FCC PART 95 TEST REPORT

for

Dog Collar

Model No.: 011-03820-42

FCC ID: IPH-0282320

of

Applicant: Garmin International Inc
Address: 1200 E. 151st. Street Olathe Kansas 66062 United States

Tested and Prepared

by

Worldwide Testing Services (Taiwan) Co., Ltd.

FCC Registration No.: 930600

Industry Canada filed test laboratory Reg. No. IC 5679A-1, IC 5107A-1

A2LA Accredited No.: 2732.01

Report No.: W6M21505-14999-C-95

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

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1. General Information

1.1 Notes

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

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

May 25, 2015		Mark Cheng	Mark Cheng.
Date	WTS-Lab.	Name	Signature

Technical responsibility for area of testing:

May 25, 2015		Kevin Wang	Kevin Wang
Date	WTS	Name	Signature

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, IC 5107A-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:	Garmin International Inc
Street:	1200 E. 151st. Street
City:	Olathe Kansas 66062
Country:	United States
Telephone:	(913) 397-8448
Fax:	(913) 397-8282

1.4 Application details

Date of receipt of test item:	May 11, 2015
Date of test:	from May 12, 2015 to May 24, 2015

1.5 General information of Test item

Type of test item:	Dog Collar
Model Number:	011-03820-42
Multi-listing model number:	011-03820-40
Brand Name:	Garmin
Photos:	See appendix

Technical data

Operating frequency band:

Frequency(MHz)	Used Band
151.820 MHz	☒
151.880 MHz	☒
151.940 MHz	☒
154.570 MHz	☒
154.600 MHz	☒

Sample tested frequency:	151.820 / 151.94 / 154.60 MHz
Number of RF-channels:	5
Type of modulation:	GFSK
Designation of emission:	6K17F1D

Registration number: W6M21505-14999-C-95
FCC ID: IPH-0282320

Antenna Type:	Braided cable antenna / -6 dBi
Connection of Antenna:	☒ detachable ☐ not detachable
Power supply	Adaptor: (I/P:100-240 V~200 mA, 50-60 Hz；O/P: 5 V, 1 A) Battery: 3.7 VDC DC: 12-24 V
End point of Battery voltage:	3.145 V / 4.255 V
Operation modes:	Half-duplex

Part number information:
AC adaptor GPN: 362-00087-00
CLA GPN: 013-00434-00
CBL GPN: 325-00128-02
Charger cable assembly GPN: 320-00859-00
Antenna-GPN: 700-00034-51

Manufacturer: (if applicable)

Name:	Garmin Corporation
Street:	No.68, Zhangshu 2nd Rd., Xizhi Dist.,
Town:	New Taipei City 221,
Country:	Taiwan (R.O.C.)

1.6 Test standards

Technical standard:

FCC RULES PART 95 - Personal Radio Service (2014-10)
Subpart J - Multi-Use Radio Service (MURS)
Subpart E - Technical Regulations
FCC RULES PART 2 - Frequency Allocations General Rules and Regulations (2014-10)

2. Technical test

2.1 Summary of test results

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

or

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

2.2 Test environment

Temperature: 23 °C

Relative humidity content: 20 ... 75 %

Air pressure: 86-103 KPa

2.3 Description of Tested System

The EUT was tested with the Accessories or Peripherals Listed below:

Equipment	Model No.	Series No.	Software	Cable information	Note
--	--	--	--	--	--
--	--	--	--	--	--
--	--	--	--	--	--
--	--	--	--	--	--
--	--	--	--	--	--
--	--	--	--	--	--

Explanation: The EUT was configured as stand alone device, and there are no accessories or peripherals during the test.

2.4 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	2014/9/2	2015/9/1
ETSTW-CE 003	AC POWER SOURCE	APS-9102	D161137	GW	Function Test	
ETSTW-CE 008	HF-EICHLEITUNG RF STEP ATTENUATOR 139dB DPSP	334.6010.02	844581/024	R&S	Function Test	
ETSTW-CE 009	TEMP.&HUMIDITY CHAMBER	GTH-225-40-1P-U	MAA0305-009	GIANT FORCE	2014/7/8	2015/7/7
ETSTW-CE 016	TWO-LINE V-NETWORK	ENV216	100050	R&S	2014/10/13	2015/10/12
ETSTW-RE 004	EMI TEST RECEIVER	ESI 40	832427/004	R&S	2014/9/2	2015/9/1
ETSTW-RE 005	EMI TEST RECEIVER	ESVS10	843207/020	R&S	2014/9/2	2015/9/1
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	2014/10/15	2015/10/14
ETSTW-RE 027	Passive Loop Antenna	6512	00034563	ETS-Lindgren	2014/7/01	2015/6/30
ETSTW-RE 030	Double-Ridged Guide Horn Antenna	3117	00035224	ETS-Lindgren	2015/3/17	2016/3/16
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	2015/3/19	2016/3/18
ETSTW-RE 050	Attenuator 10dB	50HF-010-1	None	JFW	2015/3/2	2016/3/1
ETSTW-RE 051	Attenuator 6dB	50HF-006-1	None	JFW	2015/3/2	2016/3/1
ETSTW-RE 053	Attenuator 3dB	50HF-003-1	None	JFW	2015/3/2	2016/3/1
ETSTW-RE 055	SPECTRUM ANALYZER	FSU 26	200074	R&S	2014/6/05	2015/6/04
ETSTW-RE 060	Attenuator 30dB	5015-30	F651012z-01	ATM	2015/3/2	2016/3/1
ETSTW-RE 062	Amplifier Module	CHC 2	None	KMIC	2014/11/26	2015/11/25
ETSTW-RE 064	Bluetooth Test Set	MT8852B-042	6K00005709	Anritsu	Function Test	
ETSTW-RE 069	Double-Ridged Guide Horn Antenna	3117	00069377	ETS-Lindgren	Function Test	
ETSTW-RE 072	CELL SITE TEST SET	8921A	3339A00375	HP	2014/10/9	2015/10/8
ETSTW-RE 088	SOLID STATE AMPLIFIER	KMA180265A01	99057	KMIC	2014/9/22	2015/9/21
ETSTW-RE 099	DC Block	50DB-007-1	None	JFW	2015/3/2	2016/3/1
ETSTW-RE 106	Humidity Temperature Meter	TES-1366	091011113	TES	2014/11/7	2015/11/6
ETSTW-RE 111	TRILOG Super Broadband test Antenna	VULB 9160	9160-3309	Schwarz beck	2014/12/5	2015/12/4
ETSTW-RE 112	AC POWER SOURCE	TFC-1005	T-0A023536	T-Power	Function test	
ETSTW-RE 115	2.4GHz Notch Filter	N0124411	473874	MICROWAVE CIRCUITS	2015/1/7	2016/1/6
ETSTW-RE 120	RF Player	MP9200	MP9210-111022	ADIVIC	Function test	
ETSTW-RE 122	SIGNAL GENERATOR	SMF100A	102149	R&S	2014/6/11	2015/6/10
ETSTW-RE 125	5GHz Notch filter	5NSL11-5200/E221.3-O/O	1	K&L Microwave	2014/8/12	2015/8/11
ETSTW-RE 126	5GHz Notch filter	5NSL11-5800/E221.3-O/O	1	K&L Microwave	2014/8/12	2015/8/11

ETSTW-RE 127	RF Switch Box	RFS-01	None	WTS	2015/3/2	2016/3/1
ETSTW-RE 128	5.3GHz Notch filter	N0153001	SN487233	Microwave Circits	2014/8/12	2015/8/11
ETSTW-RE 129	5.5GHz Notch filter	N0555984	SN487234	Microwave Circits	2014/8/12	2015/8/11
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	2014/10/20	2015/10/19
ETSTW-GSM 003	Radio Communication Analyzer	MT8820C	6201342073	Anritsu	2015/3/5	2016/3/4
ETSTW-GSM 019	Band Reject Filter	WRCTF824/849-822/851-40 /12+9SS	3	WI	2015/1/7	2016/1/6
ETSTW-GSM 020	Band Reject Filter	WRCD1747/1748-1743/1752-32/5SS	1	WI	2015/1/7	2016/1/6
ETSTW-GSM 021	Band Reject Filter	WRCD1879.5/1880.5-1875.5/1884.5-32/5SS	3	WI	2015/1/7	2016/1/6
ETSTW-GSM 022	Band Reject Filter	WRCT901.9/903.1-904.25-50/8SS	1	WI	2015/1/7	2016/1/6
ETSTW-GSM 023	Power Divider	4901.19.A	None	SUHNER	2014/9/17	2015/9/16
ETSTW-Cable 010	BNC Cable	5 M BNC Cable	None	JYE BAO CO.,LTD.	2014/10/15	2015/10/14
ETSTW-Cable 011	BNC Cable	BNC Cable 1	None	JYE BAO CO.,LTD.	Pre-test Use NCR	
ETSTW-Cable 012	N TYPE To SMA Cable	Cable 012	None	JYE BAO CO.,LTD.	2014/10/15	2015/10/14
ETSTW-Cable 016	BNC Cable	Switch Box	B Cable 1	Schwarz beck	2015/2/25	2016/2/24
ETSTW-Cable 017	BNC Cable	X Cable	B Cable 2	Schwarz beck	2015/2/25	2016/2/24
ETSTW-Cable 018	BNC Cable	Y Cable	B Cable 3	Schwarz beck	2015/2/25	2016/2/24
ETSTW-Cable 019	BNC Cable	Z Cable	B Cable 4	Schwarz beck	2015/2/25	2016/2/24
ETSTW-Cable 020	N TYPE Cable	OATS Cable 1	N30N30-L335-15M	JYE BAO CO.,LTD.	2015/4/23	2016/4/22
ETSTW-Cable 022	N TYPE Cable	5006	0002	JYE BAO CO.,LTD.	2015/3/19	2016/3/18
ETSTW-Cable 026	Microwave Cable	SUCOFLEX 104	279075	HUBER+SUHNER	2015/3/2	2016/3/1
ETSTW-Cable 027	Microwave Cable	SUCOFLEX 104	279083	HUBER+SUHNER	2015/5/14	2016/5/13
ETSTW-Cable 028	Microwave Cable	FA147A0015M2020	30064-2	UTIFLEX	2015/1/16	2016/1/15
ETSTW-Cable 029	Microwave Cable	FA147A0015M2020	30064-3	UTIFLEX	2014/9/22	2015/9/21
ETSTW-Cable 030	Microwave Cable	SUCOFLEX 104（S_Cable 9）	279067	HUBER+SUHNER	2015/3/2	2016/3/1
ETSTW-Cable 031	Microwave Cable	SUCOFLEX 104（S_Cable 10）	238092	HUBER+SUHNER	2014/11/26	2015/11/25
ETSTW-Cable 043	Microwave Cable	SUCOFLEX 104	317576	HUBER+SUHNER	2014/11/26	2015/11/25
ETSTW-Cable 048	Microwave Cable	SUCOFLEX 104	325518	HUBER+SUHNER	2014/11/26	2015/11/25
ETSTW-Cable 053	N TYPE To SMA Cable	RG142	None	JYE BAO CO.,LTD.	2015/3/19	2016/3/18
ETSTW-Cable 058	Microwave Cable	SUCOFLEX 104	none	HUBER+SUHNER	2015/3/19	2016/3/18
WTSTW-SW 002	EMI TEST SOFTWARE	EZ_EMC	None	Farad	Version ETS-03A1	

2.5 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. The ambient temperature of the UUT was 23°C with a humidity of 40 %.

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, an exploratory test was performed with three (3) orthogonal planes to determine the highest emissions.

Measurements were made by at the registered open field test site located at The Registration Number: 930600. When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes.

ANSI STANDARD C63.4-2009 10.2.7: Any measurements that utilize special test software shall be indicated and referenced in the test report. During testing, test software ’EZ EMC’ was used for setting up different operation modes.

3. Test results (enclosure)

TEST CASE	Para. Number	Required	Test passed	Test failed
RF Power Output	2.1046; 95.639 (h)	☒	☒	☐
Modulation Deviation	2.1047 (b) 95.631 (j)	☐	☐	☐
Audio Frequency Response	2.1047 (a) 95.631 (j)	☐	☐	☐
Occupied Bandwidth / Emission Mask	2.1049 (c)(1); 95.633 (f) 95.635 (e)	☒	☒	☐
Radiated Spurious Emission Transmitter	2.1053 95.635 (e)	☒	☒	☐
Radiated Spurious Emission Receiver	Part 15B	☒	☒	☐
Frequency Stability vs. Temperature	2.1055 (b); 95.632(c)	☒	☒	☐
Frequency Stability vs. Voltage	2.1055 (a)(1); 95.632(c)	☒	☒	☐

The following is intentionally left blank.

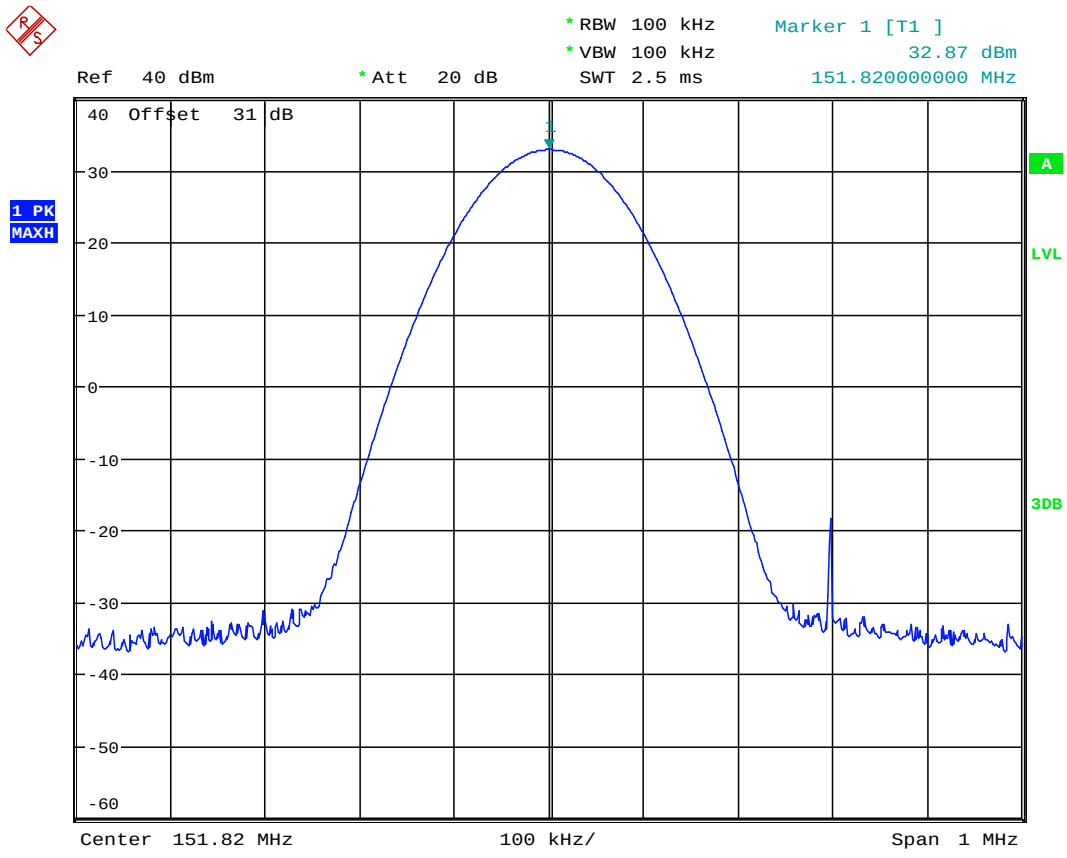
4. RF Power Output (conducted), FCC 2.1046; 95.639

4.1 Test procedure

This transmitter output was connected to a calibrated coaxial attenuator, the other end of which was connected to a spectrum analyzer. Transmitter output was derived with the spectrum analyzer in dBm. The power output at the transmitter antenna port was determined by assign the value of the attenuator to the spectrum analyzer reading.

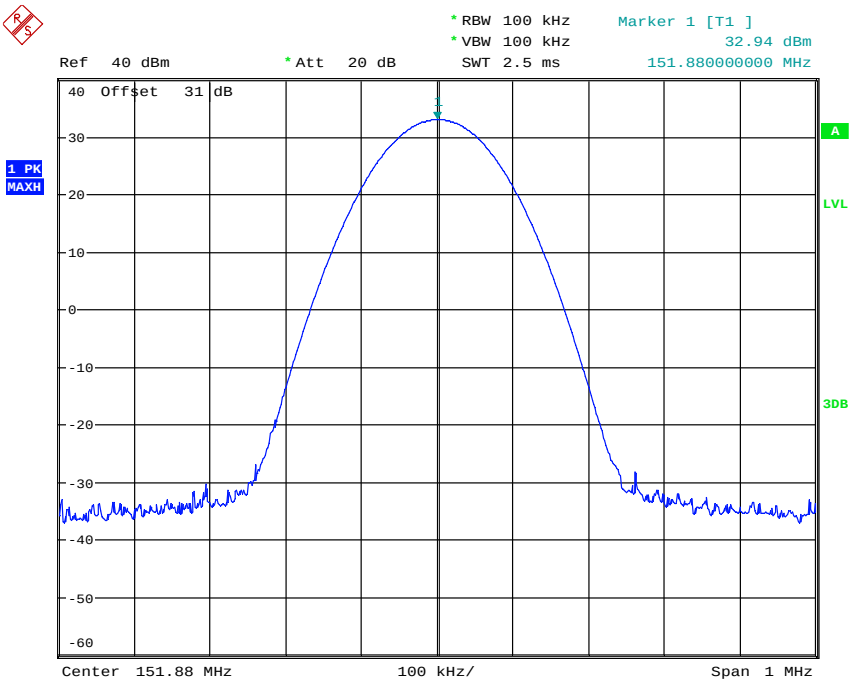
An HP power meter was also used to measure the RF power.
Tests were performed with an un-modulated carrier at three frequencies (low, middle and high channels) and on all power levels, which can be set-up on the transmitters, if applicable.

4.2 Test Results

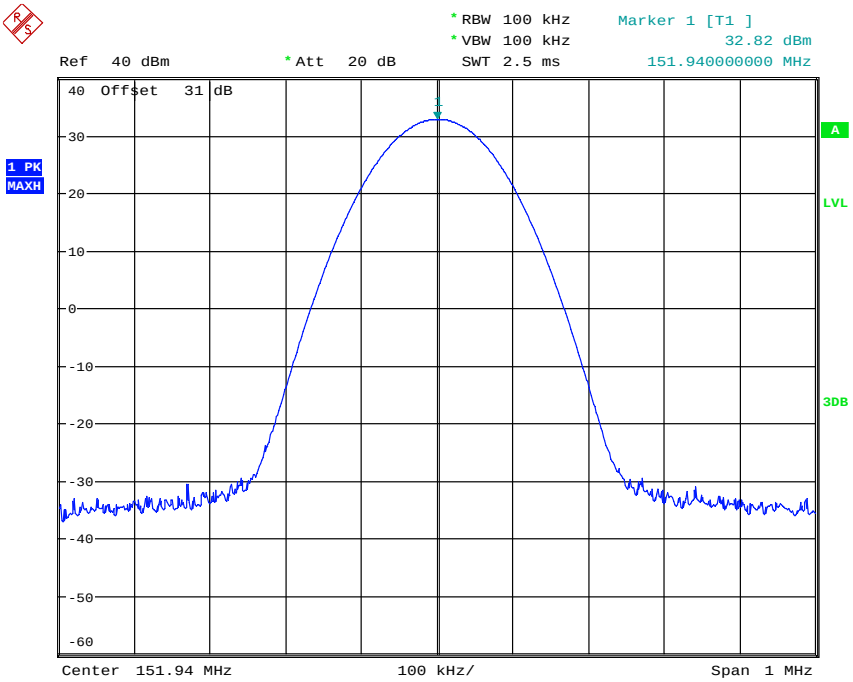


RF OUTPUT POWER 151.82MHZ
Date: 12.MAY.2015 13:10:52

Registration number: W6M21505-14999-C-95
FCC ID: IPH-0282320



RF OUTPUT POWER 151.88MHZ
Date: 12.MAY.2015 13:12:08



RF OUTPUT POWER 151.94MHZ
Date: 12.MAY.2015 13:12:40

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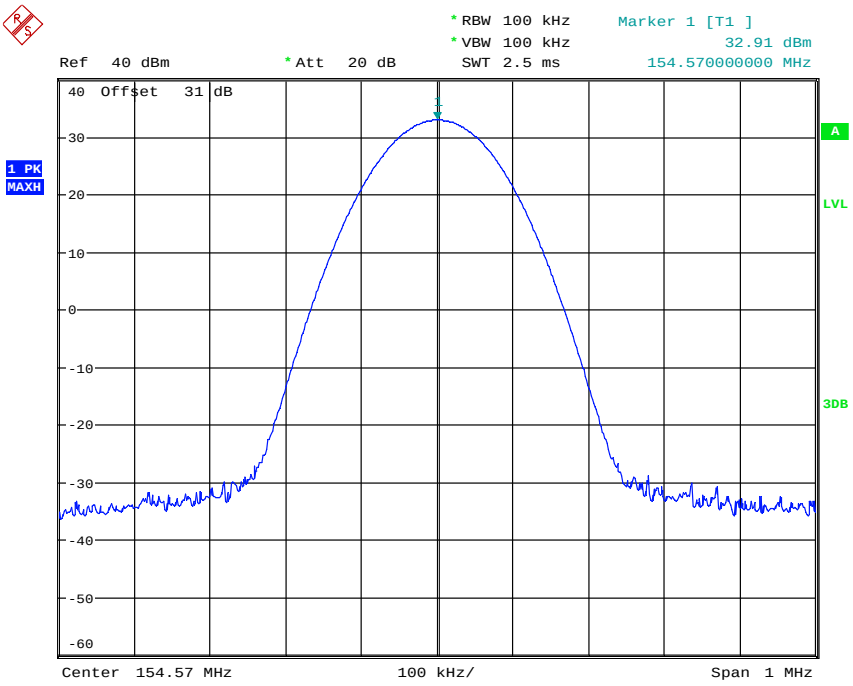
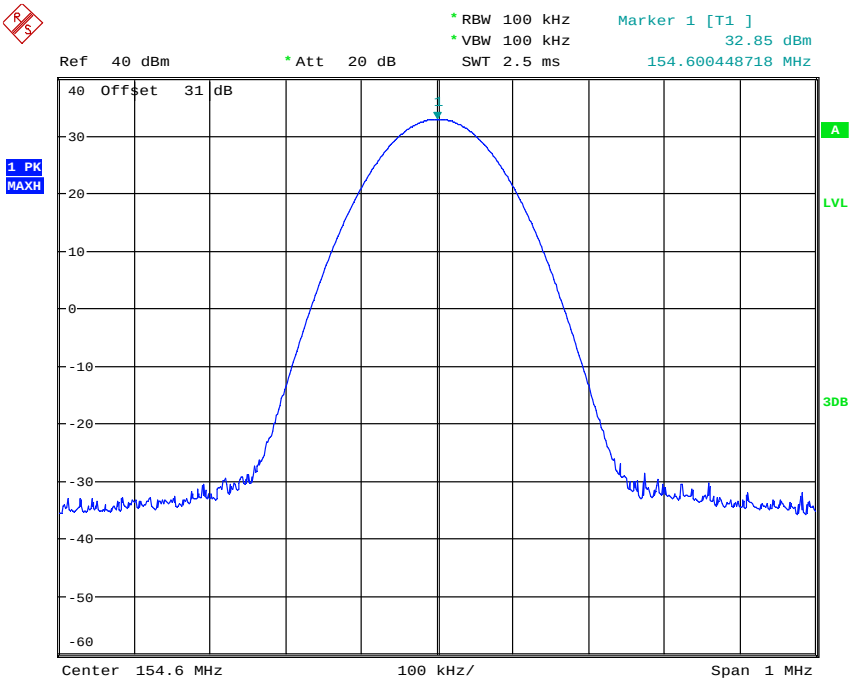


RF OUTPUT POWER 154.57MHZ
Date: 12.MAY.2015 13:13:14



RF OUTPUT POWER 154.6MHZ
Date: 12.MAY.2015 13:13:49

4.3 Limits:

No MURS unit, under any condition of modulation, shall exceed 2 Watts transmitter power output.
Test equipment used: ETSTW-RE 060, ETSTW-RE 055

5. Radiated Power

5.1 Test Procedure

The EUT was positioned on a non-conductive turntable, 0.8m above the ground on an open test site.
The radiated emission at the fundamental frequency was measured at 3m distance with a test antenna and spectrum analyzer.

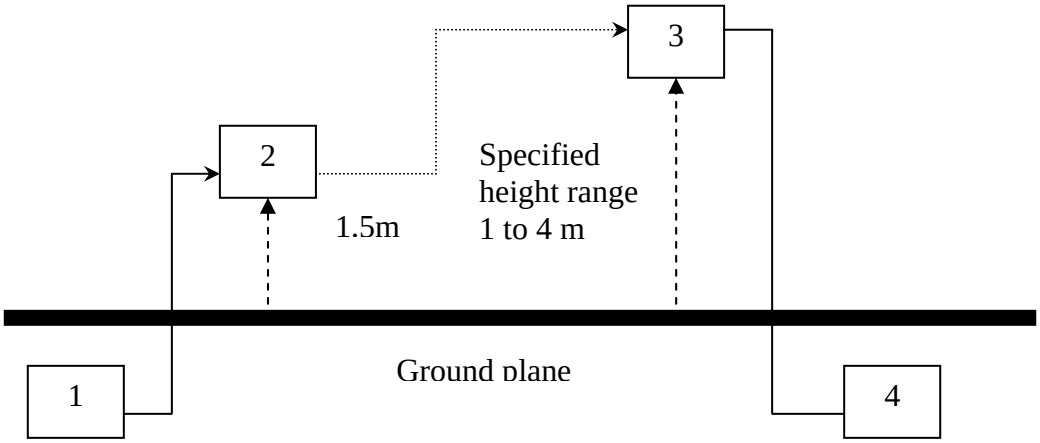
Worst case emission was recorded with the rotation of the turntable and the rising and lowering of the test antenna.

Substitution RF power Measurement at WTS

General:

The applied substitution method follows ANSI/TIA/EIA-603, ANSI/TIA/EIA-102.CAAA or the appropriate ETSI rules respectively.

The actual signal generated by the EUT can be determined by means of a substitution measurement in which a known signal source replaces the device to be measured.



1) Signal generator ;
2) Substitution antenna ;
3) Test antenna ;
4) Spectrum analyzer or selective voltmeter.

The substitution antenna replaces the transmitter antenna at the same position and in vertical polarization. The frequency of the signal generator shall be adjusted to the measurement frequency.
The test antenna shall be raised or lowered, if necessary, to ensure that the maximum signal is still received. The input signal to the substitution antenna shall be adjusted in level until an equal or a known related level to that detected from the transmitter is obtained in the measurement receiver.
If a fully anechoic chamber is used as test site in order to provide free space conditions there is no need to change the height of the antenna.

The measurement will be repeated in horizontal position.

Calibration:

In order to make this kind of measurement more effective and to avoid subjective measurement faults ETS has installed automatic computer controlled measurement procedures.

With the above described substitution method a test site is calibrated over the full frequency range which is used in suitable frequency steps. For a certain power level on the substitution antenna the received power over the whole frequency range is documented. All necessary antenna gains, cable losses, filter losses and amplifications of preamplifiers are taken in consideration. The summary of this calibration measurement performs a transducer factor that is related to the considered test site and a certain measurement distance. Differences of the radiated power levels of different test samples are determined by internal attenuation of measurement receiver. The proper function of such test site will be maintained by short term plausibility checks and periodical re-calibration.

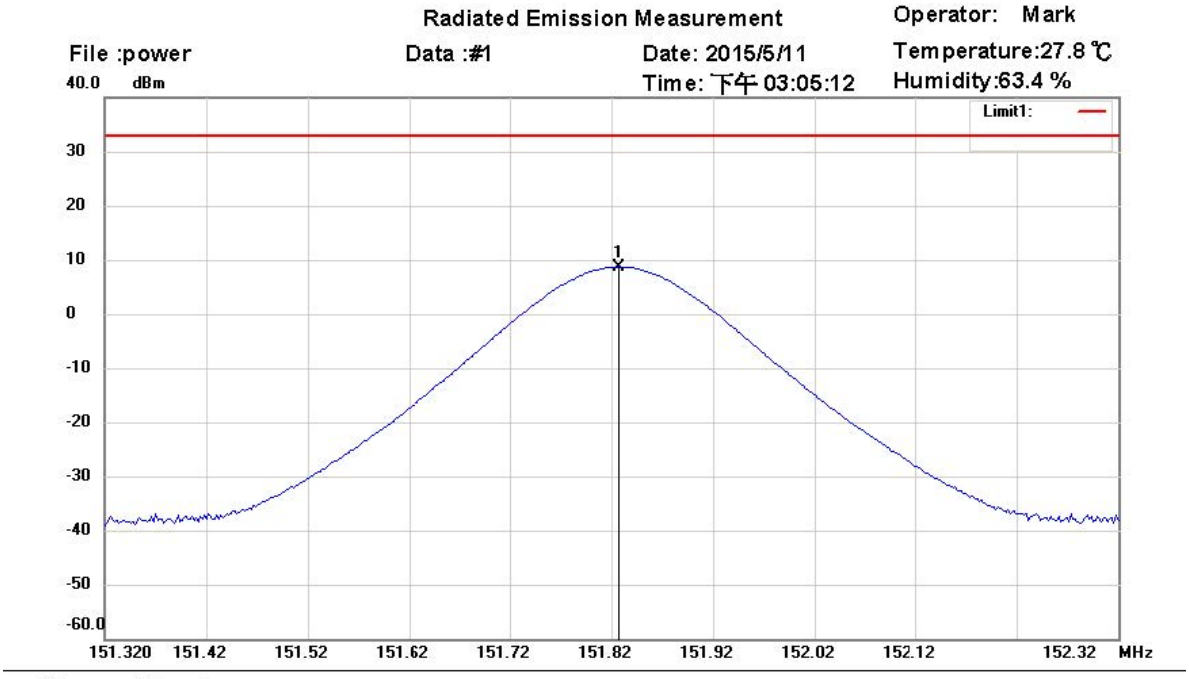
Testing:

Now the test sample will be putted on the table at the defined position and the radiated power will be receiver and documented by the measurement receiver.

