# FCC PART 15 SUBPART C TEST REPORT

for

# **USB dongle**

# Model No.: BDH-2000

# FCC ID: 2AAQQ44424832303030

of

# Applicant: Taiwan Biotronic Technology Inc. Address: 20 Lane 53 Hua Cheng Street, Da Li Dist., Taichung Hsien 41247 Taiwan

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.: W6M21307-13368-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: <u>wts@wts-lab.com</u>



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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.

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

# **Tester:**

August 26, 2013		Rick Chen	Rick Chen.
Date	WTS-Lab.	Name	Signature

# Technical responsibility for area of testing:

Kevin Wong

Kevin Wang August 26, 2013 Date WTS Signature Name



Registration number: W6M21307-13368-C-1 FCC ID: 2AAQQ44424832303030 **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: 2730.01

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:	./.



Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M21307-13368-C-1 FCC ID: 2AAQQ44424832303030 **1.3 Details of approval holder** 

Name:	Taiwan Biotronic Technology Inc.
Street:	20 Lane 53 Hua Cheng Street, Da Li Dist.,
Town:	Taichung Hsien 41247
Country:	Taiwan
Telephone:	886-4-22750988
Fax:	886-4-22766449
Teletex:	./.

#### **1.4** Application details

Date of receipt of test item:	July 31, 2013
Date of test:	from August 01, 2013 to August 22, 2013

#### **1.5** General information of Test item

Type of test item:	USB dongle
Model Number:	BDH-2000
Multi-listing model number:	./.
Photos:	see Annex

#### **Technical data**

Power supply:

Frequency band:	2.400-2.4835 GHz
Operation Frequency:	2.402-2.466 GHz
Frequency 1:	2.402 GHz
Frequency 2:	2.418 GHz
Frequency 3:	2.466 GHz
Operation modes:	Duplex
Modulation Type:	GFSK
Antenna type:	Chip Antenna
Antenna gain:	3 dBi

#### **Manufacturer: (if different from applicant)**

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

Additional information:

#### 1.6 Test standards

Technical standard : FCC RULES PART 15 SUBPART C § 15.249 (2011-10)

./.

USB: 5Vdc(Power from PC)



### 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.	X
or	
The deviations as specified in 2.5 were ascertained in the course of the tests	

The deviations as specified in 2.5 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 Power supply:	USB: 5Vdc(Power from PC)
Extreme conditions parameters:	Not required



# 2.3 Test Equipment List

No.	Test equipment	Туре	Serial No.	Manufacturer	Cal. Date	Next Cal. Date
ETSTW-CE 001	EMI TEST RECEIVER	ESHS10	842121/013	R&S	2012/9/5	2013/9/4
ETSTW-CE 003	AC POWER SOURCE	APS-9102	D161137	GW	Function	on Test
ETSTW-CE 004	ZWEILEITER-V- NETZNACHBILDUNG TWO-LINE V-NETWORK	ESH3-Z5	840731/011	R&S	2012/12/21	2013/12/20
ETSTW-CE 006	IMPULSBEGRENZER PULSE LIMITER	ESH3-Z2	100226	R&S	2013/3/4	2014/3/3
ETSTW-CE 007	SPECTRUM ANALYZER 5GHz	FSB	849670/001	R&S	Pre-te	st Use
ETSTW-CE 008	HF-EICHLEITUNG RF STEP ATTENUATOR 139dB DPSP	334.6010.02	844581/024	R&S	Function	on Test
ETSTW-CE 009	TEMP.&HUMIDITY CHAMBER	GTH-225-40-1P-U	MAA0305-009	GIANT FORCE	2013/7/10	2014/7/9
ETSTW-RE 004	EMI TEST RECEIVER	ESI 40	832427/004	R&S	2012/9/5	2013/9/4
ETSTW-RE 005	EMI TEST RECEIVER	ESVS10	843207/020	R&S	2012/9/5	2013/9/4
ETSTW-RE 012	TUNABLE BANDREJECT FILTER	D.C 0309	146	K&L	Function	on Test
ETSTW-RE 013	TUNABLE BANDREJECT FILTER	D.C 0336	397	K&L	Function	on Test
ETSTW-RE 018	MICROWAVE HORN ANTENNA	AT4560	27212	AR	2012/10/12	2013/10/11
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	2013/3/4	2014/3/3
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	2013/3/21	2014/3/20
ETSTW-RE 050	Attenuator 10dB	50HF-010-1	None	JFW	2013/3/4	2014/3/3
ETSTW-RE 051	Attenuator 6dB	50HF-006-1	None	JFW	2013/3/4	2014/3/3
ETSTW-RE 053	Attenuator 3dB	50HF-003-1	None	JFW	2013/3/4	2014/3/3
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	2013/3/4	2014/3/3
ETSTW-RE 062	Amplifier Module	CHC 2	None	KMIC	2012/11/28	2013/11/27
ETSTW-RE 064	Bluetooth Test Set	MT8852B-042	6K00005709	Anritsu	Function Test	
ETSTW-RE 069	Double-Ridged Guide Horn Antenna	3117	00069377	EMCO	Function	on Test
ETSTW-RE 072	CELL SITE TEST SET	8921A	3339A00375	HP	2012/10/5	2013/10/4
ETSTW-RE 088	SOLID STATE AMPLIFIER	KMA180265A01	99057	KMIC	2012/10/12	2013/10/11
ETSTW-RE 099	DC Block	50DB-007-1	None	JFW	2013/3/4	2014/3/3
ETSTW-RE 106	Humidity Temperature Meter	TES-1366	091011113	TES	2012/12/4	2013/12/3
ETSTW-RE 111	TRILOG Super Broadband test Antenna	VULB 9160	9160-3309	Schwarz beck	2012/12/13	2013/12/12
ETSTW-RE 112	AC POWER SOURCE	TFC-1005	None	T-Power	Functi	on test
ETSTW-RE 115	2.4GHz Notch Filter	N0124411	473874	MICROWAVE CIRCUITS	2013/1/11	2014/1/10
ETSTW-RE 120	RF Player	MP9200	MP9210-111022	ADIVIC	Functi	on 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
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	2013/3/4	2014/3/3
ETSTW-GSM 002	Universal Radio Communication Tester	CMU 200	109439	R&S	2012/10/5	2013/10/4
ETSTW-GSM 019	Band Reject Filter	WRCTF824/849- 822/851-40 /12+9SS	3	WI	2013/1/11	2014/1/10
ETSTW-GSM 020	Band Reject Filter	WRCD1747/1748- 1743/1752-32/5SS	1	WI	2013/1/11	2014/1/10
ETSTW-GSM 021	Band Reject Filter	WRCD1879.5/1880.5 -1875.5/1884.5- 32/5SS	3	WI	2013/1/11	2014/1/10
ETSTW-GSM 022	Band Reject Filter	WRCT901.9/903.1- 904.25-50/8SS	1	WI	2013/1/11	2014/1/10
ETSTW-GSM 023	Power Divider	4901.19.A	None	SUHNER	2012/9/18	2013/9/17
ETSTW-Cable 010	BNC Cable	5 M BNC Cable	None	JYE BAO CO.,LTD.	2013/3/4	2014/3/3
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.	2013/3/4	2014/3/3
ETSTW-Cable 016	BNC Cable	Switch Box	B Cable 1	Schwarz beck	2013/3/4	2014/3/3
ETSTW-Cable 017	BNC Cable	X Cable	B Cable 2	Schwarz beck	2013/3/4	2014/3/3
ETSTW-Cable 018	BNC Cable	Y Cable	B Cable 3	Schwarz beck	2013/3/4	2014/3/3
ETSTW-Cable 019	BNC Cable	Z Cable	B Cable 4	Schwarz beck	2013/3/4	2014/3/3
ETSTW-Cable 022	N TYPE Cable	5006	0002	JYE BAO CO.,LTD.	2013/3/26	2014/3/25
ETSTW-Cable 026	Microwave Cable	SUCOFLEX 104	279075	HUBER+SUHNER	2013/3/4	2014/3/3
ETSTW-Cable 027	Microwave Cable	SUCOFLEX 104	279083	HUBER+SUHNER	2013/3/4	2014/3/3
ETSTW-Cable 028	Microwave Cable	FA147A0015M2020	30064-2	UTIFLEX	2012/10/12	2013/10/11
ETSTW-Cable 029	Microwave Cable	FA147A0015M2020	30064-3	UTIFLEX	2012/10/12	2013/10/11
ETSTW-Cable 030	Microwave Cable	SUCOFLEX 104 (S_Cable 9)	279067	HUBER+SUHNER	2013/3/4	2014/3/3
ETSTW-Cable 031	Microwave Cable	SUCOFLEX 104 (S_Cable 10)	238092	HUBER+SUHNER	2012/11/28	2013/11/27
ETSTW-Cable 043	Microwave Cable	SUCOFLEX 104	317576	HUBER+SUHNER	2012/11/28	2013/11/27
ETSTW-Cable 047	Microwave Cable	SUCOFLEX 104	325518	HUBER+SUHNER	2012/11/28	2013/11/27
ETSTW-Cable 053	N TYPE To SMA Cable	RG142	None	JYE BAO CO.,LTD.	2013/3/26	2014/3/25
ETSTW-Cable 058	Microwave Cable	SUCOFLEX 104	none	HUBER+SUHNER	2013/6/20	2014/6/19
WTSTW-SW 002	EMI TEST SOFTWARE	EZ_EMC	None	Farad	Version I	ETS-03A1



## 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 according to ANSI STANDARD C63.4-2009 6.4 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  $dB\mu V$ ) 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  $20 \text{ dB}\mu\text{V} + 10.36 \text{ dB} + 6 \text{ dB} = 36.36 \text{ dB}\mu\text{V/m}@3\text{m}$ 

ANSI STANDARD C63.4-2009 6.3.1 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 10<sup>th</sup> 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 No.5-1, Lishui, Shuang Sing Village, Wanli Dist., New Taipei City 207, Taiwan (R.O.C.). 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.



