FCC PART 74 TEST REPORT

for

Digital Bodypack Transmitter

Model No.: ACT-80T

FCC ID: M5X-ACT80T

of

Applicant: MIPRO Electronics Co., Ltd.
Address: 814 Pei-kang Road Chia-yi 600 Taiwan, R.O.C

Tested and Prepared

by

Worldwide Testing Services (Taiwan) Co., Ltd.

FCC Registration No.: 930600

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

A2LA Accredited No.: 2732.01

Report No.: W6R21205-12421-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:

Date	WTS-Lab.	Name	Signature
July 26, 2012		Rick Chen	Rick Chen.

Technical responsibility for area of testing:

Date	WTS	Name	Signature
July 26, 2012		Danny Sung	Danny Sung

Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T

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
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Company
Worldwide Testing Services(Taiwan) Co., Ltd.
6F, NO. 58, LANE 188, RUEY-KUANG RD.
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1.2.2 Details of accreditation status

Accredited testing laboratory
A2LA accredited number: 2732.01
FCC filed test laboratory Reg. No. 930600
Industry Canada filed test laboratory Reg. No. IC 5679A-1

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

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

Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T

1.3 Details of approval holder

Name:	MIPRO Electronics Co., Ltd.
Street:	814 Pei-kang Road
Town:	Chia-yi, 600
Country:	Taiwan, R.O.C.
Telephone:	+886-5-238-0809
Fax:	+886-5-238-0803

1.4 Application details

Date of receipt of test sample:	May 31, 2012
Date of test:	From May 31, 2012 to July 24, 2012

1.5 General information of Test item

Type of test item: Digital Bodypack Transmitter

Model Number: ACT-80T

Multi-listing model number: ACT-8(XX)(X=0~9, A~Z,a~z or blank)

Brand Name: MIPRO

Photos: see Annex

Technical data

Frequency band :

Frequency(MHz)	TV Band	Used Band
26.100-26.480	☐	☐
54.000-72.000	☐	☐
76.000-88.000	☐	☐
161.625-161.775	☐	☐
174.000-216.000	☐	☐
450.000-451.000	☐	☐
455.000-456.000	☐	☐
470.000-488.000	☒	☒
488.000-494.000	☒	☒
494.000-608.000	☒	☒
614.000-698.000	☒	☒
944.000-952.000	☐	☐

Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T

Frequency (ch A):	480.1 MHz
Frequency (ch B):	542 MHz
Frequency (ch C):	603.9 MHz
Frequency (ch D):	630.1 MHz
Frequency (ch E):	664 MHz
Frequency (ch F):	697.9 MHz
Antenna Type:	Integral antenna
Antenna Gain:	2 dBi
Power supply:	Battery 1.5 VDC*2
Operation modes:	Simplex

Manufacturer: (if applicable)

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

1.6 Test standards

Technical standard: FCC Part 74 Subpart H , section 74.861 (2011-10)

2 Technical test

2.1 Summary of test results

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

or

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

2.2 Test environment

Temperature:	23 °C
Relative humidity content:	20 ... 75 %
Air pressure:	86-103 KPa

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	2011/9/2	2012/9/1
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	2011/12/28	2012/12/27
ETSTW-CE 005	Line-Impedance Stabilisation Network	NNBM 8126D	137	Schwarzbeck	2011/9/5	2012/9/4
ETSTW-CE 006	IMPULSBEGRENZER PULSE LIMITER	ESH3-Z2	100226	R&S	2012/3/5	2013/3/4
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-CE 013	CISPR 22 TWO BALANCED TELECOM PAIRS IMPEDANCE STABILIZATION NETWORK	FCC-TLISN-T4-02	20242	FCC	2011/9/6	2012/9/5
ETSTW-CE 024	IMPEDANCE STABILIZATION NETWORK	ISN T800	29454	TESEQ	2012/1/4	2013/1/3
ETSTW-CS 004	COUPLING AND DECOUPLING NETWORK	CDN M016	20053	SCHAFFNER	2011/8/12	2012/8/11
ETSTW-CS 005	RF Power Amplifier	100A250A	306547	AR	Function Test	
ETSTW-CS 010	6 dB Attenuator	SA3N1007-06	None	AISI	Function test	
ETSTW-RE 003	EMI TEST RECEIVER	ESI 26	831438/001	R&S	2011/8/16	2012/8/15
ETSTW-RE 004	EMI TEST RECEIVER	ESI 40	832427/004	R&S	2011/9/5	2012/9/4
ETSTW-RE 005	EMI TEST RECEIVER	ESVS10	843207/020	R&S	2011/9/2	2012/9/1
ETSTW-RE 010	ABSORBING CLAMP	MDS 21	3469	Schwarzbeck	2011/9/7	2012/9/6
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	2010/10/4	2012/10/3
ETSTW-RE 019	MICROWAVE HORN ANTENNA	22240-25	121074	FM	2012/4/03	2013/4/02
ETSTW-RE 020	MICROWAVE HORN ANTENNA	AT4002A	306915	AR	Function Test	
ETSTW-RE 027	Passive Loop Antenna	6512	00034563	ETS-Lindgren	2012/7/18	2013/7/17
ETSTW-RE 028	Log-Periodic Dipole Array Antenna	3148	34429	EMCO	Function Test	
ETSTW-RE 029	Biconical Antenna	3109	33524	EMCO	Function Test	
ETSTW-RE 030	Double-Ridged Guide Horn Antenna	3117	00035224	EMCO	2012/2/21	2013/2/20
ETSTW-RE 032	Millivoltmeter	URV 55	849086/013	R&S	2011/10/4	2012/10/3
ETSTW-RE 033	WaveRunner 6000A Serise Oscilloscope	WAVERUNNER 6100A	LCRY0604P14508	LeCroy	Function Test	
ETSTW-RE 034	Power Sensor	URV5-Z4	839313/006	R&S	2011/10/4	2012/10/3
ETSTW-RE 042	Biconical Antenna	HK116	100172	R&S	2012/1/10	2013/1/9
ETSTW-RE 043	Log-Periodic Dipole Antenna	HL223	100166	R&S	2012/4/13	2013/4/12

ETSTW-RE 044	Log-Periodic Antenna	HL050	100094	R&S	2012/4/06	2013/4/05
ETSTW-RE 045	ESA-E SERIES SPECTRUM ANALYZER	E4404B	MY45111242	Agilent	Pre-test Use	
ETSTW-RE 048	Triple Loop Antenna	HXYZ 9170	HXYZ 9170-134	Schwarzbeck	2011/8/29	2012/8/28
ETSTW-RE 049	TRILOG Super Broadband test Antenna	VULB 9160	9160-3185	Schwarzbeck	2012/3/23	2013/3/22
ETSTW-RE 050	Attenuator 10dB	50HF-010-1	None	JFW	2012/3/3	2013/3/2
ETSTW-RE 051	Attenuator 6dB	50HF-006-1	None	JFW	2012/3/3	2013/3/2
ETSTW-RE 053	Attenuator 3dB	50HF-003-1	None	JFW	2012/3/3	2013/3/2
ETSTW-RE 055	SPECTRUM ANALYZER	FSU 26	200074	R&S	2012/5/29	2013/5/28
ETSTW-RE 060	Attenuator 30dB	5015-30	F651012z-01	ATM	2012/3/3	2013/3/2
ETSTW-RE 061	Amplifier Module	CHC 1	None	ETS	2012/5/17	2013/5/16
ETSTW-RE 062	Amplifier Module	CHC 2	None	KMIC	2011/11/29	2012/11/28
ETSTW-RE 064	Bluetooth Test Set	MT8852B-042	6K00005709	Anritsu	Function Test	
ETSTW-RE 065	Amplifier	AMF-6F-18002650-25-10P	941608	MITEQ	2012/4/6	2013/4/5
ETSTW-RE 069	Double-Ridged Guide Horn Antenna	3117	00069377	EMCO	Function Test	
ETSTW-RE 072	CELL SITE TEST SET	8921A	3339A00375	HP	2011/10/5	2012/10/4
ETSTW-RE 073	Power Meter	N1911A	MY45100769	Agilent	2012/1/4	2013/1/3
ETSTW-RE 074	Power Sensor	N1921A	MY45241198	Agilent	2012/1/4	2013/1/3
ETSTW-RE 088	SOLID STATE AMPLIFIER	KMA180265A01	99057	KMIC	2011/10/13	2012/10/12
ETSTW-RE 099	DC Block	50DB-007-1	None	JFW	2012/3/5	2013/3/4
ETSTW-RE 105	2.4GHz Notch Filter	NO124411	39555	MICROWAVE CIRCUITS, INC.	2012/3/5	2013/3/4
ETSTW-RE 106	Humidity Temperature Meter	TES-1366	091011113	TES	2011/12/1	2012/11/30
ETSTW-RE 111	TRILOG Super Broadband test Antenna	VULB 9160	9160-3309	Schwarz beck	2011/12/27	2012/12/26
ETSTW-RE 112	AC POWER SOURCE	TFC-1005	None	T-Power	Function test	
ETSTW-RE 115	2.4GHz Notch Filter	N0124411	473874	MICROWAVE CIRCUITS	2012/1/12	2013/1/11
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	2011/8/19	2012/8/18
ETSTW-RE 126	5GHz Notch filter	5NSL11-5800/E221.3-O/O	1	K&L Microwave	2011/8/19	2012/8/18
ETSTW-RE 127	RF Switch Box	RFS-01	None	WTS	2012/3/3	2013/3/2
ETSTW-EMI 001	HARMONICS 1000	HAR1000-1P	093	EMC-PARTNER	2011/9/1	2012/8/31
ETSTW-EMS 001	BASELSTRASSE 160 CH-4242 LAUFEN	CN-EFT1000	354	EMC-PARTNER	Function Test	
ETSTW-EMS 002	Frequency Converter	YF-6020	0308014	None	Function Test	
ETSTW-EMS 003	EMC Immunity Test System	TRA2000IN6	579	EMC-PARTNER	2011/11/2	2012/11/1
ETSTW-EMS 009	Magnetic Field Antenna	MF1000-1	104	EMC-PARTNER	Function Test	
ETSTW-EMS 010	Coupling De-coupling Network	CDN-UTP8	014	EMC-PARTNER	Function Test	
ETSTW-EMS 012	EM Injection Clamp	F-203I-23MM	476	FCC	2012/5/29	2013/5/28

ETSTW-EMS 016	EMF Tester	1390	071208732	TES	2011/10/6	2012/10/5
ETSTW-EMS 017	Multimeter	DM-1220	518614	HOLA	2011/8/11	2012/8/10
ETSTW-EMS 019	Electrostatic Discharge Simulator	ESS-2002	ESS06Y6300	NoiseKen	2011/10/31	2012/10/30
ETSTW-EMS 020	Humidity Temperature Meter	TES-1366	091011116	TES	2011/12/20	2012/12/19
ETSTW-RS 003	RF Power Amplifier	30S1G3	306933	AR	Function Test	
ETSTW-RS 004	RF Power Amplifier	150W1000	307009	AR	Function Test	
ETSTW-RS 006	SIGNAL GENERATOR	SML03	101551	R&S	2012/2/29	2013/2/28
ETSTW-RS 007	14" COLOR VIDEO MONITOR	HS-CM145A	0512011548	None	Function Test	
ETSTW-RS 009	SIGNAL GENERATOR	8648C	3642U01656	HP	2012/2/20	2013/2/19
ETSTW-RS 010	Broadband Field Meter	NBM-520	C-0195	Narda	2011/9/8	2012/9/7
ETSTW-GSM 002	Universal Radio Communication Tester	CMU 200	109439	R&S	2011/10/4	2012/10/3
ETSTW-GSM 019	Band Reject Filter	WRCTF824/849-822/851-40 /12+9SS	3	WI	2012/1/13	2013/1/12
ETSTW-GSM 020	Band Reject Filter	WRCD1747/1748-1743/1752-32/5SS	1	WI	2012/1/13	2013/1/12
ETSTW-GSM 021	Band Reject Filter	WRCD1879.5/1880.5-1875.5/1884.5-32/5SS	3	WI	2012/1/13	2013/1/12
ETSTW-GSM 022	Band Reject Filter	WRCT901.9/903.1-904.25-50/8SS	1	WI	2012/1/13	2013/1/12
ETSTW-GSM 023	Power Divider	4901.19.A	None	SUHNER	2011/9/19	2012/9/18
ETSTW-Cable 002	Microwave Cable	SUCOFLEX 104（S_Cable 7）	238093	HUBER+SUHNER	2012/5/17	2013/5/16
ETSTW-Cable 003	Microwave Cable	SUCOFLEX 104（S_Cable 11）	209953	HUBER+SUHNER	2012/5/17	2013/5/16
ETSTW-Cable 010	BNC Cable	5 M BNC Cable	None	JYE BAO CO.,LTD.	2012/3/5	2013/3/4
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.	2012/3/5	2013/3/4
ETSTW-Cable 013	Microwave Cable	SUCOFLEX 104（S_Cable 5）	232345	HUBER+SUHNER	Function Test	
ETSTW-Cable 016	BNC Cable	Switch Box	B Cable 1	Schwarz beck	2012/3/3	2013/3/2
ETSTW-Cable 017	BNC Cable	X Cable	B Cable 2	Schwarz beck	2012/3/3	2013/3/2
ETSTW-Cable 018	BNC Cable	Y Cable	B Cable 3	Schwarz beck	2012/3/3	2013/3/2
ETSTW-Cable 019	BNC Cable	Z Cable	B Cable 4	Schwarz beck	2012/3/3	2013/3/2
ETSTW-Cable 022	N TYPE Cable	5006	0002	JYE BAO CO.,LTD.	2012/4/6	2013/4/5
ETSTW-Cable 026	Microwave Cable	SUCOFLEX 104	279075	HUBER+SUHNER	2012/3/5	2013/3/4
ETSTW-Cable 027	Microwave Cable	SUCOFLEX 104	279083	HUBER+SUHNER	2012/3/5	2013/3/4
ETSTW-Cable 028	Microwave Cable	FA147A0015M2020	30064-2	UTIFLEX	2011/10/13	2012/10/12
ETSTW-Cable 029	Microwave Cable	FA147A0015M2020	30064-3	UTIFLEX	2011/10/13	2012/10/12
ETSTW-Cable 030	Microwave Cable	SUCOFLEX 104（S_Cable 9）	279067	HUBER+SUHNER	2012/3/5	2013/3/4
ETSTW-Cable 031	Microwave Cable	SUCOFLEX 104（S_Cable 10）	238092	HUBER+SUHNER	2011/11/29	2012/11/28
ETSTW-Cable 032	Microwave Cable	SUCOFLEX 104（S_Cable 12）	237301	HUBER+SUHNER	Function Test	
ETSTW-Cable 039	Microwave Cable	SUCOFLEX 104（S_Cable 19）	316739	HUBER+SUHNER	2012/5/17	2013/5/16
ETSTW-Cable 040	Microwave Cable	SUCOFLEX 104（S_Cable 20）	316738	HUBER+SUHNER	Function Test	

ETSTW-Cable 043	Microwave Cable	SUCOFLEX 104	317576	HUBER+SUHNER	2011/11/29	2012/11/28
ETSTW-Cable 047	Microwave Cable	SUCOFLEX 104	325518	HUBER+SUHNER	2011/11/29	2012/11/28
ETSTW-Cable 051	BNC Cable	BNC Cable 6	None	JYE BAO CO.,LTD.	2012/3/30	2013/3/29
ETSTW-Cable 052	BNC Cable	Clamp Cable	None	Schwarz beck	2012/3/30	2013/3/29
ETSTW-Cable 053	N TYPE To SMA Cable	RG142	None	JYE BAO CO.,LTD.	2012/4/6	2013/4/5
ETSTW-Cable 054	BNC To SMA Cable	RG142	None	JYE BAO CO.,LTD.	2012/4/6	2013/4/5
ETSTW-Cable 055	NTYPE Cable	N30N30-JBY240-80CM	20110621-1.1	JYE BAO CO.,LTD.	Function Test	
ETSTW-Cable 056	N TYPE Cable	N30N30-JBY240-80CM	20110621-1.0	JYE BAO CO.,LTD.	Function Test	
ETSTW-Cable 057	N TYPE Cable	N30N30-JBY240-80CM	20110621-1.1	JYE BAO CO.,LTD.	Function Test	
WTSTW-SW 001	EMI TEST SOFTWARE	Harmonics-1000	None	EMC PARTNER	HARCS Version 4.16 Firmware Version 2.18	
WTSTW-SW 002	EMI TEST SOFTWARE	EZ_EMC	None	Farad	Version ETS-03A1	
WTSTW-SW 003	EMS TEST SOFTWARE	i2	None	AUDIX	Version 3.2007-8-17b	

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 100 kHz 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, a 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:
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 (a); 74.861 (e)(1)	☒	☒	☐
Modulation Deviation	2.1047 (b); 74.861 (e)(2)	☐	☐	☐
Audio Frequency Response	2.1047 (a)	☐	☐	☐
Occupied Bandwidth / Emission Mask	2.1049 (c)(1); 74.861 (e)(5)	☒	☒	☐
Spurious Emissions at Antenna Terminals	2.1051 74.861(e)(6)	☐	☐	☐
Radiated Spurious Emission	2.1053 74.861(e)(6)	☒	☒	☐
Line Conducted Emissions	15.207	☐	☐	☐
Frequency Stability vs. Temperature	2.1055 (b); 74.861(e)(4)	☒	☒	☐
Frequency Stability vs. Voltage	2.1055 (a)(1); 74.861 (e)(4)	☒	☒	☐

The follows is intended to leave blank.

4 RF Power Output (conducted) , FCC 2.1046 (a) ; 74.861 (e)

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.

4.2 Test Results

Frequency Channel	Peak Output Power (dBm)
-- MHz	--
-- MHz	--
-- MHz	--

Limits:

LPAS operating in TV bands	
Frequency [MHz]	Conducted output power [mW]
54 – 72 76 – 88 174 - 216	50 (17 dBm)
470 – 608 614 - 698	250 (24 dBm)

LPAS operating in other than TV bands	
Conducted power [W]	1

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

Explanation :This test is not required.

5 Radiated Power

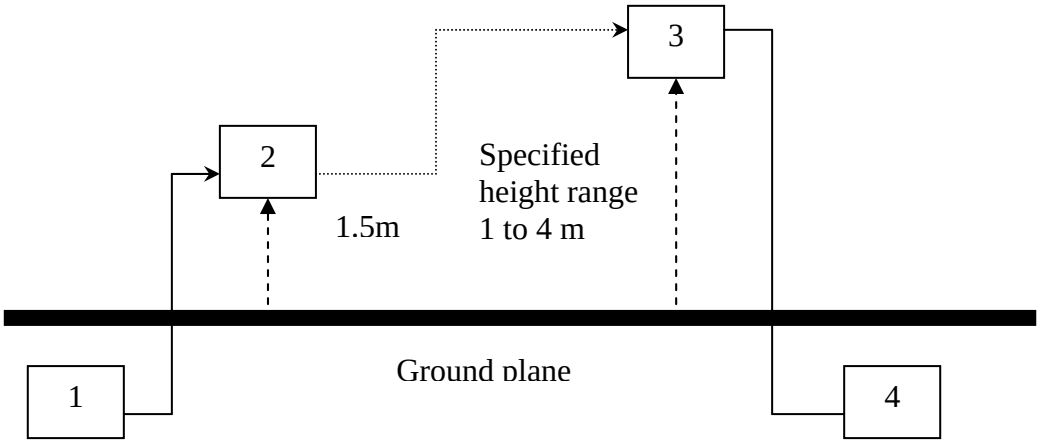
5.1 Test Procedure

The EUT was positioned on a non-conductive turntable, 0.8mabove 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 raising and lowering of the test antenna.

Substitution RF power Measurement at ETS Taiwan
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 :

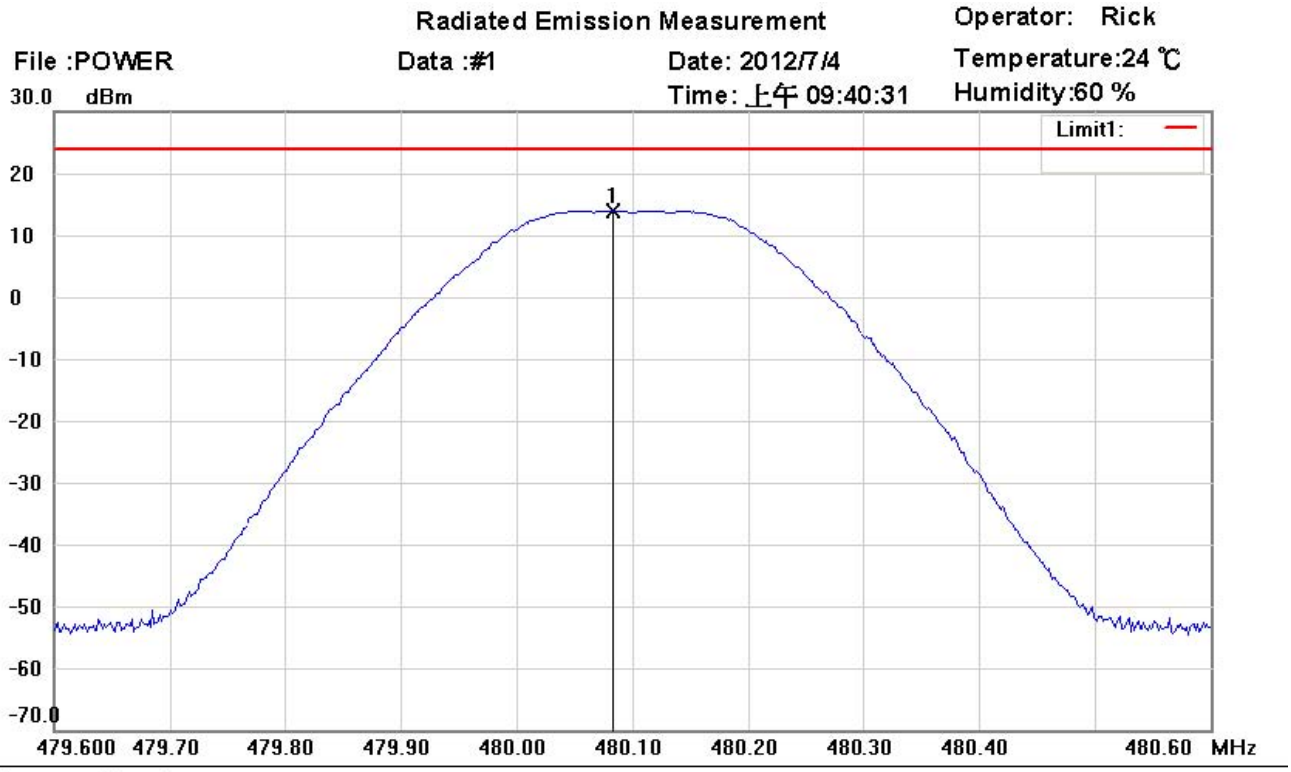
Now the test sample will be putted on the table at the defined position and the radiated power will be receiver and documented by the measurement receiver.

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.

Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T

5.2 Test results

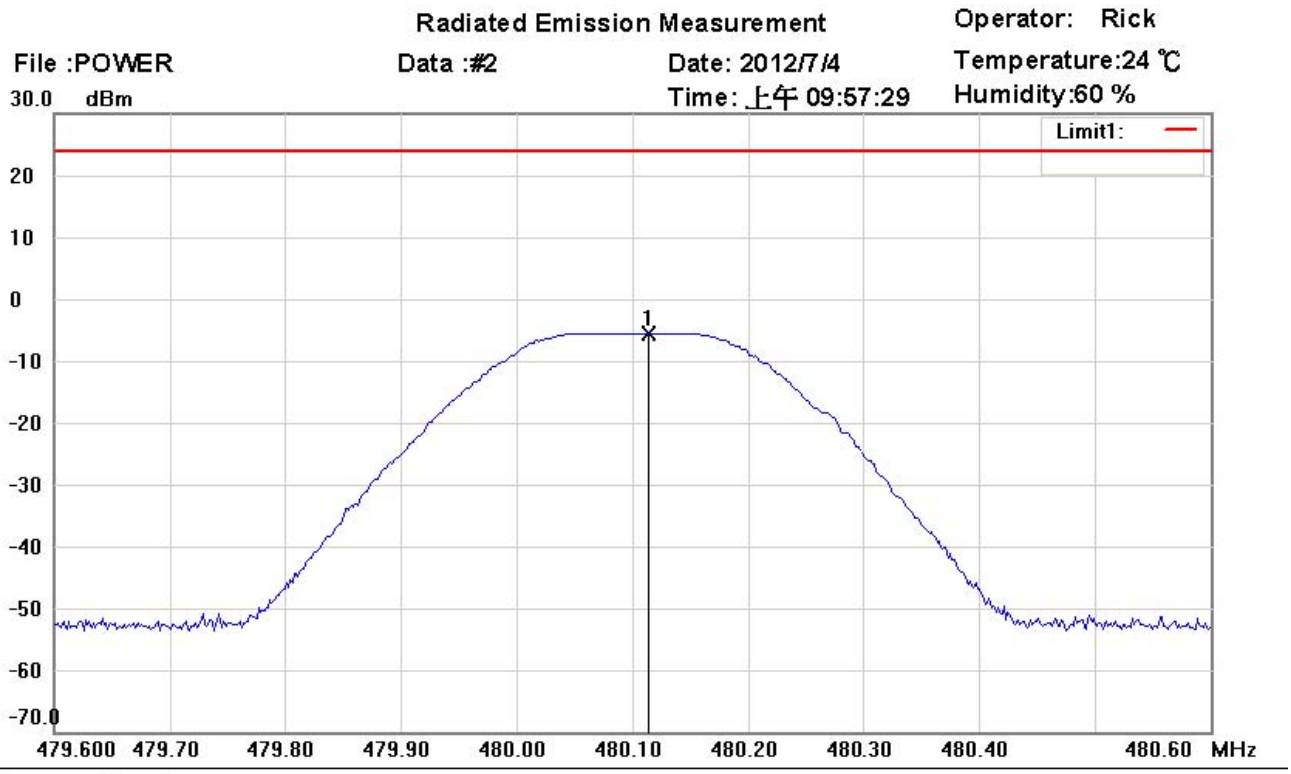


Site : Chamber
Condition : FCC 74.861 power(470-608 and 614-698)
EUT : W6R21205-12421
M/N: ACT-80T
Test Mode : 480.1MHz
Note :

Polarization: *Horizontal*
Power : 3VDC
Distance: 3m

Mk.	Frequency (MHz)	Reading (dBm)	Detector	Corr. factor (dB)	Result (dBm)	Limit (dBm)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
*	480.0840	-12.92	peak	26.77	13.85	24.00	100	160	-10.15	

Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T

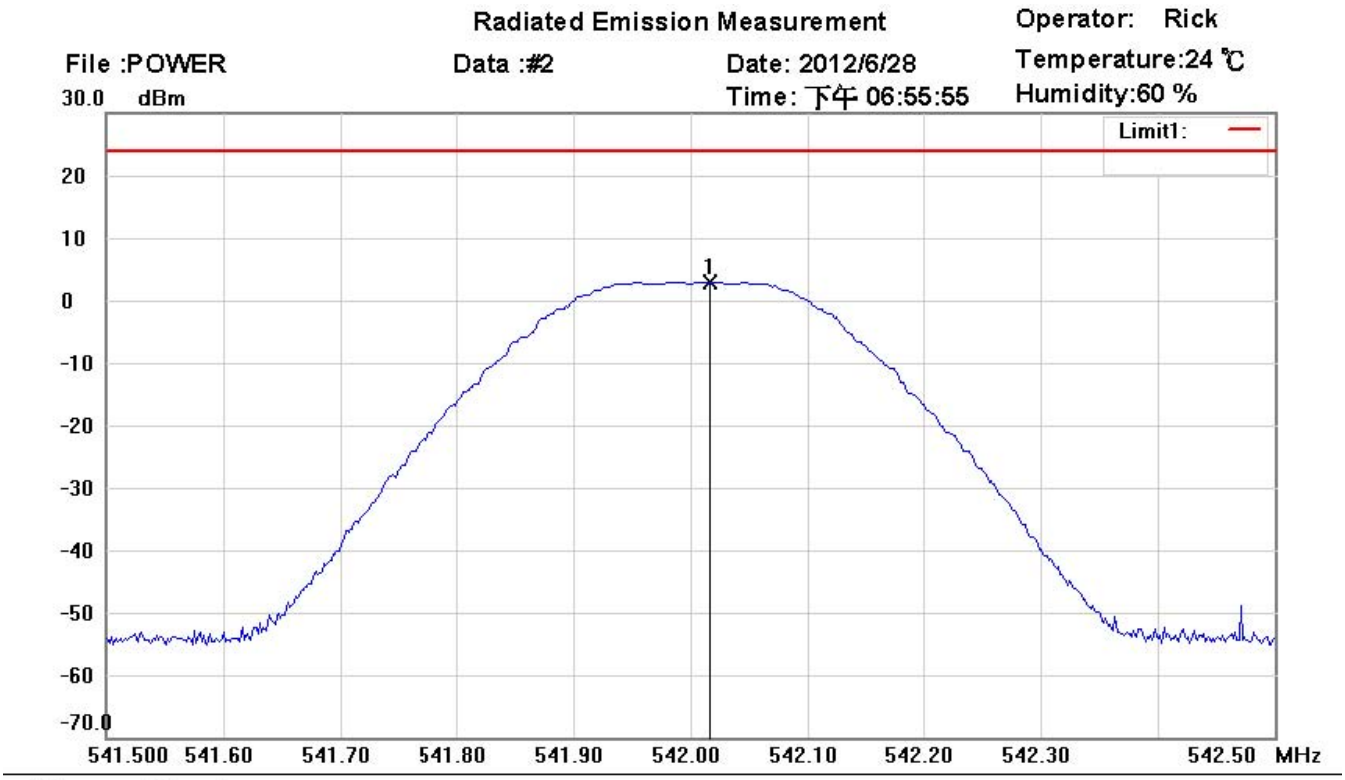


Site : Chamber
Condition : FCC 74.861 power(470-608 and 614-698)
EUT : W6R21205-12421
M/N: ACT-80T
Test Mode : 480.1MHz
Note :

Polarization: *Vertical*
Power : 3VDC
Distance: 3m

Mk.	Frequency (MHz)	Reading (dBm)	Detector	Corr. factor (dB)	Result (dBm)	Limit (dBm)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
*	480.1144	-33.40	peak	27.90	-5.50	24.00	100	250	-29.50	

Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T

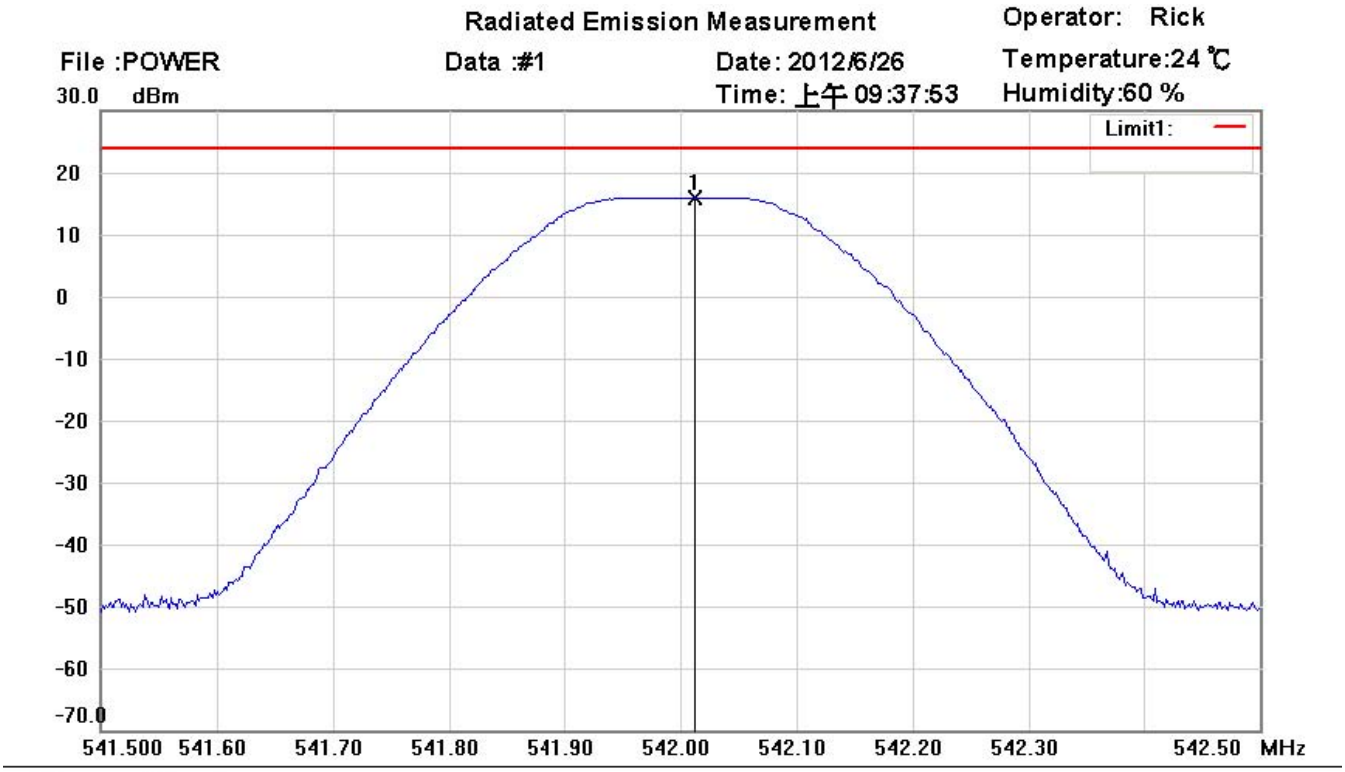


Site : Chamber
Condition : FCC 74.861 power(470-608 and 614-698)
EUT : W6R21205-12421
M/N: ACT-80T
Test Mode : 542MHz
Note :

Polarization: *Horizontal*
Power : 3VDC
Distance: 3m

Mk.	Frequency (MHz)	Reading (dBm)	Detector	Corr. factor (dB)	Result (dBm)	Limit (dBm)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
*	542.0160	-23.69	peak	26.51	2.82	24.00	100	210	-21.18	

Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T

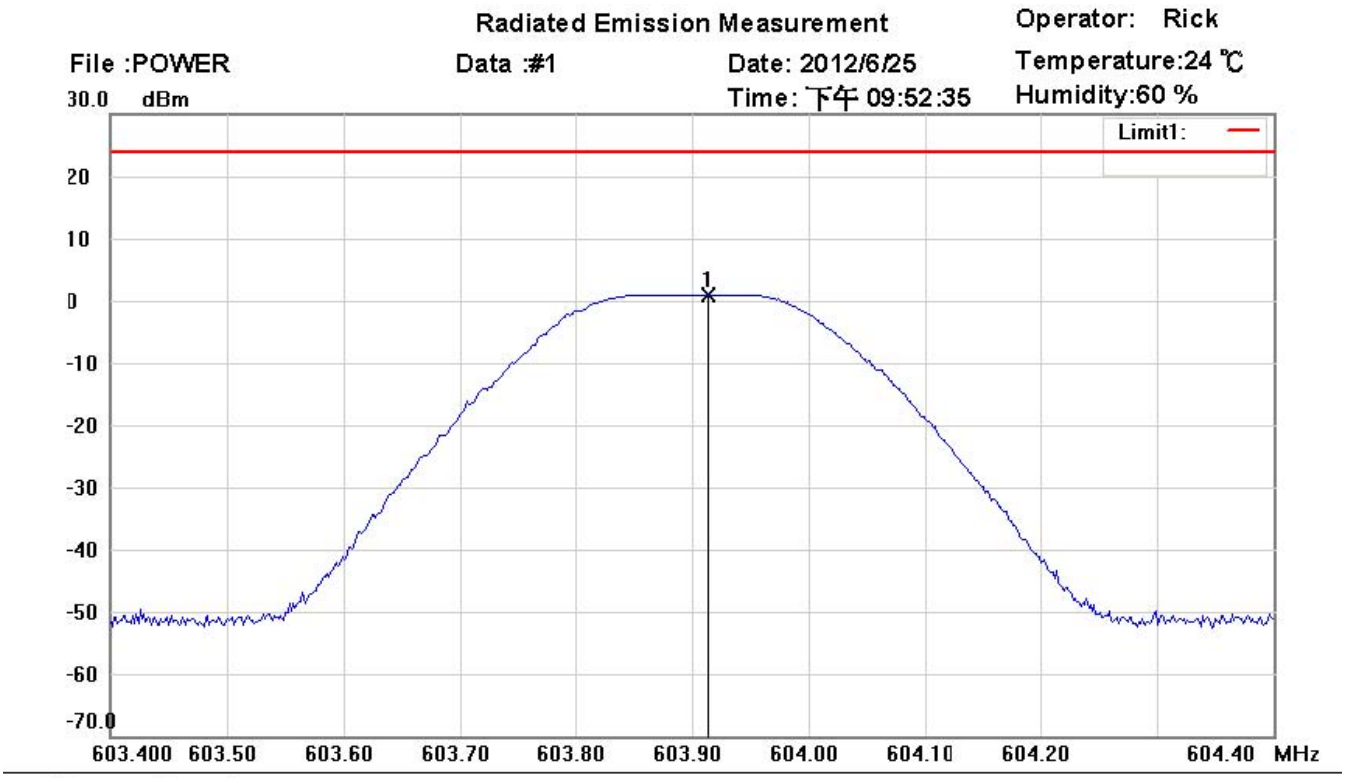


Site : Chamber
Condition : FCC 74.861 power(470-608 and 614-698)
EUT : W6R21205-12421
M/N: ACT-80T
Test Mode : 542MHz
Note :

