RADIO TEST REPORT

The device described below is tested by Dongguan Nore Testing Center Co., Ltd. to determine the maximum emission levels emanating from the device, the severe levels which the device can endure and E.U.T.'s performance criterion. The test results, data evaluation, test procedures, and equipment of configurations shown in this report were made in accordance with the procedures in ANSI C63.10(2013).

Applicant / Manufacturer	:	Shenzhen Shuoying Technology Co.,Ltd.
Address	:	Floor1-3 & 5, Block A, No.22 Hebei Industri Area, Hualian Community, Longhua Street, Shenzhen, China
Factory	:	Shenzhen Shuoying Technology Co.,Ltd.
Address	:	Floor1-3 & 5, Block A, No.22 Hebei Industri Area, Hualian Community, Longhua Street, Shenzhen, China
E.U.T.	:	IP Camera
Brand Name	:	N/A
Model No.	:	IPC032HB
FCC ID	:	2AI8H-IPC032HB
Measurement Standard	:	47 CFR FCC PART 15 Subpart E (section 407)
Date of Receiver	:	March 22, 2017
Date of Test	:	March 22, 2017 to April 21, 2017
Date of Report	:	April 21, 2017

This Test Report is Issued Under the Authority of :

Prepared by	Approved & Authorized Signer
Rose Hu / Engineer	Iori Fan / Authorized Signatory

This test report is for the customer shown above and their specific product only. This report applies to above tested sample only and shall not be reproduced in part without written approval of Dongguan Nore Testing Center Co., Ltd.

Table of Contents

Revision History of This Test Report

Report Number	Description	Issued Date
NTC1703207FV01	Initial Issue	2017-04-21

1. GENERAL INFORMATION

1.1 Product Description for Equipment under Test

This device is a IP Camera, it's powered by DC 5V come from USB port. For more details features, please refer to User's Manual.

Power Supply	:	DC 5V come from USB port
Adapter	:	M/N: WLC0510UU Input: AC 100-240V 50/60Hz, 0.2A Max Output: DC 5.0V 1.0A
Test voltage	:	AC 120V 60Hz, DC 3.7V li-ion battery
Model name	:	IPC032HB
Model difference	:	None
Hardware version	:	V1.0
Software version	:	V1.1.1
Serial number	:	N/A
Note	:	None

Technical parameters
For 5G Band

Frequency Range	:	5725-5850MHz
Modulation type	:	CCK, DQPSK, DBPSK for 802.11a 64-QAM,16-QAM, QPSK, BPSK for 802.11n 256-QAM,64-QAM,16-QAM, QPSK BPSK for 802.11ac
Modulation Technology	:	DSSS, OFDM
Number of Channel	:	802.11a/n(HT20)/ac(VHT20): 5 802.11n(HT40)/ac (VHT40): 2 802.11ac (VHT80): 1
Data rate	:	802.11a: 6~54Mbps 802.11n(HT20): MCS 0~7 802.11n(HT40): MCS 0~7 802.11ac(VHT20): MCS 0~8, Nss=1 802.11ac(VHT40): MCS 0~9, Nss=1 802.11ac(VHT80): MCS 0~9, Nss=1
Beamforming function	:	do not support
Antenna Type	:	FPC Antenna
Number of Antenna	:	1
Antenna Gain	:	-0.09 dBi

Channel list for 5GHz Band

802.11a/ n(HT20)/ac (VHT20)		802.11 n(HT40)/ac (VHT40)	
Channel	Frequency MHz	Channel	Frequency MHz
149	5745	151	5755
153	5765	159	5795
157	5785	802.11 ac (VHT80)	
161	5805	155	5775
165	5825		

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:

Test SW version	MP_Kit_RTL11ac_8811AU_USB

1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: **2AI8H-IPC032HB** filing to comply with Section 15.407 of the FCC Part 15 subpart E(2016) 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). 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

Notebook PC	:	Manufacturer: IBM Corporation M/N: R50e S/N: L3-HZNGO P/N: 1834KDC
Adapter	:	Manufacturer: IBM Corporation M/N: 08K8210 Input: AC100-240V 50/60Hz 0.5-1.0A Output: DC 16V 4.5A

1.6 Test Facility and Location

Listed by FCC, July 03, 2014
The Certificate Registration Number is 665078.
Listed by Industry Canada, June 18, 2014
The Certificate Registration Number is 9743A.

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	Uncertainty	Result
§15.207 (a)	AC Power Conducted Emission	±1.06dB	Compliant
§15.407(a)	Max. Conducted Output Power	±1.06dB	Compliant
§15.407(a)	26dB Spectrum Bandwidth and 99% Occupied Bandwidth	±1.42 x10^{-4}%	Compliant
§15.407(e)	6dB Bandwidth	±1.42 x10^{-4}%	Compliance
§15.407(a)	Power Spectral Density	±1.70dB & ±2.51dB	Compliance
§15.407(b) §15.205	Radiated Emissions	±3.70dB	Compliance
§15.407(b)	Band Edge Emissions	±1.06dB	Compliance
§15.407(g)	Frequency Stability	±8.42 x10^{-8}	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, OFDM-BPSK, QPSK, 16QAM, 256QAM and all data rate were tested. But only the worst case data is shown in this report.

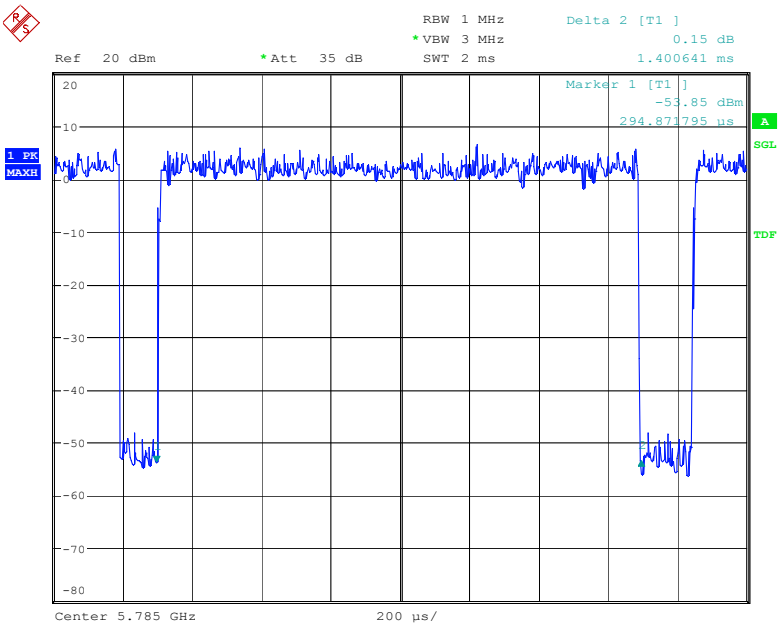
2.4 EUT Exercise

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

2.5 Duty cycle

Operation Band (MHz)	Mode	Ton (ms)	Ton+off (ms)	Duty Cycle (%)	1/T minimum VBW (kHz)
5725~5850	802.11a	1.40	1.54	90.9%	0.71
	802.11n(HT20)	1.31	1.37	95.6%	0.76
	802.11n(HT40)	0.83	0.89	93.3%	1.20
	802.11ac(VHT80)	0.51	0.57	89.5%	1.96

802.11a



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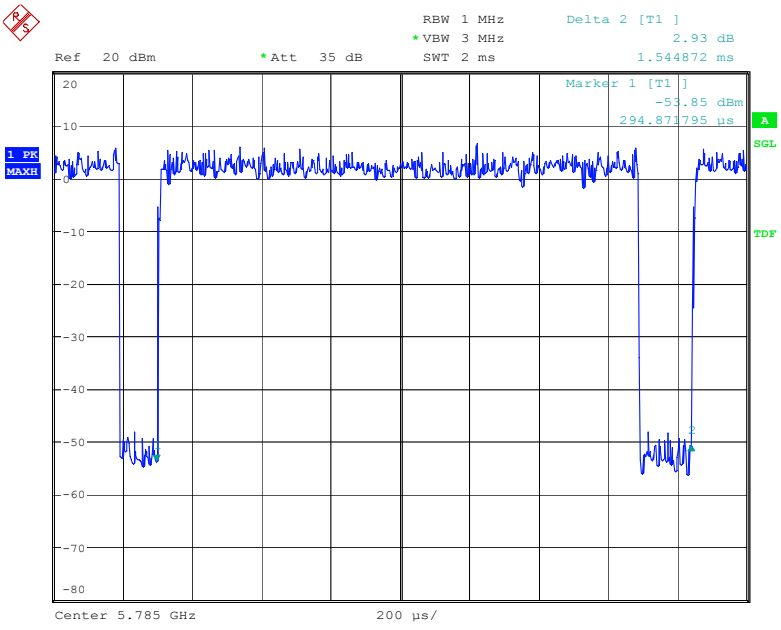

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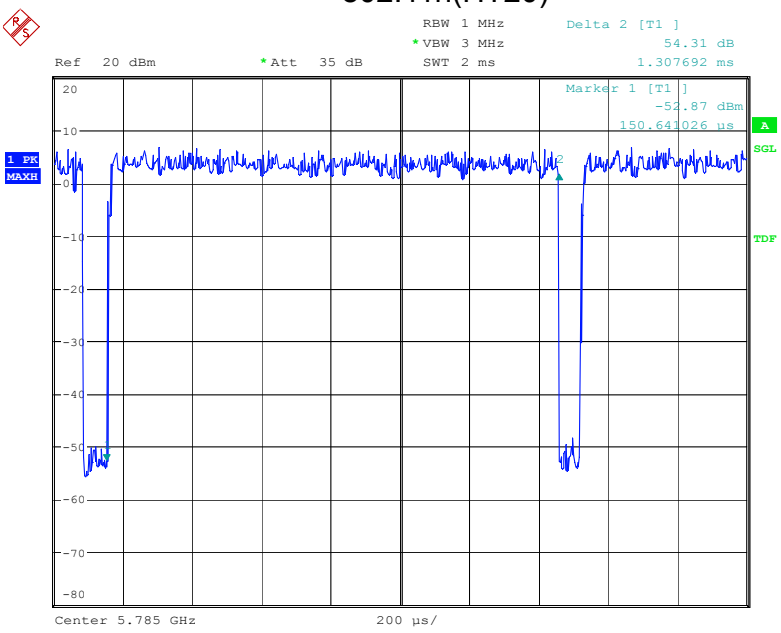
802.11n(HT20)



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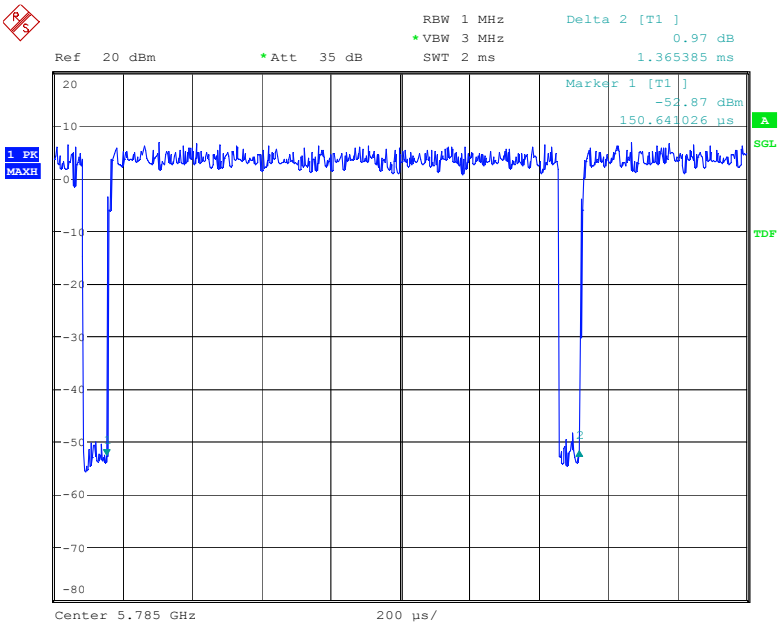

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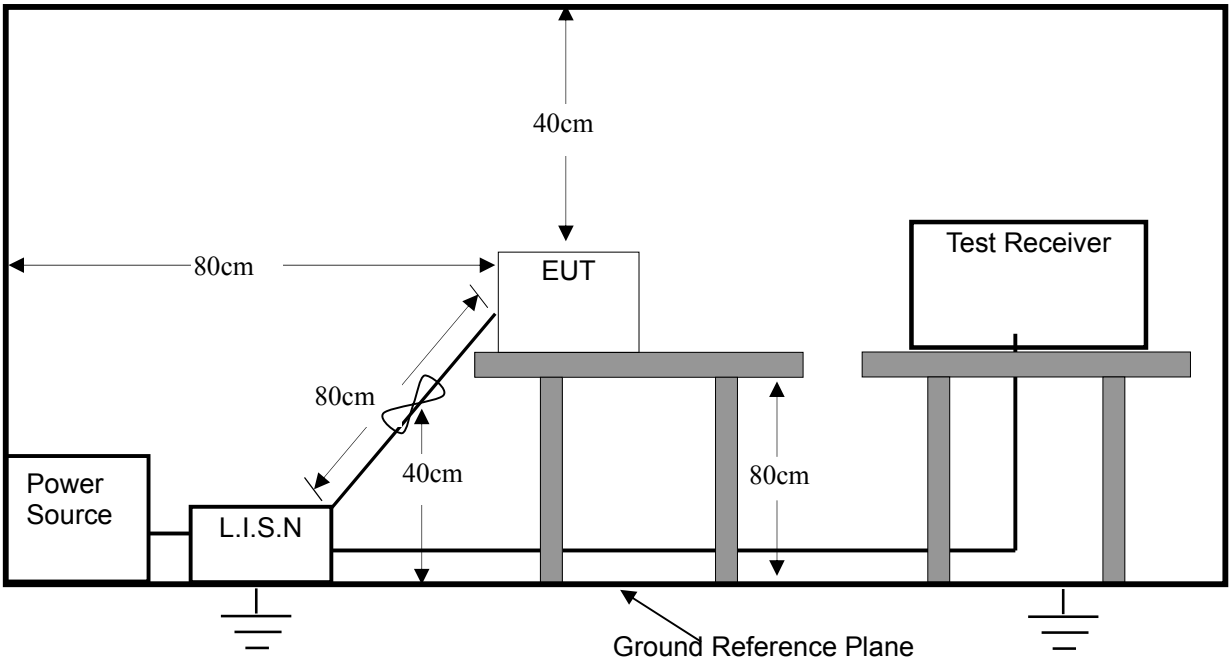
3. Conducted Emissions Test

