Application

For

Title 47 USC Part 2, Subpart J, Paragraph 2.907, 2.1043 Equipment Authorization of Certification for an Intentional Radiator per Part 15, Subpart C, Paragraphs 15.207, 15.209 and 15.249

And

Industry Canada RSS-Gen, Issue 5 and RSS-210, Issue 10

For

Cattron North America, Inc.

CANplus™
Model: CP1000BLE
FCC ID: CN2-CP1000BLE
IC: 1007A-CP1000BLE

UST Project: 20-0304
Issue Date: December 9, 2020

Total Pages in This Report: 34

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I certify that I am authorized to sign for the Test Agency and that all of the statements in this report and in the Exhibits attached hereto are true and correct to the best of my knowledge and belief:

US TECH (Agent Responsible For Test):

By: Alan Ghasiani

Name: 

Title: Consulting Engineer – President

Date: December 9, 2020

TESTING
NVLAP LAB CODE 200162-0

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MEASUREMENT TECHNICAL REPORT

COMPANY NAME: Cattron North America Inc.
655 N. River Rd NW. Suite A
Warren OH 44483-2254
MODEL: CP1000BLE
FCC ID: CN2-CP1000BLE
IC: 1007A-CP1000BLE
DATE: December 9, 2020

This report concerns (check one): Original [X] Class II Change []

Equipment type: Low Power 2.4 GHz Radio transceiver

Technical:
Technology: Bluetooth LE
Frequency of Operation: 2402-2480 MHz
Output Power: 94.74 dBuV/m @ 3 meter
Type of Modulation: GFSK
Data/Bit Rate: 1Mbps
Antenna Gain: +3.0 dBi
Software used to program EUT: nRF Connect v3.6.0/ Direct Test Mode v1.1.5
EUT firmware: CP1000_r465-12a91ed_DEBUG
Power setting: +6.0 dBm

Report prepared by:
US Tech
3505 Francis Circle
Alpharetta, GA30004

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1 General Information

1.1 Purpose of this Report

This report is prepared as a means of conveying test results and information concerning the suitability of this exact product for public distribution according to the FCC Rules and Regulations Part 15, Section 249.

1.2 Characterization of Test Sample

The sample used for testing was received by US Tech on November 6, 2020 in good operating condition.

1.3 Product Description

The Equipment under Test (EUT) is the Cattron North America Inc. CANplus™ model CP1000BLE. The EUT is an advance engine control panel with auto-start and manual operation that provides complete engine control, monitoring and protection for electronically governed engines. The EUT has the following wireless technology features, BTLE, Cellular and GPS. The Cellular module used within the EUT is pre-certified under the following identification numbers: FCC ID: XMR2017078696, IC: 10224A-201709BG96. The Cellular module is being used per its grant restrictions with approved antenna type and gain. The BTLE radio module is being evaluated in this test report for certification as a Part 15.249 unlicensed transmitter device.

1.4 Configuration of Tested System

The Test Sample was tested per ANSI C63.4:2014, Methods of Measurement of Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz for FCC subpart A Digital equipment Verification requirements and per ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices for FCC subpart C Intentional Radiators.

A list of EUT and Peripherals is found in Table 1. A block diagram of the tested system is shown in Figure 1. Test configuration photographs are provided in separate Appendices.

1.5 Test Facility

Testing was performed at US Tech's measurement facility at 3505 Francis Circle, Alpharetta, GA 30004. This site has been fully described and registered with the FCC. Its designation number is US5301. Additionally this site has also been fully described and submitted to Industry Canada (ISED), and has been approved under file number 9900A-1.

1.6 Related Submittals

The EUT is subject to the following FCC authorizations:

a) Certification under section 15.207 and 15.209 as a transmitter.
b) SDoC under 15.101 as a digital device.

The SDoC requirement (Parts 15.107 and 15.109) has been met and is reported under separate cover.

Table 1. EUT and Peripherals

PERIPHERAL MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	FCC ID/IC	CABLES P/D
CANplus™ (EUT)	CP1000BLE	Engineering Sample	CN2-CP1000BLE/ 1007A-CP1000BLE	P/D 3 m x 2
Cattron Test Box	TEST BOX	Engineering Sample	None	P/D 3 m x 2
Antenna See antenna details	--	--	--	--

U= Unshielded S= Shielded P= Power D= Data

2 Tests and Measurements

2.1 Test Equipment

The table below lists test equipment used to evaluate this product. Model numbers, serial numbers and their calibration status are indicated.

Table 2. Test Instruments

TEST INSTRUMENT	MODEL NUMBER	MANUFACTURER	SERIAL NUMBER	CALIBRATION DUE DATE
SPECTRUM ANALYZER	E4407B	AGILENT	US41442935	9/02/2022 2yr cal
RF PREAMP 100 kHz to 1.3 GHz	8447D	HEWLETT-PACKARD	1937A02980	5/13/2021
PREAMP 1.0 GHz to 26.0 GHz	8449B	HEWLETT-PACKARD	3008A00480	5/13/2021
LOOP ANTENNA	6502	ETS LINDGREN	9810-3246	4/06/2022 2yr cal
BICONICAL ANTENNA	3110B	EMCO	9306-1708	6/27/2021 2yr cal
LOG PERIODIC ANTENNA	3146	EMCO	9305-3600	2/01/2021 2yr cal
HORN ANTENNA	3115	EMCO	9107-3723	11/28/2020 2 yr cal
HIGH PASS FILTER	H3R020G2	MICROWAVE CIRCUITS	001DC9528	5/11/2021

Note: The calibration interval of the above test instruments are 12 months unless stated otherwise and all calibrations are traceable to NIST/USA.

2.2 Modifications to EUT Hardware

No physical modifications were made by US Tech in order to bring the EUT into compliance with FCC Part 15, Subpart C Intentional Radiator Limits for the transmitter portion of the EUT or the Subpart B Unintentional Radiator Limits (Receiver and Digital Device) Requirements.

2.3 Number of Measurements for Intentional Radiators (15.31(m))

Measurements of intentional radiators or receivers shall be performed and reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in Table 3 below.

Table 3. Number of Test Frequencies for Intentional Radiators

Frequency Range over which the device operates	Number of Frequencies	Location in the Range of operation
1 MHz or less	1	Middle
1 to 10 MHz	2	1 near the top 1 near the bottom
Greater than 10 MHz	3	1 near top 1 near middle 1 near bottom

Because the EUT operates at 2402 MHz to 2480 MHz, 3 test frequencies were used.

2.4 Frequency Range of Radiated Measurements (Part 15.33)

2.4.1 Intentional Radiator

The spectrum shall be investigated for the intentional radiator from the lowest RF signal generated in the EUT, without going below 9 kHz to the 10th harmonic of the highest fundamental frequency generated or 40 GHz, whichever is the lowest.

2.5 Measurement Detector Function and Bandwidth (CFR 15.35)

The radiated and conducted emissions limits shown herein are based on the parameters outlined following.

