

### FCC 47 CFR PART 15 SUBPART C

### **CERTIFICATION TEST REPORT**

For

### **CONSUMER CAMERA**

### **MODEL NUMBER: IPC-F42P**

ADDTIONAL MODEL NUMBER: IPC-TF42-LC; IPC-F42P-imou; IPC-F42N-imou; IPC-F42N; IPC-F42; LC-TF2C-4M; F42; IPC-TF42-0280B-LC; IPC-TF42-0360B-LC; IPC-TF42-0600B-LC;IPC-F42P-0280B-imou; IPC-F42P-0360B-imou; IPC-F42P-0600B-imou; IPC-F42N-0280B-imou; IPC-F42N-0360B-imou; IPC-F42N-0600B-imou; IPC-F42P-0280B; IPC-F42P-0360B;IPC-F42P-0600B; IPC-F42N-0280B; IPC-F42N-0360B; IPC-F42N-0600B

PROJECT NUMBER: 4789796032

**REPORT NUMBER: 4789796032-4** 

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Prepared for

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### **Revision History**

Rev.	Issue Date	Revisions	Revised By
V0	02/20/2021	Initial Issue	



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## I. ATTESTATION OF TEST RES

## **Applicant Information**

Company Name: Address:	Hangzhou Huacheng Network Technology Co., Ltd. No.2930, Nanhuan Road, Binjiang District, Hangzhou, China	
Manufacturer Information Company Name: Address:	Hangzhou Huacheng Network Technology Co., Ltd. No.2930, Nanhuan Road, Binjiang District, Hangzhou, China	
EUT Description		
Product Name:	CONSUMER CAMERA	
Model Name:	IPC-F42P	
Additional No. :	IPC-TF42-LC; IPC-F42P-imou; IPC-F42N-imou; IPC-F42N; IPC-F42; LC-TF2C-4M; F42; IPC-TF42-0280B-LC; IPC-TF42-	
	0360B-LC; IPC-TF42-0600B-LC; IPC-F42P-0280B-imou;	
	IPC-F42P-0360B-imou; IPC-F42P-0600B-imou; IPC-F42N-	
	0280B-imou; IPC-F42N-0360B-imou; IPC-F42N-0600B-imou;	
	IPC-F42P-0280B; IPC-F42P-0360B; IPC-F42P-0600B;	
Sample Number:	IPC-F42N-0280B; IPC-F42N-0360B; IPC-F42N-0600B 3606990	
Data of Receipt Sample:	Jan. 19, 2021	
Date Tested:	Jan. 19, 2021~ Feb. 18, 2021	

### APPLICABLE STANDARDS

STANDARD

**TEST RESULTS** 

CFR 47 Part 15 Subpart C

PASS



Summary of Test Results						
Clause	Test Items	FCC/IC Rules	Test Results			
1	6db DTS Bandwidth	FCC 15.247 (a) (2)	Complied			
2	Conducted Output Power	FCC 15.247 (b) (3)	Complied			
3	Power Spectral Density	FCC 15.247 (e)	Complied			
4	Conducted Band edge And Spurious emission	FCC 15.247 (d)	Complied			
5	Radiated Band edges and Spurious emission	FCC 15.247 (d) FCC 15.209 FCC 15.205	Complied			
6	Conducted Emission Test For AC Power Port         FCC 15.207         Complied					
7	Antenna Requirement FCC 15.203 Complied					
Remark: 1) The measurement result for the sample received is <pass> according to &lt; ANSI C63.10-2013, FCC CFR 47 Part 2, FCC CFR 47 Part 15C&gt; when <accuracy method=""> decision rule is applied. 2) For this product, it has two antennas, antenna1 and antenna2, but only the modes of 11N HT20 and 11N HT40 can support MIMO mode.</accuracy></pass>						

Prepared By:

Reviewed By:

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Chris Zhong Laboratory Leader



# 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC KDB 558074 D01 15.247 Meas Guidance v05r02, KDB 414788 D01 Radiated Test Site v01r01, ANSI C63.10-2013, FCC CFR 47 Part 2, FCC CFR 47 Part 15, KDB 662911 D01 Multiple Transmitter Output v02r01.

# 3. FACILITIES AND ACCREDITATION

Accreditation Certificate	A2LA (Certificate No.: 4829.01) UL-CCIC COMPANY LIMITED has been assessed and proved to be in compliance with A2LA. FCC (FCC Designation No.: CN1247) UL-CCIC COMPANY LIMITED has been recognized to perform compliance testing on equipment subject to the Commission's Declaration of Conformity (DoC) and Certification rules. IC (IC Designation No.: 25056) UL-CCIC COMPANY LIMITED has been recognized to perform compliance testing on equipment subject to the Commission's Declaration of Conformity (DoC) and Certification rules.
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Note 1: All tests measurement facilities use to collect the measurement data are located at No. 2, Chengwan Road, Suzhou Industrial Park, Suzhou 215122, People's Republic of China

Note 2: For below 30MHz, lab had performed measurements at test anechoic chamber and comparing to measurements obtained on an open field site. These measurements below 30MHz had been correlated to measurements performed on an OFS.

Note 3: The test anechoic chamber in UL-CCIC COMPANY LIMITED had been calibrated and compared to the open field sites and the test anechoic chamber is shown to be equivalent to or worst case from the open field site.



# 4. CALIBRATION AND UNCERTAINTY

## 4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

## 4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Test Item	Uncertainty			
Conduction emission	3.1dB			
Radiation Emission test(include Fundamental emission) (9KHz-30MHz)	3.4dB			
Radiation Emission test(include Fundamental emission) (30MHz-1GHz)	3.4dB			
Radiation Emission test (1GHz to 26GHz)(include Fundamental emission)	3.9dB (1GHz-18Gz)			
	4.2dB (18GHz-26.5Gz)			
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.				

# 5. EQUIPMENT UNDER TEST

## 5.1. DESCRIPTION OF EUT

Product Name:	CONSUMER CAMERA
Model No.:	IPC-F42P
Operating Frequency:	IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz IEEE 802.11n(HT40): 2422MHz to 2452MHz
Type of Modulation:	IEEE for 802.11b: DSSS (CCK, DQPSK, DBPSK) IEEE for 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n (HT20 and HT40): OFDM (64QAM, 16QAM, QPSK, BPSK)
Channels Step:	Channels with 5MHz step
Sample Type:	Fixed production
Test software of EUT:	Secure CRT (manufacturer declare)
Antenna Type:	Dipole Antenna
Antenna Gain:	Antenna1: 1.79 dBi Antenna2: 1.79 dBi
	Remark: This data is provided by customer and our lab isn't responsible for this data
Adapter	NAME: AC Adapter MODEL: NBS05C120050VU INPUT:100-240V~, 50/60Hz, 0.15A OUTPUT:12.0V

### Remark:

Model No.:

Number:	Name:	Number:	Name:	Number:	Name:
1	IPC-F42P	2	IPC-TF42-LC	3	IPC-F42P-imou
4	IPC-F42N-imou	5	IPC-F42N	6	IPC-F42
7	LC-TF2C-4M	8	F42	9	IPC-TF42-0280B-LC
10	IPC-TF42-0360B-LC	11	IPC-TF42-0600B-LC	12	IPC-F42P-0280B-imou
13	IPC-F42P-0360B-imou	14	IPC-F42P-0600B-imou	15	IPC-F42N-0280B-imou
16	IPC-F42N-0360B-imou	17	IPC-F42N-0600B-imou	18	IPC-F42P-0280B
19	IPC-F42P-0360B	20	IPC-F42P-0600B	21	IPC-F42N-0280B
22	IPC-F42N-0360B	23	IPC-F42N-0600B		

Only the main model **IPC-F42P** was tested and only the data of this model is shown in this test report. Since Their electrical circuit design, layout, components used and internal wiring are identical, only the name of the models.



# 5.2. MAXIMUM OUTPUT POWER

Number of Transmit Chains (NTX)	IEE Std. 802.11	Channel Number	Max AV Conducted Power (dBm)
1	IEEE 802.11B SISO	1-11[11]	17.01
1	IEEE 802.11G SISO	1-11[11]	15.60
2	IEEE 802.11N HT20 MIMO	1-11[11]	18.28
2	IEEE 802.11N HT40 MIMO	3-9[7]	18.11

Remark: For this product, it has two antennas, antenna1 and antenna2, but only the 802.11N HT20 and 802.11N HT40 modes can support both the SISO and MIMO technical.

## 5.3. CHANNEL LIST

	Channel List for 802.11b/g/n (20 MHz)						
Channel	Frequency (MHz)	Channel	Frequenc y(MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	4	2427	7	2442	10	2457
2	2417	5	2432	8	2447	11	2462
3	2422	6	2437	9	2452		

	Channel List for 802.11n (40 MHz)						
Channel	Frequency (MHz)	Channel	Frequenc y(MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
3	2422	5	2432	7	2442	9	2452
4	2427	6	2437	8	2447		



## 5.4. TEST CHANNEL CONFIGURATION

Test Mode	Test Channel	Frequency
WiFi TX(802.11b)	CH 1, CH 6, CH 11	2412MHz, 2437MHz, 2462MHz
WiFi TX(802.11g)	CH 1, CH 6, CH 11	2412MHz, 2437MHz, 2462MHz
WiFi TX(802.11n HT20)	CH 1, CH 6, CH 11	2412MHz, 2437MHz, 2462MHz
WiFi TX(802.11n HT40)	CH 3, CH 6, CH 9	2422MHz, 2437MHz, 2452MHz

## 5.5. THE WORSE CASE POWER SETTING PARAMETER

The W	The Worse Case Power Setting Parameter under 2400 ~ 2483.5MHz Band								
Test Softw	vare		SecureCRT						
	Transmit		Test Channel						
Modulation Mode	Antenna	1	NCB: 20MH	łz	١	ICB: 40MHz	Z		
Widde	Number	CH 1	CH 6	CH 11	CH 3	CH 6	CH 9		
802.11b	1/2	N/A	N/A	N/A					
802.11g	1/2	N/A	N/A	N/A	/				
802.11n HT20	1/2	N/A	N/A	N/A					
802.11n HT40	1/2		/		N/A	N/A	N/A		



## 5.6. DESCRIPTION OF AVAILABLE ANTENNAS

Ant.	Frequency (MHz)	Antenna Type	Antenna Gain (dBi)	Directional gain(dBi) For MIMO mode
1	2400-2483.5	Dipole Antenna	1.79	4.00
2	2400-2483.5	Dipole Antenna	1.79	4.80

Note:

- 1) Directional gain=  $10\log [(10^{G1/20} + 10^{G2/20})^2/N_{ANT}] = 4.80 \text{ dBi}$
- 2) N<sub>ANT</sub>: the number of Antenna
- 3) For this product, it has two antennas, antenna1 and antenna2, but only the 802.11N HT20 and 802.11N HT40 modes can support both the SISO and MIMO technical.

