



Test Report

Applicant Name: Guangdong Fenenergy Technology Co., Ltd
Address: Building 35, Zone 5, Huaide Cuigang Industrial Park, Fuyong Street, Bao'an District, Shenzhen
EUT Name: 55W Wireless Charging Station
Brand Name: atomi
Model Number: AT1705

Issued By

Company Name: Shenzhen BANTEK Testing Co., Ltd.
Address: A5&A6, Building B1&B2, No.45 Gangtuo Road, Bogang Community, Shajing Street, Bao'an District, Shenzhen, Guangdong, China 518104
Report Number: BTEK231020009AE001
Test Standards: 47 CFR Part 15 Subpart C
FCC ID: 2BDF9-AT1705
Test Conclusion: Pass
Test Date: 2023-11-16 to 2023-12-05
Date of Issue: 2023-12-05

Prepared By:

Elma Yang

Elma Yang / Project Engineer

Date: 2023-12-05

Approved By:

Damon Su

Damon Su / EMC Manager

Date: 2023-12-05

* In the configuration tested, the EUT complied with the standards specified above.





Revision History		
Version	Issue Date	Revisions Content
R_V0	2023-12-05	Original
Note:	Once the revision has been made, then previous versions reports are invalid.	





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1. Introduction

1.1 Identification of Testing Laboratory

Company Name:	Shenzhen BANTEK Testing Co., Ltd.
Address:	A5&A6,Building B1&B2,No.45 Gangtou Road,BoganCommunity, Shajing Street,Bao'an District, Shenzhen,Guangdong,China 518104
Phone Number:	+86(755) 2334 4200
Fax Number:	+86(755) 2334 4200

1.2 Identification of the Responsible Testing Location

Test Location:	Shenzhen BANTEK Testing Co., Ltd.
Address:	A5&A6, Building B1&B2, No.45 Gangtou Road,BoganCommunity, Shajing Street,Bao'an District, Shenzhen,Guangdong,China 518104
Description:	All measurement facilities used to collect the measurement data are located at A5&A6, Building B1&B2, No.45 Gangtou Road,BoganCommunity, Shajing Street,Bao'an District, Shenzhen,Guangdong,China 518104
FCC Registration Number:	264293
Designation Number:	CN1356

1.3 Laboratory Condition

Ambient Temperature:	20°C to 25°C
Ambient Relative Humidity:	45% to 55%
Ambient Pressure:	100 kPa to 102 kPa

1.4 Announcement

- (1) The test report is invalid if not marked with the signatures of the persons responsible for preparing, reviewing and approving the test report.
- (2) This document may not be altered or revised in any way unless done so by BANTEK and all revisions are duly noted in the revisions section.
- (3) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.
- (4) The laboratory is only responsible for the data released by the laboratory, except for the part provided by the applicant.





2. Product Information

2.1 Application Information

Company Name:	Guangdong Fenenergy Technology Co., Ltd
Address:	Building 35, Zone 5, Huaide Cuigang Industrial Park, Fuyong Street, Bao'an District, Shenzhen

2.2 Manufacturer Information

Company Name:	Guangdong Fenenergy Technology Co., Ltd
Address:	Building 35, Zone 5, Huaide Cuigang Industrial Park, Fuyong Street, Bao'an District, Shenzhen

2.3 Factory Information

Company Name:	Guangdong Fenenergy Technology Co., Ltd
Address:	Building 35, Zone 5, Huaide Cuigang Industrial Park, Fuyong Street, Bao'an District, Shenzhen

2.4 General Description of Equipment under Test (EUT)

EUT Name	55W Wireless Charging Station
Under Test Model Name	AT1705
Hardware Version	REV3.0
Software and Firmware Version	V3.0
Sample number	BTEK231020009AE-01





2.5 Technical Information

Power Supply	Input:100-240V~50/60Hz 1.2A Wireless Output: 15W PD Output: DC 5V 3A, 9V 2.22A, 12V 1.67A, 20W Max. Type-C+USB Output: DC 5V 2.4A(Each Port), Total DC 5V 4A max.
Modulation Type	FSK
Frequency Range	The frequency block is 110.0 KHz to 205.0KHz.
Antenna Type	Coil antenna





3. Summary of Test Results

3.1 Test Standards

No.	Identity	Document Title
1	47 CFR Part 15, Subpart C	Intentional Radiators
2	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices

3.2 Summary of Test Result

No.	Description	FCC Part No.	Test Result	Verdict	Remark
1	Antenna Requirements	15.203	--	Pass	--
2	20dB Occupied Bandwidth	2.1049	ANNEX A.1	Pass	--
3	AC Power Line Conducted Emissions	15.207	ANNEX A.2	Pass	--
4	Spurious Emissions	15.209	ANNEX A.3	Pass	--





3.3 Uncertainty of Test

The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2 and TR100 028-1/-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

Measurement	Value
Occupied Channel Bandwidth	69 KHz
RF output power, conducted	0.87 dB
Power Spectral Density, conducted	0.69 dB
Unwanted Emissions, conducted	0.94 dB
All emissions, radiated(<1GHz)	4.12 dB
All emissions, radiated(>1GHz)	4.16 dB
Temperature	0.82 °C
Humidity	4.1 %





