FCC PART 90 TEST REPORT

for

VHF WIRELESS LAVALIER MICROPHONE SYSTEM

Model No.: CAM-2W/T

FCC ID: HYJCAM2WT

of

Applicant: REOR ELECTRONICS CO., LTD.
Address: 5F., No.122, Ciaohe Rd., Jhonghe Dist., New Taipei City 235, 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.: W6M21310-13614-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

TABLE OF CONTENTS

1 General Information

1.1 Notes

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

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

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

Neither is there any guarantee that such a test sample will interwork with other genuinely open systems.

The existence of the tests nevertheless provides the confidence that the test sample possesses the qualities as maintained and that is performance generally conforms to representative cases of communications equipment.

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

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

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Tester:

December 09, 2013	Rick Chen	Rick Chen.
Date WTS-Lab.	Name	Signature

Technical responsibility for area of testing:

December 09, 2013	Kevin Wang	Kevin Wang
Date WTS	Name	Signature

1.2 Testing laboratory

1.2.1 Location

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

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

1.2.2 Details of accreditation status

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

Testing Laboratory
1477

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:	REOR ELECTRONICS CO., LTD.
Street:	5F., No.122, Ciaohe Rd., Jhonghe Dist.,
Town:	New Taipei City 235,
Country:	Taiwan (R.O.C.)
Telephone:	+886-2-2245-3259
Fax:	+886-2-2245-3279

1.4 Application details

Date of receipt of test sample:	October 30, 2013
Date of test:	From October 31, 2013 to December 09, 2013

1.5 General information of Test item

Type of test item:	VHF WIRELESS LAVALIER MICROPHONE SYSTEM
Model Number:	CAM-2W/T
Brand Name:	POLSEN
Multi-listing model number:	./.
Photos:	see Appendix

Technical data

Frequency band :

Frequency(MHz)	Used Band
169.445	☒
170.245	☐
171.045	☐
171.845	☒
169.505	☐
170.305	☐
171.105	☐
171.905	☒

Frequency (ch A):	169.445 MHz
Frequency (ch B):	171.845 MHz
Frequency (ch C):	171.905 MHz

Antenna type:	rubber antenna
Antenna gain:	-2.15 dBi
Power supply:	Battery 9 Vdc
Operation modes:	Simplex
Additional information:	The EUT is the portable device, the EUT was tested in X-axis.

Manufacturer: (if different from approval holder)

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

1.6 Test standards

Technical standard:	FCC Part 90.265 (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	2013/9/2	2014/9/1
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	2012/12/21	2013/12/20
ETSTW-CE 006	IMPULSBEGRENZER PULSE LIMITER	ESH3-Z2	100226	R&S	2013/3/4	2014/3/3
ETSTW-CE 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	2013/7/10	2014/7/9
ETSTW-RE 004	EMI TEST RECEIVER	ESI 40	832427/004	R&S	2013/9/2	2014/9/1
ETSTW-RE 005	EMI TEST RECEIVER	ESVS10	843207/020	R&S	2013/9/2	2014/9/1
ETSTW-RE 012	TUNABLE BANDREJECT FILTER	D.C 0309	146	K&L	Function Test	
ETSTW-RE 013	TUNABLE BANDREJECT FILTER	D.C 0336	397	K&L	Function Test	
ETSTW-RE 018	MICROWAVE HORN ANTENNA	AT4560	27212	AR	2013/10/15	2014/10/14
ETSTW-RE 027	Passive Loop Antenna	6512	00034563	ETS-Lindgren	2013/7/3	2014/7/2
ETSTW-RE 030	Double-Ridged Guide Horn Antenna	3117	00035224	EMCO	2013/3/4	2014/3/3
ETSTW-RE 045	ESA-E SERIES SPECTRUM ANALYZER	E4404B	MY45111242	Agilent	Pre-test Use	
ETSTW-RE 049	TRILOG Super Broadband test Antenna	VULB 9160	9160-3185	Schwarzbeck	2013/3/21	2014/3/20
ETSTW-RE 050	Attenuator 10dB	50HF-010-1	None	JFW	2013/3/4	2014/3/3
ETSTW-RE 051	Attenuator 6dB	50HF-006-1	None	JFW	2013/3/4	2014/3/3
ETSTW-RE 053	Attenuator 3dB	50HF-003-1	None	JFW	2013/3/4	2014/3/3
ETSTW-RE 055	SPECTRUM ANALYZER	FSU 26	200074	R&S	2013/5/31	2014/5/30
ETSTW-RE 060	Attenuator 30dB	5015-30	F651012z-01	ATM	2013/3/4	2014/3/3
ETSTW-RE 062	Amplifier Module	CHC 2	None	KMIC	2013/11/27	2014/11/26
ETSTW-RE 064	Bluetooth Test Set	MT8852B-042	6K00005709	Anritsu	Function Test	
ETSTW-RE 069	Double-Ridged Guide Horn Antenna	3117	00069377	EMCO	Function Test	
ETSTW-RE 072	CELL SITE TEST SET	8921A	3339A00375	HP	2013/10/7	2014/10/6
ETSTW-RE 088	SOLID STATE AMPLIFIER	KMA180265A01	99057	KMIC	2013/10/11	2014/10/10
ETSTW-RE 099	DC Block	50DB-007-1	None	JFW	2013/3/4	2014/3/3
ETSTW-RE 106	Humidity Temperature Meter	TES-1366	091011113	TES	2013/11/27	2014/11/26
ETSTW-RE 111	TRILOG Super Broadband test Antenna	VULB 9160	9160-3309	Schwarz beck	2012/12/13	2013/12/12
ETSTW-RE 112	AC POWER SOURCE	TFC-1005	None	T-Power	Function test	
ETSTW-RE 115	2.4GHz Notch Filter	N0124411	473874	MICROWAVE CIRCUITS	2013/1/11	2014/1/10
ETSTW-RE 120	RF Player	MP9200	MP9210-111022	ADIVIC	Function test	

ETSTW-RE 122	SIGNAL GENERATOR	SMF100A	102149	R&S	2013/6/28	2014/6/27
ETSTW-RE 125	5GHz Notch filter	5NSL11-5200/E221.3-O/O	1	K&L Microwave	2013/8/16	2014/8/15
ETSTW-RE 126	5GHz Notch filter	5NSL11-5800/E221.3-O/O	1	K&L Microwave	2013/8/16	2014/8/15
ETSTW-RE 127	RF Switch Box	RFS-01	None	WTS	2013/3/4	2014/3/3
ETSTW-RE 128	5.3GHz Notch filter	N0153001	SN487233	Microwave Circits	2013/8/13	2014/8/12
ETSTW-RE 129	5.5GHz Notch filter	N0555984	SN487234	Microwave Circits	2013/8/13	2014/8/12
ETSTW-RE 130	Handheld RF Spectrum Analyzer	N9340A	CN0147000204	Agilent	Pre-test Use	
ETSTW-GSM 002	Universal Radio Communication Tester	CMU 200	109439	R&S	2013/10/7	2014/10/6
ETSTW-GSM 019	Band Reject Filter	WRCTF824/849-822/851-40 /12+9SS	3	WI	2013/1/11	2014/1/10
ETSTW-GSM 020	Band Reject Filter	WRCD1747/1748-1743/1752-32/5SS	1	WI	2013/1/11	2014/1/10
ETSTW-GSM 021	Band Reject Filter	WRCD1879.5/1880.5-1875.5/1884.5-32/5SS	3	WI	2013/1/11	2014/1/10
ETSTW-GSM 022	Band Reject Filter	WRCT901.9/903.1-904.25-50/8SS	1	WI	2013/1/11	2014/1/10
ETSTW-GSM 023	Power Divider	4901.19.A	None	SUHNER	2013/9/18	2014/9/17
ETSTW-Cable 010	BNC Cable	5 M BNC Cable	None	JYE BAO CO.,LTD.	2013/3/4	2014/3/3
ETSTW-Cable 011	BNC Cable	BNC Cable 1	None	JYE BAO CO.,LTD.	Pre-test Use NCR	
ETSTW-Cable 012	N TYPE To SMA Cable	Cable 012	None	JYE BAO CO.,LTD.	2013/3/4	2014/3/3
ETSTW-Cable 016	BNC Cable	Switch Box	B Cable 1	Schwarz beck	2013/3/4	2014/3/3
ETSTW-Cable 017	BNC Cable	X Cable	B Cable 2	Schwarz beck	2013/3/4	2014/3/3
ETSTW-Cable 018	BNC Cable	Y Cable	B Cable 3	Schwarz beck	2013/3/4	2014/3/3
ETSTW-Cable 019	BNC Cable	Z Cable	B Cable 4	Schwarz beck	2013/3/4	2014/3/3
ETSTW-Cable 022	N TYPE Cable	5006	0002	JYE BAO CO.,LTD.	2013/3/26	2014/3/25
ETSTW-Cable 026	Microwave Cable	SUCOFLEX 104	279075	HUBER+SUHNER	2013/3/4	2014/3/3
ETSTW-Cable 027	Microwave Cable	SUCOFLEX 104	279083	HUBER+SUHNER	2013/3/4	2014/3/3
ETSTW-Cable 028	Microwave Cable	FA147A0015M2020	30064-2	UTIFLEX	2013/10/11	2014/10/10
ETSTW-Cable 029	Microwave Cable	FA147A0015M2020	30064-3	UTIFLEX	2013/10/11	2014/10/10
ETSTW-Cable 030	Microwave Cable	SUCOFLEX 104（S_Cable 9）	279067	HUBER+SUHNER	2013/3/4	2014/3/3
ETSTW-Cable 031	Microwave Cable	SUCOFLEX 104（S_Cable 10）	238092	HUBER+SUHNER	2013/11/27	2014/11/26
ETSTW-Cable 043	Microwave Cable	SUCOFLEX 104	317576	HUBER+SUHNER	2013/11/27	2014/11/26
ETSTW-Cable 047	Microwave Cable	SUCOFLEX 104	325518	HUBER+SUHNER	2013/11/27	2014/11/26
ETSTW-Cable 053	N TYPE To SMA Cable	RG142	None	JYE BAO CO.,LTD.	2013/3/26	2014/3/25
ETSTW-Cable 058	Microwave Cable	SUCOFLEX 104	none	HUBER+SUHNER	2013/6/20	2014/6/19
WTSTW-SW 002	EMI TEST SOFTWARE	EZ_EMC	None	Farad	Version ETS-03A1	

2.4 General Test Procedure

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

RADIATION INTERFERENCE: The test procedure used was according to ANSI STANDARD C63.4-2009 6.4 employing a spectrum analyzer. For investigated frequency is equal to or below 1GHz, the RBW and VBW of the spectrum analyzer was 100 kHz and 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	90.265 (b)	☒	☒	☐
Modulation Deviation	2.1047 (b);	☒	☒	☐
Audio Frequency Response	2.1047 (a)	☒	☒	☐
Emission Bandwidth	2.1049 90.265 (b)	☒	☒	☐
Transmitter Spurious Radiated Emission	90.210	☒	☒	☐
Frequency Stability	2.1055 90.265 (b)	☒	☒	☐
Line Conducted Emissions	15.207	☐	☐	☐

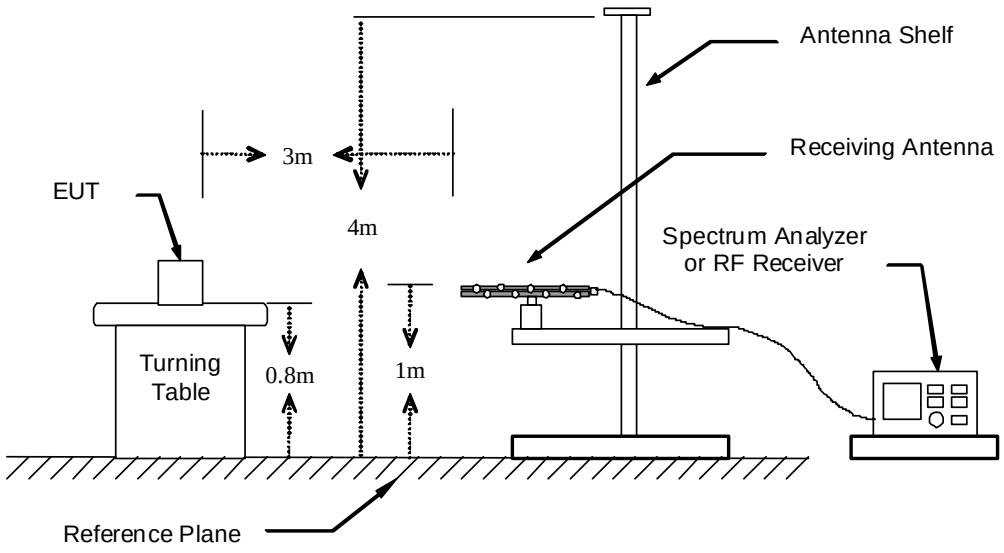
The following is intentionally left blank.

4 RF Power Output, FCC part 90.265 (b)

4.1 Test procedure

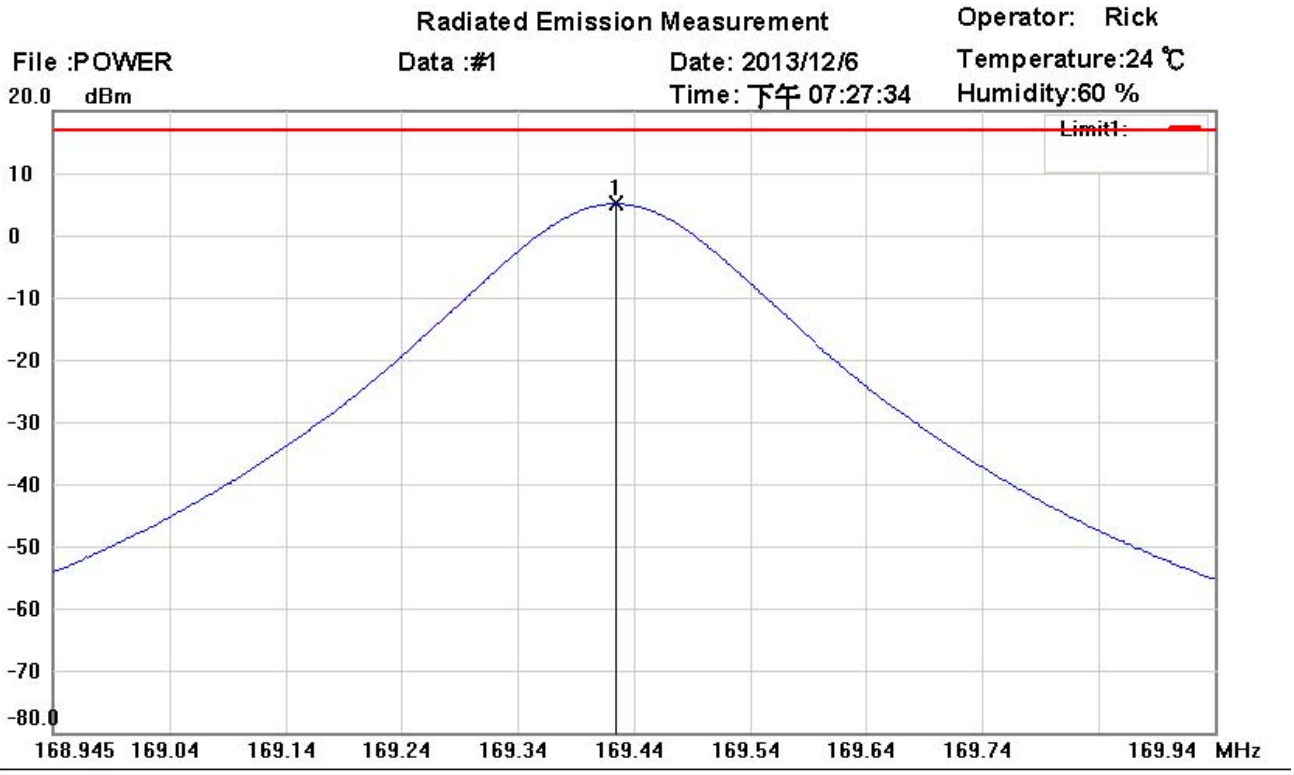
1. The EUT was placed on the top of the turntable in semi-anechoic chamber.
2. The test shall be made in the transmitting mode. Antenna tower was scan (from 1 M to 4 M) and the turn table was rotated by 360 degrees to determine the position of the highest radiation.
3. The receiving Horn antenna was placed 0.5 meters far away from the turntable.
4. The receiving antenna was fixed on the same height with the EUT to find maximum suspected emissions.
5. Recorded suspected value is indicated as Read Level (Raw).
6. Replace the EUT by standard antenna and feed the RF port by signal generator.
7. Adjust the frequency of the signal generator to the suspected emission and slightly rotate the turntable to locate the position with maximum reading.
8. Adjust the power level of the signal generator to reach the same reading with Read Level (Raw).
9. The level of the spurious emission is the power level of (7) plus the gain of the standard antenna in dBd and minus the loss of the cable used between the signal generator and the standard antenna.