2.5.1 Detector Function and Associated Bandwidth

On frequencies below 1000 MHz, the limits herein are based upon measurement equipment employing a CISPR Quasi-peak detector function and related measurement bandwidths (i.e. 9 kHz from 150 kHz to 30 MHz and 120 kHz from 30 MHz to 1000 MHz). Alternatively, measurements may be made with equipment employing a peak detector function as long as the same bandwidths specified for the quasi-peak device are used.

2.5.2 Corresponding Peak and Average Requirements

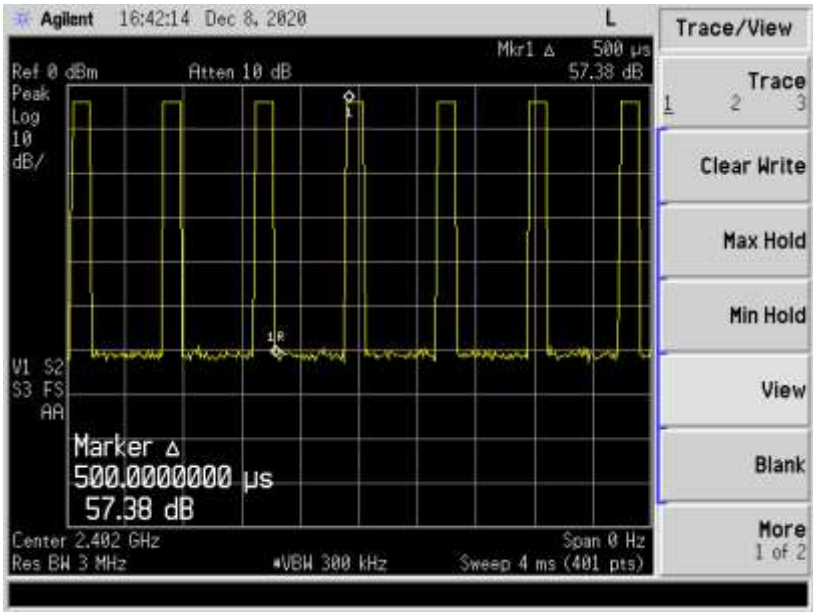
Above 1000 MHz, radiated limits are based on measuring instrumentation employing an average detector function. When average radiated emissions are specified there is also a corresponding Peak requirement, as measured using a peak detector, of 20 dB greater than the average limit. For all measurements above 1000 MHz the Resolution Bandwidth shall be at least 1 MHz.

2.5.3 Pulsed Transmitter Averaging

When the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.

2.6 Transmitter Duty Cycle (CFR 15.35 (c))

When the radiated emissions limit is expressed as an average value, and the transmitter is pulsed, the measured field strength shall be determined by applying a Duty Cycle Correction Factor based upon dividing the total ON time during the first 100 ms period by 100 ms (or by the period if less than 100 ms). The duty cycle may be expressed logarithmically in dB.



Total ON = 142 uSec x 7 x 25 = 24.85 mSec
Duty Cycle= 20 log(24.85/100.00) = -12.1 dB

NOTE: If the transmitter was programmed to transmit at >98% duty cycle, then, wherever applicable (where the detection mode was AVG), the duty cycle factor calculated will be applied.

2.7 EUT Antenna Requirements (CFR 15.203)

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. Only the antenna(s) listed in Table 4 will be used with this module.

Table 4. Allowed Antenna(s)

REPORT REFERENCE	MANUFACTURER	TYPE OF ANTENNA	MODEL	GAIN dB_i	TYPE OF CONNECTOR
Antenna	Pegasus Wireless Products, LLC	Dipole	PWP-ANT-JCE305	+3.0	SMA

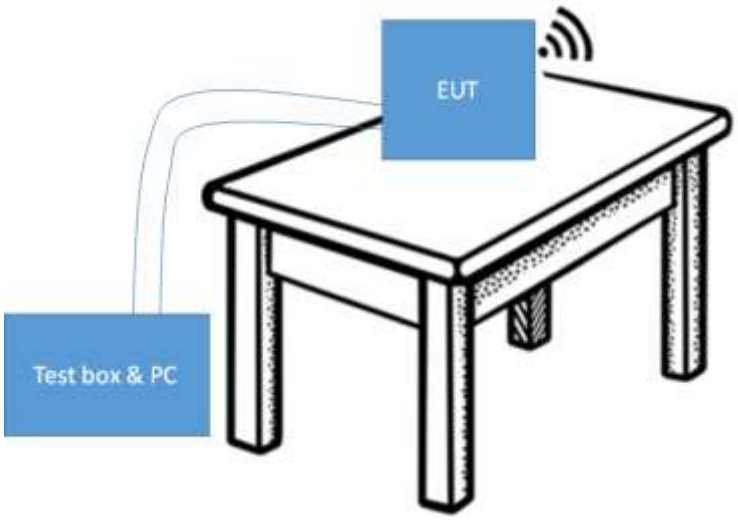


Figure 1. Block Diagram of Test Configuration

2.8 Restricted Bands of Operation (CFR 15.205)

Only spurious emissions can fall in the frequency bands of CFR 15.205. The field strength of these spurious emissions cannot exceed the limits of 15.209. Radiated Harmonics and other Spurious Emissions are examined for this requirement; see paragraph 2.1.

2.9 Intentional Radiator, Power Line Conducted Emissions (CFR 15.207)

Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines.

The EUT is not designed to be powered or operated from the AC power lines therefore compliance to this requirement is not applicable.

2.10 Intentional Radiator, Radiated Emissions (CFR 15.209, 15.249(a)(c)) (IC RSS 210, A2.9 (a))

Radiated Radio measurements: the EUT was placed into a continuous transmit mode of operation and a preliminary scan was performed on the EUT to find signal frequencies that were caused by the transmitter part of the product. To obtain the worst case results, the EUT was placed on a table top of a non-conductive table, 80 cm or 150 cm above the ground floor depending on the frequency band of investigation. The EUT was positioned 3 meters away from the receiving antenna during testing (1 meter at frequencies above 6 GHz and if the emissions were less than 6 dB from the noise floor). The EUT was tested in X, Y and Z axes or the position of normal operation to determine the worst case orientation. Radiated measurements below 30 MHz were tested with a RBW = 9 kHz; emissions below 1 GHz were tested with a RBW = 120 kHz and radiated measurements above 1 GHz were measured using a RBW =1 MHz. VBW was set to three times the RBW value.

Following are the test results collected for the fundamental and harmonics emissions. The remaining spurious emissions measurements are presented in section 2.14 of this test report.