4. Test Configuration

4.1 Environment Condition

Environment Parameter	Selected Values During Tests			
	Temperature	Voltage	Relative Humidity	Ambient Pressure
Normal Temperature, Normal Voltage (NTNV)	20°C to 25°C	18W	30% to 60%	100 kPa to 102 kPa

4.2 Test Equipment List

Conducted Method Test					
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Shielding Room	YIHENG ENLECTRONIC	5.5*3.1*3	YH-BT-220304-03	2022-03-03	2025-03-02
EXA Signal Analyzer	KEYSIGHT	N9020A	MY54230486	2023-06-12	2024-06-11
DC Power Supply	E3632A	E3642A	KR75304416	2023-06-12	2024-06-11
Attenuator	RswTech	SMA-JK-6dB	N/A	2023-06-12	2024-06-11
Attenuator	RswTech	SMA-JK-3dB	N/A	2023-06-12	2024-06-11
RF Control Unit	Techy	TR1029-1	N/A	2023-06-12	2024-06-11
RF Sensor Unit	Techy	TR1029-2	N/A	2023-06-12	2024-06-11
MXG Vector Signal Generator	Agilent	N5182A	US46240522	2023-06-12	2024-06-11
Programmable Temperature&Humidity Chamber	GRT	GR-HWX1000	GR22051001	2023-06-12	2024-06-11
Measurement Software	TACHOY	RF TestSoft	N/A	2023-06-12	2024-06-11

Radiated Method Test					
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
3m Semi-Anechoic Chamber	YIHENG ENLECTRONIC	966	YH-BT-220304-01	2022-05-06	2025-05-05
EMI Test Receiver	Rohde&Schwarz	ESCI	100694	2023-06-12	2024-06-11
TRILOG Broadband Antenna	Schwarzbeck	VULB 9168	01324	2022-06-15	2025-06-14
Pre-Amplifier	Schwarzbeck	BBV 9745	#180	2023-06-12	2024-06-11
Loop antenna	Schwarzbeck	FMZB1519B	00056	2023-06-12	2024-06-11
Measurement Software	Fara	EZ EMC Ver. FA-03A2	N/A	N/A	N/A





Conducted disturbance Test					
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Shielding Room	YIHENG ENETRONIC	9*5*3.3	YH-BT-220304-04	2022-03-03	2025-03-02
EMI Test Receiver	Rohde&Schwarz	ESCI	101021	2023-06-12	2024-06-11
Measurement Software	Fara	EZ_EMC Ver. FA-03A2	N/A	N/A	N/A
LISN	Rohde&Schwarz	ENV216	101472	2023-06-12	2024-06-11
LISN	Schwarzbeck	NSLK 8128	05127	2023-06-12	2024-06-11

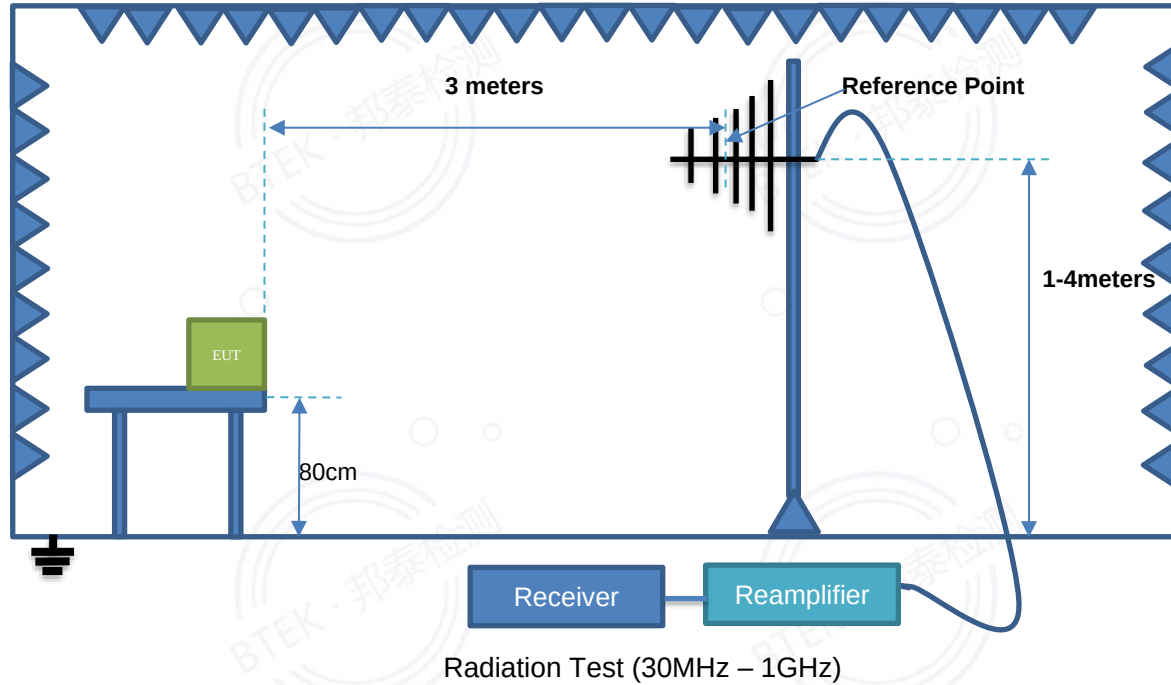
4.3 Test Auxiliary Equipment

Description	Manufacturer	Model	Serial No.	Length	Description	Use
WPC charging load	EESON	2S	/	/	/	☒
iphone	Apple	iphone 8 Plus	/	/	/	☒

