FCC 47 CFR PART 15 SUBPART C

CERTIFICATION TEST REPORT

For

IP Villa Outdoor Station

MODEL NUMBER: VTO2211G-WP

ADDITIONAL MODEL NUMBER: DHI-VTO2211G-WP

PROJECT NUMBER: 4789495399

REPORT NUMBER: 4789495399-1

FCC ID: SVN-VTO2211G-WP

ISSUE DATE: Jul. 29, 2020

Prepared for

Zhejiang Dahua Vision Technology Co., Ltd.

Prepared by

UL-CCIC COMPANY LIMITED
No. 2, Chengwan Road, Suzhou Industrial Park, People's Republic of China
Tel: +86 512-6808 6400
Fax: +86 512-6808 4099
Website: www.ul.com

Revision History

Rev.	Issue Date	Revisions	Revised By
V0	07/29/2020	Initial Issue	

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name:	Zhejiang Dahua Vision Technology Co., Ltd.
Address:	No.1199, Bin'an road, Binjiang District, Hangzhou, P.R.China.

Manufacturer Information

Company Name:	Zhejiang Dahua Vision Technology Co., Ltd.
Address:	No.1199, Bin'an road, Binjiang District, Hangzhou, P.R.China.

EUT Description

Product Name:	IP Villa Outdoor Station
Model Name:	VTO2211G-WP
Additional No.:	DHI-VTO2211G-WP
Sample Number:	3084887
Data of Receipt Sample:	May. 27, 2020
Date Tested:	May. 27, 2020 ~ Jun. 26, 2020

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

Prepared By:

Jason Yang

Jason Yang
Engineer

Reviewed By:

Tom Tang

Tom Tang
Engineer Project Associate

Authorized By:

Chris Zhong

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.

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.

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	3.00dB
Radiation Emission test(include Fundamental emission) (9KHz-30MHz)	3.306dB
Radiation Emission test(include Fundamental emission) (30MHz-1GHz)	3.306dB
Radiation Emission test (1GHz to 26GHz)(include Fundamental emission)	3.828dB (1GHz-18Gz)
	4.130dB (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:	IP Villa Outdoor Station
Model No.:	VTO2211G-WP
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 power grade:	N/A
Test software of EUT:	Secure CRT (manufacturer declare)
Antenna Type:	Patch Antenna
Antenna Gain:	Ant1: 6.12 dBi
	Ant2: 2.00 dBi

Remark:
Model No.:

Number	Name	Number	Name
1	VTO2211G-WP	2	DHI-VTO2211G-WP

Only the main model VTO2211G-WP 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 model name and selling area are different.

5.2. MAXIMUM OUTPUT POWER

Number of Transmit Chains (NTX)	IEE Std. 802.11	Channel Number	Max Peak Conducted Power-Ant 1 (dBm)	Max Peak Conducted Power-Ant 2 (dBm)	Max Peak Conducted Power-Ant 1+2 (dBm)
1/2	IEEE 802.11B	1-11[11]	17.80	16.51	N/A
1/2	IEEE 802.11G	1-11[11]	22.28	21.22	N/A
1/2	IEEE 802.11nHT20	1-11[11]	22.58	21.36	25.02
1/2	IEEE 802.11nHT40	3-9[7]	N/A	N/A	N/A

Number of Transmit Chains (NTX)	IEE Std. 802.11	Channel Number	Max AVG Conducted Power-Ant 1 (dBm)	Max AVG Conducted Power-Ant 2 (dBm)	Max AVG Conducted Power-Ant 1+2 (dBm)
1/2	IEEE 802.11B	1-11[11]	14.89	13.75	N/A
1/2	IEEE 802.11G	1-11[11]	14.13	12.90	N/A
1/2	IEEE 802.11nHT20	1-11[11]	14.06	12.81	16.49
1/2	IEEE 802.11nHT40	3-9[7]	12.03	10.39	14.30

5.3. CHANNEL LIST

Channel List for 802.11b/g/n (20 MHz)							
Channel	Frequency (MHz)	Channel	Frequency (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	Frequency (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 (MHz)
IEEE 802.11B	LCH :CH01 2412
	MCH: CH06 2437
	HCH: CH11 2462
IEEE 802.11G	LCH :CH01 2412
	MCH: CH06 2437
	HCH: CH11 2462
IEEE 802.11n HT20	LCH :CH01 2412
	MCH: CH06 2437
	HCH: CH11 2462
IEEE 802.11n HT40	LCH :CH03 2422
	MCH: CH06 2437
	HCH: CH09 2452

5.5. THE WORSE CASE POWER SETTING PARAMETER

The Worse Case Power Setting Parameter under 2400 ~ 2483.5MHz Band							
Test Software		SecureCRT					
Modulation Mode	Transmit Antenna Number	Test Channel					
		NCB: 20MHz			NCB: 40MHz		
		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)
1	2400-2483.5	Patch Antenna	6.12
2	2400-2483.5	Patch Antenna	2.00

Test Mode	Transmit and Receive Mode	Description
IEEE 802.11b	☒1TX, 1RX	Antenna1& Antenna2 can be used as transmitting/receiving antenna independently
IEEE 802.11g	☒1TX, 1RX	Antenna1& Antenna2 can be used as transmitting/receiving antenna independently
IEEE 802.11N (HT20)	☒2TX, 2RX	Antenna1& Antenna2 can be used as transmitting/receiving antenna independently
IEEE 802.11N (HT40)	☒2TX, 2RX	Antenna1& Antenna2 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

5.8. TEST ENVIRONMENT

Environment Parameter	Selected Values During Tests	
Relative Humidity	55 ~ 65%	
Atmospheric Pressure:	1025Pa	
Temperature	TN	23 ~ 28°C
Voltage :	VL	N/A
	VN	DC 12V
	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	E590	N/A

I/O PORT

Cable No	Port	Connector Type	Cable Type	Cable Length(m)	Remarks
1	USB	USB to TTL	USB	100cm Length	N/A
2	LAN	LAN	LAN	100cm Length	N/A

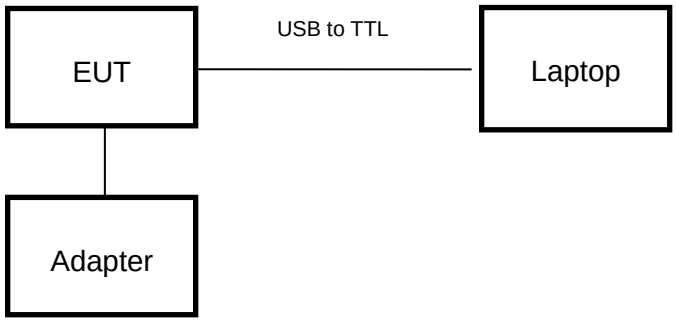
ACCESSORY

Item	Accessory	Brand Name	Model Name	Description
1	DC Adapter	HONOTO	ADS-12AM-12 12012EPCU	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



5.10. MEASURING INSTRUMENT AND SOFTWARE USED

Conducted Emissions (Instrument**)**							
Used	Equipment	Manufacturer	Model No.	Serial No.	Upper Last Cal.	Last Cal.	Next Cal.
☑	EMI Test Receiver	R&S	ESR3	126700	2018-12-13	2019-12-12	2020-12-11
☑	Two-Line V-Network	R&S	ENV216	126701	2018-12-13	2019-12-12	2020-12-11
☑	Artificial Mains Networks	R&S	ENY81	126711	2018-12-13	2019-12-12	2020-12-11
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.	Last Cal.	Next Cal.
☑	Spectrum Analyzer	Keysight	N9010B	MY57110128	2019-05-29	2020-05-28	2021-05-27
☑	EMI test receiver	R&S	ESR26	1267603	2018-12-13	2019-12-22	2020-12-21
☑	Receiver Antenna (9kHz-30MHz)	Schwarzbeck	FMZB 1513	513-265	2019-06-16	2020-06-15	2021-06-14
☑	Receiver Antenna (30MHz-1GHz)	SunAR RF Motion	JB1	126704	N/A	2019-01-28	2022-01-27
☑	Receiver Antenna (1GHz-18GHz)	R&S	HF907	126705	2019-01-26	2020-01-26	2021-01-25
☑	Receiver Antenna (18GHz-26.5GHz)	Schwarzbeck	BBHA9170	126706	2019-02-06	2020-02-05	2021-02-04
☑	Receiver Antenna (26.5GHz-40GHz)	TOYO	HAP 26-40W	00000012	2019-07-23	2020-07-22	2021-07-21
☑	Pre-amplification (To 1GHz)	R&S	SCU-03D	134666	2019-02-06	2020-02-05	2021-02-04
☑	Pre-amplification (To 18GHz)	Compliance Direction System Inc.	PAP-1G18-50	14140-13467	2019-03-18	2020-03-17	2021-03-16
☑	Pre-amplification (To 26.5GHz)	R&S	SCU-26D	134668	2019-02-06	2020-02-05	2021-02-04
☑	Band Reject Filter	Wainwright	WRCJV8-2350-2400-2483.5-2533.5-40SS	1	2019-05-29	2020-05-28	2021-05-27
☑	Highpass Filter	Wainwright	WHKX10-2700-3000-18000-40SS	2	2019-05-29	2020-05-28	2021-05-27
Software							
Used	Description		Manufacturer	Name	Version		
☑	Test Software for Radiated disturbance		Tonscend	JS32	V1.0		
Other instruments							
Used	Equipment	Manufacturer	Model No.	Serial No.	Upper Last Cal.	Last Cal.	Next Cal.
☑	Spectrum Analyzer	Keysight	N9010B	MY57110128	2019-05-29	2020-05-28	2021-05-27
☑	Power Meter	Keysight	U2021XA	MY57110002	2019-06-12	2020-06-11	2021-06-10

6. MEASUREMENT METHODS

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

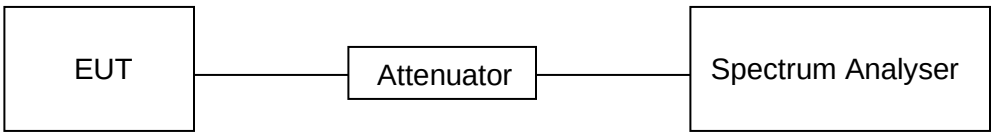
LIMITS

None; for reporting purposes only

PROCEDURE

FCC KDB 558074 Zero-Span Spectrum Analyzer Method

TEST SETUP



TEST ENVIRONMENT

Temperature	22°C	Relative Humidity	56%
Atmosphere Pressure	101kPa	Test Voltage	DC 5V

RESULTS

Mode	On Time (msec)	Period (msec)	Duty Cycle x (Linear)	Duty Cycle (%)	Duty Cycle Correction Factor (db)	1/T Minimum VBW (kHz)	Final VBW (kHz)
11B	12.41	12.56	0.9881	98.81%	0.05	0.08	0.1
11G	2.063	2.3049	0.8950	89.50%	0.48	0.48	0.5
802.11n HT20	1.919	2.176	0.8819	88.19%	0.55	0.52	1
802.11n HT40	0.943	1.184	0.7965	79.65%	0.99	1.06	2

