

FCC PART 15 SUBPART C TEST REPORT
for
Smart Home Alarm System
Model No.: MLx-xxx Series (x=0~9, A~Z or blank)
FCC ID: GX9ML

of

Applicant: CLIMAX TECHNOLOGY CO., LTD.
Address: No. 258, Sinhu 2nd Rd., Neihu District,
Taipei City 114, Taiwan (R.O.C.)

Tested and Prepared

by

Worldwide Testing Services (Taiwan) Co., Ltd.

FCC Registration No.: 930600

Industry Canada filed test laboratory Reg. No. IC 5679A-1

A2LA Accredited No.: 2732.01



Report No.: W6M21402-13847-C-1

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



TABLE OF CONTENTS

1	GENERAL INFORMATION	2
1.1	NOTES.....	2
1.2	TESTING LABORATORY	3
1.2.1	Location	3
1.2.2	Details of accreditation status	3
1.3	DETAILS OF APPROVAL HOLDER.....	3
1.4	APPLICATION DETAILS	4
1.5	TEST ITEM.....	4
1.6	TEST STANDARDS.....	5
2	TECHNICAL TEST.....	5
2.1	SUMMARY OF TEST RESULTS	5
2.2	TEST ENVIRONMENT	5
2.3	TEST EQUIPMENT UTILIZED	6
2.4	GENERAL TEST PROCEDURE	8
3	TEST RESULTS (ENCLOSURE).....	9
3.1	TRANSMISSION REQUIREMENTS.....	10
3.1.1	Limit of Transmission Time	10
3.1.2	Active Time	10
3.2	OUTPUT POWER (FIELD STRENGTH)	11
3.3	OUT OF BAND RADIATED EMISSIONS.....	12
3.4	TRANSMITTER RADIATED EMISSIONS IN RESTRICTED BANDS	13
3.5	SPURIOUS EMISSION RADIATED, TRANSMITTER	14
3.6	CHANNEL BANDWIDTH.....	16
3.7	ANTENNA REQUIREMENT	17
3.8	DUTY CYCLE	18
3.9	CONDUCTED MEASUREMENT AT (AC) POWER LINE	19



Registration number: W6M21402-13847-C-1
FCC ID: GX9ML

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:

March 05, 2014

Leon Chueh

Date

WTS-Lab.

Name

Signature

Technical responsibility for area of testing:

March 05, 2014

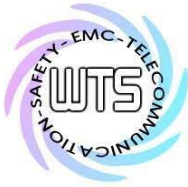
Kevin Wang

Date

WTS

Name

Signature



Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M21402-13847-C-1

FCC ID: GX9ML

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. 930600

Industry Canada filed test laboratory Reg. No. IC 5679A-1



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 : CLIMAX TECHNOLOGY CO., LTD.

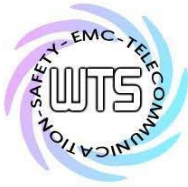
Street : No. 258, Sinhu 2nd Rd., Neihu District,

Town : Taipei City 114,

Country : Taiwan (R.O.C.)

Telephone : +886-2-2794-0001

Fax : +886-2-2792-6618



Registration number: W6M21402-13847-C-1
FCC ID: GX9ML

1.4 Application details

Date of receipt of test item: February 19, 2014
Date of test: from February 20, 2014 to March 04, 2014

1.5 Test item

Description of test item: Smart Home Alarm System
Type identification: MLx-xxx Series (x=0~9, A~Z or blank)
Brand name: Vesta
Multi-listing model number: MHx-xxx Series (x=0~9, A~Z or blank)
Transmitting frequency: 433.92 MHz
Operation mode: Duplex
Voltage supply: Adaptor: (I/P: AC 100-240V~50/60Hz, 0.6A
O/P: DC 12V, 2A)
Battery: (NI-MH 1100mAh, 1.2VDC*6 AA)

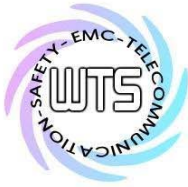
(The device is tested under fresh battery condition.)

Highest clock frequency: 433.92 MHz
Antenna type: Monopole antenna
Antenna gain: -1.17 dBi
Photos: see Annex

Manufacturer (if applicable)

Name: ./.
Street: ./.
Town: ./.
Country: ./.

Additional information: ./.



Registration number: W6M21402-13847-C-1
FCC ID: GX9ML

1.6 Test standards

Technical standard: FCC RULES PART 15 SUBPART C § 15.231 (a) (2011-10)

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 as specified in 3 were ascertained in the course of the tests performed. ☐

2.2 Test environment

Temperature:	23 °C
Relative humidity content:	20 ... 75 %
Air pressure:	86 ... 103 kPa
Details of power supply:	Adaptor: (I/P: AC 100-240V~50/60Hz, 0.6A O/P: DC 12V, 2A) Battery: (NI-MH 1100mAh, 1.2VDC*6 AA)

Note:

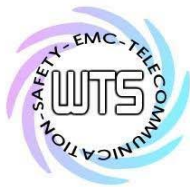
1. This test report is valid in connection to the model has been tested, any modification to the product which is different from the test model will avoid the certification of the test report.
2. This test report shall always be duplicated in full pages unless the written approval of the testing laboratory is obtained.
3. The x in model number is representing different case shape, case colors, led shape, led colors and customer's number.



Registration number: W6M21402-13847-C-1
FCC ID: GX9ML

2.3 Test equipment utilized

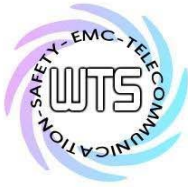
No.	Test equipment	Type	Serial No.	Manufacturer	Cal. Date	Next Cal. Date
ETSTW-CE 001	EMI TEST RECEIVER	ESHS10	842121/013	R&S	2013/9/2	2014/9/1
ETSTW-CE 003	AC POWER SOURCE	APS-9102	D161137	GW	Function Test	
ETSTW-CE 008	HF-EICHLITUNG RF STEP ATTENUATOR 139dB DPSP	334.6010.02	844581/024	R&S	Function Test	
ETSTW-CE 009	TEMP.&HUMIDITY CHAMBER	GTH-225-40-1P-U	MAA0305-009	GIANT FORCE	2013/7/10	2014/7/9
ETSTW-CE 016	TWO-LINE V-NETWORK	ENV216	100050	R&S	2013/10/28	2014/10/27
ETSTW-RE 004	EMI TEST RECEIVER	ESI 40	832427/004	R&S	2013/9/2	2014/9/1
ETSTW-RE 005	EMI TEST RECEIVER	ESVS10	843207/020	R&S	2013/9/2	2014/9/1
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	2013/10/15	2014/10/14
ETSTW-RE 027	Passive Loop Antenna	6512	00034563	ETS-Lindgren	2013/7/3	2014/7/2
ETSTW-RE 030	Double-Ridged Guide Horn Antenna	3117	00035224	EMCO	2014/3/3	2015/3/2
ETSTW-RE 045	ESA-E SERIES SPECTRUM ANALYZER	E4404B	MY45111242	Agilent	Pre-test Use	
ETSTW-RE 049	TRILOG Super Broadband test Antenna	VULB 9160	9160-3185	Schwarzbeck	2014/2/18	2015/2/17
ETSTW-RE 050	Attenuator 10dB	50HF-010-1	None	JFW	2014/3/3	2015/3/2
ETSTW-RE 051	Attenuator 6dB	50HF-006-1	None	JFW	2014/3/3	2015/3/2
ETSTW-RE 053	Attenuator 3dB	50HF-003-1	None	JFW	2014/3/3	2015/3/2
ETSTW-RE 055	SPECTRUM ANALYZER	FSU 26	200074	R&S	2013/5/31	2014/5/30
ETSTW-RE 060	Attenuator 30dB	5015-30	F651012z-01	ATM	2014/3/3	2015/3/2
ETSTW-RE 062	Amplifier Module	CHC 2	None	KMIC	2013/11/27	2014/11/26
ETSTW-RE 064	Bluetooth Test Set	MT8852B-042	6K00005709	Anritsu	Function Test	
ETSTW-RE 069	Double-Ridged Guide Horn Antenna	3117	00069377	EMCO	Function Test	
ETSTW-RE 072	CELL SITE TEST SET	8921A	3339A00375	HP	2013/10/7	2014/10/6
ETSTW-RE 088	SOLID STATE AMPLIFIER	KMA180265A01	99057	KMIC	2013/10/11	2014/10/10
ETSTW-RE 099	DC Block	50DB-007-1	None	JFW	2014/3/3	2015/3/2
ETSTW-RE 106	Humidity Temperature Meter	TES-1366	091011113	TES	2013/12/04	2014/12/03
ETSTW-RE 111	TRILOG Super Broadband test Antenna	VULB 9160	9160-3309	Schwarz beck	2013/12/27	2014/12/26
ETSTW-RE 112	AC POWER SOURCE	TFC-1005	None	T-Power	Function test	
ETSTW-RE 115	2.4GHz Notch Filter	N0124411	473874	MICROWAVE CIRCUITS	2014/1/10	2015/1/09
ETSTW-RE 120	RF Player	MP9200	MP9210-111022	ADIVIC	Function test	
ETSTW-RE 122	SIGNAL GENERATOR	SMF100A	102149	R&S	2013/6/28	2014/6/27
ETSTW-RE 125	5GHz Notch filter	5NSL11-5200/E221.3-O/O	1	K&L Microwave	2013/8/16	2014/8/15



Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M21402-13847-C-1
FCC ID: GX9ML

ETSTW-RE 126	5GHz Notch filter	5NSL11-5800/E221.3-O/O	1	K&L Microwave	2013/8/16	2014/8/15
ETSTW-RE 127	RF Switch Box	RFS-01	None	WTS	2014/3/3	2015/3/2
ETSTW-RE 128	5.3GHz Notch filter	N0153001	SN487233	Microwave Circuits	2013/8/13	2014/8/12
ETSTW-RE 129	5.5GHz Notch filter	N0555984	SN487234	Microwave Circuits	2013/8/13	2014/8/12
ETSTW-RE 130	Handheld RF Spectrum Analyzer	N9340A	CN0147000204	Agilent	Pre-test Use	
ETSTW-GSM 002	Universal Radio Communication Tester	CMU 200	109439	R&S	2013/10/7	2014/10/6
ETSTW-GSM 019	Band Reject Filter	WRCTF824/849-822/851-40/12+9SS	3	WI	2014/1/10	2015/1/09
ETSTW-GSM 020	Band Reject Filter	WRCD1747/1748-1743/1752-32/5SS	1	WI	2014/1/10	2015/1/09
ETSTW-GSM 021	Band Reject Filter	WRCD1879.5/1880.5-1875.5/1884.5-32/5SS	3	WI	2014/1/10	2015/1/09
ETSTW-GSM 022	Band Reject Filter	WRCT901.9/903.1-904.25-50/8SS	1	WI	2014/1/10	2015/1/09
ETSTW-GSM 023	Power Divider	4901.19.A	None	SUHNER	2013/9/18	2014/9/17
ETSTW-Cable 010	BNC Cable	5 M BNC Cable	None	JYE BAO CO.,LTD.	2014/2/27	2015/2/26
ETSTW-Cable 011	BNC Cable	BNC Cable 1	None	JYE BAO CO.,LTD.	Pre-test Use NCR	
ETSTW-Cable 012	N TYPE To SMA Cable	Cable 012	None	JYE BAO CO.,LTD.	2014/2/27	2015/2/26
ETSTW-Cable 016	BNC Cable	Switch Box	B Cable 1	Schwarz beck	2014/2/27	2015/2/26
ETSTW-Cable 017	BNC Cable	X Cable	B Cable 2	Schwarz beck	2014/2/27	2015/2/26
ETSTW-Cable 018	BNC Cable	Y Cable	B Cable 3	Schwarz beck	2014/2/27	2015/2/26
ETSTW-Cable 019	BNC Cable	Z Cable	B Cable 4	Schwarz beck	2014/2/27	2015/2/26
ETSTW-Cable 022	N TYPE Cable	5006	0002	JYE BAO CO.,LTD.	2014/2/19	2015/2/18
ETSTW-Cable 026	Microwave Cable	SUCOFLEX 104	279075	HUBER+SUHNER	2014/3/3	2015/3/2
ETSTW-Cable 027	Microwave Cable	SUCOFLEX 104	279083	HUBER+SUHNER	2014/3/3	2015/3/2
ETSTW-Cable 028	Microwave Cable	FA147A0015M2020	30064-2	UTIFLEX	2013/10/11	2014/10/10
ETSTW-Cable 029	Microwave Cable	FA147A0015M2020	30064-3	UTIFLEX	2013/10/11	2014/10/10
ETSTW-Cable 030	Microwave Cable	SUCOFLEX 104 (S_Cable 9)	279067	HUBER+SUHNER	2014/3/3	2015/3/2
ETSTW-Cable 031	Microwave Cable	SUCOFLEX 104 (S_Cable 10)	238092	HUBER+SUHNER	2013/11/27	2014/11/26
ETSTW-Cable 043	Microwave Cable	SUCOFLEX 104	317576	HUBER+SUHNER	2013/11/27	2014/11/26
ETSTW-Cable 047	Microwave Cable	SUCOFLEX 104	325518	HUBER+SUHNER	2013/11/27	2014/11/26
ETSTW-Cable 053	N TYPE To SMA Cable	RG142	None	JYE BAO CO.,LTD.	2014/2/19	2015/2/18
ETSTW-Cable 058	Microwave Cable	SUCOFLEX 104	none	HUBER+SUHNER	2014/2/19	2015/2/18
WTSTW-SW 002	EMI TEST SOFTWARE	EZ EMC	None	Farad	Version ETS-03A1	



Registration number: W6M21402-13847-C-1
FCC ID: GX9ML

2.4 General Test Procedure

POWER LINE CONDUCTED INTERFERENCE: The procedure used was ANSI STANDARD C63.4-2009 5.2 using a 50μH 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 ANSI STANDARD C63.4-2009 6.4 using a spectrum analyzer. The bandwidth of the spectrum analyzer was 100 kHz with an appropriate sweep speed. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The resolution bandwidth was the 100 kHz and the video bandwidth was 300 kHz.

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/m + 6 dB = 36.36 dBμV/m @3m

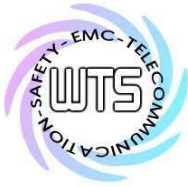
ANSI STANDARD C63.4-2009 6.3.1 MEASUREMENT PROCEDURES: The EUT was placed on a table 80 cm high and with dimensions of 1m by 1.5m (non metallic table). The EUT was placed in the center of the table. The table used for radiated measurements is capable of continuous rotation. The spectrum was scanned from 30 MHz to 10th harmonic of the fundamental.

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

Measurements were made by Worldwide Testing Services(Taiwan) Co., Ltd. at the registered open field test site located at. The Registration Number: **930600**

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 C63.4-2009 10.2.7: 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.



Registration number: W6M21402-13847-C-1
FCC ID: GX9ML

3 Test results (enclosure)

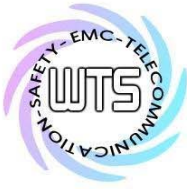
☒ 1st test

☐ test after modification

☐ production test

TEST CASE	Para. Number	Required	Test passed	Test failed
Transmission Requirements	FCC 15.231(a)	☒	☒	☐
Radiated Emission	FCC 15.231(b)	☒	☒	☐
Bandwidth of Emission	FCC 15.231(c)	☒	☒	☐
Frequency Tolerance	FCC 15.231(d)	☐	☐	☐
Period Alternate Field Strength Requirements	FCC 15.231(e)	☐	☐	☐
Antenna Requirement	FCC 15.203	☒	☒	☐
Conducted Measurement at (AC) Power Line	FCC 15.207	☒	☒	☐

The following is intentionally left blank.



Registration number: W6M21402-13847-C-1
FCC ID: GX9ML

3.1 Transmission Requirements

FCC 15.231(a)

3.1.1 Limit of Transmission Time

☒ According to 15.231(a)(1), a manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

☐ According to 15.231(a)(2), a transmitter activated automatically shall cease transmission within 5 seconds after activation.

3.1.2 Active Time

☒ This manually operated transmitter employs a switch that automatically deactivate the transmitter within 361.122 ms of being released.

☐ This transmitter is operated by automatic activation and active will cease transmission in __ ms after activation..

Explanation: See attached diagrams in appendix.

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



Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M21402-13847-C-1

FCC ID: GX9ML

3.2 Output Power (Field Strength)

Model: MLx-xxx Series (x=0~9, A~Z or blank)

Date: 2014/3/3

Mode: power

Temperature: 24 °C

Engineer: Leon

Polarization: Horizontal

Humidity: 60 %

Frequency (MHz)	Reading (dBuV) Peak	Factor (dB) Corr. Duty		Result @3m (dBuV/m) Peak Ave.		Limit @3m (dBuV/m) Peak Ave.		Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
433.9325	52.17	19.76	-0.21	71.93	71.72	100.80	80.80	-9.08	0	100

Polarization: Vertical

Frequency (MHz)	Reading (dBuV) Peak	Factor (dB) Corr. Duty		Result @3m (dBuV/m) Peak Ave.		Limit @3m (dBuV/m) Peak Ave.		Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
433.9325	50.21	19.76	-0.21	69.97	69.76	100.80	80.80	-11.04	150	100

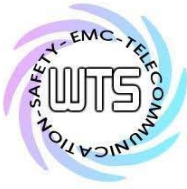
Limit 15.231(b)

Fundamental Frequency (MHz)	Field strength of fundamental, limit μV/m
40.66 – 40.70	2,250
70 – 130	1,250
130 – 174	1,250 to 3,750
174 – 260	3,750
260 – 470	3,750 to 12,500** (433.92 MHz: 80.8 dBμV/m = 10,997 μV/m)
Above 470	12,500

** linear interpolation

Explanation: See attached diagrams in appendix.

