FCC AND ISED CERTIFICATION TEST REPORT

Applicant	:	PERGOLUX LLC
Address of Applicant	:	407 Brookside Rd Waterbury, CT 06708, UNITED STATES
Manufacturer	:	Guangdong A-OK Technology Grand Development Co., Ltd.
Address of Manufacturer	:	Hexing Road South Side Sanhe Economic Development Zone, Huiyang Huizhou, Guangdong PEOPLE'S REPUBLIC OF CHINA
Equipment under Test	:	Heater controller system (receiver + emitter)
Model No.	:	PX1500+PX123-01
FCC ID	:	2BEZT-PX123
IC	:	31995-PX123
Test Standard(s)	:	FCC Rules and Regulations Part 15 Subpart C, RSS-210 Issue 10 December 2019, ANSI C63.10:2013, RSS-Gen Issue 5, Apr. 2018, Amendment 2 (February 2021)
Report No.	:	DDT-RE24022817-2E01
Issue Date	:	2024/03/20
Issue By	:	Guangdong Dongdian Testing Service Co., Ltd. Unit 2, Building 1, No. 17, Zongbu 2nd Road, Songshan Lake Park, Dongguan, Guangdong, China, 523808

REPORT

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Test Report Declare

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Test Standard Used:

FCC Rules and Regulations Part 15 Subpart C, RSS-210 Issue 10 December 2019, ANSI C63.10:2013, RSS-Gen Issue 5, Apr. 2018, Amendment 2 (February 2021)

We Declare:

The equipment described above is tested by Guangdong Dongdian Testing Service Co., Ltd. and in the configuration tested the equipment complied with the standards specified above. The test results are contained in this test report and Guangdong Dongdian Testing Service Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

Report No.:	DDT-RE24022817-2E01		
Date of Receipt:	2024/02/28	**Date of Test:**	2024/02/28~2024/03/20

Prepared By:	**Approved By:**
Ziqin Chen	Damon Hu
Ziqin Chen/Engineer	**Damon Hu/EMC Manager**

Note: This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Guangdong Dongdian Testing Service Co., Ltd.

Revision History

Rev.	Revisions	Issue Date	Revised By
---	Initial issue	2024/03/20	

1. Summary of Test Results

No.	Test Parameter	Clause No.	Condition	Result
1	On Time and Duty Cycle	FCC Rules and Regulations Part 15 Subpart C, RSS-210 Issue 10 December 2019	/	Pass
2	20dB Bandwidth and 99% Bandwidth	FCC Part 15: 15.215, ANSI C63.10:2013, RSS-210 Issue 10, RSS-Gen Issue 5	/	Pass
3	Stop Transmitting Time Test	FCC Part 15C: 15.231(a)(1), RSS-210 Issue 10	/	Pass
4	Radiated Emission	FCC Part 15: 15.209, FCC Part 15: 15.231(b), ANSI C63.10:2013, RSS-210 Issue 10, RSS-Gen Issue 5	/	Pass
5	Field Strength Of The Fundamental Signal	FCC Part 15: 15.209, FCC Part 15: 15.231(b), ANSI C63.10:2013, RSS-210 Issue 10, RSS-Gen Issue 5	/	Pass
6	Power Line Conducted Emissions	FCC Part 15: 15.207, ANSI C63.10:2013, RSS-210 Issue 10, RSS-Gen Issue 5	/	N/A
7	Antenna Requirement	FCC Part 15: 15.203, RSS-Gen Issue 5 clause 6.8	/	Pass
Note: N/A is an abbreviation for Not Applicable, and means this item is not applicable for this device or no need to test according to standard.				

2. General Test Information

2.1. Description of EUT

EUT Name	:	Heater controller system (receiver + emitter)
Model Number	:	PX1500+PX123-01
Difference of model number	:	/
EUT Function Description	:	Please reference user manual of this device
Power Supply	:	Button cell 3V
Hardware Version	:	V2
Software Version	:	200409B

Operation frequency	:	433.92MHz
Modulation	:	ASK

Antenna information		
Antenna Type	:	PCB
Max Antenna Gain(dBi)	:	-5.59

Note: The above EUT information is declared by manufacturer and for more detailed features description please refer to the manufacturer's specifications or User's Manual. The above Antenna information is declared by manufacturer and for more detailed features description please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

“☒” means to be chosen or applicable; “□” means don’t to be chosen or not applicable; This note applies to entire report.

2.2. Accessories of EUT

Accessories	Manufacturer	Model number	Description
/	/	/	/

2.3. Block diagram of EUT configuration for test

Configuration diagram

2.4. Decision of final test mode

According pre-test, the worst test modes were reported as below:

Tested mode, channel, information		
Mode	Channel	Frequency (MHz)
TX mode	/	433.92

Note：New battery is used during all test

2.5. Deviations of test standard

No deviation.

2.6. Test environment conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature range:	21-25 ℃
Humidity range:	40-75%
Pressure range:	86 kPa to106 kPa

Note: The specific temperature and humidity information of each test item refers to the temperature and humidity record in the corresponding test data.

2.7. Test laboratory

Guangdong Dongdian Testing Service Co., Ltd.

Add.: Unit 2, Building 1, No. 17, Zongbu 2nd Road, Songshan Lake Park, Dongguan, Guangdong, China, 523808.

Tel.: +86-0769-38826678, http://www.dgddt.com, Email: ddt@dgddt.com.

CNAS Accreditation No. L6451; A2LA Accreditation Number: 3870.01

FCC Designation Number: CN1182, Test Firm Registration Number: 540522

Innovation, Science and Economic Development Canada Site Registration Number: 10288A

Conformity Assessment Body identifier: CN0048

VCCI facility registration number: C-20087, T-20088, R-20123, R-20155, G-20118

2.8. Measurement uncertainty

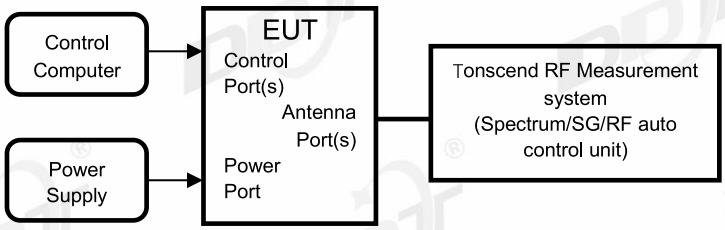
Test Item	Uncertainty
Bandwidth	1.1%
Peak Output Power (Conducted) (Spectrum analyzer)	0.86 dB (10 MHz ≤ f < 3.6 GHz);
	1.38 dB (3.6 GHz ≤ f < 8 GHz)
Peak Output Power (Conducted) (Power Sensor)	0.74 dB
Power Spectral Density	0.74 dB (10 MHz ≤ f < 3.6 GHz);
	1.38 dB (3.6 GHz ≤ f < 8 GHz)
Frequencies Stability	6.7 x 10^{-8} (Antenna couple method)
	5.5 x 10^{-8} (Conducted method)
Conducted spurious emissions	0.86 dB (10 MHz ≤ f < 3.6 GHz);
	1.40 dB (3.6 GHz ≤ f < 8 GHz)
	1.66 dB (8 GHz ≤ f < 26.5 GHz)
Uncertainty for radio frequency (RBW < 20 kHz)	3×10^{-8}
Temperature	0.4 ℃
Humidity	2 %
Uncertainty for Radiation Emission test (9 kHz – 30 MHz)	3.44 dB
Uncertainty for Radiation Emission test (30 MHz - 1 GHz)	4.70 dB (Antenna Polarize: V)
	4.84 dB (Antenna Polarize: H)
Uncertainty for Radiation Emission test (1 GHz - 40 GHz)	4.10 dB (1 - 6 GHz)
	4.40 dB (6 GHz - 18 GHz)
	3.54 dB (18 GHz - 26 GHz)
	4.30 dB (26 GHz - 40 GHz)
Uncertainty for Power line conduction emission test	3.34dB (150KHz-30MHz)
	3.72dB (9KHz-150KHz)
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	

