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Report No.: HK2506253393-E

FCC Test Report

**Test Report
On Behalf of
 CrowdSync Technology LLC
For
 CrowdController 1
Model No.: CST-DMX1**

FCC ID: 2BQZV-CST-DMX1

Prepared For: CrowdSync Technology LLC
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Date of Test: June 23, 2025 ~ Aug. 04, 2025

Date of Report: Aug. 04, 2025

Report Number: HK2506253393-E

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** Modified History **

Revision	Description	Issued Data	Remark
Revision 1.0	Initial Test Report Release	Aug. 04, 2025	Jason Zhou

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2. General Information

2.1 Description of Device (EUT)

Product Name	:	CrowdController 1
Model No.	:	CST-DMX1
Series Model(s)	:	N/A
Model Difference	:	N/A
Trade Mark	:	N/A
Test Power Supply	:	DC6V, 1000mA from adapter with AC100-240V, 50/60Hz, 0.65A Max
Product Description	Operation Frequency:	433.92MHz
	Number of Channel:	1 Channels
	Modulation Type:	OOK
	Antenna Type:	External Antenna
	Antenna Gain(Peak):	2.62dBi

Remark:

- 1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
- 2) Antenna gain Refer to the antenna specifications.
- 3) The cable loss data is obtained from the supplier.
- 4) The test results in the report only apply to the tested sample.

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2.3 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Trade Mark	Model/Type No.	Specification	Note
1	CrowdController 1	N/A	CST-DMX1	N/A	EUT
2	Adapter	N/A	ZF-0601000	Input: AC100-240V, 50/60Hz, 0.65A Max Output: DC6V, 1000mA	Accessory
3	Laptop	Lenovo	TP00096A	Input: DC 20V, 2.25~3.25A Output: 5VDC, 0.5A	Peripheral

Note:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.
3. For conducted measurements (Output Power, 6dB Emission Bandwidth, Power Spectral Density, Spurious Emissions), the antenna of EUT is connected to the test equipment via temporary antenna connector, the antenna connector is soldered on the antenna port of EUT, and the temporary antenna connector is listed in the Test Instruments.

2.4 List of Channels

Channel	Freq. (MHz)	Note (Modulation Type)
01	433.92	OOK



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2.5 Test Equipment List

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	L.I.S.N.	R&S	ENV216	HKE-002	2025/02/19	1 Year
2	L.I.S.N.	R&S	ENV216	HKE-059	2025/02/19	1 Year
3	EMI Test Receiver	R&S	ESR	HKE-005	2025/02/19	1 Year
4	Spectrum analyzer	Agilent	N9020A	HKE-025	2025/02/19	1 Year
5	Spectrum analyzer	Agilent	N9020A	HKE-117	2025/02/19	1 Year
6	Spectrum analyzer	R&S	FSV3044	HKE-126	2025/02/19	1 Year
7	Preamplifier	EMCI	EMC051845S	HKE-006	2025/02/19	1 Year
8	Preamplifier	Schwarzbeck	BBV 9743	HKE-016	2025/02/19	1 Year
9	Preamplifier	A.H. Systems	SAS-574	HKE-182	2025/02/19	1 Year
10	6dB Attenuator	Pasternack	6db	HKE-184	2025/02/19	1 Year
11	EMI Test Receiver	Rohde & Schwarz	ESR-7	HKE-010	2025/02/19	1 Year
12	Broadband Antenna	Schwarzbeck	VULB9168	HKE-167	2024/02/21	2 Year
13	Loop Antenna	COM-POWER	AL-130R	HKE-014	2024/02/21	2 Year
14	Horn Antenna	Schwarzbeck	9120D	HKE-013	2024/02/21	2 Year
15	EMI Test Software	Tonscend	JS32-CE 2.5.0.6	HKE-081	/	/
16	EMI Test Software	Tonscend	JS32-RE 5.0.0	HKE-082	/	/
17	RF Automatic control unit	Tonscend	JS0806-2	HKE-060	2025/02/19	1 Year
18	High pass filter unit	Tonscend	JS0806-F	HKE-055	2025/02/19	1 Year
19	Wireless Communication Test Set	R&S	CMU200	HKE-026	2025/02/19	1 Year
20	Wireless Communication Test Set	R&S	CMW500	HKE-027	2025/02/19	1 Year
21	High-low temperature chamber	Guangke	HT-80L	HKE-118	2024/06/11	1 Year
22	Temperature and humidity meter	Boyang	HTC-1	HKE-075	2024/06/11	1 Year
23	RF Test Software	Tonscend	JS1120-3 Version 3.5.39	HKE-083	/	/
24	10dB Attenuator	Schwarzbeck	VTSD9561F	HKE-153	2025/02/19	1 Year
25	RSE Test Software	Tonscend	JS36-RSE 5.0.0	HKE-184	/	/

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3. AC Conducted Emission Test

3.1 AC Conducted Power Line Emission Limit

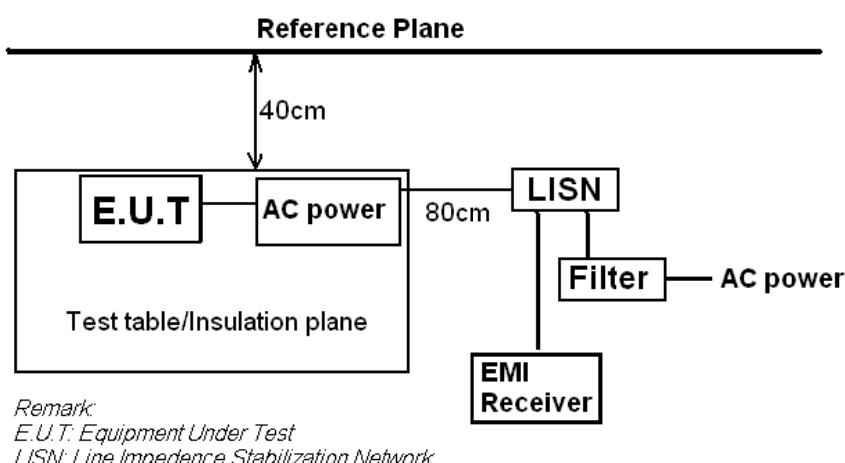
For unintentional device, according to § 15.107(a) Line Conducted Emission Limits is as following

Frequency (MHz)	Maximum RF Line Voltage (dB μ V)			
	CLASS A		CLASS B	
	Q.P.	Ave.	Q.P.	Ave.
0.15 - 0.50	79	66	66-56*	56-46*
0.50 - 5.00	73	60	56	46
5.00 - 30.0	73	60	60	50

* Decreasing linearly with the logarithm of the frequency

For intentional device, according to §15.207(a) Line Conducted Emission Limit is same as above table.

