



**Engineering Test Report No. 2200527-03**

Report Date	May 13, 2022	
Manufacturer Name	Chamberlain Group, Inc.	
Manufacturer Address	300 Windsor Dr Oak Brook, IL 60523	
Test Item Name Model No.	Falcon DC GDO Logic Board GDO 003-0454-8 Rev B	
Date Received	May 2, 2022	
Test Dates	May 2 – 13, 2022	
Specifications	FCC "Code of Federal Regulations" Title 47 Part 15, Subpart C, Section 15.247 Innovation, Science, and Economic Development Canada, RSS-GEN Innovation, Science, and Economic Development Canada, RSS-247	
Test Facility	Elite Electronic Engineering, Inc. 1516 Centre Circle, Downers Grove, IL 60515	FCC Reg. Number: 269750 IC Reg. Number: 2987A CAB Identifier: US0107
Signature	MARK E. LONGINOTTI	
Tested by	Mark Longinotti	Tylar Jozefczyk
Signature		
Approved by	Raymond J. Klouda, Registered Professional Engineer of Illinois – 44894	
PO Number	4900081875	

This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents.

This report shall not be reproduced, except in full, without the written approval of Elite Electronic Engineering Inc.

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

Table of Contents

- 1. Report Revision History ..... 3
- 2. Introduction ..... 4
- 2.1. Scope of Tests ..... 4
- 2.2. Purpose ..... 4
- 2.3. Identification of the EUT ..... 4
- 3. Power Input ..... 4
- 4. Grounding ..... 5
- 5. Support Equipment ..... 5
- 6. Interconnect Leads ..... 5
- 7. Modifications Made to the EUT ..... 5
- 8. Modes of Operation ..... 5
- 8.1. TX ..... 5
- 8.2. RX ..... 5
- 9. Test Specifications ..... 5
- 10. Test Plan ..... 6
- 11. Deviation, Additions to, or Exclusions from Test Specifications ..... 6
- 12. Laboratory Conditions ..... 6
- 13. Summary ..... 6
- 14. Sample Calculations ..... 7
- 15. Statement of Conformity ..... 7
- 16. Certification ..... 7
- 17. Photographs of EUT ..... 8
- 18. Equipment List ..... 10
- 19. Block Diagram of Test Setup ..... 11
- 20. Receiver Radiated Emissions ..... 12
- 21. 20dB Bandwidth ..... 34
- 22. Occupied Bandwidth (99%) ..... 38
- 23. Carrier Frequency Separation ..... 42
- 24. Number of Carrier Channels ..... 44
- 25. Average Time of Occupancy ..... 46
- 26. Maximum Peak Conducted Output Power ..... 49
- 27. Effective Isotropic Radiated Power (EIRP) ..... 53
- 28. Duty Cycle Factor Measurements ..... 55
- 29. Case Spurious Radiated Emissions ..... 57
- 30. Band-Edge Compliance ..... 71
- 31. Scope of Accreditation ..... 77

**This report shall not be reproduced, except in full,  
without the written approval of Elite Electronic Engineering Inc.**

## 1. Report Revision History

Revision	Date	Description
–	03 JUN 2022	Initial Release of Engineering Test Report No. 2200527-03

## 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, Inc. Falcon DC GDO Logic Board (hereinafter referred to as the Equipment Under Test (EUT)). The EUT was manufactured and submitted for testing by Chamberlain Group, Inc. 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 B, §15.107 and §15.109 for Receivers and Subpart C, §15.247 for a Frequency Hopping Spread Spectrum intentional radiator operating within the 902 – 928MHz, 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 Frequency Hopping Spread Spectrum intentional radiator operating within the 902 – 928MHz band.

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

### 2.3. Identification of the EUT

The EUT was identified as follows:

EUT Identification	
Test Item #1	
Product Description	Falcon DC GDO Logic Board
Model/Part No.	GDO 003-0454-8 Rev B
Serial No.	Sample 1
Size of EUT	10.5 in x 10 in x 7.5 in
Software/Firmware Version	Realtek WiFi/BLE: 126A0582 Rev A.1 Sec+3.0 BLELR: Preliminary test image Rev 1 GDO Firmware: 126A0543 Rev 2.9
Device Type	Frequency Hopping Transmission Device
Band of Operation	902 – 928MHz
Modulation Type	GFSK
Antenna Type	Monopole made from 20AWG wire
Antenna Gain (dBi) <sup>1</sup>	-2dBi
Conducted Output Power	75.7mW (18.79dBm)
EIRP	21.9mW (13.4dBm)
6dB Bandwidth	139.9kHz
Occupied Bandwidth (99% CBW)	185.8kHz
Emission Classification	186KF1D
Product FCC ID & ISED UPN Number	FCC ID: HBW0454X3 ISED UPN: 266A-0454X3

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

The EUT listed above was used throughout the test series.

## 3. Power Input

The EUT obtained 115V 60Hz power via a 3-wire, 1-meter, unshielded power cord.

#### 4. Grounding

The EUT was connected to ground through the third wire of its input power cord.

#### 5. Support Equipment

The EUT was submitted for testing along with the following support equipment:

Description	Model #	S/N
1 Dell Laptop	Latitude 7480	---

#### 6. Interconnect Leads

The following interconnect cables were submitted with the test item:

Item	Description
1 USB A Cable	Connects laptop to EUT to configure radios
1 Micro-USB Cable	Connects laptop to EUT to configure radios
FTDI UART Bridge	Connects laptop to EUT to configure radios
FT232 UART Bridge	Connects laptop to EUT to configure radios

#### 7. Modifications Made to the EUT

No modifications were made to the EUT during the testing.

#### 8. Modes of Operation

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

##### 8.1. TX

Protocol	Description
Continuous	- 902.25MHz - 914.75MHz - 926.75MHz
Hopping	- 902MHz to 928MHz 50 channels

##### 8.2. RX

Protocol	Description
Continuous	- 902.25MHz - 914.75MHz - 926.75MHz

#### 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 B
- Federal Communications Commission "Code of Federal Regulations", Title 47, Chapter I, Subchapter

A, Part 15, Subpart C

- ANSI C63.4-2014, "American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz"
- 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 2020, 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, Inc. 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 C63.4-2014 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	23°C
Relative Humidity	25%
Atmospheric Pressure	1007.5mb

13. Summary

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

Test Description	Requirements	Test Method	S/N	Results
Receiver Radiated Emissions	FCC 15.109 ISED RSS-GEN	ANSI C63.4:2014	Sample 1	Conforms
Transmitter Conducted Emissions (AC Mains)	FCC 15.207 ISED RSS-GEN	ANSI C63.10:2013	Sample 2 Sample 3	Conforms (1)
20dB Bandwidth	FCC 15.247 ISED RSS-247	ANSI C63.10:2013	Sample 1	Conforms
Occupied Bandwidth (99%)	FCC 15.247 ISED RSS-247	ANSI C63.10:2013	Sample 1	Conforms
Carrier Frequency Separation	FCC 15.247 ISED RSS-247	ANSI C63.10:2013	Sample 1	Conforms
Number of Carrier Channels	FCC 15.247 ISED RSS-247	ANSI C63.10:2013	Sample 1	Conforms
Average Time of Occupancy	FCC 15.247 ISED RSS-247	ANSI C63.10:2013	Sample 1	Conforms

Maximum Peak Conducted Output Power	FCC 15.247 ISED RSS-247	ANSI C63.10:2013	Sample 1	Conforms
Effective Isotropic Radiated Power (EIRP)	FCC 15.247 ISED RSS-247	ANSI C63.10:2013	Sample 1	Conforms
Duty Cycle Factor Measurements	FCC 15.247 ISED RSS-247	ANSI C63.10:2013	Sample 1	—
Case Spurious Radiated Emissions	FCC 15.247 ISED RSS-247	ANSI C63.10:2013	Sample 1	Conforms
Band-Edge Compliance	FCC 15.247 ISED RSS-247	ANSI C63.10:2013	Sample 1	Conforms

Note: (1) See Elite Electronic Engineering test report ETR2200527-07 for data and results.

## 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).

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

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.

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

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.

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

## 15. Statement of Conformity

The Chamberlain Group, Inc. Falcon DC GDO Logic Board (Model No. GDO 003-0454-8 Rev B) did fully conform to the selected requirements of FCC "Code of Federal Regulations" Title 47 Part 15, Subpart C, Section 15.247 and Innovation, Science, and Economic Development Canada, RSS-247.

## 16. Certification

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

## 17. Photographs of EUT

Picture removed for short term confidentiality purposes.

EUT top and bottom. EUT modified with external connectors for antenna conducted testing only. EUT does not normally have the external connectors attached.

Picture removed for short term confidentiality purposes.



Picture removed for short term confidentiality purposes.

EUT tested in a host GDO

Picture removed for short term confidentiality purposes.

### 18. Equipment List

Eq ID	Equipment Description	Manufacturer	Model No.	Serial No.	Frequency Range	Cal Date	Due Date
APW14	PREAMPLIFIER	PLANAR	PE2-35-120-5R0-10-12-SFF	PL22671	1-20GHz	9/21/2021	9/21/2022
CDZ3	LAB WORKSTATION	ELITE	LWS-10		WINDOWS 10	CNR	
GCM0	SFC COMPACT MODULATOR	ROHDE & SCHWARZ	2115.3510K02	100552	---	3/23/2022	3/23/2024
GRE2	SIGNAL GENERATOR	AGILENT	E4438C	MY42081749	250KHZ-6GHZ	3/4/2022	3/4/2023
GSF0	VECTOR SIGNAL GENERATOR	ROHDE & SCHWARZ	SMBV100A	260452	9kHz to 6GHz	8/24/2021	8/24/2022
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
NDQ1	TUNED DIPOLE ANTENNA	EMCO	3121C-DB4	313	400-1000MHZ	7/28/2020	7/28/2022
NHG1	STANDARD GAIN HORN ANTENNA	NARDA	638	---	18-26.5GHZ	NOTE 1	
NTA3	BILOG ANTENNA	TESEQ	6112D	32853	25-1000MHz	10/20/2020	10/20/2022
NWQ0	DOUBLE RIDGED WAVEGUIDE ANTENNA	ETS LINDGREN	3117	66657	1GHZ-18GHZ	5/13/2020	5/13/2022
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	
T1ED	10DB 25W ATTENUATOR	WEINSCHL	46-10-34	BN2320	DC-18GHZ	1/6/2022	1/6/2024
T2D1	20DB, 25W ATTENUATOR	WEINSCHL	46-20-43	AV5814	DC-18GHZ	1/18/2022	1/18/2024
VBV2	CISPR EN FCC ICES RE.EXE	ELITE	CISPR EN FCC ICES RE.EXE	---	---	N/A	
WKA1	SOFTWARE, UNIVERSAL RCV EMI	ELITE	UNIV_RCV_EMI	1	---	I/O	
XPQ3	HIGH PASS FILTER	K&L MICROWAVE	4IH30-1804/T10000-0	4	1.8GHZ-10GHZ	9/7/2021	9/7/2023

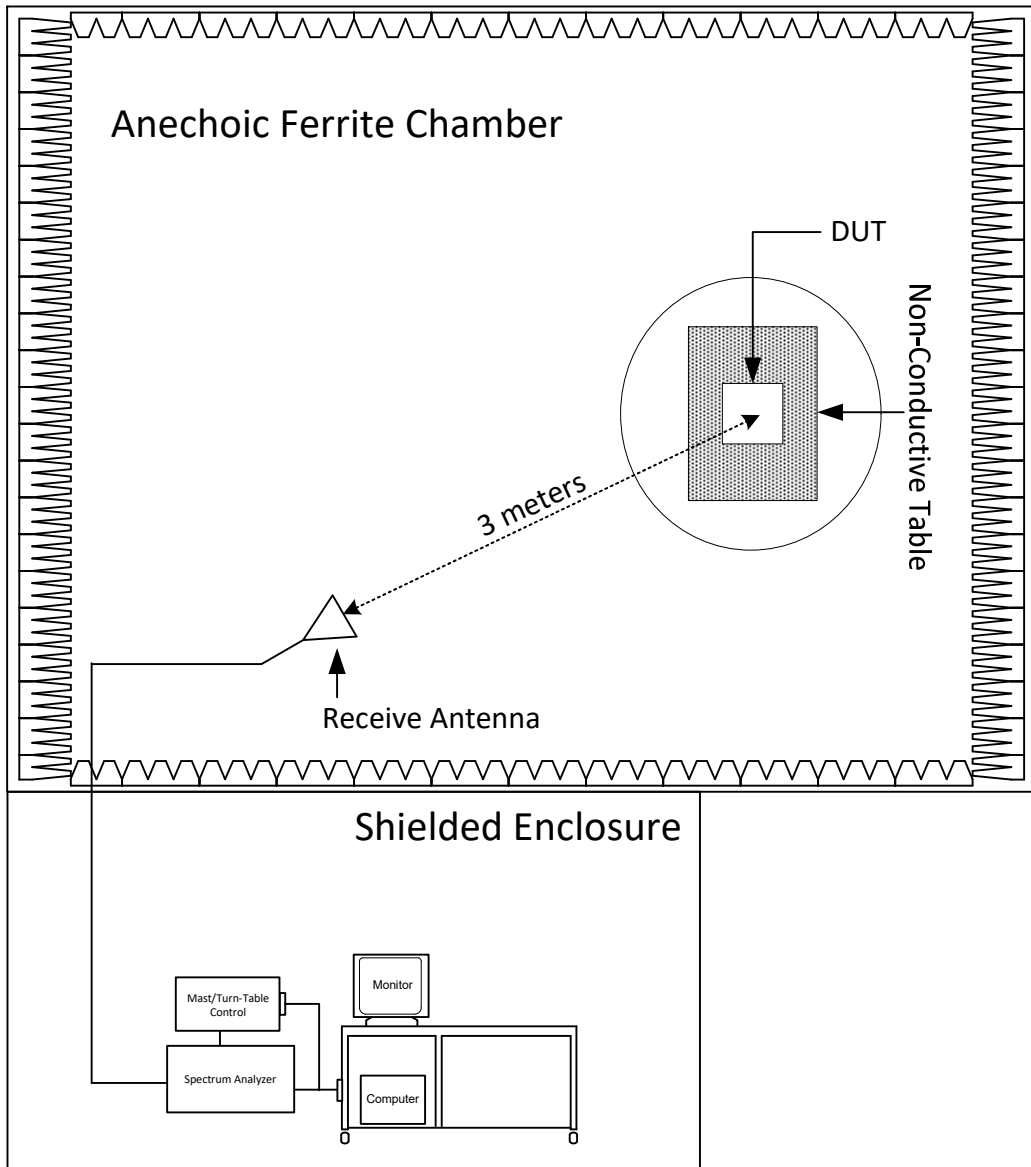
N/A: Not Applicable

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. Receiver Radiated Emissions