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

11G ON TIME AND DUTY CYCLE MID CH (WORSE CASE)

11N (HT20) ON TIME AND DUTY CYCLE MID CH (WORSE CASE)

11N (HT40) ON TIME AND DUTY CYCLE MID CH (WORSE CASE)

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

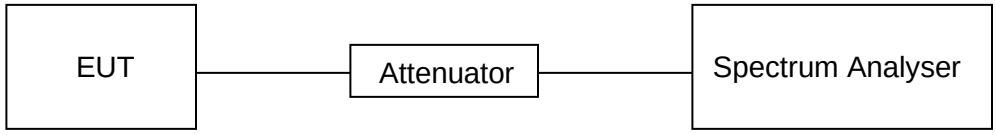
Refer to FCC KDB 558074, connect the UUT to the spectrum analyser and use the following settings:

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

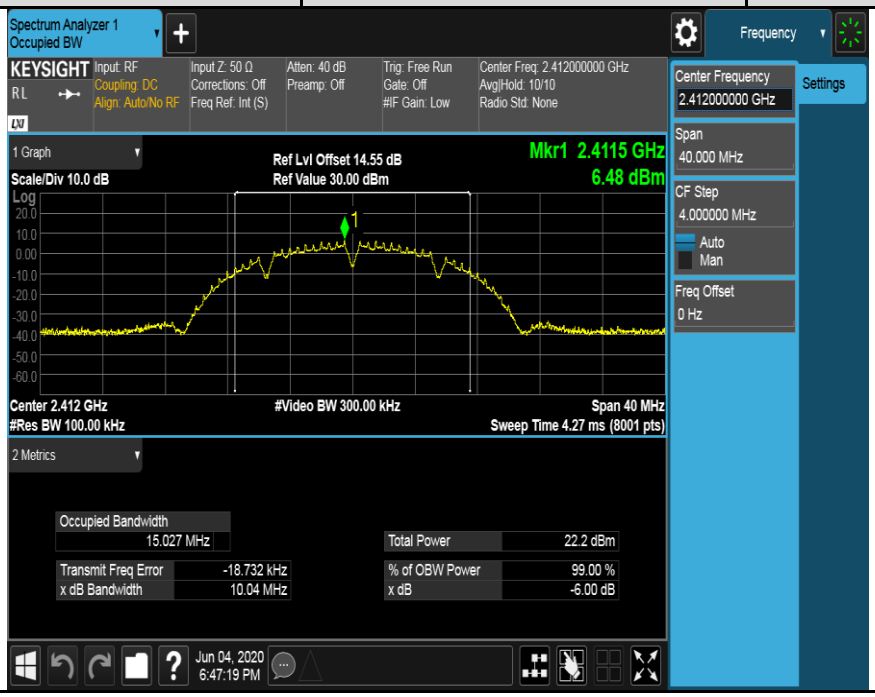


RESULTS

Test Mode	Test Channel	6dB bandwidth (MHz)		Result
		Ant 1	Ant 2	
11B	LCH	10.04	9.566	Pass
	MCH	10.05	9.990	Pass
	HCH	9.566	10.07	Pass
11G	LCH	16.36	16.36	Pass
	MCH	16.34	16.36	Pass
	HCH	16.36	16.38	Pass
11N HT20	LCH	17.57	17.30	Pass
	MCH	17.56	17.57	Pass
	HCH	17.56	17.55	Pass
11N HT40	LCH	35.76	35.73	Pass
	MCH	35.83	35.71	Pass
	HCH	36.29	35.65	Pass

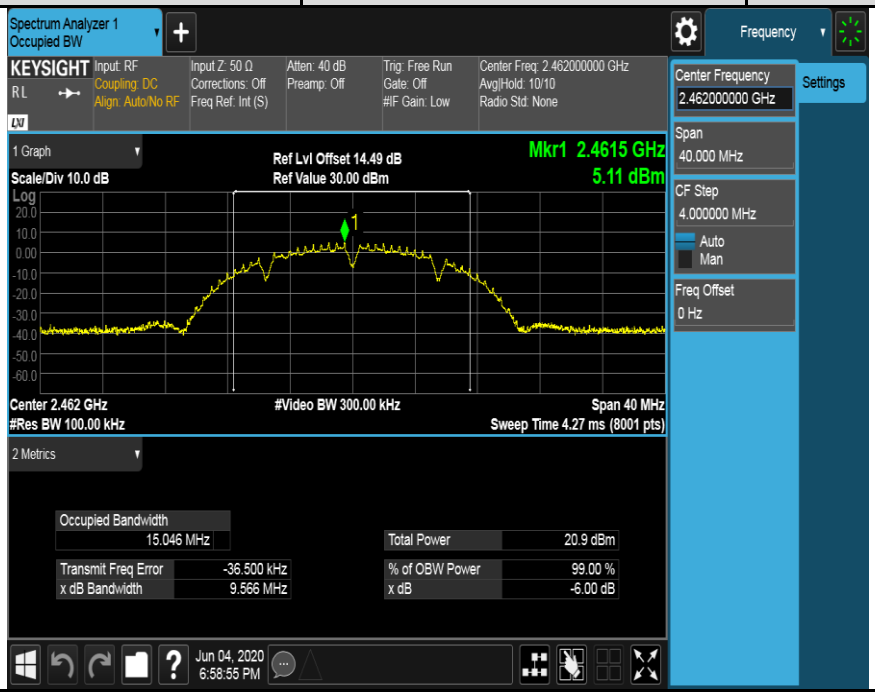
Ant 1:

Test Mode	Test Channel	Verdict
11B	LCH	PASS

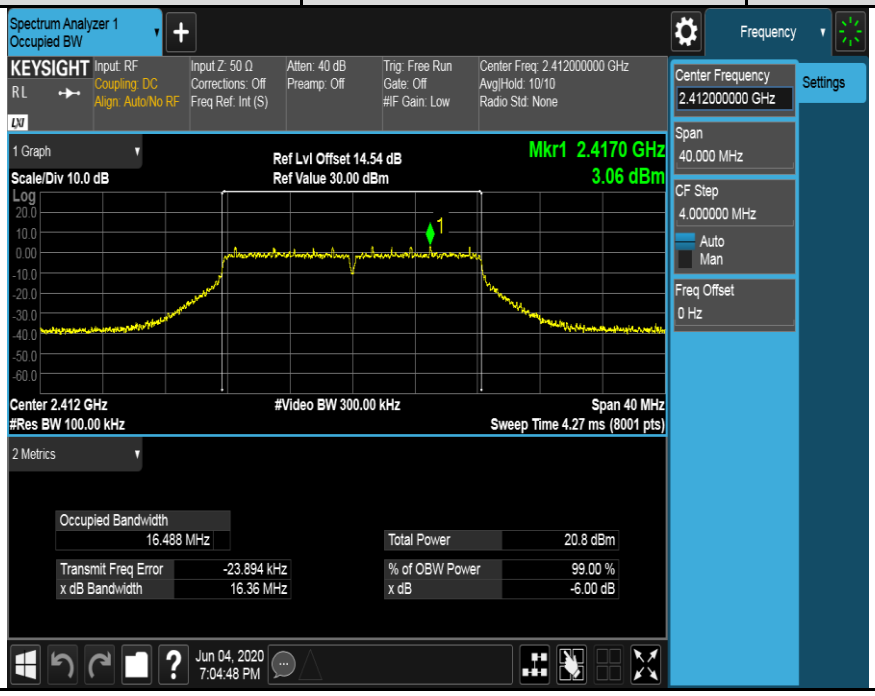


Test Mode	Test Channel	Verdict
11B	MCH	PASS

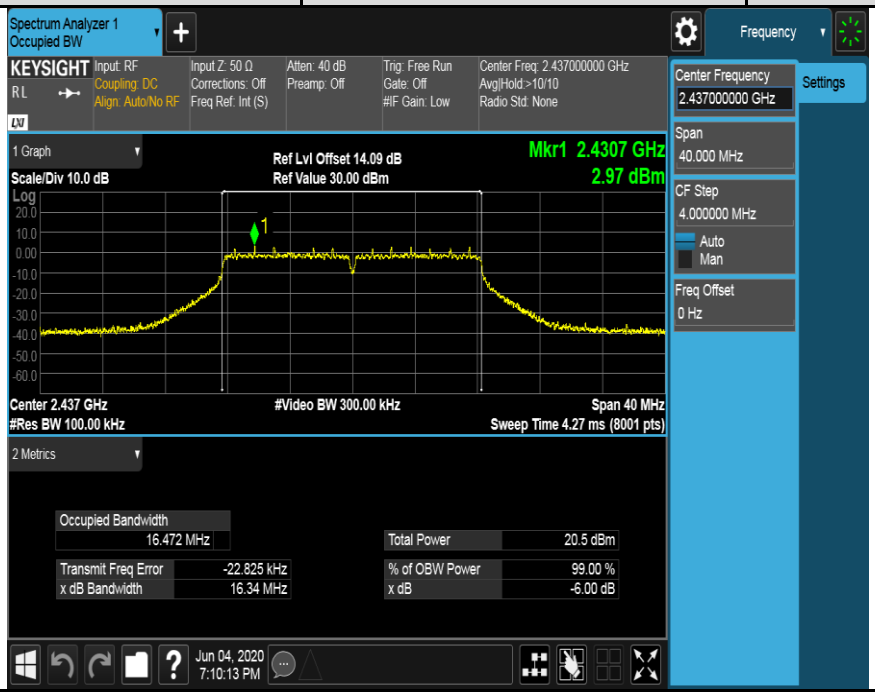
Test Mode	Test Channel	Verdict
11B	HCH	PASS



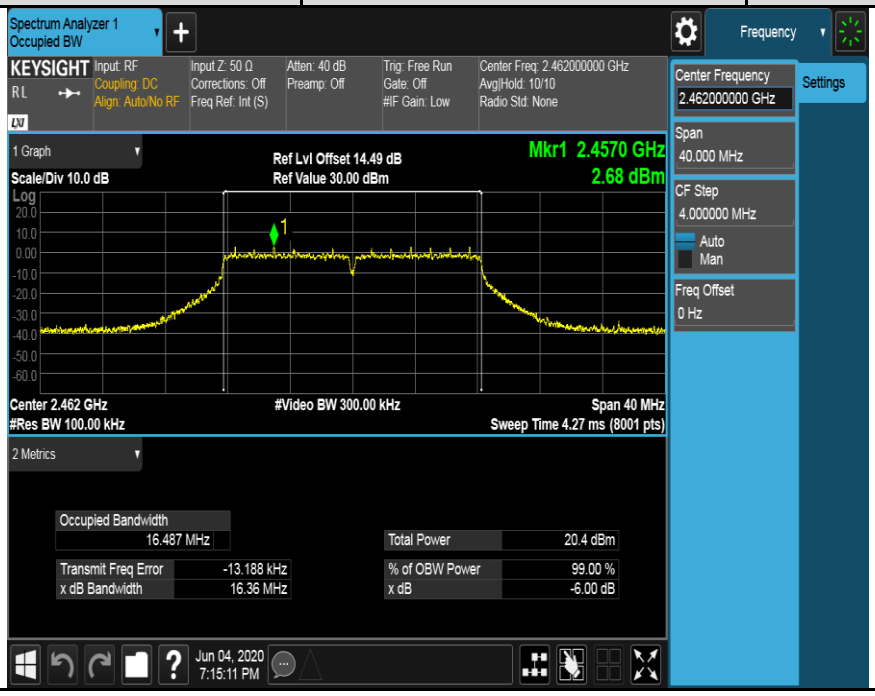
Test Mode	Test Channel	Verdict
11G	LCH	PASS



