

#### **FCC TEST REPORT**

FCC ID: 2AOV6-GRFWC1009

On Behalf of

Shenzhen Minsuo Industrial Co., Ltd

4 in 1 Foldable Wireless Charger

Model No.: GRFWC1009, MP-306

Prepared for : Shenzhen Minsuo Industrial Co., Ltd

Address 12th floor, Block B, Tengyao Building, No.268 Gushu 2nd road, Xixiang

Town, Bao'an District, Shenzhen, Guangdong, China

Prepared By : Shenzhen Alpha Product Testing Co., Ltd.

Address Building i, No.2, Lixin Road, Fuyong Street, Bao'an District,

518103, Shenzhen, Guangdong, China

Report Number : A2412256-C01-R01 Date of Receipt : December 24, 2024

Date of Test : December 24, 2024 – January 3, 2025

Date of Report : January 6, 2025

Version Number : V0

Test Result : Pass

## **TABLE OF CONTENTS**

<u>L</u>	Description	Page Page
1.	Test Result Summary	5
2.	General Information	6
	Description of Device (EUT)      Accessories of Device (EUT)	6 7
	2.3. Tested Supporting System Details	7
	2.4. Block Diagram of Connection between EUT and Simulators	7
	2.5. Description of Test Modes	7
	2.6. Test Conditions	8
	2.7. Test Facility	8
	2.8. Measurement Uncertainty	8
	2.9. Test Equipment List	9
3.	Test Results and Measurement Data	10
	3.1. Conducted Emission	10
	3.1.1. Test Specification	10
	3.1.2. Test Data	11
	3.2. Radiated Spurious Emission Measurement	14
	3.2.1. Test Specification	14
	3.2.2. Test Data	17
	3.3. Test Specification	23
	3.3.1. Test Data	24
4.	Photos of Test Setup	27
5.	Photographs of EUT	29

#### TEST REPORT DECLARATION

Applicant Shenzhen Minsuo Industrial Co., Ltd

12th floor, Block B, Tengyao Building, No.268 Gushu 2nd road, Xixiang Town, Address

Bao; an District, Shenzhen, Guangdong, China

Manufacturer Shenzhen Minsuo Industrial Co., Ltd

12th floor, Block B, Tengyao Building, No.268 Gushu 2nd road, Xixiang Town, Address

Bao'an District, Shenzhen, Guangdong, China

**EUT Description** 4 in 1 Foldable Wireless Charger

> Model No. : GRFWC1009, MP-306 (A)

(B) Trademark : N/A

Measurement Standard Used:

FCC CFR Title 47 Part 15 Subpart C Section 15.209

The device described above is tested by Shenzhen Alpha Product Testing Co., Ltd. to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The test results are contained in this test report and Shenzhen Alpha Product Testing Co., Ltd. is assumed full responsibility for the accuracy and completeness of test. Also, this report shows that the EUT is technically compliant with the FCC CFR Title 47 Part 15 Subpart C Section 15.209 requirements.

This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Shenzhen Alpha Product Testing Co., Ltd.

Janes Wer Tested by (name + signature)..... Project Engineer Jack Xu Approved by (name + signature).....: Project Manager

Yannis Wen

January 6, 2025 Date of issue.....

# **Revision History**

Revision	Issue Date	ue Date Revisions				
V0	January 6, 2025	Initial released Issue	Yannis Wen			

## 1. Test Result Summary

Requirement	CFR 47 Section	Result		
Antenna requirement	§15.203	PASS		
AC Power Line Conducted Emission	§15.207	PASS		
Spurious Emission	§15.209(a)(f)	PASS		
Occupied Bandwidth	§15.215 (c)	PASS		

#### Note:

- 1. PASS: Test item meets the requirement.
- 2. Fail: Test item does not meet the requirement.
- 3. N/A: Test case does not apply to the test object.
- 4. The test result judgment is decided by the limit of test standard.

