APPLICATION CERTIFICATION FCC Part 15C
On Behalf of
Matrix

Wireless Charging Pad
Model No.: PM14374

FCC ID: 2AQVG-14374

Prepared for	:	Matrix
Address	:	51 Clapham High Street, London, United Kingdom SW4 7TL
Prepared by	:	Shenzhen Accurate Technology Co., Ltd.
Address	:	1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China Tel: +86-755-26503290 Fax: +86-755-26503396

Report No.	:	ATE20181914
Date of Test	:	October 10, 2018
Date of Report	:	October 31, 2018

TABLE OF CONTENTS

Description Page

Test Report Declaration
1. TEST RESULTS SUMMARY 4
2. GENERAL INFORMATION 5
2.1. Description of Device (EUT) 5
2.2. Special Accessory and Auxiliary Equipment 5
2.3. Description of Test Facility 6
2.4. Measurement Uncertainty 6
3. MEASURING DEVICE AND TEST EQUIPMENT 7
3.1. The Equipment Used to Measure Conducted Disturbance 7
3.2. The Equipment Used to Measure Radiated Emission 7
4. POWER LINE CONDUCTED MEASUREMENT 8
4.1. Block Diagram of Test Setup 8
4.2. Power Line Conducted Emission Measurement Limits 8
4.3. Configuration of EUT on Measurement 8
4.4. Operating Condition of EUT 8
4.5. Test Procedure 9
4.6. Data Sample 9
4.7. Power Line Conducted Emission Measurement Results 9
5. RADIATED EMISSION MEASUREMENT 12
5.1. Block Diagram of Test 12
5.2. Radiated Emission Limit 13
5.3. EUT Configuration on Measurement 13
5.4. Operating Condition of EUT 13
5.5. Test Procedure 14
5.6. Data Sample 15
5.7. Radiated Emission Measurement Result 15
6. ANTENNA REQUIREMENT 21
6.1. The Requirement 21
6.2. Antenna Construction 21

Test Report Declaration

Applicant	:	Matrix
Address	:	51 Clapham High Street, London, United Kingdom SW4 7TL
Product	:	Wireless Charging Pad
Model No.	:	PM14374

Measurement Procedure Used:

FCC CFR47 Part 15 Subpart C Section 15.207 and 15.209
ANSI C63.10: 2013

The device described above is tested by Shenzhen Accurate Technology Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C limits both radiated and conducted emissions. The measurement results are contained in this test report and Shenzhen Accurate Technology Co., Ltd. is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC requirements.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of Shenzhen Accurate Technology Co., Ltd.

Date of Test :	October 10, 2018
Date of Report :	October 31, 2018

Prepared by : Star Yang
(Star Yang, Engineer)

Approved & Authorized Signer :
(Sean Liu, Manager)

1. TEST RESULTS SUMMARY

Test Items	Test Standard	Test Results
Power Line Conducted Emission	FCC Part 15.207	Pass
Radiated Emission	FCC Part 15.209	Pass

2. GENERAL INFORMATION

2.1.Description of Device (EUT)

		Wireless Charging Pad
Frequency	:	110-205kHz
Modulation Type	:	ASK
Type of Antenna	:	Coil Antenna
Rating	:	Input: DC 5V 1.5A Output: DC 5V 1A

2.2.Special Accessory and Auxiliary Equipment

AC/DC Adapter	HUAWEI
	Model: HW-059200CHQ Input:100~240V-50/60Hz, 0.5A Output: 5V, 2A

2.3.Description of Test Facility

EMC Lab	:	Recognition of accreditation by Federal Communications Commission (FCC) The Designation Number is CN1189 The Registration Number is 708358 Listed by Innovation, Science and Economic Development Canada (ISEDC) The Registration Number is 5077A-2 Accredited by China National Accreditation Service for Conformity Assessment (CNAS) The Registration Number is CNAS L3193 Accredited by American Association for Laboratory Accreditation (A2LA) The Certificate Number is 4297.01
Name of Firm	:	Shenzhen Accurate Technology Co., Ltd
Site Location	:	1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China

2.4.Measurement Uncertainty

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

3. MEASURING DEVICE AND TEST EQUIPMENT

3.1. The Equipment Used to Measure Conducted Disturbance

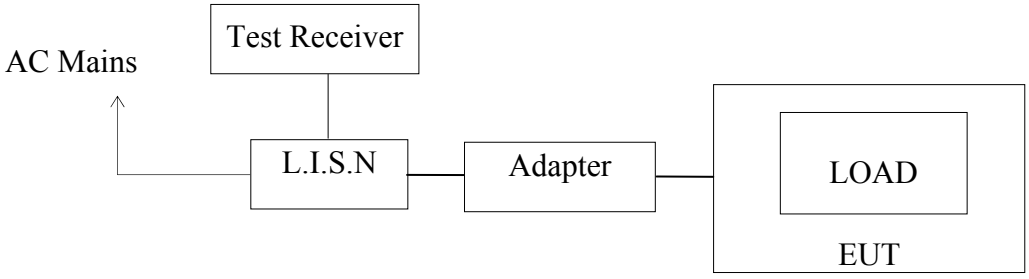
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESCS30	100307	Jan.06, 2018	1 Year
2.	L.I.S.N.	Schwarzbeck	NLSK8126	8126431	Jan.06, 2018	1 Year
3.	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100305	Jan.06, 2018	1 Year
4.	50Ω Coaxial Switch	Anritsu Corp	MP59B	6200283936	Jan.06, 2018	1 Year
5.	RF Coaxial Cable	SUHNER	N-2m	No.2	Jan.06, 2018	1 Year
6.	Measurement Software: ES-K1 V1.71					

