



Shenzhen CTL Testing Technology Co., Ltd.
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TEST REPORT

FCC PART 15.225

Report Reference No.: CTL2505262171-WF

Compiled by: Happy Guo
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Product Name: EV AC Charger

Model/Type reference: HBE-AC80A02ST-U-D21.5NWB4GG

List Model(s): N/A

Trade Mark: HBE

FCC ID: 2BF82-HBEAC80A02ST

Applicant's name: SHENZHEN HB ELECTRONIC CO., LTD.

Address of applicant: Room 101-301, Building 7, Zhengda'an Industrial City, No. 172
Xiangshan Avenue, Luotian Community, Yanluo Street, Bao'an
District, Shenzhen 518000 Guangdong, P.R. China

Test Firm: Shenzhen CTL Testing Technology Co., Ltd.

Address of Test Firm: Floor 1-A, Baisha Technology Park, No.3011, Shaheji Road,
Nanshan District, Shenzhen, China 518055

Test specification:

Standard: FCC Part 15.225: Operation within the band 13.110–14.010MHz.

TRF Originator: Shenzhen CTL Testing Technology Co., Ltd.

Master TRF: Dated 2011-01

Date of receipt of test item: May 28, 2025

Date of Test Date: May 28, 2025-June 19, 2025

Data of Issue: June 25, 2025

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TEST REPORT

Test Report No. : CTL2505262171-WF	June 25, 2025 Date of issue
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Equipment under Test : EV AC Charger

Sample No : CTL2505262171

Model /Type : HBE-AC80A02ST-U-D21.5NWB4GG

Listed Models : N/A

Applicant : SHENZHEN HB ELECTRONIC CO., LTD.

Address : Room 101-301, Building 7, Zhengda'an Industrial City,
No. 172 Xiangshan Avenue, Luotian Community, Yanluo
Street, Bao'an District, Shenzhen 518000 Guangdong,
P.R. China

Manufacturer : SHENZHEN HB ELECTRONIC CO., LTD.

Address : Room 101-301, Building 7, Zhengda'an Industrial City, No.
172 Xiangshan Avenue, Luotian Community, Yanluo Street
Bao'an District, Shenzhen 518000 Guangdong, P.R. China

Test result	Pass *
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* In the configuration tested, the EUT complied with the standards specified page 5.

The test results presented in this report relate only to the object tested.

This report shall not be reproduced, except in full, without the written approval of the issuing testing laboratory.

** Modified History **

[illegible]

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1. SUMMARY

1.1. TEST STANDARDS

The tests were performed according to following standards:

[FCC Rules Part 15.225](#): Operation within the band 13.110–14.010 MHz

[ANSI C63.10:2013](#) : American National Standard for Testing Unlicensed Wireless Devices

1.2. Test Description

FCC PART 15 .225		
FCC Part 15.207	AC Power Conducted Emission	PASS
FCC Part 15.215(c)	99% and 20dB Bandwidth	PASS
FCC Part 15.225(a) (b) (c)	In-band Emissions	PASS
FCC Part 15.225(d)/15.209	Out-of-band Emissions	PASS
FCC Part 15.225(e)	Frequency Stability Tolerance	PASS
FCC Part 15.203	Antenna Requirement	PASS

Remark: The measurement uncertainty is not included in the test result.

1.3. Test Facility

1.3.1 Address of the test laboratory

Shenzhen CTL Testing Technology Co., Ltd.

Floor 1-A, Baisha Technology Park, No.3011, Shahexi Road, Nanshan District, Shenzhen, China 518055

There is one 3m semi-anechoic chamber and two line conducted labs for final test. The Test Sites meet the requirements in documents ANSI C63.4 and CISPR 32/EN 55032 requirements.

1.3.2 Laboratory accreditation

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L7497

Shenzhen CTL Testing Technology Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2017 General Requirements) for the Competence of Testing and Calibration Laboratories.

A2LA-Lab Cert. No. 4343.01

Shenzhen CTL Testing Technology Co., Ltd, EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

IC Registration No.: 9618B

CAB identifier: CN0041

The 3m alternate test site of Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements with Registration No.: 9618B.

FCC-Registration No.: 399832

Designation No.: CN1216

Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 399832.

1.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the Shenzhen CTL Testing Technology Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for CTL laboratory is reported:

Test	Measurement Uncertainty	Notes
Transmitter power conducted	± 1.18 dB	(1)
Transmitter power Radiated	± 2.20 dB	(1)
Conducted spurious emission 9KHz-40 GHz	± 1.6 dB	(1)
Occupied Bandwidth	± 0.20 ppm	(1)
Radiated Emission 0.009~30MHz	± 4.03 dB	(1)

Radiated Emission 30~1000MHz	$\pm 4.08\text{dB}$	(1)
Radiated Emission Above 1GHz	$\pm 4.32\text{dB}$	(1)
Conducted Disturbance 0.15~30MHz	$\pm 3.20\text{dB}$	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95%

(2) confidence level using a coverage factor of $k=1.96$.

2. GENERAL INFORMATION

2.1. Environmental conditions

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

Normal Temperature:	25°C
Relative Humidity:	55 %
Air Pressure:	101 kPa

2.2. General Description of EUT

Product Name:	EV AC Charger
Model/Type reference:	HBE-AC80A02ST-U-D21.5NWB4GG
Power supply:	AC 240V/60Hz
Hardware version:	HBE-AC80A02ST-U-D21.5NWB4GG
Software version:	AUM192KB
RF ID	
Operation frequency:	13.56MHz
Modulation:	ASK
No. of Channel:	1
Antenna type:	Loop Antenna
Antenna Gain:	2dBi

Note1: For more details, please refer to the user's manual of the EUT.

Note2: Antenna gain provided by the applicant.

2.3. Equipments Used during the Test

Conducted Emission					
Test Equipment	Manufacturer	Model No.	Serial No.	Last calibration	Calibration Due
EMI Test Receiver	ROHDE & SCHWARZ	ESCI	1166.5950.03	2025/04/29	2026/04/28
LISN	ROHDE & SCHWARZ	ESH2-Z5	860014/010	2025/04/29	2026/04/28
Limitator	ROHDE & SCHWARZ	ESH3-Z2	100408	2025/04/29	2026/04/28
Software:					
Name of Software:			Version:		
ES-K1			V1.71		