### 2. General Information

### 2.1. Description of Device (EUT)

EUT Name : 4 in 1 Foldable Wireless Charger

Model No. : GRFWC1009, MP-306

DIFF.

There is no difference between the models except the appearance color.

So all the test were performed on the model GRFWC1009.

Power supply : Input: 9V DC, 3A MAX

Output: 15W/10W/7.5W/5W Watch: 2W Earbuds: 3W

Radio Technology : Wireless power transmission systems

Operation frequency : 115~205KHz, 325KHz

Modulation : MSK

Antenna Type : Coil Antenna, Maximum Gain is 0dBi

(This value is supplied by applicant).

Software version : V1.0

Hardware version : V1.0

Intend use environment : Residential, commercial and light industrial environment

### 2.2. Accessories of Device (EUT)

Accessories1 : Cable

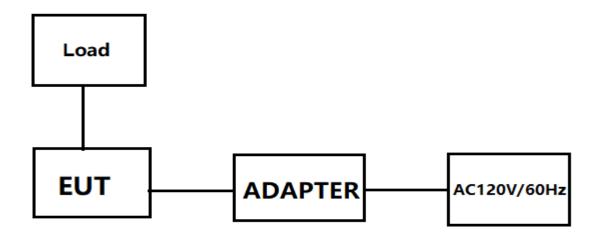
Manufacturer : Shenzhen Minsuo Industrial Co., Ltd

Model : /
Ratings : /

### 2.3. Tested Supporting System Details

No.	Description	Manufacturer	Model	Serial Number	Certification	
1	Load YBZ					
2	AC ADAPTER	Shenzhen HUONIU Technology Co., Ltd.	HNFCQC3024UU			
3	earphone					

### 2.4. Block Diagram of Connection between EUT and Simulators



### 2.5. Description of Test Modes

Mode	Frequency (KHz)
1	129
2	138
3	325
4	129+138+325

### 2.6. Test Conditions

Items	Required	Actual		
Temperature range:	15-35°C	<b>24</b> °C		
Humidity range:	25-75%	56%		
Pressure range:	86-106kPa	98kPa		

#### 2.7. Test Facility

Shenzhen Alpha Product Testing Co., Ltd Building i, No.2, Lixin Road, Fuyong Street, Bao'an District, 518103, Shenzhen, Guangdong, China

June 21, 2018 File on Federal Communication Commission

Registration Number: 293961

July 15, 2019 Certificated by IC Registration Number: 12135A

### 2.8. Measurement Uncertainty

(95% confidence levels, k=2)

Item	Uncertainty		
Uncertainty for Power point Conducted Emissions Test	1.63dB		
Uncertainty for Radiation Emission test in 3m chamber (below 30MHz)	3.5dB		
Uncertainty for Radiation Emission test in 3m chamber	3.74dB(Polarize: V)		
(30MHz to 1GHz)	3.76dB(Polarize: H)		
Uncertainty for Radiation Emission test in 3m chamber	3.77dB(Polarize: V)		
(1GHz to 25GHz)	3.80dB(Polarize: H)		
Uncertainty for radio frequency	5.06×10 <sup>-8</sup> GHz		
Uncertainty for conducted RF Power	0.40dB		
Uncertainty for temperature	0.2℃		
Uncertainty for humidity	1%		
Uncertainty for DC and low frequency voltages	0.06%		