4.2 Test Setup



Setup for Radiated Power

4.3 Test Results

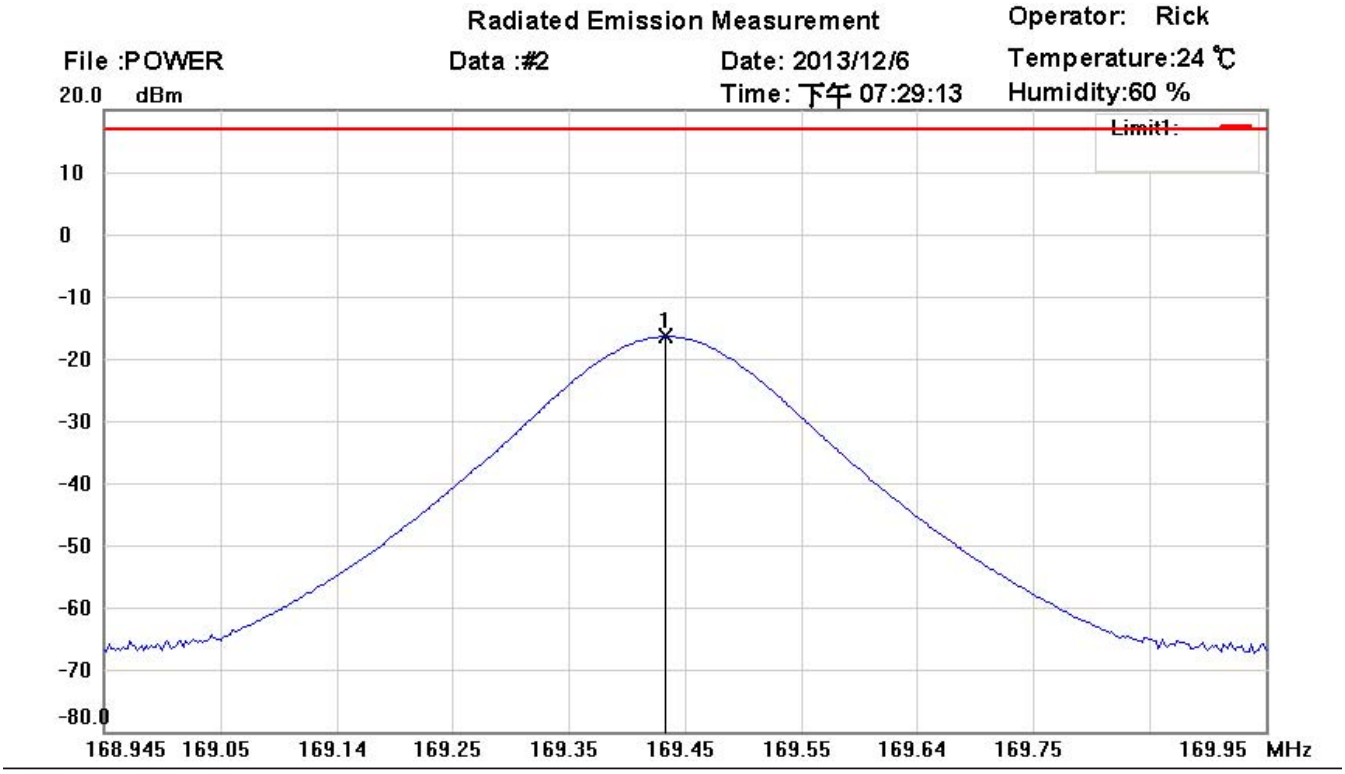


Site : Chamber
Condition : FCC_part 90 POWER(169-172)
EUT : W6M21310-13614
M/N: CAM-2W/T
Test Mode : 169.445MHz
Note :

Polarization: *Horizontal*
Power : 9V
Distance: 3m

Mk.	Frequency (MHz)	Reading (dBm)	Detector	Corr. factor (dB)	Result (dBm)	Limit (dBm)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
*	169.4300	-17.56	peak	22.65	5.09	17.00	150	230	-11.91	

Registration number: W6M21310-13614-C-1
FCC ID: HYJCAM2WT

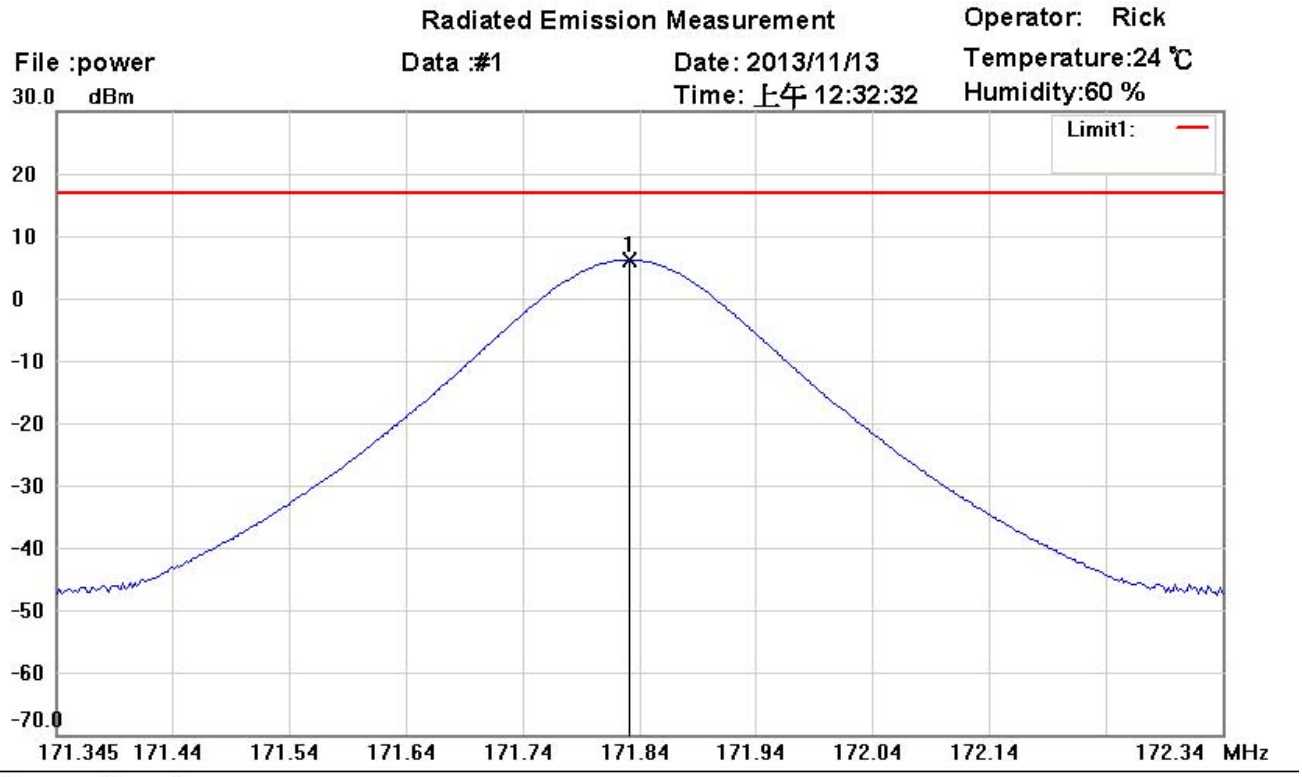


Site : Chamber
Condition : FCC_part 90 POWER(169-172)
EUT : W6M21310-13614
M/N: CAM-2W/T
Test Mode : 169.445MHz
Note :

Polarization: *Vertical*
Power : 9V
Distance: 3m

Mk.	Frequency (MHz)	Reading (dBm)	Detector	Corr. factor (dB)	Result (dBm)	Limit (dBm)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
*	169.4280	-39.64	peak	23.18	-16.46	17.00	150	110	-33.46	

Registration number: W6M21310-13614-C-1
FCC ID: HYJCAM2WT

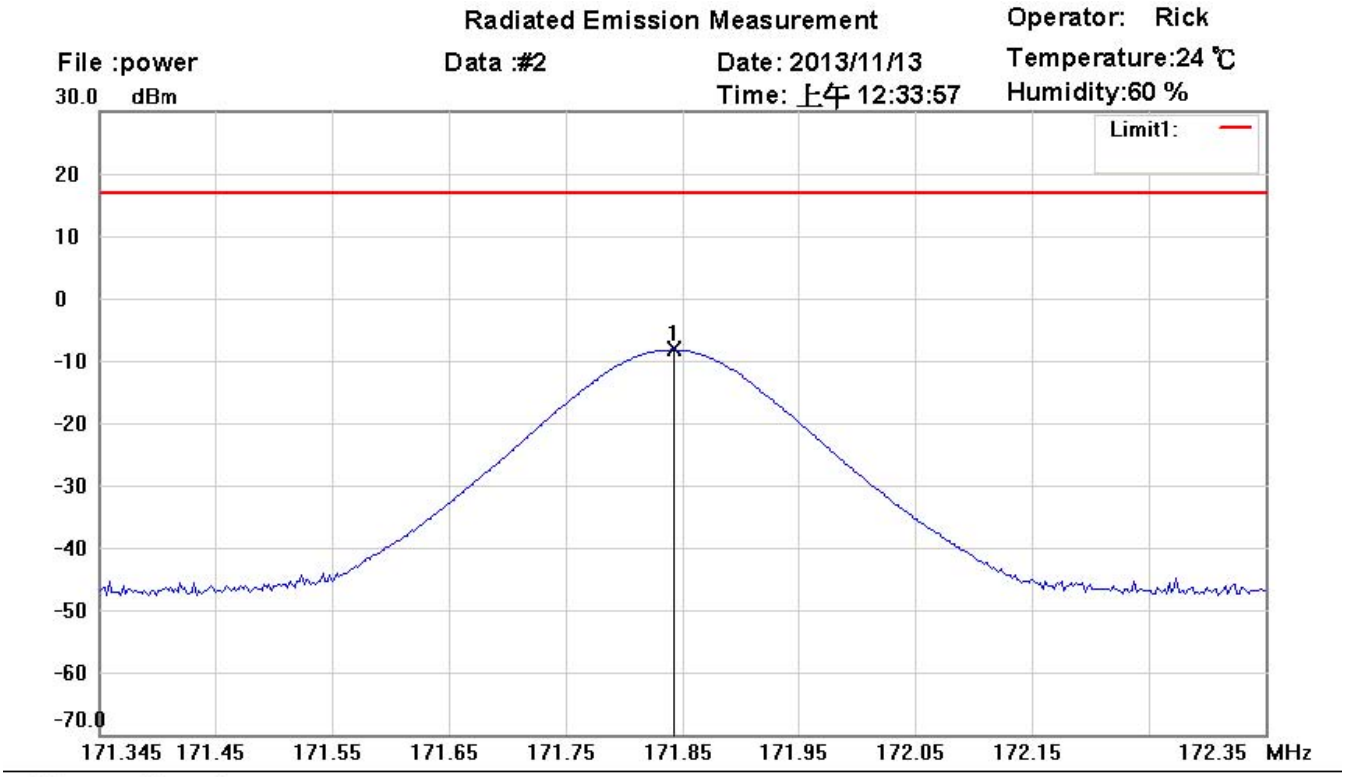


Site : Chamber
Condition : FCC_part 90 POWER(169-172)
EUT : W6M21310-13614
M/N: CAM-2W/T
Test Mode : 171.845MHz
Note :

Polarization: *Horizontal*
Power : 9V
Distance: 3m

Mk.	Frequency (MHz)	Reading (dBm)	Detector	Corr. factor (dB)	Result (dBm)	Limit (dBm)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
*	171.8360	-16.52	peak	22.70	6.18	17.00	150	110	-10.82	

Registration number: W6M21310-13614-C-1
FCC ID: HYJCAM2WT

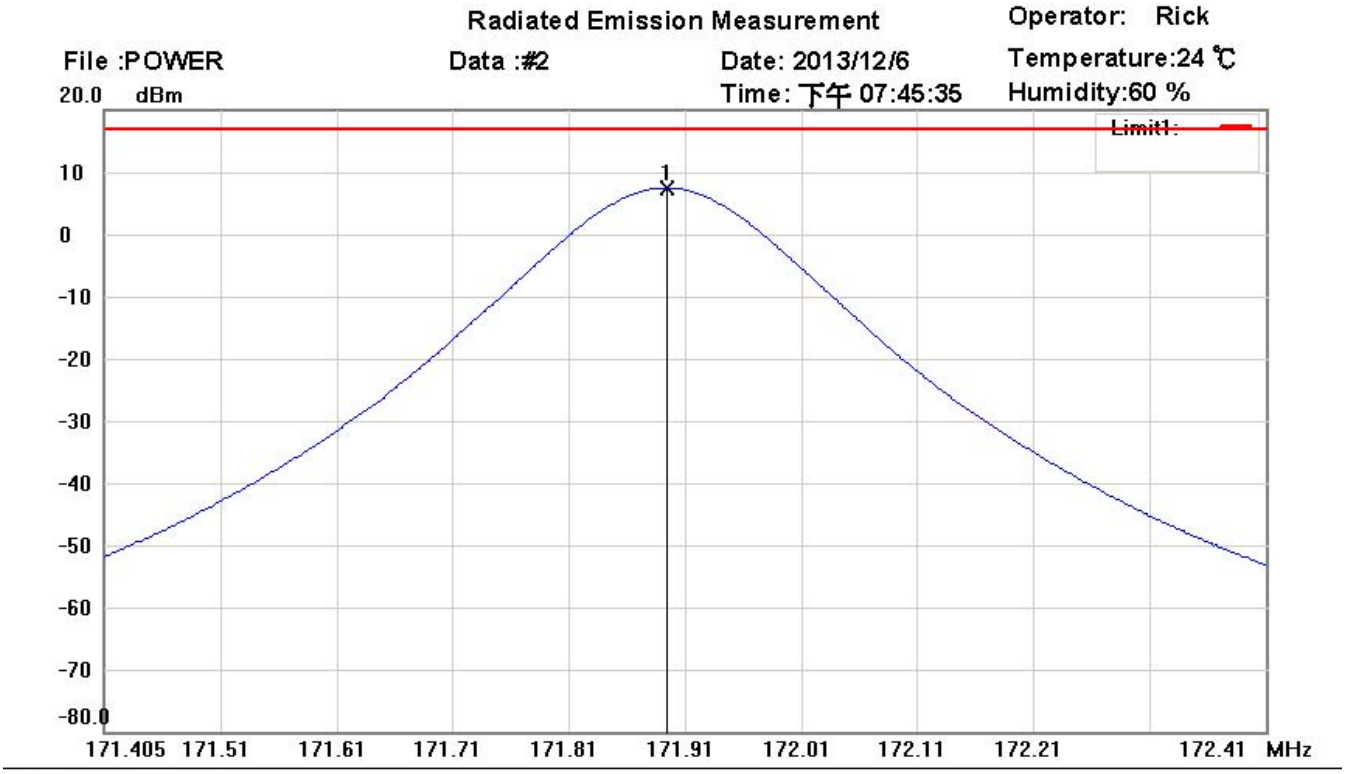


Site : Chamber
Condition : FCC_part 90 POWER(169-172)
EUT : W6M21310-13614
M/N: CAM-2W/T
Test Mode : 171.845MHz
Note :

Polarization: *Vertical*
Power : 9V
Distance: 3m

Mk.	Frequency (MHz)	Reading (dBm)	Detector	Corr. factor (dB)	Result (dBm)	Limit (dBm)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
*	171.8380	-31.42	peak	23.19	-8.23	17.00	150	280	-25.23	

Registration number: W6M21310-13614-C-1
FCC ID: HYJCAM2WT

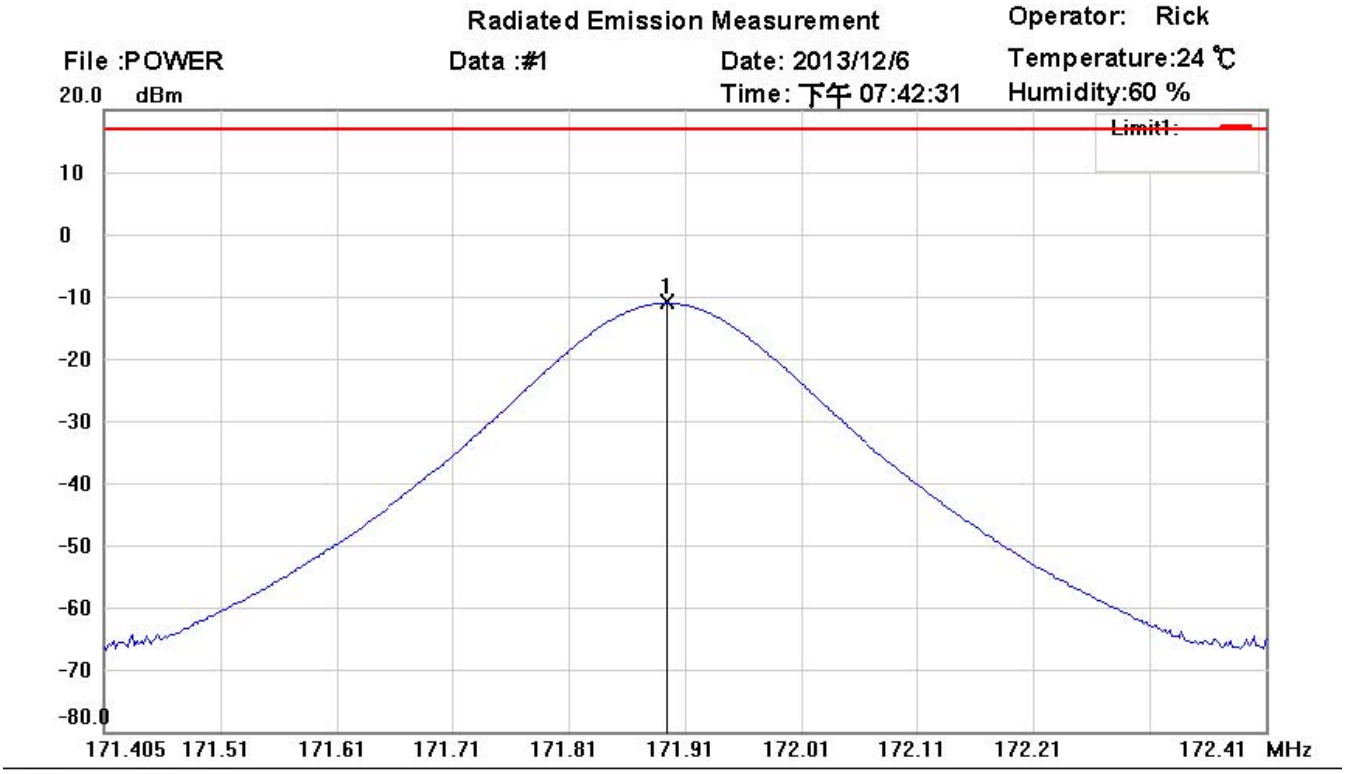


Site : Chamber
Condition : FCC_part 90 POWER(169-172)
EUT : W6M21310-13614
M/N: CAM-2W/T
Test Mode : 171.905MHz
Note :

Polarization: *Horizontal*
Power : 9V
Distance: 3m

Mk.	Frequency (MHz)	Reading (dBm)	Detector	Corr. factor (dB)	Result (dBm)	Limit (dBm)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
*	171.8900	-15.23	peak	22.70	7.47	17.00	150	300	-9.53	

Registration number: W6M21310-13614-C-1
FCC ID: HYJCAM2WT



Site : Chamber
Condition : FCC_part 90 POWER(169-172)
EUT : W6M21310-13614
M/N: CAM-2W/T
Test Mode : 171.905MHz
Note :

Polarization: *Vertical*
Power : 9V
Distance: 3m

Mk.	Frequency (MHz)	Reading (dBm)	Detector	Corr. factor (dB)	Result (dBm)	Limit (dBm)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
*	171.8900	-34.19	peak	23.20	-10.99	17.00	150	220	-27.99	

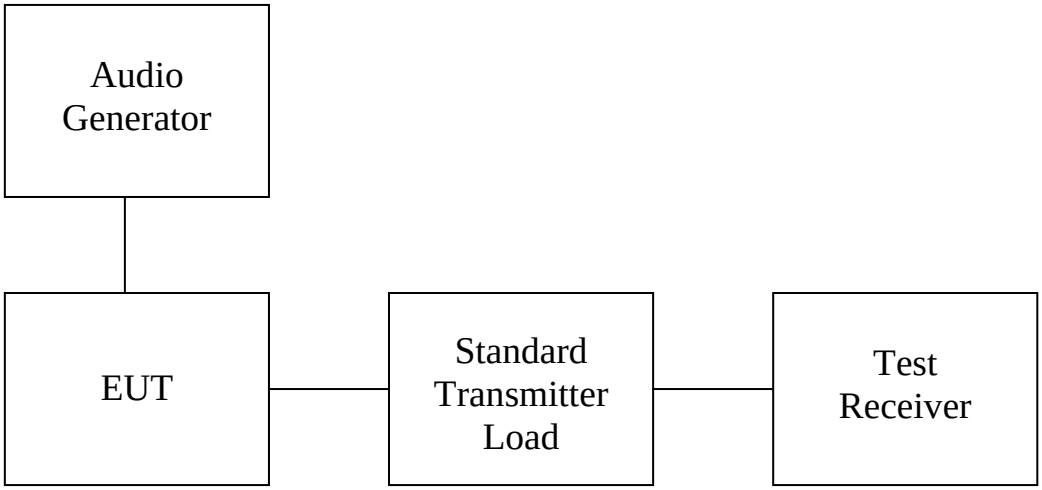
Limits: The output power shall not exceed 50 mW(17 dBm).

