

Keenon Robotics Co., Ltd.

JAPAN TEST REPORT

SCOPE OF WORK:
JAPAN RADIO REPORT

Model:
M2

REPORT NUMBER
201103007SHA-001

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Summary

The equipment complies with the requirements according to the following standard(s) or Specification:

The equipment complies with the requirements according to the following standard(s):
Article 49-20 and the relevant articles of the Ordinance Regulating Radio Equipment

The measurement was implemented in according with the following procedure(s):
MIC Notice No.88 Appendix No.43

PREPARED BY:

REVIEWED BY:



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Reviewer
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Contents

REVISION HISTORY	5
MEASUREMENT RESULT SUMMARY	6
1 GENERAL INFORMATION	7
1.1 DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)	7
1.2 RF TECHNICAL INFORMATION	7
1.3 DESCRIPTION OF TEST FACILITY	8
2 TEST SPECIFICATIONS	9
2.1 STANDARDS OR SPECIFICATION	9
2.2 MODE OF OPERATION DURING THE TEST	9
2.3 TEST ENVIRONMENT CONDITION	10
2.4 POWER SUPPLY CONDITION	10
2.5 TEST PERIPHERALS USED	11
2.6 INSTRUMENT LIST	11
2.7 MEASUREMENT UNCERTAINTY	12
3 FREQUENCY ERROR	13
3.1 LIMIT	13
3.2 MEASUREMENT PROCEDURE	13
3.3 TEST CONFIGURATION	13
3.4 TEST RESULTS OF FREQUENCY ERROR	13
4 OCCUPIED BANDWIDTH AND SPREADING BANDWIDTH / SPREADING FACTOR	14
4.1 LIMIT	14
4.2 MEASUREMENT PROCEDURE	14
4.3 TEST CONFIGURATION	14
4.4 TEST RESULTS OF OCCUPIED BANDWIDTH AND SPREADING BANDWIDTH / SPREADING FACTOR	14
5 ANTENNA POWER AND TOLERANCE	15
5.1 LIMIT	15
5.2 MEASUREMENT PROCEDURE	15
5.3 TEST CONFIGURATION	15
5.4 TEST RESULTS OF ANTENNA POWER AND TOLERANCE	15
6 SPURIOUS EMISSION	16
6.1 LIMIT	16
6.2 MEASUREMENT PROCEDURE	16
6.3 TEST CONFIGURATION	16
6.4 TEST RESULTS OF SPURIOUS EMISSION	16
7 LIMITATION OF COLLATERAL RADIO EMISSION OF RECEIVER	17
7.1 LIMIT	17
7.2 MEASUREMENT PROCEDURE	17
7.3 TEST CONFIGURATION	17
7.4 TEST RESULTS OF COLLATERAL RADIO EMISSION OF RECEIVER	17
8 CARRIER SENSE FUNCTION	18
8.1 MEASUREMENT PROCEDURE	18
8.2 TEST CONFIGURATION	18
8.3 TEST RESULTS OF CARRIER SENSE FUNCTION	18

TEST REPORT

9	INTERFERENCE PREVENTION FUNCTION.....	20
9.1	LIMIT	20
9.2	MEASUREMENT PROCEDURE	20
9.3	TEST CONFIGURATION	20
9.4	TEST RESULTS OF INTERFERENCE PREVENTION FUNCTION.....	21
10	TRANSMISSION ANTENNA GAIN (EIRP ANTENNA POWER) MEASUREMENT.....	22
10.1	LIMIT	22
10.2	MEASUREMENT PROCEDURE	22
10.3	TEST CONFIGURATION	22
10.4	TEST RESULTS OF TRANSMISSION ANTENNA GAIN	23
11	TRANSMISSION RADIATION ANGLE WIDTH (3DB BEAMWIDTH) MEASUREMENT	24
11.1	LIMIT	24
11.2	MEASUREMENT PROCEDURE	24
11.3	TEST CONFIGURATION	24
11.4	TEST RESULTS OF TRANSMISSION RADIATION ANGLE WIDTH	24
12	CONSTRUCTION PROTECTION CONFIRMATION METHOD	25
12.1	LIMIT	25
12.2	CONFIRMATION METHOD	25
12.3	THE PHOTOS OF CONSTRUCTION PROTECTION.....	25
APPENDIX A: TEST RESULTS		26
APPENDIX B: PHOTOGRAPH OF TEST SETUP		53

Revision History

Report No.	Version	Description	Issued Date
201103007SHA-001	Rev. 01	Initial issue of report	December 11, 2020

Measurement result summary

TEST ITEM	TEST RESULT	NOTE
Frequency Error	Pass	-
Occupied Bandwidth and Spreading Bandwidth / Spreading Factor	Pass	-
Antenna Power and Tolerance	Pass	-
Spurious Emission	Pass	-
Limitation of Collateral Radio Emission of Receiver	Pass	-
Carrier Sense Function	Pass	-
Interference prevention function	Pass	-
Transmitting Antenna Gain (EIRP Antenna Power)	NA	-
Transmission Radiation Angle Width (3dB Beam width)	NA	-
Construction Protection Confirmation	Pass	-

Notes: 1: NA =Not Applicable

2. Determination of the test conclusion is based on IEC Guide 115 in consideration of measurement uncertainty.

1 GENERAL INFORMATION

1.1 Description of Equipment Under Test (EUT)

Product name : Disinfection Robot

Type/Model : M2

Description of EUT : EUT is a Disinfection Robot and has only one mode. EUT supports WIFI function.

Rating : DC48V, 150W

Hardware version : /

Software version : /

Sample received date : December 01, 2020

Date of test : December 01 ~ December 08, 2020

1.2 RF Technical Information

Assigned Frequency : 2400MHz to 2483.5MHz
Band

Operating Frequency : 802.11b/g/n(HT20): 2412MHz to 2472MHz
802.11n(HT40): 2422MHz to 2462MHz

Type of Modulation : 802.11b: DSSS (DBPSK, DQPSK, CCK)
802.11g: OFDM (BPSK, QPSK, 16QAM, 64QAM)
802.11n(HT20): OFDM (BPSK, QPSK, 16QAM, 64QAM)
802.11n(HT40): OFDM (BPSK, QPSK, 16QAM, 64QAM)

Number of Channels : 802.11b/g/n(HT20): 13 Channels
802.11n(HT40): 9 Channels

Channel Separation : 5MHz

Antenna Type : PCB antenna

Antenna Gain : 3dBi

Declaration Antenna : 802.11b: 10 mW/MHz
Power : 802.11g: 2 mW/MHz
802.11n(HT20): 2 mW/MHz
802.11n(HT40): 1 mW/MHz

1.3 Description of Test Facility

Name : Intertek Testing Services Shanghai

Address : Building 86, No. 1198 Qinzhou Road(North), Shanghai 200233, P.R.
China

Telephone : 86 21 61278200

Telefax : 86 21 54262353

The test facility is : CNAS Accreditation Lab
recognized, certified, Registration No. CNAS L0139
or accredited by these FCC Accredited Lab
organizations Designation Number: CN1175

IC Registration Lab
CAB identifier.: CN0051

VCCI Registration Lab
Registration No.: R-14243, G-10845, C-14723, T-12252

A2LA Accreditation Lab
Certificate Number: 3309.02

2 TEST SPECIFICATIONS

2.1 Standards or specification

The equipment complies with the requirements according to the following standard(s):

Article 49-20 and the relevant articles of the Ordinance Regulating Radio Equipment

The measurement was implemented in according with the following procedure(s):

MIC Notice No.88 Appendix No.43

2.2 Mode of operation during the test

While testing transmitting mode of EUT, the continuously transmission was applied by following software.

Software name	Manufacturer	Version	Supplied by
RtkWiFiTest	-	V1.9.0	Client

The lowest, middle and highest channel were tested as representatives.

Frequency Band (MHz)	Mode	Lowest (L) (MHz)	Middle (M) (MHz)	Highest (H) (MHz)
2400-2483.5	802.11b	2412	2442	2472
	802.11g	2412	2442	2472
	802.11n(HT20)	2412	2442	2472
	802.11n(HT40)	2422	2442	2462

MIMO Function Description:

Frequency Band (MHz)	Mode	Tx/Rx Function	Beamforming function	CDD function	Note
2400-2483.5	802.11b	1TX/1RX	NO	NO	-
	802.11g	1TX/1RX	NO	NO	-
	802.11n(HT20)	1TX/1RX	NO	NO	-
	802.11n(HT40)	1TX/1RX	NO	NO	-

After this pretest, the following data rate was chosen to do the test as the worst case:

Frequency Band (MHz)	Mode	Tx/Rx Function
2400-2483.5	802.11b	1Mbps
	802.11g	6Mbps
	802.11n(HT20)	MCS0
	802.11n(HT40)	MCS0

2.3 Test environment condition:

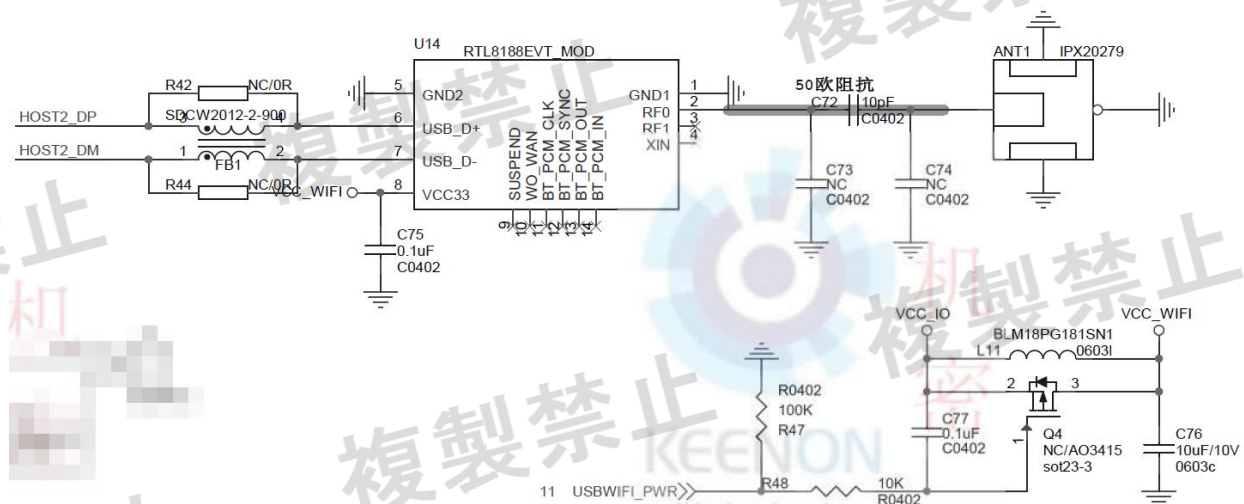
Temperature	Humidity	Atmospheric Pressure
18 - 24 °C	48 - 58 %RH	101 – 102 kPa

2.4 Power supply condition:

The EUT is supplied with 48V DC. The fluctuation of input voltage to the circuit of RF unit of test equipment is under $\pm 1\%$, when input voltage from 48V DC to the test equipment is fluctuated by $\pm 10\%$, So all measurement was conducted on the rated voltage (48V DC).

The measurement result of the voltage fluctuation at RF circuit when input voltage is fluctuated by $\pm 10\%$:

Power supply	Measured value
43.2V DC	3.30V
48.0V DC	3.30V
52.8V DC	3.31V



2.5 Test peripherals used

Item No	Description	Band and Model	S/No
1	-	-	NA

2.6 Instrument list

Used	Equipment	Manufacturer	Type	Internal no.	Cal. date	Due date	Cal. Method	Cal. Body
☐	PXA Signal Analyzer	Keysight	N9030A	EC 5338	2020-03-17	2021-03-16	(c)	CEPREI
☒	Spectrum Analyzer	Keysight	N9030B	EC 6078	2019-06-12	2021-06-11	(c)	CEPREI
☐	Power sensor	Agilent	U2021XA	EC 5338-1	2020-03-17	2021-03-16	(c)	CEPREI
☒	Vector Signal Generator	Agilent	N5182B	EC 5175	2020-03-17	2021-03-16	(c)	CEPREI
☐	MXG Analog Signal Generator	Agilent	N5181A	EC 5338-2	2020-03-17	2021-03-16	(c)	CEPREI
☐	Power meter	Keysight	N1911A	EC 4318	2019-06-24	2021-06-23	(c)	JEPSI
☐	Wideband Radio Communication Tester	R&S	CMW500	EC 5944	2019-12-10	2021-12-09	(c)	JEPSI
☒	Multi-meter	FLUKE	187	EC 2560	2020-03-04	2021-03-03	(c)	ITS

Note: The calibration interval is one year and the calibrations are traceable to the National Institute of Metrology (NIM)

Remark:

- (a) Calibration conducted by the National Institute of Information and Communications Technology (NICT) in Japan (hereinafter referred to as "NICT") or a designated calibration agency under Article 102-18 paragraph (1) in JRL.
- (b) Correction conducted pursuant to the provisions of Article 135 or Article 144 of the Measurement Act (Act No. 51 of 1992).
- (c) Calibration conducted in countries except Japan, which shall be equivalent to the calibration conducted by the NICT or a designated calibration agency under Article 102-18 paragraph (1).
- (d) Calibration, etc. conducted by using measuring instruments and other equipment listed in the right column of appended table No. 3, which shall have been given any type of calibration, etc. listed above from (a) to (c).

From JRL Article 24-2, paragraph 4, Item 2

2.7 Measurement Uncertainty

Item No.	Test Items	Expanded Uncertainty (k=2) (±)
1	Frequency error	0.84×10^{-7}
2	Antenna Power	0.74 dB
3	Occupied Bandwidth	0.88 %
4	Spurious emissions of transmitter	2.89 dB
5	Spurious emissions of receiver	2.80 dB
6	Temperature	1 °C
7	Humidity	5 %
8	Time	1.15 %

3 Frequency Error

Test result: Pass

3.1 Limit

Item	Limits
Frequency Error	$\leq 50\text{ppm}$

3.2 Measurement Procedure

- (1) Frequency accuracy of instrument shall be less than 10% of the limit.
- (2) Two methods for the item:
 - a. CW Tone method
 - i. Set the spectrum analyzer RBW=10kHz, VBW=10kHz, Span=1MHz.
 - ii. Use peak search function to find the max peak value and record the measuring frequency as f.
 - b. 10dB down method
 - i. Set the spectrum analyzer RBW=100kHz, VBW=100kHz, Trace: Max Hold.
 - ii. Display line Level = Max. level - 10dB to place two markers, highest(fH) and lowest(fL) frequency
 - iii. Determine measuring frequency $f = (fH - fL) / 2$
- (3) Calculate frequency tolerance by the formula $(f - f_c) / f_c \times 10^6$

3.3 Test Configuration



3.4 Test Results of Frequency Error

Please refer to Appendix A

4 Occupied Bandwidth and Spreading Bandwidth / Spreading Factor

Test result: Pass

4.1 Limit

Item	Limits
Occupied Bandwidth	26MHz
Spreading Bandwidth	500kHz or more

4.2 Measurement Procedure

- (1) Set the Spectrum Analyzer as: RBW: 300kHz, VBW: 300kHz, Sweep mode: Continuous sweep, Detect mode: Positive peak, Trace mode: Max hold.
- (2) Set the EUT as transmitting on fix channel with modulation (For DSSS or OFDM Device), or continuous maximum power of hopping mode (For FHSS Device)
- (3) Enable OBW function of Spectrum Analyzer to measure 99% bandwidth and 90% bandwidth.
- (4) Spreading Factor = Spreading Bandwidth / modulation rate of EUT (For DSSS system)
- (5) Spreading Factor should be greater than 5.

4.3 Test Configuration



4.4 Test Results of Occupied Bandwidth and Spreading Bandwidth / Spreading Factor

Please refer to Appendix A

5 Antenna Power and Tolerance

Test result: Pass

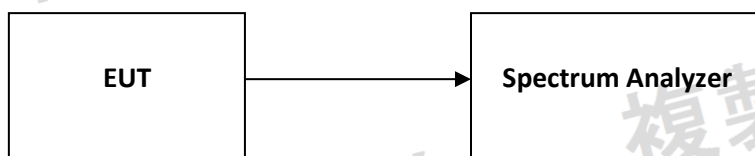
5.1 Limit

Item	Limits
Antenna Power	10mW/MHz
Tolerance	+20%, -80%

5.2 Measurement Procedure

- (1) Test Conditions:
Spectrum Analyzer is used for measurement.
- (2) EUT conditions:
Modulation/Spread/Hopping ON
For equipment using diffusion code, set to the test diffusion code and modulate with standard coding test signal
- (3) Spectrum Analyzer conditions:
Center Frequency: Test Frequency, RBW: 1 MHz, VBW: 1 MHz, Detector mode: RMS, Indication mode: Max hold

5.3 Test Configuration



5.4 Test Results of Antenna Power and Tolerance

Please refer to Appendix A

6 Spurious Emission

Test result: Pass

6.1 Limit

Item	Limits
TX Spurious Emission	(1) Below 2458MHz: 2.5μW/MHz (2) 2458 to 2471MHz: 25μW/MHz (3) 2497 to 2510MHz: 25μW/MHz (4) Over 2510MHz: 2.5μW/MHz

6.2 Measurement Procedure

- (1) Set the EUT as transmitting the maximum power and fixed channel.
- (2) Set the Spectrum Analyzer as: RBW: 1MHz, VBW: 1MHz, Sweep time: Auto, Detect mode: Positive peak.
- (3) Follow above setting to measure spurious emission from 30MHz to 12500MHz.

