

FCC 47 CFR PART 15 SUBPART C

CERTIFICATION TEST REPORT

For

CONSUMER CAMERA

MODEL NUMBER: IPC-S42FP-D

ADDTIONAL MODEL NUMBER: IPC-TS42F-D-0360B-LC;IPC-TS42F-D-0600B-LC; IPC-S42FP-D-0360B-imou;IPC-S42FN-D-0360B-imou;IPC-S42FP-D-0600B-imou; IPC-S42FN-D-0600B-imou;IPC-S42FP-D-0360B;IPC-S42FN-D;IPC-S42FN-D-0360B; IPC-S42FP-D-0600B;IPC-S42FN-D;IPC-S42FP-D-imou; IPC-S42FP-D-imou

PROJECT NUMBER: 4789973747

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Prepared for

Hangzhou Huacheng Network Technology Co.,Ltd. Prepared by

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Revision History

Rev.	Issue Date	Revisions	Revised By
V0	06/15/2021	Initial Issue	



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1. ATTESTATION OF TEST RESULTS

Applicant 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-S42FP-D
Additional No. :	IPC-TS42F-D-0360B-LC;IPC-TS42F-D-0600B-LC;
	IPC-S42FP-D-0360B-imou;IPC-S42FN-D-0360B-imou;
	IPC-S42FP-D-0600B-imou;IPC-S42FN-D-0600B-imou;
	IPC-S42FP-D-0360B;IPC-S42FN-D-0360B;
	IPC-S42FP-D-0600B;IPC-S42FN-D-0600B;IPC-S42FN-D;
	IPC-S42FP-D-imou; IPC-S42FP-D-imou
Sample Number:	3967057
Data of Receipt Sample:	Jun.05,2021
Date Tested:	Jun.06,2021~ Jun.14,2021

APPLICABLE STANDARDS					
STANDARD	TEST RESULTS				
CFR 47 Part 15 Subpart C	PASS				



Summary of Test Results							
Clause	Test Items	FCC Rules	Test Results				
1	6db DTS Bandwidth	FCC 15.247 (a) (2)	Complied				
2	Conducted 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 < ANSI C63.10-2013,</pass>							

FCC CFR 47 Part 2, FCC CFR 47 Part 15C> when <Accuracy Method> decision rule is applied.

Prepared By:

Reviewed By:

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Tom Tang Project Engineer

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Leon Wu Senior Project Engineer

Authorized By:

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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.

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-S42FP-D
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:	Monopole Antenna
Antenna Gain:	Antenna1: 3.9 dBi Antenna2: 3.9 dBi
	Remark: This data is provided by customer and our lab isn't responsible for this data
Adapter	NAME: Power Adapter MODEL: ADS-12AM-12 12012EPCU INPUT:100-240V,50/60Hz, 0.3A OUTPUT:12V 1A

Remark:

Model No.:

Number:	Name:	Number:	Name:	Number:	Name:
1	IPC-S42FP-D	2	IPC-TS42F-D-0360B- LC	3	IPC-TS42F-D-0600B- LC
4	IPC-S42FP-D-0360B- imou	5	IPC-S42FN-D-0360B- imou	6	IPC-S42FP-D-0600B- imou
7	IPC-S42FN-D-0600B- imou	8	IPC-S42FP-D-0360B	9	IPC-S42FN-D-0360B
10	IPC-S42FP-D-0600B	11	IPC-S42FN-D-0600B	12	IPC-S42FN-D
13	IPC-S42FP-D-imou;	14	IPC-S42FP-D-imou		

Only the main model **IPC-S42FP-D** 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]	15.86
1	IEEE 802.11G SISO	1-11[11]	15.03
1/2	IEEE 802.11nHT20	1-11[11]	16.94
1/2	IEEE 802.11nHT40	3-9[7]	16.83

5.3. CHANNEL LIST

	Channel List for 802.11b/g/n (20 MHz)								
Channel Channel Channel Channel 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 Channel Channel Channel 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 V	The Worse Case Power Setting Parameter under 2400 ~ 2483.5MHz Band										
Test Software				Secur	e CRT						
	Transmit			Test C	Channel						
Modulation Mode	Antenna				NCB: 40MHz						
Mode	Number	CH 1	CH 6	CH 11	CH 3	CH 6	CH 9				
802.11b	1	N/A	N/A	N/A							
802.11g	1	N/A	N/A	N/A	/						
802.11n HT20	1	N/A	N/A	N/A							
802.11n HT40	1		/			N/A	N/A				



5.6. DESCRIPTION OF AVAILABLE ANTENNAS

Ant.	Frequency (MHz)	Antenna Type	Antenna Gain (dBi)	Directional gain(dBi)
1	2400-2483.5	Monopole Antenna	3.9	6.91
2	2400-2483.5	Monopole Antenna	3.9	

Note:

- 1) Directional gain= $10\log [(10^{G1/20} + 10^{G2/20})^2/N_{ANT}] = 6.91 \text{ dBi}$
- 2) N_{ANT} : 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. For the modes of 11B&11G only the antenna1 is working.

Test Mode	Transmit and Receive Mode	Description
IEEE 802.11b	⊠1TX, 1RX	Antenna1 can be used as transmitting/receiving antenna independently.
IEEE 802.11g	⊠1TX, 1RX	Antenna1 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:

 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. For the modes of 11B&11G only the antenna1 is working.