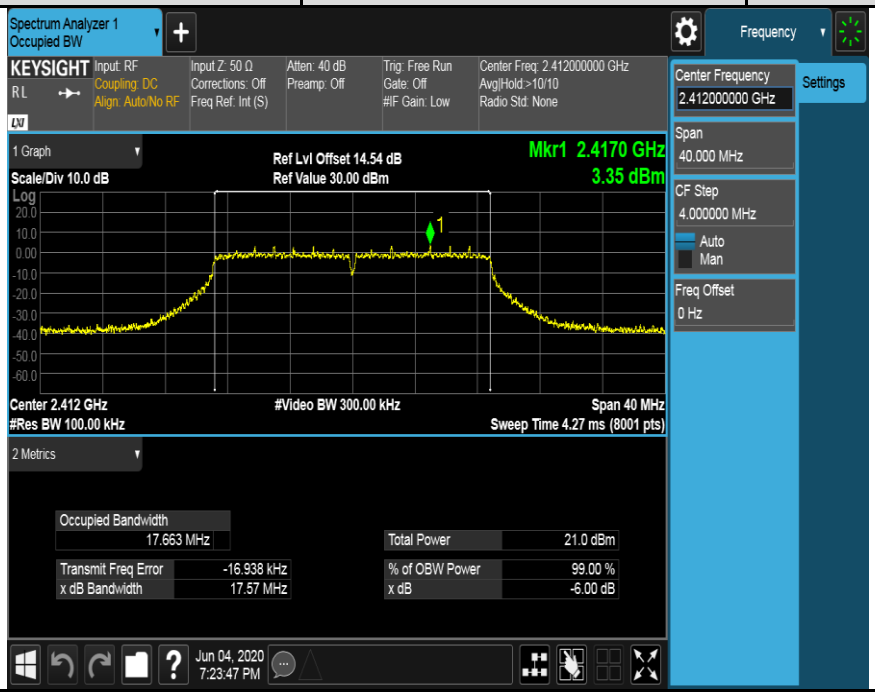
Test Mode	Test Channel	Verdict
11G	MCH	PASS



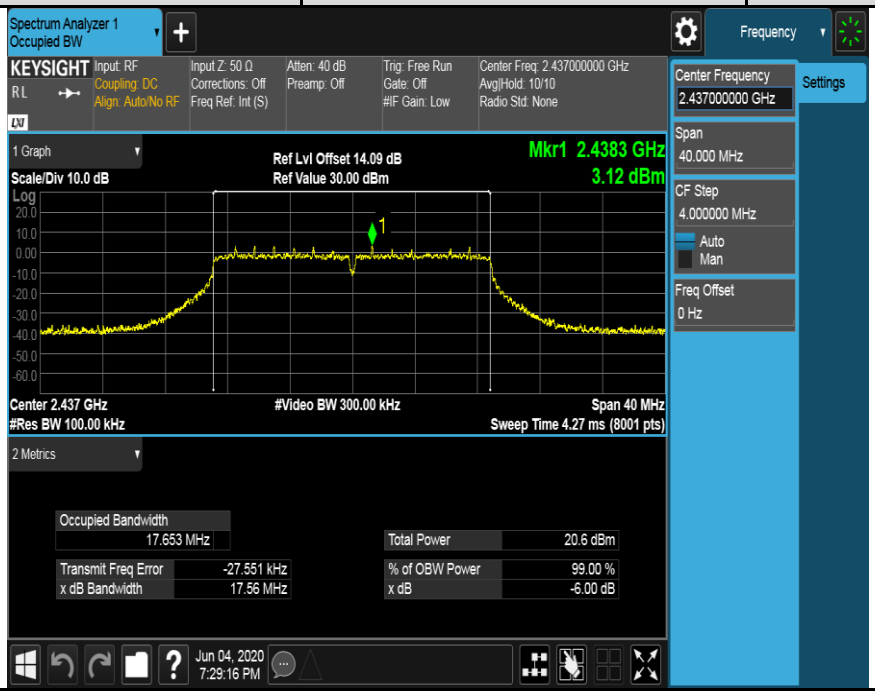
Test Mode	Test Channel	Verdict
11G	HCH	PASS



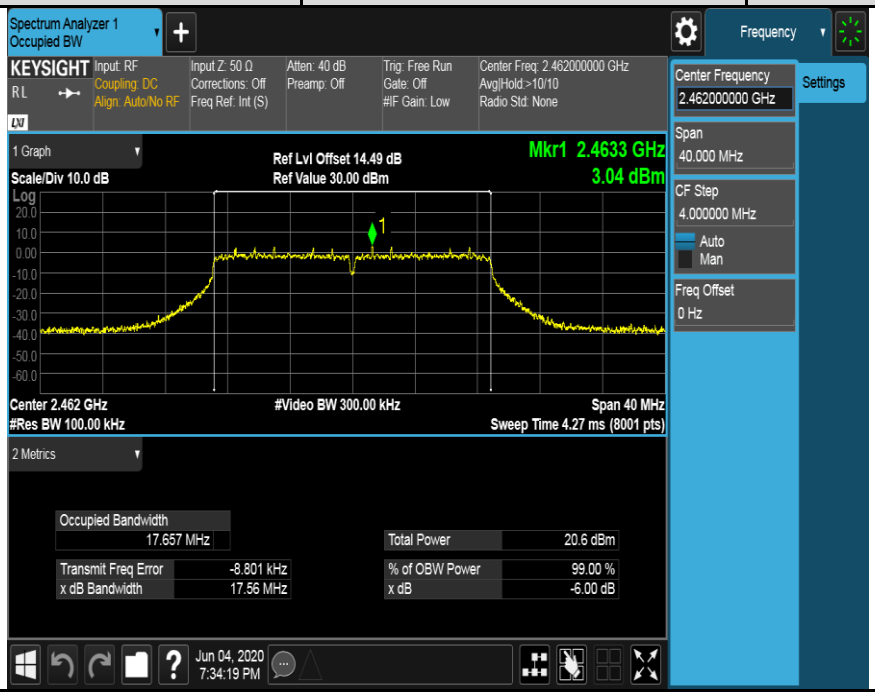
Test Mode	Test Channel	Verdict
11N HT20	LCH	PASS



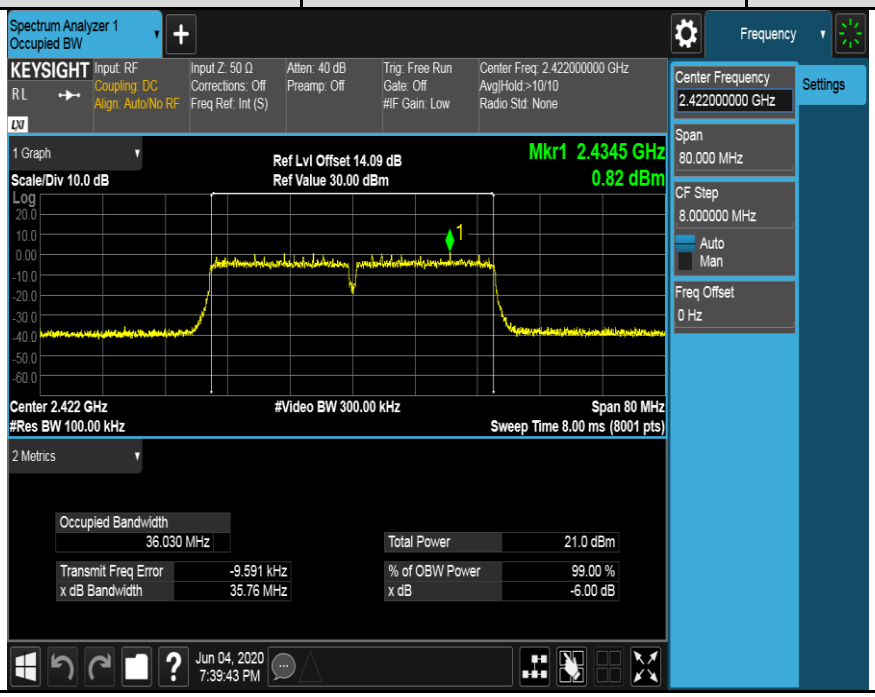
Test Mode	Test Channel	Verdict
11N HT20	MCH	PASS



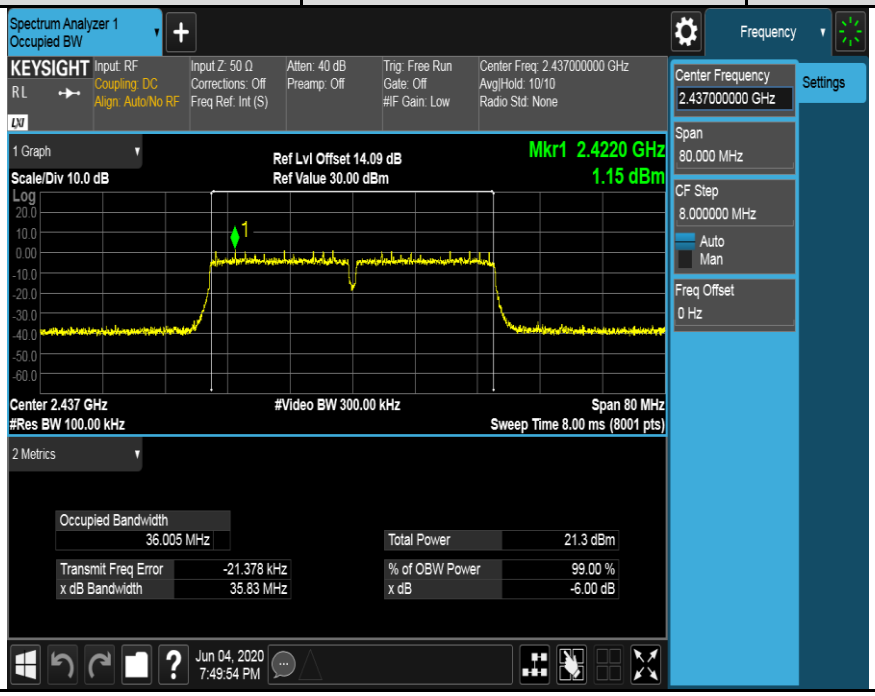
Test Mode	Test Channel	Verdict
11N HT20	HCH	PASS