6.3 Test Configuration



6.4 Test Results of Spurious Emission

Please refer to Appendix A

7 Limitation of Collateral Radio Emission of Receiver

Test result: Pass

7.1 Limit

Item	Limits
Collateral Emissions	(1) Below 1GHz: 4nW (2) 1GHz or higher: 20nW

7.2 Measurement Procedure

- (1) Set the EUT as continuous reception mode and fixed channel.
- (2) Set the Spectrum Analyzer as: RBW: 100kHz, VBW: 100kHz, Sweep time: Auto, Detect mode: Positive peak to measure the spurious emission below 1GHz.
- (3) Set the Spectrum Analyzer as: RBW: 1MHz, VBW: 1MHz, Sweep time: Auto, Detect mode: Positive peak to measure the spurious emission above 1GHz.

7.3 Test Configuration



7.4 Test Results of Collateral Radio Emission of Receiver

Please refer to Appendix A

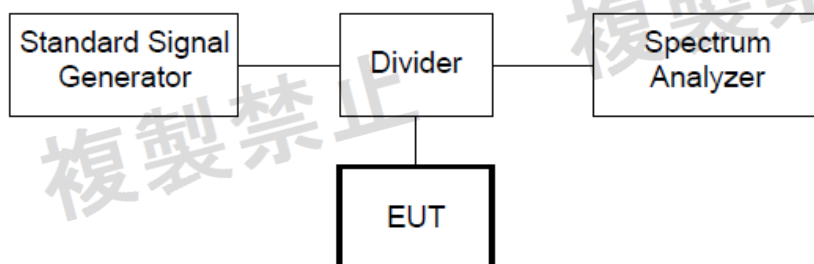
8 Carrier Sense Function

Test result: Pass

8.1 Measurement Procedure

- (1) Setting of standard signal generator is given as below. Carrier Frequency Center frequency in the RX frequency band of the EUT Modulation No-modulation (Note)
Output Level Same level as the specific value at the antenna input (the specific value is defined by the applicant.)
Note1: In case the carrier sense function of the EUT does not work with no-modulated carrier at the center frequency, the frequency may be shifted or modulation is performed, if necessary.
- (2) With the standard signal generator output OFF, turn the EUT on the TX mode. Verify with the spectrum analyzer that TX signal (OBW 26MHz or more) is put out.
- (3) Set the EUT on RX mode.
- (4) With the standard signal generator output ON, turn the EUT on the TX mode. Verify with the spectrum analyzer that TX signal (OBW 26MHz or more) is not put out.

8.2 Test Configuration



8.3 Test Results of Carrier Sense Function

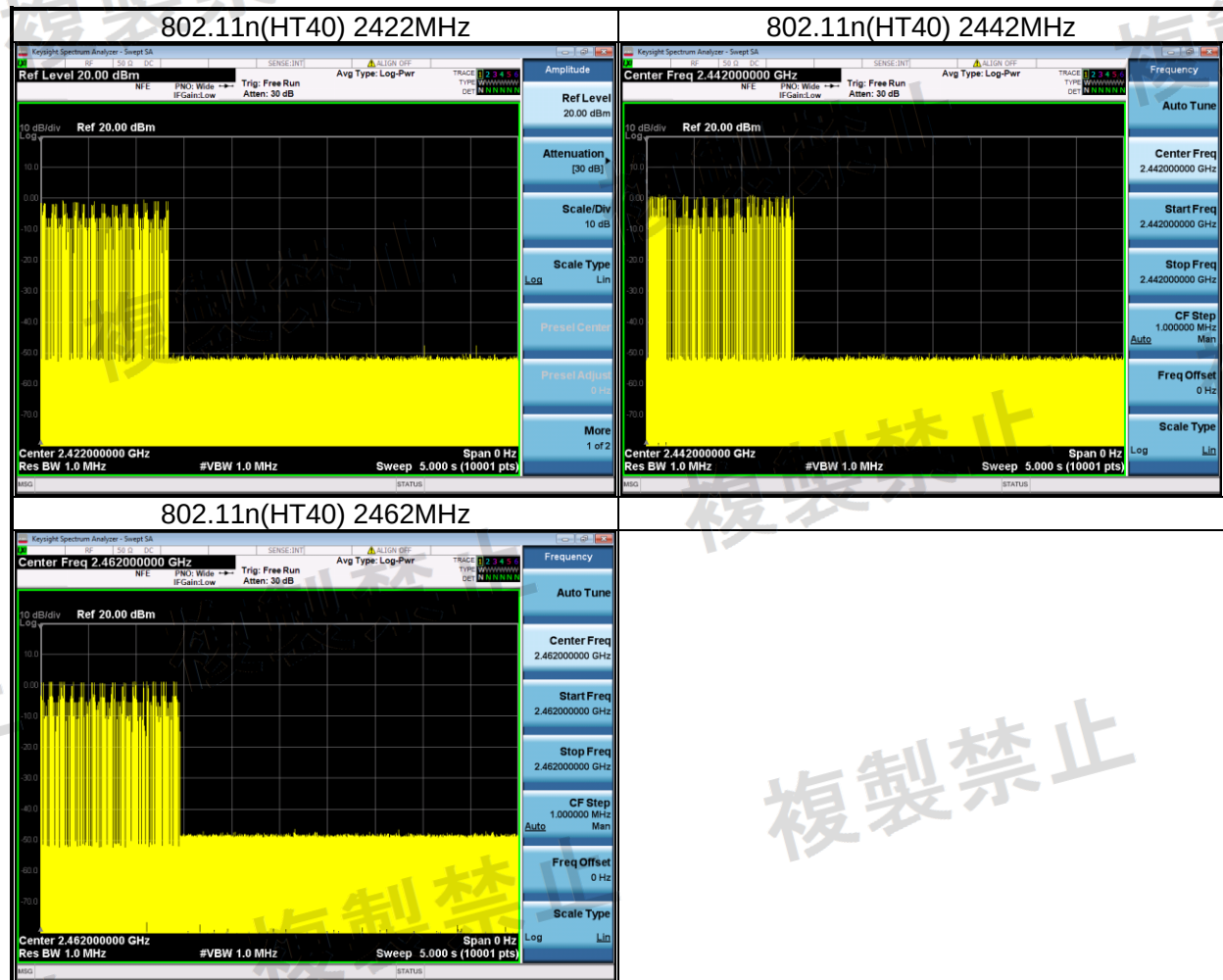
Mode	EUT Freq (MHz)	Pcs (dBm)	Result
802.11n(HT40)	2422	-42.32	Pass
802.11n(HT40)	2442	-42.54	Pass
802.11n(HT40)	2462	-42.69	Pass

Note:

$Pcs (dBm) = 22.79 + Gr - 20 \cdot \log(F)$

Gr: Antenna gain (2400-2483.5MHz: 3dBi)

F: Transmission frequency (MHz)



9 Interference prevention function

Test result: Pass

9.1 Limit

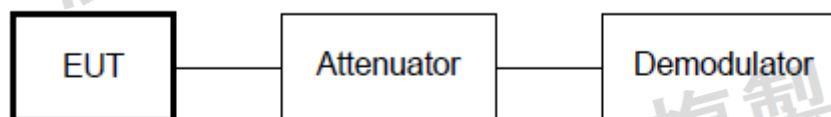
Item	Limits
Identification code	≥ 48 bits

9.2 Measurement Procedure

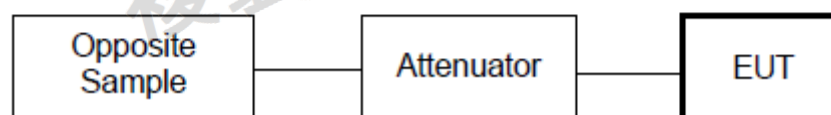
- (1) In case the EUT possesses function to transmit identification code automatically:
 - a. Predetermined identification code is transmitted by the EUT.
 - b. Verify the transmitted identification code.
- (2) In case the EUT possesses function to receive identification code automatically.
 - a. Predetermined identification code is transmitted by the opposite sample.
 - b. Verify the working of the normal communication.
 - c. Other code than the predetermined identification code is transmitted by the opposite sample.
 - d. Verify the EUT to stop transmitting or to display that the ID code is different.

9.3 Test Configuration

(1) In case identification code is transmitted

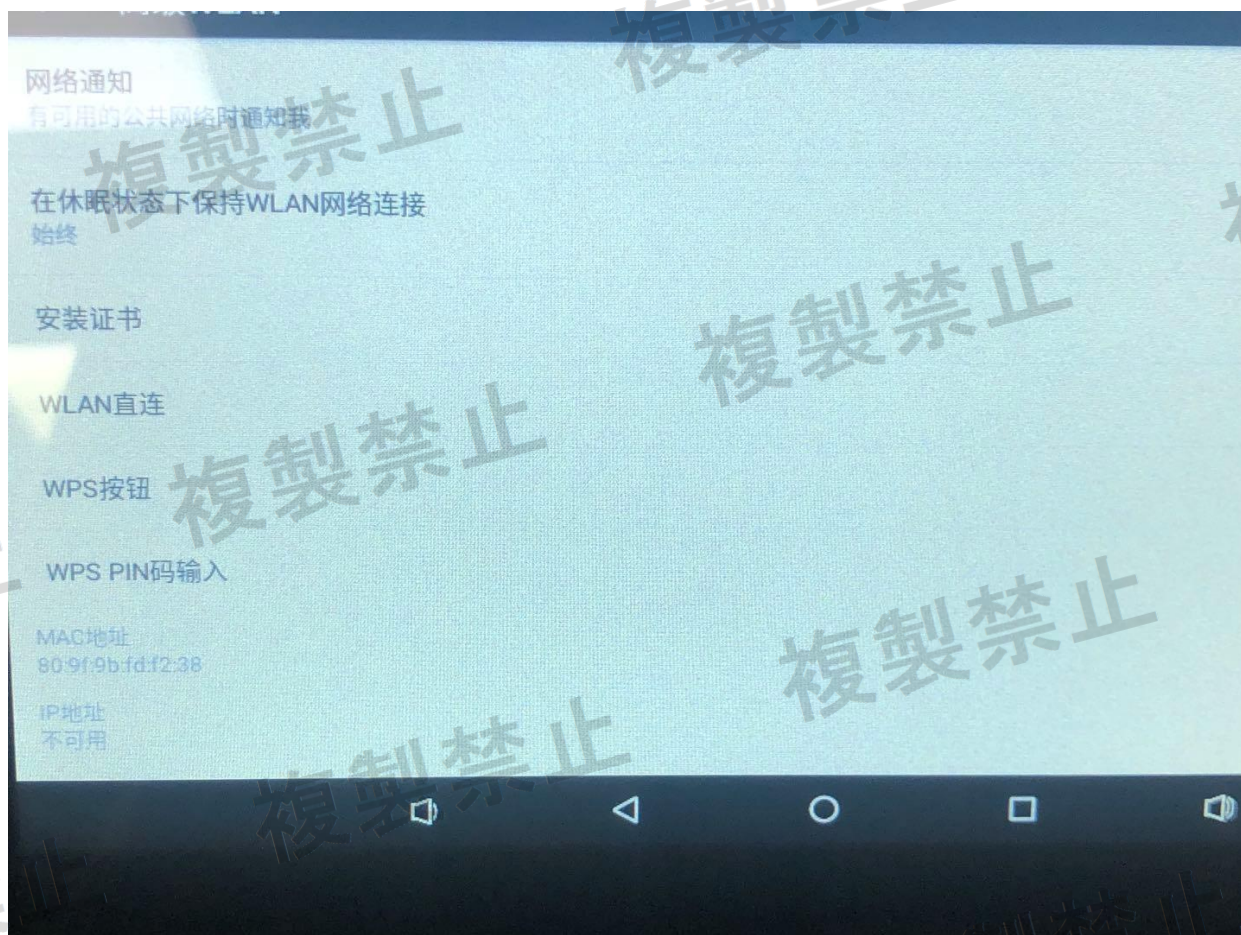


(2) In case identification code is received



9.4 Test Results of Interference prevention function

MAC address	80:9f:9b:fd:f2:38
-------------	-------------------



10 Transmission Antenna Gain (EIRP Antenna Power) Measurement

Test result: NA

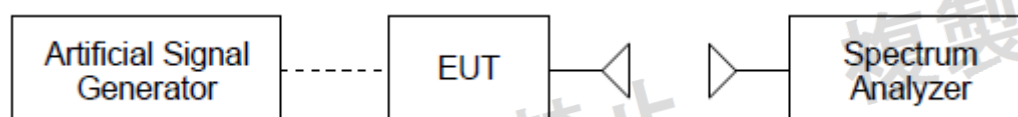
10.1 Limit

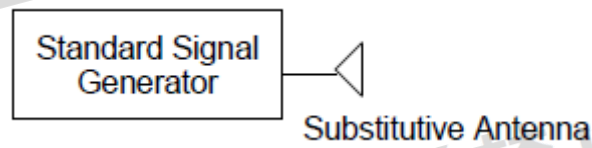
Item	Limits
EIRP Antenna Power	$\leq 12.14\text{dBm/MHz}$ (OFDM, DSSS from 2400MHz to 2483.5MHz) $\leq 12.14\text{dBm}$ (Other from 2400MHz to 2483.5MHz)
Remark: This test item is not applied to EUT with EIRP Antenna power lower than 12.14dBm/MHz	

10.2 Measurement Procedure

- (1) Set EUT and measuring antenna at the same height and roughly facing each other.
- (2) Move the measuring antenna height up and down within $\pm 50\text{cm}$ of EUT height and swing it to find the maximum output of the measuring antenna. The output level at the spectrum analyzer is read as "E".
- (3) Remove the EUT from the turn table and put the replacing antenna facing to measuring antenna at same height. Set the standard signal generator (SSG) at same frequency and transmit on then receive the signal.
- (4) Swing the replacing antenna give a maximum receiving level.
- (5) Move the measuring antenna height up and down within $\pm 50\text{cm}$ of replacing antenna height and swing it to find the maximum receiving level.
- (6) Set SSG output power at Pt to give the equivalent output level of "E" or calculate Pt with SSG output which gives the nearest of "E" and difference ($\pm 1\text{dB}$). Record the Pt.
- (7) Calculate EIRP by the formula below $\text{EIRP} = G_t - L + P_t$.
 Gt: gain of replacing antenna (dBi),
 L: feeder loss between SSG and replacing antenna
 Pt: Output power of the SSG
- (8) If the antenna for the EUT has circular polarization, sum of V-field and H-field will be result if measuring antenna is linear polarization.

10.3 Test Configuration





10.4 Test Results of Transmission Antenna Gain

For the antenna gain, please refer to antenna test report.

This test item is not applied to EUT with EIRP Antenna power lower than 12.14dBm/MHz

11 Transmission Radiation Angle Width (3dB Beamwidth) Measurement

Test result: NA

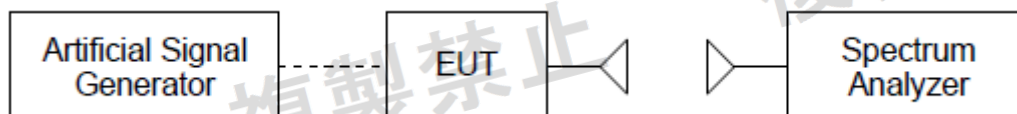
11.1 Limit

Item	Limits
3dB antenna beamwidth	$360/A$ (If $A < 1$; then $A = 1$) $A = \{ \text{EIRP Power [dBm/MHz]} - 12.14 \text{ [dBm/MHz]} \text{ for DS, OFDM} \}$ or $\{ \text{E.I.R.P Power [dBm/MHz]} - 6.91 \text{ [dBm/MHz]} \text{ for FH} \}$
Remark: This test item is not applied to EIRP power of EUT is lower than 12.14dBm/MHz	

11.2 Measurement Procedure

- (1) Set EUT and measuring antenna at the same height and roughly facing each other.
- (2) Set spectrum analyzer with condition in section 3.7.2 and tune reference level to observe receiving signal position.
- (3) Rotate directions of the EUT horizontally and vertically to find the maximum receiving power.
- (4) Move the measuring antenna height up and down within $\pm 50\text{cm}$ of EUT height and swing it to find the maximum output of measuring antenna. The output level at the spectrum analyzer is read as "E".
- (5) Calculate permitted radiation angle in horizontal and vertical using EIRP measured in another test method.
- (6) Calculate 3dB antenna beam width by the formula below $360/A$ (If $A < 1$; then $A = 1$).
 $A = \{ \text{EIRP Power [dBm/MHz]} - 12.14 \text{ [dBm/MHz]} \text{ for DS, OFDM} \}$ or
 $A = \{ \text{E.I.R.P Power [dBm/MHz]} - 6.91 \text{ [dBm/MHz]} \text{ for FH} \}$

11.3 Test Configuration



11.4 Test Results of Transmission Radiation Angle Width

For the antenna gain, please refer to antenna test report.