EUT Information	
Manufacturer	Chamberlain Group, Inc.
Product	Falcon DC GDO Logic Board
Model No.	GDO 003-0454-8 Rev B
Serial No.	Sample 1
Mode	RX

Test Site Information	
Setup Format	Tabletop
Height of Support	N/A
Type of Test Site	Semi-Anechoic Chamber
Test Site Used	R29F
Type of Antennas Used	Below 1GHz: Bilog (or equivalent) Above 1GHz: Double-ridged waveguide (or equivalent)
Highest Internal Frequency	926.75MHz
Highest Measurement Frequency	5GHz
Notes	The cables were manually maximized during the preliminary emissions sweeps. The cable arrangement which resulted in the worst-case emissions was utilized.

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

Requirements
The field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the values in the following table.

Radiated Emissions Limits (30MHz to 1GHz)		
Frequency of Emission (MHz)	Field Strength ( $\mu\text{V}/\text{m}$ )	Field Strength ( $\text{dB}\mu\text{V}/\text{m}$ )
30 – 88	100	40
88 – 216	150	43.5
216 – 960	200	46
Above 960	500	54
Radiated Emissions Limits (Above 1GHz)		
Frequency of Emission (MHz)	Peak Limit ( $\text{dB}\mu\text{V}/\text{m}$ )	Average Limit ( $\text{dB}\mu\text{V}/\text{m}$ )
Above 1000	74	54

#### Procedure

Since a quasi-peak detector and an average detector requires long integration times, it is not practical to automatically sweep through the quasi-peak and average levels. Therefore, radiated emissions from the EUT were first scanned using a peak detector and automatically plotted. The frequencies where significant emission levels were noted were then remeasured using the quasi-peak detector or average detector.

The EUT and all peripheral equipment were placed on an 80cm high non-conductive stand. The broadband measuring antenna was positioned at a 3-meter distance from the EUT. The frequency range from 30MHz to 1GHz was investigated using a peak detector function with the bilog antenna at several heights, horizontal and vertical polarization, and with several different orientations of the EUT with respect to the antenna. The frequency range from 1GHz to 5GHz was investigated using a peak detector function with the double ridged waveguide antenna at several heights, horizontal and vertical polarization, and with several different orientations of the EUT with respect to the antenna. The maximum levels for each antenna polarization were plotted.

Final radiated emissions were performed on all significant broadband and narrowband emissions found in the exploratory sweeps using the following methods:

- 1) Measurements from 30MHz to 1GHz were made using a quasi-peak detector and a broadband bilog antenna. Measurements above 1GHz were made using an average detector and a broadband double ridged waveguide antenna.
- 2) To ensure that maximum or worst case, emission levels were measured, the following steps were taken:
  - a) The EUT was rotated so that all 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 from 1 to 4 meters for each antenna polarization to maximize the readings.
  - d) For hand-held or body-worn devices, the EUT was rotated through three orthogonal axes to determine which orientation produces the highest emission relative to the limit.

Picture removed for short term confidentiality purposes.

Test Setup for Radiated Emissions: 30MHz to 1GHz, Horizontal Polarization

Picture removed for short term confidentiality purposes.

Test Setup for Radiated Emissions: 30MHz to 1GHz, Vertical Polarization

Picture removed for short term confidentiality purposes.

Test Setup for Radiated Emissions: 1GHz to 5GHz, Horizontal Polarization

Picture removed for short term confidentiality purposes.

Test Setup for Radiated Emissions: 1GHz to 5GHz, Vertical Polarization



## FCC Part 15B Class B Radiated RF Emissions Test

SW ID/Rev: VBV2 03/23/2022

Manufacturer : Chamberlain  
 Model : Lift Master GDO 87504-267  
 Serial Number :  
 DUT Mode : Rx @ 902.25MHz  
 Turntable Step Angle (°): 45  
 Mast Positions (cm) : 120, 200, 340  
 Scan Type : Stepped Scan  
 Test RBW : 120 kHz  
 Prelim Dwell Time (s) : 0.0001  
 Notes : Contains Falcon GDO logic board 003-0454-8 Rev B (with PCB array 014R1573 Rev B)  
 Test Engineer : M. Longinotti  
 Test Date : May 02, 2022 10:31:09 AM

Freq MHz	Peak Mtr Rdg dBuV	QP Mtr Rdg dBuV	Ant Fac dB/m	Amp Fac dB	Cbl Fac dB	Dist Corr dB	Peak Total dBµV/m	QP Total dBµV/m	QP Limit dBµV/m	QP Lim Mrg dB	Ant Pol	Mast Ht cm	Azim °	Excessive QP Level
30.960	6.5	-1.8	24.9	0.0	0.4	0.0	31.7	23.4	40.0	-16.6	Vertical	340	180	
40.020	20.6	18.3	19.8	0.0	0.4	0.0	40.8	38.5	40.0	-1.5	Vertical	120	225	
45.000	15.2	9.7	17.1	0.0	0.4	0.0	32.7	27.2	40.0	-12.8	Vertical	340	45	
58.560	9.7	2.7	12.3	0.0	0.4	0.0	22.4	15.3	40.0	-24.7	Vertical	120	0	
69.660	7.0	1.7	13.4	0.0	0.4	0.0	20.9	15.5	40.0	-24.5	Vertical	120	45	
79.320	4.9	-4.9	15.3	0.0	0.4	0.0	20.6	10.8	40.0	-29.2	Horizontal	340	0	
118.240	5.5	-4.8	19.1	0.0	0.5	0.0	25.0	14.8	43.5	-28.8	Horizontal	200	45	
134.080	6.4	-3.9	18.7	0.0	0.5	0.0	25.7	15.3	43.5	-28.2	Vertical	120	180	
160.000	15.2	13.4	17.2	0.0	0.6	0.0	33.1	31.3	43.5	-12.2	Vertical	120	315	
240.000	12.0	8.8	17.7	0.0	0.8	0.0	30.4	27.3	46.0	-18.7	Horizontal	120	45	
262.020	8.8	-3.8	19.4	0.0	0.8	0.0	29.0	16.3	46.0	-29.7	Vertical	340	0	
289.260	7.2	-4.5	19.1	0.0	0.8	0.0	27.0	15.3	46.0	-30.7	Vertical	200	315	
378.000	9.1	-3.3	22.1	0.0	1.1	0.0	32.3	19.9	46.0	-26.1	Vertical	200	270	
459.300	7.3	-2.9	23.1	0.0	1.1	0.0	31.6	21.4	46.0	-24.6	Horizontal	200	135	
481.440	6.5	-2.8	23.5	0.0	1.1	0.0	31.1	21.9	46.0	-24.1	Horizontal	200	135	
559.980	8.5	4.0	24.5	0.0	1.1	0.0	34.1	29.7	46.0	-16.3	Vertical	200	180	
598.680	4.7	-4.0	24.5	0.0	1.1	0.0	30.3	21.6	46.0	-24.4	Vertical	340	225	
924.000	12.7	9.5	27.0	0.0	1.5	0.0	41.2	38.1	46.0	-7.9	Vertical	200	0	

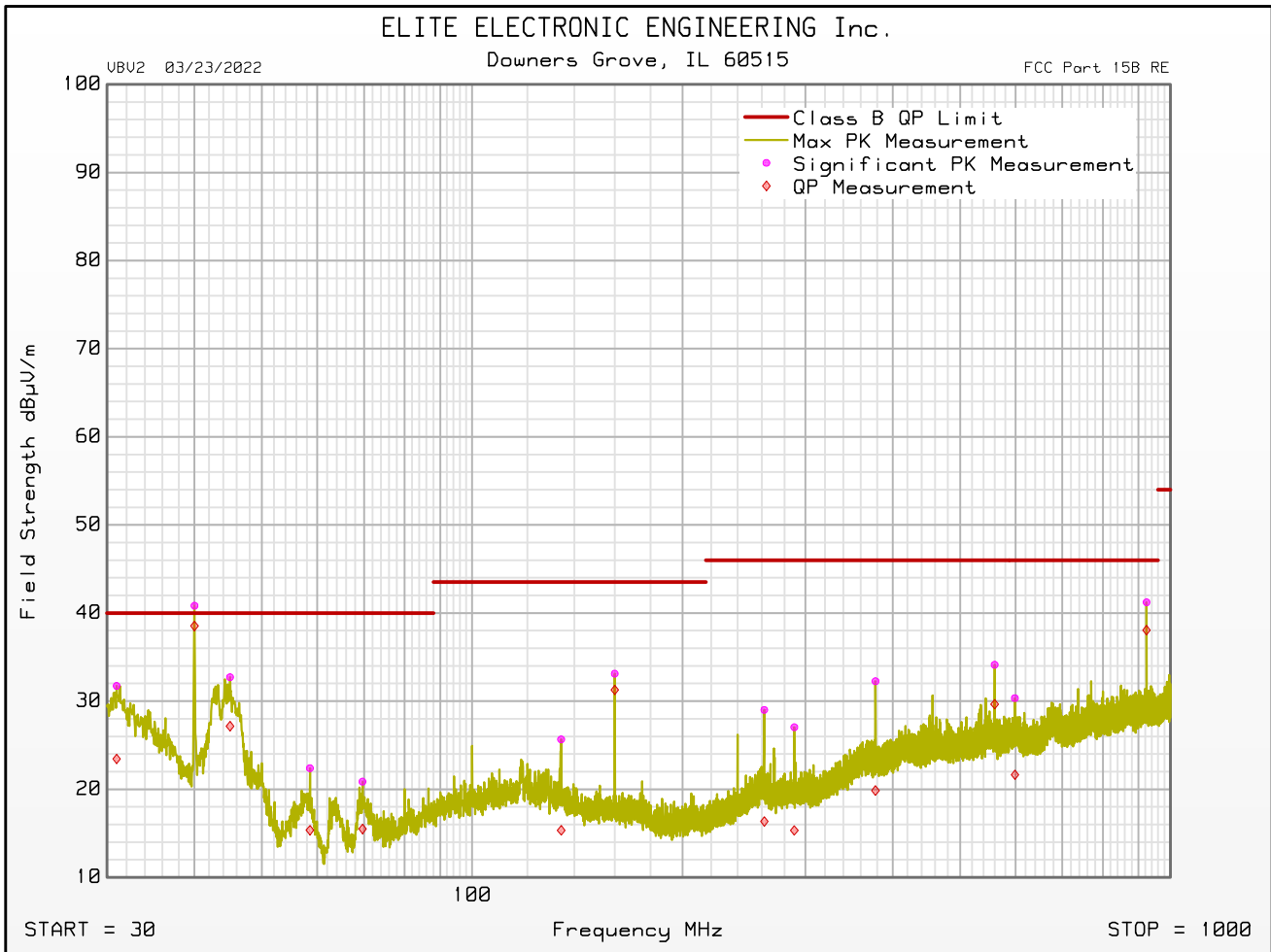




## FCC Part 15B Class B Radiated RF Emissions Test

SW ID/Rev: VBV2 03/23/2022

Manufacturer : Chamberlain  
 Model : Lift Master GDO 87504-267  
 Serial Number :  
 DUT Mode : Rx @ 902.25MHz  
 Turntable Step Angle (°): 45  
 Mast Positions (cm) : 120, 200, 340  
 Antenna Polarization : Vertical  
 Scan Type : Stepped Scan  
 Test RBW : 120 kHz  
 Prelim Dwell Time (s) : 0.0001  
 Notes : Contains Falcon GDO logic board 003-0454-8 Rev B (with PCB array 014R1573 Rev B)  
 Test Engineer : M. Longinotti  
 Test Date : May 02, 2022 10:31:09 AM





