Fangguang Inspection & Testing Co., Ltd.
Phone: +86-510-68790033
Web: www.fgtest.cn

Testing
NVLAP LAB CODE 600222-0

FCC TEST REPORT

FCC CFR Title 47 Part 15 Subpart B:2017 Class B /ICES 003 Issue 6 2017 Class B

Report No.: S202007015697E01
Report Version: V02
Issue Date: 12-27-2021

Applicant:	Hesai Technology Co., Ltd.
Address:	No. 2 Building, No. 468 Xinlai Road, Jiading District, Shanghai City, China

Application Type:	FCC ID Certification
FCC ID:	2ASO2PANDARXT
Product:	Rangefinder
Model No.:	PandarXT
FCC Rule Part(s):	CFR Title 47 Part 15 Subpart B:2017 Class B
IC Rule Part(s):	ICES 003 Issue 6 2017 Class B
Test Procedure(s):	ANSI C63.4: 2014
Result:	Pass
Test Date:	June 22 ~ July 03, 2020

Compiled By: Line Chen
(Line Chen)
Senior Test Engineer

Approved By: Kerry Zhou
(Kerry Zhou)
Senior Test Engineer

FANGGUANG INSPECTION & TESTING CO.,LTD. APPROVED(02)

The test results relate only to the samples tested.
This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4-2014. Test results reported herein relate only to the item(s) tested.

Revision History

Report No.	Version	Description	Issue Date
S202007015697E01	Rev. 01	/	07-15-2020
S202007015697E01	Rev. 02	1、Revised the name and address of the applicant 2、Deleted the EUT photos	12-27-2021

CONTENTS

Description Page

1. General Information

Applicant:	Hesai Technology Co., Ltd.
Applicant Address:	No. 2 Building, No. 468 Xinlai Road, Jiading District, Shanghai City, China
Manufacturer:	Hesai Technology Co., Ltd.
Manufacturer Address:	No. 2 Building, No. 468 Xinlai Road, Jiading District, Shanghai City, China
Factory:	Hesai Technology Co., Ltd.
Factory Address:	No. 2 Building, No. 468 Xinlai Road, Jiading District, Shanghai City, China
Test Site:	Fangguang Inspection & Testing Co., Ltd. Wuxi Branch
Test Site Address:	200 Linghu Avenue, Xinwu District, Wuxi City, China
Test Device Serial No.:	N/A ☒ Production ☐ Pre-Production ☐ Engineering

2. INTRODUCTION

2.1. Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Industry Canada Certification and Engineering Bureau.

2.2. Fangguang Test Location

These measurement tests were performed at the Fangguang Inspection and testing Co.,Ltd. Wuxi Branch located at 200 Linghu Avenue, Xinwu District, Wuxi City. The detailed description of the measurement facility was found to be in compliance with the requirements of ANSI C63.4-2014.

3. PRODUCT INFORMATION

3.1. Equipment Description

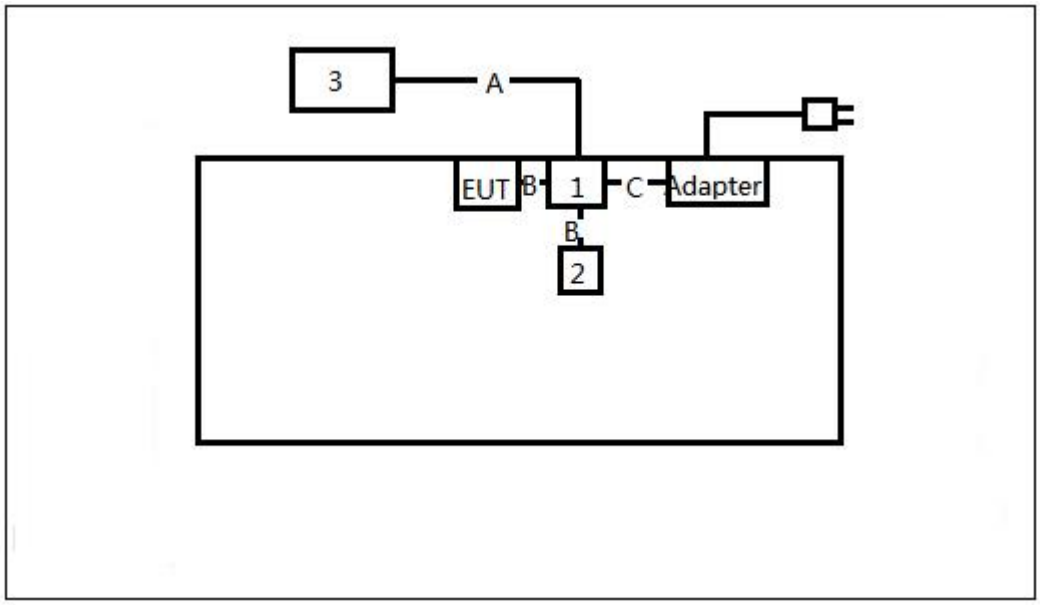
Product Name:	Rangefinder
Model Name:	PandarXT
Input Voltage Range:	DC 9-36V, 10W
Trade Mark:	HESAI “HESAI” “禾赛”
Adapter Information:	Model: GST40A12 Rated Input: AC 100-240V, 50/60Hz , Max. Input current: 1.0A, Rated Output: DC 12V, 3.34A
Variations of PandarQT	Under the same architecture of PandarQT, models with reduced channels (for example, but not limited to 8, 16, 24, 32, 48…) may be built. The configurations of these models make them within the scope of this calculation analysis and certification test: 1、There is no hardware change in the optical path, and the laser beams coming out of the shell will be exactly the same. 2、The channel distribution of the new models is only a result of reduction on the basis of the original 64 channels. In other words, the channels of the new models will only be sparser, so as the emitting beam distribution. 3、For the emitting sequence, the remaining channels will keep their original emitting time point and leave the emitting point of those deleted channels blank. In this case, no more critical situation will be formed.

