FCC PART 15 SUBPART C TEST REPORT

for

GPS dog tracking collar

Model No.: DC50 Series

FCC ID: IPH-02228

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

A2LA Accredited No.: 2732.01

Report No.: W6M21303-13066-C-1

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

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1 General Information

1.1 Notes

The purpose of conformity testing is to increase the probability of adherence to the essential requirements or conformity specifications, as appropriate.

The complexity of the technical specifications, however, means that full and thorough testing is impractical for both technical and economic reasons.

Furthermore, there is no guarantee that a test sample which has passed all the relevant tests conforms to a specification.

Neither is there any guarantee that such a test sample will interwork with other genuinely open systems. The existence of the tests nevertheless provides the confidence that the test sample possesses the qualities as maintained and that is performance generally conforms to representative cases of communications equipment.

The test results of this test report relate exclusively to the item tested as specified in 1.5.
The test report may only be reproduced or published in full.
Reproduction or publication of extracts from the report requires the prior written approval of the Worldwide Testing Services(Taiwan) Co., Ltd.

Tester:

June 03, 2013		Robert Ren	Robert Ren
Date	WTS-Lab.	Name	Signature

Technical responsibility for area of testing:

June 03, 2013		Danny Sung	Danny Sung
Date	WTS	Name	Signature

Registration number: W6M21303-13066-C-1
FCC ID: IPH-02228

1.2 Testing laboratory

1.2.1 Location

OATS
No.5-1, Lishui, Shuang Sing Village,
Wanli Dist., New Taipei City 207,
Taiwan (R.O.C.)
3 meter semi-anechoic chamber
No.35, Aly. 21, Ln. 228, Ankang Rd., Neihu Dist., Taipei City 114, Taiwan (R.O.C.)
TEL:886-2-6613-0228
FAX:886-2-2791-5046

Company
Worldwide Testing Services(Taiwan) Co., Ltd.
6F, NO. 58, LANE 188, RUEY-KUANG RD.
NEIHU, TAIPEI 114, TAIWAN R.O.C.
Tel : 886-2-66068877
Fax : 886-2-66068879

1.2.2 Details of accreditation status

Accredited testing laboratory

A2LA accredited number: 2730.01

FCC filed test laboratory Reg. No. 930600

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

Test location, where different from Worldwide Testing Services (Taiwan) Co., Ltd. :

Name:	./.
Accredited number:	./.
Street:	./.
Town:	./.
Country:	./.
Telephone:	./.
Fax:	./.

Registration number: W6M21303-13066-C-1
FCC ID: IPH-02228

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:	April 26, 2013
Date of test:	from April 29, 2013 to May 31, 2013

1.5 General information of Test item

Type of product:	GPS dog tracking collar
Type identification:	DC50 Series
Multi-listing model number:	./.
Brand Name:	Garmin
Photos:	Please find in Appendix.

Technical data

Frequency band:	2.400-2.4835GHz
Operation Frequency:	2.402-2.479 GHz
Frequency 1:	2.402 GHz
Frequency 2:	2.457 GHz
Frequency 3:	2.479 GHz
Operation modes:	Duplex
Modulation Type:	GFSK
Antenna type:	Chip antenna
Power supply:	Adaptor 1 (P/N: 362-00072-00): (I/P: 100-240V / 50-60Hz / 0.3A / 10-20VA; O/P: 5V / 1.0A MAX) Adaptor 2 (P/N: 362-00087-00): (I/P: 100-240V / 50-60Hz / 200mA; O/P: 5V / 1A) Battery: 3.7V / 2300mAh / 8.6Wh DC 12V
Part number information:	
AC adaptor-GPN:	362-00072-00 for Adaptor 1 362-00087-00 for Adaptor 2
CLA- GPN:	013-00434-00
DC50-GPN:	011-03142-0x
Charger cable assembly-GPN:	320-00788-00
Antenna-GPN:	700-00034-51 for short antenna 700-00034-52 for long antenna

Registration number: W6M21303-13066-C-1
FCC ID: IPH-02228

Manufacturer: (if different from applicant)

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

1.6 Test standards

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

2 Technical test

2.1 Summary of test results

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

or

The deviations as specified in 2.5 were ascertained in the course of the tests performed. ☐

2.2 Test environment

Temperature:	23 °C
Relative humidity content:	20 ... 75 %
Air pressure:	86 ... 103 kPa
Details Power supply:	Adaptor 1 (P/N: 362-00072-00): (I/P: 100-240V / 50-60Hz / 0.3A / 10-20VA; O/P: 5V / 1.0A MAX) Adaptor 2 (P/N: 362-00087-00): (I/P: 100-240V / 50-60Hz / 200mA; O/P: 5V / 1A) Battery: 3.7V / 2300mAh / 8.6Wh DC 12V
Extreme conditions parameters:	Not required

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	2012/9/5	2013/9/4
ETSTW-CE 003	AC POWER SOURCE	APS-9102	D161137	GW	Function Test	
ETSTW-CE 004	ZWEILEITER-V-NETZNACHBILDUNG TWO-LINE V-NETWORK	ESH3-Z5	840731/011	R&S	2012/12/21	2013/12/20
ETSTW-CE 006	IMPULSBEGRENZER PULSE LIMITER	ESH3-Z2	100226	R&S	2013/3/4	2014/3/3
ETSTW-CE 007	SPECTRUM ANALYZER 5GHz	FSB	849670/001	R&S	Pre-test Use	
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	2012/7/3	2013/7/2
ETSTW-RE 004	EMI TEST RECEIVER	ESI 40	832427/004	R&S	2012/9/5	2013/9/4
ETSTW-RE 005	EMI TEST RECEIVER	ESVS10	843207/020	R&S	2012/9/5	2013/9/4
ETSTW-RE 012	TUNABLE BANDREJECT FILTER	D.C 0309	146	K&L	Function Test	
ETSTW-RE 013	TUNABLE BANDREJECT FILTER	D.C 0336	397	K&L	Function Test	
ETSTW-RE 018	MICROWAVE HORN ANTENNA	AT4560	27212	AR	2012/10/12	2013/10/11
ETSTW-RE 027	Passive Loop Antenna	6512	00034563	ETS-Lindgren	2012/8/01	2013/7/31
ETSTW-RE 030	Double-Ridged Guide Horn Antenna	3117	00035224	EMCO	2013/3/4	2014/3/3
ETSTW-RE 045	ESA-E SERIES SPECTRUM ANALYZER	E4404B	MY45111242	Agilent	Pre-test Use	
ETSTW-RE 049	TRILOG Super Broadband test Antenna	VULB 9160	9160-3185	Schwarzbeck	2013/3/21	2014/3/20
ETSTW-RE 050	Attenuator 10dB	50HF-010-1	None	JFW	2013/3/4	2014/3/3
ETSTW-RE 051	Attenuator 6dB	50HF-006-1	None	JFW	2013/3/4	2014/3/3
ETSTW-RE 053	Attenuator 3dB	50HF-003-1	None	JFW	2013/3/4	2014/3/3
ETSTW-RE 055	SPECTRUM ANALYZER	FSU 26	200074	R&S	2013/5/28	2014/5/27
ETSTW-RE 060	Attenuator 30dB	5015-30	F651012z-01	ATM	2013/3/4	2014/3/3
ETSTW-RE 062	Amplifier Module	CHC 2	None	KMIC	2012/11/28	2013/11/27
ETSTW-RE 064	Bluetooth Test Set	MT8852B-042	6K00005709	Anritsu	Function Test	
ETSTW-RE 069	Double-Ridged Guide Horn Antenna	3117	00069377	EMCO	Function Test	
ETSTW-RE 072	CELL SITE TEST SET	8921A	3339A00375	HP	2012/10/5	2013/10/4
ETSTW-RE 088	SOLID STATE AMPLIFIER	KMA180265A01	99057	KMIC	2012/10/12	2013/10/11
ETSTW-RE 099	DC Block	50DB-007-1	None	JFW	2013/3/4	2014/3/3
ETSTW-RE 106	Humidity Temperature Meter	TES-1366	091011113	TES	2012/12/4	2013/12/3
ETSTW-RE 111	TRILOG Super Broadband test Antenna	VULB 9160	9160-3309	Schwarz beck	2012/12/13	2013/12/12
ETSTW-RE 112	AC POWER SOURCE	TFC-1005	None	T-Power	Function test	
ETSTW-RE 115	2.4GHz Notch Filter	N0124411	473874	MICROWAVE CIRCUITS	2013/1/11	2014/1/10
ETSTW-RE 120	RF Player	MP9200	MP9210-111022	ADIVIC	Function test	
ETSTW-RE 122	SIGNAL GENERATOR	SMF100A	102149	R&S	2012/7/3	2013/7/2

ETSTW-RE 125	5GHz Notch filter	5NSL11-5200/E221.3-O/O	1	K&L Microwave	2012/8/18	2013/8/17
ETSTW-RE 126	5GHz Notch filter	5NSL11-5800/E221.3-O/O	1	K&L Microwave	2012/8/18	2013/8/17
ETSTW-RE 127	RF Switch Box	RFS-01	None	WTS	2013/3/4	2014/3/3
ETSTW-GSM 002	Universal Radio Communication Tester	CMU 200	109439	R&S	2012/10/5	2013/10/4
ETSTW-GSM 019	Band Reject Filter	WRCTF824/849-822/851-40 /12+9SS	3	WI	2013/1/11	2014/1/10
ETSTW-GSM 020	Band Reject Filter	WRCD1747/1748-1743/1752-32/5SS	1	WI	2013/1/11	2014/1/10
ETSTW-GSM 021	Band Reject Filter	WRCD1879.5/1880.5-1875.5/1884.5-32/5SS	3	WI	2013/1/11	2014/1/10
ETSTW-GSM 022	Band Reject Filter	WRCT901.9/903.1-904.25-50/8SS	1	WI	2013/1/11	2014/1/10
ETSTW-GSM 023	Power Divider	4901.19.A	None	SUHNER	2012/9/18	2013/9/17
ETSTW-Cable 010	BNC Cable	5 M BNC Cable	None	JYE BAO CO.,LTD.	2013/3/4	2014/3/3
ETSTW-Cable 011	BNC Cable	BNC Cable 1	None	JYE BAO CO.,LTD.	Pre-test Use NCR	
ETSTW-Cable 012	N TYPE To SMA Cable	Cable 012	None	JYE BAO CO.,LTD.	2013/3/4	2014/3/3
ETSTW-Cable 016	BNC Cable	Switch Box	B Cable 1	Schwarz beck	2013/3/4	2014/3/3
ETSTW-Cable 017	BNC Cable	X Cable	B Cable 2	Schwarz beck	2013/3/4	2014/3/3
ETSTW-Cable 018	BNC Cable	Y Cable	B Cable 3	Schwarz beck	2013/3/4	2014/3/3
ETSTW-Cable 019	BNC Cable	Z Cable	B Cable 4	Schwarz beck	2013/3/4	2014/3/3
ETSTW-Cable 022	N TYPE Cable	5006	0002	JYE BAO CO.,LTD.	2013/3/26	2014/3/25
ETSTW-Cable 026	Microwave Cable	SUCOFLEX 104	279075	HUBER+SUHNER	2013/3/4	2014/3/3
ETSTW-Cable 027	Microwave Cable	SUCOFLEX 104	279083	HUBER+SUHNER	2013/3/4	2014/3/3
ETSTW-Cable 028	Microwave Cable	FA147A0015M2020	30064-2	UTIFLEX	2012/10/12	2013/10/11
ETSTW-Cable 029	Microwave Cable	FA147A0015M2020	30064-3	UTIFLEX	2012/10/12	2013/10/11
ETSTW-Cable 030	Microwave Cable	SUCOFLEX 104（S_Cable 9）	279067	HUBER+SUHNER	2013/3/4	2014/3/3
ETSTW-Cable 031	Microwave Cable	SUCOFLEX 104（S_Cable 10）	238092	HUBER+SUHNER	2012/11/28	2013/11/27
ETSTW-Cable 043	Microwave Cable	SUCOFLEX 104	317576	HUBER+SUHNER	2012/11/28	2013/11/27
ETSTW-Cable 047	Microwave Cable	SUCOFLEX 104	325518	HUBER+SUHNER	2012/11/28	2013/11/27
ETSTW-Cable 053	N TYPE To SMA Cable	RG142	None	JYE BAO CO.,LTD.	2013/3/26	2014/3/25
ETSTW-Cable 054	BNC To SMA Cable	RG142	None	JYE BAO CO.,LTD.	2013/3/26	2014/3/25
WTSTW-SW 002	EMI TEST SOFTWARE	EZ_EMC	None	Farad	Version ETS-03A1	

2.4 General Test Procedure

POWER LINE CONDUCTED INTERFERENCE: The procedure used was ANSI STANDARD C63.4-2009 5.2 using a 50µH LISN (if necessary). Both lines were observed. The bandwidth of the spectrum analyzer was 10 kHz with an appropriate sweep speed.

RADIATION INTERFERENCE: The test procedure used was according to ANSI STANDARD C63.4-2009 6.4 employing a spectrum analyzer. For investigated frequency is equal to or below 1GHz, the RBW and VBW of the spectrum analyzer was 100 kHz and 100kHz respectively with an appropriate sweep speed. For investigated frequency is above 1GHz, both of RBW and VBW of the spectrum analyzer were 1 MHz with an appropriate sweep speed. The analyzer was calibrated in dB above a microvolt at the output of the antenna.

FORMULA OF CONVERSION FACTORS: The Field Strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBµV) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB.

Example:

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

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

Peak readings were taken in three (3) orthogonal planes and the highest readings.
Measurements were made by Worldwide Testing Services(Taiwan) Co., Ltd. at the registered open field test site located at No.5-1, Lishui, Shuang Sing Village, Wanli Dist., New Taipei City 207, Taiwan (R.O.C.). The Registration Number: 930600.

When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes.

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

3 Test results (enclosure)

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

The following is intentionally left blank.

3.1 Peak Output Power (transmitter)

FCC Rule: 15.249 (b)

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

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

Model: DC50 Series Date: 2013/5/13
Mode: 2402MHz Temperature: 24 °C Engineer: Leon
Polarization: Horizontal Humidity: 60 %

Frequency (MHz)	Reading (dBuV) Peak	Reading (dBuV) Ave.	Factor (dB) Corr.	Result (dBuV/m) Peak	Result (dBuV/m) Ave.	Limit (dBuV/m) Peak	Limit (dBuV/m) Ave.	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
2401.9940	58.27	14.92	37.51	95.78	52.43	114.00	94.00	-41.57	185	200

Polarization: Vertical

Frequency (MHz)	Reading (dBuV) Peak	Reading (dBuV) Ave.	Factor (dB) Corr.	Result (dBuV/m) Peak	Result (dBuV/m) Ave.	Limit (dBuV/m) Peak	Limit (dBuV/m) Ave.	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
2401.6930	61.45	15.03	37.51	98.96	52.54	114.00	94.00	-41.46	210	200

Mode: 2457MHz
Polarization: Horizontal

Frequency (MHz)	Reading (dBuV) Peak	Reading (dBuV) Ave.	Factor (dB) Corr.	Result (dBuV/m) Peak	Result (dBuV/m) Ave.	Limit (dBuV/m) Peak	Limit (dBuV/m) Ave.	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
2456.7330	55.43	14.46	37.72	93.15	52.18	114.00	94.00	-41.82	305	200

Polarization: Vertical

Frequency (MHz)	Reading (dBuV) Peak	Reading (dBuV) Ave.	Factor (dB) Corr.	Result (dBuV/m) Peak	Result (dBuV/m) Ave.	Limit (dBuV/m) Peak	Limit (dBuV/m) Ave.	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
2456.8620	56.77	14.51	37.72	94.49	52.23	114.00	94.00	-41.77	210	200

Mode: 2479MHz
Polarization: Horizontal

Frequency (MHz)	Reading (dBuV) Peak	Reading (dBuV) Ave.	Factor (dB) Corr.	Result (dBuV/m) Peak	Result (dBuV/m) Ave.	Limit (dBuV/m) Peak	Limit (dBuV/m) Ave.	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
2478.9100	52.66	---	37.80	90.46	---	114.00	94.00	-23.54	310	200

Polarization: Vertical

Frequency (MHz)	Reading (dBuV) Peak	Reading (dBuV) Ave.	Factor (dB) Corr.	Result (dBuV/m) Peak	Result (dBuV/m) Ave.	Limit (dBuV/m) Peak	Limit (dBuV/m) Ave.	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
2478.9980	54.21	14.90	37.80	92.01	52.70	114.00	94.00	-41.30	215	200

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

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

3.2 Equivalent isotropic radiated power

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

3.3 RF Exposure Compliance Requirements

Not applicable for this EUT for the low power level.

3.4 Out of Band Radiated Emissions

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

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

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

Limits:

Frequency of Emission (MHz)	Field strength (microvolts/meter)	Field Strength (dB microvolts/meter)
30 - 88	100	40.0
88 – 216	150	43.5
216 – 960	200	46.5
Above 960	500	54.0

For frequencies above 1 GHz (Peak measurements).

Limit + 20 dB 54.0 dBµV/m + 20 dB= 74dBµV/m
Or
Must be attenuated at least 50dB below the level of fundament

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

Explanation: Please see attached diagram as appendix.

3.5 Spurious emission (tx)

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

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

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

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

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

Summary table with radiated data of the test plots

Model: DC50 Series Date: 2013/5/8~5/13
Mode: TX 2402MHz 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)
51.3828	23.64	peak	14.08	37.72	40.00	-2.28	205	100
68.8777	25.47	peak	11.78	37.25	40.00	-2.75	130	100

Frequency (MHz)	Reading (dBuV) Peak	Reading (dBuV) Ave.	Factor (dB) Corr.	Result (dBuV/m) Peak	Result (dBuV/m) Ave.	Limit (dBuV/m) Peak	Limit (dBuV/m) Ave.	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
4801.6030	52.30	43.39	0.44	52.74	43.83	74.00	54.00	-10.17	140	200
7206.4130	46.42	---	4.01	50.43	---	74.00	54.00	-23.57	200	200
9608.0000	34.99	---	9.14	44.13	---	74.00	54.00	-29.87	120	200
12010.0000	36.85	---	13.41	50.26	---	74.00	54.00	-23.74	135	200

Polarization: Vertical

Frequency (MHz)	Reading (dBuV)	Detector	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
47.4950	23.80	peak	14.27	38.07	40.00	-1.93	155	100
66.9338	26.68	peak	12.05	38.73	40.00	-1.27	120	100

Registration number: W6M21303-13066-C-1
FCC ID: IPH-02228

Frequency (MHz)	Reading (dBuV) Peak	Ave.	Factor (dB) Corr.	Result (dBuV/m) Peak	Ave.	Limit (dBuV/m) Peak	Ave.	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
4801.6030	48.28	---	0.44	48.72	---	74.00	54.00	-25.28	135	200
7206.0000	41.27	---	4.01	45.28	---	74.00	54.00	-28.72	110	200
9608.0000	34.92	---	9.14	44.06	---	74.00	54.00	-29.94	175	200
12017.0340	39.85	34.16	13.47	53.32	47.63	74.00	54.00	-6.37	315	200

Mode: TX 2457MHz
Polarization: Horizontal

Frequency (MHz)	Reading (dBuV)	Detector	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
51.3828	23.81	peak	14.08	37.89	40.00	-2.11	140	100
68.8777	26.63	peak	11.78	38.41	40.00	-1.59	135	100

Frequency (MHz)	Reading (dBuV) Peak	Ave.	Factor (dB) Corr.	Result (dBuV/m) Peak	Ave.	Limit (dBuV/m) Peak	Ave.	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
4913.8280	48.86	---	0.77	49.63	---	74.00	54.00	-24.37	170	200
7371.0000	42.30	---	4.38	46.68	---	74.00	54.00	-27.32	120	200
9828.0000	34.84	---	9.79	44.63	---	74.00	54.00	-29.37	230	200
12285.0000	33.01	---	14.13	47.14	---	74.00	54.00	-26.86	110	200

Polarization: Vertical

Frequency (MHz)	Reading (dBuV)	Detector	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
47.4950	24.45	peak	14.27	38.72	40.00	-1.28	160	100
66.9338	26.12	peak	12.05	38.17	40.00	-1.83	100	100

Frequency (MHz)	Reading (dBuV) Peak	Ave.	Factor (dB) Corr.	Result (dBuV/m) Peak	Ave.	Limit (dBuV/m) Peak	Ave.	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
4913.8280	47.23	---	0.77	48.00	---	74.00	54.00	-26.00	105	200
7371.0000	39.92	---	4.38	44.30	---	74.00	54.00	-29.70	160	200
9828.0000	35.00	---	9.79	44.79	---	74.00	54.00	-29.21	250	200
12285.0000	33.48	---	14.13	47.61	---	74.00	54.00	-26.39	230	200

Mode: TX 2479MHz
Polarization: Horizontal

Frequency (MHz)	Reading (dBuV)	Detector	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
51.3828	23.68	peak	14.08	37.76	40.00	-2.24	155	100
68.8777	27.02	peak	11.78	38.80	40.00	-1.20	210	100

Registration number: W6M21303-13066-C-1
FCC ID: IPH-02228

Frequency (MHz)	Reading (dBuV) Peak	Ave.	Factor (dB) Corr.	Result (dBuV/m) Peak	Ave.	Limit (dBuV/m) Peak	Ave.	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
4953.9080	48.03	---	1.06	49.09	---	74.00	54.00	-24.91	130	200
7437.0000	41.92	---	4.47	46.39	---	74.00	54.00	-27.61	175	200
9916.0000	34.55	---	9.65	44.20	---	74.00	54.00	-29.80	200	200
12395.0000	32.32	---	15.22	47.54	---	74.00	54.00	-26.46	190	200

Polarization: Vertical

Frequency (MHz)	Reading (dBuV)	Detector	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
47.4950	23.91	peak	14.27	38.18	40.00	-1.82	170	100
66.9340	26.40	peak	12.05	38.45	40.00	-1.55	145	100

Frequency (MHz)	Reading (dBuV) Peak	Ave.	Factor (dB) Corr.	Result (dBuV/m) Peak	Ave.	Limit (dBuV/m) Peak	Ave.	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
4953.9080	46.74	---	1.06	47.80	---	74.00	54.00	-26.20	120	200
7437.0000	40.74	---	4.47	45.21	---	74.00	54.00	-28.79	160	200
9916.0000	35.44	---	9.65	45.09	---	74.00	54.00	-28.91	100	200
12395.0000	33.29	---	15.22	48.51	---	74.00	54.00	-25.49	155	200

Note
1. **Correction Factor = Antenna factor + Cable loss - Preamplifier**
2. **The formula of measured value as: Test Result = Reading + Correction Factor**
3. **Detector function in the form : PK = Peak, QP = Quasi Peak, AV = Average**
4. **All not in the table noted test results are more than 20 dB below the relevant limits.**
5. **Measurement uncertainty for 3m measurement: 30-1000 MHz = ± 3.72 dB, 1-18 GHz = ± 5.33 dB, 18-40 GHz= ± 3.43 dB ; Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.**
6. **See attached diagrams in appendix.**

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

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

3.6 Radiated Emissions from Digital Part

Summary table with radiated data of the test plots

Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency of Emission (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