Test Mode	Transmit and Receive Mode	Description
IEEE 802.11b	⊠2TX, 2RX	Antenna1 or Antenna2 can be used as transmitting/receiving antenna independently.
IEEE 802.11g	⊠2TX, 2RX	Antenna1 or Antenna2 can be used as transmitting/receiving antenna independently.
IEEE 802.11N (HT20) MIMO	⊠2TX, 2RX	Antenna1 or Antenna2 can be used as transmitting/receiving antenna independently.
IEEE 802.11N (HT20) MIMO	⊠2TX, 2RX	Antenna1 or Antenna2 can be used as transmitting/receiving antenna independently.

Remark:

1) For this product, it has two antennas, antenna1 and antenna2, only the 802.11N

HT20 and 802.11N HT40 modes can support both the SISO and MIMO technical. But for the 11B and 11G modes only support the SISO technical.

2) For the 11N mode (including the 11N HT20 SISO,11N HT20 MIMO,11N HT40 SISO,11N HT40 MIMO), pre-testing all test modes, only the worst case modes is included in this report.

## 5.7. THE WORSE CASE CONFIGURATIONS

For the product, there two transmission antennas, and pre-testing both of them, only the worse data for the antenna is recorded in the report.

Worst-case data rates as provided by the client were:

802.11b mode: 1 Mbps 802.11b mode: 6 Mbps 802.11n HT20 mode: MCS0 802.11n HT40 mode: MCS0



## 5.8. TEST ENVIRONMENT

Environment Parameter	Selected Values During Tests				
Relative Humidity	nidity 55 ~ 65%				
Atmospheric Pressure:	ssure: 1025Pa				
Temperature	TN	23 ~ 28°C			
	VL	N/A			
Voltage :	VN	AC 120V			
	VH	N/A			

Note: VL= Lower Extreme Test Voltage VN= Nominal Voltage VH= Upper Extreme Test Voltage TN= Normal Temperature



## 5.9. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

Item	Equipment	Equipment Brand Name		Description	
1	Laptop	ThinkPad	E550c	N/A	
2	Fixed Frequency Board	N/A	N/A	Supply by UL Lab	

### I/O PORT

Cable No	Port	Connector Type	Cable Type	Cable Length(m)	Remarks
1	LAN	LAN	LAN Cable	100cm Length (Supply by UL Lab)	N/A
2	USB	USB	USB-VGA	100cm Length (Supply by UL Lab)	N/A

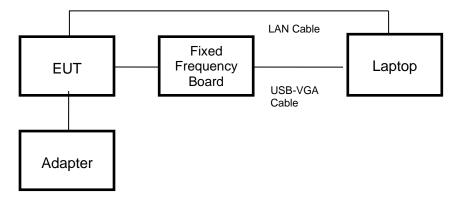
#### ACCESSORY

Item	Accessory Brand Name		Model Name	Description
1	Micro SD card	Kingston	32GB	Supply by UL lab

#### TEST SETUP

The EUT can work in an engineer mode with a software through a table PC.

### SETUP DIAGRAM FOR TESTS



Remark: The EUT has been built one SD card during the testing.



### 5.10. MEASURING INSTRUMENT AND SOFTWARE USED

	Conducted Emissions (Instrument)											
		COI	laucie		SIONS	(เกรเานเ	-					
Used	Equipment	Manufacturer	Mode	el No.	Seri	al No.	Upper Last Cal.	Last Cal.	Next Cal.			
$\checkmark$	EMI Test Receiver	R&S	ES	SR3	12	6700	2019-12-12	2020-12-05	2021-12-04			
$\checkmark$	Two-Line V-Network	R&S	EN\	/216	12	6701	2019-12-12	2020-12-05	2021-12-04			
	Artificial Mains Networks	R&S	EN	Y81	12	6711	2019-12-12	2020-12-05	2021-12-04			
	Software											
Used	Des	cription		Ma	anufac	turer	Name	Version				
	Test Software for (	Conducted distur	bance		R&S	;	EMC32	Ver. 9.25				
		Ra	diated	Emiss	ions (	Instrum	ent)					
Used	Equipment	Manufacturer	Mode	el No.	Seri	al No.	Upper Last Cal.	Last Cal.	Next Cal.			
$\checkmark$	Spectrum Analyzer	Keysight	N90	010B	MY57	110128	2019-05-29	2020-05-10	2021-05-09			
$\checkmark$	EMI test receiver	R&S	ES	R26	126	57603	2019-12-12	2020-12-05	2021-12-04			
	Receiver Antenna (9kHz-30MHz)	Schwarzbeck	FMZE	3 1513	513	3-265	N/A	2018-06-15	2021-06-14			
	Receiver Antenna (30MHz-1GHz)	SunAR RF Motion	J	B1	17	7821	N/A	2019-01-28	2022-01-27			
	Receiver Antenna (1GHz-18GHz)	R&S	HF	907	12	6705	2018-01-29	2019-01-28	2022-01-27			
	Receiver Antenna (18GHz-26.5GHz)	Schwarzbeck	BBH/	A9170	12	6706	2019-02-06	2020-12-05	2021-12-04			
V	Pre-amplification (To 18GHz)	Compliance Direction System Inc.	PAP-1	G18-50	1414(	)-13467	2019-03-18	2020-12-05	2021-12-04			
	Pre-amplification (To 26.5GHz)	R&S	SCU	J-26D	13	4668	2019-02-06	2020-09-27	2021-09-26			
	Band Reject Filter	Wainwright	2350· 2483.5·	CJV8- -2400- -2533.5- ISS		1	2019-05-29	2020-05-10	2021-05-09			
V	Highpass Filter	Wainwright	2700-	(X10- -3000- )-40SS		2	2019-05-29	2020-05-10	2021-05-09			
				Soft	ware							
Used	Desci	ription	Ν	Manufac	turer		Name	Version				
$\checkmark$	Test Software for R	adiated disturbar		Tonsce			JS32	V1.0				
			O	ther ins	strume	ents						
Used	Equipment	Manufacturer	Model No.		Seri	al No.	Upper Last Cal.	Last Cal.	Next Cal.			
V	Spectrum Analyzer	Keysight	N90	010B	MY57	110128	2019-05-29	2020-05-10	2021-05-09			
	Power Meter	Keysight	U20	21XA	MY57	110002	2019-06-12	2020-05-10	2021-05-09			



# 6. MEASUREMENT METHODS

No.	Test Item	KDB Name	Section
1	6dB Bandwidth	KDB 558074 D01 15.247 Meas Guidance v05r02	8.2
2	Conducted Output Power	KDB 558074 D01 15.247 Meas Guidance v05r02	8.3.1.3/8.3.2.3
3	Power Spectral Density	KDB 558074 D01 15.247 Meas Guidance v05r02	8.4
4	Out-of-band emissions in non-restricted bands	KDB 558074 D01 15.247 Meas Guidance v05r02	8.5
5	Out-of-band emissions in restricted bands	KDB 558074 D01 15.247 Meas Guidance v05r02	8.6
6	Band-edge	KDB 558074 D01 15.247 Meas Guidance v05r02	8.7
7	Conducted Emission Test For AC Power Port	ANSI C63.10-2013	6.2



# 7. ANTENNA PORT TEST RESULTS

## 7.1. ON TIME AND DUTY CYCLE

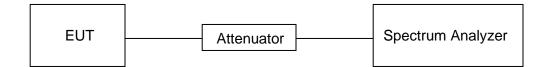
### <u>LIMITS</u>

None; for reporting purposes only

### PROCEDURE

FCC KDB 558074 Zero-Span Spectrum Analyzer Method

### TEST SETUP



#### TEST ENVIRONMENT

Temperature	22°C	Relative Humidity	56%
Atmosphere Pressure	101kPa	Test Voltage	AC 120V

### **RESULTS**

Mode	On Time (msec)	Period (msec)	Duty Cycle x (Linear)	Duty Cycle (%)	Duty Cycle Correction Factor (db)	1/T Minimum VBW (KHz)
11B	100	100	1	100	0	0.01
11G	100	100	1	100	0	0.01
11N20 MIMO	100	100	1	100	0	0.01
11N40 MIMO	100	100	1	100	0	0.01

Note: 1) Duty Cycle Correction Factor=10log(1/x).

- 2) Where: x is Duty Cycle(Linear)
- 3) Where: T is On Time (transmit duration)
- 4) Pre-testing Antenna 1 and Antenna2, and pre-testing SISO and MIMO modes, only the data of worse case is shown in this test repot.