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	55	5 ~ 65%			
Atmospheric Pressure:	1010Pa				
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 Brand Name		Model 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

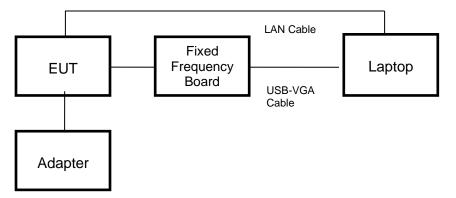
ACCESSORY

lt	em	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)											
Used	Equipment	Manufacturer		del No.		al No.	Upper Last Cal.	Last Cal.	Next Cal.		
\checkmark	EMI Test Receiver	R&S	E	SR3	12	6700	2019-12-12	2020-12-05	2021-12-04		
\checkmark	Two-Line V-Network	R&S	EN	V216	12	6701	2019-12-12	2020-12-05	2021-12-04		
	Artificial Mains Networks	R&S	E١	NY81	12	6711	2019-12-12	2020-12-05	2021-12-04		
				Soft	ware						
Used	Des	cription		Ma	anufac	turer	Name	Version			
	Test Software for (Conducted distur	bance		R&S	;	EMC32	Ver. 9.25			
		Ra	diated	d Emiss	ions (Instrum	ent)				
Used	Equipment	Manufacturer	Mod	lel No.	Seri	al No.	Upper Last Cal.	Last Cal.	Next Cal.		
\checkmark	Spectrum Analyzer	Keysight	N9	010B	MY57	110128	2020-05-10	2021-05-09	2022-05-08		
\checkmark	EMI test receiver	R&S	ES	SR26	126	67603	2019-12-12	2020-12-05	2021-12-04		
\checkmark	Receiver Antenna (9kHz-30MHz)	Schwarzbeck	FMZ	B 1513	513	3-265	2018-06-15	2021-06-03	2024-06-02		
\checkmark	Receiver Antenna (30MHz-1GHz)	SunAR RF Motion	J	JB1	17	7821	N/A	2019-01-28	2022-01-27		
	Receiver Antenna (1GHz-18GHz)	R&S	HF	F907	12	6705	2018-01-29	2019-01-28	2022-01-27		
	Receiver Antenna (18GHz-26.5GHz)	Schwarzbeck	BBH	IA9170	12	6706	2019-02-06	2020-12-05	2021-12-04		
	Pre-amplification (To 18GHz)	Compliance Direction System Inc.	PAP-1	1G18-50	1414(0-13467	2019-03-18	2020-12-05	2021-12-04		
V	Pre-amplification (To 26.5GHz)	R&S	SCI	U-26D	13	4668	2019-02-06	2020-09-27	2021-09-26		
V	Band Reject Filter	Wainwright	2350 2483.5	CJV8-)-2400- 5-2533.5- 0SS		1	2020-05-10	2021-05-09	2022-05-08		
V	Highpass Filter	Wainwright	2700	KX10-)-3000-)0-40SS		2	2020-05-10	2021-05-09	2022-05-08		
				Soft	ware						
Used	Desci	ription		Manufac	turer		Name	Version			
\checkmark	Test Software for R	adiated disturbar		Tonsce			JS32	V1.0			
			0	Other ins	strum	ents					
Used	Equipment	Manufacturer	Мос	del No.	Seri	al No.	Upper Last Cal.	Last Cal.	Next Cal.		
	Spectrum Analyzer	Keysight	N9	010B	MY57	110128	2020-05-10	2021-05-09	2022-05-08		
	Power Meter	Keysight	U20	021XA	MY57	110002	2020-05-10	2021-05-09	2022-05-08		



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

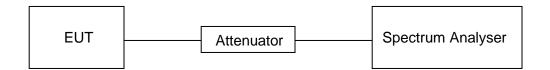
LIMITS

None; for reporting purposes only

PROCEDURE

FCC KDB 558074 Zero-Span Spectrum Analyzer Method

TEST SETUP



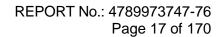
RESULTS

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
11N HT20	100	100	1	100	0	0.01
11N HT40	100	100	1	100	0	0.01

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

2) Where: x is Duty Cycle(Linear)

3) Where: T is On Time (transmit duration)





11B ON TIME AND DUTY CYCLE MID CH (WORSE CASE)													
Spectru Swept :		lyzer 1	•	+						4	Frequency	<u>الجا</u>	、 ¹ 、
RL	GHT	Input: I Coupli Align: J	ng: DC	Input Z: 50 C Corrections: Freq Ref: Int	Off Preamp: Off	B PNO: Fast Gate: Off IF Gain: Lov Sig Track: C	v Ing. Free R	w	2 3 4 5 6 WWWWW A A A A A	Center Fre 2.4370000		Settings	
لي 1 Spect Scale/I		dB	T		Ref Level 23		/11			Span 0.0000000	00 Hz : Span		
Log 13.0 3.00										Zero S			
-7.00 - -17.0 - -27.0 -										Start Freq 2.437000000 GHz			
-37.0 - -47.0 - -57.0 -										Stop Freq 2.4370000	000 GHz		
-67.0 Center Res BV)00000 (z	GHz		#Video BW 8	3.0 MHz*	Swe	ep 100.3 ms	Span 0 Hz (8001 pts)	AUTC	TUNE		
	5 Marker Table Mode Trace Scale X			Y	Function	Function Width	•		8.000000 Auto Man	MHz			
1 2 3										Freq Offse 0 Hz	t		
4 5 6										X Axis Sca Log Lin	le		
T	ら	2		Jun 15, 20 6:42:23 P			F			Signal Trac (Span Zoom			

.

	11G ON TIME AND DUTY CYCLE MID CH (WORSE CASE)							
Spectrum Analy Swept SA	yzer 1 🔻	+					Frequency	▼ ▼ <mark>\$'</mark> ∕
KEYSIGHT RL ↔	Input: RF Coupling: DC Align: Auto	Input Ζ: 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: Po Trig: Free Run	wer (RMS <mark>1</mark> 23456 W WWWW AAAAAA	Center Frequency 2.437000000 GHz Span	Settings
1 Spectrum Scale/Div 10 c	▼ IB		Ref Level 23.00	dBm			0.00000000 Hz Swept Span Zero Span	
13.0 3.00 -7.00 -17.0	······································			·			Full Span Start Freg	
-17.0							2.437000000 GHz Stop Freq	
-47.0							2.437000000 GHz	
Center 2.4370 Res BW 8 MHz 5 Marker Table			#Video BW 8.0 I	MHz*	Sweep	Span 0 Hz 100.3 ms (8001 pts)		
Mode	Trace Scale	X	Y	Function F	unction Width	Function Value	Auto Man Freq Offset	
2 3 4 5							0 Hz X Axis Scale	
		9 Jun 15, 2021					Log Lin	
		6:02:37 PM					Signal Track (Span Zoom)	