Note:

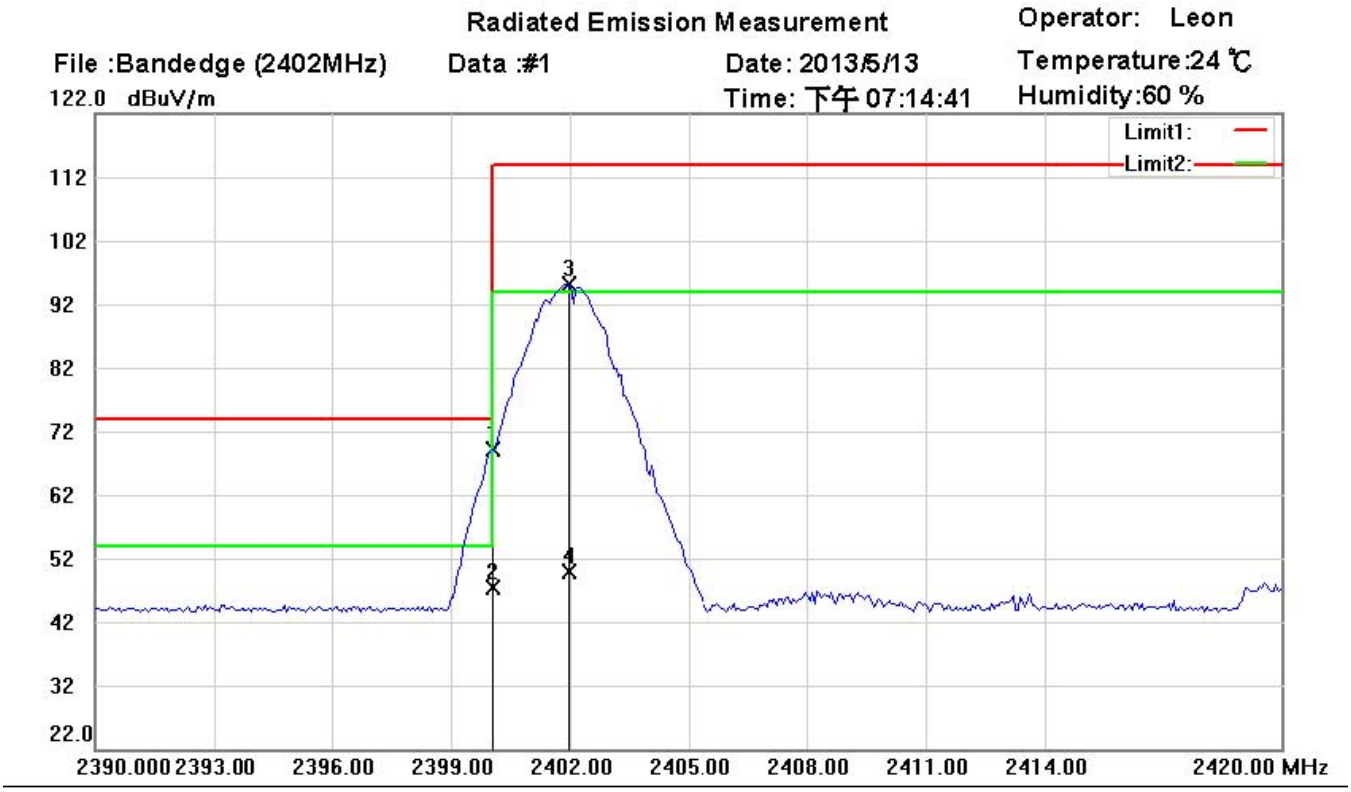
1. **Correction Factor = Antenna factor + Cable loss - Preamplifier**
2. **The formula of measured value as: Test Result = Reading + Correction Factor**
3. **Detector function in the form : PK = Peak, QP = Quasi Peak, AV = Average**
4. **All not in the table noted test results are more than 20 dB below the relevant limits.**
5. **Measurement uncertainty for 3m measurement : 30-1000 MHz = ± 3.72 dB, 1-18 GHz = ±5.33 dB, 18-40 GHz= ±3.43 dB ; Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.**

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

Explanation: The test results are listed in the separated test report no.: W6M21303-13066-P-15B.

3.7 Radiated Emission on the band edge

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

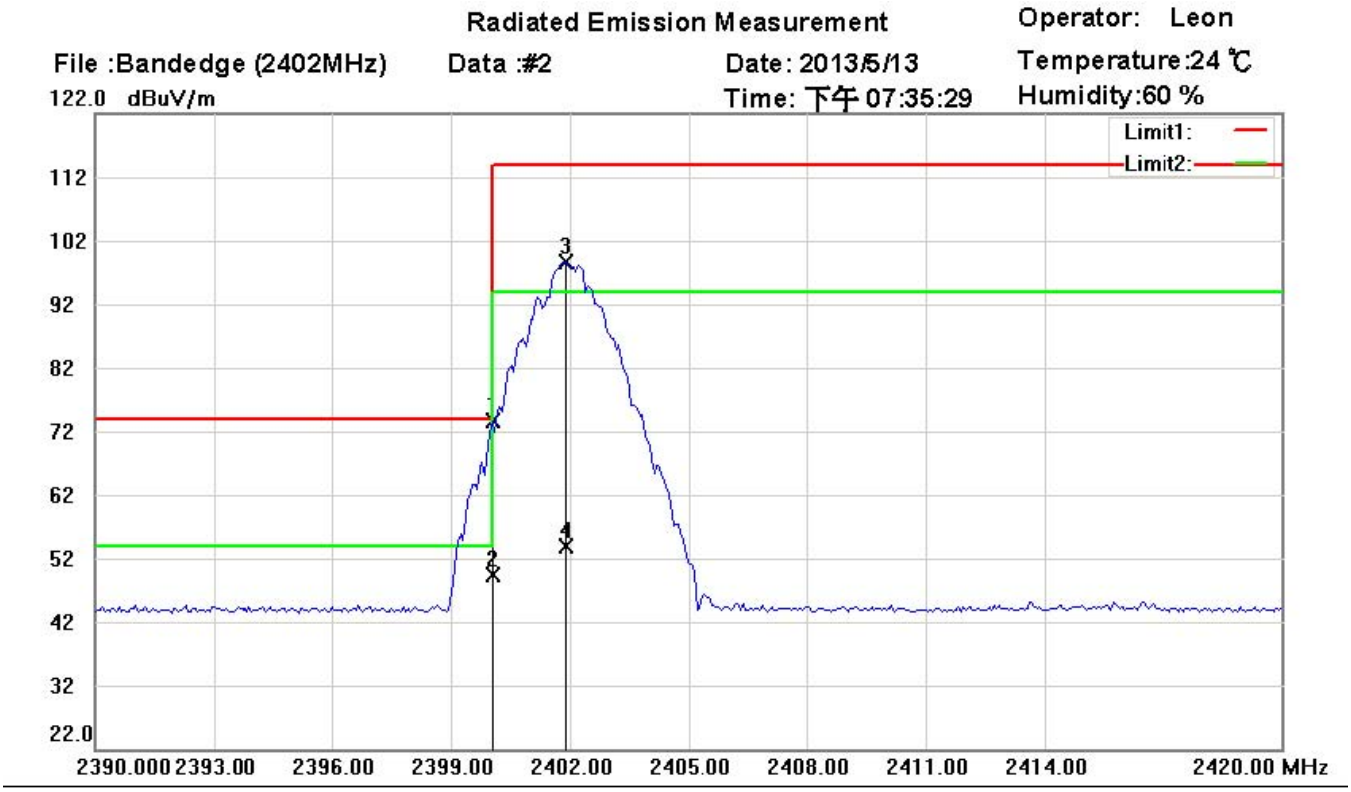


Site : Chamber
Condition : FCC 15.249 PK (Bandedge)
EUT : W6M21303-13066
M/N: DC50 Series
Test Mode : 2402MHz
Note :

Polarization: *Horizontal*
Power : 110VAC
Distance: 3m

Mk.	Frequency (MHz)	Reading (dBuV)	Detector	Corr. factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
*	2400.000	31.60	peak	37.50	69.10	74.00	200	310	-4.90	
	2400.000	10.00	AVG	37.50	47.50	54.00	200	310	-6.50	
	2401.904	57.66	peak	37.51	95.17	114.00	200	235	-18.83	
	2401.904	12.35	AVG	37.51	49.86	94.00	200	235	-44.14	

Registration number: W6M21303-13066-C-1
FCC ID: IPH-02228

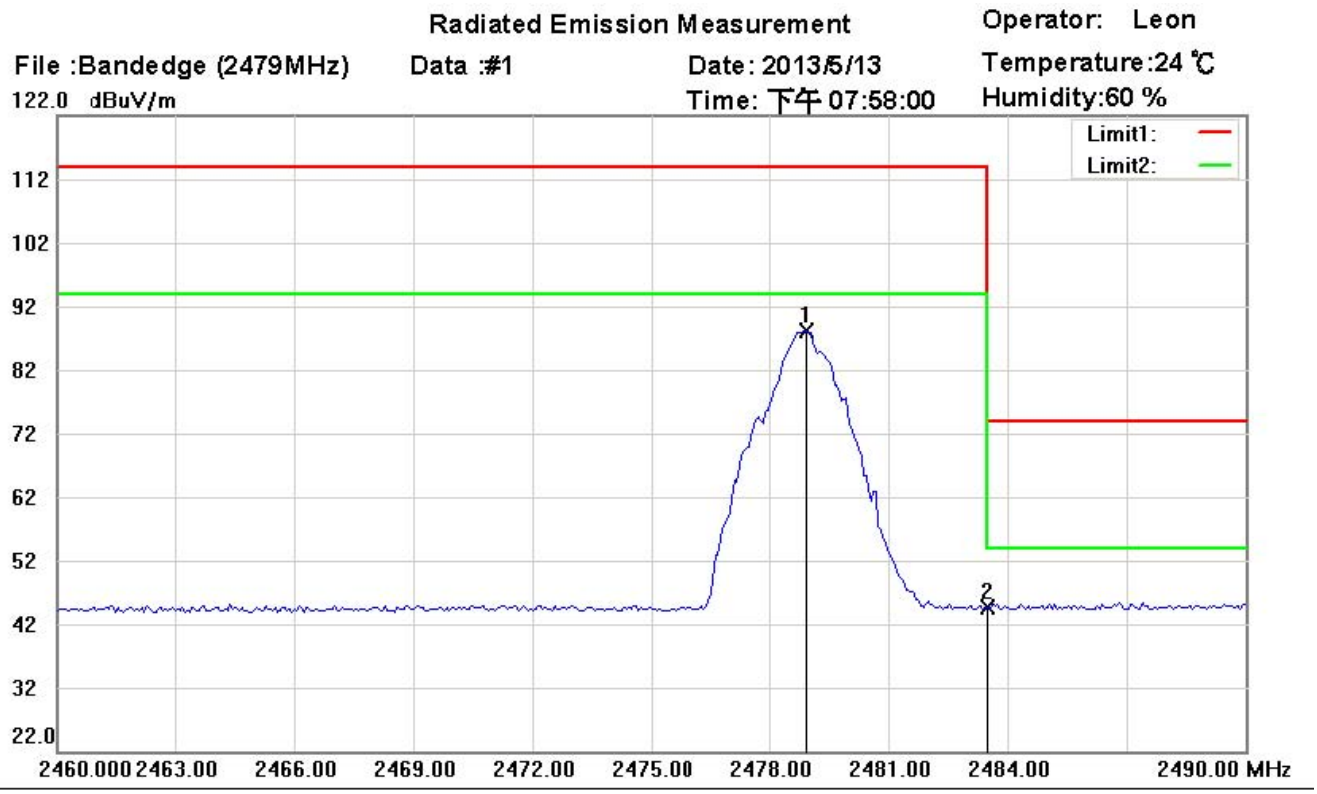


Site : Chamber
Condition : FCC 15.249 PK (Bandedge)
EUT : W6M21303-13066
M/N: DC50 Series
Test Mode : 2402MHz
Note :

Polarization: *Vertical*
Power : 110VAC
Distance: 3m

Mk.	Frequency (MHz)	Reading (dBuV)	Detector	Corr. factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
*	2400.000	36.14	peak	37.50	73.64	74.00	200	210	-0.36	
	2400.000	11.85	AVG	37.50	49.35	54.00	200	210	-4.65	
	2401.844	61.18	peak	37.51	98.69	114.00	200	205	-15.31	
	2401.844	16.37	AVG	37.51	53.88	94.00	200	205	-40.12	

Registration number: W6M21303-13066-C-1
FCC ID: IPH-02228

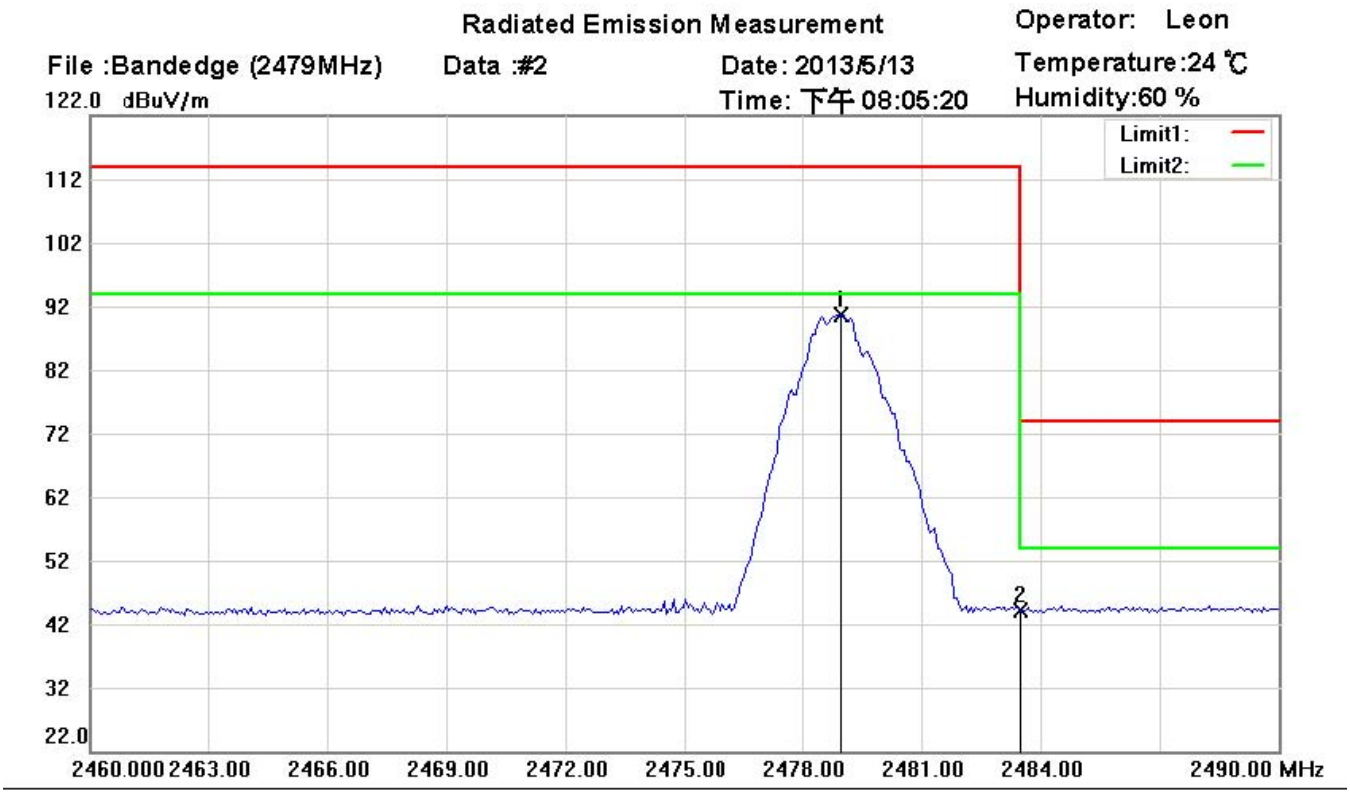


Site : Chamber
Condition : FCC 15.249 PK (Bandedge)
EUT : W6M21303-13066
M/N: DC50 Series
Test Mode : 2479MHz
Note :

Polarization: *Horizontal*
Power : 110VAC
Distance: 3m

Mk.	Frequency (MHz)	Reading (dBuV)	Detector	Corr. factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
*	2478.878	50.25	peak	37.80	88.05	114.00	200	155	-25.95	
	2483.500	6.87	peak	37.82	44.69	74.00	200	200	-29.31	

Registration number: W6M21303-13066-C-1
FCC ID: IPH-02228



Site : Chamber
Condition : FCC 15.249 PK (Bandedge)
EUT : W6M21303-13066
M/N: DC50 Series
Test Mode : 2479MHz
Note :

Polarization: *Vertical*
Power : 110VAC
Distance: 3m

Mk.	Frequency (MHz)	Reading (dBuV)	Detector	Corr. factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
*	2478.938	52.88	peak	37.80	90.68	114.00	200	230	-23.32	
	2483.500	6.30	peak	37.82	44.12	74.00	200	175	-29.88	

Limit:

Frequency Range (MHz)	Limit (dBμV/m)	
902 – 928 2400 – 2483.5 5725 – 5875 24000 - 24250	Peak	Average
	74	54

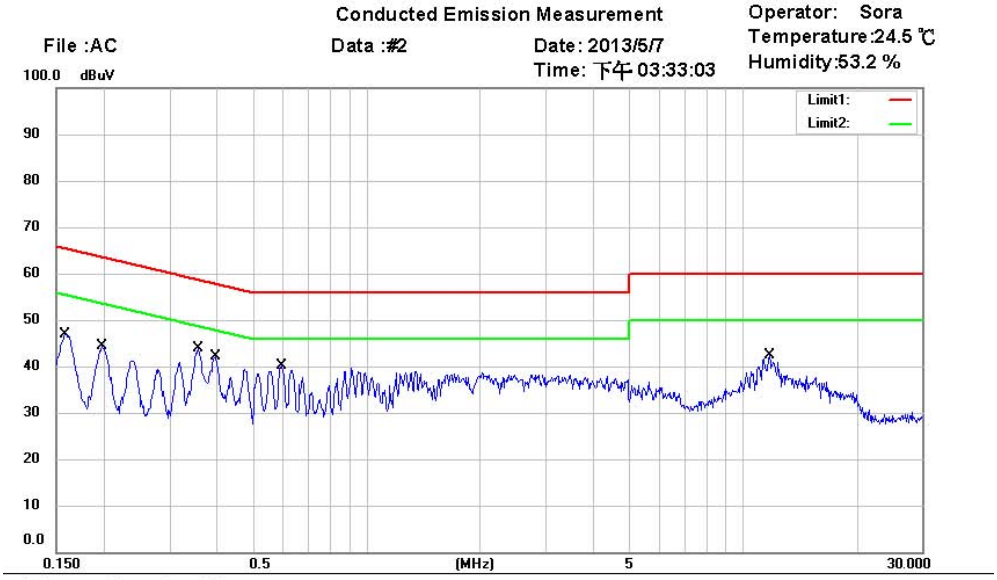
Test equipment used: ETSTW-RE 003, ETSTW-RE 004, ETSTW-RE 030, ETSTW-RE 044

3.8 Power Line Conducted Emission

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the table bellows with this provision shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminals.
This measurement was transact first with instrumentation using an average and peak detector and a 10 kHz bandwidth. If the peak detector achieves a calculated level, the measurement is repeated by an instrumentation using a quasi-peak detector.

Frequency	Level (dBμV)	
	quasi-peak	average
150 kHz	lower limit line	Lower limit line

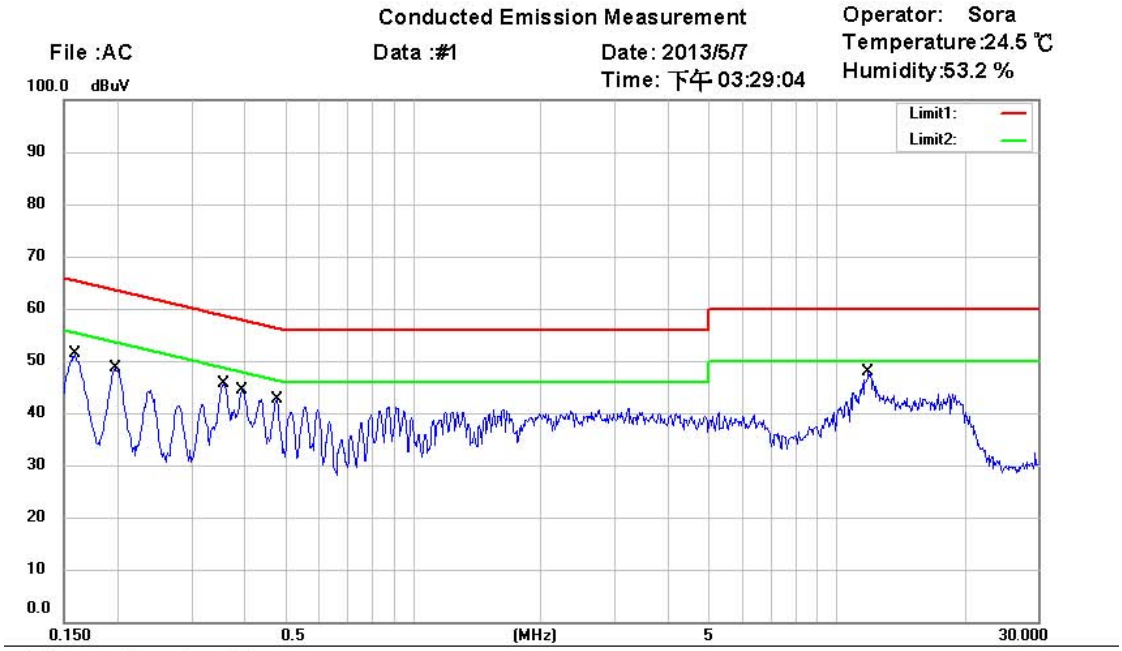
Adaptor 1 (P/N: 362-00072-00)



Site : Chamber_03
Condition : FCC Part 15 Class B Conduction (QP)
Phase: N
EUT : W6M21303-13066
Power : 110VAC
M/N: DC50 Series
Test Mode : Adaptor 1
Note :

Mk.	Frequency (MHz)	Reading (dBuV)	Detector	Corrected factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Comment
	0.1597	33.47	QP	10.12	43.59	65.48	-21.89	
	0.1597	19.05	AVG	10.12	29.17	55.48	-26.31	
	0.1993	31.25	QP	10.10	41.35	63.64	-22.29	
	0.1993	15.41	AVG	10.10	25.51	53.64	-28.13	
	0.3565	31.24	QP	10.11	41.35	58.81	-17.46	
*	0.3565	23.64	AVG	10.11	33.75	48.81	-15.06	
	0.3953	27.85	QP	10.11	37.96	57.95	-19.99	
	0.3953	20.19	AVG	10.11	30.30	47.95	-17.65	
	0.5972	26.95	QP	10.12	37.07	56.00	-18.93	
	0.5972	19.69	AVG	10.12	29.81	46.00	-16.19	
	11.6930	24.22	QP	10.65	34.87	60.00	-25.13	
	11.6930	11.12	AVG	10.65	21.77	50.00	-28.23	

