

## FCC PART 15.231


### TEST REPORT

For

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DISTRICT,QUANZHOU ,FU JIAN,China

**FCC ID: 2A2JD-F1**

<b>Report Type:</b> Original Report	<b>Product Type:</b> Wireless pager
<b>Report Number:</b> XMTN1210625-25457E-RF-00B	
<b>Report Date:</b> 2021-08-23	
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## GENERAL INFORMATION

### Product Description for Equipment under Test (EUT)

Product	Wireless pager
Tested Model	F1
Multiple Models	F3, F6
Model Difference	Refer to the DoS letter
Frequency Range	433.92MHz
Modulation Technique	OOK
Antenna Specification*	0dBi(It is provided by the applicant)
Voltage Range	DC 12V from battery
Date of Test	2021-07-24 to 2021-08-23
Sample serial number	XMTN1210625-25457E-RF-S1 (Assigned by BACL, Shenzhen)
Received date	2021-06-25
Sample/EUT Status	Good condition

### Objective

All the test measurements were performed according to the measurement procedure described in ANSI C63.10 - 2013.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, section 15.203, 15.205, 15.209, 15.35(c) and 15.231 rules.

### Test Methodology

All measurements contained in this report were conducted with ANSI C63.10 - 2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters. Each test item follows test standards and with no deviation.

**Measurement Uncertainty**

Parameter		Uncertainty
Occupied Channel Bandwidth		±5%
RF Output Power with Power meter		±0.5dB
RF conducted test with spectrum		±1.5dB
AC Power Lines Conducted Emissions		±1.95dB
Radiated Emissions	Below 1GHz	±4.75dB
	Above 1GHz	±4.88dB
Temperature		±3°C
Humidity		±6%
Supply voltages		±0.4%

*Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.*

**Test Facility**

The test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 5F(B-West) , 6F, 7F, the 3rd Phase of Wan Li Industrial Building D, Shihua Rd, FuTian Free Trade Zone, Shenzhen, China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 342867, the FCC Designation No.: CN1221.

The test site has been registered with ISED Canada under ISED Canada Registration Number 3062B.

## SYSTEM TEST CONFIGURATION

### Justification

The system was configured for testing by manufacturer.

Operating frequency: 433.92MHz

### Special Accessories

No special accessories was used

### Equipment Modifications

No modification was made to the EUT.

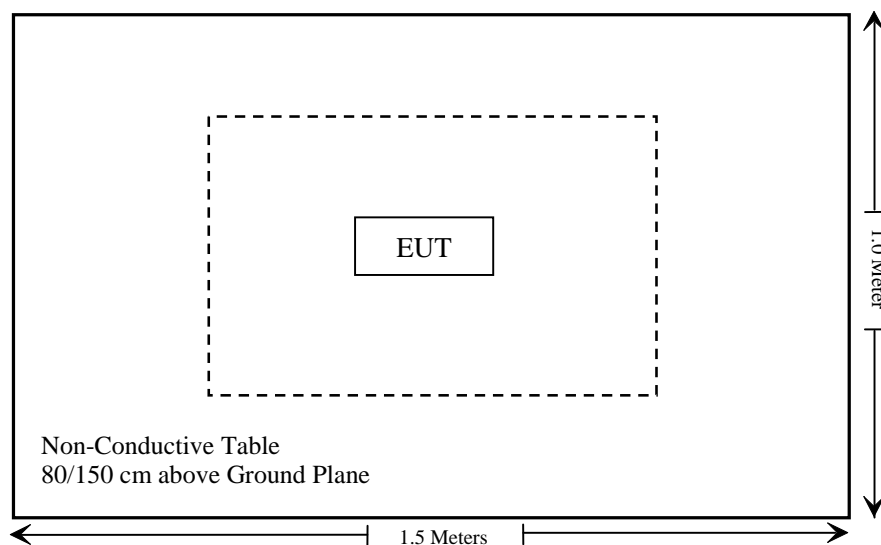
### Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
/	/	/	/

### External I/O Cable

Cable Description	Length (m)	From / Port	To
/	/	/	/

### Block Diagram of Test Setup



**SUMMARY OF TEST RESULTS**

FCC Rules	Description of Test	Result
§ 15.203	Antenna Requirement	Compliant
§ 15.207 (a)	Conducted Emissions	Not Applicable*
§ 15.205, § 15.209, § 15.231(b)	Radiated Emissions	Compliant
§ 15.231 (c)	20dB Emission Bandwidth	Compliant
§ 15.231 (a) (1)	Deactivation	Compliant

Not Applicable\*: The EUT was only powered by battery.

**TEST EQUIPMENT LIST AND DETAILS**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESR3	102455	2021/07/06	2022/07/05
Sonoma instrument	Pre-amplifier	310 N	186238	2020/08/03	2021/08/02
Sonoma instrument	Pre-amplifier	310 N	186238	2021/08/03	2022/08/02
Sunol Sciences	Broadband Antenna	JB1	A040904-2	2020/12/22	2023/12/21
Unknown	Cable 2	RF Cable 2	F-03-EM197	2020/11/29	2021/11/28
Unknown	Cable	Chamber Cable 4	EC-007	2020/11/29	2021/11/28
Rohde & Schwarz	Auto test software	EMC 32	V9.10.00	NCR	NCR
Rohde & Schwarz	Spectrum Analyzer	FSV40-N	102259	2021/07/06	2022/07/05
COM-POWER	Pre-amplifier	PA-122	181919	2020/11/29	2021/11/28
Sunol Sciences	Horn Antenna	3115	9107-3694	2021/01/15	2024/01/14
Insulted Wire Inc.	RF Cable	SPS-2503-3150	02222010	2020/11/29	2021/11/28
Unknown	RF Cable	W1101-EQ1 OUT	F-19-EM005	2020/11/29	2021/11/28

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

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## **FCC §15.203 - ANTENNA REQUIREMENT**

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### **Applicable Standard**

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.

