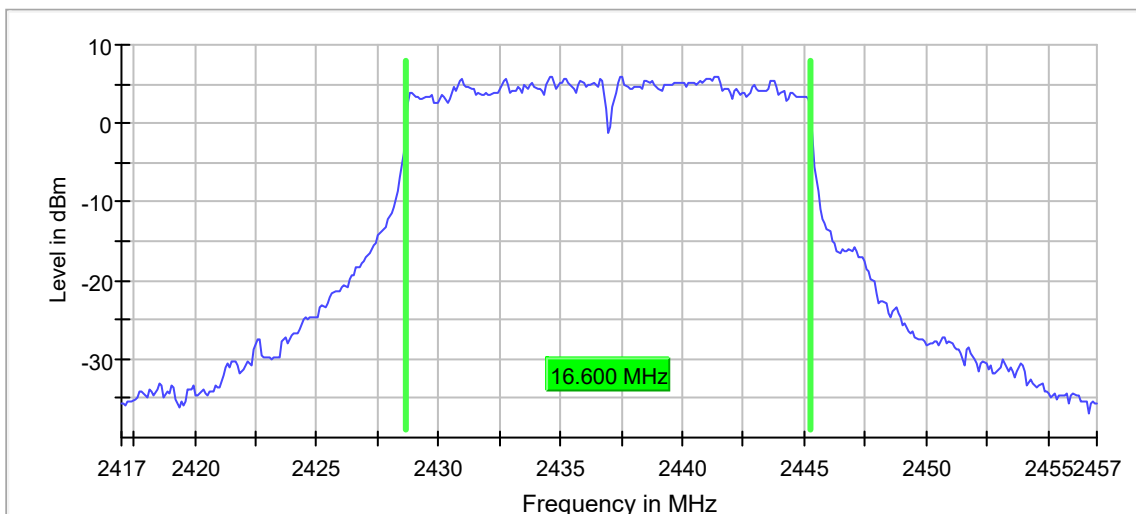
| EUT Information |   |
|-----------------|---|
| Manufacturer    | Chamberlain Group, LLC                            |
| Product         | Residential Jackshaft Opener                      |
| Model No.       | RJOA MPP  |
| Serial No.      | Antenna Conducted Sample 1                        |
| Mode            | Transmit at 2437MHz, 802.11g, 54MBPS, power = 102 |
| Date Tested     | November 29, 2022                                 |

### 99 % Bandwidth

| DUT Frequency (MHz) | Bandwidth (MHz) | Limit Min (MHz) | Limit Max (MHz) | Band Edge Left (MHz) | Band Edge Right (MHz) |
|---------------------|-----------------|-----------------|-----------------|----------------------|-----------------------|
| 2437.000000         | 16.600000       | ---             | ---             | 2428.650000          | 2445.250000           |

(continuation of the "99 % Bandwidth" table from column 6 ...)

| DUT Frequency (MHz) | Result |
|---------------------|--------|
| 2437.000000         | PASS   |



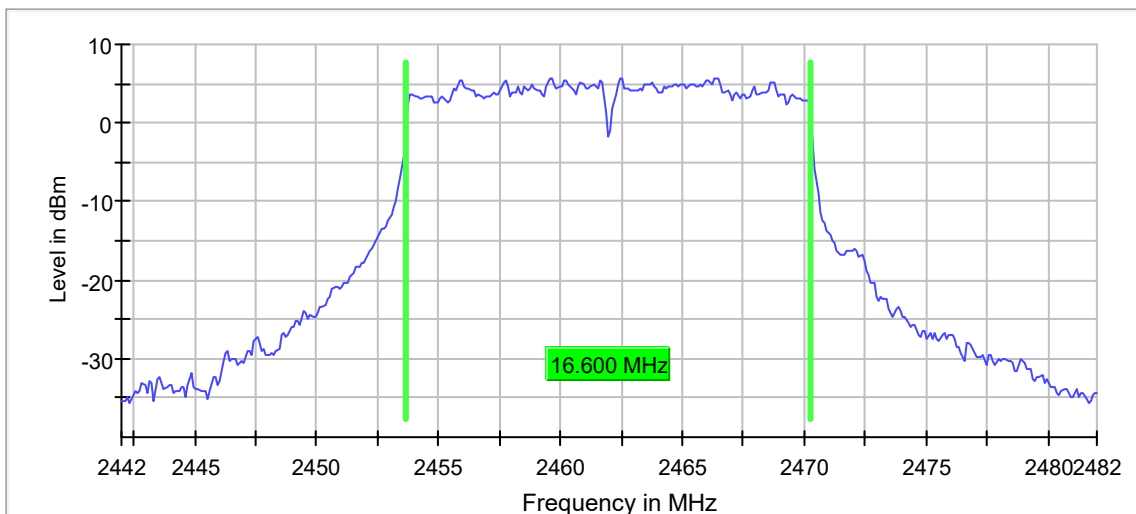
| EUT Information |   |
|-----------------|---|
| Manufacturer    | Chamberlain Group, LLC                            |
| Product         | Residential Jackshaft Opener                      |
| Model No.       | RJOA MPP  |
| Serial No.      | Antenna Conducted Sample 1                        |
| Mode            | Transmit at 2462MHz, 802.11g, 54MBPS, power = 101 |
| Date Tested     | November 29, 2022                                 |

### 99 % Bandwidth

| DUT Frequency (MHz) | Bandwidth (MHz) | Limit Min (MHz) | Limit Max (MHz) | Band Edge Left (MHz) | Band Edge Right (MHz) |
|---------------------|-----------------|-----------------|-----------------|----------------------|-----------------------|
| 2462.000000         | 16.600000       | ---             | ---             | 2453.650000          | 2470.250000           |

(continuation of the "99 % Bandwidth" table from column 6 ...)

| DUT Frequency (MHz) | Result |
|---------------------|--------|
| 2462.000000         | PASS   |





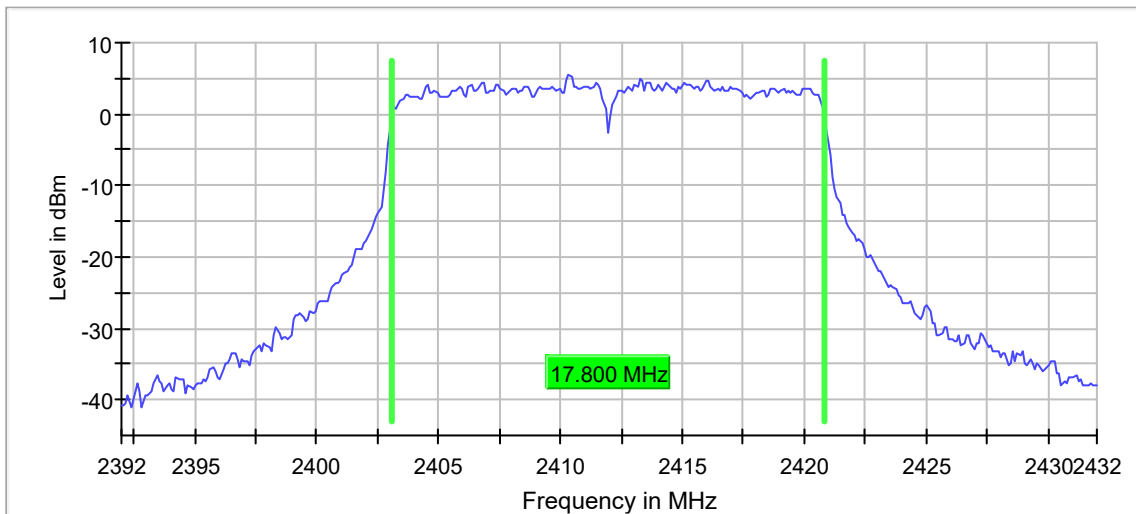
| EUT Information |  |
|-----------------|--|
| Manufacturer    | Chamberlain Group, LLC                         |
| Product         | Residential Jackshaft Opener                   |
| Model No.       | RJOA MPP                                       |
| Serial No.      | Antenna Conducted Sample 1                     |
| Mode            | Transmit at 2412MHz, 802.11n, MCS7, power = 99 |
| Date Tested     | November 29, 2022                              |

### 99 % Bandwidth

| DUT Frequency (MHz) | Bandwidth (MHz) | Limit Min (MHz) | Limit Max (MHz) | Band Edge Left (MHz) | Band Edge Right (MHz) |
|---------------------|-----------------|-----------------|-----------------|----------------------|-----------------------|
| 2412.000000         | 17.800000       | ---             | ---             | 2403.050000          | 2420.850000           |

(continuation of the "99 % Bandwidth" table from column 6 ...)

| DUT Frequency (MHz) | Result |
|---------------------|--------|
| 2412.000000         | PASS   |



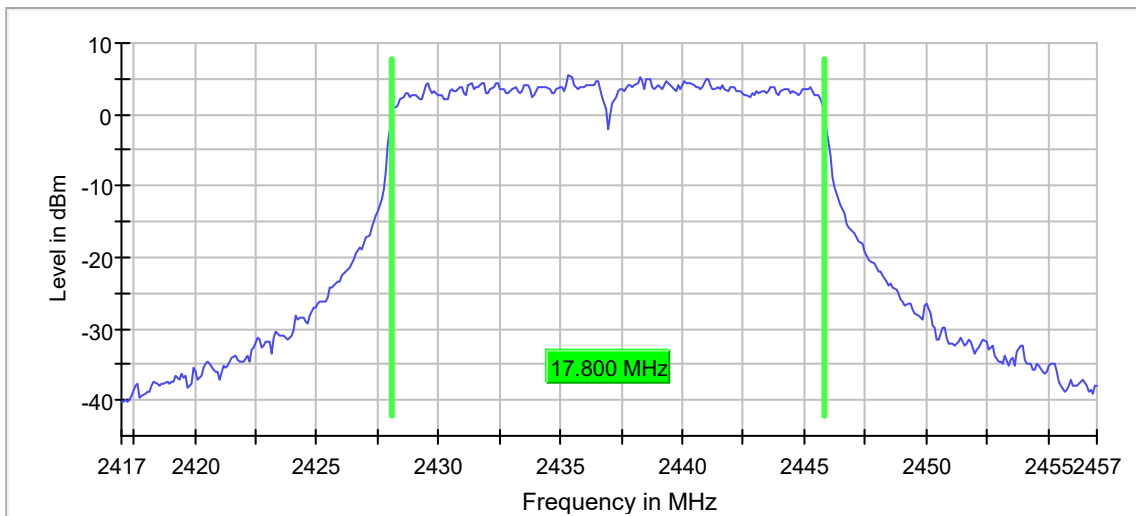
| EUT Information |  |
|-----------------|--|
| Manufacturer    | Chamberlain Group, LLC                         |
| Product         | Residential Jackshaft Opener                   |
| Model No.       | RJOA MPP                                       |
| Serial No.      | Antenna Conducted Sample 1                     |
| Mode            | Transmit at 2437MHz, 802.11n, MCS7, power = 98 |
| Date Tested     | November 29, 2022                              |

### 99 % Bandwidth

| DUT Frequency (MHz) | Bandwidth (MHz) | Limit Min (MHz) | Limit Max (MHz) | Band Edge Left (MHz) | Band Edge Right (MHz) |
|---------------------|-----------------|-----------------|-----------------|----------------------|-----------------------|
| 2437.000000         | 17.800000       | ---             | ---             | 2428.050000          | 2445.850000           |

(continuation of the "99 % Bandwidth" table from column 6 ...)

| DUT Frequency (MHz) | Result |
|---------------------|--------|
| 2437.000000         | PASS   |



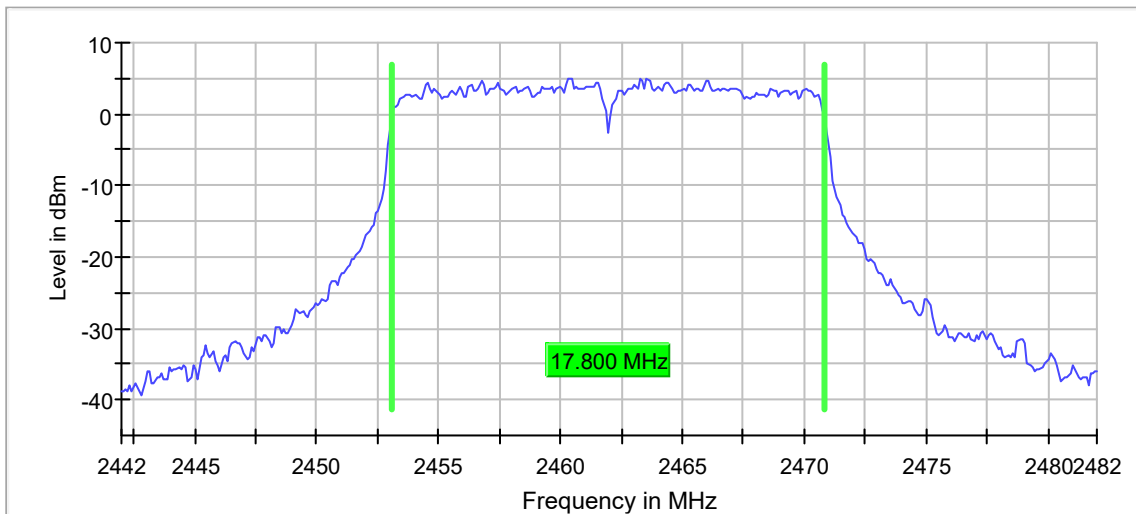
| EUT Information |  |
|-----------------|--|
| Manufacturer    | Chamberlain Group, LLC                         |
| Product         | Residential Jackshaft Opener                   |
| Model No.       | RJOA MPP                                       |
| Serial No.      | Antenna Conducted Sample 1                     |
| Mode            | Transmit at 2462MHz, 802.11n, MCS7, power = 98 |
| Date Tested     | November 29, 2022                              |

### 99 % Bandwidth

| DUT Frequency (MHz) | Bandwidth (MHz) | Limit Min (MHz) | Limit Max (MHz) | Band Edge Left (MHz) | Band Edge Right (MHz) |
|---------------------|-----------------|-----------------|-----------------|----------------------|-----------------------|
| 2462.000000         | 17.800000       | ---             | ---             | 2453.050000          | 2470.850000           |

(continuation of the "99 % Bandwidth" table from column 6 ...)

| DUT Frequency (MHz) | Result |
|---------------------|--------|
| 2462.000000         | PASS   |

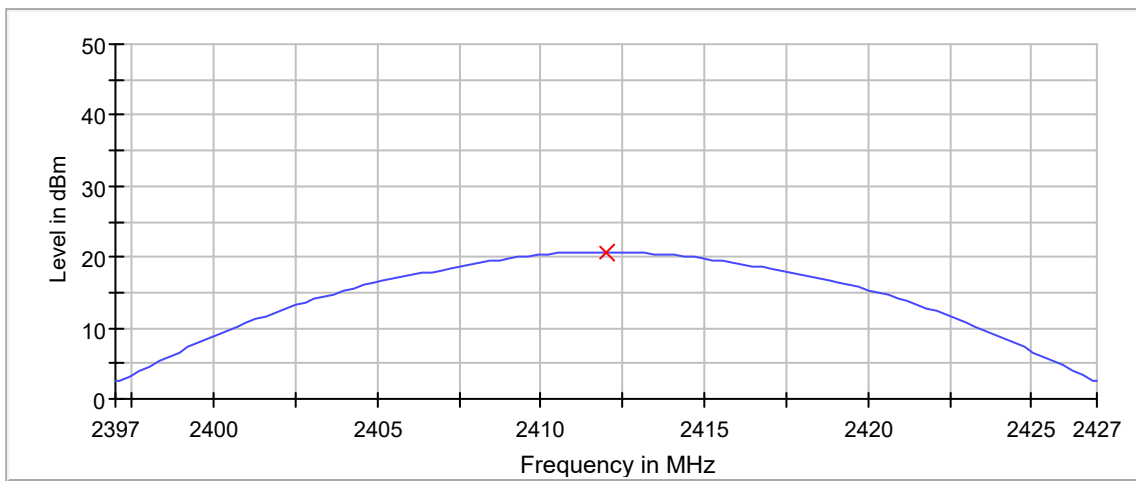


# Peak Output Power

| EUT Information |  |
|-----------------|--|
| Manufacturer    | Chamberlain Group, LLC                           |
| Product         | Residential Jackshaft Opener                     |
| Model No.       | RJOA MPP   |
| Serial No.      | Antenna Conducted Sample 1                       |
| Mode            | Transmit at 2412MHz, 802.11b, 11MBPS, power = 94 |
| Date Tested     | November 29, 2022                                |

## Result

| DUT Frequency (MHz) | Peak Power (dBm) | Limit Max (dBm) | Result |
|---------------------|------------------|-----------------|--------|
| 2412.000000         | 20.7             | 30.0            | PASS   |

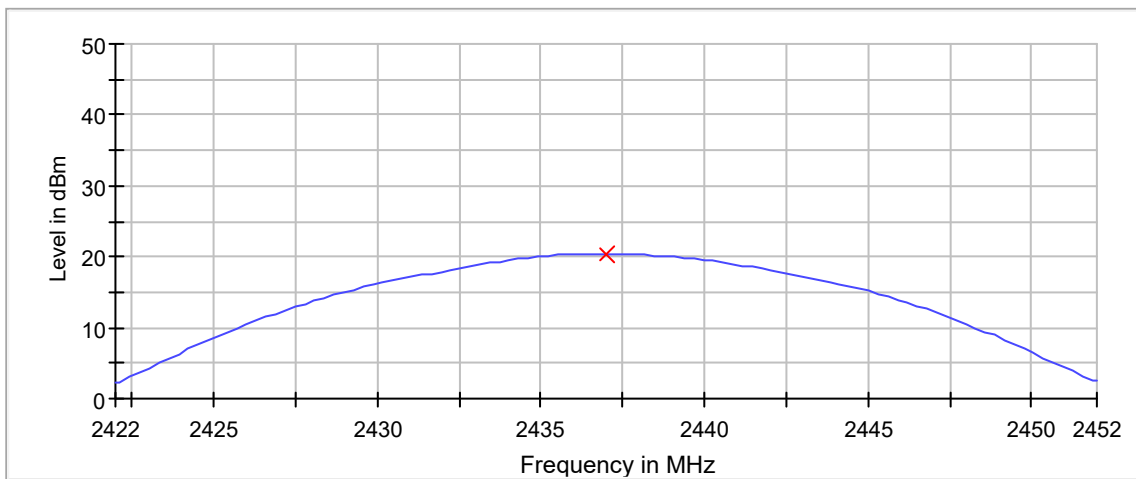


— Connector 1      × Peak Connector 1

| EUT Information |  |
|-----------------|--|
| Manufacturer    | Chamberlain Group, LLC                           |
| Product         | Residential Jackshaft Opener                     |
| Model No.       | RJOA MPP   |
| Serial No.      | Antenna Conducted Sample 1                       |
| Mode            | Transmit at 2437MHz, 802.11b, 11MBPS, power = 93 |
| Date Tested     | November 29, 2022                                |

### Result

| DUT Frequency (MHz) | Peak Power (dBm) | Limit Max (dBm) | Result |
|---------------------|------------------|-----------------|--------|
| 2437.000000         | 20.4             | 30.0            | PASS   |

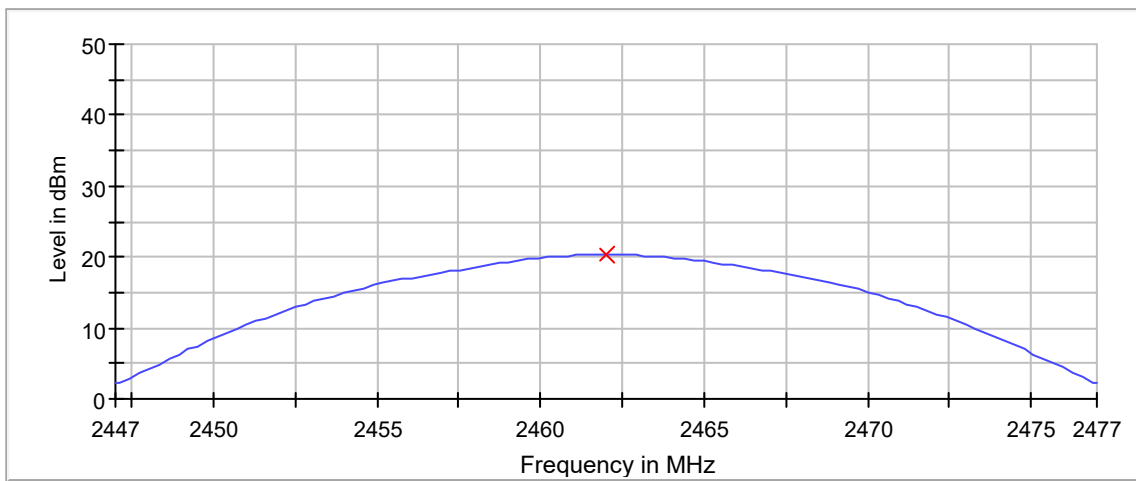


— Connector 1      X Peak Connector 1

| EUT Information |  |
|-----------------|--|
| Manufacturer    | Chamberlain Group, LLC                           |
| Product         | Residential Jackshaft Opener                     |
| Model No.       | RJOA MPP   |
| Serial No.      | Antenna Conducted Sample 1                       |
| Mode            | Transmit at 2462MHz, 802.11b, 11MBPS, power = 93 |
| Date Tested     | November 29, 2022                                |

## Result

| DUT Frequency (MHz) | Peak Power (dBm) | Limit Max (dBm) | Result |
|---------------------|------------------|-----------------|--------|
| 2462.000000         | 20.3             | 30.0            | PASS   |

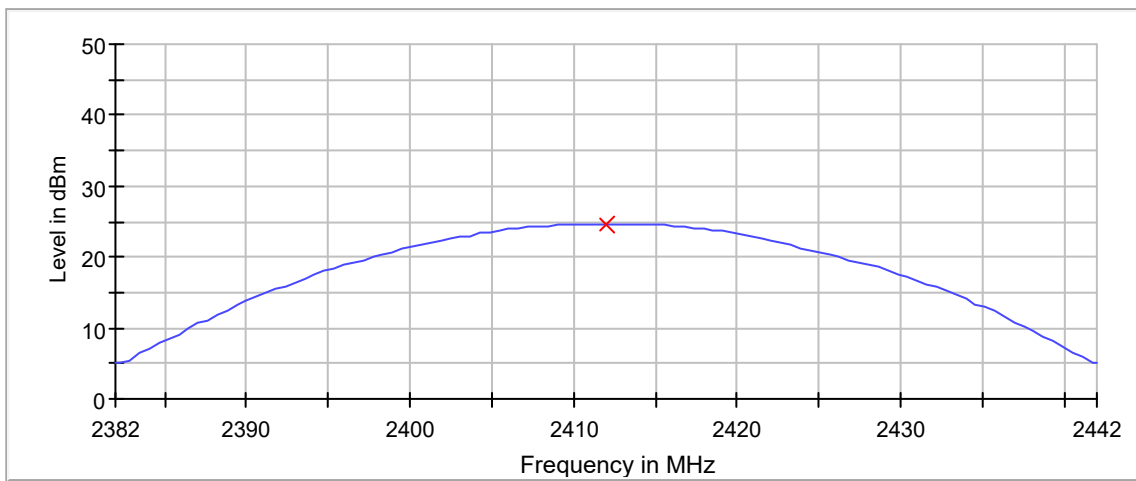


— Connector 1      X Peak Connector 1

| EUT Information |   |
|-----------------|---|
| Manufacturer    | Chamberlain Group, LLC                            |
| Product         | Residential Jackshaft Opener                      |
| Model No.       | RJOA MPP  |
| Serial No.      | Antenna Conducted Sample 1                        |
| Mode            | Transmit at 2412MHz, 802.11g, 54MBPS, power = 103 |
| Date Tested     | November 29, 2022                                 |

### Result

| DUT Frequency (MHz) | Peak Power (dBm) | Limit Max (dBm) | Result |
|---------------------|------------------|-----------------|--------|
| 2412.000000         | 24.7             | 30.0            | PASS   |



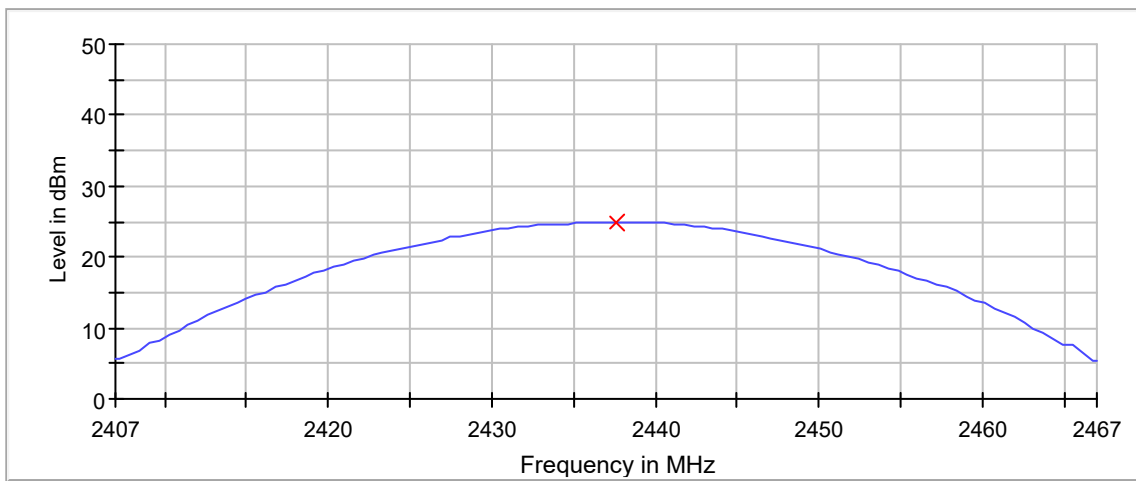
— Connector 1      X Peak Connector 1



| EUT Information |   |
|-----------------|---|
| Manufacturer    | Chamberlain Group, LLC                            |
| Product         | Residential Jackshaft Opener                      |
| Model No.       | RJOA MPP  |
| Serial No.      | Antenna Conducted Sample 1                        |
| Mode            | Transmit at 2437MHz, 802.11g, 54MBPS, power = 102 |
| Date Tested     | November 29, 2022                                 |