3.2 Test Setup



3.3 Test Procedure

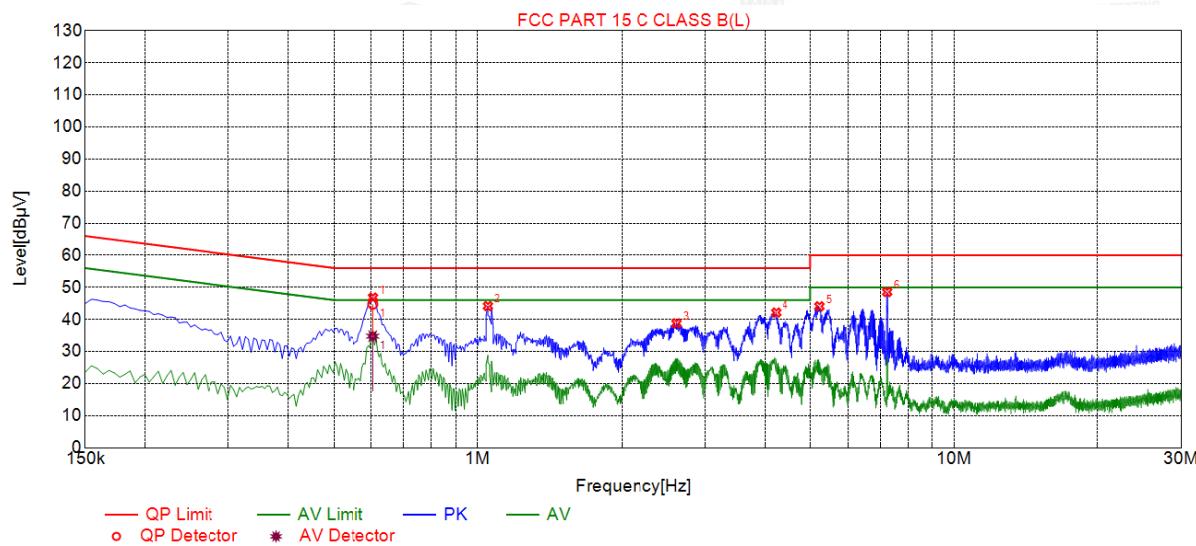
1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10.
2. Support equipment, if needed, was placed as per ANSI C63.10.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
4. If a EUT received DC power from the USB Port of Notebook PC, the PC's adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5. All support equipments received AC power from a second LISN, if any.
6. The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.

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3.4 Test Data

All modes have been tested, only the worst result was reported as below:

Test Specification: Line



Suspected List

NO.	Freq. [MHz]	Level [dB μ V]	Factor [dB]	Limit [dB μ V]	Margin [dB]	Reading [dB μ V]	Detector	Type
1	0.6045	46.81	19.75	56.00	9.19	27.06	PK	L
2	1.0500	44.16	19.79	56.00	11.84	24.37	PK	L
3	2.6160	38.79	20.24	56.00	17.21	18.55	PK	L
4	4.2270	42.14	20.36	56.00	13.86	21.78	PK	L
5	5.2305	44.09	20.40	60.00	15.91	23.69	PK	L
6	7.2420	48.56	20.46	60.00	11.44	28.10	PK	L

Final Data List

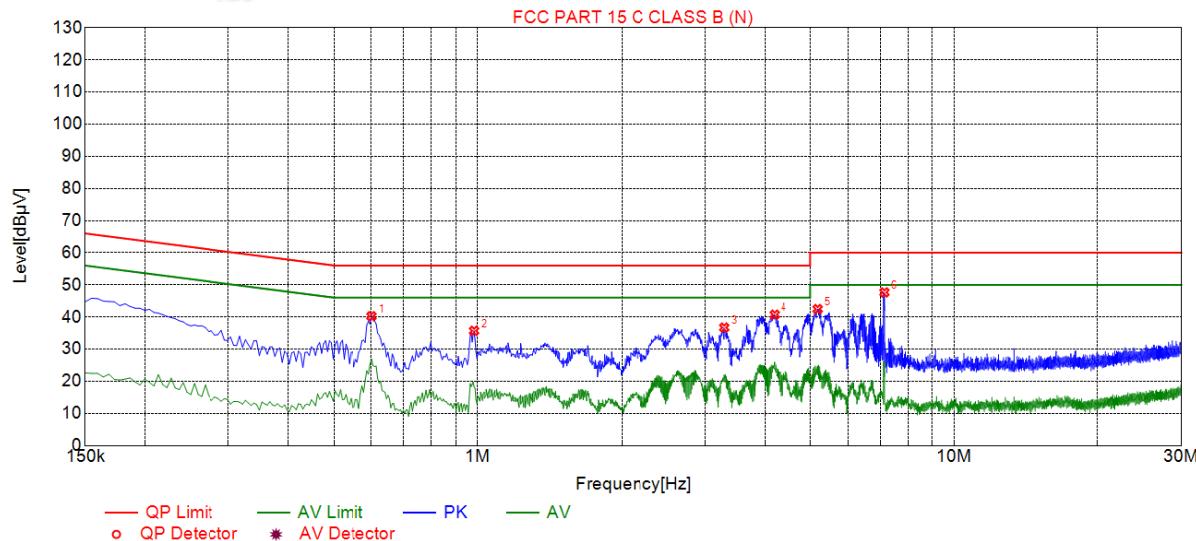
NO.	Freq. [MHz]	Correction factor[dB]	QP Value [dB μ V]	QP Limit [dB μ V]	QP Margin [dB]	QP Reading [dB μ V]	AV Value [dB μ V]	AV Limit [dB μ V]	AV Margin [dB]	AV Reading [dB μ V]	Type
1	0.6036	19.75	44.77	56.00	11.23	25.02	34.79	46.00	11.21	15.04	L