Radiated Emission					
Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due
Active Loop Antenna	Da Ze	ZN30900A	/	2024/04/30	2027/04/29
Double cone logarithmic antenna	Schwarzbeck	VULB 9168	824	2023/02/13	2026/02/12
Horn Antenna	Sunol Sciences Corp.	DRH-118	A062013	2024/11/25	2027/11/24
Horn Antenna	Ocean Microwave	OBH100400	26999002	2025/02/21	2028/02/20
Amplifier	MRT-AP01M06	MRT	S-001	2025/04/29	2026/04/28
Amplifier	Brief&Smart	LNA-4018	2104197	2025/04/30	2026/04/29
EMI Test Receiver	ROHDE & SCHWARZ	ESCI	1166.5950.03	2025/04/29	2026/04/28
Spectrum Analyzer	RS	FSP	1164.4391.38	2025/04/29	2026/04/28
Software:					
Name of Software:			Version:		
EZ_EMC(Below 1GHz)			V1.1.4.2		
EZ_EMC(Above 1GHz)			V1.1.4.2		

RF Conducted					
Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due
Spectrum Analyzer	Keysight	N9020A	MY53420874	2025/04/29	2026/04/28
Temperature/Humidity Meter	Ji Yu	MC501	/	2025/05/06	2026/05/05
Software:					
Name of Software:			Version:		
TST-PASS			V2.0		

2.4. Description of Test Modes and Test Frequency

To be provided by the applicant, the prototype that can transmit (Duty Cycle more than 98%) the signal continuously when powered on and the prototype that can receive the signal after powered on.

Operation Frequency :

Frequency (MHz)
13.56

Power Parameters:

Test Software Version	Power on
Frequency	13.56MHz
RF ID	0

2.5. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: **2BF82-HBEAC80A02ST** filing to comply with Section 15.225 of the FCC Part 15, Subpart C Rules.

2.6. Modifications

No modifications were implemented to meet testing criteria.

3. TEST CONDITIONS AND RESULTS

3.1. Conducted Emissions Test

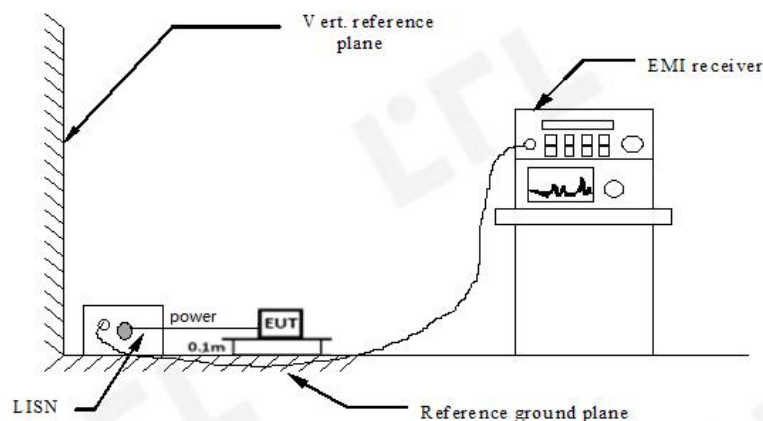
LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.207

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST CONFIGURATION

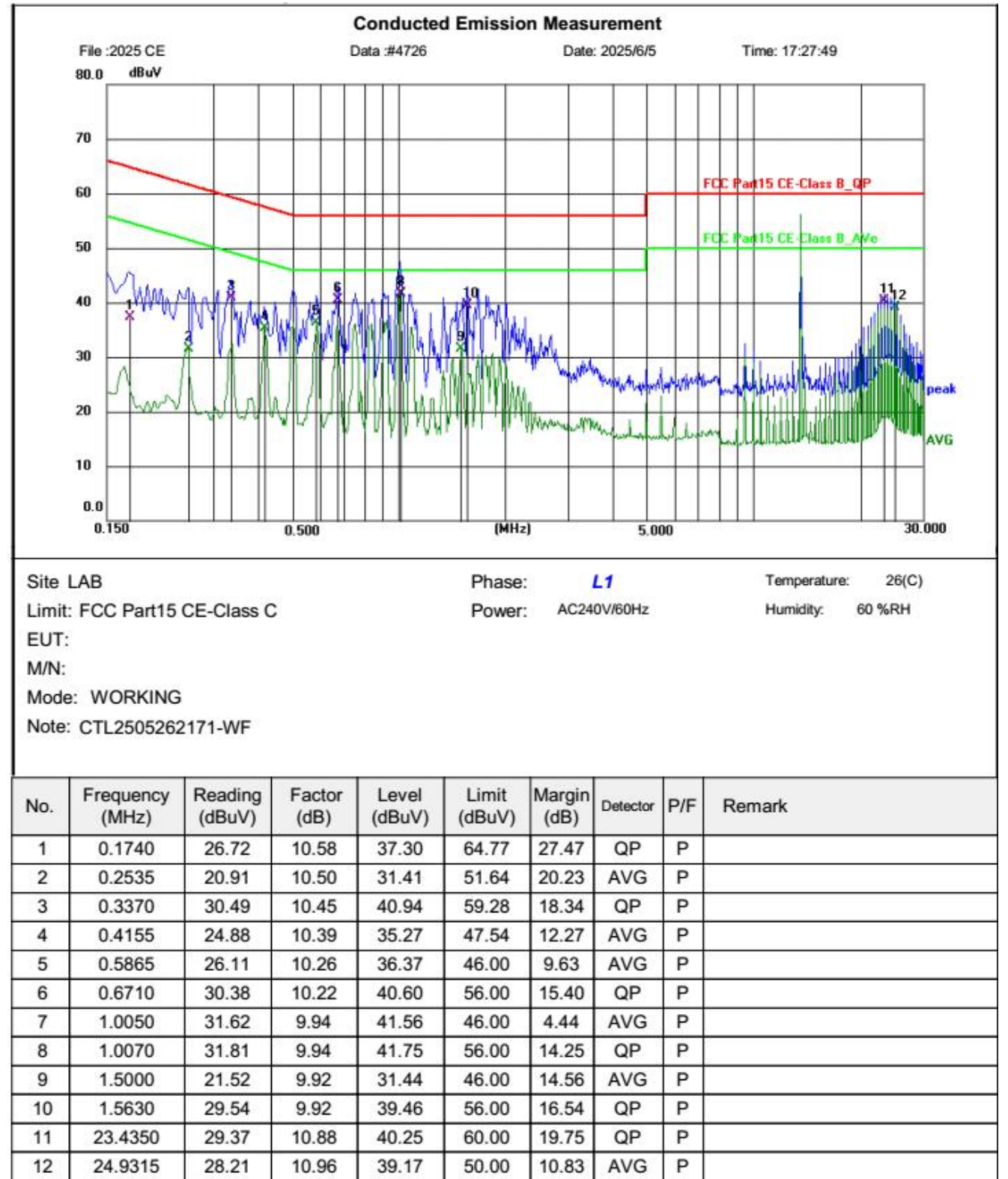


TEST PROCEDURE

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 0.1 meters is used and is placed on the ground plane as per ANSI C63.10:2013.
2. Support equipment, if needed, was placed as per ANSI C63.10:2013.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10:2013.
4. The 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.
8. During the above scans, the emissions were maximized by cable manipulation.