# 3 Test results (enclosure)

Test case	Para. Number	Required	Test passed	Test failed
Peak Output Power	15.249 (a)	×	X	
Spurious Emissions radiated – Transmitter operating	15.249 (e)	×	X	
Spurious Emissions conducted – Transmitter operating	15.249 (e)			
Radiated Emission from Digital Part	15.109			
Out of Band Spurious Emission, Band edge-Transmitter operating	15.249 (e)	×	×	
Power Line Conducted Emission	15.207	×	×	

The following is intentionally left blank.



Registration number: W6M21307-13368-C-1 FCC ID: 2AAQQ44424832303030 **3.1** Peak Output Power (transmitter)

FCC Rule: 15.249 (b)

This measurement applies to equipment with an integral antenna and to equipment with an antenna connector and equipped with an antenna as declared by the applicant.

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

Model:	BDH	-2000	Date:		2013/08/	14~2013/0	)8/15			
Mode:	TX_24	02 MHz	Temperatu	re:	24	$^{\circ}\mathrm{C}$			Engineer:	Roy
Polarization:	Horizon	tal	Humidity:		60	%				
Frequency	Rea	ding	Factor	Re	sult	Li	mit	Margin	Table	Ant.
	(dB	uV)	(dB)	(dBu	V/m)	(dBu	ıV/m)		Degree	High
(MHz)	Peak	Ave.	Corr.	Peak	Ave.	Peak	Ave.	(dB)	(Deg.)	(cm)
2401.9680	54.20		37.51	91.71		114.00	94.00	-22.29	255	100

Polarization: Vertical

Frequency	Rea	ding	Factor	Res	sult	Li	mit	Margin	Table	Ant.
	(dE	BuV)	(dB)	(dBuV/m)		(dBuV/m)			Degree	High
(MHz)	Peak	Ave.	Corr.	Peak	Ave.	Peak	Ave.	(dB)	(Deg.)	(cm)
2401.8960	48.84		37.51	86.35		114.00	94.00	-27.65	170	100

Mode: TX\_2418 MHz

Polarization: Horizontal

I elanzationi										
Frequency	Rea	ding	Factor	Res	sult	Li	mit	Margin	Table	Ant.
	(dB	uV)	(dB)	(dBuV/m)		(dBuV/m)			Degree	High
(MHz)	Peak	Ave.	Corr.	Peak	Ave.	Peak	Ave.	(dB)	(Deg.)	(cm)
2417.8200	52.15		37.57	89.72		114.00	94.00	-24.28	85	100

Polarization: Vertical

ſ	Frequency	Rea	ding	Factor			Limit		Margin	Table	Ant.
		(dB	uV)	(dB)	(dBuV/m)		(dBuV/m)			Degree	High
	(MHz)	Peak	Ave.	Corr.	Peak	Ave.	Peak	Ave.	(dB)	(Deg.)	(cm)
ſ	2417.9240	47.74		37.57	85.31		114.00	94.00	-28.69	220	100

Mode: TX\_2466 MHz Polarization: Horizontal

Frequency	Rea	ding	Factor	Res	sult	Li	mit	Margin	Table	Ant.		
	(dB	uV)	(dB)	(dBuV/m)		(dBuV/m)			Degree	High		
(MHz)	Peak	Ave.	Corr.	Peak	Ave.	Peak	Ave.	(dB)	(Deg.)	(cm)		
2465.8640	47.22		37.75	84.97		114.00	94.00	-29.03	155	100		



Polarization: Vertical

Frequency	Rea	ding	Factor	Res	sult	Li	mit	Margin	Table	Ant.
	(dB	uV)	(dB)	(dBuV/m)		(dBuV/m)			Degree	High
(MHz)	Peak	Ave.	Corr.	Peak	Ave.	Peak	Ave.	(dB)	(Deg.)	(cm)
2465.8080	44.67		37.75	82.42		114.00	94.00	-31.58	240	100

Test equipment used: ETSTW-RE 003, ETSTW-RE 004, ETSTW-RE 030, ETSTW-RE 044

Explanation: The diagrams for the field strength measurements are included in appendix.

# 3.2 Equivalent isotropic radiated power

Because using an permanent antenna there are no deviations from the radiated test results according 3.1.

## 3.3 RF Exposure Compliance Requirements

Not applicable for this EUT for the low power level.



Registration number: W6M21307-13368-C-1 FCC ID: 2AAQQ44424832303030 **3.4 Out of Band Radiated Emissions** 

FCC Rule: 15.249 (d)(e), 15.35(b)

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

For frequency above 1000 MHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For point-to-point operation, the peak field strength shall not exceed 2500 millivolts/meter at 3 meters along the antenna azimuth.

Limits:

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	46.5
Above 960	500	54.0

For frequencies above 1 GHz (Peak measurements).

Limit + 20 dB  $54.0 \text{ dB}\mu\text{V/m} + 20 \text{ dB} = 74 \text{dB}\mu\text{V/m}$ Or

Must be attenuated at least 50dB below the level of fundament

# Test equipment used: ETSTW-RE 003, ETSTW-RE 004, ETSTW-RE 111, ETSTW-RE 030, ETSTW-RE 044

Explanation: Please see attached diagram as appendix.



Registration number: W6M21307-13368-C-1 FCC ID: 2AAQQ44424832303030 **3.5 Spurious emission (tx)** 

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

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

For frequencies above 1000 MHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For point-to-point operation, the peak field strength shall not exceed 2500 millivolts/meter at 3 meters along the antenna azimuth.

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

The peak and average spurious emission plots was measured with the average limits. The critical peak value listed in the table agree with the above calculated limits.

# Summary table with radiated data of the test plots

Model: Mode: Polarization:		BDH-2 TX_240 ntal		Z	Т		oerature: dity:	201	3/08 24 60	°C		Enę	gineer:	Roy
Frequency (MHz)	Readir (dBu\		ector	Fac (dE			esult BuV/m)	Limit (dBuV/r	n)	Mar (d	rgin B)	D	able egree Deg.)	Ant. High (cm)
239.9400	20.76	5 pe	ak	13.9	92	3	4.68	46.00		-11	.32		240	100
432.3848	15.32	2 pe	ak	19.5	59	3	4.91	46.00		-11	.09		55	100
Frequency	Rea	ding	Fac	ctor	Re	sult	@3m	Limit	@3n	l	Marc	ŋin	Table	Ant.
1 3	(dB	uV)	(d	B)	(0	dBuʻ	V/m)	(dBu	V/m)			, ,	Degree	High
(MHz)	Peak	Áve.	Ċ	orr.	Pe	eak	Ave.	Peak	٨	/e.	(dE	3)	(Deg.)	(cm)
1961.9240	59.02	36.79	-5.	03	53.9	9	31.76	74.00	54	.00	-22.2	24	250	100
4801.6030	51.97	36.46	0.	44	52.4	1	36.90	74.00	54	.00	-17.1	10	220	100
4001.0030	01.77	00.10				_								100
7206.4130	43.64		4.	01	47.6	5		74.00	54	.00	-26.3	35	50	100
				01 14	47.6 44.7			74.00		.00 .00	-26.3 -29.2		50 215	100 100
7206.4130	43.64		9.			'2			54			28		

Polarization: Vertical

	Frequency (MHz)	Reading (dBuV)	Detector	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
ĺ	31.9440	20.62	peak	13.30	33.92	40.00	-6.08	260	100
	76.6533	23.33	peak	10.43	33.76	40.00	-6.24	110	100



Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M21307-13368-C-1 FCC ID: 2AAQQ44424832303030

Frequency	Rea	ding	Factor	Result	@3m	Limit	@3m	Margin	Table	Ant.
	(dB	uV)	(dB)	(dBuV/m)		(dBuV/m)		_	Degree	High
(MHz)	Peak	Ave.	Corr.	Peak	Ave.	Peak	Ave.	(dB)	(Deg.)	(cm)
4803.8290	54.09	37.21	0.45	54.54	37.66	74.00	54.00	-16.34	175	100
7206.4130	46.15		4.01	50.16		74.00	54.00	-23.84	280	100
9608.0000	35.28		9.14	44.42		74.00	54.00	-29.58	240	100
12010.0000	35.33		13.41	48.74		74.00	54.00	-25.26	70	100

Mode: TX\_2418 MHz Polarization: Horizontal

	equency (MHz)	Reading (dBuV)	Detector	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
23	39.9400	20.84	peak	13.92	34.76	46.00	-11.24	215	100
43	32.3848	15.05	peak	19.59	34.64	46.00	-11.36	70	100

Frequency	Rea	ding	Factor	Result @3m		Limit	@3m	Margin	Table	Ant.
	(dB	uV)	(dB)	(dBuV/m)		(dBu	V/m)		Degree	High
(MHz)	Peak	Ave.	Corr.	Peak	Ave.	Peak	Ave.	(dB)	(Deg.)	(cm)
4835.8570	52.59	37.81	0.52	53.11	38.33	74.00	54.00	-15.67	125	100
7254.5090	43.56		4.09	47.65		74.00	54.00	-26.35	30	100
9672.0000	34.15		9.18	43.33		74.00	54.00	-30.67	215	100
12090.0000	33.22		14.17	47.39		74.00	54.00	-26.61	40	100

Polarization: Vertical

Frequency (MHz)	Reading (dBuV)	Detector	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
31.9440	20.77	peak	13.30	34.07	40.00	-5.93	255	100
432.3848	13.64	peak	19.59	33.23	46.00	-12.77	60	100

Frequency	Rea	ding	Factor	Result	@3m	Limit	@3m	Margin	Table	Ant.
	(dB	uV)	(dB)	(dBuV/m)		(dBu	V/m)	_	Degree	High
(MHz)	Peak	Ave.	Corr.	Peak	Ave.	Peak	Ave.	(dB)	(Deg.)	(cm)
4835.8370	54.57	38.53	0.52	55.09	39.05	74.00	54.00	-14.95	175	100
7254.5090	45.44		4.09	49.53		74.00	54.00	-24.47	50	100
9672.0000	34.10		9.18	43.28		74.00	54.00	-30.72	255	100
12090.0000	32.92		14.17	47.09		74.00	54.00	-26.91	70	100

Mode: TX\_2466 MHz Polarization: Horizontal

T Olunzution.	TIONEOIItai							
Frequency (MHz)	Reading (dBuV)	Detector	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
239.9400	21.03	peak	13.92	34.95	46.00	-11.05	260	100
432.3848	15.79	peak	19.59	35.38	46.00	-10.62	40	100



Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M21307-13368-C-1 FCC ID: 2AAQQ44424832303030

Frequency	Rea	ding	Factor	Result	@3m	Limit	@3m	Margin	Table	Ant.
	(dB	uV)	(dB)	(dBuV/m)		(dBu	V/m)	_	Degree	High
(MHz)	Peak	Ave.	Corr.	Peak	Ave.	Peak	Ave.	(dB)	(Deg.)	(cm)
4929.8600	51.03	37.64	0.88	51.91	38.52	74.00	54.00	-15.48	275	100
7398.0000	39.74		4.46	44.20		74.00	54.00	-29.80	60	100
9864.0000	34.57		9.73	44.30		74.00	54.00	-29.70	245	100
12330.0000	34.41		14.38	48.79		74.00	54.00	-25.21	110	100

Polarization: Vertical

Frequency (MHz)	Reading (dBuV)	Detector	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
142.7455	17.41	peak	15.11	32.52	43.50	-10.98	80	100
311.8637	16.50	peak	16.22	32.72	46.00	-13.28	330	100

Frequency		ding suV)	Factor (dB)	Result @3m (dBuV/m)			@3m V/m)	Margin	Table Degree	Ant. High
(MHz)	Peak	Ave.	Corr.	Peak	Ave.	Peak	Ave.	(dB)	(Deg.)	(cm)
4931.8460	52.43	35.19	0.90	53.33	36.09	74.00	54.00	-17.91	185	100
7398.0000	40.46		4.46	44.92		74.00	54.00	-29.08	290	100
9864.0000	35.46		9.73	45.19		74.00	54.00	-28.81	140	100
12330.0000	32.82		14.38	47.20		74.00	54.00	-26.80	265	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 =  $\pm$  3.72 dB, 1-18 GHz =  $\pm$  5.33 dB, 18-40 GHz=  $\pm$  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.

**TEST RESULT (Transmitter):** The unit DOES meet the FCC requirements.

Test equipment used: ETSTW-RE 003, ETSTW-RE 004, ETSTW-RE 111, ETSTW-RE 030, ETSTW-RE 044, ETSTW-RE 088, ETSTW-RE 018



### 3.6 Radiated Emissions from Digital Part

#### Summary table with radiated data of the test plots

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

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 = ± 3.72 dB, 1-18 GHz = ±5.33 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.

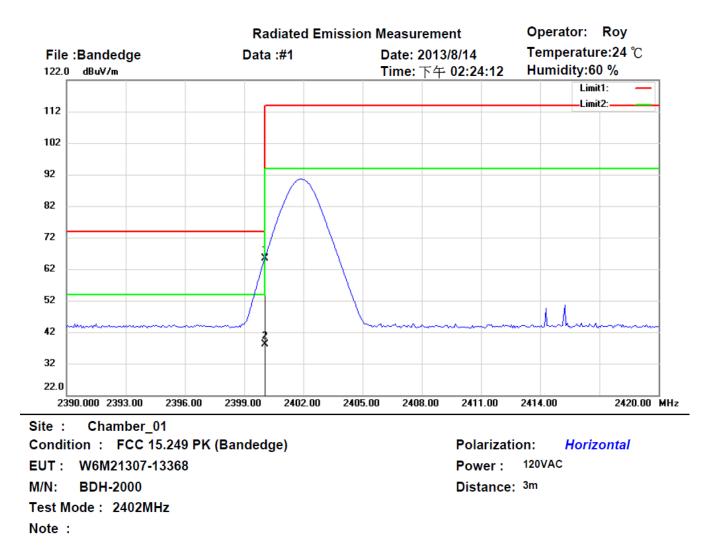
Test equipment used: ETSTW-RE 003, ETSTW-RE 004, ETSTW-RE 111, ETSTW-RE 030, ETSTW-RE 044

Explanation: The test results are listed in the separated test report no.: W6M21307-13368-P-15B.



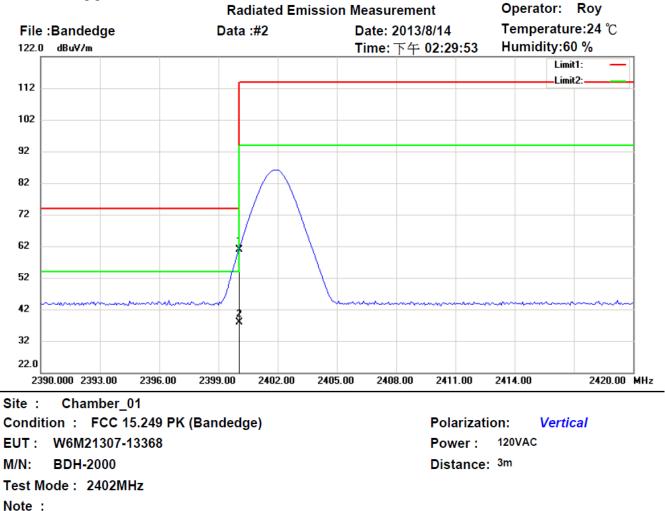
# 3.7 Radiated Emission on the band edge

From the following plots, they show that the fundamental emissions are confined in the specified band and hey at least 50 dB below the carrier level at band edge (2400 and 2483.5 MHz). It meets the requirement of section 15.249(d).