### **Antenna Connector Construction**

The EUT has one internal antenna arrangement which was permanently attached. And the antenna gain is 0dBi; fulfill the requirement of this section. Please refer to EUT photos.

**Result:** Compliant.



## FCC §15.205, §15.209, §15.231 (b) - RADIATED EMISSIONS

### Applicable Standard

FCC §15.205, §15.209, §15.231 (b)

According to FCC §15.231(b), the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

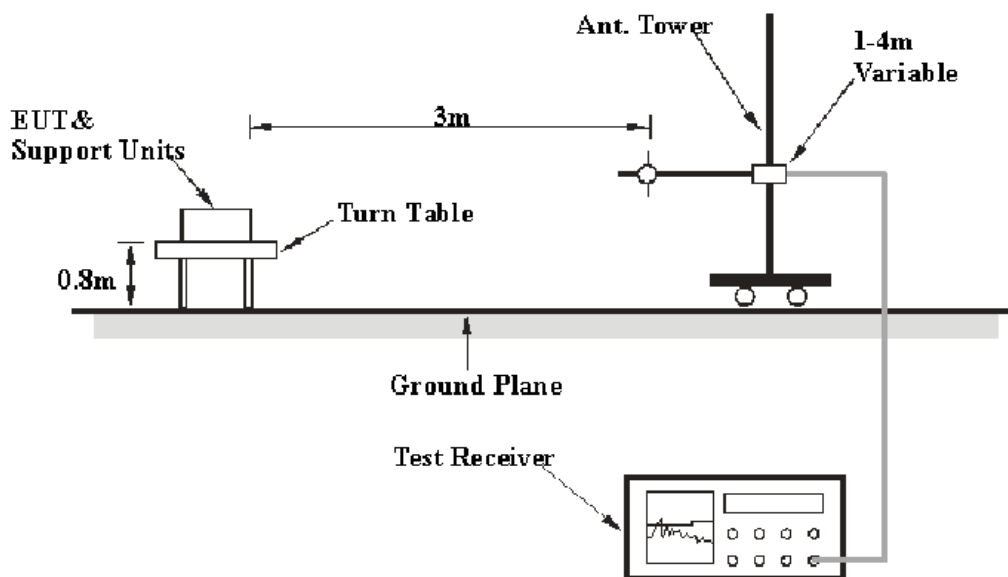
Fundamental frequency (MHz)	Field Strength of Fundamental (Microvolts /meter)	Field Strength of spurious emissions ((Microvolts /meter)
40.66-40.70	2250	225
70-130	1250	125
130-174	1250 to 3750**	125 to 375**
174-260	3750	375
260-470	3750 to 12500**	375 to 1250**
Above 470	12500	1250

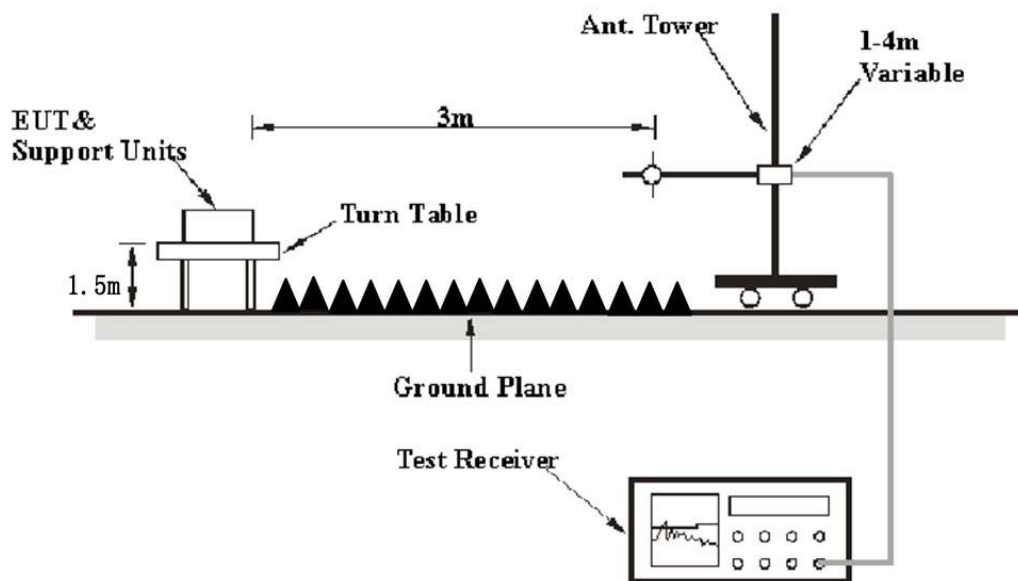
\*Linear interpolations.

The above field strength limits are specified at a distance of 3-meters the tighter limits apply at the band edges.

