

FCC PART 15C

TEST REPORT

For

Chengdu Vantron Technology, Ltd.

No.5 GaoPeng Road, Hi-Tech Zone, Chengdu, SiChuan, P.R. China 610045

FCC ID: 2AAGE5081G

Report Type: Original Report	Product Name: Tablet
Report Number: RSC191025001-0F	
Date of Report Issue: 2019-12-10	
Reviewed By: Sula Huang 	
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant	Chengdu Vantron Technology, Ltd.
Product	Tablet
Tested Model	VT-TABLET-5081G
FCC ID	2AAGE5081G
Voltage Range	DC 3.8V rechargeable Li-ion battery or DC5V from adapter
Measure approximately	246 mm (L) x 151 mm (W) x 23.5 mm (H)
Frequency	NFC: 13.56 MHz
Modulation Type:	ASK
Sample serial number	191025001/01 (assigned by the BACL, Chengdu)
Sample/EUT Status	The test sample was in good condition and received:2019-10-25

Note: Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Objective

This Type approval report is prepared on behalf of **Chengdu Vantron Technology, Ltd.** in accordance with Part 2, Subpart J, and Part 15, Subparts A and C of the Federal Communications Commission's rules.

The objective is to determine the compliance of the EUT with FCC rules, sec 15.203, 15.205, 15.207, 15.209 and 15.225.

Related Submittal(s)/Grant(s)

FCC Part 15C DSS submissions with FCC ID: 2AAGE5081G
FCC Part 15C DTS submissions with FCC ID: 2AAGE5081G
FCC Part 15E NII submissions with FCC ID: 2AAGE5081G

Measurement Uncertainty

Item			Uncertainty
Power line conducted emission			2.24 dB
Radiated Emission(Field Strength)	9 kHz-30 MHz		4.24 dB
	30MHz-200MHz	H	4.47 dB
		V	4.73 dB
	200MHz-1GHz	H	4.87 dB
		V	5.93 dB
Occupied Bandwidth			±5%
Humidity			±5%
Temperature			±1°C

Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the corresponding inclusion factor K when the inclusion probability is about 95%.

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 and Bay Area Compliance Laboratories Corp. (Chengdu). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Chengdu) to collect test data is located No.5040, Huilongwan Plaza, No. 1, Shawan Road, Jinniu District, Chengdu, Sichuan, China.

Bay Area Compliance Laboratories Corp. (Chengdu) lab is accredited to ISO/IEC 17025 by A2LA (Lab code: 4324.01) and the FCC designation No. CN1186 under the FCC KDB 974614 D01. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

SYSTEM TEST CONFIGURATION

Justification

The system was configured for testing in a test mode

EUT Exercise Software

No

Support Equipment List and Details

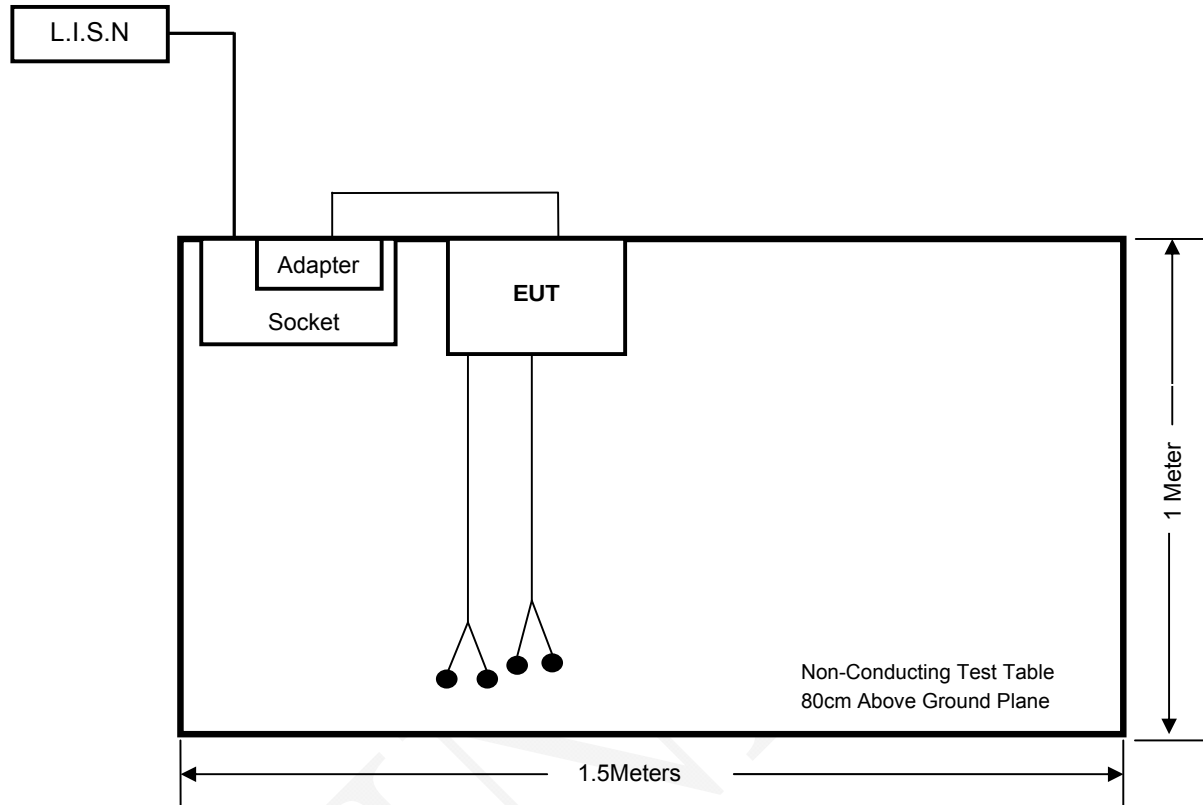
Manufacturer	Description	Model	Serial Number
XIAOMI	Adapter Input: 100-240VAC, 50/60Hz,0.5A Output:5V,2A/9V,1.2A/12V,1A	MD3-03-EB	14102116834
SAMSUNG	Wireless Charger	EP-PN920	Unknown
Huawei	Earphone	Unknown	Unknown
SS	Earphone	Unknown	Unknown

