FCC PART 15 SUBPART C TEST REPORT

for

Qi wireless charger

Model No.: QST015B

FCC ID: W23-QST015B

of

Applicant: JJPlus Corporation
Address: 13F.-3, No.120, Qiaohe Rd., Zhonghe Dist., New Taipei City 235, Taiwan

Tested and Prepared

by

Worldwide Testing Services (Taiwan) Co., Ltd.

FCC Registration No.: TW1477, TW0020, TW1072

Industry Canada filed test laboratory Reg. No. 20037

A2LA Accredited No.: 2732.01

Report No.: W6M21908-19319-C-9

6F, NO. 58, LANE 188, RUEY-KUANG RD., NEIHU TAIPEI 114, TAIWAN, R.O.C.
TEL: 886-2-66068877 FAX: 886-2-66068879 E-mail: wts@wts-lab.com

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1 General Information

1.1 Notes

The purpose of conformity testing is to increase the probability of adherence to the essential requirements or conformity specifications, as appropriate.
The complexity of the technical specifications, however, means that full and thorough testing is impractical for both technical and economic reasons.
Furthermore, there is no guarantee that a test sample which has passed all the relevant tests conforms to a specification.
Neither is there any guarantee that such a test sample will interwork with other genuinely open systems.
The existence of the tests nevertheless provides the confidence that the test sample possesses the qualities as maintained and that is performance generally conforms to representative cases of communications equipment.

The test results of this test report relate exclusively to the item tested as specified in 1.5.
The test report may only be reproduced or published in full.
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Tester:

November 26, 2019		Kent Lin	Kent Lin
Date	WTS-Lab.	Name	Signature

Technical responsibility for area of testing:

November 26, 2019		Kevin Wang	Kevin Wang
Date	WTS	Name	Signature

1.2 Testing laboratory

1.2.1 Location

OATS
No.5-1, Shuang Sing Village,
LiShuei Rd., Wanli Dist.,
New Taipei City 207, Taiwan (R.O.C.)
Company
Worldwide Testing Services(Taiwan) Co., Ltd.
6F, NO. 58, LANE 188, RUEY-KUANG RD.
NEIHU, TAIPEI 114, TAIWAN R.O.C.
Tel : 886-2-66068877
Fax : 886-2-66068879

1.2.2 Details of accreditation status

Accredited testing laboratory

A2LA accredited number: 2732.01

FCC filed test laboratory Reg. No. TW1477, TW0020, TW1072

Industry Canada filed test laboratory Reg. No. 20037

Test location, where different from Worldwide Testing Services (Taiwan) Co., Ltd. :

Name:	./.
Accredited number:	./.
Street:	./.
Town:	./.
Country:	./.
Telephone:	./.
Fax:	./.

1.3 Details of approval holder

Name:	JJPlus Corporation
Street:	13F.-3, No.120, Qiaohe Rd., Zhonghe Dist.,
Town:	New Taipei City 235,
Country:	Taiwan
Telephone:	02-2248-5700
Fax	02-2248-5977

1.4 Application details

Date of receipt of test item:	November 11, 2019
Date of test:	from November 12, 2019 to November 26, 2019

1.5 General information of Test item

Type of test item:	Qi wireless charger
Model Number:	QST015B
Multi-listing model number:	./.
Brand name:	jjPlus CORP.
Photos:	./.
Transmitting Frequency:	127-128 kHz
Operation modes:	Half-duplex
Antenna Type:	Loop Antenna
Power supply:	120 Va.c.

Manufacturer: (if different from Approval Holder)

Name:	./.
Street:	./.
	./.
Town:	./.
Country:	./.
Additional information:	./.

1.6 Test standards

Technical standard :

FCC RULES 15 SUBPART C § 2.1049, § 15.203, § 15.209 (2018-10)

2 Technical test

2.1 Summary of test results

No deviations from the technical specification(s) were ascertained in the course of the tests performed. ☒

or

The deviations were ascertained in the course of the tests performed. ☐

2.2 Test environment

Relative humidity content: 20 ... 75 %

Air pressure: 86 ... 103 kPa

Details of power supply 120 Va.c.

Extreme conditions parameters: test voltage : -- extreme
min : -- V
max : -- V

Test item Name	Measurement Uncertainty
Estimation Result of Uncertainty of Conducted Emission	Expanded Uncertainty: AMN:1.30 dB Voltage probe:1.36 dB
Estimation Result of Uncertainty of Radiated Emission(3M)	Expanded Uncertainty: 0.009-30 MHz:2.02 dB 30-1000 MHz:3.49 dB 1-18 GHz:3.01 dB 18-40 GHz:2.43 dB
Estimation Result of Uncertainty of Bandwidth Measurement 20 dB Bandwidth, Occupied bandwidth, Channel bandwidth, Necessary Bandwidth	Expanded Uncertainty:0.45 kHz
Estimation Result of Uncertainty of Frequency Drift Measurement Frequency stability	Expanded Uncertainty:6.11 Hz

The decision rule is: Measurement uncertainty is not taken into account.

2.3 Test Equipment List

No.	Test equipment	Type	Serial No.	Manufacturer	Cal. Date	Next Cal. Date
ETSTW-CE 001	EMI TEST RECEIVER	ESHS10	842121/013	R&S	2019/6/4	2020/6/3
ETSTW-CE 003	AC POWER SOURCE	APS-9102	D161137	GW	Function Test	
ETSTW-CE 004	ZWEILEITER-V-NETZNACHBILDUNG TWO-LINE V-NETWORK	ESH3-Z5	840731/011	R&S	2019/10/31	2020/10/30
ETSTW-CE 006	IMPULSBEGRENZER PULSE LIMITER	ESH3-Z2	100226	R&S	2019/9/24	2020/9/23
ETSTW-CE 008	HF-EICHLEITUNG RF STEP ATTENUATOR 139dB DPSP	334.6010.02	844581/024	R&S	Function Test	
ETSTW-CE 009	TEMP.&HUMIDITY CHAMBER	GTH-225-40-1P-U	MAA0305-009	GIANT FORCE	2019/7/23	2020/7/22
ETSTW-CE 016	TWO-LINE V-NETWORK	ENV216	100050	R&S	2019/10/3	2020/10/2
ETSTW-CE 028	MXE EMI Receiver	N9038A	MY53220110	Agilent	2019/7/18	2020/7/17
ETSTW-RE 003	EMI TEST RECEIVER	ESI 26	831438/001	R&S	2019/6/4	2020/6/3
ETSTW-RE 004	EMI TEST RECEIVER	ESI 40	832427/004	R&S	2019/5/29	2020/5/28
ETSTW-RE 012	TUNABLE BANDREJECT FILTER	D.C 0309	146	K&L	Function Test	
ETSTW-RE 013	TUNABLE BANDREJECT FILTER	D.C 0336	397	K&L	Function Test	
ETSTW-RE 018	MICROWAVE HORN ANTENNA	AT4560	27212	AR	2019/7/25	2020/7/24
ETSTW-RE 027	Passive Loop Antenna	6512	00034563	ETS-Lindgren	2019/7/22	2020/7/21
ETSTW-RE 030	Double-Ridged Guide Horn Antenna	3117	00035224	ETS-Lindgren	2019/4/2	2020/4/1
ETSTW-RE 042	Biconical Antenna	HK116	100172	R&S	2019/1/29	2020/1/28
ETSTW-RE 043	Log-Periodic Dipole Antenna	HL223	100166	R&S	2019/4/23	2020/4/22
ETSTW-RE 044	Log-Periodic Antenna	HL050	100094	R&S	2019/5/13	2020/5/12
ETSTW-RE 045	ESA-E SERIES SPECTRUM ANALYZER	E4404B	MY45111242	Agilent	Pre-test Use	
ETSTW-RE 050	Attenuator 10dB	50HF-010-1	None	JFW	2019/2/27	2020/2/26
ETSTW-RE 051	Attenuator 6dB	50HF-006-1	None	JFW	2019/2/27	2020/2/26
ETSTW-RE 053	Attenuator 3dB	50HF-003-1	None	JFW	2019/2/27	2020/2/26
ETSTW-RE 055	SPECTRUM ANALYZER	FSU 26	200074	R&S	2019/3/5	2020/3/4
ETSTW-RE 060	Attenuator 30dB	5015-30	F651012z-01	ATM	2019/2/27	2020/2/26
ETSTW-RE 062	Amplifier Module	CHC 2	None	KMIC	2019/5/16	2020/5/15
ETSTW-RE 064	Bluetooth Test Set	MT8852B-042	6K00005709	Anritsu	Function Test	
ETSTW-RE 069	Double-Ridged Guide Horn Antenna	3117	00069377	ETS-Lindgren	Function Test	
ETSTW-RE 072	CELL SITE TEST SET	8921A	3339A00375	HP	2019/9/23	2020/9/22
ETSTW-RE 088	SOLID STATE AMPLIFIER	KMA180265A01	99057	KMIC	2019/9/18	2020/9/17
ETSTW-RE 091	Match Pad	MDCS1500	None	WOKEN	2019/5/9	2020/5/8
ETSTW-RE 099	DC Block	50DB-007-1	None	JFW	2019/2/22	2020/2/21
ETSTW-RE 112	AC POWER SOURCE	TFC-1005	T-0A023536	T-Power	Function test	