Remark: Margin = Limit – Level

Correction factor = Cable loss + LISN insertion loss

Level=Test receiver reading + correction factor

Test Specification: Neutral



Suspected List

NO.	Freq. [MHz]	Level [dB μ V]	Factor [dB]	Limit [dB μ V]	Margin [dB]	Reading [dB μ V]	Detector	Type
1	0.6000	40.25	19.75	56.00	15.75	20.50	PK	N
2	0.9825	35.70	19.76	56.00	20.30	15.94	PK	N
3	3.2910	36.71	20.10	56.00	19.29	16.61	PK	N
4	4.1955	40.73	20.18	56.00	15.27	20.55	PK	N
5	5.1855	42.48	20.32	60.00	17.52	22.16	PK	N
6	7.1475	47.66	20.52	60.00	12.34	27.14	PK	N

Remark: Margin = Limit – Level

Correction factor = Cable loss + LISN insertion loss

Level=Test receiver reading + correction factor



4. Radiated Emissions

4.1 Standard Applicable

According to §15.231(e), Intentional radiators may operate at a periodic rate exceeding that specified in paragraph (a) of this section and may be employed for any type of operation, including operation prohibited in paragraph (a) of this section, provided the intentional radiator complies with the provisions of paragraphs (b) through (d) of this section, except the field strength table in paragraph (b) of this section is replaced by the following:

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emission (microvolts/meter)
40.66-40.70	1,000	100
70-130	500	50
130-174	500 to 1,500 ¹	50 to 150 ¹
174-260	1,500	150
260-470	1,500 to 5,000 ¹	150 to 500 ¹
Above 470	5,000	500

¹ Linear interpolations.

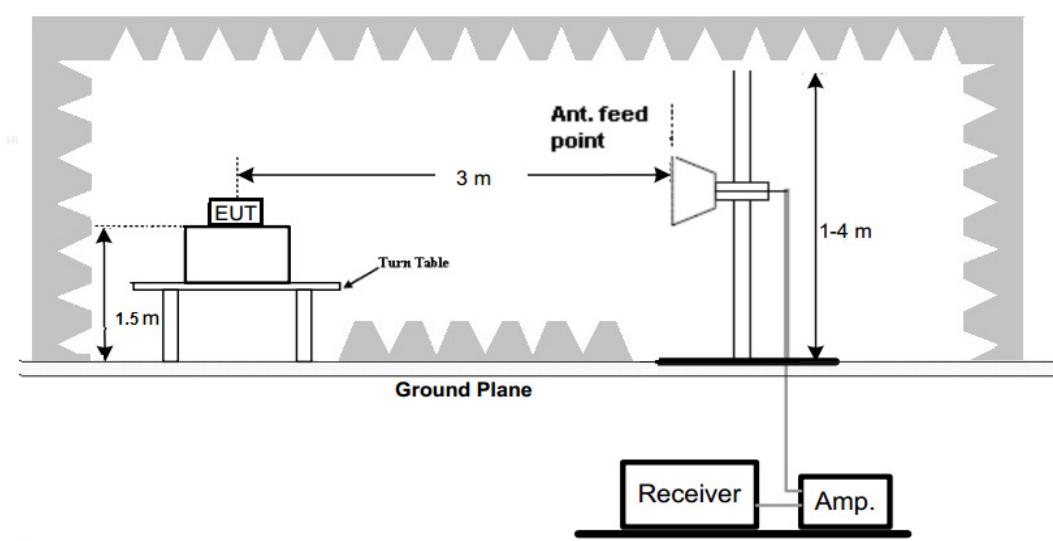
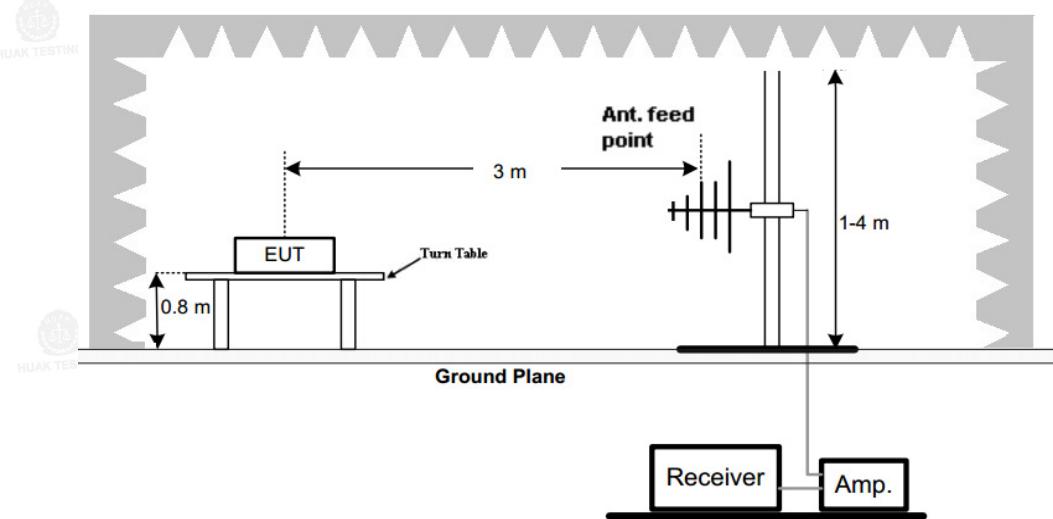
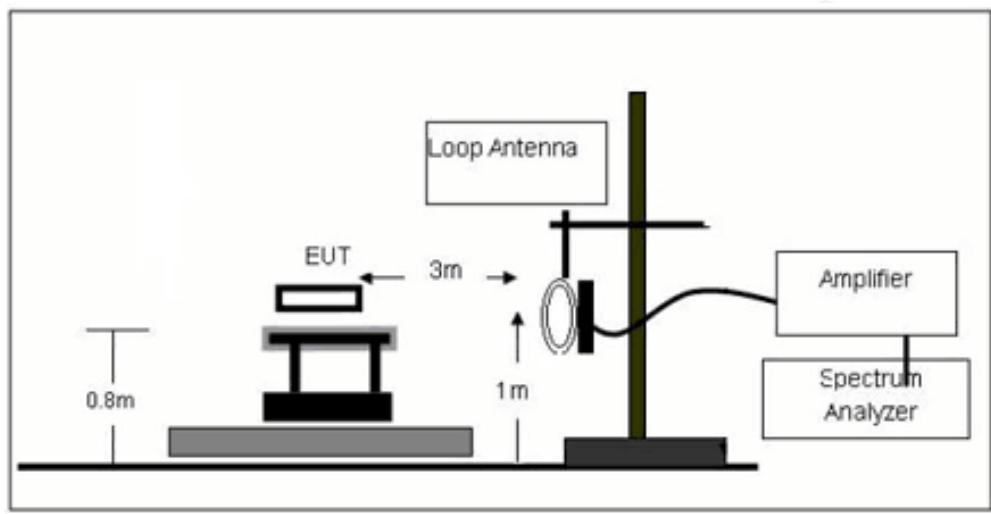
The limits on the field strength of the spurious emissions in the above table are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in §15.209, whichever limit permits a higher field strength.