3. On Time and Duty Cycle

3.1. Test equipment

Equipment	Manufacturer	Model No.	Serial No.	Cal Due To
SPECTRUM ANALYZER	R&S	FSU26	DDT-ZC00236	2024/07/11
Digital Multimeter	FLUKE	15B PRO	DDT-ZC02062	2024/07/14
AVG POWER SENSOR	R&S	NRP-Z22	DDT-ZC02301	2024/07/11

3.2. Block diagram of test setup



3.3. Limits

Just for report.

3.4. Assistant equipment used for test

Assistant equipment	Manufacturer	Model number	Description	other
/	/	/	/	/

3.5. Test procedure

Set the Centre frequency of the spectrum analyzer to the transmitting frequency;

Set the span=0MHz, RBW=10MHz, VBW=10MHz, Sweep time=5s;

Trace mode = Single hold.

3.6. Test result

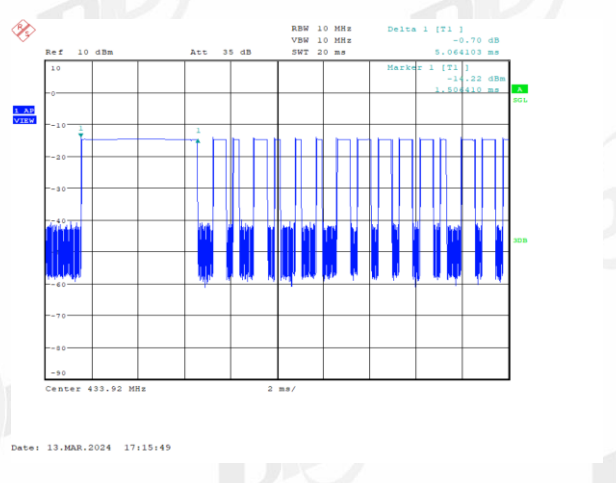
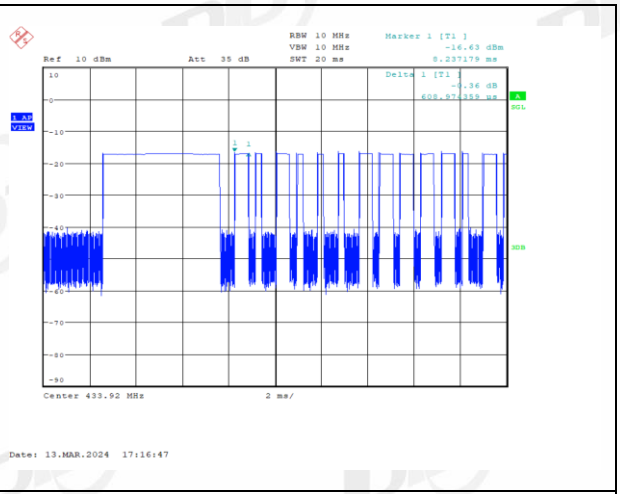
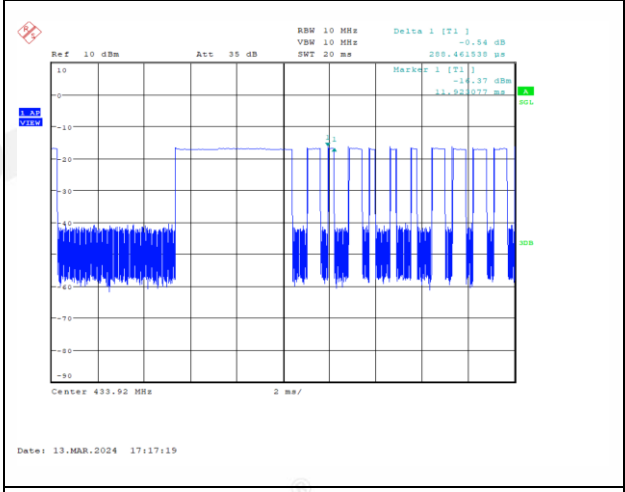
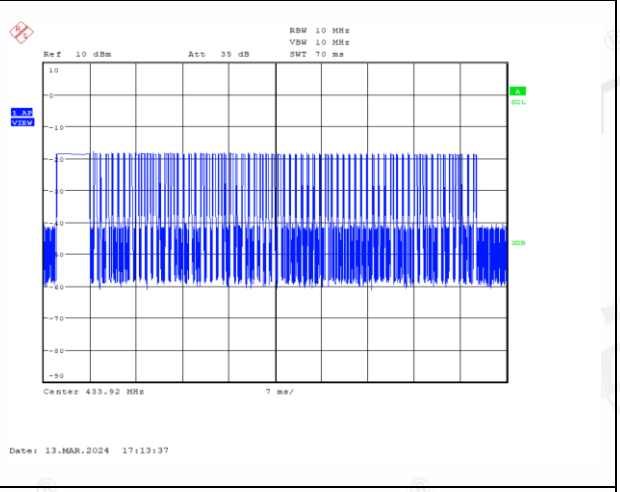
Test Site: 2#EMC Shield Room	Test Date: 2024/02/28--2024/03/20
Condition: 24.3°C,45.3%	Test Engineer: Zhongyao Zeng
Memo: /	

EUT Name: Heater controller system (receiver + emitter)	EUT Model: PX1500+PX123-01
Sample No.: S24022817-002	Test Mode: Tx mode
Power supply: Battery	Memo: /

Test Channel	Duty Cycle[%]	20 log(duty cycle)
433.92	32.484	-9.77

Note 1: The transmitter duty cycle was measured using a spectrum analyser in the time domain and calculated by below Equation:
$\delta(dB) = 20\log(\Delta) = 20\log(32.484/100) = -9.77$ dB
δ is the duty cycle correction factor (dB)
Δ is the duty cycle (dimensionless)
Note 2: In cases where the pulse train exceeds 0.1 s, the measured field strength shall be determined during a 0.1 s interval