ETSTW-RE 115	2.4GHz Notch Filter	N0124411	473874	MICROWAVE CIRCUITS	2019/1/14	2020/1/13
ETSTW-RE 120	RF Player	MP9200	MP9210-111022	ADIVIC	Function test	
ETSTW-RE 122	SIGNAL GENERATOR	SMF100A	102149	R&S	2019/6/3	2020/6/2
ETSTW-RE 125	5GHz Notch filter	5NSL11-5200/E221.3-O/O	1	K&L Microwave	2019/8/8	2020/8/7
ETSTW-RE 126	5GHz Notch filter	5NSL12-5800/E221.3-O/O	1	K&L Microwave	2019/8/8	2020/8/7
ETSTW-RE 127	RF Switch Box	RFS-01	None	WTS	2019/2/26	2020/2/25
ETSTW-RE 128	5.3GHz Notch filter	N0153001	SN487233	Microwave Circuits	2019/8/8	2020/8/7
ETSTW-RE 129	5.5GHz Notch filter	N0555984	SN487234	Microwave Circuits	2019/8/8	2020/8/7
ETSTW-RE 130	Handheld RF Spectrum Analyzer	N9340A	CN0147000204	Agilent	Pre-test Use	
ETSTW-RE 142	Amplifier	8447D	2805A03378	Agilent	2019/5/16	2020/5/15
ETSTW-RE 147	Bi-log Hybrid Antenna	MCTD 2786B	BLB16M04005	ETC	2019/4/2	2020/4/1
ETSTW-RF 002	Electromagnetic field probe	LF-30	K-0007	STT	2019/5/27	2020/5/26
ETSTW-EMI 011	USB Compact Modulator	SFC-U	101689	R&S	2019/5/16	2020/5/15
ETSTW-GSM 002	Universal Radio Communication Tester	CMU 200	109439	R&S	2019/3/5	2020/3/4
ETSTW-GSM 003	Radio Communication Analyzer	MT8820C	6201342073	Anritsu	2019/3/26	2020/3/25
ETSTW-GSM 004	Wideband Radio Communication Tester	CMW500	128092	R&S	2019/10/18	2020/10/17
ETSTW-GSM 019	Band Reject Filter	WRCTF824/849-822/851-40 /12+9SS	3	WI	2019/1/14	2020/1/13
ETSTW-GSM 020	Band Reject Filter	WRCD1747/1748-1743/1752-32/5SS	1	WI	2019/1/14	2020/1/13
ETSTW-GSM 021	Band Reject Filter	WRCD1879.5/1880.5-1875.5/1884.5-32/5SS	3	WI	2019/1/14	2020/1/13
ETSTW-GSM 022	Band Reject Filter	WRCT901.9/903.1-904.25-50/8SS	1	WI	2019/1/14	2020/1/13
ETSTW-GSM 023	Power Divider	4901.19.A	None	SUHNER	2019/9/12	2020/9/11
ETSTW-GSM 024	Radio Communication Analyzer	MT8821C	None	Anritsu	2019/3/5	2020/3/4
ETSTW-GSM 025	Band Reject Filter	BRM19835	001	Micro-Tronics	2019/8/9	2020/8/8
ETSTW-Cable 011	SMA to N type Cable	RGU-400	None	THERMAX	Pre-test Use NCR	
ETSTW-Cable 016	BNC Cable	Switch Box	B Cable 1	Schwarz beck	2019/2/21	2020/2/20
ETSTW-Cable 017	BNC Cable	X Cable	B Cable 2	Schwarz beck	2019/2/21	2020/2/20
ETSTW-Cable 018	BNC Cable	Y Cable	B Cable 3	Schwarz beck	2019/2/21	2020/2/20
ETSTW-Cable 019	BNC Cable	Z Cable	B Cable 4	Schwarz beck	2019/2/21	2020/2/20
ETSTW-Cable 020	N TYPE Cable	OATS Cable 1	N30N30-L335-15M	JYE BAO CO.,LTD.	2019/7/2	2020/7/1
ETSTW-Cable 026	Microwave Cable	SUCOFLEX 104	279075	HUBER+SUHNER	2019/2/25	2020/2/24
ETSTW-Cable 027	Microwave Cable	SUCOFLEX 104	279083	HUBER+SUHNER	2019/5/14	2020/5/13
ETSTW-Cable 028	Microwave Cable	FA147A0015M2020	30064-2	UTIFLEX	2019/9/18	2020/9/17
ETSTW-Cable 029	Microwave Cable	FA147A0015M2020	30064-3	UTIFLEX	2019/9/18	2020/9/17
ETSTW-Cable 030	Microwave Cable	SUCOFLEX 104（S_Cable 9）	279067	HUBER+SUHNER	2019/2/25	2020/2/24
ETSTW-Cable 043	Microwave Cable	SUCOFLEX 104	317576	HUBER+SUHNER	2019/5/16	2020/5/15
ETSTW-Cable 058	Microwave Cable	SUCOFLEX 104	none	HUBER+SUHNER	2019/6/6	2020/6/5

ETSTW-Cable 064	Microwave Cable	SUCOFLEX 104	MY28891	HUBER+SUHNER	2019/5/16	2020/5/15
ETSTW-Cable 066	SMA type cable	32022	None	ASTROLAB	2019/9/24	2020/9/23
ETSTW-Cable 071	N TYPE CABLE	EMCCFD400-NM-NM-25000	170239	EMCI	2019/6/6	2020/6/5
ETSTW-Cable 072	SMA type cable (8m)	SUCOFLEX 104	805800/4	HUBER+SUHNER	2019/5/16	2020/5/15
ETSTW-Cable 074	SMA type cable (2m)	SUCOFLEX 104	802563/4	HUBER+SUHNER	2019/5/16	2020/5/15
WTSTW-SW 002	EMI TEST SOFTWARE	EZ_EMC	None	Farad	Version ETS-03A1	
WTSTW-SW 006	EMI TEST SOFTWARE	e3	None	AUDIX	Version 9.161014	
WTSTW-SW 008	Signal studio	Agilent	None	AUDIX	Version 2.0.0.1	
ETSTW-TH 001	Thermohygrometer	608-H1	45204316	Testo	2019/9/9	2020/9/8
ETSTW-TH 002	Thermohygrometer	608-H1	45204317	Testo	2019/9/9	2020/9/8

2.4 General Test Procedure

POWER LINE CONDUCTED INTERFERENCE: The procedure used was ANSI STANDARD C63.10-2013 6.2 using a LISN (if necessary). Both lines were observed. The bandwidth of the spectrum analyzer was 10 kHz with an appropriate sweep speed.

