FCC PART 15 SUBPART C MEASURMENT AND TEST REPORT

For

NEO-TELECOM CORPORATION

7/F, 674-24, Anyang Dong, Manan Gu, Anyang City, Kyunggi Do, 430-831, South Korea

E.U.T.: Sound Station

Model Name: GDI-SXTTR2, GDI-SXTTR2C, GDI-IRC4300, GDI-IRCA43

Brand Name: SiriusXM, Grace Digital

FCC ID: WYHGDI-SXTTR2

Report Number: NTC1409370F

Test Date(s): October 13, 2014 to October 20, 2014

Report Date(s): October 20, 2014

Prepared by

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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.

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1. GENERAL INFORMATION

1.1 Product Description for Equipment under Test

This device is a wireless internet radio with WIFI and USB playing functions. It's powered by DC 12V come from Adapter. For more details features, please refer to User's Manual.

Manufacturer	:	Huizhou Yongrun Technology Co., Ltd.
Address	:	Building 18, No. Zhongkai Hi-Tech Industrial Development zone, Huizhou
Power Supply	:	DC 12V come from Adapter, Adapter M/N: SK06G-1200100U Input: AC 100-240V 50/60Hz 0.2A Output: DC 12V 1A
Model name	:	GDI-SXTTR2, GDI-SXTTR2C, GDI-IRC4300, GDI-IRCA43
Note	:	These models have the same circuit schematic, construction and critical components except model number and trade mark.
Technical parameters For WIFI Function		
Frequency Range	:	2412-2462MHz for 802.11b/g/n(HT20) 2422-2452MHz for 802.11n(HT40)
Modulation	:	CCK, DQPSK, DBPSK for 802.11b OFDM for 802.11g/n
Number of Channel	:	11 for 802.11b/g/n(HT20) 7 for 802.11n(HT40)
Channel space	:	5MHz
Date Rate	:	802.11b:1~11Mbps, 802.11g:6~54Mbps 802.11n: 6.5~135Mbps
Antenna Type	:	PCB
Antenna Gain	:	3 dBi (declared by manufacturer)

Channel List

802.11 b/g/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:

802.11b/g/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: WYHGDI-SXTTR2 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 C63.4 (2009) 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

None

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

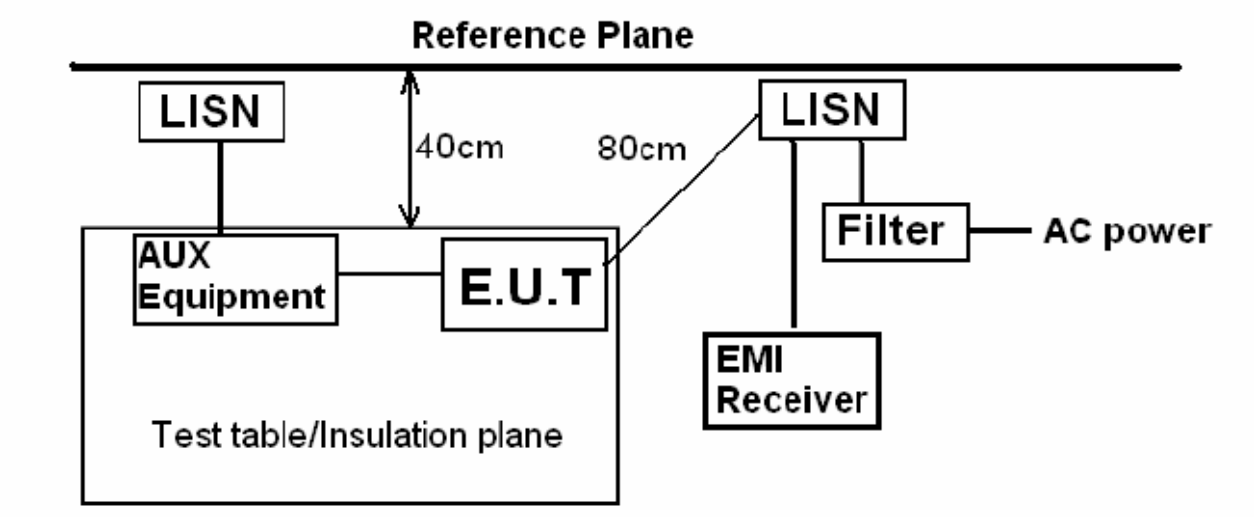
The EUT has been tested under continuous operating condition. Test program used to control the EUT staying in continuous transmitting mode. The Lowest, middle and highest channel were chosen for testing, and modulation type CCK, DQPSK, DBPSK, OFDM and all data rate were tested. But only the worst case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

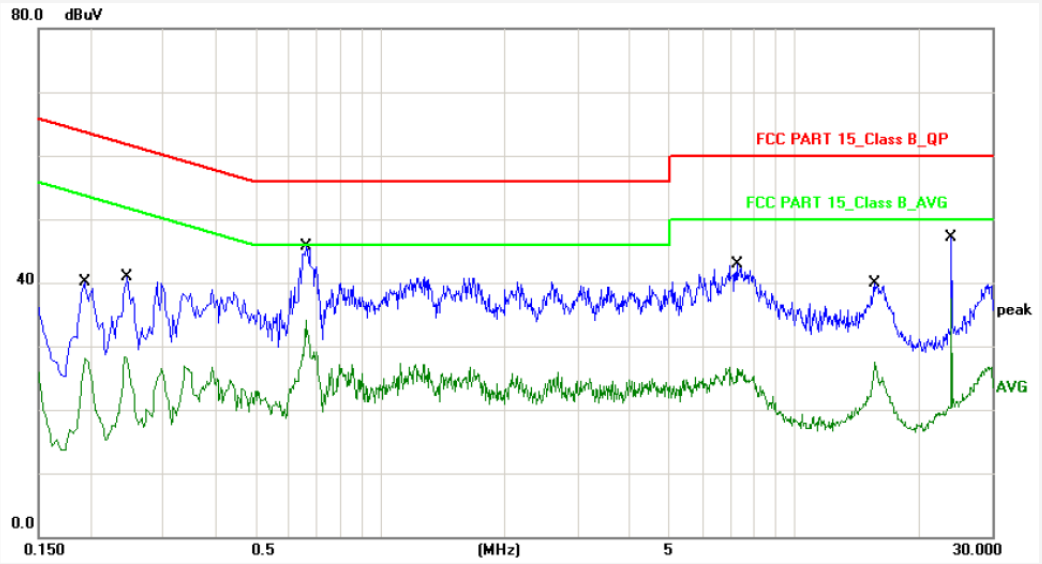
3.3 Measurement Results

Please refer to following the worst case (802.11b) plots.

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

Site: Conduction

Test Time: 2014-10-16 9:33:39



Report No.: GDI-SXTTR2
Test Standard: FCC PART 15_Class B_QP
Test item: Conducted Emission
Phase: L1
Applicant: NEO TELECOM
Temp.( )/Hum.(%): 26(C) / 60 %
Product: Sound Station
Power Rating: AC 120V/60Hz
Model No.: GDI-SXTTR2
Test Engineer: Lecdon

Test Mode: WIFI Mode
Remark: 802.11b

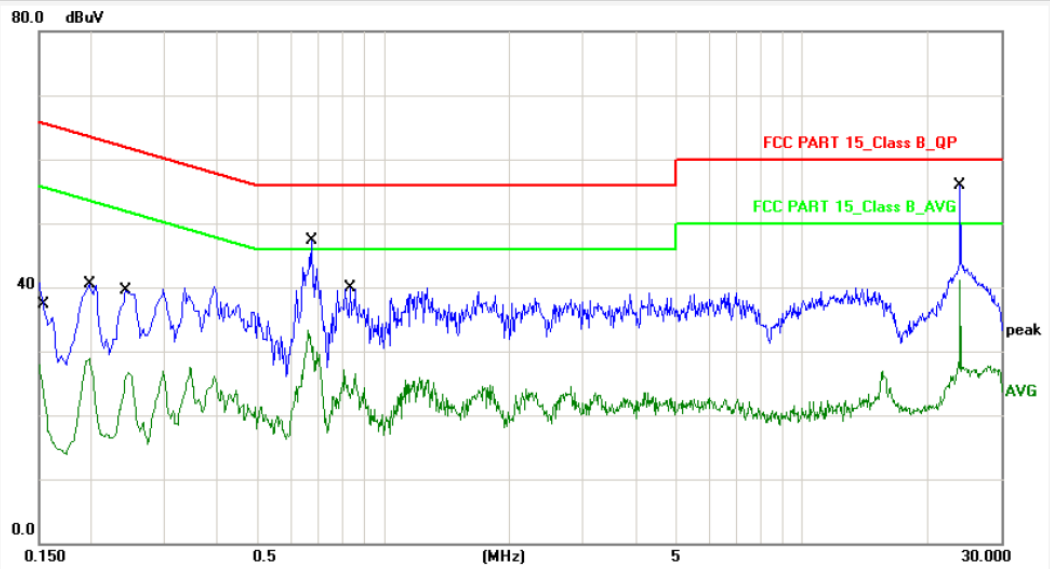
No.	Frequency (MHz)	Factor (dBuV)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1940	10.80	27.70	38.50	63.86	-25.36	QP	P	
2	0.1940	10.80	15.30	26.10	53.86	-27.76	AVG	P	
3	0.2460	10.80	27.80	38.60	61.89	-23.29	QP	P	
4	0.2460	10.80	15.50	26.30	51.89	-25.59	AVG	P	
5	0.6660	10.80	32.80	43.60	56.00	-12.40	QP	P	
6	0.6660	10.80	21.30	32.10	46.00	-13.90	AVG	P	
7	7.2779	10.80	30.10	40.90	60.00	-19.10	QP	P	
8	7.2779	10.80	13.70	24.50	50.00	-25.50	AVG	P	
9	15.6739	10.80	27.00	37.80	60.00	-22.20	QP	P	
10	15.6739	10.80	14.70	25.50	50.00	-24.50	AVG	P	
11	24.0020	10.80	34.30	45.10	60.00	-14.90	QP	P	
12	24.0020	10.80	24.80	35.60	50.00	-14.40	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: 2014-10-16 9:37:16



Report No.: GDI-SXTTR2
Test Standard: FCC PART 15_Class B_QP
Test item: Conducted Emission
Phase: N
Applicant: NEO TELECOM
Temp.( )/Hum.(%): 26(C) / 60 %
Product: Sound Station
Power Rating: AC 120V/60Hz
Model No.: GDI-SXTTR2
Test Engineer: Lecdon

Test Mode: WIFI Mode
Remark: 802.11b

No.	Frequency (MHz)	Factor (dBuV)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1548	10.80	23.70	34.50	65.73	-31.23	QP	P	
2	0.1548	10.80	13.50	24.30	55.73	-31.43	AVG	P	
3	0.1980	10.80	27.80	38.60	63.69	-25.09	QP	P	
4	0.1980	10.80	15.50	26.30	53.69	-27.39	AVG	P	
5	0.2420	10.80	26.90	37.70	62.02	-24.32	QP	P	
6	0.2420	10.80	11.80	22.60	52.02	-29.42	AVG	P	
7	0.6740	10.80	34.80	45.60	56.00	-10.40	QP	P	
8	0.6740	10.80	20.50	31.30	46.00	-14.70	AVG	P	
9	0.8340	10.80	27.10	37.90	56.00	-18.10	QP	P	
10	0.8340	10.80	13.60	24.40	46.00	-21.60	AVG	P	
11	24.0020	10.80	42.70	53.50	60.00	-6.50	QP	P	
12	24.0020	10.80	28.30	39.10	50.00	-10.90	AVG	P	

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

4. Max. Conducted Output Power

4.1 Measurement Procedure

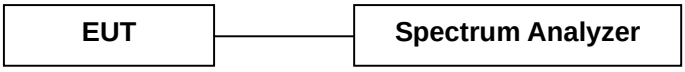
Maximum Conducted Output power at Antenna Terminals, FCC Rules 15.247(b)(3):

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

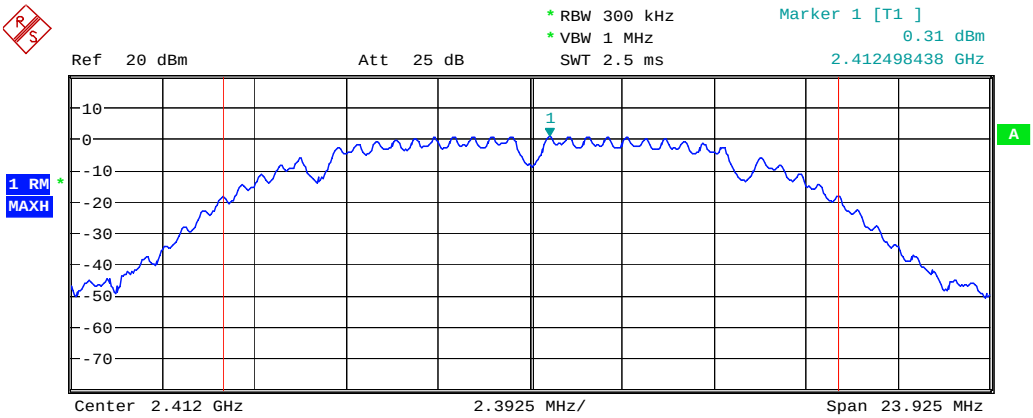
Please refer to following table and plots.

Temperature :	24 ℃	Humidity :	55%
Test By:	Sance	Test Date :	October 17, 2014
Test Result:	PASS		

Frequency MHz	Data Rate Mbps	AV Output Power dBm	Limit dBm
IEEE 802.11b Mode (CCK, Antenna Gain=3dBi)			
Low Channel: 2412	1	12.81	30
Middle Channel: 2437	1	12.09	30
High Channel: 2462	1	11.81	30
IEEE 802.11g Mode (OFDM, Antenna Gain=3dBi)			
Low Channel: 2412	6	10.36	30
Middle Channel: 2437	6	9.80	30
High Channel: 2462	6	9.65	30
IEEE 802.11n(HT20) Mode (OFDM, Antenna Gain=3dBi)			
Low Channel: 2412	6.5	10.55	30
Middle Channel: 2437	6.5	9.97	30
High Channel: 2462	6.5	9.79	30
IEEE 802.11n(HT40) Mode (OFDM, Antenna Gain=3dBi)			
Low Channel: 2422	13	11.86	30
Middle Channel: 2437	13	10.01	30
High Channel: 2452	13	9.88	30