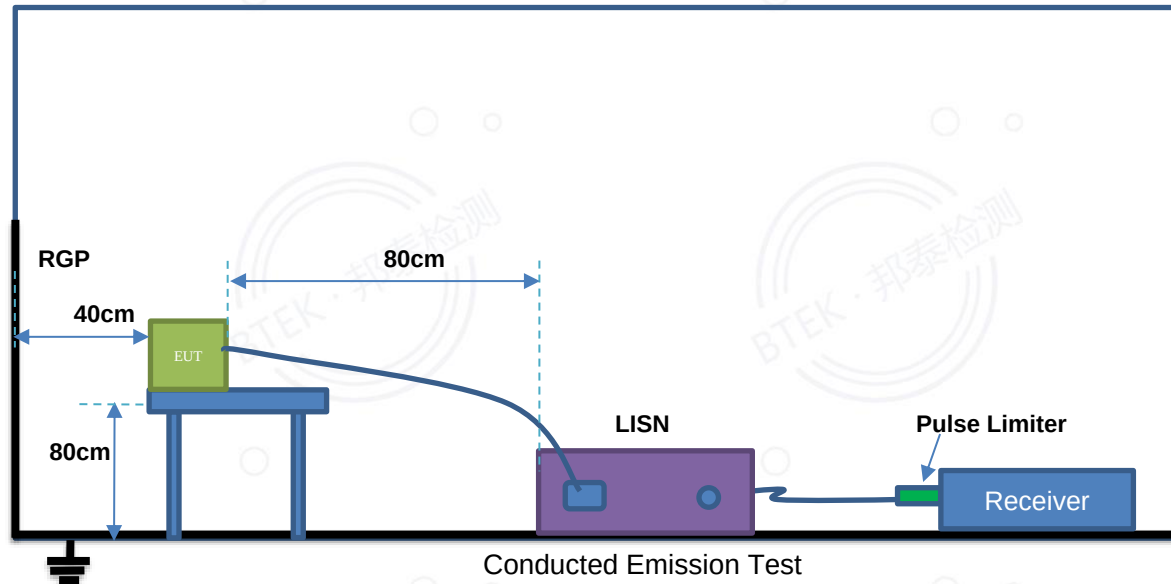


4.4 Test Setup

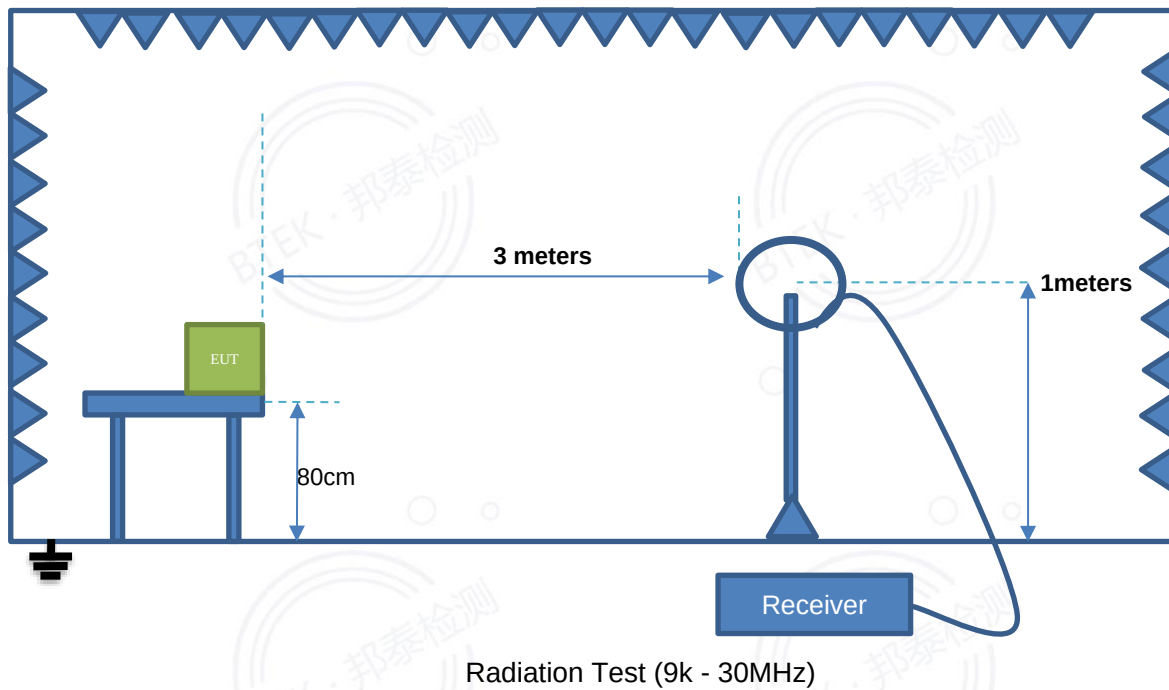
Test Setup 1



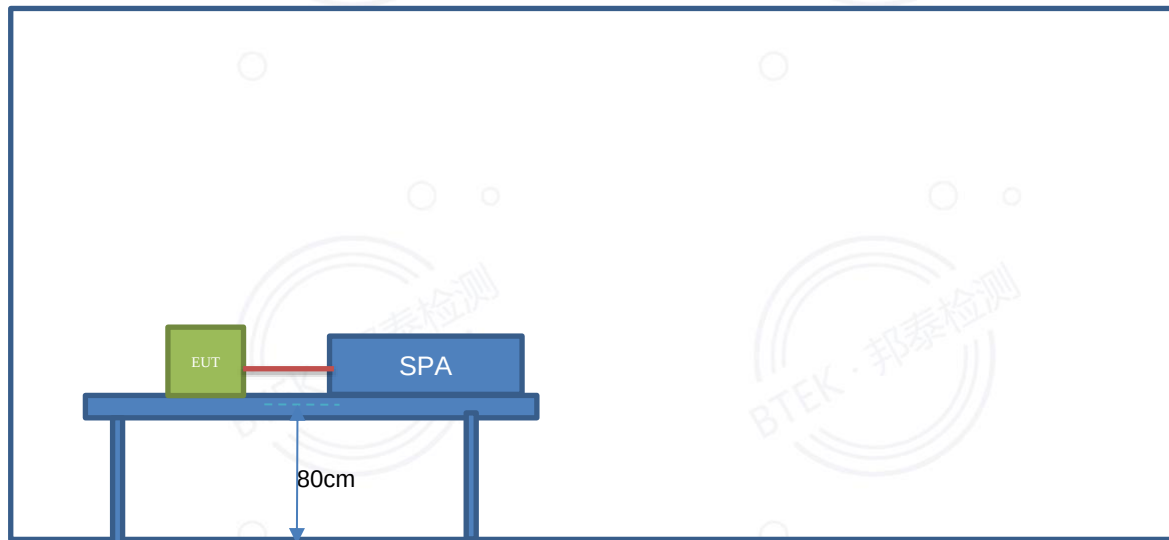
Test Setup 2



Test Setup 3



Test Setup 4





5. Test Items

5.1 Antenna Requirements

FCC §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 shall be considered sufficient to comply with the provisions of this section. 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. This requirement does not apply to carrier current devices or to devices operated under the provisions of § 15.211, § 15.213, § 15.217, § 15.219, or § 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with § 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

If directional gain of transmitting antennas is greater than 6 dBi, the power shall be reduced by the same level in dB comparing to gain minus 6 dBi. For the fixed point-to-point operation, the power shall be reduced by one dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the FCC rule.

The EUT uses an Integral Antenna which in accordance to Section 15.203 is considered sufficient to comply with the provisions of this section.





5.2 20dB Occupied Bandwidth

5.2.1 Limit

FCC Part 2.1049.

5.2.2 Test Setup

See section 4.4 for test setup 4 description for the antenna port. The photo of test setup please refer to ANNEX B

5.2.3 Test Procedure

1. The transmitter output was connected to the spectrum analyzer through an attenuator, the pathloss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously
3. Use the following spectrum analyzer settings:
Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel
RBW $\geq$ 1% of the 20 dB bandwidth, VBW $\geq$ RBW
Sweep = auto, Detector function = peak, Trace = max hold
4. Measure and record the results in the test report.

5.2.4 Test Result

Please refer to ANNEX A.1





5.3 AC Power Line Conducted Emissions

5.3.1 Limit

FCC §15.207

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50μH/50Ω line impedance stabilization network (LISN).

