

FCC PART 15 SUBPART C TEST REPORT

for

SAILFISH

Model No.: SAILFISH

FCC ID: ZPPEX980301

of

Applicant: VTECH Technology Corp.

**Address: 12F-1, No.99, Sec. 2, Zhongshan N. RD. Taipei 104,
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.: W6M21401-13780-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: wtls@wtls-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	General information of Test item.....	4
1.6	Test standards	5
2	TECHNICAL TEST	6
2.1	Summary of test results	6
2.2	Test environment	6
2.3	Test Equipment List	7
2.4	General Test Procedure	9
3	TEST RESULTS (ENCLOSURE)	11
3.1	Peak Output Power (transmitter)	12
3.2	RF Exposure Compliance Requirements	16
3.3	Out of Band Radiated Emissions	16
3.4	Transmitter Radiated Emissions in restricted Bands	17
3.5	Spurious emissions (tx)	18
3.6	Carrier Frequency Separation	21
3.7	Number of Hopping Frequencies.....	24
3.7.1	Pseudorandom Frequency Hopping Sequence.....	26
3.7.2	Coordination of hopping sequences to other transmitters	26
3.7.3	System Receiver Hopping Capability	26
3.8	Time of Occupancy (Dwell Time).....	27
3.9	20dB Bandwidth	33
3.9.1	System Receiver Input Bandwidth	36
3.10	Band-edge Compliance of RF Emissions	37
3.11	Radiated Emissions from Receiver Section of Transceiver.....	42
3.12	Power Line Conducted Emission.....	43
	Appendix.....	45



Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M21401-13780-C-1

FCC ID: ZPPEX980301

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:

February 27, 2014

Rick Chen

Rick Chen.

Date

WTS-Lab.

Name

Signature

Technical responsibility for area of testing:

February 27, 2014

Kevin Wang

Kevin Wang

Date

WTS

Name

Signature



Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M21401-13780-C-1

FCC ID: ZPPEX980301

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: VTECH Technology Corp.

Street: 12F-1, No.99, Sec. 2, Zhongshan N. RD.

Town: Taipei 104,

Country: Taiwan(R.O.C)

Telephone: +886-2-2521-3966

Fax: +886-2-2521-6465



Registration number: W6M21401-13780-C-1

FCC ID: ZPPEX980301

1.4 Application details

Date of receipt of test item: February 05, 2014
Date of test: from February 06, 2014 to February 27, 2014

1.5 General information of Test item

Type of test item: SAILFISH
Model Number: SAILFISH
Multi-listing model number: ./.
Brand Name: EXSOUND
Photos: see Annex

Technical data

Frequency band: 2402 - 2480 MHz
Frequency (ch A): 2402 MHz
Frequency (ch B): 2441 MHz
Frequency (ch C): 2480 MHz

Transmitter

Unom

Normal Mode
Power (ch 0): Conducted: 2.69 dBm
Power (ch 39): Conducted: 3.72 dBm
Power (ch 78): Conducted: 3.50 dBm

EDR Mode
Power (ch 0): Conducted: 5.34 dBm
Power (ch 39): Conducted: 5.95 dBm
Power (ch 78): Conducted: 5.55 dBm

Power supply: Battery 3.7 Vdc
USB 5 Vdc (Power from PC)

Operation modes: duplex

Modulation Type: GFSK 、 π / 4DQPSK 、 8DPSK

Antenna Type: PCBA antenna

Antenna gain: 1.87 dBi



Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M21401-13780-C-1

FCC ID: ZPPEX980301

Host device: none

Classification:

Fixed Device	<input type="checkbox"/>
Mobile Device (Human Body distance > 20cm)	<input type="checkbox"/>
Portable Device (Human Body distance < 20cm)	<input checked="" type="checkbox"/>
Modular Radio Device	<input type="checkbox"/>

Manufacturer: (if applicable)

Name: ./.

Street: ./.

Town: ./.

Country: ./.

Additional information: ./.

1.6 Test standards

Technical standard : FCC RULES PART 15 SUBPART C § 15.247 (2011-10)



Registration number: W6M21401-13780-C-1

FCC ID: ZPPEX980301

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 Battery 3.7 Vdc
USB 5 Vdc (Power from PC)

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



Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M21401-13780-C-1

FCC ID: ZPPEX980301

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	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	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	2014/2/18	2015/2/17
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	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	2013/3/4	2014/3/3
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: W6M21401-13780-C-1

FCC ID: ZPPEX980301

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-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.	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.	2014/2/19	2015/2/18
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	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	2013/3/4	2014/3/3
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: W6M21401-13780-C-1

FCC ID: ZPPEX980301

2.4 General Test Procedure

POWER LINE CONDUCTED INTERFERENCE: The procedure used was ANSI STANDARD C63.4-2009 5.2 using a 50 μ H 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. The ambient temperature of the UUT was 23°C with a humidity of 40 %.

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 μ 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 dB μ V + 10.36 dB + 6 dB = 36.36 dB μ V/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 C63.4-2009 6.3.1. 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.

Measurements were made by Worldwide Testing Services(Taiwan) Co., Ltd. at the registered open field test site located 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.



Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M21401-13780-C-1

FCC ID: ZPPEX980301

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 C63.4-2009 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.



Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M21401-13780-C-1

FCC ID: ZPPEX980301

3 Test results (enclosure)

TEST CASE	Para. Number	Required	Test passed	Test failed
Peak Output Power	15.247(b)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Equivalent radiated Power	15.247(b)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Spurious Emissions radiated – Transmitter operating	15.247(c)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Spurious Emissions conducted – Transmitter operating	15.247	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Carrier Frequency Separation	15.247(a) (1)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Number of Hopping Frequencies	15.247(a) (1)(i)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Time of Occupancy (Dwell Time)	15.247(a) (1)(i)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
20 dB Bandwidth	15.247(a) (1)(i)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Band-edge Compliance of RF Emission	15.247(c)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Radiated Emission from Digital Part	15.109	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Power Line Conducted Emission	15.207(a)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

The follows is intentionally left blank.



Registration number: W6M21401-13780-C-1

FCC ID: ZPPEX980301

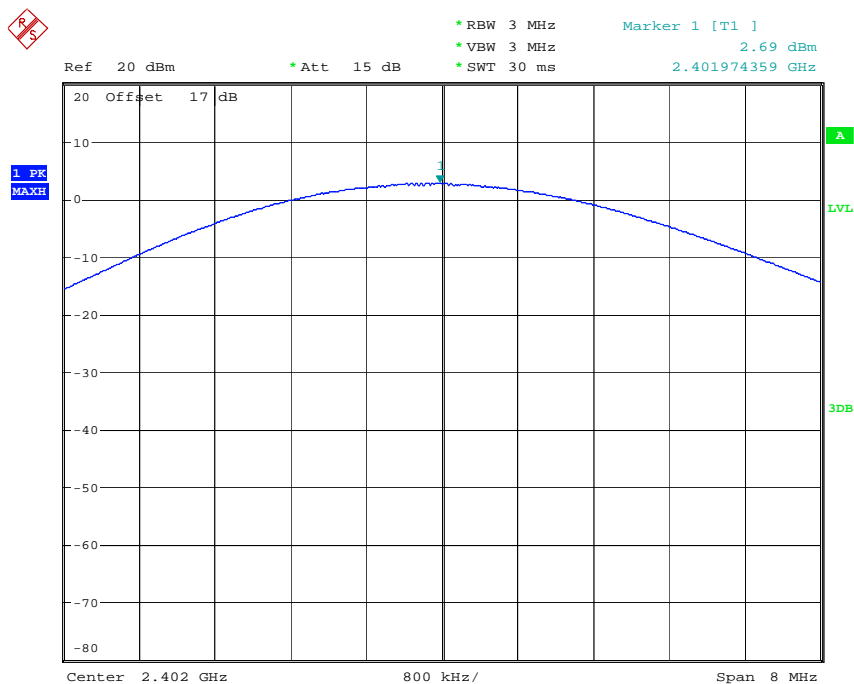
3.1 Peak Output Power (transmitter)

FCC Rule: 15.247

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).

Normal mode



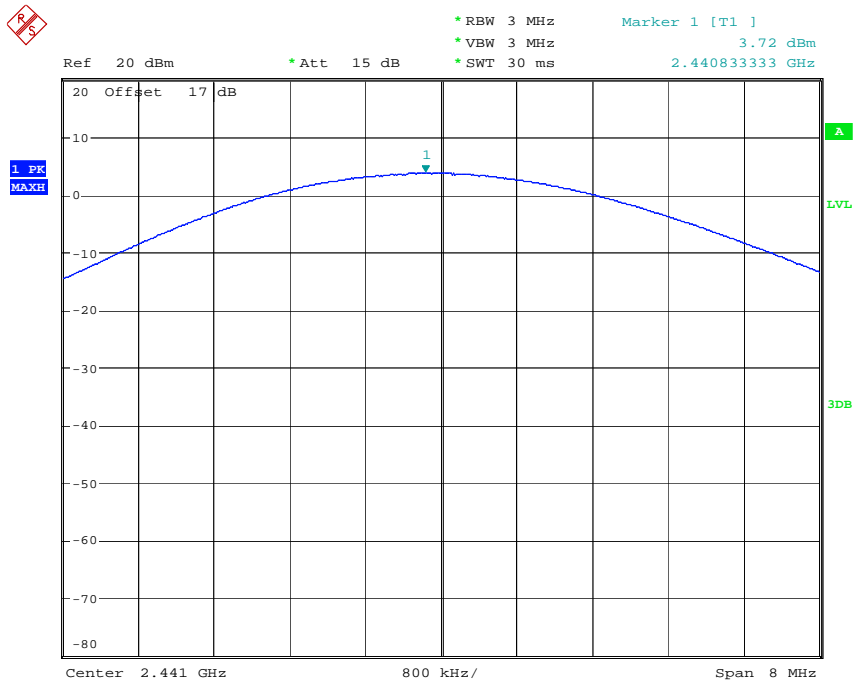
MAX OUTPUT POWER CH0

Date: 19.FEB.2014 10:54:37

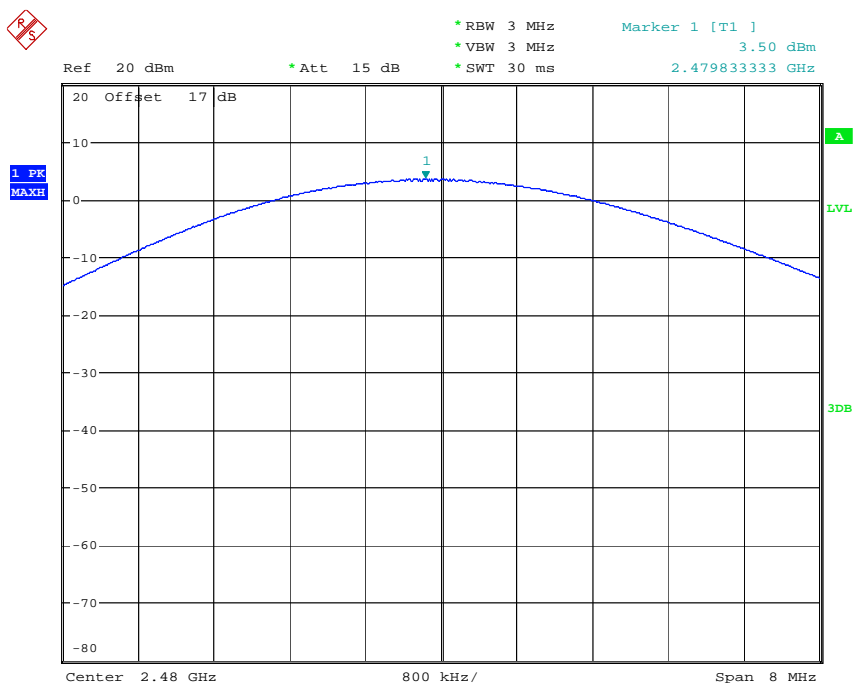


Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M21401-13780-C-1
FCC ID: ZPPEX980301



MAX OUTPUT POWER CH39
Date: 19.FEB.2014 10:55:37



MAX OUTPUT POWER CH78
Date: 19.FEB.2014 10:56:09

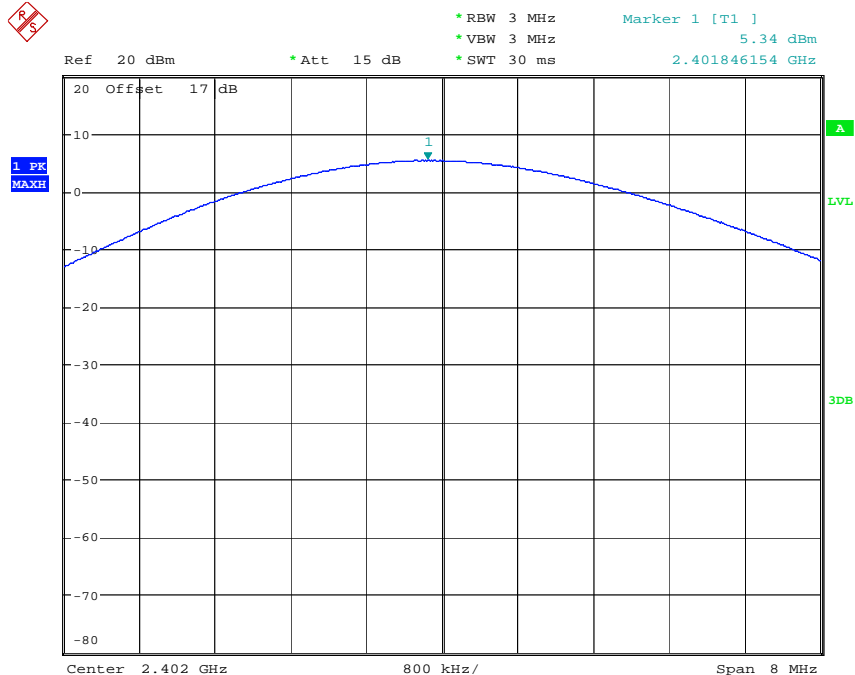


Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M21401-13780-C-1

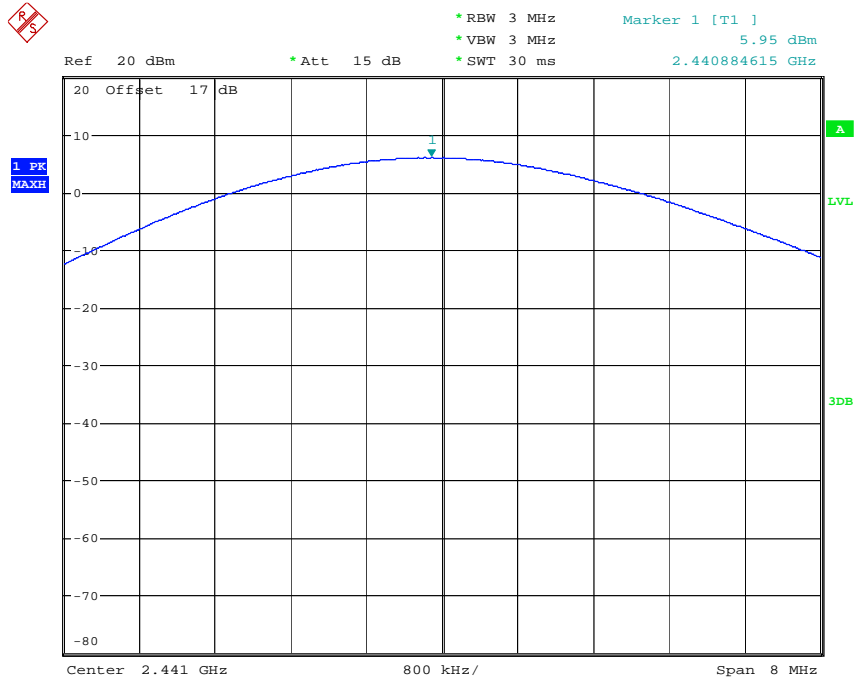
FCC ID: ZPPEX980301

EDR mode



MAX OUTPUT POWER CH0 EDR MODE

Date: 19.FEB.2014 11:02:05



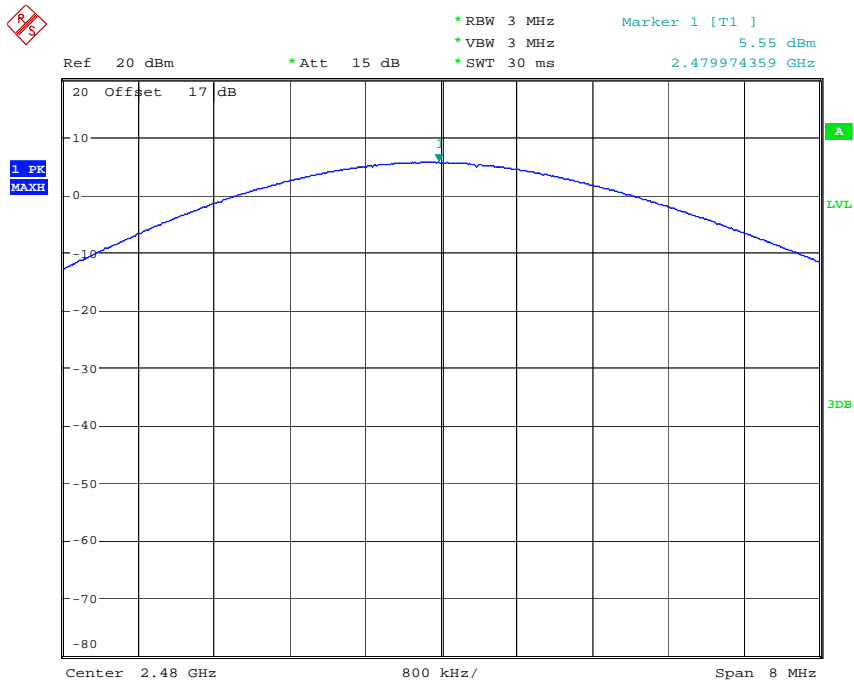
MAX OUTPUT POWER CH39 EDR MODE

Date: 19.FEB.2014 11:04:21



Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M21401-13780-C-1
FCC ID: ZPPEX980301



MAX OUTPUT POWER CH78 EDR MODE
Date: 19.FEB.2014 11:05:17

Maximum Peak Output Power

Limits:

Frequency MHz	Number of hopping channels			
	≥ 75	≥ 50	$49 \geq 25$	$74 \geq 15$
902-928	--	30 dBm	24 dBm	--
2400-2483.5 MHz	30 dBm	--	--	21 dBm
5725-5850 MHz	30 dBm	--	--	--

In case of employing transmitter antennas having antenna gain >dBi and using fixed point-to point operation consider §15.247 (b)(4).

Test equipment used: ETSTW-RE 055, ETSTW-RE 050, ETSTW-RE 064



Registration number: W6M21401-13780-C-1

FCC ID: ZPPEX980301

3.2 RF Exposure Compliance Requirements

According to Supplement C, Edition 01-01 to OET Bulletin 65, Edition 97-01 this spread spectrum transmitter is categorically excluded from routine environmental evaluation because of the low power level, where there is a high likelihood of compliance with RF exposure standards.

The antenna used for this Bluetooth transceiver module must not be co-located or operating in conjunction with any other antenna or transmitter.

3.3 Out of Band Radiated Emissions

FCC Rule: 15.247(c) , 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.

Limits:

For frequencies below 1GHz :

Max. reading – 20 dB

Guidance on Measurement of FHSS Systems:

“If the emission is pulsed, modify the unit for continuous operation , use the settings shown above, then correct the reading by subtracting the peak-average correction factor, derived from the appropriate duty cycle calculation.” Here the correction was added to the limit instead subtracted from the reading.

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

For frequencies above 1GHz (Peak measurements).

Limit = max. aver. reading-20dB +20dB(because Peak detector is used)

For frequencies above 1GHz (Average measurements).

Max. reading – 20 dB - duty cycle correction:

No duty cycle correction was added to the reading

Test equipment used: ETSTW-RE 004, ETSTW-RE 111, ETSTW-RE 030, ETSTW-RE 064

Explanation: See attached diagrams in appendix.



Registration number: W6M21401-13780-C-1

FCC ID: ZPPEX980301

3.4 Transmitter Radiated Emissions in restricted Bands

FCC Rules: 15.247 (c), 15.205, 15.209, 15.35

Radiated emission measurements were performed from 30 MHz to 26000 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 FHSS Systems:

“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.” Here the correction was added to the limit instead subtracted from the reading.

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

For frequencies above 1GHz (Average measurements).

Limit – duty cycle correction

No duty cycle correction was added to the reading.

54.0dB μ V/m

For frequencies above 1GHz (Peak measurements).

Limit + 20dB

54.0dB μ V/m + 20 dB= 74 dB μ V/m

Test equipment used: ETSTW-RE 004, ETSTW-RE 030, ETSTW-RE 111, ETSTW-RE 064

Explanation: See attached diagrams in appendix.



Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M21401-13780-C-1

FCC ID: ZPPEX980301

3.5 Spurious emissions (tx)

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

In any 100 kHz bandwidth outside the frequency band in which the intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions 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.

If in the column's correction factor states a value then the max. Field strength in the same row is corrected by a value gained from the "Marker-Delta-Method" or the „Duty-Cycle Correction Factor“.

Summary table with radiated data of the test plots

Model: SAILFISH Date: 2014/02/18
 Mode: 2402MHz Temperature: 24 °C Engineer: Roy
 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)
142.7453	4.19	peak	15.03	19.22	43.50	-24.28	240	100
317.6954	3.98	peak	16.43	20.41	46.00	-25.59	155	100

Frequency (MHz)	Reading (dBuV)		Factor (dB) Corr.	Result (dBuV/m)		Limit (dBuV/m)		Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
	Peak	Ave.		Peak	Ave.	Peak	Ave.			
4801.6030	48.62	---	0.49	49.11	---	74.00	54.00	-24.89	120	100
7206.0000	41.48	---	4.03	45.51	---	74.00	54.00	-28.49	165	100
9608.0000	34.81	---	8.03	42.84	---	74.00	54.00	-31.16	30	100
12010.0000	33.03	---	12.55	45.58	---	74.00	54.00	-28.42	110	100



Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M21401-13780-C-1

FCC ID: ZPPEX980301

Polarization: Vertical

Frequency (MHz)	Reading (dBuV)	Detector	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
39.7194	8.10	peak	13.79	21.89	40.00	-18.11	235	100
156.3527	4.69	peak	15.37	20.06	43.50	-23.44	70	100

Frequency (MHz)	Reading (dBuV)		Factor (dB) Corr.	Result (dBuV/m)		Limit (dBuV/m)		Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
	Peak	Ave.		Peak	Ave.	Peak	Ave.			
4803.9080	54.30	42.83	0.50	54.80	43.33	74.00	54.00	-10.67	240	100
7206.0000	41.52	---	4.03	45.55	---	74.00	54.00	-28.45	85	100
9608.0000	34.38	---	8.03	42.41	---	74.00	54.00	-31.59	70	100
12010.0000	33.10	---	12.55	45.65	---	74.00	54.00	-28.35	160	100

Mode: 2441MHz

Polarization: Horizontal

Frequency (MHz)	Reading (dBuV)	Detector	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
162.1844	3.37	peak	15.27	18.64	43.50	-24.86	130	100
848.3768	5.26	peak	26.39	31.65	46.00	-14.35	255	100

Frequency (MHz)	Reading (dBuV)		Factor (dB) Corr.	Result (dBuV/m)		Limit (dBuV/m)		Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
	Peak	Ave.		Peak	Ave.	Peak	Ave.			
4881.7640	48.71	---	0.73	49.44	---	74.00	54.00	-24.56	35	100
7323.0000	40.91	---	3.77	44.68	---	74.00	54.00	-29.32	100	100
9764.0000	34.11	---	8.43	42.54	---	74.00	54.00	-31.46	200	100
12205.0000	32.28	---	13.70	45.98	---	74.00	54.00	-28.02	65	100

Polarization: Vertical

Frequency (MHz)	Reading (dBuV)	Detector	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
39.7194	8.49	peak	13.79	22.28	40.00	-17.72	200	100
150.5210	4.80	peak	15.31	20.11	43.50	-23.39	120	100

Frequency (MHz)	Reading (dBuV)		Factor (dB) Corr.	Result (dBuV/m)		Limit (dBuV/m)		Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
	Peak	Ave.		Peak	Ave.	Peak	Ave.			
4881.8840	53.46	42.73	0.73	54.19	43.46	74.00	54.00	-10.54	315	100
7323.0000	40.93	---	3.77	44.70	---	74.00	54.00	-29.30	150	100
9764.0000	34.14	---	8.43	42.57	---	74.00	54.00	-31.43	195	100
12205.0000	32.78	---	13.70	46.48	---	74.00	54.00	-27.52	140	100



Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M21401-13780-C-1
FCC ID: ZPPEX980301

Mode: 2480MHz

Polarization: Horizontal

Frequency (MHz)	Reading (dBuV)	Detector	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
148.5772	3.91	peak	15.25	19.16	43.50	-24.34	105	100
842.5451	5.43	peak	26.30	31.73	46.00	-14.27	260	100

Frequency (MHz)	Reading (dBuV)		Factor (dB) Corr.	Result (dBuV/m)		Limit (dBuV/m)		Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
	Peak	Ave.		Peak	Ave.	Peak	Ave.			
4959.9620	57.59	43.57	1.16	58.75	44.73	74.00	54.00	-9.27	160	100
7440.0000	41.04	---	3.97	45.01	---	74.00	54.00	-28.99	280	100
9920.0000	34.38	---	8.60	42.98	---	74.00	54.00	-31.02	230	100
12400.0000	31.97	---	14.44	46.41	---	74.00	54.00	-27.59	115	100

Polarization: Vertical

Frequency (MHz)	Reading (dBuV)	Detector	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
39.7194	7.42	peak	13.79	21.21	40.00	-18.79	240	100
156.3527	4.60	peak	15.37	19.97	43.50	-23.53	155	100

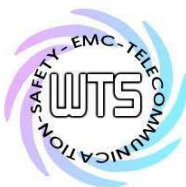
Frequency (MHz)	Reading (dBuV)		Factor (dB) Corr.	Result (dBuV/m)		Limit (dBuV/m)		Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
	Peak	Ave.		Peak	Ave.	Peak	Ave.			
4960.1200	58.38	43.77	1.16	59.54	44.93	74.00	54.00	-9.07	70	100
7440.0000	41.23	---	3.97	45.20	---	74.00	54.00	-28.80	195	100
9920.0000	33.58	---	8.60	42.18	---	74.00	54.00	-31.82	75	100
12400.0000	32.50	---	14.44	46.94	---	74.00	54.00	-27.06	220	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 above 1GHz: 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 RESULT (Transmitter): The unit DOES meet the FCC requirements.

