CFR 47 FCC PART 15 SUBPART C

TEST REPORT

Wire-Free Base Station

MODEL NUMBER: WA1001-300

ADDITIONAL NUMBER: DH-WA1001-300, DHI-WA1001-300, WA1001-300-Imou, WA1001-300-imou

PROJECT NUMBER: 4788743859

REPORT NUMBER: 4788743859-1

FCC ID: SVNWA1001-300

ISSUE DATE: Apr. 30, 2019

Prepared for

ZHEJIANG DAHUA VISION TECHNOLOGY CO.,LTD.

Prepared by

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Revision History

Rev.	Issue Date	Revisions	Revised By
V0	04/30/2019	Initial Issue	

Summary of Test Results			
Clause	**Test Items**	FCC/IC Rules	Test Results
1	6dB Bandwidth and 99% Occupied Bandwidth	FCC Part 15.247 (a) (2)	Pass
2	Peak Conducted Output Power	FCC Part 15.247 (b) (3)	Pass
3	Power Spectral Density	FCC Part 15.247 (e)	Pass
4	Conducted Bandedge and Spurious Emission	FCC Part 15.247 (d)	Pass
5	Radiated Bandedge and Spurious Emission	FCC Part 15.247 (d) FCC Part 15.209 FCC Part 15.205	Pass
6	Conducted Emission Test For AC Power Port	FCC Part 15.207	Pass
7	Antenna Requirement	FCC Part 15.203	Pass

Remark:
1) For this product, it has two antennas, antenna1 and antenna2, the 802.11B SISO&802.11G SISO modes are use the SISO technical, but the ant1 and ant2 can transmitter in the same time under these modes. The 802.11N (HT20 & HT40) uses both the SISO and MIMO technical.
2) Pre-testing Antenna 1 and Antenna2, and pre-testing SISO and MIMO modes, only the data of the worse case is shown in this test repot.
3) The measurement result for the sample received is <Pass> according to < CFR 47 FCC PART 15 SUBPART C> when <Accuracy Method> decision rule is applied.

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	Wire-Free Base Station
Model Name	WA1001-300
Additional Number	DH-WA1001-300, DHI-WA1001-300, WA1001-300-Imou, WA1001-300-imou
Sample Number	1902633
Data of Receipt Sample	Nov. 5, 2018
Date Tested	Nov. 15, 2018 ~ Feb. 20, 2019

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 FCC PART 15 SUBPART C	PASS

Tested By:

Tom Tang

Tom Tang
Engineer Project Associate

Check By:

Chris Zhong

Chris Zhong
Senior Project Engineer

Approved By:

Scholl Zhang

Scholl Zhang
Laboratory Leader

2. TEST METHODOLOGY

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

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

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 OATS.

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 recognize national standards.

4.2. CMEASUREMENT UNCERTAINTY

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

Test Item	Uncertainty
Conduction emission	3.80dB
Radiation Emission test(include Fundamental emission) (9KHz-30MHz)	3.32dB
Radiation Emission test(include Fundamental emission) (30MHz-1GHz)	3.27dB
Radiation Emission test (1GHz to 26GHz)(include Fundamental emission)	3.72dB (1GHz-18Gz)
	4.11dB (18GHz-26Gz)
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:	Wire-Free Base Station	
Model No.:	WA1001-300	
Operating Frequency:	IEEE 802.11B SISO/g/n(HT20): 2412MHz to 2462MHz IEEE 802.11n(HT40): 2422MHz to 2452MHz	
Type of Modulation:	IEEE for 802.11B SISO: DSSS (CCK, DQPSK, DBPSK) IEEE for 802.11G SISO: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n (HT20 & HT40): OFDM (64QAM, 16QAM, QPSK, BPSK)	
Channel Number:	IEEE 802.11B SISO/g, IEEE 802.11n(HT20): 11 Channels IEEE 802.11n(HT40): 7 Channels	
Channels Step:	Channels with 5MHz step	
Sample Type:	Fixed production	
Test power grade:	12	
Test software of EUT:	QA-tool (manufacturer declare)	
Antenna Type:	Extended Antenna	
Antenna Gain:	Antenna 1:	2.6 dBi
	Antenna 2:	2.6 dBi
Power Supply	Adapter	Model:S024-1A120200HU INPUT:100-240V~,50/60Hz, 0.6A OUTPUT:12V ⎓2A

Remark:
Model No.:

Number:	Name:	Number:	Name:	Number:	Name:
1	WA1001-300	2	DH-WA1001-300	3	DHI-WA1001-300
4	WA1001-300-Imou	5	WA1001-300-imou		

Only the main model **WA1001-300** is tested and only the data of this model is shown in this test report. Since have the same technical construction including circuit diagram, PCB Layout, components and component layout, all electrical construction and mechanical construction with WA1001-300. The difference lies only for model designation, different sales markets and consumer.

5.2. MAXIMUM OUTPUT POWER

Frequency Range (MHz)	Number of Transmit Chains (NTX)	IEE Std. 802.11	Channel Number	Max PK Conducted Power-Antenna 1 (dBm)	Max PK Conducted Power-Antenna 2 (dBm)	Max PK Conducted Power-Antenna1+2 (dBm)
2412-2462	1/2	IEEE 802.11B	1-11[11]	19.90	19.80	22.86
2412-2462	1/2	IEEE 802.11G	1-11[11]	21.94	22.14	24.99
2412-2462	1/2	IEEE 802.11nHT20	1-11[11]	20.81	20.53	23.52
2422-2452	1/2	IEEE 802.11nHT40	3-9[7]	20.73	20.30	23.46

Remark: For this product, it has two antennas, antenna1 and antenna2, the 802.11B SISO&802.11G SISO modes are use the SISO technical, but the ant1 and ant2 can transmitter in the same time under those modes. The 802.11N(HT20&HT40) uses both the SISO and MIMO technical.

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	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 CONFIGURATIONS

1TX Mode

The Worse Case Power Setting Parameter under 2400 ~ 2483.5MHz Band							
Test Software		cart					
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	A	12	12	12	N/A		
802.11g	A	12	12	12			
802.11n HT20	A	12	12	12			
802.11n HT40	A	N/A	N/A	N/A	12	12	12

2TX Mode

The Worse Case Power Setting Parameter under 2400 ~ 2483.5MHz Band							
Test Software		cart					
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	A&C	12	12	12	N/A		
802.11g	A&C	12	12	12			
802.11n HT20	A&C	12	12	12			
802.11n HT40	A&C	N/A	N/A	N/A	12	12	12

5.6. DESCRIPTION OF AVAILABLE ANTENNAS

Ant.	Frequency (MHz)	Antenna Type	Antenna Gain (dBi)	Directional gain(dBi)
1	2400-2483.5	Extended Antenna	2.6	5.6
2	2400-2483.5	Extended Antenna	2.6	

Note:

1） Directional gain= 10log $[(10^{G1/20}+10^{G2/20})^2/N_{ANT}]$ =5.6dBi < 6dBi

2） N_{ANT}: the number of Antenna

Test Mode	Transmit and Receive Mode	Description
IEEE 802.11b	☒2TX, 2RX	Both antennas can be used as transmitting/receiving antenna.
IEEE 802.11g	☒2TX, 2RX	Both antennas can be used as transmitting/receiving antenna.
IEEE 802.11N (HT20) MIMO	☒2TX, 2RX	Both antennas can be used as transmitting/receiving antenna.
IEEE 802.11N (HT20) MIMO	☒2TX, 2RX	Both antennas can be used as transmitting/receiving antenna.

Remark: For this product, it has two antennas, antenna1 and antenna2, the 802.11B SISO&802.11G SISO modes are use the SISO technical, but the ant1 and ant2 can transmitter in the same time under those modes. The 802.11N(HT20&HT40) uses both the SISO and MIMO technical.

5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Item	Equipment	Brand Name	Model Name	FCC ID
1	Laptop	ThinkPad	T410	N/A

I/O CABLES

Cable No	Port	Connector Type	Cable Type	Cable Length(m)	Remarks
1	LAN	LAN	N/A	N/A	N/A

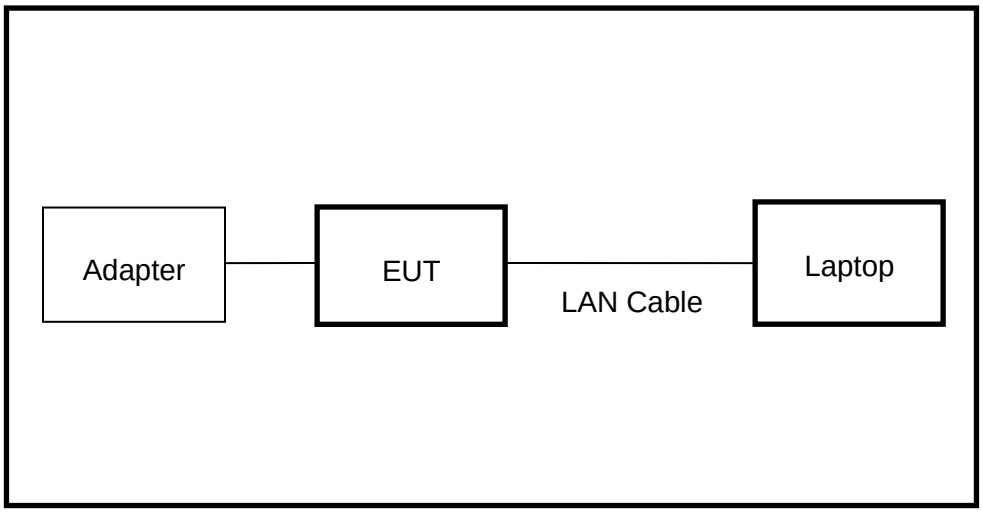
ACCESSORIES

Item	Accessory	Brand Name	Model Name	Description
1	/	/	/	/

TEST SETUP

The EUT can work in engineering mode with a software through a Laptop.