Frequency range (MHz)	Conducted Limit (dBμV)	
	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
0.50 - 30	60	50

5.3.2 Test Setup

See section 4.4 for test setup description for setup 2. The photo of test setup please refer to ANNEX B

5.3.3 Test Procedure

The maximum conducted interference is searched using Peak (PK), if the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. Refer to recorded points and plots below.

Devices subject to Part 15 must be tested for all available U.S. voltages and frequencies (such as a nominal 120 VAC, 50/60 Hz and 240 VAC, 50/60 Hz) for which the device is capable of operation. A device rated for 50/60 Hz operation need not be tested at both frequencies provided the radiated and line conducted emissions are the same at both frequencies.

5.3.4 Test Result

Please refer to ANNEX A.2

NOTE:

- Results (dBuV) = Reading (dBuV) + Factor (dB)
The reading level is calculated by software which is not shown in the sheet
- Factor = Insertion loss + Cable loss
- Over limit = Results – Limit.





5.4 Radiated Spurious Emission

5.4.1 Limit

FCC §15.209

Radiated emission outside the frequency band attenuation below the general limits specified in FCC section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC section 15.205(a), must also comply with the radiated emission limits specified in FCC section 15.209(a). According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength ($\mu\text{V/m}$)	Measurement Distance (m)
0.009 - 0.490	$2400/F(\text{kHz})$	300
0.490 - 1.705	$24000/F(\text{kHz})$	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

Note:

1. Field Strength ($\text{dB}\mu\text{V/m}$) = $20 \times \log[\text{Field Strength } (\mu\text{V/m})]$.
2. In the emission tables above, the tighter limit applies at the band edges.
3. For Above 1000 MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.
4. For above 1000 MHz, limit field strength of harmonics: $54\text{dB}\mu\text{V/m}@3\text{m}$ (AV) and $74\text{dB}\mu\text{V/m}@3\text{m}$ (PK).