RADIATION INTERFERENCE: The test procedure used was according to ANSI STANDARD C63.10-2013 6.3 employing a spectrum analyzer. For investigated frequency is equal to or below 1GHz, the RBW and VBW of the spectrum analyzer was 100 kHz and 100kHz respectively with an appropriate sweep speed. For investigated frequency is above 1GHz, both of RBW and VBW of the spectrum analyzer were 1 MHz with an appropriate sweep speed. The analyzer was calibrated in dB above a microvolt at the output of the antenna.

FORMULA OF CONVERSION FACTORS: The Field Strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBµV) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB.

Example:

Freq (MHz)	METER READING + ACF + CABLE LOSS (to the receiver) = FS
33	20 dBµV + 10.36 dB + 6 dB = 36.36 dBµV/m @3m

ANSI STANDARD C63.10-2013 6.2.2 MEASUREMENT PROCEDURES: The EUT was placed on a table 80 cm height and with dimensions of 1m by 1.5m (non metallic table). The EUT was placed in the centre of the table. The table used for radiated measurements is capable of continuous rotation. The spectrum was scanned from 30 MHz to 10th harmonic of the fundamental.

Peak readings were taken in three (3) orthogonal planes and the highest readings.

When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes.

ANSI STANDARD C63.10-2013 B.2.7: Any measurements that utilize special test software shall be indicated and referenced in the test report. During testing, test software ’EZ EMC’ was used for setting up different operation modes.

3 Test results (enclosure)

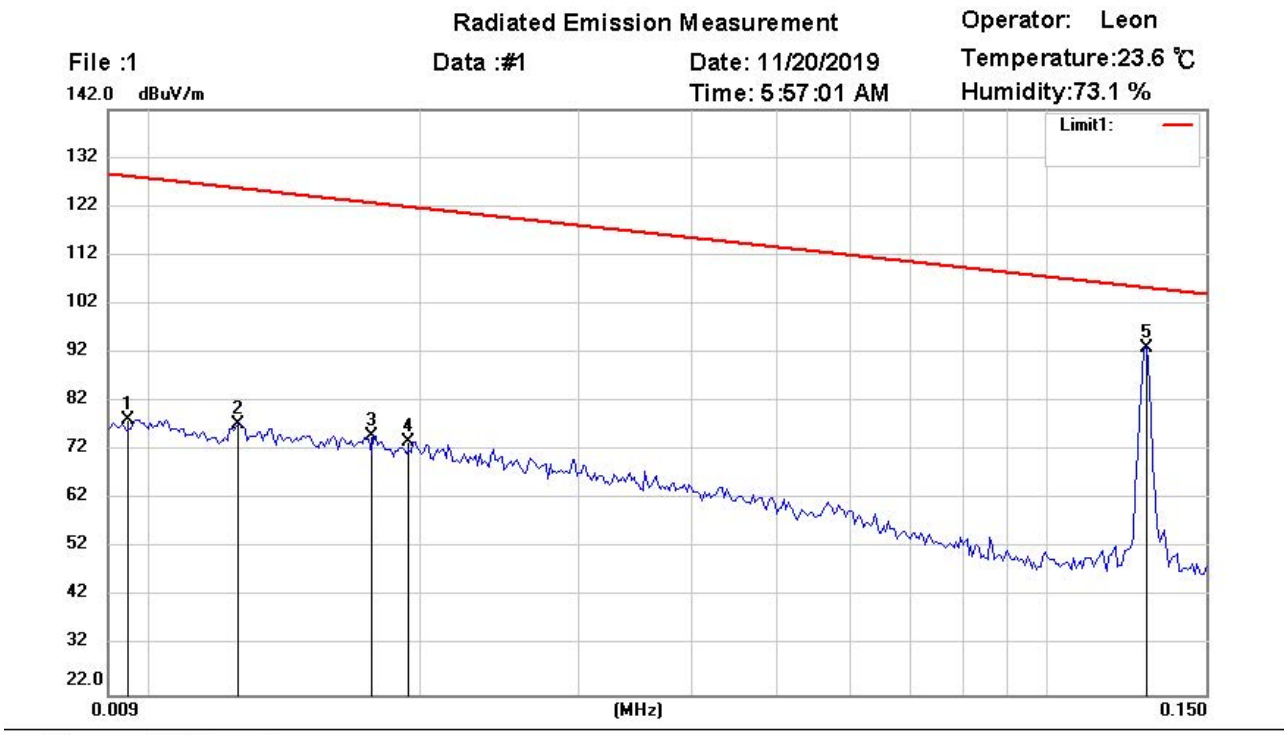
Test case	Para. Number	Required	Test passed	Test failed
Peak Output Power	15.209	☒	☒	☐
Spurious Emissions radiated – Transmitter operating	15.209	☒	☒	☐
Spurious Emissions radiated – Receiver operating	15.109	☐	☐	☐
Occupied bandwidth	2.1049	☒	☒	☐
Antenna Requirement	FCC 15.203	☒	☒	☐
Power Line Conducted Emission	FCC 15.207	☒	☒	☐

The following is intentionally left blank.

3.1 Peak Output Power

FCC Rules: 15.209

The power was measured with modulation (declared by the applicant).



Site : 966 Chamber
Condition : FCC_15.209 RE (9k-30M) (3M)
EUT : W6M21908-19319
M/N:
Test Mode :
Note :

Polarization:
Power : 120 Va.c.
Distance: 3m

Mk.	Frequency (MHz)	Reading (dBuV)	Detector	Corr. factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
	0.0095	-6.66	peak	85.00	78.34	128.04	100	58	-49.70	
	0.0126	-5.91	peak	83.35	77.44	125.59	100	160	-48.15	
	0.0177	-6.35	peak	81.38	75.03	122.64	100	237	-47.61	
	0.0195	-6.81	peak	80.68	73.87	121.80	100	240	-47.93	
*	0.1288	28.80	peak	64.16	92.96	105.40	100	225	-12.44	RF Power

Registration number: W6M21908-19319-C-9
FCC ID: W23-QST015B

Limits: 15.209

Frequency of Emission (MHz)	Field Strength of Fundamental Limit uV/m	Measurement distance
0.009 – 0.490	2400 / f (KHz)	300
0.49 – 1.705	24000 / f (KHz)	30
1.705 – 30	30	30
30 – 88	100	3
88 – 216	150	3
216 – 960	200	3
Above 960	500	3

The test was performed in the anechoic chamber at 3 meter test distance, i.e. the distance between measuring antenna and EUT boundary. The results were extrapolated by using the square of an inverse linear distance factor DF:

DF (distance factor) = 40 log (D_1/D_2) = 80 dB, where

D_1 is the 300 meter specified measurement distance,
D_2 is the 3 meter test measurement distance.

For 128 kHz frequency the calculated limit is:
$Limit_{3m} = Limit_{300m} + DF = 25.40$ dBuV/m + 80 dB = 105.40 dBuV/m

Test equipment used: ETSTW-RE 004, ETSTW-RE 027, ETSTW-RE 055.

3.2 Spurious Emissions radiated – Transmitter operating

FCC Rules: 15.209

The field strength of any emission appearing outside of the specific band shall not exceed the general radiated emission limits in 15.209.

