



# **FCC TEST REPORT**

**Test report  
On Behalf of  
Adam Elements International Co., LTD.  
For  
GRAVITY 2 10W Wireless Charging Power Bank  
Model No.: GRAVITY 2  
FCC ID: 2ABY9-GRAVITY-2**

**Prepared for :** Adam Elements International Co., LTD.  
10F.-3, No.54, Songjiang Rd., Zhongshan Dist., Taipei City, 104, Taiwan

**Prepared By :** Shenzhen HUAKE Testing Technology Co., Ltd.  
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Bao'an District, Shenzhen City, China

**Date of Test:** July 23, 2019 ~ July 30, 2019

**Date of Report:** July 30, 2019

**Report Number:** HK1907231828-1E



## TEST RESULT CERTIFICATION

**Applicant's name** ..... : Adam Elements International Co., LTD.

Address ..... : 10F.-3, No.54, Songjiang Rd., Zhongshan Dist., Taipei City,  
104, Taiwan

**Manufacture's Name** ..... : Adam Elements International Co., LTD.

Address ..... : 10F.-3, No.54, Songjiang Rd., Zhongshan Dist., Taipei City,  
104, Taiwan

### Product description

Trade Mark: ADAM elements

Product name ..... : GRAVITY 2 10W Wireless Charging Power Bank

Model and/or type reference : GRAVITY 2

**Standards** ..... : FCC Rules and Regulations Part 15 Subpart C (Section 15.209),  
ANSI C63.10: 2013

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**Date of Test** ..... :

Date (s) of performance of tests ..... : July 23, 2019 ~ July 30, 2019

Date of Issue ..... : July 30, 2019

Test Result ..... : **Pass**

Testing Engineer :

(Gary Qian)

Technical Manager :

(Eden Hu)

Authorized Signatory :

(Jason Zhou)



<b>Table of Contents</b>	<b>Page</b>
1 . TEST SUMMARY	4
1.1 TEST PROCEDURES AND RESULTS	4
1.2 TEST FACILITY	4
1.3 MEASUREMENT UNCERTAINTY	4
2. GENERAL INFORMATION	5
2.1 General Description of EUT	5
2.2. Carrier Frequency of Channels	6
2.3 Operation of EUT during testing	6
2.4 Description of Test Setup	6
2.5 Measurement Instruments List	7
3. CONDUCTED EMISSION TEST	8
3.1 Block Diagram of Test Setup	8
3.2 Conducted Power Line Emission Limit	8
3.3 Test Procedure	8
3.4 Test Result	8
4. Occupied Bandwidth	11
4.1 Block Diagram of Test Setup	11
4.2 Rules and specifications	11
4.3 Test Procedure	11
4.4 Test Result	11
5. RADIA TED EMISSIONS	13
5.1 Block Diagram of Test Setup	13
5.2 Rules and specifications	14
5.3 Test Procedure	15
5.4 Test Result	15
6 ANTENNA REQUIREMENT	18
7. PHOTOGRAPH OF TEST	19
7.1 Radiated Emission	19
7.2 Conducted Emission	20



## 1. TEST SUMMARY

### 1.1 TEST PROCEDURES AND RESULTS

DESCRIPTION OF TEST	RESULT
CONDUCTED EMISSIONS TEST	COMPLIANT
RADIATED EMISSION TEST	COMPLIANT
OCCUPIED BANDWIDTH MEASUREMENT	COMPLIANT
ANTENNA REQUIREMENT	COMPLIANT

### 1.2 TEST FACILITY

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

Address 1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park, Fuhai Street, Bao'an District, Shenzhen City, China

### 1.3 MEASUREMENT UNCERTAINTY

Measurement Uncertainty	
Conducted Emission Expanded Uncertainty	= 2.23dB, k=2
Radiated emission expanded uncertainty(9kHz-30MHz)	= 3.08dB, k=2
Radiated emission expanded uncertainty(30MHz-1000MHz)	= 4.42dB, k=2
Radiated emission expanded uncertainty(Above 1GHz)	= 4.06dB, k=2



## 2. GENERAL INFORMATION

### 2.1 General Description of EUT

Equipment	GRAVITY 2 10W Wireless Charging Power Bank
Model Name	GRAVITY 2
Serial No.	N/A
Model Difference	N/A
Trade Mark	ADAM elements
FCC ID	<b>2ABY9-GRAVITY-2</b>
Antenna Type	Coil Antenna
Antenna Gain	1dBi
Operation frequency	110-205KHz
Number of Channels	1
Modulation Type	FSK
Power Source	DC voltage
Power Rating	Built-in battery:DC3.7V Micro-B Input voltage: DC5V 2.1A or DC9V 2A USB-C Input voltage: DC5V 2.5A or DC9V 2A USB-A Output voltage: DC 5V 2.4A or DC9V 2A or 12V 1.5A USB-c Output voltage: DC 5V 3A or DC9V 2A or 12V 1.5A Wireless Output voltage: DC5V 1A or DC9V 1.1A