Table 5. Peak Radiated Fundamental & Harmonic Emissions

Frequency (MHz)	Test Data (dBuV)	Factor (dB)	AF+CA -AMP (dB/m)	Results (dBuV/m)	Limits (dBuV/m)	Antenna Distance/ Polarization	Margin (dB)	Detector Mode
Low - Channel								
2402.00	63.88	--	27.19	91.07	114.0	3.0m./HORZ	22.9	**PK**
2402.00	60.81	--	27.14	87.95	114.0	3.0m./VERT	26.0	**PK**
4804.00*	58.11	--	0.84	58.95	74.0	3.0m./HORZ	15.0	**PK**
4804.00*	57.45	--	0.71	58.16	74.0	3.0m./VERT	15.8	**PK**
7206.00	53.14	--	5.41	58.55	74.0	3.0m./HORZ	15.4	**PK**
7206.00	53.41	--	5.39	58.80	74.0	1.0m./VERT	15.2	**PK**
9608.00	48.92	--	4.46	53.38	74.0	1.0m./VERT	20.6	**PK**
No other harmonics were detected.								
Mid - Channel								
2440.00	65.76	--	28.98	94.74	114.0	3.0m./HORZ	19.3	**PK**
2440.00	60.33	--	28.94	89.27	114.0	3.0m./VERT	24.7	**PK**
4880.00*	55.46	--	3.62	59.08	74.0	3.0m./HORZ	14.9	**PK**
4880.00*	55.58	--	3.46	59.04	74.0	3.0m./VERT	15.0	**PK**
7320.00*	53.62	--	7.73	61.35	74.0	1.0m./HORZ	12.7	**PK**
No other harmonics were detected.								
High - Channel								
2480.00	65.74	--	28.99	94.73	114.0	3.0m./HORZ	19.3	**PK**
2480.00	62.59	--	28.89	91.48	114.0	3.0m./VERT	22.5	**PK**
4960.00*	58.53	--	3.20	59.73	74.0	3.0m./HORZ	14.3	**PK**
4960.00*	54.70	--	3.12	57.82	74.0	3.0m./VERT	16.2	**PK**
7440.00*	53.52	--	9.25	62.77	74.0	1.0m./HORZ	11.2	**PK**
No other harmonics were detected.								

Notes:
1. (*) Falls within the restricted bands of CFR 15.205. Limits based on CFR15.209 & 15.249.
2. No other signals detected within 20 dB of specification limit. Harmonics investigated up to the 10th harmonic
3. Measurements taken at 1 meter were extrapolated to 3 meters using a factor of (-9.5 dB).
4. The EUT was placed in three orthogonal positions and the transmitter was in constant broadcast mode, with a duty cycle of greater than 98%. The emissions were measured with the receive antenna in vertical and horizontal polarizations. The data listed in the above table was worst case.

Sample Calculation at 2402.00 MHz:

Magnitude of Measured Frequency	63.88	dBuV
+Factor (dB)	0.00	dB
+Antenna Factor + Cable Loss - Amplifier Gain	27.19	dB/m
Corrected Result	91.07	dBuV/m

Test Date: November 13, 2020

Tested By
Signature: _____ Name: Mark Afroozi

Table 6. Average Radiated Fundamental & Harmonic Emissions

Frequency (MHz)	Test Data (dBuV)	Factor (dB)	AF+CA -AMP (dB/m)	Results (dBuV/m)	Limits (dBuV/m)	Antenna Distance/ Polarization	Margin (dB)	Detector Mode
Low - Channel								
2402.00	29.75	--	27.19	56.94	94.0	3.0m,/HORZ	22.9	**AVG**
2402.00	28.57	--	27.14	55.71	94.0	3.0m./VERT	38.3	**AVG**
4804.00*	35.60	--	0.84	36.44	54.0	3.0m./HORZ	17.6	**AVG**
4804.00*	34.99	--	0.71	35.70	54.0	3.0m./VERT	18.3	**AVG**
7206.00	33.85	--	5.41	39.26	54.0	3.0m./HORZ	14.7	**AVG**
7206.00	34.47	--	5.39	39.86	54.0	1.0m./VERT	14.1	**AVG**
9608.00	32.93	--	4.46	37.39	54.0	1.0m./VERT	16.6	**AVG**
No other harmonics were detected.								
Mid - Channel								
2440.00	34.43	--	28.98	63.41	94.0	3.0m./HORZ	30.6	**AVG**
2440.00	32.07	--	28.94	61.35	94.0	3.0m./VERT	33.0	**AVG**
4880.00*	33.70	--	3.62	37.32	54.0	3.0m./HORZ	14.9	**AVG**
4880.00*	33.46	--	3.46	36.92	54.0	3.0m./VERT	17.1	**AVG**
7320.00*	33.24	--	7.73	40.97	54.0	3.0m./HORZ	12.7	**AVG**
No other harmonics were detected.								
High – Channel								
2480.00	33.87	--	28.99	62.86	94.0	3.0m./HORZ	31.1	**AVG**
2480.00	32.72	--	28.89	61.61	94.0	3.0m./VERT	32.4	**AVG**
4960.00*	33.99	--	3.20	37.19	54.0	3.0m./HORZ	16.8	**AVG**
4960.00*	33.20	--	3.12	36.32	54.0	3.0m./VERT	17.7	**AVG**
7440.00*	32.53	--	9.25	41.78	54.0	1.0m./HORZ	12.2	**AVG**
No other harmonics were detected.								

Notes:
1. (*) Falls within the restricted bands of CFR 15.205. Limits based on CFR15.209 & 15.249.
2. No other signals detected within 20 dB of specification limit. Harmonics investigated up to the 10th harmonic
3. Measurements taken at 1 meter were extrapolated to 3 meters using a factor of (-9.5 dB).
4. The EUT was placed in three orthogonal positions and the transmitter was in constant broadcast mode, with a duty cycle of greater than 98%. The emissions were measured with the receive antenna in vertical and horizontal polarizations. The data listed in the above table was worst case.
5. Duty Cycle factor of -20 dB is added to the additional factor column.

Sample Calculation at 2402.00 MHz:

Magnitude of Measured Frequency	29.75	dBuV
+Factor (dB)	0.00	dB
+Antenna Factor + Cable Loss+ Amplifier Gain	27.19	dB/m
Corrected Result	56.94	dBuV/m

Test Date: November 13, 2020

Tested By
Signature:  Name: Mark Afroozi

2.11 Band Edge Measurements – (CFR 15.249 (d))

Band Edge measurements are made following the guidelines in FCC KDB Publication No. 558074 with the EUT initially operating on the Lowest Channel and then operating on the Highest Channel within its band of operation. Radiated measurements are performed to demonstrate compliance with the requirement of 15.249(d) that all emissions outside of the band edges be attenuated by at least 50 dB or 15.209 limits, when compared to its highest in-band value (contained in a 100 kHz band).

To capture the band edge, set the Spectrum Analyzer frequency span set to 2 MHz to capture the peak level of the emission operating on the channel closest to the band edge as well as any modulation products falling outside of the authorized band of operation. See figure and calculations below for more detail.