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		11N	HT20 ON	TIME AND	DUTY C	YCLE MID	CH (WORSE	CASE)	
Spectrum Anal Swept SA	yzer 1	•	+						· • 🔣
KEYSIGHT	Input: Coupli Align:	ng: DC	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	Ing. Free Run	wer (RMS <mark>1</mark> 23456 W\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	Center Frequency 2.437000000 GHz	Settings
xr Spectrum Scale/Div 10 (dB	•		Ref Level 23.00				Span 0.00000000 Hz Swept Span Zero Span	
13.0 3.00 7.00								Full Span	
17.0 27.0								Start Freq 2.437000000 GHz	
37.0 47.0 57.0								Stop Freq 2.437000000 GHz	
enter 2.4370	00000	GHz		#Video BW 8.0	MHz*		Span 0 Hz	AUTO TUNE	
es BW 8 MH Marker Table	Z	•				Sweep	o 100.3 ms (8001 pts)	CF Step 8.000000 MHz	
Mode	Trace	Scale	Х	Y	Function	Function Width	Function Value	Auto Man	
1 2 3								Freq Offset 0 Hz	
4 5 6								X Axis Scale Log Lin	
1	6		Jun 15, 2021 6:14:05 PM	\square				Signal Track	

11N HT40 ON TIME AND DUTY CYCLE MID CH (V	NORSE CASE)
Spectrum Analyzer 1	Frequency V
Align: Auto Freq Ref: Int (S) IF Gain: Low	1 2 3 4 5 6 Center Frequency 2.437000000 GHz Span
1 Spectrum v Scale/Div 10 dB Ref Level 23.00 dBm	0.00000000 Hz Swept Span
13.0 3.00 -7.00	Full Span
-17.0 -27.0 -37.0 -47.0	Start Freq 2.437000000 GHz Stop Freq
-57.0	2.437000000 GHz
Center 2.437000000 GHz #Video BW 8.0 MHz* Res BW 8 MHz Sweep 100.3 ms 5 Marker Table	Span 0 Hz s (8001 pts) CF Step 8.000000 MHz
	on Value Man Freq Offset
	0 Hz X Axis Scale



7.2. 6 dB BANDWIDTH

<u>LIMITS</u>

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

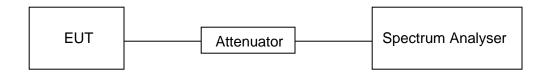
TEST PROCEDURE

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

Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	For 6dB 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
11B SISO	Antenna 1	MCH	10.08	Pass
		HCH	10.08	Pass
		LCH	16.57	Pass
11G SISO	Antenna 1	MCH	16.56	Pass
		HCH	16.58	Pass
		LCH	17.80	Pass
	Antenna 1	MCH	17.80	Pass
11N20MIMO		HCH	17.81	Pass
	Antenna 2	LCH	17.79	Pass
		MCH	17.79	Pass
		HCH	17.80	Pass
		LCH	36.45	Pass
	Antenna 1	MCH	36.42	Pass
11N40MIMO		HCH	36.44	Pass
		LCH	36.43	Pass
	Antenna 2	MCH	36.43	Pass
		HCH	36.43	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. But for the modes of 11B &11G,only the antenna 1 is working.

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.



For Antenna 1 part:

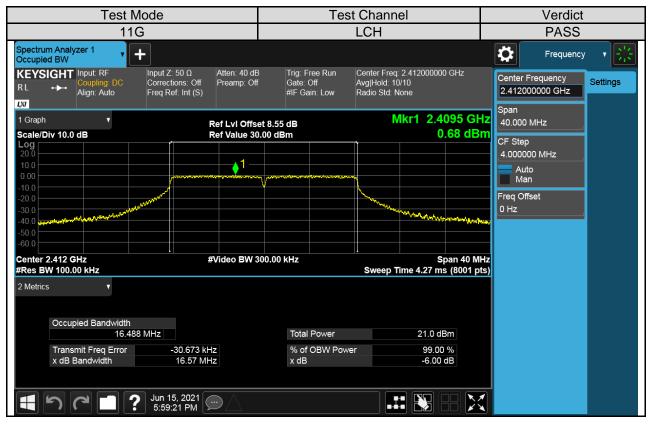




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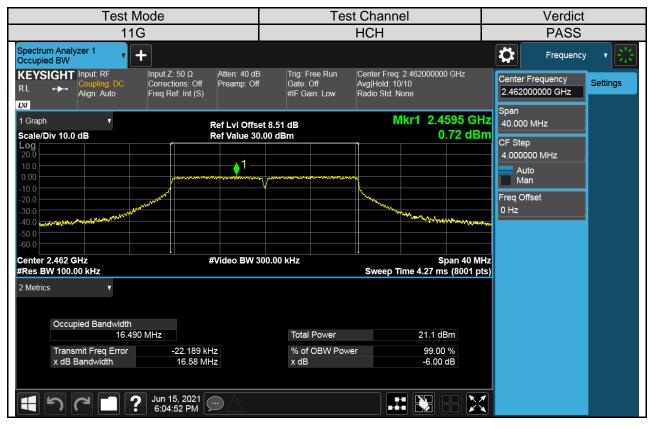