## 2.2. Carrier Frequency of Channels

Operation Frequency each of channel	
Channel	Frequency
1	125KHz

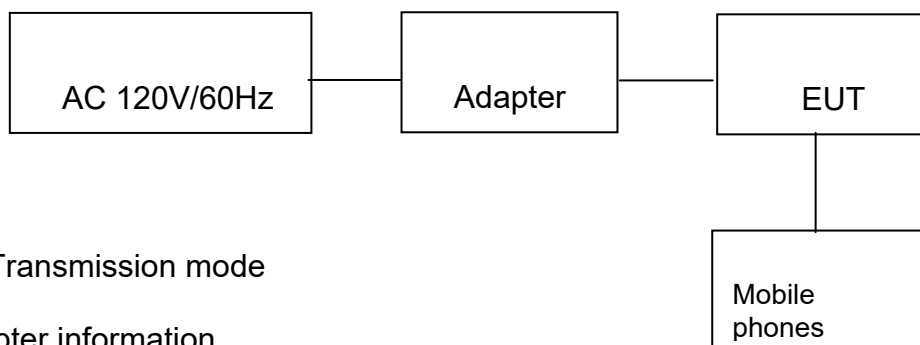
## 2.3 Operation of EUT during testing

Operating Mode

The mode is used: Transmitting mode

## 2.4 Description of Test Setup

Operation of EUT during testing



Setup: Transmission mode

- Adapter information  
Model: UP0920  
Input: AC100-240V~, 50/60Hz, 0.5A  
Output: 5VDC, 2A / 9VDC, 2A
- Mobile phones information  
Model: S6  
Input: 5VDC



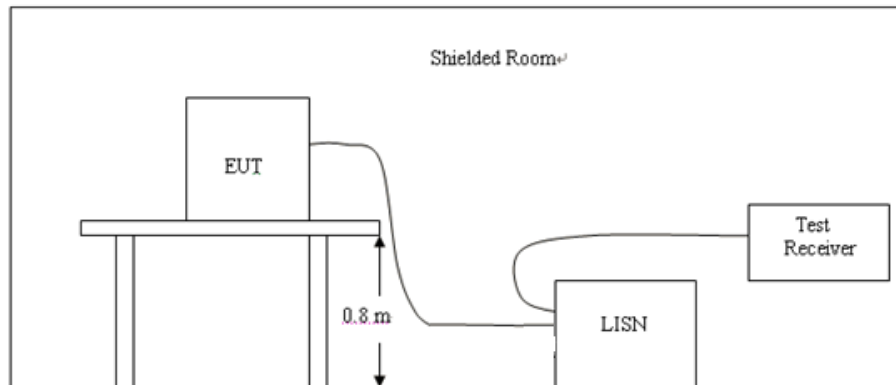
## 2.5 Measurement Instruments List

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	L.I.S.N. Artificial Mains Network	R&S	ENV216	HKE-002	Dec. 27, 2018	1 Year
2.	Receiver	R&S	ESCI 7	HKE-010	Dec. 27, 2018	1 Year
3.	RF automatic control unit	Tonscend	JS0806-2	HKE-060	Dec. 27, 2018	1 Year
4.	Spectrum analyzer	R&S	FSP40	HKE-025	Dec. 27, 2018	1 Year
5.	Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 27, 2018	1 Year
6.	Preamplifier	Schwarzbeck	BBV 9743	HKE-006	Dec. 27, 2018	1 Year
7.	EMI Test Receiver	Rohde & Schwarz	ESCI 7	HKE-010	Dec. 27, 2018	1 Year
8.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	HKE-012	Dec. 27, 2018	1 Year
9.	Loop Antenna	Schwarzbeck	FMZB 1519 B	HKE-014	Dec. 27, 2018	1 Year
10.	Horn Antenna	Schwarzbeck	9120D	HKE-013	Dec. 27, 2018	1 Year
11.	Pre-amplifier	EMCI	EMC051845 SE	HKE-015	Dec. 27, 2018	1 Year
12.	Pre-amplifier	Agilent	83051A	HKE-016	Dec. 27, 2018	1 Year
13.	EMI Test Software EZ-EMC	Tonscend	JS1120-B Version	HKE-083	Dec. 27, 2018	N/A
14.	Power Sensor	Agilent	E9300A	HKE-086	Dec. 27, 2018	1 Year
15.	Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 27, 2018	1 Year
16.	Signal generator	Agilent	N5182A	HKE-029	Dec. 27, 2018	1 Year
17.	Signal Generator	Agilent	83630A	HKE-028	Dec. 27, 2018	1 Year
18.	Shielded room	Shiel Hong	4*3*3	HKE-039	Dec. 27, 2018	3 Year



### 3. CONDUCTED EMISSION TEST

#### 3.1 Block Diagram of Test Setup



#### 3.2 Conducted Power Line Emission Limit

According to FCC Part 15.207(a)

Frequency (MHz)	Maximum RF Line Voltage (dBμV)			
	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 Line Conducted Emission Limit is same as above table.