Test equipment used: ETSTW-RE 004, ETSTW-RE 030, ETSTW-RE 111, ETSTW-RE 064
ETSTW-RE 088, ETSTW-RE 018

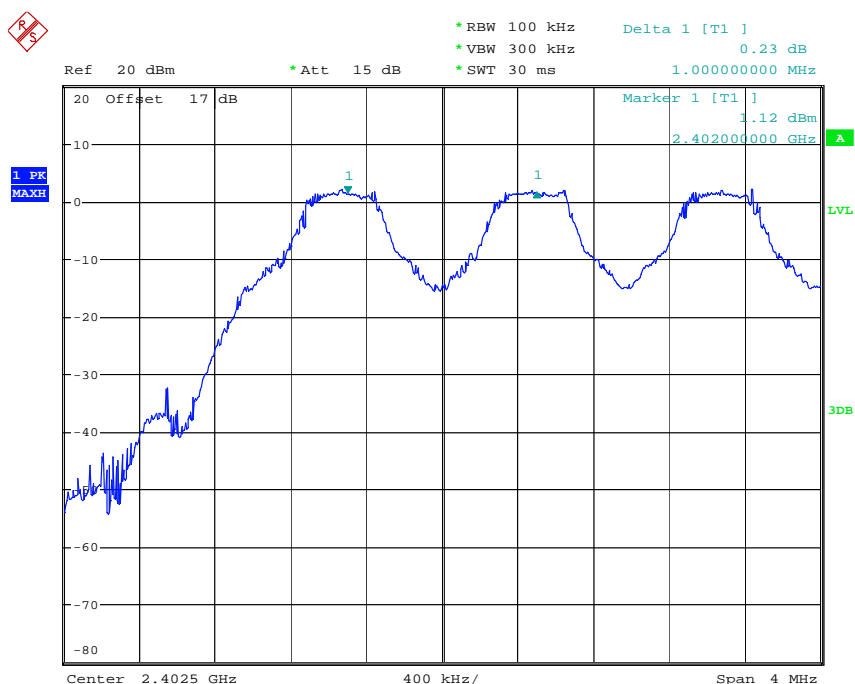


Registration number: W6M21401-13780-C-1
FCC ID: ZPPEX980301

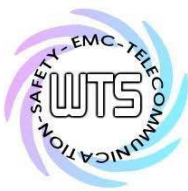
3.6 Carrier Frequency Separation

Carrier Frequency Separation was measured with modulation (declared by manufacturer).

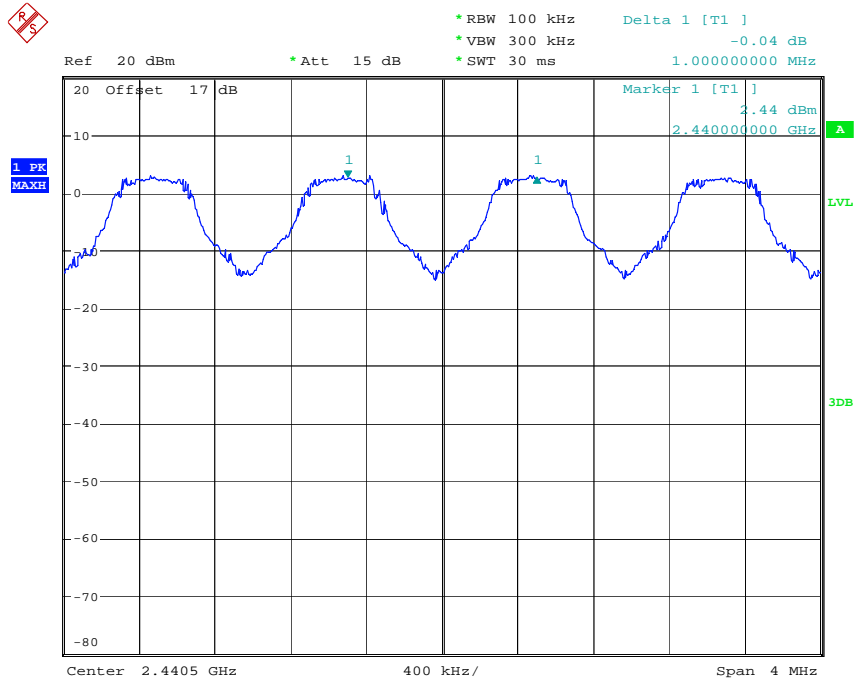
According to FCC rules part 15 subpart C §15.247 frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or 20 dB bandwidth of the hopping channel, whichever is greater.



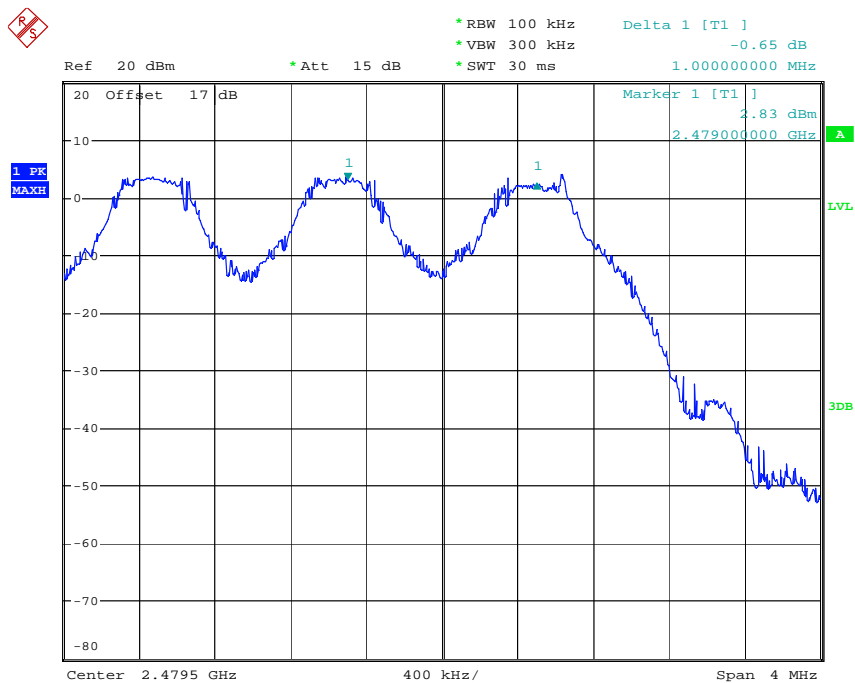
FREQUENCY SEPARATION CH0
Date: 19.FEB.2014 10:59:57



Registration number: W6M21401-13780-C-1
FCC ID: ZPPEX980301



FREQUENCY SEPARATION CH39
Date: 19.FEB.2014 11:00:41



FREQUENCY SEPARATION CH78
Date: 19.FEB.2014 11:01:29



Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M21401-13780-C-1
FCC ID: ZPPEX980301

Limits:

Frequency Range MHz	Limits	
	20 dB bandwidth < 25 kHz	20 dB bandwidth > 25 kHz
902-928	25 kHz	20 dB bandwidth
2400-2483.5 5725-5850.0	25 kHz	20 dB bandwidth

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



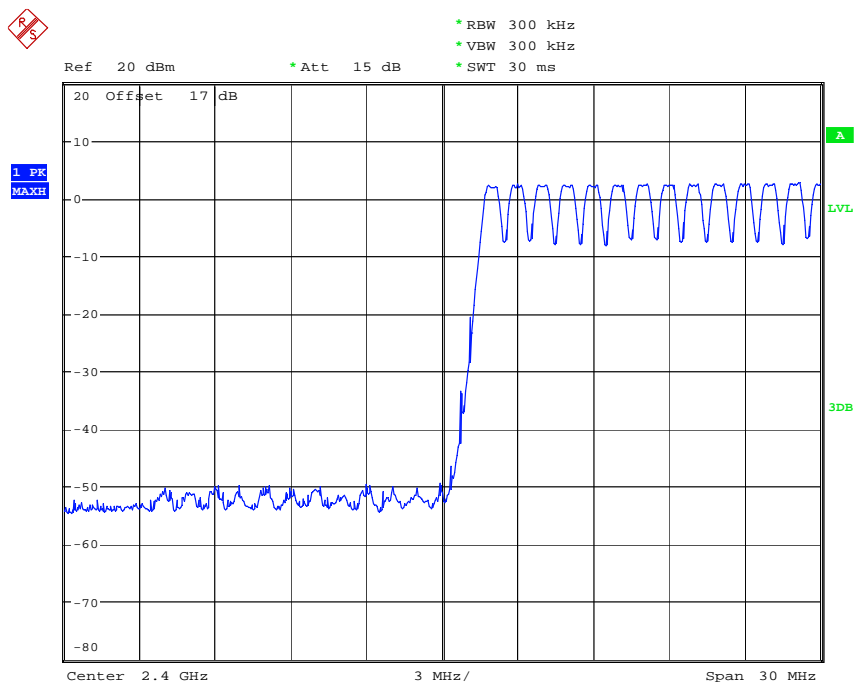
Registration number: W6M21401-13780-C-1

FCC ID: ZPPEX980301

3.7 Number of Hopping Frequencies

According to FCC rules part 15 subpart C §15.247 frequency hopping systems operating in the 2400-2483.5 MHz band shall use at least 15 hopping frequencies. Frequency hopping systems in 5725-5850 MHz bands shall use least 75 hopping frequencies.

For frequency hopping systems operating in the 902-928 MHz band: if the 20dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies; if the 20dB bandwidth of the hopping channel 250 kHz or greater, the system shall use at least 25 hopping frequencies.

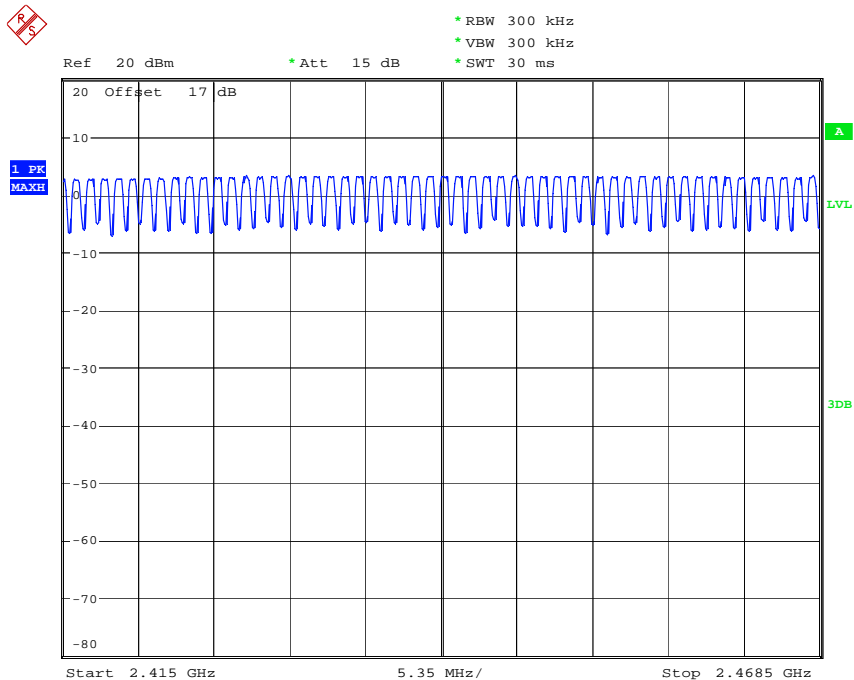


NUMBER OF HOPPING CH0-13

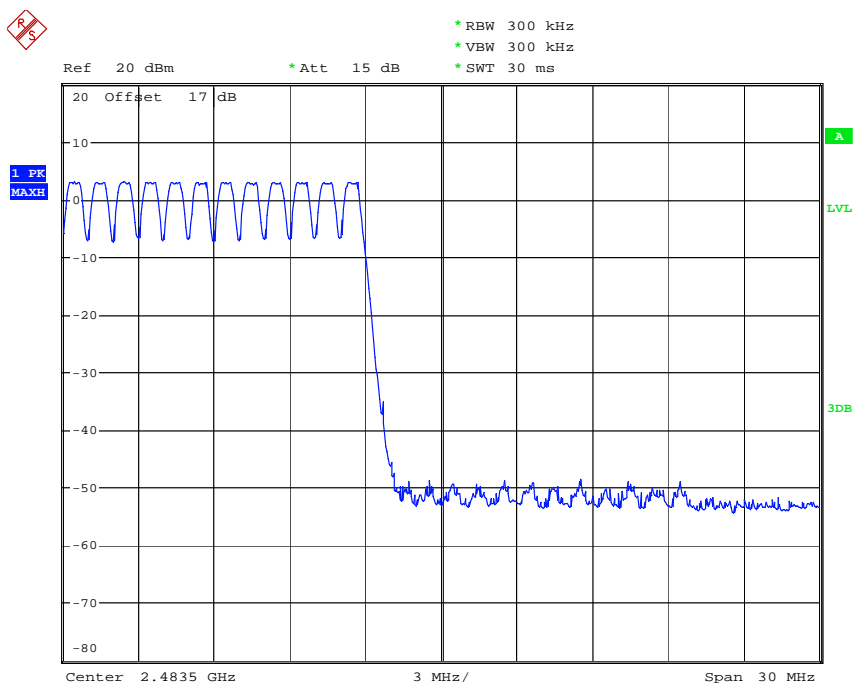
Date: 19.FEB.2014 10:57:17



Registration number: W6M21401-13780-C-1
FCC ID: ZPPEX980301



NUMBER OF HOPPING CH14-66
Date: 19.FEB.2014 10:59:05



NUMBER OF HOPPING CH67-78
Date: 19.FEB.2014 10:57:57



Registration number: W6M21401-13780-C-1
FCC ID: ZPPEX980301

Limits:

Frequency Range MHz	Limit	
	20dB Bandwidth	Number of Channels
902-928 MHz	Bandwidth < 250 kHz	≥ 50
	Bandwidth ≥ 250 kHz	≥ 25
2400-2483.5	not defined	15
5725-5850.0 MHz	1 MHz	75

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

3.7.1 Pseudorandom Frequency Hopping Sequence

The generation of the hopping sequence is determined by the Bluetooth core specification and complies with the FCC requirements.

3.7.2 Coordination of hopping sequences to other transmitters

According to the Bluetooth core specification such a coordination is not possible. During scatternet function only one of the two hopping sequences will be used at a definite moment.

3.7.3 System Receiver Hopping Capability

According to the Bluetooth core specification. The system receivers shift frequencies in synchronization with the transmitted signals.



Registration number: W6M21401-13780-C-1

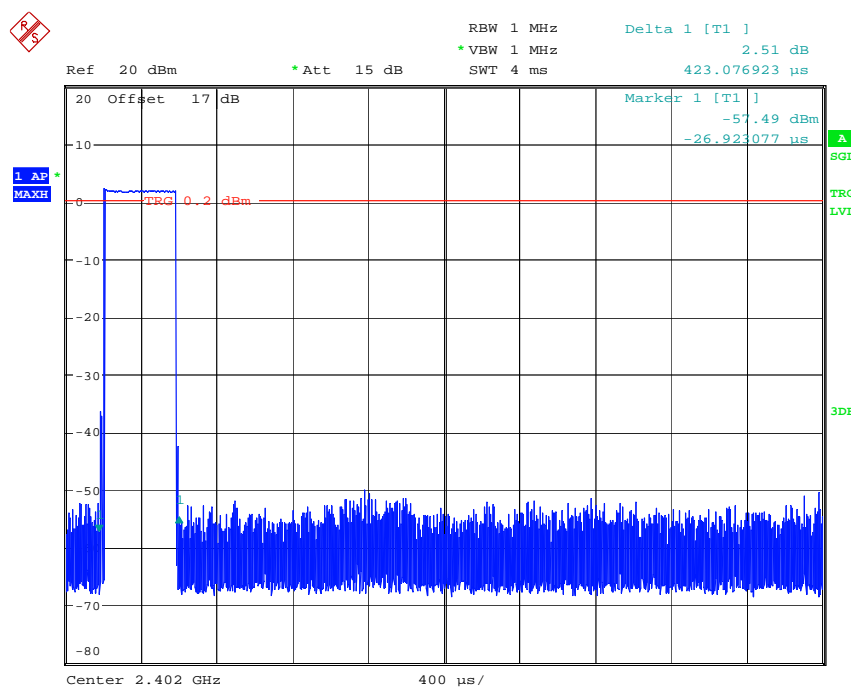
FCC ID: ZPPEX980301

3.8 Time of Occupancy (Dwell Time)

Frequency hopping systems operating in the 5725-5850 MHz band shall use an average time of occupancy on any frequency not greater than 0.4 seconds within a 30 second period.

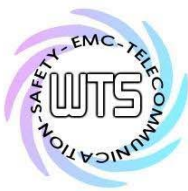
In 2400-2483.5 MHz band the average time of occupancy on any channel shall not be greater than 0.4 seconds multiplied by the number of hopping channels employed.

For frequency hopping systems operating in the 902-928 MHz band: if the 20dB bandwidth of the hopping channel is less than 250 kHz, the average time of occupancy on any frequency shall not greater than 0.4 seconds within a 20 second period; if the 20dB bandwidth of the hopping channel is 250 kHz or greater, the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period.



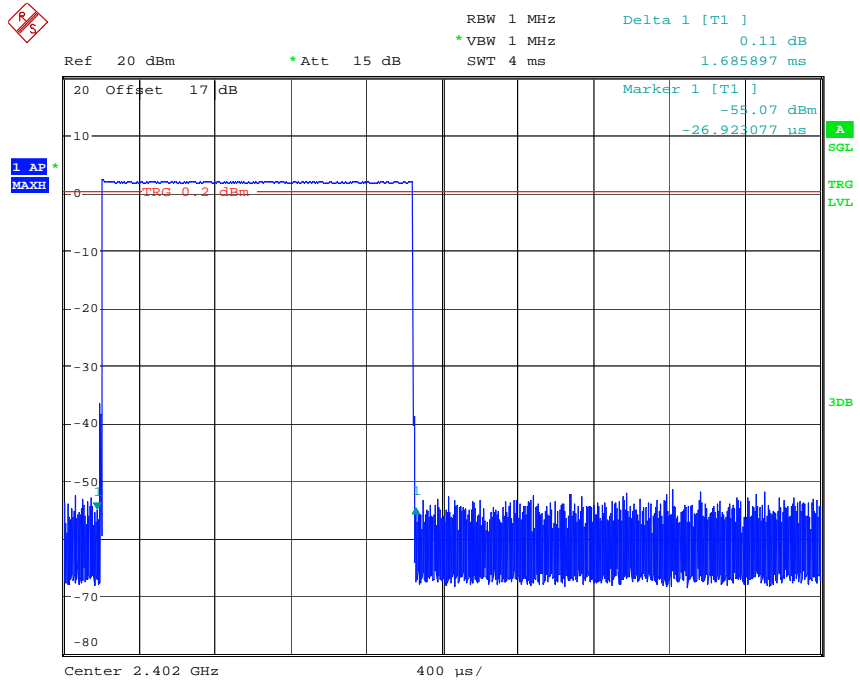
DWELL TIME CH0 DH1 (0.423ms * 320events = 135.36ms)

Date: 19.FEB.2014 11:34:14



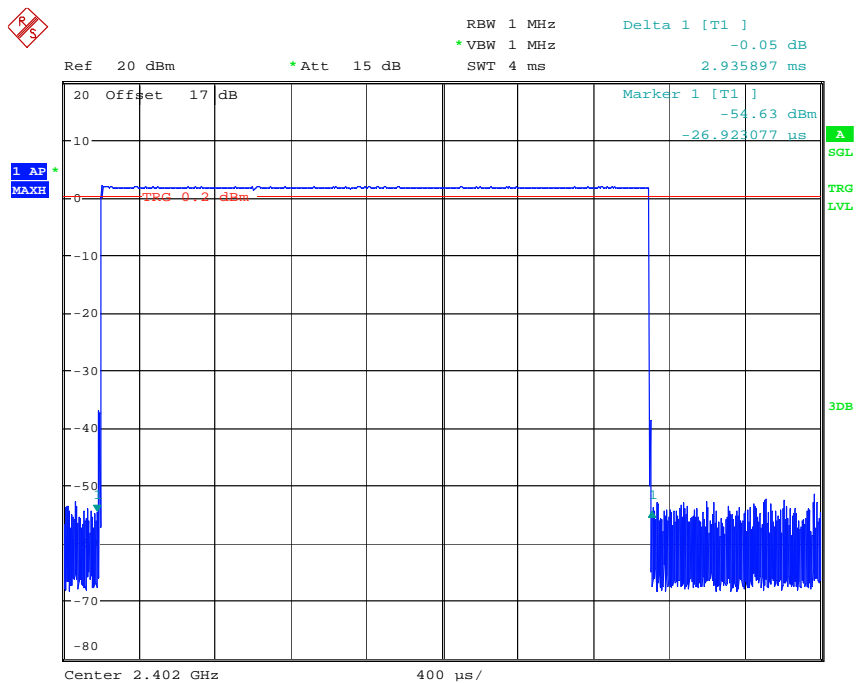
Registration number: W6M21401-13780-C-1

FCC ID: ZPPEX980301



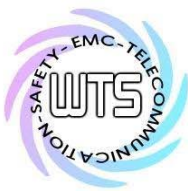
DWELL TIME CH0 DH3 (1.685ms * 160events = 269.6ms)

Date: 19.FEB.2014 11:35:38



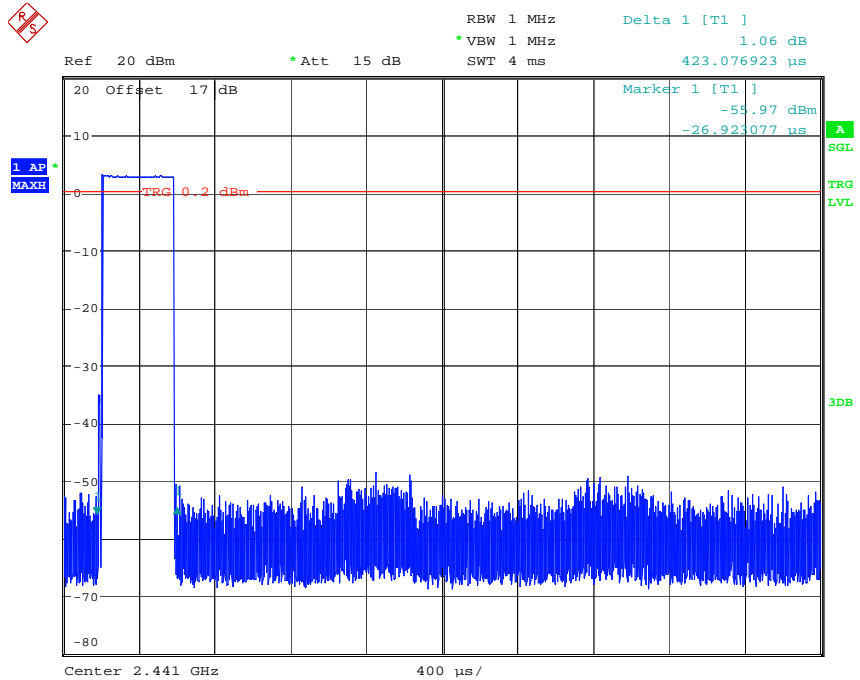
DWELL TIME CH0 DH5 (2.935ms * 106events = 311.11ms)

