

FCC PART 15 SUBPART C TEST REPORT

for

Web Based RFID and PIN Controller

Model No.: AR2015E

FCC ID: 2ATG9AR2015E

of

Applicant: **MERIT LILIN ENT. CO., LTD.**

Address: No20, Wu-kong 6Rd., Wu-Ku Industrial Zone Wu-Ku Dist.,
New Taipei City 248, 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.: W6M21905-19082-C-1

6F, NO. 58, LANE 188, RUEY-KUANG RD., NEIHU TAIPEI 114, TAIWAN, R.O.C.
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Registration number: W6M21905-19082-C-1
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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 its 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.

Reproduction or publication of extracts from the report requires the prior written approval of the Worldwide Testing Services(Taiwan) Co., Ltd.

Tester:

July 15, 2019

Leon Chueh

Date

WTS-Lab.

Name

Signature

Technical responsibility for area of testing:

July 15, 2019

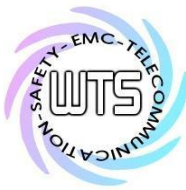
Kevin Wang

Date

WTS

Name

Signature



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1.2 Testing laboratory

1.2.1 Location

OATS

No.5-1, Lishui, Shuang Sing Village,
Wanli Dist., New Taipei City 207,
Taiwan (R.O.C.)

3 meter semi-anechoic chamber

No.35, Aly. 21, Ln. 228, Ankang Rd., Neihu Dist., Taipei City 114, Taiwan (R.O.C.)

TEL:886-2-6613-0228

FAX:886-2-2791-5046

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: ./.

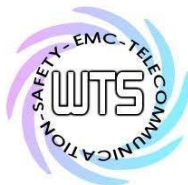
Street: ./.

Town: ./.

Country: ./.

Telephone: ./.

Fax: ./.



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1.3 Details of approval holder

Name:	MERIT LILIN ENT. CO., LTD.
Street:	No20,Wu-kong 6Rd., Wu-Ku Industrial Zone Wu-Ku Dist.,
City:	New Taipei City 248,
Country:	Taiwan
Telephone:	+886-2-2298-8988
Fax:	+886-2-2298-9077

1.4 Application details

Date of receipt of test item:	May 24, 2019
Date of test:	from May 27, 2019 to July 12, 2019

1.5 General information of Test item

Description of test item:	Web Based RFID and PIN Controller
Type identification:	AR2015E
Multi-listing model number:	ARX ₁ X ₂ X ₃ X ₄
Transmitting frequency:	13.56 MHz
Operation mode:	duplex
Voltage supply:	9-24VDC

(If the device is using battery, please check if the device is tested under fresh battery condition.)

Antenna type:	Loop antenna
---------------	--------------

Photos:	./.
---------	-----

Manufacturer: (if applicable)

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

1.6 Test standards

Technical standard : FCC RULES PART 15 SUBPART C § 15.225 (2018-10)



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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: 9-24VDC

Extreme conditions parameters: /.

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.

Special statement

1. This test report is valid in connection to the model has been tested, any modification to the product which is different from the test model will avoid the certification of the test report.
2. This test report shall always be duplicated in full pages unless the written approval of the testing laboratory is obtained.
3. The AR in model number is representing Access controller, the X1 in model number is representing Software version, the X2 in model number is representing protocol port, the X3 in model number is representing DC9~24V, the X4 in model number is representing OEM.
4. The operation conditions of the test sample during the all test items were under the demand of the applicant. Any deviation from the required condition of test standard is the responsibility of the applicant.



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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	2018/11/1	2019/10/31
ETSTW-CE 006	IMPULSBEGRENZER PULSE LIMITER	ESH3-Z2	100226	R&S	2018/8/21	2019/8/20
ETSTW-CE 008	HF-EICHLITUNG 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	2019/7/1	2020/6/30
ETSTW-CE 016	TWO-LINE V-NETWORK	ENV216	100050	R&S	2018/9/25	2019/9/24
ETSTW-CE 028	MXE EMI Receiver	N9038A	MY53220110	Agilent	2019/7/15	2020/7/14
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	2019/7/1	2020/6/30
ETSTW-RE 027	Passive Loop Antenna	6512	00034563	ETS-Lindgren	2019/7/1	2020/6/30
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	2018/9/17	2019/9/16
ETSTW-RE 088	SOLID STATE AMPLIFIER	KMA180265A01	99057	KMIC	2018/9/18	2019/9/17
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	2019/1/15	2020/1/14



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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	2018/8/8	2019/8/7
ETSTW-RE 126	5GHz Notch filter	5NSL12-5800/E221.3-O/O	1	K&L Microwave	2018/8/8	2019/8/7
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	2018/8/8	2019/8/7
ETSTW-RE 129	5.5GHz Notch filter	N0555984	SN487234	Microwave Circuits	2018/8/8	2019/8/7
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-RE 151	Thermohygrometer	608-h1	45104376	TESTO	2018/8/17	2019/8/16
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	2018/10/19	2019/10/18
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	2018/9/12	2019/9/11
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	2018/8/9	2019/8/8
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.	2019/7/1	2020/6/30
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	2019/5/10	2020/5/9
ETSTW-Cable 028	Microwave Cable	FA147A0015M2020	30064-2	UTIFLEX	2018/9/18	2019/9/17
ETSTW-Cable 029	Microwave Cable	FA147A0015M2020	30064-3	UTIFLEX	2018/9/18	2019/9/17
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

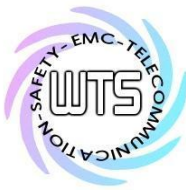


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ETSTW-Cable 066	SMA type cable	32022	None	ASTROLAB	2019/3/15	2020/3/14
ETSTW-Cable 071	N TYPE CABLE	EMCCFD400-NM-NM-25000	170239	EMCI	2019/6/6	2020/6/5
ETSTW-Cable 072	SMA type cable (8m)	SUCOFLEX 104	805800/4	HUBER+SUHNER	2019/5/16	2020/5/15
ETSTW-Cable 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	



