

FCC Part 15.236 Test Report
for
Wideband Digital Handheld Transmitter
Model No.: ACT-80H
FCC ID: M5X-ACT80H18

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.: TW1477, TW1111, TW1072, TW1110

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

A2LA Accredited No.: 2732.01



Report No.: W6D21712-17670-C-1

6F, NO. 58, LANE 188, RUEY-KUANG RD., NEIHU TAIPEI 114, TAIWAN, R.O.C.
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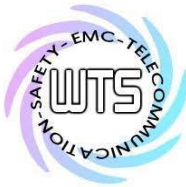
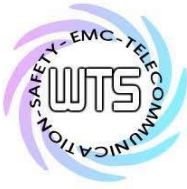


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1 General Information

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 its performance generally conforms to representative cases of communications equipment.

The test results of this test report relate exclusively to the item tested as specified in 1.5.

The test report may only be reproduced or published in full.

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

Tester:

January 19, 2018

Mark Cheng

Date

WTS-Lab.

Name

Signature

Technical responsibility for area of testing:

January 19, 2018

Kevin Wang

Date

WTS

Name

Signature



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1.2 Testing laboratory

1.2.1 Location

OATS

No.5-1, Lishui, Shuang Sing Village,

Wanli Dist., New Taipei City 207,

Taiwan (R.O.C.)

3 meter semi-anechoic chamber

No.35, Aly. 21, Ln. 228, Ankang Rd., Neihu Dist., Taipei City 114, Taiwan (R.O.C.)

TEL:886-2-6613-0228

FAX:886-2-2791-5046

Company

Worldwide Testing Services(Taiwan) Co., Ltd.

6F, NO. 58, LANE 188, RUEY-KUANG RD.

NEIHU, TAIPEI 114, TAIWAN R.O.C.

Tel : 886-2-66068877

Fax : 886-2-66068879

1.2.2 Details of accreditation status

Accredited testing laboratory

A2LA accredited number: 2732.01

FCC filed test laboratory Reg. No. TW1477, TW1111, TW1072, TW1110

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

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

Name: ./.

Accredited number: ./.

Street: ./.

Town: ./.

Country: ./.

Telephone: ./.

Fax: ./.

1.3 Details of approval holder

Name: 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



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1.4 Application details

Date of receipt of test sample (1st): June 08, 2012

Date of test (1st): From June 11, 2012 to July 24, 2012

Date of receipt of test sample (2nd): January 04, 2018

Date of test (2nd): from January 05, 2018 to January 18, 2018

1.5 General information of Test item

Type of test item: Wideband Digital Handheld Transmitter

Model Number: ACT-80H

Brand Name: MIPRO

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

Photos: see Annex

Technical data

Frequency band : 470-608 MHz

Frequency (ch A): 480.1 MHz

Frequency (ch B): 542 MHz

Frequency (ch C): 603.9 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 RULES PART 15 SUBPART C § 15.236 (2016-10)



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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.

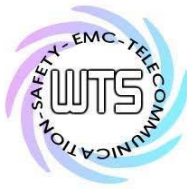
2.2 Test environment

Temperature: 23 °C

Relative humidity content: 20 ... 75 %

Power supply: Battery 1.5 VDC*2

Air pressure: 86-103 KPa

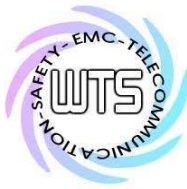


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2.3 Test Equipment List

No.	Test equipment	Type	Serial No.	Manufacturer	Cal. Date	Next Cal. Date
ETSTW-CE 001	EMI TEST RECEIVER	ESHS10	842121/013	R&S	2017/5/26	2018/5/25
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	2017/10/26	2018/10/25
ETSTW-CE 006	IMPULSBEGRENZER PULSE LIMITER	ESH3-Z2	100226	R&S	2017/8/22	2018/8/21
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	2017/7/14	2018/7/13
ETSTW-CE 016	TWO-LINE V-NETWORK	ENV216	100050	R&S	2017/8/31	2018/8/30
ETSTW-CE 028	MXE EMI Receiver	N9038A	MY53220110	Agilent	2017/7/11	2018/7/10
ETSTW-RE 003	EMI TEST RECEIVER	ESI 26	831438/001	R&S	2017/5/26	2018/5/25
ETSTW-RE 004	EMI TEST RECEIVER	ESI 40	832427/004	R&S	2017/5/17	2018/5/16
ETSTW-RE 005	EMI TEST RECEIVER	ESVS10	843207/020	R&S	2017/8/25	2018/8/24
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	2017/7/4	2018/7/3
ETSTW-RE 027	Passive Loop Antenna	6512	00034563	ETS-Lindgren	2017/7/3	2018/7/2
ETSTW-RE 030	Double-Ridged Guide Horn Antenna	3117	00035224	ETS-Lindgren	2017/3/22	2018/3/21
ETSTW-RE 042	Biconical Antenna	HK116	100172	R&S	2017/2/7	2018/2/6
ETSTW-RE 043	Log-Periodic Dipole Antenna	HL223	100166	R&S	2017/4/10	2018/4/9
ETSTW-RE 044	Log-Periodic Antenna	HL050	100094	R&S	2017/4/27	2018/4/26
ETSTW-RE 045	ESA-E SERIES SPECTRUM ANALYZER	E4404B	MY45111242	Agilent	Pre-test Use	
ETSTW-RE 050	Attenuator 10dB	50HF-010-1	None	JFW	2017/3/1	2018/2/28
ETSTW-RE 051	Attenuator 6dB	50HF-006-1	None	JFW	2017/3/1	2018/2/28
ETSTW-RE 053	Attenuator 3dB	50HF-003-1	None	JFW	2017/3/1	2018/2/28
ETSTW-RE 055	SPECTRUM ANALYZER	FSU 26	200074	R&S	2017/3/1	2018/2/28
ETSTW-RE 060	Attenuator 30dB	5015-30	F651012z-01	ATM	2017/3/1	2018/2/28
ETSTW-RE 062	Amplifier Module	CHC 2	None	KMIC	2017/4/12	2018/4/11
ETSTW-RE 064	Bluetooth Test Set	MT8852B-042	6K00005709	Anritsu	Function Test	
ETSTW-RE 069	Double-Ridged Guide Horn Antenna	3117	00069377	ETS-Lindgren	Function Test	
ETSTW-RE 072	CELL SITE TEST SET	8921A	3339A00375	HP	2017/9/11	2018/9/10
ETSTW-RE 088	SOLID STATE AMPLIFIER	KMA180265A01	99057	KMIC	2017/9/19	2018/9/18
ETSTW-RE 091	Match Pad	MDCS1500	None	WOKEN	2017/4/6	2018/4/5
ETSTW-RE 099	DC Block	50DB-007-1	None	JFW	2017/3/1	2018/2/28



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ETSTW-RE 112	AC POWER SOURCE	TFC-1005	T-0A023536	T-Power	Function test	
ETSTW-RE 115	2.4GHz Notch Filter	N0124411	473874	MICROWAVE CIRCUITS	2018/1/11	2019/1/10
ETSTW-RE 120	RF Player	MP9200	MP9210-111022	ADIVIC	Function test	
ETSTW-RE 122	SIGNAL GENERATOR	SMF100A	102149	R&S	2017/5/26	2018/5/25
ETSTW-RE 125	5GHz Notch filter	5NSL11-5200/E221.3-O/O	1	K&L Microwave	2017/8/9	2018/8/8
ETSTW-RE 126	5GHz Notch filter	5NSL12-5800/E221.3-O/O	1	K&L Microwave	2017/8/9	2018/8/8
ETSTW-RE 127	RF Switch Box	RFS-01	None	WTS	2017/3/1	2018/2/28
ETSTW-RE 128	5.3GHz Notch filter	N0153001	SN487233	Microwave Circuits	2017/8/9	2018/8/8
ETSTW-RE 129	5.5GHz Notch filter	N0555984	SN487234	Microwave Circuits	2017/8/9	2018/8/8
ETSTW-RE 130	Handheld RF Spectrum Analyzer	N9340A	CN0147000204	Agilent	Pre-test Use	
ETSTW-RE 142	Amplifier	8447D	2805A03378	Agilent	2017/4/12	2018/4/11
ETSTW-RE 147	Bi-log Hybrid Antenna	MCTD 2786B	BLB16M04005	ETC	2017/3/22	2018/3/21
ETSTW-RE 151	Thermohyrometer	608-h1	45104376	TESTO	2017/8/30	2018/8/29
ETSTW-EMI 011	USB Compact Modulator	SFC-U	101689	R&S	2017/5/10	2018/5/9
ETSTW-GSM 002	Universal Radio Communication Tester	CMU 200	109439	R&S	2017/2/24	2018/2/23
ETSTW-GSM 003	Radio Communication Analyzer	MT8820C	6201342073	Anritsu	2017/2/10	2018/2/9
ETSTW-GSM 004	Wideband Radio Communication Tester	CMW500	128092	R&S	2017/10/16	2018/10/15
ETSTW-GSM 019	Band Reject Filter	WRCTF824/849-822/851-40 /12+9SS	3	WI	2018/1/11	2019/1/10
ETSTW-GSM 020	Band Reject Filter	WRCD1747/1748-1743/1752-32/5SS	1	WI	2018/1/11	2019/1/10
ETSTW-GSM 021	Band Reject Filter	WRCD1879.5/1880.5-1875.5/1884.5-32/5SS	3	WI	2018/1/11	2019/1/10
ETSTW-GSM 022	Band Reject Filter	WRCT901.9/903.1-904.25-50/8SS	1	WI	2018/1/11	2019/1/10
ETSTW-GSM 023	Power Divider	4901.19.A	None	SUHNER	2017/9/13	2018/9/12
ETSTW-Cable 011	SMA to N type Cable	RGU-400	None	THERMAX	Pre-test Use NCR	
ETSTW-Cable 016	BNC Cable	Switch Box	B Cable 1	Schwarz beck	2017/2/23	2018/2/22
ETSTW-Cable 017	BNC Cable	X Cable	B Cable 2	Schwarz beck	2017/2/23	2018/2/22
ETSTW-Cable 018	BNC Cable	Y Cable	B Cable 3	Schwarz beck	2017/2/23	2018/2/22
ETSTW-Cable 019	BNC Cable	Z Cable	B Cable 4	Schwarz beck	2017/2/23	2018/2/22
ETSTW-Cable 020	N TYPE Cable	OATS Cable 1	N30N30-L335-15M	JYE BAO CO.,LTD.	2017/7/3	2018/7/2
ETSTW-Cable 022	N TYPE Cable	5006	0002	JYE BAO CO.,LTD.	2017/4/6	2018/4/5
ETSTW-Cable 026	Microwave Cable	SUCOFLEX 104	279075	HUBER+SUHNER	2017/3/1	2018/2/28
ETSTW-Cable 027	Microwave Cable	SUCOFLEX 104	279083	HUBER+SUHNER	2017/5/12	2018/5/11
ETSTW-Cable 028	Microwave Cable	FA147A0015M2020	30064-2	UTIFLEX	2017/9/7	2018/9/6
ETSTW-Cable 029	Microwave Cable	FA147A0015M2020	30064-3	UTIFLEX	2017/9/7	2018/9/6
ETSTW-Cable 030	Microwave Cable	SUCOFLEX 104 (S Cable 9)	279067	HUBER+SUHNER	2017/3/1	2018/2/28
ETSTW-Cable 031	Microwave Cable	SUCOFLEX 104 (S Cable 10)	238092	HUBER+SUHNER	2017/4/12	2018/4/11
ETSTW-Cable 043	Microwave Cable	SUCOFLEX 104	317576	HUBER+SUHNER	2017/4/12	2018/4/11
ETSTW-Cable 048	Microwave Cable	SUCOFLEX 104	325519	HUBER+SUHNER	2017/4/12	2018/4/11



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ETSTW-Cable 058	Microwave Cable	SUCOFLEX 104	none	HUBER+SUHNER	2017/2/20	2018/2/19
ETSTW-Cable 064	Microwave Cable	SUCOFLEX 104	MY28891	HUBER+SUHNER	2017/4/12	2018/4/11
ETSTW-Cable 066	SMA type cable	32022	None	ASTROLAB	2017/8/31	2018/8/30
ETSTW-Cable 071	N TYPE CABLE	EMCCFD400-NM- NM-25000	170239	EMCI	2017/2/20	2018/2/19
WTSTW-SW 002	EMI TEST SOFTWARE	EZ EMC	None	Farad	Version ETS-03A1	
WTSTW-SW 006	EMI TEST SOFTWARE	e3	None	AUDIX	Version 9.161014	
WTSTW-SW 008	Signal studio	Agilent	None	AUDIX	Version 2.0.0.1	



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2.4 General Test Procedure

POWER LINE CONDUCTED INTERFERENCE: The procedure used was ANSI STANDARD C63.10-2013 6.2 using a 50 μ H LISN (if necessary). Both lines were observed. The bandwidth of the spectrum analyzer was 10 kHz with an appropriate sweep speed.

RADIATION INTERFERENCE: The test procedure used was according to ANSI STANDARD C63.10-2013 6.3 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 C63.10-2013 B.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.



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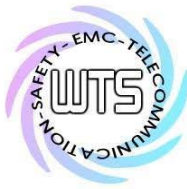
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3 Test results (enclosure)

Test case	Para. Number	Required	Test passed	Test failed
RF Power Output	§15.236(d)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Occupied Bandwidth	§15.236(f)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Emission Mask	§15.236(g) ETSI EN 300 422-1 v1.4.2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Radiated Spurious Emission	§15.236(g)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Line Conducted Emissions	15.207	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Frequency Stability vs. Temperature Frequency Stability vs. Voltage	§15.236(f)(3)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

The following is intentionally left blank.



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4 RF Power Output, FCC15.236 (d)

4.1 Test procedure

§ 2.1046 Measurements required: RF power output.

(a) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in § 2.1033(c)(8). The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.

(b) For single sideband, independent sideband, and single channel, controlled carrier radiotelephone transmitters the procedure specified in paragraph (a) of this section shall be employed and, in addition, the transmitter shall be modulated during the test as follows. In all tests, the input level of the modulating signal shall be such as to develop rated peak envelope power or carrier power, as appropriate, for the transmitter.

(1) Single sideband transmitters in the A3A or A3J emission modes - by two tones at frequencies of 400 Hz and 1800 Hz (for 3.0 kHz authorized bandwidth), or 500 Hz and 2100 Hz (3.5 kHz authorized bandwidth), or 500 Hz and 2400 Hz (for 4.0 kHz authorized bandwidth), applied simultaneously, the input levels of the tones so adjusted that the two principal frequency components of the radio frequency signal produced are equal in magnitude.

(2) Single sideband transmitters in the A3H emission mode - by one tone at a frequency of 1500 Hz (for 3.0 kHz authorized bandwidth), or 1700 Hz (for 3.5 kHz authorized bandwidth), or 1900 Hz (for 4.0 kHz authorized bandwidth), the level of which is adjusted to produce a radio frequency signal component equal in magnitude to the magnitude of the carrier in this mode.

(3) As an alternative to paragraphs (b) (1) and (2) of this section other tones besides those specified may be used as modulating frequencies, upon a sufficient showing of need. However, any tones so chosen must not be harmonically related, the third and fifth order intermodulation products which occur must fall within the -25 dB step of the emission bandwidth limitation curve, the seventh and ninth order intermodulation product must fall within the 35 dB step of the referenced curve and the eleventh and all higher order products must fall beyond the -35 dB step of the referenced curve.

(4) Independent sideband transmitters having two channels by 1700 Hz tones applied simultaneously in both channels, the input levels of the tones so adjusted that the two principal frequency components of the radio frequency signal produced are equal in magnitude.

(5) Independent sideband transmitters having more than two channels by an appropriate signal or signals applied to all channels simultaneously. The input signal or signals shall simulate the input signals specified by the manufacturer for normal operation.

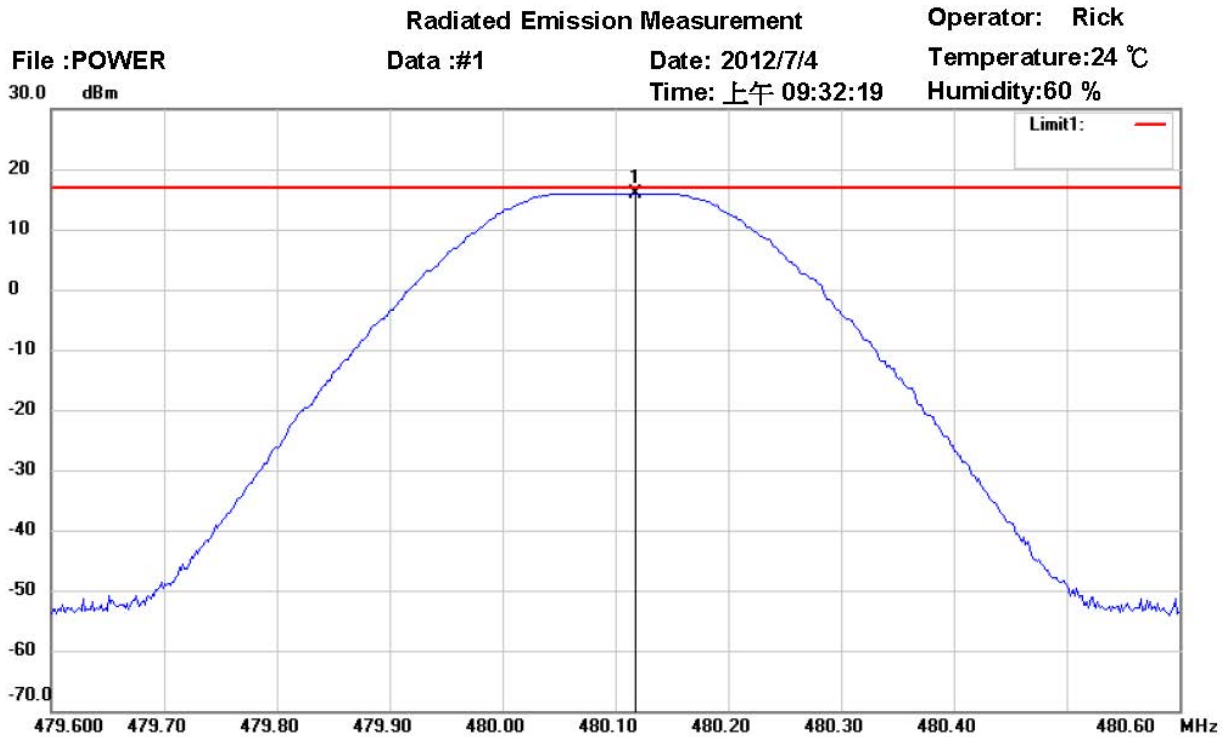
(6) Single-channel controlled-carrier transmitters in the A3 emission mode - by a 2500 Hz tone.

(c) For measurements conducted pursuant to paragraphs (a) and (b) of this section, all calculations and methods used by the applicant for determining carrier power or peak envelope power, as appropriate, on the basis of measured power in the radio frequency load attached to the transmitter output terminals shall be shown. Under the test conditions specified, no components of the emission spectrum shall exceed the limits specified in the applicable rule parts as necessary for meeting occupied bandwidth or emission limitations.



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4.2 Test Results



Site : Chamber
 Condition : FCC 15.236 power(470-608) Polarization: *Horizontal*
 EUT : W6M21205-12420 Power : 3VDC
 M/N: ACT-80H Distance: 3m
 Test Mode : 480.1MHz
 Note :

Mk.	Frequency (MHz)	Reading (dBm)	Detector	Corr. factor (dB)	Result (dBm)	Limit (dBm)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
*	480.1176	-10.82	peak	26.77	15.95	17.00	100	200	-1.05	



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Radiated Emission Measurement

Operator: Rick

File :POWER
 30.0 dBm

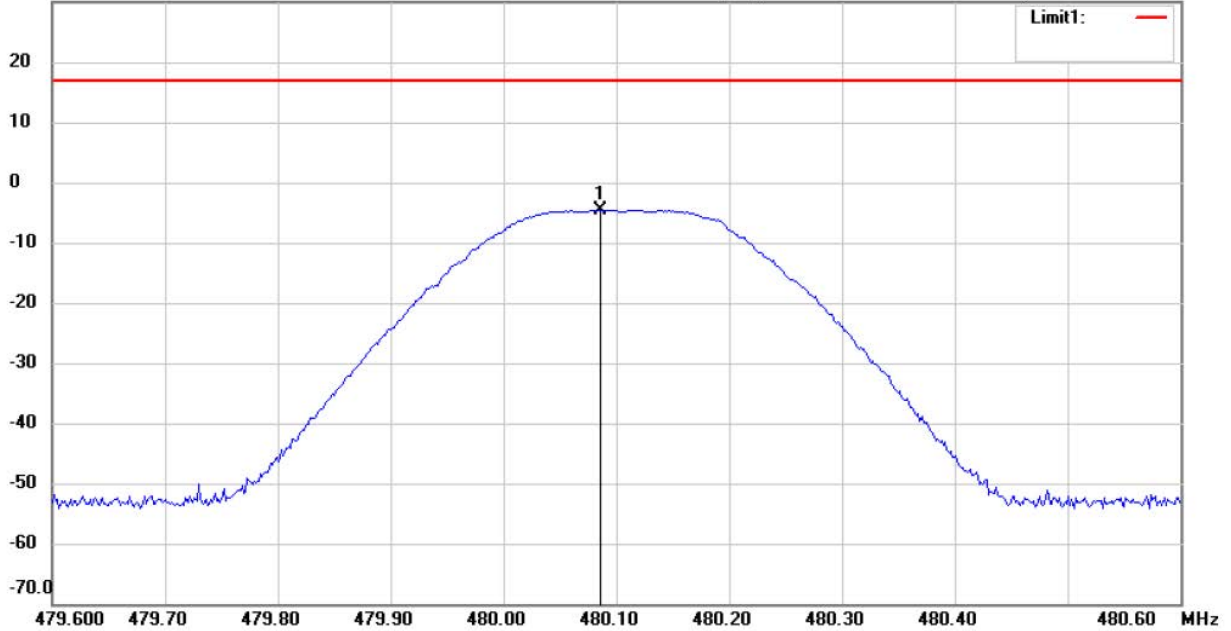
Data :#2

Date: 2012/7/4

Temperature:24 °C

Time: 上午 09:55:40

Humidity:60 %



Site : Chamber

Condition : FCC 15.236 power(470-608)

Polarization: *Vertical*

EUT : W6M21205-12420

Power : 3VDC

M/N: ACT-80H

Distance: 3m

Test Mode : 480.1MHz

Note :

Mk.	Frequency (MHz)	Reading (dBm)	Detector	Corr. factor (dB)	Result (dBm)	Limit (dBm)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
*	480.0855	-32.58	peak	27.90	-4.68	17.00	100	170	-21.68	