3.7. Test data

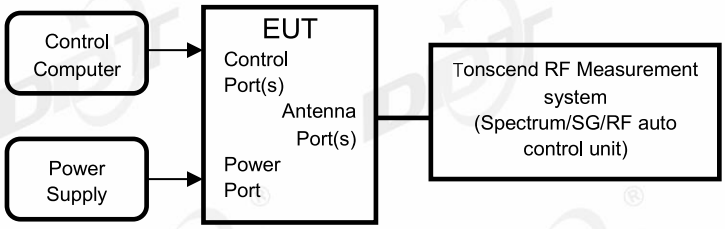
	
Duty Cycle -t1	Duty Cycle -t2
	
Duty Cycle -t3	Duty Cycle

4. 20dB Bandwidth and 99% Bandwidth

4.1. Test equipment

Equipment	Manufacturer	Model No.	Serial No.	Cal Due To
WIDEBAND RADIO COMMUNICATION TESTER	R&S	CMW500	DDT-ZC01994	2024/07/14
RF Test System 1# (Bluetooth, WIFI RF conduction automatic test software)	Tonscend	JS1120-2	DDT-ZC00291	/
Spectrum analyzer	R&S	FSQ26	DDT-ZC01490	2024/04/26
MXG Vector Signal Generator	Agilent	N5182A	DDT-ZC01447	2024/04/26
RF Control Unit	Tonscend	JS0806-2	DDT-ZC00290	2024/04/26
Digital Multimeter	FLUKE	15B PRO	DDT-ZC02062	2024/07/14
MXG Vector Signal Generator(9KHz-6GHz)	Agilent	N5182B	DDT-ZC01710	2024/04/26
TEMP&HUMI Programmable chamber	ZHIXIANG	ZXGDJS-150L	DDT-ZC00243	2024/05/16

4.2. Block diagram of test setup



4.3. Limits

The bandwidth of the emission shall be no wider than 0.25% of the center frequency of devices operation above 70MHz and below 900MHz.

4.4. Assistant equipment used for test

Assistant equipment	Manufacturer	Model number	Description	other
/	/	/	/	/

4.5. Test procedure

(1) Connect EUT's antenna output to spectrum analyzer by RF cable.

(2) The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100 Hz RBW and 300 Hz VBW. Use the 99% bandwidth function of the spectrum analyzer to measure the occupied bandwidth of the EUT.

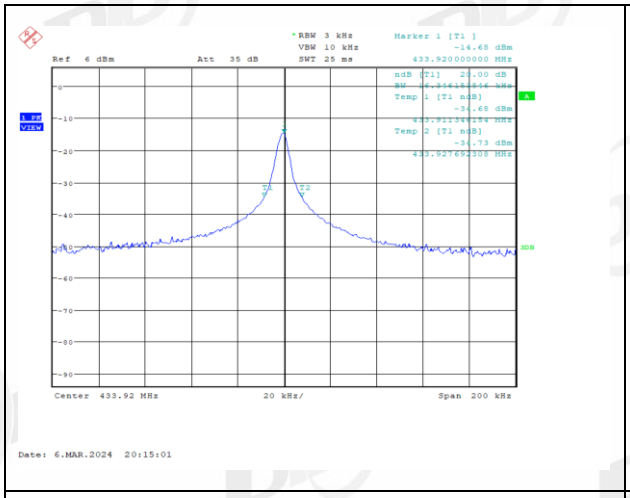
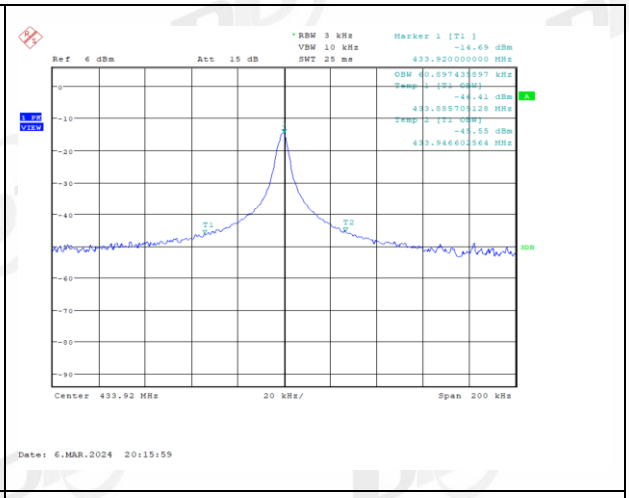
4.6. Test result

Test Site: 3#EMC Shield Room	Test Date: 2024/02/28--2024/03/20
Condition: 24.3°C,45.6%	Test Engineer: Zora Zhang
Memo: /	

EUT Name: Heater controller system (receiver + emitter)	EUT Model: PX1500+PX123-01
Sample No.: S24022817-002	Test Mode: Tx mode
Power supply: Battery	Memo: /

Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)	Limit (MHz): No wider than 0.25% of the center frequency	Conclusion
433.92	16.35	60.90	433.92*0.25%=1.0848MHz	PASS

4.7. Test data

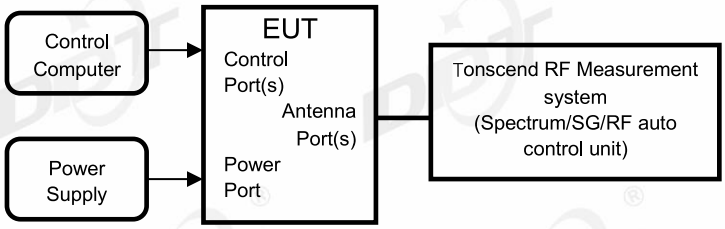
	
20 dB Bandwidth	99% Bandwidth

5. Stop Transmitting Time Test

5.1. Test equipment

Equipment	Manufacturer	Model No.	Serial No.	Cal Due To
MXG Vector Signal Generator	Agilent	N5182A	DDT-ZC01447	2024/04/26
TEMP&HUMI Programmable chamber	ZHIXIANG	ZXGDJS-150L	DDT-ZC00243	2024/05/16
RF Test System 1# (Bluetooth, WIFI RF conduction automatic test software)	Tonscend	JS1120-2	DDT-ZC00291	/
RF Control Unit	Tonscend	JS0806-2	DDT-ZC00290	2024/04/26
MXG Vector Signal Generator(9KHz-6GHz)	Agilent	N5182B	DDT-ZC01710	2024/04/26
Spectrum analyzer	R&S	FSQ26	DDT-ZC01490	2024/04/26
WIDEBAND RADIO COMMUNICATION TESTER	R&S	CMW500	DDT-ZC01994	2024/07/14
Digital Multimeter	FLUKE	15B PRO	DDT-ZC02062	2024/07/14

5.2. Block diagram of test setup



5.3. Limits

(a) The provisions of this section are restricted to periodic operation within the band 40.66-40.70 MHz and above 70 MHz. Except as shown in paragraph (e) of this section, the intentional radiator is restricted to the transmission of a control signal such as those used with alarm systems, door openers, remote switches, etc. Continuous transmissions, voice, video and the radio control of toys are not permitted. Data is permitted to be sent with a control signal. The following conditions shall be met to comply with the provisions for this periodic operation:

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

(2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.

(3) Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions does not exceed more than two seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does not exceed two seconds per hour.

5.4. Assistant equipment used for test

Assistant equipment	Manufacturer	Model number	Description	other
/	/	/	/	/

5.5. Test procedure

(1) The EUT's RF signal was coupled to spectrum analyzer by antenna connected to spectrum analyzer.

(2) Set the spectrum to zero span mode, and centered of EUT frequency.

(3) Measure the stop transmitting time after release EUT button.