### EUT Setup

Below 1 GHz:



**Above 1 GHz:**

The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.10 - 2013. The specification used was the FCC 15 § 15.209, 15.205 and 15.231.

**EMI Test Receiver Setup**

The system was investigated from 30 MHz to 5 GHz.

During the radiated emission test, the test receiver was set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Measurement
30MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	PK
Above 1 GHz	1 MHz	3 MHz	/	PK

**Test Procedure**

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All final data was recorded in the Quasi-peak detection mode from 30MHz to 1GHz, Peak and average detection mode above 1 GHz.

## Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Loss and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Loss} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 5.8 dB means the emission is 5.8 dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

## Test Results Summary

According to the data in the following table, the EUT complied with the FCC §15.205, §15.209, §15.231 (b).

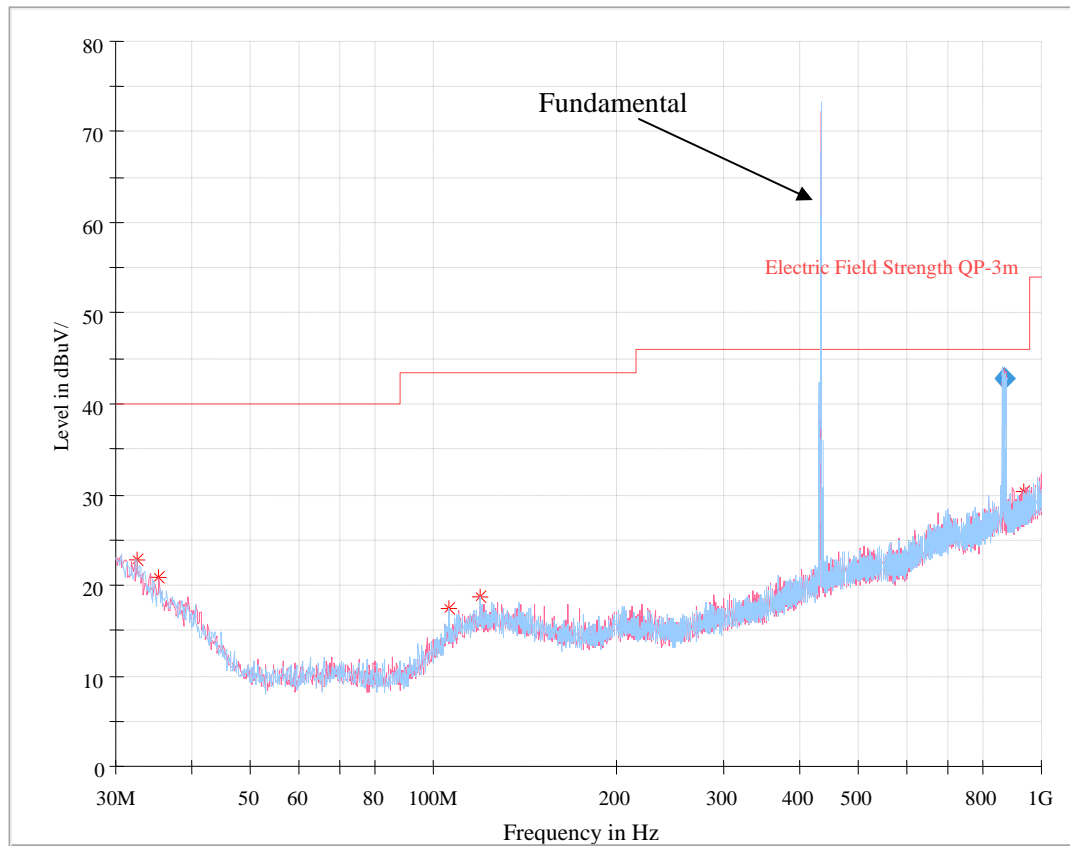
## Test Data

### Environmental Conditions

<b>Temperature:</b>	26~26.8°C
<b>Relative Humidity:</b>	51~56%
<b>ATM Pressure:</b>	101.0~101.2 kPa

*The testing was performed by Cloud Qiu on 2021-07-24 for below 1GHz and Dio Ding on 2021-08-07 for above 1GHz.*

*Test mode: Transmitting (Pre-scan in the X,Y and Z axes of orientation, the worst case X-axis of orientation was recorded)*

