FCC PART 15 SUBPART C MEASUREMENT AND TEST REPORT

For

IONOTE Electronics (Dongguan) Ltd

6 Ling Dong 3 Road Lincun Industrial Center Tangxia, Dongguan, Guangdong China – 523710

E.U.T.: Ambi Climate

Model Name: Ambi Climate

Brand Name: Ambi Labs

FCC ID: 2AFE9AMBICL

Report Number: NTC1507045F-1

Test Date(s): July 06, 2015 to August 05, 2015

Report Date(s): August 05, 2015

Prepared by

Dongguan Nore Testing Center Co., Ltd.

Building D, Gaosheng Science and Technology Park, Hongtu Road, Nancheng District,Dongguan City, Guangdong, China

Tel: +86-769-22022444 Fax: +86-769-22022799

Prepared By	Approved & Authorized Signer
Rose Hu / Engineer	Sunm Lv / Q.A. Director

Note: This test report is for the customer shown above and their specific product only. It may not be duplicated or used in part without prior written consent from Dongguan Nore Testing Center Co., Ltd. The test results referenced from this report are relevant only to the s ample tested.

Table of Contents

1. GENERAL INFORMATION 4

1.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST 4
1.2 RELATED SUBMITTAL(S) / GRANT (S) 7
1.3 TEST METHODOLOGY 7
1.4 EQUIPMENT MODIFICATIONS 7
1.5 SUPPORT DEVICE 7
1.6 TEST FACILITY AND LOCATION 8
1.7 SUMMARY OF TEST RESULTS 8

2. SYSTEM TEST CONFIGURATION 9

2.1 EUT CONFIGURATION 9
2.2 SPECIAL ACCESSORIES 9
2.3 DESCRIPTION OF TEST MODES 9
2.4 EUT EXERCISE 9

3. CONDUCTED EMISSIONS TEST 10

3.1 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) 10
3.2 TEST CONDITION 10
3.3 MEASUREMENT RESULTS 10

4. MAX. CONDUCTED OUTPUT POWER 13

4.1 MEASUREMENT PROCEDURE 13
4.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) 13
4.3 MEASUREMENT RESULTS 13

5. 6DB&20DB BANDWIDTH 17

5.1 MEASUREMENT PROCEDURE 17
5.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) 17
5.3 MEASUREMENT RESULTS 17

6. POWER SPECTRAL DENSITY 25

6.1 MEASUREMENT PROCEDURE 25
6.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) 25
6.3 MEASUREMENT RESULTS 25

7. BAND EDGE AND CONDUCTED SPURIOUS EMISSIONS 30

7.1 REQUIREMENT AND MEASUREMENT PROCEDURE 30
7.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) 30
7.3 MEASUREMENT RESULTS 30

8. RADIATED SPURIOUS EMISSIONS AND RESTRICTED BANDS 37

8.1 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) 37
8.2 MEASUREMENT PROCEDURE 38
8.3 LIMIT 39
8.4 MEASUREMENT RESULTS 39

9. ANTENNA APPLICATION 44

9.1 ANTENNA REQUIREMENT 44
9.2 MEASUREMENT RESULTS 44

10. TEST EQUIPMENT LIST 45

1. GENERAL INFORMATION

1.1 Product Description for Equipment under Test

This device is a wireless controller, it's powered by DC 5V come from Adapter. For more details features, please refer to User's Manual.

Manufacturer	:	IONOTE Electronics (Dongguan) Ltd
Address	:	6 Ling Dong 3 Road Lincun Industrial Center Tangxia, Dongguan, Guangdong China – 523710
Factory	:	IONOTE Electronics (Dongguan) Ltd
Address	:	6 Ling Dong 3 Road Lincun Industrial Center Tangxia, Dongguan, Guangdong China – 523710
Power Supply	:	DC 5V Come from Adapter Adapter M/N: MW701i Input: AC100-240V 47-63Hz 0.12A Output: DC 5V 1000mA
Test voltage	:	AC 120V 60Hz, AC 240V 60Hz Only the worst case were recoded in the report.
Model name	:	Ambi Climate
Hardware version	:	Climate V1.16
Software version	:	001
Serial number	:	ACDEMO000001

Technical parameters
For WIFI Function

Frequency Range	:	2412-2462MHz for 802.11n(HT20) 2422-2452MHz for 802.11n(HT40)
Modulation	:	OFDM for 802.11n
Number of Channel	:	11 for 802.11n(HT20) 7 for 802.11n(HT40)
Channel space	:	5MHz
Date Rate	:	802.11n: 6.5~135Mbps
Antenna Type	:	FPC antenna
Antenna Gain	:	3.80 dBi (declared by manufacturer)

For BT function

BT Version		BLE(V4.0)
Frequency	:	2402-2480MHz
Modulation	:	GFSK
Number of Channel	:	40
Channel space	:	2MHz
Antenna Type	:	PCB antenna
Antenna Gain	:	2 dBi (declared by manufacturer)

WIFI Channel List

802.11 n(HT20)		802.11 n(HT40)	
Channel	**Frequency MHz**	**Channel**	**Frequency MHz**
1	2412	---	---
2	2417	---	---
3	2422	3	2422
4	2427	4	2427
5	2432	5	2432
6	2437	6	2437
7	2442	7	2442
8	2447	8	2447
9	2452	9	2452
10	2457	---	---
11	2462	---	---

Note: According to section 15.31(m), regards to the operating frequency range over 10MHz, the Lowest, middle, and the Highest frequency of channel were selected to perform the test. The selected frequency see below:

802.11 n(HT20)		802.11 n(HT40)	
Channel	**Frequency MHz**	**Channel**	**Frequency MHz**
1	2412	3	2422
6	2437	6	2437
11	2462	9	2452

1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: **2AFE9AMBICL** filing to comply with Section 15.247 of the FCC Part 15(2014), Subpart C Rule.

1.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.10-2013 and KDB558074 (v03r02). Radiated emission measurement was performed in semi-anechoic chamber and conducted emission measurement was performed in shield room. For radiated emission measurement, preliminary scans were performed in the semi-anechoic chamber only to determine the worst case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters. All other measurements were made in accordance with the procedures in 47 CFR part 2.

1.4 Equipment Modifications

Not available for this EUT intended for grant.

1.5 Support Device

Router	:	Manufacturer: Shenzhen pulian M/N: TL-SF1005+ S/N: 07817402327
Mobile phone	:	Manufacturer: Vivo Model: X5SL S/N: 867047023930426

1.6 Test Facility and Location

Listed by FCC, August 02, 2011
The Certificate Registration Number is 665078.
Listed by Industry Canada, July 01, 2011
The Certificate Registration Number is 46405-9743.

Dongguan NTC Co., Ltd.
(Full Name: Dongguan Nore Testing Center Co., Ltd.)

Building D, Gaosheng Science and Technology Park, Hongtu Road, Nancheng District, Dongguan City, Guangdong, China
(Full Name: Building D, Gaosheng Science & Technology Park, Zhouxi Longxi Road, Nancheng District, Dongguan, Guangdong, China.

1.7 Summary of Test Results

FCC Rules	Description Of Test	Result
§15.207 (a)	AC Power Conducted Emission	Compliance
§15.247(b)(3)	Max. Conducted Output Power	Compliance
§15.247(a)(2)	6dB Bandwidth	Compliance
§15.247(e)	Power Spectral Density	Compliance
§15.247(d)	Band Edge and Conducted Spurious Emissions	Compliance
§15.247(d),§15.209, §15.205	Radiated Spurious Emissions and Restricted Bands	Compliance
§15.203	Antenna Requirement	Compliance

2. System Test Configuration

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 Special Accessories

Not available for this EUT intended for grant.

2.3 Description of test modes

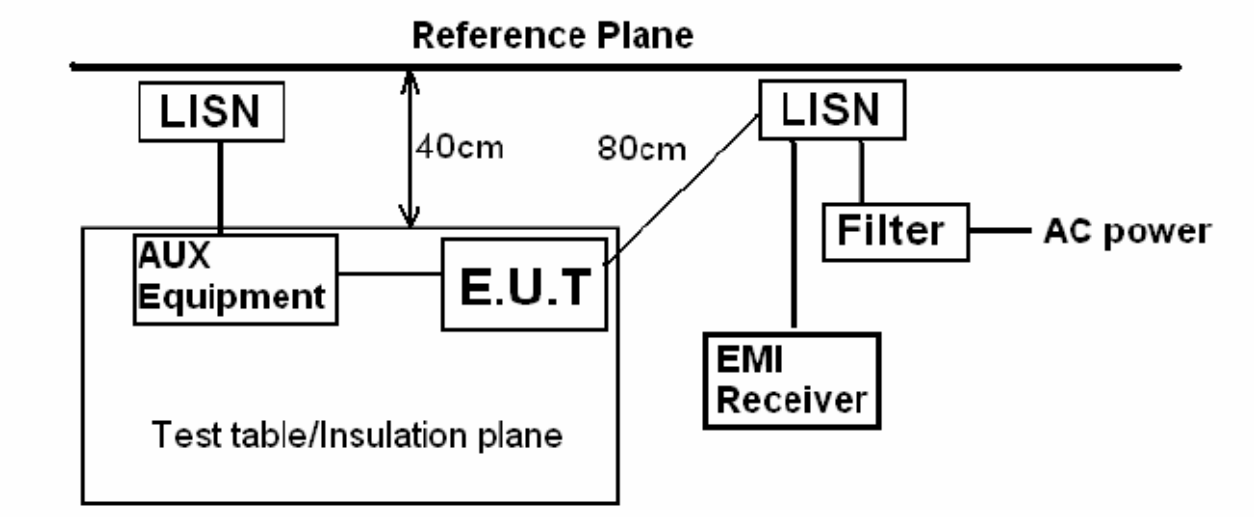
The EUT has been tested under continuous operating condition. Test program used to control the EUT staying in continuous transmitting mode. The Lowest, middle and highest channel were chosen for testing, and modulation type CCK, DQPSK, DBPSK, OFDM and all data rate were tested. But only the worst case data is shown in this report.

2.4 EUT Exercise

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements.

3. Conducted Emissions Test

3.1 Test SET-UP (Block Diagram of Configuration)



3.2 Test Condition

Test Requirement: FCC Part 15.207

Frequency Range: 150KHz ~ 30MHz

Detector: RBW 9KHz, VBW 30KHz

Operation Mode: WIFI Mode

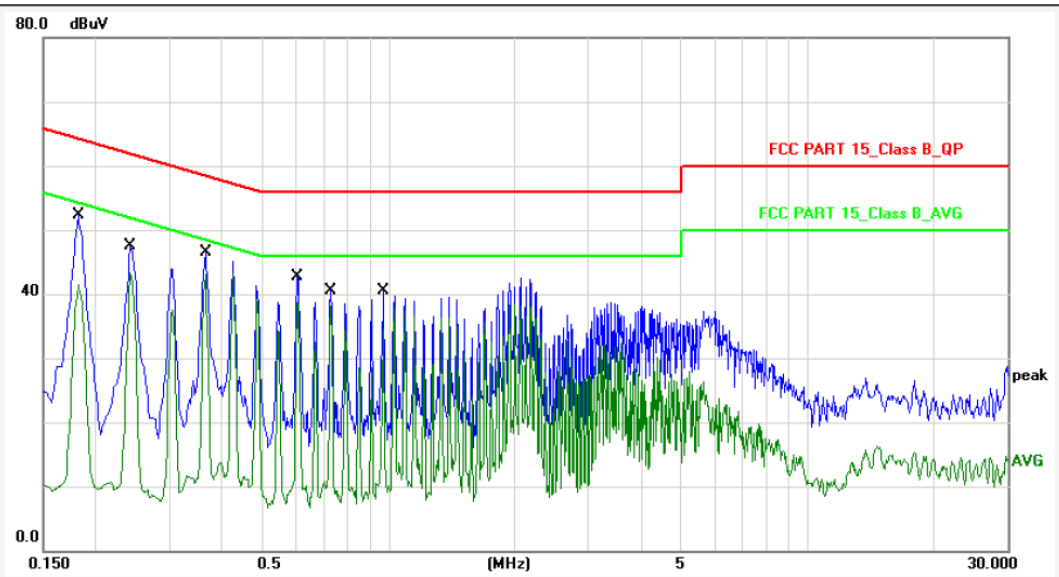
3.3 Measurement Results

Please refer to following plots of the worst case (802.11n HT20) plots.
The worst case of the test voltage is: AC 120V 60Hz

Dongguan NTC Co., Ltd.
Tel: +86-769-22022444 Fax: +86-769-22022799
Web: Http://www.ntc-c.com

Site: Conduction

Test Time: 2015-7-13 9:57:12



Report No.: Ambi Climate
Test Standard: FCC PART 15_Class B_QP
Test item: Conducted Emission
Phase: L1
Applicant: IONOTE
Temp.( )/Hum.(%): 24(C) / 58 %
Product: Ambi Climate
Power Rating: AC 120V/60Hz
Model No.: Ambi Climate
Test Engineer: Gavin