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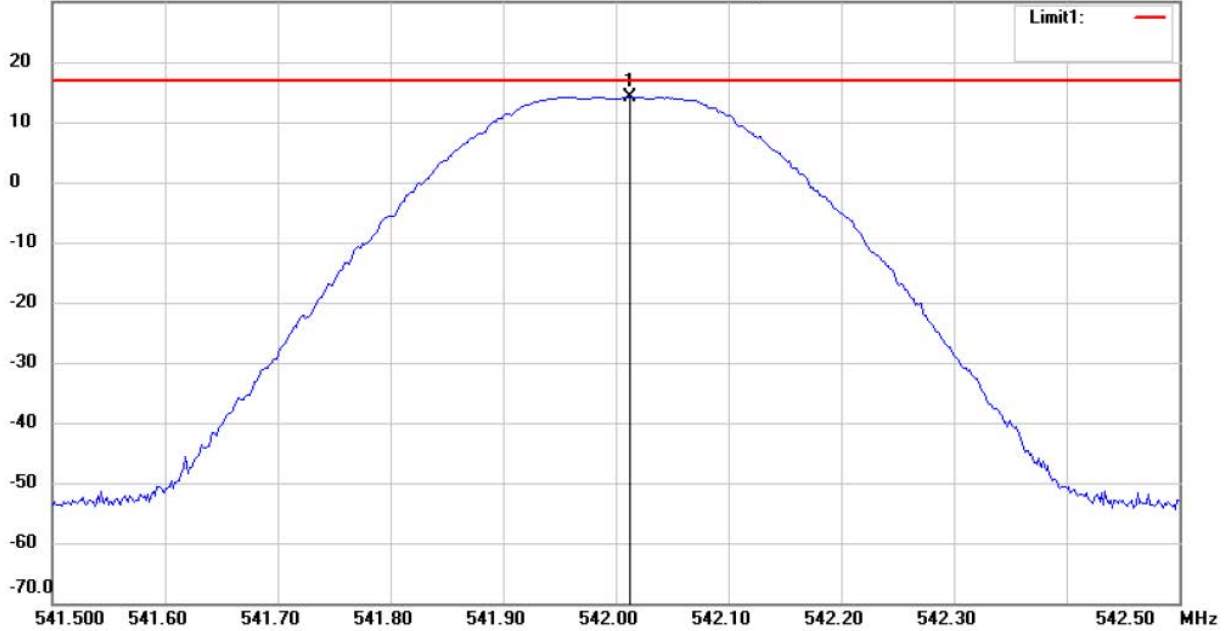
Radiated Emission Measurement

Operator: Rick
 Temperature: 24 °C
 Humidity: 60 %

File : POWER
 30.0 dBm

Data : #1

Date: 2012/7/4
 Time: 上午 10:19:22



Site : Chamber

Condition : FCC 15.236 power(470-608)

EUT : W6M21205-12420

M/N: ACT-80H

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
*	542.0128	-12.44	peak	26.51	14.07	17.00	100	130	-2.93	



Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6D21712-17670-C-1
 FCC ID: M5X-ACT80H18

Radiated Emission Measurement

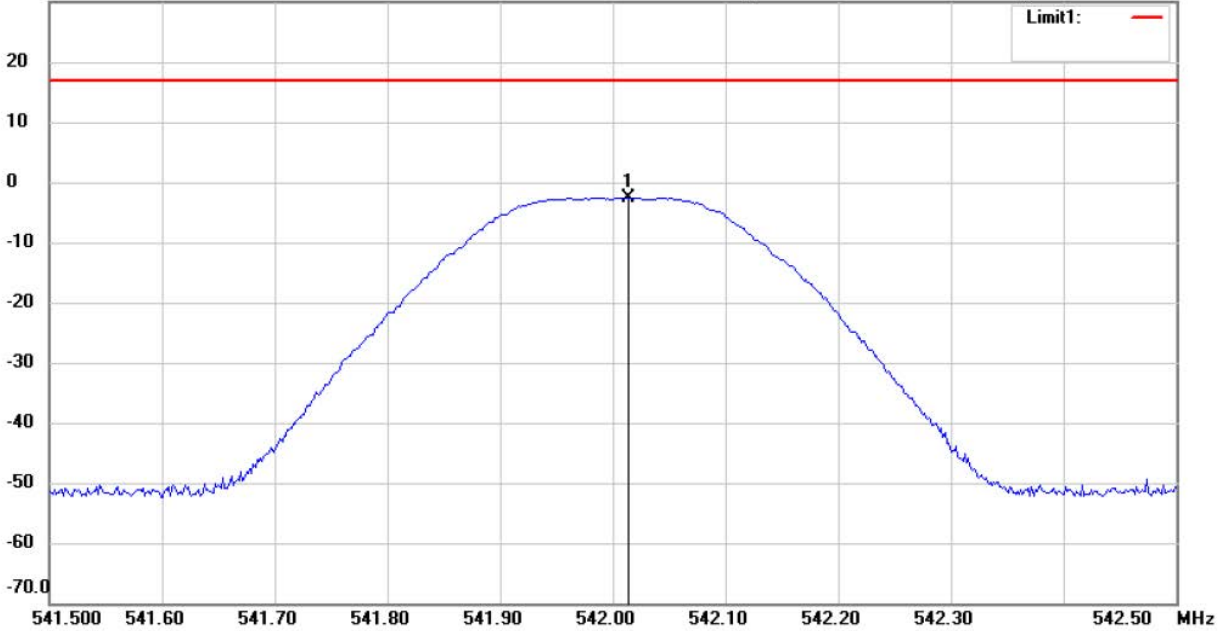
Operator: Rick
 Temperature: 24 °C
 Humidity: 60 %

File : POWER
 30.0 dBm

Data : #2

Date: 2012/7/4

Time: 上午 10:21:16



Site : Chamber

Condition : FCC 15.236 power(470-608)

EUT : W6M21205-12420

M/N: ACT-80H

Test Mode : 542MHz

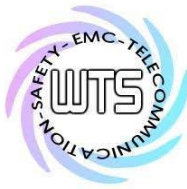
Note :

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
*	542.0144	-32.02	peak	29.34	-2.68	17.00	100	300	-19.68	



Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6D21712-17670-C-1
 FCC ID: M5X-ACT80H18

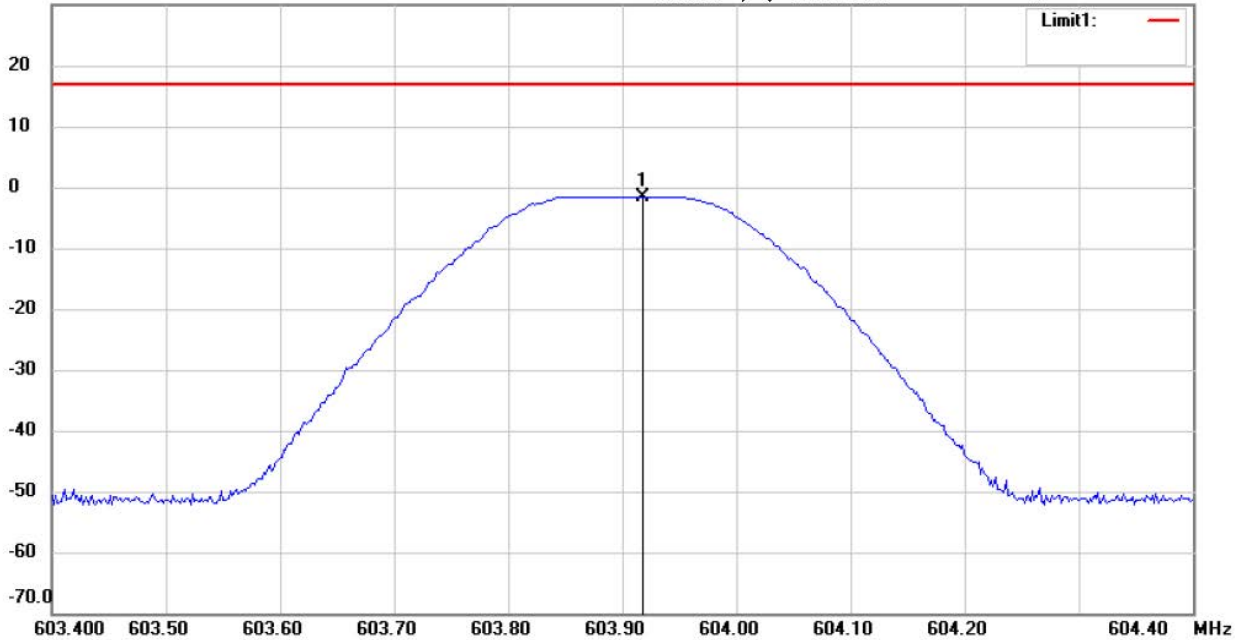
Radiated Emission Measurement

Operator: Rick
 Temperature: 24 °C
 Humidity: 60 %

File : power
 30.0 dBm

Data : #1

Date: 2012/6/25
 Time: 下午 09:39:57



Site : Chamber

Condition : FCC 15.236 power(470-608)

EUT : W6M21205-12420

M/N: ACT-80H

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
*	603.9176	-30.88	peak	29.31	-1.57	17.00	100	150	-18.57	



Registration number: W6D21712-17670-C-1
 FCC ID: M5X-ACT80H18

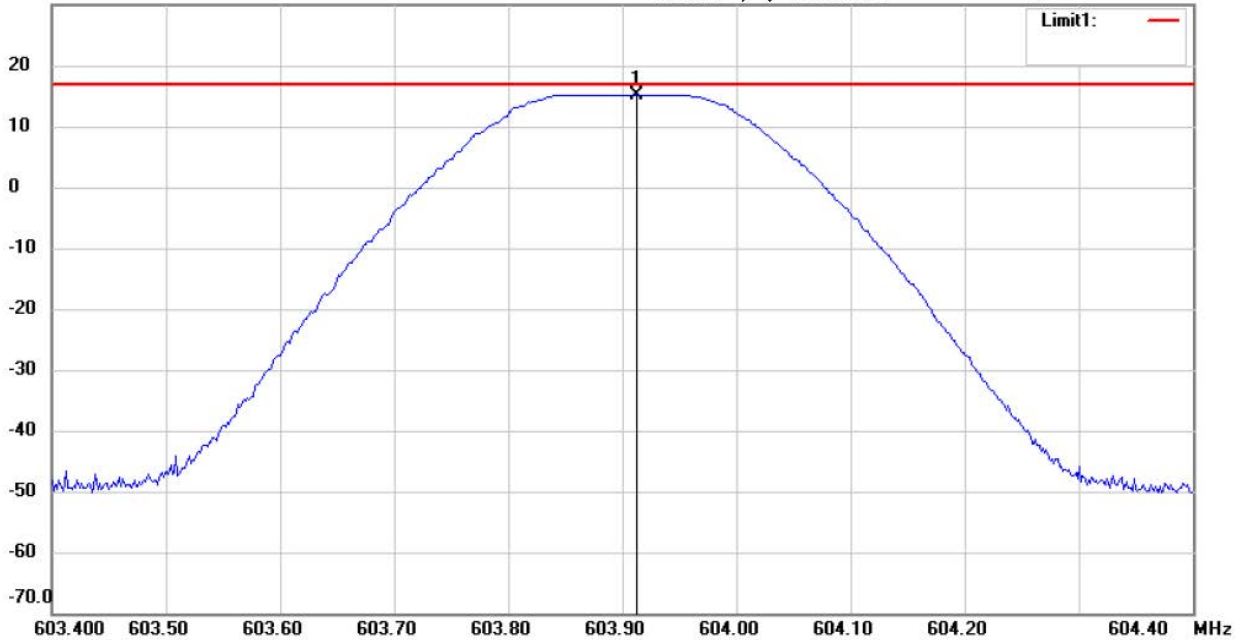
Radiated Emission Measurement

Operator: Rick
 Temperature: 24 °C
 Humidity: 60 %

File : power
 30.0 dBm

Data : #2

Date: 2012/6/25
 Time: 下午 09:41:35



Site : Chamber

Condition : FCC 15.236 power(470-608)

EUT : W6M21205-12420

M/N: ACT-80H

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
*	603.9128	-14.38	peak	29.63	15.25	17.00	100	100	-1.75	

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

Limit According to FCC PART 15.236(d): The output power limit: 50 mW (17 dBm)



Registration number: W6D21712-17670-C-1
FCC ID: M5X-ACT80H18

5 Occupied Bandwidth, FCC15.236 (f) / Emission Mask, FCC15.236 (g)

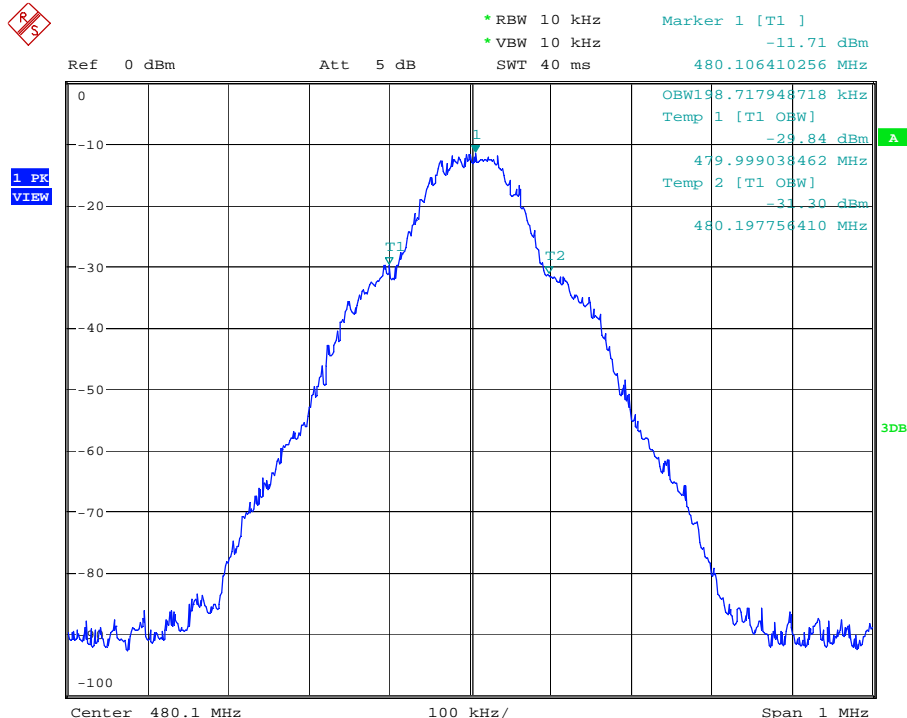
5.1 Test Procedure

Occupied Bandwidth

- (f) The operating frequency within a permissible band of operation as defined in paragraph (c) must comply with the following requirements.
- (1) The frequency selection shall be offset from the upper or lower band limits by 25 kHz or an integral multiple thereof.
 - (2) One or more adjacent 25 kHz segments within the assignable frequencies may be combined to form a channel whose maximum bandwidth shall not exceed 200 kHz. The operating bandwidth shall not exceed 200 kHz.
 - (3) The frequency tolerance of the carrier signal shall be maintained within $\pm 0.005\%$ of the operating frequency over a temperature variation of - 20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. Battery (1) In the bands allocated and assigned for broadcast television and in the 600 MHz service band: 50 mW EIRP
 - (2) In the 600 MHz guard bands including the duplex gap: 20 mW EIRP (e) Operation is limited to locations separated from licensed services by the following distances. (1) Four kilometers outside the following protected service contours of co-channel TV stations. operated equipment shall be tested using a new battery.

5.2 Test results

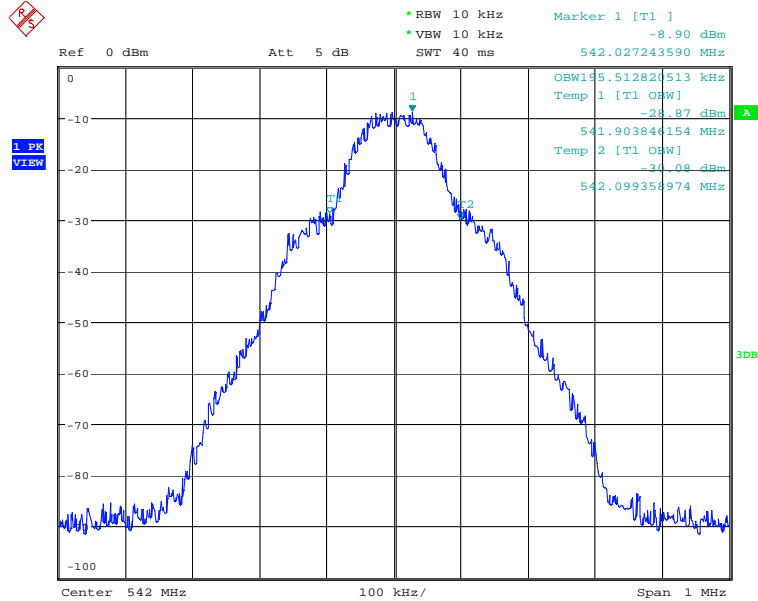
Occupied Bandwidth



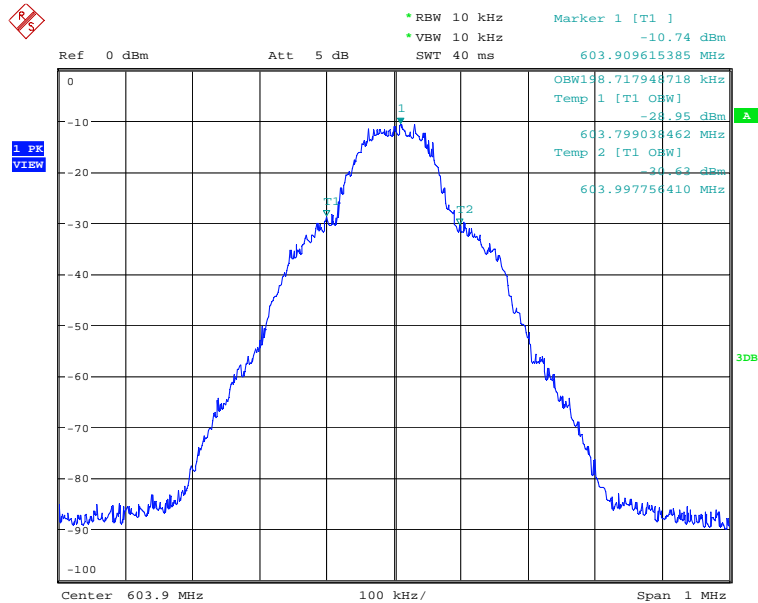
OCCUPIED BANDWIDTH 480.1MHz
Date: 17.JUL.2012 19:02:58



Registration number: W6D21712-17670-C-1
FCC ID: M5X-ACT80H18



OCCUPIED BANDWIDTH 542MHz
Date: 17.JUL.2012 18:26:24



OCCUPIED BANDWIDTH 603.9MHz
Date: 17.JUL.2012 18:28:10

Limit

The operating bandwidth shall not exceed 200 kHz.

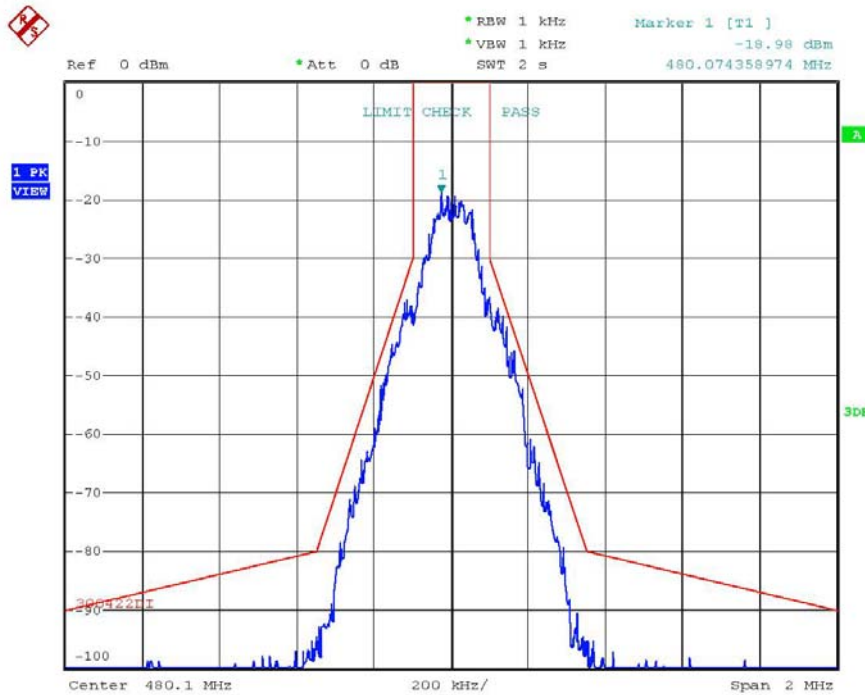
Test equipment used: ETSTW-RE 055 , ETSTW-RE 072, ETSTW-RE 050



Registration number: W6D21712-17670-C-1
FCC ID: M5X-ACT80H18

Emission Mask

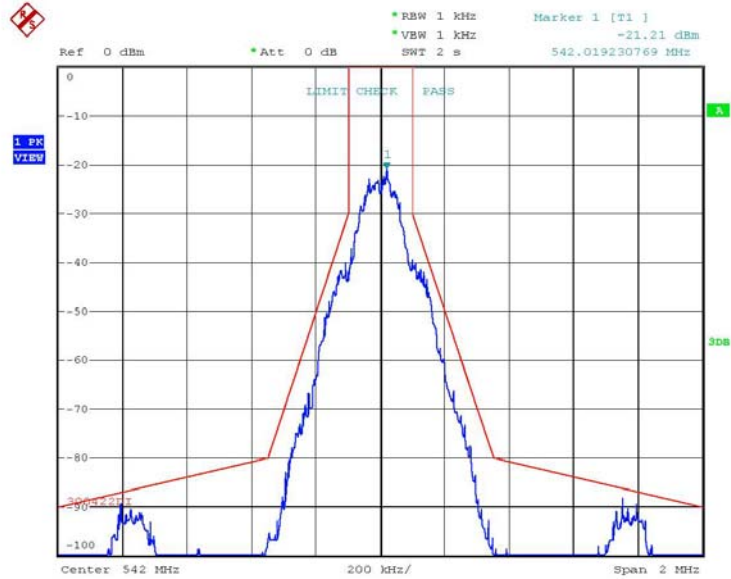
(g) Emissions within the band from one megahertz below to one megahertz above the carrier frequency shall comply with the emission mask in Section 8.3 of ETSI EN 300 422-1 V1.4.2 (2011-08) (incorporated by reference, see § 15.38). Emissions outside this band shall comply with the limit specified at the edges of the ETSI mask.