On test sites with ground plane the measurement antenna will be lowered and raised to maximum values at significant frequencies.

For peak power measurements the sample is turned by the turntable over 360 degree in order to find the direction with the maximum radiation or to document the max reading with the MAXHOLD function during the rotation.

5.2 Test results

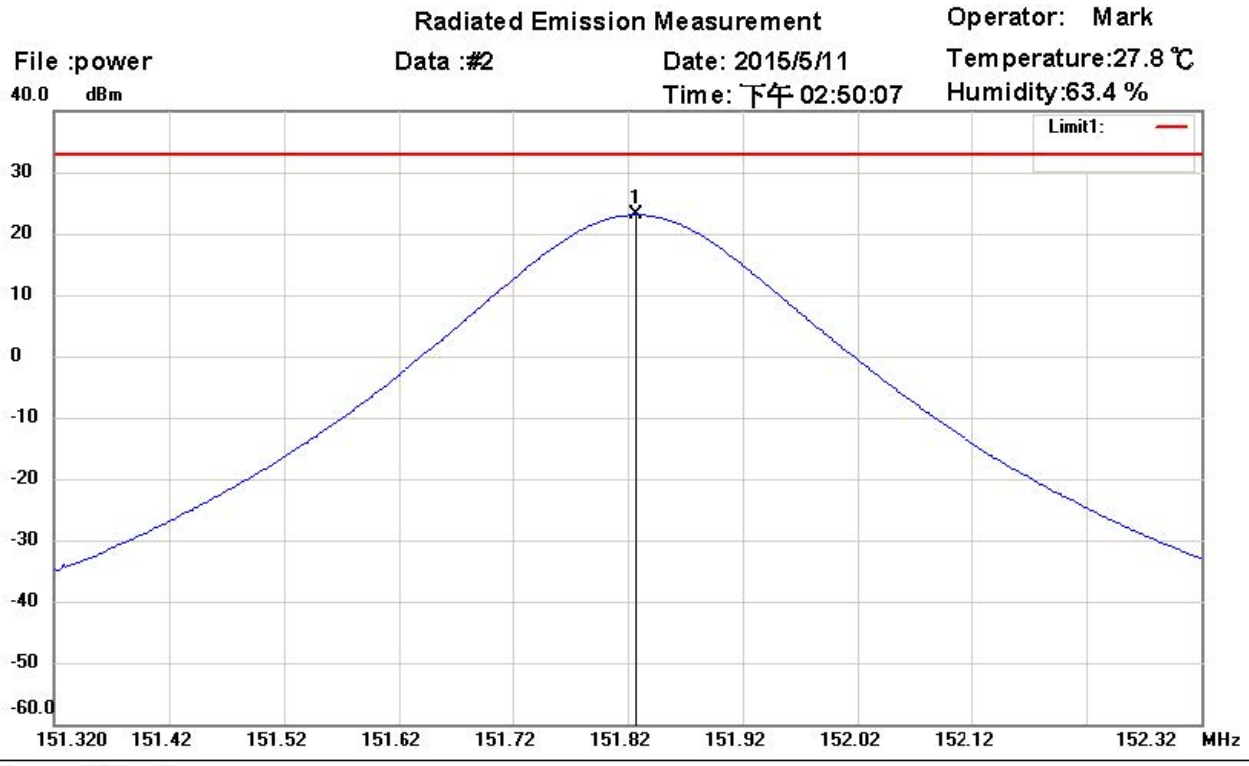


Site : Chamber
Condition : FCC_part 95 MURS Power
EUT : W6M21505-14999
M/N:
Test Mode : US CH1 151.82MHz
Note :

Polarization: *Horizontal*
Power : 3.7 Vd.c.
Distance: 3m

Mk.	Frequency (MHz)	Reading (dBm)	Detector	Corr. factor (dB)	Result (dBm)	Limit (dBm)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
*	151.8270	-12.07	peak	20.77	8.70	33.00	150	230	-24.30	

Registration number: W6M21505-14999-C-95
FCC ID: IPH-0282320

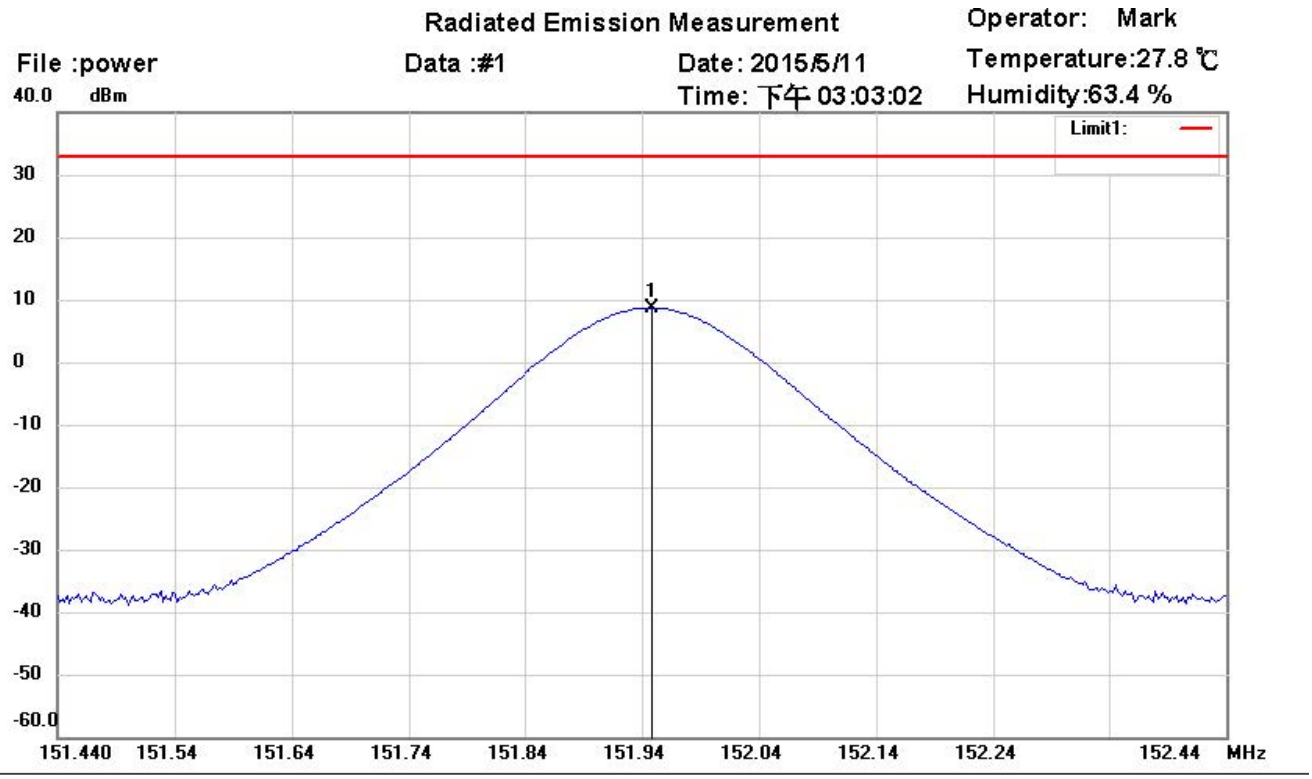


Site : Chamber
Condition : FCC_part 95 MURS Power
EUT : W6M21505-14999
M/N:
Test Mode : US CH1 151.82MHz
Note :

Polarization: *Vertical*
Power : 3.7 Vd.c.
Distance: 3m

Mk.	Frequency (MHz)	Reading (dBm)	Detector	Corr. factor (dB)	Result (dBm)	Limit (dBm)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
*	151.8270	1.68	peak	21.40	23.08	33.00	150	140	-9.92	

Registration number: W6M21505-14999-C-95
FCC ID: IPH-0282320

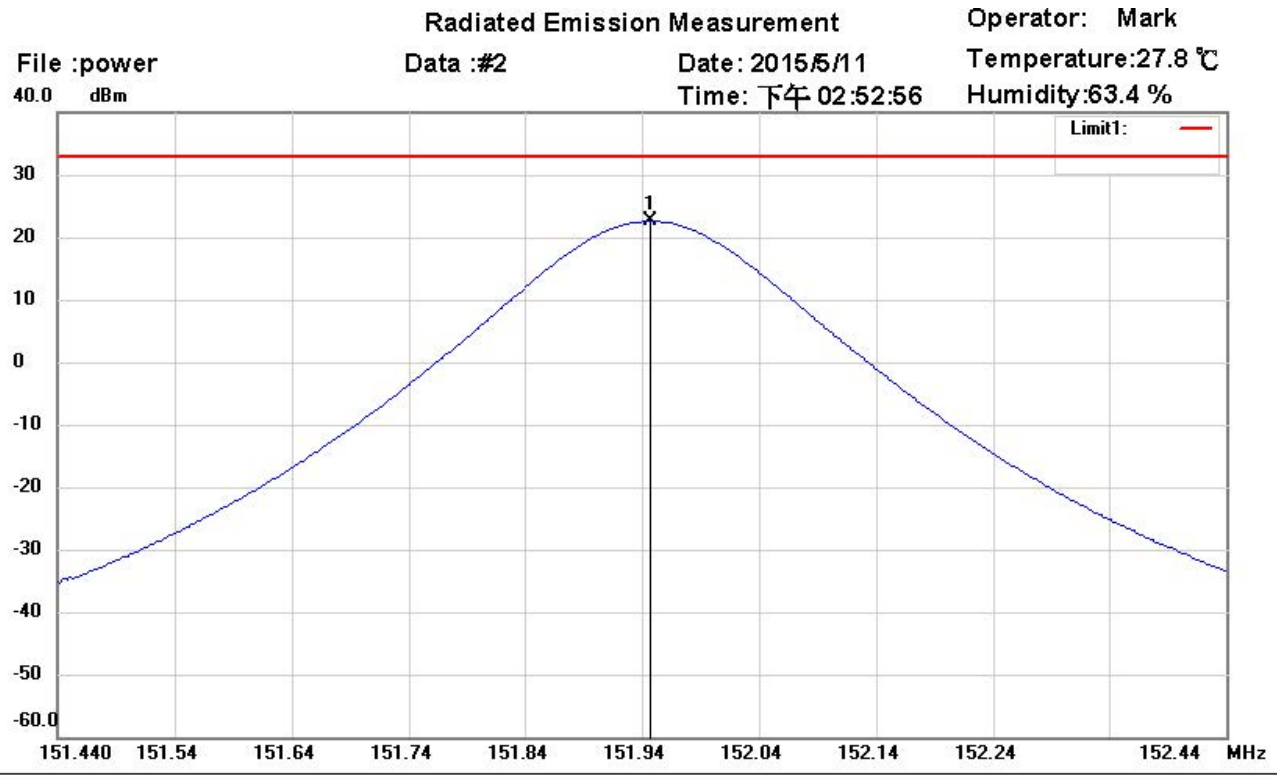


Site : Chamber
Condition : FCC_part 95 MURS Power
EUT : W6M21505-14999
M/N:
Test Mode : US CH3 151.94MHz
Note :

Polarization: *Horizontal*
Power : 3.7 Vd.c.
Distance: 3m

Mk.	Frequency (MHz)	Reading (dBm)	Detector	Corr. factor (dB)	Result (dBm)	Limit (dBm)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
*	151.9490	-12.06	peak	20.78	8.72	33.00	150	140	-24.28	

Registration number: W6M21505-14999-C-95
FCC ID: IPH-0282320

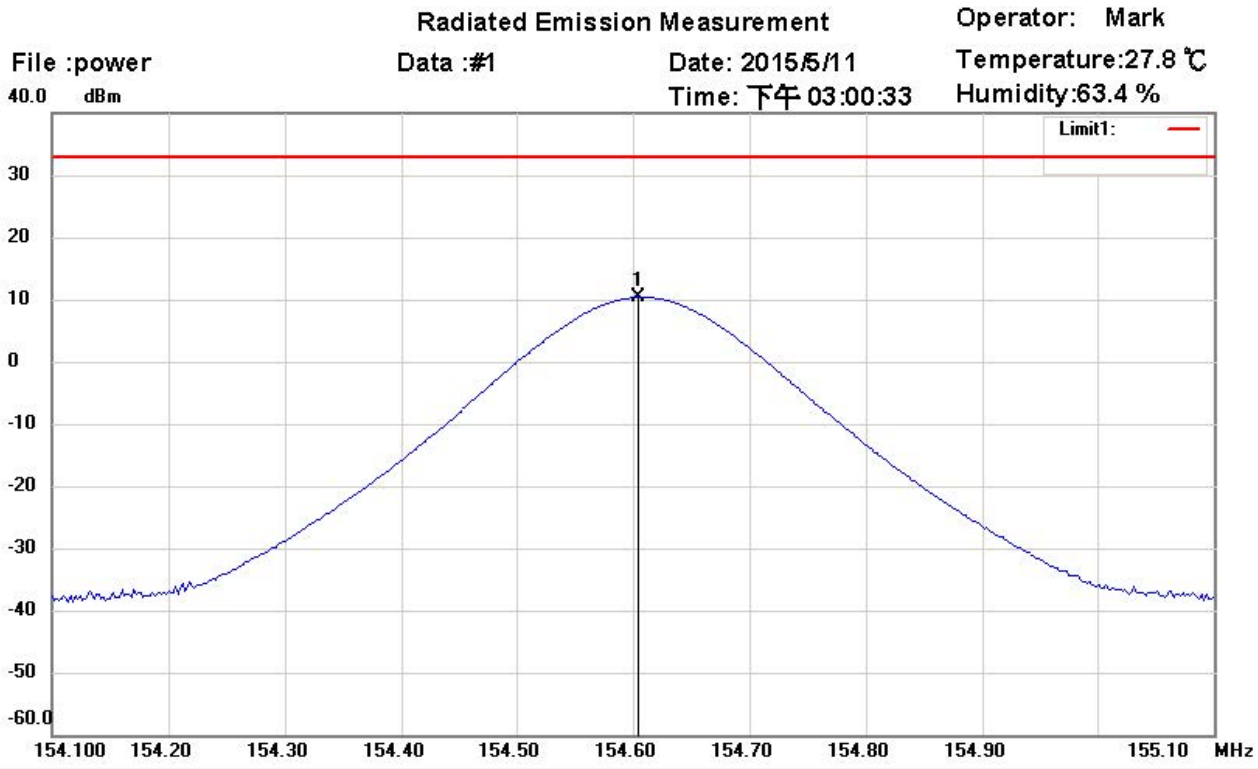


Site : Chamber
Condition : FCC_part 95 MURS Power
EUT : W6M21505-14999
M/N:
Test Mode : US CH3 151.94MHz
Note :

Polarization: *Vertical*
Power : 3.7 Vd.c.
Distance: 3m

Mk.	Frequency (MHz)	Reading (dBm)	Detector	Corr. factor (dB)	Result (dBm)	Limit (dBm)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
*	151.9470	1.18	peak	21.41	22.59	33.00	150	150	-10.41	

Registration number: W6M21505-14999-C-95
FCC ID: IPH-0282320

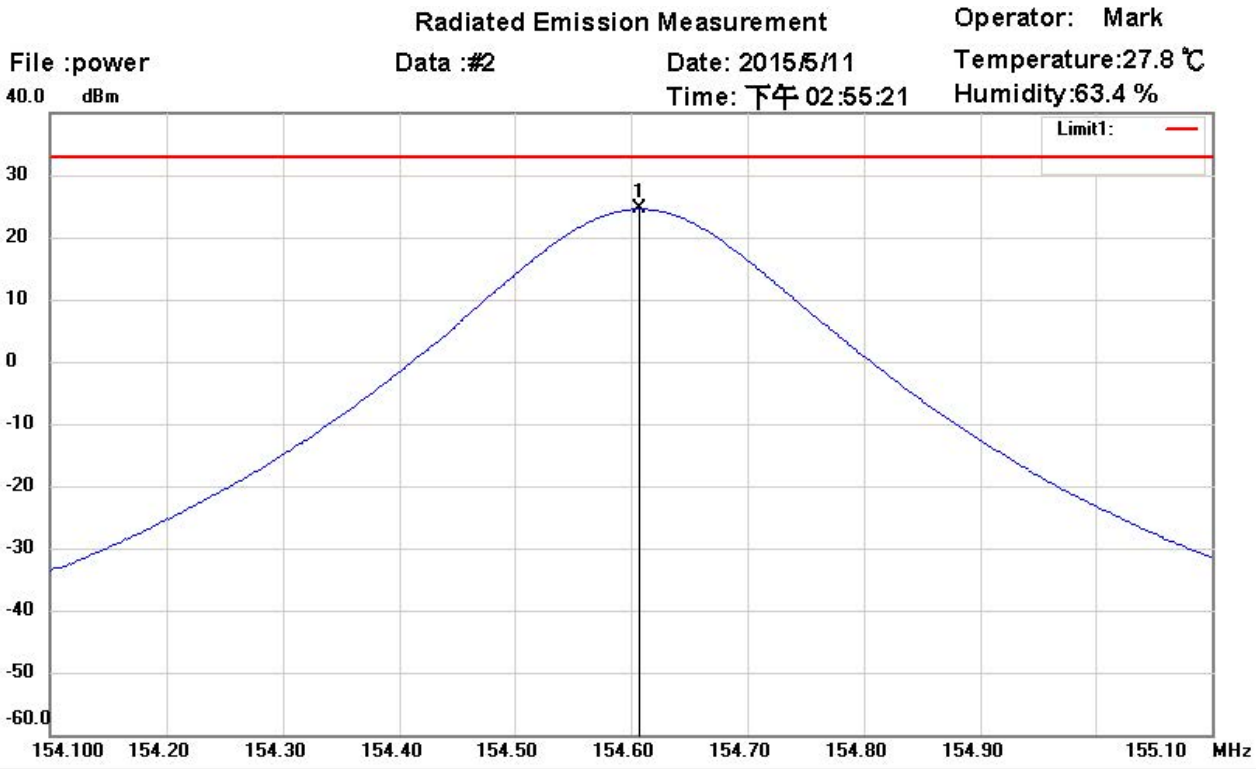


Site : Chamber
Condition : FCC_part 95 MURS Power
EUT : W6M21505-14999
M/N:
Test Mode : US CH5 154.6MHz
Note :

Polarization: *Horizontal*
Power : 3.7 Vd.c.
Distance: 3m

Mk.	Frequency (MHz)	Reading (dBm)	Detector	Corr. factor (dB)	Result (dBm)	Limit (dBm)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
*	154.6050	-10.62	peak	20.97	10.35	33.00	150	100	-22.65	

Registration number: W6M21505-14999-C-95
FCC ID: IPH-0282320



Site : Chamber
Condition : FCC_part 95 MURS Power
EUT : W6M21505-14999
M/N:
Test Mode : US CH5 154.6MHz
Note :

Polarization: *Vertical*
Power : 3.7 Vd.c.
Distance: 3m

Mk.	Frequency (MHz)	Reading (dBm)	Detector	Corr. factor (dB)	Result (dBm)	Limit (dBm)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
*	154.6070	2.86	peak	21.67	24.53	33.00	150	240	-8.47	

Test equipment used: ETSTW-RE 004, ETSTW-RE 122, ETSTW-RE 030,
ETSTW-RE 042, ETSTW-RE 043, ETSTW-RE 044

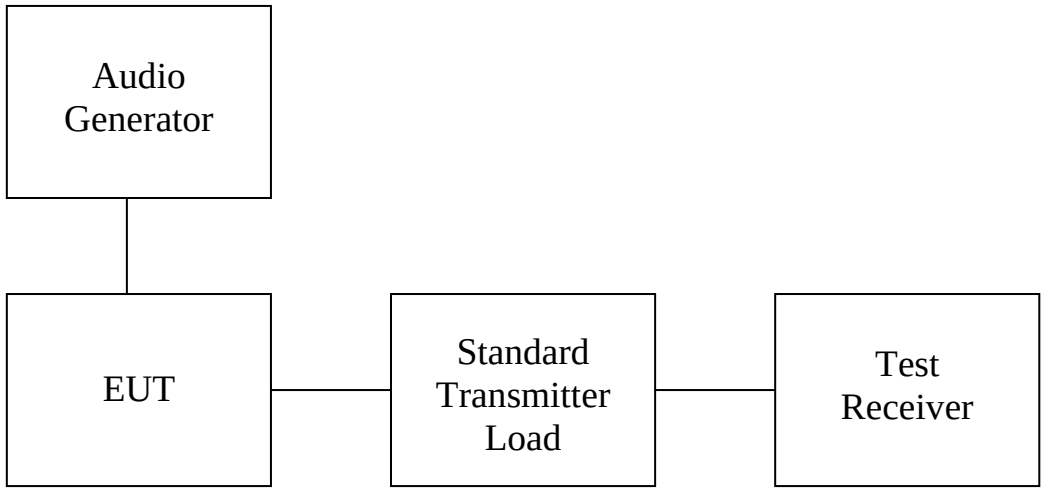
5.3 Limits:

No MURS unit, under any condition of modulation, shall exceed 2 Watts transmitter power output.

6. Modulation Deviation, FCC 2.1047 (b), 95.631(j)

6.1 Test procedure

Modulation limiting is the transmitter circuit's ability to limit the transmitter from producing deviations in excess of rated system deviation.
The audio signal generator is connected to the audio input of the EUT with its full rating.
The modulation response is measured at certain modulation frequencies, related to 1000Hz reference signal. Tests are performed for positive and negative modulation.



6.2 Test results:

Explanation: This test is not required because the EUT belongs to digital modulation.

6.3 Limits:

A MURS transmitter must transmit only emission types A1D, A2B, A2D, A3E, F2B, F1D, F2D, F3E, G3E. Emission types A3E, F3E and G3E include selective calling or tone-operated squelch tones to establish or continue voice communications. MURS transmitters are prohibited from transmitting in the continuous carrier mode.

Test equipment used: ETSTW-RE 055, ETSTW-RE 060

7. Audio frequency response, FCC 2.1047 (a)

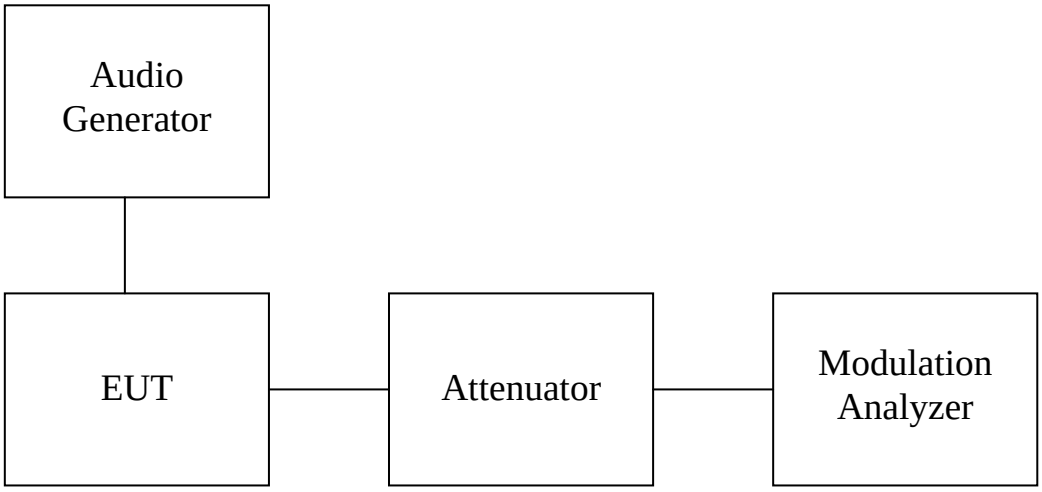
7.1 Test procedure

The audio frequency response is the degree of closeness to which the frequency deviation of the transmitter follows a prescribed characteristic.
The frequency response of the audio modulation part is measured over a frequency range of 100 Hz to 5000Hz.

For 1000Hz tone reference signal the audio generator level is adjusted to get 20% of the rated system deviation.

The deviations obtained over the frequency range from 100Hz to 5000Hz are recorded and compared with the reference deviation as follows:

$$\text{Audio Frequency Response} = 20 \log [\ DEV_{Freq} /\ DEV_{ref}\ ].$$



7.2 Test results:

Explanation: This test is not required because the EUT belongs to digital modulation.

7.3 Limits:

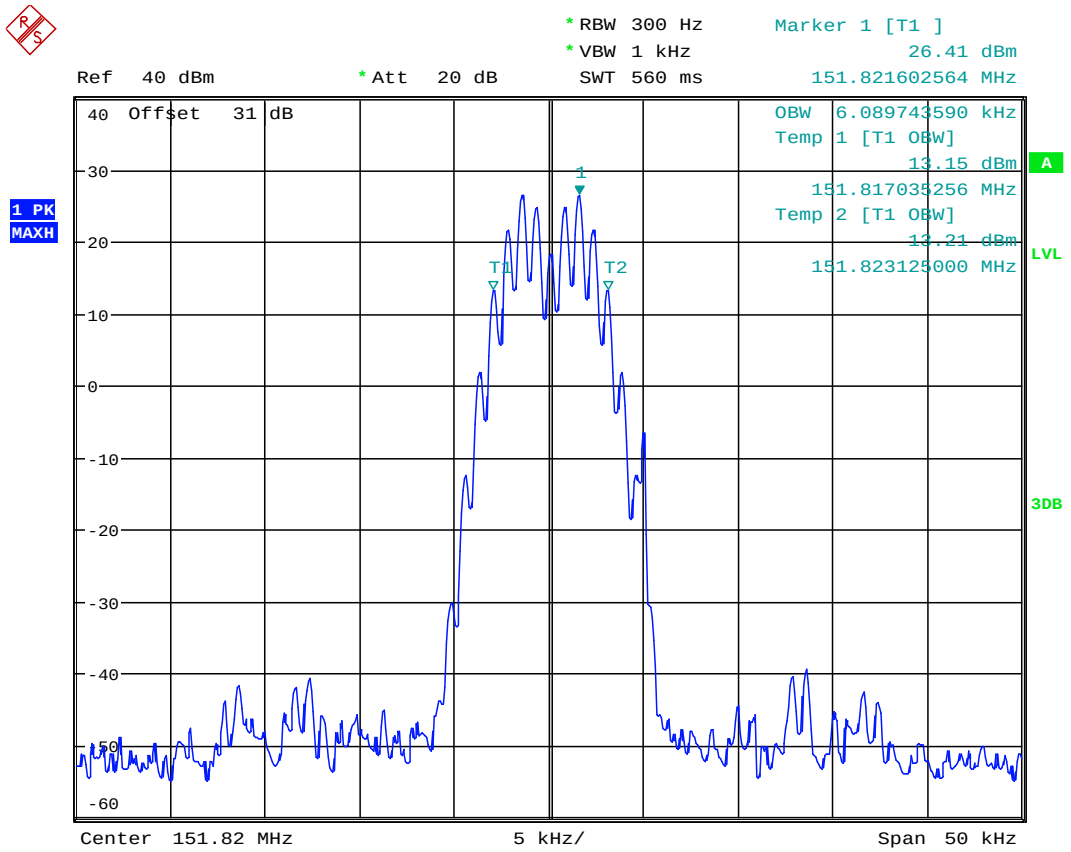
A MURS transmitter must transmit only emission types A1D, A2B, A2D, A3E, F2B, F1D, F2D, F3E, G3E. Emission types A3E, F3E and G3E include selective calling or tone-operated squelch tones to establish or continue voice communications. MURS transmitters are prohibited from transmitting in the continuous carrier mode.

Test equipment used: ETSTW-RE 072, ETSTW-RE 055

8. Occupied Bandwidth/Emission Mask, FCC 2.1049 (c) ; 95.632

The authorized bandwidth is 11.25 kHz on frequencies 151.820 MHz, 151.880 MHz and 151.940 MHz.
The authorized bandwidth is 20.0 kHz on frequencies 154.570 and 154.600 MHz.