Model: QST015B Date: - -
Mode: - - Temperature: - - °C Engineer: - -
Polarization: Horizontal Humidity: - - %

Frequency (MHz)	Reading (dBuV)	Detector	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
- -	- -	- -	- -	- -	- -	- -	- -	- -
- -	- -	- -	- -	- -	- -	- -	- -	- -

Polarization: Vertical

Frequency (MHz)	Reading (dBuV)	Detector	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
- -	- -	- -	- -	- -	- -	- -	- -	- -
- -	- -	- -	- -	- -	- -	- -	- -	- -

Note

1. **Correction Factor = Antenna factor + Cable loss - Preamplifier**
2. **The formula of measured value as: Test Result = Reading + Correction Factor**
3. **Detector function in the form : PK = Peak, QP = Quasi Peak, AV = Average**
4. **All not in the table noted test results are more than 20 dB below the relevant limits.**
5. **See attached diagrams in the Appendix.**

All other not noted test plots do not contain significant test results in relation to the limits.
TEST RESULT (Transmitter): The unit DOES meet the FCC requirements.
Limits: 15.209

Frequency of Emission (MHz)	Field Strength of Fundamental Limit uV/m	Measurement distance
0.009 – 0.490	2400 / f (KHz)	300
0.49 – 1.705	24000 / f (KHz)	30
1.705 – 30	30	30
30 – 88	100	3
88 – 216	150	3
216 – 960	200	3
Above 960	500	3

* In the emission table above, the tighter limit applies at the band edges.

The test was performed in the anechoic chamber at 3 meter test distance, i.e. the distance between measuring antenna and EUT boundary. The results were extrapolated by using the square of an inverse linear distance factor DF:

DF = 40 log (D_1/D_2) = 80 dB, where

For D_1 is the 300 meter specified measurement distance.
D_2 is the 3 meter test measurement distance.
The DF = 80 dB was applied for limit calculation at 3 meter test distance measurements.

For D_1 is the 30 meter specified measurement distance.
D_2 is the 3 meter test measurement distance.
The DF = 40 dB was applied for limit calculation at 3 meter test distance measurements.

If the frequency between 9 – 490 kHz,
Limit = 20log(2400/f(kHz)) + 80

If the frequency between 490 – 1705 kHz,
Limit = 20log(2400/f(kHz)) + 40

If the frequency between 1705 – 30000 kHz,
Limit = 20log30 + 40

For 128 kHz frequency the calculated limit is:
$Limit_{3m}$ = $Limit_{300m}$ + DF = 25.40 dBuV/m + 80 dB = 105.40 dBuV/m

Test equipment used: ETSTW-RE 004, ETSTW-RE 027, ETSTW-RE 055,
ETSTW-RE 146, ETSTW-RE 148.

3.3 Occupied Bandwidth

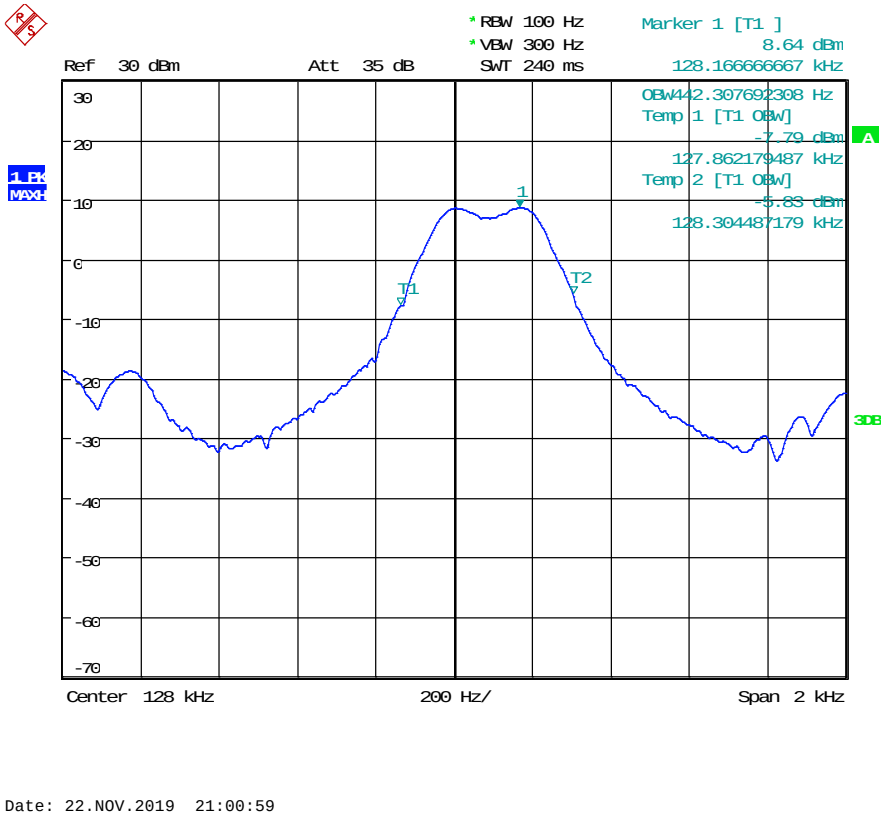
FCC Rules: 2.1049

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated are each equal to 0.5% of the total mean power radiated by a given emission.

The resolution bandwidth of the spectrum analyzer shall be set to a value greater than 5.0% of the allowed bandwidth specifications are given, the following guidelines are used:

Fundamental frequency	Minimum resolution bandwidth
9 kHz to 30 MHz	1 kHz
30 MHz to 1000 MHz	10 kHz
1000 MHz to 40 GHz	100 kHz

Test result:



Test equipment: ETSTW-RE 055

3.4 Antenna requirement

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 Sections 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 Section 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.

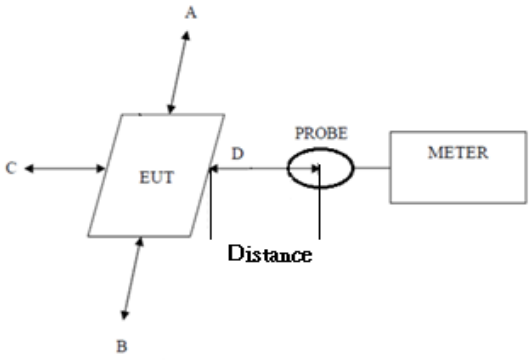
Explanation: This antenna is Loop antenna which passes antenna requirement.

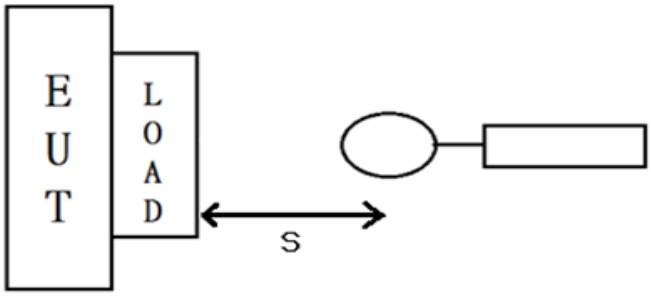
The equipment meets the requirements	yes ☒	no ☐

3.5 RF Exposure Compliance Requirements

Test standard : FCC KDB Publication
680106 D01 RF Exposure Wireless Charging App v03

Probe from EUT Side





All of the following requirements as below:

(1) Power transfer frequency is less than 1 MHz.
Explanation: The power transfer frequency range is 100~148kHz. (Refer to user manual.)

(2) Output power from each primary coil is less than or equal to 15 watts.
Explanation: The max. output power is 7.5W. (Refer to user manual.)

(3) The transfer system includes only single primary and secondary coils. This includes charging systems that may have multiple primary coils and clients that are able to detect and allow coupling only between individual pairs of coils.
Explanation: The transfer system has only single primary and secondary coils.