External I/O Cable

Cable Description	Length (m)	From	To
Unshielded Power Cable	1.8	Adapter	EUT
Unshielded Earphone Cable*2	1.5	EUT	Earphone

Block Diagram of Test Setup

For AC Line Conducted Emission



Test Equipments List

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted Emission					
Rohde & Schwarz	EMI Test Receiver	ESCI	100028	2019-04-15	2020-04-14
ROHDE&SCHWARZ	L.I.S.N.	ENV216	3560.6550.16	2019-02-25	2020-02-24
HP	RF Limiter	11947A	3107A01270	2019-10-18	2020-10-17
Unknown	Conducted Cable	L-E003	000003	2019-08-05	2020-08-04
Rohde & Schwarz	EMC32	EMC32	V 8.52.0	NCR	NCR
Radiated Emission					
EMCT	Semi-Anechoic Chamber	966	001	2017-05-18	2020-05-17
Rohde & Schwarz	EMI Test Receiver	ESR 3	102456	2019-04-15	2020-04-14
EMCO	Active Loop Antenna	6507	9506-1345	2019-8-26	2020-08-25
SONOMA INSTRUMENT	Amplifier	310 N	186684	2019-09-06	2020-09-05
SUNOL SCIENCES	Broadband Antenna	JB3	A121808	2017-05-19	2020-05-18
Unknown	RF Cable (Below 1GHz)	L-E005	000005	2018-11-27	2019-11-26
Unknown	RF Cable (Below 1GHz)	T-E128	000128	2019-10-17	2020-10-16
Unknown	RF Cable (Below 1GHz)	T-E237	233522-001	2019-07-19	2020-07-18
Rohde & Schwarz	EMC32	EMC32	V9.10.00	NCR	NCR
Frequency Stability Test					
Rohde & Schwarz	Spectrum Analyzer	FSEM30	100018	2019-04-15	2020-04-14
WEINSCHL ENGINEERING	Attenuator	1A 10dB	AB1165	2019-08-05	2020-08-04
EMCO	Active Loop Antenna	6507	9506-1345	2019-08-26	2020-08-25
ZhaoXin	DC Power supply	RXN-305D	20141218916	2019-05-18	2020-05-17
Shenzhen BACL	High Temperature Test Chamber	BTH-150	30024	2019-04-15	2020-04-14
FLUKE	Digital Multimeter	FLUKE 1587	27870099	2019-05-07	2020-05-06

SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliance
§15.207	AC Line Conducted Emission	Compliance
§15.225 §15.209 §15.205	Radiated Emission Test	Compliance
§15.225(e)	Frequency Stability	Compliance
§15.215(c)	20 dB Emission Bandwidth	Compliance

Note: Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

FCC§15.203 - ANTENNA REQUIREMENT

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 Connected Construction

The EUT has one WIFI antenna, one WIFI/Bluetooth antenna, four 4G antennas and one NFC antenna, which are permanently attached and fulfill the requirement of this section. Please refer to the table below and EUT photos.