## 2.9. Test Equipment List

Equipment			Firmware version	Serial No.	Last cal.	Cal Interval
9*6*6 anechoic chamber	chamber		/	N/A	2022.05.18	3Year
Spectrum analyzer	Spectrum ROHDE&SCHWARZ		2.3 102137		2024.08.08	1Year
Spectrum analyzer	Agilent	N9020A	A.14.16	MY499100060	2024.08.08	1Year
Receiver	ROHDE&SCHWARZ	ESR	2.28 SP1	1316.3003K03-10 2082-Wa	2024.08.08	1Year
Receiver	R&S	ESCI	4.42 SP1	101165	2024.08.08	1Year
Bilog Antenna	Schwarzbeck	VULB 9168	/	VULB 9168#627	2023.08.28	2Year
Horn Antenna	SCHWARZBECK	BBHA 9120 D			2023.08.19	2Year
Loop Antenna	SCHWARZBECK	FMZB 1519B	/	00128	2023.08.19	2Year
RF Cable	Resenberger	Cable 1	/	RE1	2024.08.08	1Year
RF Cable	Resenberger	Cable 2	/ RE2		2024.08.08	1Year
RF Cable	Resenberger	Cable 3	/	CE1	2024.08.08	1Year
Pre-amplifier	HP	HP8347A	/	2834A00455	2024.08.08	1Year
Pre-amplifier	Agilent	8449B	/ 3008A02664		2024.08.08	1Year
L.I.S.N.#1	Schwarzbeck	NSLK8126	/ 8126-466		2024.08.08	1Year
L.I.S.N.#2	ROHDE&SCHWARZ	ENV216	/ 101043		2024.08.08	1Year
Horn Antenna	SCHWARZBECK	BBHA 9170	/ 00946		2023.08.19	2Year
Preamplifier	SKET	LNPA_1840 -50	/	SK2018101801	2024.08.08	1 Year
Power Meter	Agilent	E9300A	/	MY41496628	2024.08.08	1 Year
Power Sensor	DARE	RPR3006W	/	15100041SNO91	2024.08.08	1 Year
Electronic Thermo-Hygrome ter	S.H.Qixiang	HTC-1	/	N/A	2024.08.11	1 Year
Switching Mode Power Supply			/	20140927-6	2024.08.08	1 Year
Adjustable attenuator	MWRFtest	N/A	/	N/A	N/A	N/A
10dB Attenuator	Mini-Circuits	DC-6G	/	N/A	N/A	N/A

Software Information									
Test Item	Software Name	Manufacturer	Version						
RE	EZ-EMC	EZ	Alpha-3A1						
CE	CE EZ-EMC EZ		Alpha-3A1						
RF-CE	MTS 8310	MW	V2.0.0.0						

## 3. Test Results and Measurement Data

### 3.1. Conducted Emission

### 3.1.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.207					
Test Method:	ANSI C63.10:2013					
Frequency Range:	150 kHz to 30 MHz					
Receiver setup:	RBW=9 kHz, VBW=30 kHz,	Sweep time=auto				
Limits:	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					
	Reference Plane					
Test Setup:	Remark: E.U.T: Equipment Under Test LISN: Line Impedence Stabilization Network Test table height=0.8m					
Test Mode:	Transmitting Mode					
Test Procedure:	<ol> <li>The E.U.T is connected to an adapter through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment.</li> <li>The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).</li> <li>Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement.</li> </ol>					
Test Result:	PASS					

#### 3.1.2. Test Data

#### Please refer to following diagram for individual

Test Mode : TM1

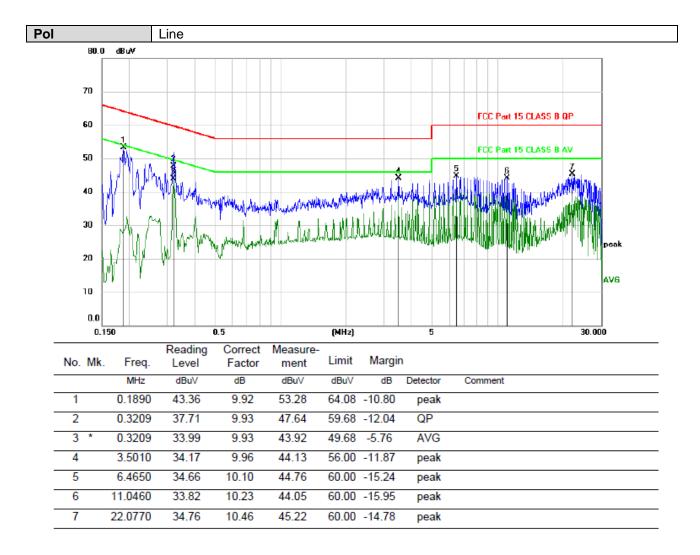
Test Result : PASS

Note: The test results are listed in next pages.