5.4.2 Test Setup

See section 4.4 for test setup description for setup 1 and 3. The photo of test setup please refer to ANNEX B

5.4.3 Test Procedure

The EUT is placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna which is mounted on a antenna tower. The antenna can move up and down between 1 to 4 meters to find out the maximum emission level. Broadband antenna (calibrated by dipole antenna) are used as a receiving antenna. Both horizontal and vertical polarization of the antenna are set on measurement.





5.4.4 Test Result

Please refer to ANNEX A.3

NOTE:

1. Results (dBuV/m) = Read_Level(dBuV) + Cable_Loss(dB)+Antenna_Factor(dB/m)-Preamp_Gain(dB)
2. Over limit = Results – Limit.



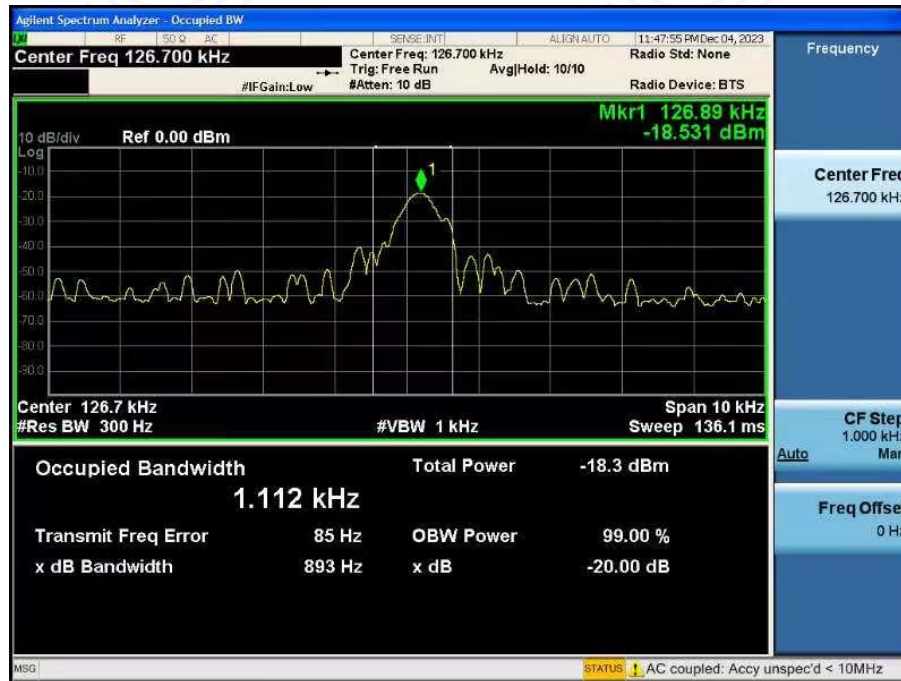


ANNEX A Test Results

A.1 20dB Occupied Bandwidth

Freq. (kHz)	20 dB bandwidth Result (kHz)	Conclusion
126.7	0.893	PASS

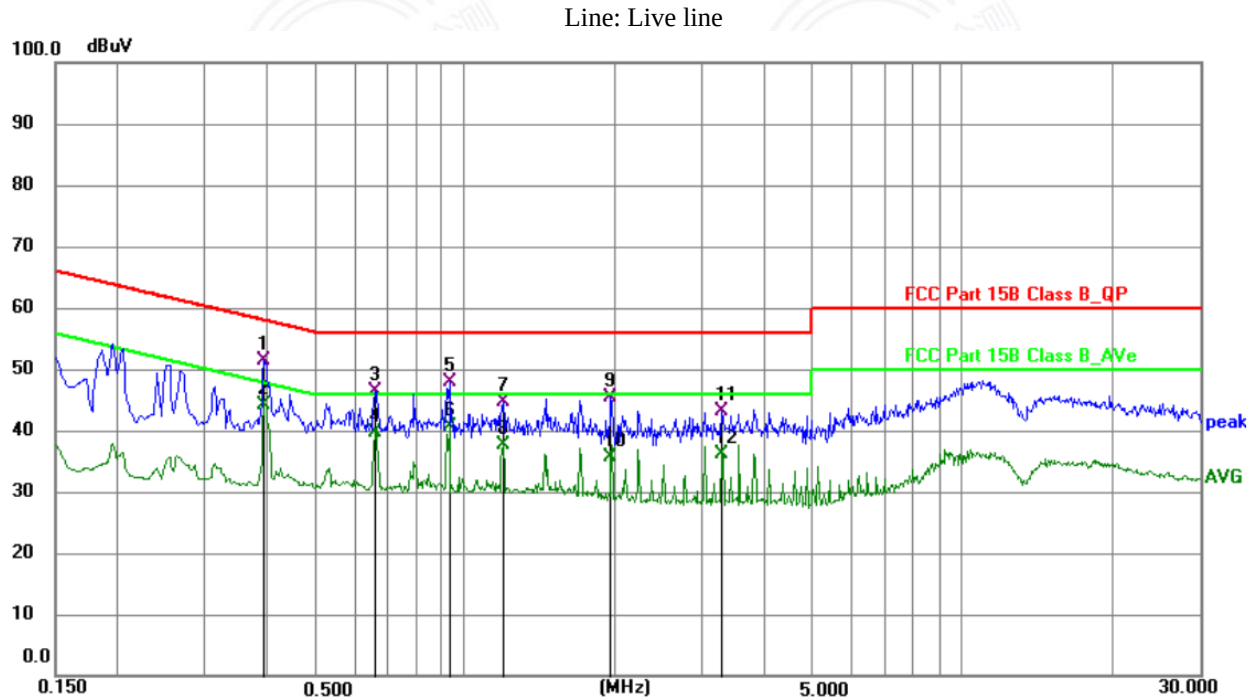
142KHz:





A.2 AC Power Line Conducted Emissions

Note: Results (dBuV) = Reading (dBuV) + Factor (dB)

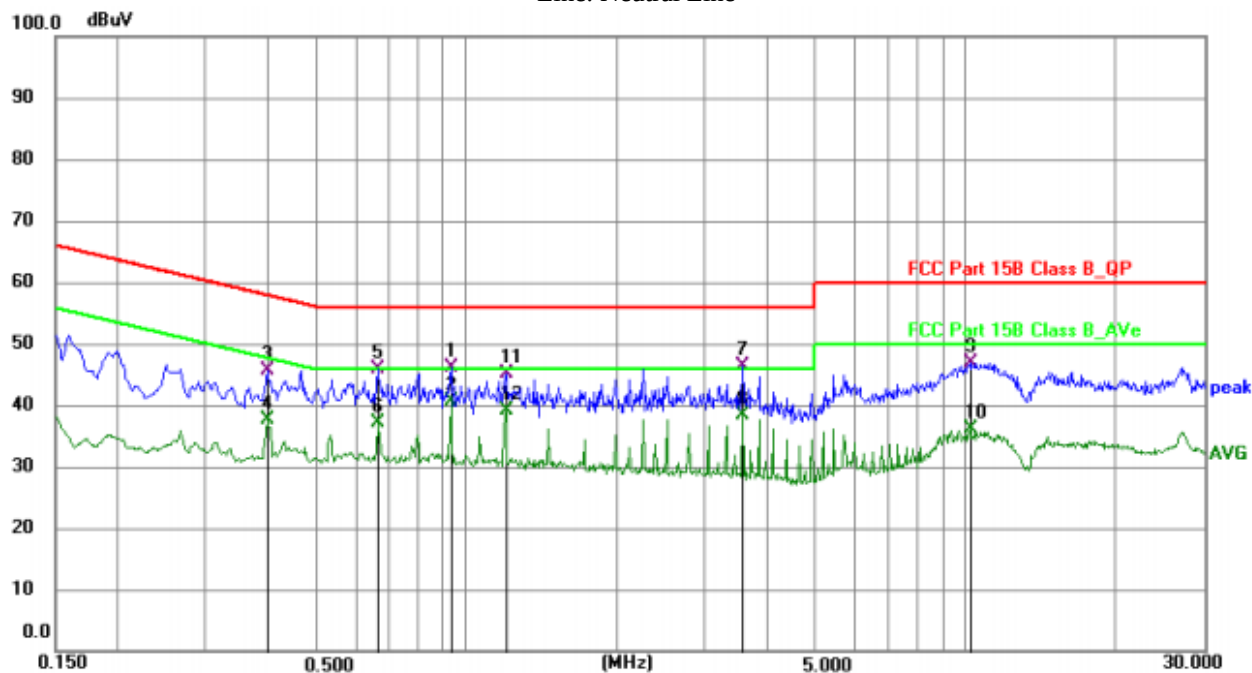


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.3930	31.66	19.83	51.49	58.00	-6.51	QP	P	
2 *	0.3930	24.20	19.83	44.03	48.00	-3.97	AVG	P	
3	0.6585	26.58	19.90	46.48	56.00	-9.52	QP	P	
4	0.6585	19.83	19.90	39.73	46.00	-6.27	AVG	P	
5	0.9285	27.82	19.99	47.81	56.00	-8.19	QP	P	
6	0.9285	20.55	19.99	40.54	46.00	-5.46	AVG	P	
7	1.1940	24.61	20.02	44.63	56.00	-11.37	QP	P	
8	1.1940	17.55	20.02	37.57	46.00	-8.43	AVG	P	
9	1.9680	25.29	20.06	45.35	56.00	-10.65	QP	P	
10	1.9680	15.59	20.06	35.65	46.00	-10.35	AVG	P	
11	3.2910	22.90	20.19	43.09	56.00	-12.91	QP	P	
12	3.2910	15.86	20.19	36.05	46.00	-9.95	AVG	P	





Line: Neutral Line



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.9285	26.24	20.00	46.24	56.00	-9.76	QP	P	
2 *	0.9285	20.75	20.00	40.75	46.00	-5.25	AVG	P	
3	0.3975	25.71	19.84	45.55	57.91	-12.36	QP	P	
4	0.3975	17.86	19.84	37.70	47.91	-10.21	AVG	P	
5	0.6630	25.87	19.91	45.78	56.00	-10.22	QP	P	
6	0.6630	17.30	19.91	37.21	46.00	-8.79	AVG	P	
7	3.5790	26.15	20.18	46.33	56.00	-9.67	QP	P	
8	3.5790	18.30	20.18	38.48	46.00	-7.52	AVG	P	
9	10.2255	26.18	20.79	46.97	60.00	-13.03	QP	P	
10	10.2255	15.28	20.79	36.07	50.00	-13.93	AVG	P	
11	1.1985	24.99	20.03	45.02	56.00	-10.98	QP	P	
12	1.1985	19.18	20.03	39.21	46.00	-6.79	AVG	P	





