PointGuard Energy Inc.

TEST REPORT

SCOPE OF WORK
FCC TESTING– SCH1_RFID1

REPORT NUMBER
241008031SZN-001

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Test Report

Intertek Report No.: 241008031SZN-001

PointGuard Energy Inc.

Application for Certification

FCC ID: 2BMFT-RFIDC20

RFID module for EV charger product

Model: SCH1_RFID1

13.56MHz Transceiver

Report No.: 241008031SZN-001

We hereby certify that the sample of the above item is considered to comply with the requirements of FCC Part 15, Subpart C for Intentional Radiator, mention 47 CFR [10-1-23]

Prepared and Checked by:

Draven Li
Project Engineer

Approved by:

Johnny Wang
Project Engineer
Date: 11 December 2024

MEASUREMENT/TECHNICAL REPORT

This report concerns (check one:) Original Grant X Class II Change _____

Equipment Type: DXX - Part 15 Low Power Communication Device Transmitter

Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? Yes _____ No X

If yes, defer until: _____
date

Company Name agrees to notify the Commission by: _____
date
of the intended date of announcement of the product so that the grant can be issued on that date.

Transition Rules Request per 15.37? Yes _____ No X

If no, assumed Part 15, Subpart C for intentional radiator – the new 47 CFR [10-1-23 Edition] provision.

Report prepared by:

Draven Li
Intertek Testing Services Shenzhen Ltd. Longhua Branch
101, 201, Building B, No. 308 Wuhe Avenue, Zhangkengjing Community
GuanHu Subdistrict, LongHua District, Shenzhen, People's Republic of China
Tel / Fax: 86-755-8601 6288/86-755-8601 6751

Table of Contents

1.0 Summary of Test Result

Applicant: PointGuard Energy Inc.
Applicant Address: 2377 Gold Meadow Way, Gold River, California, United States
Manufacturer: PointGuard Energy Inc.
Manufacturer Address: 2377 Gold Meadow Way, Gold River, California, United States

MODEL: SCH1_RFID1

FCC ID: 2BMFT-RFIDC20

Test Specification	Reference	Results
Transmitter Radiated Emission	15.225(a)(b)(c) &15.209 &15.205	Pass
Band edge		
Frequency Stability	15.225(e)	Pass
20dB Bandwidth	15.215(c)	Pass
AC Conducted Emission	FCC 15.209	Pass

Notes: The EUT uses an Integral Antenna which in accordance to Section 15.203 is considered sufficient to comply with the provisions of this section.

2.0 General Description

2.1 Product Description

The equipment under test (EUT) is a RFID module for EV charger product operating at 13.56 MHz. The EUT can be powered by DC 12V/300mA. For more detail information pls. refer to the user manual.

Antenna Type: Integral antenna
Modulation Type: OOK

For electronic filing, the brief circuit description is saved with filename: descri.pdf.

2.2 Related Submittal(s) Grants

This is an application for certification of the RFID module for EV charger product.

2.3 Test Methodology

Radiated emission measurements were performed according to the procedures in ANSI C63.10 (2013). Radiated emission measurement was performed in Semi-anechoic chamber. For radiated emission measurement, preliminary scans were performed in the semi-anechoic chamber only to determine the worst-case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application. All other measurements were made in accordance with the procedures in part 2 of CFR 47.

2.4 Test Facility

The Semi-anechoic chamber used to collect the radiated data is **Intertek Testing Services Shenzhen Ltd. Longhua Branch** and located at 101, 201, Building B, No. 308 Wuhe Avenue, Zhangkengjing Community GuanHu Subdistrict, LongHua District, Shenzhen, People's Republic of China. This test facility and site measurement data have been fully placed on file with the FCC (Registration Number: CN1188).

3.0 System Test Configuration

3.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in ANSI C63.10 (2013).

The EUT was powered by DC 12V/300mA during the test, only the worst data was reported in this report.