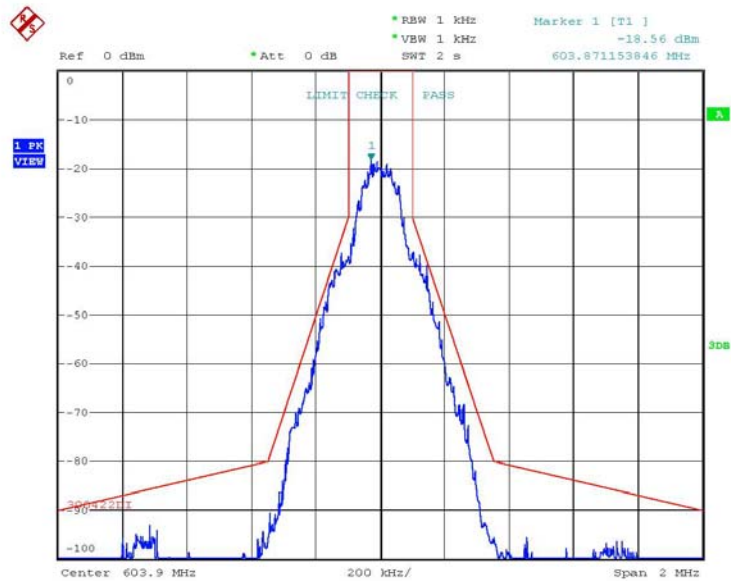
NECESSARY BANDWIDTH 480.1MHZ
Date: 18.JAN.2018 14:56:53



Registration number: W6D21712-17670-C-1
FCC ID: M5X-ACT80H18



NECESSARY BANDWIDTH 542MHZ
Date: 18.JAN.2018 14:58:09



NECESSARY BANDWIDTH 603.9MHZ
Date: 18.JAN.2018 14:59:45

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

Registration number: W6D21712-17670-C-1
 FCC ID: M5X-ACT80H18
 LIMIT acc. Subclause 8.3.1.2

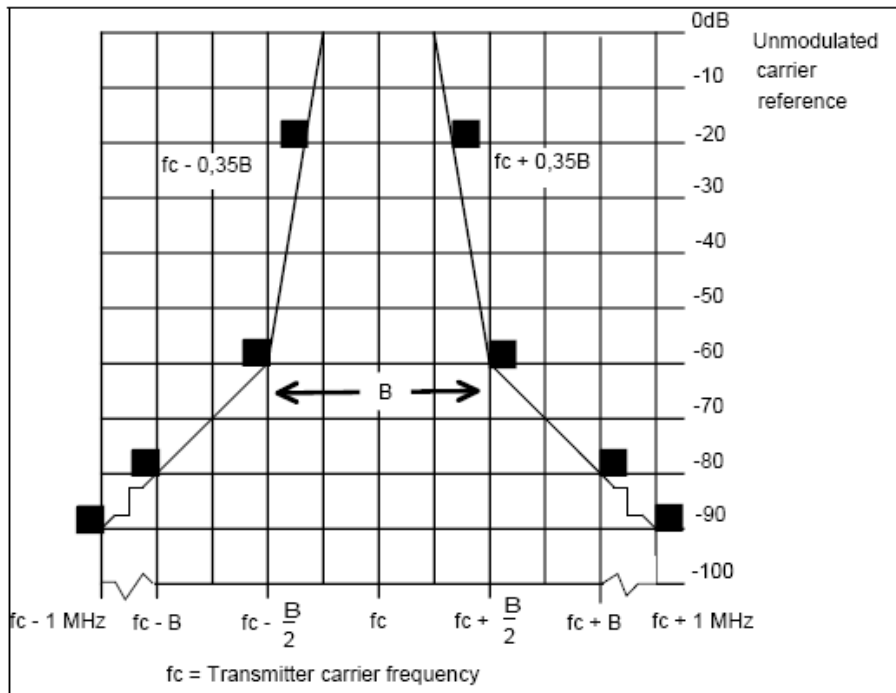


Figure 1: Spectrum mask for analogue systems in all bands

LIMIT acc. Subclause 8.3.2.2

The transmitter output spectrum shall be within the mask defined in figure 2. This mask may also be used for both analogue and digital Assistive Listening Devices.

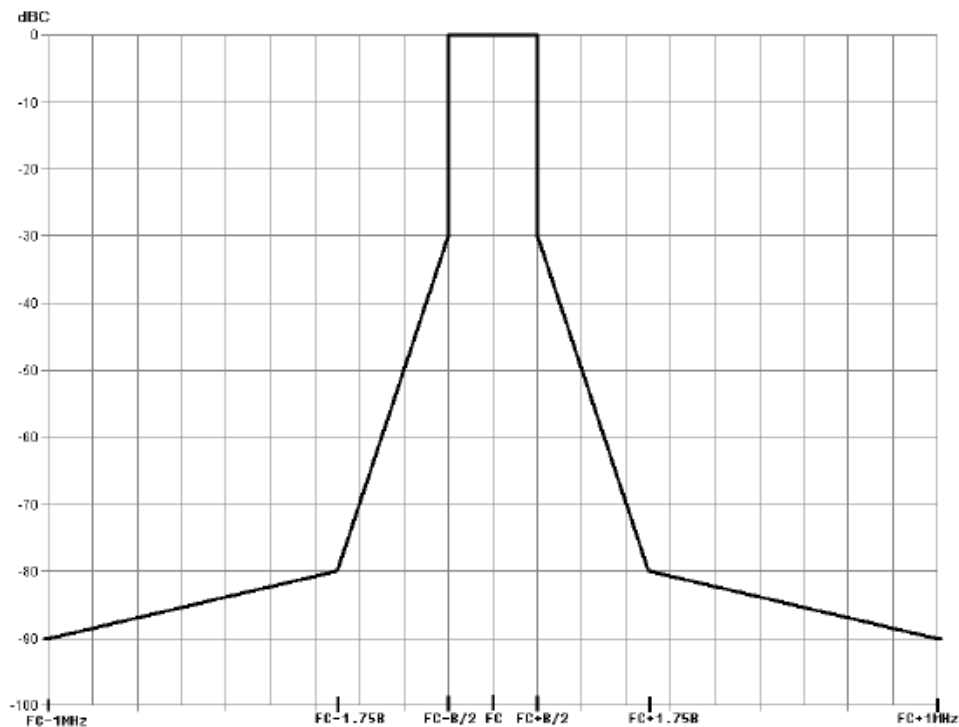


Figure 2: Spectrum mask for digital systems below 1 GHz



Registration number: W6D21712-17670-C-1

FCC ID: M5X-ACT80H18

6 Radiated Spurious Emission , FCC 15.236(g)

6.1 Test procedure

(g) Emissions within the band from one megahertz below to one megahertz above the carrier frequency shall comply with the emission mask in Section 8.3 of ETSI EN 300 422-1 V1.4.2 (2011-08) (incorporated by reference, see § 15.38). Emissions outside this band shall comply with the limit specified at the edges of the ETSI mask.

6.2 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.

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

Model: ACT-80H 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)
46.3462	-95.43	22.10	-73.33	-13.00	-60.33	120	100
92.1154	-95.68	20.84	-74.84	-13.00	-61.84	260	100
564.1026	-68.93	-8.42	-77.35	-13.00	-64.35	110	100
960.2564	-67.22	-2.30	-69.52	-13.00	-56.52	200	150
1437.5000	-58.60	0.65	-57.95	-13.00	-44.95	270	100
1918.2690	-58.24	1.70	-56.54	-13.00	-43.54	130	100
2399.0390	-62.89	3.74	-59.15	-13.00	-46.15	200	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	-97.73	22.16	-75.57	-13.00	-62.57	230	100
173.0288	-99.25	23.20	-76.05	-13.00	-63.05	140	100
507.6923	-54.07	-7.01	-61.08	-13.00	-48.08	320	100
960.2564	-66.83	-3.48	-70.31	-13.00	-57.31	120	100
1437.5000	-57.82	-0.50	-58.32	-13.00	-45.32	40	100
1918.2690	-59.11	1.38	-57.73	-13.00	-44.73	250	100
2399.0390	-58.55	4.42	-54.13	-13.00	-41.13	130	100



Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6D21712-17670-C-1

FCC ID: M5X-ACT80H18

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)
45.8012	-96.71	22.17	-74.54	-13.00	-61.54	120	100
161.8590	-98.94	22.48	-76.46	-13.00	-63.46	300	100
507.6923	-66.91	-8.89	-75.80	-13.00	-62.80	110	100
564.1026	-66.69	-8.42	-75.11	-13.00	-62.11	300	100
1081.7310	-57.93	-0.32	-58.25	-13.00	-45.25	80	100
1626.0000	-62.38	0.77	-61.61	-13.00	-48.61	210	100
2168.0000	-63.13	2.01	-61.12	-13.00	-48.12	70	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	-97.57	22.13	-75.44	-13.00	-62.44	260	100
180.3846	-98.60	23.22	-75.38	-13.00	-62.38	150	100
507.6923	-53.78	-7.01	-60.79	-13.00	-47.79	160	100
564.1026	-54.77	-6.08	-60.85	-13.00	-47.85	210	100
1081.7310	-54.91	-2.82	-57.73	-13.00	-44.73	250	100
1626.0000	-63.17	-1.60	-64.77	-13.00	-51.77	210	100
2158.6540	-58.89	2.97	-55.92	-13.00	-42.92	30	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)
30.8173	-97.05	23.09	-73.96	-13.00	-60.96	110	100
97.8365	-95.71	21.13	-74.58	-13.00	-61.58	270	100
564.1026	-65.43	-8.42	-73.85	-13.00	-60.85	300	100
734.6154	-71.06	-4.14	-75.20	-13.00	-62.20	70	100
1206.7310	-60.68	-1.11	-61.79	-13.00	-48.79	270	100
1811.7000	-62.50	1.58	-60.92	-13.00	-47.92	30	100
2413.4610	-59.44	3.82	-55.62	-13.00	-42.62	140	100



Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6D21712-17670-C-1
FCC ID: M5X-ACT80H18

Polarization: Vertical

Frequency (MHz)	Reading (dBm) Peak	Factor (dB) Corr.	Result (dBm)	Limit (dBm)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
97.8365	-96.46	22.16	-74.30	-13.00	-61.30	270	100
178.7500	-99.74	23.25	-76.49	-13.00	-63.49	140	100
507.6923	-54.08	-7.01	-61.09	-13.00	-48.09	210	100
564.1026	-55.36	-6.08	-61.44	-13.00	-48.44	110	100
1206.7310	-58.13	0.38	-57.75	-13.00	-44.75	260	100
1811.7000	-60.19	1.34	-58.85	-13.00	-45.85	210	100
2413.4610	-56.18	4.39	-51.79	-13.00	-38.79	50	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.**

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



Registration number: W6D21712-17670-C-1

FCC ID: M5X-ACT80H18

7 Frequency Stability, FCC 15.236(f)(3)

7.1 Test procedure

The frequency tolerance of the carrier signal shall be maintained within $\pm 0.005\%$ of the operating frequency over a temperature variation of -20 degrees to $+50$ degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. Battery operated equipment shall be tested using a new battery.

7.2 Test results

Temperature

480.1 MHz

°C	Frequency Error (kHz)	Frequency Error (ppm)
-30	2.016	4.199
-20	2.016	4.199
-10	4.032	8.398
0	1.635	3.406
10	1.232	2.566
20	0.801	1.668
30	-0.187	-0.390
40	-1.325	-2.760
50	-3.169	-6.601

25°C: 480.100400 MHz

Limit: 24.005 kHz($\pm 0.005\%$)

542 MHz

°C	Frequency Error (kHz)	Frequency Error (ppm)
-30	2.804	5.173
-20	2.804	5.173
-10	4.407	8.131
0	2.804	5.173
10	1.602	2.956
20	-1.602	-2.956
30	-0.401	-0.740
40	-1.202	-2.218
50	-3.205	-5.913

25°C: 542.001602 MHz

Limit: 27.100 kHz($\pm 0.005\%$)



Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6D21712-17670-C-1
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603.9 MHz

°C	Frequency Error (kHz)	Frequency Error (ppm)
-30	-0.584	-0.967
-20	-0.460	-0.762
-10	-0.380	-0.629
0	-0.380	-0.629
10	-0.223	-0.369
20	0.000	0.000
30	-0.970	-1.606
40	-1.053	-1.744
50	-1.801	-2.982

25°C: 603.900801 MHz

Limit: 30.195 kHz(±0.005%)

Limit According to FCC 15.236(f)(3)

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

Voltage

Test Voltage: 2.55 VDC

Frequency in MHz	Frequency Error (kHz)	Frequency Error (ppm)
480.1 MHz	0.801	1.668
542 MHz	-1.602	-2.956
603.9 MHz	0.000	0.000

Limit : ±0.005%

Limit According to FCC 15.236(f)(3)

The frequency tolerance of the transmitter shall be 0.005 percent.

Test equipment used: ETSTW-RE 055



Registration number: W6D21712-17670-C-1
 FCC ID: M5X-ACT80H18

8 Line Conducted Emission , FCC 15.207

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

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.

8.2 Test Results

Model: ACT-80H Date: --
 Mode: -- Temperature: -- °C Engineer: --
 Polarization: -- Humidity: -- %

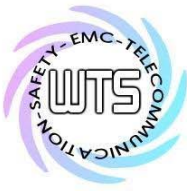
Frequency (MHz)	Reading (dBuV)		Factor (dB) Corr.	Result (dBuV)		Limit (dBuV)		Margin (dB)
	QP	Ave.		QP	Ave.	QP	Ave.	
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--

Polarization: L1

Frequency (MHz)	Reading (dBuV)		Factor (dB) Corr.	Result (dBuV)		Limit (dBuV)		Margin (dB)
	QP	Ave.		QP	Ave.	QP	Ave.	
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--

- 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.
 6. Up Line: QP Limit Line, Down Line: Ave Limit Line.
 7. This test is not required because the EUT uses battery.

Test equipment used: ETSTW-CE 001, ETSTW-CE 016, ETSTW-RE 028



Registration number: W6D21712-17670-C-1
FCC ID: M5X-ACT80H18

Appendix

A Measurement diagrams

Radiation Spurious Emission

B Photos

1. External Photos
2. Internal Photos
3. Set Up Photo of Radiated Emission



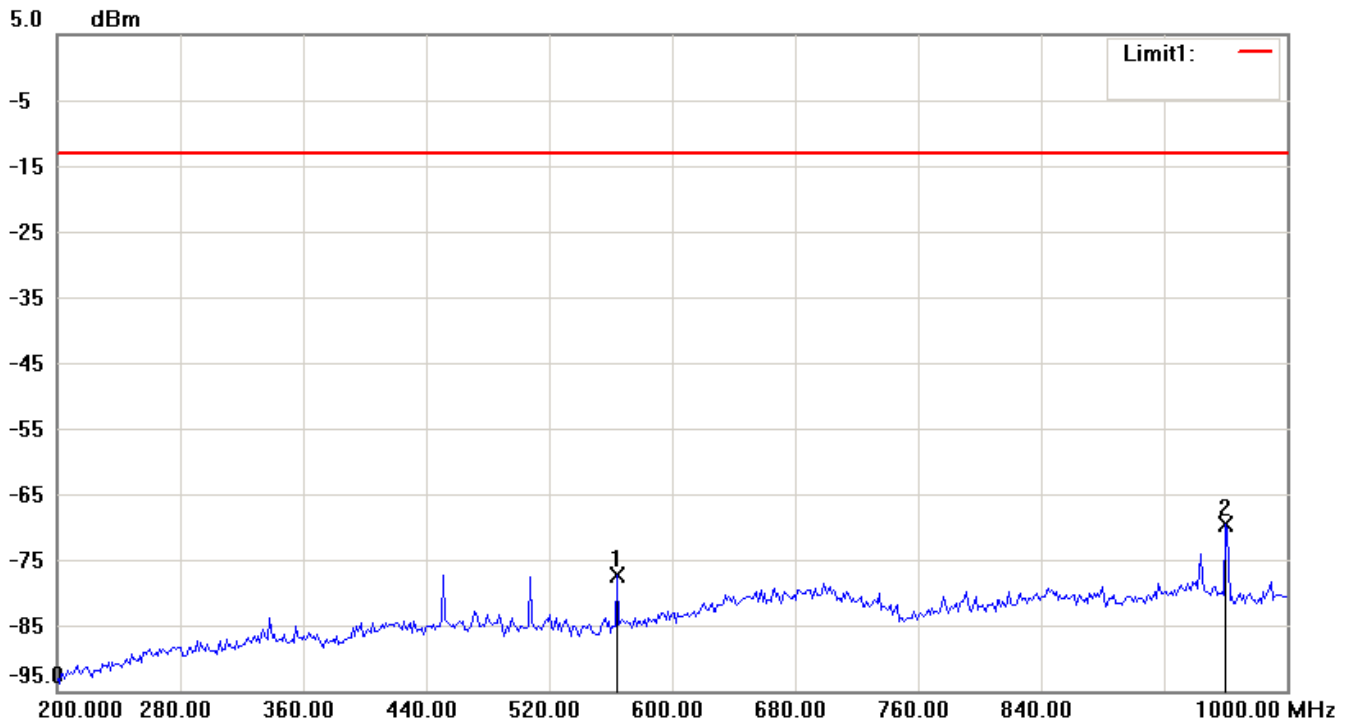
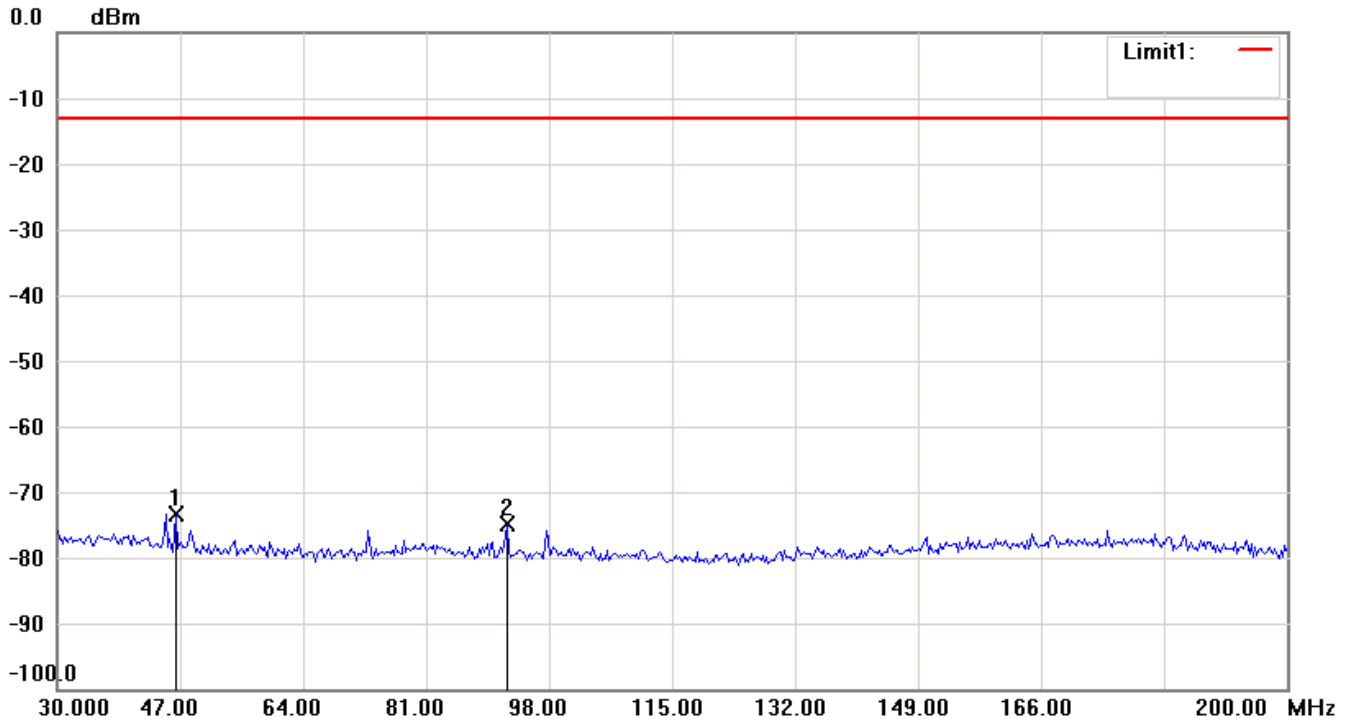
Registration number: W6D21712-17670-C-1

FCC ID: M5X-ACT80H18

Radiation Spurious Emission

480.1 MHz

Antenna Polarization H



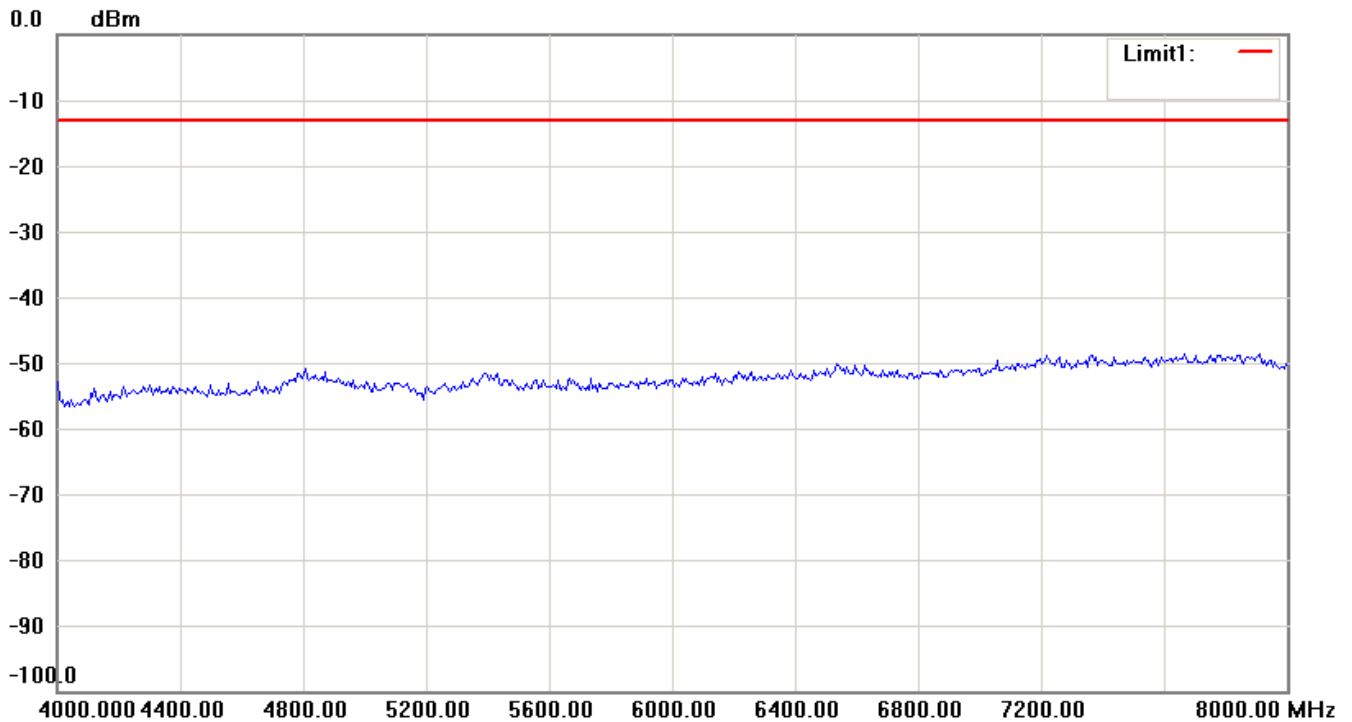
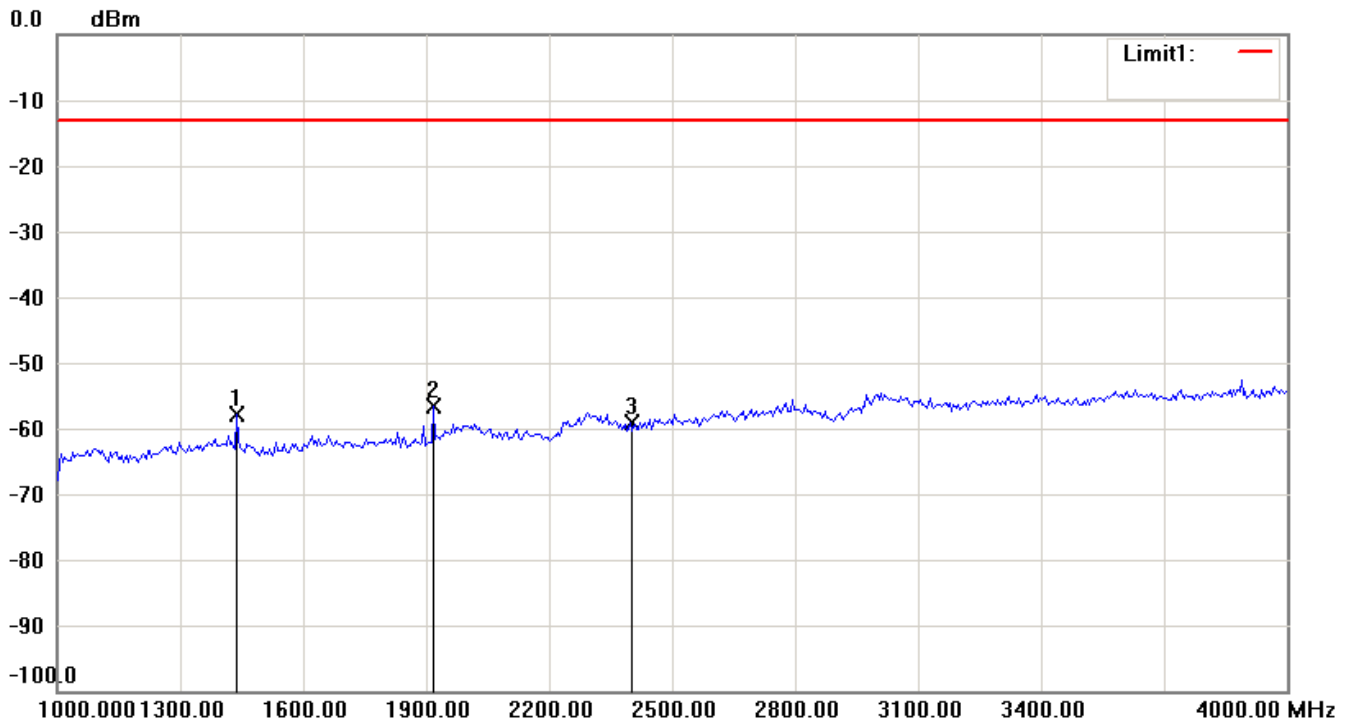
Note:

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.



