



Measurement of RF Interference from an CapXL with PCAP Display Access Control Unit Transceiver

For	Chamberlain Group, Inc. 300 Windsor Dr Oak Brook, IL 60523
P.O. Number	4900066660
Date Received	January 14, 2020
Date Tested	January 14, 2020
Test Personnel	Mark Longinotti
Specification	FCC "Code of Federal Regulations" Title 47, Part 15, Subpart C, Sections 15.207 and 15.247 for Digital Modulation Intentional Radiators Operating within the band 902-928MHz RSS-247 RSS-GEN

Test Report By: *MARK E. LONGINOTTI*
Mark Longinotti
EMC Engineer

Requested By: Andrew Marks
Chamberlain Group, Inc.

Approved By: *Raymond J. Klouda*
Raymond J. Klouda
Registered Professional
Engineer of Illinois - 44894

Elite Electronic Engineering Inc.

1516 CENTRE CIRCLE
DOWNERS GROVE, IL 60515

TEL: 630 - 495 - 9770

FAX: 630 - 495 - 9785

www.elitetest.com

TABLE OF CONTENTS

PARAGRAPH	DESCRIPTION OF CONTENTS	PAGE NO.
1.	INTRODUCTION	4
1.1	Scope of Tests	4
1.2	Purpose	4
1.3	Deviations, Additions and Exclusions	4
1.4	EMC Laboratory Identification	4
1.5	Laboratory Conditions	4
2.	APPLICABLE DOCUMENTS	4
3.	EUT SET-UP AND OPERATION	5
3.1	General Description	5
3.1.1	Power Input	5
3.1.2	Peripheral Equipment	5
3.1.3	Interconnect Cables	5
3.1.4	Grounding	5
3.2	Software	5
3.3	Operational Mode	5
3.4	EUT Modifications	5
4.	TEST FACILITY AND TEST INSTRUMENTATION	5
4.1	Shielded Enclosure	5
4.2	Test Instrumentation	6
4.3	Calibration Traceability	6
4.4	Measurement Uncertainty	6
5.	TEST PROCEDURES	6
5.1	Transmitter	6
5.1.1	EIRP	6
5.1.1.1	Requirements	6
5.1.1.2	Procedures	6
5.1.1.3	Results	7
5.1.2	Radiated Spurious Emissions Measurements	7
5.1.2.1	Requirements	7
5.1.2.2	Procedures	7
5.1.2.3	Results	8
5.1.3	Band Edge Compliance	8
5.1.3.1	Requirements	8
5.1.3.2	Procedures	8
5.1.3.2.1	Low Band Edge	8
5.1.3.2.2	High Band Edge	9
5.1.3.3	Results	9
6.	CONCLUSIONS	9
7.	CERTIFICATION	10
8.	ENDORSEMENT DISCLAIMER	10
9.	EQUIPMENT LIST	11
	Table 9-1 Equipment List	11

THIS REPORT SHALL NOT BE REPRODUCED, EXCEPT IN FULL, WITHOUT THE
WRITTEN APPROVAL OF ELITE ELECTRONIC ENGINEERING INCORPORATED.

REVISION HISTORY

Revision	Date	Description
—	20 Jan 2020	Initial release
A	24 Jan 2020 By Mark Longinotti	<ul style="list-style-type: none">– Changed report number from 1904860-01 to 1904860-01 Rev. A throughout the test report.– Section 3.3: Changed Transmit at 90.23MHz to 902.23MHz.– Section 5.1.2.3: Changed Transmit at 2405 to Transmit at 926.74MHz.

Measurement of RF Emissions from an Access Control Unit, Part No. CapXL with PCAP Display**1. INTRODUCTION****1.1 Scope of Tests**

This document represents the results of the series of radio interference measurements performed on a Chamberlain Group, Inc. Access Control Unit, Part No. CapXL with PCAP Display, Serial No. 3919N1738, transceiver (hereinafter referred to as the EUT). The EUT is a frequency hopping spread spectrum transceiver. The transceiver was designed to transmit and receive in the 902 - 928MHz band using an external, wire antenna.

The EUT was originally certified under the following:

FCC ID: HBW8439

IC ID: 2666A-8439

The EUT was manufactured and submitted for testing by Chamberlain Group, Inc. located in Oak Brook, IL.

1.2 Purpose

The test series was performed to determine if the EUT, with a new touchscreen, meets the Class II Permissive Change requirements of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart C, Section 15.247 for Intentional Radiators Operating within the 902-928MHz band.

The test series was also performed to determine if the EUT, with a new touchscreen, meets the Class II Permissive Change requirements of Innovation, Science, and Economic Development Canada Radio Standards Specification RSS-247 for Transmitters.

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

1.3 Deviations, Additions and Exclusions

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

1.4 EMC Laboratory Identification

This series of tests was performed by Elite Electronic Engineering Incorporated of Downers Grove, Illinois. The laboratory is accredited by the American Association for Laboratory Accreditation (A2LA), A2LA Lab Code: 1786-01.

1.5 Laboratory Conditions

The temperature at the time of the test was 23C and the relative humidity was 17%.

2. APPLICABLE DOCUMENTS

The following documents of the exact issue designated form part of this document to the extent specified herein:

- Federal Communications Commission "Code of Federal Regulations", Title 47, 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 9 kHz to 40 GHz"
- 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 System, Frequency Hopping

Spread Spectrum System, and Hybrid System Devices Operating Under Section 15.247 of the FCC Rules, April 2, 2019, KDB 558074

- Innovation, Science, and Economic Development Canada RSS-247, Issue 2, February 2017, "Spectrum Management and Telecommunications Radio Standards Specification, Digital Transmission Systems (DTSS), Frequency Hopping Systems (FHSs), and License-Exempt Local Area Network (LE-LAN) Devices"
- Innovation, Science, and Economic Development Canada RSS-GEN, Issue 5, March 2019, "Spectrum Management and Telecommunications Radio Standards Specification, General Requirements for Compliance of Radio Apparatus"

3. EUT SET-UP AND OPERATION

3.1 General Description

The EUT is an Access Control Unit, Part No. CapXL with PCAP Display. A block diagram of the EUT setup is shown as Figure 1. Photographs of the EUT are shown as Figure 2 and Figure 3.

3.1.1 Power Input

The EUT received 115V, 60Hz via two wires from the output of an AC/DC Adapter, Model: YHY-24003000, P/N: DS240072C14-W. The AC/DC Adapter was powered with 115V, 60Hz power.

3.1.2 Peripheral Equipment

The EUT was submitted for testing with no peripheral equipment.

3.1.3 Interconnect Cables

The EUT was submitted for testing with no interconnect cables.

3.1.4 Grounding

The chassis ground of the EUT was connected to ground.

3.2 Software

For all tests, the EUT had Firmware Version 1.29 loaded onto the device to provide correct load characteristics.

3.3 Operational Mode

For all tests, the EUT was programmed to operate separately in each of the following modes:

- Transmit at 902.23MHz
- Transmit at 914.73MHz
- Transmit at 926.74MHz

3.4 EUT Modifications

No modifications were required for compliance.

4. TEST FACILITY AND TEST INSTRUMENTATION

4.1 Shielded Enclosure

All tests were performed in a 32ft. x 20ft. x 18ft. hybrid ferrite-tile/anechoic absorber lined test chamber. With the exception of the floor, the reflective surfaces of the shielded chamber are lined with ferrite tiles on the walls and ceiling. Anechoic absorber material is installed over the ferrite tile. The floor of the chamber is used as the ground plane. The chamber complies with ANSI C63.4-2014 for site attenuation.

4.2 Test Instrumentation

The test instrumentation and auxiliary equipment used during the tests are listed in Table 9-1.

4.3 Calibration Traceability

Test equipment is maintained and calibrated on a regular basis with a calibration interval not greater than two years. All calibrations are traceable to the International System Units (SI).

4.4 Measurement Uncertainty

All measurements are an estimate of their true value. The measurement uncertainty characterizes, with a specified confidence level, the spread of values which may be possible for a given measurement system.

Values of Expanded Measurement Uncertainty (95% Confidence) are presented below:

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

5. TEST PROCEDURES

5.1 Transmitter

5.1.1 EIRP

5.1.1.1 Requirements

Per section FCC 15.247(b)(2) and ISED Canada RSS-247 section 5.4, for systems using digital modulation operating in the 902-928MHz band, the maximum peak output conducted power shall not be greater than 1W (30dBm). Per section FCC 15.247(b)(4) and ISED Canada RSS-247 section 5.4, this limit is based on the use of antennas with directional gains that do not exceed 6dBi. Since the limit allows for a 6dBi antenna gain, the maximum EIRP can be increased by 6dB to 4 Watt (36dBm).

If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below 30dBm by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

5.1.1.2 Procedures

The EUT was placed on an 80cm high, 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 6dB 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 channels.

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 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, as required. The peak power output was calculated for low, middle, and high channels.

5.1.1.3 Results

The results are presented on pages 17 through 19. The maximum EIRP measured from the transmitter was 40.7mW (16.1dBm) which is below the 4 Watt limit.

5.1.2 Radiated Spurious Emissions Measurements

5.1.2.1 Requirements

Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must comply with the radiated emission limits specified in §15.209(a).

Paragraph 15.209(a) has the following radiated emission limits:

Frequency MHz	Field Strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	3
30.0-88.0	100	3
88.0-216.0	150	3
216.0-960.0	200	3
Above 960	500	3

5.1.2.2 Procedures

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

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

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

1) For all emissions in the restricted bands, the following procedure was used:

- 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 80cm high non-conductive stand. A peak detector with a resolution bandwidth of 100 kHz was used on the spectrum analyzer.
- 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 stand. A peak detector with a resolution bandwidth of 1 MHz was used on the spectrum analyzer.
- To ensure that maximum or worst case emission levels were measured, the following steps were taken when taking all measurements:
 - The EUT was rotated so that all of its sides were exposed to the receiving antenna.
 - Since the measuring antenna is linearly polarized, both horizontal and vertical field components were measured.

- iii) The measuring antenna was raised and lowered for each antenna polarization to maximize the readings.
- iv) In instances where it was necessary to use a shortened cable between the measuring antenna and the spectrum analyzer. The measuring antenna was not raised or lowered to ensure maximized readings, instead the EUT was rotated through all axis to ensure the maximum readings were recorded for the EUT.
- d) For all radiated emissions measurements below 1 GHz, if the peak reading is below the limits listed in 15.209(a), no further measurements are required. If however, the peak readings exceed the limits listed in 15.209(a), then the emissions are remeasured using a quasi-peak detector.
- e) For all radiated emissions measurements above 1 GHz, 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).
- f) Next, for all radiated emissions measurements above 1GHz, the resolution bandwidth was set to 1MHz. The analyzer was set to linear mode with a 10Hz video bandwidth in order to simulate an average detector. An average reading was taken.

5.1.2.3 Results

Transmit at 902.23MHz:

Preliminary radiated emissions plots are shown on pages 20 through 23. Final radiated emissions data are presented on data pages 24 and 25. As can be seen from the data, all emissions measured from the EUT were within the specification limits.

Transmit at 914.73MHz:

Preliminary radiated emissions plots are shown on pages 26 through 29. Final radiated emissions data are presented on data pages 30 and 31. As can be seen from the data, all emissions measured from the EUT were within the specification limits.

Transmit at 926.74MHz:

Preliminary radiated emissions plots are shown on pages 32 through 35. Final radiated emissions data are presented on data pages 36 and 37. As can be seen from the data, all emissions measured from the EUT were within the specification limits.

Photographs of the test configuration which yielded the highest, or worst case, radiated emission levels are shown in Figure 4 and Figure 5.

5.1.3 Band Edge Compliance

5.1.3.1 Requirements

Per section 15.247(d), the emissions at the band edges must be at least 20dB below the highest level measured within the band but attenuation below the general limits listed in 15.209(a) is not required.

5.1.3.2 Procedures

5.1.3.2.1 Low Band Edge

- 1) The EUT was set up inside the test chamber on a non-conductive stand.
- 2) A broadband measuring antenna was placed at a test distance of 3 meters from the EUT.

