



MEASUREMENT REPORT

FCC PART 15C

FCC ID: IDH-ZION01

APPLICANT: Fellowes Inc

Application Type: Certification

Product: Wireless Charging Pod

Model No.: Fellowes® Rapido Wireless Charging Pod

Brand Name: Fellowes®

FCC Classification: Part 15 Low Power Transmitter Below 1705 kHz (DCD)

FCC Rule Part(s): Part15 Subpart C

Test Procedure(s): ANSI C63.10-2013

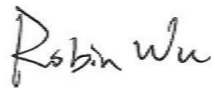
Test Date: November 04 ~ 17, 2019

Reviewed By:



(Kevin Guo)

Approved By:



(Robin Wu)



The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2013. Test results reported herein relate only to the item(s) tested.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

Revision History

Report No.	Version	Description	Issue Date	Note
1910RSU061-U1	Rev. 01	Initial Report	12-05-2019	Valid

CONTENTS

Description	Page
1. INTRODUCTION	6
1.1. Scope	6
1.2. MRT Test Location	6
2. PRODUCT INFORMATION	7
2.1. Feature of Equipment under Test	7
2.2. Test System Details	7
2.3. Test mode	7
2.4. EMI Suppression Device(s)/Modifications	7
2.5. Labeling Requirements	7
3. DESCRIPTION OF TEST	8
3.1. Evaluation Procedure	8
3.2. AC Line Conducted Emissions	8
3.3. Radiated Emissions	9
4. ANTENNA REQUIREMENTS	10
5. TEST EQUIPMENT CALIBRATION DATE	11
6. MEASUREMENT UNCERTAINTY	12
7. TEST RESULT	13
7.1. Summary	13
7.2. Conducted Emission	14
7.2.1. Test Limit	14
7.2.2. Test Setup	14
7.2.3. Test Result	15
7.3. Radiated Emission	17
7.3.1. Test Limit	17
7.3.2. Test Procedure Used	17
7.3.3. Test Setup	17
7.3.4. Test Result	19
7.4. 20dB Spectrum Bandwidth Measurement	20
7.4.1. Test Limit	20
7.4.2. Test Procedure Used	20
7.4.3. Test Setting	20
7.4.4. Test Setup	20
7.4.5. Test Result	21

8. CONCLUSION.....	22
Appendix A - Test Setup Photograph	23
Appendix B - EUT Photograph.....	24

§2.1033 General Information

Applicant:	Fellowes Inc
Applicant Address:	1789 Norwood Avenue Itasca, Illinois 60143-1095, USA
Manufacturer:	Fellowes Office Products(Suzhou) Co, Ltd
Manufacturer Address:	1# Shilin Road, Suzhou New & Hi-tech District, 215151 Suzhou, Jiangsu, People's Republic of China
Test Site:	MRT Technology (Suzhou) Co., Ltd
Test Site Address:	D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China

Test Facility / Accreditations

Measurements were performed at MRT Laboratory located in Tian'edang Rd., Suzhou, China.

- MRT facility is a FCC registered (MRT Reg. No. 893164) test facility with the site description report on file and has met all the requirements specified in ANSI C63.4-2014.
- MRT facility is an IC registered (MRT Reg. No. 11384A-1) test laboratory with the site description on file at Industry Canada.
- MRT facility is a VCCI registered (R-20025, G-20034, C-20020, T-20020) test laboratory with the site description on file at VCCI Council.
- MRT Lab is accredited to ISO 17025 by the American Association for Laboratory Accreditation (A2LA) under the American Association for Laboratory Accreditation Program (A2LA Cert. No. 3628.01) in EMC, Telecommunications, Radio and SAR testing.



1. INTRODUCTION

1.1. Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Innovation, Science and Economic Development Canada and Certification and Engineering Bureau.

1.2. MRT Test Location

The map below shows the location of the MRT LABORATORY, its proximity to the Taihu Lake. These measurement tests were conducted at the MRT Technology (Suzhou) Co., Ltd. Facility located at D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China. The measurement facility compliant with the test site requirements specified in ANSI C63.4-2014.