		11B	ON TIME		UTY CYC	LE MID C	CW) H	RSE	CASE)	
Spectrum Ar Swept SA	Ĩ.	•	ŀ						Frequency	/ ▼ 🛣
KEYSIGH RL ↔	Couplin	RF Ig: DC Nuto/No RF	Input Z: 50 Ω Corrections: Off Freq Ref: Int (S)	#Atten: 40 dE Preamp: Off	B PNO: Fast Gate: Off IF Gain: Low Sig Track: Off	Trig: Free Ru	W 👭	2 3 4 5 6 \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	Center Frequency 2.437000000 GHz	Settings
1 Spectrum Scale/Div 10	) dB	•		Ref Level 23	.00 dBm				Span 0.00000000 Hz Swept Span Zero Span	
13.0 3.00 -7.00			un presi una presi de se una desi con pr						Full Span	
-17.0 -27.0 -37.0 -47.0									Start Freq 2.437000000 GHz Stop Freq	
-57.0 -67.0 Center 2.43				#Video BW 8					2.437000000 GHz	
S Marker Tab	Hz	v V			.0 MHZ*	Swee	s p 40.00 ms (8	pan 0 Hz 8001 pts)	CF Step 8.000000 MHz Auto	
Mode 1 2	Trace	Scale	Х	Y	Function	Function Width	Function	Value	Man Freq Offset 0 Hz	
3 4 5 6									X Axis Scale	
<b>1</b> 5		]?	Feb 01, 2021 8:06:43 PM	$\Box$				X	Signal Track (Span Zoom)	

110	G ON TIME	AND DU	TY CYCL	E MID CH	(WORSE	CASE)	
Spectrum Analyzer 1	+					Frequency	₩
KEYSIGHT Input: RF RL ↔ Coupling: DC Align: Auto/No I	Input Z: 50 Ω Corrections: Off Freq Ref: Int (S)	#Atten: 40 dB Preamp: Off	PNO: Fast Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Power (F Trig: Free Run	RMS <mark>1</mark> 23456 WWWWWW AAAAAA	Center Frequency 2.437000000 GHz Span	Settings
1 Spectrum  Scale/Div 10 dB Log 13.0 3.00		Ref Level 23.00	dBm			0.00000000 Hz Swept Span Zero Span Full Span	
-7.00 -17.0 -27.0 -37.0 -47.0					n seles en el se de la se de la serie de la serie Un une de la serie de la se	Start Freq 2.437000000 GHz Stop Freq	
-57.0 -67.0 Center 2.437000000 GHz Res BW 8 MHz		#Video BW 8.0 I	MHz*	Sweep 5.00	Span 0 Hz 00 ms (8001 pts)	2.437000000 GHz AUTO TUNE CF Step	
5 Marker Table  Mode Trace Scale	X	Y	Function F	unction Width Fu	unction Value	8.000000 MHz Auto Man	
2 3 4 5 6						Freq Offset 0 Hz X Axis Scale Log	
	Feb 01, 2021 8:13:45 PM					Signal Track (Span Zoom)	



Spectrum Ar Swept SA	alyzer 1	•	ł					4	Frequency V
KEYSIGH RL ↔►	Coupl	RF ing: DC Auto/No RF	Input Z: 50 Ω Corrections: Off Freq Ref: Int (S		PNO: Fast Gate: Off IF Gain: Low Sig Track: Off	Trig: Free Run	wer (RMS <mark>1</mark> 2345 WWWWW A A A A A A	2.4370000	
1 Spectrum		T						Span 0.0000000	) Hz
Scale/Div 10	) dB			Ref Level 23.00	) dBm			Swept Zero S	
3.00	(in all print and a	la tradulara da manana Parti la como la contraci	delegation de la contra de la cistema de	risten als V. Davie at all presentation de la di- A ante in 18 autorited also parts de la trans-	en stel disserten er det die stel die stel Gebeuren stel er stelle die stelle stelle stelle	land han ya anal dia Tana ani takan kaban dalah ki Kabupatén kabupatén kaban dalam kabupatén kaban	an an an tao ini an ini an ini an an an an Ini an	Full S	pan
-17.0 -27.0		10.16 00 . 1	faichte of the same		- fraile of a let			Start Freq 2.4370000	00 GHz
-37.0 -47.0 -57.0								Stop Freq 2.4370000	00 GHz
-67.0 Center 2.43	7000000	GH7		#Video BW 8.0	MHz*		Span 0 H	AUTO	TUNE
Res BW 8 M		OTIZ				Sweep	5.000 ms (8001 pts	CF Step	
5 Marker Tabl		▼ Scale	X	Y	Function	Function Width	Function Value	8.000000 N Auto Man	IHZ
1 2 3 4								Freq Offset 0 Hz	
4 5 6								X Axis Scale Log Lin	

11N HT	40 ON TIME AND	DUTY CYCLI	E MID CH (WOF	RSE CASE)	
Spectrum Analyzer 1				Frequency	· *
KEYSIGHT RL ↔ Coupling: DC Align: Auto/No RF	Input Z: 50 Ω #Atten: 40 dB Corrections: Off Preamp: Off Freq Ref: Int (S)	PNO: Fast #Avg Gate: Off Trig: IF Gain: Low Sig Track: Off	3 Type: Power (RMS 1 2 3 4 5 Free Run WWWWW A A A A A	2.437000000 GHz	ettings
1 Spectrum v Scale/Div 10 dB Log	Ref Level 23.00			Span 0.00000000 Hz Swept Span Zero Span	
	lang menganang penganang menganang penganang penganang penganang penganang penganang penganang penganang pengan Ang penganang pengana	n a star and a star and a star a s A star a star	na dina manana da aban garangan da pasa manana dan saga saga Na panga panana da atan garangan da pasa manana da saga saga	Full Span	
-27.0 -37.0 -47.0 -57.0				2.437000000 GHz Stop Freq 2.437000000 GHz	
-67.0 Center 2.437000000 GHz Res BW 8 MHz	#Video BW 8.0 M	MHz*	Span 0 H Sweep 4.000 ms (8001 pts		
5 Marker Table   Mode Trace Scale	X Y	Function Function	n Width Function Value	8.000000 MHz Auto Man	
1 2 3 4				Freq Offset 0 Hz	
				X Axis Scale Log Lin	
1002	Feb 01, 2021 8:27:07 PM			Signal Track (Span Zoom)	



## 7.2. 6 dB BANDWIDTH

### LIMITS

FCC Part15 (15.247) Subpart C					
Section Test Item Limit Frequency Ra (MHz)					
FCC 15.247(a)(2)	6dB Bandwidth	>= 500KHz	2400-2483.5		

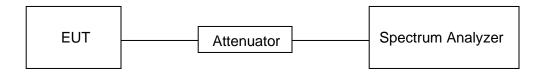
### TEST PROCEDURE

Refer to FCC KDB 558074, connect the UUT to the spectrum analyser and use the following settings:

Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	For 6 dB Bandwidth :100K
VBW	For 6dB Bandwidth : ≥3 × RBW
Trace	Max hold
Sweep	Auto couple

Allow the trace to stabilize and measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

#### TEST SETUP





### **RESULTS**

Test Mode	Test Antenna	Test Channel	6dB bandwidth (MHz)	Result
		LCH	10.08	Pass
	Antenna 1	MCH	10.06	Pass
11B SISO		НСН	10.08	Pass
116 3130		LCH	10.07	Pass
	Antenna 2	МСН	10.07	Pass
		НСН	10.07	Pass
		LCH	16.55	Pass
	Antenna 1	MCH	16.52	Pass
11G SISO		HCH	16.54	Pass
116 3130		LCH	16.54	Pass
	Antenna 2	MCH	16.50	Pass
		HCH	16.54	Pass
		LCH	17.68	Pass
	Antenna 1	MCH	17.66	Pass
11N20MIMO		HCH	17.66	Pass
		LCH	17.64	Pass
	Antenna 2	MCH	17.65	Pass
		HCH	17.68	Pass
		LCH	36.40	Pass
	Antenna 1	MCH	36.38	Pass
11N40MIMO		HCH	36.40	Pass
		LCH	36.38	Pass
	Antenna 2	MCH	36.39	Pass
		HCH	36.39	Pass

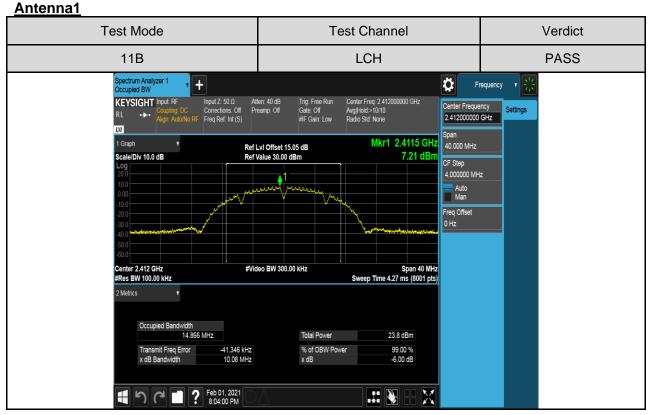
Remark:

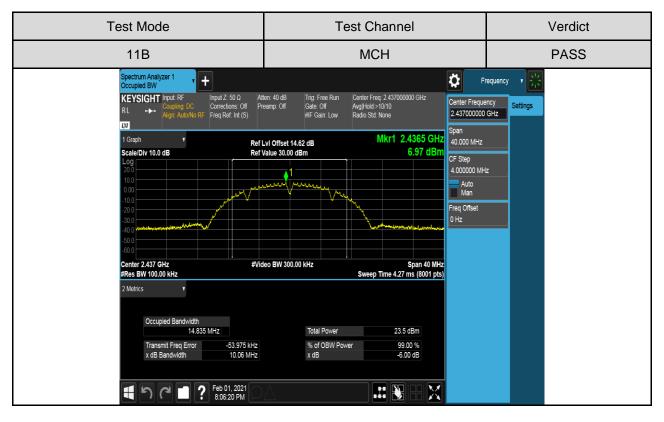
1) For this product, it has two antennas, antenna1 and antenna2, but only the 802.11N HT20 and 802.11N HT40 modes can support both the SISO and MIMO technical.

2) Through pre-testing all the test modes of 11N 20 and 11N40, including SISO and MIMO, but only the data if worse case is included in this test report.