This test item is not applied to EUT with EIRP Antenna power lower than 12.14dBm/MHz

12 Construction Protection Confirmation Method

Test result: Pass

12.1 Limit

The high-frequency section and modulation section of the radio equipment except for the antenna system shall not be capable of being opened easily.

12.2 Confirmation Method

☐	Sealed with special screws.
☐	Plastic chassis is being welded using ultrasonic waves.
☐	Chassis is glued using a special adhesive.
☐	Metal covers are spot-fused.
☐	Cover is specially interlocked.
☐	RF and Modulation components are covered with shielding case and this shielding case is soldered.
☒	RF and Modulation parts are mounted on PCB with surface mount technology, and there are no any adjustable parts on PCB or adjustable parts are not exposed.
☐	Shield case is welded at RF and modulation parts, and ID-ROM is welded using the BGA Method.
☐	Shield case is welded at RF and modulation parts, and ID-ROM is glued at its lead with a special adhesive.
☐	Shield case is welded at RF and modulation parts, and ID-ROM is glued with a non-transparent laminating agent.
☐	Other:

12.3 The Photos of Construction Protection

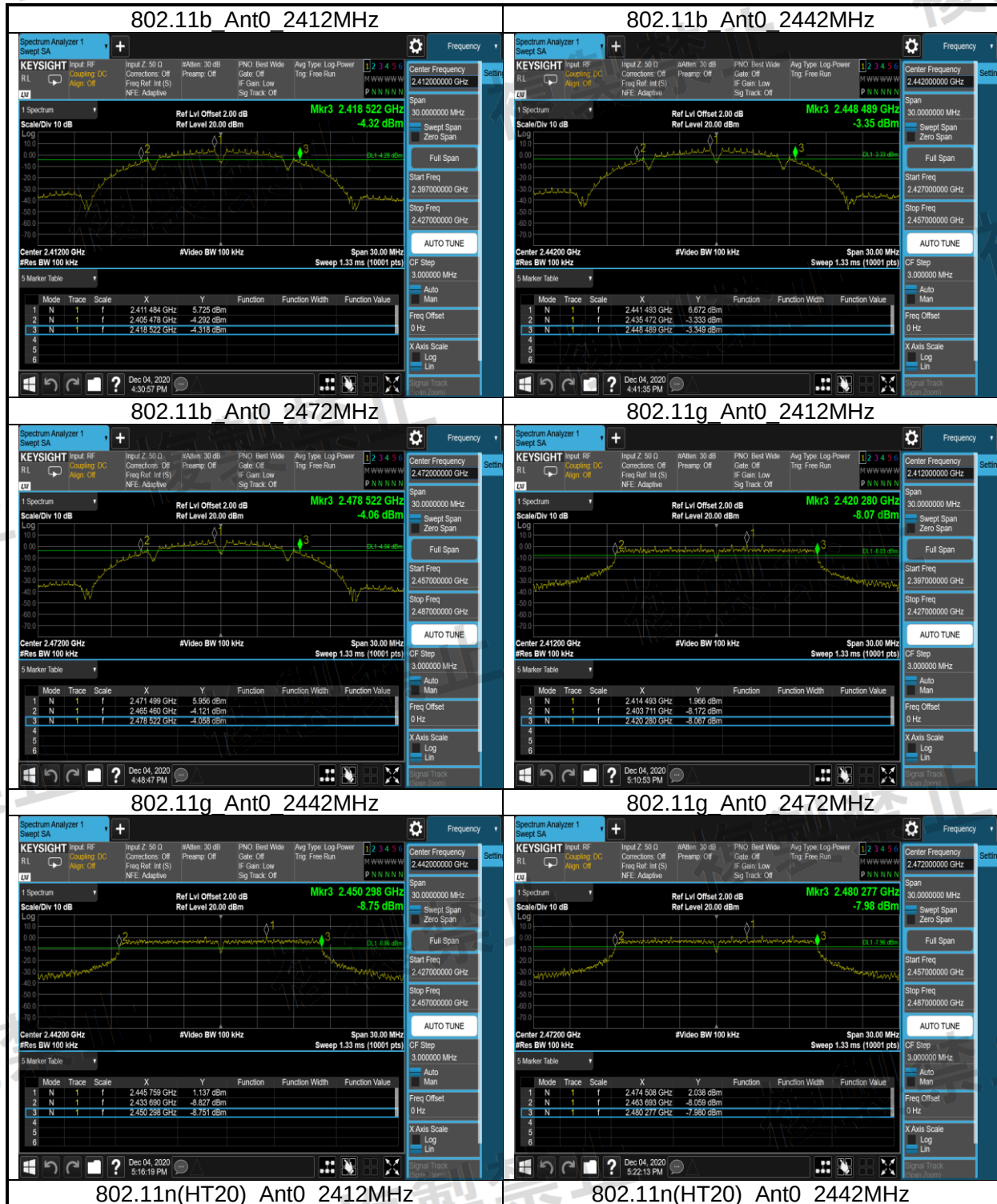
Please refer to the EUT's photos

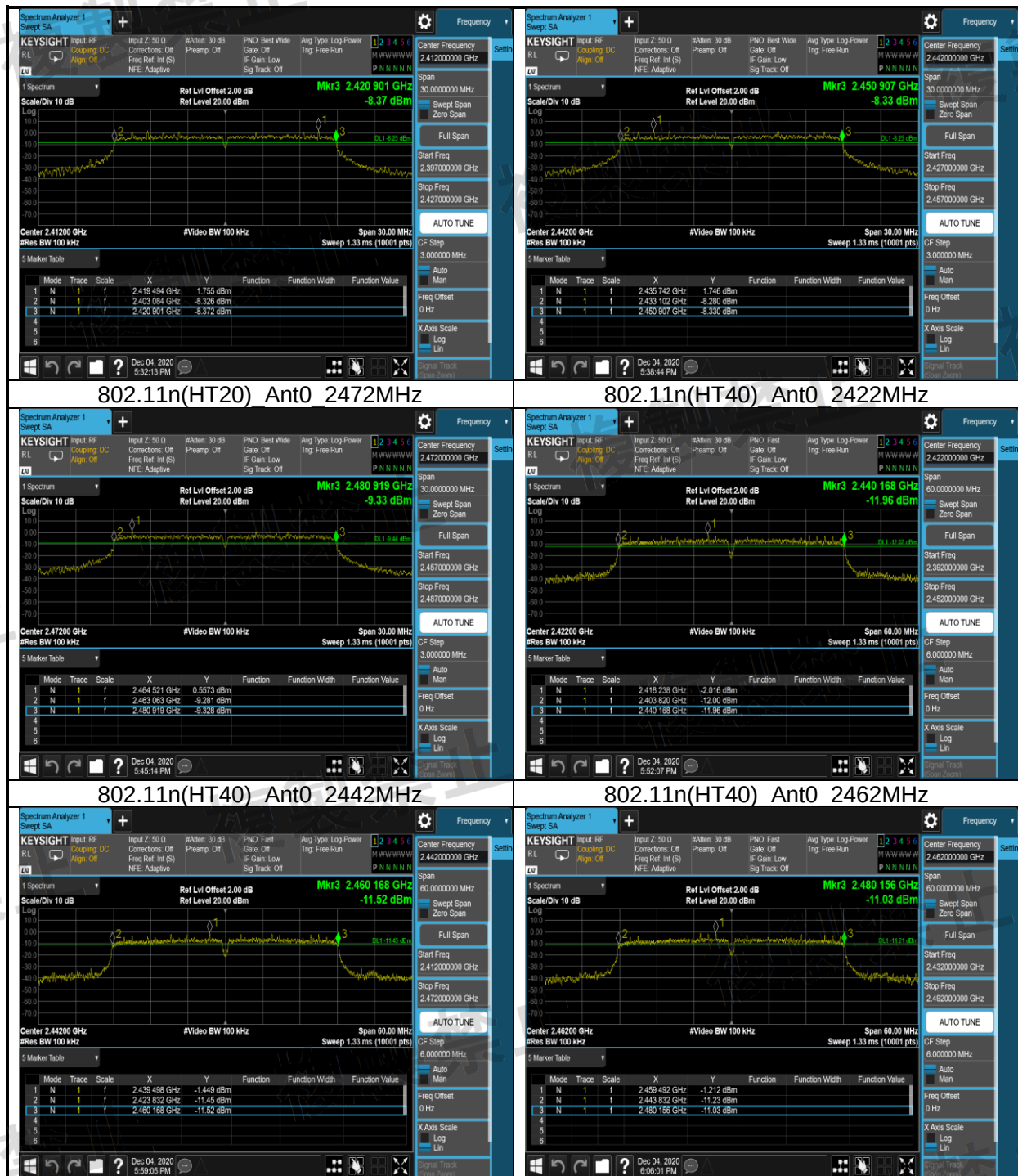
Appendix A: Test results

1. Frequency Error

1.1 Test Data

WLAN Frequency Error Normal								
Test Mode	Test Freq (MHz)	Ant	FL (MHz)	FH (MHz)	FC (MHz)	Measured Freq Error (ppm)	Limit (ppm)	Result
802.11b	2412	Ant0	2405.48	2418.52	2412.00	-0.41	50.00	Pass
802.11b	2442	Ant0	2435.47	2448.49	2441.98	-7.99	50.00	Pass
802.11b	2472	Ant0	2465.46	2478.52	2471.99	-3.64	50.00	Pass
802.11g	2412	Ant0	2403.71	2420.28	2412.00	-1.87	50.00	Pass
802.11g	2442	Ant0	2433.69	2450.30	2441.99	-2.46	50.00	Pass
802.11g	2472	Ant0	2463.69	2480.28	2471.99	-6.07	50.00	Pass
802.11n (HT20)	2412	Ant0	2403.08	2420.90	2411.99	-3.11	50.00	Pass
802.11n (HT20)	2442	Ant0	2433.10	2450.91	2442.00	1.84	50.00	Pass
802.11n (HT20)	2472	Ant0	2463.06	2480.92	2471.99	-3.64	50.00	Pass
802.11n (HT40)	2422	Ant0	2403.82	2440.17	2421.99	-2.48	50.00	Pass
802.11n (HT40)	2442	Ant0	2423.83	2460.17	2442.00	0.00	50.00	Pass
802.11n (HT40)	2462	Ant0	2443.83	2480.16	2461.99	-2.44	50.00	Pass





2. Occupied Bandwidth (OBW) and Spreading Bandwidth (SBW) / Spreading Factor (SF)

2.1 Test Data

WLAN Occupied Bandwidth Normal					
Test Mode	Test Freq (MHz)	Ant	OBW (MHz)	OBW Limit	OBW Result
802.11b	2412	Ant0	15.023	26	Pass
802.11b	2442	Ant0	15.103	26	Pass
802.11b	2472	Ant0	15.090	26	Pass
802.11g	2412	Ant0	16.872	38	Pass
802.11g	2442	Ant0	16.912	38	Pass
802.11g	2472	Ant0	17.029	38	Pass
802.11n (HT20)	2412	Ant0	17.994	38	Pass
802.11n (HT20)	2442	Ant0	18.012	38	Pass
802.11n (HT20)	2472	Ant0	17.971	38	Pass
802.11n (HT40)	2422	Ant0	35.814	38	Pass
802.11n (HT40)	2442	Ant0	35.882	38	Pass
802.11n (HT40)	2462	Ant0	35.840	38	Pass

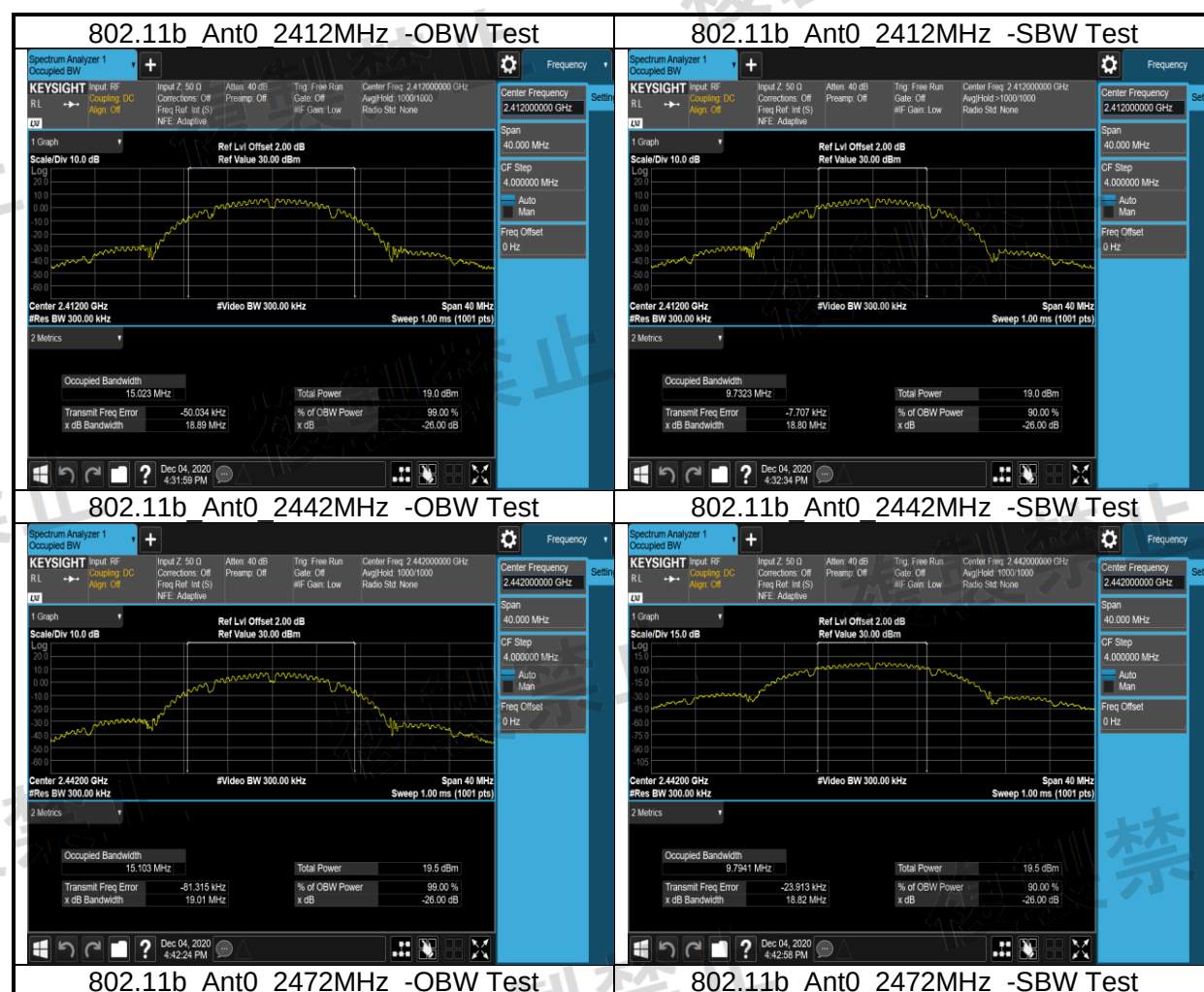
WLAN Spreading Bandwidth Normal					
Test Mode	Test Freq (MHz)	Ant	SBW (MHz)	SBW Limit	SBW Result
802.11b	2412	Ant0	9.732	0.5	Pass
802.11b	2442	Ant0	9.794	0.5	Pass
802.11b	2472	Ant0	9.790	0.5	Pass
802.11g	2412	Ant0	14.783	0.5	Pass
802.11g	2442	Ant0	14.875	0.5	Pass
802.11g	2472	Ant0	14.811	0.5	Pass
802.11n (HT20)	2412	Ant0	15.754	0.5	Pass
802.11n (HT20)	2442	Ant0	15.747	0.5	Pass
802.11n (HT20)	2472	Ant0	15.729	0.5	Pass
802.11n (HT40)	2422	Ant0	31.772	0.5	Pass