## FCC Part 15B Class B Radiated RF Emissions Test

SW ID/Rev: VBV2 03/23/2022

Manufacturer : Chamberlain  
 Model : Lift Master GDO 87504-267  
 Serial Number :  
 DUT Mode : Rx @ 902.25MHz  
 Turntable Step Angle (°) : 45  
 Mast Positions (cm) : 120, 200, 340  
 Scan Type : Stepped Scan  
 Test RBW : 1 MHz  
 Prelim Dwell Time (s) : 0.0001  
 Notes : Contains Falcon GDO logic board 003-0454-8 Rev B (with PCB array 014R1573)  
 Test Engineer : M. Longinotti  
 Test Date : May 12, 2022 12:44:00 PM

Freq MHz	Peak Mtr Rdg dBuV	Ant Fac dB/m	Amp Fac dB	Cbl Fac dB	Dist Corr dB	Peak Total dBµV/m	Peak Limit dBµV/m	Peak Lim Mrg dB	Ant Pol	Mast Ht cm	Azim °	Excessive Peak Level
1185.500	49.6	29.8	-40.9	1.7	0.0	40.2	74.0	-33.8	Horizontal	200	270	
1340.500	49.3	29.6	-40.5	1.8	0.0	40.3	74.0	-33.7	Horizontal	120	180	
2131.500	48.2	33.2	-39.8	2.4	0.0	43.9	74.0	-30.0	Horizontal	340	0	
2551.000	48.6	33.9	-40.2	2.7	0.0	45.0	74.0	-29.0	Vertical	120	0	
3767.500	47.1	34.5	-39.6	3.3	0.0	45.3	74.0	-28.7	Horizontal	200	135	
4956.000	47.0	37.0	-39.6	3.8	0.0	48.1	74.0	-25.9	Horizontal	200	315	

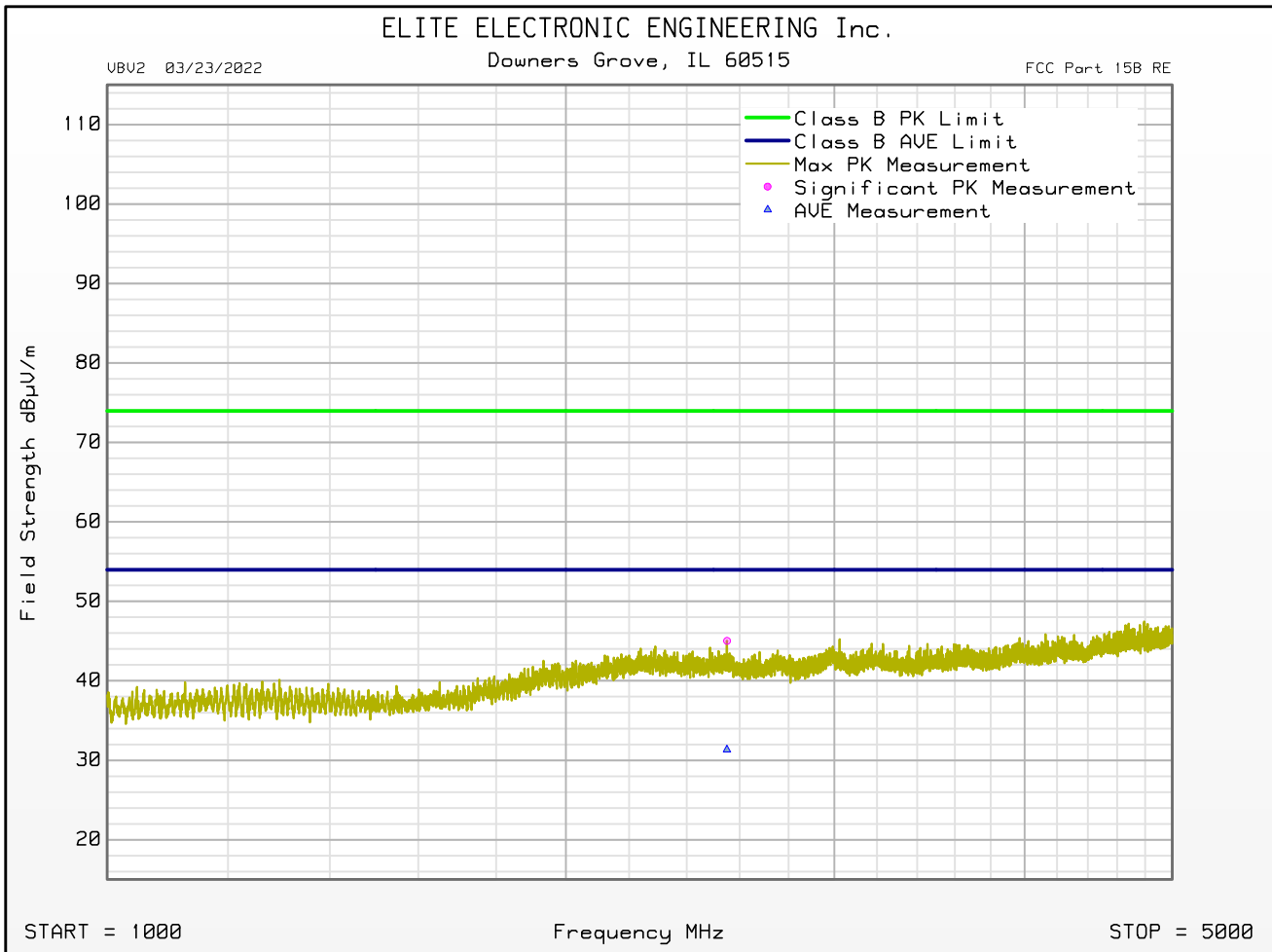
Freq MHz	Average Mtr Rdg dBuV	Ant Fac dB/m	Amp Fac dB	Cbl Fac dB	Dist Corr dB	Average Total dBµV/m	Average Limit dBµV/m	Average Lim Mrg dB	Ant Pol	Mast Ht cm	Azim °	Excessive Average Level
1185.500	35.3	29.8	-40.9	1.7	0.0	26.0	54.0	-28.0	Horizontal	200	270	
1340.500	35.9	29.6	-40.5	1.8	0.0	26.8	54.0	-27.1	Horizontal	120	180	
2131.500	34.7	33.2	-39.8	2.4	0.0	30.5	54.0	-23.5	Horizontal	340	0	
2551.000	35.0	33.9	-40.2	2.7	0.0	31.3	54.0	-22.6	Vertical	120	0	
3767.500	33.1	34.5	-39.6	3.3	0.0	31.4	54.0	-22.6	Horizontal	200	135	
4956.000	33.3	37.0	-39.6	3.8	0.0	34.5	54.0	-19.5	Horizontal	200	315	



## FCC Part 15B Class B Radiated RF Emissions Test

SW ID/Rev: VBV2 03/23/2022

Manufacturer : Chamberlain  
 Model : Lift Master GDO 87504-267  
 Serial Number :  
 DUT Mode : Rx @ 902.25MHz  
 Turntable Step Angle (°): 45  
 Mast Positions (cm) : 120, 200, 340  
 Antenna Polarization : Vertical  
 Scan Type : Stepped Scan  
 Test RBW : 1 MHz  
 Prelim Dwell Time (s) : 0.0001  
 Notes : Contains Falcon GDO logic board 003-0454-8 Rev B (with PCB array 014R1573)  
 Test Engineer : M. Longinotti  
 Test Date : May 12, 2022 12:44:00 PM





## FCC Part 15B Class B Radiated RF Emissions Test

SW ID/Rev: VBV2 03/23/2022

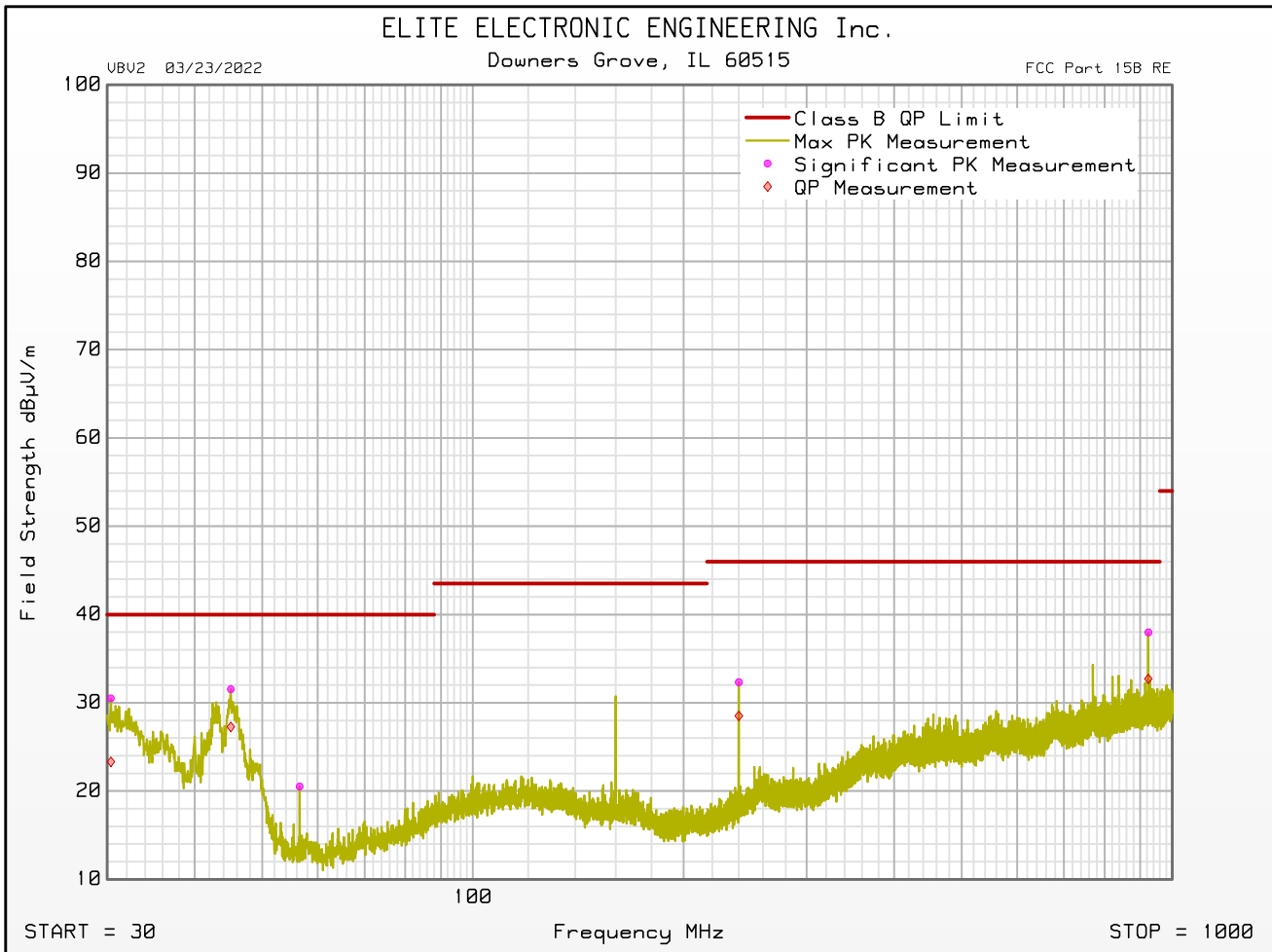
Manufacturer : Chamberlain  
 Model : Lift Master GDO 87504-267  
 Serial Number :  
 DUT Mode : Rx @ 914.75MHz  
 Turntable Step Angle (°): 45  
 Mast Positions (cm) : 120, 200, 340  
 Scan Type : Stepped Scan  
 Test RBW : 120 kHz  
 Prelim Dwell Time (s) : 0.0001  
 Notes : Contains Falcon GDO logic board 003-0454-8 Rev B (with PCB array 014R1573)  
 Test Engineer : M. Longinotti  
 Test Date : May 02, 2022 11:18:29 AM