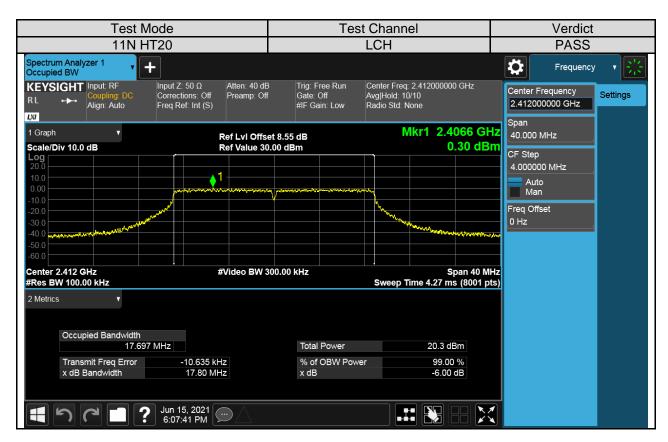








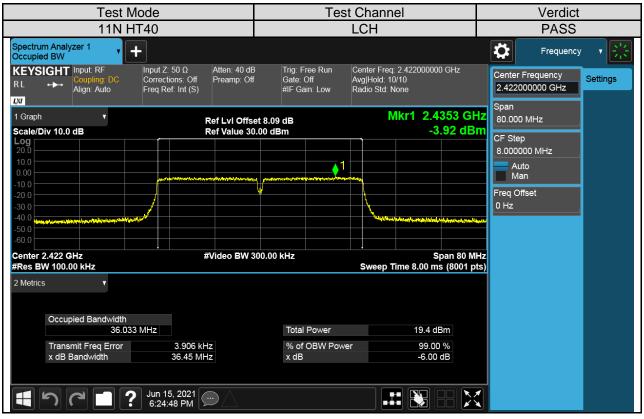






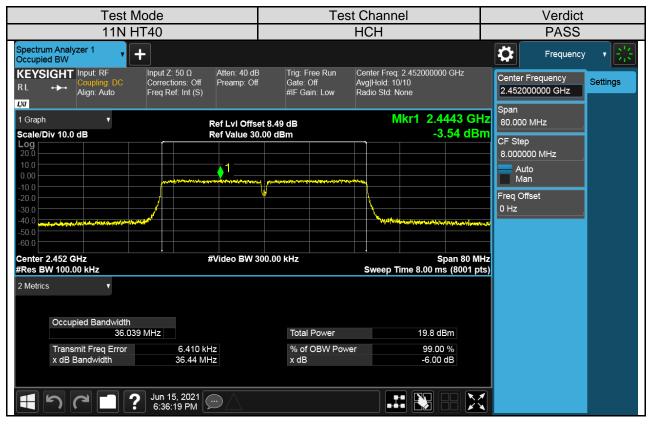






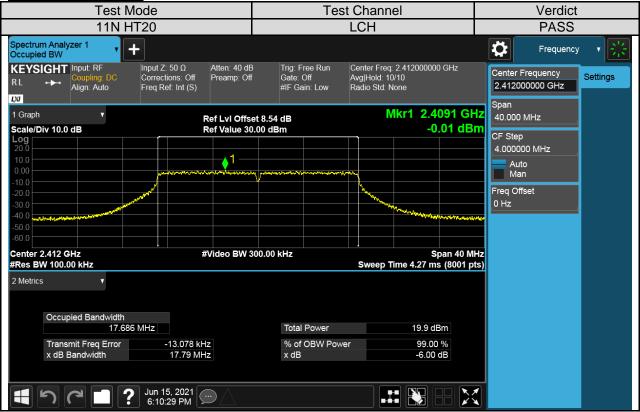








For Antenna 2 part:

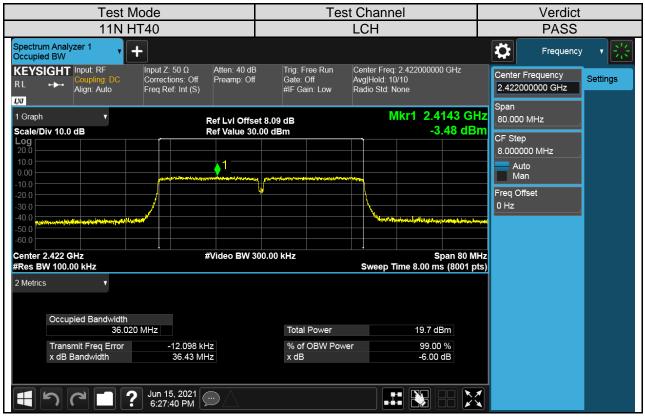




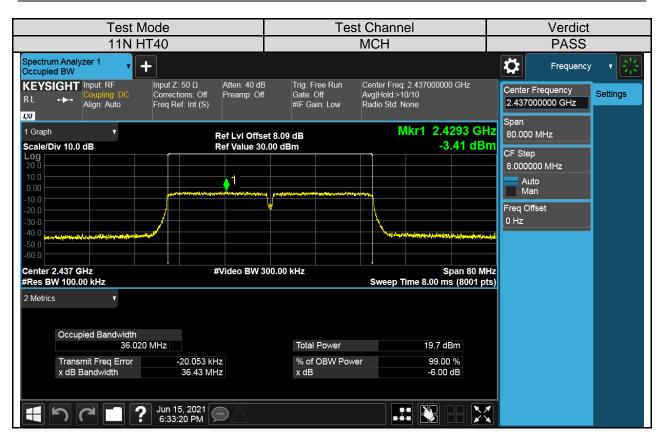
UL-CCIC COMPANY LIMITED

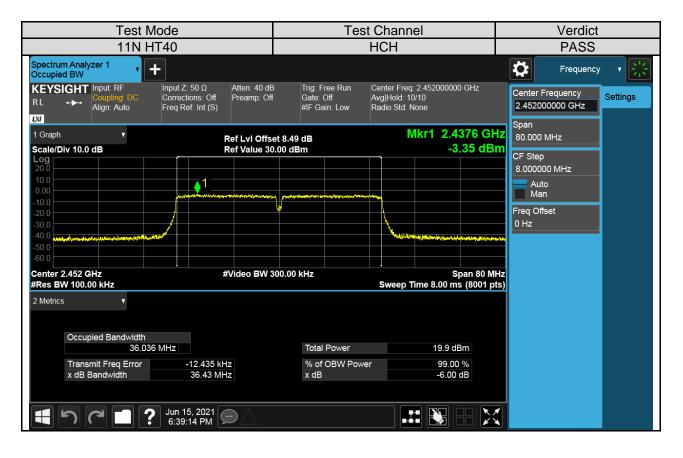














7.3. CONDUCTED POWER

LIMITS

FCC Part15 (15.247) , Subpart C									
Section	Section Test Item Limit Frequency Range (MHz)								
FCC 15.247(b)(3)	Peak Output Power	1 watt or 30dBm	2400-2483.5						
 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. Limit=30dBm – (Directional gain -6)dBi Directional gain = 10log [(10^{G1/20} +10^{G2/20})²/N_{ANT}] =6.91>6dBi,where the NANT is the numbers of antenna. So, the power limit shall be reduced to 30 – (6.91-6) = 29.09 dBm 									