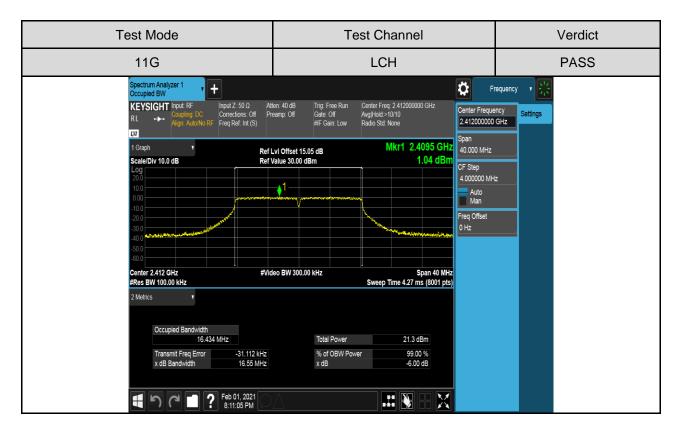
# Test Graphs



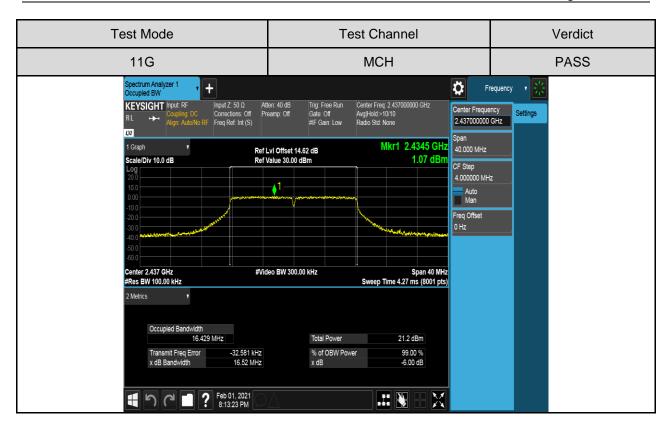


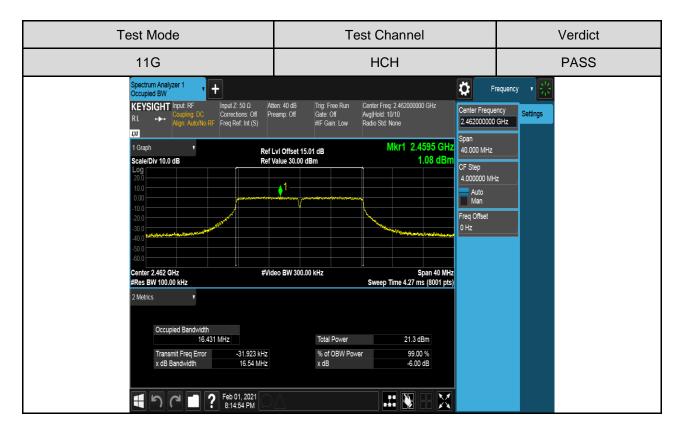




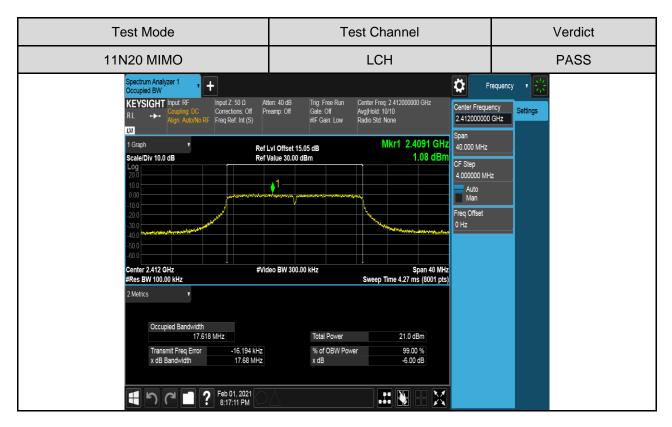


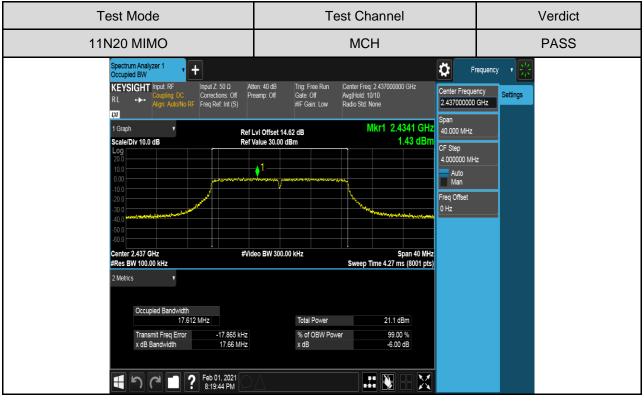


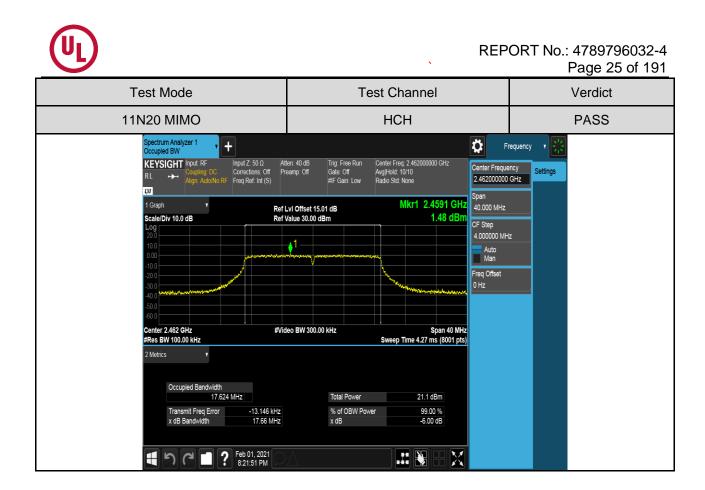


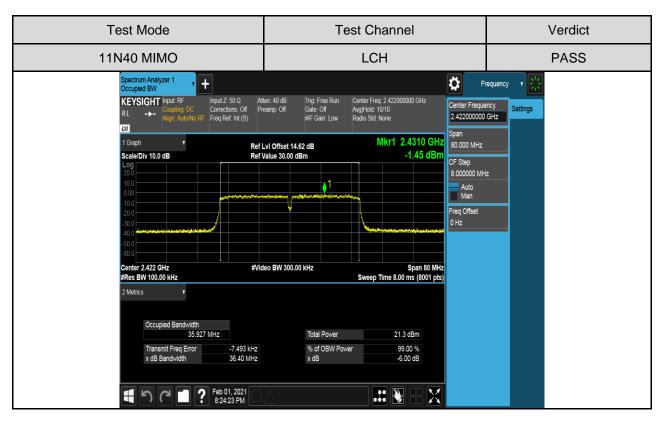




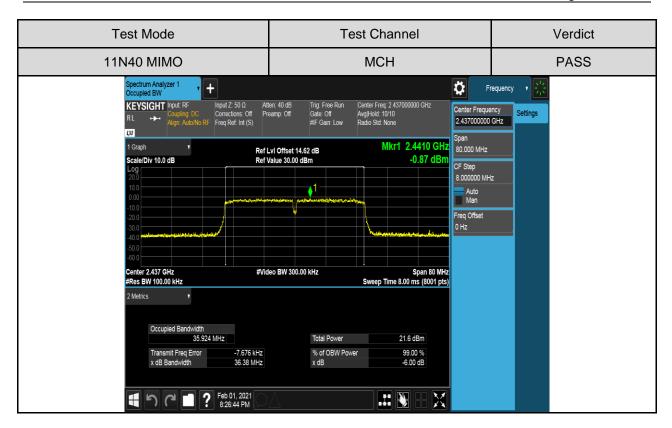


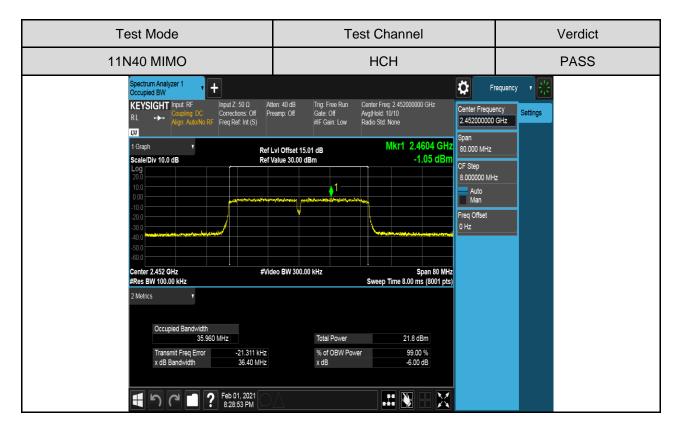






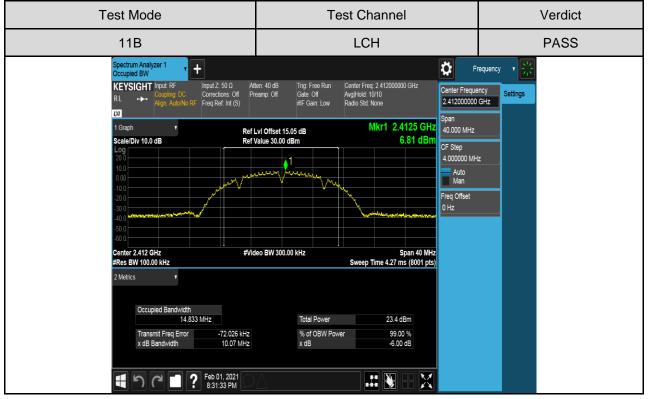


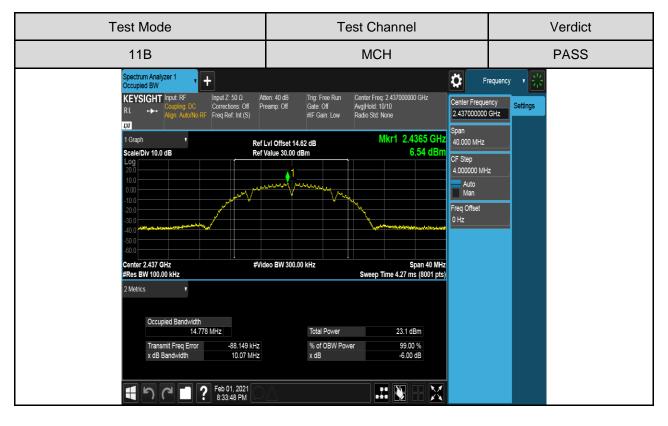


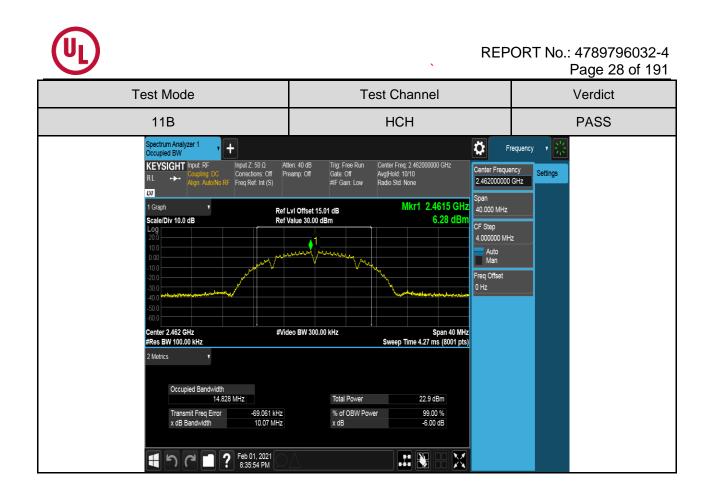


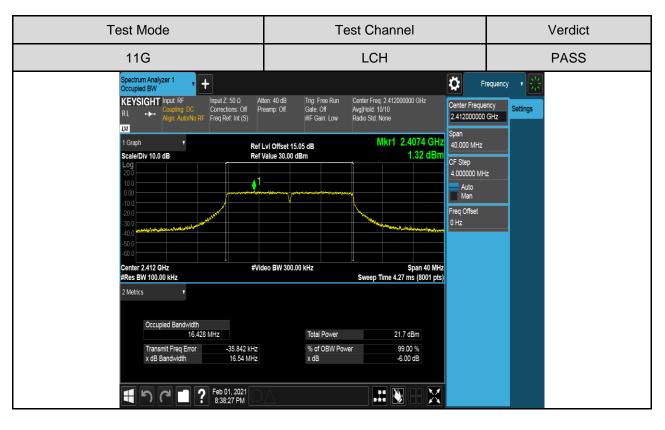


### Antenna2

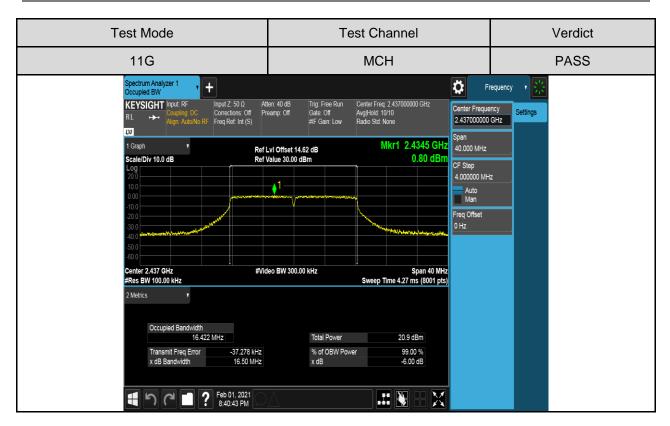


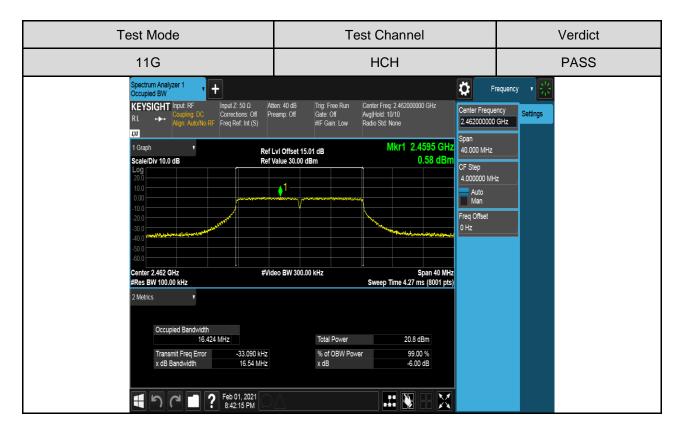