All test modes has been tested, this report only reflected the worst mode.(TM1)

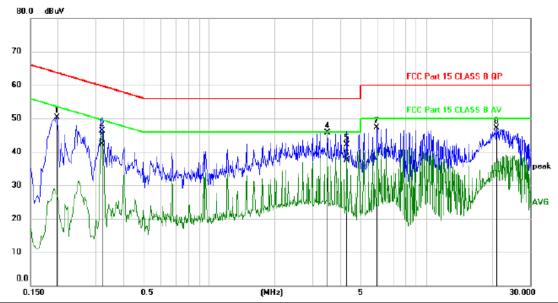
If the limits for the measurement with the average detector are met when using a receiver with a peak detector, the test unit shall be deemed to meet both limits and the measurement with the average detector and quasi-peak detector need not be carried out.

If the limits for the measurement with the average detector are met when using a receiver with a quasi-peak detector, the test unit shall be deemed to meet both limits and the measurement with the average detector need not be carried out.



<sup>\*:</sup>Maximum data x:Over limit !:over margin \( \text{Reference Only} \)
Note: Measurement=Reading Level+Correc Factor. Factor=(LISN or ISN or PLC or Current Probe)Factor+Cable

### Pol Neutral



No. Mk	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margir	n	
	MHz	dBu∀	dB	dBu∀	dBu∨	dB	Detector	Comment
1	0.1980	40.44	9.92	50.36	63.69	-13.33	peak	
2	0.3209	36.30	9.93	46.23	59.68	-13.45	QP	
3 *	0.3209	32.47	9.93	42.40	49.68	-7.28	AVG	
4	3.5010	35.80	9.96	45.76	56.00	-10.24	peak	
5	4.3110	32.06	9.99	42.05	56.00	-13.95	QP	
6	4.3110	27.51	9.99	37.50	46.00	-8.50	AVG	
7	5.9220	37.29	10.08	47.37	60.00	-12.63	peak	
8	21.0120	36.58	10.46	47.04	60.00	-12.96	peak	

(Reference Only

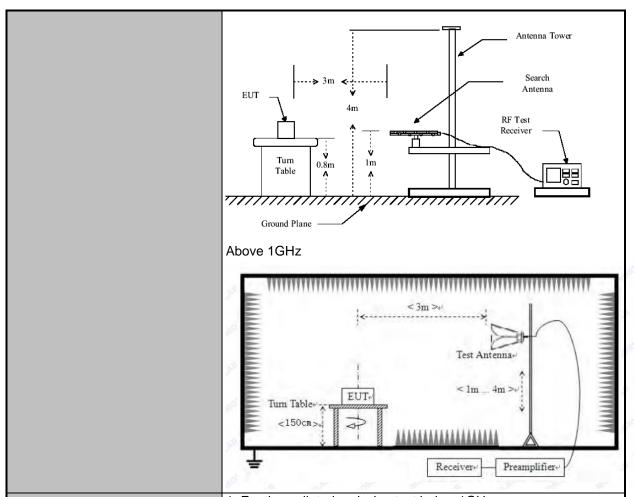
Note: Measurement=Reading Level+Correc Factor. Factor=(LISN or ISN or PLC or Current Probe)Factor+Cable