Antenna	Manufacturer	Antenna Model Number	Max. Antenna Gain	Antenna Type
2.4G/5G WIFI; Bluetooth Antenna (Chain 0)	Dongguan Yijia Electronics communication Technology Co.,Ltd	YJS01.042.002.305C	2.4G:1.1dBi 5G: 4.6dBi	FPC Antenna
2.4G/5G WIFI Antenna (Chain 1)		YJS01.042.002.306C	2.4G: 0.7dBi 5G: 2.7dBi	
4G Antenna (Diversity)	Dongguan Yijia Electronics communication Technology Co.,Ltd	YJS01.042.002.301C	1.9dBi	FPC Antenna
4G Antenna (Main)		YJS01.042.002.302C	2.1dBi	
4G Antenna (Diversity)		YJS01.042.002.303C	1.9dBi	
4G Antenna (Diversity)		YJS01.042.002.304C	1.9dBi	
NFC Antenna	SHENZHEN SUNSHINE GOOD ELECTRONICS CO.,LTD	P134FQ2137A0	0dBi	FPC Antenna

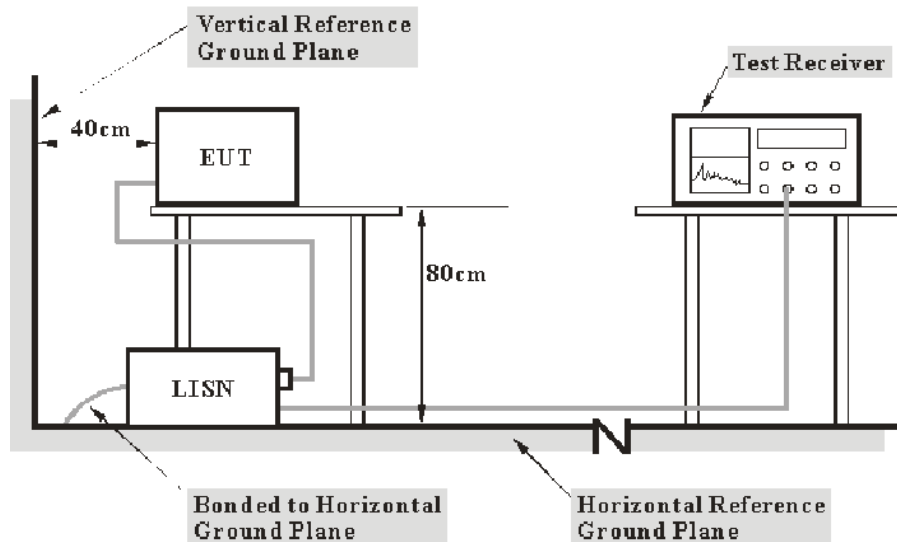
Result: Compliance.

FCC §15.207 – AC LINE CONDUCTED EMISSION

Applicable Standard

FCC §15.207

EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

The adapter was connected to a 120 VAC/60 Hz power source.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

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

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

During the conducted emission test, the adapter was connected to the outlet of the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

According FCC publication number 174176, for a device with a permanent antenna operating at or below 30 MHz, the measurements done with a suitable dummy load, in lieu of the permanent antenna under the following conditions: (1) perform the AC line conducted tests with the permanent antenna to determine compliance with the Section 15.207 limits outside the transmitter's fundamental emission band; (2) retest with a dummy load in lieu of the permanent antenna to determine compliance with the Section 15.207 limits within the transmitter's fundamental emission band.

Corrected Amplitude & Margin Calculation

The basic equation is as follows:

$$V_C = V_R + A_C + VDF$$

Herein,

V_C : corrected voltage amplitude

V_R : reading voltage amplitude

A_C : attenuation caused by cable loss

VDF: voltage division factor of AMN or ISN

The “**Margin**” column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit.

The equation for margin calculation is as follows:

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

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207.