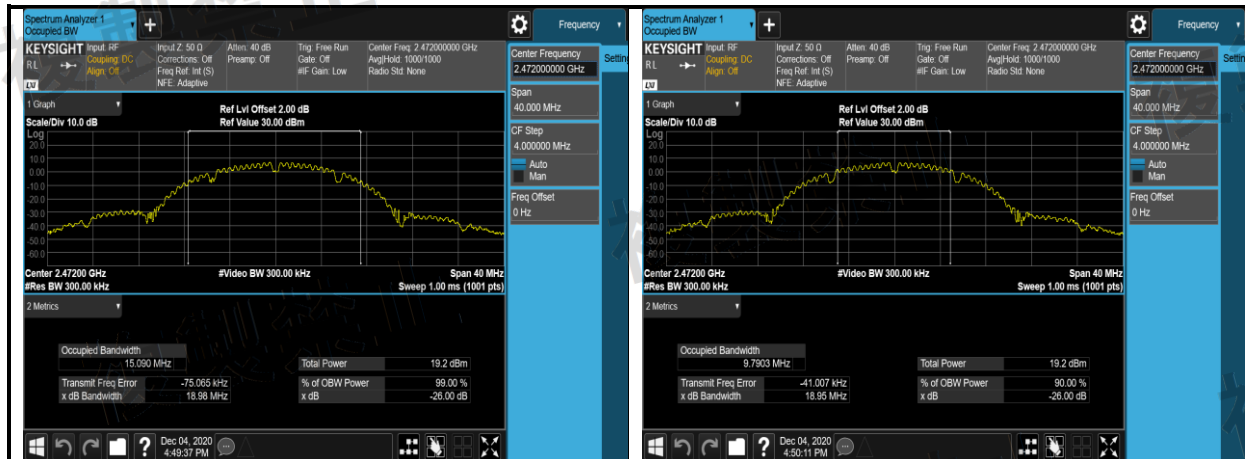
TEST REPORT

802.11n (HT40)	2442	Ant0	31.768	0.5	Pass
802.11n (HT40)	2462	Ant0	31.261	0.5	Pass

WLAN Spread Spectrum Factor Normal						
Test Mode	Test Freq (MHz)	Ant	SBW (MHz)	SF	SF Limit	SF Result
802.11b	2412	Ant0	9.732	7.078	5	Pass
802.11b	2442	Ant0	9.794	7.123	5	Pass
802.11b	2472	Ant0	9.790	7.120	5	Pass