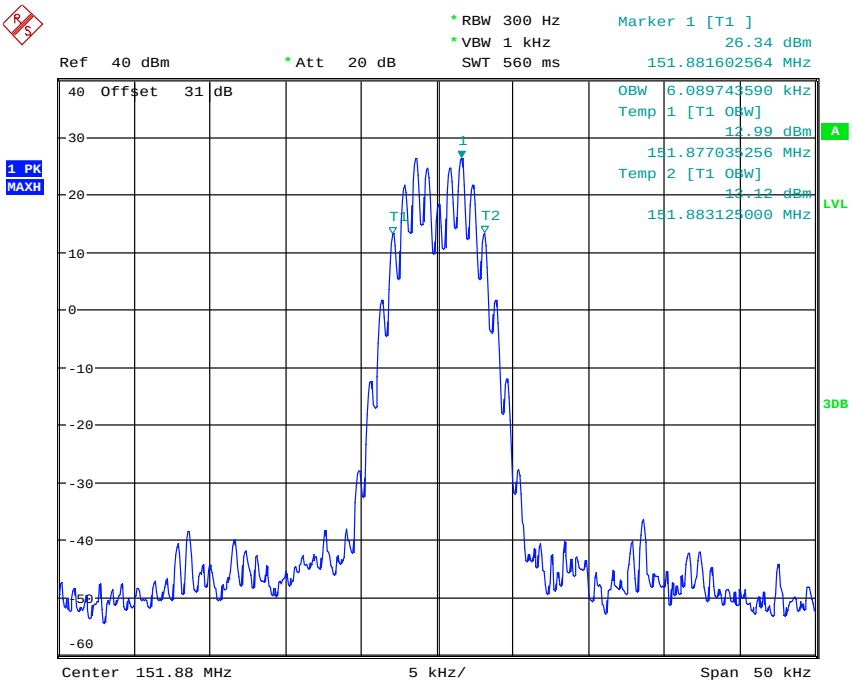
8.1 Test Results



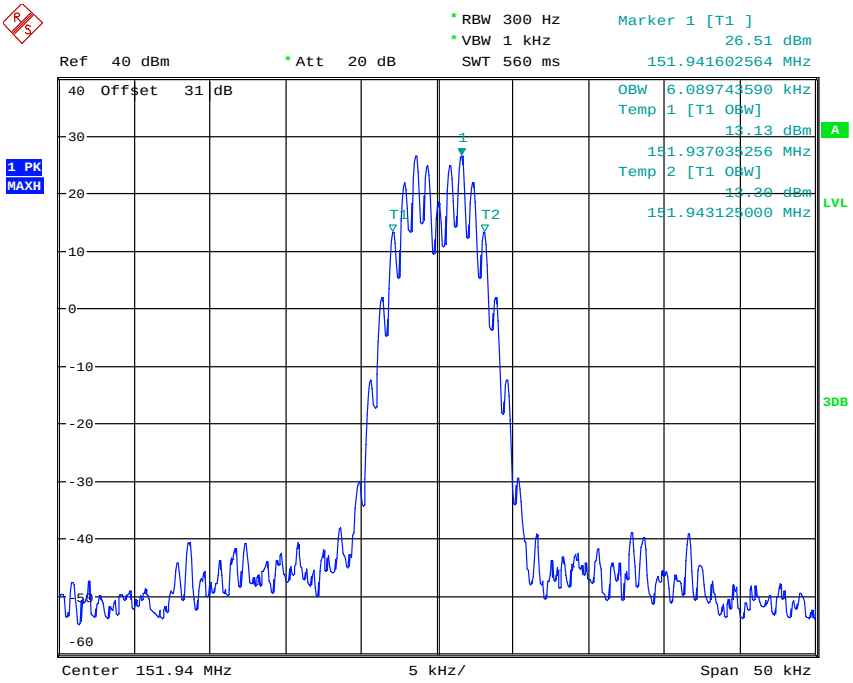
OCCUPIED BANDWIDTH 151.82MHZ

Date: 12.MAY.2015 13:26:58

Registration number: W6M21505-14999-C-95
FCC ID: IPH-0282320

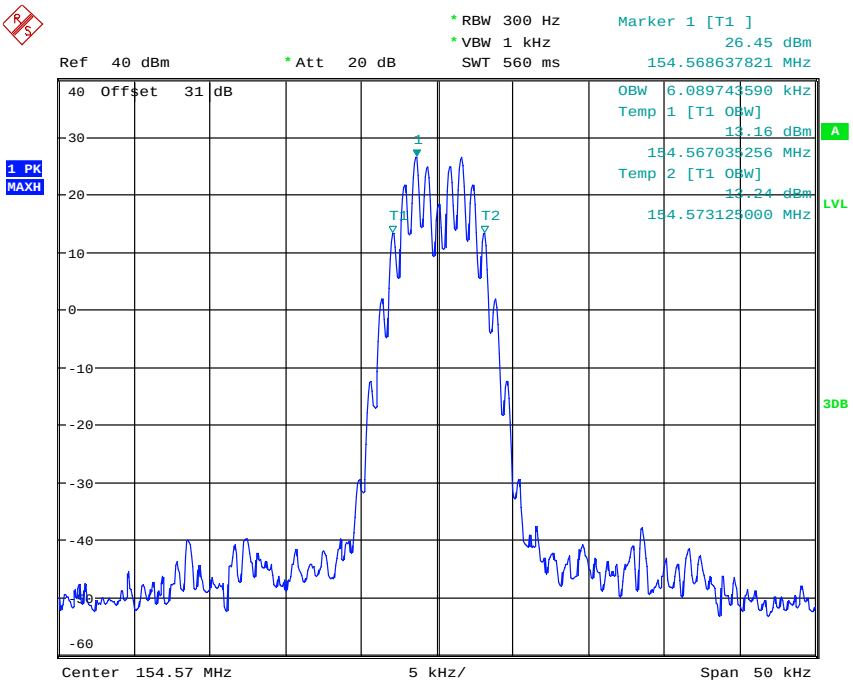


OCCUPIED BANDWIDTH 151.88MHZ
Date: 12.MAY.2015 13:30:59

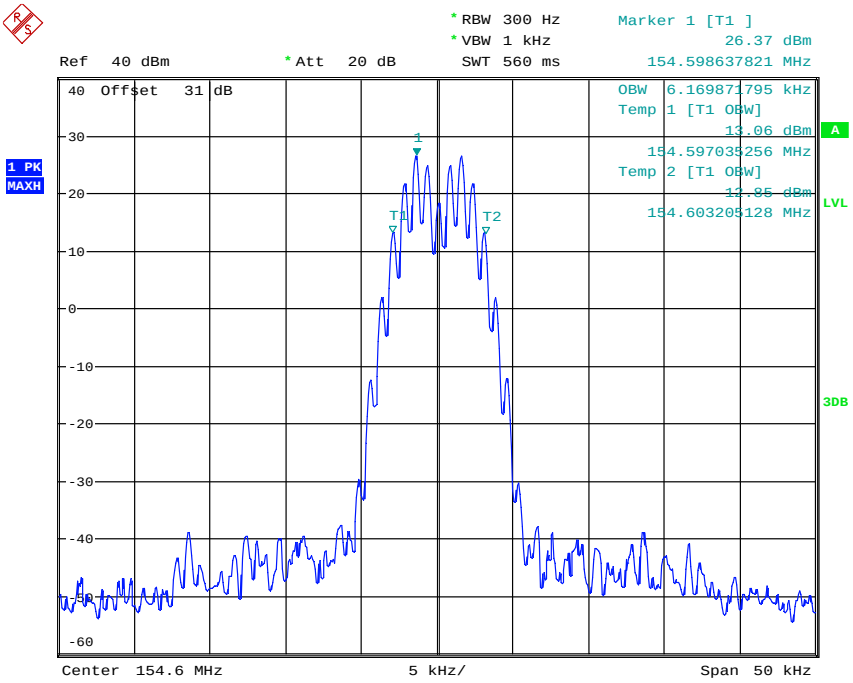


OCCUPIED BANDWIDTH 151.94MHZ
Date: 12.MAY.2015 13:31:38

Registration number: W6M21505-14999-C-95
FCC ID: IPH-0282320



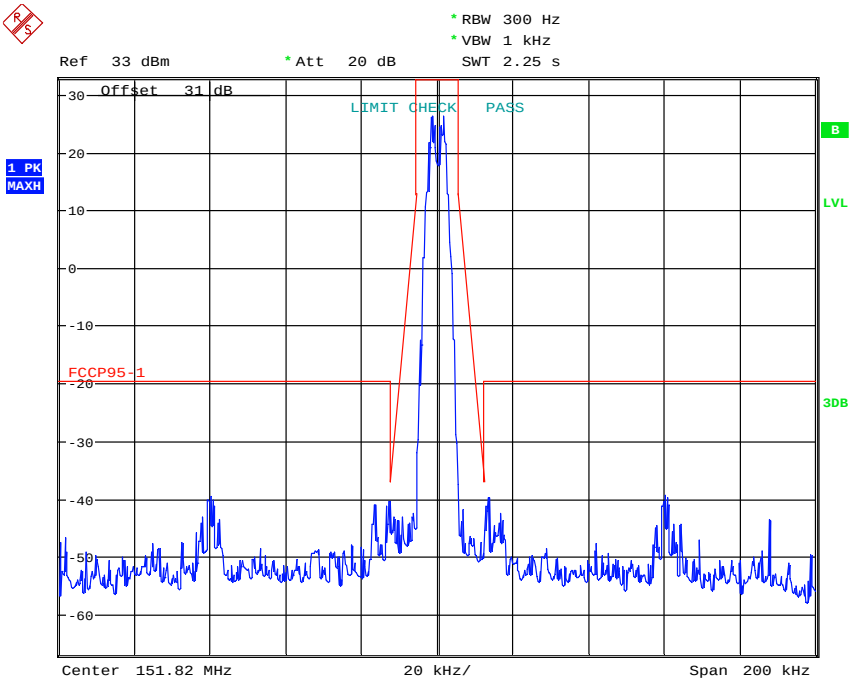
OCCUPIED BANDWIDTH 154.57MHZ
Date: 12.MAY.2015 13:34:18



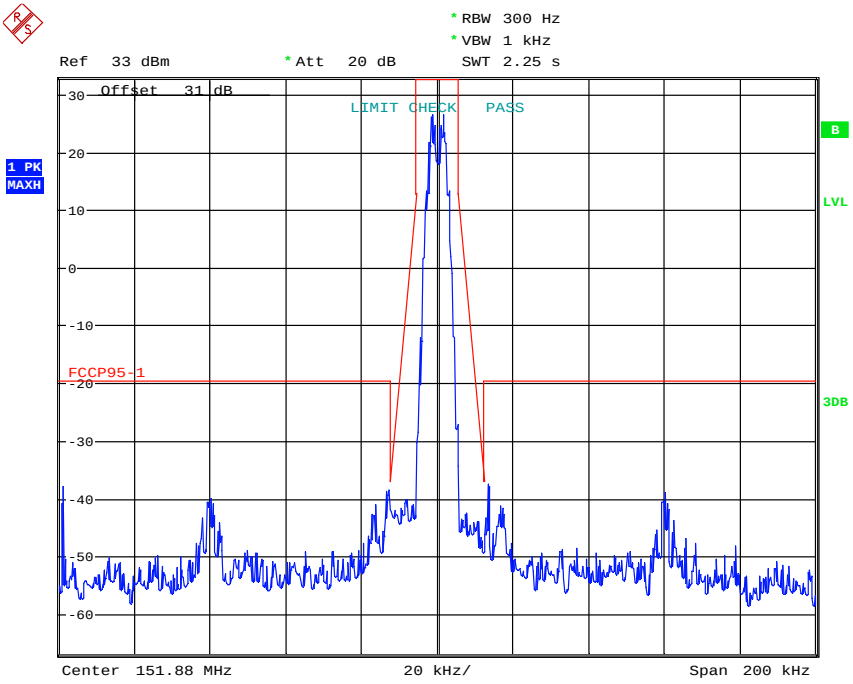
OCCUPIED BANDWIDTH 154.6MHZ
Date: 12.MAY.2015 13:34:48

Registration number: W6M21505-14999-C-95
FCC ID: IPH-0282320

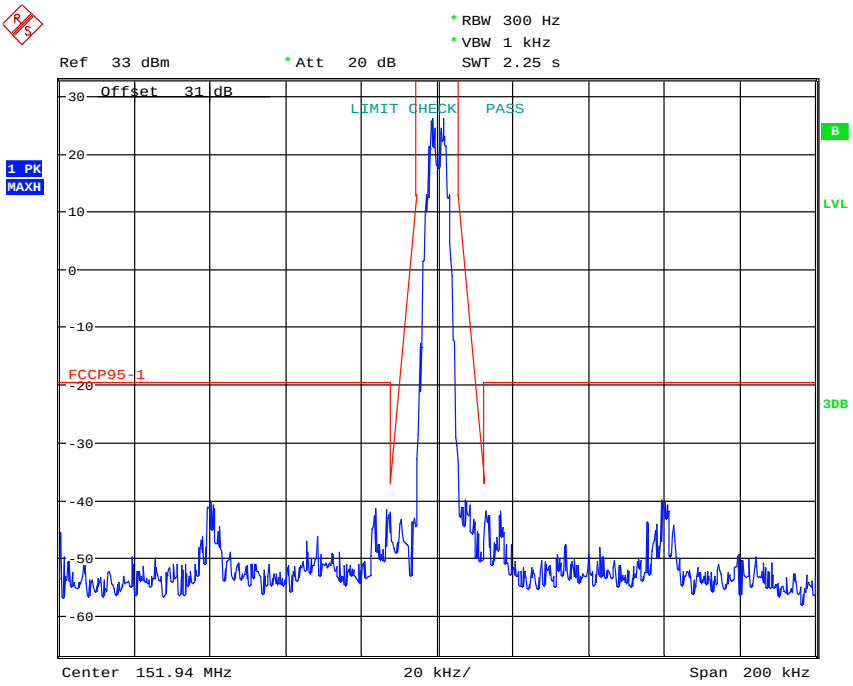
Emission Mask



EMISSION MASK 151.82MHZ
Date: 12.MAY.2015 13:29:20

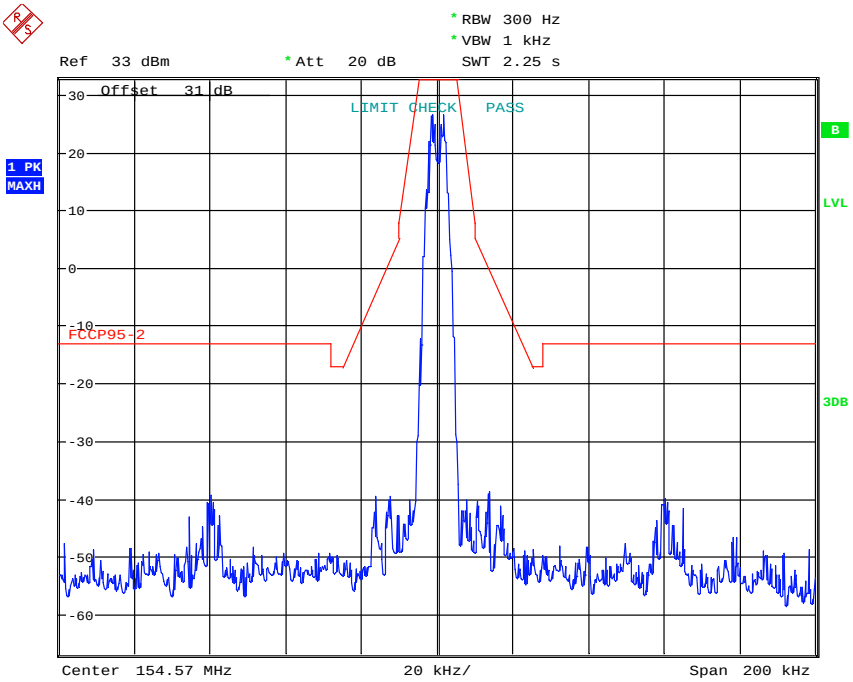


EMISSION MASK 151.88MHZ
Date: 12.MAY.2015 13:29:58



EMISSION MASK 151.94MHZ

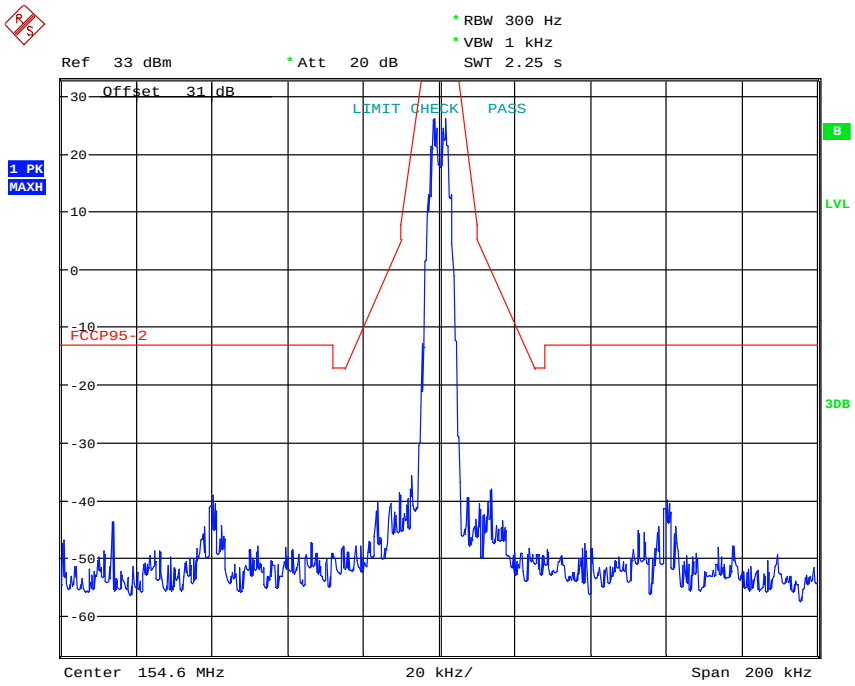
Date: 12.MAY.2015 13:32:08



EMISSION MASK 154.57MHZ

Date: 12.MAY.2015 13:33:46

Registration number: W6M21505-14999-C-95
FCC ID: IPH-0282320



EMISSION MASK 154.6MHZ
Date: 12.MAY.2015 13:35:28

8.2 Limit

Frequencies	Authorized bandwidth
151.820 MHz 151.880 MHz 151.940 MHz	11.25 kHz
154.570 and 154.60 MHz	20.0 kHz

Test equipment used: ETSTW-RE 055, ETSTW-RE 060

9. Radiated Spurious Emission, FCC 2.1053; 95.635

9.1 Test procedure

The EUT was positioned on a non-conductive turntable, 0.8m above the ground plane.
The radiated emission at the fundamental frequency was measured at 3 m distance with a test antenna and spectrum analyzer.
Worst case emission was recorded with the rotation of the turntable and the raising and lowering of the test antenna.
ERP was measured using a substitution method. The EUT was replaced by reference antenna connected to a signal generator.
The test of spurious radiated emission has been carried out with the validated test software. The measurements below 1GHz were performed with a measurement bandwidth of 100 kHz, above 1GHz with a bandwidth of 1MHz.
Spurious emission limits near the carrier are defined by a emission mask.

9.2 Test Results

The measurements of the spurious emission at the upper, center and lower channel, if applicable.
The measurement diagrams show that all significant spurious emissions are well below the limit line.

9.2.1 Spurious emission near the carrier:

The Results of Emission Mask: ☒ PASSED ☐ NOT PASSED

9.2.2 Spurious emission not near the carrier:

Model: 011-03820-42 Date: 2015/5/11~5/12
Mode: TX_151.82MHz Temperature: 27.8 °C Engineer: Mark
Polarization: Horizontal Humidity: 63.4 %

Frequency (MHz)	Reading (dBm) Peak	Factor (dB) Corr.	Result (dBm)	Limit (dBm)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
78.0361	-97.06	21.79	-75.27	-20.00	-55.27	150	150
97.7956	-99.45	21.31	-78.14	-20.00	-58.14	100	150
302.6051	-39.25	-10.88	-50.13	-20.00	-30.13	240	150
607.2145	-51.93	-5.45	-57.38	-20.00	-37.38	150	150
1817.6350	-51.69	0.77	-50.92	-20.00	-30.92	170	150
1973.9480	-52.04	2.64	-49.40	-20.00	-29.40	200	150

Registration number: W6M21505-14999-C-95
FCC ID: IPH-0282320

Polarization: Vertical

Frequency (MHz)	Reading (dBm) Peak	Factor (dB) Corr.	Result (dBm)	Limit (dBm)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
85.5311	-91.89	21.70	-70.19	-20.00	-50.19	180	150
172.7455	-102.47	22.44	-80.03	-20.00	-60.03	250	150
302.6053	-19.86	-7.69	-27.55	-20.00	-7.55	170	150
607.2145	-34.97	-5.61	-40.58	-20.00	-20.58	240	150
1060.1200	-46.97	0.13	-46.84	-20.00	-26.84	100	150
1517.0340	-48.79	0.54	-48.25	-20.00	-28.25	80	150

Mode: TX_151.94MHz
Polarization: Horizontal

Frequency (MHz)	Reading (dBm) Peak	Factor (dB) Corr.	Result (dBm)	Limit (dBm)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
78.7175	-93.40	21.77	-71.63	-20.00	-51.63	170	150
88.5973	-93.60	21.40	-72.20	-20.00	-52.20	240	150
302.6053	-39.03	-10.88	-49.91	-20.00	-29.91	170	150
607.2145	-52.79	-5.45	-58.24	-20.00	-38.24	150	150
1667.3350	-51.73	1.54	-50.19	-20.00	-30.19	170	150
1973.9480	-52.37	3.39	-48.98	-20.00	-28.98	250	150

Polarization: Vertical

Frequency (MHz)	Reading (dBm) Peak	Factor (dB) Corr.	Result (dBm)	Limit (dBm)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
84.8498	-90.31	21.70	-68.61	-20.00	-48.61	140	150
163.2064	-102.56	22.25	-80.31	-20.00	-60.31	270	150
302.6051	-21.17	-7.69	-28.86	-20.00	-8.86	170	150
607.2145	-36.19	-5.61	-41.80	-20.00	-21.80	20	150
1060.1200	-44.16	0.13	-44.03	-20.00	-24.03	140	150
1517.0340	-47.25	0.54	-46.71	-20.00	-26.71	100	150

Mode: TX_154.6MHz
Polarization: Horizontal

Frequency (MHz)	Reading (dBm) Peak	Factor (dB) Corr.	Result (dBm)	Limit (dBm)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
77.6954	-98.50	21.80	-76.70	-20.00	-56.70	170	150
97.7956	-98.94	21.31	-77.63	-20.00	-57.63	280	150
309.0181	-44.40	-10.69	-55.09	-20.00	-35.09	140	150
462.9260	-48.19	-9.38	-57.57	-20.00	-37.57	210	150
1697.3950	-50.00	0.65	-49.35	-20.00	-29.35	170	150
2010.0200	-50.76	3.03	-47.73	-20.00	-27.73	150	150

Polarization: Vertical

Frequency (MHz)	Reading (dBm) Peak	Factor (dB) Corr.	Result (dBm)	Limit (dBm)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
82.1243	-92.82	21.68	-71.14	-20.00	-51.14	140	150
165.9320	-102.22	22.31	-79.91	-20.00	-59.91	240	150
309.0181	-28.42	-7.96	-36.38	-20.00	-16.38	170	150
618.4370	-35.12	-5.34	-40.46	-20.00	-20.46	240	150
1697.3950	-50.48	2.29	-48.19	-20.00	-28.19	180	150
2010.0200	-48.62	3.99	-44.63	-20.00	-24.63	50	150

Note:

1. **Correction Factor = Antenna Gain + Cable Loss + Amplifier Gain**
2. **The formula of measured value as: Test Result = Reading + Correction Factor**
3. **Detector function in the form : PK = Peak, AV = Average**
4. **All not in the table noted test results are more than 20 dB below the relevant limits.**
5. **Measurement uncertainty: 30-200MHz：±2.84 dB, 200-1000MHz：±2.84 dB, 1-18GHz：±3.31 dB Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.**
6. **See the attached diagram as appendix.**

Test equipment used: ETSTW-RE 004, ETSTW-RE 122, ETSTW-RE 030,
ETSTW-RE 042, ETSTW-RE 043, ETSTW-RE 044

9.3 Explanation of test result

The measurements of the spurious emissions at the equipment output terminals were performed pursuant to the test procedure above in order to verify that any emissions are below the limits given by § 95.635(e).

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.

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

9.4 Limits

For transmitters designed to operate in the MURS, transmitters shall comply with the following:

Frequency	Mask with audio low pass filter	Mask without audio low pass filter
151.820 MHz, 151.880 MHz and 151.940 MHz.....	(1)	(1)
154.570 MHz and 154.600 MHz	(2)	(3)

(1) Emission Mask 1—For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows: (i) On any frequency from the center of the authorized bandwidth foto 5.625 kHz removed from f_o: Zero dB. (ii) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5.625 kHz but no more than 12.5 kHz: at least 7.27(f_d-2.88 kHz) dB. (iii) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 12.5 kHz: at least 50 + 10 log (P) dB or 70 dB, whichever is the lesser attenuation. (2) Emission Mask 2—For transmitters designed to operate with a 25 kHz channel bandwidth that are equipped with an audio low-pass filter, the power of any emission must be below the unmodulated carrier power (P) as follows: (i) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: at least 25 dB. (ii) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: at least 35 dB. (iii) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: at least 43 + 10 log (P) dB. (3) Emission Mask 3—For transmitters designed to operate with a 25 kHz channel bandwidth that are not equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier output power (P) as follows: (i) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5 kHz, but not more than 10 kHz: at least 83 log (f_d/5) dB. (ii) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 10 kHz, but not more than 250 percent of the authorized band-width: at least 29 log (f_d^2/11) dB or 50 dB, whichever is the lesser attenuation. (iii) On any frequency removed from the center of the authorized bandwidth by more than 250 percent of the authorized bandwidth: at least 43 + 10 log (P) dB.

The compliance limit was calculated as the following table:

151.820 MHz, 151.880 MHz and 151.940 MHz

Maximum transmitter output power	32.94 dBm
Required attenuation	50 + 10 x Log(1.9679) = 52.94 dBm
Maximum transmitter output power Required attenuation Compliance limit	32.94 dBm 52.94 dB -20 dBm

154.570 MHz and 154.600 MHz

Maximum transmitter output power	32.91 dBm
Required attenuation	43 + 10 x Log(1.9543) = 45.91 dBm
Maximum transmitter output power Required attenuation Compliance limit	32.91 dBm 45.91 dB -13 dBm

10. Frequency Stability vs. Temperature, FCC 2.1055, 95.632

10.1 Test procedure

The equipment under test was connected to an external DC power supply and the RF output was connected to a frequency counter via feed through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable, exited the chamber through an opening made for that purpose.
After the temperature stabilized the frequency output was recorded from the counter.

10.2 Test Results

151.82 MHz

Temperature(℃)	Frequency(MHz)	Error(kHz)	Error(ppm)
-30	151.8200481	0.048077	0.3166711
-20	151.8200481	0.048077	0.3166711
-10	151.8200641	0.064103	0.4222303
0	151.8200962	0.096154	0.6333421
+10	151.8200962	0.096154	0.6333421
+20	151.8201282	0.128205	0.844454
+30	151.8201282	0.128205	0.844454
+40	151.8200962	0.096154	0.6333421
+50	151.8201122	0.112179	0.7388947

151.94 MHz

Temperature(℃)	Frequency(MHz)	Error(kHz)	Error(ppm)
-30	151.9400321	0.032051	0.2109451
-20	151.9400321	0.032051	0.2109451
-10	151.9400481	0.048077	0.316421
0	151.9400962	0.096154	0.6328419
+10	151.9400801	0.080128	0.5273661
+20	151.9401122	0.112179	0.7383112
+30	151.9401122	0.112179	0.7383112
+40	151.9401122	0.112179	0.7383112
+50	151.9401122	0.112179	0.7383112

154.60 MHz

Temperature(℃)	Frequency(MHz)	Error(kHz)	Error(ppm)
-30	154.6000321	0.032051	0.2073157
-20	154.6000321	0.032051	0.2073157
-10	154.600016	0.016026	0.1036611
0	154.6000962	0.096154	0.6219534
+10	154.6000641	0.064103	0.4146378
+20	154.6001122	0.112179	0.725608
+30	154.6001122	0.112179	0.725608
+40	154.6000962	0.096154	0.6219534
+50	154.6000962	0.096154	0.6219534

10.3 Limits:

According to FCC 95.632(c), MURS transmitters must maintain a frequency stability of 5.0 ppm, or 2.0 ppm if designed to operate with a 6.25 kHz bandwidth.

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

11. Frequency Stability vs. Voltage, FCC 2.1055 (d) ; 95.632

11.1 Test procedure

An external variable DC power supply was connected to the battery terminals of the equipment under test.
For hand carried, battery powered equipment primary supply voltage was reduced to the battery operating end point as specified by the manufacturer. The output frequency was recorded for each battery voltage.

11.2 Test Results

151.82 MHz

Voltage	Frequency(MHz)	Error(kHz)	Error(ppm)
Norm	151.8201282	0.128205	0.844454
3.145 V	151.8201282	0.128205	0.844454
4.255 V	151.8201282	0.128205	0.844454

151.94 MHz

Voltage	Frequency(MHz)	Error(kHz)	Error(ppm)
Norm	151.9401122	0.112179	0.7383112
3.145 V	151.9401122	0.112179	0.7383112
4.255 V	151.9401122	0.112179	0.7383112

154.60 MHz

Voltage	Frequency(MHz)	Error(kHz)	Error(ppm)
Norm	154.6001122	0.112179	0.725608
3.145 V	154.6001122	0.112179	0.725608
4.255 V	154.6001122	0.112179	0.725608

11.3 Limits:

According to FCC 95.632(c), MURS transmitters must maintain a frequency stability of 5.0 ppm, or 2.0 ppm if designed to operate with a 6.25 kHz bandwidth.

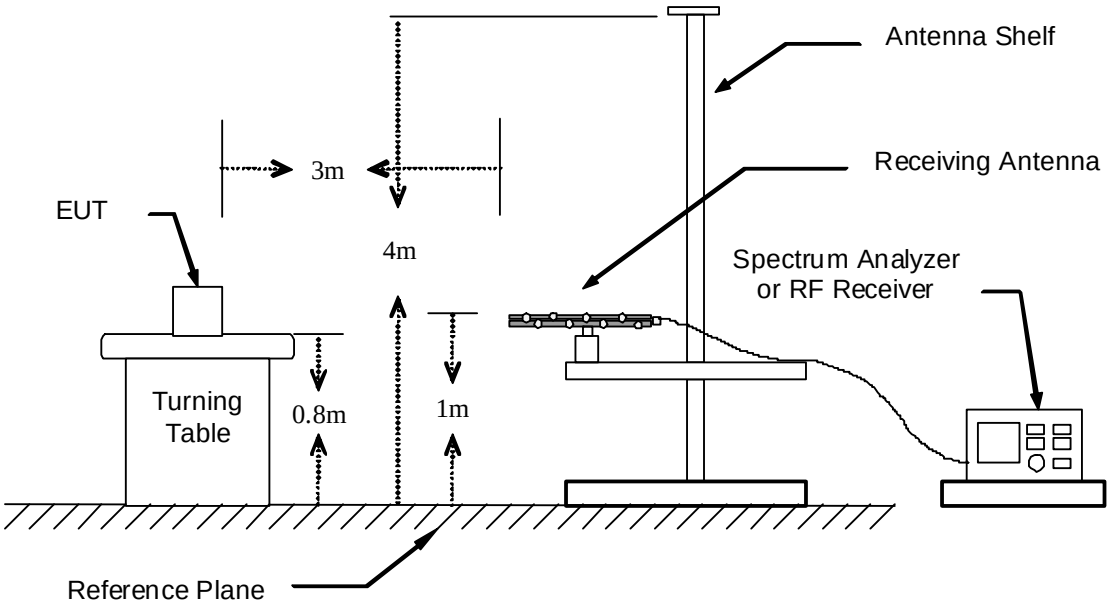
Test equipment used: ETSTW-RE 055

12. Receiver Radiated Spurious Emission

12.1 Test Procedures

1. Configure the EUT according to ANSI C63.4.
2. The EUT was placed on the top of the turn table 0.8 meter above ground.
3. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turn table.
4. Power on the EUT and all the supporting units.
5. The turn table was rotated 360 degrees to determine the position of the highest radiation.
6. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emission field strength of both horizontal and vertical polarization.
7. For each suspected emission, the antenna tower was scan (from 1 M to 4 M) and then the turn table was rotated (from 0 degree to 360 degrees) to find the maximum reading.
8. Adjust the spectrum analyzer for the following settings:
   - Resolution Bandwidth = 100 kHz for spurious emissions below 1 GHz and 1 MHz for spurious emissions above 1GHz.
   - Video Bandwidth = 100 kHz for spurious emissions below 1 GHz, and 1 MHz for spurious emissions above 1 GHz.
   - Sweep Speed slow enough to maintain measurement calibration.
   - Detector Mode = Positive Peak.