The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply. Spurious Radiated Emissions measurements starting below or at the lowest crystal frequency.

Compliance with the provisions of §15.205 shall be demonstrated using the measurement instrumentation specified in that section.

4.2 Test Procedure

The setup of EUT is according with per ANSI C63.10: 2020 measurement procedure. The specification used was with the FCC Part 15.205 15.231(e) and FCC Part 15.209 Limit.



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4.3 Corrected Amplitude & Margin Calculation

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

Corr. Ampl. = Indicated Reading + Ant.Loss + Cab. Loss – Ampl.Gain

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of $-6\text{dB } \mu\text{V}$ means the emission is $6\text{dB } \mu\text{V}$ below the maximum limit. The equation for margin calculation is as follows:

Margin = Corr. Ampl. – FCC Part15C Limit

4.4 Environmental Conditions

Temperature:	21°C
Relative Humidity:	50%
ATM Pressure:	1011 mbar

4.5 Test Data

According to the data below, the FCC Part 15.205, 15.209 and 15.231 standards, and had the worst margin of:

Note: this EUT was tested in 3 orthogonal positions and the worst case position data was reported.

(Fundamental 433.92MHz)

No.	Frequency	Reading	Corr.	Duty cycle	Result	Limit	Margin	Deg.	Height	Polarity	Remark
	MHz	dBuV/m	Factor (dB)	Factor (dB)	dBuV/m	dBuV/m	dB	(°)	(cm)		
1	433.9200	30.16	12.33	N/A	42.49	92.9	50.41	177	100	H	Peak
2	433.9200	N/A	N/A	-11.29	31.20	72.9	41.7	177	100	H	AV
3	433.9200	25.61	12.33	N/A	37.94	92.9	54.96	177	100	V	Peak
4	433.9200	N/A	N/A	-11.29	26.65	72.9	46.25	117	100	V	AV

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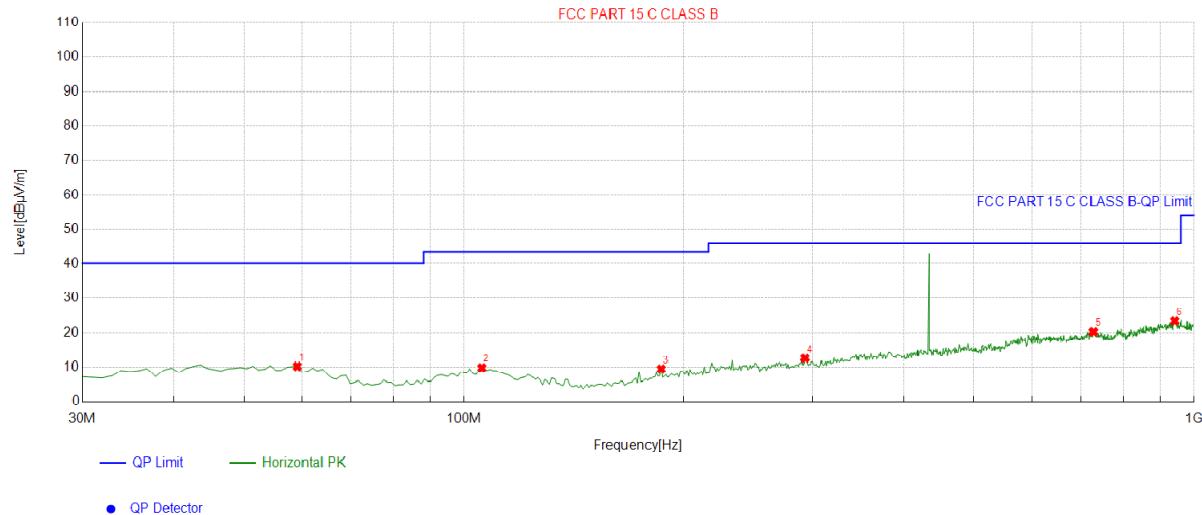
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Radiated Emission

Antenna polarity: H



Suspected List									
NO.	Freq. [MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	59.1291	-13.54	23.76	10.22	40.00	29.78	100	193	Horizontal
2	105.7357	-14.49	24.30	9.81	43.50	33.69	100	128	Horizontal
3	186.3263	-15.96	25.43	9.47	43.50	34.03	100	359	Horizontal
4	293.1331	-11.96	24.59	12.63	46.00	33.37	100	284	Horizontal
5	728.1281	-3.69	23.94	20.25	46.00	25.75	100	312	Horizontal
6	940.7708	-0.90	24.30	23.40	46.00	22.60	100	174	Horizontal

Remark: Factor = Cable loss + Antenna factor + Attenuator – Preamplifier; Level = Reading + Factor; Margin = Limit – Level;