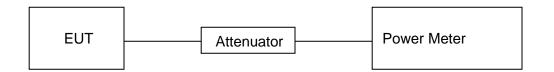
TEST PROCEDURE

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



RESULTS

Test Mode	Test Antenna	Test Channel	Maximum Average Conducted Output Power (dBm)	Result
		LCH	15.34	Pass
11B	Antenna 1	MCH	15.02	Pass
		HCH	15.86	Pass
		LCH	14.96	Pass
11G	Antenna 1	MCH	14.65	Pass
		HCH	15.03	Pass
		LCH	14.01	Pass
	Antenna 1	MCH	13.43	Pass
		HCH	13.77	Pass
	Antenna 2	LCH	13.85	Pass
11N20MIMO		MCH	13.32	Pass
		HCH	13.30	Pass
	Antenna 1+2	LCH	16.94	Pass
		MCH	16.39	Pass
		HCH	16.55	Pass
		LCH	13.36	Pass
	Antenna 1	MCH	13.38	Pass
		HCH	13.77	Pass
		LCH	13.74	Pass
11N40MIMO	Antenna 2	MCH	13.71	Pass
		HCH	13.87	Pass
		LCH	16.56	Pass
	Antenna 1+2	MCH	16.56	Pass
		HCH	16.83	Pass

Remark:

1) For all the test results has been adjusted the duty cycle factor.

2) For Correction Factor is refer to the result in section 7.1

- 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. But for the modes of 11B &11G,only the antenna 1 is working.
- 4) 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

LIMITS

FCC Part15 (15.247) Subpart C									
Section	Section Test Item Limit Frequency Range (MHz)								
FCC §15.247 (e)	FCC §15.247 (e)Power Spectral Density8 dBm in any 3 kHz band2400-2483.5								
 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. 2) Limit=30dBm - (Directional gain -6)dBi Directional gain = 10log [(10^{G1/20} +10^{G2/20})²/N_{ANT}] =6.91>6dBi,where the NANT is the numbers of antenna. So, the power limit shall be reduced to 8 - (6.91-6) = 7.09dBm 									

TEST PROCEDURE

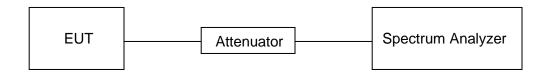
Refer to FCC KDB 558074, connect the UUT to the spectrum analyser and use the following settings:

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 SETUP





RESULTS

Test Mode	Test Antenna	Test Channel	Maximum Peak power spectral density(dBm/30kHz)	Result
		LCH	0.42	Pass
11B	Antenna 1	MCH	0.10	Pass
		HCH	0.95	Pass
		LCH	-2.36	Pass
11G	Antenna 1	MCH	-2.35	Pass
		HCH	-1.91	Pass
		LCH	-3.02	Pass
	Antenna 1	MCH	-3.38	Pass
		HCH	-3.22	Pass
	Antenna 2	LCH	-3.11	Pass
11N20MIMO		MCH	-3.57	Pass
		HCH	-3.64	Pass
	Antenna 1+2	LCH	-0.05	Pass
		MCH	-0.46	Pass
		HCH	-0.41	Pass
		LCH	-6.60	Pass
	Antenna 1	MCH	-6.70	Pass
		HCH	-6.27	Pass
		LCH	-6.28	Pass
11N40MIMO	Antenna 2	MCH	-6.19	Pass
		HCH	-6.16	Pass
		LCH	-3.48	Pass
	Antenna 1+2	MCH	-3.43	Pass
		НСН	-3.20	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. But for the modes of 11B &11G,only the antenna 1 is working.

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.



For Antenna 1 Part:





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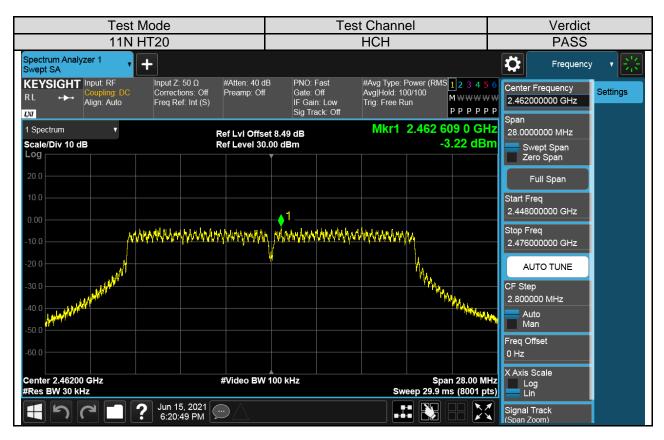