TEST RESULTS

Note: The product is a dual live wire equipment, two live wires and one ground wire. The power supply is AC240V/60Hz.

LINE**L1**

LINE

L2

Conducted Emission Measurement

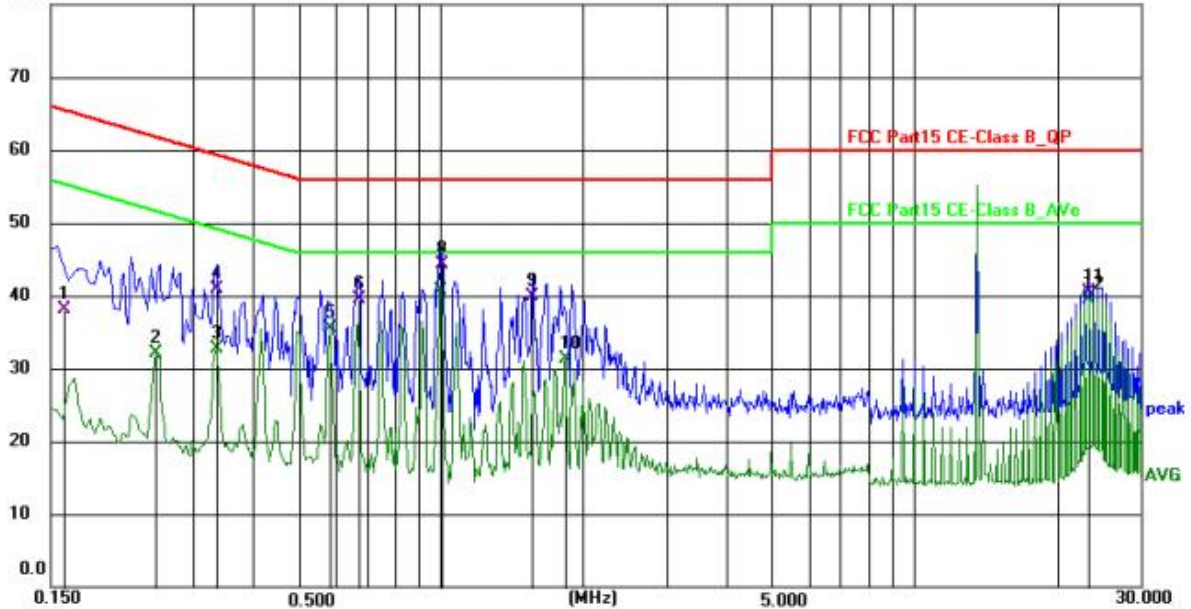
File :2025 CE

Data :#4725

Date: 2025/6/5

Time: 17:24:16

80.0 dBuV



Site LAB

Phase: L2

Temperature: 26(C)

Limit: FCC Part15 CE-Class C

Power: AC240V/60Hz

Humidity: 60 %RH

EUT:

M/N:

Mode: WORKING

Note: CTL2505262171-WF

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1600	27.58	10.62	38.20	65.46	27.26	QP	P	
2	0.2490	21.50	10.52	32.02	51.79	19.77	AVG	P	
3	0.3345	22.26	10.47	32.73	49.34	16.61	AVG	P	
4	0.3350	30.45	10.47	40.92	59.33	18.41	QP	P	
5	0.5820	25.19	10.28	35.47	46.00	10.53	AVG	P	
6	0.6710	29.30	10.23	39.53	56.00	16.47	QP	P	
7	0.9960	30.69	9.95	40.64	46.00	5.36	AVG	P	
8	1.0040	34.31	9.95	44.26	56.00	11.74	QP	P	
9	1.5640	30.00	9.95	39.95	56.00	16.05	QP	P	
10	1.8330	21.26	9.96	31.22	46.00	14.78	AVG	P	
11	23.4370	29.76	10.83	40.59	60.00	19.41	QP	P	
12	23.4420	28.74	10.83	39.57	50.00	10.43	AVG	P	

3.2. Radiated Emission

Limit

- The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/ meter at 30 meters.
- 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.
- 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.
- 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.

Frequency (MHz)	Distance (Meters)	Radiated (dBuV/m)	Radiated (μV/m)
0.009-0.49	3	$20\log(2400/F(\text{KHz}))+40\log(300/3)$	$2400/F(\text{KHz})$
0.49-1.705	3	$20\log(24000/F(\text{KHz}))+ 40\log(30/3)$	$24000/F(\text{KHz})$
1.705-13.110	3	69.54	30
13.110-13.410	3	80.50	106
13.410-13.553	3	90.47	334
13.553-13.567	3	124.00	15848
13.567-13.710	3	90.47	334
13.710-14.010	3	80.50	106
14.010-30.0	3	69.54	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

- Field strength of fundamental emissions limit and Mask limit:

The field strength of fundamental emissions shall not exceed 15848 microvolts/meter at 30 meters. The emissions limit in this paragraph is based on measurement instrumentation employing a QP detector.

Frequencies (MHz)	Field Strength (microvolts/meter)	Field Strength (dBμV/m) at 10m	Field Strength (dBμV/m) at 3m
13.553 ~ 13.567MHz	15848 at 30m	103.08 (QP)	124 (QP)

Mask Limit:

Frequency (MHz)	Limit (dBuV/m)	Distance (m)
1.705-13.110	69.5	3
13.110-13.410	80.5	3
13.410-13.553	90.5	3
13.553-13.567	124.0	3
13.567-13.710	90.5	3
13.710-14.010	80.5	3
14.010-30.000	69.5	3

Test Procedure

- The EUT was placed on 80cm wooden desk above ground plane which on a turn table.
- Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0°C to 360°C to acquire the highest emissions from EUT
- And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

4. Repeat above procedures until all frequency measurements have been completed.

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

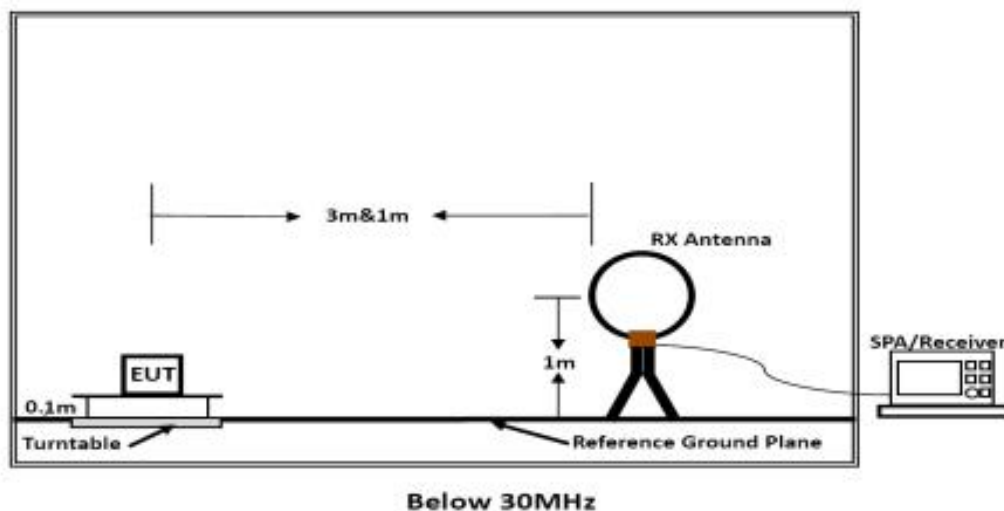
For example

Frequency (MHz)	FS (dBuV/m)	RA (dBuV/m)	AF (dB)	CL (dB)	AG (dB)	Transd (dB)
150.00	40	58.1	12.2	1.6	31.90	-18.1