SETUP DIAGRAM FOR TESTS



6. 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	2017-12-14	2018-12-13	2019-12-12
☑	Two-Line V-Network	R&S	ENV216	126701	2017-12-14	2018-12-13	2019-12-12
☑	Artificial Mains Networks	R&S	ENY81	126711	2017-12-14	2018-12-13	2019-12-12
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	2017-05-31	2018-05-30	2019-05-29
☑	EMI test receiver	R&S	ESR26	1267603	2017-12-14	2018-12-13	2019-12-22
☑	Receiver Antenna (30MHz-1GHz)	SunAR RF Motion	JB1	126704	N/A	2019-01-28	2022-01-27
☑	Receiver Antenna (9kHz-30MHz)	Schwarzbeck	FMZB1513	513-265	2017-06-18	2018-06-17	2019-06-16
☑	Receiver Antenna (1GHz-18GHz)	R&S	HF907	126705	2018-01-27	2019-01-26	2020-01-26
☑	Receiver Antenna (18GHz-26.5GHz)	Schwarzbeck	BBHA9170	126706	2018-02-07	2019-02-06	2020-02-05
☑	Receiver Antenna (26.5GHz-40GHz)	TOYO	HAP 26-40W	00000012	2017-07-26	2018-07-25	2019-07-24
☑	Pre-amplification (To 1GHz)	R&S	SCU-03D	134666	2018-02-07	2019-02-06	2020-02-05
☑	Pre-amplification (To 18GHz)	TDK	PA-02-0118	TRS-305-00066	2017-12-12	2018-12-11	2019-12-10
☑	Pre-amplification (To 26.5GHz)	R&S	SCU-26D	134668	2018-02-07	2019-02-06	2020-02-05
☑	Band Reject Filter	Wainwright	WRCJV8-2350-2400-2483.5-2533.5-40SS	1	2017-05-31	2018-05-30	2019-05-29
☑	Highpass Filter	Wainwright	WHKX10-2700-3000-18000-40SS	2	2017-05-31	2018-05-30	2019-05-29
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.	Next Cal.	
☑	Spectrum Analyzer	Keysight	N9010B	MY57110128	2017-05-31	2018-05-30	2019-05-29
☑	Power Meter	Keysight	U2021XA	MY57110002	2017-06-14	2018-06-13	2019-06-12

7. MEASUREMENT METHODS

No.	Test Item	KDB Name	Section
1	6dB Bandwidth	KDB 558074 D01 DTS Meas Guidance v05r02	8.2
2	Peak Output Power	KDB 558074 D01 DTS Meas Guidance v05 r02	8.3.1.3/8.3.2.3
3	Power Spectral Density	KDB 558074 D01 DTS Meas Guidance v05 r02	8.4
4	Out-of-band emissions in non-restricted bands	KDB 558074 D01 DTS Meas Guidance v05 r02	8.5
5	Out-of-band emissions in restricted bands	KDB 558074 D01 DTS Meas Guidance v05 r02	8.6
6	Band-edge	KDB 558074 D01 DTS Meas Guidance v05 r02	8.7
7	Conducted Emission Test For AC Power Port	ANSI C63.10-2013	6.2

8. ANTENNA PORT TEST RESULTS

8.1. ON TIME AND DUTY CYCLE

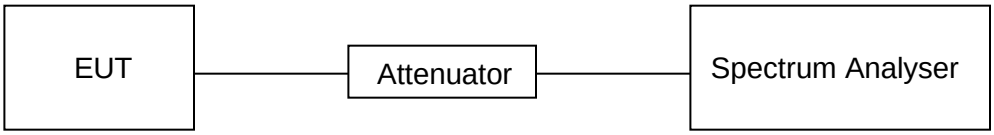
LIMITS

None; for reporting purposes only

PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method

TEST SETUP



TEST ENVIRONMENT

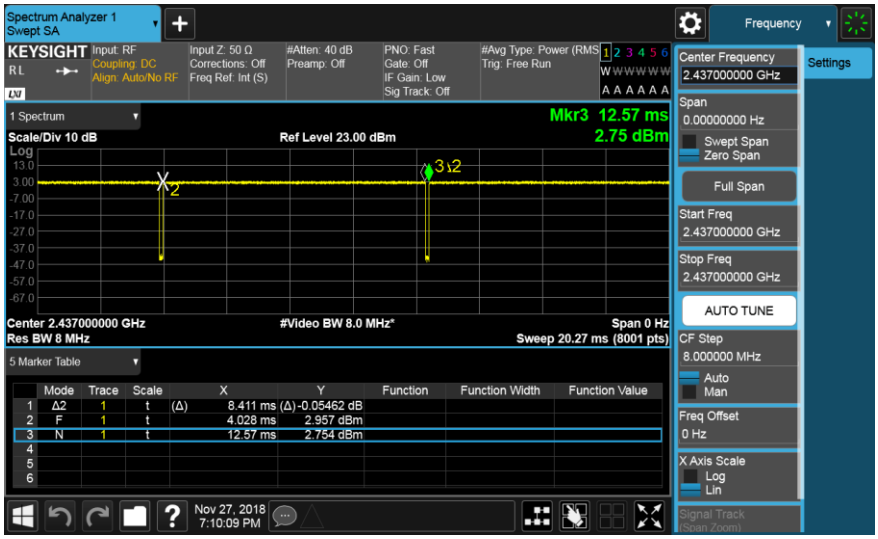
Temperature	25°C	Relative Humidity	58%
Atmosphere Pressure	101kPa	Test Voltage	DC 12.0V

RESULTS

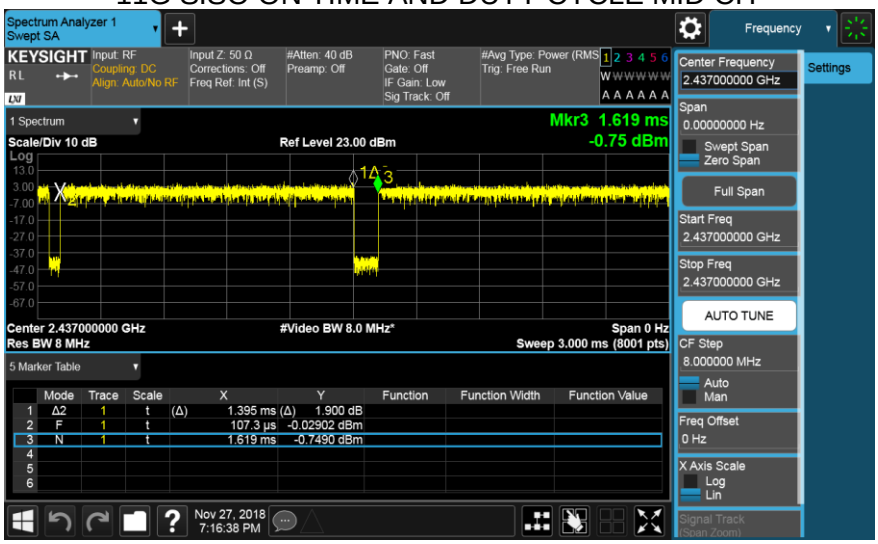
Mode	On Time (msec)	Period (msec)	Duty Cycle x (Linear)	Duty Cycle	Duty Cycle Correction Factor (db)	1/T Minimum VBW (KHz)
11B	8.411	8.542	0.9847	98.47%	0.0671	0.1189
11G	1.395	1.5117	0.9228	92.28%	0.3489	0.7168
11N20 MIMO	1.307	1.3791	0.9477	94.77%	0.2332	0.7651
11N40 MIMO	0.6358	0.7427	0.8561	85.61%	0.6749	1.5728

Note: 1) Duty Cycle Correction Factor=10log(1/x).
2) Where: x is Duty Cycle (Linear)
3) Where: T is On Time (transmit duration)
4) Pre-testing Antenna 1 and Antenna2, and pre-testing SISO and MIMO modes, only the data of the worst case is shown in this test repot.

11B SISO ON TIME AND DUTY CYCLE MID CH



11G SISO ON TIME AND DUTY CYCLE MID CH



11n HT20 ON TIME AND DUTY CYCLE MID CH

11n HT40 ON TIME AND DUTY CYCLE MID CH

Remark:

1) For the period time=N(the end time of the burst)-F(the start time of the burst)

8.2. 6 dB DTS BANDWIDTH AND 99% OCCUPIED BANDWIDTH

LIMITS

CFR 47 FCC Part15 (15.247) Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
CFR 47 FCC 15.247(a)(2)	6 dB Bandwidth	≥ 500KHz	2400-2483.5

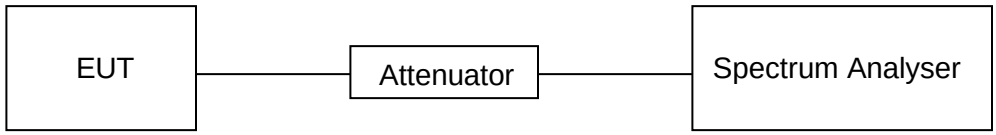
TEST PROCEDURE

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 6dB Bandwidth :100K For 99% Occupied Bandwidth :1% to 5% of the occupied bandwidth
VBW	For 6dB Bandwidth: ≥3 × RBW For 99% Occupied Bandwidth: approximately 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 and 99% relative to the maximum level measured in the fundamental emission.

TEST SETUP



TEST ENVIRONMENT

Temperature	25°C	Relative Humidity	58%
Atmosphere Pressure	101kPa	Test Voltage	DC 12.0V

RESULTS

8.2.1. 802.11b MODE

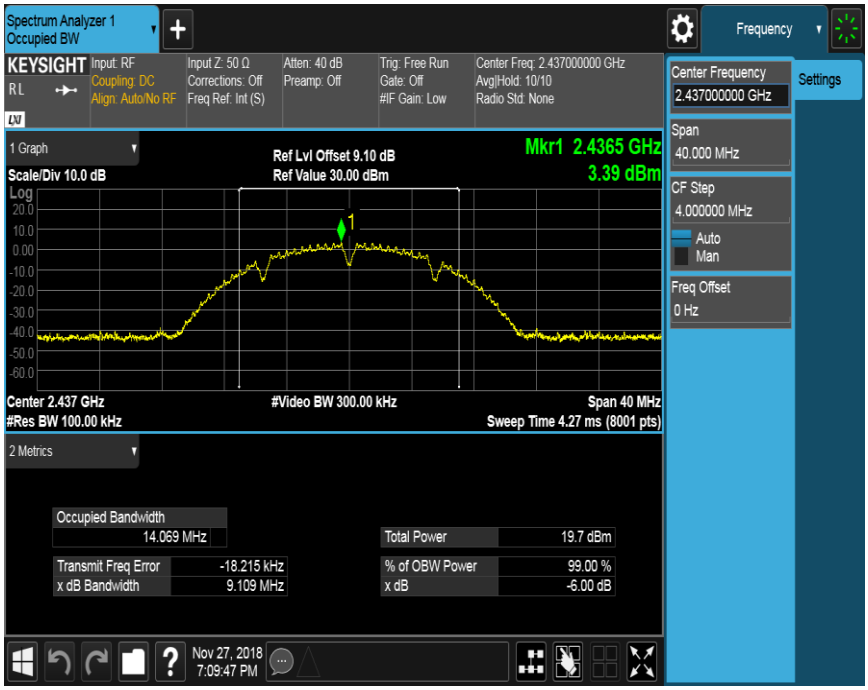
ANTENNA 1

Channel	6dB bandwidth (MHz)	99% bandwidth (MHz)	Limit (kHz)	Result
Low	9.552	14.080	≥500	Pass
Middle	9.109	14.069	≥500	Pass
High	9.556	14.090	≥500	Pass

Remark: For this product, it has two antennas, antenna1 and antenna2, the 802.11B SISO&802.11G SISO modes are use the SISO technical, but the ant1 and ant2 can transmitter in the same time under these modes. The 802.11N(HT20&HT40) uses both the SISO and MIMO technical.

