

RADIO TEST REPORT

FCC 47 CFR PART 15 SUBPART C

INDUSTRY CANADA RSS-247

Test Standard	FCC Part 15.247 RSS-247 issue 2 and RSS-GEN issue 5
Product name	ac2x2+BT5.0 USB2.0
Brand Name	CC&C
Model No.	P31ASUS
Test Result	Pass
Statements of Conformity	Determination of compliance is based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

The test Result was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were given in ANSI C63.10: 2013 and compliance standards.

The test results of this report relate only to the tested sample (EUT) identified in this report.

The test Report of full or partial shall not copy. Without written approval of Compliance Certification Services Inc. (Wugu Laboratory).

Approved by:



Kevin Tsai
Deputy Manager

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

除非另有說明，此報告結果僅對測試之樣品負責，同時此樣品僅保留90天。本報告未經本公司書面許可，不可部份複製。

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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	November 25, 2021	Initial Issue	ALL	Doris Chu

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1 GENERAL INFORMATION

1.1 EUT INFORMATION

Applicant	CC&C Technologies, Inc. 8F, No.150, Jian Yi Rd, Zhonghe District, New Taipei City, 235, Taiwan
Manufacturer	CC&C Technologies, Inc. 8F, No.150, Jian Yi Rd, Zhonghe District, New Taipei City, 235, Taiwan
Equipment	ac2x2+BT5.0 USB2.0
Model No.	P31ASUS
Model Discrepancy	N/A
Trade Name	CC&C
Received Date	September 10, 2021
Date of Test	September 28 ~ November 2, 2021
Power Supply	Power from host device.
HW Version	V.A
SW Version	V15
EUT Serial #	CCCP312145001

Remark:

1. For more details, please refer to the User's manual of the EUT.
2. Disclaimer: Antenna information is provided by the applicant, test results of this report are applicable to the sample EUT received.

1.2 EUT CHANNEL INFORMATION

Frequency Range	802.11b/g/n HT 20: 2412MHz ~ 2462MHz 802.11n HT40: 2422MHz ~ 2452MHz
Modulation Type	1. IEEE 802.11b mode: CCK 2. IEEE 802.11g mode: OFDM 3. IEEE 802.11n HT 20 MHz mode : OFDM 4. IEEE 802.11n HT 40 MHz mode : OFDM
Number of channel	1. IEEE 802.11b mode: 11 Channels 2. IEEE 802.11g mode: 11 Channels 3. IEEE 802.11n HT 20 MHz mode : 11 Channels 4. IEEE 802.11n HT 40 MHz mode : 7 Channels

Remark:

Refer as ANSI C63.10: 2013 clause 5.6.1 Table 4 and RSS-GEN Table A1 for test channels

Number of frequencies to be tested		
Frequency range in which device operates	Number of frequencies	Location in frequency range of operation
☐ 1 MHz or less	1	Middle
☐ 1 MHz to 10 MHz	2	1 near top and 1 near bottom
☒ More than 10 MHz	3	1 near top, 1 near middle, and 1 near bottom

1.3 ANTENNA INFORMATION

Antenna Type	☐ FPC ☒ PCB ☐ Dipole ☐ Coils
Antenna Gain	Main: WA-P-LB-02-914: Gain :2.93 dBi Aux: WA-P-LB-01-289: Gain :2.81 dBi Power Directional Gain: 5.88 dBi

Remark:

- 1.The antenna(s) of the EUT are permanently attached and there are no provisions for connection to an external antenna. So the EUT complies with the requirements of §15.203 and RSS-Gen 6.8.
2. Power Directional Gain = $10 \cdot \log \{ [10^{(Ant1/20)} + 10^{(Ant2/20)} + \dots + 10^{(Ant N /20)}]^2 / N \text{ ANT} \}$ dBi

1.4 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
AC Powerline Conducted Emission	+/- 1.2575
Emission bandwidth, 20dB bandwidth	+/- 0.0014
RF output power, conducted	+/- 1.14
Power density, conducted	+/- 1.40
3M Semi Anechoic Chamber / 30M~1G (Horizontally)	+/- 3.91
3M Semi Anechoic Chamber / 30M~1G (Vertically)	+/- 4.57
3M Semi Anechoic Chamber / 1G~6G	+/- 5.20
3M Semi Anechoic Chamber / 6G~18G	+/- 5.18
3M Semi Anechoic Chamber / 18G~40G	+/- 3.68

Remark:

- 1.This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2
2. ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report.

1.5 FACILITIES AND TEST LOCATION

All measurement facilities used to collect the measurement data are located at

No.11, Wugong 6th Rd., Wugu Dist., New Taipei City, Taiwan. (R.O.C.)

CAB identifier: TW1309

Test site	Test Engineer	Remark
AC Conduction Room	Jack Chen	-
Radiation	Ray Li	-
RF Conducted	Lance Chen	-

Remark: The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC public Access Link (PAL) database, FCC Registration No. :444940, the FCC Designation No.:TW1309

1.6 INSTRUMENT CALIBRATION

RF Conducted Test Site					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Coaxial Cable	Woken	WC12	CC003	06/28/2021	06/27/2022
Coaxial Cable	Woken	WC12	CC001	06/28/2021	06/27/2022
Power Meter	Anritsu	ML2487A	6K00003260	05/24/2021	05/23/2022
Power Sensor	Anritsu	MA2490A	032910	05/24/2021	05/23/2022
EXA Signal Analyzer	KEYSIGHT	N9010B	MY55460167	09/07/2021	09/06/2022
Software	Radio Test Software Ver. 21				

Conducted Emission Room					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
CABLE	EMCI	CFD300-NL	CERF	06/28/2021	06/27/2022
EMI Test Receiver	R&S	ESCI	100064	07/05/2021	07/04/2022
LISN	SCHAFFNER	NNB 41	03/10013	02/02/2021	02/01/2022
Software	EZ-EMC(CCS-3A1-CE)				



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3M 966 Chamber Test Site					
Equipment	Manufacturer	Model	Serial Number	Cal Date	Cal Due
Band Reject Filters	MICRO TRONICS	BRM 50702	120	02/08/2021	02/07/2022
Bilog Antenna	Sunol Sciences	JB3	A030105	07/19/2021	07/18/2022
Coaxial Cable	HUBER SUHNER	SUCOFLEX 104PEA	20995	02/24/2021	02/23/2022
Coaxial Cable	EMCI	EMC105	190914+327109/4	09/17/2021	09/16/2022
Digital Thermo-Hygro Meter	WISEWIND	1206	D07	01/06/2021	01/05/2022
Horn Antenna	ETS LINDGREN	3116	00026370	12/11/2020	12/10/2021
Horn Antenna	ETS LINDGREN	3117	00055165	07/29/2021	07/28/2022
K Type Cable	Huber+Suhner	SUCOFLEX 102	29406/2	12/09/2020	12/08/2021
K Type Cable	Huber+Suhner	SUCOFLEX 102	22470/2	12/09/2020	12/08/2021
Pre-Amplifier	EMEC	EM330	060609	02/24/2021	02/23/2022
Pre-Amplifier	HP	8449B	3008A00965	12/25/2020	12/24/2021
Pre-Amplifier	MITEQ	AMF-6F-18004000-37-8P	985646	09/08/2021	09/07/2022
PSA Series Spectrum Analyzer	Agilent	E4446A	US42510268	09/23/2021	09/22/2022
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R	N.C.R
Controller	CCS	CC-C-1F	N/A	N.C.R	N.C.R
Turn Table	CCS	CC-T-1F	N/A	N.C.R	N.C.R
Software	e3 6.11-20180413				

Remark: Each piece of equipment is scheduled for calibration once a year.

1.7 SUPPORT AND EUT ACCESSORIES EQUIPMENT

EUT Accessories Equipment					
No.	Equipment	Brand	Model	Series No.	FCC ID
	N/A				

Support Equipment						
No.	Equipment	Brand	Model	Series No.	FCC ID	IC
1	NB(G)	Lenovo	IBM 1951	N/A	CJ6UPA3489WL	N/A
2	NB(J)	TOSHIBA	PT345T-00L002	N/A	PD97260H	1000M-7260H

1.8 TEST METHODOLOGY AND APPLIED STANDARDS

The test methodology, setups and results comply with all requirements in accordance with ANSI C63.10:2013, FCC Part 2, FCC Part 15.247, RSS-247 Issue 2 and RSS-GEN Issue 5.

2 TEST SUMMARY

FCC Standard Section	IC Standard Section	Report Section	Test Item	Result
15.203	RSS-Gen 6.8	1.3	Antenna Requirement	Pass
15.207(a)	RSS-GEN 8.8	5.1	AC Conducted Emission	Pass
15.247(a)(2)	RSS-247(5.2)(a)	5.2	6 dB Bandwidth	Pass
-	RSS-GEN 6.7	5.2	Occupied Bandwidth (99%)	Pass
15.247(b)(3)	RSS-247(5.4)(d)	5.3	Output Power Measurement	Pass
15.247(e)	RSS-247(5.2)(b)	5.4	Power Spectral Density	Pass
15.247(d)	RSS-247(5.5)	5.5	Conducted Band Edge	Pass
15.247(d)	RSS-247(5.5)	5.5	Conducted Emission	Pass
15.247(d)	RSS-GEN 8.9, 8.10	5.6	Radiation Band Edge	Pass
15.247(d)	RSS-GEN 8.9, 8.10	5.6	Radiation Spurious Emission	Pass

3 DESCRIPTION OF TEST MODES

3.1 THE WORST MODE OF OPERATING CONDITION

Operation mode	IEEE 802.11b mode :1Mbps IEEE 802.11g mode :6Mbps IEEE 802.11n HT20 mode :MCS8 IEEE 802.11n HT40 Mode: MCS8
Test Channel Frequencies	IEEE 802.11b mode : 1. Lowest Channel : 2412MHz 2. Middle Channel : 2437MHz 3. Highest Channel : 2462MHz IEEE 802.11g mode : 1. Lowest Channel : 2412MHz 2. Middle Channel : 2437MHz 3. Highest Channel : 2462MHz IEEE 802.11n HT20 mode : 1. Lowest Channel : 2412MHz 2. Middle Channel : 2437MHz 3. Highest Channel : 2462MHz IEEE 802.11n HT40 Mode: 1. Lowest Channel: 2422MHz 2. Middle Channel: 2437MHz 3. Highest Channel: 2452MHz
Operation Transmitter	IEEE 802.11b mode : 1T1R IEEE 802.11g mode : 1T1R IEEE 802.11n HT20 mode : 2T2R IEEE 802.11n HT20 mode : 2T2R

Remark:

1. EUT pre-scanned data rate of output power for each mode, the worst data rate were recorded in this report.
2. The worst-case data rates are determined to be as follows for each mode based upon investigations by evaluate the peak power, average power and PSD across all data rates, bandwidths, and modulations. The device supports SISO and MIMO at 802.11 b/g/n mode, per pre-test, MIMO 2TX mode was the worst and reported.

3.2 THE WORST MODE OF MEASUREMENT

AC Power Line Conducted Emission	
Test Condition	AC Power line conducted emission for line and neutral
Power supply Mode	Mode 1: EUT power by Host System
Worst Mode	☒ Mode 1 ☐ Mode 2 ☐ Mode 3 ☐ Mode 4

Radiated Emission Measurement Above 1G	
Test Condition	Radiated Emission Above 1G
Power supply Mode	Mode 1: EUT power by Host System
Worst Mode	☒ Mode 1 ☐ Mode 2 ☐ Mode 3 ☐ Mode 4
Worst Position	☐ Placed in fixed position. ☒ Placed in fixed position at X-Plane (E2-Plane) ☐ Placed in fixed position at Y-Plane (E1-Plane) ☐ Placed in fixed position at Z-Plane (H-Plane)

Radiated Emission Measurement Below 1G	
Test Condition	Radiated Emission Below 1G
Power supply Mode	Mode 1: EUT power by Host System
Worst Mode	☒ Mode 1 ☐ Mode 2 ☐ Mode 3 ☐ Mode 4

Remark:

1. The worst mode was record in this test report.
2. EUT pre-scanned in three axis ,X,Y, Z and two polarity, for radiated measurement. The worst case(X-Plane) were recorded in this report
3. AC power line conducted emission and for below 1G radiation emission were performed the EUT transmit at the highest output power channel as worse case.