Test Mode: WIFI Mode
Remark: 802.11n (HT20)

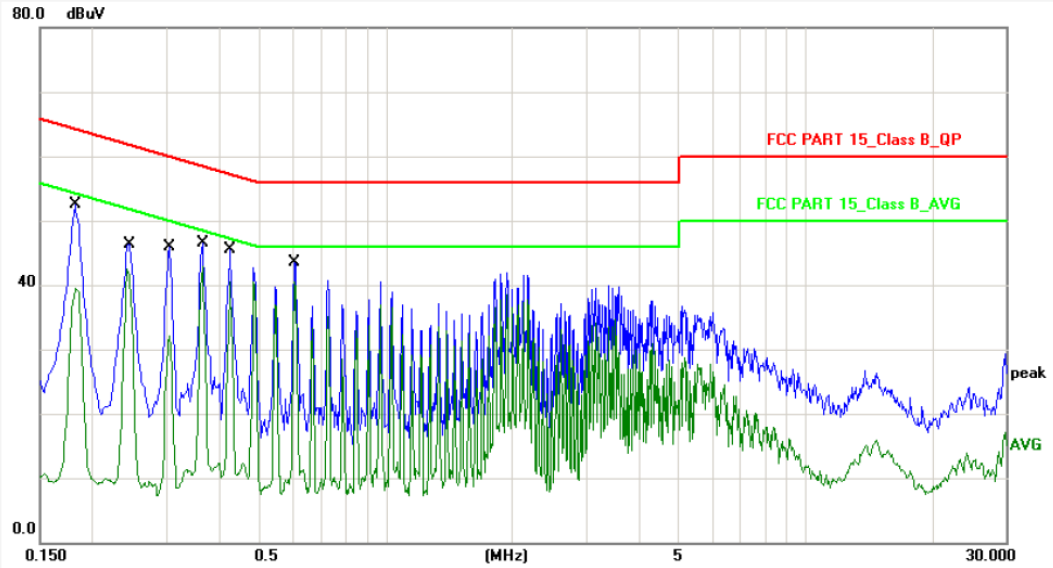
No.	Frequency (MHz)	Factor (dBuV)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1819	10.80	38.40	49.20	64.39	-15.19	QP	P	
2	0.1819	10.80	27.60	38.40	54.39	-15.99	AVG	P	
3	0.2420	10.80	33.60	44.40	62.02	-17.62	QP	P	
4	0.2420	10.80	29.40	40.20	52.02	-11.82	AVG	P	
5	0.3633	10.80	32.70	43.50	58.65	-15.15	QP	P	
6	0.3633	10.80	27.40	38.20	48.65	-10.45	AVG	P	
7	0.6058	10.80	28.80	39.60	56.00	-16.40	QP	P	
8	0.6058	10.80	24.90	35.70	46.00	-10.30	AVG	P	
9	0.7298	10.80	26.60	37.40	56.00	-18.60	QP	P	
10	0.7298	10.80	24.30	35.10	46.00	-10.90	AVG	P	
11	0.9740	10.80	26.60	37.40	56.00	-18.60	QP	P	
12	0.9740	10.80	20.40	31.20	46.00	-14.80	AVG	P	

Note: Level=Reading+Factor.
Margin=Limit-Level.

Dongguan NTC Co., Ltd.
Tel: +86-769-22022444 Fax: +86-769-22022799
Web: Http://www.ntc-c.com

Site: Conduction

Test Time: 2015-7-13 9:53:43



Report No.:	Ambi Climate		
Test Standard:	FCC PART 15_Class B_QP		
Test item:	Conducted Emission	Phase:	N
Applicant:	IONOTE	Temp.( )/Hum.(%):	24(C) / 58 %
Product:	Ambi Climate	Power Rating:	AC 120V/60Hz
Model No.:	Ambi Climate	Test Engineer:	Gavin

Test Mode: WIFI Mode

Remark: 802.11n (HT20)

No.	Frequency (MHz)	Factor (dBuV)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1819	10.80	38.90	49.70	64.39	-14.69	QP	P	
2	0.1819	10.80	25.80	36.60	54.39	-17.79	AVG	P	
3	0.2420	10.80	32.40	43.20	62.02	-18.82	QP	P	
4	0.2420	10.80	28.70	39.50	52.02	-12.52	AVG	P	
5	0.3059	10.80	32.10	42.90	60.08	-17.18	QP	P	
6	0.3059	10.80	18.30	29.10	50.08	-20.98	AVG	P	
7	0.3659	10.80	32.70	43.50	58.59	-15.09	QP	P	
8	0.3659	10.80	29.10	39.90	48.59	-8.69	AVG	P	
9	0.4260	10.80	31.60	42.40	57.33	-14.93	QP	P	
10	0.4260	10.80	26.60	37.40	47.33	-9.93	AVG	P	
11	0.6058	10.80	29.70	40.50	56.00	-15.50	QP	P	
12	0.6058	10.80	26.50	37.30	46.00	-8.70	AVG	P	

Note: Level=Reading+Factor.
Margin=Limit-Level.

4. Max. Conducted Output Power

4.1 Measurement Procedure

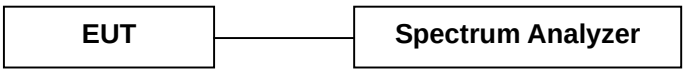
Maximum Conducted Output power at Antenna Terminals, FCC Rules 15.247(b)(3):

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer was set as below according to FCC KDB558074 (v03r02):

Maximum conducted (Average) output power:

1. Set the RBW = 1-5% of the OBW, not to exceed 1MHz.
2. Set the VBW ≥ 3 x RBW
3. Set the span ≥ 1.5 x OBW
4. Detector = RMS
5. Sweep time = auto couple.
6. Number of points in sweep ≥2x span/RBW. (This gives bin-to-bin spacing≤2, so that narrowband signals are not lost between frequency bins.)
7. Trace mode = Trace average at least 100 traces in power averaging (i.e., RMS) mode.
8. If transmit duty cycle <98%, use a sweep trigger with the level set to enable triggering only on full power pulses. The transmitter shall operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously(i.e., with no off intervals) or at duty cycle ≥98%, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to “free run”.
9. Compute power by integrating the spectrum across the OBW of the signal using the instrument’s band power measurement function, with band limits set equal to the OBW band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

4.2 Test SET-UP (Block Diagram of Configuration)



4.3 Measurement Results

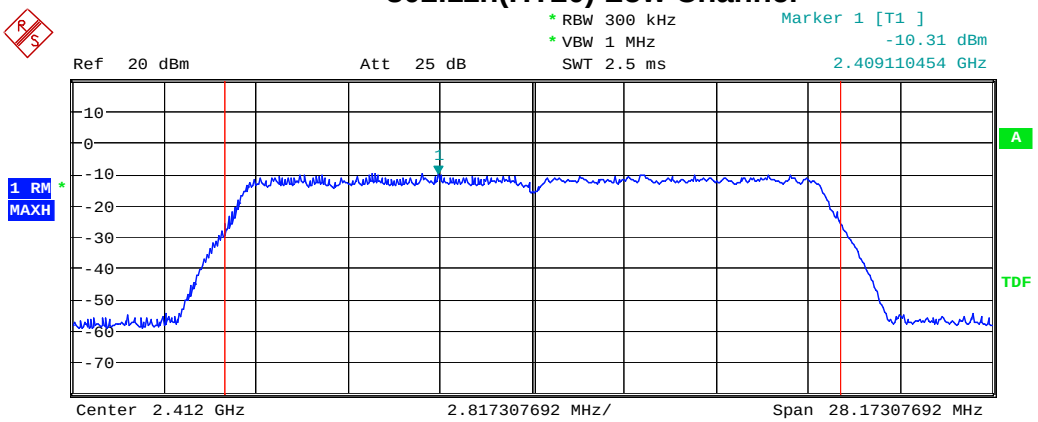
Pass

Please refer to following table and plots.

Temperature :	24 ℃	Humidity :	50%
Test By:	Sance	Test Date :	July 18, 2015
Test Result:	PASS		

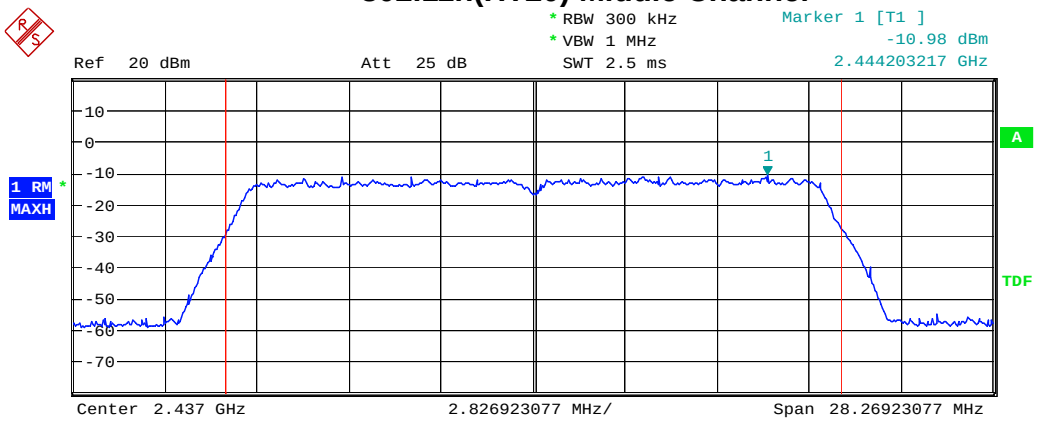
Frequency MHz	Data Rate Mbps	AV Output Power dBm	Limit dBm
IEEE 802.11n(HT20) Mode (OFDM, Antenna Gain=3.8dBi)			
Low Channel: 2412	6.5	4.61	30
Middle Channel: 2437	6.5	3.61	30
High Channel: 2462	6.5	3.85	30
IEEE 802.11n(HT40) Mode (OFDM, Antenna Gain=3.8dBi)			
Low Channel: 2422	13	3.84	30
Middle Channel: 2437	13	3.53	30
High Channel: 2452	13	3.12	30

Maximum Average Conducted Output Power
802.11n(HT20) Low Channel



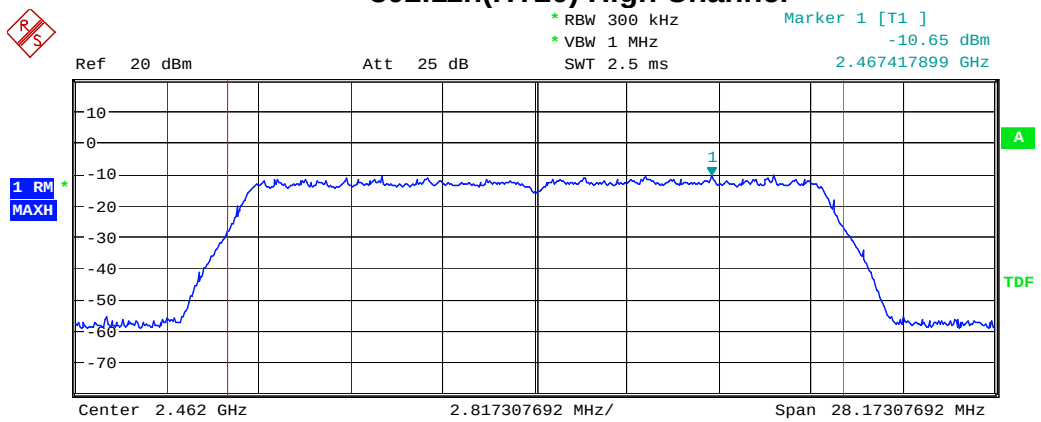
Tx Channel
Bandwidth 18.7820513 MHz Power 4.61 dBm

802.11n(HT20) Middle Channel



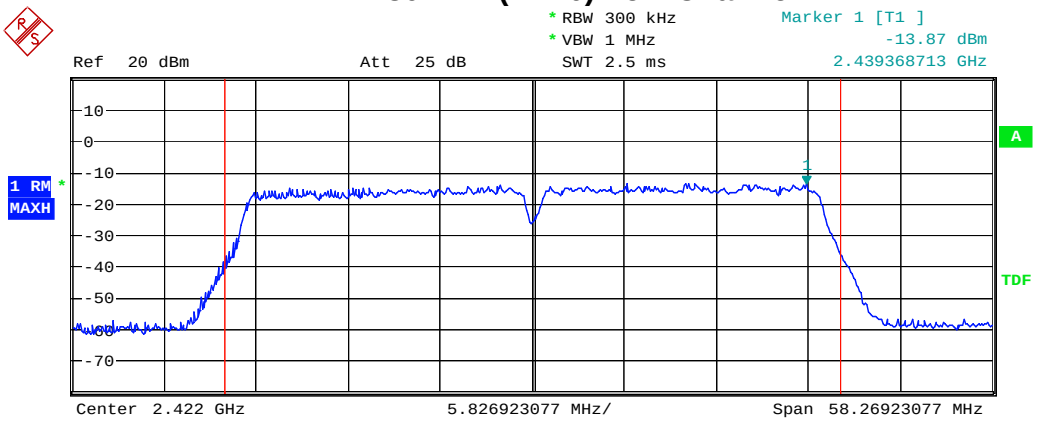
Tx Channel
Bandwidth 18.8461538 MHz Power 3.61 dBm