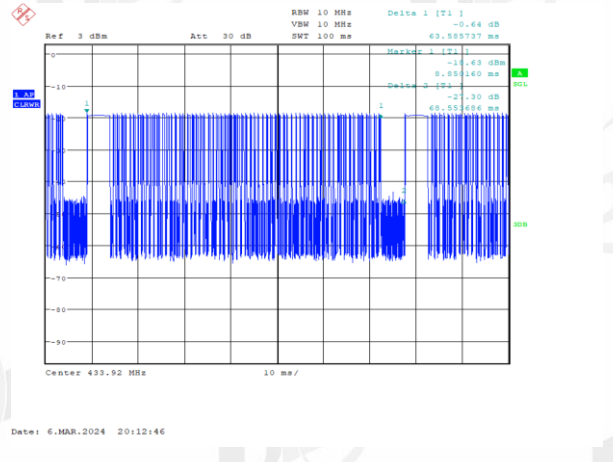
5.6. Test result

Test Site: 3#EMC Shield Room	Test Date: 2024/02/28--2024/03/20
Condition: 23.5°C,43.5%	Test Engineer: Zora Zhang
Memo: /	

EUT Name: Heater controller system (receiver + emitter)	EUT Model: PX1500+PX123-01
Sample No.: S24022817-002	Test Mode: Tx mode
Power supply: Battery	Memo: /