Test Data

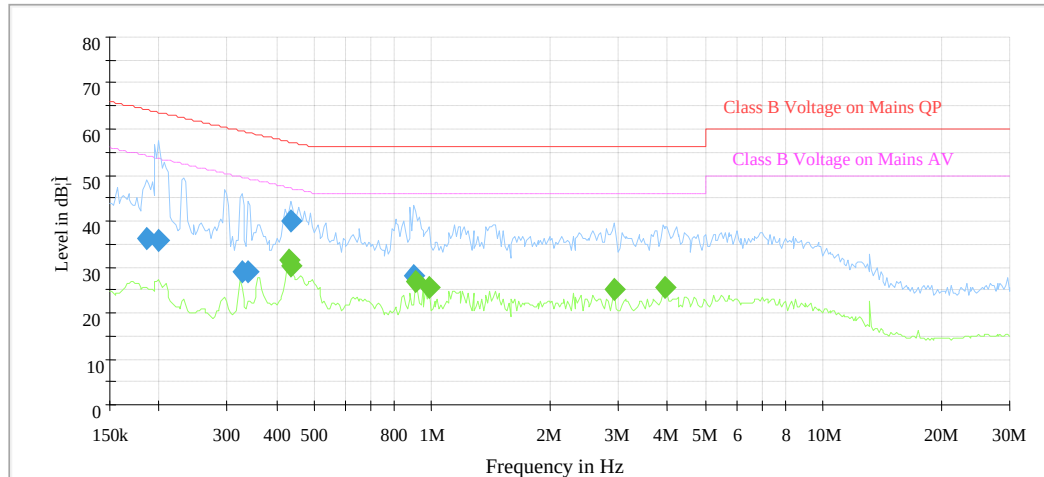
Environmental Conditions

Temperature:	23 °C
Relative Humidity:	64 %
ATM Pressure:	94.8 kPa

The testing was performed by Eric Xiao on 2019-11-24.

Test Mode: Charging & Transmitting

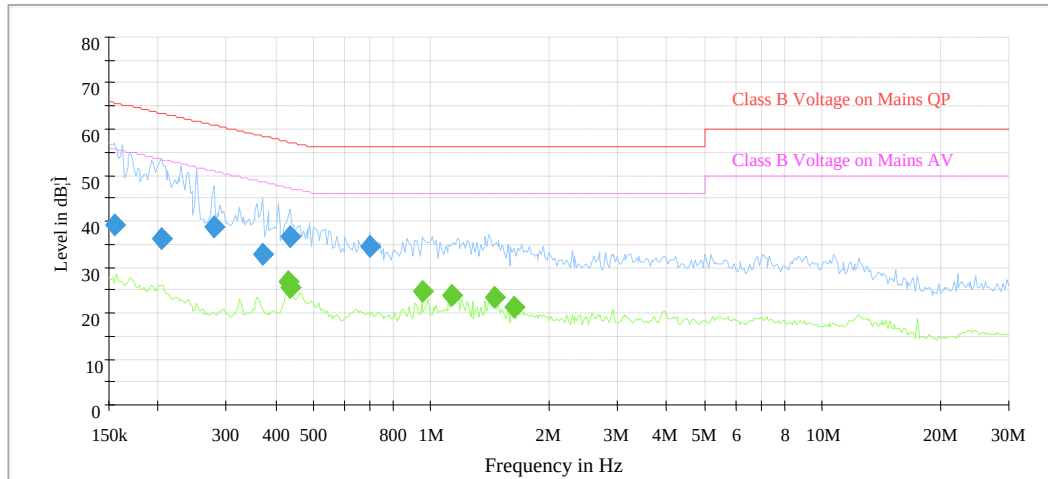
AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dB µ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)
0.186708	36.3	L1	19.6	27.9	64.2
0.200176	35.9	L1	19.6	27.7	63.6
0.325956	29.1	L1	19.6	30.5	59.6
0.339191	28.9	L1	19.6	30.3	59.2
0.434989	39.8	L1	19.6	17.4	57.2
0.899371	28.1	L1	19.6	27.9	56.0

Frequency (MHz)	Average (dB µ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)
0.430682	31.7	L1	19.6	15.5	47.2
0.434989	30.2	L1	19.6	17.0	47.2
0.908365	26.7	L1	19.6	19.3	46.0
0.983629	25.4	L1	19.6	20.6	46.0
2.909785	25.2	L1	19.6	20.8	46.0
3.921951	25.3	L1	19.6	20.7	46.0

AC120 V, 60 Hz, Neutral:



Frequency (MHz)	QuasiPeak (dB µ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)
0.154545	39.4	N	19.6	26.4	65.8
0.204199	36.2	N	19.6	27.2	63.4
0.277982	38.7	N	19.6	22.2	60.9
0.370968	32.7	N	19.6	25.8	58.5
0.434989	36.4	N	19.6	20.8	57.2
0.694357	34.4	N	19.7	21.6	56.0