802.11n(HT20) High Channel



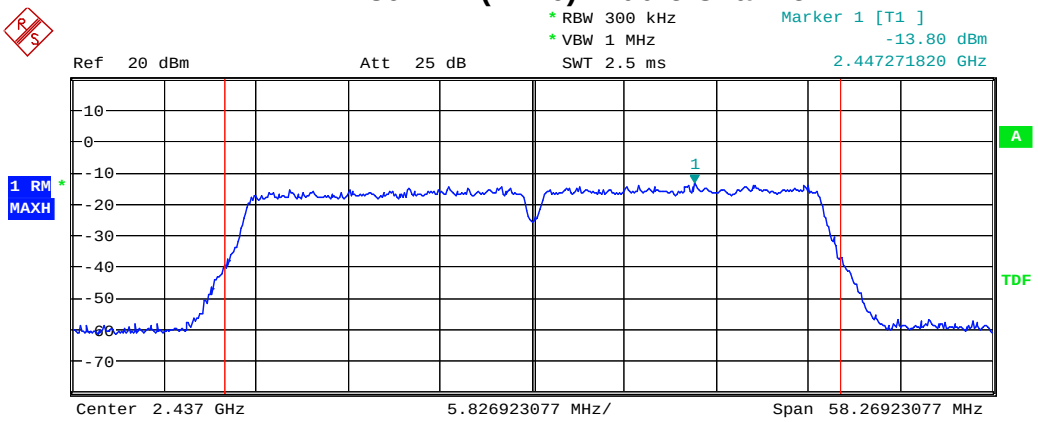
Tx Channel
Bandwidth 18.7820513 MHz Power 3.85 dBm

802.11n(HT40) Low Channel



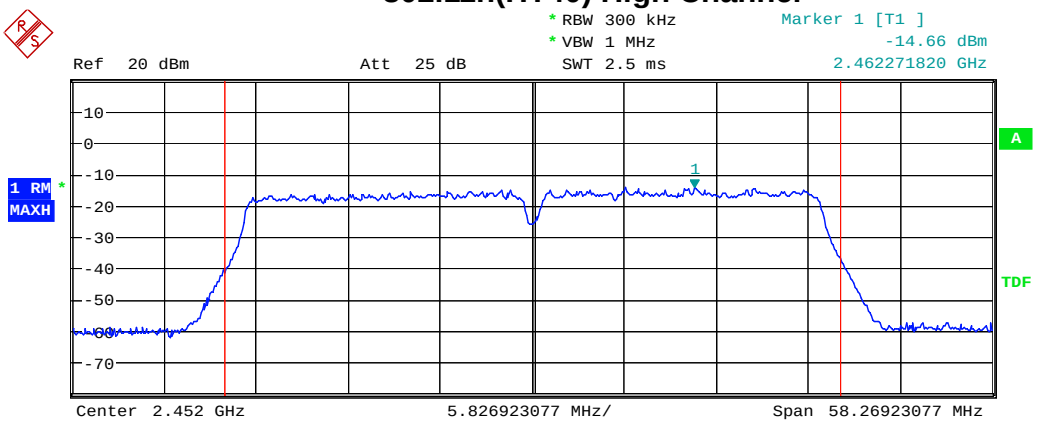
Tx Channel
Bandwidth 38.8461538 MHz Power 3.84 dBm

802.11n(HT40) Middle Channel



Tx Channel
Bandwidth 38.8461538 MHz Power 3.53 dBm

802.11n(HT40) High Channel



Tx Channel
Bandwidth 38.8461538 MHz Power 3.12 dBm

5. 6dB&20dB Bandwidth

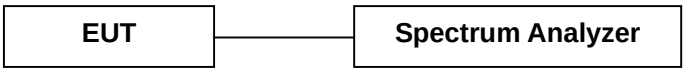
5.1 Measurement Procedure

DTS 6dB Channel Bandwidth, FCC Rule 15.247(a)(2):

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer was set as below according to FCC KDB558074(v03r02):

1. For 6dB bandwidth, Set the RBW = 100KHz.
   For 20dB bandwidth, Set the RBW=1-5% of the OBW, not to exceed 1MHz.
2. Set the VBW ≥ 3 x RBW
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. 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.

5.2 Test SET-UP (Block Diagram of Configuration)



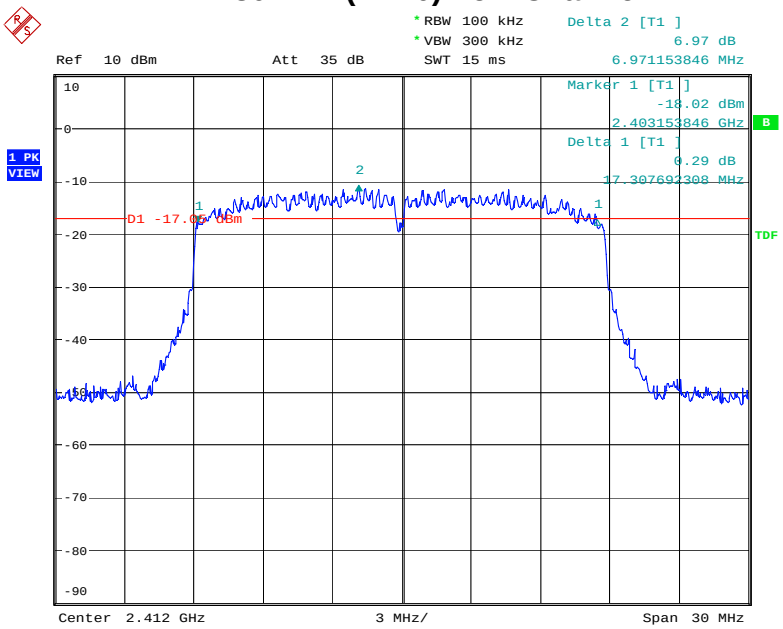
5.3 Measurement Results

Pass

Please refer to following table and plots.

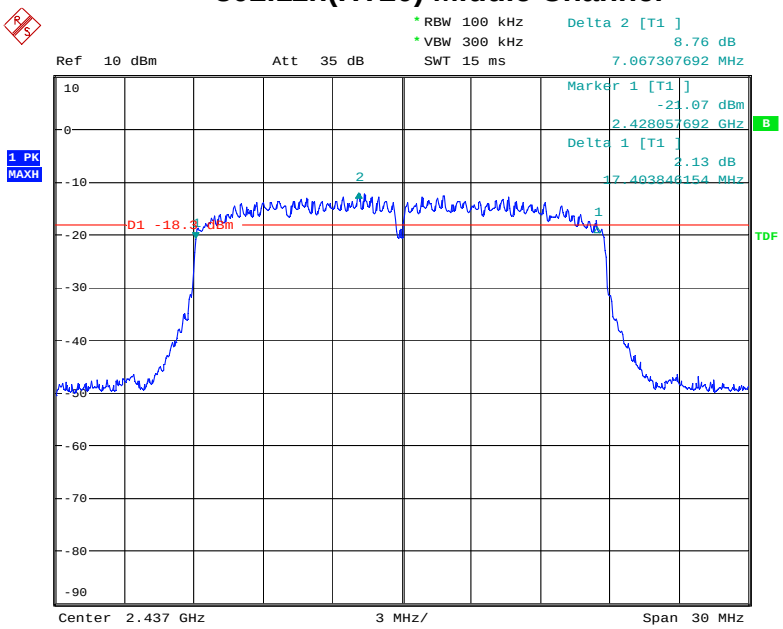
Temperature :	24 ℃	Humidity : 50 %		
Test By:	Sance	Test Date : July 16, 2015 to July 17, 2015		
Test Result:	PASS			
Frequency MHz	Data Rate Mbps	6dB Bandwidth MHz	20dB Bandwidth MHz	Limit
IEEE 802.11n(HT20) Mode (OFDM)				
Low Channel: 2412	6.5	17.31	18.78	>500KHz
Middle Channel: 2437	6.5	17.40	18.85	>500KHz
High Channel: 2462	6.5	17.45	18.78	>500KHz
IEEE 802.11n(HT40) Mode (OFDM)				
Low Channel: 2422	13	35.02	38.85	>500KHz
Middle Channel: 2437	13	35.02	38.85	>500KHz
High Channel: 2452	13	35.34	38.85	>500KHz