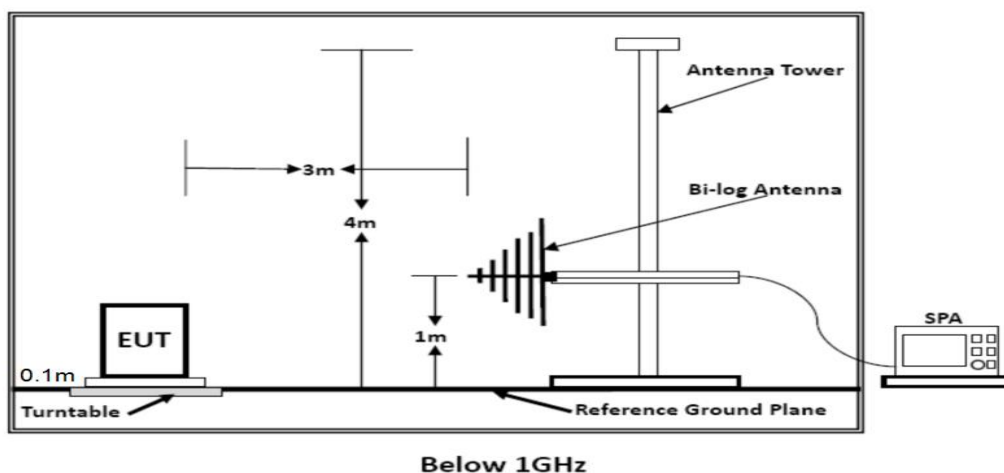
$$\text{Transd} = \text{AF} + \text{CL} - \text{AG}$$

Test Configuration

(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency below 1000MHz



Test Results**In-band Emissions**

Polarization:

Horizontal

Radiated Emission Measurement

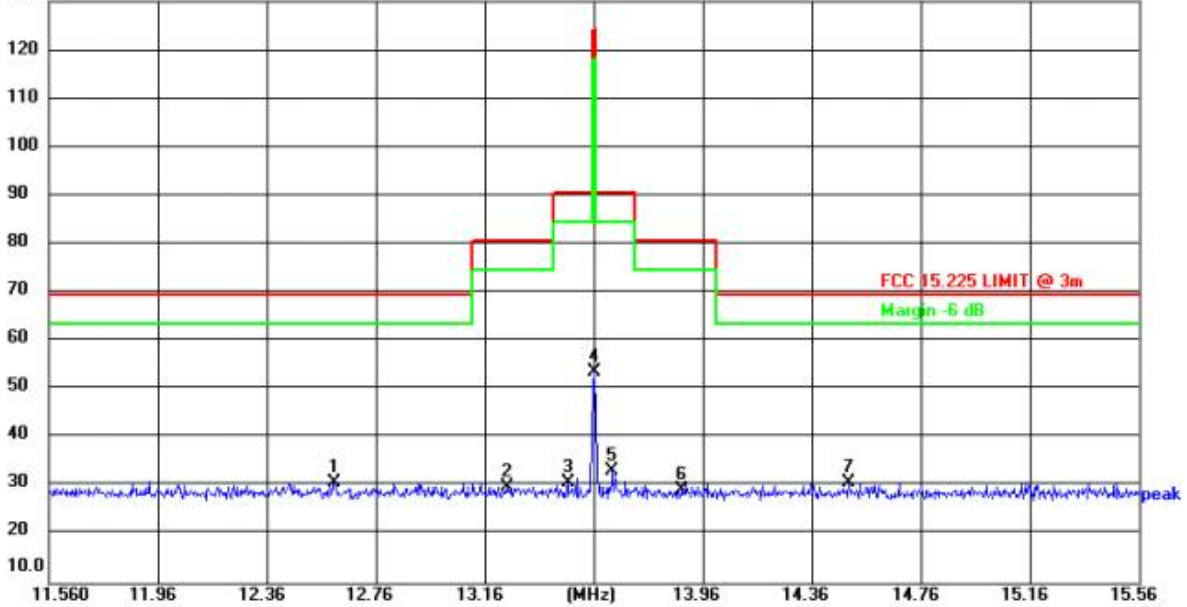
File :2025-RE

Data :#6045

Date: 2025/06/10

Time: 10:38:35

130.0 dBuV/m



Site CTL 966 Chamber 1

Polarization: **Horizontal**

Temperature: 25(C)