## Result

| DUT Frequency (MHz) | Peak Power (dBm) | Limit Max (dBm) | Result |
|---------------------|------------------|-----------------|--------|
| 2437.000000         | 24.9             | 30.0            | PASS   |

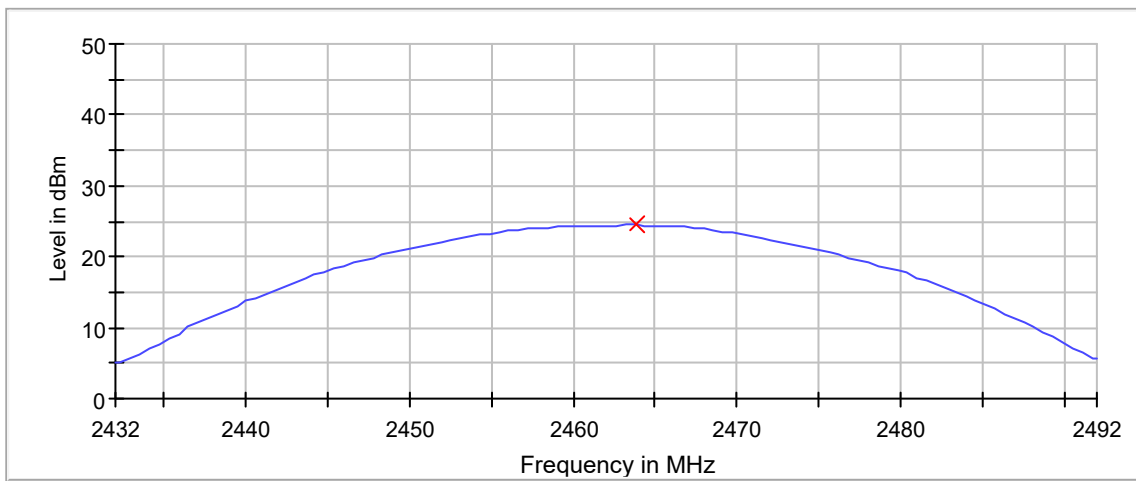


— Connector 1      × Peak Connector 1

| EUT Information |   |
|-----------------|---|
| Manufacturer    | Chamberlain Group, LLC                            |
| Product         | Residential Jackshaft Opener                      |
| Model No.       | RJOA MPP  |
| Serial No.      | Antenna Conducted Sample 1                        |
| Mode            | Transmit at 2462MHz, 802.11g, 54MBPS, power = 101 |
| Date Tested     | November 29, 2022                                 |

### Result

| DUT Frequency (MHz) | Peak Power (dBm) | Limit Max (dBm) | Result |
|---------------------|------------------|-----------------|--------|
| 2462.000000         | 24.5             | 30.0            | PASS   |

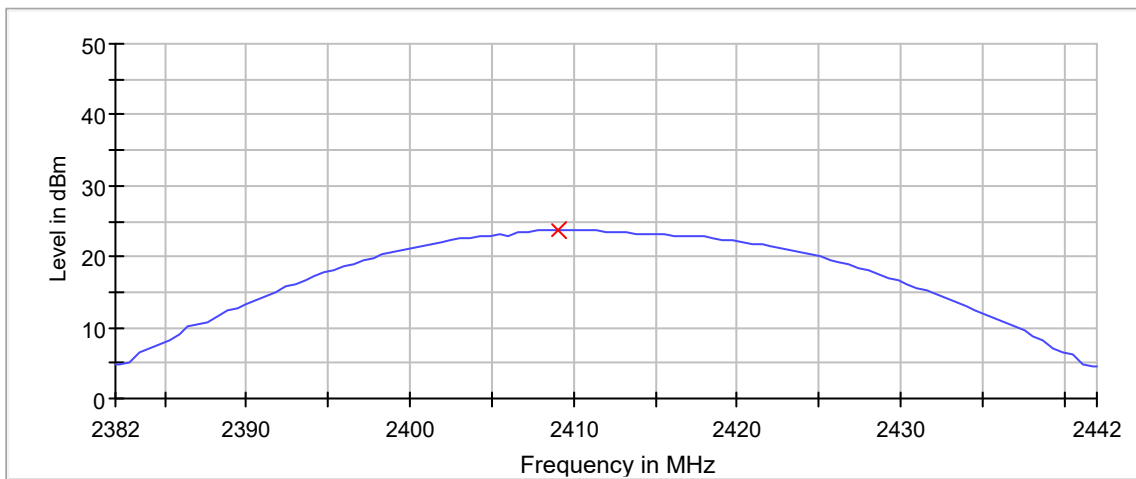


— Connector 1      X Peak Connector 1

| EUT Information |  |
|-----------------|--|
| Manufacturer    | Chamberlain Group, LLC                         |
| Product         | Residential Jackshaft Opener                   |
| Model No.       | RJOA MPP                                       |
| Serial No.      | Antenna Conducted Sample 1                     |
| Mode            | Transmit at 2412MHz, 802.11n, MCS7, power = 99 |
| Date Tested     | November 29, 2022                              |

### Result

| DUT Frequency (MHz) | Peak Power (dBm) | Limit Max (dBm) | Result |
|---------------------|------------------|-----------------|--------|
| 2412.000000         | 23.7             | 30.0            | PASS   |

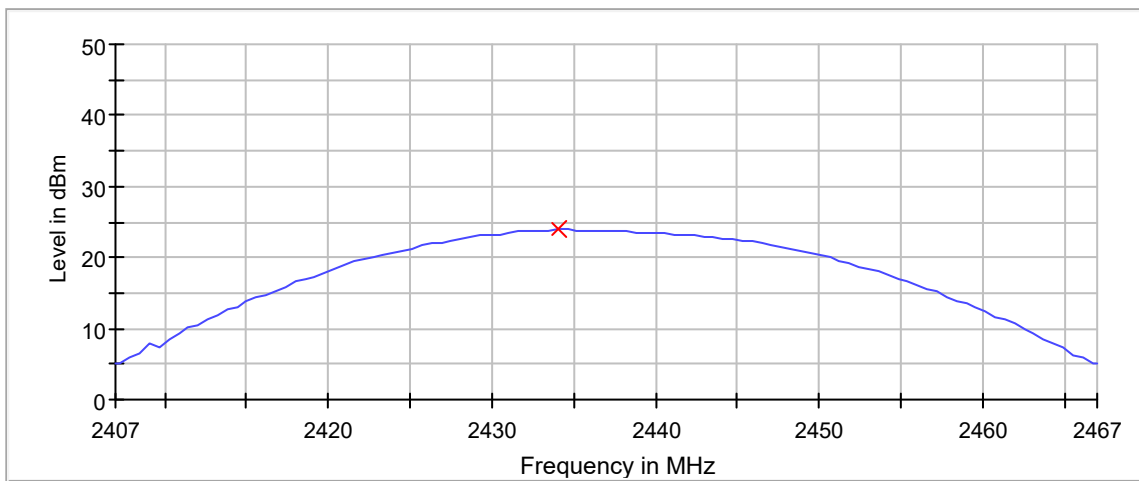


— Connector 1      × Peak Connector 1

| EUT Information |  |
|-----------------|--|
| Manufacturer    | Chamberlain Group, LLC                         |
| Product         | Residential Jackshaft Opener                   |
| Model No.       | RJOA MPP                                       |
| Serial No.      | Antenna Conducted Sample 1                     |
| Mode            | Transmit at 2437MHz, 802.11n, MCS7, power = 98 |
| Date Tested     | November 29, 2022                              |

## Result

| DUT Frequency (MHz) | Peak Power (dBm) | Limit Max (dBm) | Result |
|---------------------|------------------|-----------------|--------|
| 2437.000000         | 23.9             | 30.0            | PASS   |

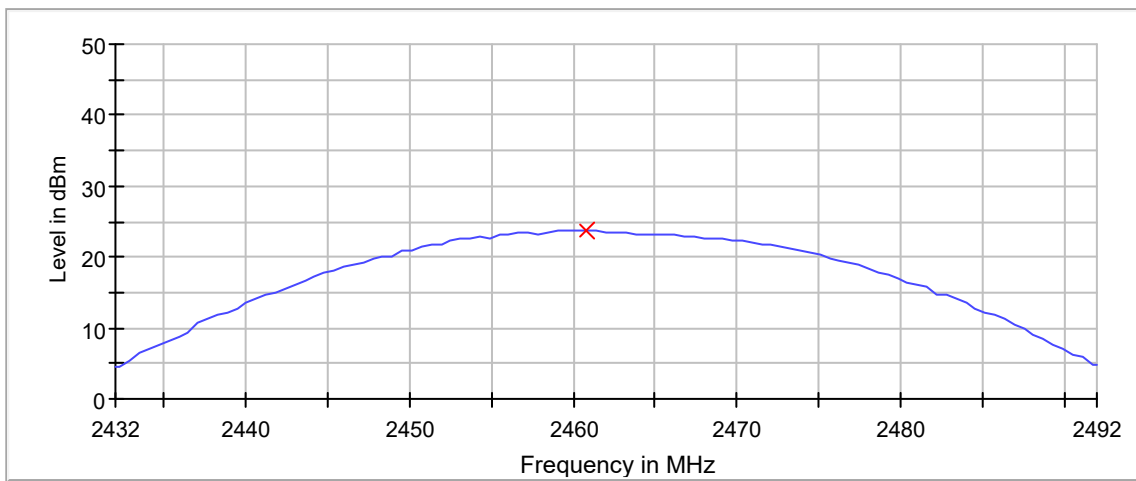


— Connector 1      × Peak Connector 1

| EUT Information |  |
|-----------------|--|
| Manufacturer    | Chamberlain Group, LLC                         |
| Product         | Residential Jackshaft Opener                   |
| Model No.       | RJOA MPP                                       |
| Serial No.      | Antenna Conducted Sample 1                     |
| Mode            | Transmit at 2462MHz, 802.11n, MCS7, power = 98 |
| Date Tested     | November 29, 2022                              |

### Result

| DUT Frequency (MHz) | Peak Power (dBm) | Limit Max (dBm) | Result |
|---------------------|------------------|-----------------|--------|
| 2462.000000         | 23.6             | 30.0            | PASS   |



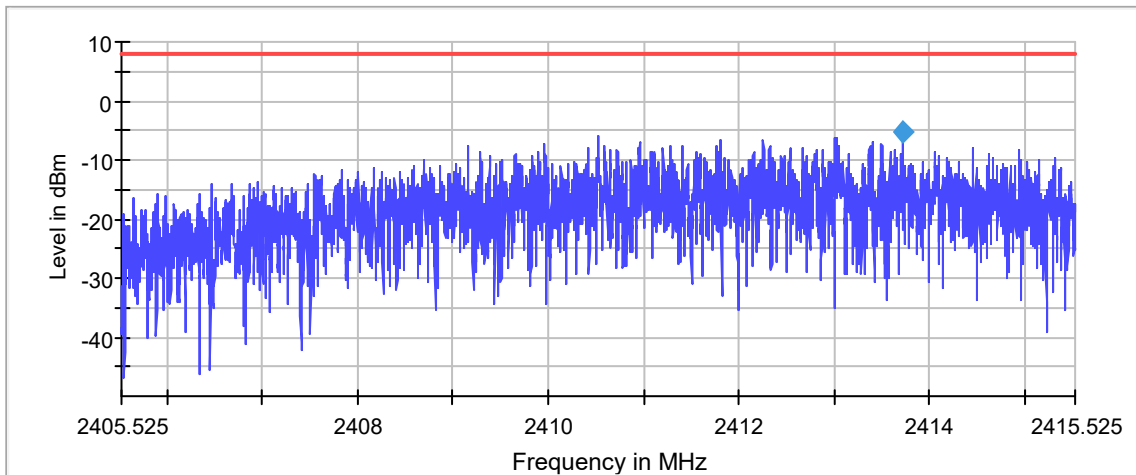
— Connector 1      × Peak Connector 1

# Peak Power Spectral Density

| EUT Information |  |
|-----------------|--|
| Manufacturer    | Chamberlain Group, LLC                           |
| Product         | Residential Jackshaft Opener                     |
| Model No.       | RJOA MPP   |
| Serial No.      | Antenna Conducted Sample 1                       |
| Mode            | Transmit at 2412MHz, 802.11b, 11MBPS, power = 94 |
| Date Tested     | November 29, 2022                                |

### Result

| DUT Frequency (MHz) | Frequency (MHz) | PSD (dBm) | Limit Max (dBm) | Result |
|---------------------|-----------------|-----------|-----------------|--------|
| 2412.000000         | 2413.712341     | -5.203    | 8.0             | PASS   |



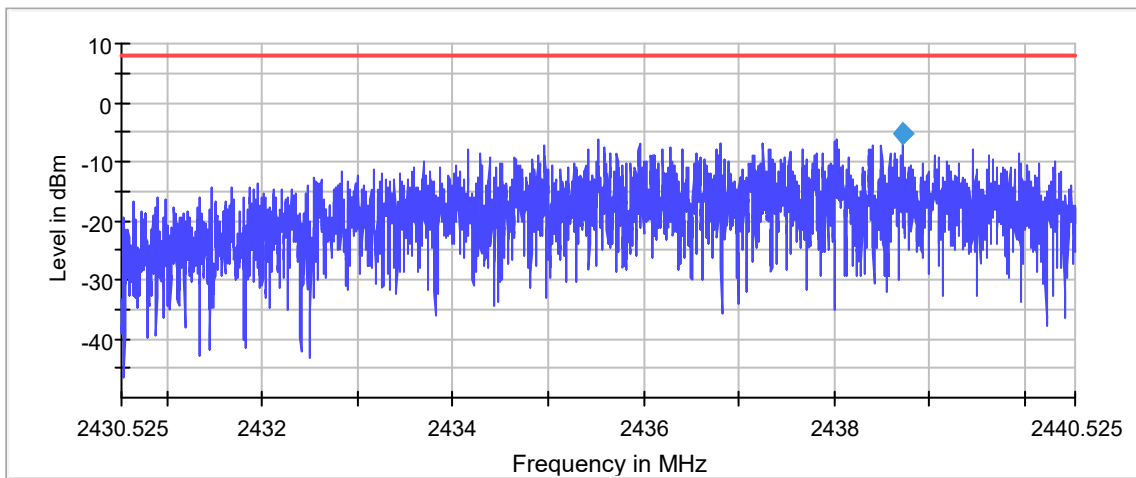
— Limit    — Sum Level    ◆ PSD

Measured with a 3kHz RBW

| EUT Information |  |
|-----------------|--|
| Manufacturer    | Chamberlain Group, LLC                           |
| Product         | Residential Jackshaft Opener                     |
| Model No.       | RJOA MPP   |
| Serial No.      | Antenna Conducted Sample 1                       |
| Mode            | Transmit at 2437MHz, 802.11b, 11MBPS, power = 93 |
| Date Tested     | November 29, 2022                                |

## Result

| DUT Frequency (MHz) | Frequency (MHz) | PSD (dBm) | Limit Max (dBm) | Result |
|---------------------|-----------------|-----------|-----------------|--------|
| 2437.000000         | 2438.712341     | -5.366    | 8.0             | PASS   |



— Limit    — Sum Level    ◆ PSD

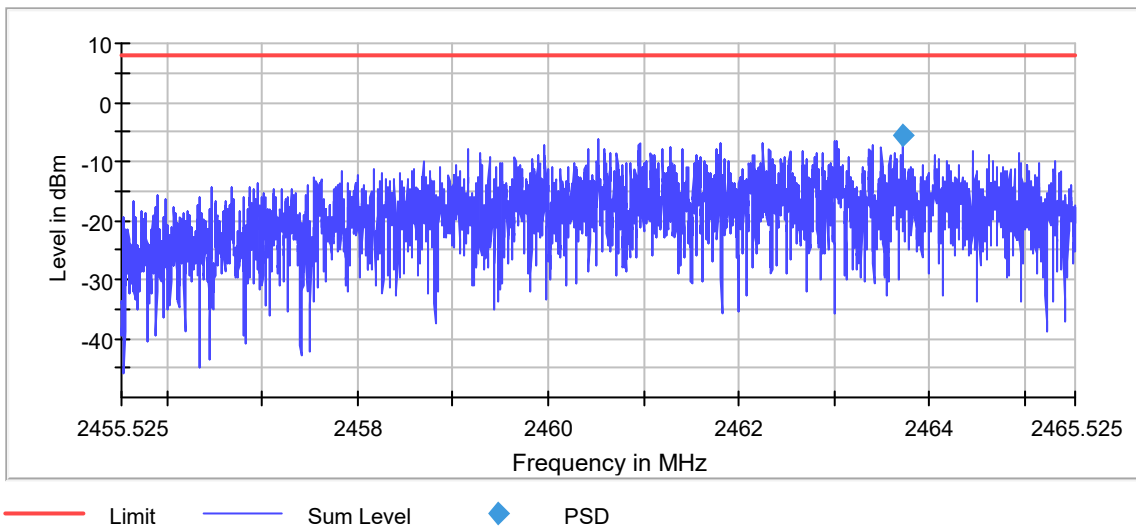
Measured with a 3kHz RBW



| EUT Information |  |
|-----------------|--|
| Manufacturer    | Chamberlain Group, LLC                           |
| Product         | Residential Jackshaft Opener                     |
| Model No.       | RJOA MPP   |
| Serial No.      | Antenna Conducted Sample 1                       |
| Mode            | Transmit at 2462MHz, 802.11b, 11MBPS, power = 93 |
| Date Tested     | November 29, 2022                                |

## Result

| DUT Frequency (MHz) | Frequency (MHz) | PSD (dBm) | Limit Max (dBm) | Result |
|---------------------|-----------------|-----------|-----------------|--------|
| 2462.000000         | 2463.712341     | -5.548    | 8.0             | PASS   |

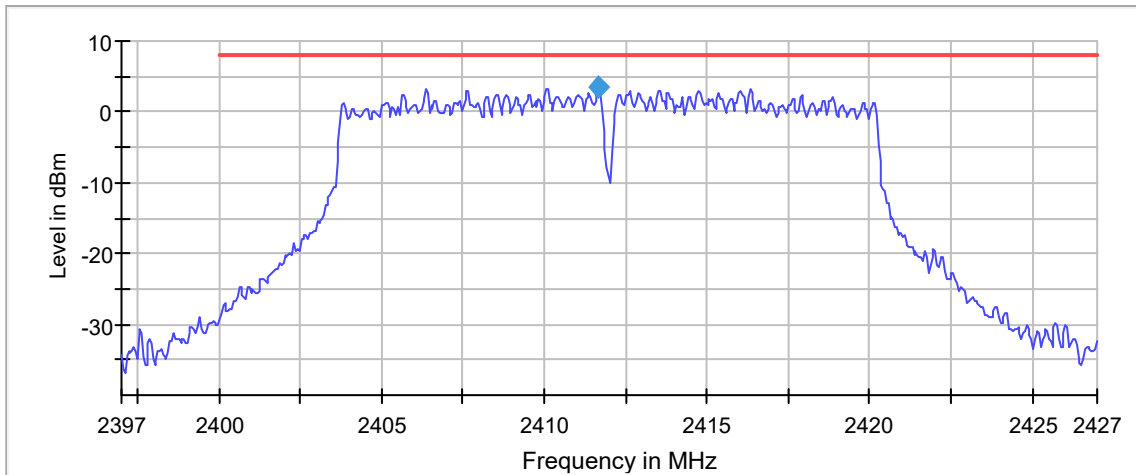


Measured with a 3kHz RBW

| EUT Information |   |
|-----------------|---|
| Manufacturer    | Chamberlain Group, LLC                            |
| Product         | Residential Jackshaft Opener                      |
| Model No.       | RJOA MPP  |
| Serial No.      | Antenna Conducted Sample 1                        |
| Mode            | Transmit at 2412MHz, 802.11g, 54MBPS, power = 103 |
| Date Tested     | November 29, 2022                                 |

### Result

| DUT Frequency (MHz) | Frequency (MHz) | PSD (dBm) | Limit Max (dBm) | Result |
|---------------------|-----------------|-----------|-----------------|--------|
| 2412.000000         | 2411.675000     | 3.633     | 8.0             | PASS   |



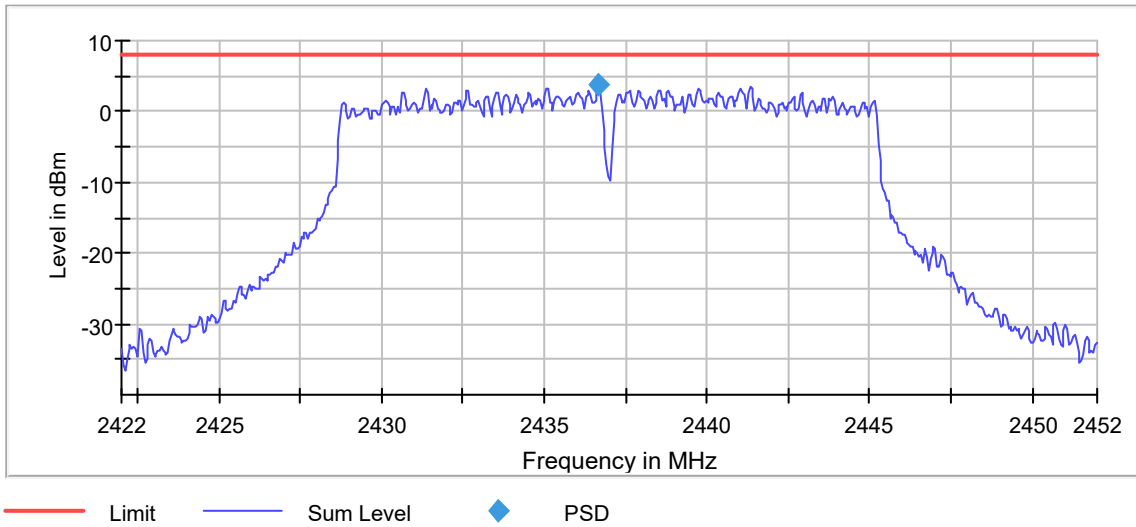
— Limit    — Sum Level    ◆ PSD

Measured with a 100kHz RBW

| EUT Information |   |
|-----------------|---|
| Manufacturer    | Chamberlain Group, LLC                            |
| Product         | Residential Jackshaft Opener                      |
| Model No.       | RJOA MPP  |
| Serial No.      | Antenna Conducted Sample 1                        |
| Mode            | Transmit at 2437MHz, 802.11g, 54MBPS, power = 102 |
| Date Tested     | November 29, 2022                                 |

## Result

| DUT Frequency (MHz) | Frequency (MHz) | PSD (dBm) | Limit Max (dBm) | Result |
|---------------------|-----------------|-----------|-----------------|--------|
| 2437.000000         | 2436.675000     | 3.784     | 8.0             | PASS   |

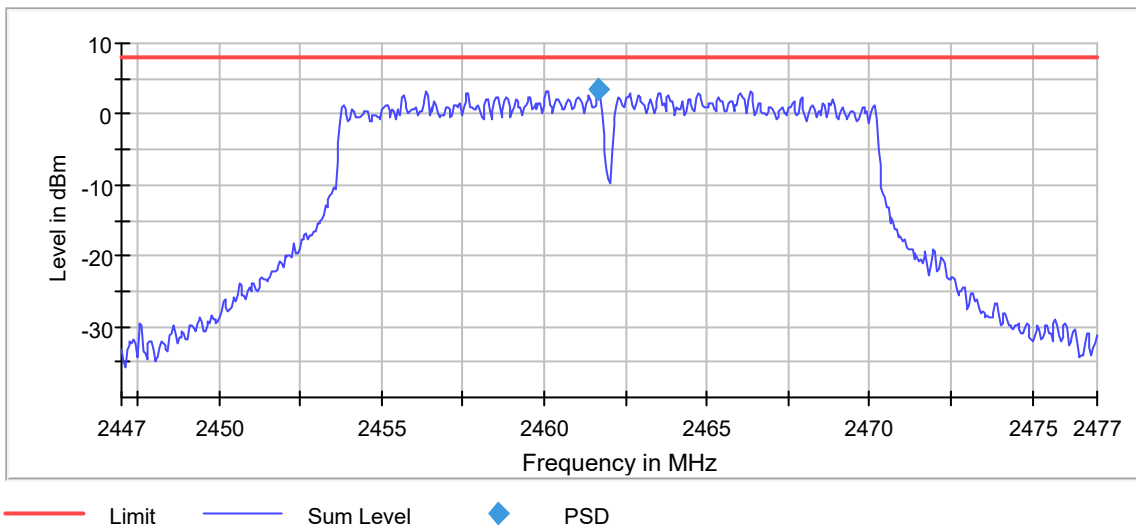


Measured with a 100kHz RBW

| EUT Information |   |
|-----------------|---|
| Manufacturer    | Chamberlain Group, LLC                            |
| Product         | Residential Jackshaft Opener                      |
| Model No.       | RJOA MPP  |
| Serial No.      | Antenna Conducted Sample 1                        |
| Mode            | Transmit at 2462MHz, 802.11g, 54MBPS, power = 101 |
| Date Tested     | November 29, 2022                                 |

## Result

| DUT Frequency (MHz) | Frequency (MHz) | PSD (dBm) | Limit Max (dBm) | Result |
|---------------------|-----------------|-----------|-----------------|--------|
| 2462.000000         | 2461.675000     | 3.597     | 8.0             | PASS   |