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: Charging+5.8G WIFI Mode

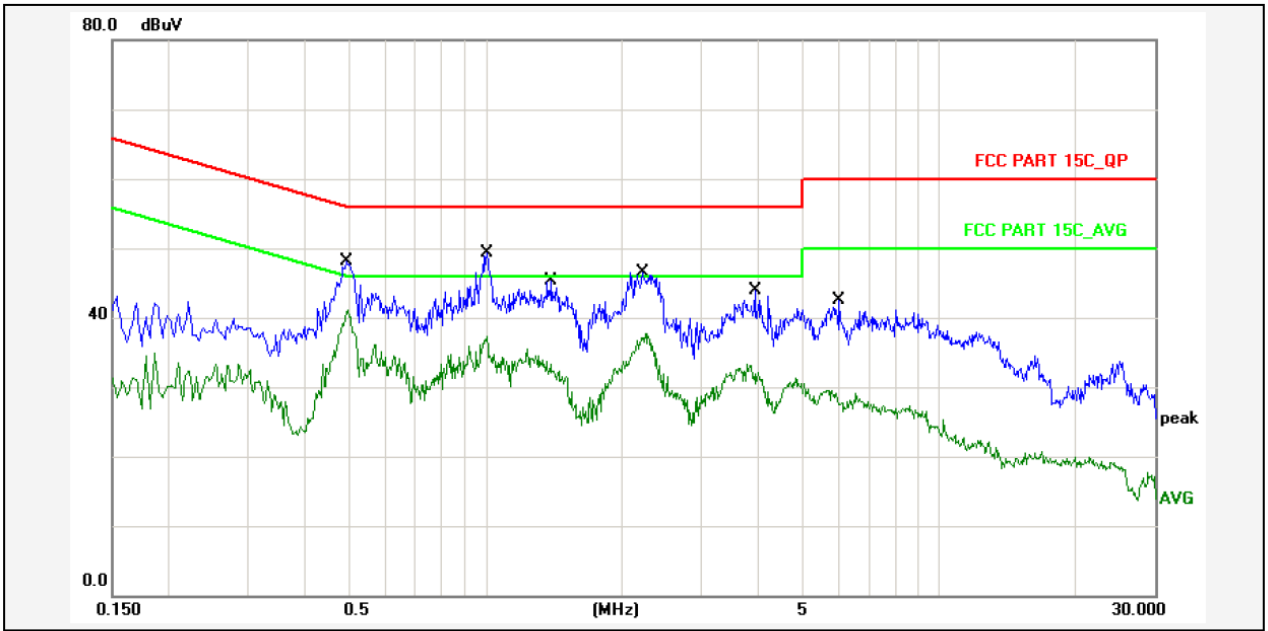
3.3 Measurement Results

Please refer to following plots of the worst case: 802.11n(HT20) Low channel.

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

Site: Conduction

Test Time: 2017-3-22 15:10:59



Report No.: IPC032HB
Test Standard: FCC PART 15C_QP
Test item: Conducted Emission
Applicant: Shuoying
Product: IP Camera
Model No.: IPC032HB
Phase: L1
Temp.( )/Hum.(%): 26(C) / 60 %
Power Rating: AC 120V/60Hz
Test Engineer: Eden

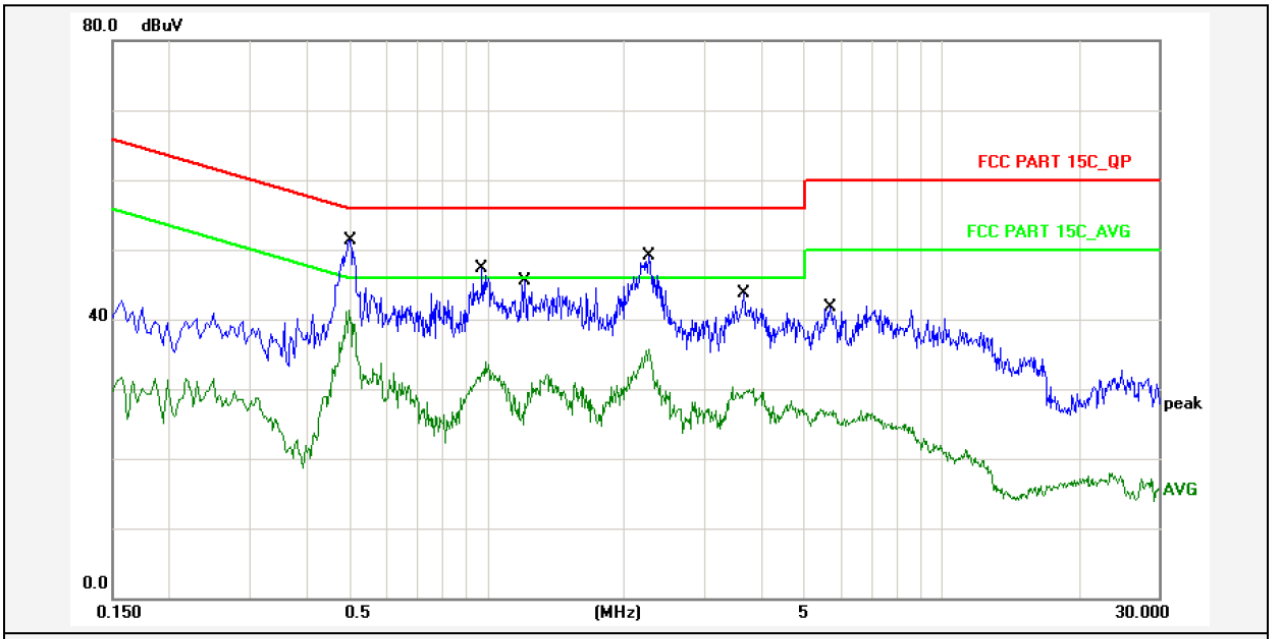
Test Mode: Charging+5.8G WIFI Mode
Remark:

No.	Frequency (MHz)	Factor (dBuV)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.4940	10.80	35.40	46.20	56.10	-9.90	QP	P	
2	0.4940	10.80	28.50	39.30	46.10	-6.80	AVG	P	
3	1.0100	10.80	36.50	47.30	56.00	-8.70	QP	P	
4	1.0100	10.80	24.40	35.20	46.00	-10.80	AVG	P	
5	1.4020	10.80	32.40	43.20	56.00	-12.80	QP	P	
6	1.4020	10.80	22.80	33.60	46.00	-12.40	AVG	P	
7	2.2219	10.80	33.80	44.60	56.00	-11.40	QP	P	
8	2.2219	10.80	24.90	35.70	46.00	-10.30	AVG	P	
9	3.9380	10.80	31.10	41.90	56.00	-14.10	QP	P	
10	3.9380	10.80	20.40	31.20	46.00	-14.80	AVG	P	
11	6.0499	10.80	29.70	40.50	60.00	-19.50	QP	P	
12	6.0499	10.80	16.30	27.10	50.00	-22.90	AVG	P	

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

Site: Conduction

Test Time: 2017-3-22 15:17:16



Report No.: IPC032HB
Test Standard: FCC PART 15C_QP
Test item: Conducted Emission
Applicant: Shuoying
Product: IP Camera
Model No.: IPC032HB
Phase: N
Temp.( )/Hum.(%): 26(C) / 60 %
Power Rating: AC 120V/60Hz
Test Engineer: Eden

Test Mode: Charging+5.8G WIFI Mode
Remark:

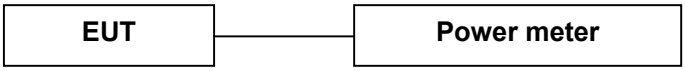
No.	Frequency (MHz)	Factor (dBuV)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.5020	10.80	38.60	49.40	56.00	-6.60	QP	P	
2	0.5020	10.80	28.60	39.40	46.00	-6.60	AVG	P	
3	0.9780	10.80	34.40	45.20	56.00	-10.80	QP	P	
4	0.9780	10.80	21.00	31.80	46.00	-14.20	AVG	P	
5	1.2096	10.80	32.60	43.40	56.00	-12.60	QP	P	
6	1.2096	10.80	18.30	29.10	46.00	-16.90	AVG	P	
7	2.2820	10.80	36.30	47.10	56.00	-8.90	QP	P	
8	2.2820	10.80	22.90	33.70	46.00	-12.30	AVG	P	
9	3.6740	10.80	31.00	41.80	56.00	-14.20	QP	P	
10	3.6740	10.80	17.40	28.20	46.00	-17.80	AVG	P	
11	5.7019	10.80	29.00	39.80	60.00	-20.20	QP	P	
12	5.7019	10.80	14.10	24.90	50.00	-25.10	AVG	P	

4. Max. Conducted Output Power

4.1 Limits

Operation Band	EUT category	Limit
□5150~5250MHz	□Outdoor Access Point	1 Watt (30dBm) (Max. e.i.r.p ≤ 125mW(21dBm) at any elevation angle above 30 degrees as measured from the horizon)
	□Fixed point-to-point Access Point	1 Watt (30dBm)
	□Indoor Access Point	1 Watt (30dBm)
	□Mobile and Portable client device	250mW (24dBm)
■5725~5850MHz		1 Watt (30dBm)

4.2 Test SET-UP (Block Diagram of Configuration)



4.3 Test Procedure

1. The transmitter output (antenna port) was connected to the power meter.
2. Test was performed in accordance with KDB789033 v01r03 for compliance testing of Unlicensed National Information Infrastructure (U-NII) Device -section (E) Maximum conducted output power. =3. Measurement using a power meter (PM) =b Method PM-G (Measurement using a gated RF average power meter).

4.4 Measurement Results

Pass

Please refer to following table.

Temperature :	24 ℃	Humidity :	50%
Test By:	Sance	Test Date :	March 27, 2017
Test Result:	PASS		

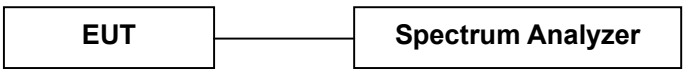
Frequency MHz	Data Rate Mbps	Peak Output Power dBm	Limit dBm
IEEE 802.11a Mode (OFDM, Antenna Gain=-0.09dBi)			
Low Channel: 5745	6	8.94	30
Middle Channel: 5785	6	8.06	30
High Channel: 5825	6	8.19	30
IEEE 802.11n(HT20)Mode (OFDM, Antenna Gain=-0.09dBi)			
Low Channel: 5745	MCS0	9.73	30
Middle Channel: 5785	MCS0	9.39	30
High Channel: 5825	MCS0	9.17	30
IEEE 802.11n(HT40) Mode (OFDM, Antenna Gain=-0.09dBi)			
Low Channel: 5755	MCS0	8.74	30
High Channel: 5795	MCS0	8.78	30
IEEE 802.11ac (VHT20) Mode (OFDM, Antenna Gain=-0.09dBi)			
Low Channel: 5745	MCS0	9.14	30
Middle Channel: 5785	MCS0	9.39	30
High Channel: 5825	MCS0	8.98	30
IEEE 802.11ac (VHT40) Mode (OFDM, Antenna Gain=-0.09dBi)			
Low Channel: 5755	MCS0	8.98	30
High Channel: 5795	MCS0	8.62	30
IEEE 802.11ac (VHT80) Mode (OFDM, Antenna Gain=-0.09dBi)			
Channel: 5775	MCS0	9.80	30

5. 6dB Bandwidth

5.1 Limits

For digital modulation systems, the minimum 6dB bandwidth shall be at least 500 kHz.

5.2 Test SET-UP (Block Diagram of Configuration)



5.3 Test Procedure

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer was set as below according to FCC KDB789033(v01r03):

1. For 6dB bandwidth, 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.

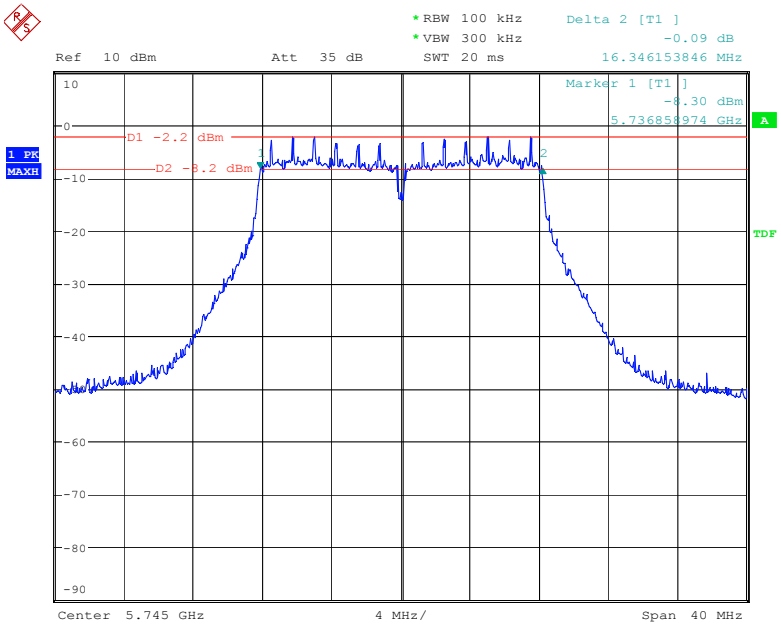
5.4 Measurement Results

Pass

Please refer to following table and plots.

