

# RADIO TEST REPORT

## FCC 47 CFR PART 15 SUBPART C

### INDUSTRY CANADA RSS-247

<b>Test Standard</b>	<b>FCC Part 15.247</b> <b>RSS-247 issue 2 and RSS-GEN issue 5</b>
<b>Product name</b>	<b>Neat Pad</b>
<b>Brand Name</b>	<b>neat.</b>
<b>Model No.</b>	<b>A1</b>
<b>Test Result</b>	<b>Pass</b>
<b>Statements of Conformity</b>	<b>Determination of compliance is based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.</b>

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。

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com.tw/Terms-and-Conditions> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com.tw/Terms-and-Conditions>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of client's instruction, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced, except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

## Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	September 14, 2021	Initial Issue	ALL	Doris Chu

## Table of contents

<b>1.</b>	<b>GENERAL INFORMATION.....</b>	<b>4</b>
1.1	EUT INFORMATION.....	4
1.2	EUT CHANNEL INFORMATION.....	5
1.3	ANTENNA INFORMATION.....	6
1.4	MEASUREMENT UNCERTAINTY .....	6
1.5	FACILITIES AND TEST LOCATION.....	7
1.6	INSTRUMENT CALIBRATION .....	7
1.7	SUPPORT AND EUT ACCESSORIES EQUIPMENT .....	9
1.8	TEST METHODOLOGY AND APPLIED STANDARDS.....	9
<b>2.</b>	<b>TEST SUMMARY.....</b>	<b>10</b>
<b>3.</b>	<b>DESCRIPTION OF TEST MODES.....</b>	<b>11</b>
3.1	THE WORST MODE OF OPERATING CONDITION .....	11
3.2	THE WORST MODE OF MEASUREMENT.....	12
<b>4.</b>	<b>EUT DUTY CYCLE .....</b>	<b>13</b>
<b>5.</b>	<b>TEST RESULT.....</b>	<b>14</b>
5.1	AC POWER LINE CONDUCTED EMISSION.....	14
5.2	6DB BANDWIDTH AND OCCUPIED BANDWIDTH(99%).....	19
5.3	OUTPUT POWER MEASUREMENT .....	37
5.4	POWER SPECTRAL DENSITY .....	41
5.5	CONDUCTED BANDEDGE AND SPURIOUS EMISSION.....	51
5.6	RADIATION BANDEDGE AND SPURIOUS EMISSION.....	64
	<b>APPENDIX 1 - PHOTOGRAPHS OF EUT .....</b>	<b>A-1</b>

## 1. GENERAL INFORMATION

### 1.1 EUT INFORMATION

Applicant	<b>For FCC</b> Neatframe AS Martin Linges Vei 25 Fornebu Fornebu 1364 Norway <b>For IC</b> Neatframe Limited The Charter Building Charter Place UXBRIDGE United Kingdom UB8 1JG United Kingdom Of Great Britain And Northern Ireland
Manufacturer	Neatframe Limited The Charter Building Charter Place UXBRIDGE United Kingdom UB8 1JG United Kingdom Of Great Britain And Northern Ireland
Equipment	Neat Pad
Model No.	A1
Model Discrepancy	N/A
Trade Name	neat.
Received Date	August 13, 2021
Date of Test	August 19 ~ September 11, 2021
Power Supply	Power from Power Adapter. 1. Model: POE16R-1AFG I/P: 100-240VAC, 50-60Hz, 0.8A, 32-44VA O/P: 56VDC, 0.275A 2. Model: POE16R-1AFG6 I/P: 100-240VAC, 50-60Hz, 0.8A O/P: 56VDC, 0.275A, 15.4W
HW Version	E08WWNFB2M5E.NPADA11
SW Version	V5.12.1.3
EUT Serial #	NA12017000590

**Remark:**

- For more details, please refer to the User's manual of the EUT.
- 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
<input type="checkbox"/> 1 MHz or less	1	Middle
<input type="checkbox"/> 1 MHz to 10 MHz	2	1 near top and 1 near bottom
<input checked="" type="checkbox"/> More than 10 MHz	3	1 near top, 1 near middle, and 1 near bottom

### 1.3 ANTENNA INFORMATION

<b>Antenna Type</b>	<input checked="" type="checkbox"/> FPC <input type="checkbox"/> PCB <input type="checkbox"/> Dipole <input type="checkbox"/> Coils
<b>Antenna Gain</b>	FPA2927-1A: Gain :0.85 dBi FPA2927-2A: Gain :0.89 dBi Power Directional Gain: 3.88 dBi
<b>Antenna Connector</b>	i-pex

**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 =  $10 \cdot \log \left\{ \left[ 10^{(Ant1/20)} + 10^{(Ant2/20)} + \dots + 10^{(Ant N /20)} \right]^2 / N \text{ ANT} \right\}$  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~200M	+/- 4.12
3M Semi Anechoic Chamber / 200M~1000M	+/- 4.68
3M Semi Anechoic Chamber / 1G~8G	+/- 5.18
3M Semi Anechoic Chamber / 8G~18G	+/- 5.47
3M Semi Anechoic Chamber / 18G~26G	+/- 3.81
3M Semi Anechoic Chamber / 26G~40G	+/- 3.87

**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	09/07/2020	09/06/2021
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)				

3M 966 Chamber Test Site					
Equipment	Manufacturer	Model	Serial Number	Cal Date	Cal Due
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	09/19/2020	09/18/2021
Digital Thermo-Hygro Meter	WISEWIND	1206	D07	01/06/2021	01/05/2022
double Ridged Guide Horn Antenna	ETC	MCTD 1209	DRH13M02003	09/30/2020	09/29/2021
High Pass Filters	MICRO TRONICS	HPM13195	003	02/08/2021	02/07/2022
Horn Antenna	ETS LINDGREN	3116	00026370	12/11/2020	12/10/2021
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	02/25/2021	02/24/2022
Pre-Amplifier	MITEQ	AMF-6F-18004000-37-8P	985646	09/02/2020	09/01/2021
Signal Analyzer	R&S	FSV 40	101073	09/17/2020	09/16/2021
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(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	4.1	AC Conducted Emission	Pass
15.247(a)(2)	RSS-247(5.2)(a)	4.2	6 dB Bandwidth	Pass
-	RSS-GEN 6.7	4.2	Occupied Bandwidth (99%)	Pass
15.247(b)(3)	RSS-247(5.4)(d)	4.3	Output Power Measurement	Pass
15.247(e)	RSS-247(5.2)(b)	4.4	Power Spectral Density	Pass
15.247(d)	RSS-247(5.5)	4.5	Conducted Band Edge	Pass
15.247(d)	RSS-247(5.5)	4.5	Conducted Emission	Pass
15.247(d)	RSS-GEN 8.9, 8.10	4.6	Radiation Band Edge	Pass
15.247(d)	RSS-GEN 8.9, 8.10	4.6	Radiation Spurious Emission	Pass

### 3. DESCRIPTION OF TEST MODES

#### 3.1 THE WORST MODE OF OPERATING CONDITION

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

**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 date 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 Adapter (POE16R-1AFG) Mode 2: EUT power by Adapter (POE16R-1AFG6)
Worst Mode	<input checked="" type="checkbox"/> Mode 1 <input checked="" type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3 <input type="checkbox"/> Mode 4

Radiated Emission Measurement Above 1G	
Test Condition	Radiated Emission Above 1G
Power supply Mode	Mode 1: EUT Power by Adapter (POE16R-1AFG) Mode 2: EUT Power by Adapter (POE16R-1AFG6)
Worst Mode	<input checked="" type="checkbox"/> Mode 1 <input type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3 <input type="checkbox"/> Mode 4
Worst Position	<input type="checkbox"/> Placed in fixed position. <input checked="" type="checkbox"/> Placed in fixed position at X-Plane (E2-Plane) <input type="checkbox"/> Placed in fixed position at Y-Plane (E1-Plane) <input type="checkbox"/> 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 Adapter (POE16R-1AFG) Mode 2: EUT Power by Adapter (POE16R-1AFG6)
Worst Mode	<input checked="" type="checkbox"/> Mode 1 <input type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3 <input type="checkbox"/> 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

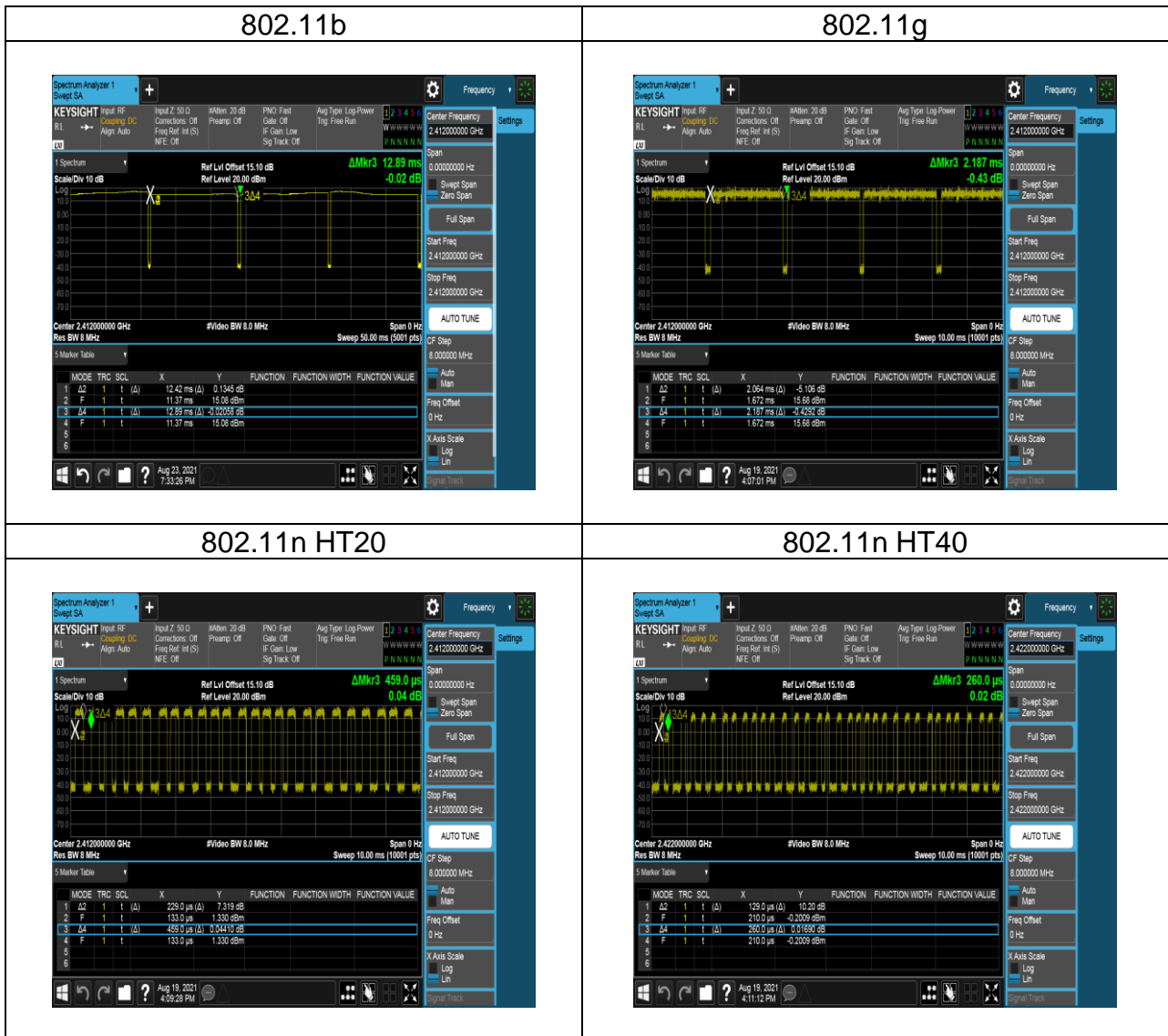
Temperature: 20.3 ~ 26.8°C

Humidity: 54 ~ 62% RH

Tested by: Lance Chen

Test date: August 19 ~ 31, 2021

Duty Cycle				
Configuration	Duty Cycle (%)	Duty Factor (dB) =10*log (1/Duty Cycle)	1/T (kHz)	VBW setting (kHz)
802.11b	96.35	0.16	0.08	1.00
802.11g	94.38	0.25	0.48	1.00
802.11n HT20	49.89	3.02	4.37	5.00
802.11n HT40	49.62	3.04	7.75	8.00



## 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

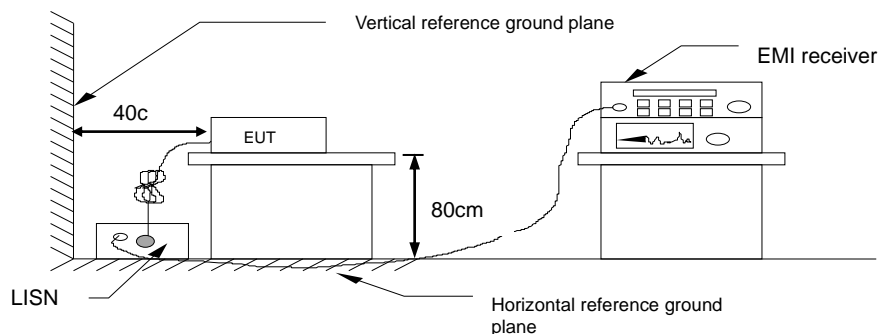
\* Decreases with the logarithm of the frequency.