3.2. The Equipment Used to Measure Radiated Emission

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum Analyzer	Rohde&Schwarz	FSV40	101495	Jan.06, 2018	1 Year
2.	Test Receiver	Rohde& Schwarz	ESR	101817	Jan.06, 2018	1 Year
3.	Bilog Antenna	Schwarzbeck	VULB9163	9163-323	Jan.06, 2018	1 Year
4.	Loop Antenna	Schwarzbeck	FMZB1516	1516131	Jan.06, 2018	1 Year
5.	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-655	Jan.06, 2018	1 Year
6.	Horn Antenna	Schwarzbeck	BBHA9170	9170-359	Jan.06, 2018	1 Year
7.	RF Switching Unit+PreAMP	Compliance Direction	RSU-M2	38322	Jan.06, 2018	1 Year
8.	Pre-Amplifier	Agilent	8447D	294A10619	Jan.06, 2018	1 Year
9.	Pre-Amplifier	Rohde&Schwarz	CBLU11835 40-01	3791	Jan.06, 2018	1 Year
10.	50 Coaxial Switch	Anritsu Corp	MP59B	6200506474	Jan.06, 2018	1 Year
11.	RF Coaxial Cable	RESENBERGER	N-12m	No.11	Jan.06, 2018	1 Year
12.	RF Coaxial Cable	RESENBERGER	N-0.5m	No.12	Jan.06, 2018	1 Year
13.	RF Coaxial Cable	SUHNER	N-2m	No.13	Jan.06, 2018	1 Year
14.	RF Coaxial Cable	SUHNER	N-0.5m	No.15	Jan.06, 2018	1 Year
15.	RF Coaxial Cable	SUHNER	N-2m	No.16	Jan.06, 2018	1 Year
16.	RF Coaxial Cable	RESENBERGER	N-6m	No.17	Jan.06, 2018	1 Year
17.	Measurement Software: EZ_EMC V1.1.4.2					

4. POWER LINE CONDUCTED MEASUREMENT

4.1.Block Diagram of Test Setup



4.2.Power Line Conducted Emission Measurement Limits

Frequency (MHz)	Limit dB(μV)	
	Quasi-peak Level	Average Level
0.15 - 0.50	66.0 – 56.0 *	56.0 – 46.0 *
0.50 - 5.00	56.0	46.0
5.00 - 30.00	60.0	50.0
NOTE1: The lower limit shall apply at the transition frequencies. NOTE2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.		

4.3.Configuration of EUT on Measurement

The equipments are installed on Power Line Conducted Emission Measurement to meet the commission requirement and operating regulations in a manner, which tends to maximize its emission characteristics in a normal application.

4.4.Operating Condition of EUT

4.4.1. Setup the EUT and simulator as shown as Section 4.1.

4.4.2. Turn on the power of all equipment.

4.4.3. Let the EUT work in test mode and measure it.

4.5. Test Procedure

The EUT is put on the plane 0.8 m high above the ground by insulating support and is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC lines are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.10: 2013 on Conducted Emission Measurement.

The bandwidth of test receiver (R & S ESCS30) is set at 9kHz.

The frequency range from 150kHz to 30MHz is checked.

4.6. Data Sample

Frequency (MHz)	Transducer value (dB)	QuasiPeak Level (dBμV)	Average Level (dBμV)	QuasiPeak Limit (dBμV)	Average Limit (dBμV)	QuasiPeak Margin (dB)	Average Margin (dB)	Remark (Pass/Fail)
X.XX	10.6	25.3	17.0	59.0	49.0	33.7	32.0	Pass

Transducer value = Insertion loss of LISN + Cable Loss
Result = Quasi-peak Level/Average Level + Transducer value
Limit = Limit stated in standard

Calculation Formula:

Margin = Limit – Reading level value – Transducer value

4.7. Power Line Conducted Emission Measurement Results

PASS.

The frequency range from 150kHz to 30MHz is checked.

Emissions attenuated more than 20 dB below the permissible value are not reported.

The spectral diagrams are attached as below.