Temperature :	24 ℃	Humidity : 50 %	
Test By:	Sance	Test Date : March 27, 2017	
Test Result:	PASS		
Frequency MHz	Data Rate Mbps	6dB Bandwidth MHz	Limit
IEEE 802.11a Mode (CCK)			
Low Channel: 5745	6	16.35	>500KHz
Middle Channel: 5785	6	16.35	>500KHz
High Channel: 5825	6	16.22	>500KHz
IEEE 802.11n(HT20) Mode (OFDM)			
Low Channel: 5745	MCS0	17.37	>500KHz
Middle Channel: 5785	MCS0	16.86	>500KHz
High Channel: 5825	MCS0	17.24	>500KHz
IEEE 802.11n(HT40) Mode (OFDM)			
Low Channel: 5755	MCS0	35.77	>500KHz
High Channel: 5795	MCS0	35.90	>500KHz
IEEE 802.11ac (VHT20) Mode (OFDM)			
Low Channel: 5745	MCS0	17.31	>500KHz
Middle Channel: 5785	MCS0	16.99	>500KHz
High Channel: 5825	MCS0	17.18	>500KHz
IEEE 802.11ac (VHT40) Mode (OFDM)			
Low Channel: 5755	MCS0	35.90	>500KHz
High Channel: 5795	MCS0	35.90	>500KHz
IEEE 802.11ac (VHT80) Mode (OFDM)			
Channel: 5775	MCS0	75.26	>500KHz

802.11a Low Channel



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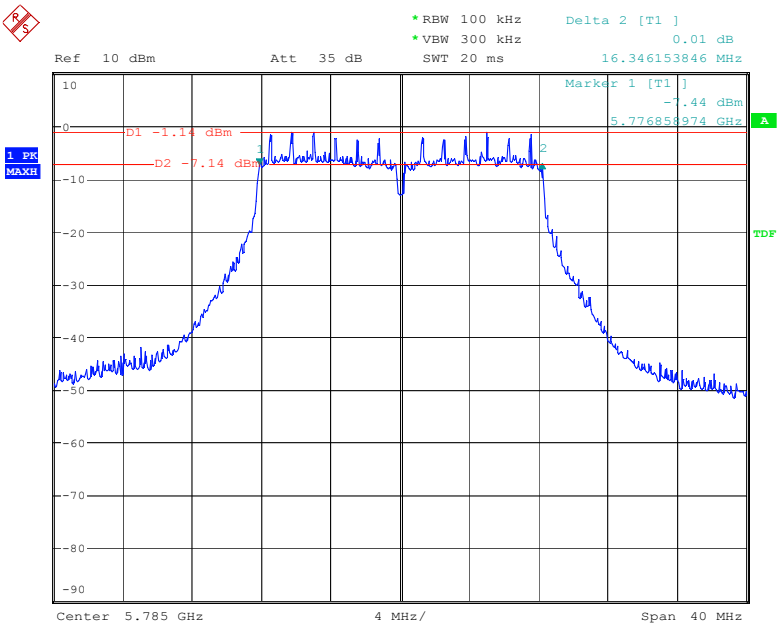
802.11a Middle Channel



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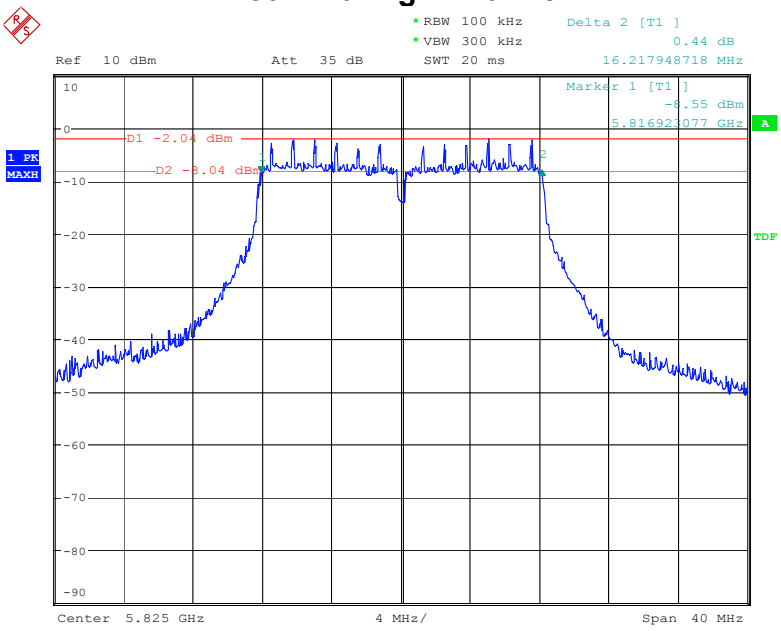
802.11a High Channel



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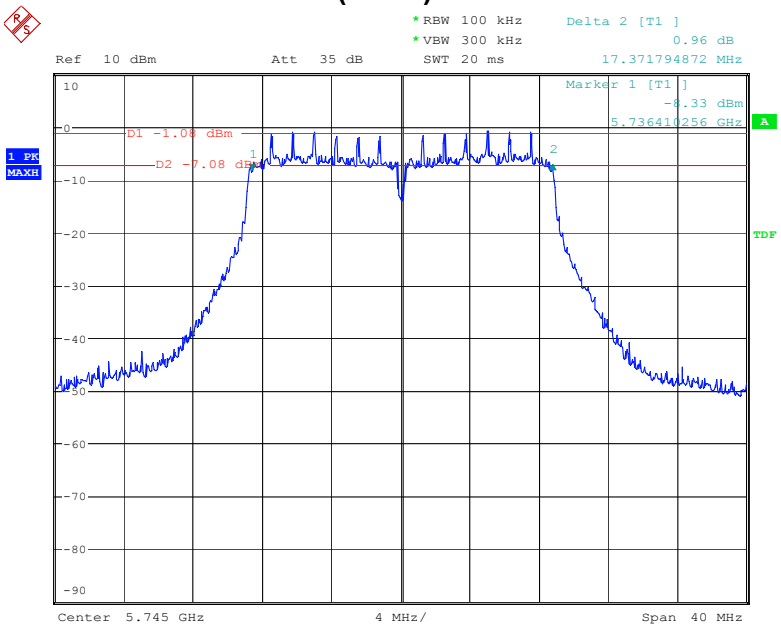
802.11n(HT20) Low Channel



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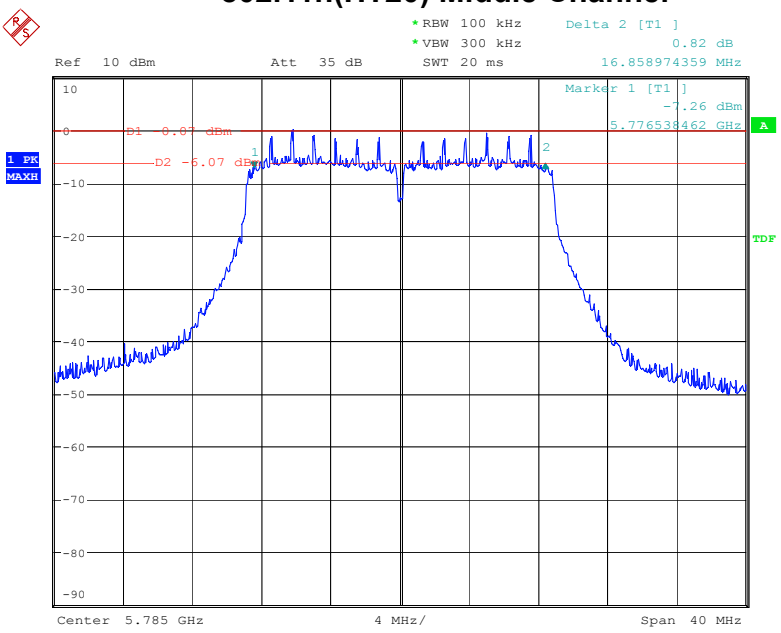
802.11n(HT20) Middle Channel



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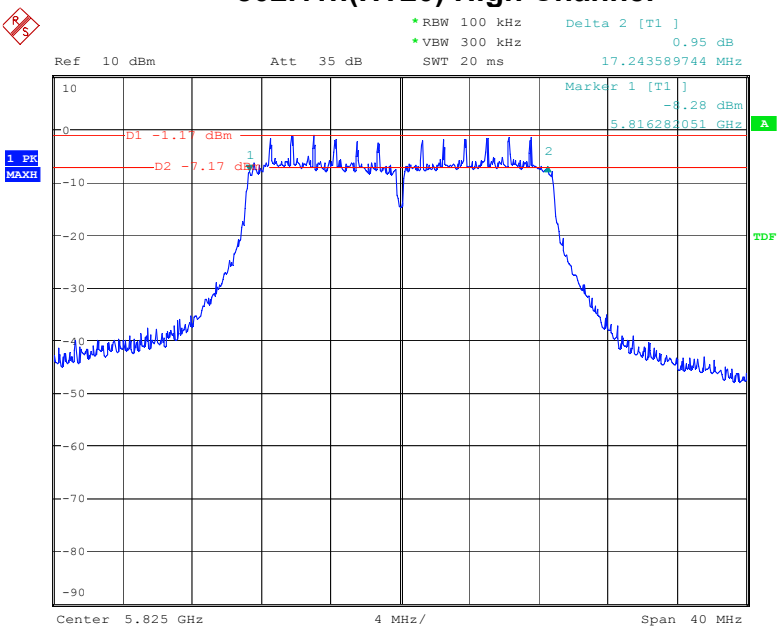
802.11n(HT20) High Channel



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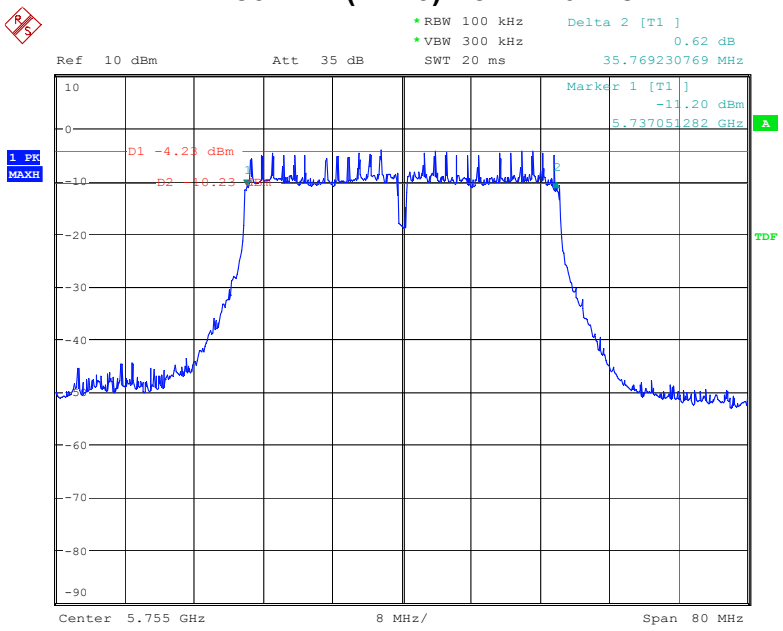
802.11n(HT40) Low Channel



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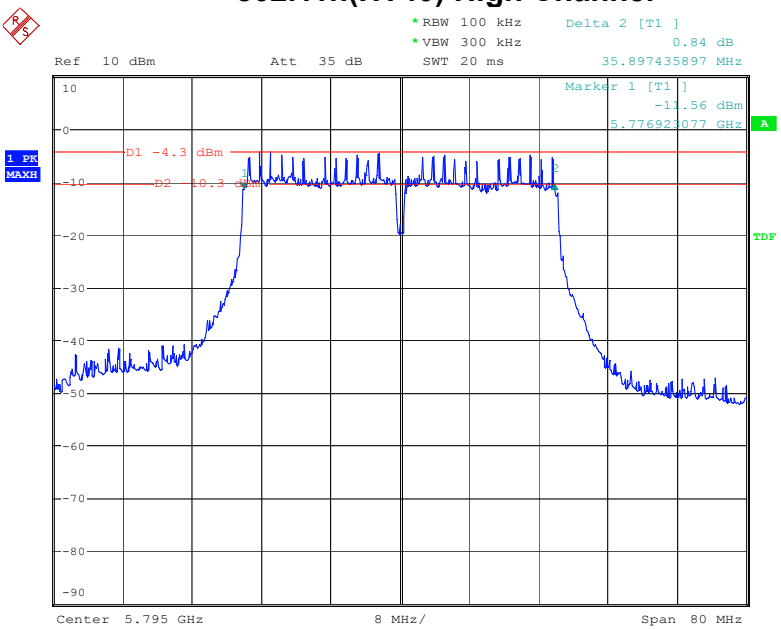
802.11n(HT40) High Channel