#### 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

#### 3.4 Test Result

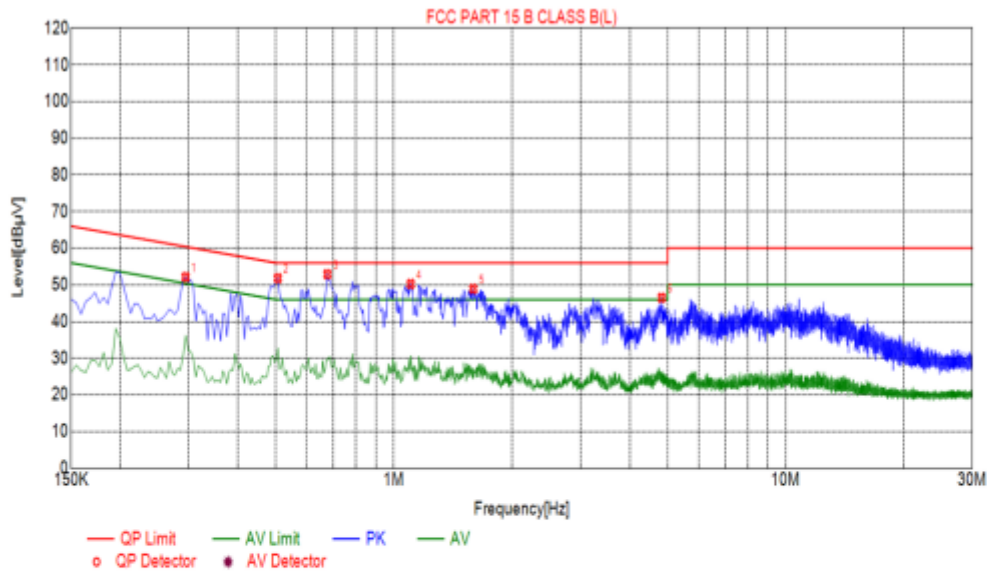
PASS





Remark: We tested all mode, the worst(Wireless Output voltage DC9V ) case was recorded.  
Please refer to following diagram for individual

Test Specification: Line

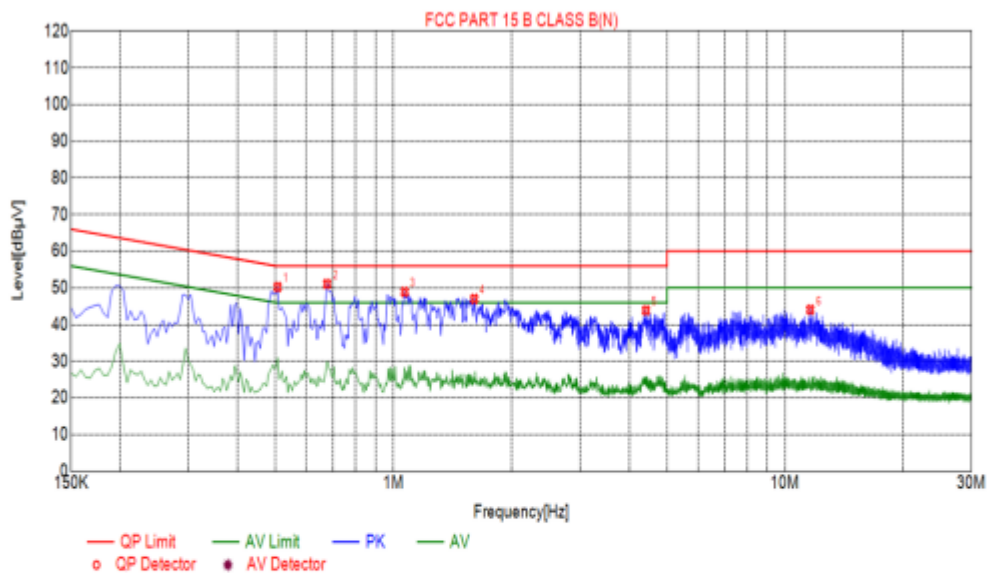


Suspected List						
NO.	Freq. [MHz]	Level [dBμV]	Factor [dB]	Limit [dBμV]	Margin [dB]	Detector
1	0.2940	52.13	10.03	60.41	8.28	PK
2	0.5055	51.82	10.04	56.00	4.18	PK
3	0.6765	52.90	10.05	56.00	3.10	PK
4	1.1040	50.24	10.07	56.00	5.76	PK
5	1.5945	48.91	10.11	56.00	7.09	PK
6	4.8300	46.48	10.26	56.00	9.52	PK

Remark: Margin = Limit – Level  
Correction factor = Cable lose + LISN insertion loss  
Level=Test receiver reading + correction factor



## Test Specification: Neutral



Suspected List						
NO.	Freq. [MHz]	Level [dBμV]	Factor [dB]	Limit [dBμV]	Margin [dB]	Detector
1	0.5055	50.24	10.04	56.00	5.76	PK
2	0.6765	51.08	10.05	56.00	4.92	PK
3	1.0680	48.92	10.07	56.00	7.08	PK
4	1.6080	47.00	10.11	56.00	9.00	PK
5	4.4160	43.88	10.25	56.00	12.12	PK
6	11.6115	44.06	10.00	60.00	15.94	PK