Freq MHz	Peak Mtr Rdg dBuV	QP Mtr Rdg dBuV	Ant Fac dB/m	Amp Fac dB	Cbl Fac dB	Dist Corr dB	Peak Total dBµV/m	QP Total dBµV/m	QP Limit dBµV/m	QP Lim Mrg dB	Ant Pol	Mast Ht cm	Azim °	Excessive QP Level
30.360	4.9	-2.3	25.2	0.0	0.4	0.0	30.5	23.3	40.0	-16.7	Horizontal	340	180	
40.020	21.6	18.8	19.8	0.0	0.4	0.0	41.8	39.0	40.0	-1.0	Vertical	120	315	
45.060	14.1	9.8	17.1	0.0	0.4	0.0	31.5	27.3	40.0	-12.7	Horizontal	340	270	
56.520	7.7	-4.6	12.5	0.0	0.4	0.0	20.5	8.2	40.0	-31.8	Horizontal	120	180	
85.080	9.5	0.5	16.3	0.0	0.4	0.0	26.2	17.2	40.0	-22.8	Vertical	120	225	
100.000	7.5	3.6	18.3	0.0	0.4	0.0	26.2	22.3	43.5	-21.2	Vertical	120	45	
133.900	4.8	-3.8	18.7	0.0	0.5	0.0	24.1	15.4	43.5	-28.1	Vertical	120	180	
160.000	17.2	15.1	17.2	0.0	0.6	0.0	35.1	33.0	43.5	-10.5	Vertical	120	0	
192.640	5.9	-4.2	15.6	0.0	0.7	0.0	22.3	12.1	43.5	-31.4	Vertical	120	180	
240.000	13.9	10.1	17.7	0.0	0.8	0.0	32.3	28.5	46.0	-17.5	Horizontal	120	45	
282.960	9.8	-3.8	19.0	0.0	0.8	0.0	29.5	15.9	46.0	-30.1	Vertical	340	0	
318.060	5.7	-4.8	19.6	0.0	0.8	0.0	26.1	15.7	46.0	-30.3	Vertical	200	315	
452.760	7.5	-1.3	22.9	0.0	1.1	0.0	31.6	22.7	46.0	-23.3	Vertical	120	180	
770.040	10.8	6.4	26.5	0.0	1.5	0.0	38.7	34.4	46.0	-11.6	Vertical	340	90	
799.980	6.6	2.0	26.2	0.0	1.5	0.0	34.3	29.7	46.0	-16.3	Vertical	120	135	
924.060	9.5	4.2	27.0	0.0	1.5	0.0	38.0	32.7	46.0	-13.3	Horizontal	340	90	

## FCC Part 15B Class B Radiated RF Emissions Test

SW ID/Rev: VBV2 03/23/2022

Manufacturer : Chamberlain  
 Model : Lift Master GDO 87504-267  
 Serial Number :  
 DUT Mode : Rx @ 914.75MHz  
 Turntable Step Angle (°): 45  
 Mast Positions (cm) : 120, 200, 340  
 Antenna Polarization : Horizontal  
 Scan Type : Stepped Scan  
 Test RBW : 120 kHz  
 Prelim Dwell Time (s) : 0.0001  
 Notes : Contains Falcon GDO logic board 003-0454-8 Rev B (with PCB array 014R1573)  
 Test Engineer : M. Longinotti  
 Test Date : May 02, 2022 11:18:29 AM









## FCC Part 15B Class B Radiated RF Emissions Test

SW ID/Rev: VBV2 03/23/2022

Manufacturer : Chamberlain  
 Model : Lift Master GDO 87504-267  
 Serial Number :  
 DUT Mode : Rx @ 914.75MHz  
 Turntable Step Angle (°) : 45  
 Mast Positions (cm) : 120, 200, 340  
 Scan Type : Stepped Scan  
 Test RBW : 1 MHz  
 Prelim Dwell Time (s) : 0.0001  
 Notes : Contains Falcon GDO logic board 003-0454-8 Rev B (with PCB array 014R1573)  
 Test Engineer : M. Longinotti  
 Test Date : May 12, 2022 12:56:40 PM

Freq MHz	Peak Mtr Rdg dBuV	Ant Fac dB/m	Amp Fac dB	Cbl Fac dB	Dist Corr dB	Peak Total dBµV/m	Peak Limit dBµV/m	Peak Lim Mrg dB	Ant Pol	Mast Ht cm	Azim °	Excessive Peak Level
1209.500	49.8	29.8	-40.8	1.7	0.0	40.6	74.0	-33.4	Horizontal	120	135	
1578.500	48.9	29.2	-40.2	2.0	0.0	39.9	74.0	-34.0	Horizontal	340	0	
2152.500	48.8	33.3	-39.8	2.4	0.0	44.8	74.0	-29.2	Vertical	200	315	
2552.000	48.8	33.9	-40.2	2.7	0.0	45.2	74.0	-28.8	Vertical	200	0	
3188.500	47.7	34.3	-39.8	3.1	0.0	45.3	74.0	-28.7	Vertical	200	315	
4742.500	48.0	36.9	-39.7	3.7	0.0	48.9	74.0	-25.1	Horizontal	120	270	

Freq MHz	Average Mtr Rdg dBuV	Ant Fac dB/m	Amp Fac dB	Cbl Fac dB	Dist Corr dB	Average Total dBµV/m	Average Limit dBµV/m	Average Lim Mrg dB	Ant Pol	Mast Ht cm	Azim °	Excessive Average Level
1209.500	36.2	29.8	-40.8	1.7	0.0	27.0	54.0	-27.0	Horizontal	120	135	
1578.500	35.0	29.2	-40.2	2.0	0.0	26.0	54.0	-27.9	Horizontal	340	0	
2152.500	34.5	33.3	-39.8	2.4	0.0	30.4	54.0	-23.6	Vertical	200	315	
2552.000	34.9	33.9	-40.2	2.7	0.0	31.3	54.0	-22.7	Vertical	200	0	
3188.500	34.0	34.3	-39.8	3.1	0.0	31.6	54.0	-22.3	Vertical	200	315	
4742.500	32.8	36.9	-39.7	3.7	0.0	33.7	54.0	-20.3	Horizontal	120	270	







## FCC Part 15B Class B Radiated RF Emissions Test

SW ID/Rev: VBV2 03/23/2022

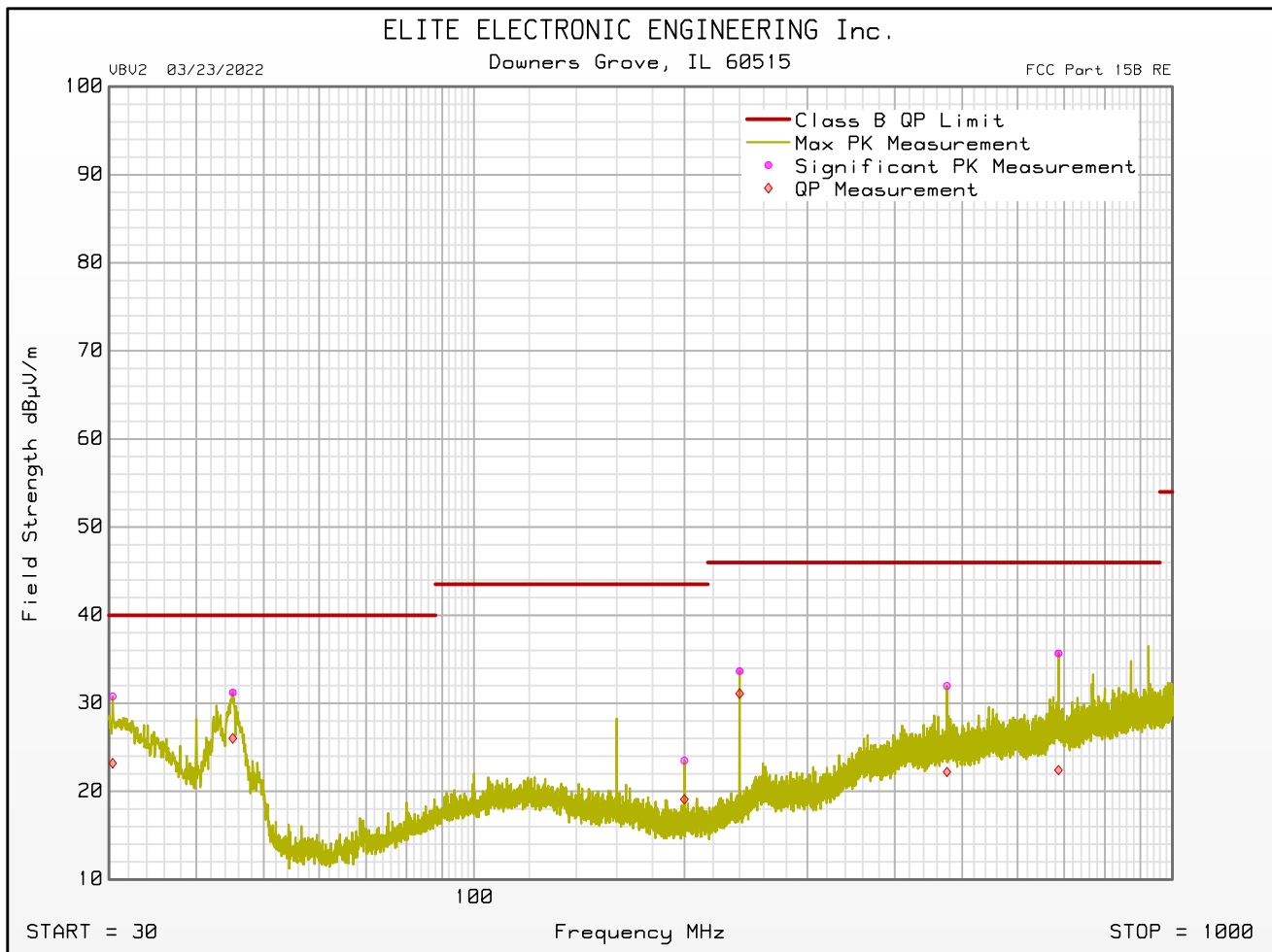
Manufacturer : Chamberlain  
 Model : Lift Master GDO 87504-267  
 Serial Number :  
 DUT Mode : Rx @ 926.75MHz  
 Turntable Step Angle (°): 45  
 Mast Positions (cm) : 120, 200, 340  
 Scan Type : Stepped Scan  
 Test RBW : 120 kHz  
 Prelim Dwell Time (s) : 0.0001  
 Notes : Contains Falcon GDO logic board 003-0454-8 Rev B (with PCB array 014R1573)  
 Test Engineer : M. Longinotti  
 Test Date : May 02, 2022 11:39:58 AM

Freq MHz	Peak Mtr Rdg dBuV	QP Mtr Rdg dBuV	Ant Fac dB/m	Amp Fac dB	Cbl Fac dB	Dist Corr dB	Peak Total dBµV/m	QP Total dBµV/m	QP Limit dBµV/m	QP Lim Mrg dB	Ant Pol	Mast Ht cm	Azim °	Excessive QP Level
30.360	5.2	-2.4	25.2	0.0	0.4	0.0	30.8	23.2	40.0	-16.8	Horizontal	120	90	
40.020	20.4	18.4	19.8	0.0	0.4	0.0	40.6	38.6	40.0	-1.4	Vertical	120	0	
45.120	13.8	8.6	17.0	0.0	0.4	0.0	31.2	26.0	40.0	-14.0	Horizontal	340	180	
63.840	6.5	1.3	12.5	0.0	0.4	0.0	19.4	14.2	40.0	-25.8	Vertical	200	180	
80.280	7.7	-3.4	15.5	0.0	0.4	0.0	23.5	12.4	40.0	-27.6	Vertical	120	135	
97.660	6.0	-4.1	18.1	0.0	0.4	0.0	24.5	14.4	43.5	-29.2	Vertical	120	90	
100.000	7.7	3.9	18.3	0.0	0.4	0.0	26.4	22.6	43.5	-20.9	Vertical	120	90	
160.000	15.4	13.2	17.2	0.0	0.6	0.0	33.3	31.1	43.5	-12.4	Vertical	120	180	
200.020	6.8	2.4	15.9	0.0	0.8	0.0	23.5	19.1	43.5	-24.4	Horizontal	120	0	
240.000	15.2	12.7	17.7	0.0	0.8	0.0	33.6	31.1	46.0	-14.9	Horizontal	120	45	
269.280	6.0	-4.6	18.7	0.0	0.8	0.0	25.5	14.9	46.0	-31.1	Vertical	200	90	
454.800	7.1	-2.5	23.0	0.0	1.1	0.0	31.2	21.6	46.0	-24.4	Vertical	120	135	
475.380	7.4	-2.4	23.5	0.0	1.1	0.0	32.0	22.2	46.0	-23.8	Horizontal	200	135	
686.700	8.3	-5.0	26.1	0.0	1.3	0.0	35.7	22.4	46.0	-23.6	Horizontal	200	45	
770.040	10.8	6.7	26.5	0.0	1.5	0.0	38.8	34.6	46.0	-11.4	Vertical	200	0	
924.000	10.3	5.9	27.0	0.0	1.5	0.0	38.9	34.4	46.0	-11.6	Vertical	120	90	