Limit: FCC 15.225 LIMIT @ 3m

Power: AC240V/60Hz

Humidity: 50 %

EUT: EV AC Charger

Distance: 3m

M/N: HBE-AC80A02ST-U-D21.5NWB4GG

Mode: WORKING

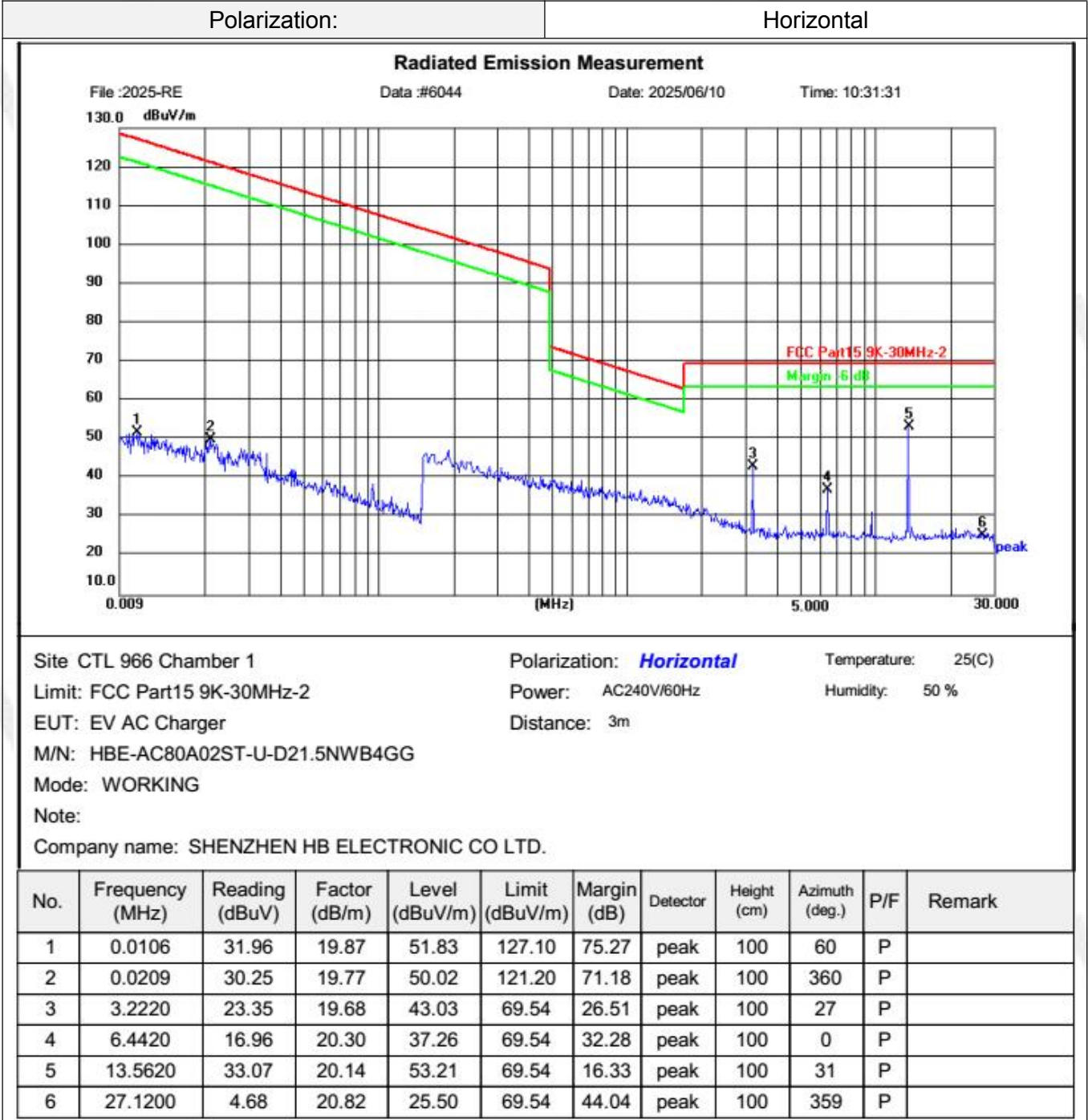
Note:

Company name: SHENZHEN HB ELECTRONIC CO LTD.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	12.6080	10.60	20.19	30.79	69.54	38.75	peak	100	56	P	
2	13.2400	9.64	20.18	29.82	80.50	50.68	peak	100	56	P	
3	13.4640	10.68	20.15	30.83	90.47	59.64	peak	100	26	P	
4	13.5600	33.37	20.14	53.51	124.00	70.49	peak	100	1	P	
5	13.6280	13.19	20.14	33.33	90.47	57.14	peak	100	26	P	
6	13.8800	9.36	20.11	29.47	80.50	51.03	peak	100	351	P	
7	14.4960	10.75	20.11	30.86	69.54	38.68	peak	100	203	P	

Out-of-band Emissions

For 9kHz-30MHz



Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	32.0667	41.54	-16.69	24.85	40.00	15.15	peak	100	282	P	
2	93.4402	51.29	-18.82	32.47	43.50	11.03	peak	199	8	P	
3	167.8242	45.58	-14.45	31.13	43.50	12.37	peak	100	334	P	
4	276.1235	53.54	-15.87	37.67	46.00	8.33	peak	199	8	P	
5	312.1794	52.88	-14.82	38.06	46.00	7.94	peak	199	8	P	
6	672.8444	46.57	-6.09	40.48	46.00	5.52	peak	199	13	P	

3.3. 20dB Bandwidth

Limit

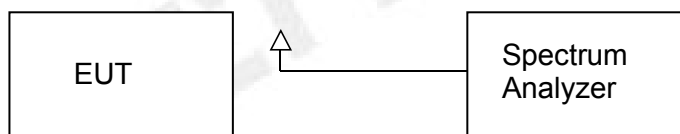
None, for reporting purposes only.

Test Procedure

The 20dB bandwidth is measured with a spectrum analyzer connected via a receive antenna placed near the EUT while the EUT is operating in transmission mode.

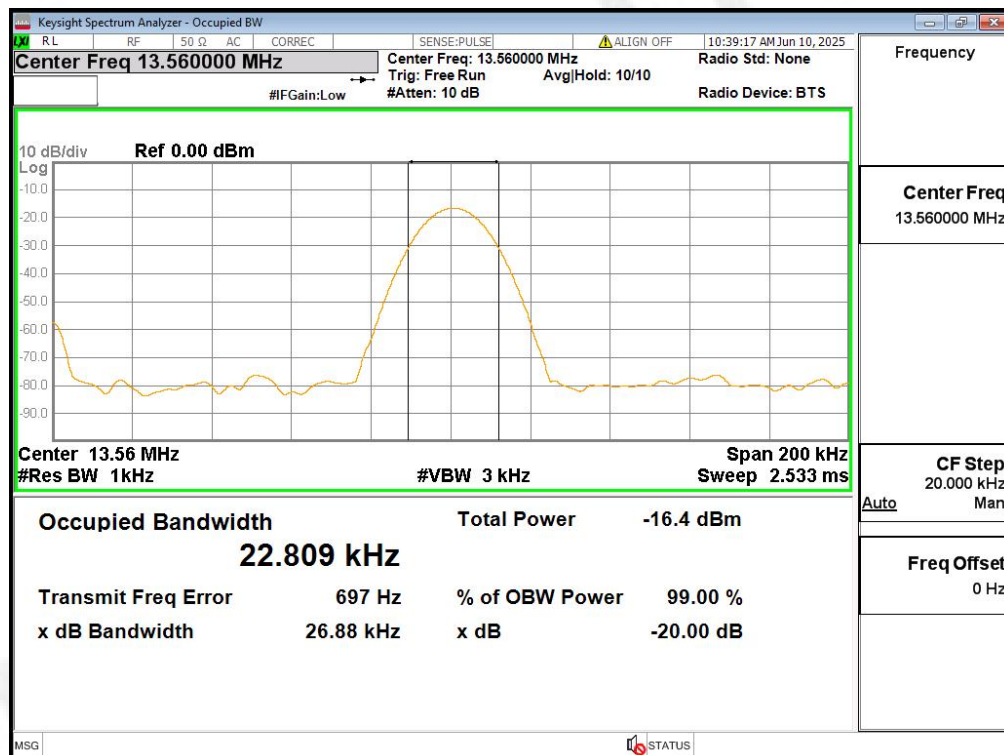
The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