6dB Bandwidth
802.11n(HT20) Low Channel



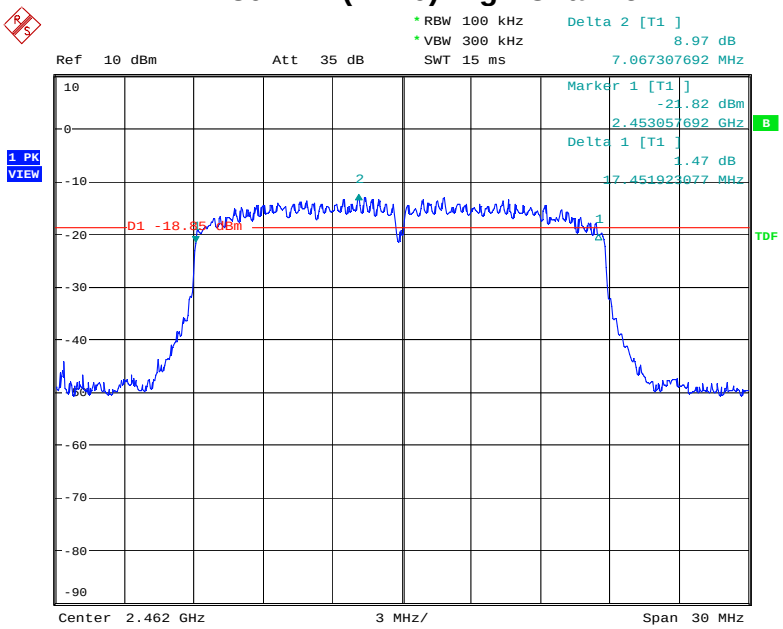
Date: 16.JUL.2015 23:44:06

802.11n(HT20) Middle Channel



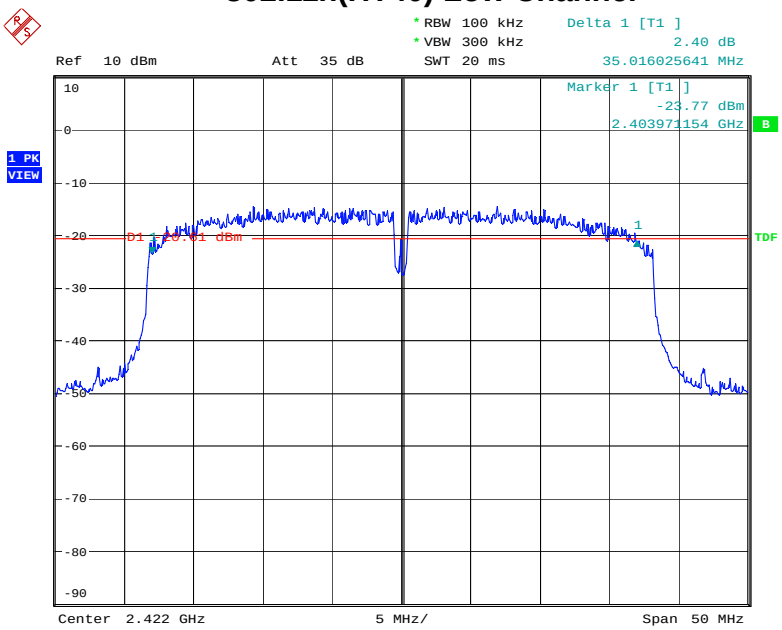
Date: 17.JUL.2015 02:05:14

802.11n(HT20) High Channel



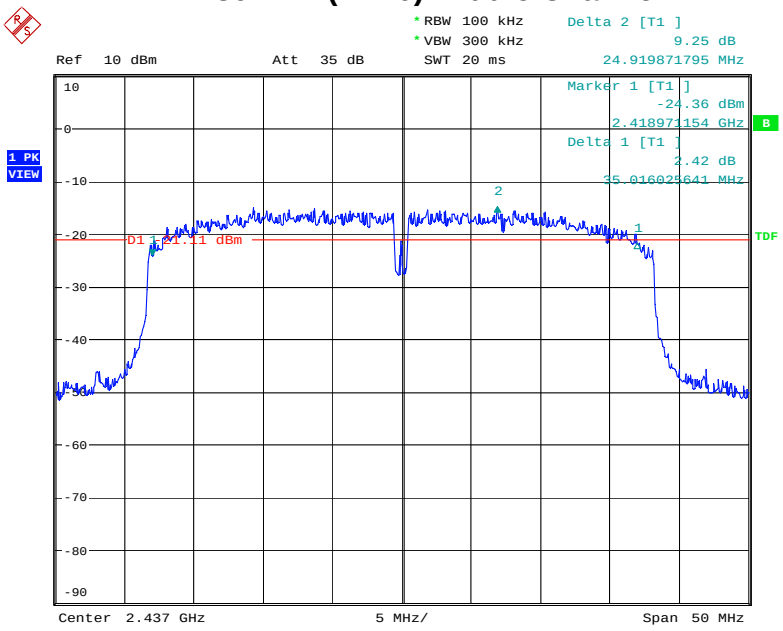
Date: 16.JUL.2015 23:55:19

802.11n(HT40) Low Channel



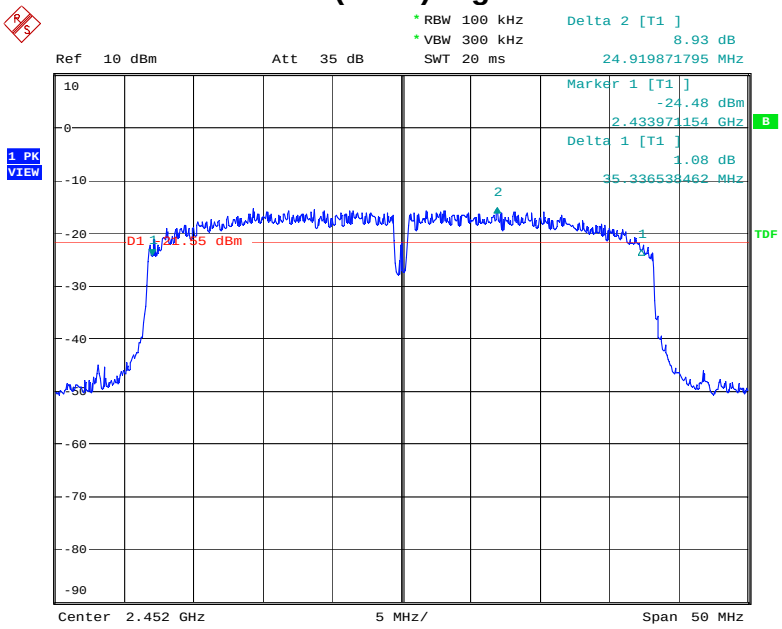
Date: 17.JUL.2015 00:01:18

802.11n(HT40) Middle Channel



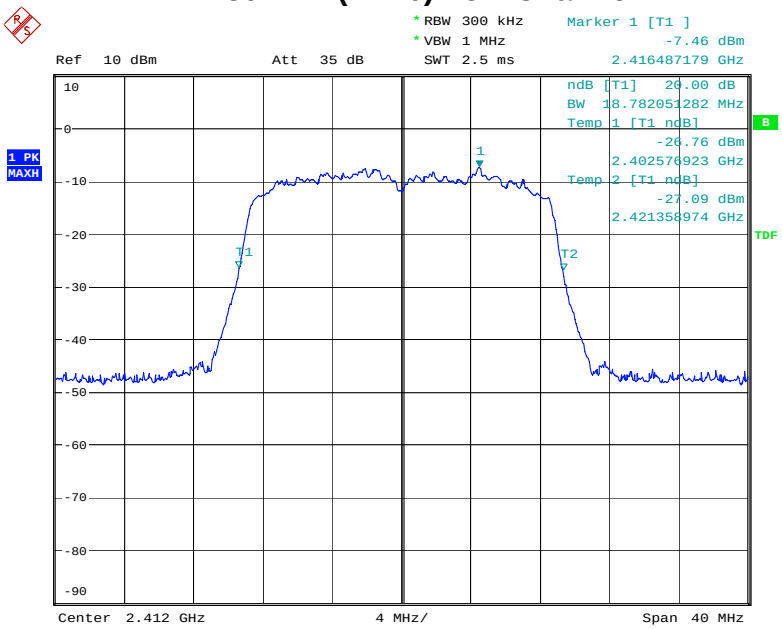
Date: 17.JUL.2015 00:03:12

802.11n(HT40) High Channel



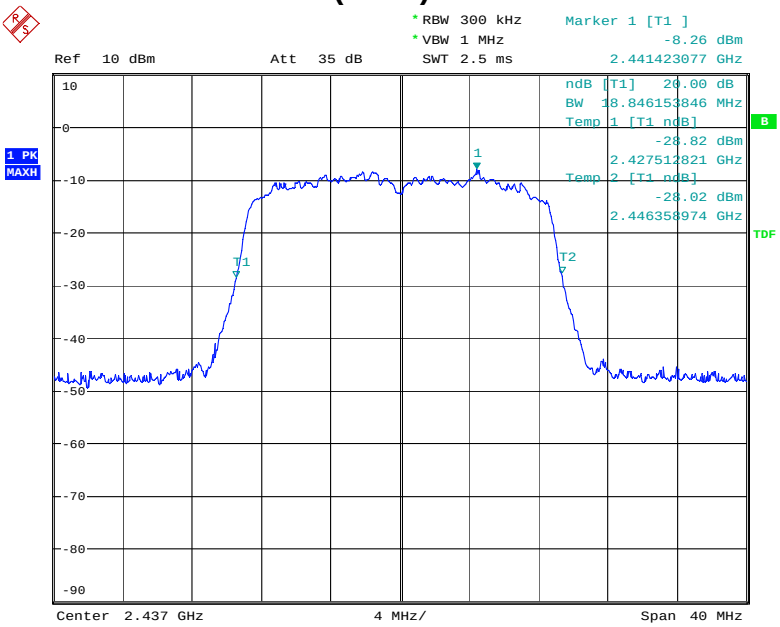
Date: 17.JUL.2015 00:05:47

20dB Bandwidth
802.11n(HT20) Low Channel



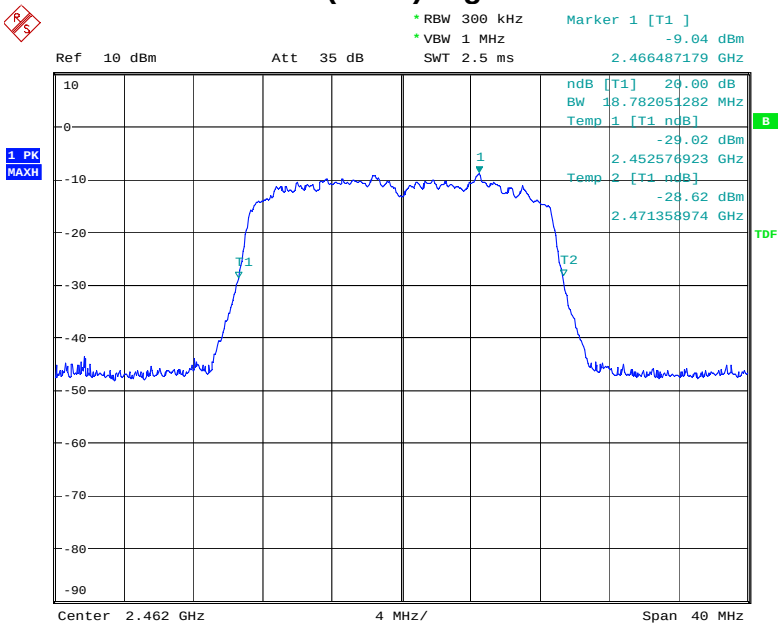
Date: 17.JUL.2015 00:48:59

802.11n(HT20) Middle Channel



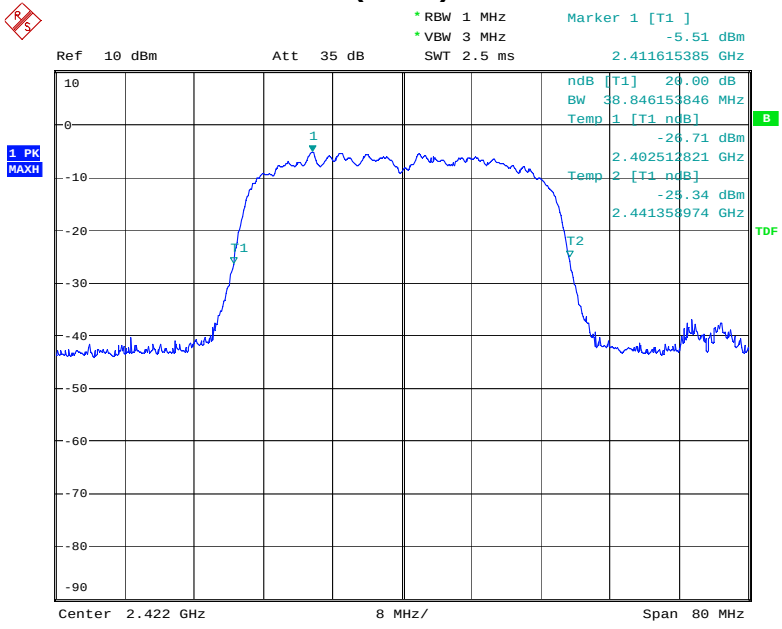
Date: 17.JUL.2015 00:52:31

802.11n(HT20) High Channel



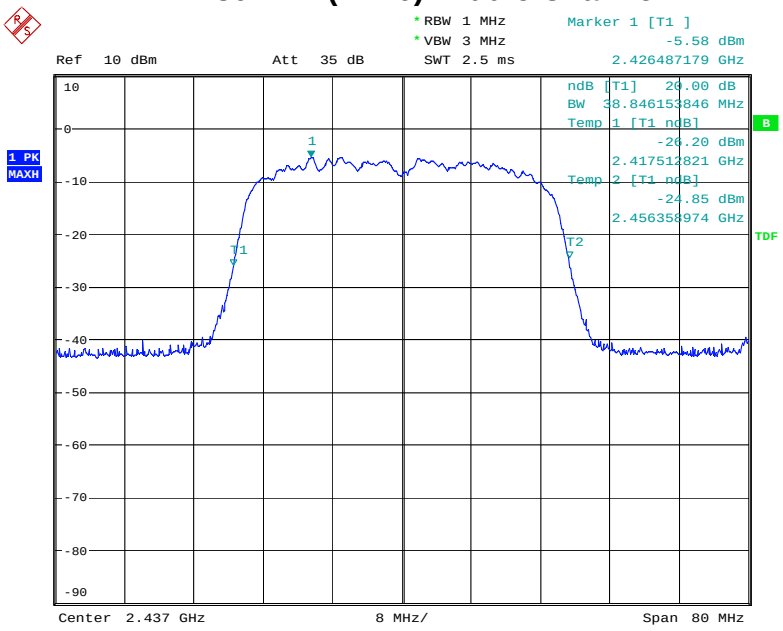
Date: 17.JUL.2015 00:55:08

802.11n(HT40) Low Channel



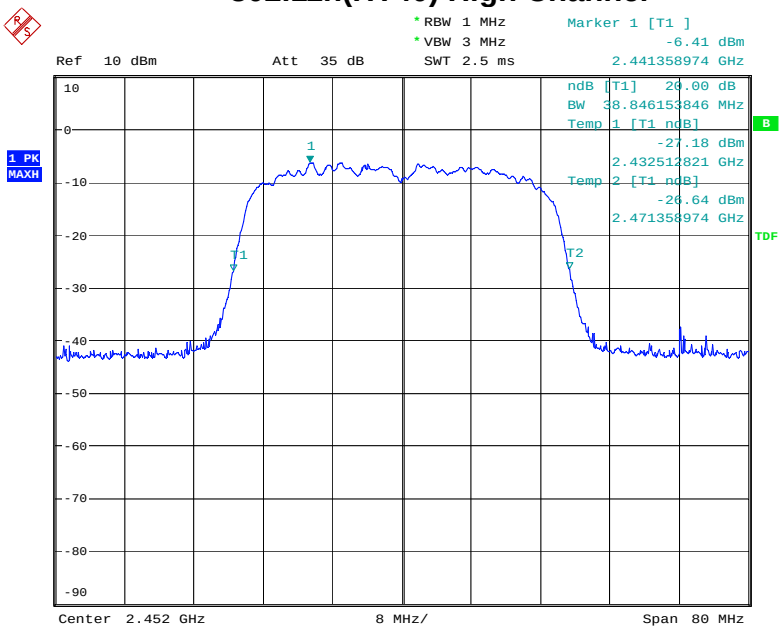
Date: 17.JUL.2015 00:45:41

802.11n(HT40) Middle Channel



Date: 17.JUL.2015 00:41:38

802.11n(HT40) High Channel



Date: 17.JUL.2015 00:35:44

6. Power Spectral Density

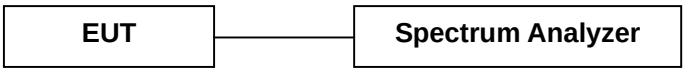
6.1 Measurement Procedure

DTS 6dB Channel Bandwidth, FCC Rule 15.247(a)(2):

