

#### FCC 47 CFR PART 15 SUBPART C

#### **CERTIFICATION TEST REPORT**

For

#### **CONSUMER CAMERA**

**MODEL NUMBER: IPC-TA42P** 

ADDTIONAL MODEL NUMBER: IPC-TA42P-imou; IPC-TA42N;IPC-TA42N-imou;

IPC-TA42-LC

**PROJECT NUMBER: 4789748163** 

REPORT NUMBER: 4789748163-4

FCC ID: 2AVYF-IPC-TA4X

**ISSUE DATE: Dec. 25, 2020** 

Prepared for

Hangzhou Huacheng Network Technology Co., Ltd.

Prepared by

UL-CCIC COMPANY LIMITED

No. 2, Chengwan Road, Suzhou Industrial Park, People's Republic of China

Tel: +86 769 22038881 Fax: +86 769 33244054 Website: www.ul.com



Page 2 of 152

## **Revision History**

Rev.	Issue Date	Revisions	Revised By
V0	12/25/2020	Initial Issue	



## **TABLE OF CONTENTS**

1.	A	TTEST	ATION OF TEST RESULTS	4
2.	TI	EST M	ETHODOLOGY	6
3.	F	ACILIT	TIES AND ACCREDITATION	6
4.	C	ALIBR	ATION AND UNCERTAINTY	7
	4.1.	ME	ASURING INSTRUMENT CALIBRATION	7
	4.2.	ME	ASUREMENT UNCERTAINTY	7
5.	E	QUIPN	IENT UNDER TEST	8
	5.1.	DES	SCRIPTION OF EUT	8
	5.2.	MA	XIMUM OUTPUT POWER	9
	5.3.	CHA	ANNEL LIST	9
	5.4.	TES	ST CHANNEL CONFIGURATION1	10
	5.5.	THE	E WORSE CASE POWER SETTING PARAMETER1	10
	5.6.	DES	SCRIPTION OF AVAILABLE ANTENNAS1	11
	5.7.	THE	E WORSE CASE CONFIGURATIONS1	11
	5.8.	TES	ST ENVIRONMENT1	12
	5.9.	DES	SCRIPTION OF TEST SETUP1	13
	5.10		NEASURING INSTRUMENT AND SOFTWARE USED1	
6.	M	EASU	REMENT METHODS1	5
7.	A	NTENI	NA PORT TEST RESULTS1	6
	7.1.	ON	TIME AND DUTY CYCLE	16
	7.2.	6 dE	B BANDWIDTH1	19
	7.3.	PEA	AK CONDUCTED OUTPUT POWER2	?7
	7.4.	POI	WER SPECTRAL DENSITY2	29
	7.5.	CO	NDUCTED BANDEDGE AND SPURIOUS EMISSIONS3	37
	7.6.		DIATED TEST RESULTS7	
		6.1. 6.2.	LIMITS AND PROCEDURE	
		-	RESTRICTED BANDEDGE	_
			SPURIOUS EMISSIONS	
8.	A	C POV	VER LINE CONDUCTED EMISSIONS14	9
9.	Α	NTENI	NA REQUIREMENTS15	<b>i</b> 2



Page 4 of 152

## 1. ATTESTATION OF TEST RESULTS

**Applicant Information** 

Company Name: Hangzhou Huacheng Network Technology Co., Ltd.

Address: No.2930, Nanhuan Road, Binjiang District, Hangzhou, China

**Manufacturer Information** 

Company Name: Hangzhou Huacheng Network Technology Co., Ltd.

Address: No.2930, Nanhuan Road, Binjiang District, Hangzhou, China

**EUT Description** 

Product Name: CONSUMER CAMERA

Model Name: IPC-TA42P

Additional No.: IPC-TA42P-imou; IPC-TA42N;IPC-TA42N-imou;

IPC-TA42-LC

Sample Number: 3502815

Data of Receipt Sample: Dec. 02, 2020

Date Tested: Dec. 02, 2020~ Dec. 24, 2020

**APPLICABLE STANDARDS** 

STANDARD TEST RESULTS

CFR 47 Part 15 Subpart C PASS



Page 5 of 152

	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:

Prepared By:	Reviewed By:
Jason Yang	Tom Tang
Jason Yang Engineer	Tom Tang Engineer Project Associate
Authorized By:	
Chris Zhong	
Chris Zhong Laboratory Leader	_

<sup>1)</sup> The measurement result for the sample received is <Pass> according to < ANSI C63.10-2013, FCC CFR 47 Part 2, FCC CFR 47 Part 15C> when <Accuracy Method> decision rule is applied.



Page 6 of 152

## 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.
------------------------------	---

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.



Page 7 of 152

## 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)
Notes This was estaintened and amount of the standard of the s	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.



Page 8 of 152

## 5. EQUIPMENT UNDER TEST

## 5.1. DESCRIPTION OF EUT

Product Name:	CONSUMER CAMERA		
Model No.:	IPC-TA42P		
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:	Shrapnel antenna		
Antenna Gain:	Antenna1: 2.8 dBi		
	Remark: This data is provided by customer and our lab isn't responsible for this data		
Adapter	NAME: Power Adapter  MODEL: NBS5B050100VUU  INPUT:100-240V,50/60Hz, 0.2A  OUTPUT:5.0V 1.0A		

### Remark:

#### Model No.:

Number:	Name:	Number:	Name:	Number:	Name:
1	IPC-TA42P	2	IPC-TA42P-imou	3	IPC-TA42N
4	IPC-TA42N-imou	5	IPC-TA42-LC	6	IPC-TA42N-imou

Only the main model **IPC-TA42P** 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 market regions and customers are different.

Page 9 of 152

## 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]	15.38
1	IEEE 802.11G SISO	1-11[11]	14.78
1	IEEE 802.11nHT20	1-11[11]	14.82
1	IEEE 802.11nHT40	3-9[7]	12.16

## 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		



Page 10 of 152

## 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 Worse Case Power Setting Parameter under 2400 ~ 2483.5MHz Band							
Test Softv	vare	SecureCRT					
	Transmit		Test Channel				
Modulation Mode	Antenna	1	NCB: 20MHz		١	ICB: 40MHz	
Mode	Number	CH 1	CH 6	CH 11	CH 3	CH 6	CH 9
802.11b	1	-2	-2	-2			
802.11g	1	-4	-4	-4		/	
802.11n HT20	1	-4	-4	-4			
802.11n HT40	1	/ -6 -6 -6			-6		



Page 11 of 152

### 5.6. DESCRIPTION OF AVAILABLE ANTENNAS

Ant.	Frequency (MHz)	Antenna Type	Antenna Gain (dBi)
1	2400-2483.5	Shrapnel antenna	2.8

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)	⊠1TX, 1RX	Antenna1 can be used as transmitting/receiving antenna independently.		
IEEE 802.11N (HT20)	⊠1TX, 1RX	Antenna1 can be used as transmitting/receiving antenna independently.		

## 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



Page 12 of 152

#### 5.8. **TEST ENVIRONMENT**

Environment Parameter	Selected Values During Tests		
Relative Humidity	55 ~ 65%		
Atmospheric Pressure:	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

Page 13 of 152

## 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

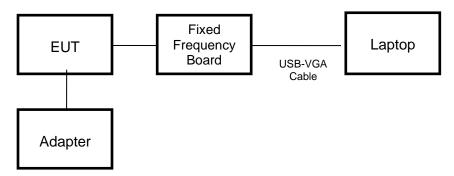
#### **ACCESSORY**

Item	Accessory	Brand Name	Model Name	Description
1	Micro SD card	Kingston	32GB	Supply by UL lab
2	USB-VGA Cable	NA	NA	100cm Length (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.