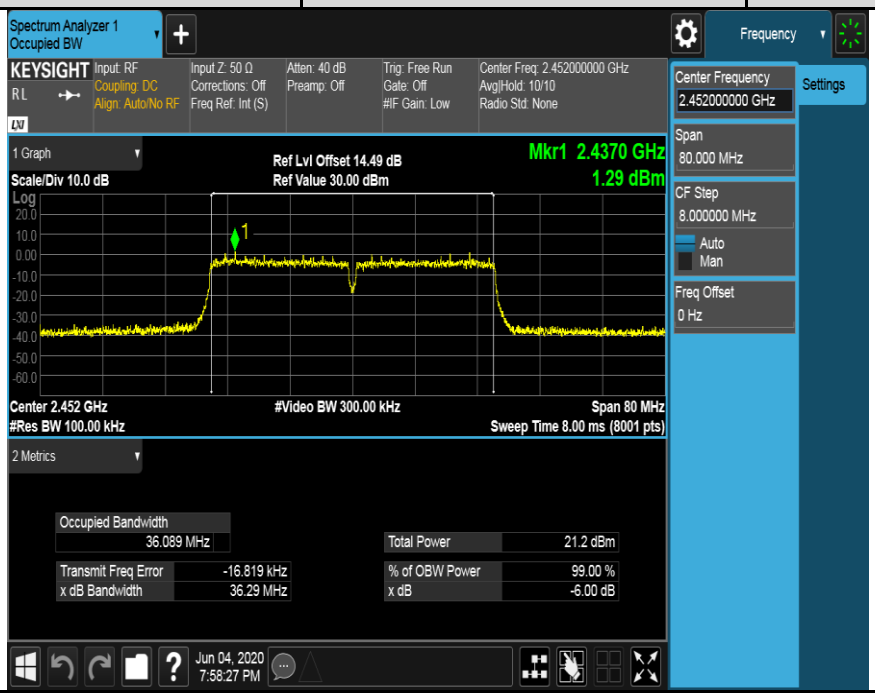
Test Mode	Test Channel	Verdict
11N HT40	LCH	PASS



Test Mode	Test Channel	Verdict
11N HT40	MCH	PASS

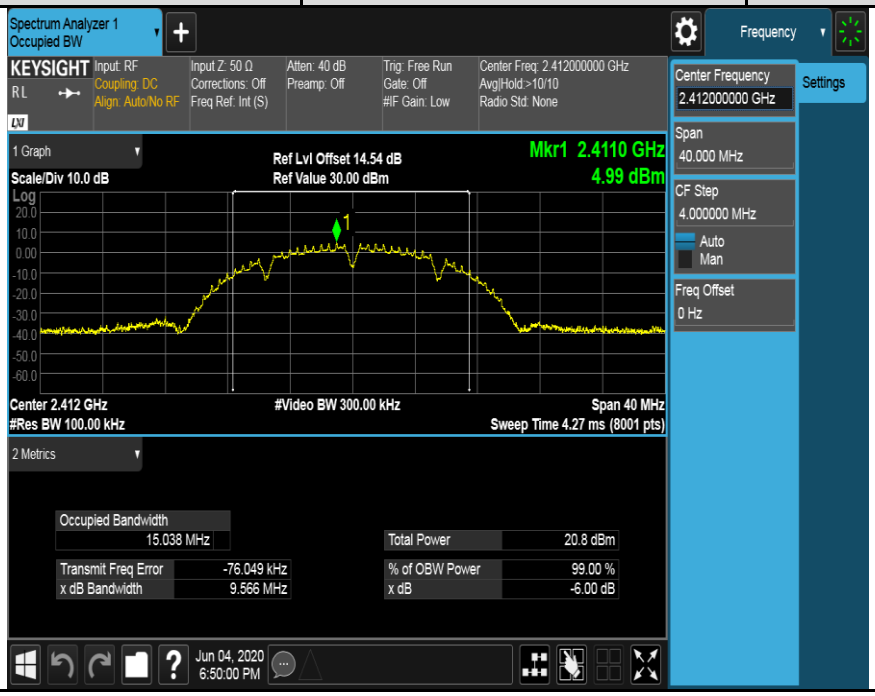


Test Mode	Test Channel	Verdict
11N HT40	HCH	PASS

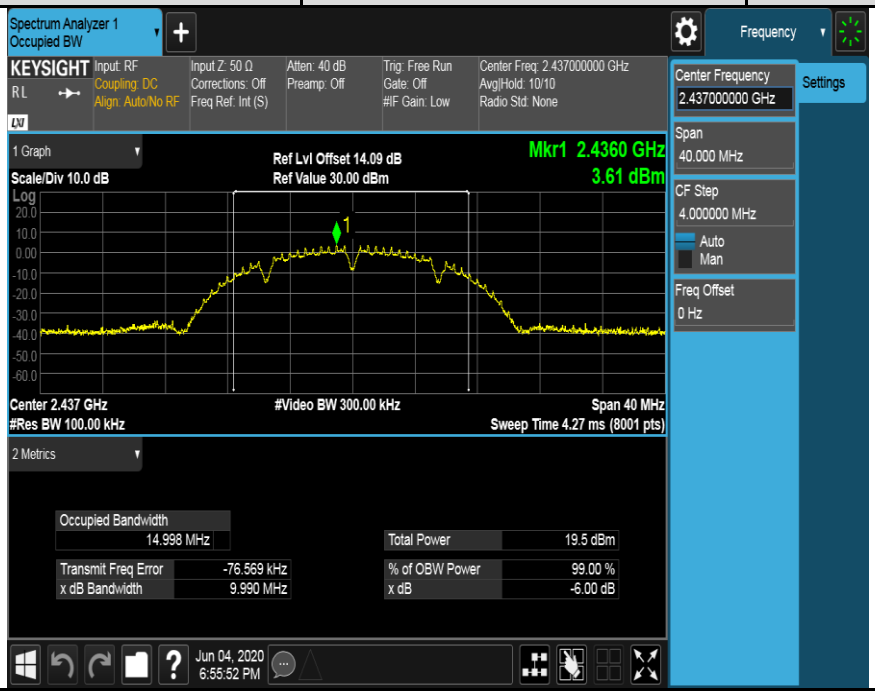


Ant 2:

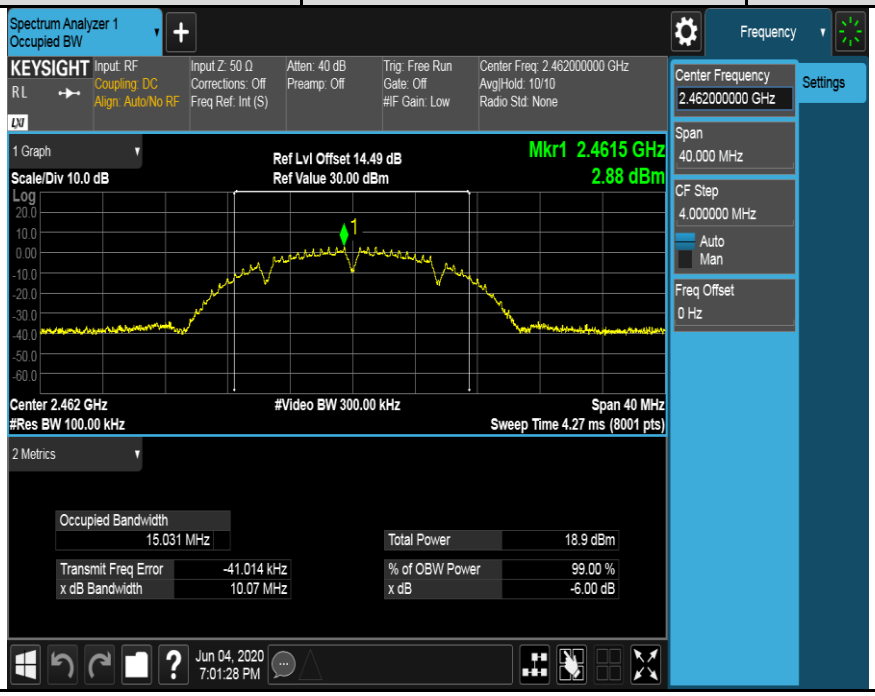
Test Mode	Test Channel	Verdict
11B	LCH	PASS



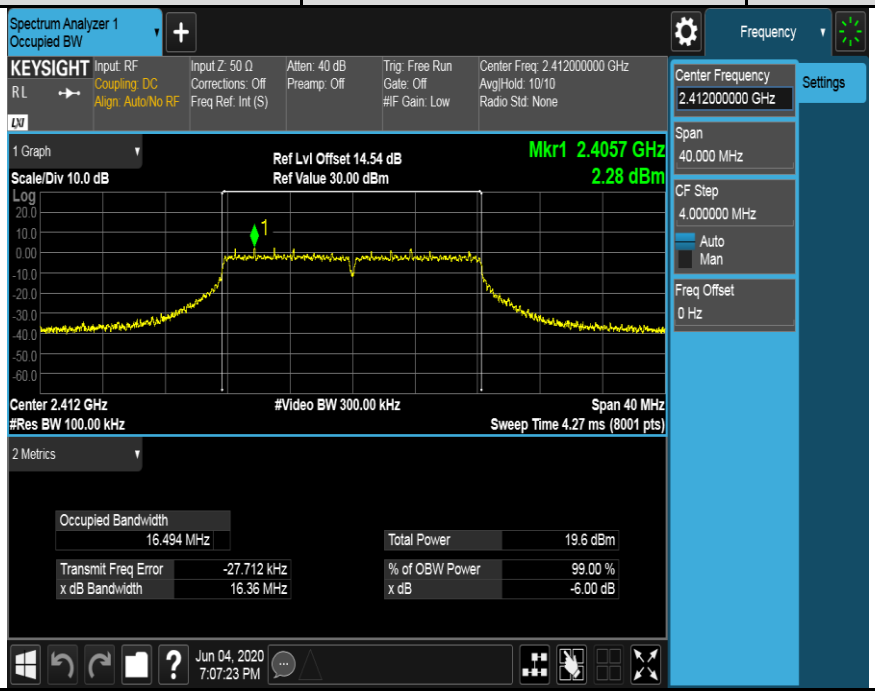
Test Mode	Test Channel	Verdict
11B	MCH	PASS