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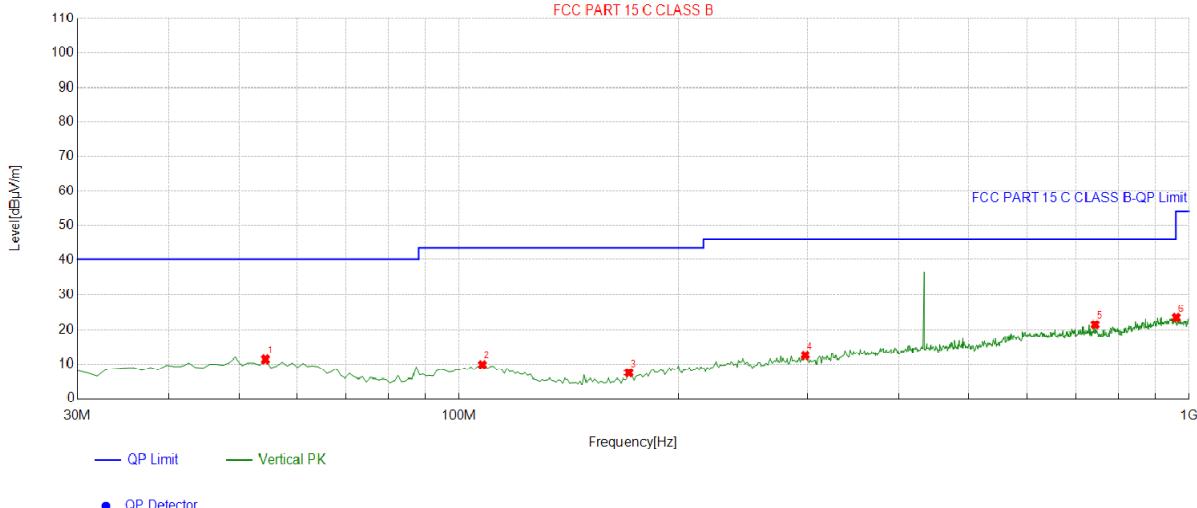
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Antenna polarity: V



Suspected List									
NO.	Freq. [MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	54.2743	-13.50	24.85	11.35	40.00	28.65	100	200	Vertical
2	107.6777	-14.18	24.06	9.88	43.50	33.62	100	54	Vertical
3	170.7908	-17.02	24.47	7.45	43.50	36.05	100	281	Vertical
4	297.9880	-11.79	24.34	12.55	46.00	33.45	100	229	Vertical
5	743.6637	-3.42	24.90	21.48	46.00	24.52	100	148	Vertical
6	961.1612	-0.61	24.14	23.53	54.00	30.47	100	356	Vertical

Remark: Factor = Cable loss + Antenna factor + Attenuator – Preamplifier; Level = Reading + Factor; Margin = Limit – Level;

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Above 1GHz

Horizontal:

No.	Frequency	Reading	Corr.	Duty cycle	Result	Limit	Margin	Deg.	Height	Remark
	MHz	dBuV/m	Factor (dB)	Factor (dB)	dBuV/m	dBuV/m	dB	(°)	(cm)	
1	1301.73	24.12	25.83	N/A	49.95	74	24.05	41	100	Peak
	1301.73	/	/	-11.29	38.66	54	15.34	306	100	Ave
2	1735.64	23.87	27.25	N/A	51.12	74	22.88	204	100	Peak
	1735.64	/	/	-11.29	39.83	54	14.17	87	100	Ave

Vertical:

No.	Frequency	Reading	Corr.	Duty cycle	Result	Limit	Margin	Deg.	Height	Remark
	MHz	dBuV/m	Factor (dB)	Factor (dB)	dBuV/m	dBuV/m	dB	(°)	(cm)	
1	1301.73	23.19	25.83	N/A	49.02	74	24.98	151	100	Peak
	1301.73	/	/	-11.29	37.73	54	16.27	74	100	Ave
2	1735.64	23.68	27.25	N/A	50.93	74	23.07	332	100	Peak
	1735.64	/	/	-11.29	39.64	54	14.36	51	100	Ave

Note: Testing is carried out with frequency rang 30MHz to the tenth harmonics, which above 5th Harmonics are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
The fundamental frequency is 433.92MHz, so the fundamental and spurious emissions radiated limit base on the operating frequency 433.92MHz.

Frequency Range (9 kHz-30MHz)

Frequency (MHz)	Level@3m (dB μ V/m)			Limit@3m (dB μ V/m)	
--	--	HUAK TESTING	--	--	--
--	--	--	--	--	--
--	--	--	--	--	--

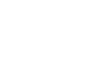
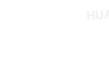
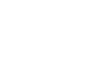
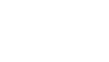
Note: 1. Emission Level=Reading+ Cable loss-Antenna factor-Amp factor

2. The emission levels are 20 dB below the limit value, which are not reported. It is deemed to comply with the requirement.

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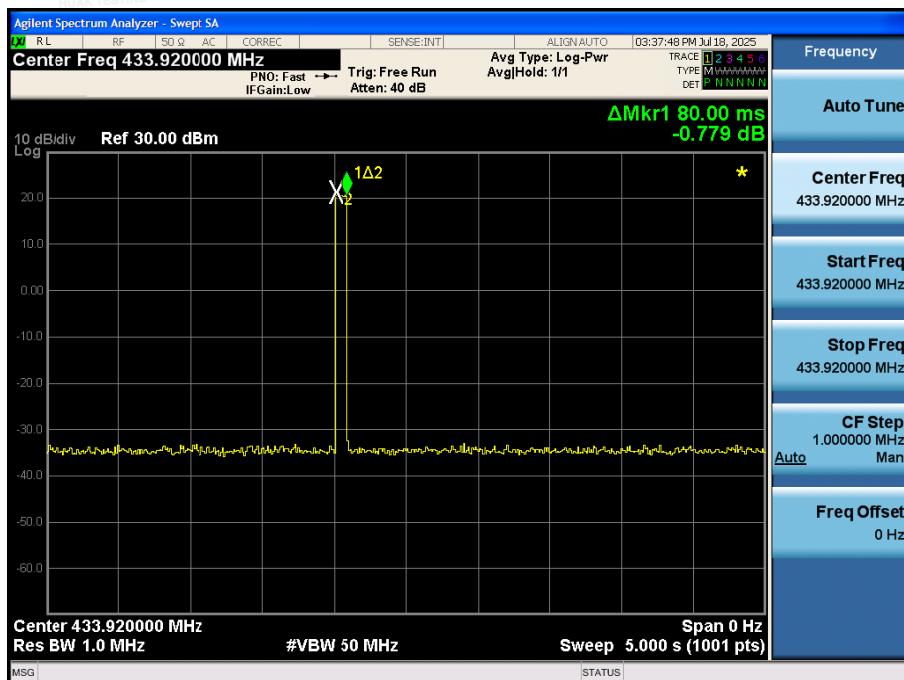
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6.4 Test Data