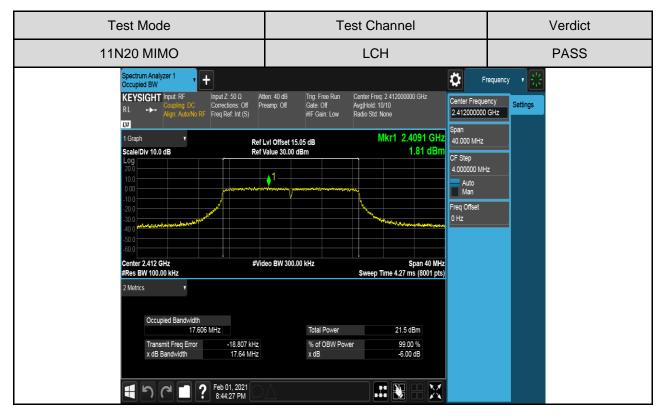


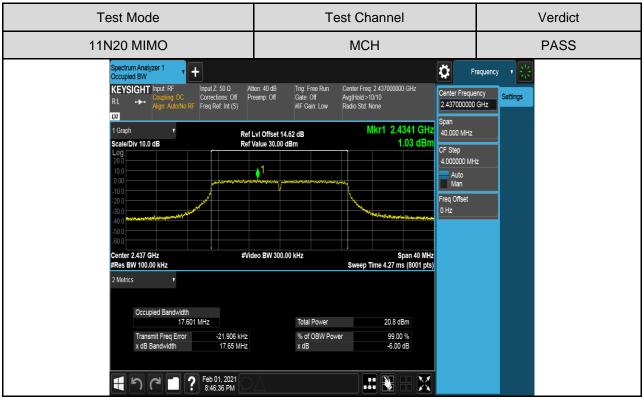








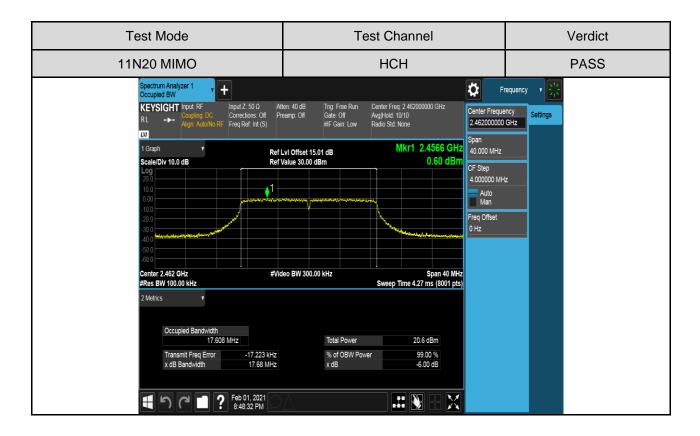


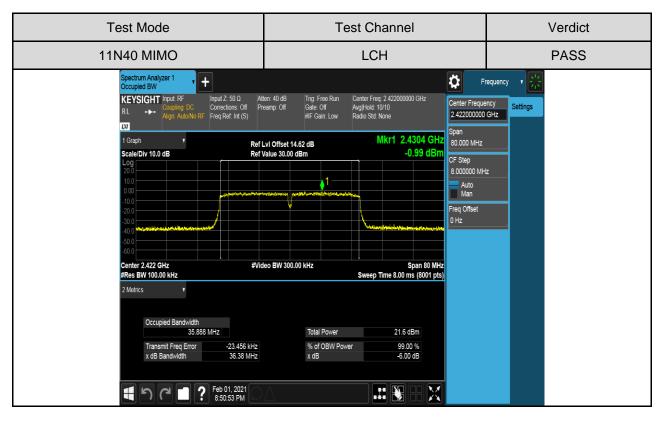


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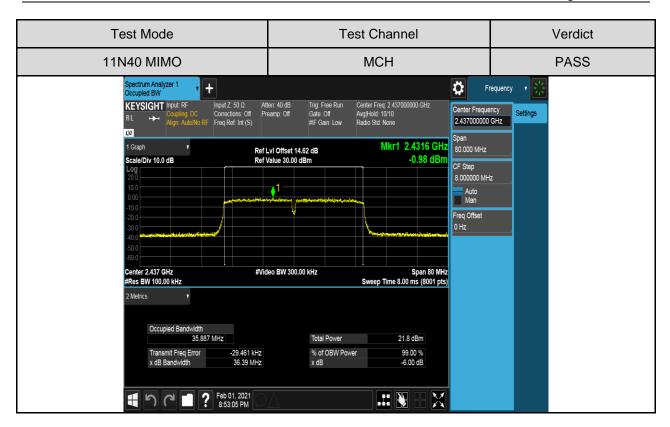
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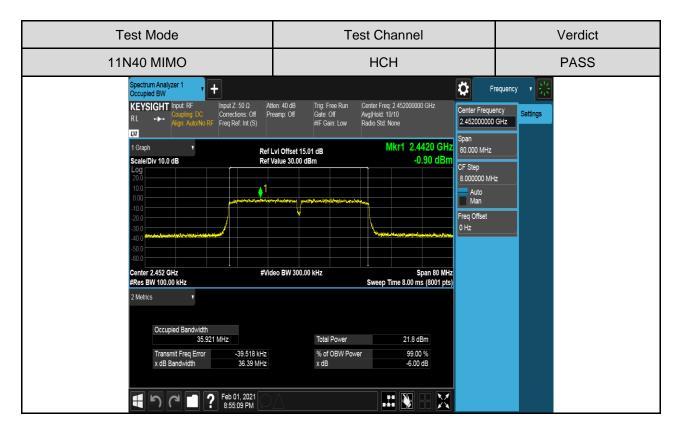














# 7.3. CONDUCTED OUTPUT POWER

### LIMITS

FCC Part15 (15.247) , Subpart C					
Section Test Item Limit Frequency Range (MHz)					
FCC 15.247(b)(3) Conducted Output Power		1 watt or 30dBm	2400-2483.5		
1. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.					