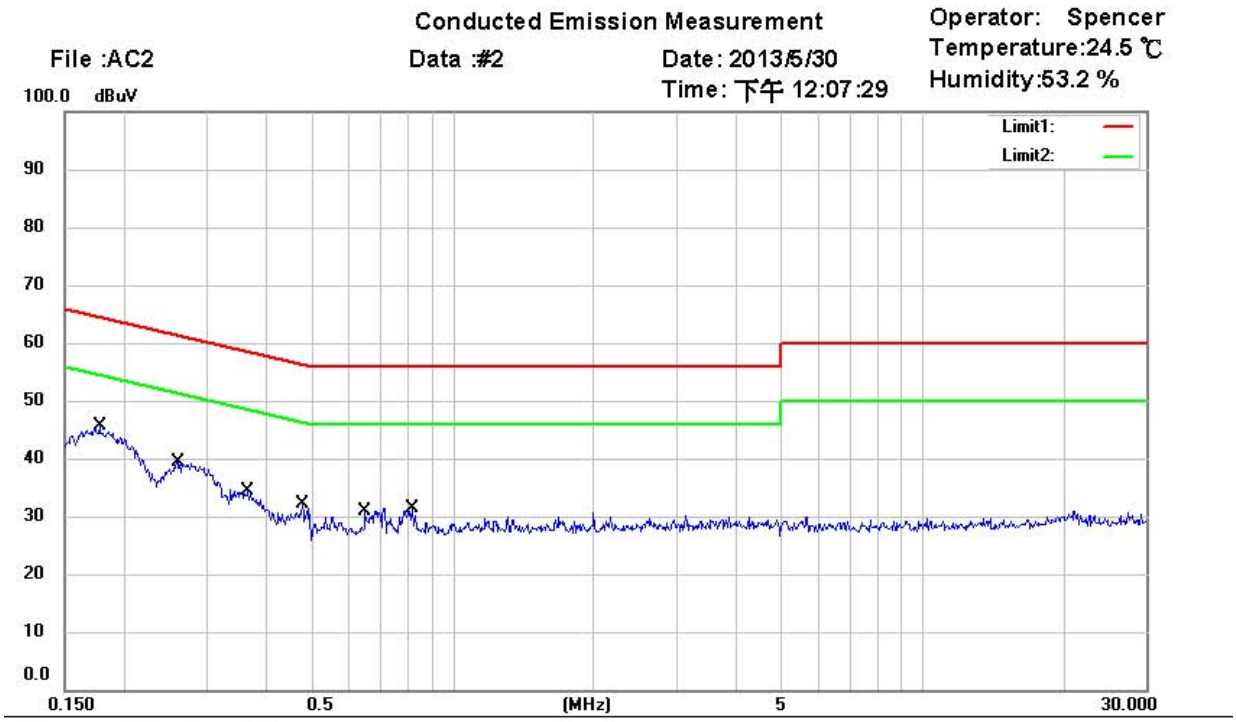
Registration number: W6M21303-13066-C-1
FCC ID: IPH-02228



Site : Chamber_03
Condition : FCC Part 15 Class B Conduction (QP)
Phase: L1
EUT : W6M21303-13066
Power : 110VAC
M/N: DC50 Series
Test Mode : Adaptor 1
Note :

Mk.	Frequency (MHz)	Reading (dBuV)	Detector	Corrected factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Comment
	0.1590	37.45	QP	10.11	47.56	65.52	-17.96	
	0.1590	26.67	AVG	10.11	36.78	55.52	-18.74	
	0.1981	35.58	QP	10.09	45.67	63.69	-18.02	
	0.1981	26.33	AVG	10.09	36.42	53.69	-17.27	
	0.3571	34.02	QP	10.11	44.13	58.80	-14.67	
*	0.3571	27.97	AVG	10.11	38.08	48.80	-10.72	
	0.3980	30.81	QP	10.11	40.92	57.90	-16.98	
	0.3980	23.14	AVG	10.11	33.25	47.90	-14.65	
	0.4756	31.26	QP	10.12	41.38	56.42	-15.04	
	0.4756	25.51	AVG	10.12	35.63	46.42	-10.79	
	11.8577	27.34	QP	10.78	38.12	60.00	-21.88	
	11.8577	14.59	AVG	10.78	25.37	50.00	-24.63	

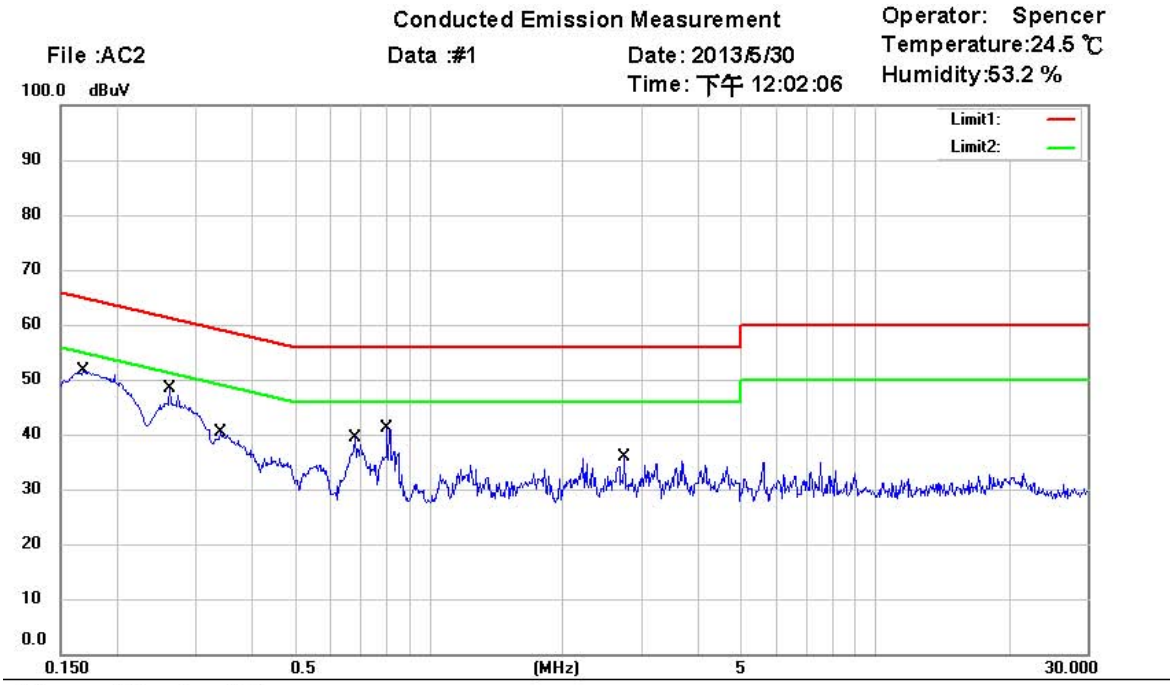
Registration number: W6M21303-13066-C-1
FCC ID: IPH-02228
Adaptor 2 (P/N: 362-00072-00)



Site : Chamber_03
Condition : FCC Part 15 Class B Conduction (QP)
Phase: N
EUT : W6M21303-13066
Power : 110VAC
M/N: DC50 Series
Test Mode : Adaptor 2
Note :

Mk.	Frequency (MHz)	Reading (dBuV)	Detector	Corrected factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Comment
	0.1775	-2.52	QP	10.11	7.59	64.60	-57.01	
	0.1775	-7.33	AVG	10.11	2.78	54.60	-51.82	
	0.2590	-2.54	QP	10.11	7.57	61.46	-53.89	
	0.2590	-7.27	AVG	10.11	2.84	51.46	-48.62	
	0.3658	-2.59	QP	10.11	7.52	58.60	-51.08	
	0.3658	-7.26	AVG	10.11	2.85	48.60	-45.75	
	0.4778	-2.53	QP	10.12	7.59	56.38	-48.79	
	0.4778	-7.30	AVG	10.12	2.82	46.38	-43.56	
	0.6507	-2.57	QP	10.13	7.56	56.00	-48.44	
*	0.6507	-7.23	AVG	10.13	2.90	46.00	-43.10	
	0.8195	-2.62	QP	10.13	7.51	56.00	-48.49	
	0.8195	-7.26	AVG	10.13	2.87	46.00	-43.13	

Registration number: W6M21303-13066-C-1
FCC ID: IPH-02228



Site : Chamber_03
Condition : FCC Part 15 Class B Conduction (QP)
Phase: L1
EUT : W6M21303-13066
Power : 110VAC
M/N: DC50 Series
Test Mode : Adaptor 2
Note :

Mk.	Frequency (MHz)	Reading (dBuV)	Detector	Corrected factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Comment
*	0.1682	33.10	QP	10.11	43.21	65.05	-21.84	
	0.1682	15.28	AVG	10.11	25.39	55.05	-29.66	
	0.2630	27.09	QP	10.10	37.19	61.34	-24.15	
	0.2630	12.27	AVG	10.10	22.37	51.34	-28.97	
	0.3406	18.81	QP	10.11	28.92	59.19	-30.27	
	0.3406	4.71	AVG	10.11	14.82	49.19	-34.37	
	0.6821	18.35	QP	10.13	28.48	56.00	-27.52	
	0.6821	13.04	AVG	10.13	23.17	46.00	-22.83	
	0.8037	18.31	QP	10.13	28.44	56.00	-27.56	
	0.8037	12.59	AVG	10.13	22.72	46.00	-23.28	
	2.7410	9.77	QP	10.24	20.01	56.00	-35.99	
	2.7410	4.24	AVG	10.24	14.48	46.00	-31.52	

Note: 1. The formula of measured value as: Test Result = Reading + Correction Factor
2. The Correction Factor = Cable Loss + LISN Insertion Loss
3. Detector function in the form : PK = Peak, QP = Qusai Peak, AV = Average
4. All not in the table noted test results are more than 20 dB below the relevant limits.
5. Measurement uncertainty = ±1.60 dB; Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.
6. Up Line: QP Limit Line, Down Line: Ave Limit Line.

Registration number: W6M21303-13066-C-1
FCC ID: IPH-02228

Limits:

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

Test equipment used: ETSTW-CE 001, ETSTW-CE 004, ETSTW-CE 006, ETSTW-RE045

Appendix

Measurement diagrams

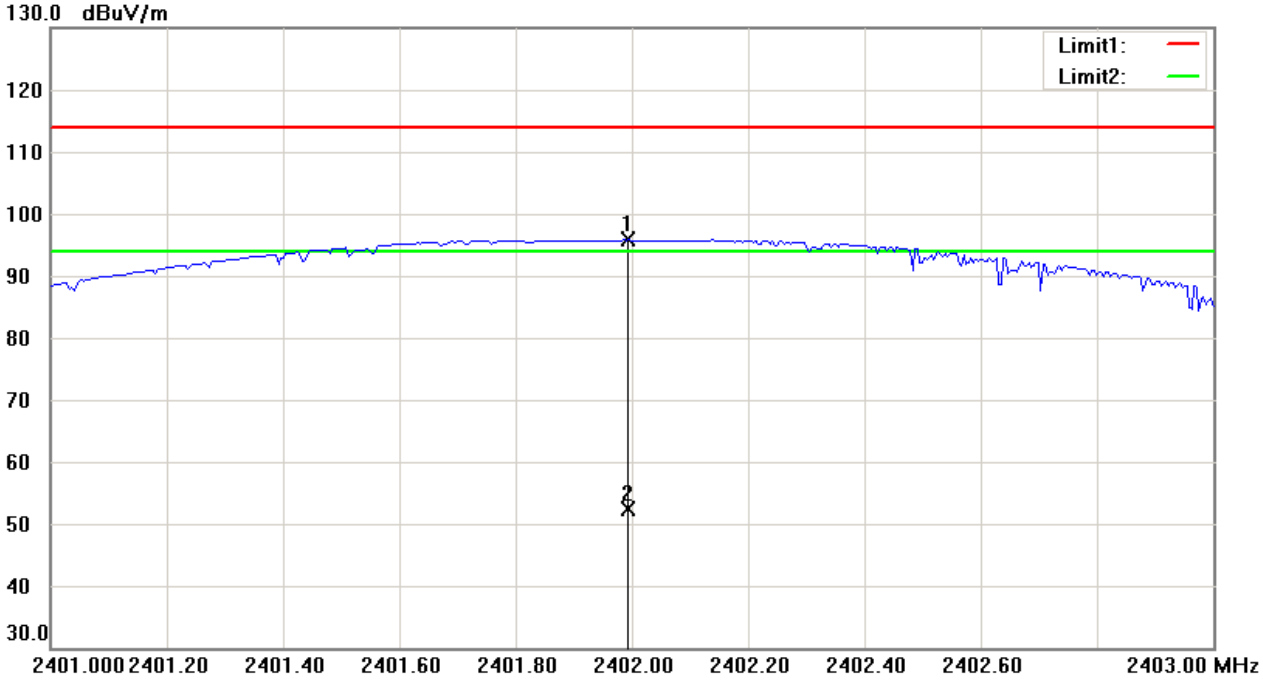
1. Fundamental Field Strength
2. Spurious Emissions radiated

Registration number: W6M21303-13066-C-1
FCC ID: IPH-02228

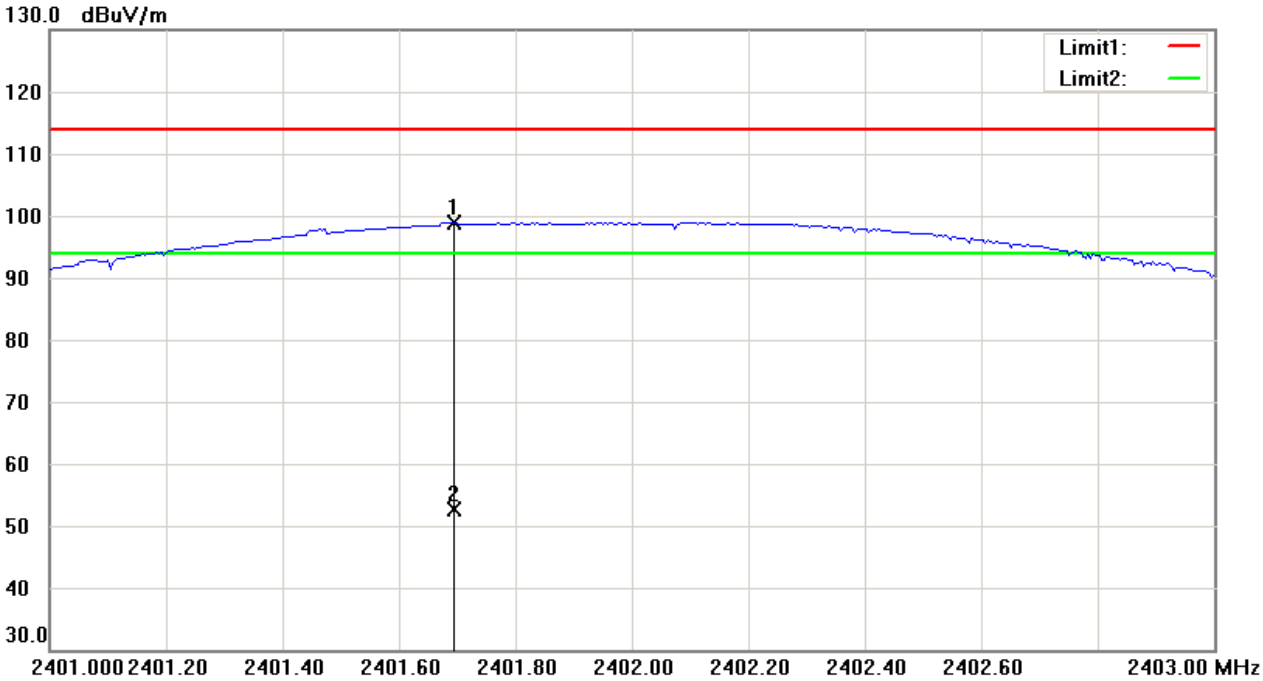
Fundamental Field Strength

2402MHz

Antenna Polarization H



Antenna Polarization V



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

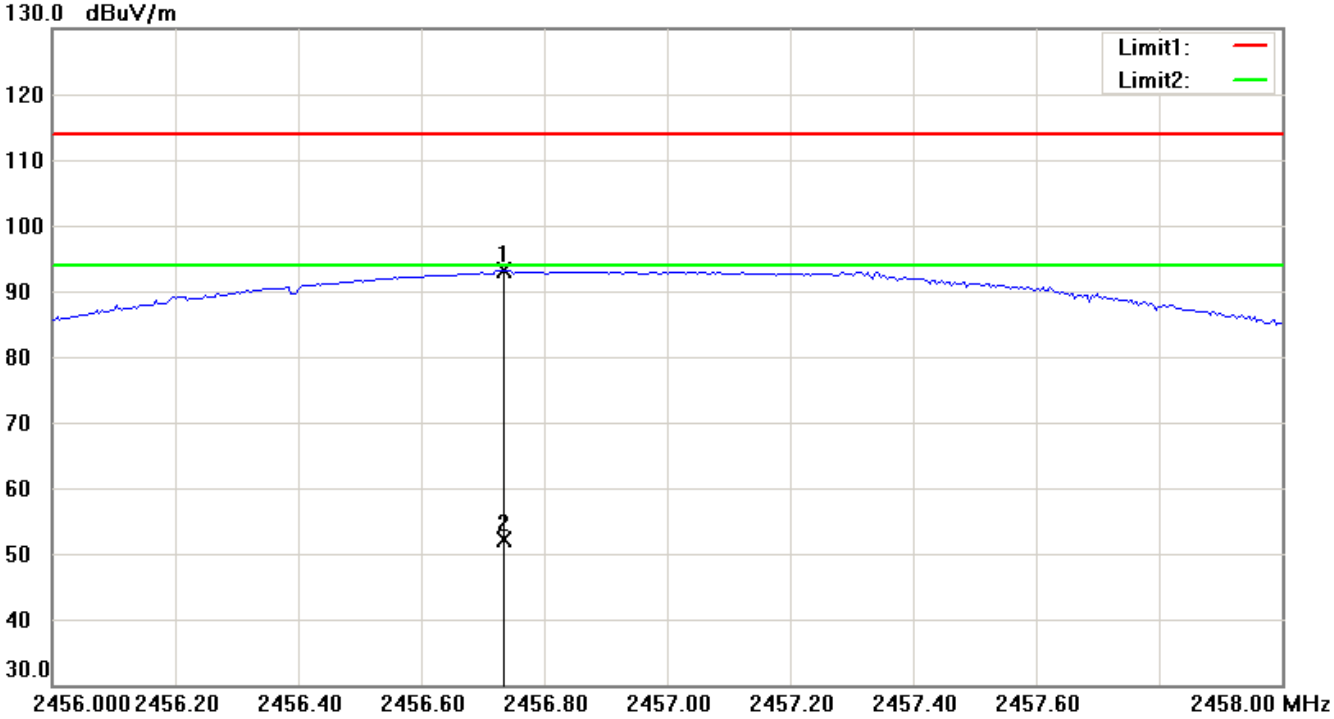
Note:

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 fundamental field strength test data of this test report.**

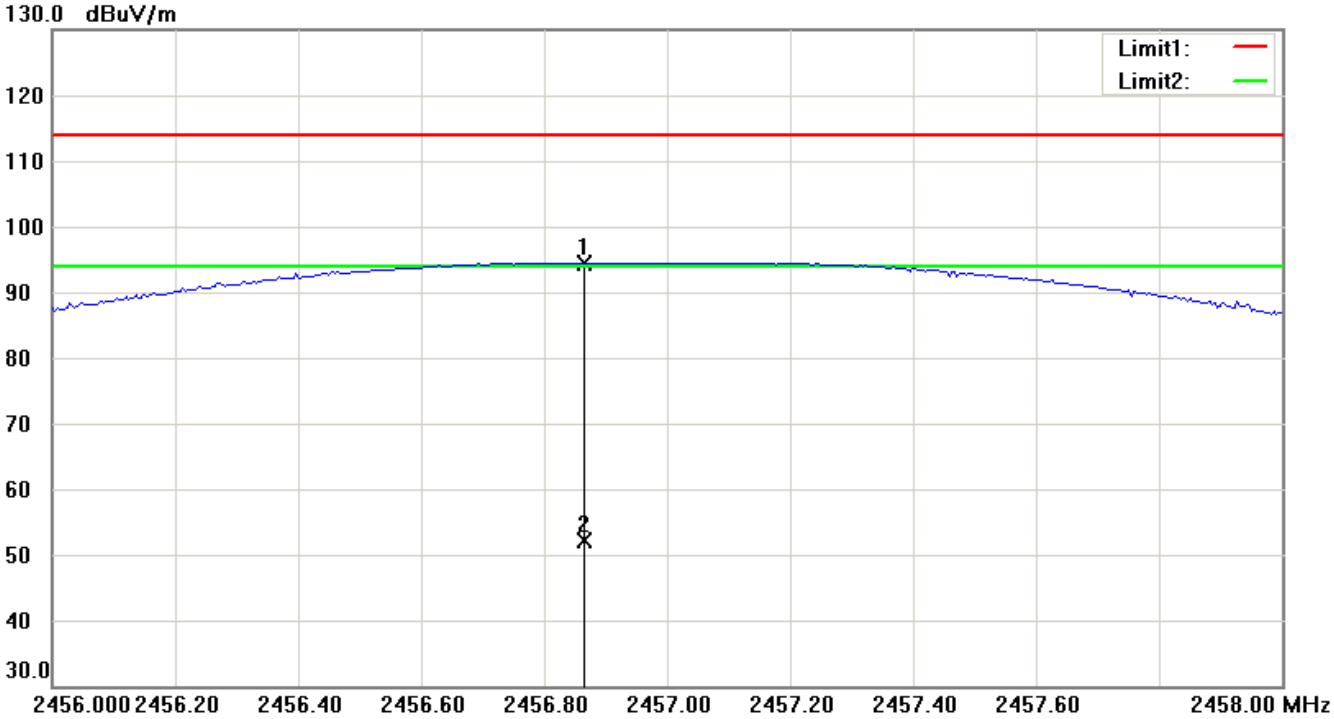
Registration number: W6M21303-13066-C-1
FCC ID: IPH-02228