#### 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

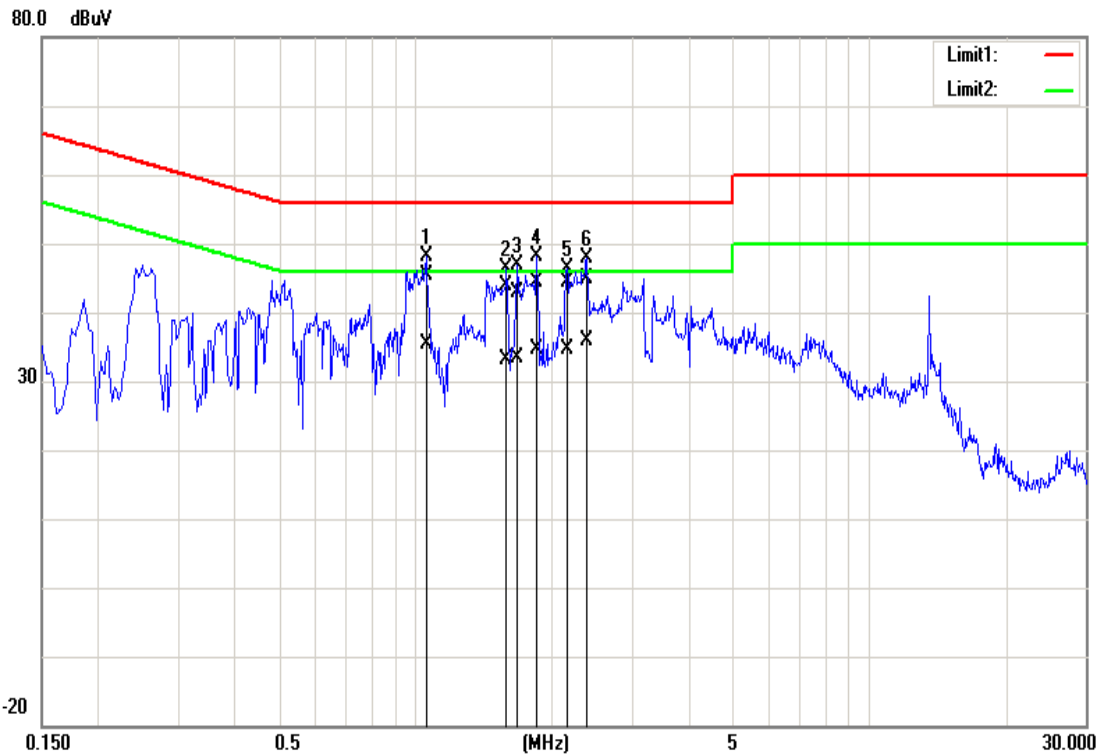


#### 5.1.4 Test Result

**PASS**

### Test Data

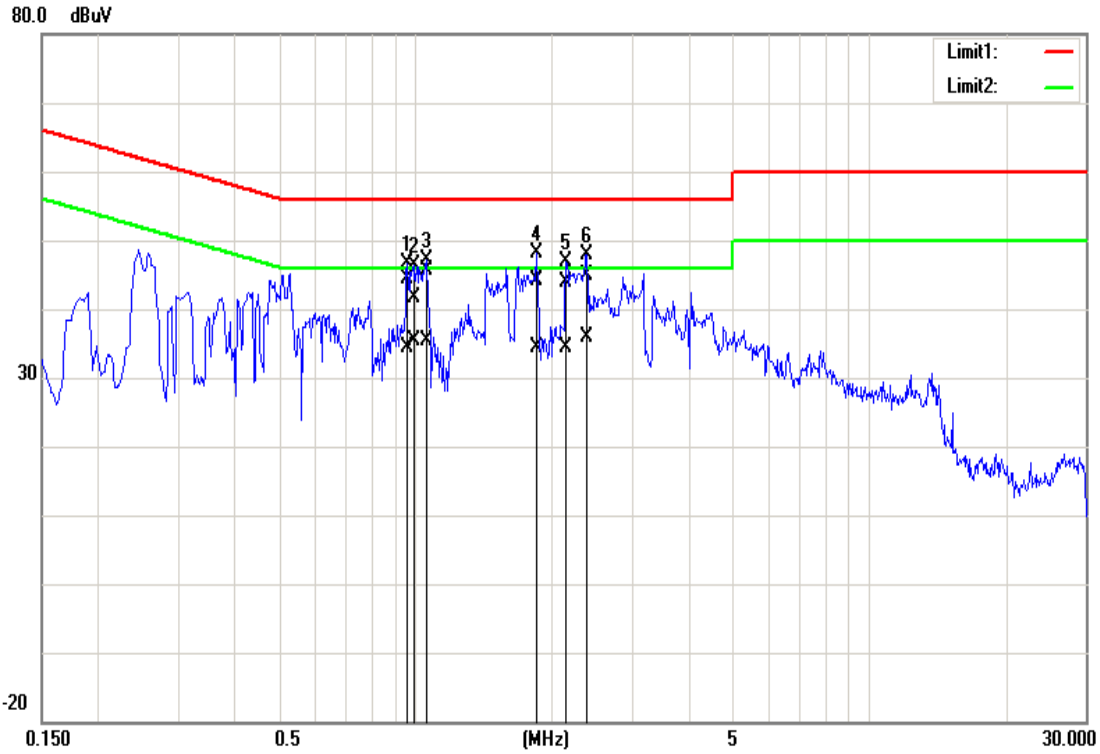
Test Mode:	Mode 1	Temp/Hum	27.3(°C)/ 48%RH
Phase:	Line	Test Date	August 20, 2021
		Test Engineer	Jack Chen



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
1.0580	35.06	24.99	10.31	45.37	35.30	56.00	46.00	-10.63	-10.70	Pass
1.5860	33.62	22.85	10.33	43.95	33.18	56.00	46.00	-12.05	-12.82	Pass
1.6780	32.64	23.02	10.33	42.97	33.35	56.00	46.00	-13.03	-12.65	Pass
1.8500	34.05	24.41	10.34	44.39	34.75	56.00	46.00	-11.61	-11.25	Pass
2.1580	33.93	24.32	10.34	44.27	34.66	56.00	46.00	-11.73	-11.34	Pass
2.3860	34.61	25.48	10.34	44.95	35.82	56.00	46.00	-11.05	-10.18	Pass

Note: Correction factor = LISN loss + Cable loss.

Test Mode:	Mode 1	Temp/Hum	27.3(°C)/ 48%RH
Phase:	Neutral	Test Date	August 20, 2021
		Test Engineer	Jack Chen

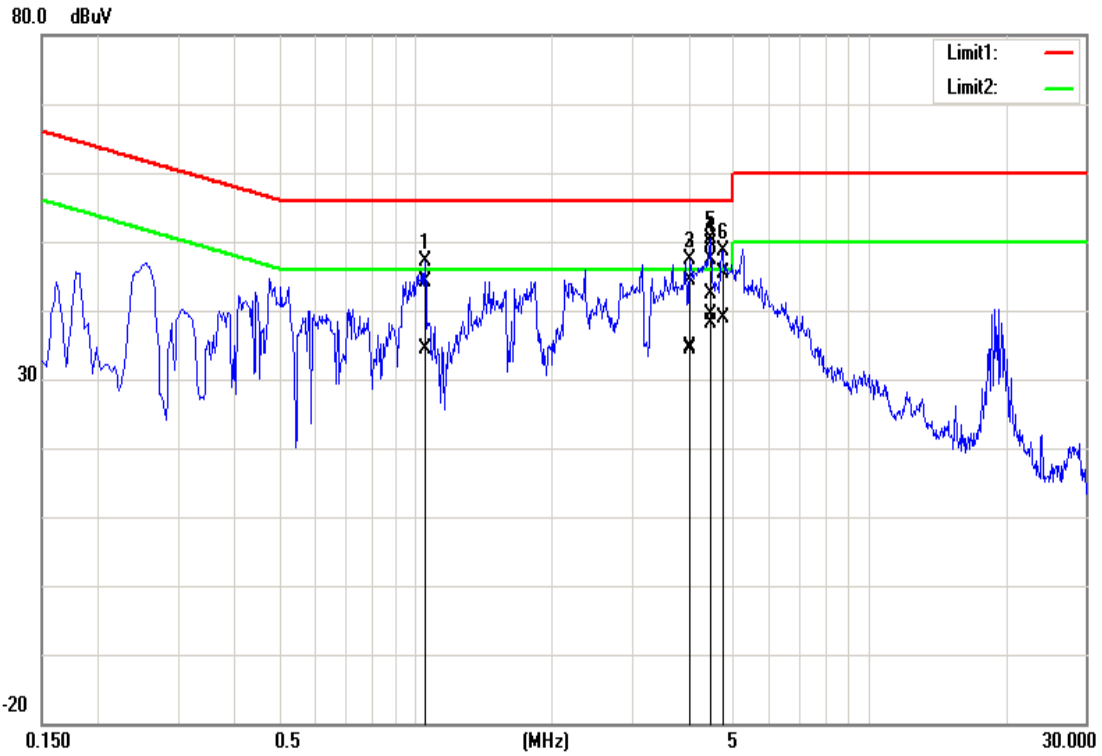


Frequency (MHz)	Quasi Peak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	Quasi Peak result (dBuV)	Average result (dBuV)	Quasi Peak limit (dBuV)	Average limit (dBuV)	Quasi Peak margin (dB)	Average margin (dB)	Remark
0.9620	34.00	24.17	10.31	44.31	34.48	56.00	46.00	-11.69	-11.52	Pass
0.9900	31.41	25.06	10.31	41.72	35.37	56.00	46.00	-14.28	-10.63	Pass
1.0580	35.21	24.99	10.31	45.52	35.30	56.00	46.00	-10.48	-10.70	Pass
1.8540	33.88	24.00	10.34	44.22	34.34	56.00	46.00	-11.78	-11.66	Pass
2.1540	33.63	24.07	10.34	43.97	34.41	56.00	46.00	-12.03	-11.59	Pass
2.3860	34.52	25.55	10.34	44.86	35.89	56.00	46.00	-11.14	-10.11	Pass

Note: Correction factor = LISN loss + Cable loss.