### TEST PROCEDURE

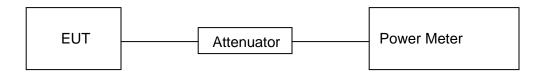
Place the EUT on the table and set it in the transmitting mode.

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the Power sensor.

Measure the power of each channel.

AVG Detector use for AVG result.

### TEST SETUP





JLTS Test Mode	Test Antenna	Test Channel	Maximum Average Conducted Output Power (dBm)	Result
		LCH	17.01	Pass
	Antenna 1	MCH	16.78	Pass
440		HCH	16.70	Pass
11B		LCH	16.70	Pass
	Antenna 2	MCH	16.38	Pass
		HCH	16.14	Pass
		LCH	15.29	Pass
	Antenna 1	MCH	15.23	Pass
110		HCH	15.26	Pass
11G		LCH	15.60	Pass
	Antenna 2	MCH	14.93	Pass
		HCH	14.72	Pass
	Antenna 1	LCH	15.01	Pass
		MCH	15.09	Pass
		HCH	15.13	Pass
	Antenna 2	LCH	15.51	Pass
11N20MIMO		MCH	14.81	Pass
		HCH	14.63	Pass
		LCH	18.28	Pass
	Antenna 1+2	MCH	17.96	Pass
	112	HCH	17.90	Pass
		LCH	14.58	Pass
	Antenna 1	МСН	14.86	Pass
		НСН	15.06	Pass
		LCH	14.87	Pass
11N40MIMO	Antenna 2	МСН	15.08	Pass
		НСН	15.14	Pass
		LCH	17.74	Pass
	Antenna	МСН	17.98	Pass
	1+2	HCH	18.11	Pass

### Remark:

1) For this product, it has two antennas, antenna1 and antenna2, but only the 802.11N HT20 and 802.11N HT40 modes can support both the SISO and MIMO technical.

2) Through pre-testing all the test modes of 11N 20 and 11N40, including SISO and MIMO, but only the data if worse case is included in this test report.



## 7.4. POWER SPECTRAL DENSITY

#### <u>LIMITS</u>

FCC Part15 (15.247) , Subpart C					
Section Test Item Limit Frequency Range (MHz)					
FCC §15.247 (e) Power Spectral Density		8 dBm in any 3 kHz band	2400-2483.5		
1. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.					

#### TEST PROCEDURE

Refer to FCC KDB 558074, connect the UUT to the spectrum analyser and use the following settings:

Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	3 kHz ≤ RBW ≤100 kHz
VBW	≥3 × RBW
Span	1.5 x DTS bandwidth
Trace	Max hold
Sweep time	Auto couple.

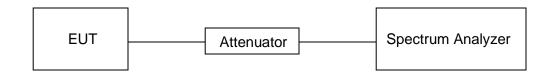
Allow trace to fully stabilize and use the peak marker function to determine the maximum amplitude level within the RBW.

If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

#### TEST ENVIRONMENT

Temperature	22°C	Relative Humidity	56%
Atmosphere Pressure	101kPa	Test Voltage	AC 120V

#### TEST SETUP



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### RESULTS

Test Mode	Test Antenna	Test Channel	Maximum Peak power spectral density(dBm/30kHz)	Result
		LCH	2.01	Pass
	Antenna 1	MCH	1.82	Pass
440		НСН	1.79	Pass
11B		LCH	1.79	Pass
	Antenna 2	MCH	1.46	Pass
		НСН	1.23	Pass
		LCH	-1.76	Pass
	Antenna 1	MCH	-1.90	Pass
110		НСН	-1.92	Pass
11G		LCH	-1.48	Pass
	Antenna 2	MCH	-2.15	Pass
		НСН	-2.50	Pass
	Antenna 1	LCH	-1.84	Pass
		MCH	-1.83	Pass
		НСН	-1.64	Pass
		LCH	-1.21	Pass
11N20MIMO	Antenna 2	MCH	-1.99	Pass
		НСН	-2.18	Pass
		LCH	1.50	Pass
	Antenna 1+2	MCH	1.10	Pass
		НСН	1.11	Pass
		LCH	-4.79	Pass
	Antenna 1	MCH	-4.56	Pass
		НСН	-4.51	Pass
		LCH	-4.81	Pass
11N40MIMO	Antenna 2	MCH	-3.52	Pass
		НСН	-3.71	Pass
		LCH	-1.79	Pass
	Antenna 1+2	MCH	-1.00	Pass
		НСН	-1.08	Pass

Remark:

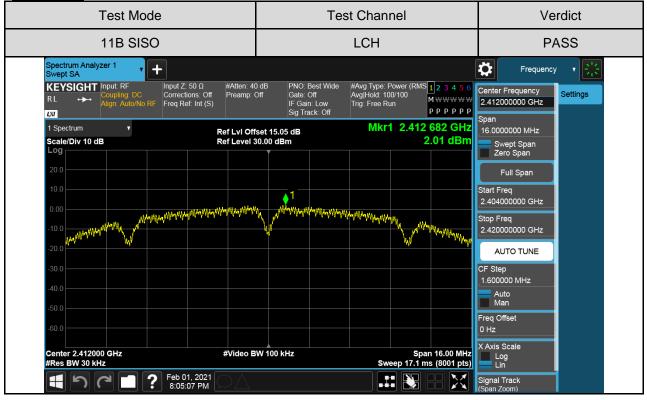
1) For this product, it has two antennas, antenna1 and antenna2, but only the 802.11N HT20 and 802.11N HT40 modes can support both the SISO and MIMO technical.

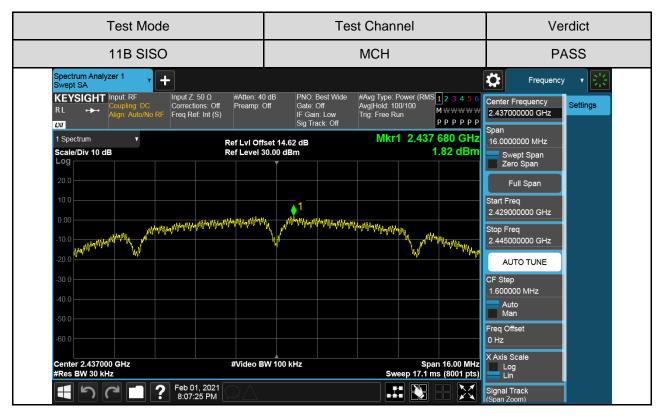
2) Through pre-testing all the test modes of 11N 20 and 11N40, including SISO and MIMO, but only the data if worse case is included in this test report.



# Test Graphs:

#### Antenna1:

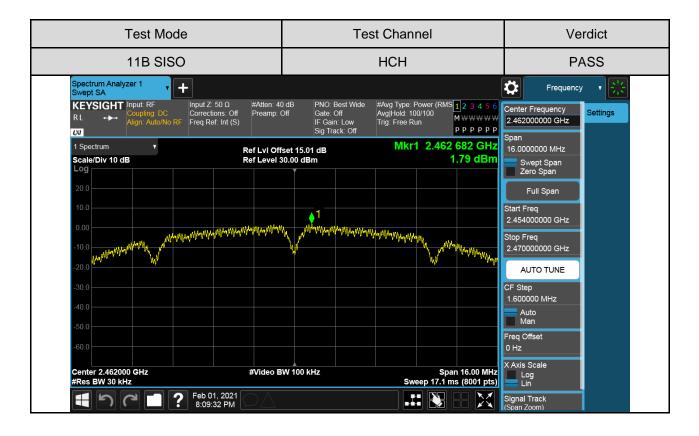


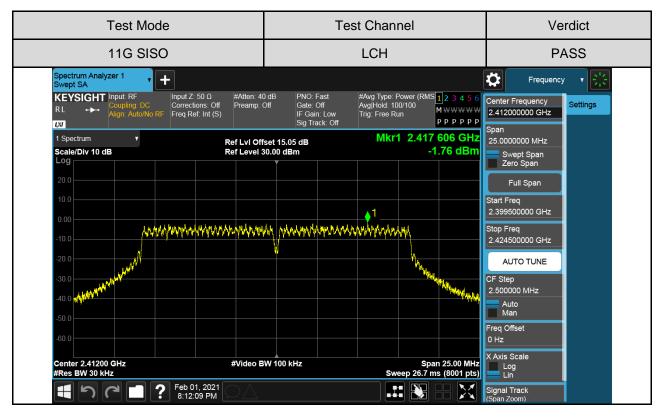


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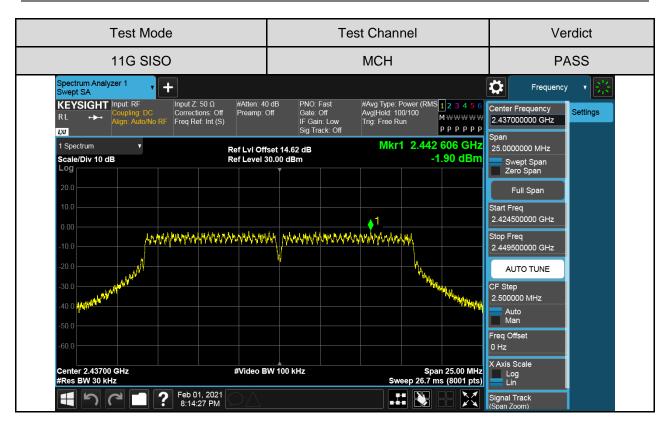
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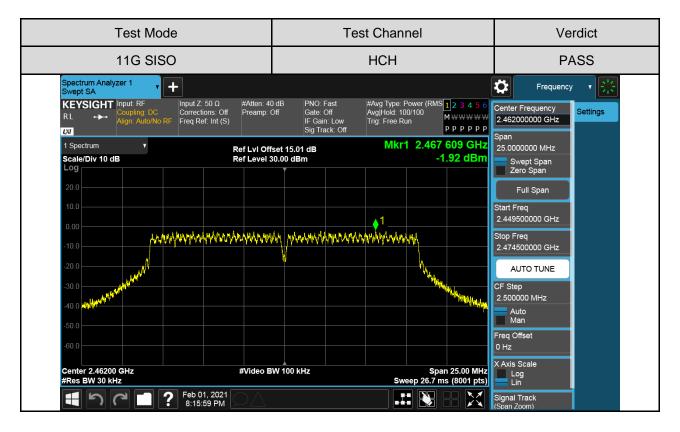