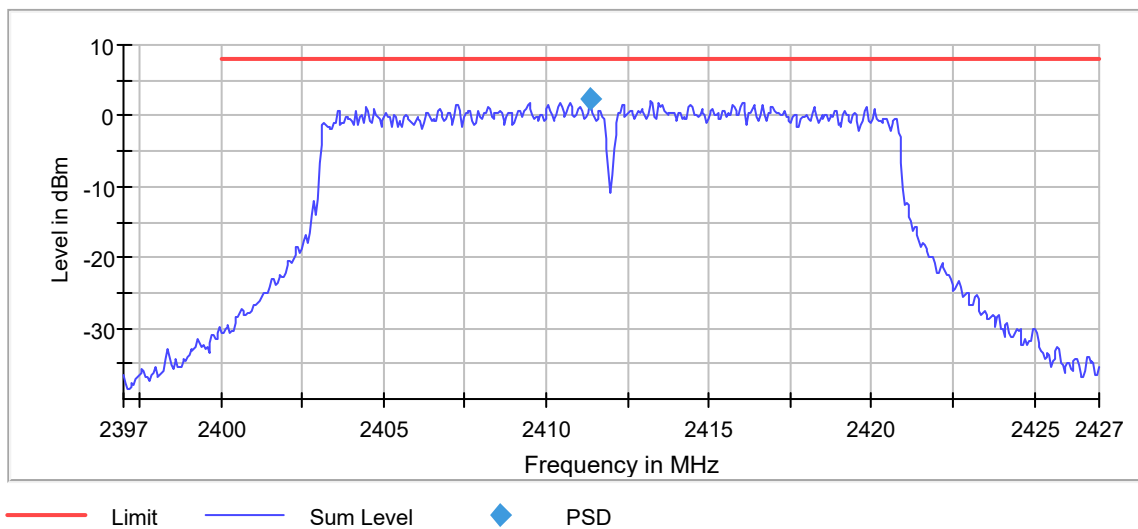


Measured with a 100kHz RBW

| EUT Information |  |
|-----------------|--|
| Manufacturer    | Chamberlain Group, LLC                         |
| Product         | Residential Jackshaft Opener                   |
| Model No.       | RJOA MPP                                       |
| Serial No.      | Antenna Conducted Sample 1                     |
| Mode            | Transmit at 2412MHz, 802.11n, MCS7, power = 99 |
| Date Tested     | November 29, 2022                              |

### Result

| DUT Frequency (MHz) | Frequency (MHz) | PSD (dBm) | Limit Max (dBm) | Result |
|---------------------|-----------------|-----------|-----------------|--------|
| 2412.000000         | 2411.325000     | 2.267     | 8.0             | PASS   |

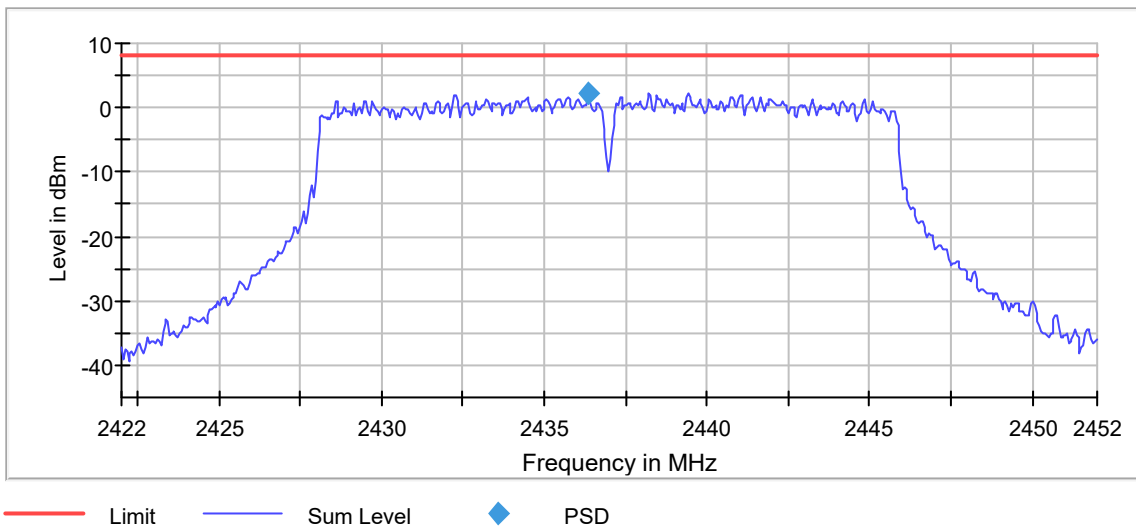


Measured with a 100kHz RBW

| EUT Information |  |
|-----------------|--|
| Manufacturer    | Chamberlain Group, LLC                         |
| Product         | Residential Jackshaft Opener                   |
| Model No.       | RJOA MPP                                       |
| Serial No.      | Antenna Conducted Sample 1                     |
| Mode            | Transmit at 2437MHz, 802.11n, MCS7, power = 98 |
| Date Tested     | November 29, 2022                              |

### Result

| DUT Frequency (MHz) | Frequency (MHz) | PSD (dBm) | Limit Max (dBm) | Result |
|---------------------|-----------------|-----------|-----------------|--------|
| 2437.000000         | 2436.325000     | 2.283     | 8.0             | PASS   |

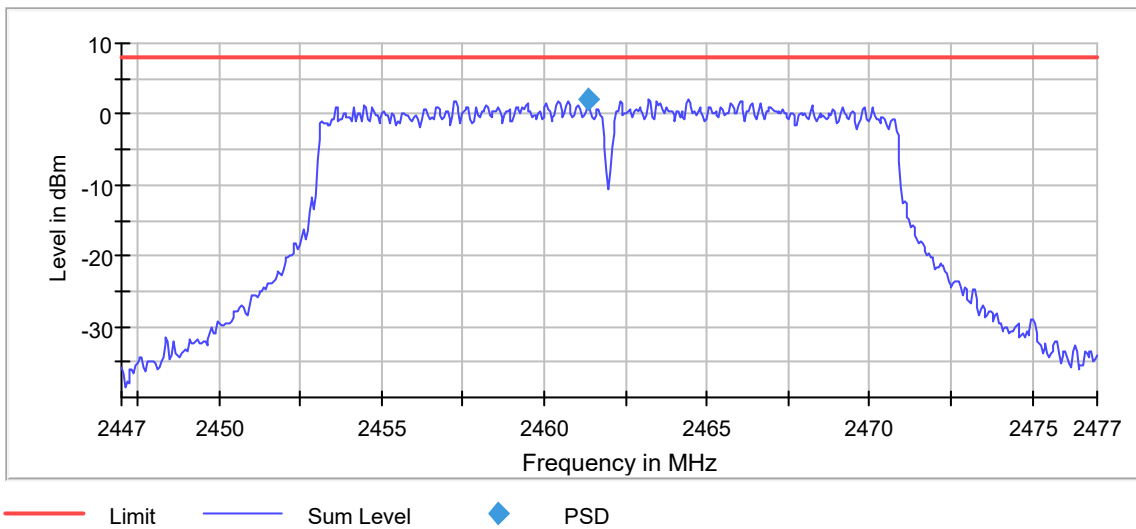


Measured with a 100kHz RBW

| EUT Information |  |
|-----------------|--|
| Manufacturer    | Chamberlain Group, LLC                         |
| Product         | Residential Jackshaft Opener                   |
| Model No.       | RJOA MPP                                       |
| Serial No.      | Antenna Conducted Sample 1                     |
| Mode            | Transmit at 2462MHz, 802.11n, MCS7, power = 98 |
| Date Tested     | November 29, 2022                              |

### Result

| DUT Frequency (MHz) | Frequency (MHz) | PSD (dBm) | Limit Max (dBm) | Result |
|---------------------|-----------------|-----------|-----------------|--------|
| 2462.000000         | 2461.325000     | 2.205     | 8.0             | PASS   |



Measured with a 100kHz RBW

# Low Band Edge



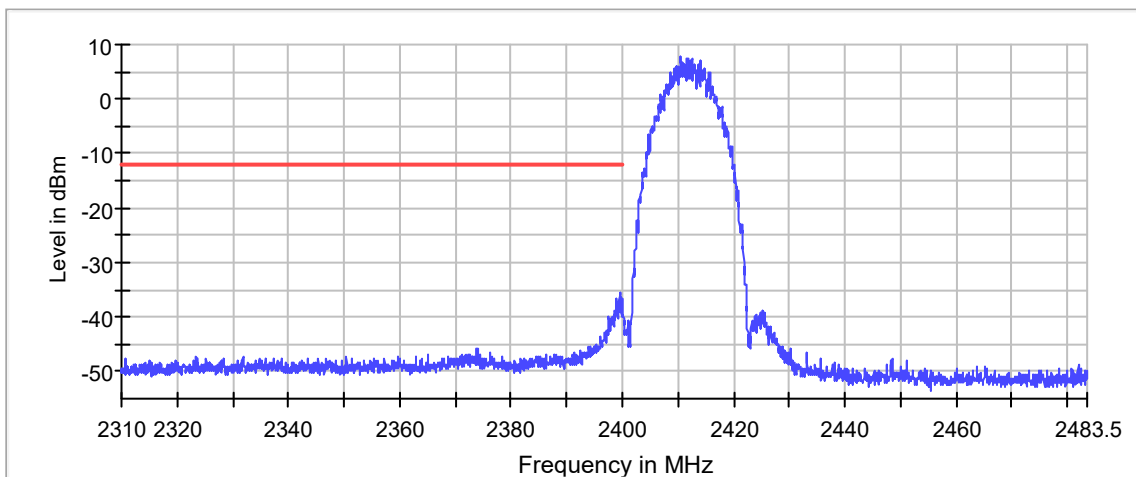
| EUT Information |  |
|-----------------|--|
| Manufacturer    | Chamberlain Group, LLC                           |
| Product         | Residential Jackshaft Opener                     |
| Model No.       | RJOA MPP   |
| Serial No.      | Antenna Conducted Sample 1                       |
| Mode            | Transmit at 2412MHz, 802.11b, 11MBPS, power = 94 |
| Date Tested     | November 29, 2022                                |

### In band Peak

| Frequency (MHz) | Level (dBm) |
|-----------------|-------------|
| 2410.525000     | 7.9         |

### Measurements

| Frequency (MHz) | Level (dBm) | Margin (dB) | Limit (dBm) | Result |
|-----------------|-------------|-------------|-------------|--------|
| 2399.525000     | -35.5       | 23.3        | -12.1       | PASS   |
| 2399.475000     | -35.8       | 23.6        | -12.1       | PASS   |
| 2399.675000     | -36.4       | 24.3        | -12.1       | PASS   |
| 2399.575000     | -36.5       | 24.4        | -12.1       | PASS   |
| 2398.925000     | -36.6       | 24.4        | -12.1       | PASS   |
| 2399.975000     | -36.7       | 24.6        | -12.1       | PASS   |
| 2399.725000     | -36.9       | 24.7        | -12.1       | PASS   |
| 2399.625000     | -36.9       | 24.8        | -12.1       | PASS   |
| 2398.975000     | -37.0       | 24.8        | -12.1       | PASS   |
| 2398.875000     | -37.1       | 25.0        | -12.1       | PASS   |
| 2399.425000     | -37.4       | 25.3        | -12.1       | PASS   |
| 2399.925000     | -37.8       | 25.6        | -12.1       | PASS   |
| 2399.375000     | -37.8       | 25.6        | -12.1       | PASS   |
| 2398.825000     | -38.6       | 26.4        | -12.1       | PASS   |
| 2398.725000     | -38.8       | 26.6        | -12.1       | PASS   |



— Limit    — Sum Level    × Fail

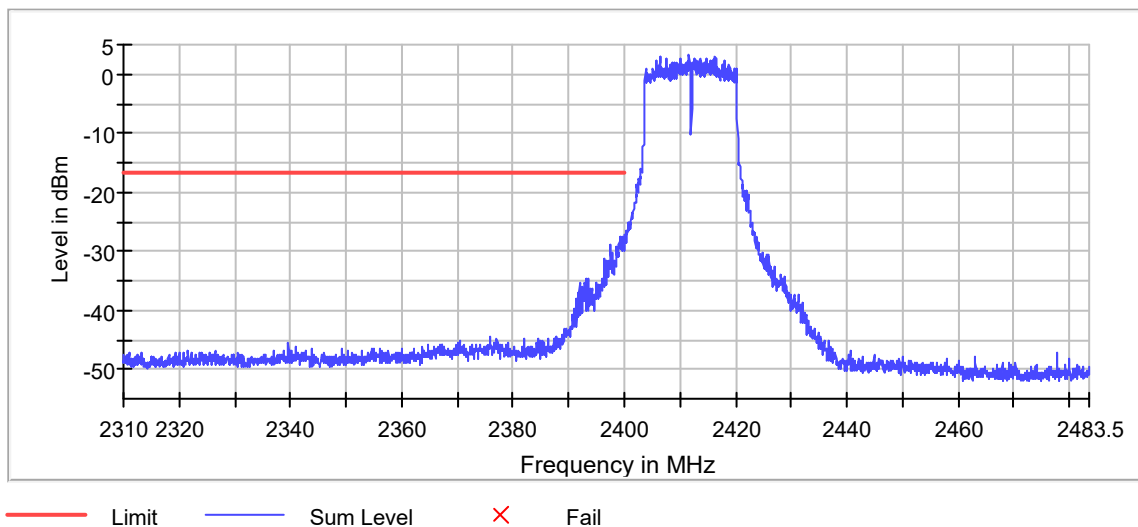
| EUT Information |   |
|-----------------|---|
| Manufacturer    | Chamberlain Group, LLC                            |
| Product         | Residential Jackshaft Opener                      |
| Model No.       | RJOA MPP  |
| Serial No.      | Antenna Conducted Sample 1                        |
| Mode            | Transmit at 2412MHz, 802.11g, 54MBPS, power = 103 |
| Date Tested     | November 29, 2022                                 |

### In band Peak

| Frequency (MHz) | Level (dBm) |
|-----------------|-------------|
| 2411.675000     | 3.2         |

### Measurements

| Frequency (MHz) | Level (dBm) | Margin (dB) | Limit (dBm) | Result |
|-----------------|-------------|-------------|-------------|--------|
| 2399.775000     | -27.6       | 10.8        | -16.8       | PASS   |
| 2399.375000     | -27.7       | 10.9        | -16.8       | PASS   |
| 2399.425000     | -27.8       | 11.0        | -16.8       | PASS   |
| 2399.825000     | -27.8       | 11.0        | -16.8       | PASS   |
| 2399.675000     | -27.8       | 11.0        | -16.8       | PASS   |
| 2399.725000     | -27.8       | 11.0        | -16.8       | PASS   |
| 2399.125000     | -28.1       | 11.3        | -16.8       | PASS   |
| 2399.875000     | -28.2       | 11.4        | -16.8       | PASS   |
| 2399.975000     | -28.3       | 11.5        | -16.8       | PASS   |
| 2399.925000     | -28.3       | 11.5        | -16.8       | PASS   |
| 2399.175000     | -28.4       | 11.6        | -16.8       | PASS   |
| 2399.625000     | -28.6       | 11.8        | -16.8       | PASS   |
| 2399.225000     | -28.7       | 11.8        | -16.8       | PASS   |
| 2399.325000     | -28.7       | 11.8        | -16.8       | PASS   |
| 2399.075000     | -28.9       | 12.1        | -16.8       | PASS   |



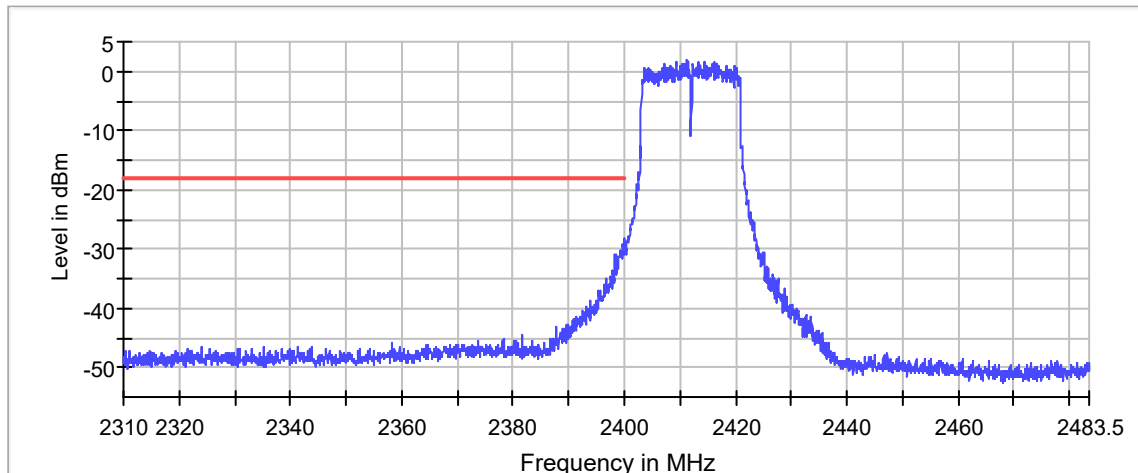
| EUT Information |  |
|-----------------|--|
| Manufacturer    | Chamberlain Group, LLC                         |
| Product         | Residential Jackshaft Opener                   |
| Model No.       | RJOA MPP                                       |
| Serial No.      | Antenna Conducted Sample 1                     |
| Mode            | Transmit at 2412MHz, 802.11n, MCS7, power = 99 |
| Date Tested     | November 29, 2022                              |

### In band Peak

| Frequency (MHz) | Level (dBm) |
|-----------------|-------------|
| 2411.325000     | 1.8         |

### Measurements

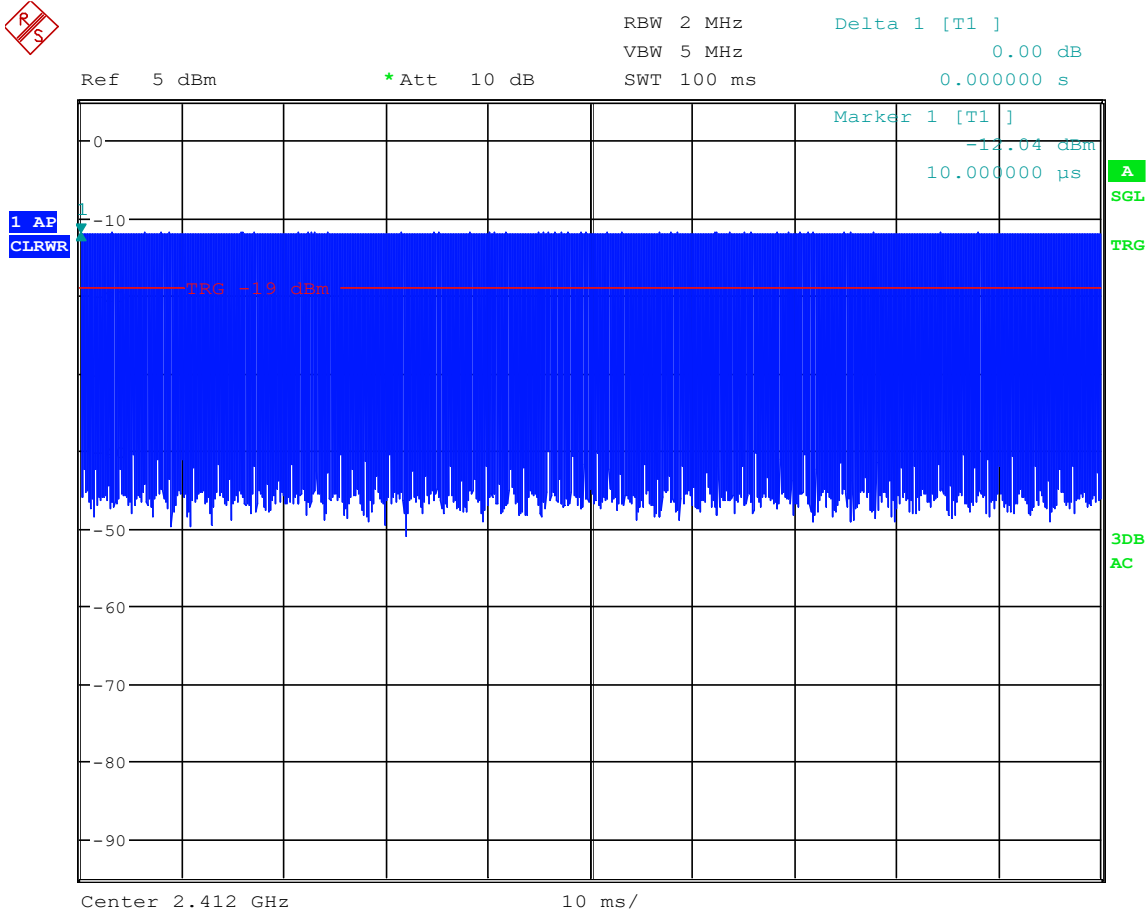
| Frequency (MHz) | Level (dBm) | Margin (dB) | Limit (dBm) | Result |
|-----------------|-------------|-------------|-------------|--------|
| 2399.975000     | -28.3       | 10.1        | -18.2       | PASS   |
| 2399.925000     | -28.7       | 10.6        | -18.2       | PASS   |
| 2399.875000     | -29.2       | 11.0        | -18.2       | PASS   |
| 2399.725000     | -29.4       | 11.2        | -18.2       | PASS   |
| 2399.825000     | -29.4       | 11.3        | -18.2       | PASS   |
| 2399.775000     | -29.5       | 11.3        | -18.2       | PASS   |
| 2399.325000     | -30.3       | 12.2        | -18.2       | PASS   |
| 2399.675000     | -30.5       | 12.3        | -18.2       | PASS   |
| 2399.375000     | -30.6       | 12.5        | -18.2       | PASS   |
| 2399.475000     | -30.7       | 12.5        | -18.2       | PASS   |
| 2398.375000     | -30.9       | 12.7        | -18.2       | PASS   |
| 2399.275000     | -30.9       | 12.8        | -18.2       | PASS   |
| 2398.325000     | -31.1       | 12.9        | -18.2       | PASS   |
| 2399.425000     | -31.1       | 12.9        | -18.2       | PASS   |
| 2399.575000     | -31.1       | 13.0        | -18.2       | PASS   |



— Limit    — Sum Level    × Fail

# Duty Cycle Correction Factor

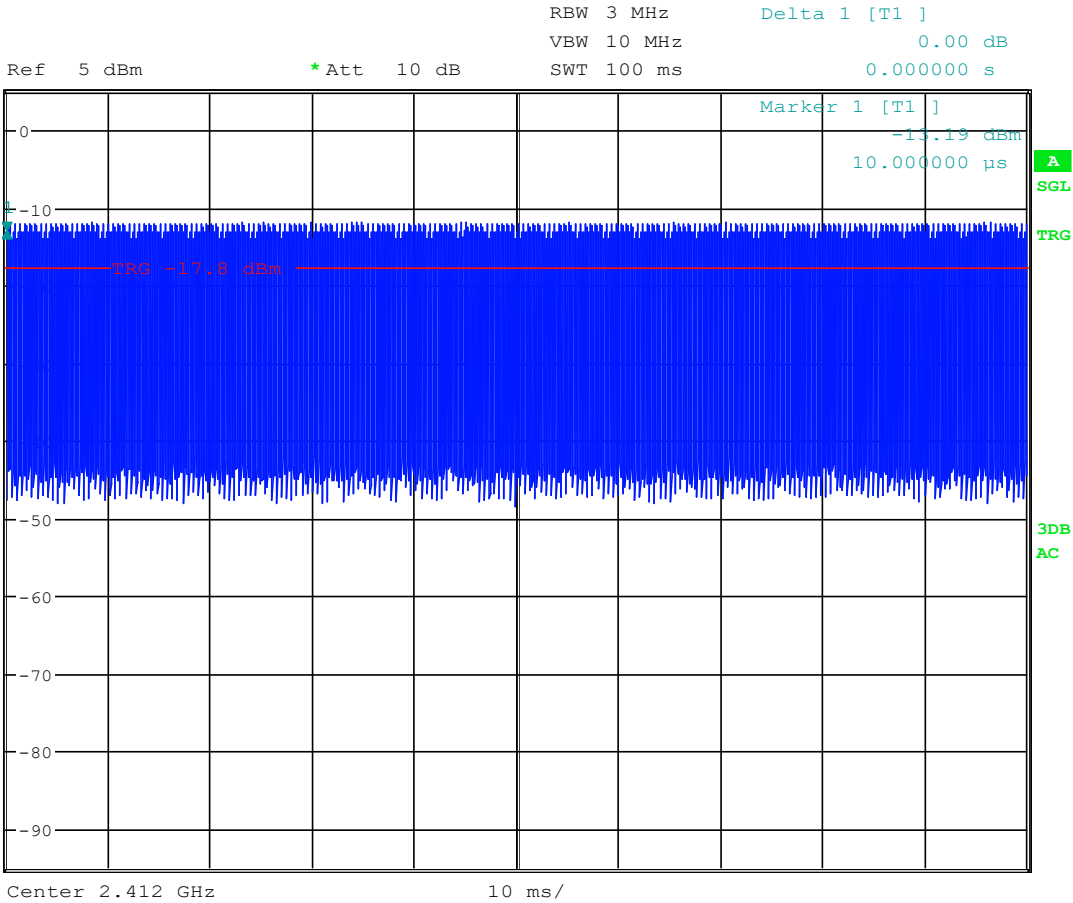
| EUT Information |  |
|-----------------|--|
| Manufacturer    | Chamberlain Group, LLC                           |
| Product         | Residential Jackshaft Opener                     |
| Model No.       | RJOA MPP   |
| Serial No.      | Antenna Conducted Sample 1                       |
| Mode            | Transmit at 2412MHz, 802.11b, 11MBPS, power = 94 |
| Date Tested     | December 1, 2022                                 |