3.2. Configuration of Tested System

The **Rangefinder** was tested per the guidance FCC CFR Title 47 Part 15 Subpart B:2017 Class B and ANSI C63.4: 2014 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing.

3.3. Test Mode

Test Mode	
EMI Mode	Mode 1: power on and the sample is in real-time detection state

Connection Diagram (Mode 1)


Signal Cable Type		Signal Cable Description
A	LAN Cable	Non-Shielded, >6m
B	Signal cable	Shielded, 2m
C	power cable	Shielded, 2m

3.4. Description of Auxiliary Equipment

The types for all equipments, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product		Manufacturer	Model No.	Serial No.	Power Cord
1	Connection box	HESAI	/	/	/
2	GPS antenna	/	GPSU7/U28	/	/
3	Notebook	DELL	Latitude 3490	/	/

3.5. EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

4. DESCRIPTION OF TEST

4.1. Evaluation Procedure

The measurement procedures described in the American National Standard for Methods of Measurement of Radio-Noise Emission from Low-Voltage Electrical Equipment in the Range of 9kHz to 18GHz (ANSI C63.4-2014) was used in the measurement of the **Rangefinder.**

Deviation from measurement procedure…….....None

4.2. AC Line Conducted Emissions

The line-conducted facility is located inside an shielded enclosure. A 1m x 2m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, 50Ω/50uH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.

The EUT is powered from one LISN and the support equipment is powered from the second LISN. If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply line(s) will be connected to the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference ground-plane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the receiver and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The receiver was scanned from 150 kHz to 30 MHz. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 9 kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Each emission was also maximized by varying: power lines, the mode of operation or resolution, clock or data exchange speed, scrolling H pattern to the EUT and/or support equipment whichever determined the worst-case emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions are used for final measurements on the same test site.

4.3. Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. For measurements above 1GHz absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1GHz, the absorbers are removed. A turntable is used for radiated measurement. It is a continuously rotatable, remote controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm high PVC support structure is placed on top of the turntable.

For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30 MHz up to the upper frequency shown in 15.33(b)(1) depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30 MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up was placed on top of the 0.8 meter high, 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, mode of operation, if applicable, turntable azimuth, and receive antenna height was noted for each frequency found.

Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, whichever produced the worst-case emissions. According to 3dB beam-width of horn antenna, the horn antenna should be always directed to the EUT when rising height.

5. LIST OF USED TEST EQUIPMENT

Conducted Emissions

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR3	FWXGJC-2016-181	1 year	2021/03/23
Two-Line V-Network	R&S	ENV 216	FWXGJC-2016-182	1 year	2021/03/15
AMN	AFJ	LT32C/10	FWXGJC-2016-179	1 year	2021/04/29
Thermohygrometer	Yuhuaze	HTC-1	FWXDA-2016-385	1 year	2021/02/28