- 3) The EUT was set to transmit continuously at the channel closest to the low band edge (hopping function disabled).
- 4) The EUT was maximized for worst case emissions at the measuring antenna. The maximum meter reading was recorded.
- 5) To determine the band edge compliance, the following spectrum analyzer settings were used:
 - a. Center frequency = low band edge frequency.
 - b. Span = Wide enough to capture the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products which fall outside of the authorized band of operation.
 - c. Resolution bandwidth (RBW) = 100kHz.
 - d. The 'Max-Hold' function was engaged. The analyzer was allowed to scan until the envelope of the transmitter bandwidth was defined.
 - e. The marker was set on the peak of the in-band emissions. A display line was placed 20dB down from the peak of the in-band emissions. All emissions which fall outside of the authorized band of operation must be below the 20dB down display line. (All emissions to the left of the center frequency (band edge) must be below the display line.)
 - f. The analyzer's display was plotted using a 'screen dump' utility.
- 6) Step 5) was repeated with the frequency hopping function enabled.

5.1.3.2.2 High Band Edge

- 1) The EUT was set up inside the test chamber on a non-conductive stand.
- 2) A broadband measuring antenna was placed at a test distance of 3 meters from the EUT.
- 3) The EUT was set to transmit continuously at the channel closest to the high band edge (hopping function disabled).
- 4) The EUT was maximized for worst case emissions at the measuring antenna.
- 5) To determine the band edge compliance, the following spectrum analyzer settings were used:
 - a. Center frequency = high band edge frequency.
 - b. Span = Wide enough to capture the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products which fall outside of the authorized band of operation.
 - c. Resolution bandwidth (RBW) = 100kHz.
 - d. The 'Max-Hold' function was engaged. The analyzer was allowed to scan until the envelope of the transmitter bandwidth was defined.
 - e. The marker was set on the peak of the in-band emissions. A display line was placed 20dB down from the peak of the in-band emissions. All emissions which fall outside of the authorized band of operation must be below the 20dB down display line. (All emissions to the right of the center frequency (band edge) must be below the display line.)
 - f. The analyzer's display was plotted using a 'screen dump' utility.
- 6) Step 5) was repeated with the frequency hopping function enabled.

5.1.3.3 Results

Pages 38 through 41 show the radiated band edge compliance results. As can be seen from these plots, the emissions at the low end band edge and the high end band edge are within the 20 dB down limits.

6. CONCLUSIONS

It was determined that the Chamberlain Group, Inc. Access Control Unit, Part No. CapXL with PCAP Display, Serial No. 3919N1738, frequency hopping spread spectrum transceiver, with a new touchscreen, meets the Class II Permissive Change requirements of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart C, Section 15.247 for Intentional Radiators Operating within the 902-928 MHz band, when tested per ANSI C63.10-2013.

It was also determined that the Chamberlain Group, Inc. Access Control Unit, Part No. CapXL with PCAP Display, Serial No. 3919N1738, frequency hopping spread spectrum transceiver, with a new touchscreen, meets the Class II Permissive Change requirements of the Innovation, Science, and Economic Development Canada Radio Standards Specification RSS-Gen and Radio Standards Specification RSS-247 for transmitters, when tested per ANSI C63.10-2013.

7. 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 test specifications.

The data presented in this test report pertains to the EUT at the test date. Any electrical or mechanical modification made to the EUT subsequent to the specified test date will serve to invalidate the data and void this certification.

8. ENDORSEMENT DISCLAIMER

This report must not be used to claim product certification, approval, or endorsement by A2LA, NIST or any agency of the Federal Government.

9. EQUIPMENT LIST

Table 9-1 Equipment List

Eq ID	Equipment Description	Manufacturer	Model No.	Serial No.	Frequency Range	Cal Date	Due Date
APW3	PREAMPLIFIER	PLANAR ELECTRONICS	PE2-35-120-5R0-10-12	PL2924	1GHZ-20GHZ	4/8/2019	4/8/2020
CDY0	WORKSTATION	ELITE	WORKSTATION		WINDOWS 7	N/A	
GRE1	SIGNAL GENERATOR	AGILENT	E4438C	MY42081749	250KHZ-6GHZ	2/22/2019	2/22/2020
NDQ1	TUNED DIPOLE ANTENNA	EMCO	3121C-DB4	313	400-1000MHZ	6/28/2018	6/28/2020
NTA3	BILOG ANTENNA	TESEQ	6112D	32853	25-1000MHz	10/10/2019	10/10/2020
NWQ2	DOUBLE RIDGED WAVEGUIDE ANTENNA	ETS LINDGREN	3117	66659	1GHZ-18GHZ	3/22/2018	3/22/2020
RBG3	EMI ANALYZER	ROHDE & SCHWARZ	ESW44	101592	2HZ-44GHZ	2/20/2019	2/20/2020
XPQ3	HIGH PASS FILTER	K&L MICROWAVE	4IH30-1804/T10000-0	4	1.8GHZ-10GHZ	9/6/2019	9/6/2021

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.

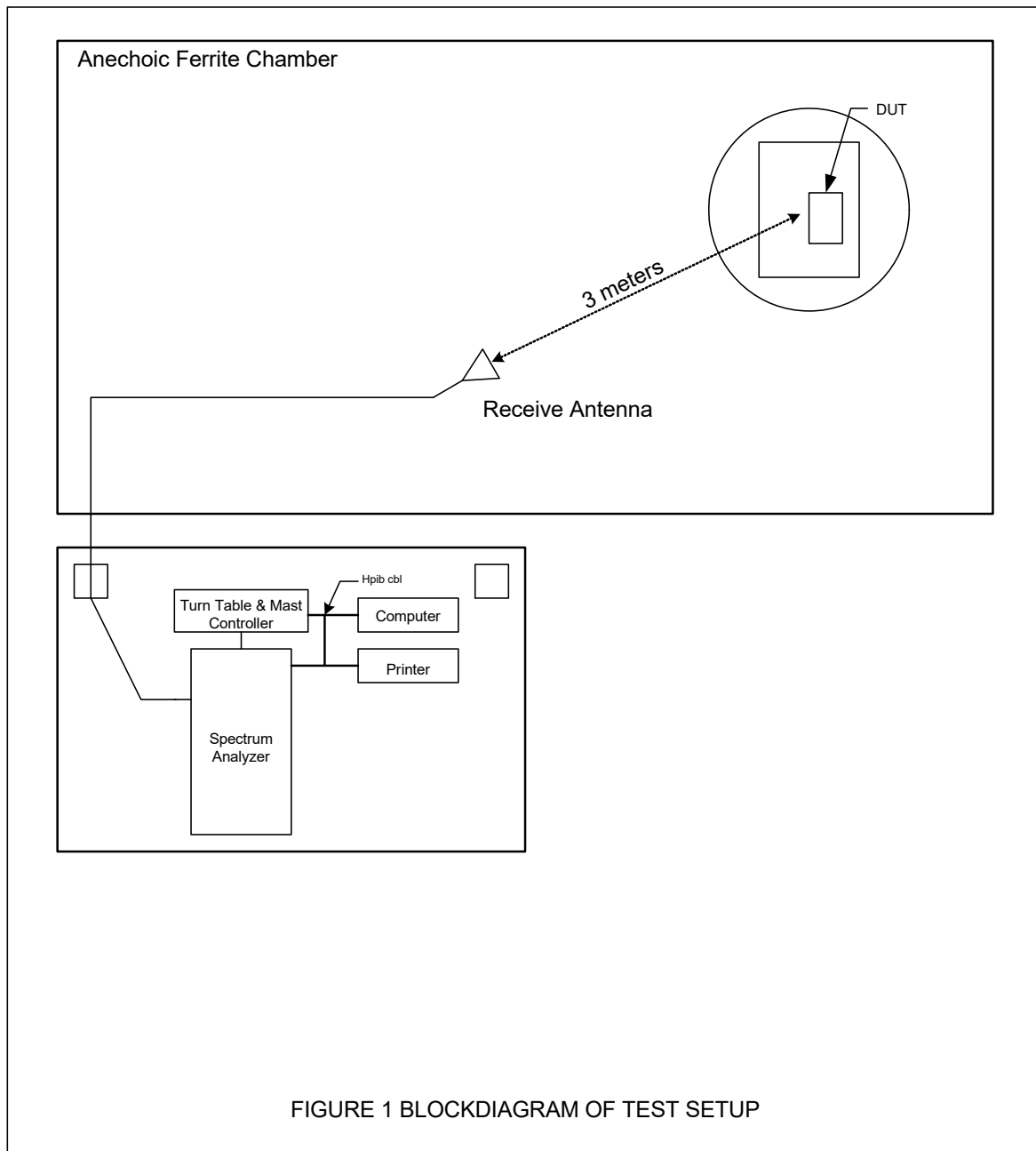
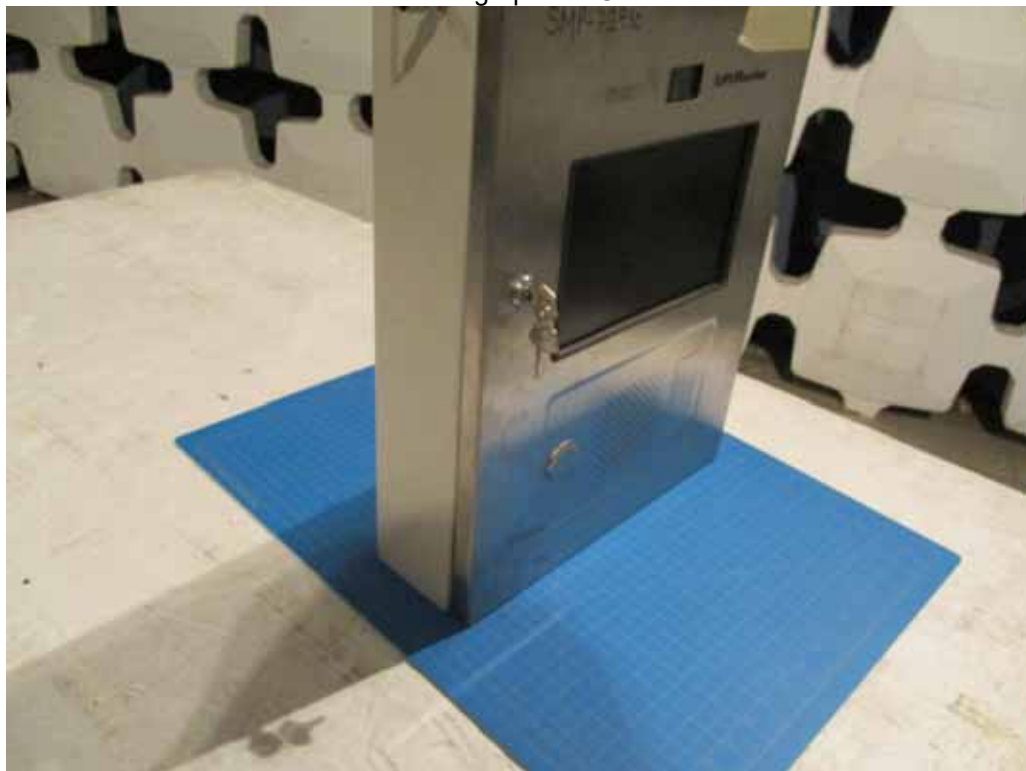


Figure 2



Photograph of EUT



Photograph of EUT

Figure 3



Photograph of EUT

Figure 4



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



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

Figure 5



Test Setup for Radiated Emissions above 1GHz, Horizontal Polarization



Test Setup for Radiated Emissions above 1GHz, Vertical Polarization



Manufacturer : Chamberlain Group, Inc.
Test Item : Access Control Unit
Model No. : CapXL with PCAP Display
Serial No. : 3919N1738
Mode : Transmit at 902.23MHz
Test Specification : FCC-15.247, RSS-247 Peak EIRP
Date : January 14, 2020
Test Distance : 3 meters
Notes :