Registration number: W6D21712-17670-C-1

FCC ID: M5X-ACT80H18



Note:

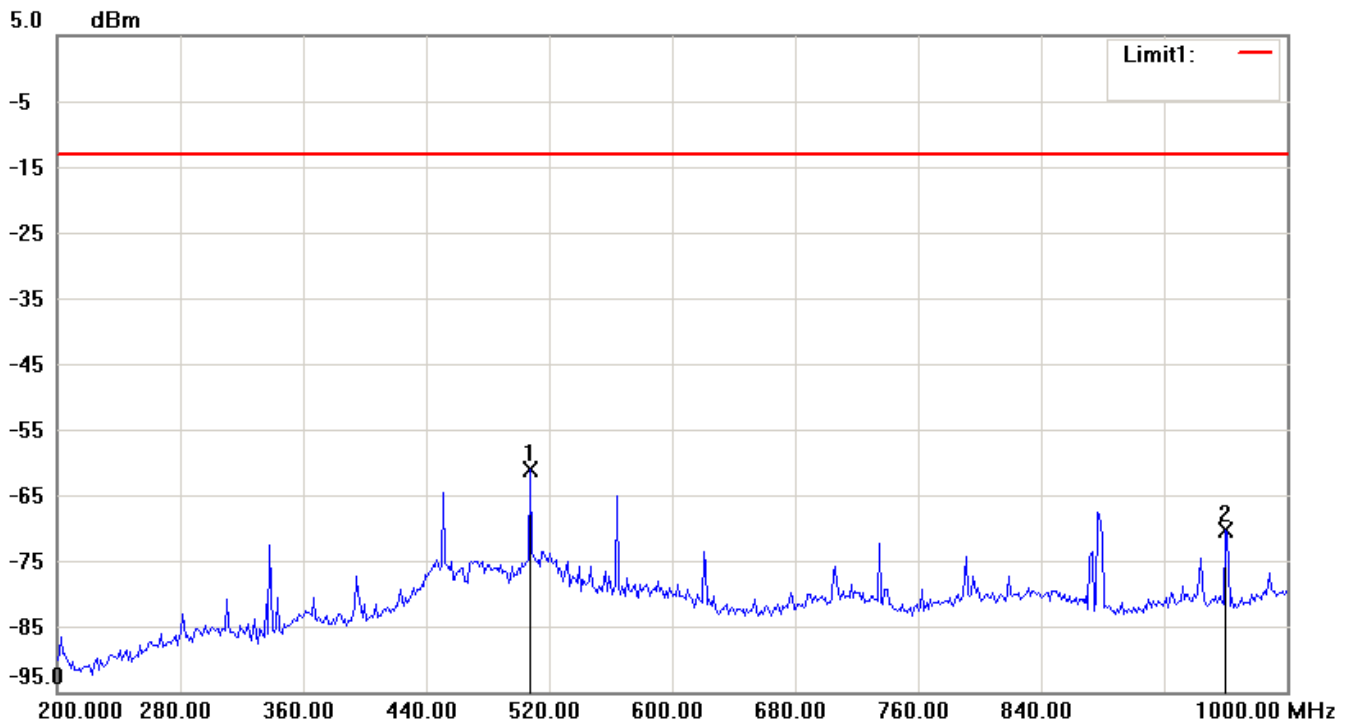
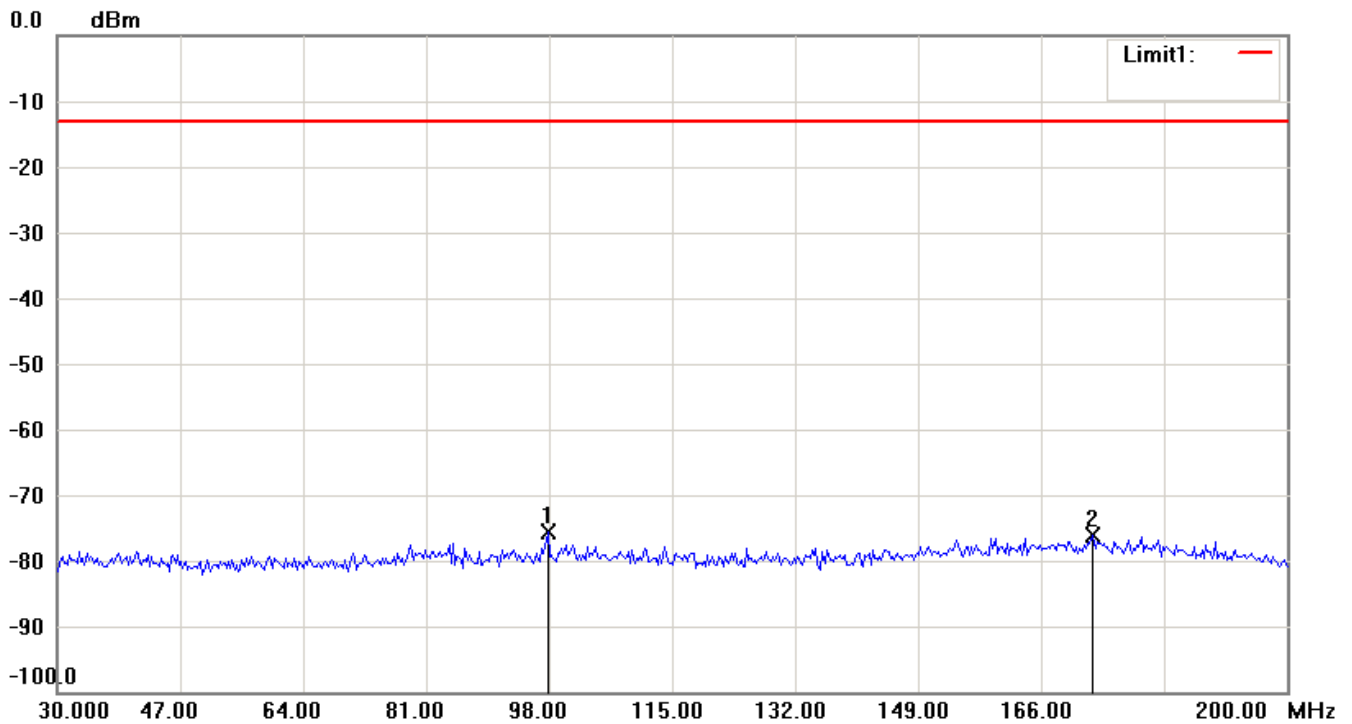
1. The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.
2. The some frequencies may exceed the limit line without the specified detectors, but that cannot present the results are failed to the specification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



Registration number: W6D21712-17670-C-1

FCC ID: M5X-ACT80H18

Antenna Polarization V



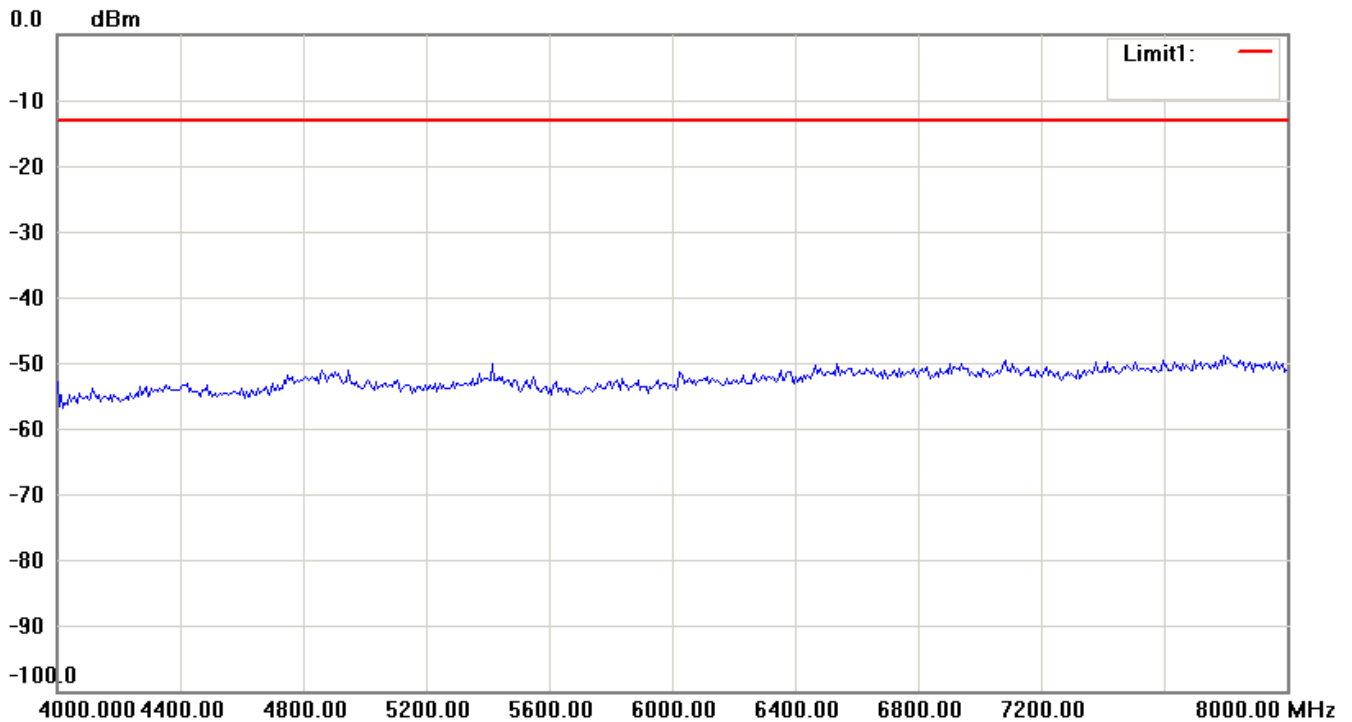
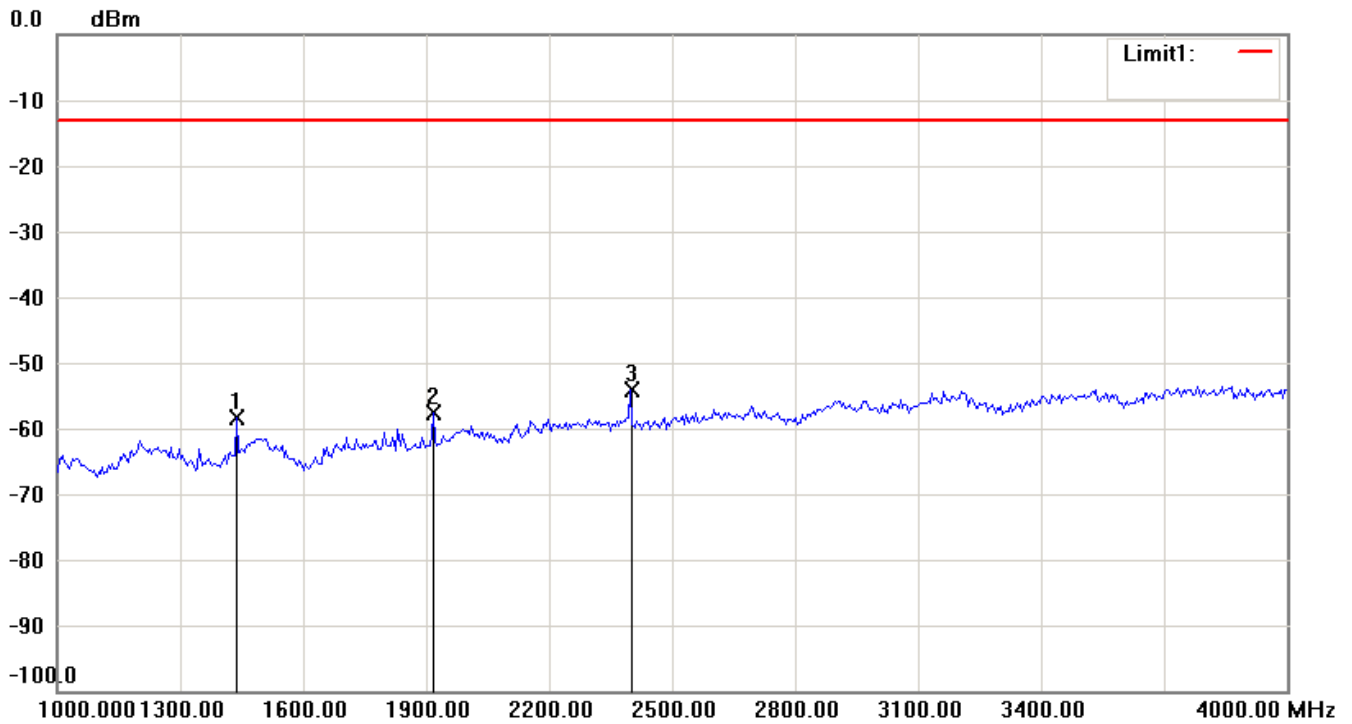
Note:

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: W6D21712-17670-C-1

FCC ID: M5X-ACT80H18



Note:

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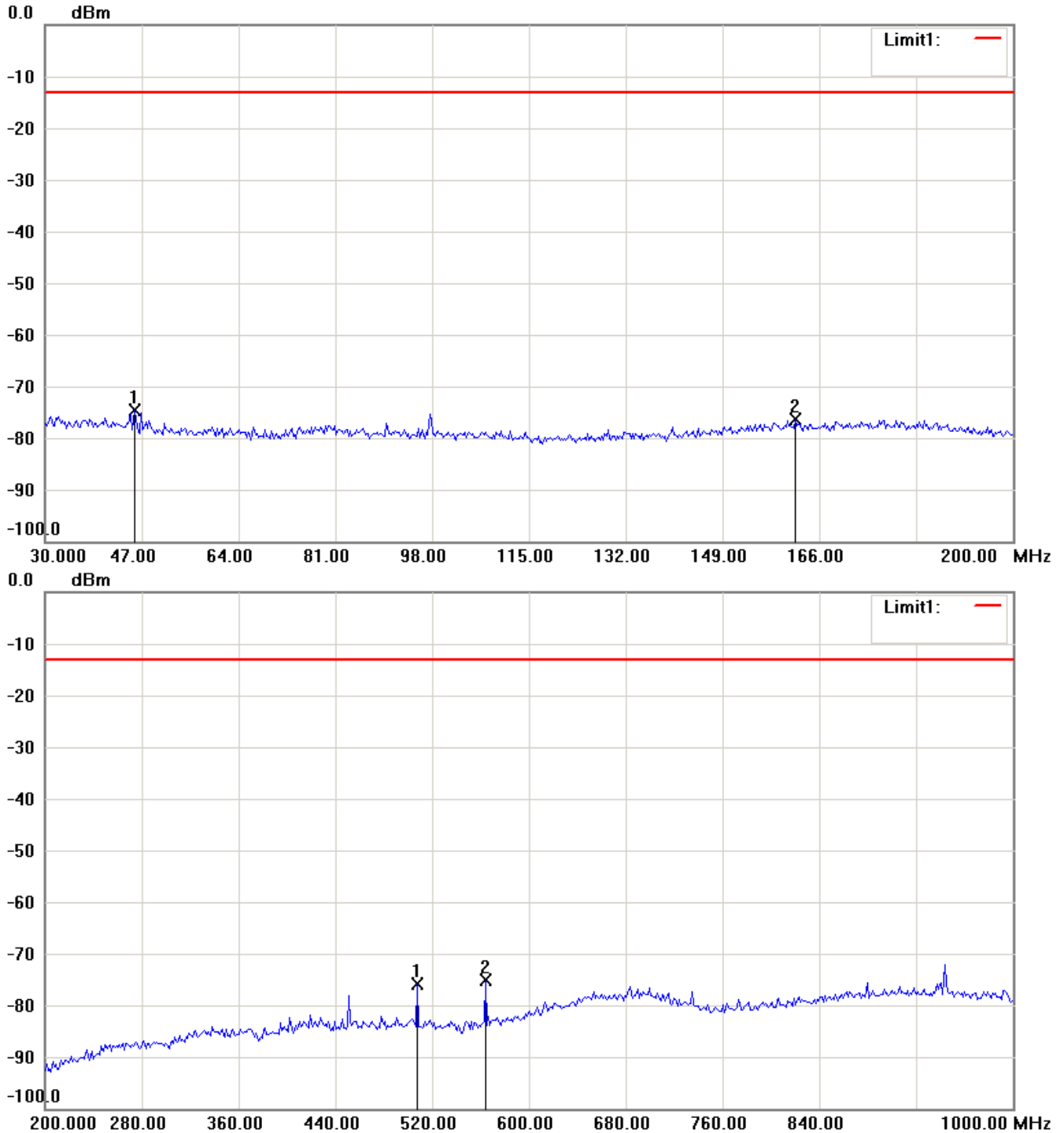


Registration number: W6D21712-17670-C-1

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542 MHz

Antenna Polarization H



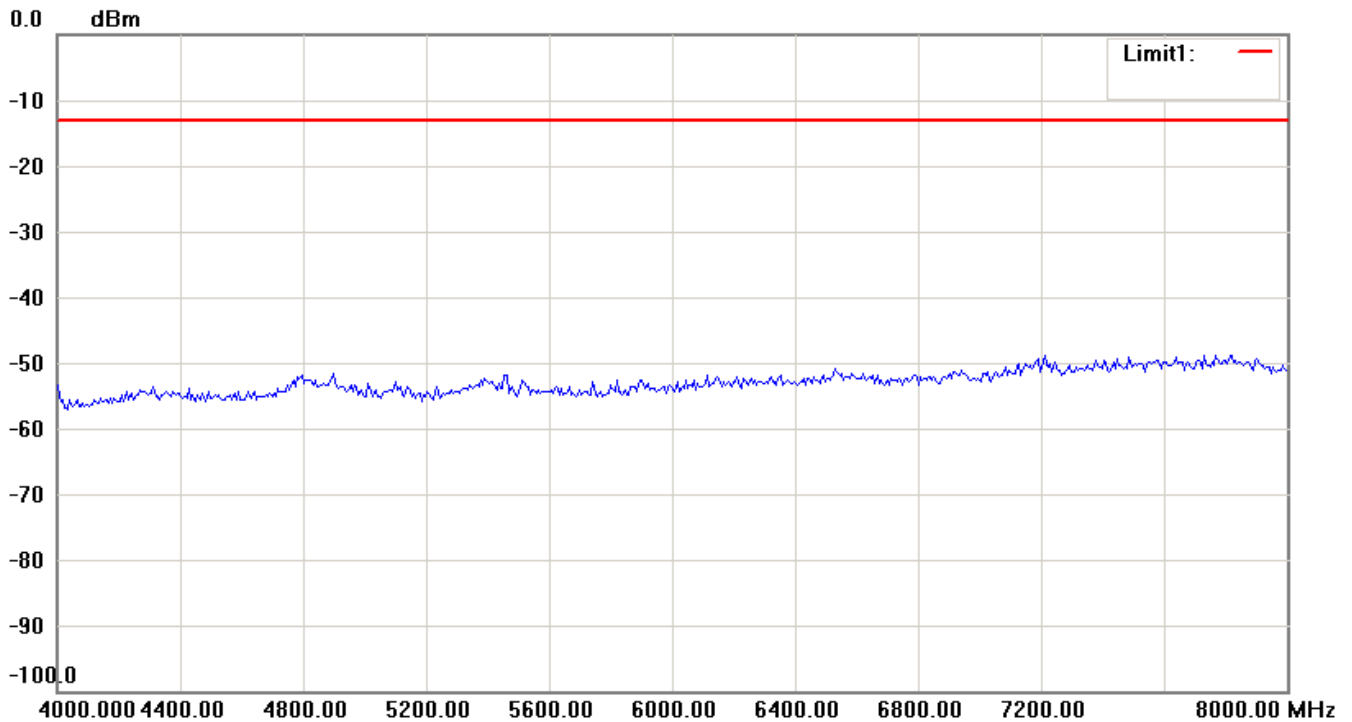
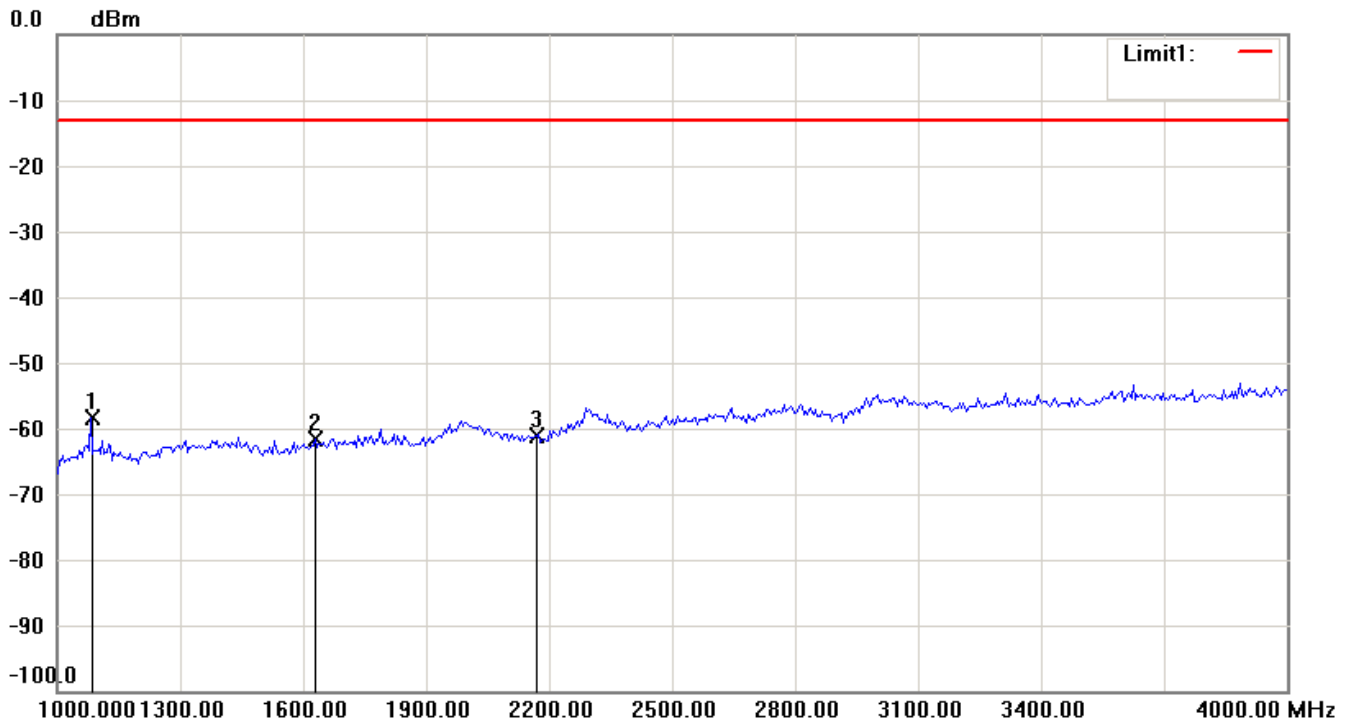
Note:

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.