2. PRODUCT INFORMATION

2.1. Feature of Equipment under Test

Product Name	Wireless Charging Pod
Model No.	Fellowes® Rapido Wireless Charging Pod
Brand Name	Fellowes®
Working Frequency Range	110kHz ~ 205kHz
Modulation Type	FSK
Input	12V=3A
Output	10W MAX for Wireless charger

2.2. Test System Details

Auxiliary Equipment Used during Test:

Description	Manufacturer	Model No.	Serial No.	Power Cord
Mobile Phone	Apple	iphone 8	N/A	N/A

Note: Measurements at different battery levels of 0 10 50 and 90% for charging mobile phone mode have been evaluated. The worst-case data was shown in this report.

2.3. Test mode

Test Mode	Mode 1: Standby mode
	Mode 2: Charging mode (normal operation with client device)

Note: The test results shown in this report represent the worst-case data.

2.4. EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

2.5. Labeling Requirements

Per 2.1074 & 15.19; Docket 95-19

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase.

However, when the device is so small wherein placement of the label with specified statement is not practical, only the FCC ID must be displayed on the device per Section 15.19(a)(5). Please see attachment for FCC ID label and label location.

3. DESCRIPTION OF TEST

3.1. Evaluation Procedure

The measurement procedures described in the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices (ANSI C63.10-2013) and were used in the measurement.

Deviation from measurement procedure.....None

3.2. AC Line Conducted Emissions

The line-conducted facility is located inside an 8'x4'x4' shielded enclosure. A 1m x 2m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, 50Ω/50uH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.

The EUT is powered from one LISN and the support equipment is powered from the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference ground-plane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the receiver and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The receiver was scanned from 150kHz to 30MHz. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 9kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Each emission was also maximized by varying: power lines, the mode of operation or data exchange speed, or support equipment whichever determined the worst-case emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions were used for final measurements on the same test site. The analyzer is set to CISPR quasi-peak and average detectors with a 9kHz resolution bandwidth for final measurements.

An extension cord was used to connect to a single LISN which powered by EUT. The extension cord was calibrated with LISN, the impedance and insertion loss are compliance with the requirements as stated in ANSI C63.10-2013.

3.3. Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. For measurements above 1GHz absorbers are arranged on the floor between the turn table and the Antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1GHz, the absorbers are removed. A MF Model 210SS turntable is used for radiated measurement. It is a continuously rotatable, remote controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm high PVC support structure is placed on top of the turntable. For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive Antenna height using a broadband Antenna from 30MHz up to the upper frequency shown in 15.33(b)(1) depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn Antennas were used. For frequencies below 30MHz, a calibrated loop Antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband Antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up for frequencies below 1GHz was placed on top of the 0.8 meter high, 1 x 1.5 meter table; and test set-up for frequencies 1-40GHz was placed on top of the 1.5 meter high, 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, if applicable, turntable azimuth, and receive Antenna height was noted for each frequency found.

Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn Antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive Antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive Antenna, whichever produced the worst-case emissions. According to 3dB Beam-Width of horn Antenna, the horn Antenna should be always directed to the EUT when rising height.

4. ANTENNA REQUIREMENTS

Excerpt from §15.203 of the FCC Rules/Regulations:

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can 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 antenna of the unit is **permanently attached**.
- There are no provisions for connection to an external antenna.

Conclusion:

The unit complies with the requirement of §15.203.

5. TEST EQUIPMENT CALIBRATION DATE

Conducted Emissions - SR2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR3	MRTSUE06185	1 year	2020/04/15
Two-Line V-Network	R&S	ENV 216	MRTSUE06002	1 year	2020/06/13
Two-Line V-Network	R&S	ENV 216	MRTSUE06003	1 year	2020/06/13
Thermohygrometer	Testo	608-H1	MRTSUE06404	1 year	2020/08/08
Shielding Chamber	MIX-BEP	Chamber-SR2	MRTSUE06215	N/A	N/A

Radiated Emissions - AC1

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2020/08/01
PXA Signal Analyzer	Keysight	9030B	MRTSUE06395	1 year	2020/09/03
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2020/11/10
Bilog Period Antenna	Schwarzbeck	VULB 9168	MRTSUE06172	1 year	2020/03/31
Broad Band Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06023	1 year	2020/10/13
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06024	1 year	2019/12/17
Microwave System Amplifier	Agilent	83017A	MRTSUE06076	1 year	2020/11/15
Preamplifier	Schwarzbeck	BBV 9721	MRTSUE06121	1 year	2020/06/11
Thermohygrometer	Testo	608-H1	MRTSUE06403	1 year	2020/08/08
Anechoic Chamber	TDK	Chamber-AC1	MRTSUE06212	1 year	2020/04/30