Date: 3.JAN.2003 04:26:58

Duty Cycle is 100% for all 802.11b channels

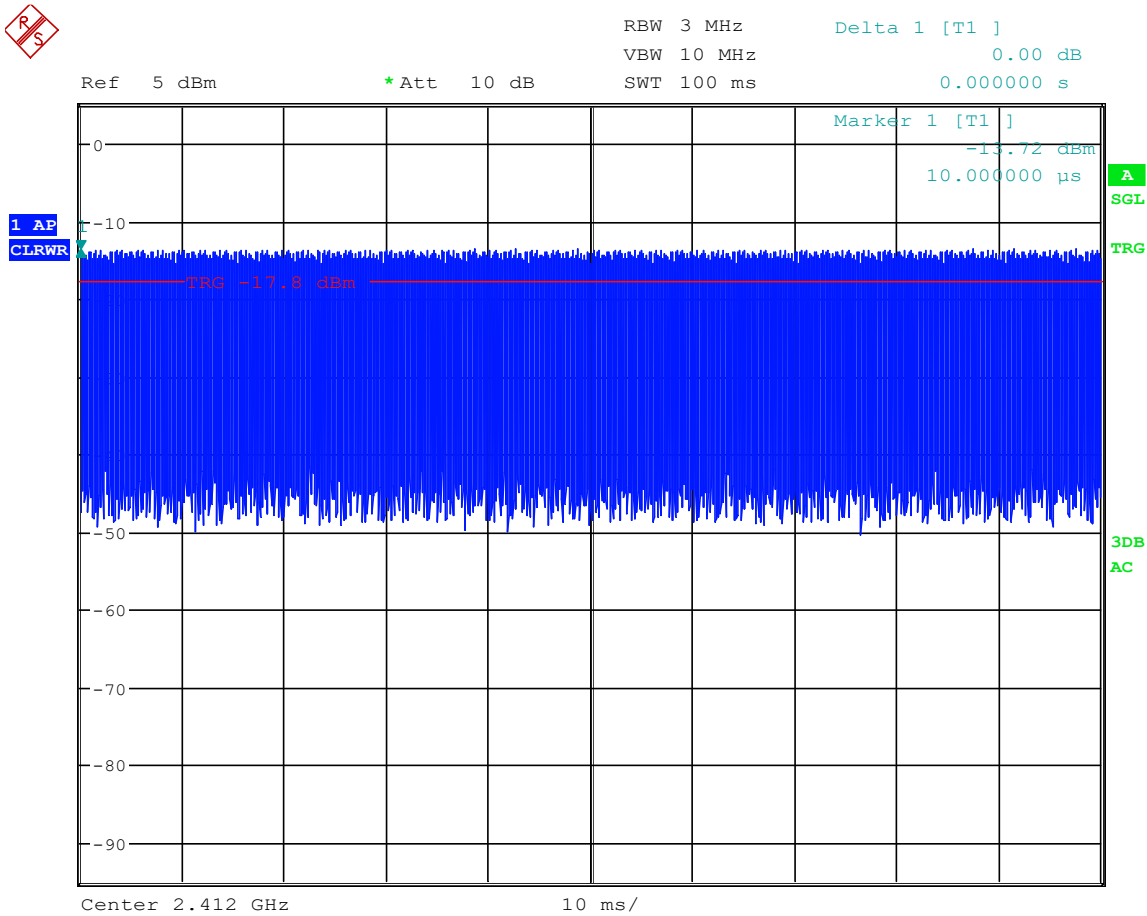
| EUT Information |   |
|-----------------|---|
| Manufacturer    | Chamberlain Group, LLC                            |
| Product         | Residential Jackshaft Opener                      |
| Model No.       | RJOA MPP  |
| Serial No.      | Antenna Conducted Sample 1                        |
| Mode            | Transmit at 2412MHz, 802.11g, 54MBPS, power = 103 |
| Date Tested     | December 1, 2022                                  |



Date: 3.JAN.2003 04:32:27

Duty Cycle is 100% for all 802.11g channels

| EUT Information |  |
|-----------------|--|
| Manufacturer    | Chamberlain Group, LLC                         |
| Product         | Residential Jackshaft Opener                   |
| Model No.       | RJOA MPP                                       |
| Serial No.      | Antenna Conducted Sample 1                     |
| Mode            | Transmit at 2412MHz, 802.11n, MCS7, power = 99 |
| Date Tested     | December 1, 2022                               |



Date: 3.JAN.2003 04:37:38

Duty Cycle is 100% for all 802.11b channels

22. Radiated Emissions Tests

| EUT Information |  |
|-----------------|--|
| Manufacturer    | Chamberlain Group, LLC                           |
| Product         | Residential Jackshaft Opener                     |
| Model No.       | RJOA MPP   |
| Serial No.      | Radiated Sample 2                                |
| Mode            | Transmit at 2412MHz, 802.11b, 11MBPS, power = 94 |

| Test Setup Details                          |  |
|---|--|
| Setup Format                                | Tabletop   |
| Height of Support (For Floor Standing only) | N/A  |
| Type of Test Site                           | Semi-Anechoic Chamber  |
| Test Site Used                              | Room #29   |
| Type of Antennas Used                       | Below 1GHz: Bilog (or equivalent)<br>1 – 18GHz: Double-Ridged Waveguide (or equivalent)<br>Above 18GHz: Standard Gain Horn (or equivalent) |
| Notes                                       | N/A  |

| 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                              |
| Radiated disturbance (electric field strength on an open area test site or alternative test site) (26.5 GHz – 40 GHz) | 3.4                              |



| Requirements   |
|--|
| <p><u>Peak EIRP:</u></p> <p>Per FCC 15.247, Section (b)(3) and ISED RSS-247, Section 5.4(d), for systems using digital modulation, the maximum peak conducted output power shall not exceed 1 watt.</p> <p>Per FCC 15.247, Section (b)(4), and ISED RSS-247, Section 5.4(d), the conducted output power limit is based on the use of antennas with directional gains that do not exceed 6dBi. If transmitting antennas of directional gain greater than 6dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values, by the amount in dB that the directional gain of the antenna exceeds 6dBi.</p>   |
| <p><u>Radiated Emissions in Non-Restricted Bands:</u></p> <p>Per FCC 15.247, Section (d), and ISED RSS-247, Section 5.5, in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated emissions measurement. Attenuation below the general limits specified in §15.209(a) is not required.</p> <p><u>Radiated Emissions in Restricted Bands:</u></p> <p>Per 15.247, Section (d), radiated emissions which fall in the restricted bands, as defined in FCC 15.205, Section (a), must comply with the radiated emission limits specified in FCC 15.209, Section (a).</p> <p>Per ISED RSS-247, Section 3.3, radiated emissions which fall in the restricted bands, as defined in ISED RSS-Gen, Section 8.10, must comply with the radiated emission limits specified in RSS-Gen, Section 8.9.</p> |
| <p><u>High Band Edge:</u></p> <p>Per 15.247, Section (d), radiated emissions which fall in the restricted band beginning at 2483.5MHz, as defined in FCC 15.205, Section (a), must comply with the radiated emission limits specified in FCC 15.209, Section (a).</p> <p>Per ISED RSS-247, Section 3.3, radiated emissions which fall in the restricted band beginning at 2483.5MHz, as defined in ISED RSS-Gen, Section 8.10, must comply with the radiated emission limits specified in RSS-Gen, Section 8.9.</p>  |

| Procedures   |                           |                           |           |           |          |                 |          |           |                                |                   |                 |      |               |      |            |          |
|--|---------------------------|---------------------------|-----------|-----------|----------|-----------------|----------|-----------|--------------------------------|-------------------|-----------------|------|---------------|------|------------|----------|
| <p><u>Peak EIRP:</u></p> <p>C63.10 Annex G and Section 11.9.1.1:</p> <p>The EUT was placed on a 1.5-meter-high non-conductive stand and set to transmit. A double ridged waveguide antenna was placed at a test distance of 3 meters from the EUT.</p> <p>a) The following settings were employed on the EMI Test Receiver:</p> <table style="margin-left: 40px;"> <tr> <td>1) Center Frequency =</td> <td>Transmit frequency of EUT</td> </tr> <tr> <td>2) Span =</td> <td>≥ 3 x RBW</td> </tr> <tr> <td>3) RBW =</td> <td>≥ DTS Bandwidth</td> </tr> <tr> <td>4) VBW =</td> <td>≥ 3 x RBW</td> </tr> <tr> <td>5) Number of points in sweep =</td> <td>≥ (2 x span /RBW)</td> </tr> <tr> <td>6) Sweep time =</td> <td>Auto</td> </tr> <tr> <td>7) Detector =</td> <td>Peak</td> </tr> <tr> <td>8) Trace =</td> <td>Max hold</td> </tr> </table> | 1) Center Frequency =     | Transmit frequency of EUT | 2) Span = | ≥ 3 x RBW | 3) RBW = | ≥ DTS Bandwidth | 4) VBW = | ≥ 3 x RBW | 5) Number of points in sweep = | ≥ (2 x span /RBW) | 6) Sweep time = | Auto | 7) Detector = | Peak | 8) Trace = | Max hold |
| 1) Center Frequency =  | Transmit frequency of EUT |                           |           |           |          |                 |          |           |                                |                   |                 |      |               |      |            |          |
| 2) Span =  | ≥ 3 x RBW                 |                           |           |           |          |                 |          |           |                                |                   |                 |      |               |      |            |          |
| 3) RBW =   | ≥ DTS Bandwidth           |                           |           |           |          |                 |          |           |                                |                   |                 |      |               |      |            |          |
| 4) VBW =   | ≥ 3 x RBW                 |                           |           |           |          |                 |          |           |                                |                   |                 |      |               |      |            |          |
| 5) Number of points in sweep =   | ≥ (2 x span /RBW)         |                           |           |           |          |                 |          |           |                                |                   |                 |      |               |      |            |          |
| 6) Sweep time =  | Auto                      |                           |           |           |          |                 |          |           |                                |                   |                 |      |               |      |            |          |
| 7) Detector =  | Peak                      |                           |           |           |          |                 |          |           |                                |                   |                 |      |               |      |            |          |
| 8) Trace =   | Max hold                  |                           |           |           |          |                 |          |           |                                |                   |                 |      |               |      |            |          |

- b) Allow trace to stabilize and use peak marker function to determine the peak amplitude level.
- c) The equivalent power was determined using equation G.1 in C63.10 to convert field intensity levels measured at 3 meters into EIRP readings.

#### Radiated Emissions in Non-Restricted Bands:

##### C63.10-2013 Section 11.11

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 radiated emission tests were then manually performed over the frequency range of 30MHz to 25GHz.

- 1) 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 and set to transmit. A peak detector with a resolution bandwidth of 100kHz was used on the spectrum analyzer.
- 2) 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 and set to transmit. A peak detector with a resolution bandwidth of 100kHz was used on the spectrum analyzer.
- 3) 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:
  - a) The EUT was rotated so that all of its sides were exposed to the receiving antenna.
  - b) Since the measuring antenna is linearly polarized, both horizontal and vertical field components were measured.
  - c) The measuring antenna was raised and lowered for each antenna polarization to maximize the readings.
  - d) 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.
- 4) 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.

#### Radiated Emissions in Restricted Bands:

##### C63.10-2013 Section 11.12

- 1) The field strengths of all emissions below 1 GHz 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 80 cm high non-conductive stand and set to transmit. A peak detector with a resolution bandwidth of 100 kHz was used on the spectrum analyzer.

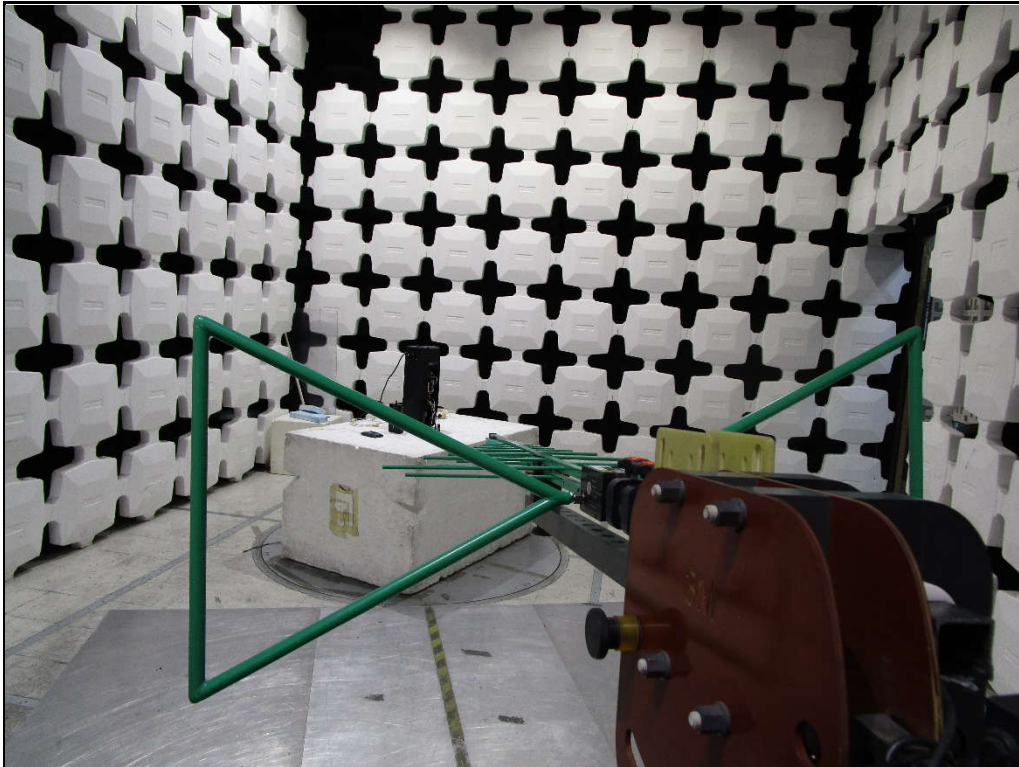
- 2) The field strengths of all emissions above 1 GHz were measured using a double-ridged waveguide antenna. The waveguide antenna was positioned at a 3-meter distance from the EUT. The EUT was placed on a 1.5 meter high non-conductive and set to transmit. A peak detector with a resolution bandwidth of 1 MHz was used on the spectrum analyzer.
- 3) To ensure that maximum or worst-case emission levels were measured, the following steps were taken when taking all measurements:
  - a) The EUT was rotated so that all of its sides were exposed to the receiving antenna.
  - b) Since the measuring antenna is linearly polarized, both horizontal and vertical field components were measured.
  - c) The measuring antenna was raised and lowered for each antenna polarization to maximize the readings.
  - d) 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.
- 4) 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.
- 5) 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).
- 6) 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.

#### High Band Edge:

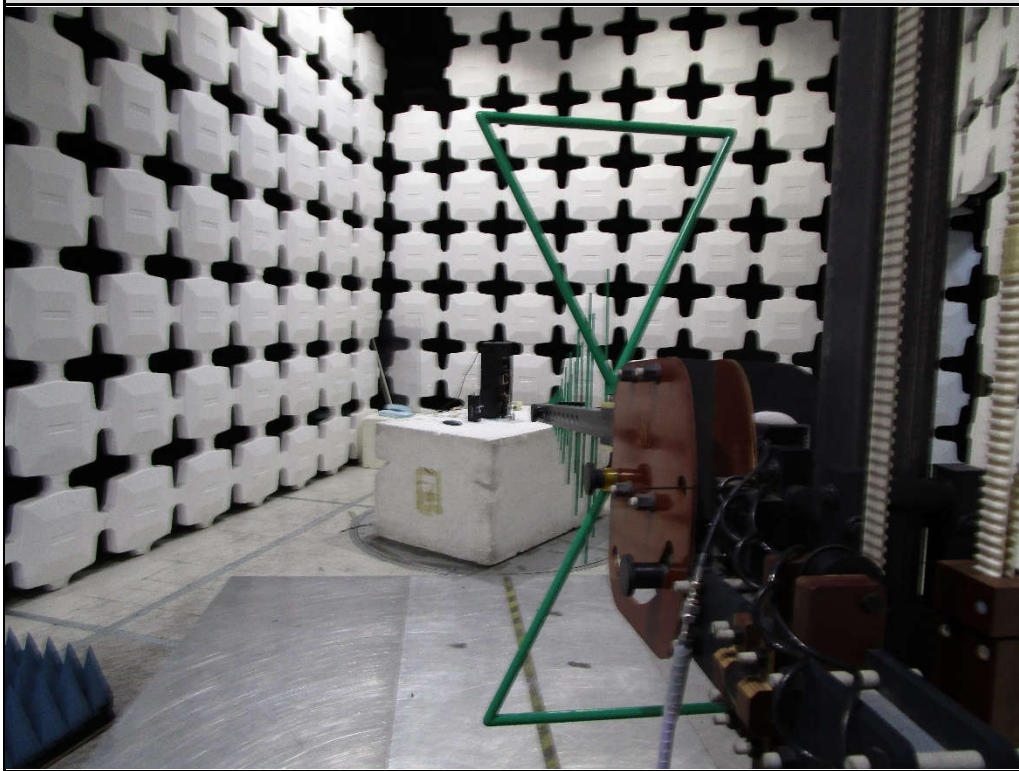
C63.10-2013 section 6.10.5:

- 1) The EUT was set to transmit continuously at the channel closest to the high band-edge.
- 2) 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 and set to transmit. A peak detector with a resolution bandwidth of 1 MHz was used on the spectrum analyzer.
- 3) To ensure that maximum or worst-case emission levels were measured, the following steps were taken when taking all measurements:
  - a) The EUT was rotated so that all of its sides were exposed to the receiving antenna.
  - b) Since the measuring antenna is linearly polarized, both horizontal and vertical field components were measured.
  - c) The measuring antenna was raised and lowered for each antenna polarization to maximize the readings.
- 4) 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 20 dB above the maximum permitted average emission limit applicable to the equipment under test. Therefore, all peak readings above 1 GHz must be no greater than 20 dB above the limits specified in 15.209(a).

- 5) Next, 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.

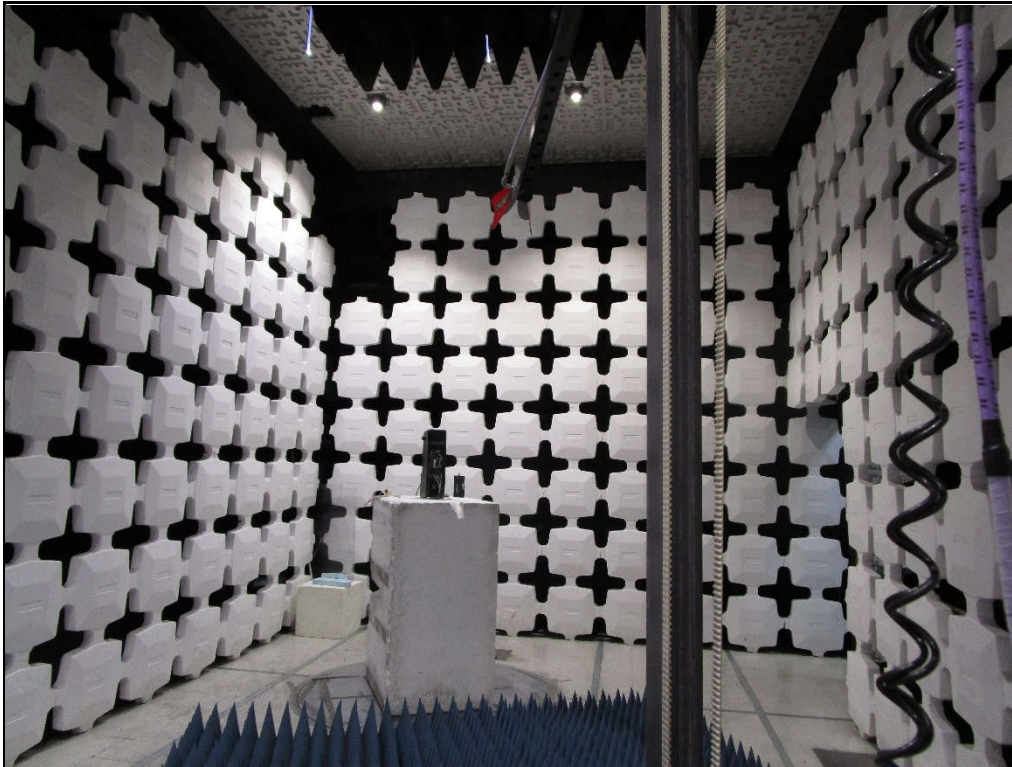


Test Setup for Spurious Radiated Emissions, 30MHz – 1GHz – Antenna Polarization Horizontal

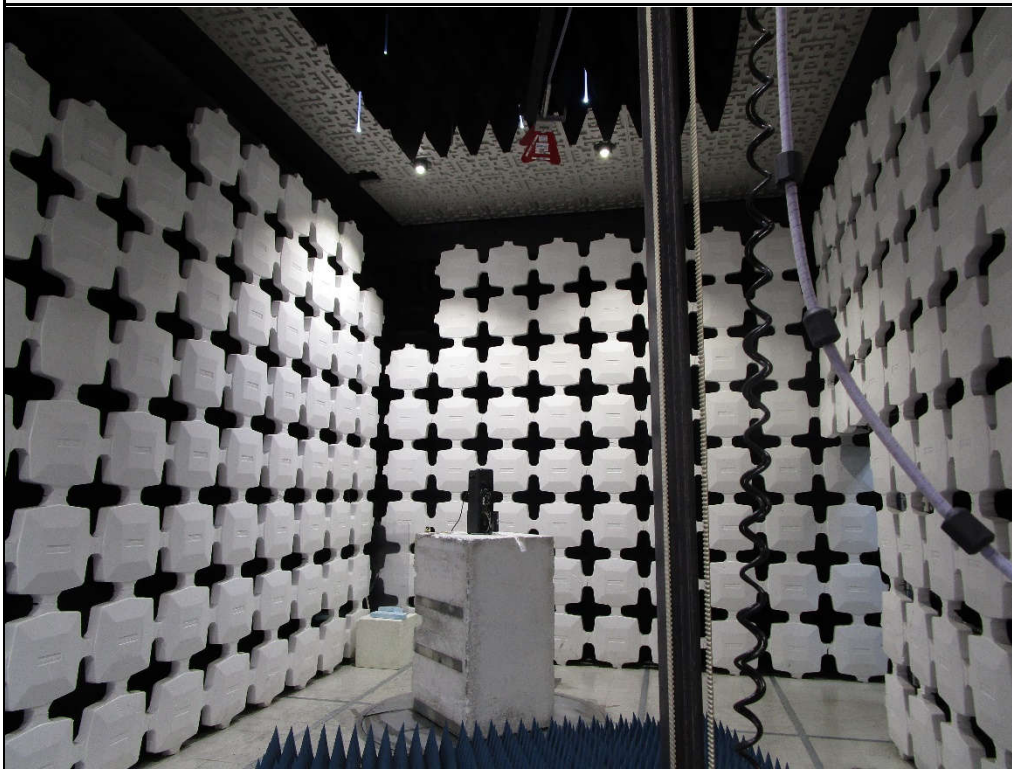


Test Setup for Spurious Radiated Emissions, 30MHz – 1GHz – Antenna Polarization Vertical

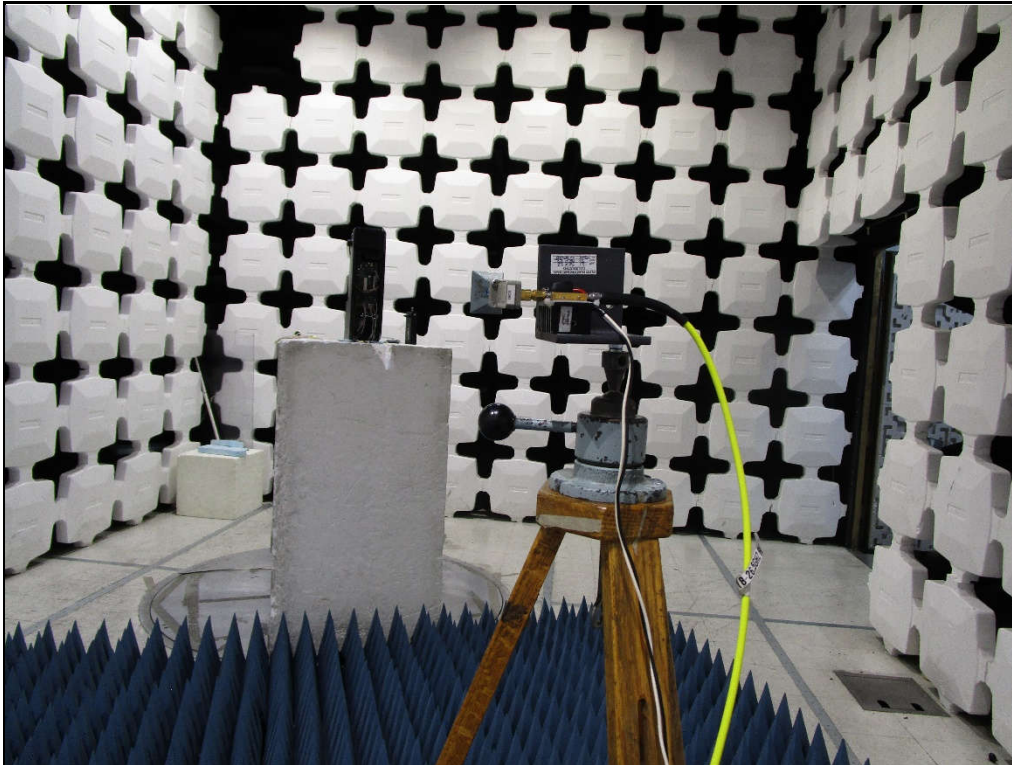




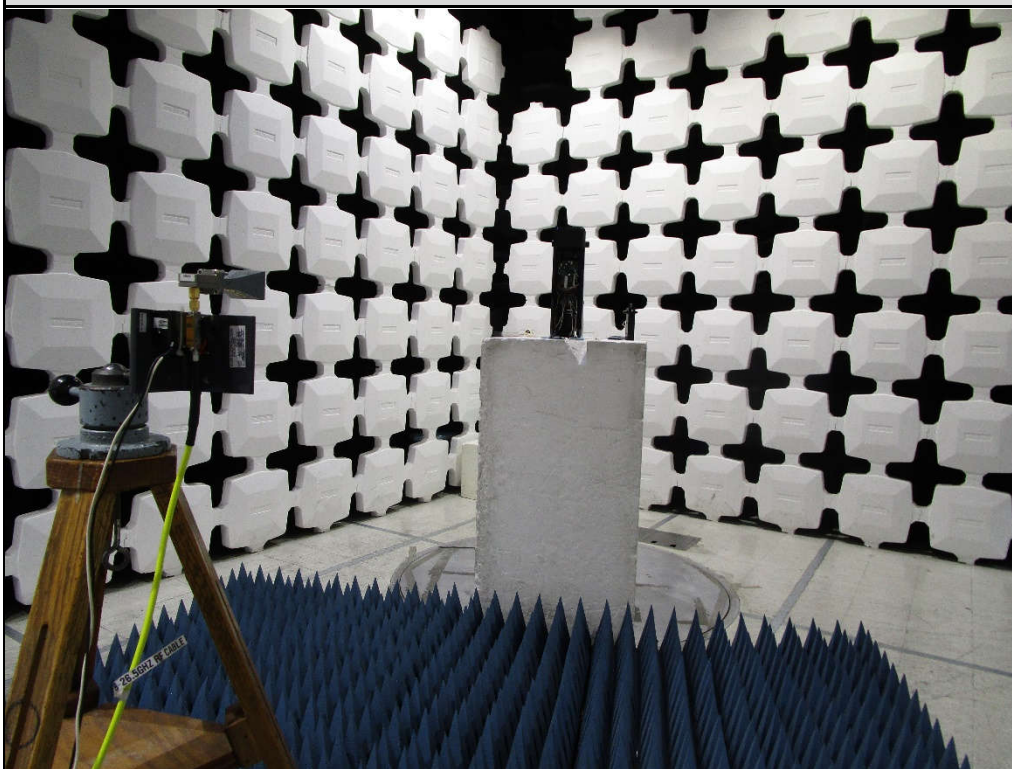
Test Setup for Spurious Radiated Emissions, 1 – 18GHz – Antenna Polarization Horizontal