A.3 Radiated Spurious Emission

9 kHz ~ 30 MHz

Freq (MHz)	Cable Loss (dB)	Antenna Factor or (dB/m)	Preamp Gain (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Detector
0.0161	2.24	17.8	31.53	80.12	68.63	121.00	-52.38	QP
0.0301	2.32	17.8	32.43	78.16	65.85	118.04	-52.19	QP
0.1267	2.39	17.8	32.52	84.63	72.30	105.55	-33.25	QP
0.7050	2.46	17.8	31.67	44.51	33.10	70.64	-37.54	QP
1.7059	3.06	27.53	33.76	28.07	24.90	69.54	-44.64	QP
2.6008	3.11	29.26	33.52	27.93	26.78	69.54	-42.76	QP
7.6044	3.25	28.72	33.94	25.89	23.92	69.54	-45.62	QP

Note:

- 1).Level(dBuV/m)=Reading(dBuV)+Factor(dB/m)
- 2).Factor(dB/m)=Antenna Factor(dB/m)+Cable loss(dB)-Pre Amplifier gain(dB)
- 3).Margin(dB)=Limit(dBuV/m)-Level(dBuV/m)

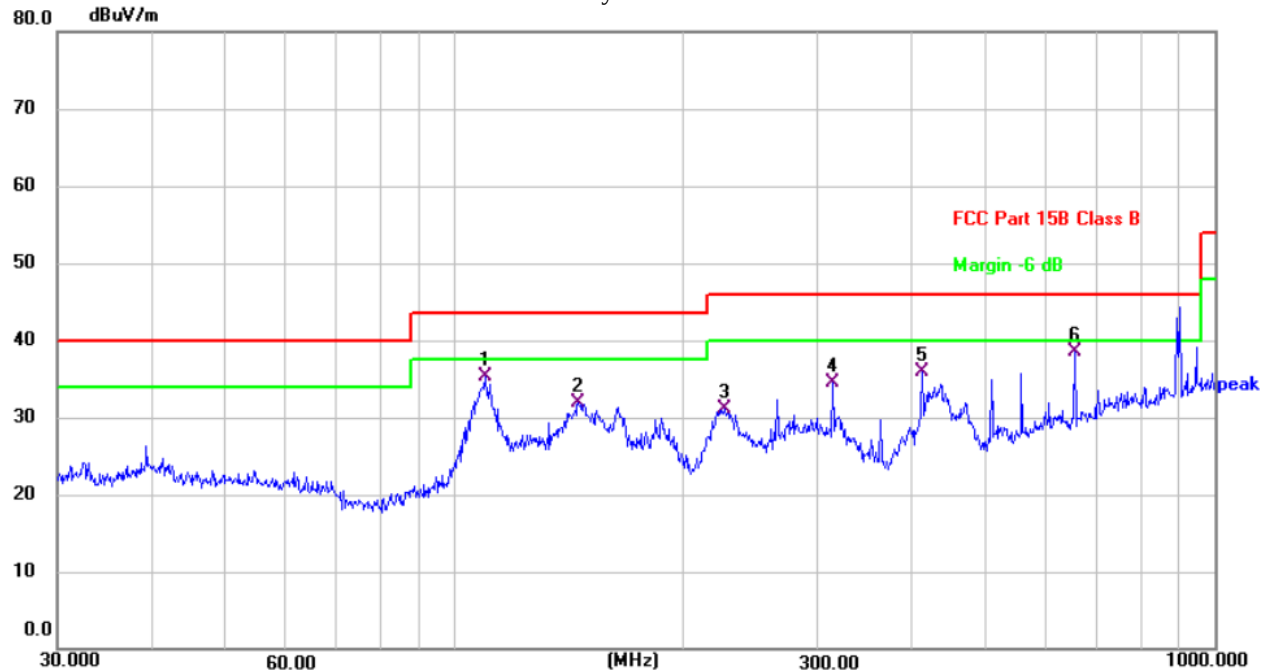




30 MHz ~ 1GHz

Note: Results (dBuV/m) = Reading (dBuV) + Factor (dB/m)