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

5 Modulation Characteristics, FCC part 2.1047

5.1 Test procedure

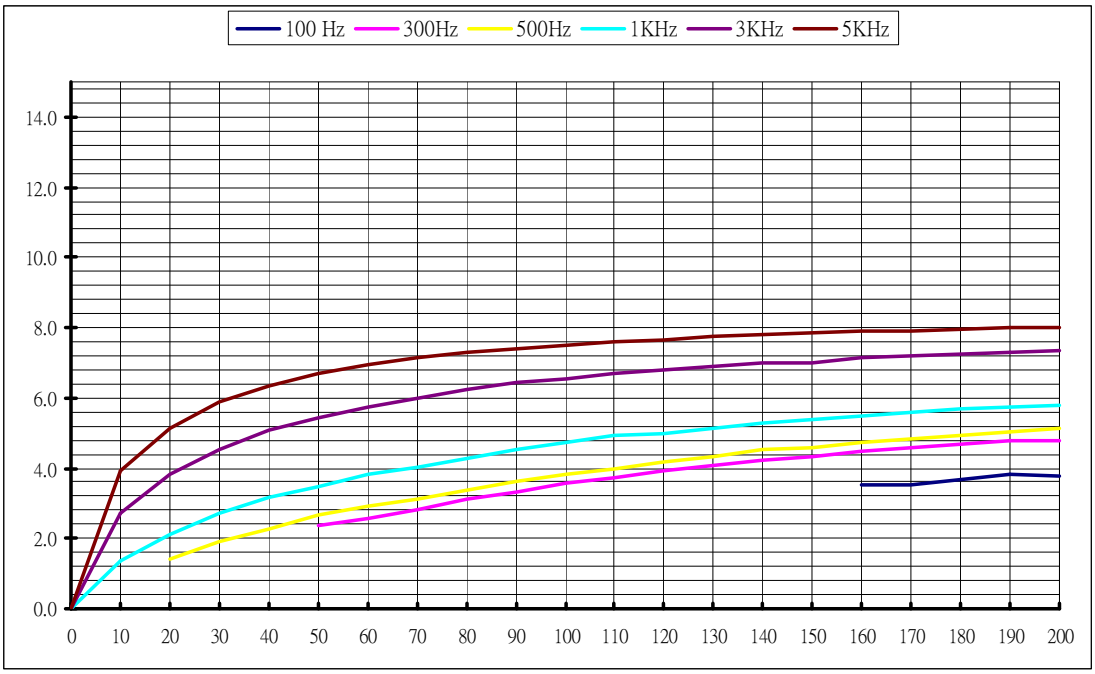
Modulation limiting is the transmitter circuit's ability to limit the transmitter from producing deviations in excess of rated system deviation.
The audio signal generator is connected to the audio input of the EUT with its full rating.
The modulation response is measured at certain modulation frequencies,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



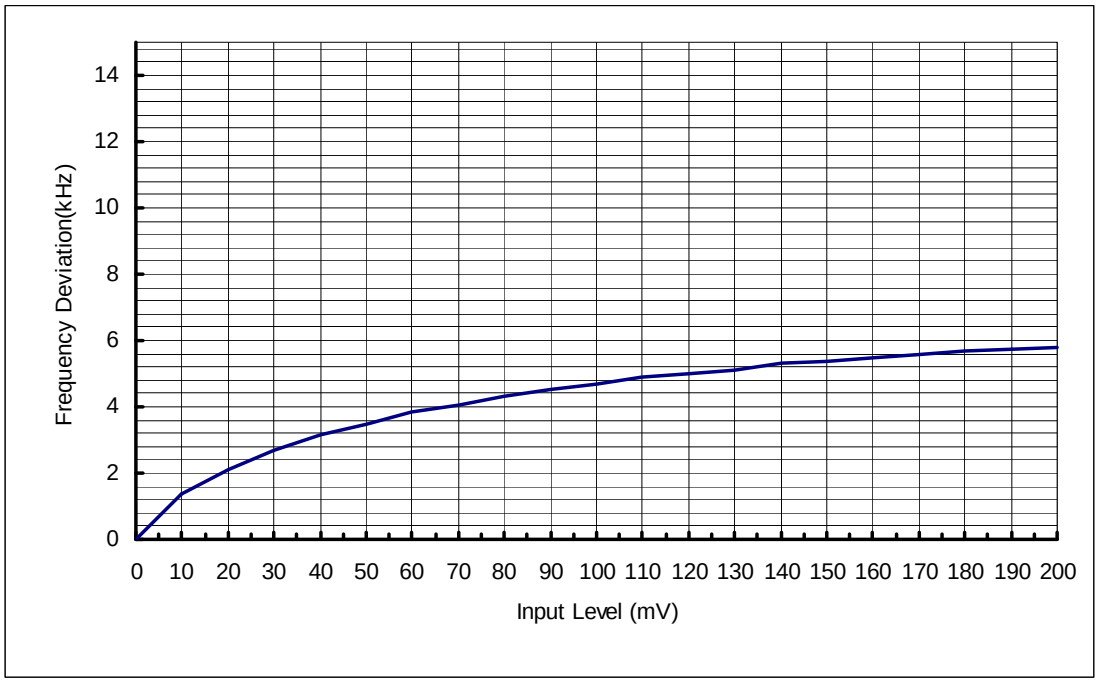
5.2 Test results

169.445 MHz

Modulation Characteristics

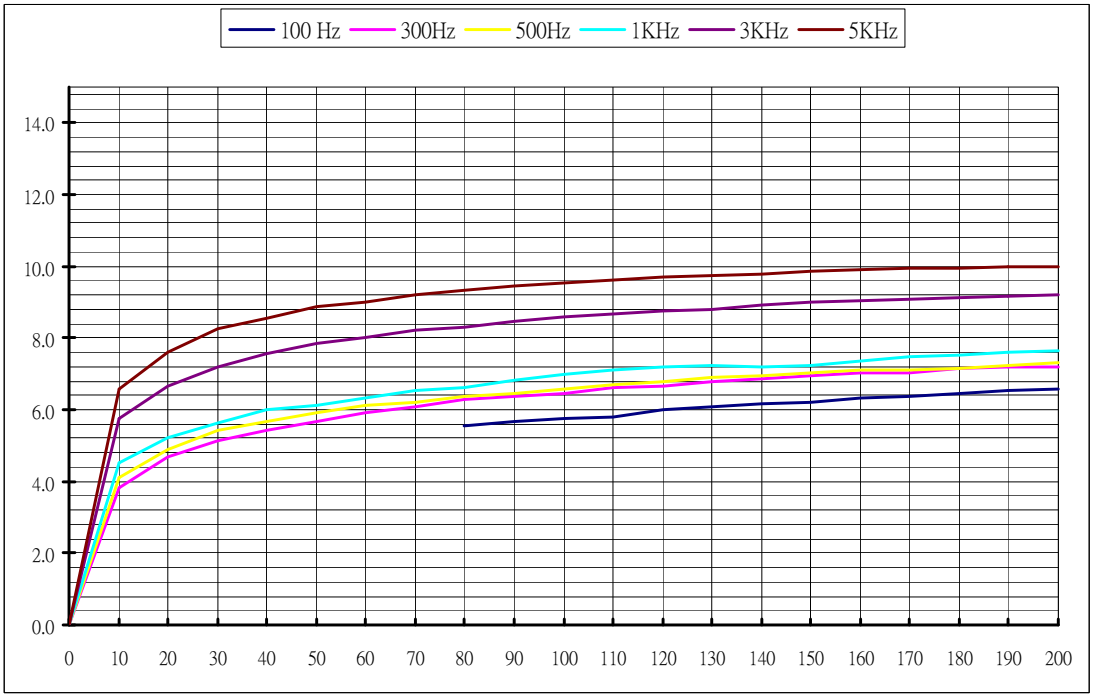


Frequency Deviation at 1kHz

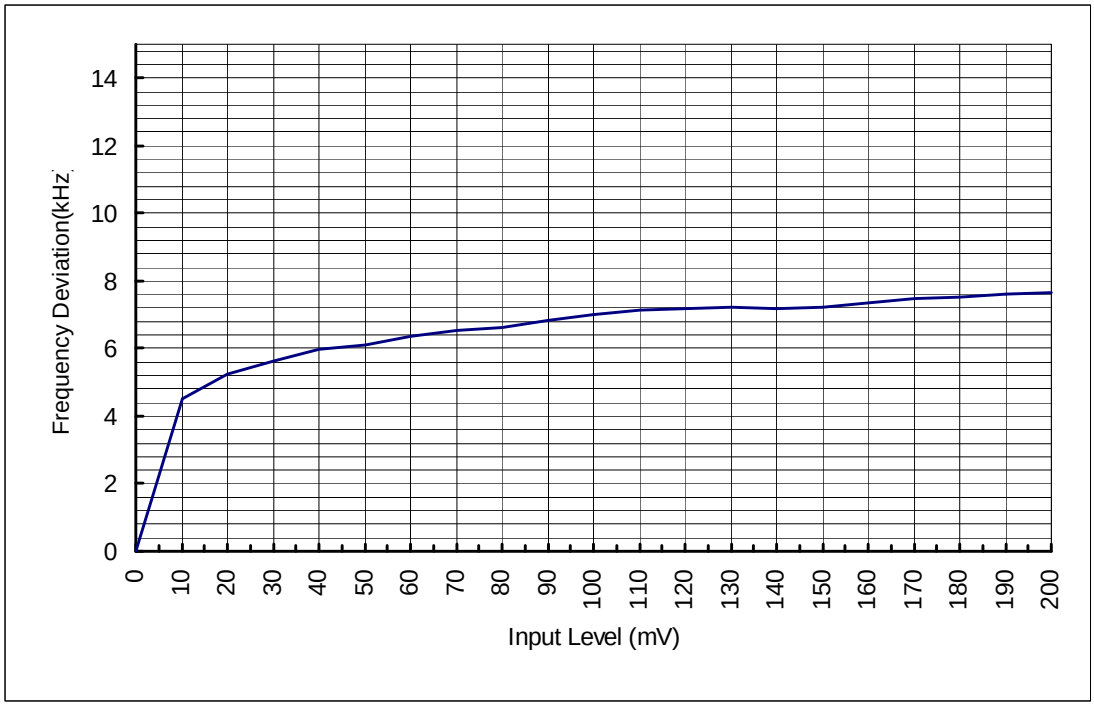


171.845 MHz

Modulation Characteristics

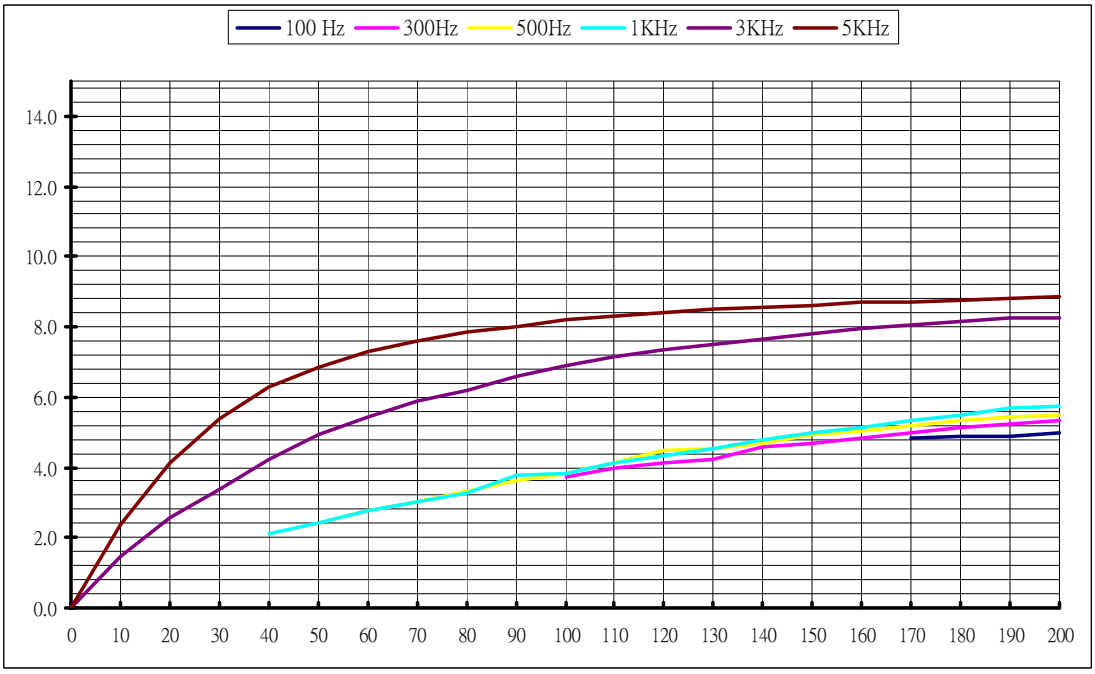


Frequency Deviation at 1kHz

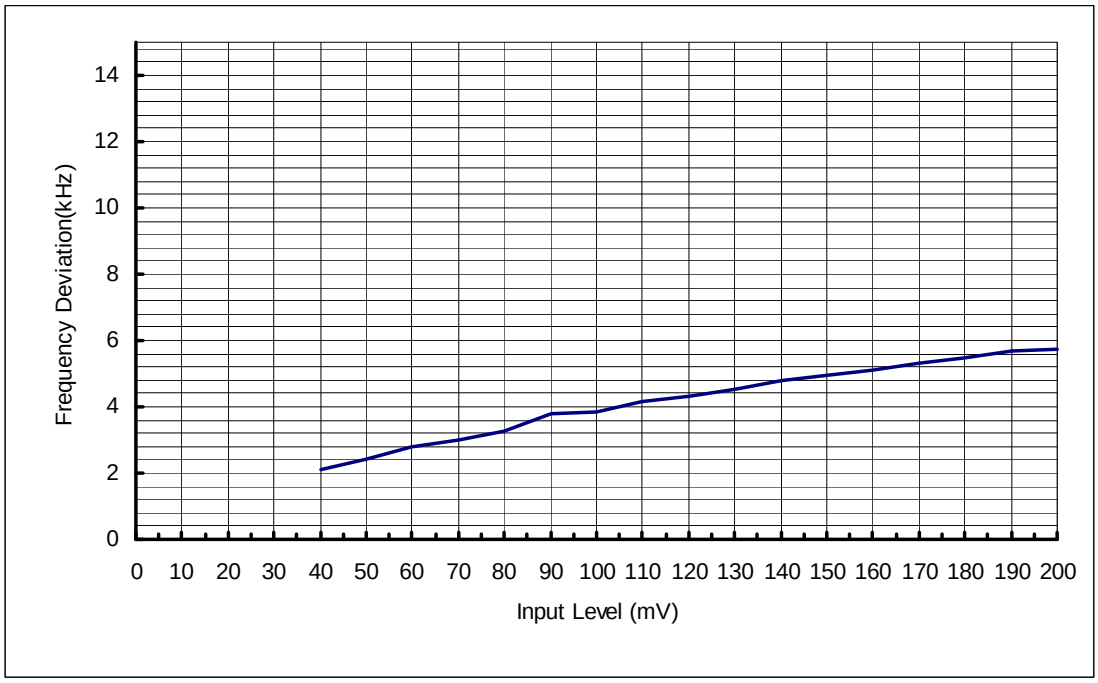


171.905MHz

Modulation Characteristics



Frequency Deviation at 1kHz



Test equipment used: ETSTW-RE 072, ETSTW-RE 002

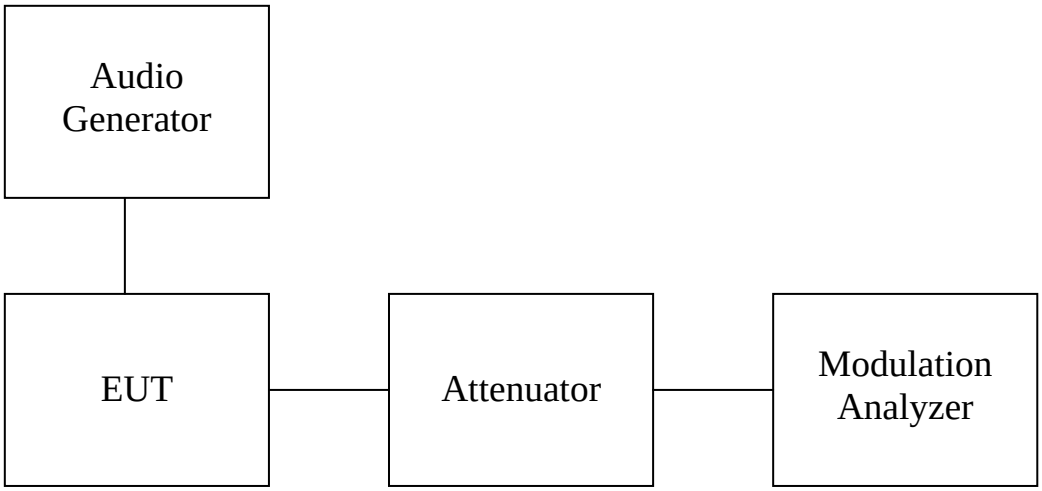
6 Audio frequency response , FCC 2.1047 (a)

6.1 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 :

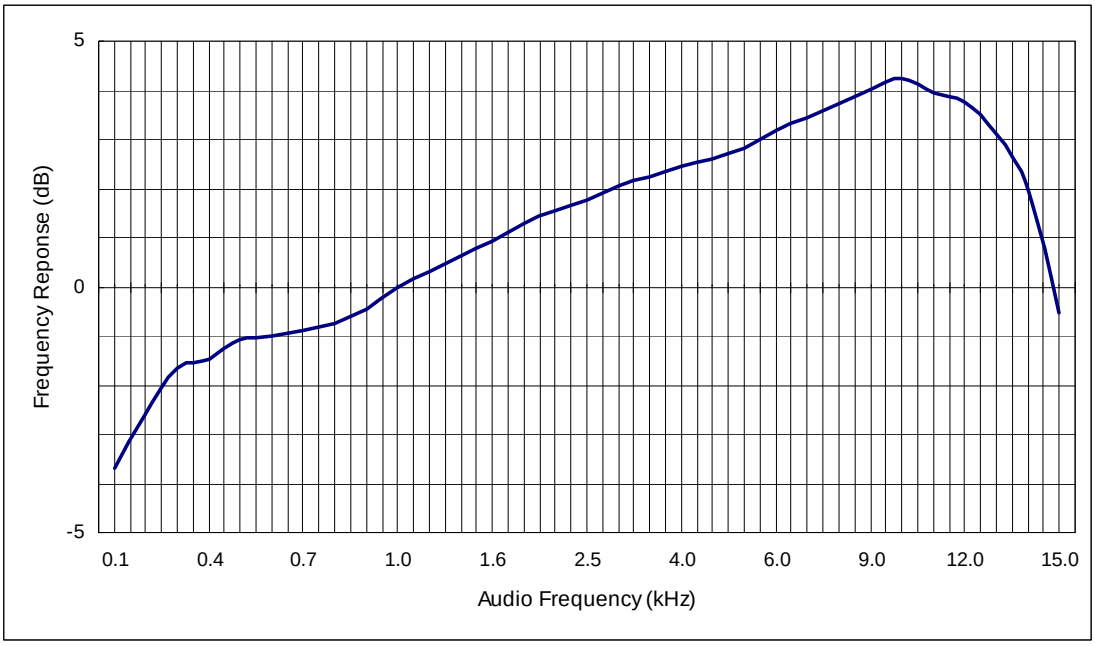
$$\text{Audio Frequency Response} = 20 \log [DEV_{Freq} / DEV_{ref}].$$