4 EUT DUTY CYCLE

Temperature: 21.7 ~ 23.6°C

Humidity: 55 ~ 58% RH

Tested by: Lance Chen

Test date: September 28 ~ 29, 2021

Duty Cycle				
Configuration	Duty Cycle (%)	Duty Factor (dB) =10*log (1/Duty Cycle)	1/T (kHz)	VBW setting (kHz)
802.11b	100.00	0.00	0.00	0.01
802.11g	100.00	0.00	0.00	0.01
802.11n HT20	100.00	0.00	0.00	0.01
802.11n HT40	100.00	0.00	0.00	0.01



5 TEST RESULT

5.1 AC POWER LINE CONDUCTED EMISSION

5.1.1 Test Limit

According to §15.207(a)(2) and RSS-GEN section 8.8,

Frequency Range (MHz)	Limits(dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

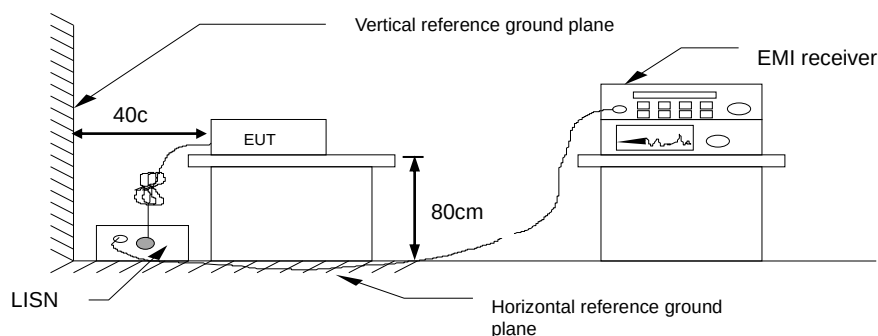
* Decreases with the logarithm of the frequency.

5.1.2 Test Procedure

Test method Refer as ANSI C63.10: 2013 clause 6.2,

1. The EUT was placed on a non-conducted table, which is 0.8m above horizontal ground plane and 0.4m above vertical ground plane.
2. EUT connected to the line impedance stabilization network (LISN)
3. Receiver set RBW of 9kHz and Detector Peak, and note as quasi-peak and average.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. Recorded Line for Neutral and Line.

5.1.3 Test Setup

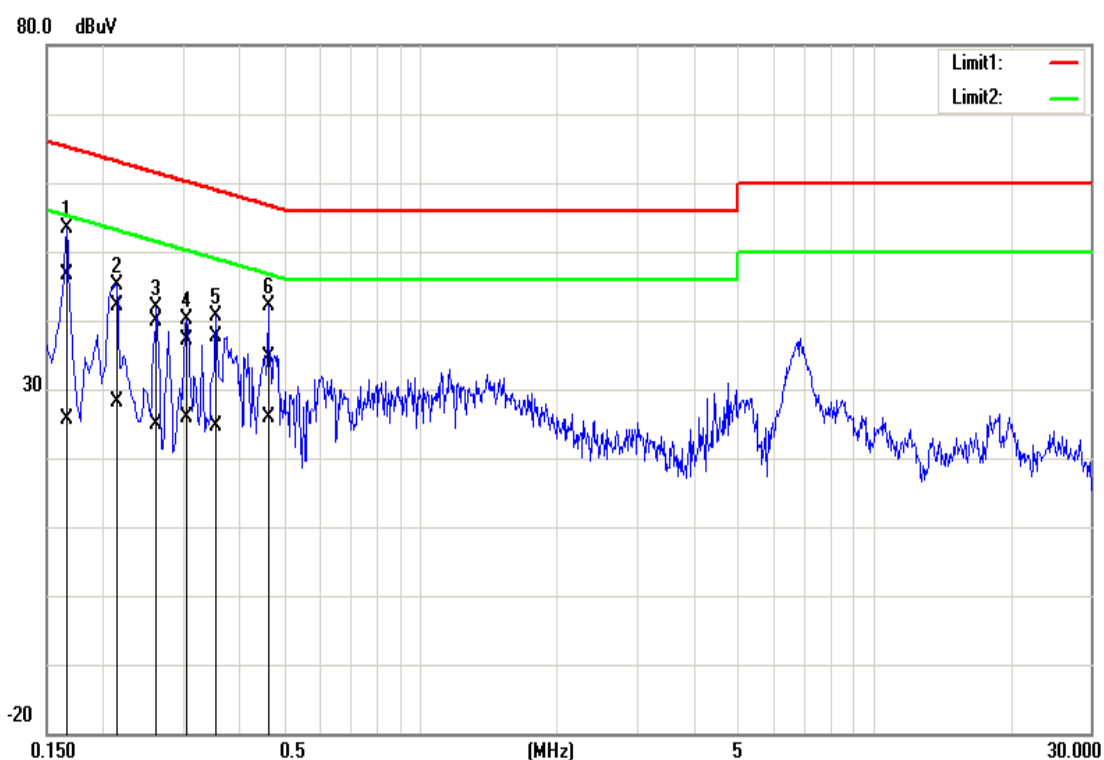


5.1.4 Test Result

PASS

Test Data

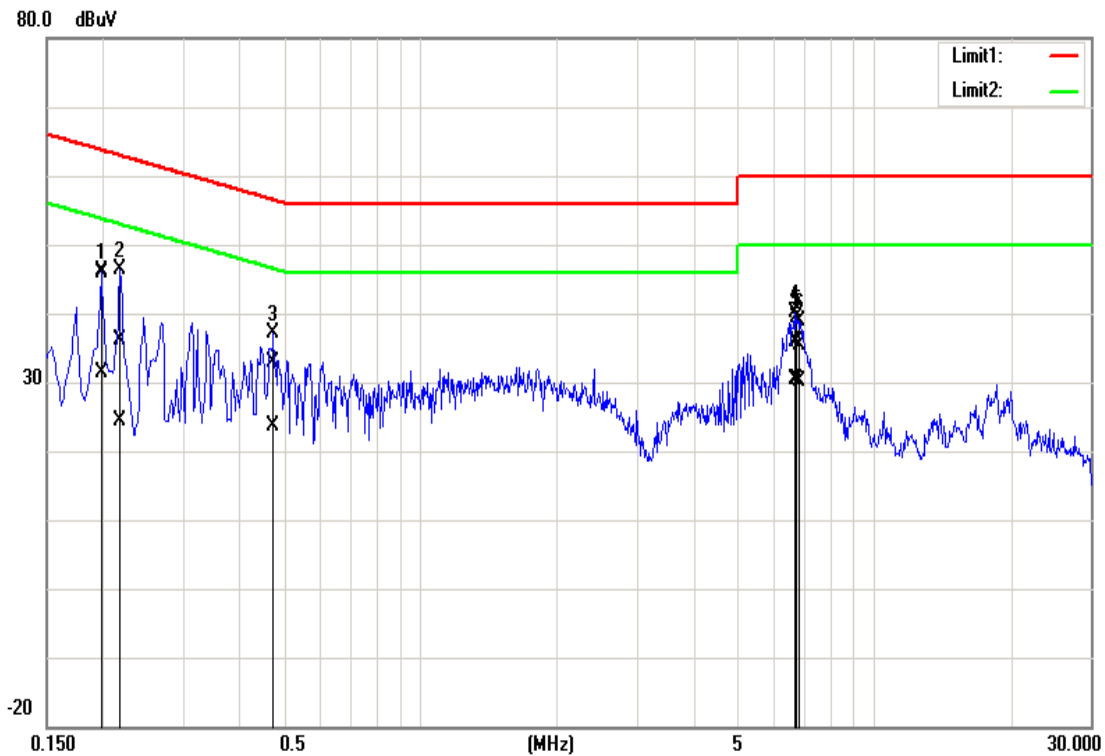
Test Mode:	Mode 1	Temp/Hum	24.6(°C)/ 51%RH
Phase:	Line	Test Date	September 28, 2021
		Test Engineer	Jack Chen



Frequency (MHz)	Quasi Peak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	Quasi Peak result (dBuV)	Average result (dBuV)	Quasi Peak limit (dBuV)	Average limit (dBuV)	Quasi Peak margin (dB)	Average margin (dB)	Remark
0.1660	36.41	15.23	10.29	46.70	25.52	65.16	55.16	-18.46	-29.64	Pass
0.2140	31.92	17.82	10.29	42.21	28.11	63.05	53.05	-20.84	-24.94	Pass
0.2620	29.51	14.51	10.29	39.80	24.80	61.37	51.37	-21.57	-26.57	Pass
0.3060	26.81	15.61	10.29	37.10	25.90	60.08	50.08	-22.98	-24.18	Pass
0.3540	27.24	14.28	10.29	37.53	24.57	58.87	48.87	-21.34	-24.30	Pass
0.4620	24.22	15.59	10.29	34.51	25.88	56.66	46.66	-22.15	-20.78	Pass

Note: Correction factor = LISN loss + Cable loss.

Test Mode:	Mode 1	Temp/Hum	24.6(°C)/ 51%RH
Phase:	Neutral	Test Date	September 28, 2021
		Test Engineer	Jack Chen



Frequency (MHz)	Quasi Peak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	Quasi Peak result (dBuV)	Average result (dBuV)	Quasi Peak limit (dBuV)	Average limit (dBuV)	Quasi Peak margin (dB)	Average margin (dB)	Remark
0.1980	35.51	21.19	10.29	45.80	31.48	63.69	53.69	-17.89	-22.21	Pass
0.2180	25.77	14.17	10.29	36.06	24.46	62.89	52.89	-26.83	-28.43	Pass
0.4740	22.54	13.35	10.29	32.83	23.64	56.44	46.44	-23.61	-22.80	Pass
6.6900	25.44	20.00	10.41	35.85	30.41	60.00	50.00	-24.15	-19.59	Pass
6.7380	25.38	20.07	10.41	35.79	30.48	60.00	50.00	-24.21	-19.52	Pass
6.8380	25.07	19.80	10.41	35.48	30.21	60.00	50.00	-24.52	-19.79	Pass

Note: Correction factor = LISN loss + Cable loss.

5.2 6DB BANDWIDTH AND OCCUPIED BANDWIDTH (99%)

5.2.1 Test Limit

According to §15.247(a)(2) and RSS-247 section 5.2(a),

6 dB Bandwidth :

Limit	Shall be at least 500kHz
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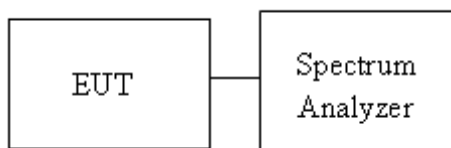
Occupied Bandwidth(99%) : For reporting purposes only.

5.2.2 Test Procedure

Test method Refer as ANSI C63.10: 2013,

1. The EUT RF output connected to the spectrum analyzer by RF cable.
2. Setting maximum power transmit of EUT
3. SA set RBW = 100kHz, VBW = 300kHz and Detector = Peak, to measurement 6 dB Bandwidth.
4. SA set RBW = 1% ~ 5% OBW, VBW = three times the RBW and Detector = Peak, to measurement 99% Bandwidth
5. Measure and record the result of 6 dB Bandwidth and 99% Bandwidth. in the test report.