6 dB AND 99% BANDWIDTH LOW CH

6 dB AND 99% BANDWIDTH MID CH



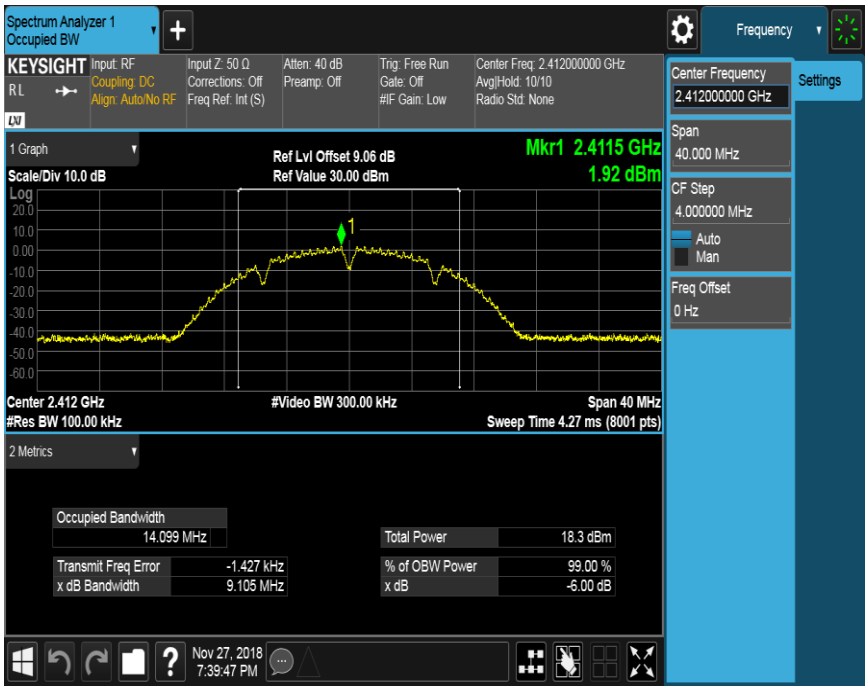
6 dB AND 99% BANDWIDTH HIGH CH

ANTENNA 2

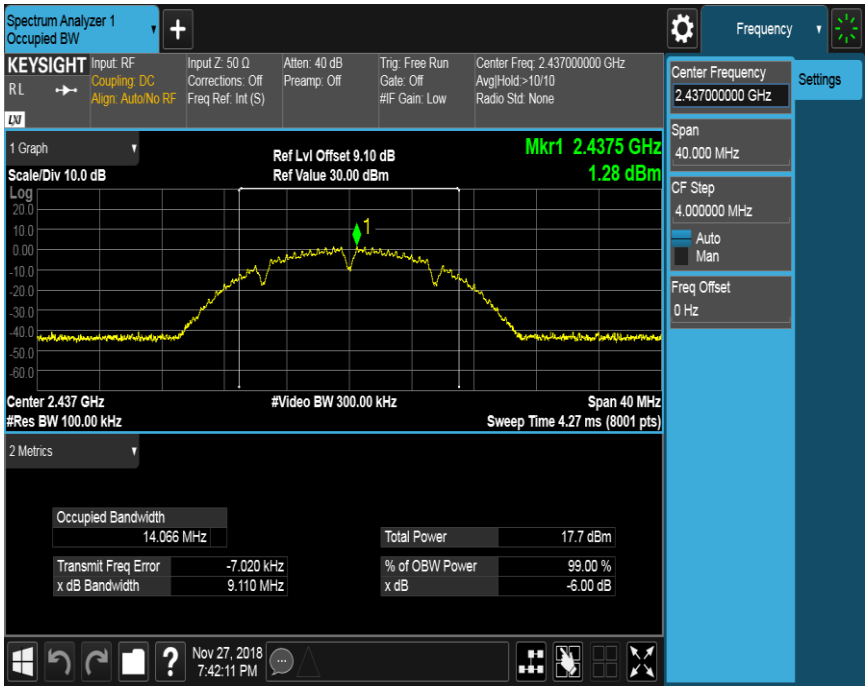
Channel	6dB bandwidth (MHz)	99% bandwidth (MHz)	Limit (kHz)	Result
Low	9.105	14.099	≥500	Pass
Middle	9.110	14.066	≥500	Pass
High	9.532	14.096	≥500	Pass

Remark: For this product, it has two antennas, antenna1 and antenna2, the 802.11B SISO&802.11G SISO modes are use the SISO technical, but the ant1 and ant2 can transmitter in the same time under these modes. The 802.11N(HT20&HT40) uses both the SISO and MIMO technical.

6 dB AND 99% BANDWIDTH LOW CH



6 dB AND 99% BANDWIDTH MID CH



6 dB AND 99% BANDWIDTH HIG CH

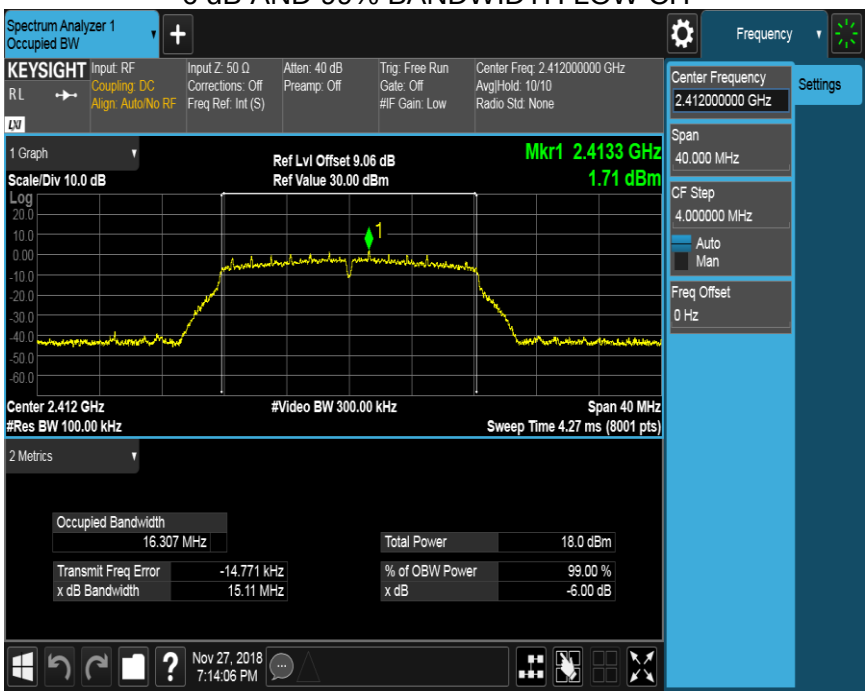
8.2.2. 802.11g MODE

ANTENNA 1

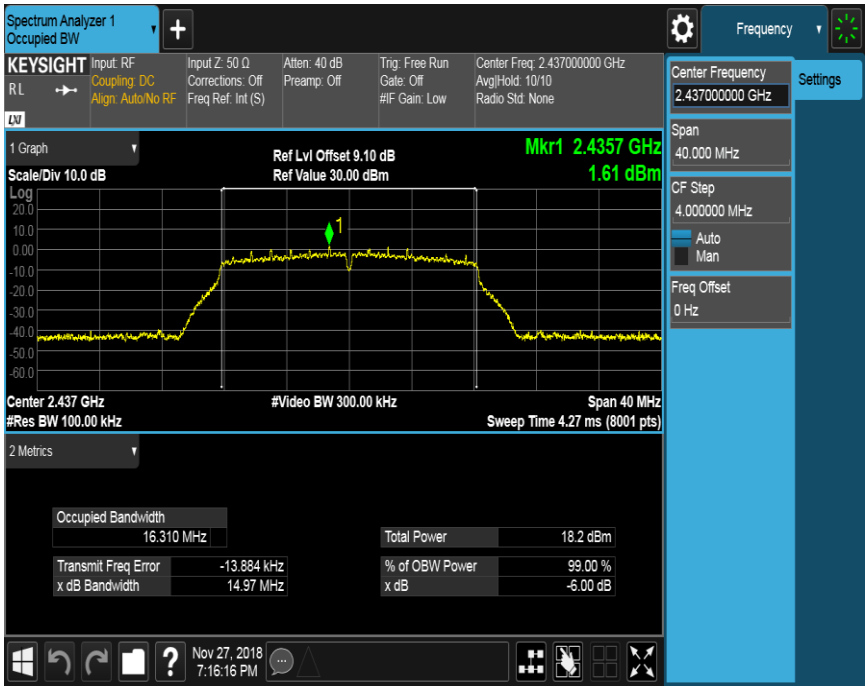
Channel	6dB bandwidth (MHz)	99% bandwidth (MHz)	Limit (kHz)	Result
Low	15.11	16.307	≥500	Pass
Middle	14.97	16.310	≥500	Pass
High	15.08	16.304	≥500	Pass

Remark: For this product, it has two antennas, antenna1 and antenna2, the 802.11B SISO&802.11G SISO modes are use the SISO technical, but the ant1 and ant2 can transmitter in the same time under these modes. The 802.11N(HT20&HT40) uses both the SISO and MIMO technical.