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Note:

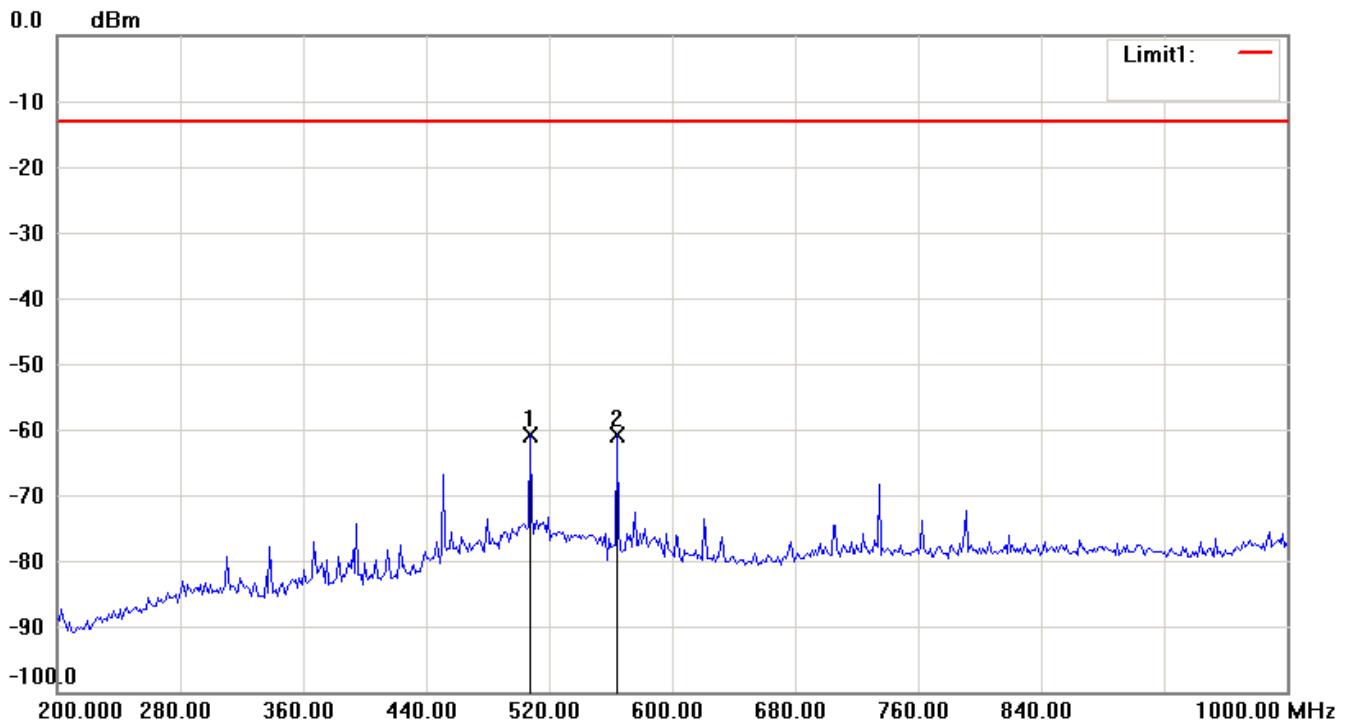
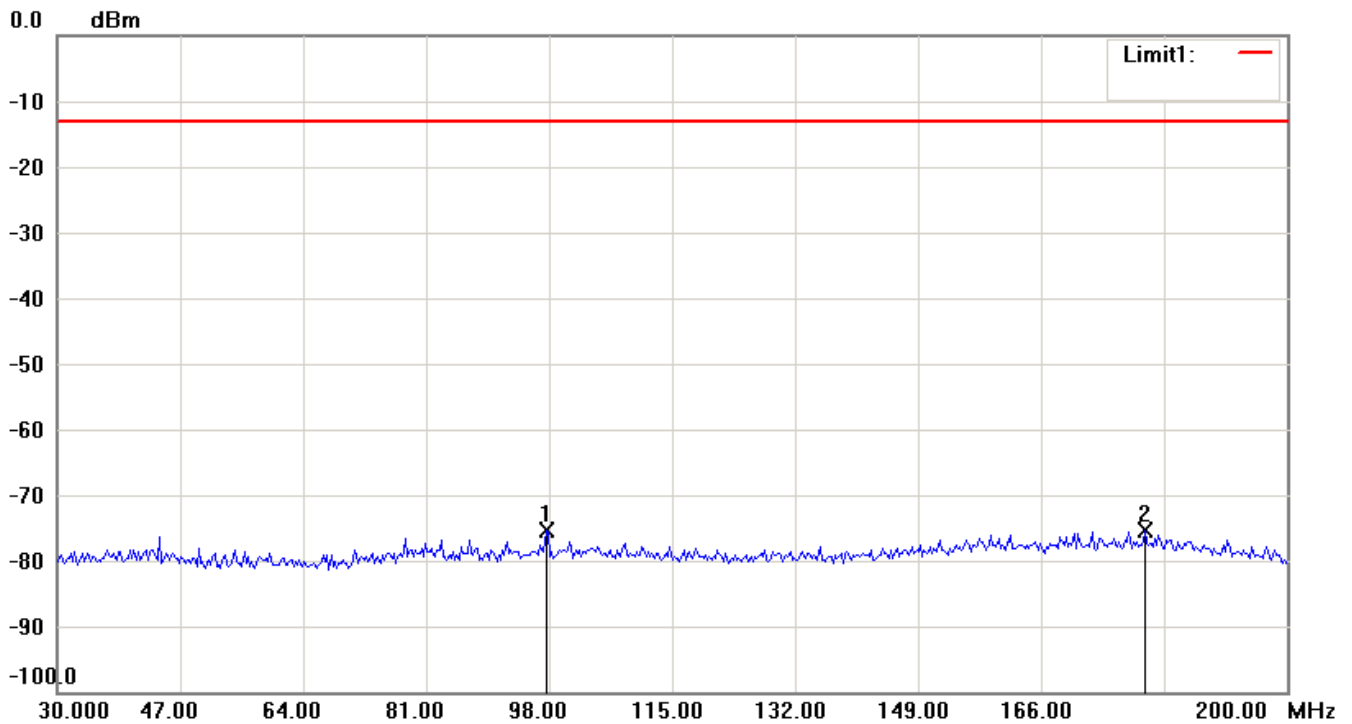
1. The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.
2. The some frequencies may exceed the limit line without the specified detectors, but that cannot present the results are failed to the specification of test standard.
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Registration number: W6D21712-17670-C-1

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Antenna Polarization V



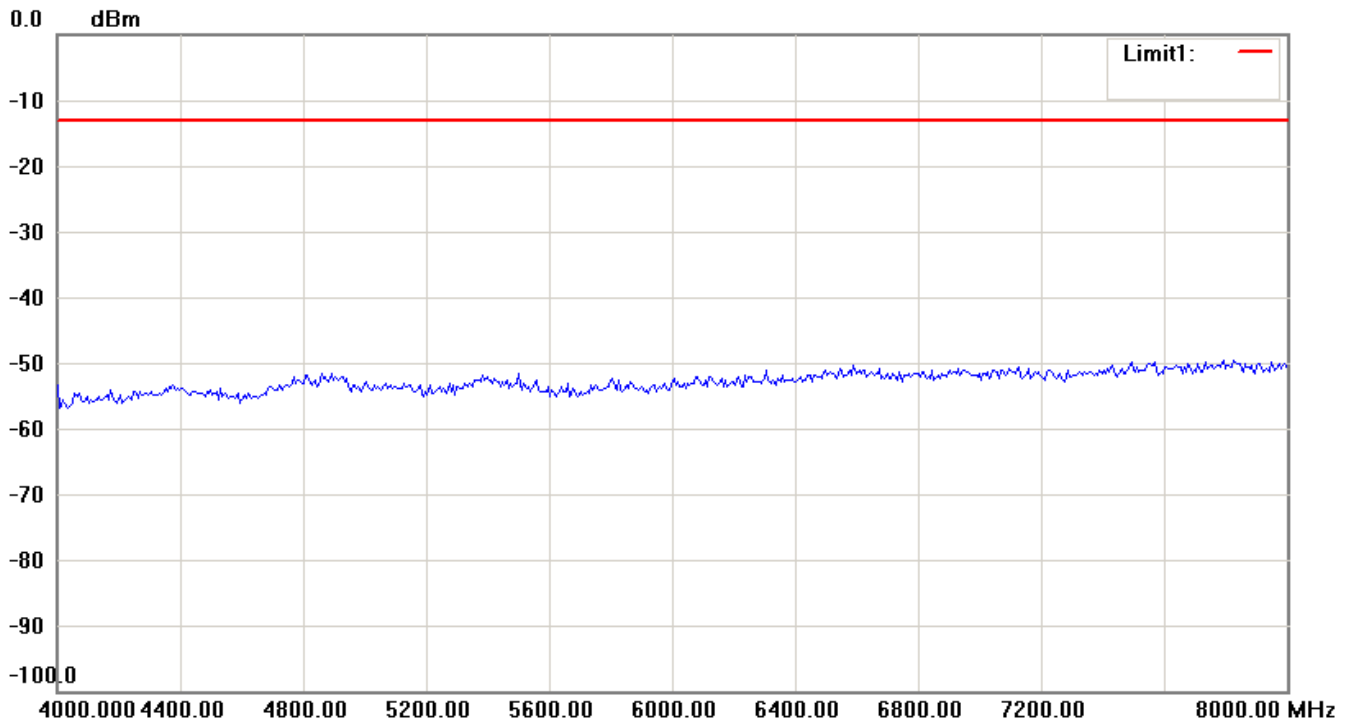
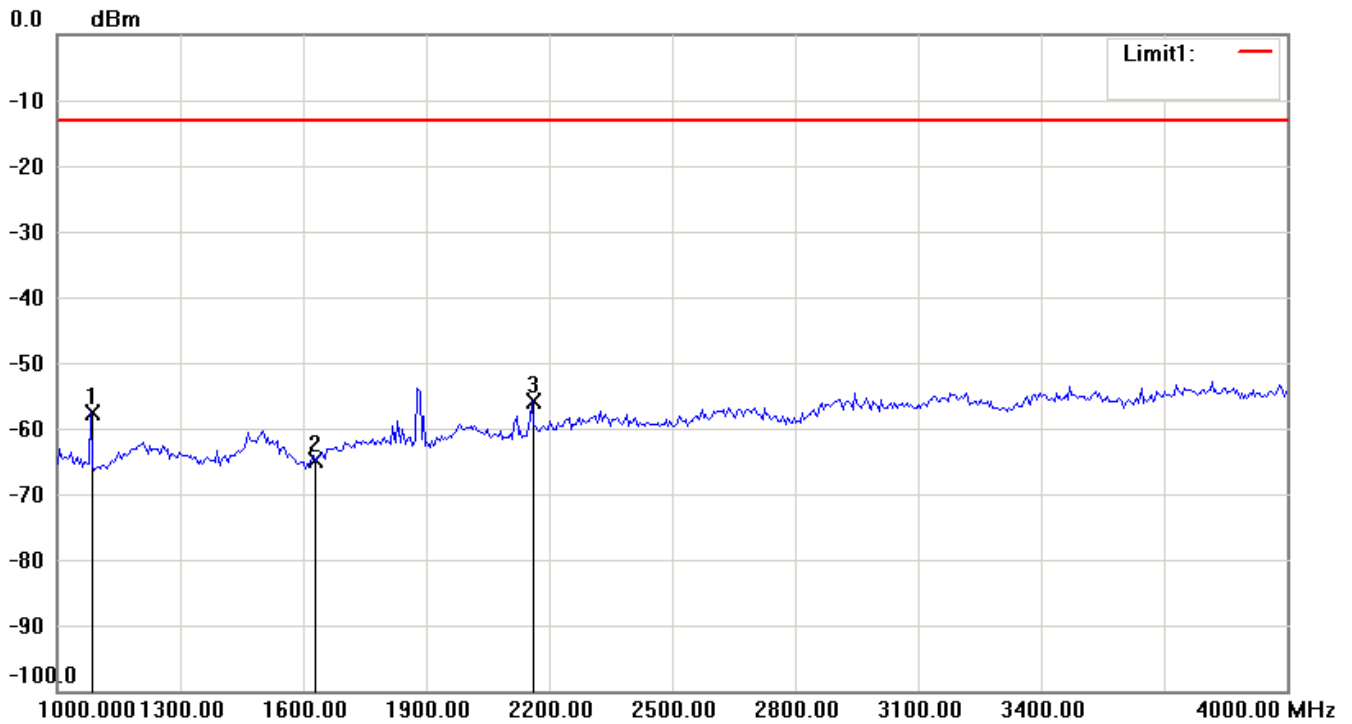
Note:

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.
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Registration number: W6D21712-17670-C-1

FCC ID: M5X-ACT80H18



Note:

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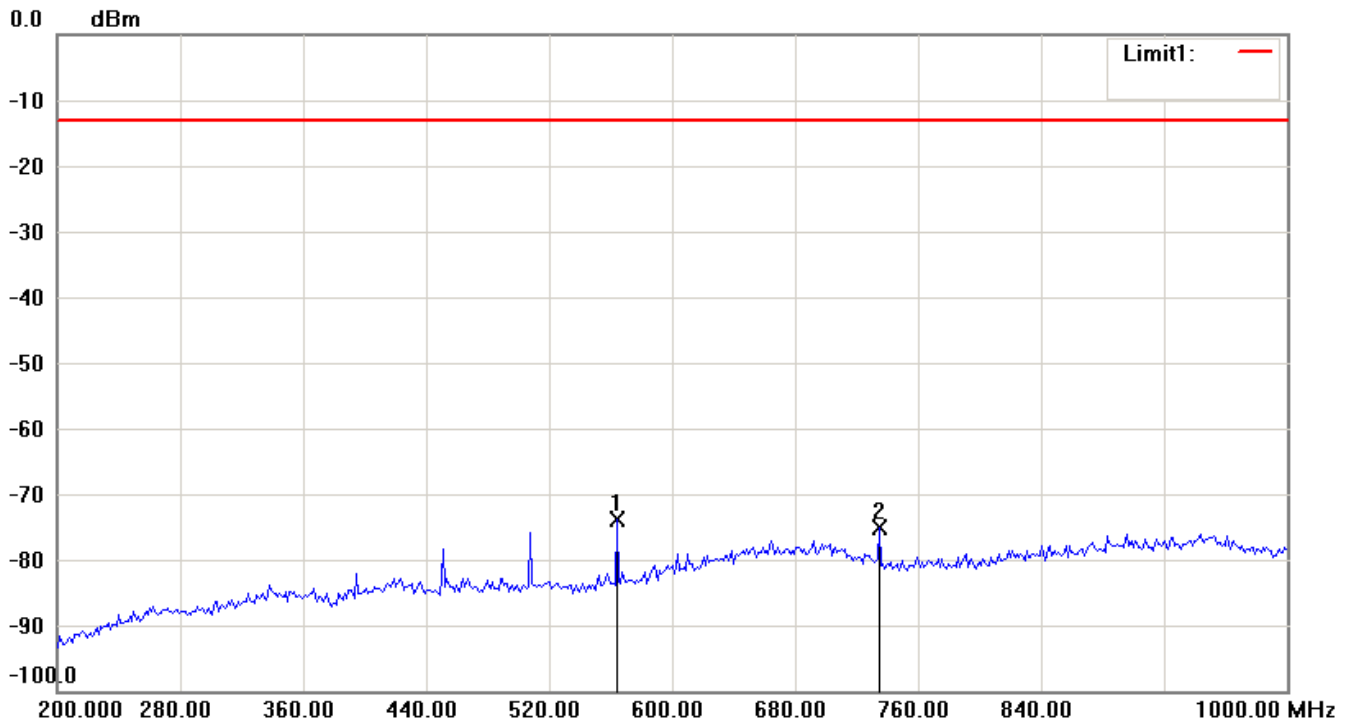
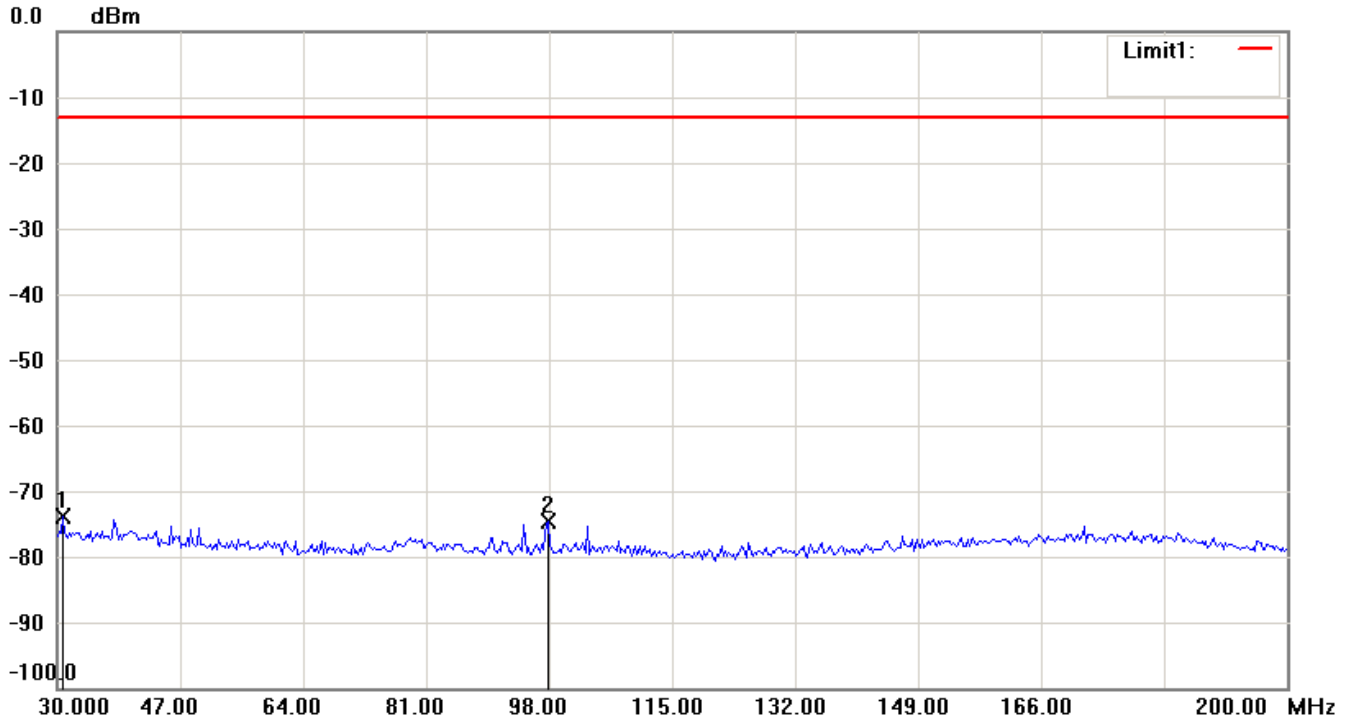