Test Configuration



Test Results

Modulation	Frequency (MHz)	99% Bandwidth (kHz)	20dB bandwidth (kHz)	Result
ASK	13.56	22.809	26.88	Pass

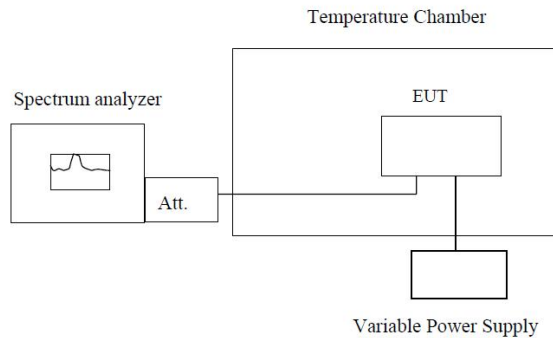


3.4. Frequency Stability

LIMIT

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.

TEST CONFIGURATION



Note : Measurement setup for testing on Antenna connector

TEST PROCEDURE

1. The equipment under test was connected to an external DC power supply and input rated voltage.
2. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators.
3. The EUT was placed inside the temperature chamber.
4. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20°C operating frequency as reference frequency.
5. Turn EUT off and set the chamber temperature to -20°C . After the temperature stabilized for approximately 30 minutes recorded the frequency.
6. Repeat step measure with 10°C increased per stage until the highest temperature of $+50^{\circ}\text{C}$ reached.
7. Reduce the input voltage to specified extreme voltage variation ($\pm 15\%$) or endpoint, record the maximum frequency change.

TEST RESULTS

Reference Frequency: 13.56MHz					
Voltage (V)	Temperature (°C)	Frequency (MHz)	Frequency Deviation (MHz)	Tolerance (ppm)	Limit (ppm)
240	+20	13.560042	0.000042	3.10	±100
	-20	13.560017	0.000017	1.25	±100
	-10	13.560055	0.000055	4.06	±100
	0	13.560016	0.000016	1.18	±100
	+10	13.560024	0.000024	1.77	±100
	+20	13.560033	0.000033	2.43	±100
	+25	13.560052	0.000052	3.83	±100
	+30	13.560021	0.000021	1.55	±100
	+40	13.560017	0.000017	1.25	±100
	+50	13.560041	0.000041	3.02	±100
276	+20	13.560024	0.000024	1.77	±100
204	+20	13.560039	0.000039	2.88	±100

3.5. Antenna Requirement

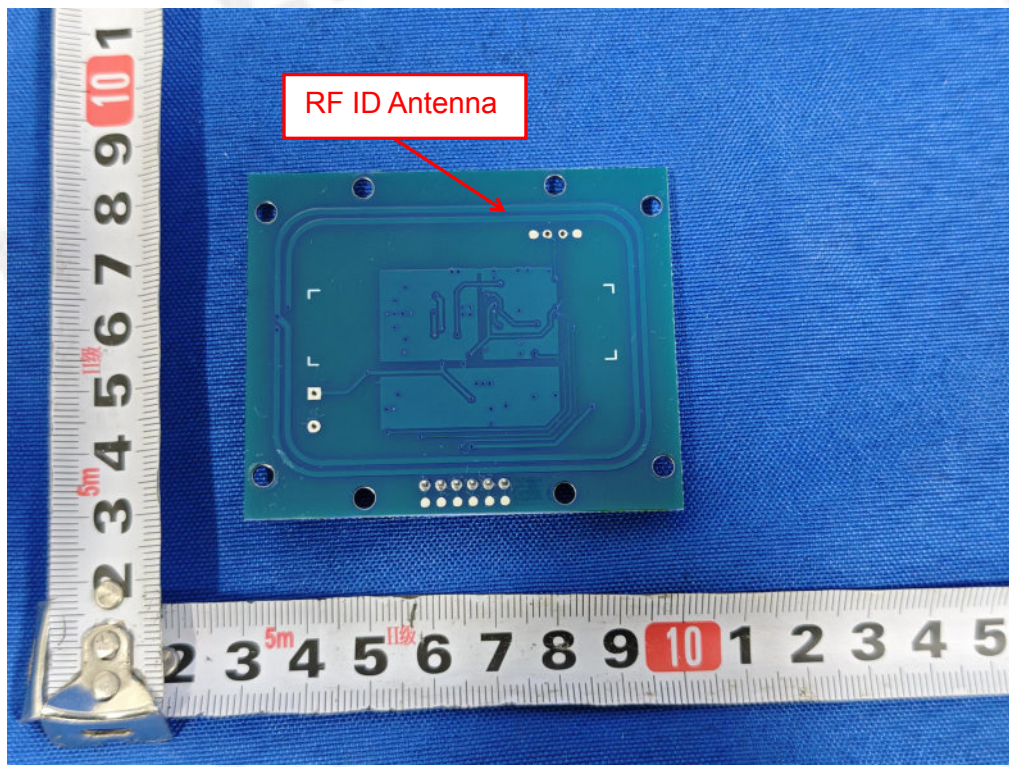
Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203:

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, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited

Test Result:

The antenna is a Loop Antenna and no consideration of replacement. See the chart below for details.