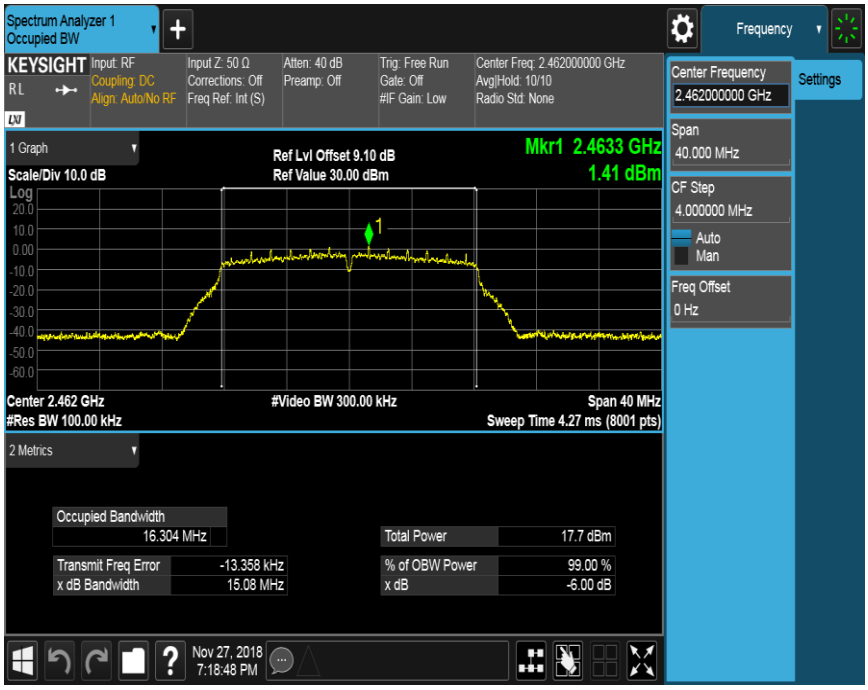
6 dB AND 99% BANDWIDTH LOW CH



6 dB AND 99% BANDWIDTH MID CH



6 dB AND 99% BANDWIDTH HIGH CH

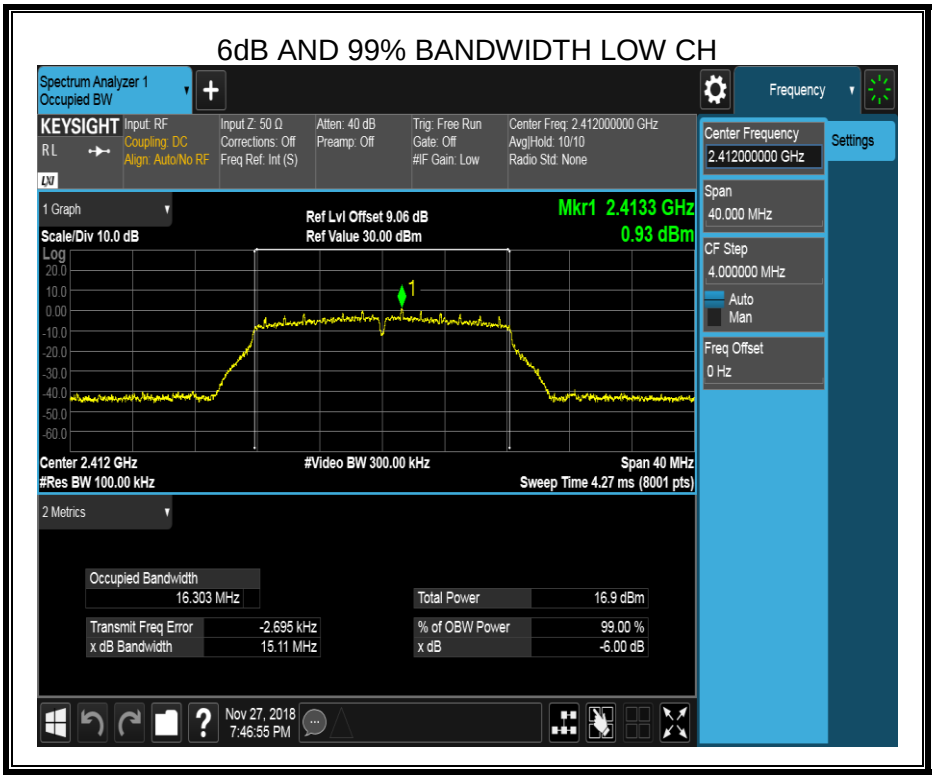


ANTENNA 2

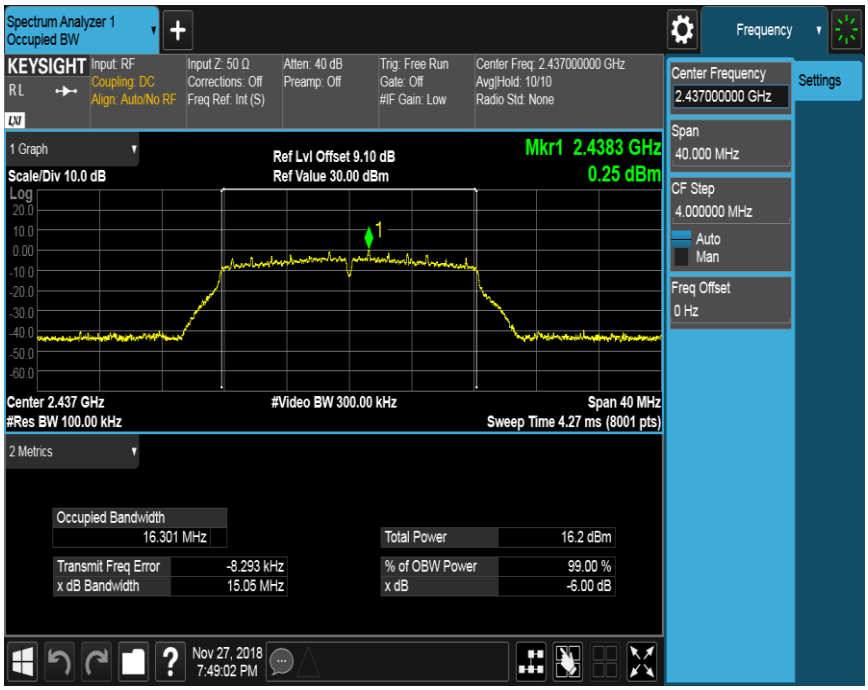
Channel	6dB bandwidth (MHz)	99% bandwidth (MHz)	Limit (kHz)	Result
Low	15.11	16.303	≥500	Pass
Middle	15.05	16.301	≥500	Pass
High	15.09	16.311	≥500	Pass

Remark: For this product, it has two antennas, antenna1 and antenna2, the 802.11B SISO&802.11G SISO modes are use the SISO technical, but the ant1 and ant2 can transmitter in the same time under these modes. The 802.11N(HT20&HT40) uses both the SISO and MIMO technical.

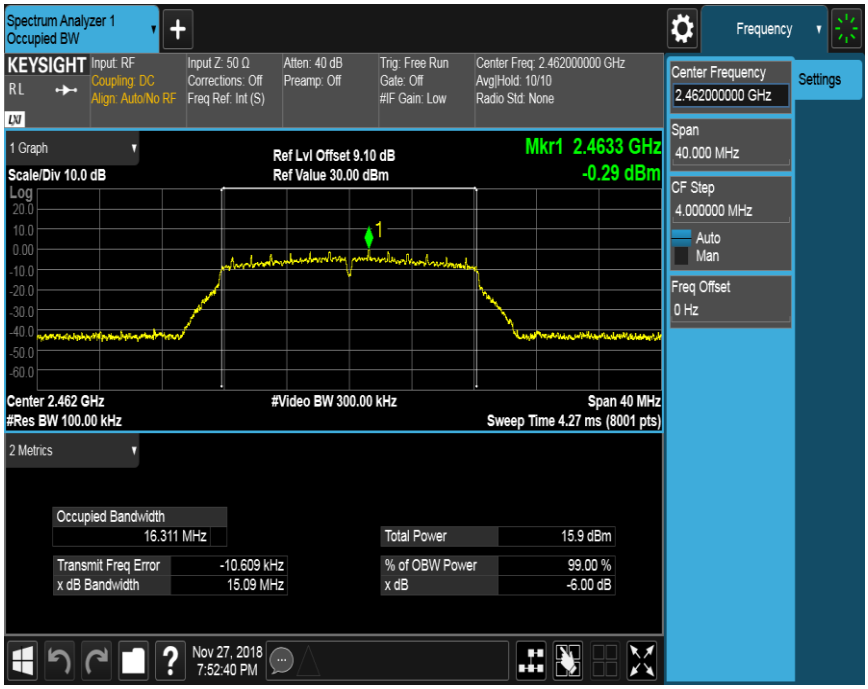
6dB AND 99% BANDWIDTH LOW CH



6dB AND 99% BANDWIDTH MID CH



6dB AND 99% BANDWIDTH HIGH CH



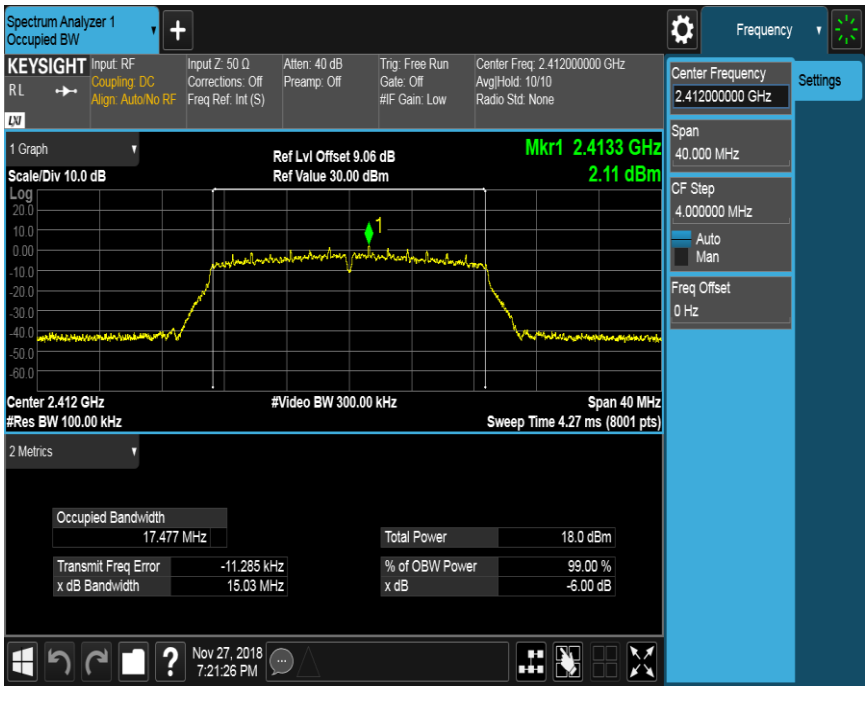
8.2.3. 802.11n HT20 MODE

ANTENNA 1

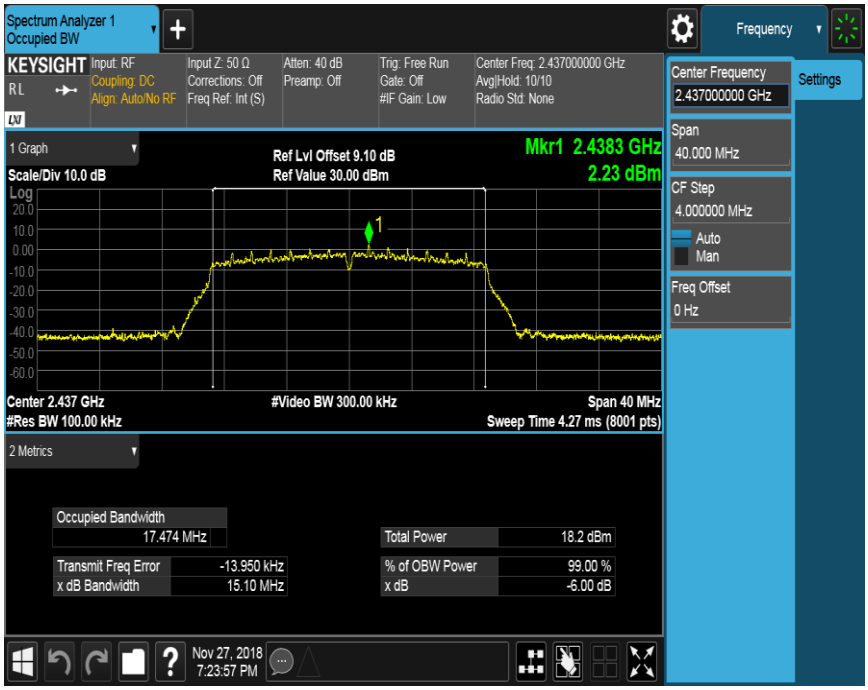
Channel	6dB bandwidth (MHz)	99% bandwidth (MHz)	Limit (kHz)	Result
Low	15.03	17.477	≥500	Pass
Middle	15.10	17.474	≥500	Pass
High	15.05	17.481	≥500	Pass

Remark: For this product, it has two antennas, antenna1 and antenna2, the 802.11B SISO&802.11G SISO modes are use the SISO technical, but the ant1 and ant2 can transmitter in the same time under these modes. The 802.11N(HT20&HT40) uses both the SISO and MIMO technical.