Registration number: W6D21712-17670-C-1

FCC ID: M5X-ACT80H18

603.9 MHz

Antenna Polarization H



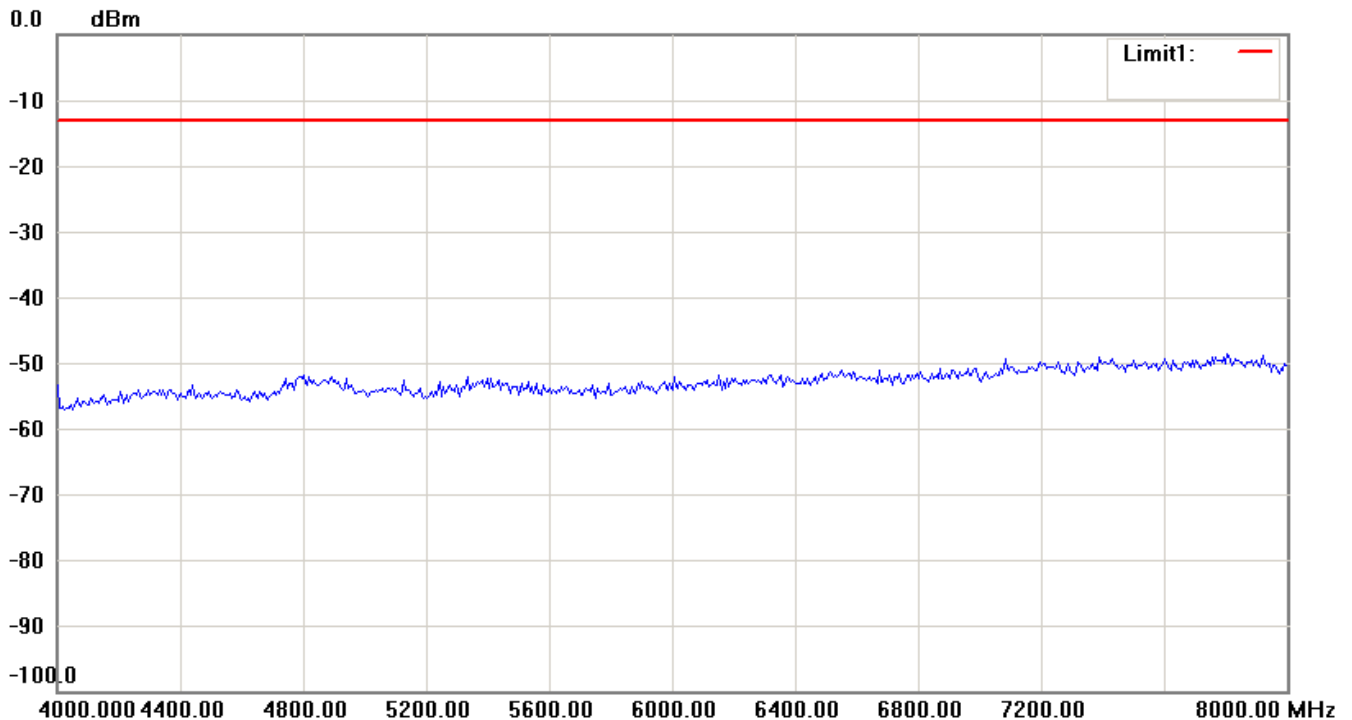
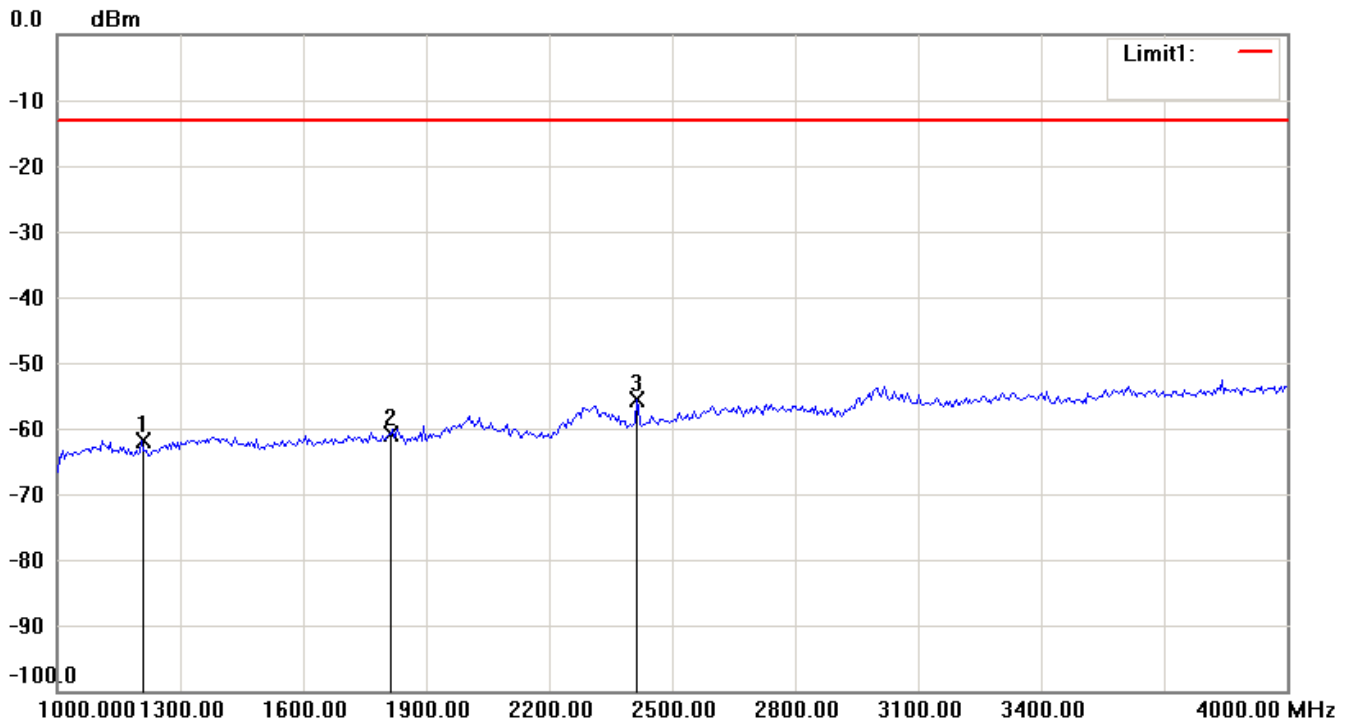
Note:

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Registration number: W6D21712-17670-C-1

FCC ID: M5X-ACT80H18



Note:

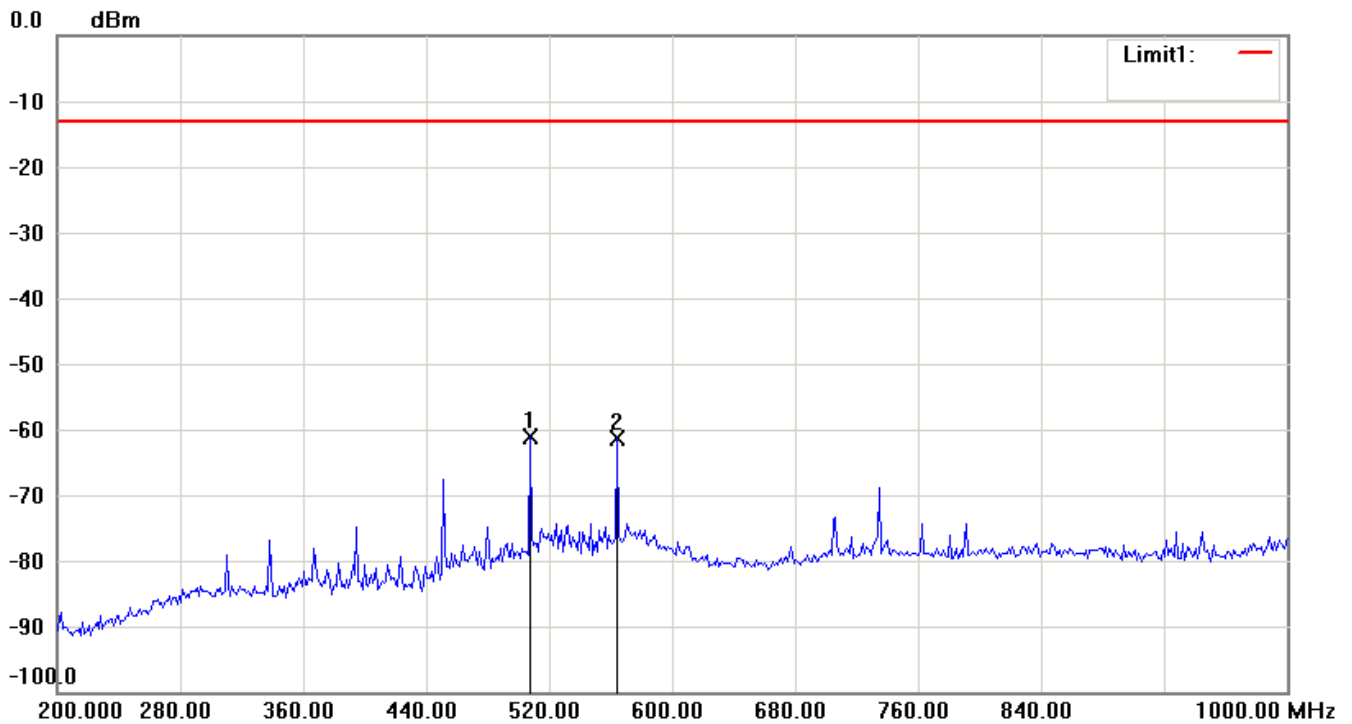
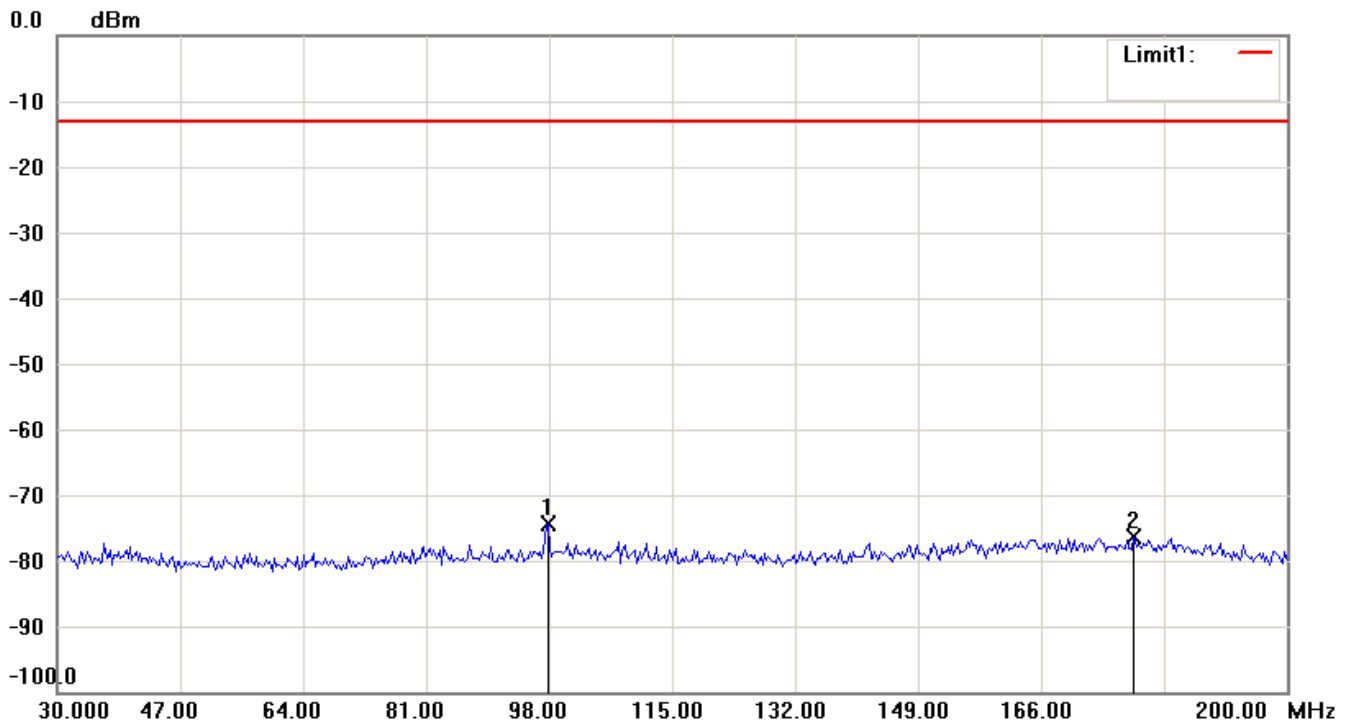
1. The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.
2. The some frequencies may exceed the limit line without the specified detectors, but that cannot present the results are failed to the specification of test standard.
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Registration number: W6D21712-17670-C-1

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Antenna Polarization V

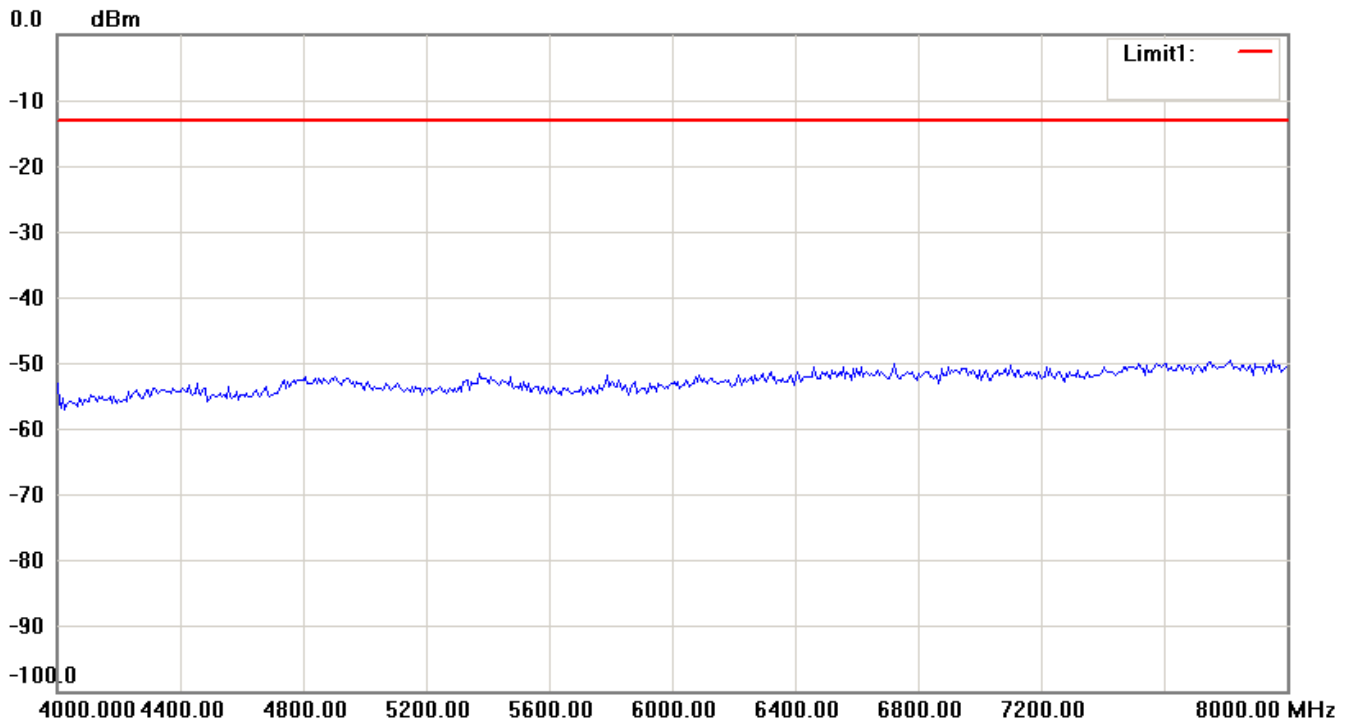
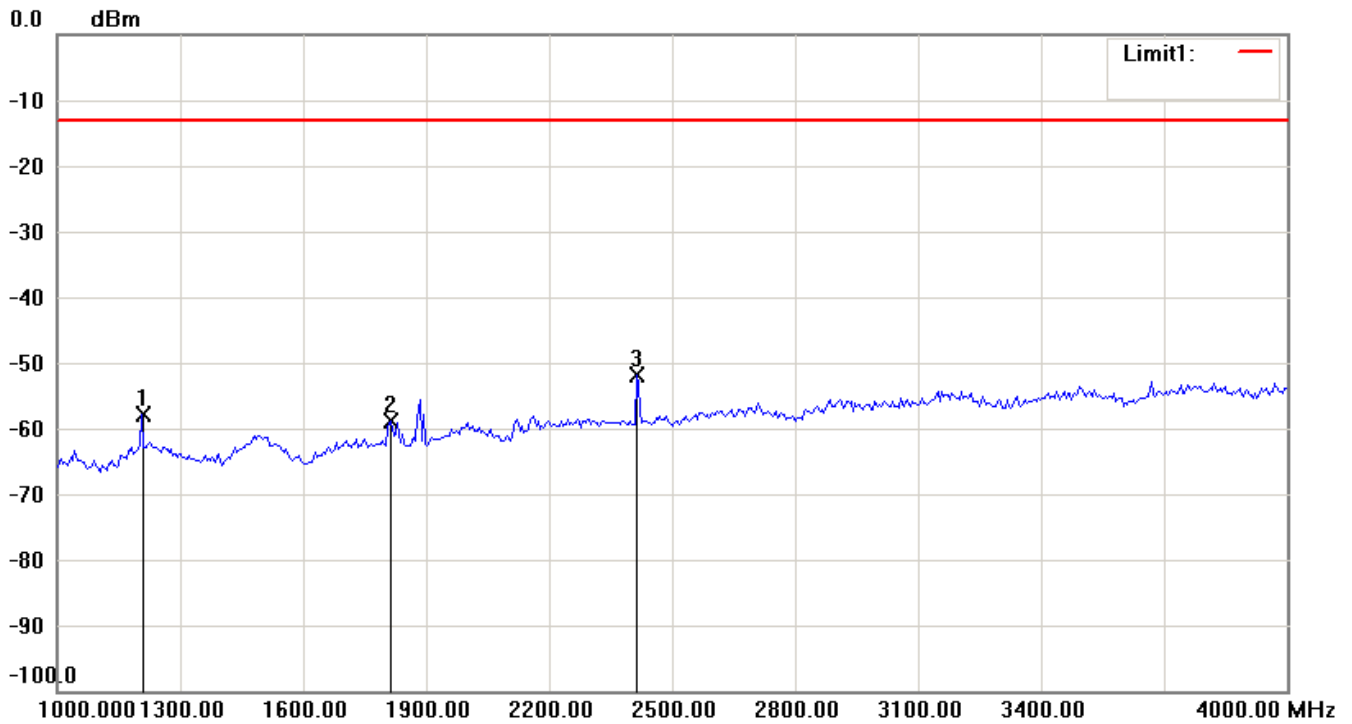


Note:

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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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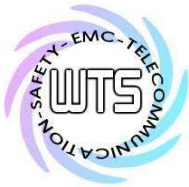


Registration number: W6D21712-17670-C-1
FCC ID: M5X-ACT80H18



Note:

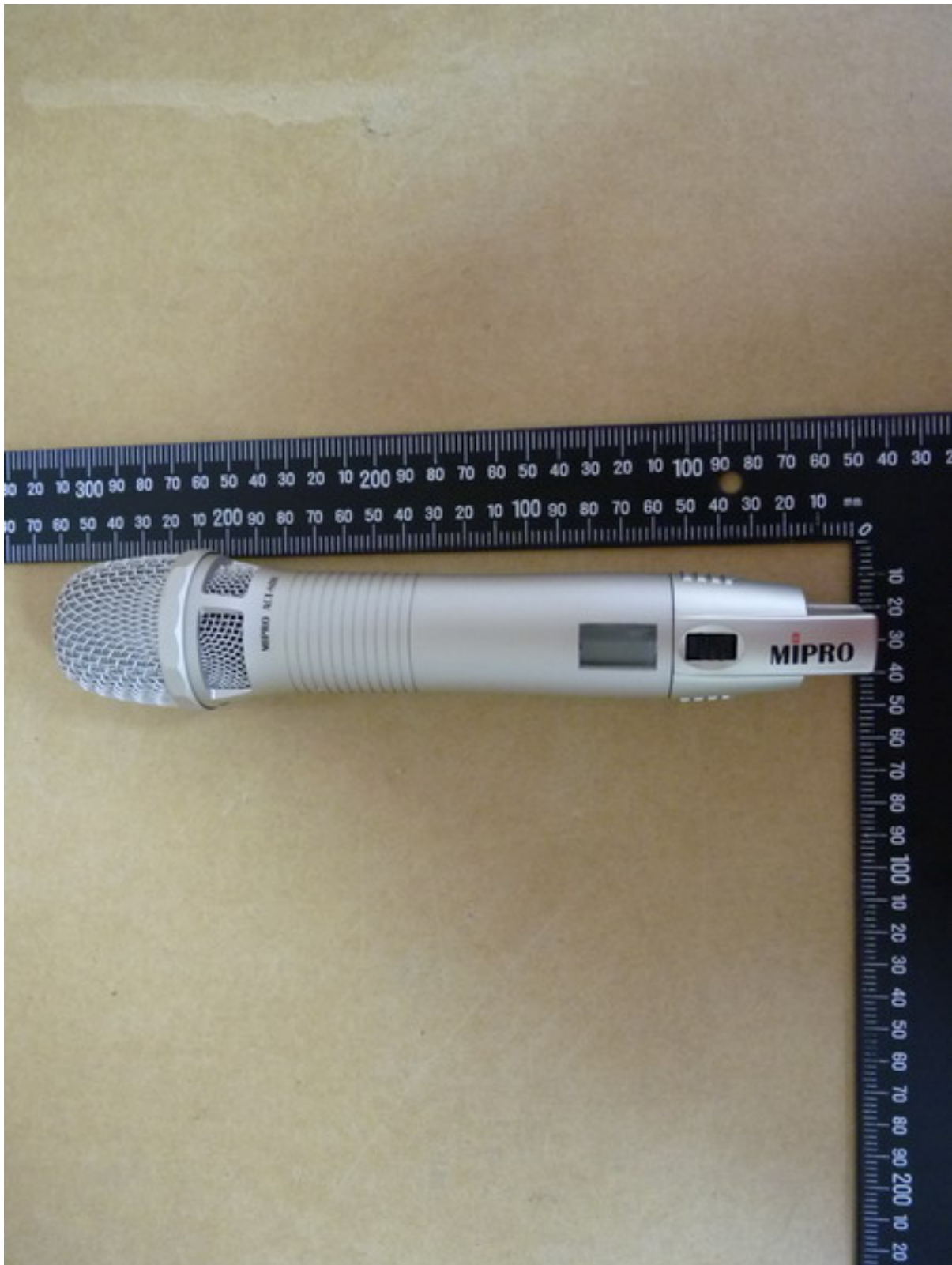
1. The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.
2. The some frequencies may exceed the limit line without the specified detectors, but that cannot present the results are failed to the specification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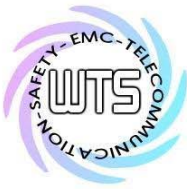


Registration number: W6D21712-17670-C-1

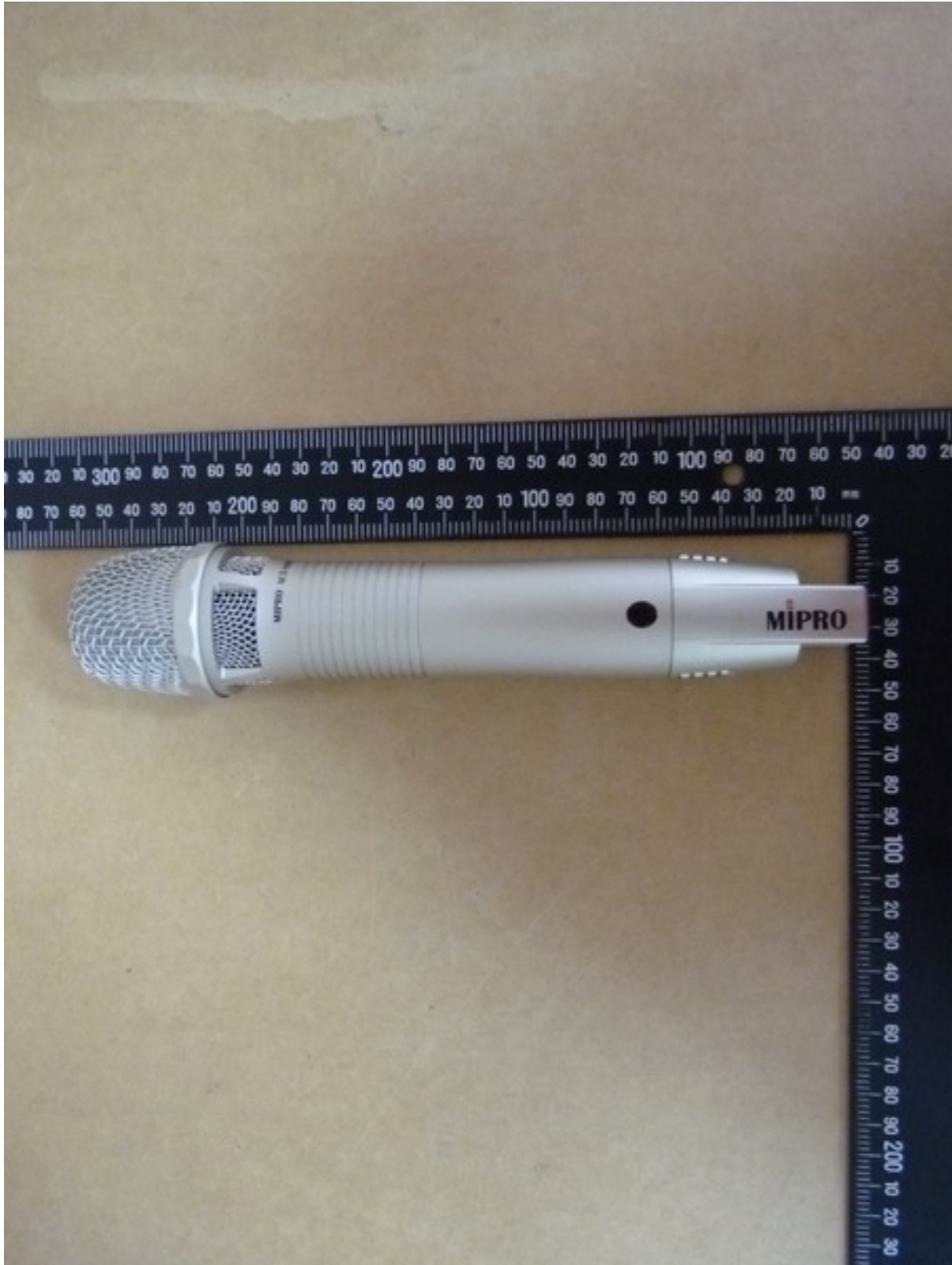
FCC ID: M5X-ACT80H18

External Photos





Registration number: W6D21712-17670-C-1
FCC ID: M5X-ACT80H18





Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6D21712-17670-C-1
FCC ID: M5X-ACT80H18