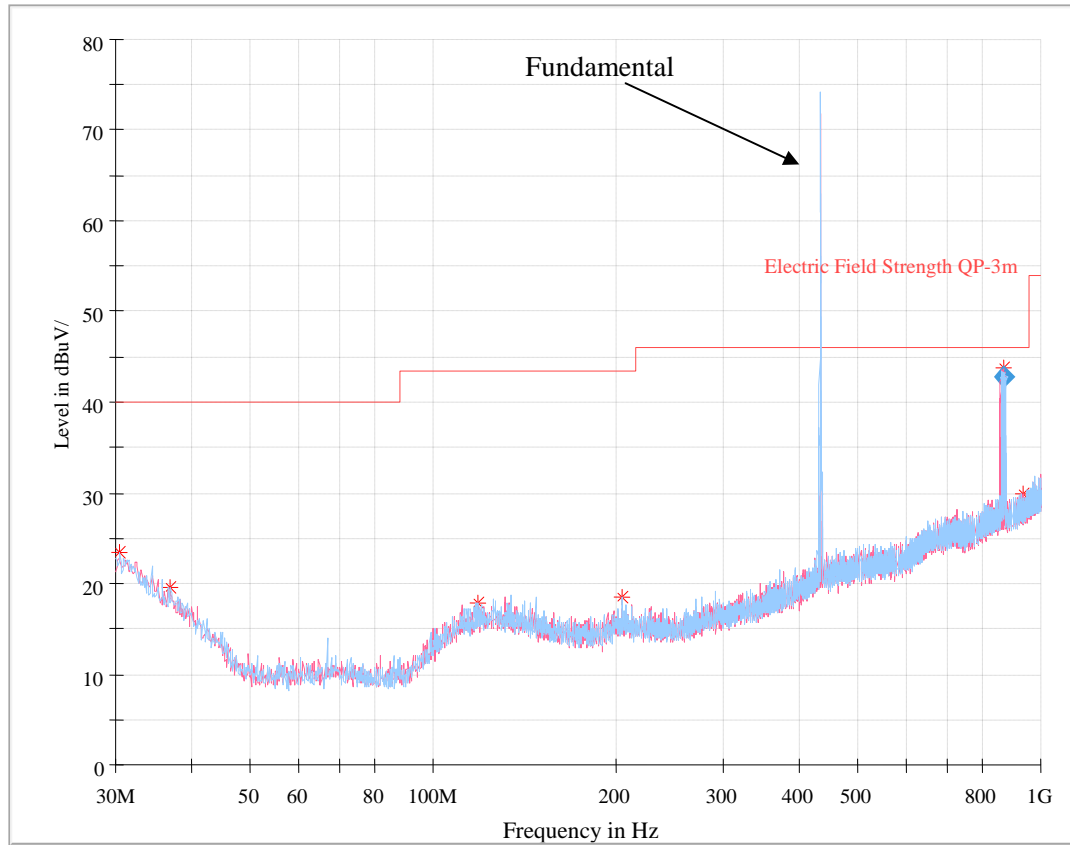
**30MHz – 1 GHz:****For F1:****Final Result**

Frequency (MHz)	QuasiPeak (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
867.554000	42.75	46.00	3.25	109.0	H	66.0	0.5

**Critical Freqs**

Frequency (MHz)	MaxPeak (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
32.425000	22.71	40.00	17.29	200.0	H	83.0	-5.4
35.335000	20.80	40.00	19.20	100.0	V	215.0	-7.5
106.266250	17.40	43.50	26.10	200.0	H	97.0	-12.1
119.361250	18.74	43.50	24.76	100.0	H	273.0	-10.4
935.737500	30.33	46.00	15.67	100.0	H	116.0	1.5

Note: the peak value can meet the limit of the QP value.

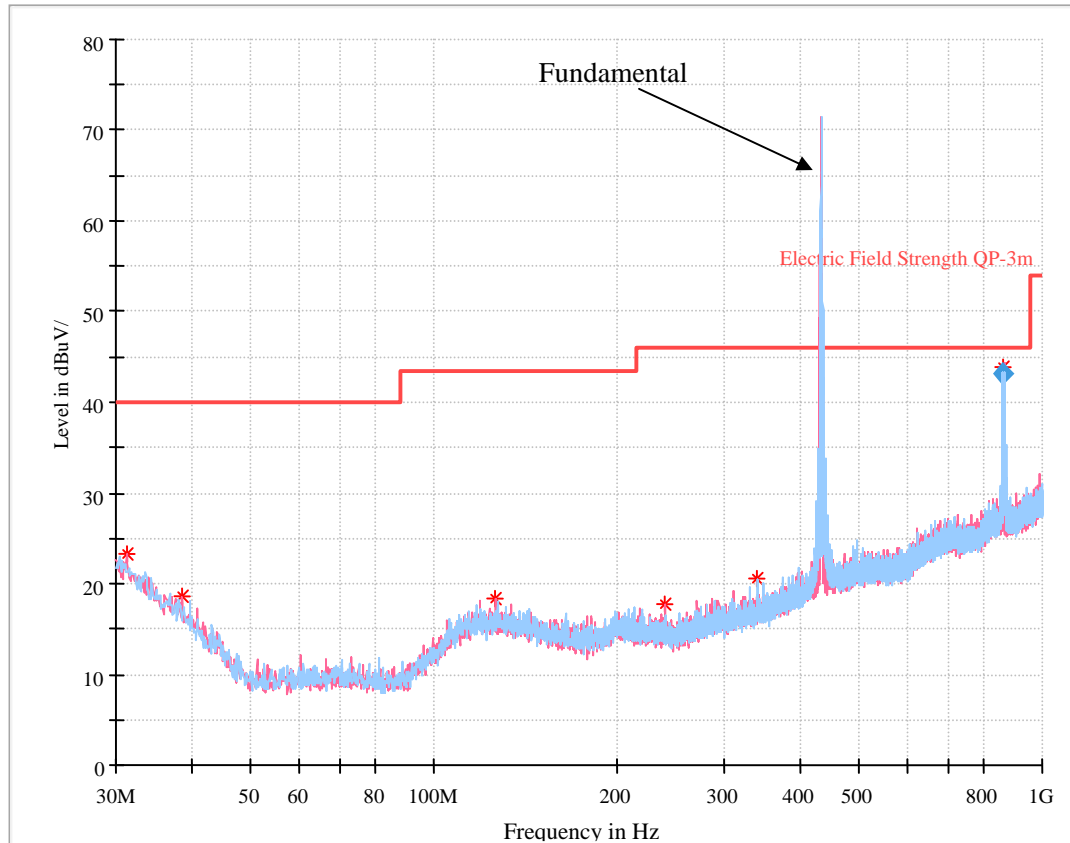
**For F3****Final\_Result**

Frequency (MHz)	QuasiPeak (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
867.538750	42.78	46.00	3.22	108.0	H	71.0	0.5