12.2 Test Setup



12.3 Test Result

Model: 011-03820-42 Date: 2015/5/24
Mode: RX_151.82MHz Temperature: 24 °C Engineer: Leon
Polarization: Horizontal Humidity: 60 %

Frequency (MHz)	Reading (dBuV)	Detector	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
47.4950	9.18	peak	14.77	23.95	40.00	-16.05	185	100
107.7555	8.30	peak	12.85	21.15	43.50	-22.35	60	100
150.5210	5.82	peak	15.50	21.32	43.50	-22.18	110	100
797.8357	6.77	peak	26.57	33.34	46.00	-12.66	135	100

Frequency	Reading (dBuV)		Factor (dB)	Result (dBuV/m)		Limit (dBuV/m)		Margin	Table Degree	Ant. High
(MHz)	Peak	Ave.	Corr.	Peak	Ave.	Peak	Ave	(dB)	(Deg.)	(cm)
1028.0560	45.38	---	-7.08	38.30	---	74.00	54.00	-35.70	25	100
2486.9740	46.46	---	-3.90	42.56	---	74.00	54.00	-31.44	140	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	22.73	peak	14.56	37.29	40.00	-2.71	65	100
103.8676	14.28	peak	12.14	26.42	43.50	-17.08	110	100
148.5772	6.37	peak	15.49	21.86	43.50	-21.64	170	100
166.0721	7.16	peak	15.25	22.41	43.50	-21.09	35	100

Frequency	Reading (dBuV)		Factor (dB)	Result (dBuV/m)		Limit (dBuV/m)		Margin	Table Degree	Ant. High
(MHz)	Peak	Ave.	Corr.	Peak	Ave.	Peak	Ave	(dB)	(Deg.)	(cm)
1028.0560	44.95	---	-7.08	37.87	---	74.00	54.00	-36.13	175	100
4478.9580	44.25	---	0.92	45.17	---	74.00	54.00	-28.83	80	100

Mode: RX_151.94MHz
Polarization: Horizontal

Frequency (MHz)	Reading (dBuV)	Detector	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
47.4950	9.18	peak	14.77	23.95	40.00	-16.05	150	100
107.7555	8.30	peak	12.85	21.15	43.50	-22.35	95	100
416.8337	4.44	peak	19.19	23.63	46.00	-22.37	70	100
607.3347	5.32	peak	23.57	28.89	46.00	-17.11	115	100

Frequency	Reading (dBuV)		Factor (dB)	Result (dBuV/m)		Limit (dBuV/m)		Margin	Table Degree	Ant. High
(MHz)	Peak	Ave.	Corr.	Peak	Ave.	Peak	Ave	(dB)	(Deg.)	(cm)
1028.0560	44.88	---	-7.08	37.80	---	74.00	54.00	-36.20	90	100
1813.6270	46.80	---	-7.10	39.70	---	74.00	54.00	-34.30	155	100

Registration number: W6M21505-14999-C-95
FCC ID: IPH-0282320

Polarization: Vertical

Frequency (MHz)	Reading (dBuV)	Detector	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
49.4388	22.26	peak	14.65	36.91	40.00	-3.09	80	100
103.8676	14.78	peak	12.14	26.92	43.50	-16.58	235	100
166.0721	7.66	peak	15.25	22.91	43.50	-20.59	110	100
739.5190	5.87	peak	25.78	31.65	46.00	-14.35	145	100

Frequency	Reading (dBuV)		Factor (dB)	Result (dBuV/m)		Limit (dBuV/m)		Margin	Table Degree	Ant. High
(MHz)	Peak	Ave.	Corr.	Peak	Ave.	Peak	Ave	(dB)	(Deg.)	(cm)
1028.0560	43.95	---	-7.08	36.87	---	74.00	54.00	-37.13	95	100
1561.1220	44.03	---	-8.22	35.81	---	74.00	54.00	-38.19	130	100

Mode: RX_154.6MHz
Polarization: Horizontal

Frequency (MHz)	Reading (dBuV)	Detector	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
47.4950	9.18	peak	14.77	23.95	40.00	-16.05	210	100
107.7555	7.80	peak	12.85	20.65	43.50	-22.85	90	100
150.5210	5.82	peak	15.50	21.32	43.50	-22.18	175	100
517.9158	5.70	peak	21.32	27.02	46.00	-18.98	110	100

Frequency	Reading (dBuV)		Factor (dB)	Result (dBuV/m)		Limit (dBuV/m)		Margin	Table Degree	Ant. High
(MHz)	Peak	Ave.	Corr.	Peak	Ave.	Peak	Ave	(dB)	(Deg.)	(cm)
1028.0560	45.38	---	-7.08	38.30	---	74.00	54.00	-35.70	85	100
2430.8620	45.75	---	-4.01	41.74	---	74.00	54.00	-32.26	130	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	22.73	peak	14.56	37.29	40.00	-2.71	110	100
49.4388	22.76	peak	14.65	37.41	40.00	-2.59	85	100
103.8676	13.78	peak	12.14	25.92	43.50	-17.58	145	100
166.0721	6.66	peak	15.25	21.91	43.50	-21.59	70	100

Frequency	Reading (dBuV)		Factor (dB)	Result (dBuV/m)		Limit (dBuV/m)		Margin	Table Degree	Ant. High
(MHz)	Peak	Ave.	Corr.	Peak	Ave.	Peak	Ave	(dB)	(Deg.)	(cm)
1028.0560	45.45	---	-7.08	38.37	---	74.00	54.00	-35.63	210	100
4254.5090	44.29	---	0.45	44.74	---	74.00	54.00	-29.26	145	100

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FCC ID: IPH-0282320

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. Measurement uncertainty for 3m measurement: 30-1000 MHz = ± 4.32 dB, 1-18 GHz = ± 4.95 dB, 18-40 GHz= ± 2.94 dB ; Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.**
5. **See attached diagrams in appendix.**

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

Test equipment used: ETSTW-RE 004, ETSTW-RE 030, ETSTW-RE 042,
ETSTW-RE 043, ETSTW-RE 044, ETSTW-RE 122

13. Maximum Permissible Exposure

13.1 Applicable Standard

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2 m normally can be maintained between the user and the device.

13.2 MPE Calculation Method

(A) Limits for Occupational/Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $\|E\|^2$, $\|H\|^2$ or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	($900/f^2$)*	6
30-300	61.4	0.163	1.0	6
300-1500	--	--	f/300	6
1500-100,000	--	--	5	6

(B) Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $\|E\|^2$, $\|H\|^2$ or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	($180/f^2$)*	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30

f = frequency in MHz *Plane-wave equivalent power density

$$E\ (V/m) = \frac{\sqrt{30 \times P \times G}}{d} \qquad \text{Power Density: } Pd\ (W/m^2) = \frac{E^2}{377}$$

E = Electric field (V/m) P = output power (W) G = EUT Antenna numeric gain (numeric)
d = Separation distance between radiator and human body (m)
The formula can be changed to

$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$

Max output power (W)	Antenna Gain	Power Density(S) (mW/cm²)	Limit of Power Density (S) (mW/cm²)	Test Result
1.9679	-6	0.10	0.2	Complies

From the peak EUT RF output power, the minimum mobile separation distance, d=0.2 m, as well as the gain of the used antenna, the RF power density can be obtained.

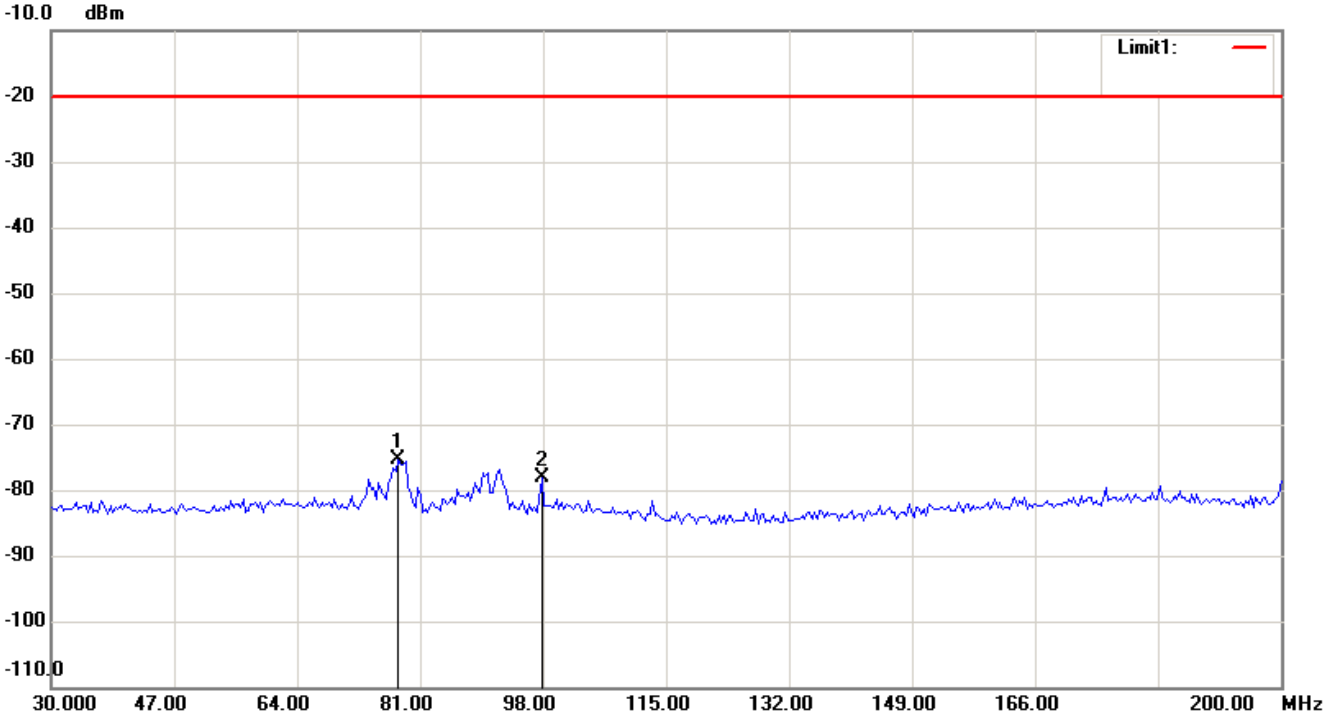
Appendix

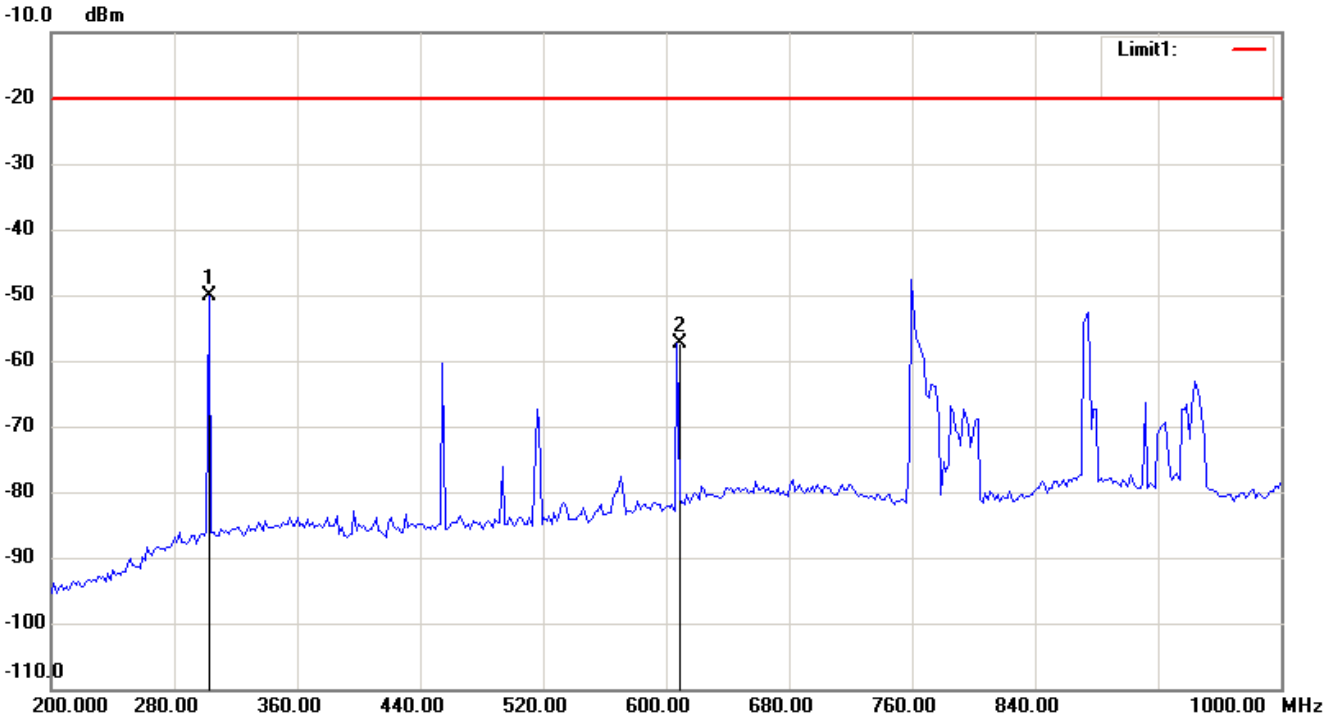
Measurement diagrams

Radiation Spurious Emission

Registration number: W6M21505-14999-C-95
FCC ID: IPH-0282320

Radiated Emission
TX_ 151.82MHz
Antenna Polarization H

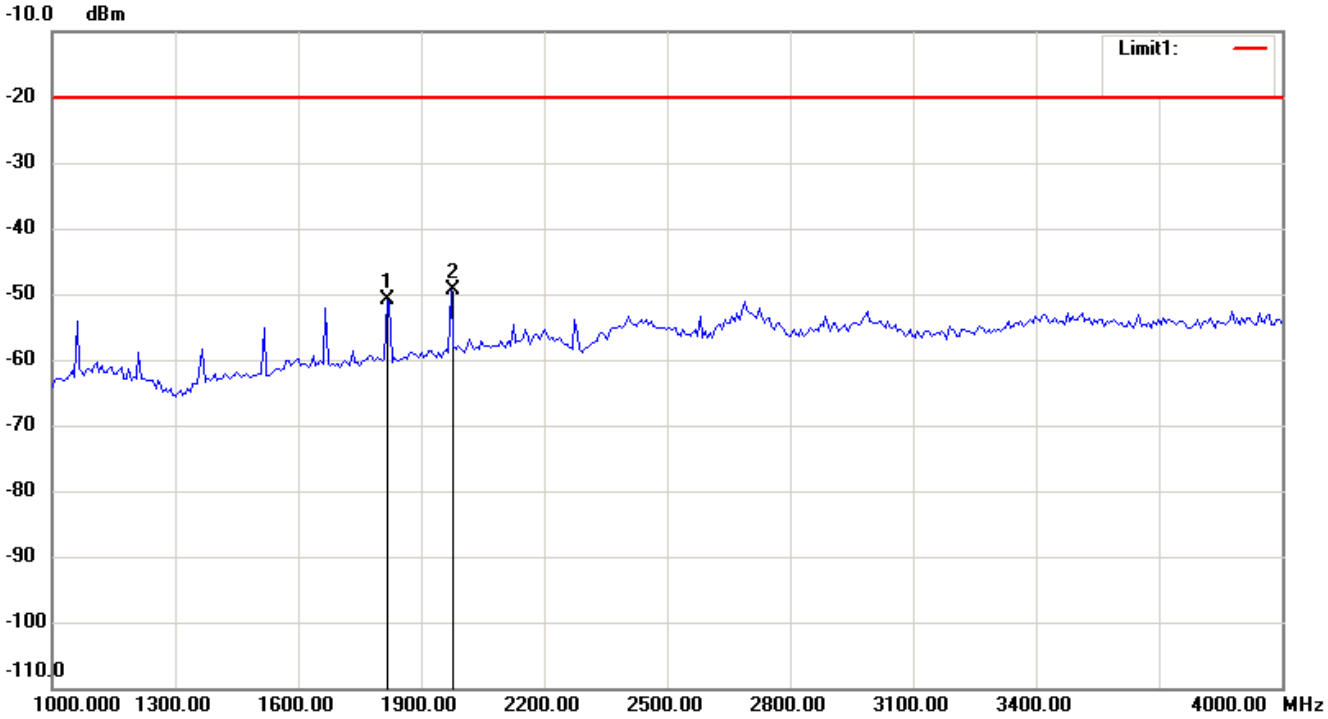




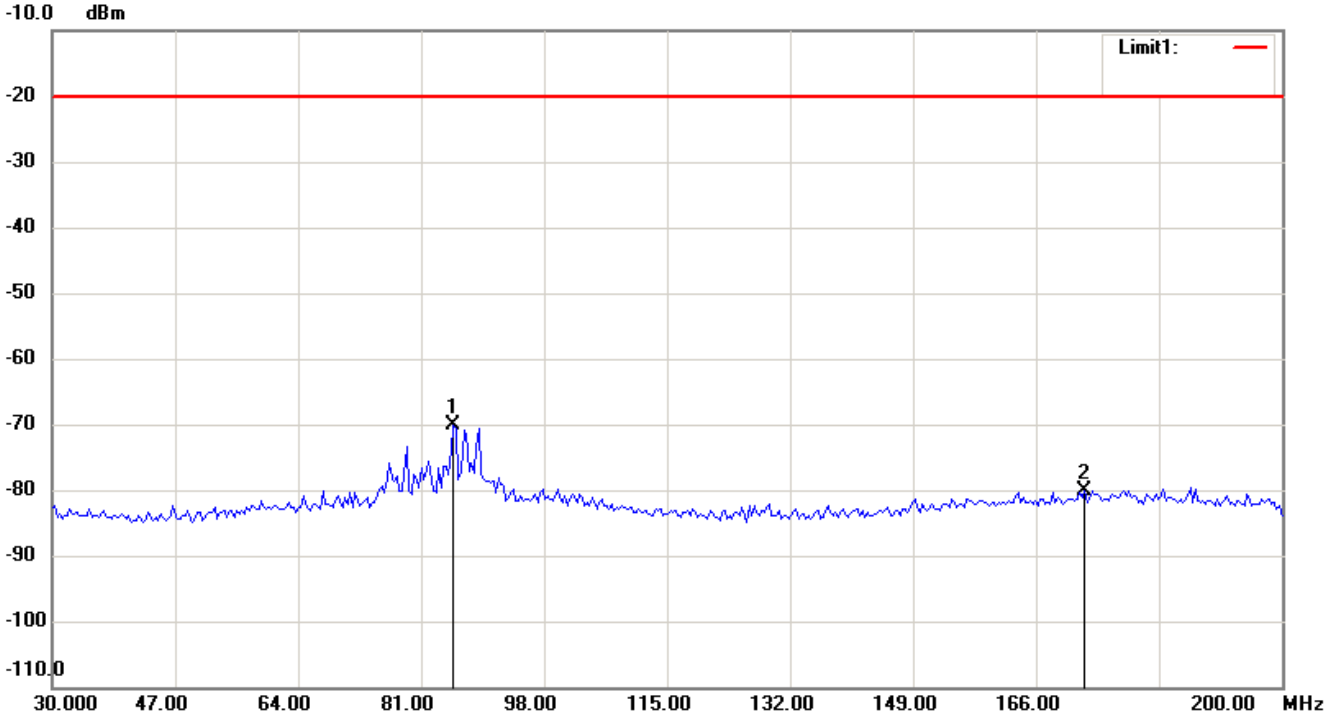
Up Line: Peak Limit Line Down Line: Ave Limit Line
Note:

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: W6M21505-14999-C-95
FCC ID: IPH-0282320



Antenna Polarization V



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.**
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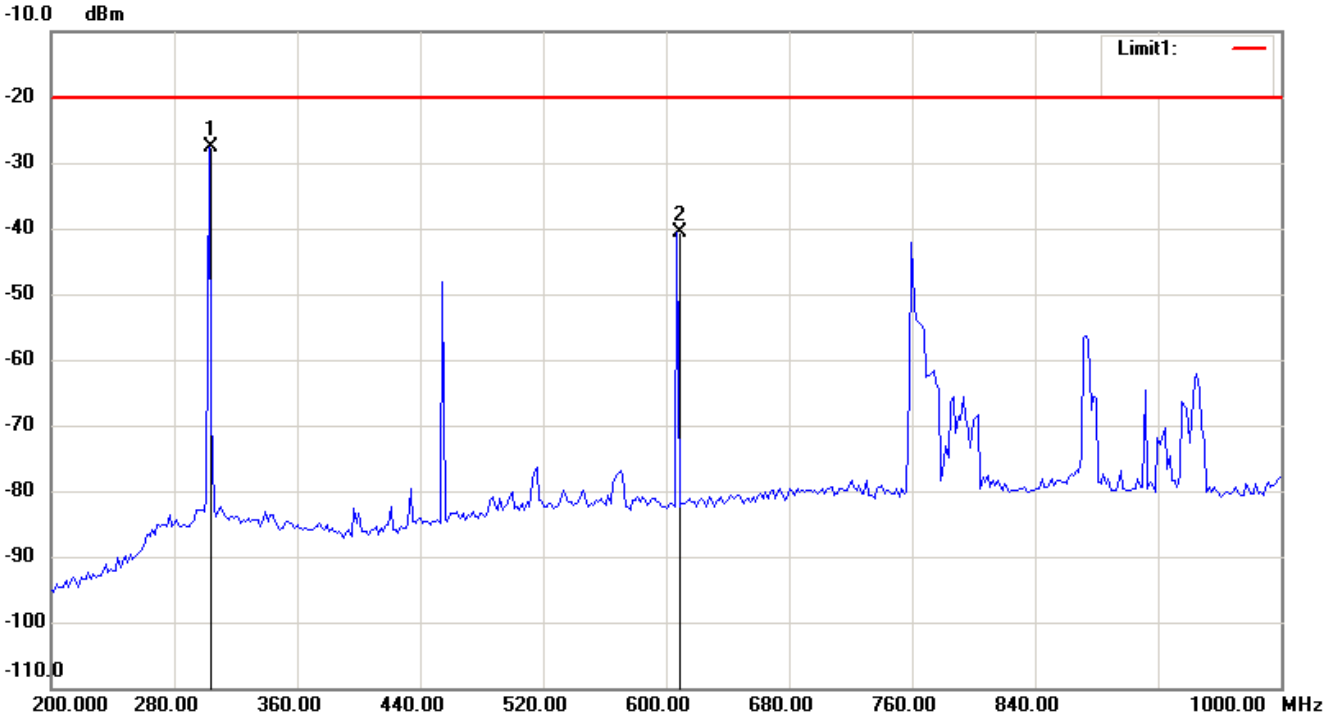
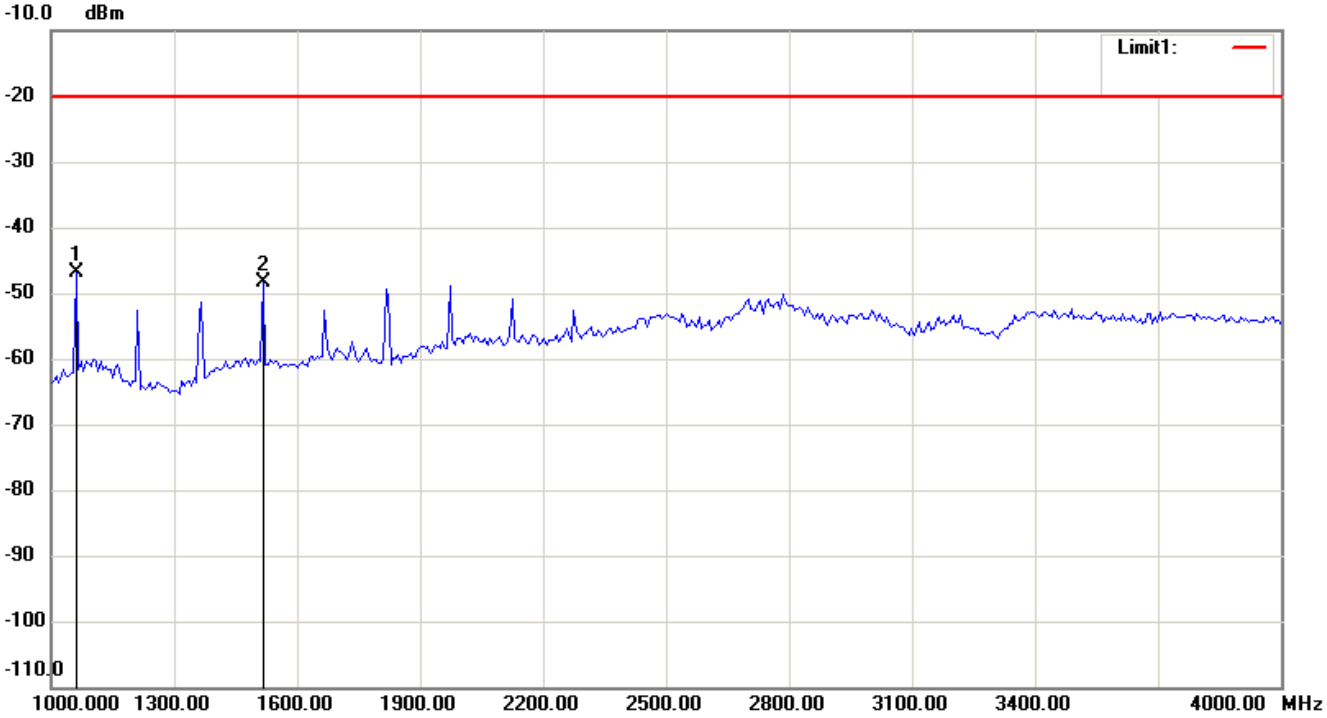
Registration number: W6M21505-14999-C-95
FCC ID: IPH-0282320





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

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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.**
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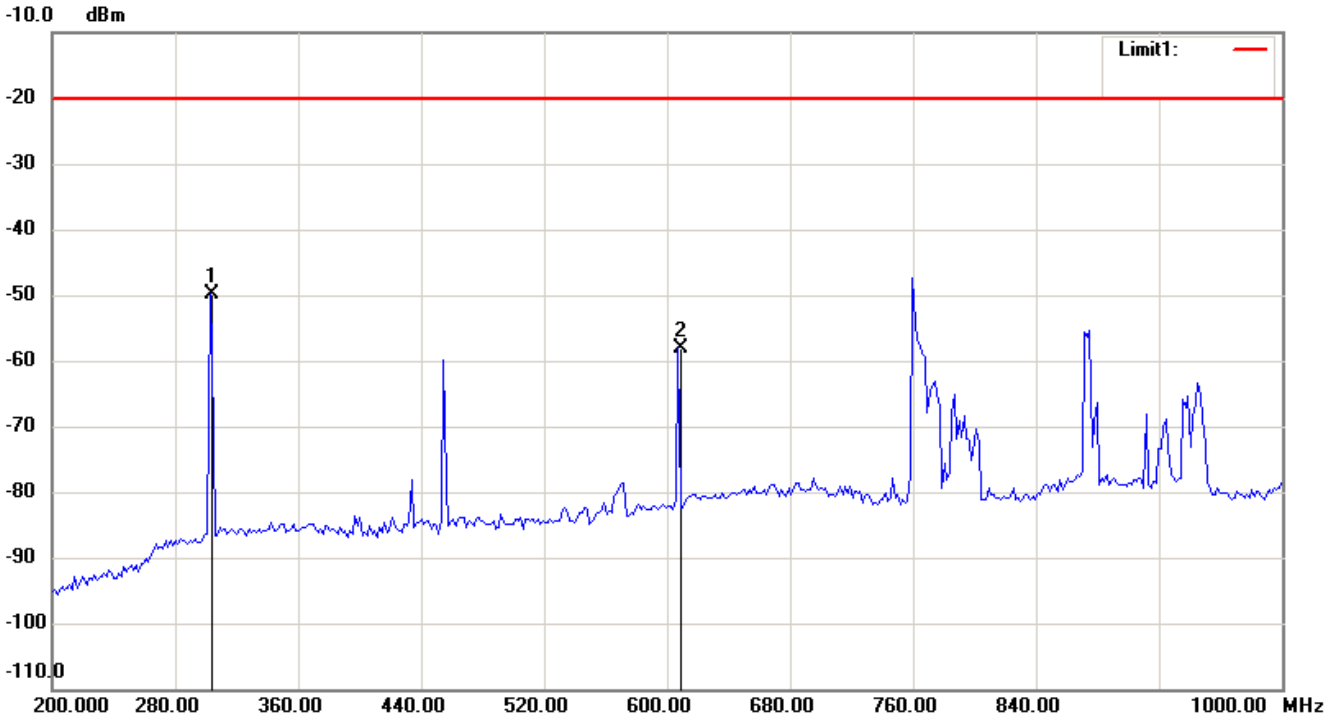
Registration number: W6M21505-14999-C-95
FCC ID: IPH-0282320