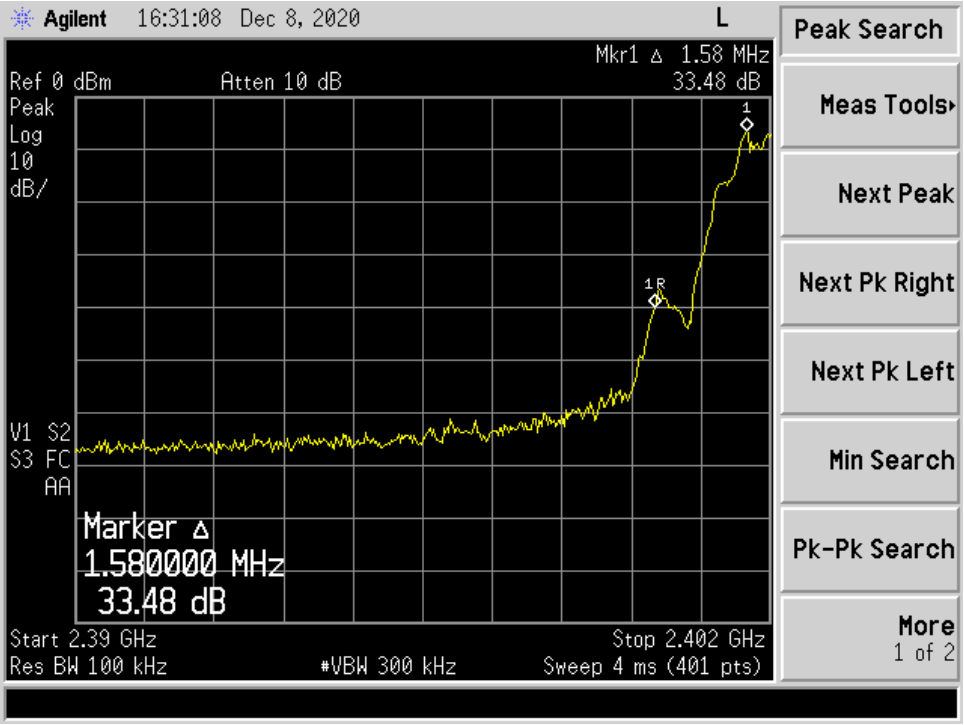


Figure 2. Band Edge Compliance, Low Channel Delta – Peak

Low Channel Corrected Measured Value from Table 6	91.07	dBuV
Low Channel Band Edge Delta from Figure 4	-33.48	dB
Calculated Result (PEAK)	57.59	dBuV/m
Band Edge Limit (AVG)	74.00	dBuV/m
Calculated Result (PEAK)	-57.59	dBuV/m
Band Edge Margin	16.41	dBuV/m
AVERAGE RESULT:		
Calculated Result (PEAK)	57.59	dBuV/m
Duty Cycle Factor	-12.10	dB
Corrected Value	45.49	dBuV/m
Band Edge Limit (AVG)	54.00	dBuV/m
Corrected Value	45.49	dBuV/m
Band Edge Margin	8.51	dBuV/m

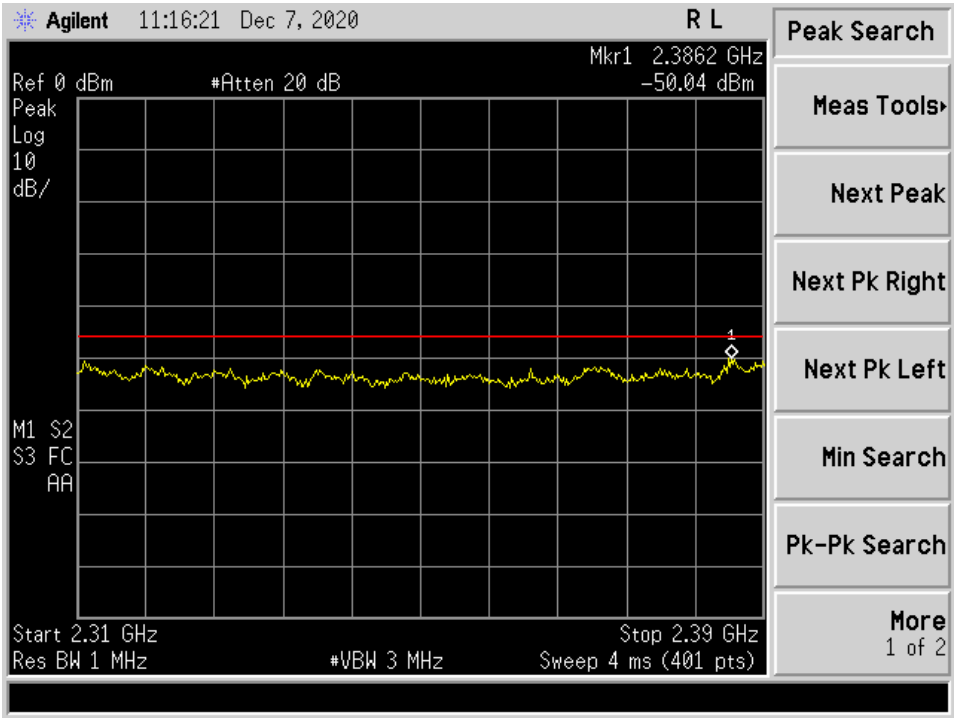


Figure 3. Restricted Band, Low Channel, PEAK

Limit converted to EIRP (dBm)=
74 dBuV/m + 20log(3) – 104.8= -21.25 dBm
54 dBuV/m + 20log (3) – 104.8= -41.25 dBm

Table 7. Radiated Restricted Band 2310 MHz to 2390 MHz, Peak

Frequency (MHz)	Measured result (dBm)	Limit (dBuV/m)	Limit (dBm)	Margin (dB)	PK/AVG
2386.20	-50.04	74.0	-21.25	28.79	**PK**
2386.20	-50.04	54.0	-41.25	8.79	**AVG**