Polarization: *Vertical*
Power : 3VDC
Distance: 3m

Mk.	Frequency (MHz)	Reading (dBm)	Detector	Corr. factor (dB)	Result (dBm)	Limit (dBm)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
*	542.0128	-13.42	peak	29.34	15.92	24.00	100	70	-8.08	

Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T

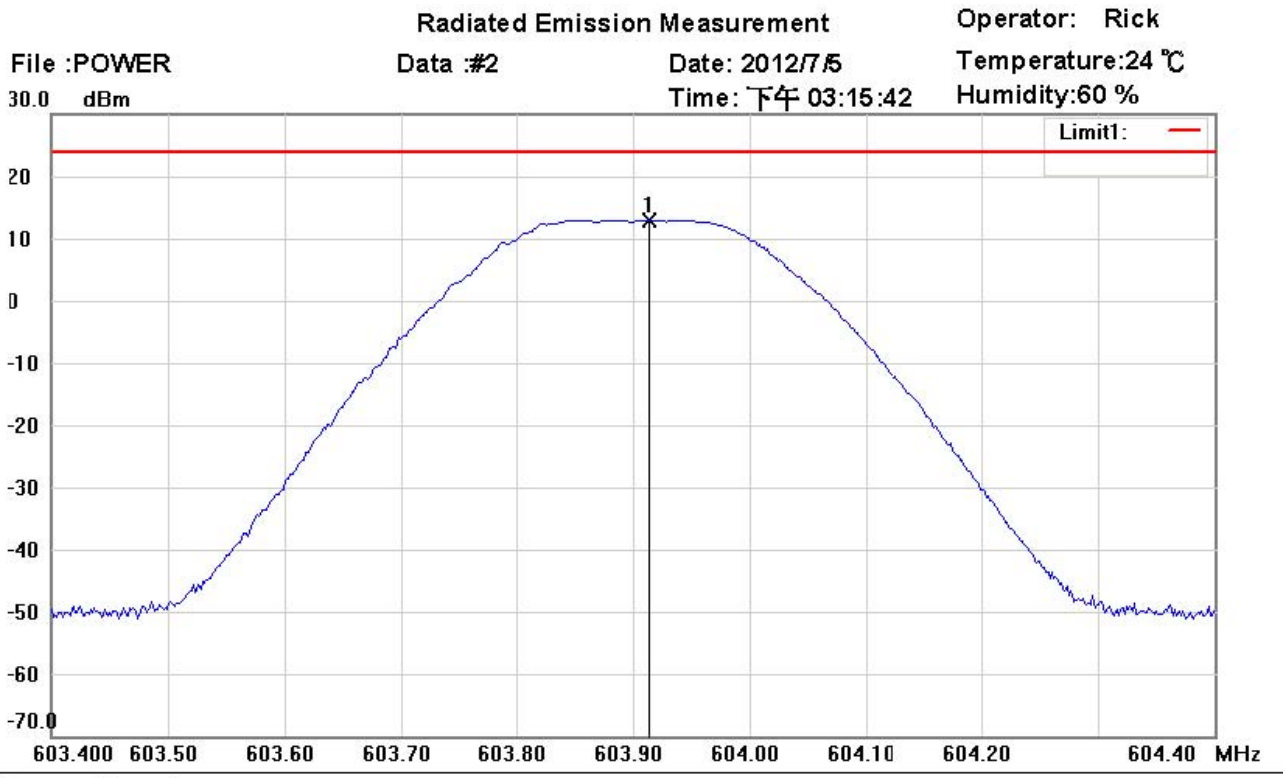


Site : Chamber
Condition : FCC 74.861 power(470-608 and 614-698)
EUT : W6R21205-12421
M/N: ACT-80T
Test Mode : 603.9MHz
Note :

Polarization: *Horizontal*
Power : 3VDC
Distance: 3m

Mk.	Frequency (MHz)	Reading (dBm)	Detector	Corr. factor (dB)	Result (dBm)	Limit (dBm)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
*	603.9144	-28.37	peak	29.31	0.94	24.00	100	120	-23.06	

Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T

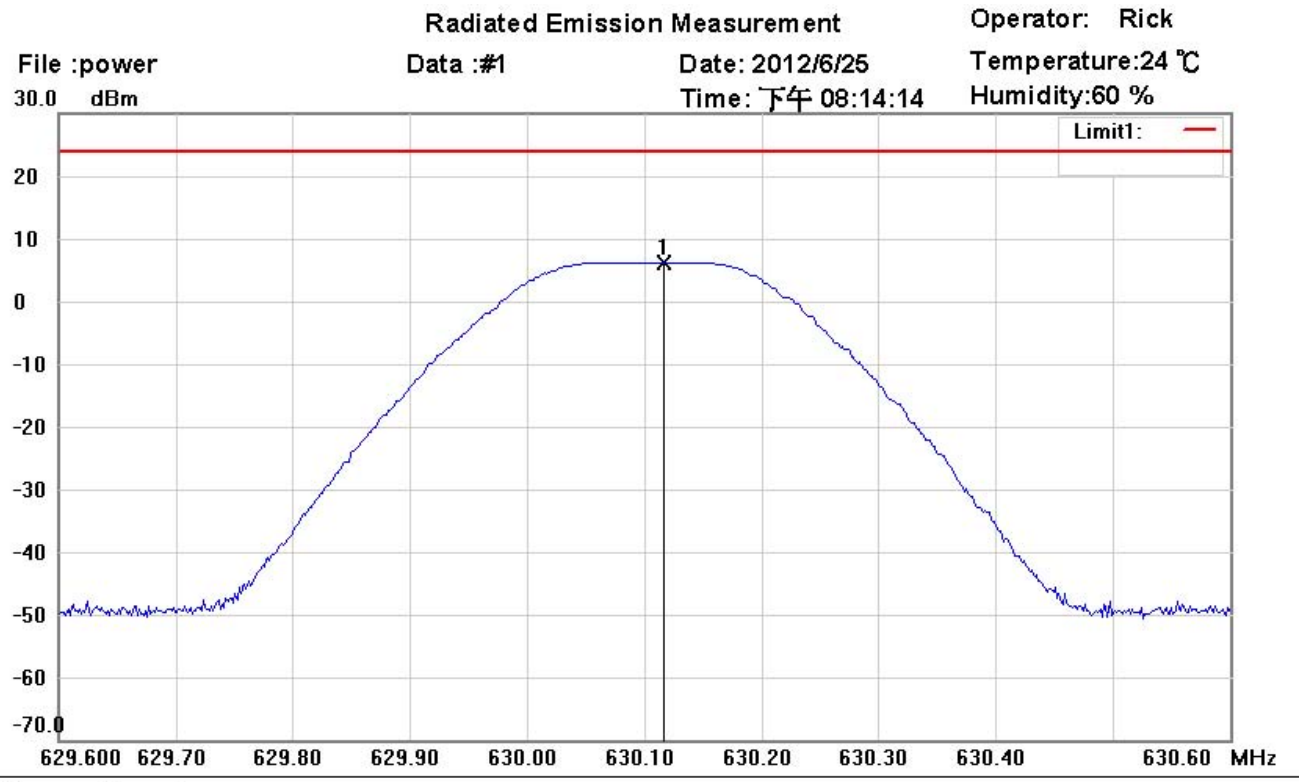


Site : Chamber
Condition : FCC 74.861 power(470-608 and 614-698)
EUT : W6R21205-12421
M/N: ACT-80T
Test Mode : 603.9MHz
Note :

Polarization: *Vertical*
Power : 3VDC
Distance: 3m

Mk.	Frequency (MHz)	Reading (dBm)	Detector	Corr. factor (dB)	Result (dBm)	Limit (dBm)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
*	603.9144	-16.78	peak	29.63	12.85	24.00	100	250	-11.15	

Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T

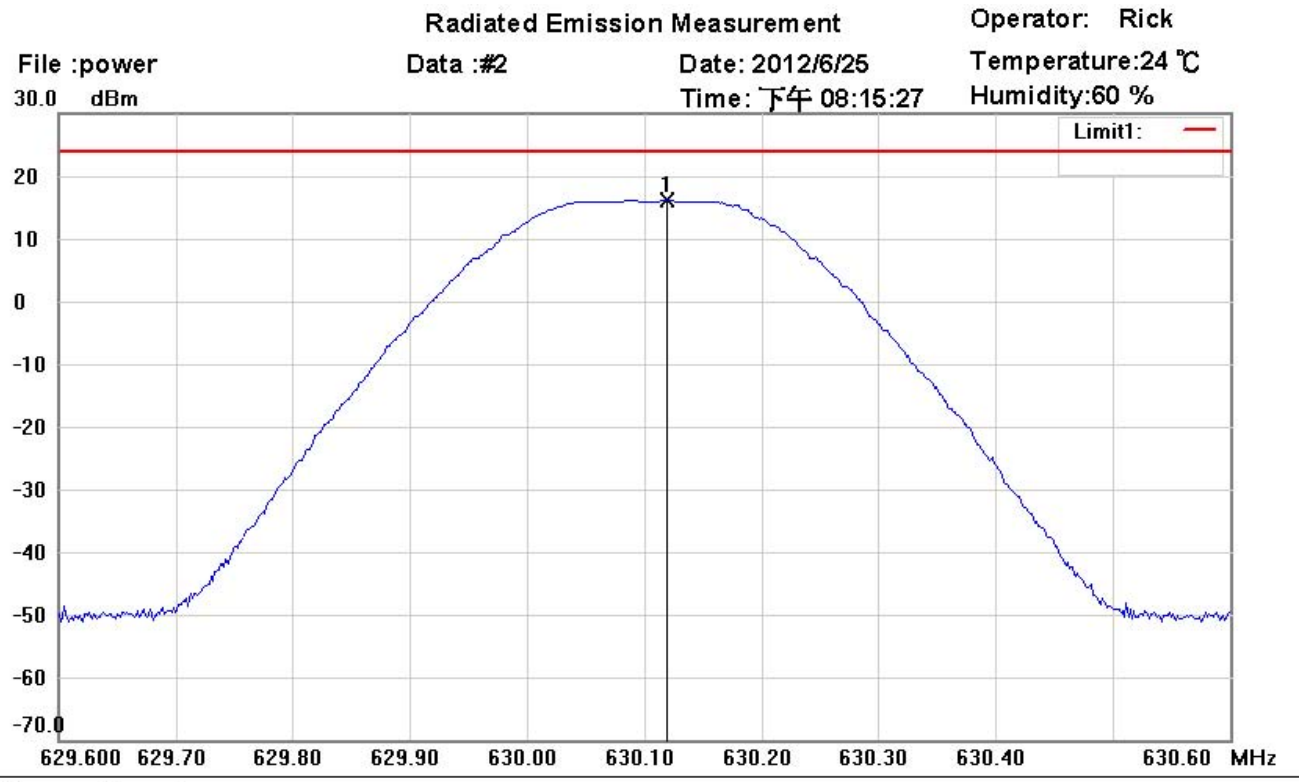


Site : Chamber
Condition : FCC 74.861 power(470-608 and 614-698)
EUT : W6R21205-12421
M/N: ACT-80T
Test Mode : 630.1MHz
Note :

Polarization: *Horizontal*
Power : 3VDC
Distance: 3m

Mk.	Frequency (MHz)	Reading (dBm)	Detector	Corr. factor (dB)	Result (dBm)	Limit (dBm)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
*	630.1160	-25.19	peak	31.36	6.17	24.00	100	270	-17.83	

Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T

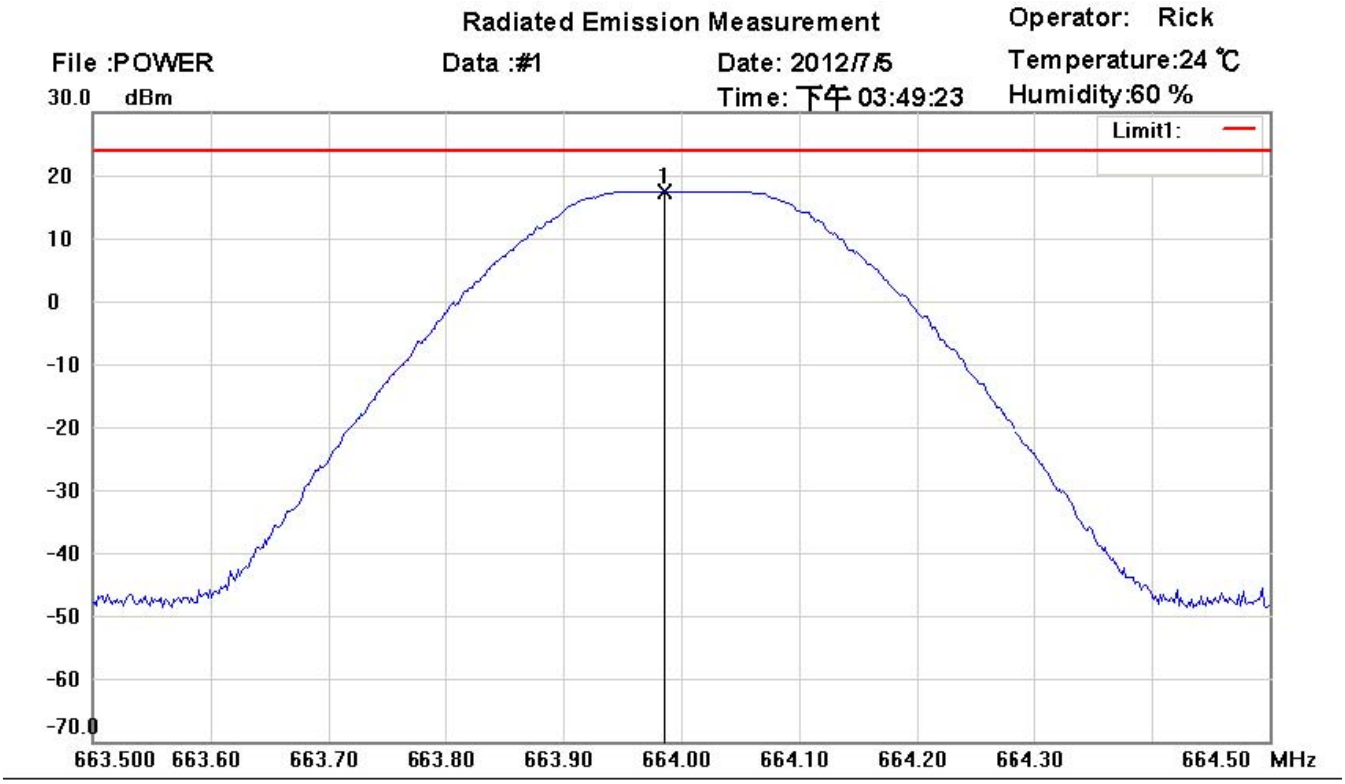


Site : Chamber
Condition : FCC 74.861 power(470-608 and 614-698)
EUT : W6R21205-12421
M/N: ACT-80T
Test Mode : 630.1MHz
Note :

Polarization: *Vertical*
Power : 3VDC
Distance: 3m

Mk.	Frequency (MHz)	Reading (dBm)	Detector	Corr. factor (dB)	Result (dBm)	Limit (dBm)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
*	630.1191	-13.75	peak	29.77	16.02	24.00	100	250	-7.98	

Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T

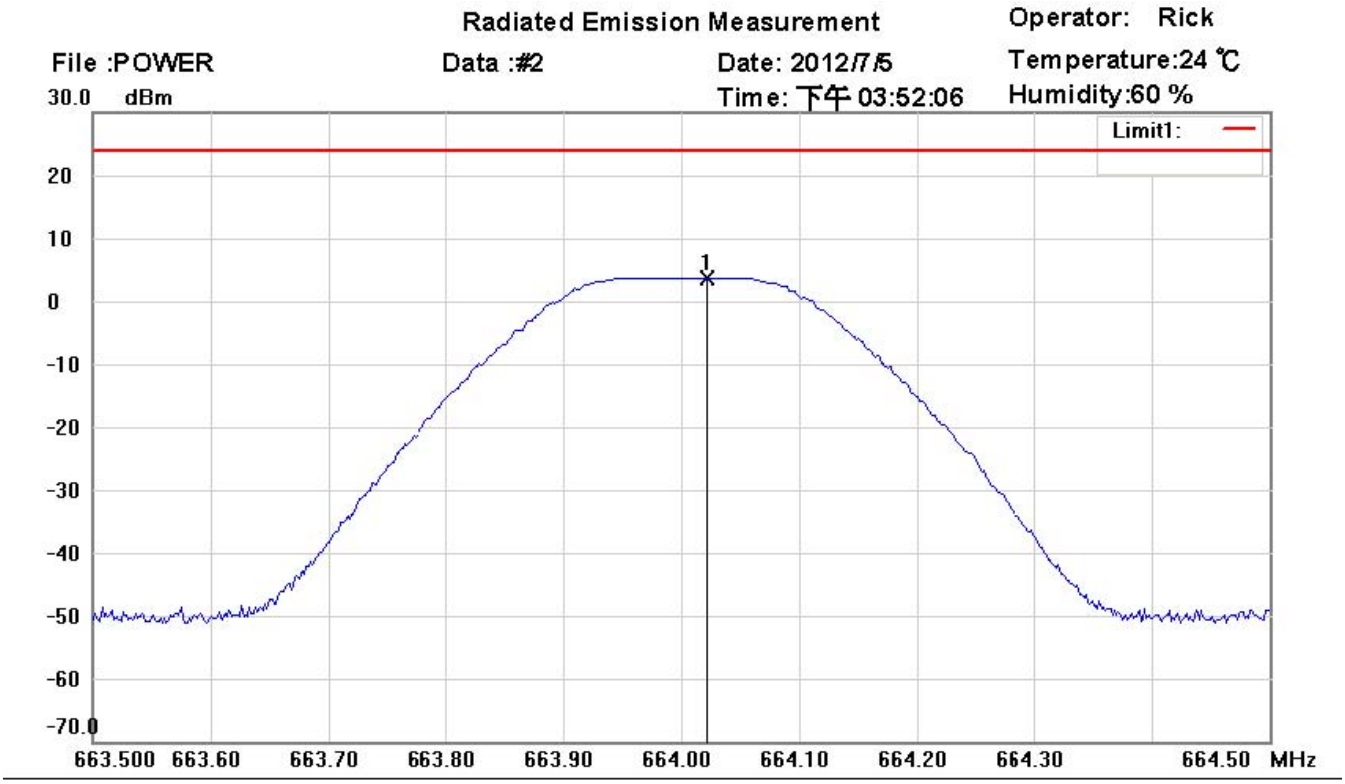


Site : Chamber
Condition : FCC 74.861 power(470-608 and 614-698)
EUT : W6R21205-12421
M/N: ACT-80T
Test Mode : 664MHz
Note :

Polarization: *Horizontal*
Power : 3VDC
Distance: 3m

Mk.	Frequency (MHz)	Reading (dBm)	Detector	Corr. factor (dB)	Result (dBm)	Limit (dBm)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
*	663.9855	-15.30	peak	32.77	17.47	24.00	100	260	-6.53	

Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T

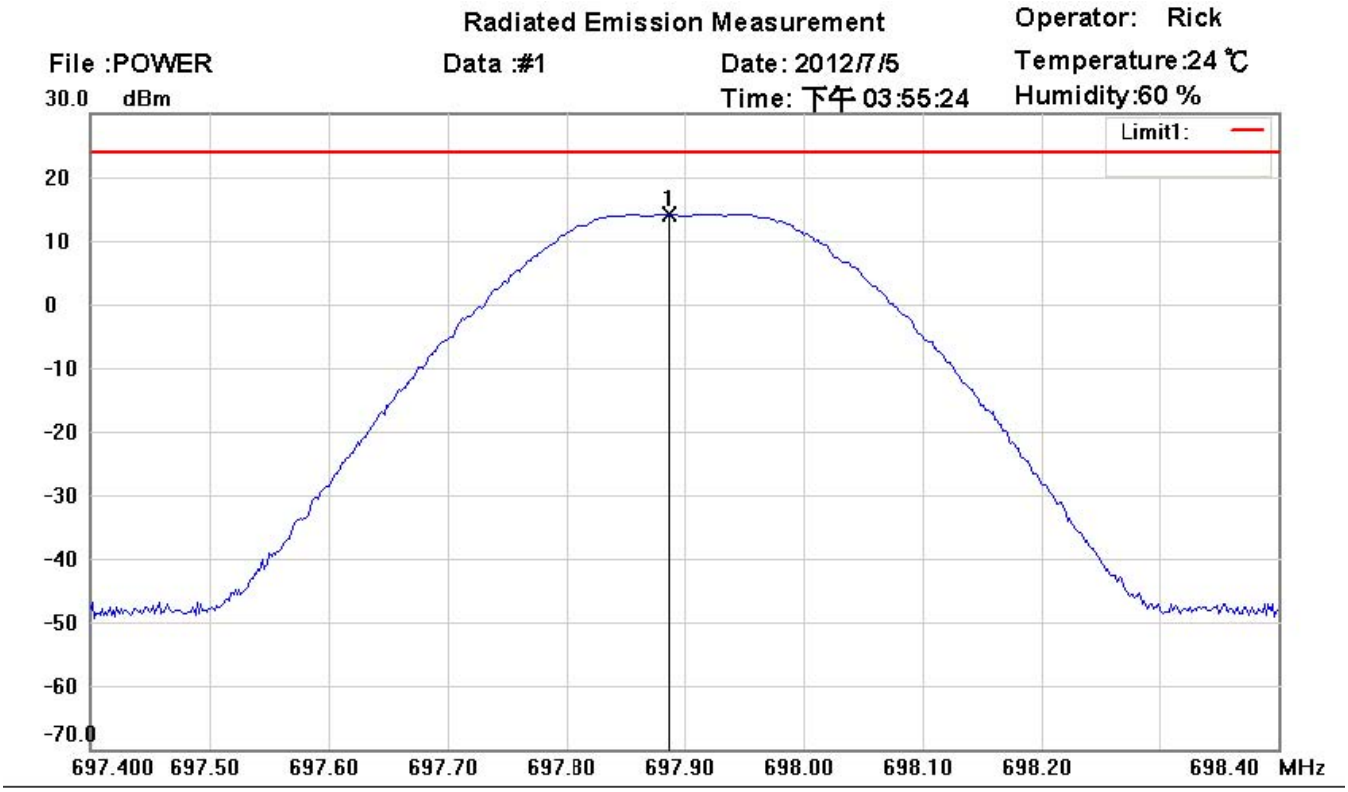


Site : Chamber
Condition : FCC 74.861 power(470-608 and 614-698)
EUT : W6R21205-12421
M/N: ACT-80T
Test Mode : 664MHz
Note :

Polarization: *Vertical*
Power : 3VDC
Distance: 3m

Mk.	Frequency (MHz)	Reading (dBm)	Detector	Corr. factor (dB)	Result (dBm)	Limit (dBm)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
*	664.0223	-26.81	peak	30.50	3.69	24.00	100	120	-20.31	

Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T

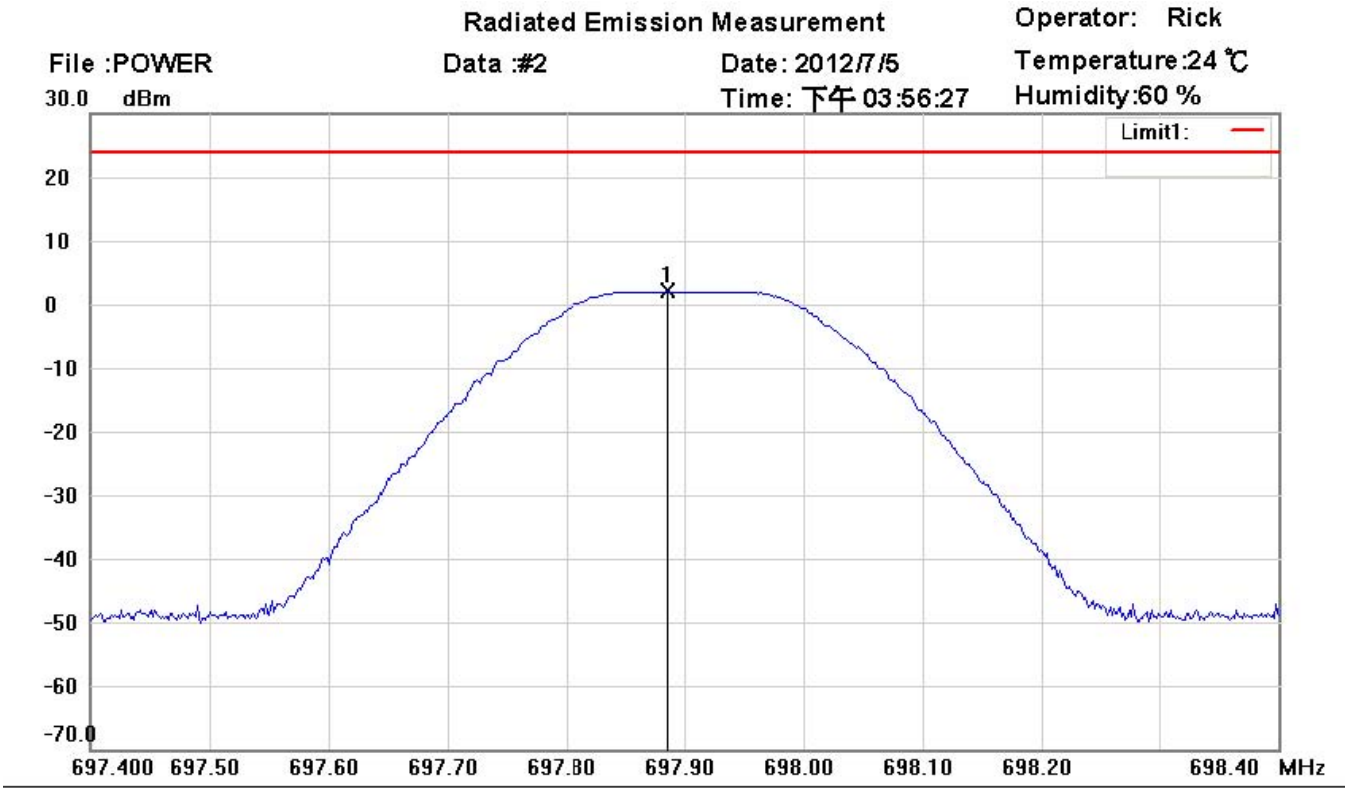


Site : Chamber
Condition : FCC 74.861 power(470-608 and 614-698)
EUT : W6R21205-12421
M/N: ACT-80T
Test Mode : 697.9MHz
Note :

Polarization: *Horizontal*
Power : 3VDC
Distance: 3m

Mk.	Frequency (MHz)	Reading (dBm)	Detector	Corr. factor (dB)	Result (dBm)	Limit (dBm)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
*	697.8872	-18.35	peak	32.42	14.07	24.00	100	250	-9.93	

Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T



Site : Chamber
Condition : FCC 74.861 power(470-608 and 614-698)
EUT : W6R21205-12421
M/N: ACT-80T
Test Mode : 697.9MHz
Note :

Polarization: *Vertical*
Power : 3VDC
Distance: 3m

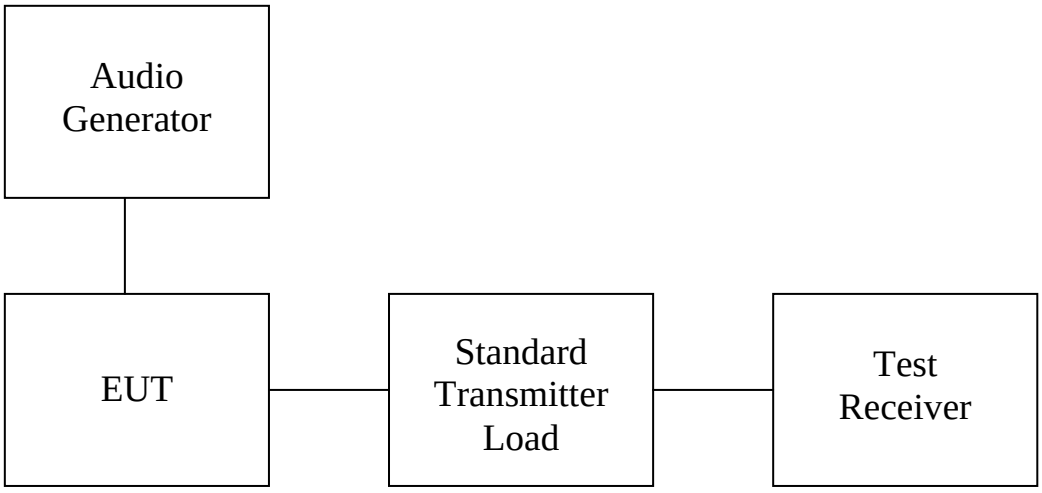
Mk.	Frequency (MHz)	Reading (dBm)	Detector	Corr. factor (dB)	Result (dBm)	Limit (dBm)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
*	697.8856	-30.01	peak	32.02	2.01	24.00	100	130	-21.99	

Test equipment used: ETSTW-RE 003, ETSTW-RE 004, ETSTW-RE 122, ETSTW-RE 042, ETSTW-RE 043

6 Modulation Deviation , FCC 2.1047 (b) ; 74.861(e)

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

Limits : ± 75 kHz

Test equipment used: ETSTW-RE 072, ETSTW-RE 055, ETSTW-RE 050

Explanation : This test is not applicable because this device is digital modulation.

7 Audio frequency response , FCC 2.1047 (a)

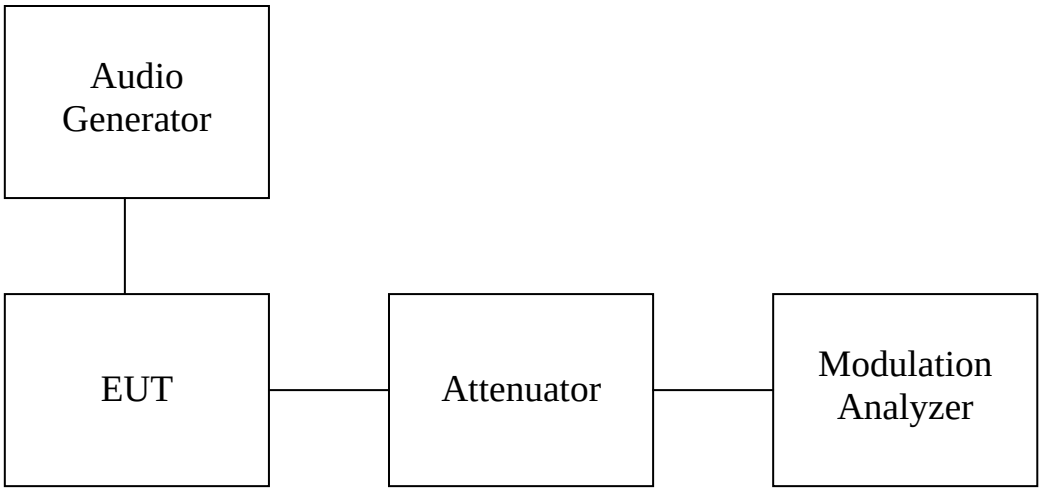
7.1 Test procedure

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 5000 Hz.

For 1000 Hz 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 100 Hz to 5000 Hz are recorded and compared with the reference deviation as follows :

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



7.2 Test results

Test equipment used: ETSTW-RE 072

Explanation : This test is not applicable because this device is digital modulation.

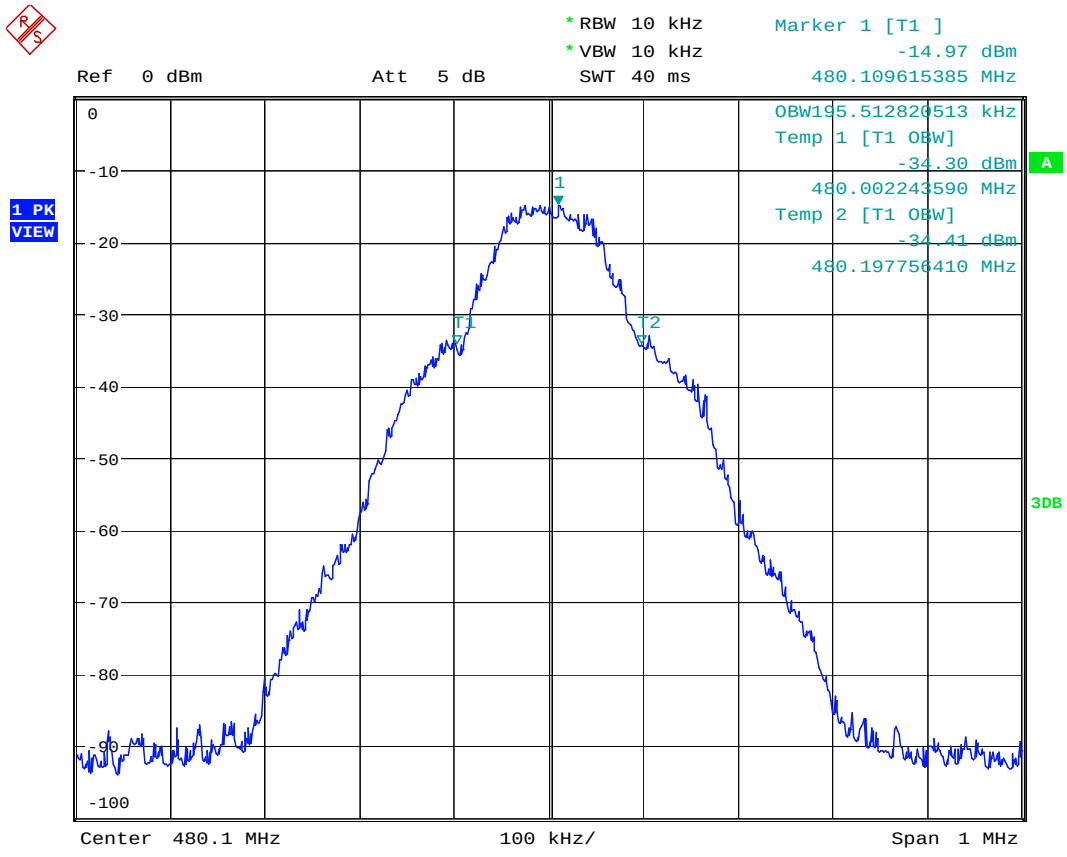
8 Occupied Bandwidth/Emission Mask, FCC 2.1049 (c) ; 74.861 (e)(5)

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power.
Near the carrier an Emission Mask is defined by the standard.

8.1 Test procedure

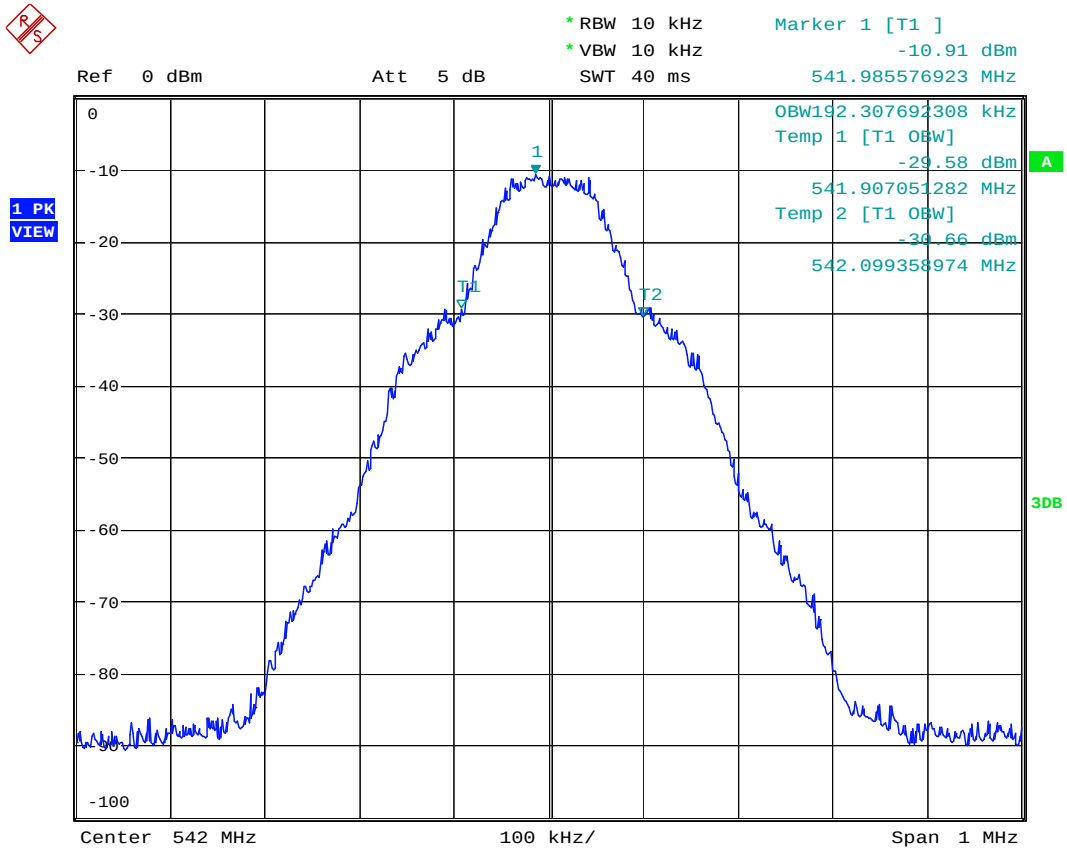
The RF output of the transceiver was connected to the input of the spectrum analyzer through sufficient attenuation.
Occupied Bandwidth was measured with a occupied bandwidth function of the analyzer.
The near the carrier emissions are measured by normal power measurement function of the analyzer.