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:

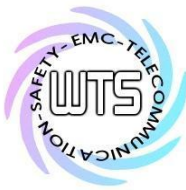
Freq (MHz)	METER READING + ACF + CABLE LOSS (to the receiver) = FS
33	20 dBμV + 10.36 dB + 6 dB = 36.36 dBμV/m @3m

The EUT was placed on a table 80 cm high and with dimensions of 1m by 1.5m (non metallic table) and arranged according to ANSI C63.10-2013 Section 6.2.2. The table used for radiated measurements is capable of continuous rotation. The spectrum was scanned from 30 MHz to the frequency specified as follows:

- (1) If the intentional radiator operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.
- (2) If the intentional radiator operates at or above 10 GHz and below 30 GHz: to the fifth harmonic of the highest fundamental frequency or to 100 GHz, whichever is lower.
- (3) If the intentional radiator operates at or above 30 GHz: to the fifth harmonic of the highest fundamental frequency or to 200 GHz, whichever is lower, unless specified otherwise elsewhere in the rules.
- (4) If the intentional radiator contains a digital device, regardless of whether this digital device controls the functions of the intentional radiator or the digital device is used for additional control or function purposes other than to enable the operation of the intentional radiator, the frequency range shall be investigated up to the range specified in paragraphs (a)(1)-(a)(3) of this section or the range applicable to the digital device, as shown in paragraph (b)(1) of this Section, whichever is the higher frequency range of investigation.

For hand-held devices, a exploratory test was performed with three (3) orthogonal planes to determine the highest emissions.

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.



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When the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.

The formula is as follows:

Average = Peak + Duty Factor

Duty Factor = $20 \log (\text{dwell time}/T)$

$T = 100\text{ms}$ when the pulse train period is over 100 ms or the period of the pulse train.

Modified Limits for peak according to 15.35 (b) = Max Permitted average Limits + 20dB

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.



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3 Test results (enclosure)

TEST CASE	Para. Number	Required	Test passed	Test failed
Output Power Field Strength	15.225 (a) (b) (c)	☒	☒	☐
Out of Band Radiated Emissions	15.225 (d)	☒	☒	☐
Band Edge	15.225 (d)	☒	☒	☐
Occupied Bandwidth	2.1049	☒	☒	☐
Frequency Stability	15.225 (e)	☒	☒	☐
Power Line Conducted Emission	15.207 (a)	☒	☒	☐

The following is intentionally left blank.



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3.1 Output Power (Field Strength)

FCC Rules: 15.225 (a) (b) (c), 15.205, 15.209, 15.35

Operation within the band 13.110 - 14.010 MHz

Limit

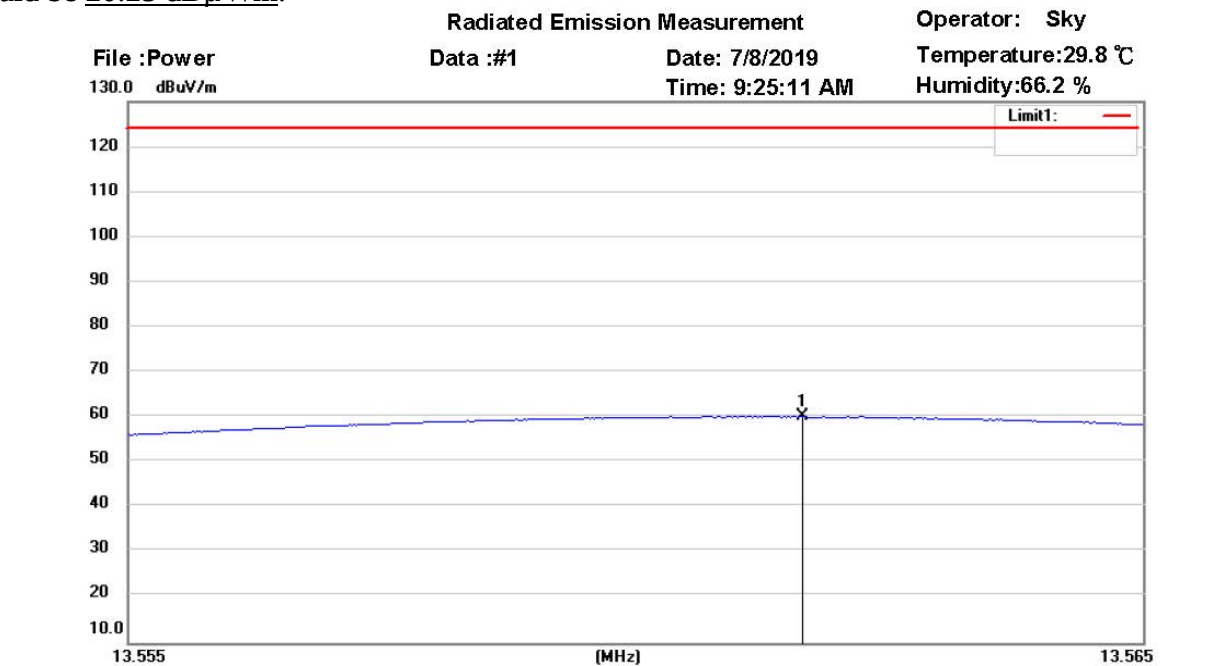
(a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

(b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

(c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

Measurement Results:

The field strength at 3 meter distance as 60.25 dB μ V/m. Extrapolated with 40dB to 30 meter distance it would be 20.25 dB μ V/m.