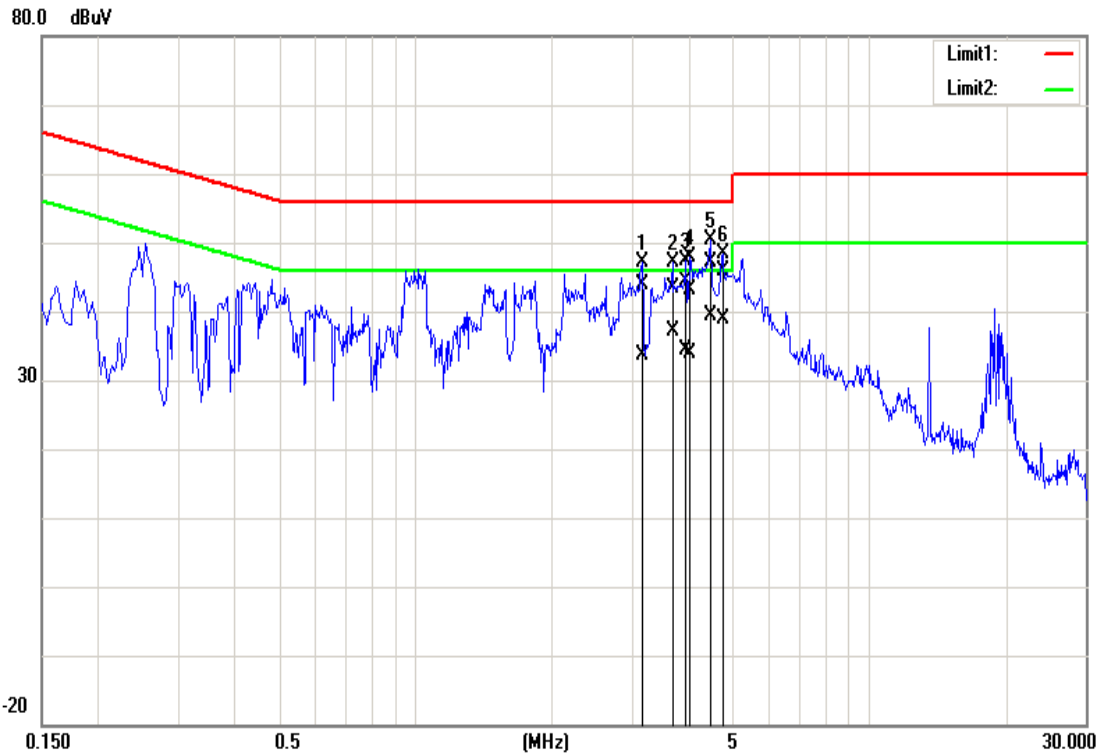
Test Mode:	Mode 2	Temp/Hum	26.1(°C)/ 47%RH
Phase:	Line	Test Date	September 11, 2021
		Test Engineer	Jack Chen



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
1.0500	33.82	24.05	10.31	44.13	34.36	56.00	46.00	-11.87	-11.64	Pass
3.9500	34.01	23.98	10.38	44.39	34.36	56.00	46.00	-11.61	-11.64	Pass
4.0260	34.03	24.34	10.38	44.41	34.72	56.00	46.00	-11.59	-11.28	Pass
4.3900	32.05	27.87	10.38	42.43	38.25	56.00	46.00	-13.57	-7.75	Pass
4.4780	36.94	29.05	10.38	47.32	39.43	56.00	46.00	-8.68	-6.57	Pass
4.7580	35.01	28.37	10.39	45.40	38.76	56.00	46.00	-10.60	-7.24	Pass

Note: Correction factor = LISN loss + Cable loss.

Test Mode:	Mode 2	Temp/Hum	26.1(°C)/ 47%RH
Phase:	Neutral	Test Date	September 11, 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
3.1580	33.40	23.25	10.36	43.76	33.61	56.00	46.00	-12.24	-12.39	Pass
3.6860	32.90	26.85	10.38	43.28	37.23	56.00	46.00	-12.72	-8.77	Pass
3.9460	34.00	23.96	10.38	44.38	34.34	56.00	46.00	-11.62	-11.66	Pass
4.0300	32.78	23.53	10.38	43.16	33.91	56.00	46.00	-12.84	-12.09	Pass
4.4780	36.81	29.08	10.38	47.19	39.46	56.00	46.00	-8.81	-6.54	Pass
4.7580	35.41	28.60	10.39	45.80	38.99	56.00	46.00	-10.20	-7.01	Pass

Note: Correction factor = LISN loss + Cable loss.

Report No.: TMWK2108000370KR

## 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
-------	--------------------------

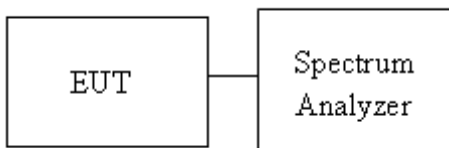
Occupied Bandwidth(99%) : For reporting purposes only.

### 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:** 20.3 ~ 26.8°C

**Humidity:** 54 ~ 62% RH

**Tested by:** Lance Chen

**Test date:** August 19 ~ 31, 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	14.785	14.611	10.13	10.13	≥500
Mid	2437	14.820	14.824	10.13	10.14	
High	2462	14.805	14.659	10.14	10.13	

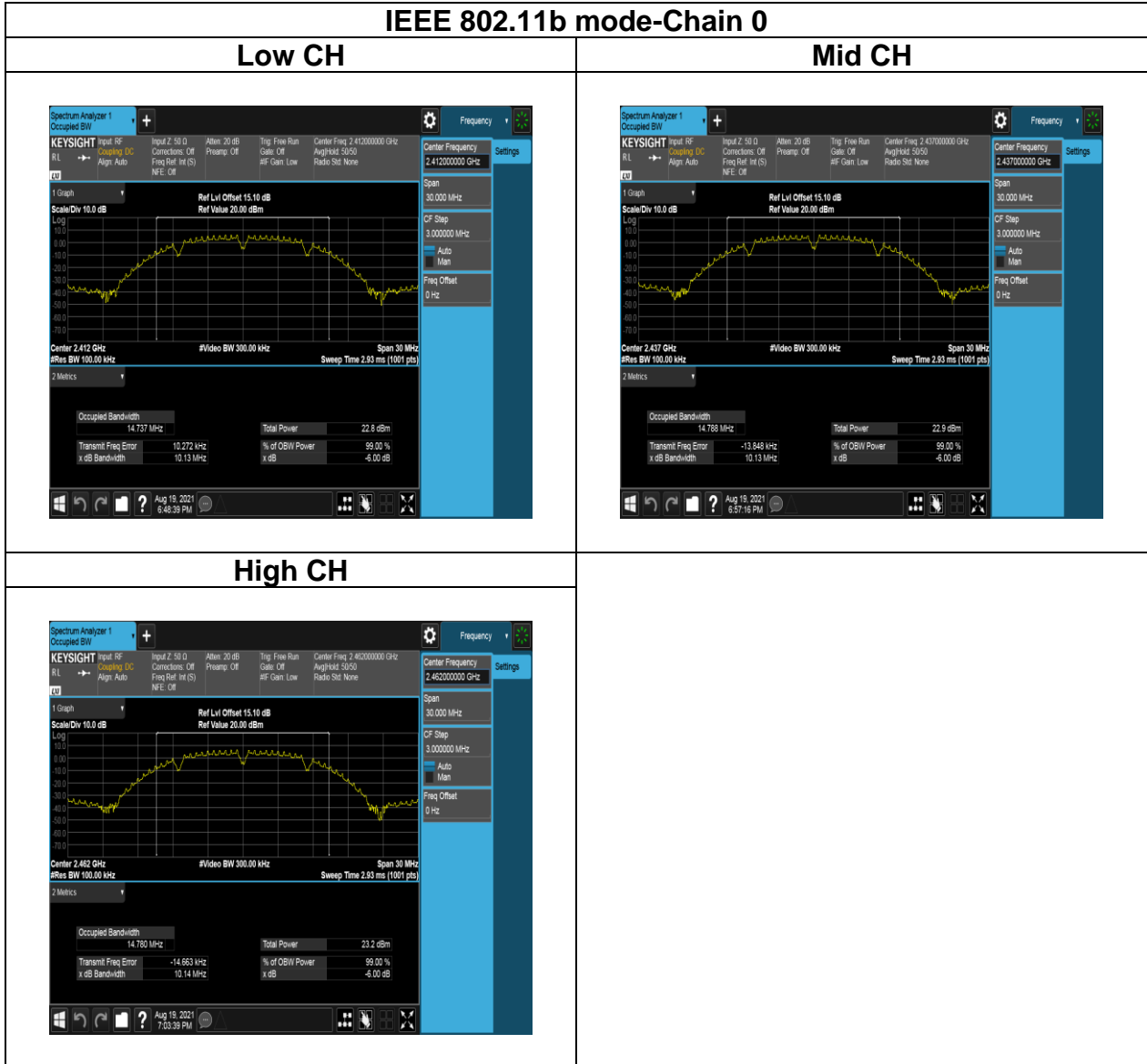
Test mode: IEEE 802.11g mode / 2412-2462 MHz						
Channel	Frequency (MHz)	Chain 0 OBW(99%) (MHz)	Chain 1 OBW(99%) (MHz)	Chain 0 6dB BW (MHz)	Chain 1 6dB BW (MHz)	6dB limit (kHz)
Low	2412	16.574	16.457	15.69	15.79	≥500
Mid	2437	16.656	16.657	15.75	15.71	
High	2462	16.546	16.463	16.31	15.68	

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	17.749	17.566	17.27	16.38	≥500
Mid	2437	17.853	17.854	16.43	16.43	
High	2462	17.864	17.836	16.41	17.34	

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	36.151	36.417	35.48	35.47	≥500
Mid	2437	36.128	36.127	35.49	35.50	
High	2452	36.157	34.65	35.78	35.20	