Maximum Average Conducted Output Power

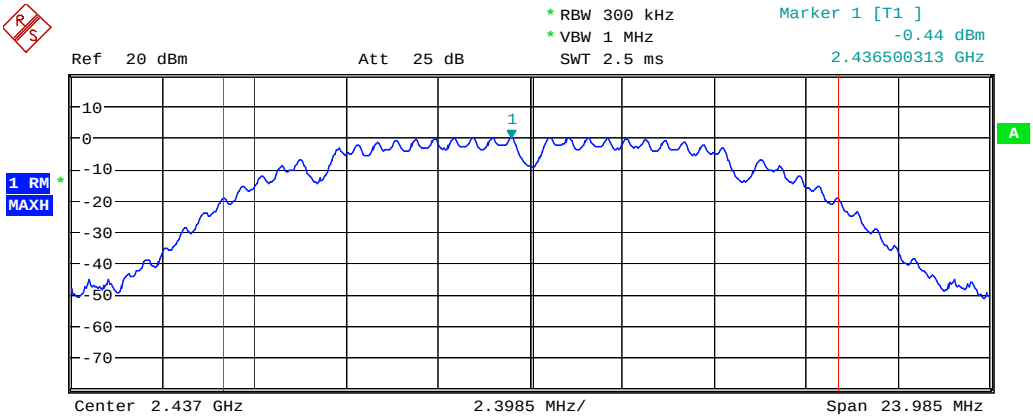
802.11b Low Channel



Tx Channel

Bandwidth	15.95 MHz	Power	12.81 dBm

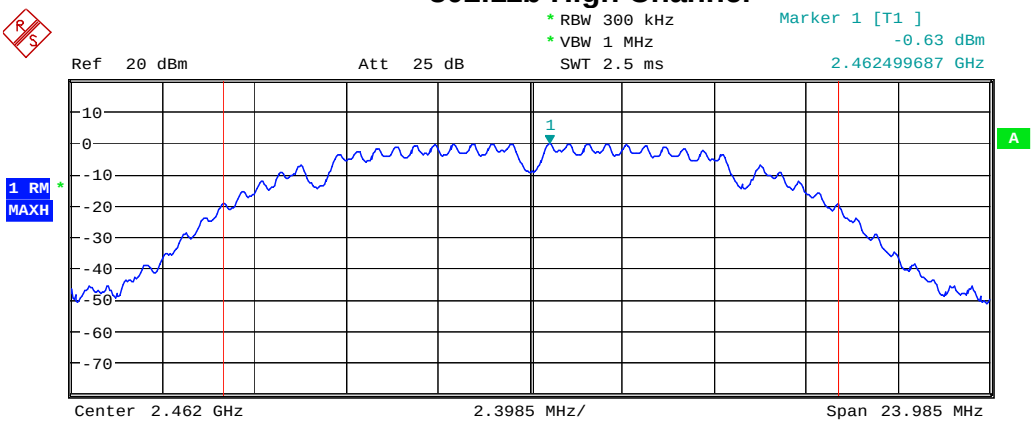
802.11b Middle Channel



Tx Channel

Bandwidth	15.99 MHz	Power	12.09 dBm

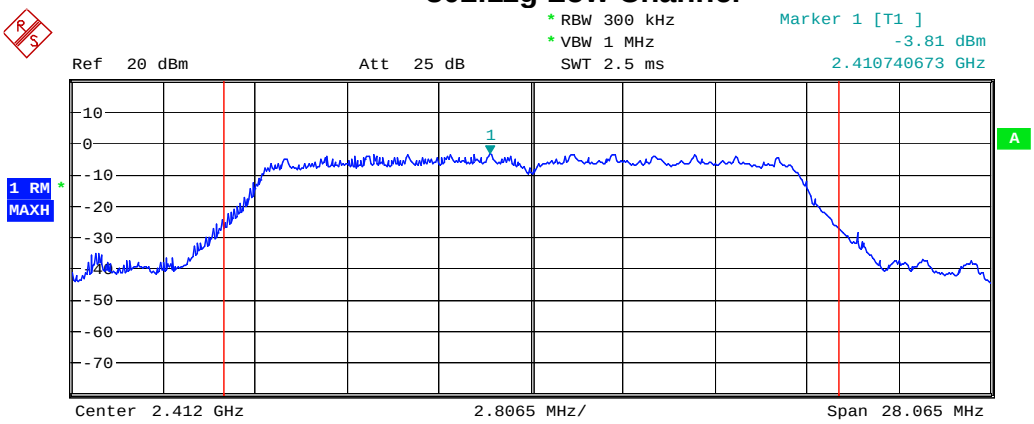
802.11b High Channel



Tx Channel

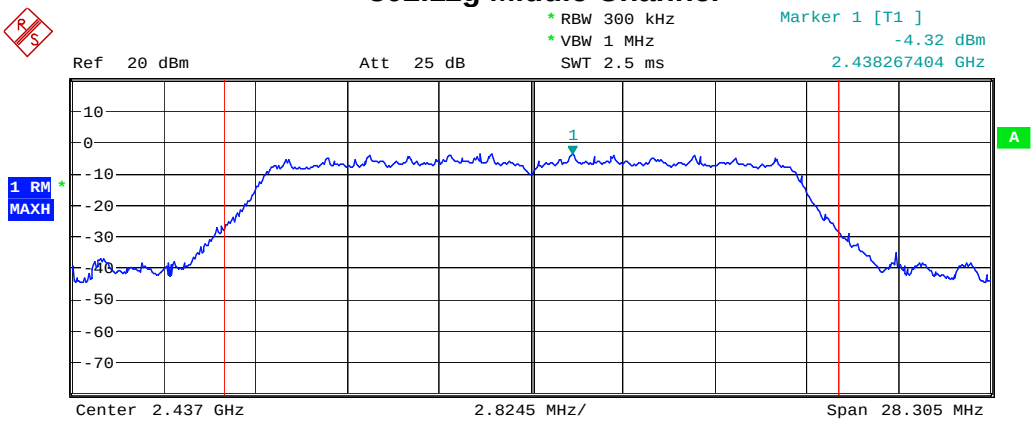
Bandwidth	15.99 MHz	Power	11.81 dBm

802.11g Low Channel



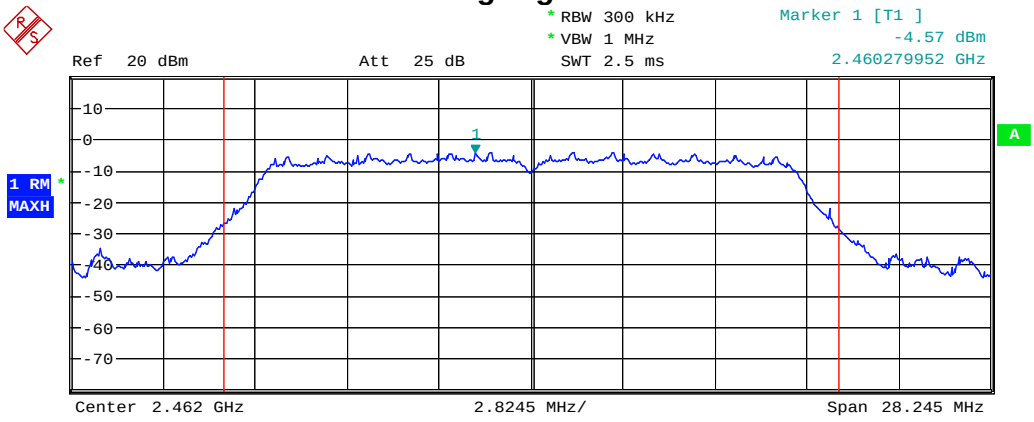
Tx Channel
Bandwidth 18.71 MHz Power 10.36 dBm

802.11g Middle Channel



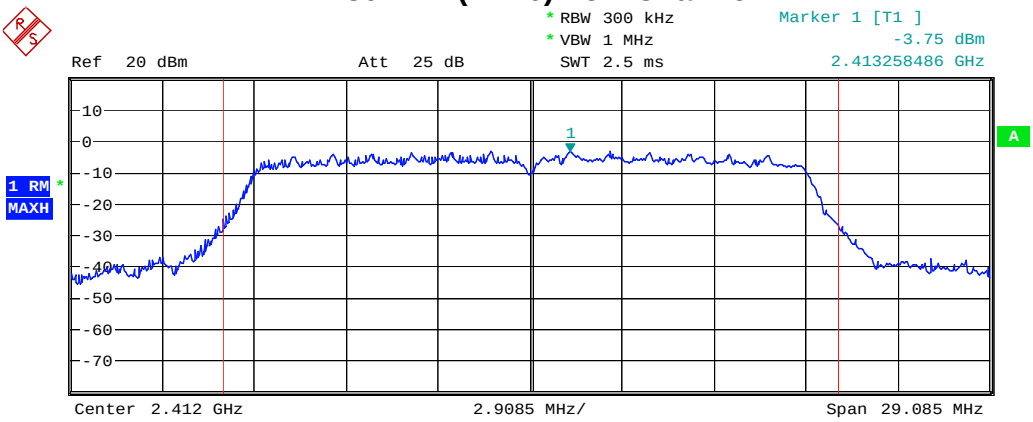
Tx Channel
Bandwidth 18.83 MHz Power 9.80 dBm

802.11g High Channel



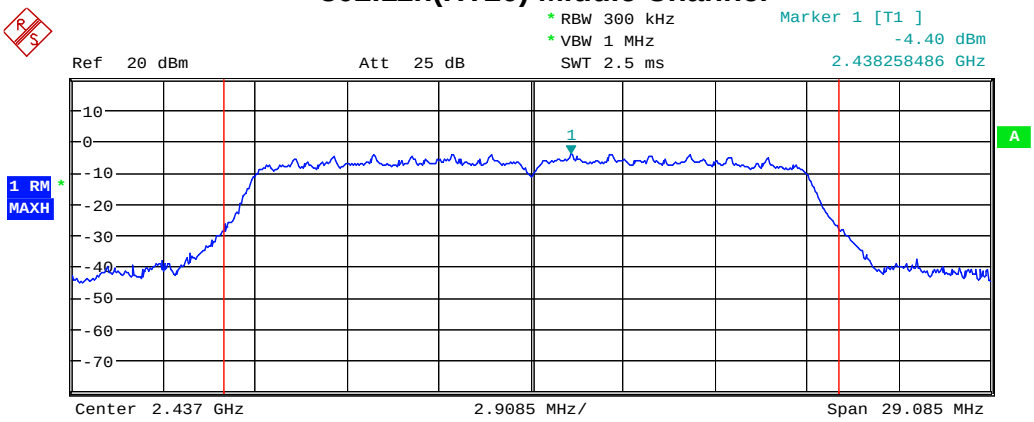
Tx Channel
Bandwidth 18.83 MHz Power 9.65 dBm

802.11n(HT20) Low Channel



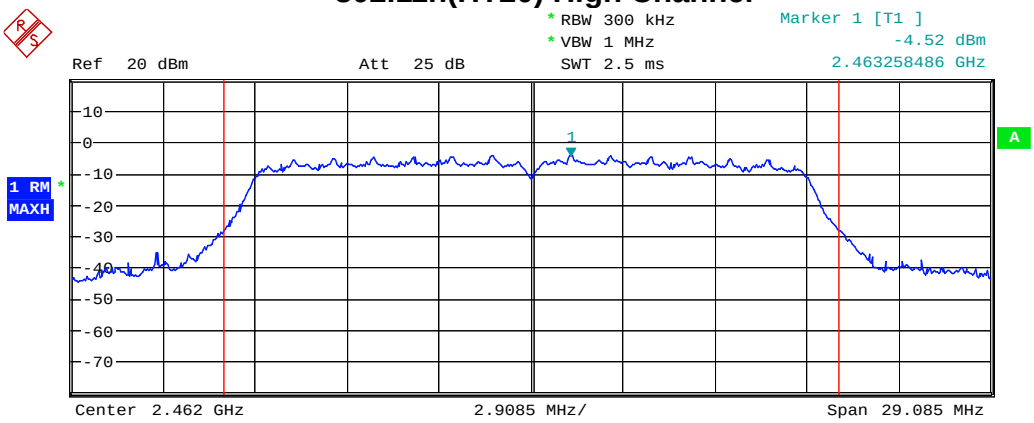
Tx Channel
Bandwidth 19.39 MHz Power 10.55 dBm

802.11n(HT20) Middle Channel



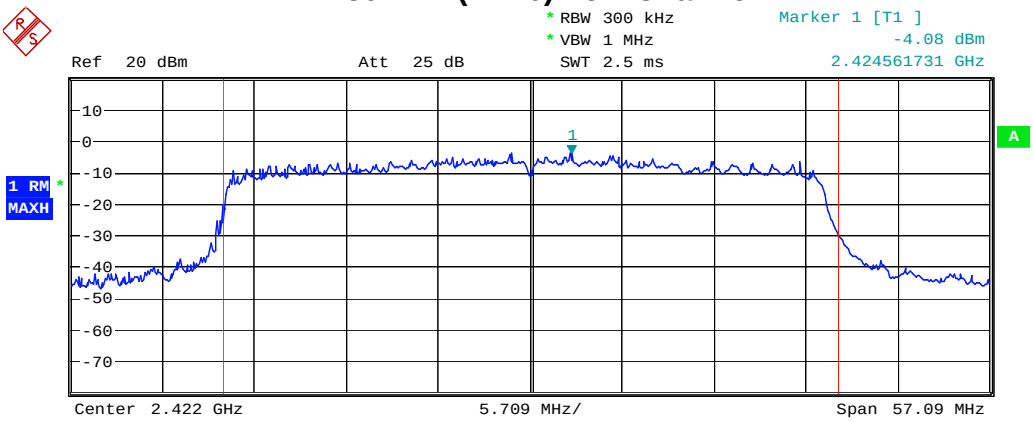
Tx Channel
Bandwidth 19.39 MHz Power 9.97 dBm

802.11n(HT20) High Channel



Tx Channel
Bandwidth 19.39 MHz Power 9.79 dBm

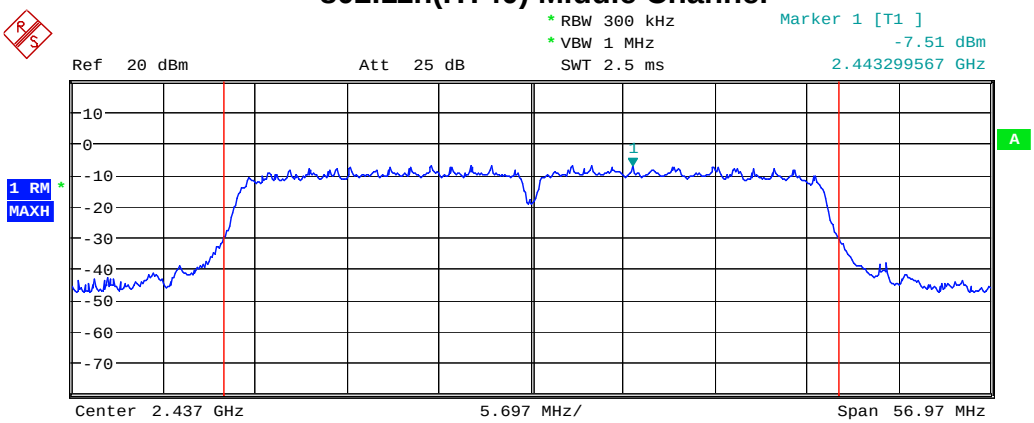
802.11n(HT40) Low Channel



Tx Channel

Bandwidth	38.06 MHz	Power	11.86 dBm

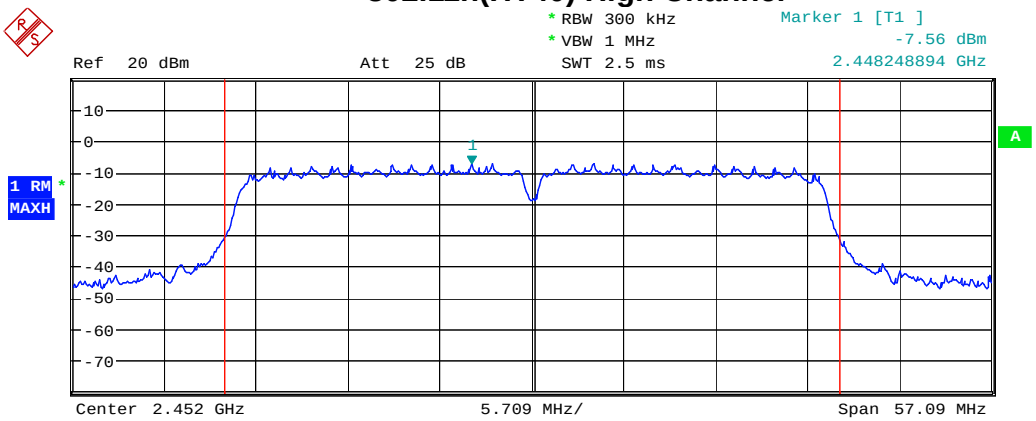
802.11n(HT40) Middle Channel



Tx Channel

Bandwidth	37.98 MHz	Power	10.01 dBm

802.11n(HT40) High Channel



Tx Channel

Bandwidth	38.06 MHz	Power	9.88 dBm

5. 6dB&20dB Bandwidth

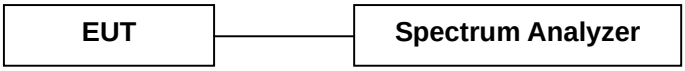
5.1 Measurement Procedure

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. Set the RBW = 100KHz.
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)



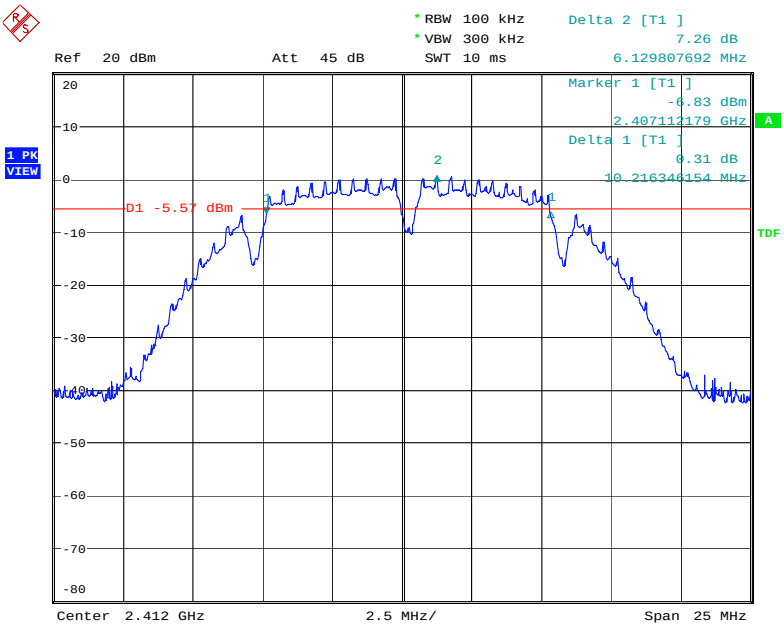
5.3 Measurement Results

Pass

Please refer to following table and plots.