Site : Chamber

Condition : FCC 15.225 power (3m)

EUT : W6M21905-19082

M/N:

Test Mode : TX 13.56MHz

Note :

Polarization:

Power : 120 V.a.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
*	13.5617	26.47	peak	33.78	60.25	124.00	100	180	-63.75	

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



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3.2 Out of Band Radiated Emissions

(d) The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in § 15.209.

Frequency of Emission (MHz)	Limit	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

Calculation of test results:

Such factors like antenna correction, cable loss, external attenuation etc. are already included in the provided measurement results. This is done by using validated test software and calibrated test system according the accreditation requirements.

Summary table with radiated data of the test plots

Model: AR2015E 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

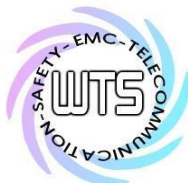
1. Correction Factor = Antenna factor + Cable loss - Preamplifier
2. The formula of measured value as: Test Result = Reading + Correction Factor
3. Detector function in the form : PK = Peak, QP = Quasi Peak, AV = Average
4. All not in the table noted test results are more than 20 dB below the relevant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

Explanation: See attached diagrams for above 30MHz in appendix. For receiver part of above 30 MHz, Please refer to test report no.: W6M21905-19082-P-15B.

All other not noted test plots do not contain significant test results in relation to the limits

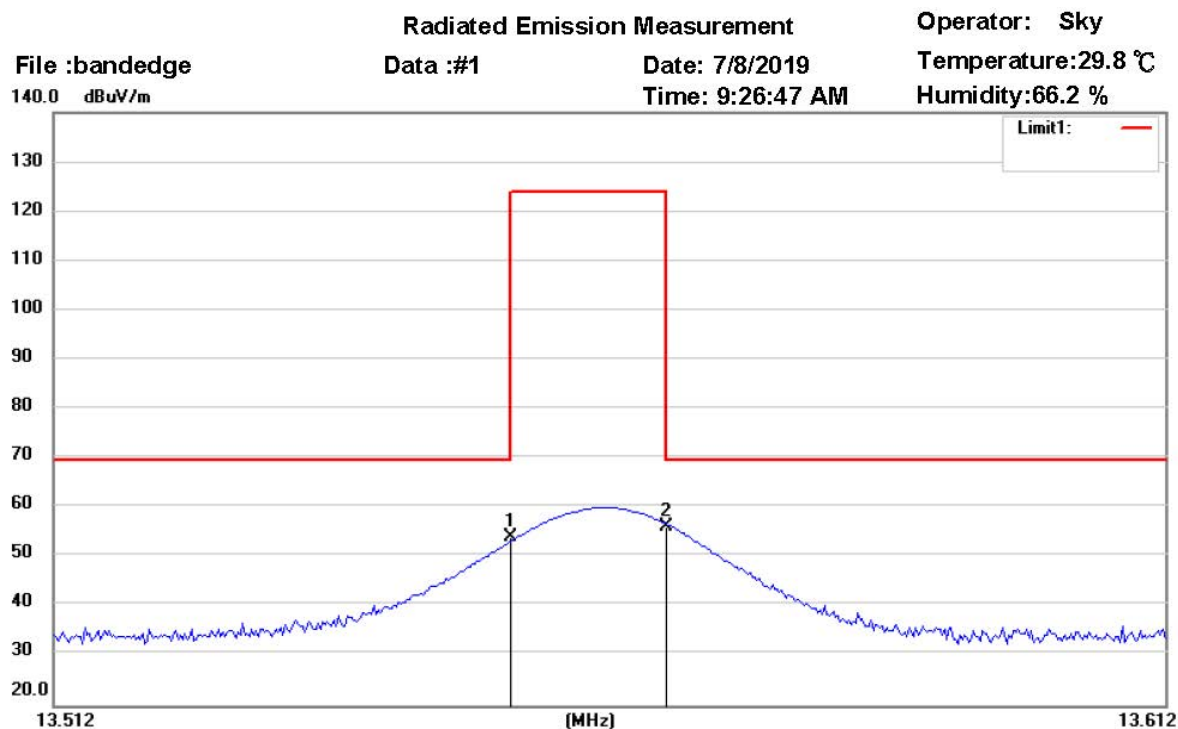
Test results: The unit meet the FCC requirements.

Test equipment used: ETSTW-RE 004, ETSTW-RE 027, ETSTW-RE 142, ETSTW-RE 147, ETSTW-RE 062



Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M21905-19082-C-1
FCC ID: 2ATG9AR2015E
Test result of Band Edge



Site : Chamber

Condition : FCC 15.225 Bandedge (3m)

EUT : W6M21905-19082

M/N:

Test Mode : TX 13.56MHz

Note :

Polarization:

Power : 120 V.a.c.