**Critical\_Freqs**

Frequency (MHz)	MaxPeak (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.485000	23.47	40.00	16.53	100.0	H	101.0	-3.9
36.911250	19.66	40.00	20.34	300.0	H	283.0	-8.5
118.512500	17.76	43.50	25.74	300.0	H	253.0	-10.5
204.115000	18.55	43.50	24.95	200.0	H	0.0	-11.1
935.858750	29.97	46.00	16.03	300.0	V	348.0	1.5

Note: the peak value can meet the limit of the QP value.

**For F6****Final\_Result**

Frequency (MHz)	QuasiPeak (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
867.496750	42.61	46.00	3.39	108.0	H	313.0	0.5

**Critical\_Freqs**

Frequency (MHz)	MaxPeak (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
31.333750	23.88	40.00	16.12	200.0	V	145.0	-4.6
38.608750	19.17	40.00	20.83	200.0	V	0.0	-9.6
126.393750	18.75	43.50	24.75	200.0	V	260.0	-10.3
240.490000	18.31	46.00	27.69	200.0	V	216.0	-11.7
339.308750	21.07	46.00	24.93	200.0	H	318.0	-9.1

Note: the peak value can meet the limit of the QP value.

**Fundamental:**

Frequency (MHz)	Receiver		Turn-Table	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.231(b)	
	Reading (dBμV)	PK/QP/Ave.	Angle Degree	Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
433.92MHz									
433.92	83.68	PK	288	2.2	H	-6.5	77.18	80.83	3.65
433.92	75.23	PK	256	1.8	H	-6.5	68.73	80.83	12.10

Note: the peak value can meet the limit of the QP value.

**1 GHz - 5 GHz:**

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.231(b)	
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
1301.76	49.24	PK	188	1.4	H	-3.28	45.96	54.00	8.04
1735.68	48.56	PK	188	1.4	H	-1.86	46.70	60.83	14.13
2169.60	43.43	PK	307	1.9	H	-0.06	43.37	60.83	17.46
2603.52	44.08	PK	307	1.9	H	0.83	44.91	60.83	15.92
3037.44	43.62	PK	71	2.0	H	1.94	45.56	60.83	15.27
3471.36	55.26	PK	71	2.0	H	3.13	58.39	60.83	2.44

**Note:**

All peak value can meet the limit of the average value.

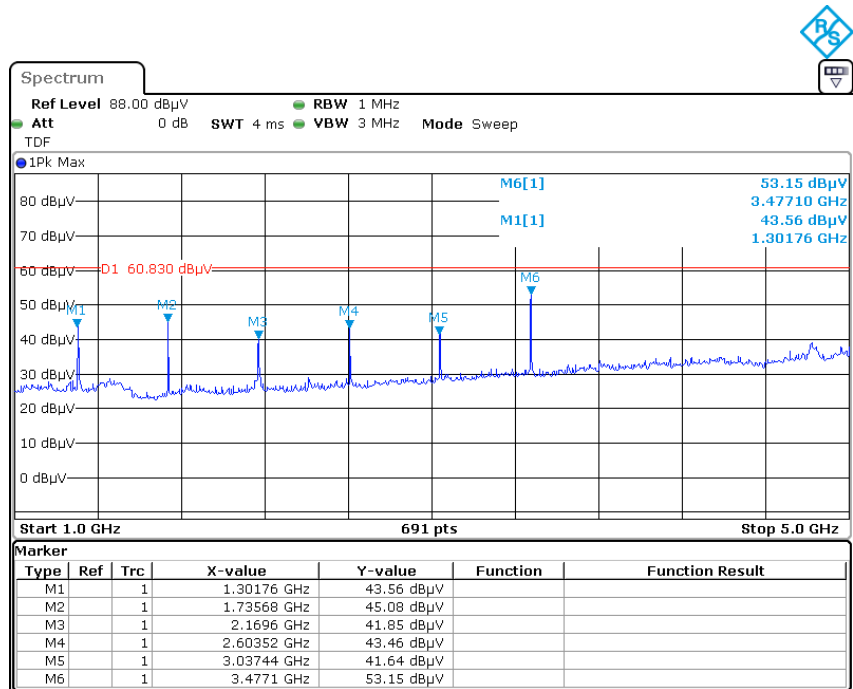
Corrected Amplitude = Corrected Factor + Reading