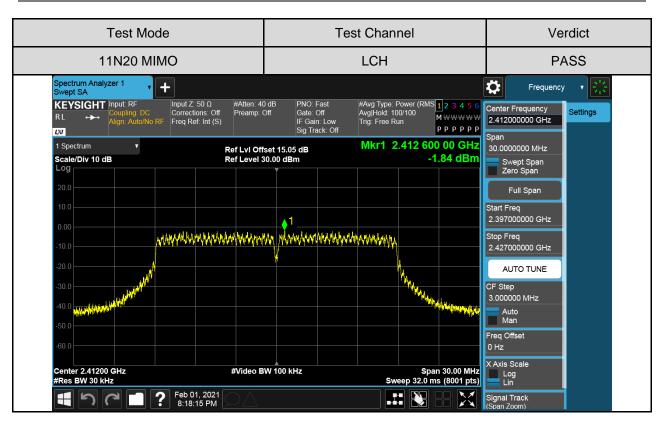


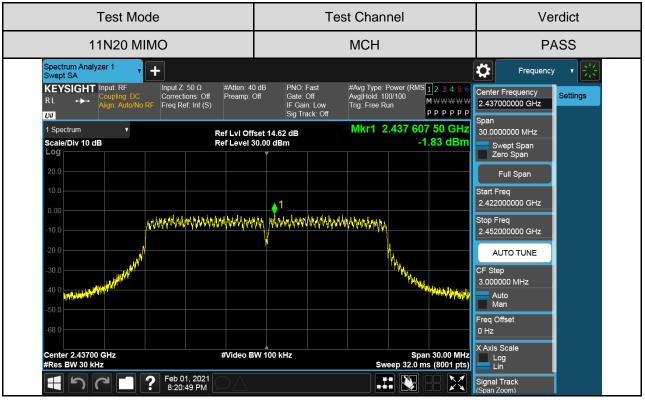




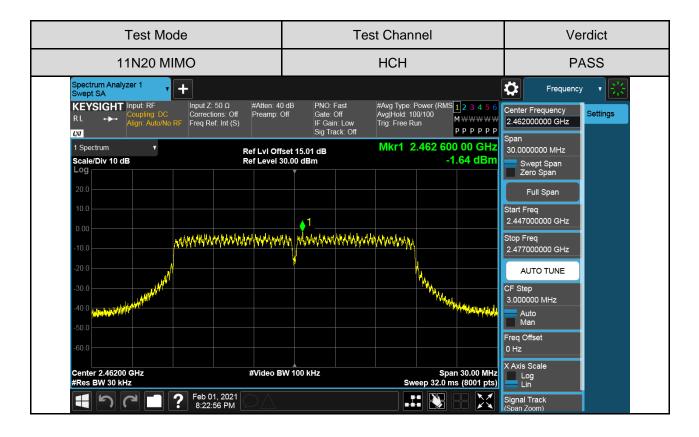






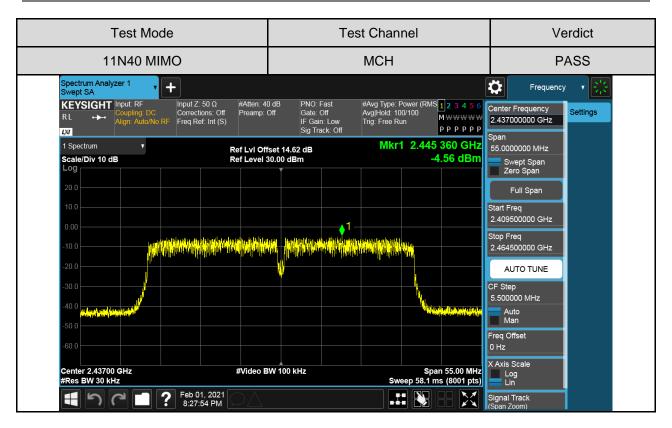


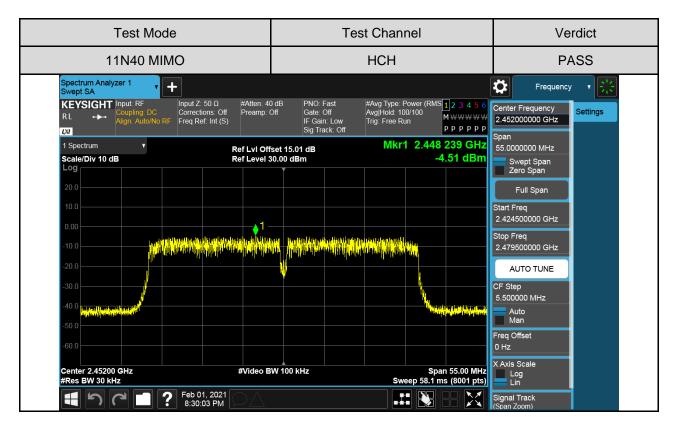




Test N	Node	Tes	t Channel		Verdict	
11N40 MIMO		LCH			PASS	
R L +>+ Coupling: DC Align: Auto/No RF	nput Ζ: 50 Ω #Atten: 40 dB Corrections: Off Preamp: Off Freq Ref: Int (S)	Gate: Off Avg Hold IF Gain: Low Trig: Free		Center Fre 2.422000		
1 Spectrum  Scale/Div 10 dB	Ref Lvi Offset 14.6 Ref Level 30.00 dB	2 06	kr1 2.418 239 GHz -4.79 dBm		00 MHz ot Span Span	
20.0				Ful Start Freq 2.394500		
-10.0	winapalyanianinanpalpahana. Jpah	n pantan panja di kali ka		Stop Freq 2.449500 AUTO		
-30.0			ly My Hydrogen and the state of	CF Step 5.500000 Auto Man	MHz	
-60.0 Center 2.42200 GHz	#Video BW 100 k		Span 55.00 MHz	Freq Offse 0 Hz X Axis Sca Loq		
#Res BW 30 kHz	Feb 01, 2021 8:25:33 PM		Sweep 58.1 ms (8001 pts)	Log Lin Signal Tra (Span Zoor	n)	