Freq. (MHz)	Ant Pol	Wide BW Meter Reading (dBuV)	Matched Sig. Gen. Reading (dBm)	Equivalent Antenna Gain (dB)	Cable Loss (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
902.23	H	78.3	8.6	2.2	1.6	9.1	30.0	-20.9
902.23	V	82.3	15.6	2.2	1.6	16.1	30.0	-13.9

$EIRP(dBm) = Sig. Gen. Reading (dBm) + Antenna Gain (dB) - Cable Loss (dB)$



Manufacturer : Chamberlain Group, Inc.
Test Item : Access Control Unit
Model No. : CapXL with PCAP Display
Serial No. : 3919N1738
Mode : Transmit at 914.73MHz
Test Specification : FCC-15.247, RSS-247 Peak EIRP
Date : January 14, 2020
Test Distance : 3 meters
Notes :

Freq. (MHz)	Ant Pol	Wide BW Meter Reading (dBuV)	Matched Sig. Gen. Reading (dBm)	Equivalent Antenna Gain (dB)	Cable Loss (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
914.73	H	79.4	9.1	2.2	1.6	9.6	30.0	-20.4
914.73	V	81.0	13.6	2.2	1.6	14.1	30.0	-15.9

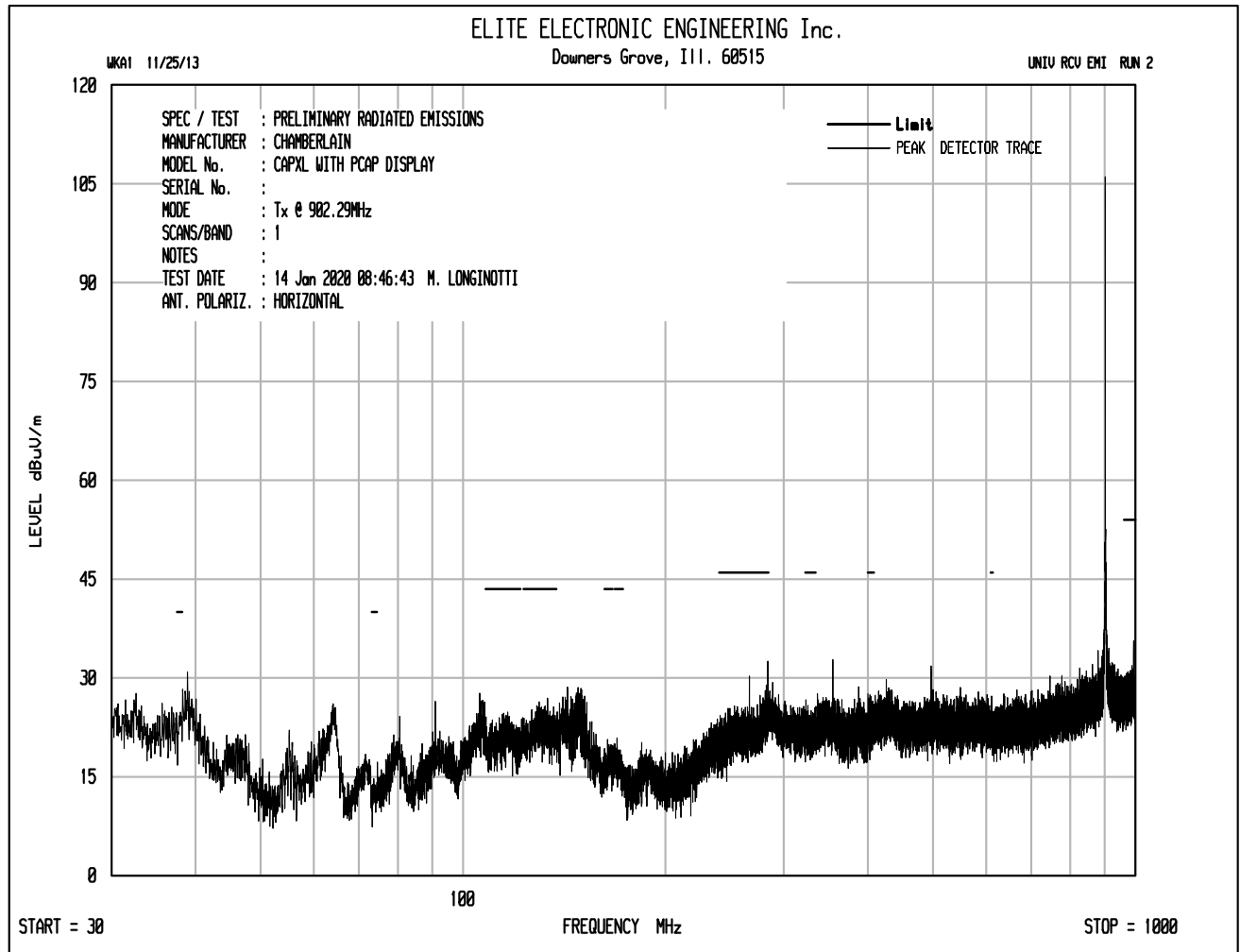
$$\text{EIRP(dBm)} = \text{Sig. Gen. Reading (dBm)} + \text{Antenna Gain (dB)} - \text{Cable Loss (dB)}$$

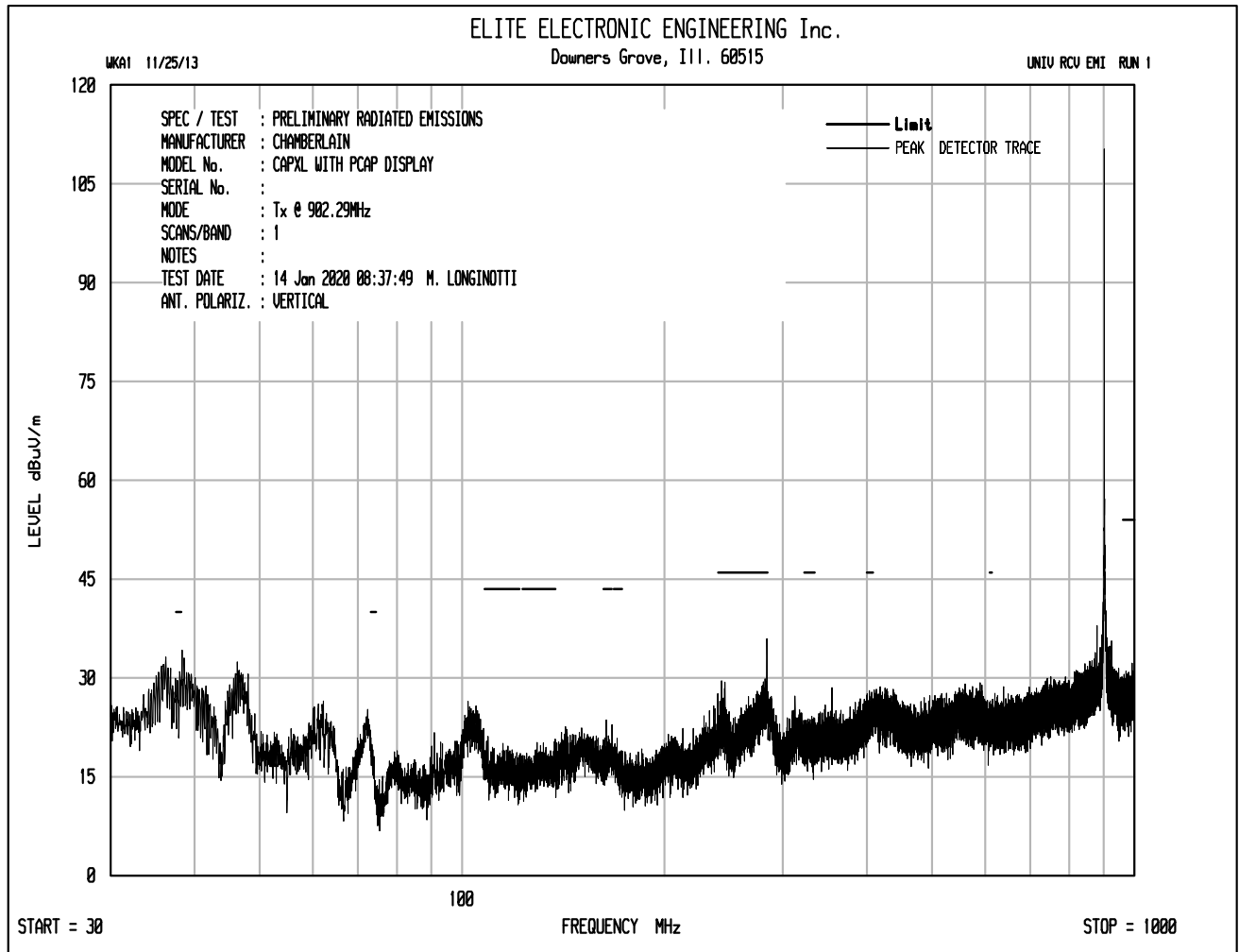


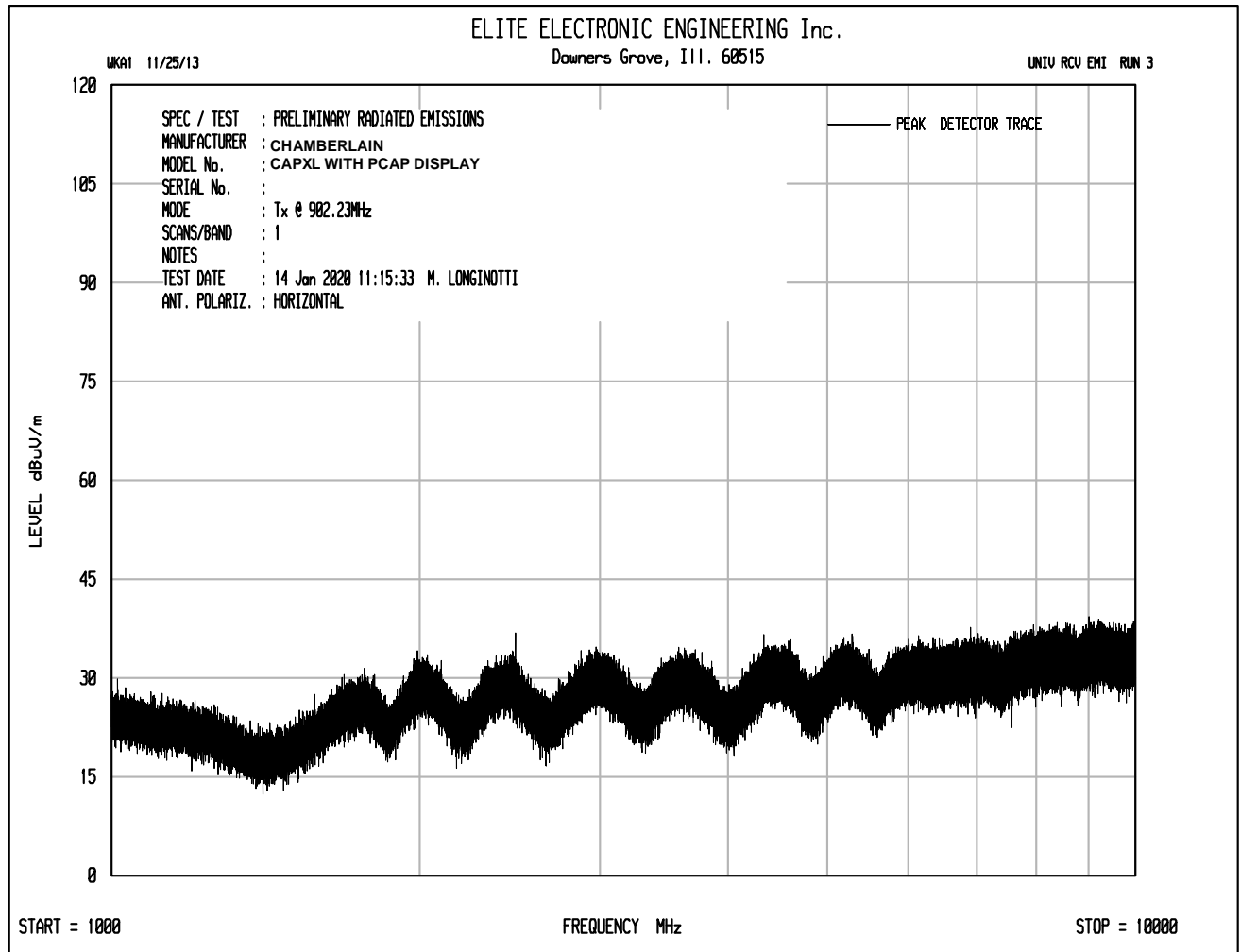
Manufacturer : Chamberlain Group, Inc.
Test Item : Access Control Unit
Model No. : CapXL with PCAP Display
Serial No. : 3919N1738
Mode : Transmit at 926.74MHz
Test Specification : FCC-15.247, RSS-247 Peak EIRP
Date : January 14, 2020
Test Distance : 3 meters
Notes :