Remark:  $\text{Margin} = \text{Limit} - \text{Level}$

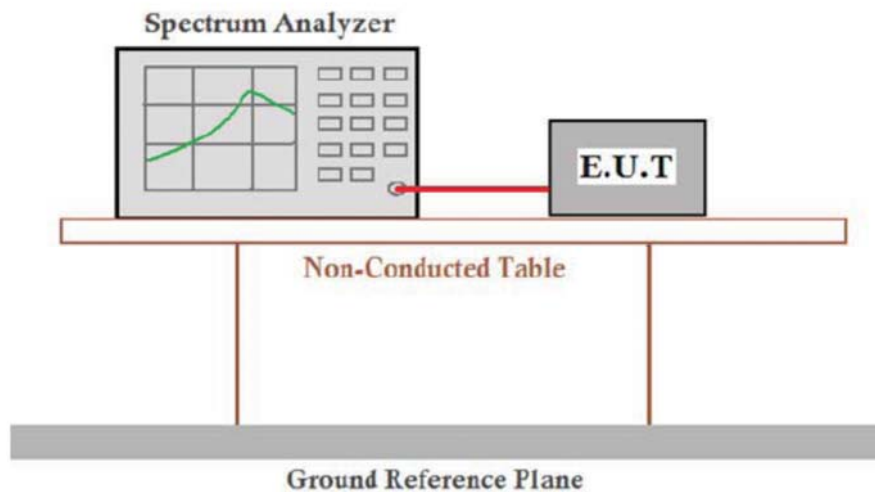
Correction factor = Cable lose + LISN insertion loss

Level = Test receiver reading + correction factor



#### 4. Occupied Bandwidth

##### 4.1 Block Diagram of Test Setup



##### 4.2 Rules and specifications

CFR 47 Part 15.215(c)

ANSI C63.10-2013

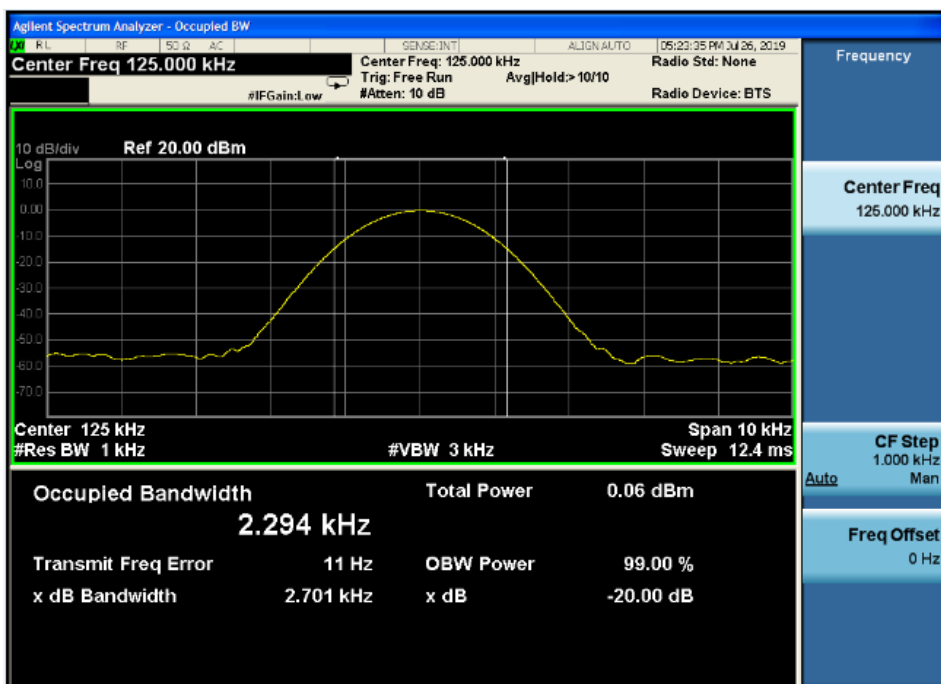
##### 4.3 Test Procedure

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in subpart E of this part, must be designed to ensure that 20dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equip compliance with the 20dB attenuation specification may base on measurement at the intentional radiator's antenna output terminal unless the intentional radiator uses a permanently attached antenna, in which case compliance shall be demonstrated by measuring the radiated emissions.