Distance: 3m

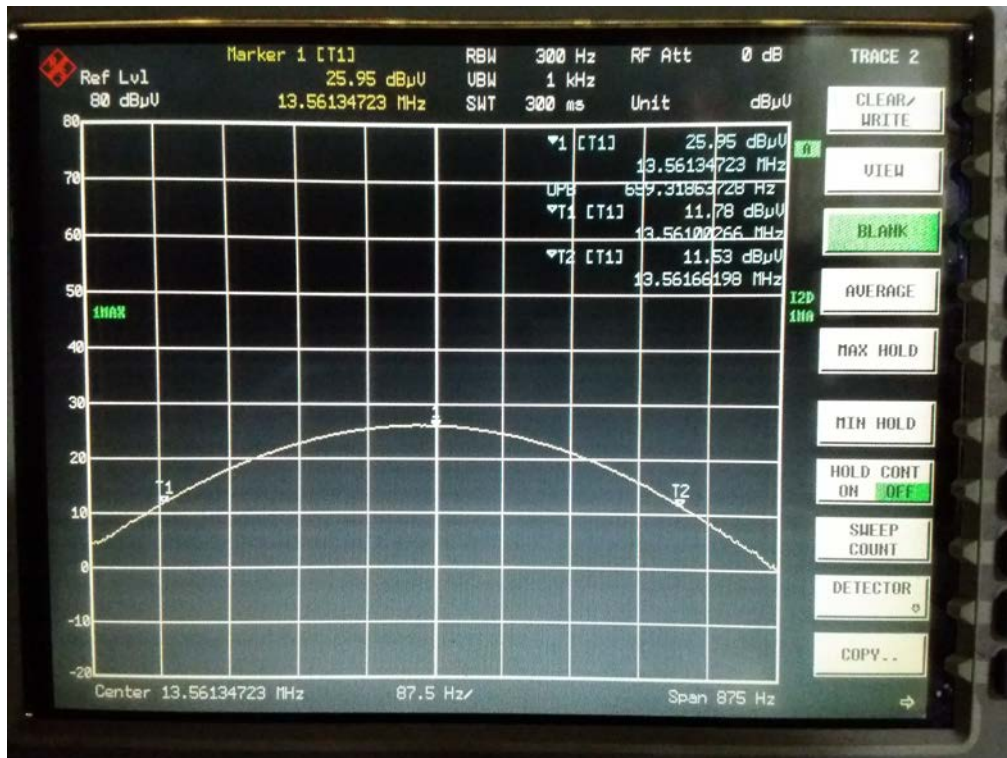
Mk.	Frequency (MHz)	Reading (dBuV)	Detector	Corr. factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
	13.5530	20.20	peak	33.78	53.98	69.50	100	180	-15.52	
*	13.5670	22.25	peak	33.78	56.03	69.50	100	180	-13.47	

Test equipment used: ETSTW-RE 055

Registration number: W6M21905-19082-C-1

FCC ID: 2ATG9AR2015E

3.3 Occupied Bandwidth



Test equipment used: ETSTW-RE 055, ETSTW-RE 064



Registration number: W6M21905-19082-C-1
FCC ID: 2ATG9AR2015E

3.4 Frequency tolerance

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of -20°C to +50°C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20°C. For battery operated equipment, the equipment tests shall be performed using a new battery.

Measurement Results:

Test Voltage 12V	On time	Carrier Freq.	Deviation	Result
	0 min	13.561346	0.000	0 ppm
	*2min	13.561346	0.000	0 ppm
	5min	13.561346	0.000	0 ppm
	10min	13.561346	0.000	0 ppm
Test Voltage 10.2V	On time	Carrier Freq.	Deviation	Result
	0 min	13.561346	0.000	0 ppm
	2min	13.561330	-0.016	-1.18 ppm
	5min	13.561346	0.000	0 ppm
	10min	13.561346	0.000	0 ppm
Test Voltage 13.8V	On time	Carrier Freq.	Deviation	Result
	0 min	13.561346	0.000	0 ppm
	2min	13.561346	0.000	0 ppm
	5min	13.561346	0.000	0 ppm
	10min	13.561346	0.000	0 ppm

*Represent test standard frequency



Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M21905-19082-C-1

FCC ID: 2ATG9AR2015E

Test Temp	On time	Carrier Freq.	Deviation	Result
50°C	0 min	13.561330	-0.016	-1.18 ppm
50°C	2min	13.561330	-0.016	-1.18 ppm
50°C	5min	13.561330	-0.016	-1.18 ppm
50°C	10min	13.561330	-0.016	-1.18 ppm
40°C	0 min	13.561338	-0.008	-0.59 ppm
40°C	2min	13.561322	-0.024	-1.77 ppm
40°C	5min	13.561338	-0.008	-0.59 ppm
40°C	10min	13.561338	-0.008	-0.59 ppm
30°C	0 min	13.561330	-0.016	-1.18 ppm
30°C	2min	13.561330	-0.016	-1.18 ppm
30°C	5min	13.561330	-0.016	-1.18 ppm
30°C	10min	13.561330	-0.016	-1.18 ppm
20°C	0 min	13.561346	0.000	0 ppm
*20°C	2min	13.561346	0.000	0 ppm
20°C	5min	13.561346	0.000	0 ppm
20°C	10min	13.561346	0.000	0 ppm
10°C	0 min	13.561330	-0.016	-1.18 ppm
10°C	2min	13.561330	-0.016	-1.18 ppm
10°C	5min	13.561338	-0.008	-0.59 ppm
10°C	10min	13.561338	-0.008	-0.59 ppm
0°C	0 min	13.561330	-0.016	-1.18 ppm
0°C	2min	13.561330	-0.016	-1.18 ppm
0°C	5min	13.561330	-0.016	-1.18 ppm
0°C	10min	13.561330	-0.016	-1.18 ppm
-10°C	0 min	13.561330	-0.016	-1.18 ppm
-10°C	2min	13.561330	-0.016	-1.18 ppm
-10°C	5min	13.561330	-0.016	-1.18 ppm
-10°C	10min	13.561330	-0.016	-1.18 ppm
-20°C	0 min	13.561314	-0.032	-2.36 ppm
-20°C	2min	13.561314	-0.032	-2.36 ppm
-20°C	5min	13.561314	-0.032	-2.36 ppm
-20°C	10min	13.561314	-0.032	-2.36 ppm