Date: 19.FEB.2014 11:38:30



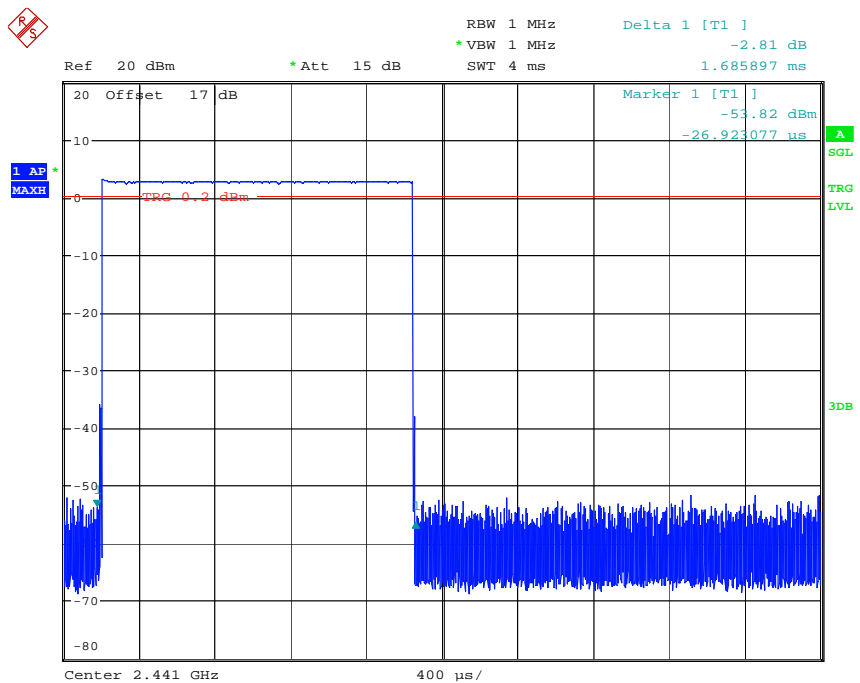
Registration number: W6M21401-13780-C-1

FCC ID: ZPPEX980301



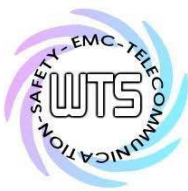
DWELL TIME CH39 DH1 (0.423ms * 320events = 135.36ms)

Date: 19.FEB.2014 11:33:11

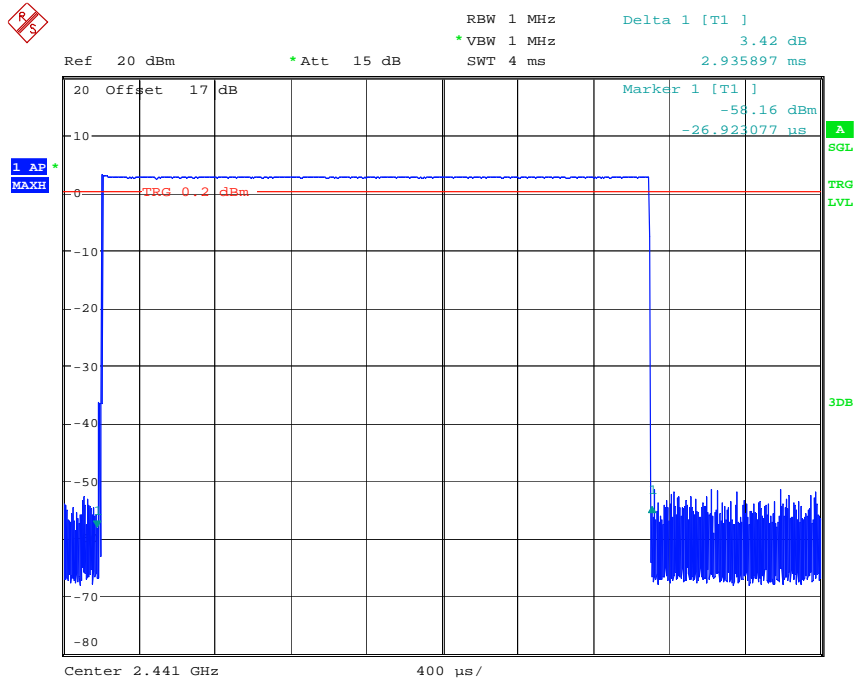


DWELL TIME CH39 DH3 (1.685ms * 160events = 269.6ms)

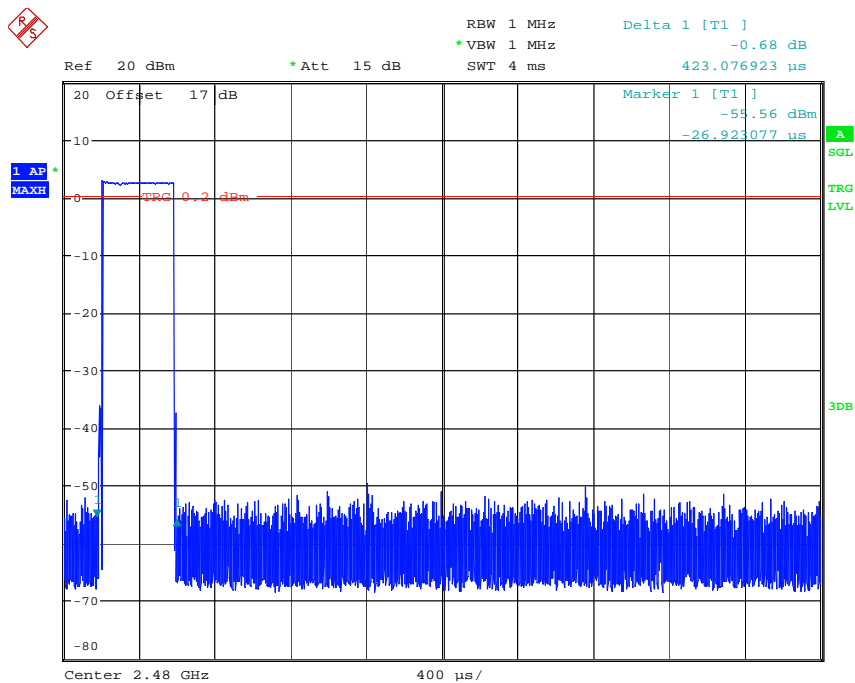
Date: 19.FEB.2014 11:36:03



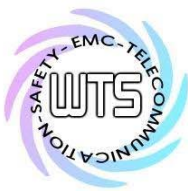
Registration number: W6M21401-13780-C-1
FCC ID: ZPPEX980301



DWELL TIME CH39 DH5 (2.935ms * 106events = 311.11ms)
Date: 19.FEB.2014 11:38:03

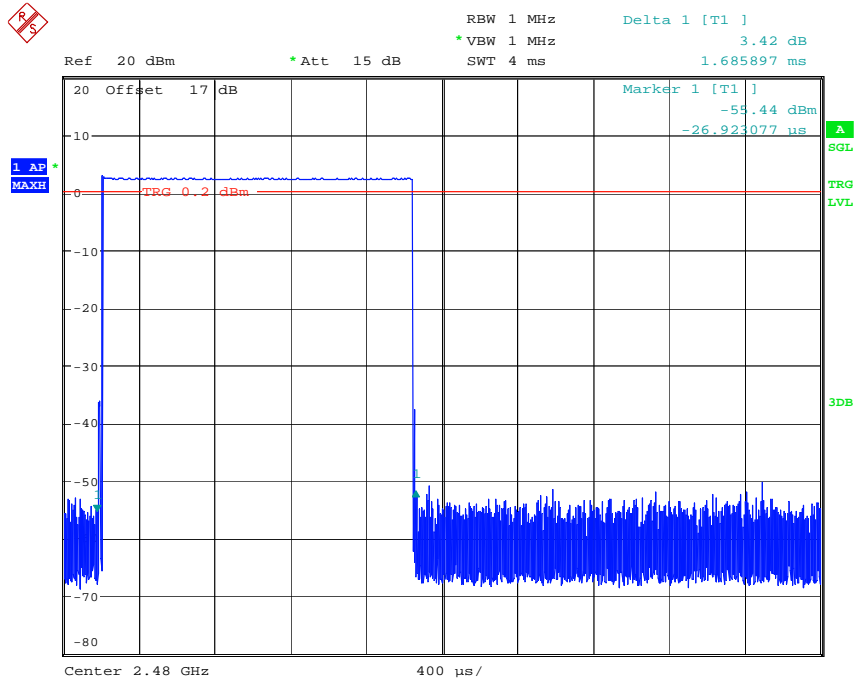


DWELL TIME CH78 DH1 (0.423ms * 320events = 135.36ms)
Date: 19.FEB.2014 11:33:42



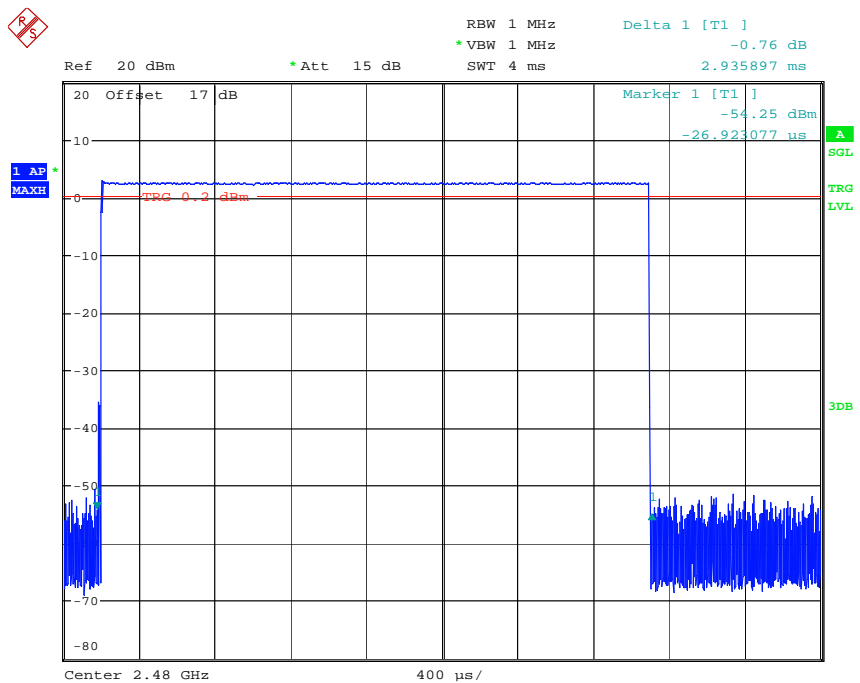
Registration number: W6M21401-13780-C-1

FCC ID: ZPPEX980301



DWELL TIME CH78 DH3 (1.685ms * 160events = 269.6ms)

Date: 19.FEB.2014 11:36:26



DWELL TIME CH78 DH5 (2.935ms * 106events = 311.11ms)

Date: 19.FEB.2014 11:37:40



Registration number: W6M21401-13780-C-1
FCC ID: ZPPEX980301

Limits and measurement periods:

Frequency MHz	Number of channels	Measurement Periode	Limit
902 – 928	≥ 50	20 s	0.4 s
	$49 \geq 25$	10 s	0.4 s
2400 – 2483.5	≥ 15	0.4 s * number of used channels	0.4 s
5725- 5850	≥ 75	30 s	0.4s

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



Registration number: W6M21401-13780-C-1

FCC ID: ZPPEX980301

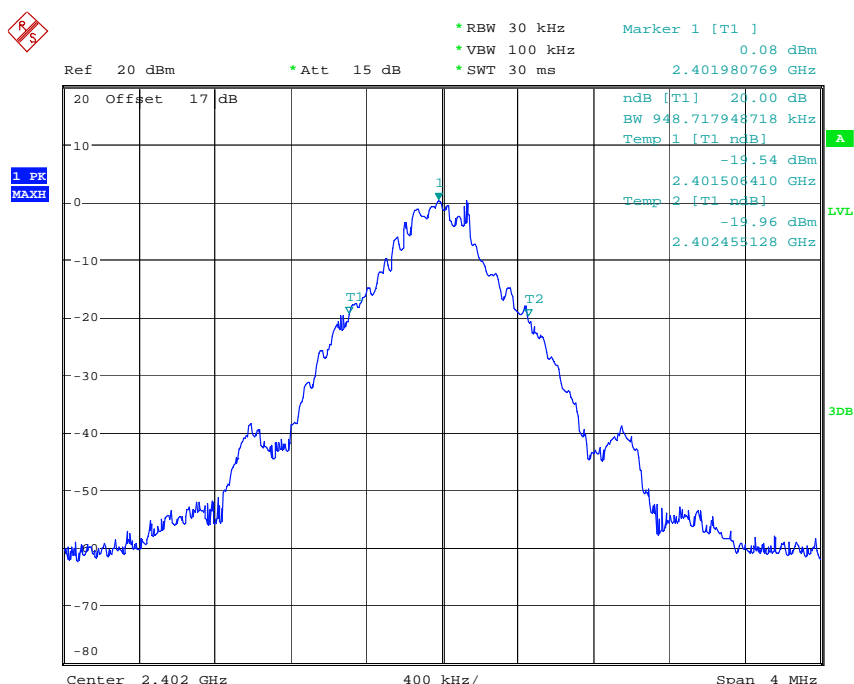
3.9 20dB Bandwidth

Frequency hopping systems operating in the 5725-5850 MHz bands shall use a maximum 20dB bandwidth of 1 MHz.

The 20dB bandwidth is measured on the lowest, middle and highest hopping channel.

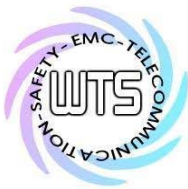
For frequency hopping systems operating in the 902-928 MHz band the maximum 20dB bandwidth of the hopping channel is 500 kHz.

Normal mode



20DB BANDWIDTH CH0

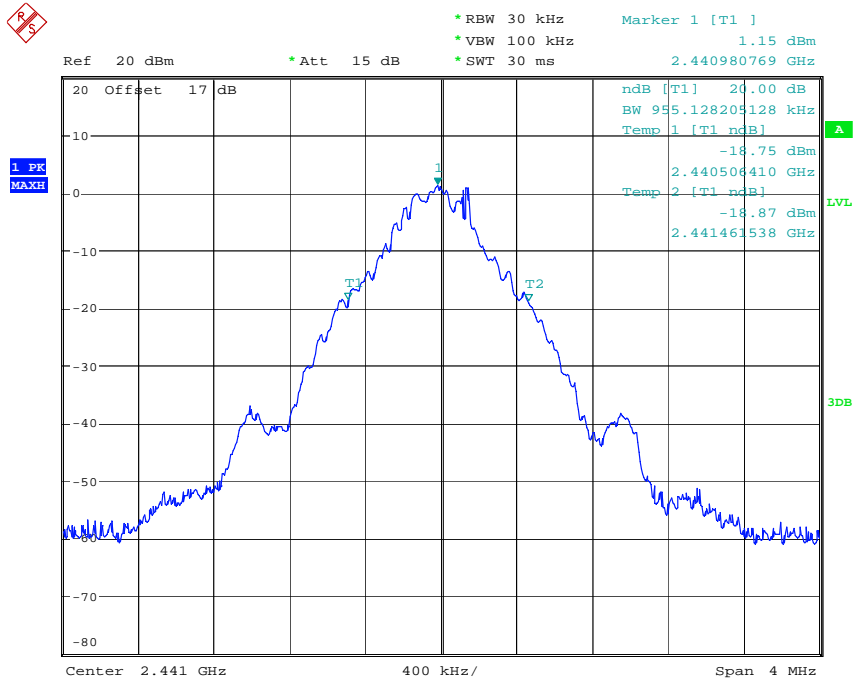
Date: 19.FEB.2014 10:54:46



Worldwide Testing Services(Taiwan) Co., Ltd.

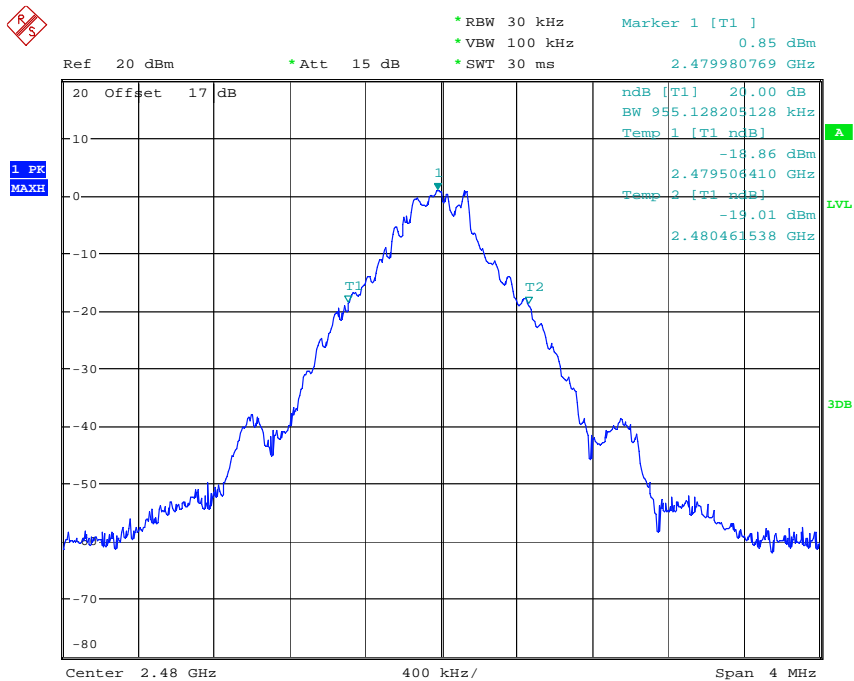
Registration number: W6M21401-13780-C-1

FCC ID: ZPPEX980301



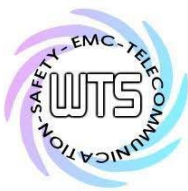
20DB BANDWIDTH CH39

Date: 19.FEB.2014 10:55:45



20DB BANDWIDTH CH78

Date: 19.FEB.2014 10:56:17

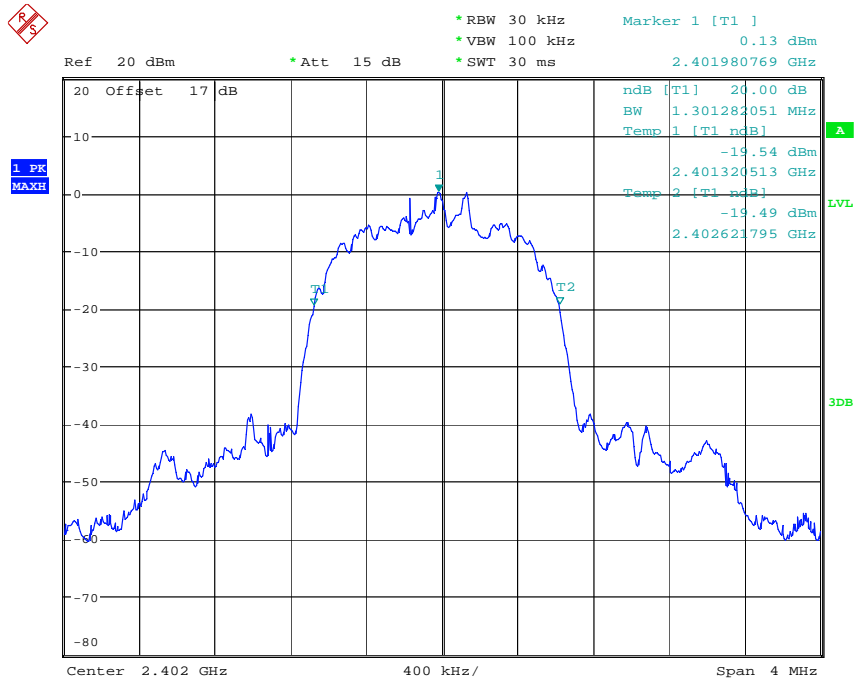


Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M21401-13780-C-1

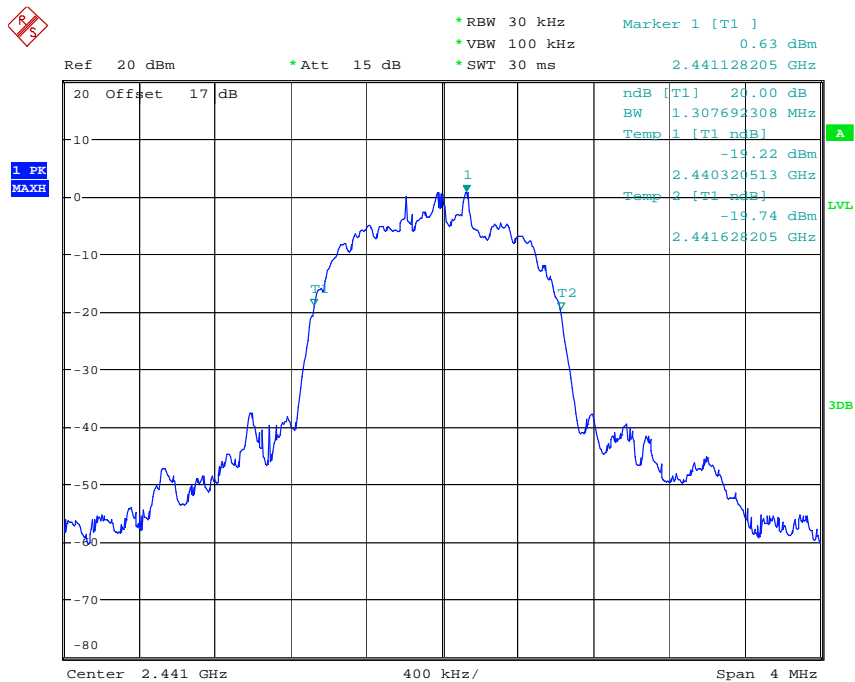
FCC ID: ZPPEX980301

EDR mode



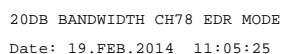
20DB BANDWIDTH CH0 EDR MODE

Date: 19.FEB.2014 11:02:13



20DB BANDWIDTH CH39 EDR MODE

Date: 19.FEB.2014 11:04:29



Frequency Range / MHz	Limit
902-928	≤ 500 kHz
2400-2483.5	not defined
5725-5850	≤ 1 MHz



Registration number: W6M21401-13780-C-1

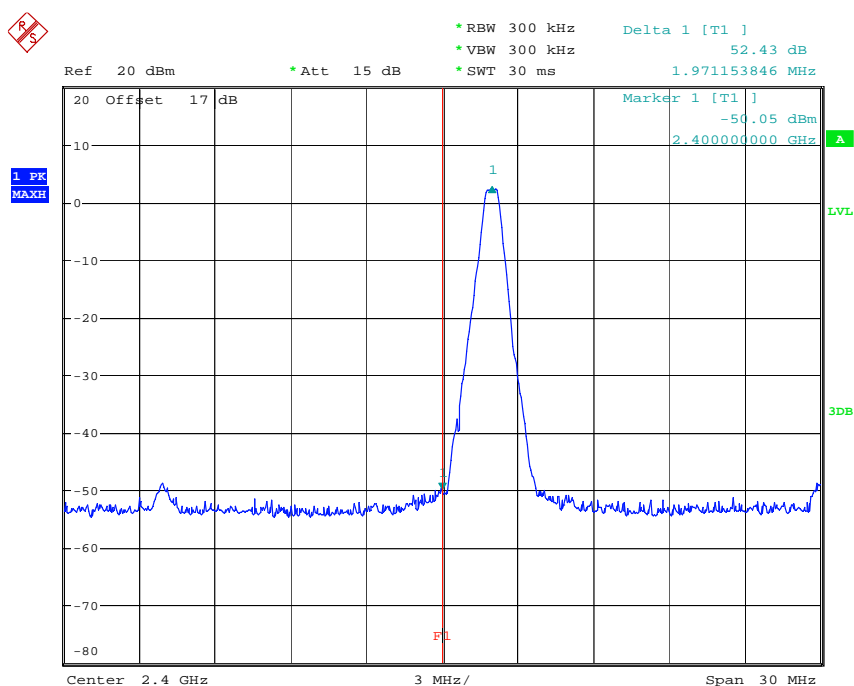
FCC ID: ZPPEX980301

3.10 Band-edge Compliance of RF Emissions

According to FCC rules part 15 subpart C §15.247(c) in any 100 kHz bandwidth outside the frequency band in which the intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in § 15.209(a) is not required.

In addition radiated emission which fall in the restricted bands, as defined in section 15.205(a), must also with the radiated emission limits.

Normal mode

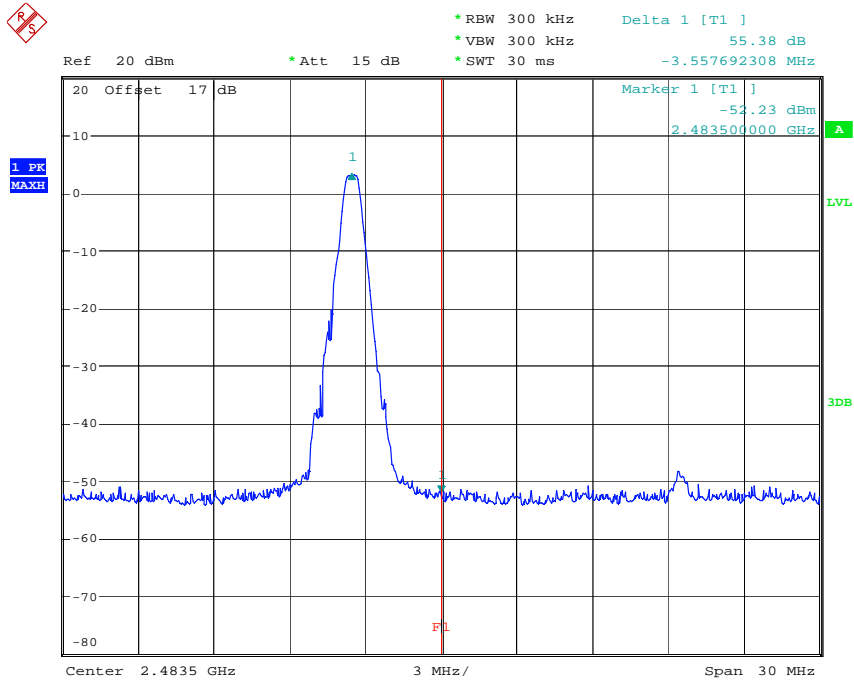




Worldwide Testing Services(Taiwan) Co., Ltd.