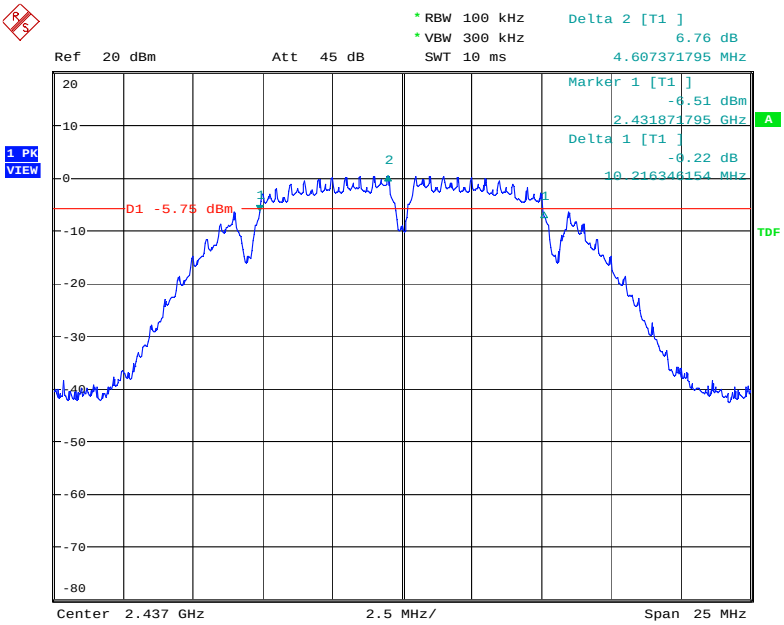
Temperature :	24 ℃	Humidity : 55 %		
Test By:	Sance	Test Date : October 17, 2014		
Test Result:	PASS			
Frequency MHz	Data Rate Mbps	6dB Bandwidth MHz	20dB Bandwidth MHz	Limit
IEEE 802.11b Mode (CCK)				
Low Channel: 2412	1	10.22	15.95	>500KHz
Middle Channel: 2437	1	10.22	15.99	>500KHz
High Channel: 2462	1	10.22	15.99	>500KHz
IEEE 802.11g Mode (OFDM)				
Low Channel: 2412	6	16.43	18.71	>500KHz
Middle Channel: 2437	6	16.43	18.87	>500KHz
High Channel: 2462	6	16.43	18.83	>500KHz
IEEE 802.11n(HT20) Mode (OFDM)				
Low Channel: 2412	6.5	17.11	19.39	>500KHz
Middle Channel: 2437	6.5	16.99	19.39	>500KHz
High Channel: 2462	6.5	17.15	19.39	>500KHz
IEEE 802.11n(HT40) Mode (OFDM)				
Low Channel: 2422	13	35.26	38.06	>500KHz
Middle Channel: 2437	13	35.34	37.98	>500KHz
High Channel: 2452	13	35.42	38.06	>500KHz

6dB Bandwidth
802.11b Low Channel



Date: 17.OCT.2014 14:54:29

802.11b Middle Channel



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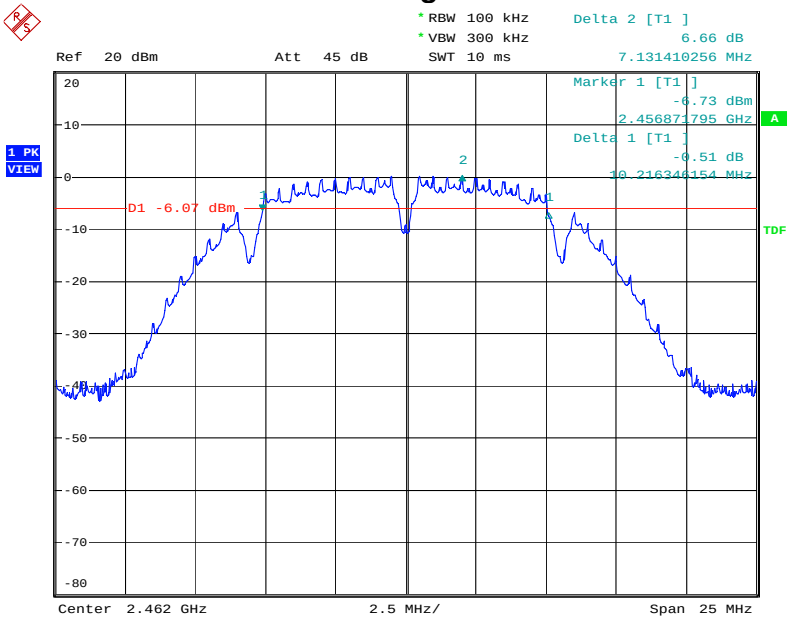
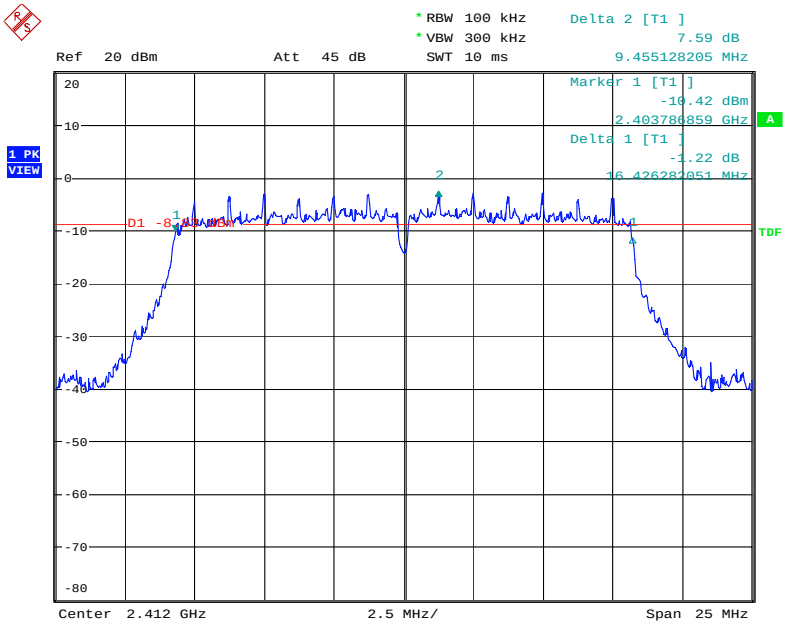
802.11b High Channel



Date: 17.OCT.2014 14:56:48

802.11g Low Channel



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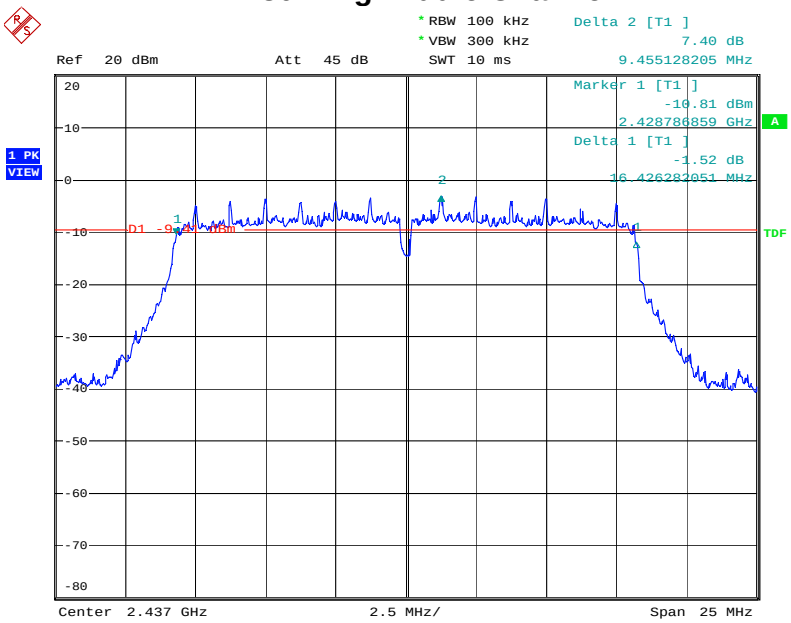
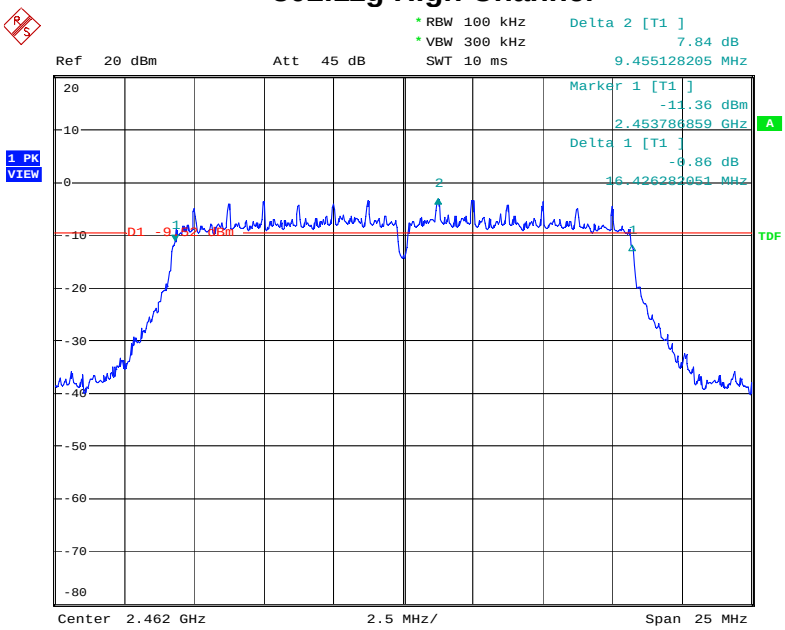
802.11g Middle Channel



Date: 17.OCT.2014 15:00:27

802.11g High Channel



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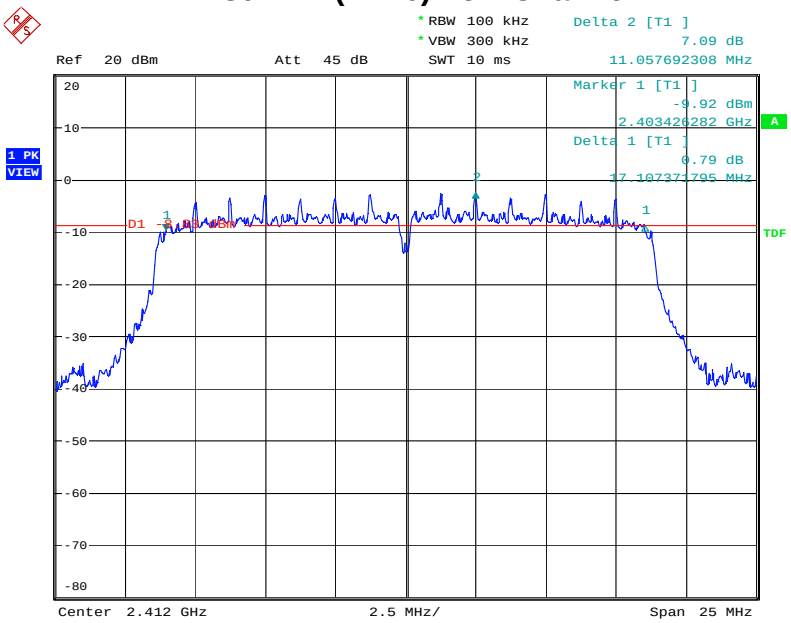
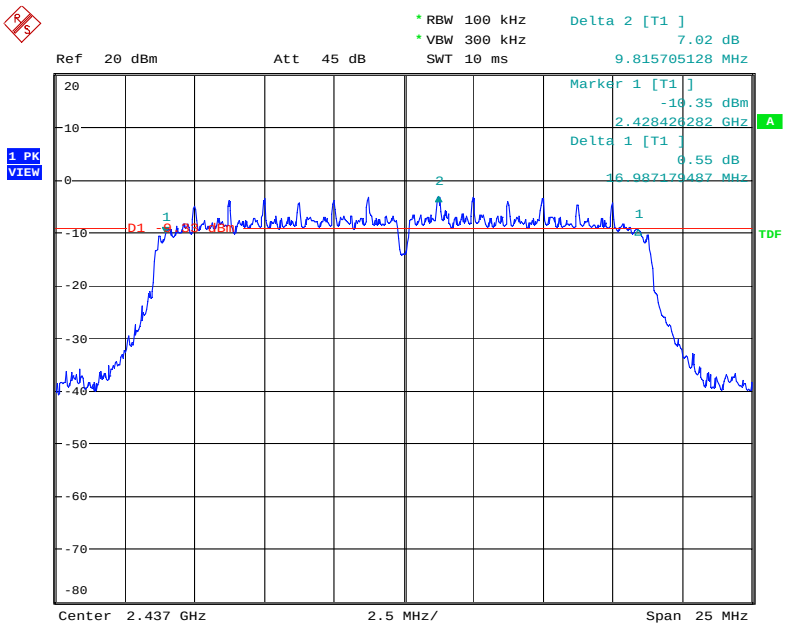
802.11n(HT20) Low Channel