##### 4.4 Test Result

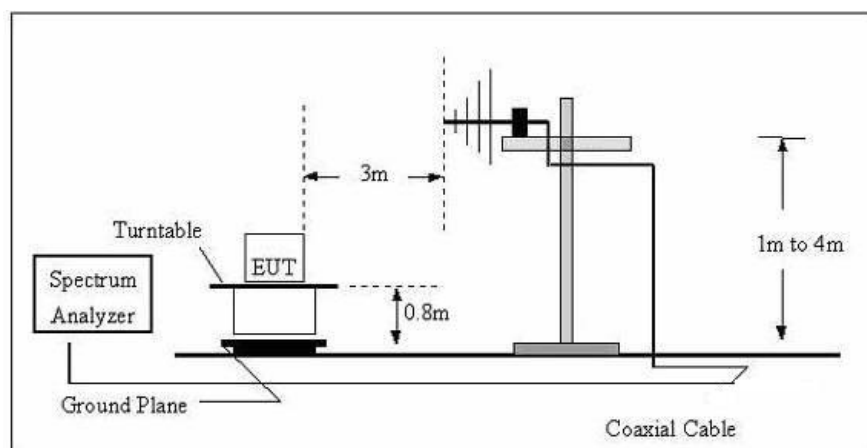
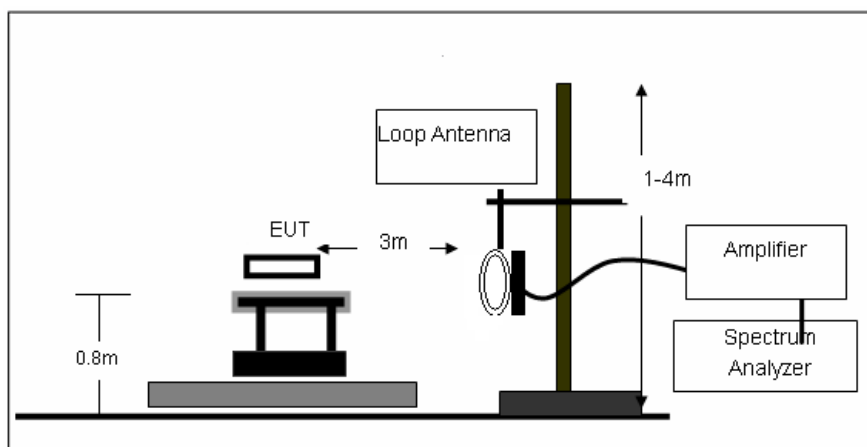
PASS

Mode	Freq (KHz)	20dB Bandwidth (KHz)	Limit (kHz)	Conclusion
Tx Mode	125	2.701	/	PASS



## 5. RADIA TED EMISSIONS

### 5.1 Block Diagram of Test Setup





## 5.2 Rules and specifications

CFR 47 Part 15, section 15.205

Only spurious emissions are permitted in any of the frequency bands listed the tables in these sections.

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
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	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	23.6-24.0
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			

CFR 47 Part 15, section 15.209

The emissions from an intentional radiator shall not exceed the limits in the tables in these sections using an average detector

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F (kHz)	300
0.490-1.705	24000/F (kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

Limit calculation and transfer to 3m distance as showed in the following table:

Frequency (MHz)	Limit (dBuV/m)	Distance (m)
0.009-0.490	$20\log(2400/F(\text{KHz}))+40\log(300/3)$	3
0.490-1.705	$20\log(24000/F(\text{KHz}))+40\log(300/3)$	3
1.705-30.0	69.5	3
30-88	40.0	3
88-216	43.5	3
216-960	46.0	3
Above 960	54.0	3

CFR 47 Part 15, section 15.35

When average radiated emission measurements are specified, the limit on the peak level of the radio Frequency emission is 20dB above the maximum permitted average emission limit.

Transmitter Spurious Emissions 9KHz-30MHz			
	9-150KHz	150-490KHz	490KHz-30MHz
Resolution Bandwidth	200Hz	9KHz	9KHz
Video Bandwidth	2KHz	100KHz	100KHz
Detector	Peak	Peak	Peak
Trace Mode	Max Hold	Max Hold	Max Hold
Sweep Time	Auto	Auto	Auto



### 5.3 Test Procedure

Measurement distance 3m

For the measurement range up to 30MHz in the following plots the field strength result from 3m Distance measurement are extrapolated to 300m and 30m distance respectively, by 40dB/decade, According to part 15.31(f)(2), per antenna factor scaling.

Measurements below 1000MHz are performed with a peak detector and compared to average limits, Measurements with an average detector are not required.

Note:

For battery operated equipment, the equipment tests shall be performed using a new battery.