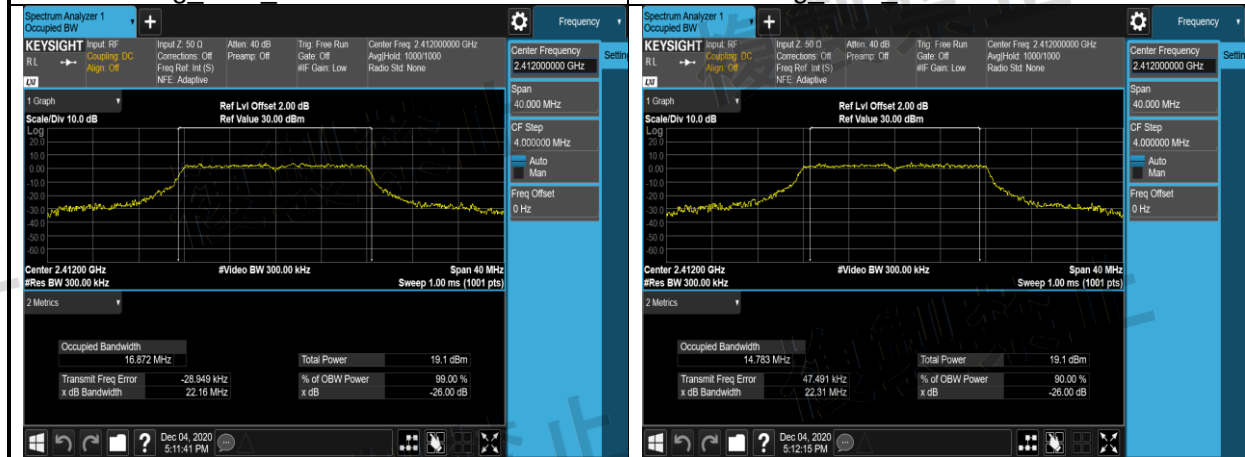
2.2 Test Plots





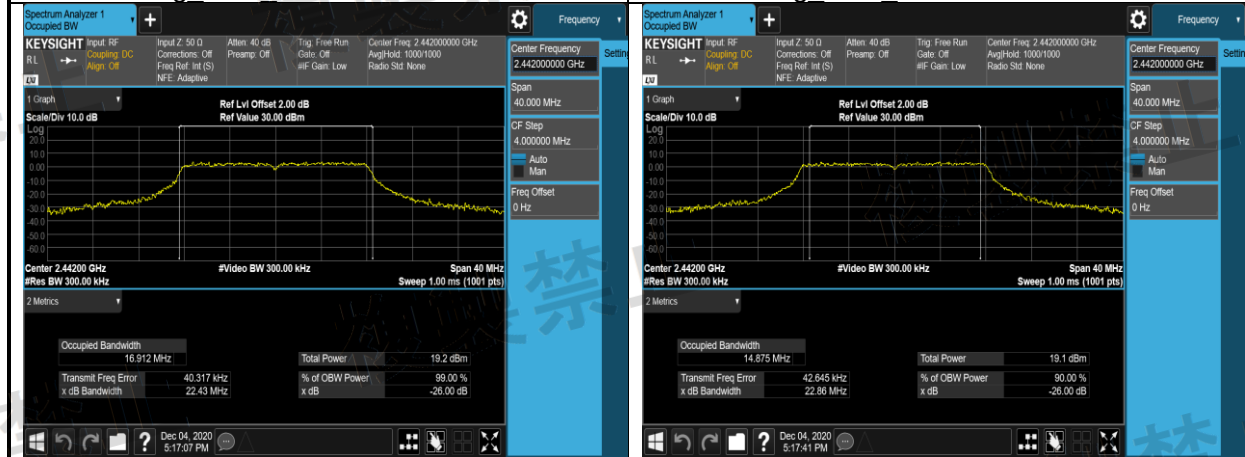
802.11g Ant0 2412MHz -OBW Test

802.11g Ant0 2412MHz -SBW Test



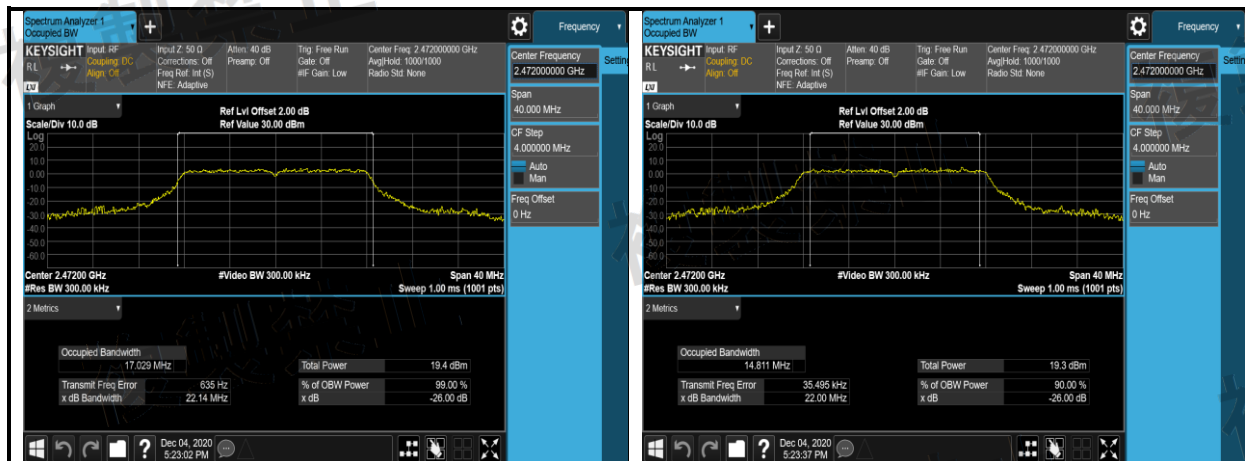
802.11g Ant0 2442MHz -OBW Test

802.11g Ant0 2442MHz -SBW Test



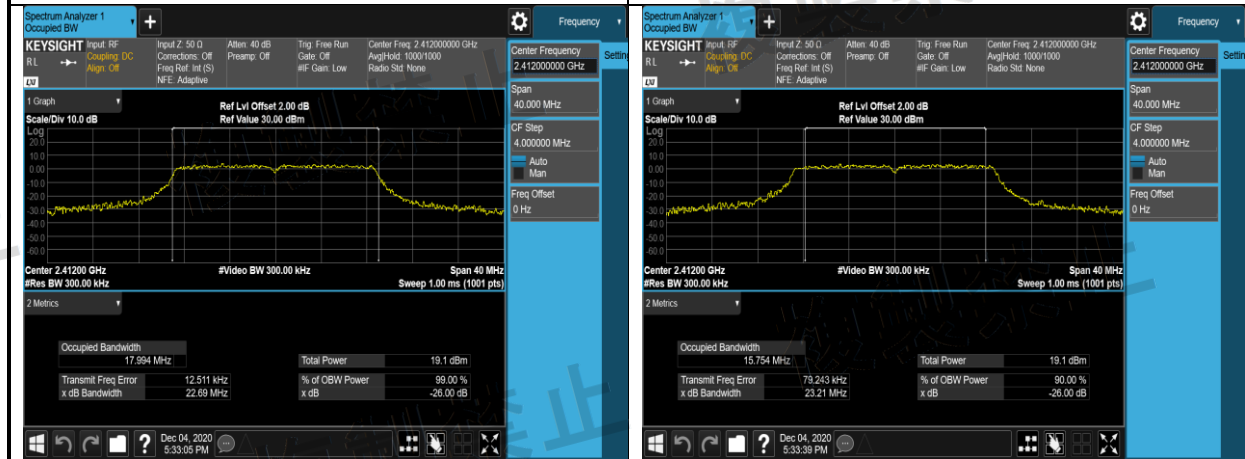
802.11g Ant0 2472MHz -OBW Test

802.11g Ant0 2472MHz -SBW Test



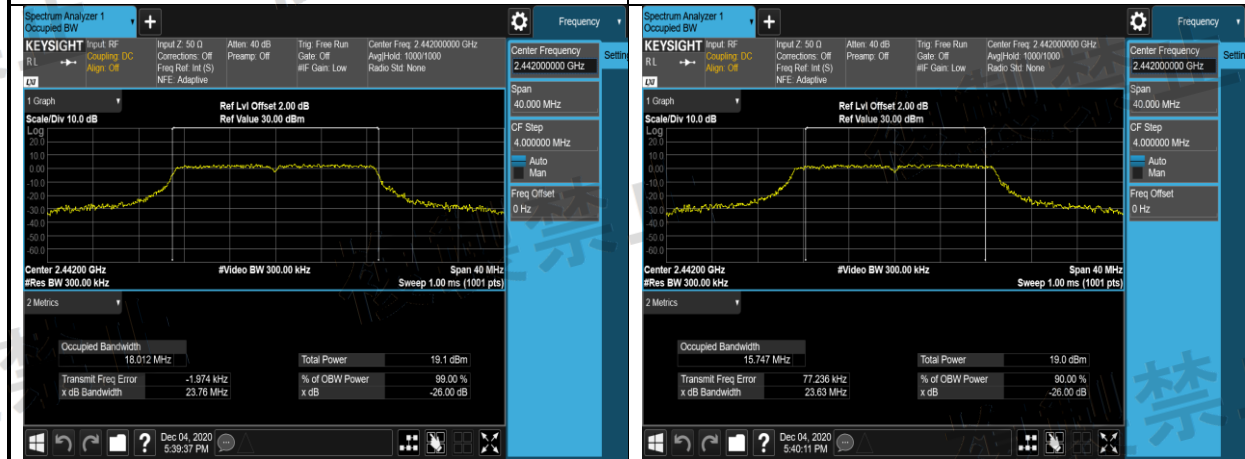
802.11n(HT20)_Ant0_2412MHz -OBW Test

802.11n(HT20)_Ant0_2412MHz -SBW Test



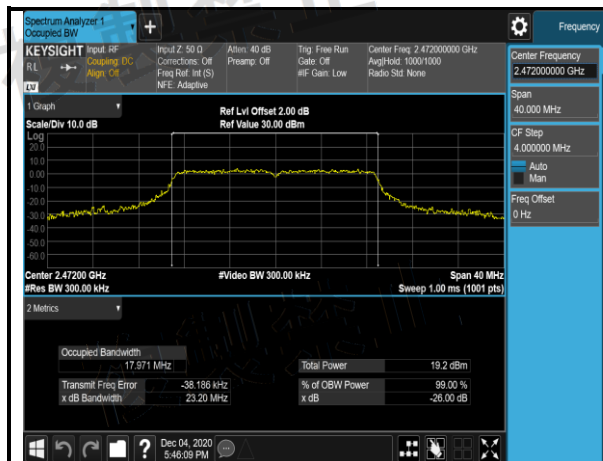
802.11n(HT20)_Ant0_2442MHz -OBW Test

802.11n(HT20)_Ant0_2442MHz -SBW Test



802.11n(HT20)_Ant0_2472MHz -OBW Test

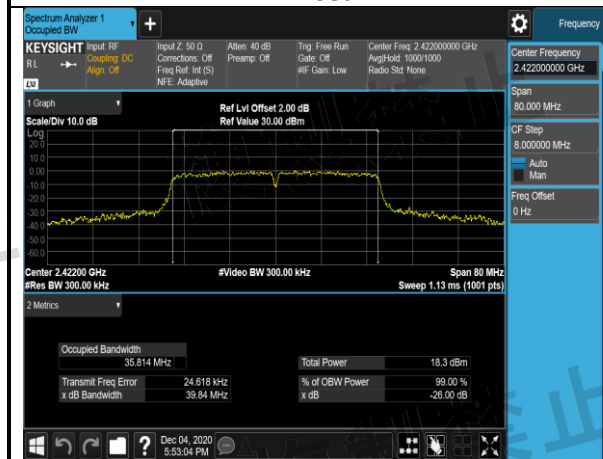
802.11n(HT20)_Ant0_2472MHz -SBW Test



802.11n(HT40)_Ant0_2422MHz -OBW Test



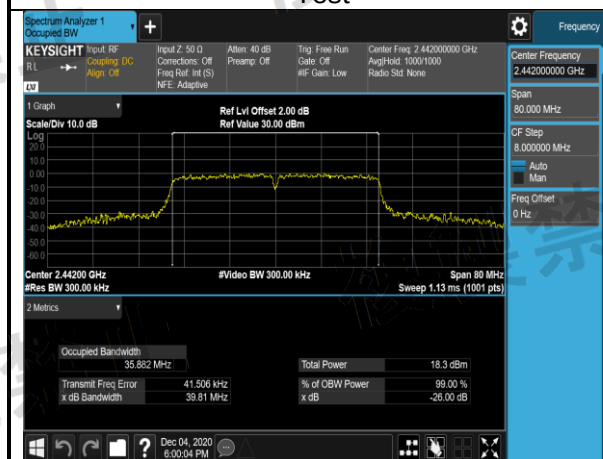
802.11n(HT40)_Ant0_2422MHz -SBW Test



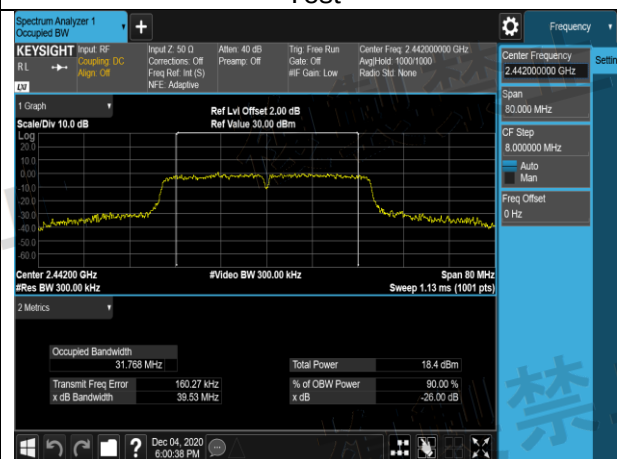
802.11n(HT40)_Ant0_2442MHz -OBW Test



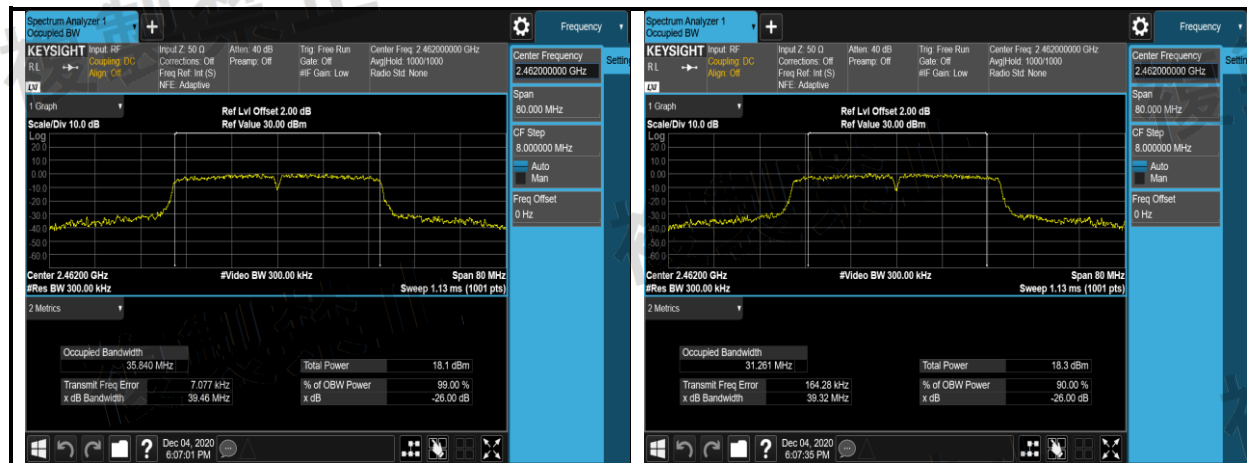
802.11n(HT40)_Ant0_2442MHz -SBW Test



802.11n(HT40)_Ant0_2462MHz -OBW Test



802.11n(HT40)_Ant0_2462MHz -SBW Test



3. Spurious Emission

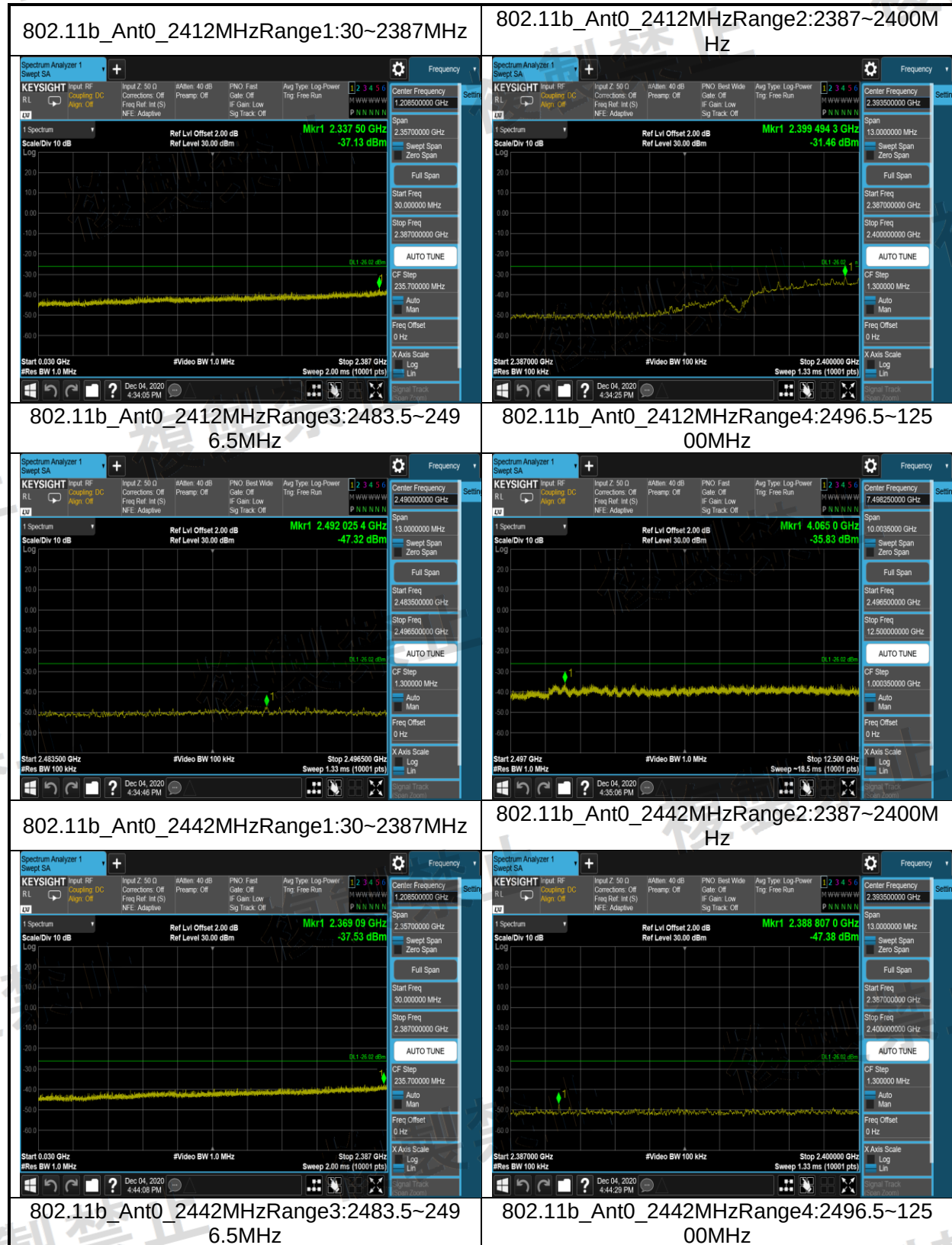
3.1 Test Data

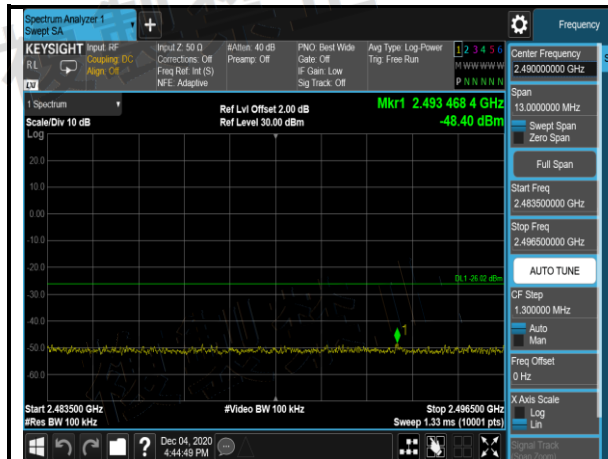
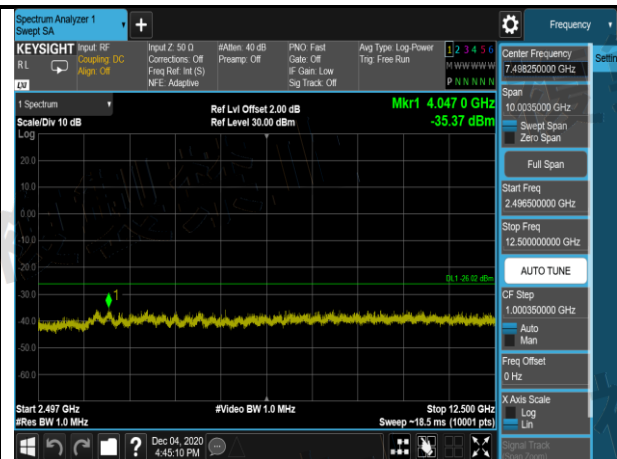
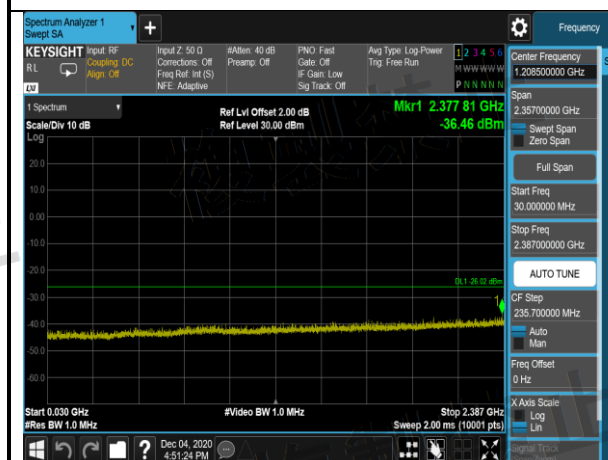
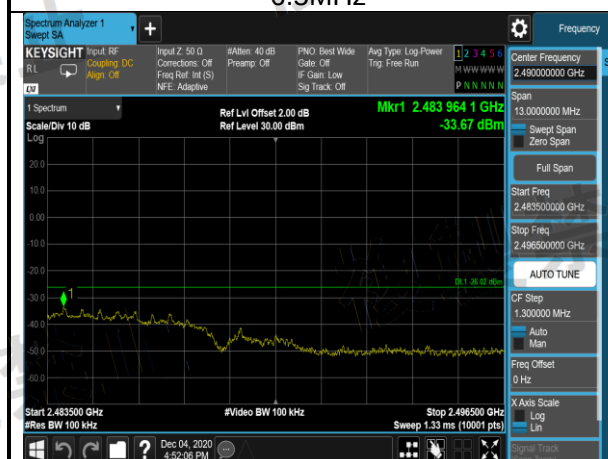
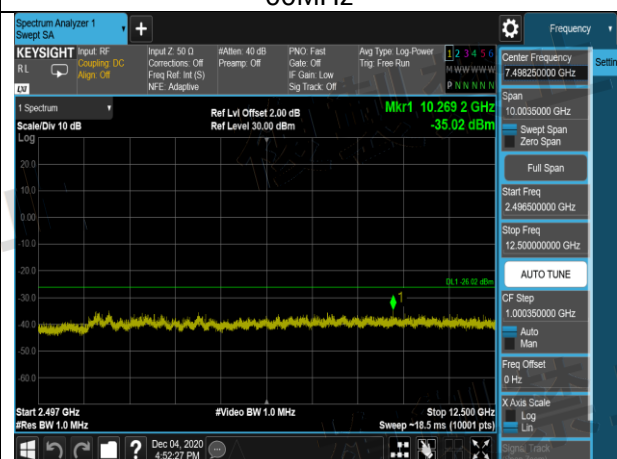
WLAN Spurious Emission Normal									
Test Mode	Test Freq (MHz)	Ant	Test No.	Start Freq (MHz)	Stop Freq (MHz)	Peak Value Freq (MHz)	Spurious Emission (uW)	Limit (uW)	Result
802.11b	2412	Ant0	1	30	2387	2337.5	0.194	2.5	Pass
802.11b	2412	Ant0	2	2387	2400	2399.5	0.714	2.5	Pass
802.11b	2412	Ant0	3	2483.5	2496.5	2492.0	0.019	2.5	Pass
802.11b	2412	Ant0	4	2496.5	12500	4065.0	0.261	2.5	Pass
802.11b	2442	Ant0	1	30	2387	2369.1	0.177	2.5	Pass
802.11b	2442	Ant0	2	2387	2400	2388.8	0.018	2.5	Pass
802.11b	2442	Ant0	3	2483.5	2496.5	2493.5	0.014	2.5	Pass
802.11b	2442	Ant0	4	2496.5	12500	4047.0	0.290	2.5	Pass
802.11b	2472	Ant0	1	30	2387	2377.8	0.226	2.5	Pass
802.11b	2472	Ant0	2	2387	2400	2390.5	0.018	2.5	Pass
802.11b	2472	Ant0	3	2483.5	2496.5	2484.0	0.430	2.5	Pass
802.11b	2472	Ant0	4	2496.5	12500	10269.2	0.315	2.5	Pass
802.11g	2412	Ant0	1	30	2387	2324.8	0.245	2.5	Pass
802.11g	2412	Ant0	2	2387	2400	2399.5	1.318	2.5	Pass
802.11g	2412	Ant0	3	2483.5	2496.5	2492.0	0.022	2.5	Pass
802.11g	2412	Ant0	4	2496.5	12500	4011.0	0.258	2.5	Pass
802.11g	2442	Ant0	1	30	2387	2358.5	0.218	2.5	Pass
802.11g	2442	Ant0	2	2387	2400	2395.0	0.014	2.5	Pass
802.11g	2442	Ant0	3	2483.5	2496.5	2486.9	0.014	2.5	Pass
802.11g	2442	Ant0	4	2496.5	12500	4046.0	0.305	2.5	Pass
802.11g	2472	Ant0	1	30	2387	2360.1	0.178	2.5	Pass
802.11g	2472	Ant0	2	2387	2400	2392.1	0.021	2.5	Pass
802.11g	2472	Ant0	3	2483.5	2496.5	2485.1	1.303	2.5	Pass
802.11g	2472	Ant0	4	2496.5	12500	4040.0	0.340	2.5	Pass
802.11n (HT20)	2412	Ant0	1	30	2387	2384.6	0.284	2.5	Pass
802.11n (HT20)	2412	Ant0	2	2387	2400	2399.9	1.059	2.5	Pass