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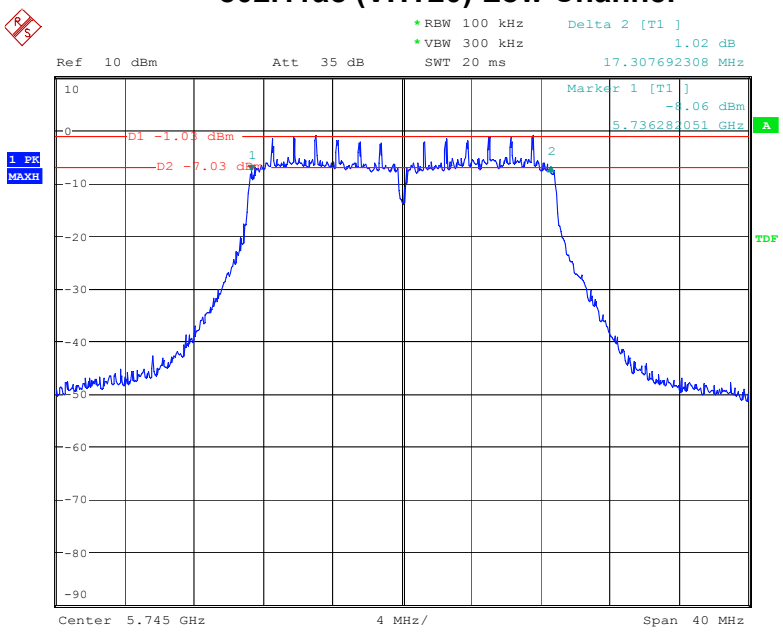
802.11ac (VHT20) Low Channel



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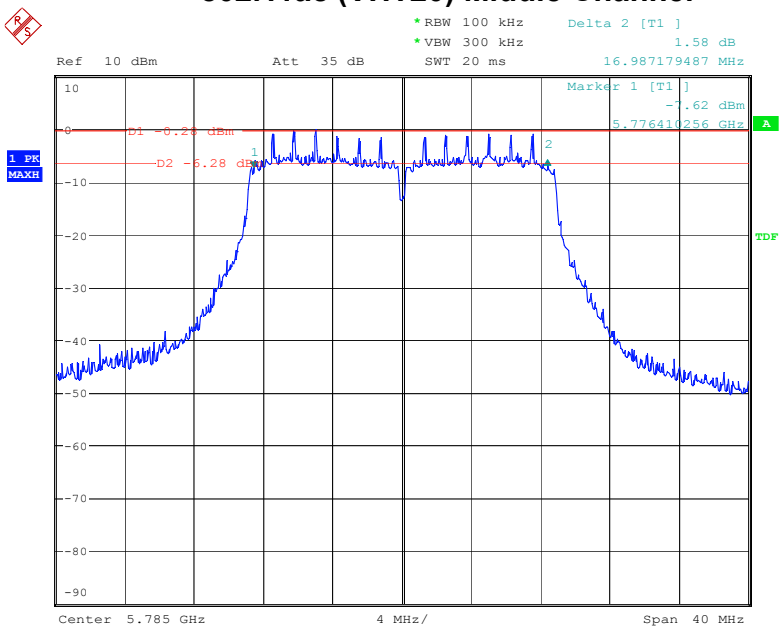
802.11ac (VHT20) Middle Channel



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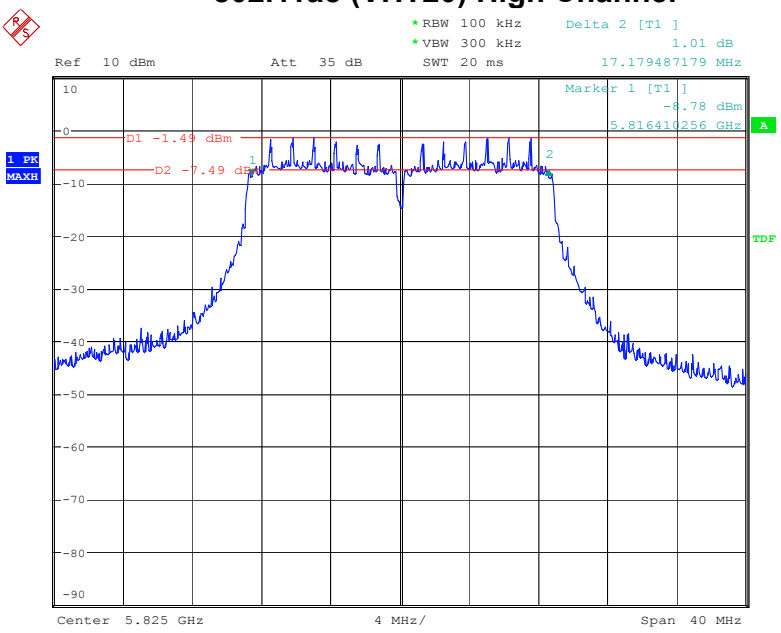
802.11ac (VHT20) High Channel



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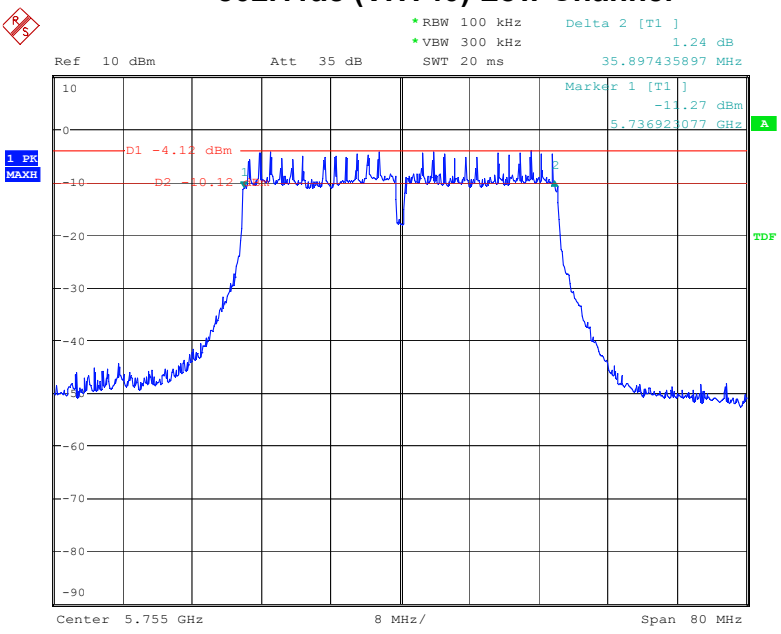
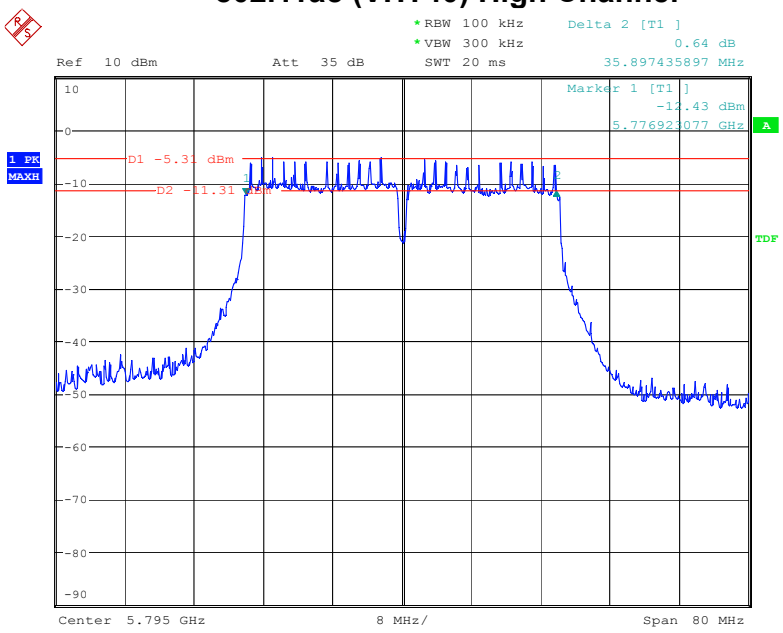
802.11ac (VHT40) Low Channel



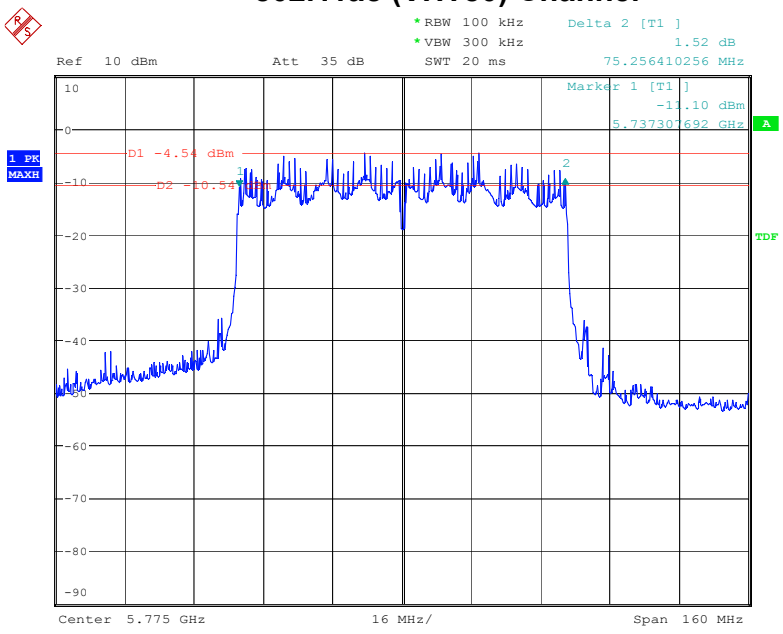
Date: 27.MAR.2017 15:41:47

802.11ac (VHT40) High Channel



Date: 27.MAR.2017 15:43:14

802.11ac (VHT80) Channel



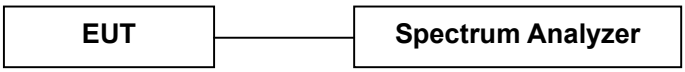
Date: 27.MAR.2017 15:45:37

6. 26dB Bandwidth & 99% Occupied Bandwidth

6.1 Limits

No restriction limits.

6.2 Test SET-UP (Block Diagram of Configuration)



6.3 Test Procedure

The antenna port of the EUT was connected to the input of a spectrum analyzer.
Analyzer was set as below according to FCC KDB789033(v01r03):

1. For 26dB bandwidth, Set the RBW = Approximately 1% of the emission bandwidth
2. Set the VBW ＞ 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 26 dB relative to the maximum level measured in the fundamental emission.

1. For 99% occupied bandwidth, Set the RBW = 1% to 5% of the OBW
2. Set the VBW ≥ 3 x RBW
3. Detector = peak.
4. Span = 1.5 times to 5.0 times the OBW
5. Sweep time = auto couple.
6. Trace mode = max hold. Allow trace to fully stabilize.
7. Use the 99% power bandwidth function of the spectrum analyzer measure the occupied bandwidth.

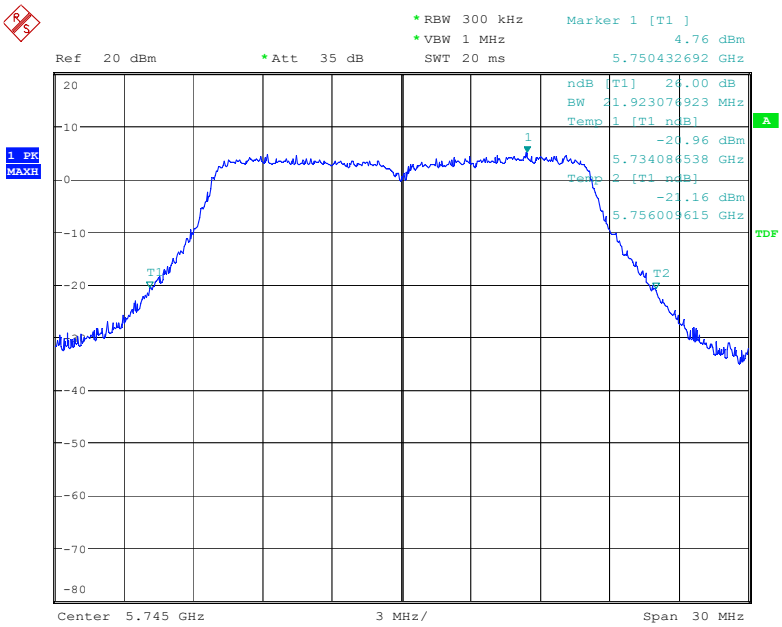
6.4 Measurement Results

Pass

Please refer to following table and plots.