Frequency (MHz)	Average (dB µ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)
0.430682	26.8	N	19.6	20.4	47.2
0.434989	25.3	N	19.6	21.9	47.2
0.945248	24.6	N	19.6	21.4	46.0
1.130656	23.8	N	19.7	22.2	46.0
1.449989	23.6	N	19.6	22.4	46.0
1.633884	21.2	N	19.6	24.8	46.0

Note:

- 1) Corrected Amplitude = Reading + Correction Factor
- 2) Correction Factor = LISN VDF (Voltage Division Factor) + Cable Loss + Transient Limiter
- 3) Margin = Limit – Corrected Amplitude

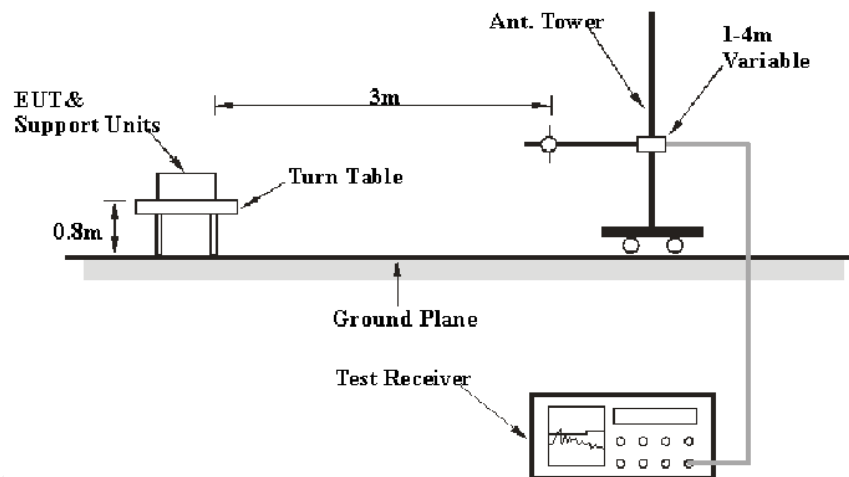
FCC§15.225, §15.205 & §15.209 - RADIATED EMISSIONS TEST

Applicable Standard

As per FCC Part 15.225

- (a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.
- (b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.
- (c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.
- (d) The field strength of any emissions appearing outside of the 13.110–14.010 MHz band shall not exceed the general radiated emission limits in §15.209.

EUT Setup



All measurements contained in this report were conducted with ANSI C63.10-2013. The specification used was the FCC Part Subpart C limits.

The spacing between the peripherals was 10 cm.

The adapter was connected to 120VAC/60Hz power source.

EMI Test Receiver Setup

The system was investigated from 9 kHz to 1 GHz.

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

Frequency Range	RBW	Video B/W	Detector
9 kHz – 150 kHz	200 Hz	1 kHz	QP
150 kHz – 30 MHz	9 kHz	30 kHz	QP
30 MHz – 1000 MHz	120 kHz	300 kHz	QP

If the maximized peak measured value complies with under the QP/Average limit more than 6dB, then it is unnecessary to perform an QP/Average measurement.

Corrected Amplitude & Margin Calculation

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

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

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the maximum 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 Part 15.209;15.225.

Test Data

Environmental Conditions

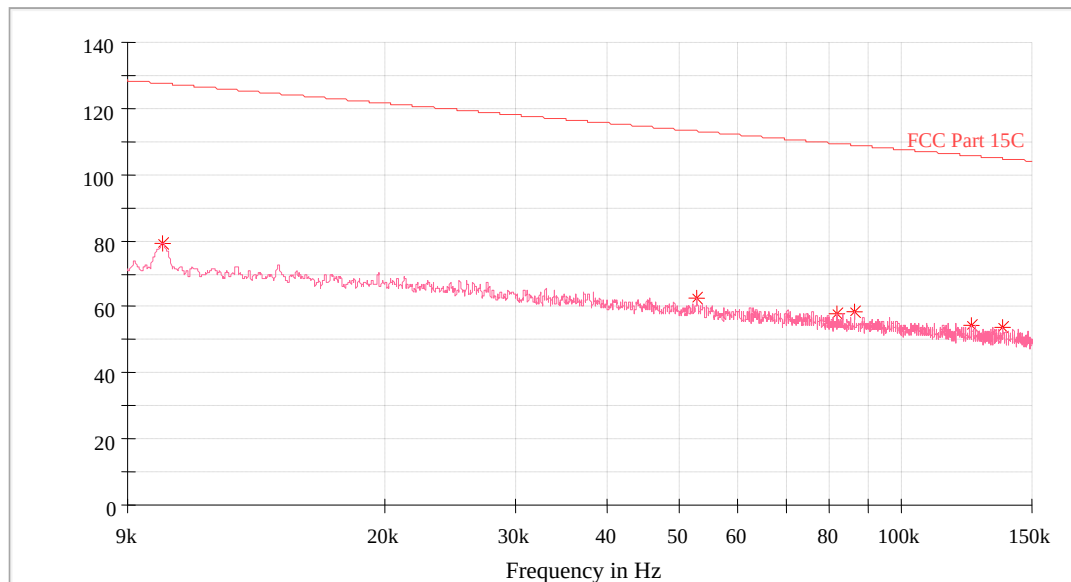
Temperature:	25°C
Relative Humidity:	65 %
ATM Pressure:	95.3 kPa