Page 14 of 152

## 5.10. MEASURING INSTRUMENT AND SOFTWARE USED

EMI Test Receiver R&S ESR3 126700 2018-12-13 2019-12-12 202  ✓ Two-Line V-Network R&S ENV216 126701 2018-12-13 2019-12-12 202  ✓ Artificial Mains Networks R&S ENY81 126711 2018-12-13 2019-12-12 202  Software  Used Description Manufacturer Name Version  ✓ Test Software for Conducted disturbance R&S EMC32 Ver. 9.25  Radiated Emissions (Instrument)  Used Equipment Manufacturer Model No. Serial No. Upper Last Cal. New Cal.	ext Cal.  20-12-11  20-12-11  20-12-11  ext Cal.
Serial No.   Cal.   Last Cal.   No.	20-12-11 20-12-11 20-12-11
✓Two-Line V-NetworkR&SENV2161267012018-12-132019-12-12202✓Artificial Mains NetworksR&SENY811267112018-12-132019-12-12202SoftwareUsedDescriptionManufacturerNameVersion✓Test Software for Conducted disturbanceR&SEMC32Ver. 9.25Radiated Emissions (Instrument)UsedEquipmentManufacturerModel No.Serial No.Upper Last Cal.Last Cal.Networks	20-12-11
✓ Artificial Mains Networks R&S ENY81 126711 2018-12-13 2019-12-12 2028-12-13 2019-12-12 2019-12-12 2019-12-12 2019-12-12 2019-12-12 2019-12-12 2019-12-12 2019-12-12 2019-12-12 2019-12-12 2019	20-12-11
Networks R&S ENY81 126711 2018-12-13 2019-12-12 202  Software  Used Description Manufacturer Name Version  ✓ Test Software for Conducted disturbance R&S EMC32 Ver. 9.25  Radiated Emissions (Instrument)  Used Equipment Manufacturer Model No. Serial No. Upper Last Cal. Ne	
Used     Description     Manufacturer     Name     Version       ✓     Test Software for Conducted disturbance     R&S     EMC32     Ver. 9.25       Radiated Emissions (Instrument)       Used     Equipment     Manufacturer     Model No.     Serial No.     Upper Last Cal.     Last Cal.     Ne	ext Cal.
Test Software for Conducted disturbance R&S EMC32 Ver. 9.25  Radiated Emissions (Instrument)  Used Equipment Manufacturer Model No. Serial No. Upper Last Cal. No.	ext Cal.
Used Equipment Manufacturer Model No. Serial No. Upper Last Cal. No.	ext Cal.
Used Equipment Manufacturer Model No. Serial No. Upper Last Cal. No.	ext Cal.
Used Equipment Manufacturer Model No. Serial No. Upper Last Cal. No.	ext Cal.
☑ Spectrum Analyzer Keysight N9010B MY57110128 2019-05-29 2020-05-10 202	21-05-09
	21-12-06
Receiver Antenna (9kHz-30MHz) Schwarzbeck FMZB 1513 513-265 N/A 2018-06-15 202	21-06-14
Receiver Antenna SunAR RF JB1 126704 N/A 2019-01-28 202	22-01-27
Receiver Antenna (1GHz-18GHz) R&S HF907 126705 2019-01-26 2020-01-26 2020	21-01-25
Receiver Antenna (18GHz-26.5GHz) Schwarzbeck BBHA9170 126706 2019-02-06 2020-02-05 202	21-02-04
Pre-amplification (To 1GHz) R&S SCU-03D 134666 2019-02-06 2020-02-05 202	21-02-04
Pre-amplification (To 18GHz) Compliance Direction System Inc. PAP-1G18-50 14140-13467 2019-03-18 2020-02-20 202	21-02-19
Pre-amplification (To 26.5GHz) R&S SCU-26D 134668 2019-02-06 2020-02-05 2020	21-02-04
✓         Band Reject Filter         Wainwright         WRCJV8- 2350-2400- 2483.5-2533.5- 40SS         1         2019-05-29         2020-05-10         202	21-05-09
Highpass Filter Wainwright 2700-3000- 2 2019-05-29 2020-05-10 2020	21-05-09
Software	
Used Description Manufacturer Name Version	
✓ Test Software for Radiated disturbance Tonscend JS32 V1.0	
Other instruments	
l Inner Last	ext Cal.
	21-05-09
	21-05-09



Page 15 of 152

# **6. MEASUREMENT METHODS**

No.	Test Item	KDB Name	Section
1	6dB Bandwidth	KDB 558074 D01 15.247 Meas Guidance v05r02	8.2
2	Peak 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

Page 16 of 152

## 7. ANTENNA PORT TEST RESULTS

### 7.1. ON TIME AND DUTY CYCLE

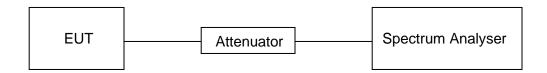
#### **LIMITS**

None; for reporting purposes only

#### **PROCEDURE**

FCC KDB 558074 Zero-Span Spectrum Analyzer Method

#### **TEST SETUP**



#### **TEST ENVIRONMENT**

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

### **RESULTS**

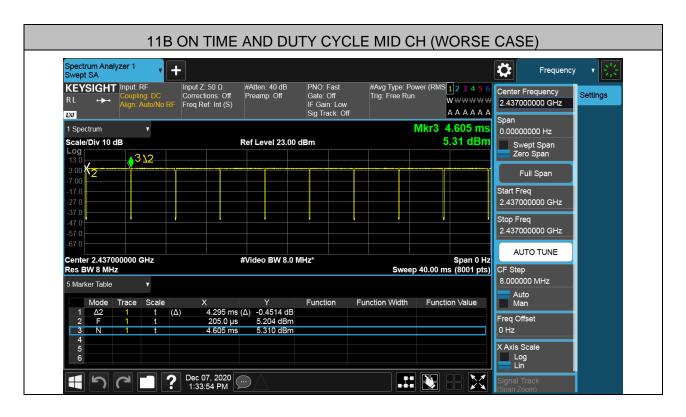
Mode	On Time (msec)	Period (msec)	Duty Cycle x (Linear)	Duty Cycle (%)	Duty Cycle Correction Factor (db)	1/T Minimum VBW (KHz)	Final Minimum VBW (KHz)
11B	4.295	4.40	0.976	97.6	0.11	0.23	1
11G	0.7113	0.8097	0.879	87.9	0.56	1.41	2
11N HT20	0.6669	0.70817	0.942	94.2	0.26	1.50	2
11N HT40	0.339	0.3805	0.891	89.1	0.50	2.95	3

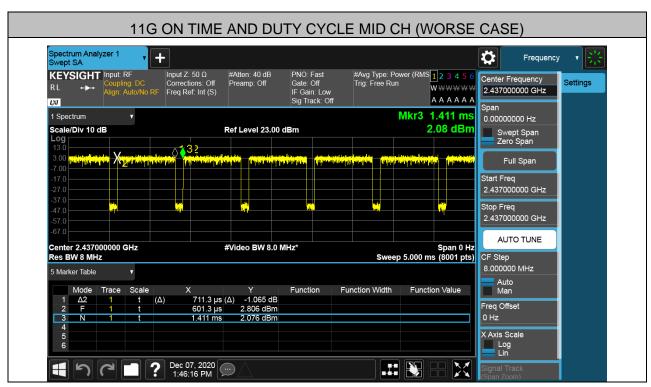
Note: 1) Duty Cycle Correction Factor=10log(1/x).