Radiated Emission - AC2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Keysight	N9038A	MRTSUE06125	1 year	2020/08/01
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2020/11/10
Bilog Period Antenna	Schwarzbeck	VULB 9162	MRTSUE06022	1 year	2020/10/13
Horn Antenna	Schwarzbeck	BBHA9120D	MRTSUE06171	1 year	2020/10/27
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06024	1 year	2019/12/17
Broadband Coaxial Preamplifier	Schwarzbeck	BBV 9718	MRTSUE06176	1 year	2020/11/15
Preamplifier	Schwarzbeck	BBV 9721	MRTSUE06121	1 year	2020/06/11
Temperature/Humidity Meter	Minggao	ETH529	MRTSUE06170	1 year	2019/12/13
Anechoic Chamber	RIKEN	Chamber-AC2	MRTSUE06213	1 year	2020/04/30

Software	Version	Function
EMI Software	V3	EMI Test Software

6. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k = 2$.

AC Conducted Emission Measurement - SR2
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 9kHz~150kHz: 3.84dB 150kHz~30MHz: 3.46dB
Radiated Emission Measurement - AC1
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): Horizontal: 30MHz~300MHz: 4.07dB 300MHz~1GHz: 3.63dB 1GHz~18GHz: 4.16dB Vertical: 30MHz~300MHz: 4.18dB 300MHz~1GHz: 3.60dB 1GHz~18GHz: 4.76dB
Radiated Emission Measurement - AC2
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): Horizontal: 30MHz~300MHz: 3.75dB 300MHz~1GHz: 3.53dB 1GHz~18GHz: 4.28dB Vertical: 30MHz~300MHz: 3.86dB 300MHz~1GHz: 3.53dB 1GHz~18GHz: 4.33dB

7. TEST RESULT

7.1. Summary

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.207	AC Conducted Emissions 150kHz - 30MHz	< FCC 15.207 limits	Line Conducted	Pass	Section 7.2
15.209	General Field Strength Limits	FCC Part 15.209 limits	Radiated	Pass	Section 7.3
15.215(c)	20dB Spectrum Bandwidth	20 dB bandwidth of the emission in the specific band		Pass	Section 7.4

Notes: The test results shown in the following sections represent the worst-case emissions