* The testing was performed by Eric Xiao on 2019-11-24.

Test mode: Transmitting

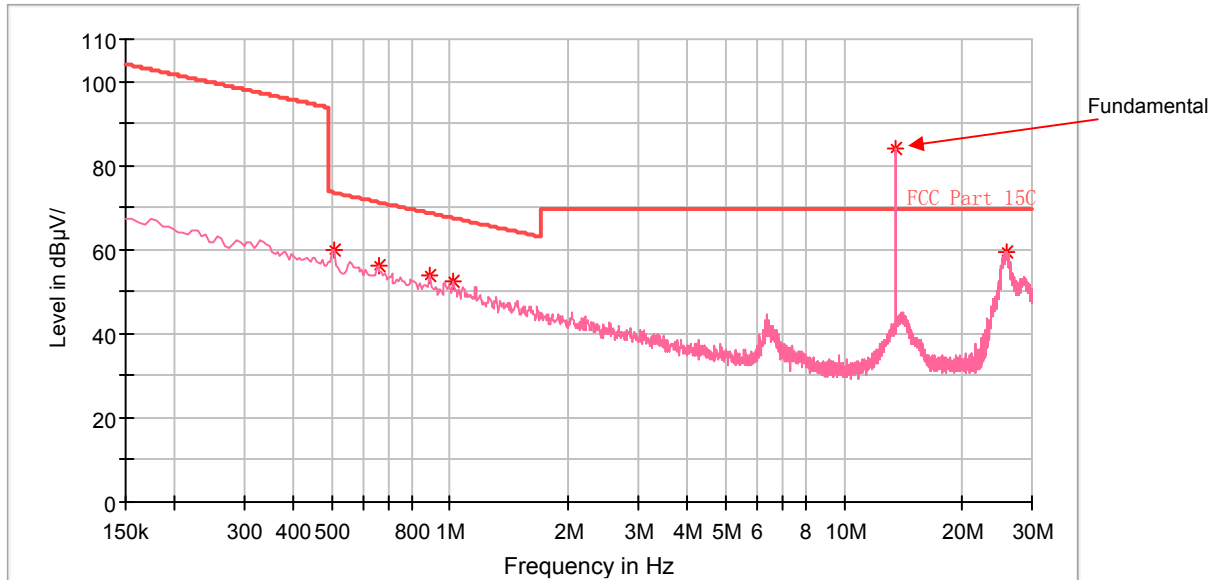
1) Radiated Emissions (9 kHz ~30 MHz):