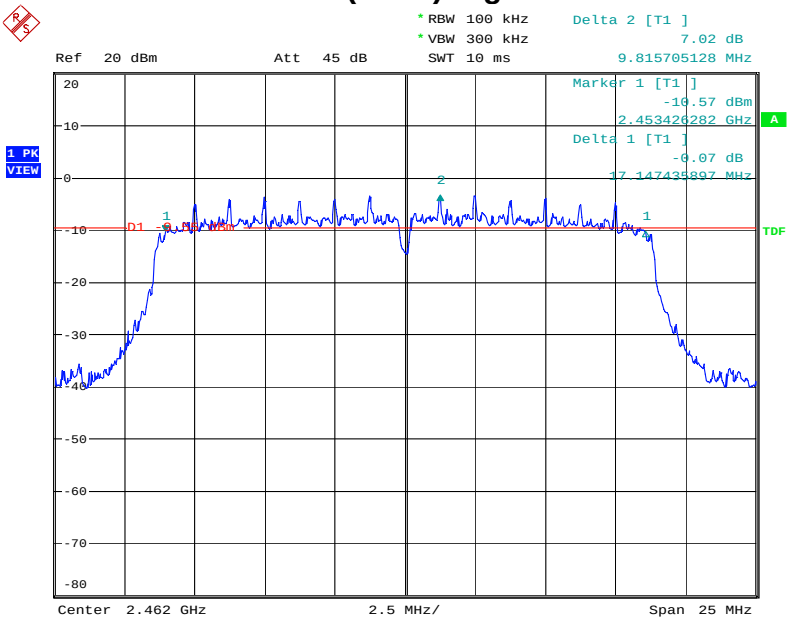
Date: 17.OCT.2014 15:07:20

802.11n(HT20) Middle Channel



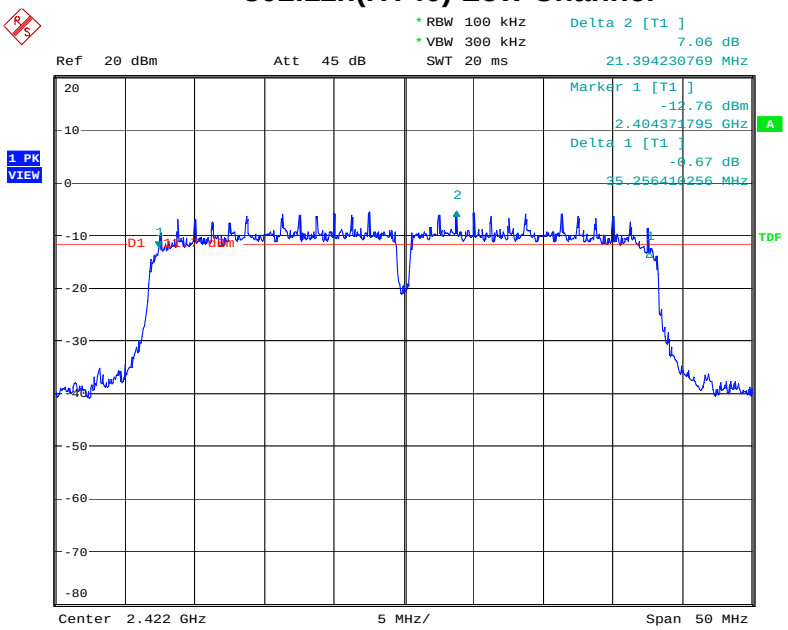
Date: 17.OCT.2014 15:09:10

802.11n(HT20) High Channel



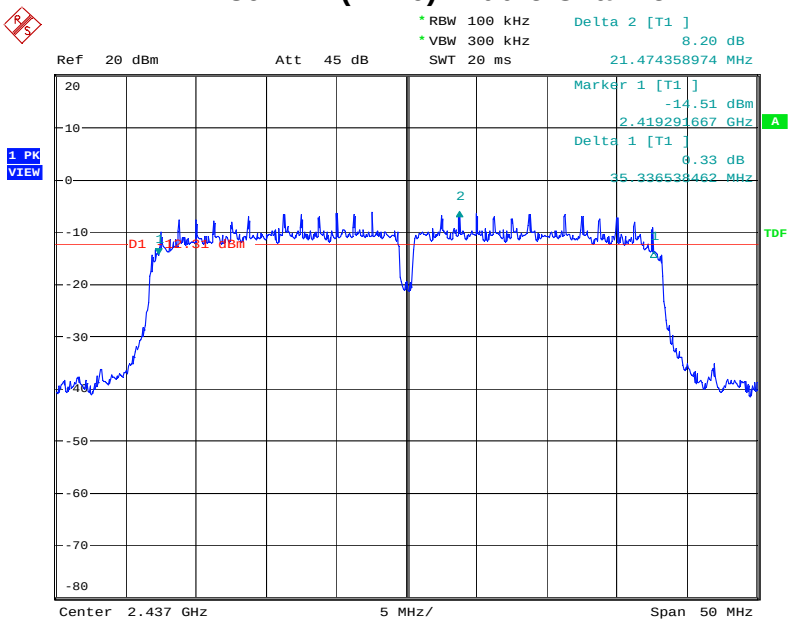
Date: 17.OCT.2014 15:10:40

802.11n(HT40) Low Channel



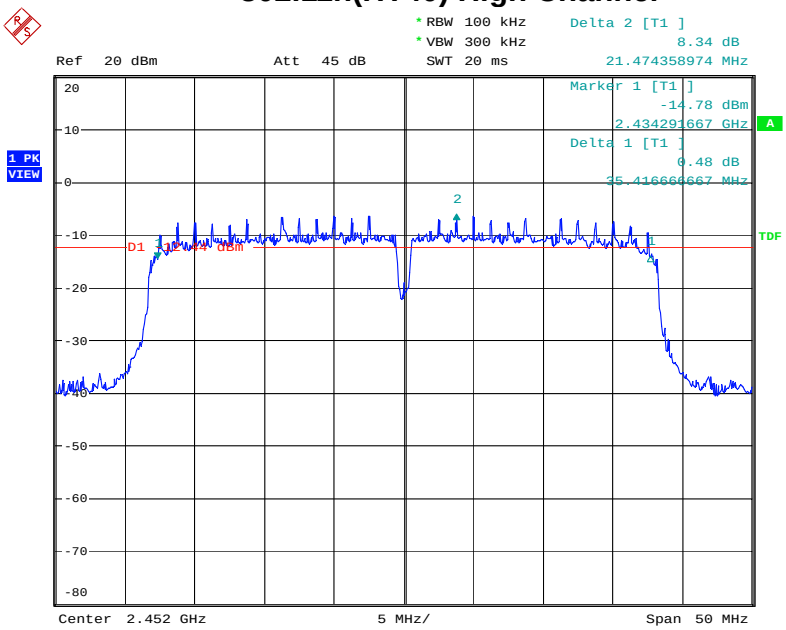
Date: 17.OCT.2014 15:12:39

802.11n(HT40) Middle Channel



Date: 17.OCT.2014 15:14:31

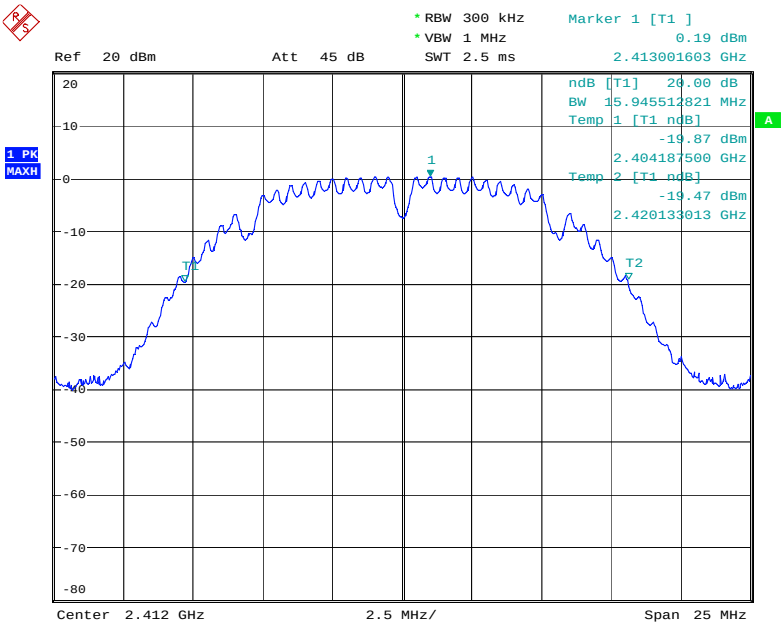
802.11n(HT40) High Channel



Date: 17.OCT.2014 15:16:31

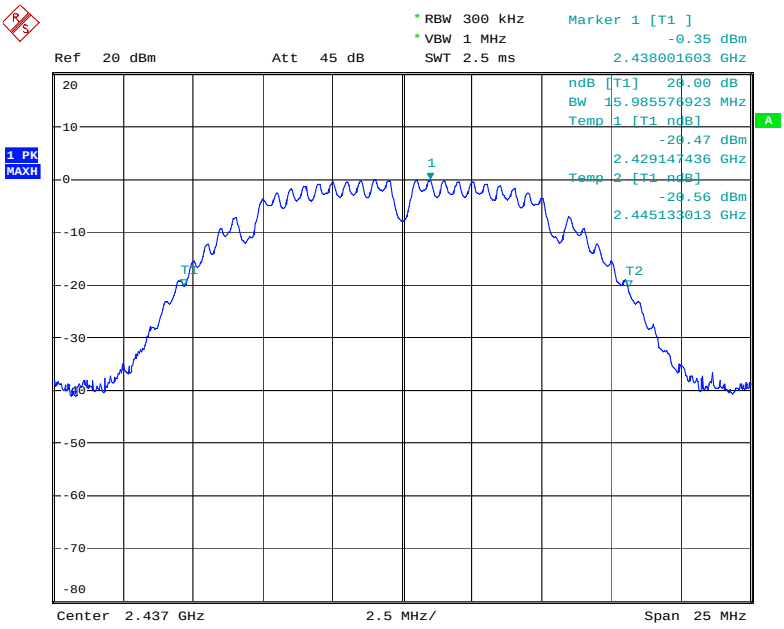
20dB Bandwidth

802.11b Low Channel



Date: 17.OCT.2014 16:13:08

802.11b Middle Channel



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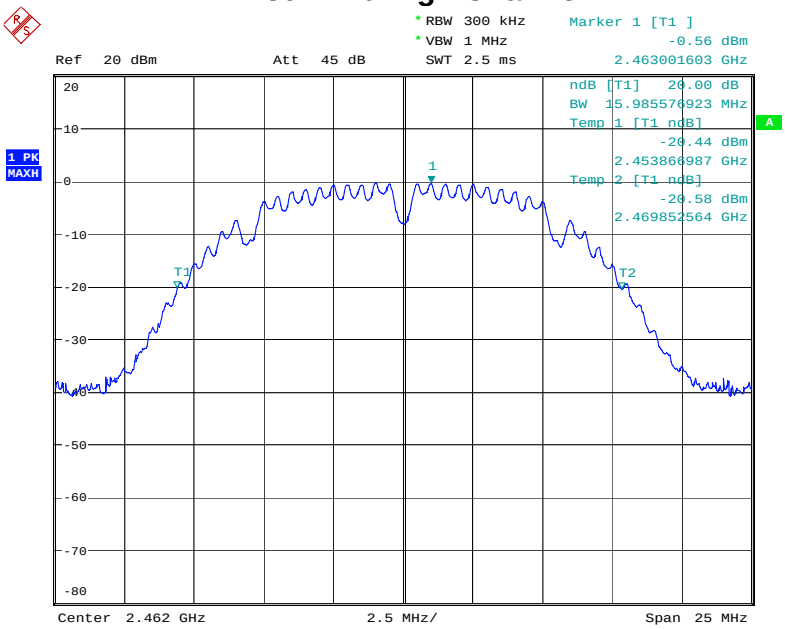
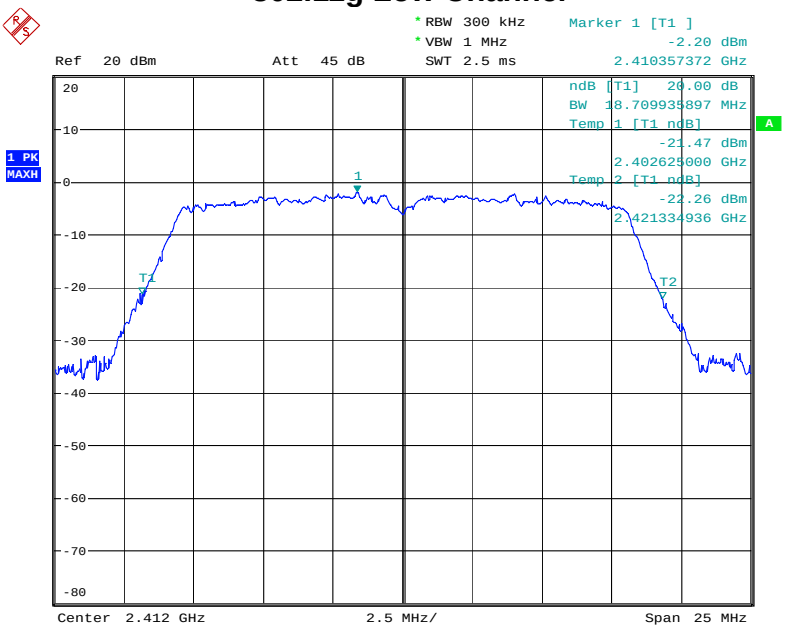
802.11b High Channel



Date: 17.OCT.2014 16:14:12

802.11g Low Channel



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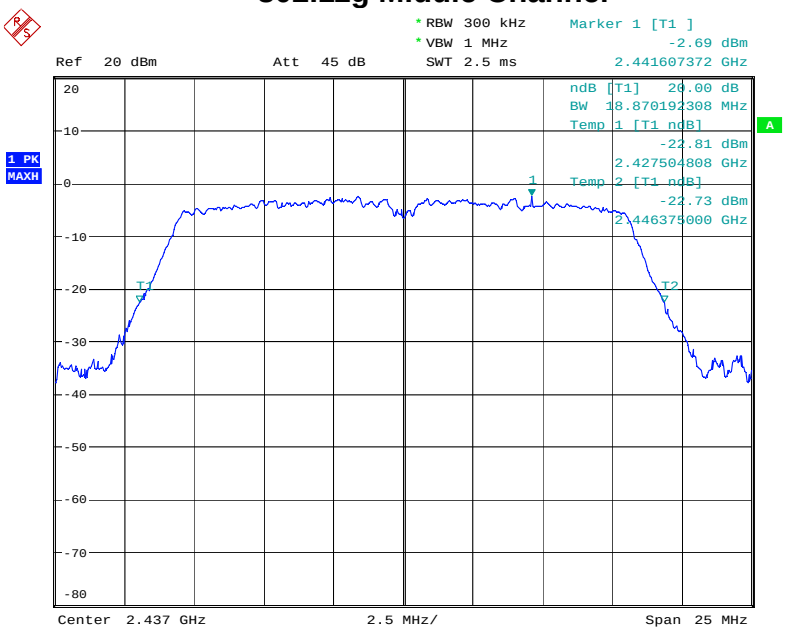
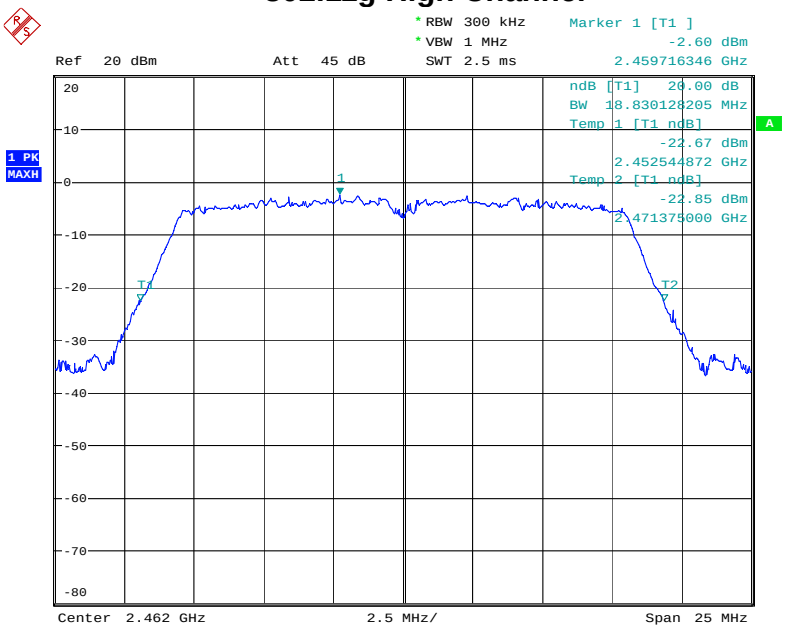
802.11g Middle Channel



Date: 17.OCT.2014 16:15:43

802.11g High Channel



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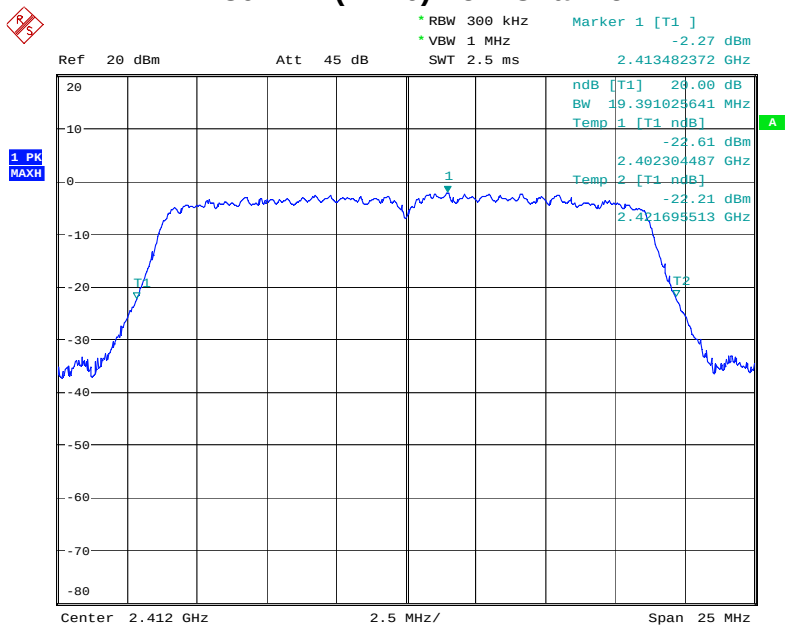
802.11n(HT20) Low Channel



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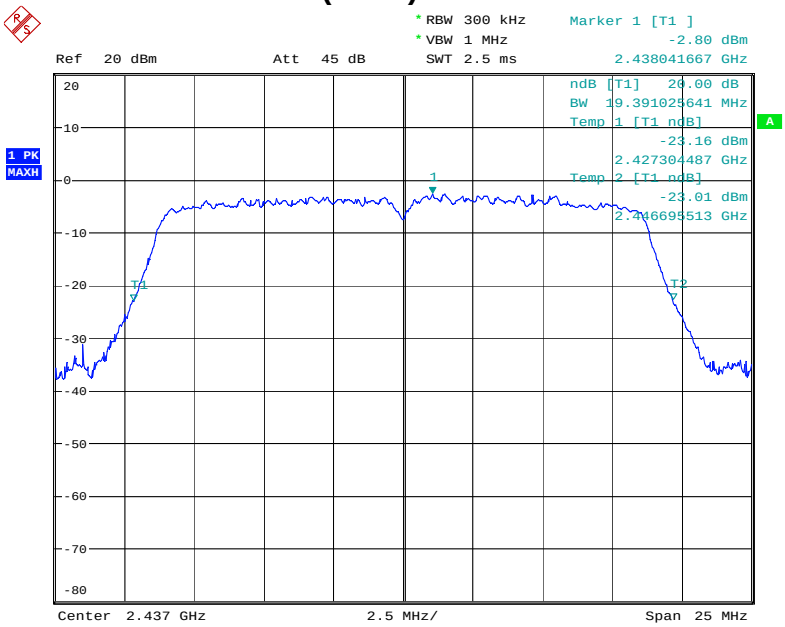
802.11n(HT20) Middle Channel