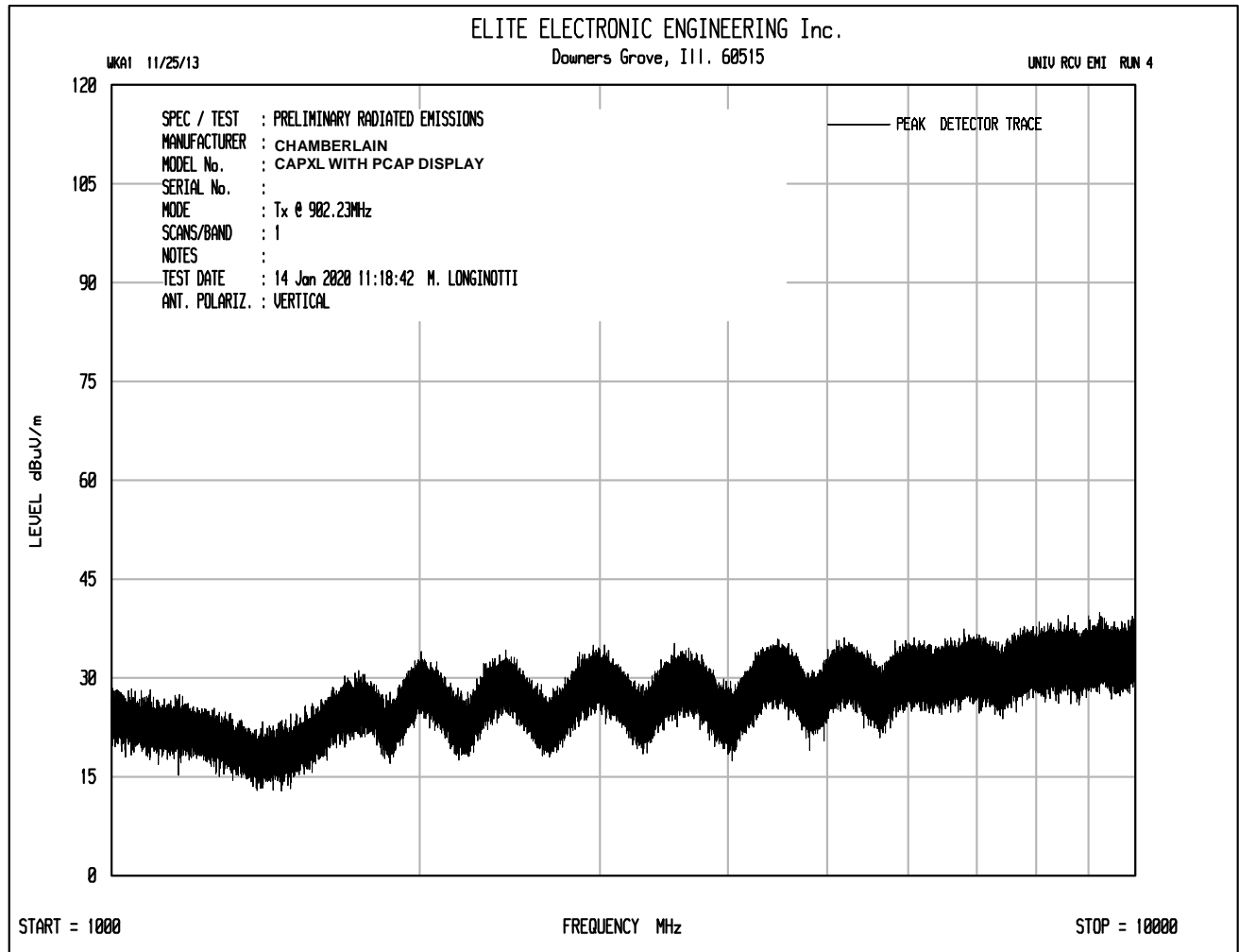
Freq. (MHz)	Ant Pol	Wide BW Meter Reading (dBuV)	Matched Sig. Gen. Reading (dBm)	Equivalent Antenna Gain (dB)	Cable Loss (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
926.74	H	78.3	8.3	2.2	1.7	8.8	30.0	-21.2
926.74	V	80.4	13.2	2.2	1.7	13.7	30.0	-16.3

$EIRP(dBm) = Sig. Gen. Reading (dBm) + Antenna Gain (dB) - Cable Loss (dB)$









Manufacturer : Chamberlain Group, Inc.
 Test Item : Access Control Unit
 Model No. : CapXL with PCAP Display
 Serial No. : 3919N1738
 Mode : Transmit at 902.23MHz
 Test Specification : FCC-15.247, RSS-247 Peak Radiated Emissions in Restricted Bands
 Date : January 14, 2020
 Test Distance : 3 meters
 Notes : Peak Detector with 1MHz Resolution Bandwidth

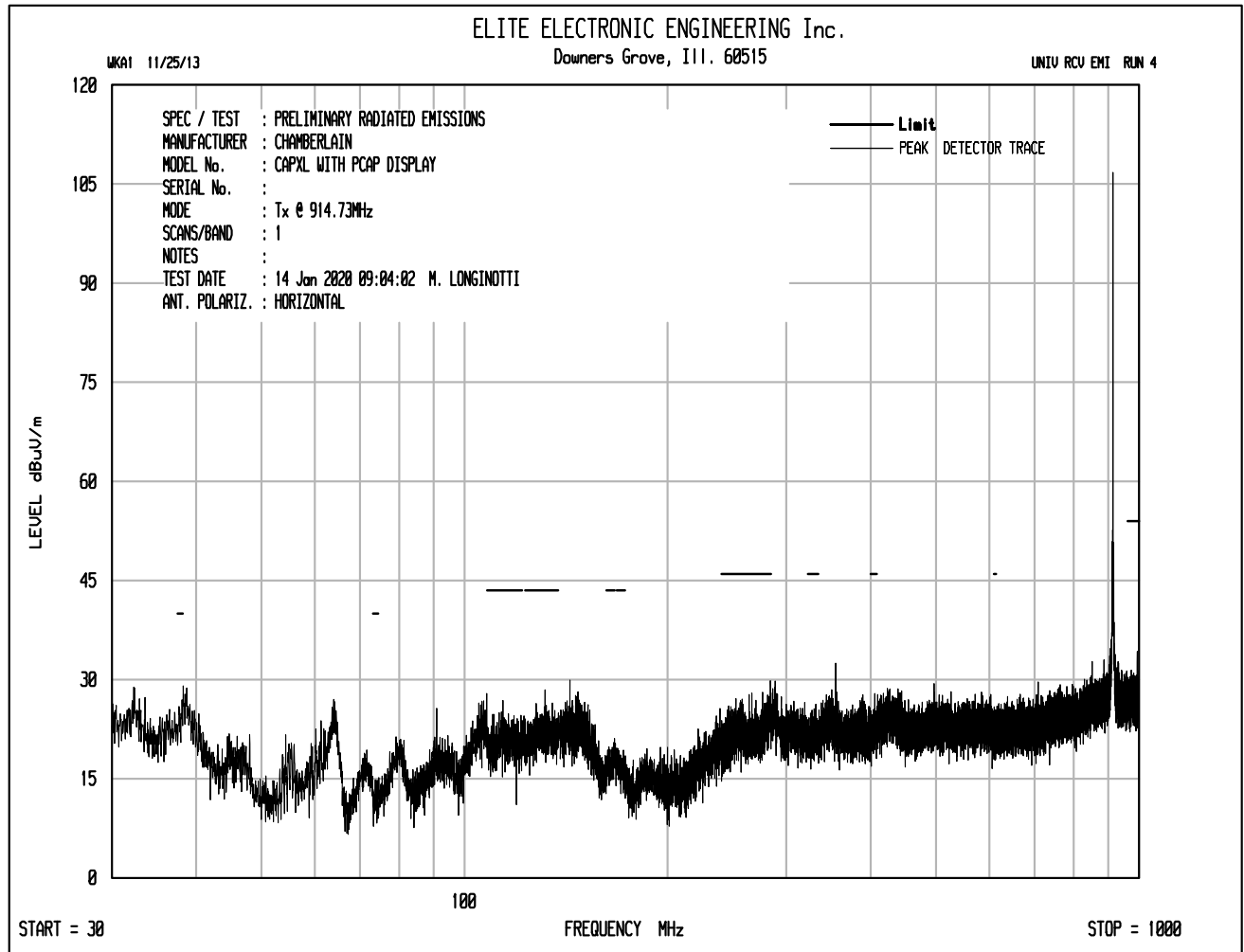
Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	Peak Total dBuV/m at 3m	Peak Total uV/m at 3 m	Peak Limit uV/m at 3 m	Margin (dB)
2706.69	H	47.7	Ambient	3.7	32.4	-40.4	43.4	147.6	5000.0	-30.6
2706.69	V	47.4	Ambient	3.7	32.4	-40.4	43.1	142.6	5000.0	-30.9
3608.92	H	53.4	Ambient	4.3	33.2	-40.3	50.5	336.2	5000.0	-23.4
3608.92	V	52.2	Ambient	4.3	33.2	-40.3	49.3	292.8	5000.0	-24.6
4511.15	H	51.7	Ambient	4.7	34.3	-40.1	50.6	338.3	5000.0	-23.4
4511.15	V	52.1	Ambient	4.7	34.3	-40.1	51.0	354.2	5000.0	-23.0
5413.38	H	50.6	Ambient	5.1	34.7	-40.2	50.1	321.7	5000.0	-23.8
5413.38	V	50.0	Ambient	5.1	34.7	-40.2	49.5	300.2	5000.0	-24.4