For maximizing emissions below 30 MHz, the EUT was rotated through 360°, the bottom of the loop antenna was placed 1 meter above the ground, and the antenna polarization was changed. For maximizing emissions, the EUT was rotated through 360°, the antenna height was varied from 1 meter to 4 meters above the ground plane, and the antenna polarization was changed. This step by step procedure for maximizing emissions led to the data reported in Section 4.

The EUT was operated standalone and placed in the central of the turntable.

The equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). The EUT was placed on a turn table, which enabled the engineer to maximize emissions through its placement in the three orthogonal axes.

3.2 EUT Exercising Software

There was no special software to exercise the device.

3.3 Special Accessories

No special accessories used.

3.4 Equipment Modification

Any modifications installed previous to testing by PointGuard Energy Inc. will be incorporated in each production model sold / leased in the United States.

No modifications were installed by Intertek Testing Services Shenzhen Ltd Longhua Branch.

3.5 Measurement Uncertainty

When determining the test conclusion, the Measurement Uncertainty of test has been considered.

3.6 Support Equipment List and Description

Description	Manufacturer	Model No.
Control box (SECC board) (Provided by applicant)	PointGuard Energy Inc.	/
NFC card (Provided by applicant)	PointGuard Energy Inc.	/
DC Power Supply (Provided by Intertek)	Guwei	GPS-3030DD

4.0 Emission Results

Data is included worst-case configuration (the configuration which resulted in the highest emission levels).

4.1 Radiated Test Results

A sample calculation, configuration photographs and data tables of the emissions are included.

4.1.1 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

FS = RA + AF + CF - AG + PD + AV

Where FS = Field Strength in dBµV/m
RA = Receiver Amplitude (including preamplifier) in dBµV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB/m
AG = Amplifier Gain in dB
PD = Pulse Desensitization in dB
AV = Average Factor in -dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

FS = RA + AF + CF - AG + PD + AV

Assume a receiver reading of 62.0 dBµV is obtained. The antenna factor of 7.4 dB/m and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0 dB, and the resultant average factor was -10 dB. The net field strength for comparison to the appropriate emission limit is 32 dBµV/m. This value in dBµV/m was converted to its corresponding level in µV/m.

RA = 62.0 dBµV
AF = 7.4 dB/m
CF = 1.6 dB
AG = 29.0 dB
PD = 0 dB
AV = -10 dB
FS = 62 + 7.4 + 1.6 - 29 + 0 = 42 dBµV/m
Level in µV/m = Common Antilogarithm [(42 dBµV/m)/20] = 125.9 µV/m

4.1.2 Radiated Emission Configuration Photograph

For electronic filing, the worst case radiated emission configuration photograph is saved with filename: radiated photos. pdf.

4.1.3 Radiated Emissions

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Worst Case Radiated Emission
at
379.685000 MHz

Judgement: Passed by 6.5 dB

TEST PERSONNEL:

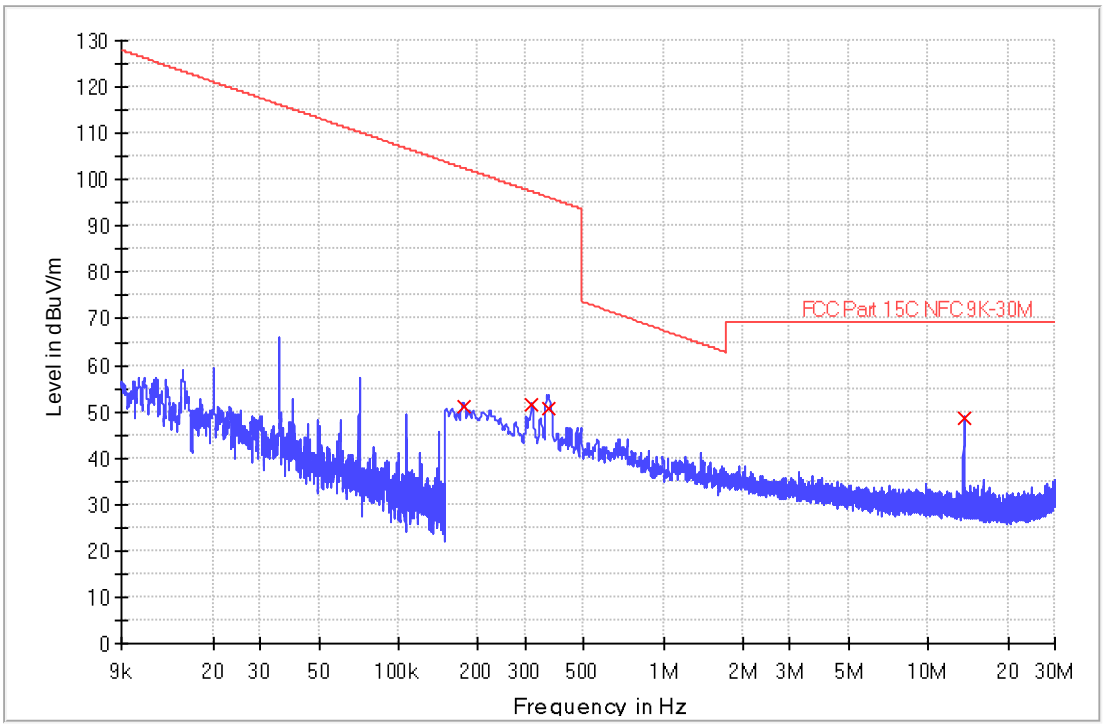
Sign on file

Draven Li, Project Engineer
Typed/Printed Name

20 November 2024
Date

Applicant: PointGuard Energy Inc.
Date of Test: 20 November 2024 Model: SCH1_RFID1
Worst Case Operating Mode: Transmitting

Table 1
Fundamental & Spurious Emission Below 30MHz



Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	13.560000	36.3	0	12.3	48.6	69.5	-20.9
Horizontal	0.175870	36.0	0	15.2	51.2	102.6	-51.4
Horizontal	0.317160	36.2	0	15.1	51.3	97.5	-46.2
Horizontal	0.365915	35.6	0	15.0	50.6	96.3	-45.7

Table 2
Spurious emission (30MHz ~ 1GHz)

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	35.302667	32.3	20	19.6	31.9	40.0	-8.1
Horizontal	57.806667	37.6	20	13.3	30.9	40.0	-9.1
Horizontal	379.685000	35.1	20	24.5	39.6	46.0	-6.5

NOTES:

1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meter. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative sign in the column shows value below limit.

4. Loop antenna is used for the emissions below 30 MHz

5. Limits at 3 meter for radiated emissions below 30 MHz is converted from the Limits at 30 meter according to the Formula:
   Limits at 3 meter (dBµV/m) = Limits at 30 meter (dBµV/m) + 40 log (30/3)

4.2 Conducted Emission at Mains Terminal

3.2.1 Conducted Emissions Configuration Photograph

For electronic filing, the worst case conducted emission configuration photograph is saved with filename: conducted photos.pdf.

4.2.2 Conducted Emissions

Worst Case Conducted Configuration

at 1.146 MHz

Judgement: Passed by 14.8 dB margin

TEST PERSONNEL:

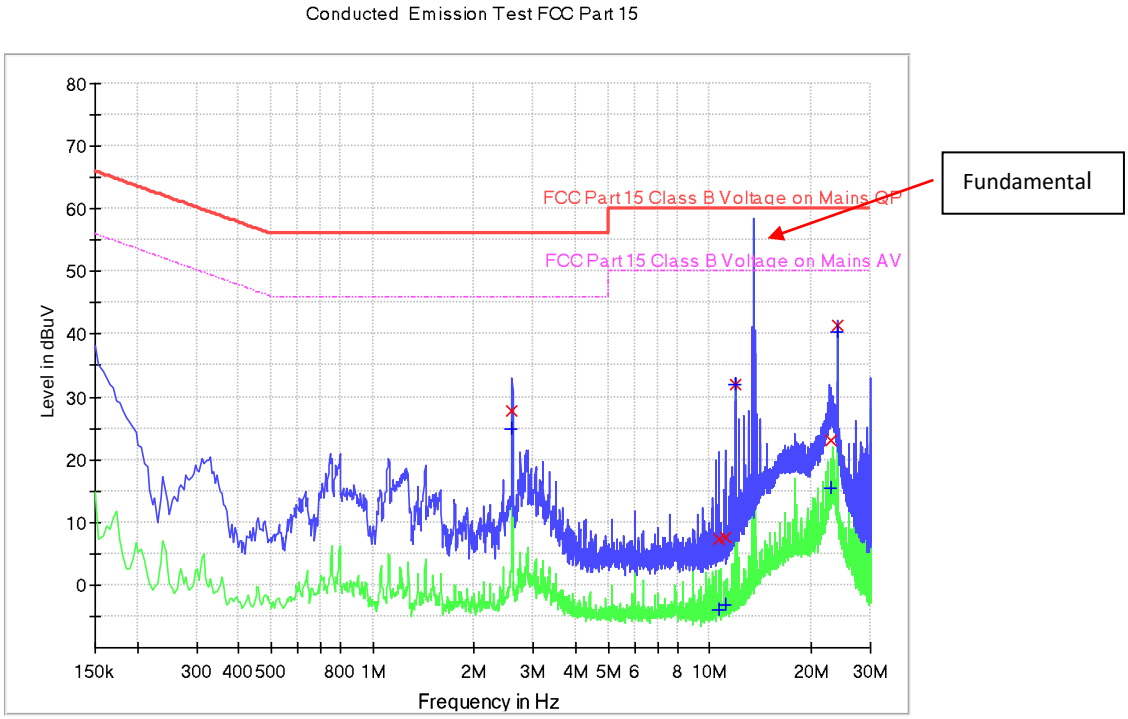
Sign on file

Draven Li, Project Engineer
Typed/Printed Name

20 November 2024
Date

Applicant: PointGuard Energy Inc.
Date of Test: 20 November 2024 Model: SCH1_RFID1
Worst Case Operating Mode: Transmitting
Sample: 1/1
Phase: Live

Conducted Emission Test - FCC



Limit and Margin QP

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
2.594000	27.7	9.000	L1	9.7	28.3	56.0
10.682000	7.2	9.000	L1	10.0	52.8	60.0
11.114000	7.6	9.000	L1	10.1	52.4	60.0
11.974000	31.9	9.000	L1	10.2	28.1	60.0
22.974000	23.2	9.000	L1	10.5	36.8	60.0
23.946000	41.5	9.000	L1	10.6	18.5	60.0