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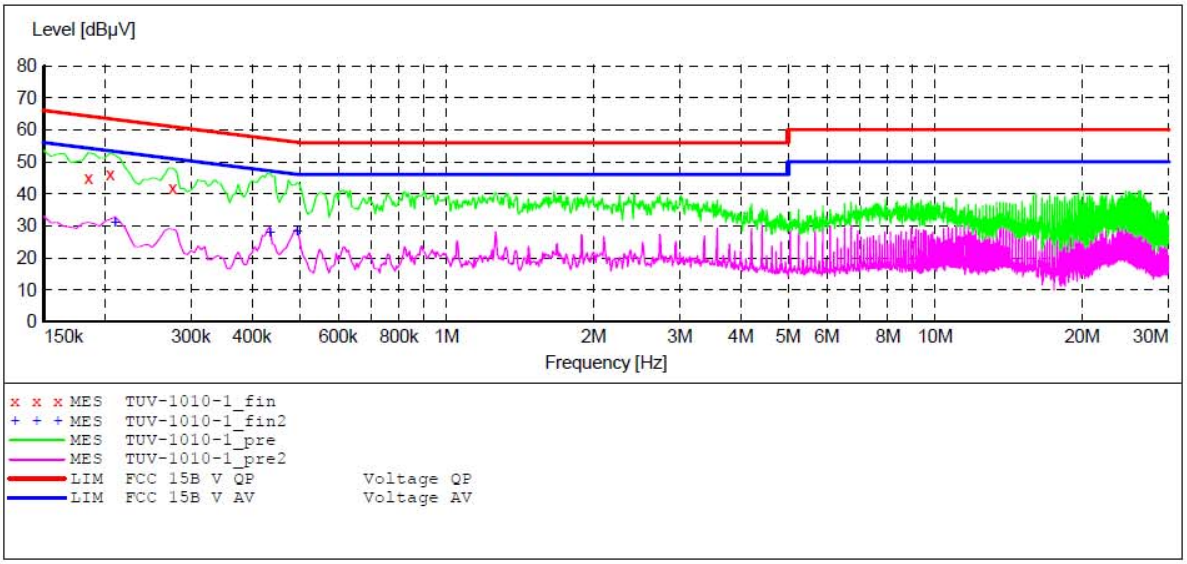
CONDUCTED EMISSION STANDARD FCC PART 15 C

EUT: Wireless Charging Pad M/N:PM14374
Manufacturer: Matrix
Operating Condition: Max load
Test Site: 1#Shielding Room
Operator: WADE
Test Specification: N 120V/60Hz
Comment: Mains port
Start of Test: 10/10/2018 /

SCAN TABLE: "V 9K-30MHz fin"

Short Description: _SUB_STD_VTERM2 1.70

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
9.0 kHz	150.0 kHz	100.0 Hz	QuasiPeak Average	1.0 s	200 Hz	NSLK8126 2008
150.0 kHz	30.0 MHz	5.0 kHz	QuasiPeak Average	1.0 s	9 kHz	NSLK8126 2008



MEASUREMENT RESULT: "TUV-1010-1_fin"

10/10/2018

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.185000	44.80	10.5	64	19.5	QP	N	GND
0.205000	46.10	10.5	63	17.3	QP	N	GND
0.275000	41.90	10.6	61	19.1	QP	N	GND

MEASUREMENT RESULT: "TUV-1010-1_fin2"

10/10/2018

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.210000	30.70	10.5	53	22.5	AV	N	GND
0.435000	27.80	10.7	47	19.4	AV	N	GND
0.495000	28.00	10.7	46	18.1	AV	N	GND

ACCURATE TECHNOLOGY CO.,LTD

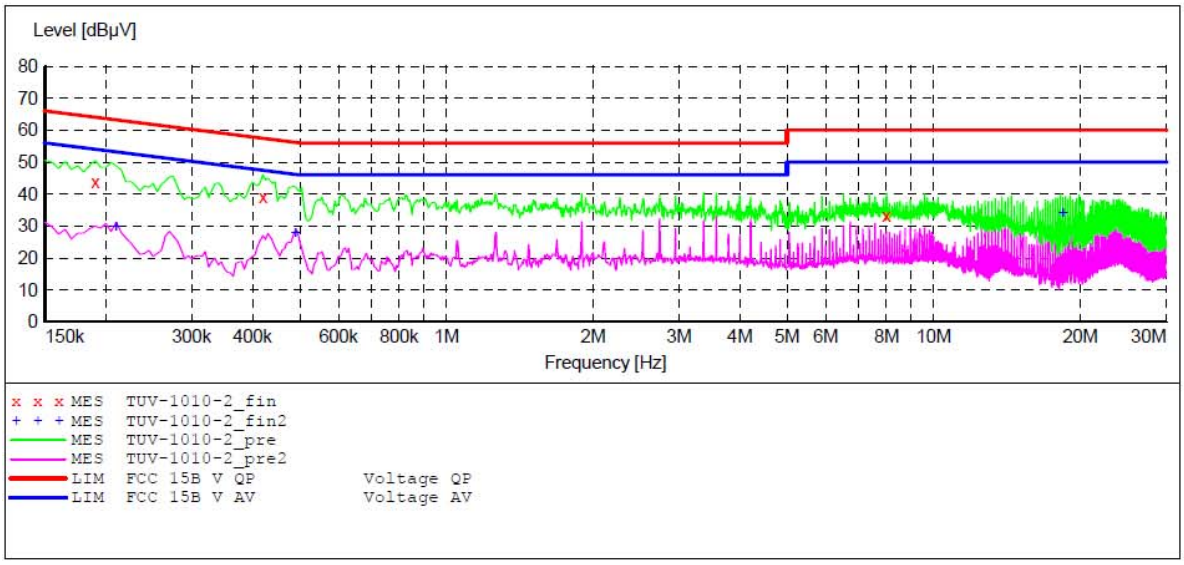
CONDUCTED EMISSION STANDARD FCC PART 15 C