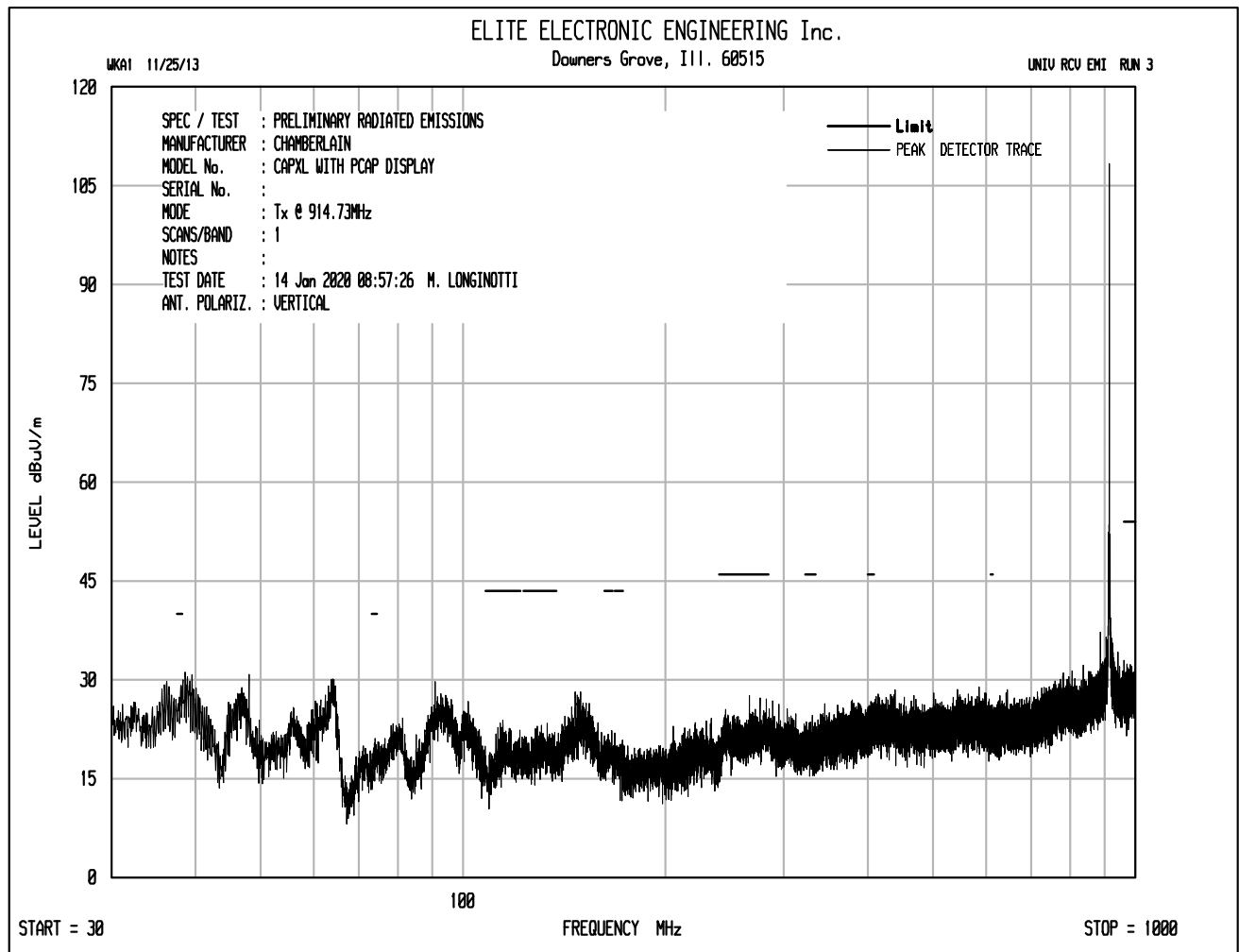
Total (dBuV/m) = Meter Reading + CBL FAC + Ant Fac + Pre Amp

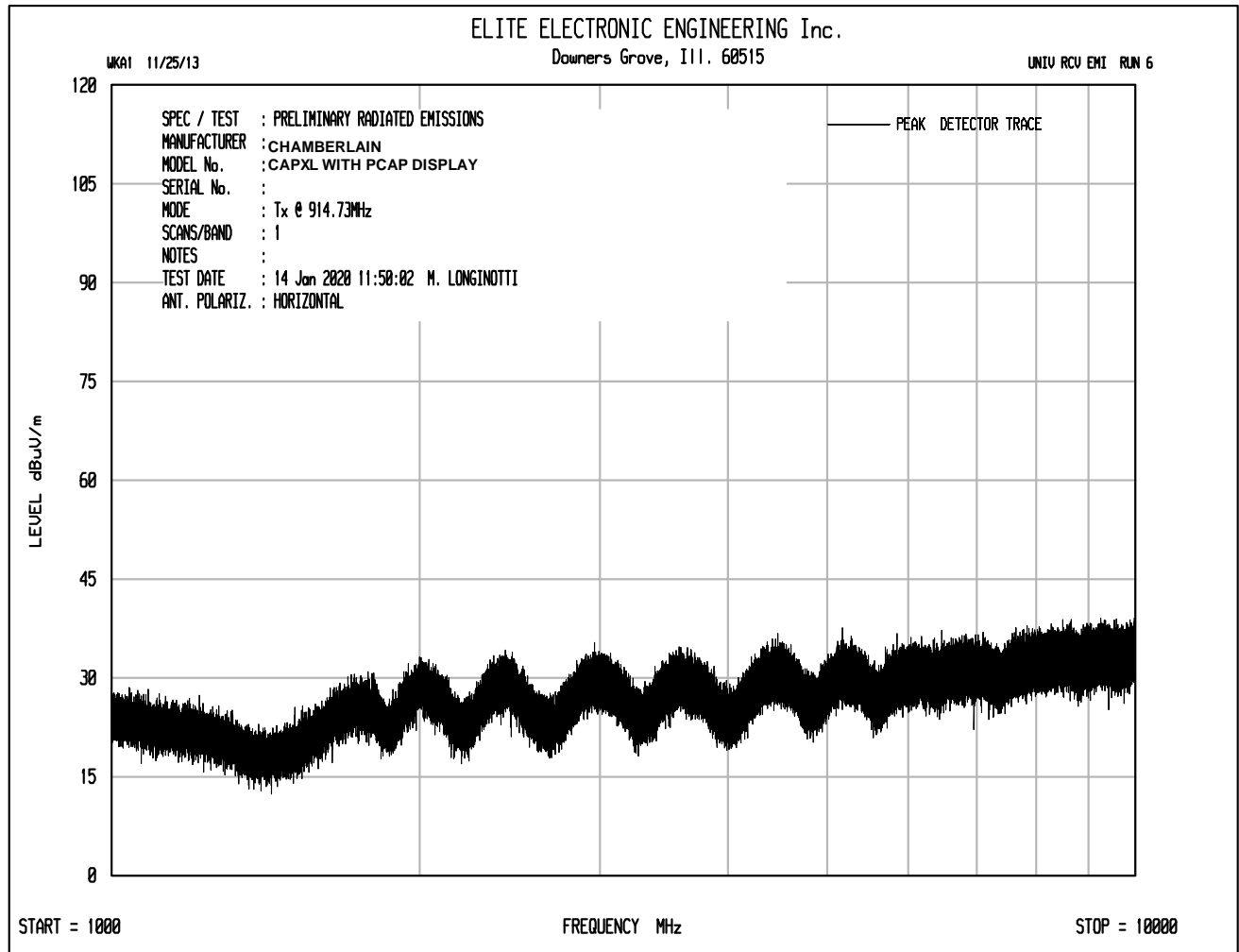
Manufacturer : Chamberlain Group, Inc.
 Test Item : Access Control Unit
 Model No. : CapXL with PCAP Display
 Serial No. : 3919N1738
 Mode : Transmit at 902.23MHz
 Test Specification : FCC-15.247, RSS-247 Average Radiated Emissions in Restricted Bands
 Date : January 14, 2020
 Test Distance : 3 meters
 Notes : Average Detector with 1MHz Resolution Bandwidth

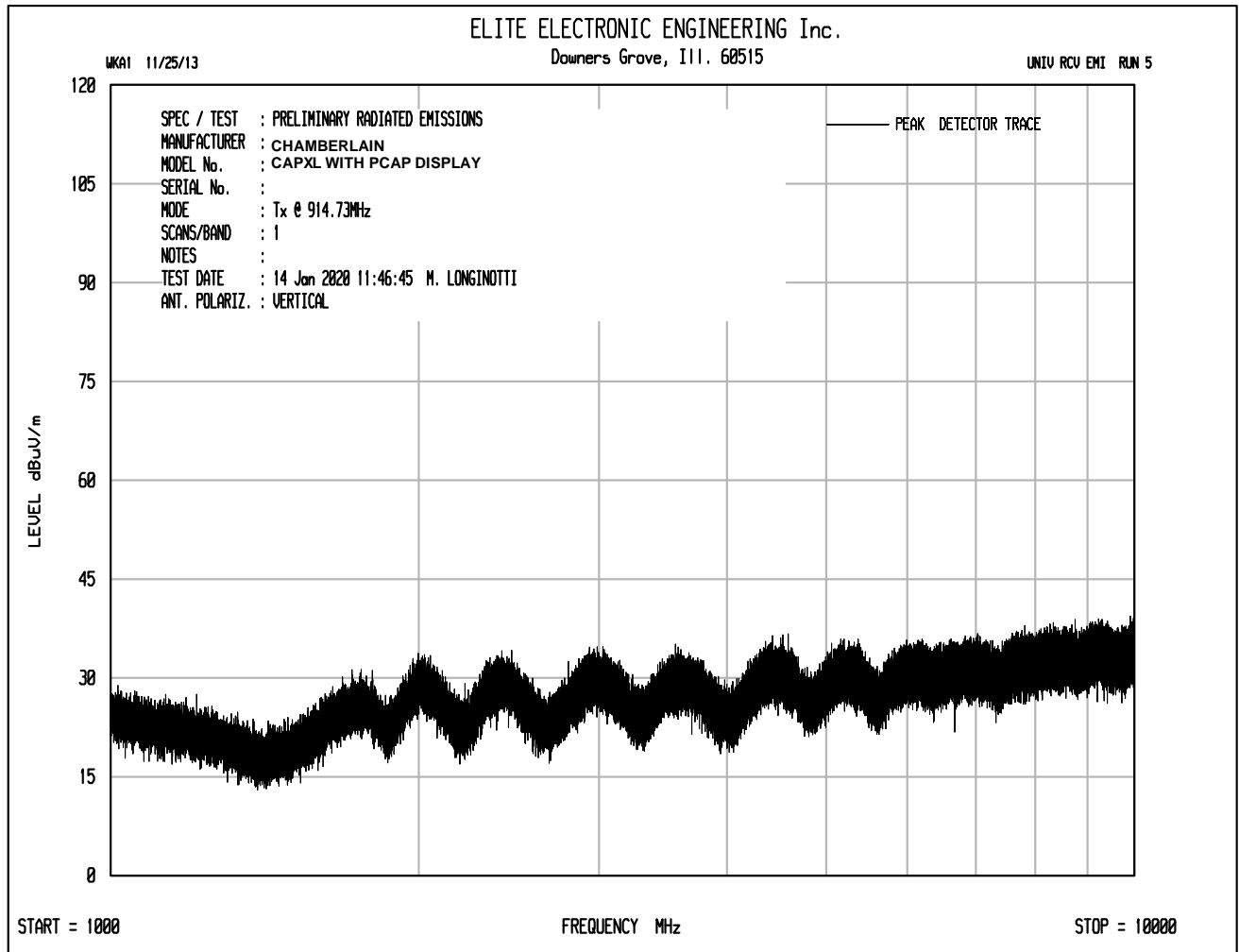
Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	Duty Cycle (dB)	Average Total dBuV/m at 3m	Average Total uV/m at 3 m	Average Limit uV/m at 3 m	Margin (dB)
2706.69	H	47.70	Ambient	3.7	32.4	-40.4	-37.7	5.7	1.9	500.0	-48.2
2706.69	V	47.4	Ambient	3.7	32.4	-40.4	-37.7	5.4	1.9	500.0	-48.5
3608.92	H	54.4	Ambient	4.3	33.2	-40.3	-37.7	13.9	4.9	500.0	-40.1
3608.92	V	52.2	Ambient	4.3	33.2	-40.3	-37.7	11.7	3.8	500.0	-42.3
4511.15	H	51.7	Ambient	4.7	34.3	-40.1	-37.7	12.9	4.4	500.0	-41.0
4511.15	V	52.1	Ambient	4.7	34.3	-40.1	-37.7	13.3	4.6	500.0	-40.6
5413.38	H	50.6	Ambient	5.1	34.7	-40.2	-37.7	12.5	4.2	500.0	-41.5
5413.38	V	50.6	Ambient	5.1	34.7	-40.2	-37.7	12.5	4.2	500.0	-41.5

Total (dBuV/m) = Meter Reading + CBL FAC + Ant Fac + Pre Amp + Duty Cycle









Manufacturer : Chamberlain Group, Inc.
 Test Item : Access Control Unit
 Model No. : CapXL with PCAP Display
 Serial No. : 3919N1738
 Mode : Transmit at 914.73MHz
 Test Specification : FCC-15.247, RSS-247 Peak Radiated Emissions in Restricted Bands
 Date : January 14, 2020
 Test Distance : 3 meters
 Notes : Peak Detector with 1MHz Resolution Bandwidth

Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	Peak Total dBuV/m at 3m	Peak Total uV/m at 3 m	Peak Limit uV/m at 3 m	Margin (dB)
2744.19	H	48.8	Ambient	3.7	32.5	-40.4	44.6	170.7	5000.0	-29.3
2744.19	V	49.1	Ambient	3.7	32.5	-40.4	44.9	176.7	5000.0	-29.0
3658.92	H	51.7	Ambient	4.3	33.2	-40.3	48.9	279.7	5000.0	-25.0
3658.92	V	52.0	Ambient	4.3	33.2	-40.3	49.2	289.5	5000.0	-24.7
4573.65	H	50.3	Ambient	4.7	34.3	-40.1	49.2	289.8	5000.0	-24.7
4573.65	V	50.7	Ambient	4.7	34.3	-40.1	49.6	303.5	5000.0	-24.3

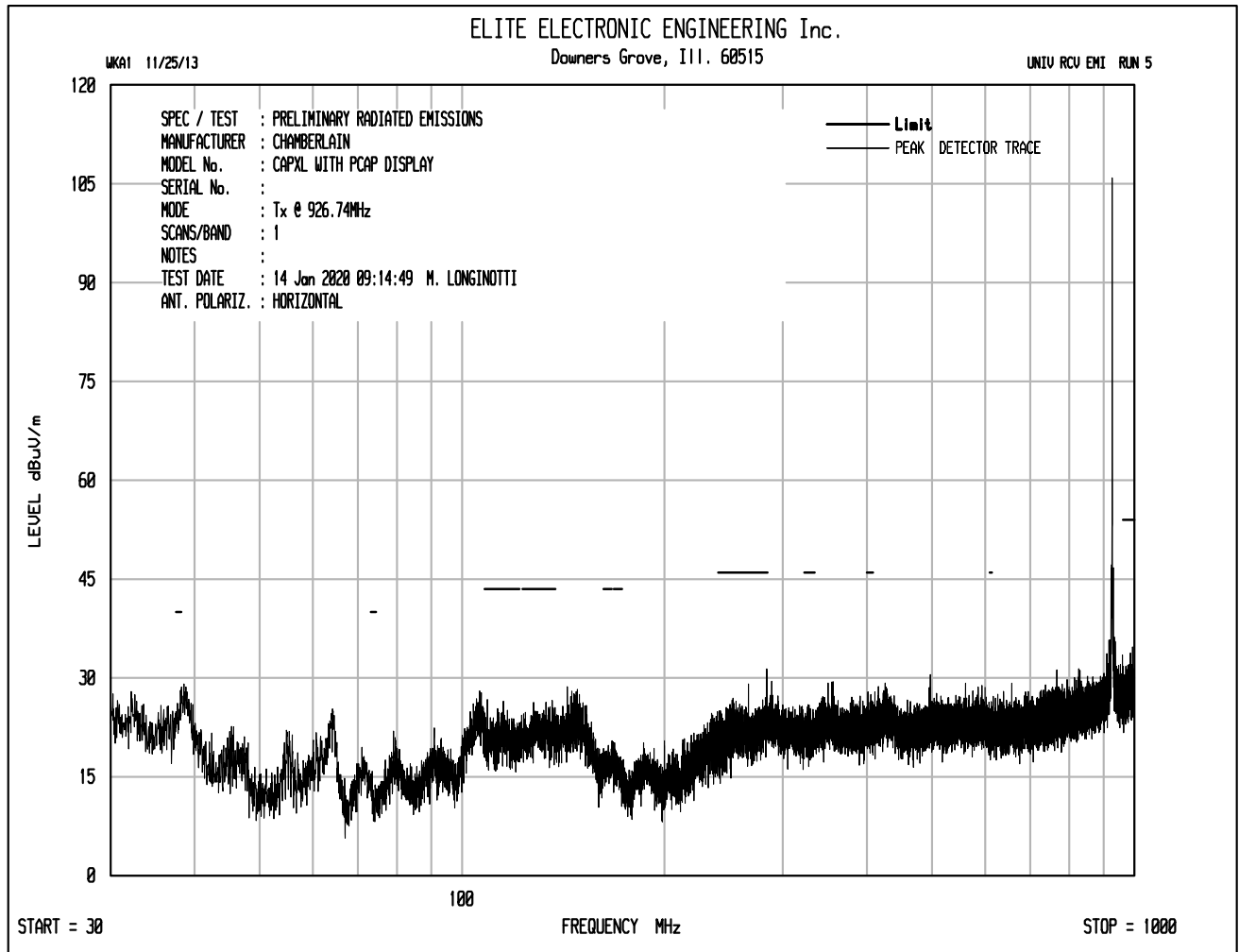
Total (dBuV/m) = Meter Reading + CBL FAC + Ant Fac + Pre Amp

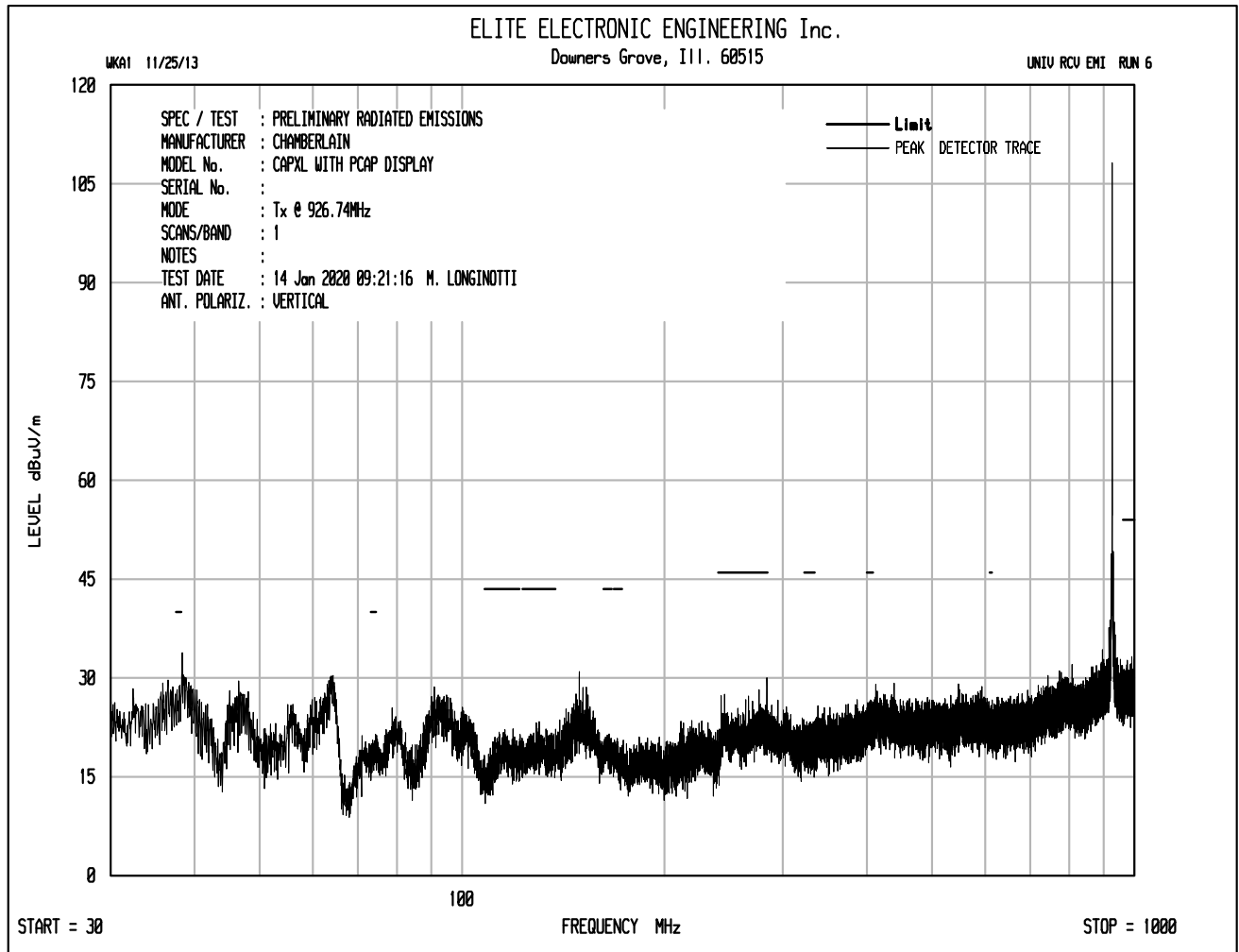


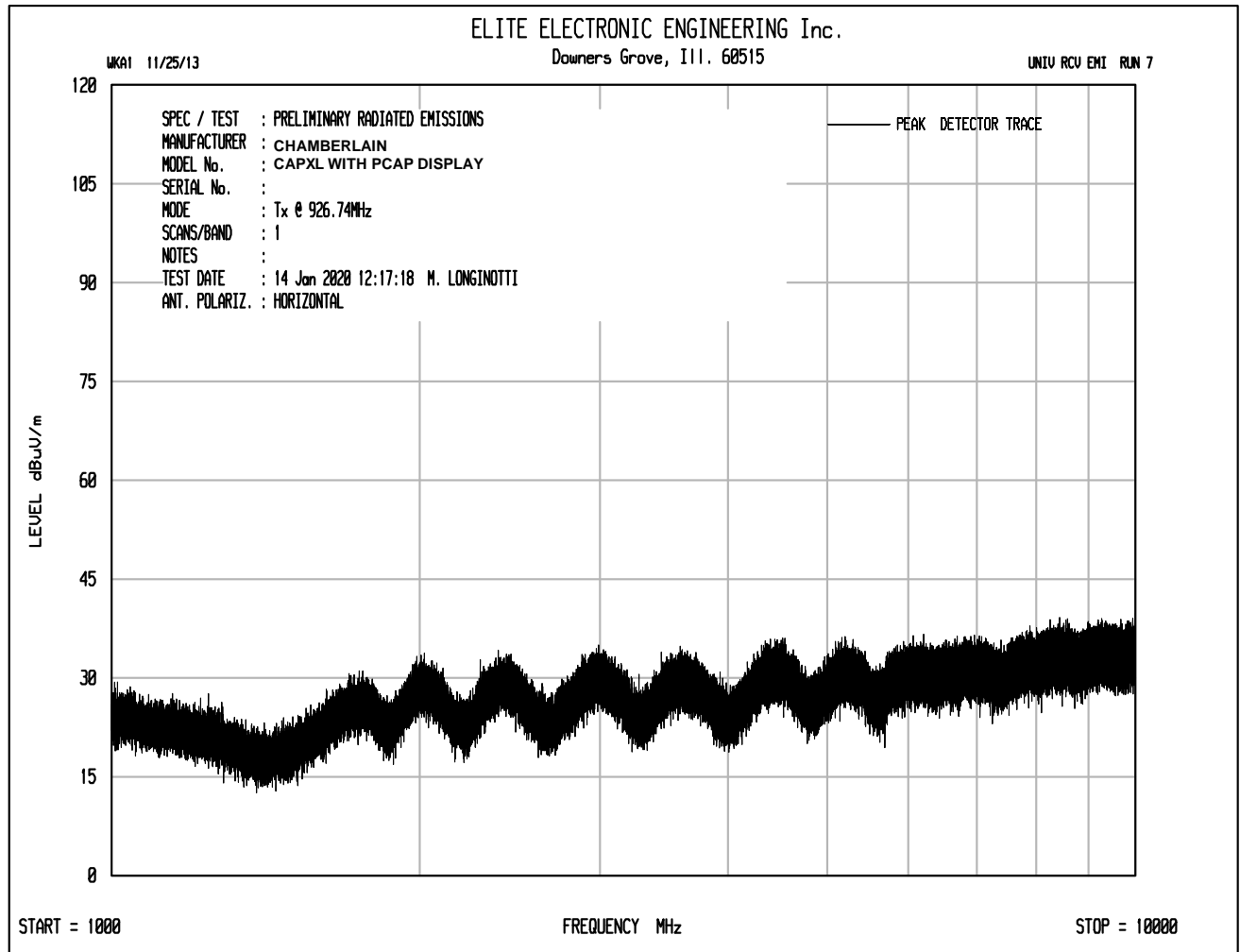
Manufacturer : Chamberlain Group, Inc.
Test Item : Access Control Unit
Model No. : CapXL with PCAP Display
Serial No. : 3919N1738
Mode : Transmit at 914.73MHz
Test Specification : FCC-15.247, RSS-247 Average Radiated Emissions in Restricted Bands
Date : January 14, 2020
Test Distance : 3 meters
Notes : Average Detector with 1MHz Resolution Bandwidth