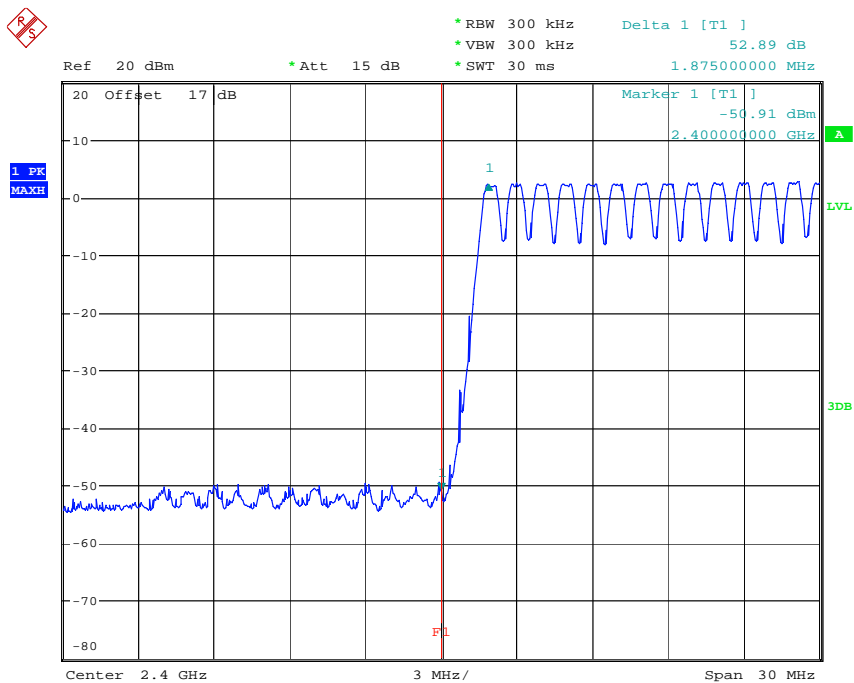
Registration number: W6M21401-13780-C-1

FCC ID: ZPPEX980301



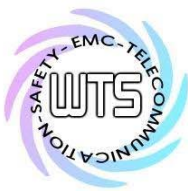
BANDEDGE CH78

Date: 19.FEB.2014 10:56:25



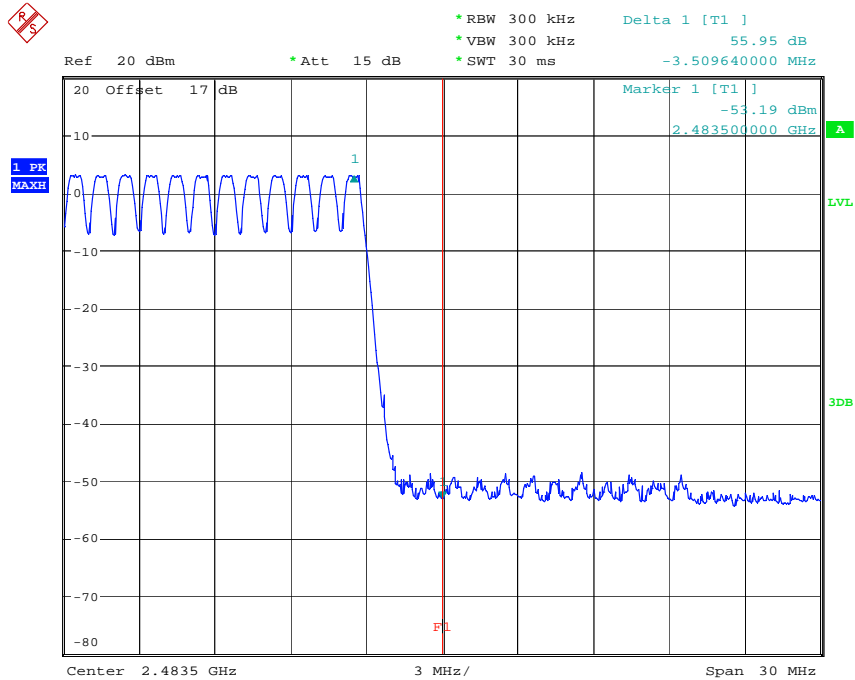
BANDEDGE CH0 HOPPING MODE

Date: 19.FEB.2014 10:57:18



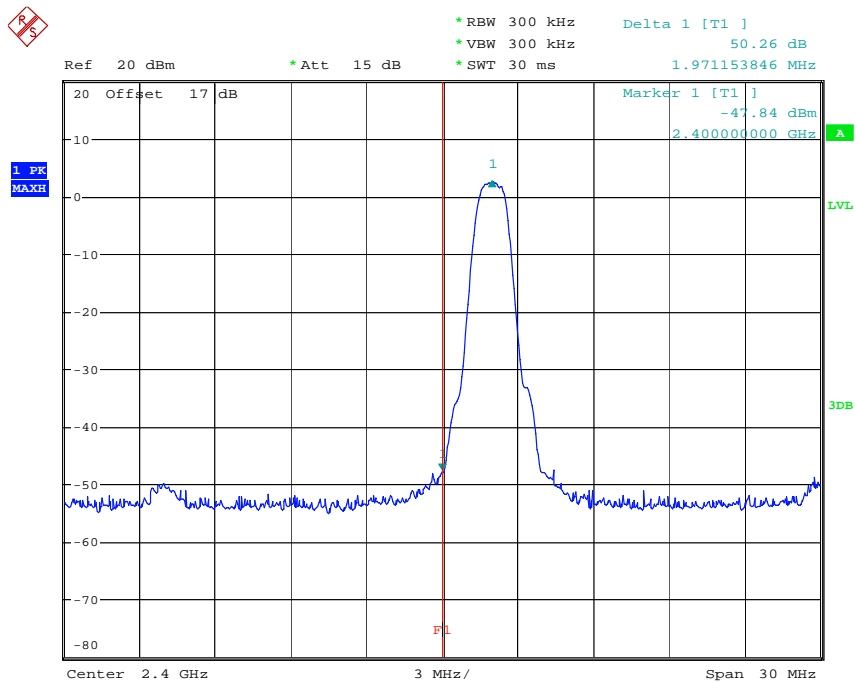
Registration number: W6M21401-13780-C-1

FCC ID: ZPPEX980301

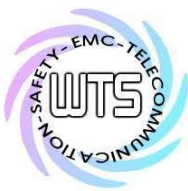


BANDEDGE CH78 HOPPING MODE
Date: 19.FEB.2014 10:57:58

EDR mode



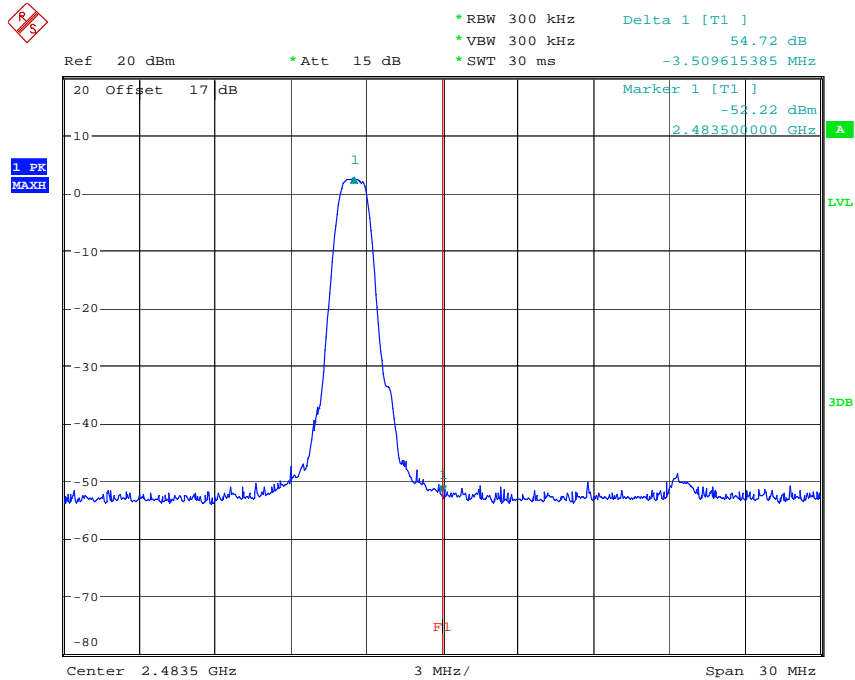
BANDEDGE CH0 EDR MODE
Date: 19.FEB.2014 11:02:22



Worldwide Testing Services(Taiwan) Co., Ltd.

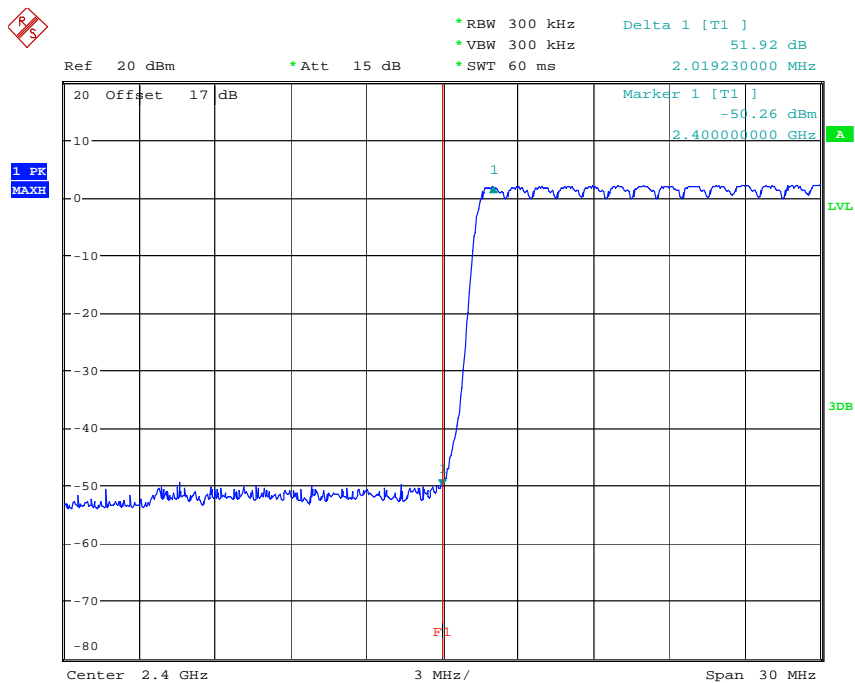
Registration number: W6M21401-13780-C-1

FCC ID: ZPPEX980301



BANDEDGE CH78 EDR MODE

Date: 19.FEB.2014 11:05:37



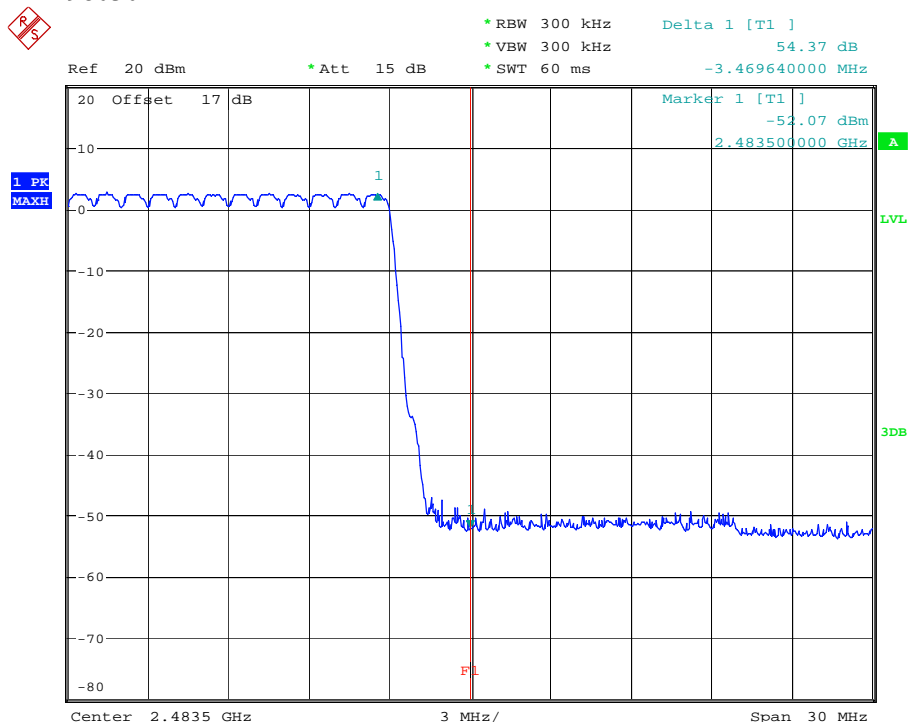
BANDEDGE CH0 EDR HOPPING MODE

Date: 19.FEB.2014 11:07:49



Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M21401-13780-C-1
FCC ID: ZPPEX980301



BANDEDGE CH78 EDR HOPPING MODE
Date: 19.FEB.2014 11:09:33

Limits:

Frequency Range / MHz	Limit
902 – 928	- 20 dB
2400 – 2483.5	
5725 - 5850	

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



Registration number: W6M21401-13780-C-1

FCC ID: ZPPEX980301

3.11 Radiated Emissions from Digital Part

FCC Rule: 15.109

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

Explanation: The test results are listed in the separated test report no.: W6M21401-13780-P-15B.

Test equipment used: ETSTW-RE 055, ETSTW-RE 064, ETSTW-RE 004, ETSTW-RE 030
ETSTW-RE 111



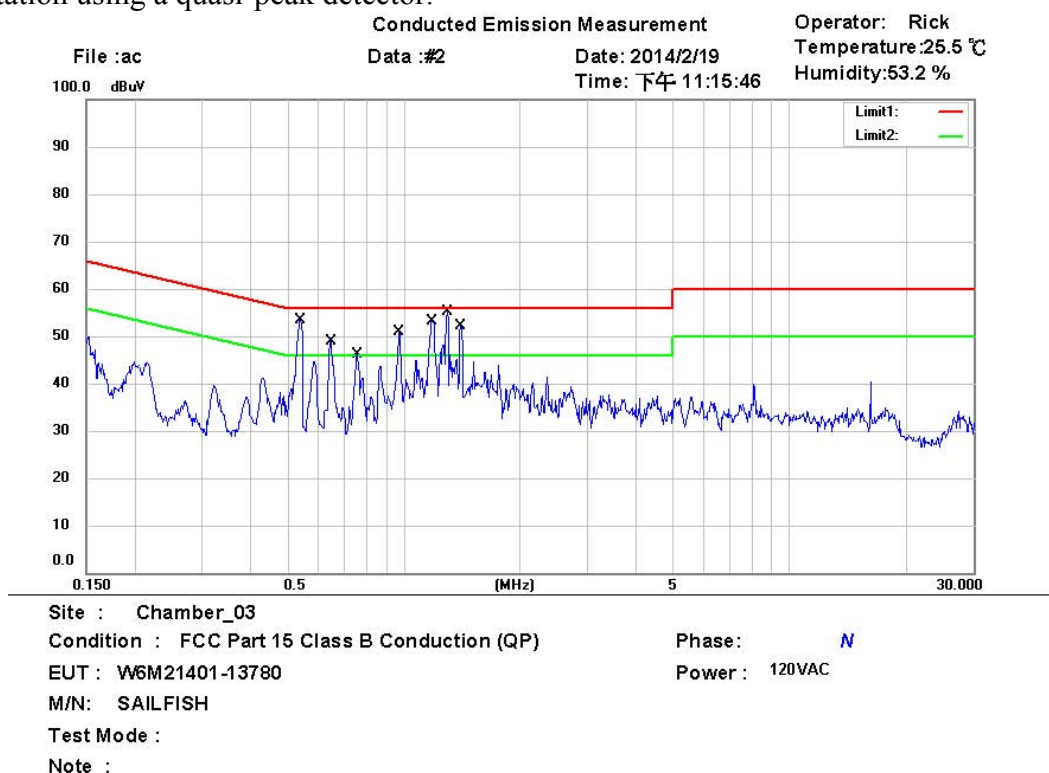
Registration number: W6M21401-13780-C-1

FCC ID: ZPPEX980301

3.12 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.

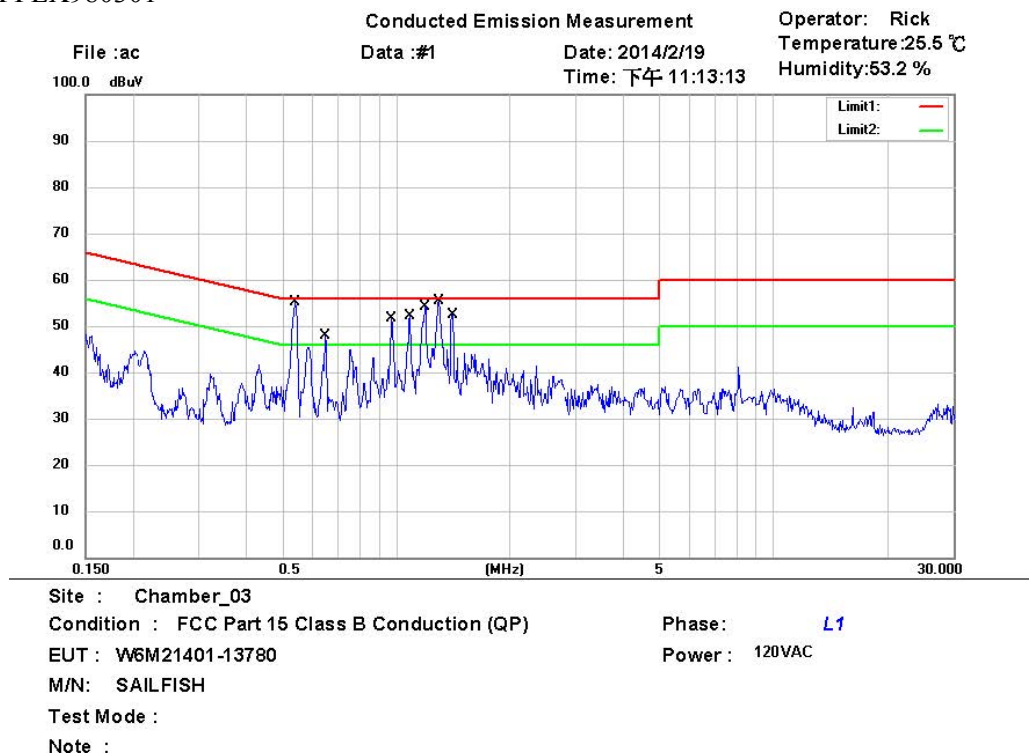


Mk.	Frequency (MHz)	Reading (dBuV)	Detector	Corrected factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Comment
	0.5383	42.31	QP	9.67	51.98	56.00	-4.02	
	0.5383	26.75	AVG	9.67	36.42	46.00	-9.58	
	0.6462	37.56	QP	9.68	47.24	56.00	-8.76	
	0.6462	21.57	AVG	9.68	31.25	46.00	-14.75	
	0.7565	34.56	QP	9.68	44.24	56.00	-11.76	
	0.7565	22.65	AVG	9.68	32.33	46.00	-13.67	
	0.9725	38.41	QP	9.69	48.10	56.00	-7.90	
	0.9725	29.35	AVG	9.69	39.04	46.00	-6.96	
	1.1795	31.69	QP	9.69	41.38	56.00	-14.62	
	1.1795	18.28	AVG	9.69	27.97	46.00	-18.03	
*	1.2942	43.85	QP	9.70	53.55	56.00	-2.45	
	1.2942	28.29	AVG	9.70	37.99	46.00	-8.01	
	1.4023	40.64	QP	9.70	50.34	56.00	-5.66	
	1.4023	25.82	AVG	9.70	35.52	46.00	-10.48	



Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M21401-13780-C-1
FCC ID: ZPPEX980301



Mk.	Frequency (MHz)	Reading (dBuV)	Detector	Corrected factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Comment
*	0.5404	42.85	QP	9.66	52.51	56.00	-3.49	
	0.5404	27.49	AVG	9.66	37.15	46.00	-8.85	
	0.6485	37.68	QP	9.67	47.35	56.00	-8.65	
	0.6485	20.51	AVG	9.67	30.18	46.00	-15.82	
	0.9725	38.35	QP	9.69	48.04	56.00	-7.96	
	0.9725	29.59	AVG	9.69	39.28	46.00	-6.72	
	1.0850	31.98	QP	9.69	41.67	56.00	-14.33	
	1.0850	19.56	AVG	9.69	29.25	46.00	-16.75	
	1.1907	37.47	QP	9.69	47.16	56.00	-8.84	
	1.1907	23.64	AVG	9.69	33.33	46.00	-12.67	
	1.2920	41.83	QP	9.70	51.53	56.00	-4.47	
	1.2920	27.27	AVG	9.70	36.97	46.00	-9.03	
	1.4045	40.44	QP	9.70	50.14	56.00	-5.86	
	1.4045	26.36	AVG	9.70	36.06	46.00	-9.94	

Limits:

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

- 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.

Test equipment used: ETSTW-CE 001, ETSTW-CE 016, ETSTW-CE 006, ETSTW-RE 064



Appendix

Measurement diagrams

Spurious Emissions radiated



Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M21401-13780-C-1

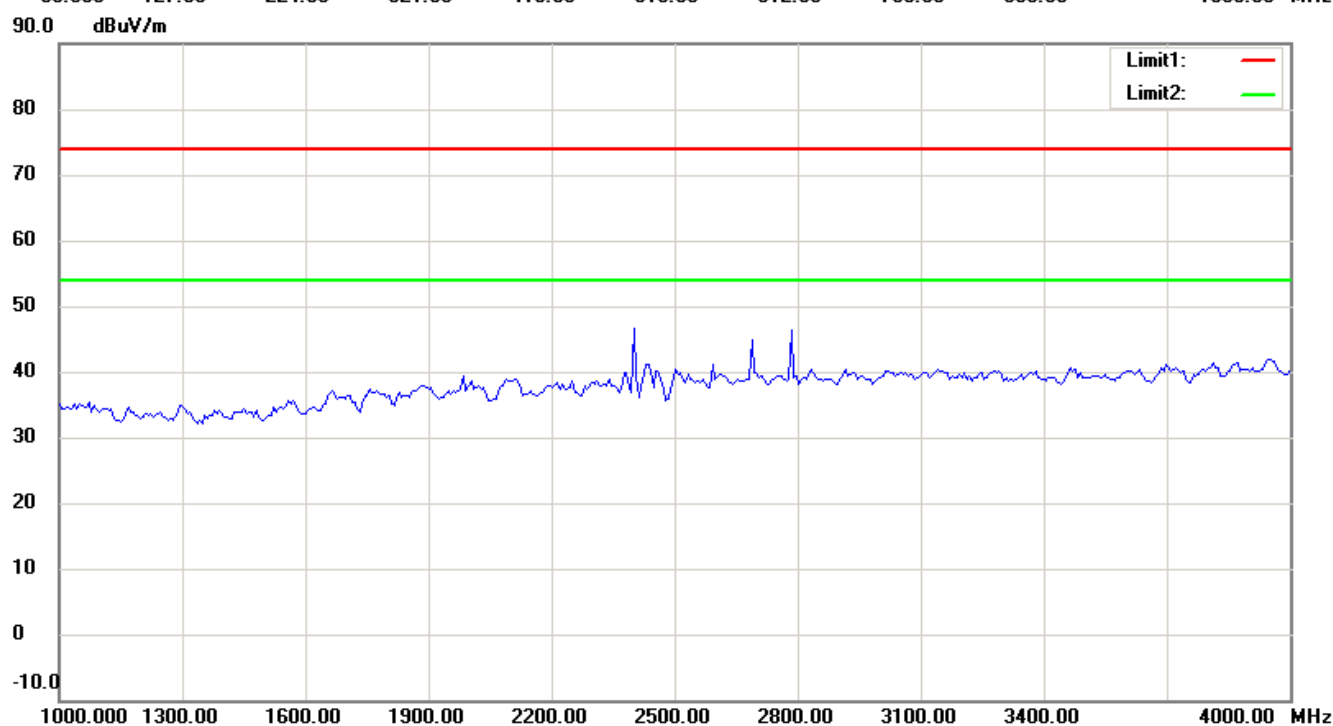
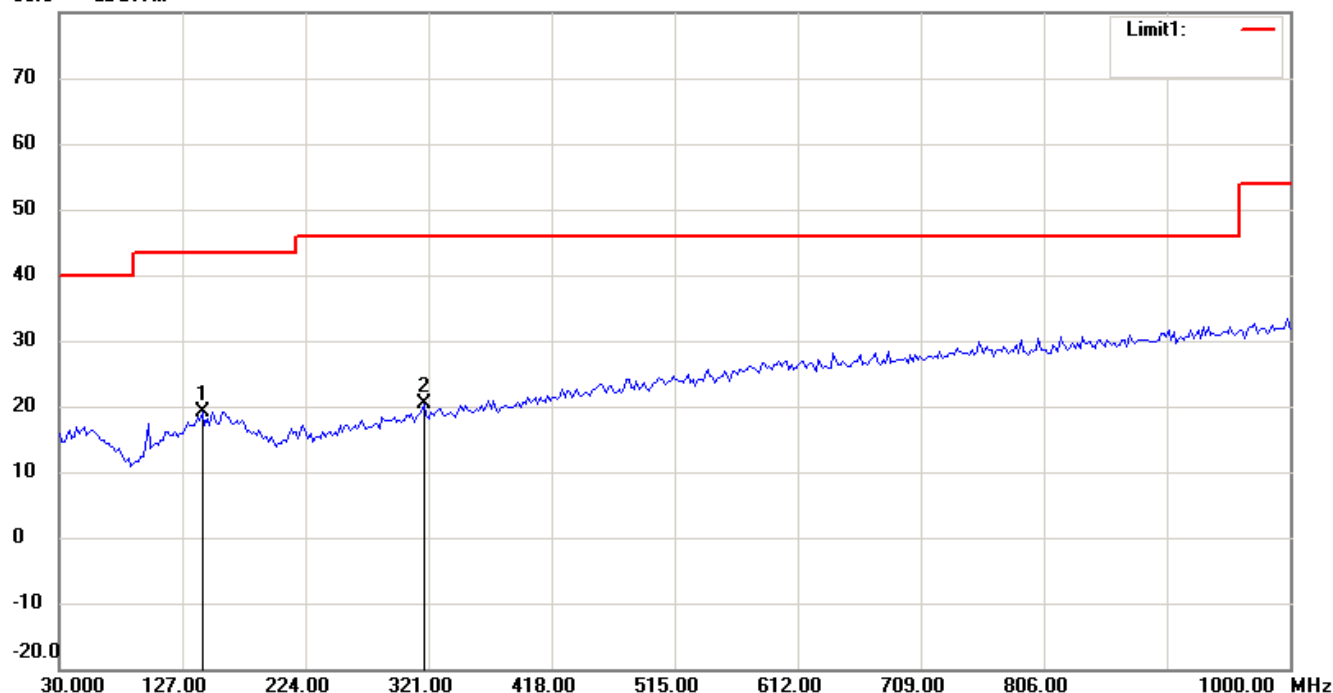
FCC ID: ZPPEX980301

Spurious Emissions radiated_Transmitter

2402 MHz

Antenna Polarization H

80.0 dBuV/m



Up Line: Peak Limit Line Down Line: Ave Limit Line

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.