7.2. Conducted Emission

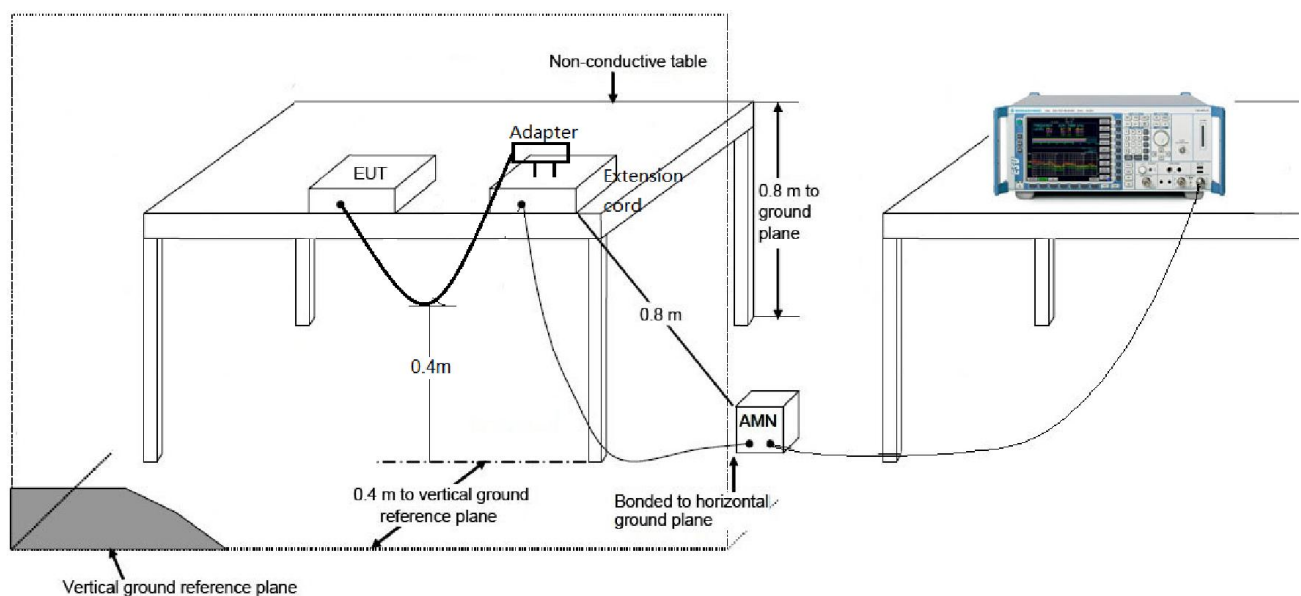
7.2.1. Test Limit

FCC 15.207 Limits		
Frequency (MHz)	QP (dBuV)	AV (dBuV)
0.15 ~ 0.50	66 ~ 56	56 ~ 46
0.50 ~ 5.0	56	46
5.0 ~ 30	60	50

Note 1: The lower limit shall apply at the transition frequencies.

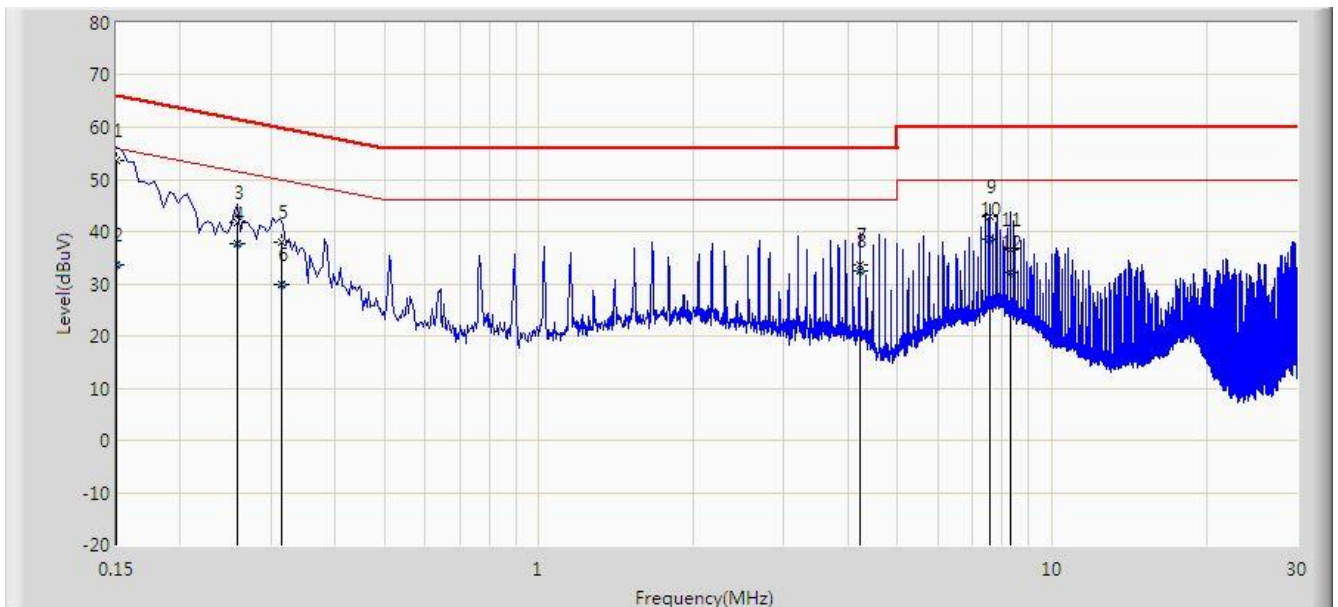
Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.