2457MHz

Antenna Polarization H



Antenna Polarization V



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

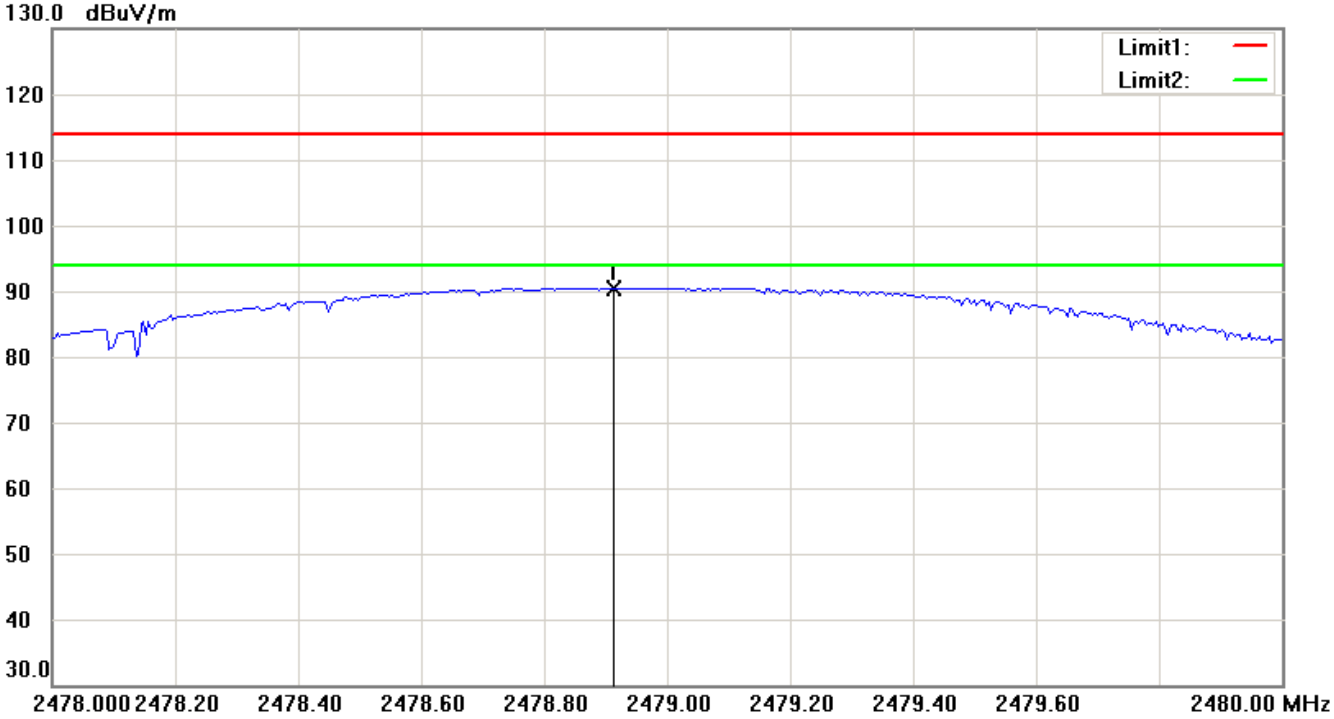
Note:

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 fundamental field strength test data of this test report.**

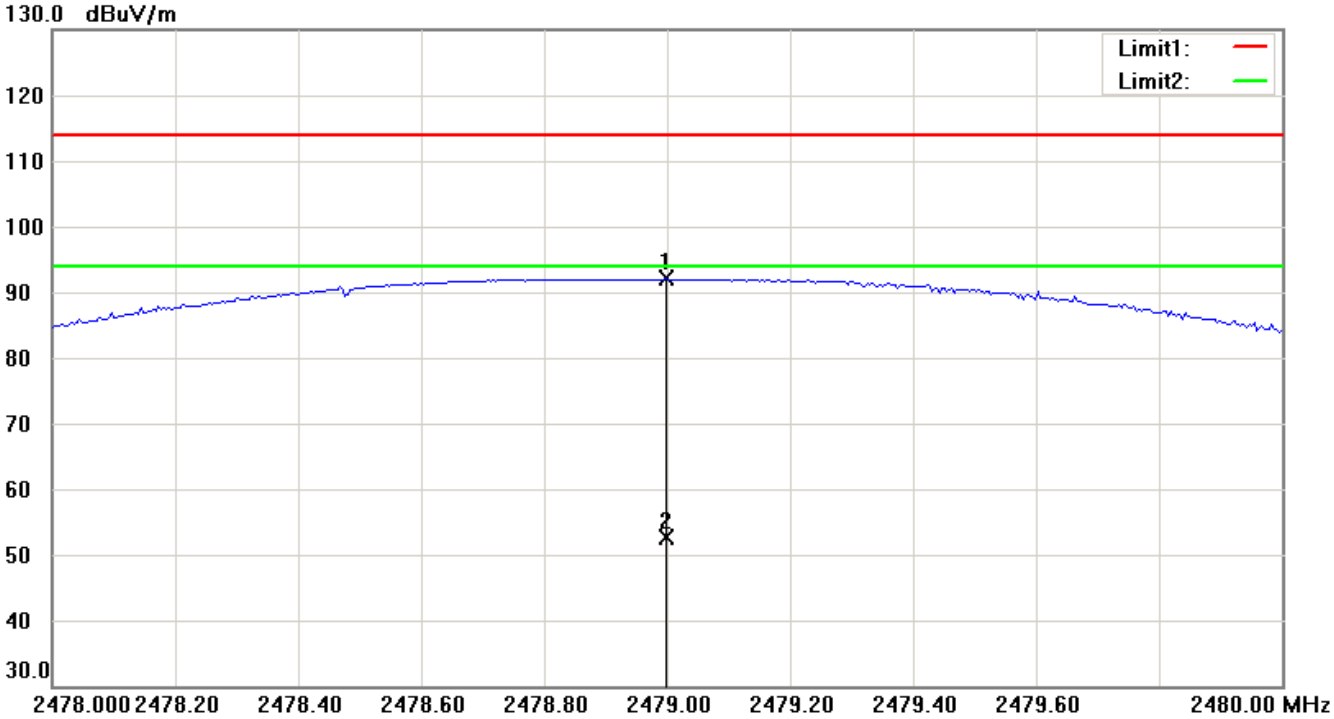
Registration number: W6M21303-13066-C-1
FCC ID: IPH-02228

2479MHz

Antenna Polarization H



Antenna Polarization V



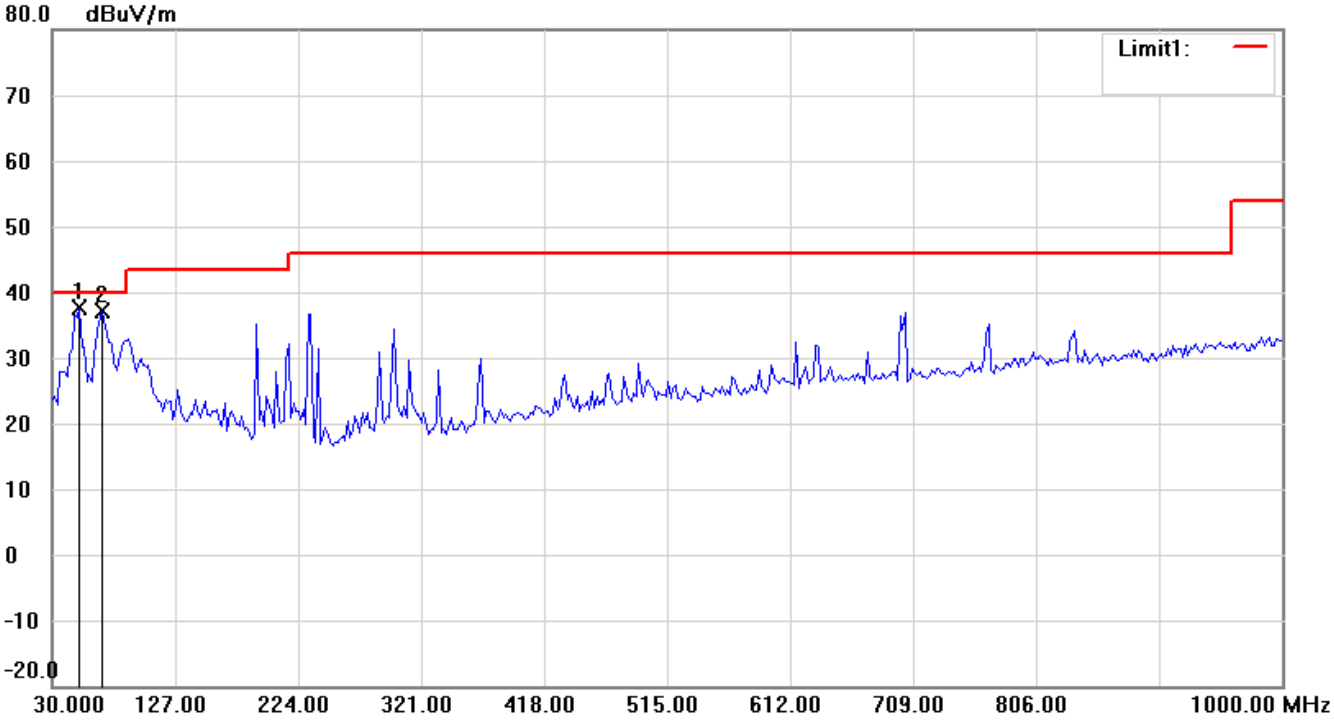
Up Line: Peak Limit Line Down Line: Ave Limit Line

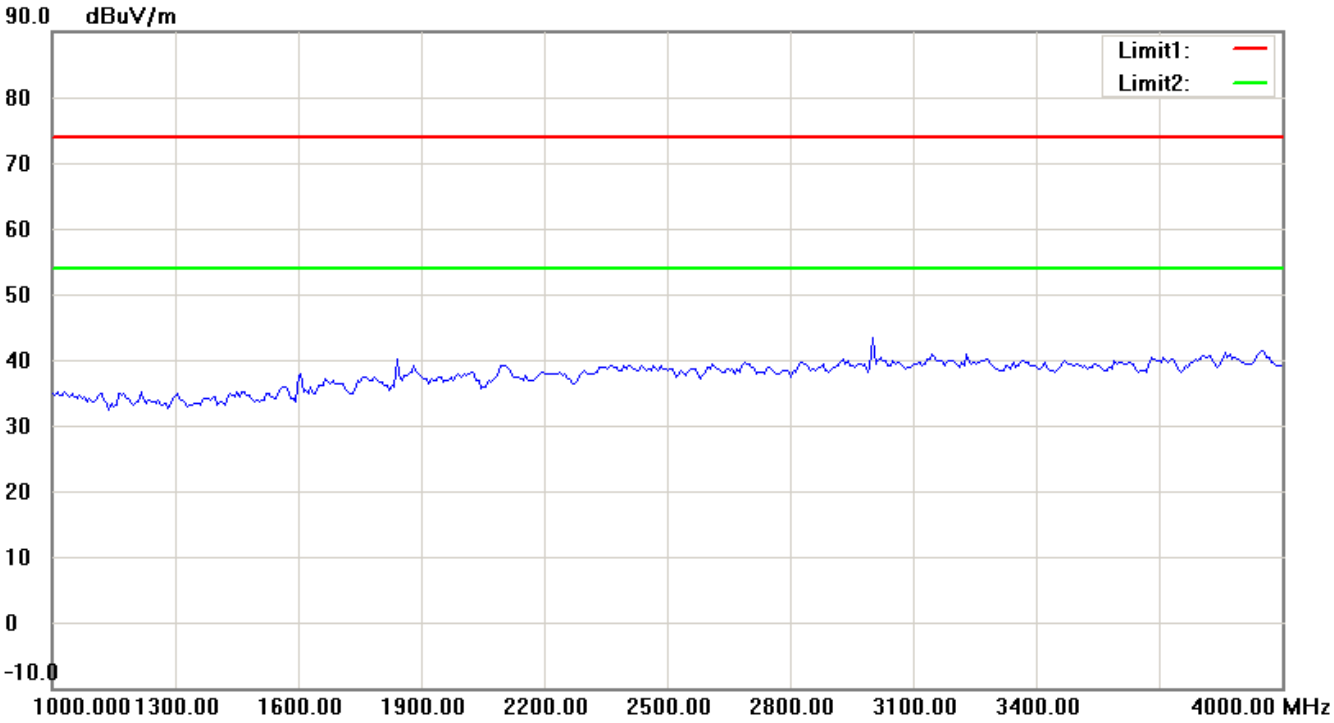
Note:

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 fundamental field strength test data of this test report.**

Registration number: W6M21303-13066-C-1
FCC ID: IPH-02228

Spurious Emissions radiated_ Transmitter
TX 2402MHz
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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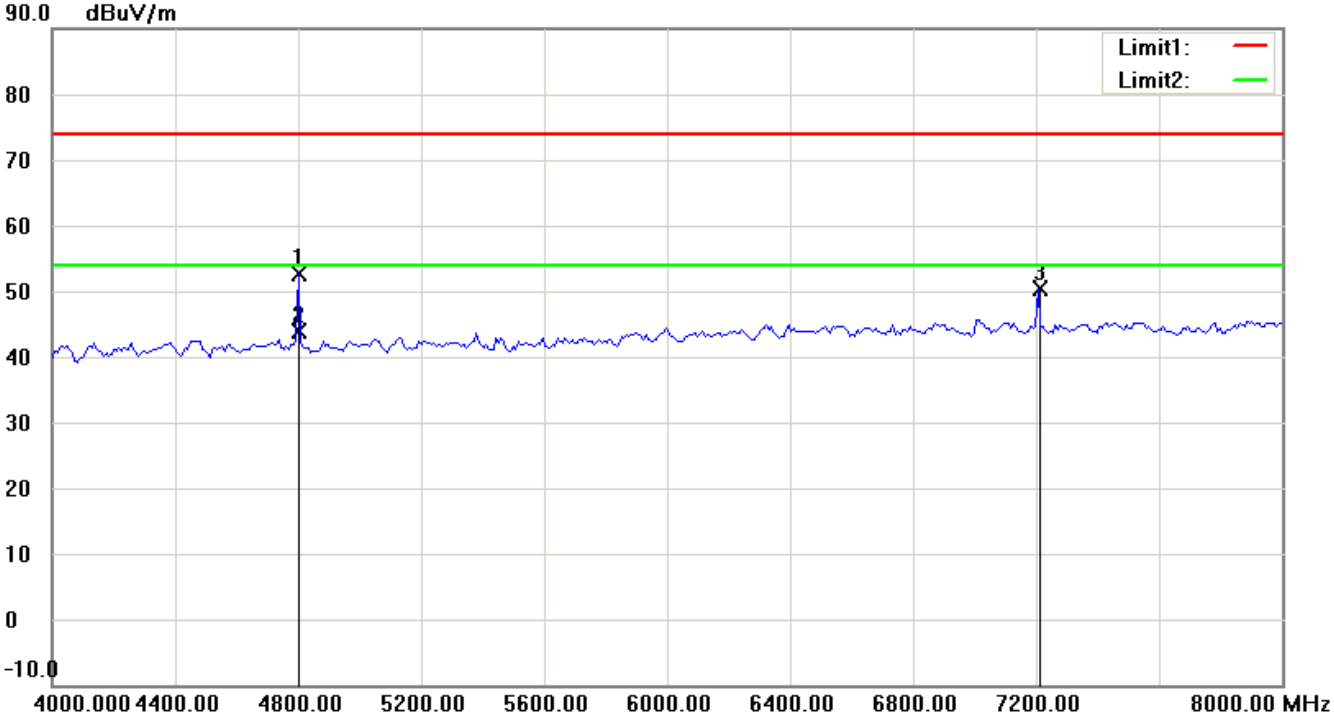
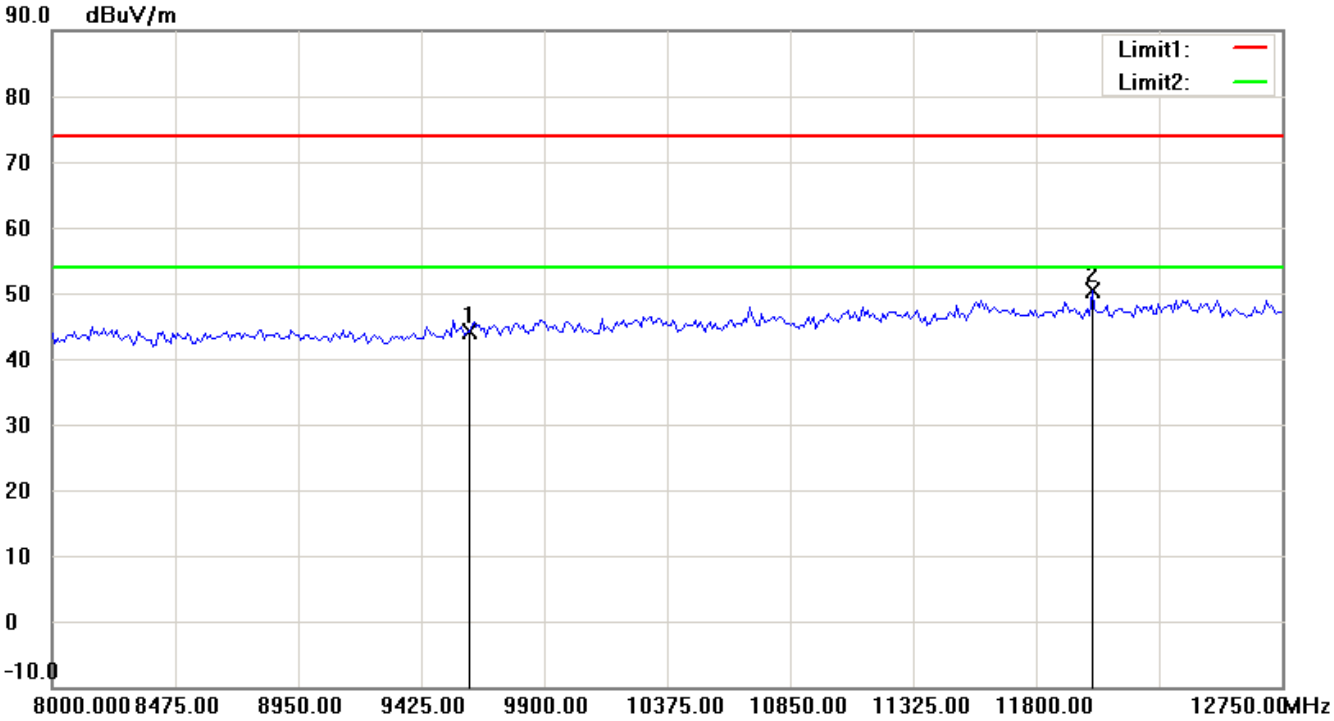
3. **For corrected test results are listed in the relevant table of radiated test data of this test report.**

Registration number: W6M21303-13066-C-1
FCC ID: IPH-02228





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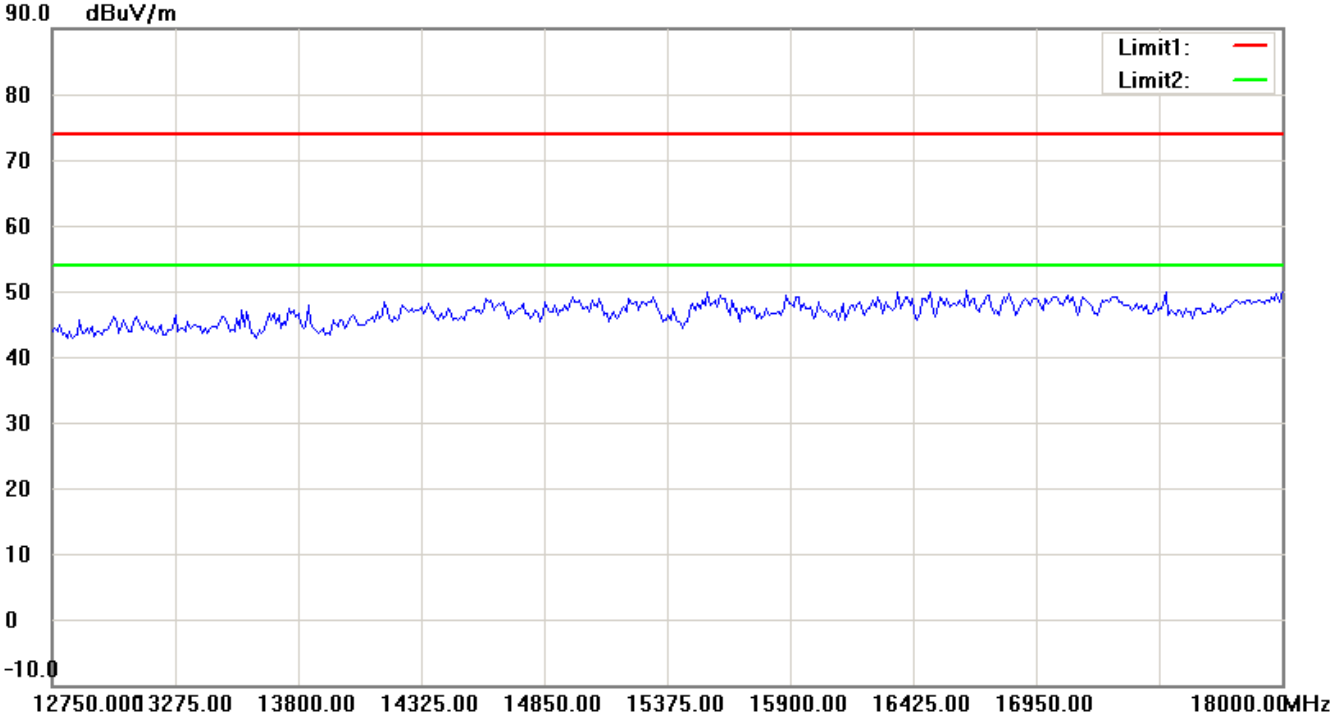