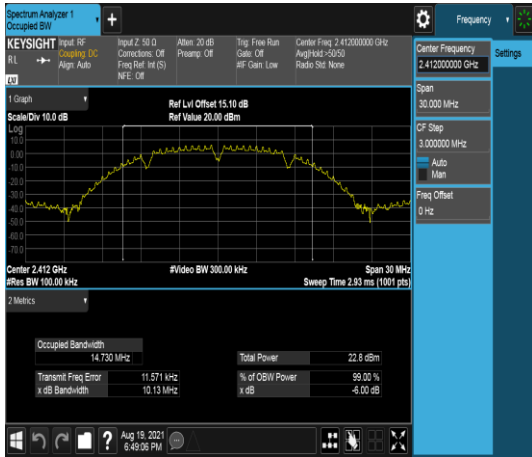
## Test Data

### 6dB BANDWIDTH

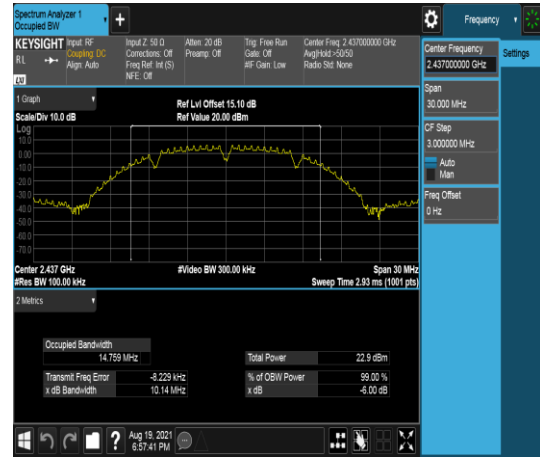


## IEEE 802.11b mode-Chain 1

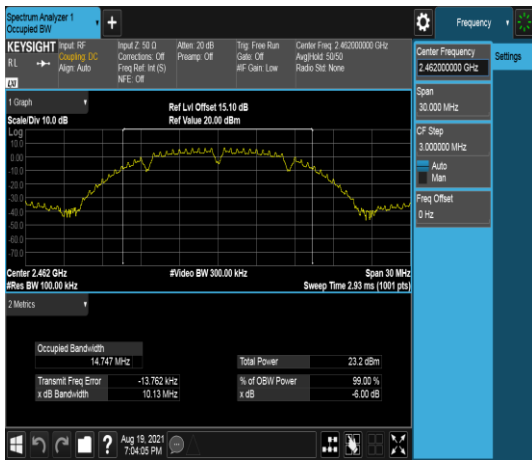
### Low CH

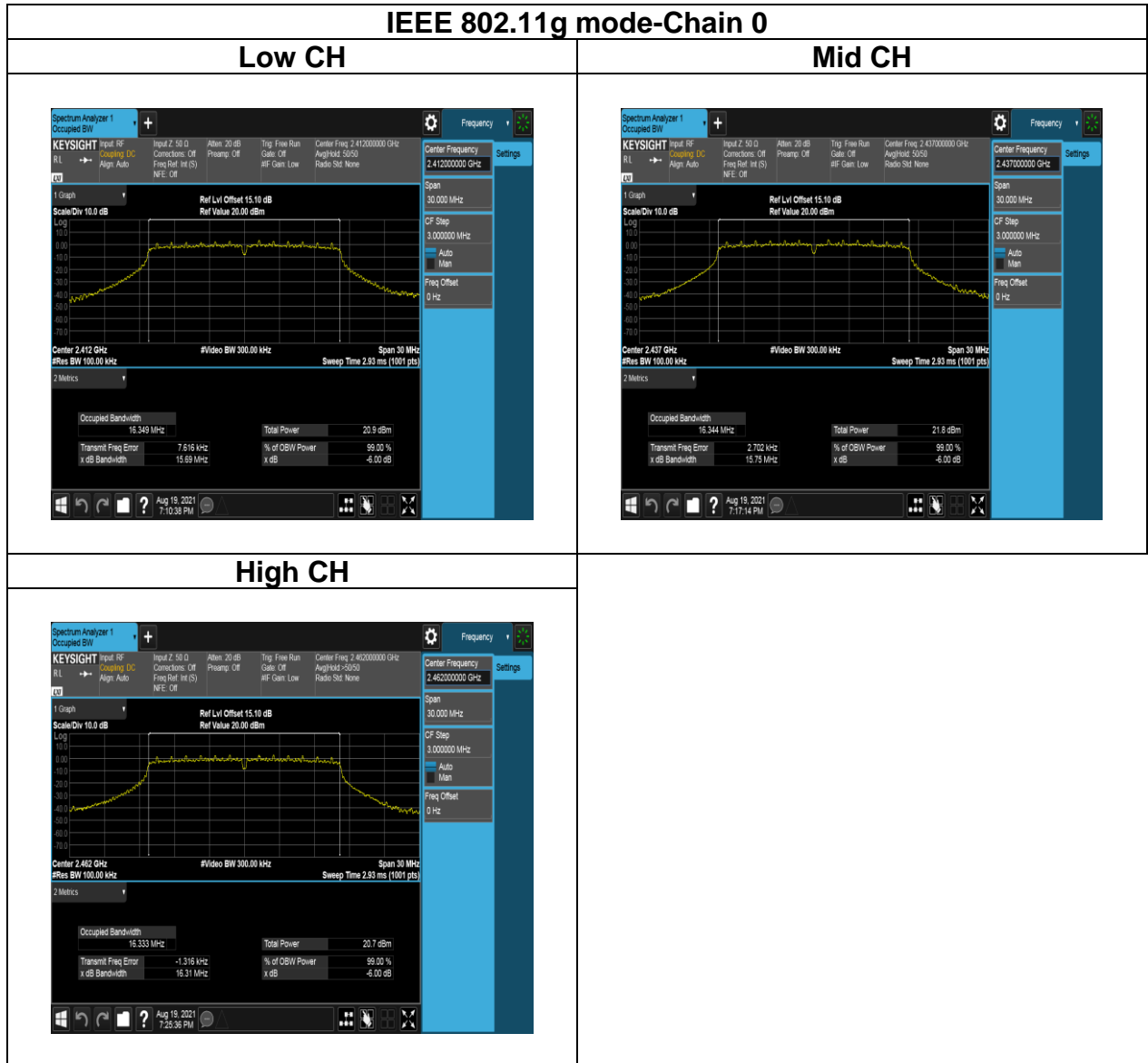


### Mid CH



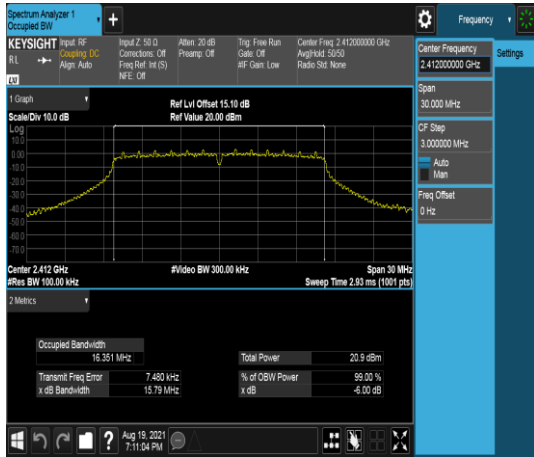
### High CH



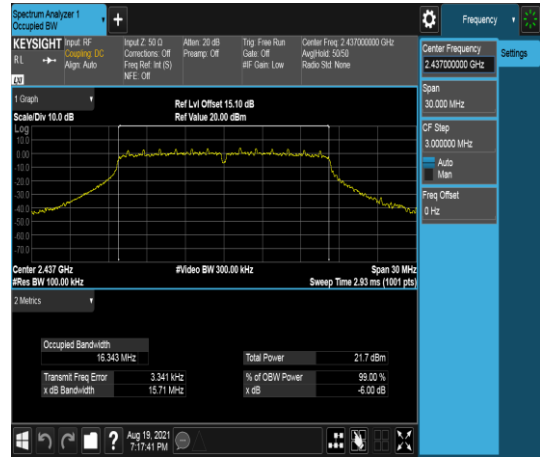


## IEEE 802.11g mode-Chain 1

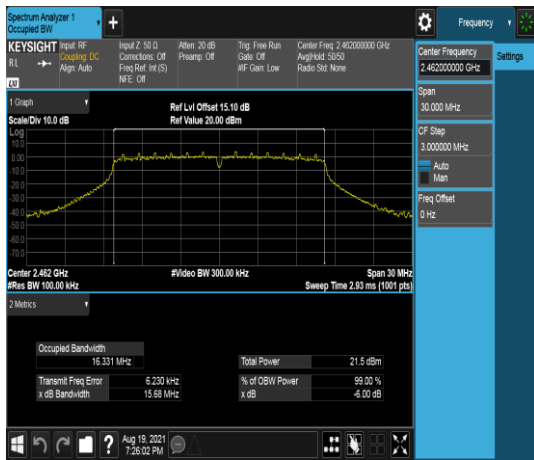
### Low CH



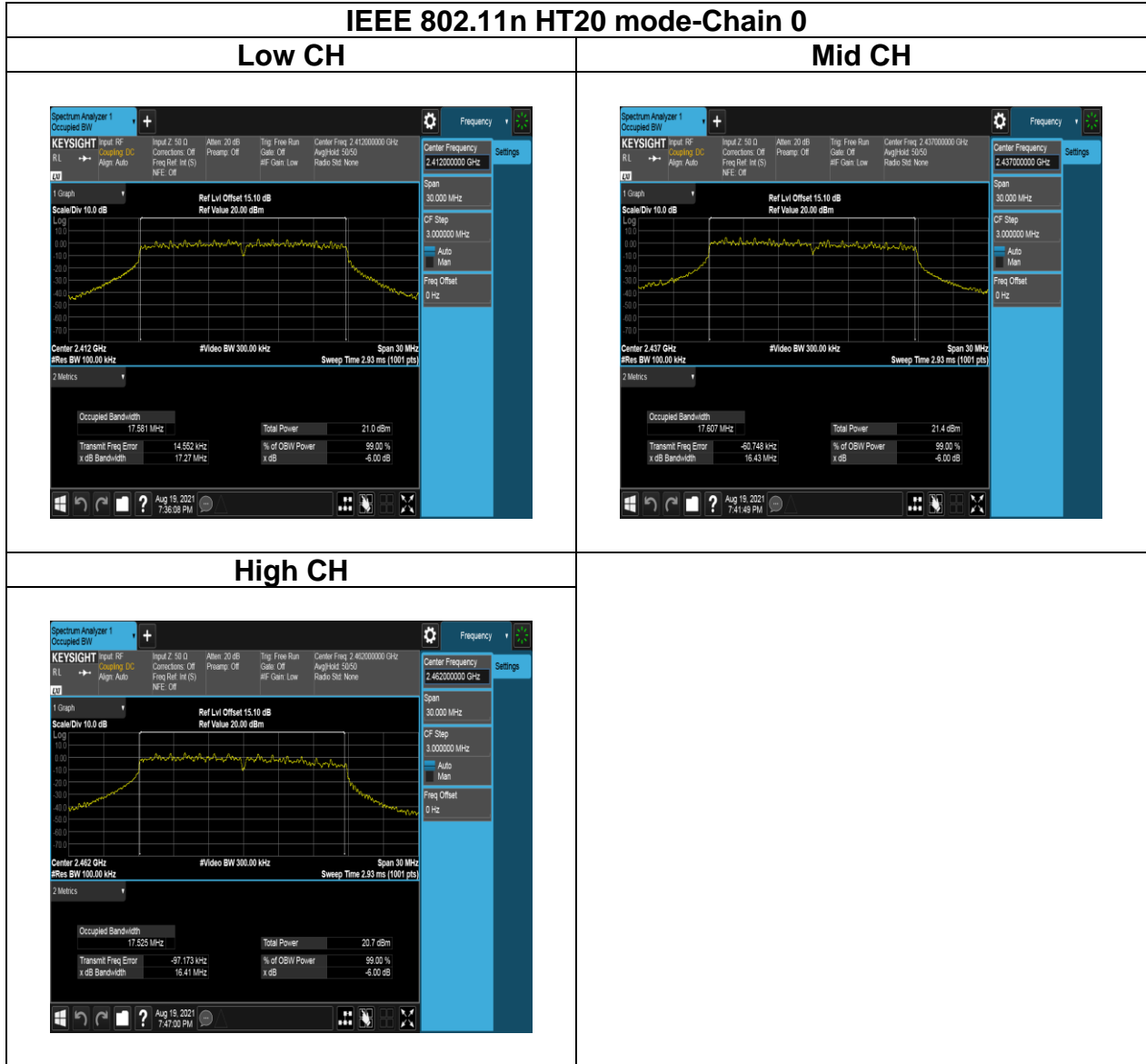
### Mid CH

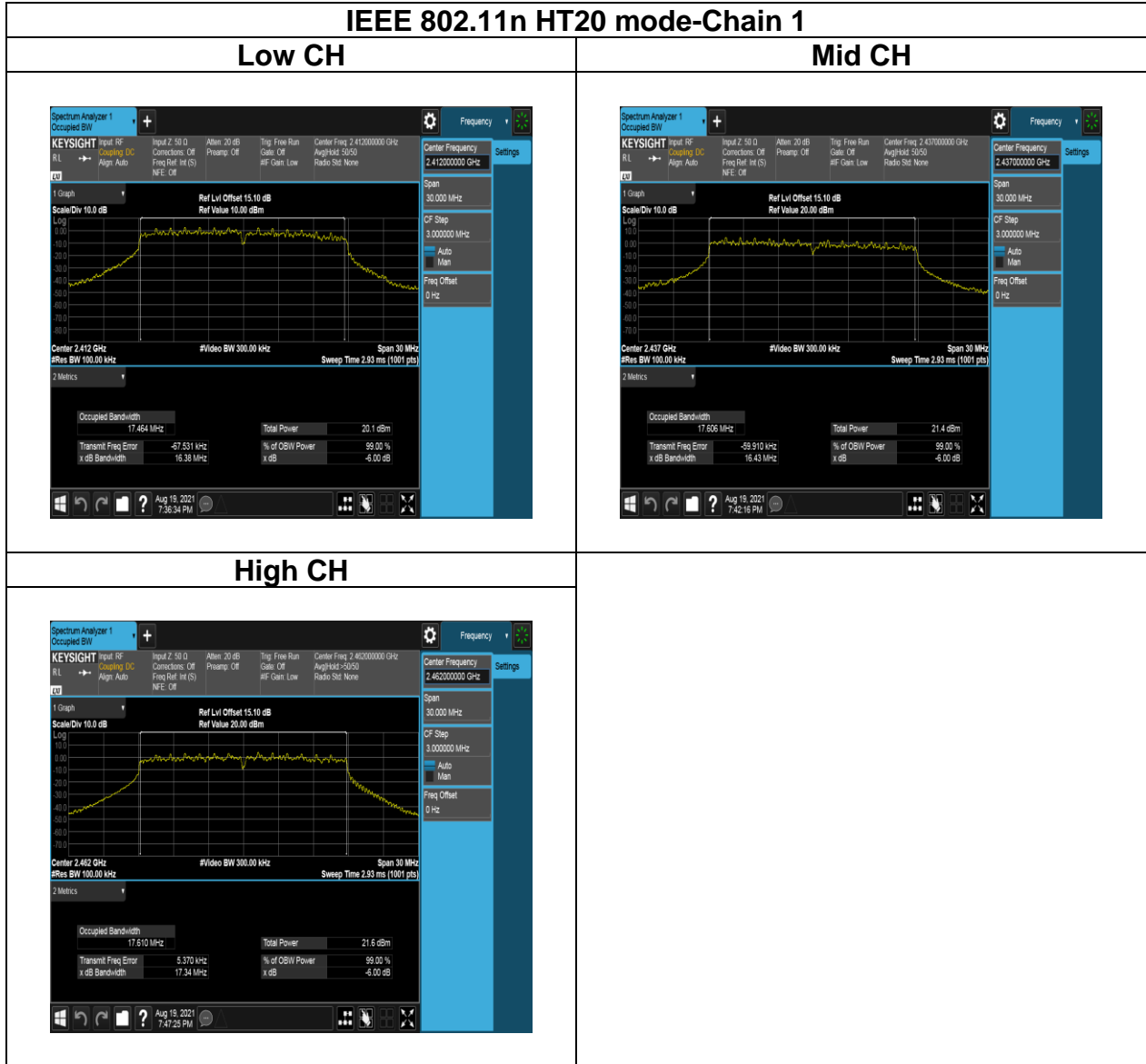


### High CH



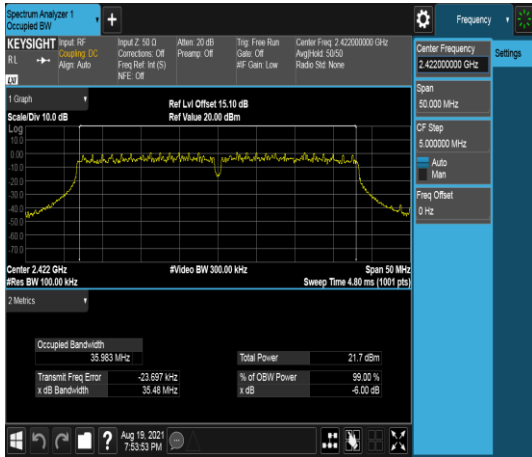




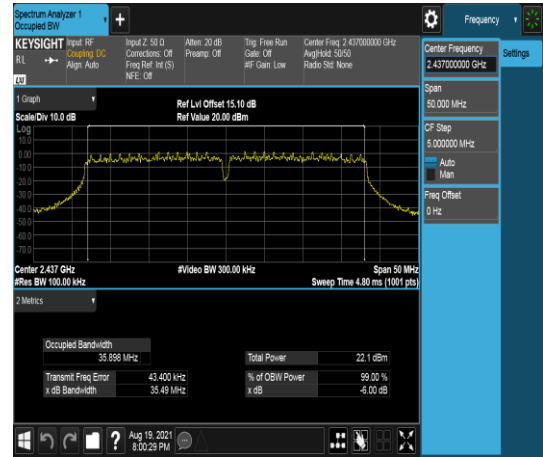


## IEEE 802.11n HT40 mode-Chain 0

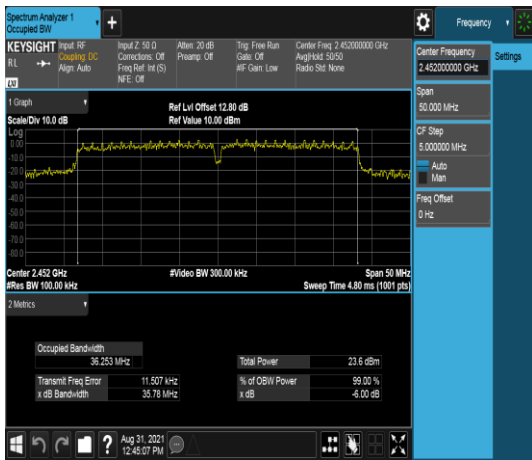
### Low CH

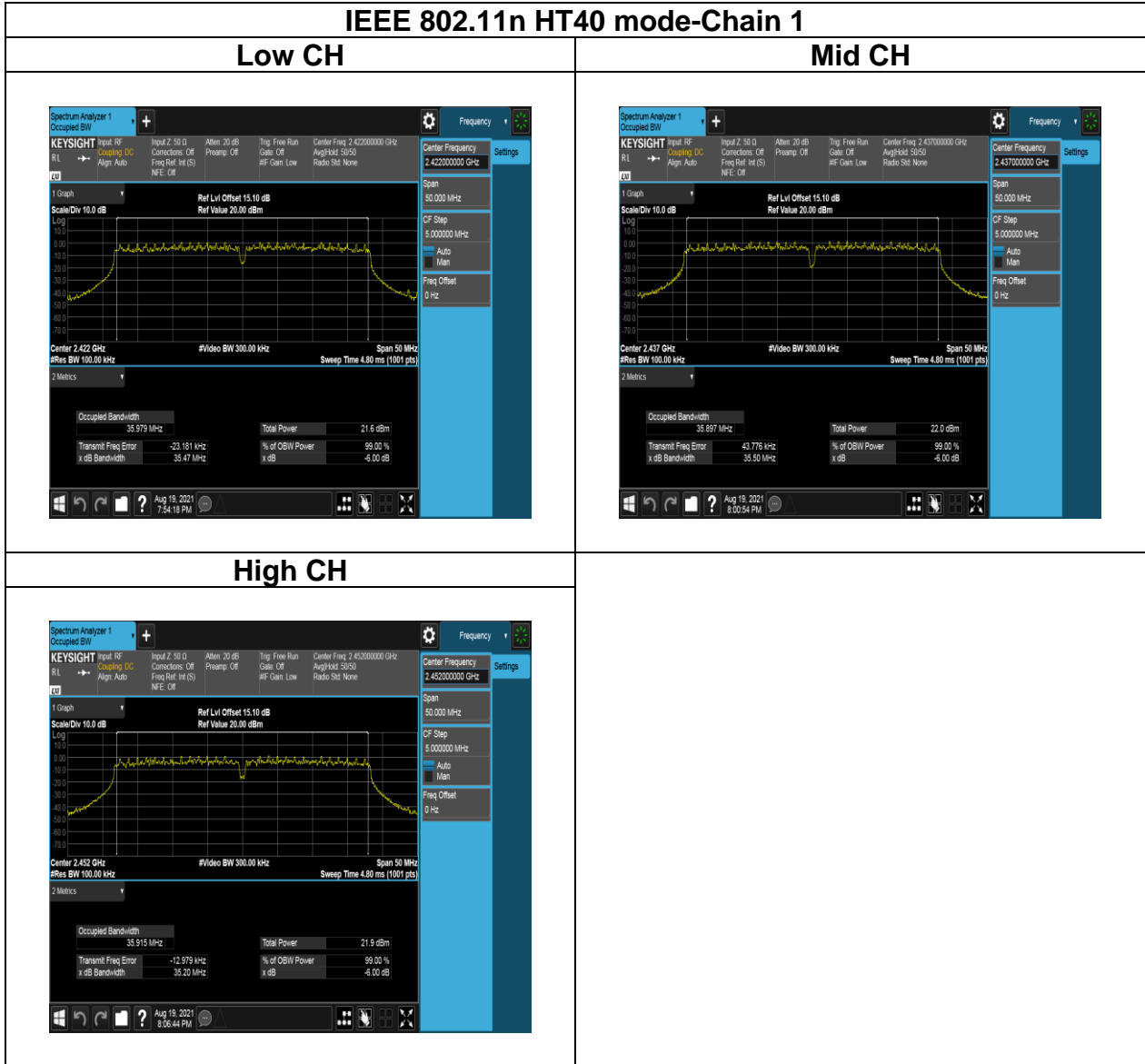


### Mid CH

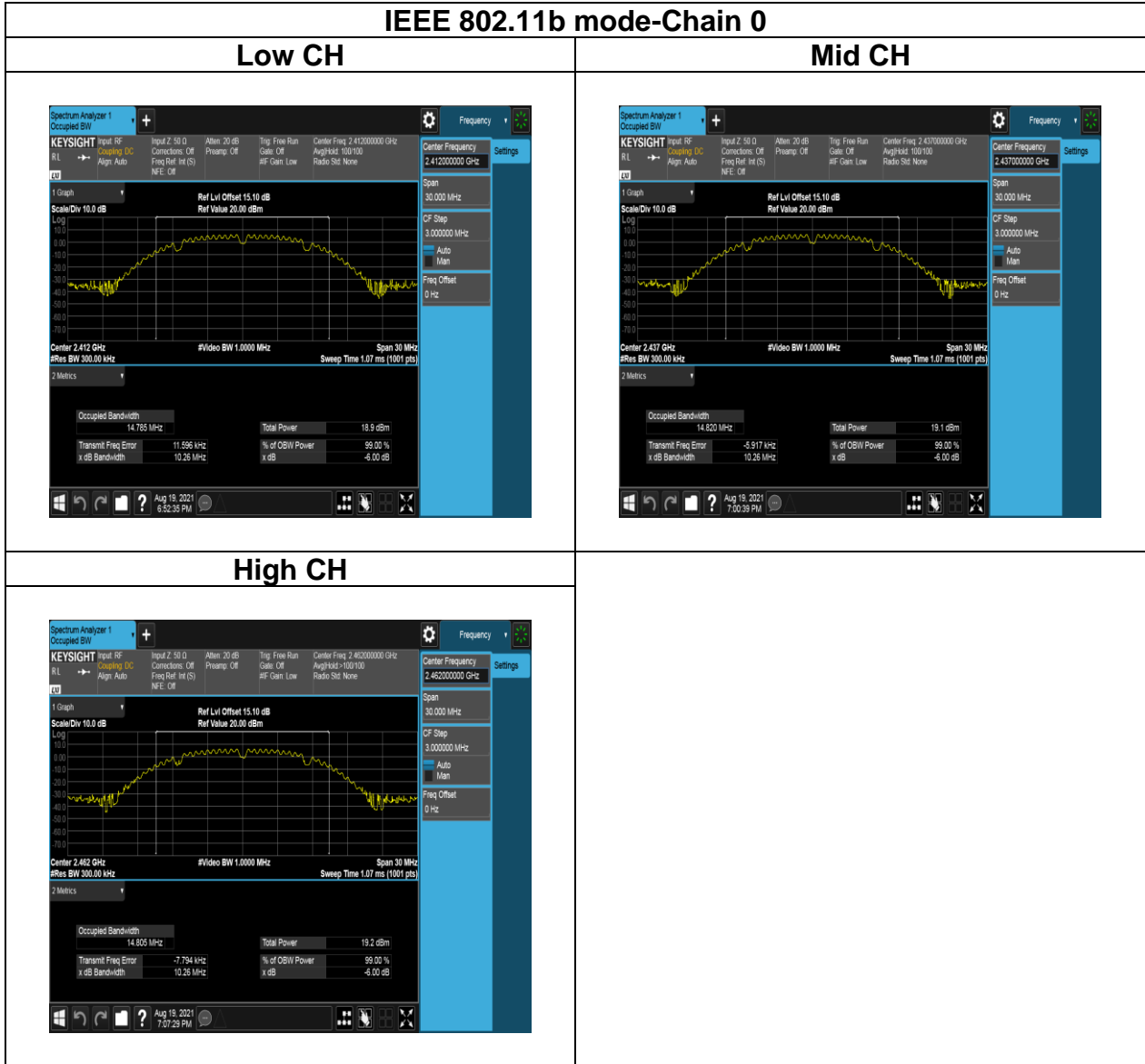


### High CH



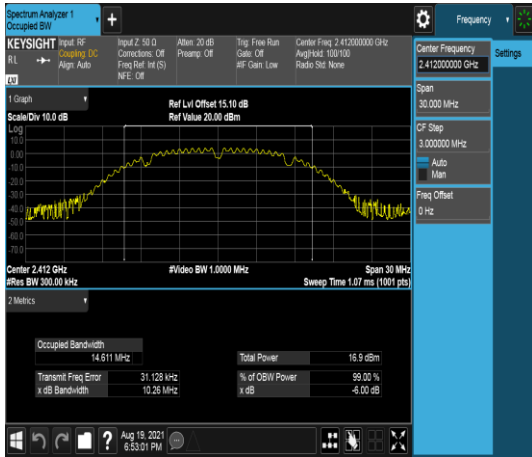


## Test Data BANDWIDTH 99%

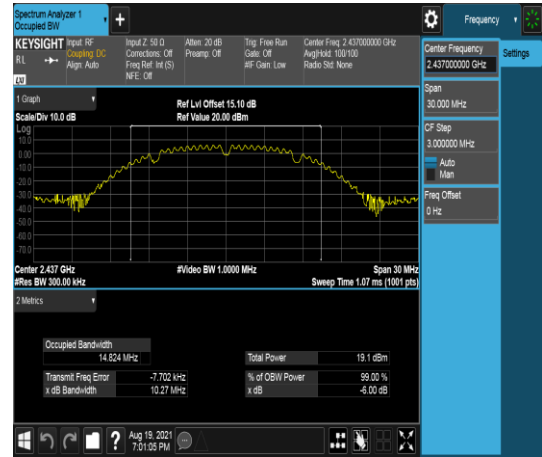


## IEEE 802.11b mode-Chain 1

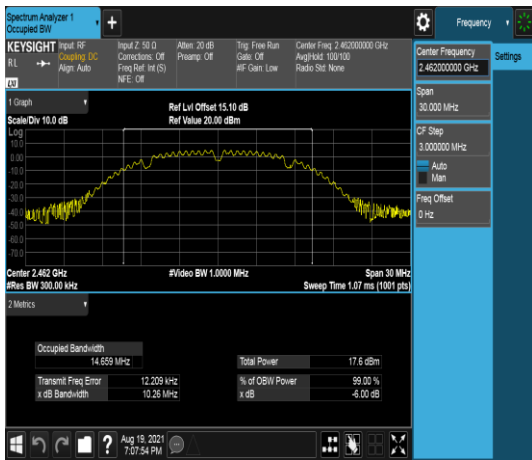
### Low CH

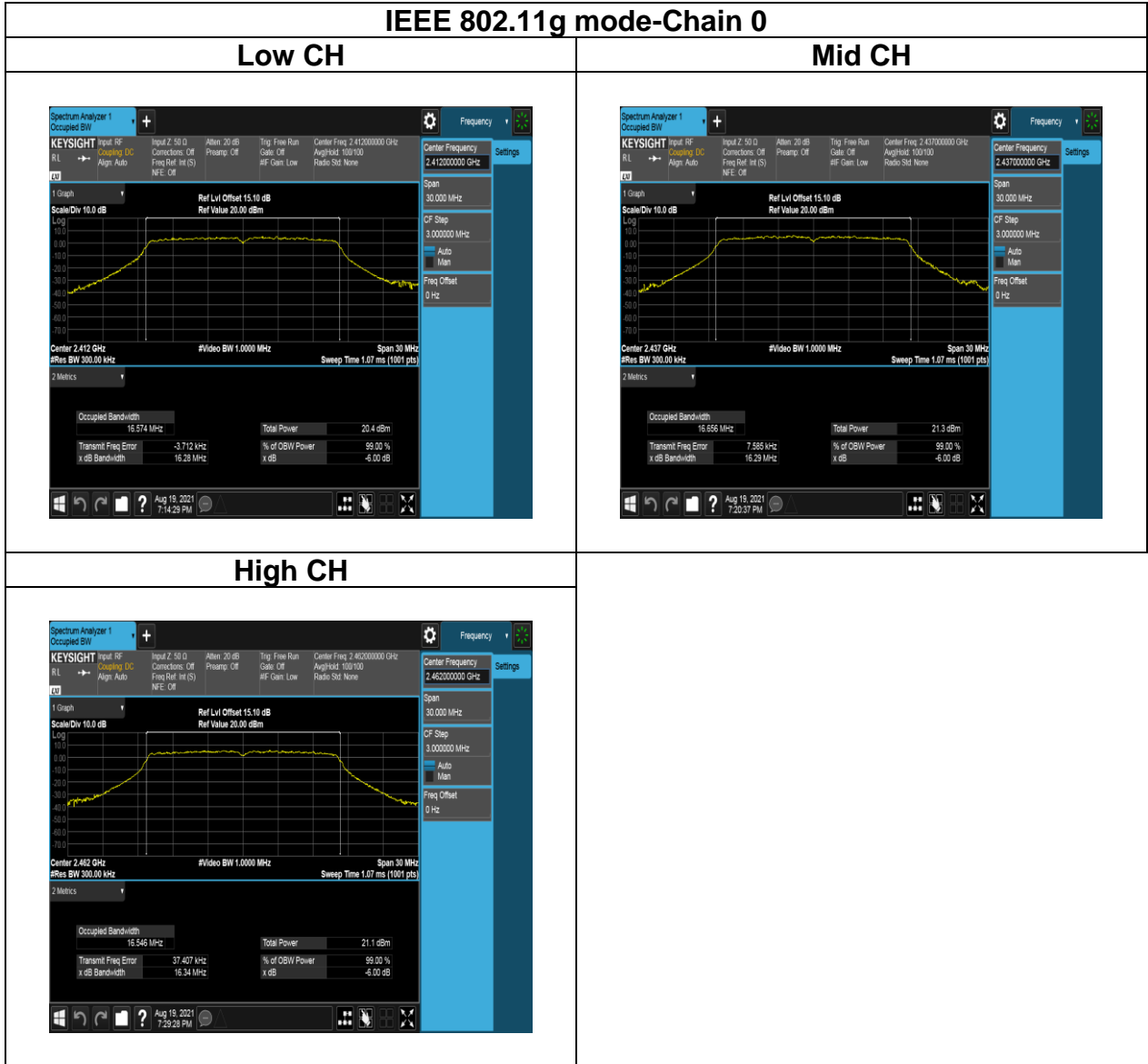


### Mid CH



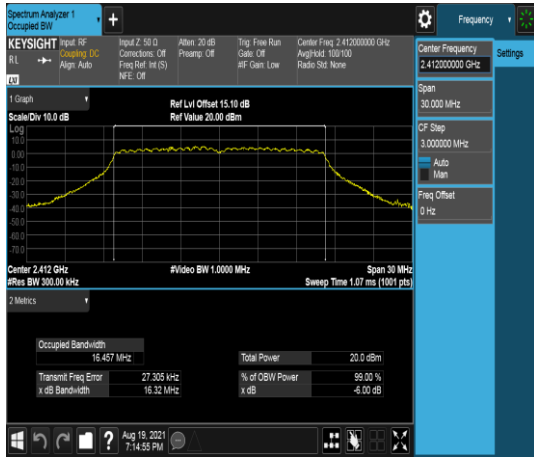
### High CH



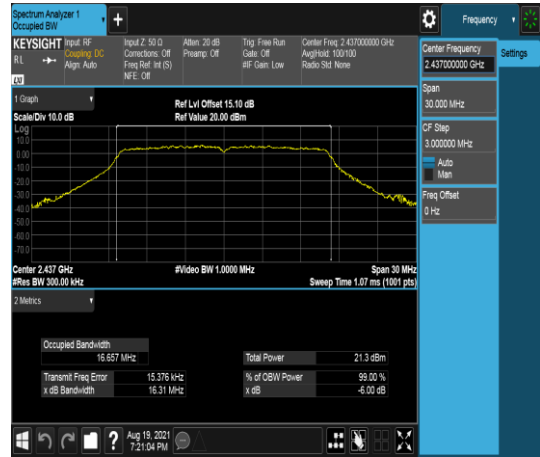