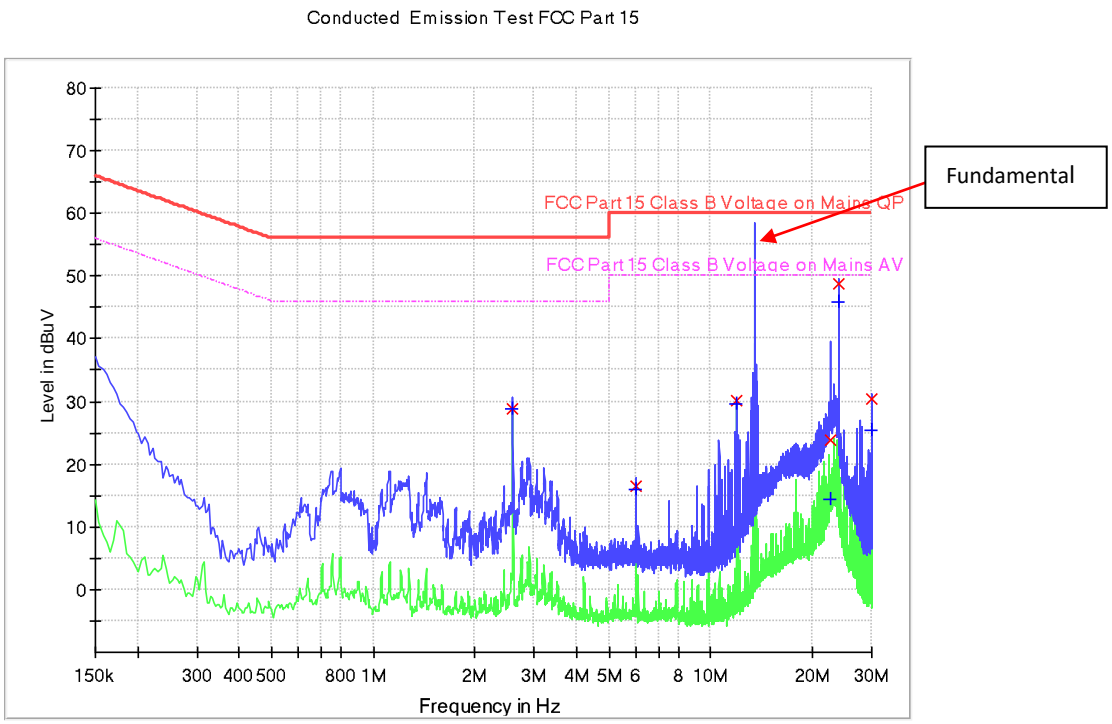
Limit and Margin AV

Frequency (MHz)	Average (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
2.594000	24.8	9.000	L1	9.7	21.2	46.0
10.682000	-3.9	9.000	L1	10.0	53.9	50.0
11.114000	-3.3	9.000	L1	10.1	53.3	50.0
11.974000	32.0	9.000	L1	10.2	18.0	50.0
22.974000	15.3	9.000	L1	10.5	34.7	50.0
23.946000	40.5	9.000	L1	10.6	9.5	50.0

Remark:
1. Corr. Factor (dB) = LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Limit (dBuV) – Level (dBuV)

Applicant: PointGuard Energy Inc.
Date of Test: 20 November 2024 Model: SCH1_RFID1
Worst Case Operating Mode: Transmitting
Sample: 1/1
Phase: Neutral

Conducted Emission Test - FCC



Limit and Margin QP

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
2.586000	28.9	9.000	N	9.7	27.1	56.0
5.986000	16.5	9.000	N	9.8	43.5	60.0
11.974000	30.1	9.000	N	10.2	29.9	60.0
22.538000	23.7	9.000	N	10.5	36.3	60.0
23.946000	48.7	9.000	N	10.7	11.3	60.0
29.938000	30.4	9.000	N	11.2	29.6	60.0

Limit and Margin AV

Frequency (MHz)	Average (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
2.586000	28.8	9.000	N	9.7	17.2	46.0
5.986000	15.9	9.000	N	9.8	34.1	50.0
11.974000	29.7	9.000	N	10.2	20.3	50.0
22.538000	14.5	9.000	N	10.5	35.5	50.0
23.946000	46.0	9.000	N	10.7	4.0	50.0
29.938000	25.4	9.000	N	11.2	24.6	50.0

Remark:
1. Corr. Factor (dB) = LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Limit (dBuV) – Level (dBuV)

4.3 Frequency Stability

If required, the operating or transmitting frequency of an intentional radiator should be measured in accordance with the following procedure to ensure that the device operates outside certain precluded frequency bands and within the frequency range. No modulation needs to be supplied to the intentional radiator during these tests, unless modulation is required to produce an output, e.g., single-sideband suppressed carrier transmitters.