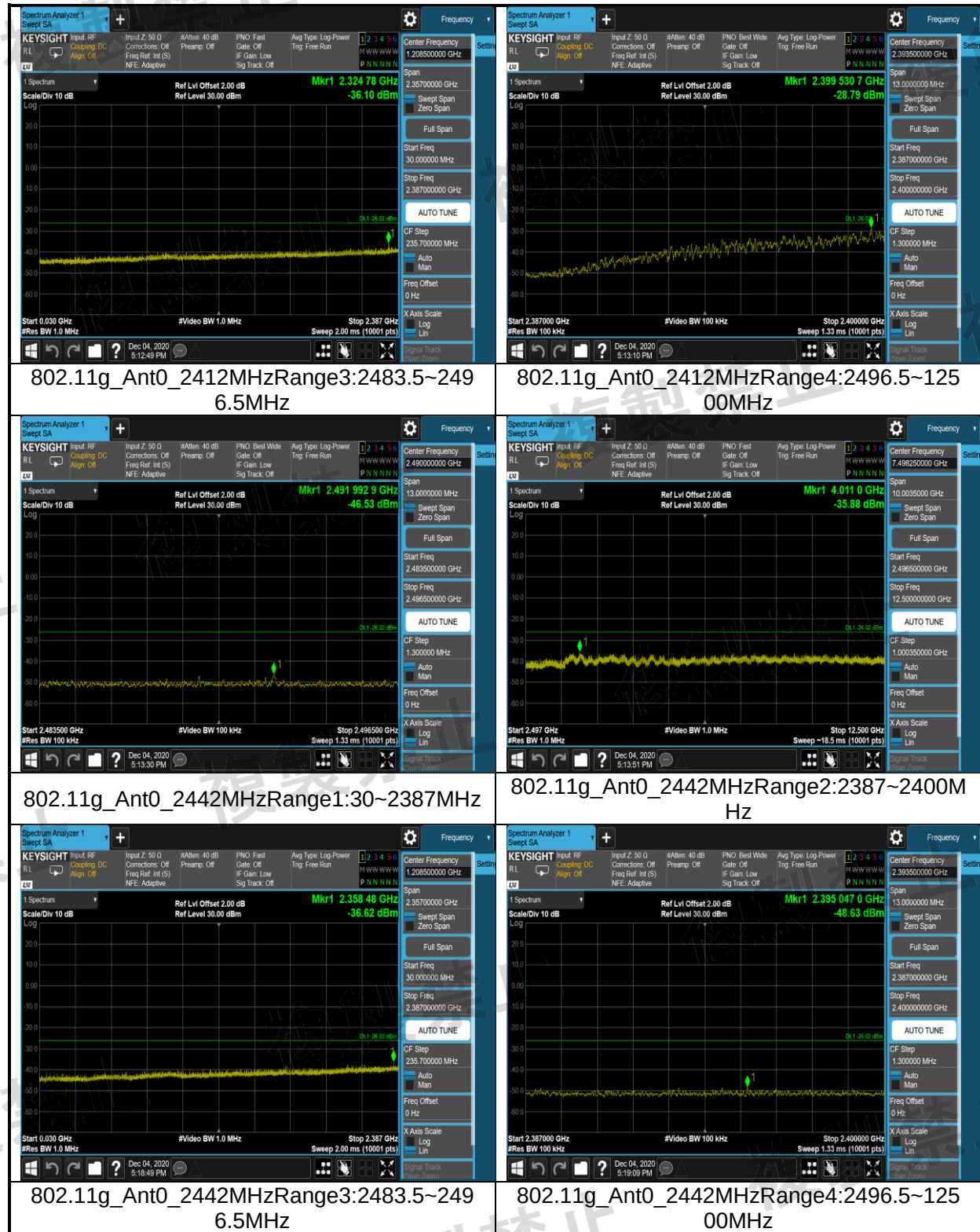
TEST REPORT

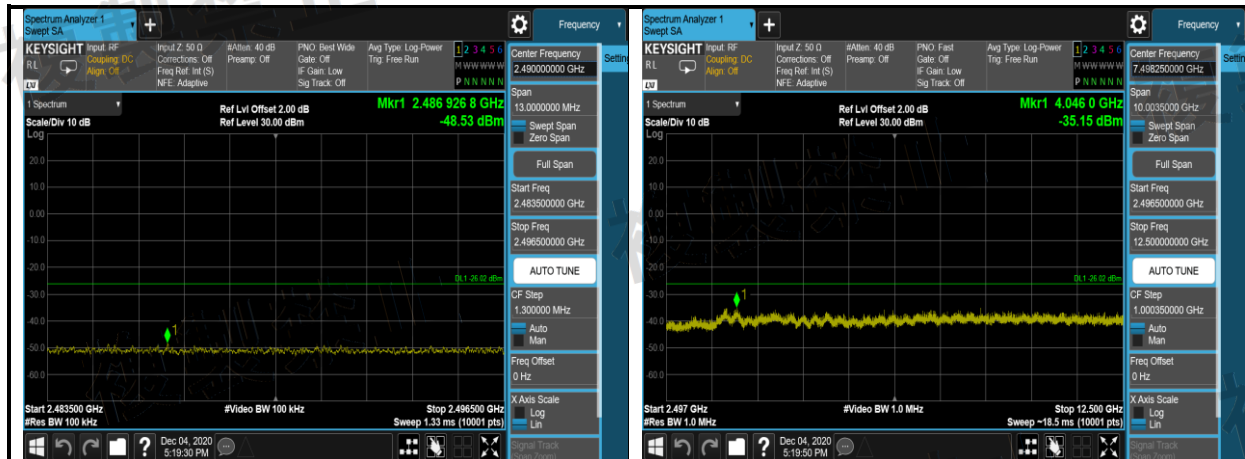
802.11n (HT20)	2412	Ant0	3	2483.5	2496.5	2492.0	0.021	2.5	Pass
802.11n (HT20)	2412	Ant0	4	2496.5	12500	4051.0	0.294	2.5	Pass
802.11n (HT20)	2442	Ant0	1	30	2387	2369.1	0.194	2.5	Pass
802.11n (HT20)	2442	Ant0	2	2387	2400	2399.2	0.012	2.5	Pass
802.11n (HT20)	2442	Ant0	3	2483.5	2496.5	2492.4	0.016	2.5	Pass
802.11n (HT20)	2442	Ant0	4	2496.5	12500	8879.7	0.251	2.5	Pass
802.11n (HT20)	2472	Ant0	1	30	2387	2363.0	0.185	2.5	Pass
802.11n (HT20)	2472	Ant0	2	2387	2400	2392.0	0.020	2.5	Pass
802.11n (HT20)	2472	Ant0	3	2483.5	2496.5	2484.2	1.531	2.5	Pass
802.11n (HT20)	2472	Ant0	4	2496.5	12500	8897.7	0.342	2.5	Pass
802.11n (HT40)	2422	Ant0	1	30	2387	2387.0	0.679	2.5	Pass
802.11n (HT40)	2422	Ant0	2	2387	2400	2398.6	0.394	2.5	Pass
802.11n (HT40)	2422	Ant0	3	2483.5	2496.5	2487.2	0.015	2.5	Pass
802.11n (HT40)	2422	Ant0	4	2496.5	12500	4876.3	0.290	2.5	Pass
802.11n (HT40)	2442	Ant0	1	30	2387	2227.9	0.193	2.5	Pass
802.11n (HT40)	2442	Ant0	2	2387	2400	2399.5	0.036	2.5	Pass
802.11n (HT40)	2442	Ant0	3	2483.5	2496.5	2483.9	0.049	2.5	Pass
802.11n (HT40)	2442	Ant0	4	2496.5	12500	7209.1	0.304	2.5	Pass
802.11n (HT40)	2462	Ant0	1	30	2387	2276.7	0.186	2.5	Pass
802.11n (HT40)	2462	Ant0	2	2387	2400	2392.1	0.013	2.5	Pass
802.11n (HT40)	2462	Ant0	3	2483.5	2496.5	2483.8	0.457	2.5	Pass
802.11n (HT40)	2462	Ant0	4	2496.5	12500	2496.5	0.875	2.5	Pass

3.2 Test Plots



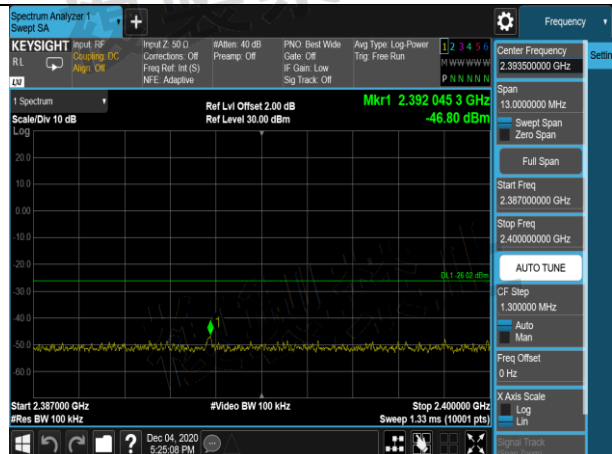






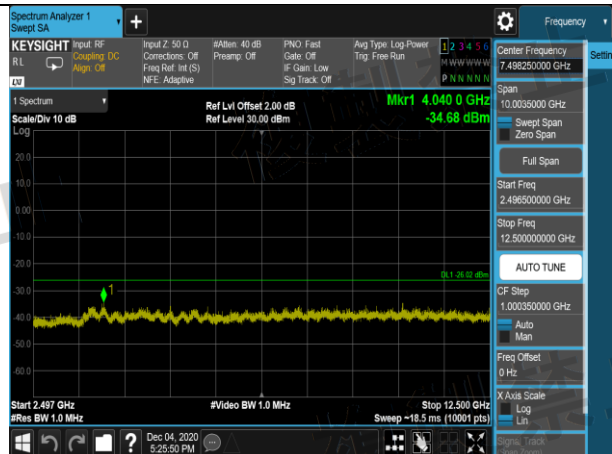
802.11g_Ant0_2472MHzRange1:30~2387MHz

802.11g_Ant0_2472MHzRange2:2387~2400MHz



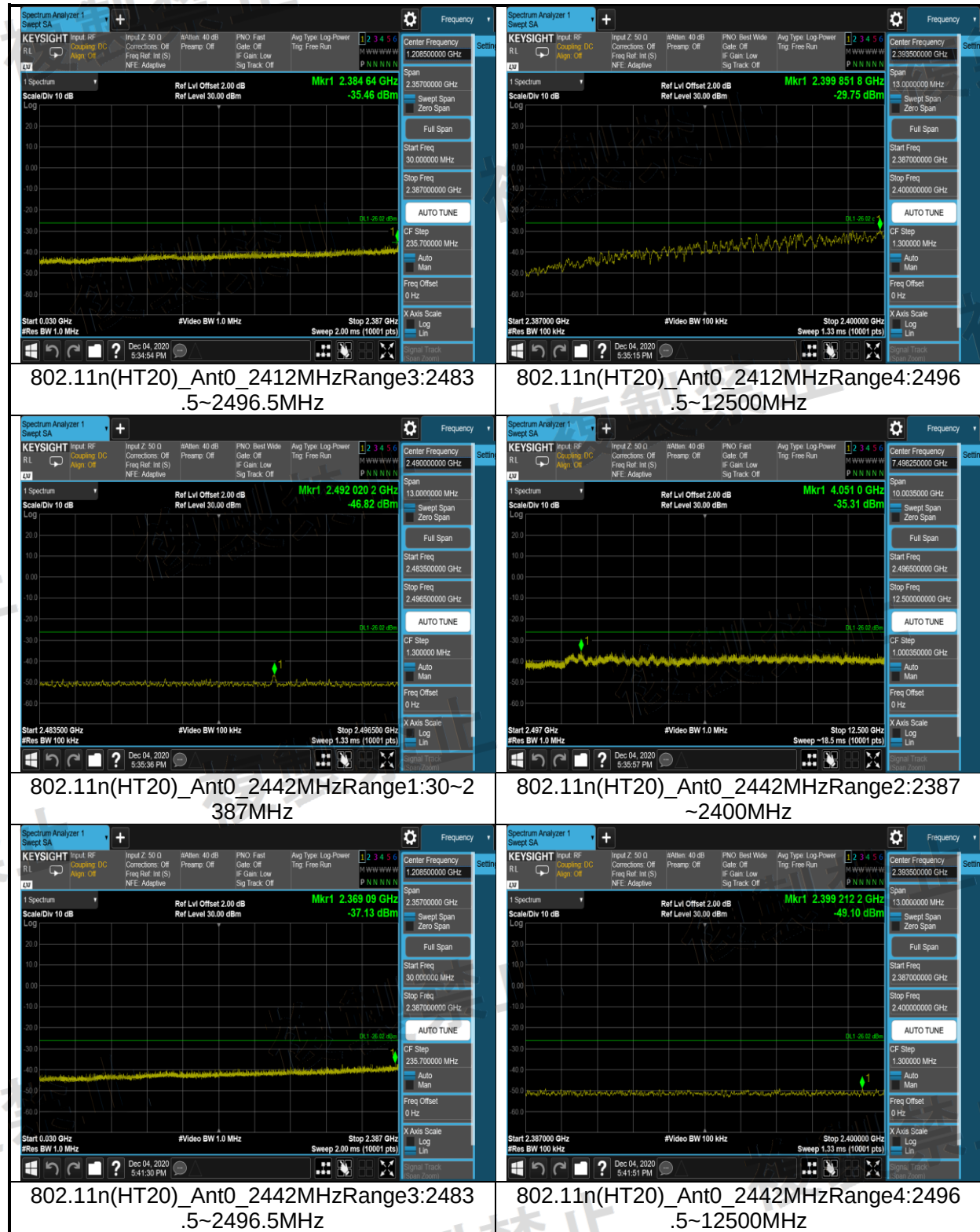
802.11g_Ant0_2472MHzRange3:2483.5~2496.5MHz

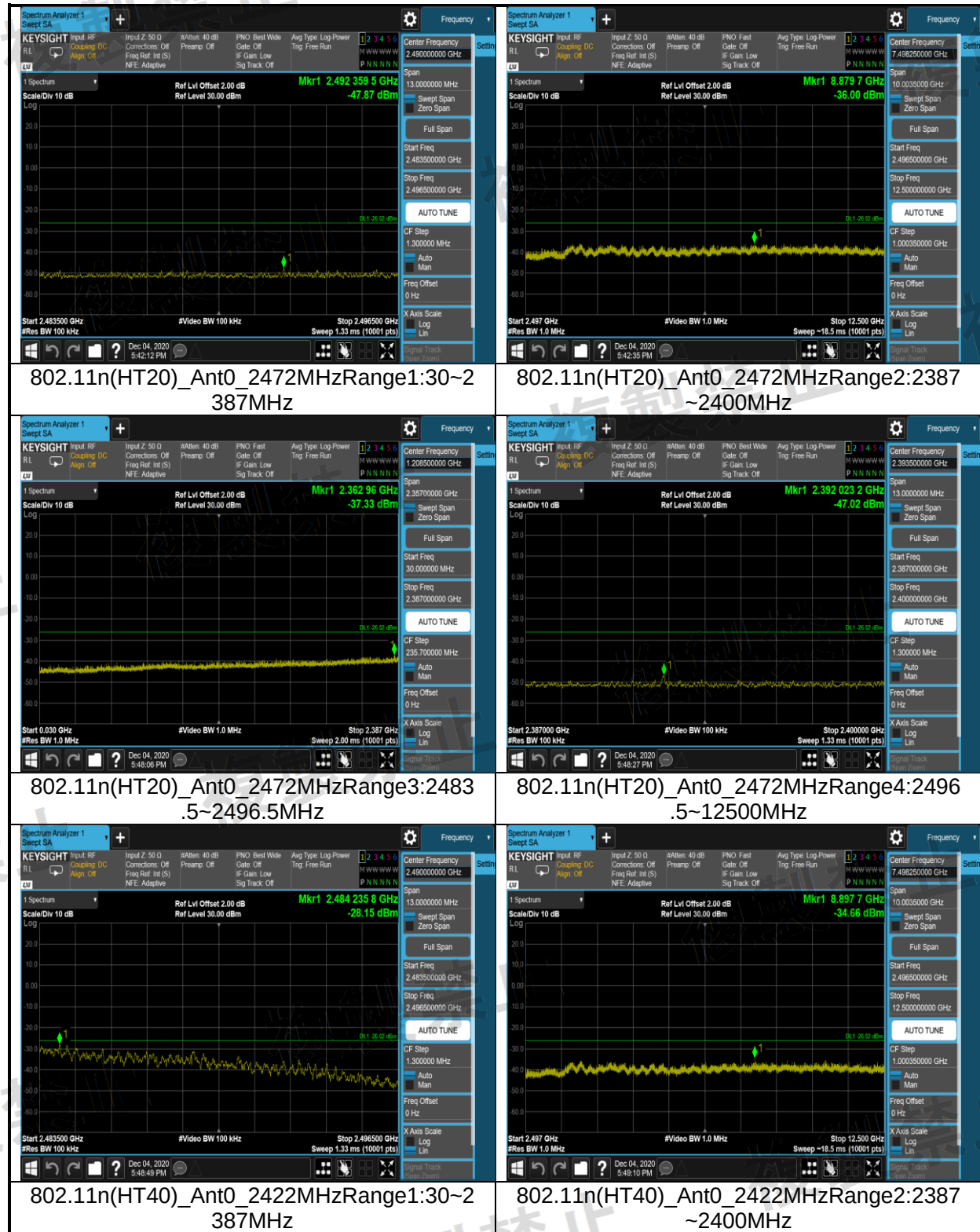
802.11g_Ant0_2472MHzRange4:2496.5~2500MHz