## FCC Part 15B Class B Radiated RF Emissions Test

SW ID/Rev: VBV2 03/23/2022

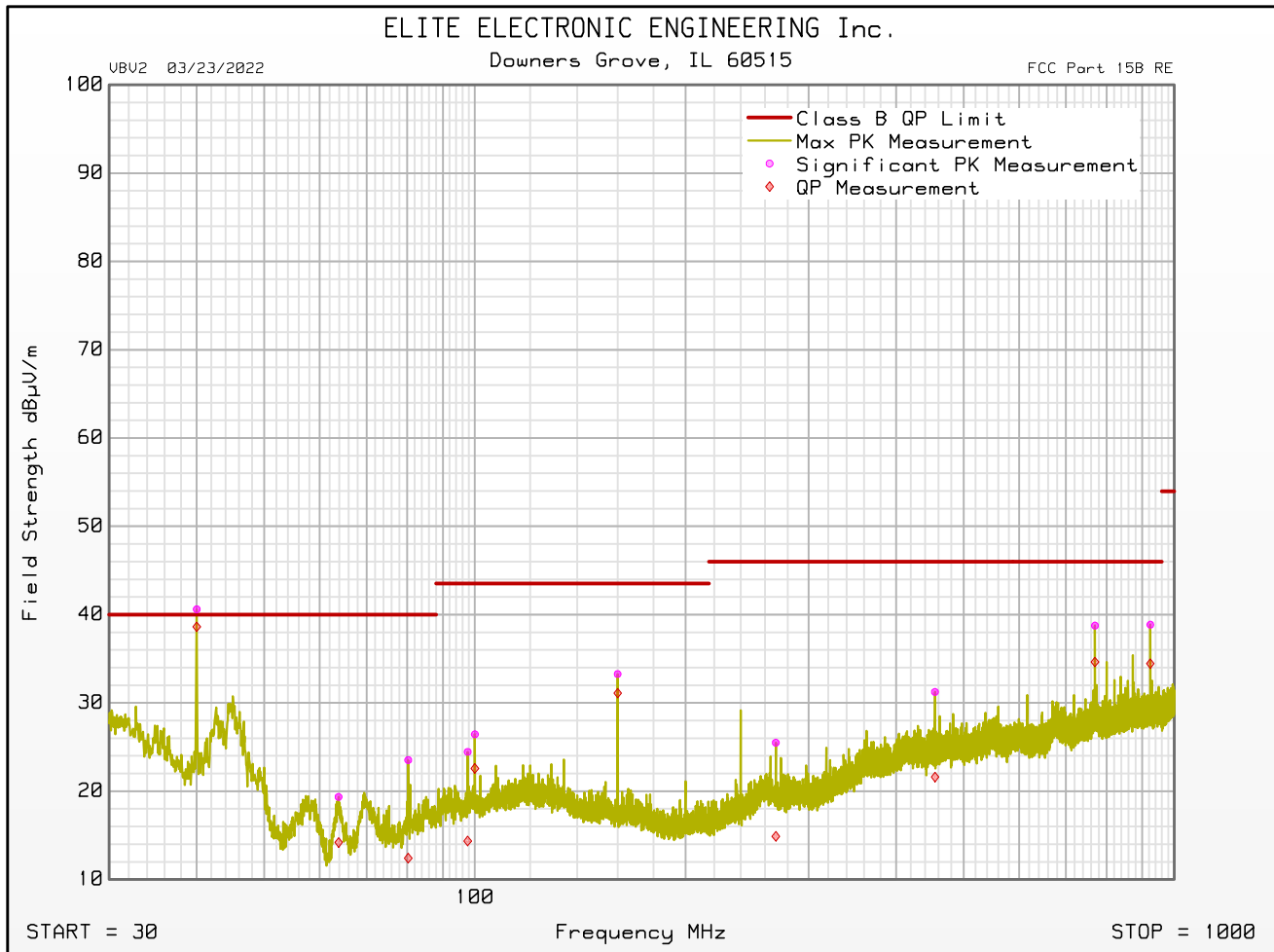
Manufacturer : Chamberlain  
 Model : Lift Master GDO 87504-267  
 Serial Number :  
 DUT Mode : Rx @ 926.75MHz  
 Turntable Step Angle (°): 45  
 Mast Positions (cm) : 120, 200, 340  
 Antenna Polarization : Horizontal  
 Scan Type : Stepped Scan  
 Test RBW : 120 kHz  
 Prelim Dwell Time (s) : 0.0001  
 Notes : Contains Falcon GDO logic board 003-0454-8 Rev B (with PCB array 014R1573)  
 Test Engineer : M. Longinotti  
 Test Date : May 02, 2022 11:39:58 AM



## FCC Part 15B Class B Radiated RF Emissions Test

SW ID/Rev: VBV2 03/23/2022

Manufacturer : Chamberlain  
 Model : Lift Master GDO 87504-267  
 Serial Number :  
 DUT Mode : Rx @ 926.75MHz  
 Turntable Step Angle (°): 45  
 Mast Positions (cm) : 120, 200, 340  
 Antenna Polarization : Vertical  
 Scan Type : Stepped Scan  
 Test RBW : 120 kHz  
 Prelim Dwell Time (s) : 0.0001  
 Notes : Contains Falcon GDO logic board 003-0454-8 Rev B (with PCB array 014R1573)  
 Test Engineer : M. Longinotti  
 Test Date : May 02, 2022 11:39:58 AM



## FCC Part 15B Class B Radiated RF Emissions Test

SW ID/Rev: VBV2 03/23/2022

Manufacturer : Chamberlain  
 Model : Lift Master GDO 87504-267  
 Serial Number :  
 DUT Mode : Rx @ 926.75MHz  
 Turntable Step Angle (°) : 45  
 Mast Positions (cm) : 120, 200, 340  
 Scan Type : Stepped Scan  
 Test RBW : 1 MHz  
 Prelim Dwell Time (s) : 0.0001  
 Notes : Contains Falcon GDO logic board 003-0454-8 Rev B (with PCB array 014R1573)  
 Test Engineer : M. Longinotti  
 Test Date : May 12, 2022 01:18:06 PM

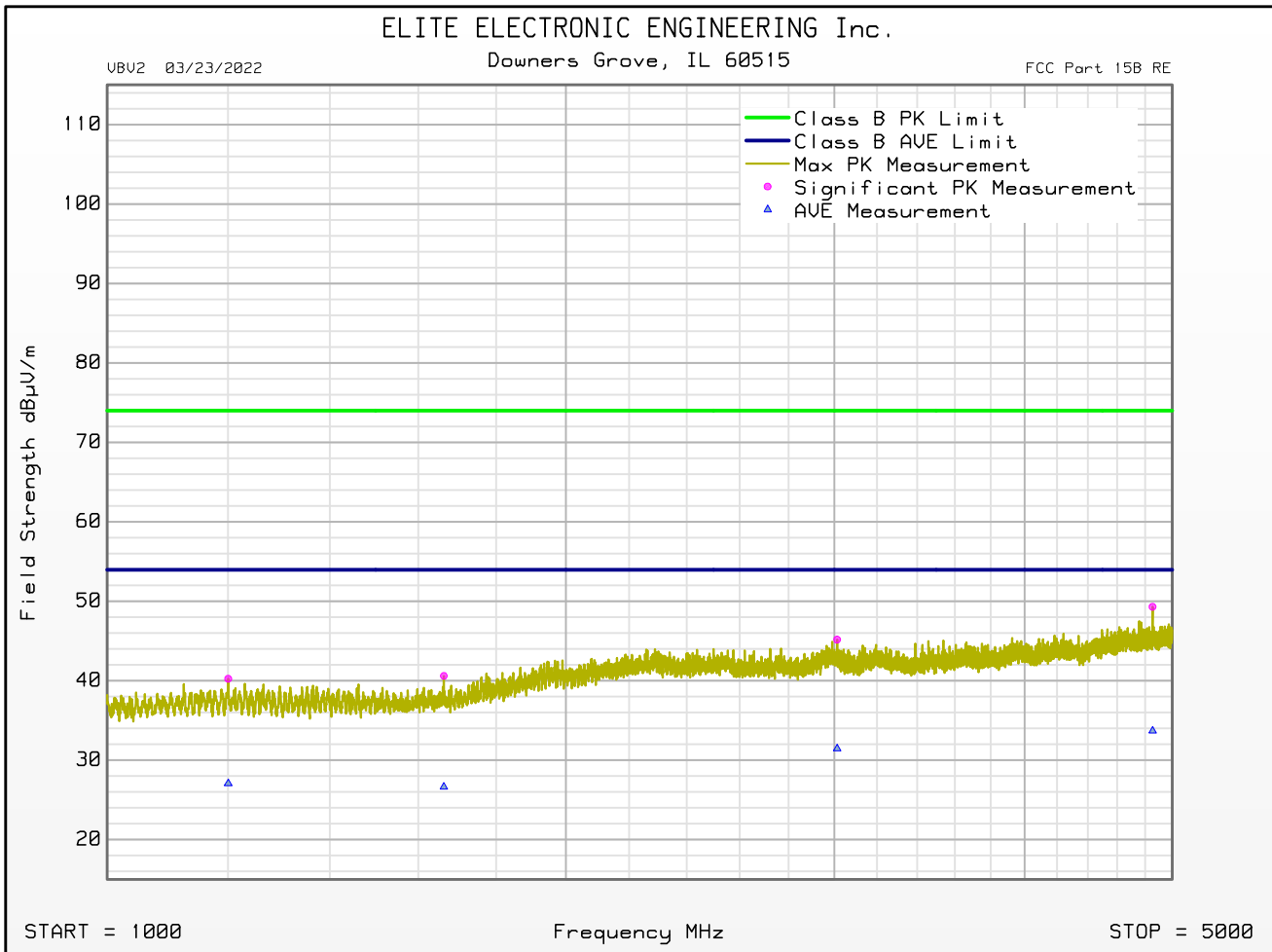
Freq MHz	Peak Mtr Rdg dBuV	Ant Fac dB/m	Amp Fac dB	Cbl Fac dB	Dist Corr dB	Peak Total dBµV/m	Peak Limit dBµV/m	Peak Lim Mrg dB	Ant Pol	Mast Ht cm	Azim °	Excessive Peak Level
1200.500	49.5	29.8	-40.8	1.7	0.0	40.2	74.0	-33.7	Horizontal	340	315	
1663.000	49.1	29.6	-40.2	2.1	0.0	40.6	74.0	-33.4	Horizontal	120	135	
2177.000	47.8	33.5	-39.9	2.4	0.0	43.9	74.0	-30.1	Vertical	340	225	
2760.500	48.8	33.6	-40.2	2.8	0.0	45.1	74.0	-28.9	Vertical	340	135	
3013.000	47.8	34.3	-39.9	3.0	0.0	45.2	74.0	-28.8	Horizontal	340	0	
4852.500	48.4	36.8	-39.6	3.8	0.0	49.3	74.0	-24.7	Horizontal	340	135	

Freq MHz	Average Mtr Rdg dBuV	Ant Fac dB/m	Amp Fac dB	Cbl Fac dB	Dist Corr dB	Average Total dBµV/m	Average Limit dBµV/m	Average Lim Mrg dB	Ant Pol	Mast Ht cm	Azim °	Excessive Average Level
1200.500	36.4	29.8	-40.8	1.7	0.0	27.1	54.0	-26.9	Horizontal	340	315	
1663.000	35.1	29.6	-40.2	2.1	0.0	26.7	54.0	-27.3	Horizontal	120	135	
2177.000	34.7	33.5	-39.9	2.4	0.0	30.7	54.0	-23.3	Vertical	340	225	
2760.500	34.5	33.6	-40.2	2.8	0.0	30.8	54.0	-23.2	Vertical	340	135	
3013.000	34.1	34.3	-39.9	3.0	0.0	31.5	54.0	-22.5	Horizontal	340	0	
4852.500	32.8	36.8	-39.6	3.8	0.0	33.7	54.0	-20.3	Horizontal	340	135	

## FCC Part 15B Class B Radiated RF Emissions Test

SW ID/Rev: VBV2 03/23/2022

Manufacturer : Chamberlain  
 Model : Lift Master GDO 87504-267  
 Serial Number :  
 DUT Mode : Rx @ 926.75MHz  
 Turntable Step Angle (°): 45  
 Mast Positions (cm) : 120, 200, 340  
 Antenna Polarization : Horizontal  
 Scan Type : Stepped Scan  
 Test RBW : 1 MHz  
 Prelim Dwell Time (s) : 0.0001  
 Notes : Contains Falcon GDO logic board 003-0454-8 Rev B (with PCB array 014R1573)  
 Test Engineer : M. Longinotti  
 Test Date : May 12, 2022 01:18:06 PM







21. 20dB Bandwidth

EUT Information	
Manufacturer	Chamberlain Group, Inc.
Product	Falcon DC GDO Logic Board
Model No.	GDO 003-0454-8 Rev B
Serial No.	Sample 1
Mode	TX

Test Setup Details	
Setup Format	Tabletop
Height of Support	N/A
Measurement Method	Antenna Conducted
Type of Test Site	Tabletop
Test Site Used	N/A
Type of Antennas Used	N/A
Notes	None

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

Requirements
Systems using frequency hopping techniques operating in the 902 – 928MHz band are allowed a maximum 20dB bandwidth of 500kHz.