## IEEE 802.11g mode-Chain 1

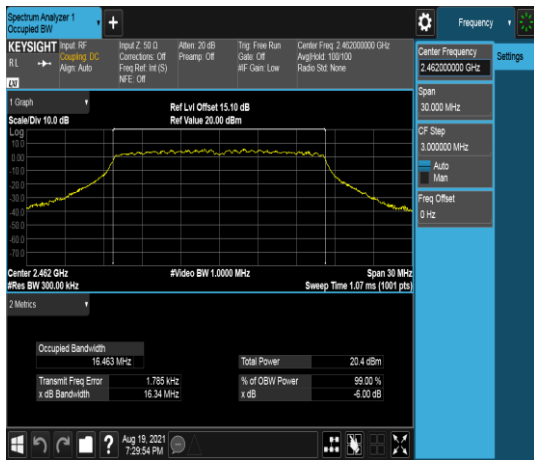
### Low CH



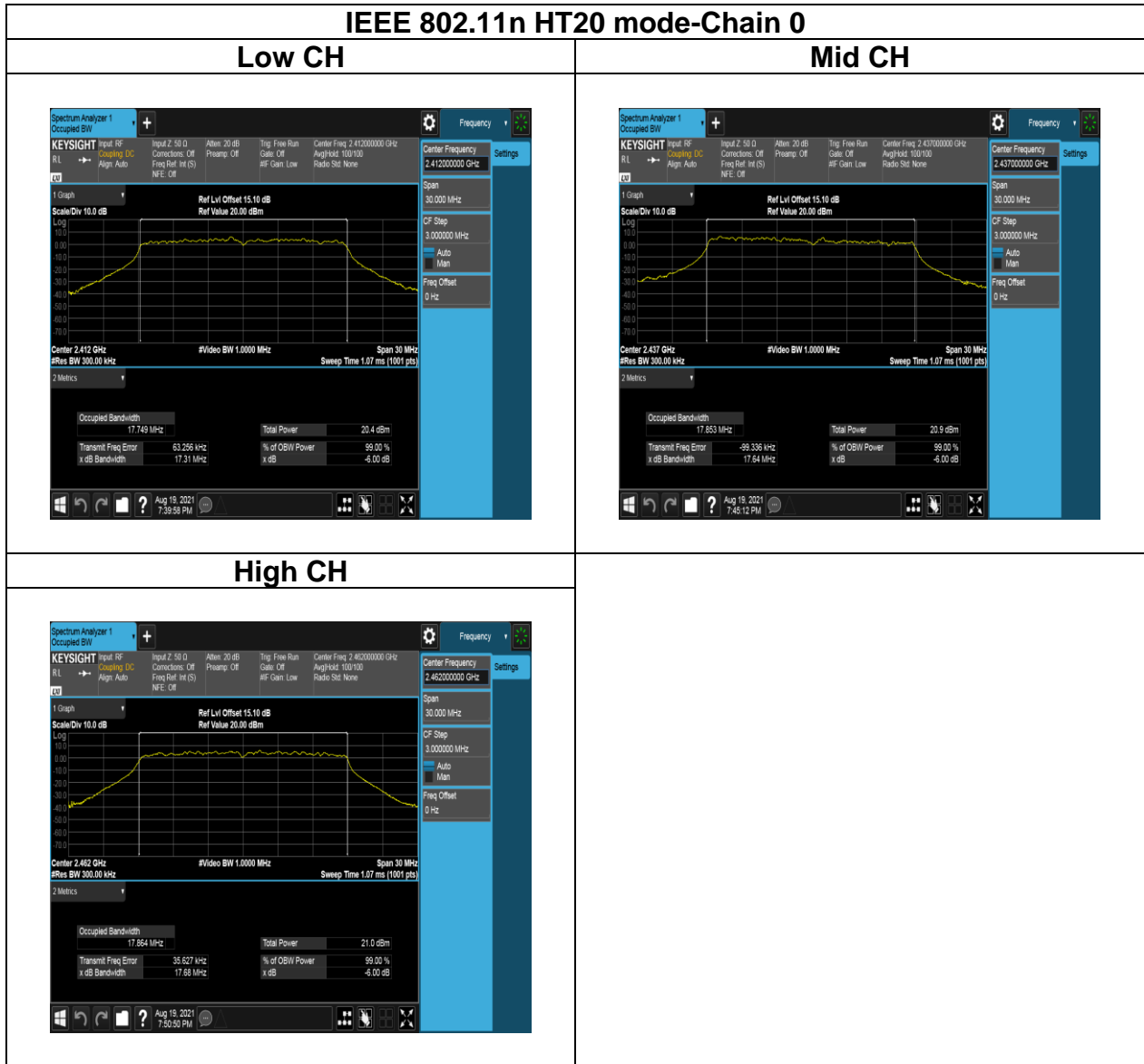
### Mid CH

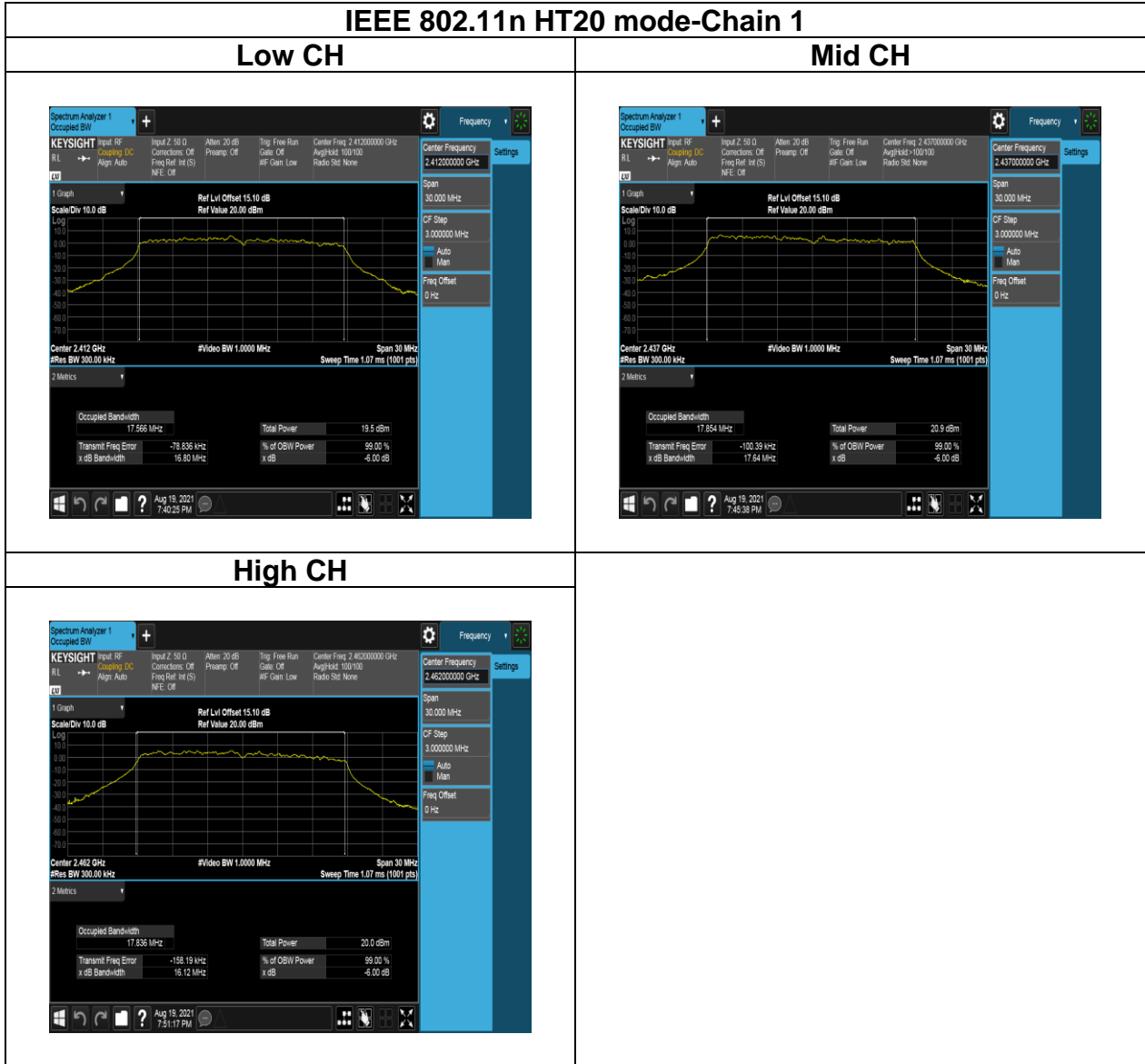


### High CH



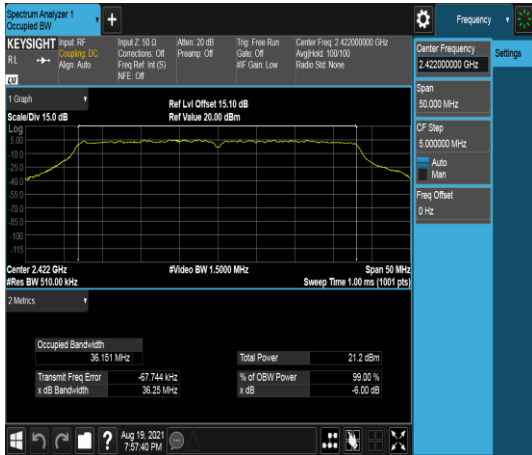




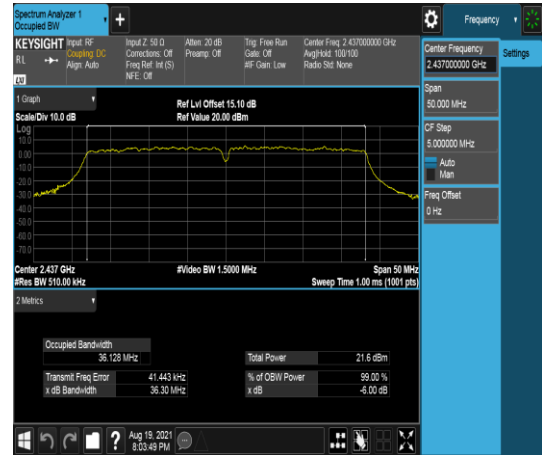


## IEEE 802.11n HT40 mode-Chain 0

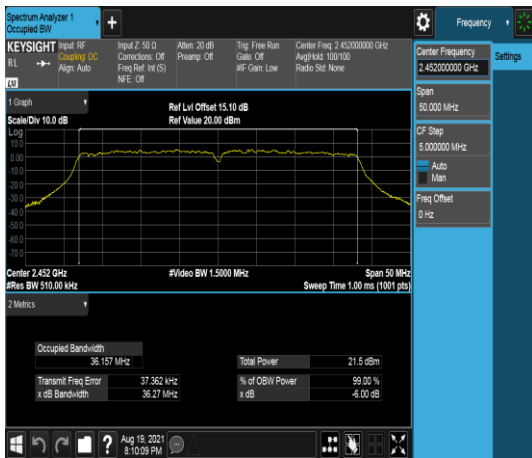
### Low CH

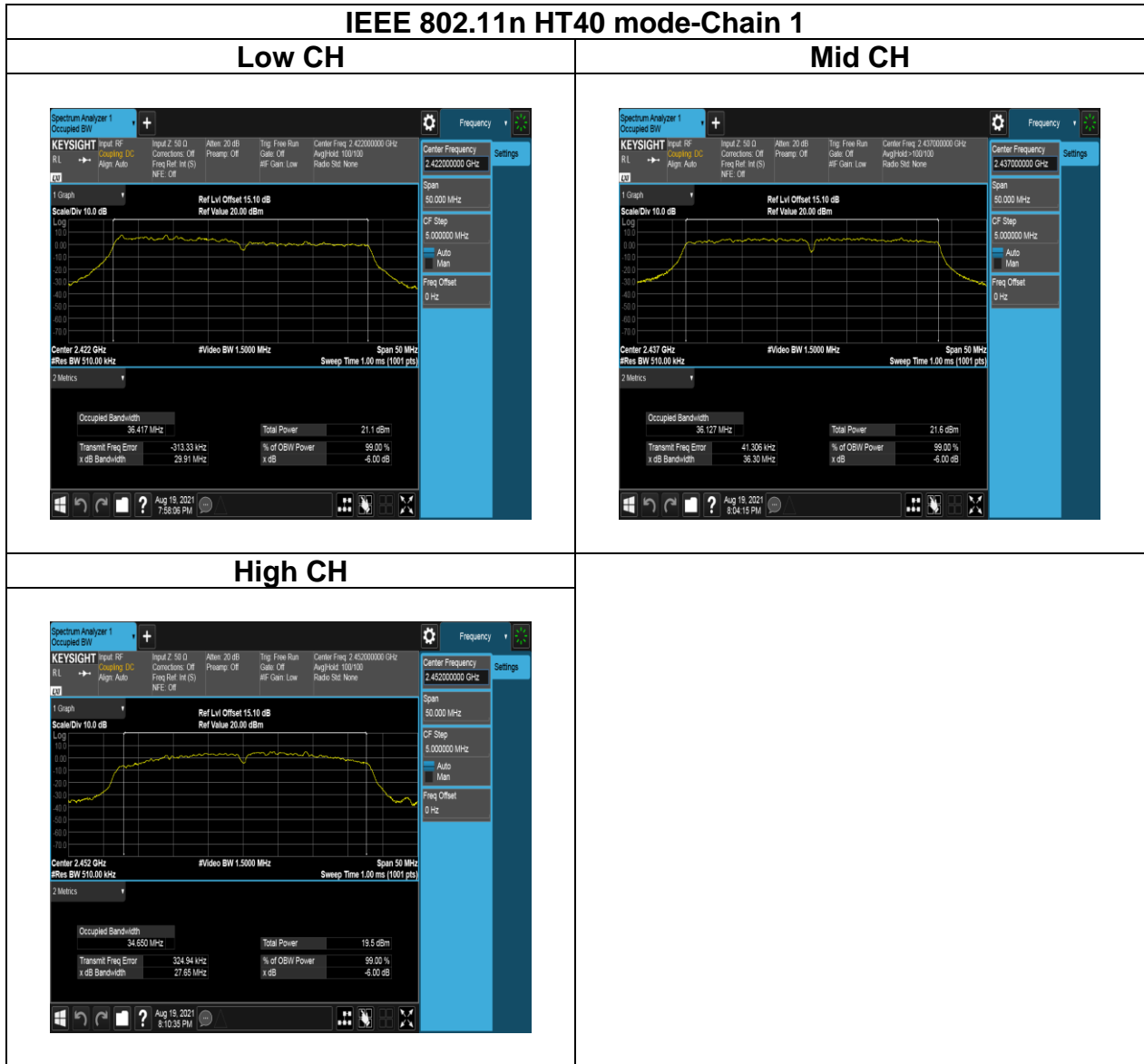


### Mid CH



### High CH





Report No.: TMWK2108000370KR

## 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	<input checked="" type="checkbox"/> Antenna not exceed 6 dBi : 30dBm <input type="checkbox"/> Antenna with DG greater than 6 dBi : [Limit = 30 – (DG – 6)] <input type="checkbox"/> Point-to-point operation :
-------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

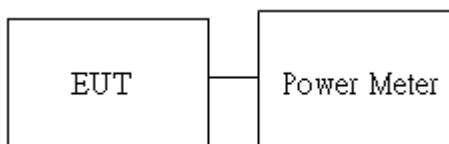
**Average output power** : For reporting purposes only.

### 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.: TMWK2108000370KR

### 5.3.4 Test Result

Temperature: 20.3 ~ 26.8°C

Humidity: 54 ~ 62% RH

Tested by: Lance Chen

Test date: August 19 ~ 31, 2021

#### Peak output power :

802.11b_2TX								
CH	Freq. (MHz)	Data Rate	Power set	Peak Output Power (dBm)		Total Peak Output Power (dBm)	Limit (dBm)	RESULT