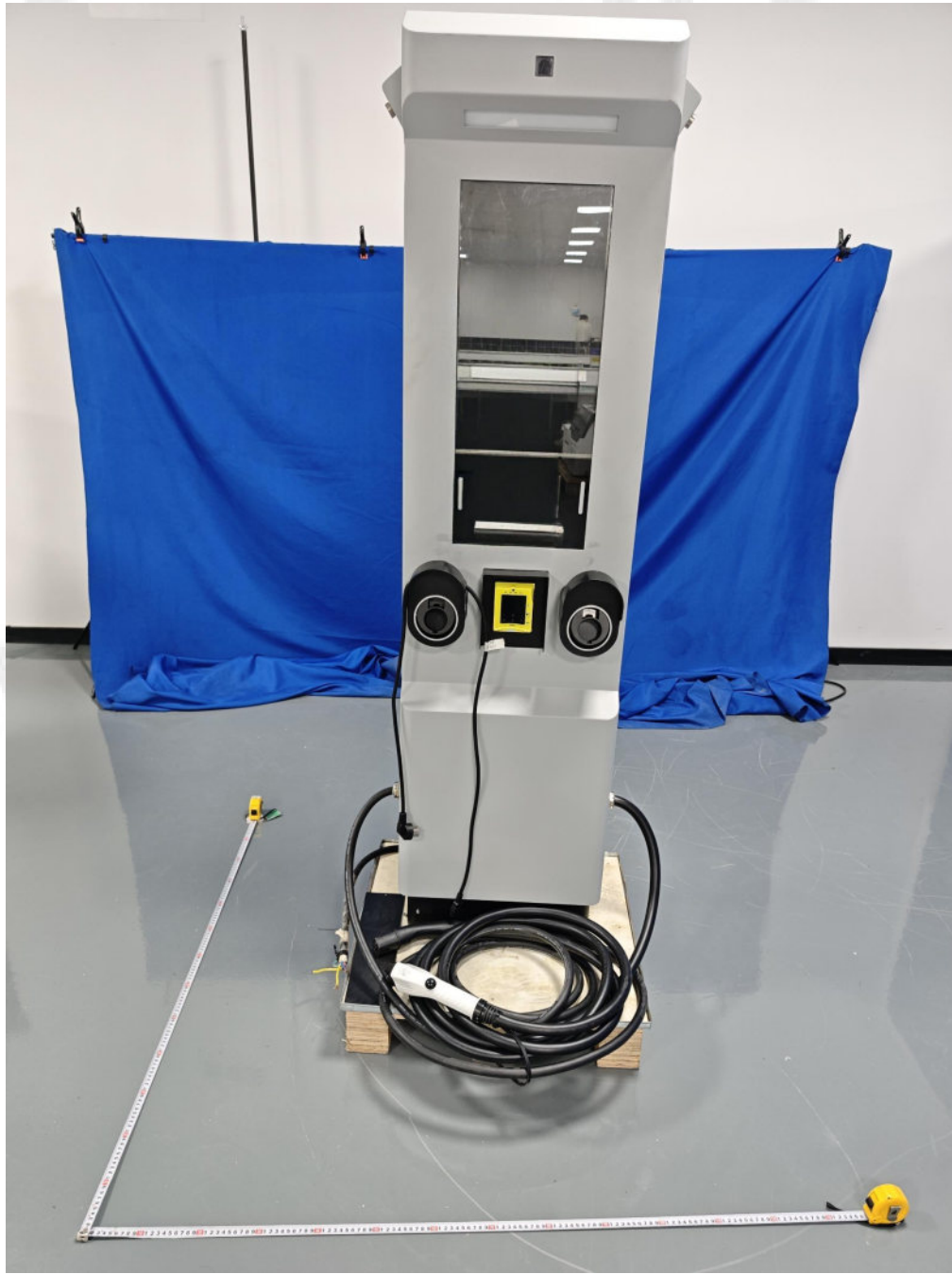
4. Test Setup Photos of the EUT





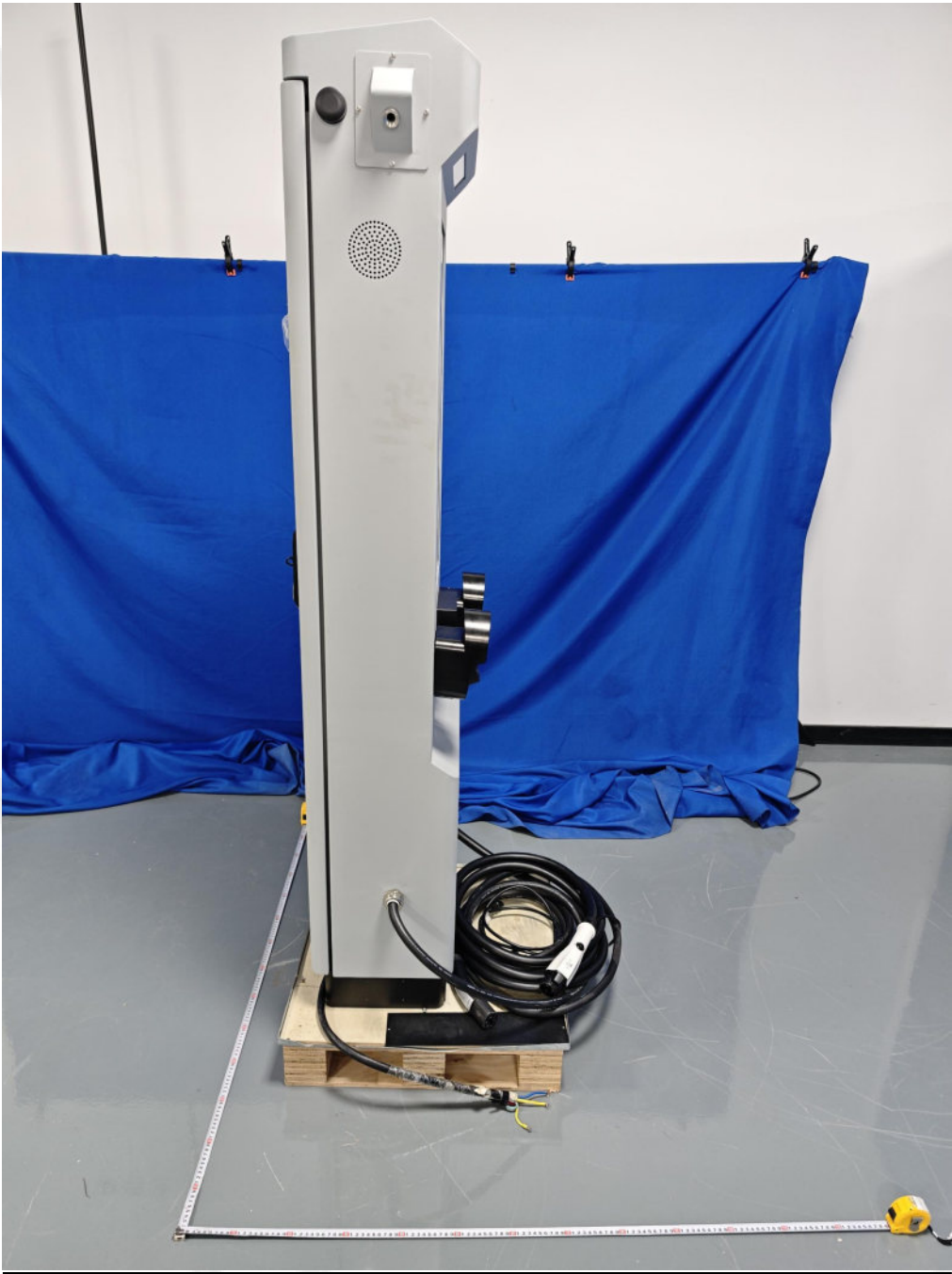
5. External and Internal Photos of the EUT