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



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



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



| Test Details |  |
|--------------|--|
| Manufacturer | Chamberlain Group, LLC   |
| EUT          | Residential Jackshaft Opener   |
| Model No.    | RJOA MPP   |
| Serial No.   | Radiated Sample 2  |
| Mode         | Transmit at 2412MHz, 802.11b, 11MBPS, power = 94<br>Transmit at 2437MHz, 802.11b, 11MBPS, power = 93<br>Transmit at 2462MHz, 802.11b, 11MBPS, power = 93 |
| Result       | Max EIRP =182mW (22.6dBm)  |
| Date Tested  | December 5, 2022   |
| Notes        |  |

| Freq (MHz) | Ant Pol | Wide BW Meter Reading (dBµV) | Cable Factor (dB) | Antenna Factor (dB/m) | Pre Amp (dB) | Peak Total (dBµV/m) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
|------------|---------|------------------------------|-------------------|-----------------------|--------------|---------------------|------------|-------------|-------------|
| 2412.00    | H       | 80.0                         | 2.6               | 32.6                  | 0.0          | 115.2               | 19.9       | 36.0        | -16.1       |
|            | V       | 82.7                         | 2.6               | 32.6                  | 0.0          | 117.9               | 22.6       | 36.0        | -13.4       |
| 2437.00    | H       | 78.8                         | 2.6               | 32.6                  | 0.0          | 114.1               | 18.8       | 36.0        | -17.2       |
|            | V       | 80.0                         | 2.6               | 32.6                  | 0.0          | 115.3               | 20.0       | 36.0        | -16.0       |
| 2462.00    | H       | 79.4                         | 2.6               | 32.7                  | 0.0          | 114.7               | 19.4       | 36.0        | -16.6       |
|            | V       | 80.3                         | 2.6               | 32.7                  | 0.0          | 115.6               | 20.3       | 36.0        | -15.7       |

Peak Total (dBµV/m) = Meter Reading (dBµV) + CBL Fac (dB) + Ant Fac (dB/m) + Pre Amp (dB)

EIRP (dBm) = Peak Total (dBµV/m) – 95.3dB



| Test Details |   |
|--------------|---|
| Manufacturer | Chamberlain Group, LLC  |
| EUT          | Residential Jackshaft Opener  |
| Model No.    | RJOA MPP  |
| Serial No.   | Radiated Sample 2   |
| Mode         | Transmit at 2412MHz, 802.11g, 54MBPS, power = 103<br>Transmit at 2437MHz, 802.11g, 54MBPS, power = 102<br>Transmit at 2462MHz, 802.11g, 54MBPS, power = 101 |
| Result       | Max EIRP =234.4mW (23.7dBm)   |
| Date Tested  | December 5, 2022  |
| Notes        |   |

| Freq (MHz) | Ant Pol | Wide BW Meter Reading (dBµV) | Cable Factor (dB) | Antenna Factor (dB/m) | Pre Amp (dB) | Peak Total (dBµV/m) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
|------------|---------|------------------------------|-------------------|-----------------------|--------------|---------------------|------------|-------------|-------------|
| 2412.00    | H       | 82.8                         | 2.6               | 32.6                  | 0.0          | 118.0               | 22.7       | 36.0        | -13.3       |
|            | V       | 83.8                         | 2.6               | 32.6                  | 0.0          | 119.0               | 23.7       | 36.0        | -12.3       |
| 2437.00    | H       | 83.1                         | 2.6               | 32.6                  | 0.0          | 118.4               | 23.1       | 36.0        | -12.9       |
|            | V       | 82.4                         | 2.6               | 32.6                  | 0.0          | 117.7               | 22.4       | 36.0        | -13.6       |
| 2462.00    | H       | 81.3                         | 2.6               | 32.7                  | 0.0          | 116.6               | 21.3       | 36.0        | -14.7       |
|            | V       | 82.6                         | 2.6               | 32.7                  | 0.0          | 117.9               | 22.6       | 36.0        | -13.4       |

Peak Total (dBµV/m) = Meter Reading (dBµV) + CBL Fac (dB) + Ant Fac (dB/m) + Pre Amp (dB)

EIRP (dBm) = Peak Total (dBµV/m) – 95.3dB

| Test Details |  |
|--------------|--|
| Manufacturer | Chamberlain Group, LLC   |
| EUT          | Residential Jackshaft Opener   |
| Model No.    | RJOA MPP   |
| Serial No.   | Radiated Sample 2  |
| Mode         | Transmit at 2412MHz, 802.11n, MCS7, power = 99<br>Transmit at 2437MHz, 802.11n, MCS7, power = 98<br>Transmit at 2462MHz, 802.11n, MCS7, power = 98 |
| Result       | Max EIRP =288.4mW (24.6dBm)  |
| Date Tested  | December 5, 2022   |
| Notes        |  |

| Freq (MHz) | Ant Pol | Wide BW Meter Reading (dBµV) | Cable Factor (dB) | Antenna Factor (dB/m) | Pre Amp (dB) | Peak Total (dBµV/m) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
|------------|---------|------------------------------|-------------------|-----------------------|--------------|---------------------|------------|-------------|-------------|
| 2412.00    | H       | 84.7                         | 2.6               | 32.6                  | 0.0          | 119.9               | 24.6       | 36.0        | -11.4       |
|            | V       | 83.0                         | 2.6               | 32.6                  | 0.0          | 118.2               | 22.9       | 36.0        | -13.1       |
| 2437.00    | H       | 82.6                         | 2.6               | 32.6                  | 0.0          | 117.9               | 22.6       | 36.0        | -13.4       |
|            | V       | 82.3                         | 2.6               | 32.6                  | 0.0          | 117.6               | 22.3       | 36.0        | -13.7       |
| 2462.00    | H       | 81.5                         | 2.6               | 32.7                  | 0.0          | 116.8               | 21.5       | 36.0        | -14.5       |
|            | V       | 82.1                         | 2.6               | 32.7                  | 0.0          | 117.4               | 22.1       | 36.0        | -13.9       |

Peak Total (dBµV/m) = Meter Reading (dBµV) + CBL Fac (dB) + Ant Fac (dB/m) + Pre Amp (dB)

EIRP (dBm) = Peak Total (dBµV/m) – 95.3dB

| Test Details |  |
|--------------|--|
| Manufacturer | Chamberlain Group, LLC                           |
| EUT          | Residential Jackshaft Opener                     |
| Model No.    | RJOA MPP   |
| Serial No.   | Radiated Sample 2                                |
| Test         | Peak Measurements in the Restricted Bands        |
| Mode         | Transmit at 2412MHz, 802.11b, 11MBPS, power = 94 |
| Date Tested  | December 5, 2022 through December 9, 2022        |
| Notes        |  |

| Freq (MHz) | Ant Pol | Meter Reading (dBμV) | Ambient | Cable Factor (dB) | Antenna Factor (dB/m) | Pre Amp (dB) | Peak Total at 3m (dBμV/m) | Peak Total at 3m (μV/m) | Peak Limit at 3m (μV/m) | Margin (dBm) |
|------------|---------|----------------------|---------|-------------------|-----------------------|--------------|---------------------------|-------------------------|-------------------------|--------------|
| 4824.00    | H       | 51.1                 |         | 3.7               | 34.3                  | -39.7        | 49.4                      | 295.6                   | 5000.0                  | -24.6        |
|            | V       | 50.5                 |         | 3.7               | 34.3                  | -39.7        | 48.8                      | 275.9                   | 5000.0                  | -25.2        |
| 12060.00   | H       | 49.1                 | Ambient | 6.1               | 38.8                  | -39.0        | 55.0                      | 564.6                   | 5000.0                  | -18.9        |
|            | V       | 47.7                 | Ambient | 6.1               | 38.8                  | -39.0        | 53.6                      | 480.5                   | 5000.0                  | -20.3        |
| 14472.00   | H       | 47.5                 | Ambient | 6.6               | 39.4                  | -38.6        | 55.0                      | 560.2                   | 5000.0                  | -19.0        |
|            | V       | 46.8                 | Ambient | 6.6               | 39.4                  | -38.6        | 54.3                      | 516.8                   | 5000.0                  | -19.7        |
| 19296.00   | H       | 30.7                 | Ambient | 2.2               | 40.4                  | -27.9        | 45.4                      | 186.8                   | 5000.0                  | -28.6        |
|            | V       | 30.3                 | Ambient | 2.2               | 40.4                  | -27.9        | 45.0                      | 178.4                   | 5000.0                  | -29.0        |

| Test Details |  |
|--------------|--|
| Manufacturer | Chamberlain Group, LLC                           |
| EUT          | Residential Jackshaft Opener                     |
| Model No.    | RJOA MPP   |
| Serial No.   | Radiated Sample 2                                |
| Test         | Average Measurements in the Restricted Bands     |
| Mode         | Transmit at 2412MHz, 802.11b, 11MBPS, power = 94 |
| Date Tested  | December 5, 2022 through December 9, 2022        |
| Notes        |  |

| Freq (MHz) | Ant Pol | Meter Reading (dB $\mu$ V) | Ambient | CBL Fac (dB) | Ant Fac (dB/m) | Pre Amp (dB) | Duty Cycle Factor (dB) | Average Total at 3m (dB $\mu$ V/m) | Average Total at 3m ( $\mu$ V/m) | Average Limit at 3m ( $\mu$ V/m) | Margin (dB) |
|------------|---------|----------------------------|---------|--------------|----------------|--------------|------------------------|------------------------------------|----------------------------------|----------------------------------|-------------|
| 4824.00    | H       | 37.30                      |         | 3.7          | 34.3           | -39.7        | 0.0                    | 35.6                               | 60.4                             | 500.0                            | -18.4       |
|            | V       | 37.20                      |         | 3.7          | 34.3           | -39.7        | 0.0                    | 35.5                               | 59.7                             | 500.0                            | -18.5       |
| 12060.00   | H       | 34.40                      | Ambient | 6.1          | 38.8           | -39.0        | 0.0                    | 40.3                               | 103.9                            | 500.0                            | -13.6       |
|            | V       | 33.60                      | Ambient | 6.1          | 38.8           | -39.0        | 0.0                    | 39.5                               | 94.8                             | 500.0                            | -14.4       |
| 14472.00   | H       | 32.90                      | Ambient | 6.6          | 39.4           | -38.6        | 0.0                    | 40.4                               | 104.3                            | 500.0                            | -13.6       |
|            | V       | 32.90                      | Ambient | 6.6          | 39.4           | -38.6        | 0.0                    | 40.4                               | 104.3                            | 500.0                            | -13.6       |
| 19296.00   | H       | 16.30                      | Ambient | 2.2          | 40.4           | -27.9        | 0.0                    | 31.0                               | 35.6                             | 500.0                            | -23.0       |
|            | V       | 15.90                      | Ambient | 2.2          | 40.4           | -27.9        | 0.0                    | 30.6                               | 34.0                             | 500.0                            | -23.4       |

| Test Details |  |
|--------------|--|
| Manufacturer | Chamberlain Group, LLC                           |
| EUT          | Residential Jackshaft Opener                     |
| Model No.    | RJOA MPP   |
| Serial No.   | Radiated Sample 2                                |
| Test         | Peak Measurements in the Non-Restricted Bands    |
| Mode         | Transmit at 2412MHz, 802.11b, 11MBPS, power = 94 |
| Date Tested  | December 5, 2022 through December 9, 2022        |
| Notes        |  |

| Freq (MHz) | Ant Pol | Meter Reading (dBμV) | Ambient | Cable Factor (dB) | Antenna Factor (dB/m) | Pre Amp (dB) | Peak Total at 3m (dBμV/m) | Peak Total at 3m (μV/m) | Peak Limit at 3m (μV/m) | Margin (dBm) |
|------------|---------|----------------------|---------|-------------------|-----------------------|--------------|---------------------------|-------------------------|-------------------------|--------------|
| 2412.00    | H       | 67.60                |         | 2.6               | 32.6                  | 0.0          | 102.8                     | 138149.2                | NA                      | NA           |
|            | V       | 70.00                |         | 2.6               | 32.6                  | 0.0          | 105.2                     | 182116.1                | NA                      | NA           |
| 7236.00    | H       | 52.40                |         | 4.7               | 36.3                  | -39.7        | 53.7                      | 482.0                   | 18211.6                 | -31.5        |
|            | V       | 49.80                |         | 4.7               | 36.3                  | -39.7        | 51.1                      | 357.3                   | 18211.6                 | -34.1        |
| 9648.00    | H       | 44.30                |         | 5.2               | 37.2                  | -39.3        | 47.4                      | 233.7                   | 18211.6                 | -37.8        |
|            | V       | 42.40                |         | 5.2               | 37.2                  | -39.3        | 45.5                      | 187.8                   | 18211.6                 | -39.7        |
| 16884.00   | H       | 36.80                | Ambient | 7.2               | 42.3                  | -37.4        | 48.9                      | 278.0                   | 18211.6                 | -36.3        |
|            | V       | 37.40                | Ambient | 7.2               | 42.3                  | -37.4        | 49.5                      | 297.9                   | 18211.6                 | -35.7        |
| 21708.00   | H       | 20.40                | Ambient | 2.2               | 40.6                  | -28.7        | 34.5                      | 53.2                    | 18211.6                 | -50.7        |
|            | V       | 20.20                | Ambient | 2.2               | 40.6                  | -28.7        | 34.3                      | 51.9                    | 18211.6                 | -50.9        |
| 24120.00   | H       | 19.60                | Ambient | 2.2               | 40.6                  | -29.4        | 33.1                      | 45.2                    | 18211.6                 | -52.1        |
|            | V       | 19.90                | Ambient | 2.2               | 40.6                  | -29.4        | 33.4                      | 46.8                    | 18211.6                 | -51.8        |

| Test Details |  |
|--------------|--|
| Manufacturer | Chamberlain Group, LLC                           |
| EUT          | Residential Jackshaft Opener                     |
| Model No.    | RJOA MPP   |
| Serial No.   | Radiated Sample 2                                |
| Test         | Peak Measurements in the Restricted Bands        |
| Mode         | Transmit at 2437MHz, 802.11b, 11MBPS, power = 93 |
| Date Tested  | December 5, 2022 through December 9, 2022        |
| Notes        |  |

| Freq (MHz) | Ant Pol | Meter Reading (dBμV) | Ambient | Cable Factor (dB) | Antenna Factor (dB/m) | Pre Amp (dB) | Peak Total at 3m (dBμV/m) | Peak Total at 3m (μV/m) | Peak Limit at 3m (μV/m) | Margin (dBm) |
|------------|---------|----------------------|---------|-------------------|-----------------------|--------------|---------------------------|-------------------------|-------------------------|--------------|
| 4874.00    | H       | 52.0                 |         | 3.7               | 34.2                  | -39.6        | 50.3                      | 327.0                   | 5000.0                  | -23.7        |
|            | V       | 53.1                 |         | 3.7               | 34.2                  | -39.6        | 51.4                      | 371.1                   | 5000.0                  | -22.6        |
| 7311.00    | H       | 59.7                 |         | 4.7               | 36.3                  | -39.6        | 61.0                      | 1124.9                  | 5000.0                  | -13.0        |
|            | V       | 56.8                 |         | 4.7               | 36.3                  | -39.6        | 58.1                      | 805.6                   | 5000.0                  | -15.9        |
| 12185.00   | H       | 47.9                 | Ambient | 6.1               | 38.8                  | -38.9        | 53.9                      | 497.3                   | 5000.0                  | -20.0        |
|            | V       | 46.8                 | Ambient | 6.1               | 38.8                  | -38.9        | 52.8                      | 438.2                   | 5000.0                  | -21.1        |
| 19496.00   | H       | 30.3                 | Ambient | 2.2               | 40.4                  | -27.7        | 45.2                      | 181.2                   | 5000.0                  | -28.8        |
|            | V       | 29.7                 | Ambient | 2.2               | 40.4                  | -27.7        | 44.6                      | 169.1                   | 5000.0                  | -29.4        |

| Test Details |  |
|--------------|--|
| Manufacturer | Chamberlain Group, LLC                           |
| EUT          | Residential Jackshaft Opener                     |
| Model No.    | RJOA MPP   |
| Serial No.   | Radiated Sample 2                                |
| Test         | Average Measurements in the Restricted Bands     |
| Mode         | Transmit at 2437MHz, 802.11b, 11MBPS, power = 93 |
| Date Tested  | December 5, 2022 through December 9, 2022        |
| Notes        |  |

| Freq (MHz) | Ant Pol | Meter Reading (dB $\mu$ V) | Ambient | CBL Fac (dB) | Ant Fac (dB/m) | Pre Amp (dB) | Duty Cycle Factor (dB) | Average Total at 3m (dB $\mu$ V/m) | Average Total at 3m ( $\mu$ V/m) | Average Limit at 3m ( $\mu$ V/m) | Margin (dB) |
|------------|---------|----------------------------|---------|--------------|----------------|--------------|------------------------|------------------------------------|----------------------------------|----------------------------------|-------------|
| 4874.00    | H       | 38.50                      |         | 3.7          | 34.2           | -39.6        | 0.0                    | 36.8                               | 69.1                             | 500.0                            | -17.2       |
|            | V       | 39.10                      |         | 3.7          | 34.2           | -39.6        | 0.0                    | 37.4                               | 74.0                             | 500.0                            | -16.6       |
| 7311.00    | H       | 46.50                      |         | 4.7          | 36.3           | -39.6        | 0.0                    | 47.8                               | 246.1                            | 500.0                            | -6.2        |
|            | V       | 43.20                      |         | 4.7          | 36.3           | -39.6        | 0.0                    | 44.5                               | 168.3                            | 500.0                            | -9.5        |
| 12185.00   | H       | 33.70                      | Ambient | 6.1          | 38.8           | -38.9        | 0.0                    | 39.7                               | 97.0                             | 500.0                            | -14.2       |
|            | V       | 32.70                      | Ambient | 6.1          | 38.8           | -38.9        | 0.0                    | 38.7                               | 86.4                             | 500.0                            | -15.2       |
| 19496.00   | H       | 17.50                      | Ambient | 2.2          | 40.4           | -27.7        | 0.0                    | 32.4                               | 41.5                             | 500.0                            | -21.6       |
|            | V       | 16.00                      | Ambient | 2.2          | 40.4           | -27.7        | 0.0                    | 30.9                               | 34.9                             | 500.0                            | -23.1       |

| Test Details |  |
|--------------|--|
| Manufacturer | Chamberlain Group, LLC                           |
| EUT          | Residential Jackshaft Opener                     |
| Model No.    | RJOA MPP   |
| Serial No.   | Radiated Sample 2                                |
| Test         | Peak Measurements in the Non-Restricted Bands    |
| Mode         | Transmit at 2437MHz, 802.11b, 11MBPS, power = 93 |
| Date Tested  | December 5, 2022 through December 9, 2022        |
| Notes        |  |

| Freq (MHz) | Ant Pol | Meter Reading (dBμV) | Ambient | Cable Factor (dB) | Antenna Factor (dB/m) | Pre Amp (dB) | Peak Total at 3m (dBμV/m) | Peak Total at 3m (μV/m) | Peak Limit at 3m (μV/m) | Margin (dBm) |
|------------|---------|----------------------|---------|-------------------|-----------------------|--------------|---------------------------|-------------------------|-------------------------|--------------|
| 2437.00    | H       | 65.40                |         | 2.6               | 32.6                  | 0.0          | 100.7                     | 107880.1                | NA                      | NA           |
|            | V       | 66.60                |         | 2.6               | 32.6                  | 0.0          | 101.9                     | 123862.9                | NA                      | NA           |
| 9748.00    | H       | 45.60                |         | 5.2               | 37.2                  | -39.3        | 48.8                      | 274.7                   | 12386.3                 | -33.1        |
|            | V       | 43.10                |         | 5.2               | 37.2                  | -39.3        | 46.3                      | 206.0                   | 12386.3                 | -35.6        |
| 14622.00   | H       | 37.60                | Ambient | 6.7               | 39.5                  | -38.6        | 45.2                      | 181.3                   | 12386.3                 | -36.7        |
|            | V       | 37.20                | Ambient | 6.7               | 39.5                  | -38.6        | 44.8                      | 173.1                   | 12386.3                 | -37.1        |
| 17059.00   | H       | 36.70                | Ambient | 7.2               | 42.4                  | -37.4        | 49.0                      | 281.7                   | 12386.3                 | -32.9        |
|            | V       | 37.00                | Ambient | 7.2               | 42.4                  | -37.4        | 49.3                      | 291.6                   | 12386.3                 | -32.6        |
| 21933.00   | H       | 19.40                | Ambient | 2.2               | 40.6                  | -28.9        | 33.3                      | 46.2                    | 12386.3                 | -48.6        |
|            | V       | 19.70                | Ambient | 2.2               | 40.6                  | -28.9        | 33.6                      | 47.8                    | 12386.3                 | -48.3        |
| 24370.00   | H       | 20.10                | Ambient | 2.2               | 40.6                  | -29.4        | 33.6                      | 47.8                    | 12386.3                 | -48.3        |
|            | V       | 20.40                | Ambient | 2.2               | 40.6                  | -29.4        | 33.9                      | 49.5                    | 12386.3                 | -48.0        |



| Test Details |  |
|--------------|--|
| Manufacturer | Chamberlain Group, LLC                           |
| EUT          | Residential Jackshaft Opener                     |
| Model No.    | RJOA MPP   |
| Serial No.   | Radiated Sample 2                                |
| Test         | Peak Measurements in the Restricted Bands        |
| Mode         | Transmit at 2462MHz, 802.11b, 11MBPS, power = 93 |
| Date Tested  | December 5, 2022 through December 9, 2022        |
| Notes        |  |

| Freq (MHz) | Ant Pol | Meter Reading (dBμV) | Ambient | Cable Factor (dB) | Antenna Factor (dB/m) | Pre Amp (dB) | Peak Total at 3m (dBμV/m) | Peak Total at 3m (μV/m) | Peak Limit at 3m (μV/m) | Margin (dBm) |
|------------|---------|----------------------|---------|-------------------|-----------------------|--------------|---------------------------|-------------------------|-------------------------|--------------|
| 4924.00    | H       | 54.4                 |         | 3.7               | 34.2                  | -39.6        | 52.6                      | 428.7                   | 5000.0                  | -21.3        |
|            | V       | 52.5                 |         | 3.7               | 34.2                  | -39.6        | 50.7                      | 344.4                   | 5000.0                  | -23.2        |
| 7386.00    | H       | 55.5                 |         | 4.7               | 36.3                  | -39.6        | 56.9                      | 702.0                   | 5000.0                  | -17.1        |
|            | V       | 52.9                 |         | 4.7               | 36.3                  | -39.6        | 54.3                      | 520.4                   | 5000.0                  | -19.7        |
| 12310.00   | H       | 48.3                 | Ambient | 6.1               | 38.9                  | -38.8        | 54.4                      | 525.9                   | 5000.0                  | -19.6        |
|            | V       | 47.7                 | Ambient | 6.1               | 38.9                  | -38.8        | 53.8                      | 490.8                   | 5000.0                  | -20.2        |
| 19696.00   | H       | 30.3                 | Ambient | 2.2               | 40.4                  | -28.0        | 44.9                      | 175.5                   | 5000.0                  | -29.1        |
|            | V       | 30.4                 | Ambient | 2.2               | 40.4                  | -28.0        | 45.0                      | 177.5                   | 5000.0                  | -29.0        |
| 22158.00   | H       | 30.3                 | Ambient | 2.2               | 40.6                  | -28.7        | 44.4                      | 165.3                   | 5000.0                  | -29.6        |
|            | V       | 30.6                 | Ambient | 2.2               | 40.6                  | -28.7        | 44.7                      | 171.1                   | 5000.0                  | -29.3        |

| Test Details |  |
|--------------|--|
| Manufacturer | Chamberlain Group, LLC                           |
| EUT          | Residential Jackshaft Opener                     |
| Model No.    | RJOA MPP   |
| Serial No.   | Radiated Sample 2                                |
| Test         | Average Measurements in the Restricted Bands     |
| Mode         | Transmit at 2462MHz, 802.11b, 11MBPS, power = 93 |
| Date Tested  | December 5, 2022 through December 9, 2022        |
| Notes        |  |