Radiated Emission

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Loop Antenna	Schwarzbeck	FMZB 1519B	FWXGJC-2018-015	1 year	2021/08/23
Bi-Log Antenna	R&S	HL562E	FWXGJC-2016-267-06	3 year	2021/03/21
Broadband Horn Antenna	R&S	HF907	FWXGJC-2016-267-07	1 year	2021/04/06
Broadband Horn Antenna	Schwarzbeck	BBHA9170	FWXGJC-2018-016	1 year	2021/08/19
EMI Receiver	R&S	ESR26	FWXGJC-2016-267-01	1 year	2021/03/23
Pre-Amplifier	R&S	SCU-18D	FWXGJC-2016-267-05	1 year	2021/04/09
Pre-Amplifier	R&S	EMC184055 SE			2020/08/09
Thermohygrometer	Yuhuaze	HTC-1	FWXDA-2016-386	1 year	2021/02/28
Anechoic Chamber	Aimuke	EMCCT-3	FWXGJC-2016-270	1 year	2021/04/10

Test Software	Manufacturer	Version	Asset No.	Function
EMI Test Software	tonscend	V2.5.0.0	FWXWA-2018-004	Emission Test

6. TEST RESULT

6.1. Summary

FCC Part Section(s)	IC Part Section(s)	Test Description	Test Result
FCC CFR Title 47 Part 15 Subpart B:2017 15.107 Class B, ANSI C63.4: 2014	ICES 003 Issue 6 2017 Class B	Conducted Emissions	Pass
FCC CFR Title 47 Part 15 Subpart B:2017 15.109 Class B, ANSI C63.4: 2014	ICES 003 Issue 6 2017 Class B	Radiated Emissions	Pass

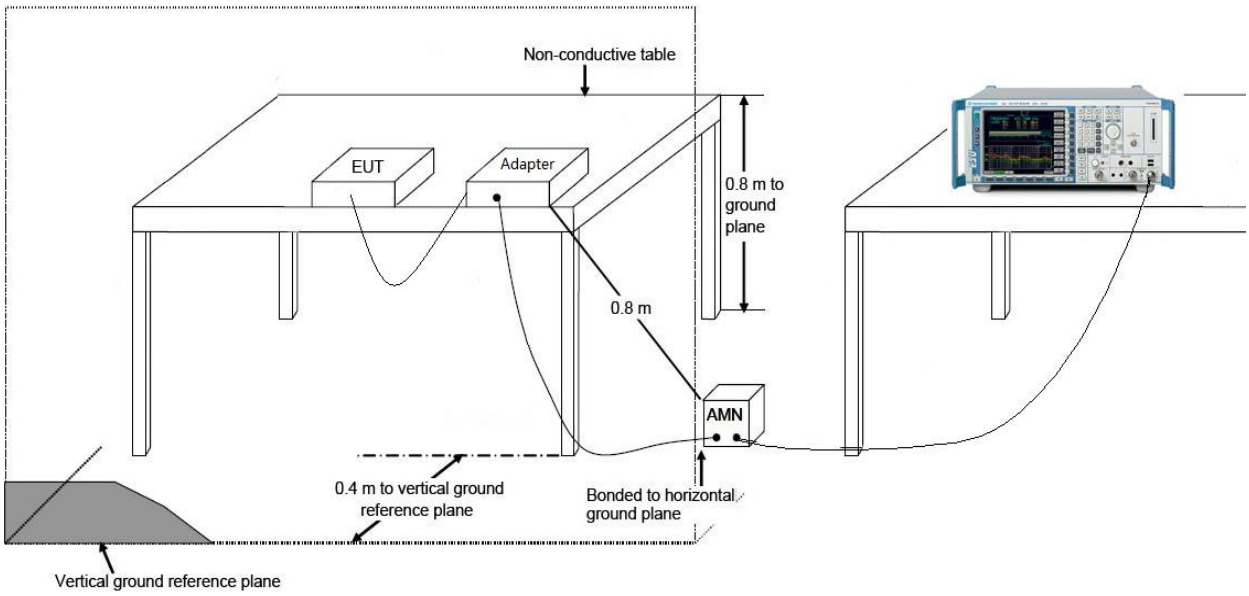
6.2. Conducted Emission Measurement

6.2.1. Test Limit

FCC Part 15.107 Class B Limits		
Frequency (MHz)	QP (dBμV)	AV (dBμV)
0.15 to 0.50	66 to 56	59 to 46
0.50 to 5	56	46
5 to 30	60	50