### 5.4 Test Result

PASS

For 9KHz-30MHz

**Remark: We tested 3 ANTENNAS and the voltage in 5VDC and 9VDC, the worst case ANTENNA 3 (5VDC) was recorded.**

**Please refer to following diagram for individual**

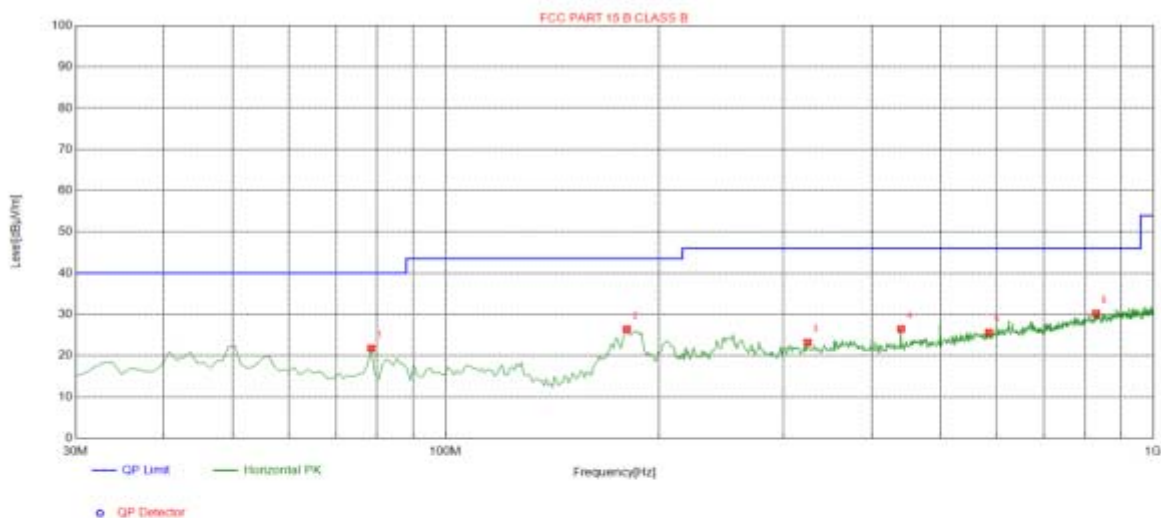
Freq. (MHz)	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limits 3m (dBuV/m)	Margin (dBuV/m)
0.110	Peak	21.44	24.8	46.24	126.77	80.53
0.125	Peak	46.18	24.8	70.98	125.67	54.69
0.486	Peak	25.54	25.03	50.57	113.71	63.14
0.500	Peak	26.17	25.03	51.2	113.62	62.42



For 30MHz-1GHz

**Remark: We tested all mode, the worst(Wireless Output voltage DC9V ) case was recorded.  
Please refer to following diagram for individual**

Antenna polarity: H



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	78.5000	21.78	-19.20	40.00	18.22	100	11	Horizontal
2	180.350	26.39	-16.83	43.50	17.11	100	126	Horizontal
3	324.880	23.22	-11.85	46.00	22.78	100	291	Horizontal
4	440.310	26.46	-9.41	46.00	19.54	100	252	Horizontal
5	585.810	25.62	-6.70	46.00	20.38	100	149	Horizontal
6	830.250	30.24	-2.44	46.00	15.76	100	293	Horizontal

Remark: Margin = Limit – Level

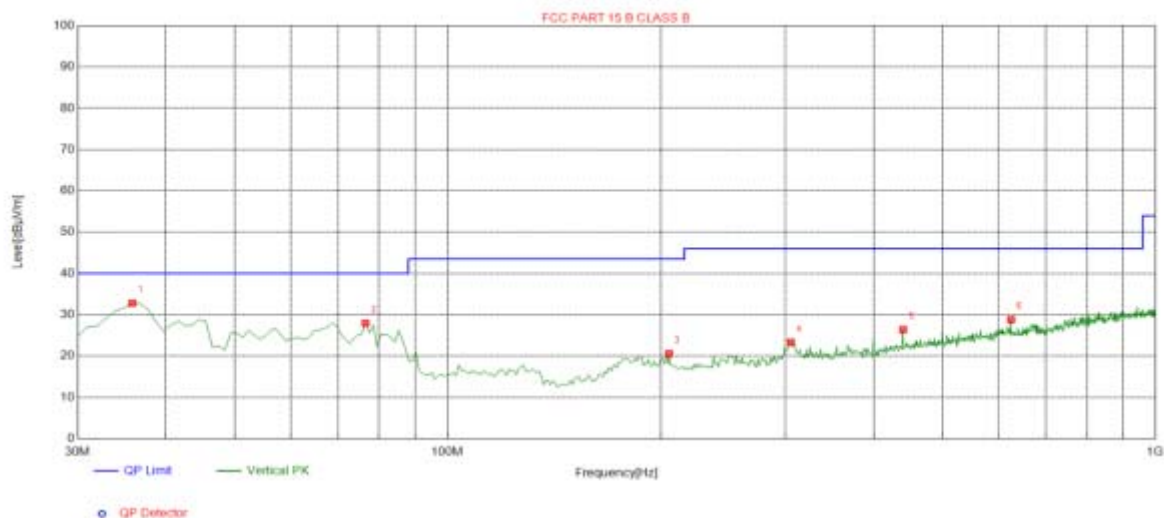
Correction factor = Cable lose + LISN insertion loss

Level=Test receiver reading + correction factor





Antenna polarity: V



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	35.8200	32.80	-15.88	40.00	7.20	100	57	Vertical
2	76.5600	27.96	-18.85	40.00	12.04	100	30	Vertical
3	205.570	20.57	-14.92	43.50	22.93	100	254	Vertical
4	305.480	23.32	-12.67	46.00	22.68	100	57	Vertical
5	440.310	26.37	-9.41	46.00	19.63	100	215	Vertical
6	625.580	28.79	-5.50	46.00	17.21	100	262	Vertical