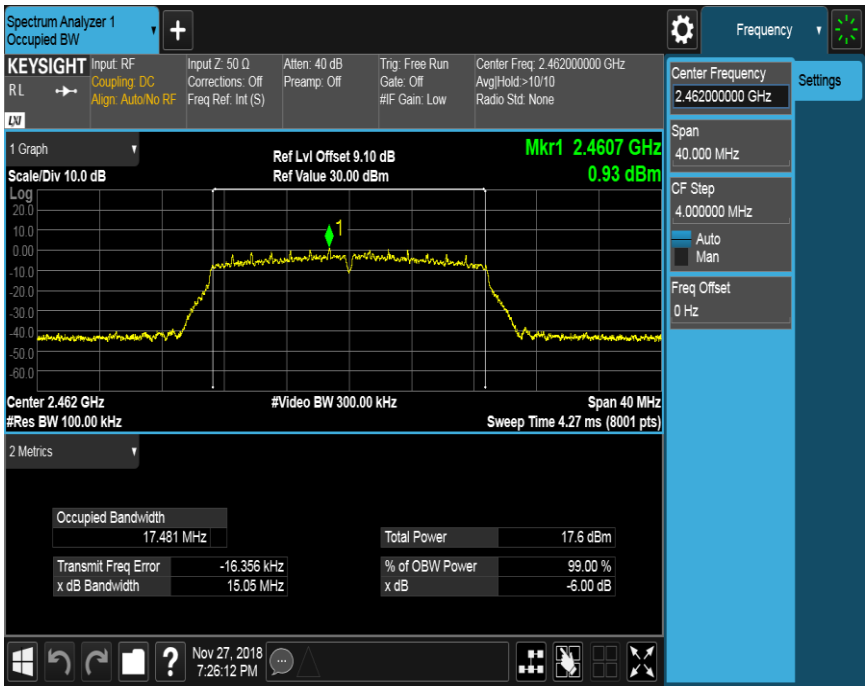
6dB AND 99% BANDWIDTH LOW CH



6dB AND 99% BANDWIDTH MID CH



6dB AND 99% BANDWIDTH HIGH CH

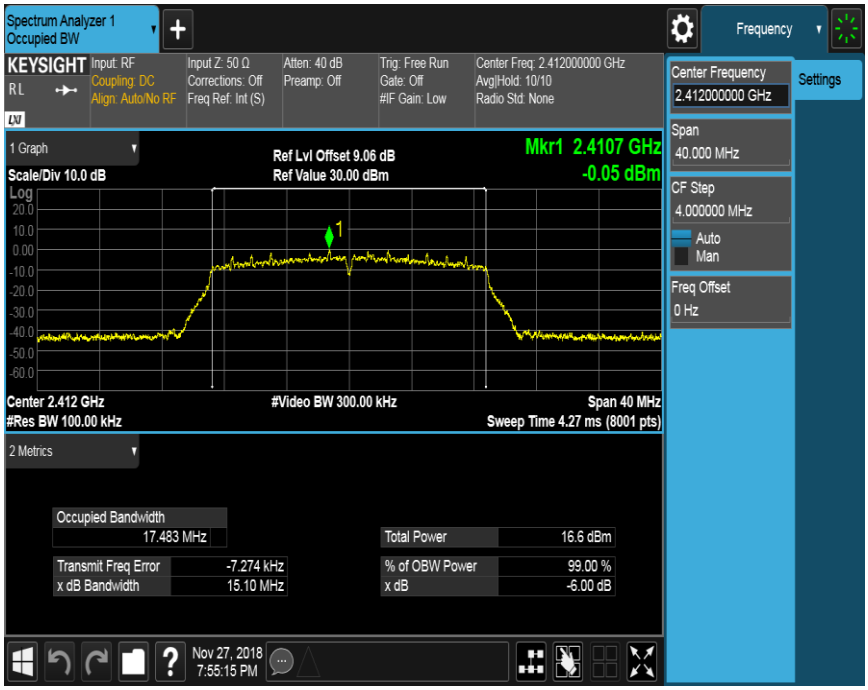


ANTENNA 2

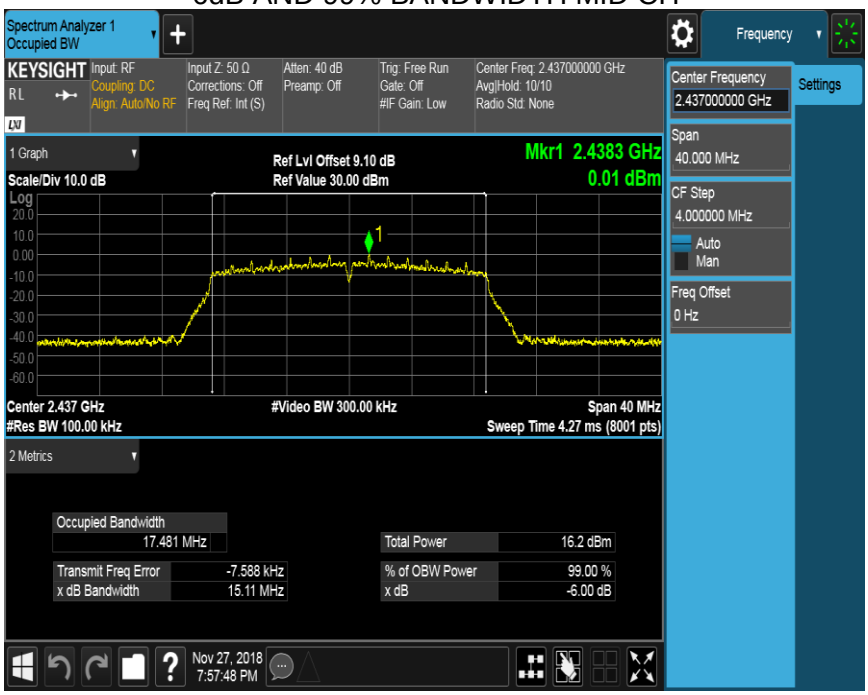
Channel	6dB bandwidth (MHz)	99% bandwidth (MHz)	Limit (kHz)	Result
Low	15.10	17.483	≥500	Pass
Middle	15.11	17.481	≥500	Pass
High	15.09	17.481	≥500	Pass

Remark: For this product, it has two antennas, antenna1 and antenna2, the 802.11B SISO&802.11G SISO modes are use the SISO technical, but the ant1 and ant2 can transmitter in the same time under these modes. The 802.11N(HT20&HT40) uses both the SISO and MIMO technical.

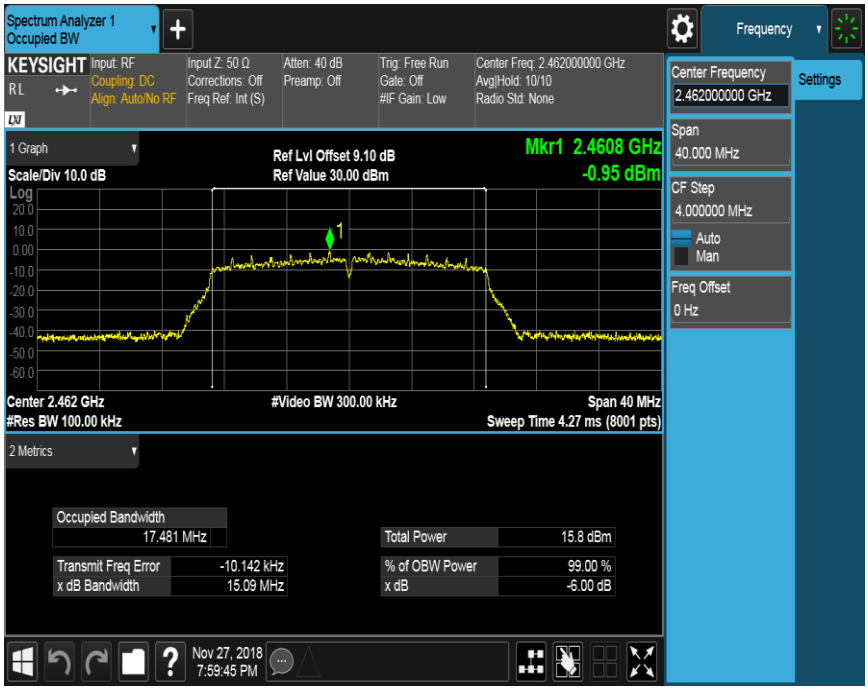
6dB AND 99% BANDWIDTH LOW CH



6dB AND 99% BANDWIDTH MID CH



6dB AND 99% BANDWIDTH HIGH CH



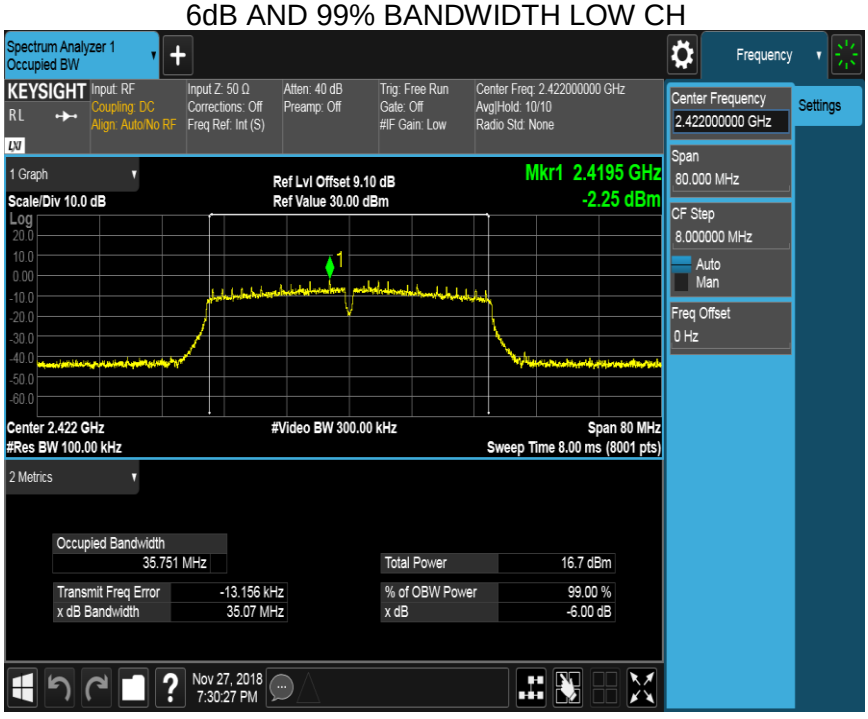
8.2.4. 802.11n HT40 MODE

ANTENNA 1

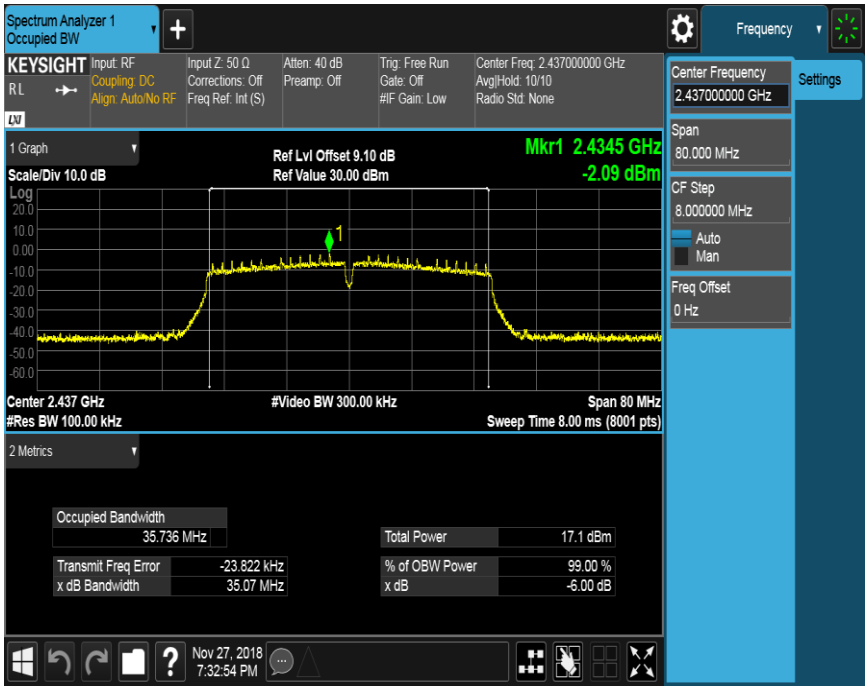
Channel	6dB bandwidth (MHz)	99% bandwidth (MHz)	Limit (kHz)	Result
Low	35.07	35.751	≥500	Pass
Middle	35.07	35.736	≥500	Pass
High	35.05	35.773	≥500	Pass

Remark: For this product, it has two antennas, antenna1 and antenna2, the 802.11B SISO&802.11G SISO modes are use the SISO technical, but the ant1 and ant2 can transmitter in the same time under these modes. The 802.11N(HT40) uses both the SISO and MIMO technical.