				CH 0	CH 1			
1	2412	1	default	18.45	16.71	20.68	30.00	PASS
6	2437	1	default	18.40	17.06	20.79	30.00	PASS
11	2462	1	default	18.65	17.09	<b>20.95</b>	30.00	PASS

802.11g_2TX								
CH	Freq. (MHz)	Data Rate	Power set	Peak Output Power (dBm)		Total Peak Output Power (dBm)	Limit (dBm)	RESULT
				CH 0	CH 1			
1	2412	6	default	18.12	16.25	20.30	30.00	PASS
6	2437	6	default	18.36	17.11	20.79	30.00	PASS
11	2462	6	default	18.64	17.12	<b>20.96</b>	30.00	PASS

802.11n_HT20M MIMO								
CH	Freq. (MHz)	Data Rate	Power set	Peak Output Power (dBm)		Total Peak Output Power (dBm)	Limit (dBm)	RESULT
				CH 0	CH 1			
1	2412	MCS8	default	25.09	24.21	<b>27.68</b>	30.00	PASS
6	2437	MCS8	default	24.78	23.59	27.24	30.00	PASS
11	2462	MCS8	default	24.03	22.52	26.35	30.00	PASS

802.11n_HT40M MIMO								
CH	Freq. (MHz)	Data Rate	Power set	Peak Output Power (dBm)		Total Peak Output Power (dBm)	Limit (dBm)	RESULT
				CH 0	CH 1			
3	2422	MCS8	default	24.22	23.58	26.92	30.00	PASS
6	2437	MCS8	default	25.58	25.11	<b>28.36</b>	30.00	PASS
9	2452	MCS8	default	25.47	24.56	28.05	30.00	PASS

**Average output power :**

802.11b_2TX								
CH	Freq. (MHz)	Data Rate	Power set	Avg. Output Power (dBm)		Max. Avg. Output include tune up tolerance Power (dBm)	Limit (dBm)	RESULT