Corrected Factor=Antenna factor (RX) +cable loss – amplifier factor

Margin = Limit- Corr. Amplitude

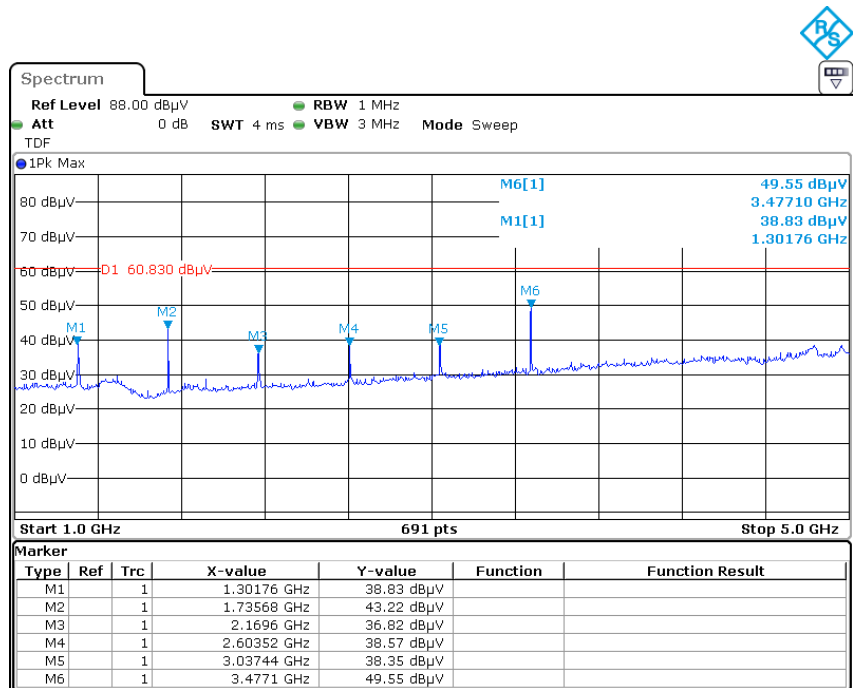
The emission more than 20dB below the limit was not required to be recorded.

## Pre-scan-Horizontal



Date: 7.AUG.2021 21:05:59

## Pre-scan – Vertical



Date: 7.AUG.2021 21:09:25



## FCC §15.231(a) (1) - DEACTIVATION TESTING

### Applicable Standard

Per FCC §15.231(a) (1), A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

### Test Procedure

1. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set center frequency of spectrum analyzer=operating frequency.
3. Set the spectrum analyzer as RBW=100kHz/ VBW=300kHz/ Span=0Hz.
4. Repeat above procedures until all frequency measured was complete.

### Test Data

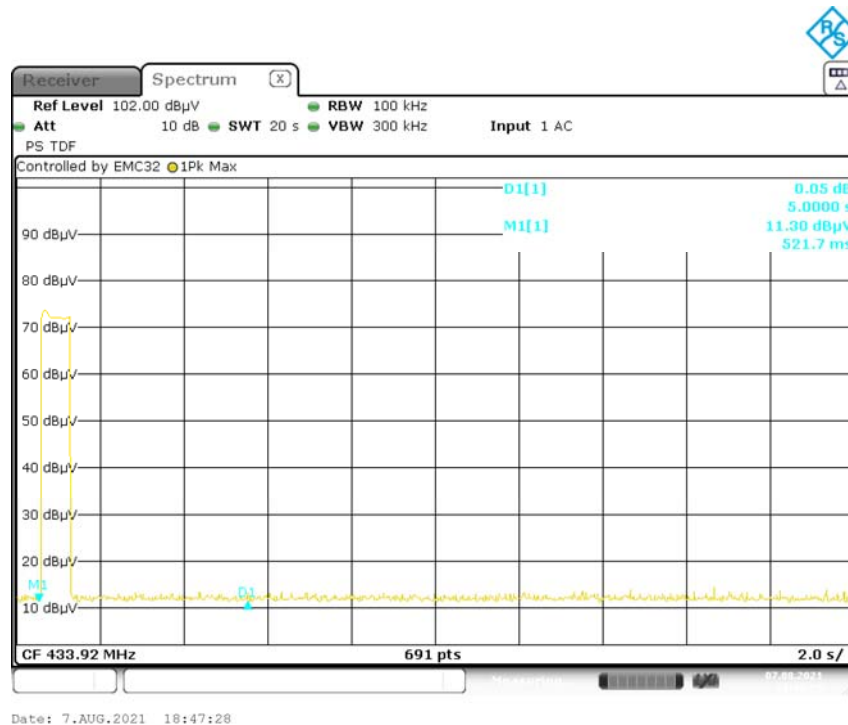
#### Environmental Conditions

Temperature:	26 °C
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by Cloud Qiu from 2021-08-07 to 2021-08-23.  
Test mode: Transmitting