The frequency stability of the transmitter is measured by:
a) Temperature: The temperature is varied from -20°C to + 50°C using an environmental chamber.
b) for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20°C.

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency.

Measurement Result:

Voltage (%)	Power	Temperature (ºC)	Frequency (MHz)	Limit	Result
100	120Vac	-20	13.560000	±0.01% (±1356Hz)	Pass
		-10	13.560000		Pass
		0	13.560000		Pass
		10	13.560000		Pass
		20	13.560000		Pass
		30	13.560000		Pass
		40	13.560000		Pass
		50	13.560000		Pass

Temperature (ºC)	Power	Voltage (%)	Frequency (MHz)	Limit	Result
20	120Vac	85	13.560000	±0.01% (±1356Hz)	Pass
		90	13.560000		Pass
		95	13.560000		Pass
		100	13.560000		Pass
		105	13.560000		Pass
		110	13.560000		Pass
		115	13.560000		Pass

Note: The device is deemed to comply with requirement of FCC Part 15.225(e).

5.0 Equipment Photographs

For electronic filing, the photographs of the tested EUT are saved with filename: external photos.pdf & internal photos.pdf.

6.0 Product Labelling

For electronic filing, the FCC ID label artwork and the label location are saved with filename: label.pdf.

7.0 Technical Specifications

For electronic filing, the block diagram and schematics of the tested EUT are saved with filename: block.pdf and circuit.pdf respectively.

8.0 Instruction Manual

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: manual.pdf.

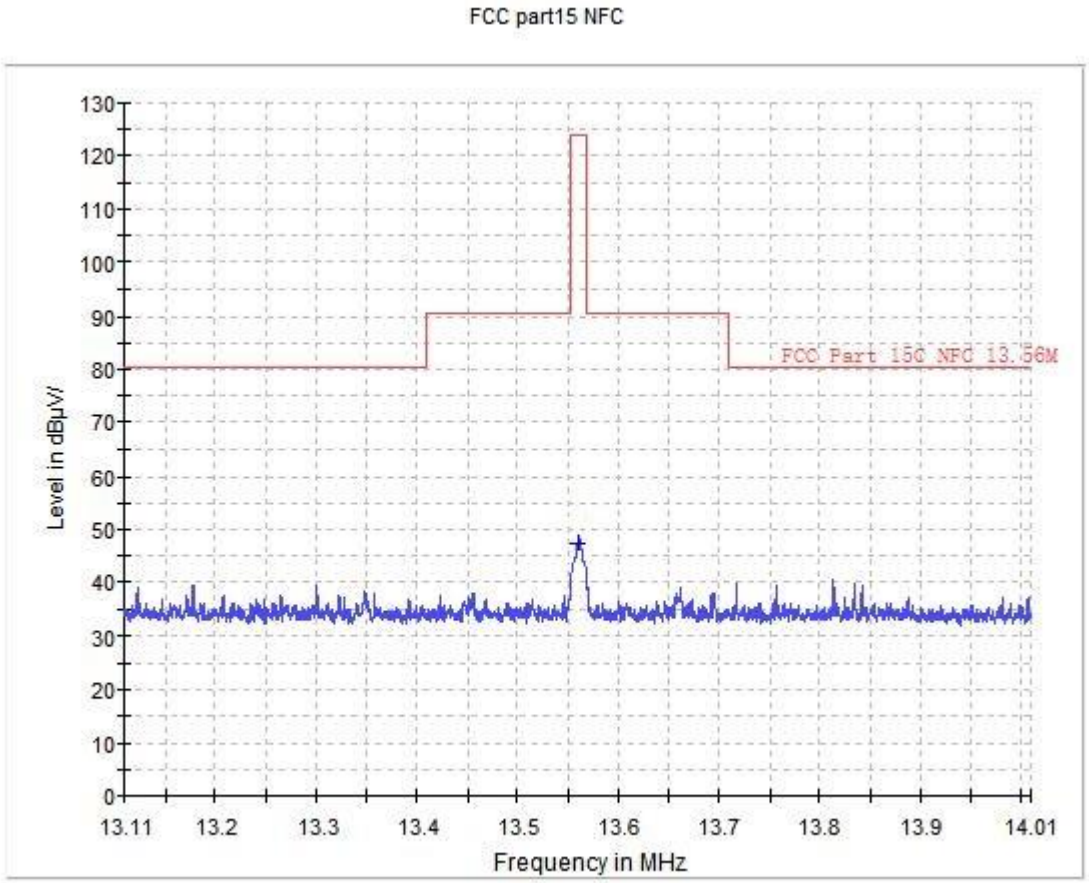
This manual will be provided to the end-user with each unit sold/leased in the United States.