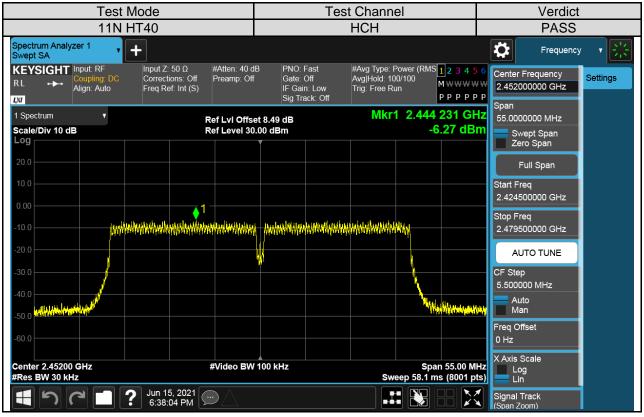








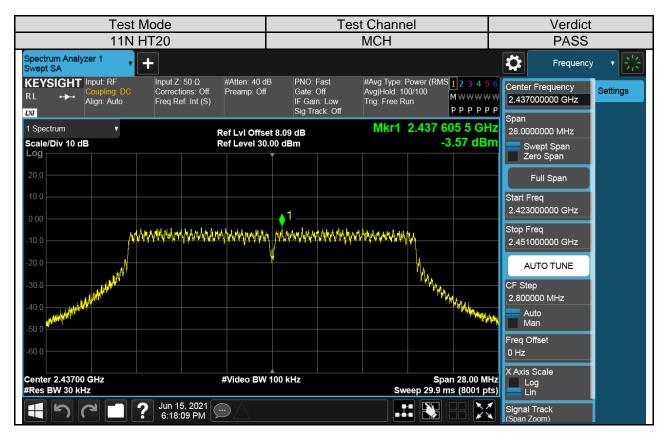






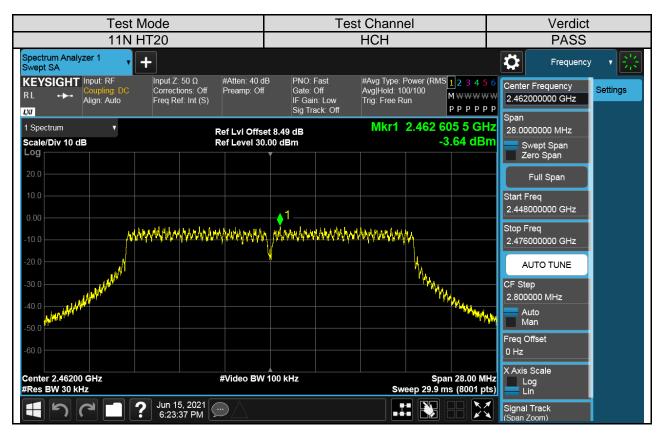
For Antenna 2 Part:

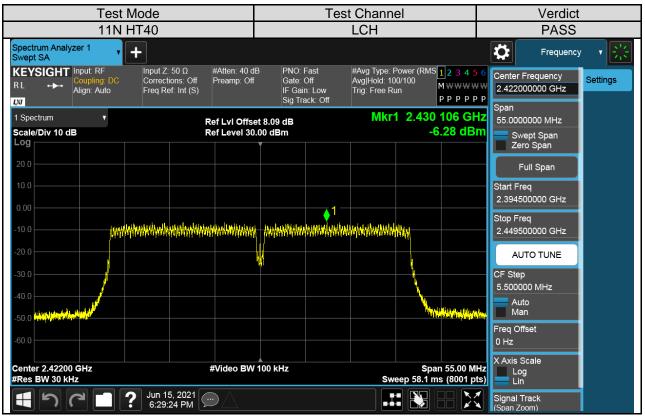




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7.5. CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS

<u>LIMITS</u>

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 analyser 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.

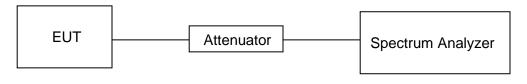
settings:

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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Part I :Conducted Bandedge

RESULTS TABLE

Test Mode	Test Antenna	Test Channel	Carrier Power[dBm]	Max. Spurious Level [dBm]	Limit [dBm]	Verdict
11B	Antonno 1	LCH	5.536	-40.99	-24.46	PASS
ПВ	Antenna 1	HCH	6.044	-40.40	-23.96	PASS
11G	Antenna 1	LCH	0.721	-40.64	-29.28	PASS
ПĞ	Antenna i	HCH	0.763	-41.30	-29.24	PASS
	Antenna 1	LCH	-0.148	-41.12	-30.15	PASS
	Antenna I	HCH	-0.154	-40.50	-30.15	PASS
11N20MIMO	Antonno 2	LCH	-0.392	-41.27	-30.39	PASS
	Antenna 2	HCH	-0.714	-41.50	-30.71	PASS
	Antonno 1	LCH	-3.838	-40.19	-33.84	PASS
	Antenna 1	HCH	-3.495	-39.35	-33.5	PASS
	11N40MIMO	LCH	-3.443	-41.71	-33.44	PASS
Antenna 2	HCH	-3.241	-40.16	-33.24	PASS	

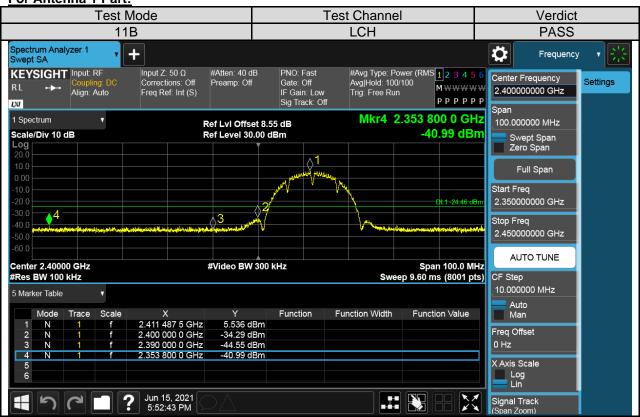
Remark:

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. But for the modes of 11B &11G,only the antenna 1 is working.

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.



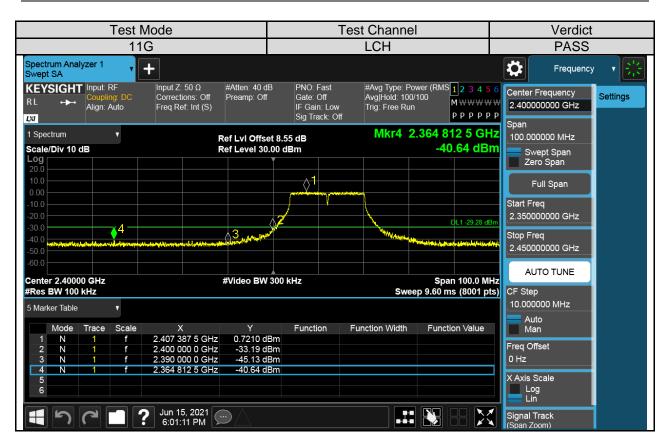
For Antenna 1 Part:





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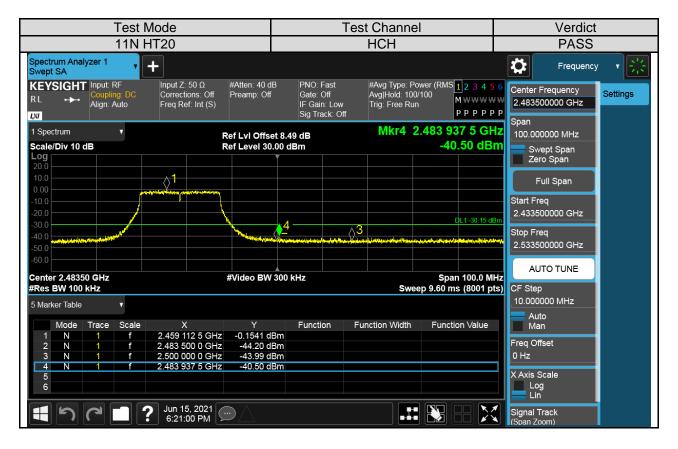