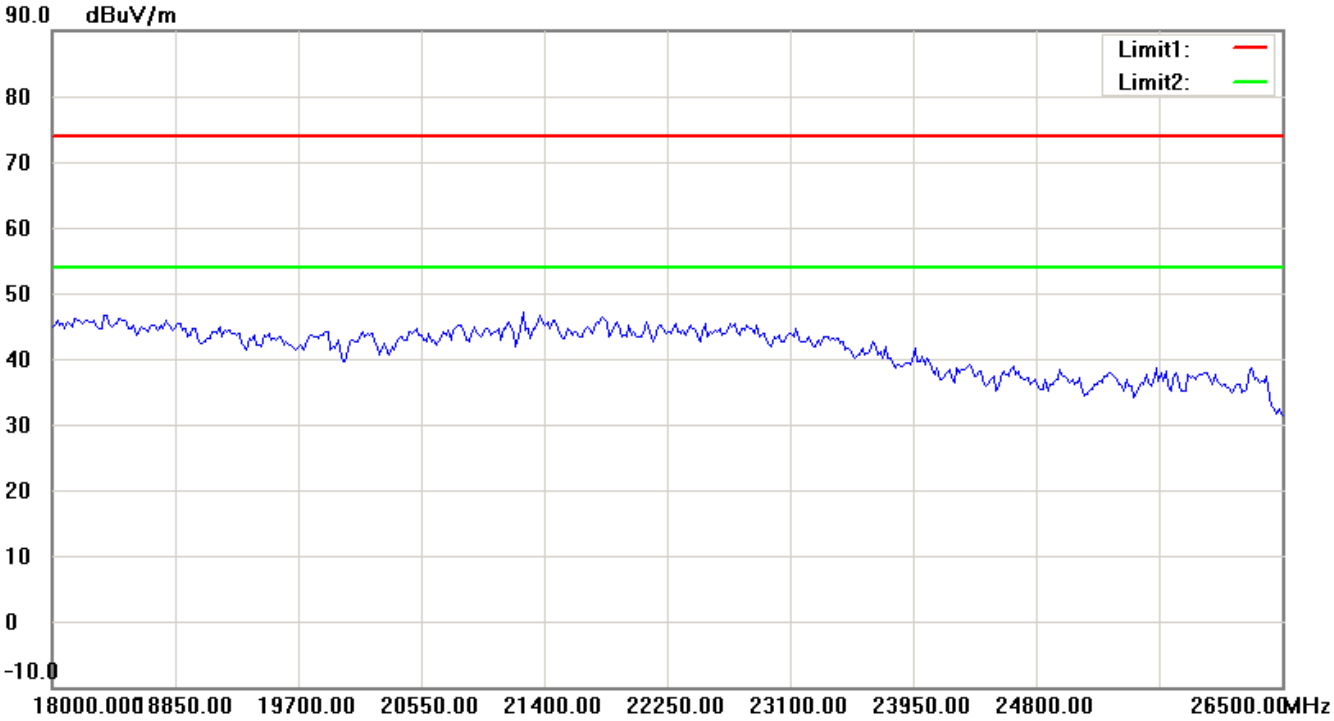

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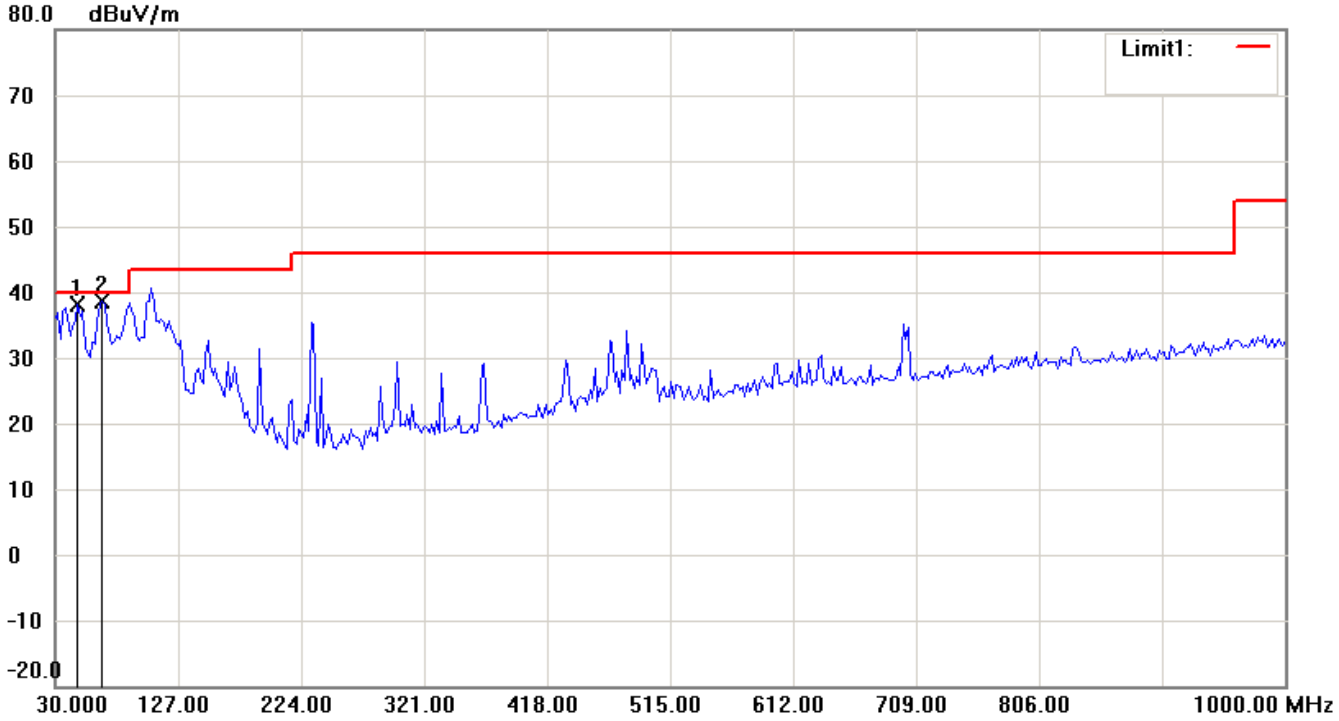
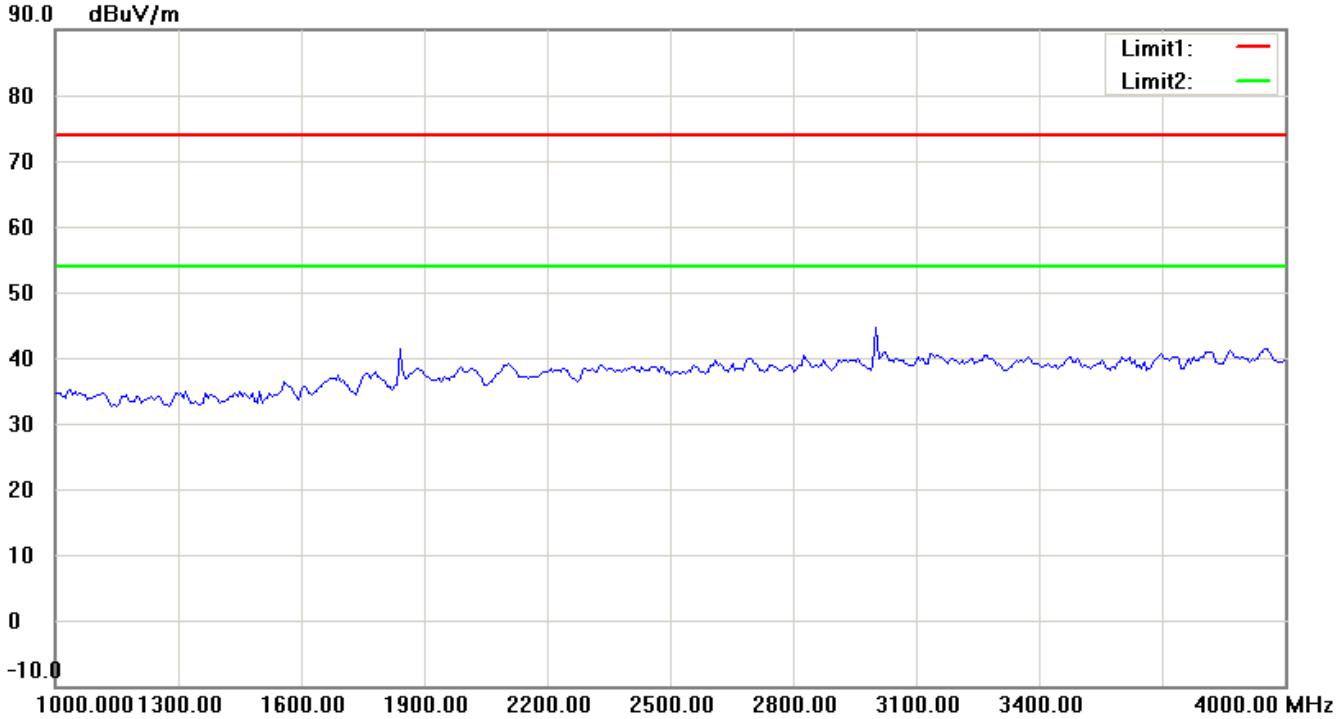
Registration number: W6M21303-13066-C-1
FCC ID: IPH-02228

Antenna Polarization V





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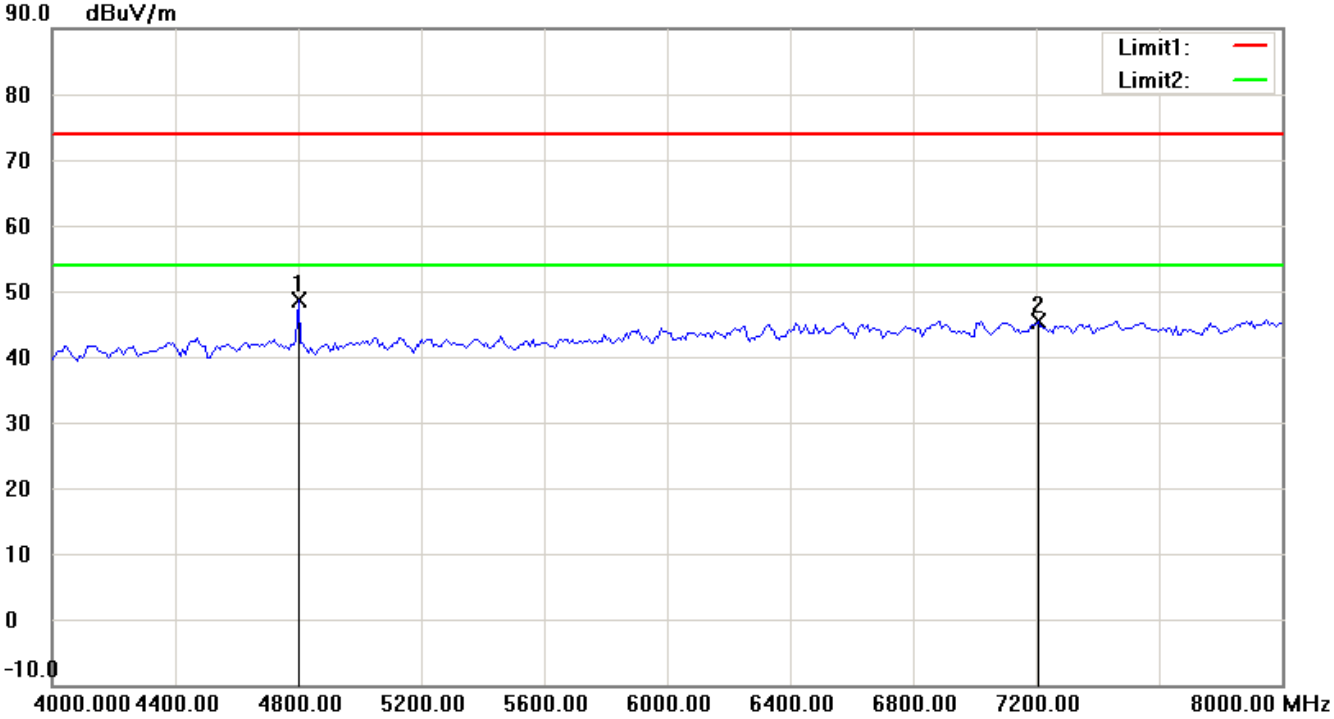

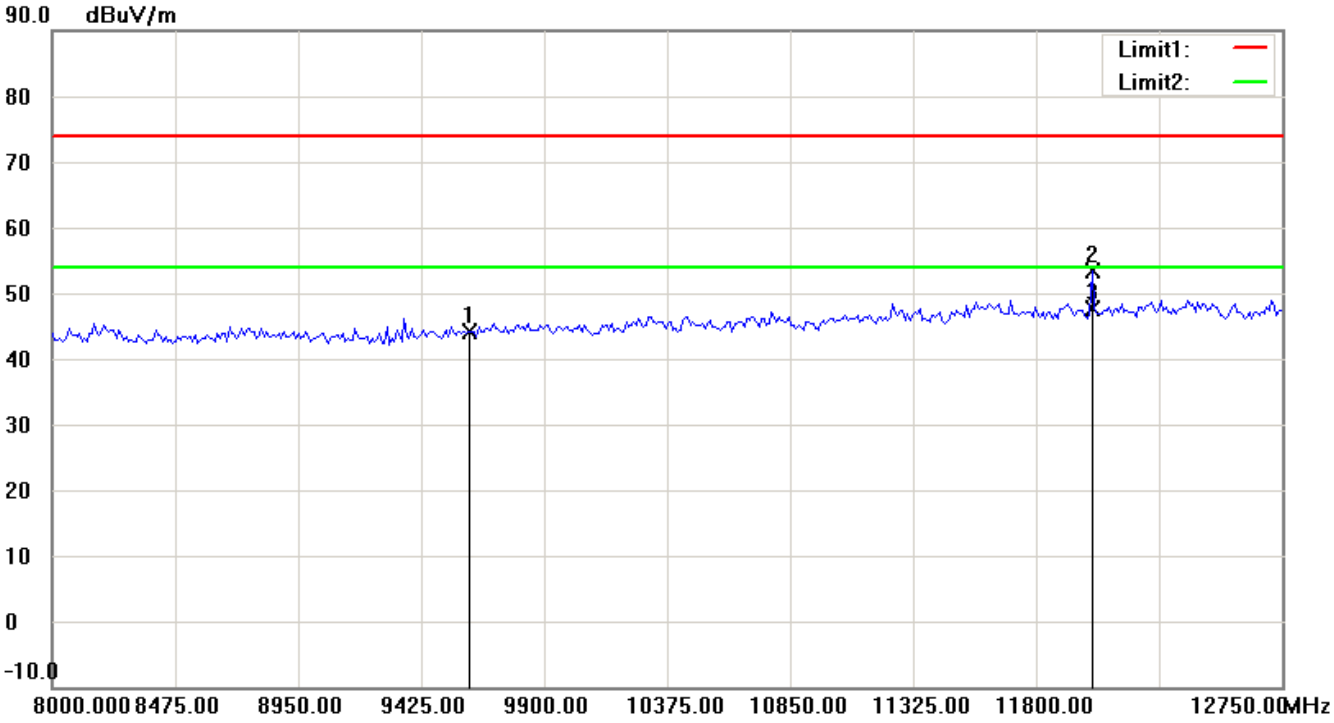

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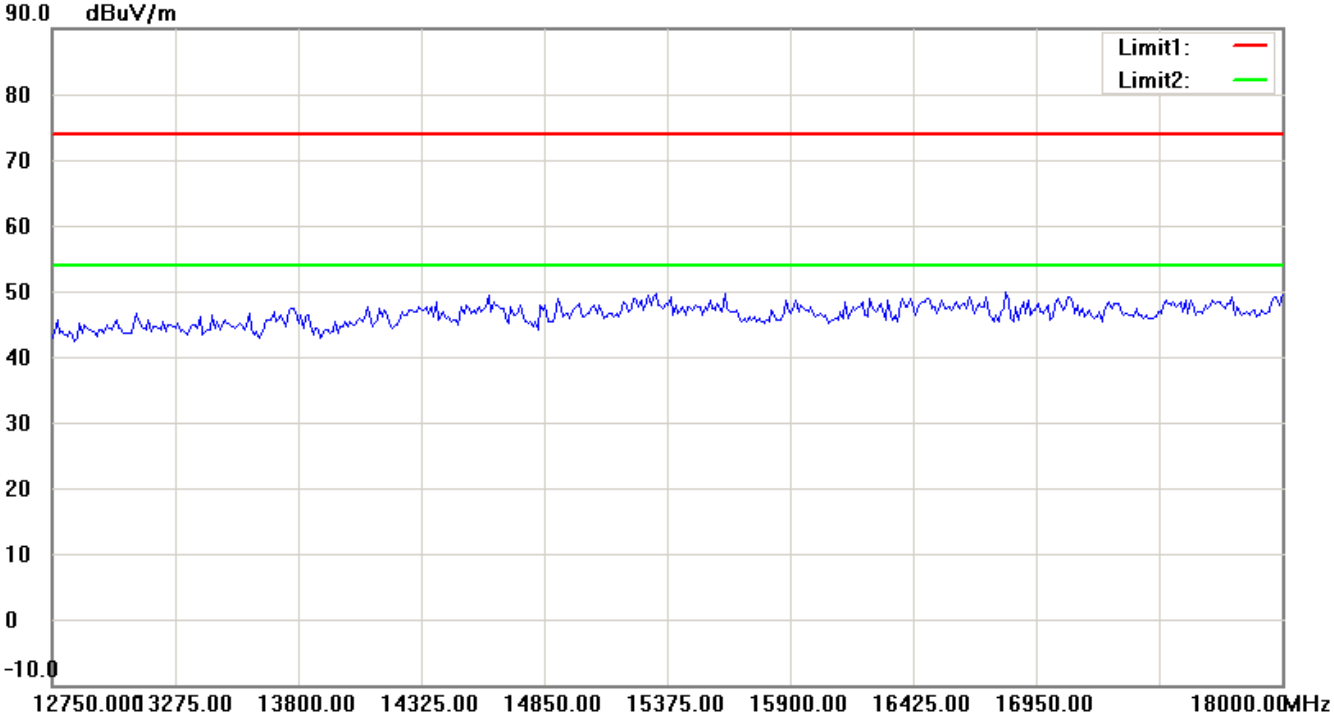

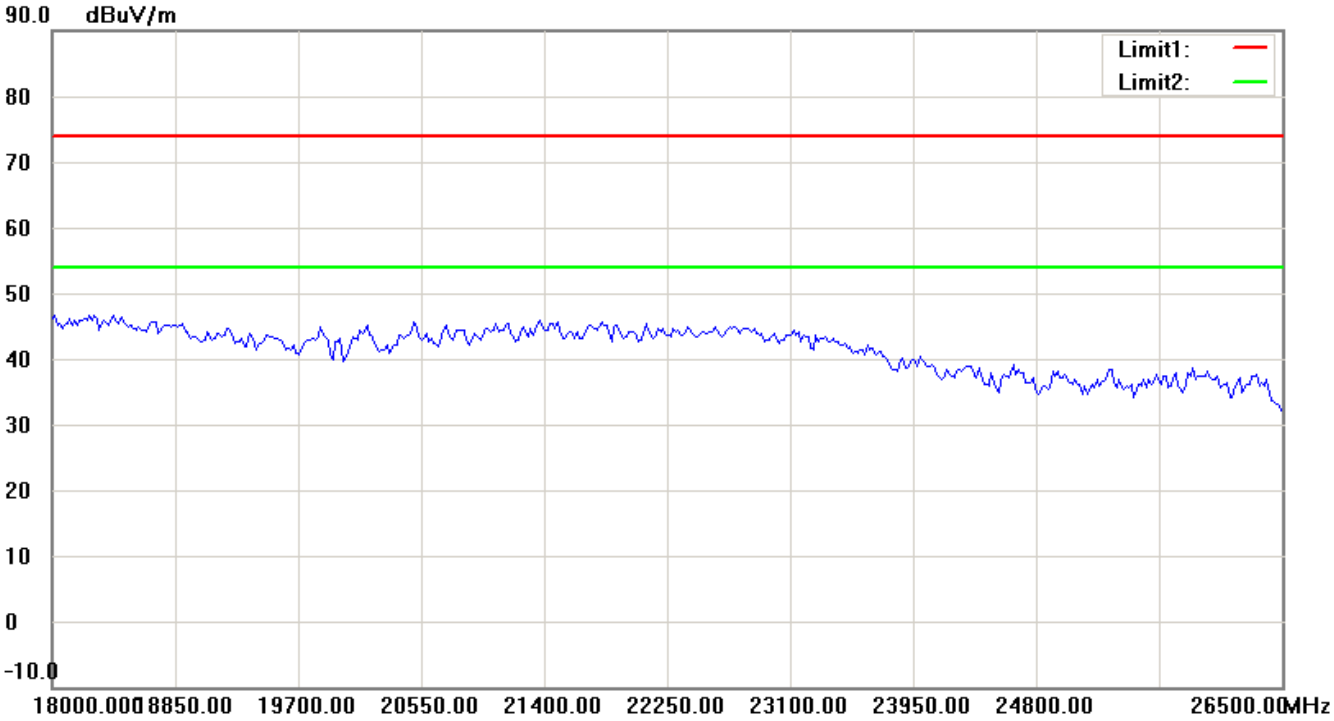

Up Line: Peak Limit Line
Down Line: Ave Limit Line
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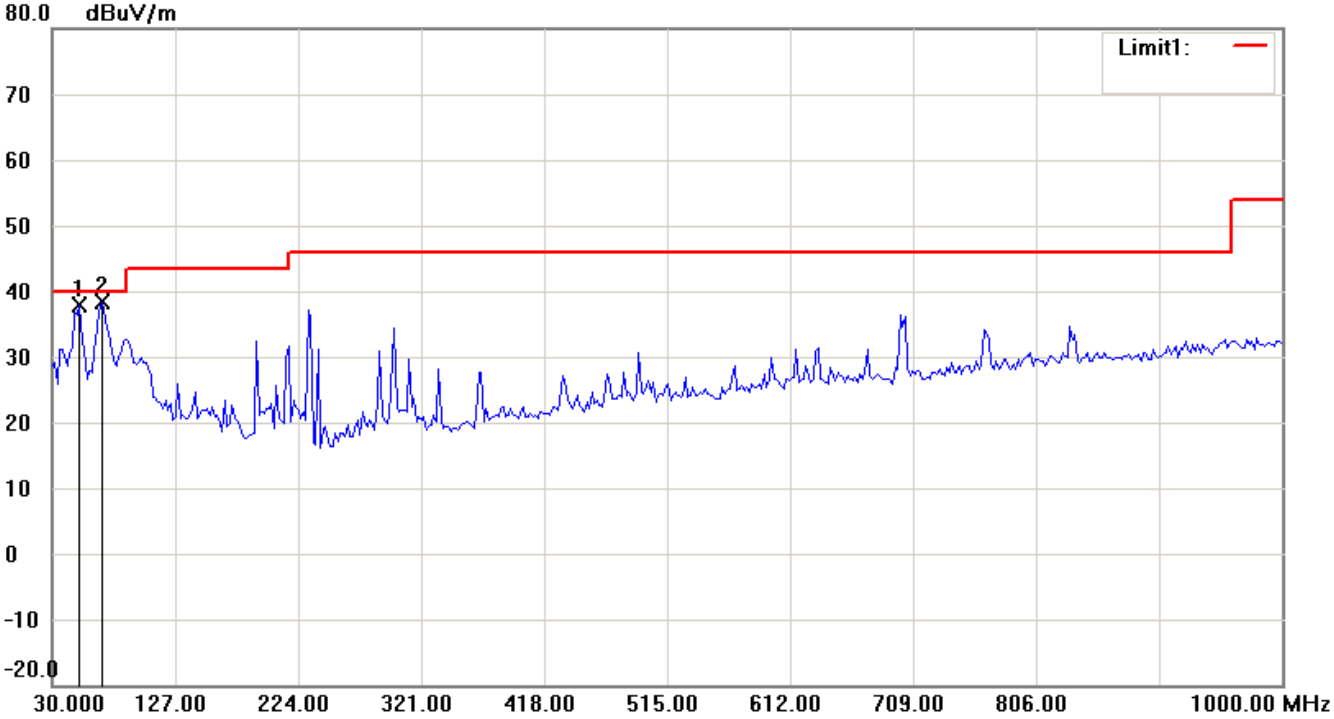
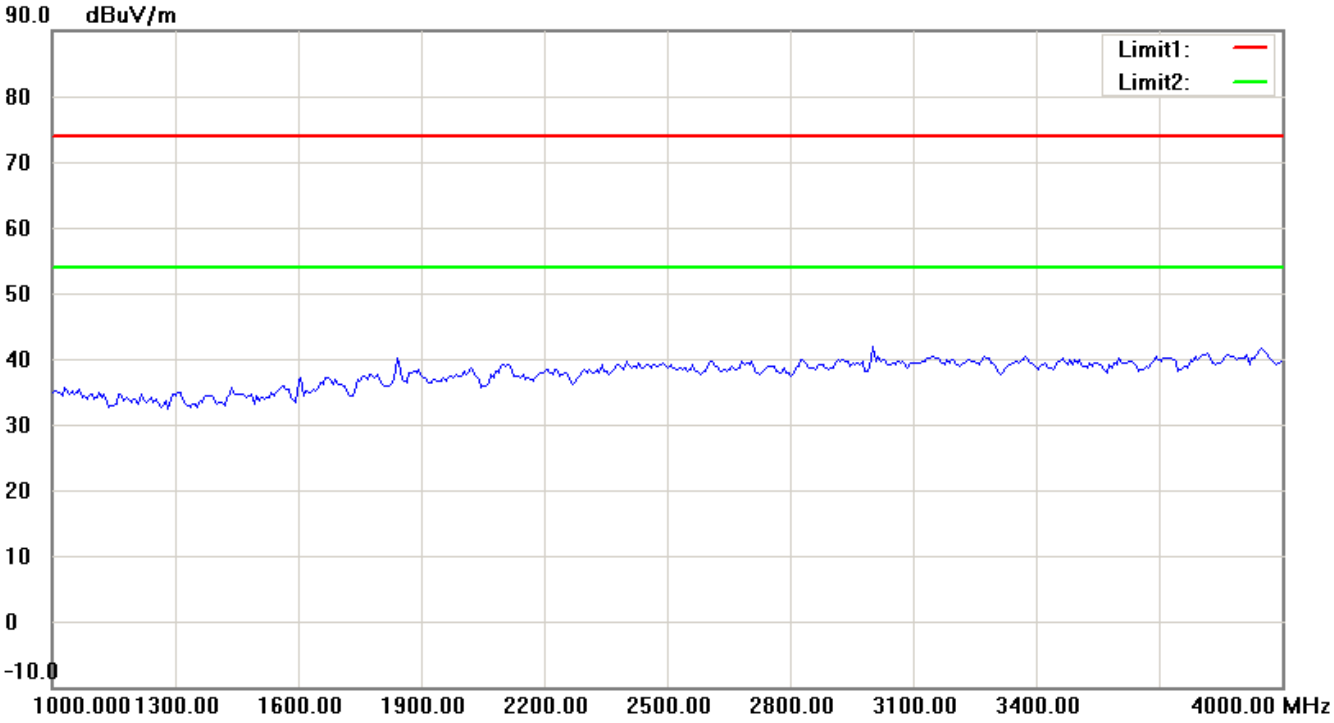
Registration number: W6M21303-13066-C-1
FCC ID: IPH-02228