*Represent test standard frequency

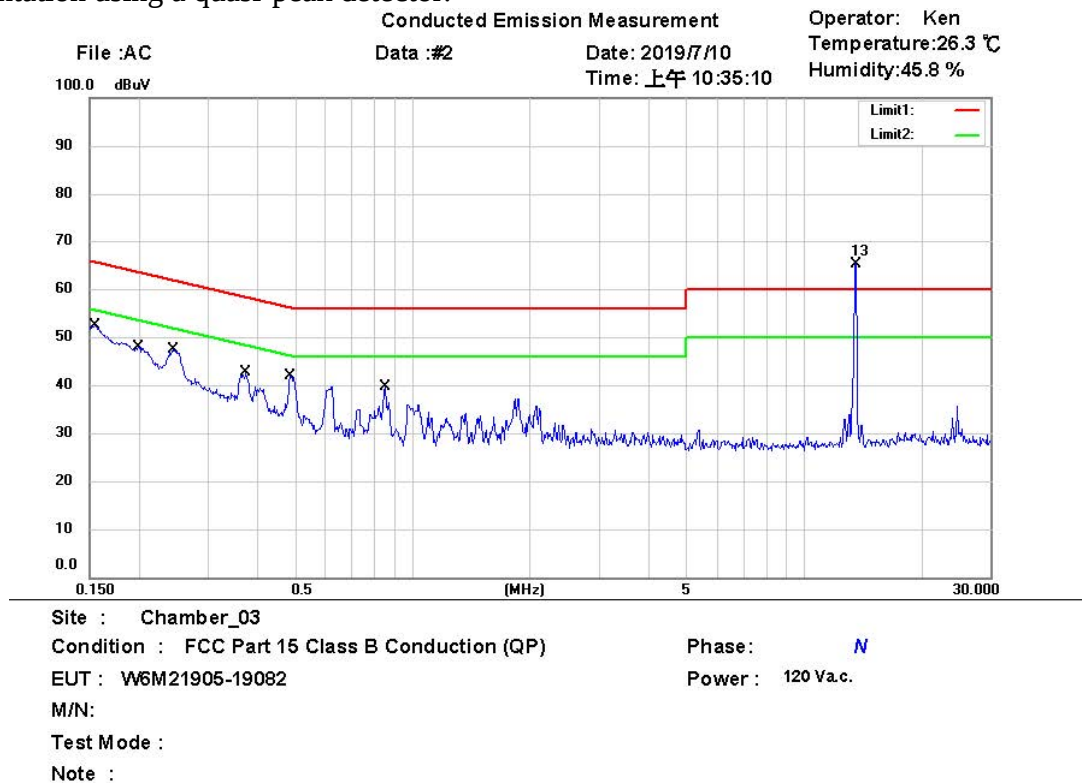
Test equipment used: ETSTW-RE 055, ETSTW-CE 009

Registration number: W6M21905-19082-C-1
FCC ID: 2ATG9AR2015E

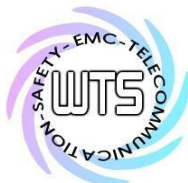
3.5 Power Line Conducted Emission

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.

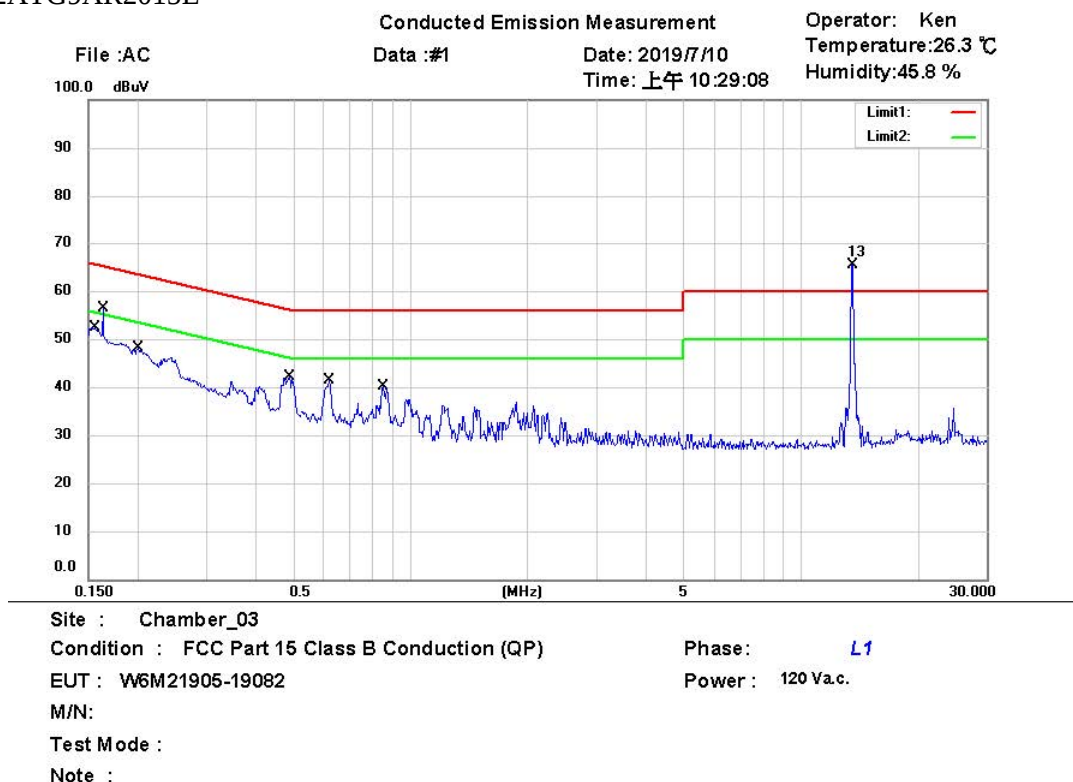


Mk.	Frequency (MHz)	Reading (dBuV)	Detector	Corrected factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Comment
	0.1544	31.48	QP	9.95	41.43	65.76	-24.33	
	0.1544	22.91	AVG	9.95	32.86	55.76	-22.90	
	0.1990	26.60	QP	9.92	36.52	63.65	-27.13	
	0.1990	15.73	AVG	9.92	25.65	53.65	-28.00	
	0.2435	30.11	QP	9.92	40.03	61.98	-21.95	
	0.2435	24.55	AVG	9.92	34.47	51.98	-17.51	
	0.3743	26.99	QP	9.90	36.89	58.40	-21.51	
	0.3743	17.90	AVG	9.90	27.80	48.40	-20.60	
	0.4858	28.91	QP	9.90	38.81	56.24	-17.43	
	0.4858	19.57	AVG	9.90	29.47	46.24	-16.77	
	0.8532	23.65	QP	9.92	33.57	56.00	-22.43	
	0.8532	15.56	AVG	9.92	25.48	46.00	-20.52	
*	13.5625	54.86	peak	10.20	65.06	60.00	5.06	RFID



Worldwide Testing Services(Taiwan) Co., Ltd.