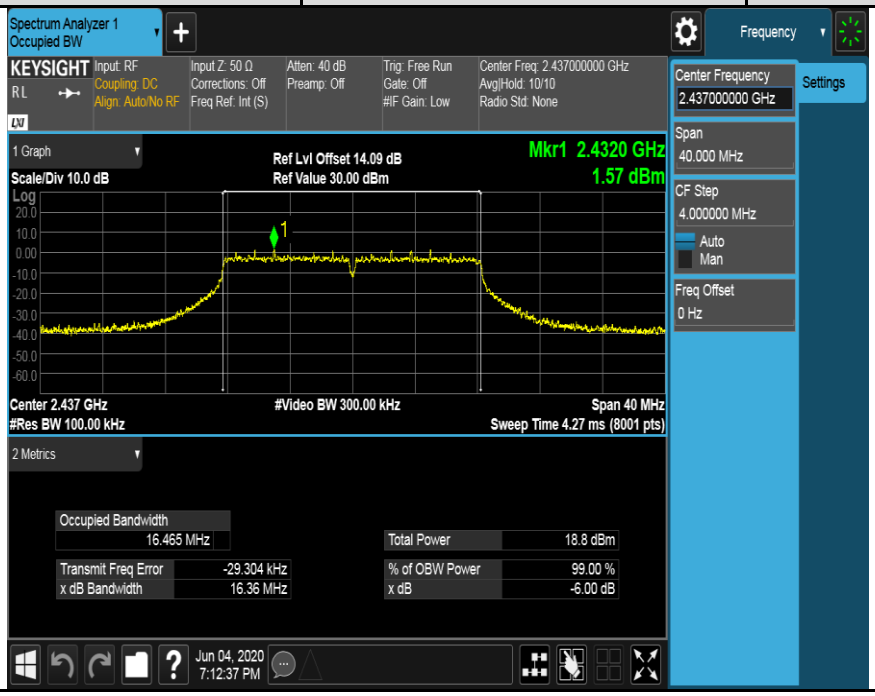
Test Mode	Test Channel	Verdict
11B	HCH	PASS



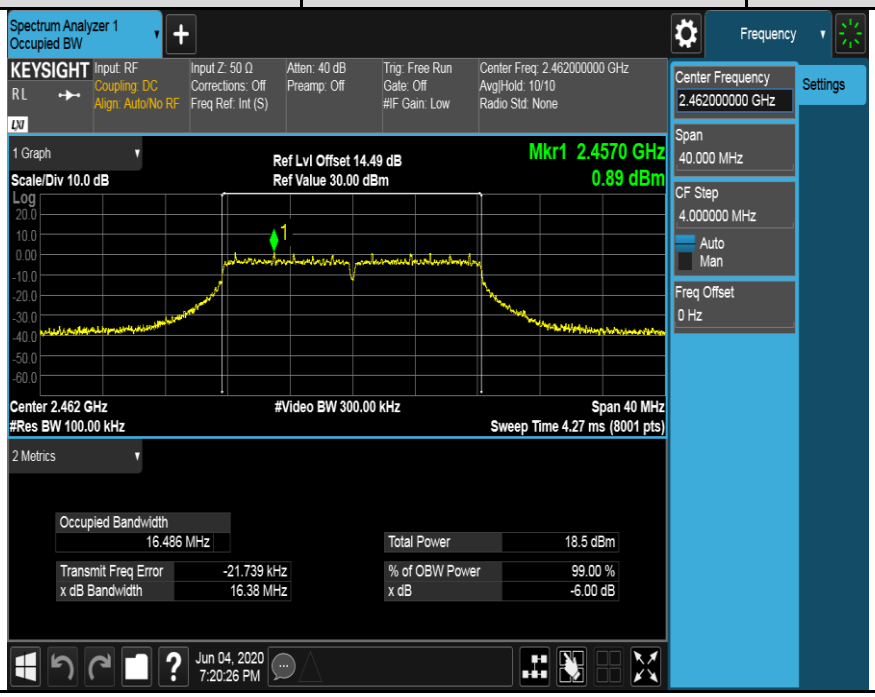
Test Mode	Test Channel	Verdict
11G	LCH	PASS



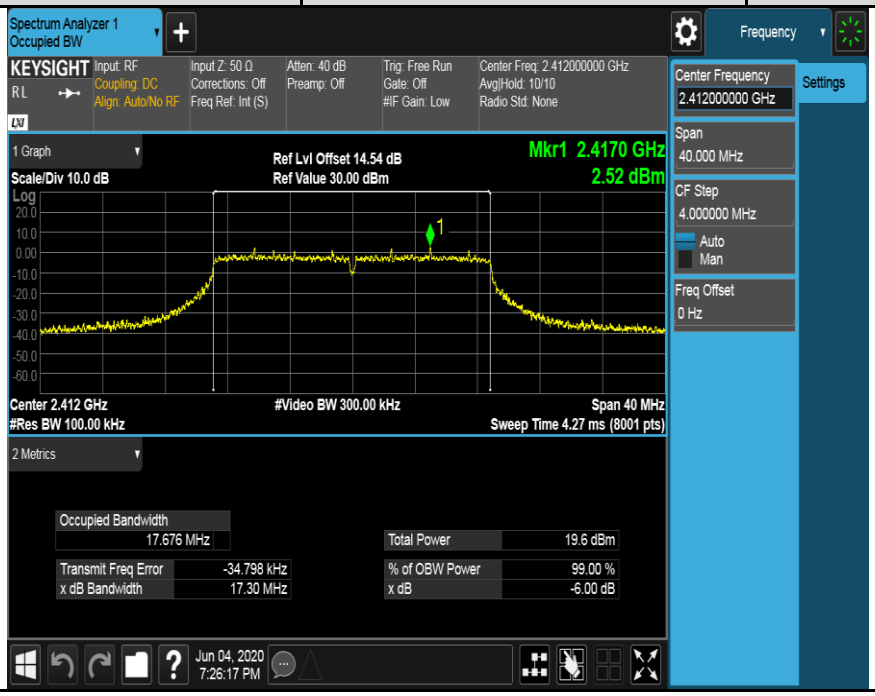
Test Mode	Test Channel	Verdict
11G	MCH	PASS



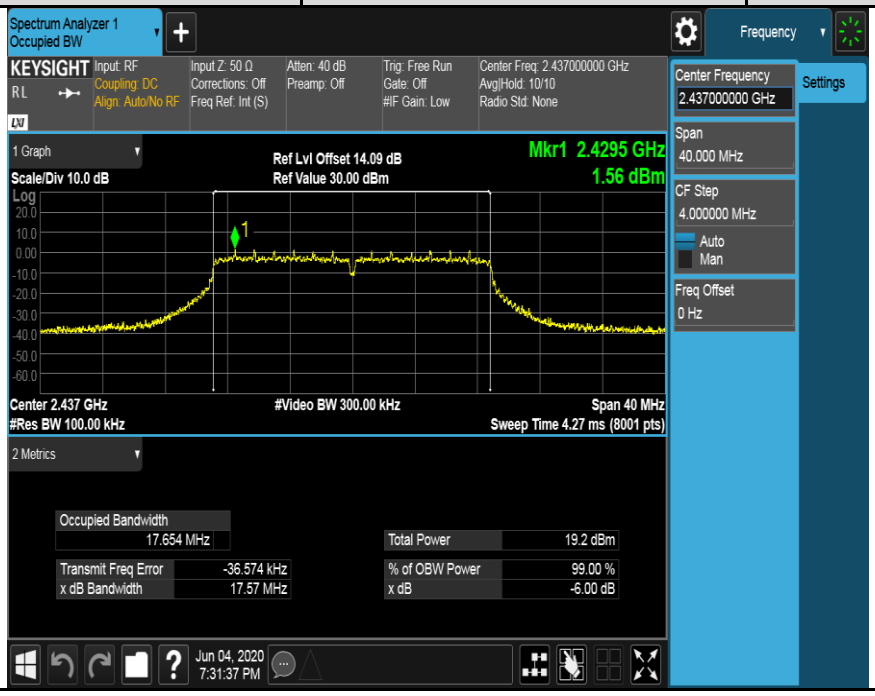
Test Mode	Test Channel	Verdict
11G	HCH	PASS



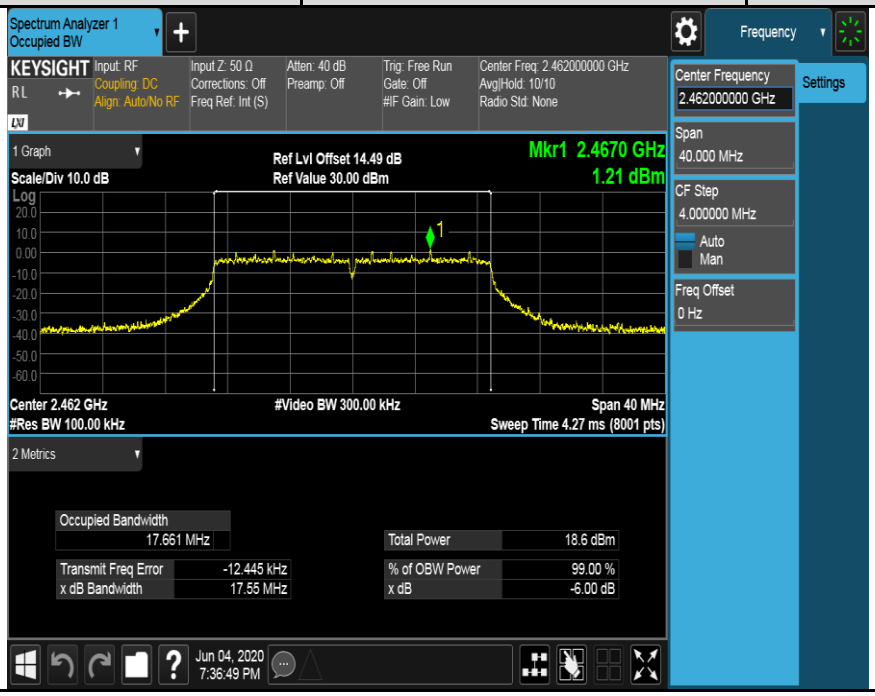
Test Mode	Test Channel	Verdict
11N HT20	LCH	PASS



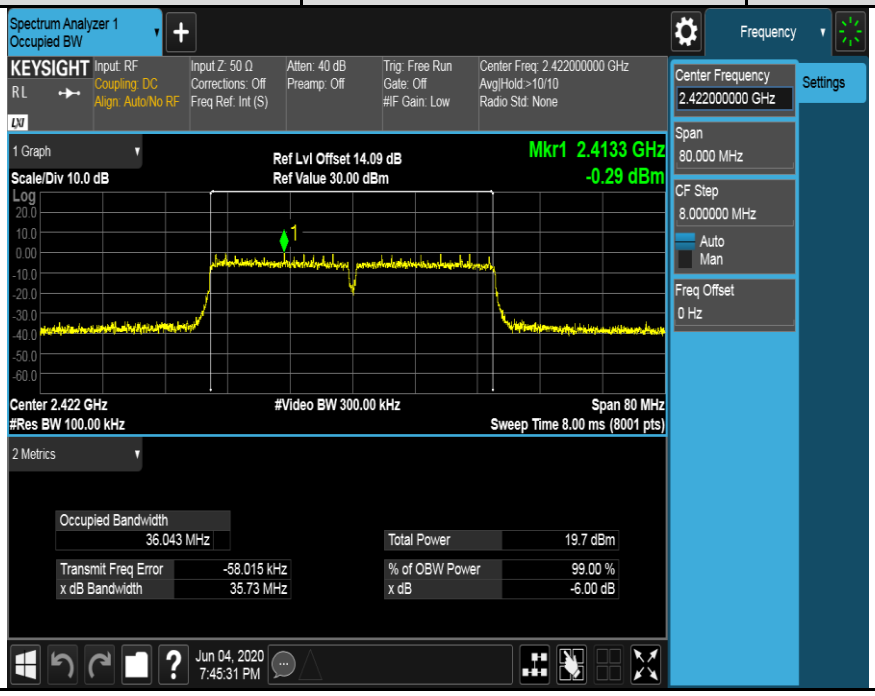
Test Mode	Test Channel	Verdict
11N HT20	MCH	PASS