Frequency (MHz)	Stop transmitting time (s)	Limit
433.92	0.64	≤5 s

5.7. Test data

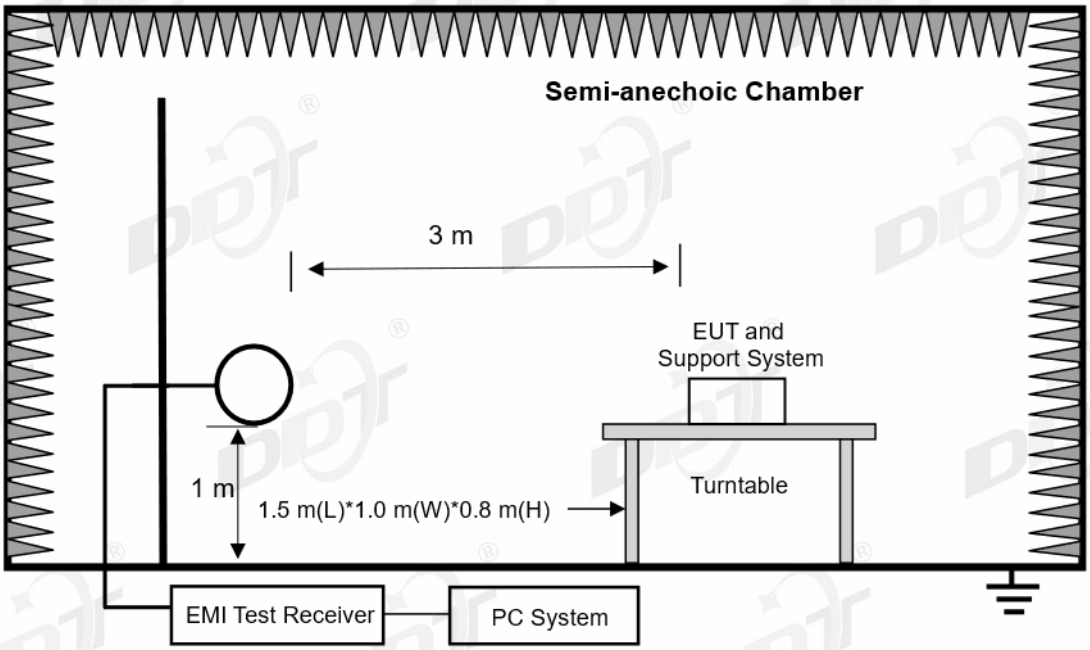
	/
Stop transmitting time	/

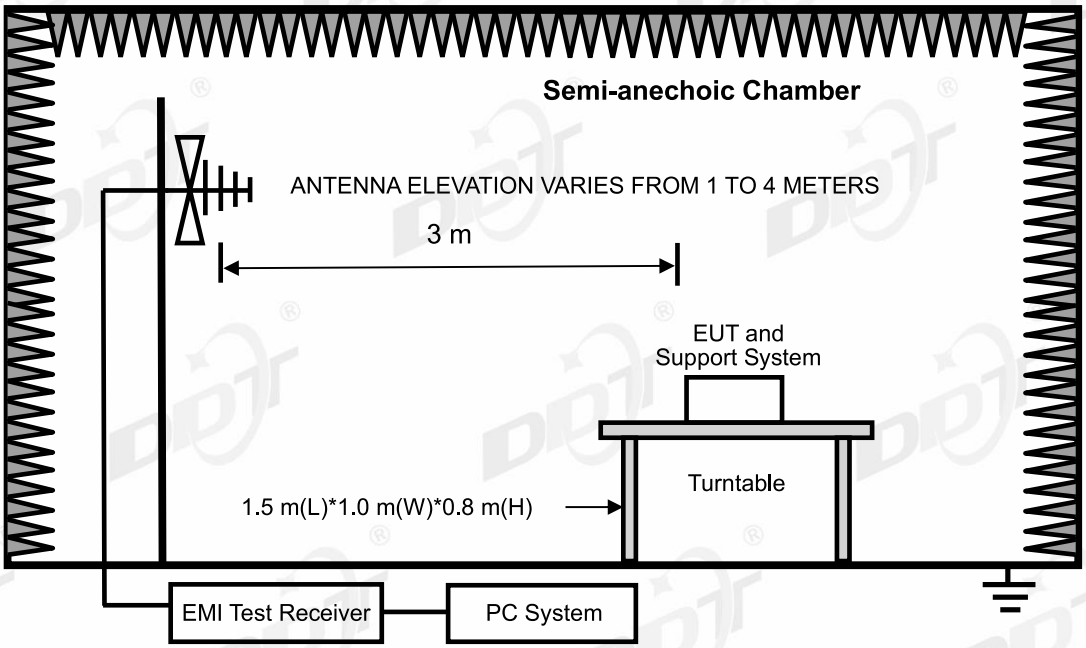
6. Radiated Emission

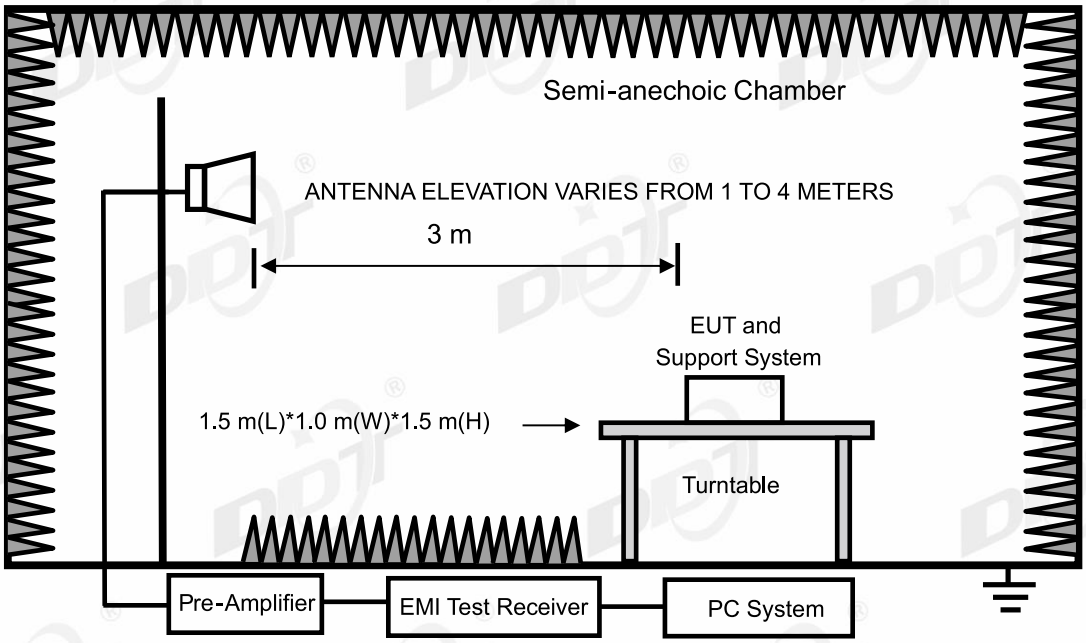
6.1. Test equipment

Equipment	Manufacturer	Model No.	Serial No.	Cal Due To
Pre-amplifier	COM-POWER	PAM-118A	DDT-ZC01293	2024/07/14
Micro-Tronics filters	REBES	BRM50716	DDT-ZC03240	/
PSA Series Spectrum Analyzer	Agilent	E4447A	DDT-ZC00517	2024/04/22
RF cable	Yuhu Technology	ZT26S-SMAJ-SMAJ-1M	DDT-ZC02037	2024/04/22
Micro-Tronics filters	REBES	BRM50702	DDT-ZC03242	/
Trilog Broadband Antenna	Schwarzbeck	VULB 9163	DDT-ZC02050	2024/07/11
RF cable	Zhongke Junchuang	JCT26S-NJ-NJ-1.5M	DDT-ZC02762	2024/04/20
High pass filter	Micro-Tronics	HPM50108	DDT-ZC00560	2024/05/14
ELECTRIC AND MAGNETIC FIELD ANALYZER	Narda	EHP-200A	DDT-ZC01401	2024/09/20
RF cable	Yuhu Technology	JCTB810-NJ-NJ-9M	DDT-ZC02538	2024/04/22
RF Cable	N/A	W13.02 AP1-X2	DDT-ZC04023	2024/04/20
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	DDT-ZC00506	2024/04/25
EMI TEST RECEIVER	R&S	ESU26	DDT-ZC01909	2024/04/22
High Pass filter	Xi'an Xingbo	XBLBQ-GTA67	DDT-ZC02179	2024/05/14
Active Loop Antenna	Schwarzbeck	FMZB1519	DDT-ZC00524	2025/09/10
RF Cable	N/A	W24.02 HL-562	DDT-ZC04022	2024/04/20
Pre-amplifier	COM-POWER	PAM-840A	DDT-ZC01693	2024/04/26
Hochgewinn-Hornantenne	SCHWARZBECK	BBHA 9120 D	DDT-ZC02129	2025/09/17
High pass filter	Micro-Tronics	HPM50102	DDT-ZC00561	2024/05/14

6.2. Block diagram of test setup







6.3. Limits

(1) FCC 15.205 Restricted frequency band

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
[1]0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.1772&4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.2072&4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.G
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	([2])
13.36-13.41			

RSS-Gen section 8.10 Restricted frequency bands*

MHz	MHz	MHz	GHz
0.090-0.110	12.51975-12.52025	240-285	3.5-4.4
0.495-0.505	12.57675-12.57725	322-335.4	4.5-5.15
2.1735-2.1905	13.36-13.41	399.9-410	5.35-5.46

3.020-3.026	16.42-16.423	608-614	7.25-7.75
4.125-4.128	16.69475-16.69525	960-1427	8.025-8.5
4.1772&4.17775	16.80425-16.80475	1435-1626.5	9.0-9.2
4.2072&4.20775	25.5-25.67	1645.5-1646.5	9.3-9.5
5.677-5.683	37.5-38.25	1660-1710	10.6-12.7
6.215-6.218	73-74.6	1718.8-1722.2	13.25-13.4
6.26775-6.26825	74.8-75.2	2200-2300	14.47-14.5
6.31175-6.31225	108-138	2310-2390	15.35-16.2
8.291-8.294	149.9-150.05	2483.5-2500	17.7-21.4
8.362-8.366	156.52475-156.52525	2655-2900	22.01-23.12
8.37625-8.38675	156.7-156.9	3260-3267	23.6-24.0
8.41425-8.41475	162.0125-167.17	3332-3339	31.2-31.8
12.29-12.293	167.72-173.2	3345.8-3358	36.43-36.5
			Above 38.6

* Certain frequency bands listed in table and in bands above 38.6 GHz are designated for licence-exempt applications. These frequency bands and the requirements that apply to related devices are set out in the 200 and 300 series of RSSs.

(2) FCC 15.209 Limit.

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		mV/m	dB(mV)/m
0.009 ~ 0.490	300	2400/F(kHz)	67.6-20log(F)
0.490 ~ 1.705	30	24000/F(kHz)	87.6-20log(F)
1.705 ~ 30.0	30	30	29.54
30~88	3	100	40.0
88~216	3	150	43.5
216~960	3	200	46.0
960~1000	3	500	54.0
Above 1000	3	74.0 dB(mV)/m (Peak) 54.0 dB(mV)/m (Average)	

Note:

(1) The emission limits shown in the above table are based on measurements employing a CISPR QP detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000MHz.Radiated emissions limits in these three bands are based on measurements employing an average detector.

(2) At frequencies below 30MHz, measurement may be performed at a distance closer then that specified, and the limit at closer measurement distance can be extrapolated by below formula:

$Limit_{3m}$(dBuV/m)= $Limit_{300m}$(dBuV/m) + 40Log(300m/3m) = $Limit_{300m}$(dBuV/m) + 80

$Limit_{3m}$(dBuV/m)= $Limit_{30m}$(dBuV/m) + 40Log(30m/3m) = $Limit_{30m}$(dBuV/m) + 40

(3) Limit for this EUT

All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions include fundamental emission shall not exceed FCC 15.231 section (e) limit of comply with FCC 15.209 limit which permit higher emission level.

RSS-210 Issue 10 Annex D
(b)exceed 11,000 μV/m measured at 3 m with an average detector. The peak level of any emission within this specified frequency band shall not exceed 55,000 μV/m measured at 3 m; and
(c)The field strength of emissions on any frequencies outside this specified band shall not exceed the general field strength limits specified in RSS-Gen.

6.4. Assistant equipment used for test

Assistant equipment	Manufacturer	Model number	Description	other
/	/	/	/	/

6.5. Test procedure

(1) EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber.
(2) Test antenna was located 3m from the EUT on an adjustable mast, and the antenna used as below table.

Test frequency range	Test antenna used	Test antenna distance
30MHz-1GHz	Trilog Broadband Antenna	3m

The Trilog Broadband Antenna or Horn Antenna was located 3m from EUT, Measurements were made with the antenna positioned in both the horizontal and vertical planes of Polarization, and the measurement antenna was varied from 1 m to 4 m. in height above the reference ground plane to obtain the maximum signal strength.