Procedure
<p>The antenna port of the EUT was connected to the spectrum analyzer through 30dB of attenuation. With the hopping function disabled, the EUT was allowed to transmit continuously.</p> <p>The frequency hopping channel was set separately to low, middle, and high hopping channels. The resolution bandwidth (RBW) was set to <math>\geq 1\%</math> of the 20dB BW. The span was set to approximately 2 to 3 times the 20dB bandwidth.</p> <p>The 'Max-Hold' function was engaged. The analyzer was allowed to scan until the envelope of the transmitter bandwidth was defined. The analyzer's display was then screenshot and saved.</p>

Test Details	
Manufacturer	Chamberlain Group, Inc.
EUT	Falcon DC GDO Logic Board
Model No.	GDO 003-0454-8 Rev B
Serial No.	Sample 1
Mode	TX
Frequency Tested	902.25MHz
Result	20dB BW = 139.9kHz
Notes	None



15:30:11 10.05.2022

Test Details	
Manufacturer	Chamberlain Group, Inc.
EUT	Falcon DC GDO Logic Board
Model No.	GDO 003-0454-8 Rev B
Serial No.	Sample 1
Mode	TX
Frequency Tested	914.75MHz
Result	20dB BW = 138.9kHz
Notes	None



15:33:13 10.05.2022

Test Details	
Manufacturer	Chamberlain Group, Inc.
EUT	Falcon DC GDO Logic Board
Model No.	GDO 003-0454-8 Rev B
Serial No.	Sample 1
Mode	TX
Frequency Tested	926.75MHz
Result	20dB BW = 138.9kHz
Notes	None



15:35:38 10.05.2022

22. Occupied Bandwidth (99%)

EUT Information	
Manufacturer	Chamberlain Group, Inc.
Product	Falcon DC GDO Logic Board
Model No.	GDO 003-0454-8 Rev B
Serial No.	Sample 1
Mode	TX

Test Setup Details	
Setup Format	Tabletop
Height of Support	N/A
Measurement Method	Antenna Conducted
Type of Test Site	Tabletop
Test Site Used	N/A
Type of Antennas Used	N/A
Notes	None

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

Procedure
<p>The antenna port of the EUT was connected to the spectrum analyzer through 30dB of attenuation.</p> <p>The EUT was allowed to transmit continuously. The transmit channel was set separately to low, middle, and high channels. The resolution bandwidth (RBW) was set to 1% to 5% of the actual occupied / x dB bandwidth, the video bandwidth (VBW) was set 3 times greater than the RBW, and the span was set large enough to capture all products of the modulation process, including the emission skirts, around the carrier frequency.</p> <p>The 'Max-Hold' function was engaged. The analyzer was allowed to scan until the envelope of the transmitter bandwidth was defined. The analyzer's display was plotted using a 'screen dump' utility.</p>

Test Details	
Manufacturer	Chamberlain Group, Inc.
EUT	Falcon DC GDO Logic Board
Model No.	GDO 003-0454-8 Rev B
Serial No.	Sample 1
Mode	TX
Frequency Tested	902.25MHz
Result	OBW = 185.8kHz
Notes	None



15:31:00 10.05.2022

Test Details	
Manufacturer	Chamberlain Group, Inc.
EUT	Falcon DC GDO Logic Board
Model No.	GDO 003-0454-8 Rev B
Serial No.	Sample 1
Mode	TX
Frequency Tested	914.75MHz
Result	OBW = 183.9kHz
Notes	None



15:32:54 10.05.2022



Test Details	
Manufacturer	Chamberlain Group, Inc.
EUT	Falcon DC GDO Logic Board
Model No.	GDO 003-0454-8 Rev B
Serial No.	Sample 1
Mode	TX
Frequency Tested	926.75MHz
Result	OBW = 184kHz
Notes	None



15:35:08 10.05.2022

### 23. Carrier Frequency Separation

EUT Information	
Manufacturer	Chamberlain Group, Inc.
Product	Falcon DC GDO Logic Board
Model No.	GDO 003-0454-8 Rev B
Serial No.	Sample 1
Mode	TX - Hopping

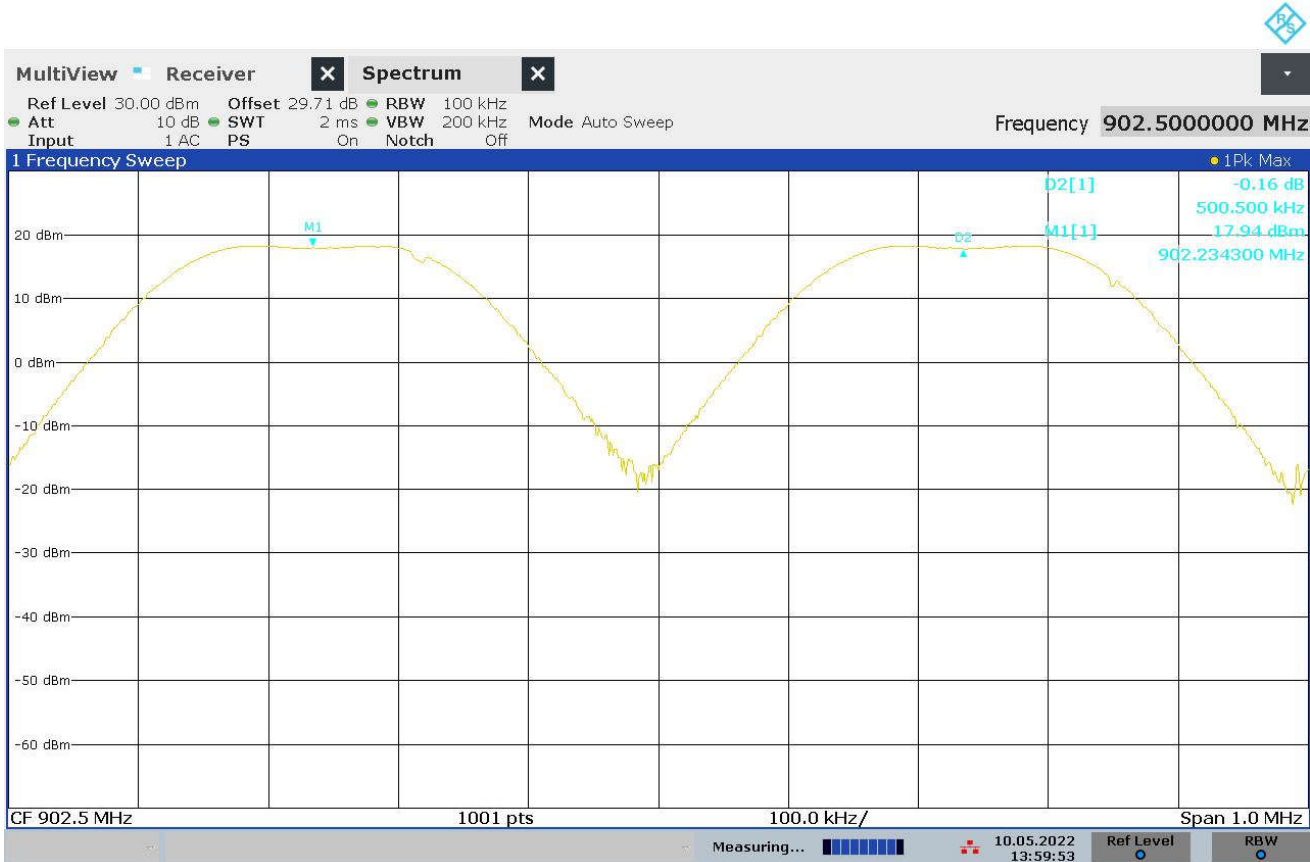
Test Setup Details	
Setup Format	Tabletop
Height of Support	N/A
Measurement Method	Antenna Conducted
Type of Test Site	Tabletop
Test Site Used	N/A
Type of Antennas Used	N/A
Notes	None

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

Requirement
Channel carrier frequencies shall be separated by a minimum of 25kHz or the 20dB bandwidth, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5MHz band may have hopping channel carrier frequencies that are separated by 25kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125mW.

Procedure
<p>The antenna port of the EUT was connected to the spectrum analyzer through 30dB of attenuation. With the hopping function enabled, the EUT was allowed to transmit continuously.</p> <p>Span was set wide enough to capture the peaks of two adjacent channels. The resolution bandwidth was set to approximately 30% of the channel spacing. The peak detector and 'Max-Hold' function were engaged. The span was set wide enough to capture the peaks of at least two adjacent channels. When the trace had stabilized after multiple scans, the marker-delta function was used to determine the separation between the peaks of the adjacent channels. The analyzer's display was plotted using a 'screen dump' utility.</p>

Test Details	
Manufacturer	Chamberlain Group, Inc.
EUT	Falcon DC GDO Logic Board
Model No.	GDO 003-0454-8 Rev B
Serial No.	Sample 1
Mode	TX - Hopping
Result	Separation = 500.5kHz
Notes	None



13:59:54 10.05.2022

24. Number of Carrier Channels

EUT Information	
Manufacturer	Chamberlain Group, Inc.
Product	Falcon DC GDO Logic Board
Model No.	GDO 003-0454-8 Rev B
Serial No.	Sample 1
Mode	TX - Hopping

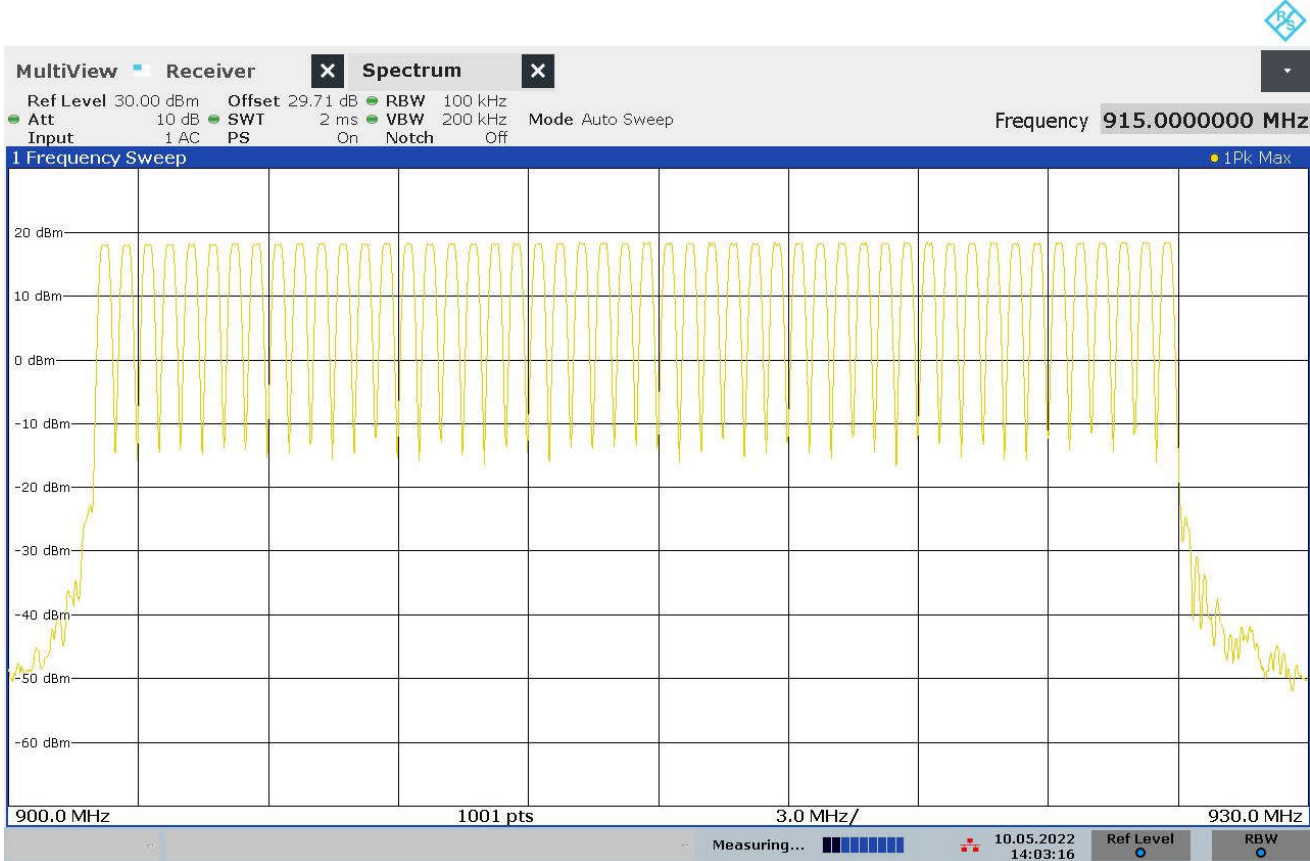
Test Setup Details	
Setup Format	Tabletop
Height of Support	N/A
Measurement Method	Antenna Conducted
Type of Test Site	Tabletop
Test Site Used	N/A
Type of Antennas Used	N/A
Notes	None

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

Requirements
The system shall use at least 50 hopping frequencies.