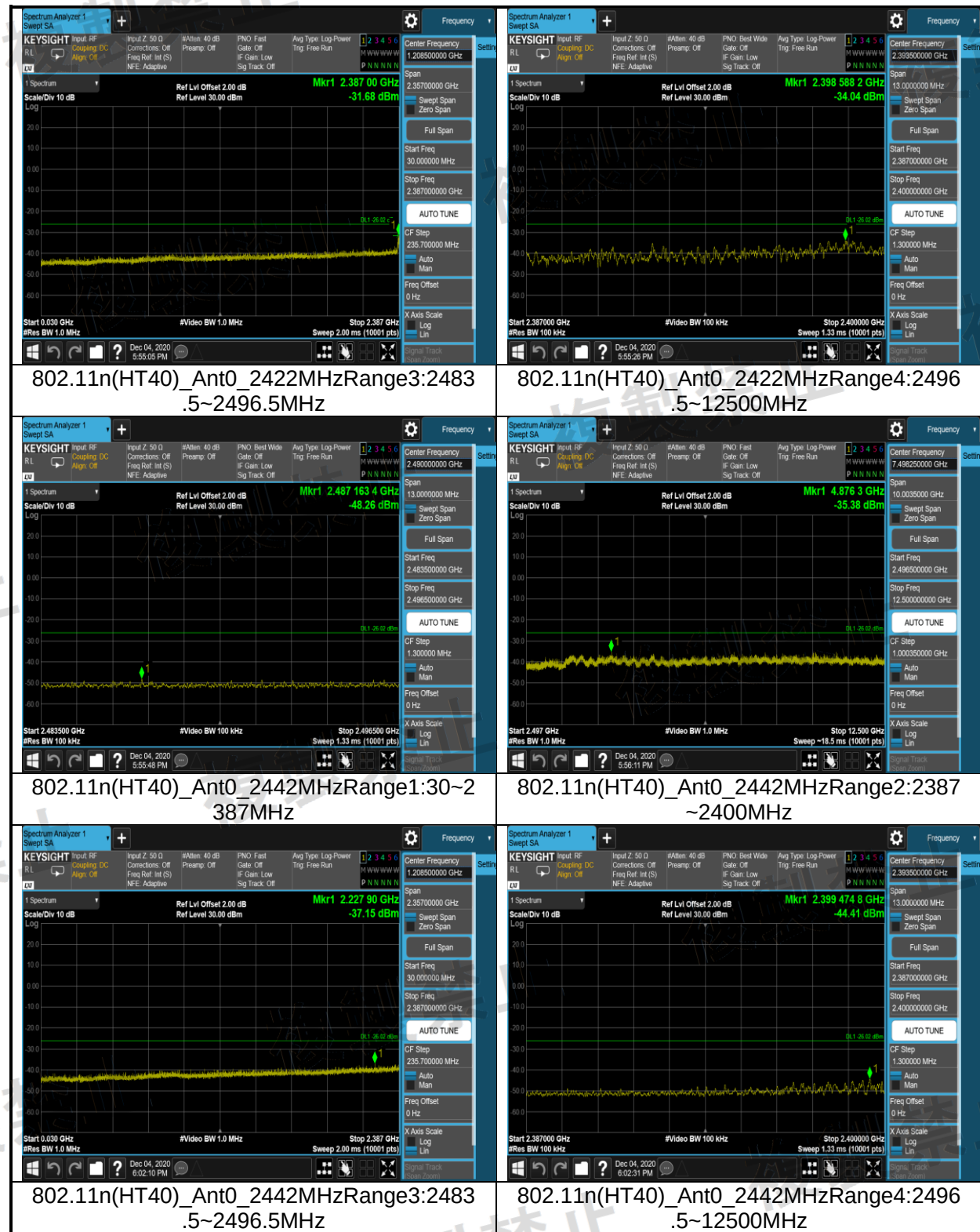


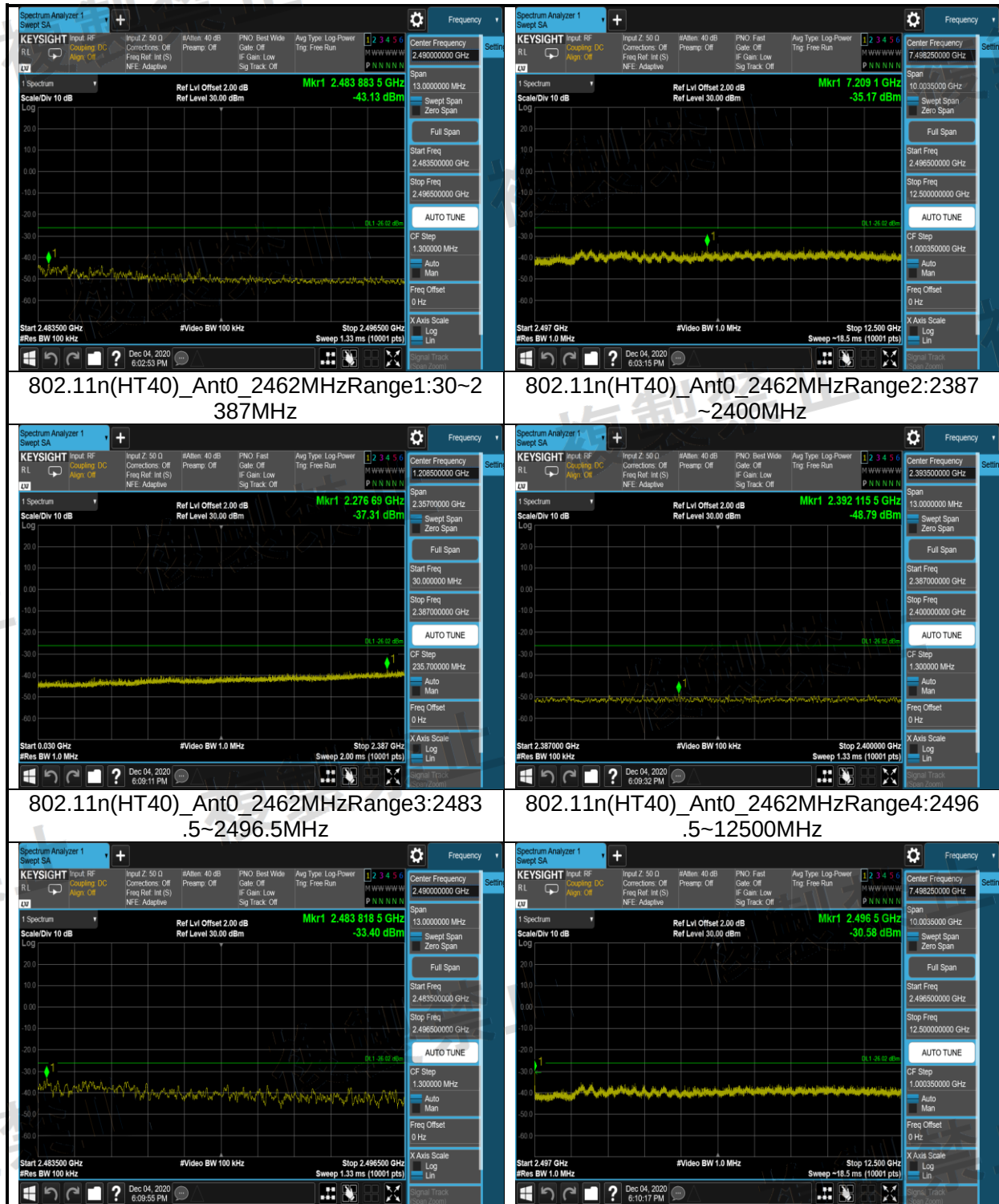
802.11n(HT20)_Ant0_2412MHzRange1:30~2387MHz

802.11n(HT20)_Ant0_2412MHzRange2:2387~2400MHz









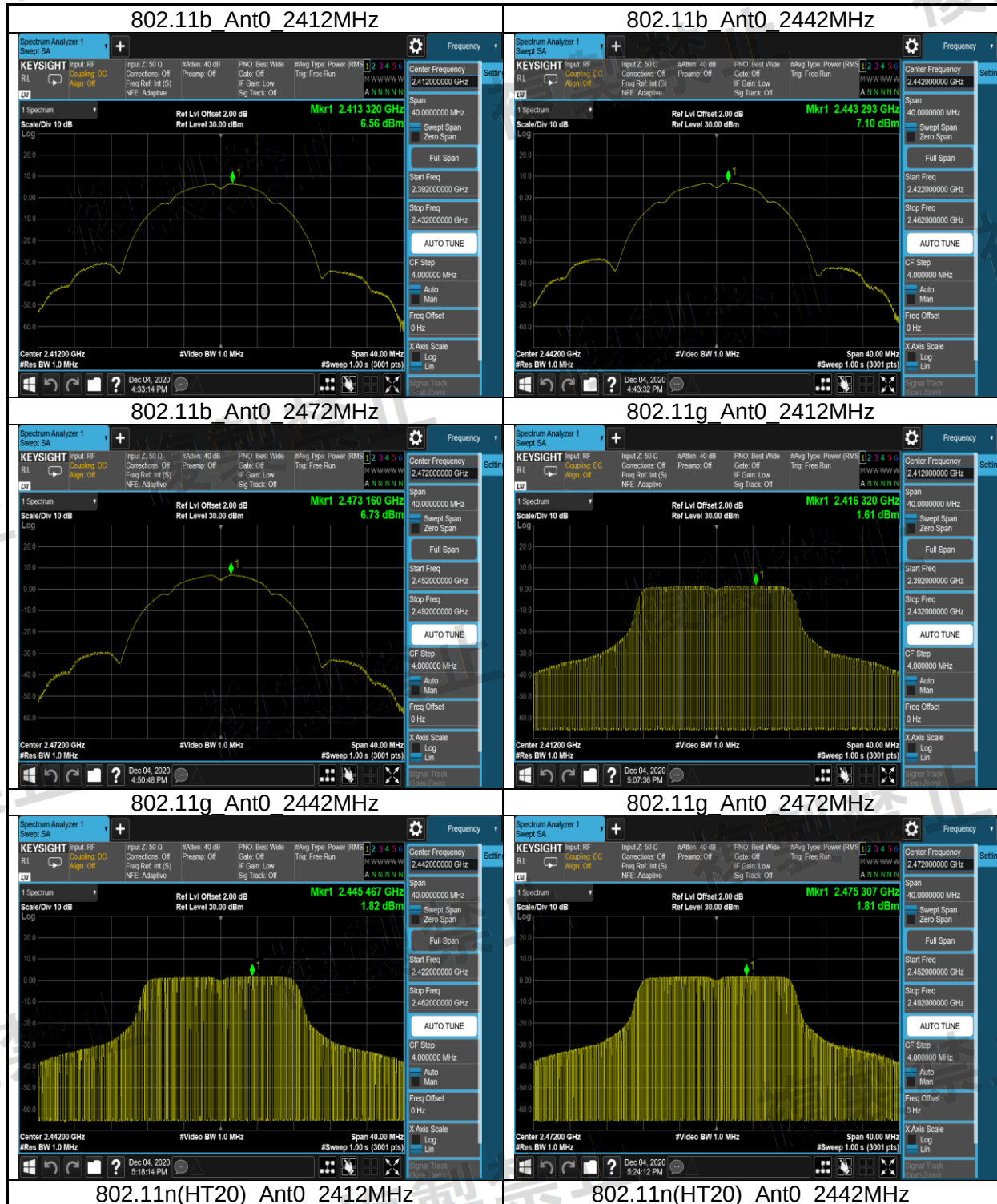
4. Antenna Power and Tolerance

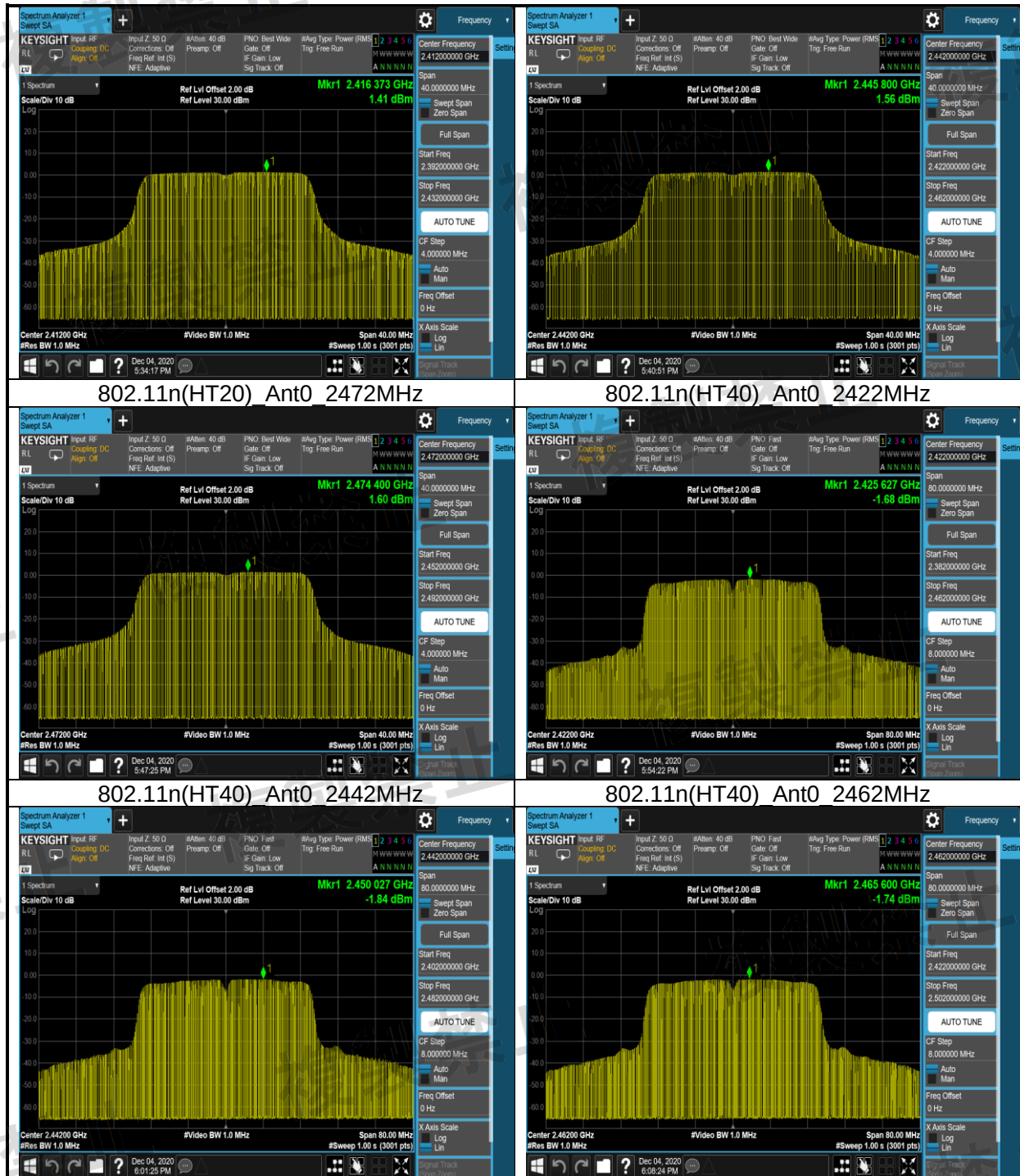
4.1 Test Data

WLAN Antenna Power and Tolerance Normal								
Test Mode	Test Freq (MHz)	Ant	Antenna Power Density (mW/MHz)	Limit (mW/MHz)	Declaration Antenna Power (mW/MHz)	Tolerance (%)	Tolerance Limit (%)	Result
802.11b	2412	Ant0	4.52	10	10	-54.8	-80% ~ 20.00%	Pass
802.11b	2442	Ant0	5.13	10	10	-48.7	-80% ~ 20.00%	Pass
802.11b	2472	Ant0	4.71	10	10	-52.9	-80% ~ 20.00%	Pass
802.11g	2412	Ant0	1.45	10	2	-27.5	-80% ~ 20.00%	Pass
802.11g	2442	Ant0	1.52	10	2	-24.0	-80% ~ 20.00%	Pass
802.11g	2472	Ant0	1.52	10	2	-24.0	-80% ~ 20.00%	Pass
802.11n (HT20)	2412	Ant0	1.38	10	2	-31.0	-80% ~ 20.00%	Pass
802.11n (HT20)	2442	Ant0	1.43	10	2	-28.5	-80% ~ 20.00%	Pass
802.11n (HT20)	2472	Ant0	1.45	10	2	-27.5	-80% ~ 20.00%	Pass
802.11n (HT40)	2422	Ant0	0.68	5	1	-32.0	-80% ~ 20.00%	Pass
802.11n (HT40)	2442	Ant0	0.65	5	1	-35.0	-80% ~ 20.00%	Pass
802.11n (HT40)	2462	Ant0	0.67	5	1	-33.0	-80% ~ 20.00%	Pass

Worst Antenna Power Density (dBm/MHz)	Antenna Gain (dBi)	EIRP (dBm/MHz)	Limit (dBm/MHz)	Result
7.10	3	10.10	12.14	Pass