7.2.2. Test Setup



7.2.3.Test Result

Site: SR2	Time: 2019/11/05 - 15:31
Limit: FCC_Part15.207_CE_AC Power	Engineer: Liz Yuan
Probe: ENV216_101683_Filter On	Polarity: Line
EUT: Wireless Charging Pod	Power: AC 120V/60Hz
Test Mode 2 (Worst case mode: The battery level of mobile phone is 0%)	

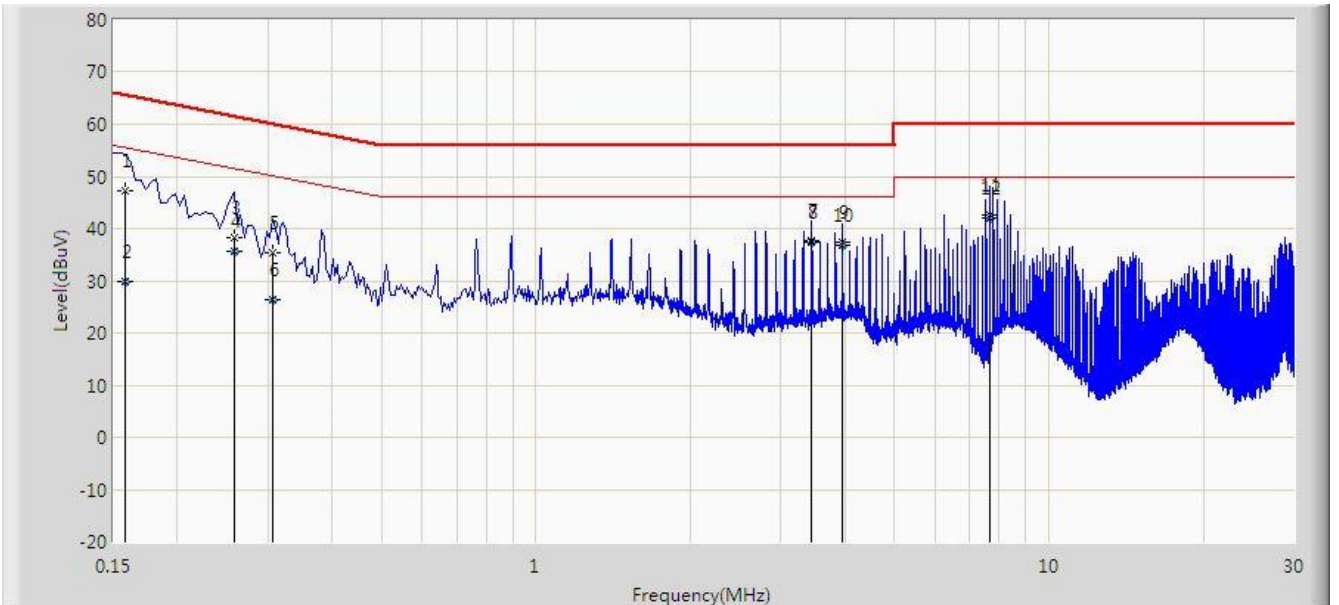


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV)	Factor (dB)	Type
1			0.150	53.603	42.435	-12.397	66.000	11.168	QP
2			0.150	33.618	22.449	-22.382	56.000	11.168	AV
3			0.258	41.688	31.718	-19.808	61.496	9.970	QP
4			0.258	37.569	27.598	-13.927	51.496	9.970	AV
5			0.314	38.069	28.053	-21.795	59.864	10.015	QP
6			0.314	29.787	19.771	-20.077	49.864	10.015	AV
7			4.218	33.690	23.713	-22.310	56.000	9.977	QP
8			4.218	32.522	22.545	-13.478	46.000	9.977	AV
9			7.542	42.811	32.643	-17.189	60.000	10.168	QP
10		*	7.542	38.588	28.420	-11.412	50.000	10.168	AV
11			8.310	36.578	26.412	-23.422	60.000	10.166	QP
12			8.310	32.290	22.124	-17.710	50.000	10.166	AV

Note: Measure Level (dBμV) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + LISN Factor (dB)