9.0 Miscellaneous Information

This miscellaneous information includes details of the measured band edge, 20dB Bandwidth, the test procedure and calculation of factor such as pulse desensitization.

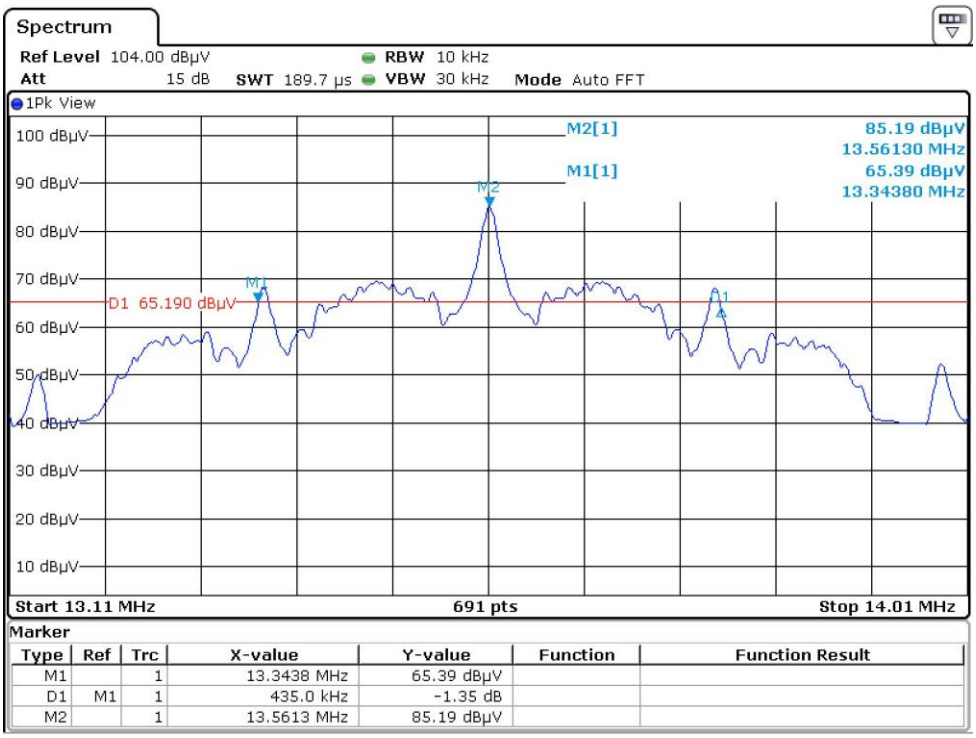
9.1 Band edge Plot

The test plots are attached as below. From the plot, the field strength of any emissions is below the limit of 90.5dBuV/m in the range of outside of (13.410–13.553 MHz and 13.567–13.710 MHz) and the limit of 80.5dBuV/m in the frequency range of (13.110-13.410MHz and 13.710-14.010MHz). Therefore, they meet the requirement of Section 15.225(b), (c).