<sup>\*:</sup>Maximum data x:Over limit !:over margin

## 3.2. Radiated Spurious Emission Measurement

### 3.2.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.209									
Test Method:	ANSI C63.10: 2	2013								
Frequency Range:	9 kHz to 25 GH	z								
Measurement Distance:	3 m									
Antenna Polarization:	Horizontal & Ve	ertica								
Operation mode:	Refer to item 4.	.1								
	Frequency 9kHz-		tector asi-pe		VBW 1kHz	+	Remark uasi-peak			
Receiver Setup:	150kHz 150kHz- 30MHz	Qua	<u>k</u> asi-pe k	a 9kHz	30kHz	Q	Value uasi-peak Value			
	30MHz-1GH z	Qua	asi-pe	a 100KH z	300KH z	Q	uasi-peak Value			
	Above 1GHz		Peak Peak	1MHz 1MHz	3MHz 10Hz		eak Value erage Value			
	Frequency			Field St (microvolt	rength	Me [	asurement Distance (meters)			
	0.009-0.490			2400/F		300				
	0.490-1.705			24000/F			30 30			
	1.705-30 30-88			30 100		3				
	88-216			150			3			
Limit:	216-960			20	0	3				
	Above 960			50	0		3			
	Frequency		Field Strength (microvolts/mete r)		Measur nt Distar (mete	nce	Detector			
	Above 1GHz		500 5000		3		Average Peak			
	For radiated em	nissio	ns be		<u> </u>		Peak			
	For radiated emissions below 30MHz  Distance = 3m  Computer									
Test setup:	Pre -Amplifier  Turn table									
	Receiver Ground Plane									
	30MHz to 1GHz									



1. For the radiated emission test below 1GHz:

The EUT was placed on a turntable with 0.8 meter above ground. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high PASS filter are used for the test in order to get better signal level.

For the radiated emission test above 1GHz:

Place the measurement antenna on a turntable with 1.5 meter above ground, which is away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

- Corrected Reading: Antenna Factor + Cable Loss + Read Level -Preamp Factor = Level
- 3. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using

#### **Test Procedure:**

	the quasi-peak detector and reported.  4. Use the following spectrum analyzer settings:  (1) Span shall wide enough to fully capture the emission being measured;  (2) Set RBW=100 kHz for f < 1 GHz; VBW ≥RBW; Sweep = auto; Detector function = peak; Trace = max hold;  (3) Set RBW = 1 MHz, VBW= 3MHz for f 1 GHz for peak measurement.  For average measurement: VBW = 10 Hz, when duty cycle is no less than 98 percent. VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.
Test mode:	Refer to section 4.1 for details
Test results:	PASS

#### 3.2.2. Test Data

#### Please refer to following diagram for individual

Frequency Range : 9KHz~30MHz

Polarization : Coaxial

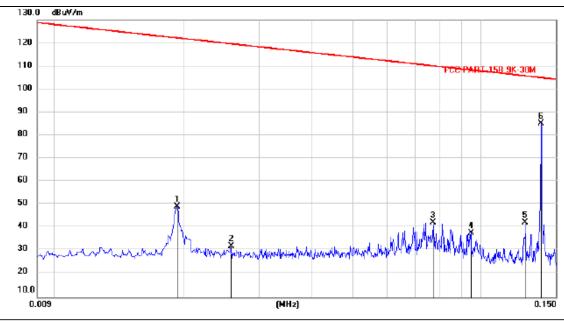
Test Mode : TX: 138kHz

Test Results : PASS

Note: 1. The test results are listed in next pages.

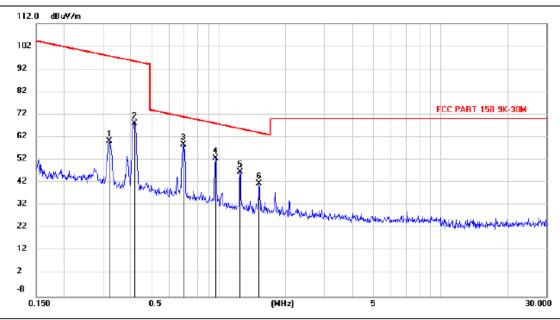
2. This mode is worst case mode, so this report only reflected the worst mode.