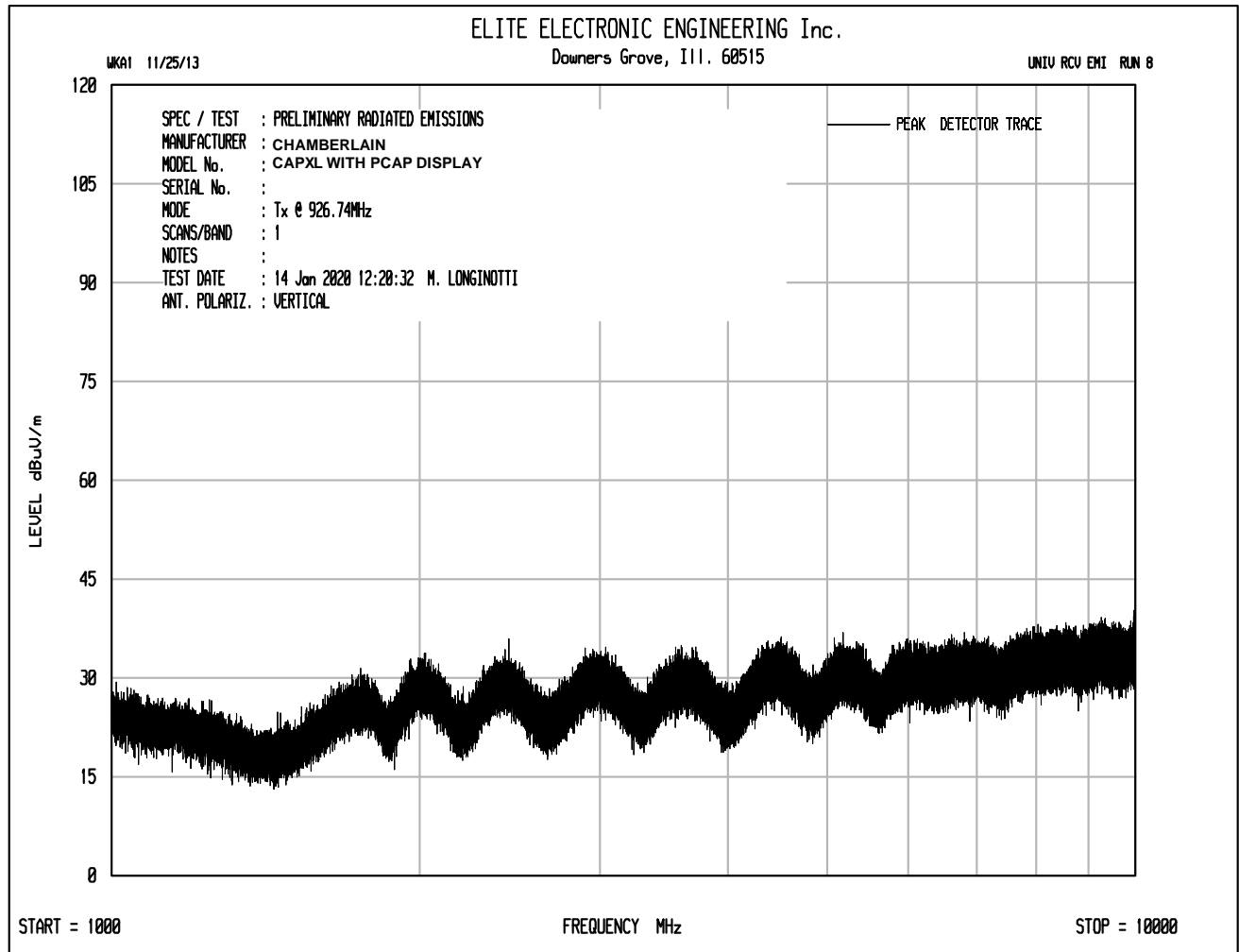
Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	Duty Cycle (dB)	Average Total dBuV/m at 3m	Average Total uV/m at 3 m	Average Limit uV/m at 3 m	Margin (dB)
2744.19	H	48.80	Ambient	3.7	32.5	-40.4	-37.7	7.0	2.2	500.0	-47.0
2744.19	V	49.1	Ambient	3.7	32.5	-40.4	-37.7	7.3	2.3	500.0	-46.7
3658.92	H	51.7	Ambient	4.3	33.2	-40.3	-37.7	11.3	3.7	500.0	-42.7
3658.92	V	52.0	Ambient	4.3	33.2	-40.3	-37.7	11.6	3.8	500.0	-42.4
4573.65	H	50.3	Ambient	4.7	34.3	-40.1	-37.7	11.6	3.8	500.0	-42.4
4573.65	V	50.7	Ambient	4.7	34.3	-40.1	-37.7	12.0	4.0	500.0	-42.0

Total (dBuV/m) = Meter Reading + CBL FAC + Ant Fac + Pre Amp + Duty Cycle









Manufacturer : Chamberlain Group, Inc.
 Test Item : Access Control Unit
 Model No. : CapXL with PCAP Display
 Serial No. : 3919N1738
 Mode : Transmit at 926.74MHz
 Test Specification : FCC-15.247, RSS-247 Peak Radiated Emissions in Restricted Bands
 Date : January 14, 2020
 Test Distance : 3 meters
 Notes : Peak Detector with 1MHz Resolution Bandwidth

Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	Peak Total dBuV/m at 3m	Peak Total uV/m at 3 m	Peak Limit uV/m at 3 m	Margin (dB)
2780.22	H	49.7	Ambient	3.7	32.5	-40.4	45.5	189.0	5000.0	-28.4
2780.22	V	49.7	Ambient	3.7	32.5	-40.4	45.5	189.0	5000.0	-28.4
3706.96	H	52.2	Ambient	4.3	33.2	-40.2	49.5	298.9	5000.0	-24.5
3706.96	V	51.4	Ambient	4.3	33.2	-40.2	48.7	272.6	5000.0	-25.3
4633.70	H	49.9	Ambient	4.8	34.3	-40.2	48.8	276.3	5000.0	-25.2
4633.70	V	50.0	Ambient	4.8	34.3	-40.2	48.9	279.5	5000.0	-25.1

Total (dBuV/m) = Meter Reading + CBL FAC + Ant Fac + Pre Amp

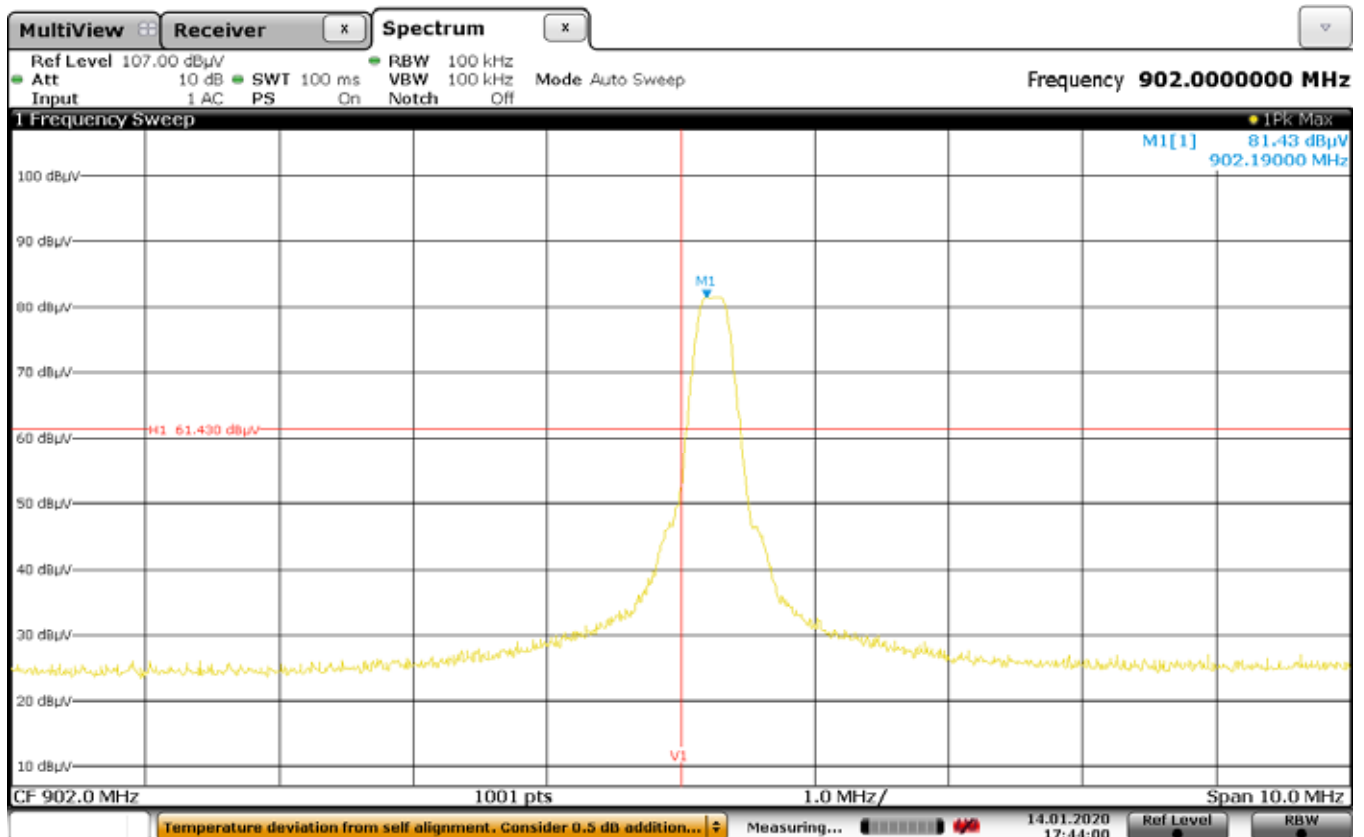


Manufacturer : Chamberlain Group, Inc.
Test Item : Access Control Unit
Model No. : CapXL with PCAP Display
Serial No. : 3919N1738
Mode : Transmit at 926.74MHz
Test Specification : FCC-15.247, RSS-247 Average Radiated Emissions in Restricted Bands
Date : January 14, 2020
Test Distance : 3 meters
Notes : Average Detector with 1MHz Resolution Bandwidth

Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	Duty Cycle (dB)	Average Total dBuV/m at 3m	Average Total uV/m at 3 m	Average Limit uV/m at 3 m	Margin (dB)
2780.22	H	49.70	Ambient	3.7	32.5	-40.4	-37.7	7.9	2.5	500.0	-46.1
2780.22	V	47.7	Ambient	3.7	32.5	-40.4	-37.7	5.9	2.0	500.0	-48.1
3706.96	H	52.2	Ambient	4.3	33.2	-40.2	-37.7	11.9	3.9	500.0	-42.1
3706.96	V	51.4	Ambient	4.3	33.2	-40.2	-37.7	11.1	3.6	500.0	-42.9
4633.70	H	49.9	Ambient	4.8	34.3	-40.2	-37.7	11.2	3.6	500.0	-42.8
4633.70	V	50.0	Ambient	4.8	34.3	-40.2	-37.7	11.3	3.7	500.0	-42.7