8.2 Test Results



OCCUPIED BANDWIDTH 480.1MHz
Date: 17.JUL.2012 18:43:48

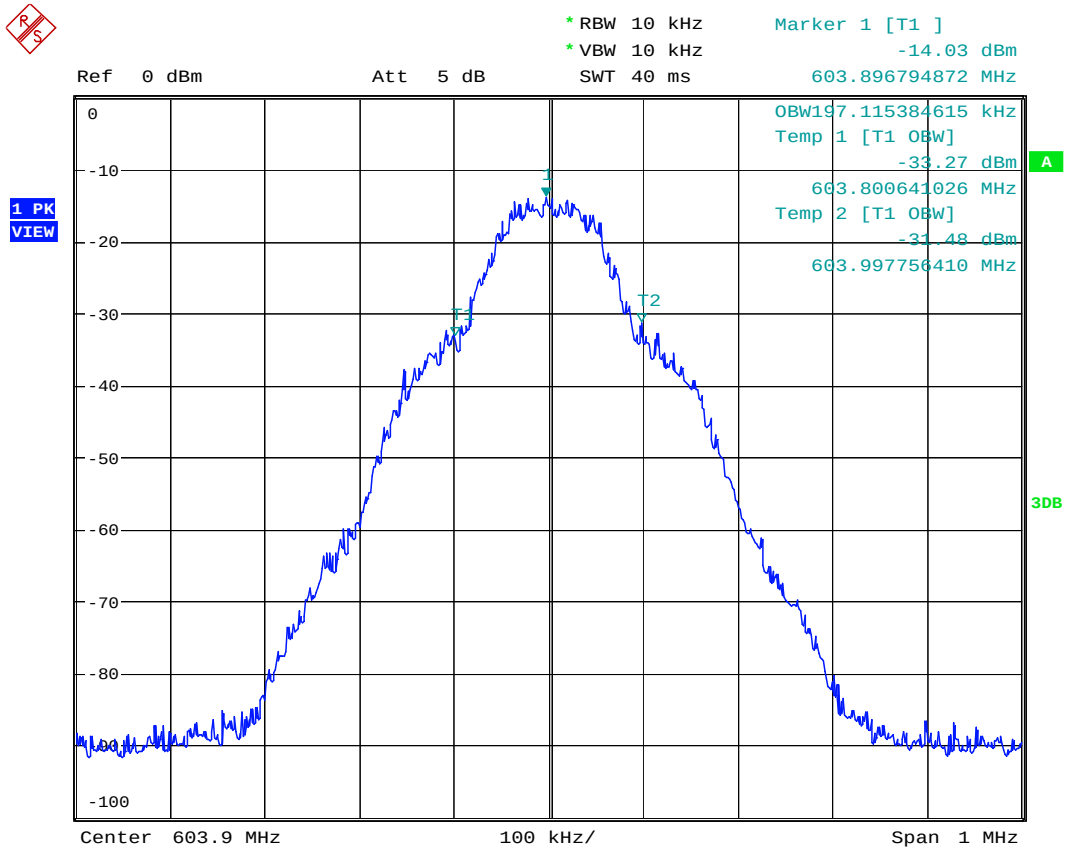
Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T



OCCUPIED BANDWIDTH 542MHz

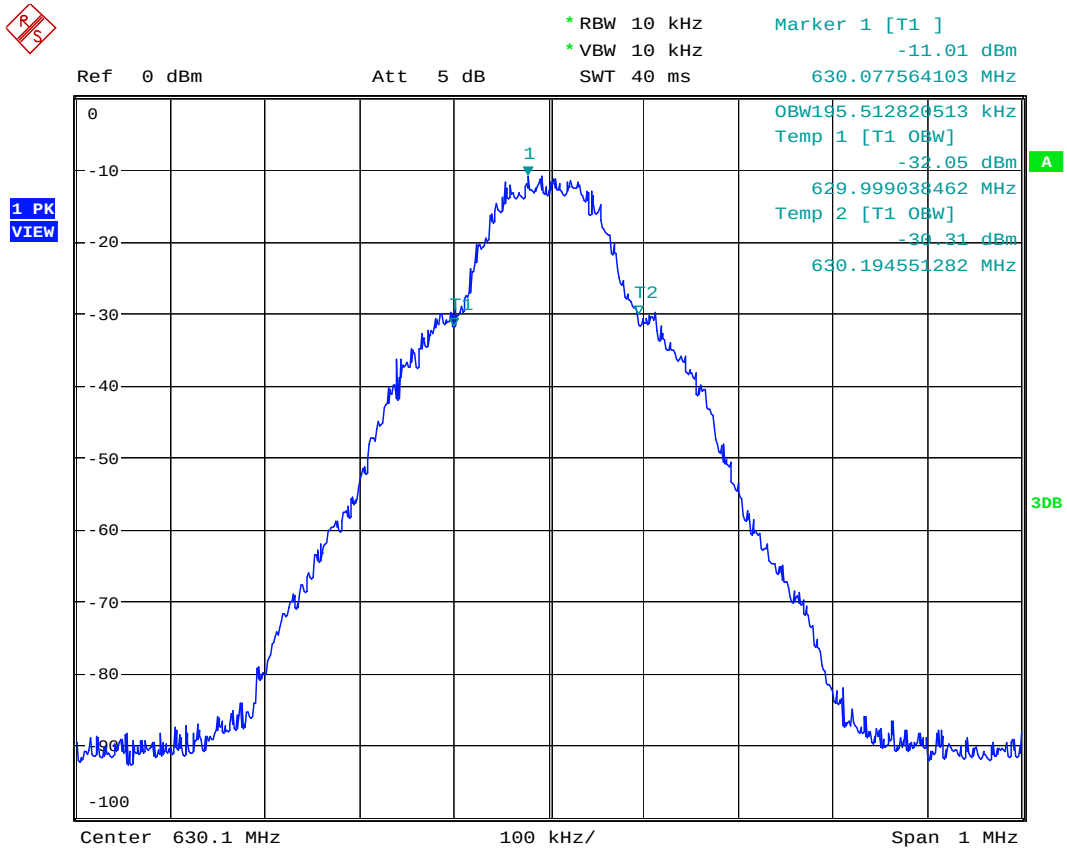
Date: 17.JUL.2012 18:42:42

Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T



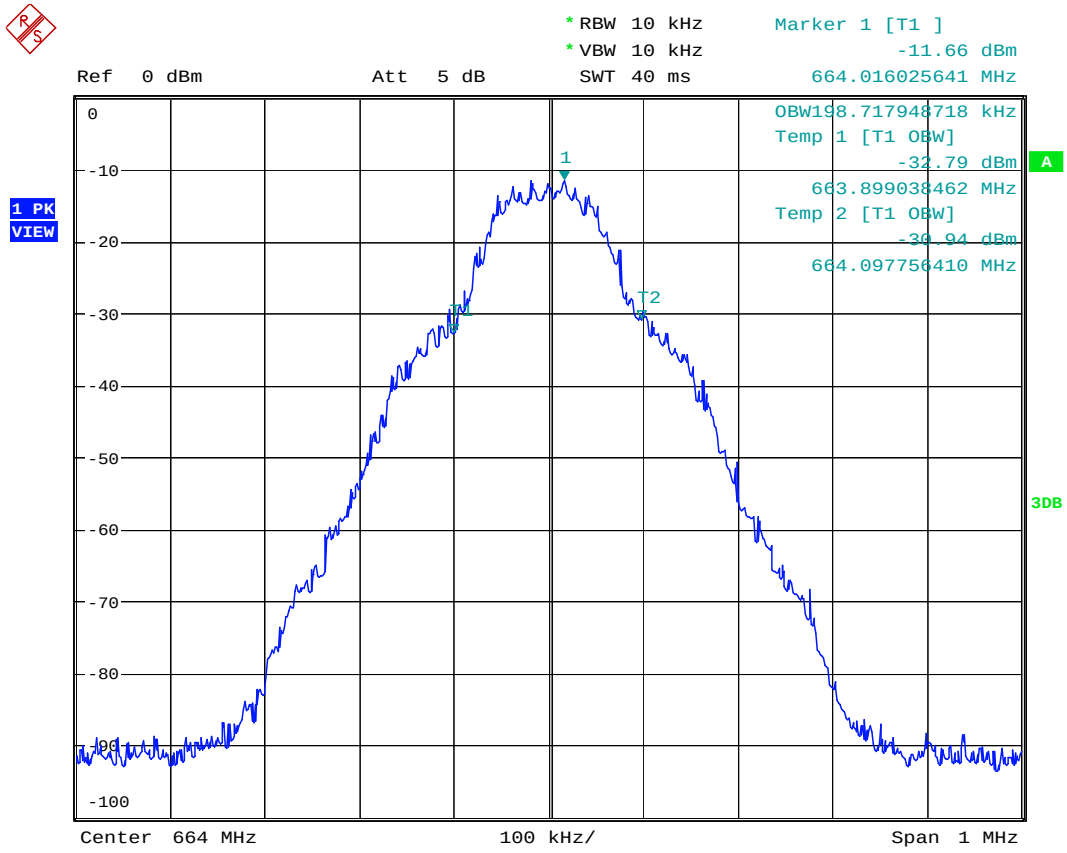
OCCUPIED BANDWIDTH 603.9MHz
Date: 17.JUL.2012 18:41:44

Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T



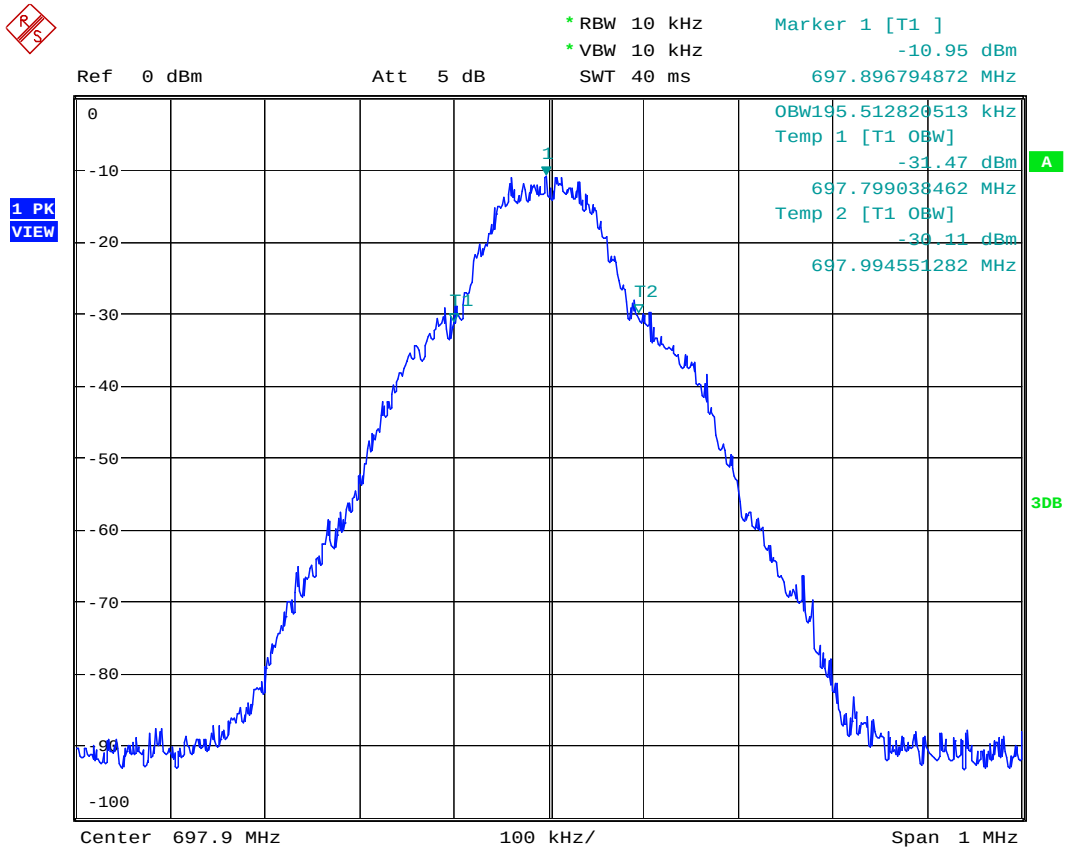
OCCUPIED BANDWIDTH 630.1MHz
Date: 17.JUL.2012 18:45:51

Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T



OCCUPIED BANDWIDTH 664MHz

Date: 17.JUL.2012 18:47:13



OCCUPIED BANDWIDTH 697.9MHz
Date: 17.JUL.2012 18:48:27

8.3 Limit

The operating bandwidth shall not exceed 200 kHz.

Test equipment used: ETSTW-RE 055 , ETSTW-RE 072, ETSTW-RE 050

9 Spurious Emissions at Antenna Terminals FCC2.1051 ; 74.861 (e)

9.1 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 Spurious Emissions at Antenna Terminals was measured by the spectrum analyzer with a suitable notch filter and high-pass filter.

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.

9.2 Test Results

Summary table with conducted data of the test plots for Carrier Test Frequency

Frequency Marker Indication [MHz]	Indication Power Level [dBm]	Compliance Limit [dBm	Margin
--	--	--	--
--	--	--	--
--	--	--	--
--	--	--	--
--	--	--	--

9.3 Limit

Compliance with § 74.861 requires that any emission be attenuated below the transmitter power at least $43 + 10 \log_{10} P$ (P = transmitter power in Watts).

The compliance limit was calculated as an example per the following table :

Maximum transmitter output power	-- dBm
Required attenuation	$43 + 10 \log_{10}$ --W = -- dB
Maximum transmitter output power Required attenuation Compliance limit	-- dBm -- dB -13 dBm

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

Explanation : This test is not applicable.

10 Radiated Spurious Emission , FCC 2.1053 ; 74.861 (e)

10.1 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 have been carried out with the ESK-Software from Rode & Schwarz. The measurements below 1GHz were performed with a measurement bandwidth of 100kHz, above 1GHz with a bandwidth of 1 MHz.
Spurious emission limits near the carrier are defined by a emission mask. This measurements are done in conducted mode.

10.2 Test Results

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

Model: ACT-80T Date: 2012/6/20
Mode: 480.1 MHz Temperature: 24 °C Engineer: Rick
Polarization: Horizontal Humidity: 60 %

Frequency (MHz)	Reading (dBm) Peak	Factor (dB) Corr.	Result (dBm)	Limit (dBm)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
79.3110	-97.94	22.00	-75.94	-13.00	-62.94	300	100
180.9295	-98.71	22.79	-75.92	-13.00	-62.92	120	100
716.6666	-72.69	-3.15	-75.84	-13.00	-62.84	260	100
961.5385	-68.26	-2.34	-70.60	-13.00	-57.60	140	100
1440.3000	-63.14	0.61	-62.53	-13.00	-49.53	120	100
1920.4000	-63.14	1.77	-61.37	-13.00	-48.37	330	100
2400.5000	-63.61	3.72	-59.89	-13.00	-46.89	120	100

Polarization: Vertical

Frequency (MHz)	Reading (dBm) Peak	Factor (dB) Corr.	Result (dBm)	Limit (dBm)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
97.5641	-96.28	22.13	-74.15	-13.00	-61.15	130	100
172.7564	-99.09	23.20	-75.89	-13.00	-62.89	210	100
791.0256	-67.18	-3.26	-70.44	-13.00	-57.44	150	100
961.5385	-70.33	-3.45	-73.78	-13.00	-60.78	60	100
1084.0000	-63.59	-2.88	-66.47	-13.00	-53.47	250	100
1626.0000	-62.62	-1.60	-64.22	-13.00	-51.22	300	100
2168.0000	-63.30	3.12	-60.18	-13.00	-47.18	120	100

Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T

Mode: 542 MHz
Polarization: Horizontal

Frequency (MHz)	Reading (dBm) Peak	Factor (dB) Corr.	Result (dBm)	Limit (dBm)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
47.4360	-97.19	21.95	-75.24	-13.00	-62.24	70	100
90.2083	-97.11	20.74	-76.37	-13.00	-63.37	210	100
669.2308	-73.95	-2.52	-76.47	-13.00	-63.47	110	100
943.5897	-70.27	-1.97	-72.24	-13.00	-59.24	230	100
1084.0000	-63.02	-0.29	-63.31	-13.00	-50.31	50	100
1626.0000	-63.20	0.77	-62.43	-13.00	-49.43	300	100
2168.0000	-62.90	2.01	-60.89	-13.00	-47.89	120	100

Polarization: Vertical

Frequency (MHz)	Reading (dBm) Peak	Factor (dB) Corr.	Result (dBm)	Limit (dBm)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
97.8365	-95.43	22.16	-73.27	-13.00	-60.27	270	100
164.5833	-99.82	23.14	-76.68	-13.00	-63.68	130	100
700.0000	-68.89	-3.51	-72.40	-13.00	-59.40	110	100
791.0256	-67.48	-3.26	-70.74	-13.00	-57.74	320	100
1072.1150	-59.56	-2.57	-62.13	-13.00	-49.13	90	100
1626.0000	-63.59	-1.60	-65.19	-13.00	-52.19	250	100
2168.0000	-63.11	3.12	-59.99	-13.00	-46.99	120	100

Mode: 603.9 MHz
Polarization: Horizontal

Frequency (MHz)	Reading (dBm) Peak	Factor (dB) Corr.	Result (dBm)	Limit (dBm)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
93.7500	-95.05	20.92	-74.13	-13.00	-61.13	130	100
97.8365	-96.34	21.13	-75.21	-13.00	-62.21	70	100
507.6923	-68.68	-8.89	-77.57	-13.00	-64.57	300	100
700.0000	-73.44	-2.24	-75.68	-13.00	-62.68	120	100
1207.8000	-63.02	-1.09	-64.11	-13.00	-51.11	80	100
1811.7000	-63.68	1.58	-62.10	-13.00	-49.10	320	100
2415.6000	-64.37	3.84	-60.53	-13.00	-47.53	120	100

Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T

Polarization: Vertical

Frequency (MHz)	Reading (dBm) Peak	Factor (dB) Corr.	Result (dBm)	Limit (dBm)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
97.8365	-97.87	22.16	-75.71	-13.00	-62.71	310	100
175.2083	-100.19	23.22	-76.97	-13.00	-63.97	140	100
700.0000	-67.90	-3.51	-71.41	-13.00	-58.41	130	100
791.0256	-67.17	-3.26	-70.43	-13.00	-57.43	280	100
1207.8000	-62.38	0.36	-62.02	-13.00	-49.02	250	100
1811.7000	-64.26	1.34	-62.92	-13.00	-49.92	300	100
2415.6000	-63.91	4.38	-59.53	-13.00	-46.53	210	100

Mode: 630.1 MHz

Polarization: Horizontal

Frequency (MHz)	Reading (dBm) Peak	Factor (dB) Corr.	Result (dBm)	Limit (dBm)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
37.9006	-98.10	22.99	-75.11	-13.00	-62.11	310	100
119.0865	-97.94	20.22	-77.72	-13.00	-64.72	130	100
471.7950	-71.15	-9.15	-80.30	-13.00	-67.30	130	100
666.6667	-74.14	-2.55	-76.69	-13.00	-63.69	250	100
1260.2000	-62.33	-0.36	-62.69	-13.00	-49.69	330	100
1890.3000	-63.93	1.21	-62.72	-13.00	-49.72	210	100
2520.4000	-62.92	4.76	-58.16	-13.00	-45.16	120	100

Polarization: Vertical

Frequency (MHz)	Reading (dBm) Peak	Factor (dB) Corr.	Result (dBm)	Limit (dBm)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
97.8365	-97.91	22.16	-75.75	-13.00	-62.75	270	100
173.0288	-99.76	23.20	-76.56	-13.00	-63.56	130	100
535.8973	-68.07	-6.76	-74.83	-13.00	-61.83	130	100
676.9230	-67.52	-4.29	-71.81	-13.00	-58.81	70	100
1259.6150	-59.18	-0.51	-59.69	-13.00	-46.69	50	100
1894.2310	-58.99	0.96	-58.03	-13.00	-45.03	310	100
2520.4000	-63.89	4.59	-59.30	-13.00	-46.30	280	100

Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T
Mode: 664 MHz
Polarization: Horizontal

Frequency (MHz)	Reading (dBm) Peak	Factor (dB) Corr.	Result (dBm)	Limit (dBm)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
45.8012	-97.20	22.17	-75.03	-13.00	-62.03	100	100
128.0770	-98.66	20.53	-78.13	-13.00	-65.13	230	100
453.8462	-71.94	-9.15	-81.09	-13.00	-68.09	170	100
701.2821	-75.04	-2.31	-77.35	-13.00	-64.35	240	100
1328.0000	-64.56	0.44	-64.12	-13.00	-51.12	60	100
1992.0000	-63.27	3.90	-59.37	-13.00	-46.37	290	100
2656.0000	-65.14	6.02	-59.12	-13.00	-46.12	120	100

Polarization: Vertical

Frequency (MHz)	Reading (dBm) Peak	Factor (dB) Corr.	Result (dBm)	Limit (dBm)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
97.8365	-95.70	22.16	-73.54	-13.00	-60.54	100	100
176.2981	-99.29	23.23	-76.06	-13.00	-63.06	180	100
547.4358	-69.54	-6.56	-76.10	-13.00	-63.10	230	100
721.7948	-73.94	-3.55	-77.49	-13.00	-64.49	120	100
1326.9230	-60.50	-1.44	-61.94	-13.00	-48.94	310	100
1990.3850	-61.97	3.17	-58.80	-13.00	-45.80	170	100
2754.8080	-62.45	5.35	-57.10	-13.00	-44.10	110	100

Mode: 697.9 MHz
Polarization: Horizontal

Frequency (MHz)	Reading (dBm) Peak	Factor (dB) Corr.	Result (dBm)	Limit (dBm)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
38.9904	-98.24	22.97	-75.27	-13.00	-62.27	200	100
157.2276	-98.73	22.25	-76.48	-13.00	-63.48	120	100
647.4358	-75.05	-2.89	-77.94	-13.00	-64.94	300	100
880.7691	-75.26	-2.34	-77.60	-13.00	-64.60	210	100
1394.2310	-60.92	1.05	-59.87	-13.00	-46.87	80	100
2091.3460	-58.45	2.58	-55.87	-13.00	-42.87	230	100
2791.6000	-63.28	6.37	-56.91	-13.00	-43.91	210	100

Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T
Polarization: Vertical

Frequency (MHz)	Reading (dBm) Peak	Factor (dB) Corr.	Result (dBm)	Limit (dBm)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
97.5641	-96.70	22.13	-74.57	-13.00	-61.57	130	100
163.2211	-99.14	23.13	-76.01	-13.00	-63.01	140	100
547.4358	-67.98	-6.56	-74.54	-13.00	-61.54	260	100
664.1026	-69.90	-4.72	-74.62	-13.00	-61.62	220	100
1394.2310	-60.84	-2.08	-62.92	-13.00	-49.92	70	100
2091.3460	-57.27	2.14	-55.13	-13.00	-42.13	310	100
2791.6000	-63.33	4.62	-58.71	-13.00	-45.71	120	100

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: 30-300 MHz = ± 1.56 dB, 300-1000 MHz = ± 1.56 dB, 1-18 GHz = ± 2.33 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.**

10.3 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 § 74.861 (6).

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.

10.4 Limits

Compliance with § 74.861 requires that any emission be attenuated below the transmitter power at least $43 + 10 \log_{10} P$ (P = transmitter power in Watts).

The compliance limit was calculated as an example per the following table :

Maximum transmitter output power	17.47 dBm
Required attenuation	$43 + 10 \log_{10} 0.0558$ W = 30.47 dB
Maximum transmitter output power Required attenuation Compliance limit	17.47 dBm 30.47 dB -13 dBm

Test equipment used: ETSTW-RE 003, ETSTW-RE 004, ETSTW-RE 122, ETSTW-RE 030,
ETSTW-RE 042, ETSTW-RE 043, ETSTW-RE 044

Explanation : See attached diagrams in appendix.

11 Line Conducted Emission , FCC 15.207

11.1 Test procedure

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.

11.2 Test Results

Frequency	Max. Level (dBµV)	
	quasi-peak	average
-- kHz	--	--

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

Note: 1. The formula of measured value as: Test Result = Reading + Correction Factor
2. The Correction Factor = Cable Loss + LISN Insertion Loss + Pulse Limit Loss
3. Detector function in the form : PK = Peak, QP = Quasi Peak, AV = Average
4. All not in the table noted test results are more than 20 dB below the relevant limits.
5. Measurement uncertainty = ±1.10 dB; Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Explanation : This test is not required because the EUT is battery back-up powered.
Test equipment used: ETSTW-CE 001, ETSTW-CE 004, ETSTW-CE 006, ETSTW-RE 045

12 Frequency Stability vs. Temperature , FCC 2.1055 , 74.861 (e)

12.1 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.

12.2 Test Results

480.1 MHz

°C	Frequency Error (kHz)	Frequency Error (ppm)
-30	-4.466	-9.302
-20	-1.246	-2.595
-10	0.635	1.323
0	0.969	2.018
10	1.879	3.914
20	0.127	0.265
30	0.528	1.100
40	-0.078	-0.162
50	-0.471	-0.981

25°C: 480.101602 MHz
Limit: 24.005 kHz(±0.005%)

542 MHz

°C	Frequency Error (kHz)	Frequency Error (ppm)
-30	-6.539	-12.065
-20	-0.802	-1.480
-10	0.400	0.738
0	0.801	1.478
10	2.804	5.173
20	0.000	0.000
30	0.801	1.478
40	0.000	0.000
50	-0.401	-0.740

25°C: 542.000801 MHz
Limit: 27.100 kHz(±0.005%)

603.9 MHz

°C	Frequency Error (kHz)	Frequency Error (ppm)
-30	-3.676	-6.087
-20	-2.689	-4.453
-10	0.216	0.358
0	-0.938	-1.553
10	1.499	2.482
20	-0.137	-0.227
30	2.111	3.496
40	3.221	5.334
50	-0.917	-1.518

25°C: 603.900938 MHz
Limit: 30.195 kHz(±0.005%)

630.1 MHz

°C	Frequency Error (kHz)	Frequency Error (ppm)
-30	-3.616	-7.532
-20	-2.876	-5.990
-10	0.603	1.256
0	0.743	1.547
10	1.747	3.639
20	0.000	0.000
30	1.766	3.678
40	2.174	4.528
50	-0.377	-0.785

25°C: 630.098397 MHz
Limit: 31.505 kHz(±0.005%)

664 MHz

°C	Frequency Error (kHz)	Frequency Error (ppm)
-30	-4.006	-7.391
-20	-3.206	-5.915
-10	0.400	0.738
0	0.801	1.478
10	1.603	2.958
20	0.801	1.478
30	2.003	3.696
40	2.804	5.173
50	-0.885	-1.633

25°C: 663.997195 MHz
Limit: 33.200 kHz(±0.005%)

697.9 MHz

°C	Frequency Error (kHz)	Frequency Error (ppm)
-30	-3.814	-6.316
-20	-3.450	-5.713
-10	0.224	0.371
0	0.902	1.494
10	1.764	2.921
20	-0.401	-0.664
30	1.845	3.055
40	2.538	4.203
50	-0.766	-1.268

25°C: 697.898797 MHz
Limit: 34.895 kHz(±0.005%)

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

13 Frequency Stability vs. Voltage , FCC 2.1055 (d) ; 74.861 (e)

13.1 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.

13.2 Test Results

Test Voltage: 2.55 VDC

Frequency in MHz	Frequency Error (kHz)	Frequency Error (ppm)
480.1 MHz	-0.078	-0.162
542 MHz	0.000	0.000
603.9 MHz	0.000	0.000
630.1 MHz	0.000	0.000
664 MHz	0.000	0.000
697.9 MHz	-0.401	-0.664

Limit : ±0.005%

Test equipment used: ETSTW-RE 055

Appendix

A Measurement diagrams

1. Emission Mask

2. Radiation Spurious Emission

B Photos

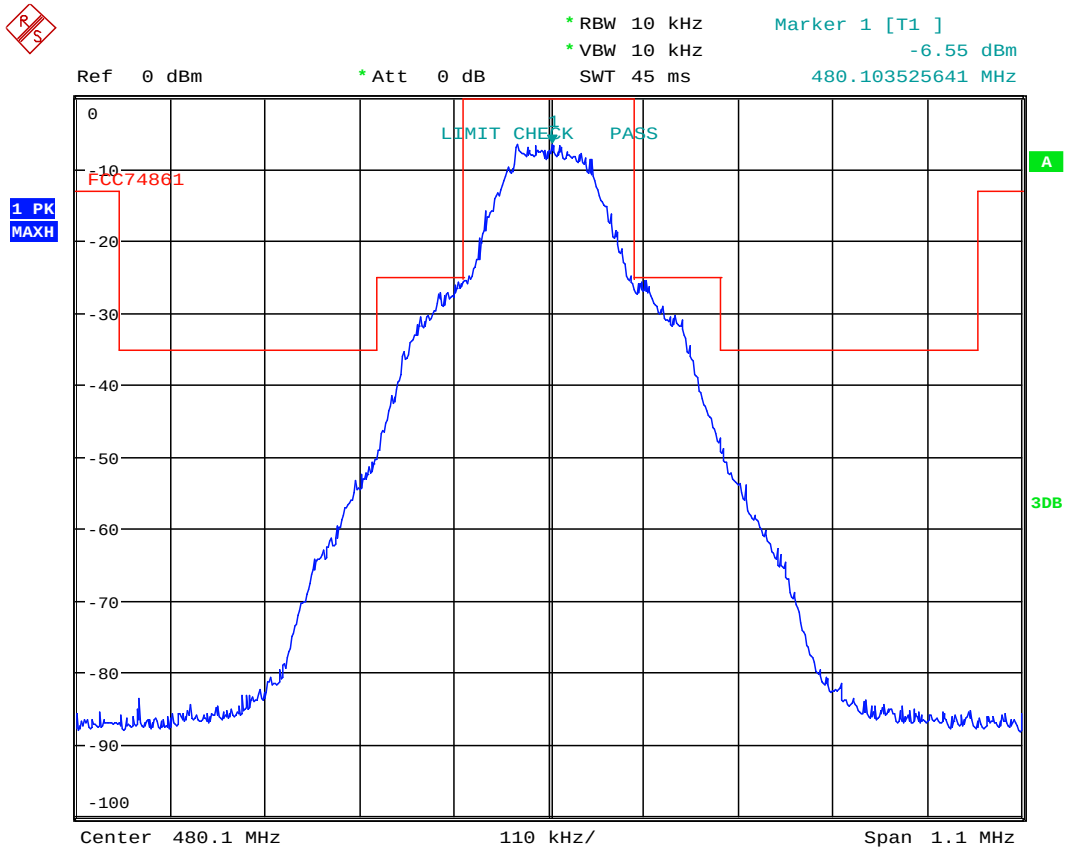
1. External Photos

2. Internal Photos

3. Set Up Photo of Radiated Emission

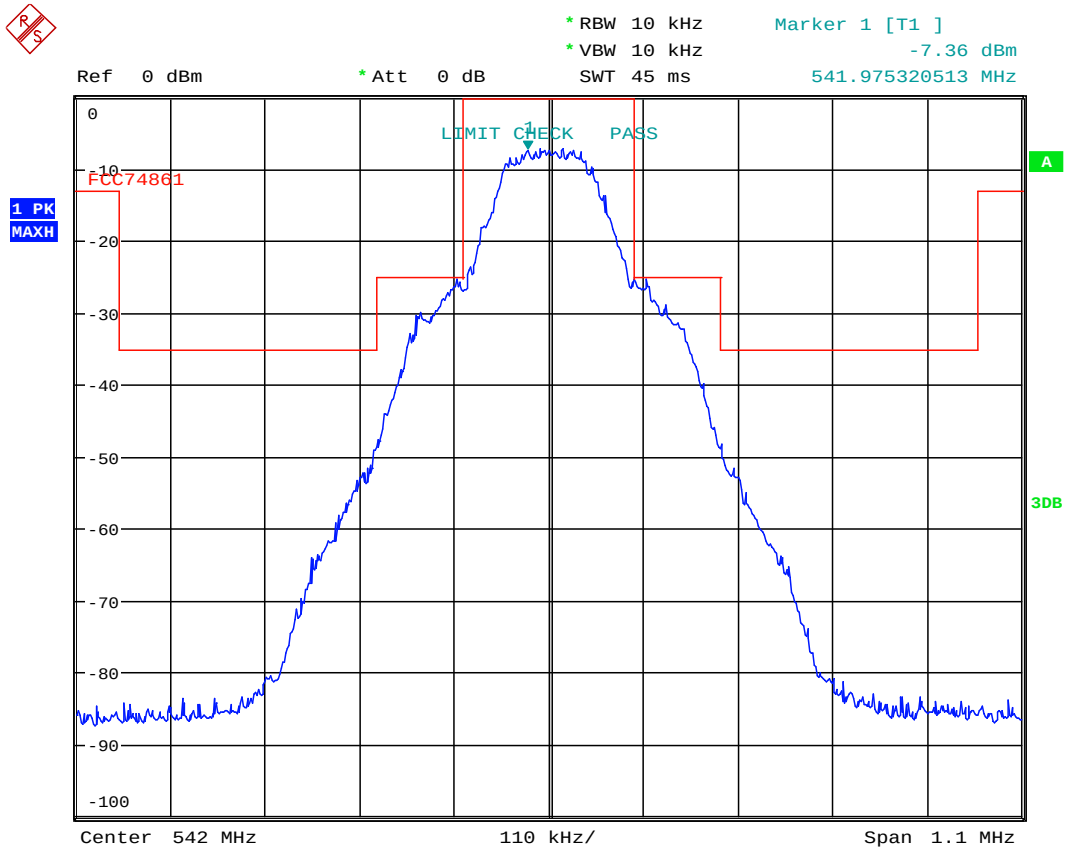
Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T

Emission Mask



EMISSION MASK 480.1MHz
Date: 30.JUN.2012 12:51:00

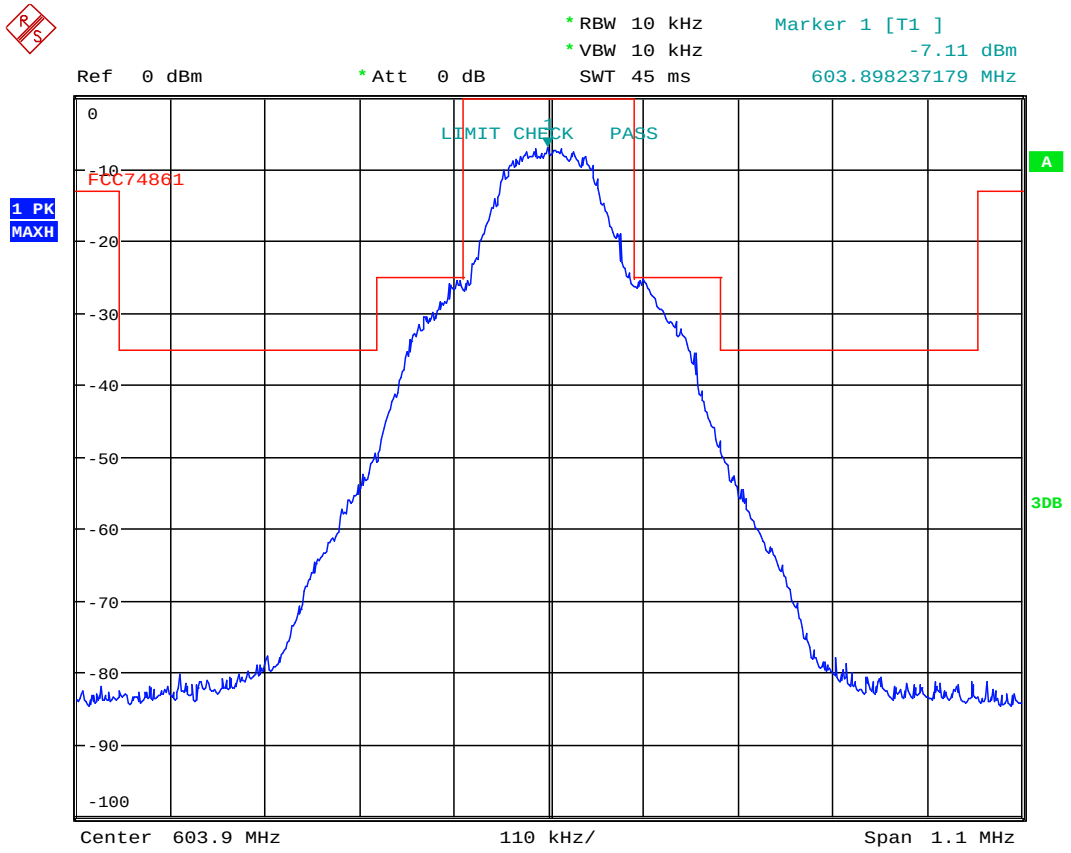
Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T