2) Where: x is Duty Cycle(Linear)

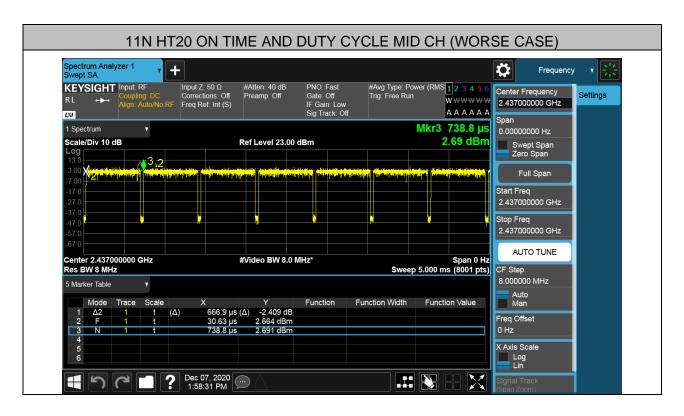
3) Where: T is On Time (transmit duration)

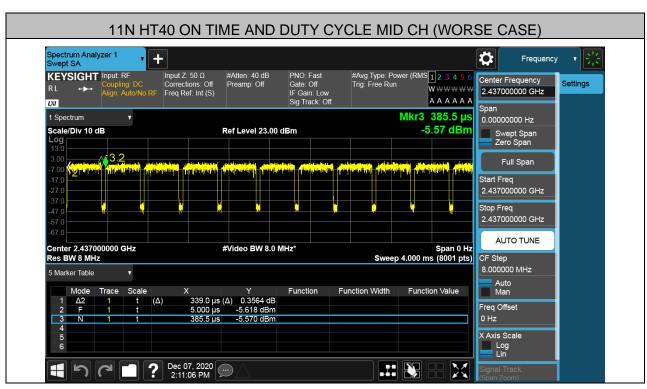














Page 19 of 152

## 7.2. 6 dB BANDWIDTH

## **LIMITS**

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

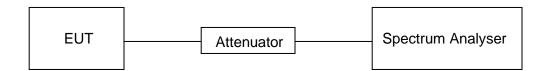
#### **TEST PROCEDURE**

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 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**





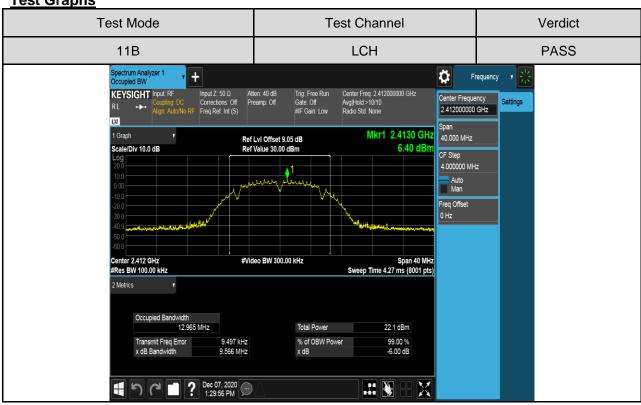
Page 20 of 152

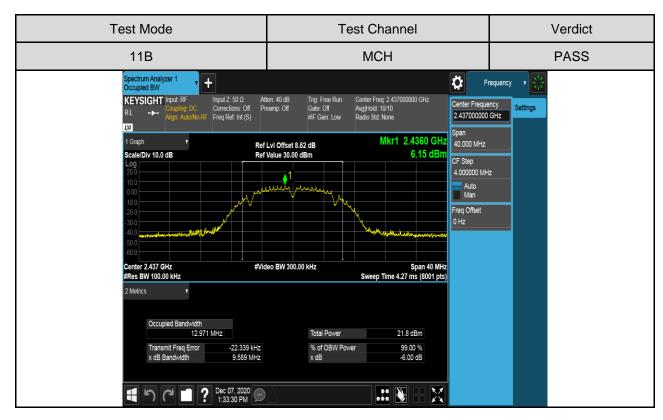
## **RESULTS**

Test Mode	Test Channel	6dB bandwidth (MHz)	Result
	LCH	9.566	Pass
11B	MCH	9.589	Pass
	HCH	10.06	Pass
11G	LCH	16.34	Pass
	MCH	16.34	Pass
	HCH	16.35	Pass
11N HT20	LCH	17.03	Pass
	MCH	17.08	Pass
	HCH	17.04	Pass
11N HT40	LCH	35.13	Pass
	MCH	35.15	Pass
	HCH	35.33	Pass