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer was set as below according to FCC KDB558074 (v03r02):

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS bandwidth.
3. Set the RBW to: 3 kHz≤RBW≤100KHz
4. Set the VBW ≥ 3 x RBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

6.2 Test SET-UP (Block Diagram of Configuration)



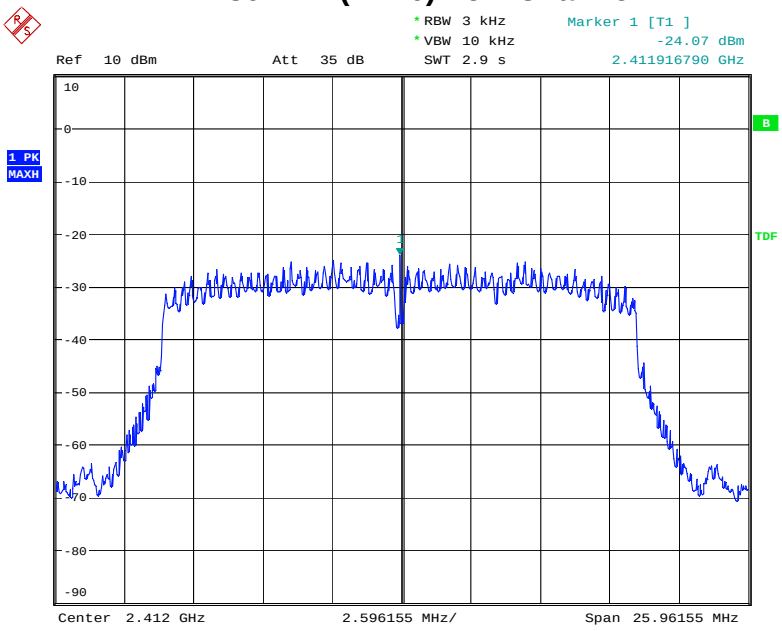
6.3 Measurement Results

Pass

Please refer to following table and plots.

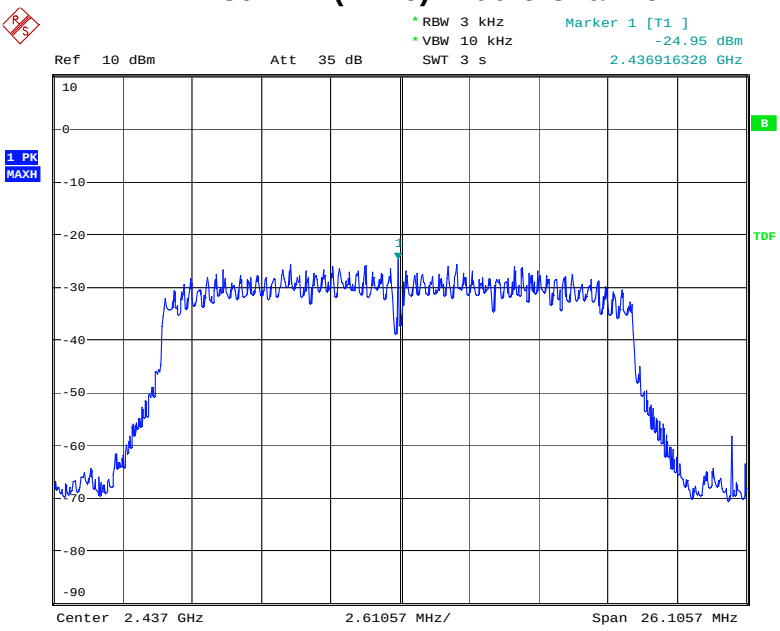
Temperature :	24 ℃	Humidity :	50 %
Test By:	Sance	Test Date :	July 17, 2015
Test Result:	PASS		
Frequency MHz	Data Rate Mbps	PSD dBm	Limit dBm
IEEE 802.11n(HT20) Mode (OFDM)			
Low Channel: 2412	6.5	-24.07	8
Middle Channel: 2437	6.5	-24.95	8
High Channel: 2462	6.5	-25.50	8
IEEE 802.11n(HT40) Mode (OFDM)			
Low Channel: 2422	13	-26.41	8
Middle Channel: 2437	13	-25.80	8
High Channel: 2452	13	-26.53	8

802.11n(HT20) Low Channel



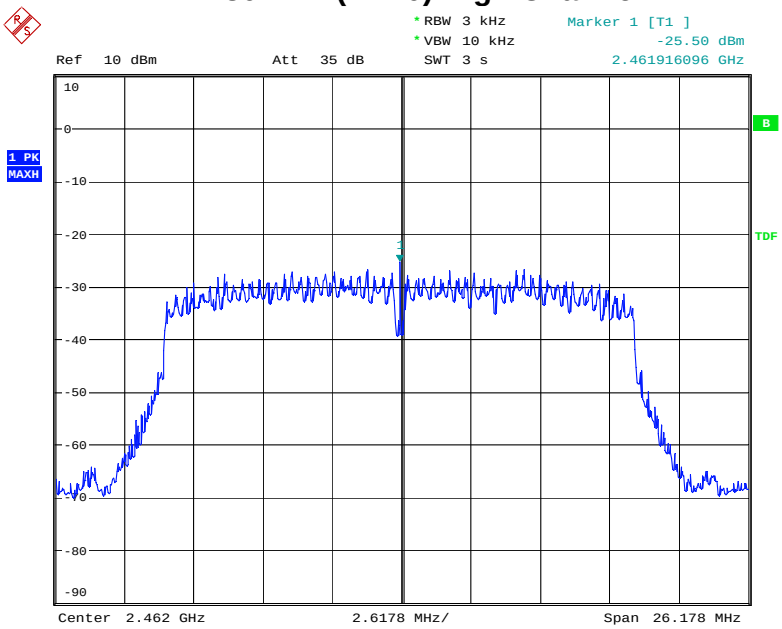
Date: 17.JUL.2015 00:07:45

802.11n(HT20) Middle Channel



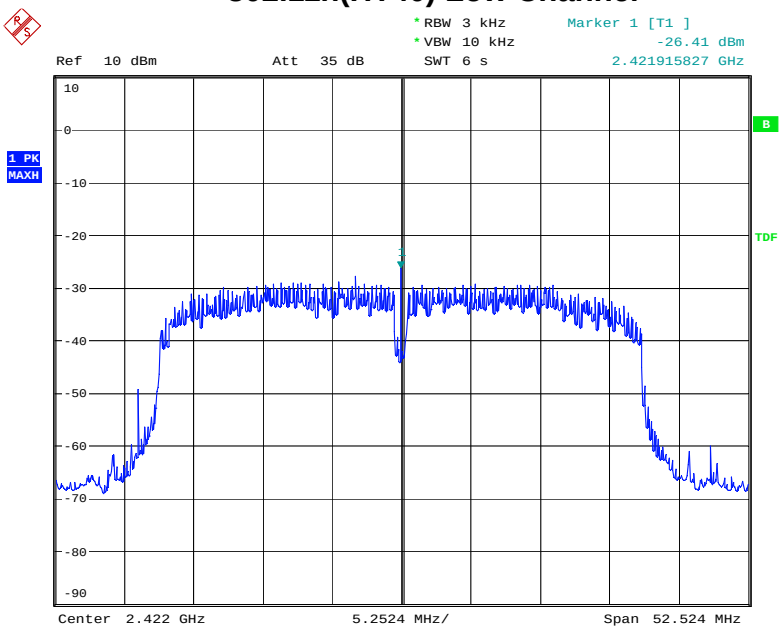
Date: 17.JUL.2015 00:10:30

802.11n(HT20) High Channel



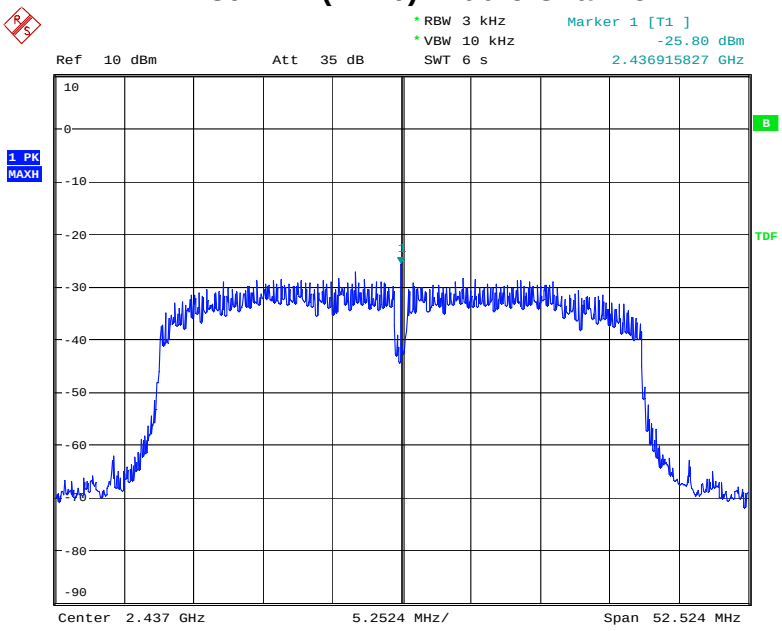
Date: 17.JUL.2015 00:12:41

802.11n(HT40) Low Channel



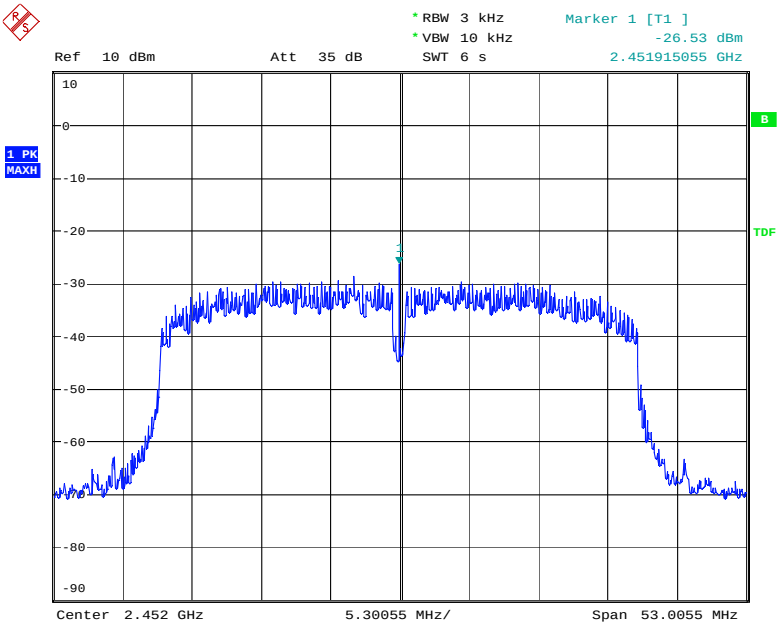
Date: 17.JUL.2015 02:09:07

802.11n(HT40) Middle Channel



Date: 17.JUL.2015 00:30:04

802.11n(HT40) High Channel



Date: 17.JUL.2015 00:31:05

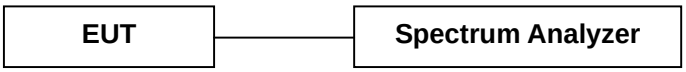
7. Band Edge and Conducted Spurious Emissions

7.1 Requirement and Measurement Procedure

Out of Band Conducted Emissions, FCC Rule 15.247(d):

The transmitter output is connected to spectrum analyzer. The resolution bandwidth is set to100KHz, and the video bandwidth set to 300KHz.

7.2 Test SET-UP (Block Diagram of Configuration)



7.3 Measurement Results

The test plots showed that all spurious emission and up to the tenth harmonic was measured and they were found to be at least 20dB below the highest level of the desired power in the passband. Please refer to below tables and plots.