Test equipment used: ETSTW-RE 004, ETSTW-RE 111



Registration number: W6M21402-13847-C-1
FCC ID: GX9ML

3.3 Out of Band Radiated Emissions

FCC Rule: 15.231(b) , 15.35

For out of band emissions that are close to or that exceed the 20 dB attenuation requirement described in the specification, radiated measurements were performed at a 3 m separation distance to determine whether these emissions complied with the general radiated emission requirement.

Guidance on Measurement of pulsed emission: 15.35(c)

“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.”

Duty Cycle correction = $20 \log (\text{dwell time}/100\text{ms or one period})$

Limits:

For frequencies (Average measurements)

Correction factor conform 15.35 (c) (Average measurements)

Duty cycle correction :

Max. Peak reading – duty cycle correction

Max permitted average Limits = Max permitted Fundamental limit – 20 dB

For example for 433.92 fundamental carrier:

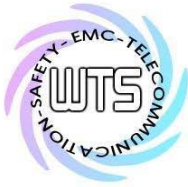
Max permitted average Limit: $80.80 \text{ dB}\mu\text{V/m} - 20 \text{ dB} = 60.80 \text{ dB}\mu\text{V/m}$

For frequencies above 1GHz (Peak measurements).

Modified Limits for peak conform 15.35 (b) = Max Permitted average Limits + 20dB (because Peak detector is used)

Explanation: See attached diagrams in appendix.

Test equipment used: ETSTW-RE 004, ETSTW-RE 030, ETSTW-RE 111,



Registration number: W6M21402-13847-C-1
FCC ID: GX9ML

3.4 Transmitter Radiated Emissions in restricted Bands

FCC Rules: 15.231 (b), 15.205, 15.209, 15.35

Radiated emission measurements were performed from 30 MHz to 8000 MHz.

For radiated emission tests, the analyzer setting was as followings:

RES BW VID BW

Frequency <1 GHz 100 kHz 100 kHz (Peak measurements)

Frequency >1 GHz 1 MHz 1 MHz (Peak measurements)

1 MHz 1 MHz (Average measurements)

Limits:

For frequencies below 1GHz :

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

For frequencies above 1GHz (Average measurements).

Guidance on Measurement of pulsed emission:

“If the emission is pulsed, modify the unit for continues operation , use the settings shown above, then correct the reading by subtracting the peak-average correction factor, derived from the appropriate duty cycle calculation.

For frequencies above 1GHz (Average measurements).

The correction factor, based on the channel dwell time in a 100 ms period, may be mathematically applied to a measurement made with an average detector, to further reduce the value.

Duty cycle correction = $20 \log (\text{dwell time}/100\text{ms})$

No duty cycle correction was added to the reading

Modified Limits for peak conform 15.35 (b) = Max Permitted average Limits + 20dB (because Peak detector is used)

Above 960 MHz

For mode DSSS CW: $54 \text{ dB}\mu\text{V/m} + 20 \text{ dB} = 74 \text{ dB}\mu\text{V/m}$

Explanation: See attached diagrams in appendix.



Registration number: W6M21402-13847-C-1

FCC ID: GX9ML

3.5 Spurious Emission radiated, Transmitter

Spurious emission was measured with modulation (declared by manufacturer).

The limits on the field strength of the spurious emission in the table § 15.231(b) are based on the fundamental frequency of the intentional radiator. Spurious emission shall be attenuated to the average (or alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in § 15.209, whichever limit permits a higher field strength.

In addition, radiated emission which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (See § 15.205(c)).

SAMPLE CALCULATION OF LIMIT. All results will be updated by an automatic measuring system in accordance to point 2.3.

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.

The peak and average spurious emission plots was measured with the average limits.

In the Table being listed the critical peak and average value an exhibit the compliance with the above calculated Limits.

Summary table with radiated data of the test plots

Model: MLx-xxx Series (x=0~9, A~Z or blank)

Date: 2014/2/23~2014/3/3

Mode: TX

Temperature: 24 °C

Engineer: Leon

Polarization: Horizontal

Humidity: 60 %

Frequency (MHz)	Reading (dBuV)	Detector	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
108.4570	23.59	peak	12.20	35.79	43.50	-7.71	90	100
121.9000	21.94	peak	13.37	35.31	43.50	-8.19	155	100

Frequency (MHz)	Reading (dBuV) Peak	Factor (dB)		Result @3m (dBuV/m)		Limit @3m (dBuV/m)		Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
		Corr.	Duty	Peak	Ave.	Peak	Ave.			
325.2505	18.00	16.63	-0.21	34.63	34.42	46.00	46.00	-11.37	130	100
650.7014	14.84	23.60	-0.21	38.44	38.23	80.80	60.80	-22.57	165	100
1571.1420	44.87	-8.54	-0.21	36.33	36.12	74.00	54.00	-17.88	115	100
1695.3910	44.14	-7.30	-0.21	36.84	36.63	74.00	54.00	-17.37	70	100
2336.6730	44.05	-4.83	-0.21	39.22	39.01	74.00	54.00	-14.99	130	100
3470.9420	49.78	-2.49	-0.21	47.29	47.08	80.80	60.80	-13.72	155	100



Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M21402-13847-C-1
FCC ID: GX9ML

Polarization: Vertical

Frequency (MHz)	Reading (dBuV)	Detector	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
108.4570	29.57	peak	12.20	41.77	43.50	-1.73	55	100
121.9000	29.94	peak	13.37	43.31	43.50	-0.19	70	100

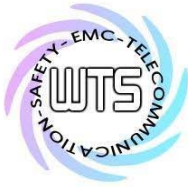
Polarization: Vertical

Frequency (MHz)	Reading (dBuV)	Factor (dB)		Result @3m (dBuV/m)		Limit @3m (dBuV/m)		Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
	Peak	Corr.	Duty	Peak	Ave.	Peak	Ave.			
325.2505	11.88	16.63	-0.21	28.51	28.30	46.00	46.00	-17.49	80	100
650.7014	11.77	23.60	-0.21	35.37	35.16	80.80	60.80	-25.64	135	100
1442.8860	44.47	-9.21	-0.21	35.26	35.05	74.00	54.00	-18.95	95	100
1695.3910	44.73	-7.30	-0.21	37.43	37.22	74.00	54.00	-16.78	160	100
2168.3370	46.62	-5.63	-0.21	40.99	40.78	80.80	60.80	-20.02	125	100
3470.9420	46.35	-2.49	-0.21	43.86	43.65	80.80	60.80	-17.15	70	100

- 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. **Measurement uncertainty for 3m measurement: 30-1000 MHz = ± 3.68 dB, 1-18 GHz = ± 5.37 dB, 18-40 GHz = ± 3.43 dB ; Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.**
 6. **See attached diagrams in appendix.**

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 030, ETSTW-RE 111



Registration number: W6M21402-13847-C-1
FCC ID: GX9ML

3.6 Channel Bandwidth

Measurement of Necessary Bandwidth (BN)

Used frequency	Bandwidth	Limit
433.92 MHz	61.12224449 kHz	1.0848 MHz

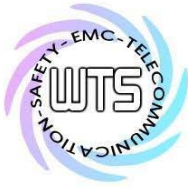
Explanation: The bandwidth fulfills the requirements of FCC § 15.231,

Limits:

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

Explanation: See attached diagrams in appendix.

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



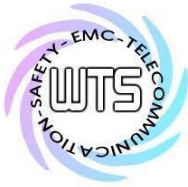
Registration number: W6M21402-13847-C-1
FCC ID: GX9ML

3.7 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 Monopole antenna is integral antenna which passes antenna requirement.

The equipment meets the requirements	yes ☒	no ☐
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Registration number: W6M21402-13847-C-1

FCC ID: GX9ML

3.8 Duty Cycle

The correction factor, based on the channel dwell time in a 100ms period, may be mathematically applied to a measurement made with an average detector, to further reduce the measured value.

Average Reading = Peak Reading (dBuV/m) + Duty Cycle Correction

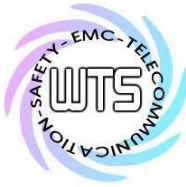
Duty Cycle Correction = $20 \log (\text{Cycle})$

In order to determine the Duty Cycle, the EUT is measured as:

Testing Mode	T period (ms)	T on (ms)	Duty Cycle	Duty Cycle Correction $20*\log(\text{Duty Cycle})$
433.92 MHz	100	97.59519	0.975951904	-0.21

Explanation: See attached diagrams in appendix.