(4) Client device is placed directly in contact with the transmitter.
Explanation: Compliance.

(5) Mobile exposure conditions only (portable exposure conditions are not covered by this exclusion).
Explanation: Compliance.

(6) The aggregate H-field strengths at 15 cm surrounding the device and 20 cm above the top surface from all simultaneous transmitting coils are demonstrated to be less than 50% of the MPE limit.
Explanation: Compliance, please refer to page 18 of this report.

Registration number: W6M21908-19319-C-9
FCC ID: W23-QST015B

Limit:

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*($900/f^2$)	6
30-300	61.4	0.163	1.0	6
300-1500	/	/	f/300	6
1500-100,000	/	/	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*($180/f^2$)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

F=frequency in MHz
*=Plane-wave equivalent power density
RF exposure compliance will need to be determined with respect to 1.1307(c) and (d) of the FCC rules. The emissions should be within the limits at 300kHz in Table 1 of 1.1310(use the 300kHz limits for 150kHz:614V/m,1.63A/m).

Registration number: W6M21908-19319-C-9
FCC ID: W23-QST015B

Test Result:

QST015B_FULL					
Operation Frequency (MHz)	Test Distance (cm)	Probe from EUT Side	E-Field strength (V/m)	H-Field strength (A/m)	H-Field strength (A/m) (for 50% limit)
0.127~0.128	15	A	5.004	0.364	0.364
0.127~0.128	15	B	6.57	0.781	0.781
0.127~0.128	15	C	7.732	0.656	0.656
0.127~0.128	15	D	7.97	0.597	0.597
0.127~0.128	20	S	0.77	0.702	0.702
Limit			614	1.63	0.815

QST015B_HALF					
Operation Frequency (MHz)	Test Distance (cm)	Probe from EUT Side	E-Field strength (V/m)	H-Field strength (A/m)	H-Field strength (A/m) (for 50% limit)
0.127~0.128	15	A	4.525	0.343	0.343
0.127~0.128	15	B	6.539	0.787	0.787
0.127~0.128	15	C	4.328	0.622	0.622
0.127~0.128	15	D	6.066	0.520	0.520
0.127~0.128	20	S	0.775	0.575	0.575
Limit			614	1.63	0.815

20191108-QST015B_10% LOAD (change load 5V 0.1A)					
Operation Frequency (MHz)	Test Distance (cm)	Probe from EUT Side	E-Field strength (V/m)	H-Field strength (A/m)	H-Field strength (A/m) (for 50% limit)
0.127~0.128	15	A	3.123	0.323	0.323
0.127~0.128	15	B	4.563	0.542	0.542
0.127~0.128	15	C	4.331	0.500	0.500
0.127~0.128	15	D	4.726	0.507	0.507
0.127~0.128	20	S	0.965	0.526	0.526
Limit			614	1.63	0.815

Note: The test compliance with RF exposure requirements.

3.6 Radiated Emissions from Receiver Section of Receiver Part

For the frequency from 9 kHz to 30 MHz:

FCC Rule: 15.209
The field strength of any emission appearing outside of the specific band shall not exceed the general radiated emission limits in 15.209.

Frequency of Emission (MHz)	Field Strength of Fundamental Limit uV/m	Measurement distance
0.009 – 0.490	2400 / f (KHz)	300
0.49 – 1.705	24000 / f (KHz)	30
1.705 – 30	30	30
30 – 88	100	3
88 – 216	150	3
216 – 960	200	3
Above 960	500	3

* In the emission table above, the tighter limit applies at the band edges.

Note: The above field strength limits are specified at a distance of 3 meters.

The test was performed in the anechoic chamber at 3 meter test distance, i.e. the distance between measuring antenna and EUT boundary. The results were extrapolated by using the square of an inverse linear distance factor DF:

DF = 40 log (D_1/D_2) = 80 dB, where

For D_1 is the 300 meter specified measurement distance.
D_2 is the 3 meter test measurement distance.
The DF = 80 dB was applied for limit calculation at 3 meter test distance measurements.

For D_1 is the 30 meter specified measurement distance.
D_2 is the 3 meter test measurement distance.
The DF = 40 dB was applied for limit calculation at 3 meter test distance measurements.

If the frequency between 9 – 490 kHz, limit = 20log(2400/f(kHz)) + 80

If the frequency between 490 – 1705 kHz, limit = 20log(2400/f(kHz)) + 40

If the frequency between 1705 – 30000 kHz, limit = 20log30 + 40

For 128 kHz frequency the calculated limit is:
$Limit_{3m}$ = $Limit_{300m}$ + DF = 25.40 dBuV/m + 80 dB = 105.40 dBuV/m

Test equipment used: ETSTW-RE 004, ETSTW-RE 027, ETSTW-RE 055, ETSTW-RE 146, ETSTW-RE 148

Explanation: The test is not required because the EUT is TX only.

For the frequency from 30 MHz to 1000 MHz.:

FCC Rule: 15.109

Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency of Emission (MHz)	Field Strength (microvolts/meter)	Field Strength (dBmicrovolts/meter)
30 – 88	100	40.0
88 – 216	150	43.5
216 – 960	200	46.0
Above 960	500	54.0

Model: QST015B Date: --
Mode: - - Temperature: -- °C Engineer: --
Polarization: Horizontal Humidity: -- %

Frequency (MHz)	Reading (dBuV)	Detector	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--

Polarization: Vertical

Frequency (MHz)	Reading (dBuV)	Detector	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--

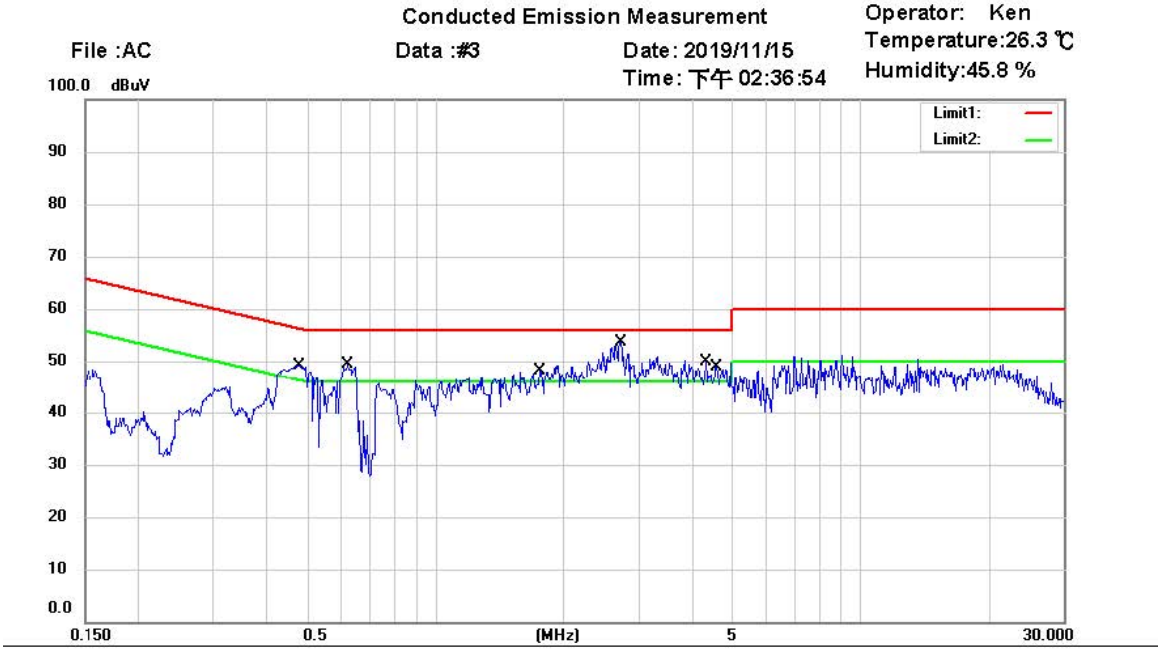
Test equipment used: ETSTW-RE 004, ETSTW-RE 030, ETSTW-RE 062, ETSTW-RE 064, ETSTW-RE 142, ETSTW-RE 147

Note

1. **Correction Factor = Antenna factor + Cable loss - Preamplifier**
2. **The formula of measured value as: Test Result = Reading + Correction Factor**
3. **Detector function in the form : PK = Peak, QP = Quasi Peak, AV = Average**
4. **All not in the table noted test results are more than 20 dB below the relevant limits.**
5. **The test is not required because the EUT is TX only.**

3.7 Power Line Conducted Emission

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the table bellows with this provision shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminals.
This measurement was transact first with instrumentation using an average and peak detector and a 10 kHz bandwidth. If the peak detector achieves a calculated level, the measurement is repeated by an instrumentation using a quasi-peak detector.