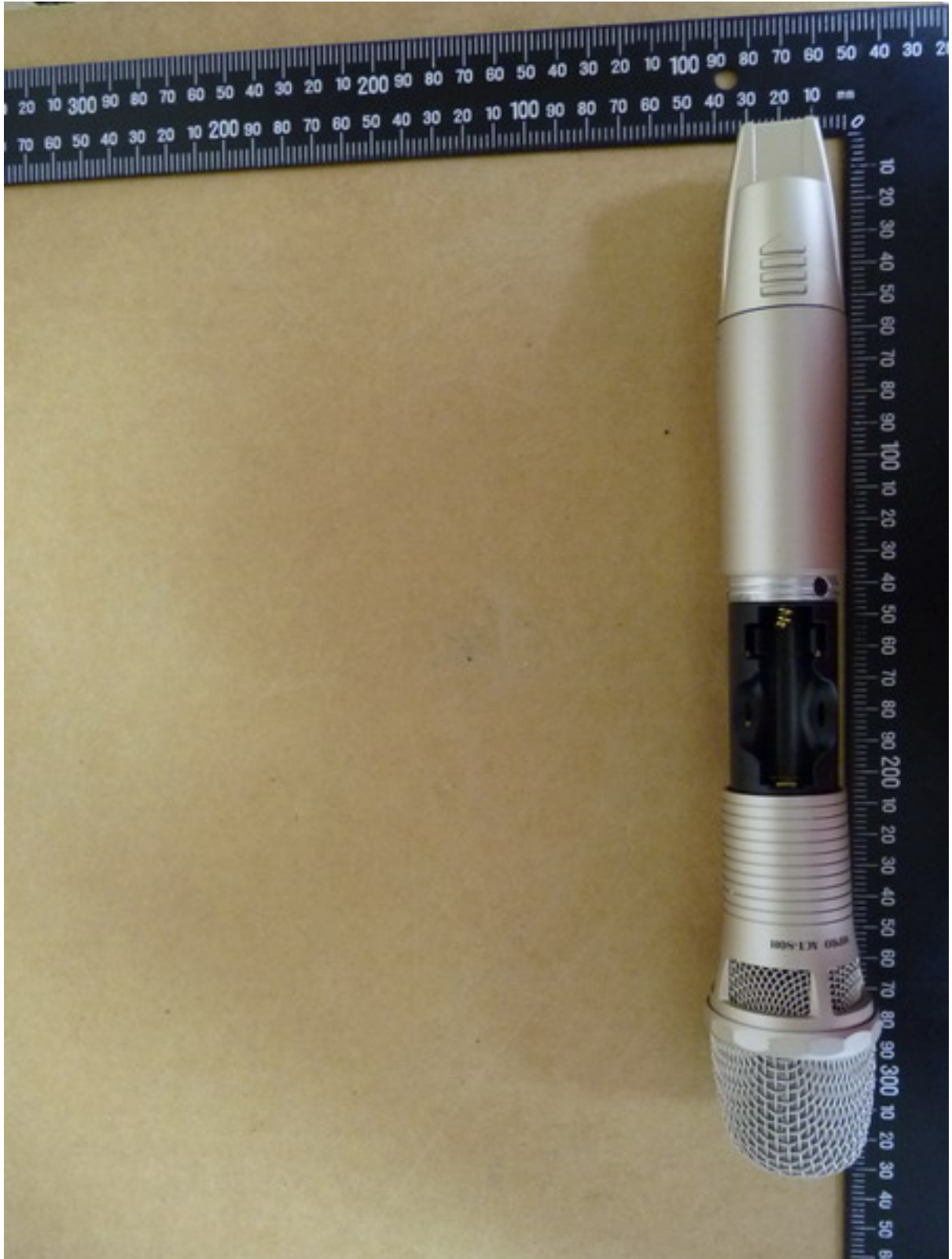
Registration number: W6D21712-17670-C-1
FCC ID: M5X-ACT80H18





Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6D21712-17670-C-1
FCC ID: M5X-ACT80H18





Registration number: W6D21712-17670-C-1

FCC ID: M5X-ACT80H18

Internal Photos





Registration number: W6D21712-17670-C-1
FCC ID: M5X-ACT80H18

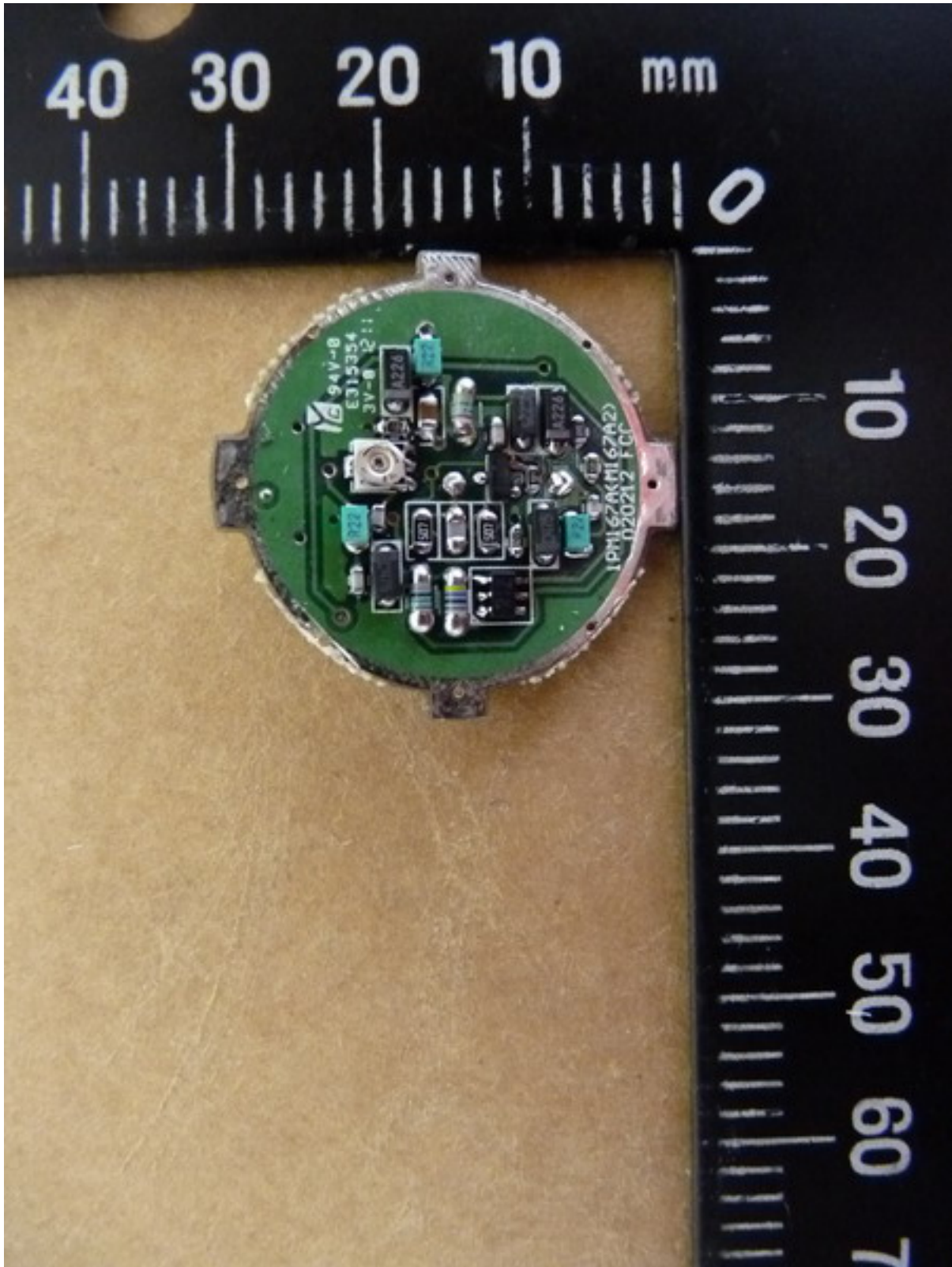




Registration number: W6D21712-17670-C-1
FCC ID: M5X-ACT80H18

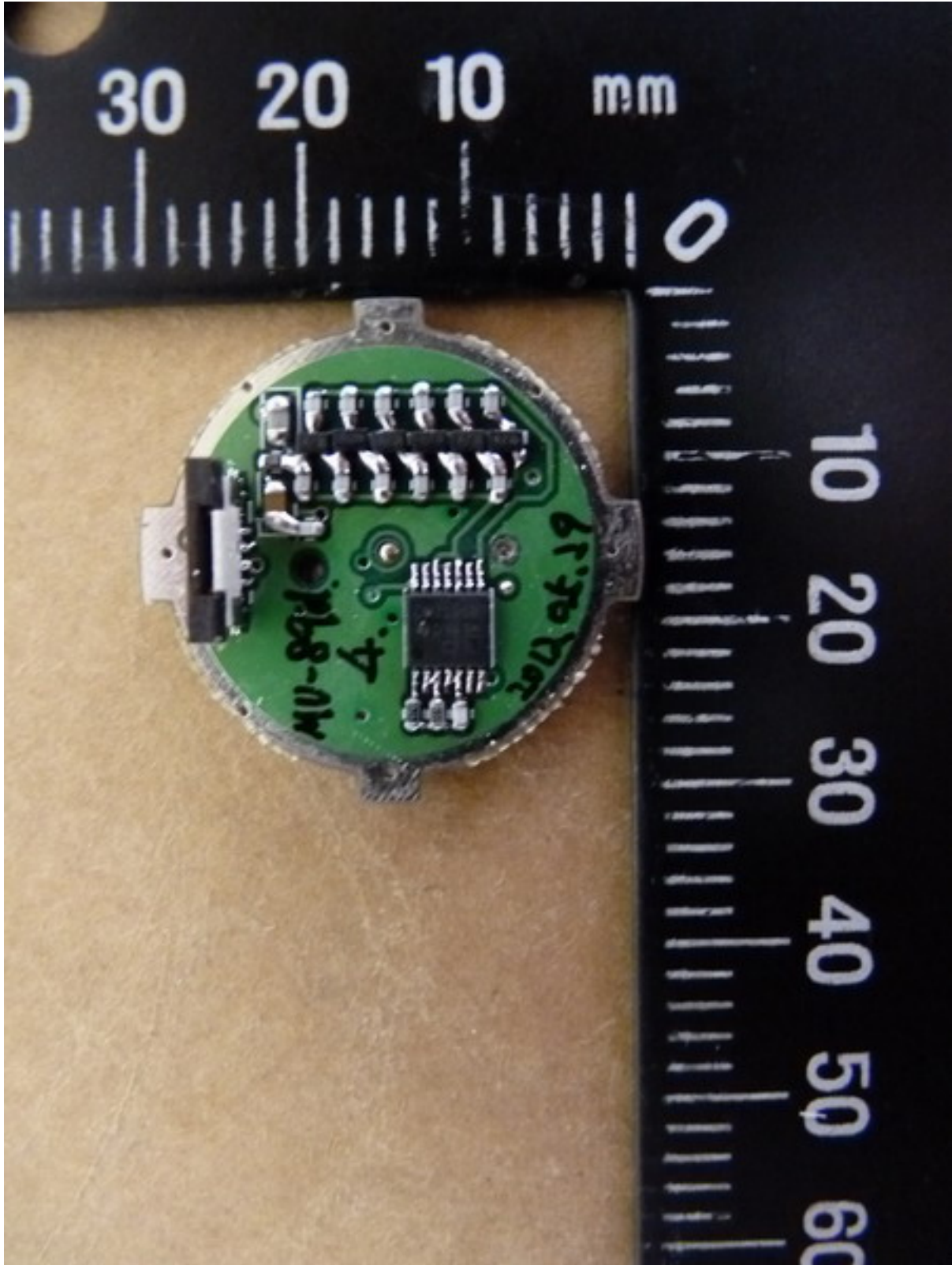


Registration number: W6D21712-17670-C-1
FCC ID: M5X-ACT80H18





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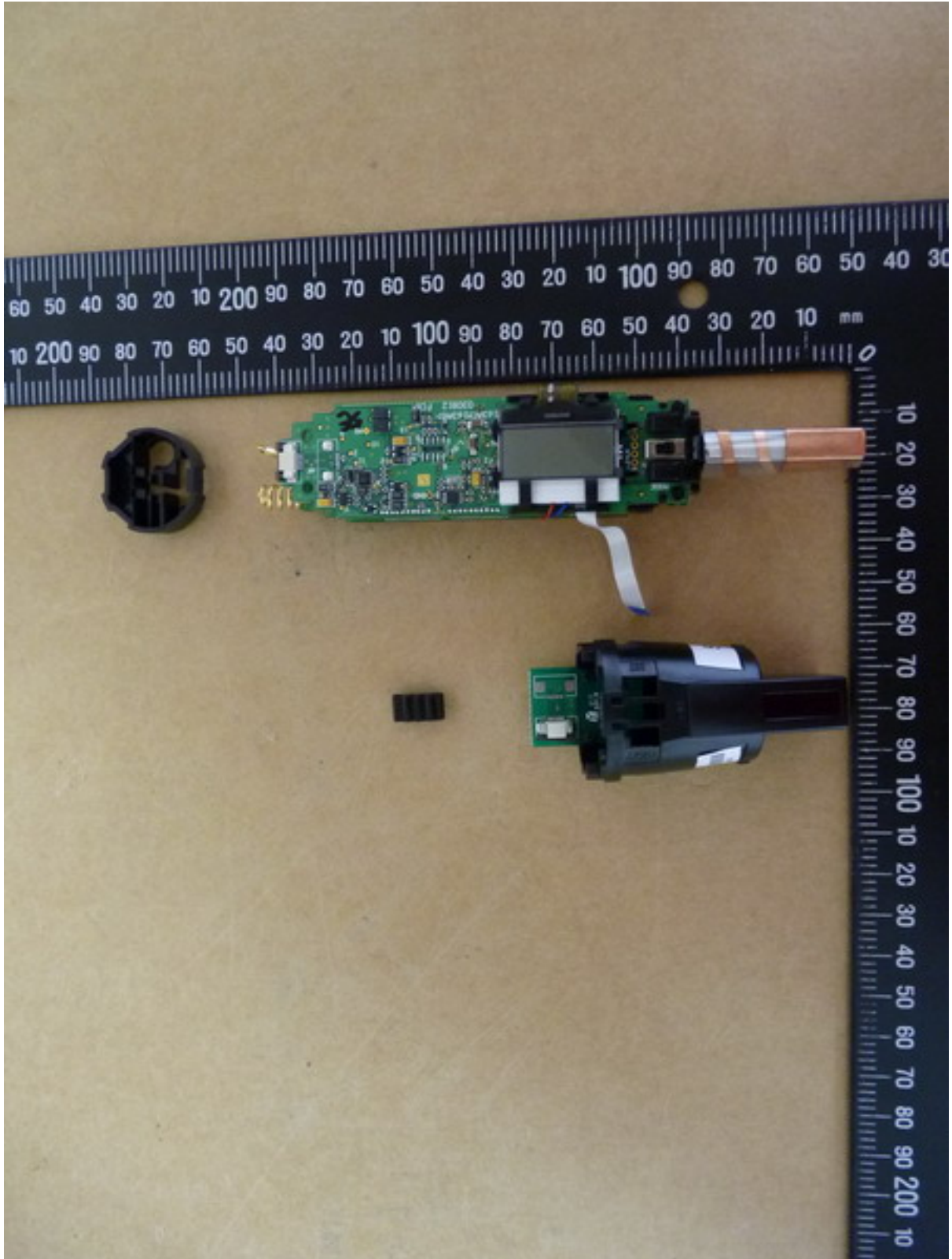


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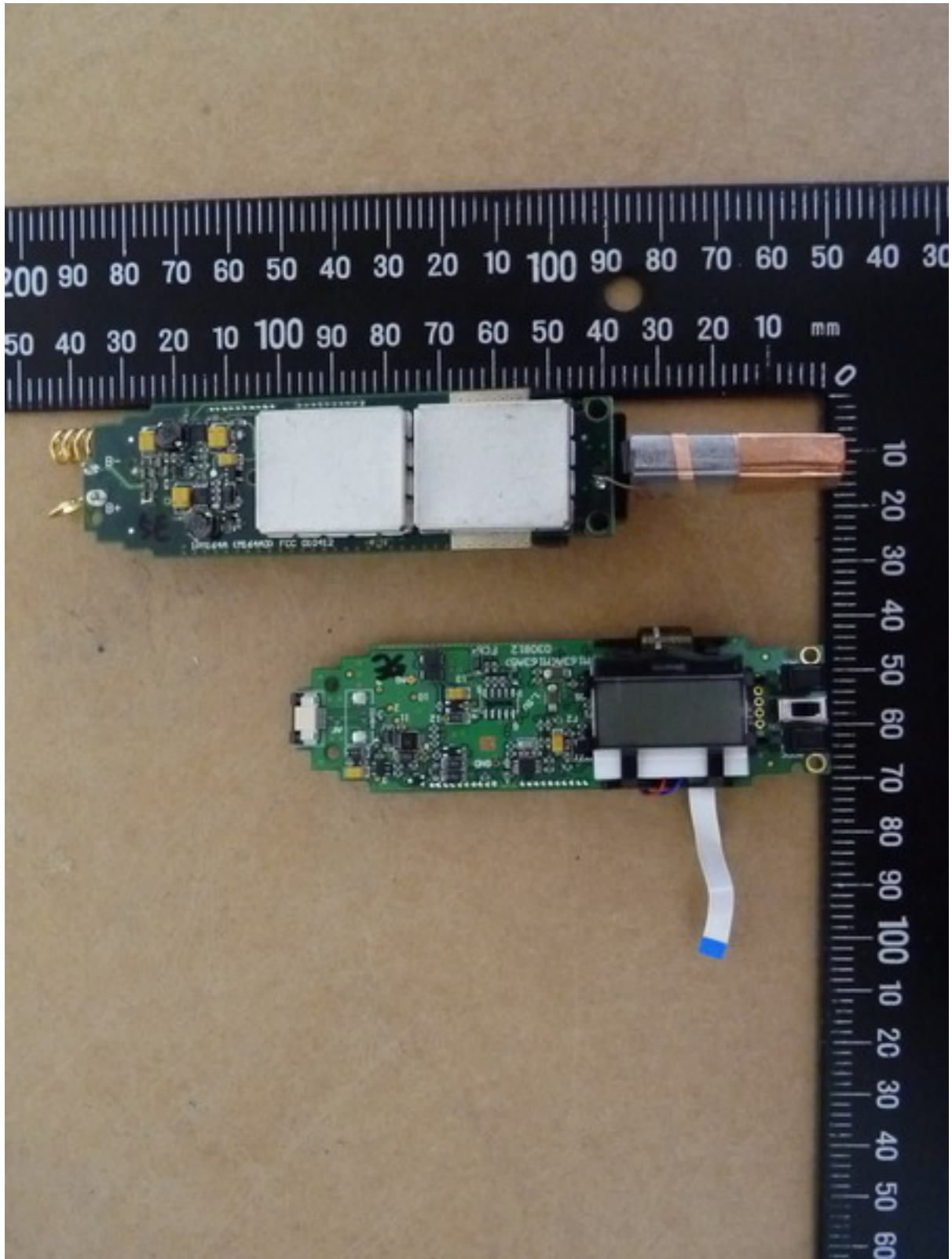


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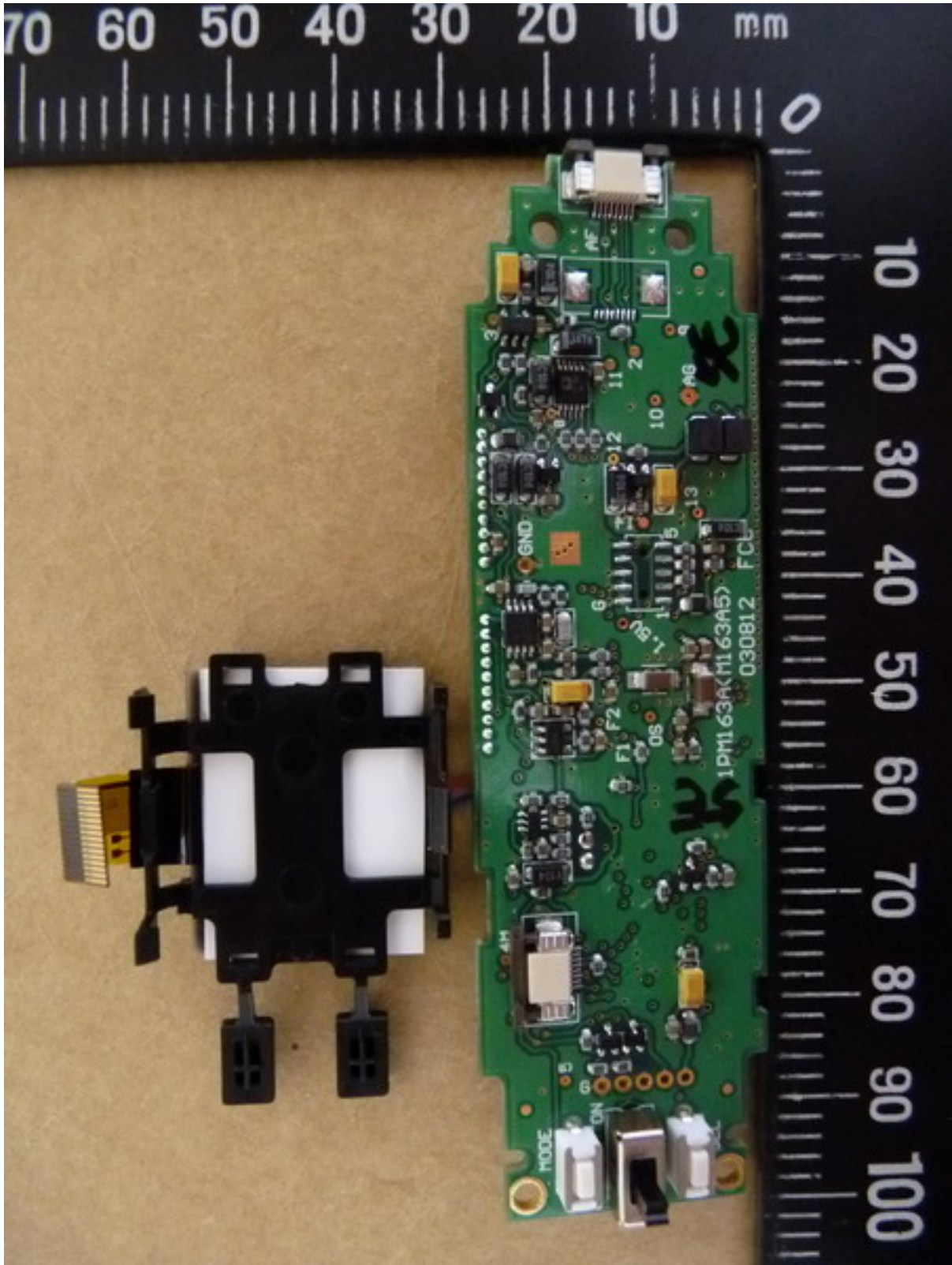