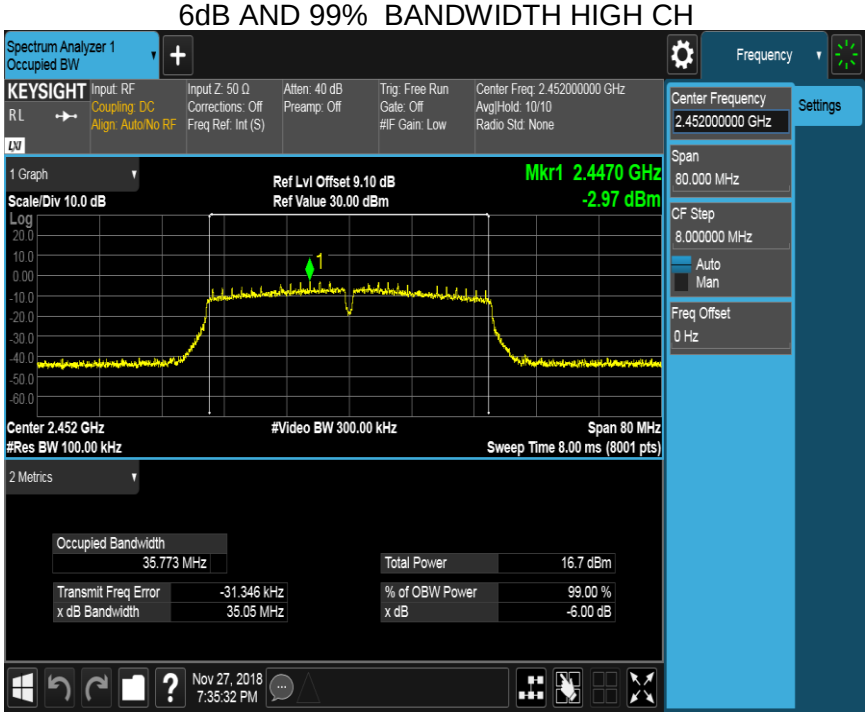
6dB AND 99% BANDWIDTH LOW CH



6dB AND 99% BANDWIDTH MID CH



6dB AND 99% BANDWIDTH HIGH CH

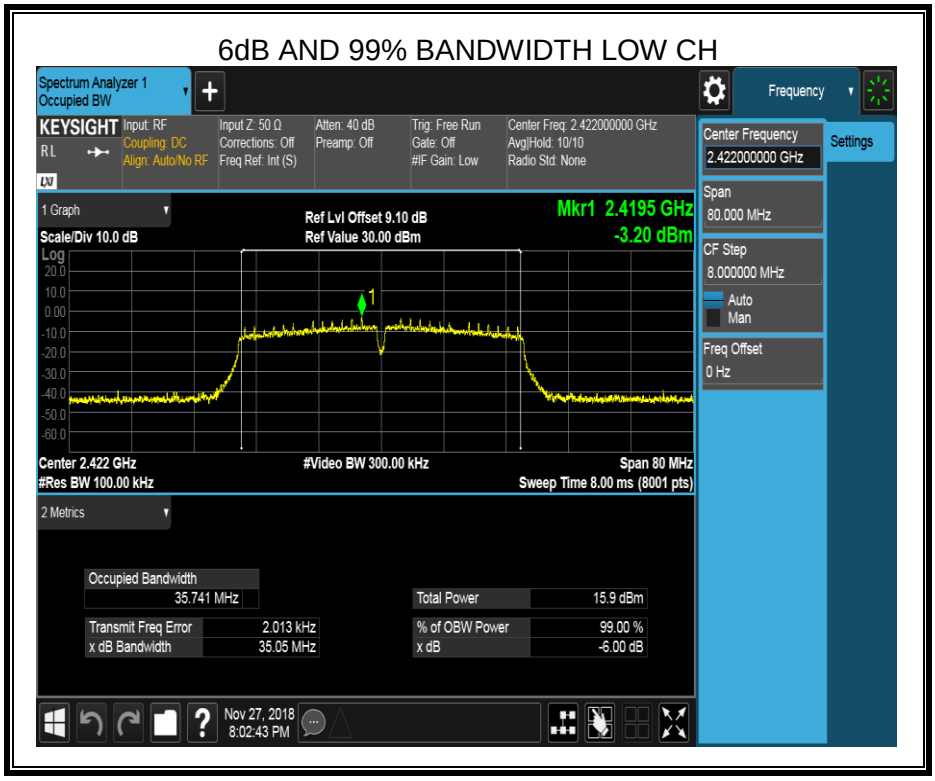


ANTENNA 2

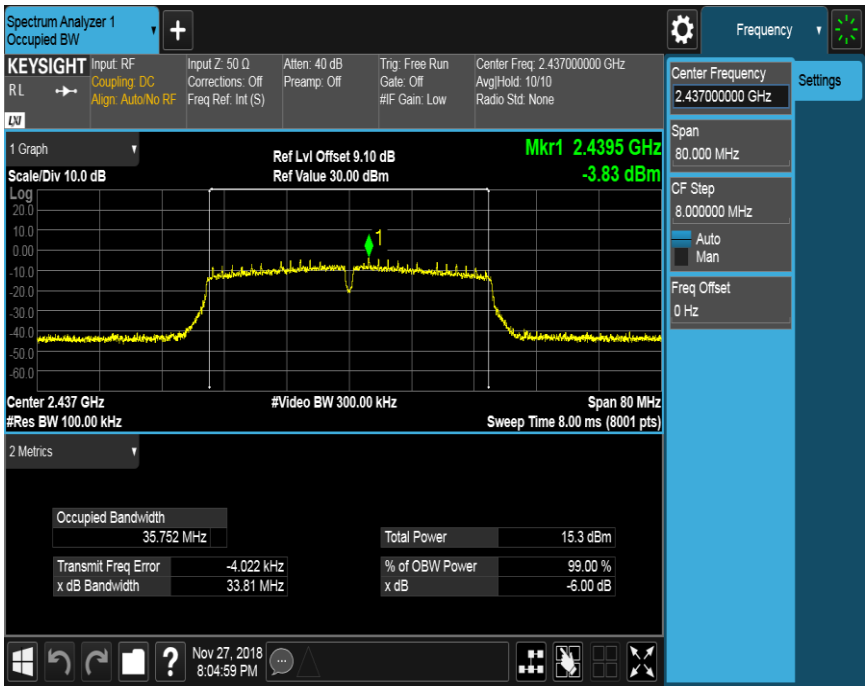
Channel	6dB bandwidth (MHz)	99% bandwidth (MHz)	Limit (kHz)	Result
Low	35.05	35.741	≥500	Pass
Middle	33.81	35.752	≥500	Pass
High	35.10	35.750	≥500	Pass

Remark: For this product, it has two antennas, antenna1 and antenna2, the 802.11B SISO&802.11G SISO modes are use the SISO technical, but the ant1 and ant2 can transmitter in the same time under these modes. The 802.11N(HT20&HT40) uses both the SISO and MIMO technical.

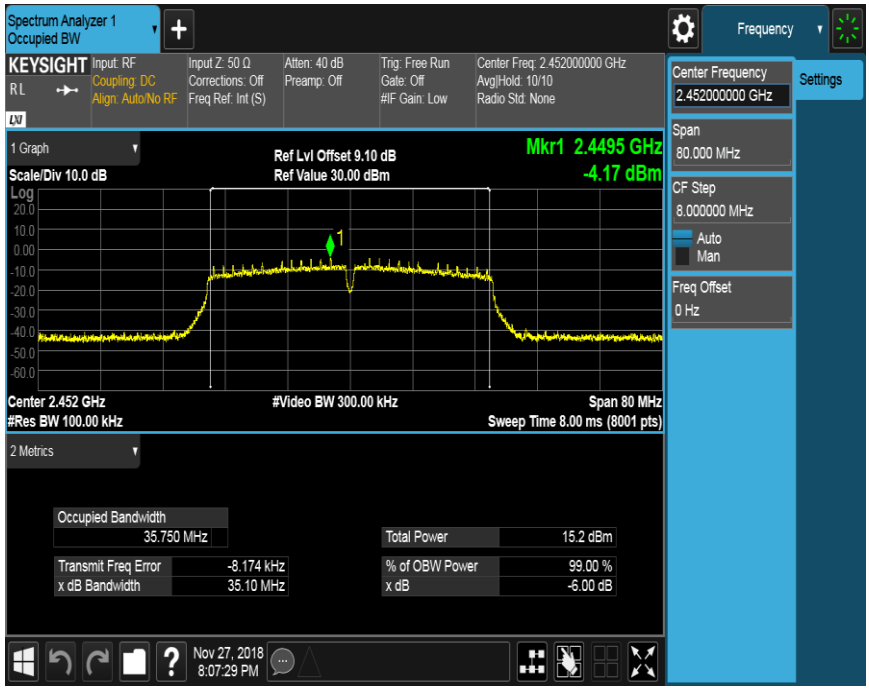
6dB AND 99% BANDWIDTH LOW CH



6dB AND 99% BANDWIDTH MID CH



6dB AND 99% BANDWIDTH HIGH CH



8.3. PEAK CONDUCTED OUTPUT POWER

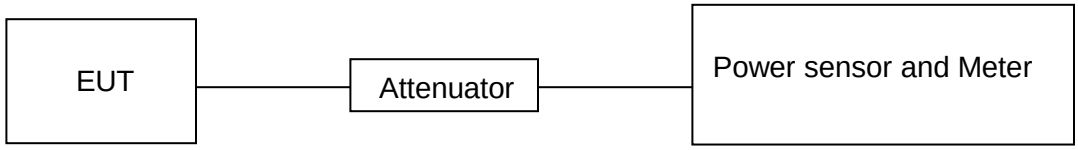
LIMITS

CFR 47 FCC Part15 (15.247) Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
CFR 47 FCC 15.247(b)(3)	Peak Output Power	1 watt or 30dBm (See Note 1/2)	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 Directional gain = $10\log [(10^{G1/20} +10^{G2/20})^2/N_{ANT}]$ =5.6<6dBi,where the N_{ANT} is the numbers of antenna. So, the power limit shall be 30 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 peak power each channel.
Peak Detector used for Peak result.
AVG Detector used for AVG result.