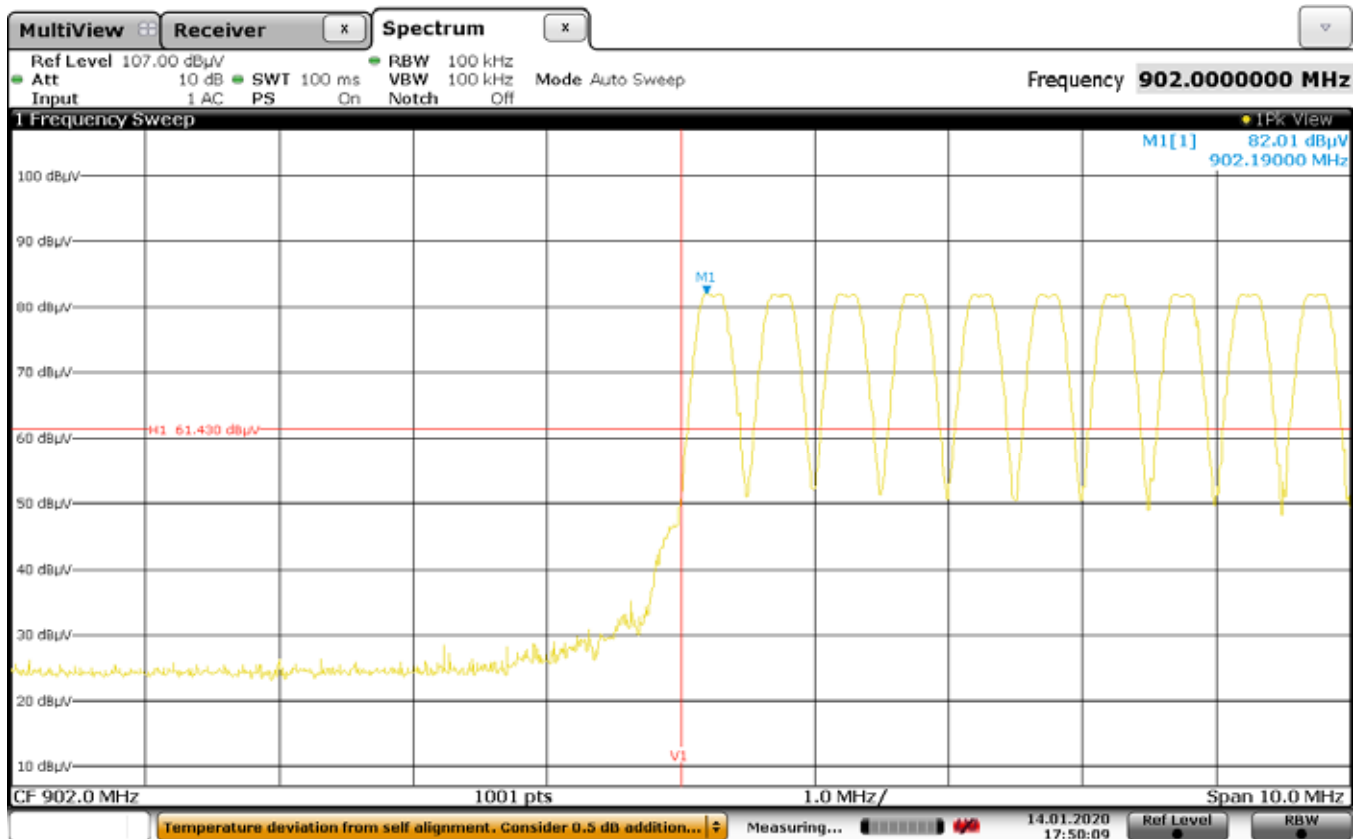
Total (dBuV/m) = Meter Reading + CBL FAC + Ant Fac + Pre Amp + Duty Cycle

Manufacturer : Chamberlain Group, Inc.
 Test Item : Access Control Unit
 Model No. : CapXL with PCAP Display
 Serial No. : 3919N1738
 Mode : Transmit at 902.23MHz
 Test Specification : FCC-15.247, RSS-247 Low Band Edge Peak Radiated Emissions
 Date : January 14, 2020
 Test Distance : 3 meters
 Notes :



Date: 14 JAN 2020 17:44:00

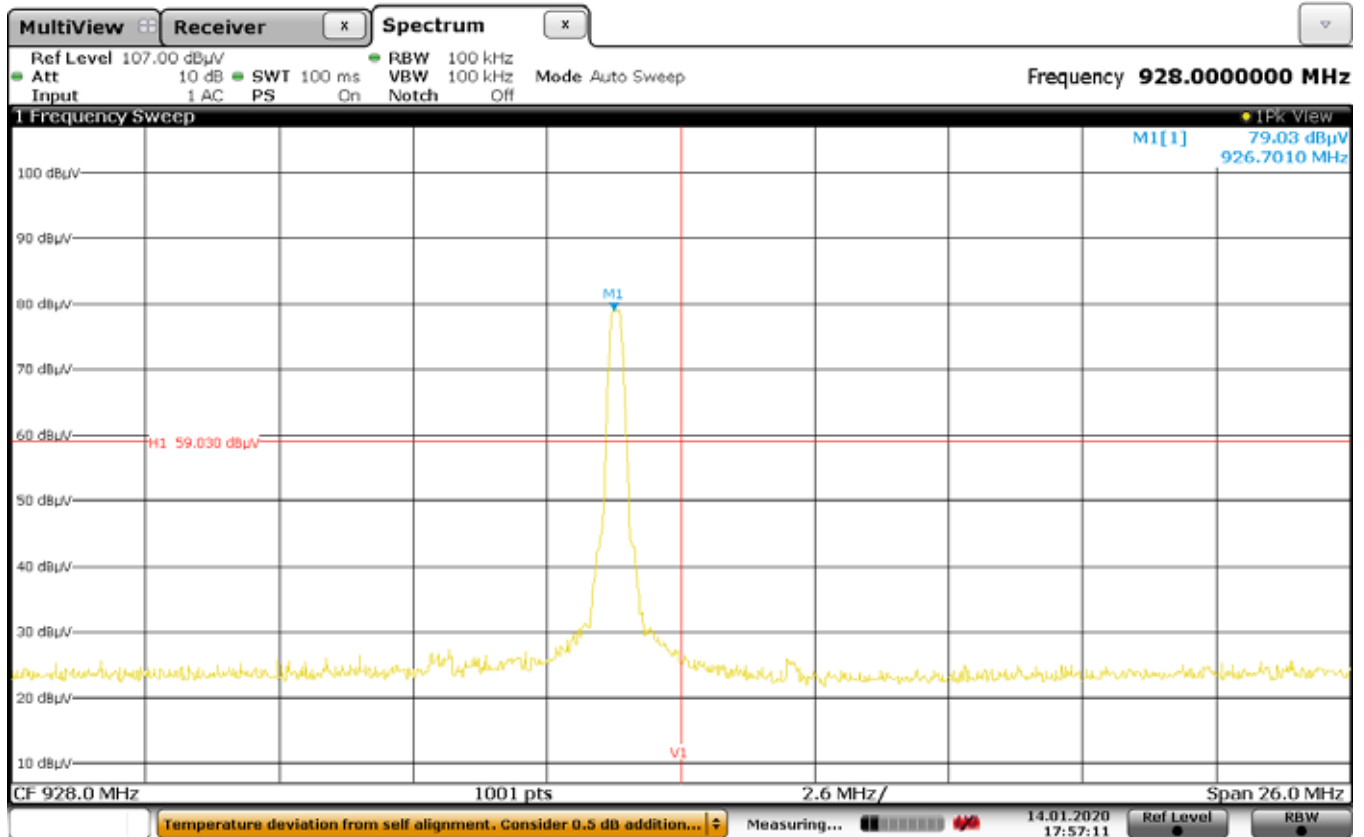
Manufacturer : Chamberlain Group, Inc.
 Test Item : Access Control Unit
 Model No. : CapXL with PCAP Display
 Serial No. : 3919N1738
 Mode : Hopping
 Test Specification : FCC-15.247, RSS-247 Low Band Edge Peak Radiated Emissions
 Date : January 14, 2020
 Test Distance : 3 meters
 Notes :



Date: 14 JAN 2020 17:50:10

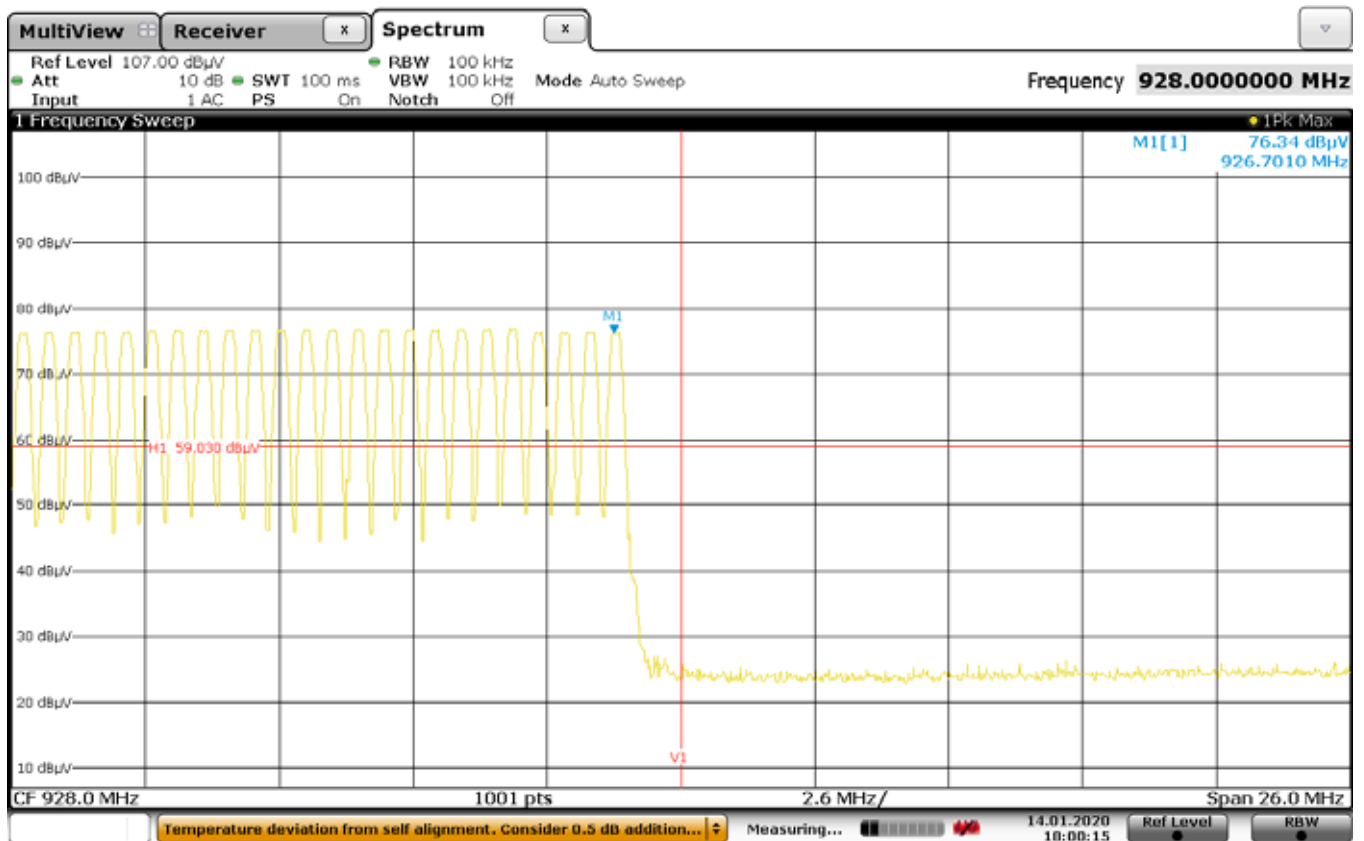


Manufacturer : Chamberlain Group, Inc.
Test Item : Access Control Unit
Model No. : CapXL with PCAP Display
Serial No. : 3919N1738
Mode : Transmit at 926.74MHz
Test Specification : FCC-15.247, RSS-247 Low Band Edge Peak Radiated Emissions
Date : January 14, 2020
Test Distance : 3 meters
Notes :



Date: 14 JAN 2020 17:57:11

Manufacturer	: Chamberlain Group, Inc.
Test Item	: Access Control Unit
Model No.	: CapXL with PCAP Display
Serial No.	: 3919N1738
Mode	: Hopping
Test Specification	: FCC-15.247, RSS-247 Low Band Edge Peak Radiated Emissions
Date	: January 14, 2020
Test Distance	: 3 meters
Notes	:



Date: 14 JAN 2020 18:00:16