Test Date: December 7, 2020
Tested By
Signature: _____ Name: Mark Afroozi

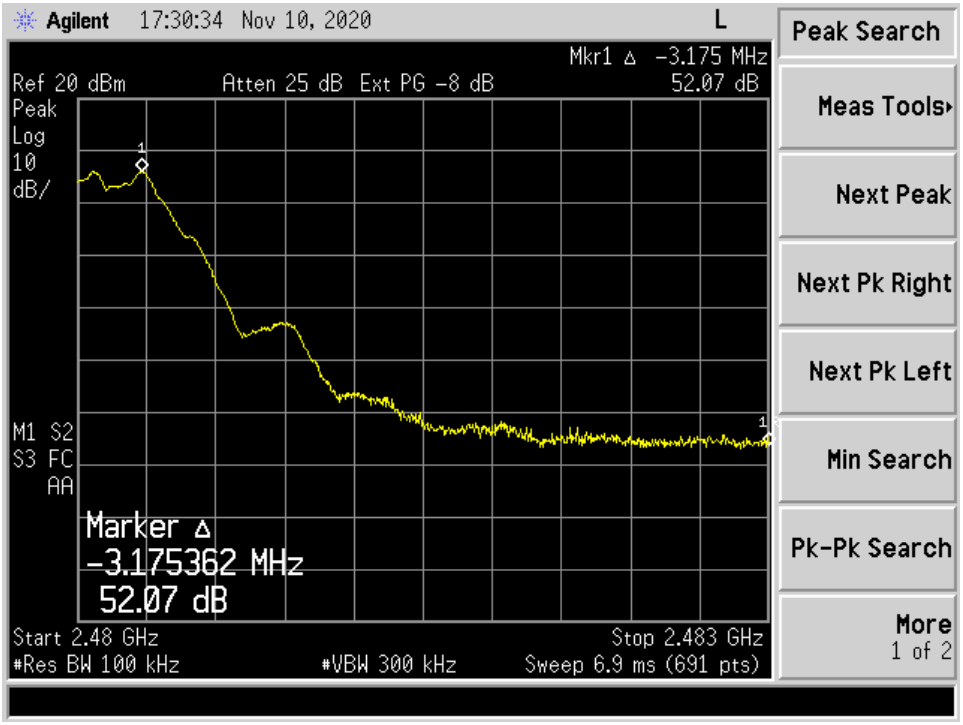


Figure 4. Band Edge Compliance, High Channel Delta, Peak

High Channel Corrected Measured Value from Table 6	94.73	dBuV
High Channel Band Edge Delta from Figure 6	-52.07	dB
Calculated Result (PEAK)	42.66	dBuV/m
Band Edge Limit (AVG)	54.00	dBuV/m
Calculated Result (PEAK)	-42.66	dBuV/m
Band Edge Margin	11.34	dBuV/m

Note: Peak meets AVG limits

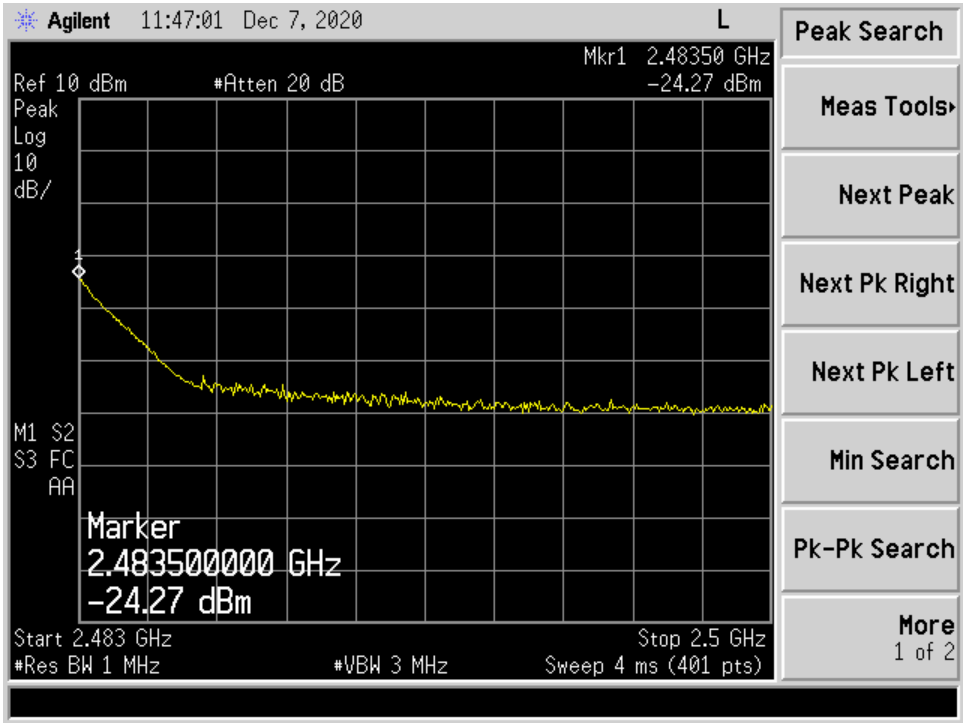


Figure 5. Restricted Band, High Channel, PEAK

Limit converted to EIRP (dBm)=
74 dBuV/m + 20log(3) – 104.8= -21.25 dBm

Table 8. Radiated Restricted Band 2483.5 MHz to 2500 MHz, Peak

Frequency (MHz)	Measured result (dBm)	Limit (dBuV/m)	Limit (dBm)	Margin (dB)	PK/AVG
2386.20	-50.04	74.0	-21.25	28.79	PK

Test Date: December 7, 2020
Tested By
Signature: _____ Name: Mark Afroozi

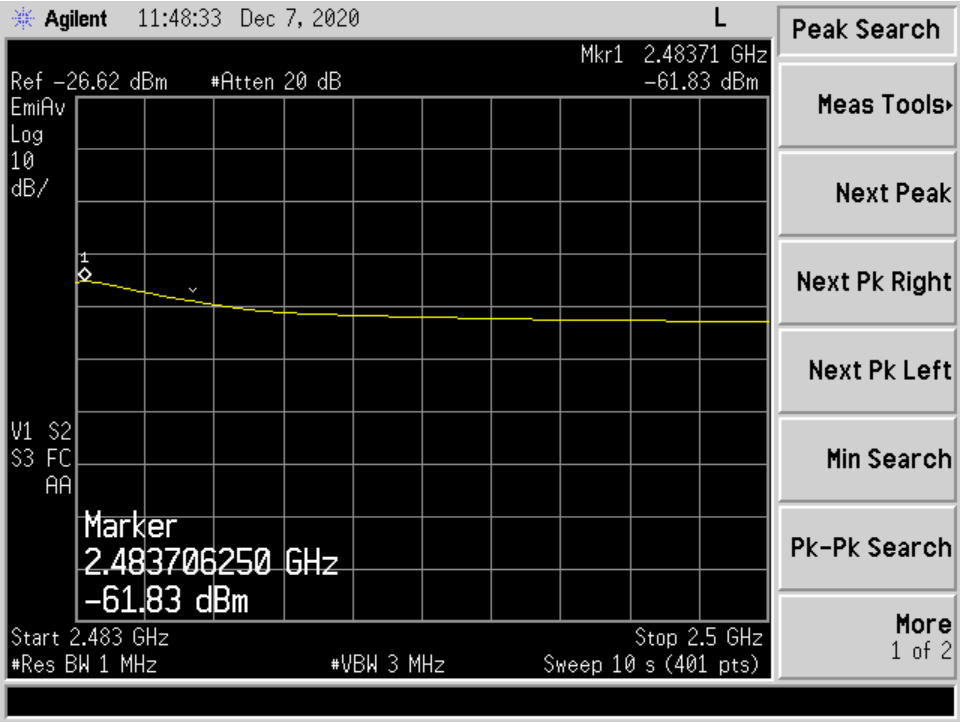


Figure 6. Restricted Band, High Channel, AVERAGE

Limit converted to EIRP (dBm)=
54 dBuV/m + 20log (3) – 104.8= -41.25 dBm

Table 9. Radiated Restricted Band 2483.5 MHz to 2500 MHz, AVERAGE

Frequency (MHz)	Measured result (dBm)	Limit (dBuV/m)	Limit (dBm)	Margin (dB)	PK/AVG
2386.20	-50.04	54.0	-41.25	8.79	AVG