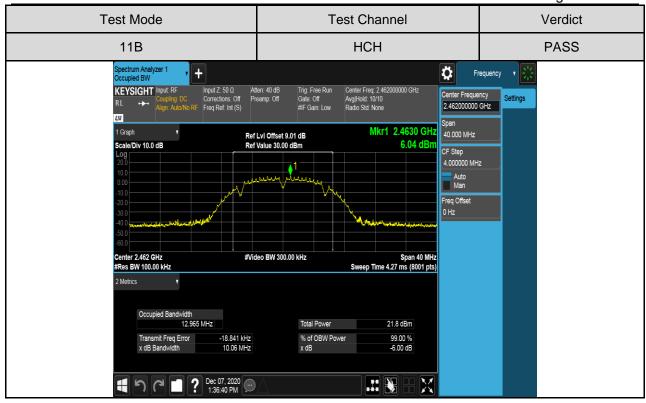
**Test Graphs** 

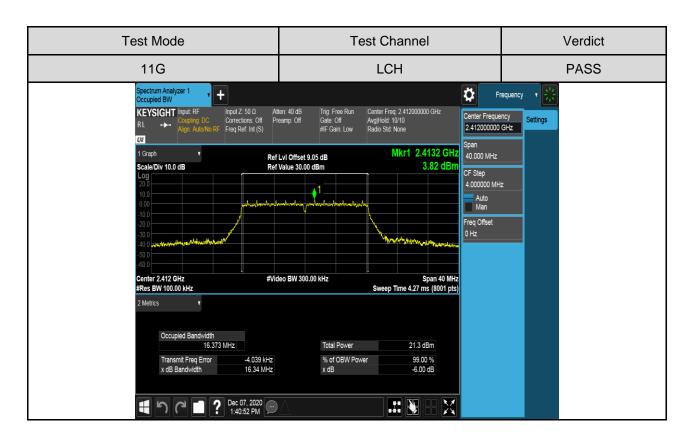






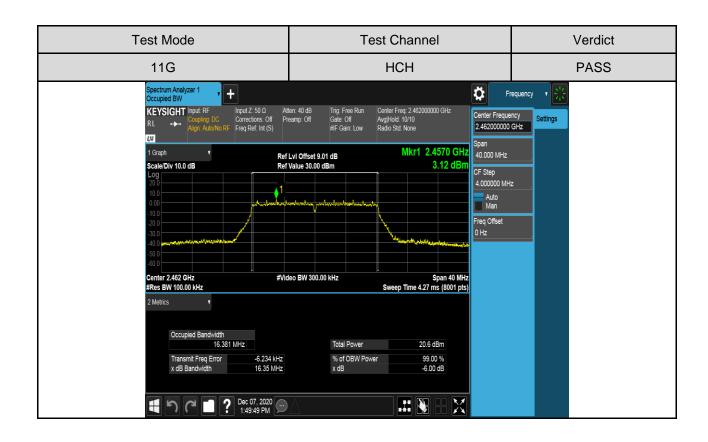
Page 22 of 152



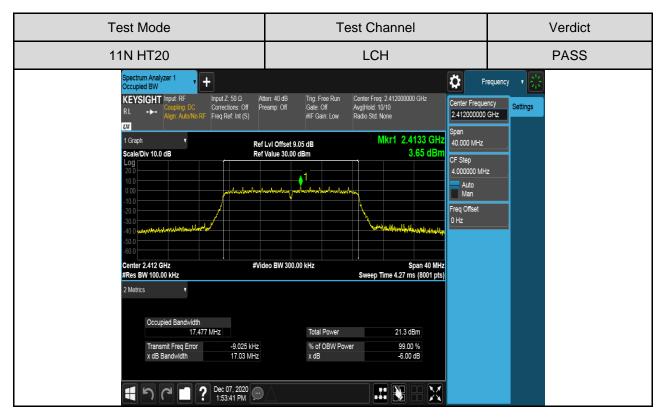


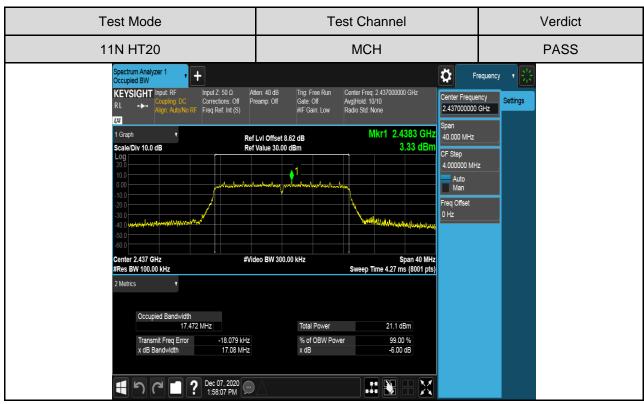


Test Mode Test Channel Verdict **PASS** 11G **MCH** pectrum Analyzer 1 ccupied BW Ö Frequency Atten: 40 dB Preamp: Off Center Freq: 2.437000000 GHz Avg|Hold: 10/10 Radio Std: None Input Z: 50 Ω Corrections: Off Freq Ref: Int (S) Trig: Free Run Gate: Off #IF Gain: Low KEYSIGHT Input RF Settings 2.437000000 GHz LXI 1 Graph Mkr1 2.4320 GHz Ref Lvl Offset 8.62 dB Ref Value 30.00 dBm 40.000 MHz 3.22 dBr Scale/Div 10.0 dB CF Step 4.000000 MHz Auto Man Freq Offset 0 Hz Center 2.437 GHz #Res BW 100.00 kHz #Video BW 300.00 kHz Span 40 MHz Sweep Time 4.27 ms (8001 pts) 2 Metrics 16.372 MHz Total Power 20.9 dBm % of OBW Power 99.00 % -6.00 dB -8.430 kHz 16.34 MHz Transmit Freq Error x dB Bandwidth x dB 1:45:52 PM Dec 07, 2020 X # 1

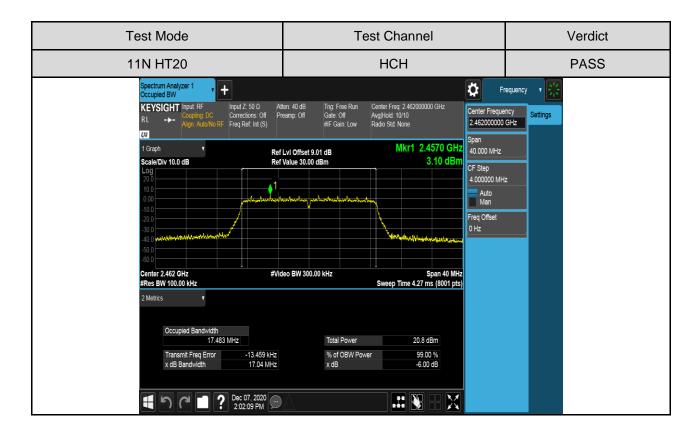


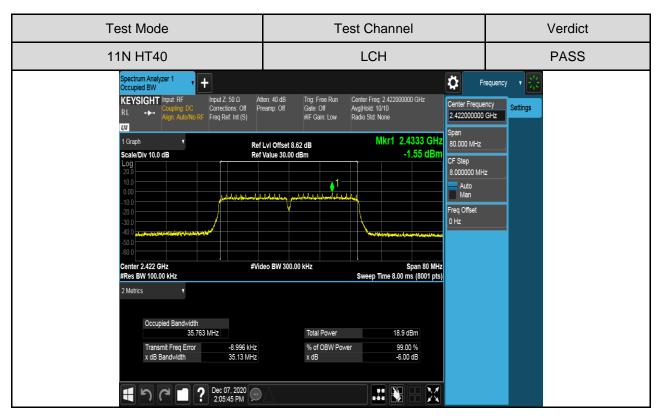














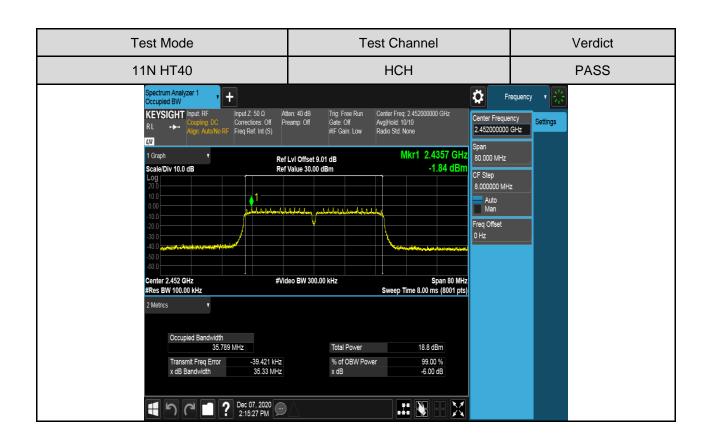
x dB Bandwidth

Test Mode Test Channel Verdict **PASS** 11N HT40 **MCH** pectrum Analyzer 1 ccupied BW Ö Frequency Atten: 40 dB Preamp: Off Center Freq: 2.437000000 GHz Avg|Hold: 10/10 Radio Std: None Input Z: 50 Ω Corrections: Off Freq Ref: Int (S) Trig: Free Run Gate: Off #IF Gain: Low KEYSIGHT Input RF Settings 2.437000000 GHz LXI 1 Graph Mkr1 2.4483 GHz 80.000 MHz Ref Lvl Offset 8.62 dB -2.17 dBn Scale/Div 10.0 dB Ref Value 30.00 dBm CF Step 8.000000 MHz Auto Man Freq Offset 0 Hz Center 2.437 GHz #Res BW 100.00 kHz #Video BW 300.00 kHz Span 80 MHz Sweep Time 8.00 ms (8001 pts) 2 Metrics 35 758 MHz Total Power 18.5 dBm % of OBW Power -24.009 kHz 35.15 MHz 99.00 % -6.00 dB Transmit Freq Error

x dB

X

# 1





### 7.3. CONDUCTED POWER

#### **LIMITS**

FCC Part15 (15.247) , Subpart C			
Section Test Item Li		Limit	Frequency Range (MHz)
FCC 15.247(b)(3)	Output Power	1 watt or 30dBm	2400-2483.5

### **TEST PROCEDURE**

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

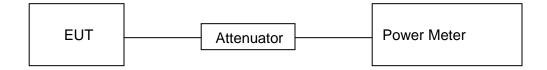
Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the Power sensor.