Site: SR2	Time: 2019/11/05 - 15:42
Limit: FCC_Part15.207_CE_AC Power	Engineer: Liz Yuan
Probe: ENV216_101683_Filter On	Polarity: Neutral
EUT: Wireless Charging Pod	Power: AC 120V/60Hz
Test Mode 2 (Worst case mode: The battery level of mobile phone is 0%)	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV)	Factor (dB)	Type
1			0.158	47.335	37.045	-18.234	65.568	10.290	QP
2			0.158	29.840	19.551	-25.728	55.568	10.290	AV
3			0.258	38.299	28.292	-23.196	61.496	10.007	QP
4			0.258	35.698	25.691	-15.798	51.496	10.007	AV
5			0.306	35.332	25.290	-24.746	60.078	10.042	QP
6			0.306	26.444	16.402	-23.635	50.078	10.042	AV
7			3.446	37.722	27.812	-18.278	56.000	9.909	QP
8			3.446	37.334	27.424	-8.666	46.000	9.909	AV
9			3.958	37.519	27.551	-18.481	56.000	9.968	QP
10			3.958	36.866	26.897	-9.134	46.000	9.968	AV
11			7.660	42.475	32.300	-17.525	60.000	10.175	QP
12		*	7.660	42.075	31.900	-7.925	50.000	10.175	AV

Note: Measure Level (dBμV) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + LISN Factor (dB)

7.3. Radiated Emission

7.3.1. Test Limit

FCC Part 15.209 Limit		
Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 80	100	3
80 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

Note 1: The lower limit shall apply at the transition frequency.

Note 2: Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

Note 3: E field strength (dBuV/m) = 20 log E field strength (uV/m).

7.3.2. Test Procedure Used

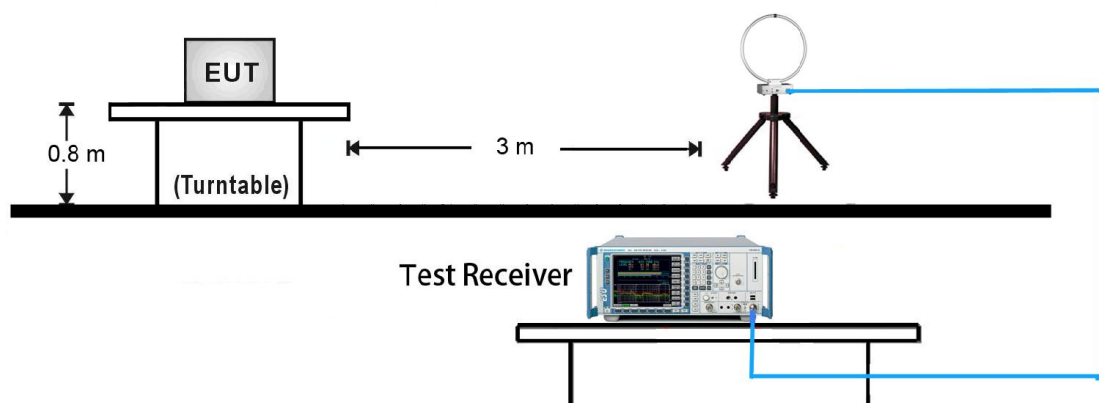
ANSI C63.10 - Section 6.3 (General Requirements)

ANSI C63.10 - Section 6.4 (Standard test method below 30MHz)

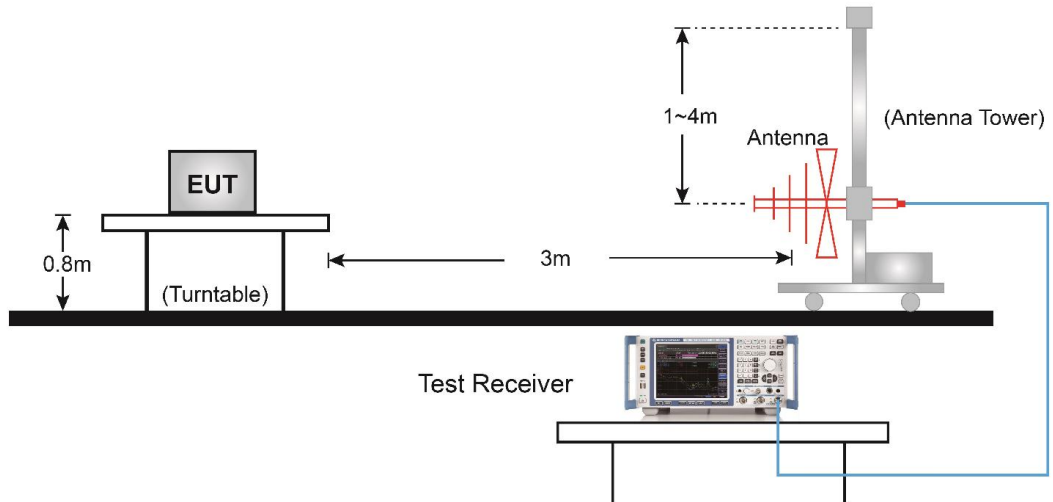
ANSI C63.10 - Section 6.5 (Standard test method above 30MHz to 1GHz)