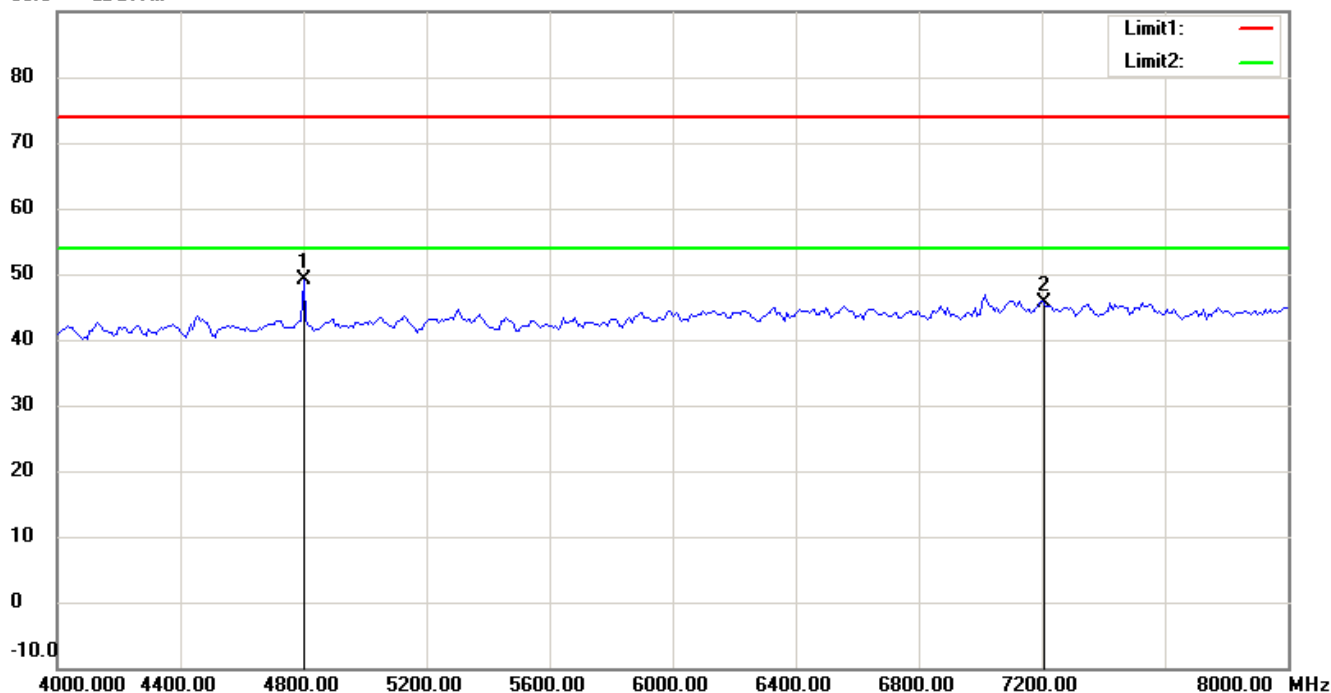


Worldwide Testing Services(Taiwan) Co., Ltd.

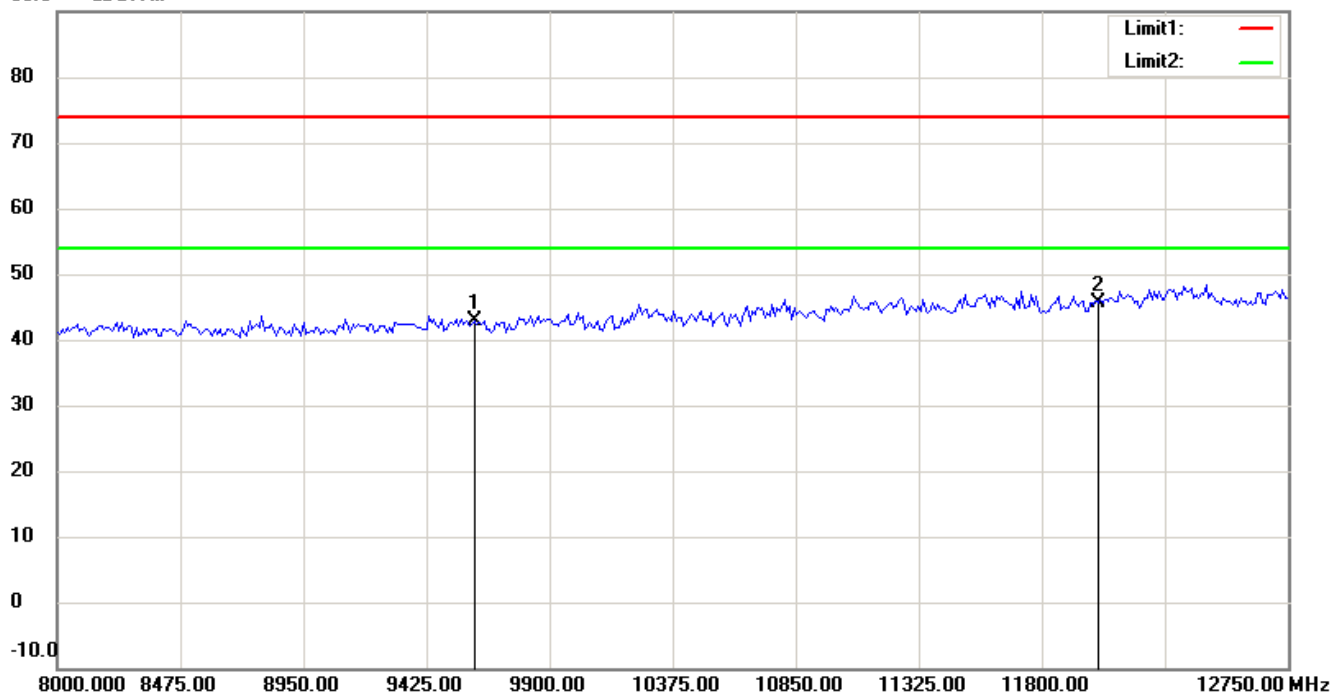
Registration number: W6M21401-13780-C-1

FCC ID: ZPPEX980301

90.0 dBuV/m



90.0 dBuV/m



Up Line: Peak Limit Line Down Line: Ave Limit Line

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.

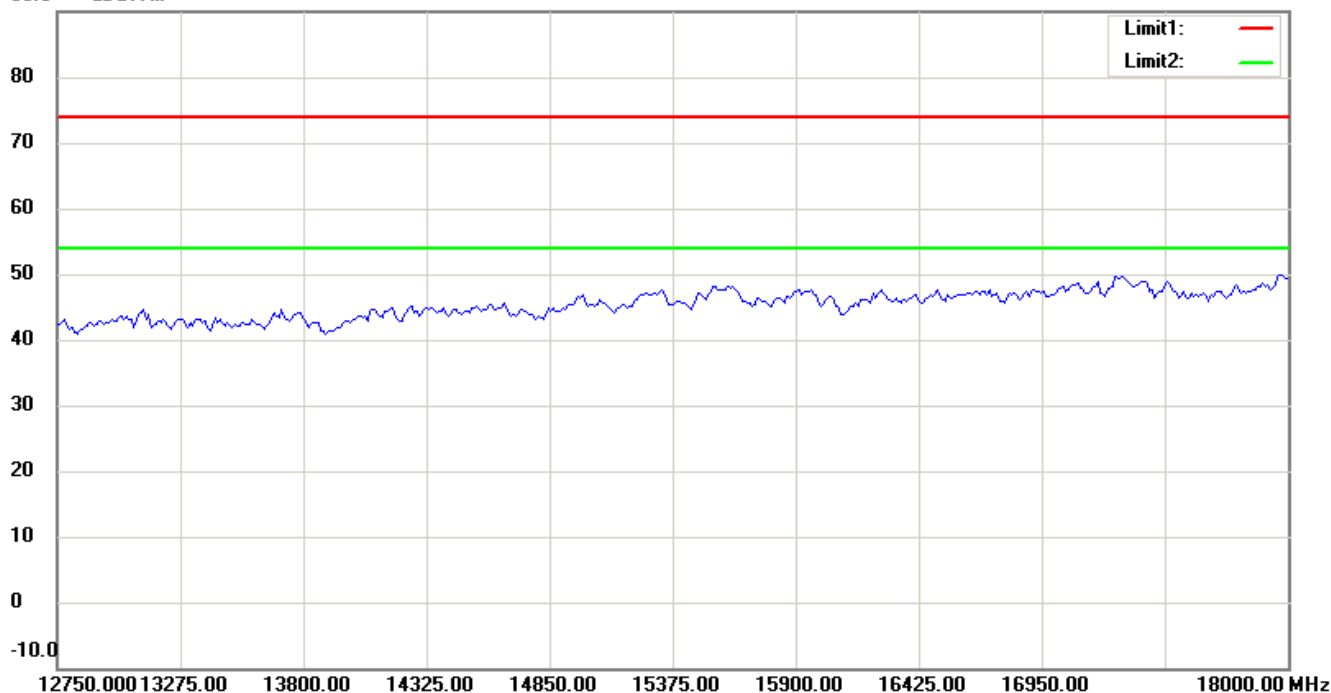


Worldwide Testing Services(Taiwan) Co., Ltd.

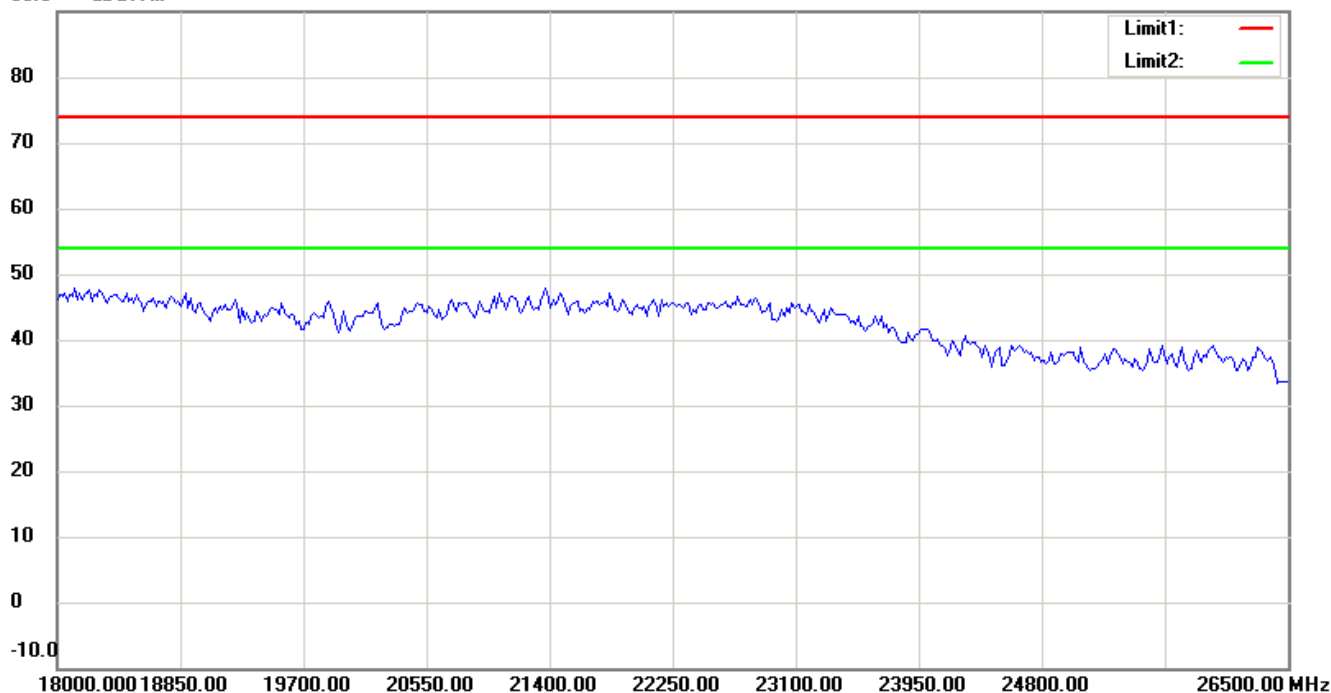
Registration number: W6M21401-13780-C-1

FCC ID: ZPPEX980301

90.0 dBuV/m



90.0 dBuV/m



Up Line: Peak Limit Line Down Line: Ave Limit Line

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.



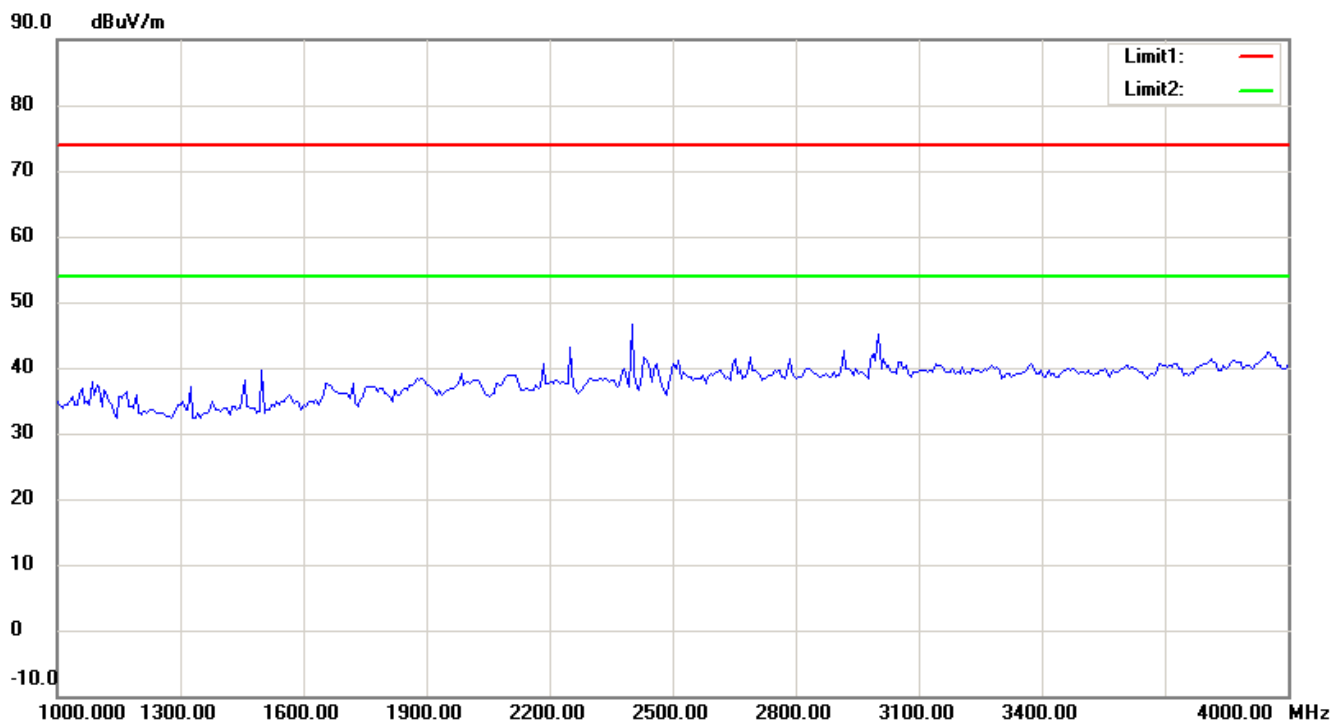
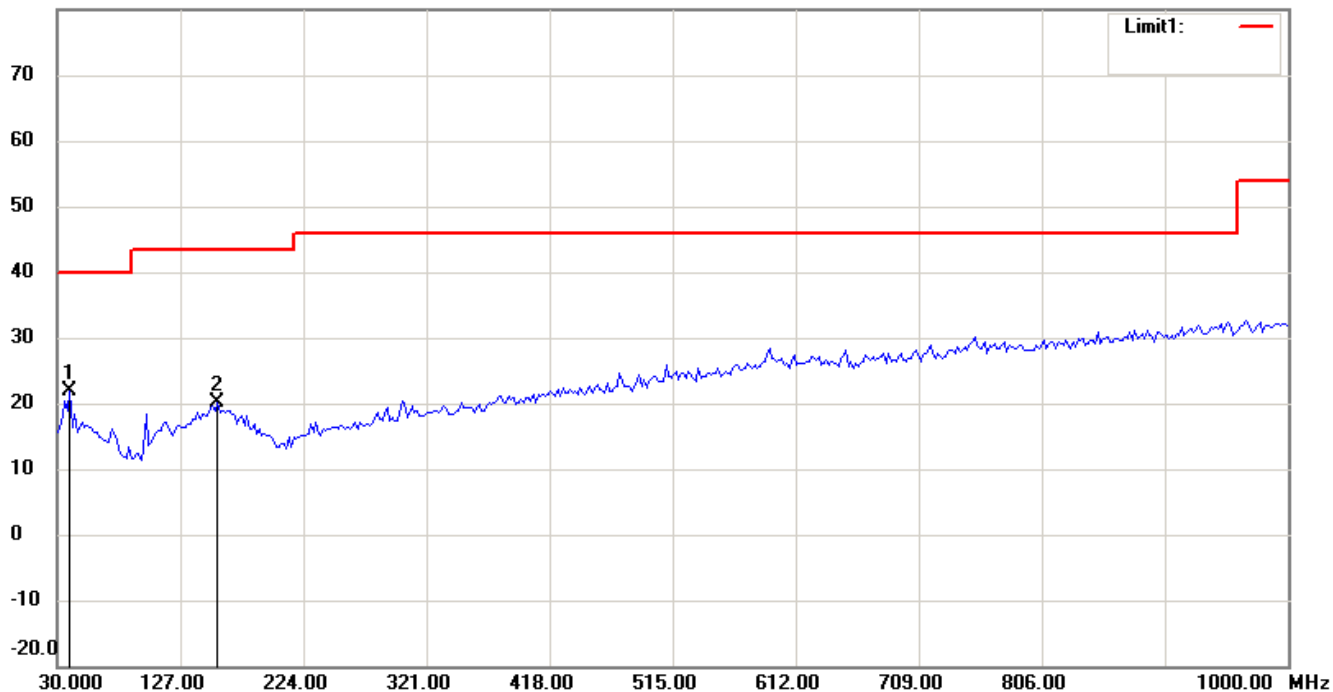
Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M21401-13780-C-1

FCC ID: ZPPEX980301

Antenna Polarization V

80.0 dBuV/m



Up Line: Peak Limit Line Down Line: Ave Limit Line

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.

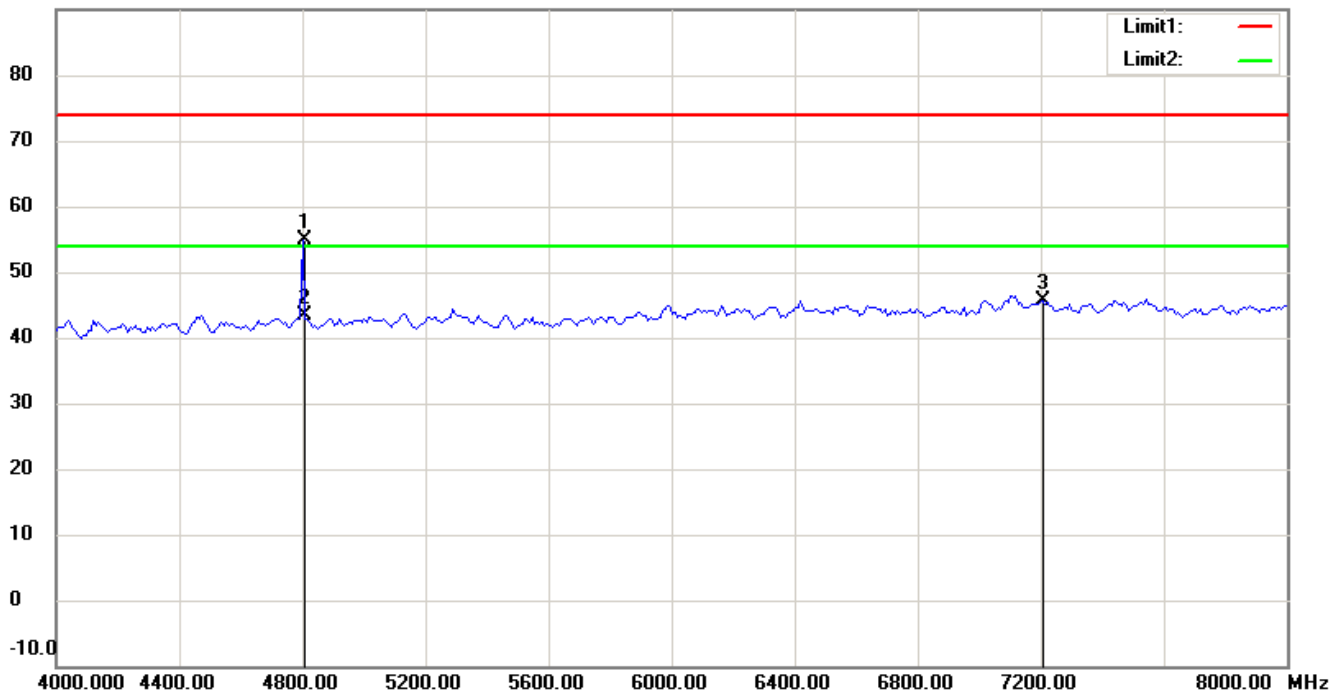


Worldwide Testing Services(Taiwan) Co., Ltd.

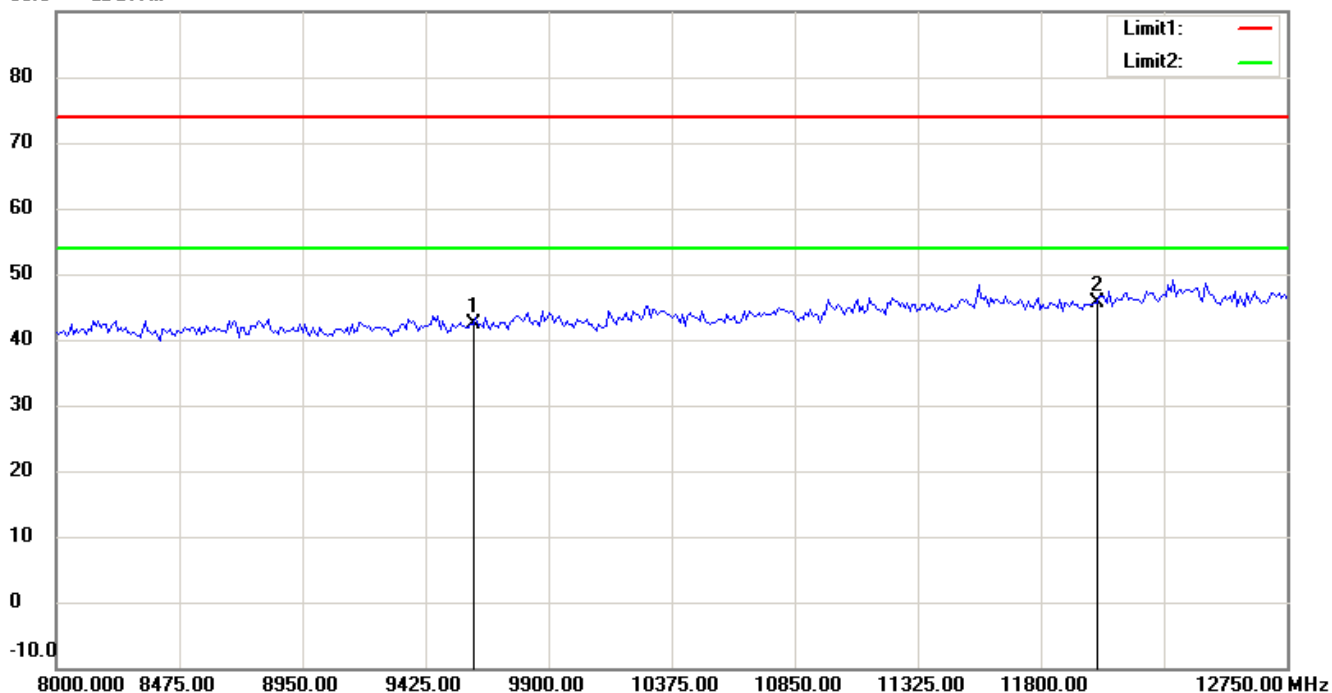
Registration number: W6M21401-13780-C-1

FCC ID: ZPPEX980301

90.0 dBuV/m



90.0 dBuV/m



Up Line: Peak Limit Line Down Line: Ave Limit Line

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.