Remark: Margin = Limit – Level

Correction factor = Cable lose + LISN insertion loss

Level=Test receiver reading + correction factor

## 6 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.

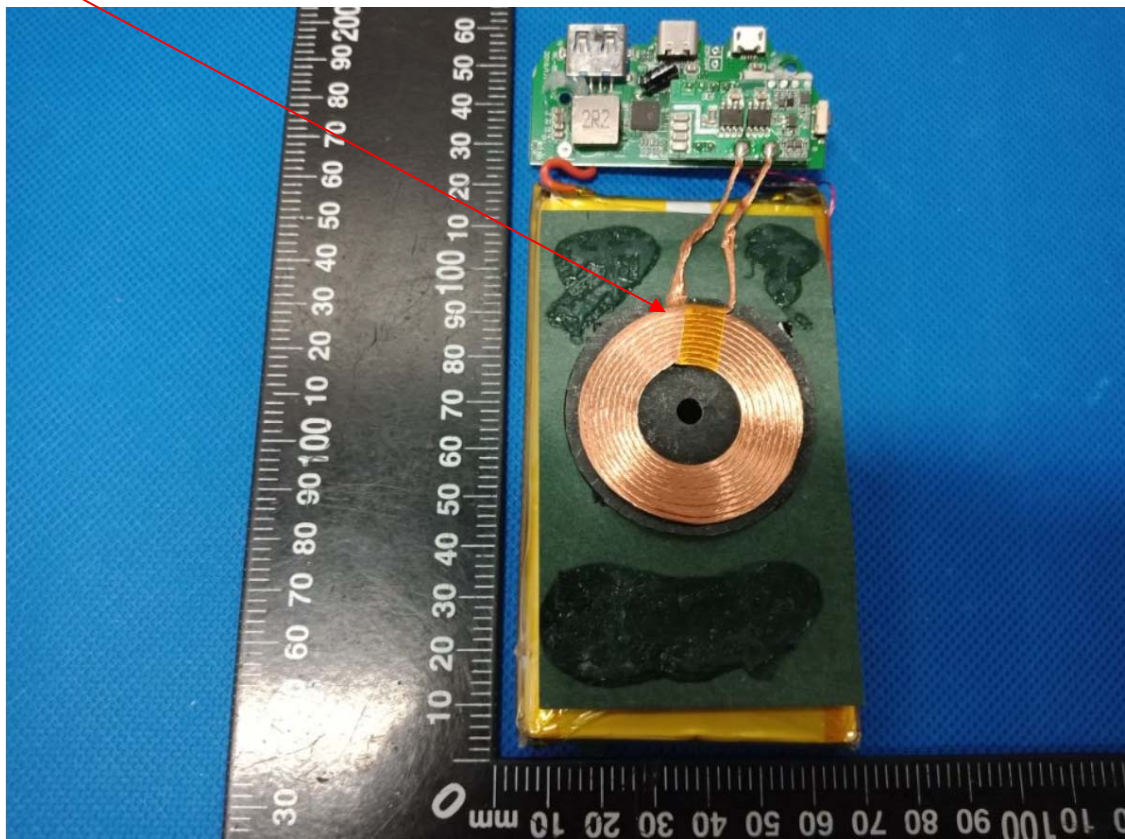
### Refer to statement below for compliance.