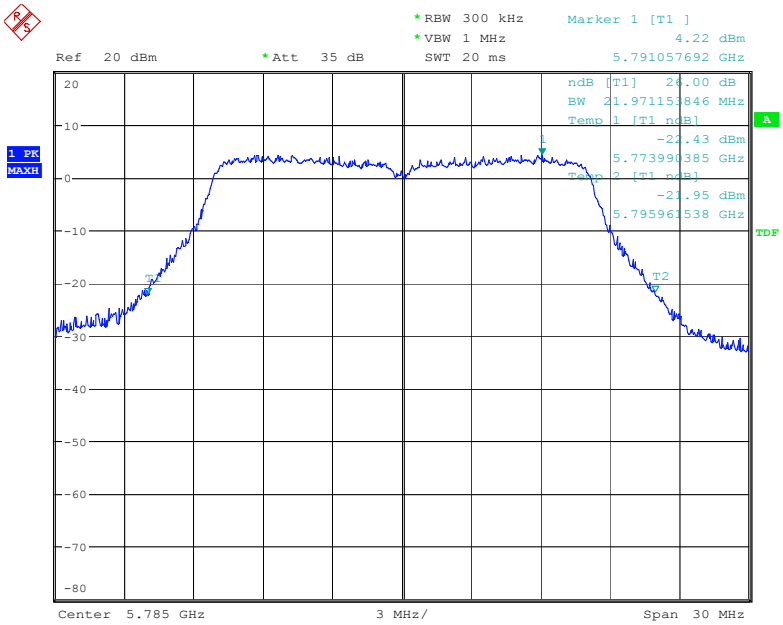
Temperature :	23 ℃	Humidity : 59 %	
Test By:	Sance	Test Date : April 21, 2017	
Test Result:	PASS		
Frequency MHz	Data Rate Mbps	26dB Bandwidth MHz	99% Occupied Bandwidth MHz
IEEE 802.11a Mode (CCK)			
Low Channel: 5745	6	21.92	17.16
Middle Channel: 5785	6	21.97	17.16
High Channel: 5825	6	22.55	17.16
IEEE 802.11n(HT20) Mode (OFDM)			
Low Channel: 5745	MCS0	22.40	18.08
Middle Channel: 5785	MCS0	22.79	18.08
High Channel: 5825	MCS0	22.98	18.13
IEEE 802.11n(HT40) Mode (OFDM)			
Low Channel: 5755	MCS0	45.67	37.69
High Channel: 5795	MCS0	45.96	37.88
IEEE 802.11ac (VHT20) Mode (OFDM)			
Low Channel: 5745	MCS0	22.50	18.08
Middle Channel: 5785	MCS0	22.54	18.08
High Channel: 5825	MCS0	23.08	18.22
IEEE 802.11ac (VHT40) Mode (OFDM)			
Low Channel: 5755	MCS0	45.77	37.69
High Channel: 5795	MCS0	46.54	37.88
IEEE 802.11ac (VHT80) Mode (OFDM)			
Channel: 5775	MCS0	82.50	75.19