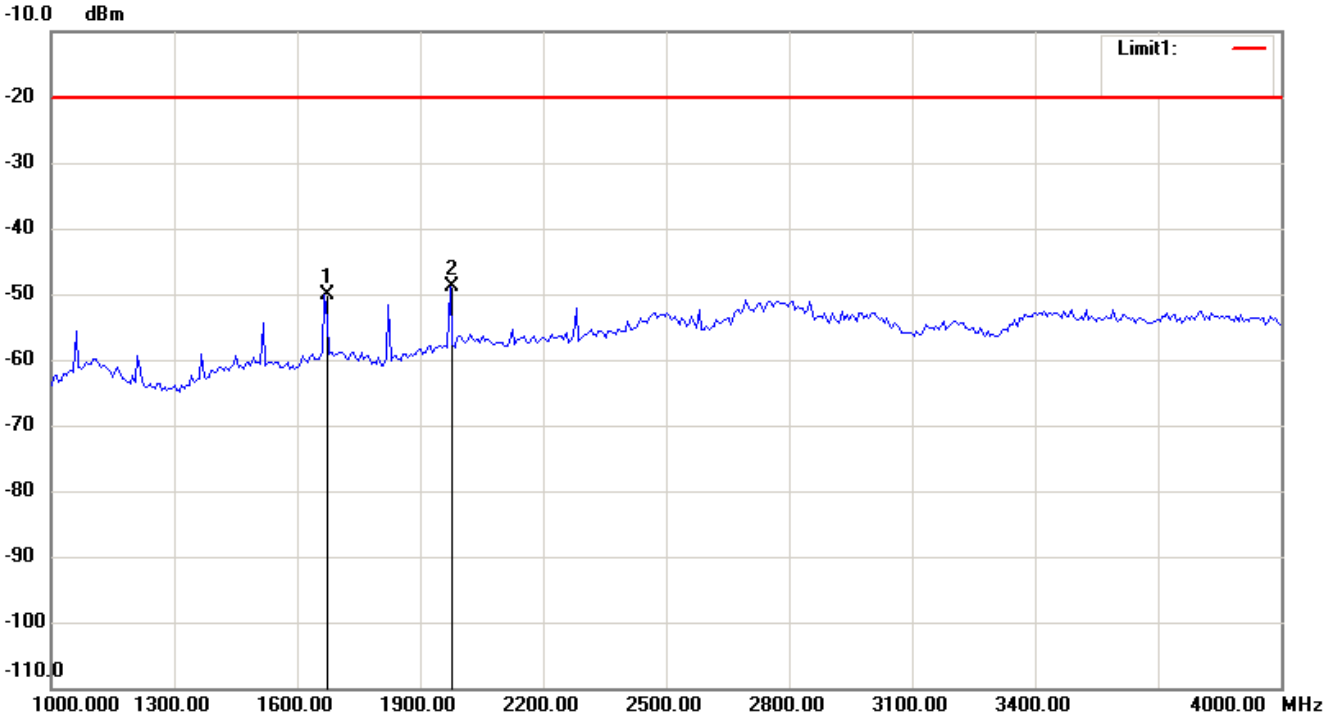
TX_ 151.94MHz
Antenna Polarization H



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: W6M21505-14999-C-95
FCC ID: IPH-0282320

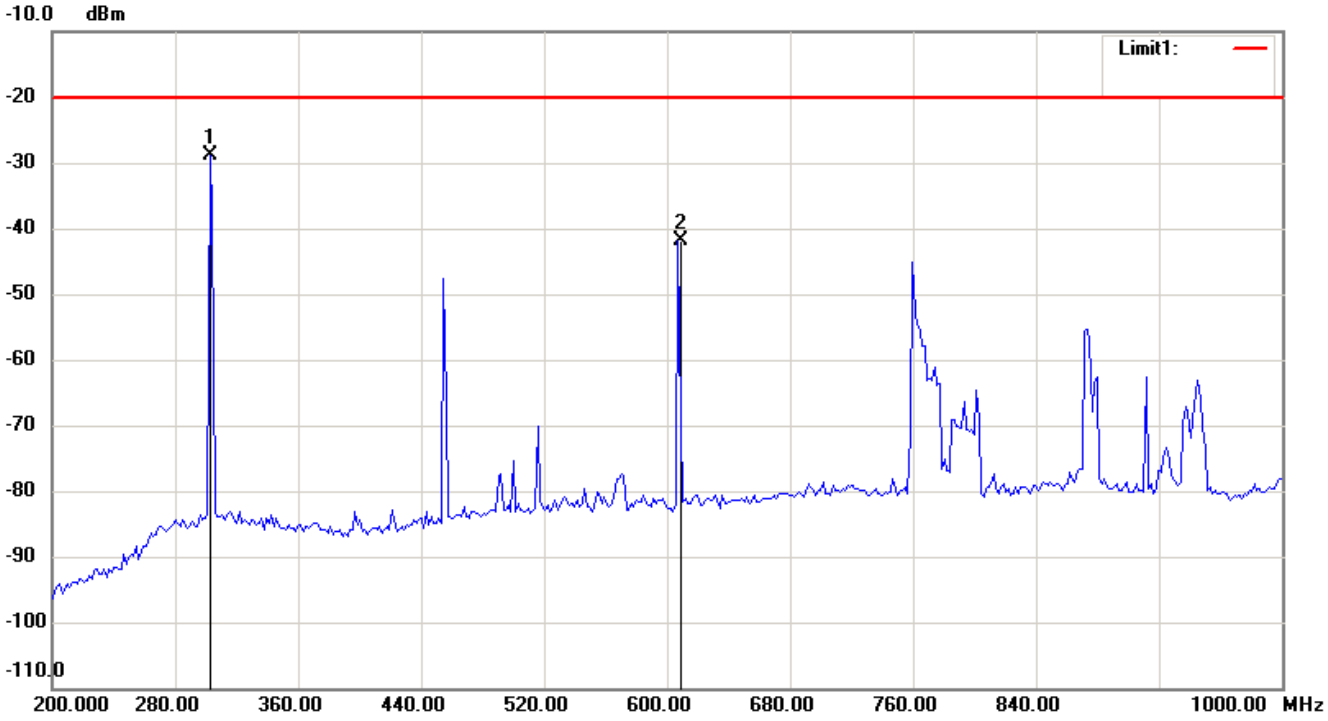


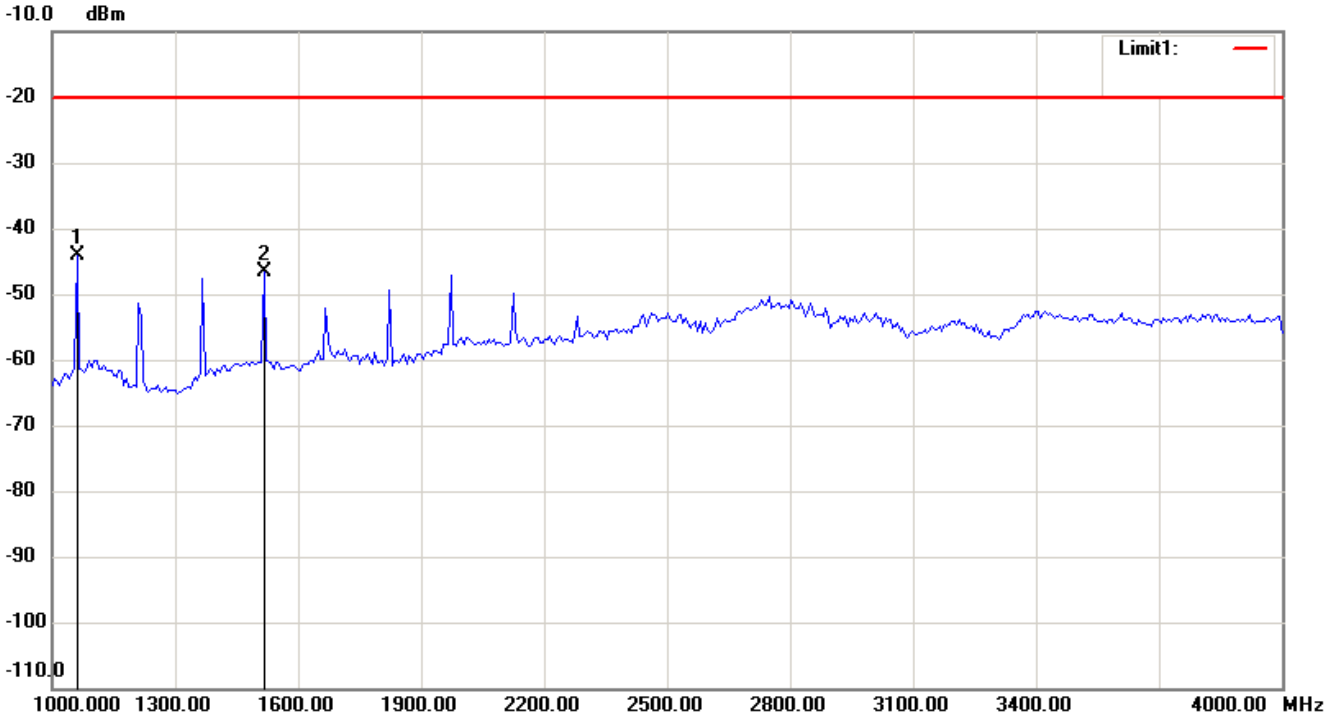
Antenna Polarization V

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: W6M21505-14999-C-95
FCC ID: IPH-0282320



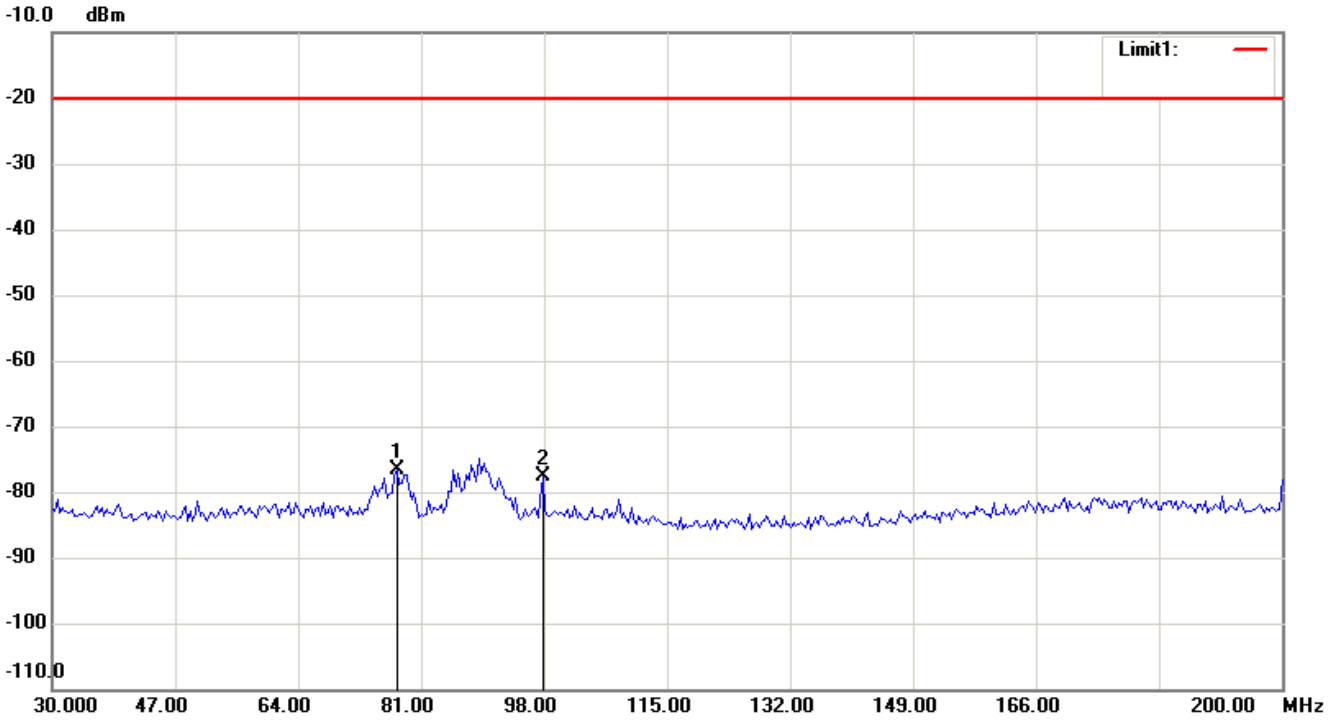


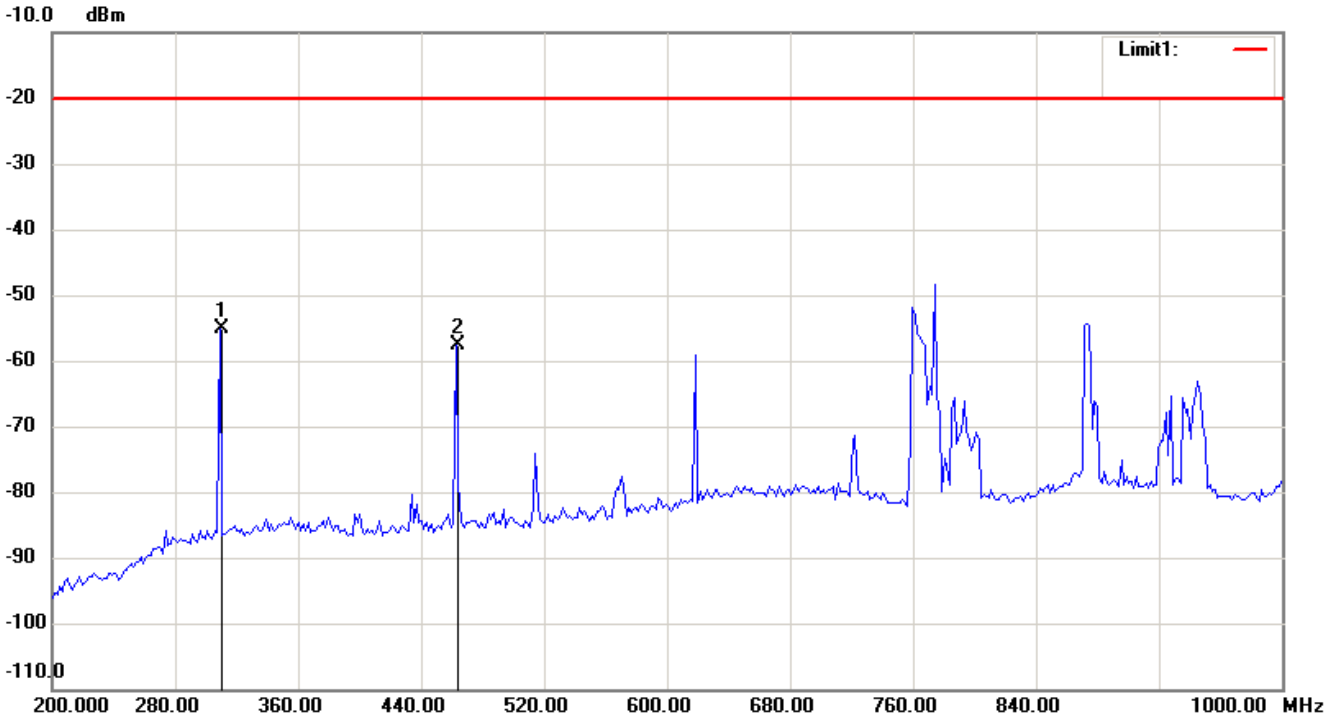
Up Line: Peak Limit Line Down Line: Ave Limit Line
Note:

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: W6M21505-14999-C-95
FCC ID: IPH-0282320

TX_ 154.6MHz
Antenna Polarization H

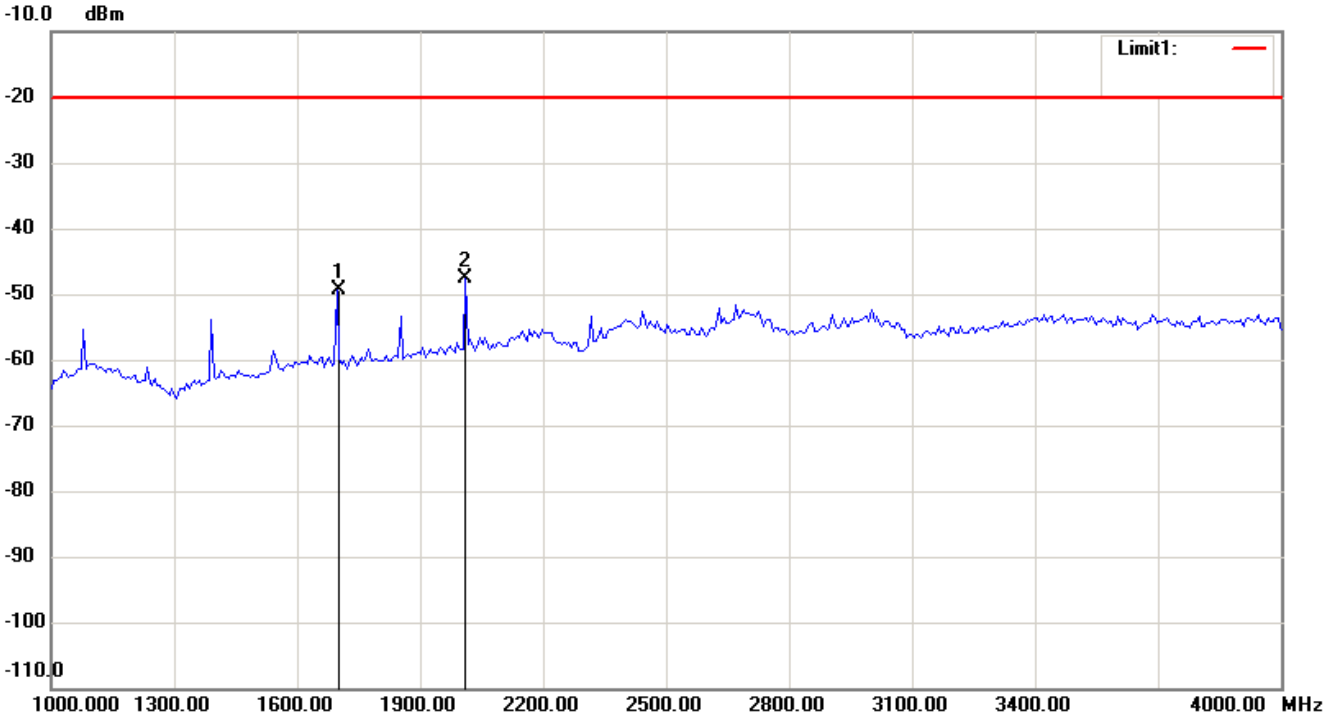




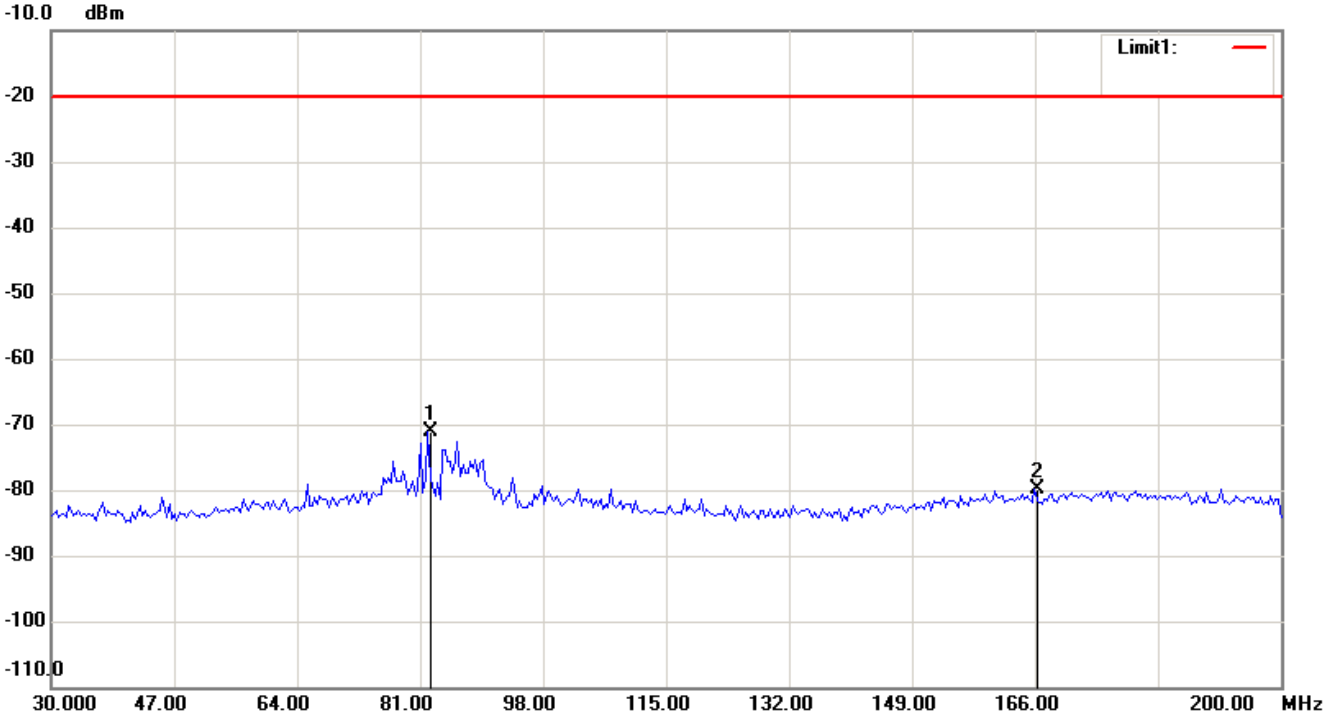
Up Line: Peak Limit Line Down Line: Ave Limit Line
Note:

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: W6M21505-14999-C-95
FCC ID: IPH-0282320



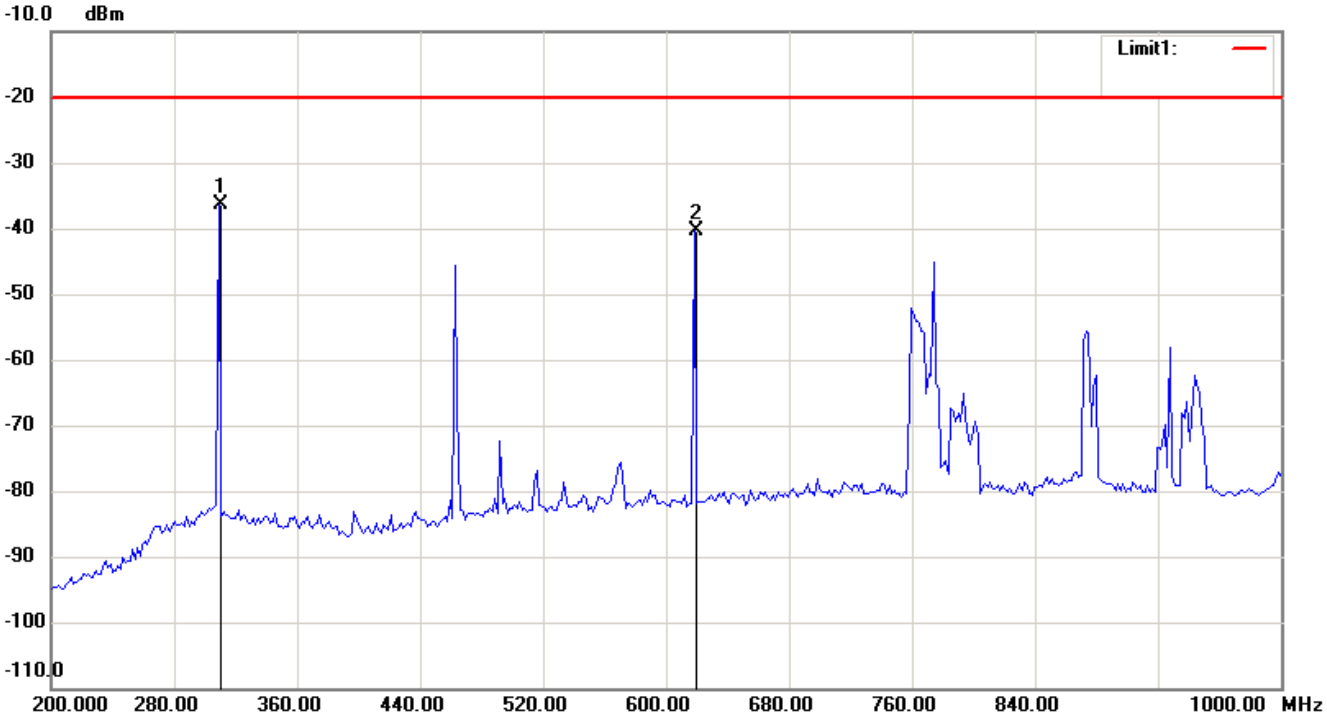
Antenna Polarization V

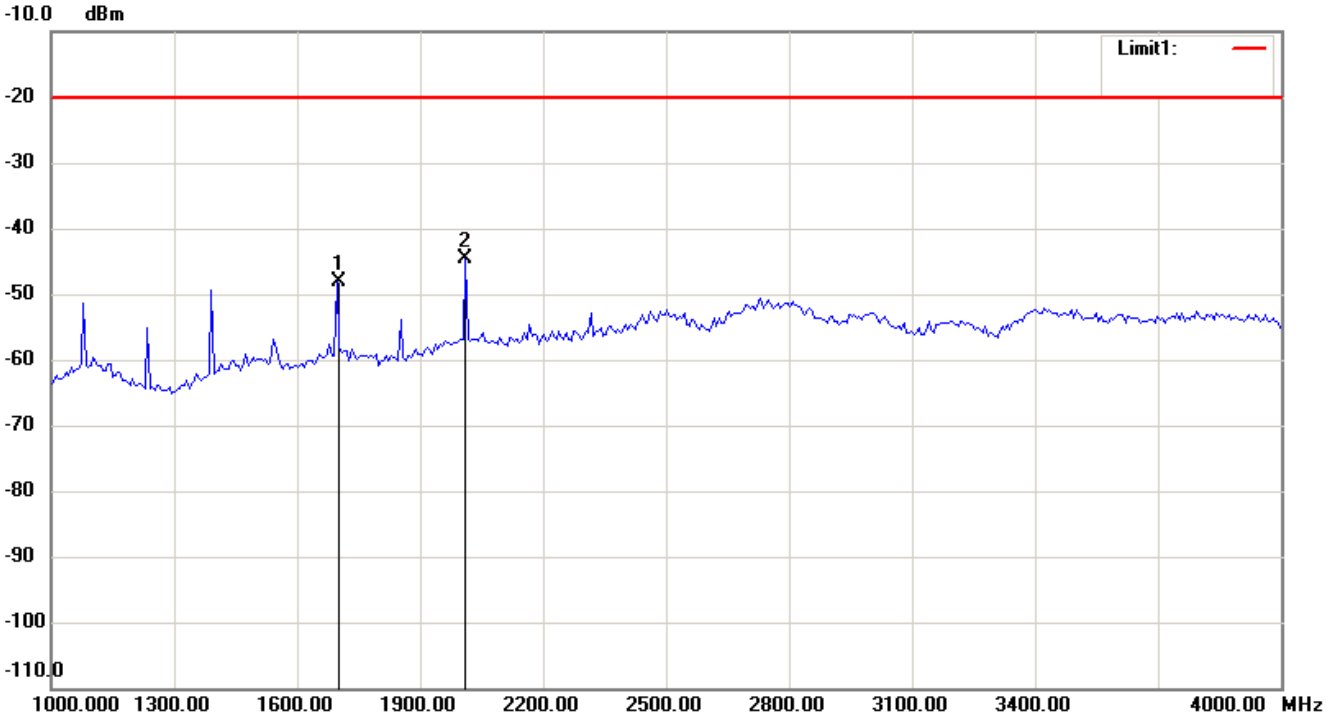


Up Line: Peak Limit Line Down Line: Ave Limit Line
Note:

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: W6M21505-14999-C-95
FCC ID: IPH-0282320