4.2 Test Plots



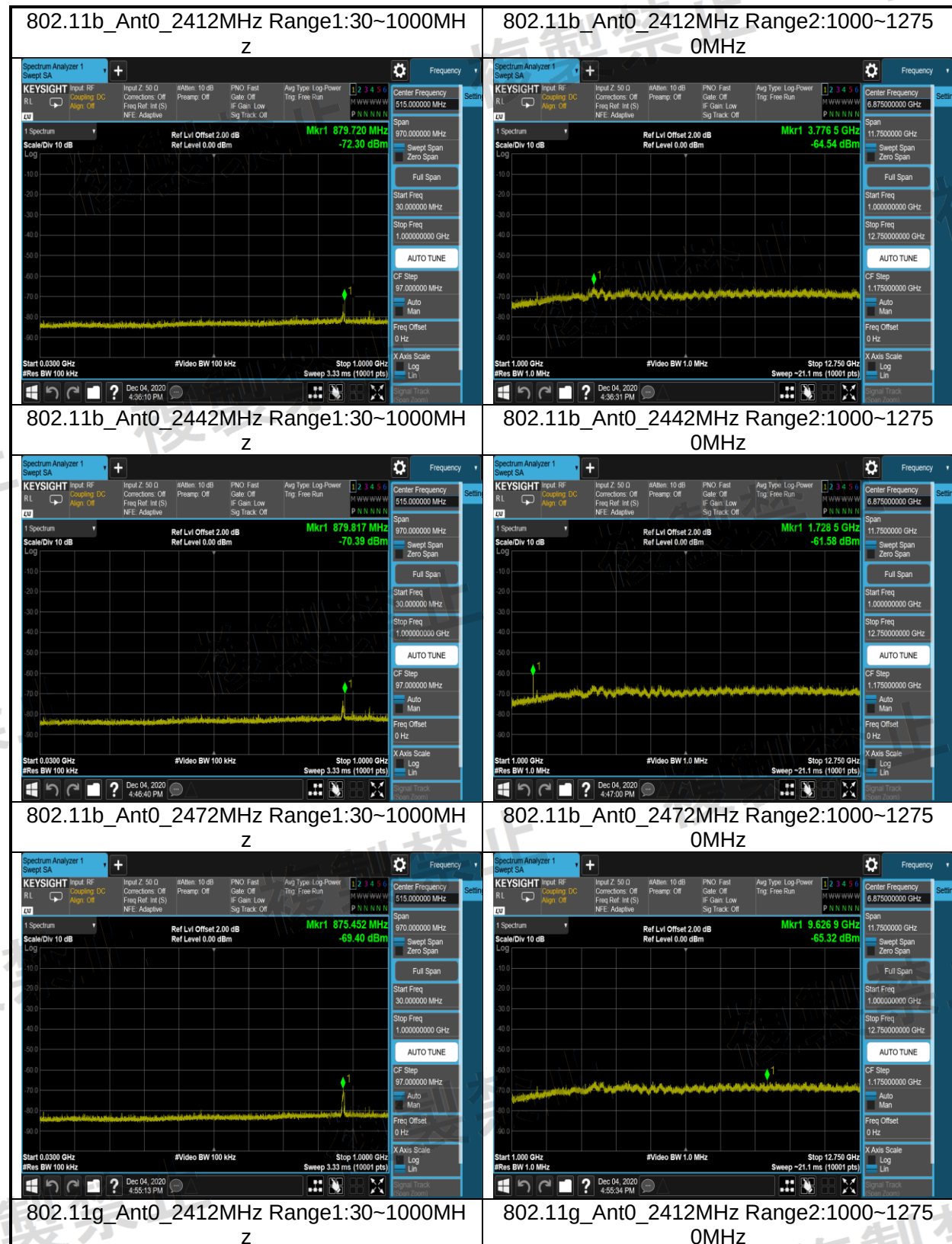


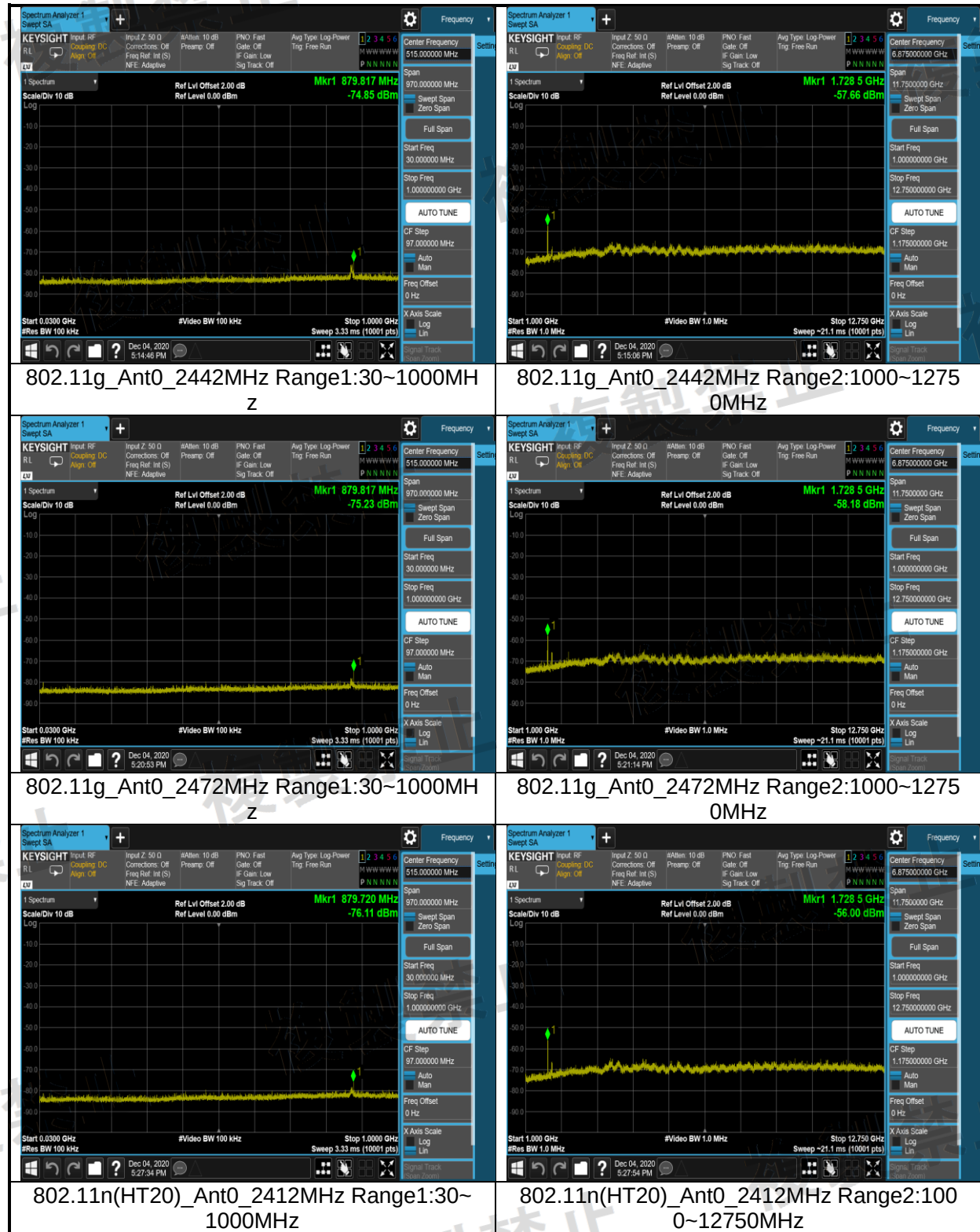
5. Limitation of Collateral Radio Emission of Receiver

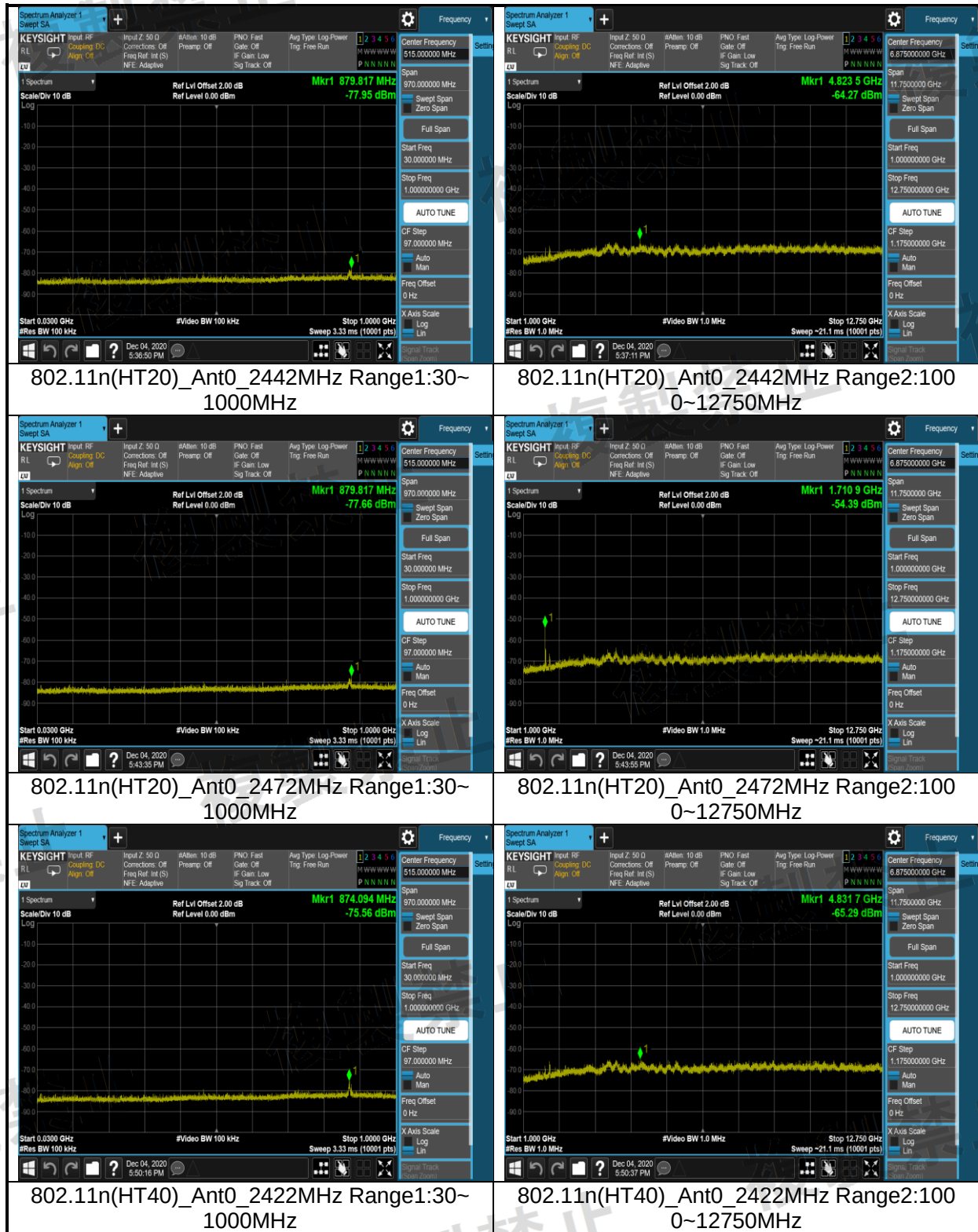
5.1 Test Data

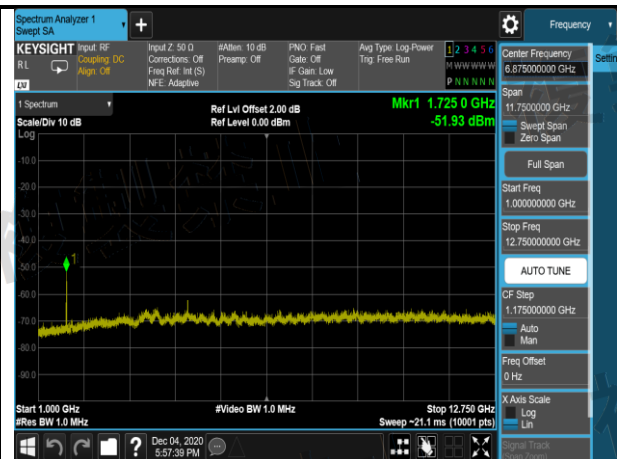
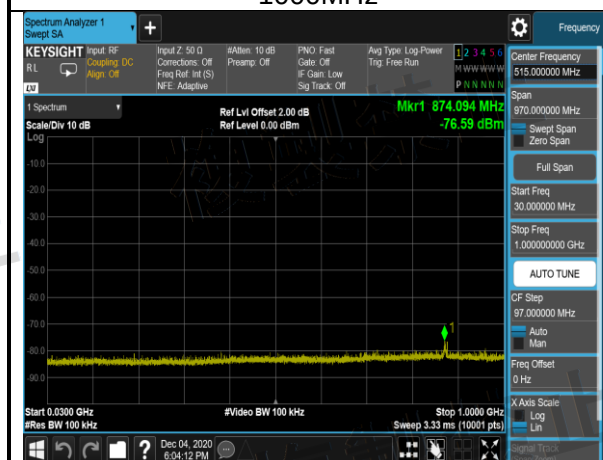
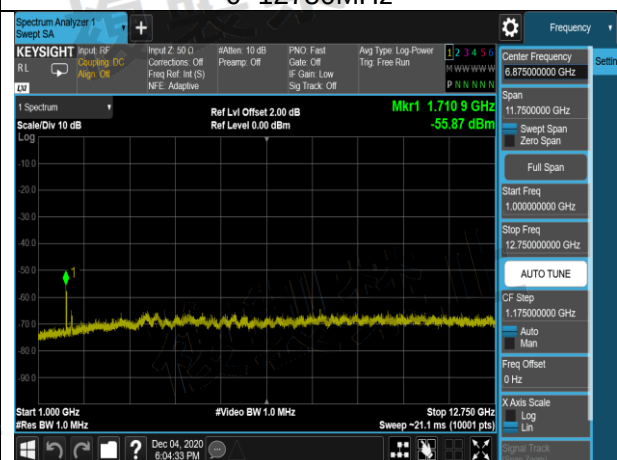
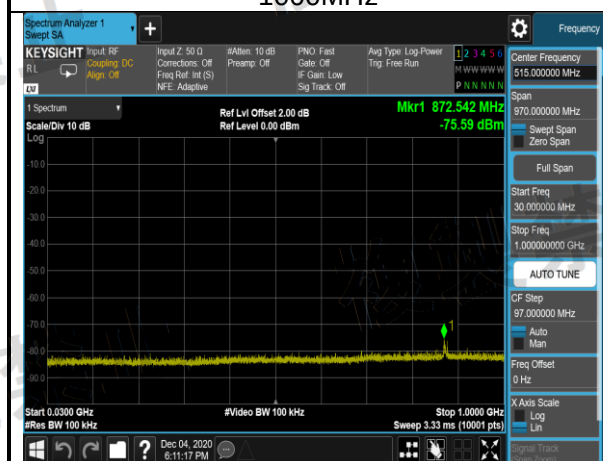
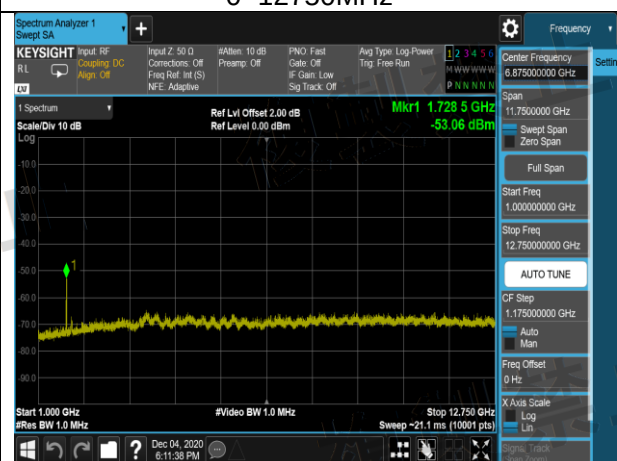
WLAN Collateral Emission of Receiver Normal									
Test Mode	Test Freq (MHz)	Ant	Test No.	Start Freq (MHz)	Stop Freq (MHz)	Peak Value Freq (MHz)	Emission Of Receiver (nW)	Limit (nW)	Result
802.11b	2412	Ant0	1	30	1000	879.7	0.059	4	Pass
802.11b	2412	Ant0	2	1000	12750	3776.5	0.352	20	Pass
802.11b	2442	Ant0	1	30	1000	879.8	0.091	4	Pass
802.11b	2442	Ant0	2	1000	12750	1728.5	0.695	20	Pass
802.11b	2472	Ant0	1	30	1000	875.5	0.115	4	Pass
802.11b	2472	Ant0	2	1000	12750	9626.9	0.294	20	Pass
802.11g	2412	Ant0	1	30	1000	879.8	0.033	4	Pass
802.11g	2412	Ant0	2	1000	12750	1728.5	1.714	20	Pass
802.11g	2442	Ant0	1	30	1000	879.8	0.030	4	Pass
802.11g	2442	Ant0	2	1000	12750	1728.5	1.521	20	Pass
802.11g	2472	Ant0	1	30	1000	879.7	0.024	4	Pass
802.11g	2472	Ant0	2	1000	12750	1728.5	2.512	20	Pass
802.11n (HT20)	2412	Ant0	1	30	1000	879.8	0.016	4	Pass
802.11n (HT20)	2412	Ant0	2	1000	12750	4823.5	0.374	20	Pass
802.11n (HT20)	2442	Ant0	1	30	1000	879.8	0.017	4	Pass
802.11n (HT20)	2442	Ant0	2	1000	12750	1710.9	3.639	20	Pass
802.11n (HT20)	2472	Ant0	1	30	1000	874.1	0.028	4	Pass
802.11n (HT20)	2472	Ant0	2	1000	12750	4831.7	0.295	20	Pass
802.11n (HT40)	2422	Ant0	1	30	1000	872.4	0.031	4	Pass
802.11n (HT40)	2422	Ant0	2	1000	12750	1725.0	6.412	20	Pass
802.11n (HT40)	2442	Ant0	1	30	1000	874.1	0.022	4	Pass
802.11n (HT40)	2442	Ant0	2	1000	12750	1710.9	2.588	20	Pass
802.11n (HT40)	2462	Ant0	1	30	1000	872.5	0.028	4	Pass
802.11n (HT40)	2462	Ant0	2	1000	12750	1728.5	4.943	20	Pass

5.2 Test Plots









Appendix B: Photograph of Test setup



***** END *****