(3) Below pre-scan procedure was first performed in order to find prominent frequency spectrum radiated emissions:

(a) Scanning the peak frequency spectrum with the antenna specified in step (3), and the EUT was rotated 360 degree, the antenna height was varied from 1m to 4m(Except loop antenna, it’s fixed 1m above ground.)

(b) Change work frequency or channel of device if practicable.

(c) Change modulation type of device if practicable.

(d) Change power supply range from 85% to 115% of the rated supply voltage

(e) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions.

(4) For final emissions measurements at each frequency of interest, the EUT was rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.10 2013 on Radiated Emission test.

(5) The emissions from 9kHz to 1GHz were measured based on CISPR QP detector except for the frequency bands 9-90kHz, 110-490kHz, for emissions from 9kHz-90kHz,110kHz-490kHz and

above 1GHz were measured based on average detector, for emissions above 1GHz, peak emissions also be measured and need comply with Peak limit.

(6) The emissions from 9kHz to 1GHz, QP or average values were measured with EMI receiver with below RBW.

Frequency band	RBW
30MHz-1GHz	120kHz

(7) X axis, Y axis, Z axis are tested, and worse setup X axis is reported

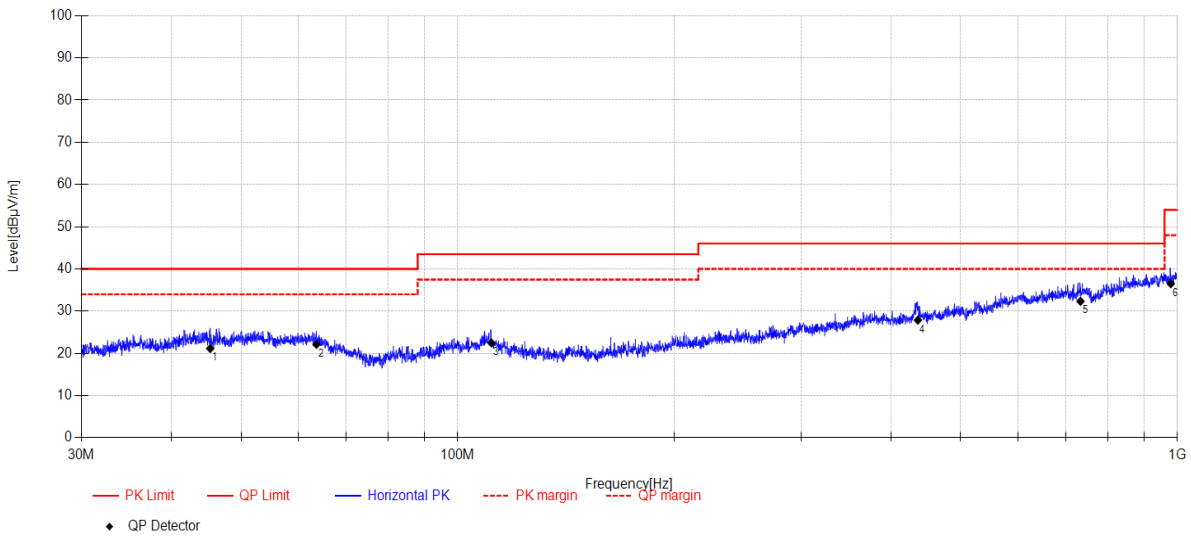
6.6. Test result

PASS. (See below detailed test result)

6.7. Test data

TR-4-E-009 Radiated Emission Test Result

Test Date:	2024-03-12	**Tested By**:	Junchang Du
EUT:	Heater controller system (receiver + emitter)	**Model Number**:	PX1500+PX123-01
Test Mode:	433.92MHz TX	**Power Supply**:	Battery
Condition:	Temp:23.2°C;Humi:62.7%	**Test Site**:	DDT 3# Chamber
File Path:	d:\ts\2024 report data\Q24022817-1E PX1500\FCC BELOW 1G\20240312-221021_H		
Memo:	Sample Number:S24022817-001 Power Setting:NA		

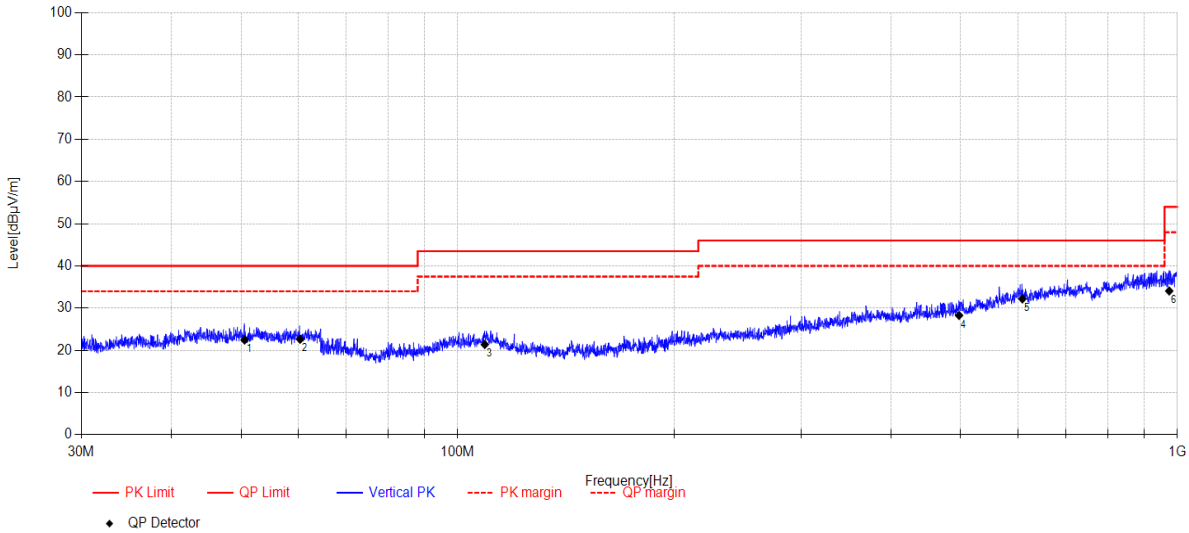


Data List										
NO.	**Freq. [MHz]**	**Reading [dBµV/m]**	**Antenna Factor [dB]**	**Cable Loss [dB]**	**AMP [dB]**	**Result [dBµV/m]**	**Limit [dBµV/m]**	**Margin [dB]**	**Detector**	**Polarity**
1	45.31	3.56	12.92	4.67	0.00	21.15	40.00	18.85	QP	Horizontal
2	63.66	5.04	12.33	4.77	0.00	22.14	40.00	17.86	QP	Horizontal
3	111.40	5.53	11.82	5.13	0.00	22.48	43.50	21.02	QP	Horizontal
4	435.97	5.06	16.02	6.78	0.00	27.86	46.00	18.14	QP	Horizontal
5	733.51	4.54	19.97	7.83	0.00	32.34	46.00	13.66	QP	Horizontal
6	979.18	5.79	22.10	8.62	0.00	36.51	54.00	17.49	QP	Horizontal