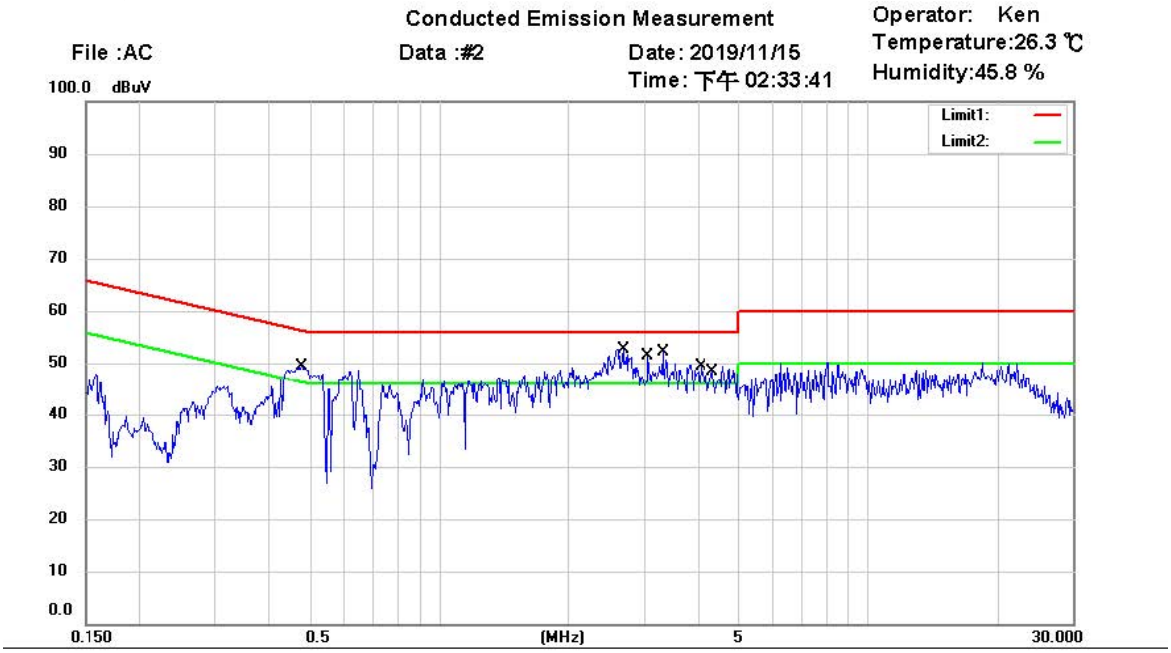
Site : Chamber_03
Condition : FCC Part 15 Class B / FCC Part 18 consumer devices / ICES-001 Group II Class B / ICES-003 Class B Conduction (QP)

EUT : W6M21908-19319
M/N:
Test Mode :
Note :

Phase: N
Power : 120 Va.c.

Mk.	Frequency (MHz)	Reading (dBuV)	Detector	Corrected factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Comment
	0.4767	36.64	QP	9.68	46.32	56.40	-10.08	
	0.4767	23.12	AVG	9.68	32.80	46.40	-13.60	
	0.6237	36.10	QP	9.67	45.77	56.00	-10.23	
	0.6237	17.17	AVG	9.67	26.84	46.00	-19.16	
	1.7532	34.14	QP	9.56	43.70	56.00	-12.30	
	1.7532	20.14	AVG	9.56	29.70	46.00	-16.30	
	2.7072	36.25	QP	9.55	45.80	56.00	-10.20	
	2.7072	17.99	AVG	9.55	27.54	46.00	-18.46	
	4.3272	34.66	QP	9.79	44.45	56.00	-11.55	
*	4.3272	29.35	AVG	9.79	39.14	46.00	-6.86	
	4.5815	33.98	QP	9.86	43.84	56.00	-12.16	
	4.5815	29.25	AVG	9.86	39.11	46.00	-6.89	

Registration number: W6M21908-19319-C-9
FCC ID: W23-QST015B



Site : Chamber_03
Condition : FCC Part 15 Class B / FCC Part 18 consumer devices / ICES-001 Group II Class B / ICES-003 Class B Conduction (QP)

EUT : W6M21908-19319
M/N:
Test Mode :
Note :

Phase: L1
Power : 120 Va.c.

Mk.	Frequency (MHz)	Reading (dBuV)	Detector	Corrected factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Comment
	0.4767	36.56	QP	9.70	46.26	56.40	-10.14	
	0.4767	23.75	AVG	9.70	33.45	46.40	-12.95	
	2.6690	34.70	QP	9.57	44.27	56.00	-11.73	
	2.6690	21.52	AVG	9.57	31.09	46.00	-14.91	
	3.0492	36.05	QP	9.58	45.63	56.00	-10.37	
	3.0492	30.41	AVG	9.58	39.99	46.00	-6.01	
	3.3058	36.63	QP	9.61	46.24	56.00	-9.76	
*	3.3058	32.26	AVG	9.61	41.87	46.00	-4.13	
	4.0685	33.44	QP	9.73	43.17	56.00	-12.83	
	4.0685	29.24	AVG	9.73	38.97	46.00	-7.03	
	4.3250	34.30	QP	9.80	44.10	56.00	-11.90	
	4.3250	31.31	AVG	9.80	41.11	46.00	-4.89	

Note

1. **The formula of measured value as: Test Result = Reading + Correction Factor**
2. **The Correction Factor = Cable Loss + LISN Insertion Loss + Pulse Limit Loss**
3. **Detector function in the form : PK = Peak, QP = Quasi Peak, AV = Average**
4. **All not in the table noted test results are more than 20 dB below the relevant limits.**
5. **Up Line: QP Limit Line, Down Line: Ave Limit Line.**

Registration number: W6M21908-19319-C-9
FCC ID: W23-QST015B

Limits:

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi Peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