Transmission Type	Test Frequency MHz	Transmission Time seconds	Limit s	Result
Manually	433.92	0.08	1	PASS

The silent period is 15.24s, greater than $0.08 \times 30 = 2.4$ s, also greater than 10s, meet the requirements.

Please refer the following plot.



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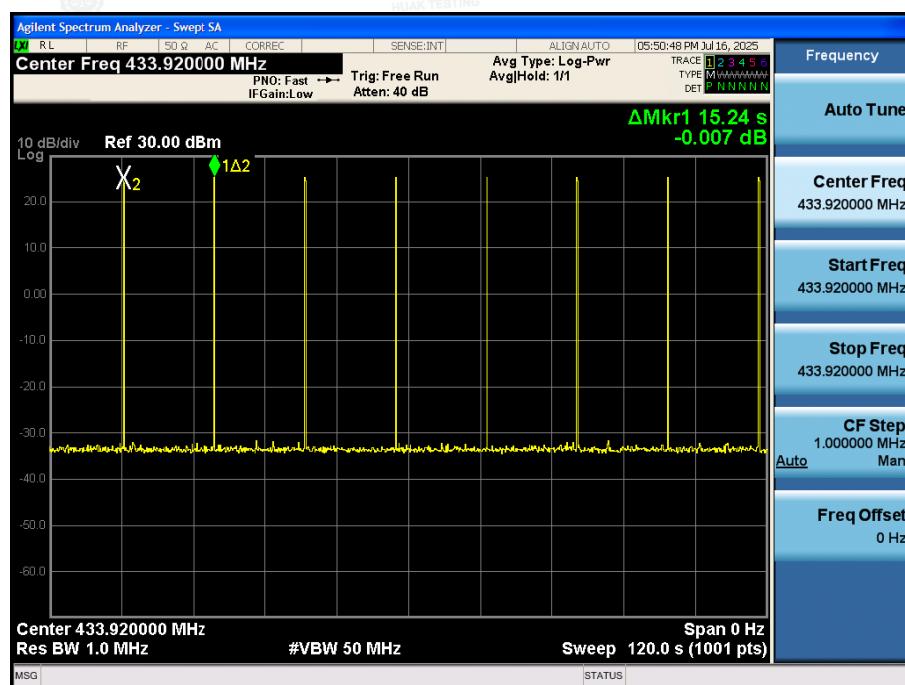


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7. Duty Cycle

7.1 Standard Applicable

According to FCC Part 15.231(b)(2) and 15.35 (c), For pulse operation transmitter, the averaging pulsed emissions are calculated by peak value of measured emission plus duty cycle factor.

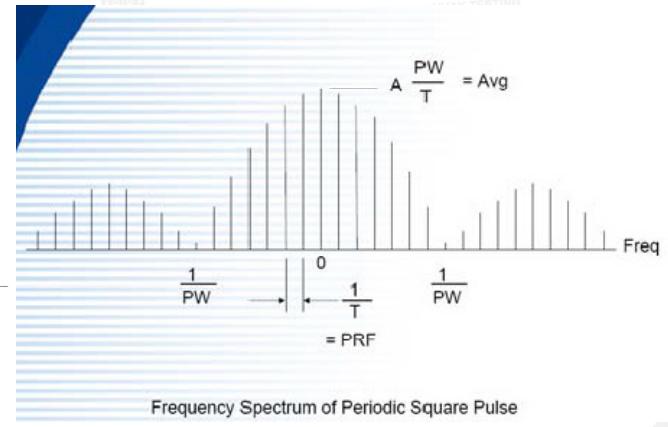
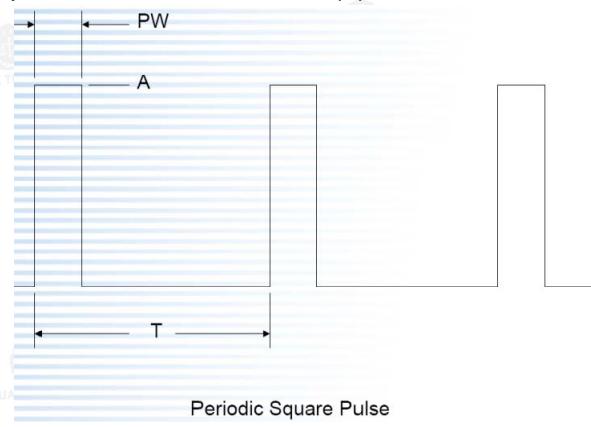
7.2 Test Procedure

- 1) The EUT was placed on a turntable which is 0.8m above ground plane.
- 2) Set EUT operating in continuous transmitting mode
- 3) Set Test Receiver into spectrum analyzer mode, Tune the spectrum analyzer to the transmitter carrier frequency, and set the spectrum analyzer resolution bandwidth(RBW) to 1000kHz and video bandwidth(VBW) to 1000kHz, Span was set to 0Hz.
- 4) The Duty Cycle was measured and recorded.

7.3 Introduction to PDCF Reference:

(§15.35 Measurement detector functions and bandwidths.)