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FCC ID: 2ATG9AR2015E



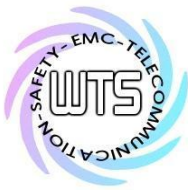
Mk.	Frequency (MHz)	Reading (dBuV)	Detector	Corrected factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Comment
	0.1556	31.92	QP	9.95	41.87	65.70	-23.83	
	0.1556	24.73	AVG	9.95	34.68	55.70	-21.02	
	0.1631	30.27	QP	9.94	40.21	65.30	-25.09	
	0.1631	10.53	AVG	9.94	20.47	55.30	-34.83	
	0.2006	27.44	QP	9.92	37.36	63.59	-26.23	
	0.2006	21.66	AVG	9.92	31.58	53.59	-22.01	
	0.4881	28.21	QP	9.90	38.11	56.20	-18.09	
	0.4881	18.66	AVG	9.90	28.56	46.20	-17.64	
	0.6215	27.43	QP	9.90	37.33	56.00	-18.67	
	0.6215	18.42	AVG	9.90	28.32	46.00	-17.68	
	0.8532	27.23	QP	9.91	37.14	56.00	-18.86	
	0.8532	19.90	AVG	9.91	29.81	46.00	-16.19	
*	13.5625	55.36	peak	10.14	65.50	60.00	5.50	RFID

- 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.

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.



Registration number: W6M21905-19082-C-1
FCC ID: 2ATG9AR2015E

Appendix

Measurement diagrams

Radiated Emissions



Address: 6F., No. 58, Ln 188, Ruey Kuang Rd, NeiHu, Taipei
Tel: +886-2-6606-8877
Fax: +886-2-6606-8875

Radiated Emission Measurement

Operator: Sky

File : 1

Data : #1

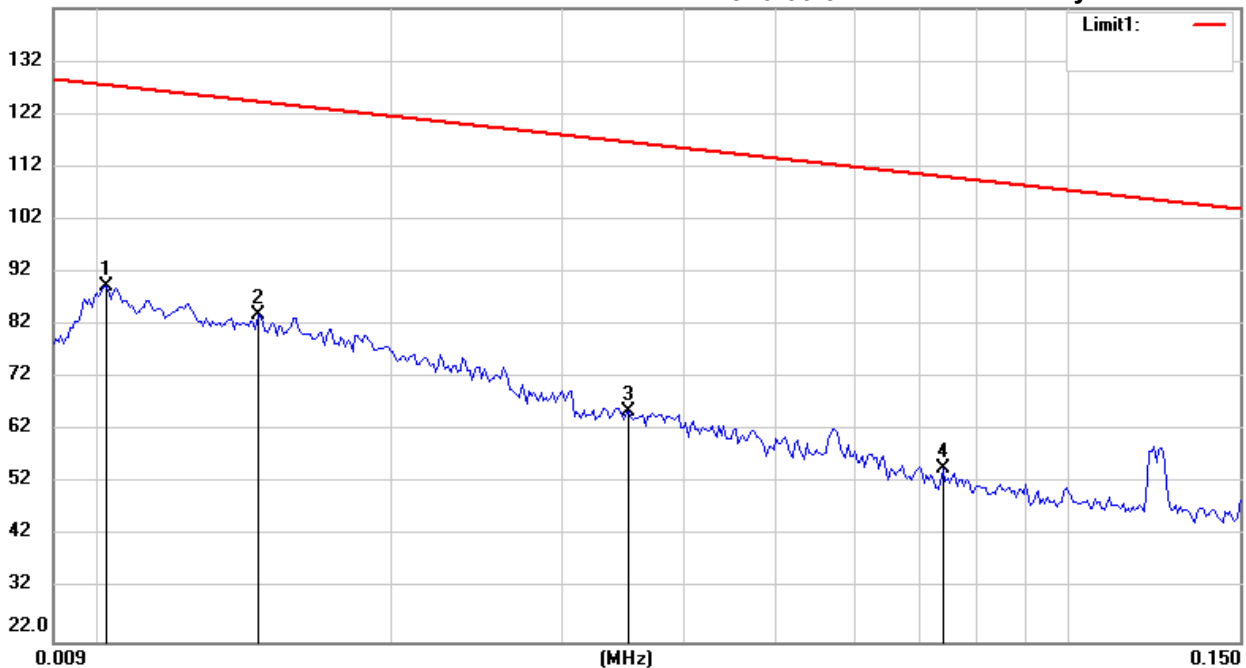
Date: 7/8/2019

Temperature: 29.8 °C

142.0 dBuV/m

Time: 9:36:51 AM

Humidity: 66.2 %



Site : Chamber

Condition : FCC 15.225 RE (3m)(<30MHz)

EUT : W6M21905-19082

M/N:

Test Mode : TX 13.56MHz

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
*	0.0102	-5.27	peak	94.73	89.46	127.42	100	15	-37.96	
	0.0146	-6.72	peak	90.66	83.94	124.31	100	70	-40.37	
	0.0352	-9.58	peak	75.21	65.63	116.67	100	150	-51.04	
	0.0740	-13.82	peak	68.55	54.73	110.21	100	245	-55.48	