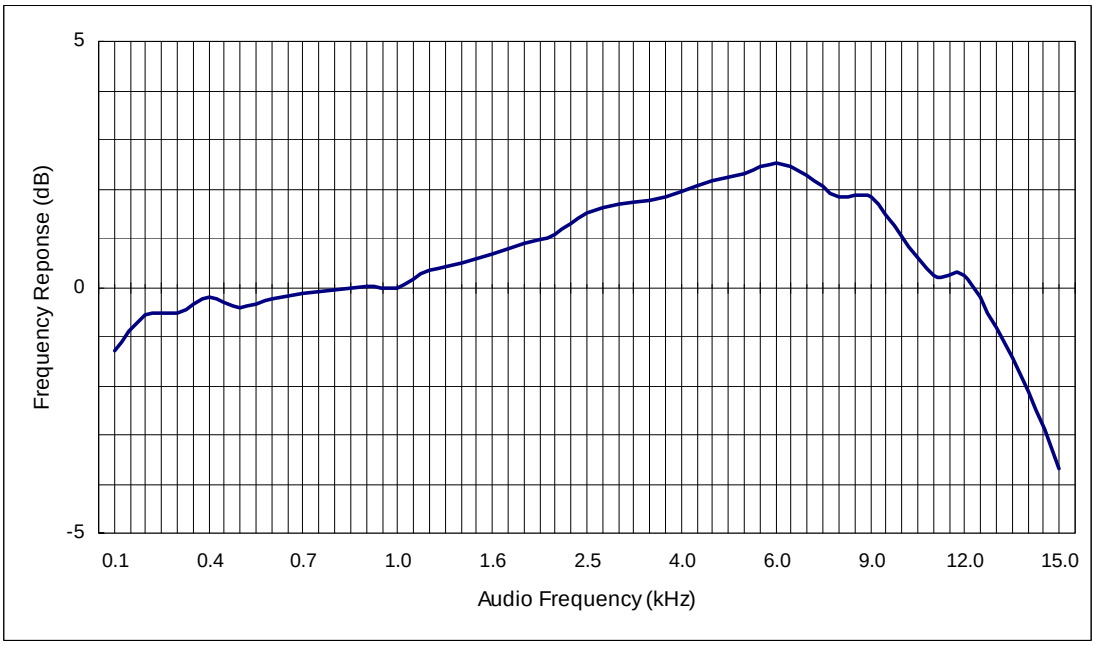
6.2 Test results

Audio Response

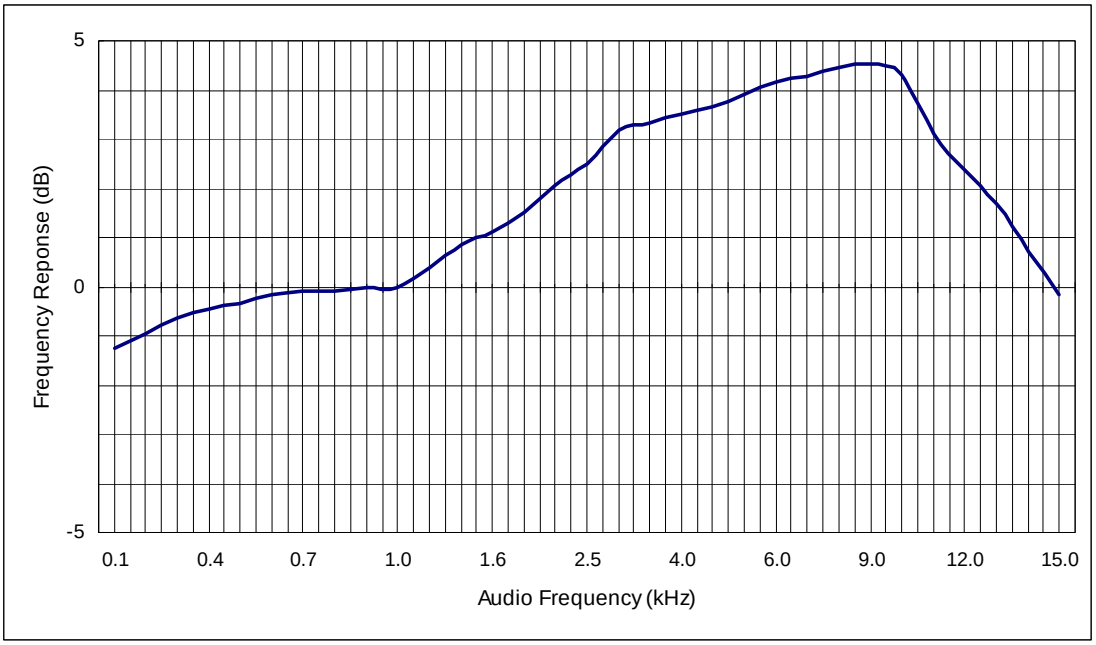
169.445 MHz



171.845MHz



171.905MHz



Test equipment used: ETSTW-RE 072, ETSTW-RE 002

7 Emission Bandwidth, FCC 90.265 (b)

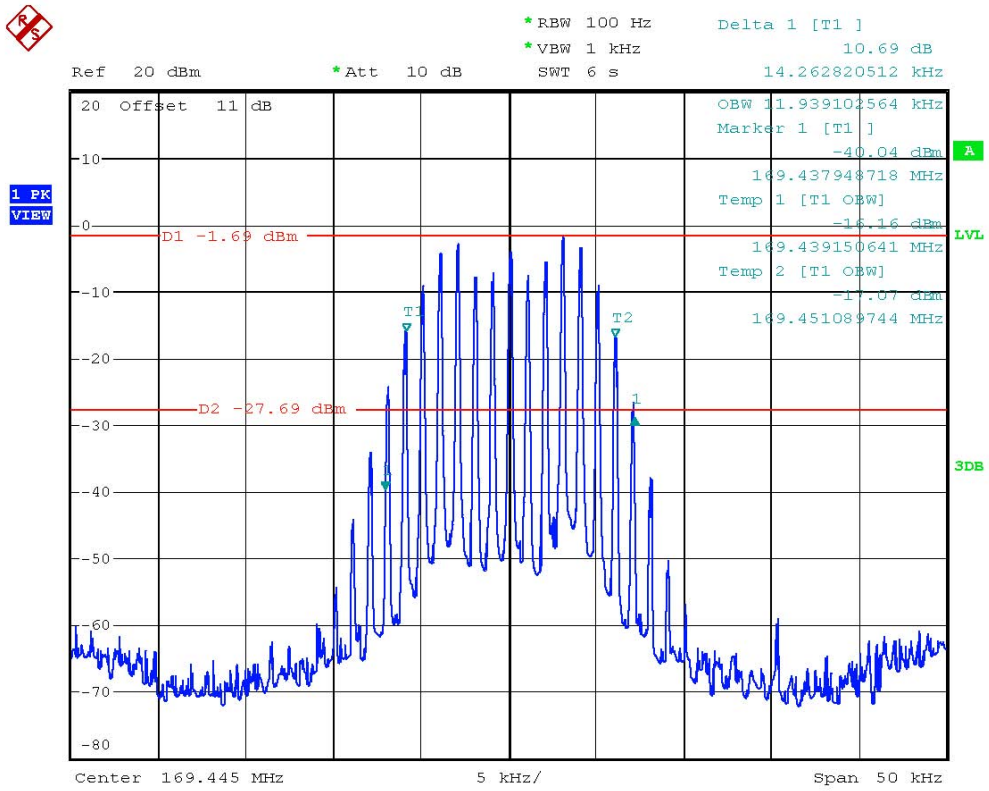
The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power.
Near the carrier an Emission Mask is defined by the standard.

7.1 Test procedure

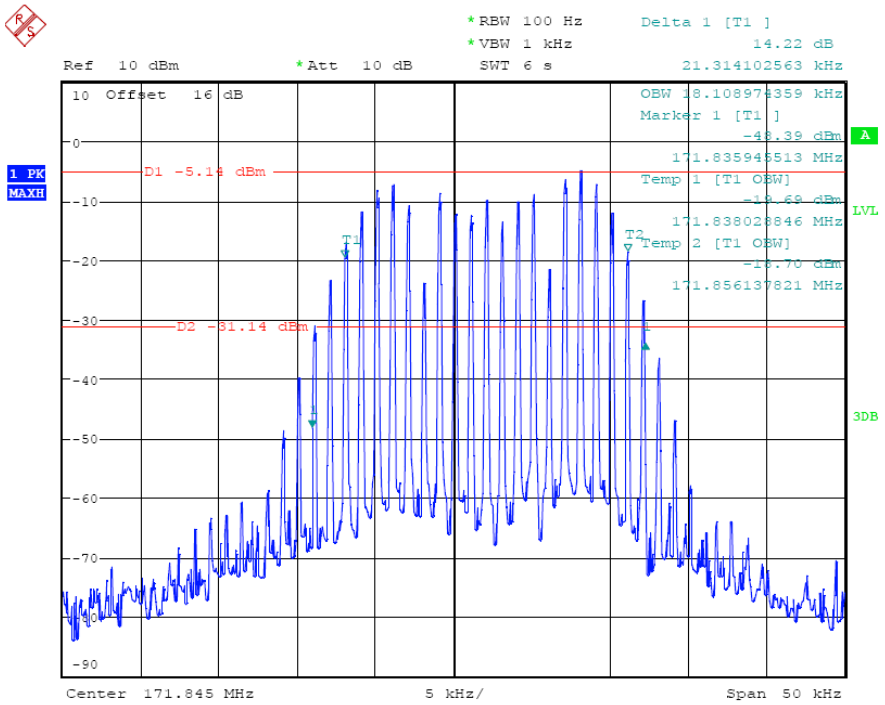
The RF output of the transceiver was connected to the input of the spectrum analyzer through sufficient attenuation.
Occupied Bandwidth was measured with a occupied bandwidth function of the analyzer.
The near the carrier emissions are measured by normal power measurement function of the analyzer.

7.2 Test Results

1 kHz

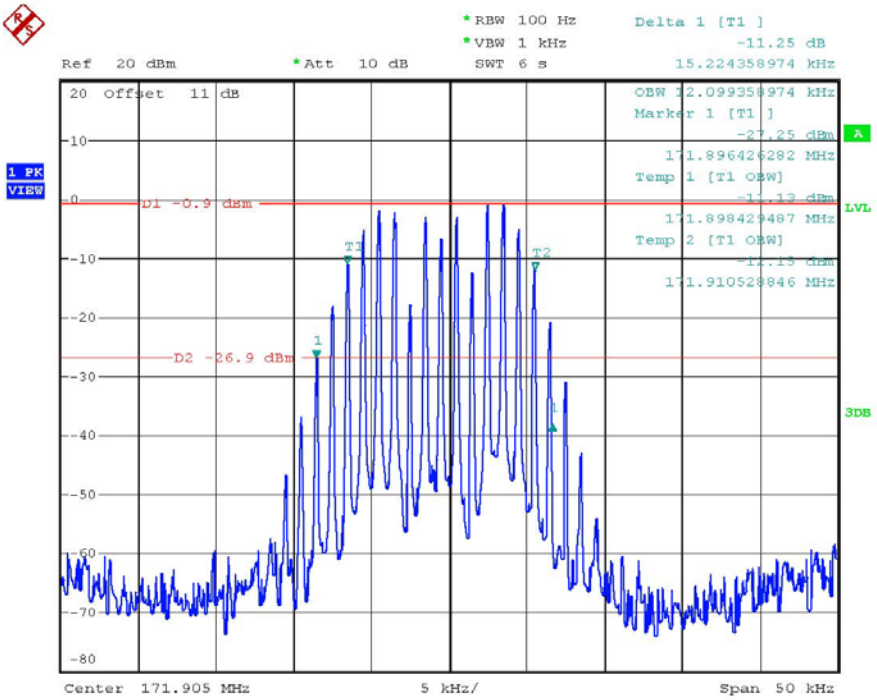


OBW BANDWIDTH 169.445MHz 1kHz
Date: 6.DEC.2013 14:38:05



OBW BANDWIDTH 171.845MHz 1kHz

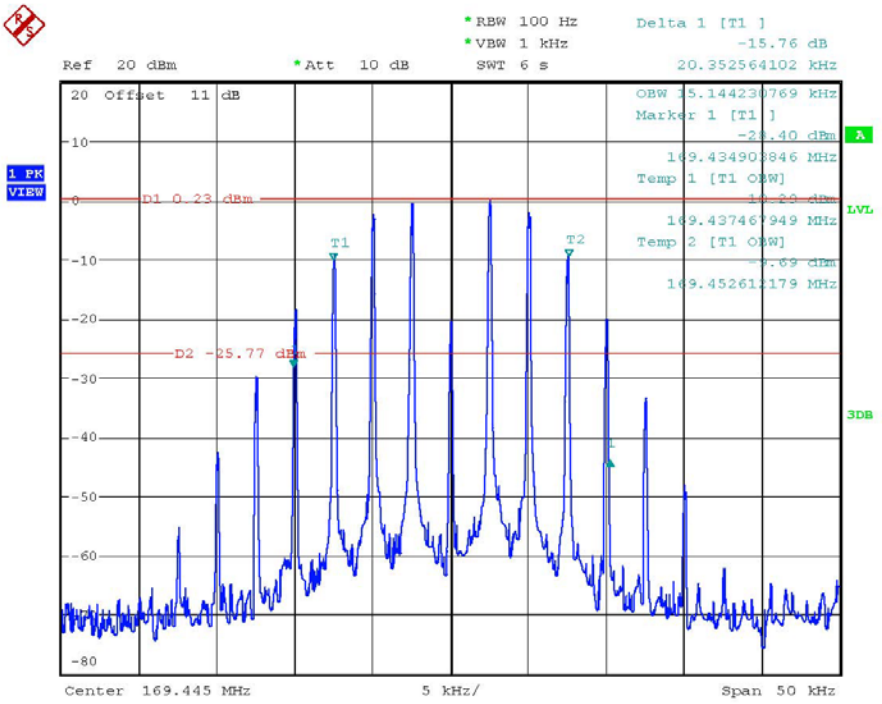
Date: 14.NOV.2013 05:04:47



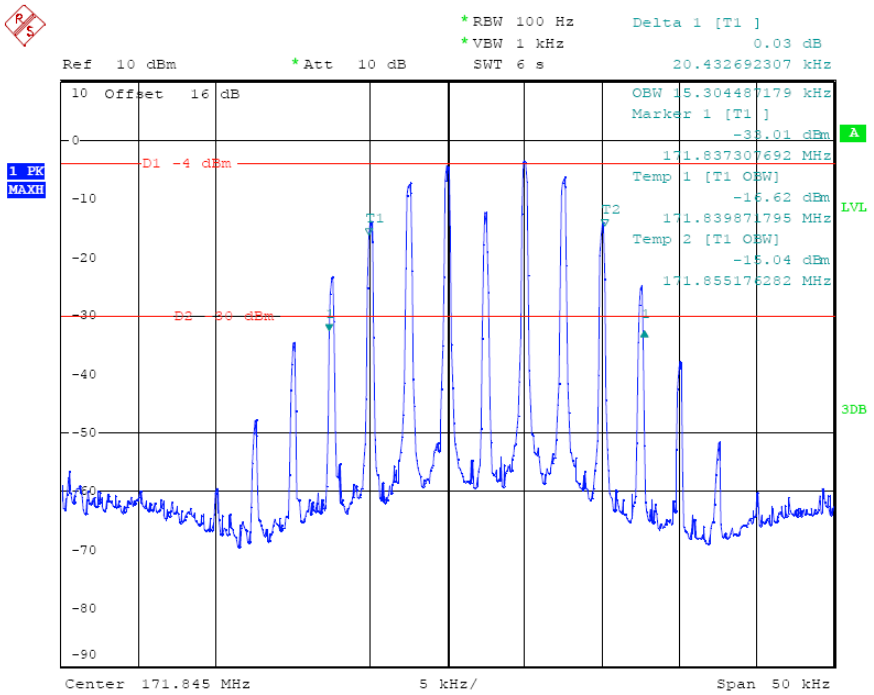
OBW BANDWIDTH 171.905MHz 1kHz

Date: 6.DEC.2013 14:39:34

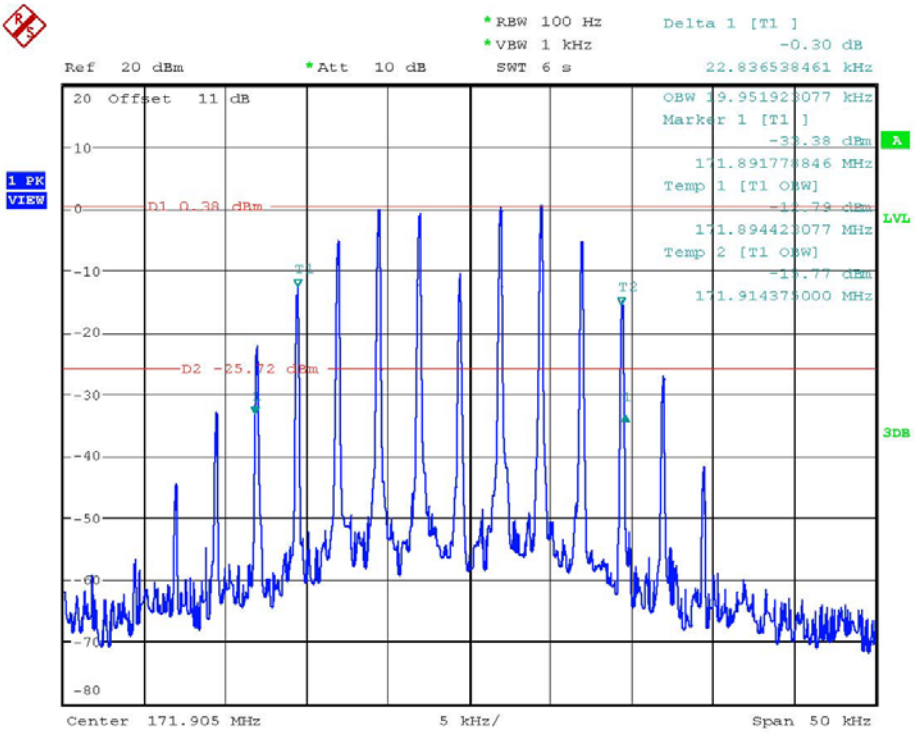
2.5 kHz



OBW BANDWIDTH 169.445MHz 2.5kHz
Date: 6.DEC.2013 14:36:38



OBW BANDWIDTH 171.845MHz 2.5kHz
Date: 16.NOV.2013 04:20:08



OBW BANDWIDTH 171.905MHz 2.5kHz
Date: 6.DEC.2013 14:41:02

7.3 Limit

The emission bandwidth shall not exceed 54 kHz.

Test equipment used: ETSTW-RE 055 , ETSTW-RE 072, ETSTW-RE 050, ETSTW-RE 051

8 Transmitter Spurious Radiated Emission

8.1 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.