1) Part 15 of the FCC Rules provides for the operation of low power communication devices without an individual license (e.g., intrusion detectors, pulsed water tank level gauges, etc.), subject to certain requirements. Some of these devices use extremely narrow pulses to generate wideband emissions, which are measured to determine compliance with the rules. These measurements are typically performed with a receiver or spectrum analyzer. Depending on a number of factors (e.g., resolution bandwidth, pulse width, etc.), the spectrum analyzer may not always display the true peak value of the measured emission. This effect, called "pulse desensitization," relates to the capabilities of the measuring instrument. For the measurement and reporting of the true peak of pulsed emissions, it may be necessary to apply a "pulse desensitization correction factor" (PDCF) to the measured value, pursuant to 47 CFR 15.35(a).



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If using spectrum analyzer to measure pulse signal, it have to make sure the RBW use is at least $2/PW$.

- When RBW is less than $2/PW$, you are able to measure the true peak level of the pulse signal. If this is the case.

PDCF is required to compensate to determine true peak value.

Pulse desensitization:

PW =29250usec (0.6* 13+ 1.65*13), Period=67500usec, Level=A

RBW>2/PW=0.068K, 1/T=0.15K

NOTE: 2 / PW < RBW, first don't need

2). For the actual test, please refer to the ANSI C63.10, Annex C refer to section 5 for more detail

7.4 Test Data

Type of Pulse	Width of Pulse ms	Quantity of Pulse	Transmission time ms	Total Time (T_{on}) ms
Pulse 1	0.109	91	9.919	9.919

Test Period (T_p) ms	Total Time (T_{on}) ms	Duty Cycle %	Duty Cycle Factor dB
72.8	$9.919*2=19.838$	27.25	-11.29

Remark: Duty Cycle Factor=20*log (Duty Cycle)

Please refer to the attached test plots



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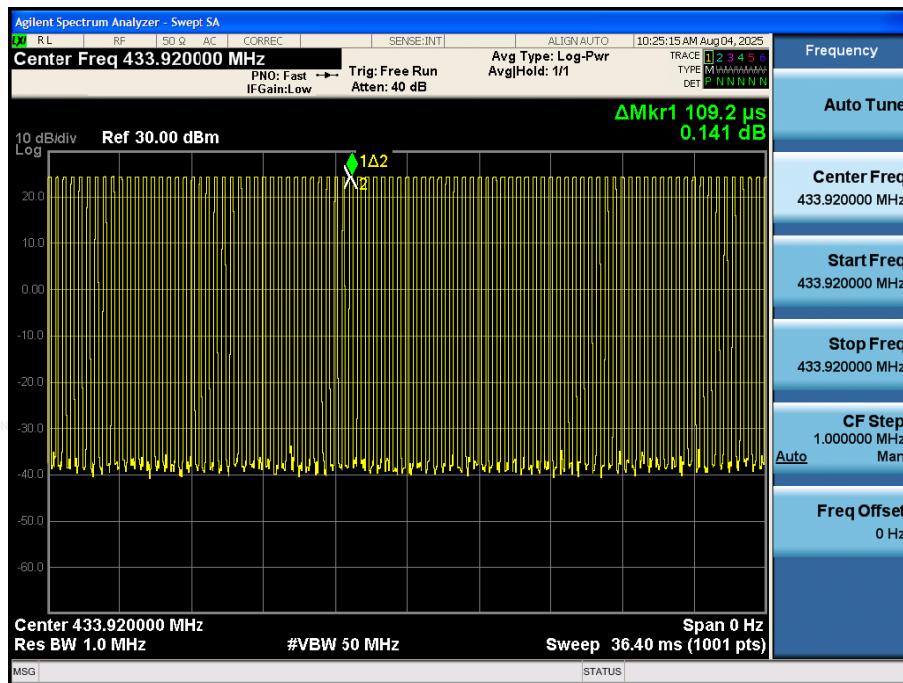
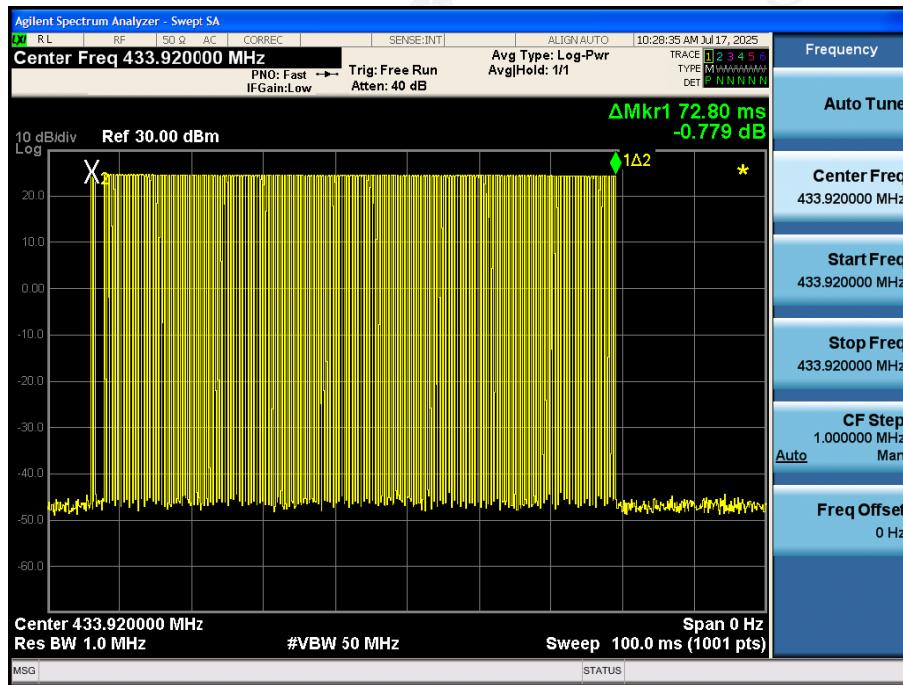
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8. Antenna Connected Construction

The antenna used in this product is an External Antenna, with non-standard SMA connector, need professional installation, not easy to remove. It conforms to the standard requirements. The directional gains of antenna used for transmitting is 2.62dBi.