Procedure
<p>The antenna port of the EUT was connected to the spectrum analyzer through 30dB of attenuation. With the hopping function enabled, the EUT was allowed to transmit continuously.</p> <p>The resolution bandwidth (RBW) was set to less than 30% of the channel spacing or the 20dB bandwidth, whichever is smaller. The peak detector and 'Max-Hold' function were engaged. The span was set wide enough to capture the entire frequency band of operation.</p> <p>The EUT's signal was allowed to stabilize after multiple scans. The number of hopping frequencies was counted. The analyzer's display was plotted using a 'screen dump' utility.</p>

Test Details	
Manufacturer	Chamberlain Group, Inc.
EUT	Falcon DC GDO Logic Board
Model No.	GDO 003-0454-8 Rev B
Serial No.	Sample 1
Mode	TX - Hopping
Result	50 hopping frequencies
Notes	None



14:03:16 10.05.2022

25. Average Time of Occupancy

EUT Information	
Manufacturer	Chamberlain Group, Inc.
Product	Falcon DC GDO Logic Board
Model No.	GDO 003-0454-8 Rev B
Serial No.	Sample 1
Mode	TX - Hopping

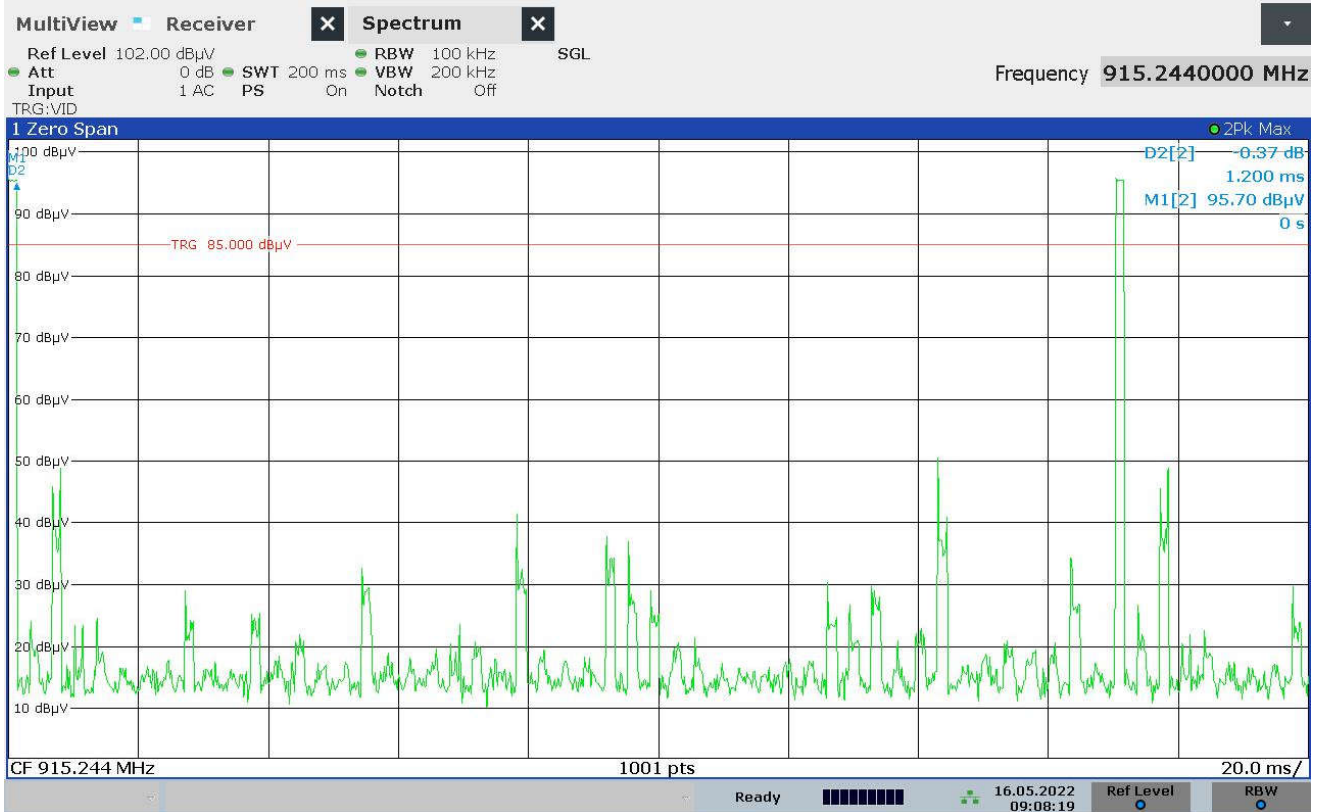
Test Setup Details	
Setup Format	Tabletop
Height of Support	N/A
Measurement Method	Antenna Conducted
Type of Test Site	Tabletop
Test Site Used	N/A
Type of Antennas Used	N/A
Notes	None

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

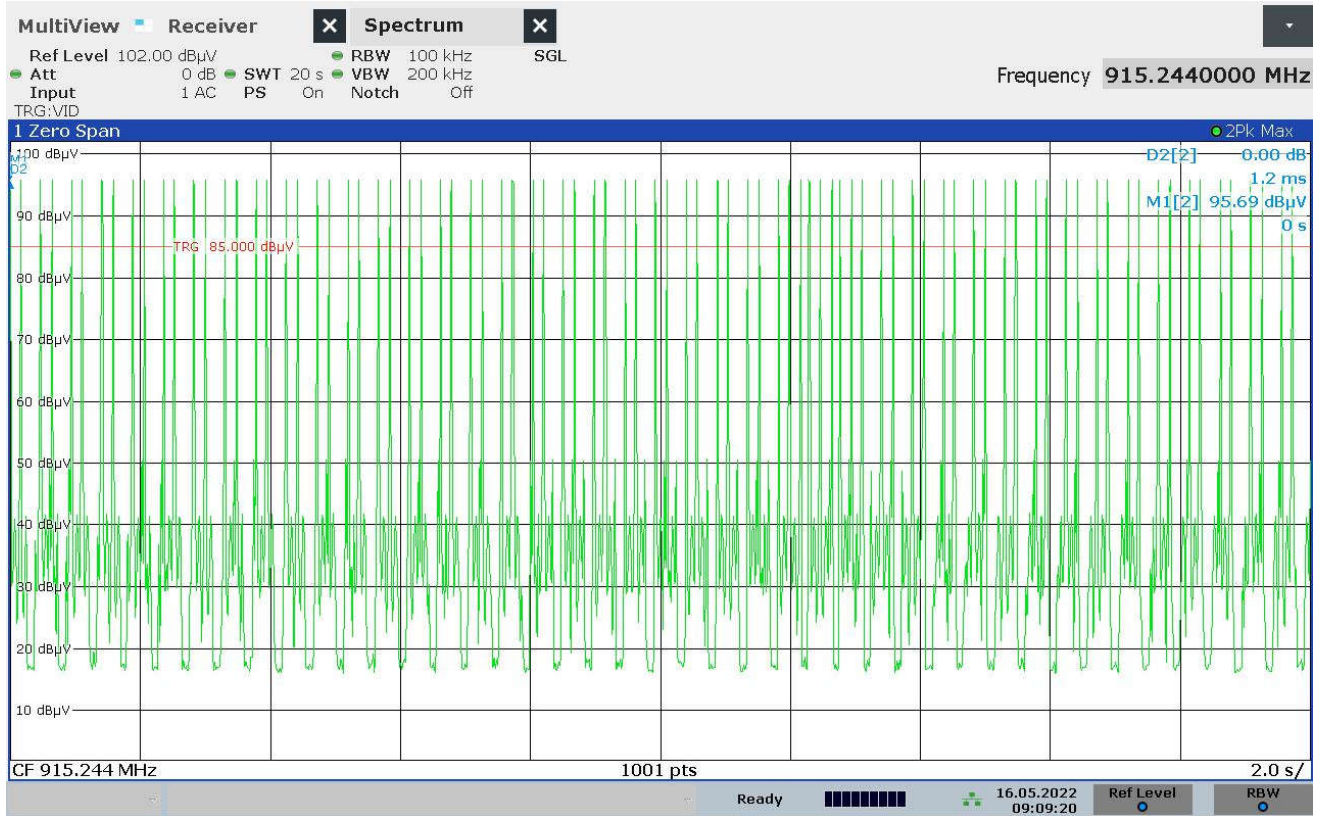
Requirements
The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period.

Procedure
<p>The antenna port of the EUT was connected to the spectrum analyzer through 30dB of attenuation. With the hopping function enabled, the EUT was allowed to transmit continuously.</p> <p>The spectrum analyzer was set to zero span centered on a hopping channel. The resolution bandwidth (RBW) was set <math>\geq</math> to the channel spacing. The sweep was set to capture the entire dwell time per hopping channel. The peak detector and 'Max-Hold' function were engaged. The analyzer's display was plotted using a 'screen dump' utility.</p>

Test Details	
Manufacturer	Chamberlain Group, Inc.
EUT	Falcon DC GDO Logic Board
Model No.	GDO 003-0454-8 Rev B
Serial No.	Sample 1
Mode	TX - Hopping
Result	Ave. Time of Occupancy = $87 \times 1.2\text{ms} = 0.104\text{s}$
Notes	None



09:08:20 16.05.2022



09:09:21 16.05.2022



26. Maximum Peak Conducted Output Power

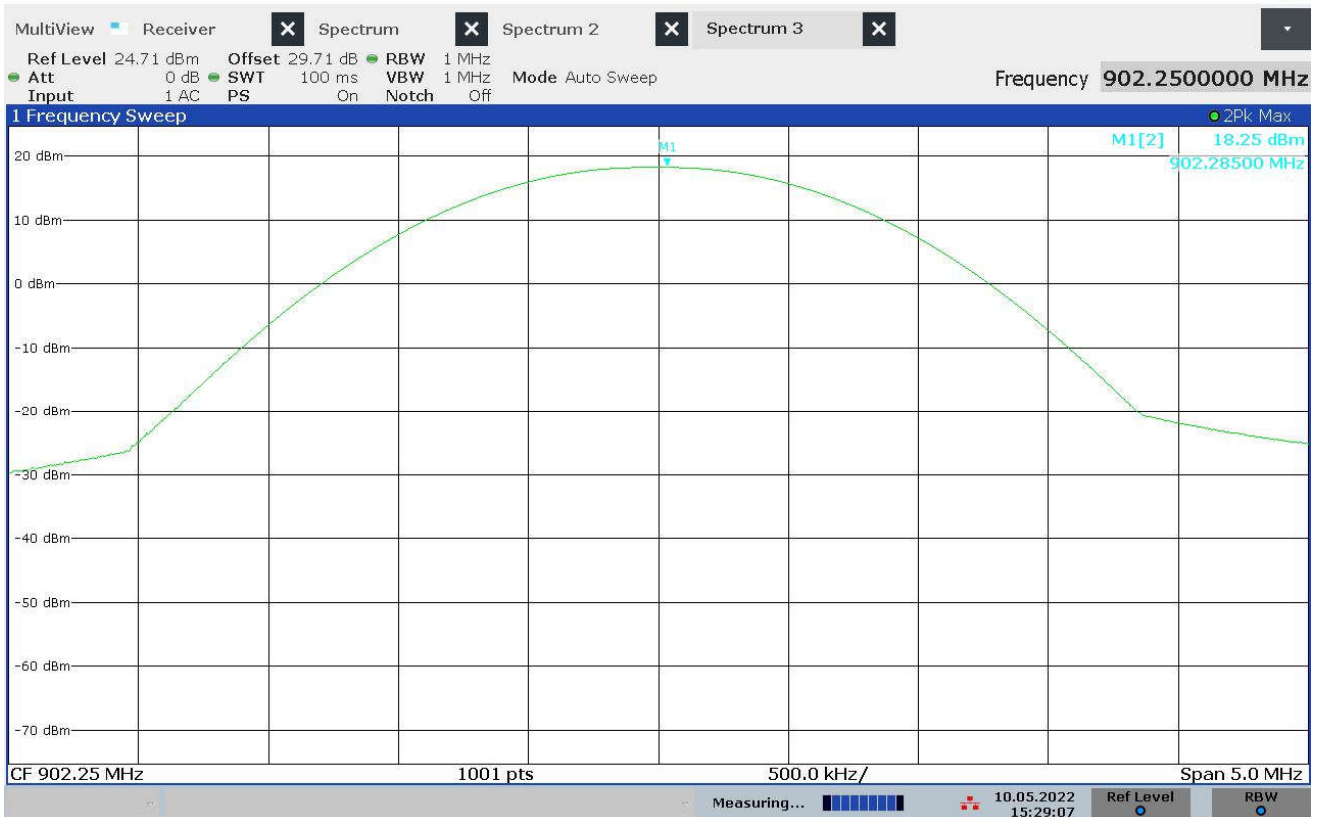
EUT Information	
Manufacturer	Chamberlain Group, Inc.
Product	Falcon DC GDO Logic Board
Model No.	GDO 003-0454-8 Rev B
Serial No.	Sample 1
Mode	TX

Test Setup Details	
Setup Format	Tabletop
Height of Support	N/A
Measurement Method	Antenna Conducted
Type of Test Site	Tabletop
Test Site Used	N/A
Notes	None

Requirements
The output power shall not exceed 1W (30dBm).