3. If the limits for the measurement with the average detector are met when using a receiver with a peak detector, the test unit shall be deemed to meet both limits and the measurement with the quasi-peak detector need not be carried out.



No. Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin		Antenna Height	Table Degree	
	MHz	dBu∨	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	0.0192	27.93	21.27	49.20	122.1	-72.92	peak			
2	0.0258	11.00	21.10	32.10	119.5	-87.46	peak			
3	0.0771	22.04	20.09	42.13	110.0	-67.93	peak			
4	0.0946	17.81	19.85	37.66	108.2	-70.62	peak			
5	0.1272	22.41	19.87	42.28	105.7	-63.43	peak			
6 *	0.1385	64.98	20.03	85.01	104.9	-19.96	peak		·	

Note:1. \*:Maximum data; x:Over limit; !:over margin.
2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.



No. Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin		Antenna Height	Table Degree	
	MHz	dBuV	dB	dBu∀/m	dBuV/m	dB	Detector	cm	degree	Comment
1	0.3206	40.20	19.96	60.16	97.68	-37.52	peak			
2	0.4151	48.34	19.82	68.16	95.44	-27.28	peak			
3 *	0.6933	38.97	19.82	58.79	70.94	-12.15	peak			
4	0.9679	32.81	19.98	52.79	67.99	-15.20	peak			
5	1.2462	26.66	20.06	46.72	65.77	-19.05	peak			
6	1.5222	21.45	20.13	41.58	64.00	-22.42	peak			

Note:1. \*:Maximum data; x:Over limit; !:over margin.
2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

Frequency Range : 30MHz~1000MHz

Test Mode : Full Load

Test Results : PASS

Note: 1. T

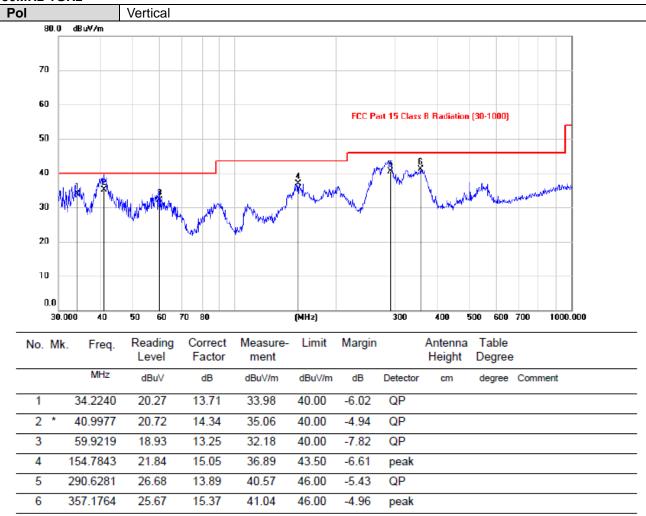
- 1. The test results are listed in next pages.
- 2. All test modes has been tested, this report only reflected the worst mode. (Charging+5W)
- 3. If the limits for the measurement with the average detector are met when using a receiver with a peak detector, the test unit shall be deemed to meet both limits and the measurement with the quasi-peak detector need not be carried out.

Frequency Range	:	Above 1GHz			
EUT	:	/	Test Date	:	/
M/N	:	/	Temperature	:	/
Test Engineer	:	/	Humidity	:	/
Test Mode	:	/			
Test Results	:	N/A			

Note:

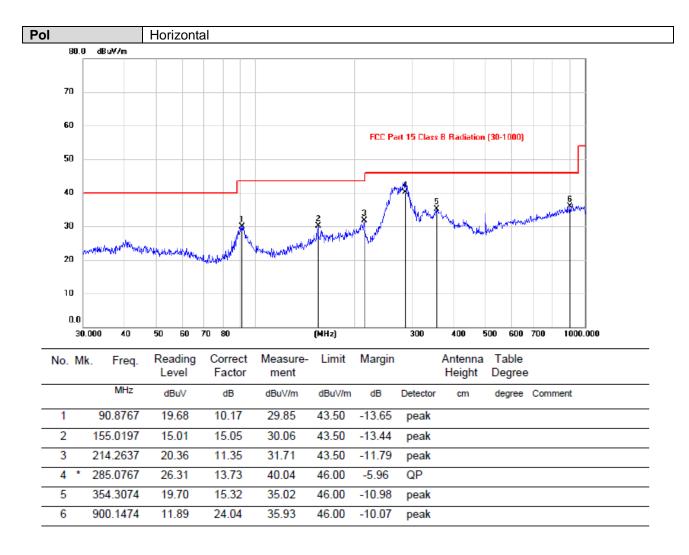
1. The highest frequency of the internal sources of the EUT is less than 108 MHz, the measurement shall only be made up to 1 GHz. So the frequency rang above 1GHz radiation test not applicable.

#### 30MHz-1GHz



Note:1. \*: Maximum data; x: Over limit; !: over margin.

<sup>2.</sup>Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.



Note:1. \*: Maximum data; x: Over limit; !: over margin.

<sup>2.</sup>Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

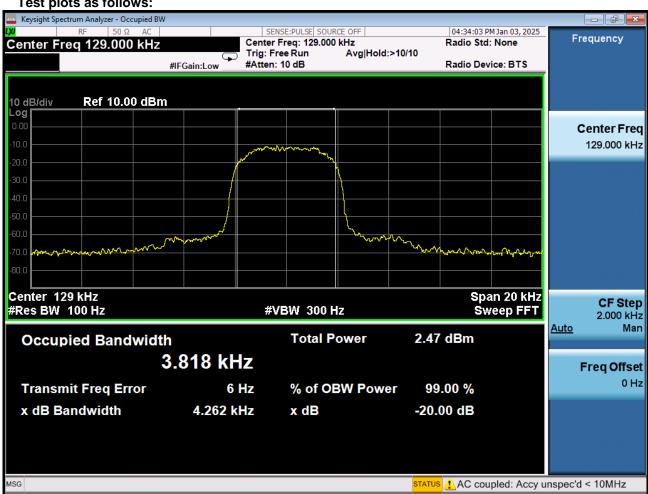
## 3.3. Test Specification

Test Requirement:	FCC Part15 C Section 15.215(c)					
Test Method:	ANSI C63.10: 2013					
Limit:	N/A					
Test Procedure:	<ol> <li>According to the follow Test-setup, keep the relative position between the artificial antenna and the EUT.</li> <li>Set to the maximum power setting and enable the EUT transmit continuously.</li> <li>Use the following spectrum analyzer settings for 20dB Bandwidth measurement.         Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel; RBW≥1% of the 20 dB bandwidth; VBW≥RBW; Sweep = auto; Detector function = peak; Trace = max hold.     </li> <li>Measure and record the results in the test report.</li> </ol>					
Test setup:	Spectrum Analyzer EUT					
Test Mode:	Refer to section 4.1 for details					
Test results:	PASS					

#### 20dB Occupy Bandwidth Frequency(KHz) Conclusion Limit (kHz) (kHz) 129 4.262 **PASS**

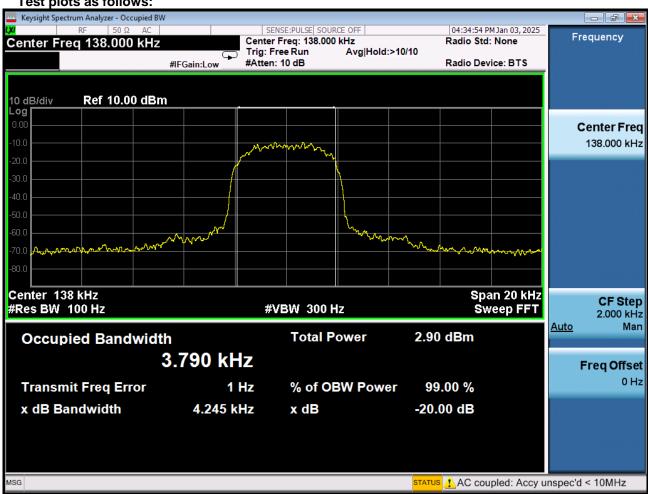
Page 24 of 47

Test plots as follows:



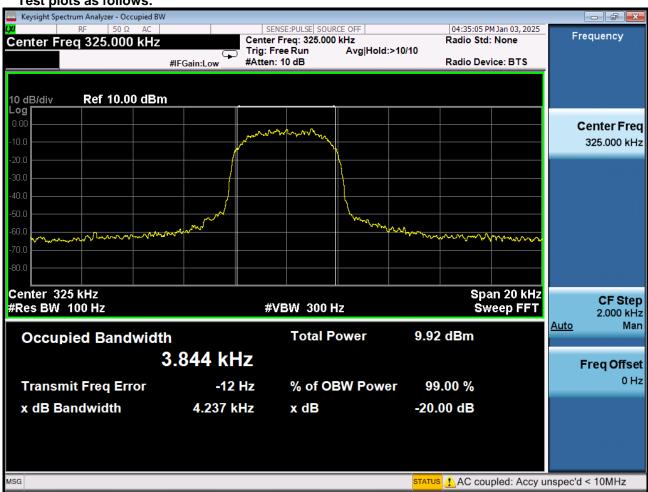
Frequency(KHz)	20dB Occupy Bandwidth (kHz)	Limit (kHz)	Conclusion
138	4.245		PASS

Test plots as follows:



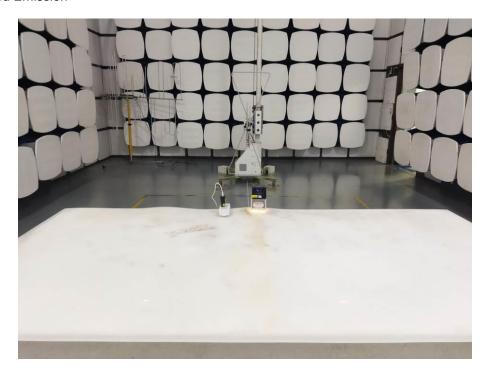
Frequency(KHz)	20dB Occupy Bandwidth (kHz)	Limit (kHz)	Conclusion
325	4.237		PASS

Test plots as follows:

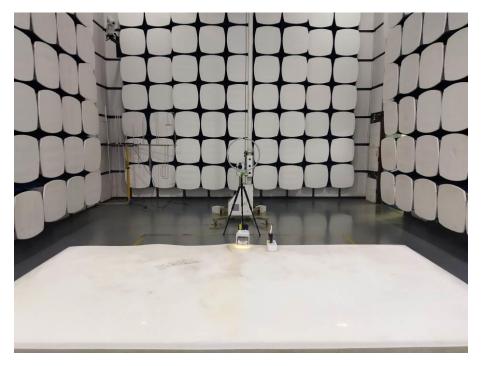


#### **Photos of Test Setup** 4.

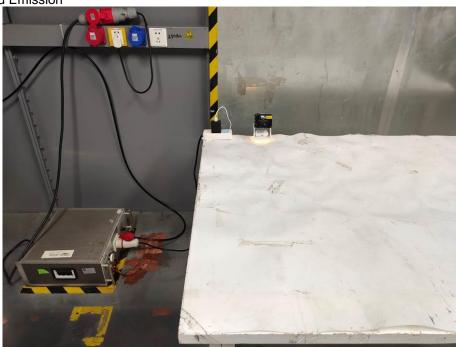
Radiated Emission



Page 27 of 47



## Conducted Emission



## 5. Photographs of EUT