| Freq (MHz) | Ant Pol | Meter Reading (dB $\mu$ V) | Ambient | CBL Fac (dB) | Ant Fac (dB/m) | Pre Amp (dB) | Duty Cycle Factor (dB) | Average Total at 3m (dB $\mu$ V/m) | Average Total at 3m ( $\mu$ V/m) | Average Limit at 3m ( $\mu$ V/m) | Margin (dB) |
|------------|---------|----------------------------|---------|--------------|----------------|--------------|------------------------|------------------------------------|----------------------------------|----------------------------------|-------------|
| 4924.00    | H       | 40.40                      |         | 3.7          | 34.2           | -39.6        | 0.0                    | 38.6                               | 85.5                             | 500.0                            | -15.3       |
|            | V       | 37.50                      |         | 3.7          | 34.2           | -39.6        | 0.0                    | 35.7                               | 61.3                             | 500.0                            | -18.2       |
| 7386.00    | H       | 42.20                      |         | 4.7          | 36.3           | -39.6        | 0.0                    | 43.6                               | 151.8                            | 500.0                            | -10.4       |
|            | V       | 38.50                      |         | 4.7          | 36.3           | -39.6        | 0.0                    | 39.9                               | 99.2                             | 500.0                            | -14.1       |
| 12310.00   | H       | 33.60                      | Ambient | 6.1          | 38.9           | -38.8        | 0.0                    | 39.7                               | 96.8                             | 500.0                            | -14.3       |
|            | V       | 33.20                      | Ambient | 6.1          | 38.9           | -38.8        | 0.0                    | 39.3                               | 92.4                             | 500.0                            | -14.7       |
| 19696.00   | H       | 16.40                      | Ambient | 2.2          | 40.4           | -28.0        | 0.0                    | 31.0                               | 35.4                             | 500.0                            | -23.0       |
|            | V       | 15.90                      | Ambient | 2.2          | 40.4           | -28.0        | 0.0                    | 30.5                               | 33.4                             | 500.0                            | -23.5       |
| 22158.00   | H       | 17.00                      | Ambient | 2.2          | 40.6           | -28.7        | 0.0                    | 31.1                               | 35.7                             | 500.0                            | -22.9       |
|            | V       | 16.60                      | Ambient | 2.2          | 40.6           | -28.7        | 0.0                    | 30.7                               | 34.1                             | 500.0                            | -23.3       |

| Test Details |  |
|--------------|--|
| Manufacturer | Chamberlain Group, LLC                           |
| EUT          | Residential Jackshaft Opener                     |
| Model No.    | RJOA MPP   |
| Serial No.   | Radiated Sample 2                                |
| Test         | Peak Measurements in the Non-Restricted Bands    |
| Mode         | Transmit at 2462MHz, 802.11b, 11MBPS, power = 93 |
| Date Tested  | December 5, 2022 through December 9, 2022        |
| Notes        |  |

| Freq (MHz) | Ant Pol | Meter Reading (dBμV) | Ambient | Cable Factor (dB) | Antenna Factor (dB/m) | Pre Amp (dB) | Peak Total at 3m (dBμV/m) | Peak Total at 3m (μV/m) | Peak Limit at 3m (μV/m) | Margin (dBm) |
|------------|---------|----------------------|---------|-------------------|-----------------------|--------------|---------------------------|-------------------------|-------------------------|--------------|
| 2462.00    | H       | 66.30                |         | 2.6               | 32.7                  | 0.0          | 101.6                     | 120485.5                | NA                      | NA           |
|            | V       | 67.60                |         | 2.6               | 32.7                  | 0.0          | 102.9                     | 139937.7                | NA                      | NA           |
| 9848.00    | H       | 45.80                |         | 5.3               | 37.2                  | -39.2        | 49.0                      | 282.3                   | 13993.8                 | -33.9        |
|            | V       | 45.40                |         | 5.3               | 37.2                  | -39.2        | 48.6                      | 269.6                   | 13993.8                 | -34.3        |
| 14772.00   | H       | 37.50                | Ambient | 6.8               | 39.7                  | -38.6        | 45.3                      | 184.4                   | 13993.8                 | -37.6        |
|            | V       | 37.20                | Ambient | 6.8               | 39.7                  | -38.6        | 45.0                      | 178.2                   | 13993.8                 | -37.9        |
| 17234.00   | H       | 37.30                | Ambient | 7.3               | 42.5                  | -37.4        | 49.7                      | 306.4                   | 13993.8                 | -33.2        |
|            | V       | 36.80                | Ambient | 7.3               | 42.5                  | -37.4        | 49.2                      | 289.3                   | 13993.8                 | -33.7        |
| 24620.00   | H       | 20.60                | Ambient | 2.2               | 40.6                  | -29.0        | 34.4                      | 52.8                    | 13993.8                 | -48.5        |
|            | V       | 20.80                | Ambient | 2.2               | 40.6                  | -29.0        | 34.6                      | 54.0                    | 13993.8                 | -48.3        |

| Test Details |   |
|--------------|---|
| Manufacturer | Chamberlain Group, LLC                            |
| EUT          | Residential Jackshaft Opener                      |
| Model No.    | RJOA MPP  |
| Serial No.   | Radiated Sample 2                                 |
| Test         | Peak Measurements in the Restricted Bands         |
| Mode         | Transmit at 2412MHz, 802.11g, 54MBPS, power = 103 |
| Date Tested  | December 5, 2022 through December 9, 2022         |
| Notes        |   |

| Freq (MHz) | Ant Pol | Meter Reading (dBμV) | Ambient | Cable Factor (dB) | Antenna Factor (dB/m) | Pre Amp (dB) | Peak Total at 3m (dBμV/m) | Peak Total at 3m (μV/m) | Peak Limit at 3m (μV/m) | Margin (dBm) |
|------------|---------|----------------------|---------|-------------------|-----------------------|--------------|---------------------------|-------------------------|-------------------------|--------------|
| 4824.00    | H       | 49.9                 | Ambient | 3.7               | 34.3                  | -39.7        | 48.2                      | 257.5                   | 5000.0                  | -25.8        |
|            | V       | 49.2                 | Ambient | 3.7               | 34.3                  | -39.7        | 47.5                      | 237.5                   | 5000.0                  | -26.5        |
| 12060.00   | H       | 50.6                 | Ambient | 6.1               | 38.8                  | -39.0        | 56.5                      | 671.0                   | 5000.0                  | -17.4        |
|            | V       | 48.5                 | Ambient | 6.1               | 38.8                  | -39.0        | 54.4                      | 526.9                   | 5000.0                  | -19.5        |
| 14472.00   | H       | 47.9                 | Ambient | 6.6               | 39.4                  | -38.6        | 55.4                      | 586.6                   | 5000.0                  | -18.6        |
|            | V       | 48.4                 | Ambient | 6.6               | 39.4                  | -38.6        | 55.9                      | 621.3                   | 5000.0                  | -18.1        |
| 19296.00   | H       | 29.9                 | Ambient | 2.2               | 40.4                  | -27.9        | 44.6                      | 170.4                   | 5000.0                  | -29.4        |
|            | V       | 29.6                 | Ambient | 2.2               | 40.4                  | -27.9        | 44.3                      | 164.6                   | 5000.0                  | -29.7        |

| Test Details |   |
|--------------|---|
| Manufacturer | Chamberlain Group, LLC                            |
| EUT          | Residential Jackshaft Opener                      |
| Model No.    | RJOA MPP  |
| Serial No.   | Radiated Sample 2                                 |
| Test         | Average Measurements in the Restricted Bands      |
| Mode         | Transmit at 2412MHz, 802.11g, 54MBPS, power = 103 |
| Date Tested  | December 5, 2022 through December 9, 2022         |
| Notes        |   |

| Freq (MHz) | Ant Pol | Meter Reading (dBμV) | Ambient | CBL Fac (dB) | Ant Fac (dB/m) | Pre Amp (dB) | Duty Cycle Factor (dB) | Average Total at 3m (dBμV/m) | Average Total at 3m (μV/m) | Average Limit at 3m (μV/m) | Margin (dB) |
|------------|---------|----------------------|---------|--------------|----------------|--------------|------------------------|------------------------------|----------------------------|----------------------------|-------------|
| 4824.00    | H       | 35.20                | Ambient | 3.7          | 34.3           | -39.7        | 0.0                    | 33.5                         | 47.4                       | 500.0                      | -20.5       |
|            | V       | 34.60                | Ambient | 3.7          | 34.3           | -39.7        | 0.0                    | 32.9                         | 44.2                       | 500.0                      | -21.1       |
| 12060.00   | H       | 33.74                | Ambient | 6.1          | 38.8           | -39.0        | 0.0                    | 39.7                         | 96.3                       | 500.0                      | -14.3       |
|            | V       | 0.00                 | Ambient | 6.1          | 38.8           | -39.0        | 0.0                    | 5.9                          | 2.0                        | 500.0                      | -48.0       |
| 14472.00   | H       | 32.90                | Ambient | 6.6          | 39.4           | -38.6        | 0.0                    | 40.4                         | 104.3                      | 500.0                      | -13.6       |
|            | V       | 32.20                | Ambient | 6.6          | 39.4           | -38.6        | 0.0                    | 39.7                         | 96.2                       | 500.0                      | -14.3       |
| 19296.00   | H       | 15.90                | Ambient | 2.2          | 40.4           | -27.9        | 0.0                    | 30.6                         | 34.0                       | 500.0                      | -23.4       |
|            | V       | 16.10                | Ambient | 2.2          | 40.4           | -27.9        | 0.0                    | 30.8                         | 34.8                       | 500.0                      | -23.2       |

| Test Details |   |
|--------------|---|
| Manufacturer | Chamberlain Group, LLC                            |
| EUT          | Residential Jackshaft Opener                      |
| Model No.    | RJOA MPP  |
| Serial No.   | Radiated Sample 2                                 |
| Test         | Peak Measurements in the Non-Restricted Bands     |
| Mode         | Transmit at 2412MHz, 802.11g, 54MBPS, power = 103 |
| Date Tested  | December 5, 2022 through December 9, 2022         |
| Notes        |   |

| Freq (MHz) | Ant Pol | Meter Reading (dBμV) | Ambient | Cable Factor (dB) | Antenna Factor (dB/m) | Pre Amp (dB) | Peak Total at 3m (dBμV/m) | Peak Total at 3m (μV/m) | Peak Limit at 3m (μV/m) | Margin (dBm) |
|------------|---------|----------------------|---------|-------------------|-----------------------|--------------|---------------------------|-------------------------|-------------------------|--------------|
| 2412.00    | H       | 62.70                |         | 2.6               | 32.6                  | 0.0          | 97.9                      | 78586.6                 | NA                      | NA           |
|            | V       | 63.50                |         | 2.6               | 32.6                  | 0.0          | 98.7                      | 86168.5                 | NA                      | NA           |
| 7236.00    | H       | 50.50                |         | 4.7               | 36.3                  | -39.7        | 51.8                      | 387.3                   | 8616.8                  | -26.9        |
|            | V       | 47.20                |         | 4.7               | 36.3                  | -39.7        | 48.5                      | 264.9                   | 8616.8                  | -30.2        |
| 9648.00    | H       | 43.80                |         | 5.2               | 37.2                  | -39.3        | 46.9                      | 220.6                   | 8616.8                  | -31.8        |
|            | V       | 41.20                | 0.00    | 5.2               | 37.2                  | -39.3        | 44.3                      | 163.5                   | 8616.8                  | -34.4        |
| 16884.00   | H       | 37.30                | Ambient | 7.2               | 42.3                  | -37.4        | 49.4                      | 294.5                   | 8616.8                  | -29.3        |
|            | V       | 36.90                | Ambient | 7.2               | 42.3                  | -37.4        | 49.0                      | 281.2                   | 8616.8                  | -29.7        |
| 21708.00   | H       | 20.20                | Ambient | 2.2               | 40.6                  | -28.7        | 34.3                      | 51.9                    | 8616.8                  | -44.4        |
|            | V       | 19.40                | Ambient | 2.2               | 40.6                  | -28.7        | 33.5                      | 47.4                    | 8616.8                  | -45.2        |
| 24120.00   | H       | 19.70                | Ambient | 2.2               | 40.6                  | -29.4        | 33.2                      | 45.7                    | 8616.8                  | -45.5        |
|            | V       | 20.40                | Ambient | 2.2               | 40.6                  | -29.4        | 33.9                      | 49.5                    | 8616.8                  | -44.8        |

| Test Details |   |
|--------------|---|
| Manufacturer | Chamberlain Group, LLC                            |
| EUT          | Residential Jackshaft Opener                      |
| Model No.    | RJOA MPP  |
| Serial No.   | Radiated Sample 2                                 |
| Test         | Peak Measurements in the Restricted Bands         |
| Mode         | Transmit at 2437MHz, 802.11g, 54MBPS, power = 102 |
| Date Tested  | December 5, 2022 through December 9, 2022         |
| Notes        |   |

| Freq (MHz) | Ant Pol | Meter Reading (dBµV) | Ambient | Cable Factor (dB) | Antenna Factor (dB/m) | Pre Amp (dB) | Peak Total at 3m (dBµV/m) | Peak Total at 3m (µV/m) | Peak Limit at 3m (µV/m) | Margin (dBm) |
|------------|---------|----------------------|---------|-------------------|-----------------------|--------------|---------------------------|-------------------------|-------------------------|--------------|
| 4874.00    | H       | 48.5                 | Ambient | 3.7               | 34.2                  | -39.6        | 46.8                      | 218.5                   | 5000.0                  | -27.2        |
|            | V       | 49.4                 | Ambient | 3.7               | 34.2                  | -39.6        | 47.7                      | 242.4                   | 5000.0                  | -26.3        |
| 7311.00    | H       | 57.7                 |         | 4.7               | 36.3                  | -39.6        | 59.0                      | 893.5                   | 5000.0                  | -15.0        |
|            | V       | 56.4                 |         | 4.7               | 36.3                  | -39.6        | 57.7                      | 769.3                   | 5000.0                  | -16.3        |
| 12185.00   | H       | 47.8                 | Ambient | 6.1               | 38.8                  | -38.9        | 53.8                      | 491.7                   | 5000.0                  | -20.1        |
|            | V       | 47.7                 | Ambient | 6.1               | 38.8                  | -38.9        | 53.7                      | 486.0                   | 5000.0                  | -20.2        |
| 19496.00   | H       | 31.1                 | Ambient | 2.2               | 40.4                  | -27.7        | 46.0                      | 198.7                   | 5000.0                  | -28.0        |
|            | V       | 29.2                 | Ambient | 2.2               | 40.4                  | -27.7        | 44.1                      | 159.6                   | 5000.0                  | -29.9        |

| Test Details |   |
|--------------|---|
| Manufacturer | Chamberlain Group, LLC                            |
| EUT          | Residential Jackshaft Opener                      |
| Model No.    | RJOA MPP  |
| Serial No.   | Radiated Sample 2                                 |
| Test         | Average Measurements in the Restricted Bands      |
| Mode         | Transmit at 2437MHz, 802.11g, 54MBPS, power = 102 |
| Date Tested  | December 5, 2022 through December 9, 2022         |
| Notes        |   |

| Freq (MHz) | Ant Pol | Meter Reading (dBμV) | Ambient | CBL Fac (dB) | Ant Fac (dB/m) | Pre Amp (dB) | Duty Cycle Factor (dB) | Average Total at 3m (dBμV/m) | Average Total at 3m (μV/m) | Average Limit at 3m (μV/m) | Margin (dB) |
|------------|---------|----------------------|---------|--------------|----------------|--------------|------------------------|------------------------------|----------------------------|----------------------------|-------------|
| 4874.00    | H       | 34.90                | Ambient | 3.7          | 34.2           | -39.6        | 0.0                    | 33.2                         | 45.7                       | 500.0                      | -20.8       |
|            | V       | 35.50                | Ambient | 3.7          | 34.2           | -39.6        | 0.0                    | 33.8                         | 48.9                       | 500.0                      | -20.2       |
| 7311.00    | H       | 43.30                |         | 4.7          | 36.3           | -39.6        | 0.0                    | 44.6                         | 170.3                      | 500.0                      | -9.4        |
|            | V       | 41.30                |         | 4.7          | 36.3           | -39.6        | 0.0                    | 42.6                         | 135.2                      | 500.0                      | -11.4       |
| 12185.00   | H       | 32.20                | Ambient | 6.1          | 38.8           | -38.9        | 0.0                    | 38.2                         | 81.6                       | 500.0                      | -15.7       |
|            | V       | 32.10                | Ambient | 6.1          | 38.8           | -38.9        | 0.0                    | 38.1                         | 80.7                       | 500.0                      | -15.8       |
| 19496.00   | H       | 18.40                | Ambient | 2.2          | 40.4           | -27.7        | 0.0                    | 33.3                         | 46.0                       | 500.0                      | -20.7       |
|            | V       | 15.60                | Ambient | 2.2          | 40.4           | -27.7        | 0.0                    | 30.5                         | 33.4                       | 500.0                      | -23.5       |



| Test Details |   |
|--------------|---|
| Manufacturer | Chamberlain Group, LLC                            |
| EUT          | Residential Jackshaft Opener                      |
| Model No.    | RJOA MPP  |
| Serial No.   | Radiated Sample 2                                 |
| Test         | Peak Measurements in the Non-Restricted Bands     |
| Mode         | Transmit at 2437MHz, 802.11g, 54MBPS, power = 102 |
| Date Tested  | December 5, 2022 through December 9, 2022         |
| Notes        |   |

| Freq (MHz) | Ant Pol | Meter Reading (dBμV) | Ambient | Cable Factor (dB) | Antenna Factor (dB/m) | Pre Amp (dB) | Peak Total at 3m (dBμV/m) | Peak Total at 3m (μV/m) | Peak Limit at 3m (μV/m) | Margin (dBm) |
|------------|---------|----------------------|---------|-------------------|-----------------------|--------------|---------------------------|-------------------------|-------------------------|--------------|
| 2437.00    | H       | 62.80                |         | 2.6               | 32.6                  | 0.0          | 98.1                      | 79972.6                 | NA                      | NA           |
|            | V       | 62.20                |         | 2.6               | 32.6                  | 0.0          | 97.5                      | 74634.8                 | NA                      | NA           |
| 9748.00    | H       | 42.50                |         | 5.2               | 37.2                  | -39.3        | 45.7                      | 192.3                   | 7997.3                  | -32.4        |
|            | V       | 41.30                |         | 5.2               | 37.2                  | -39.3        | 44.5                      | 167.5                   | 7997.3                  | -33.6        |
| 14622.00   | H       | 37.60                | Ambient | 6.7               | 39.5                  | -38.6        | 45.2                      | 181.3                   | 7997.3                  | -32.9        |
|            | V       | 37.00                | Ambient | 6.7               | 39.5                  | -38.6        | 44.6                      | 169.2                   | 7997.3                  | -33.5        |
| 17059.00   | H       | 36.70                | Ambient | 7.2               | 42.4                  | -37.4        | 49.0                      | 281.7                   | 7997.3                  | -29.1        |
|            | V       | 37.10                | Ambient | 7.2               | 42.4                  | -37.4        | 49.4                      | 295.0                   | 7997.3                  | -28.7        |
| 21933.00   | H       | 19.30                | Ambient | 2.2               | 40.6                  | -28.9        | 33.2                      | 45.6                    | 7997.3                  | -44.9        |
|            | V       | 19.00                | Ambient | 2.2               | 40.6                  | -28.9        | 32.9                      | 44.1                    | 7997.3                  | -45.2        |
| 24370.00   | H       | 20.20                | Ambient | 2.2               | 40.6                  | -29.4        | 33.7                      | 48.4                    | 7997.3                  | -44.4        |
|            | V       | 20.50                | Ambient | 2.2               | 40.6                  | -29.4        | 34.0                      | 50.1                    | 7997.3                  | -44.1        |

| Test Details |   |
|--------------|---|
| Manufacturer | Chamberlain Group, LLC                            |
| EUT          | Residential Jackshaft Opener                      |
| Model No.    | RJOA MPP  |
| Serial No.   | Radiated Sample 2                                 |
| Test         | Peak Measurements in the Restricted Bands         |
| Mode         | Transmit at 2462MHz, 802.11g, 54MBPS, power = 101 |
| Date Tested  | December 5, 2022 through December 9, 2022         |
| Notes        |   |

| Freq (MHz) | Ant Pol | Meter Reading (dBμV) | Ambient | Cable Factor (dB) | Antenna Factor (dB/m) | Pre Amp (dB) | Peak Total at 3m (dBμV/m) | Peak Total at 3m (μV/m) | Peak Limit at 3m (μV/m) | Margin (dBm) |
|------------|---------|----------------------|---------|-------------------|-----------------------|--------------|---------------------------|-------------------------|-------------------------|--------------|
| 4924.00    | H       | 52.5                 |         | 3.7               | 34.2                  | -39.6        | 50.7                      | 344.4                   | 5000.0                  | -23.2        |
|            | V       | 50.6                 | Ambient | 3.7               | 34.2                  | -39.6        | 48.8                      | 276.8                   | 5000.0                  | -25.1        |
| 7386.00    | H       | 53.0                 |         | 4.7               | 36.3                  | -39.6        | 54.4                      | 526.4                   | 5000.0                  | -19.6        |
|            | V       | 52.3                 |         | 4.7               | 36.3                  | -39.6        | 53.7                      | 485.7                   | 5000.0                  | -20.3        |
| 12310.00   | H       | 47.8                 | Ambient | 6.1               | 38.9                  | -38.8        | 53.9                      | 496.4                   | 5000.0                  | -20.1        |
|            | V       | 48.2                 | Ambient | 6.1               | 38.9                  | -38.8        | 54.3                      | 519.8                   | 5000.0                  | -19.7        |
| 19696.00   | H       | 29.3                 | Ambient | 2.2               | 40.4                  | -28.0        | 43.9                      | 156.4                   | 5000.0                  | -30.1        |
|            | V       | 29.7                 | Ambient | 2.2               | 40.4                  | -28.0        | 44.3                      | 163.8                   | 5000.0                  | -29.7        |
| 22158.00   | H       | 30.6                 | Ambient | 2.2               | 40.6                  | -28.7        | 44.7                      | 171.1                   | 5000.0                  | -29.3        |
|            | V       | 31.0                 | Ambient | 2.2               | 40.6                  | -28.7        | 45.1                      | 179.2                   | 5000.0                  | -28.9        |

| Test Details |   |
|--------------|---|
| Manufacturer | Chamberlain Group, LLC                            |
| EUT          | Residential Jackshaft Opener                      |
| Model No.    | RJOA MPP  |
| Serial No.   | Radiated Sample 2                                 |
| Test         | Average Measurements in the Restricted Bands      |
| Mode         | Transmit at 2462MHz, 802.11g, 54MBPS, power = 101 |
| Date Tested  | December 5, 2022 through December 9, 2022         |
| Notes        |   |

| Freq (MHz) | Ant Pol | Meter Reading (dBμV) | Ambient | CBL Fac (dB) | Ant Fac (dB/m) | Pre Amp (dB) | Duty Cycle Factor (dB) | Average Total at 3m (dBμV/m) | Average Total at 3m (μV/m) | Average Limit at 3m (μV/m) | Margin (dB) |
|------------|---------|----------------------|---------|--------------|----------------|--------------|------------------------|------------------------------|----------------------------|----------------------------|-------------|
| 4924.00    | H       | 37.80                |         | 3.7          | 34.2           | -39.6        | 0.0                    | 36.0                         | 63.4                       | 500.0                      | -17.9       |
|            | V       | 36.10                | Ambient | 3.7          | 34.2           | -39.6        | 0.0                    | 34.3                         | 52.1                       | 500.0                      | -19.6       |
| 7386.00    | H       | 38.50                |         | 4.7          | 36.3           | -39.6        | 0.0                    | 39.9                         | 99.2                       | 500.0                      | -14.1       |
|            | V       | 37.30                |         | 4.7          | 36.3           | -39.6        | 0.0                    | 38.7                         | 86.4                       | 500.0                      | -15.3       |
| 12310.00   | H       | 33.10                | Ambient | 6.1          | 38.9           | -38.8        | 0.0                    | 39.2                         | 91.4                       | 500.0                      | -14.8       |
|            | V       | 33.10                | Ambient | 6.1          | 38.9           | -38.8        | 0.0                    | 39.2                         | 91.4                       | 500.0                      | -14.8       |
| 19696.00   | H       | 16.40                | Ambient | 2.2          | 40.4           | -28.0        | 0.0                    | 31.0                         | 35.4                       | 500.0                      | -23.0       |
|            | V       | 15.90                | Ambient | 2.2          | 40.4           | -28.0        | 0.0                    | 30.5                         | 33.4                       | 500.0                      | -23.5       |
| 22158.00   | H       | 16.90                | Ambient | 2.2          | 40.6           | -28.7        | 0.0                    | 31.0                         | 35.3                       | 500.0                      | -23.0       |
|            | V       | 16.30                | Ambient | 2.2          | 40.6           | -28.7        | 0.0                    | 30.4                         | 33.0                       | 500.0                      | -23.6       |

| Test Details |   |
|--------------|---|
| Manufacturer | Chamberlain Group, LLC                            |
| EUT          | Residential Jackshaft Opener                      |
| Model No.    | RJOA MPP  |
| Serial No.   | Radiated Sample 2                                 |
| Test         | Peak Measurements in the Non-Restricted Bands     |
| Mode         | Transmit at 2462MHz, 802.11g, 54MBPS, power = 101 |
| Date Tested  | December 5, 2022 through December 9, 2022         |
| Notes        |   |

| Freq (MHz) | Ant Pol | Meter Reading (dBµV) | Ambient | Cable Factor (dB) | Antenna Factor (dB/m) | Pre Amp (dB) | Peak Total at 3m (dBµV/m) | Peak Total at 3m (µV/m) | Peak Limit at 3m (µV/m) | Margin (dBm) |
|------------|---------|----------------------|---------|-------------------|-----------------------|--------------|---------------------------|-------------------------|-------------------------|--------------|
| 2462.00    | H       | 62.10                |         | 2.6               | 32.7                  | 0.0          | 97.4                      | 74290.8                 | NA                      | NA           |
|            | V       | 63.20                |         | 2.6               | 32.7                  | 0.0          | 98.5                      | 84320.8                 | NA                      | NA           |
| 9848.00    | H       | 42.40                |         | 5.3               | 37.2                  | -39.2        | 45.6                      | 190.9                   | 8432.1                  | -32.9        |
|            | V       | 39.60                |         | 5.3               | 37.2                  | -39.2        | 42.8                      | 138.3                   | 8432.1                  | -35.7        |
| 14772.00   | H       | 36.90                | Ambient | 6.8               | 39.7                  | -38.6        | 44.7                      | 172.1                   | 8432.1                  | -33.8        |
|            | V       | 36.60                | Ambient | 6.8               | 39.7                  | -38.6        | 44.4                      | 166.3                   | 8432.1                  | -34.1        |
| 17234.00   | H       | 37.30                | Ambient | 7.3               | 42.5                  | -37.4        | 49.7                      | 306.4                   | 8432.1                  | -28.8        |
|            | V       | 37.10                | Ambient | 7.3               | 42.5                  | -37.4        | 49.5                      | 299.5                   | 8432.1                  | -29.0        |
| 24620.00   | H       | 20.60                | Ambient | 2.2               | 40.6                  | -29.0        | 34.4                      | 52.8                    | 8432.1                  | -44.1        |
|            | V       | 20.80                | Ambient | 2.2               | 40.6                  | -29.0        | 34.6                      | 54.0                    | 8432.1                  | -43.9        |