Measure the power of each channel.

Peak Detector use for Peak result.

AVG Detector use for AVG result.

#### **TEST SETUP**





**RESULTS** 

Test Mode	Test Channel	Maximum Conducted Output Power (PK)	Maximum Conducted Output Power (AV)	Result
		dBm	dBm	
	LCH	18.09	15.38	Pass
11B	MCH	17.63	14.88	Pass
	HCH	17.62	14.85	Pass
	LCH	22.58	14.78	Pass
11G	MCH	22.36	14.56	Pass
	HCH	22.12	14.33	Pass
	LCH	22.76	14.82	Pass
11N HT20	MCH	22.25	14.34	Pass
	HCH	22.03	14.31	Pass
	LCH	N/A	12.16	Pass
11N HT40	MCH	N/A	12.04	Pass
	HCH	N/A	12.15	Pass



## 7.4. POWER SPECTRAL DENSITY

## **LIMITS**

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

#### **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.	

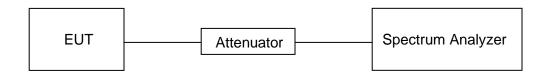
Allow trace to fully stabilize and use the peak marker function to determine the maximum amplitude level within the RBW.

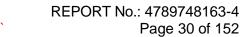
If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

#### **TEST ENVIRONMENT**

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

### **TEST SETUP**





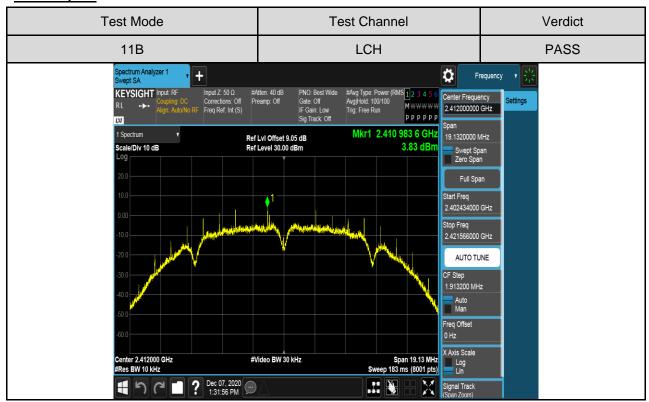


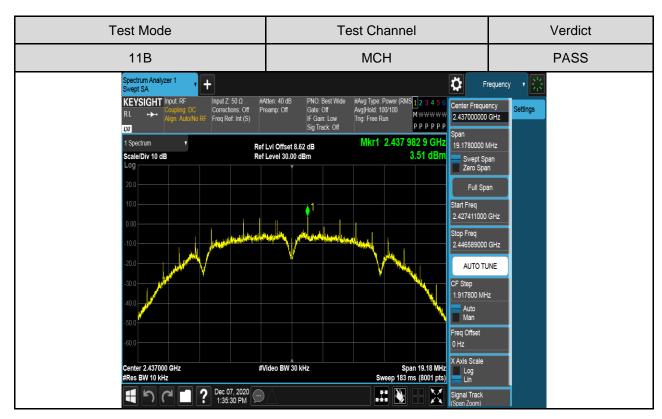
**RESULTS** 

Test Mode	Test Channel	Maximum Peak power spectral density (dBm/10kHz)	Result
	LCH	3.83	Pass
11B	MCH	3.51	Pass
	HCH	3.37	Pass
	LCH	-5.71	Pass
11G	MCH	-5.84	Pass
	HCH	-6.04	Pass
	LCH	-4.59	Pass
11N HT20	MCH	-4.86	Pass
	HCH	-5.46	Pass
11N HT40	LCH	-9.06	Pass
	MCH	-10.06	Pass
	HCH	-9.93	Pass