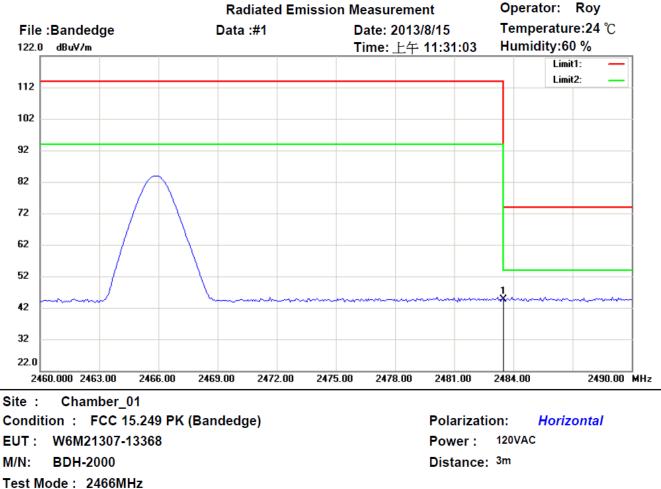
Mk.	Frequency (MHz)	Reading (dBuV)	Detector	Corr. factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
*	2400.000	27.76	peak	37.50	65.26	74.00	100	135	-8.74	
	2400.000	0.55	AVG	37.50	38.05	54.00	100	135	-15.95	





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
*	2400.000	23.47	peak	37.50	60.97	74.00	100	75	-13.03	
	2400.000	0.46	AVG	37.50	37.96	54.00	100	75	-16.04	

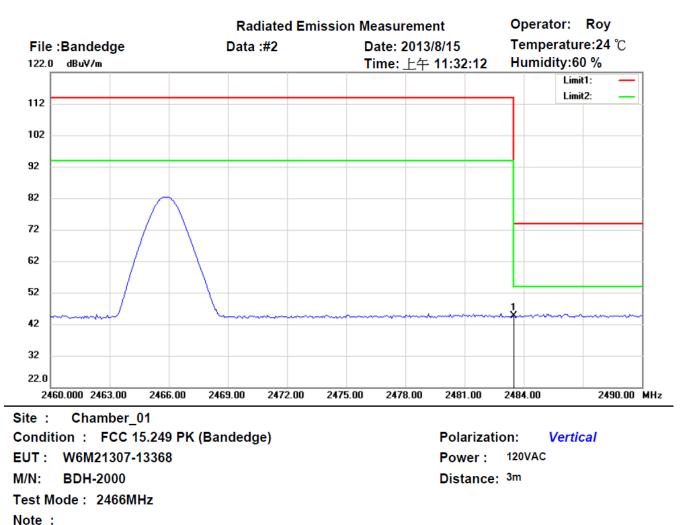




	Mk.	Frequency (MHz)	Reading (dBuV)	Detector	Corr. factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
Γ	*	2483.500	6.70	peak	37.82	44.52	74.00	100	75	-29.48	

Note :





Mk.	Frequency (MHz)	Reading (dBuV)	Corr. factor (dB/m)	Result (dBuV/m)		

37.82

Limit:

2483.500

6.85

peak

Frequency Range (MHz)	Limit (dBµV/m)			
Trequency Range (WITZ)	Peak	Average		
902 - 928	114	94		
2400 - 2483.5	74	54		
5725 - 5875	74	54		

44.67

74.00

100

170

-29.33

Test equipment used: ETSTW-RE 003, ETSTW-RE 004, ETSTW-RE 030, ETSTW-RE 044

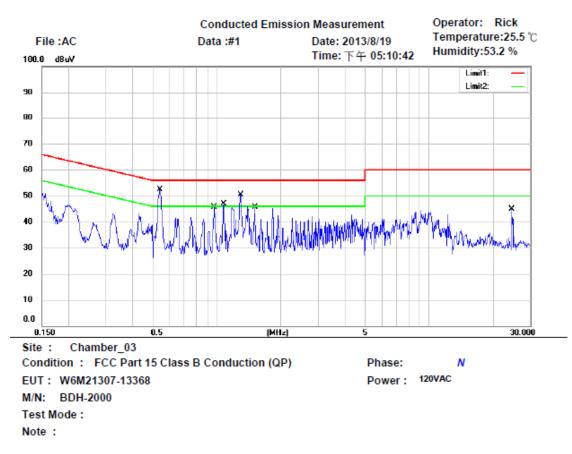
Comment



# 3.8 Power Line Conducted Emission

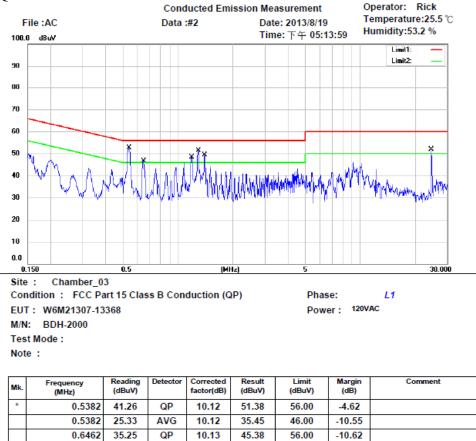
For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the table bellows with this provision 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
*	0.5404	40.81	QP	10.12	50.93	56.00	-5.07	
	0.5404	24.79	AVG	10.12	34.91	46.00	-11.09	
	0.9680	32.69	QP	10.14	42.83	56.00	-13.17	
	0.9680	19.68	AVG	10.14	29.82	46.00	-16.18	
	1.0782	34.59	QP	10.14	44.73	56.00	-11.27	
	1.0782	21.77	AVG	10.14	31.91	46.00	-14.09	
	1.2898	36.46	QP	10.15	46.61	56.00	-9.39	
	1.2898	19.63	AVG	10.15	29.78	46.00	-16.22	
	1.5125	27.71	QP	10.16	37.87	56.00	-18.13	
	1.5125	12.14	AVG	10.16	22.30	46.00	-23.70	
	24.4500	26.60	QP	11.03	37.63	60.00	-22.37	
	24.4500	5.18	AVG	11.03	16.21	50.00	-33.79	





0.6462	35.25	QP	10.13	45.38	56.00	-10.62	
0.6462	18.09	AVG	10.13	28.22	46.00	-17.78	
1.1863	32.57	QP	10.15	42.72	56.00	-13.28	
1.1863	17.51	AVG	10.15	27.66	46.00	-18.34	
1.2920	37.67	QP	10.15	47.82	56.00	-8.18	
1.2920	20.63	AVG	10.15	30.78	46.00	-15.22	
1.4000	37.28	QP	10.16	47.44	56.00	-8.56	
1.4000	22.18	AVG	10.16	32.34	46.00	-13.66	
24.5125	36.49	QP	11.30	47.79	60.00	-12.21	
24.5125	10.29	AVG	11.30	21.59	50.00	-28.41	

Note: 1. The formula of measured value as: Test Result = Reading + Correction Factor

- 2. The Correction Factor = Cable Loss + LISN Insertion Loss
- **3.** Detector function in the form : PK = Peak, QP = Qusai Peak, AV = Average
- 4. All not in the table noted test results are more than 20 dB below the relevant limits.
- 5. Measurement uncertainty =  $\pm 1.60$  dB; Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.
- 6. Up Line: PK 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 004, ETSTW-CE 006, ETSTW-RE045



# **Appendix**

# **Measurement diagrams**

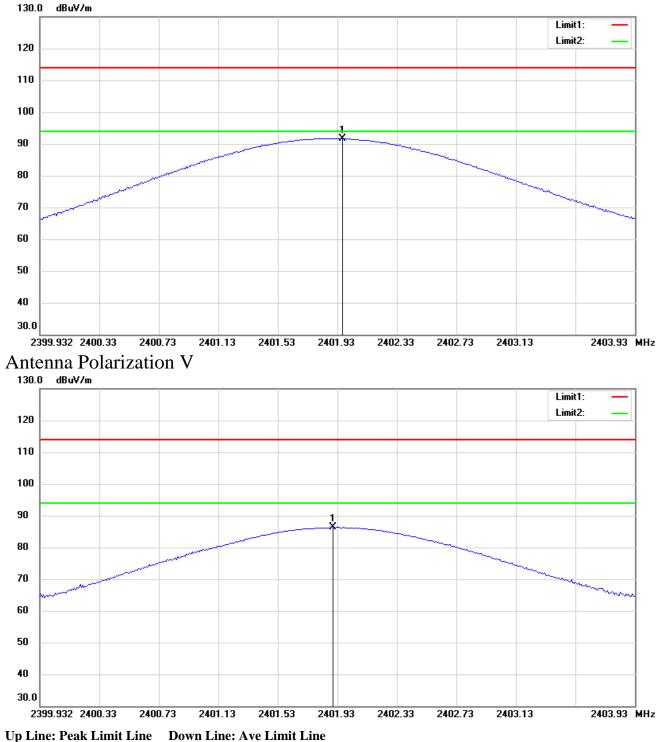
- 1. Fundamental Field Strength
- 2. Spurious Emissions radiated



Fundamental Field Strength

TX\_2402 MHz

Antenna Polarization H



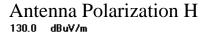
Note:

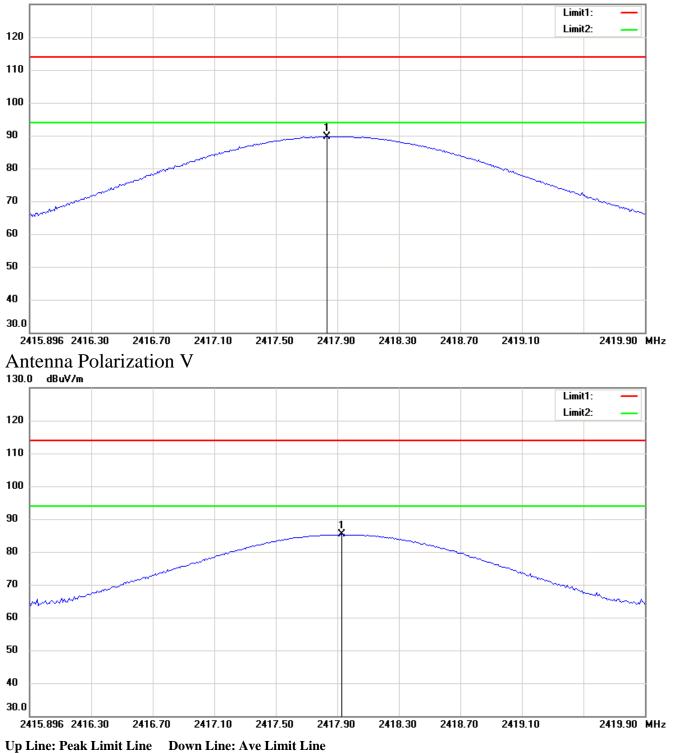
1. The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.

- 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 fundamental field strength test data of this test report.



# TX\_2418 MHz



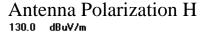


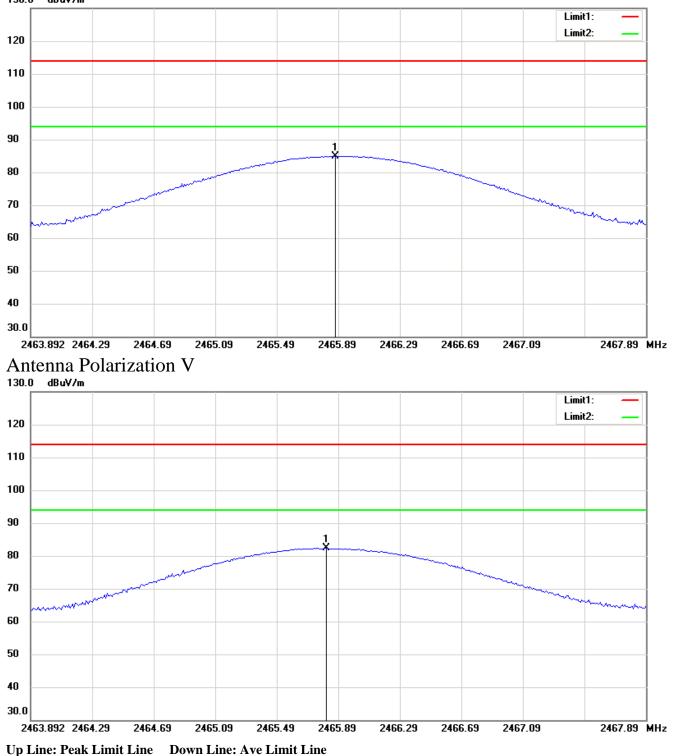
Note:

- 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 fundamental field strength test data of this test report.



# TX 2466 MHz



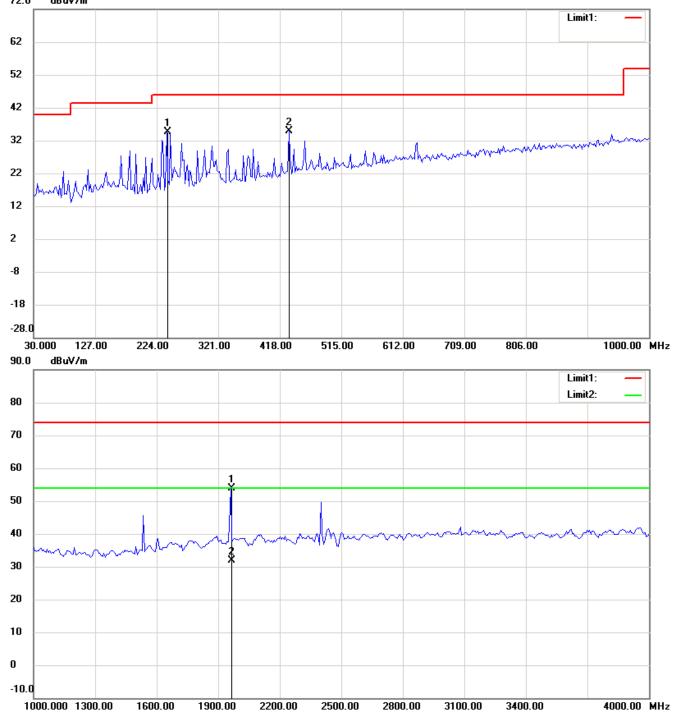


Note:

- 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 fundamental field strength test data of this test report.

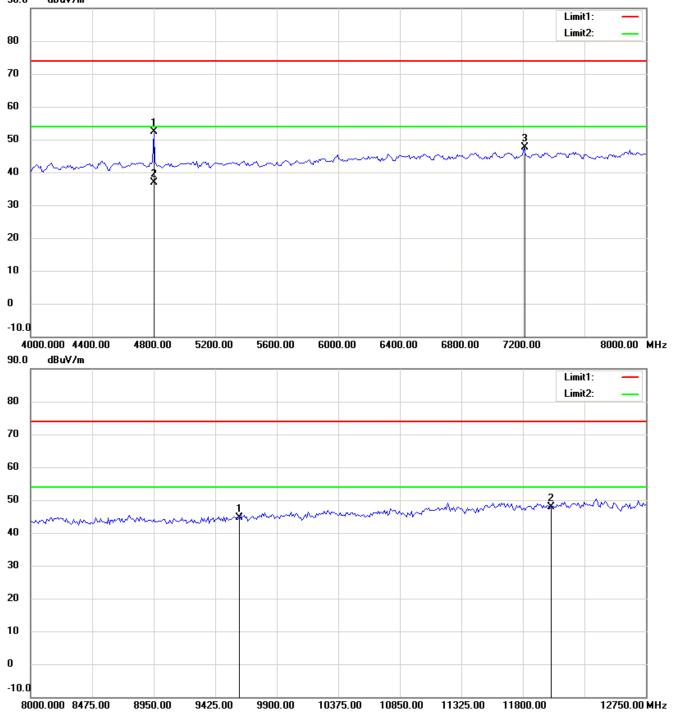


Registration number: W6M21307-13368-C-1 FCC ID: 2AAQQ44424832303030 Spurious Emissions radiated\_ Transmitter 2402 MHz Antenna Polarization H



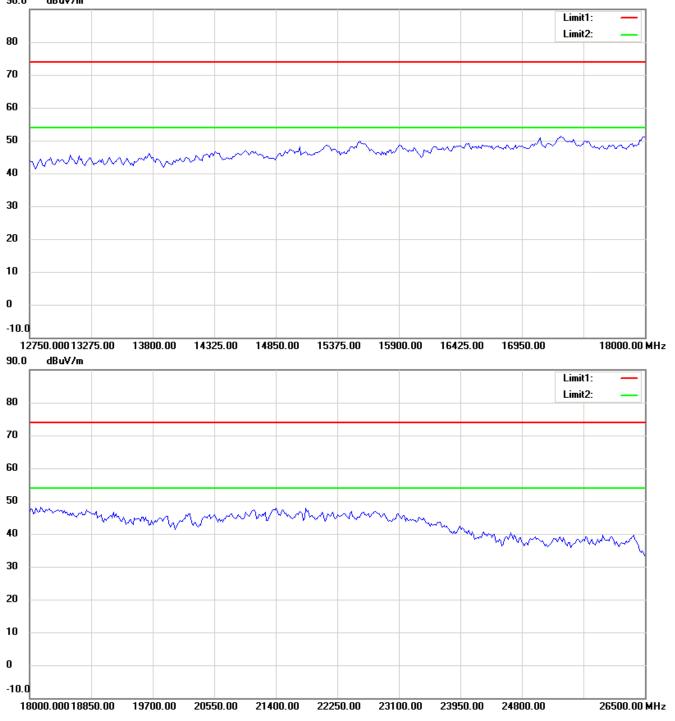
- 1. The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.
- 2. The some frequencies may exceed the limit line without the specified detectors, but that cannot present the results are failed to the specification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