| Test Details |  |
|--------------|--|
| Manufacturer | Chamberlain Group, LLC                         |
| EUT          | Residential Jackshaft Opener                   |
| Model No.    | RJOA MPP                                       |
| Serial No.   | Radiated Sample 2                              |
| Test         | Peak Measurements in the Restricted Bands      |
| Mode         | Transmit at 2412MHz, 802.11n, MCS7, power = 99 |
| Date Tested  | December 5, 2022 through December 9, 2022      |
| Notes        |  |

| Freq (MHz) | Ant Pol | Meter Reading (dBμV) | Ambient | Cable Factor (dB) | Antenna Factor (dB/m) | Pre Amp (dB) | Peak Total at 3m (dBμV/m) | Peak Total at 3m (μV/m) | Peak Limit at 3m (μV/m) | Margin (dBm) |
|------------|---------|----------------------|---------|-------------------|-----------------------|--------------|---------------------------|-------------------------|-------------------------|--------------|
| 4824.00    | H       | 48.9                 | Ambient | 3.7               | 34.3                  | -39.7        | 47.2                      | 229.5                   | 5000.0                  | -26.8        |
|            | V       | 49.4                 | Ambient | 3.7               | 34.3                  | -39.7        | 47.7                      | 243.0                   | 5000.0                  | -26.3        |
| 12060.00   | H       | 47.7                 | Ambient | 6.1               | 38.8                  | -39.0        | 53.6                      | 480.5                   | 5000.0                  | -20.3        |
|            | V       | 48.9                 | Ambient | 6.1               | 38.8                  | -39.0        | 54.8                      | 551.7                   | 5000.0                  | -19.1        |
| 14472.00   | H       | 47.1                 | Ambient | 6.6               | 39.4                  | -38.6        | 54.6                      | 534.9                   | 5000.0                  | -19.4        |
|            | V       | 47.2                 | Ambient | 6.6               | 39.4                  | -38.6        | 54.7                      | 541.1                   | 5000.0                  | -19.3        |
| 19296.00   | H       | 30.1                 | Ambient | 2.2               | 40.4                  | -27.9        | 44.8                      | 174.3                   | 5000.0                  | -29.2        |
|            | V       | 30.5                 | Ambient | 2.2               | 40.4                  | -27.9        | 45.2                      | 182.6                   | 5000.0                  | -28.8        |

| Test Details |  |
|--------------|--|
| Manufacturer | Chamberlain Group, LLC                         |
| EUT          | Residential Jackshaft Opener                   |
| Model No.    | RJOA MPP                                       |
| Serial No.   | Radiated Sample 2                              |
| Test         | Average Measurements in the Restricted Bands   |
| Mode         | Transmit at 2412MHz, 802.11n, MCS7, power = 99 |
| Date Tested  | December 5, 2022 through December 9, 2022      |
| Notes        |  |

| Freq (MHz) | Ant Pol | Meter Reading (dBμV) | Ambient | CBL Fac (dB) | Ant Fac (dB/m) | Pre Amp (dB) | Duty Cycle Factor (dB) | Average Total at 3m (dBμV/m) | Average Total at 3m (μV/m) | Average Limit at 3m (μV/m) | Margin (dB) |
|------------|---------|----------------------|---------|--------------|----------------|--------------|------------------------|------------------------------|----------------------------|----------------------------|-------------|
| 4824.00    | H       | 34.50                | Ambient | 3.7          | 34.3           | -39.7        | 0.0                    | 32.8                         | 43.7                       | 500.0                      | -21.2       |
|            | V       | 33.80                | Ambient | 3.7          | 34.3           | -39.7        | 0.0                    | 32.1                         | 40.3                       | 500.0                      | -21.9       |
| 12060.00   | H       | 33.50                | Ambient | 6.1          | 38.8           | -39.0        | 0.0                    | 39.4                         | 93.7                       | 500.0                      | -14.5       |
|            | V       | 33.40                | Ambient | 6.1          | 38.8           | -39.0        | 0.0                    | 39.3                         | 92.6                       | 500.0                      | -14.6       |
| 14472.00   | H       | 32.80                | Ambient | 6.6          | 39.4           | -38.6        | 0.0                    | 40.3                         | 103.1                      | 500.0                      | -13.7       |
|            | V       | 32.80                | Ambient | 6.6          | 39.4           | -38.6        | 0.0                    | 40.3                         | 103.1                      | 500.0                      | -13.7       |
| 19296.00   | H       | 16.30                | Ambient | 2.2          | 40.4           | -27.9        | 0.0                    | 31.0                         | 35.6                       | 500.0                      | -23.0       |
|            | V       | 16.10                | Ambient | 2.2          | 40.4           | -27.9        | 0.0                    | 30.8                         | 34.8                       | 500.0                      | -23.2       |

| Test Details |  |
|--------------|--|
| Manufacturer | Chamberlain Group, LLC                         |
| EUT          | Residential Jackshaft Opener                   |
| Model No.    | RJOA MPP                                       |
| Serial No.   | Radiated Sample 2                              |
| Test         | Peak Measurements in the Non-Restricted Bands  |
| Mode         | Transmit at 2412MHz, 802.11n, MCS7, power = 99 |
| Date Tested  | December 5, 2022 through December 9, 2022      |
| Notes        |  |

| Freq (MHz) | Ant Pol | Meter Reading (dBμV) | Ambient | Cable Factor (dB) | Antenna Factor (dB/m) | Pre Amp (dB) | Peak Total at 3m (dBμV/m) | Peak Total at 3m (μV/m) | Peak Limit at 3m (μV/m) | Margin (dBm) |
|------------|---------|----------------------|---------|-------------------|-----------------------|--------------|---------------------------|-------------------------|-------------------------|--------------|
| 2412.00    | H       | 63.90                |         | 2.6               | 32.6                  | 0.0          | 99.1                      | 90229.5                 | NA                      | NA           |
|            | V       | 61.30                |         | 2.6               | 32.6                  | 0.0          | 96.5                      | 66888.0                 | NA                      | NA           |
| 7236.00    | H       | 48.70                |         | 4.7               | 36.3                  | -39.7        | 50.0                      | 314.8                   | 9022.9                  | -29.1        |
|            | V       | 44.70                |         | 4.7               | 36.3                  | -39.7        | 46.0                      | 198.6                   | 9022.9                  | -33.1        |
| 9648.00    | H       | 43.50                |         | 5.2               | 37.2                  | -39.3        | 46.6                      | 213.1                   | 9022.9                  | -32.5        |
|            | V       | 40.70                |         | 5.2               | 37.2                  | -39.3        | 43.8                      | 154.4                   | 9022.9                  | -35.3        |
| 16884.00   | H       | 37.20                | Ambient | 7.2               | 42.3                  | -37.4        | 49.3                      | 291.1                   | 9022.9                  | -29.8        |
|            | V       | 37.40                | Ambient | 7.2               | 42.3                  | -37.4        | 49.5                      | 297.9                   | 9022.9                  | -29.6        |
| 21708.00   | H       | 20.00                | Ambient | 2.2               | 40.6                  | -28.7        | 34.1                      | 50.8                    | 9022.9                  | -45.0        |
|            | V       | 20.40                | Ambient | 2.2               | 40.6                  | -28.7        | 34.5                      | 53.2                    | 9022.9                  | -44.6        |
| 24120.00   | H       | 20.00                | Ambient | 2.2               | 40.6                  | -29.4        | 33.5                      | 47.3                    | 9022.9                  | -45.6        |

| Test Details |  |
|--------------|--|
| Manufacturer | Chamberlain Group, LLC                         |
| EUT          | Residential Jackshaft Opener                   |
| Model No.    | RJOA MPP                                       |
| Serial No.   | Radiated Sample 2                              |
| Test         | Peak Measurements in the Restricted Bands      |
| Mode         | Transmit at 2437MHz, 802.11n, MCS7, power = 98 |
| Date Tested  | December 5, 2022 through December 9, 2022      |
| Notes        |  |

| Freq (MHz) | Ant Pol | Meter Reading (dBµV) | Ambient | Cable Factor (dB) | Antenna Factor (dB/m) | Pre Amp (dB) | Peak Total at 3m (dBµV/m) | Peak Total at 3m (µV/m) | Peak Limit at 3m (µV/m) | Margin (dBm) |
|------------|---------|----------------------|---------|-------------------|-----------------------|--------------|---------------------------|-------------------------|-------------------------|--------------|
| 4874.00    | H       | 49.1                 | Ambient | 3.7               | 34.2                  | -39.6        | 47.4                      | 234.2                   | 5000.0                  | -26.6        |
|            | V       | 48.9                 | Ambient | 3.7               | 34.2                  | -39.6        | 47.2                      | 228.8                   | 5000.0                  | -26.8        |
| 7311.00    | H       | 56.0                 |         | 4.7               | 36.3                  | -39.6        | 57.3                      | 734.7                   | 5000.0                  | -16.7        |
|            | V       | 56.4                 |         | 4.7               | 36.3                  | -39.6        | 57.7                      | 769.3                   | 5000.0                  | -16.3        |
| 12185.00   | H       | 47.2                 | Ambient | 6.1               | 38.8                  | -38.9        | 53.2                      | 458.8                   | 5000.0                  | -20.7        |
|            | V       | 47.3                 | Ambient | 6.1               | 38.8                  | -38.9        | 53.3                      | 464.2                   | 5000.0                  | -20.6        |
| 19496.00   | H       | 29.5                 | Ambient | 2.2               | 40.4                  | -27.7        | 44.4                      | 165.2                   | 5000.0                  | -29.6        |
|            | V       | 30.0                 | Ambient | 2.2               | 40.4                  | -27.7        | 44.9                      | 175.0                   | 5000.0                  | -29.1        |



| Test Details |  |
|--------------|--|
| Manufacturer | Chamberlain Group, LLC                         |
| EUT          | Residential Jackshaft Opener                   |
| Model No.    | RJOA MPP                                       |
| Serial No.   | Radiated Sample 2                              |
| Test         | Average Measurements in the Restricted Bands   |
| Mode         | Transmit at 2437MHz, 802.11n, MCS7, power = 98 |
| Date Tested  | December 5, 2022 through December 9, 2022      |
| Notes        |  |

| Freq (MHz) | Ant Pol | Meter Reading (dBμV) | Ambient | CBL Fac (dB) | Ant Fac (dB/m) | Pre Amp (dB) | Duty Cycle Factor (dB) | Average Total at 3m (dBμV/m) | Average Total at 3m (μV/m) | Average Limit at 3m (μV/m) | Margin (dB) |
|------------|---------|----------------------|---------|--------------|----------------|--------------|------------------------|------------------------------|----------------------------|----------------------------|-------------|
| 4874.00    | H       | 34.60                | Ambient | 3.7          | 34.2           | -39.6        | 0.0                    | 32.9                         | 44.1                       | 500.0                      | -21.1       |
|            | V       | 34.50                | Ambient | 3.7          | 34.2           | -39.6        | 0.0                    | 32.8                         | 43.6                       | 500.0                      | -21.2       |
| 7311.00    | H       | 41.90                |         | 4.7          | 36.3           | -39.6        | 0.0                    | 43.2                         | 144.9                      | 500.0                      | -10.8       |
|            | V       | 39.60                |         | 4.7          | 36.3           | -39.6        | 0.0                    | 40.9                         | 111.2                      | 500.0                      | -13.1       |
| 12185.00   | H       | 32.90                | Ambient | 6.1          | 38.8           | -38.9        | 0.0                    | 38.9                         | 88.4                       | 500.0                      | -15.0       |
|            | V       | 32.90                | Ambient | 6.1          | 38.8           | -38.9        | 0.0                    | 38.9                         | 88.4                       | 500.0                      | -15.0       |
| 19496.00   | H       | 18.50                | Ambient | 2.2          | 40.4           | -27.7        | 0.0                    | 33.4                         | 46.6                       | 500.0                      | -20.6       |
|            | V       | 15.60                | Ambient | 2.2          | 40.4           | -27.7        | 0.0                    | 30.5                         | 33.4                       | 500.0                      | -23.5       |

| Test Details |  |
|--------------|--|
| Manufacturer | Chamberlain Group, LLC                         |
| EUT          | Residential Jackshaft Opener                   |
| Model No.    | RJOA MPP                                       |
| Serial No.   | Radiated Sample 2                              |
| Test         | Peak Measurements in the Non-Restricted Bands  |
| Mode         | Transmit at 2437MHz, 802.11n, MCS7, power = 98 |
| Date Tested  | December 5, 2022 through December 9, 2022      |
| Notes        |  |

| Freq (MHz) | Ant Pol | Meter Reading (dBμV) | Ambient | Cable Factor (dB) | Antenna Factor (dB/m) | Pre Amp (dB) | Peak Total at 3m (dBμV/m) | Peak Total at 3m (μV/m) | Peak Limit at 3m (μV/m) | Margin (dBm) |
|------------|---------|----------------------|---------|-------------------|-----------------------|--------------|---------------------------|-------------------------|-------------------------|--------------|
| 2437.00    | H       | 61.40                |         | 2.6               | 32.6                  | 0.0          | 96.7                      | 68067.7                 | NA                      | NA           |
|            | V       | 60.70                |         | 2.6               | 32.6                  | 0.0          | 96.0                      | 62797.3                 | NA                      | NA           |
| 9748.00    | H       | 42.80                |         | 5.2               | 37.2                  | -39.3        | 46.0                      | 199.0                   | 6806.8                  | -30.7        |
|            | V       | 41.90                |         | 5.2               | 37.2                  | -39.3        | 45.1                      | 179.4                   | 6806.8                  | -31.6        |
| 14622.00   | H       | 37.00                | Ambient | 6.7               | 39.5                  | -38.6        | 44.6                      | 169.2                   | 6806.8                  | -32.1        |
|            | V       | 38.00                | Ambient | 6.7               | 39.5                  | -38.6        | 45.6                      | 189.8                   | 6806.8                  | -31.1        |
| 17059.00   | H       | 37.20                | Ambient | 7.2               | 42.4                  | -37.4        | 49.5                      | 298.4                   | 6806.8                  | -27.2        |
|            | V       | 37.20                | Ambient | 7.2               | 42.4                  | -37.4        | 49.5                      | 298.4                   | 6806.8                  | -27.2        |
| 21933.00   | H       | 19.10                | Ambient | 2.2               | 40.6                  | -28.9        | 33.0                      | 44.6                    | 6806.8                  | -43.7        |
|            | V       | 19.60                | Ambient | 2.2               | 40.6                  | -28.9        | 33.5                      | 47.2                    | 6806.8                  | -43.2        |
| 24370.00   | H       | 20.30                | Ambient | 2.2               | 40.6                  | -29.4        | 33.8                      | 49.0                    | 6806.8                  | -42.9        |
|            | V       | 20.00                | Ambient | 2.2               | 40.6                  | -29.4        | 33.5                      | 47.3                    | 6806.8                  | -43.2        |

| Test Details |  |
|--------------|--|
| Manufacturer | Chamberlain Group, LLC                         |
| EUT          | Residential Jackshaft Opener                   |
| Model No.    | RJOA MPP                                       |
| Serial No.   | Radiated Sample 2                              |
| Test         | Peak Measurements in the Restricted Bands      |
| Mode         | Transmit at 2462MHz, 802.11n, MCS7, power = 98 |
| Date Tested  | December 5, 2022 through December 9, 2022      |
| Notes        |  |

| Freq (MHz) | Ant Pol | Meter Reading (dBμV) | Ambient | Cable Factor (dB) | Antenna Factor (dB/m) | Pre Amp (dB) | Peak Total at 3m (dBμV/m) | Peak Total at 3m (μV/m) | Peak Limit at 3m (μV/m) | Margin (dBm) |
|------------|---------|----------------------|---------|-------------------|-----------------------|--------------|---------------------------|-------------------------|-------------------------|--------------|
| 4924.00    | H       | 51.9                 |         | 3.7               | 34.2                  | -39.6        | 50.1                      | 321.4                   | 5000.0                  | -23.8        |
|            | V       | 50.7                 | Ambient | 3.7               | 34.2                  | -39.6        | 48.9                      | 280.0                   | 5000.0                  | -25.0        |
| 7386.00    | H       | 51.7                 |         | 4.7               | 36.3                  | -39.6        | 53.1                      | 453.3                   | 5000.0                  | -20.9        |
|            | V       | 51.0                 |         | 4.7               | 36.3                  | -39.6        | 52.4                      | 418.2                   | 5000.0                  | -21.6        |
| 12310.00   | H       | 47.8                 | Ambient | 6.1               | 38.9                  | -38.8        | 53.9                      | 496.4                   | 5000.0                  | -20.1        |
|            | V       | 47.2                 | Ambient | 6.1               | 38.9                  | -38.8        | 53.3                      | 463.3                   | 5000.0                  | -20.7        |
| 19696.00   | H       | 29.4                 | Ambient | 2.2               | 40.4                  | -28.0        | 44.0                      | 158.2                   | 5000.0                  | -30.0        |
|            | V       | 30.3                 | Ambient | 2.2               | 40.4                  | -28.0        | 44.9                      | 175.5                   | 5000.0                  | -29.1        |
| 22158.00   | H       | 30.1                 | Ambient | 2.2               | 40.6                  | -28.7        | 44.2                      | 161.5                   | 5000.0                  | -29.8        |
|            | V       | 30.9                 | Ambient | 2.2               | 40.6                  | -28.7        | 45.0                      | 177.1                   | 5000.0                  | -29.0        |

| Test Details |  |
|--------------|--|
| Manufacturer | Chamberlain Group, LLC                         |
| EUT          | Residential Jackshaft Opener                   |
| Model No.    | RJOA MPP                                       |
| Serial No.   | Radiated Sample 2                              |
| Test         | Average Measurements in the Restricted Bands   |
| Mode         | Transmit at 2462MHz, 802.11n, MCS7, power = 98 |
| Date Tested  | December 5, 2022 through December 9, 2022      |
| Notes        |  |

| Freq (MHz) | Ant Pol | Meter Reading (dBμV) | Ambient | CBL Fac (dB) | Ant Fac (dB/m) | Pre Amp (dB) | Duty Cycle Factor (dB) | Average Total at 3m (dBμV/m) | Average Total at 3m (μV/m) | Average Limit at 3m (μV/m) | Margin (dB) |
|------------|---------|----------------------|---------|--------------|----------------|--------------|------------------------|------------------------------|----------------------------|----------------------------|-------------|
| 4924.00    | H       | 35.50                |         | 3.7          | 34.2           | -39.6        | 0.0                    | 33.7                         | 48.7                       | 500.0                      | -20.2       |
|            | V       | 34.30                | Ambient | 3.7          | 34.2           | -39.6        | 0.0                    | 32.5                         | 42.4                       | 500.0                      | -21.4       |
| 7386.00    | H       | 37.40                |         | 4.7          | 36.3           | -39.6        | 0.0                    | 38.8                         | 87.4                       | 500.0                      | -15.2       |
|            | V       | 36.40                |         | 4.7          | 36.3           | -39.6        | 0.0                    | 37.8                         | 77.9                       | 500.0                      | -16.2       |
| 12310.00   | H       | 32.70                | Ambient | 6.1          | 38.9           | -38.8        | 0.0                    | 38.8                         | 87.3                       | 500.0                      | -15.2       |
|            | V       | 32.60                | Ambient | 6.1          | 38.9           | -38.8        | 0.0                    | 38.7                         | 86.3                       | 500.0                      | -15.3       |
| 19696.00   | H       | 16.10                | Ambient | 2.2          | 40.4           | -28.0        | 0.0                    | 30.7                         | 34.2                       | 500.0                      | -23.3       |
|            | V       | 16.00                | Ambient | 2.2          | 40.4           | -28.0        | 0.0                    | 30.6                         | 33.8                       | 500.0                      | -23.4       |
| 22158.00   | H       | 17.00                | Ambient | 2.2          | 40.6           | -28.7        | 0.0                    | 31.1                         | 35.7                       | 500.0                      | -22.9       |
|            | V       | 16.90                | Ambient | 2.2          | 40.6           | -28.7        | 0.0                    | 31.0                         | 35.3                       | 500.0                      | -23.0       |

| Test Details |  |
|--------------|--|
| Manufacturer | Chamberlain Group, LLC                         |
| EUT          | Residential Jackshaft Opener                   |
| Model No.    | RJOA MPP                                       |
| Serial No.   | Radiated Sample 2                              |
| Test         | Peak Measurements in the Non-Restricted Bands  |
| Mode         | Transmit at 2462MHz, 802.11n, MCS7, power = 98 |
| Date Tested  | December 5, 2022 through December 9, 2022      |
| Notes        |  |

| Freq (MHz) | Ant Pol | Meter Reading (dBμV) | Ambient | Cable Factor (dB) | Antenna Factor (dB/m) | Pre Amp (dB) | Peak Total at 3m (dBμV/m) | Peak Total at 3m (μV/m) | Peak Limit at 3m (μV/m) | Margin (dBm) |
|------------|---------|----------------------|---------|-------------------|-----------------------|--------------|---------------------------|-------------------------|-------------------------|--------------|
| 2462.00    | H       | 60.50                |         | 2.6               | 32.7                  | 0.0          | 95.8                      | 61792.4                 | NA                      | NA           |
|            | V       | 61.30                |         | 2.6               | 32.7                  | 0.0          | 96.6                      | 67754.0                 | NA                      | NA           |
| 9848.00    | H       | 43.00                |         | 5.3               | 37.2                  | -39.2        | 46.2                      | 204.5                   | 6775.4                  | -30.4        |
|            | V       | 42.50                |         | 5.3               | 37.2                  | -39.2        | 45.7                      | 193.1                   | 6775.4                  | -30.9        |
| 14772.00   | H       | 38.30                | Ambient | 6.8               | 39.7                  | -38.6        | 46.1                      | 202.2                   | 6775.4                  | -30.5        |
|            | V       | 38.10                | Ambient | 6.8               | 39.7                  | -38.6        | 45.9                      | 197.6                   | 6775.4                  | -30.7        |
| 17234.00   | H       | 37.70                | Ambient | 7.3               | 42.5                  | -37.4        | 50.1                      | 320.9                   | 6775.4                  | -26.5        |
|            | V       | 36.70                | Ambient | 7.3               | 42.5                  | -37.4        | 49.1                      | 286.0                   | 6775.4                  | -27.5        |
| 24620.00   | H       | 20.90                | Ambient | 2.2               | 40.6                  | -29.0        | 34.7                      | 54.6                    | 6775.4                  | -41.9        |
|            | V       | 20.50                | Ambient | 2.2               | 40.6                  | -29.0        | 34.3                      | 52.1                    | 6775.4                  | -42.3        |

| Test Details |  |
|--------------|--|
| Manufacturer | Chamberlain Group, LLC                           |
| EUT          | Residential Jackshaft Opener                     |
| Model No.    | RJOA MPP   |
| Serial No.   | Radiated Sample 2                                |
| Test         | High Band-Edge – Peak Readings                   |
| Mode         | Transmit at 2462MHz, 802.11b, 11MBPS, power = 93 |
| Date Tested  | December 5, 2022                                 |
| Notes        |  |

| Freq. (MHz) | Ant Pol | Meter Reading (dB $\mu$ V) | Ambient | CBL Fac (dB) | Ant Fac (dB/m) | Pre Amp (dB) | Peak Total dB $\mu$ V/m at 3m | Peak Total $\mu$ V/m at 3 m | Peak Limit $\mu$ V/m at 3 m | Margin (dB) |
|-------------|---------|----------------------------|---------|--------------|----------------|--------------|-------------------------------|-----------------------------|-----------------------------|-------------|
| 2483.60     | H       | 20.1                       |         | 2.7          | 32.7           | 0.0          | 55.5                          | 594.1                       | 5000.0                      | -18.5       |
|             | V       | 20.8                       |         | 2.7          | 32.7           | 0.0          | 56.2                          | 644.1                       | 5000.0                      | -17.8       |

| Test Details |  |
|--------------|--|
| Manufacturer | Chamberlain Group, LLC                           |
| EUT          | Residential Jackshaft Opener                     |
| Model No.    | RJOA MPP   |
| Serial No.   | Radiated Sample 2                                |
| Test         | High Band-Edge – Average Readings                |
| Mode         | Transmit at 2462MHz, 802.11b, 11MBPS, power = 93 |
| Date Tested  | December 5, 2022                                 |
| Notes        |  |

| Freq. (MHz) | Ant Pol | Meter Reading (dBµV) | Ambient | CBL Fac (dB) | Ant Fac (dB/m) | Pre Amp (dB) | Duty Cycle (dB) | Average Total dBµV/m at 3m | Average Total µV/m at 3 m | Average Limit µV/m at 3 m | Margin (dB) |
|-------------|---------|----------------------|---------|--------------|----------------|--------------|-----------------|----------------------------|---------------------------|---------------------------|-------------|
| 2483.60     | H       | 6.80                 |         | 2.7          | 32.7           | 0.0          | 0.0             | 42.2                       | 128.5                     | 500.0                     | -11.8       |
|             | V       | 7.60                 |         | 2.7          | 32.7           | 0.0          | 0.0             | 43.0                       | 140.9                     | 500.0                     | -11.0       |

| Test Details |   |
|--------------|---|
| Manufacturer | Chamberlain Group, LLC                            |
| EUT          | Residential Jackshaft Opener                      |
| Model No.    | RJOA MPP  |
| Serial No.   | Radiated Sample 2                                 |
| Test         | High Band-Edge – Peak Readings                    |
| Mode         | Transmit at 2462MHz, 802.11g, 54MBPS, power = 101 |
| Date Tested  | December 5, 2022                                  |
| Notes        |   |