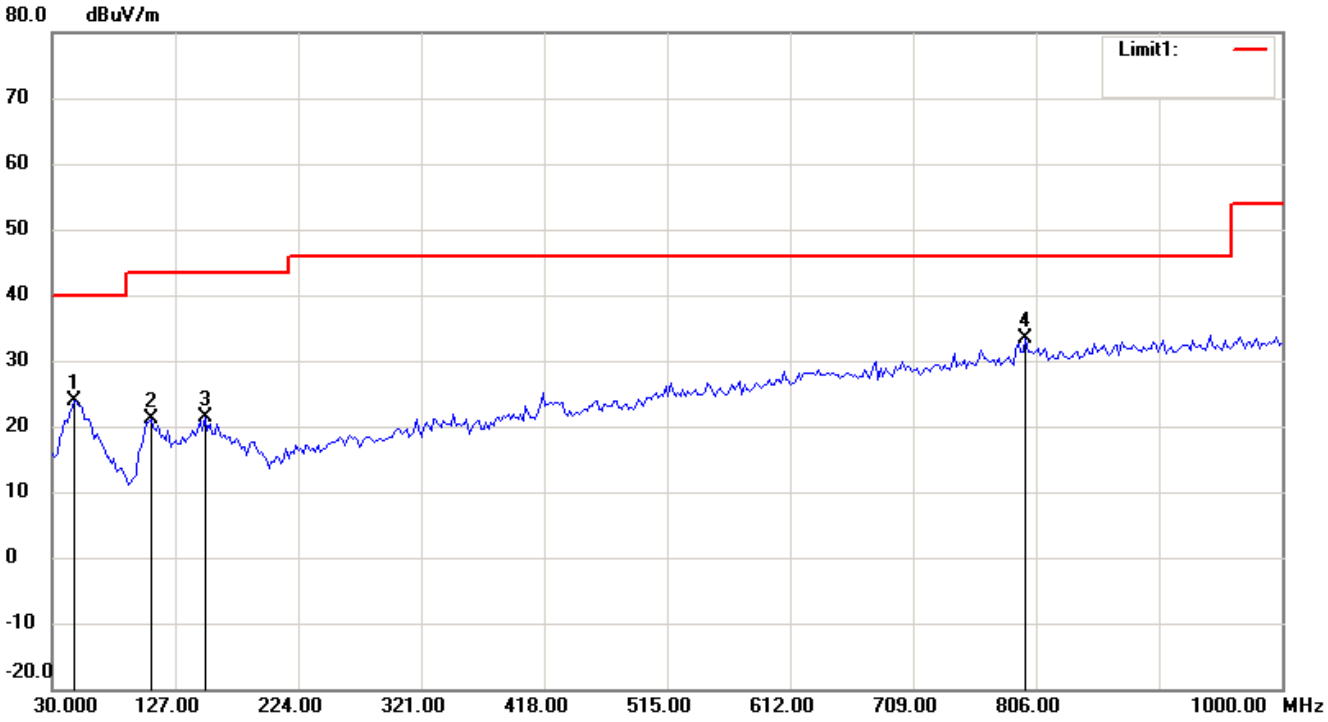


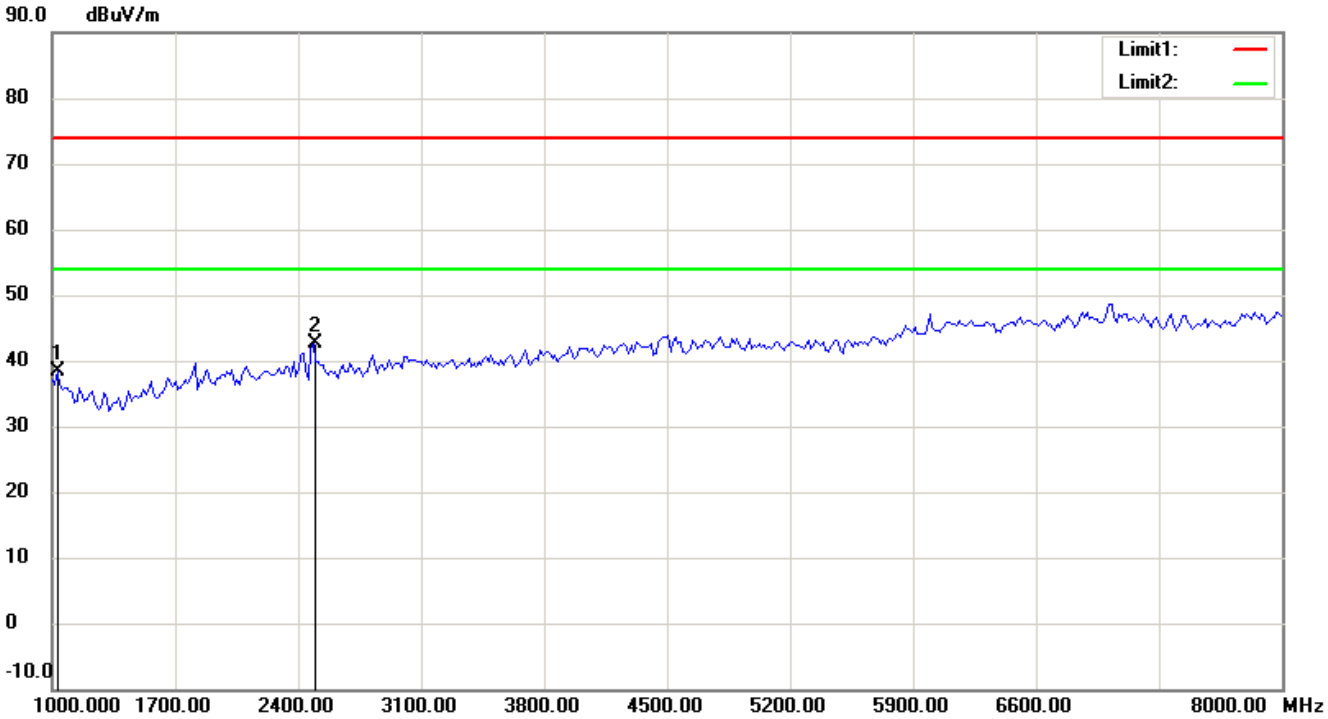
Up Line: Peak Limit Line Down Line: Ave Limit Line
Note:

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: W6M21505-14999-C-95
FCC ID: IPH-0282320

RX_ 151.82MHz
Antenna Polarization H

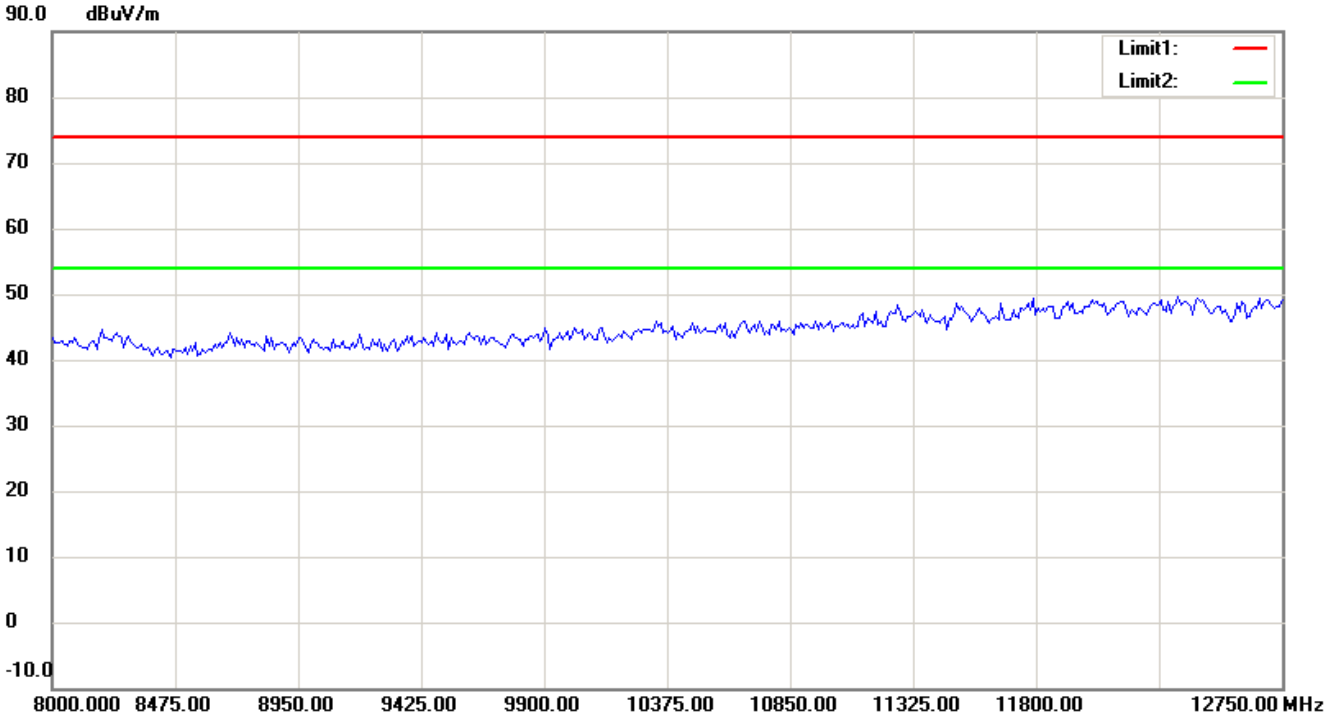


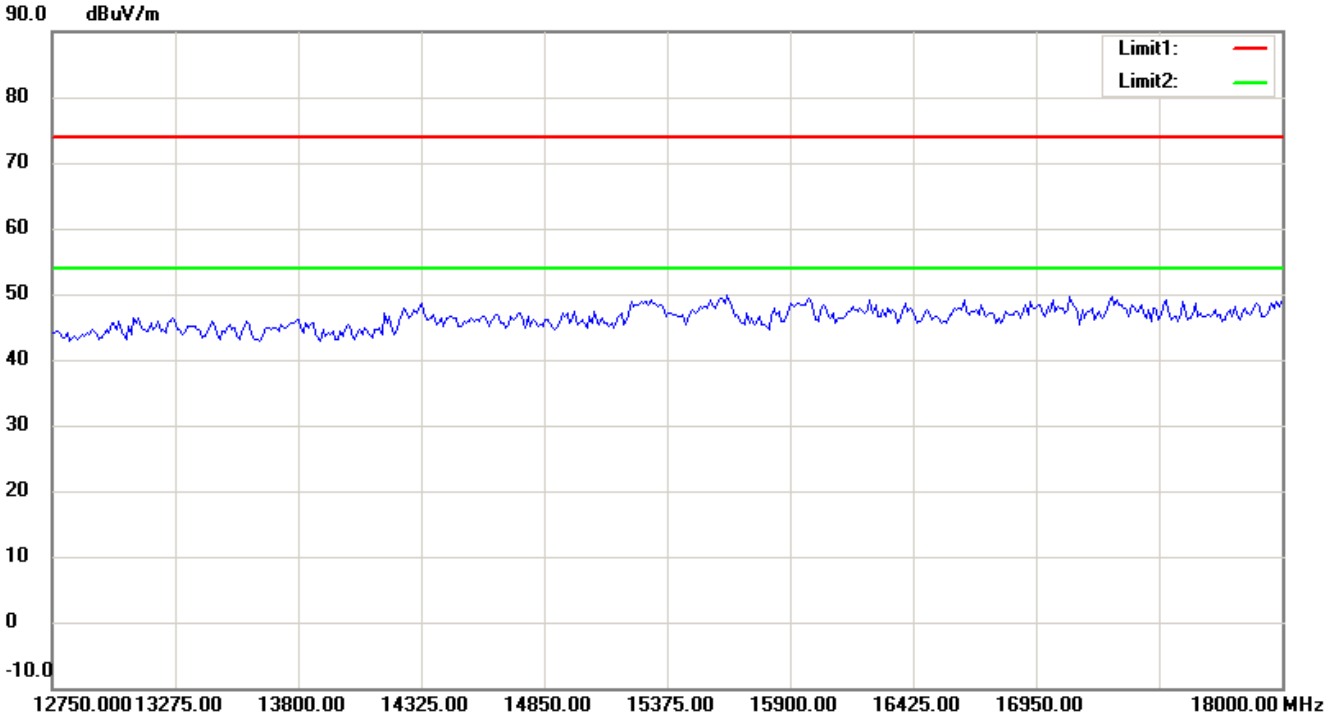


Up Line: Peak Limit Line Down Line: Ave Limit Line
Note:

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: W6M21505-14999-C-95
FCC ID: IPH-0282320

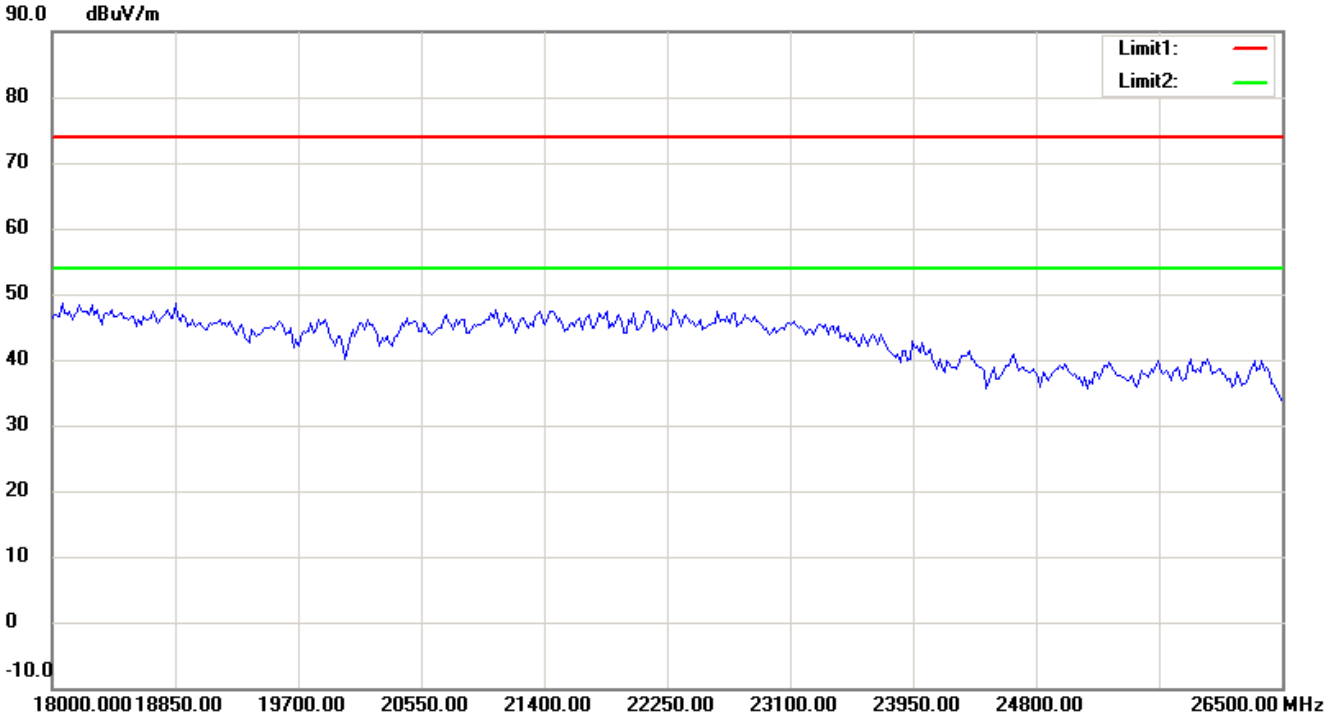




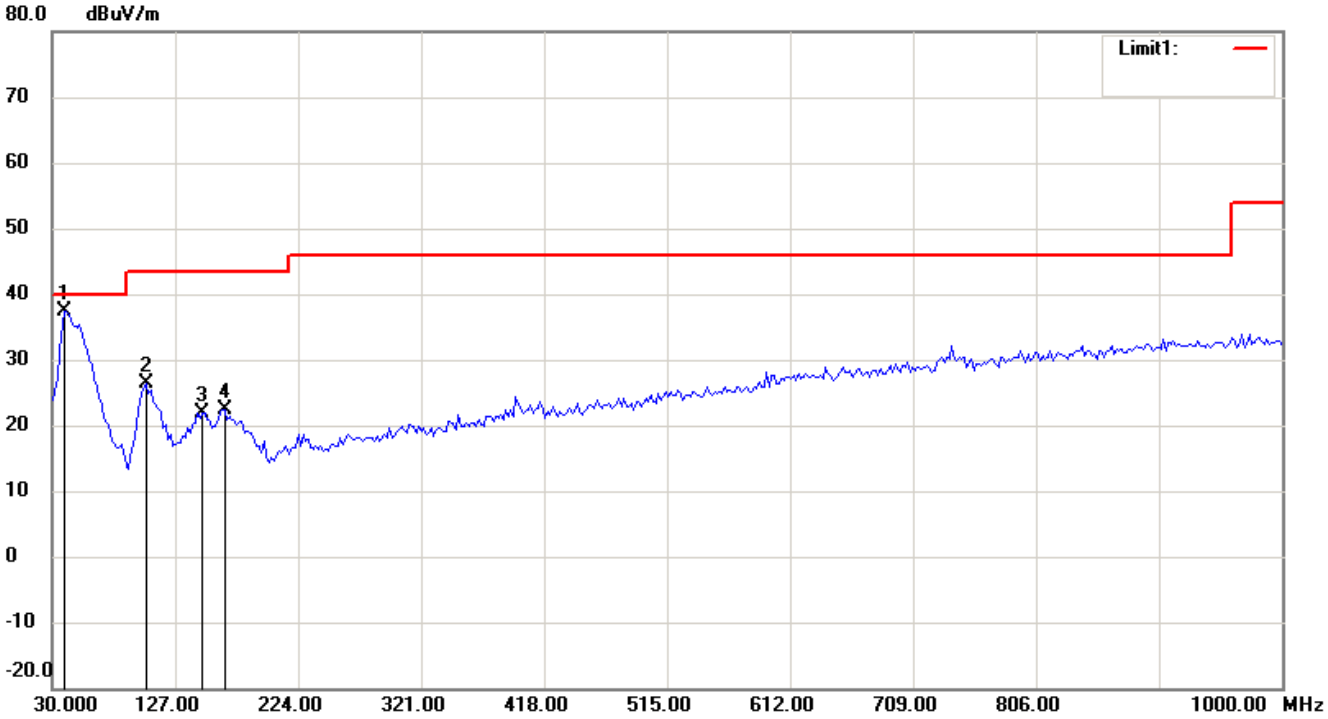
Up Line: Peak Limit Line Down Line: Ave Limit Line
Note:

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: W6M21505-14999-C-95
FCC ID: IPH-0282320



Antenna Polarization V



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

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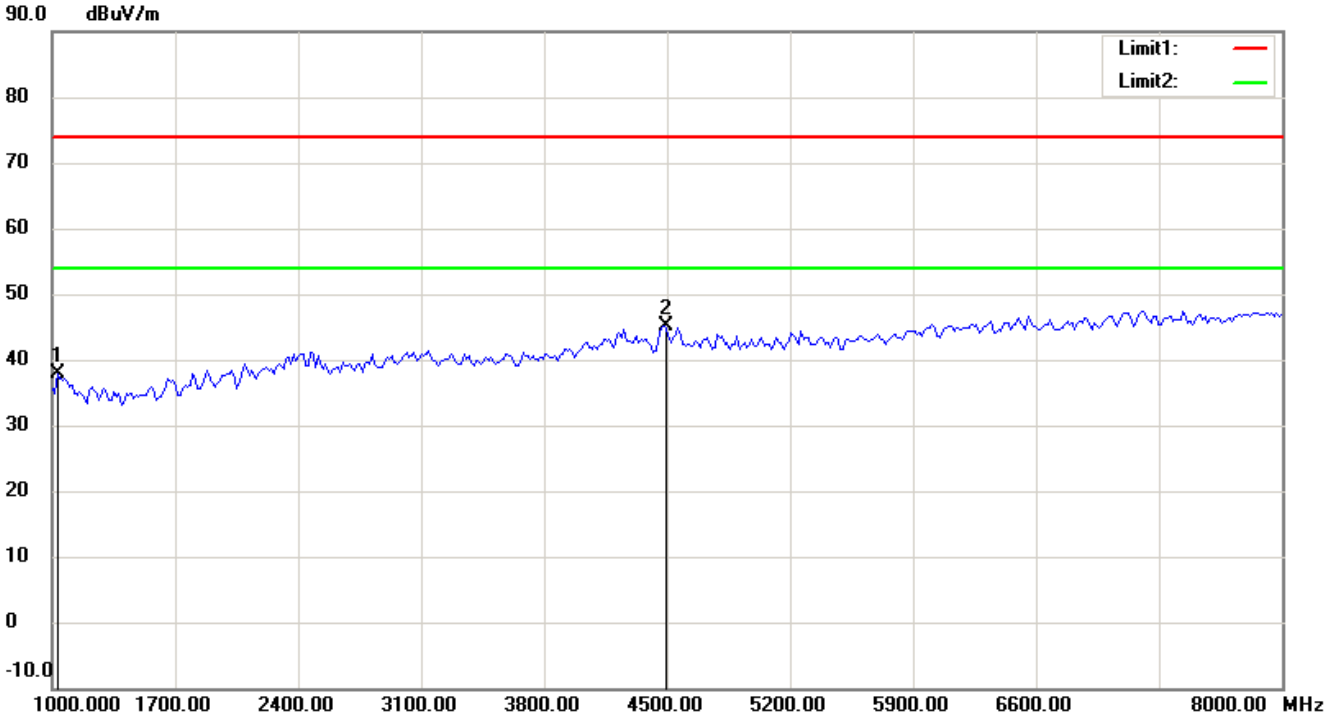
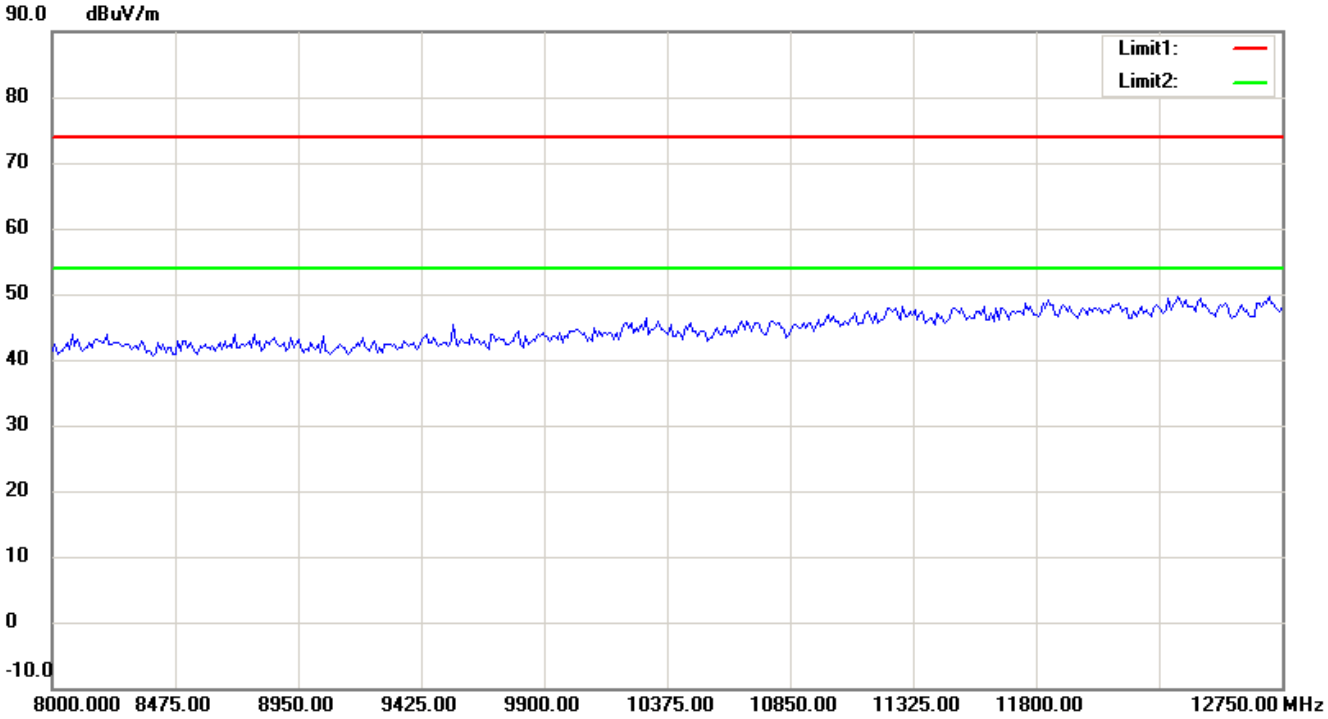
Registration number: W6M21505-14999-C-95
FCC ID: IPH-0282320





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

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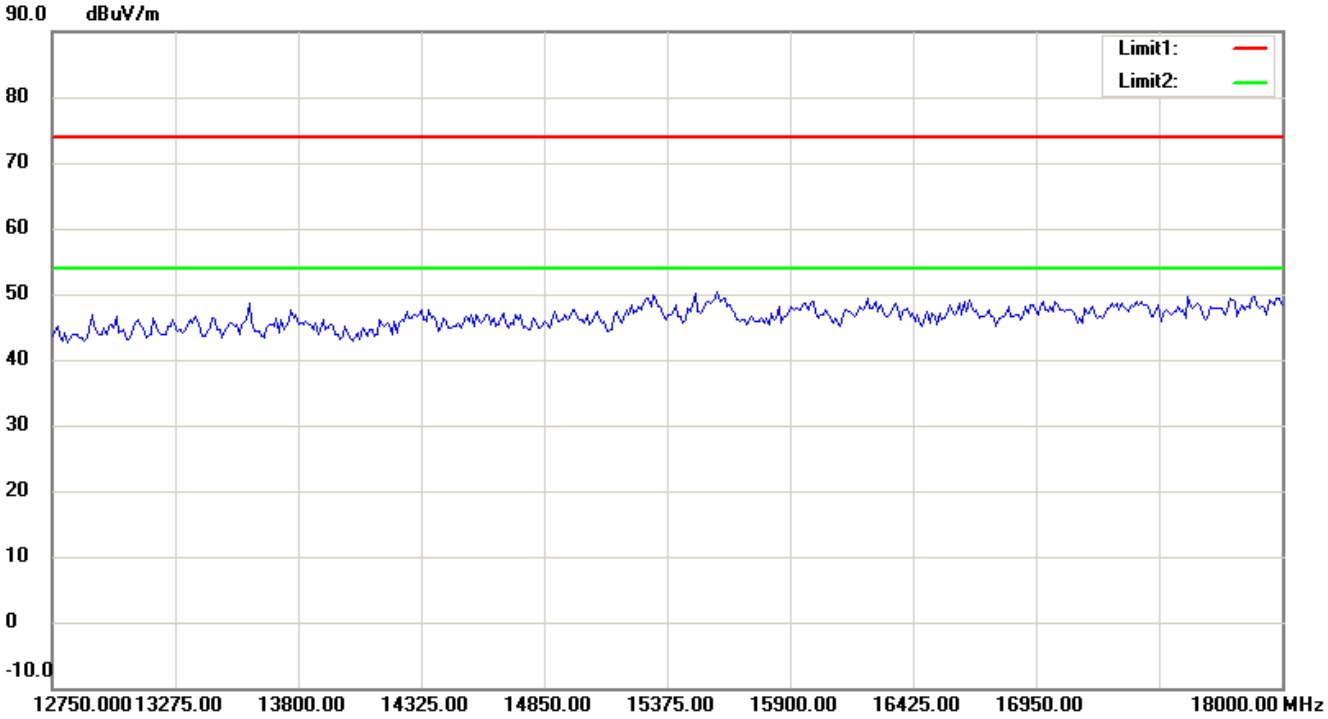
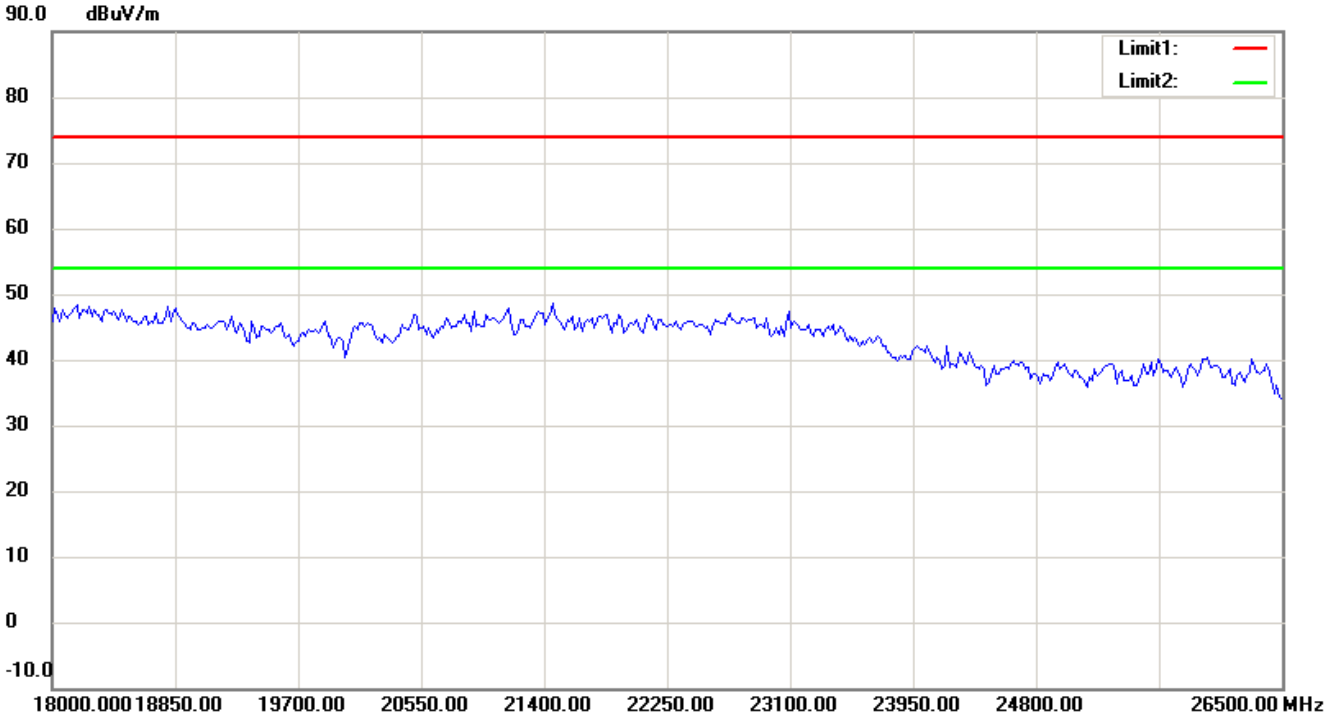
Registration number: W6M21505-14999-C-95
FCC ID: IPH-0282320