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

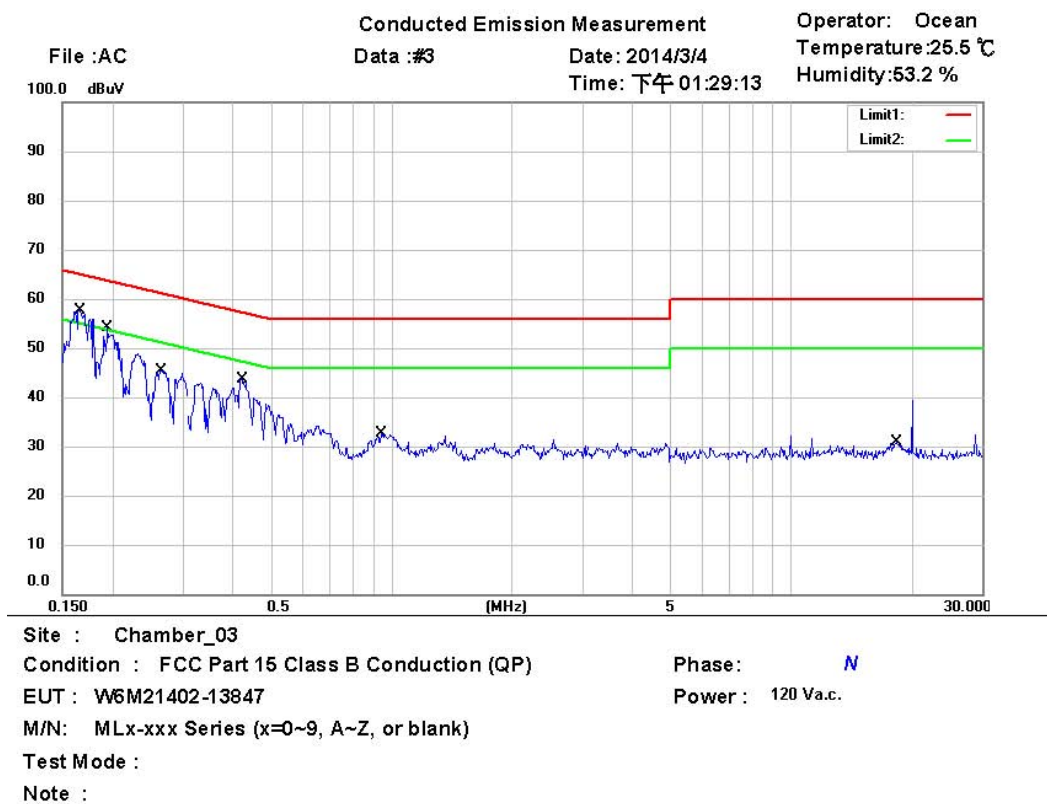


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FCC ID: GX9ML

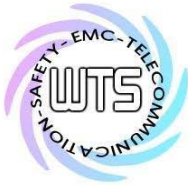
3.9 Conducted Measurement at (AC) Power Line

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
*	0.1651	46.07	QP	9.67	55.74	65.20	-9.46	
	0.1651	30.76	AVG	9.67	40.43	55.20	-14.77	
	0.1941	40.49	QP	9.67	50.16	63.86	-13.70	
	0.1941	24.81	AVG	9.67	34.48	53.86	-19.38	
	0.2634	33.63	QP	9.67	43.30	61.32	-18.02	
	0.2634	21.97	AVG	9.67	31.64	51.32	-19.68	
	0.4216	30.69	QP	9.68	40.37	57.42	-17.05	
	0.4216	21.84	AVG	9.68	31.52	47.42	-15.90	
	0.9410	17.10	QP	9.70	26.80	56.00	-29.20	
	0.9410	7.54	AVG	9.70	17.24	46.00	-28.76	
	18.3125	11.08	QP	10.18	21.26	60.00	-38.74	
	18.3125	5.57	AVG	10.18	15.75	50.00	-34.25	



Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M21402-13847-C-1
FCC ID: GX9ML

Conducted Emission Measurement

Operator: Ocean
Temperature: 25.5 °C
Humidity: 53.2 %

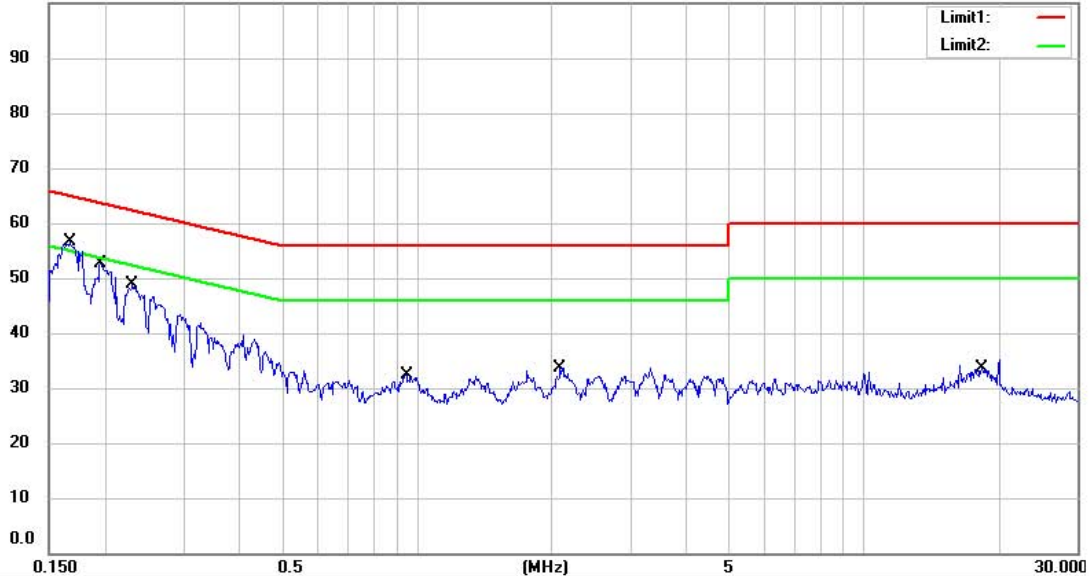
File : AC

Data : #2

Date: 2014/3/4

Time: 下午 01:25:59

100.0 dBuV



Site : Chamber_03

Condition : FCC Part 15 Class B Conduction (QP)

Phase: L1

EUT : W6M21402-13847

Power : 120 V.a.c.

M/N: MLx-xxx Series (x=0~9, A~Z, or blank)

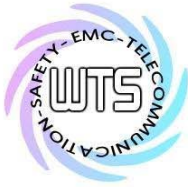
Test Mode :

Note :

Mk.	Frequency (MHz)	Reading (dBuV)	Detector	Corrected factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Comment
*	0.1661	45.11	QP	9.66	54.77	65.15	-10.38	
	0.1661	29.33	AVG	9.66	38.99	55.15	-16.16	
	0.1952	40.55	QP	9.66	50.21	63.81	-13.60	
	0.1952	23.41	AVG	9.66	33.07	53.81	-20.74	
	0.2298	36.78	QP	9.66	46.44	62.46	-16.02	
	0.2298	20.52	AVG	9.66	30.18	52.46	-22.28	
	0.9432	16.84	QP	9.70	26.54	56.00	-29.46	
	0.9432	7.06	AVG	9.70	16.76	46.00	-29.24	
	2.0795	17.40	QP	9.75	27.15	56.00	-28.85	
	2.0795	10.03	AVG	9.75	19.78	46.00	-26.22	
	18.2873	14.71	QP	10.05	24.76	60.00	-35.24	
	18.2873	8.74	AVG	10.05	18.79	50.00	-31.21	

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. Measurement uncertainty = ± 1.41 dB; Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of $k = 2$.
6. Up Line: QP Limit Line, Down Line: Ave Limit Line.



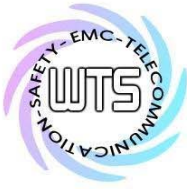
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Registration number: W6M21402-13847-C-1
FCC ID: GX9ML

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

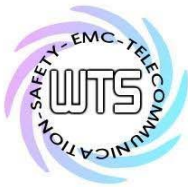
Test equipment used: ETSTW-CE 001, ETSTW-CE 003, ETSTW-CE 016, ETSTW-CE 006, ETSTW-RE045