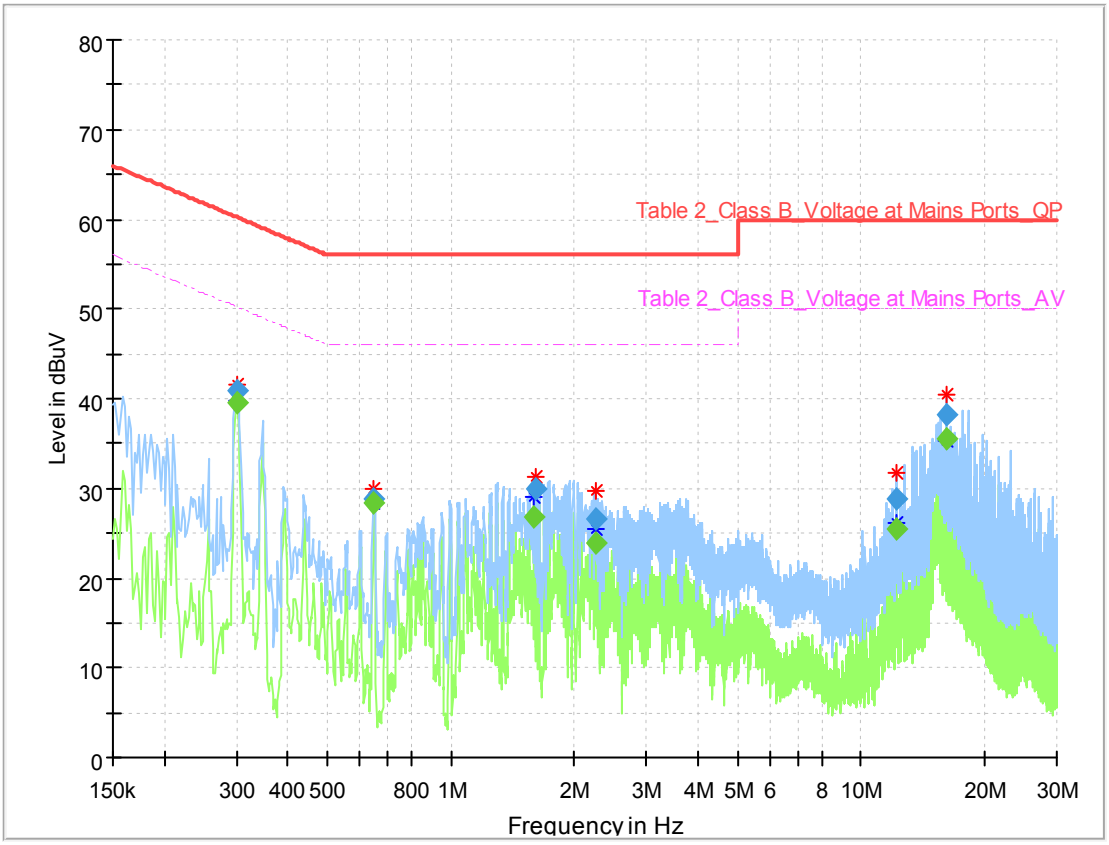
Note 1: The lower limit shall apply at the transition frequencies.

6.2.2. Test Setup



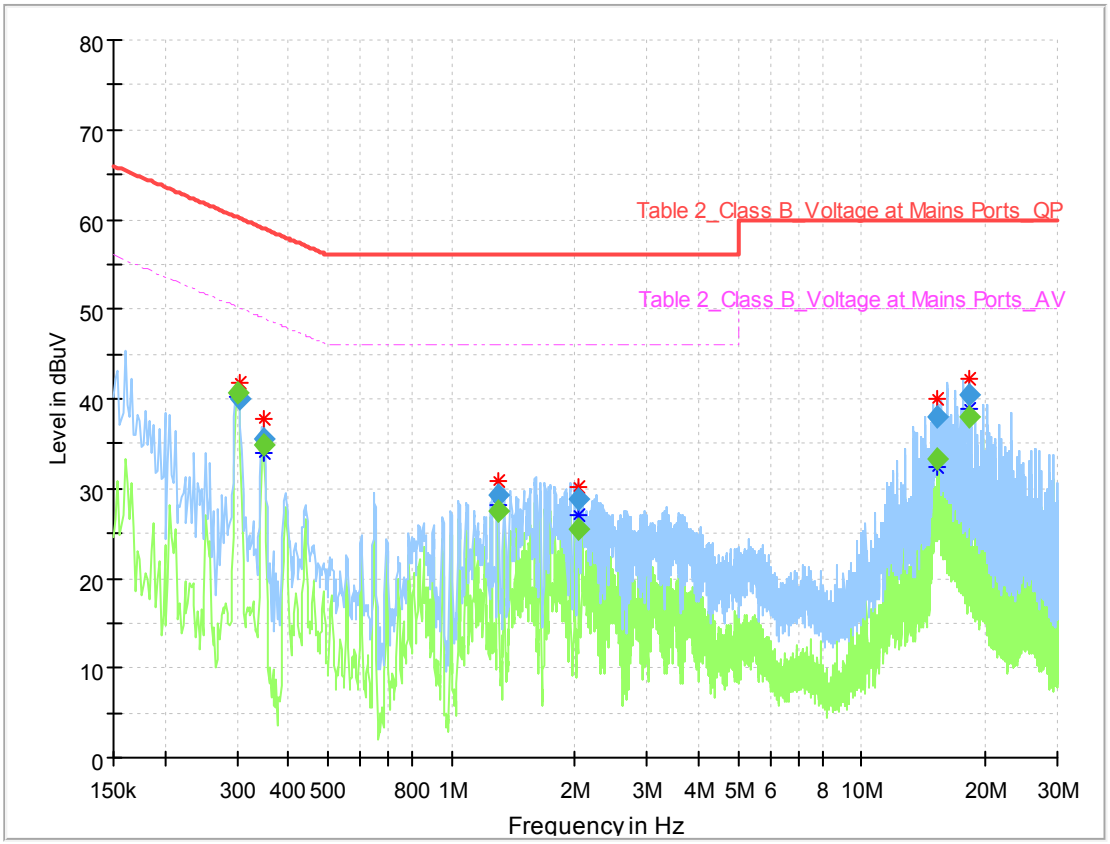
6.2.3. Test Result of Conducted Emissions