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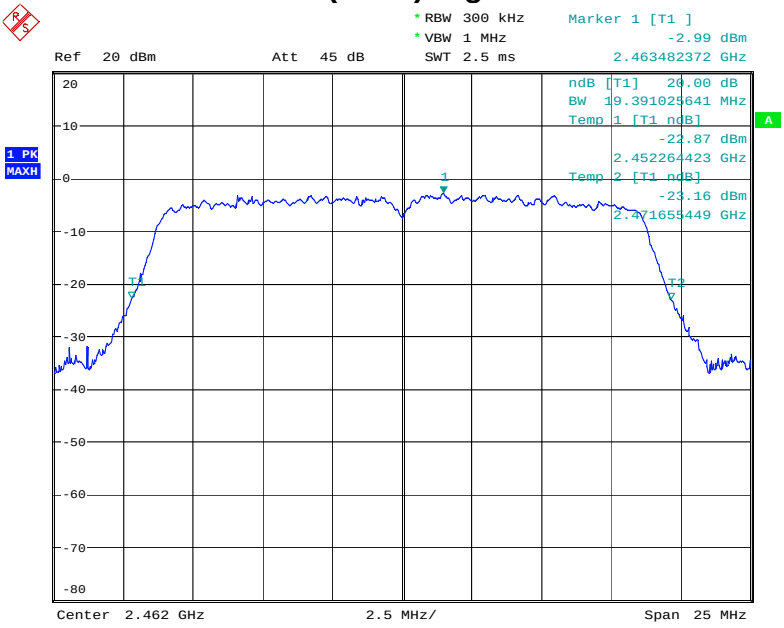
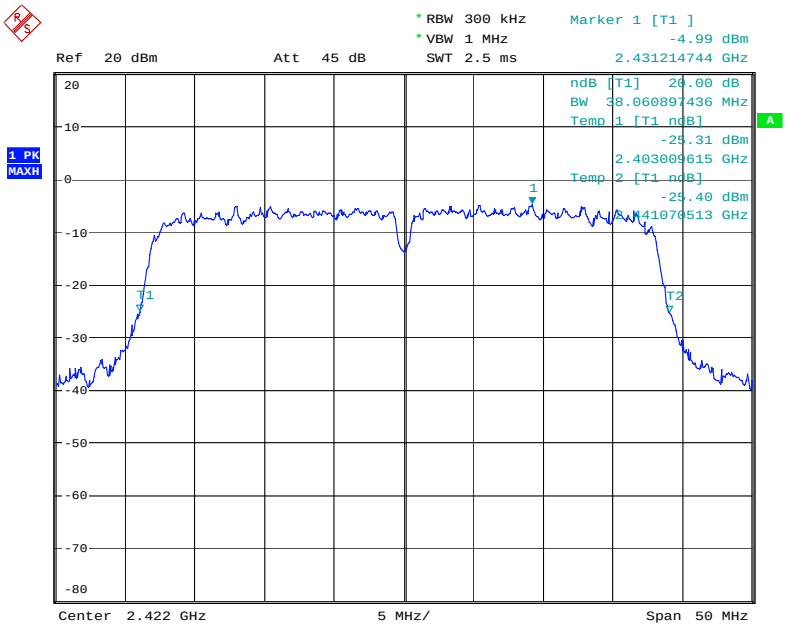
802.11n(HT20) High Channel



Date: 17.OCT.2014 16:18:59

802.11n(HT40) Low Channel



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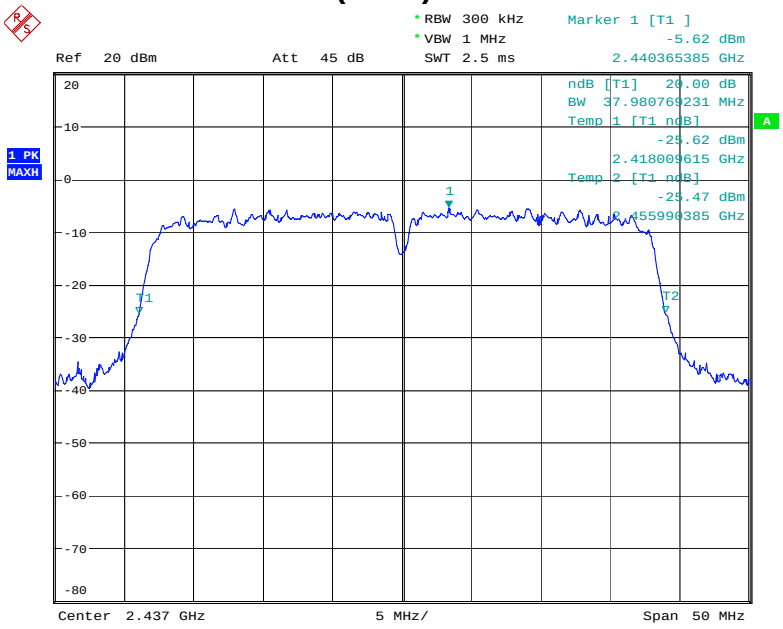
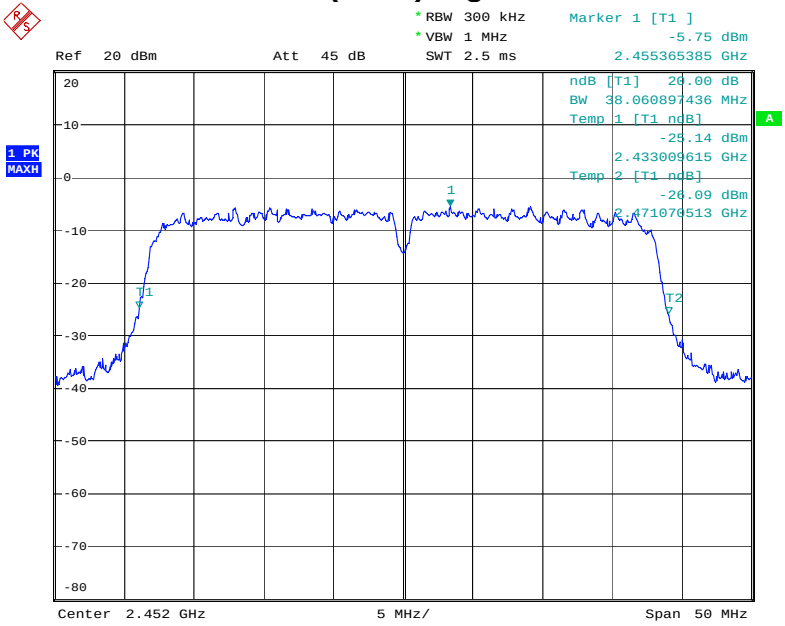
802.11n(HT40) Middle Channel



Date: 17.OCT.2014 16:20:54

802.11n(HT40) High Channel



Date: 17.OCT.2014 16:21:32

6. Power Spectral Density

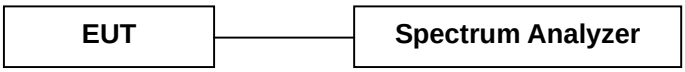
6.1 Measurement Procedure

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)



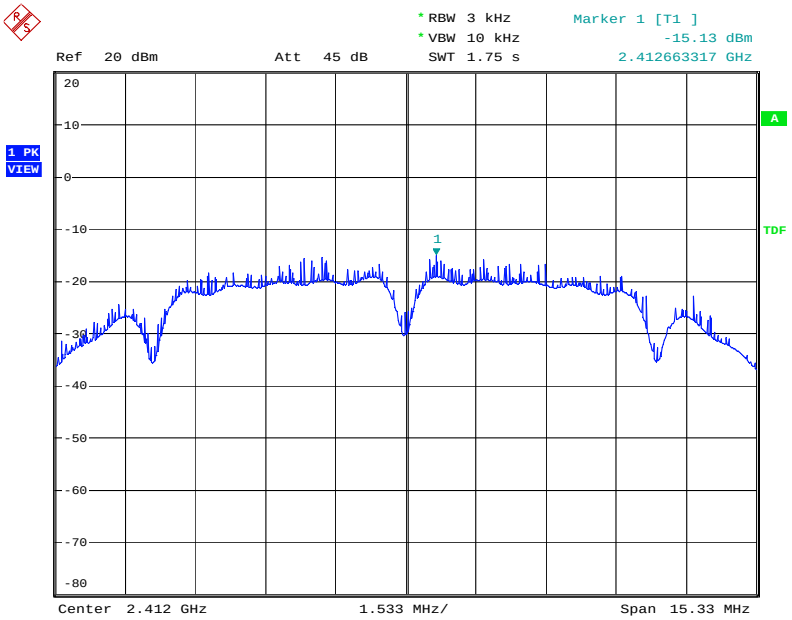
6.3 Measurement Results

Pass

Please refer to following table and plots.

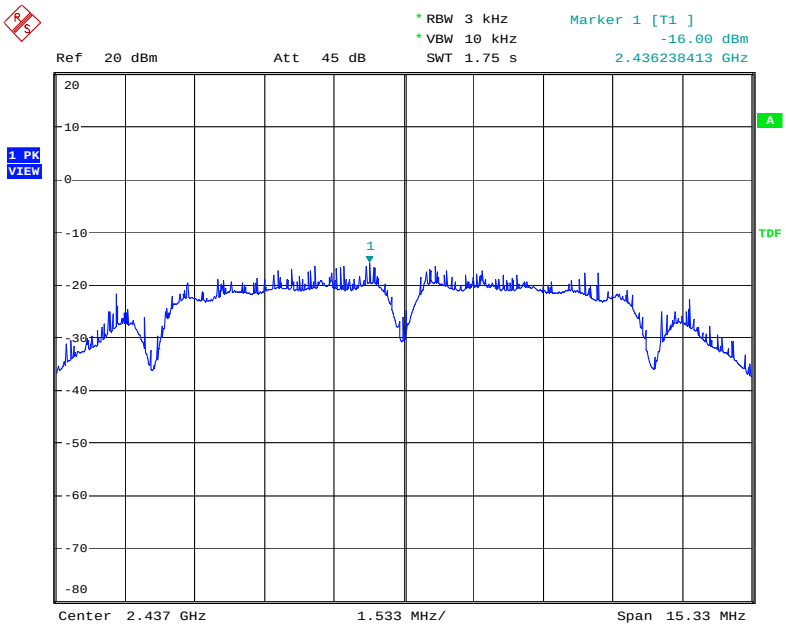
Temperature :	24 ℃	Humidity :	55 %
Test By:	Sance	Test Date :	October 17, 2014
Test Result:	PASS		
Frequency MHz	Data Rate Mbps	PSD dBm	Limit dBm
IEEE 802.11b Mode (CCK)			
Low Channel: 2412	1	-15.13	8
Middle Channel: 2437	1	-16.00	8
High Channel: 2462	1	-16.14	8
IEEE 802.11g Mode (OFDM)			
Low Channel: 2412	6	-18.38	8
Middle Channel: 2437	6	-20.21	8
High Channel: 2462	6	-20.43	8
IEEE 802.11n(HT20) Mode (OFDM)			
Low Channel: 2412	6.5	-19.06	8
Middle Channel: 2437	6.5	-20.05	8
High Channel: 2462	6.5	-19.14	8
IEEE 802.11n(HT40) Mode (OFDM)			
Low Channel: 2422	13	-21.36	8
Middle Channel: 2437	13	-22.50	8
High Channel: 2452	13	-22.56	8

802.11b Low Channel



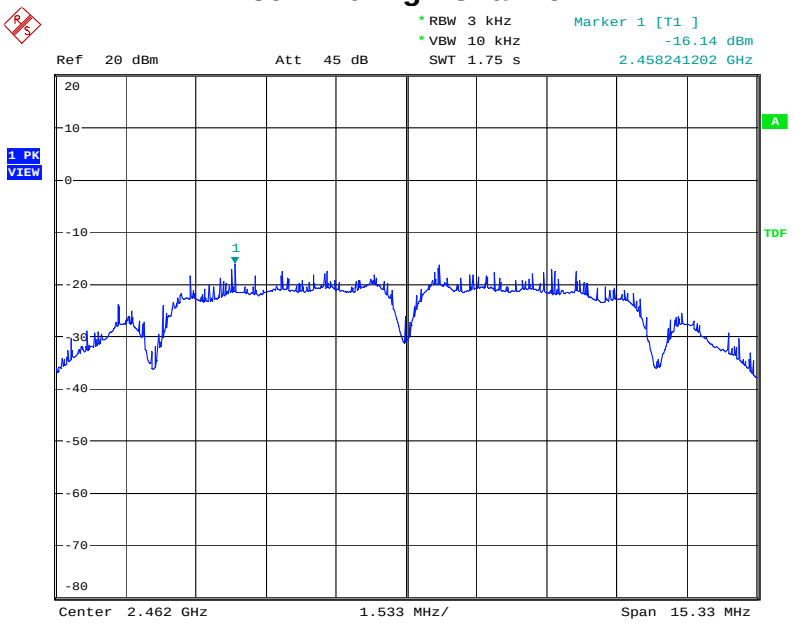
Date: 17.OCT.2014 15:38:18

802.11b Middle Channel



Date: 17.OCT.2014 15:39:09

802.11b High Channel



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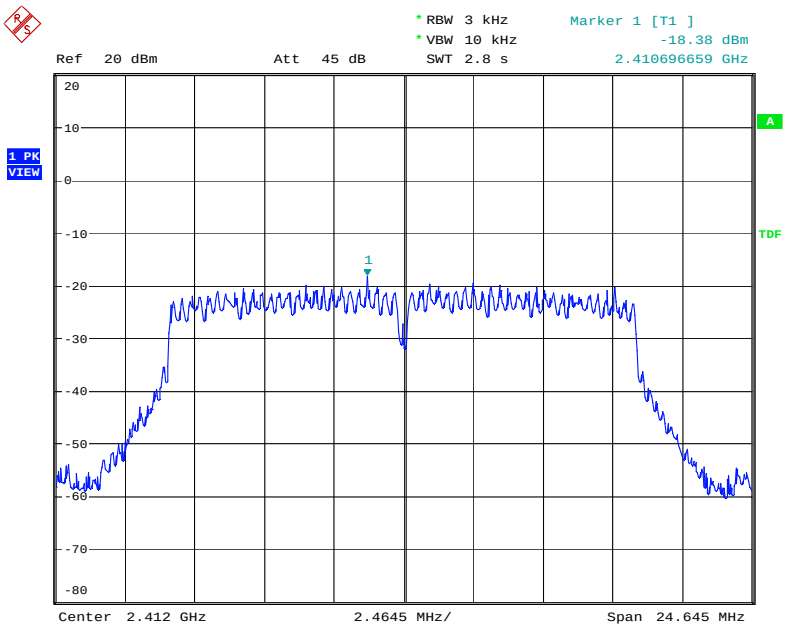
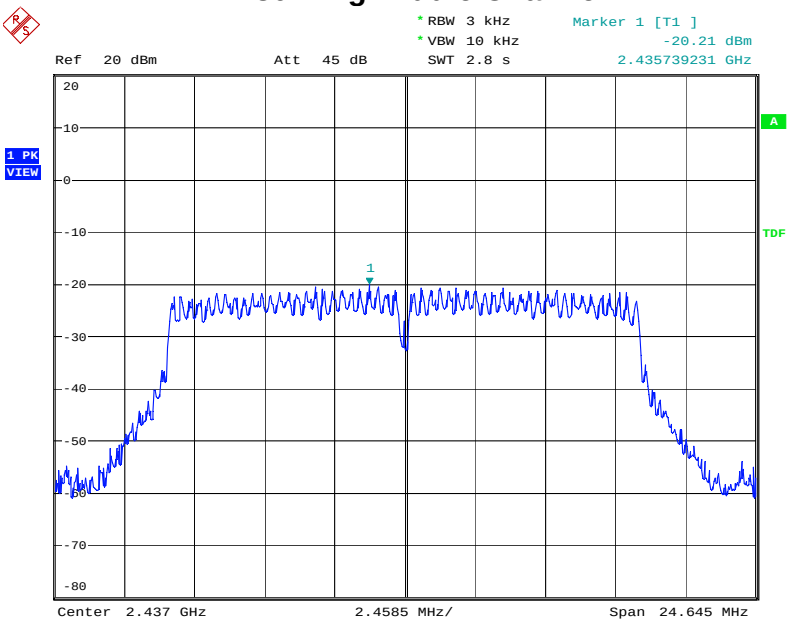
802.11g Low Channel



Date: 17.OCT.2014 15:40:13

802.11g Middle Channel



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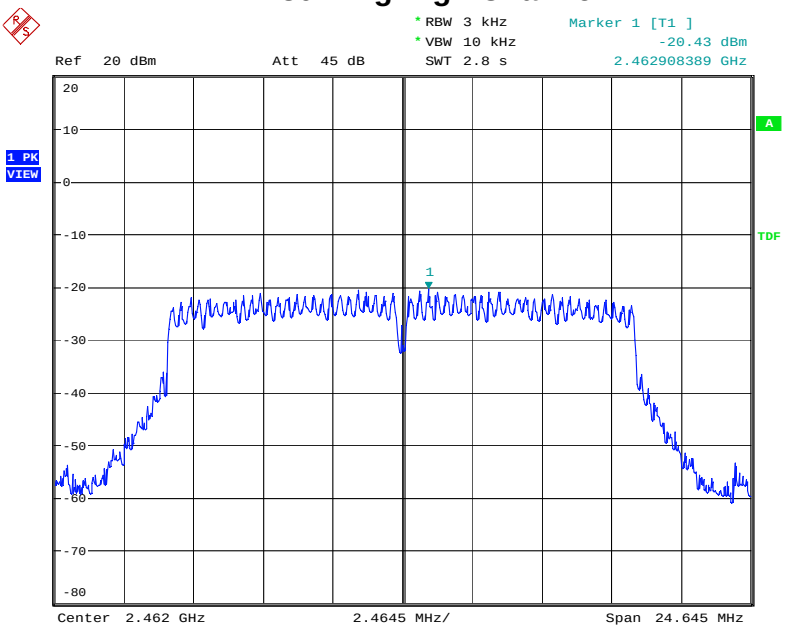
802.11g High Channel