EMISSION MASK 542MHz

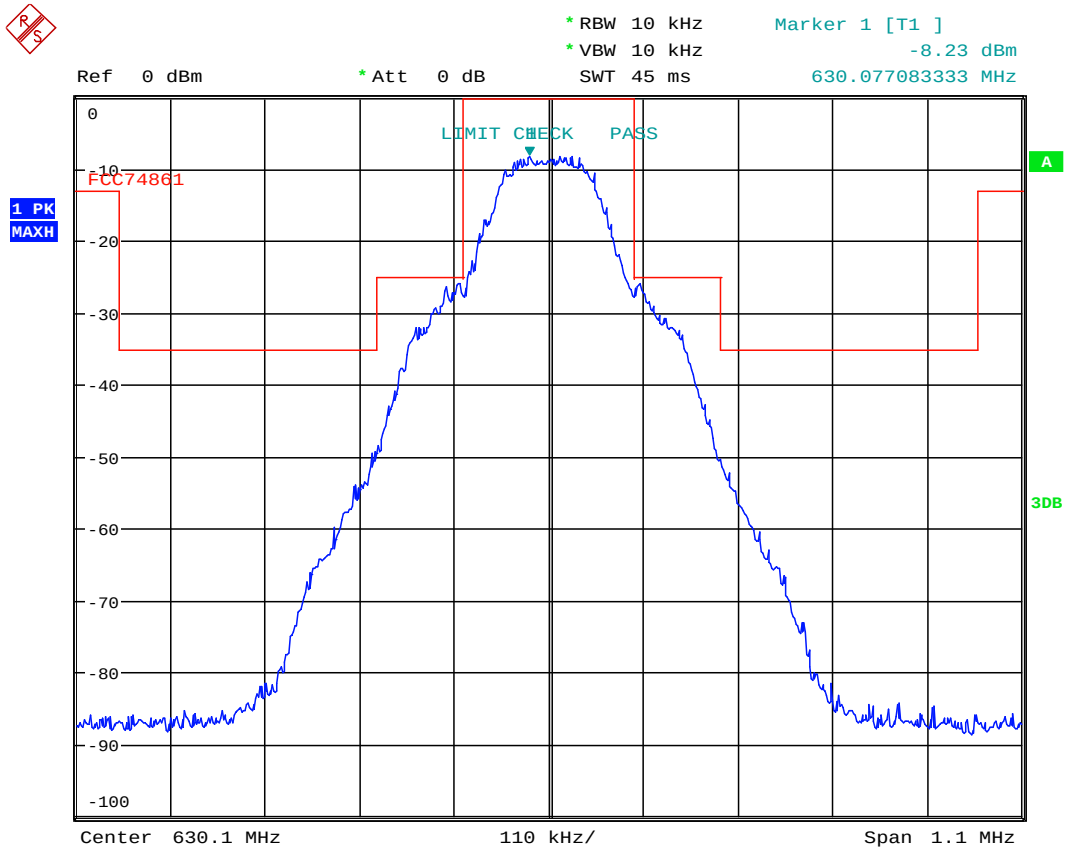
Date: 30.JUN.2012 12:58:39

Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T



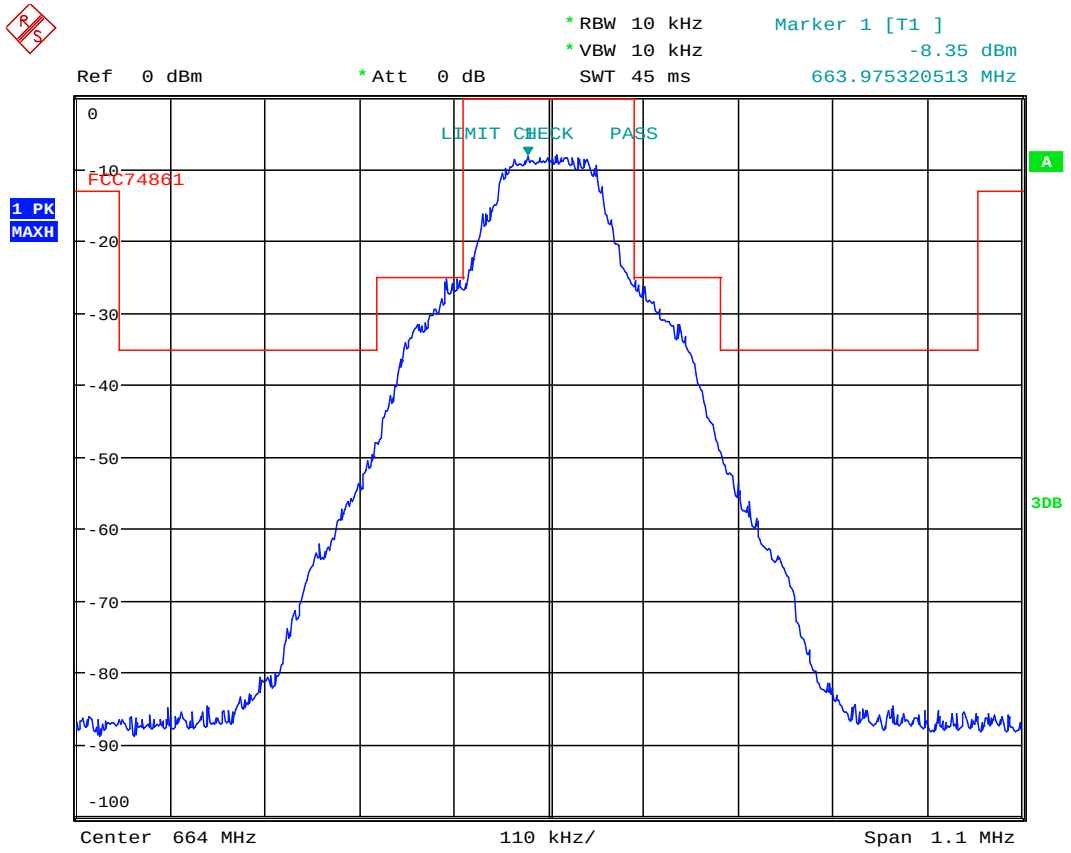
EMISSION MASK 603.9MHz
Date: 30.JUN.2012 12:48:18

Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T



EMISSION MASK 630.1MHz
Date: 30.JUN.2012 12:35:48

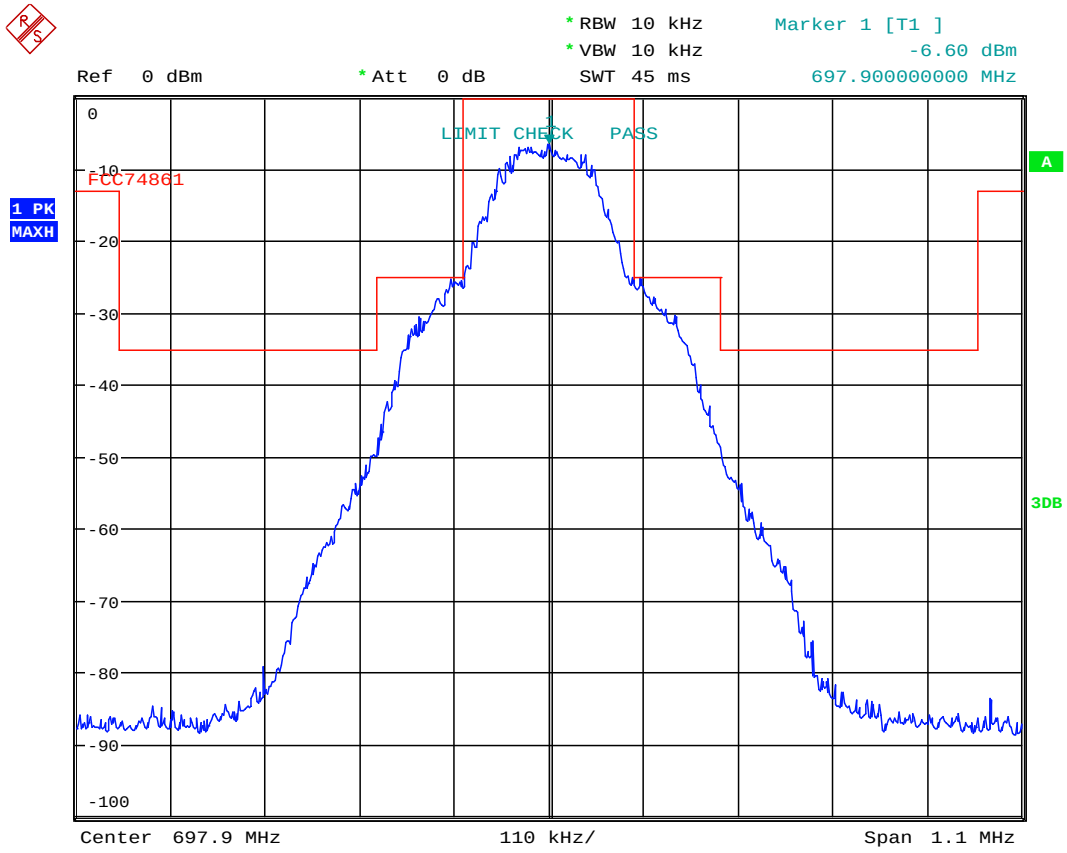
Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T



EMISSION MASK 664MHz

Date: 30.JUN.2012 12:40:49

Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T

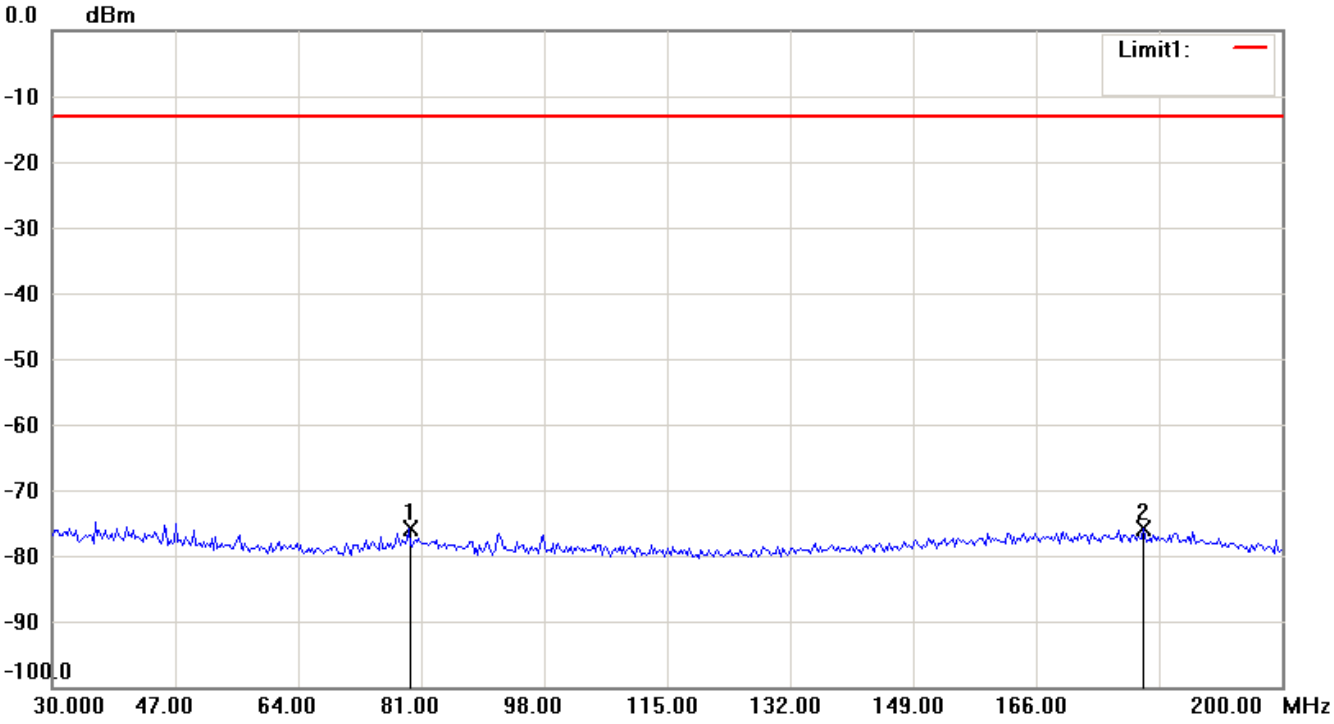


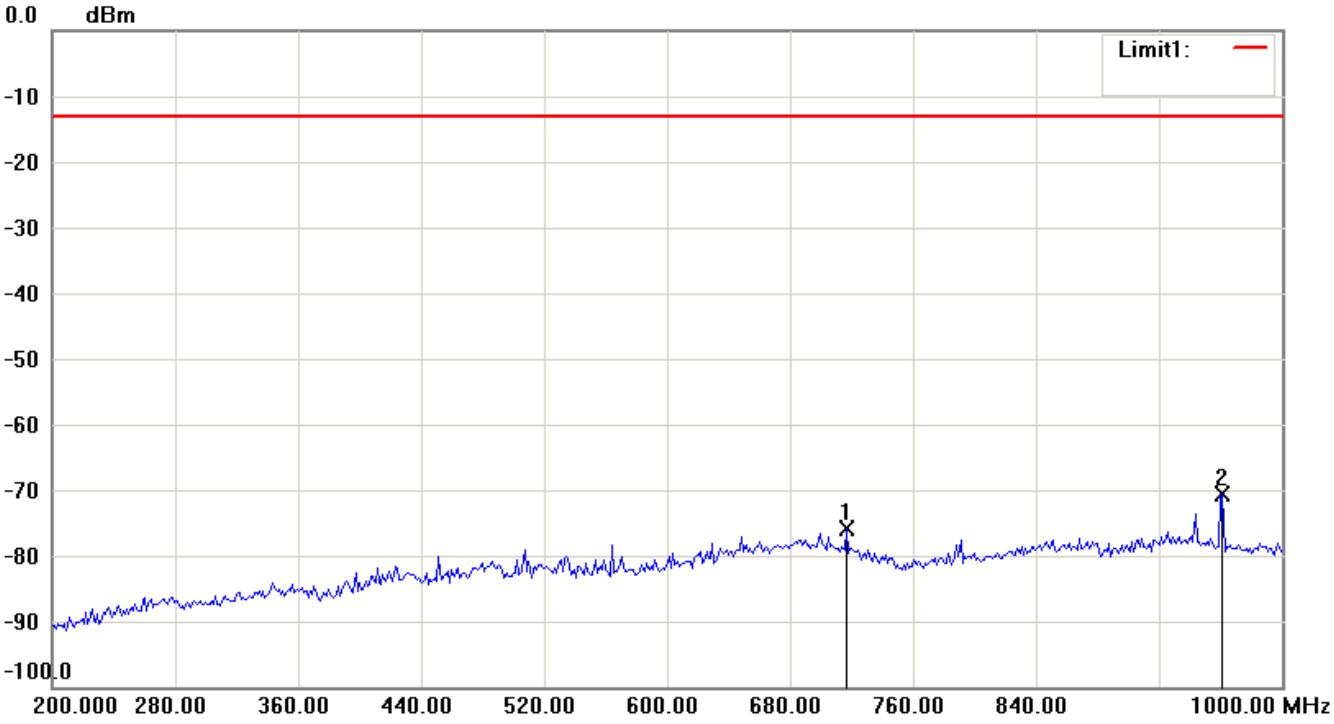
EMISSION MASK 697.9MHz

Date: 30.JUN.2012 12:42:30

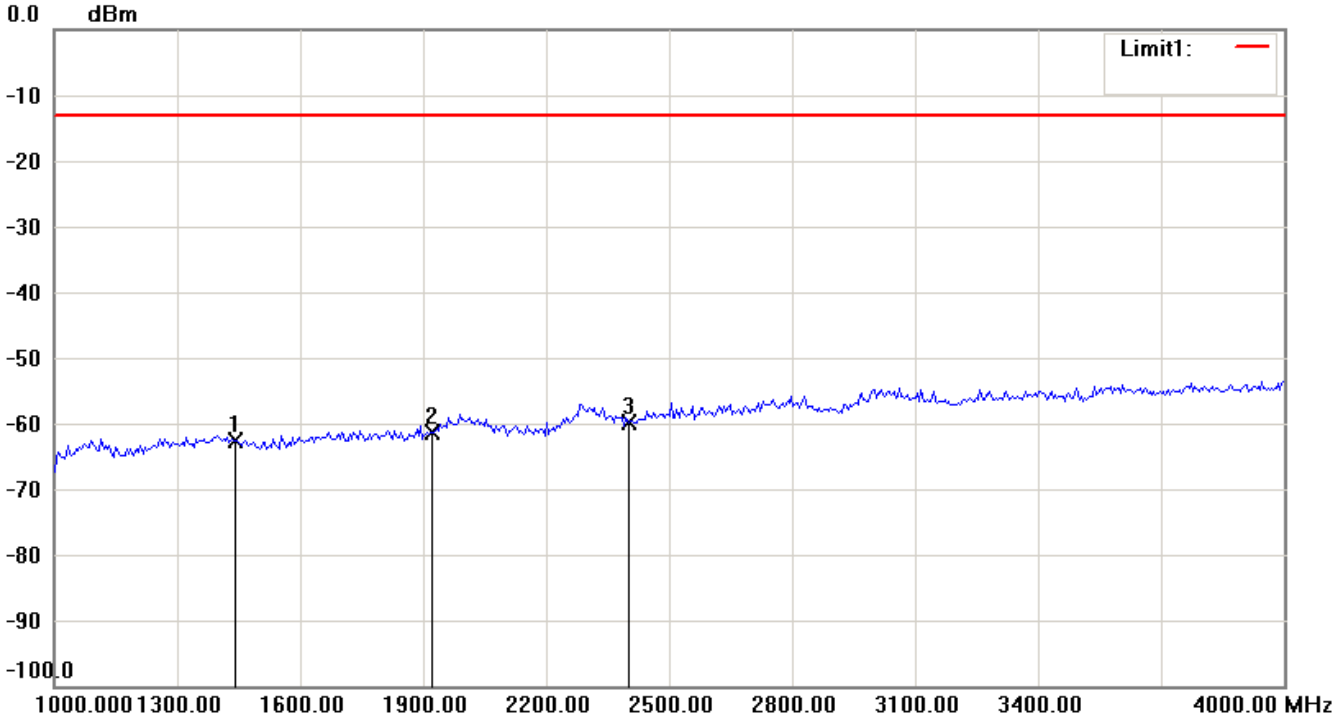
Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T

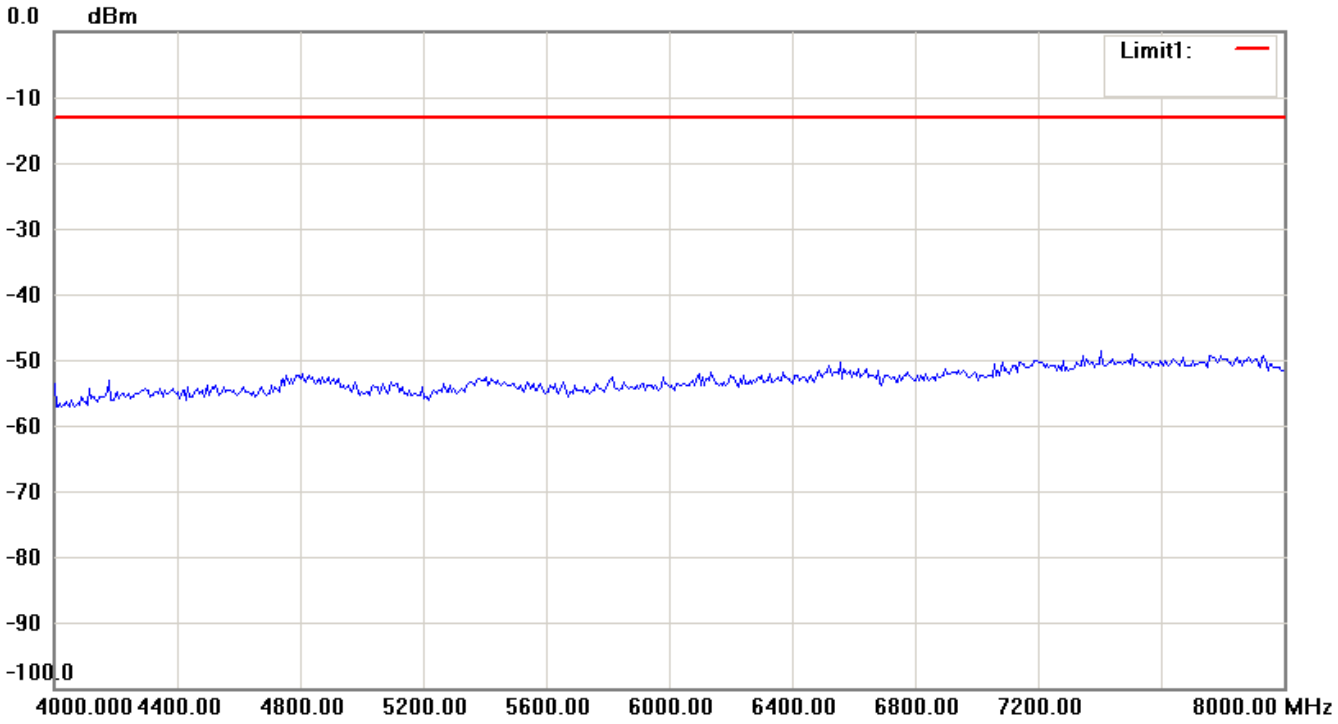
Radiation Spurious Emission
480.1 MHz
Antenna Polarization H





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



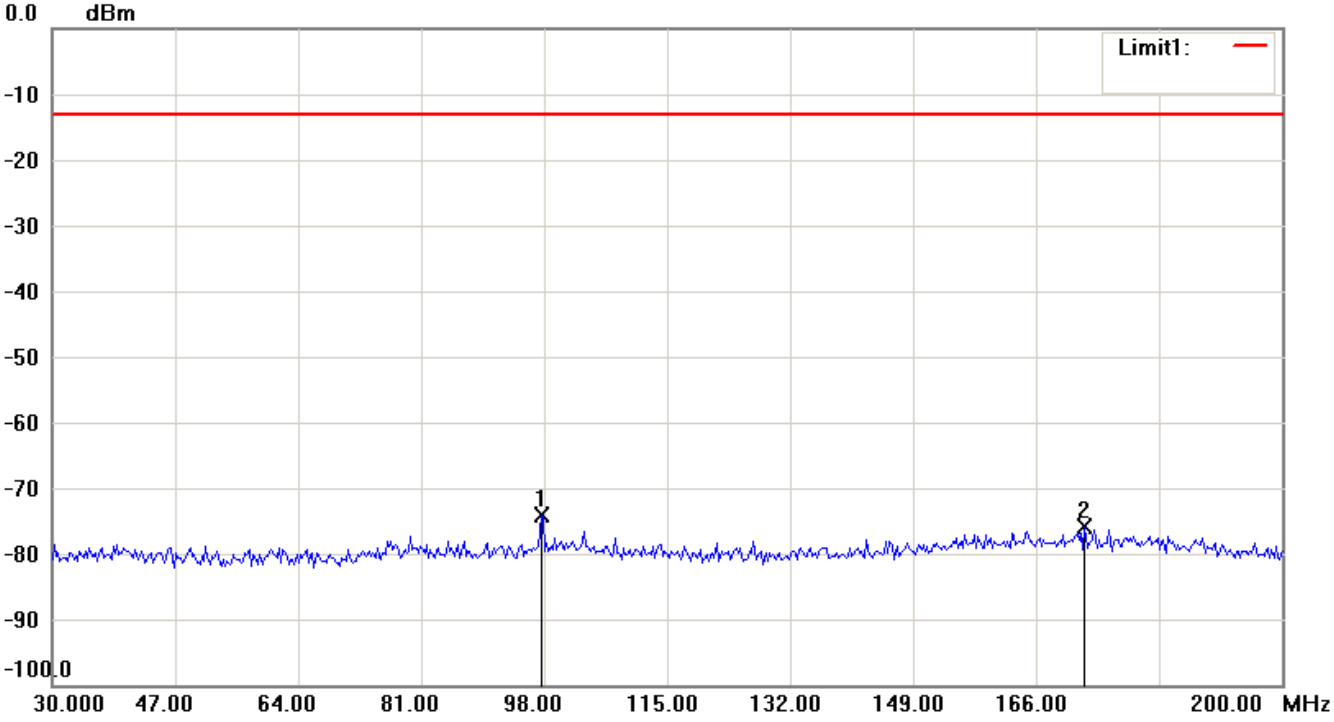


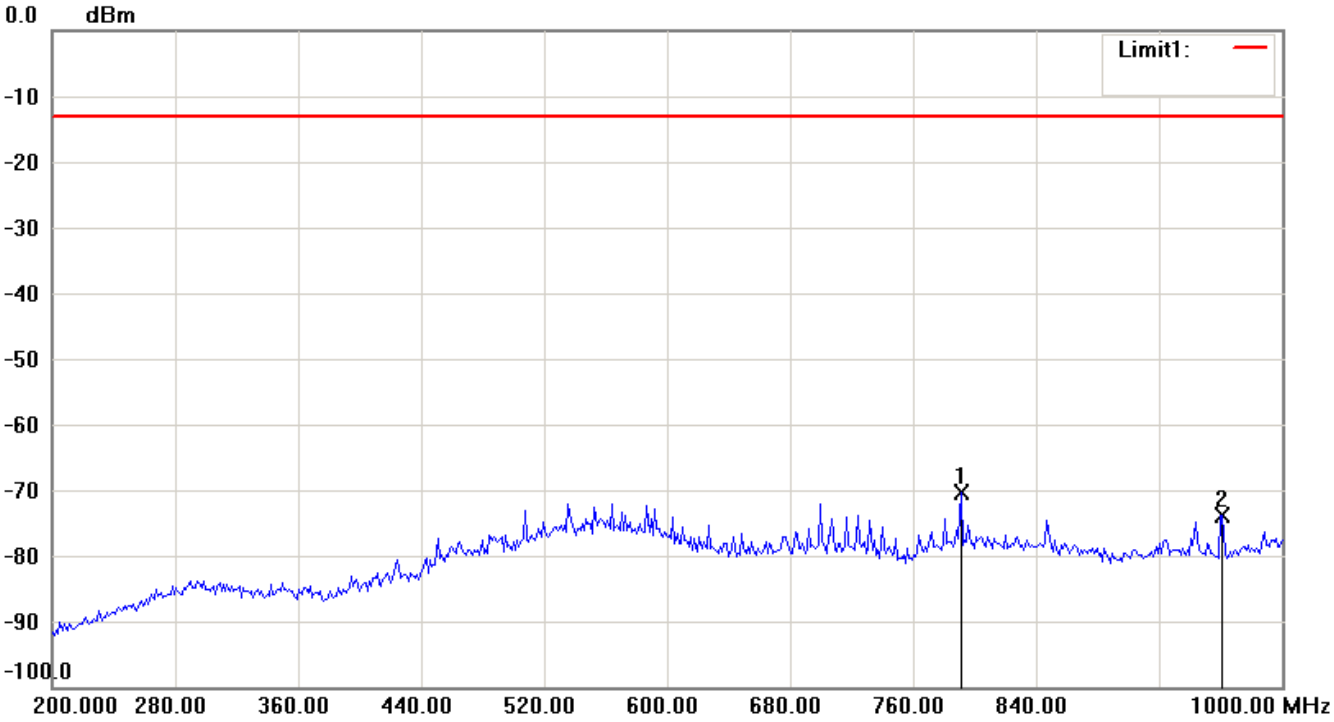
Note:

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: W6R21205-12421-C-1
FCC ID: M5X-ACT80T

Antenna Polarization V

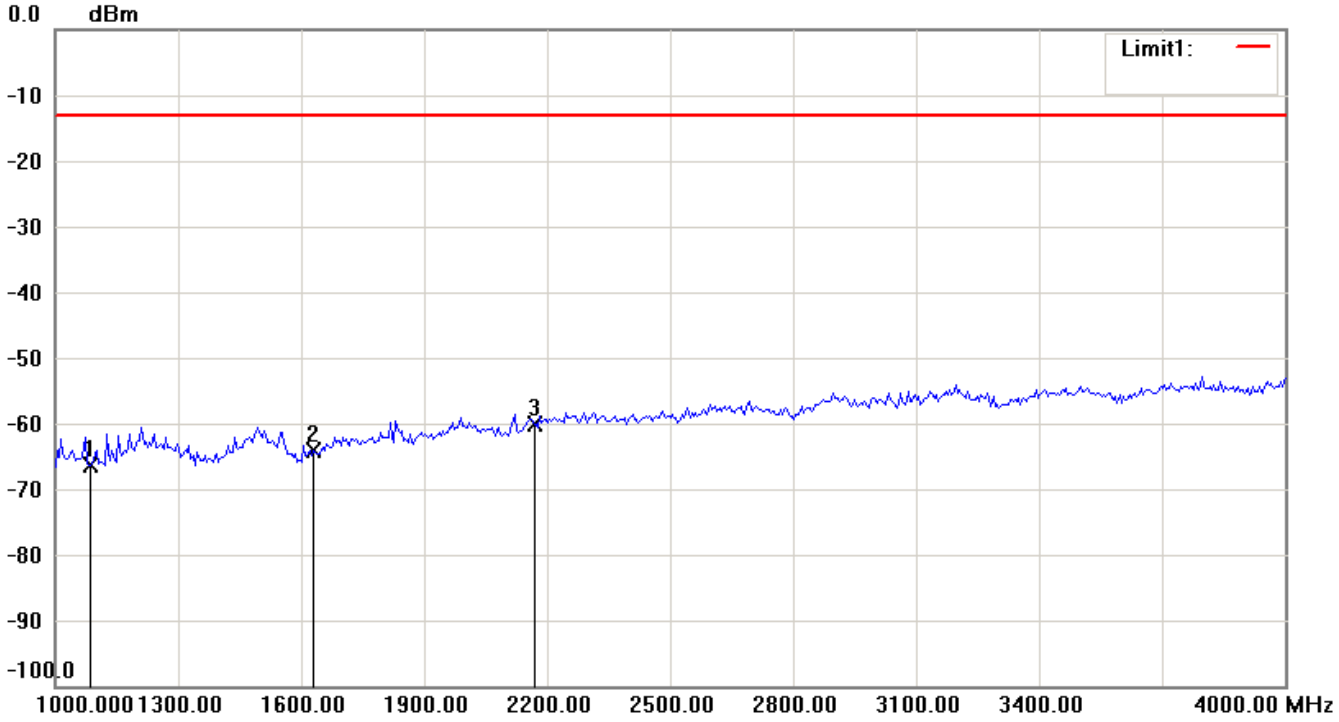


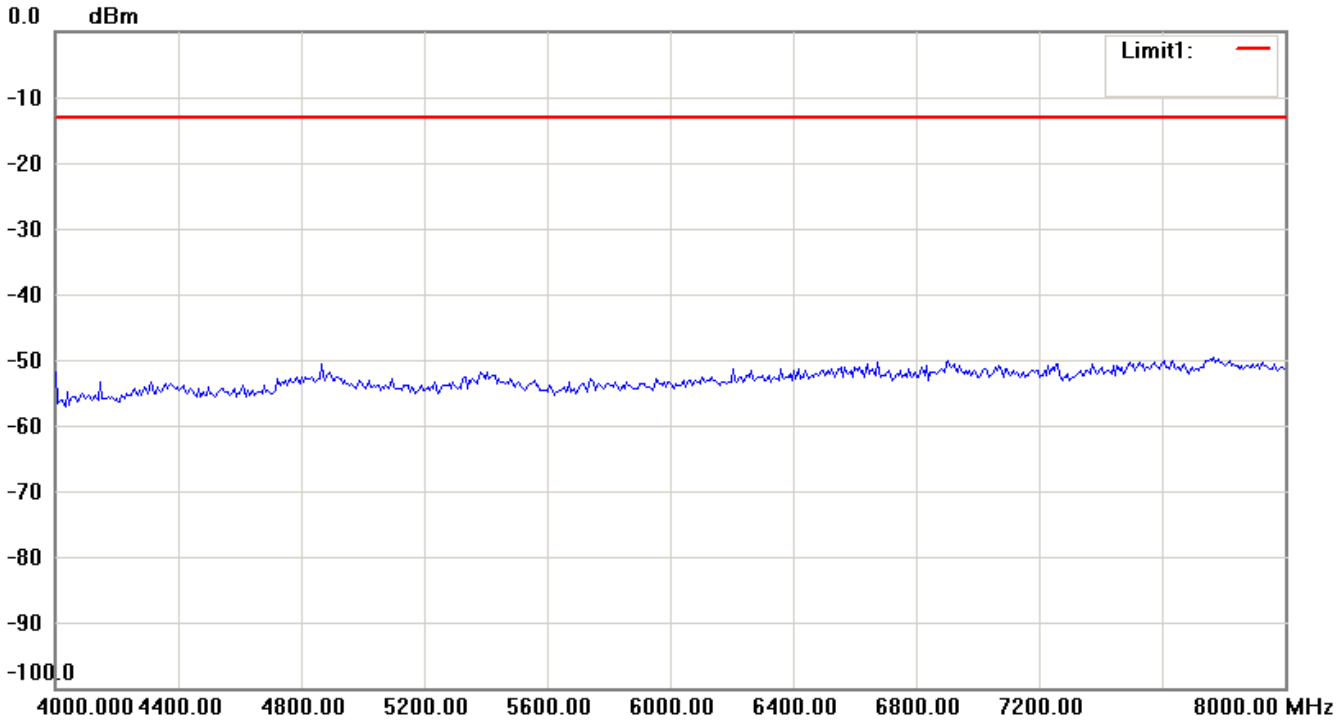


Note:

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: W6R21205-12421-C-1
FCC ID: M5X-ACT80T





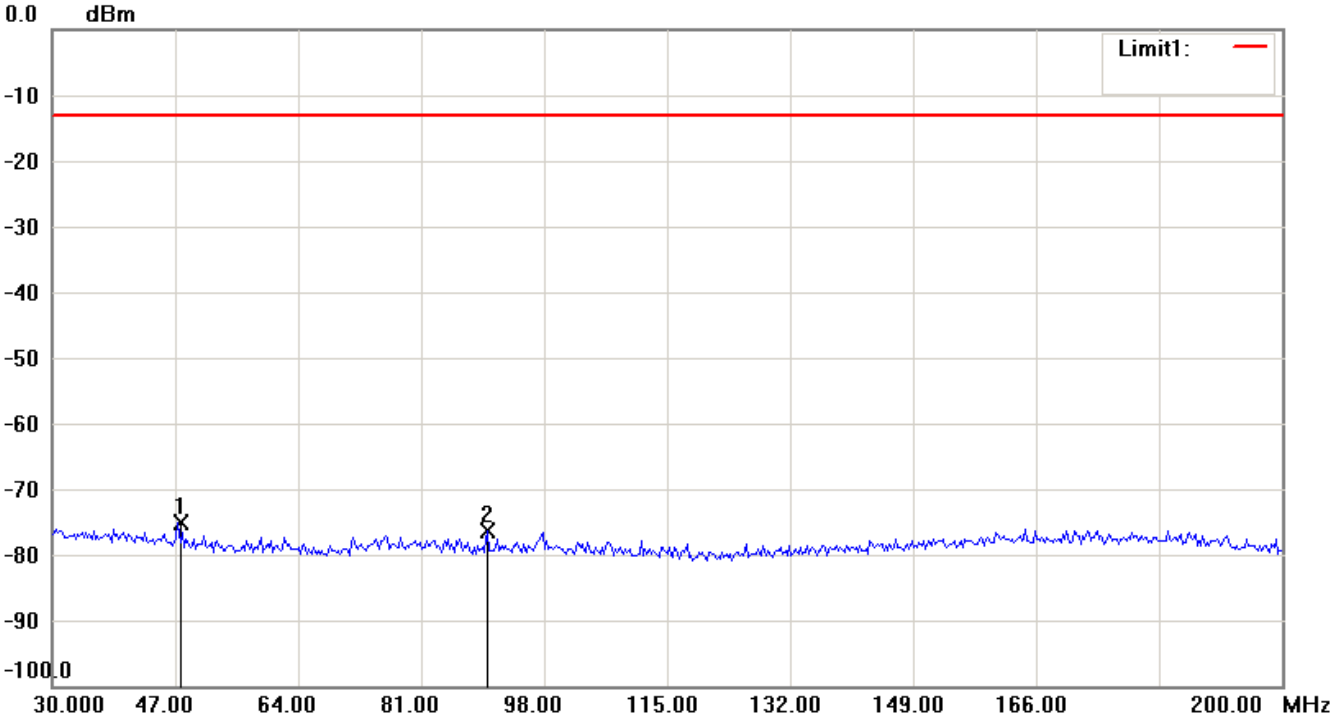
Note:

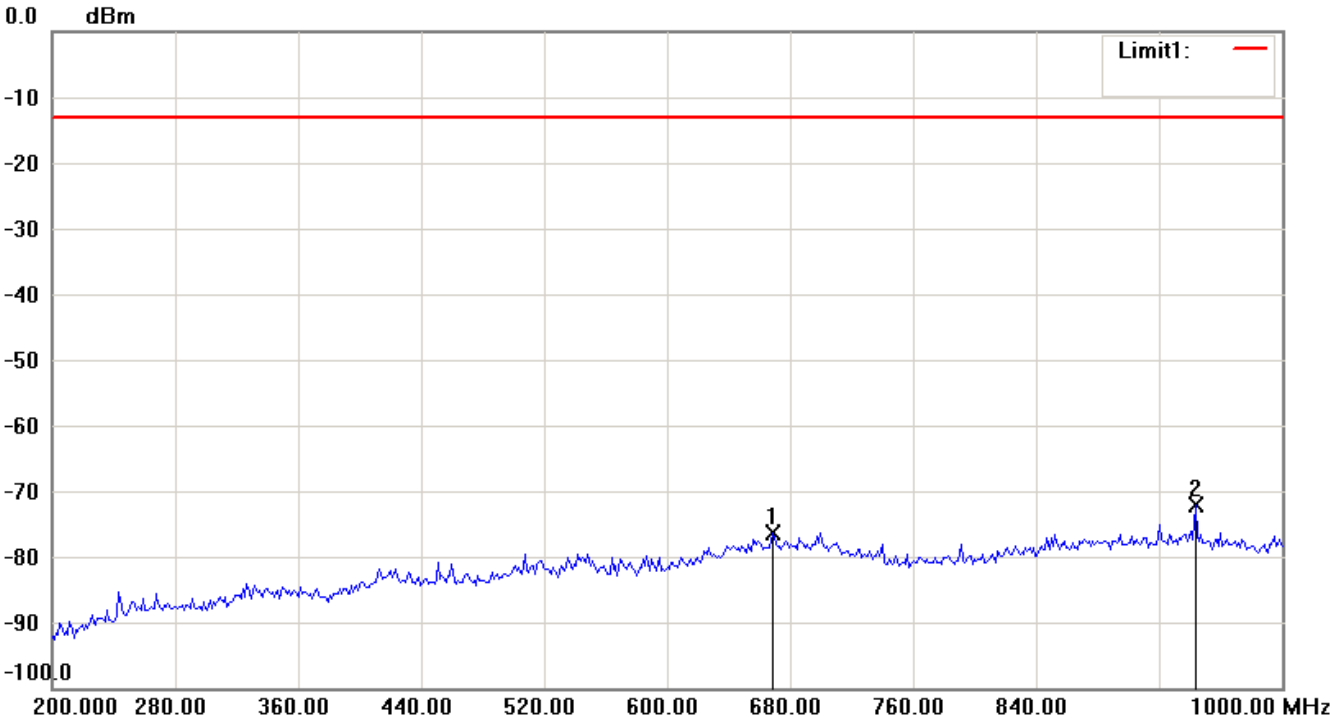
1. **The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.**
2. **The some frequencies may exceed the limit line without the specified detectors, but that cannot present the results are failed to the 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: W6R21205-12421-C-1
FCC ID: M5X-ACT80T

542 MHz

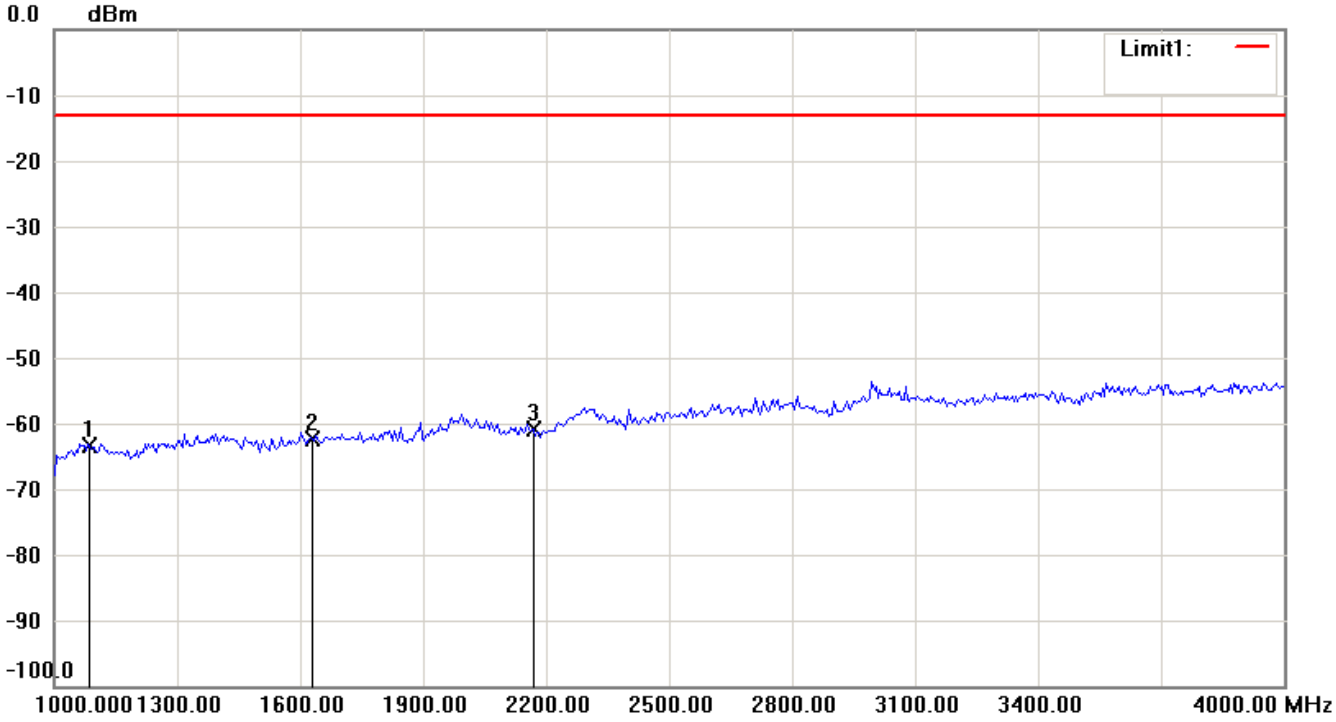
Antenna Polarization H

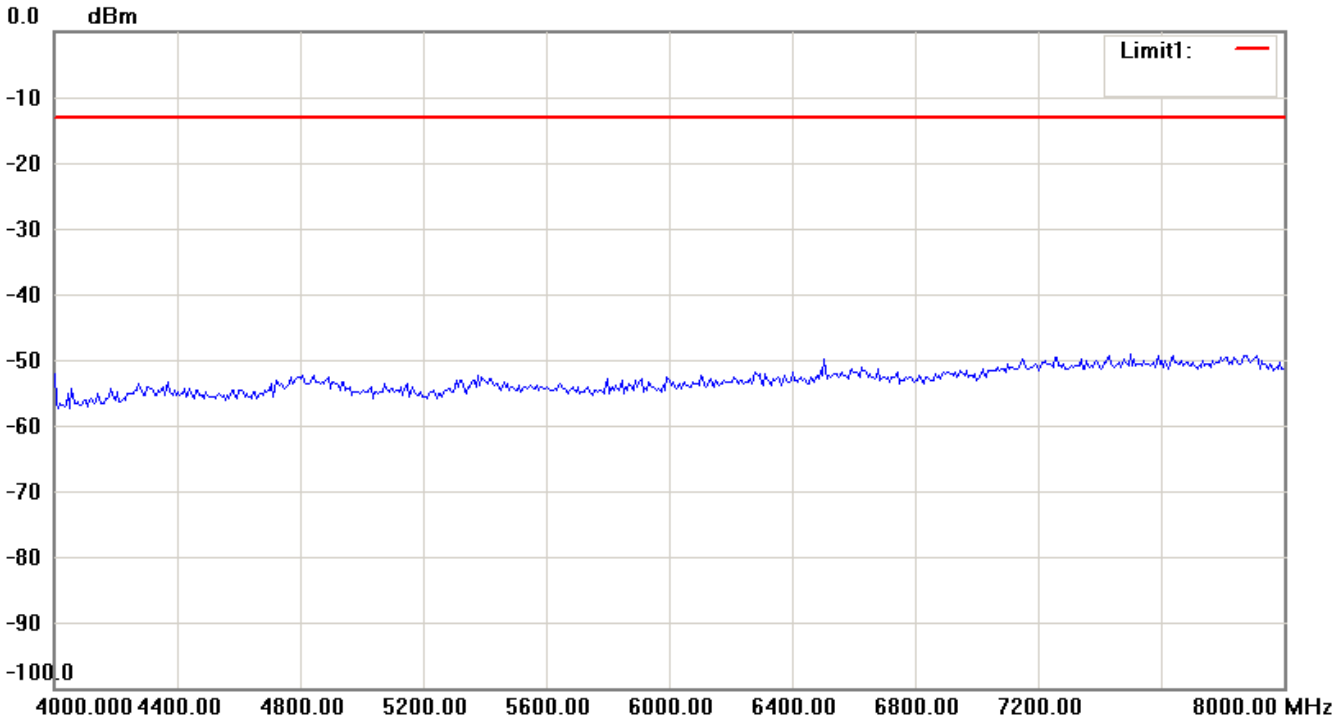




Note:

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



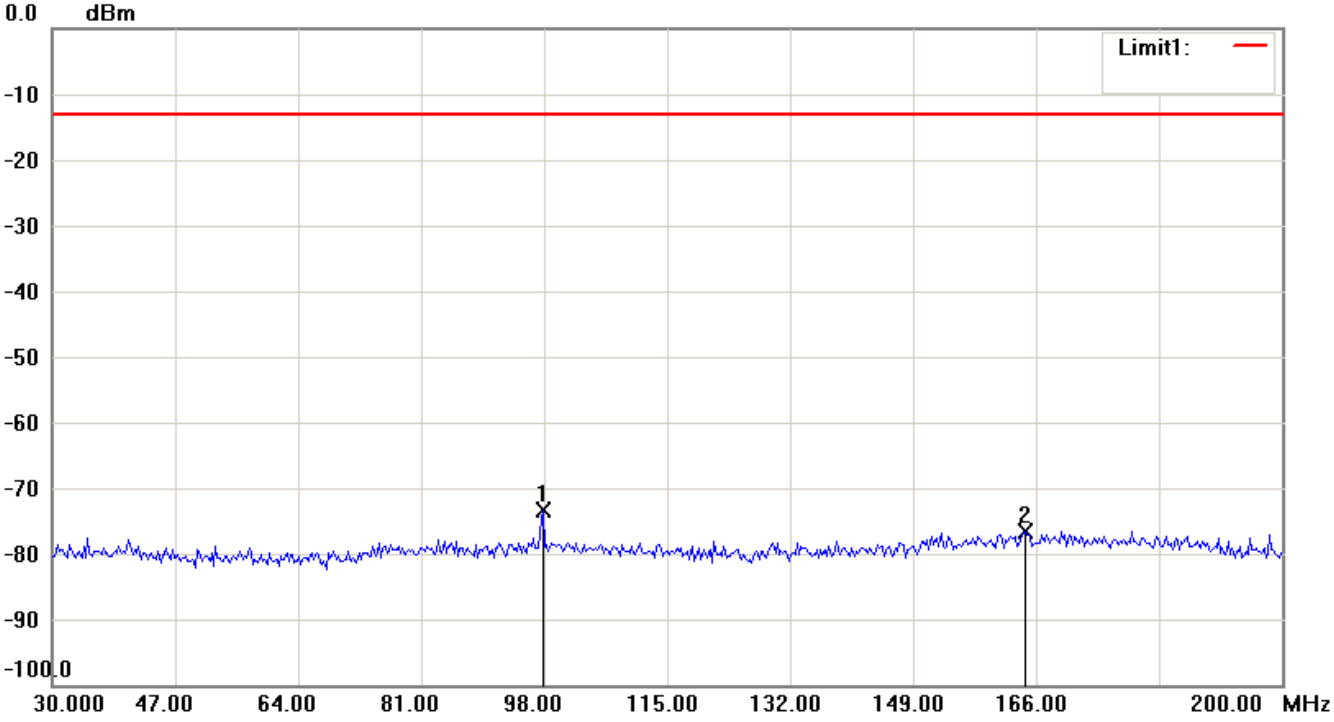


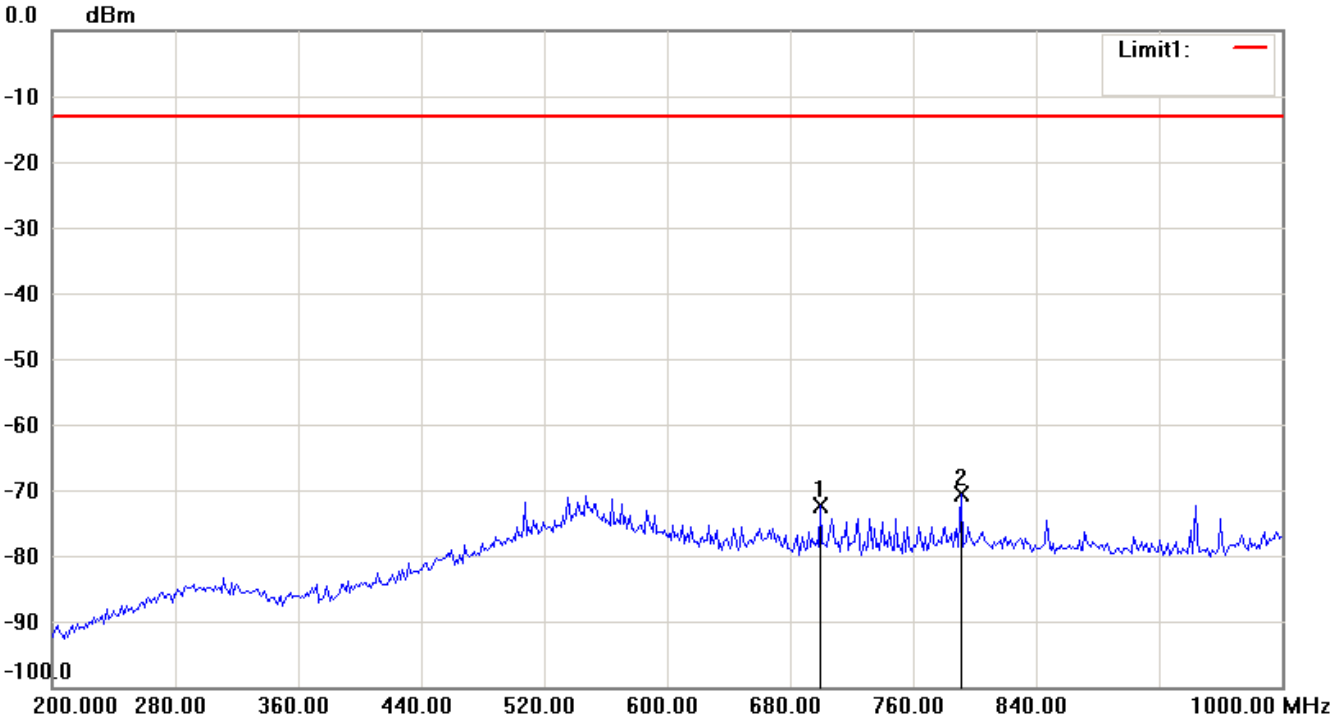
Note:

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: W6R21205-12421-C-1
FCC ID: M5X-ACT80T

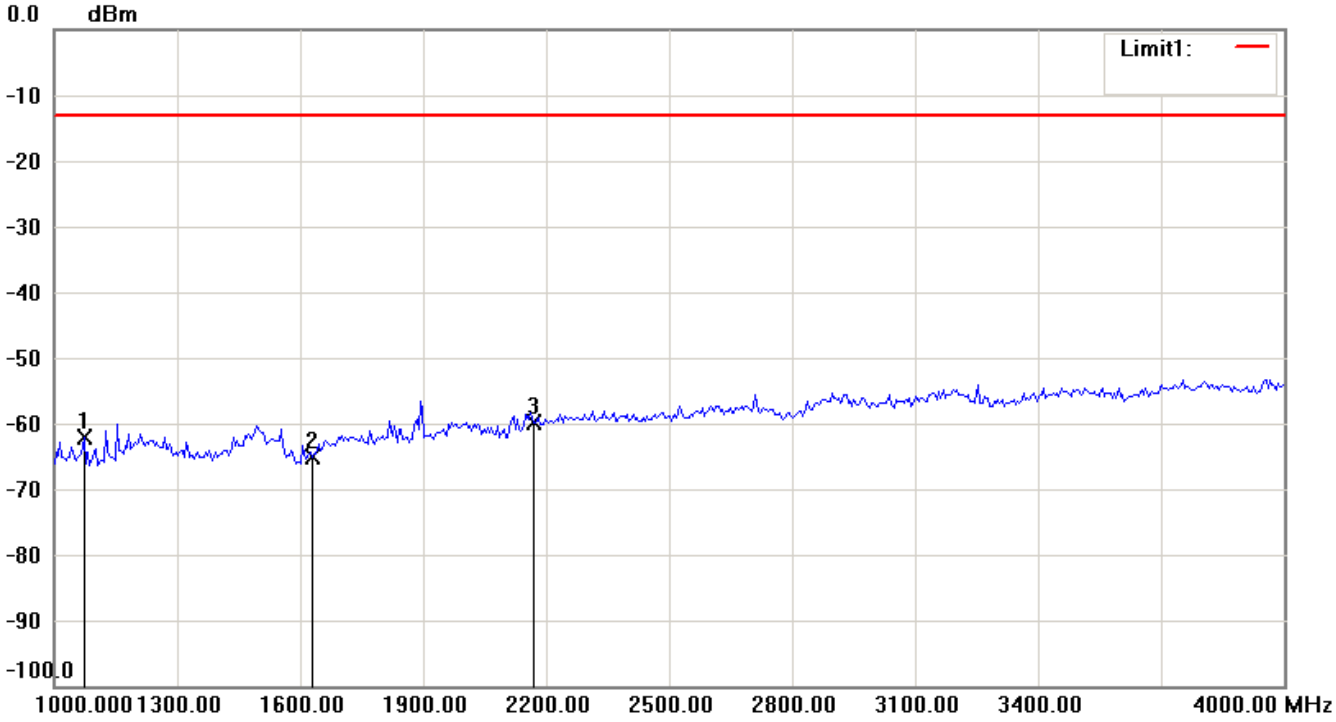
Antenna Polarization V

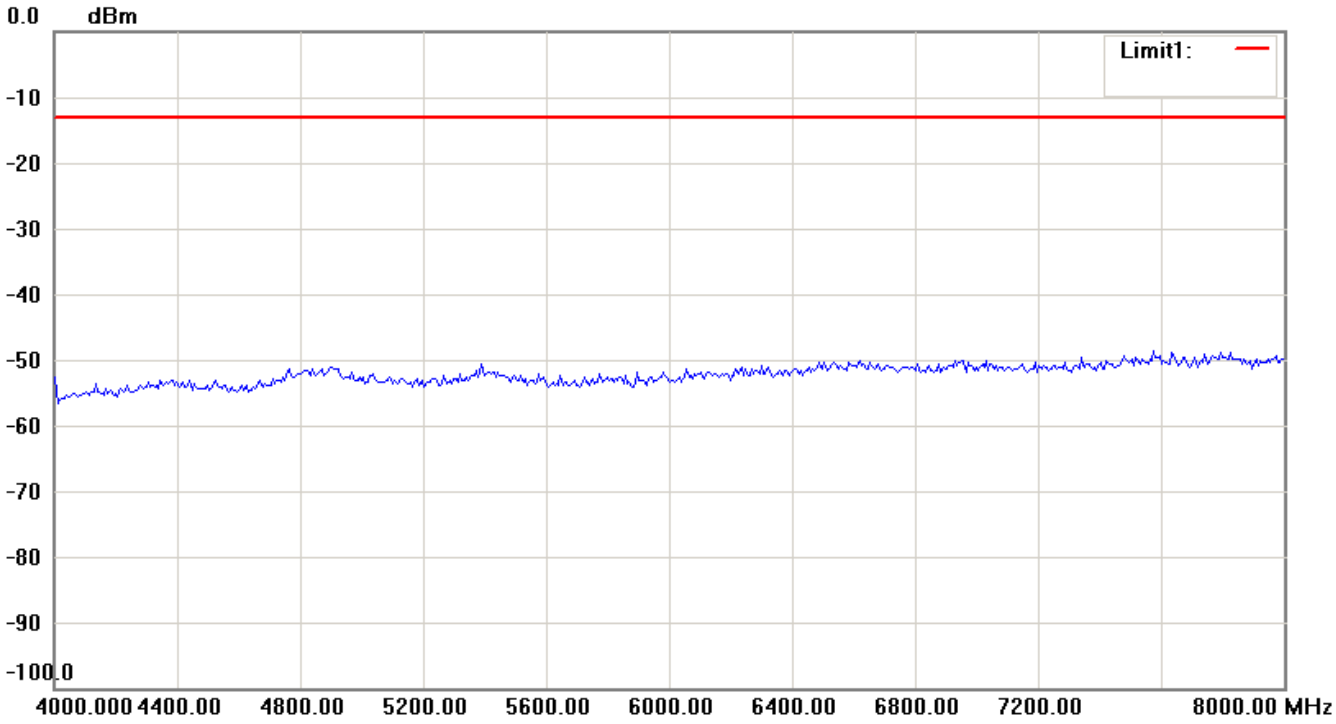




Note:

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.**





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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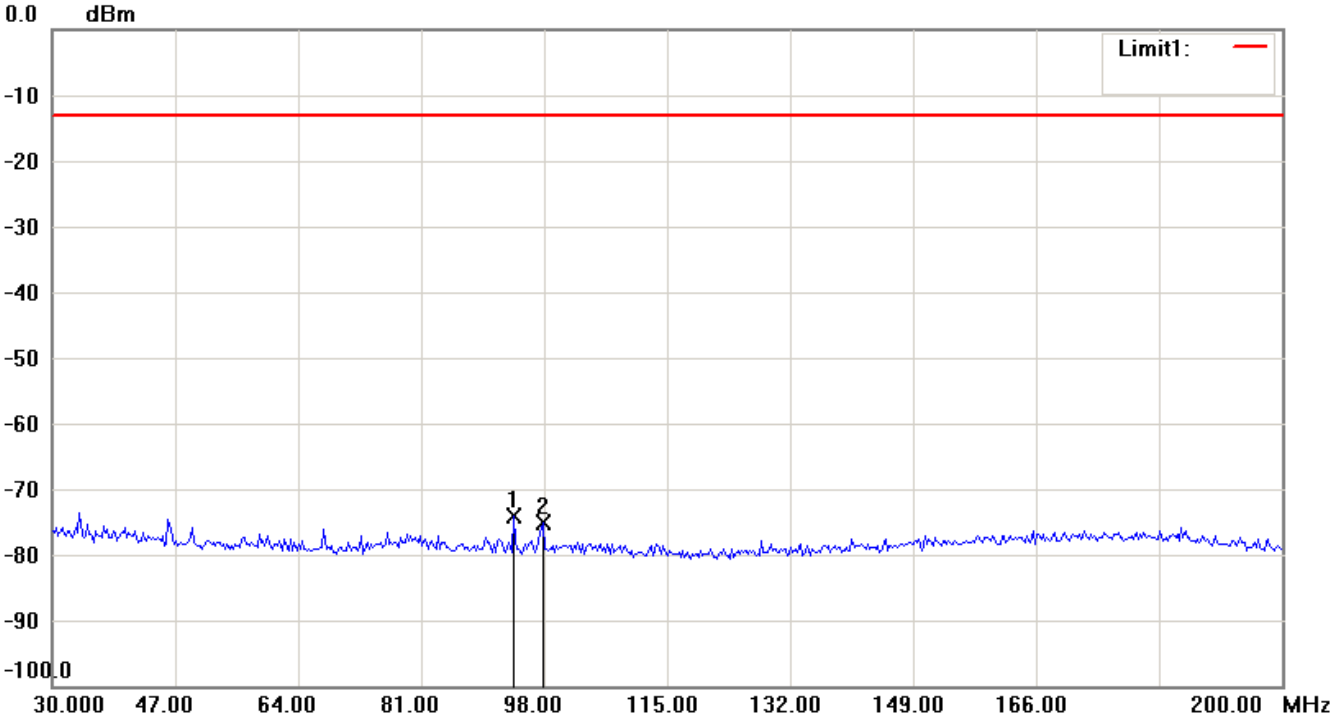
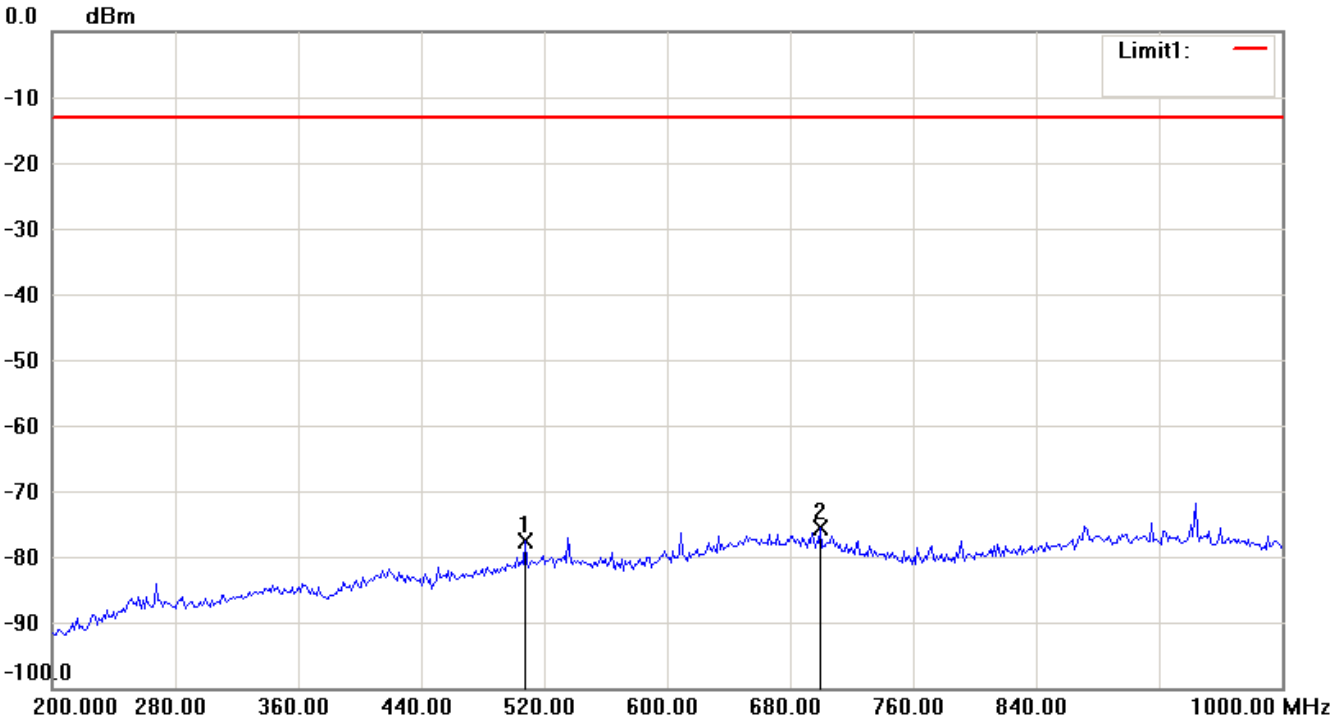
Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T

603.9 MHz

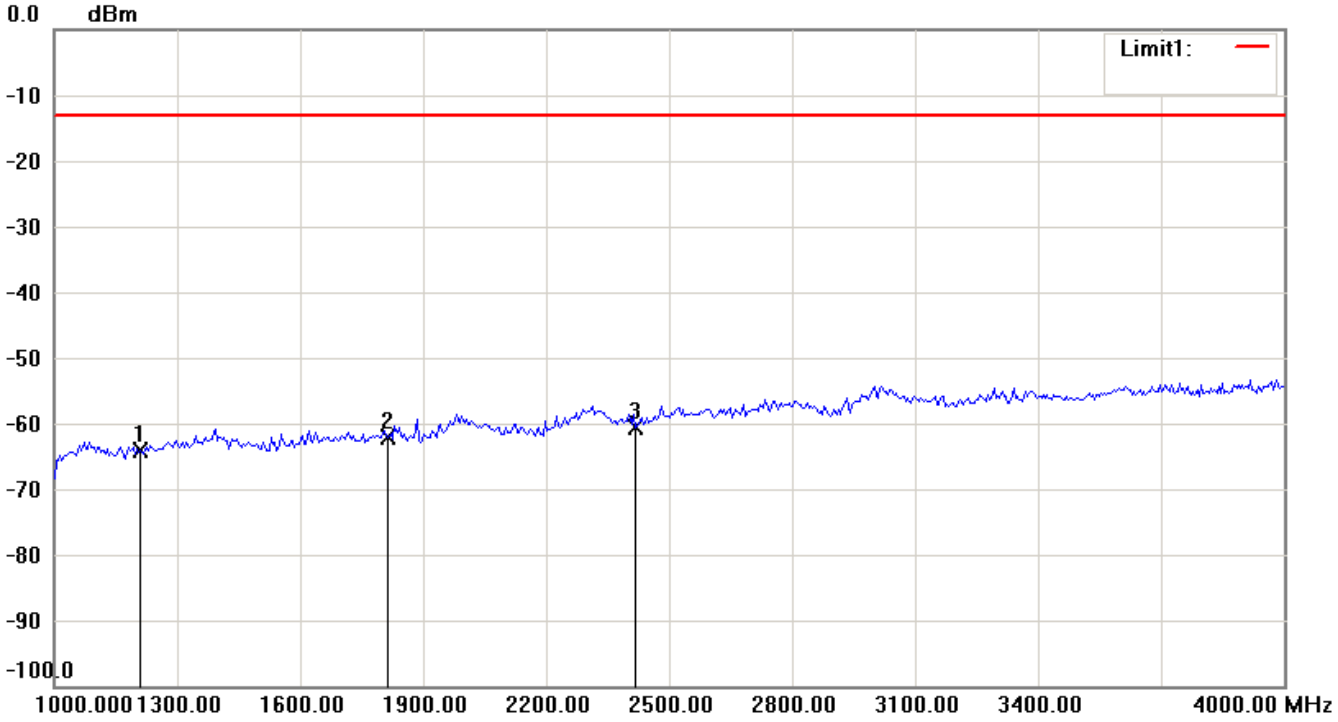
Antenna Polarization H

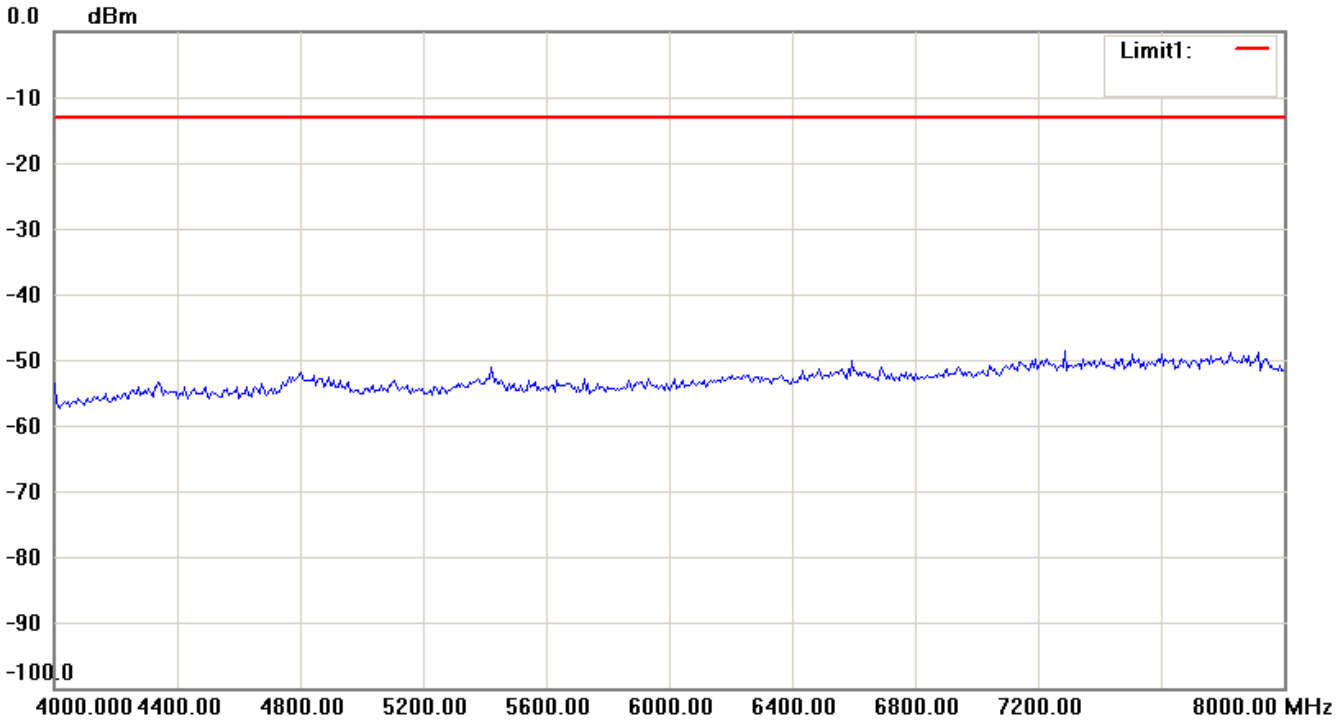




Note:

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



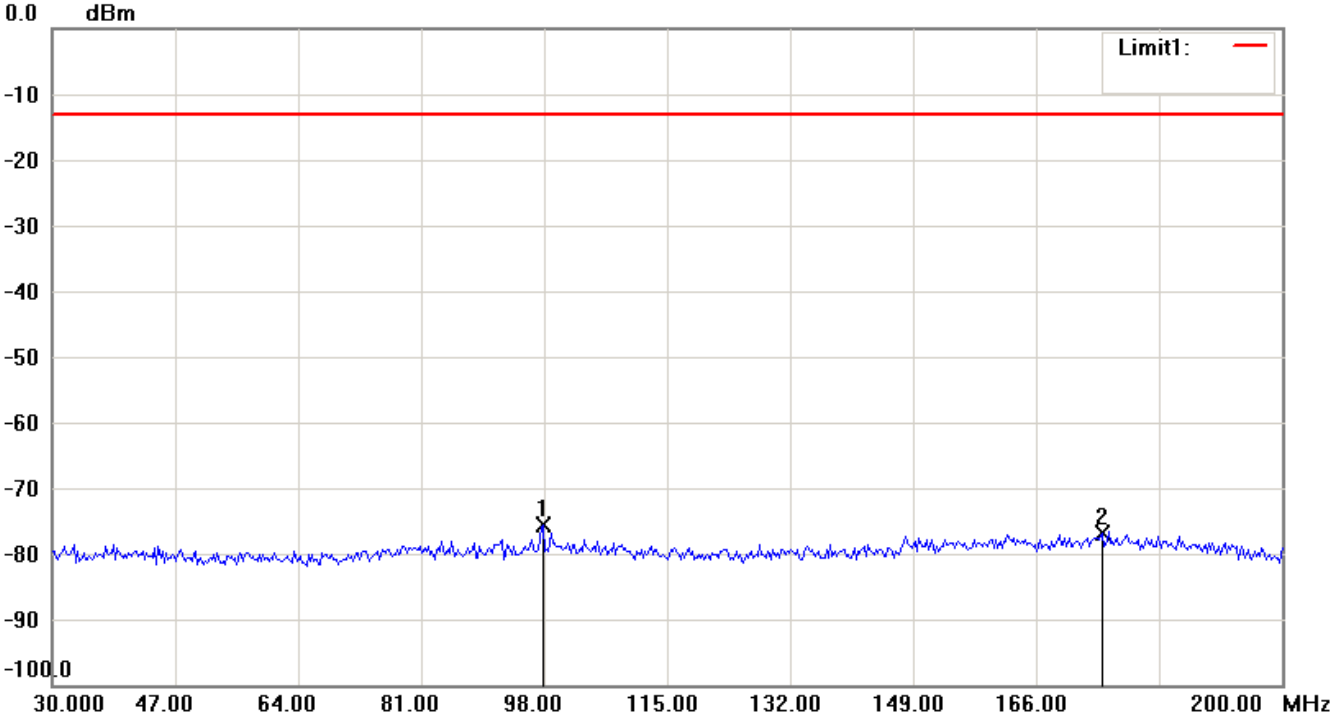


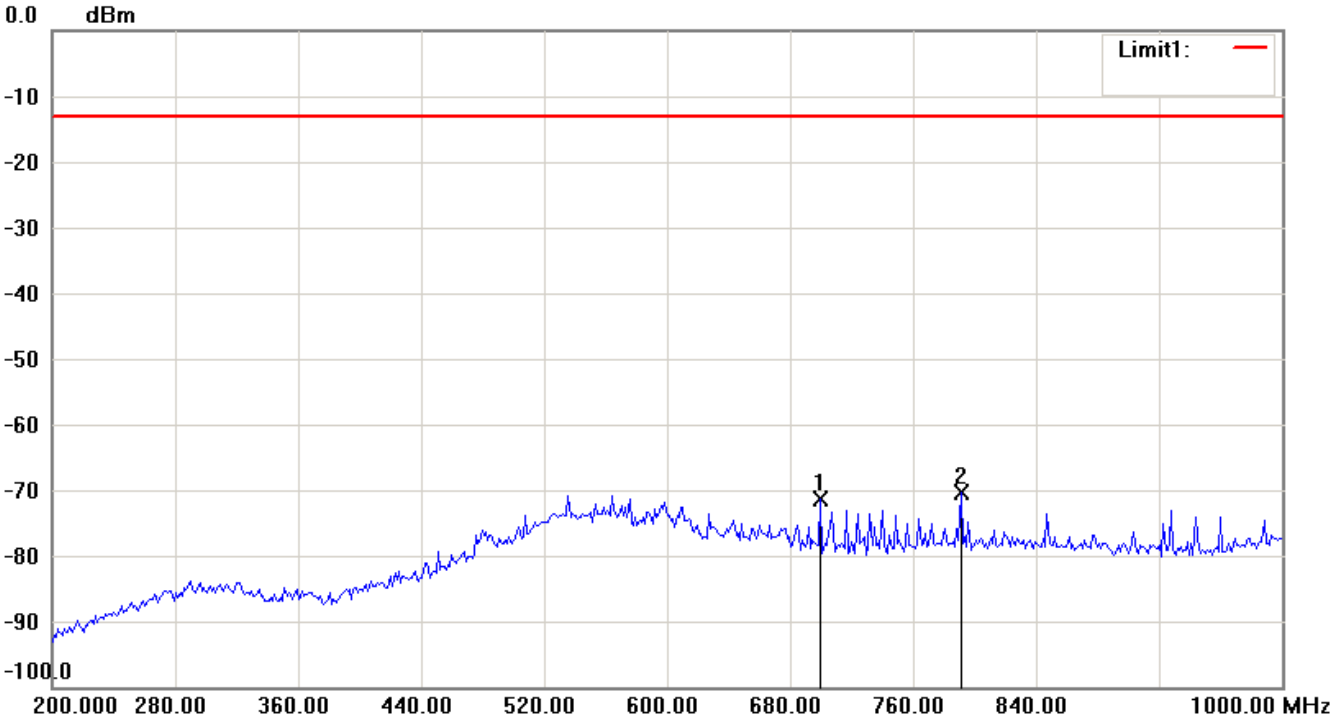
Note:

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: W6R21205-12421-C-1
FCC ID: M5X-ACT80T

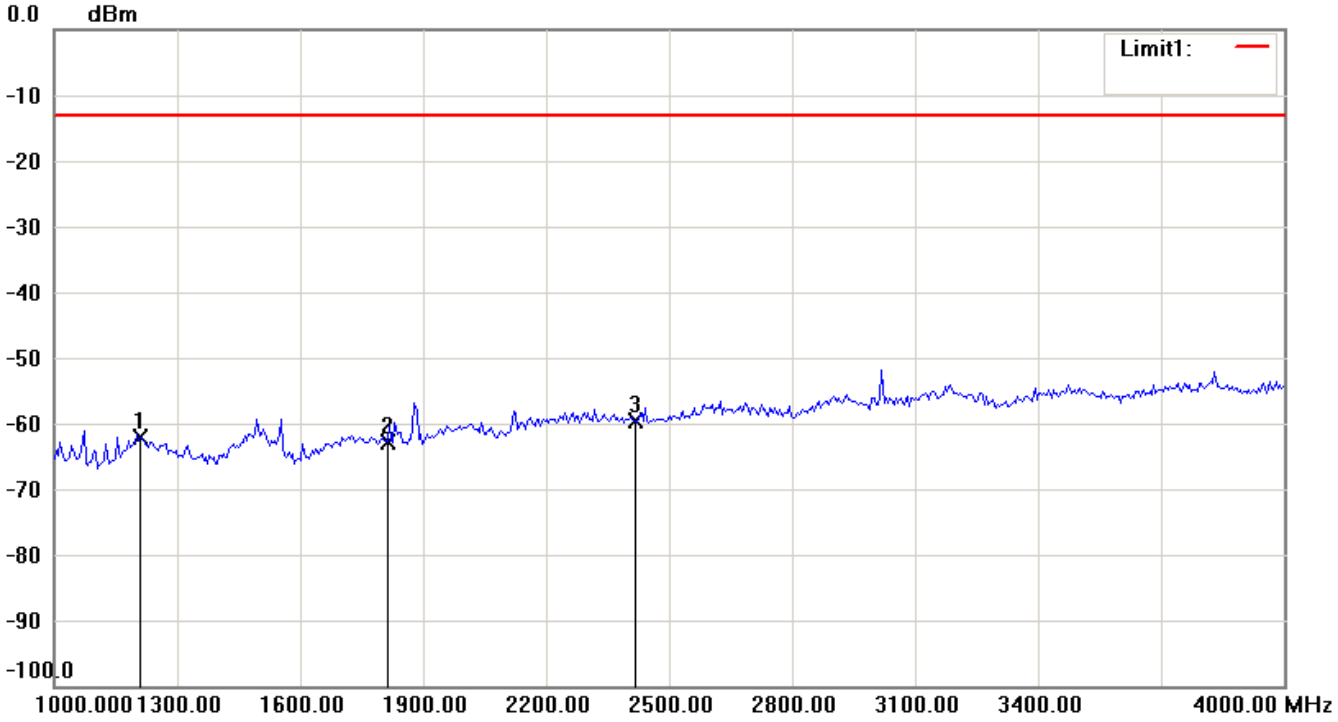
Antenna Polarization V

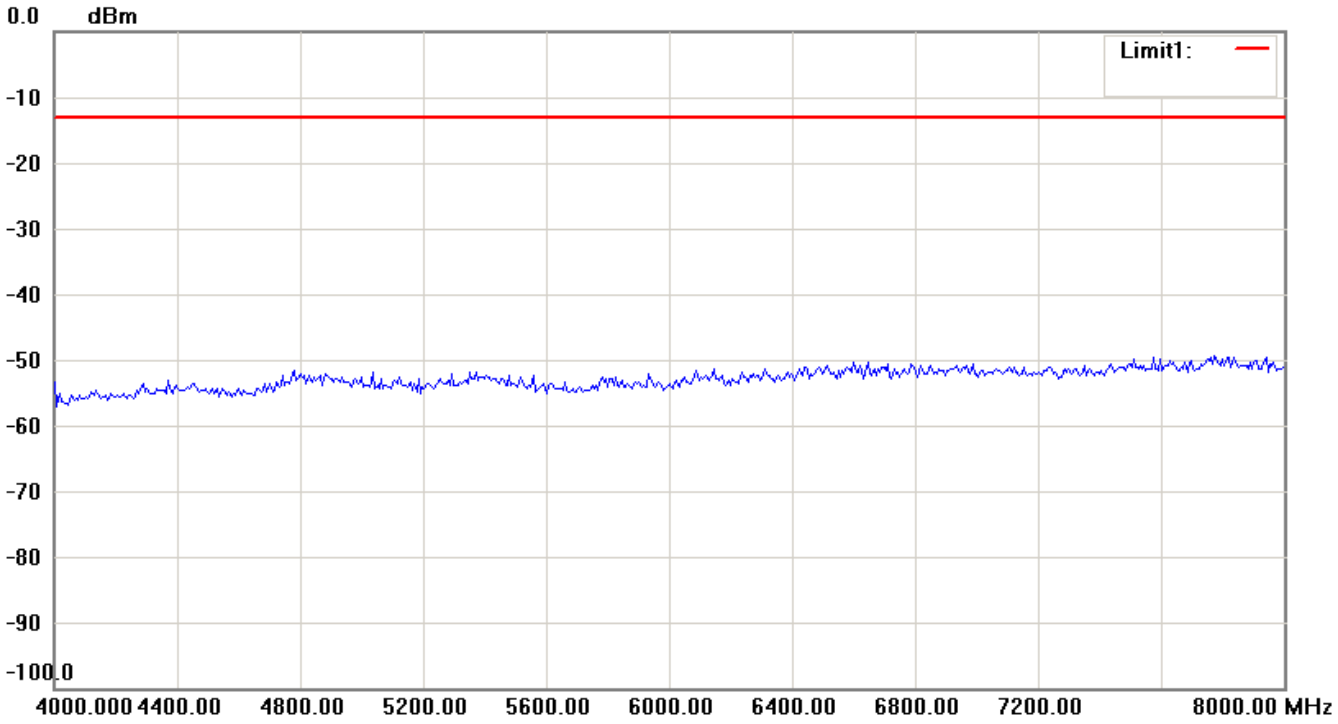




Note:

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.**





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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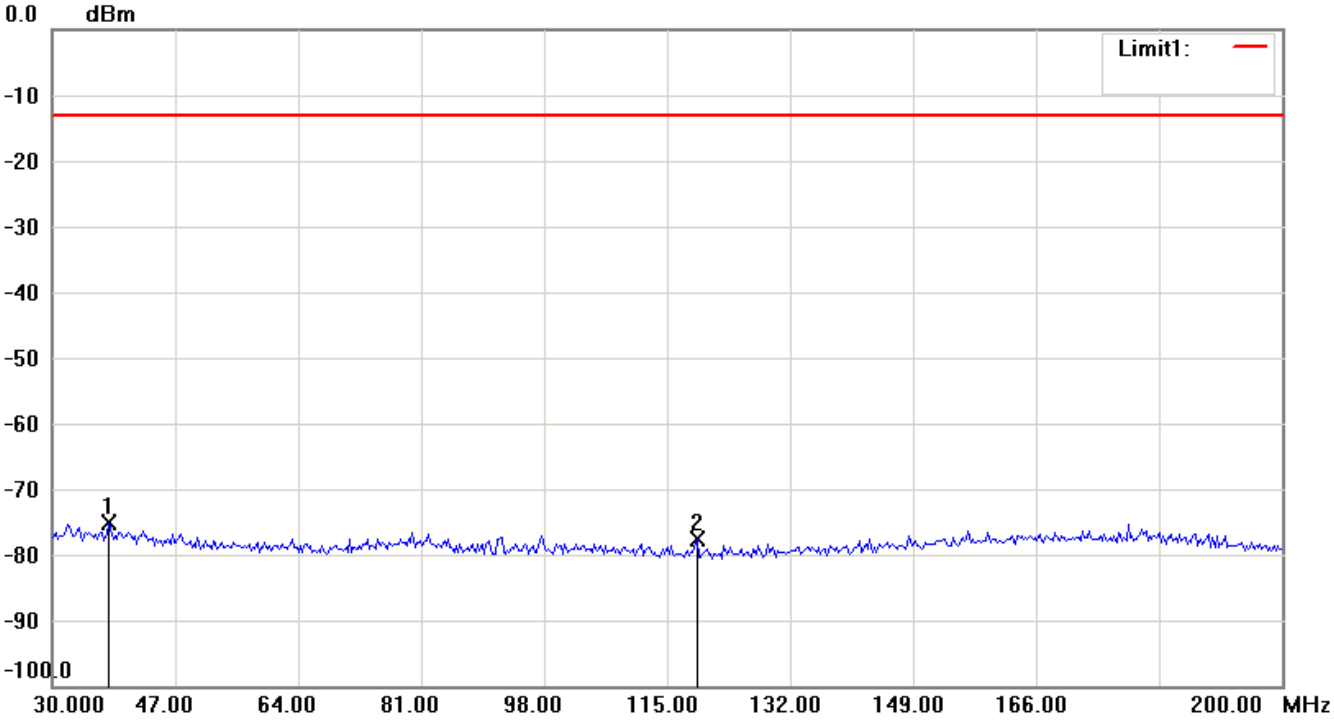
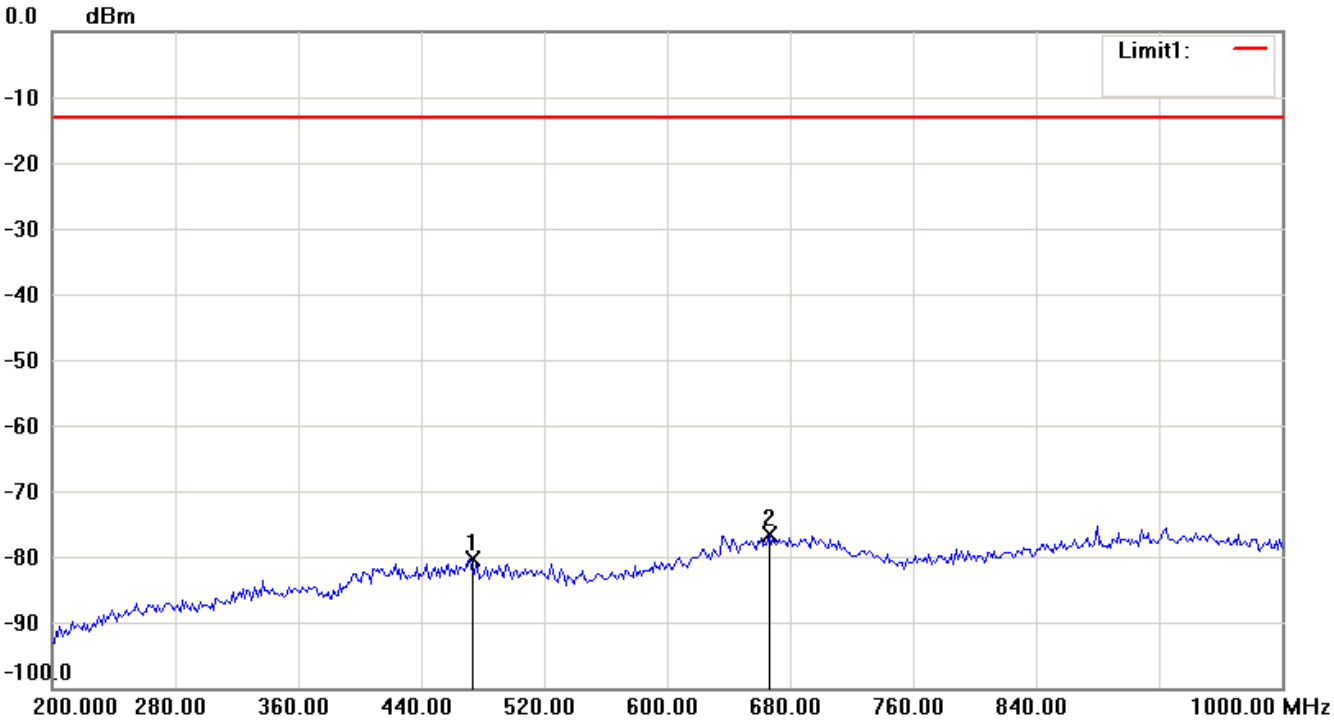
Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T

630.1 MHz

Antenna Polarization H

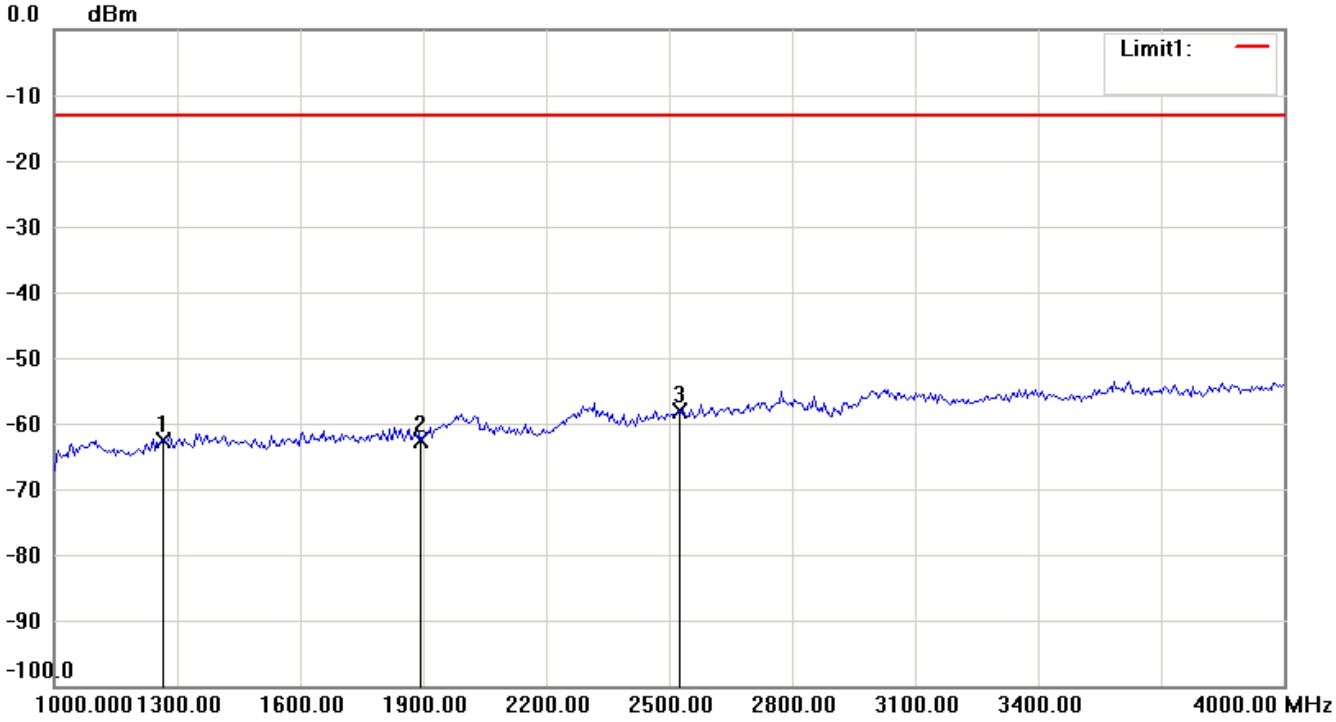


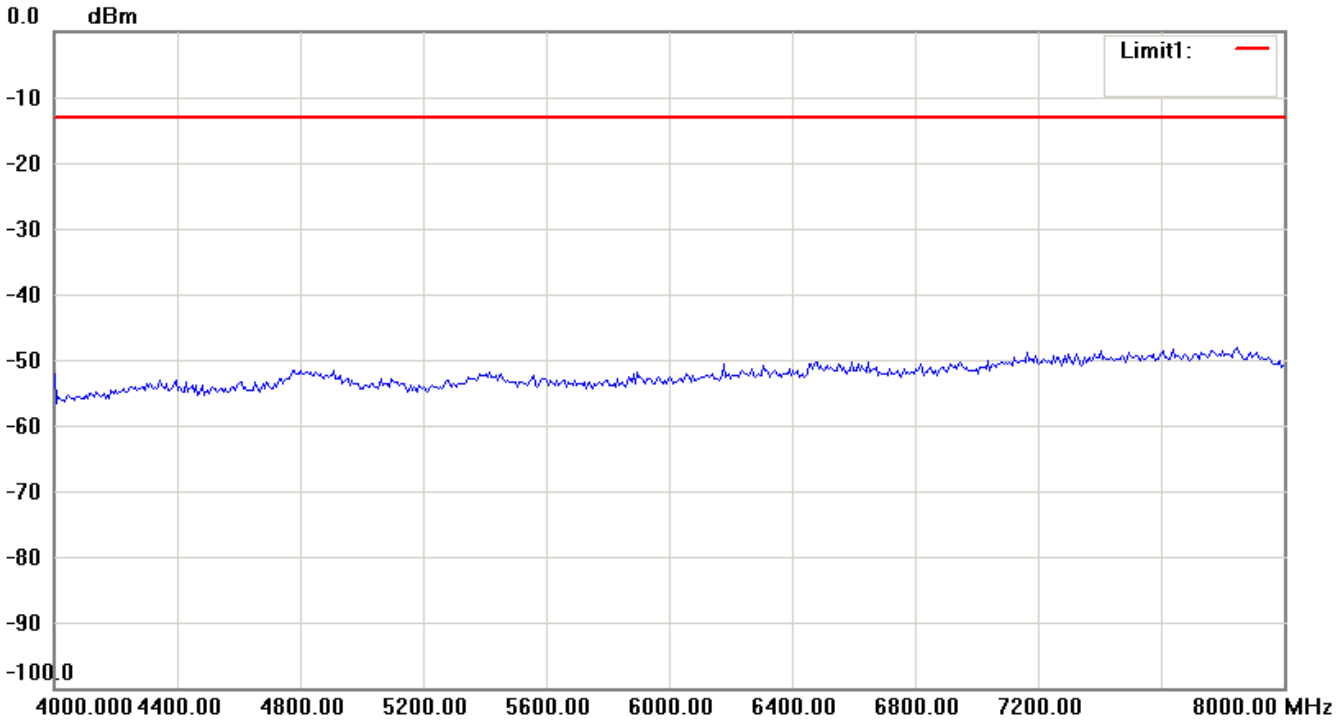


Note:

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

Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T



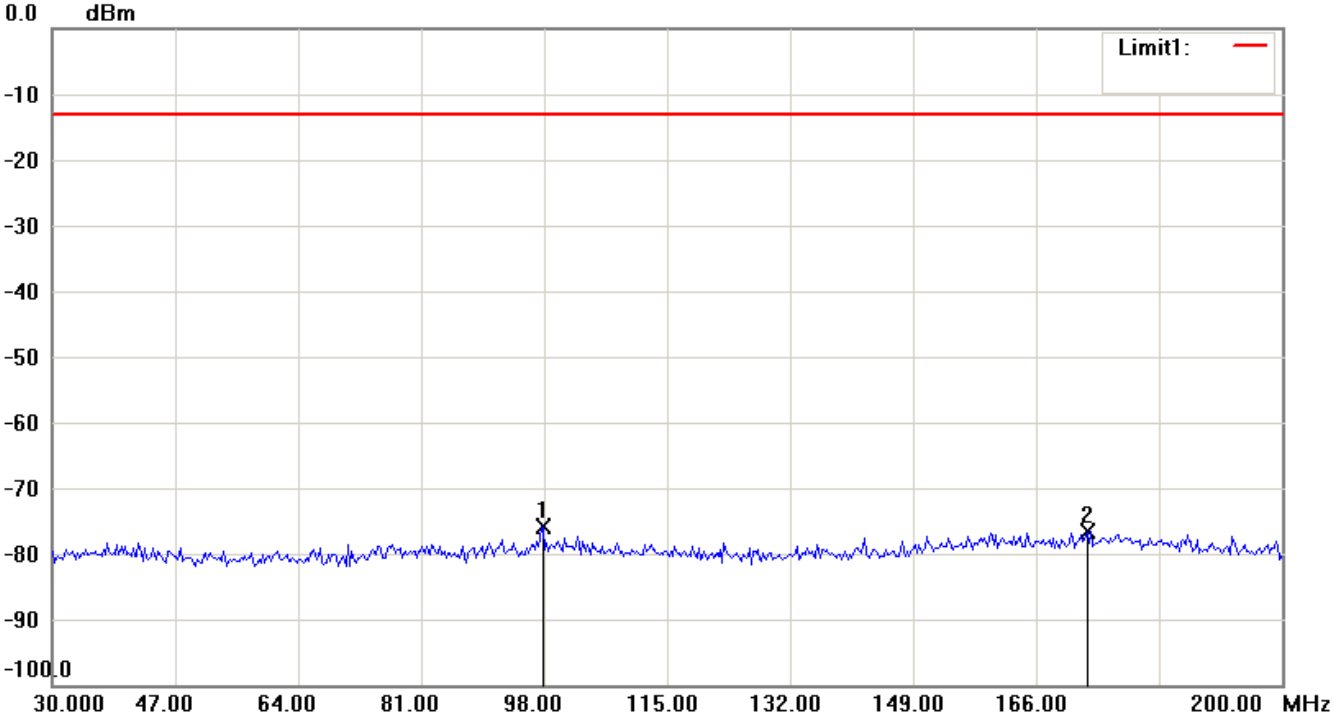


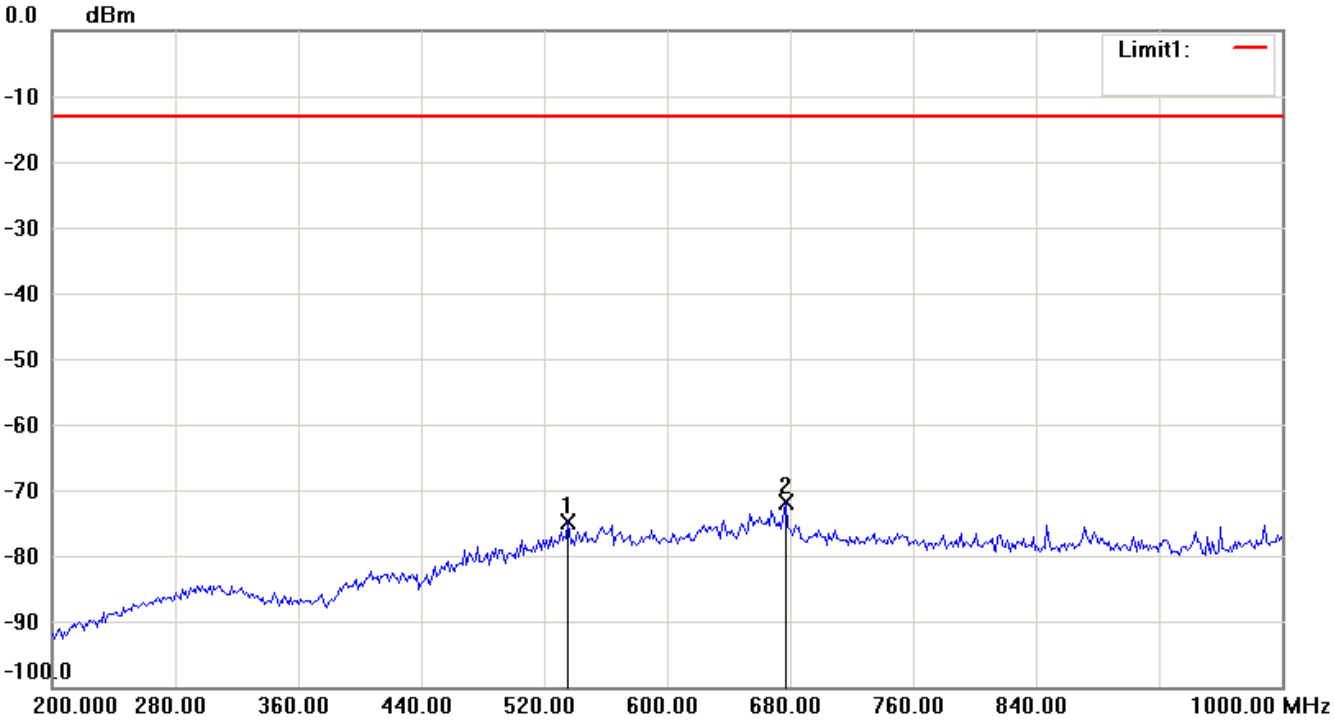
Note:

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: W6R21205-12421-C-1
FCC ID: M5X-ACT80T

Antenna Polarization V





Note:

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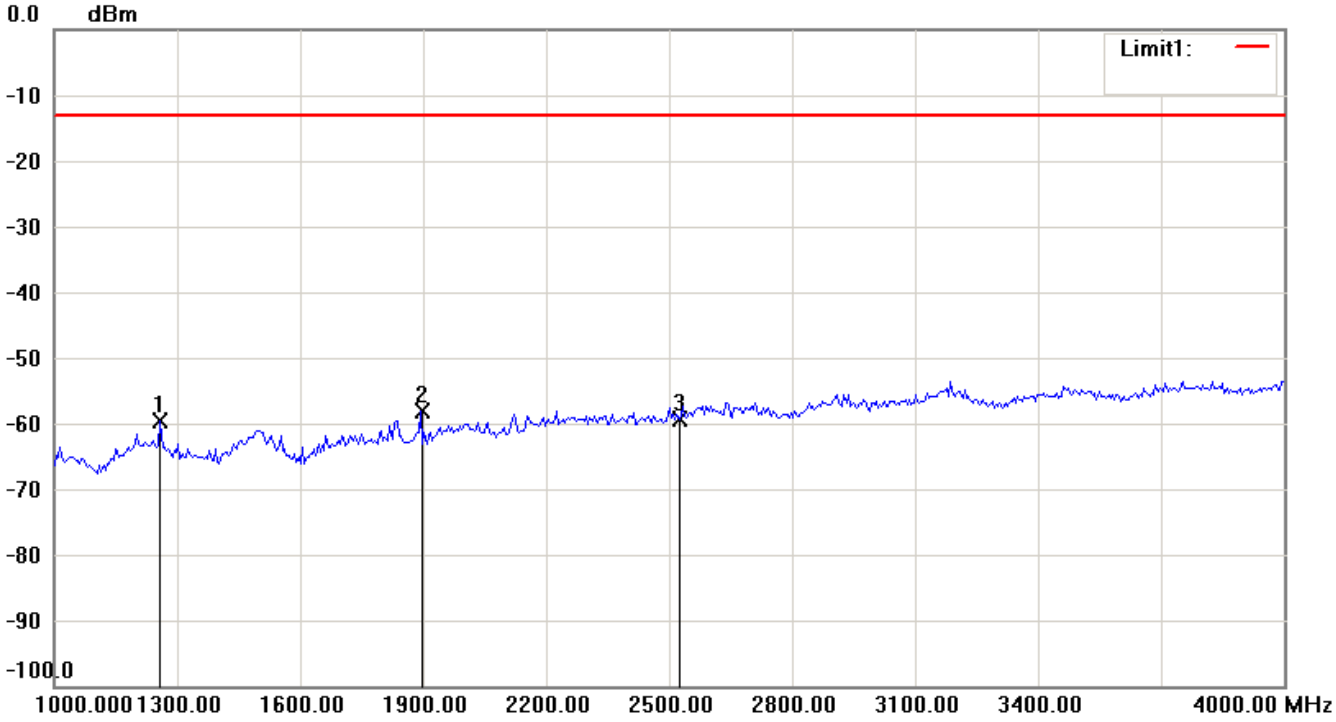
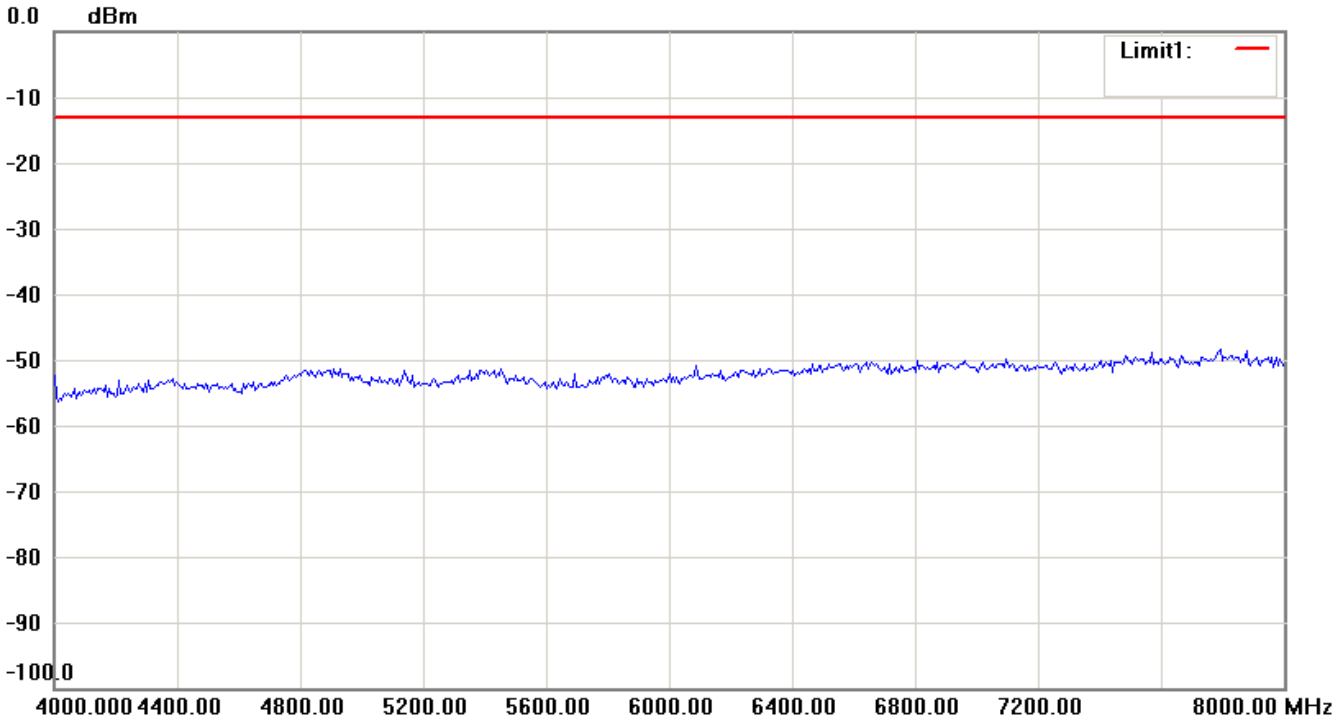
3. **For corrected test results are listed in the relevant table of radiated test data of this test report.**

Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T





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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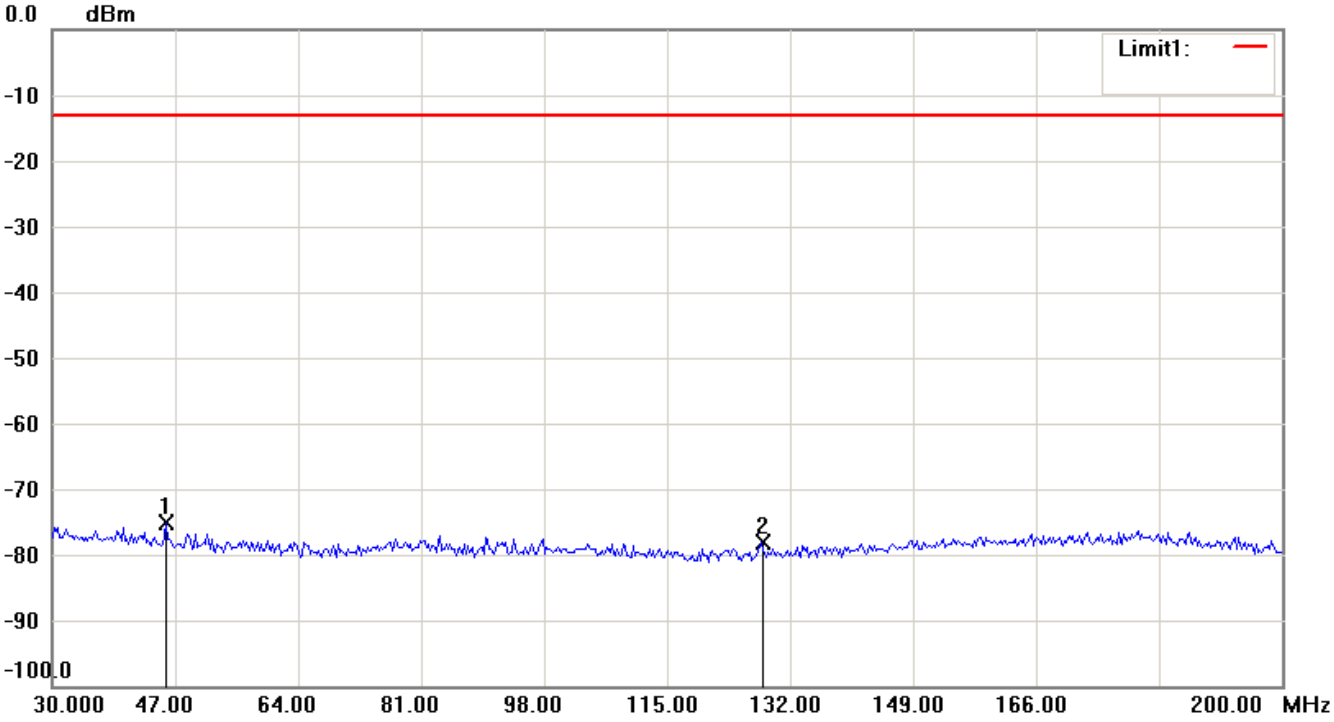
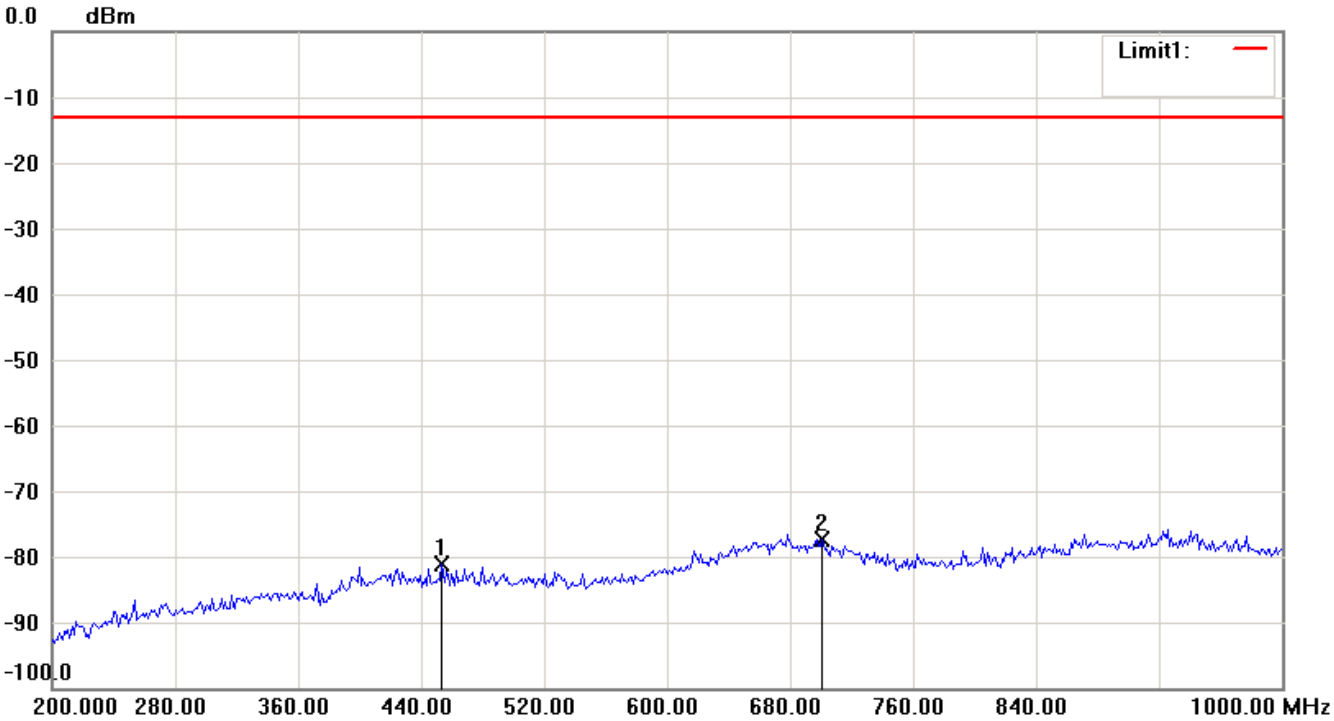
Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T