EUT:	Rangefinder	Polarity:	LINE
Model:	PandarXT	SN:	XT3CC956933CC956
Mode:	Mode 1	Voltage:	120V/60Hz
Environment:	Temp: 25℃; Humi:60%	Engineer:	Emin Fang



Frequency (MHz)	QuasiPeak (dBuV)	Average (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.302000	---	39.66	50.19	10.53	1000.	9.000	L1	ON	10.0
0.302000	40.83	---	60.19	19.36	1000.	9.000	L1	ON	10.0
0.646000	28.75	---	56.00	27.25	1000.	9.000	L1	ON	10.0
0.648000	---	28.32	46.00	17.68	1000.	9.000	L1	ON	10.0
1.600000	---	26.71	46.00	19.29	1000.	9.000	L1	ON	9.8
1.602000	30.01	---	56.00	25.99	1000.	9.000	L1	ON	9.8
2.246000	---	23.87	46.00	22.13	1000.	9.000	L1	ON	9.8
2.256000	26.53	---	56.00	29.47	1000.	9.000	L1	ON	9.8
12.198000	28.80	---	60.00	31.20	1000.	9.000	L1	ON	9.8
12.198000	---	25.56	50.00	24.44	1000.	9.000	L1	ON	9.8
16.228000	---	35.43	50.00	14.57	1000.	9.000	L1	ON	9.8
16.228000	38.23	---	60.00	21.77	1000.	9.000	L1	ON	9.8

EUT:	Rangefinder	Polarity:	NEUTRAL
Model:	PandarXT	SN:	XT3CC956933CC956
Mode:	Mode 1	Voltage:	120V/60Hz
Environment:	Temp: 25℃; Humi:60%	Engineer:	Emin Fang



Frequency (MHz)	QuasiPeak (dBuV)	Average (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.300000	---	40.60	50.24	9.65	1000.	9.000	N	ON	10.0
0.304000	39.91	---	60.13	20.22	1000.	9.000	N	ON	10.0
0.348000	---	34.87	49.01	14.14	1000.	9.000	N	ON	10.0
0.350000	35.64	---	58.96	23.32	1000.	9.000	N	ON	10.0
1.296000	---	27.56	46.00	18.44	1000.	9.000	N	ON	9.9
1.298000	29.23	---	56.00	26.77	1000.	9.000	N	ON	9.9
2.040000	28.77	---	56.00	27.23	1000.	9.000	N	ON	9.9
2.040000	---	25.38	46.00	20.62	1000.	9.000	N	ON	9.9
15.250000	38.01	---	60.00	21.99	1000.	9.000	N	ON	9.9
15.252000	---	33.19	50.00	16.81	1000.	9.000	N	ON	9.9
18.244000	---	37.94	50.00	12.06	1000.	9.000	N	ON	9.9
18.244000	40.40	---	60.00	19.60	1000.	9.000	N	ON	9.9

6.3. Radiated Emission Measurement

6.3.1. Test Limit

FCC Part 15.109 Class B Limits		
Frequency (MHz)	Distance (m)	Level (dBμV/m)
30 - 88	3	40
88 - 216	3	43.5
216 - 960	3	46
Above 960	3	54