EUT: Wireless Charging Pad M/N:PM14374
Manufacturer: Matrix
Operating Condition: Max load
Test Site: 1#Shielding Room
Operator: WADE
Test Specification: L 120V/60Hz
Comment: Mains port
Start of Test: 10/10/2018 /

SCAN TABLE: "V 9K-30MHz fin"

Short Description: _SUB_STD_VTERM2 1.70

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
9.0 kHz	150.0 kHz	100.0 Hz	QuasiPeak Average	1.0 s	200 Hz	NSLK8126 2008
150.0 kHz	30.0 MHz	5.0 kHz	QuasiPeak Average	1.0 s	9 kHz	NSLK8126 2008



MEASUREMENT RESULT: "TUV-1010-2_fin"

10/10/2018

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.190000	43.70	10.5	64	20.3	QP	L1	GND
0.420000	39.20	10.7	57	18.2	QP	L1	GND
8.000000	33.40	11.2	60	26.6	QP	L1	GND

MEASUREMENT RESULT: "TUV-1010-2_fin2"

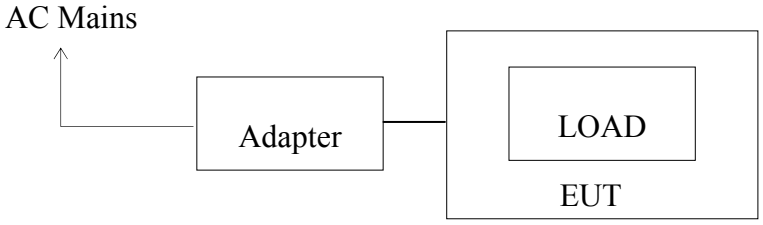
10/10/2018

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.210000	29.60	10.5	53	23.6	AV	L1	GND
0.490000	27.70	10.7	46	18.5	AV	L1	GND
18.430000	34.00	11.4	50	16.0	AV	L1	GND

5. RADIATED EMISSION MEASUREMENT

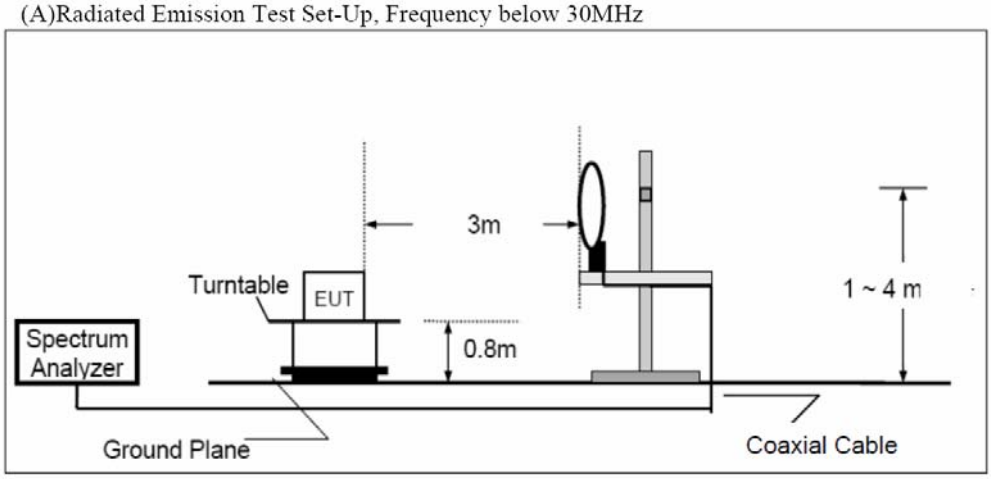
5.1.Block Diagram of Test

5.1.1.Block diagram of connection between the EUT and simulators

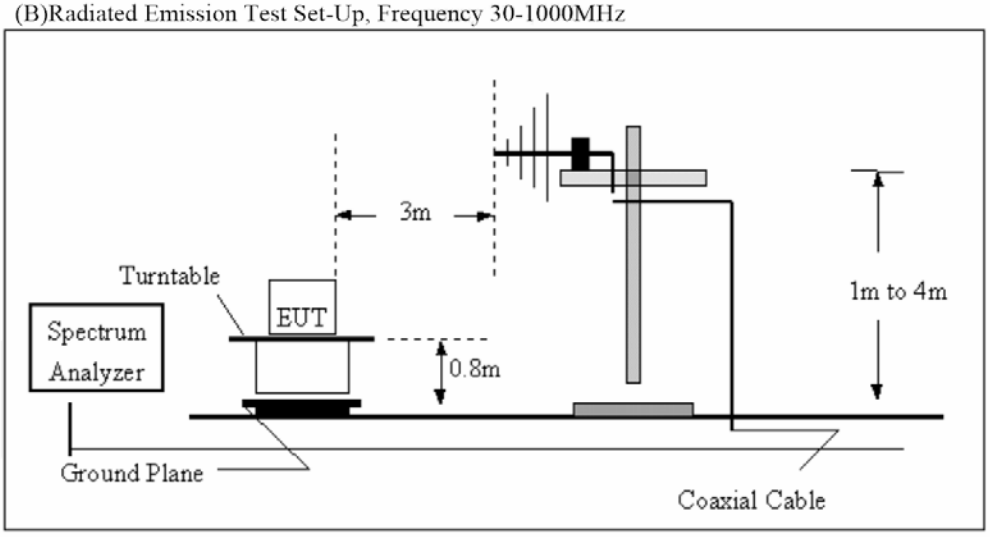


5.1.2.Block diagram of test setup (In chamber)