5.2.3 Test Setup



5.2.4 Test Result

Temperature: 21.7 ~ 23.6°C

Humidity: 55 ~ 58% RH

Tested by: Lance Chen

Test date: September 28 ~ 29, 2021

Test mode: IEEE 802.11b mode / 2412-2462 MHz						
Channel	Frequency (MHz)	Chain 0 OBW(99%) (MHz)	Chain 1 OBW(99%) (MHz)	Chain 0 6dB BW (MHz)	Chain 1 6dB BW (MHz)	6dB limit (kHz)
Low	2412	14.604	-	10.15	-	≥500
Mid	2437	14.585	-	10.15	-	
High	2462	14.681	-	10.16	-	

Test mode: IEEE 802.11g mode / 2412-2462 MHz						
Channel	Frequency (MHz)	Chain 0 OBW(99%) (MHz)	Chain 1 OBW(99%) (MHz)	Chain 0 6dB BW (MHz)	Chain 1 6dB BW (MHz)	6dB limit (kHz)
Low	2412	16.527	-	16.45	-	≥500
Mid	2437	16.528	-	16.44	-	
High	2462	16.524	-	16.46	-	

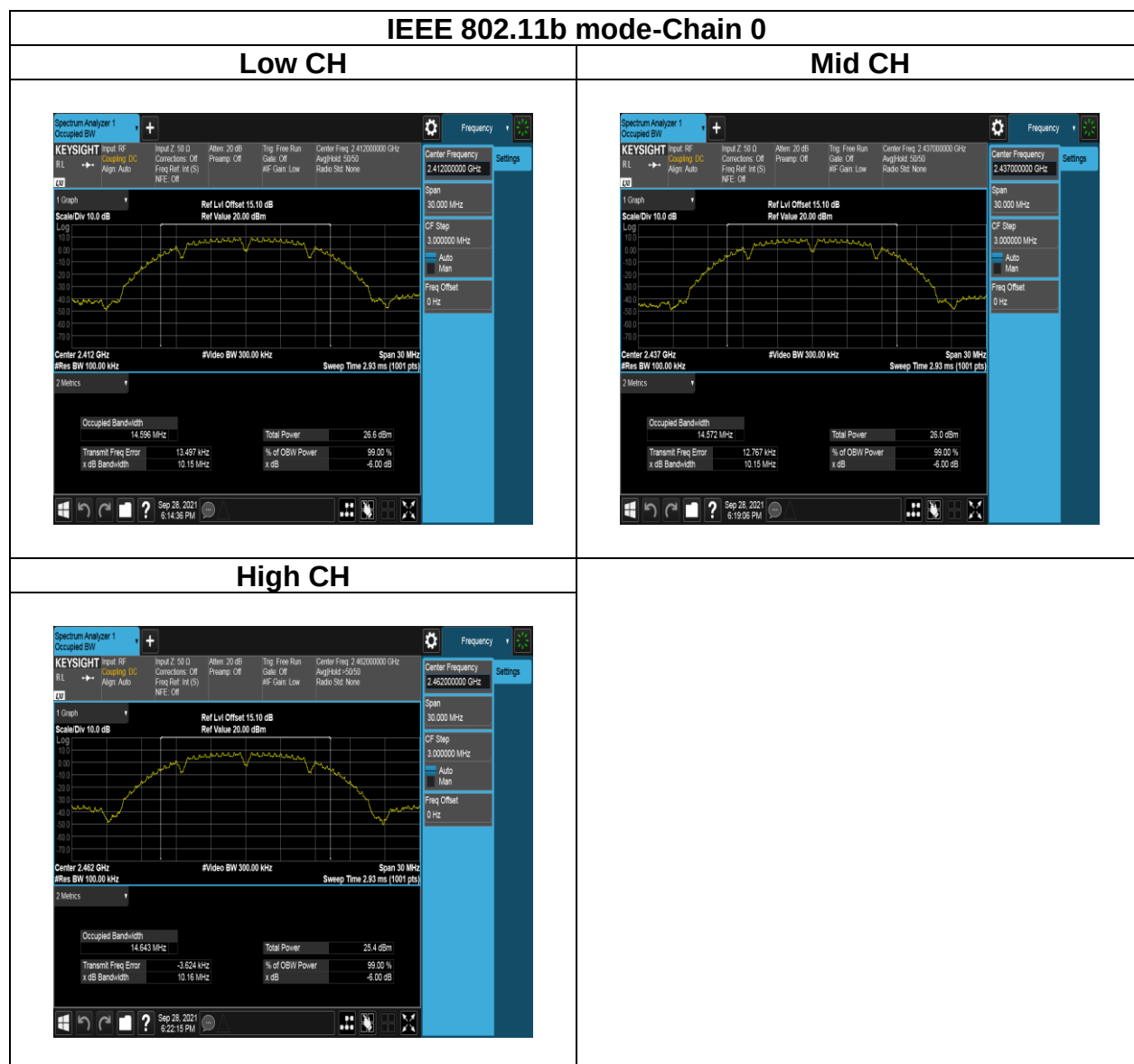
Test mode: IEEE 802.11n HT 20 MHz mode / 2412-2462 MHz						
Channel	Frequency (MHz)	Chain 0 OBW(99%) (MHz)	Chain 1 OBW(99%) (MHz)	Chain 0 6dB BW (MHz)	Chain 1 6dB BW (MHz)	6dB limit (kHz)
Low	2412	17.663	17.664	17.63	17.65	≥500
Mid	2437	17.664	17.662	17.64	17.63	
High	2462	17.669	17.659	17.65	17.65	

Test mode: IEEE 802.11n HT40 Mode / 2422-2452 MHz						
Channel	Frequency (MHz)	Chain 0 OBW(99%) (MHz)	Chain1 OBW(99%) (MHz)	Chain 0 6dB BW (MHz)	Chain 1 6dB BW (MHz)	6dB limit (kHz)
Low	2422	36.100	36.105	36.43	36.41	≥500
Mid	2437	36.106	36.094	36.42	36.42	
High	2452	36.089	36.087	36.42	36.41	

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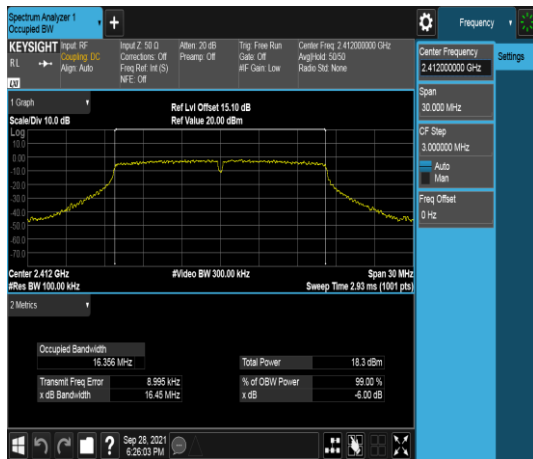
Test Data