TX 2457MHz

Antenna Polarization H





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

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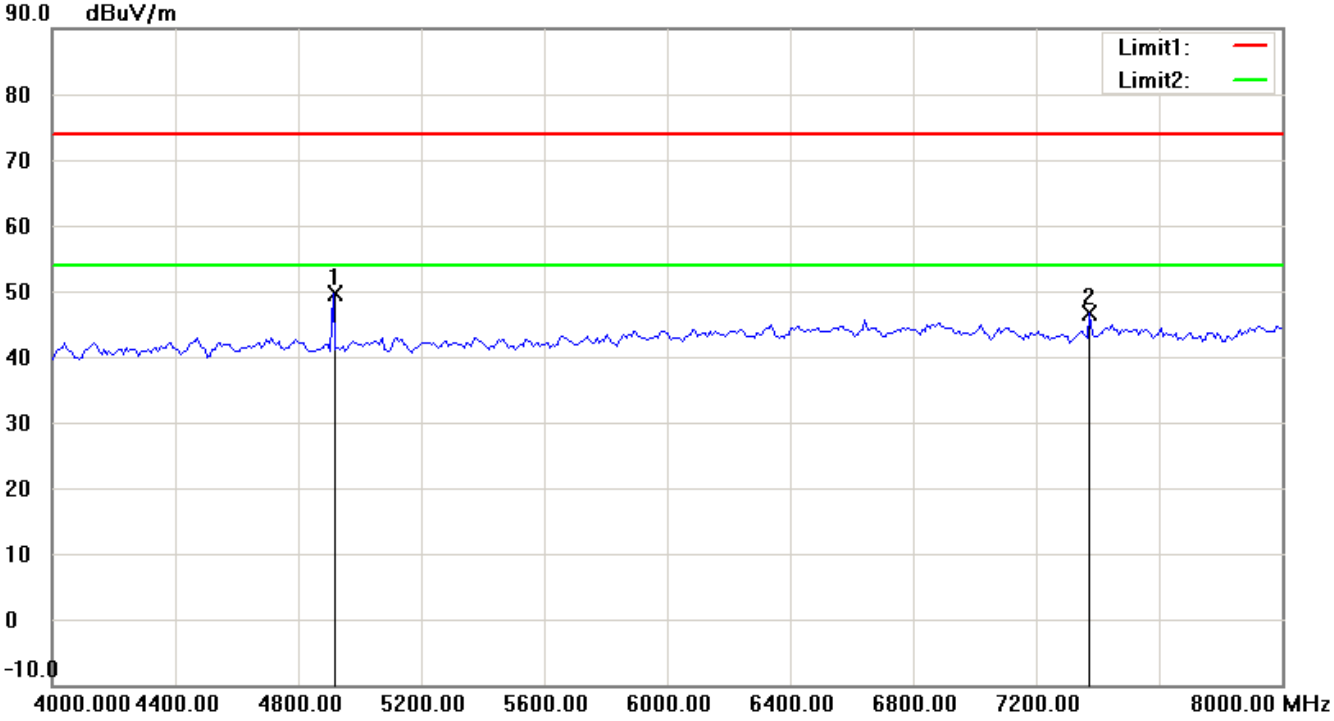
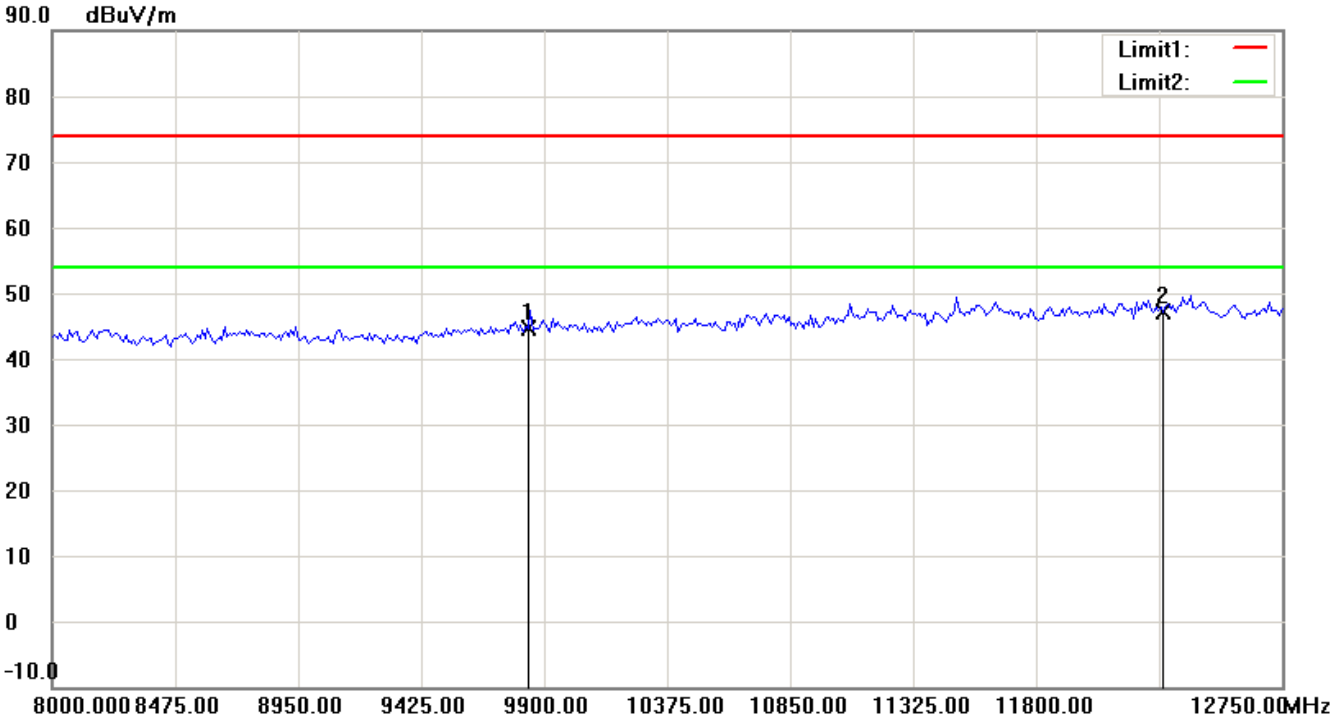
Registration number: W6M21303-13066-C-1
FCC ID: IPH-02228





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

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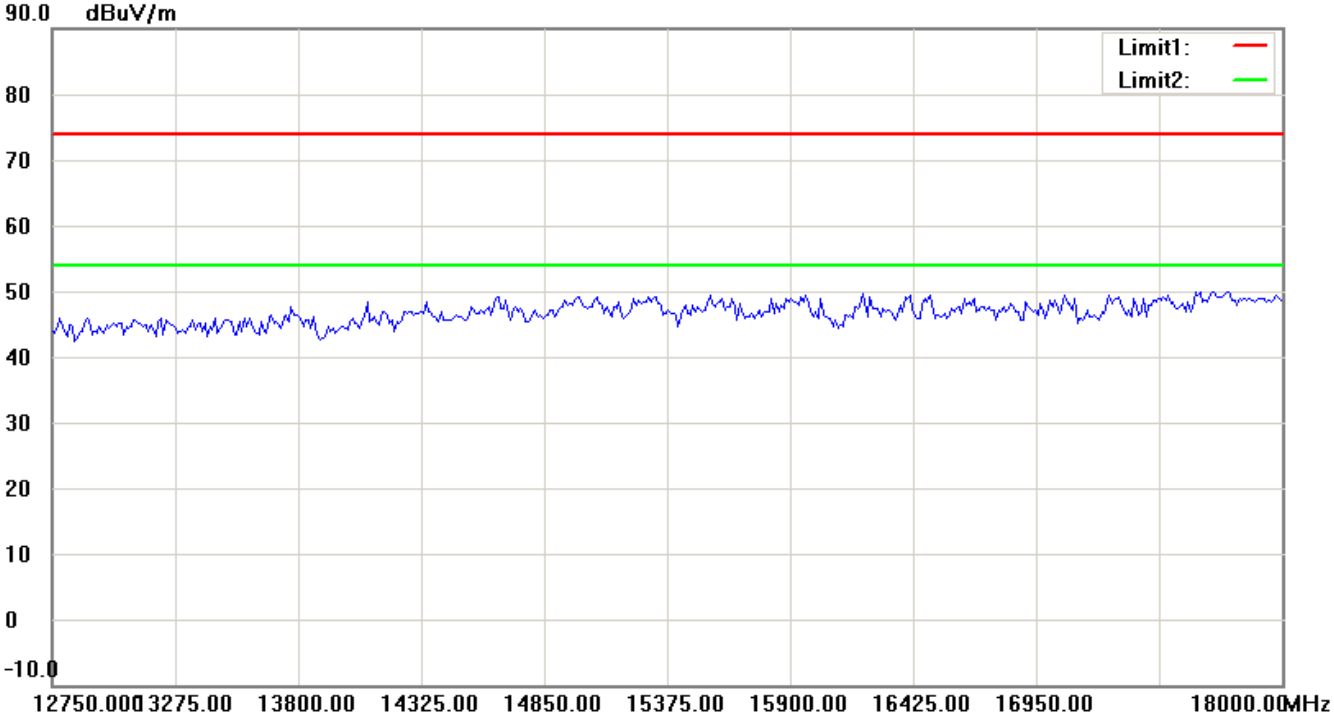

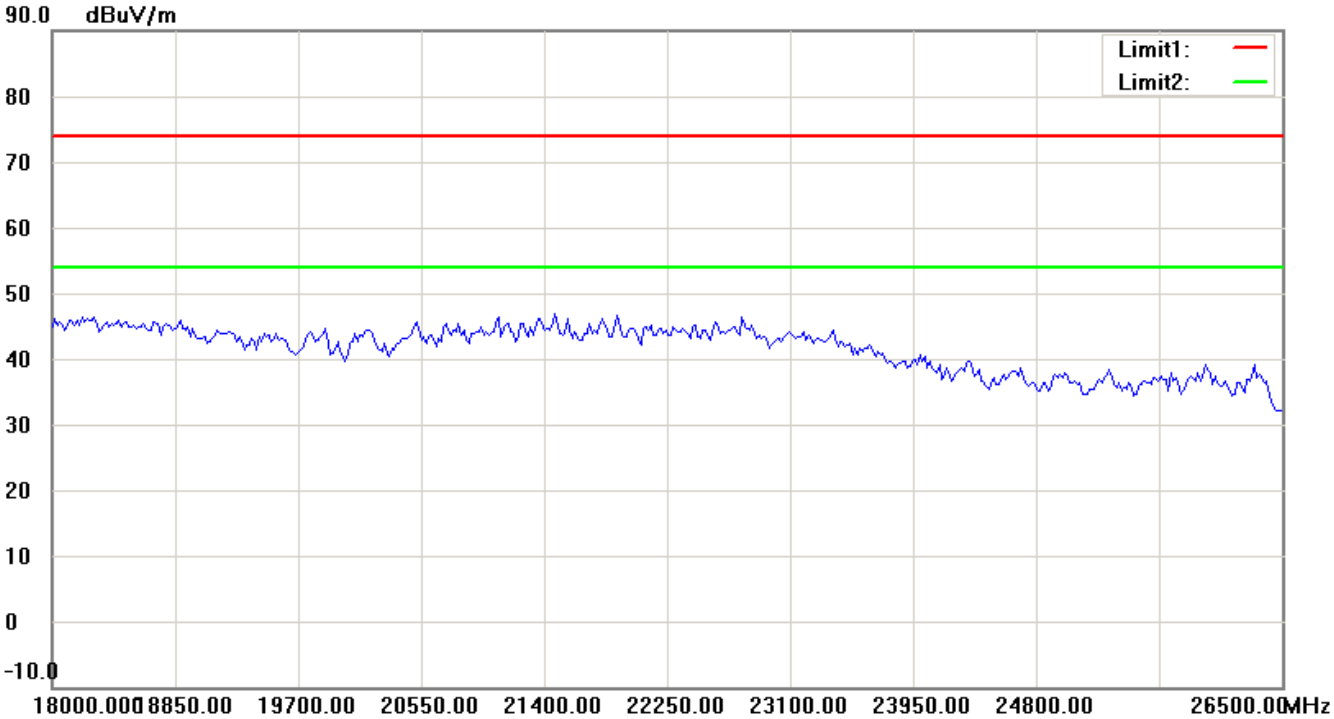

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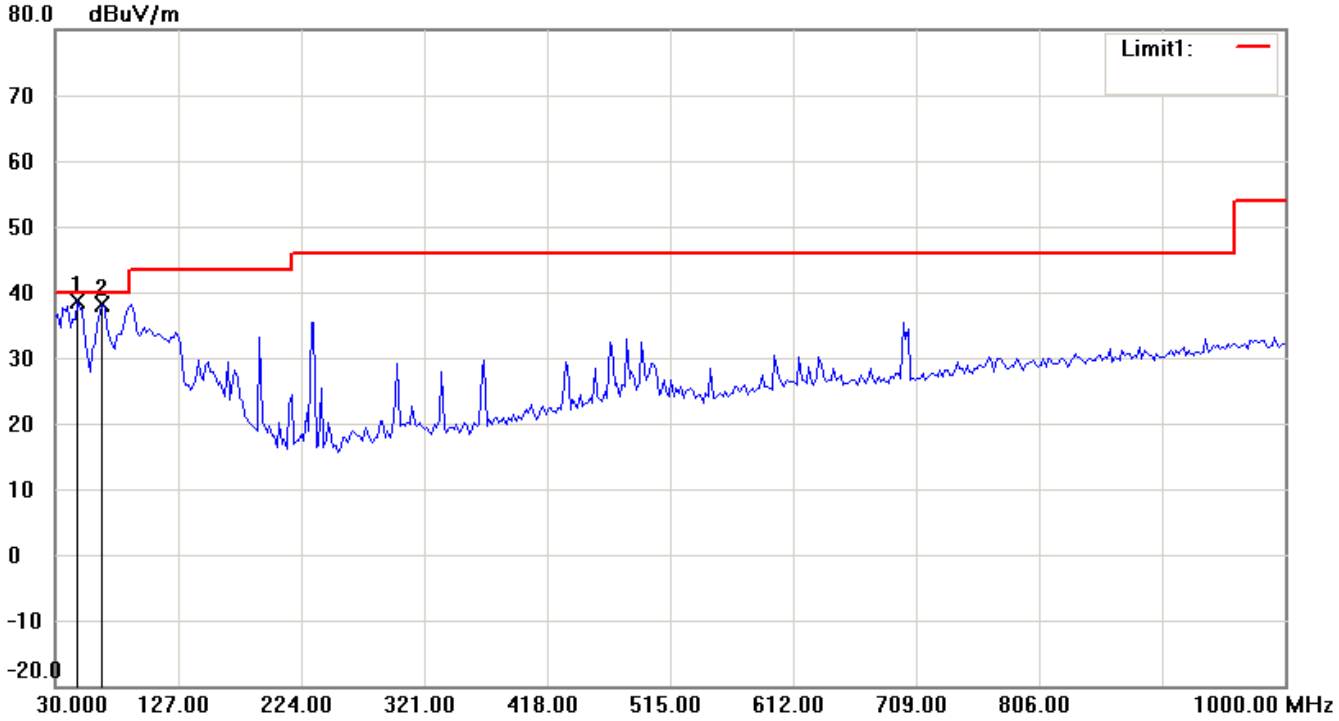
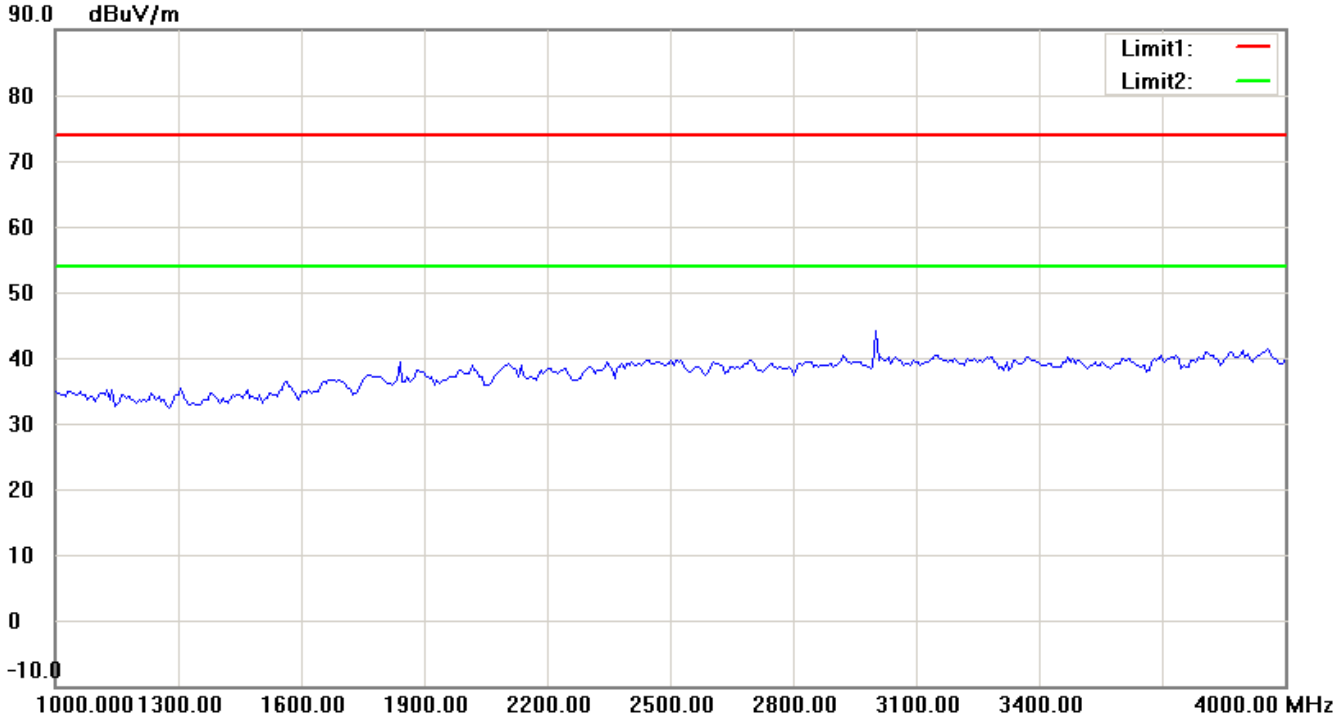
Registration number: W6M21303-13066-C-1
FCC ID: IPH-02228

Antenna Polarization V





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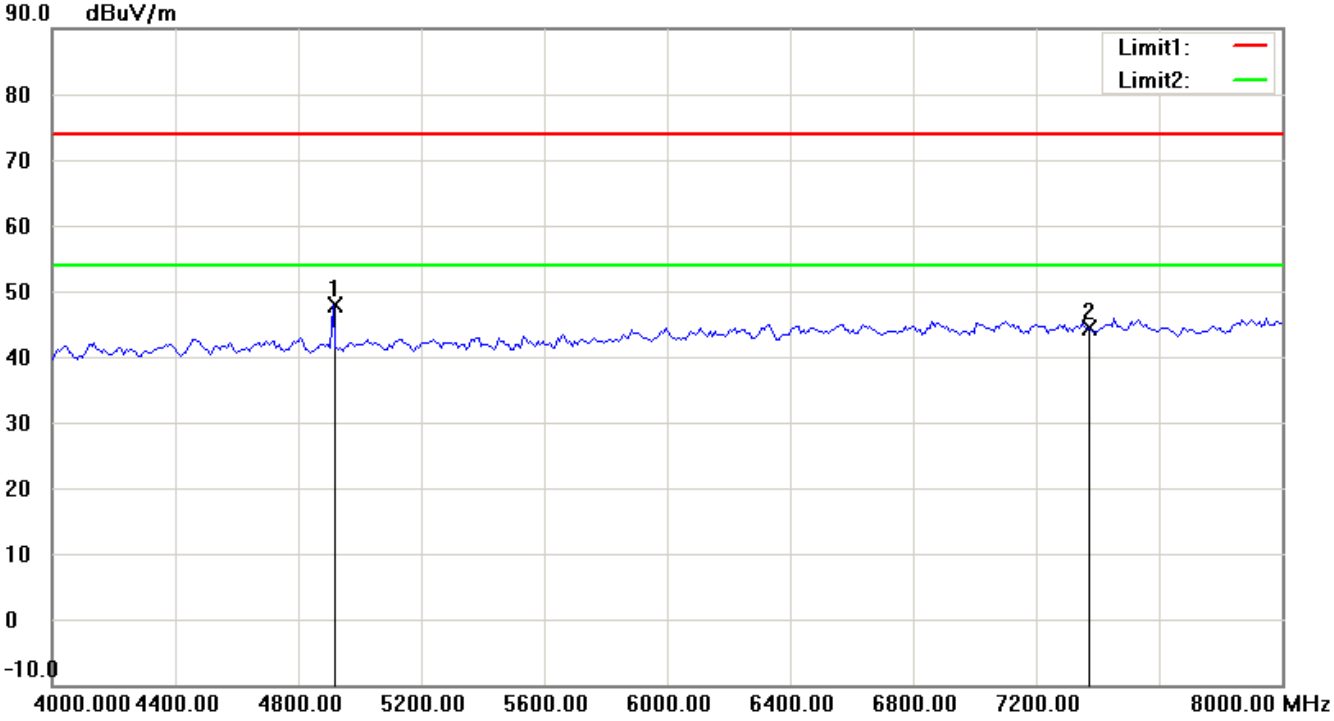