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



(B)Radiated Emission Test Set-Up, Frequency 30-1000MHz



5.2.Radiated Emission Limit

Frequency (MHz)	Field Strength Limitation		Field Strength Limitation at 3m Measurement Dist	
	(uV/m)	Dist	(uV/m)	(dBuV/m)
0.009 – 0.490	2400 / F(KHz)	300m	10000 * 2400/F(KHz)	20log 2400/F(KHz) + 80
0.490 – 1.705	24000 / F(KHz)	30m	100 * 24000/F(KHz)	20log 24000/F(KHz) + 40
1.705 – 30.00	30	30m	100* 30	20log 30 + 40
30.0 – 88.0	100	3m	100	20log 100
88.0 – 216.0	150	3m	150	20log 150
216.0 – 960.0	200	3m	200	20log 200
Above 960.0	500	3m	500	20log 500

Limit: 2400/125=19.2uV/m@300m
Distance Correction Factor=40log(test distance/specific distance)

5.3.EUT Configuration on Measurement

The equipments are installed on Radiated Emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

5.4.Operating Condition of EUT

5.4.1. Setup the EUT and simulator as shown as Section 5.1.

5.4.2. Turn on the power of all equipment.

5.4.3. Let the EUT work in test mode and measure it.

5.5. Test Procedure

The EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bilog antenna) is used as receiving antenna. Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission levels, all of the interface cables must be manipulated according to ANSI C63.10: 2013 on radiated emission measurement.

From 9kHz to 30MHz at distance 3m The EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.

From 30MHz to 1000MHz at distance 3m The measuring antenna height varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity. The measurements were performed for both vertical and horizontal antenna polarization.

The final measurement will be performed with an EMI Receiver set to Quasi Peak detector for the frequency bands 9kHz to 90kHz and 110 to 490 kHz where an average detector will be used according to Section 15.209(d)(2).

The final level, expressed in dBuV/m, is arrived at by taking the reading from the EMI receiver(Level dBuV) and adding the antenna correction factor and cable loss factor(Factor dB) to it. This result then has to be compared with the relevant FCC limit.The resolution bandwidth during the measurement is as follows:

9kHz – 150kHz: ResBW: 200Hz
150kHz – 30MHz: ResBW: 9kHz

The bandwidth of the EMI test receiver is set at 120kHz from 30MHz to 1000MHz.

5.6. Data Sample

Frequency(MHz)	Reading (dBμv)	Factor (dB/m)	Result (dBμv/m)	Limit (dBμv/m)	Margin (dB)	Remark
X.XX	49.83	-22.03	27.80	43.50	-15.70	QP

Frequency(MHz) = Emission frequency in MHz
Reading(dBμv) = Uncorrected Analyzer/Receiver reading
Factor (dB/m)= Antenna factor + Cable Loss – Amplifier gain
Result(dBμv/m) = Reading + Factor
Limit (dBμv/m)= Limit stated in standard

Calculation Formula:

Margin(dB) = Result (dBμv/m)–Limit(dBμv/m)

Result(dBμv/m)= Reading(dBμv)+ Factor(dB/m)

The "Margin" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the limit.

5.7. Radiated Emission Measurement Result

PASS.

Emissions attenuated more than 20 dB below the permissible value are not reported.

The spectrum analyzer plots are attached as below.