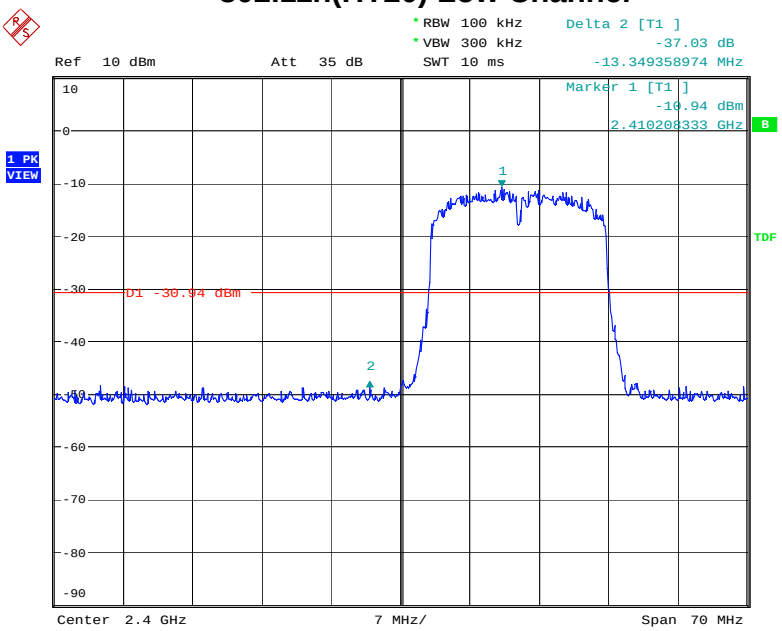
Spurious Emission in restricted band:

Operation Mode:	TX	Test Date :	July 29, 2015
Frequency Range:	Above 1GHz	Temperature :	24 ℃
Test Result:	PASS	Humidity :	50 %
Measured Distance:	3m	Test By:	Sance

Freq. (MHz)	Ant.Pol. (H/V)	Reading Level(dBuV)		Factor (dB/m)	Emission Level (dBuV)		Limit 3m (dBuV/m)		Margin (dB)	
		PK	AV		PK	AV	PK	AV	PK	AV
Test Mode: 802.11n(HT20)										
2399.990	H	61.04	42.76	8.09	69.13	50.85	74.00	54.00	-4.87	-3.15
2483.501	V	54.66	41.90	8.09	62.75	49.99	74.00	54.00	-11.25	-4.01
2483.501	H	43.00	29.17	8.36	51.36	37.53	74.00	54.00	-22.64	-16.47
2483.501	V	40.82	26.18	8.36	49.18	34.54	74.00	54.00	-24.82	-19.46
Test Mode: 802.11n(HT40)										
2399.990	H	61.49	41.28	8.09	69.58	49.37	74.00	54.00	-4.42	-4.63
2483.501	V	52.36	41.10	8.09	60.45	49.19	74.00	54.00	-13.55	-4.81
2483.501	H	43.18	28.84	8.36	51.54	37.20	74.00	54.00	-22.46	-16.80
2483.501	V	38.84	26.00	8.36	47.20	34.36	74.00	54.00	-26.80	-19.64

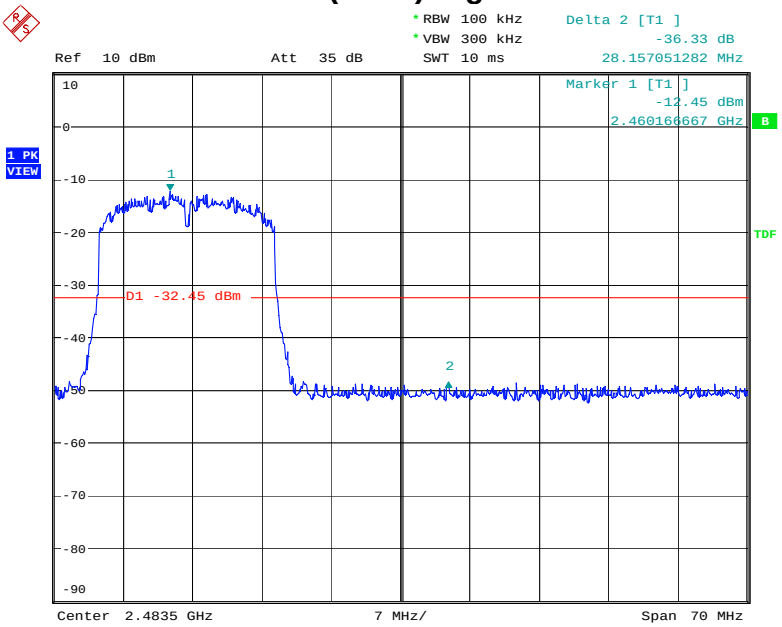
Note: (1) All Readings are Peak Value and AV.
(2) Emission Level= Reading Level+Probe Factor +Cable Loss
(3) Measurement uncertainty : ±3.7dB

Band Edge
802.11n(HT20) Low Channel



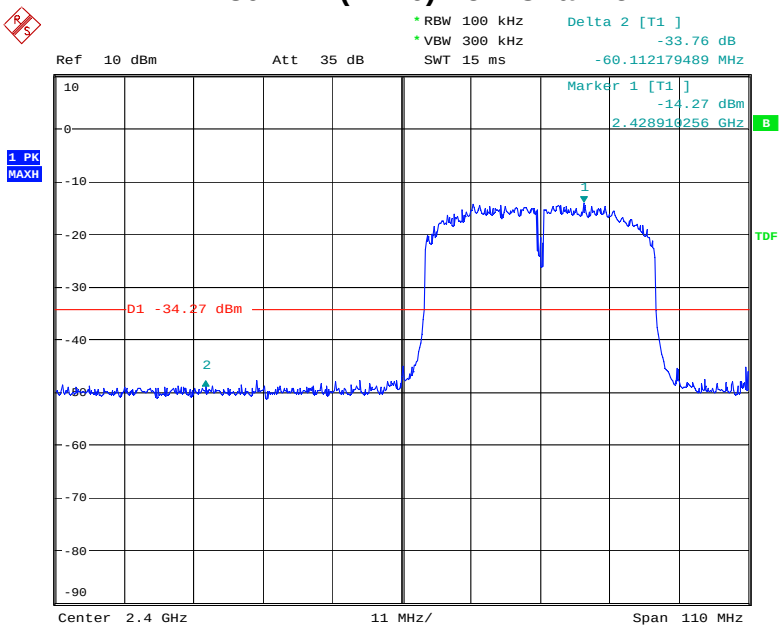
Date: 17.JUL.2015 00:08:56

802.11n(HT20) High Channel



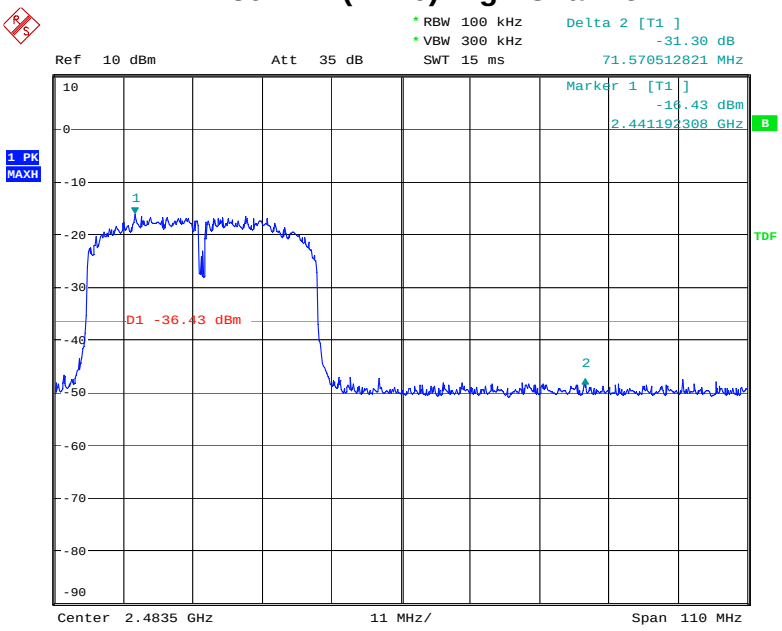
Date: 17.JUL.2015 00:13:43

802.11n(HT40) Low Channel



Date: 17.JUL.2015 00:28:46

802.11n(HT40) High Channel

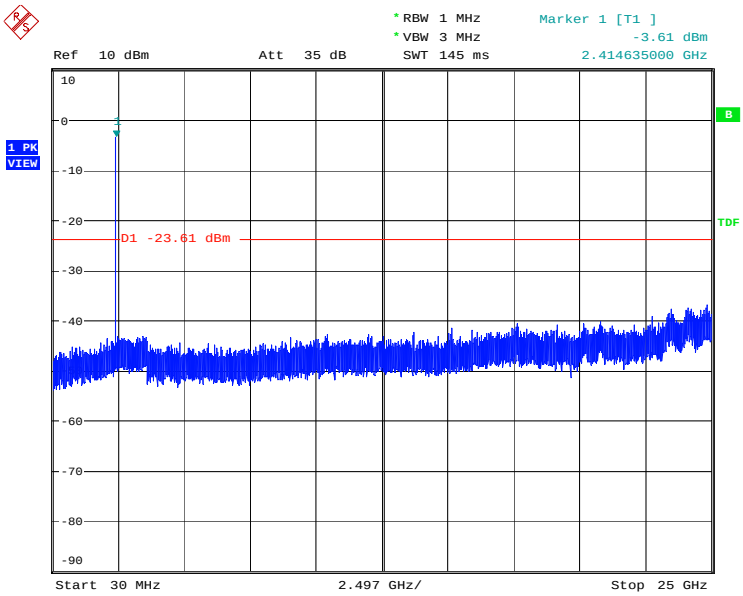


Date: 17.JUL.2015 00:31:53

Conducted Spurious Emissions

802.11n (HT20)