26dB Bandwidth
802.11a Low Channel



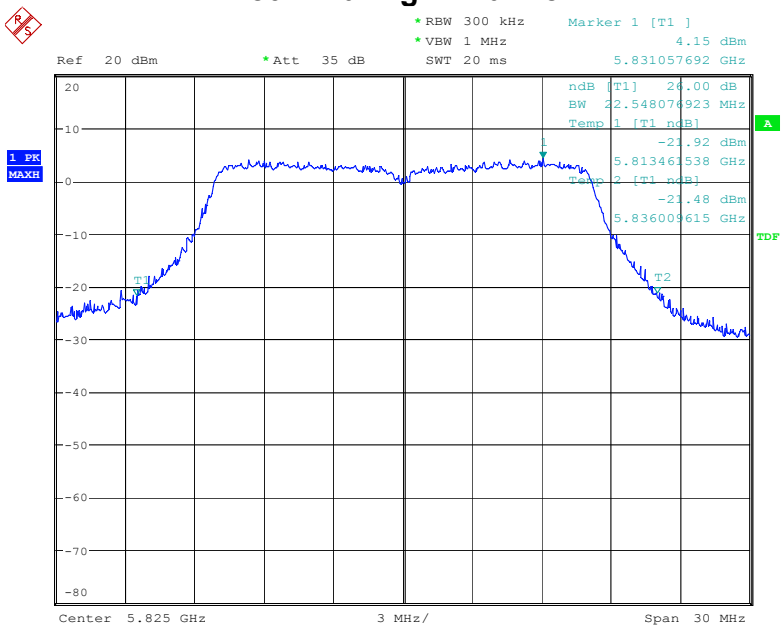
Date: 21.APR.2017 13:10:22

802.11a Middle Channel



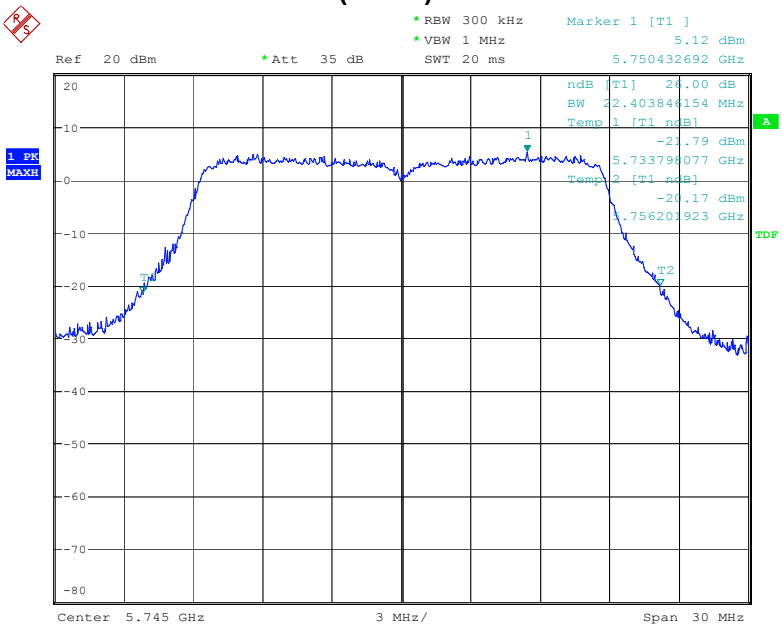
Date: 21.APR.2017 13:11:01

802.11a High Channel



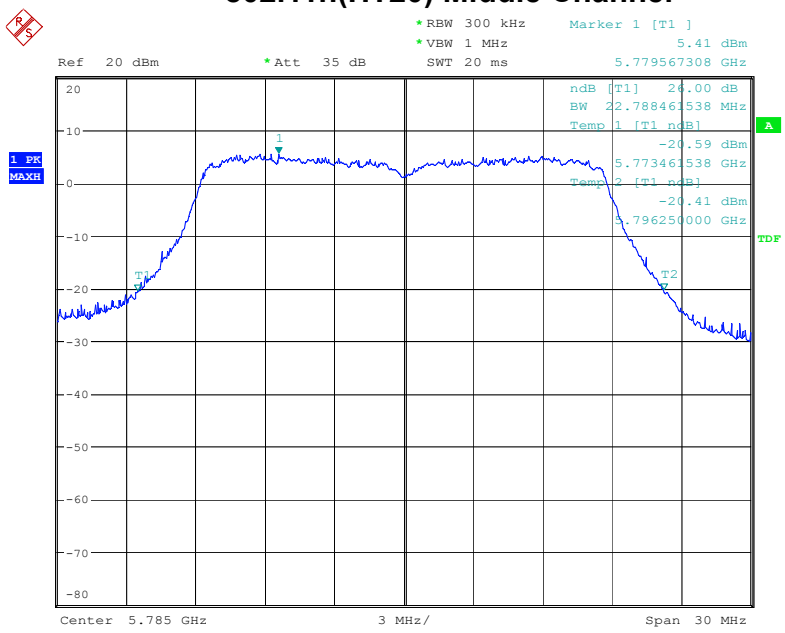
Date: 21.APR.2017 13:11:50

802.11n(HT20) Low Channel



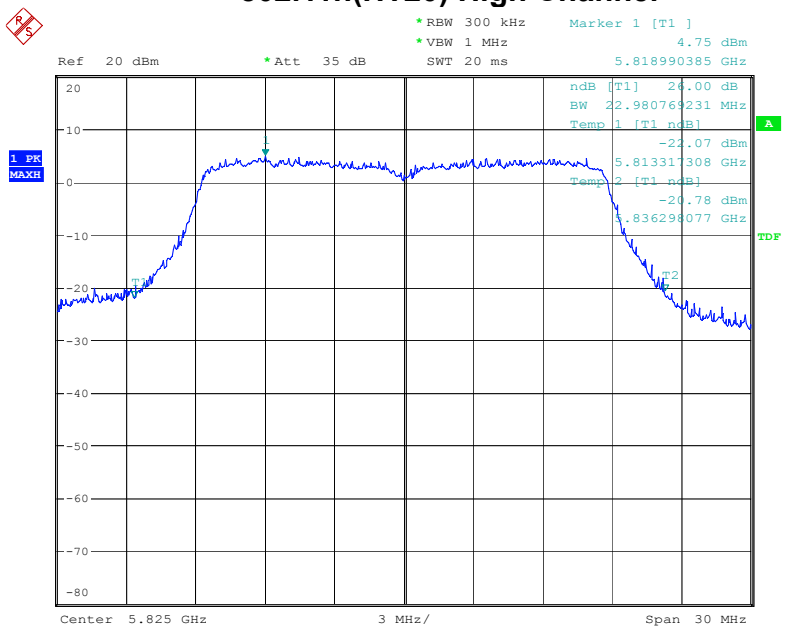
Date: 21.APR.2017 13:15:27

802.11n(HT20) Middle Channel



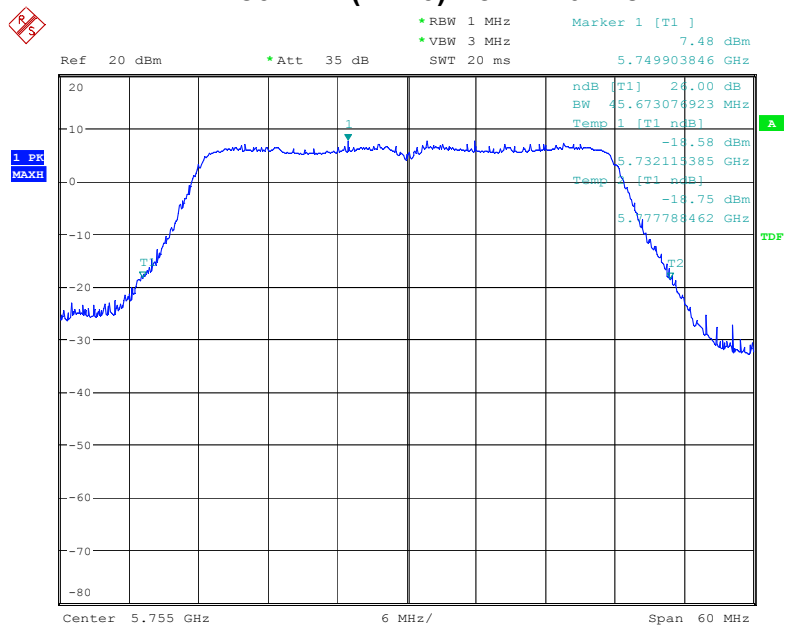
Date: 21.APR.2017 13:24:42

802.11n(HT20) High Channel



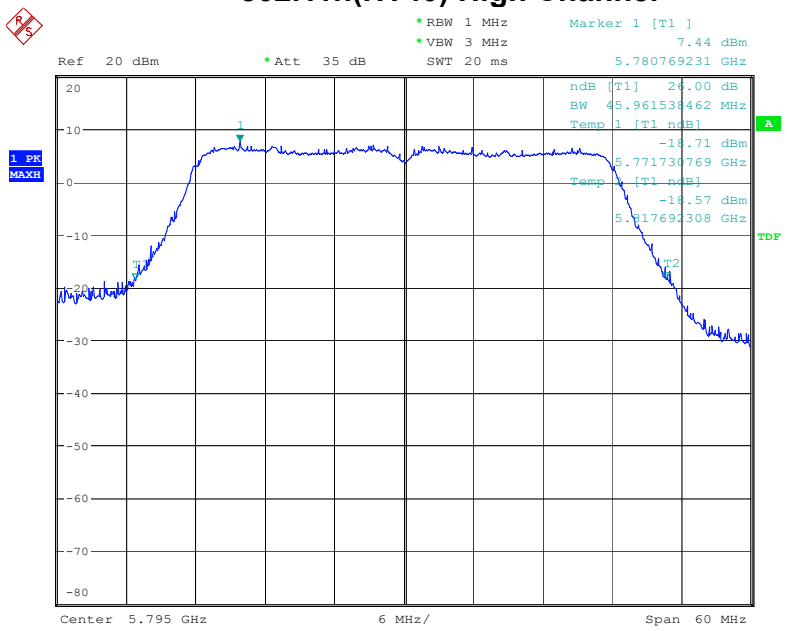
Date: 21.APR.2017 13:41:15

802.11n(HT40) Low Channel



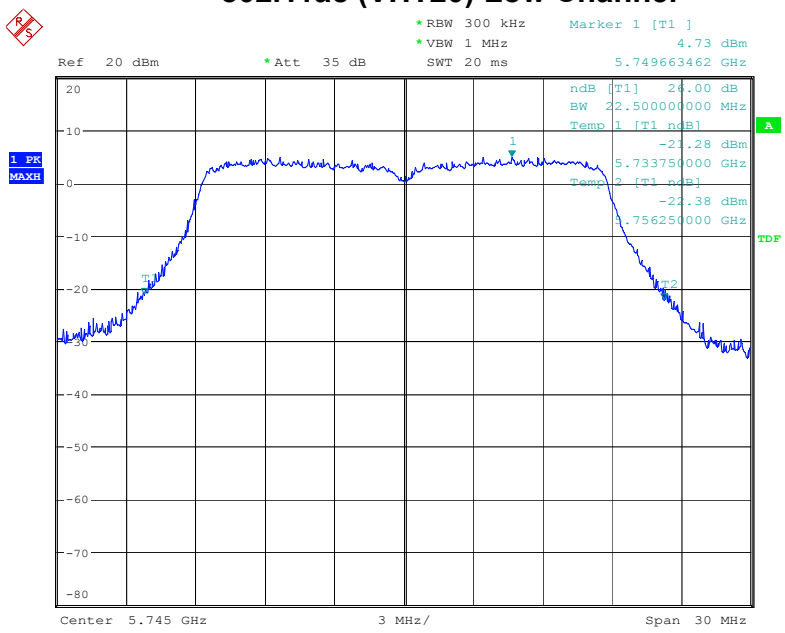
Date: 21.APR.2017 13:52:04

802.11n(HT40) High Channel



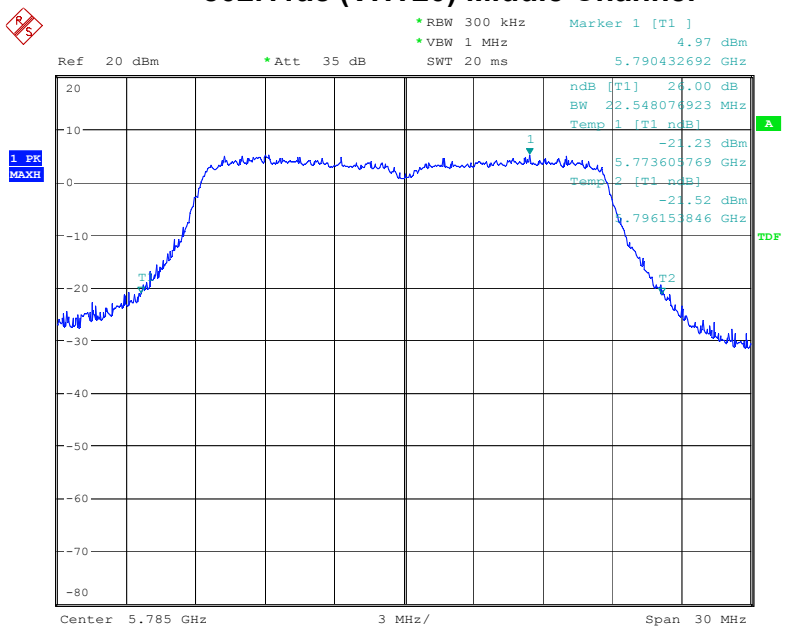
Date: 21.APR.2017 13:53:08

802.11ac (VHT20) Low Channel



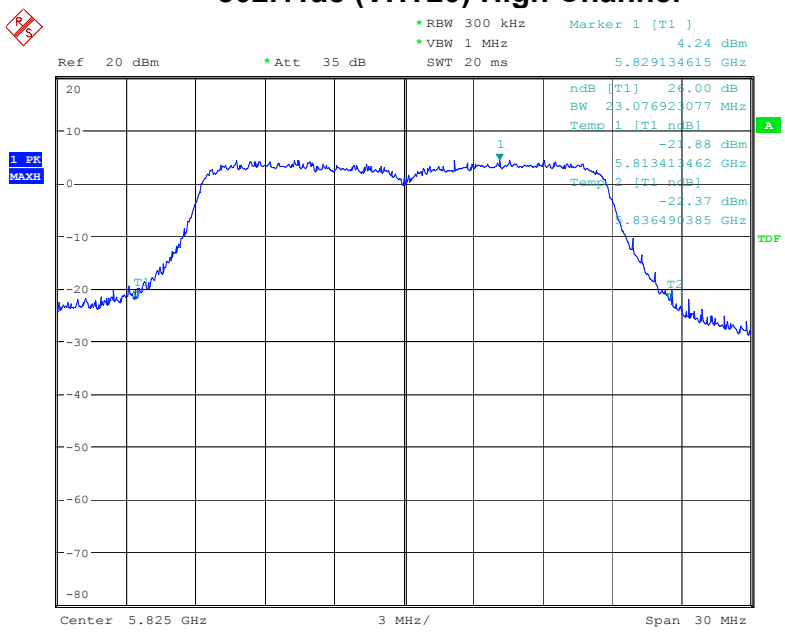
Date: 21.APR.2017 13:44:59

802.11ac (VHT20) Middle Channel



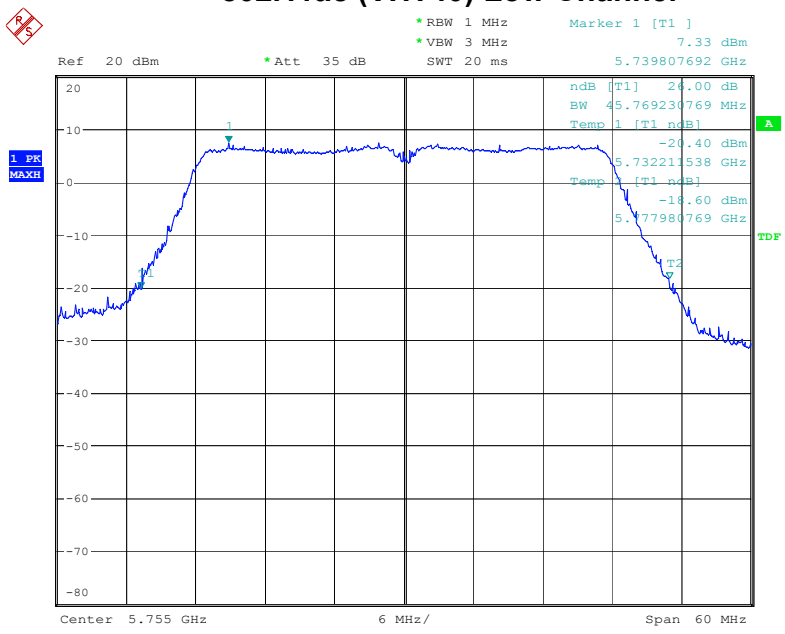
Date: 21.APR.2017 13:45:37

802.11ac (VHT20) High Channel



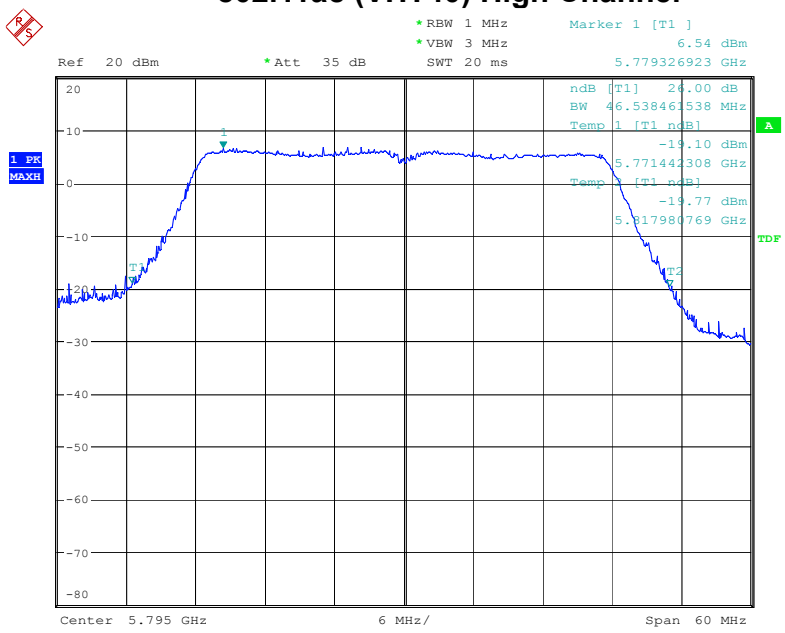
Date: 21.APR.2017 13:46:20

802.11ac (VHT40) Low Channel



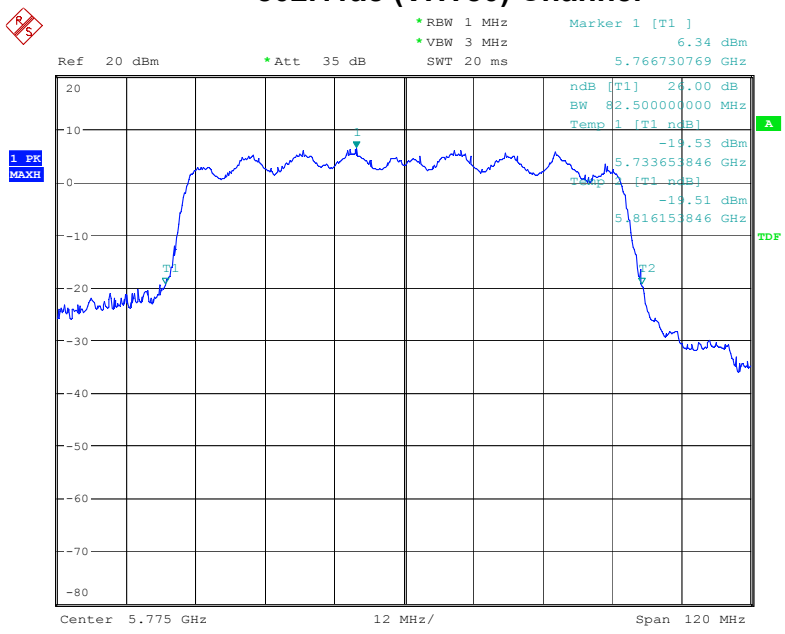
Date: 21.APR.2017 13:56:19

802.11ac (VHT40) High Channel



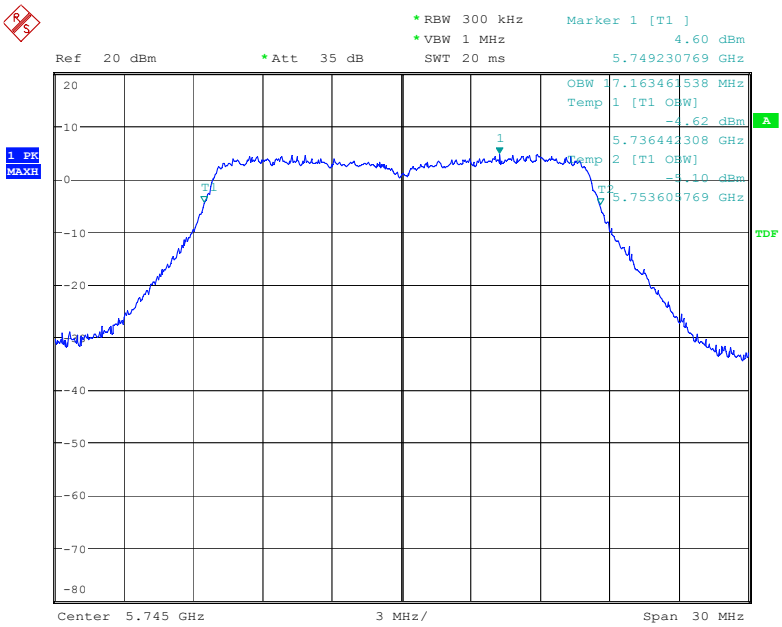
Date: 21.APR.2017 13:56:54

802.11ac (VHT80) Channel



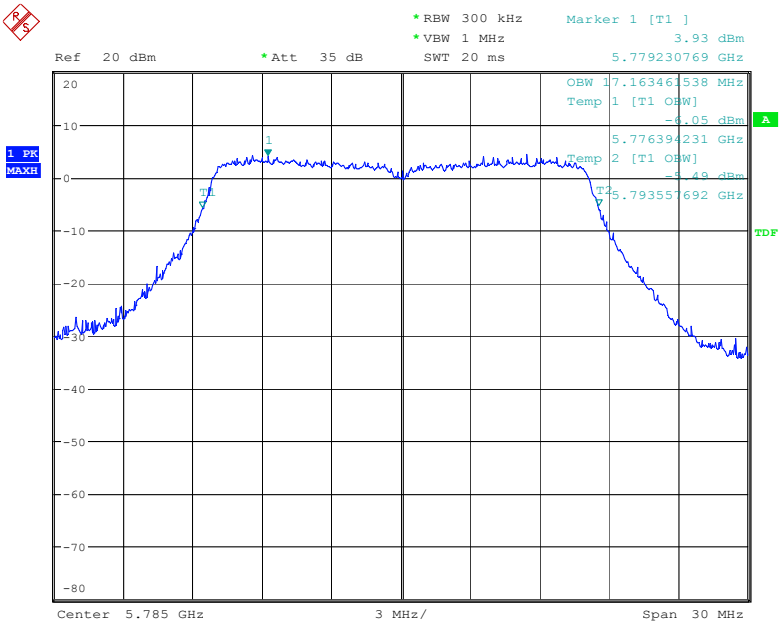
Date: 21.APR.2017 13:59:58

99% Occupied Bandwidth
802.11a Low Channel



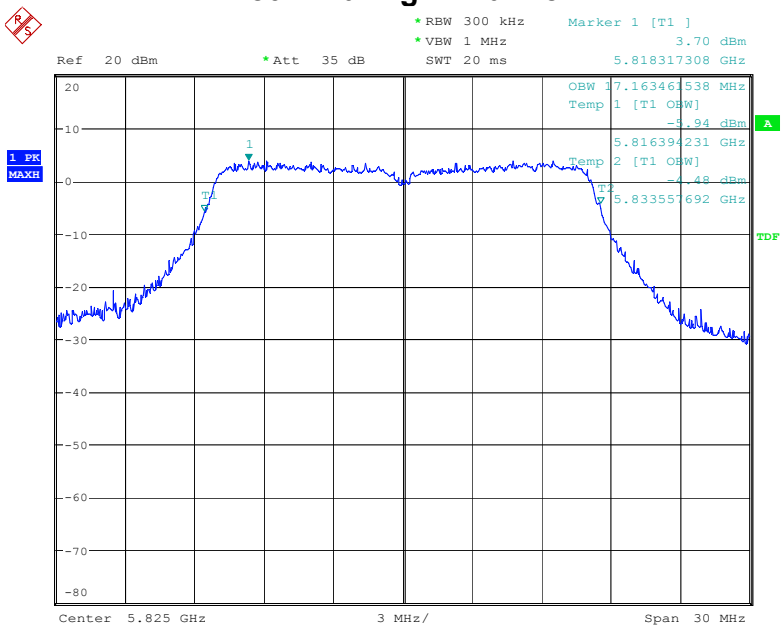
Date: 21.APR.2017 13:08:16

802.11a Middle Channel



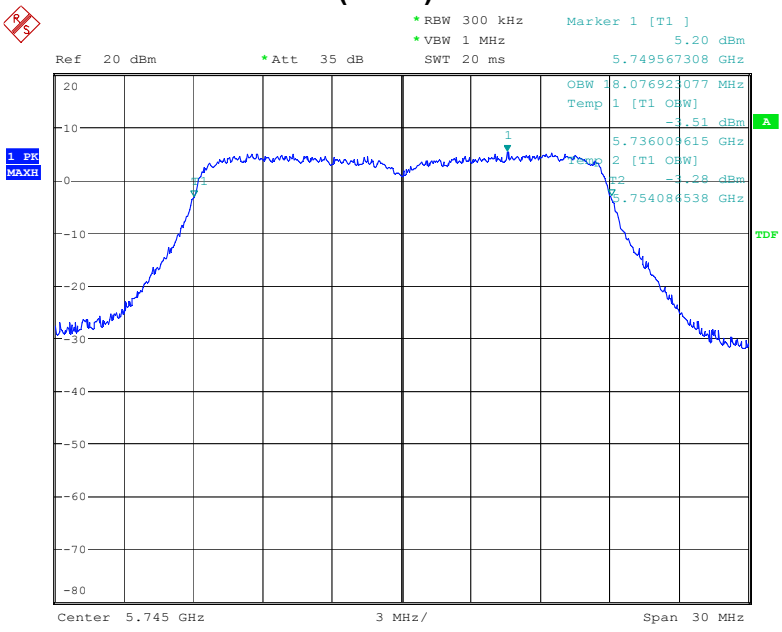
Date: 21.APR.2017 13:09:01

802.11a High Channel



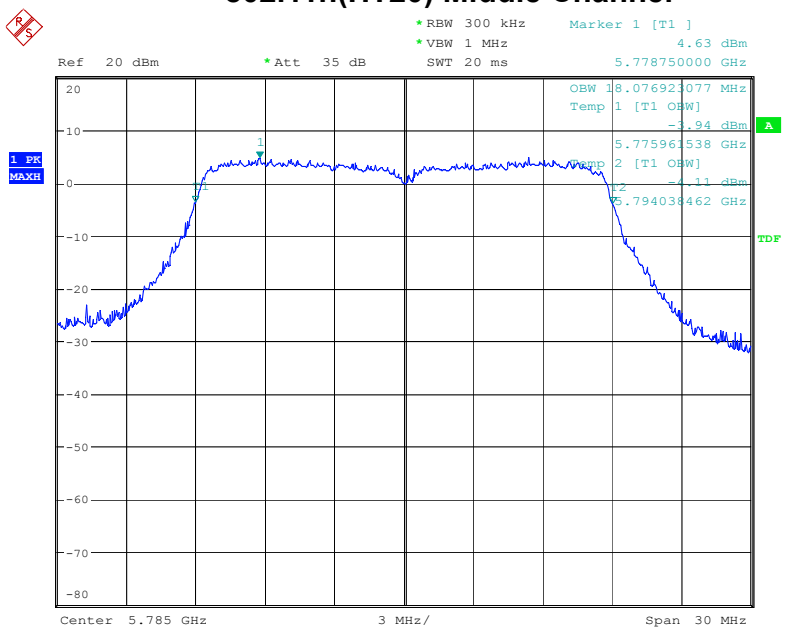