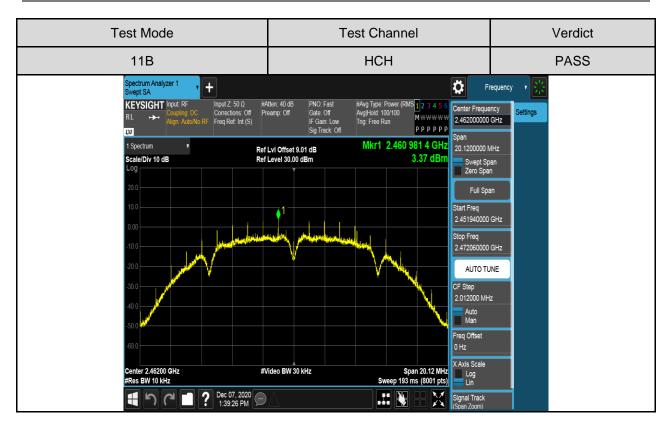


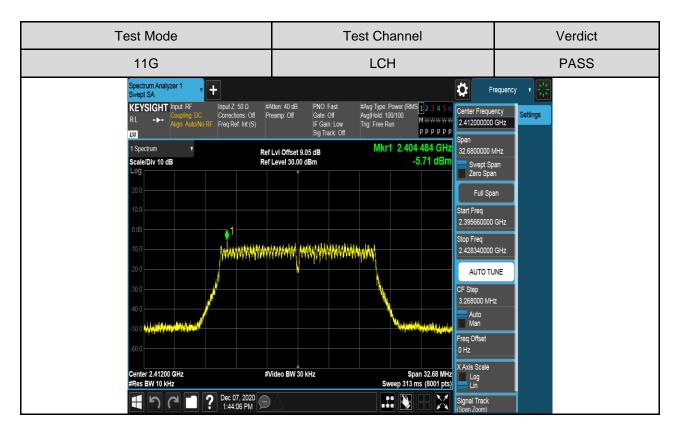
#### **Test Graphs:**





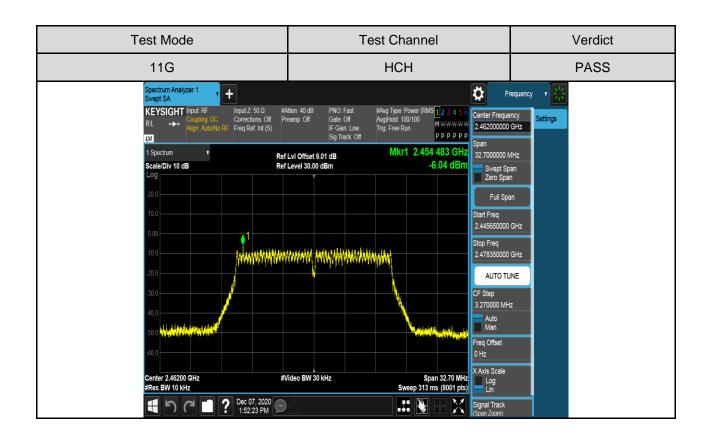








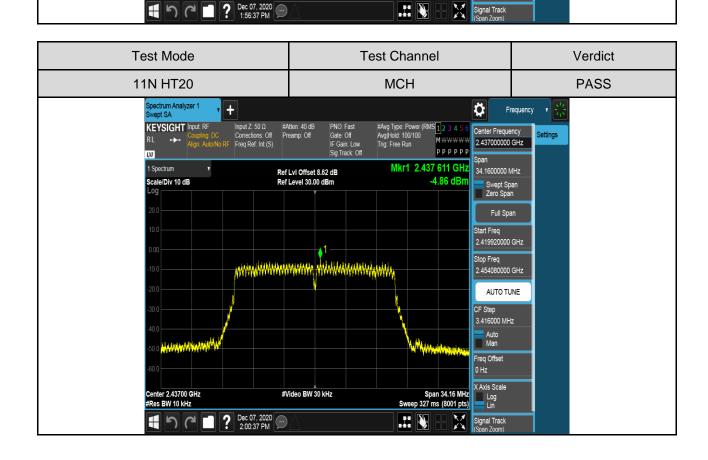
Test Mode Test Channel Verdict **PASS** 11G **MCH** pectrum Analyzer 1 wept SA Ö Frequency Input Z: 50 Ω Corrections: Off Freq Ref: Int (S) PNO: Fast Gate: Off IF Gain: Low Sig Track: Off #Atten: 40 dB Preamp: Off KEYSIGHT Input RF Settings 2.437000000 GHz PPPPPP L)XI Mkr1 2.429 484 GHz 1 Spectrum Ref Lvl Offset 8.62 dB 32.6800000 MHz -5.84 dBn Scale/Div 10 dB Swept Span Zero Span Full Span 2.420660000 GHz Stop Freq dangani dipinara andal paliki pikidi kabahayak 2.453340000 GHz AUTO TUNE 3.268000 MHz Auto Man req Offset X Axis Scale Span 32.68 MHz Sweep 313 ms (8001 pts) enter 2.43700 GHz #Video BW 30 kHz Log Lin Res BW 10 kHz # 1



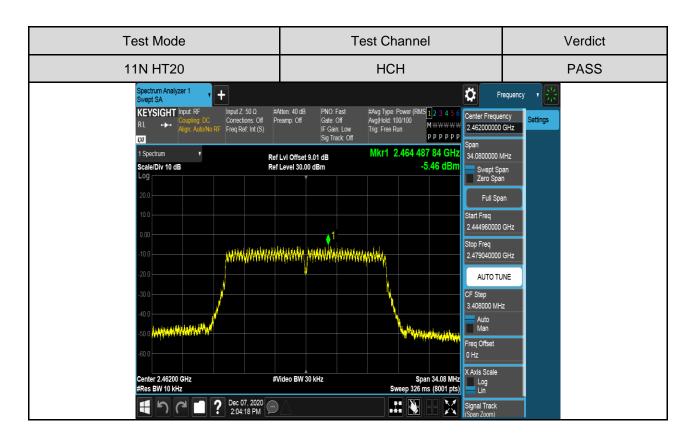


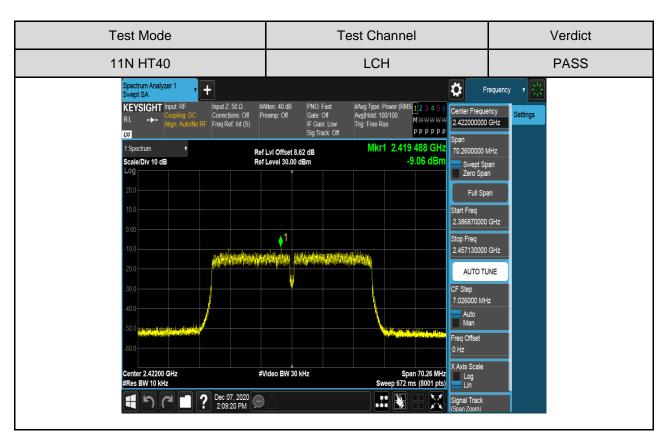
Res BW 10 kHz

Test Mode Test Channel Verdict LCH **PASS** 11N HT20 pectrum Analyzer 1 wept SA Ö Frequency Input Z: 50 Ω Corrections: Off Freq Ref: Int (S) #Atten: 40 dB Preamp: Off PNO: Fast Gate: Off IF Gain: Low KEYSIGHT Input RF Settings 2.412000000 GHz PPPPPP L)XI Mkr1 2.419 485 GHz 1 Spectrum Ref Lvl Offset 9.05 dB 34.0600000 MHz -4.59 dBn Scale/Div 10 dB Swept Span Zero Span Full Span 2.394970000 GHz Stop Freq 2.429030000 GHz AUTO TUNE 3.406000 MHz Auto Man req Offset 0 Hz X Axis Scale Span 34.06 MHz Sweep 326 ms (8001 pts) Center 2.41200 GHz #Video BW 30 kHz Log Lin

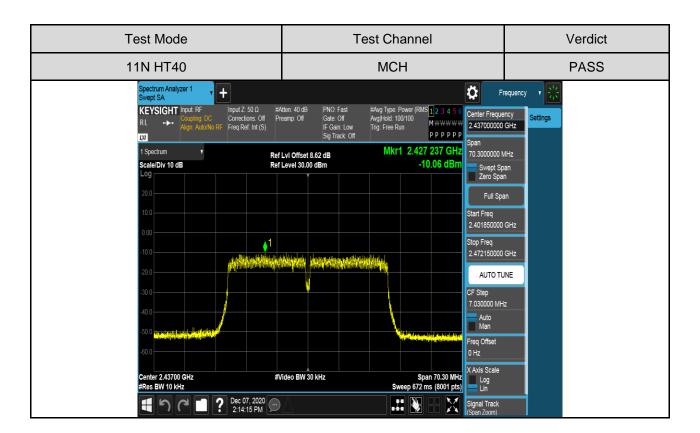


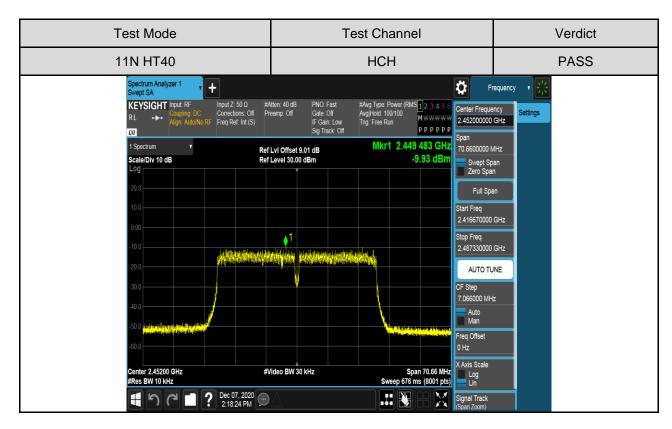














## 7.5. CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS

## **LIMITS**

FCC Part15 (15.247) , Subpart C			
Section Test Item Limit			
FCC §15.247 (d)	Conducted Bandedge and Spurious Emissions	1) For 11B, 11G and 11N HT20 modes: at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power; 2) For 11N HT40 mode: 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:

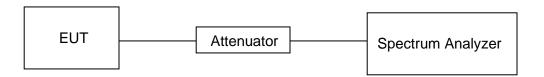
Use the peak marker function to determine the maximum PSD level.