Note:
1. Result Level = Reading + Cable loss + Antenna Factor + AMP
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Date:	2024-03-12	**Tested By**:	Junchang Du
EUT:	Heater controller system (receiver + emitter)	**Model Number**:	PX1500+PX123-01
Test Mode:	433.92MHz TX	**Power Supply**:	Battery
Condition:	Temp:23.2°C;Humi:62.7%	**Test Site**:	DDT 3# Chamber
File Path:	d:\ts\2024 report data\Q24022817-1E PX1500\FCC BELOW 1G\20240312-221114_V		
Memo:	Sample Number:S24022817-001 Power Setting:NA		



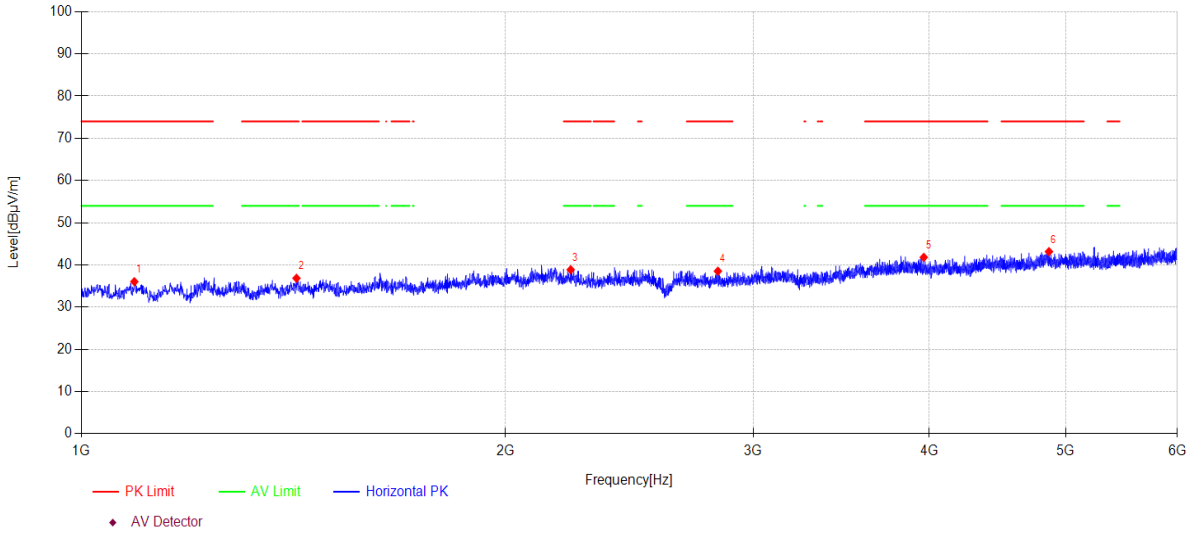
Data List										
NO.	**Freq. [MHz]**	**Reading [dBµV/m]**	**Antenna Factor [dB]**	**Cable Loss [dB]**	**AMP [dB]**	**Result [dBµV/m]**	**Limit [dBµV/m]**	**Margin [dB]**	**Detector**	**Polarity**
1	50.58	5.25	12.48	4.73	0.00	22.46	40.00	17.54	QP	Vertical
2	60.40	5.23	12.64	4.76	0.00	22.63	40.00	17.37	QP	Vertical
3	109.08	4.17	12.10	5.12	0.00	21.39	43.50	22.11	QP	Vertical
4	497.40	4.52	16.84	6.92	0.00	28.28	46.00	17.72	QP	Vertical
5	609.13	5.49	19.33	7.37	0.00	32.19	46.00	13.81	QP	Vertical
6	974.39	3.43	22.04	8.60	0.00	34.07	54.00	19.93	QP	Vertical

Note:
1. Result Level = Reading + Cable loss + Antenna Factor + AMP
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Date:	2024-03-12	**Tested By**:	Junchang Du
EUT:	Heater controller system (receiver + emitter)	**Model Number**:	PX1500+PX123-01
Test Mode:	433.92MHz TX	**Power Supply**:	Battery
Condition:	Temp:23.2°C;Humi:62.7%	**Test Site**:	DDT 3# Chamber
File Path:	d:\ts\2024 report data\Q24022817-1E PX1500\FCC ABOVE 1G\1		
Memo:	Sample Number:S24022817-001 Power Setting:NA		

Test Graph



Data List

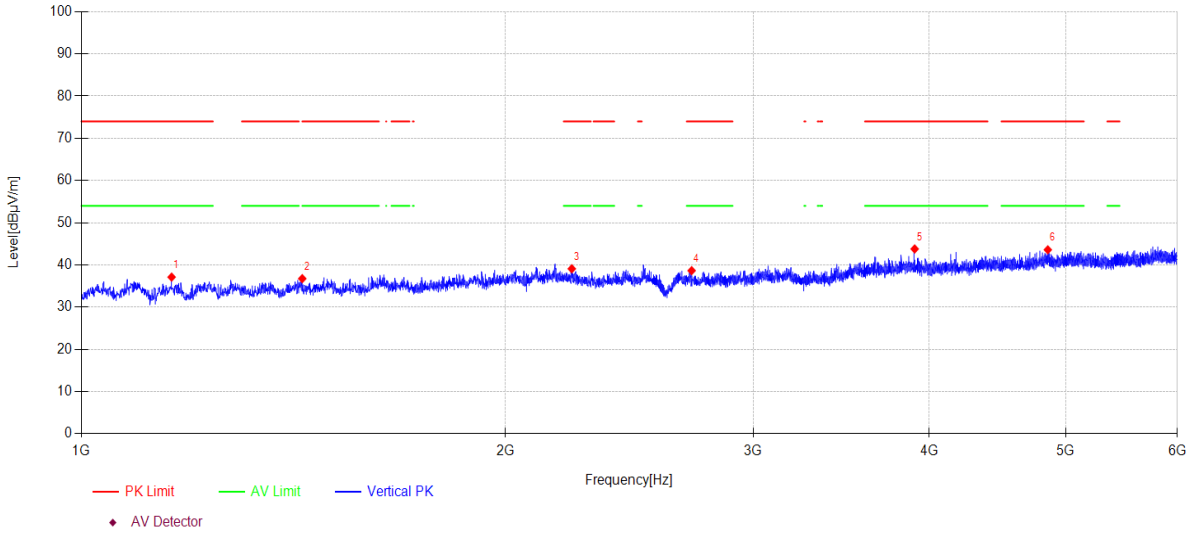
NO.	Freq. [MHz]	Reading [dBµV/m]	Antenna Factor [dB]	Cable loss [dB]	AMP [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Detector	Polarity
1	1090.50	45.80	24.48	2.65	-36.89	36.04	74.00	37.96	PK	Horizontal
2	1421.50	45.60	25.19	2.99	-36.93	36.85	74.00	37.15	PK	Horizontal
3	2225.50	45.23	27.55	3.74	-37.65	38.87	74.00	35.13	PK	Horizontal
4	2831.00	46.03	27.65	4.20	-39.36	38.52	74.00	35.48	PK	Horizontal
5	3964.00	46.19	31.04	5.01	-40.43	41.81	74.00	32.19	PK	Horizontal
6	4864.00	44.26	33.58	5.45	-40.13	43.16	74.00	30.84	PK	Horizontal