Antenna



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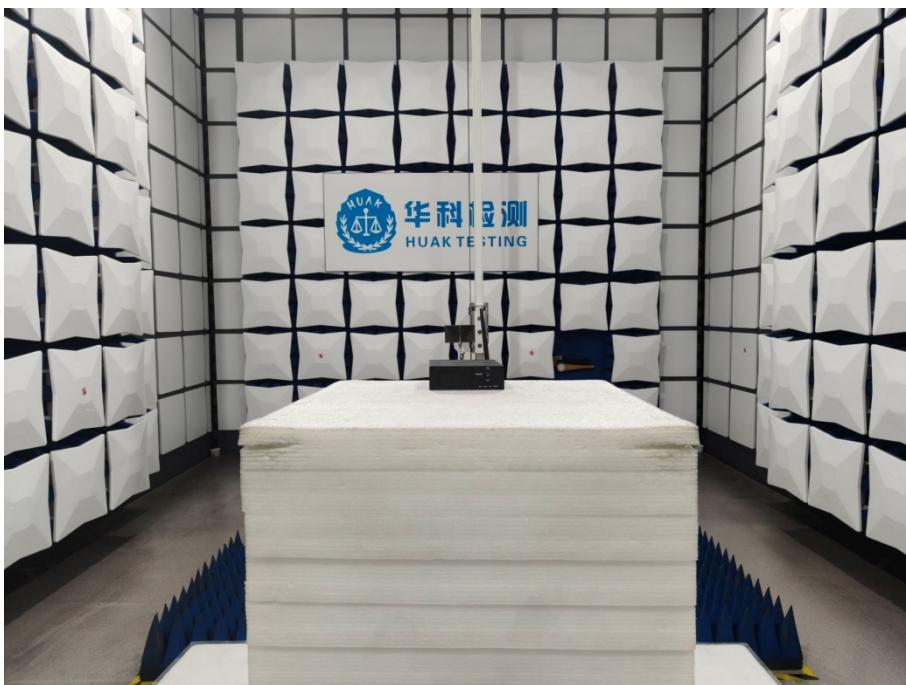
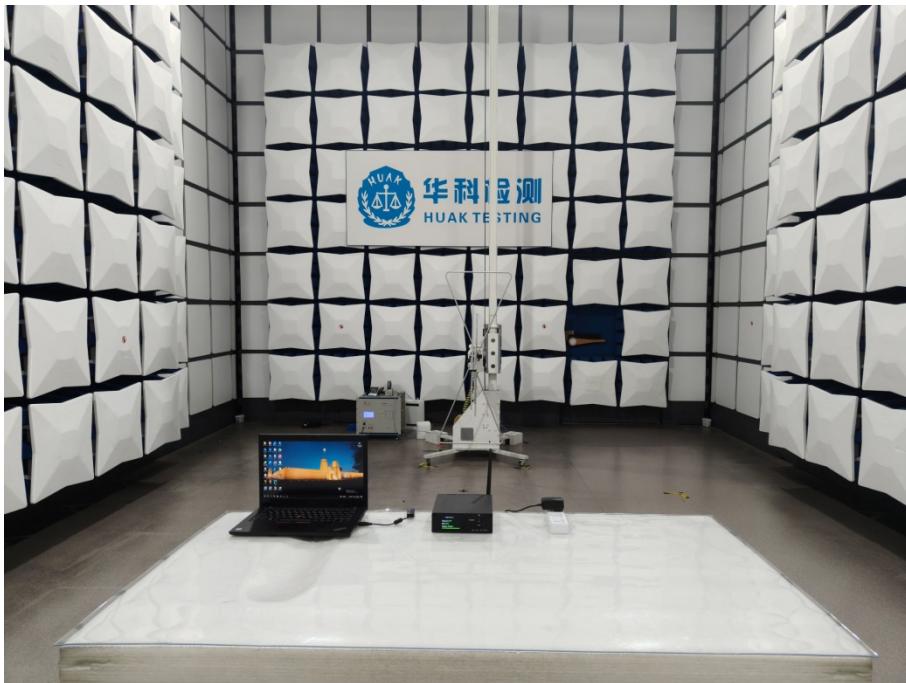
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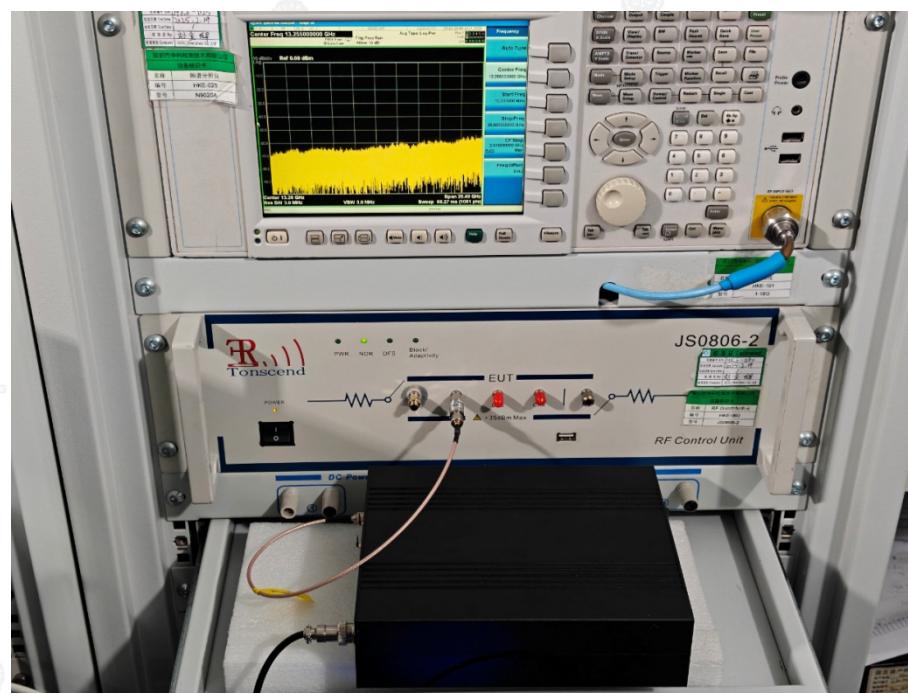
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9. Photographs of Test

Radiated Emission



AC Conducted Emission



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