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**





Page 39 of 152

# **TEST ENVIRONMENT**

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

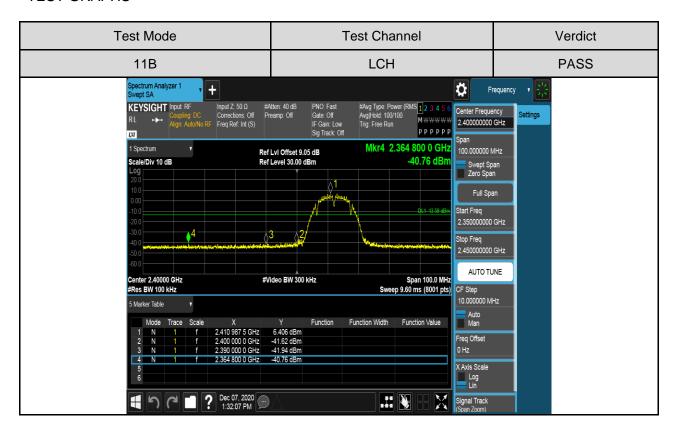
REPORT No.: 4789748163-4 Page 40 of 152

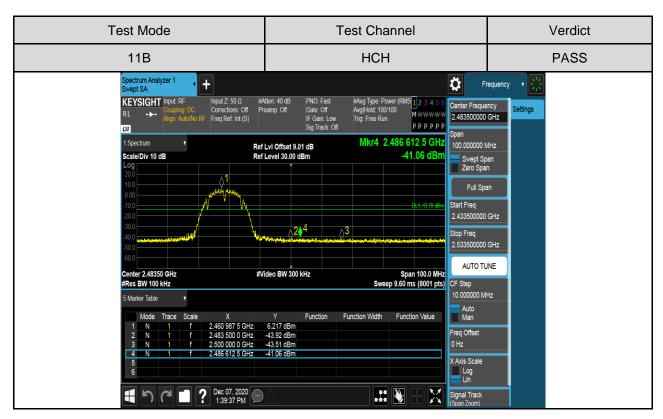
## Part I: Conducted Bandedge

# **RESULTS TABLE**

Test Mode	Test Channel	Carrier Power[dBm]	Max. Spurious Level [dBm]	Limit [dBm]	Verdict
11D	LCH	6.406	-40.76	-13.59	PASS
11B	HCH	6.217	-41.06	-13.78	PASS
110	LCH	3.583	-41.11	-16.42	PASS
11G	HCH	3.282	-39.47	-16.72	PASS
11N HT20	LCH	3.830	-40.48	-16.17	PASS
I IIN HIZU	HCH	3.283	-40.64	-16.72	PASS
11N UT40	LCH	-1.784	-39.83	-31.78	PASS
11N HT40	HCH	-1.886	-40.43	-31.89	PASS

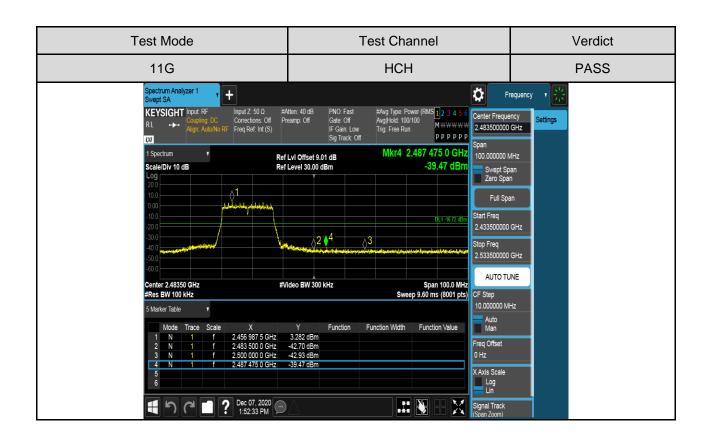
#### **TEST GRAPHS**





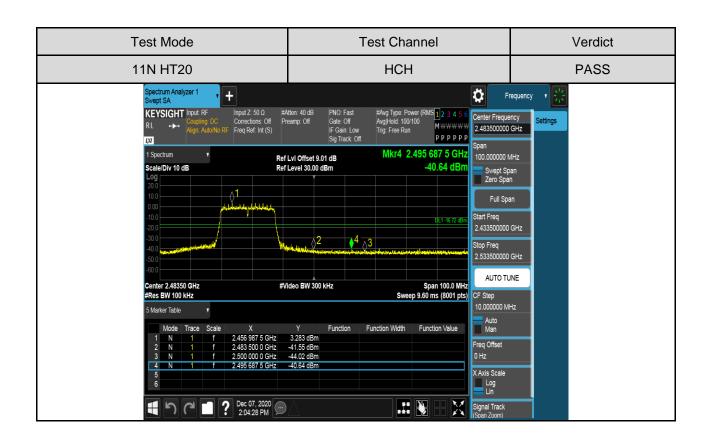


**Test Channel** Test Mode Verdict LCH **PASS** 11G pectrum Analyzer 1 wept SA Ö Frequency KEYSIGHT Input RF Center Frequency M₩₩₩₩ 2.400000000 GHz PPPPPP Mkr4 2.379 862 5 GHz Ref LvI Offset 9.05 dB Ref Level 30.00 dBm 100.000000 MHz -41.11 dBr Scale/Div 10 dB Full Span Start Freq 2.350000000 GHz **∆**3 Stop Freq 2.450000000 GHz AUTO TUNE enter 2.40000 GHz #Video BW 300 kHz Span 100.0 MH Res BW 100 kHz Sweep 9.60 ms (8001 pts) Auto Man Function Function Width Function Value 3.583 dBm -39.10 dBm -43.59 dBm Freq Offset 2.400 000 0 GHz 2.390 000 0 GHz X Axis Scale Log Lin Signal Track (Span Zoom)