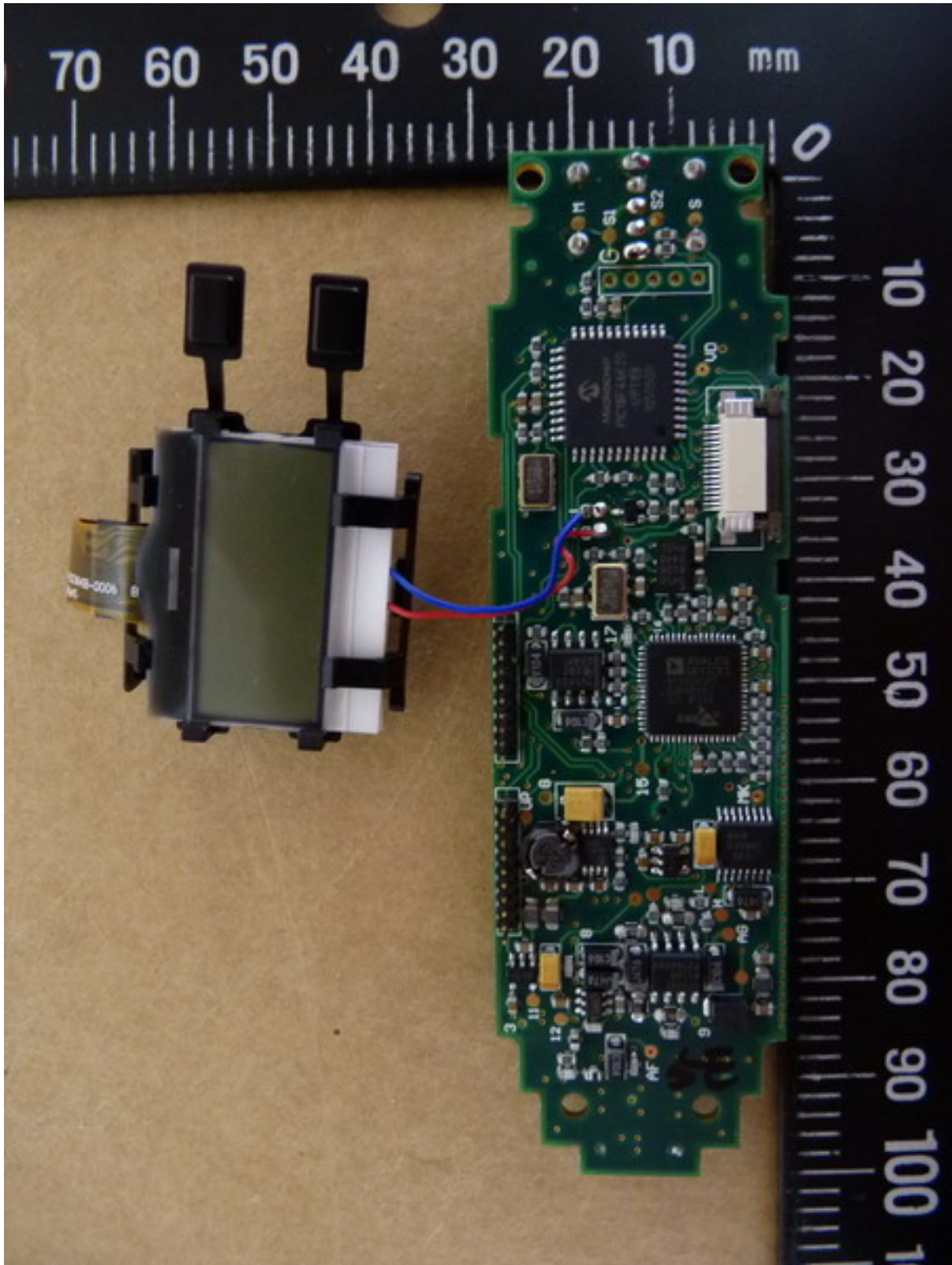
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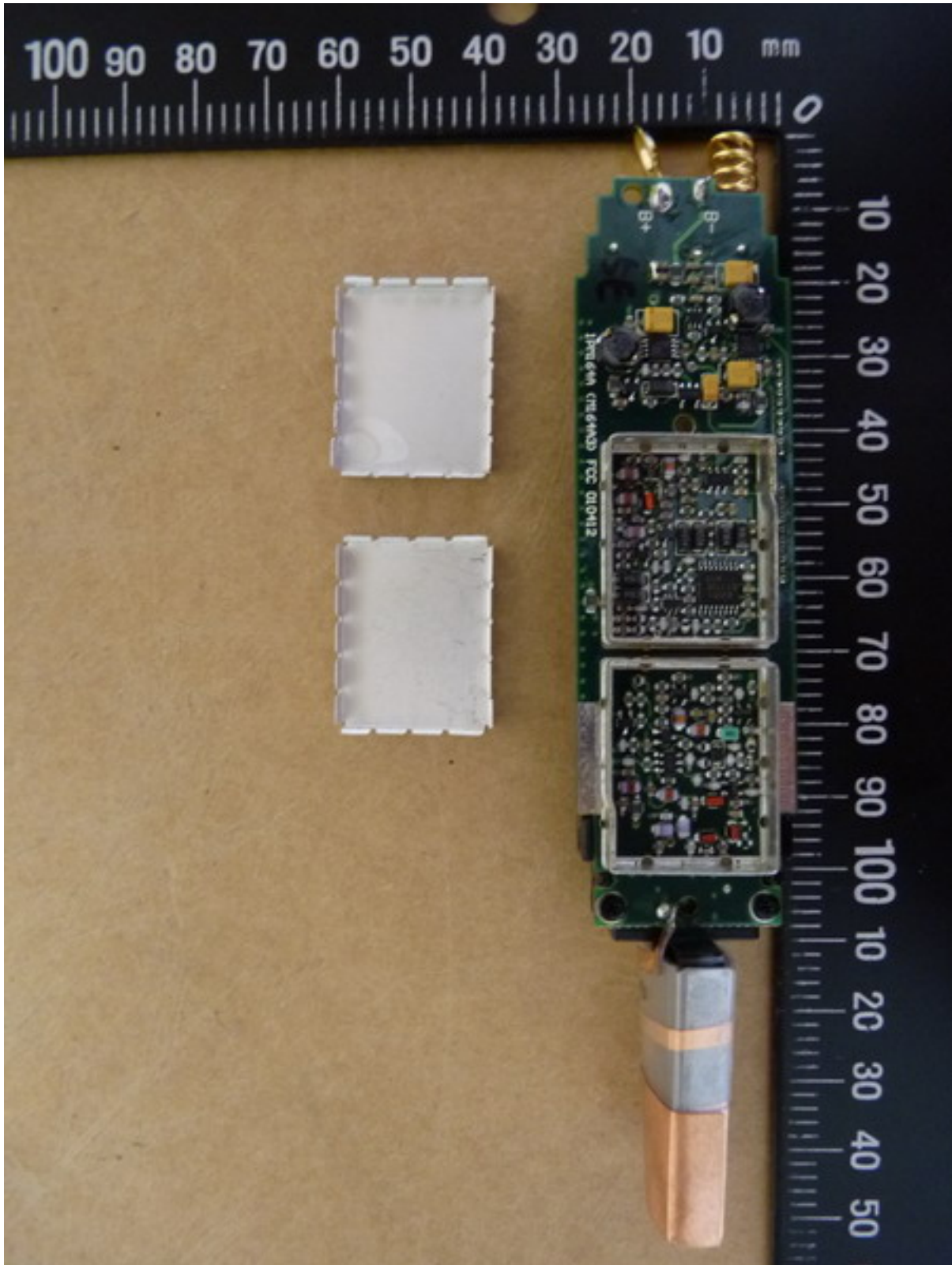


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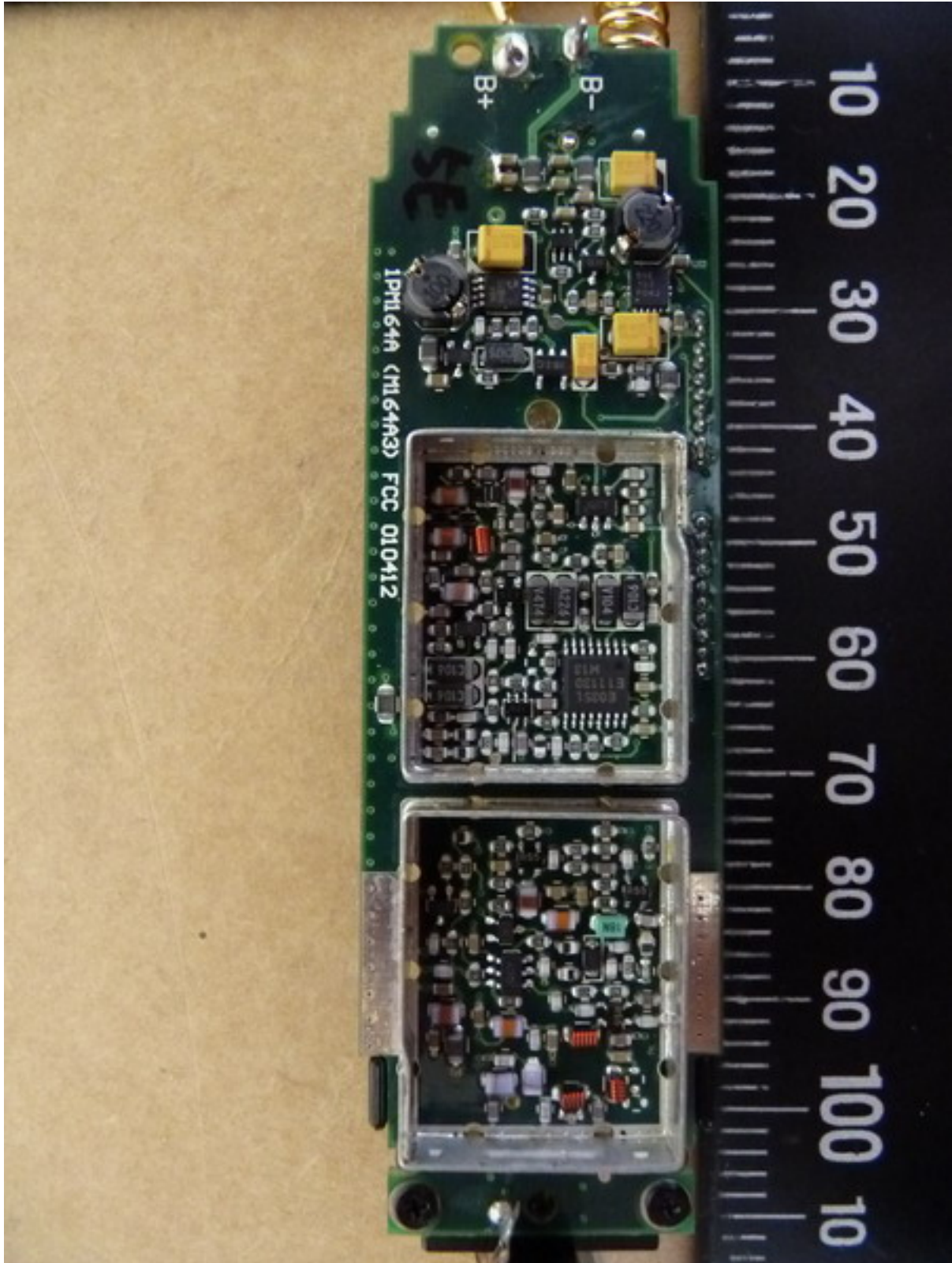


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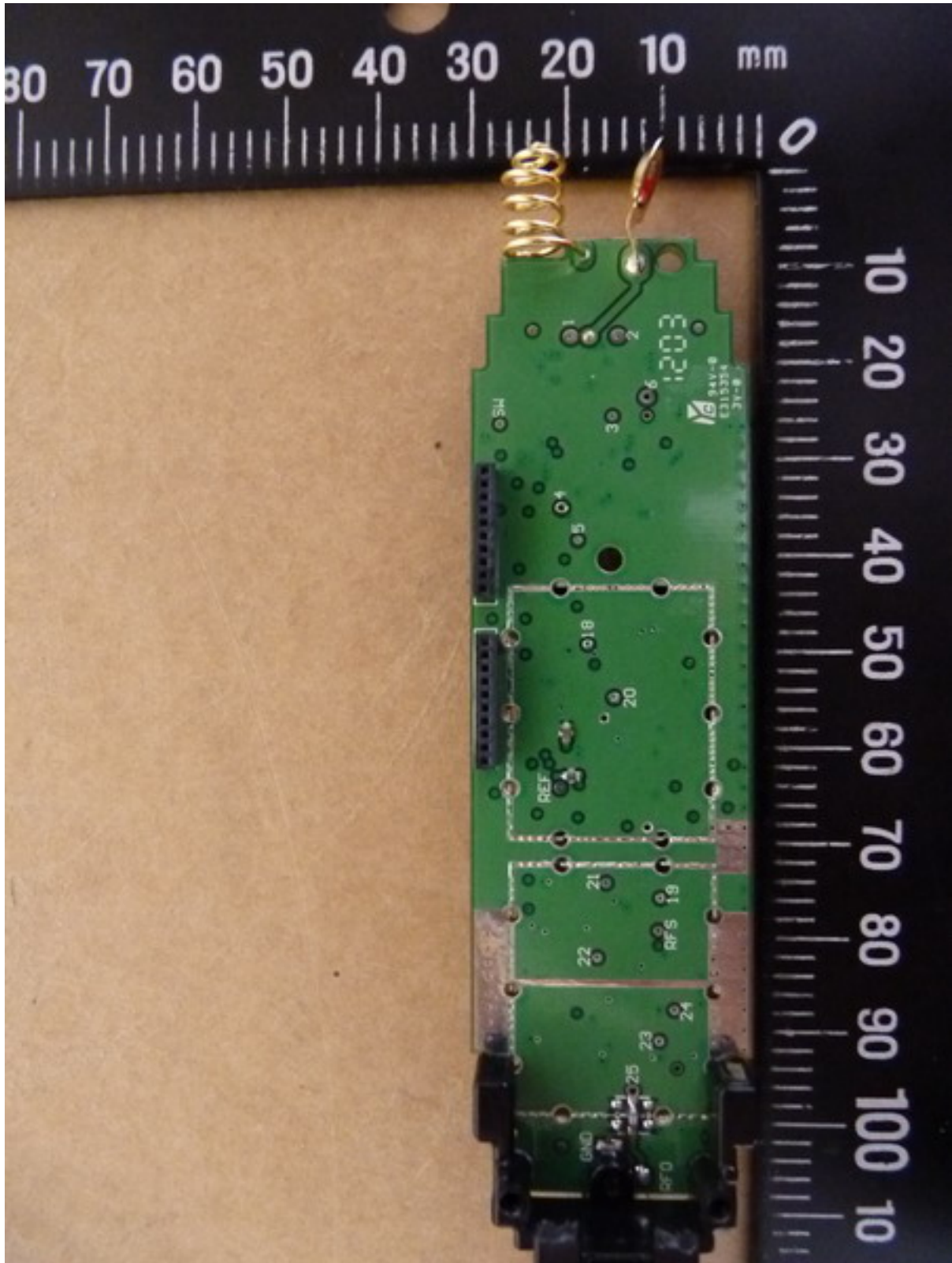


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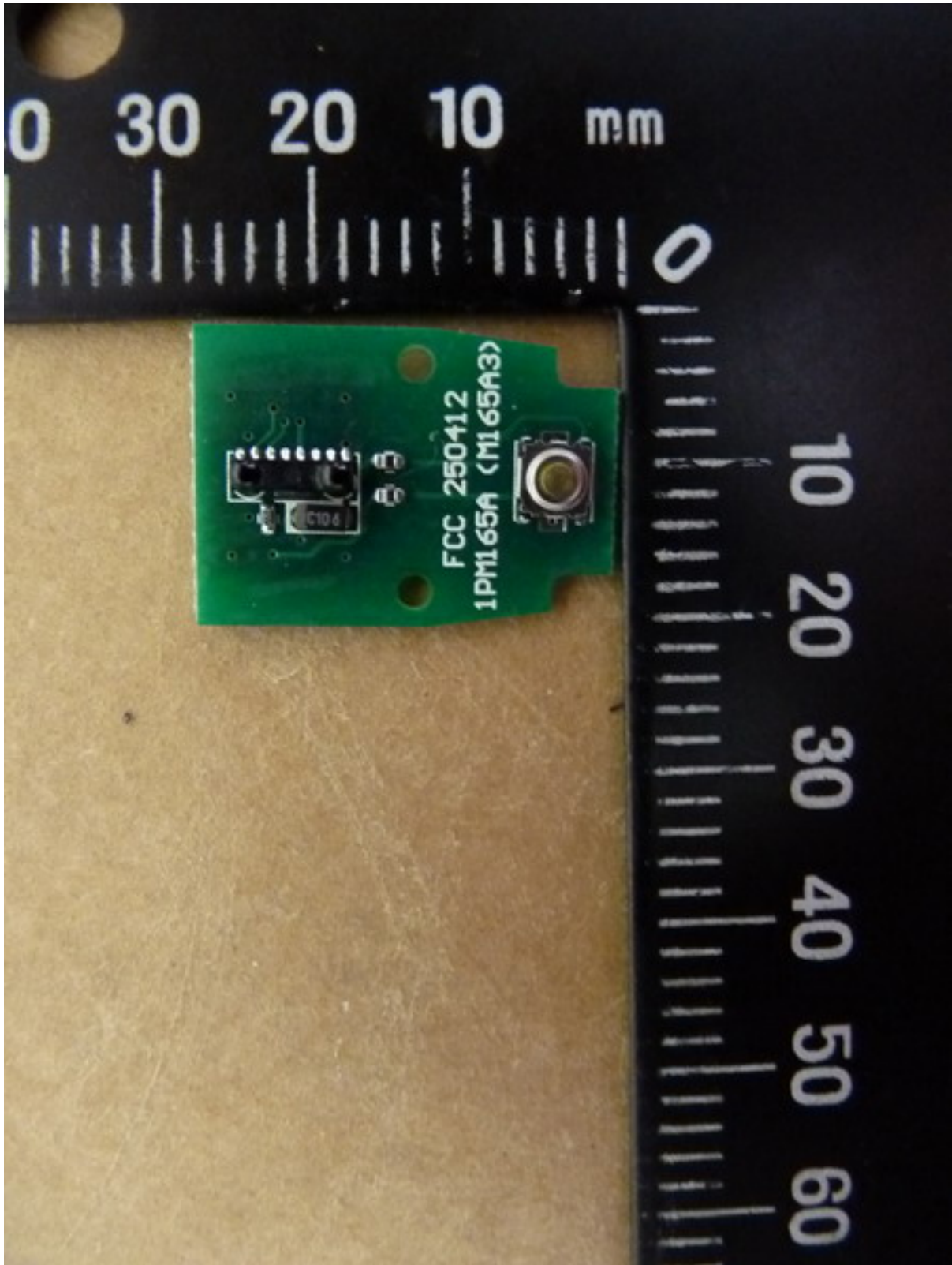


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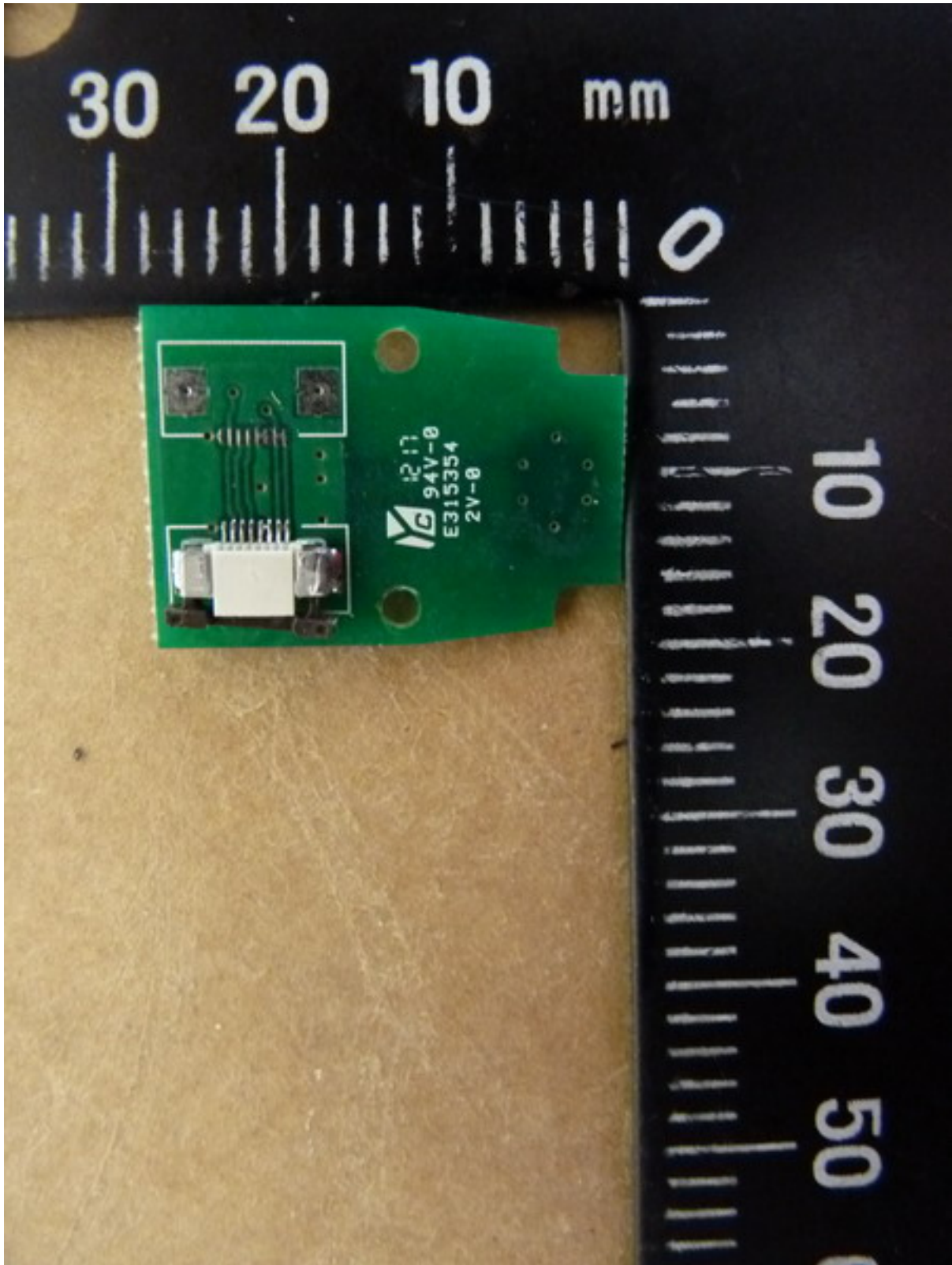


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Set Up Photo of Radiated Emission