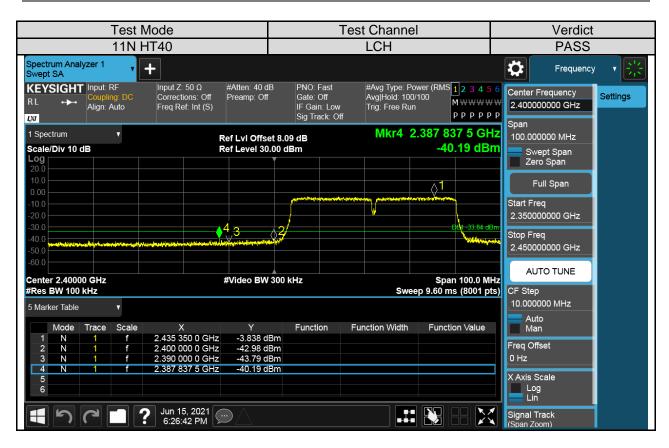








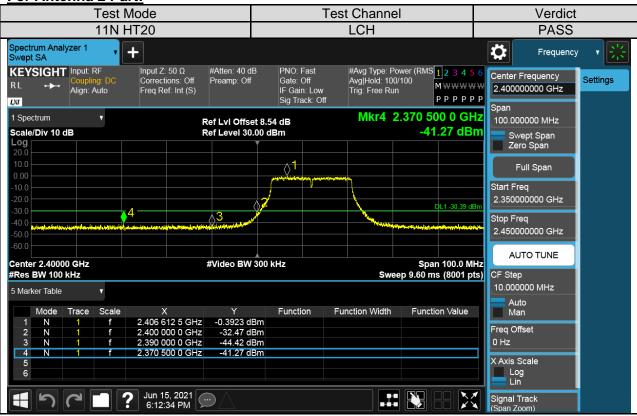








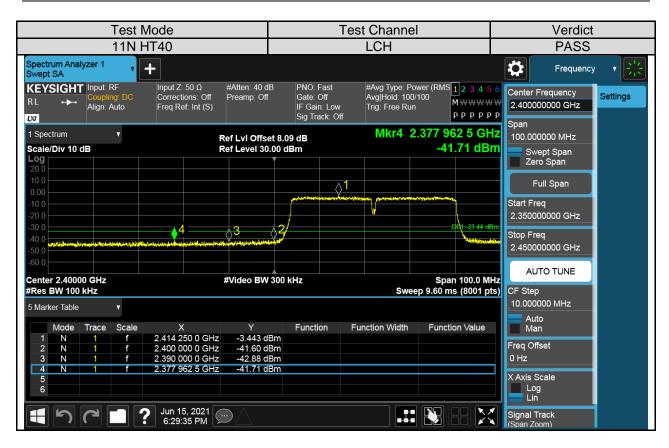
For Antenna 2 Part:





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Part II :Conducted Emission

Test	Result	Table

Test Mode	Test Antenna	Channel	Pref(dBm)	Puw(dBm)	Verdict
		LCH	See the test graphs	<limit< td=""><td>PASS</td></limit<>	PASS
	Antenna 1	MCH	See the test graphs	<limit< td=""><td>PASS</td></limit<>	PASS
11B SISO		НСН	See the test graphs	<limit< td=""><td>PASS</td></limit<>	PASS
		LCH	See the test graphs	<limit< td=""><td>PASS</td></limit<>	PASS
	Antenna 1	MCH	See the test graphs	<limit< td=""><td>PASS</td></limit<>	PASS
11G SISO		НСН	See the test graphs	<limit< td=""><td>PASS</td></limit<>	PASS
		LCH	See the test graphs	<limit< td=""><td>PASS</td></limit<>	PASS
	Antenna 1	MCH	See the test graphs	<limit< td=""><td>PASS</td></limit<>	PASS
11N MIMO20		HCH	See the test graphs	<limit< td=""><td>PASS</td></limit<>	PASS
11111111020		LCH	See the test graphs	<limit< td=""><td>PASS</td></limit<>	PASS
	Antenna 2	MCH	See the test graphs	<limit< td=""><td>PASS</td></limit<>	PASS
		HCH	See the test graphs	<limit< td=""><td>PASS</td></limit<>	PASS
		LCH	See the test graphs	<limit< td=""><td>PASS</td></limit<>	PASS
	Antenna 1	MCH	See the test graphs	<limit< td=""><td>PASS</td></limit<>	PASS
11N MIMO40		HCH	See the test graphs	<limit< td=""><td>PASS</td></limit<>	PASS
		LCH	See the test graphs	<limit< td=""><td>PASS</td></limit<>	PASS
	Antenna 2	MCH	See the test graphs	<limit< td=""><td>PASS</td></limit<>	PASS
		HCH	See the test graphs	<limit< td=""><td>PASS</td></limit<>	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. But for the modes of 11B &11G,only the antenna 1 is working.

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.



For Antenna 1 Part:

Test Mode	Channel	Verdict
11B	LCH	PASS

Pref test Plot

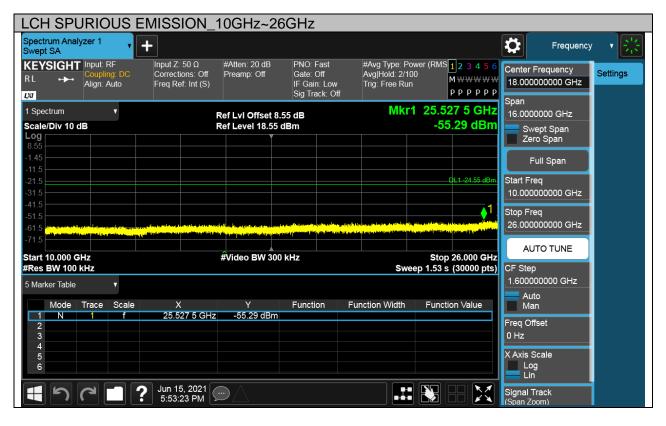




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Puw test Plot







Test Mode	Channel	Verdict
11B	MCH	PASS

Pref test Plot





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Puw test Plot

MCH SPL	JRIOUS E	EMISSION_	_30MHz~10)GHz					
Spectrum Analy Swept SA	zer 1	+					₽	Frequency	・ 岩
KEYSIGHT RL ↔	Input: RF Coupling: DC Align: Auto	Input Z: 50 Ω Corrections: Off Freq Ref: Int (S)	#Atten: 20 dB Preamp: Off	PNO: Fast Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Po Avg Hold: 12/1 Trig: Free Run		5.0150	Frequency 000000 GHz	Settings
1 Spectrum Scale/Div 10 dl Log 8.12	B		Ref LvI Offset 8.1 Ref Level 18.12 d		Mk	r2 4.873 9 GHz -44.77 dBm	Sv	00000 GHz vept Span ero Span	
-1.88								⁼ull Span	
-21.9 -31.9 -41.9			2			DL1-24.85 dBm-	Start Fi 30.000	req 0000 MHz	
-51.9 -61.9 -71.9						a tala ana amin'ny distant distant dia 1914. Ilay kaodim-bener Ny INSEE dia mampiasa dia kaodim-paositra dia kaodim-bener dia kaodim-bener dia kaodim-bener dia kaodim-bener di	Stop Fi 10.000	^{req} 0000000 GHz	
Start 30 MHz #Res BW 100 k	Hz		#Video BW 300	kHz	Swee	Stop 10.000 GHz p 954 ms (30000 pts)	Al CF Ste		
5 Marker Table	٣							00000 MHz	
1 N 2 N 3	Trace Scale 1 f 1 f	X 2.439 5 GHz 4.873 9 GHz		Function F	unction Width	Function Value	Ma Freq O 0 Hz		
4 5 6		_					X Axis Lo Li	g	
1 5		Jun 15, 2021 5:56:01 PM			.		Signal (Span Z	Track oom)	

MCH SPURIOUS E	EMISSION_10GF	lz~26GHz		
Swept SA	+			Frequency V
KEYSIGHT Input: RF R L Coupling: DC Align: Auto Align: Auto	Input Ζ: 50 Ω #Atten: Corrections: Off Preamp: Freq Ref: Int (S)		#Avg Type: Power (RMS 1 2 3 4 5 Avg Hold: 2/100 Trig: Free Run P P P P	* 18.000000000 GHz
1 Spectrum v Scale/Div 10 dB		ffset 8.12 dB 18.12 dBm	Mkr1 25.669 3 GH -54.83 dBr	2 16.0000000 GHz 1 Swept Span
8.12 -1.88 -11.9				Euli Span
-21.9			DL1-24.85 dB	E Start Freq 10.00000000 GHz
-51.9 -61.9	n bi stan faransi ku, iki ku li shekarat ita ini ku la kasa ita ini ku la ku sa ku sa ku sa ku sa ku sa ku sa Na ku sa k	ne se anna an an Anna ann an Anna an A Anna anna a		Stop Freq 26.00000000 GHz
-71.9 Start 10.000 GHz #Res BW 100 kHz	#Video	BW 300 kHz	Stop 26.000 GH Sweep 1.53 s (30000 pts	
5 Marker Table 🔹 🔻				1.60000000 GHz
Mode Trace Scale	X Y 25.669 3 GHz -54.8	Function F 3 dBm	unction Width Function Value	Auto Man
2 3 4				Freq Offset 0 Hz
5				X Axis Scale Log Lin
1 C C C C	Jun 15, 2021 5:56:10 PM			Signal Track (Span Zoom)



Test Mode	Channel	Verdict
11B	HCH	PASS

Pref test Plot

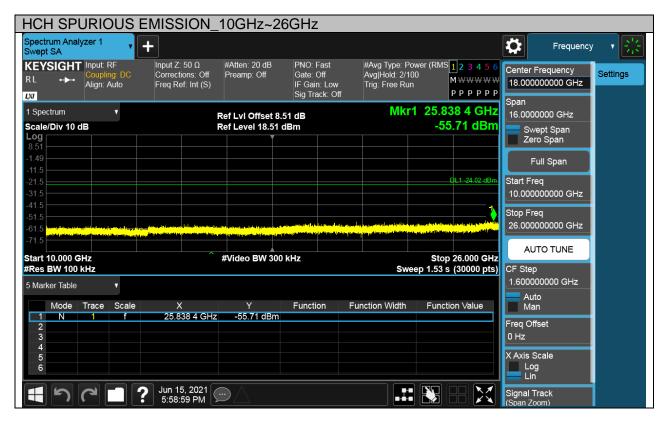




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Puw test Plot

HCH SPURIO	US EMISSION_	_30MHz~10GHz		
Spectrum Analyzer 1 Swept SA	▼ +			Frequency V
RL +++ Align: Al	EDC Corrections: Off	#Atten: 20 dB PNO: Fast Preamp: Off Gate: Off IF Gain: Low Sig Track: O		3.01500000 GH2
1 Spectrum Scale/Div 10 dB Log		Ref Lvi Offset 8.51 dB Ref Level 18.51 dBm	Mkr2 4.924 1 GHz -42.92 dBm	Swept Span
8.51 -1.49 -11.5	1			Zero Span Full Span
-21.5 -31.5 -41.5		2	DL1-24.02 dBm	Start Freq 30.000000 MHz
-51.5 -61.5 -71.5				Stop Freq 10.00000000 GHz
Start 30 MHz #Res BW 100 kHz	×	#Video BW 300 kHz	Stop 10.000 GHz Sweep 954 ms (30000 pts)	
5 Marker Table Mode Trace	Scale X f 2.463 1 GHz	Y Function 5.606 dBm	Function Width Function Value	Auto Man
2 N 1 3 4	f 4.924 1 GHz			Freq Offset 0 Hz
5 6				X Axis Scale Log Lin
	Jun 15, 2021 5:58:50 PM			Signal Track (Span Zoom)





Test Mode	Channel	Verdict
11G	LCH	PASS

Pref test Plot