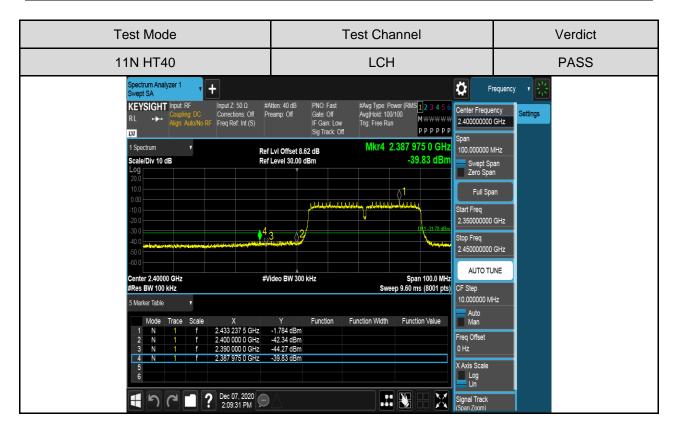


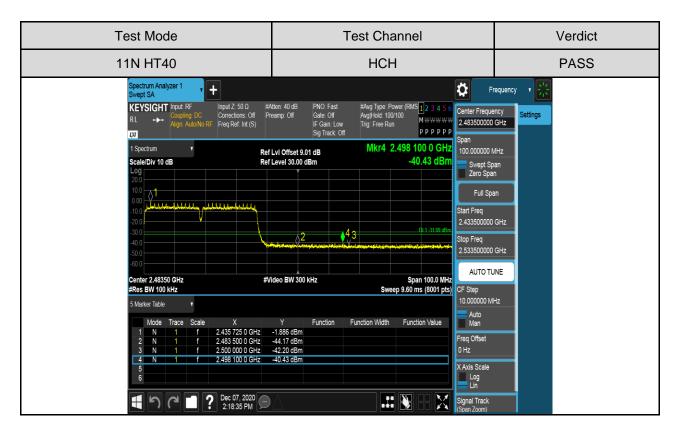


**Test Channel** Test Mode Verdict LCH **PASS** 11N HT20 pectrum Analyzer 1 wept SA Ö Frequency KEYSIGHT Input RF Center Frequency Settings M₩₩₩₩ 2.400000000 GHz PPPPPP Mkr4 2.388 312 5 GHz Ref LvI Offset 9.05 dB Ref Level 30.00 dBm 100.000000 MHz -40.48 dB Scale/Div 10 dB Full Span Start Freq 2.350000000 GHz <sup>4</sup><sub>3</sub> Stop Freq 2.450000000 GHz AUTO TUNE enter 2.40000 GHz #Video BW 300 kHz Span 100.0 MH Res BW 100 kHz Sweep 9.60 ms (8001 pts) Auto Man Function Function Width Function Value 3.830 dBm -39.64 dBm -43.90 dBm Freq Offset 2.400 000 0 GHz 2.390 000 0 GHz X Axis Scale Log Lin # 🐉 Signal Track (Span Zoom)











Page 45 of 152

# Part II :Conducted Emission

Test Result Table

Test Mode	Test Antenna	Channel	Pref(dBm)	Puw(dBm)	Verdict
	11B Antenna 1	LCH	6.40	<limit< td=""><td>PASS</td></limit<>	PASS
11B		MCH	6.19	<limit< td=""><td>PASS</td></limit<>	PASS
		HCH	6.01	<limit< td=""><td>PASS</td></limit<>	PASS
		LCH	3.72	<limit< td=""><td>PASS</td></limit<>	PASS
11G	Antenna 1	MCH	3.48	<limit< td=""><td>PASS</td></limit<>	PASS
110		HCH	3.26	<limit< td=""><td>PASS</td></limit<>	PASS
		LCH	3.74	<limit< td=""><td>PASS</td></limit<>	PASS
11N HT20	Antenna 1	MCH	3.27	<limit< td=""><td>PASS</td></limit<>	PASS
111411120		HCH	3.19	<limit< td=""><td>PASS</td></limit<>	PASS
11N HT40	Antenna 1	LCH	-1.61	<limit< td=""><td>PASS</td></limit<>	PASS
		MCH	-2.00	<limit< td=""><td>PASS</td></limit<>	PASS
		HCH	-1.82	<limit< td=""><td>PASS</td></limit<>	PASS

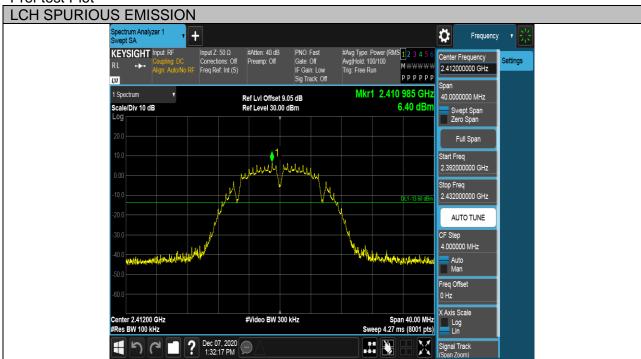


Page 46 of 152

### **Test Plots**

Test Mode	Channel	Verdict
11B	LCH	PASS

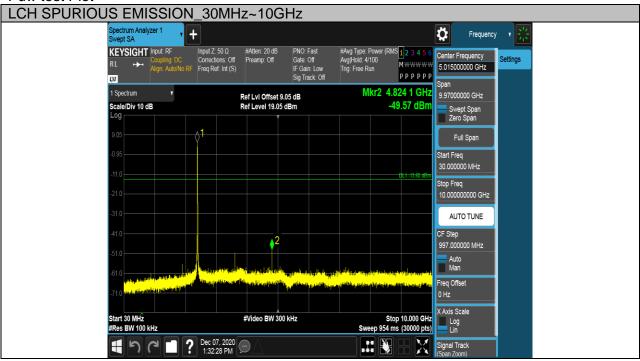
### Pref test Plot

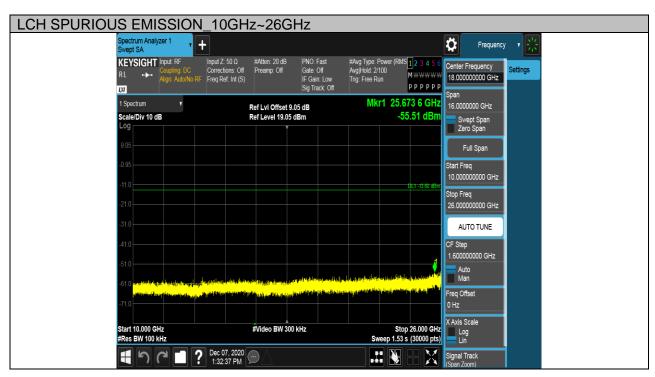




Page 47 of 152

#### Puw test Plot







Page 48 of 152

Test Mode	Channel	Verdict
11B	MCH	PASS

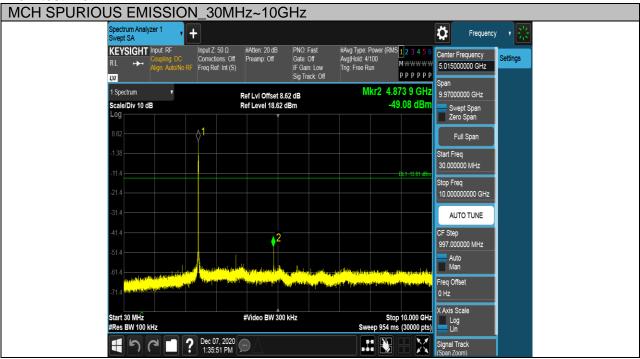
### Pref test Plot

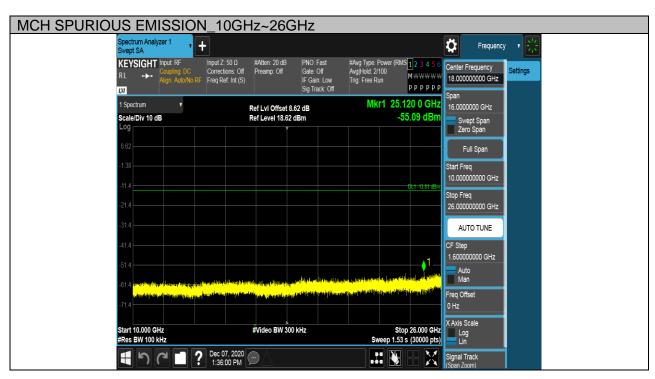




Page 49 of 152

#### Puw test Plot







Page 50 of 152

Test Mode	Channel	Verdict
11B	HCH	PASS

### Pref test Plot