9kHz-150kHz



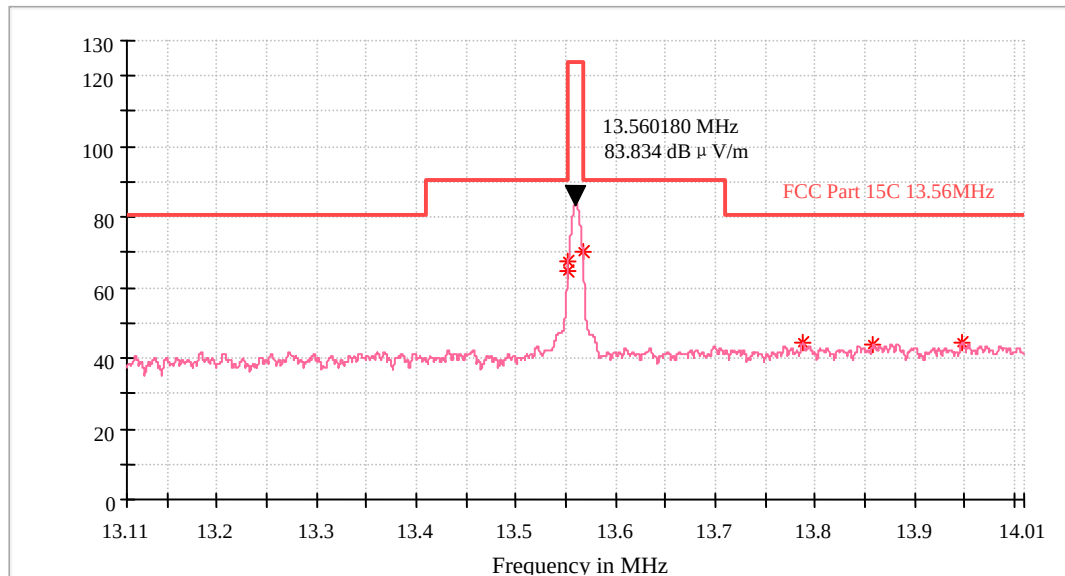
Frequency (MHz)	MaxPeak (dB μV/m)	Limit (dB μV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Corr. (dB/m)
0.010058	79.42	127.54	48.11	102.0	93.0	23.9
0.052922	62.48	113.12	50.64	102.0	56.0	16.2
0.081650	58.10	109.36	51.26	102.0	165.0	15.8
0.086286	58.50	108.88	50.38	102.0	284.0	15.8
0.124585	54.24	105.69	51.45	102.0	287.0	15.8
0.136905	53.68	104.87	51.19	102.0	299.0	15.8

150kHz-30MHz



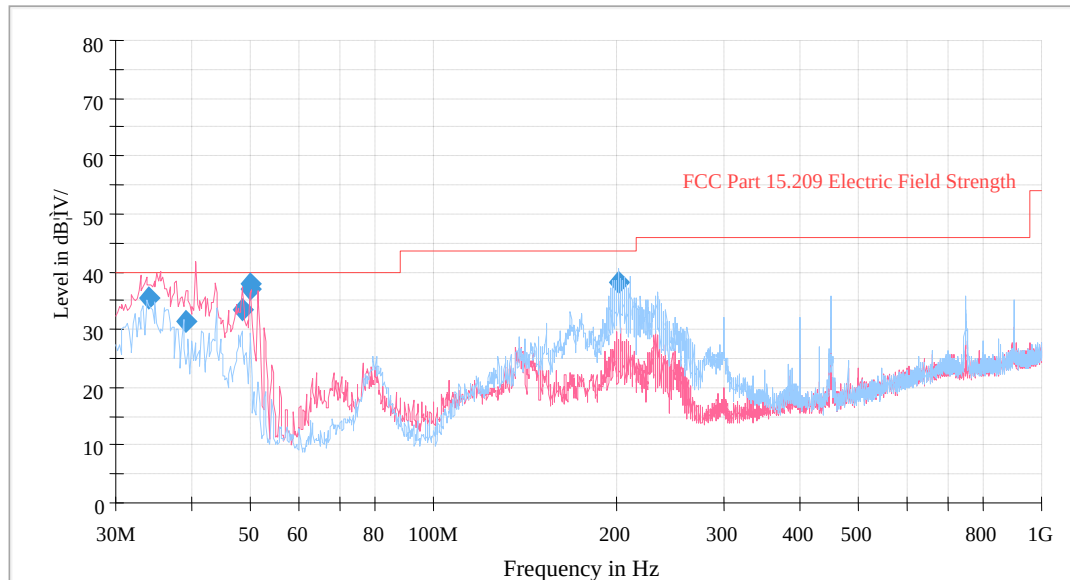
Frequency (MHz)	MaxPeak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Corr. (dB/m)
0.508200	59.71	73.48	13.78	102.0	236.0	15.8
0.657450	56.13	71.25	15.13	102.0	81.0	15.9
0.890280	54.01	68.63	14.62	102.0	304.0	16.0
1.021620	52.36	67.44	15.08	102.0	109.0	16.0
13.558620	83.81	124.0	40.19	102.0	21.0	16.0
25.779210	59.57	69.50	9.93	102.0	230.0	16.1

Emission Mask (13.11MHz -14.01MHz)



Frequency (MHz)	MaxPeak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Corr. (dB/m)
13.552440	64.81	90.47	25.66	102.0	0.0	16.0
13.552980	67.26	90.47	23.21	102.0	0.0	16.0
13.567020	70.38	90.47	20.09	102.0	6.0	16.0
13.788060	44.30	80.50	36.20	102.0	0.0	16.0
13.858980	43.95	80.50	36.55	102.0	0.0	16.1
13.948080	44.30	80.50	36.20	102.0	0.0	16.1
13.56.0180	83.83	124.00	40.17	102.0	21.0	16.0