664 MHz

Antenna Polarization H





Note:

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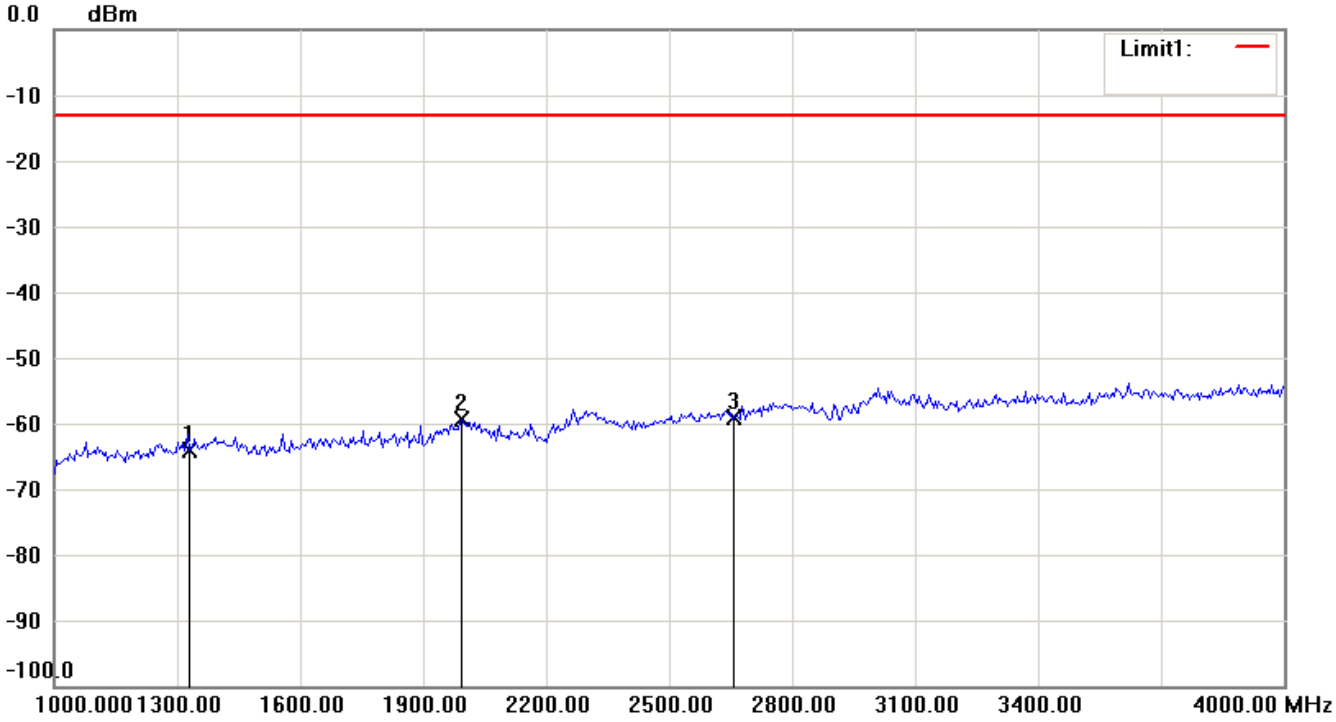
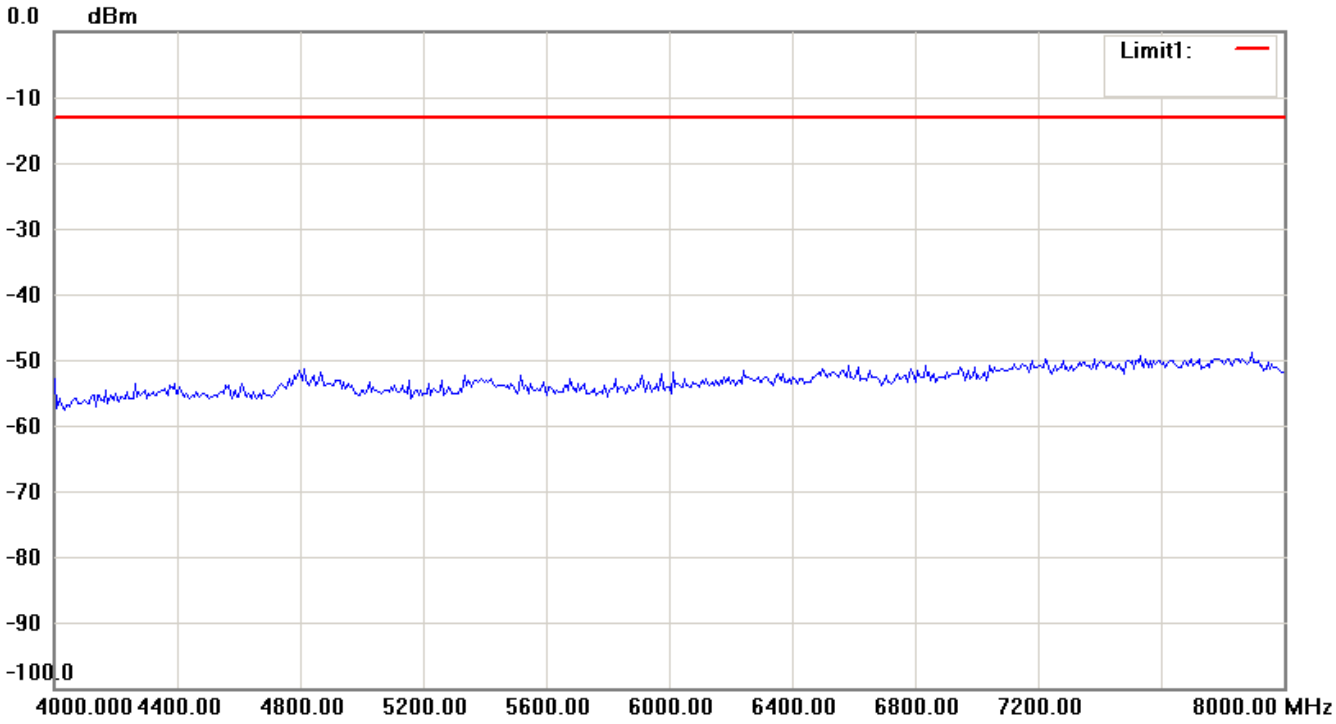
3. **For corrected test results are listed in the relevant table of radiated test data of this test report.**

Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T





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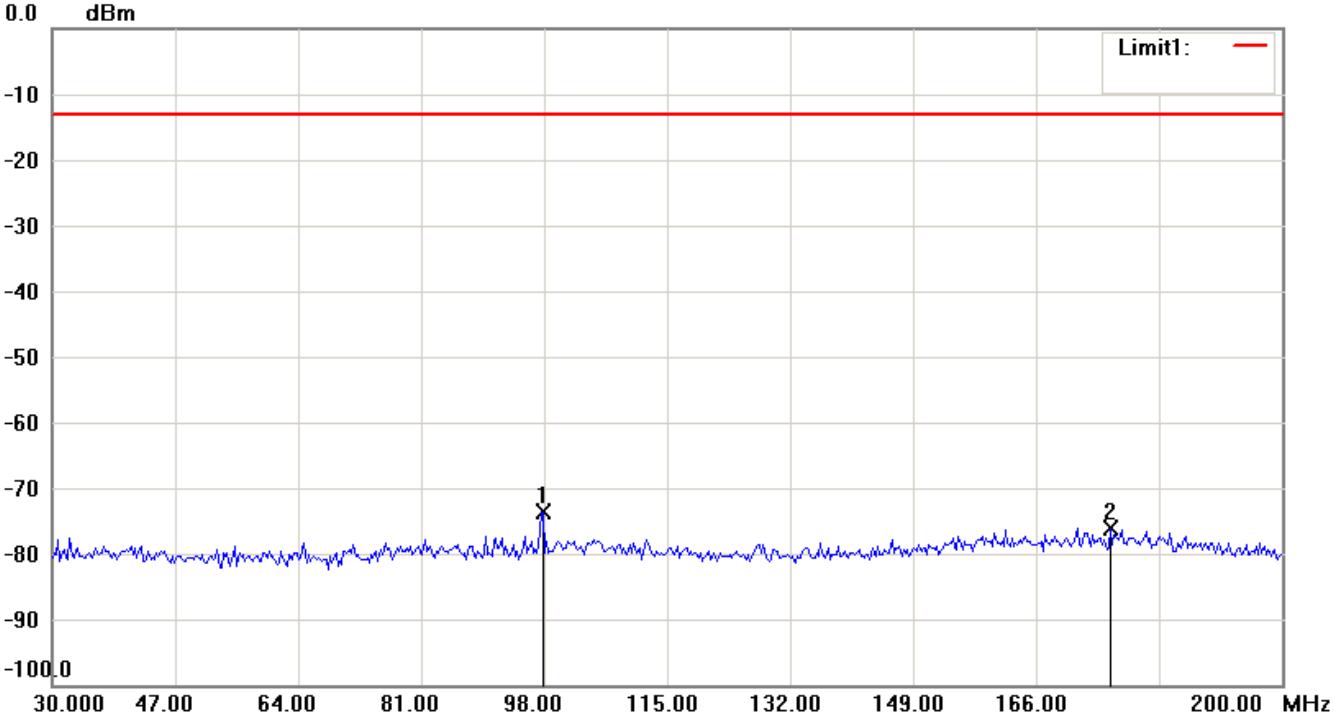
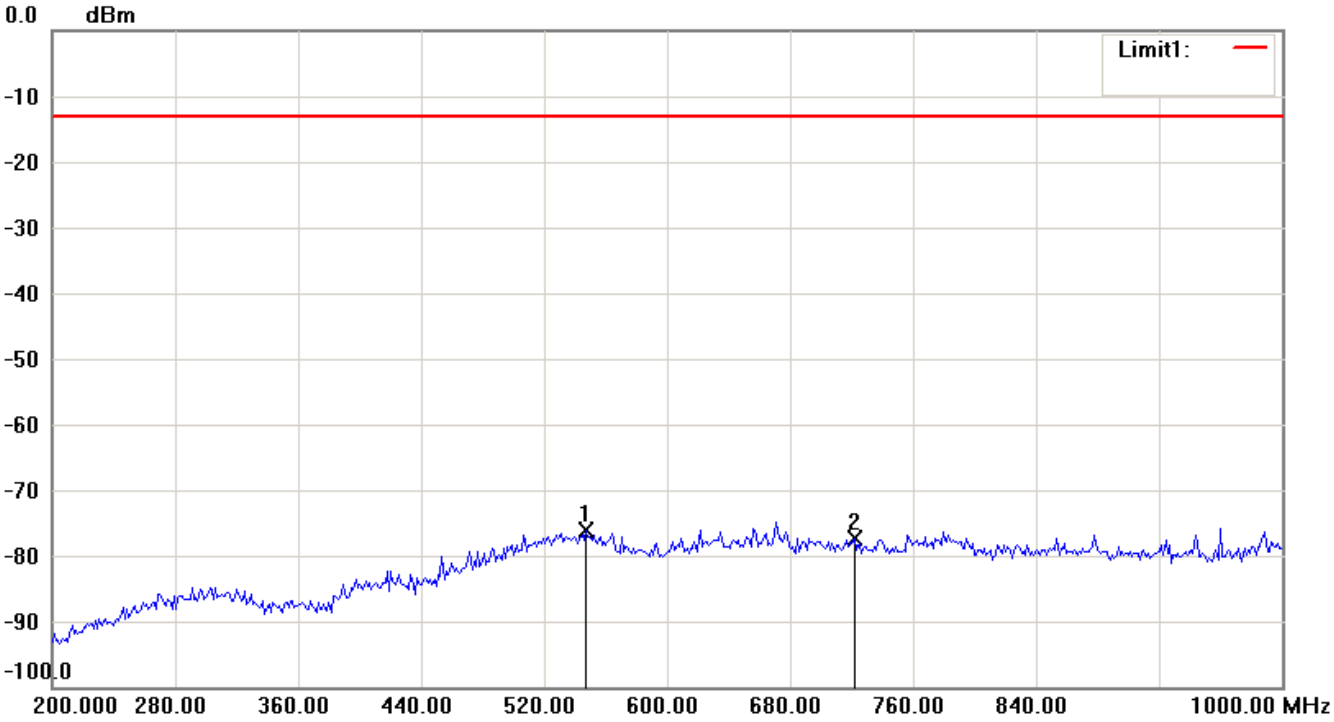
Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T

Antenna Polarization V





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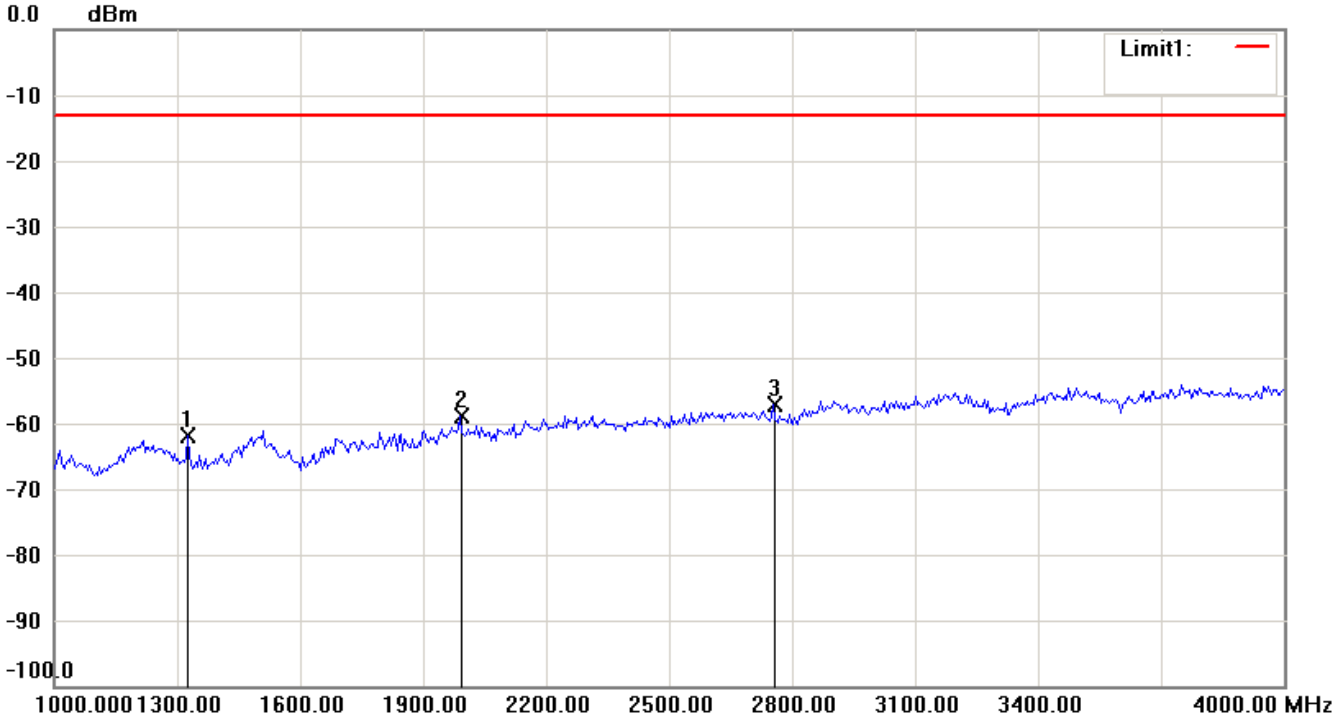
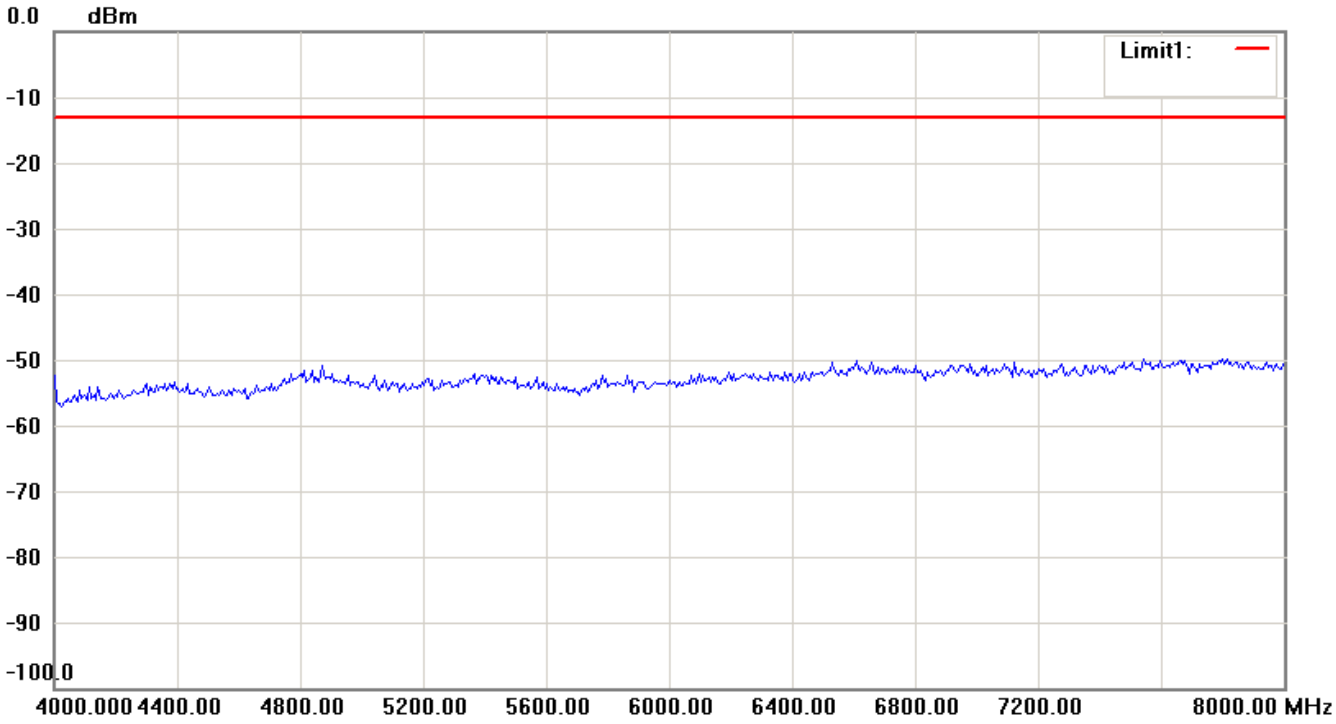
Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T





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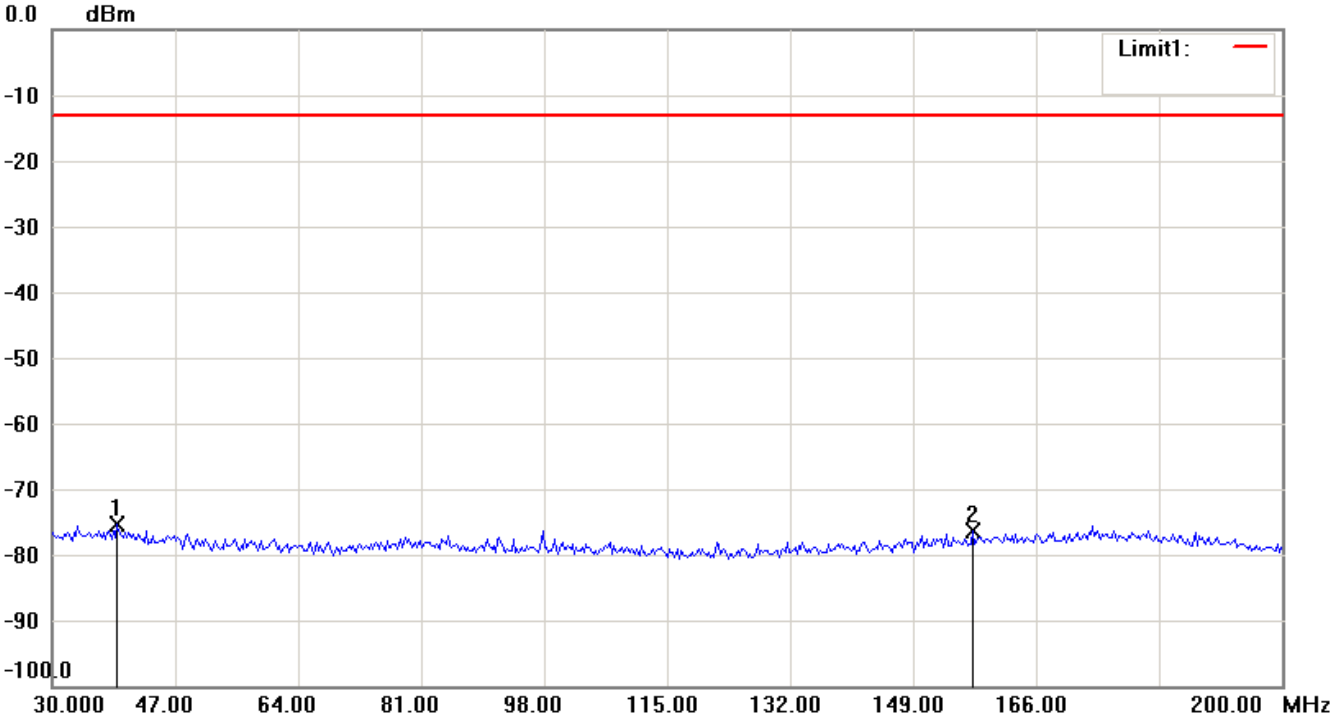
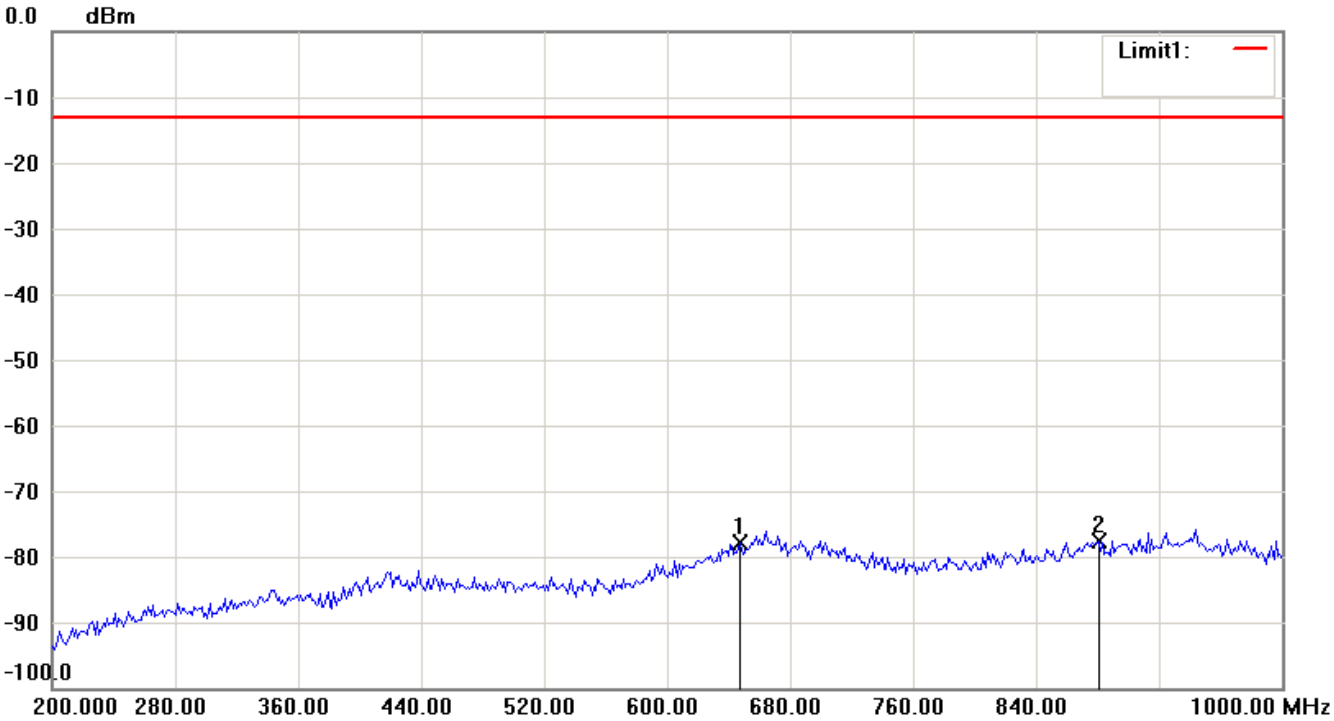
Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T

697.9 MHz

Antenna Polarization H





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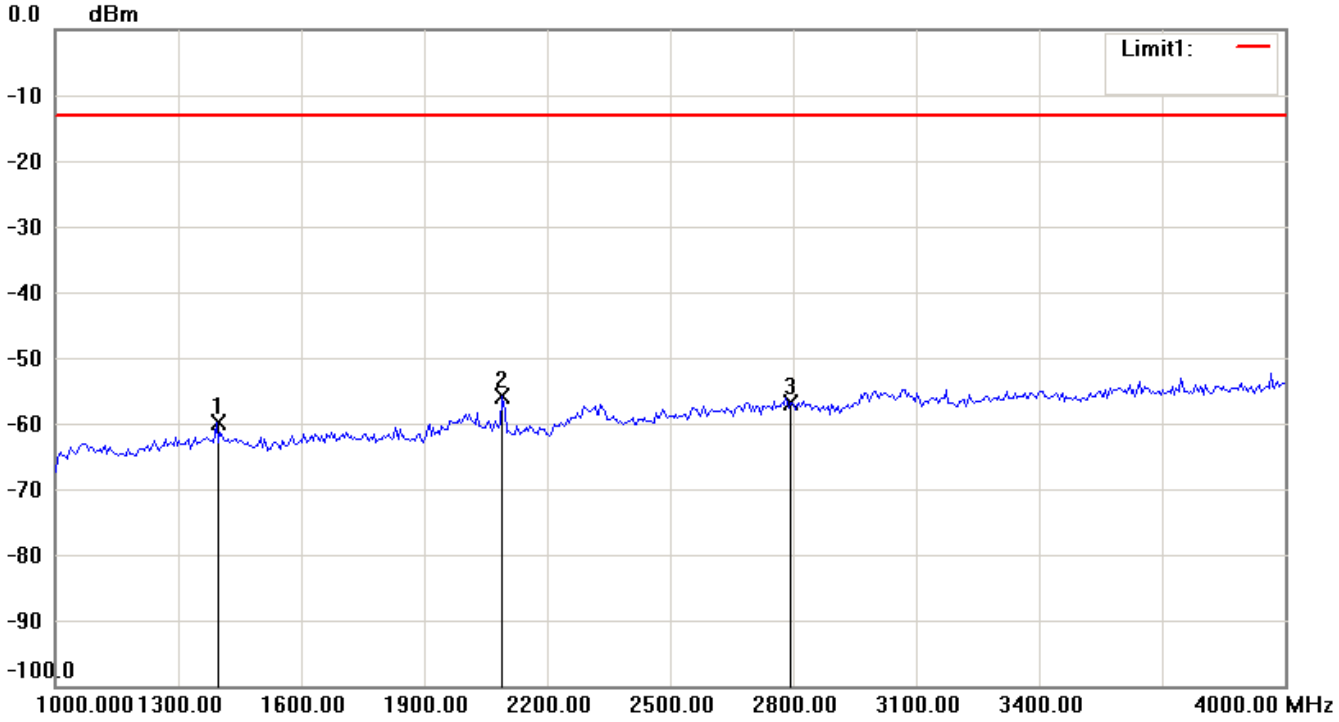

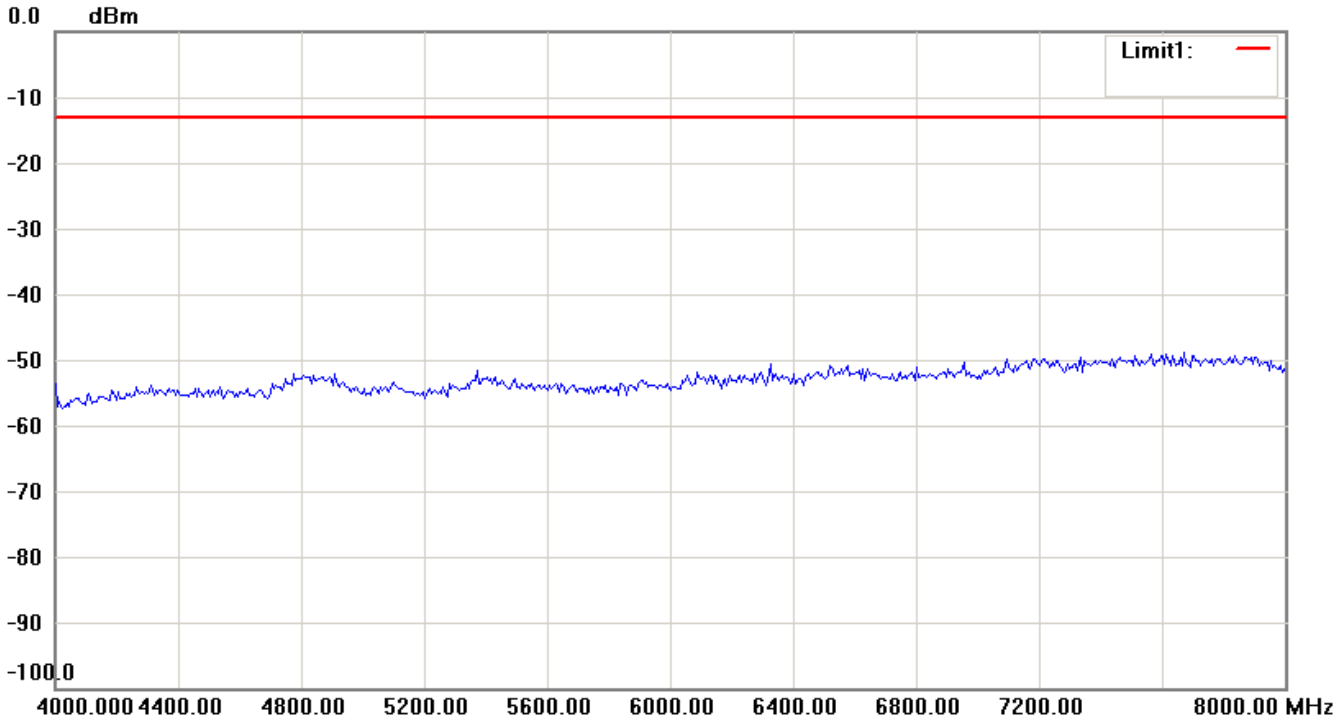

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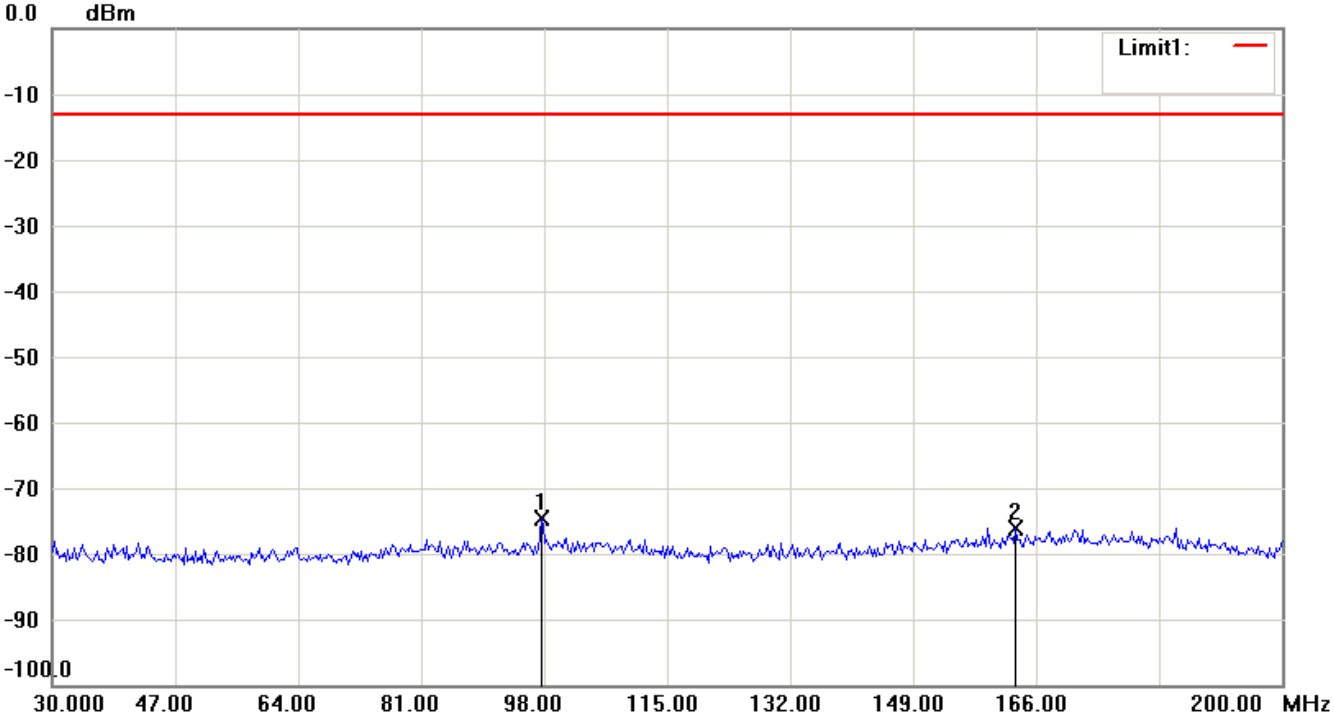
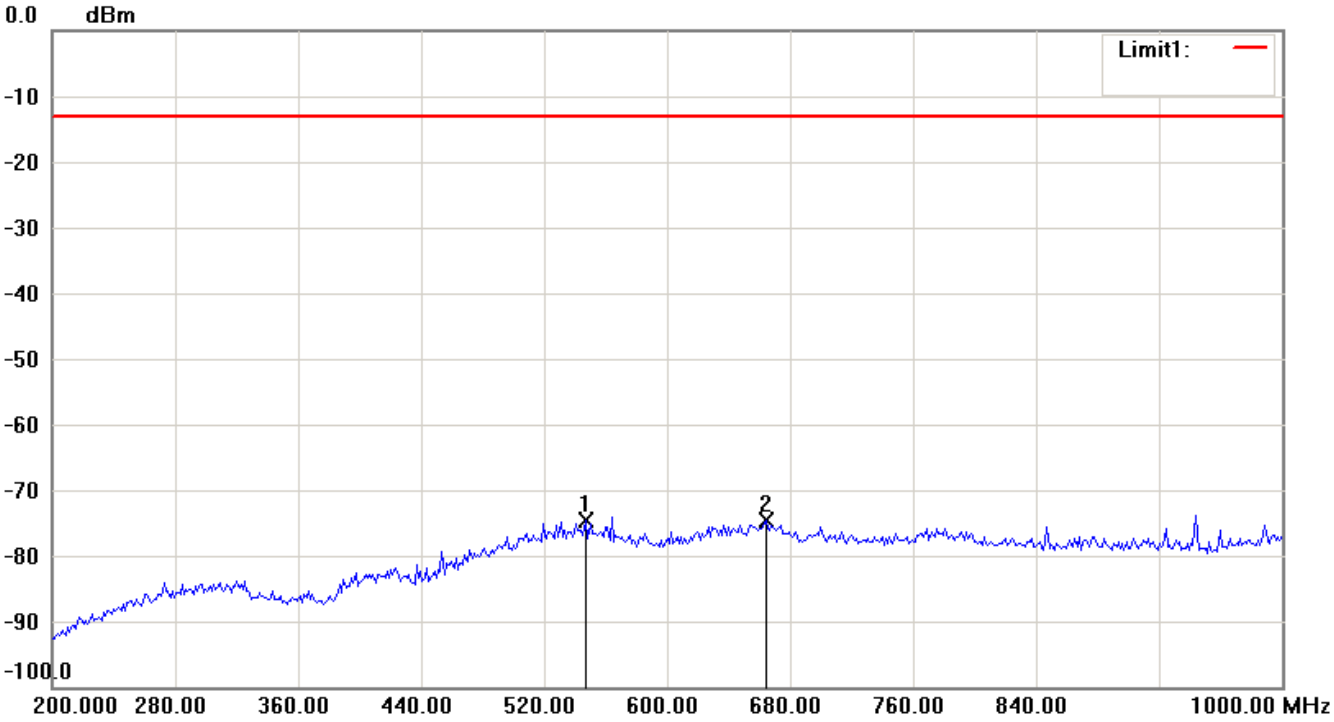
Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T