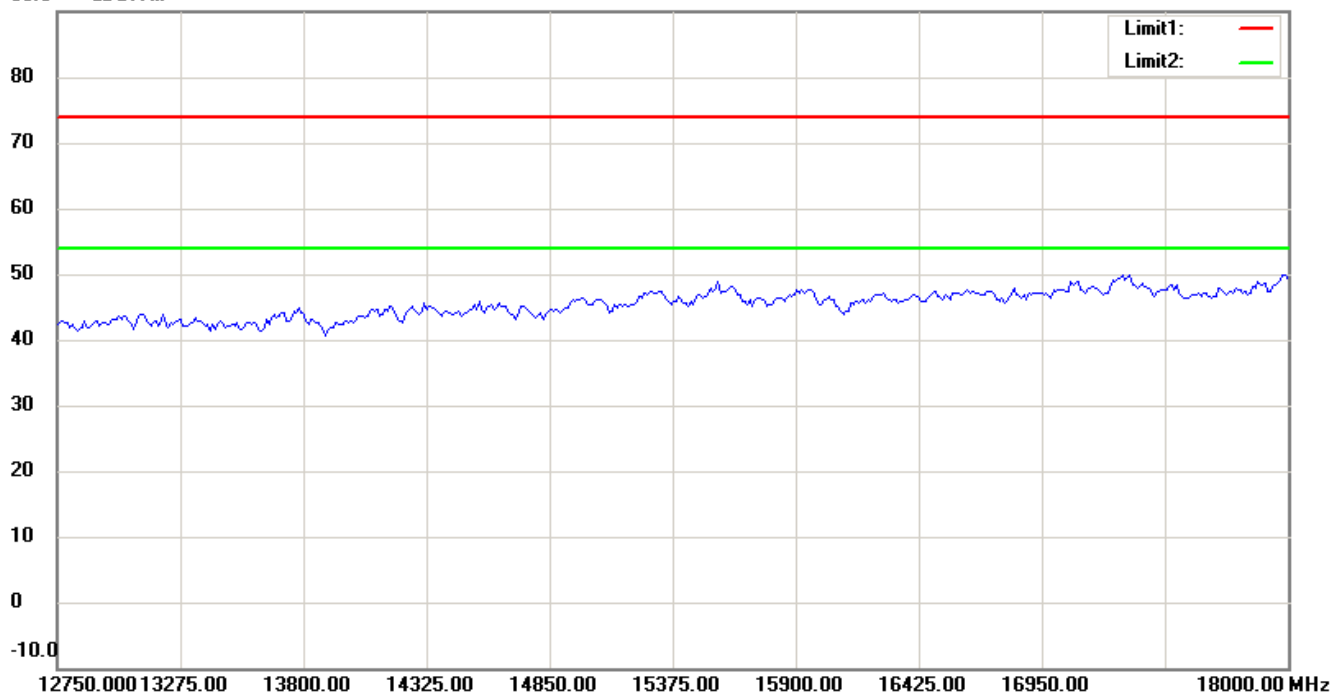


Worldwide Testing Services(Taiwan) Co., Ltd.

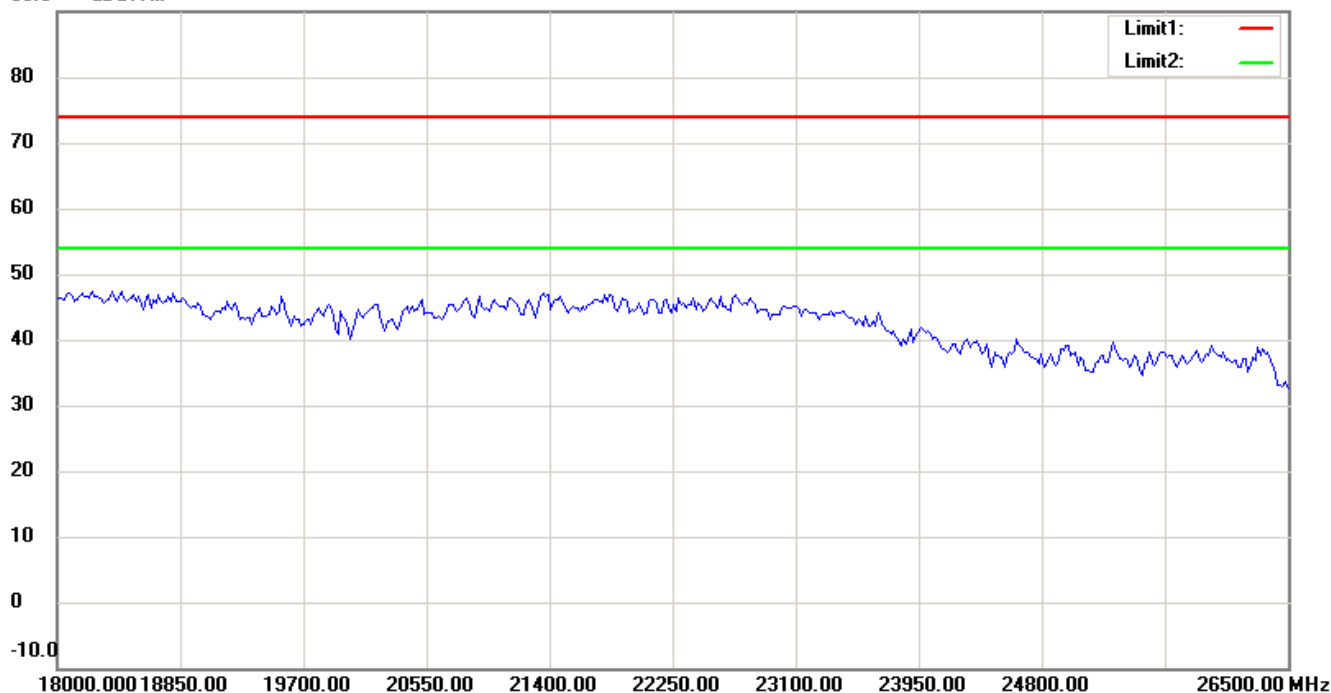
Registration number: W6M21401-13780-C-1

FCC ID: ZPPEX980301

90.0 dBuV/m



90.0 dBuV/m



Up Line: Peak Limit Line Down Line: Ave Limit Line

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.



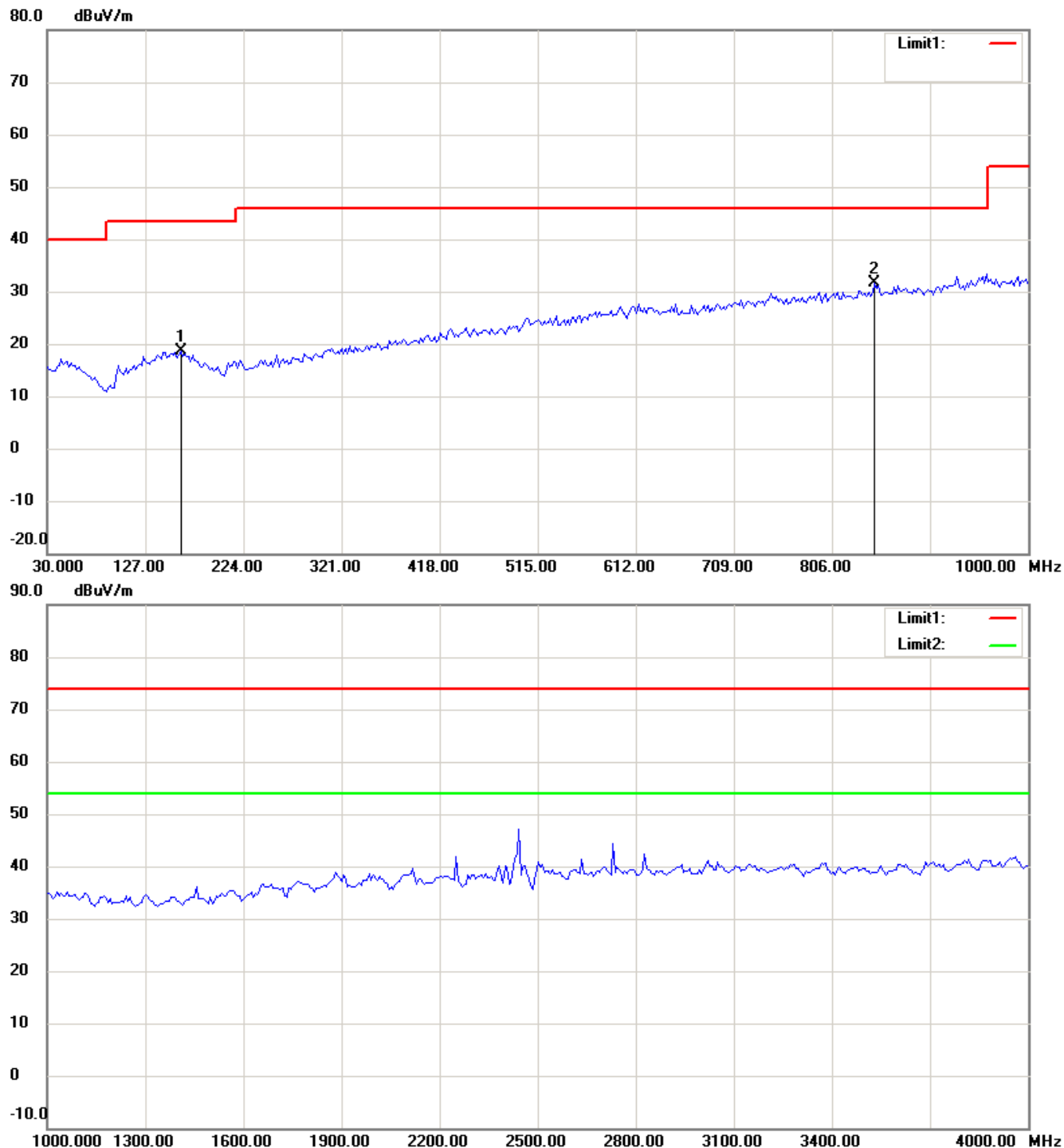
Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M21401-13780-C-1

FCC ID: ZPPEX980301

2441 MHz

Antenna Polarization H



Up Line: Peak Limit Line Down Line: Ave Limit Line

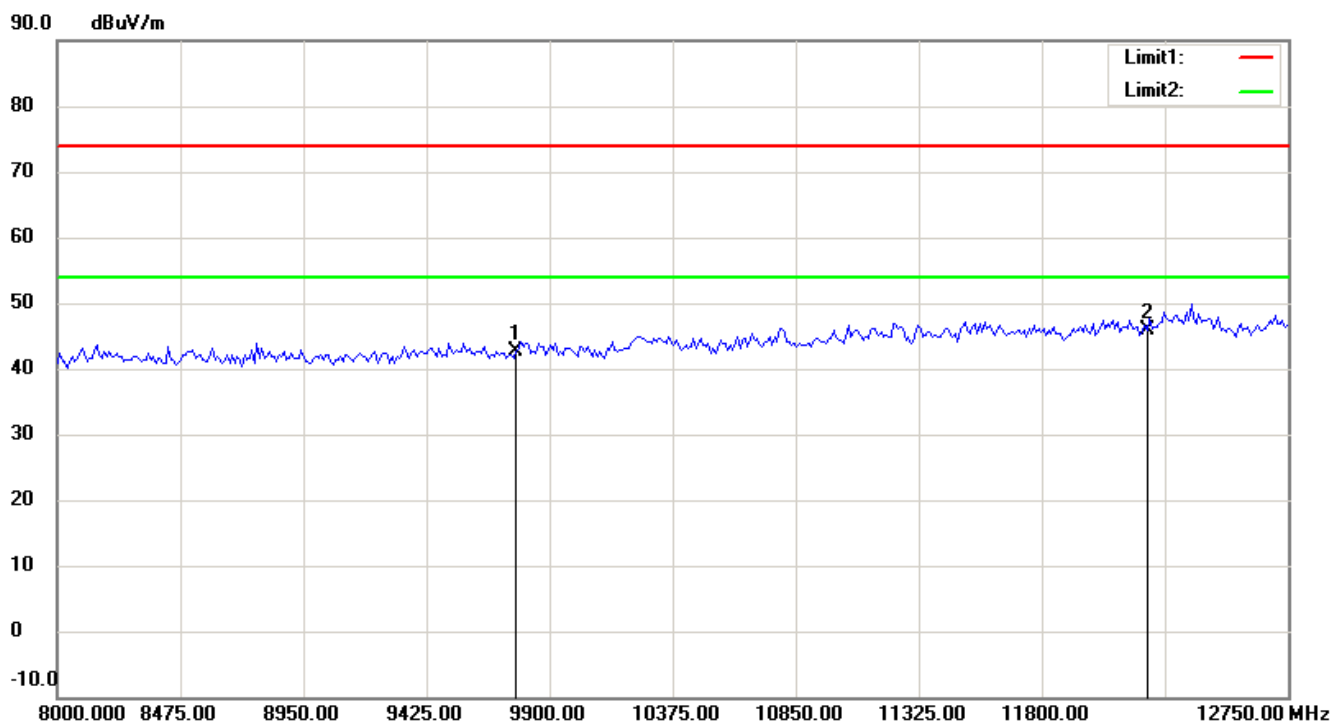
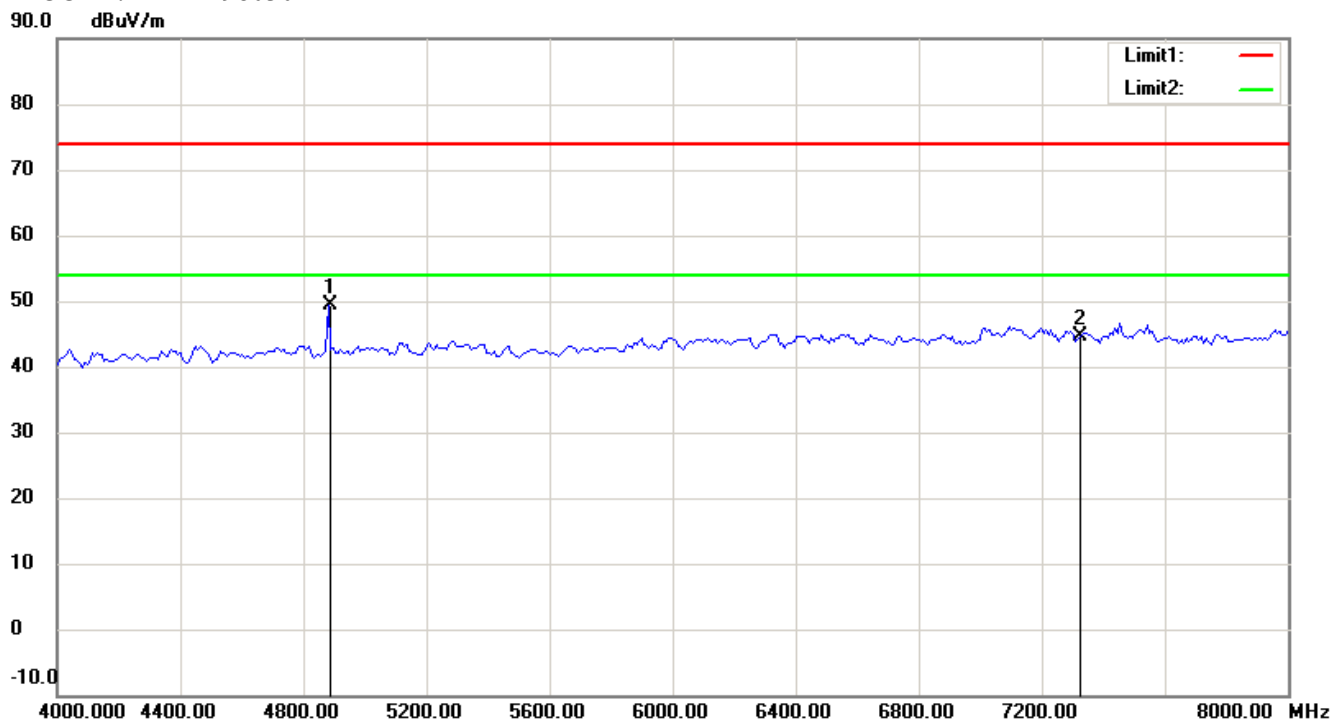
Note:

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.



Registration number: W6M21401-13780-C-1

FCC ID: ZPPEX980301



Up Line: Peak Limit Line Down Line: Ave Limit Line

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.

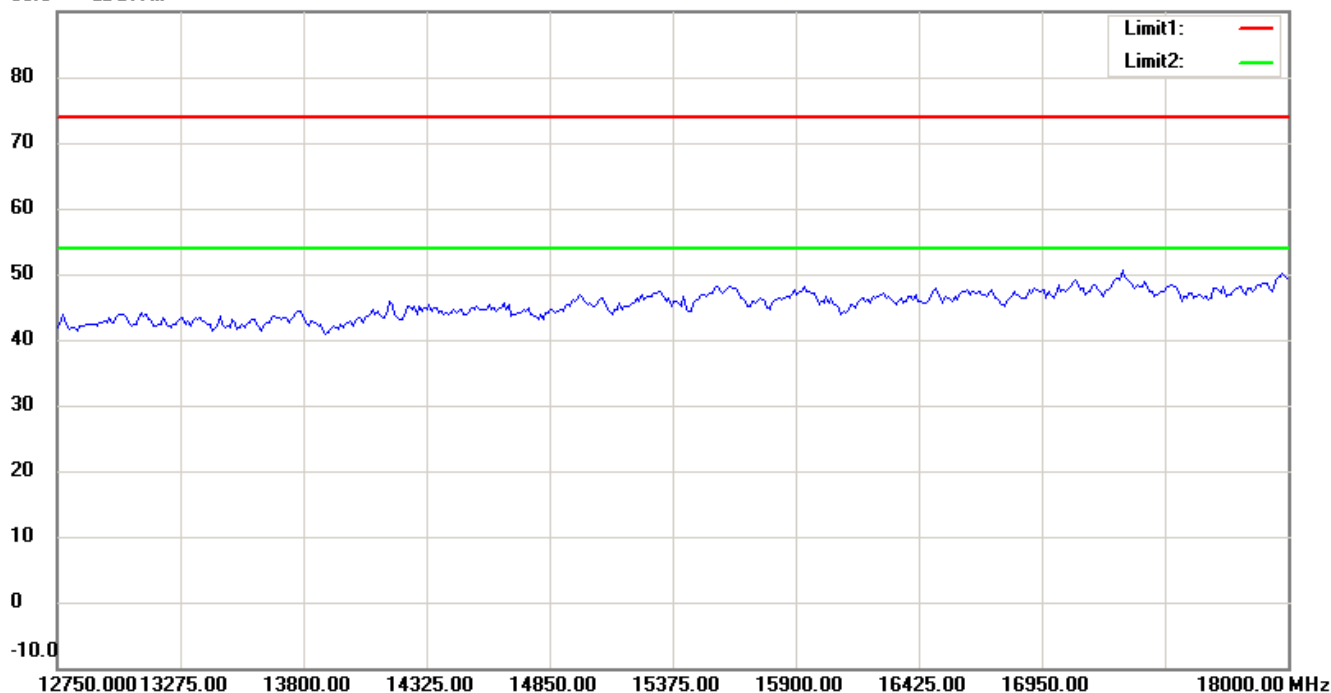


Worldwide Testing Services(Taiwan) Co., Ltd.

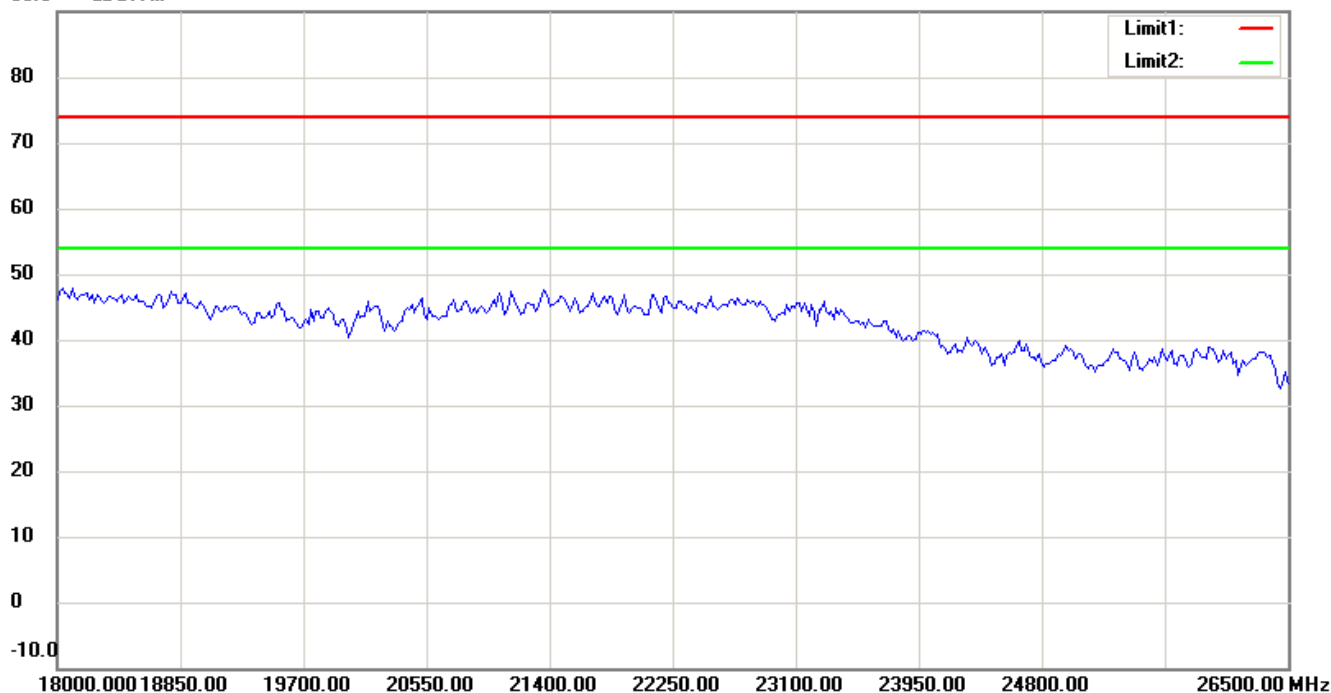
Registration number: W6M21401-13780-C-1

FCC ID: ZPPEX980301

90.0 dBuV/m



90.0 dBuV/m



Up Line: Peak Limit Line Down Line: Ave Limit Line

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.