Note:
1. Level = Reading + Cable loss + Antenna Factor + AMP
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Date:	2024-03-12	**Tested By**:	Junchang Du
EUT:	Heater controller system (receiver + emitter)	**Model Number**:	PX1500+PX123-01
Test Mode:	433.92MHz TX	**Power Supply**:	Battery
Condition:	Temp:23.2°C;Humi:62.7%	**Test Site**:	DDT 3# Chamber
File Path:	d:\ts\2024 report data\Q24022817-1E PX1500\FCC ABOVE 1G\2		
Memo:	Sample Number:S24022817-001 Power Setting:NA		

Test Graph



Data List										
NO.	**Freq. [MHz]**	**Reading [dBµV/m]**	**Antenna Factor [dB]**	**Cable loss [dB]**	**AMP [dB]**	**Level [dBµV/m]**	**Limit [dBµV/m]**	**Margin [dB]**	**Detector**	**Polarity**
1	1159.00	46.48	24.82	2.72	-36.90	37.12	74.00	36.88	PK	Vertical
2	1435.00	45.46	25.24	3.00	-36.94	36.76	74.00	37.24	PK	Vertical
3	2229.50	45.50	27.51	3.74	-37.66	39.09	74.00	34.91	PK	Vertical
4	2712.00	46.04	27.52	4.11	-39.02	38.65	74.00	35.35	PK	Vertical
5	3905.50	48.02	31.19	4.97	-40.39	43.79	74.00	30.21	PK	Vertical
6	4855.00	44.56	33.72	5.44	-40.13	43.59	74.00	30.41	PK	Vertical

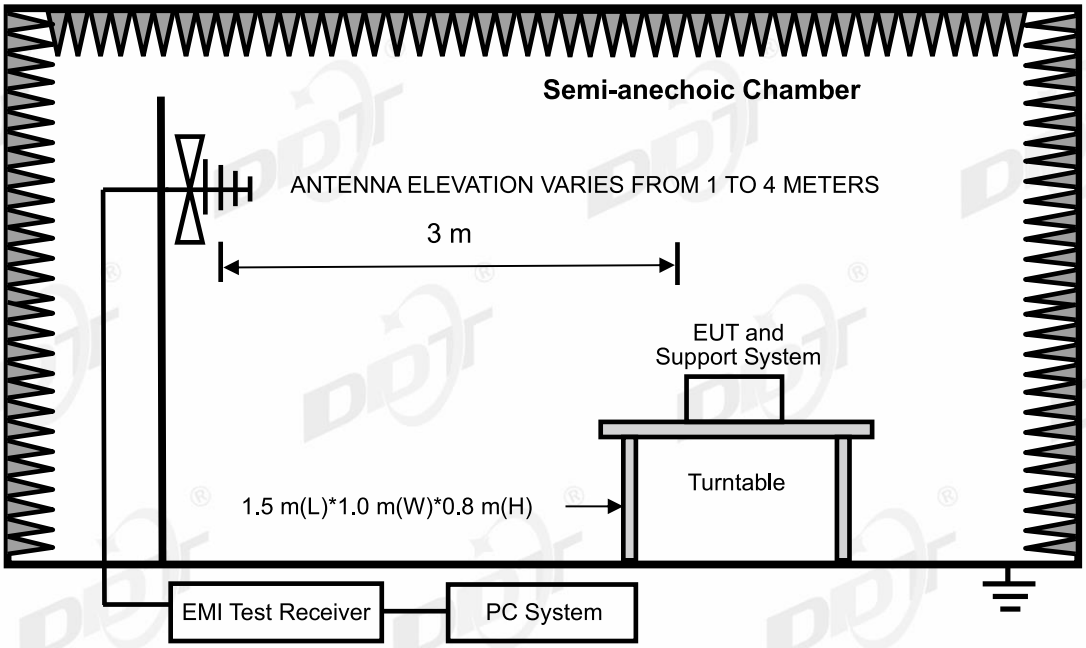
Note:
1. Level = Reading + Cable loss + Antenna Factor + AMP
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

7. Field Strength Of The Fundamental Signal

7.1. Test equipment

Equipment	Manufacturer	Model No.	Serial No.	Cal Due To
/	/	/	/	/

7.2. Block diagram of test setup



7.3. Limits

(3) FCC 15.231 section (a) limit

Fundamental Frequency (MHz)	Field Strength of Fundamental
433.92	AV: 80.83 dBuV/m @3m PK: 100.83dBuV/m @3m

7.4. Assistant equipment used for test

Assistant equipment	Manufacturer	Model number	Description	other
/	/	/	/	/

7.5. Test procedure

(1) EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber.

(2) Test antenna was located 3m from the EUT on an adjustable mast, and the antenna used as below table.

Test frequency range	Test antenna used	Test antenna distance
30MHz-1GHz	Trilog Broadband Antenna	3m

The Trilog Broadband Antenna or Horn Antenna was located 3m from EUT, Measurements were made with the antenna positioned in both the horizontal and vertical planes of Polarization, and the measurement antenna was varied from 1 m to 4 m. in height above the reference ground plane to obtain the maximum signal strength.

(3) Below pre-scan procedure was first performed in order to find prominent frequency spectrum radiated emissions:

(a) Scanning the peak frequency spectrum with the antenna specified in step (3), and the EUT was rotated 360 degree, the antenna height was varied from 1m to 4m(Except loop antenna, it's fixed 1m above ground.)

(b) Change work frequency or channel of device if practicable.

(c) Change modulation type of device if practicable.

(d) Change power supply range from 85% to 115% of the rated supply voltage

(e) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions.

(4) For final emissions measurements at each frequency of interest, the EUT was rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.10 2013 on Radiated Emission test.

(5) The emissions from 9kHz to 1GHz were measured based on CISPR QP detector except for the frequency bands 9-90kHz, 110-490kHz, for emissions from 9kHz-90kHz,110kHz-490kHz and above 1GHz were measured based on average detector, for emissions above 1GHz, peak emissions also be measured and need comply with Peak limit.

(6) The emissions from 9kHz to 1GHz, QP or average values were measured with EMI receiver with below RBW.

Frequency band	RBW
30MHz-1GHz	120kHz

(7) X axis, Y axis, Z axis are tested, and worse setup X axis is reported.

7.6. Test result

Test Site: 3# 3m暗室	Test Date: 2024/02/28--2024/03/21
Condition: 23.2°C,62.7%	Test Engineer: Junchang Du
Memo: /	

EUT Name: Heater controller system (receiver + emitter)	EUT Model: PX1500+PX123-01
Sample No.: S24022817-002	Test Mode: Tx mode
Power supply: Battery	Memo: /

Frequency (MHz)	PK Level (dBuV/m)	PK Limit Line (dBuV/m)	Over Limit (dB)	Polarization
433.92	83.48	100.83	-17.35	Horizontal
433.92	80.10	100.83	-20.73	Vertical

Frequency (MHz)	AV Level (dBuV/m)	AV Limit Line (dBuV/m)	Over Limit (dB)	Polarization
433.92	73.71	80.83	-7.12	Horizontal
433.92	70.33	80.83	-10.50	Vertical
Note: AV Level= PK Level+ Duty factor				

8. Antenna Requirement

8.1. Limits

The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

8.2. Assess result

The antenna used for this product is inductive PCB antenna and that no antenna other than that furnished by the responsible party shall be used with the device.

10. Photos of the EUT

Please refer to DDT-Q24022817-2E appendix I

----------End Report----------