6dB BANDWIDTH

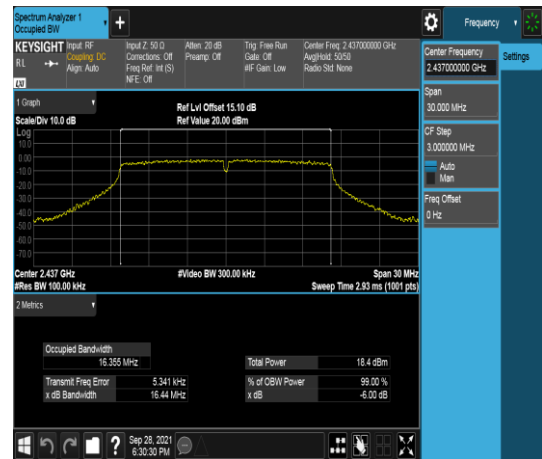


IEEE 802.11g mode-Chain 0

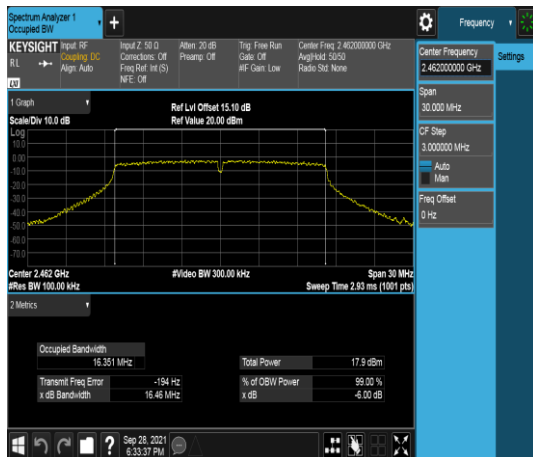
Low CH

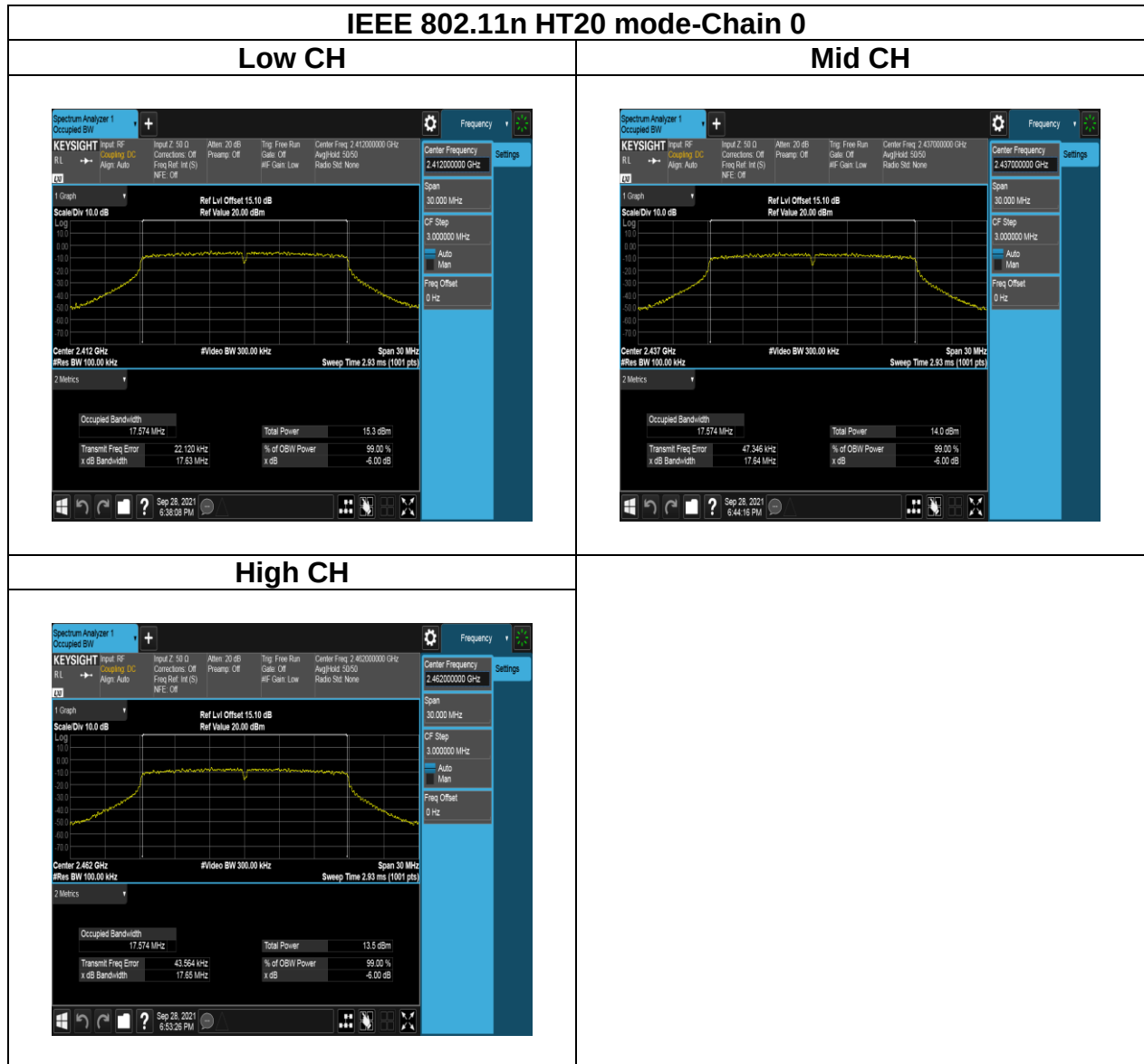


Mid CH



High CH

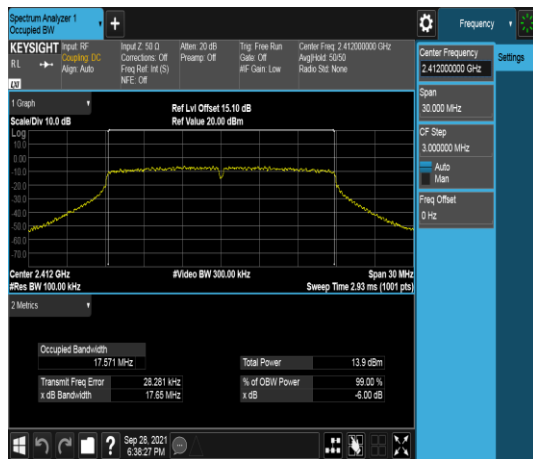




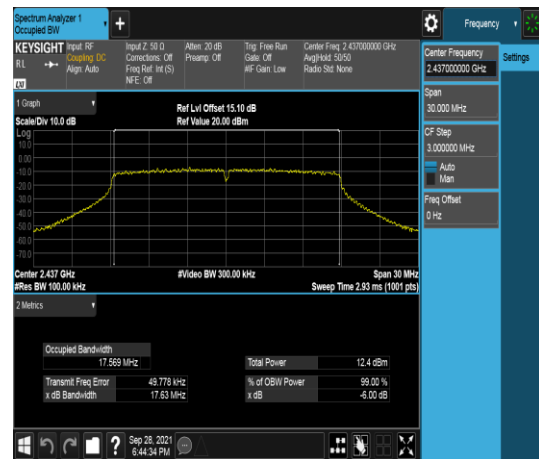
Report No.: TMWK2109000573KR

IEEE 802.11n HT20 mode-Chain 1

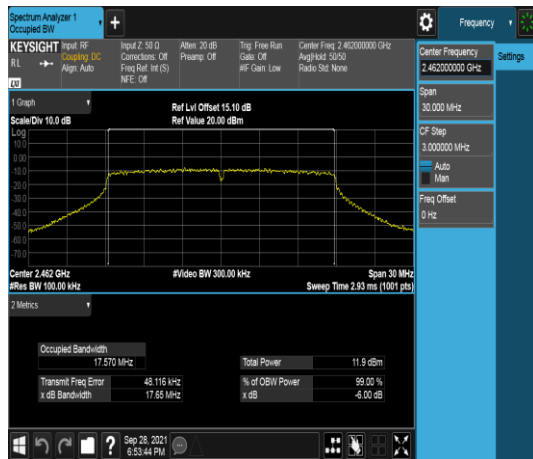
Low CH



Mid CH



High CH

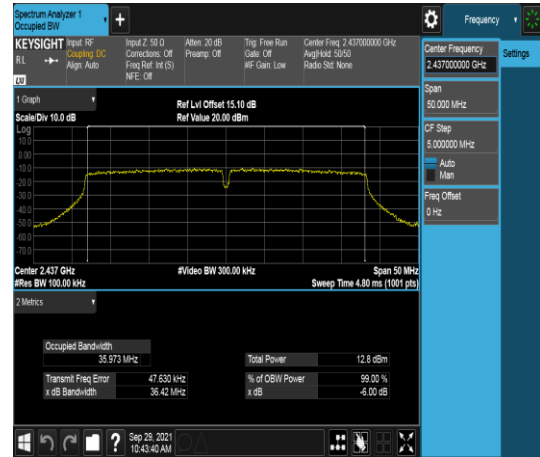


IEEE 802.11n HT40 mode-Chain 0

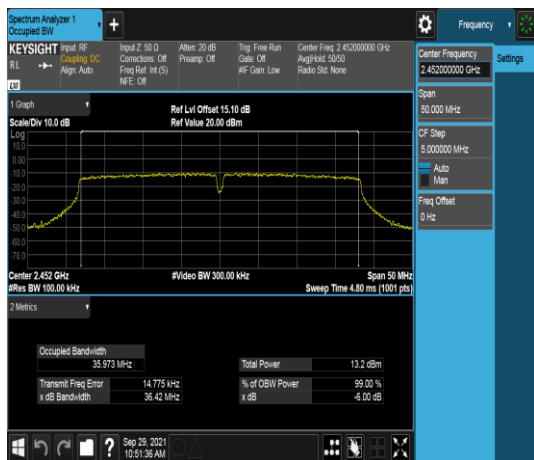
Low CH

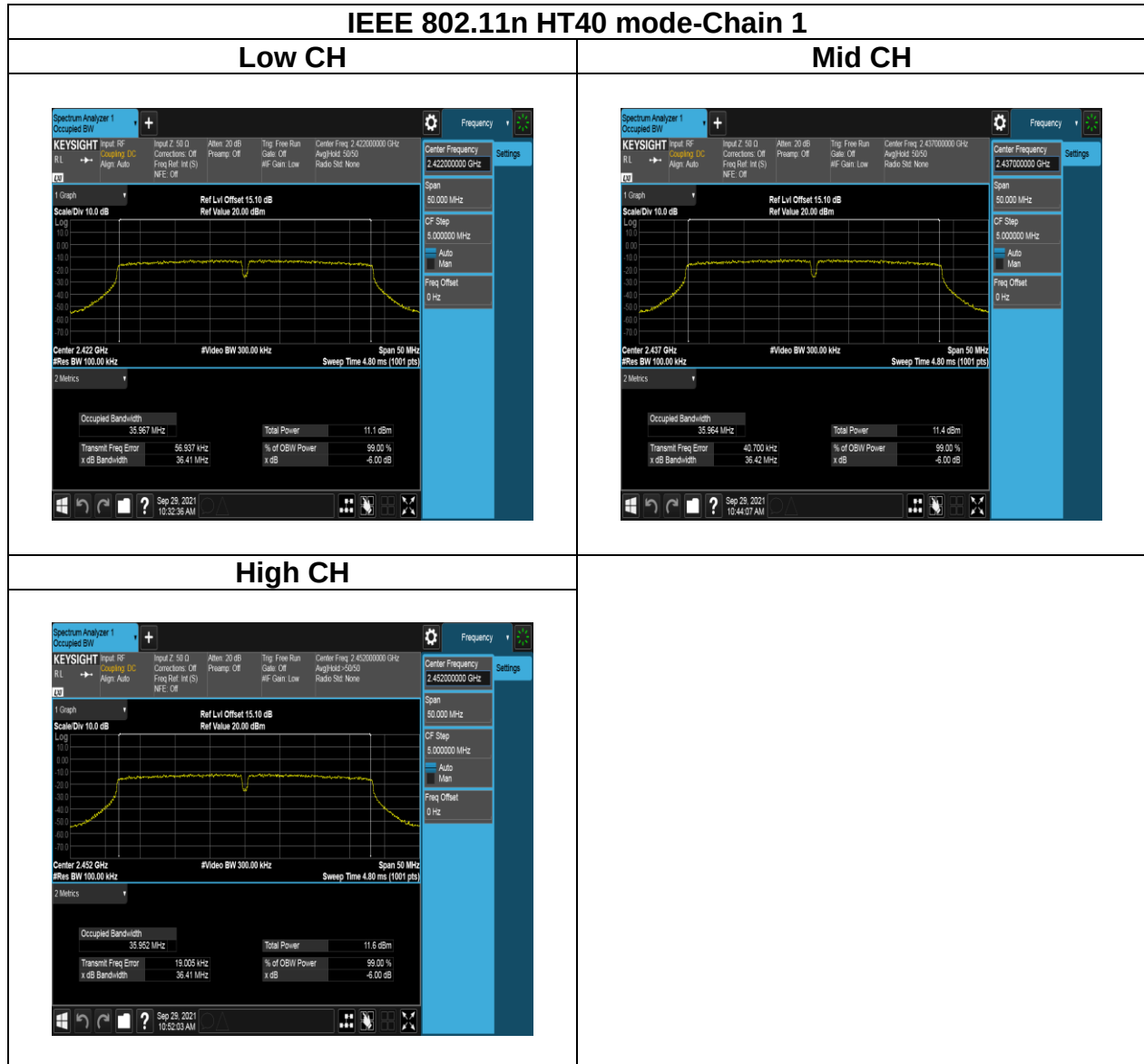


Mid CH



High CH

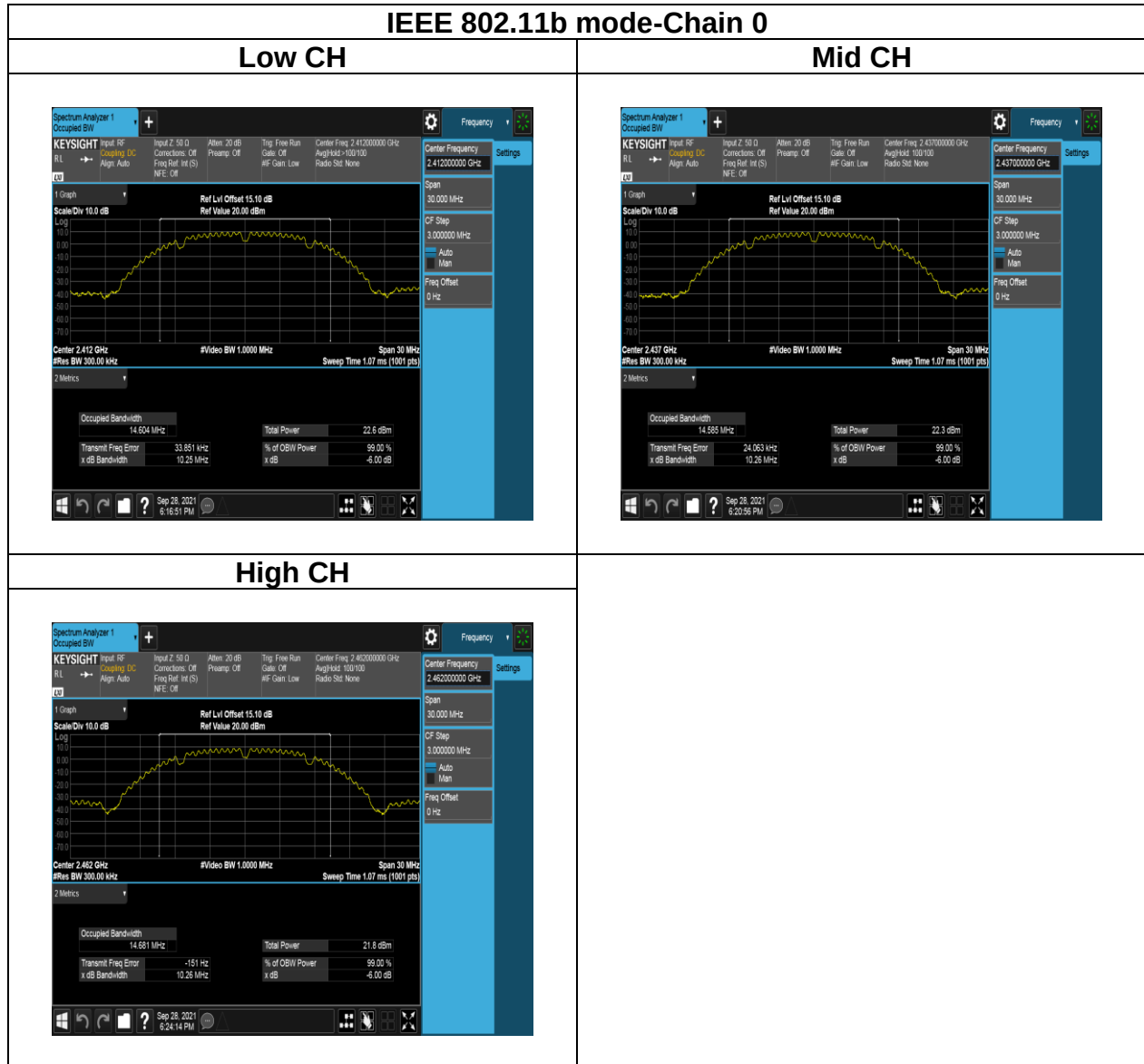




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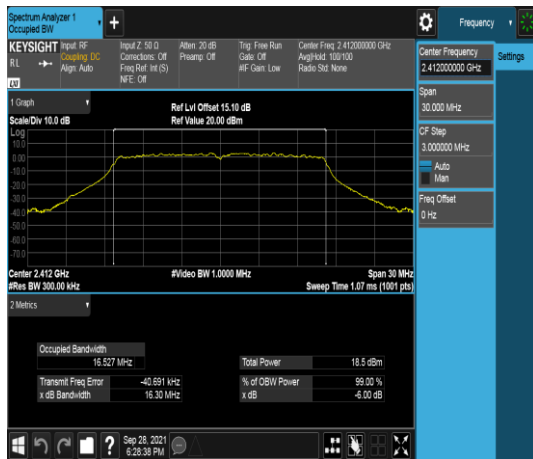
Test Data