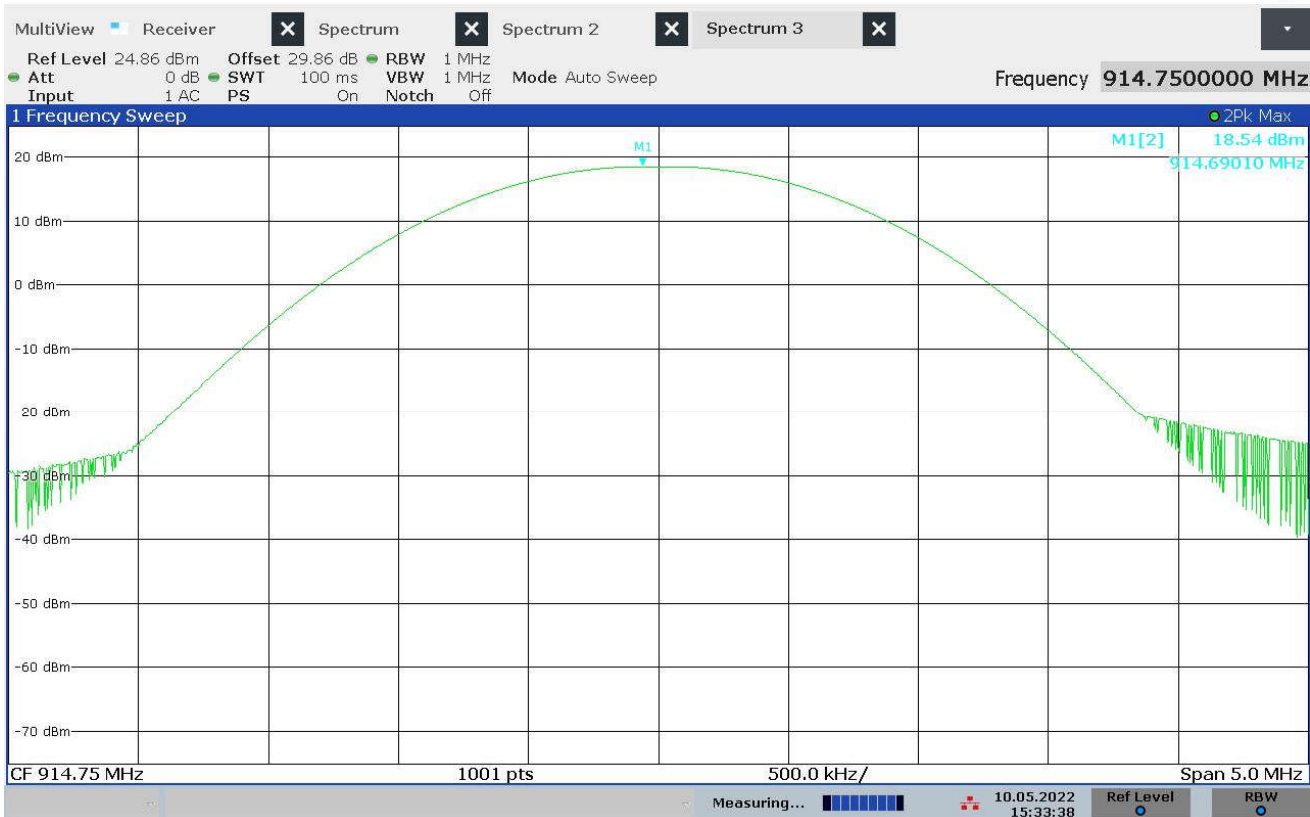
Procedure
The antenna port of the EUT was connected to the spectrum analyzer through 30dB of attenuation. With the hopping function disabled, the EUT was allowed to transmit continuously. The frequency hopping channel was set separately to low, middle, and high hopping channels. The resolution bandwidth (RBW) was set to greater than the 20dB bandwidth. The span was set to approximately 5 times the 20dB bandwidth. The 'Max-Hold' function was engaged. The maximum meter reading was recorded. The peak power output was calculated for the low, middle, and high hopping frequencies.

Test Details	
Manufacturer	Chamberlain Group, Inc.
EUT	Falcon DC GDO Logic Board
Model No.	GDO 003-0454-8 Rev B
Serial No.	Sample 1
Mode	TX
Frequency Tested	902.25MHz
Result	Output Power = 66.8mW (18.25dBm)
Notes	None



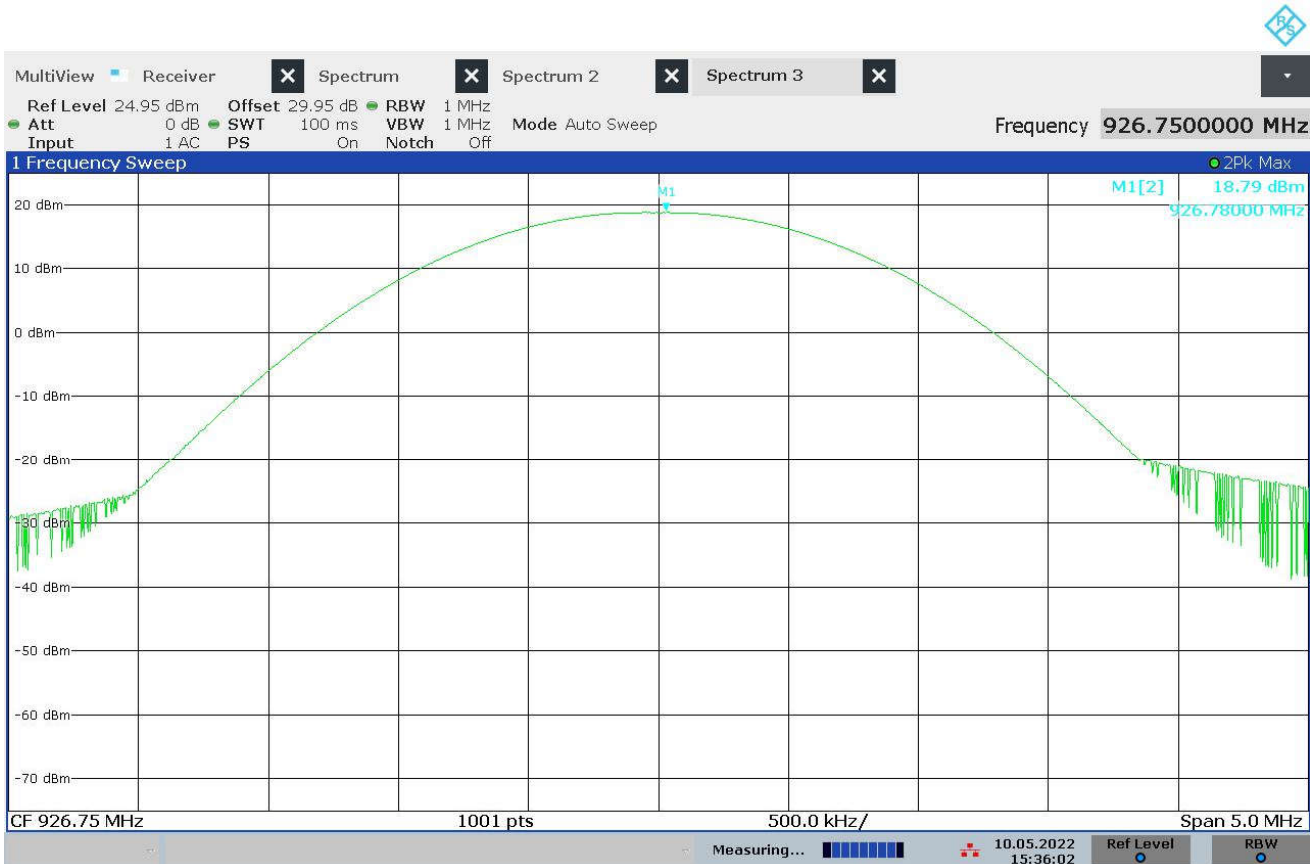
15:29:08 10.05.2022

Test Details	
Manufacturer	Chamberlain Group, Inc.
EUT	Falcon DC GDO Logic Board
Model No.	GDO 003-0454-8 Rev B
Serial No.	Sample 1
Mode	TX
Frequency Tested	914.75MHz
Result	Output Power = 71.4mW (18.54dBm)
Notes	None



15:33:38 10.05.2022

Test Details	
Manufacturer	Chamberlain Group, Inc.
EUT	Falcon DC GDO Logic Board
Model No.	GDO 003-0454-8 Rev B
Serial No.	Sample 1
Mode	TX
Frequency Tested	926.75MHz
Result	Output Power = 75.7mW (18.79dBm)
Notes	None



15:36:02 10.05.2022

27. Effective Isotropic Radiated Power (EIRP)

EUT Information	
Manufacturer	Chamberlain Group, Inc.
Product	Falcon DC GDO Logic Board
Model No.	GDO 003-0454-8 Rev B
Serial No.	Sample 1
Mode	TX

Test Setup Details	
Setup Format	Tabletop
Height of Support	N/A
Measurement Method	Antenna Conducted
Type of Test Site	Tabletop
Test Site Used	N/A
Notes	None
Setup Format	Tabletop

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

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

Procedure
<p>The EUT was placed on the non-conductive stand and set to transmit. A bilog antenna was placed at a test distance of 3 meters from the EUT. The resolution bandwidth (RBW) of the spectrum analyzer was set to greater than the 20dB bandwidth. The span was set to approximately 5 times the 20 dB bandwidth. The EUT was maximized for worst case emissions (or maximum output power) at the measuring antenna. The maximum meter reading was recorded. The peak power output was measured for the low, middle, and high hopping frequencies.</p> <p>The equivalent power was determined from the field intensity levels measured at 3 meters using the substitution method. To determine the emission power, a dipole antenna (double ridged waveguide antenna for all measurements above 1GHz) was then set in place of the EUT and connected to a calibrated signal generator. The output of the signal generator was adjusted to match the received level at the spectrum analyzer. The signal level was recorded. The reading was then corrected to compensate for cable loss (and antenna gain for all measurements above 1GHz), as required. The peak power output was calculated for low, middle, and high hopping frequencies.</p>

Test Details	
Manufacturer	Chamberlain Group, Inc.
EUT	Falcon DC GDO Logic Board
Model No.	GDO 003-0454-8 Rev B
Serial No.	Sample 1
Mode	TX
Result	Max EIRP = 21.9mW (13.4dBm)
Notes	None

Freq (MHz)	Ant Pol	Wide BW Meter Reading (dBμV)	Matched Sig Gen Reading (dBm)	Equivalent Antenna Gain (dB)	Cable Loss (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
902.25	H	82.5	12.9	2.2	1.6	13.4	36.0	-22.6
	V	78.0	9.8	2.2	1.6	10.3	36.0	-25.7
914.75	H	80.3	10.8	2.2	1.6	11.3	36.0	-24.7
	V	80.1	12.6	2.2	1.6	13.1	36.0	-22.9
926.75	H	81.9	12.2	2.2	2.1	12.3	36.0	-23.7
	V	80.5	13.2	2.2	2.1	13.3	36.0	-22.7

## 28. Duty Cycle Factor Measurements

EUT Information	
Manufacturer	Chamberlain Group, Inc.
Product	Falcon DC GDO Logic Board
Model No.	GDO 003-0454-8 Rev B
Serial No.	Sample 1
Mode	TX

Test Setup Details	
Setup Format	Tabletop
Height of Support	N/A
Measurement Method	Antenna Conducted
Type of Test Site	Elite Test Bench
Type of Antennas Used	N/A
Notes	None

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

Procedure
<p>The duty cycle factor is used to convert peak detected readings to average readings when pulsed modulation is employed. This factor is computed from the time domain trace of the pulse modulation signal.</p> <p>With the transmitter set up to transmit for maximum pulse density, the time domain trace is displayed on the spectrum analyzer. This trace is obtained by tuning center frequency to the transmitter frequency and then setting a zero-span width with 10msec/div. The amplitude settings are adjusted so that the on/off transitions clear the 4<sup>th</sup> division from the bottom of the display. The markers are set at the beginning and end of the “on-time”. The trace is recorded.</p> <p>Next the spectrum analyzer center frequency is set to the transmitter frequency with a zero-span width and 10msec/div. This shows if the word is longer than 100msec or shorter than 100msec. If the word period is less than 100msec, the display is set to show at least one word. The on-time and off-time are then measured. The on-time is total time signal level exceeds the 4th division. Off-time is time under for the word period.</p> <p>The duty cycle is then computed as <math>\left(\frac{On\ Time}{Word\ Period}\right)</math>, where <math>Word\ Period = (On\ Time + Off\ Time)</math>.</p>