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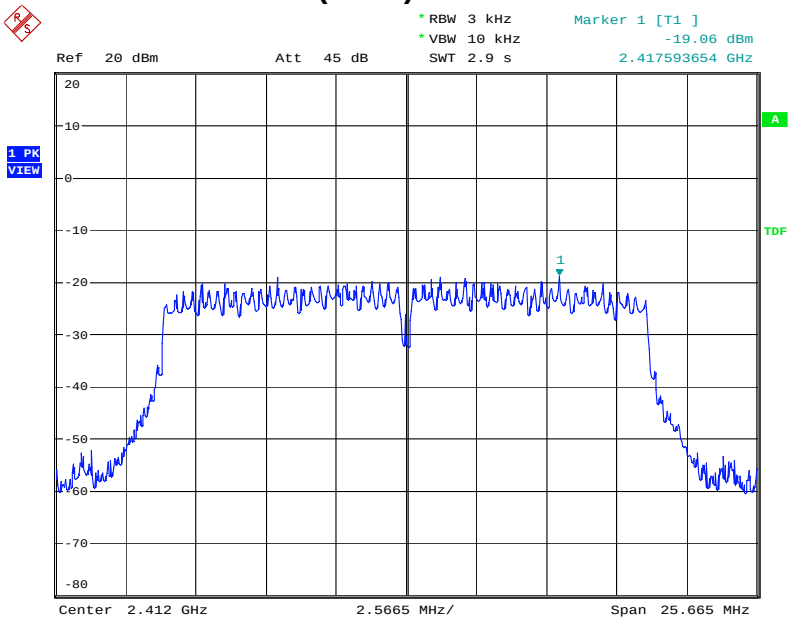
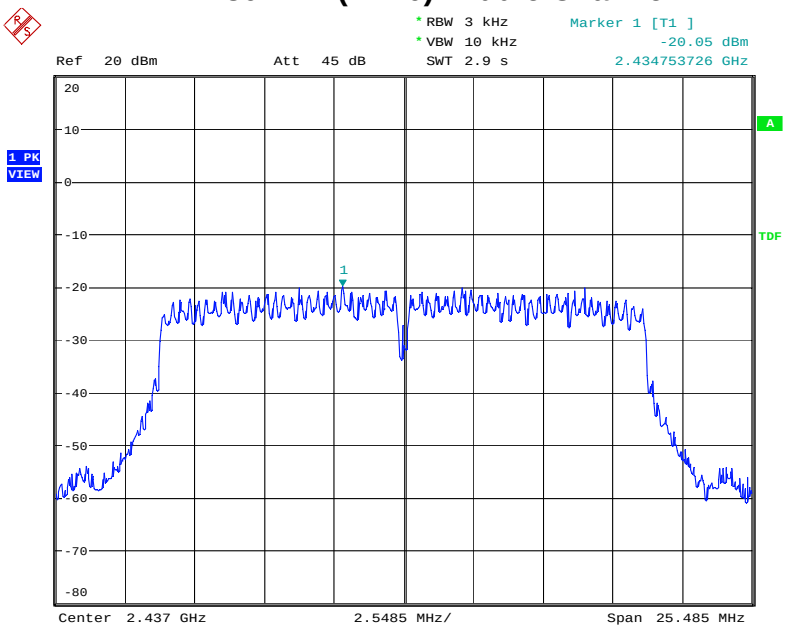
802.11n(HT20) Low Channel



Date: 17.OCT.2014 15:42:06

802.11n(HT20) Middle Channel



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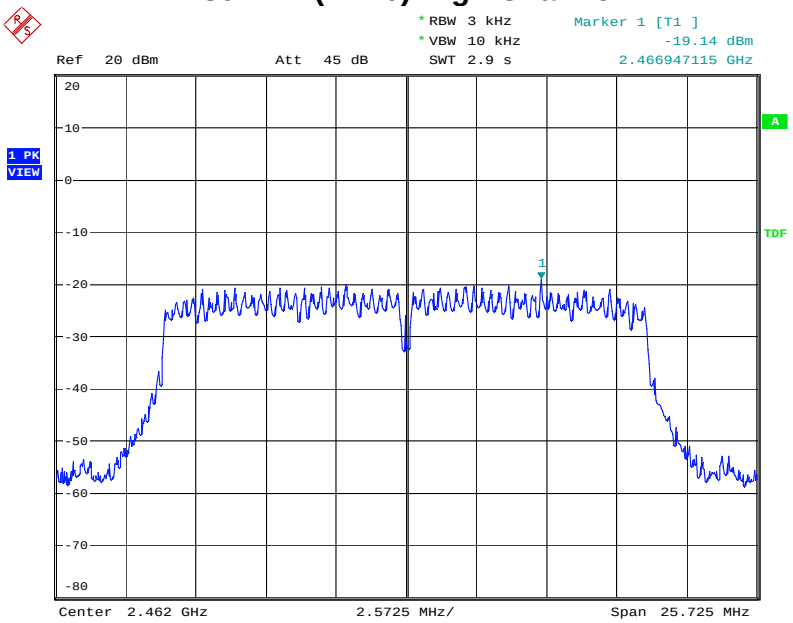
802.11n(HT20) High Channel



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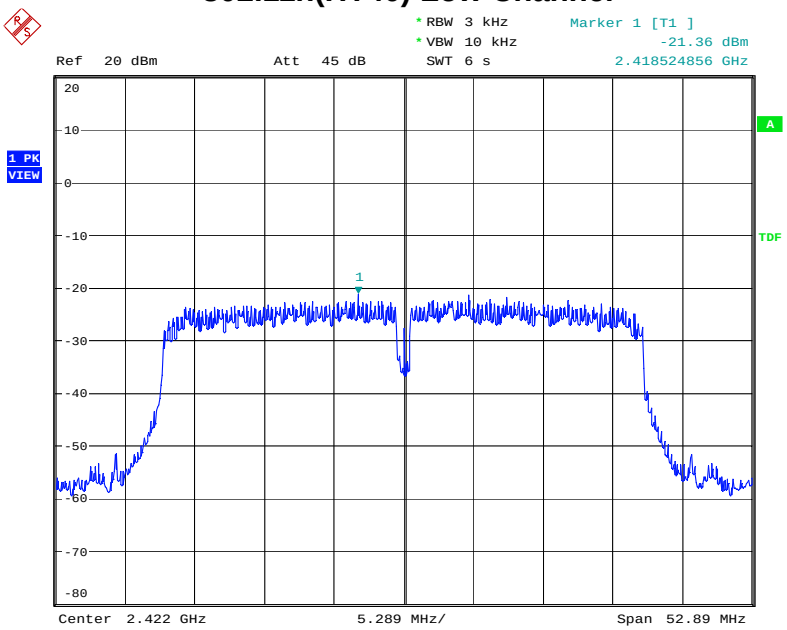
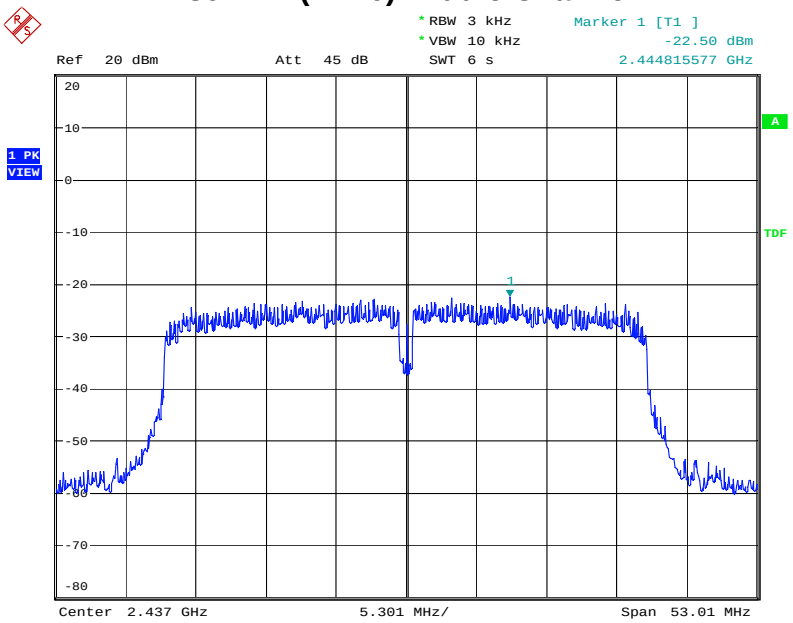
802.11n(HT40) Low Channel



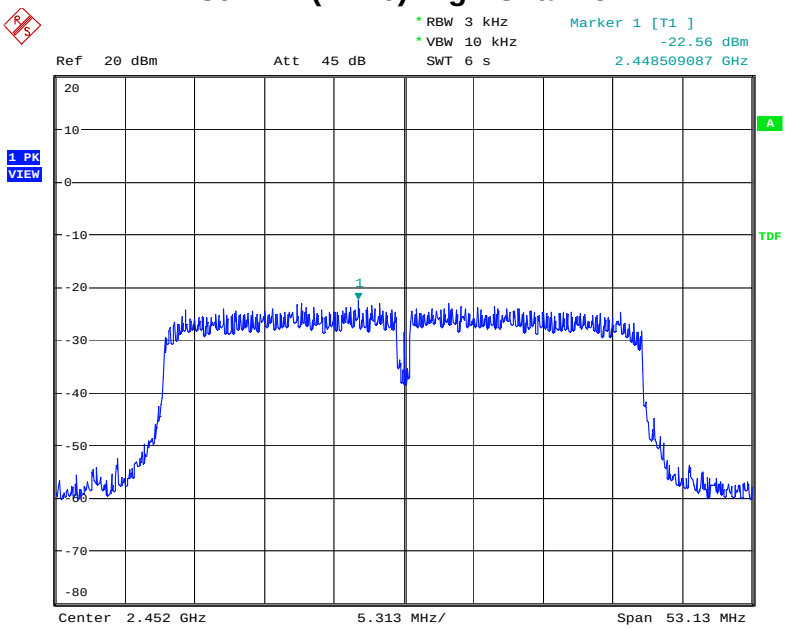
Date: 17.OCT.2014 15:45:16

802.11n(HT40) Middle Channel



Date: 17.OCT.2014 15:45:59

802.11n(HT40) High Channel



Date: 17.OCT.2014 15:46:41

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.

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

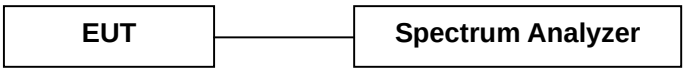
For 30MHz to 1GHz:
Sept the spectrum analyzer as: RBW=120kHz, VBW=300kHz, Detector=Quasi-Peak

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

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.

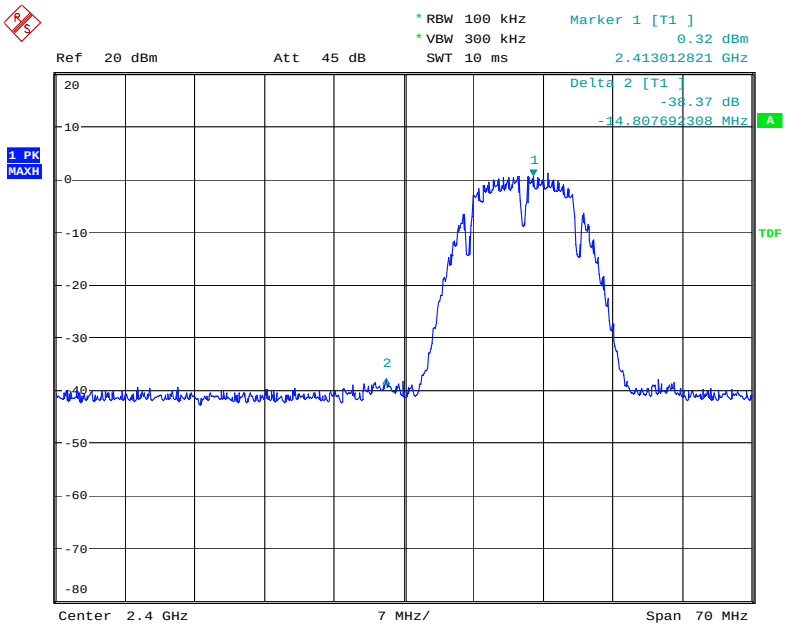
Spurious Emission in restricted band:

Operation Mode:	TX	Test Date :	October 17, 2014
Frequency Range:	Above 1GHz	Temperature :	24 ℃
Test Result:	PASS	Humidity :	55 %
Measured Distance:	3m	Test By:	Sance

Freq. (MHz)	Ant.Pol.	Emission Level(dBuV)		Limit 3m(dBuV/m)		Margin(dB)	
	H/V	PK	AV	PK	AV	PK	AV
Test Mode: 802.11b							
2398.760	H	46.22	34.33	74.00	54.00	-27.78	-19.67
2397.890	V	45.99	33.22	74.00	54.00	-28.01	-20.78
2484.330	H	47.12	34.39	74.00	54.00	-26.88	-19.61
2485.390	V	46.33	33.82	74.00	54.00	-27.67	-20.18
Test Mode: 802.11g							
2398.380	H	50.47	32.41	74.00	54.00	-23.53	-21.59
2395.370	V	45.10	33.32	74.00	54.00	-28.9	-20.68
2483.180	H	48.45	36.13	74.00	54.00	-25.55	-17.87
2484.750	V	47.12	34.77	74.00	54.00	-26.88	-19.23
Test Mode: 802.11n(HT20)							
2398.720	H	45.06	30.13	74.00	54.00	-28.94	-23.87
2395.510	V	42.19	32.89	74.00	54.00	-31.81	-21.11
2485.560	H	46.88	34.63	74.00	54.00	-27.12	-19.37
2485.630	V	48.34	33.41	74.00	54.00	-25.66	-20.59
Test Mode: 802.11n(HT40)							
2398.660	H	47.52	33.15	74.00	54.00	-26.48	-20.85
2398.280	V	47.06	33.26	74.00	54.00	-26.94	-20.74
2485.500	H	43.77	36.08	74.00	54.00	-30.23	-17.92
2485.760	V	46.76	34.54	74.00	54.00	-27.24	-19.46

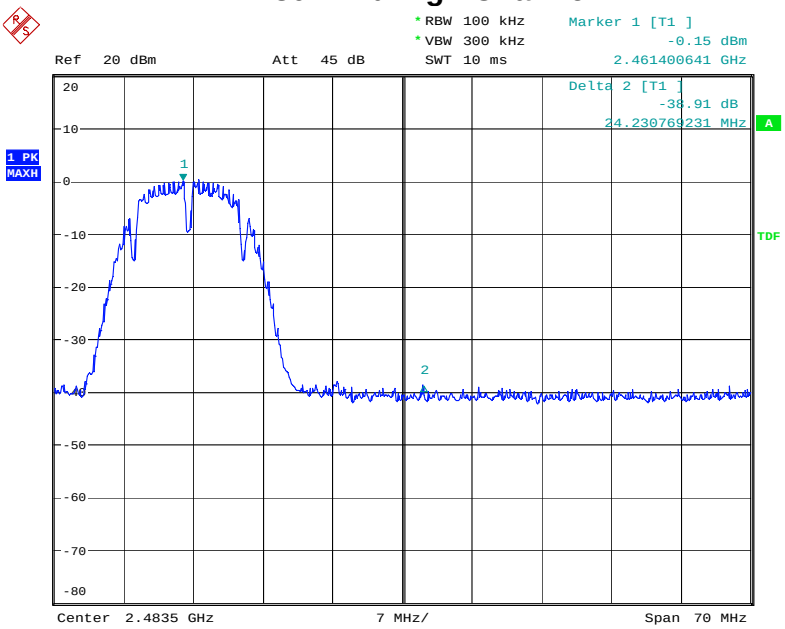
Note: (1) All Readings are Peak Value and AV.
(2) Emission Level= Reading Level+Probe Factor +Cable Loss
(3) Measurement uncertainty : ±3.7dB