Polarity: Horizontal

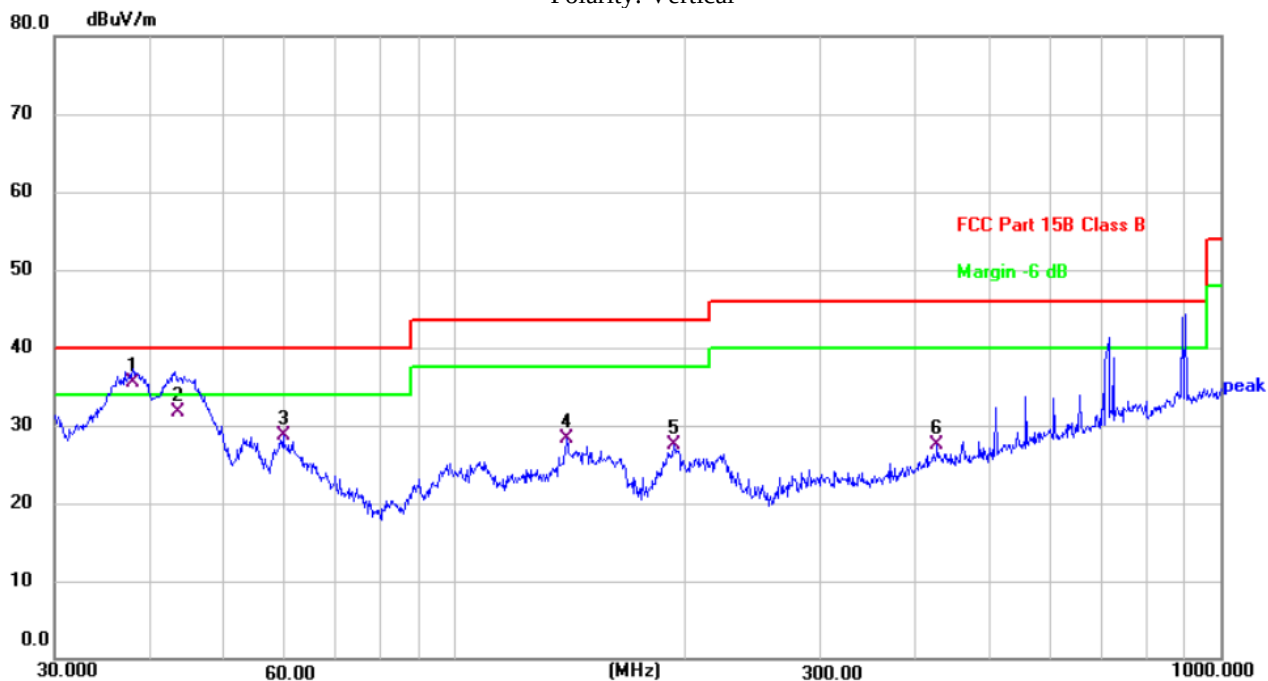


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	109.7960	55.21	-20.00	35.21	43.50	-8.29	QP	300	223	P	
2	145.3506	48.97	-17.12	31.85	43.50	-11.65	QP	300	262	P	
3	226.0994	50.93	-19.74	31.19	46.00	-14.81	QP	100	135	P	
4	314.3765	51.67	-17.14	34.53	46.00	-11.47	QP	100	199	P	
5	411.8240	51.00	-15.11	35.89	46.00	-10.11	QP	100	336	P	
6 *	654.2318	49.24	-10.76	38.48	46.00	-7.52	QP	100	162	P	





Polarity: Vertical



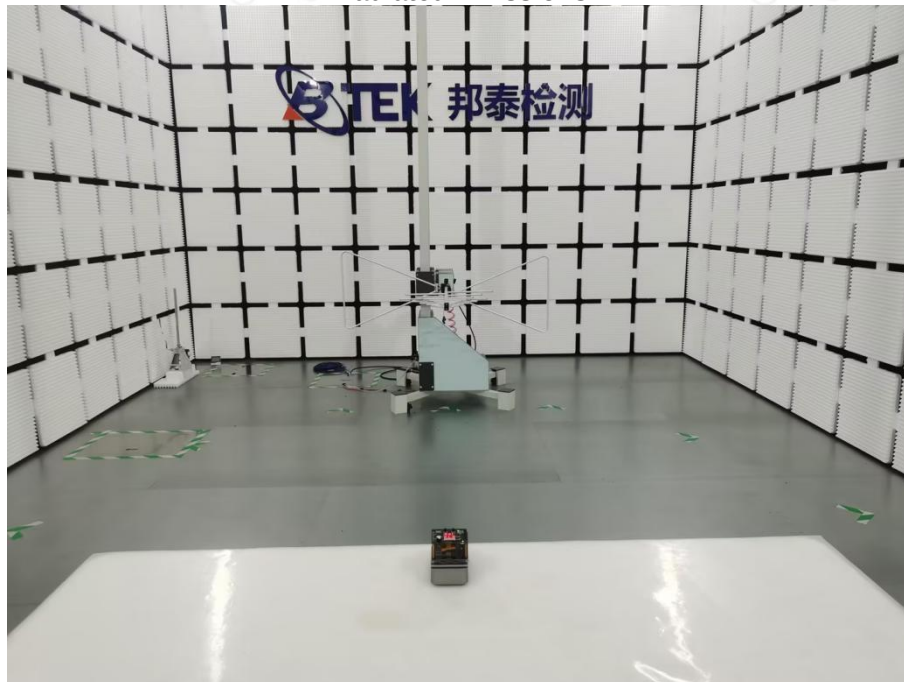
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1 *	37.9450	52.61	-17.11	35.50	40.00	-4.50	QP	299	10	P	
2	43.5855	49.55	-17.75	31.80	40.00	-8.20	QP	100	167	P	
3	59.6493	46.75	-18.09	28.66	40.00	-11.34	QP	100	174	P	
4	139.8508	45.69	-17.47	28.22	43.50	-15.28	QP	100	348	P	
5	193.0945	48.66	-21.23	27.43	43.50	-16.07	QP	100	274	P	
6	426.5210	42.25	-14.68	27.57	46.00	-18.43	QP	299	285	P	





ANNEX BTEST SETUP PHOTOS

Radiated Emissions



Radiated Emissions





Power Line Conducted Emissions





ANNEX C EUT EXTERNAL PHOTOS

Please refer to the External Appendix EUT Photos.





ANNEX D EUT INTERNAL PHOTOS

Please refer to the Internal Appendix EUT Photos.

--END OF REPORT--