Date: 21.APR.2017 13:09:37

802.11n(HT20) Low Channel



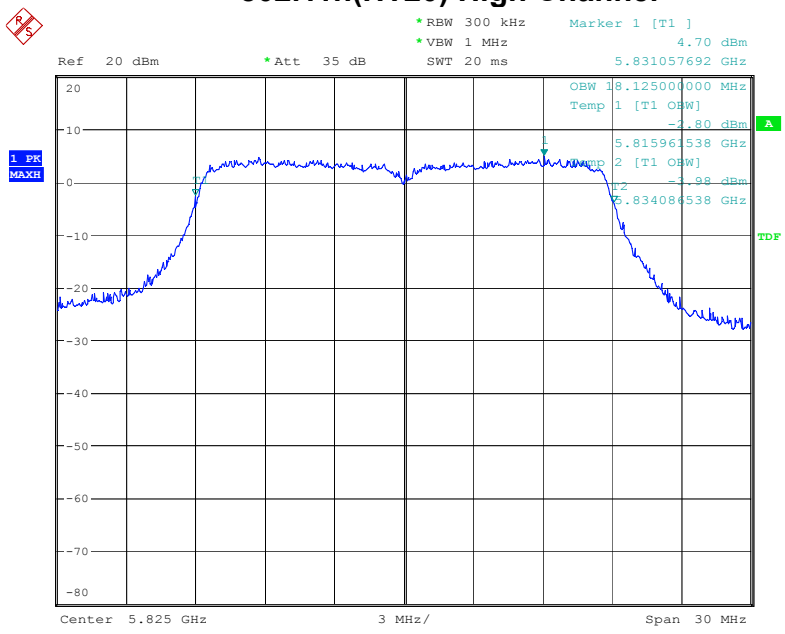
Date: 21.APR.2017 13:13:29

802.11n(HT20) Middle Channel



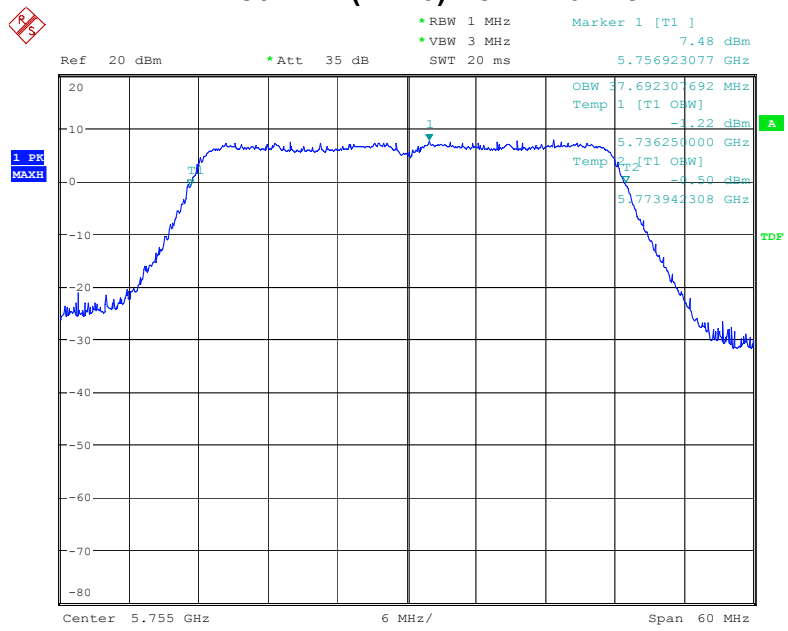
Date: 21.APR.2017 13:14:11

802.11n(HT20) High Channel



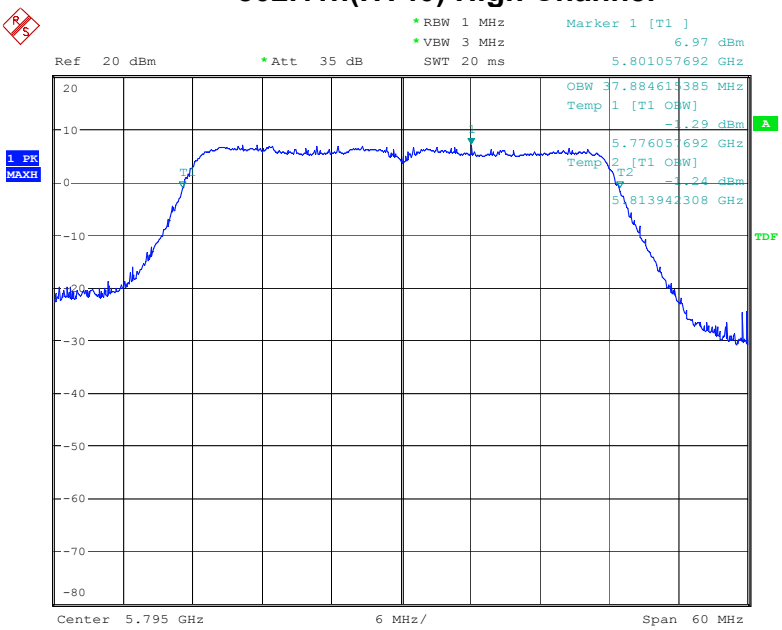
Date: 21.APR.2017 13:14:47

802.11n(HT40) Low Channel



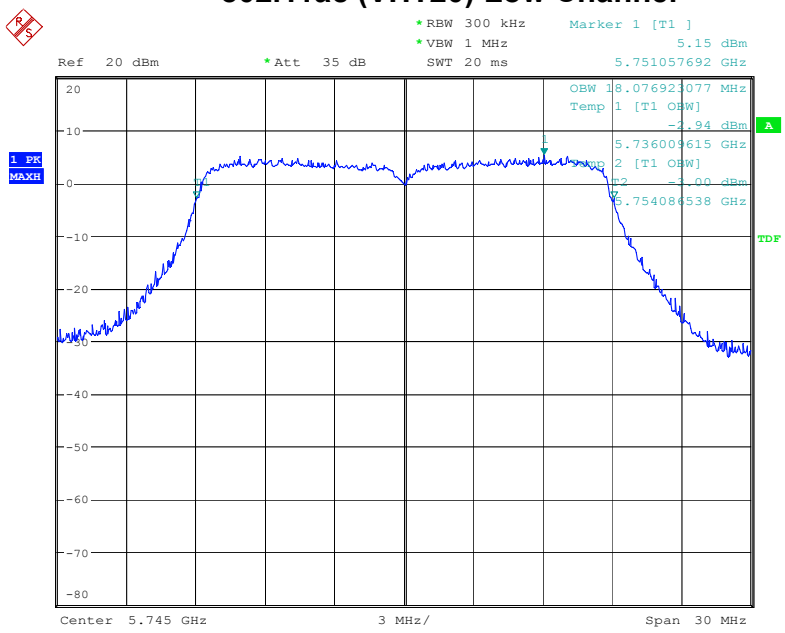
Date: 21.APR.2017 13:48:38

802.11n(HT40) High Channel



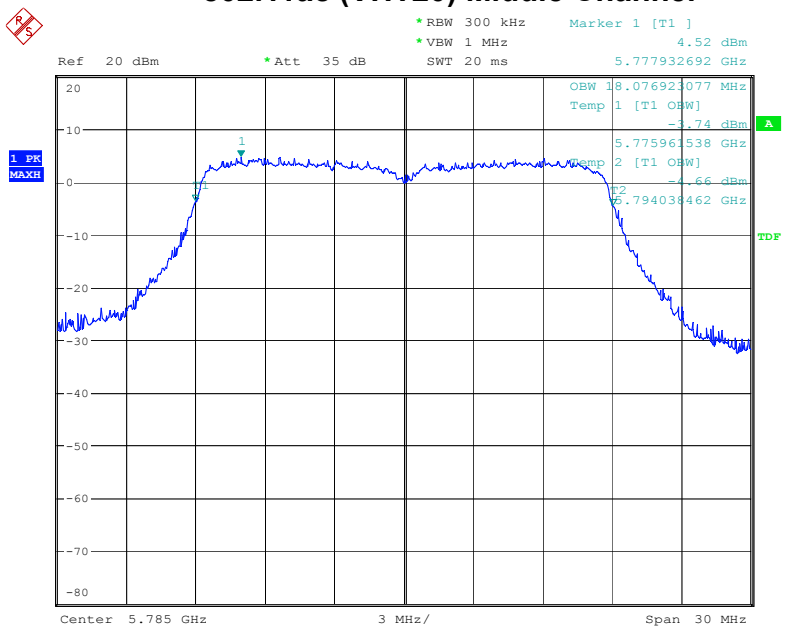
Date: 21.APR.2017 13:50:13

802.11ac (VHT20) Low Channel



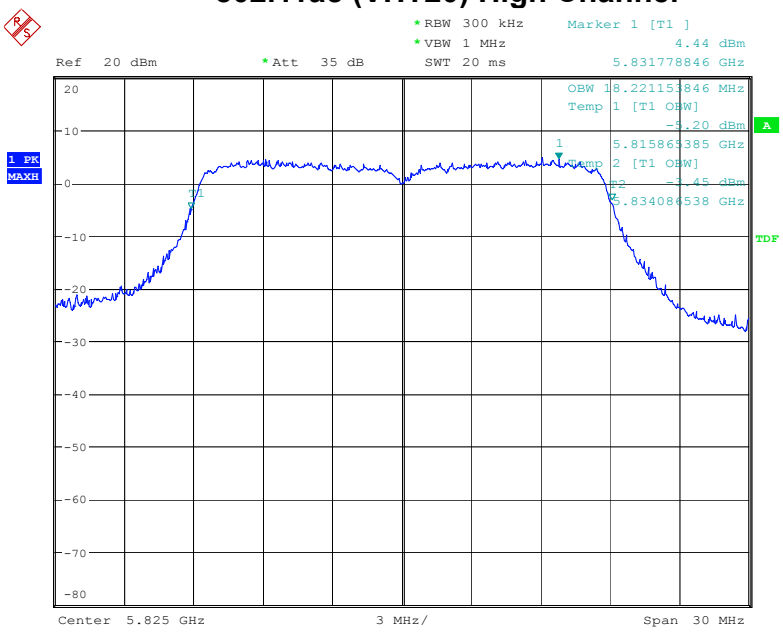
Date: 21.APR.2017 13:42:05

802.11ac (VHT20) Middle Channel



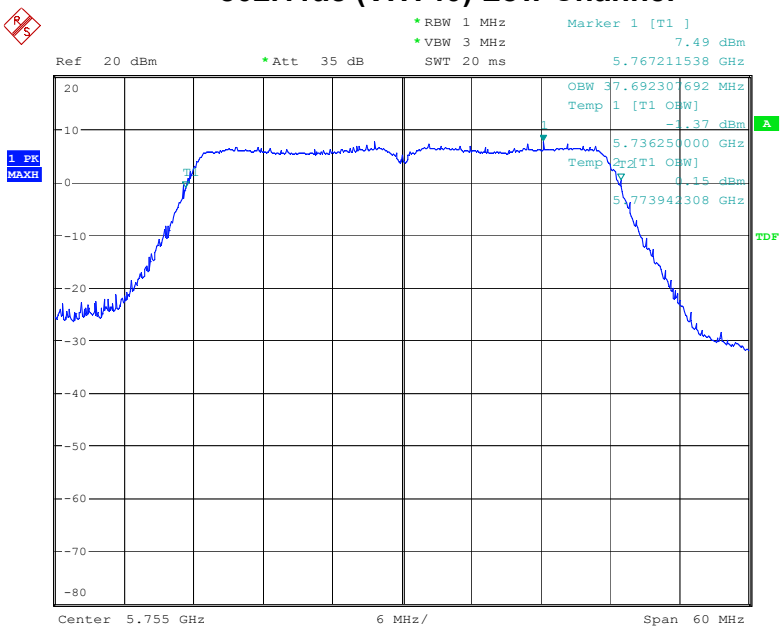
Date: 21.APR.2017 13:42:31

802.11ac (VHT20) High Channel



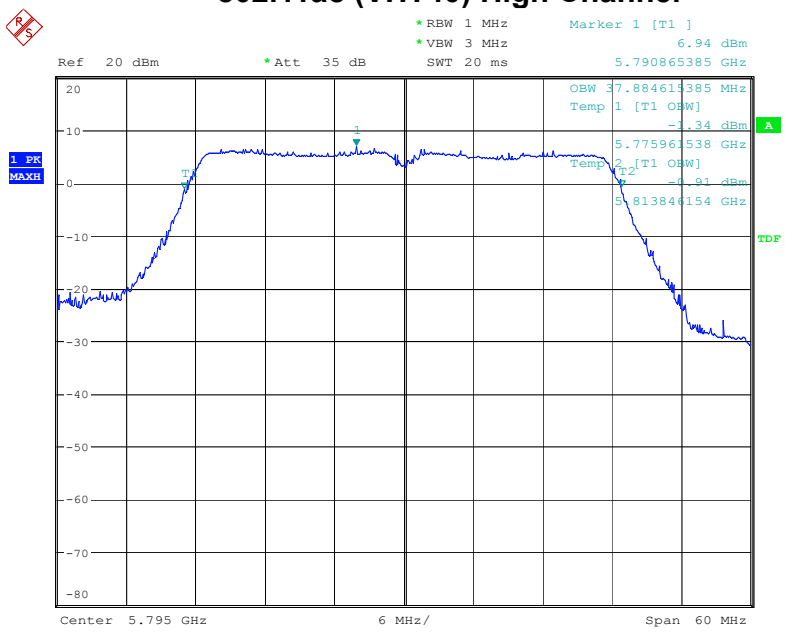
Date: 21.APR.2017 13:44:12

802.11ac (VHT40) Low Channel



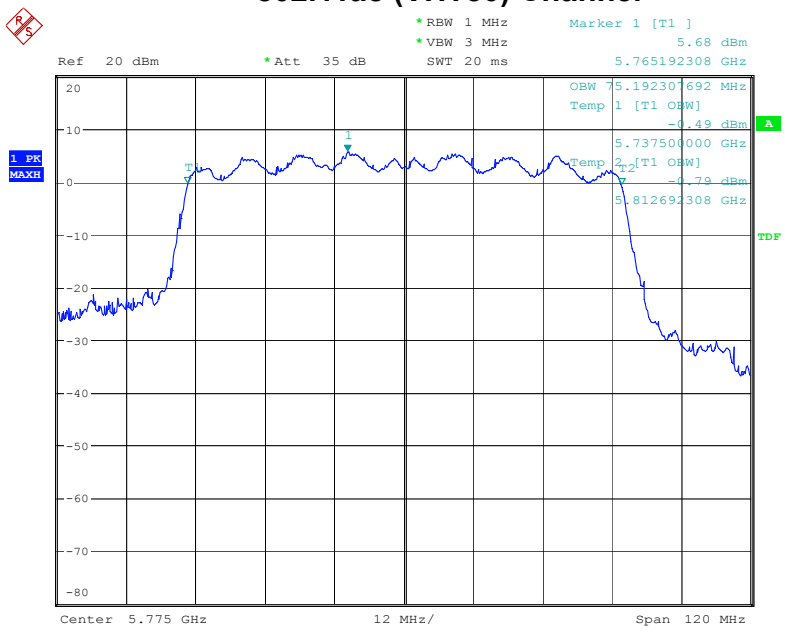
Date: 21.APR.2017 13:53:55

802.11ac (VHT40) High Channel



Date: 21.APR.2017 13:54:36

802.11ac (VHT80) Channel



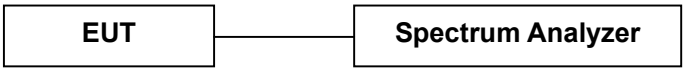
Date: 21.APR.2017 13:58:26

7. Power Spectral Density

7.1 Limits

Operation Band		Limit
□5150~5250MHz	□Outdoor access point	17 dBm/MHz
	□Indoor access point	17 dBm/MHz
	□Fixed point-to-point access points	17 dBm/MHz
	□Client devices	17 dBm/MHz
■5725~5850MHz		30 dBm/500kHz

7.2 Test SET-UP (Block Diagram of Configuration)

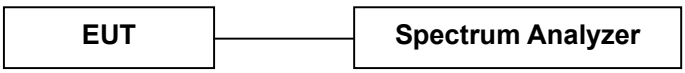


7.3 Test Procedure

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer was set as below according to FCC KDB789033 (v01r03):

1. Set analyzer center frequency to center frequency
2. Set the RBW to: 1MHz