Band Edge
802.11b Low Channel



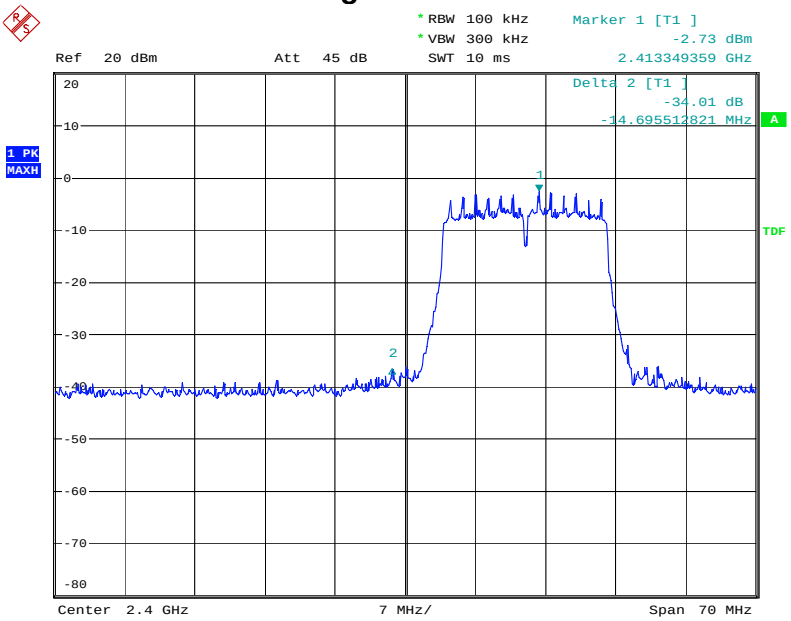
Date: 17.OCT.2014 15:47:48

802.11b High Channel



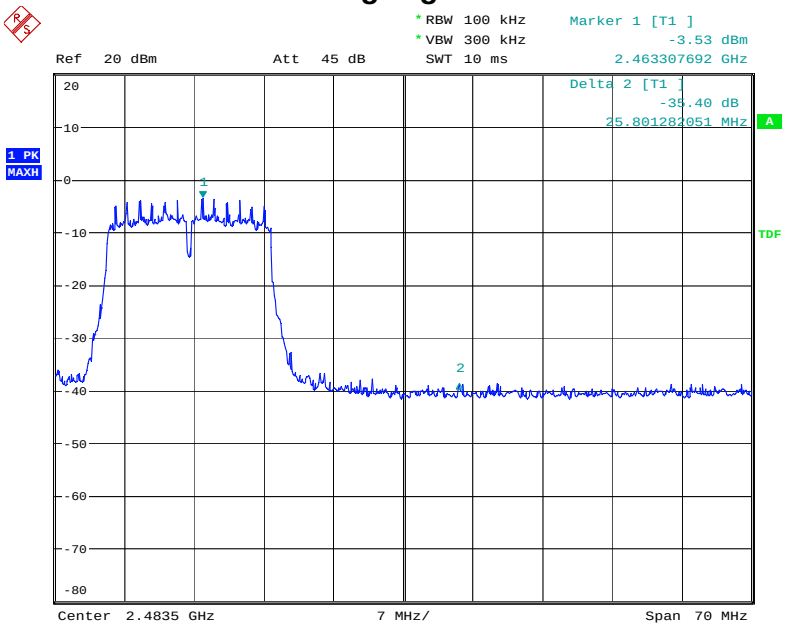
Date: 17.OCT.2014 15:48:26

802.11g Low Channel



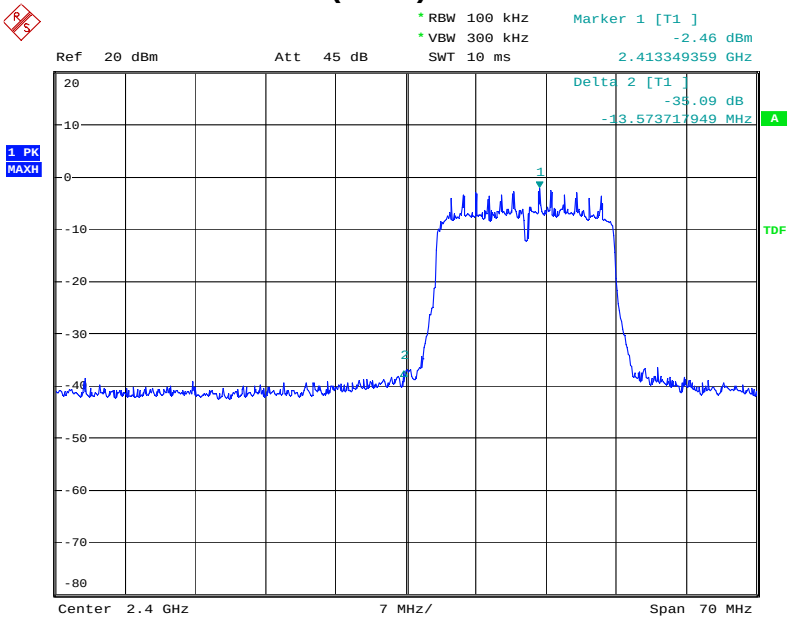
Date: 17.OCT.2014 15:49:19

802.11g High Channel



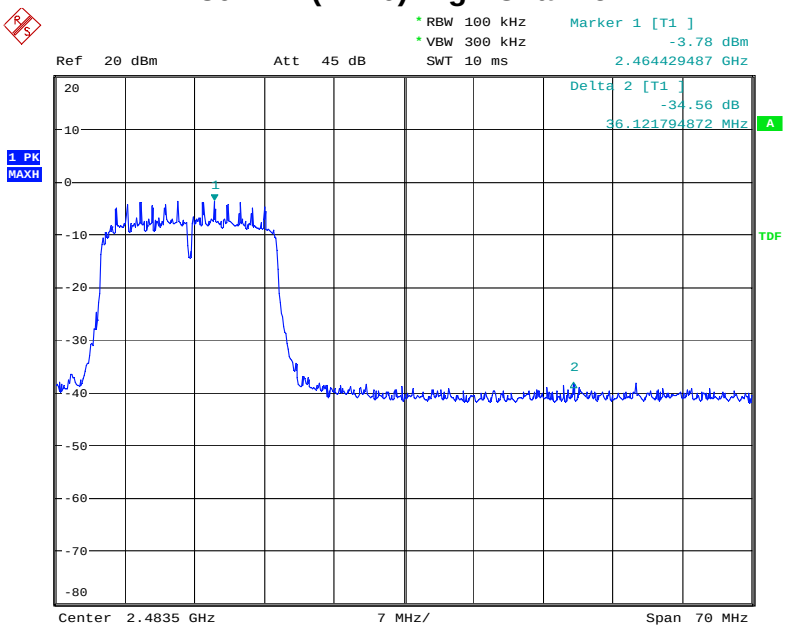
Date: 17.OCT.2014 15:50:23

802.11n(HT20) Low Channel



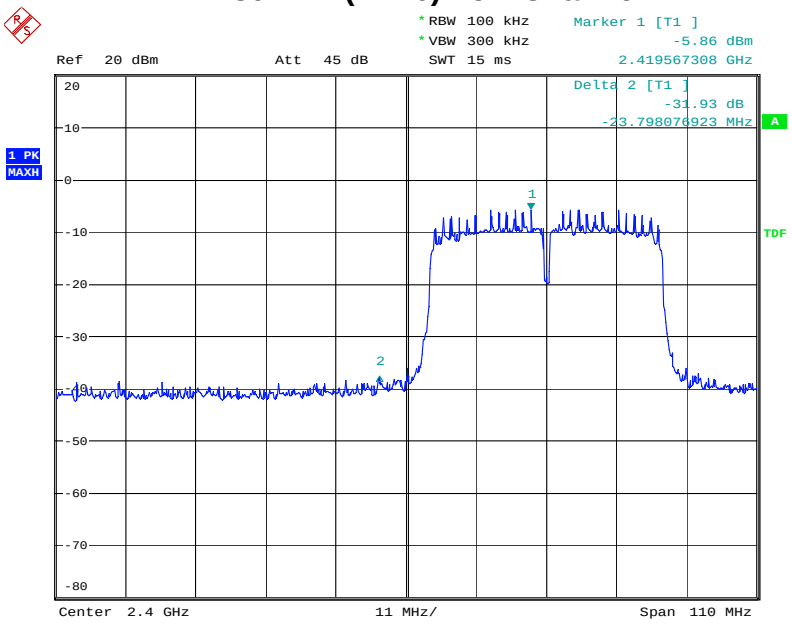
Date: 17.OCT.2014 15:51:10

802.11n(HT20) High Channel



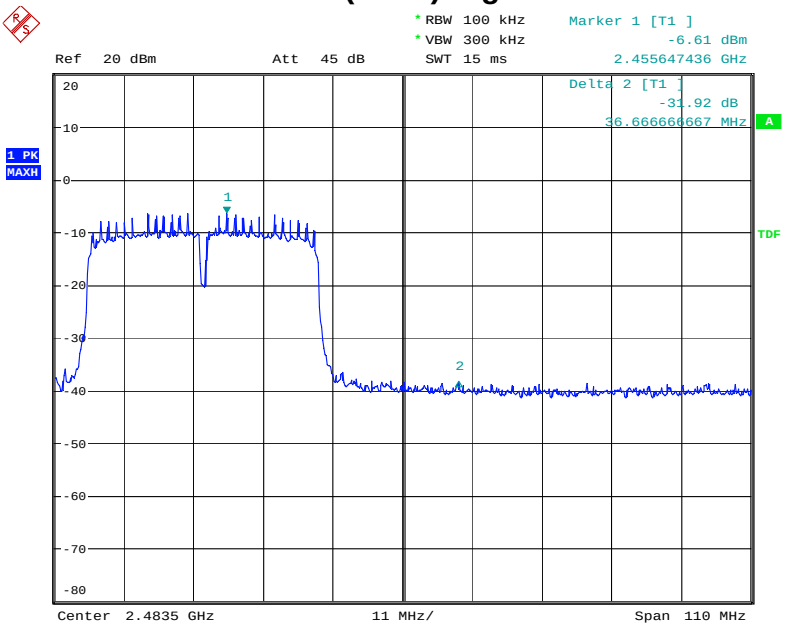
Date: 17.OCT.2014 15:51:53

802.11n(HT40) Low Channel



Date: 17.OCT.2014 15:52:52

802.11n(HT40) High Channel

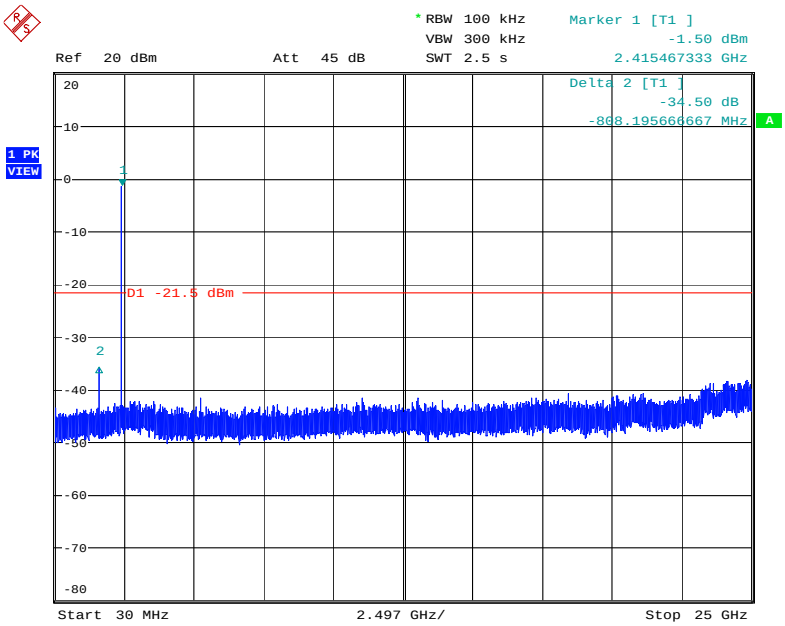


Date: 17.OCT.2014 15:54:07

Conducted Spurious Emissions

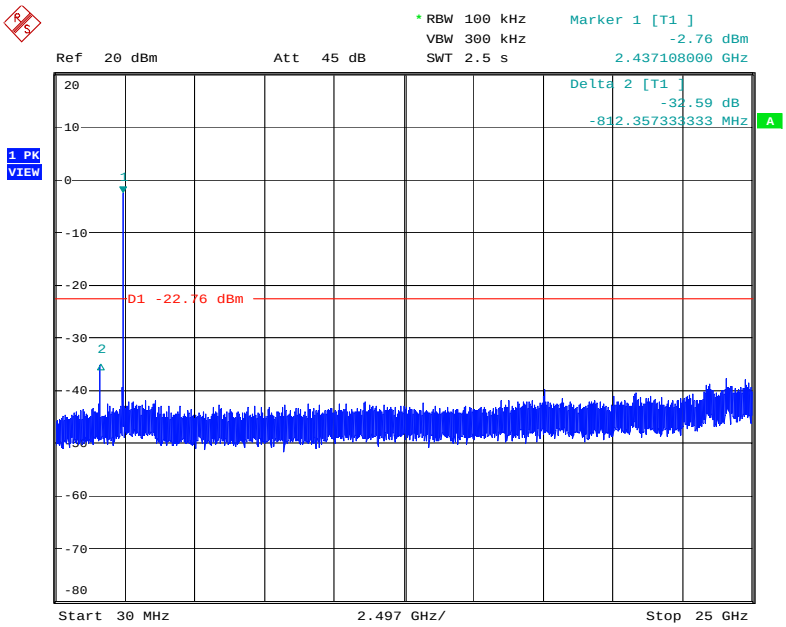
The worst case: 802.11b

Low Channel



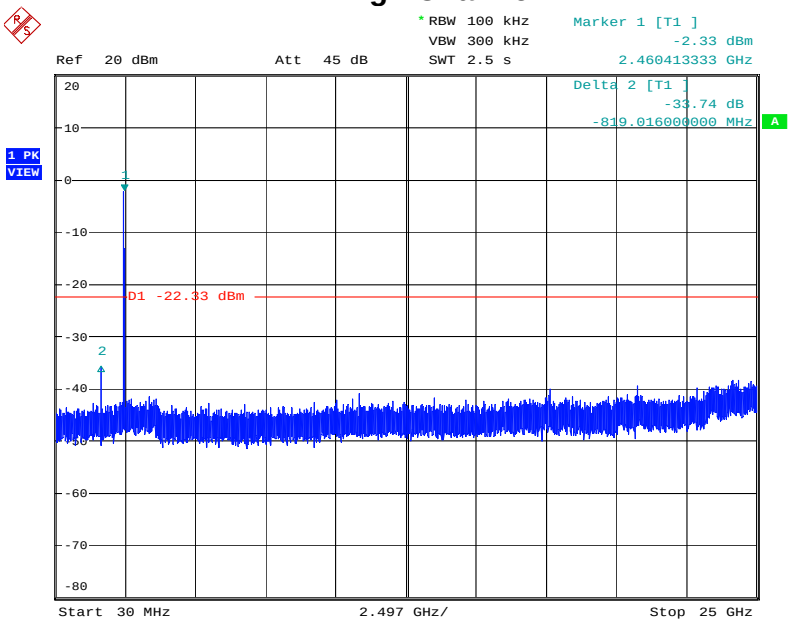
Date: 17.OCT.2014 16:00:06

Middle Channel



Date: 17.OCT.2014 16:00:41

High Channel

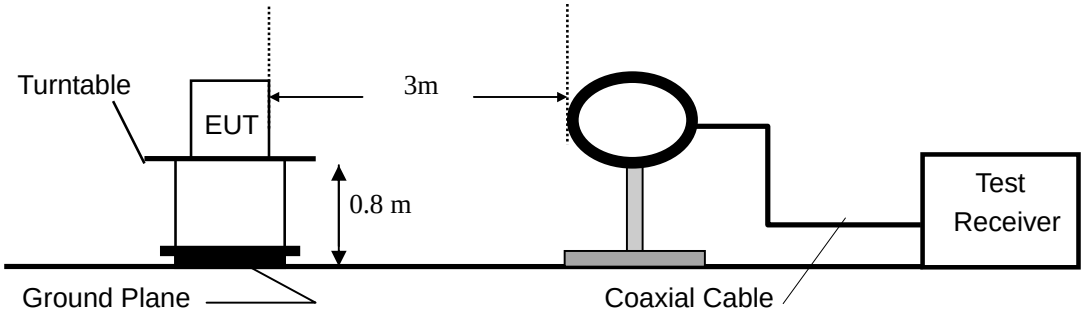


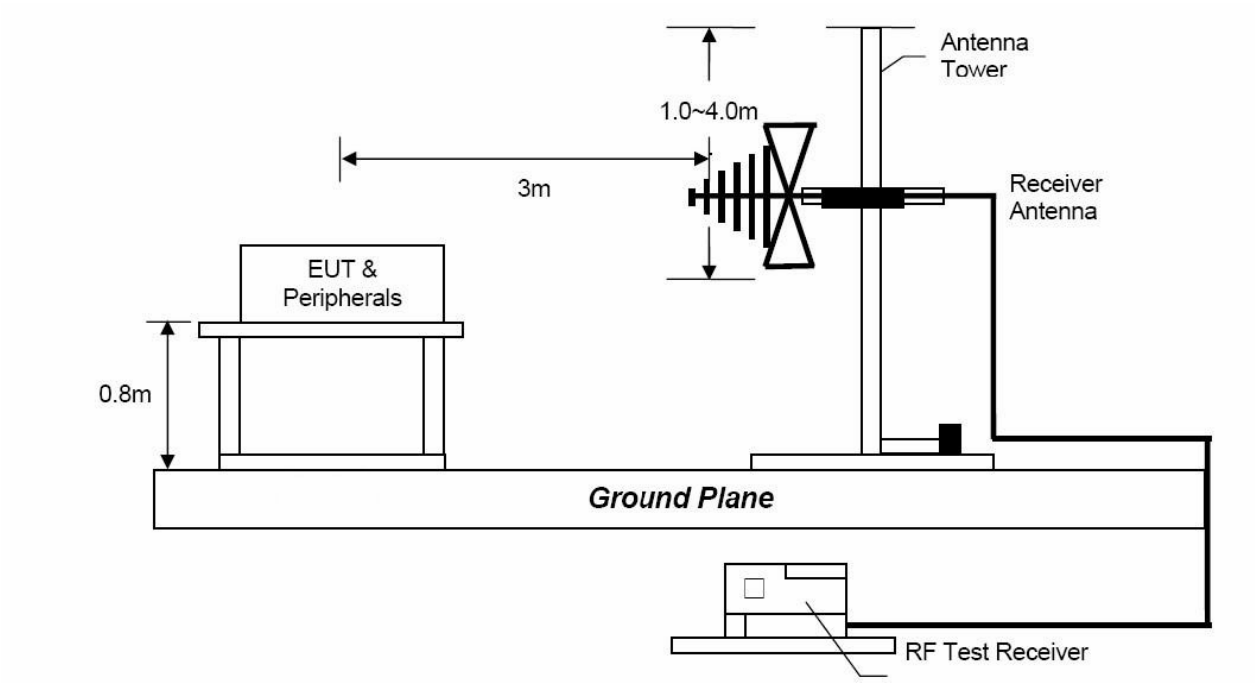
Date: 17.OCT.2014 16:01:16

8. Radiated Spurious Emissions and Restricted Bands

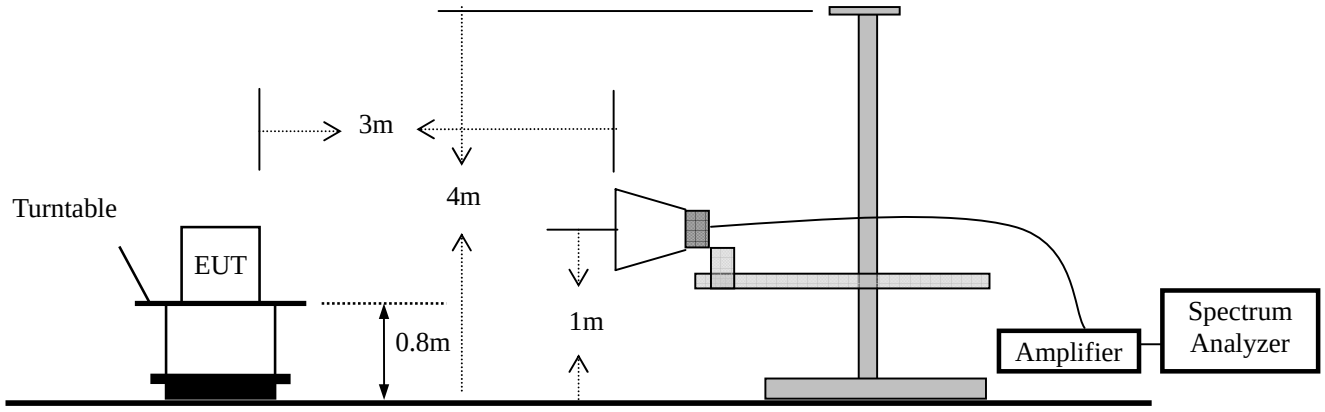
8.1 Test SET-UP (Block Diagram of Configuration)

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. 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. 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 (dBμV = 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

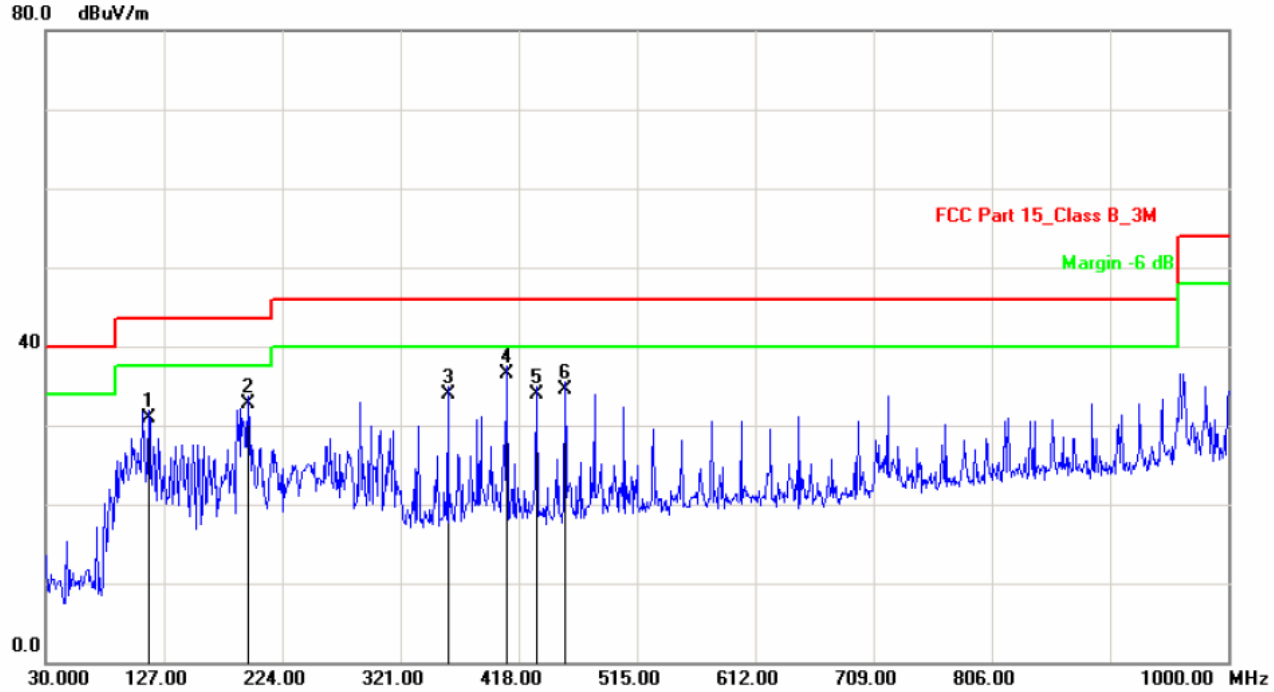
Test Mode:	802.11b(the worst case)		
Frequency Range:	Below 1GHz	Temperature :	24 ℃
Test Result:	PASS	Humidity :	55 %
Measured Distance:	3m	Test By:	Sance
Test Date :	October 17, 2014		

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV)	Limit 3m (dBuV/m)	Margin (dB)	Note
195.8700	H	32.67	43.50	-10.83	QP
408.3000	H	36.49	46.00	-9.51	QP
455.8300	H	34.43	46.00	-11.57	QP

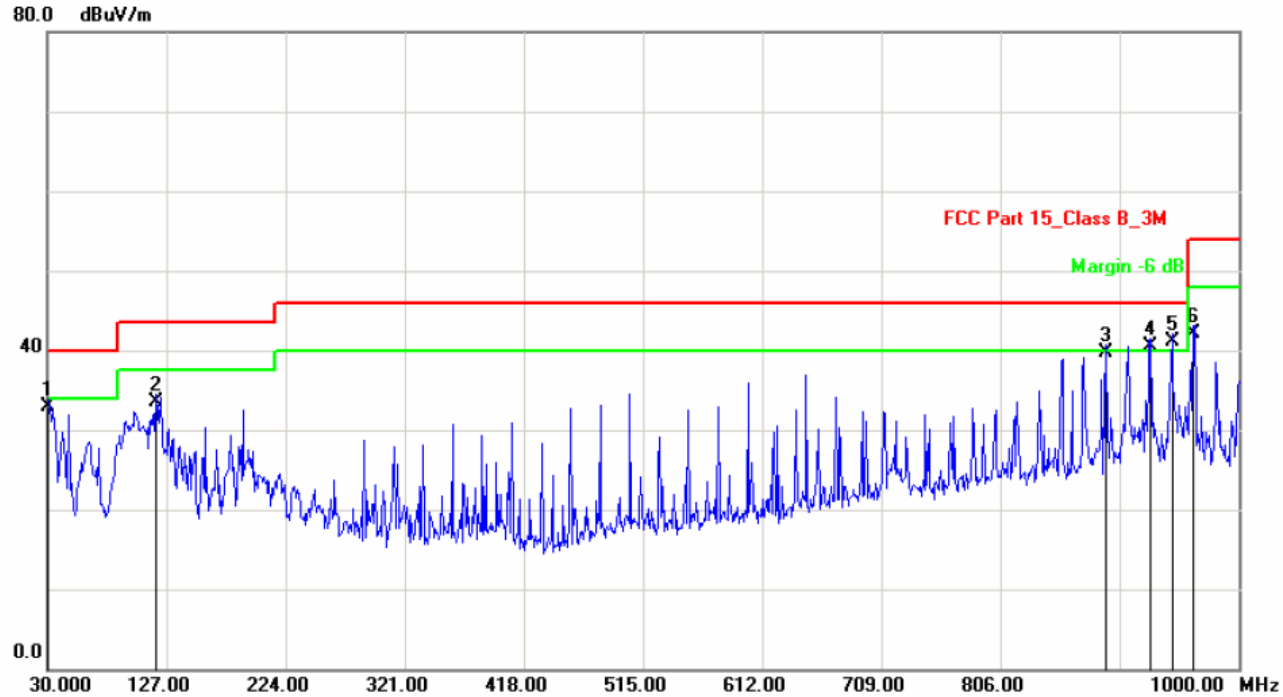
30.9700	V	32.96	40.00	-7.04	QP
118.2700	V	33.59	43.50	-9.91	QP
891.3600	V	39.76	46.00	-6.24	QP
928.2200	V	40.48	46.00	-5.52	QP
945.6800	V	41.17	46.00	-4.83	QP
963.1400	V	42.16	54.00	-11.84	QP

Note:
(1) Emission Level= Reading Level + Factor
(2) Factor= Antenna Gain + Cable Loss – Amplifier Gain
(3) Measurement uncertainty : ±3.4dB
(4) Loop antenna used for the emission below 30MHz.
(5) 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.

Horizontal



Vertical



Test Mode:	802.11b	Test Date :	October 17, 2014
Frequency Range:	Above 1GHz	Temperature :	24℃
Test Result:	PASS	Humidity :	55 %
Measured Distance:	3m	Test By:	Sance

Freq. (MHz)	Ant.Pol.	Emission Level(dBuV)		Limit 3m(dBuV/m)		Margin(dB)	
	H/V	PK	AV	PK	AV	PK	AV
Operation Mode: TX Mode (Low)							
4824	V	52.13	38.32	74.00	54.00	-21.87	-15.68
7236	V	57.43	44.67	74.00	54.00	-16.57	-9.33

4824	H	62.04	48.56	74.00	54.00	-11.96	-5.44
7236	H	55.73	43.33	74.00	54.00	-18.27	-10.67

Operation Mode: TX Mode (Mid)							
4874	V	53.71	38.85	74.00	54.00	-20.29	-15.15
7311	V	51.84	37.60	74.00	54.00	-22.16	-16.40

4874	H	56.96	43.95	74.00	54.00	-17.04	-10.05
7311	H	61.82	47.63	74.00	54.00	-12.18	-6.37

Operation Mode: TX Mode (High)							
4924	V	55.27	39.38	74.00	54.00	-18.73	-14.62
7386	V	51.92	38.09	74.00	54.00	-22.08	-15.91

4924	H	57.05	44.20	74.00	54.00	-16.95	-9.80
7386	H	61.28	48.02	74.00	54.00	-12.72	-5.98

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:	802.11g	Test Date :	October 17, 2014
Frequency Range:	Above 1GHz	Temperature :	24℃
Test Result:	PASS	Humidity :	55 %
Measured Distance:	3m	Test By:	Sance

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV)		Limit 3m(dBuV/m)		Margin(dB)	
		PK	AV	PK	AV	PK	AV