Appendix

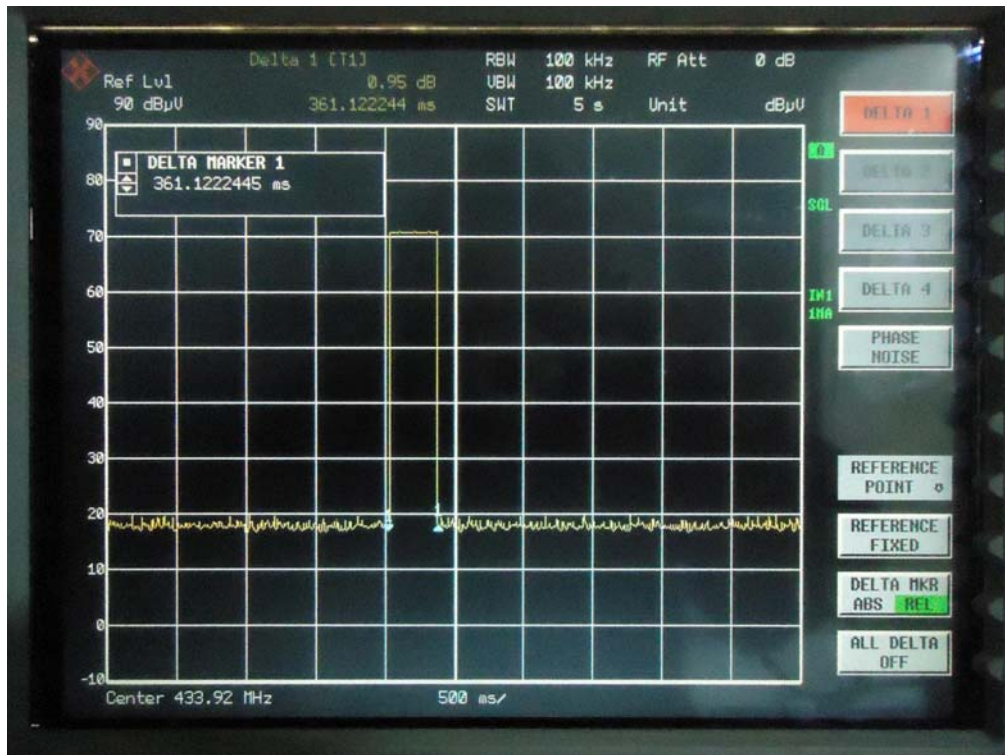
Measurement diagrams

1. Active Time
2. Channel Bandwidth
3. Output Power
4. Spurious Emissions radiated
5. Duty Cycle

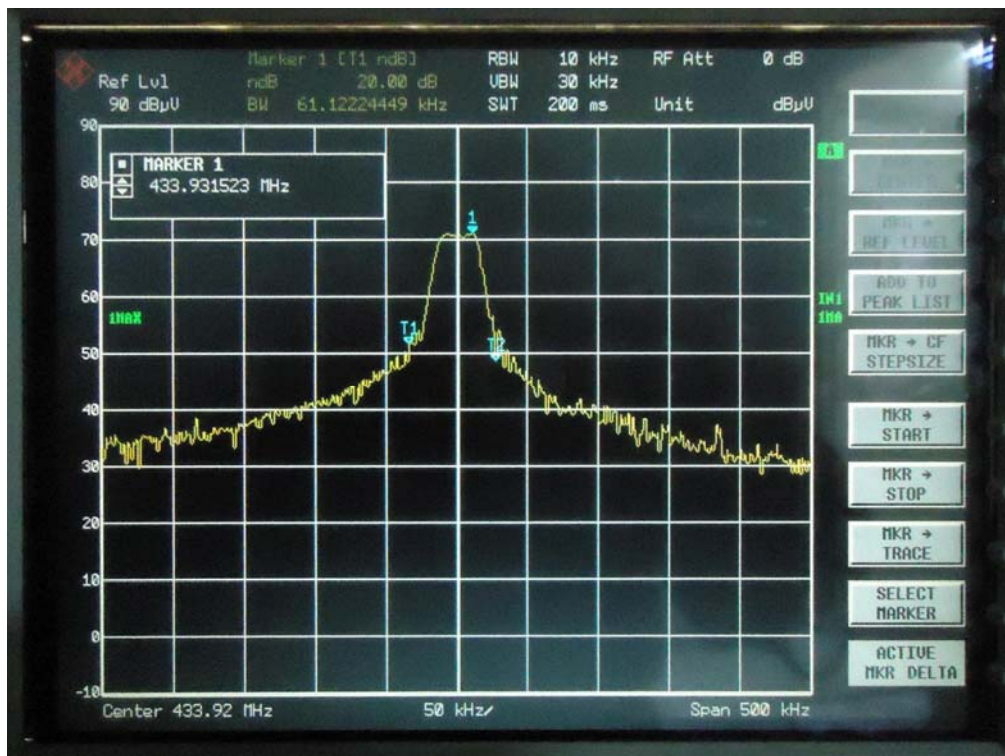


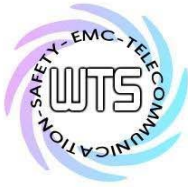
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Registration number: W6M21402-13847-C-1
FCC ID: GX9ML
Active time



Channel Bandwidth





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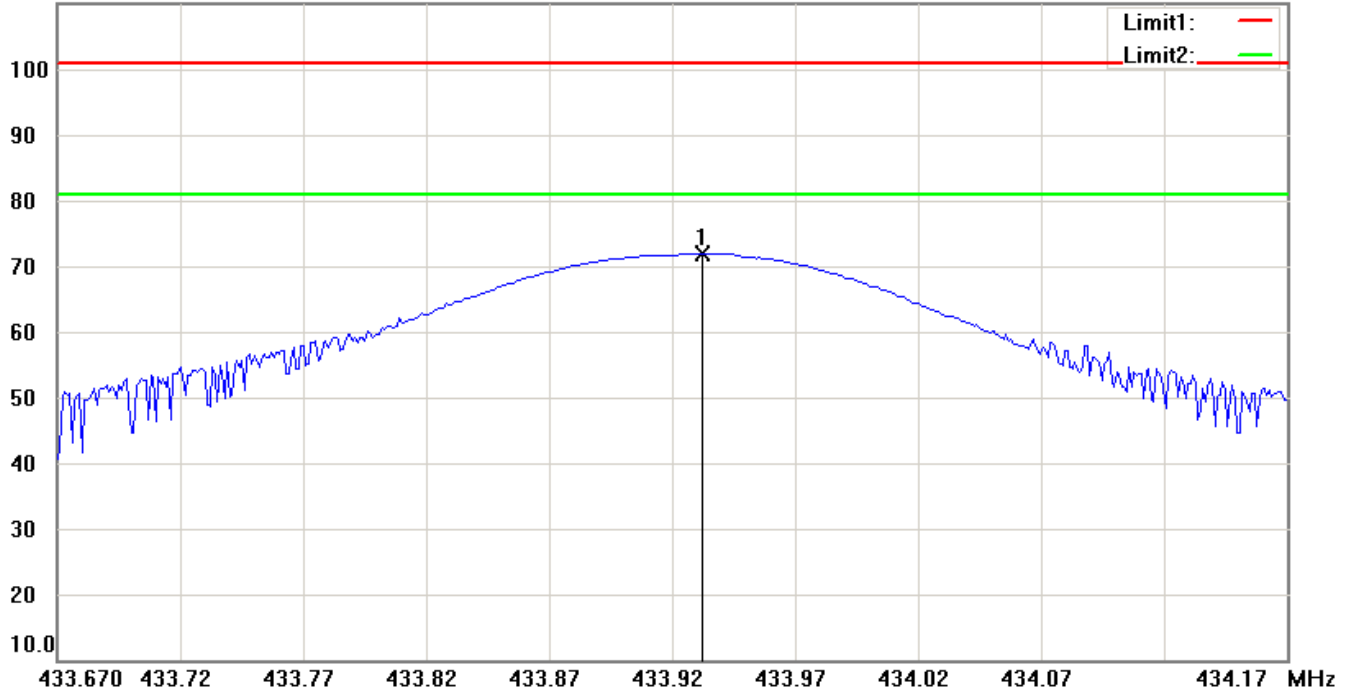
Registration number: W6M21402-13847-C-1

FCC ID: GX9ML

Output Power

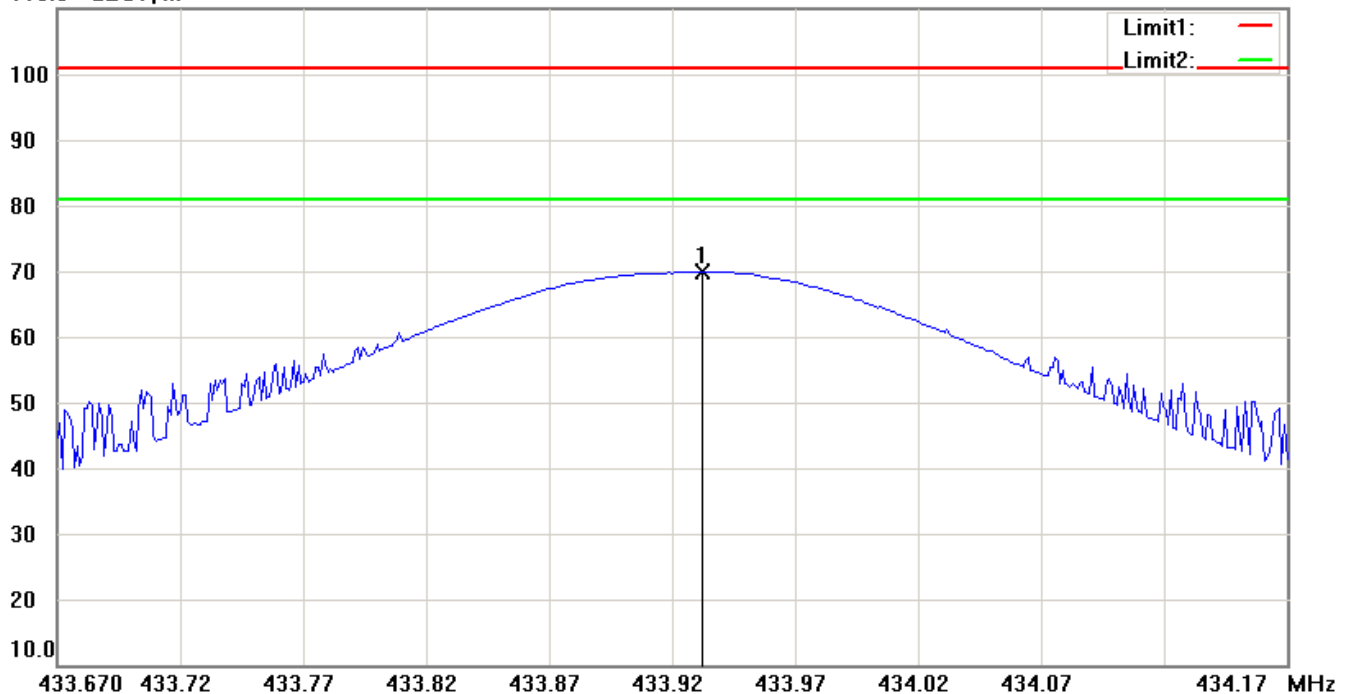
Antenna Polarization H

110.0 dBuV/m



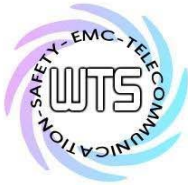
Antenna Polarization V

110.0 dBuV/m



Note:

1. The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.
2. The some frequencies may exceed the limit line without the specified detectors, but that cannot present the results are failed to the specification of test standard.
3. For corrected test results are listed in the relevant table of field Strength test data of this test report.