7.3.3. Test Setup

Below 30MHz Test Setup:



30MHz ~ 1GHz Test Setup:



7.3.4. Test Result

Product	Wireless Charging Pod	Temperature	25°C
Test Engineer	Yeto Yin	Relative Humidity	52%
Test Site	AC1	Test Date	2019/11/08
Test Mode	Test Mode 2 (Worst case mode: The battery level of mobile phone is 0%)		

Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
Fundamental Radiated Emission							
0.173	69.430	20.208	89.638	102.843	-13.205	Peak	Face On
Radiated Spurious Emission							
0.042	29.119	20.613	49.732	115.139	-65.407	Peak	Face On
0.047	28.630	20.609	49.239	114.162	-64.923	Peak	Face On
0.068	26.182	20.293	46.475	110.954	-64.479	Peak	Face On
69.770	15.931	10.852	26.783	40.000	-13.217	QP	Horizontal
240.975	9.021	13.222	22.243	46.000	-23.757	QP	Horizontal
307.420	8.348	14.495	22.843	46.000	-23.157	QP	Horizontal
373.380	8.147	15.893	24.040	46.000	-21.960	QP	Horizontal
686.205	5.142	20.899	26.041	46.000	-19.959	QP	Horizontal
838.495	4.641	22.942	27.582	46.000	-18.418	QP	Horizontal
40.185	22.152	13.822	35.974	40.000	-4.026	QP	Vertical
46.005	17.028	14.907	31.934	40.000	-8.066	QP	Vertical
69.770	18.216	10.852	29.068	40.000	-10.932	QP	Vertical
93.050	18.512	11.870	30.382	43.500	-13.118	QP	Vertical
214.785	11.549	12.320	23.869	43.500	-19.631	QP	Vertical
833.160	4.786	22.872	27.658	46.000	-18.342	QP	Vertical
Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)							

7.4. 20dB Spectrum Bandwidth Measurement

7.4.1. Test Limit

N/A

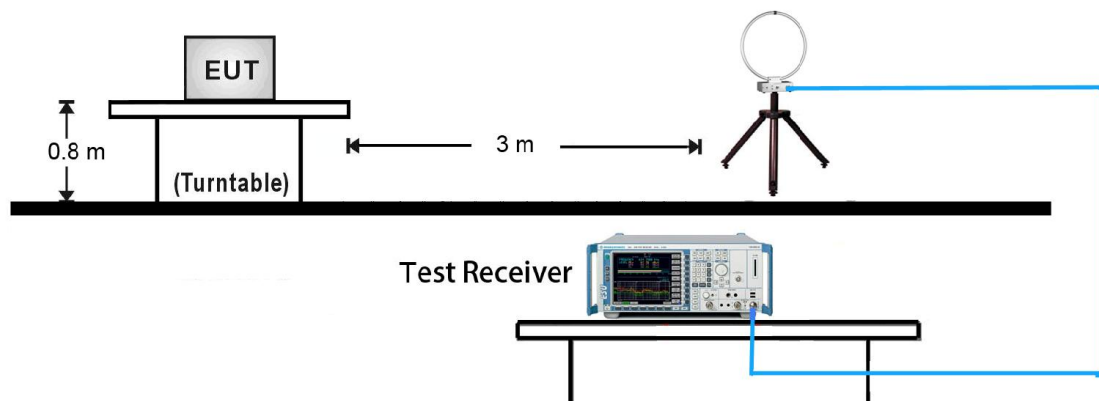
7.4.2. Test Procedure Used

ANSI C63.10 Clause 6.9.2

7.4.3. Test Setting

1. Set the spectrum span range to overlap the nominal center frequency
2. Set RBW = 1% ~ 5% of the OBW
3. VBW $\geq 3 \times$ RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. Allow the trace was allowed to stabilize and marker the highest level.
8. Determine the display level (the highest level - 20dB) and place two markers, one at the lowest frequency and the other at the highest frequency.