2) Radiated Emissions (30 MHz ~1 GHz):



Frequency (MHz)	QuasiPeak (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
34.115600	35.55	40.00	4.45	103.0	V	2.0	-7.7
39.211400	31.56	40.00	8.44	105.0	V	14.0	-10.6
48.582700	33.45	40.00	6.55	103.0	V	313.0	-16.1
49.998700	38.77	40.00	1.23	105.0	V	148.0	-16.8
50.003600	38.78	40.00	1.78	103.0	V	142.0	-16.8
201.546200	38.13	43.50	5.37	124.0	H	20.0	-12.4

Note:

Corrected Amplitude = Corrected Factor + Reading

Corrected Factor=Antenna factor (RX) + Cable Loss – Amplifier Factor

Margin = Limit- Corrected Amplitude

FCC§15.225(e) - FREQUENCY STABILITY

Applicable Standard

The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency over a temperature variation of -20 degrees to $+50$ degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to DC power supply source which connected to an external AC power supply and loop antenna was connected to a Spectrum Analyzer.

The EUT was placed inside the temperature chamber.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the Spectrum Analyzer.

Frequency Stability vs. Voltage: An external variable DC power supply Source. The voltage was set to 115% of the nominal value and was then decreased until the transmitter light no longer illuminated; i.e., the end point. The output frequency was recorded for each voltage.

Test Data

Environmental Conditions

Temperature:	25°C
Relative Humidity:	65 %
ATM Pressure:	95.3 kPa

* The testing was performed by Eric Xiao on 2019-11-24.

Test Mode: Transmitting

Test Result: Compliant. Please refer to the below table.

$f_0 = 13.56 \text{ MHz}$				
Temperature	Voltage	Measured Frequency	Frequency Error	Limit
°C	Vdc	MHz		
-20	3.8	13.56042	0.0031%	$\pm 0.01\%$
-10		13.56005	0.0004%	
0		13.56028	0.0021%	
10		13.56056	0.0041%	
20		13.56044	0.0032%	
30		13.56087	0.0064%	
40		13.56041	0.0030%	
50		13.56087	0.0064%	
20	4.2	13.56018	0.0013%	
	3.5	13.56061	0.0045%	

Note: The extreme temperature and voltage condition was declared by manufacturer.

FCC §15.215(c) – 20 dB EMISSION BANDWIDTH

Applicable Standard

Per FCC §15.215 (c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §15.217 through § 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of band operation.

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.

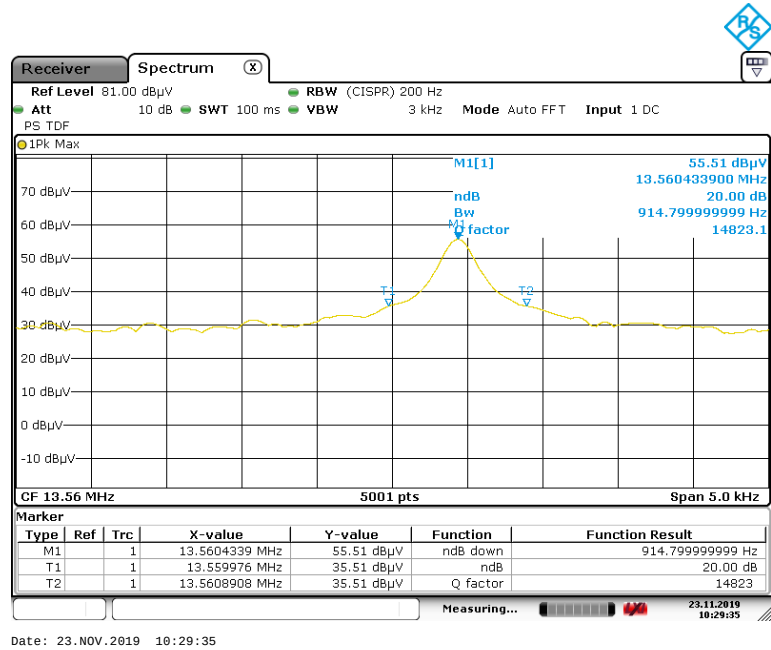
Test Data

Temperature:	24°C
Relative Humidity:	66 %
ATM Pressure:	95.2 kPa

* The testing was performed by Eric Xiao on 2019-11-23.

Test Mode: Transmitting

20 dB Emission Bandwidth



END OF REPORT