Antenna Polarization V





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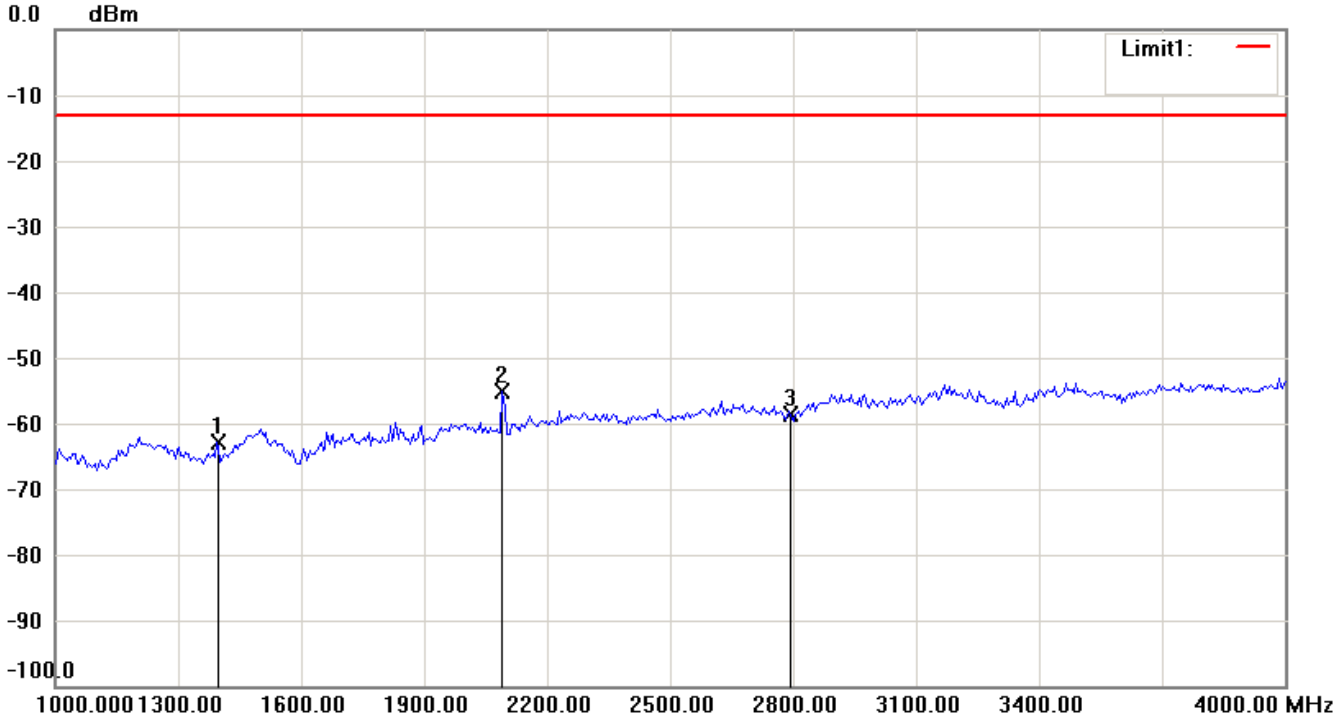

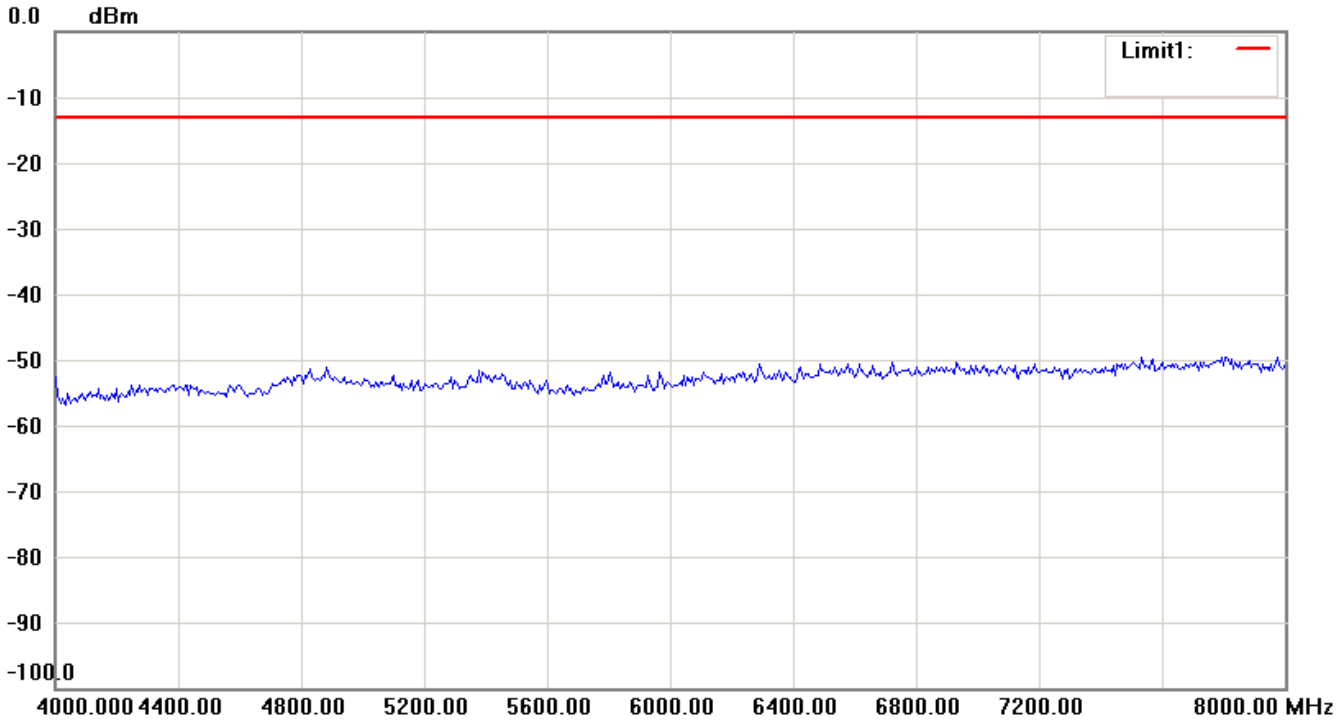

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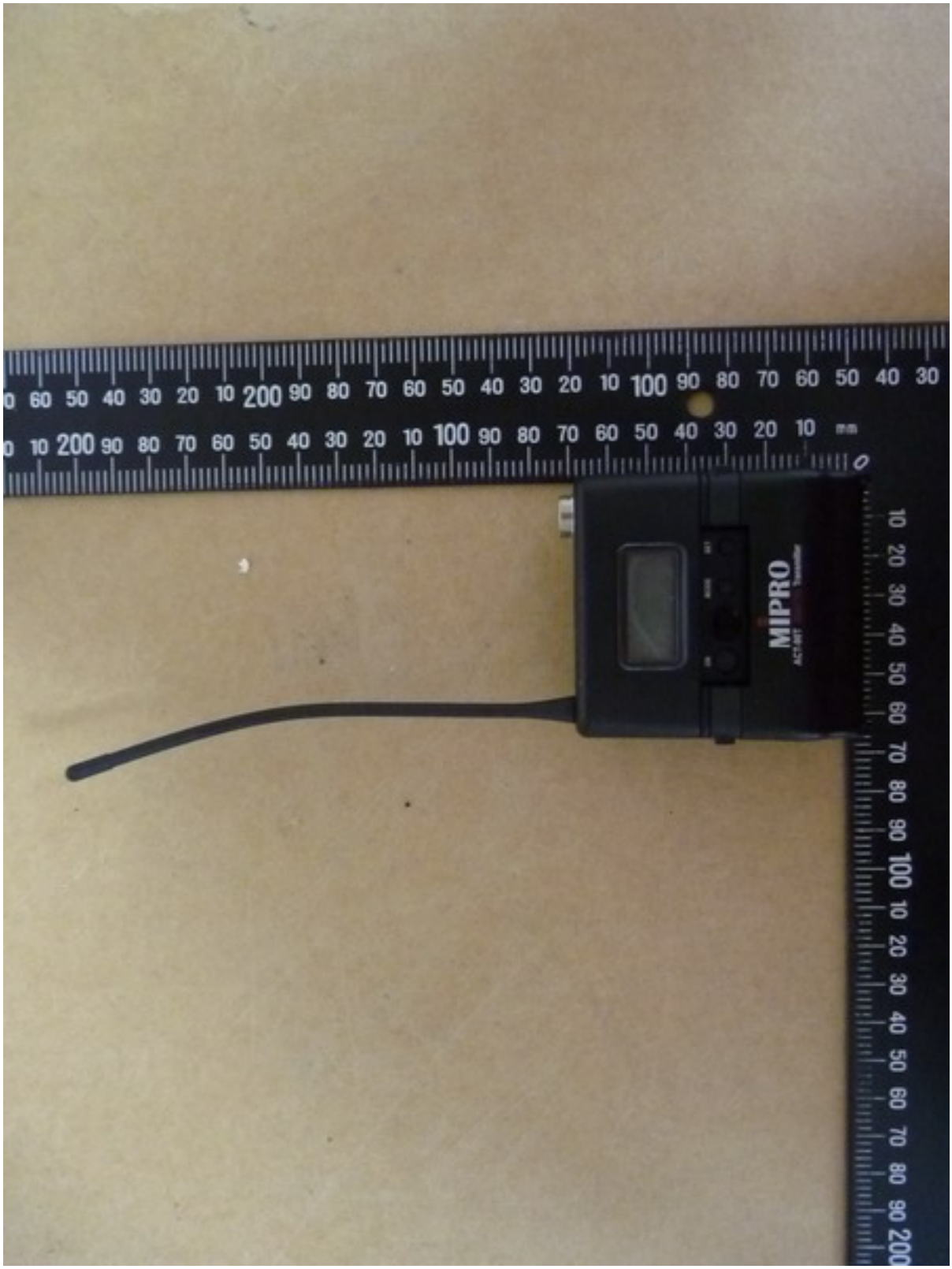
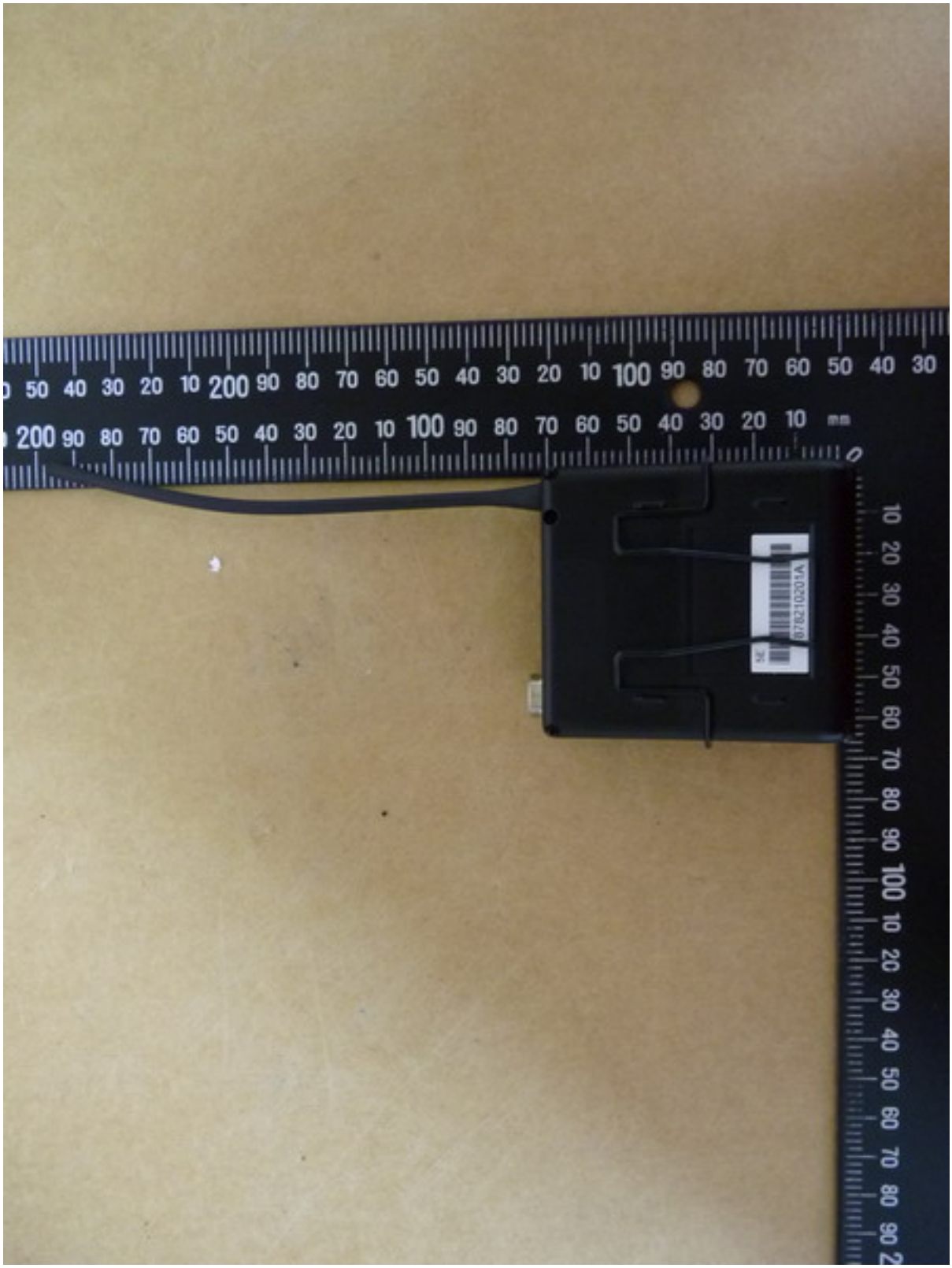
Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T

External Photos


MIPRO

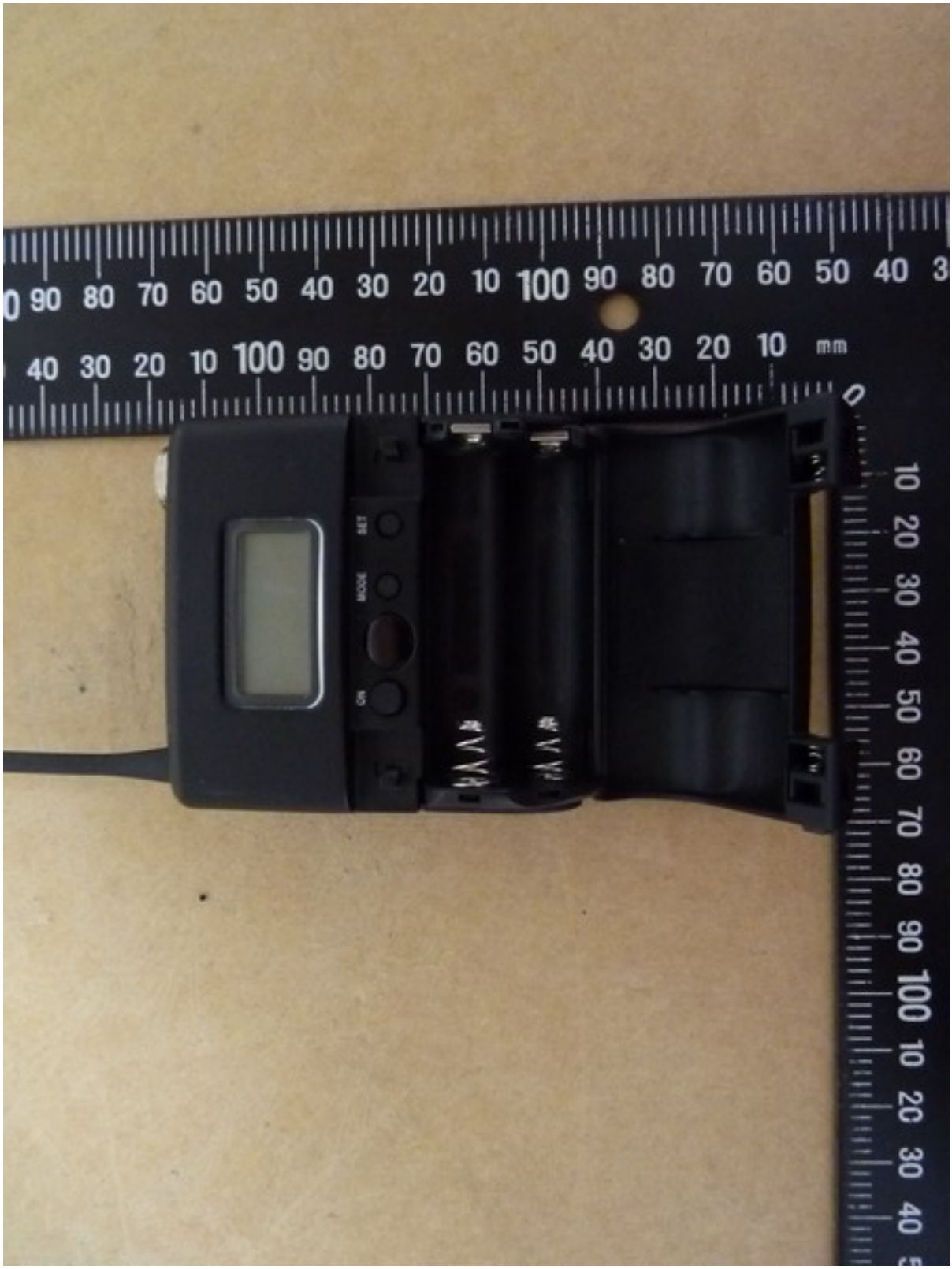


Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T


MIPRO

Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T

Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T

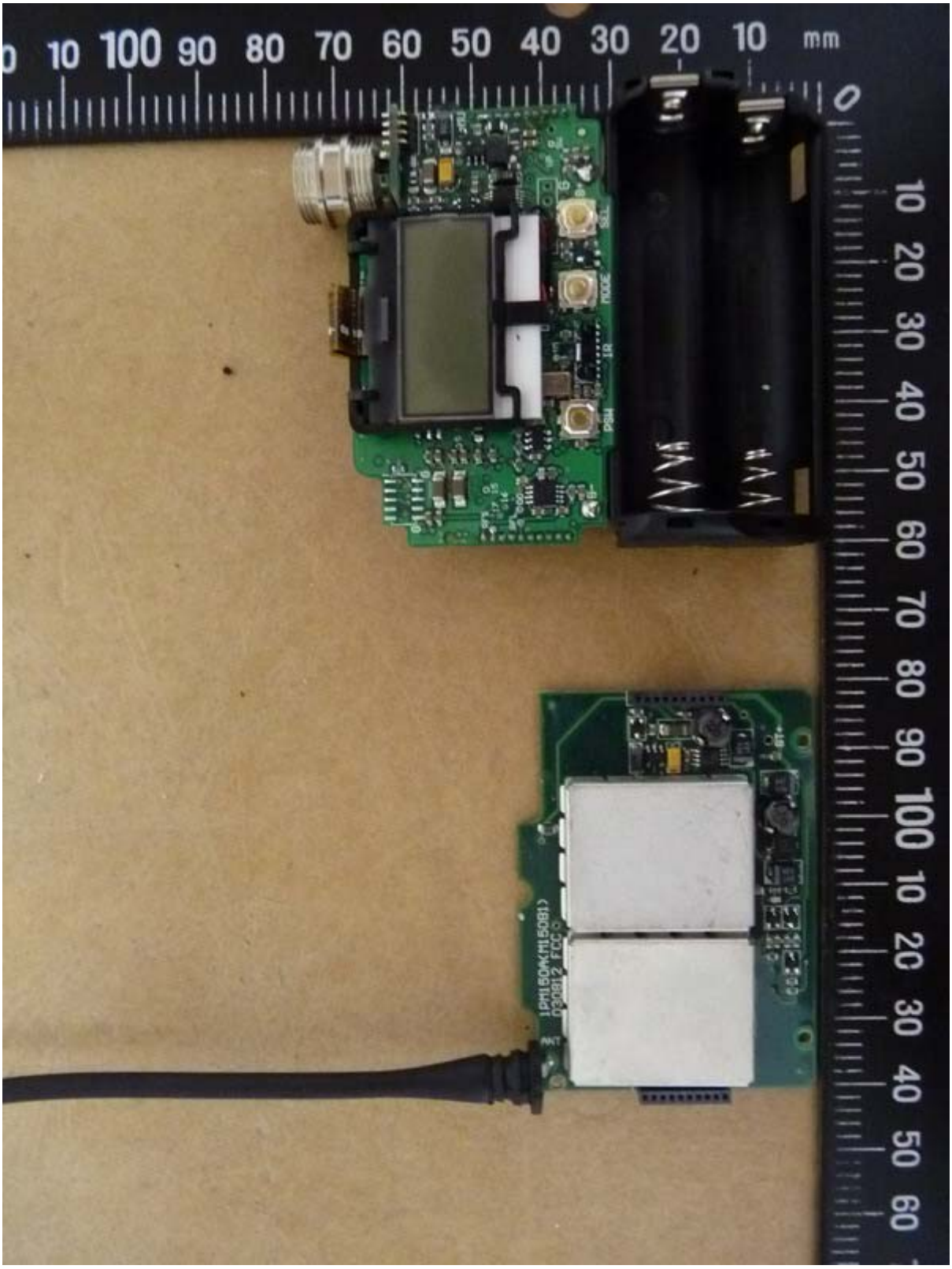

mm

Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T

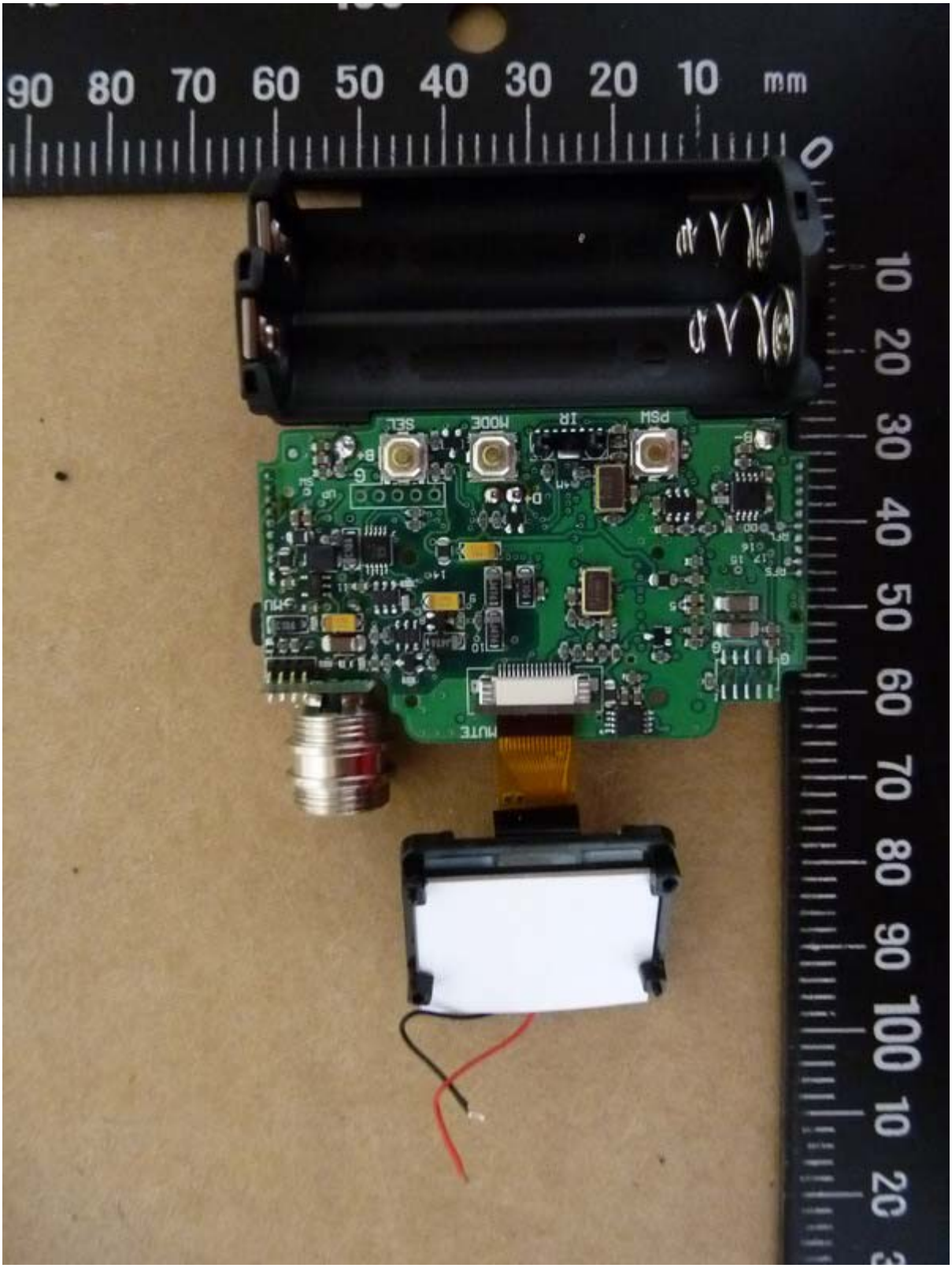
Internal Photos


mm

Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T



Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T



Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T

Registration number: W6R21205-12421-C-1
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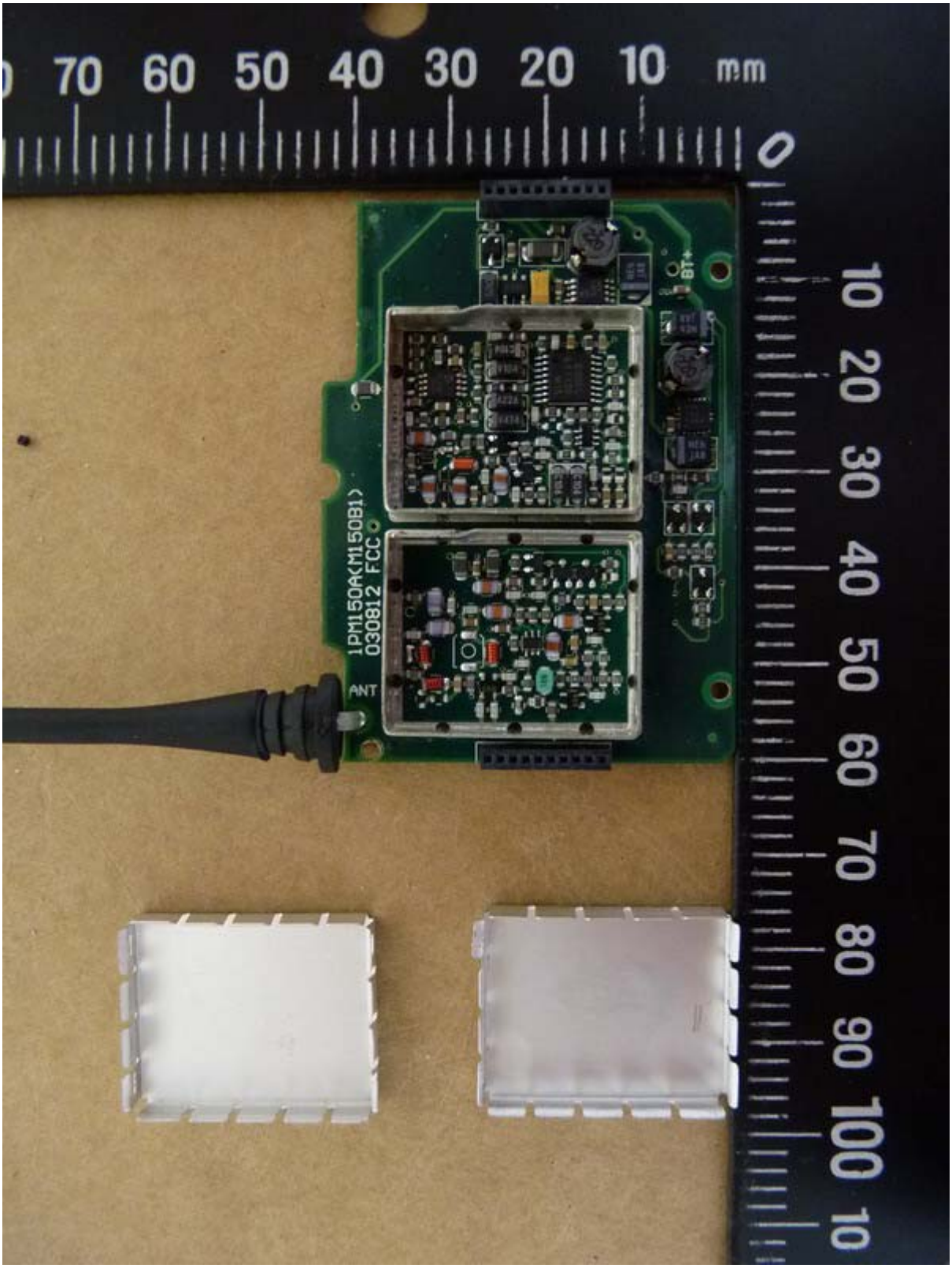
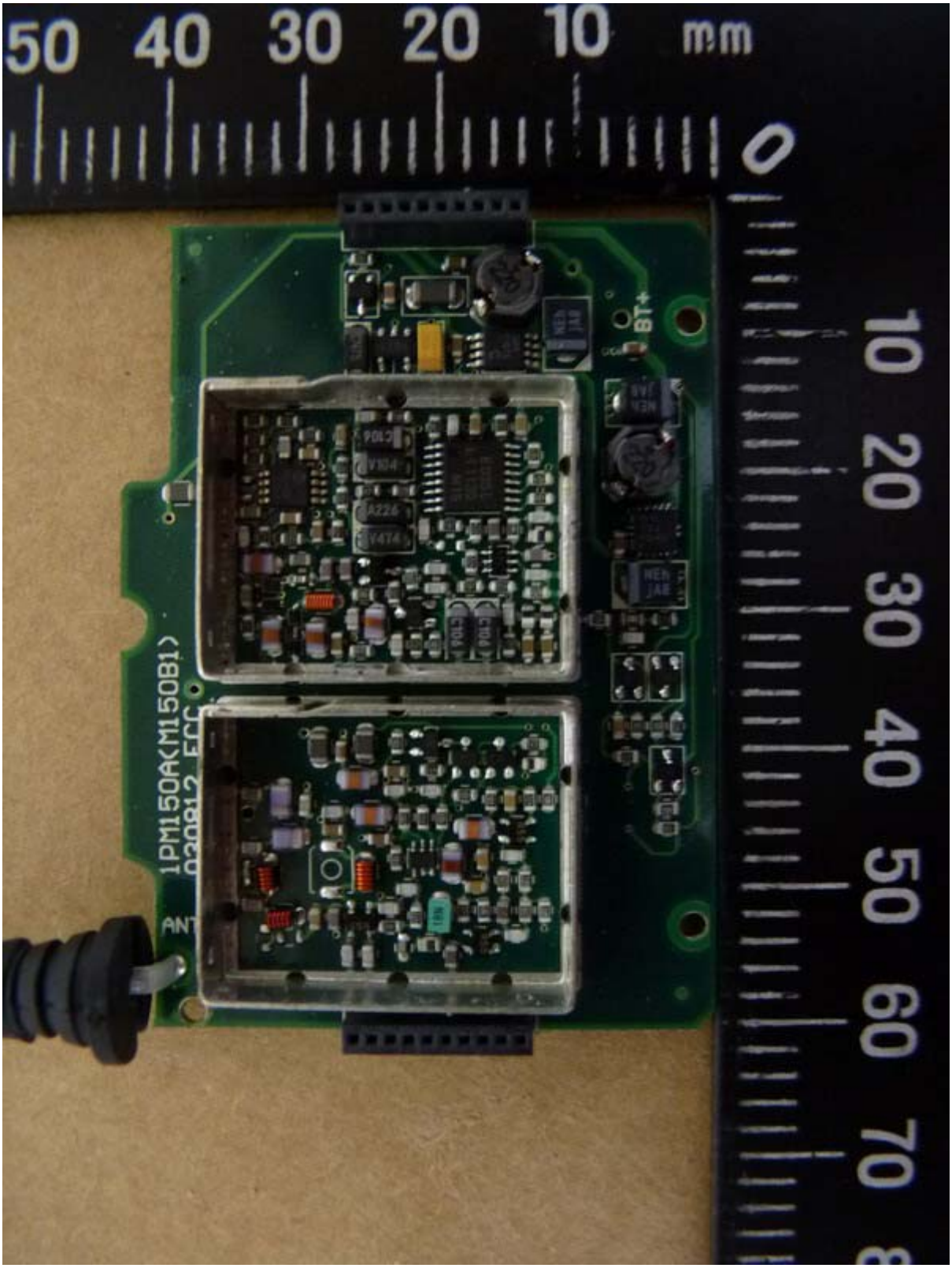
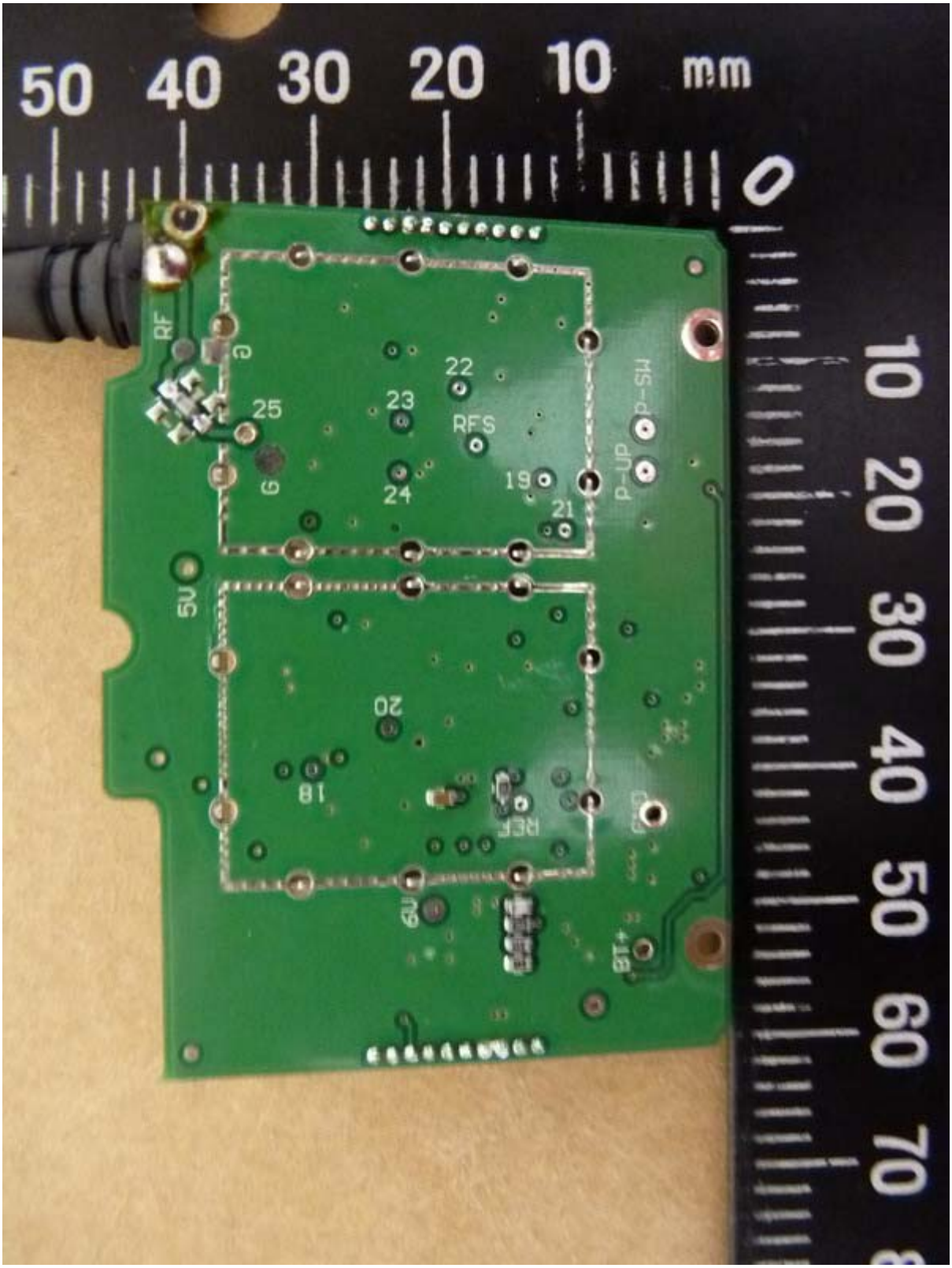


Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T



Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T



Registration number: W6R21205-12421-C-1
FCC ID: M5X-ACT80T

Set Up Photo of Radiated Emission