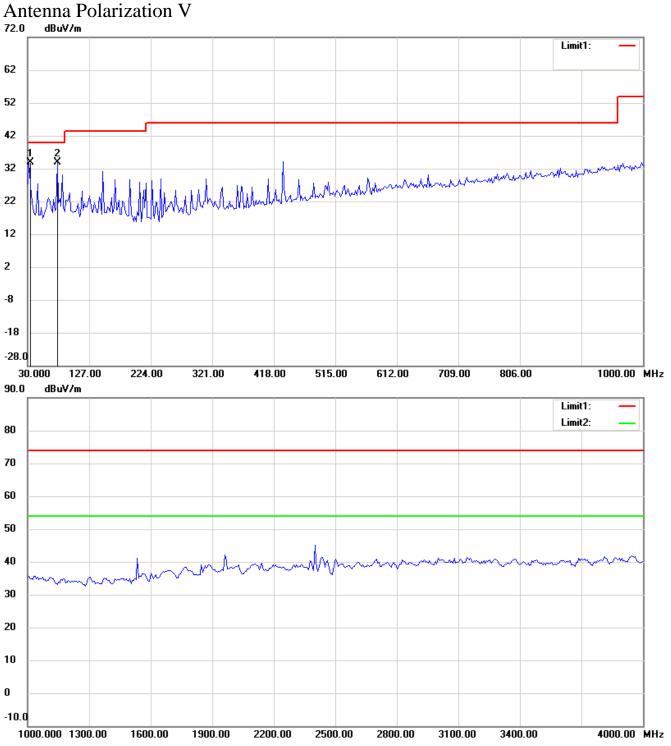
- 1. The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.
- 2. The some frequencies may exceed the limit line without the specified detectors, but that cannot present the results are failed to the specification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





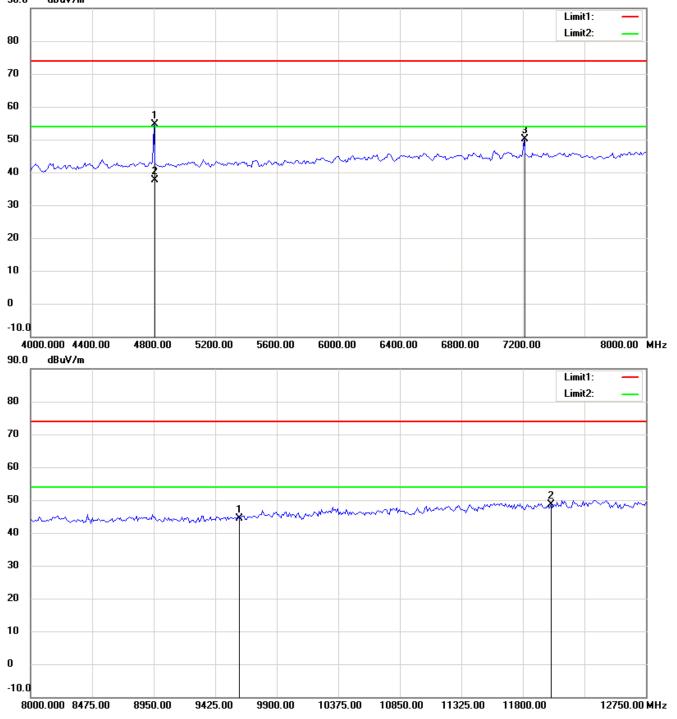
- 1. The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.
- 2. The some frequencies may exceed the limit line without the specified detectors, but that cannot present the results are failed to the specification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





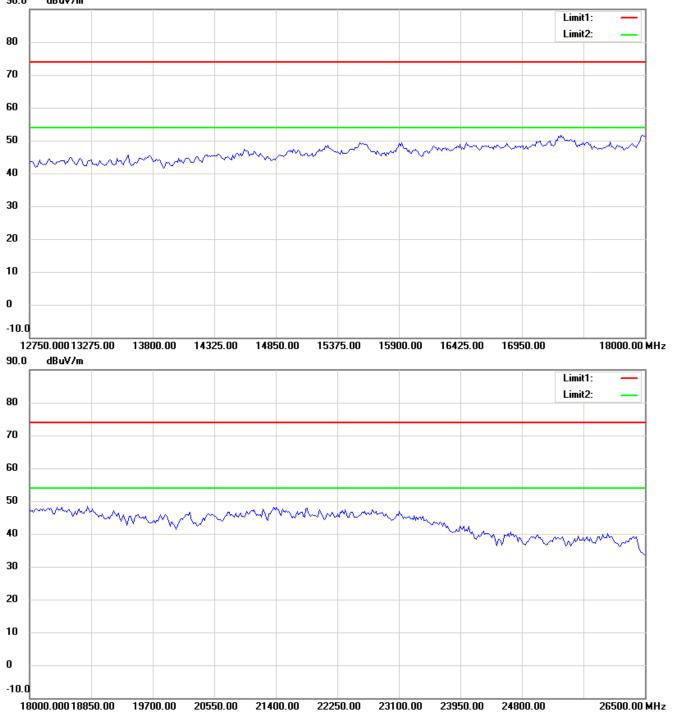
- 1. The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.
- 2. The some frequencies may exceed the limit line without the specified detectors, but that cannot present the results are failed to the specification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





- 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.



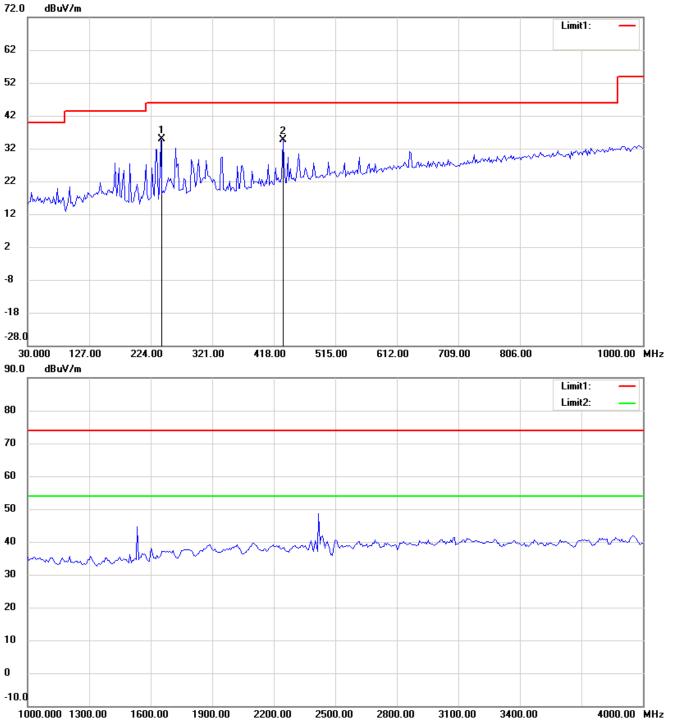


- 1. The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.
- 2. The some frequencies may exceed the limit line without the specified detectors, but that cannot present the results are failed to the specification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



2418 MHz

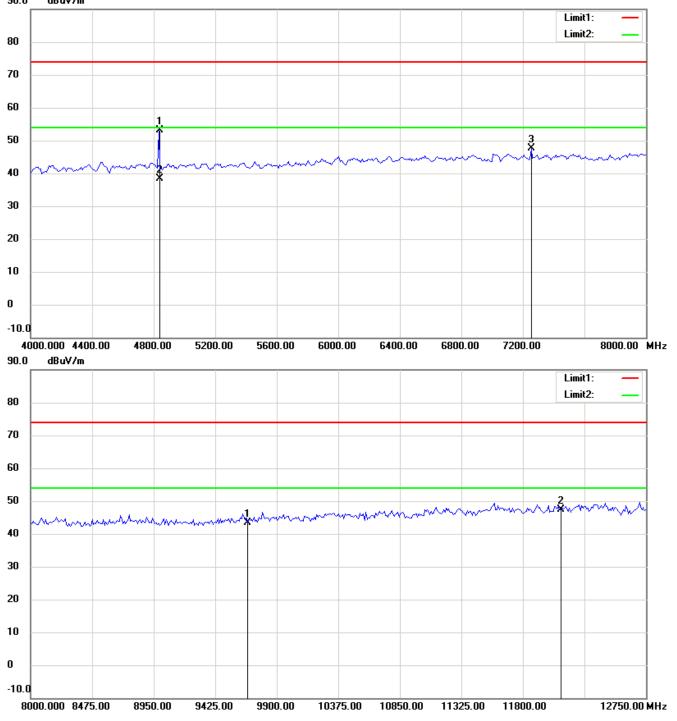
# Antenna Polarization H



- 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.

<sup>1.</sup> The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.