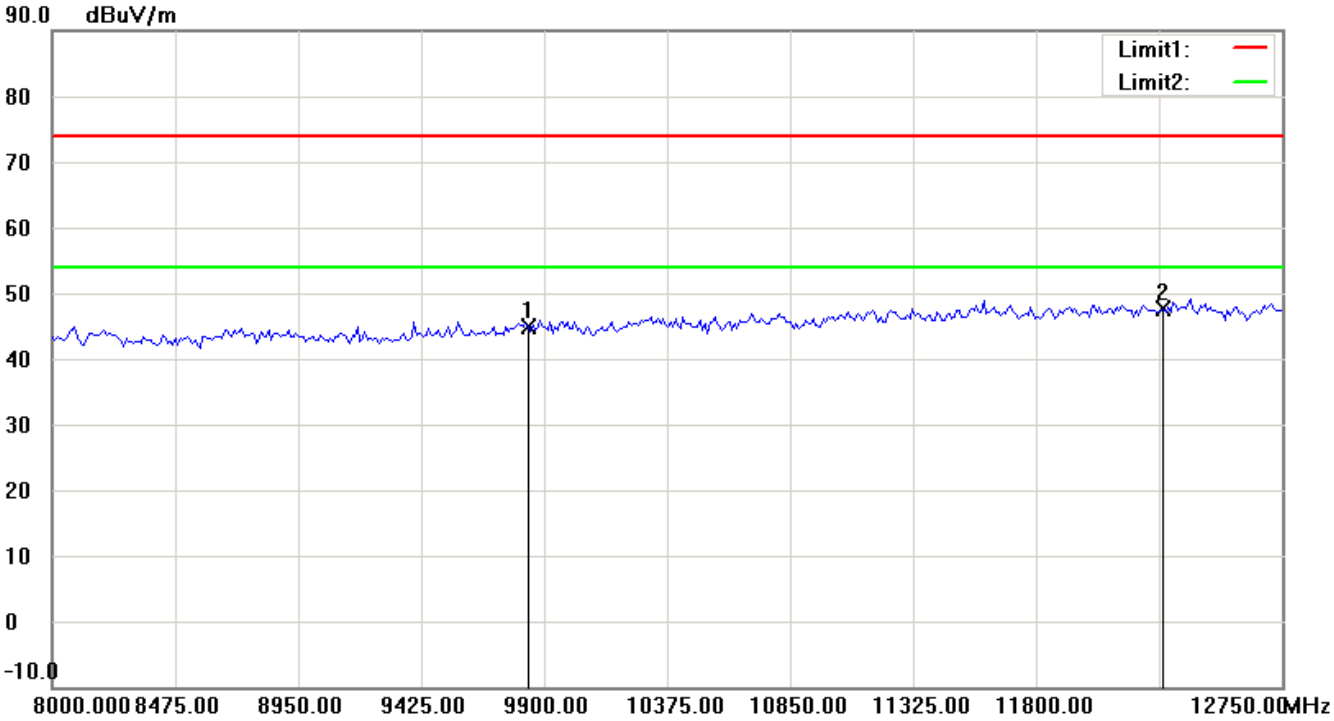

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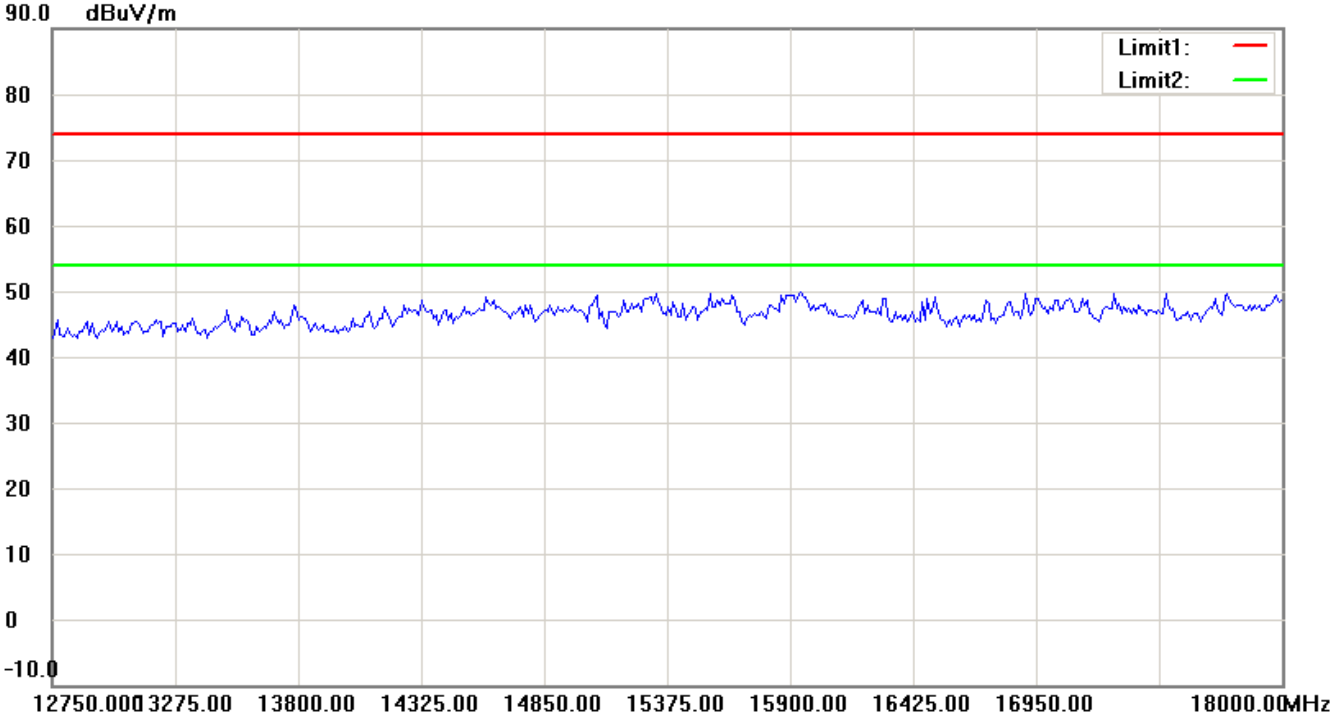

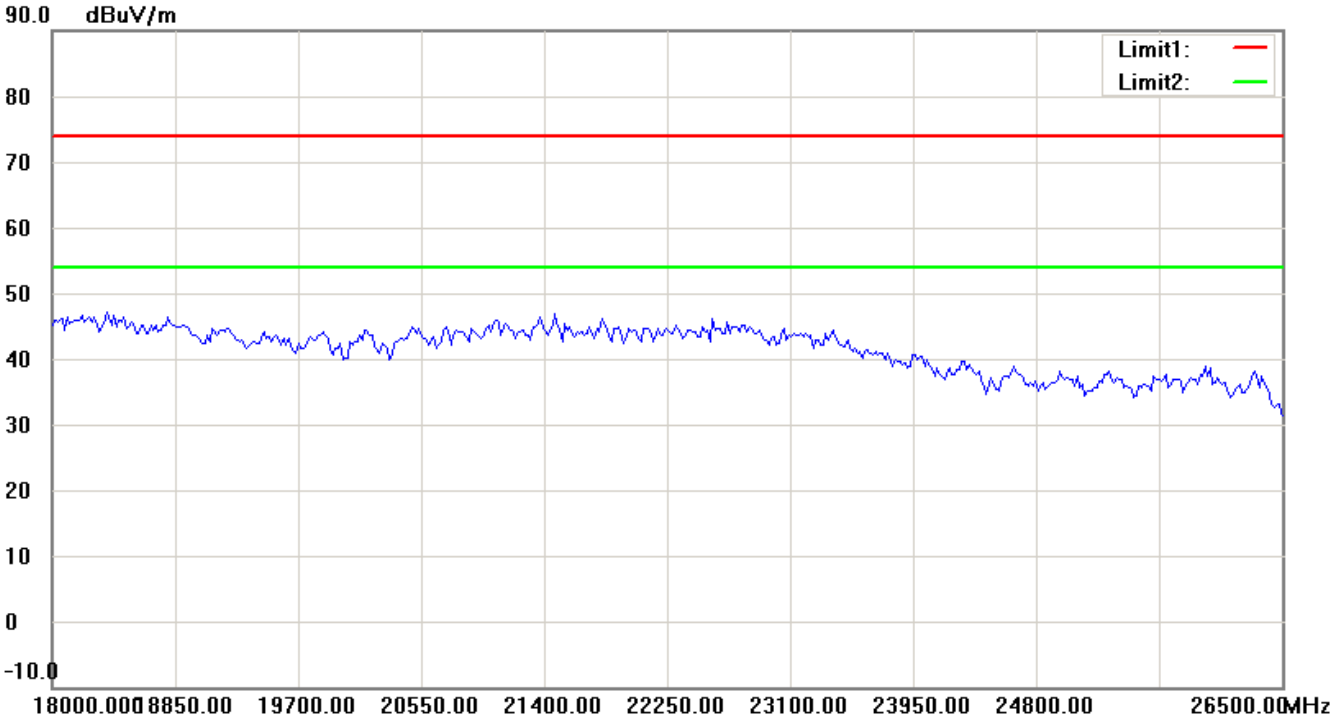

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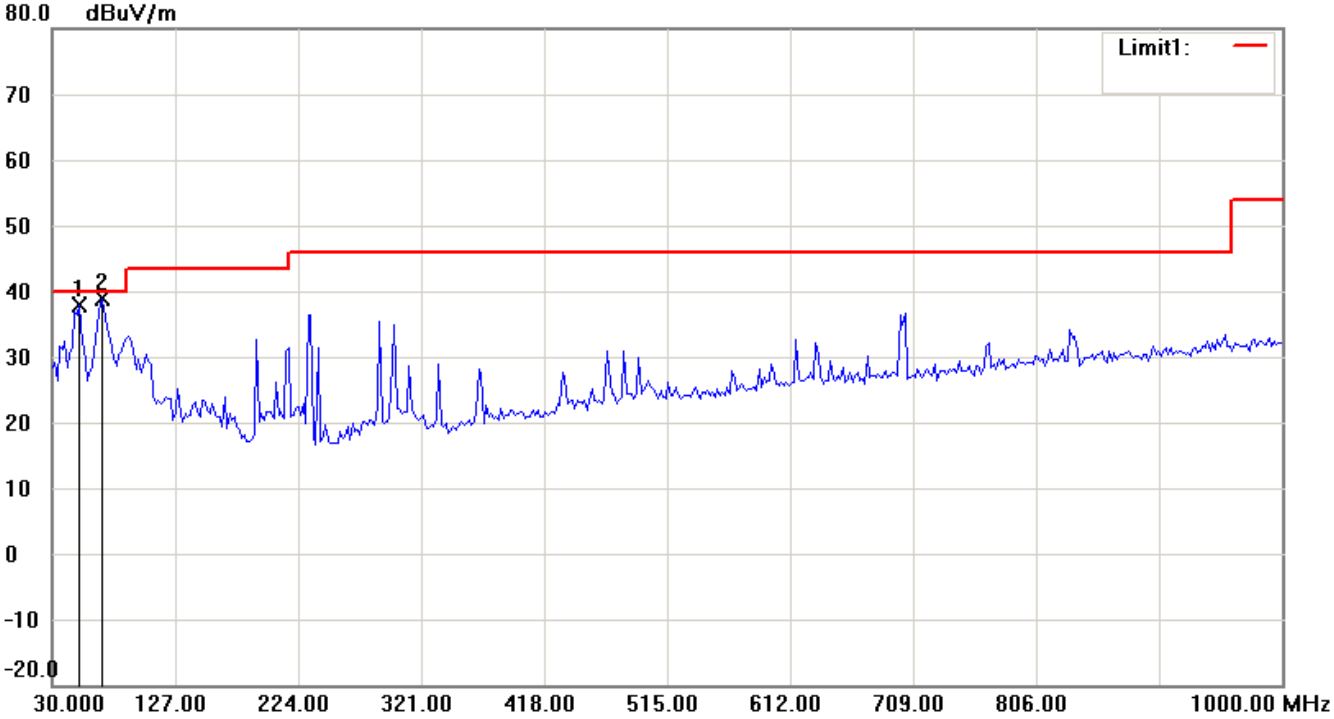
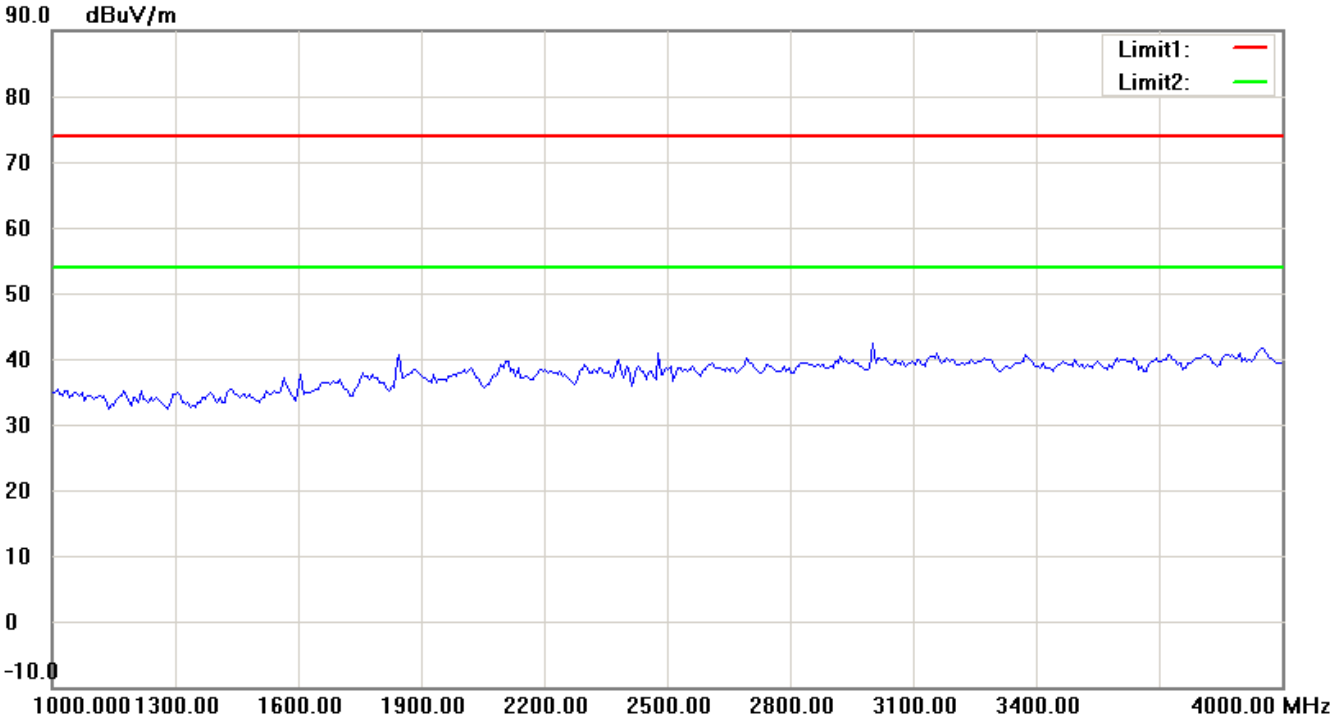
TX 2479MHz

Antenna Polarization H





Up Line: Peak Limit Line
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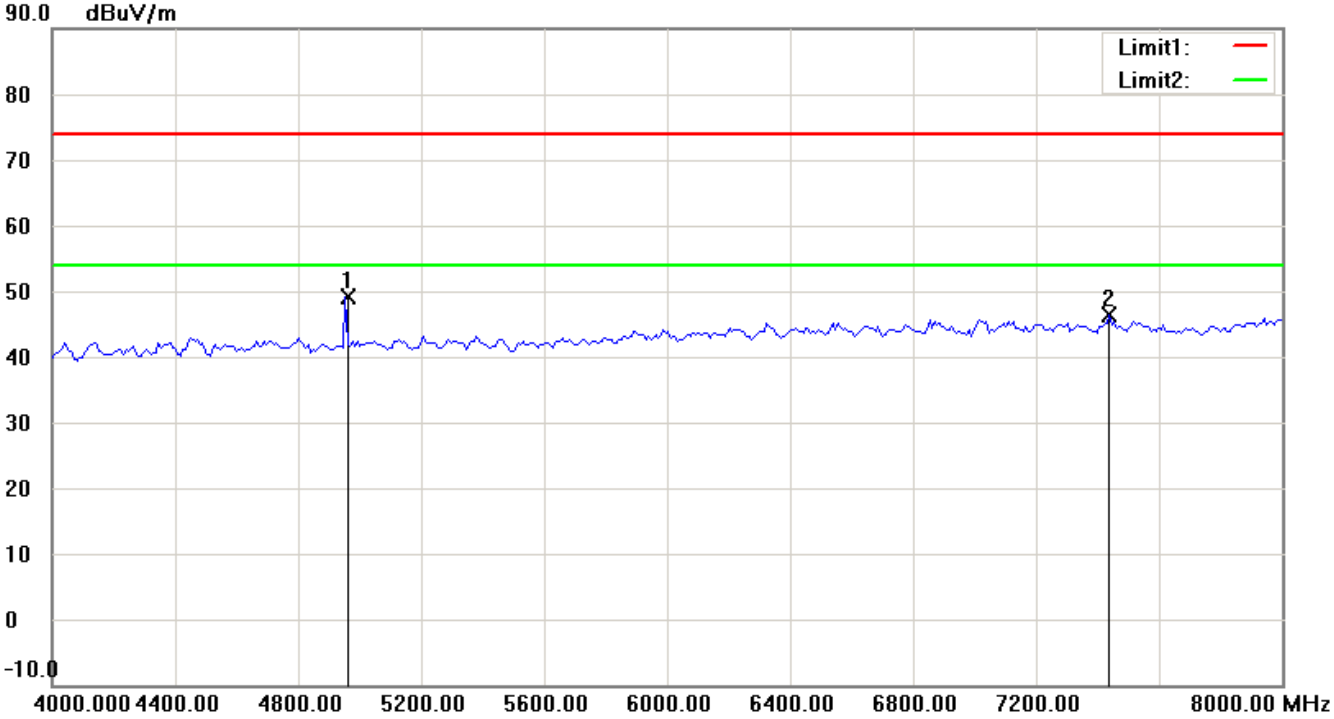

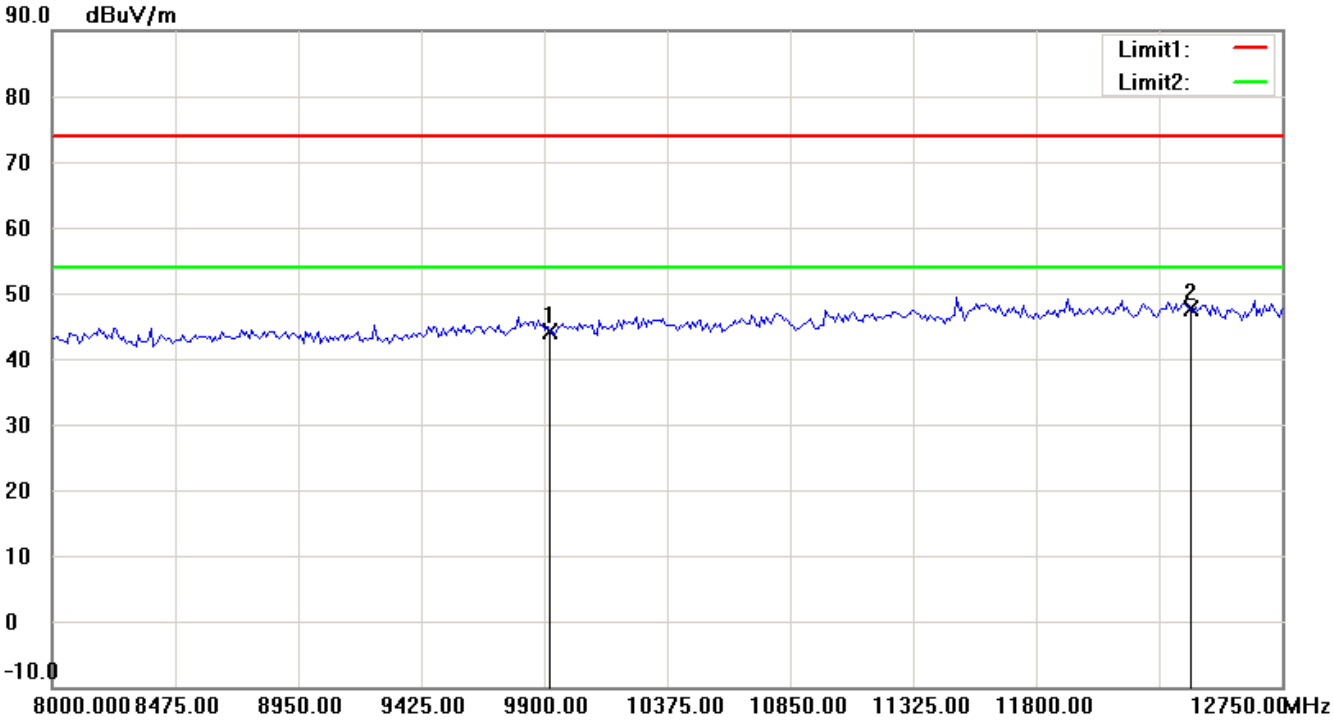

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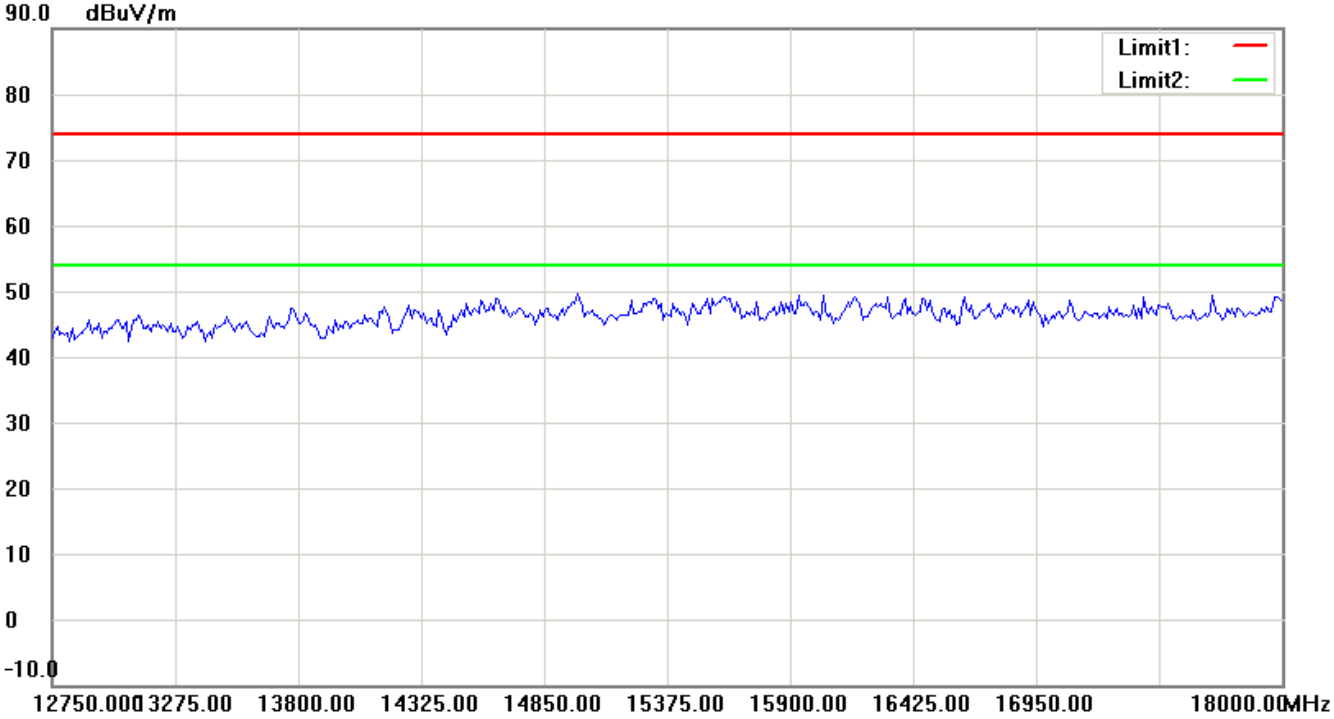