BANDWIDTH 99%

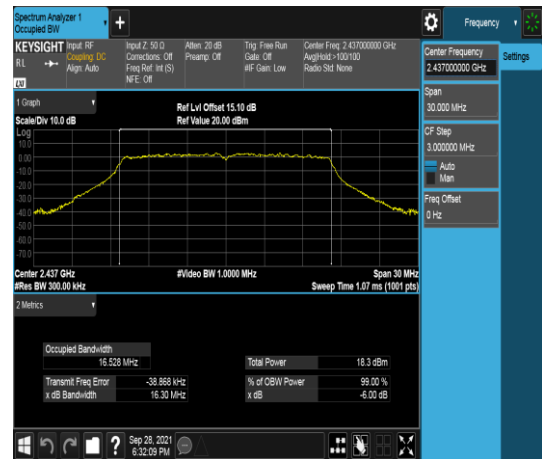


IEEE 802.11g mode-Chain 0

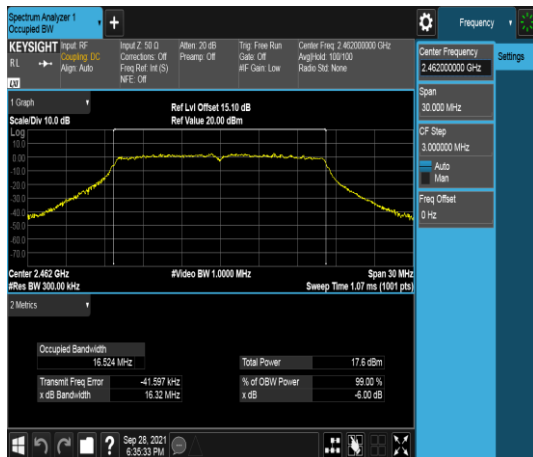
Low CH



Mid CH

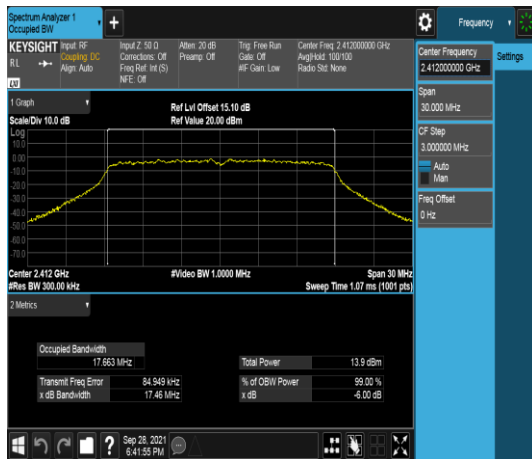


High CH

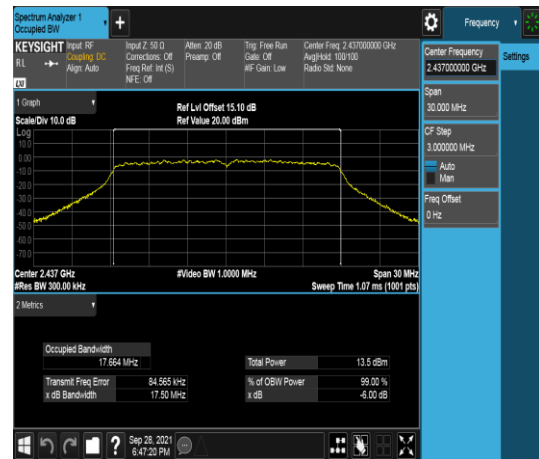


IEEE 802.11n HT20 mode-Chain 0

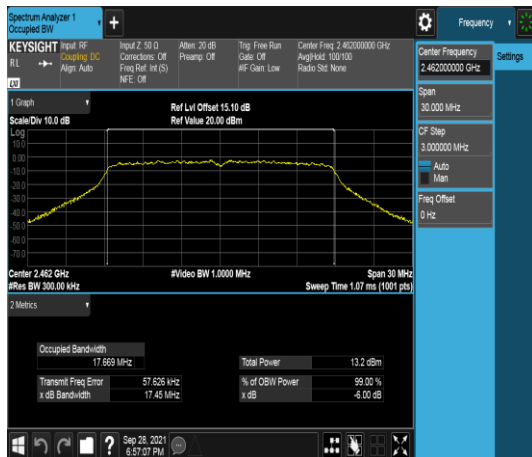
Low CH



Mid CH



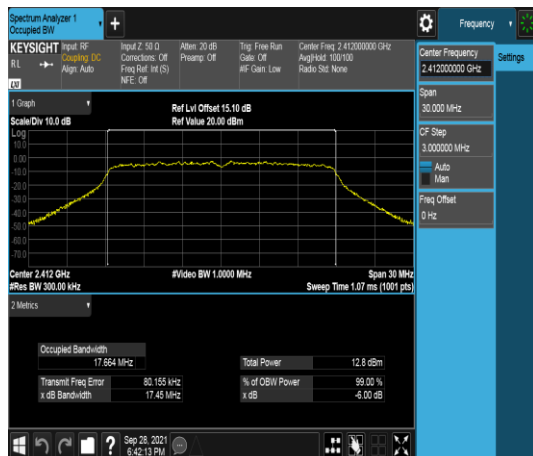
High CH



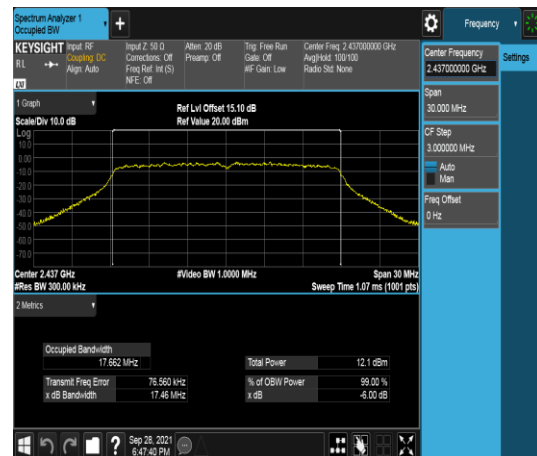
Report No.: TMWK2109000573KR

IEEE 802.11n HT20 mode-Chain 1

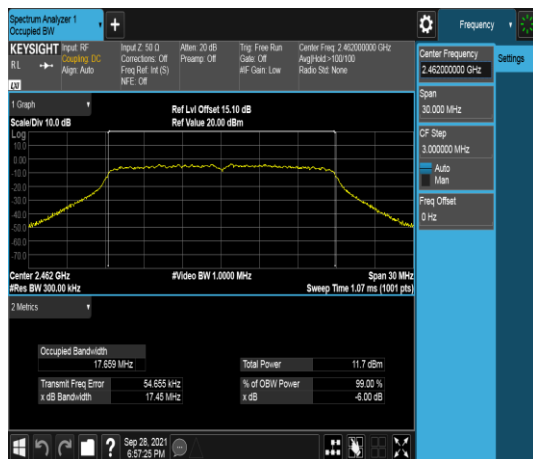
Low CH



Mid CH

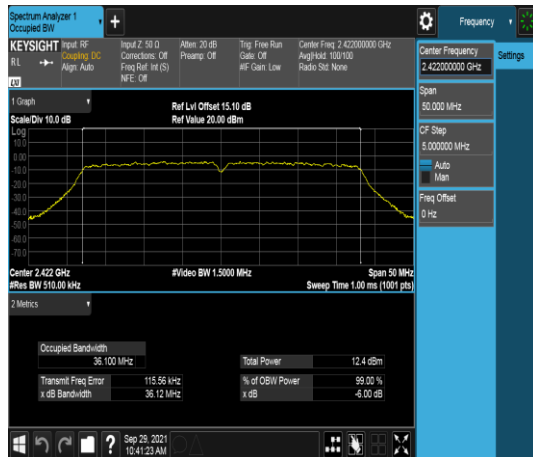


High CH

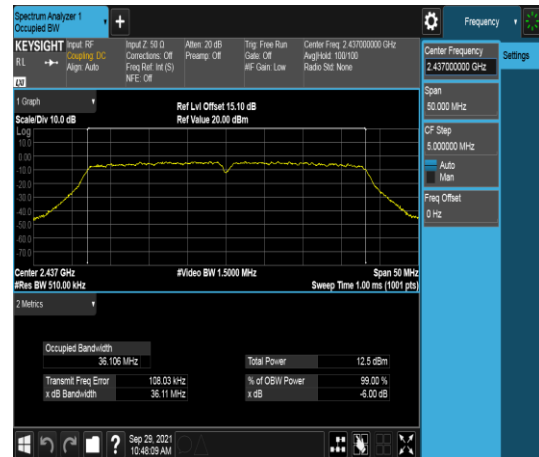


IEEE 802.11n HT40 mode-Chain 0

Low CH



Mid CH

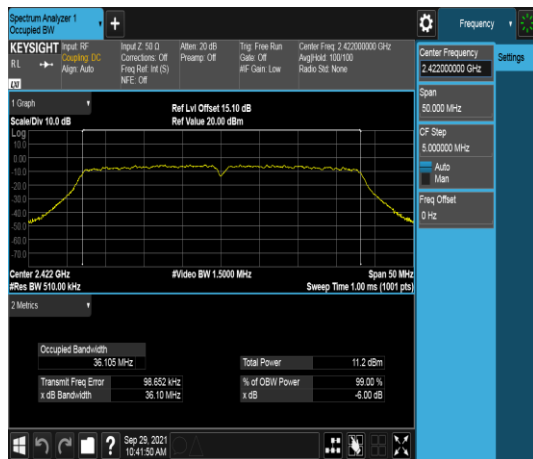


High CH

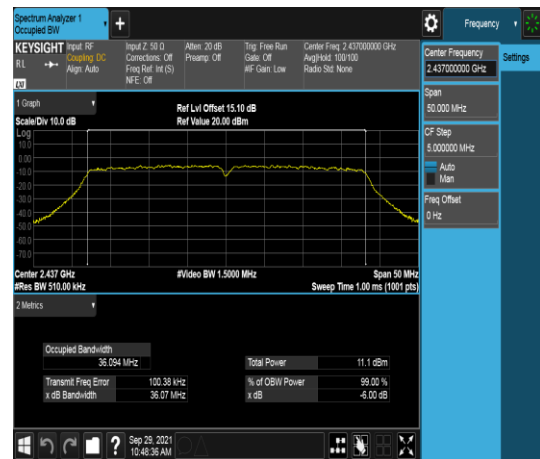


IEEE 802.11n HT40 mode-Chain 1

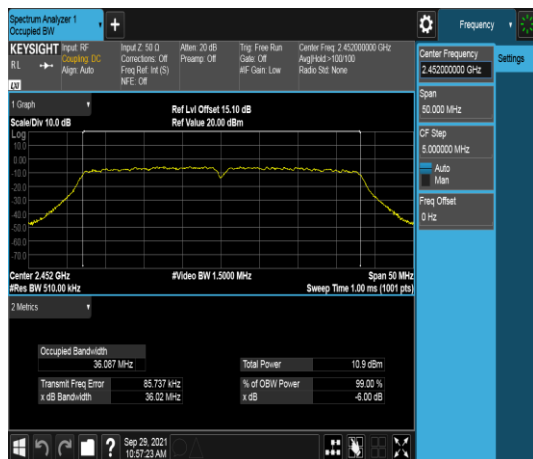
Low CH



Mid CH



High CH



5.3 OUTPUT POWER MEASUREMENT

5.3.1 Test Limit

According to §15.247(b) and RSS-247 section 5.4(d),

Peak output power :

FCC:

For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement,

IC:

For systems using digital modulation in the 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt(30 dBm) and the e.i.r.p. shall not exceed 4Watt(36 dBm), base on the use of antennas with directional gain not exceed 6 dBi If transmitting antennas of directional gain greater than 6dBi are used the peak output power the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement,

Limit	☒ Antenna not exceed 6 dBi : 30dBm ☐ Antenna with DG greater than 6 dBi : [Limit = 30 – (DG – 6)] ☐ Point-to-point operation :
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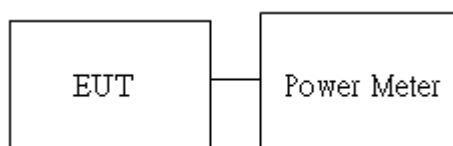
Average output power : For reporting purposes only.

5.3.2 Test Procedure

Test method Refer as ANSI C63.10:2013.