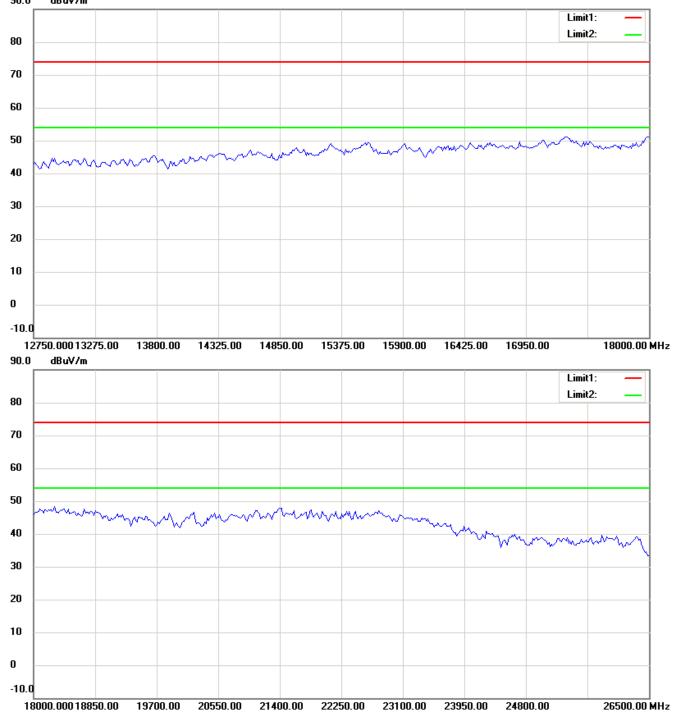




- 1. The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.
- 2. The some frequencies may exceed the limit line without the specified detectors, but that cannot present the results are failed to the specification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

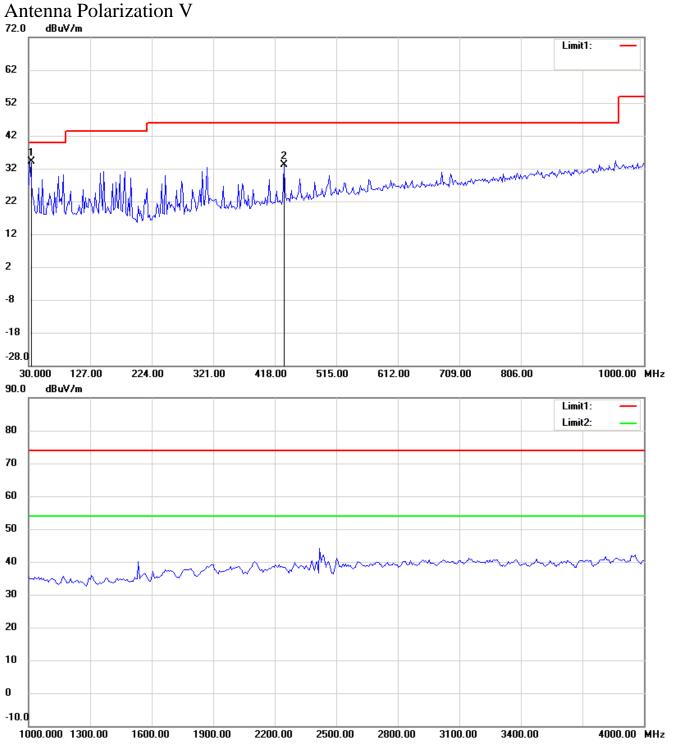


Registration number: W6M21307-13368-C-1 FCC ID: 2AAQQ44424832303030 90.0 dBuV/m



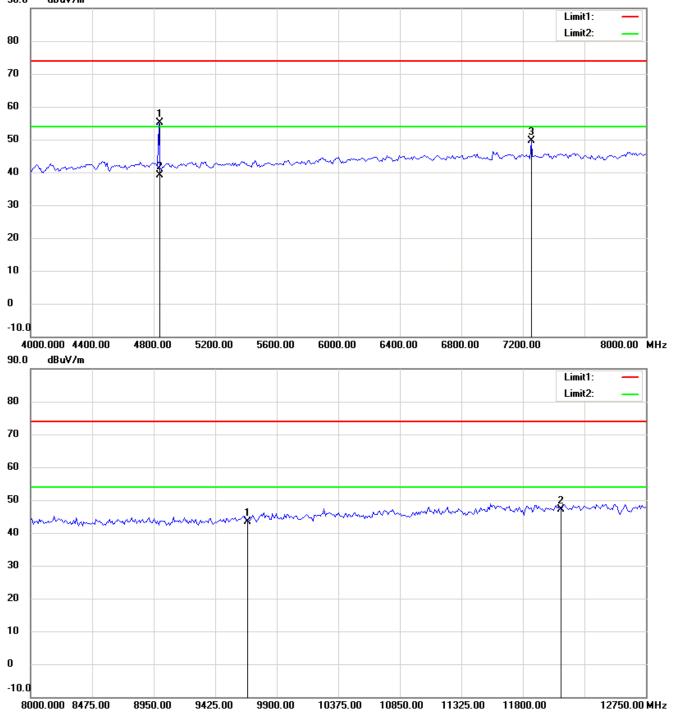
- 1. The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.
- 2. The some frequencies may exceed the limit line without the specified detectors, but that cannot present the results are failed to the specification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





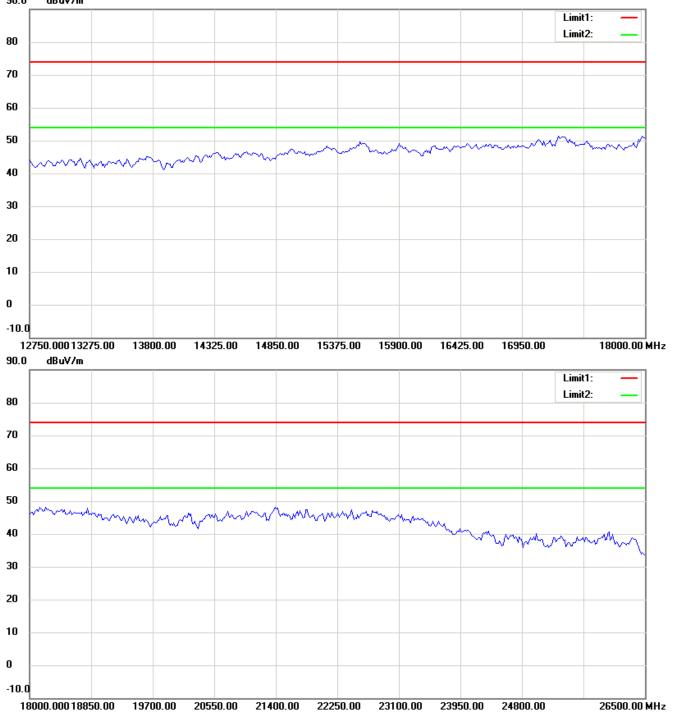
- 1. The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.
- 2. The some frequencies may exceed the limit line without the specified detectors, but that cannot present the results are failed to the specification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





- 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.



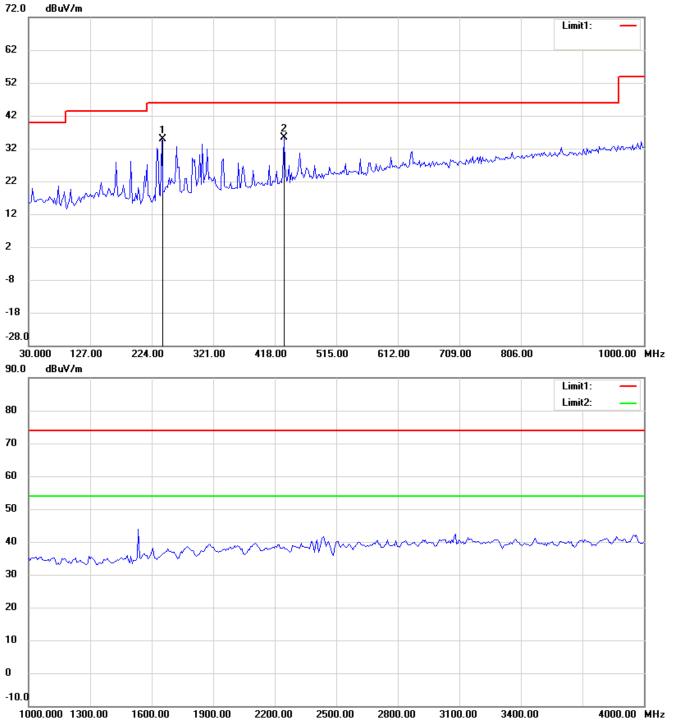


- 1. The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.
- 2. The some frequencies may exceed the limit line without the specified detectors, but that cannot present the results are failed to the specification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