| Freq. (MHz) | Ant Pol | Meter Reading (dB $\mu$ V) | Ambient | CBL Fac (dB) | Ant Fac (dB/m) | Pre Amp (dB) | Peak Total dB $\mu$ V/m at 3m | Peak Total $\mu$ V/m at 3 m | Peak Limit $\mu$ V/m at 3 m | Margin (dB) |
|-------------|---------|----------------------------|---------|--------------|----------------|--------------|-------------------------------|-----------------------------|-----------------------------|-------------|
| 2483.50     | H       | 36.5                       |         | 2.7          | 32.7           | 0.0          | 71.9                          | 3925.4                      | 5000.0                      | -2.1        |
|             | V       | 37.3                       |         | 2.7          | 32.7           | 0.0          | 72.7                          | 4304.2                      | 5000.0                      | -1.3        |



| Test Details |   |
|--------------|---|
| Manufacturer | Chamberlain Group, LLC                            |
| EUT          | Residential Jackshaft Opener                      |
| Model No.    | RJOA MPP  |
| Serial No.   | Radiated Sample 2                                 |
| Test         | High Band-Edge – Average Readings                 |
| Mode         | Transmit at 2462MHz, 802.11g, 54MBPS, power = 101 |
| Date Tested  | December 5, 2022                                  |
| Notes        |   |

| Freq. (MHz) | Ant Pol | Meter Reading (dBμV) | Ambient | CBL Fac (dB) | Ant Fac (dB/m) | Pre Amp (dB) | Duty Cycle (dB) | Average Total dBμV/m at 3m | Average Total μV/m at 3 m | Average Limit μV/m at 3 m | Margin (dB) |
|-------------|---------|----------------------|---------|--------------|----------------|--------------|-----------------|----------------------------|---------------------------|---------------------------|-------------|
| 2483.50     | H       | 18.10                |         | 2.7          | 32.7           | 0.0          | 0.0             | 53.5                       | 471.9                     | 500.0                     | -0.5        |
|             | V       | 18.40                |         | 2.7          | 32.7           | 0.0          | 0.0             | 53.8                       | 488.5                     | 500.0                     | -0.2        |

| Test Details |  |
|--------------|--|
| Manufacturer | Chamberlain Group, LLC                         |
| EUT          | Residential Jackshaft Opener                   |
| Model No.    | RJOA MPP                                       |
| Serial No.   | Radiated Sample 2                              |
| Test         | High Band-Edge – Peak Readings                 |
| Mode         | Transmit at 2462MHz, 802.11n, MCS7, power = 98 |
| Date Tested  | December 5, 2022                               |
| Notes        |  |

| Freq. (MHz) | Ant Pol | Meter Reading (dB $\mu$ V) | Ambient | CBL Fac (dB) | Ant Fac (dB/m) | Pre Amp (dB) | Peak Total dB $\mu$ V/m at 3m | Peak Total $\mu$ V/m at 3 m | Peak Limit $\mu$ V/m at 3 m | Margin (dB) |
|-------------|---------|----------------------------|---------|--------------|----------------|--------------|-------------------------------|-----------------------------|-----------------------------|-------------|
| 2483.70     | H       | 36.0                       |         | 2.7          | 32.7           | 0.0          | 71.4                          | 3706.0                      | 5000.0                      | -2.6        |
|             | V       | 36.4                       |         | 2.7          | 32.7           | 0.0          | 71.8                          | 3880.4                      | 5000.0                      | -2.2        |

| Test Details |  |
|--------------|--|
| Manufacturer | Chamberlain Group, LLC                         |
| EUT          | Residential Jackshaft Opener                   |
| Model No.    | RJOA MPP                                       |
| Serial No.   | Radiated Sample 2                              |
| Test         | High Band-Edge – Average Readings              |
| Mode         | Transmit at 2462MHz, 802.11n, MCS7, power = 98 |
| Date Tested  | December 5, 2022                               |
| Notes        |  |

| Freq. (MHz) | Ant Pol | Meter Reading (dBμV) | Ambient | CBL Fac (dB) | Ant Fac (dB/m) | Pre Amp (dB) | Duty Cycle (dB) | Average Total dBμV/m at 3m | Average Total μV/m at 3 m | Average Limit μV/m at 3 m | Margin (dB) |
|-------------|---------|----------------------|---------|--------------|----------------|--------------|-----------------|----------------------------|---------------------------|---------------------------|-------------|
| 2483.70     | H       | 17.60                |         | 2.7          | 32.7           | 0.0          | 0.0             | 53.0                       | 445.6                     | 500.0                     | -1.0        |
|             | V       | 18.30                |         | 2.7          | 32.7           | 0.0          | 0.0             | 53.7                       | 482.9                     | 500.0                     | -0.3        |

## 23. Scope of Accreditation

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

ELITE ELECTRONIC ENGINEERING, INC.  
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## ELECTRICAL

Valid To: June 30, 2023

Certificate Number: 1786.01

In recognition of the successful completion of the A2LA Accreditation Program evaluation process, accreditation is granted to this laboratory to perform the following automotive electromagnetic compatibility and other electrical tests:

**Test Technology:****Test Method(s) <sup>1</sup>:*****Transient Immunity***

ISO 7637-2 (including emissions); ISO 7637-3;  
ISO 16750-2:2012, Sections 4.6.3 and 4.6.4;  
CS-11979, Section 6.4; CS.00054, Section 5.9;  
EMC-CS-2009.1 (CI220); FMC1278 (CI220, CI221, CI222);  
GMW 3097, Section 3.5; SAE J1113-11; SAE J1113-12;  
ECE Regulation 10.06 Annex 10

***Electrostatic Discharge (ESD)***

ISO 10605 (2001, 2008);  
CS-11979 Section 7.0; CS.00054, Section 5.10;  
EMC-CS-2009.1 (CI 280); FMC1278 (CI280); SAE J1113-13;  
GMW 3097 Section 3.6

***Conducted Emissions***

CISPR 25 (2002, 2008), Sections 6.2 and 6.3;  
CISPR 25 (2016), Sections 6.3 and 6.4;  
CS-11979, Section 5.1; CS.00054, Sections 5.6.1 and 5.6.2;  
GMW 3097, Section 3.3.2;  
EMC-CS-2009.1 (CE 420); FMC1278 (CE420, CE421)

***Radiated Emissions Anechoic***

CISPR 25 (2002, 2008), Section 6.4;  
CISPR 25 (2016), Section 6.5;  
CS-11979, Section 5.3; CS.00054, Section 5.6.3;  
GMW 3097, Section 3.3.1;  
EMC-CS-2009.1 (RE 310); FMC1278 (RE310);

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| <b><u>Test Technology:</u></b>  | <b><u>Test Method(s) <sup>1</sup>:</u></b>  |
|---|---|
| <i>Vehicle Radiated Emissions</i>   | CISPR 12; CISPR 36; ICES-002;<br>ECE Regulation 10.06 Annex 5   |
| <i>Bulk Current Injection (BCI)</i>   | ISO 11452-4; CS-11979, Section 6.1; CS.00054, Section 5.8.1;<br>GMW 3097, Section 3.4.1; SAE J1113-4;<br>EMC-CS-2009.1 (RI112); FMC1278 (RI112);<br>ECE Regulation 10.06 Annex 9  |
| <i>Radiated Immunity Anechoic<br/>(Including Radar Pulse)</i>                             | ISO 11452-2; ISO 11452-5;<br>CS-11979, Section 6.2; CS.00054, Section 5.8.2;<br>GMW 3097, Section 3.4.2;<br>EMC-CS-2009.1 (RI114); FMC1278 (RI114); SAE J1113-21;<br>ECE Regulation 10.06 Annex 9   |
| <i>Radiated Immunity Magnetic Field</i>   | ISO 11452-8   |
| <i>Radiated Immunity Reverb</i>   | ISO/IEC 61000-4-21; GMW 3097, Section 3.4.3;<br>EMC-CS-2009.1 (RI114); FMC1278 (RI114);<br>ISO 11452-11   |
| <i>Radiated Immunity<br/>(Portable Transmitters)</i>                                      | ISO 11452-9;<br>EMC-CS-2009.1 (RI115); FMC1278 (RI115)  |
| <i>Vehicle Radiated Immunity (ALSE)</i>   | ISO 11451-2; ECE Regulation 10.06 Annex 6   |
| <i>Vehicle Product Specific EMC<br/>Standards</i>   | EN 14982; EN ISO 13309; ISO 13766; EN 50498;<br>EC Regulation No. 2015/208; EN 55012  |
| <i>Electrical Loads</i>   | ISO 16750-2   |
| <b>Emissions</b><br>Radiated and Conducted<br>(3m Semi-anechoic chamber,<br>up to 40 GHz) | 47 CFR, FCC Part 15 B (using ANSI C63.4:2014);<br>47 CFR, FCC Part 18 (using FCC MP-5:1986);<br>ICES-001; ICES-003; ICES-005;<br>IEC/CISPR 11, Ed. 4.1 (2004-06); AS/NZS CISPR 11 (2004);<br>IEC/CISPR 11 Ed 5 (2009-05) + A1 (2010);<br>KN 11 (2008-5) with RRL Notice No. 2008-3 (May 20, 2008);<br>CISPR 11; EN 55011; KS C 9811; CNS 13803 (1997, 2003);<br>CISPR 14-1; EN 55014-1; AS/NZS CISPR 14.1;<br>CISPR 16-2-1 (2008); CISPR 16-2-1; KS C 9814-1; KN 14-1;<br>IEC/CISPR 22 (1997);<br>EN 55022 (1998) + A1(2000);<br>EN 55022 (1998) + A1(2000) + A2(2003); EN 55022 (2006);<br>IEC/CISPR 22 (2008-09); AS/NZS CISPR 22 (2004);<br>AS/NZS CISPR 22, 3rd Edition (2006); KN 22 (up to 6 GHz);<br>CNS 13438 (up to 6 GHz); VCCI V-3 (up to 6 GHz);<br>CISPR 32; EN 55032; KS C 9832; KN 32;<br>ECE Regulation 10.06 Annex 7 (Broadband)<br>ECE Regulation 10.06 Annex 8 (Narrowband)<br>ECE Regulation 10.06 Annex 14 (Conducted) |

**Test Technology:****Test Method(s) <sup>1</sup>:****Emissions (cont'd)**

Cellular Radiated Spurious Emissions

ETSI TS 151 010-1 GSM; 3GPP TS 51.010-1, Sec 12;  
ETSI TS 134 124 UMTS; 3GPP TS 34.124;  
ETSI TS 136 124 LTE; E-UTRA; 3GPP TS 36.124

Current Harmonics

IEC 61000-3-2; EN 61000-3-2; KN 61000-3-2;  
KS C 9610-3-2; ECE Regulation 10.06 Annex 11

Flicker and Fluctuations

IEC 61000-3-3; EN 61000-3-3; KN 61000-3-3;  
KS C 9610-3-3; ECE Regulation 10.06 Annex 12**Immunity**

Electrostatic Discharge

IEC 61000-4-2, Ed. 1.2 (2001);  
IEC 61000-4-2 (1995) + A1(1998) + A2(2000);  
EN 61000-4-2 (1995); EN 61000-4-2 (2009-05);  
KN 61000-4-2 (2008-5);  
RRL Notice No. 2008-4 (May 20, 2008);  
IEC 61000-4-2; EN 61000-4-2; KN 61000-4-2;  
KS C 9610-4-2; IEEE C37.90.3 2001

Radiated Immunity

IEC 61000-4-3 (1995) + A1(1998) + A2(2000);  
IEC 61000-4-3, Ed. 3.0 (2006-02);  
IEC 61000-4-3, Ed. 3.2 (2010);  
KN 61000-4-3 (2008-5);  
RRL Notice No. 2008-4 (May 20, 2008);  
IEC 61000-4-3; EN 61000-4-3; KN 61000-4-3;  
KS C 9610-4-3; IEEE C37.90.2 2004

Electrical Fast Transient/Burst

IEC 61000-4-4, Ed. 2.0 (2004-07);  
IEC 61000-4-4, Ed. 2.1 (2011);  
IEC 61000-4-4 (1995) + A1(2000) + A2(2001);  
KN 61000-4-4 (2008-5);  
RRL Notice No. 2008-5 (May 20, 2008);  
IEC 61000-4-4; EN 61000-4-4; KN 61000-4-4;  
KS C 9610-4-4; ECE Regulation 10.06 Annex 15

Surge

IEC 61000-4-5 (1995) + A1(2000);  
IEC 61000-4-5, Ed 1.1 (2005-11);  
EN 61000-4-5 (1995) + A1(2001);  
KN 61000-4-5 (2008-5);  
RRL Notice No. 2008-4 (May 20, 2008);  
IEC 61000-4-5; EN 61000-4-5; KN 61000-4-5;  
KS C 9610-4-5;  
IEEE C37.90.1 2012; IEEE STD C62.41.2 2002;  
ECE Regulation 10.06 Annex 16

**Test Technology:****Test Method(s) <sup>1</sup>:****Immunity (cont'd)**

Conducted Immunity

IEC 61000-4-6 (1996) + A1(2000);  
IEC 61000-4-6, Ed 2.0 (2006-05);  
IEC 61000-4-6 Ed. 3.0 (2008);  
KN 61000-4-6 (2008-5);  
RRL Notice No. 2008-4 (May 20, 2008);  
EN 61000-4-6 (1996) + A1(2001); IEC 61000-4-6;  
EN 61000-4-6; KN 61000-4-6; KS C 9610-4-6

Power Frequency Magnetic Field  
Immunity (*Down to 3 A/m*)

IEC 61000-4-8 (1993) + A1(2000); IEC 61000-4-8 (2009);  
EN 61000-4-8 (1994) + A1(2000);  
KN 61000-4-8 (2008-5);  
RRL Notice No. 2008-4 (May 20, 2008);  
IEC 61000-4-8; EN 61000-4-8; KN 61000-4-8; KS C 9610-4-8

Voltage Dips, Short Interrupts, and Line  
Voltage Variations

IEC 61000-4-11, Ed. 2 (2004-03);  
KN 61000-4-11 (2008-5);  
RRL Notice No. 2008-4 (May 20, 2008);  
IEC 61000-4-11; EN 61000-4-11; KN 61000-4-11;  
KS C 9610-4-11

Ring Wave

IEC 61000-4-12, Ed. 2 (2006-09);  
EN 61000-4-12:2006;  
IEC 61000-4-12; EN 61000-4-12; KN 61000-4-12;  
IEEE STD C62.41.2 2002

Generic and Product Specific EMC  
Standards

IEC/EN 61000-6-1; AS/NZS 61000-6-1; KN 61000-6-1;  
KS C 9610-6-1; IEC/EN 61000-6-2; AS/NZS 61000-6-2;  
KN 61000-6-2; KS C 9610-6-2; IEC/EN 61000-6-3;  
AS/NZS 61000-6-3; KN 61000-6-3; KS C 9610-6-3;  
IEC/EN 61000-6-4; AS/NZS 61000-6-4; KN 61000-6-4;  
KS C 9610-6-4; EN 50130-4; EN 61326-1; EN 50121-3-2;  
EN 12895; EN 50270; EN 50491-1; EN 50491-2; EN 50491-3;  
EN 55015; EN 60730-1; EN 60945; IEC 60533;  
EN 61326-2-6; EN 61800-3; IEC/CISPR 14-2; EN 55014-2;  
AS/NZS CISPR 14.2; KN 14-2; KS C 9814-2;  
IEC/CISPR 24; AS/NZS CISPR 24; EN 55024; KN 24;  
IEC/CISPR 35; AS/NZS CISPR 35; EN 55035; KN 35;  
KS C 9835; IEC 60601-1-2; JIS T0601-1-2

***TxRx EMC Requirements***

EN 301 489-1; EN 301 489-3; EN 301 489-9;  
EN 301 489-17; EN 301 489-19; EN 301 489-20



**Test Technology:****Test Method(s) <sup>1</sup>:*****European Radio Test Standards***

ETSI EN 300 086-1; ETSI EN 300 086-2;  
ETSI EN 300 113-1; ETSI EN 300 113-2;  
ETSI EN 300 220-1; ETSI EN 300 220-2;  
ETSI EN 300 220-3-1; ETSI EN 300 220-3-2;  
ETSI EN 300 330-1; ETSI EN 300 330-2;  
ETSI EN 300 440-1; ETSI EN 300 440-2;  
ETSI EN 300 422-1; ETSI EN 300 422-2;  
ETSI EN 300 328; ETSI EN 301 893;  
ETSI EN 301 511; ETSI EN 301 908-1;  
ETSI EN 908-2; ETSI EN 908-13;  
ETSI EN 303 413; ETSI EN 302 502;  
EN 303 340; EN 303 345-2; EN 303 345-3; EN 303 345-4

***Canadian Radio Tests***

RSS-102 (RF Exposure Evaluation <sup>MEAS</sup>);  
RSS-102 (Nerve Stimulation <sup>MEAS</sup>) (5Hz to 400kHz);  
SPR-002; RSS-111; RSS-112; RSS-117; RSS-119; RSS-123;  
RSS-125; RSS-127; RSS-130; RSS-131; RSS-132; RSS-133;  
RSS-134; RSS-135; RSS-137; RSS-139; RSS-140; RSS-141;  
RSS-142; RSS-170; RSS-181; RSS-182; RSS-191; RSS-192;  
RSS-194; RSS-195; RSS-196; RSS-197; RSS-199; RSS-210;  
RSS-211; RSS-213; RSS-215; RSS-216; RSS-220; RSS-222;  
RSS-236; RSS-238; RSS-243; RSS-244; RSS-247; RSS-248;  
RSS-251; RSS-252; RSS-287; RSS-288; RSS-310; RSS-GEN

***Mexico Radio Tests***

IFT-008-2015; NOM-208-SCFI-2016

***Japan Radio Tests***

Radio Law No. 131, Ordinance of MPT No. 37, 1981,  
MIC Notification No. 88:2004, Table No. 22-11;  
ARIB STD-T66, Regulation 18

***Taiwan Radio Tests***

LP-0002 (July 15, 2020)

***Australia/New Zealand Radio Tests***

AS/NZS 4268; Radiocommunications (Short Range Devices)  
Standard (2014)

***Hong Kong Radio Tests***

HKCA 1039 Issue 6; HKCA 1042; HKCA 1033 Issue 7;  
HKCA 1061; HKCA 1008; HKCA 1043; HKCA 1057;  
HKCA 1073

***Korean Radio Test Standards***

KN 301 489-1; KN 301 489-3; KN 301 489-9;  
KN 301 489-17; KN 301 489-52; KS X 3124; KS X 3125;  
KS X 3130; KS X 3126; KS X 3129

***Vietnam Radio Test Standards***

QCVN 47:2015/BTTTT; QCVN 54:2020/BTTTT;  
QCVN 55:2011/BTTTT; QCVN 65:2013/BTTTT;  
QCVN 73:2013/BTTTT; QCVN 74:2020/BTTTT;  
QCVN 112:2017/BTTTT; QCVN 117:2020/BTTTT

***Vietnam EMC Test Standards***

QCVN 18:2014/BTTTT; QCVN 86:2019/BTTTT;  
QCVN 96:2015/BTTTT; QCVN 118:2018/BTTTT



**Test Technology:**

**Test Method(s) <sup>1</sup>:**

***Unlicensed Radio Frequency Devices***  
(3 Meter Semi-Anechoic Room)

47 CFR FCC Part 15C, 15D, 15E, 15F, 15G, 15H  
(using ANSI C63.10:2013, ANSI C63.17:2013 and  
FCC KDB 905462 D02 (v02))

***Licensed Radio Service Equipment***

47 CFR FCC Parts 20, 22, 24, 25, 27, 30, 73, 74, 80, 87,  
90, 95, 96, 97, 101 (using ANSI/TIA-603-E,  
TIA-102.CAAA-E, ANSI C63.26:2015)

***OTA (Over the Air) Performance***

GSM, GPRS, EGPRS  
UMTS (W-CDMA)  
LTE including CAT M1  
A-GPS for UMTS/GSM  
LTS A-GPS, A-GLONASS,  
SIB8/SIB16  
Large Device/Laptop/Tablet Testing  
Integrated Device Testing  
WiFi 802.11 a/b/g/n/a

CTIA Test Plan for Wireless Device Over-the-Air  
Performance (Method for Measurement for Radiated Power  
and Receiver Performance) V3.8.2;  
CTIA Test Plan for RF Performance Evaluation of WiFi  
Mobile Converged Devices V2.1.0

***Electrical Measurements and  
Simulation***

AC Voltage / Current

(1mV to 5kV) 60 Hz  
(0.1V to 250V) up to 500 MHz  
(1µA to 150A) 60 Hz

FAA AC 150/5345-10H

FAA AC 150/5345-43J

FAA AC 150/5345-44K

DC Voltage / Current

(1mV to 15-kV) / (1µA to 10A)

FAA AC 150/5345-46E

FAA AC 150/5345-47C

Power Factor / Efficiency / Crest Factor

(Power to 30kW)

FAA EB 67D

Resistance

(1mΩ to 4000MΩ)

Surge

(Up to 10 kV / 5 kA) (Combination  
Wave and Ring Wave)

On the following products and materials:

Telecommunications Terminal Equipment (TTE), Radio Equipment, Network Equipment, Information Technology Equipment (ITE), Automotive Electronic Equipment, Automotive Hybrid Electronic Devices, Maritime Navigation and Radio Communication Equipment and Systems, Vehicles, Boats and Internal Combustion Engine Driven Devices, Automotive, Aviation, and General Lighting Products, Medical Electrical Equipment, Motors, Industrial, Scientific and Medical (ISM) Radio-Frequency Equipment, Household Appliances, Electric Tools, Low-voltage Switchgear and Control gear, Programmable Controllers, Electrical Equipment for Measurement, Control and Laboratory Use, Base Materials, Power and Data Transmission Cables and Connectors

<sup>1</sup> When the date, edition, version, etc. is not identified in the scope of accreditation, laboratories may use the version that immediately precedes the current version for a period of one year from the date of publication of the standard measurement method, per part C., Section 1 of A2LA R101 - *General Requirements- Accreditation of ISO-IEC 17025 Laboratories.*

Testing Activities Performed in Support of FCC Certification in Accordance with 47 Code of Federal Regulations and FCC KDB 974614, Appendix A, Table A.1<sup>2</sup>

| <b>Rule Subpart/Technology</b>  | <b>Test Method</b>                                     | <b>Maximum Frequency (MHz)</b> |
|---|--|--------------------------------|
| <u>Unintentional Radiators</u><br>Part 15B  | ANSI C63.4:2014  | 40000                          |
| <u>Industrial, Scientific, and Medical Equipment</u><br>Part 18   | FCC MP-5 (February 1986)                               | 40000                          |
| <u>Intentional Radiators</u><br>Part 15C  | ANSI C63.10:2013                                       | 40000                          |
| <u>Unlicensed Personal Communication Systems Devices</u><br>Part 15D  | ANSI C63.17:2013                                       | 40000                          |
| <u>U-NII without DFS Intentional Radiators</u><br>Part 15E  | ANSI C63.10:2013                                       | 40000                          |
| <u>U-NII with DFS Intentional Radiators</u><br>Part 15E   | FCC KDB 905462 D02 (v02)                               | 40000                          |
| <u>UWB Intentional Radiators</u><br>Part 15F  | ANSI C63.10:2013                                       | 40000                          |
| <u>BPL Intentional Radiators</u><br>Part 15G  | ANSI C63.10:2013                                       | 40000                          |
| <u>White Space Device Intentional Radiators</u><br>Part 15H   | ANSI C63.10:2013                                       | 40000                          |
| <u>Commercial Mobile Services (FCC Licensed Radio Service Equipment)</u><br>Parts 22 (cellular), 24, 25 (below 3 GHz), and 27                           | ANSI/TIA-603-E;<br>TIA-102.CAAA-E;<br>ANSI C63.26:2015 | 40000                          |
| <u>General Mobile Radio Services (FCC Licensed Radio Service Equipment)</u><br>Parts 22 (non-cellular), 90 (below 3 GHz), 95, 97, and 101 (below 3 GHz) | ANSI/TIA-603-E;<br>TIA-102.CAAA-E;<br>ANSI C63.26:2015 | 40000                          |
| <u>Citizens Broadband Radio Services (FCC Licensed Radio Service Equipment)</u><br>Part 96  | ANSI/TIA-603-E;<br>TIA-102.CAAA-E;<br>ANSI C63.26:2015 | 40000                          |

Testing Activities Performed in Support of FCC Certification in Accordance with 47 Code of Federal Regulations and FCC KDB 974614, Appendix A, Table A.1<sup>2</sup>

| <b>Rule Subpart/Technology</b>   | <b>Test Method</b>                                     | <b>Maximum Frequency (MHz)</b> |
|--|--|--------------------------------|
| <u>Maritime and Aviation Radio Services</u><br>Parts 80 and 87   | ANSI/TIA-603-E;<br>ANSI C63.26:2015                    | 40000                          |
| <u>Microwave and Millimeter Bands Radio Services</u><br>Parts 25, 30, 74, 90 (above 3 GHz), 97 (above 3 GHz), and 101                                      | ANSI/TIA-603-E;<br>TIA-102.CAAA-E;<br>ANSI C63.26:2015 | 40000                          |
| <u>Broadcast Radio Services</u><br>Parts 73 and 74 (below 3 GHz)   | ANSI/TIA-603-E;<br>TIA-102.CAAA-E;<br>ANSI C63.26:2015 | 40000                          |
| <u>Signal Boosters</u><br>Part 20 (Wideband Consumer Signal Boosters, Provider-specific signal boosters, and Industrial Signal Boosters)<br>Section 90.219 | ANSI C63.26:2015                                       | 40000                          |

<sup>2</sup> Accreditation does not imply acceptance to the FCC equipment authorization program. Please see the FCC website (<https://apps.fcc.gov/oetcf/eas/>) for a listing of FCC approved laboratories.



## Accredited Laboratory

A2LA has accredited

### ELITE ELECTRONIC ENGINEERING INC.

Downers Grove, IL

for technical competence in the field of

### Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).



Presented this 19<sup>th</sup> day of May 2021.



Vice President, Accreditation Services  
For the Accreditation Council  
Certificate Number 1786.01  
Valid to June 30, 2023

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.