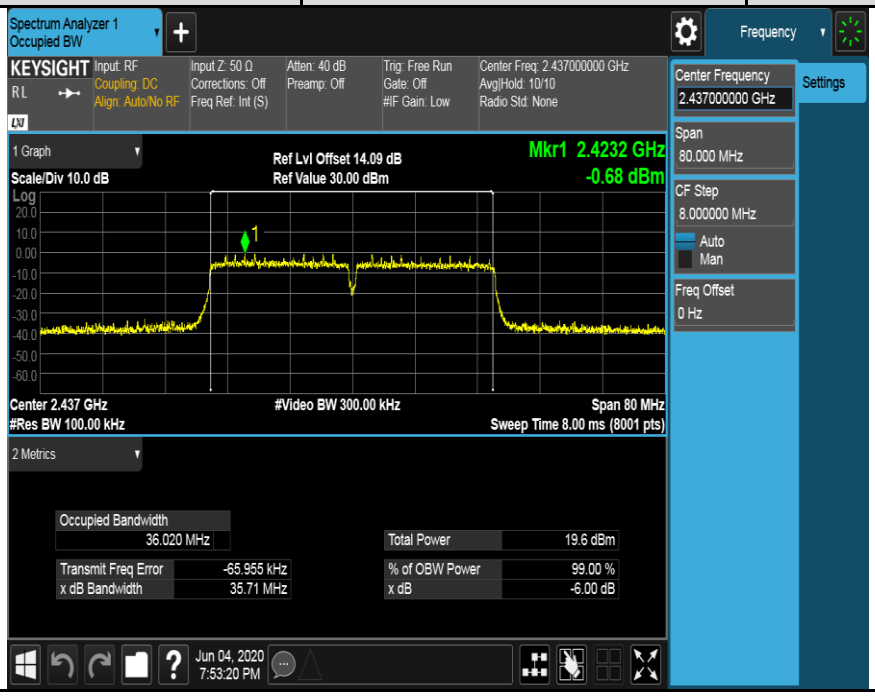
Test Mode	Test Channel	Verdict
11N HT20	HCH	PASS



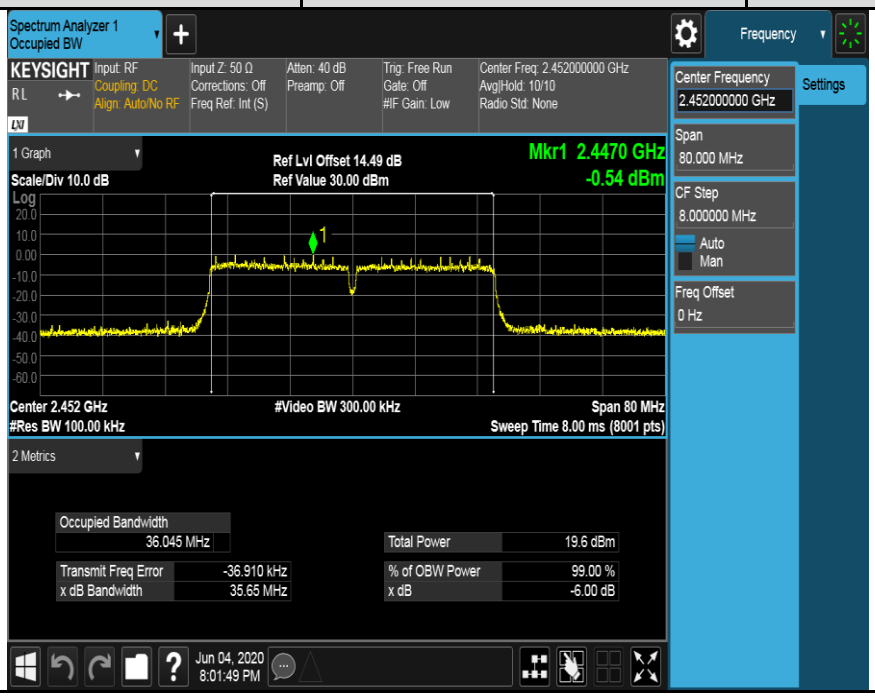
Test Mode	Test Channel	Verdict
11N HT40	LCH	PASS



Test Mode	Test Channel	Verdict
11N HT40	MCH	PASS



Test Mode	Test Channel	Verdict
11N HT40	HCH	PASS



7.3. CONDUCTED OUTPUT POWER

LIMITS

FCC Part15 (15.247) , Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
FCC 15.247(b)(3)	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. 2. Limit=30dBm – (Directional gain -6)dBi The antenna 2 gain of EUT is more than 6 dBi, 1) For the 11b&11g mode, the gain of antenna 1 = 6.12＞6dBi. So, the power limit of antenna 1 shall be reduced to 30 - (6.12 - 6) = 29.88 dBm 2) For the 11n20&11n40 mode, the Directional gain = $10\log [(10^{G1/20}+10^{G2/20})^2/N_{ANT}]$ =7.31 ＞6dBi,where the NANT is the numbers of antenna. So, the power limit shall be reduced to 30 - (7.31 - 6) = 28.69 dBm			

Note: For b/g/n HT20 mode the average data is for reference only.

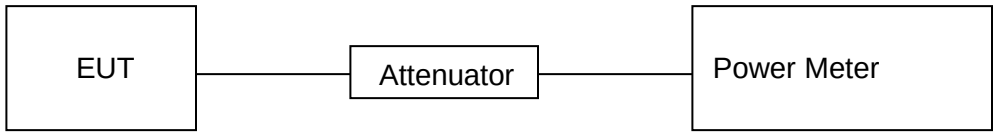
TEST PROCEDURE

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 ENVIRONMENT

Temperature	22°C	Relative Humidity	56%
Atmosphere Pressure	101kPa	Test Voltage	DC 12V

TEST SETUP



RESULTS

Test Mode	Test Channel	Max Peak Conducted Power(dBm)			Result
		Ant 1	Ant 2	Ant 1+2	
11B	LCH	17.80	16.51	N/A	Pass
	MCH	16.89	15.28	N/A	Pass
	HCH	16.63	14.75	N/A	Pass
11G	LCH	22.28	21.22	N/A	Pass
	MCH	21.99	20.75	N/A	Pass
	HCH	21.99	20.01	N/A	Pass
11n HT20 MIMO	LCH	22.58	21.36	25.02	Pass
	MCH	22.22	20.79	24.57	Pass
	HCH	22.20	20.26	24.35	Pass

Test Mode	Test Channel	Max Average Conducted Power(dBm)			LIMIT (dBm)
		Ant 1	Ant 2	Ant 1+2	
11B	LCH	14.89	13.75	N/A	Pass
	MCH	14.09	12.52	N/A	Pass
	HCH	13.90	12.02	N/A	Pass
11G	LCH	14.13	12.90	N/A	Pass
	MCH	13.77	12.21	N/A	Pass
	HCH	13.73	11.75	N/A	Pass
11n HT20 MIMO	LCH	14.06	12.81	16.49	Pass
	MCH	13.70	12.14	14.90	Pass
	HCH	13.68	11.62	15.78	Pass
11n HT40 MIMO	LCH	12.03	10.39	14.30	Pass
	MCH	11.99	10.32	14.25	Pass
	HCH	12.12	10.18	14.27	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/3 kHz	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. 2. Limit=30dBm – (Directional gain -6)dBi The antenna 2 gain of EUT is more than 6 dBi, 1) For the 11b&11g mode, the gain of antenna 1 = 6.12＞6dBi. So, the power limit of antenna 1 shall be reduced to 8 - (6.12 - 6) = 7.88 dBm 2) For the 11n20&11n40 mode, Directional gain = 10log [(10G1/20 +10G2/20)2/NANT] =7.31 ＞6dBi,where the NANT is the numbers of antenna. So, the power limit shall be reduced to 8 - (7.31 - 6) = 6.69 dBm			

TEST PROCEDURE

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

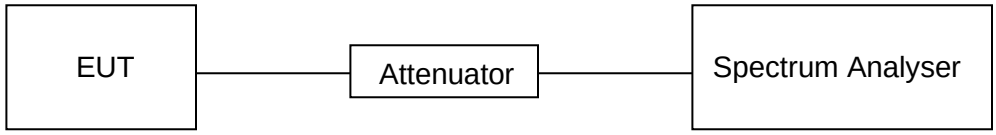
Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	3 kHz ≤ RBW ≤100 kHz
VBW	≥3 × RBW
Span	1.5 x DTS bandwidth
Trace	Max hold
Sweep time	Auto couple.

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	DC 12V

TEST SETUP



RESULTS

Test Mode	Test Channel	Maximum Peak power spectral density (dBm/30kHz)			Result
		Ant 1	Ant 2	Ant 1+2	
11B	LCH	2.04	0.31	N/A	Pass
	MCH	1.43	-0.88	N/A	Pass
	HCH	1.06	-0.03	N/A	Pass
11G	LCH	-1.42	-2.67	N/A	Pass
	MCH	-1.44	-3.44	N/A	Pass
	HCH	-1.52	-3.63	N/A	Pass
11n HT20 MIMO	LCH	-1.62	-2.62	0.92	Pass
	MCH	-1.73	-3.35	0.55	Pass
	HCH	-1.76	-4.33	0.15	Pass
11n HT40 MIMO	LCH	-3.91	-5.04	-1.43	Pass
	MCH	-4.03	-4.76	-1.37	Pass
	HCH	-3.48	-5.16	-1.23	Pass

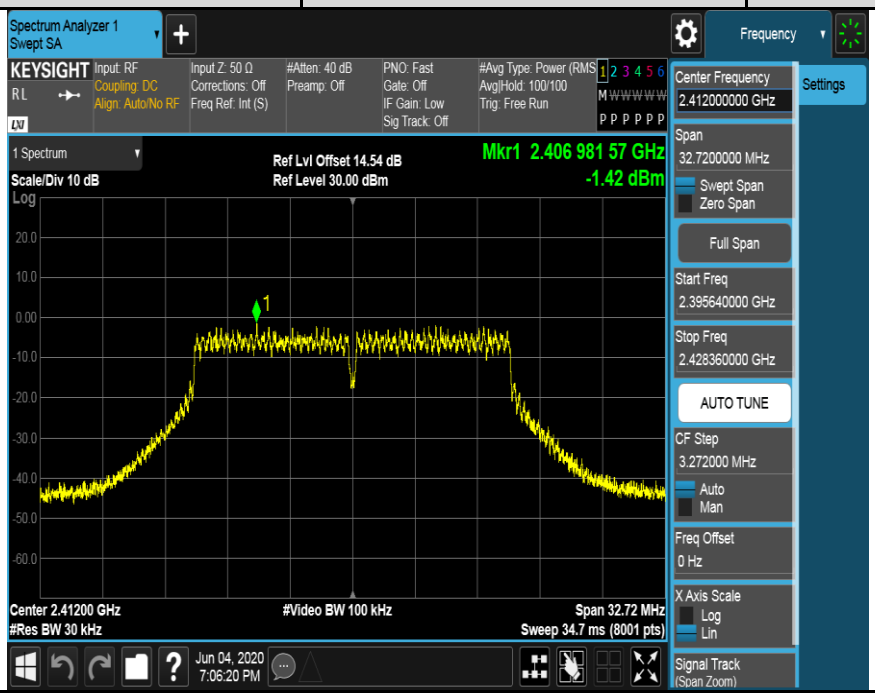
Ant 1:

Test Mode	Test Channel	Verdict
11B	LCH	PASS

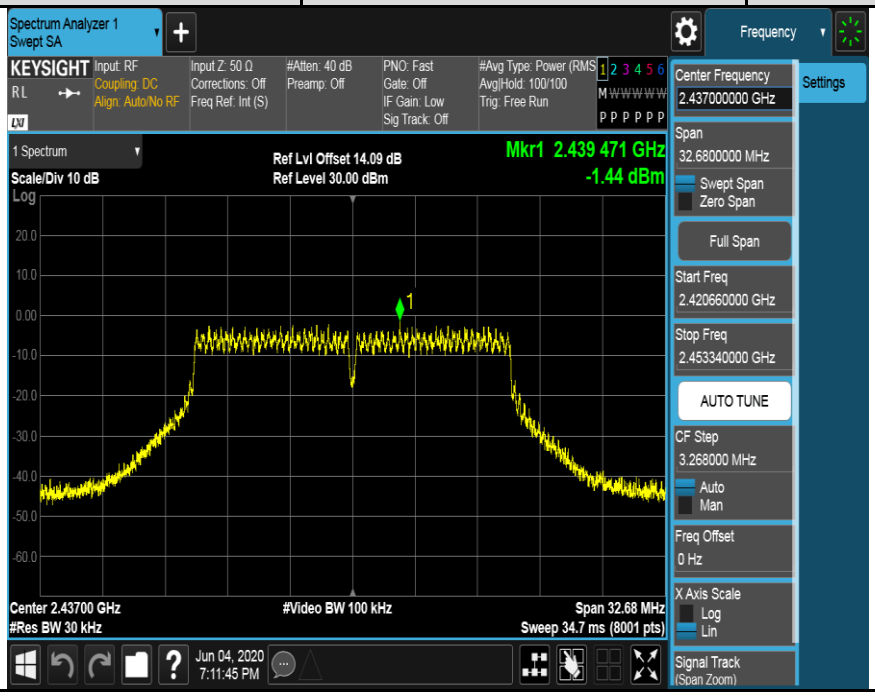
Test Mode	Test Channel	Verdict
11B	MCH	PASS

Test Mode	Test Channel	Verdict
11B	HCH	PASS

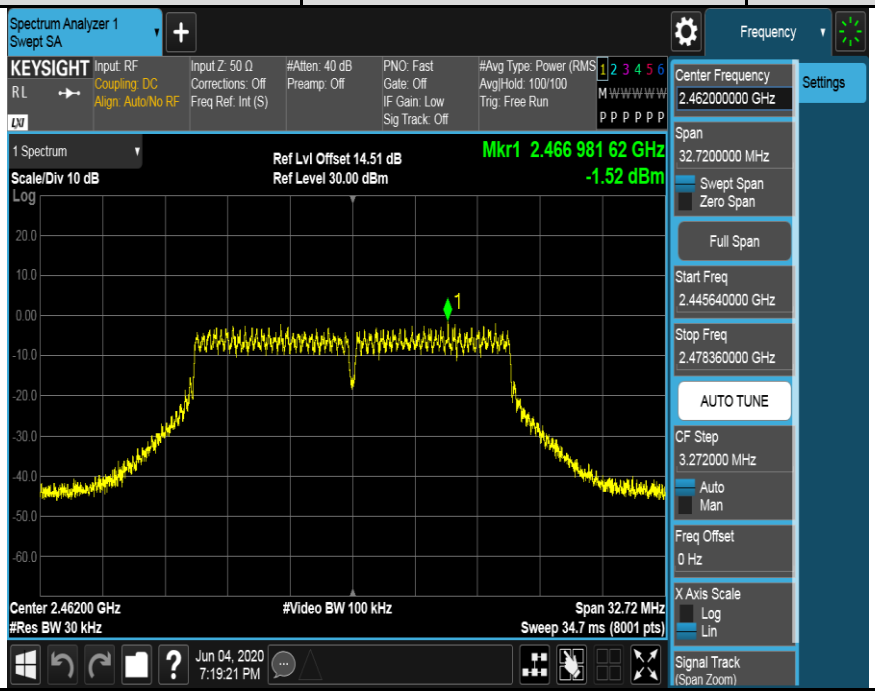
Test Mode	Test Channel	Verdict
11G	LCH	PASS



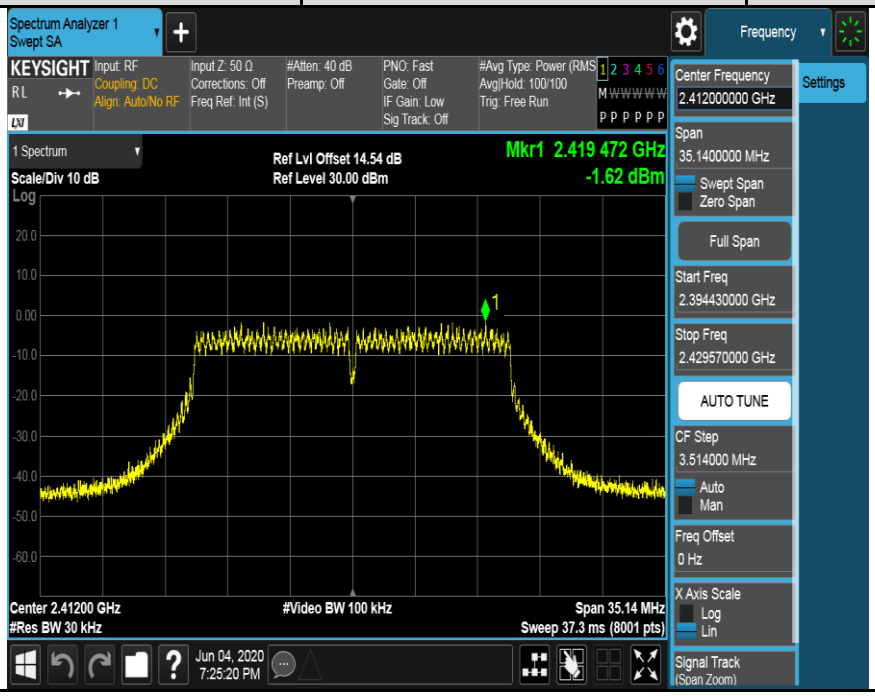
Test Mode	Test Channel	Verdict
11G	MCH	PASS



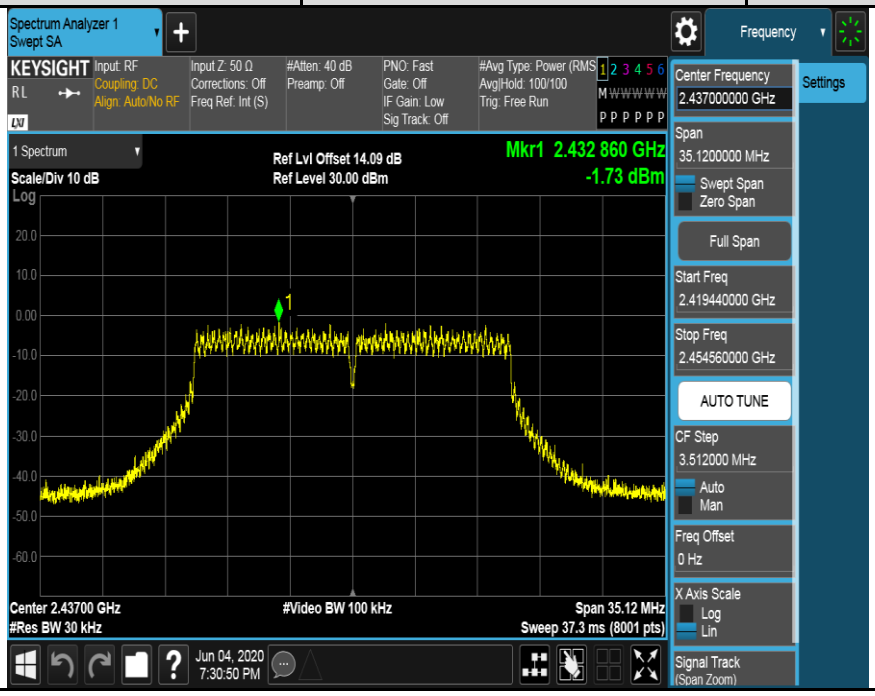
Test Mode	Test Channel	Verdict
11G	HCH	PASS



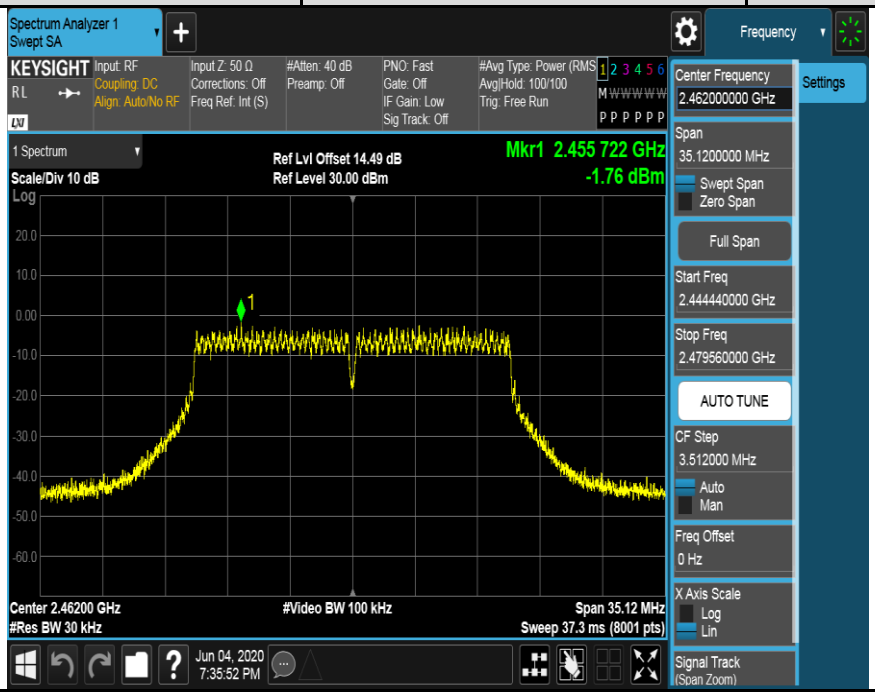
Test Mode	Test Channel	Verdict
11N HT20 MIMO	LCH	PASS