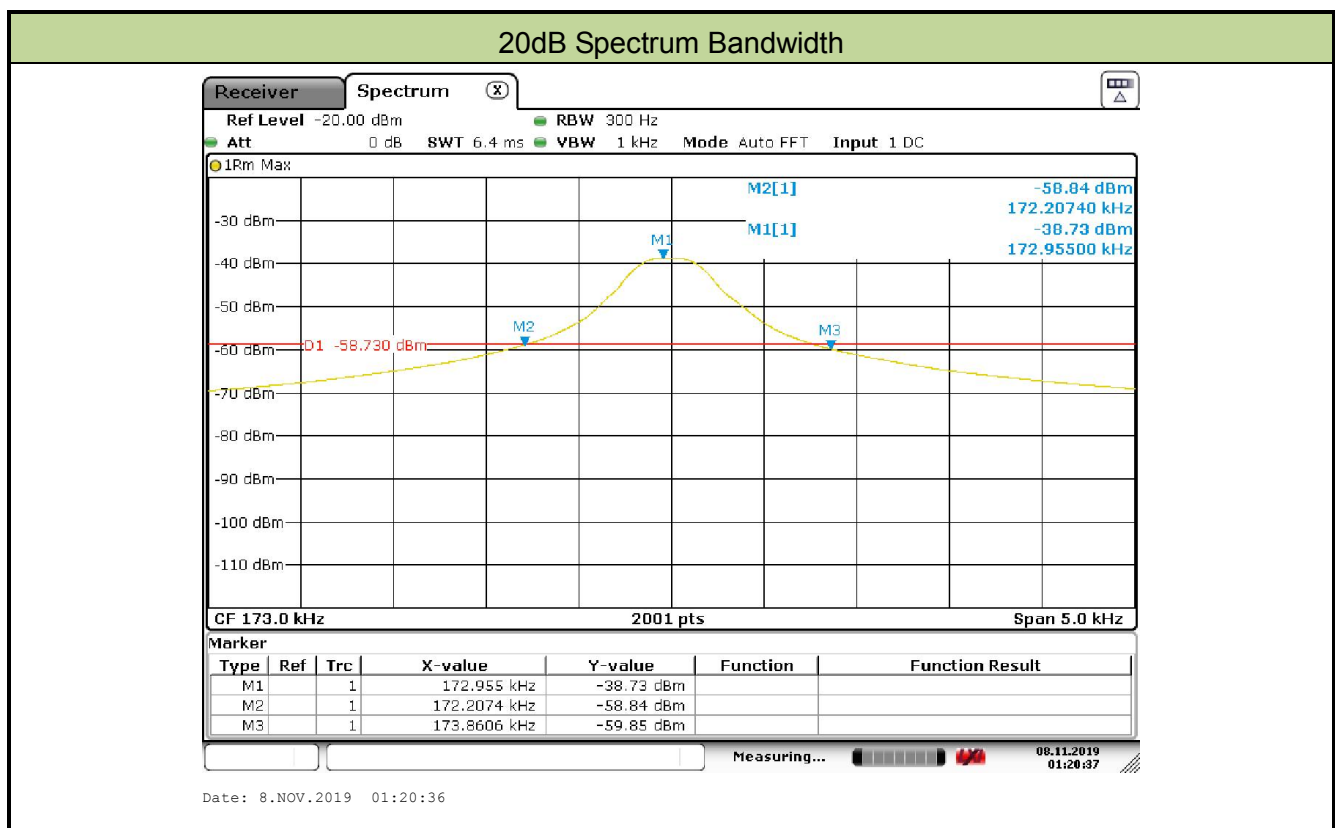
7.4.4. Test Setup



7.4.5. Test Result

Product	Wireless Charging Pod	Temperature	25°C
Test Engineer	Yeto Yin	Relative Humidity	52%
Test Site	AC1	Test Date	2019/11/08

Low Frequency (KHz)	High Frequency (KHz)	20dBc Bandwidth (KHz)	Result
172.207	173.861	1.653	Pass



8. CONCLUSION

The data collected relate only the item(s) tested and show that the unit is compliance with Part 15C of the FCC rules.

_____ The End _____

Appendix A - Test Setup Photograph

Refer to “1910RSU061-UT” file.

Appendix B - EUT Photograph

Refer to "1910RSU061-UE" file.