From 9kHz to 30MHz：TX Mode

ACCURATE TECHNOLOGY CO.,LTD

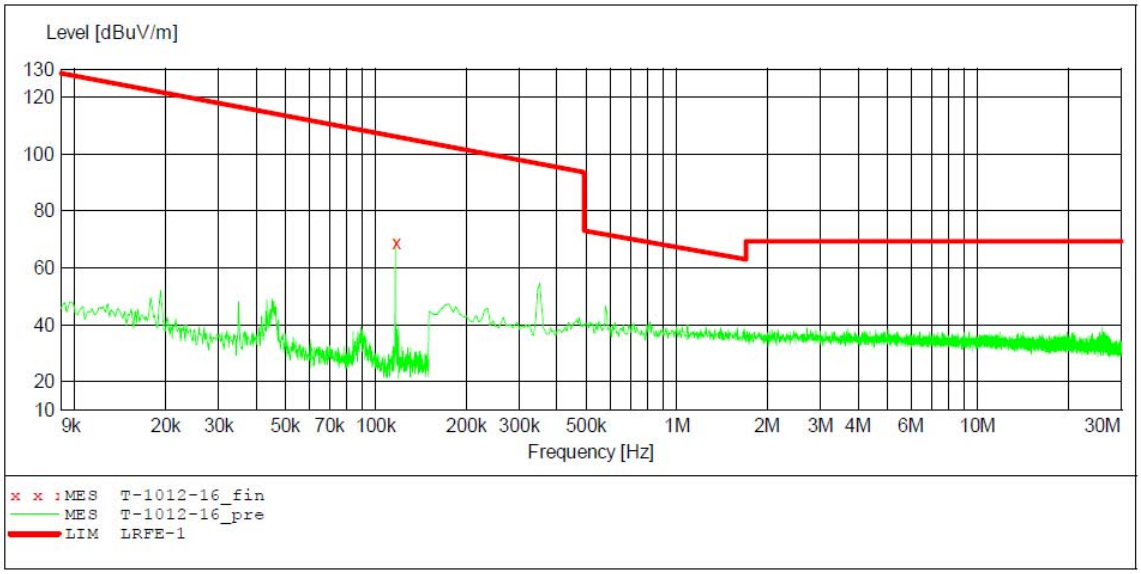
RADIATED EMISSION STANDARD FCC PART 15 C

```
EUT:                  Wireless Charging Pad M/N:PM14374
Manufacturer:
Operating Condition:  TX
Test Site:            1#Shielding Room
Operator:             LGWADE
Test Specification:   AC 120V/60Hz
Comment:              X
Start of Test:        2018-10-13 /
```

SCAN TABLE: "LFRE(E) Fin"

Short Description: _SUB_STD_VTERM2 1.70

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
9.0 kHz	150.0 kHz	100.0 Hz	QuasiPeak	1.0 s	200 Hz	1516E
150.0 kHz	30.0 MHz	5.0 kHz	QuasiPeak	1.0 s	9 kHz	1516E



MEASUREMENT RESULT: "T-1012-16_fin"

2018-10-13

Frequency MHz	Level dBuV/m	Transd dB	Limit dBuV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
0.116000	69.10	/	/	/	PK	/	/	/

ACCURATE TECHNOLOGY CO.,LTD

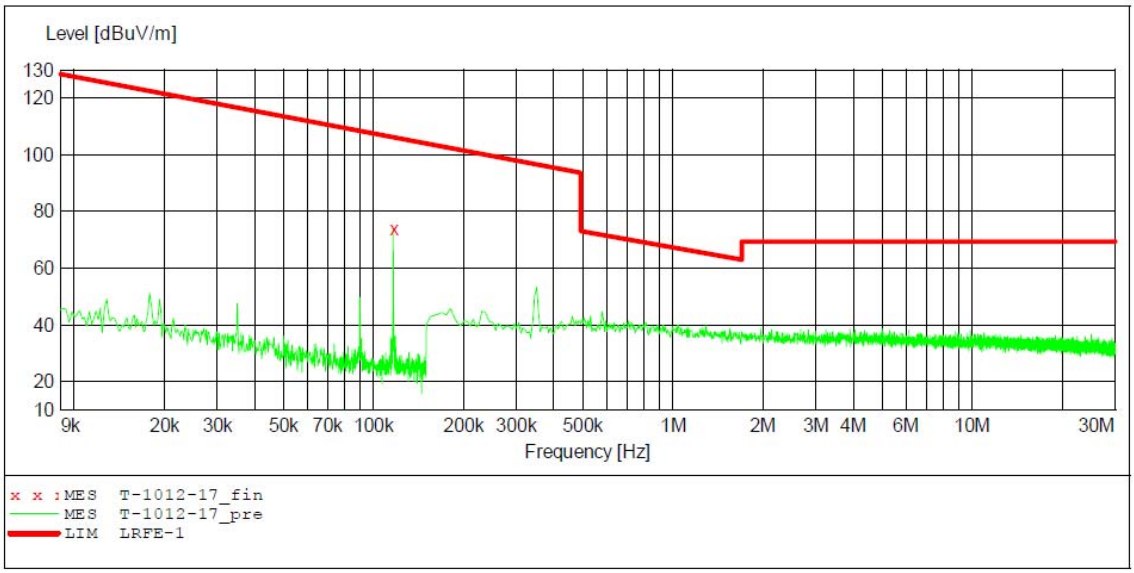
RADIATED EMISSION STANDARD FCC PART 15 C

EUT: Wireless Charging Pad M/N:PM14374
Manufacturer:
Operating Condition: TX
Test Site: 1#Shielding Room
Operator: LGWADE
Test Specification: AC 120V/60Hz
Comment: Y
Start of Test: 2018-10-13 /

SCAN TABLE: "LFRE(E) Fin"

Short Description: _SUB_STD_VTERM2 1.70

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
9.0 kHz	150.0 kHz	100.0 Hz	QuasiPeak	1.0 s	200 Hz	1516E
150.0 kHz	30.0 MHz	5.0 kHz	QuasiPeak	1.0 s	9 kHz	1516E



MEASUREMENT RESULT: "T-1012-17_fin"

2018-10-13

Frequency MHz	Level dBuV/m	Transd dB	Limit dBuV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
0.116000	73.96	/	/	/	PK	/	/	/