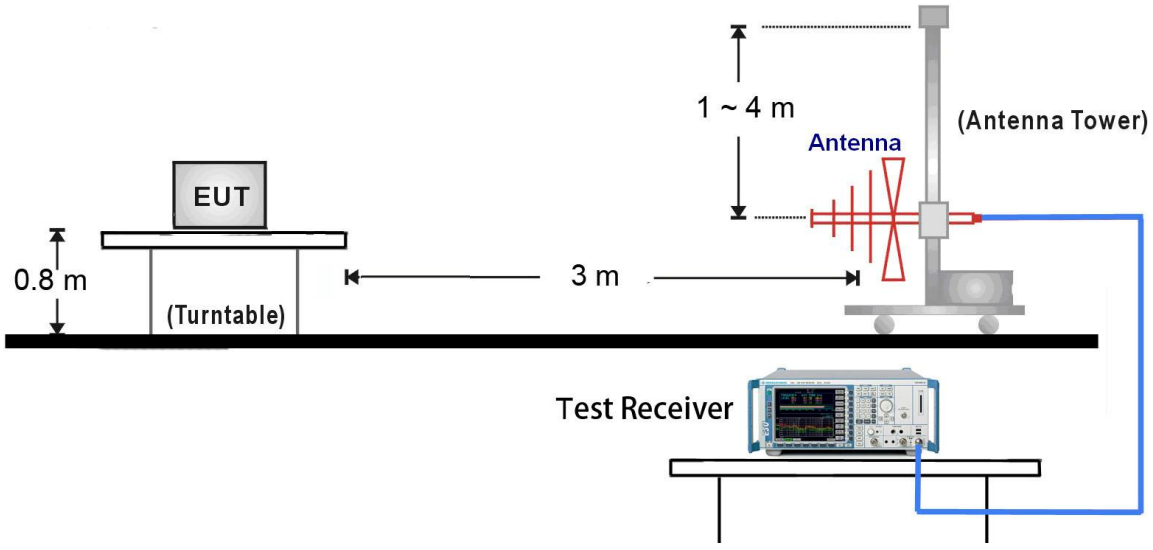
Note 1: The lower limit shall apply at the transition frequency.

Note 2: Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

Note 3: E field strength (dBμV/m) = 20 log E field strength (uV/m)

6.3.2. Test Setup

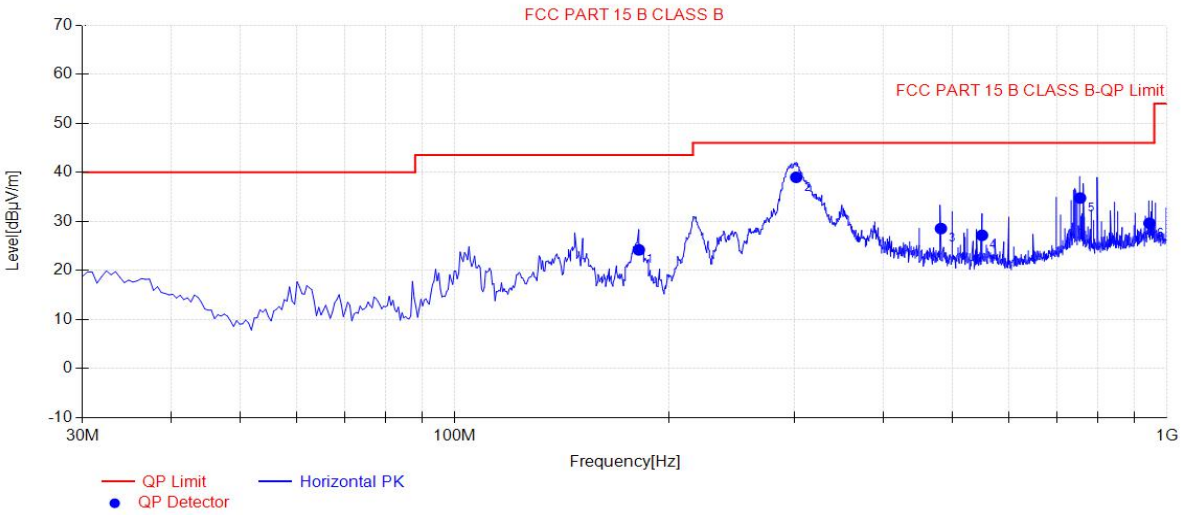
30MHz ~ 1GHz Test Setup:



6.3.3. Test Result of Radiated Emissions

EUT:	Rangefinder	Polarity:	Horizontal
Model:	PandarXT	SN:	XT3CC956933CC956
Mode:	Mode 1	Voltage:	120V/60Hz
Environment:	Temp: 25℃; Humi:60%	Engineer:	Line Chen