1. The EUT RF output connected to the power meter by RF cable.
2. Setting maximum power transmit of EUT.
3. The path loss was compensated to the results for each measurement.
4. Measure and record the result of Peak output power and Average output power. in the test report.

5.3.3 Test Setup



Report No.: TMWK2109000573KR

5.3.4 Test Result

Temperature: 21.7 ~ 23.6°C

Humidity: 55 ~ 58% RH

Tested by: Lance Chen

Test date: September 28 ~ 29, 2021

Peak output power :

802.11b Ch0							
CH	Freq. (MHz)	Data Rate	Power set	Peak Output Power (dBm)	Peak Output Power (mW)	Limit (dBm)	RESULT
1	2412	1	99	22.85	192.75	30.00	PASS
6	2437	1	97	21.95	156.68	30.00	PASS
11	2462	1	97	21.78	150.66	30.00	PASS

802.11b Ch1							
CH	Freq. (MHz)	Data Rate	Power set	Peak Output Power (dBm)	Peak Output Power (mW)	Limit (dBm)	RESULT
1	2412	1	99	22.04	159.96	30.00	PASS
6	2437	1	99	21.45	139.64	30.00	PASS
11	2462	1	99	21.66	146.55	30.00	PASS

802.11g Ch0							
CH	Freq. (MHz)	Data Rate	Power set	Peak Output Power (dBm)	Peak Output Power (mW)	Limit (dBm)	RESULT
1	2412	6	58	23.17	207.49	30.00	PASS
6	2437	6	58	23.25	211.35	30.00	PASS
11	2462	6	58	22.47	176.60	30.00	PASS

802.11g Ch1							
CH	Freq. (MHz)	Data Rate	Power set	Peak Output Power (dBm)	Peak Output Power (mW)	Limit (dBm)	RESULT
1	2412	6	58	22.88	194.09	30.00	PASS
6	2437	6	58	22.94	196.79	30.00	PASS
11	2462	6	58	22.21	166.34	30.00	PASS

802.11n_HT20M MIMO									
CH	Freq. (MHz)	Data Rate	Power set	Peak Output Power (dBm)		Total Peak Output Power (dBm)	Total Peak Output Power (mW)	Limit (dBm)	RESULT
				CH 0	CH 1				
1	2412	MCS0	50	19.23	17.78	21.58	143.73	30.00	PASS
6	2437	MCS0	48	18.54	17.46	21.04	127.17	30.00	PASS
11	2462	MCS0	48	18.02	17.23	20.65	116.23	30.00	PASS

802.11n_HT40M MIMO									
CH	Freq. (MHz)	Data Rate	Power set	Peak Output Power (dBm)		Total Peak Output Power (dBm)	Total Peak Output Power (mW)	Limit (dBm)	RESULT
				CH 0	CH 1				
3	2422	MCS0	42	16.42	15.33	18.92	77.97	30.00	PASS
6	2437	MCS0	42	16.35	15.17	18.81	76.04	30.00	PASS
9	2452	MCS0	42	16.03	15.50	18.78	75.57	30.00	PASS

Report No.: TMWK2109000573KR

Average output power :

802.11b Ch0

CH	Freq. (MHz)	Data Rate	Power set	Max. Avg. Output include tune up tolerance Power (dBm)	Avg. Output Power (mW)	Limit (dBm)	RESULT
1	2412	1	99	20.45	110.92	30.00	PASS
6	2437	1	97	19.76	94.62	30.00	PASS
11	2462	1	97	19.45	88.10	30.00	PASS

802.11b Ch1

CH	Freq. (MHz)	Data Rate	Power set	Max. Avg. Output include tune up tolerance Power (dBm)	Max. Avg. Output include tune up tolerance Power (mW)	Limit (dBm)	RESULT
1	2412	1	99	20.16	103.75	30.00	PASS
6	2437	1	99	19.56	90.36	30.00	PASS
11	2462	1	99	19.12	81.66	30.00	PASS

802.11g Ch0

CH	Freq. (MHz)	Data Rate	Power set	Max. Avg. Output include tune up tolerance Power (dBm)	Avg. Output Power (mW)	Limit (dBm)	RESULT
1	2412	6	58	13.14	20.61	30.00	PASS
6	2437	6	58	13.25	21.13	30.00	PASS
11	2462	6	58	12.56	18.03	30.00	PASS

802.11g Ch1

CH	Freq. (MHz)	Data Rate	Power set	Max. Avg. Output include tune up tolerance Power (dBm)	Max. Avg. Output include tune up tolerance Power (mW)	Limit (dBm)	RESULT
1	2412	6	58	13.07	20.28	30.00	PASS
6	2437	6	58	12.72	18.71	30.00	PASS
11	2462	6	58	12.34	17.14	30.00	PASS

802.11n_HT20M MIMO									
CH	Freq. (MHz)	Data Rate	Power set	Avg. Output Power (dBm)		Max. Avg. Output include tune up tolerance Power (dBm)	Max. Avg. Output include tune up tolerance Power (mW)	Limit (dBm)	RESULT
				CH 0	CH 1				
1	2412	MCS0	50	9.33	8.52	11.95	15.68	30.00	PASS
6	2437	MCS0	48	8.82	7.79	11.35	13.63	30.00	PASS
11	2462	MCS0	48	8.63	7.51	11.12	12.93	30.00	PASS

802.11n_HT40M MIMO									
CH	Freq. (MHz)	Data Rate	Power set	Avg. Output Power (dBm)		Max. Avg. Output include tune up tolerance Power (dBm)	Max. Avg. Output include tune up tolerance Power (mW)	Limit (dBm)	RESULT
				CH 0	CH 1				
3	2422	MCS0	42	6.94	5.69	9.37	8.65	30.00	PASS
6	2437	MCS0	42	6.95	5.61	9.34	8.59	30.00	PASS
9	2452	MCS0	42	6.72	5.41	9.12	8.17	30.00	PASS

EIRP power :

802.11b Ch0							
CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	RESULT
1	2412	1	20.45	2.93	23.38	36	PASS
6	2437	1	19.76	2.93	22.69	36	PASS
11	2462	1	19.45	2.93	22.38	36	PASS

802.11b Ch1							
CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	RESULT
1	2412	1	20.16	2.81	22.97	36	PASS
6	2437	1	19.56	2.81	22.37	36	PASS
11	2462	1	19.12	2.81	21.93	36	PASS

802.11g Ch0							
CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	RESULT
1	2412	6	13.14	2.93	16.07	36	PASS
6	2437	6	13.25	2.93	16.18	36	PASS
11	2462	6	12.56	2.93	15.49	36	PASS

802.11g Ch1							
CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	RESULT
1	2412	6	13.07	2.81	15.88	36	PASS
6	2437	6	12.72	2.81	15.53	36	PASS
11	2462	6	12.34	2.81	15.15	36	PASS

802.11n_HT20M MIMO									
CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)		Total Avg. Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	RESULT
			CH 0	CH 1					
1	2412	MCS0	9.33	8.52	11.95	5.88	17.83	36	PASS
6	2437	MCS0	8.82	7.79	11.35	5.88	17.23	36	PASS
11	2462	MCS0	8.63	7.51	11.12	5.88	17.00	36	PASS

802.11n_HT40M MIMO									
CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)		Total Avg. Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	RESULT
			CH 0	CH 1					
3	2422	MCS0	6.94	5.69	9.37	5.88	15.25	36	PASS
6	2437	MCS0	6.95	5.61	9.34	5.88	15.22	36	PASS
9	2452	MCS0	6.72	5.41	9.12	5.88	15.00	36	PASS

5.4 POWER SPECTRAL DENSITY

5.4.1 Test Limit

According to §15.247(e) and RSS-247 section 5.2(b),

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

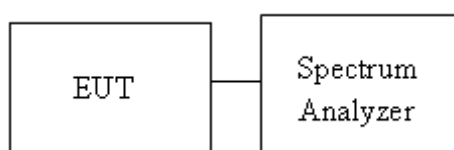
Limit	☒ Antenna not exceed 6 dBi : 8dBm ☐ Antenna with DG greater than 6 dBi : [Limit = 8 – (DG – 6)] ☐ Point-to-point operation :
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5.4.2 Test Procedure

Test method Refer as ANSI C63.10:2013

1. The EUT RF output connected to the spectrum analyzer by RF cable.
2. Setting maximum power transmit of EUT
3. SA set RBW = 3kHz, VBW = 10kHz, Span = 1.5 times DTS Bandwidth (6 dB BW), Detector = Peak, Sweep Time = Auto and Trace = Max hold.
4. The path loss and Duty Factor were compensated to the results for each measurement by SA.
5. Mark the maximum level.
6. Measure and record the result of power spectral density. in the test report.

5.4.3 Test Setup



5.4.4 Test Result

Temperature: 21.7 ~ 23.6°C

Humidity: 55 ~ 58% RH

Tested by: Lance Chen

Test date: September 28 ~ 29, 2021

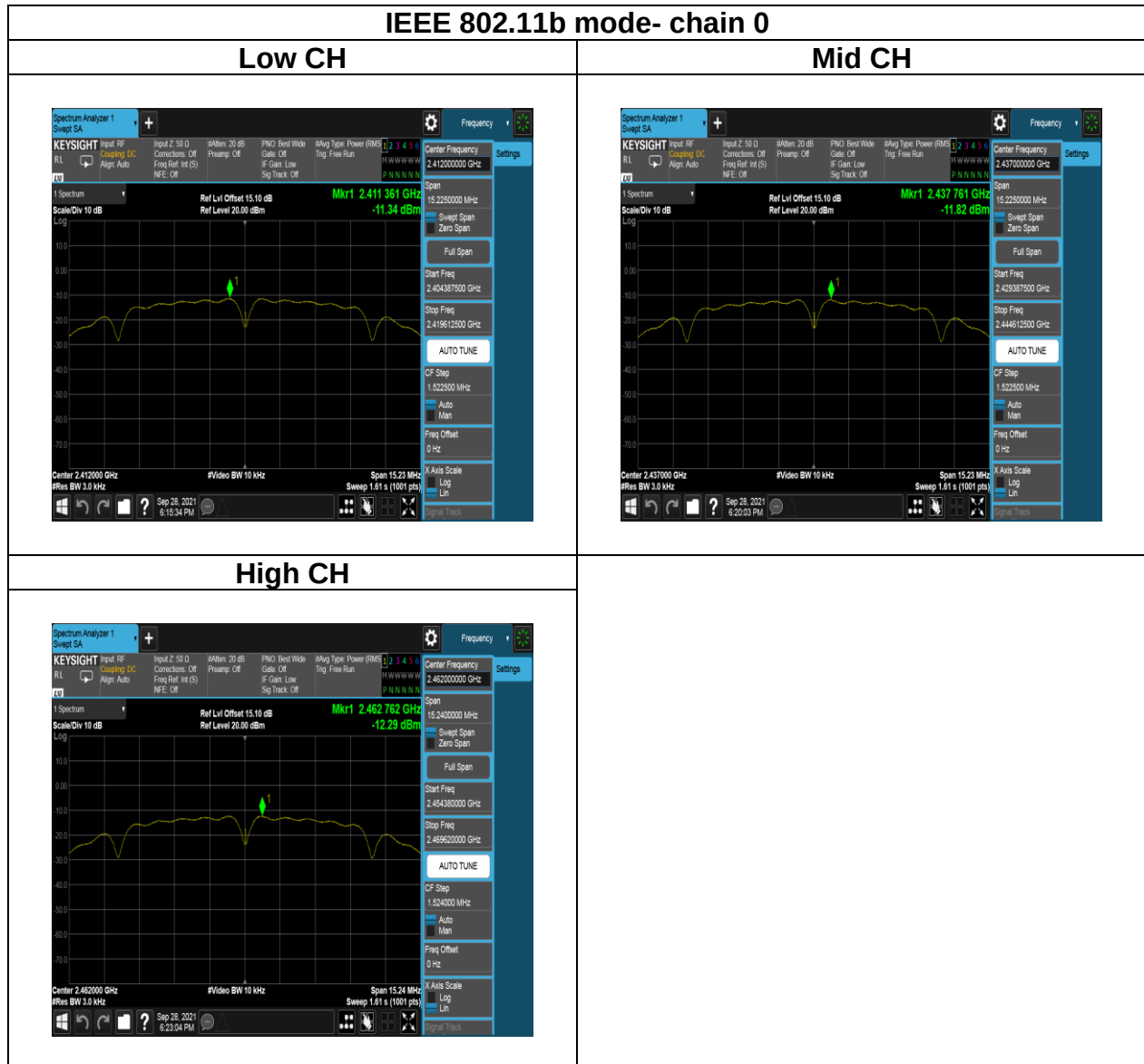
POWER DENSITY 802.11b					
Freq. (MHz)	Ch0 PSD	Ch1 PSD	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Result
2412	-11.34	-	-11.34	8.00	PASS
2437	-11.82	-	-11.82	8.00	PASS
2462	-12.29	-	-12.29	8.00	PASS