8.2 Test Results

Model: CAM-2W/T Date: 2013/11/13~2013/12/6
Mode: 169.445MHz 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)
112.7856	-76.25	20.56	-55.69	-13.00	-42.69	100	150
150.6012	-79.92	21.79	-58.13	-13.00	-45.13	270	150
225.6513	-80.86	19.28	-61.58	-13.00	-48.58	100	150
337.8758	-80.79	25.58	-55.21	-13.00	-42.21	350	150
1418.8380	-61.34	0.87	-60.47	-13.00	-47.47	300	150
1817.6350	-60.60	1.55	-59.05	-13.00	-46.05	290	150

Polarization: Vertical

Frequency (MHz)	Reading (dBm) Peak	Factor (dB) Corr.	Result (dBm)	Limit (dBm)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
155.3707	-88.07	22.72	-65.35	-13.00	-52.35	120	150
167.6353	-88.01	23.16	-64.85	-13.00	-51.85	250	150
321.8437	-88.96	25.66	-63.30	-13.00	-50.30	300	150
490.1804	-87.22	28.49	-58.73	-13.00	-45.73	130	150
1202.4050	-61.41	0.45	-60.96	-13.00	-47.96	100	150
1484.9700	-61.01	1.56	-59.45	-13.00	-46.45	260	150

Mode: 171.845MHz
Polarization: Horizontal

Frequency (MHz)	Reading (dBm) Peak	Factor (dB) Corr.	Result (dBm)	Limit (dBm)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
114.4890	-81.88	20.46	-61.42	-13.00	-48.42	250	150
152.9860	-81.06	21.96	-59.10	-13.00	-46.10	320	150
191.1423	-86.48	21.81	-64.67	-13.00	-51.67	110	150
228.8577	-75.91	19.70	-56.21	-13.00	-43.21	230	150
342.6854	-81.24	25.72	-55.52	-13.00	-42.52	110	150
1805.6110	-55.91	1.60	-54.31	-13.00	-41.31	230	150

Polarization: Vertical

Frequency (MHz)	Reading (dBm) Peak	Factor (dB) Corr.	Result (dBm)	Limit (dBm)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
114.4890	-85.68	21.54	-64.14	-13.00	-51.14	70	150
151.2826	-88.46	22.38	-66.08	-13.00	-53.08	100	150
187.7355	-88.65	22.44	-66.21	-13.00	-53.21	230	150
228.8577	-79.81	20.62	-59.19	-13.00	-46.19	100	150
342.6854	-83.03	24.59	-58.44	-13.00	-45.44	230	150
1501.0020	-56.69	2.16	-54.53	-13.00	-41.53	100	150

Mode: 171.905MHz
Polarization: Horizontal

Frequency (MHz)	Reading (dBm) Peak	Factor (dB) Corr.	Result (dBm)	Limit (dBm)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
114.4890	-74.81	20.46	-54.35	-13.00	-41.35	300	150
152.9860	-76.86	21.96	-54.90	-13.00	-41.90	100	150
342.6854	-80.76	25.72	-55.04	-13.00	-42.04	270	150
515.8317	-86.03	26.85	-59.18	-13.00	-46.18	100	150
1030.0600	-56.95	-1.02	-57.97	-13.00	-44.97	200	150
1893.7880	-59.46	1.19	-58.27	-13.00	-45.27	100	150

Polarization: Vertical

Frequency (MHz)	Reading (dBm) Peak	Factor (dB) Corr.	Result (dBm)	Limit (dBm)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
104.6092	-89.30	22.13	-67.17	-13.00	-54.17	100	150
152.9860	-88.01	22.52	-65.49	-13.00	-52.49	250	150
547.8958	-87.19	29.62	-57.57	-13.00	-44.57	140	150
705.0100	-87.22	32.10	-55.12	-13.00	-42.12	300	150
1494.9900	-61.09	1.99	-59.10	-13.00	-46.10	90	150
1885.7720	-55.09	1.00	-54.09	-13.00	-41.09	260	150

Note:

1. **Correction Factor = Antenna Gain + Cable Loss + Amplifier Gain**
2. **The formula of measured value as: Test Result = Reading + Correction Factor**
3. **All not in the table noted test results are more than 20 dB below the relevant limits.**
4. **Measurement uncertainty: 30-200MHz：±2.11 dB, 200-1000MHz：±2.11 dB, 1-18GHz：±2.71 dB; Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.**
5. **See attached diagrams in appendix.**

8.3 Limits

Compliance with § 90.210 requires that any emission be attenuated below the transmitter power at least $43 + 10 \log_{10} P$ (P = transmitter power in Watts).

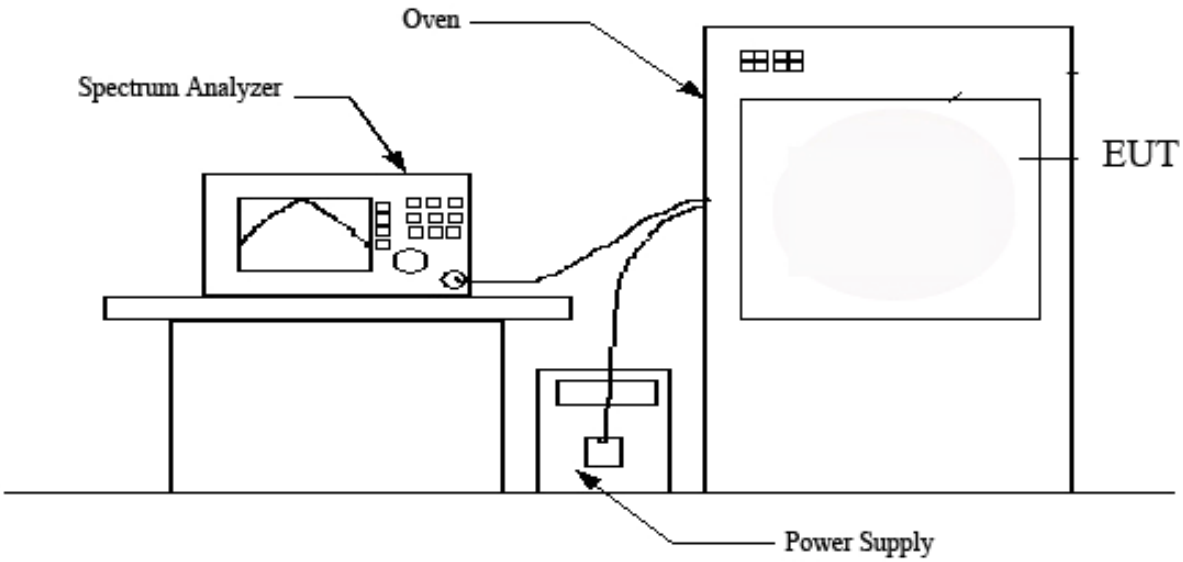
Test equipment used: ETSTW-RE 004, ETSTW-RE 062, ETSTW-RE 111, ETSTW-RE 030

Explanation : See attached diagrams in appendix.

9 Frequency Stability vs. Temperature , FCC 2.1055 , 90.265 (b)

9.1 Test procedure

1. The transmitter output is connected to the spectrum analyzer through an attenuator.
2. Set RBW of spectrum analyzer to 1kHz and VBW to 1kHz.
3. Use peak detector mode, Max-hold and search the peak of trace 1.
4. According to the part 2.1055(d)(1), the supply voltage has to be changed from 85 to 115 percent of the nominal value.
5. According to the part 2.1055(a)(1), extreme temperature has to be changed from -20℃ to 50℃.
6. Read the frequency of the carrier and calculate the deviation.



9.2 Test Results

169.445 MHz

Voltage VS. Frequency Stability	
Voltage	Measurement Frequency (MHz)
9 VDC	169.445
9 VDC	169.445
7.65 VDC	169.44492
Max Deviation (MHz)	0.00008
Max Deviation (ppm)	0.47
Limit (ppm)	191.8
Temperature VS. Frequency Stability	
Temperature (℃)	Measurement Frequency (MHz)
-20.00	169.440112
-10.00	169.440512
0.00	169.441394
10.00	169.442756
20.00	169.444119
30.00	169.445406
40.00	169.446025
50.00	169.447362
Max Deviation (MHz)	0.004888
Max Deviation (ppm)	-28.84
Limit (ppm)	191.8

171.845MHz

Voltage VS. Frequency Stability	
Voltage	Measurement Frequency(MHz)
9 VDC	171.847788
9 VDC	171.847788
7.65 VDC	171.847788
Max Deviation (MHz)	0.002788
Max Deviation (ppm)	16.22
Limit (ppm)	189
Temperature VS. Frequency Stability	
Temperature (℃)	Measurement Frequency(MHz)
-20.00	171.839647
-10.00	171.840769
0.00	171.842660
10.00	171.844022
20.00	171.846731
30.00	171.848044
40.00	171.851314
50.00	171.853237
Max Deviation (MHz)	0.005353
Max Deviation (ppm)	-31.15
Limit (ppm)	189

171.905 MHz

Voltage VS. Frequency Stability	
Voltage	Measurement Frequency (MHz)
9 VDC	171.904119
9 VDC	171.904119
7.65 VDC	171.904199
Max Deviation (MHz)	0.000881
Max Deviation (ppm)	5.12
Limit (ppm)	189
Temperature VS. Frequency Stability	
Temperature (℃)	Measurement Frequency (MHz)
-20.00	171.899151
-10.00	171.899151
0.00	171.900192
10.00	171.901394
20.00	171.903317
30.00	171.904679
40.00	171.906362
50.00	171.908205
Max Deviation (MHz)	0.005849
Max Deviation (ppm)	-34.02
Limit (ppm)	189

Limit : The frequency stability of wireless microphones shall limit the total emission to within ±32.5 kHz of the assigned frequency.

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

10 Line Conducted Emission , FCC 15.207

10.1 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.

10.2 Test Results

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

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 = ±1.60 dB; Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.**
6. **Up Line: QP Limit Line, Down Line: Ave Limit Line.**
7. **This test is not required because the EUT is battery-used.**

Limits:

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

Test equipment used: ETSTW-CE 001, ETSTW-CE 004, ETSTW-CE 006, ETSTW-RE 045

Appendix

A Measurement diagrams

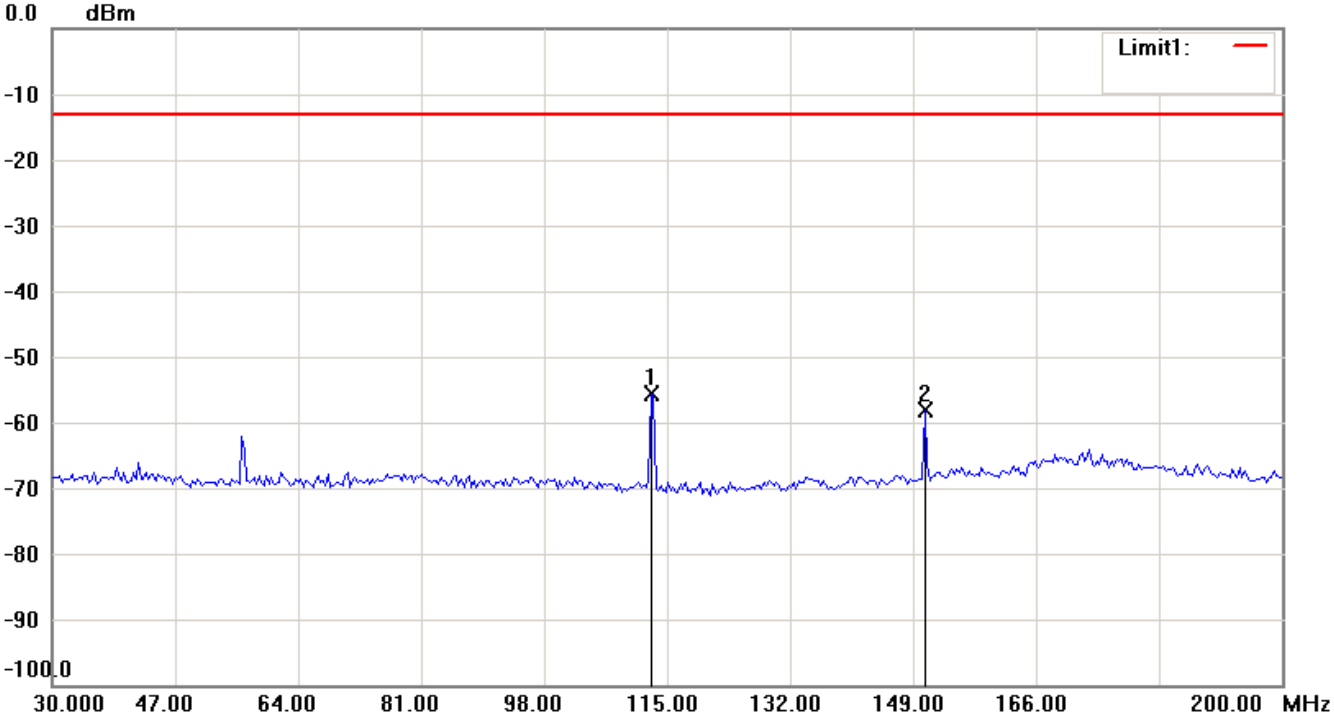
Radiation Spurious Emission

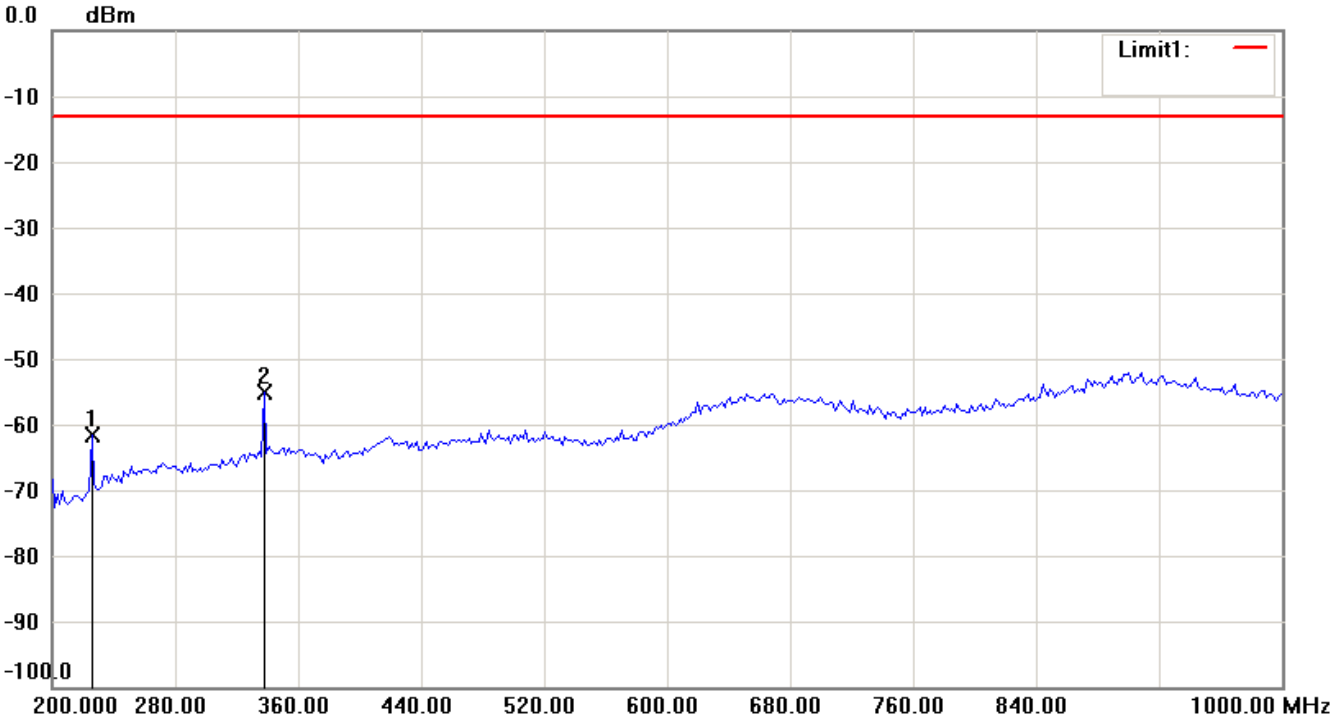
B Photos

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

Registration number: W6M21310-13614-C-1
FCC ID: HYJCAM2WT

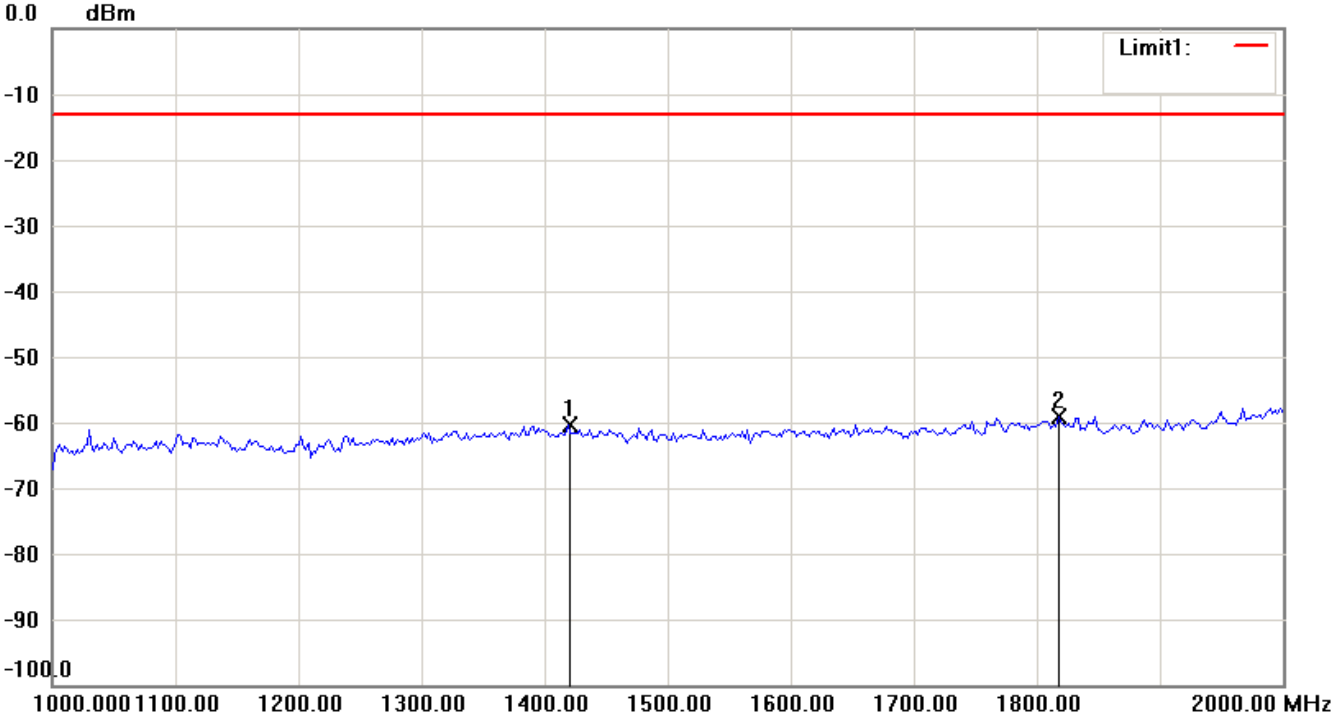
Radiation Spurious Emission
169.445 MHz
Antenna Polarization H