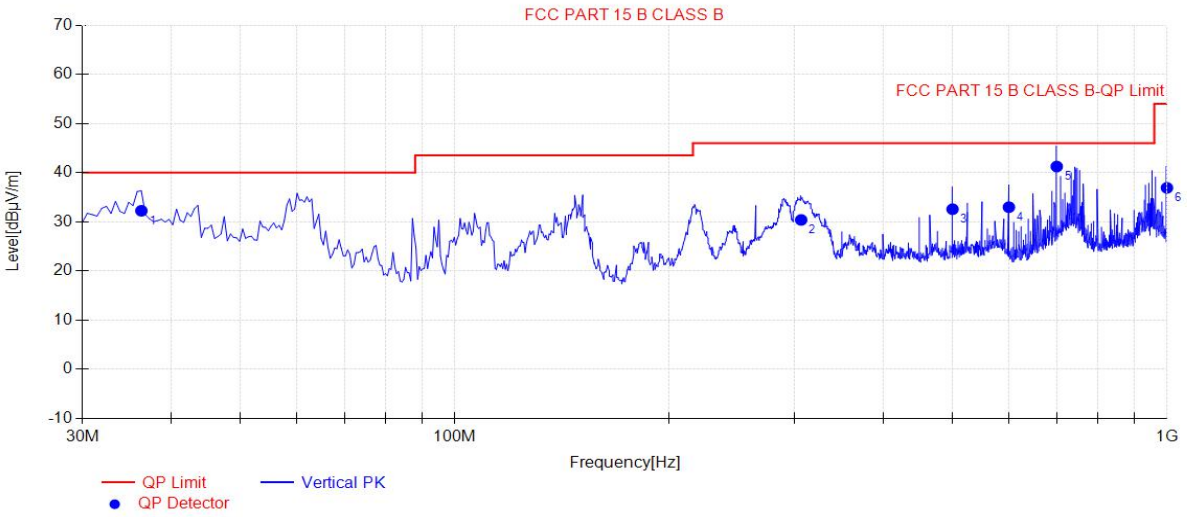
Test Graph



Final Data List								
NO.	Freq. [MHz]	Factor [dB]	QP Value [dBµV/m]	QP Limit [dBµV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity
1	181.320	9.39	24.20	43.50	19.30	200	219	Horizontal
2	301.600	13.30	38.98	46.00	7.02	100	251.1	Horizontal
3	481.535	17.80	28.54	46.00	17.46	100	278	Horizontal
4	549.920	18.93	27.16	46.00	18.84	100	50	Horizontal
5	755.075	22.80	34.76	46.00	11.24	100	93	Horizontal
6	945.195	24.53	29.62	46.00	16.38	100	357	Horizontal

EUT:	Rangefinder	Polarity:	Vertical
Model:	PandarXT	SN:	XT3CC956933CC956
Mode:	Mode 1	Voltage:	120V/60Hz
Environment:	Temp: 25℃; Humi:60%	Engineer:	Line Chen

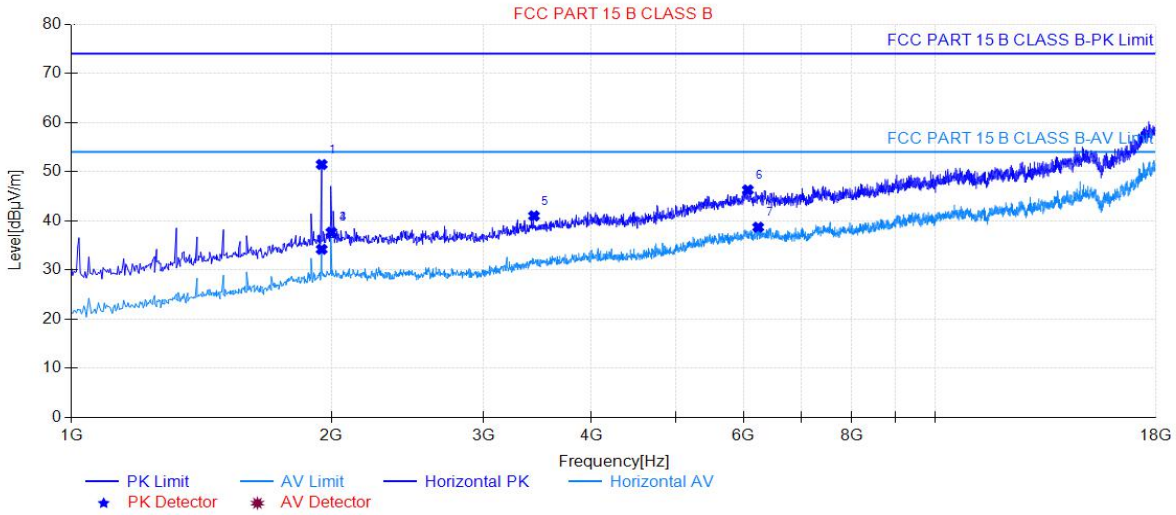
Test Graph



Final Data List								
NO.	Freq. [MHz]	Factor [dB]	QP Value [dBµV/m]	QP Limit [dBµV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity
1	36.3050	16.64	32.25	40.00	7.75	100	137	Vertical
2	306.450	13.46	30.39	46.00	15.61	200	308	Vertical
3	499.965	17.92	32.56	46.00	13.44	100	144	Vertical
4	599.875	19.96	32.97	46.00	13.03	100	216	Vertical
5	700.270	22.08	41.24	46.00	4.76	100	0	Vertical
6	1000.00	24.84	36.91	54.00	17.09	100	187	Vertical