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



Address: 6F., No. 58, Ln 188, Ruey Kuang Rd, Neihu, Taipei
Tel: +886-2-6606-8877
Fax: +886-2-6606-8875

Radiated Emission Measurement

Operator: Sky

File : 2

Data : #1

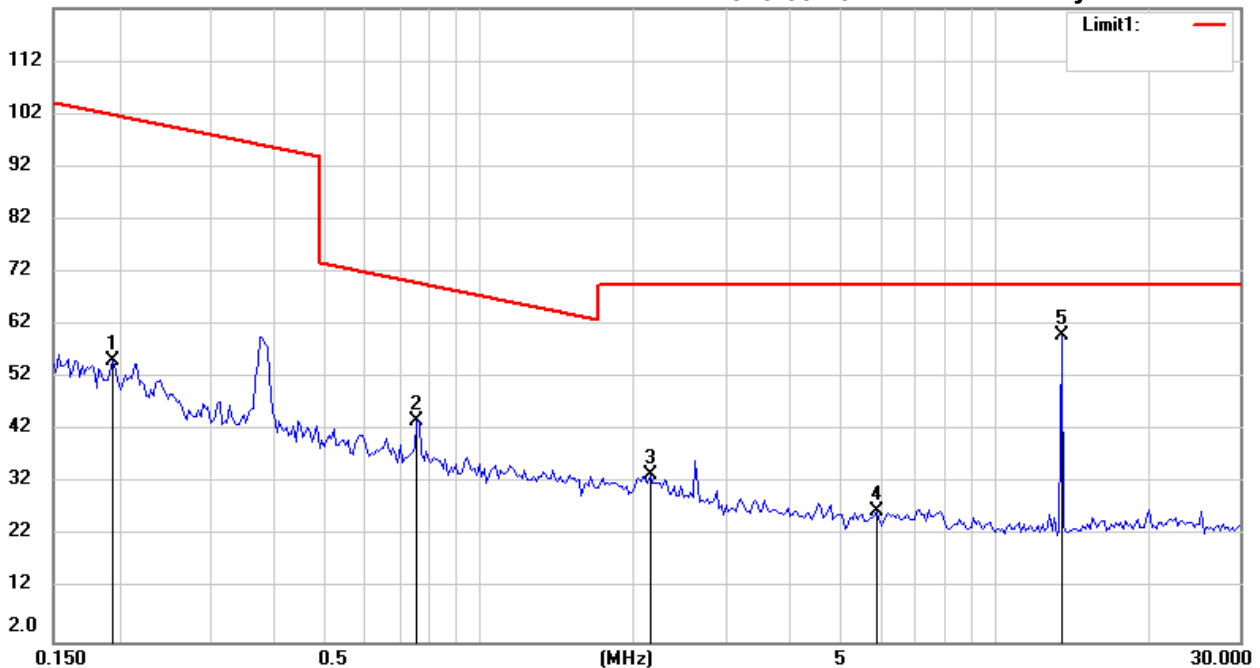
Date: 7/8/2019

Temperature: 29.8 °C

122.0 dBuV/m

Time: 9:35:25 AM

Humidity: 66.2 %



Site : Chamber

Condition : FCC 15.225 RE (3m)(<30MHz)

EUT : W6M21905-19082

M/N:

Test Mode : TX 13.56MHz

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
	0.1955	-5.56	peak	60.77	55.21	101.78	100	340	-46.57	
	0.7613	-5.22	peak	48.92	43.70	69.97	100	160	-26.27	
	2.1554	-7.63	peak	41.31	33.68	69.54	100	255	-35.86	
	5.9100	-7.90	peak	34.51	26.61	69.54	100	170	-42.93	
*	13.5292	26.38	peak	33.78	60.16	69.54			-9.38	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: +886-2-6606-8875