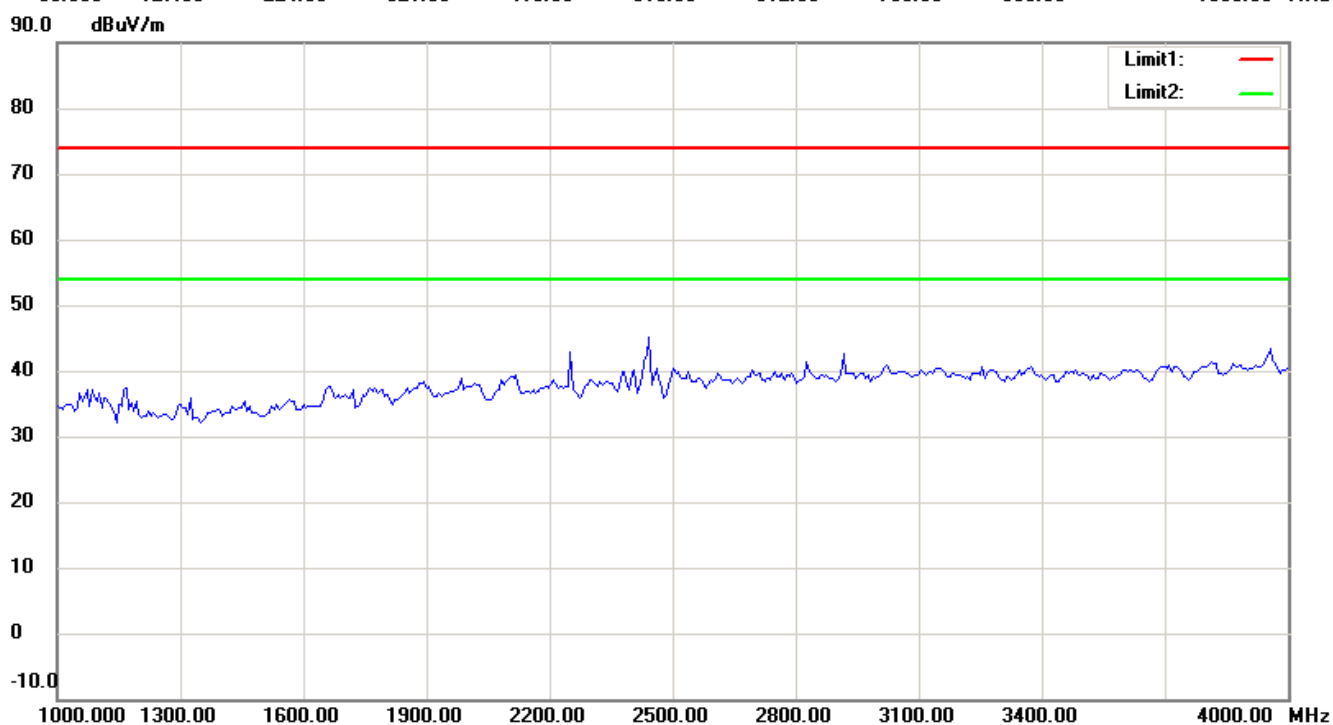
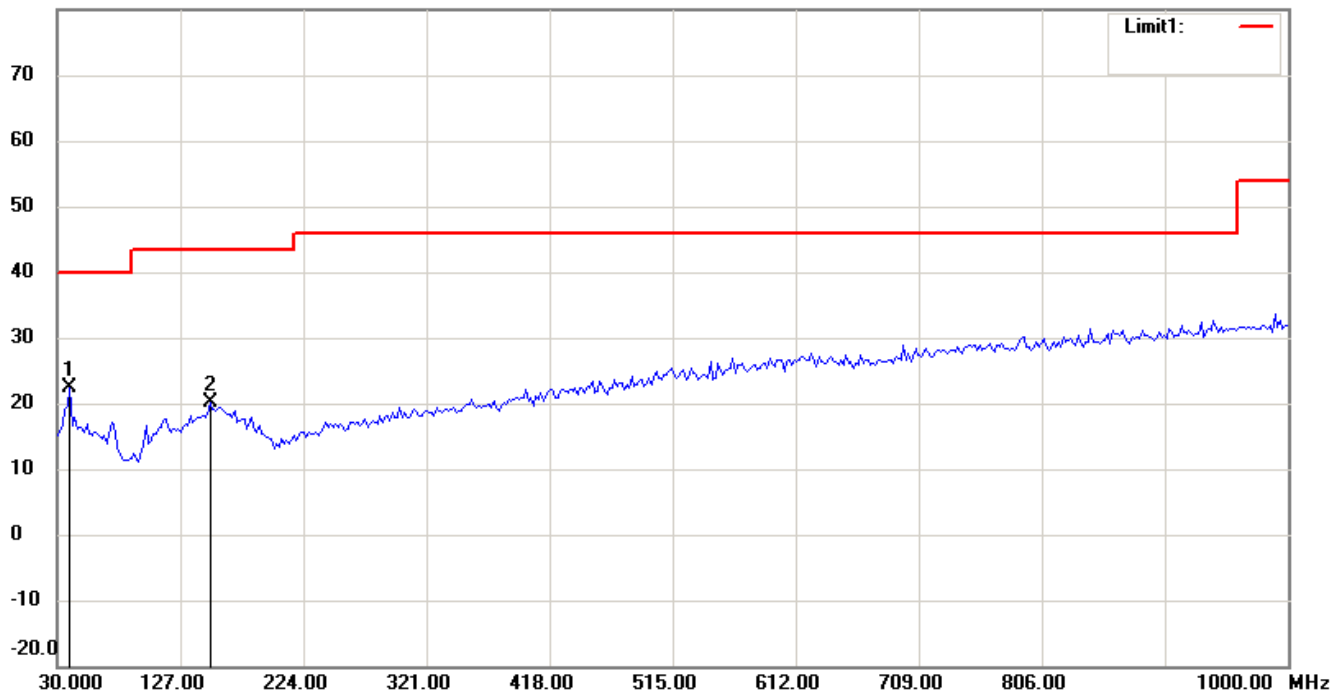
Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M21401-13780-C-1

FCC ID: ZPPEX980301

Antenna Polarization V

80.0 dBuV/m



Up Line: Peak Limit Line Down Line: Ave Limit Line

Note:

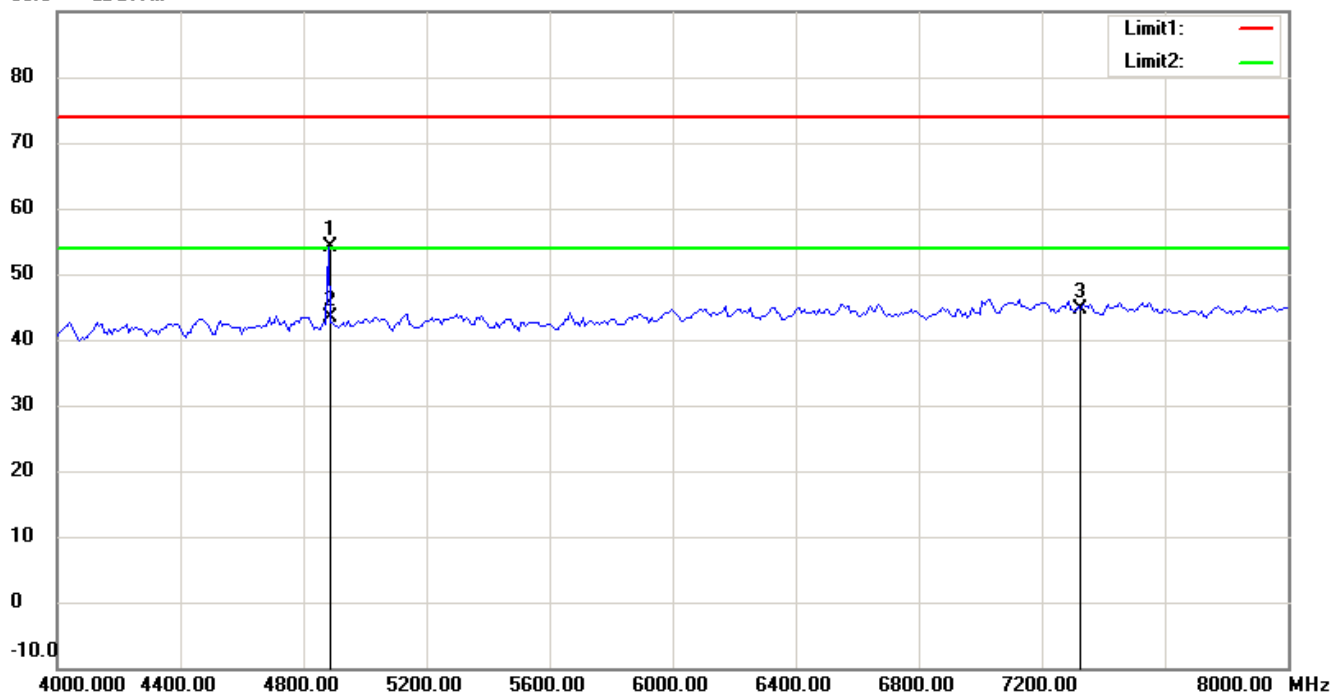
1. The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.
2. The some frequencies may exceed the limit line without the specified detectors, but that cannot present the results are failed to the specification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



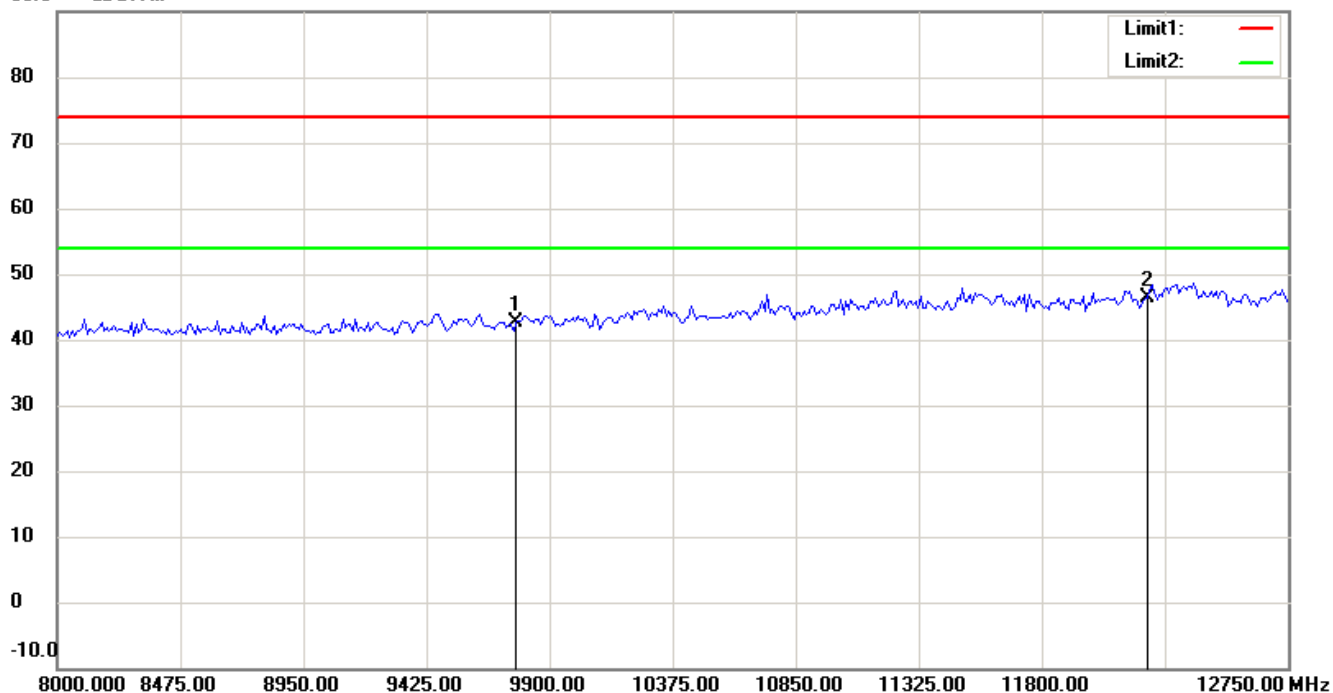
Registration number: W6M21401-13780-C-1

FCC ID: ZPPEX980301

90.0 dBuV/m



90.0 dBuV/m



Up Line: Peak Limit Line Down Line: Ave Limit Line

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.

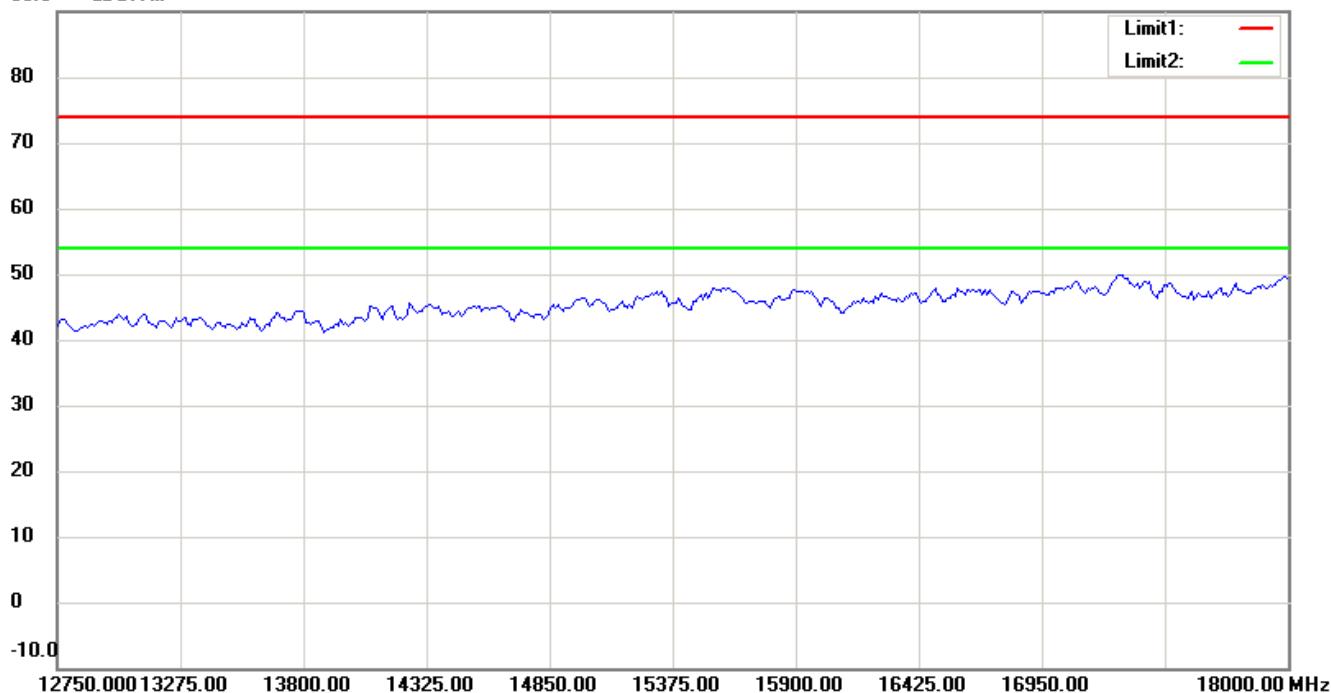


Worldwide Testing Services(Taiwan) Co., Ltd.

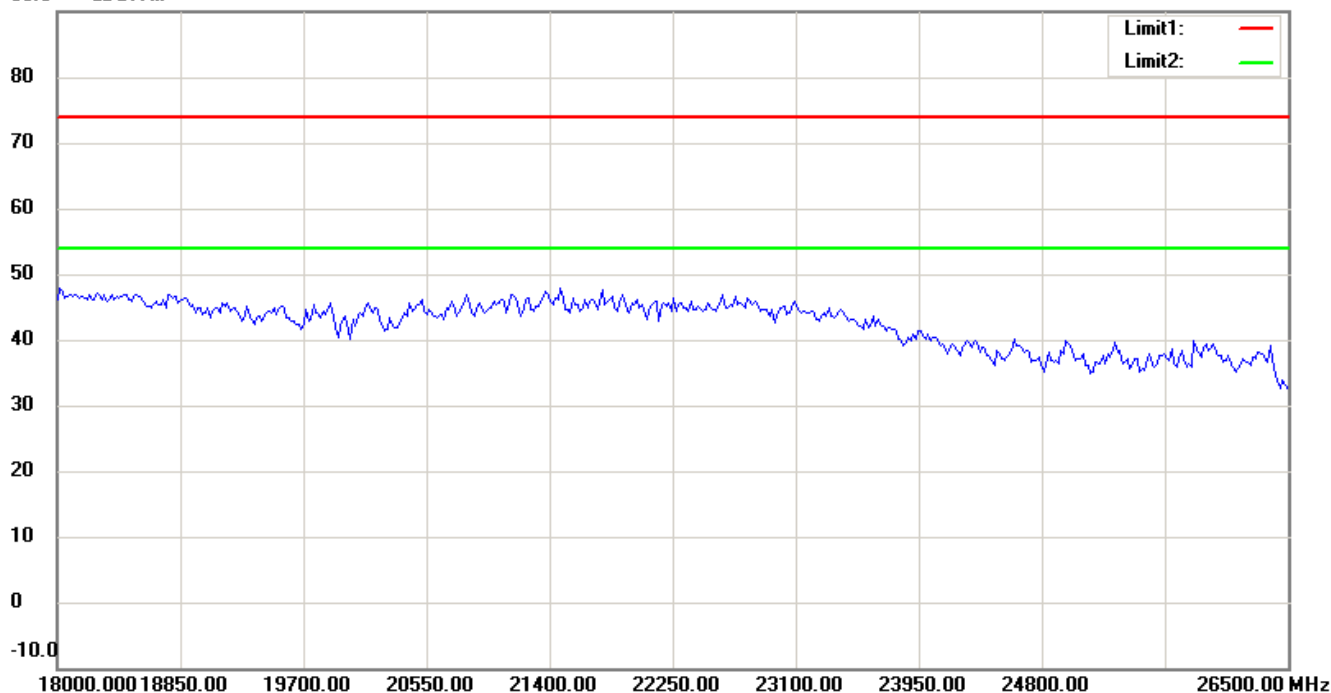
Registration number: W6M21401-13780-C-1

FCC ID: ZPPEX980301

90.0 dBuV/m



90.0 dBuV/m



Up Line: Peak Limit Line Down Line: Ave Limit Line

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.



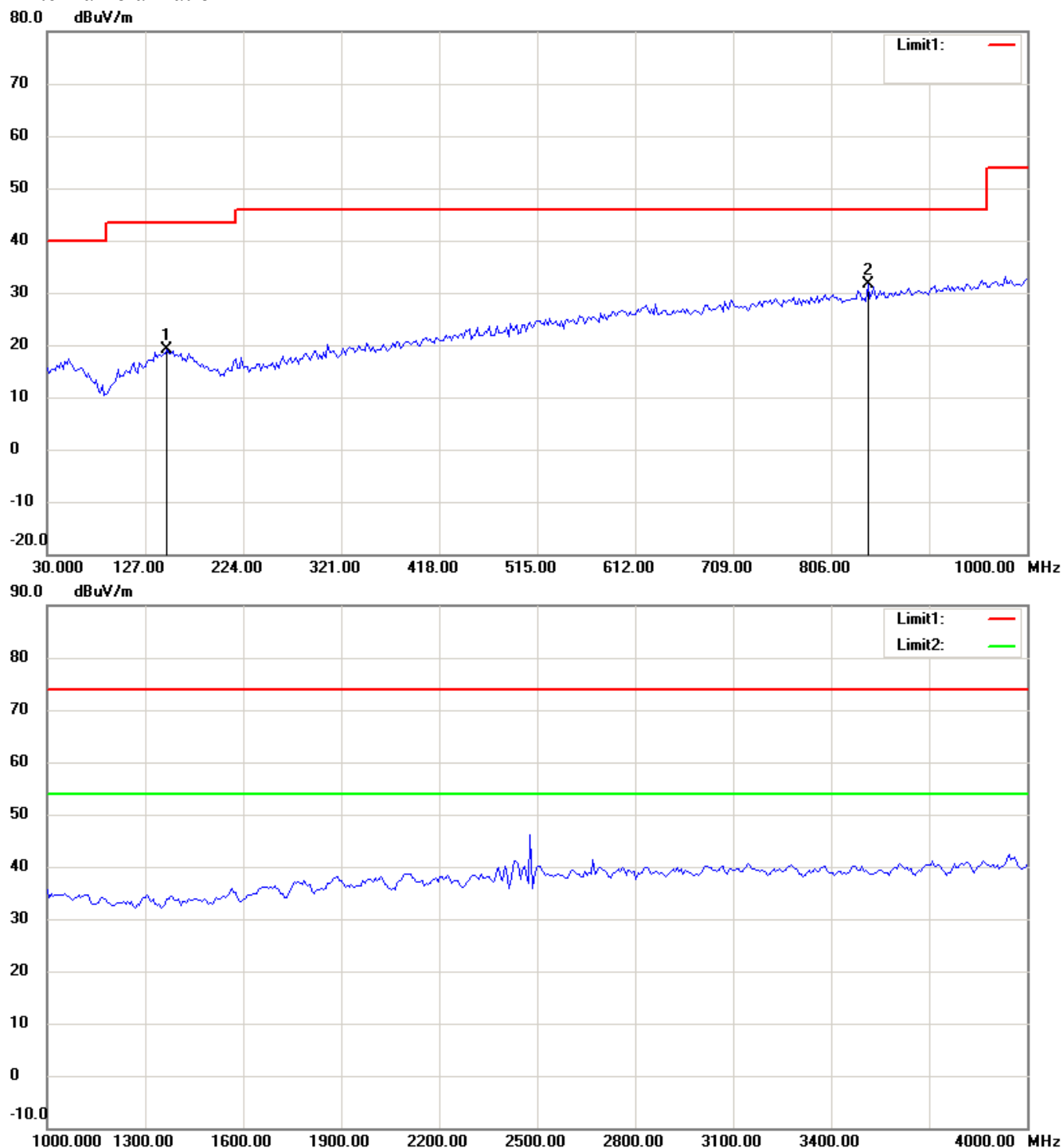
Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M21401-13780-C-1

FCC ID: ZPPEX980301

2480 MHz

Antenna Polarization H



Up Line: Peak Limit Line Down Line: Ave Limit Line

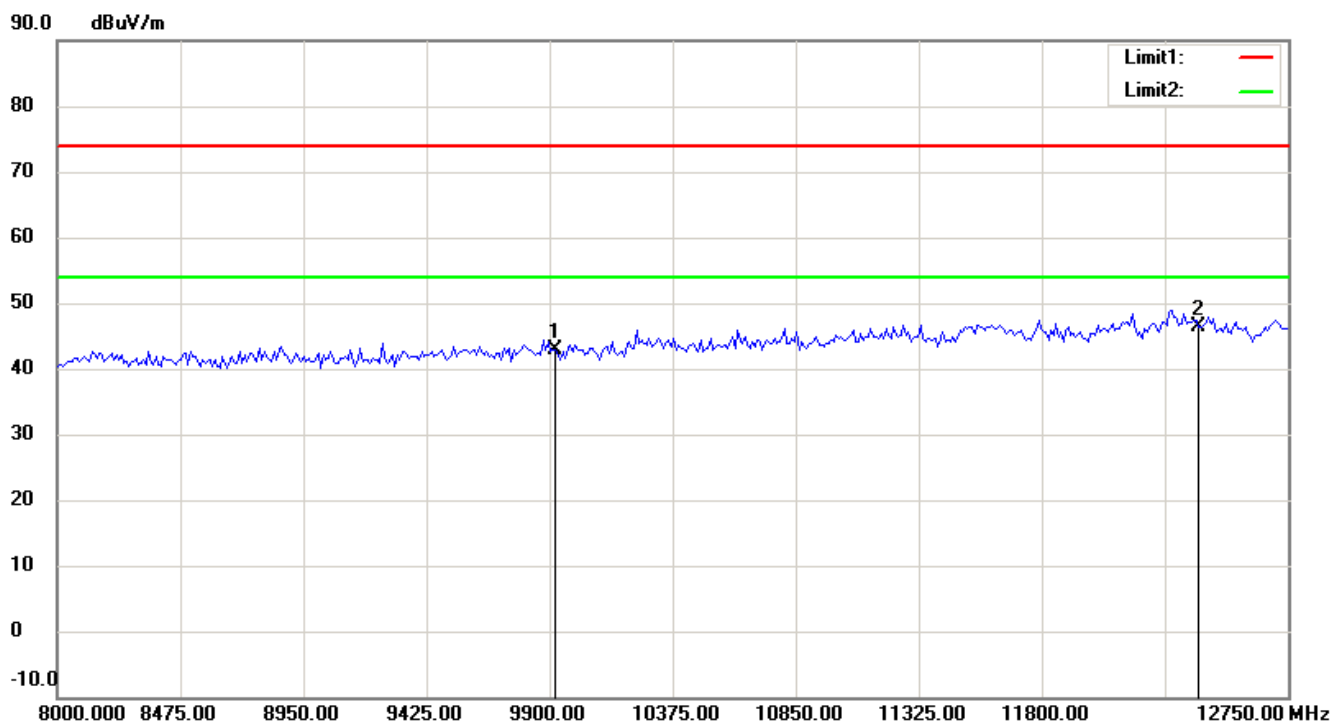
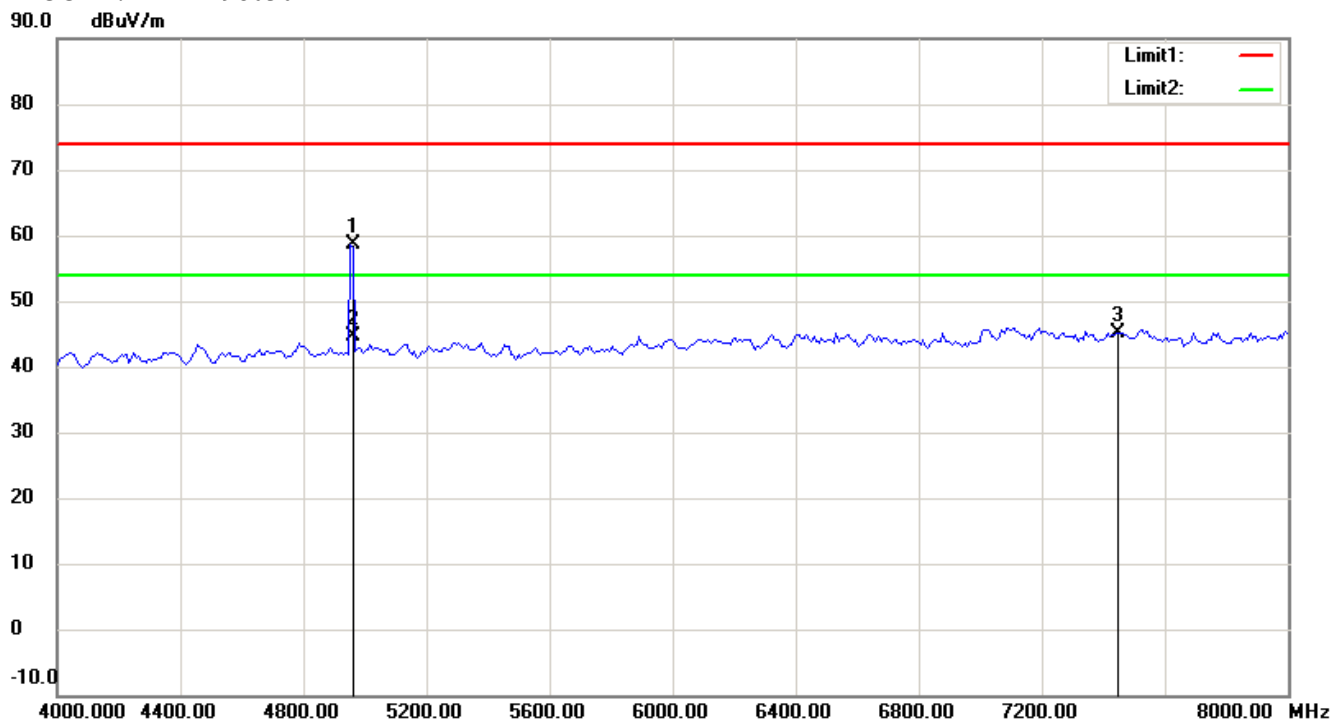
Note:

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.