				CH 0	CH 1			
1	2412	1	default	16.45	14.61	18.80	30.00	PASS
6	2437	1	default	16.31	14.99	18.87	30.00	PASS
11	2462	1	default	17.02	14.98	<b>19.29</b>	30.00	PASS

802.11g_2TX								
CH	Freq. (MHz)	Data Rate	Power set	Avg. Output Power (dBm)		Max. Avg. Output include tune up tolerance Power (dBm)	Limit (dBm)	RESULT
				CH 0	CH 1			
1	2412	6	default	16.03	14.37	18.54	30.00	PASS
6	2437	6	default	16.39	14.97	19.00	30.00	PASS
11	2462	6	default	16.53	15.14	<b>19.15</b>	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)	Limit (dBm)	RESULT
				CH 0	CH 1			
1	2412	MCS8	default	12.74	12.06	18.44	30.00	PASS
6	2437	MCS8	default	13.16	11.97	<b>18.64</b>	30.00	PASS
11	2462	MCS8	default	13.05	12.07	18.62	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)	Limit (dBm)	RESULT
				CH 0	CH 1			
3	2422	MCS8	default	11.05	10.97	17.06	30.00	PASS
6	2437	MCS8	default	13.07	12.55	<b>18.87</b>	30.00	PASS
9	2452	MCS8	default	12.89	11.35	18.24	30.00	PASS

**EIRP power :**

802.11b_2TX									
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	1	16.45	14.61	18.80	3.88	22.68	36	PASS
6	2437	1	16.31	14.99	18.87	3.88	22.75	36	PASS
11	2462	1	17.02	14.98	19.29	3.88	<b>23.17</b>	36	PASS