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

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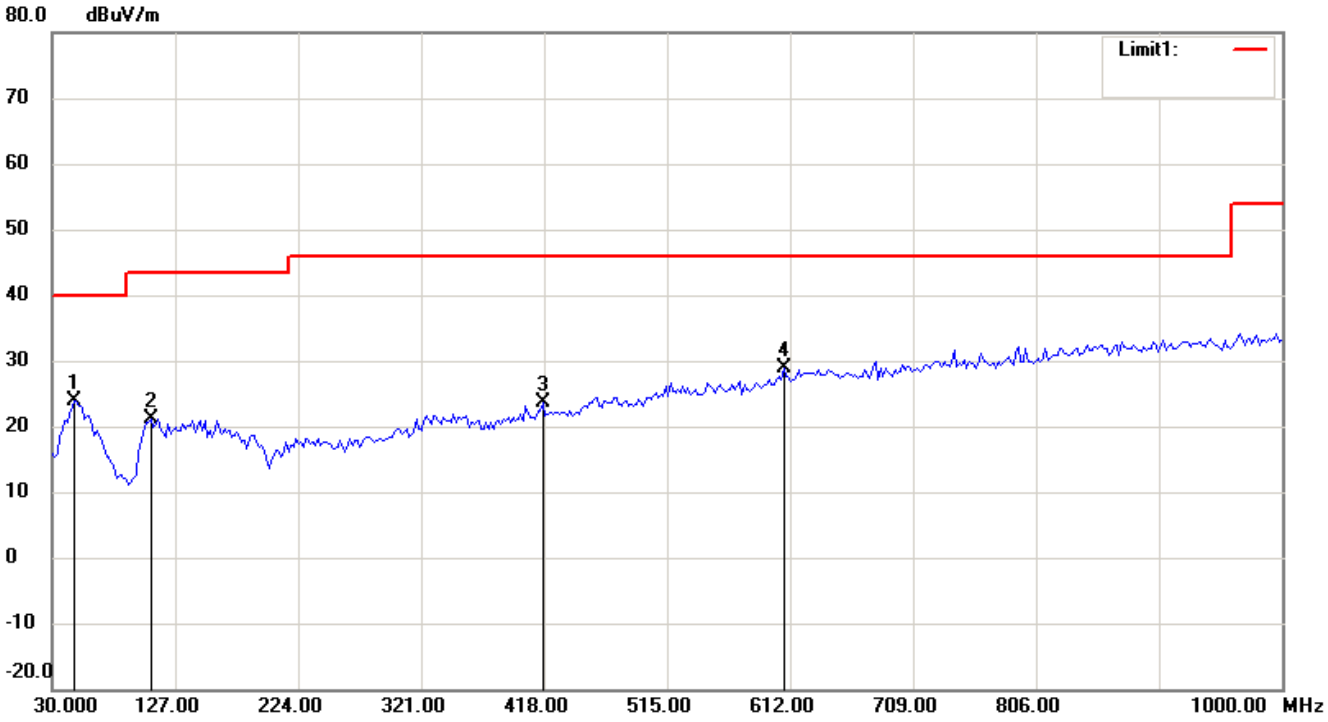
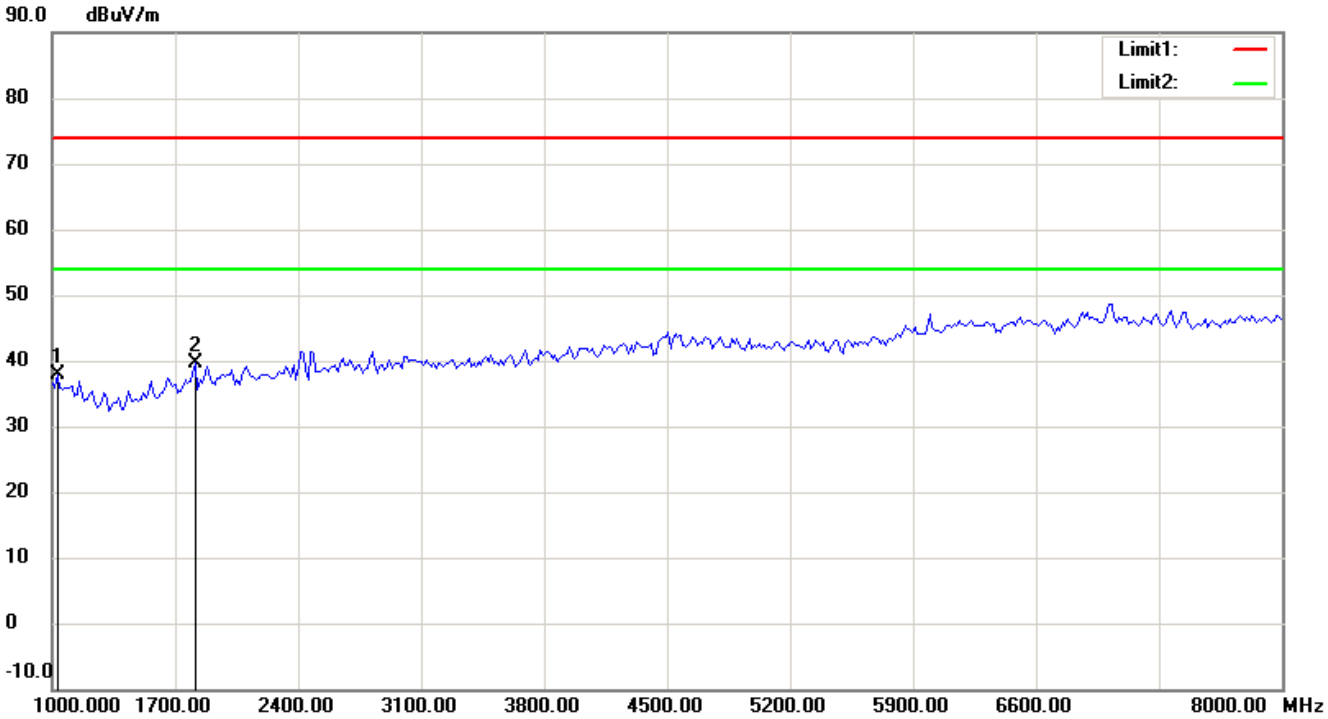
Registration number: W6M21505-14999-C-95
FCC ID: IPH-0282320

RX_ 151.94MHz
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.**
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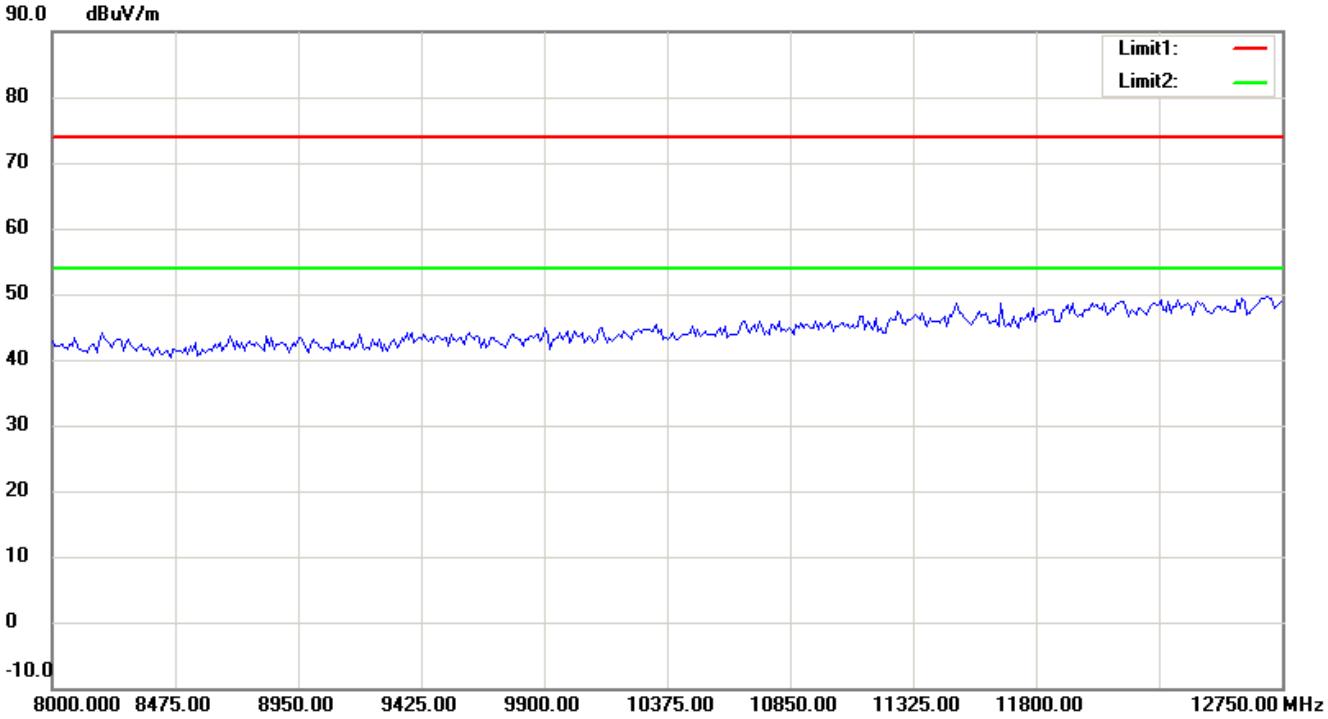
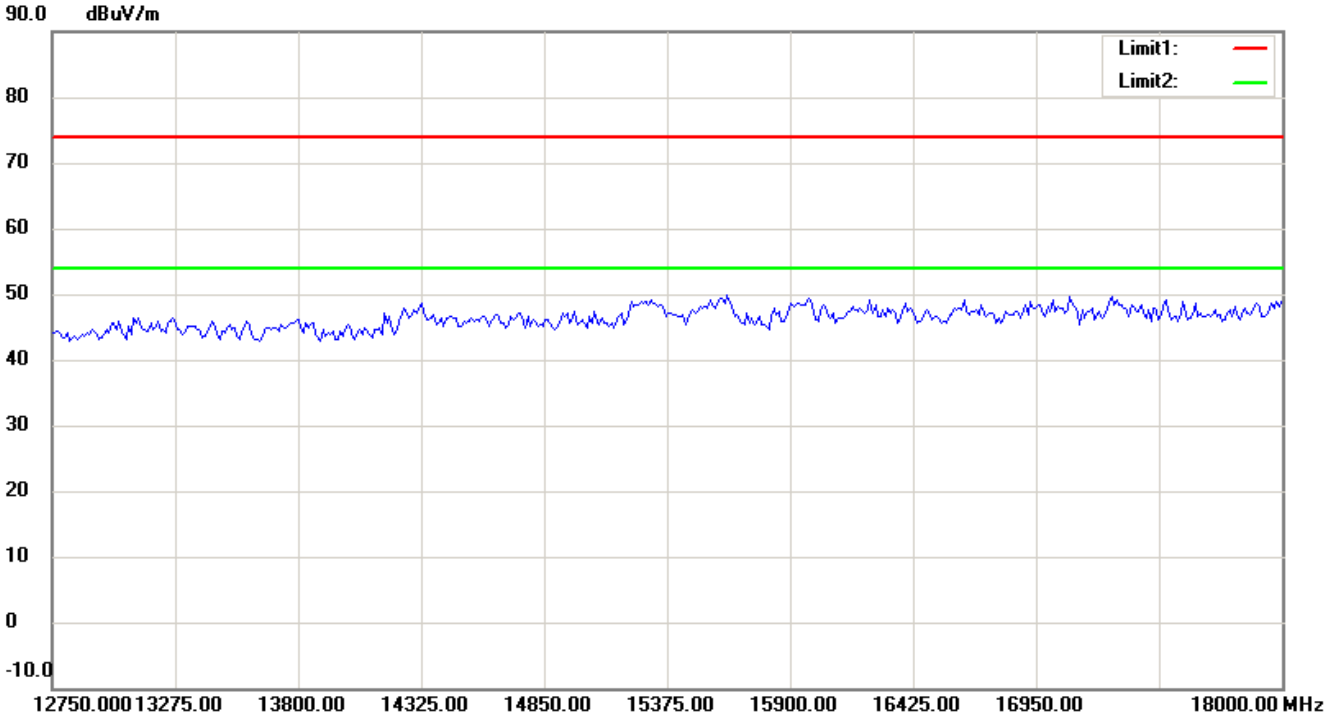
Registration number: W6M21505-14999-C-95
FCC ID: IPH-0282320





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

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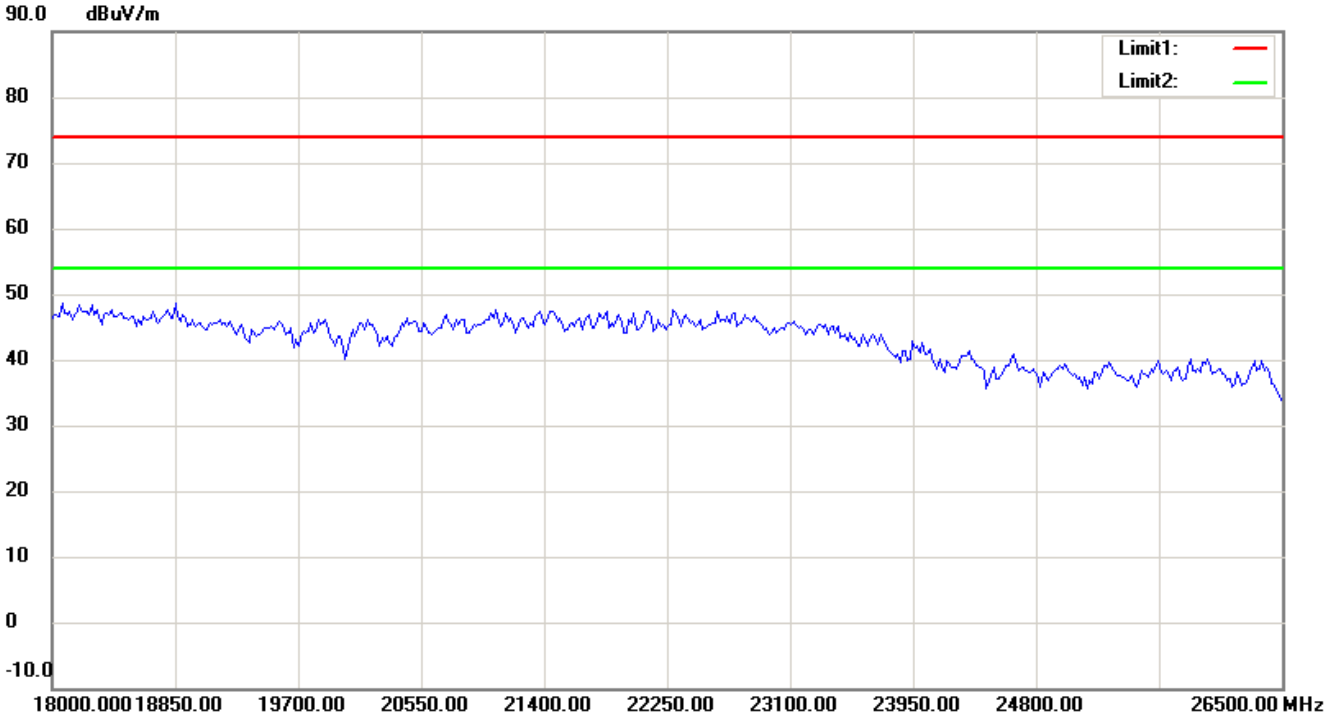
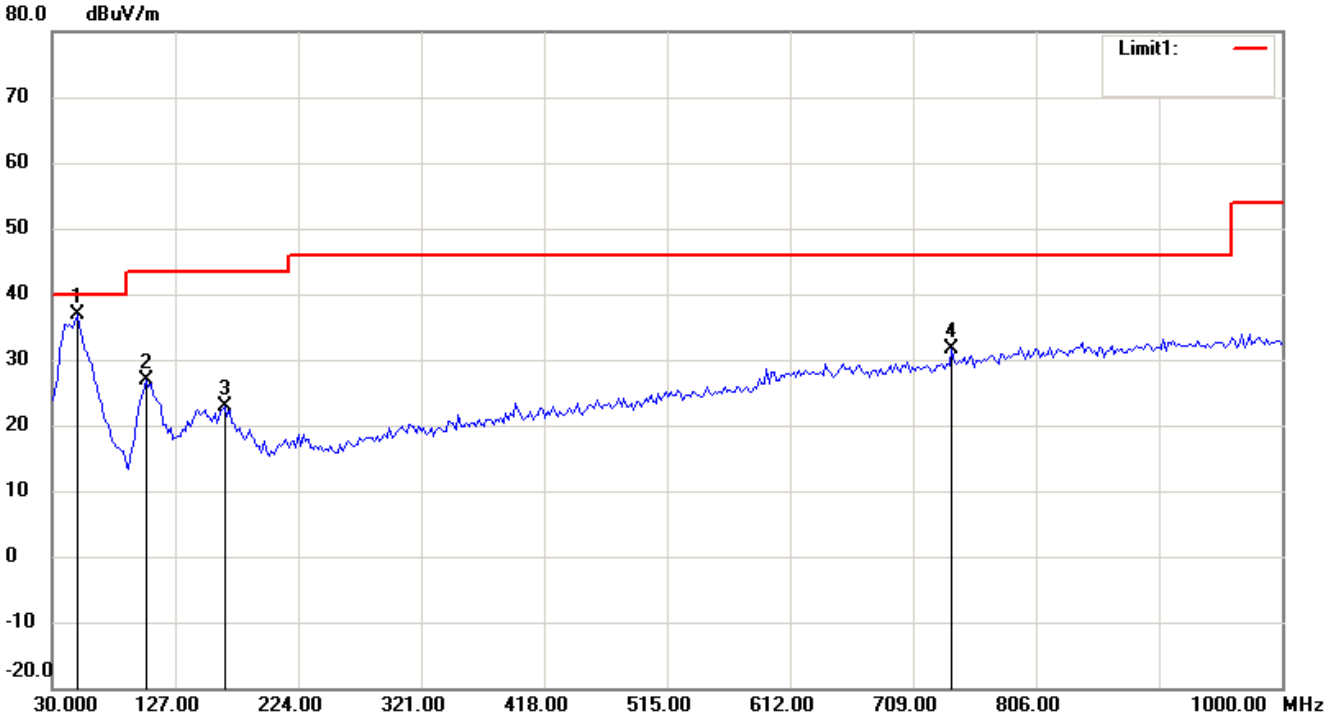
Registration number: W6M21505-14999-C-95
FCC ID: IPH-0282320



Antenna Polarization V



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

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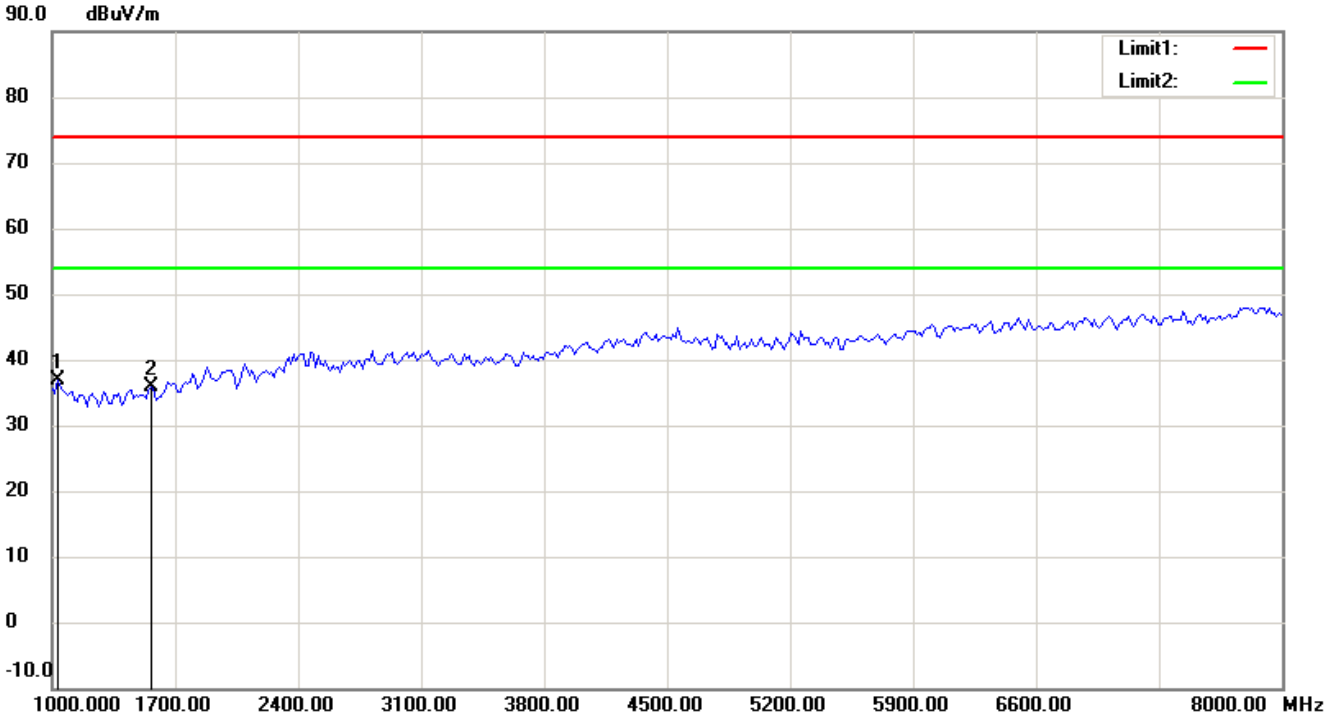
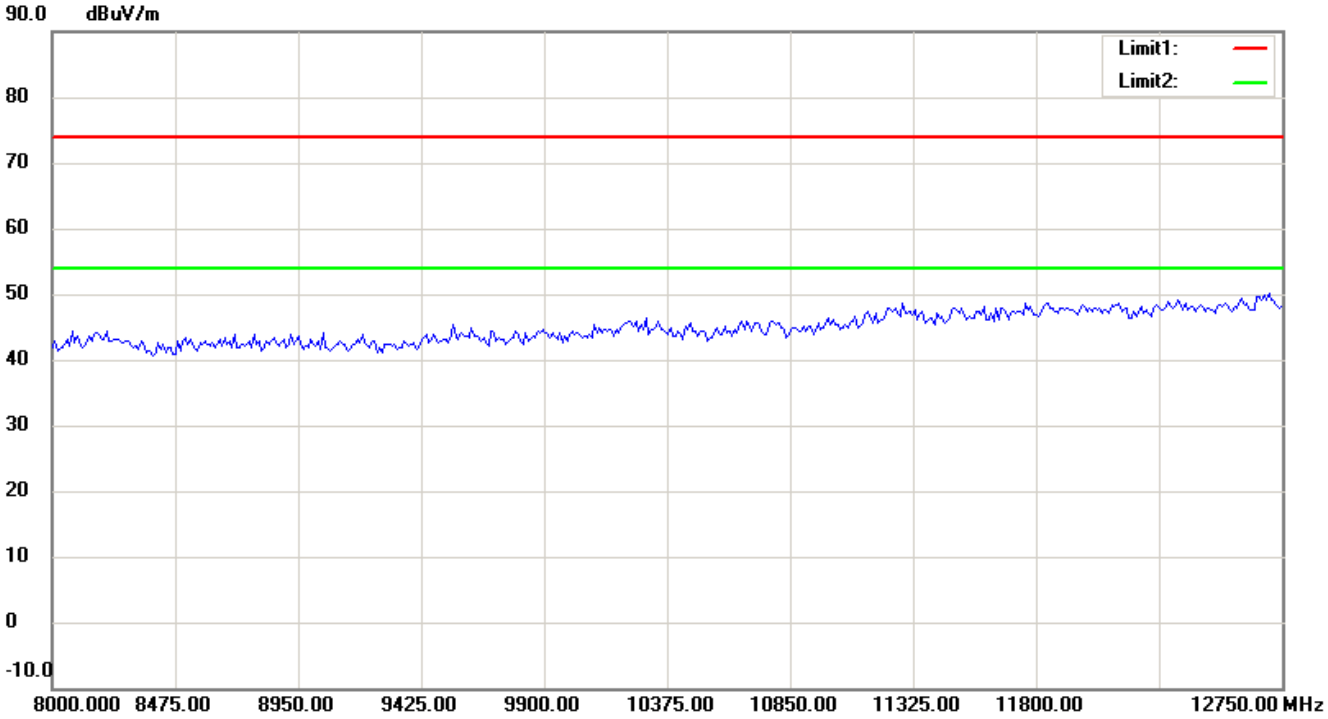
3. **For corrected test results are listed in the relevant table of radiated test data of this test report.**

Registration number: W6M21505-14999-C-95
FCC ID: IPH-0282320





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

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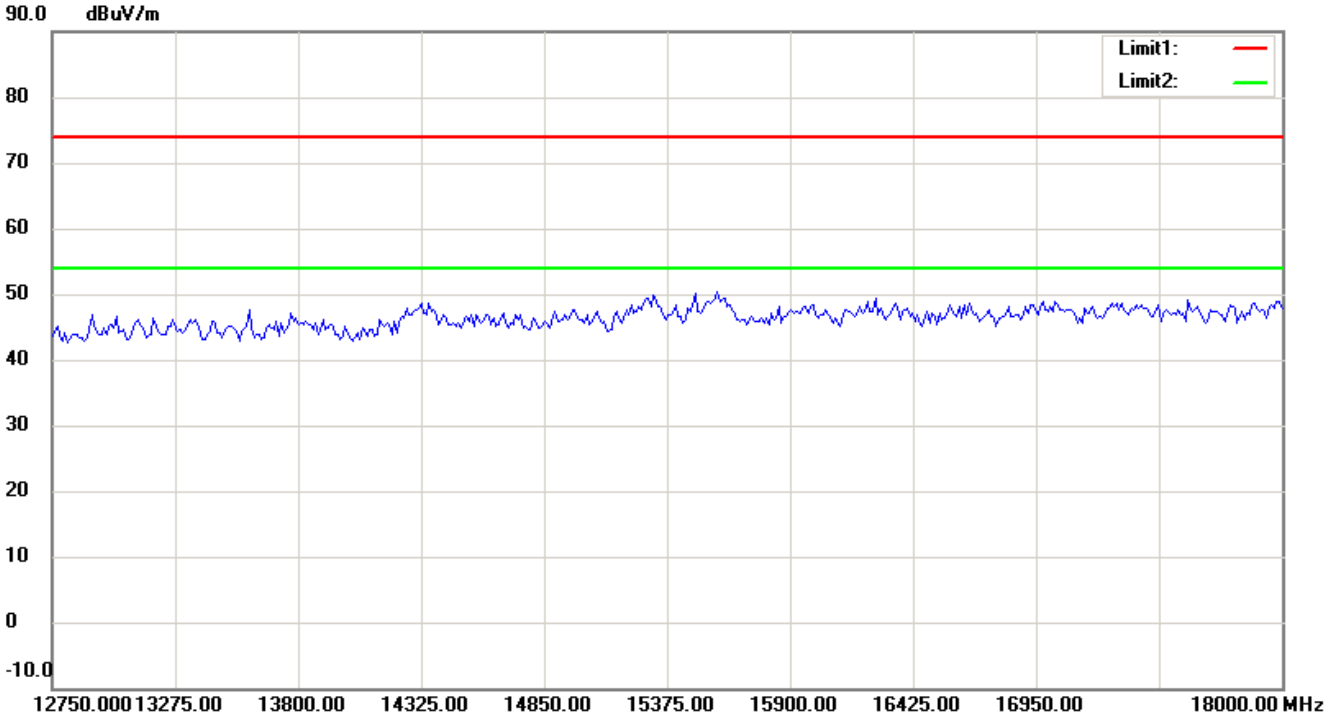
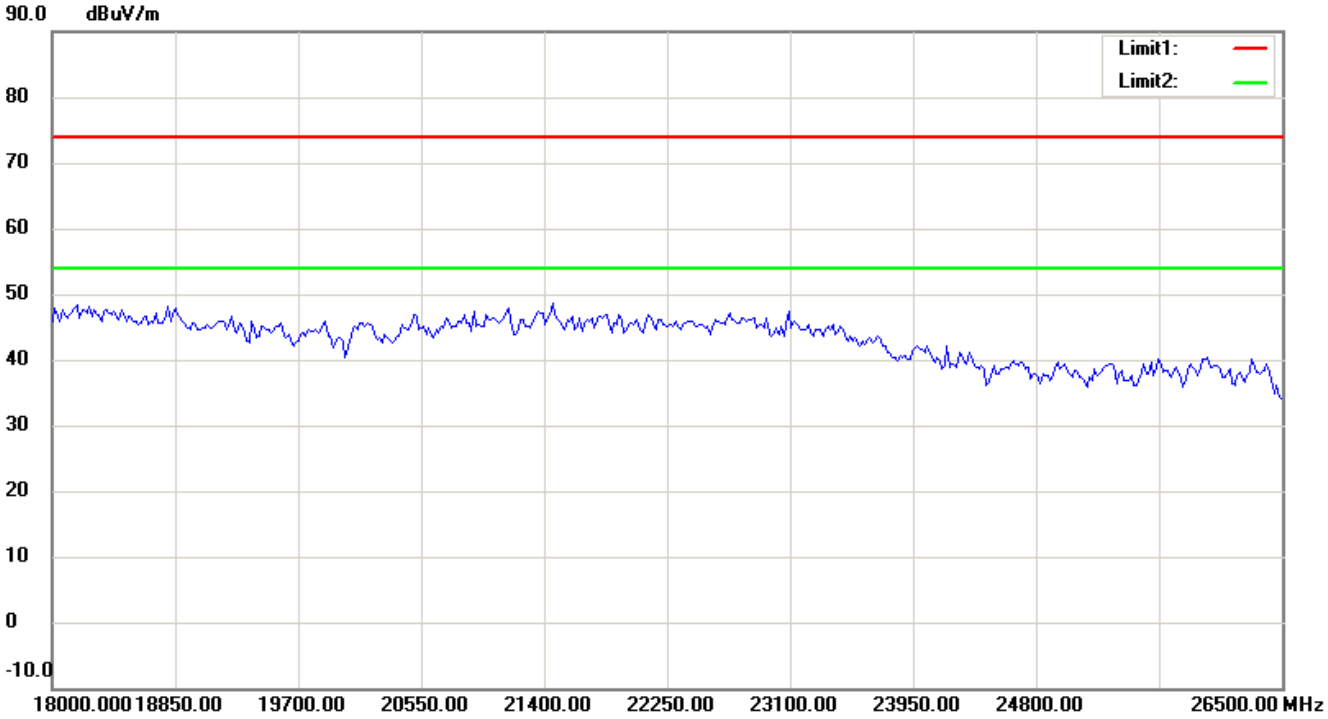
FCC ID: IPH-0282320