TEST SETUP



TEST ENVIRONMENT

Temperature	25°C	Relative Humidity	58%
Atmosphere Pressure	101kPa	Test Voltage	DC 12.0V

RESULTS

8.3.1. 802.11b MODE-SISO

SISO MODE

Frequency (MHz)	ANT	Maximum PK Conducted Output Power (dBm)		Result
		Single	Total	
Low	1	15.34	17.70	PASS
	2	13.92		
Middle	1	15.45	17.55	
	2	13.39		
High	1	14.91	17.10	
	2	13.09		

Frequency (MHz)	ANT	Maximum AV Conducted Output Power (dBm)		Result
		Single	Total	
Low	1	12.87	15.21	PASS
	2	11.40		
Middle	1	12.84	14.87	
	2	10.60		
High	1	12.31	14.43	
	2	10.29		

Remark: For this product, it has two antennas, antenna1 and antenna2, the 802.11B SISO&802.11G SISO modes are use the SISO technical, but the ant1 and ant2 can transmitter in the same time under these modes. The 802.11N(HT20&HT40) uses both the SISO and MIMO technical.

8.3.2. 802.11g MODE-SISO

SISO MODE

Frequency (MHz)	ANT	Maximum PK Conducted Output Power (dBm)		Result
		Single	Total	
Low	1	19.55	21.96	PASS
	2	18.26		
Middle	1	19.76	21.87	
	2	17.72		
High	1	19.17	21.38	
	2	17.39		

Frequency (MHz)	ANT	Maximum AV Conducted Output Power (dBm)		Result
		Single	Total	
Low	1	11.58	14.24	PASS
	2	10.84		
Middle	1	11.45	13.82	
	2	10.07		
High	1	10.90	13.38	
	2	9.76		

Remark: For this product, it has two antennas, antenna1 and antenna2, the 802.11B SISO&802.11G SISO modes are use the SISO technical, but the ant1 and ant2 can transmitter in the same time under these modes. The 802.11N(HT20&HT40) uses both the SISO and MIMO technical.

8.3.3. 802.11n HT20 MODE-MIMO

MIMO MODE

Frequency (MHz)	ANT	Maximum PK Conducted Output Power (dBm)		Result
		Single	Total	
Low	1	19.24	21.63	PASS
	2	17.90		
Middle	1	19.45	21.57	
	2	17.45		
High	1	18.81	21.05	
	2	17.10		

Frequency (MHz)	ANT	Maximum AV Conducted Output Power (dBm)		Result
		Single	Total	
Low	1	11.29	14.03	PASS
	2	10.74		
Middle	1	11.26	13.67	
	2	9.96		
High	1	10.77	13.26	
	2	9.65		

Remark: For this product, it has two antennas, antenna1 and antenna2, the 802.11B SISO&802.11G SISO modes are use the SISO technical, but the ant1 and ant2 can transmitter in the same time under these modes. The 802.11N(HT20&HT40) uses both the SISO and MIMO technical.

8.3.4. 802.11n HT40 MODE-MIMO

MIMO MODE

Frequency (MHz)	ANT	Maximum PK Conducted Output Power (dBm)		Result
		Single	Total	
Low	1	18.21	20.80	PASS
	2	17.33		
Middle	1	18.47	20.70	
	2	16.73		
High	1	18.15	20.47	
	2	16.63		

Frequency (MHz)	ANT	Maximum AV Conducted Output Power (dBm)		Result
		Single	Total	
Low	1	11.12	13.86	PASS
	2	10.56		
Middle	1	11.26	13.64	
	2	9.89		
High	1	11.08	13.47	
	2	9.73		

Remark: For this product, it has two antennas, antenna1 and antenna2, the 802.11B SISO&802.11G SISO modes are use the SISO technical, but the ant1 and ant2 can transmitter in the same time under these modes. The 802.11N(HT20&HT40) uses both the SISO and MIMO technical.

8.4. POWER SPECTRAL DENSITY

LIMITS

CFR 47 FCC Part15 (15.247) Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
CFR 47 FCC §15.247 (e)	Power Spectral Density	8 dBm/3 kHz (See Note 1/2)	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. Directional gain = $10\log[(10^{G1/20}+10^{G2/20})^2/N_{ANT}]$dBi, where N_{ANT} is the number of outputs, G_{ANT} is the Antenna gain. Directional gain = $10\log[(10^{G1/20}+10^{G2/20})^2/N_{ANT}]$ =5.6<6dBi,where the N_{ANT} is the numbers of antenna. So, the power density limit shall be 8dBm in any 3KHz band.			

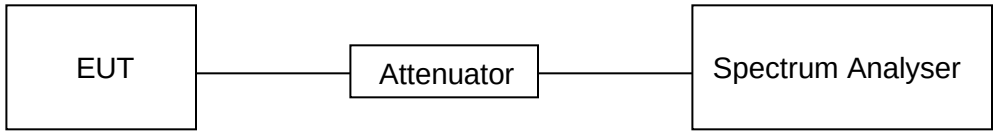
TEST PROCEDURE

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



TEST ENVIRONMENT

Temperature	25°C	Relative Humidity	58%
Atmosphere Pressure	101kPa	Test Voltage	DC 12.0V

RESULTS

8.4.1. 802.11b MODE

SISO MODE

Frequency (MHz)	ANT	Power Spectral Density (dBm/10kHz)		Limit (dBm/3kHz)
		Single	Total	
Low	1	2.22	4.92	8
	2	1.58		
Middle	1	2.65	4.94	
	2	1.06		
High	1	1.70	4.43	
	2	1.13		

Remark: For this product, it has two antennas, antenna1 and antenna2, the 802.11B SISO&802.11G SISO modes are use the SISO technical, but the ant1 and ant2 can transmitter in the same time under these modes. The 802.11N (HT20 & HT40) uses both the SISO and MIMO technical, pre-testing both the SISO and MIMO modes, only the data of worse case is shown in this report.

ANTENNA 1

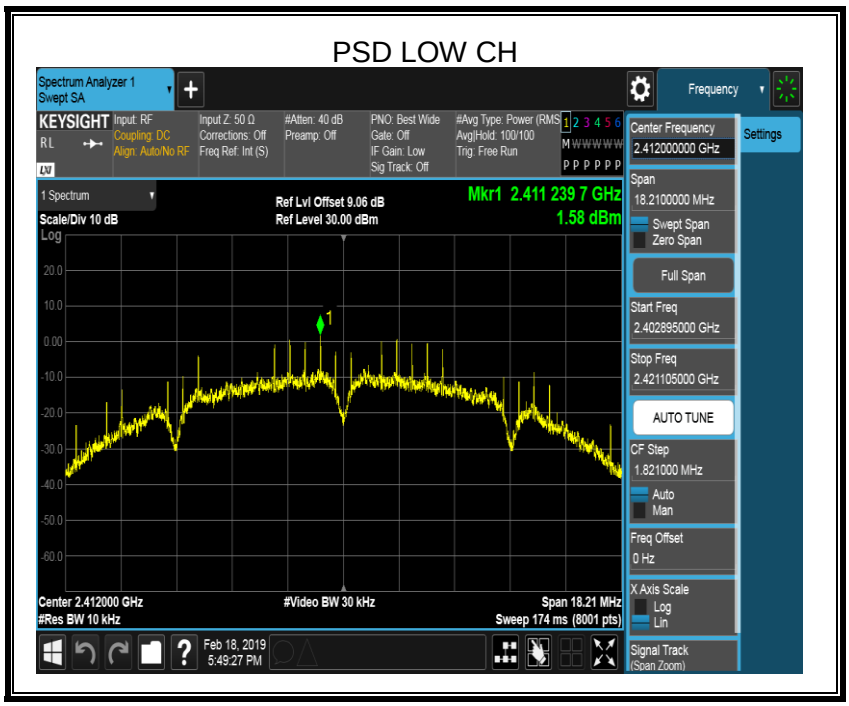
PSD LOW CH

PSD MID CH

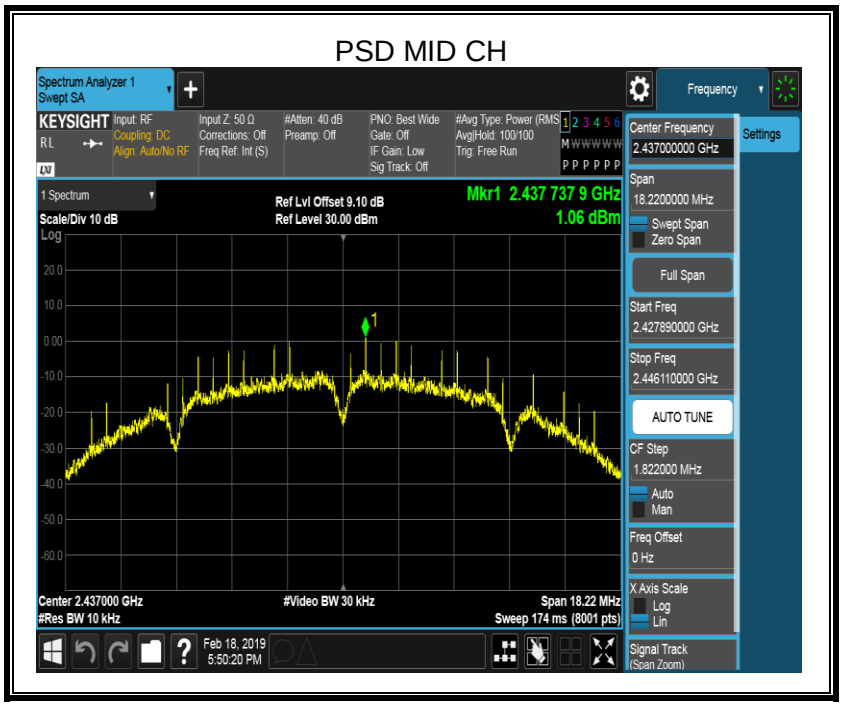
PSD HIGH CH

ANTENNA 2

PSD LOW CH



PSD MID CH



PSD HIGH CH

8.4.1. 802.11g MODE

SISO MODE

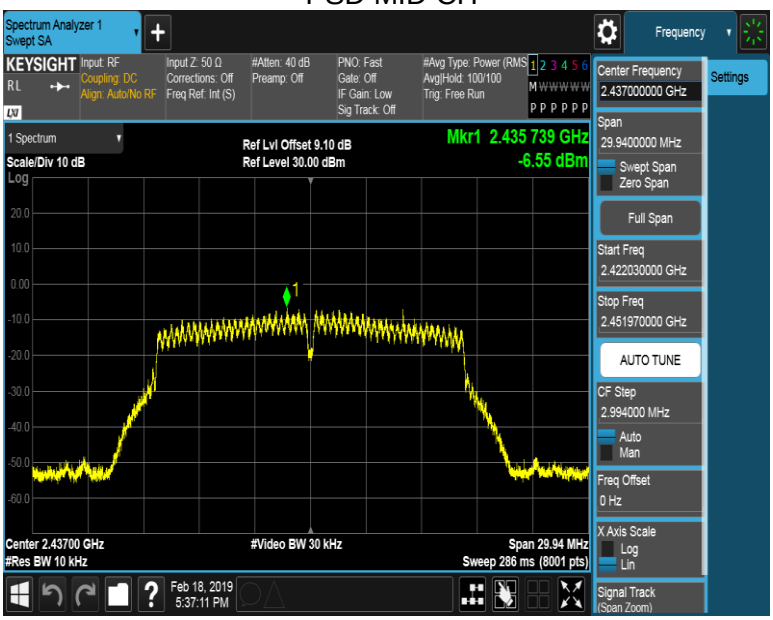
Frequency (MHz)	ANT	Power Spectral Density (dBm/10kHz)		Limit (dBm/3kHz)
		Single	Total	
Low	1	-7.43	-4.47	8
	2	-7.54		
Middle	1	-6.55	-3.04	
	2	-5.61		
High	1	-7.89	-5.96	
	2	-10.41		

Remark: For this product, it has two antennas, antenna1 and antenna2, the 802.11B SISO&802.11G SISO modes are use the SISO technical, but the ant1 and ant2 can transmitter in the same time under these modes. The 802.11N (HT20 & HT40) uses both the SISO and MIMO technical, pre-testing both the SISO and MIMO modes, only the data of worse case is shown in this report.