# 2466 MHz

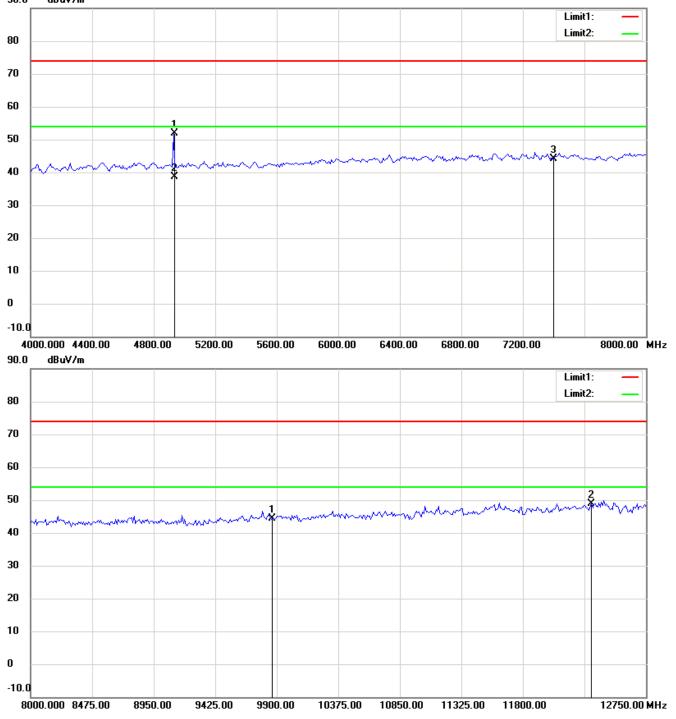
# Antenna Polarization H



- 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.

<sup>1.</sup> The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.

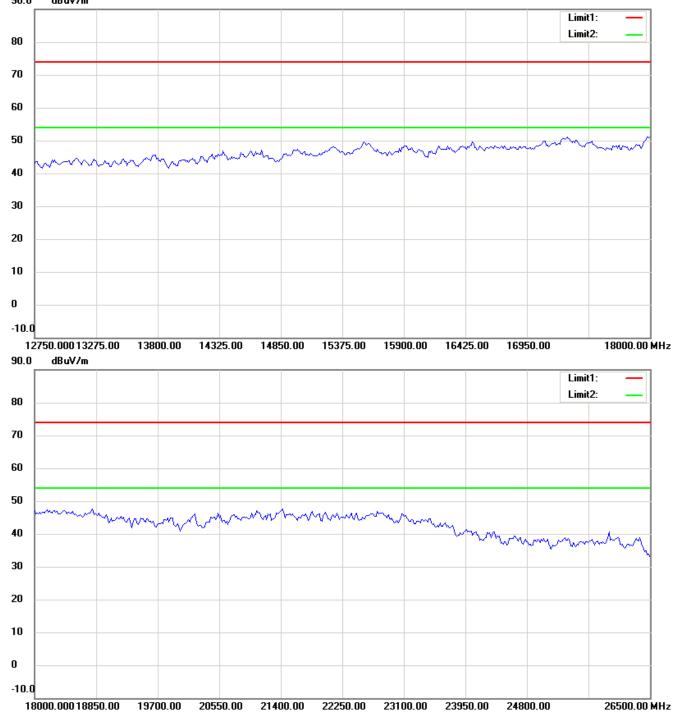




- 1. The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.
- 2. The some frequencies may exceed the limit line without the specified detectors, but that cannot present the results are failed to the specification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

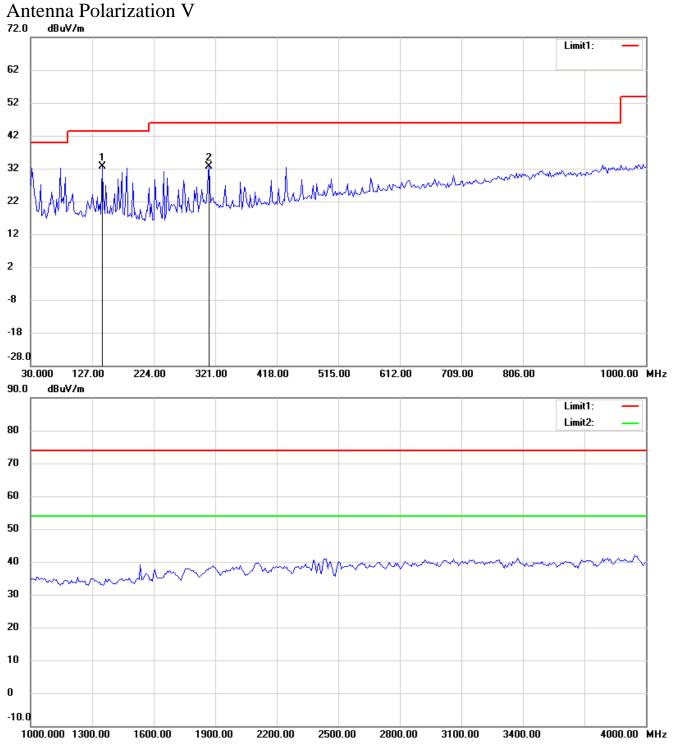


Registration number: W6M21307-13368-C-1 FCC ID: 2AAQQ44424832303030 90.0 dBuV/m



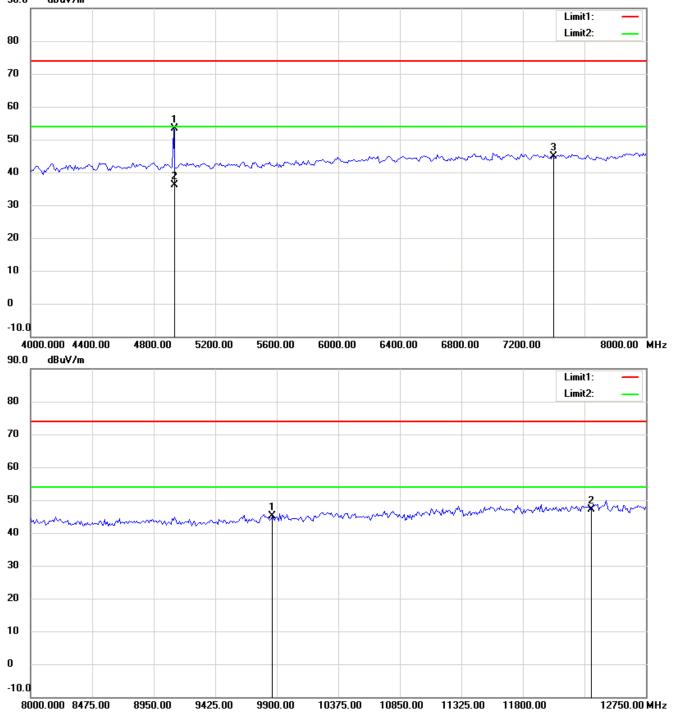
- 1. The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.
- 2. The some frequencies may exceed the limit line without the specified detectors, but that cannot present the results are failed to the specification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





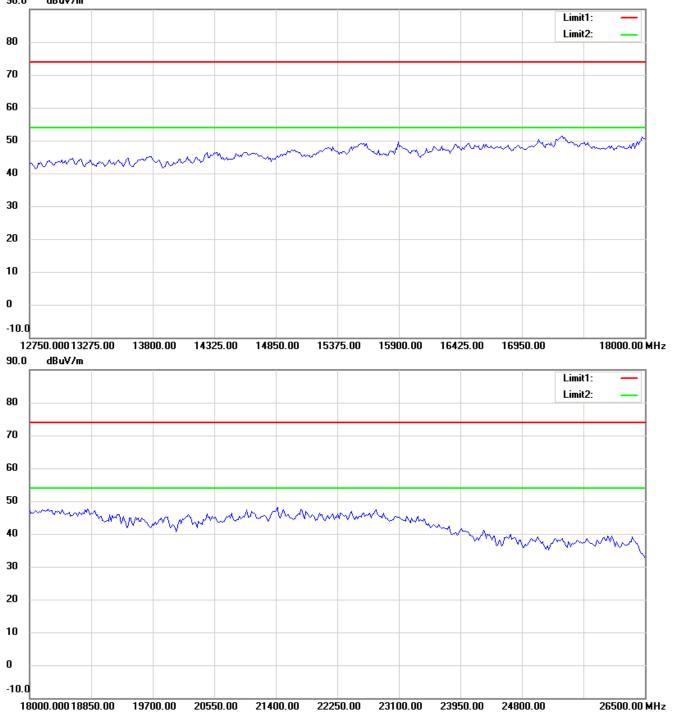
- 1. The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.
- 2. The some frequencies may exceed the limit line without the specified detectors, but that cannot present the results are failed to the specification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





- 1. The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.
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