Operation Mode: TX Mode (Low)							
4824	V	54.84	39.07	74.00	54.00	-19.16	-14.93
7236	V	52.02	37.93	74.00	54.00	-21.98	-16.07

4824	H	57.61	44.23	74.00	54.00	-16.39	-9.77
7236	H	63.12	48.47	74.00	54.00	-10.88	-5.53

Operation Mode: TX Mode (Mid)							
4874	V	55.25	39.44	74.00	54.00	-18.75	-14.56
7311	V	52.50	38.07	74.00	54.00	-21.50	-15.93

4874	H	57.80	44.68	74.00	54.00	-16.20	-9.32
7311	H	62.63	48.18	74.00	54.00	-11.37	-5.82

Operation Mode: TX Mode (High)							
4924	V	55.04	39.50	74.00	54.00	-18.96	-14.50
7386	V	52.06	37.60	74.00	54.00	-21.94	-16.40

4924	H	57.43	43.95	74.00	54.00	-16.57	-10.05
7386	H	62.87	48.02	74.00	54.00	-11.13	-5.98

Note:
(1) All Readings are Peak Value and AV.
(2) Emission Level= Reading Level + Factor
(3) Factor= Antenna Gain + Cable Loss – Amtplifier 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(HT20)	Test Date :	October 17, 2014
Frequency Range:	Above 1GHz	Temperature :	24℃
Test Result:	PASS	Humidity :	55 %
Measured Distance:	3m	Test By:	Sance

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV)		Limit 3m(dBuV/m)		Margin(dB)	
		PK	AV	PK	AV	PK	AV
Operation Mode: TX Mode (Low)							
4824	V	53.59	38.70	74.00	54.00	-20.41	-15.30
7236	V	52.03	38.52	74.00	54.00	-21.97	-15.48

4824	H	57.85	44.39	74.00	54.00	-16.15	-9.61
7236	H	62.32	47.94	74.00	54.00	-11.68	-6.06

Operation Mode: TX Mode (Mid)							
4874	V	54.07	38.90	74.00	54.00	-19.93	-15.10
7311	V	51.88	37.83	74.00	54.00	-22.12	-16.17

4874	H	57.99	43.66	74.00	54.00	-16.01	-10.34
7311	H	63.11	48.31	74.00	54.00	-10.89	-5.69

Operation Mode: TX Mode (High)							
4924	V	54.33	38.23	74.00	54.00	-19.67	-15.77
7386	V	52.54	38.24	74.00	54.00	-21.46	-15.76

4924	H	57.64	44.12	74.00	54.00	-16.36	-9.88
7386	H	62.68	48.21	74.00	54.00	-11.32	-5.79

Not e: (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 :	October 17, 2014
Frequency Range:	Above 1GHz	Temperature :	24℃
Test Result:	PASS	Humidity :	55 %
Measured Distance:	3m	Test By:	Sance

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV)		Limit 3m(dBuV/m)		Margin(dB)	
		PK	AV	PK	AV	PK	AV
Operation Mode: TX Mode (Low)							
4844	V	51.09	43.45	74.00	54.00	-22.91	-10.55
7266	V	51.81	37.61	74.00	54.00	-22.19	-16.39

4844	H	56.93	43.70	74.00	54.00	-17.07	-10.30
7266	H	61.80	47.69	74.00	54.00	-12.20	-6.31

Operation Mode: TX Mode (Mid)							
4874	V	51.32	33.40	74.00	54.00	-22.68	-20.60
7311	V	51.91	38.33	74.00	54.00	-22.09	-15.67

4874	H	57.35	43.37	74.00	54.00	-16.65	-10.63
7311	H	61.90	48.24	74.00	54.00	-12.10	-5.76

Operation Mode: TX Mode (High)							
4904	V	51.43	33.64	74.00	54.00	-22.57	-20.36
7356	V	52.13	38.03	74.00	54.00	-21.87	-15.97

4904	H	57.38	44.26	74.00	54.00	-16.62	-9.74
7356	H	62.00	48.18	74.00	54.00	-12.00	-5.82

Not e: (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 PCB antenna that no antenna other than that furnished by the responsible party shall be used with the device, and the best case gain of the antenna is 3dBi, 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. 25, 2013	Nov. 24, 2014
Antenna	Schwarzbeck	VULB9162	9162-010	30MHz~7GHz	Nov. 28, 2013	Nov. 27, 2014
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. 09, 2013	Nov. 08, 2014
Cable	Huber+Suhner	CIL02	N/A	9KHz~7GHz	Nov. 09, 2013	Nov. 08, 2014
Power Amplifier	HP	HP 8447D	1145A00203	100KHz~1.3GHz	Nov. 09, 2013	Nov. 08, 2014
Horn Antenna	Schwarzbeck	BBHA9170	9170-372	15GHz~26.5GHz	Oct.24, 2013	Oct.23, 2014
Horn Antenna	Com-Power	AH-118	071078	1GHz~18GHz	Nov. 07, 2013	Nov. 06, 2014
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. 05, 2013	Nov. 04, 2014
L.I.S.N.	Rohde & Schwarz	ENV 216	101317	9KHz~30MHz	Nov. 09, 2013	Nov. 08, 2014

---End of report---