The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

### Antenna Connected Construction

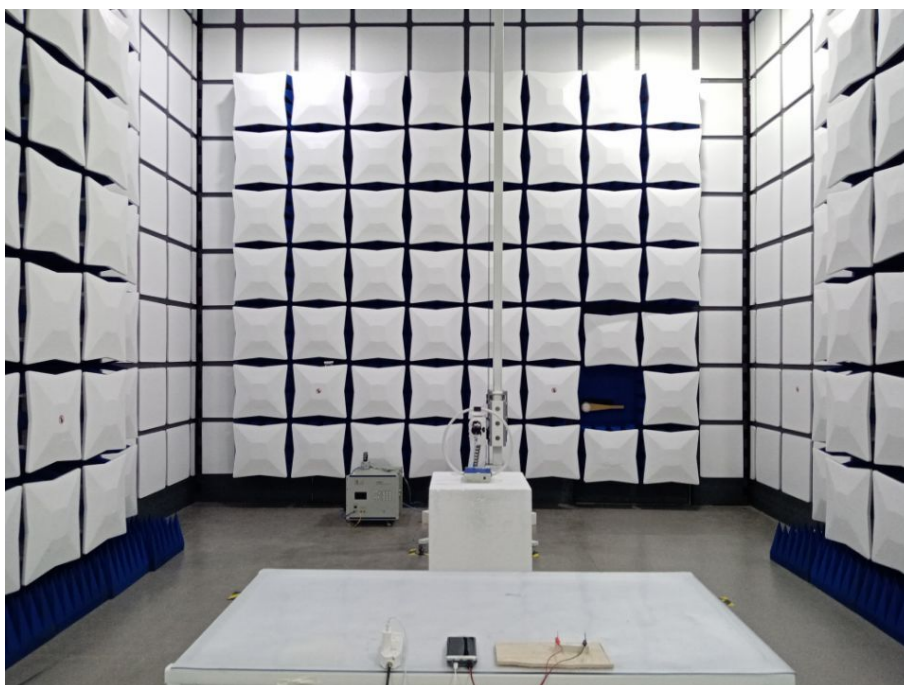
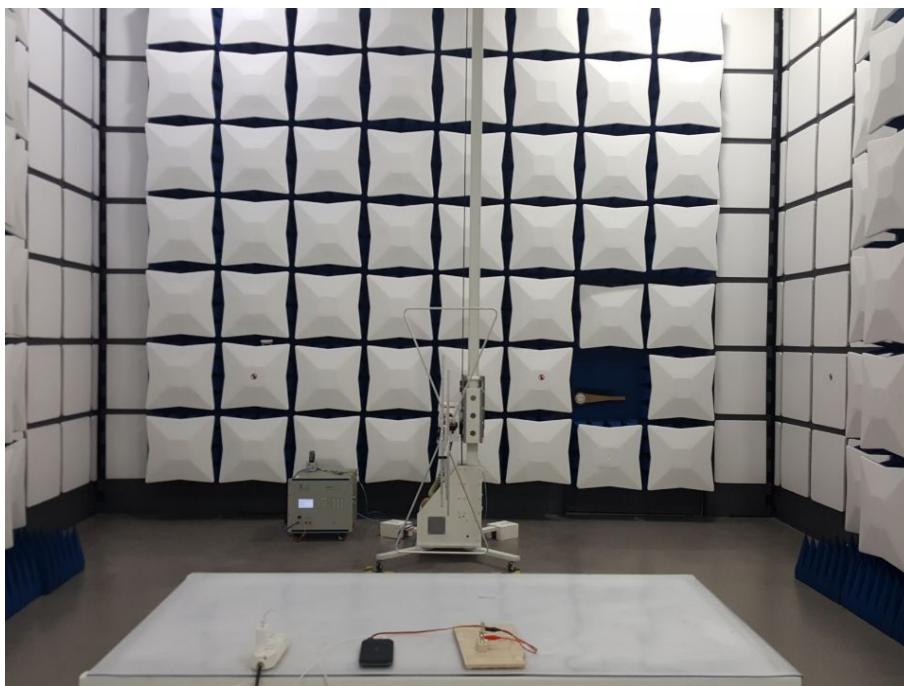
The antenna used in this product is a Coil Antenna, The directional gains of antenna used for transmitting is 1dBi.

### ANTENNA



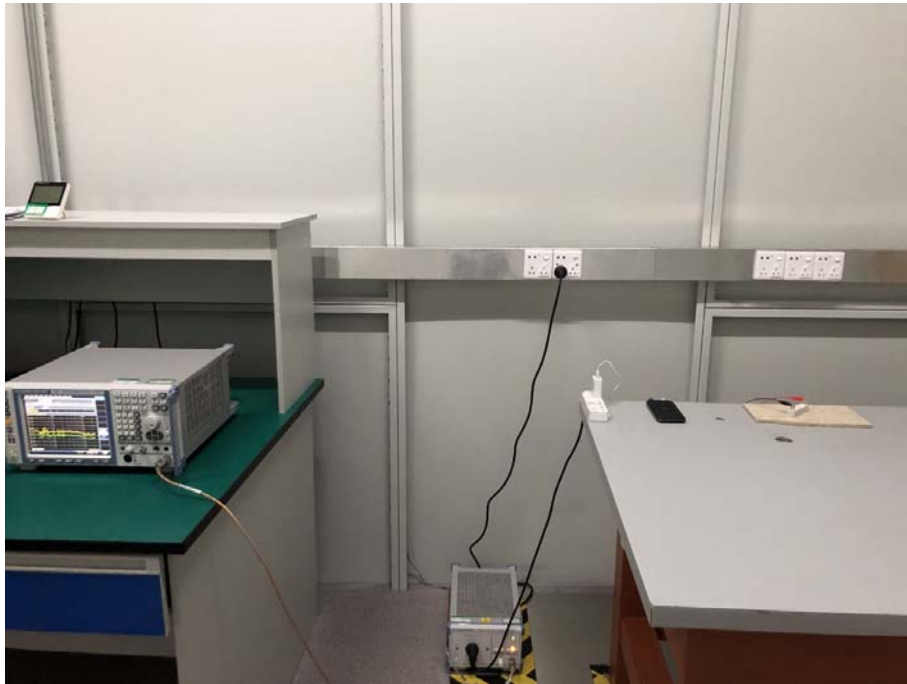
## 7. PHOTOGRAPH OF TEST

### 7.1 Radiated Emission





## 7.2 Conducted Emission



## 8. PHOTOGRAPH OF TEST

Reference to the reporter : ANNEX A of external photos and ANNEX B of internal photos

-----End of test report-----