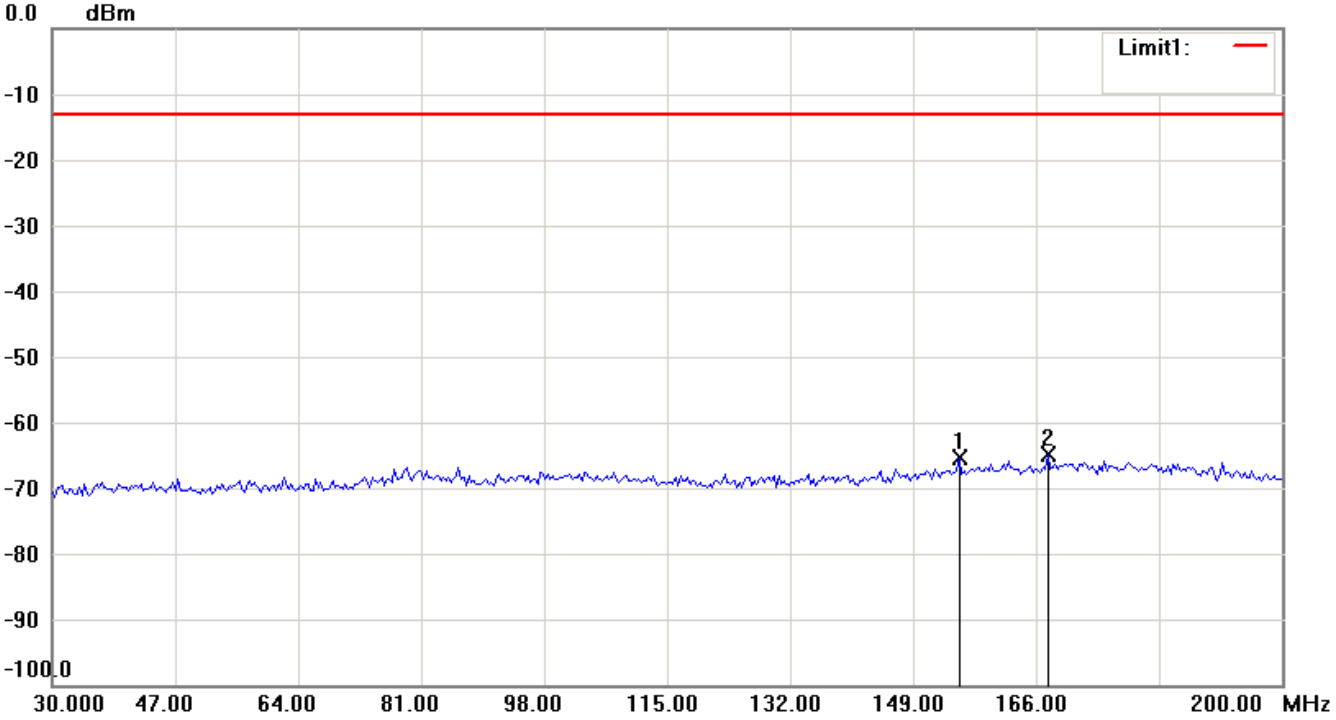


Note:

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.**

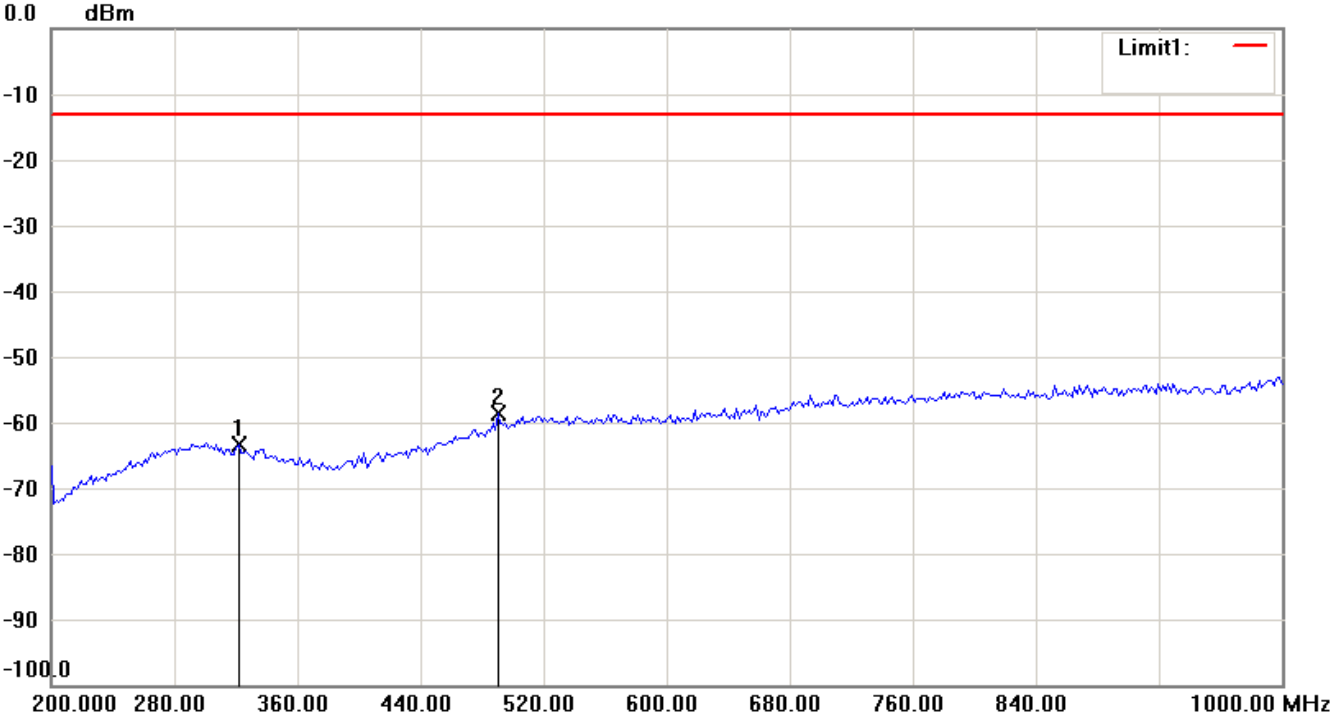


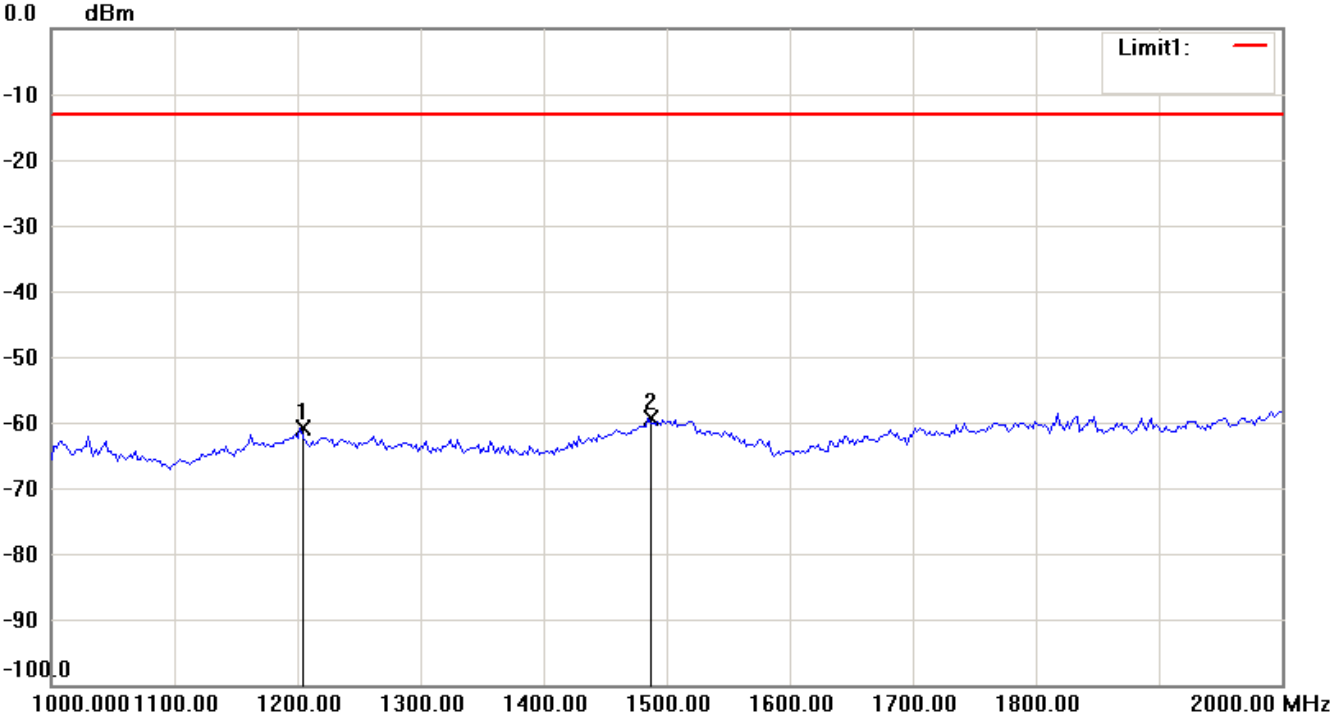
Antenna Polarization V



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.**





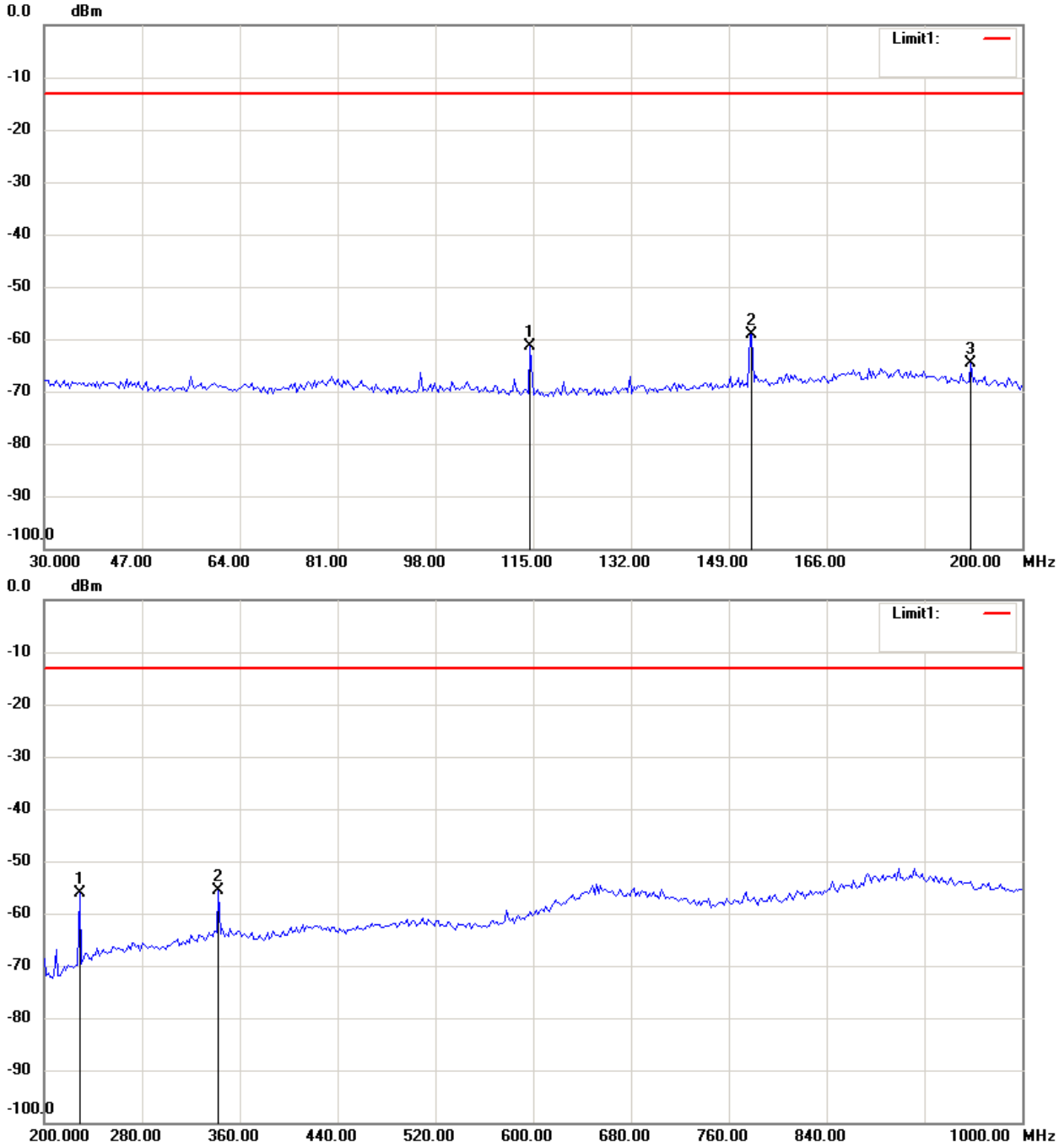
Note:

1. **The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.**
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: W6M21310-13614-C-1
FCC ID: HYJCAM2WT

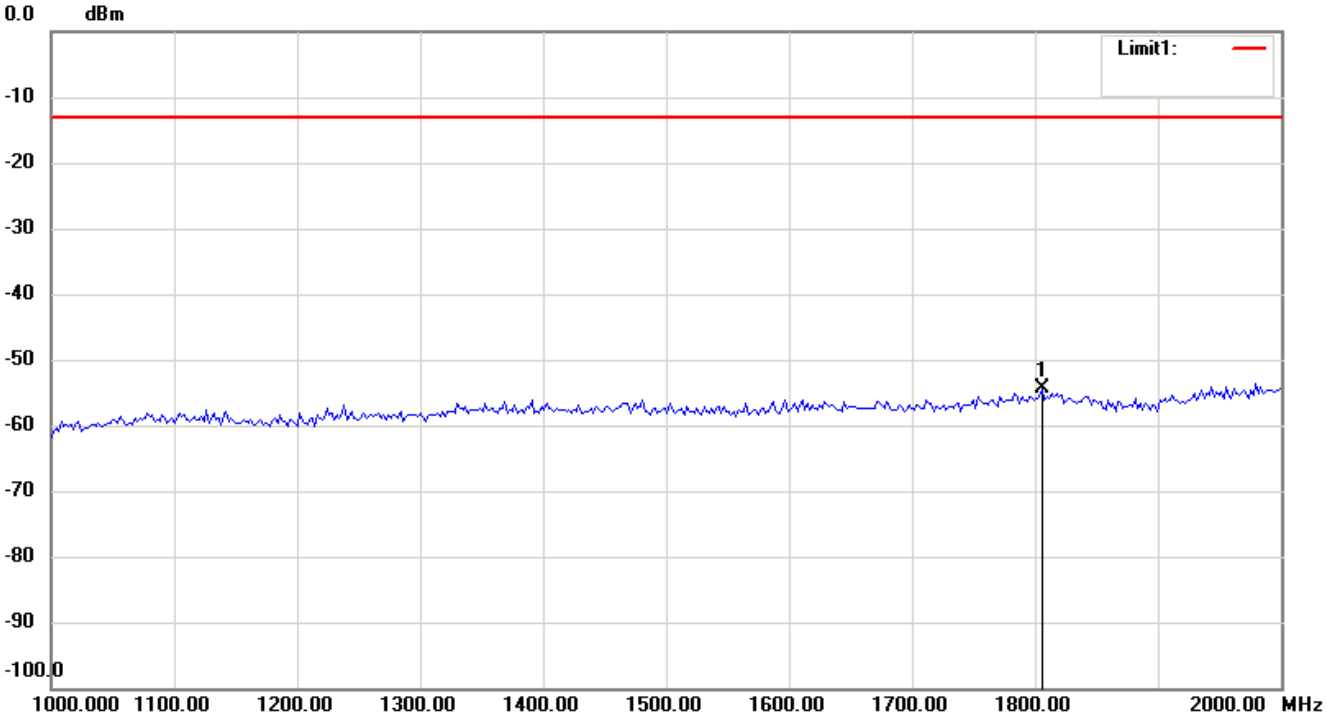
171.845MHz

Antenna Polarization H

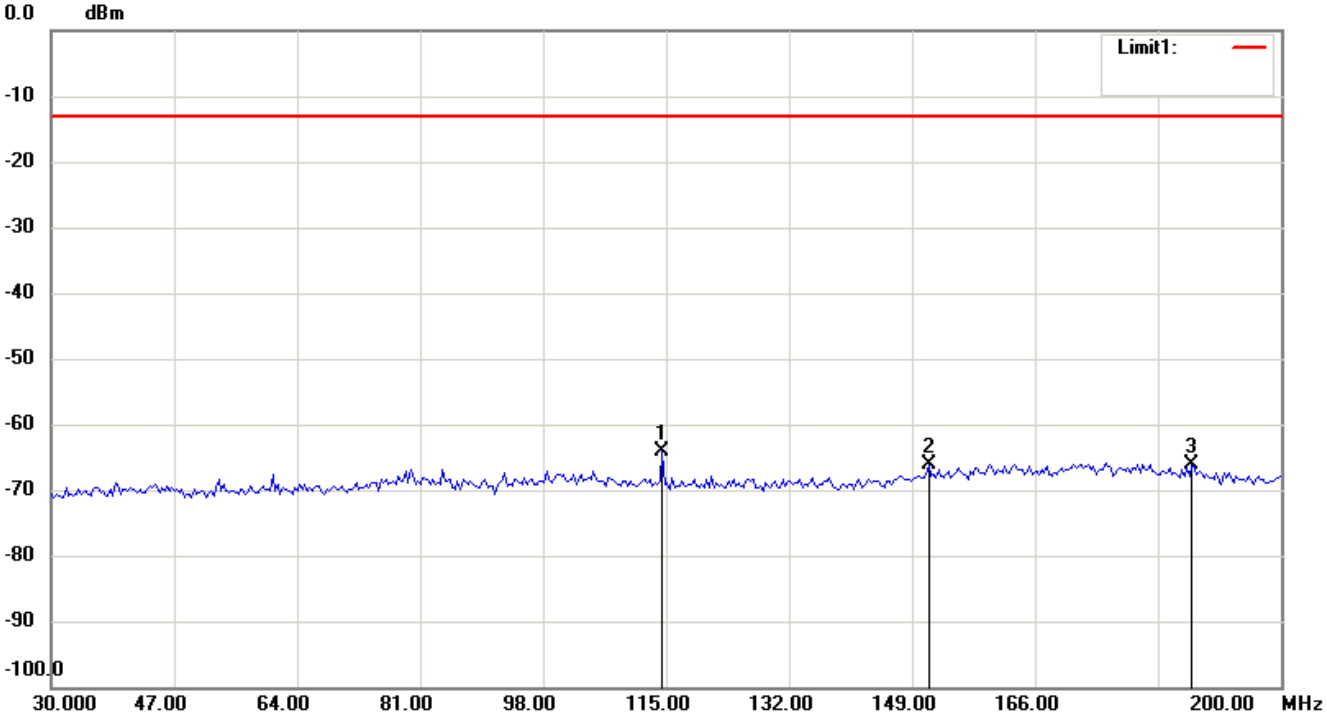


Note:

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.**

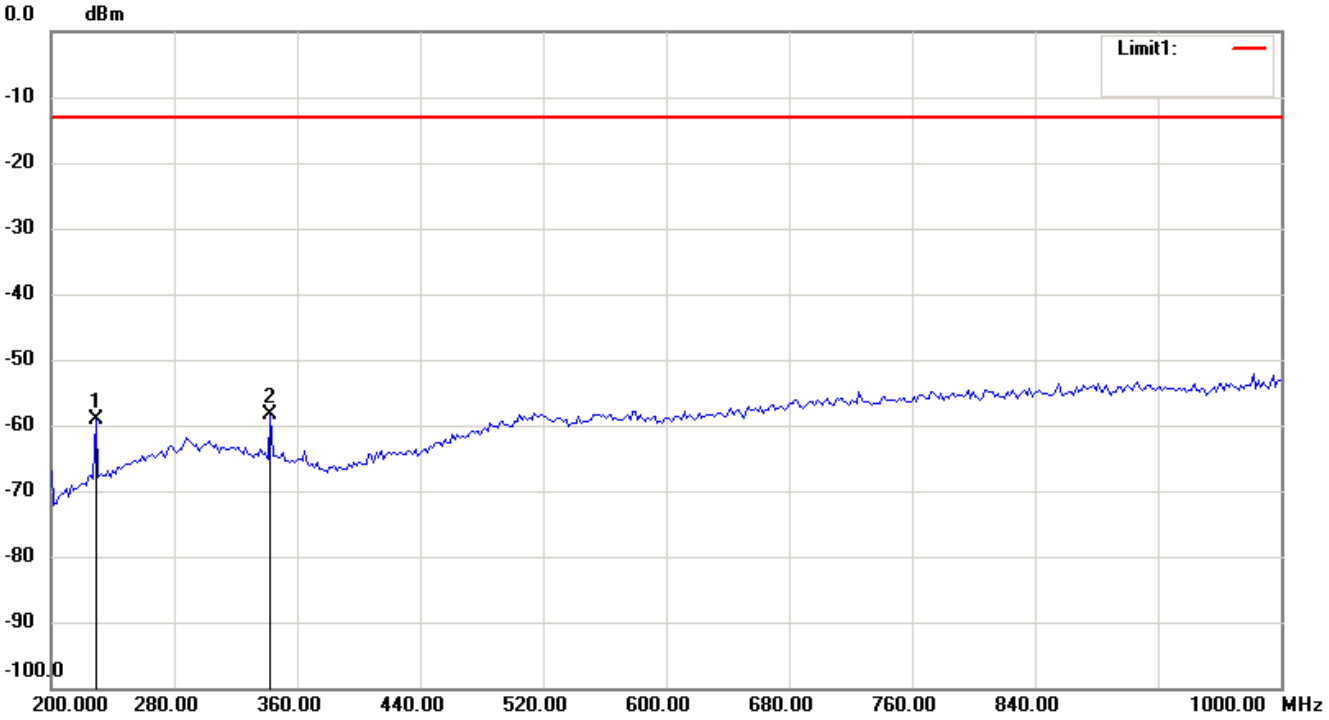


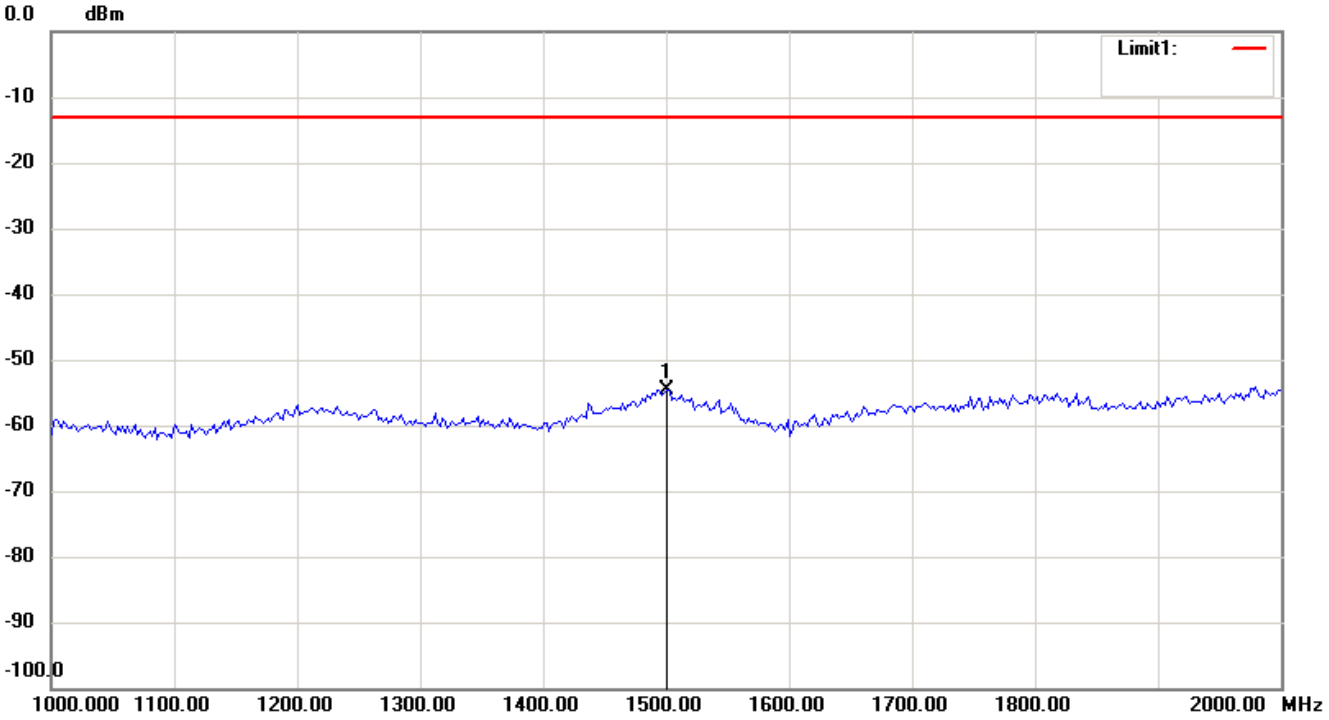
Antenna Polarization V



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.**



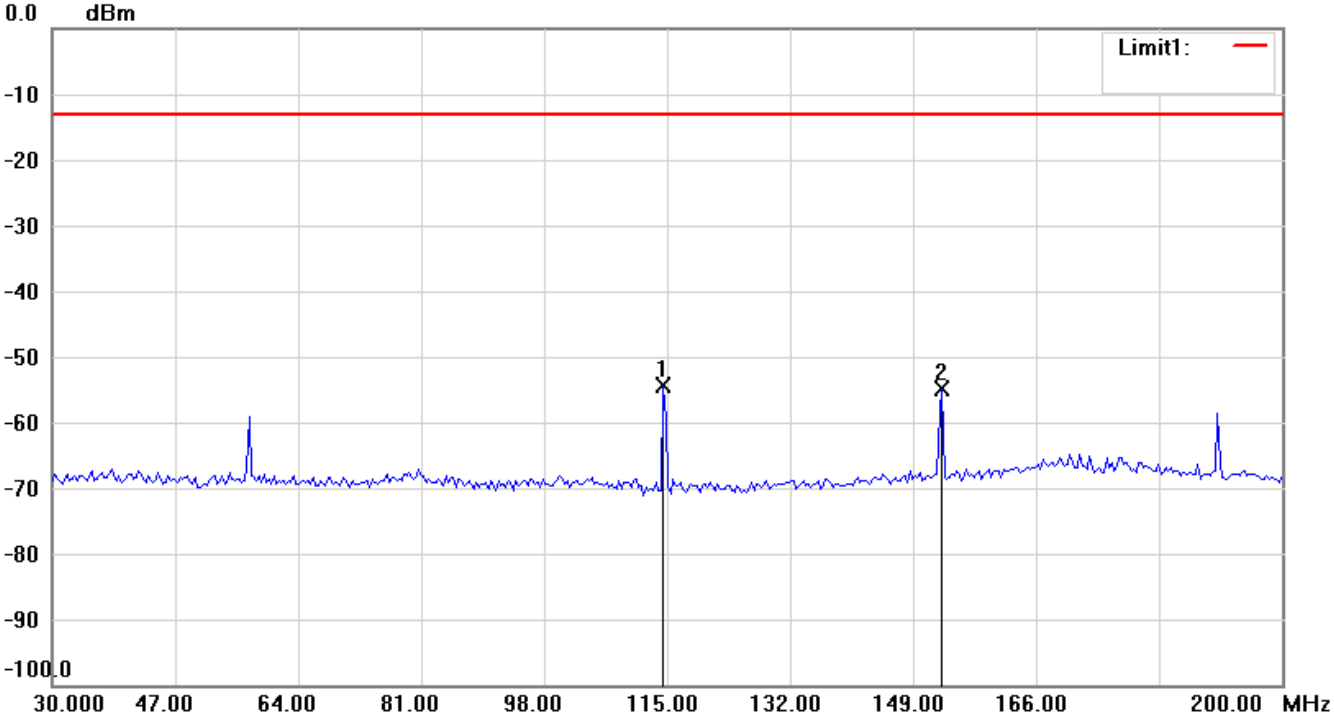


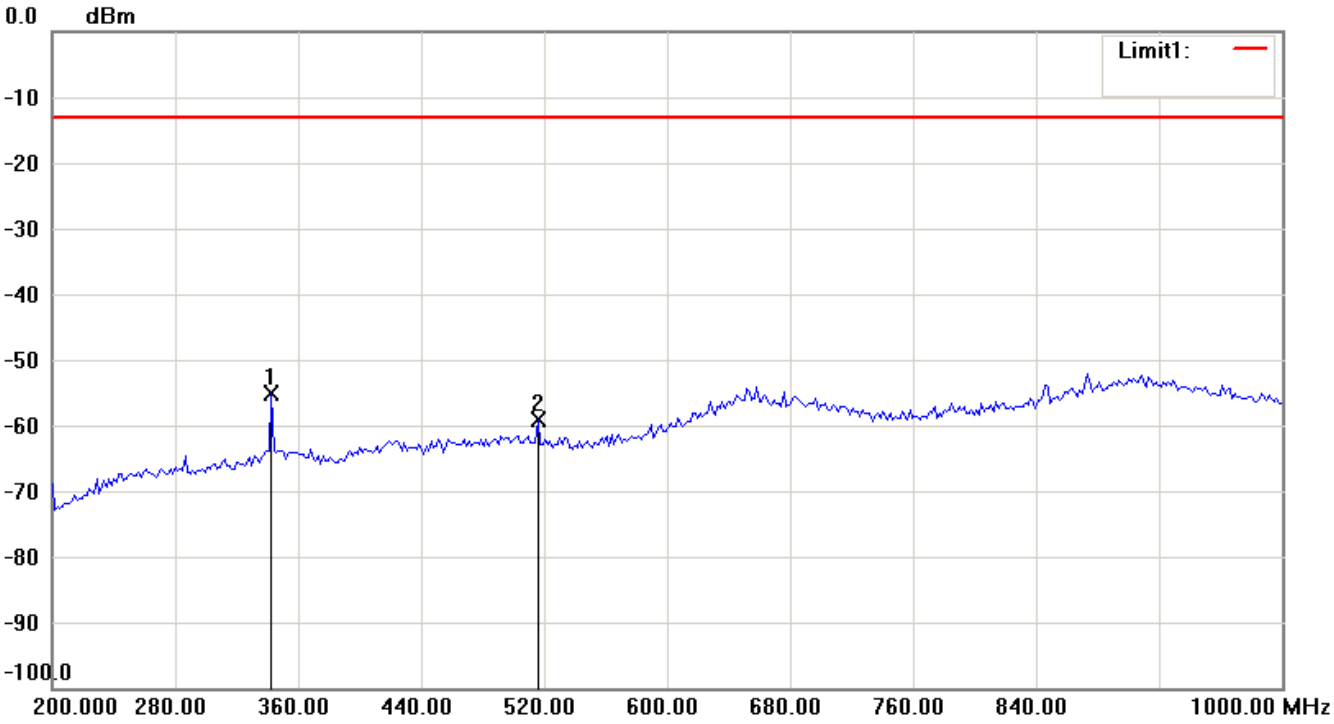
Note:

1. **The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.**
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.**

171.905 MHz

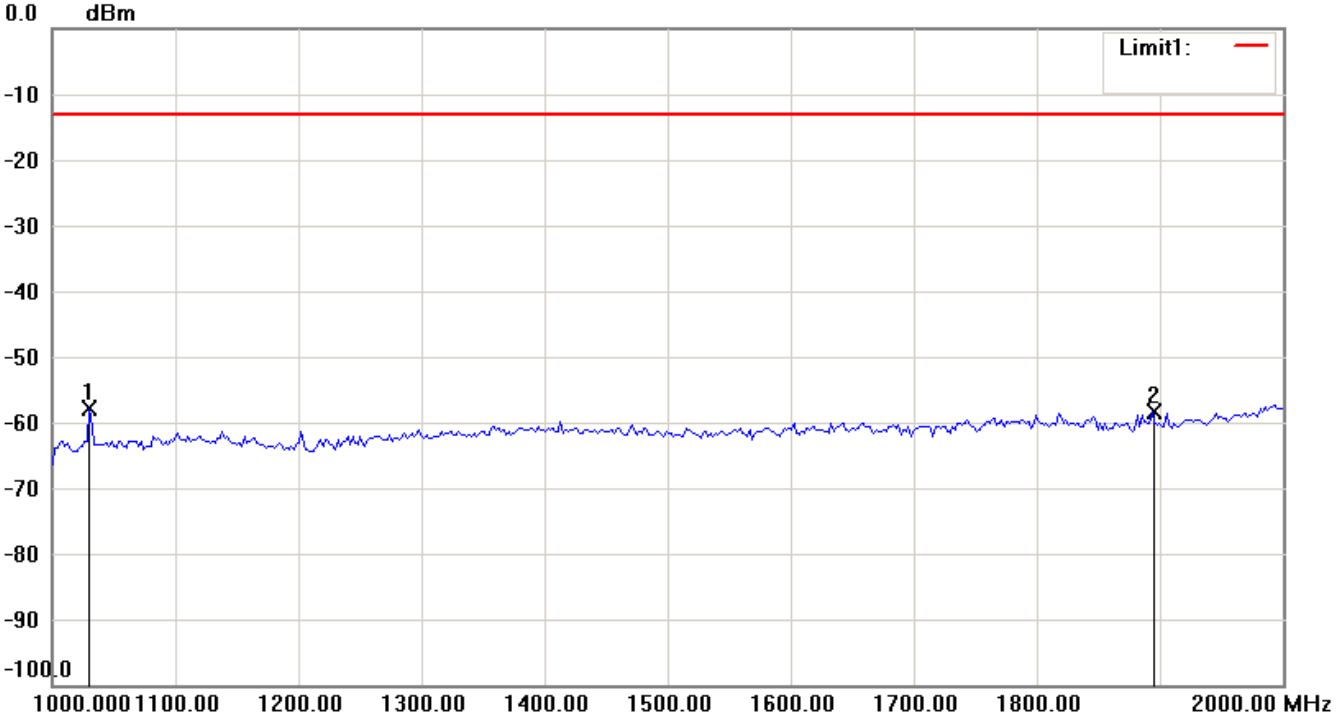
Antenna Polarization H



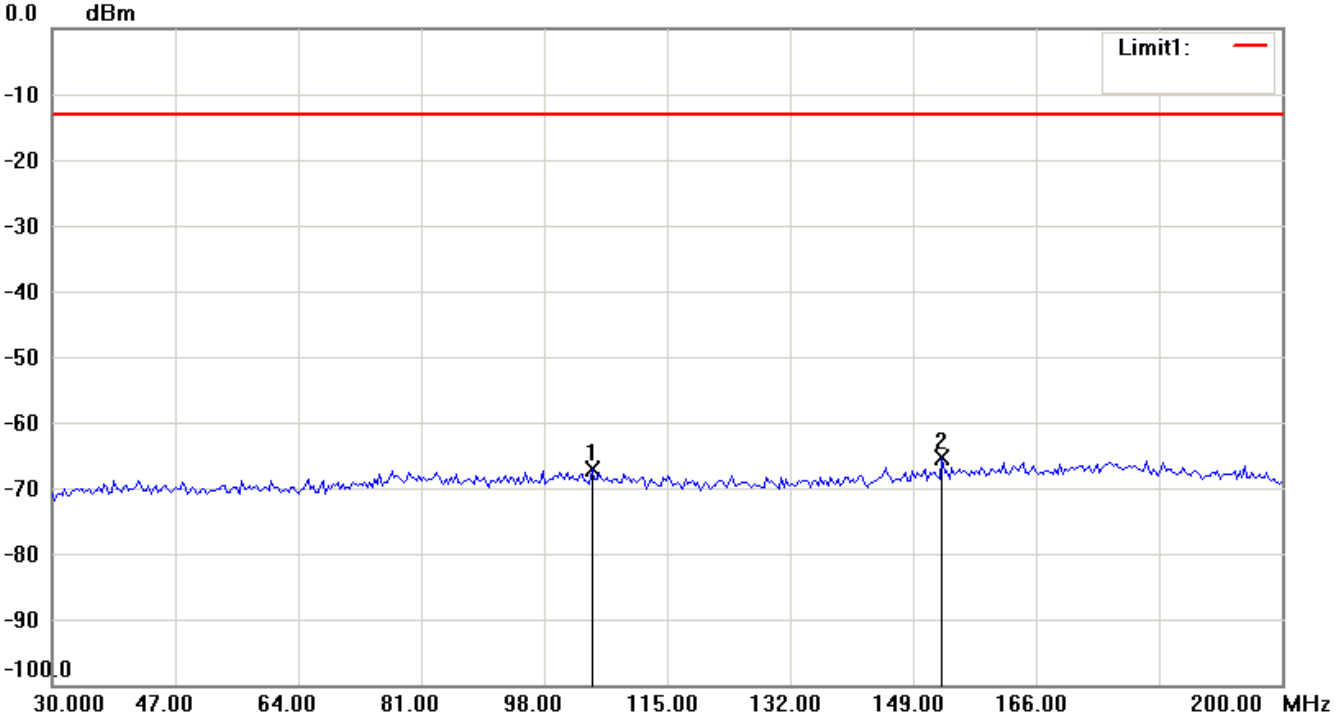


Note:

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.**

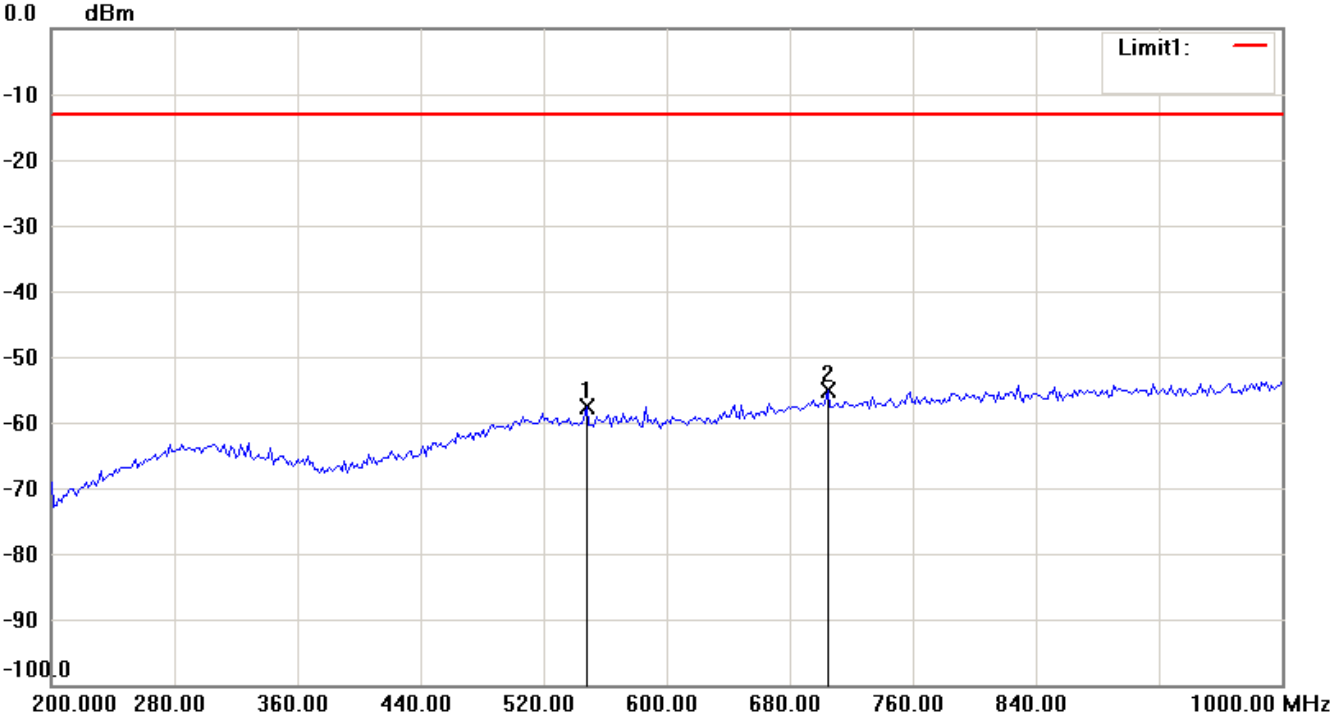


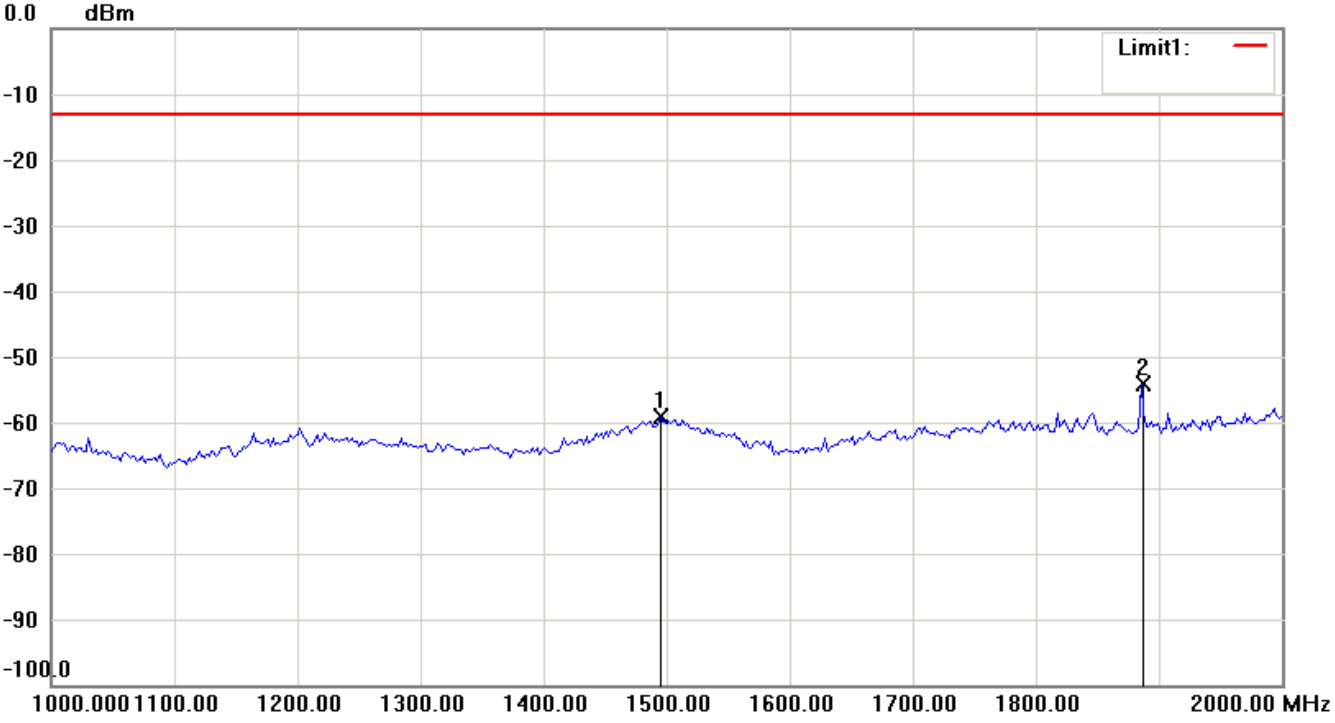
Antenna Polarization V



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.**
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.**

External Photos


POLSEN
CAM-2W
VHF TRANSMITTER


171.045|171.845MHZ

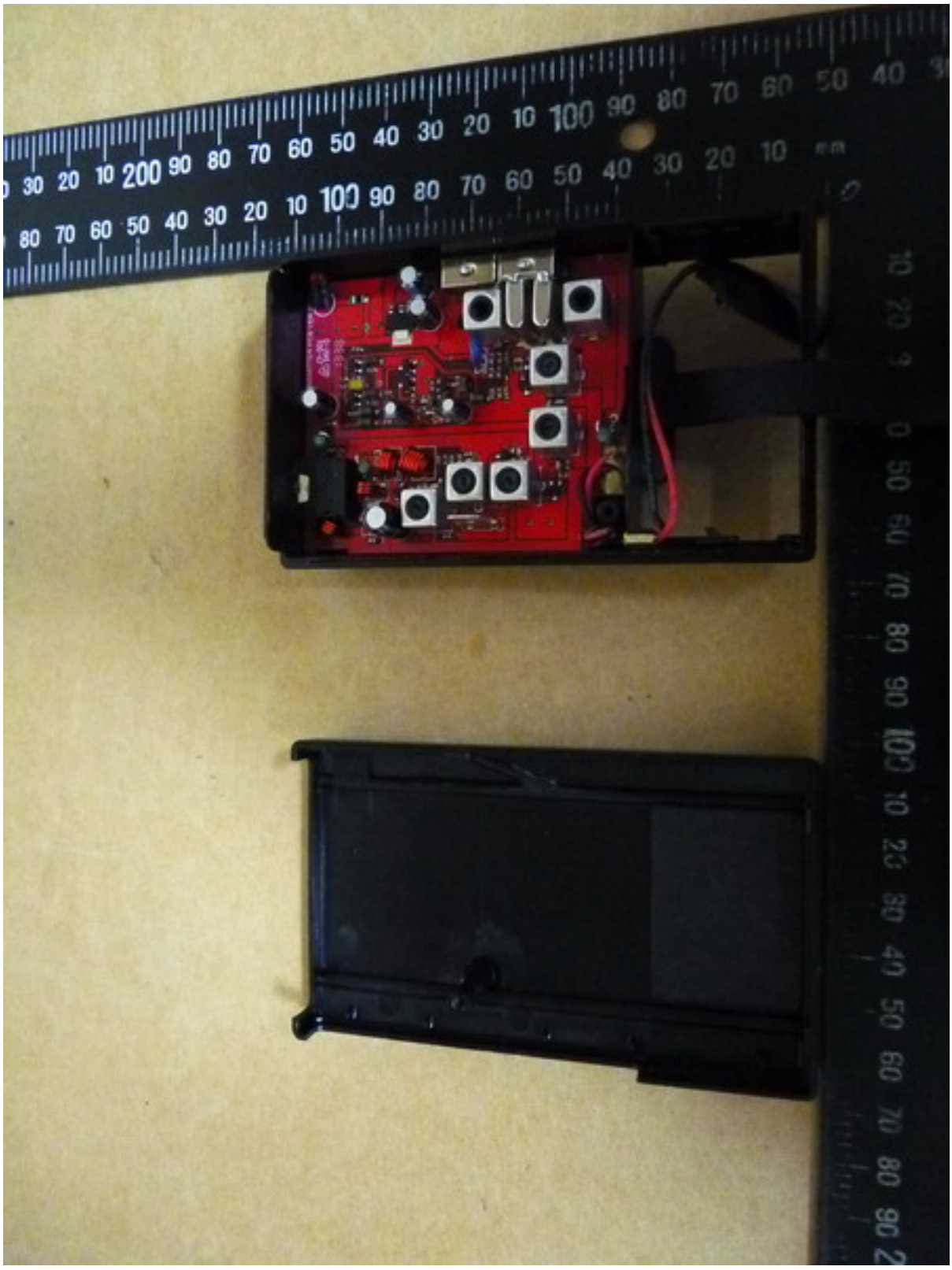
Registration number: W6M21310-13614-C-1
FCC ID: HYJCAM2WT

Registration number: W6M21310-13614-C-1
FCC ID: HYJCAM2WT

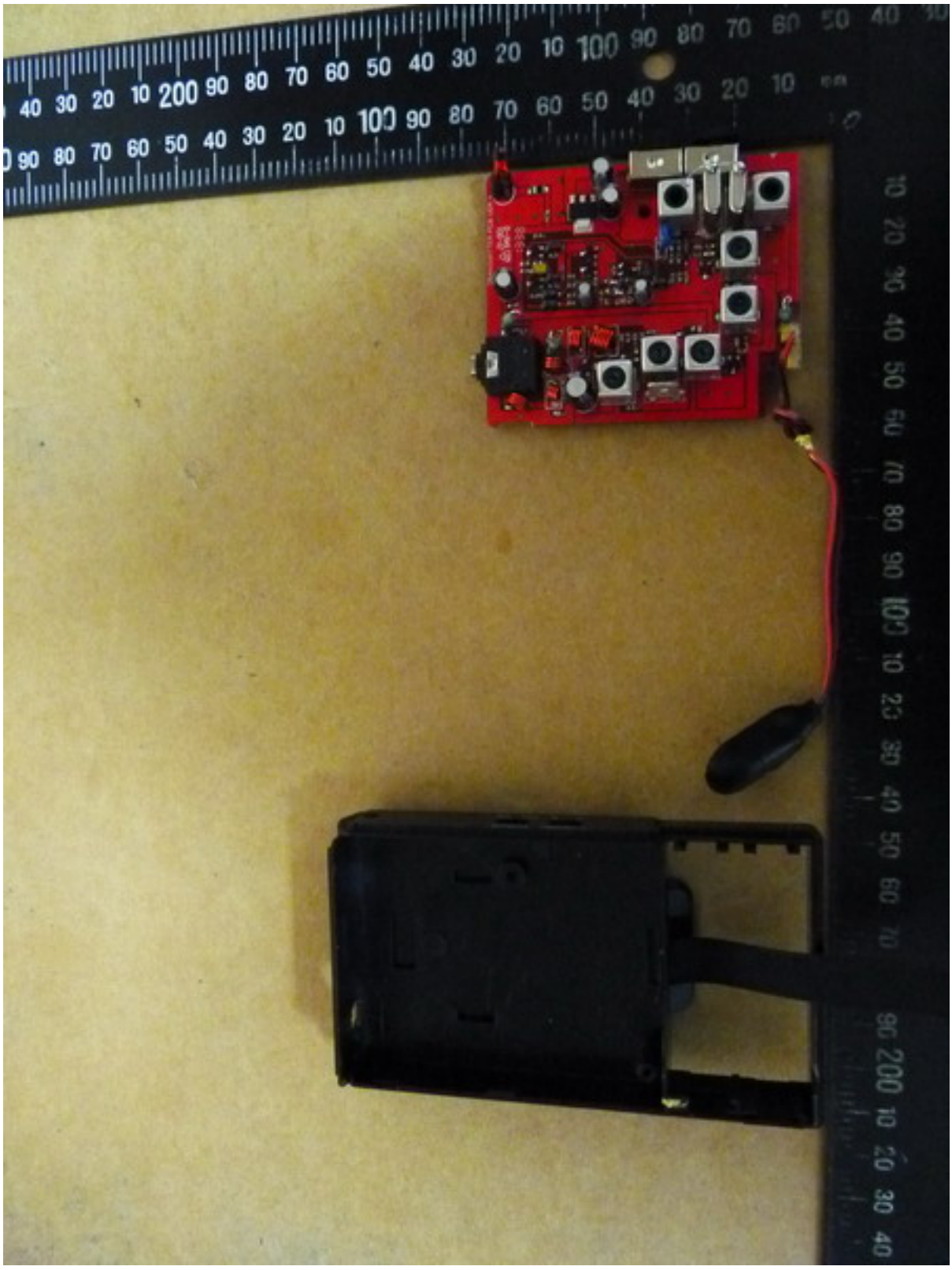

POLSEN
CAM2W
VHF TRANSMITTER


POLSEN

Internal Photos



Registration number: W6M21310-13614-C-1
FCC ID: HYJCAM2WT



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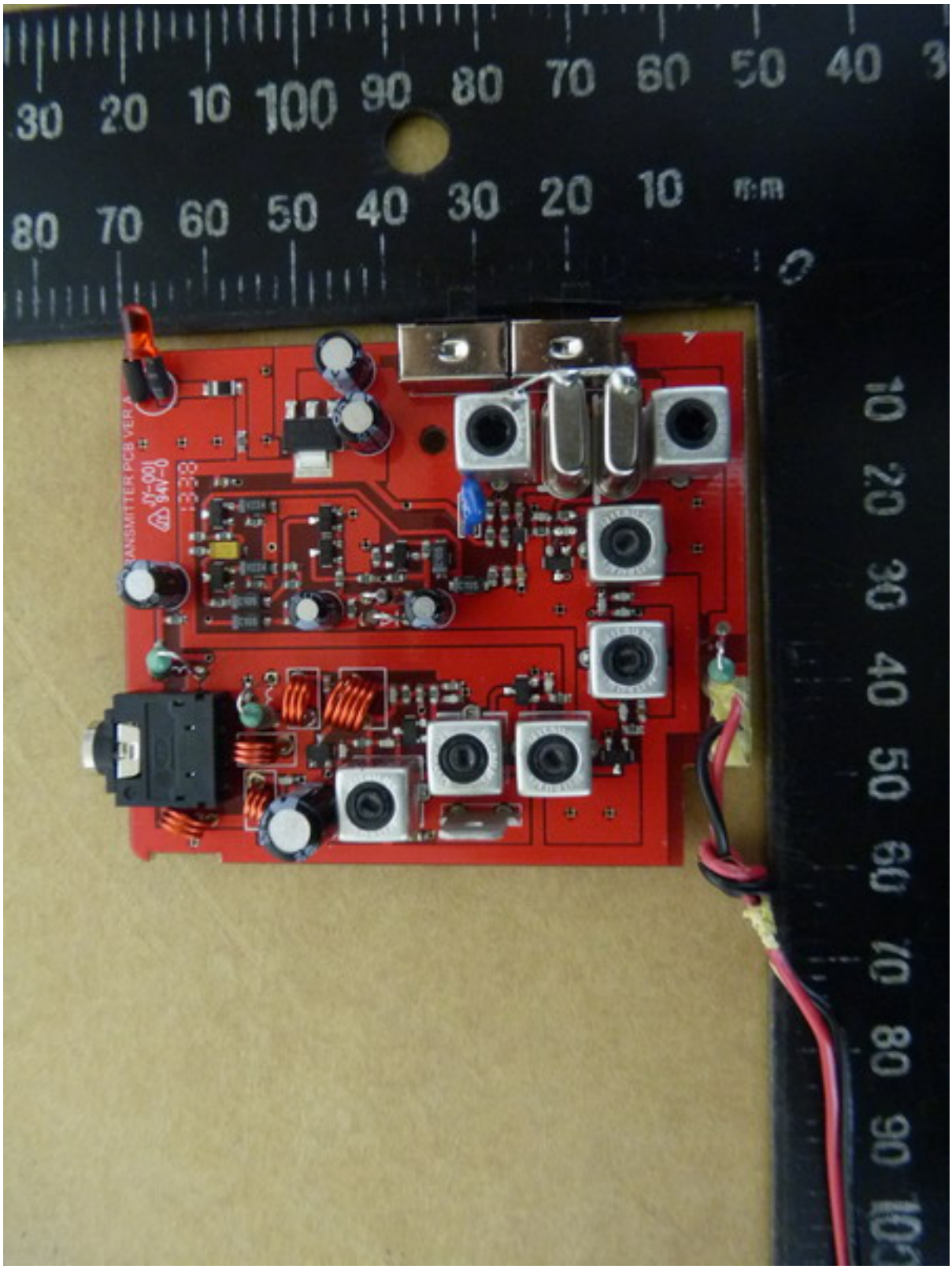

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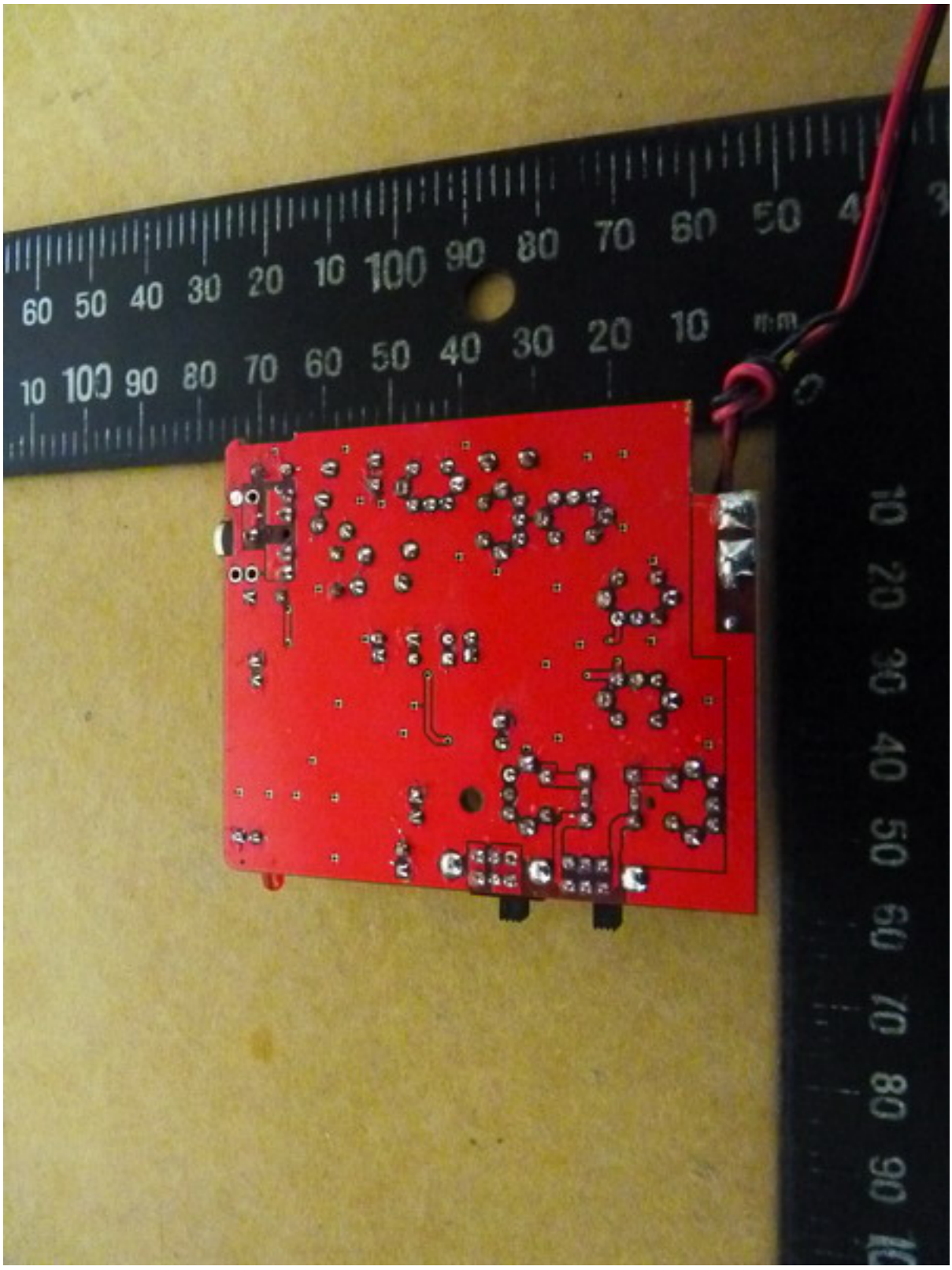

Registration number: W6M21310-13614-C-1
FCC ID: HYJCAM2WT

Set Up Photo of Radiated Emission