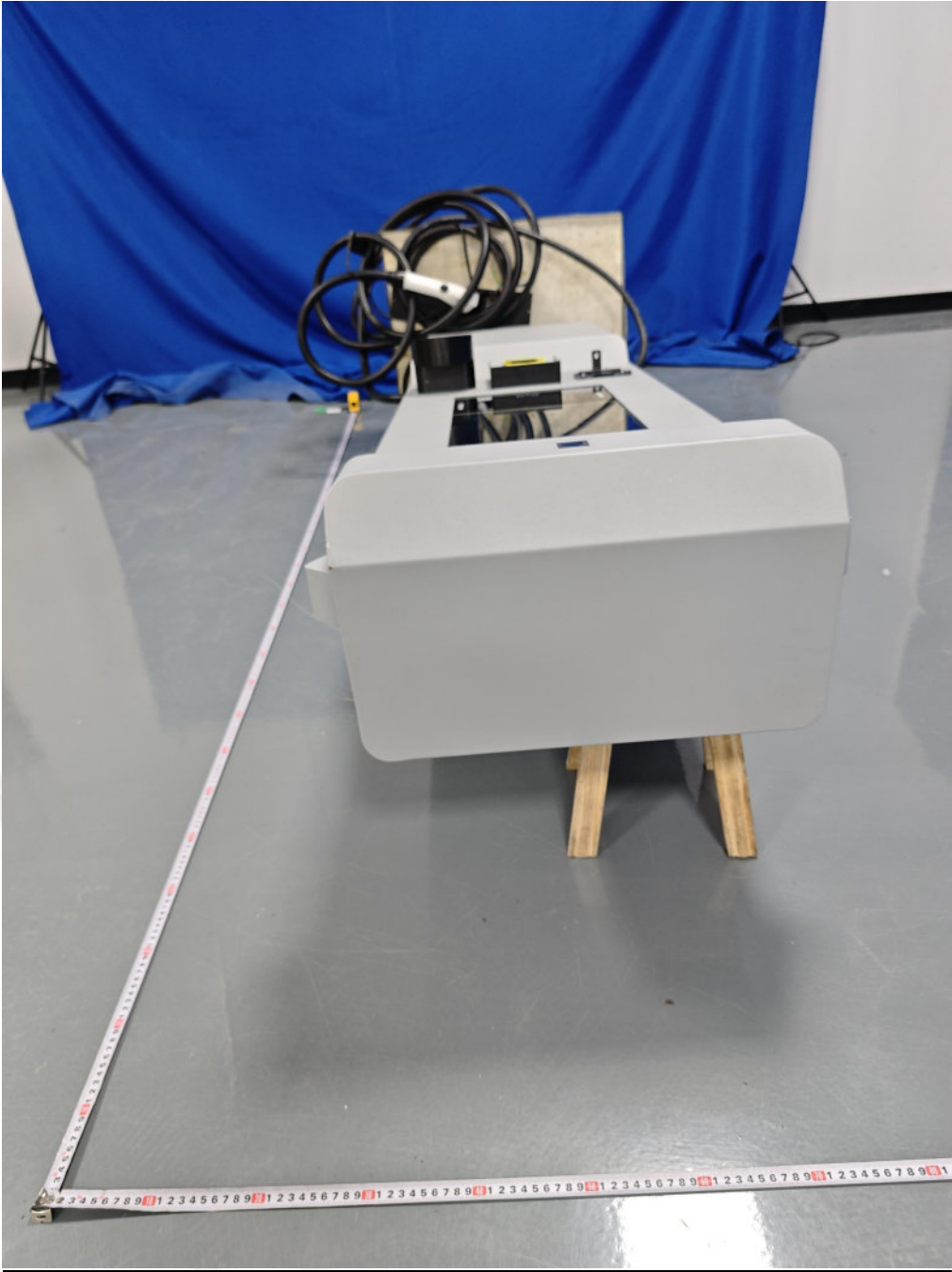
External Photos

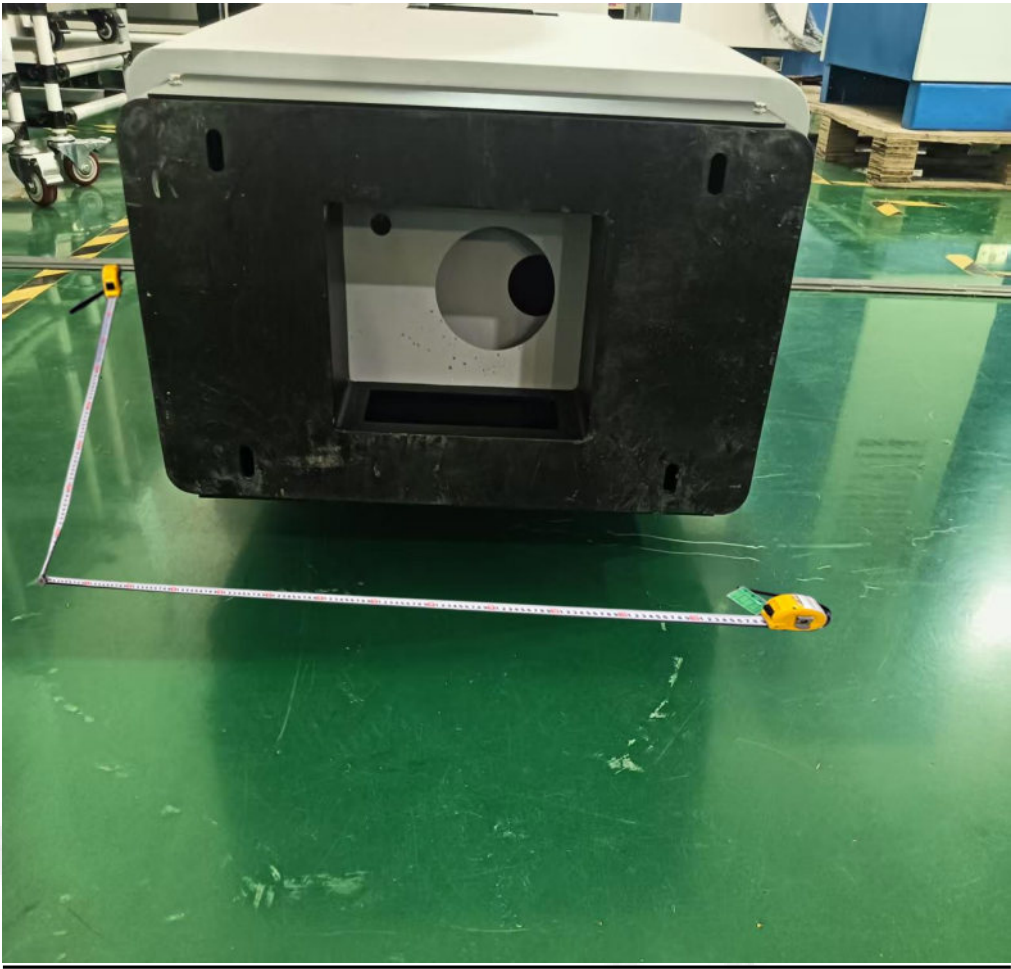












Internal Photos of EUT