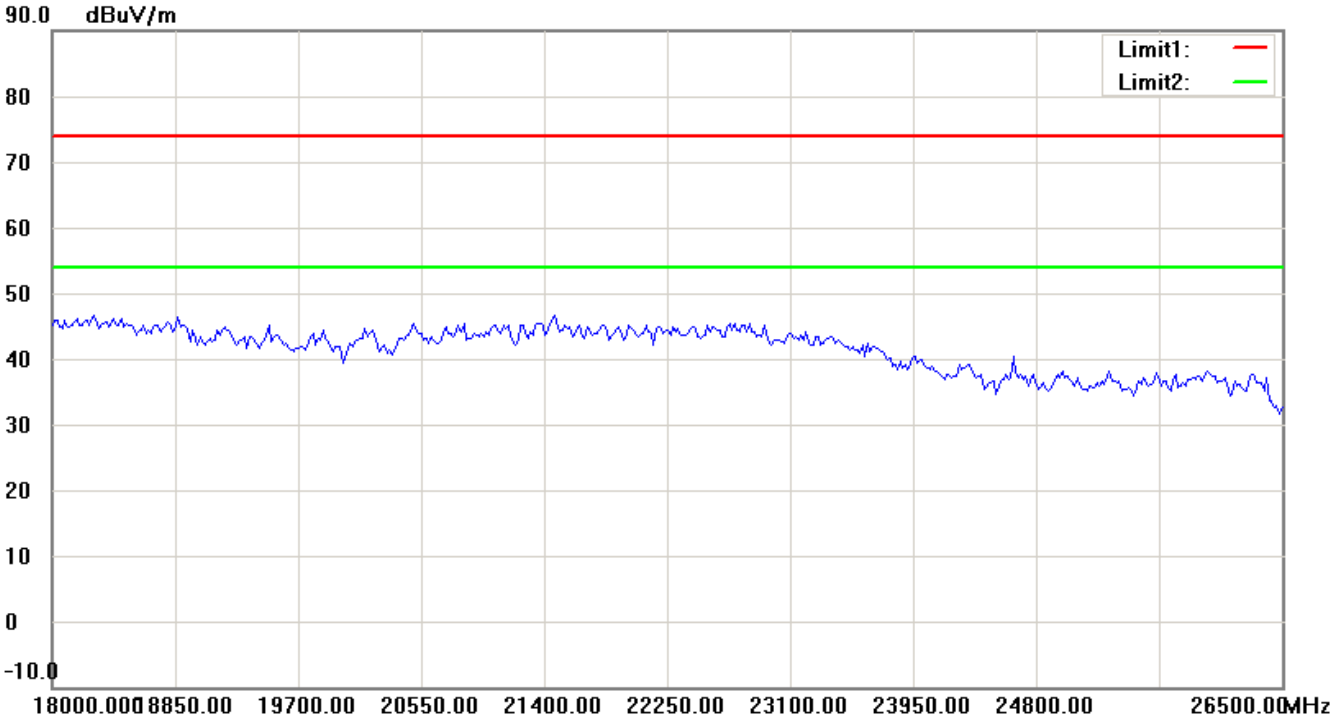

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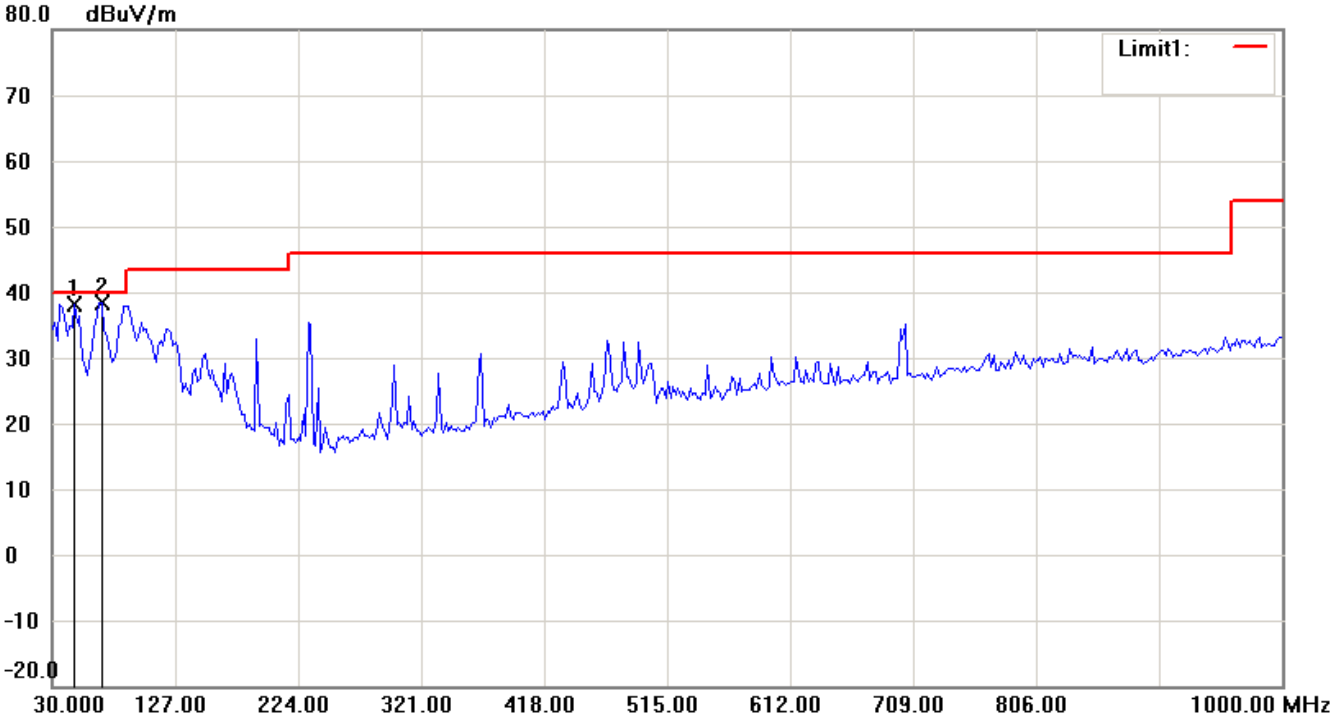
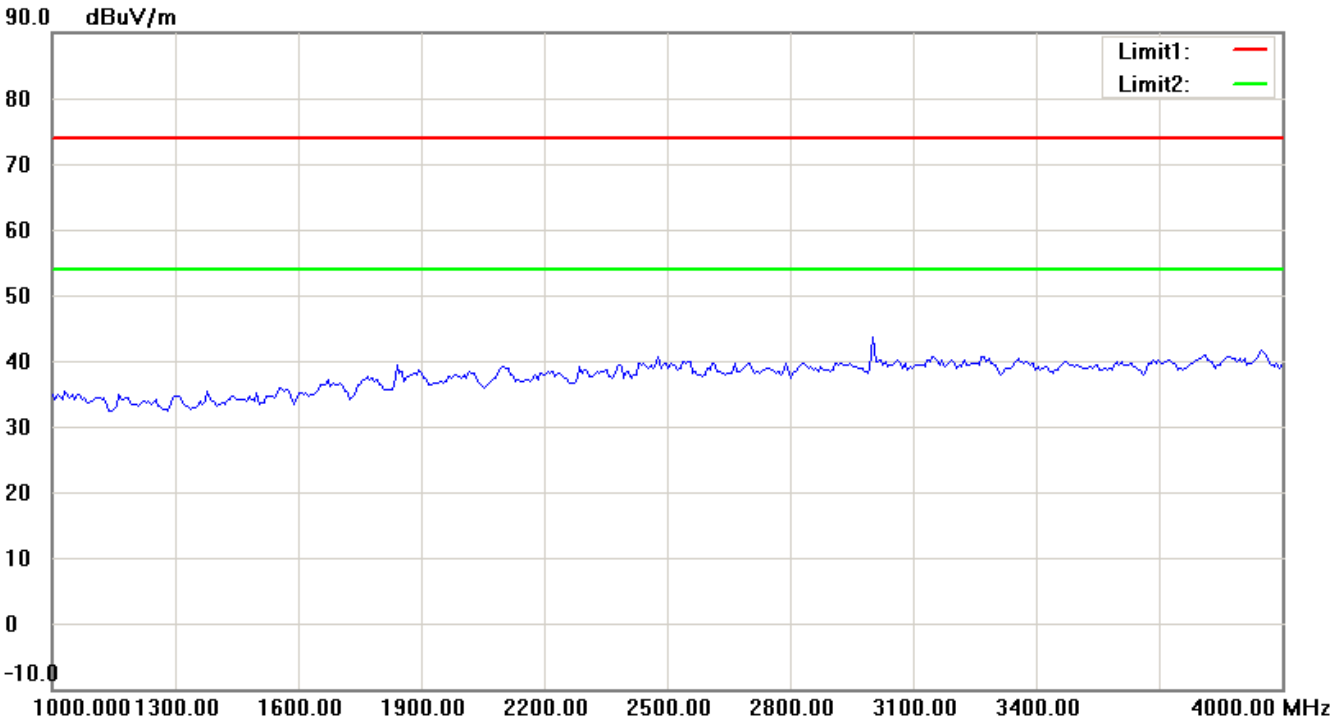
Antenna Polarization V





Up Line: Peak Limit Line
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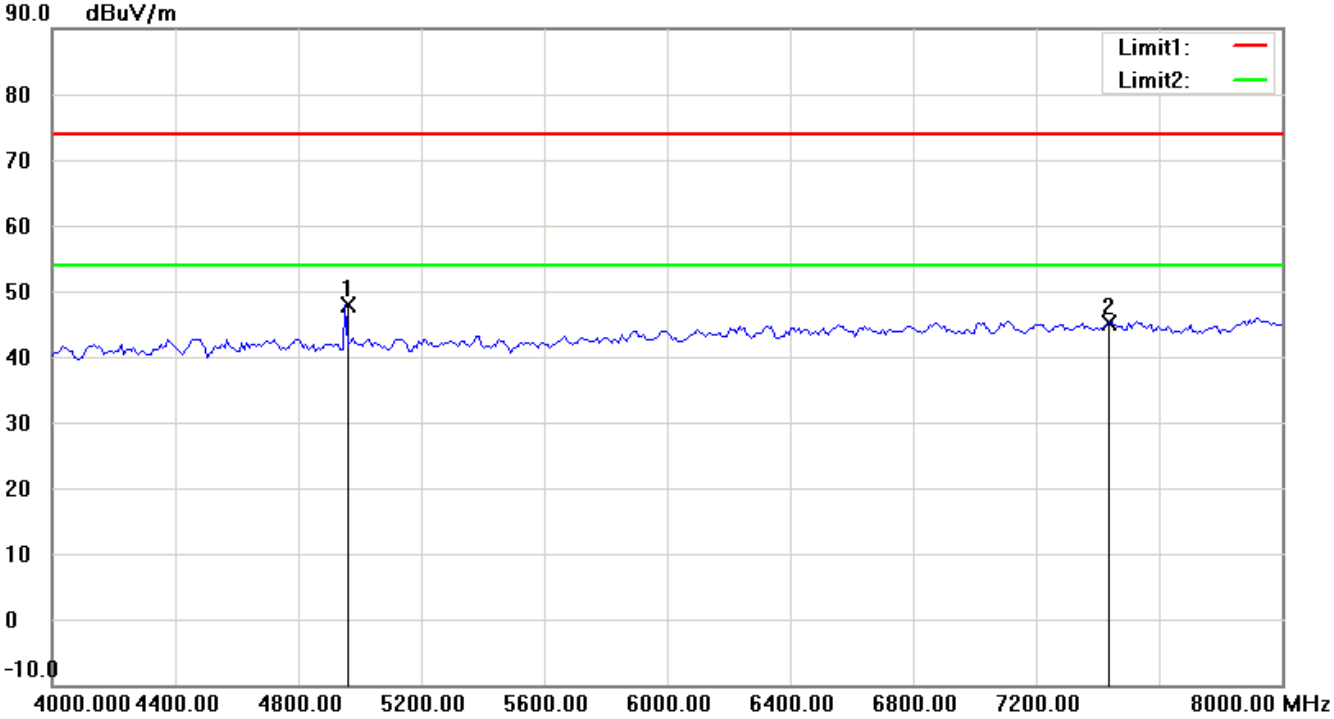

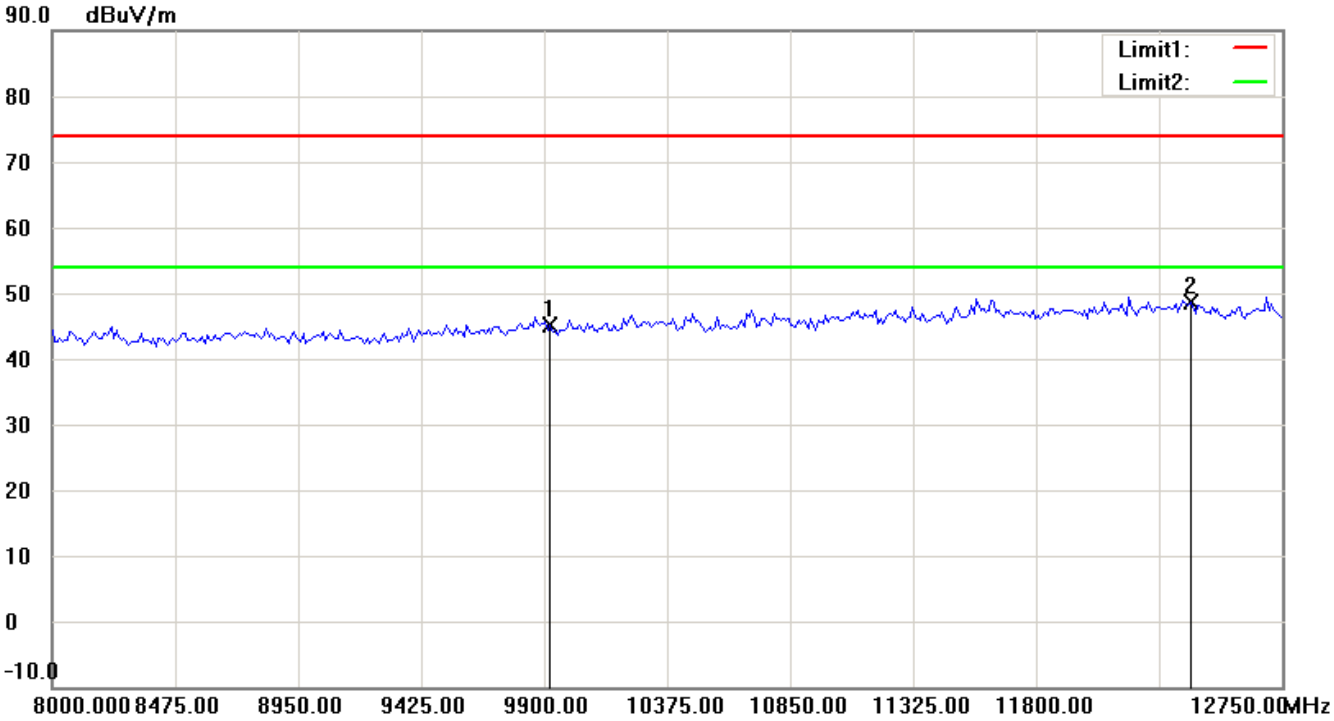

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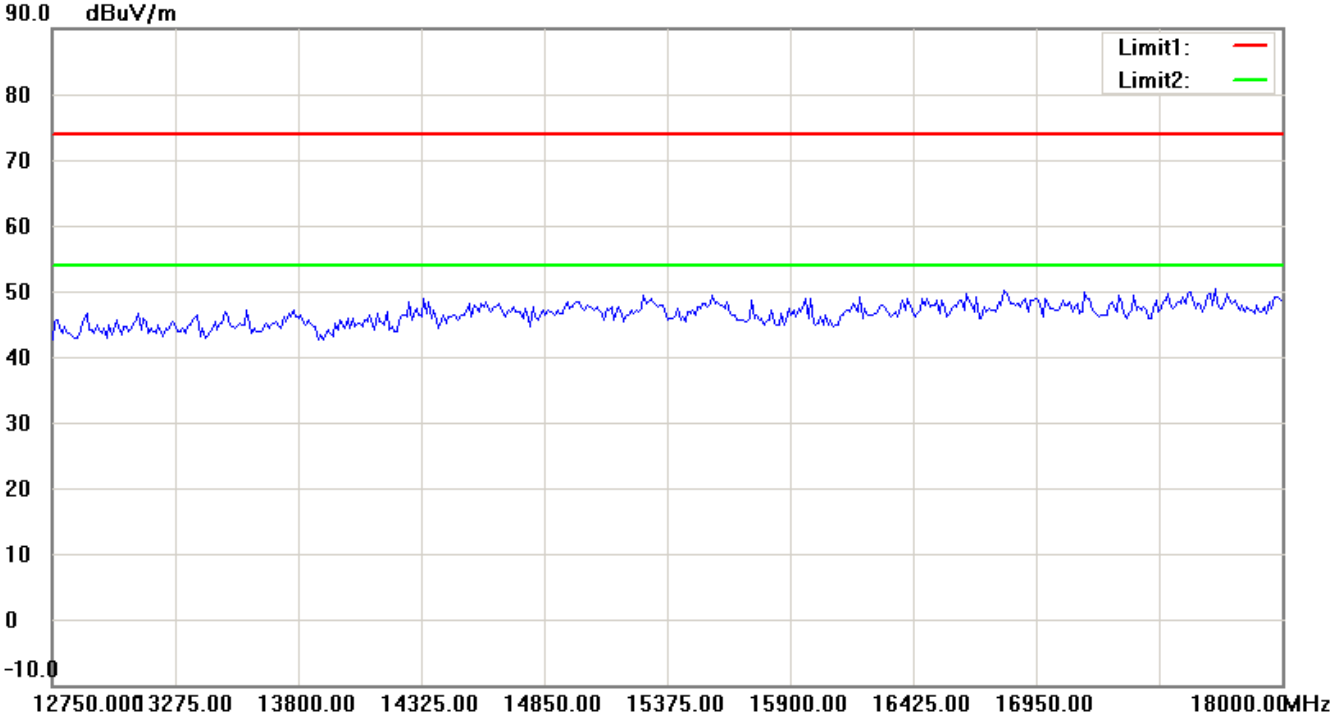

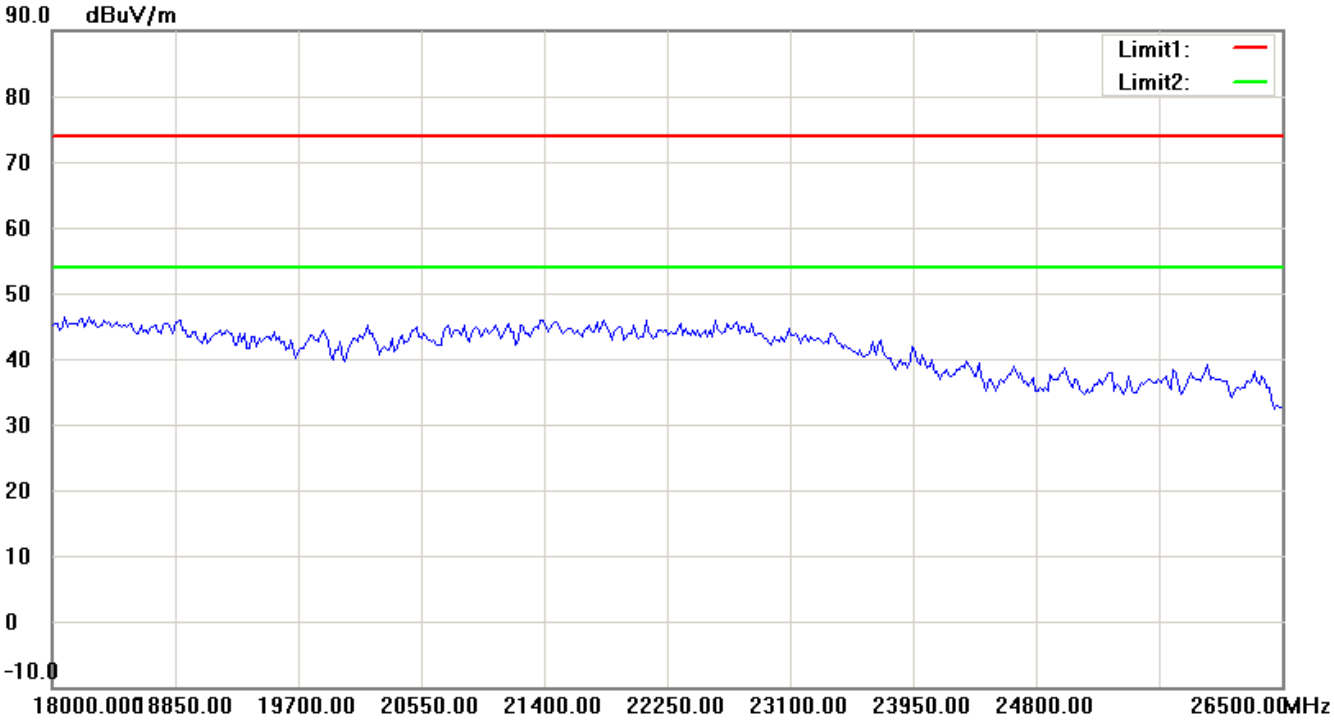

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