9.2 20dB Bandwidth

Pursuant to FCC part 15 Section 15.215(c), the 20dB bandwidth of the emission was contained within the frequency band designated (13.110-14.010MHz) which the EUT operated. The effects, if any, from frequency sweeping, frequency hopping, other modulation techniques and frequency stability over excepted variations in temperature and supply voltage were considered. The test plots are reported as below.



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	13.3438 MHz	65.39 dBµV		
D1	M1	1	435.0 kHz	-1.35 dB		
M2		1	13.5613 MHz	85.19 dBµV		

9.3 Discussion of Pulse Desensitization

Pulse desensitivity is not applicable for this device since the transmitter transmits the RF signal continuously.

9.4 Emissions Test Procedures

The following is a description of the test procedure used by Intertek Testing Services in the measurements of transmitters operating under Part 15, Subpart C rules.

The test set-up and procedures described below are designed to meet the requirements of ANSI C63.10 - 2013.

The transmitting equipment under test (EUT) is placed on a styrene turntable which is four feet in diameter and approximately 0.8 meter up to 1GHz in height above the ground plane. During the radiated emissions test, the turntable is rotated and any cables leaving the EUT are manipulated to find the configuration resulting in maximum emissions. The EUT is adjusted through all three orthogonal axes to obtain maximum emission levels. The antenna height and polarization are varied during the testing to search for maximum signal levels.

Detector function for radiated emissions is in peak mode. The frequency range scanned is from the lowest radio frequency signal generated in the device which is greater than 9 kHz up to the 1GHz.

The EUT is warmed up for 15 minutes prior to the test.

AC power to the unit is varied from 85% to 115% nominal and variation in the fundamental emission field strength is recorded. If battery powered, a new, fully charged battery is used.

The IF bandwidth used for measurement of radiated signal strength was 10 kHz for emission below 30 MHz and 120 kHz for emission from 30 MHz to 1000 MHz Where pulsed transmissions of short enough pulse duration warrant, a greater bandwidth is selected according to the recommendations of Hewlett Packard Application Note 150-2. A discussion of whether pulse desensitivity is applicable to this unit is included in this report (See Section 9.3).

Transmitter measurements are normally conducted at a measurement distance of three meters. However, to assure low enough noise floor in the restricted bands and above 1 GHz, signals are acquired at a distance of one meter or less. All measurements are extrapolated to three meters using inverse scaling, but those measurements taken at a closer distance are so marked.

10.0 Test Equipment List

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
SZ061-13	BiConiLog Antenna	ETS	3142E	00166158	13-Jul-2022	13-Jul-2025
SZ185-03	EMI Receiver	R&S	ESR7	101975	23-Apr-2024	23-Apr-2025
SZ061-06	Active Loop Antenna	Electro-Metrics	EM-6876	217	05-May-2024	05-May-2027
SZ056-03	Spectrum Analyzer	R & S	FSP30	101148	22-Apr-2024	22-Apr-2025
SZ181-08	Preamplifier	Agilent	83017A	MY57280108	29-Jul-2024	29-Jul-2025
SZ188-01	Anechoic Chamber	ETS	RFD-F/A-100	4102	12-Dec-2021	12-Dec-2024
SZ016-12	Temperature & Humidity Chamber	Terchy	MHK-120NK	AB0105	14-Dec-2023	14-Dec-2024
SZ062-23	RF Cable	RADIALL	SF104PE	--	30-Sep-2024	30-Sep-2025
SZ062-34	RF Cable	RADIALL	A50-3.5M3.5M-1M	--	30-Sep-2024	30-Sep-2025
SZ185-02	EMI Test Receiver	R&S	ESCI	100692	09-Jul-2024	09-Jul-2025
SZ187-01	Two-Line V-Network	R&S	ENV216	100072	24-Oct-2024	24-Oct-2025
SZ188-03	Shielding Room	ETS	RFD-100	4100	24-Oct-2024	24-Oct-2025
SZ006-05	DC Power Supply	Guwei	GPS-3030DD	E1811323	14-Dec-2023	14-Dec-2024