Test Date: December 7, 2020
Tested By
Signature: _____ Name: Mark Afroozi

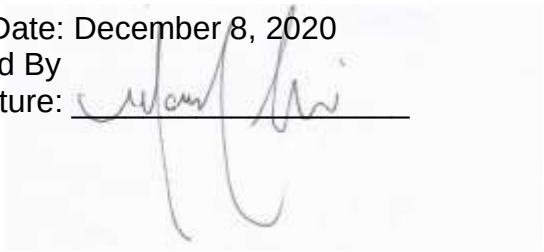
2.12 Occupied Bandwidth (CFR 2.1049)

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured.

The changes do not affect the emissions bandwidth therefore the originally recorded measurements are presented herein.

Table 10. Occupied Bandwidth

Frequency (MHz)	Occupied Bandwidth (MHz)
2402	2074.40
2440	2070.80
2480	2069.90

Test Date: December 8, 2020
Tested By
Signature: 

Name: Mark Afroozi

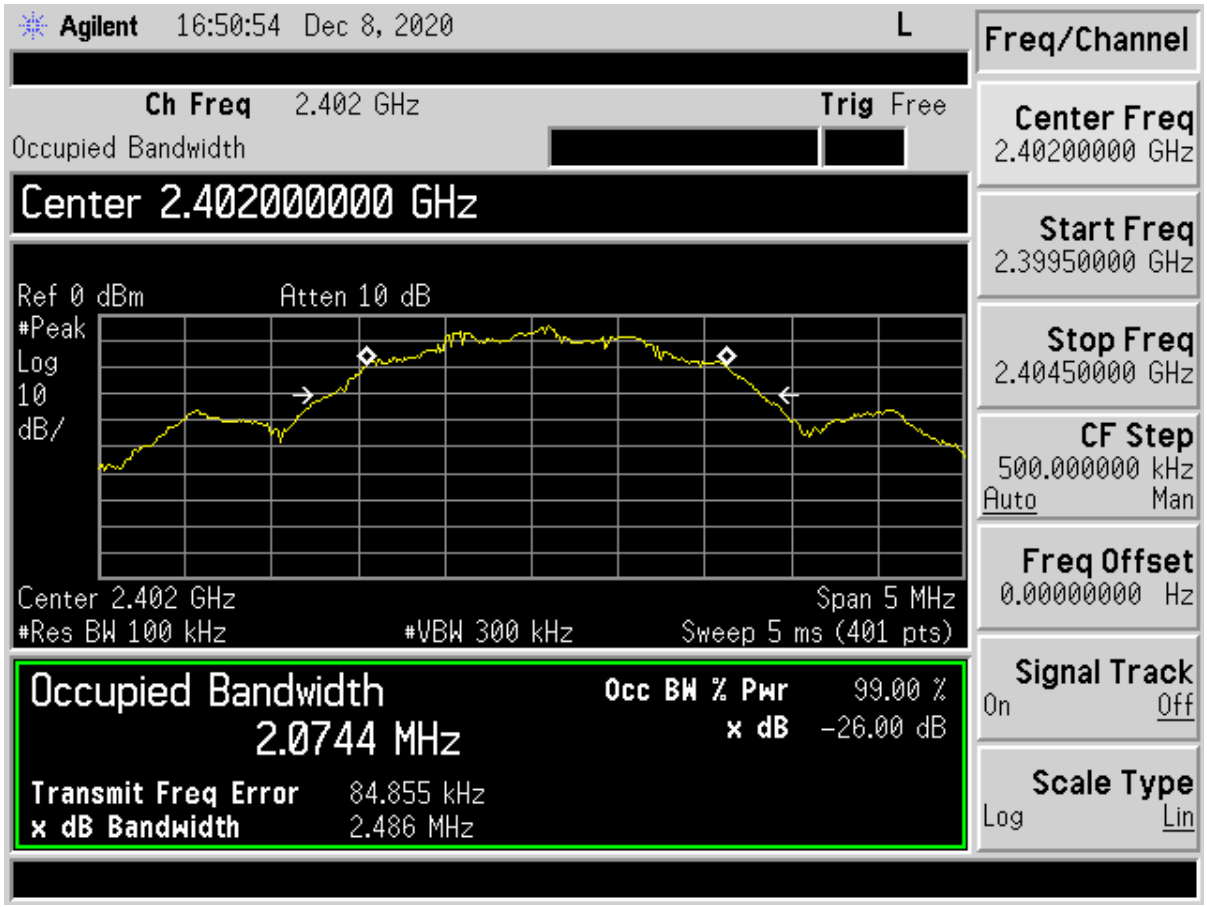


Figure 7. 99% Occupied Bandwidth Low Channel

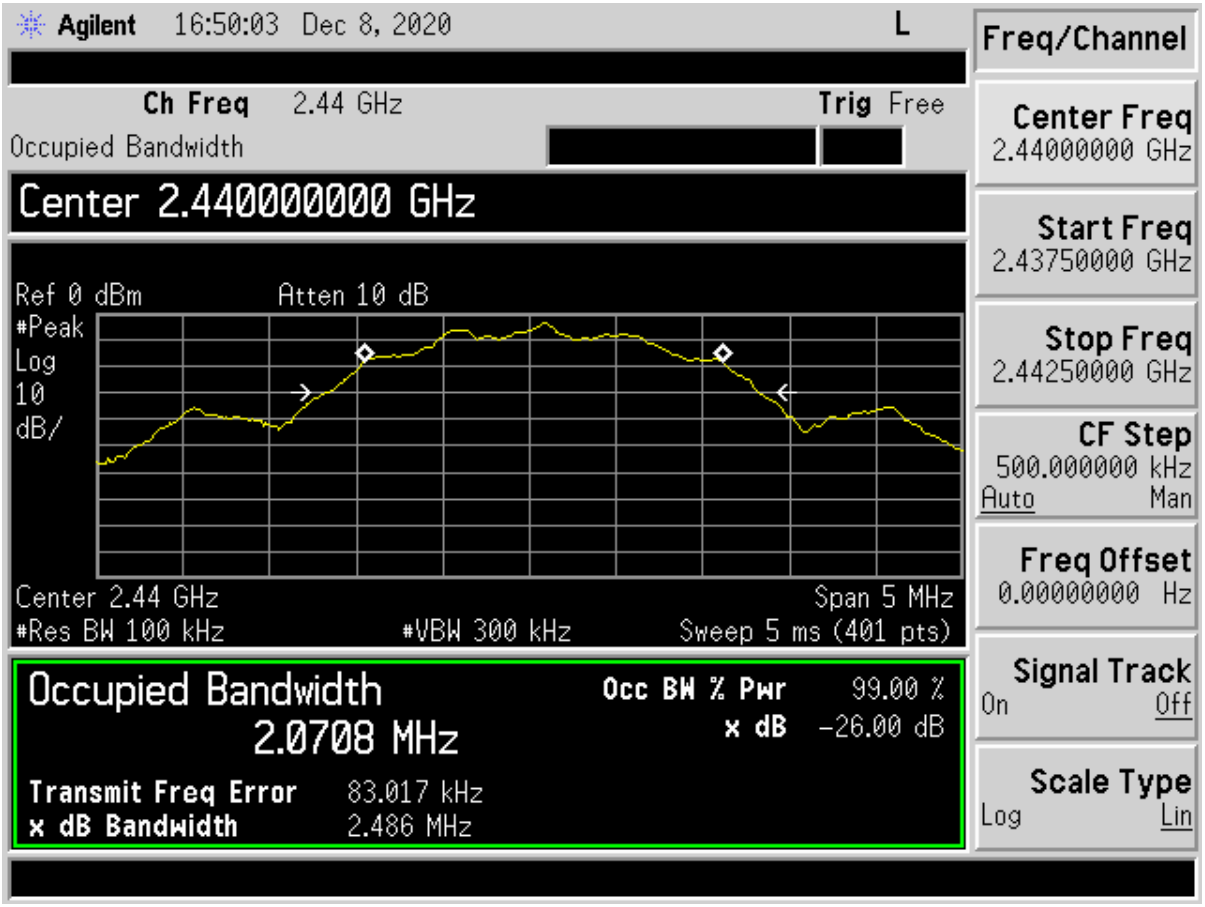


Figure 8. 99% Occupied Bandwidth Mid Channel

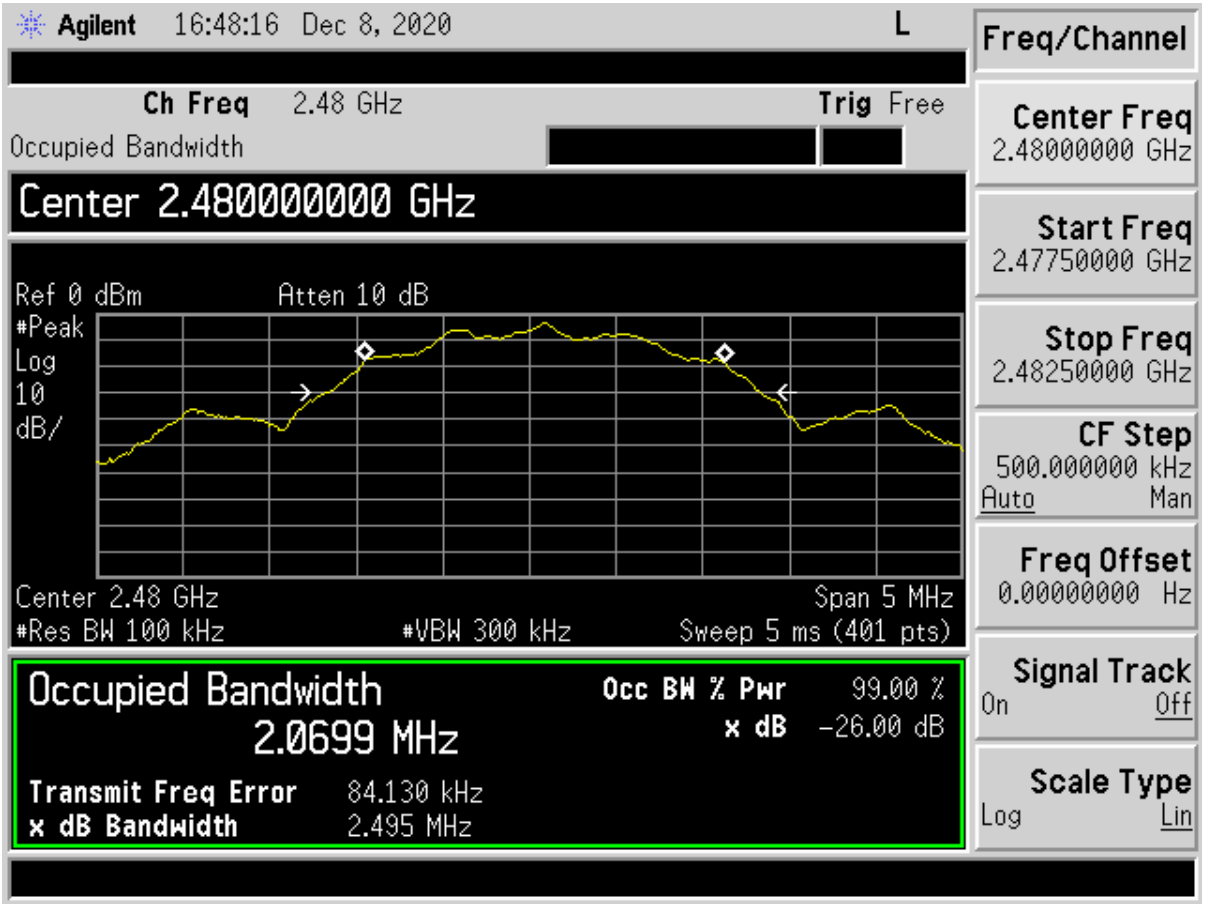


Figure 9. 99% Occupied Bandwidth High Channel

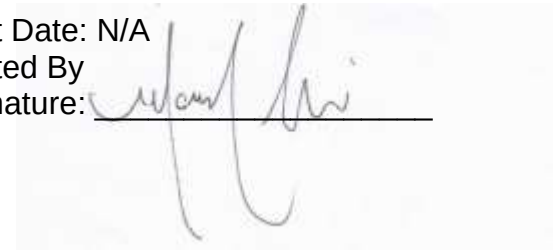
2.13 Intentional Radiator, Powerline Emissions (CFR 15.207)

The EUT is designed to be connected to that DC power source such as the battery powering the engine system in which the panel is being used to control. It is not designed to be connected to the AC mains. This testing is therefore not required.

Table 11. Transmitter Power Line Conducted Emissions Test Data, Part 15.107

9kHz to 30 MHz with Class B Limits						
Test: Radiated Emissions				**Client: Cattron N. America**		
Project: 20-0304				**Model:** CP1000BLE		
Frequency (MHz)	**Test Data (dBuV)**	**LISN+CL-PA (dB)**	**Results (dBuV)**	**AVG Limits (dBuV)**	**Margin (dB)**	**Detector PK, QP, or AVG**
The EUT is DC powered; therefore, this test is not applicable.						