802.11g_2TX									
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	6	16.03	14.37	18.54	3.88	22.42	36	PASS
6	2437	6	16.39	14.97	19.00	3.88	22.88	36	PASS
11	2462	6	16.53	15.14	19.15	3.88	<b>23.03</b>	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	MCS8	12.74	12.06	18.44	3.88	22.32	36	PASS
6	2437	MCS8	13.16	11.97	18.64	3.88	<b>22.52</b>	36	PASS
11	2462	MCS8	13.05	12.07	18.62	3.88	22.50	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	MCS8	11.05	10.97	17.06	3.88	20.94	36	PASS
6	2437	MCS8	13.07	12.55	18.87	3.88	<b>22.75</b>	36	PASS
9	2452	MCS8	12.89	11.35	18.24	3.88	22.12	36	PASS



Report No.: TMWK2108000370KR

## 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.

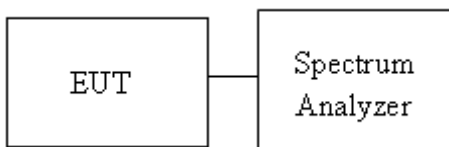
Limit	<input checked="" type="checkbox"/> Antenna not exceed 6 dBi : 8dBm <input type="checkbox"/> Antenna with DG greater than 6 dBi : [ Limit = 8 – (DG – 6) ] <input type="checkbox"/> Point-to-point operation :
-------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

### 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



Report No.: TMWK2108000370KR

#### 5.4.4 Test Result

**Temperature:** 20.3 ~ 26.8°C

**Humidity:** 54 ~ 62% RH

**Tested by:** Lance Chen

**Test date:** August 19 ~ 31, 2021

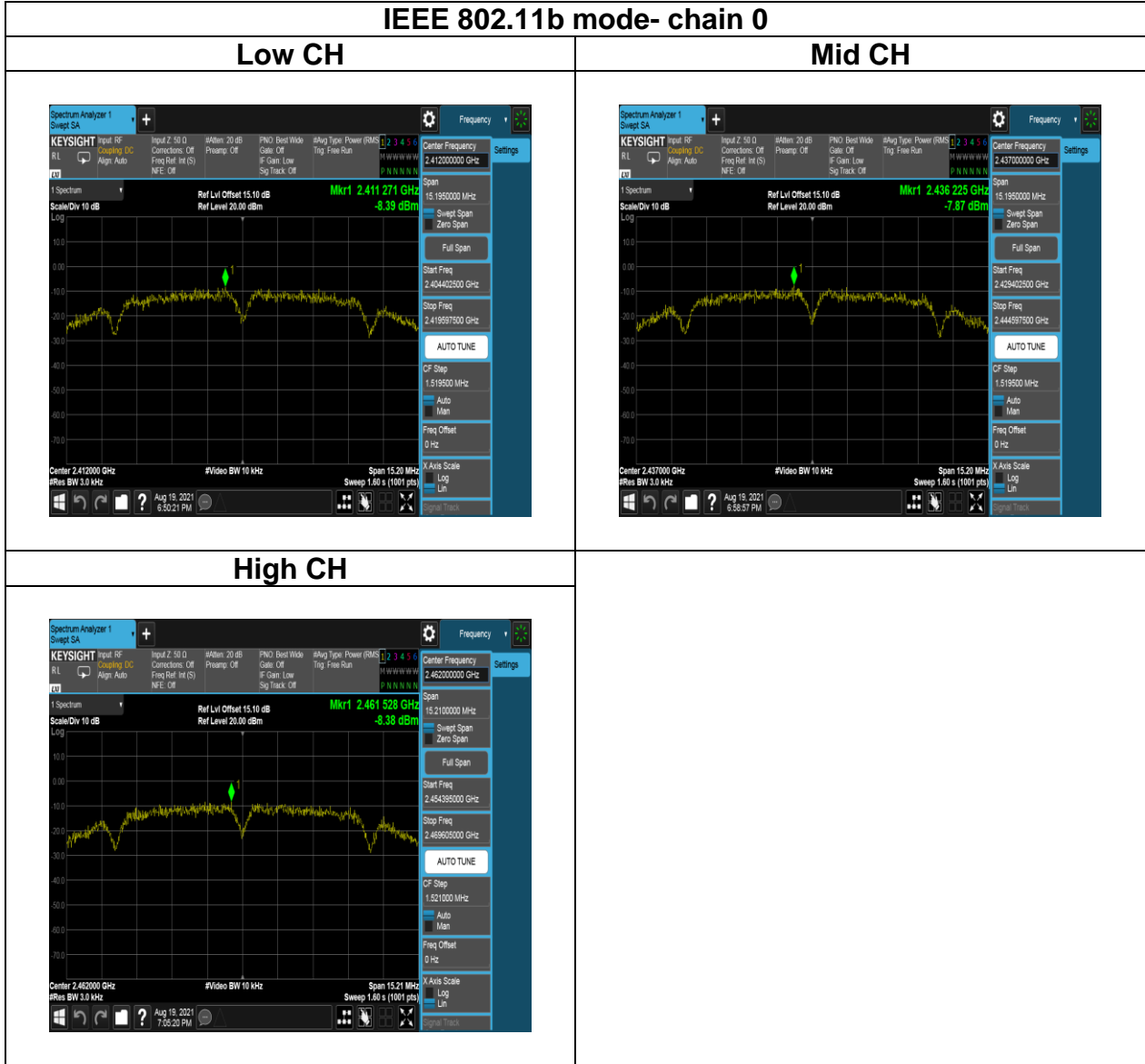
POWER DENSITY 802.11b					
Freq. (MHz)	Ch0 PSD	Ch1 PSD	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Result
2412	-8.39	-7.61	-4.97	8.00	PASS
2437	-7.87	-8.07	-4.96	8.00	PASS
2462	-8.38	-7.41	-4.85	8.00	PASS

POWER DENSITY 802.11g					
Freq. (MHz)	Ch0 PSD	Ch1 PSD	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Result
2412	-10.94	-10.51	-7.71	8.00	PASS
2437	-9.68	-10.38	-7.01	8.00	PASS
2462	-11.8	-10.57	-8.13	8.00	PASS

POWER DENSITY 802.11n HT20					
Freq. (MHz)	Ch0 PSD	Ch1 PSD	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Result
2412	-12.15	-12.83	-9.47	8.00	PASS
2437	-12.52	-12.29	-9.39	8.00	PASS
2462	-13.08	-10.82	-8.79	8.00	PASS

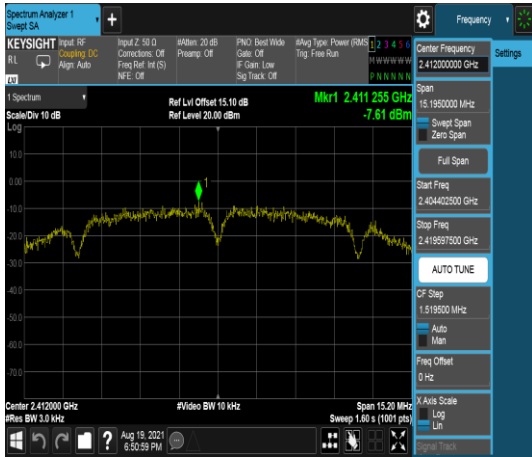
POWER DENSITY 802.11n HT40					
Freq. (MHz)	Ch0 PSD	Ch1 PSD	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Result
2422	-16.36	-16.21	-13.27	8.00	PASS
2437	-15.01	-15.54	-12.26	8.00	PASS
2452	-17.45	-16.20	-13.77	8.00	PASS

## Test Data



## IEEE 802.11b mode- chain 1

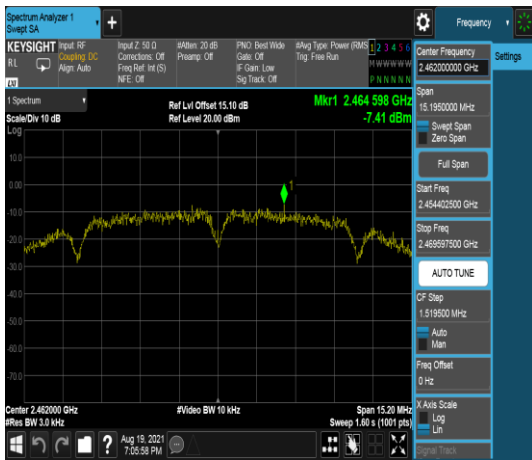
### Low CH



### Mid CH

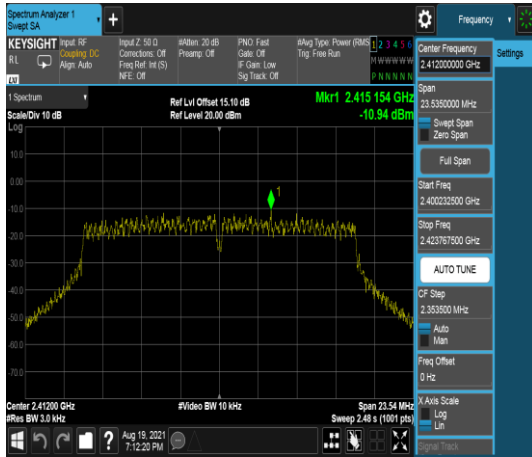


### High CH

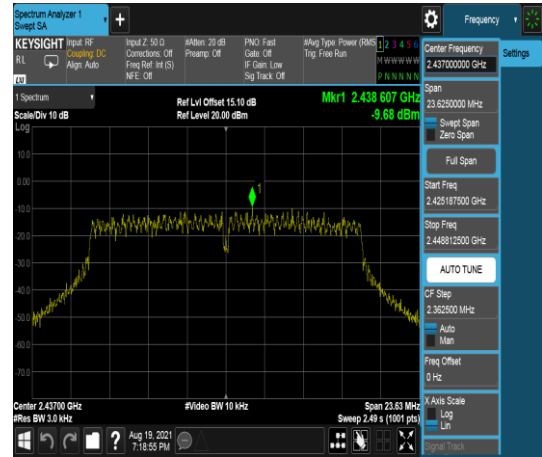


## IEEE 802.11g mode- chain 0

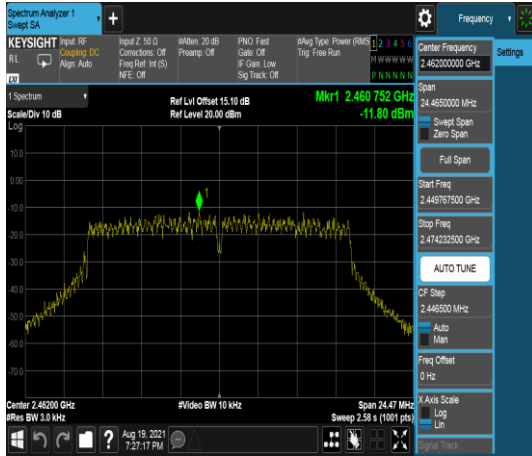
### Low CH



### Mid CH

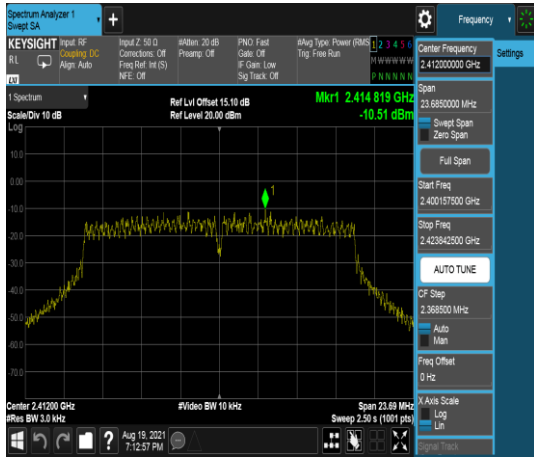


### High CH

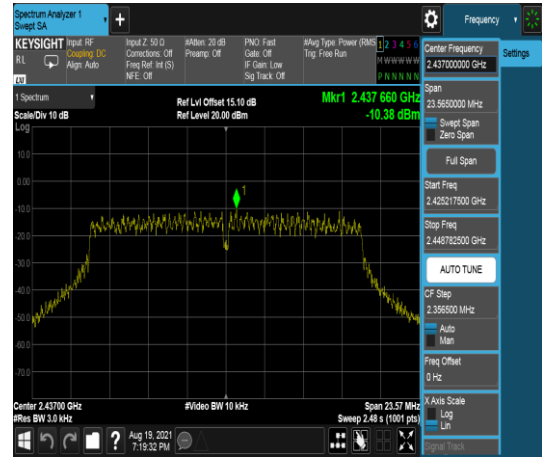


## IEEE 802.11g mode- chain 1

### Low CH



### Mid CH



### High CH