ANTENNA 1

PSD LOW CH

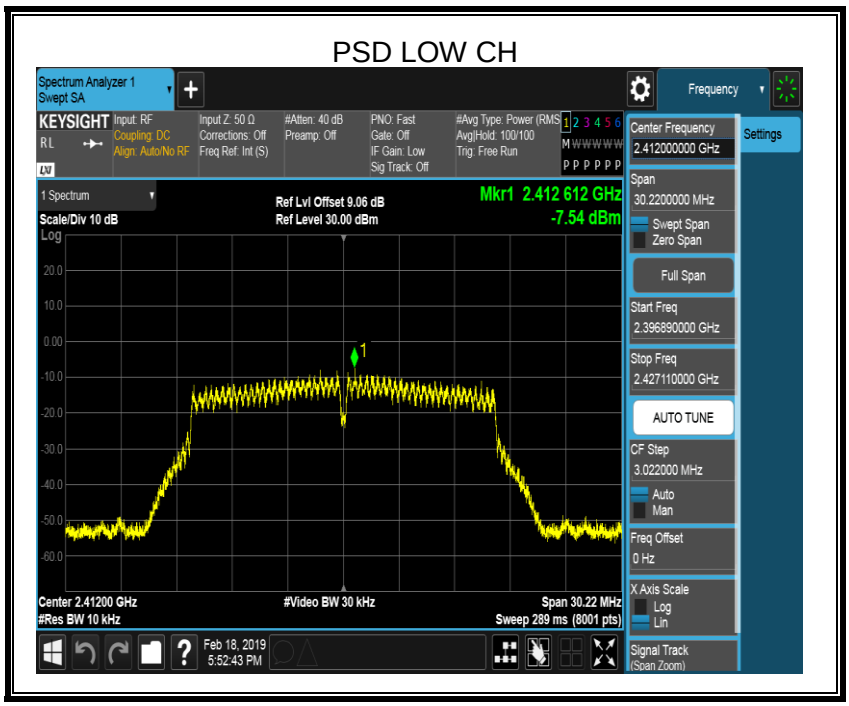
PSD MID CH



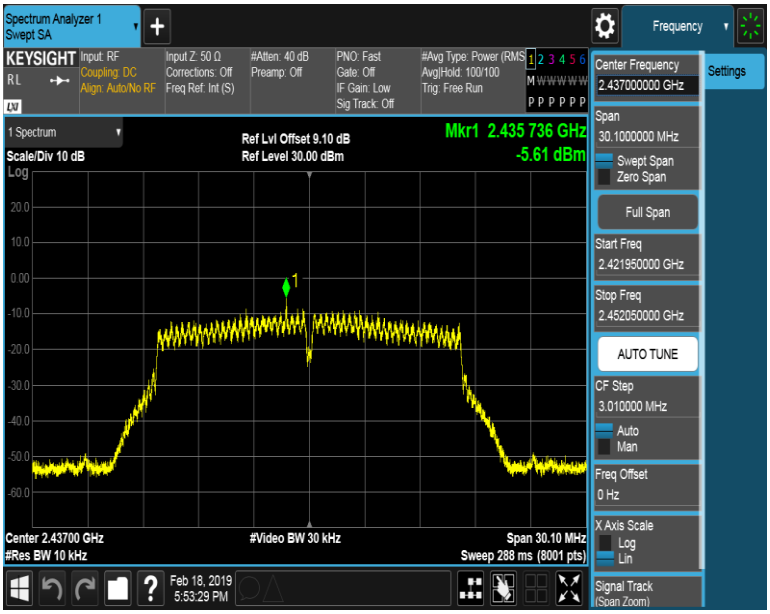
PSD HIGH CH

ANTENNA 2

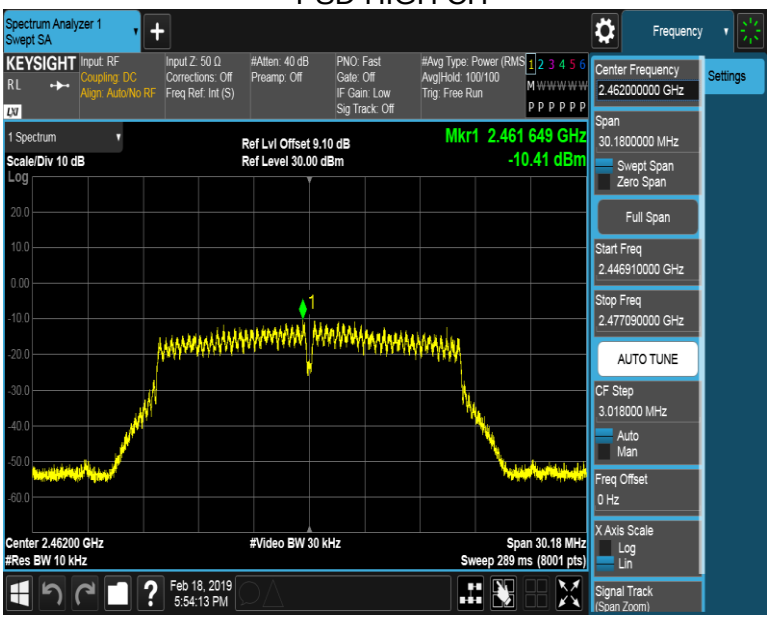
PSD LOW CH



PSD MID CH



PSD HIGH CH



8.4.2. 802.11n HT20 MODE

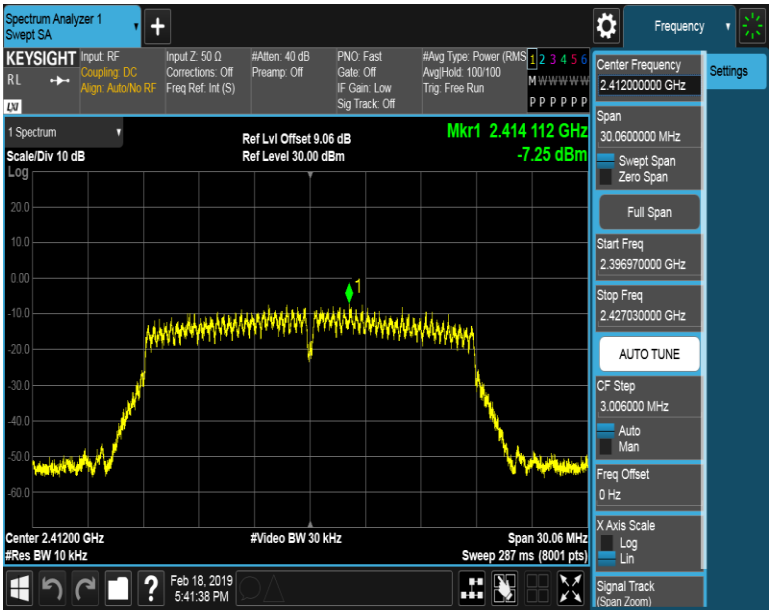
MIMO MODE

Frequency (MHz)	ANT	Power Spectral Density (dBm/10kHz)		Limit (dBm/3kHz)
		Single	Total	
Low	1	-7.25	-3.70	8
	2	-6.23		
Middle	1	-5.85	-3.21	
	2	-6.62		
High	1	-7.11	-4.49	
	2	-7.94		

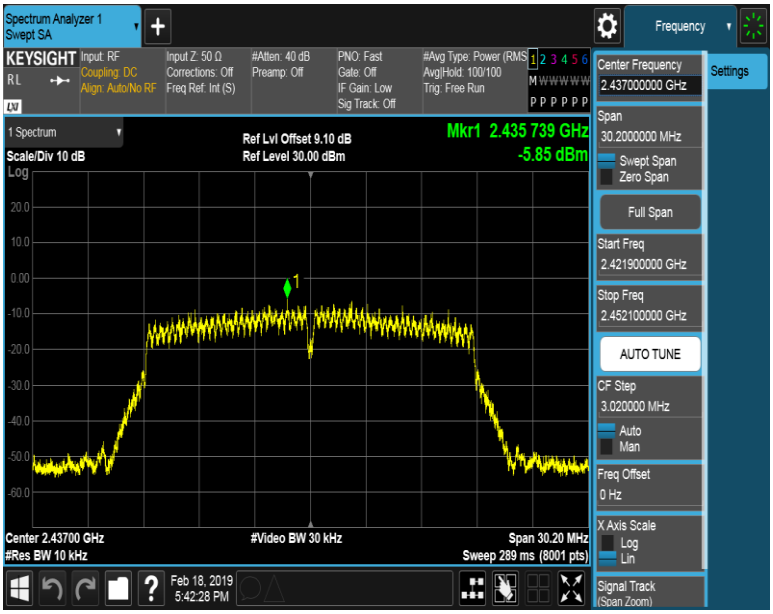
Remark: For this product, it has two antennas, antenna1 and antenna2, the 802.11B SISO&802.11G SISO modes are use the SISO technical, but the ant1 and ant2 can transmitter in the same time under these modes. The 802.11N (HT20 & HT40) uses both the SISO and MIMO technical, pre-testing both the SISO and MIMO modes, only the data of worse case is shown in this report.

ANTENNA 1

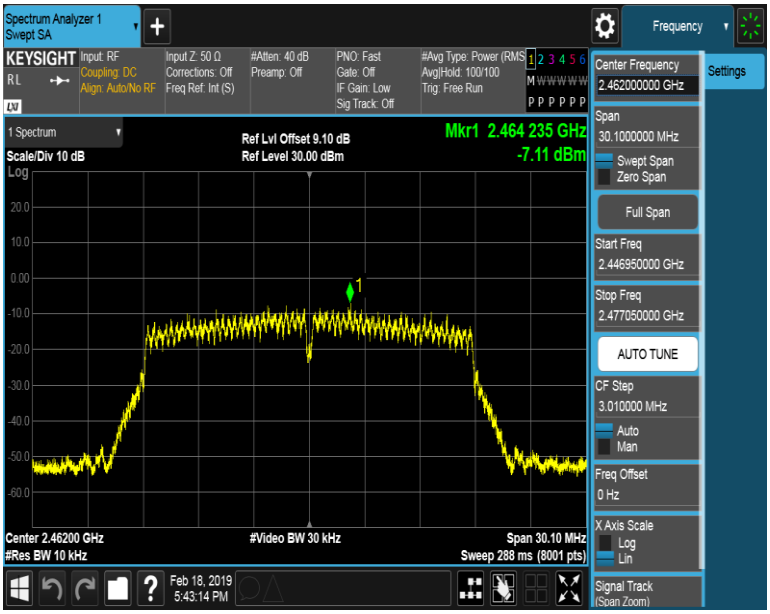
PSD LOW CH



PSD MID CH



PSD HIGH CH



ANTENNA 2

PSD LOW CH