Test equipment used: ETSTW-CE 001, ETSTW-CE 016, ETSTW-RE 045

Appendix

Measurement diagrams

Spurious Emissions Radiated

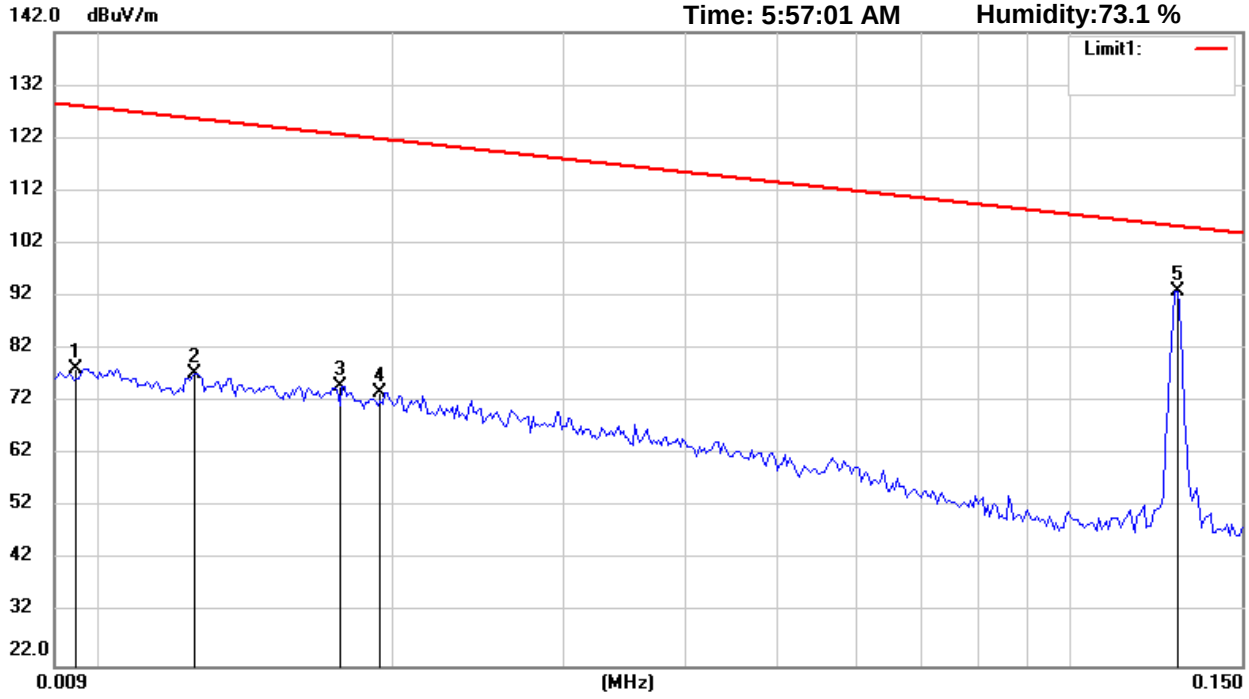
Address:6F.,No.58,Ln 188,Ruey Kuang Rd,Neihu,Taipei
Tel:+886-2-6606-8877
Fax:+886-2-6606-8879

Radiated Emission Measurement

Operator: Leon

File :1 Data :#1 Date: 11/20/2019 Time: 5:57:01 AM

Temperature:23.6 ℃ Humidity:73.1 %



Site : 966 Chamber

Condition : FCC_15.209 RE (9k-30M) (3M)

EUT : W6M21908-19319

M/N:

Test Mode :

Note :

Polarization:

Power : 120 Va.c.

Distance: 3m

Mk.	Frequency (MHz)	Reading (dBuV)	Detector	Corr. factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
	0.0095	-6.66	peak	85.00	78.34	128.04	100	58	-49.70	
	0.0126	-5.91	peak	83.35	77.44	125.59	100	160	-48.15	
	0.0177	-6.35	peak	81.38	75.03	122.64	100	237	-47.61	
	0.0195	-6.81	peak	80.68	73.87	121.80	100	240	-47.93	
*	0.1288	28.80	peak	64.16	92.96	105.40	100	225	-12.44	RF Power

*:Maximum data x:Over limit !:over margin

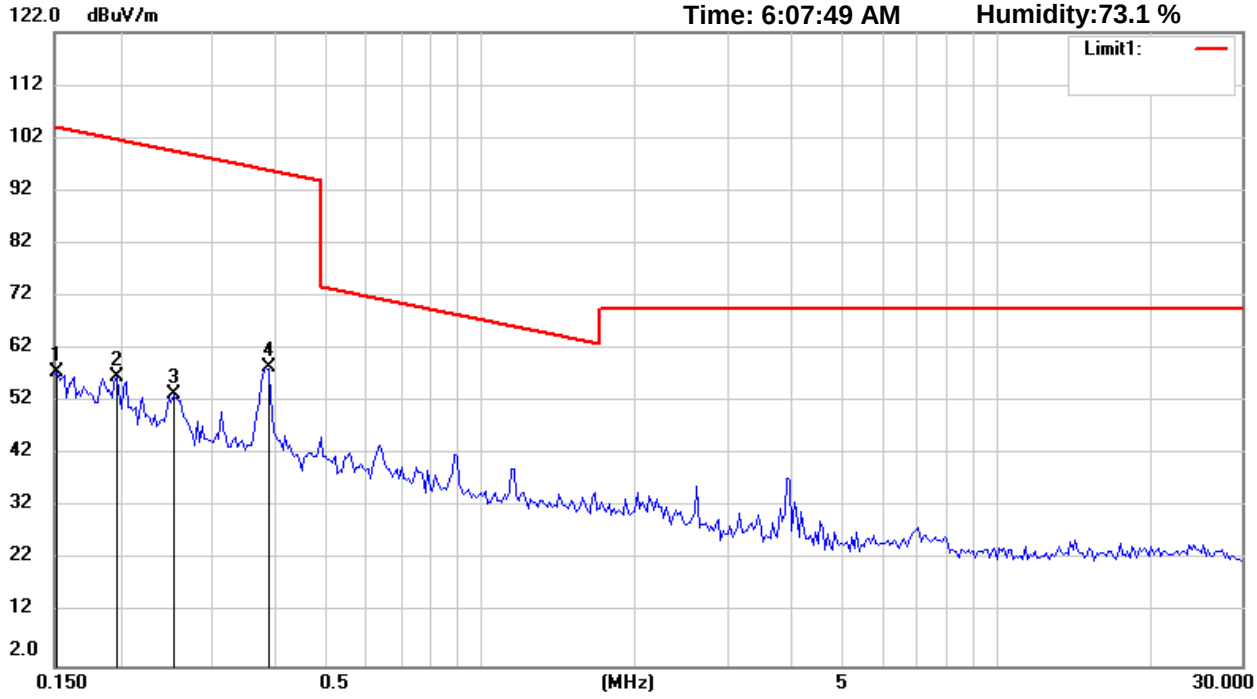
Address:6F.,No.58,Ln 188,Ruey Kuang Rd,Neihu,Taipei
Tel:+886-2-6606-8877
Fax:+886-2-6606-8879

Radiated Emission Measurement

Operator: Leon

File :2 Data :#1 Date: 11/20/2019 Time: 6:07:49 AM

Temperature:23.6 ℃ Humidity:73.1 %



Site : 966 Chamber

Condition : FCC_15.209 RE (9k-30M) (3M)

EUT : W6M21908-19319

M/N:

Test Mode :

Note :

Polarization:

Power : 120 Va.c.