Radiated Emission Measurement

Operator: Sky

File : 3

Data : #1

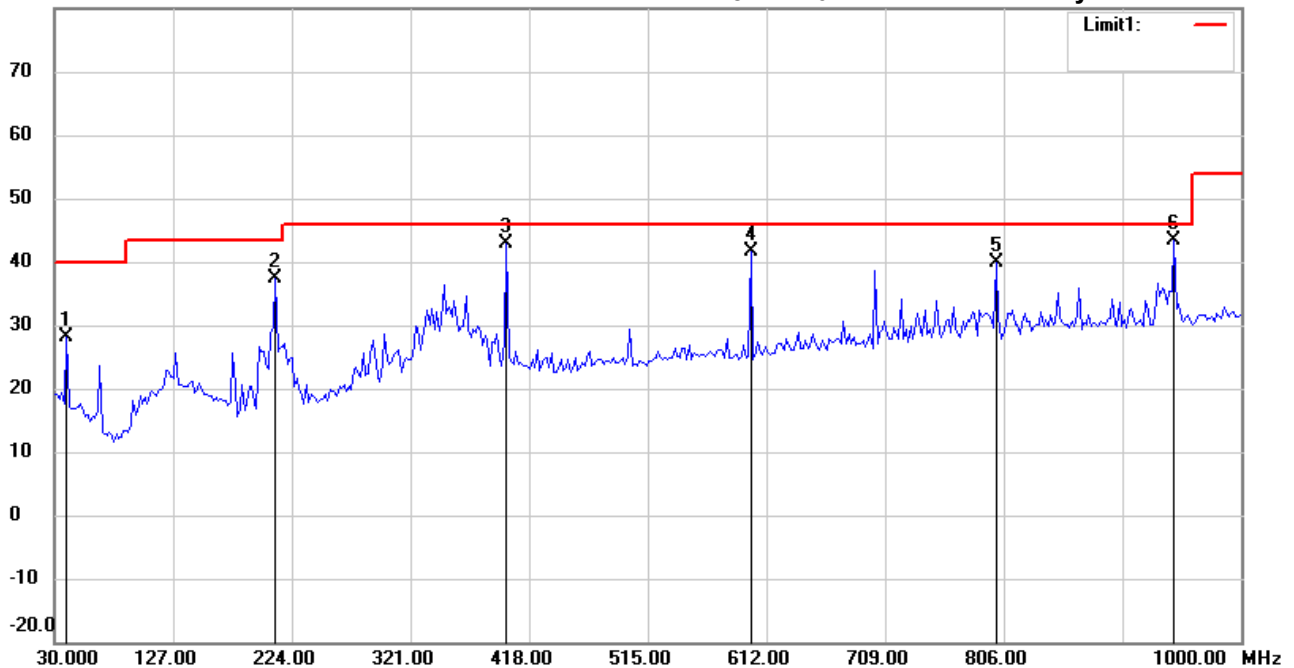
Date: 7/8/2019

Temperature: 29.8 °C

80.0 dBuV/m

Time: 12:20:14 AM

Humidity: 66.2 %



Site : Chamber

Condition : FCC_part 15 RE-Class C_30-1000MHz

EUT : W6M21905-19082

M/N:

Test Mode : TX 13.56MHz

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
	39.7194	37.37	peak	-9.30	28.07	40.00	100	14	-11.93	
	210.7812	48.04	peak	-10.72	37.32	43.50	100	255	-6.18	
	399.3387	46.71	peak	-3.85	42.86	46.00	100	105	-3.14	
	599.5590	43.76	peak	-2.20	41.56	46.00	100	45	-4.44	
	799.7794	38.67	peak	1.19	39.86	46.00	100	237	-6.14	
*	945.5711	39.29	peak	4.13	43.42	46.00	100	10	-2.58	

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



Address: 6F., No. 58, Ln 188, Ruey Kuang Rd, NeiHu, Taipei
Tel: +886-2-6606-8877
Fax: +886-2-6606-8875

Radiated Emission Measurement

Operator: Sky

File :3

Data :#2

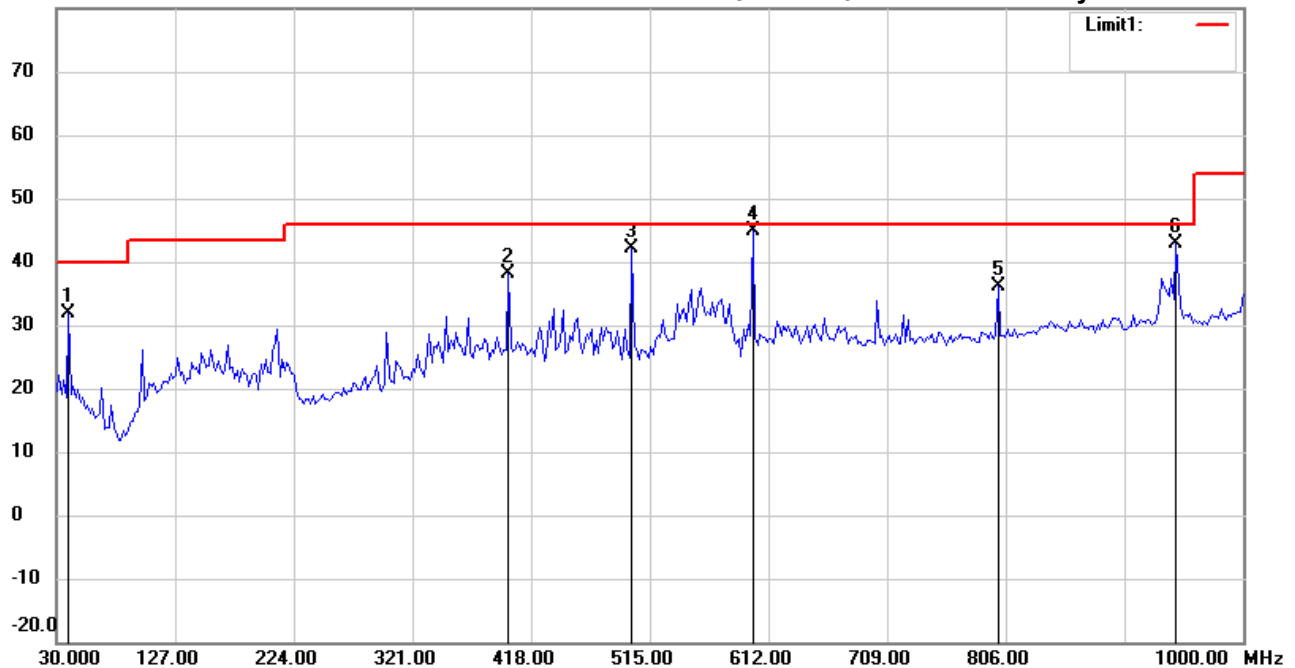
Date: 7/8/2019

Temperature: 29.8 °C

80.0 dBuV/m

Time: 12:22:31 AM

Humidity: 66.2 %



Site : Chamber

Condition : FCC_part 15 RE-Class C_30-1000MHz

EUT : W6M21905-19082

M/N:

Test Mode : TX 13.56MHz

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
	39.7194	41.09	peak	-9.30	31.79	40.00	100	90	-8.21	
	399.3387	42.03	peak	-3.85	38.18	46.00	100	140	-7.82	
	500.4207	45.11	peak	-2.96	42.15	46.00	100	215	-3.85	
*	599.5590	47.01	peak	-2.20	44.81	46.00	100	30	-1.19	
	799.7794	34.92	peak	1.19	36.11	46.00	100	110	-9.89	
	945.5711	38.84	peak	4.13	42.97	46.00	100	25	-3.03	

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