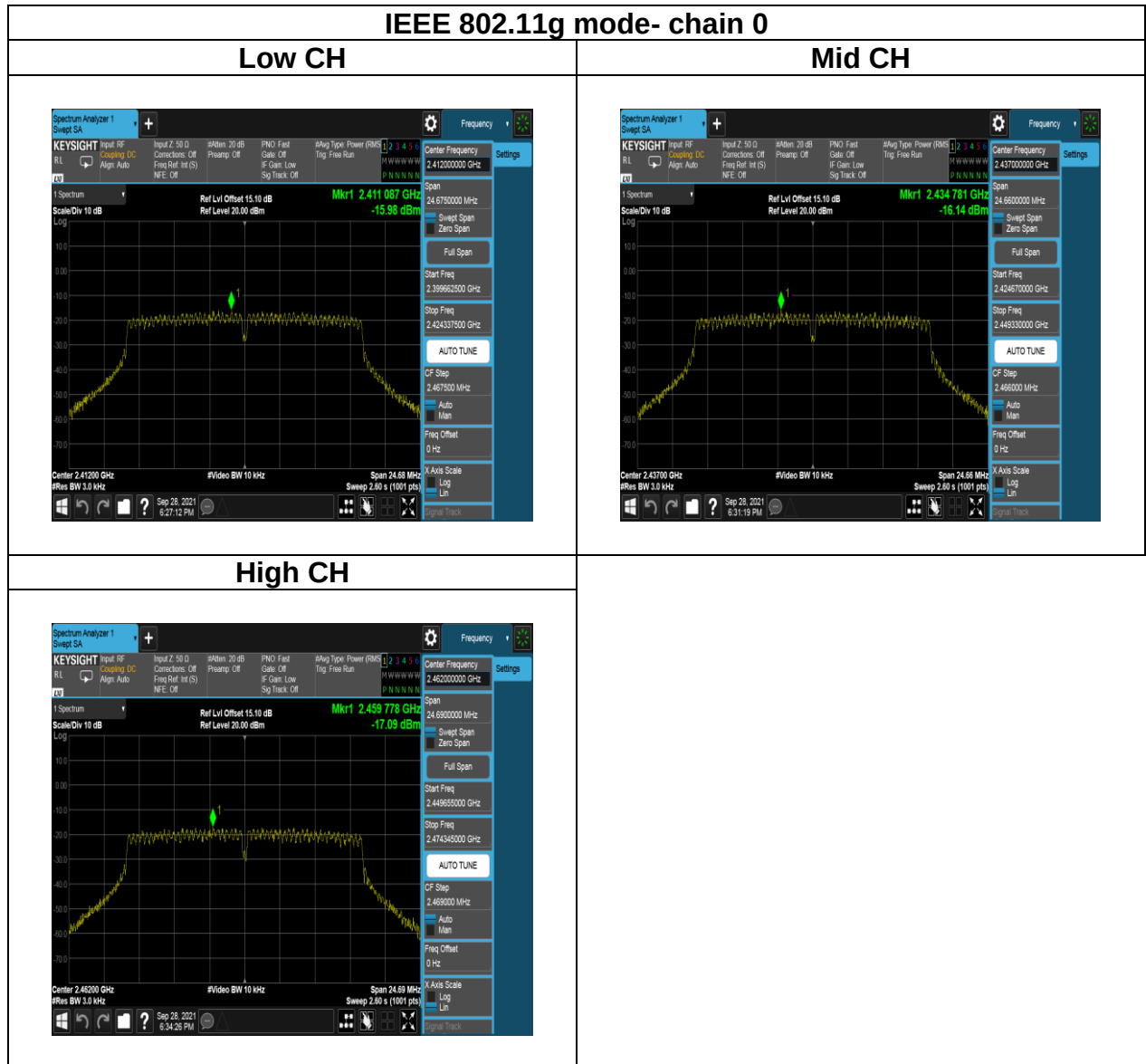
POWER DENSITY 802.11g					
Freq. (MHz)	Ch0 PSD	Ch1 PSD	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Result
2412	-15.98	-	0.11	8.00	PASS
2437	-16.14	-	0.10	8.00	PASS
2462	-17.09	-	0.08	8.00	PASS

POWER DENSITY 802.11n HT20					
Freq. (MHz)	Ch0 PSD	Ch1 PSD	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Result
2412	-19.30	-21.22	-17.14	8.00	PASS
2437	-20.90	-21.74	-18.29	8.00	PASS
2462	-20.93	-22.15	-18.49	8.00	PASS

POWER DENSITY 802.11n HT40					
Freq. (MHz)	Ch0 PSD	Ch1 PSD	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Result
2422	-23.43	-25.59	-21.37	8.00	PASS
2437	-24.79	-24.99	-21.88	8.00	PASS
2452	-23.27	-25.35	-21.18	8.00	PASS