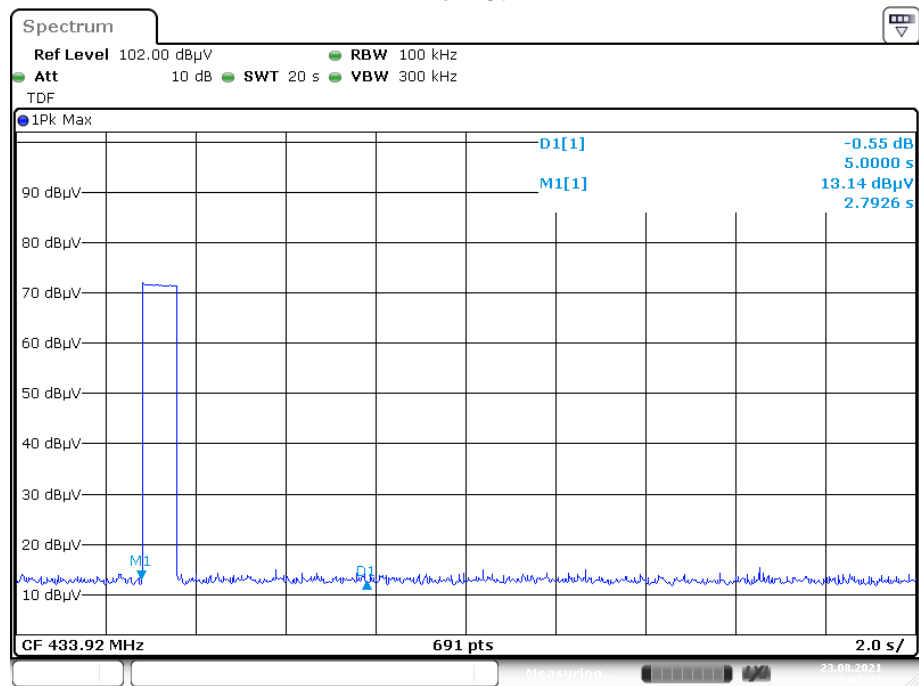
**Test Result:** Compliant. This product will cease transmission within 5 seconds after activation. Please refer to following plots.

For F1:



Date: 7.AUG.2021 18:47:28

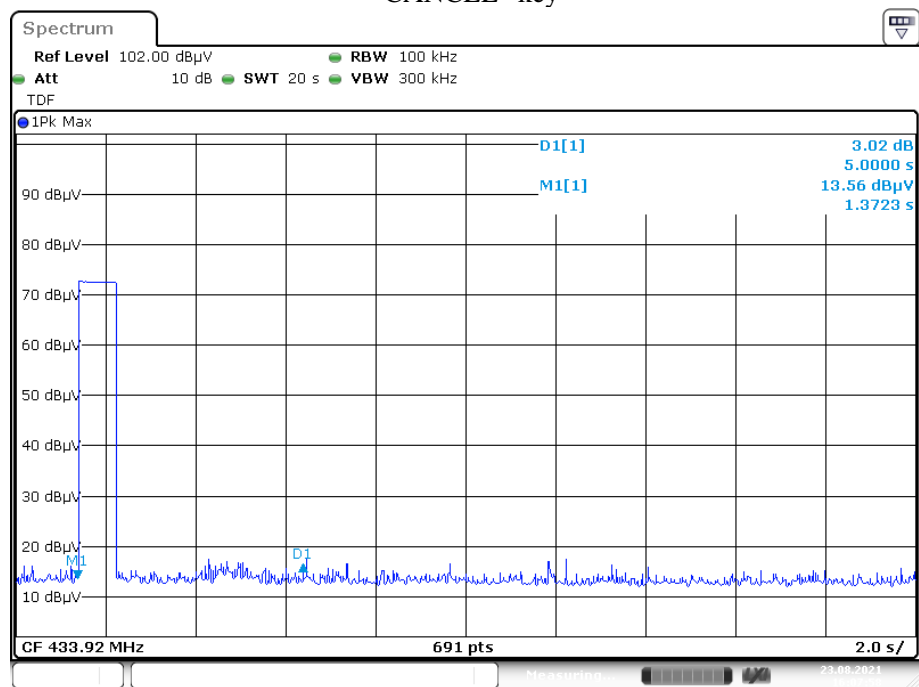
For F3:



Date: 23.AUG.2021 16:05:42

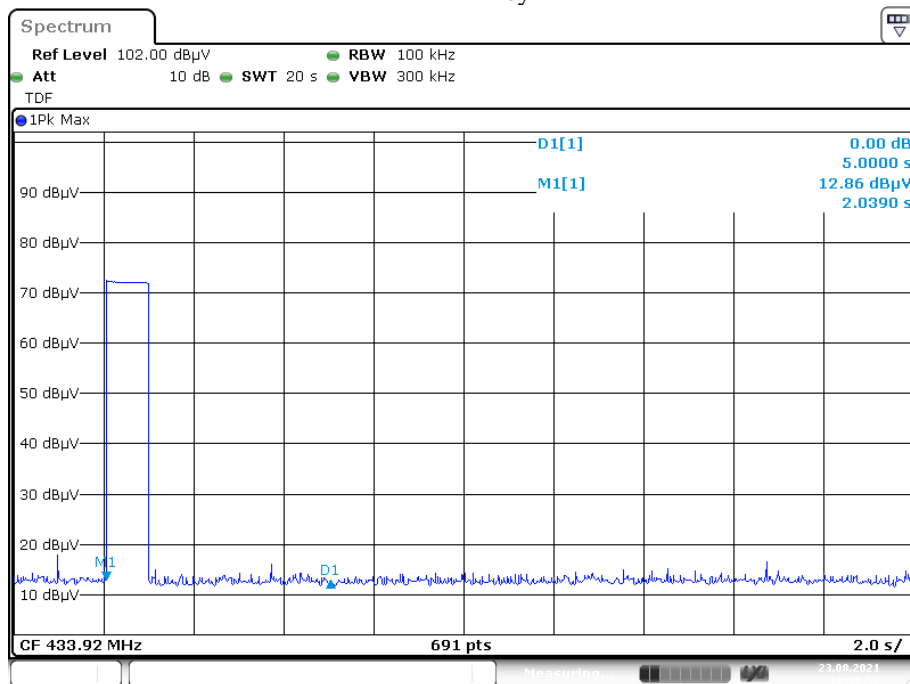
For F6:

“CANCEL” key



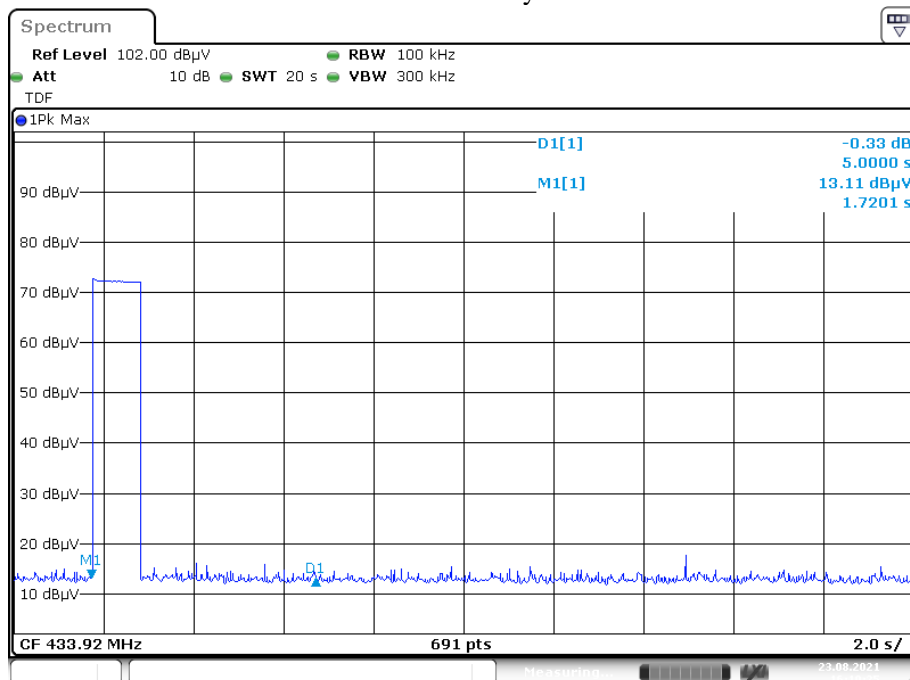
Date: 23.AUG.2021 16:07:58

“BILL” key



Date: 23.AUG.2021 16:08:53

“CALL” key



Date: 23.AUG.2021 16:10:25

## FCC §15.231(c) – 20 dB EMISSION BANDWIDTH TESTING

### Applicable Standard

Per 15.231(c), The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. Bandwidth is determined at the points 20 dB down from the modulated carrier.

### Test Procedure

The EUT is setting to the transmit mode, the waveform was received by the test antenna which was connected to the spectrum analyzer, plot the 20 dB bandwidth.

### Test Data

#### Environmental Conditions

<b>Temperature:</b>	26°C
<b>Relative Humidity:</b>	56 %
<b>ATM Pressure:</b>	101.0 kPa

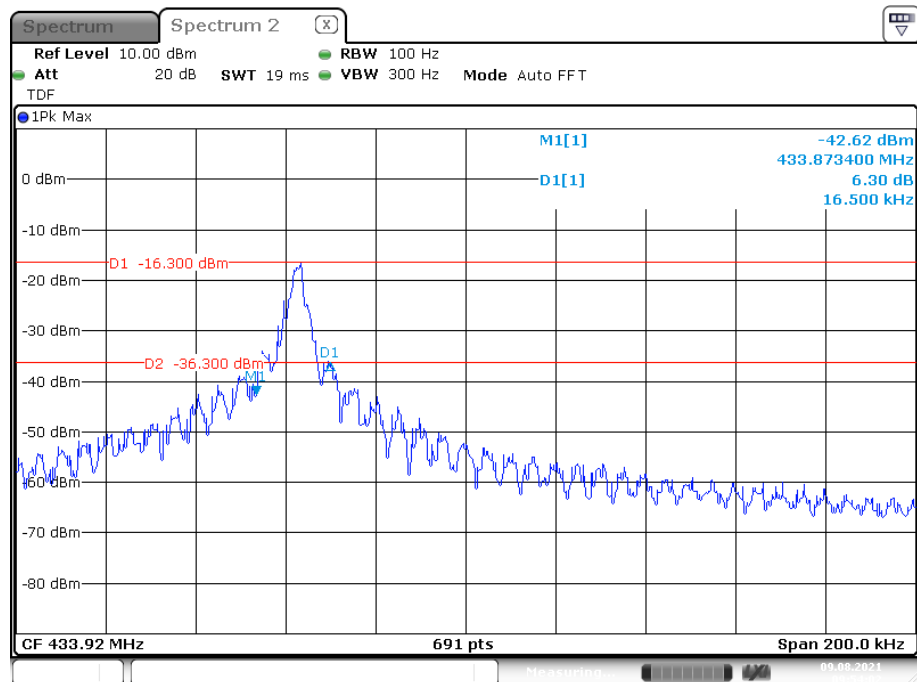
*The testing was performed by Cloud Qiu on 2021-08-09.*

*Test Mode: Transmitting*

Please refer to following table and plots.

Channel Frequency (MHz )	20 dB Emission Bandwidth (kHz)	Limit (kHz)	Result
433.92	16.5	<1084.8	Pass

### 20 dB Emission Bandwidth



Date: 9.AUG.2021 09:54:03

\*\*\*\*\* END OF REPORT \*\*\*\*\*