Up Line: Peak Limit Line Down Line: Ave Limit Line
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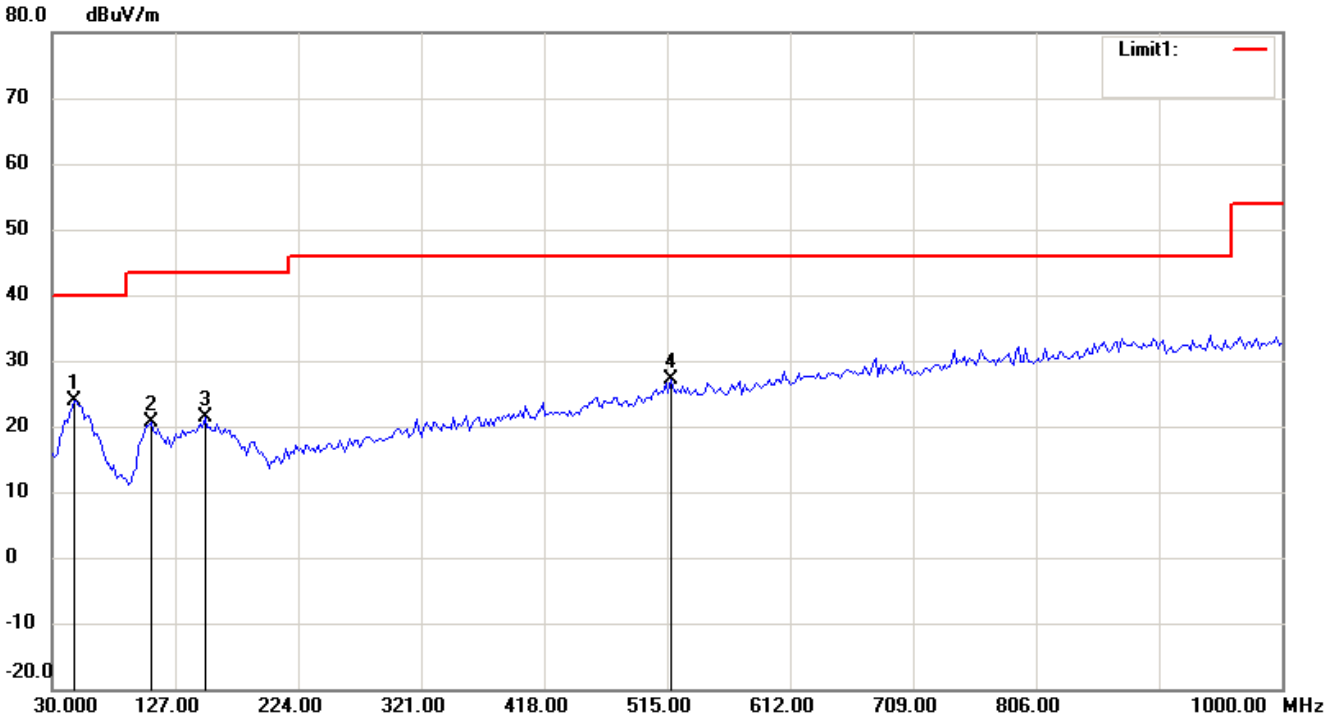
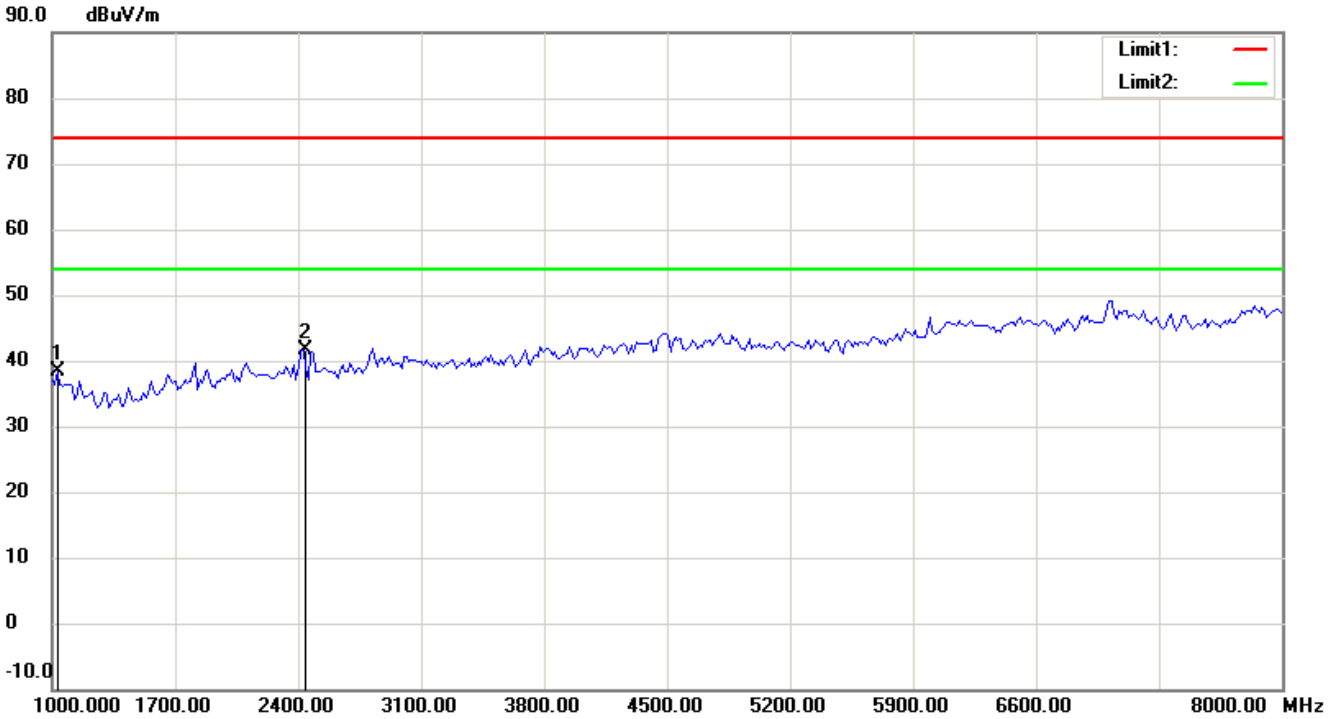
Registration number: W6M21505-14999-C-95
FCC ID: IPH-0282320

RX_ 154.6MHz
Antenna Polarization H





Up Line: Peak Limit Line Down Line: Ave Limit Line
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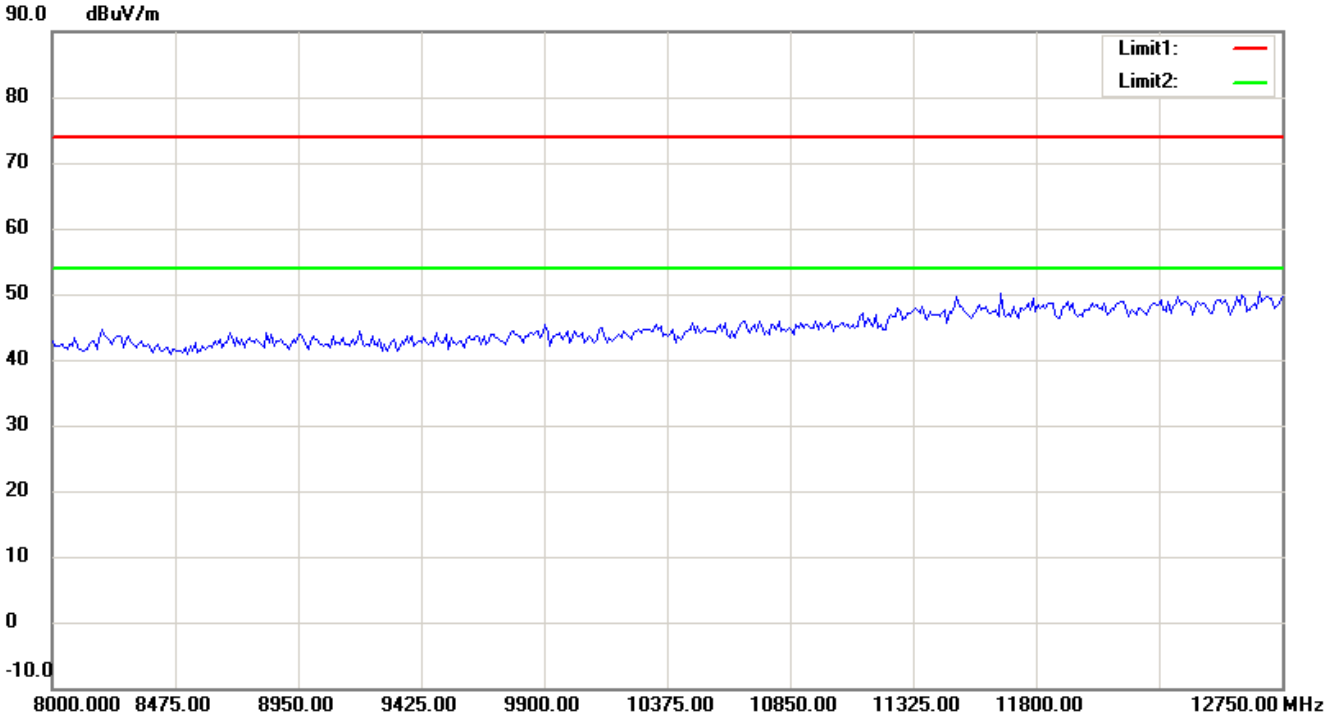
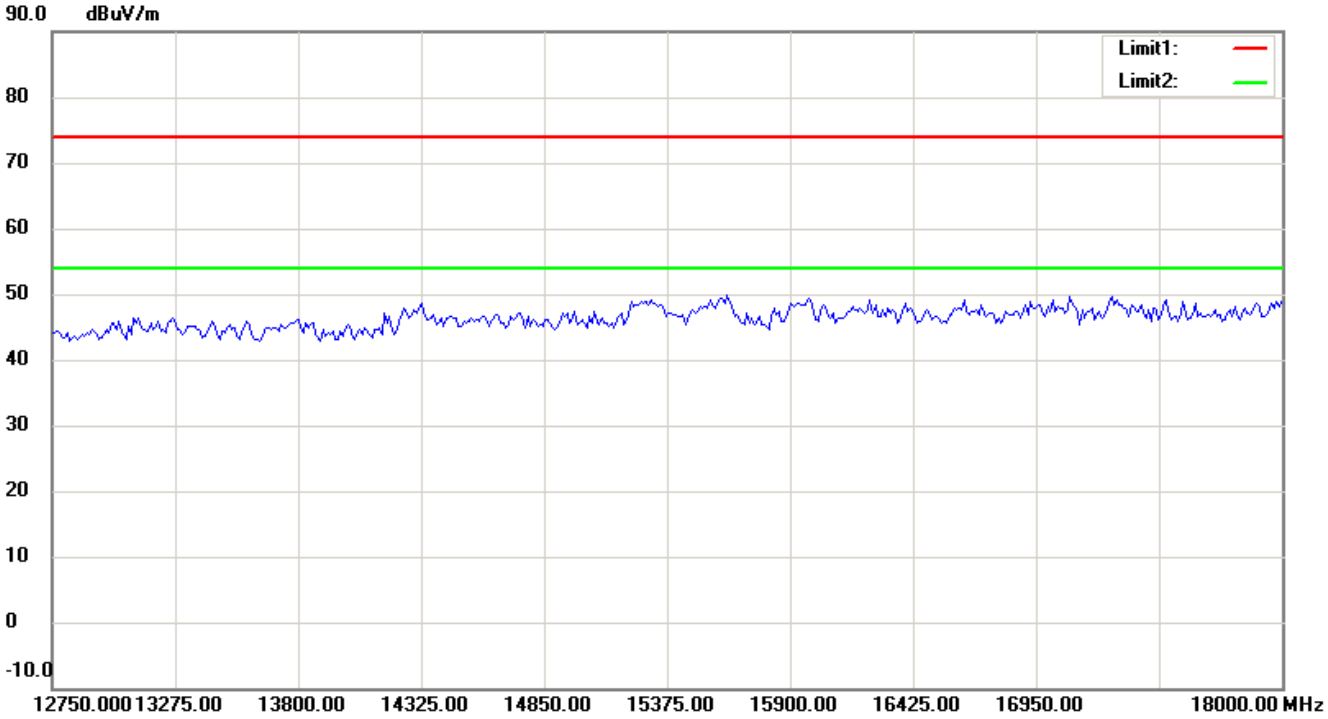
Registration number: W6M21505-14999-C-95
FCC ID: IPH-0282320





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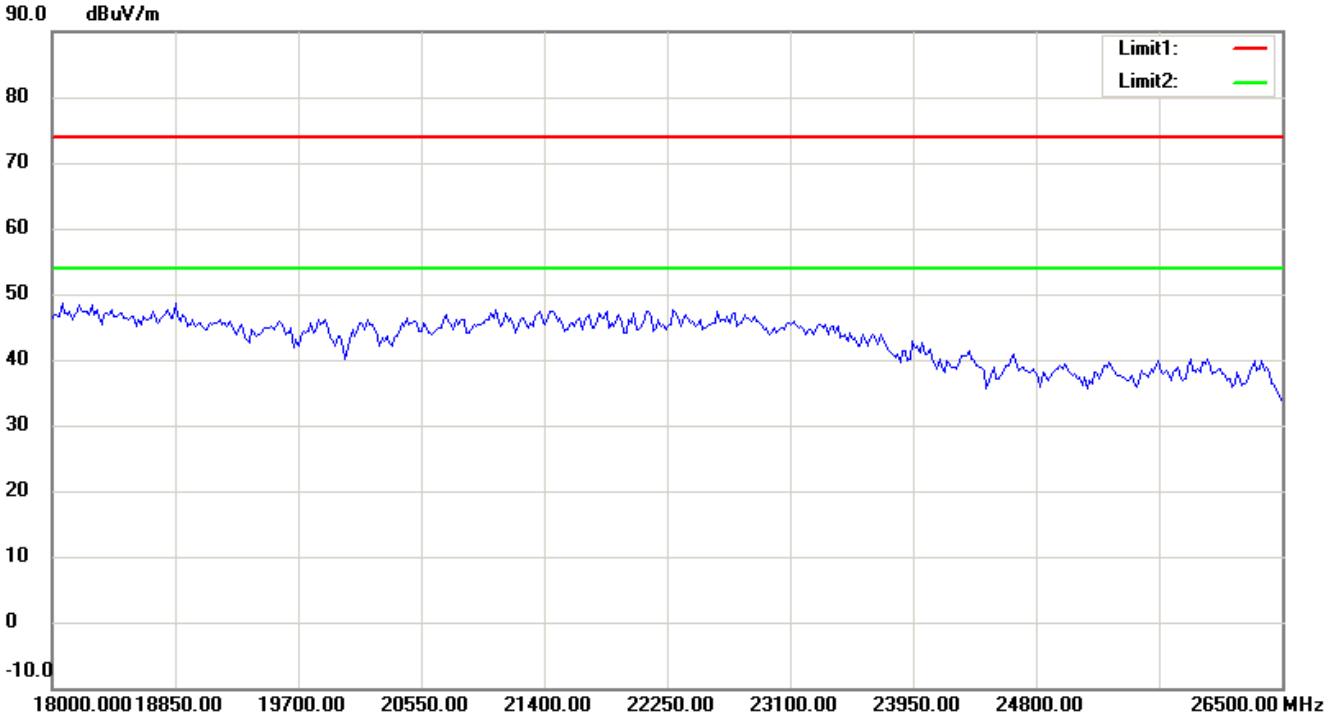
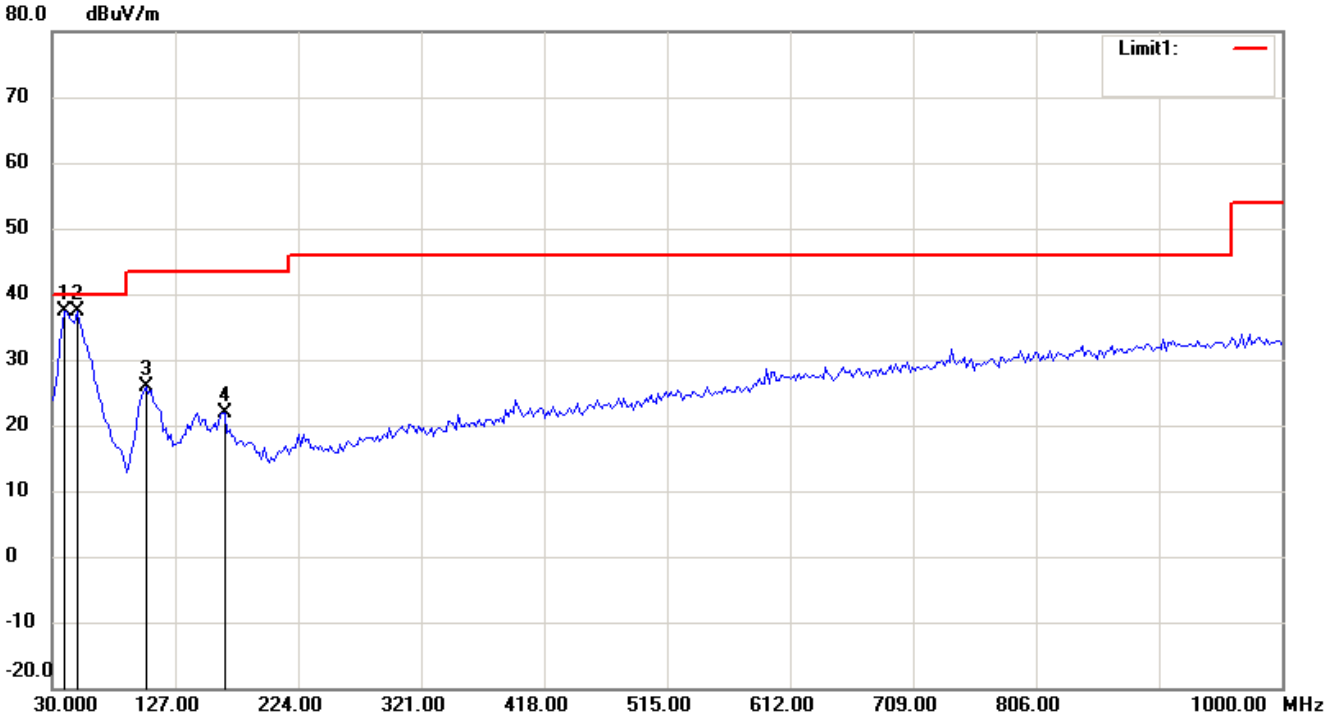


Antenna Polarization V



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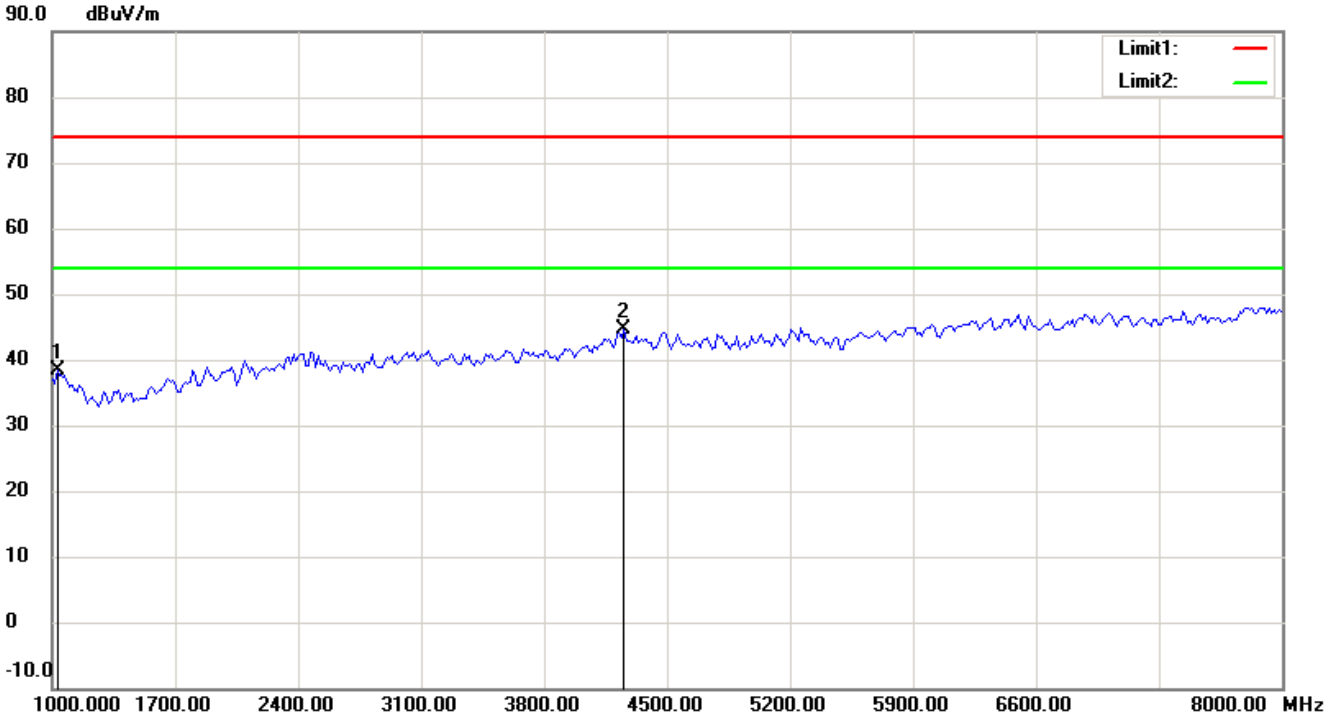

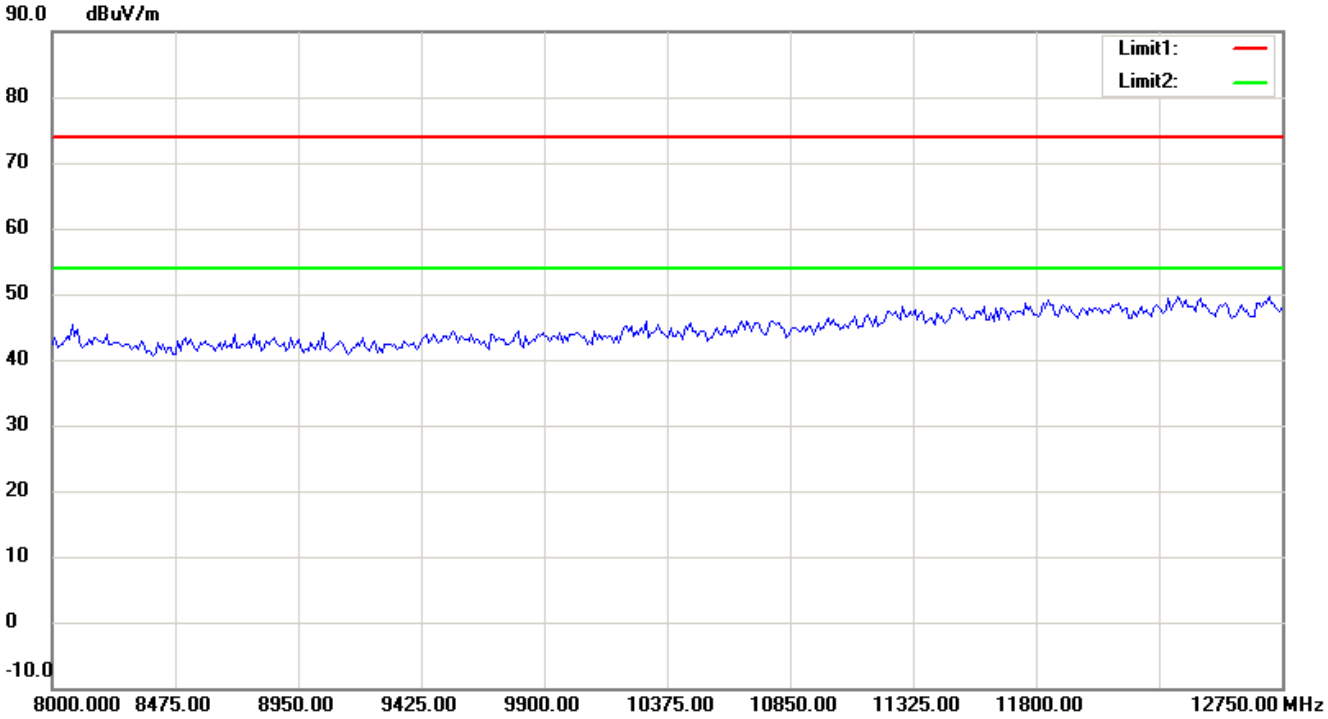

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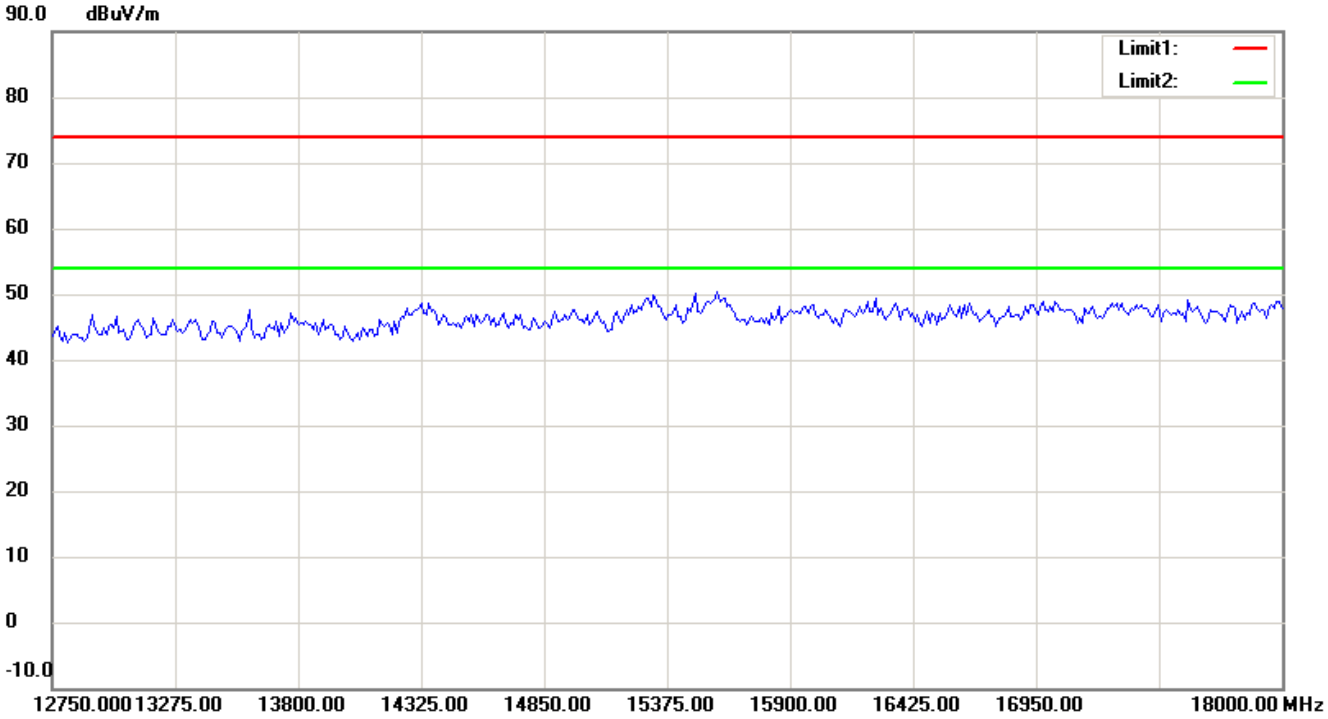

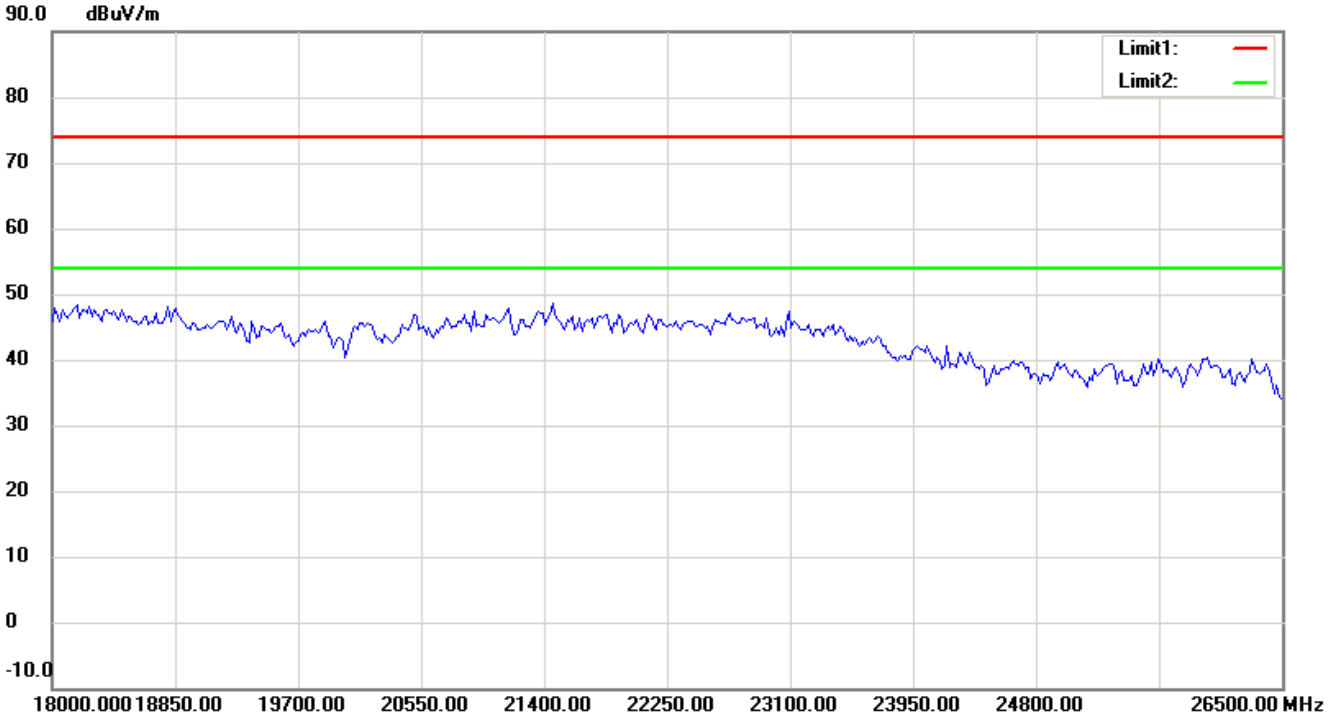

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