ACCURATE TECHNOLOGY CO.,LTD

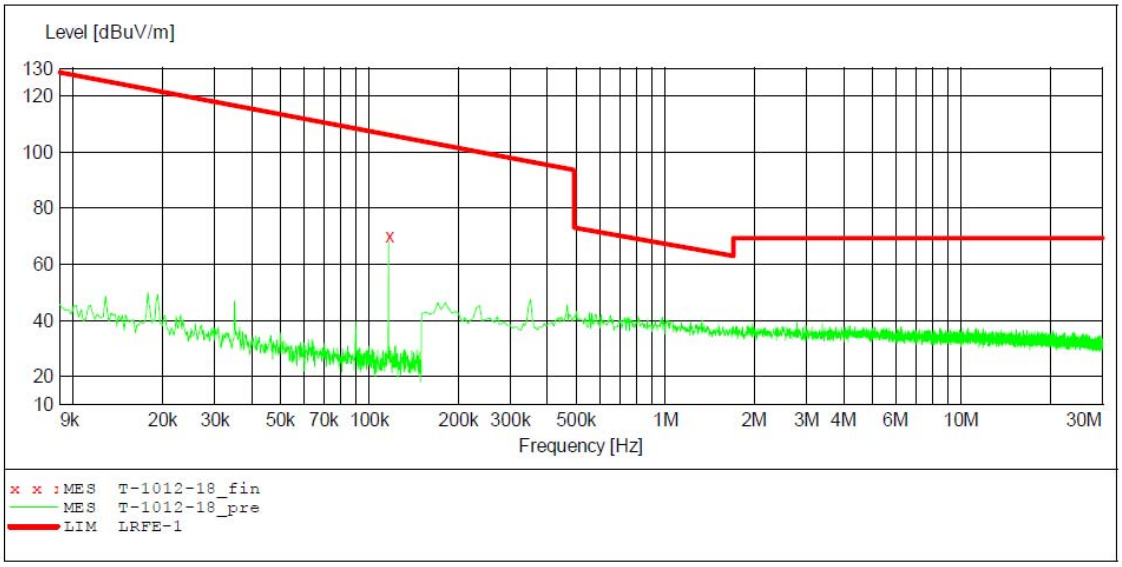
RADIATED EMISSION STANDARD FCC PART 15 C

EUT: Wireless Charging Pad M/N:PM14374
Manufacturer:
Operating Condition: TX
Test Site: 1#Shielding Room
Operator: LGWADE
Test Specification: AC 120V/60Hz
Comment: Z
Start of Test: 2018-10-13 /

SCAN TABLE: "LFRE(E) Fin"

Short Description: _SUB_STD_VTERM2 1.70

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
9.0 kHz	150.0 kHz	100.0 Hz	QuasiPeak	1.0 s	200 Hz	1516E
150.0 kHz	30.0 MHz	5.0 kHz	QuasiPeak	1.0 s	9 kHz	1516E



MEASUREMENT RESULT: "T-1012-18_fin"

2018-10-13

Frequency MHz	Level dBuV/m	Transd dB	Limit dBuV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
0.116000	70.00	/	/	/	PK	/	/	/

From 30MHz to 1000MHz: TX Mode

ACCURATE TECHNOLOGY CO., LTD.
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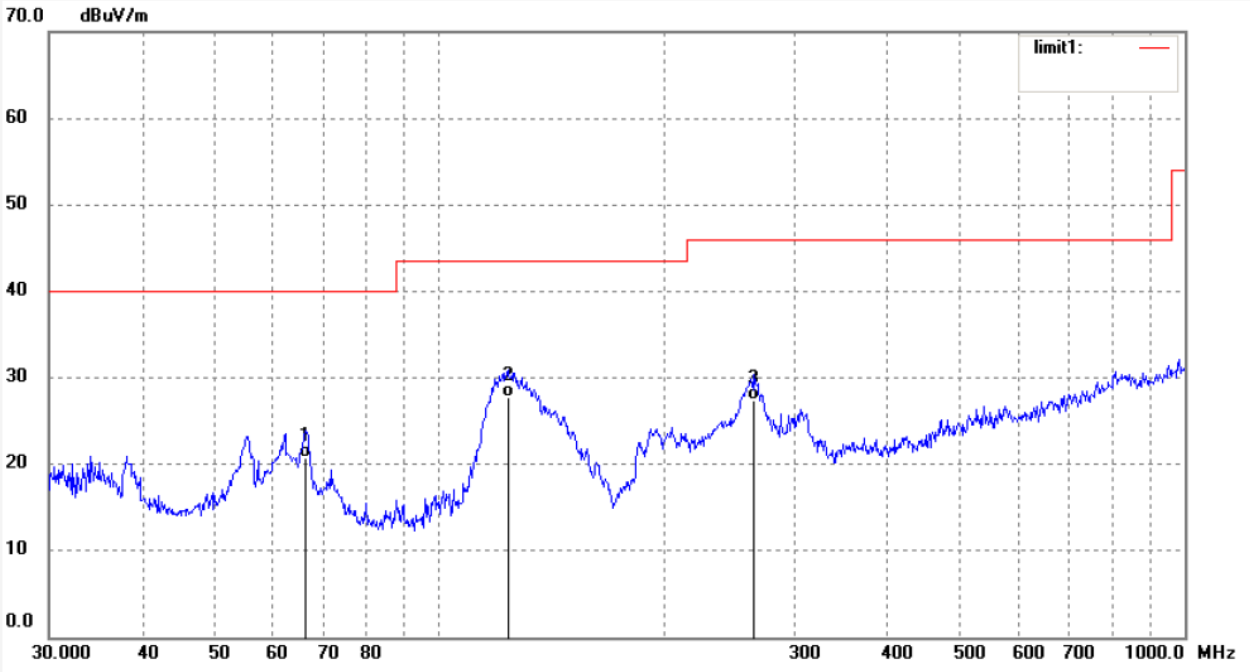
Science & Industry Park,Nanshan Shenzhen,P.R.China
Site: 2# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: LGW2018 #2622	Polarization: Horizontal
Standard: FCC Part 15C 3M Radiated	Power Source: AC 120V/60Hz
Test item: Radiation Test	Date: 18/10/10/
Temp.(C)/Hum.(%) 23 C / 48 %	Time:
EUT: Wireless Charging Pad	Engineer Signature: WADE
Mode: TX	Distance: 3m
Model: PM14374	
Manufacturer:	

Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	66.2661	36.61	-15.79	20.82	40.00	-19.18	QP			
2	123.6984	41.29	-13.48	27.81	43.50	-15.69	QP			
3	264.7456	37.62	-10.20	27.42	46.00	-18.58	QP			

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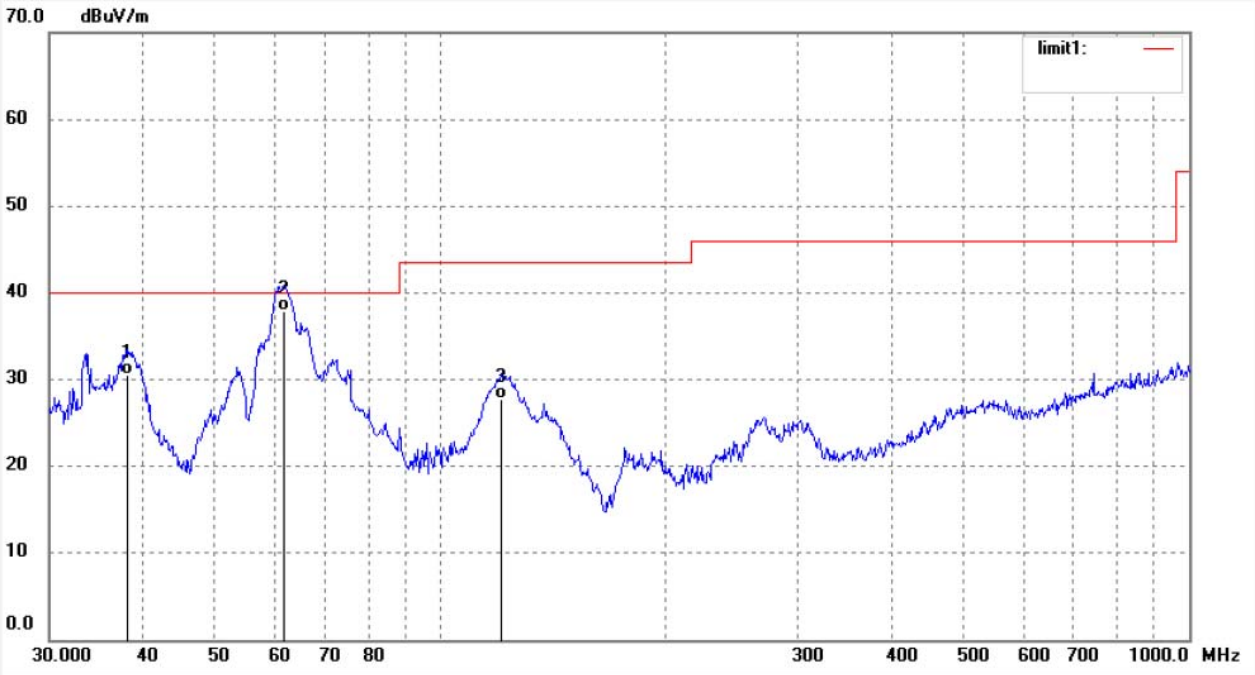
Fax:+86-0755-26503396

Job No.: LGW2018 #2621	Polarization: Vertical
Standard: FCC Part 15C 3M Radiated	Power Source: AC 120V/60Hz
Test item: Radiation Test	Date: 18/10/10/
Temp.(C)/Hum.(%) 23 C / 48 %	Time:
EUT: Wireless Charging Pad	Engineer Signature: WADE
Mode: TX	Distance: 3m
Model: PM14374	
Manufacturer:	

Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	38.2120	41.71	-11.13	30.58	40.00	-9.42	QP			
2	61.7781	52.38	-14.55	37.83	40.00	-2.17	QP			
3	120.6991	40.79	-13.13	27.66	43.50	-15.84	QP			

6. ANTENNA REQUIREMENT

6.1. The Requirement

According to 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.

6.2. Antenna Construction

Device is equipped with permanent attached antenna, which isn't displaced by other antenna. Therefore, the equipment complies with the antenna requirement of Section 15.203.

******* End of Test Report *******