SAMPLE CALCULATION: N/A

Test Date: N/A
Tested By
Signature: 

Name: Mark Afroozi

2.14 Intentional Radiator, Radiated Emissions (CFR 15.209)

Radiated emissions disturbance Measurements were performed with an instrument having both peak and quasi-peak detectors over the frequency range of 30 MHz to 1 GHz and peak and average detectors over the frequency range of 1 GHz to 25 GHz. Measurements of the radiated emissions were made with the receiver antenna at a distance of 3 m from the boundary of the test unit unless noted otherwise.

The test antenna was varied from 1 m to 4 m in height while watching the analyzers' display for the maximum magnitude of the signal at the test frequency. The antenna polarization (horizontal or vertical) and test sample azimuth were varied during the measurements to find the maximum field strength readings to record.

The worst-case radiated emissions in the range of 30 MHz to 25 GHz are reported in the tables below.

Table 12. Part 15.209 Limits

Frequency (MHz)	Field Strength (dBuV/m)	Measurement Distance (meters)	Measurement Distance Correction Factor
0.009-0.490	20*log (2400/F(kHz))	300	+80
0.490-1.705	20* log (24000/F(kHz))	30	+40
1.705-30.0	29.5	30	+40
30-88	40	3	+0
88-216	43.5	3	+0
216-960	46.0	3	+0
Above 960	54.0	3	+0

Measurements are PK or QP unless the following: frequencies in the band 9-90 kHz, 110-490 kHz and above 1000 MHz are performed using PK or AVG detection.

Table 13. Intentional Radiator, Radiated Emissions (CFR 15.209) 9 kHz to 30 MHz

Frequency (MHz)	Test Data (dBuV)	AF+CA-AMP (dB/m)	Results (dBuV/m)	Limits (dBuV/m)	Antenna Distance/ Polarization	Margin (dB)	Detector PK, or QP
0.62	49.67	11.86	61.53	71.8	3.0m./LOOP	10.3	**PK**
1.00	39.01	11.86	50.87	67.6	3.0m./LOOP	16.7	**PK**
1.85	39.97	11.86	51.83	62.3	3.0m./LOOP	10.4	**PK**
3.09	34.45	11.19	45.64	57.8	3.0m./LOOP	12.2	**PK**
4.32	29.68	11.19	40.87	54.9	3.0m./LOOP	14.0	**PK**
5.56	25.99	11.12	37.11	52.7	3.0m./LOOP	15.6	**PK**
All other emissions were more than 20 dB below the limit.							

Tested from 9 kHz to 30 MHz

SAMPLE CALCULATION at 0.62 MHz:

Magnitude of Measured Frequency	49.67	dBuV
+Antenna Factor + Cable Loss - Amplifier Gain	11.86	dB/m
Corrected Result	61.53	dBuV/m

Test Date: November 13, 2020

Tested By
Signature: _____ Name: Mark Afroozi

Table 14. Intentional Radiator, Radiated Emissions (CFR 15.209) 30 MHz to 1000 MHz

Frequency (MHz)	Test Data (dBuV)	AF+CA-AMP (dB/m)	Results (dBuV/m)	Limits (dBuV/m)	Antenna Distance/ Polarization	Margin (dB)	Detector PK or QP
47.99	43.39	-15.82	27.57	40.0	3m./HORZ	12.4	**QP**
540.90	46.66	-5.65	41.01	46.0	3m./HORZ	5.0	**QP**
756.50	38.43	-1.51	36.92	46.0	3m./HORZ	9.1	**QP**
864.30	44.05	-0.28	43.77	46.0	3m./HORZ	2.2	**QP**
31.48	44.17	-13.11	31.06	40.0	3m./VERT	8.9	**QP**
47.99	52.86	-16.52	36.34	40.0	3m./VERT	3.7	**QP**
52.67	53.11	-16.92	36.19	40.0	3m./VERT	3.8	**QP**
60.06	46.93	-17.79	29.14	40.0	3m./VERT	10.9	**QP**
324.10	46.86	-10.34	36.52	46.0	3m./VERT	9.5	**QP**
540.02	49.98	-6.35	43.63	46.0	3m./VERT	2.4	**QP**
648.70	41.50	-3.81	37.69	46.0	3m./VERT	8.3	**QP**
756.50	44.57	-2.11	42.46	46.0	3m./VERT	3.5	**QP**
972.20	39.62	-1.08	38.54	54.0	3m./VERT	15.5	**QP**
All other emissions were more than 20 dB below the limit.							

Tested from 30 MHz to 1000 MHz

SAMPLE CALCULATION at 47.99 MHz:

Magnitude of Measured Frequency	43.39	dBuV
+Antenna Factor + Cable Loss - Amplifier Gain	-15.82	dB/m
Corrected Result	27.57	dBuV/m

Test Date: December 7, 2020

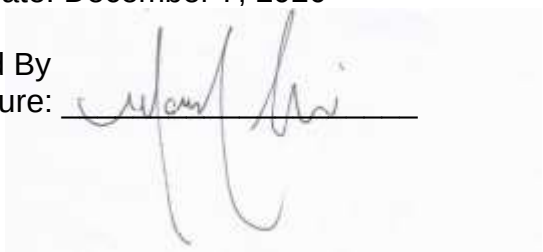
Tested By
Signature:  Name: Mark Afroozi

Table 15. Intentional Radiator, Radiated Emissions (CFR 15.209) 1 GHz to 25 GHz

1 GHz to 25 GHz							
Test: Radiated Emissions				**Client:** Cattron N.A.			
Project: 20-0304				**Model:** CP1000BLE			
Frequency (MHz)	**Test Data (dBuV)**	**AF+CA-AMP (dB/m)**	**Results (dBuV/m)**	**Limits (dBuV/m)**	**Antenna Distance/ Polarization**	**Margin (dB)**	**Detector PK or AVG**
No spurious emissions were detected except for fundamental and harmonics emissions as presented in tables above.							

Tested from 1 GHz to 25 GHz

SAMPLE CALCULATION at: N/A

Test Date: November 13, 2020

Tested By
Signature: _____ Name: Mark Afroozi

2.15 Measurement Uncertainty

The measurement uncertainties given were calculated using the method detailed in CISPR 16-4-2: 2011. A coverage factor of k=2 was used to give a level of confidence of approximately 95%.

2.15.1 Conducted Emissions Measurement Uncertainty

Measurement Uncertainty (within a 95% confidence level) for this test is ± 2.85 dB.

This EUT is battery powered; therefore this tested was deemed not applicable.

2.15.2 Radiated Emissions Measurement Uncertainty

For a measurement distance of 3 m the measurement uncertainty (with a 95% confidence level) for this test using a Biconical Antenna (30 MHz to 200 MHz) is ± 5.40 dB. This value includes all elements of measurement.

The measurement uncertainty (with a 95% confidence level) for this test using a Log Periodic Antenna (200 MHz to 1000 MHz) is ± 5.19 dB.

The measurement uncertainty (with a 95% confidence level) for this test using a Horn Antenna is ± 5.08 dB.

END REPORT