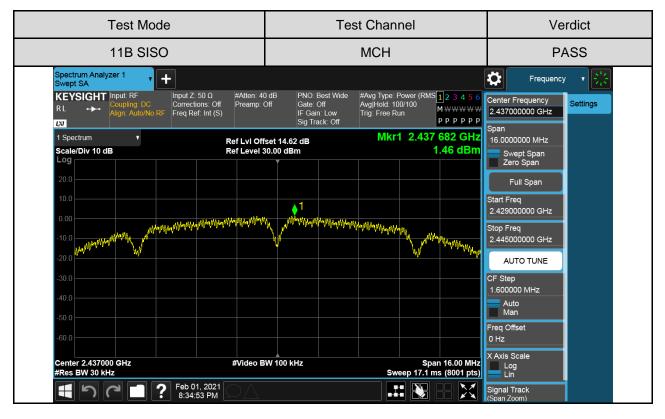


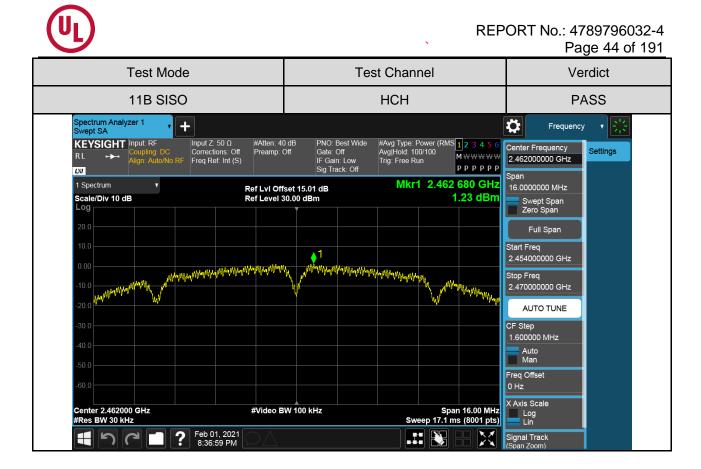


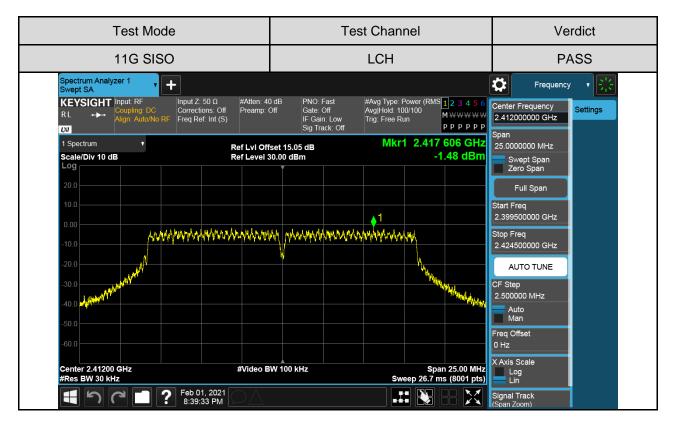


## Antenna2:

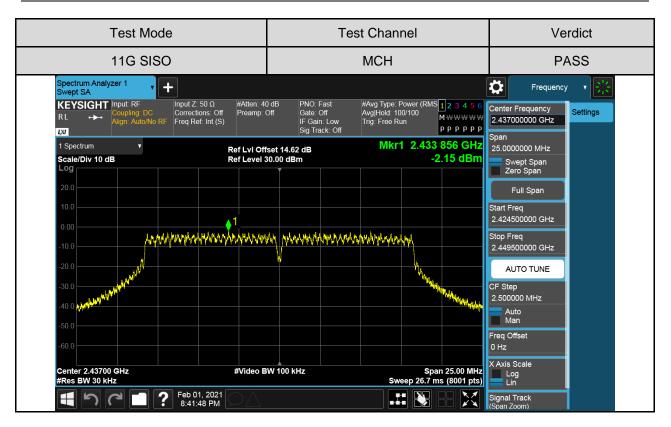


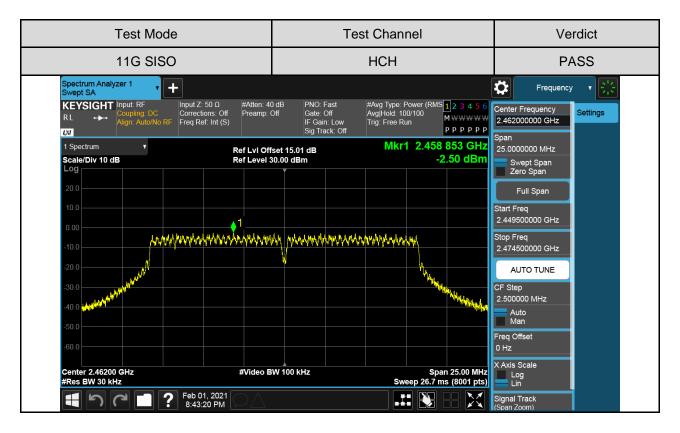




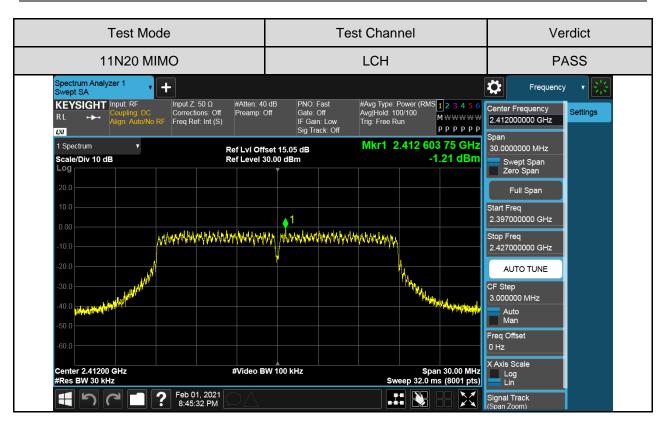


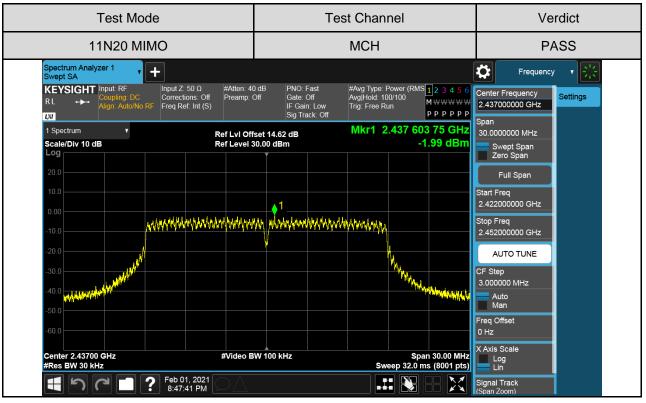




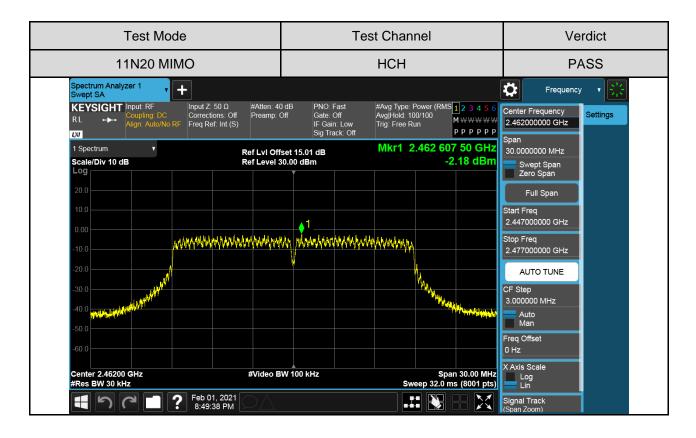


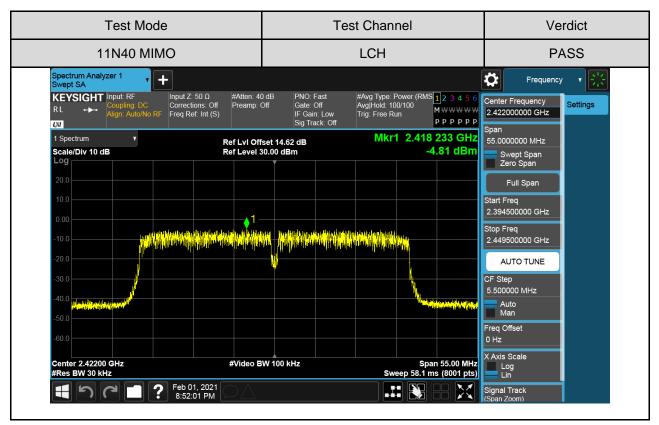








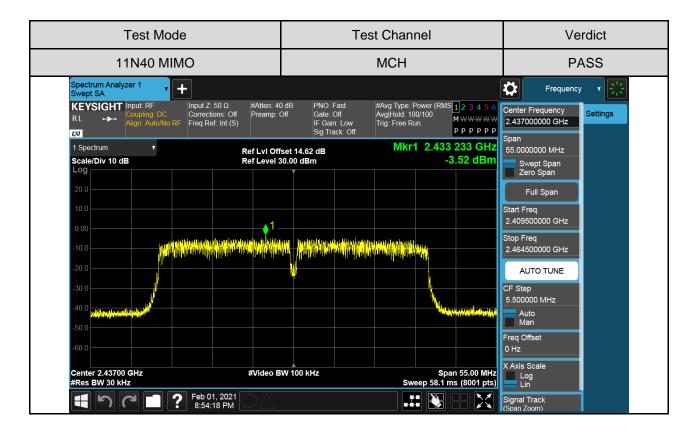




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Test Mode	Test Channel	Verdict	
11N40 MIMO	HCH	PASS	
Spectrum Analyzer 1 Swept SA	0 dB       PNO: Fast       #Avg Type: Power (RMS 1 2 3 4 5 6 Gate: Off         0 dB       Gate: Off       Avg[Hold: 100/100 Trig: Free Run       M WWWWW P P P P P P         Set 15.01 dB       Mkr1 2.448 233 GHz         30.00 dBm       -3.71 dBm         9       -3.71 dBm         9	Frequency   Center Frequency   2.45200000 GHz   Span   55.000000 MHz   Swept Span   Zero Span   Full Span   Start Freq   2.424500000 GHz   Start Freq   2.424500000 GHz   Stop Freq   2.479500000 GHz   Stop Freq   2.479500000 GHz   Stop Freq   2.479500000 GHz   CF Step   5.00000 MHz   AUTO TUNE   CF Step   5.00000 MHz   Man   Freq Offset   Hz   X Axis Scale   Lin	
E 7 C 1 7 Feb 01, 2021 8:56:19 PM		Signal Track (Span Zoom)	



# 7.5. CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS

#### **LIMITS**

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit		
FCC §15.247 (d)	Conducted Bandedge and Spurious Emissions	At least 30 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power		

#### TEST PROCEDURE

Refer to FCC KDB 558074, connect the UUT to the spectrum analyzer and use the following

Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	100K
VBW	≥3 × RBW
Span	1.5 x DTS bandwidth
Trace	Max hold
Sweep time	Auto couple.

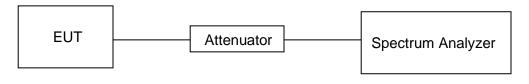
settings:

Use the peak marker function to determine the maximum PSD level.

Span	Set the center frequency and span to encompass frequency range to be measured
Detector	Peak
RBW	100K
VBW	≥3 × RBW
measurement points	≥span/RBW
Trace	Max hold
Sweep time	Auto couple.

Use the peak marker function to determine the maximum amplitude level.

### TEST SETUP



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# TEST ENVIRONMENT

Temperature	22°C	Relative Humidity	56%
Atmosphere Pressure	101kPa	Test Voltage	AC 120V

# Part I : Conducted Bandedge

#### **RESULTS TABLE**

Test Mode	Test Antenna	Test Channel	Carrier Power[dBm]	Max. Spurious Level [dBm]	Limit [dBm]	Verdict
11B	Antenna 1	LCH	7.113	-35.63	-22.89	PASS
		HCH	6.871	-34.66	-23.13	PASS
	Antenna 2	LCH	6.926	-35.18	-23.07	PASS
		HCH	6.358	-34.77	-23.64	PASS
11G	Antenna 1	LCH	1.142	-34.47	-28.86	PASS
		HCH	1.128	-34.64	-28.87	PASS
	Antenna 2	LCH	1.441	-34.96	-28.56	PASS
		HCH	0.539	-35.23	-29.46	PASS
	Antenna 1	LCH	1.375	-34.80	-28.63	PASS
11N20MIMO		HCH	0.773	-35.12	-29.23	PASS
	Antenna 2	LCH	1.668	-35.26	-28.33	PASS
		HCH	0.641	-35.06	-29.36	PASS
11N40MIMO	Antenna 1	LCH	-1.362	-35.43	-31.36	PASS
		HCH	-1.068	-34.54	-31.07	PASS
	Antenna 2	LCH	-1.171	-35.00	-31.17	PASS
		HCH	-0.918	-34.79	-30.92	PASS

## Remark:

1) For this product, it has two antennas, antenna1 and antenna2, but only the 802.11N HT20 and 802.11N HT40 modes can support both the SISO and MIMO technical.

2) Through pre-testing all the test modes of 11N 20 and 11N40, including SISO and MIMO, but only the data if worse case is included in this test report.