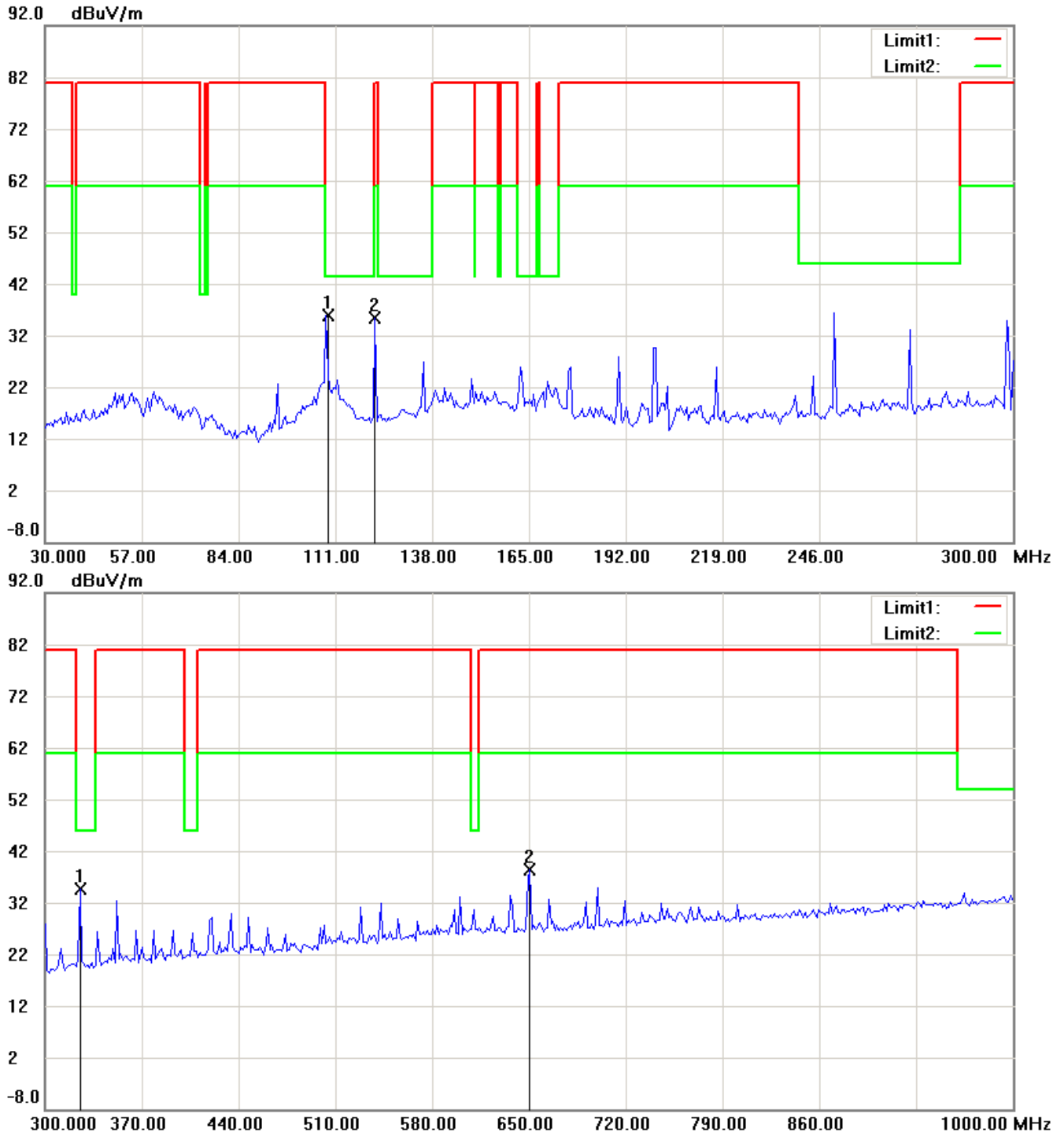
Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M21402-13847-C-1

FCC ID: GX9ML

Spurious Emissions radiated _TX

Antenna Polarization H



Note:

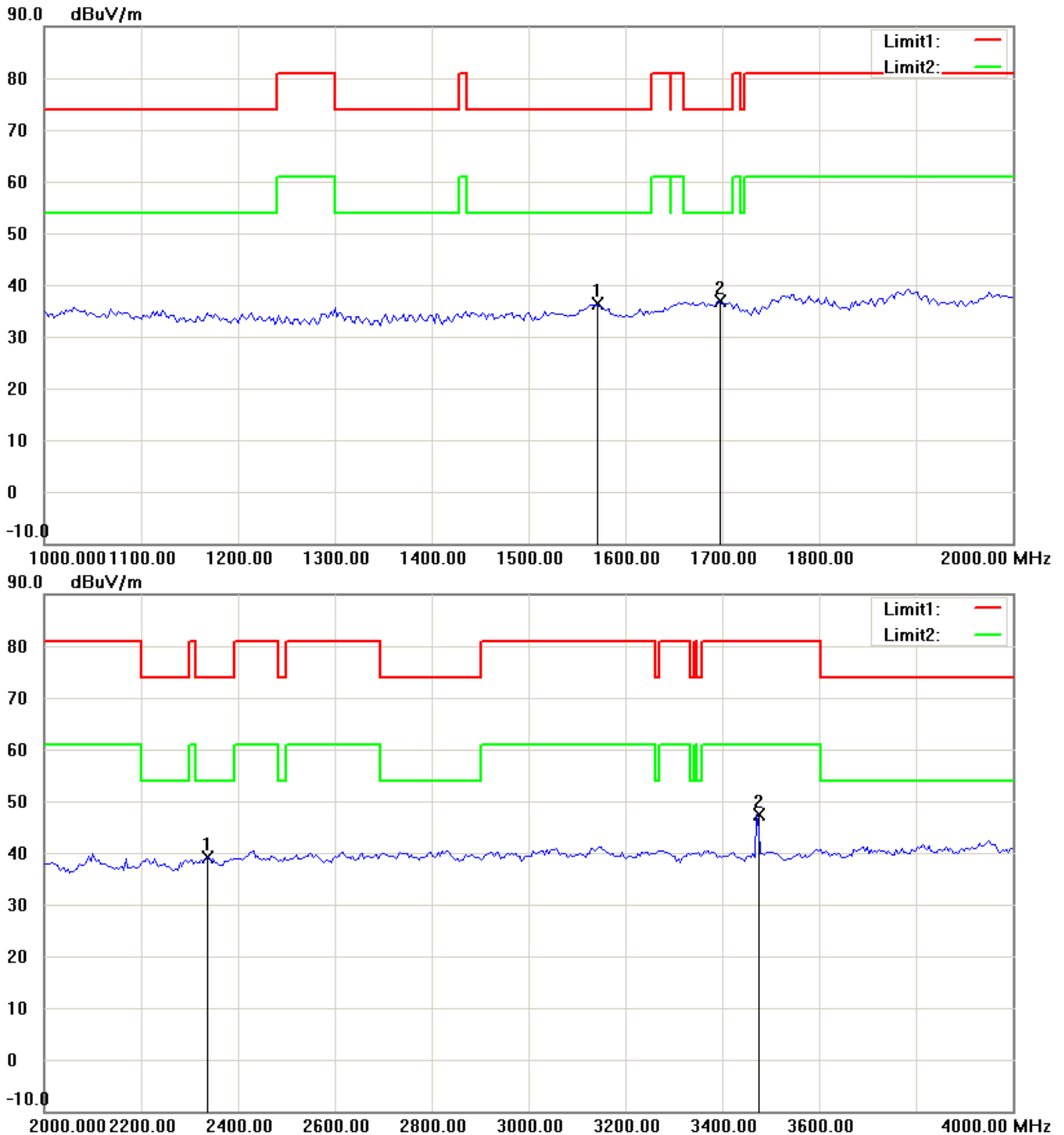
1. The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.
2. The some frequencies may exceed the limit line without the specified detectors, but that cannot present the results are failed to the specification of test standard.
3. For corrected test results are listed in the relevant table of radiated test data of this test report.