Distance: 3m

Mk.	Frequency (MHz)	Reading (dBuV)	Detector	Corr. factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
	0.1516	-5.54	peak	63.28	57.74	103.99	100	75	-46.25	
	0.1977	-4.70	peak	61.51	56.81	101.68	100	160	-44.87	
	0.2550	-5.92	peak	59.30	53.38	99.47	100	225	-46.09	
*	0.3860	3.04	peak	55.45	58.49	95.87	100	37	-37.38	

*:Maximum data x:Over limit !:over margin

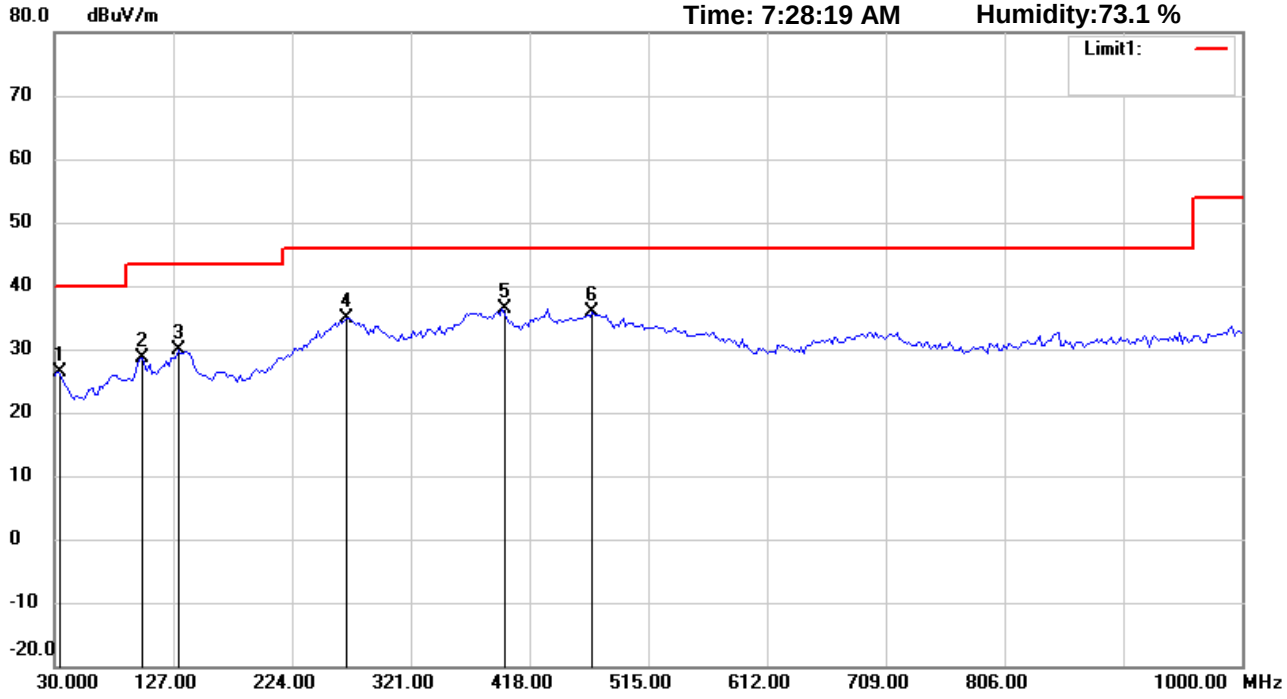
Address:6F.,No.58,Ln 188,Ruey Kuang Rd,Neihu,Taipei
Tel:+886-2-6606-8877
Fax:+886-2-6606-8879

Radiated Emission Measurement

Operator: Leon

File :1 Data :#1 Date: 11/20/2019 Time: 7:28:19 AM

Temperature:23.6 ℃ Humidity:73.1 %



Site : 966 Chamber

Condition : FCC_15.209_30-1000MHz

EUT : W6M21908-19319

M/N:

Test Mode :

Note :

Polarization: *Horizontal*

Power : 120 Va.c.

Distance: 3m

Mk.	Frequency (MHz)	Reading (dBuV)	Detector	Corr. factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
	31.9440	34.73	QP	-8.37	26.36	40.00	100	52	-13.64	
	101.9238	38.53	QP	-9.87	28.66	43.50	100	70	-14.84	
	131.0822	36.23	QP	-6.31	29.92	43.50	100	110	-13.58	
	269.0982	41.66	QP	-6.79	34.87	46.00	100	135	-11.13	
*	395.4510	40.20	QP	-3.94	36.26	46.00	100	69	-9.74	
	469.3186	39.24	QP	-3.40	35.84	46.00	100	280	-10.16	

*:Maximum data x:Over limit !:over margin

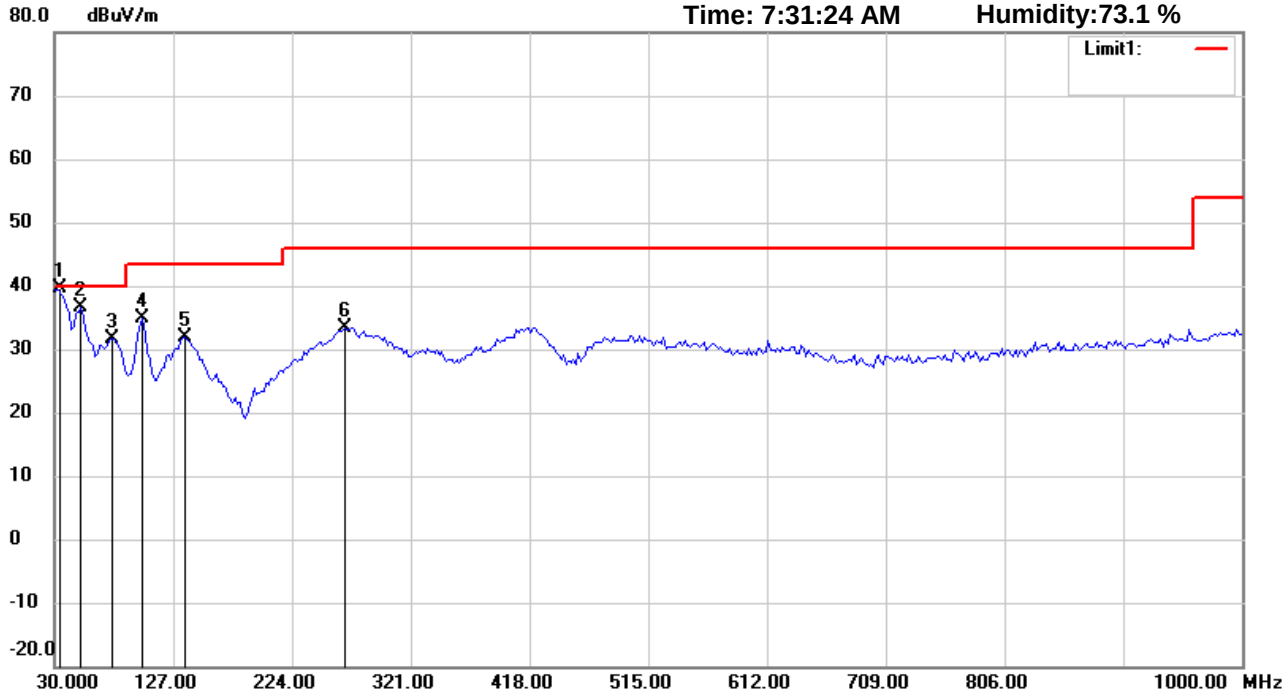
Address:6F.,No.58,Ln 188,Ruey Kuang Rd,Neihu,Taipei
Tel:+886-2-6606-8877
Fax:+886-2-6606-8879

Radiated Emission Measurement

Operator: Leon

File :1 Data :#2 Date: 11/20/2019 Time: 7:31:24 AM

Temperature:23.6 ℃ Humidity:73.1 %



Site : 966 Chamber

Condition : FCC_15.209_30-1000MHz

EUT : W6M21908-19319

M/N:

Test Mode :

Note :

Polarization: *Vertical*

Power : 120 Va.c.

Distance: 3m

Mk.	Frequency (MHz)	Reading (dBuV)	Detector	Corr. factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
*	31.9440	48.12	QP	-8.37	39.75	40.00	100	355	-0.25	
	51.3828	46.85	QP	-10.34	36.51	40.00	100	137	-3.49	
	76.6533	46.32	QP	-14.75	31.57	40.00	100	270	-8.43	
	101.9238	44.65	QP	-9.87	34.78	43.50	100	196	-8.72	
	134.9700	38.35	QP	-6.39	31.96	43.50	100	53	-11.54	
	267.1543	40.29	QP	-6.93	33.36	46.00	100	210	-12.64	

*:Maximum data x:Over limit !:over margin