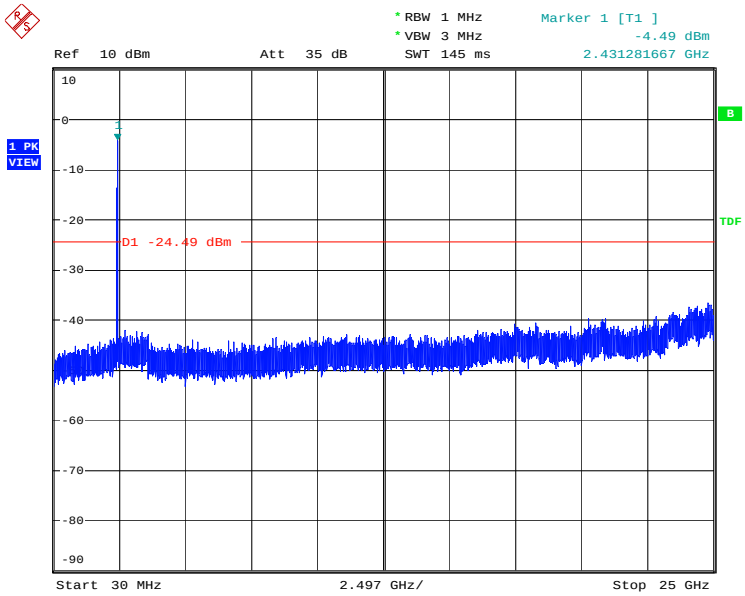
Low Channel



Date: 16.JUL.2015 23:45:16

Note: Sweep points=30001pts

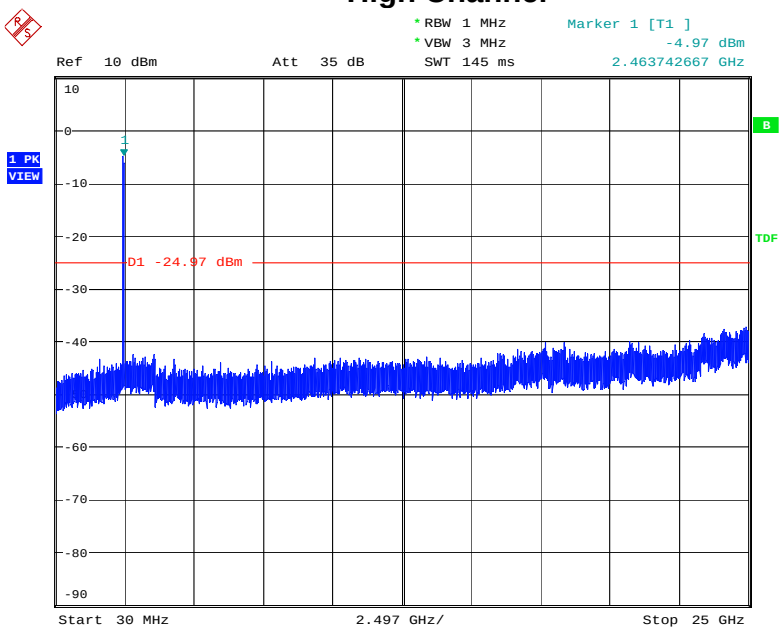
Middle Channel



Date: 16.JUL.2015 23:46:17

Note: Sweep points=30001pts

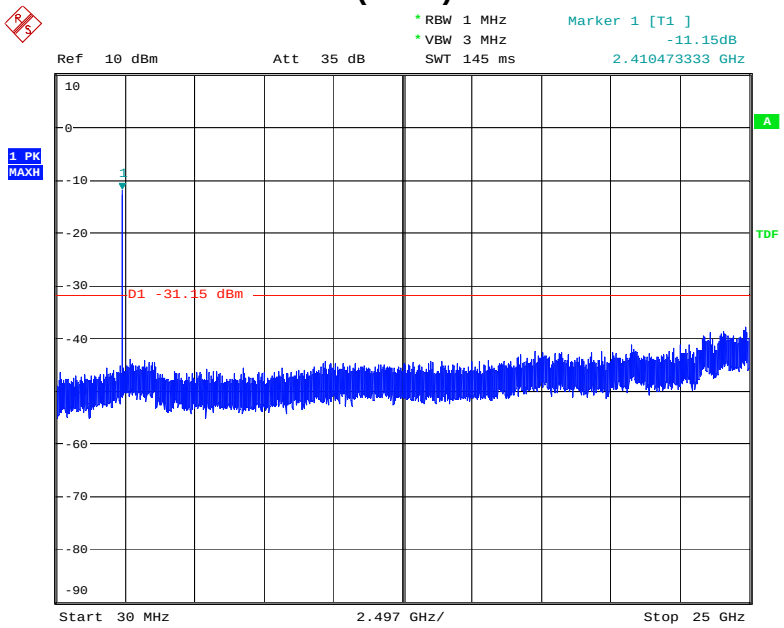
High Channel



Date: 16.JUL.2015 23:56:46

Note: Sweep points=30001pts

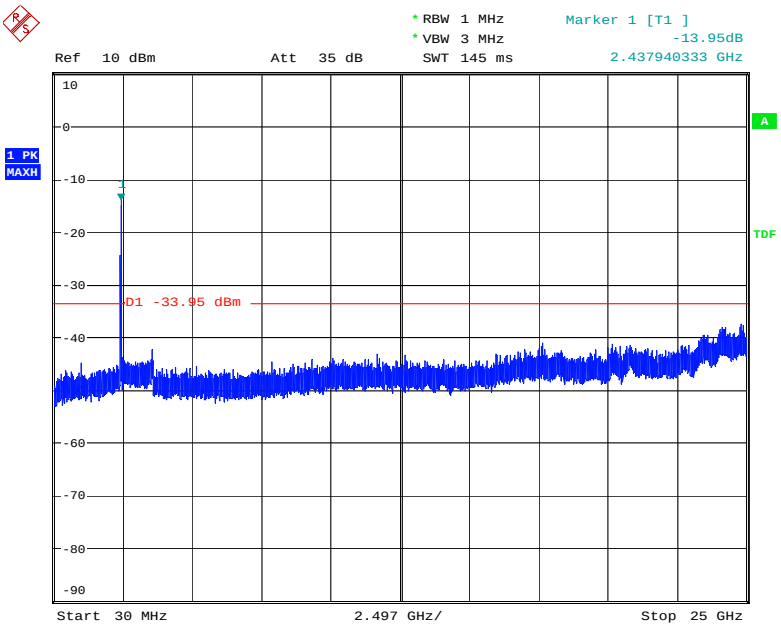
802.11n (HT40)Low Channel



Date: 16.JUL.2015 23:57:27

Note: Sweep points=30001pts

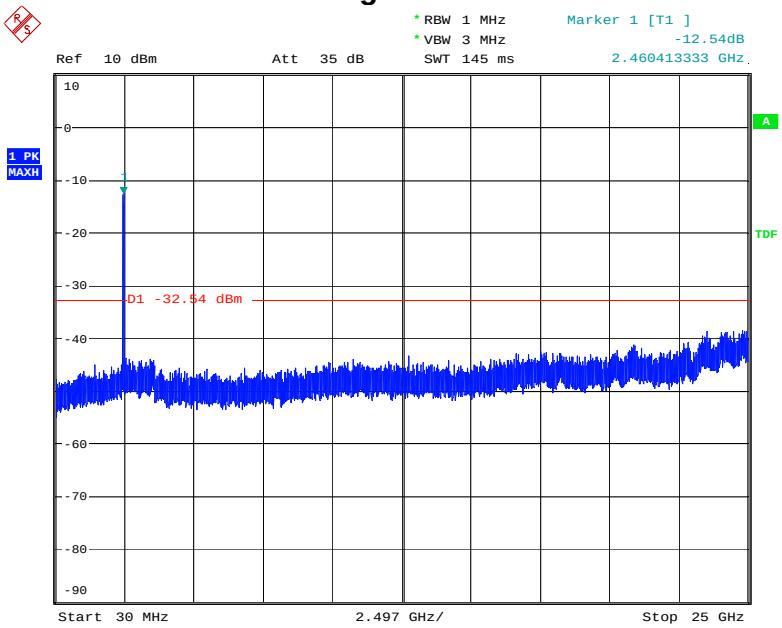
Middle Channel



Date: 16.JUL.2015 23:58:41

Note: Sweep points=30001pts

High Channel



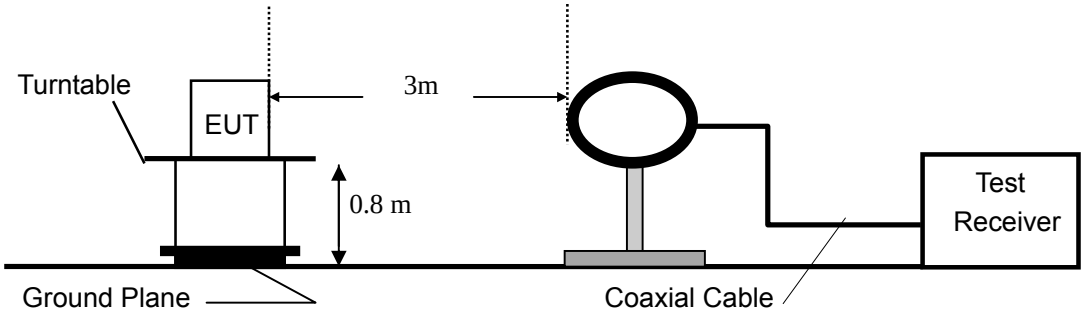
Date: 16.JUL.2015 23:59:56

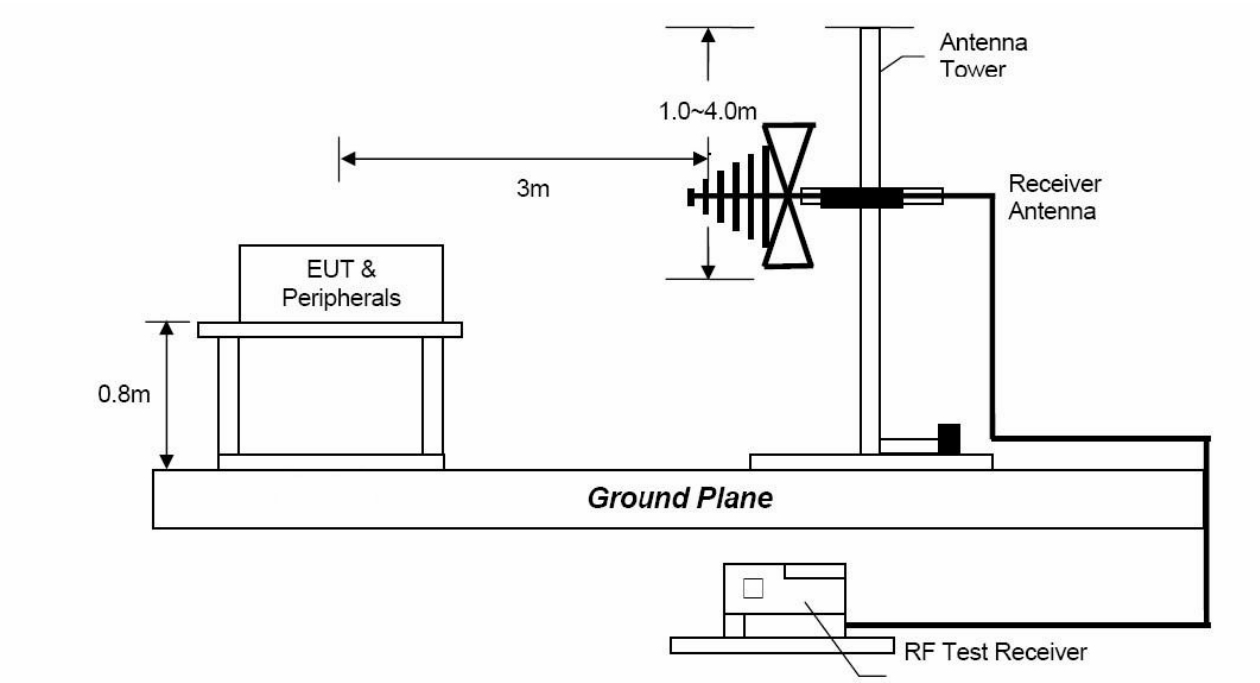
Note: Sweep points=30001pts

8. Radiated Spurious Emissions and Restricted Bands

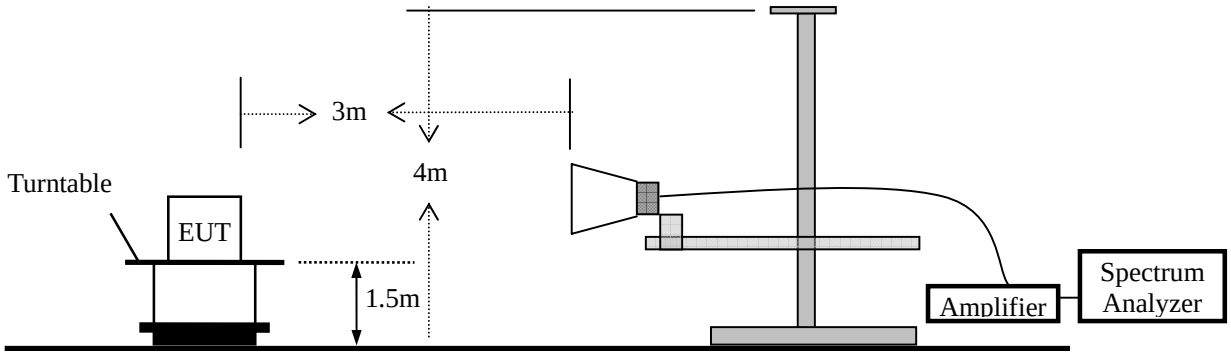
8.1 Test SET-UP (Block Diagram of Configuration)

8.1.1 Radiated Emission Test Set-Up, Frequency Below 30MHz





8.1.2 Radiated Emission Test Set-Up, Frequency above 1GHz



8.2 Measurement Procedure

a. Blow 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi- anechoic chamber room. Above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi- anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. The test-receiver system was set to peak detect function and specified bandwidth with maximum hold mode.

e. A Quasi-peak measurement was then made for that frequency point for below 1GHz test. PK and AV for above 1GHz emission test.

For 30MHz to 1GHz:
Sept the spectrum analyzer as: RBW=120kHz, VBW=300kHz, Detector=Quasi-Peak

For Above 1GHz:
Set the spectrum analyzer as: RBW=1MHz, VBW=3MHz, Detector=Peak.
Set the spectrum analyzer as: RBW=1MHz, VBW=10Hz, Detector=Peak.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

Frequency Band (MHz)	Level	Resolution Bandwidth	Video Bandwidth
30 to 1000	QP	120 kHz	300 kHz
Above 1000	Peak	1 MHz	3 MHz
	Average	1 MHz	10 Hz

8.3 Limit

Frequency range MHz	Distance Meters	Field Strengths Limit (15.209) μV/m
0.009 ~ 0.490	300	2400/F(kHz)
0.490 ~ 1.705	30	24000/F(kHz)
1.705 ~ 30	30	30
30 ~ 88	3	100
88 ~ 216	3	150
216 ~ 960	3	200
Above 960	3	500

Remark：(1) Emission level (dB)μV = 20 log Emission level μV/m
(2) The smaller limit shall apply at the cross point between two frequency bands.
(3) As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.
(4) The frequency range scanned is from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or 40 GHz, whichever is lower.
(5) §15.247(d) specifies that emissions which fall in the restricted bands, as defined in §15.205 comply with radiated emission limits specified in §15.209.