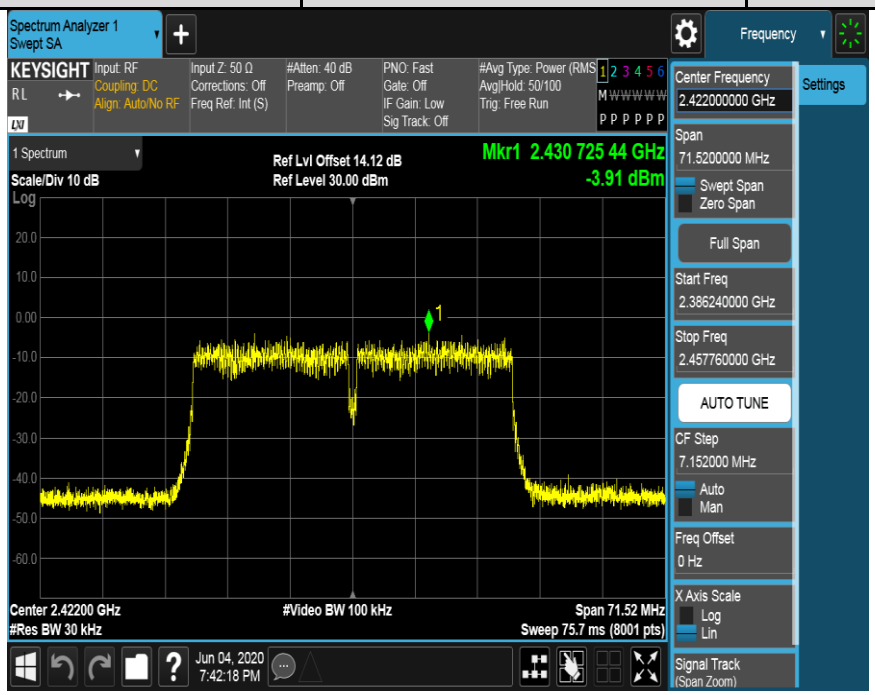
Test Mode	Test Channel	Verdict
11N HT20 MIMO	MCH	PASS



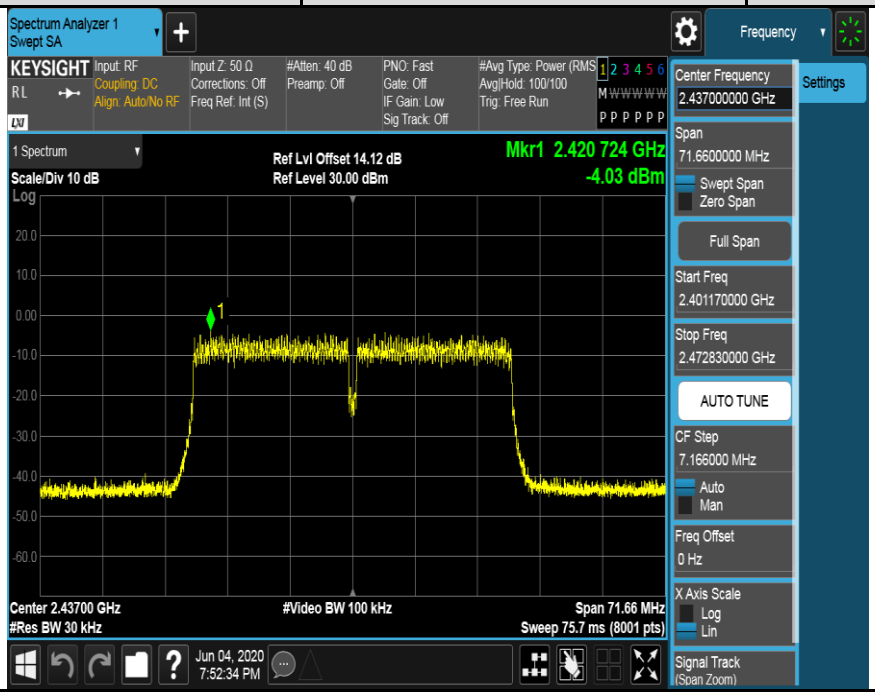
Test Mode	Test Channel	Verdict
11N HT20 MIMO	HCH	PASS



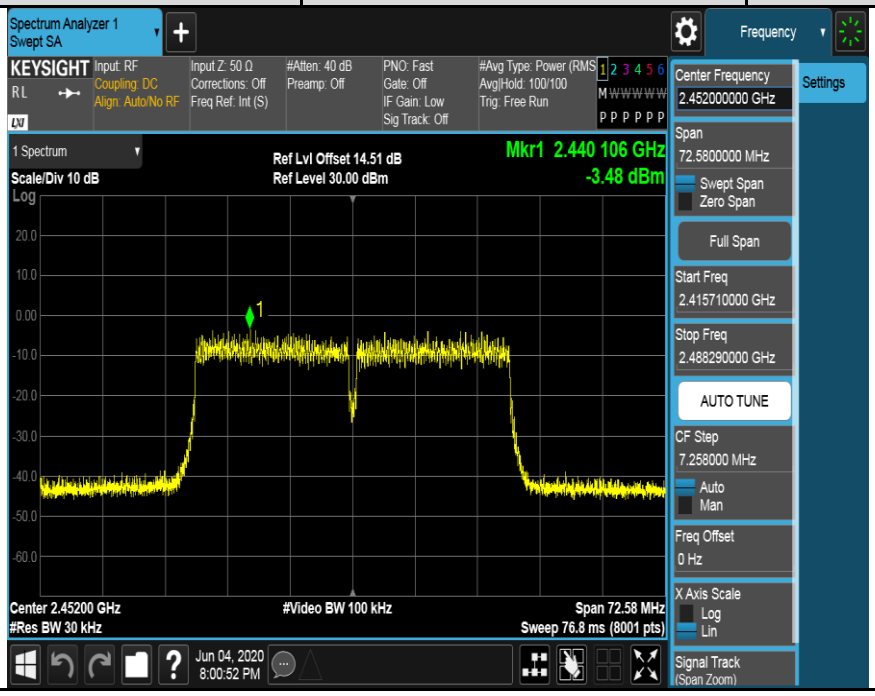
Test Mode	Test Channel	Verdict
11N HT40 MIMO	LCH	PASS



Test Mode	Test Channel	Verdict
11N HT40 MIMO	MCH	PASS



Test Mode	Test Channel	Verdict
11N HT40 MIMO	HCH	PASS



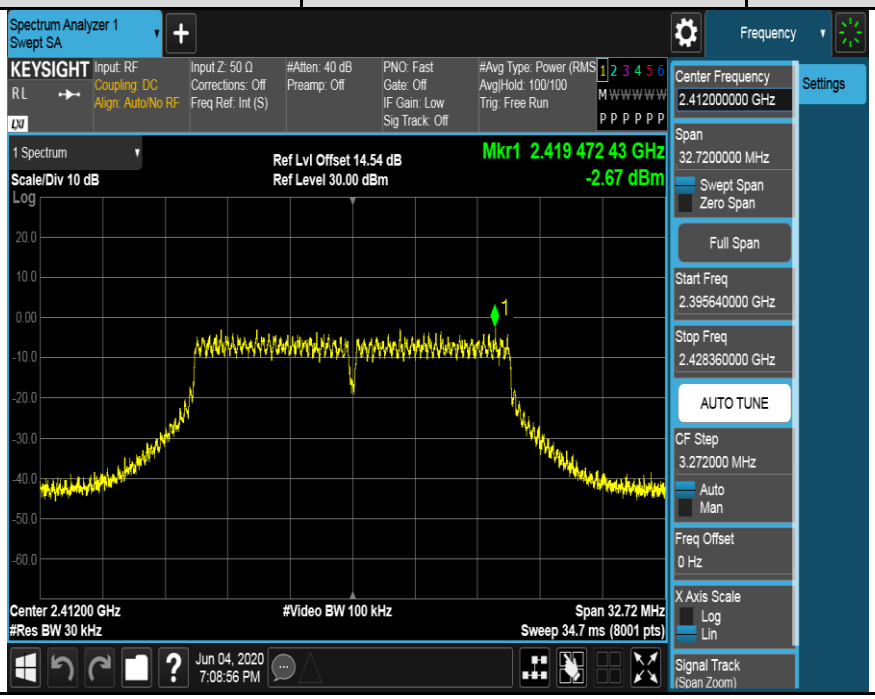
Ant 2:

Test Mode	Test Channel	Verdict
11B	LCH	PASS

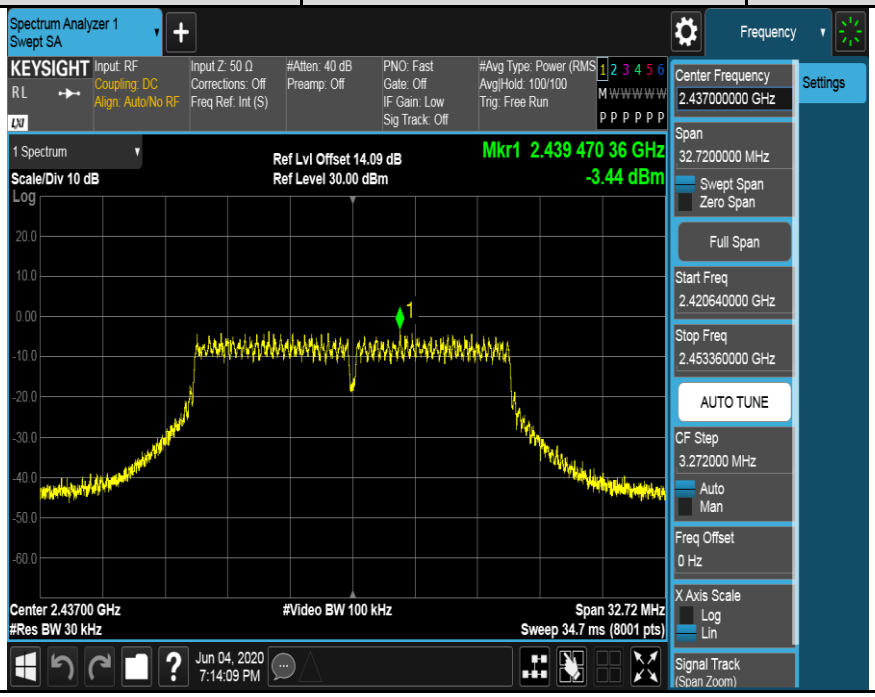
Test Mode	Test Channel	Verdict
11B	MCH	PASS

Test Mode	Test Channel	Verdict
11B	HCH	PASS

Test Mode	Test Channel	Verdict
11G	LCH	PASS



Test Mode	Test Channel	Verdict
11G	MCH	PASS



Test Mode	Test Channel	Verdict
11G	HCH	PASS