Registration number: W6M21401-13780-C-1

FCC ID: ZPPEX980301



Up Line: Peak Limit Line Down Line: Ave Limit Line

Note:

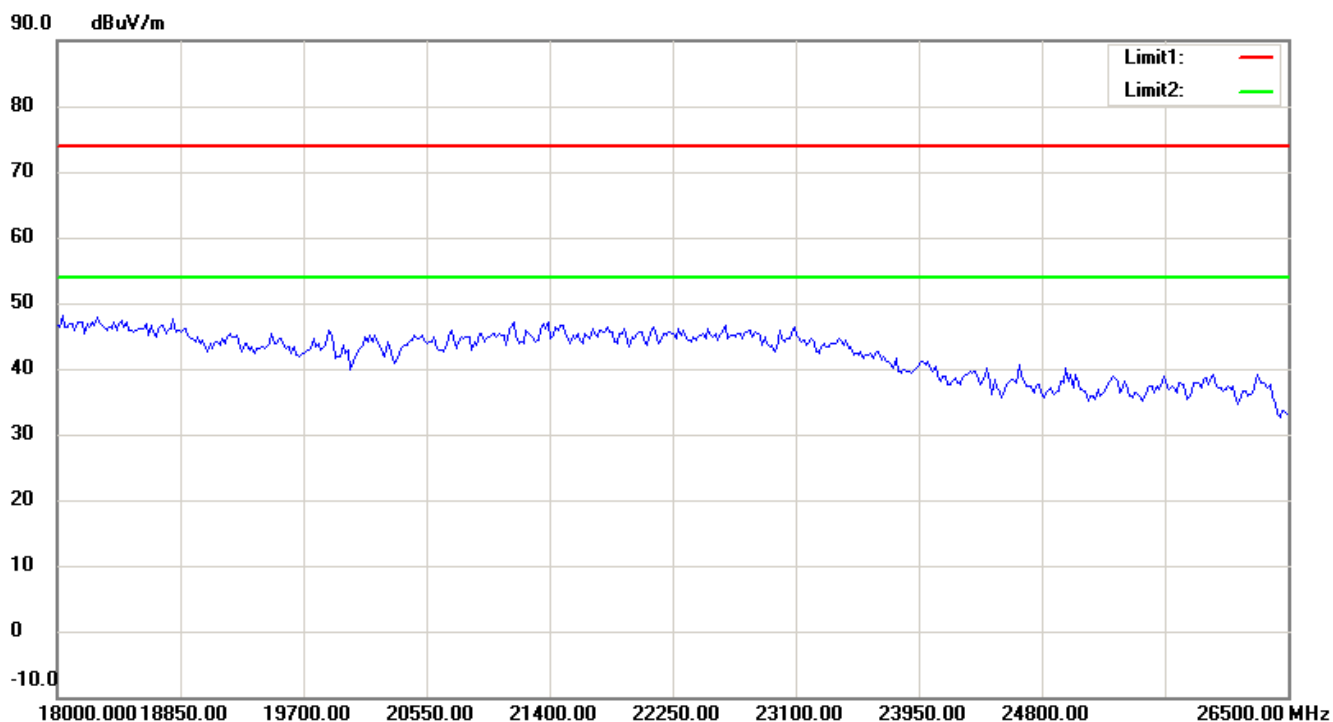
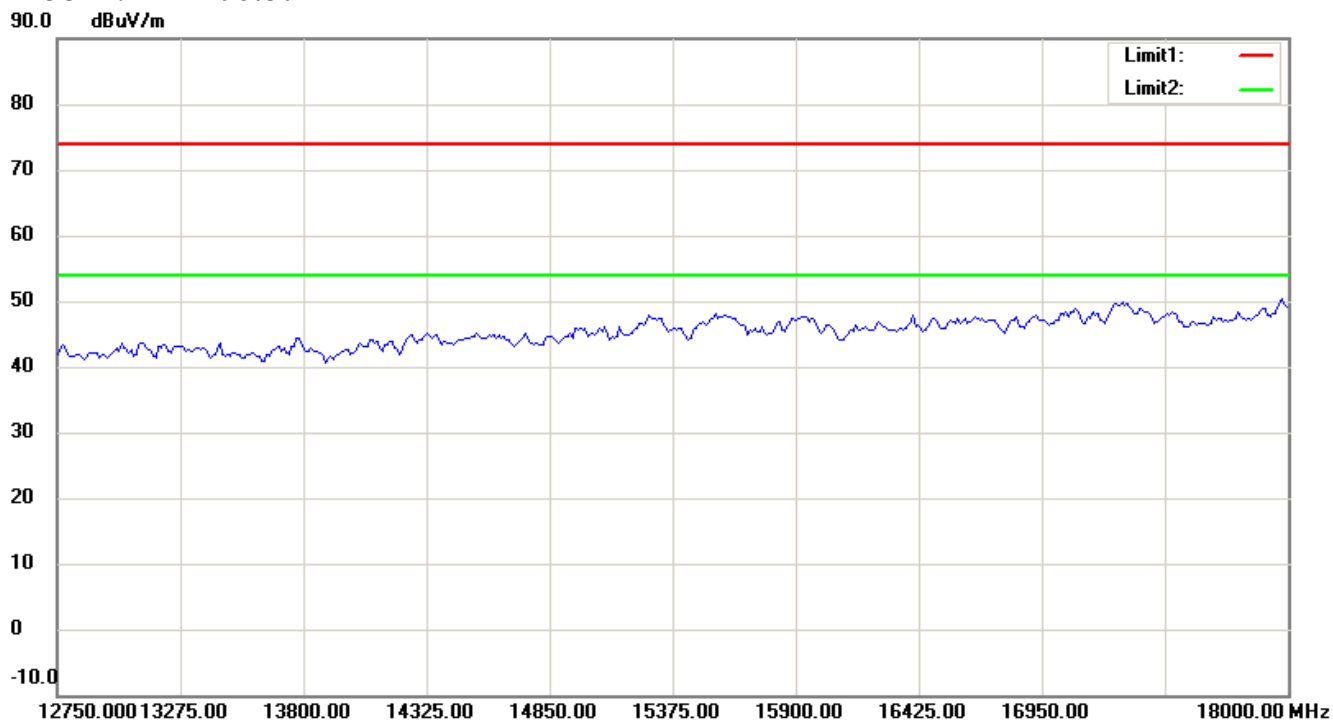
1. The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.
2. The some frequencies may exceed the limit line without the specified detectors, but that cannot present the results are failed to the specification 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: W6M21401-13780-C-1

FCC ID: ZPPEX980301



Up Line: Peak Limit Line Down Line: Ave Limit Line

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.



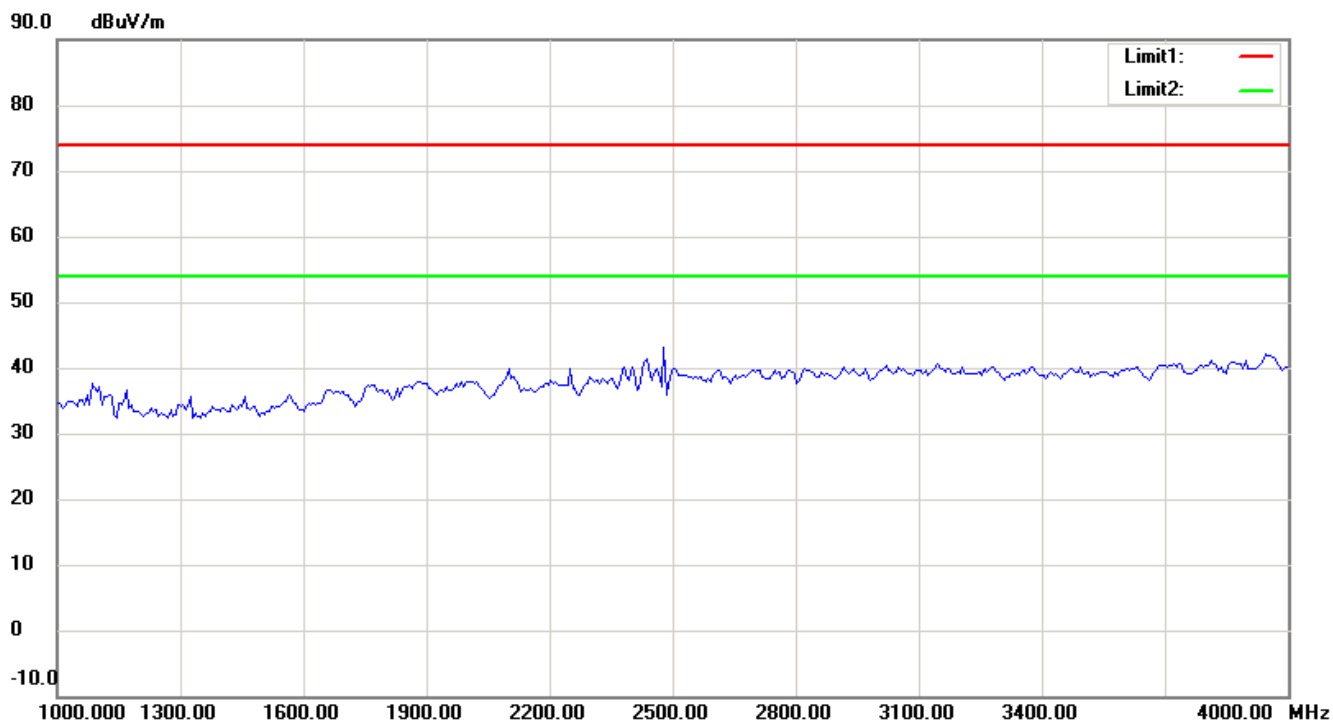
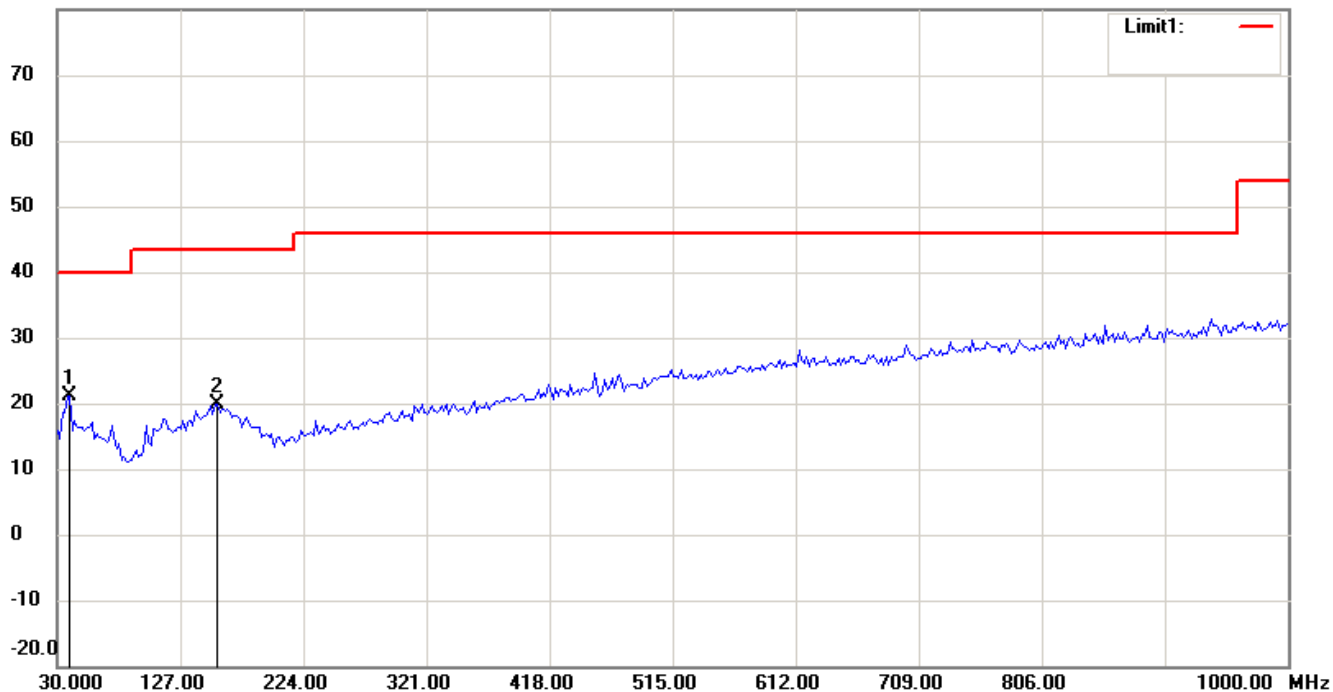
Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M21401-13780-C-1

FCC ID: ZPPEX980301

Antenna Polarization V

80.0 dBuV/m



Up Line: Peak Limit Line Down Line: Ave Limit Line

Note:

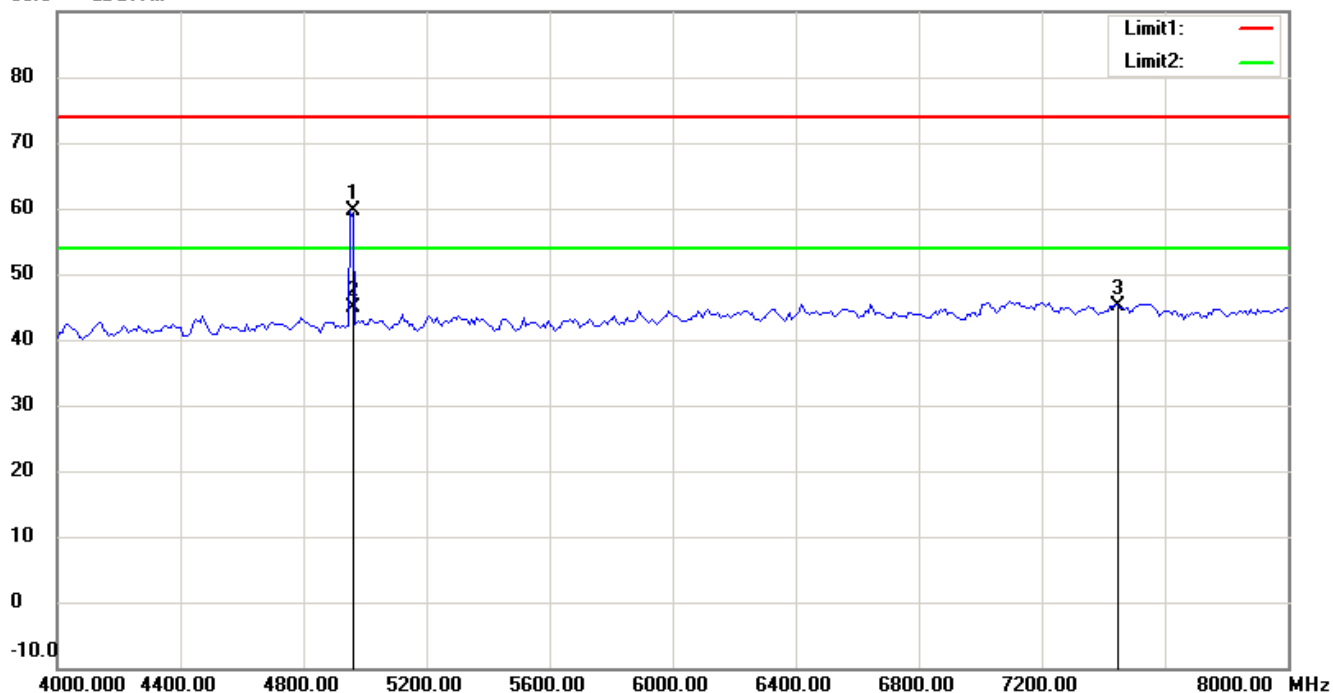
1. The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.
2. The some frequencies may exceed the limit line without the specified detectors, but that cannot present the results are failed to the specification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



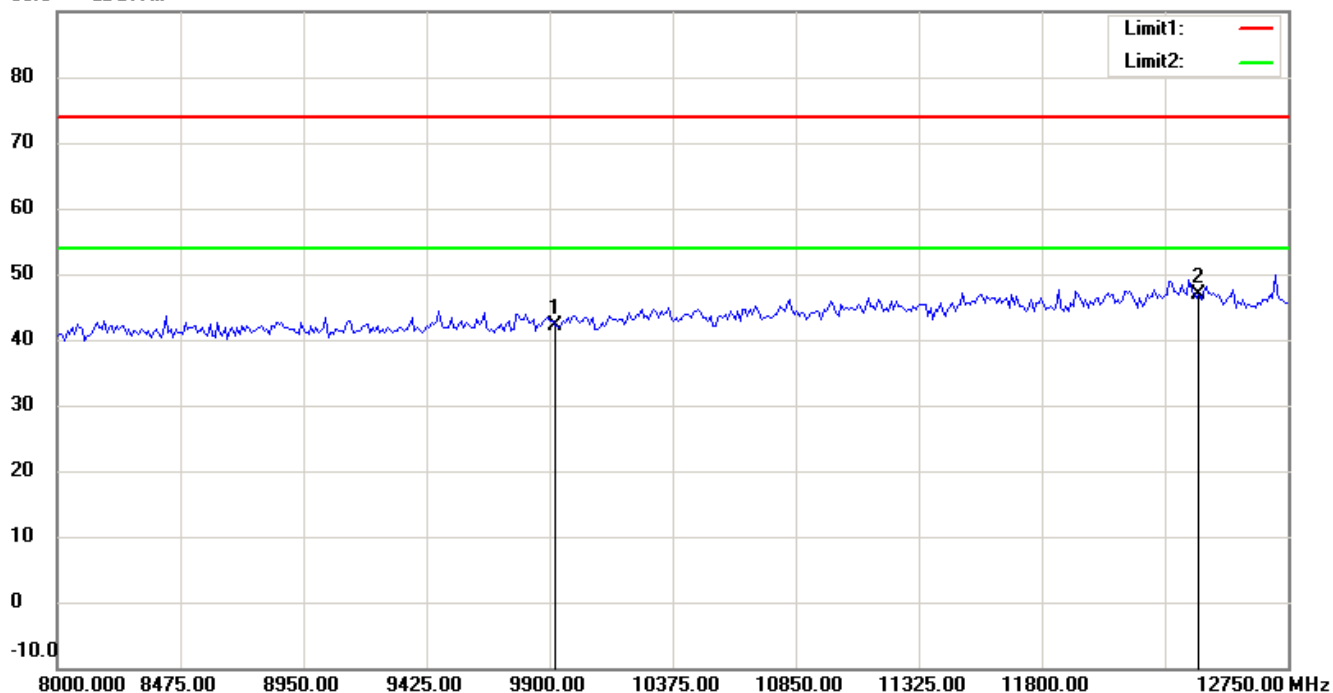
Registration number: W6M21401-13780-C-1

FCC ID: ZPPEX980301

90.0 dBuV/m



90.0 dBuV/m



Up Line: Peak Limit Line Down Line: Ave Limit Line

Note:

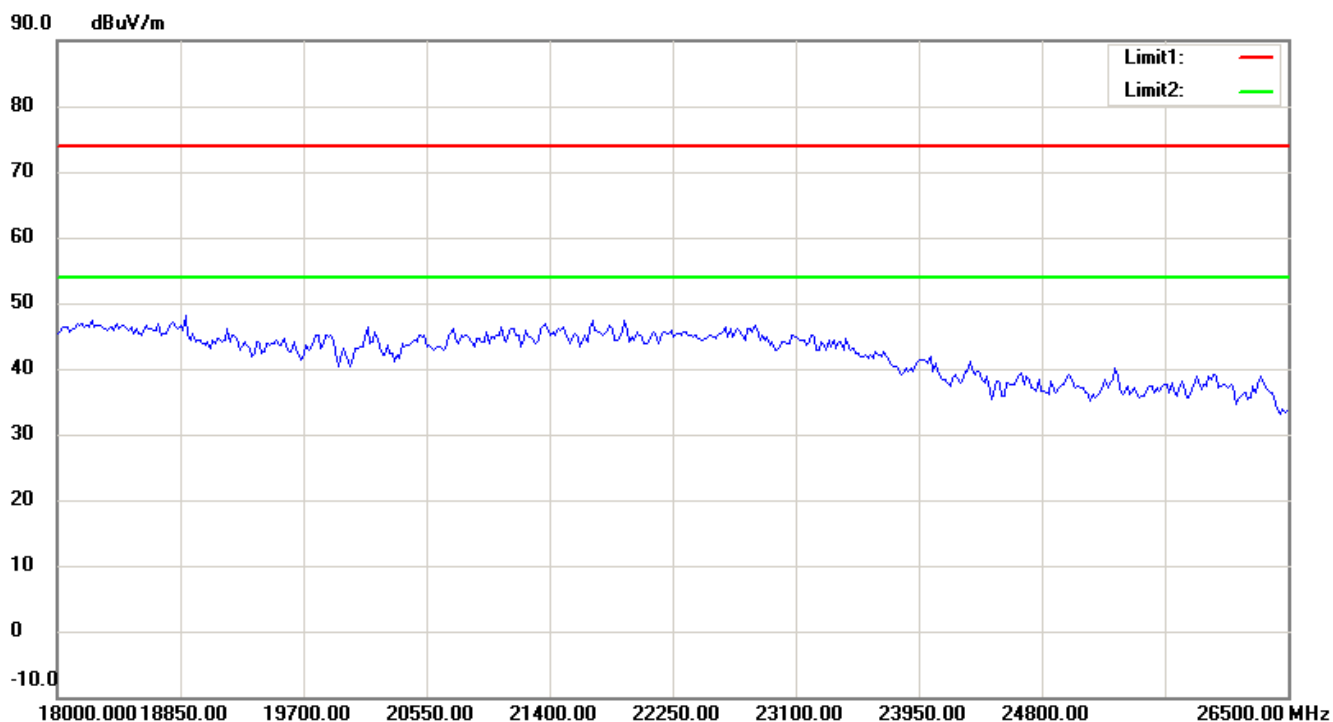
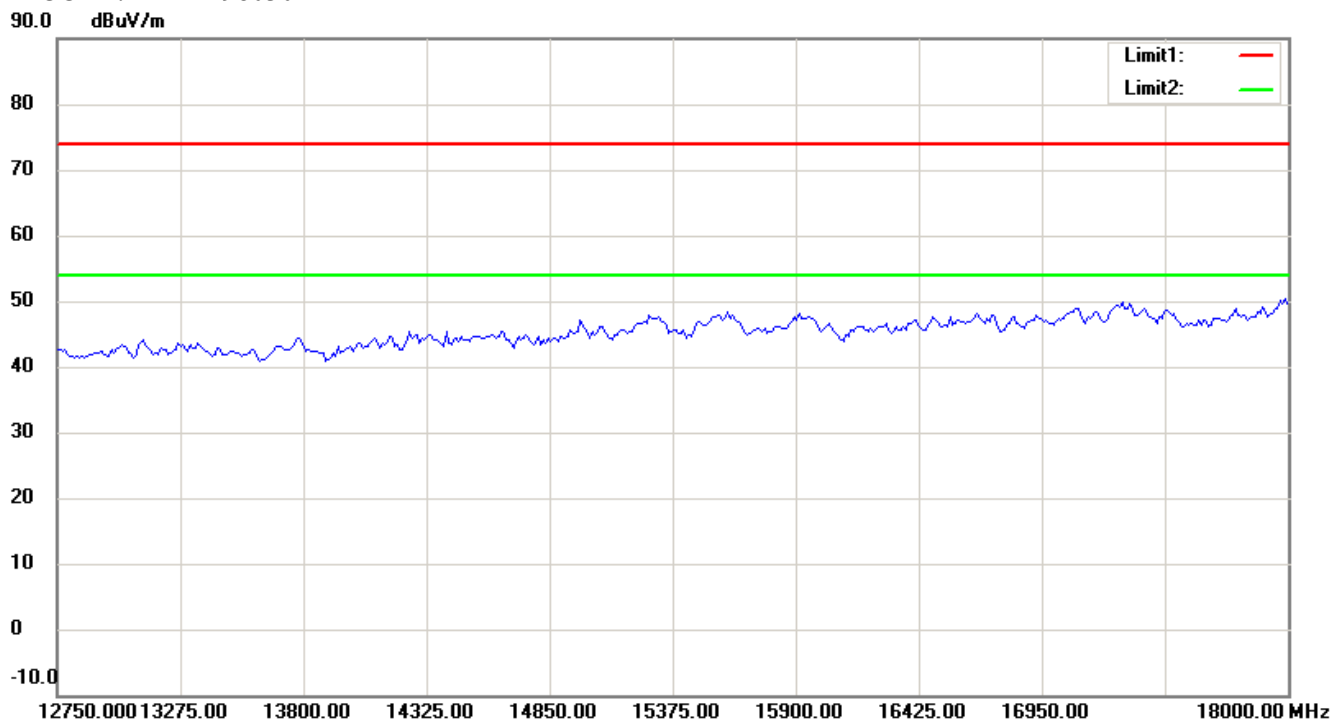
1. The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.
2. The some frequencies may exceed the limit line without the specified detectors, but that cannot present the results are failed to the specification 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: W6M21401-13780-C-1

FCC ID: ZPPEX980301



Up Line: Peak Limit Line Down Line: Ave Limit Line

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.