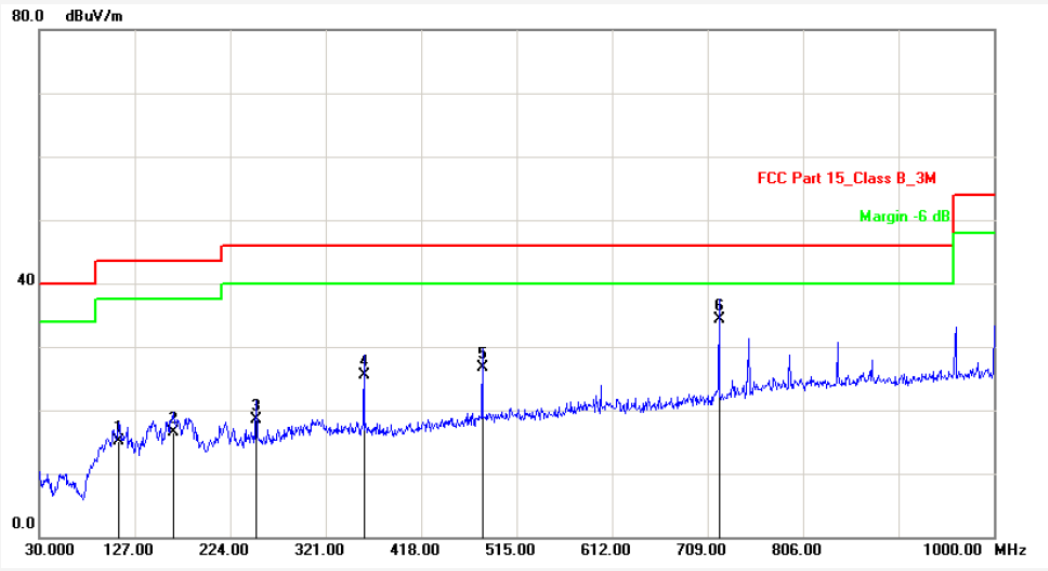
8.4 Measurement Results

Please refer to following plots of the worst case: AC 120V 60Hz.

Dongguan NTC Co., Ltd.
Tel:+86-769-22022444 Fax:+86-769-22022799
Web: Http://www.ntc-c.com

Site: Radiation

Test Time: 2015-7-27 20:29:51



Report No.:	Ambi Climate		
Test Standard:	FCC Part 15_Class B_3M	Test Distance:	
Test item:	Radiation Emission	Ant. Polarization:	Horizontal
Applicant:	IONOTE	Temp.(C)/Hum.(%):	21(C) / 55 %
Product:	Ambi Climate	Power Rating:	AC 120V/60Hz
Model No.:	Ambi Climate	Test Engineer:	Gavin

Test Mode: WIFI Mode

Remark: 802.11n(HT20) Lowest channel

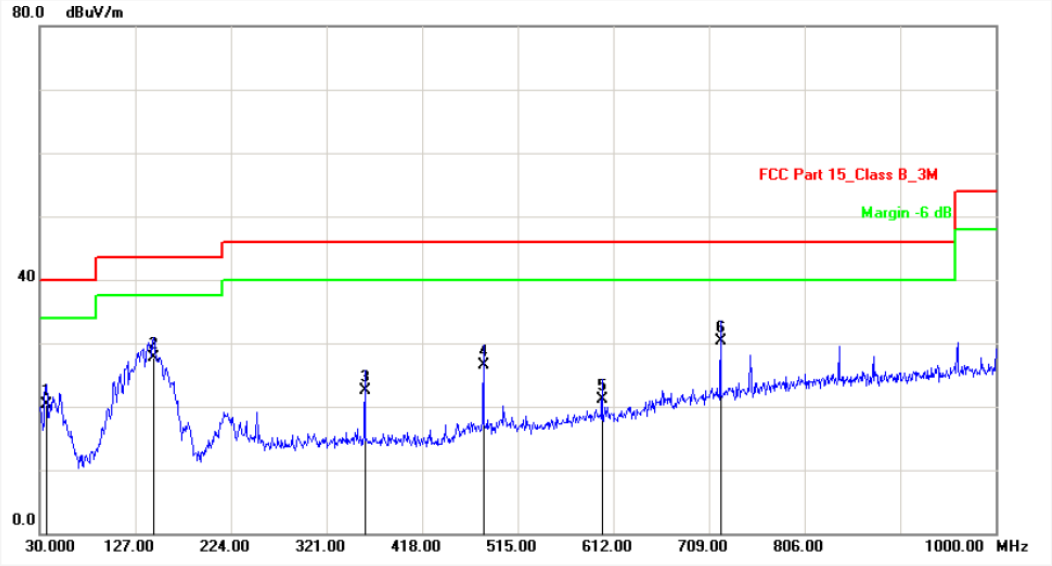
No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	110.5100	-12.26	27.36	15.10	43.50	-28.40	QP			P	
2	165.8000	-14.95	31.55	16.60	43.50	-26.90	QP			P	
3	250.1897	-11.69	30.19	18.50	46.00	-27.50	QP			P	
4	359.8000	-9.13	34.73	25.60	46.00	-20.40	QP			P	
5	480.0800	-7.21	33.91	26.70	46.00	-19.30	QP			P	
6	720.6400	-3.28	37.68	34.40	46.00	-11.60	QP			P	

Note: Level=Reading+Factor.
Margin=Limit-Level.

Dongguan NTC Co., Ltd.
Tel:+86-769-22022444 Fax:+86-769-22022799
Web: Http://www.ntc-c.com

Site: Radiation

Test Time: 2015-7-27 20:34:03



Report No.:	Ambi Climate		
Test Standard:	FCC Part 15_Class B_3M	Test Distance:	
Test item:	Radiation Emission	Ant. Polarization:	Vertical
Applicant:	IONOTE	Temp.(C)/Hum.(%):	21(C) / 55 %
Product:	Ambi Climate	Power Rating:	AC 120V/60Hz
Model No.:	Ambi Climate	Test Engineer:	Gavin

Test Mode: WIFI Mode

Remark: 802.11n(HT20) Lowest channel

No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	36.7900	-16.75	37.15	20.40	40.00	-19.60	QP			P	
2	145.4299	-18.59	46.39	27.80	43.50	-15.70	QP			P	
3	359.8000	-11.13	33.73	22.60	46.00	-23.40	QP			P	
4	480.0800	-9.21	35.81	26.60	46.00	-19.40	QP			P	
5	600.3600	-7.00	28.20	21.20	46.00	-24.80	QP			P	
6	720.6400	-3.28	33.68	30.40	46.00	-15.60	QP			P	

Note: Level=Reading+Factor.
Margin=Limit-Level.

Test Mode:	802.11n(HT20)	Test Date :	July 29, 2015
Frequency Range:	Above 1GHz	Temperature :	24℃
Test Result:	PASS	Humidity :	50 %
Measured Distance:	3m	Test By:	Sance

Freq. (MHz)	Ant.Pol. (H/V)	Reading Level(dBuV)		Factor (dB/m)	Emission Level (dBuV)		Limit 3m (dBuV/m)		Margin (dB)	
		PK	AV		PK	AV	PK	AV	PK	AV
Operation Mode: TX Mode (Low)										
4824	V	39.51	32.57	14.72	54.23	47.29	74.00	54.00	-19.77	-6.71
7236	V	38.58	23.28	20.74	59.32	44.02	74.00	54.00	-14.68	-9.98

4824	H	40.48	34.40	14.72	55.20	49.12	74.00	54.00	-18.80	-4.88
7236	H	37.46	27.47	20.74	58.20	48.21	74.00	54.00	-15.80	-5.79

Operation Mode: TX Mode (Mid)										
4874	V	39.27	32.60	14.93	54.20	47.53	74.00	54.00	-19.80	-6.47
7311	V	38.26	24.49	20.88	59.14	45.37	74.00	54.00	-14.86	-8.63

4874	H	39.80	32.30	14.93	54.73	47.23	74.00	54.00	-19.27	-6.77
7311	H	38.36	23.32	20.88	59.24	44.20	74.00	54.00	-14.76	-9.80

Operation Mode: TX Mode (High)										
4924	V	40.04	32.72	15.15	55.19	47.87	74.00	54.00	-18.81	-6.13
7386	V	39.22	25.33	21.04	60.26	46.37	74.00	54.00	-13.74	-7.63

4924	H	41.12	35.17	15.15	56.27	50.32	74.00	54.00	-17.73	-3.68
7386	H	39.25	27.09	21.04	60.29	48.13	74.00	54.00	-13.71	-5.87

Note: (1) All Readings are Peak Value and AV.
(2) Emission Level= Reading Level + Factor
(3) Factor= Antenna Gain + Cable Loss – Amplifier Gain
(4) Data of measurement within this frequency range shown " ---" in the table above means the reading of emissions are attenuated more than 10dB below the permissible limits.
(5) Measurement uncertainty : ±3.7dB.
(6) Horn antenna used for the emission over 1000MHz.

Test Mode:	802.11n(HT40)	Test Date :	July 29, 2015
Frequency Range:	Above 1GHz	Temperature :	24℃
Test Result:	PASS	Humidity :	50 %
Measured Distance:	3m	Test By:	Sance

Freq. (MHz)	Ant.Pol. (H/V)	Reading Level(dBuV)		Factor (dB/m)	Emission Level (dBuV)		Limit 3m (dBuV/m)		Margin (dB)	
		PK	AV		PK	AV	PK	AV	PK	AV
Operation Mode: TX Mode (Low)										
4844	V	40.35	33.88	14.81	55.16	48.69	74.00	54.00	-18.84	-5.31
7266	V	38.60	22.71	20.79	59.39	43.50	74.00	54.00	-14.61	-10.50

4844	H	43.02	35.16	14.81	57.83	49.97	74.00	54.00	-16.17	-4.03
7266	H	36.56	29.21	20.79	57.35	50.00	74.00	54.00	-16.65	-4.00

Operation Mode: TX Mode (Mid)										
4874	V	39.19	32.63	14.93	54.12	47.56	74.00	54.00	-19.88	-6.44
7311	V	39.46	24.88	20.88	60.34	45.76	74.00	54.00	-13.66	-8.24

4874	H	41.19	32.27	14.93	56.12	47.20	74.00	54.00	-17.88	-6.80
7311	H	40.91	25.44	20.88	61.79	46.32	74.00	54.00	-12.21	-7.68

Operation Mode: TX Mode (High)										
4904	V	40.14	33.42	15.05	55.19	48.47	74.00	54.00	-18.81	-5.53
7356	V	39.05	25.39	20.97	60.02	46.36	74.00	54.00	-13.98	-7.64

4904	H	39.46	32.67	15.05	54.51	47.72	74.00	54.00	-19.49	-6.28
7356	H	39.21	25.39	20.97	60.18	46.36	74.00	54.00	-13.82	-7.64

Note:
(1) All Readings are Peak Value and AV.
(2) Emission Level= Reading Level + Factor
(3) Factor= Antenna Gain + Cable Loss – Amplifier Gain
(4) Data of measurement within this frequency range shown " ---" in the table above means the reading of emissions are attenuated more than 10dB below the permissible limits.
(5) Measurement uncertainty : ±3.7dB.
(6) Horn antenna used for the emission over 1000MHz.

9. Antenna Application

9.1 Antenna requirement

According to of FCC part 15C section 15.203 and 15.240:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.
Systems operating in the 2400-2483.5MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum peak output power of the intentional radiator is reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

9.2 Measurement Results

The antenna is PFC antenna and no consideration of replacement, and the best case gain of the antenna is 3.8dBi. So, the antenna is consider meet the requirement.

10. Test Equipment List

Description	Manufacturer	Model Number	Serial Number	Characteristics	Calibration Date	Calibration Due Date
Test Receiver	Rohde & Schwarz	ESCI7	100837	9KHz~7GHz	Nov. 24, 2014	Nov. 23, 2015
Antenna	Schwarzbeck	VULB9162	9162-010	30MHz~7GHz	Nov. 27, 2014	Nov. 26, 2015
Positioning Controller	UC	UC 3000	N/A	0~360°, 1-4m	N/A	N/A
Color Monitor	SUNSPO	SP-140A	N/A	N/A	N/A	N/A
Single Phase Power Line Filter	SAEMC	PF201A-32	110210	32A	N/A	N/A
3 Phase Power Line Filter	SAEMC	PF401A-200	110318	200A	N/A	N/A
DC Power Filter	SAEMC	PF301A-200	110245	200A	N/A	N/A
Cable	Huber+Suhner	CBL2-NN-1M	22390001	9KHz~7GHz	Nov. 08, 2014	Nov. 07, 2015
Cable	Huber+Suhner	CIL02	N/A	9KHz~7GHz	Nov. 08, 2014	Nov. 07, 2015
Power Amplifier	HP	HP 8447D	1145A00203	100KHz~1.3GHz	Nov. 08, 2014	Nov. 07, 2015
Horn Antenna	Schwarzbeck	BBHA9170	9170-372	15GHz~26.5GHz	Oct.24, 2014	Oct.23, 2015
Horn Antenna	Com-Power	AH-118	071078	1GHz~18GHz	Nov. 06, 2014	Nov. 05, 2015
Loop antenna	Daze	ZA30900A	0708	9KHz~30MHz	Oct.11, 2014	Oct.10, 2015
Spectrum Analyzer	Rohde & Schwarz	FSU26	200409/026	20Hz~26.5GHz	Sep. 02, 2014	Sep. 01, 2015
Pre-Amplifier	Agilent	8449B	3008A02964	1GHz~26.5GHz	Nov. 04, 2014	Nov. 03, 2015
L.I.S.N.	Rohde & Schwarz	ENV 216	101317	9KHz~30MHz	Nov. 08, 2014	Nov. 07, 2015

---End---