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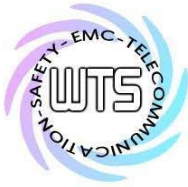
Registration number: W6M21402-13847-C-1

FCC ID: GX9ML



Note:

1. The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.
2. The some frequencies may exceed the limit line without the specified detectors, but that cannot present the results are failed to the specification of test standard.
3. For corrected test results are listed in the relevant table of radiated test data of this test report.

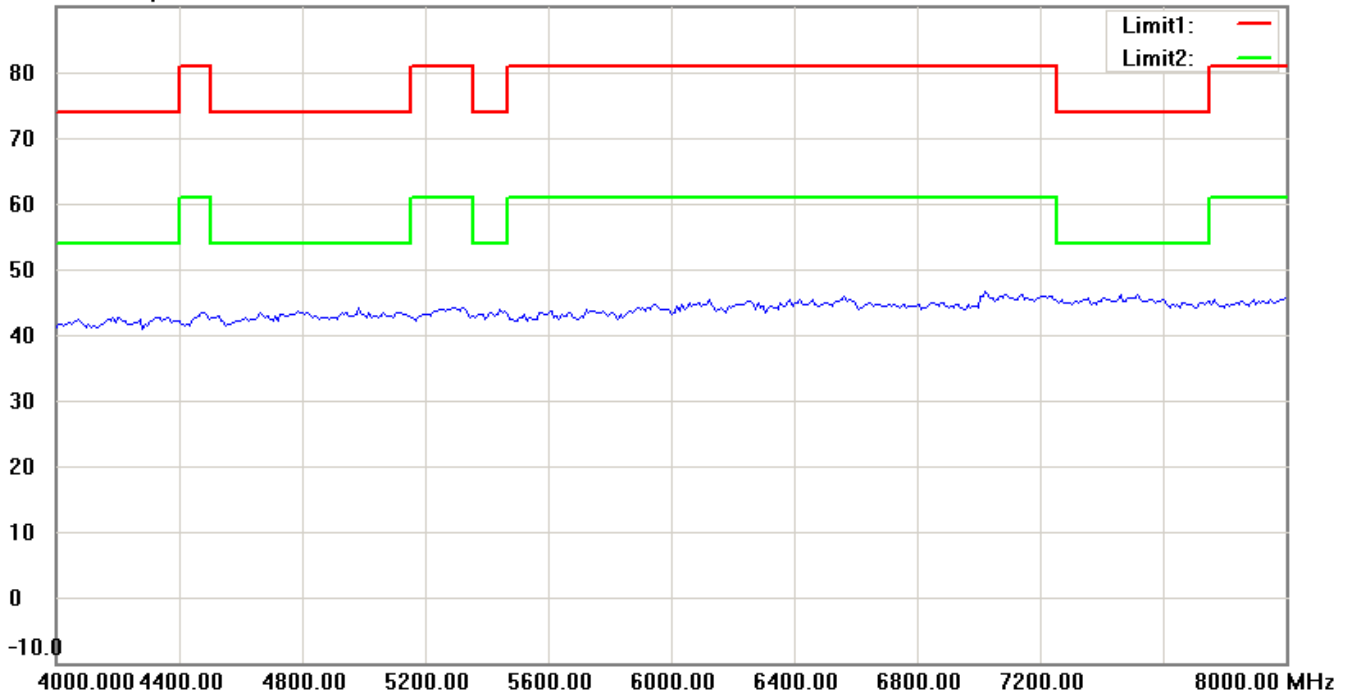


Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M21402-13847-C-1

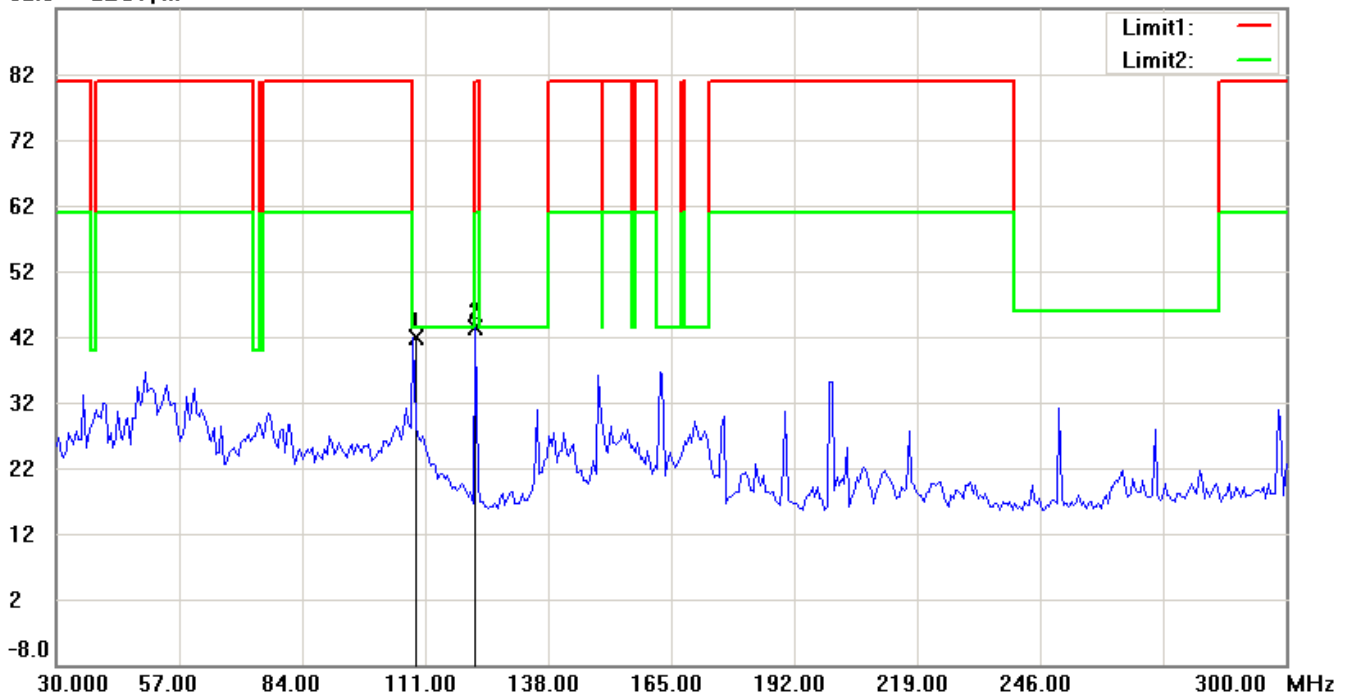
FCC ID: GX9ML

90.0 dBuV/m



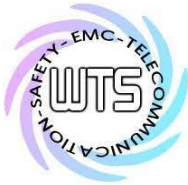
Antenna Polarization V

92.0 dBuV/m



Note:

1. The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.
2. The some frequencies may exceed the limit line without the specified detectors, but that cannot present the results are failed to the specification of test standard.
3. For corrected test results are listed in the relevant table of radiated test data of this test report.

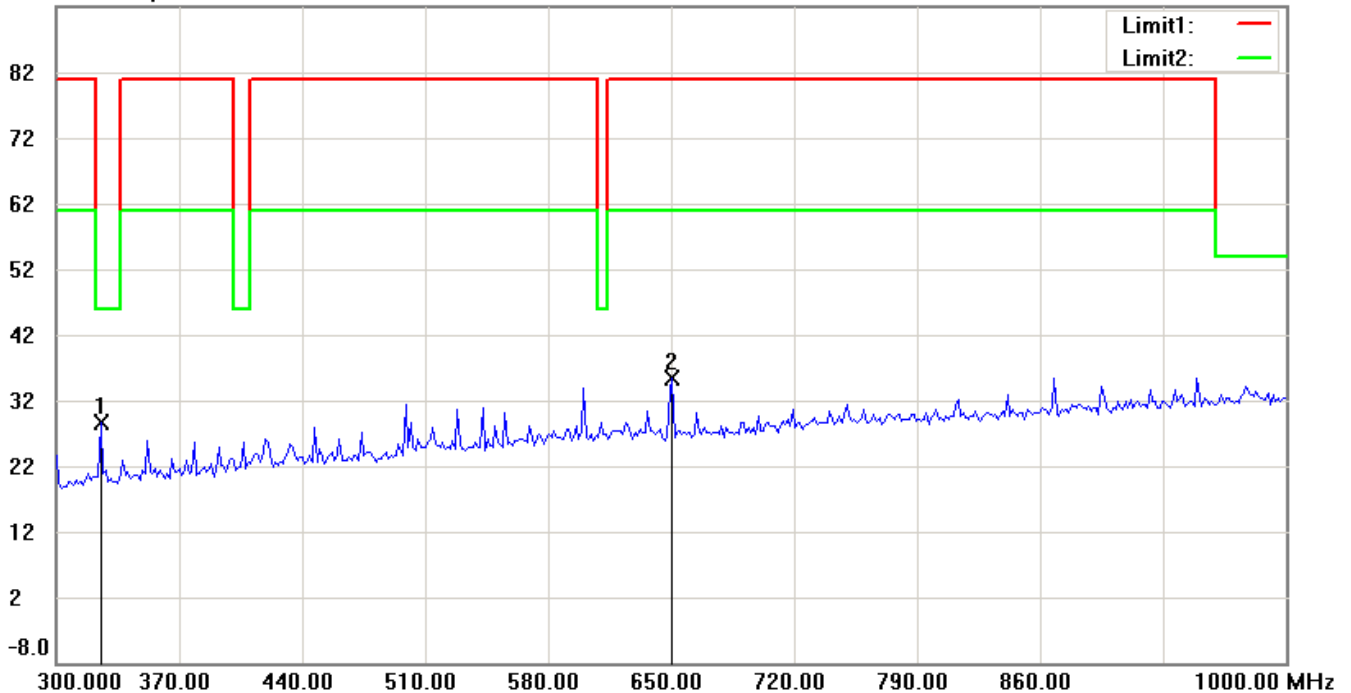


Worldwide Testing Services(Taiwan) Co., Ltd.