EUT:	Rangefinder	Polarity:	Horizontal
Model:	PandarXT	SN:	XT3CC956933CC956
Mode:	Mode 1	Voltage:	120V/60Hz
Environment:	Temp: 25℃; Humi:60%	Engineer:	Line Chen

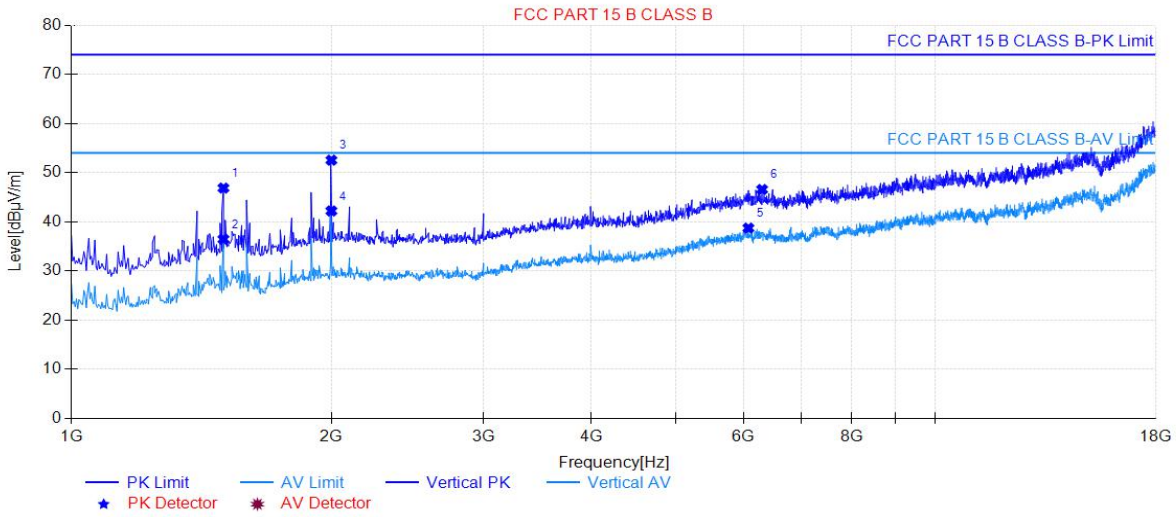
Test Graph



Final Data List								
NO.	Freq. [MHz]	Factor [dB]	Value [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Detection Mode
1	1948.78	51.45	0.73	74.00	22.55	100	294	PK
2	1948.78	34.20	0.73	54.00	19.80	100	294	AV
3	1999.80	37.66	1.09	54.00	16.34	100	311	AV
4	1999.80	37.66	1.09	54.00	16.34	100	311	AV
5	3431.48	40.99	3.98	74.00	33.01	100	221	PK
6	6067.01	46.27	10.85	74.00	27.73	100	58	PK

EUT:	Rangefinder	Polarity:	Vertical
Model:	PandarXT	SN:	XT3CC956933CC956
Mode:	Mode 1	Voltage:	120V/60Hz
Environment:	Temp: 25℃; Humi:60%	Engineer:	Line Chen

Test Graph



Final Data List								
NO.	Freq. [MHz]	Factor [dB]	QP Value [dBµV/m]	QP Limit [dBµV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Detection Mode
1	1499.90	46.86	-3.02	74.00	27.14	100	169	PK
2	1499.90	36.45	-3.02	54.00	17.55	100	169	AV
3	1999.80	52.53	1.09	74.00	21.47	100	4	PK
4	1999.80	42.20	1.09	54.00	11.80	100	360	AV
5	6077.21	38.72	10.94	54.00	15.28	100	48	AV
6	6301.66	46.57	11.12	74.00	27.43	100	122	PK

7. CONCLUSION

The data collected relate only the item(s) tested and show that the **Rangefinder (Model:PandarXT)**has been tested to comply with the requirements specified in §15.107 / §15.109 of the FCC CFR Title 47 Part 15 Subpart B:2017.

The End