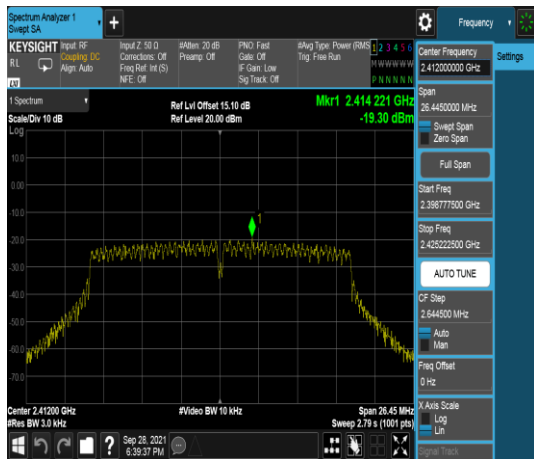
Test Data



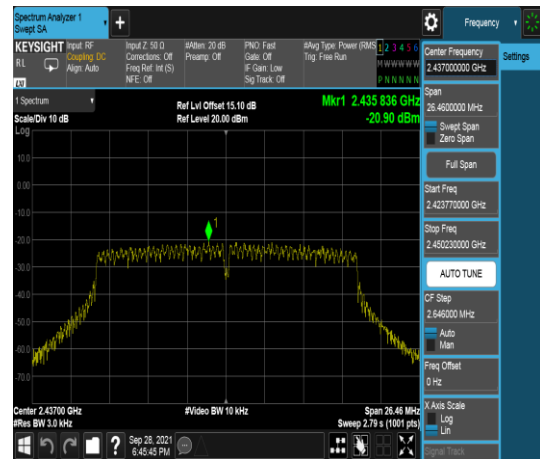


IEEE 802.11n HT20 mode- chain 0

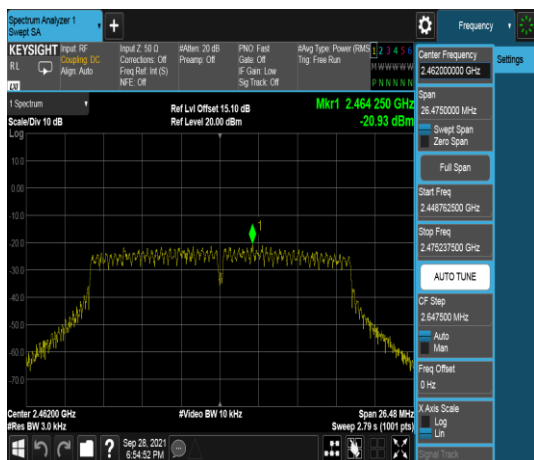
Low CH



Mid CH

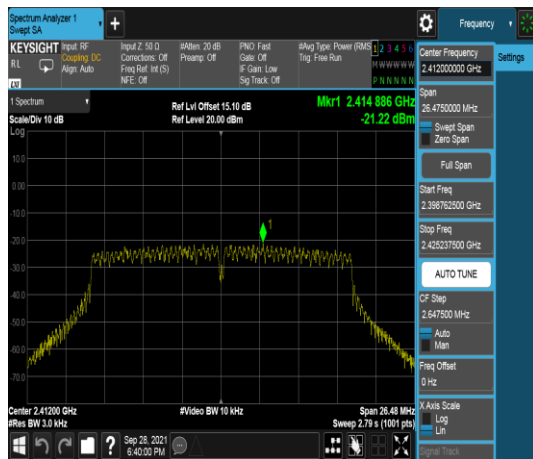


High CH

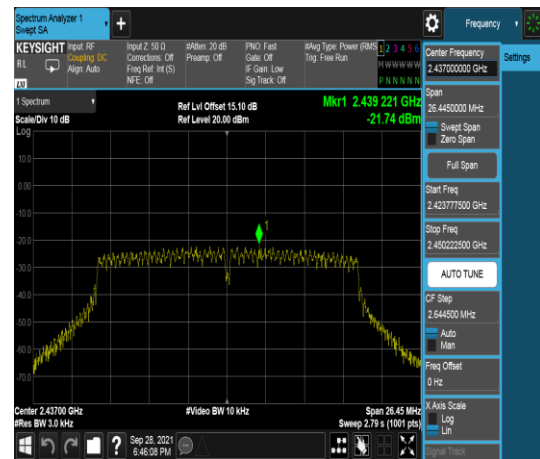


IEEE 802.11n HT20 mode- chain 1

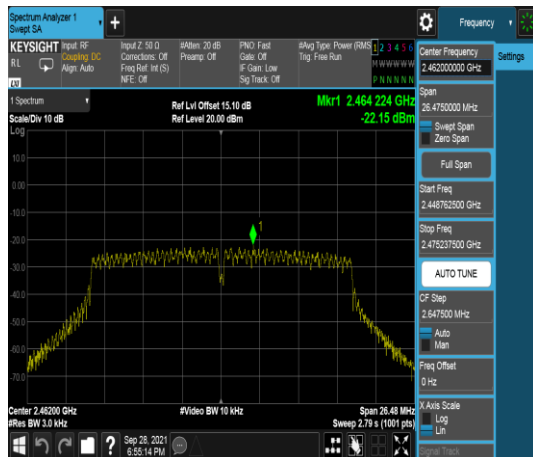
Low CH



Mid CH

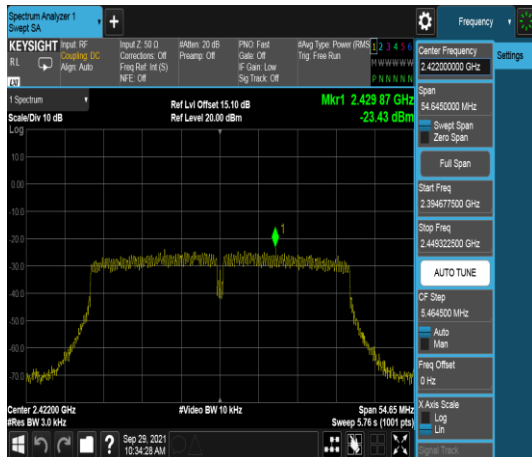


High CH

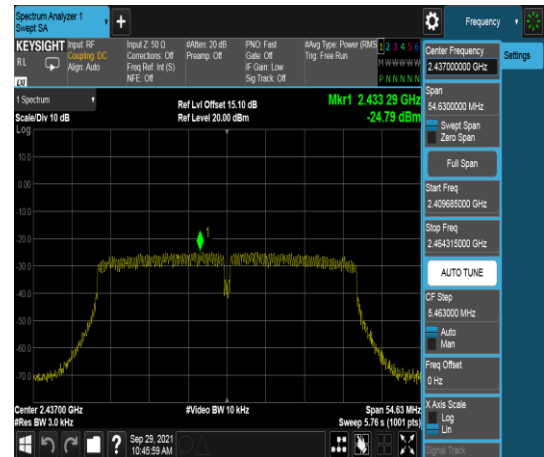


IEEE 802.11n HT40 mode- chain 0

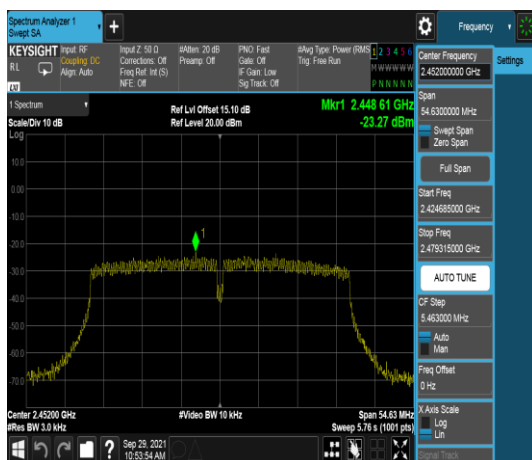
Low CH



Mid CH

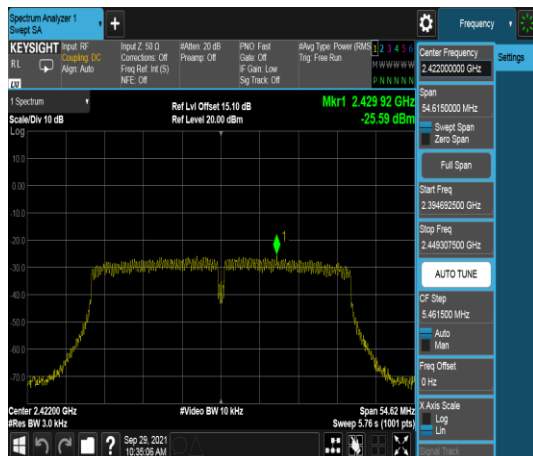


High CH

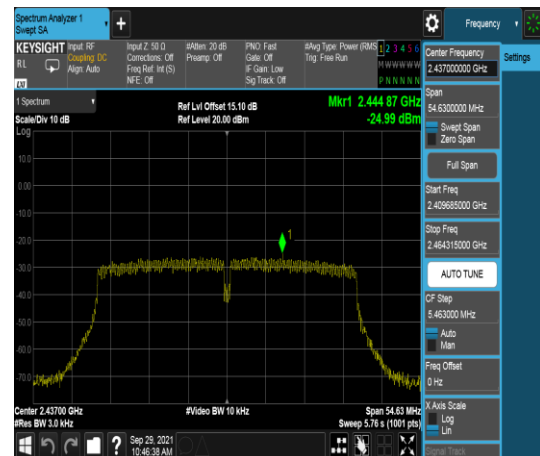


IEEE 802.11n HT40 mode- chain 1

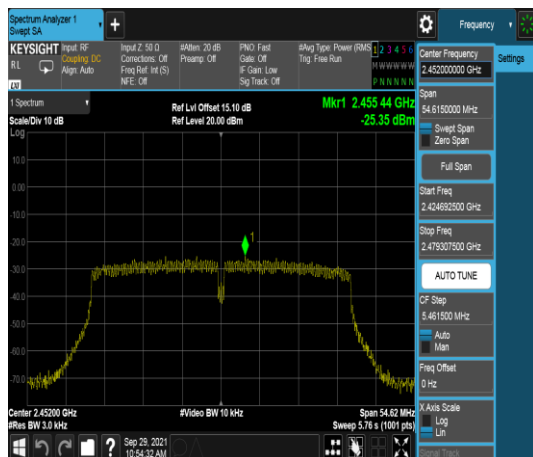
Low CH



Mid CH



High CH



5.5 CONDUCTED BANDEDGE AND SPURIOUS EMISSION

5.5.1 Test Limit

According to §15.247(d) and RSS-247 section 5.5,

FCC:

In any 100 kHz bandwidth outside the authorized frequency band,

Non-restricted bands shall be attenuated at least 20 dB/30 dB relative to the maximum PSD level in 100 kHz by RF conducted or a radiated measurement which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

IC:

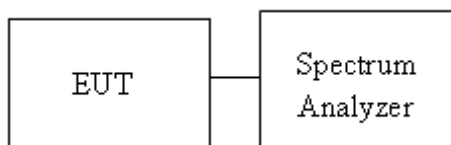
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

5.5.2 Test Procedure

Test method Refer as ANSI C63.10:2013.

1. EUT RF output port connected to the SA by RF cable, and the path loss was compensated to result.
2. SA setting, RBW=100kHz, VBW=300kHz, Detector=Peak, Trace mode = max hold, SWT = Auto.
3. In any 100 kHz bandwidth outside the authorized frequency band, shall be attenuated at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when conducted power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

5.5.3 Test Setup

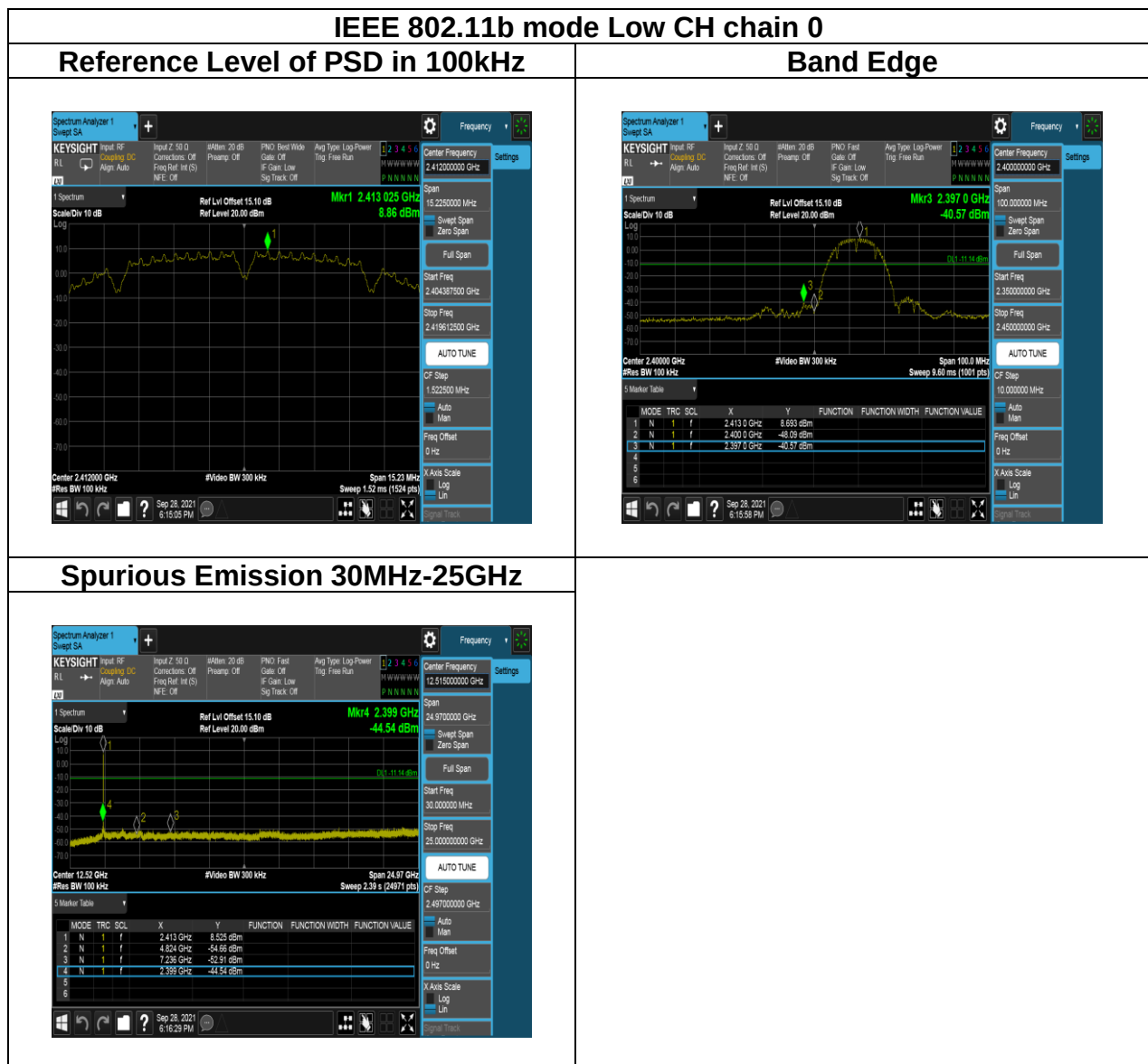


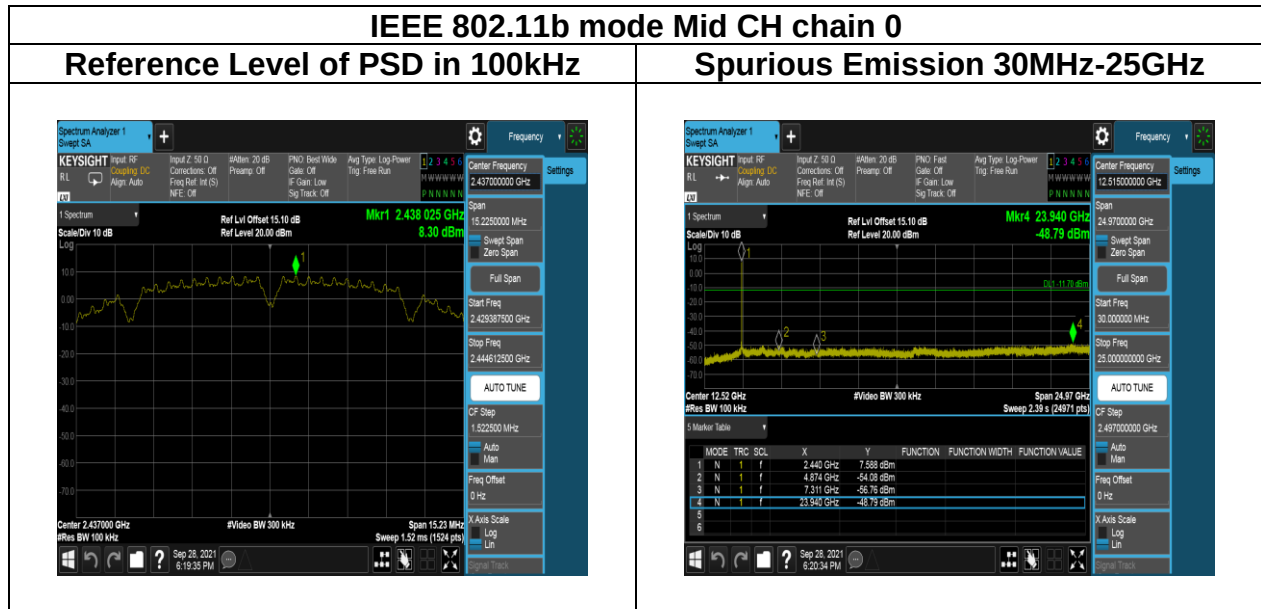
Report No.: TMWK2109000573KR

5.5.4 Test Result

Test Data

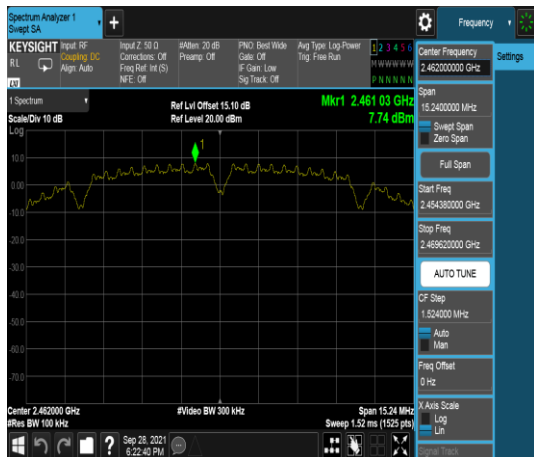
Temperature:	21.7 ~ 23.6°C	Humidity:	55 ~ 58% RH
Tested by:	Lance Chen	Test date:	September 28 ~ 29, 2021
Temperature:	23.9°C	Humidity:	53.1% RH
Tested by:	Lance Chen	Test date:	November 2, 2021





IEEE 802.11b mode High CH chain 0

Reference Level of PSD in 100kHz



Band Edge



Spurious Emission 30MHz-25GHz