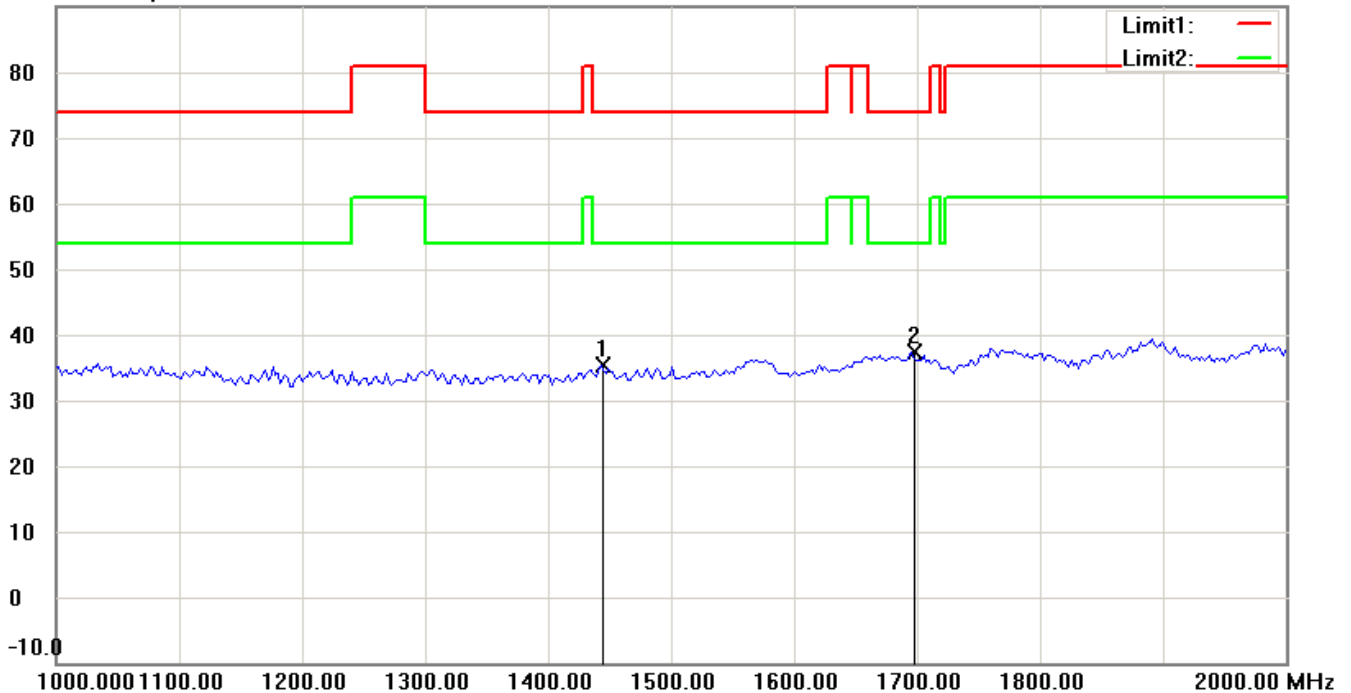
Registration number: W6M21402-13847-C-1

FCC ID: GX9ML

92.0 dBuV/m

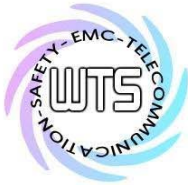


90.0 dBuV/m



Note:

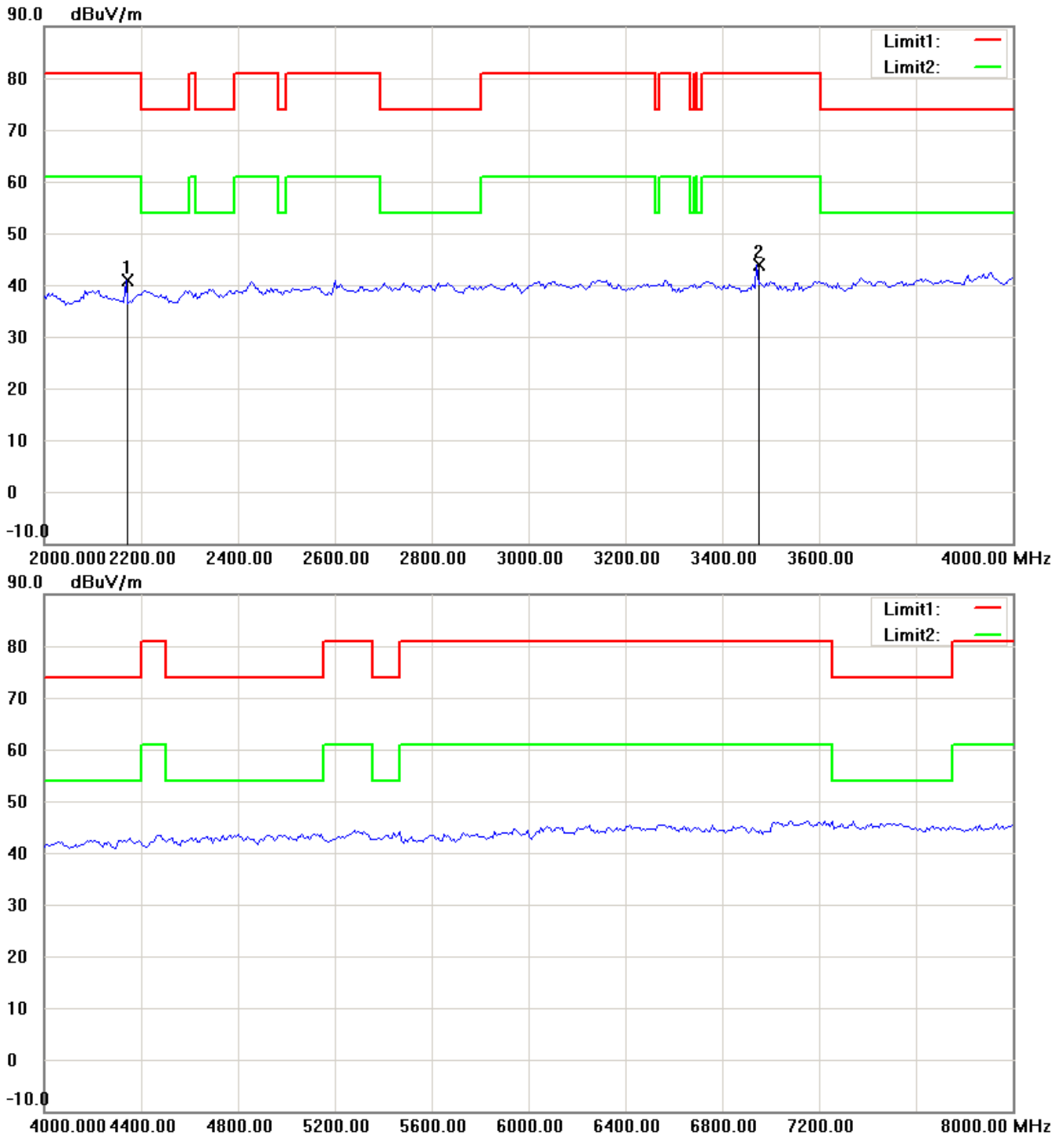
1. The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.
2. The some frequencies may exceed the limit line without the specified detectors, but that cannot present the results are failed to the specification of test standard.
3. For corrected test results are listed in the relevant table of radiated test data of this test report.



Worldwide Testing Services(Taiwan) Co., Ltd.

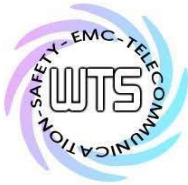
Registration number: W6M21402-13847-C-1

FCC ID: GX9ML



Note:

1. The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.
2. The some frequencies may exceed the limit line without the specified detectors, but that cannot present the results are failed to the specification of test standard.
3. For corrected test results are listed in the relevant table of radiated test data of this test report.



Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M21402-13847-C-1

FCC ID: GX9ML

Duty Cycle