3. Set the VBW to: 3MHz
4. Detector = RMS
5. Sweep time = auto couple
6. Trace Average = 100 times
7. If measured bandwidth of Maximum PSD is specified in 500kHz, add 10log(500kHz/RBW) to the measured result, whereas RBW (<500kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.

7.4 Test SET-UP (Block Diagram of Configuration)



7.5 Measurement Results

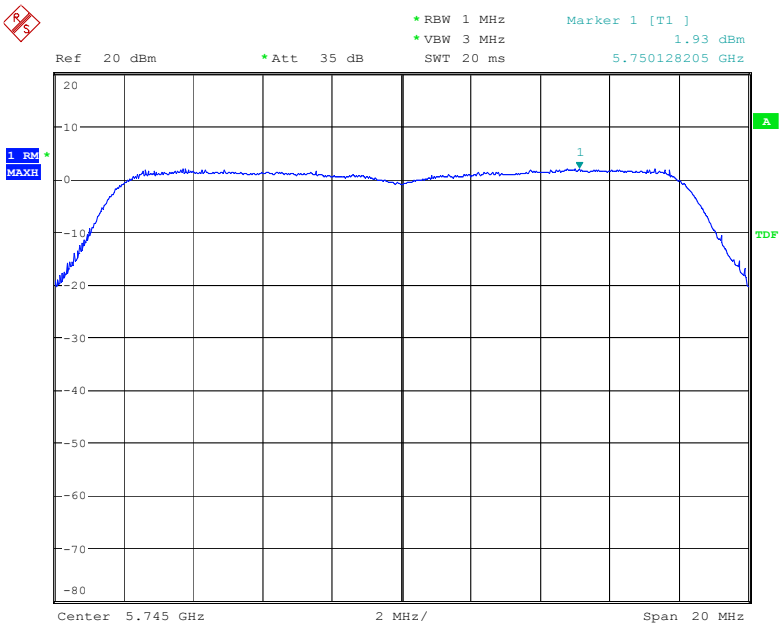
Pass

Please refer to following table and plots.

Temperature :	23 ℃	Humidity :	59 %	
Test By:	Sance	Test Date :	April 21, 2017	
Test Result:	PASS			
Frequency MHz	Data Rate Mbps	PSD dBm/MHz	PSD dBm/ 500kHz	Limit dBm/ 500kHz
IEEE 802.11a Mode (OFDM)				
Low Channel: 5745	6	1.93	-1.08	30
Middle Channel: 5785	6	1.34	-1.67	30
High Channel: 5825	6	1.44	-1.57	30
IEEE 802.11n(HT20) Mode (OFDM)				
Low Channel: 5745	MCS0	2.63	-0.38	30
Middle Channel: 5785	MCS0	2.68	-0.33	30
High Channel: 5825	MCS0	2.38	-0.63	30
IEEE 802.11n(HT40) Mode (OFDM)				
Low Channel: 5755	MCS0	-0.90	-3.91	30
High Channel: 5795	MCS0	-0.74	-3.75	30
IEEE 802.11ac (VHT20) Mode (OFDM)				
Low Channel: 5745	MCS0	3.18	0.17	30
Middle Channel: 5785	MCS0	2.89	-0.12	30
High Channel: 5825	MCS0	2.90	-0.11	30
IEEE 802.11ac (VHT40) (OFDM)				
Low Channel: 5755	MCS0	-0.08	-3.09	30
High Channel: 5795	MCS0	-0.57	-3.58	30
IEEE 802.11ac (VHT80) Mode (OFDM)				
Channel: 5775	MCS0	-1.83	-4.84	30

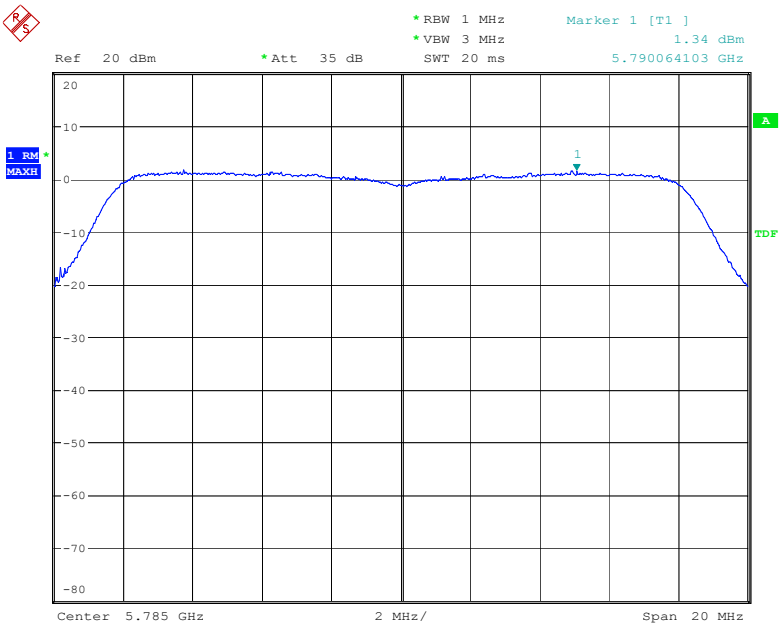
Note: 10log(500kHz/RNW) Factor = -3.01dB

802.11a Low Channel



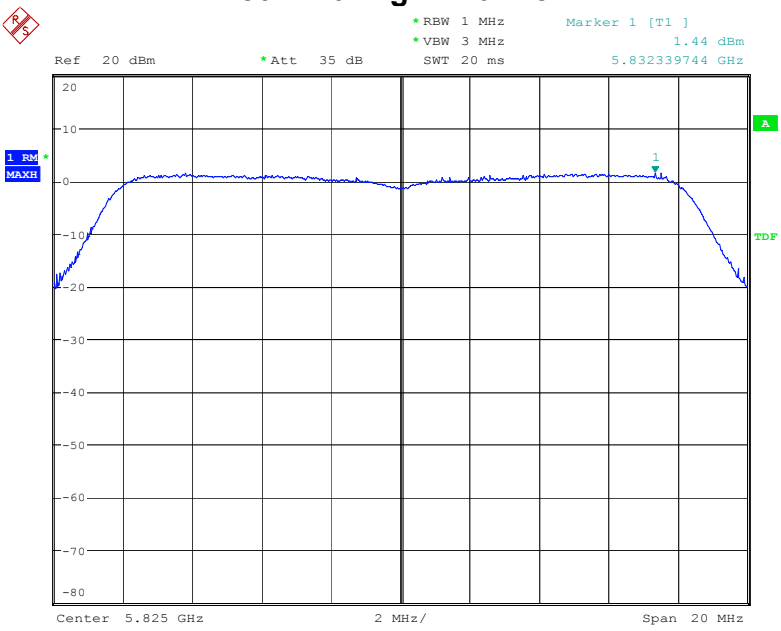
Date: 21.APR.2017 14:01:41

802.11a Middle Channel



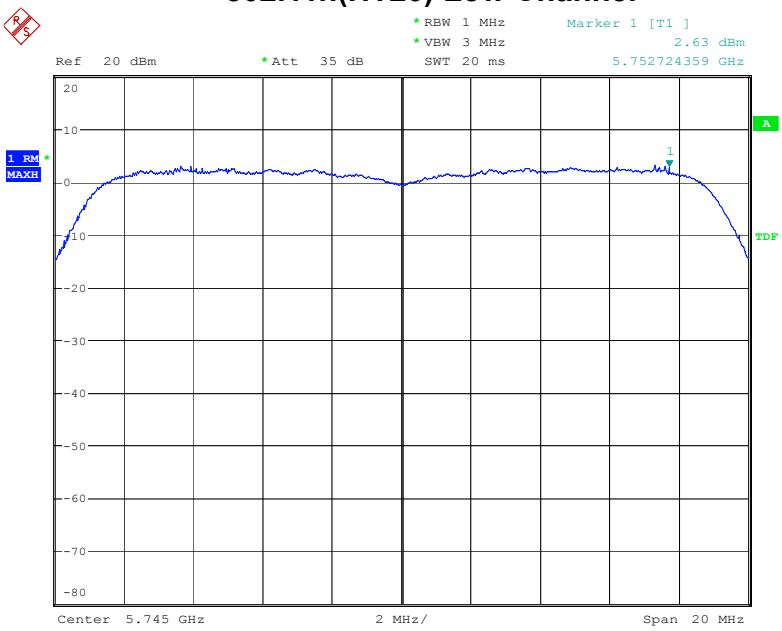
Date: 21.APR.2017 14:02:05

802.11a High Channel



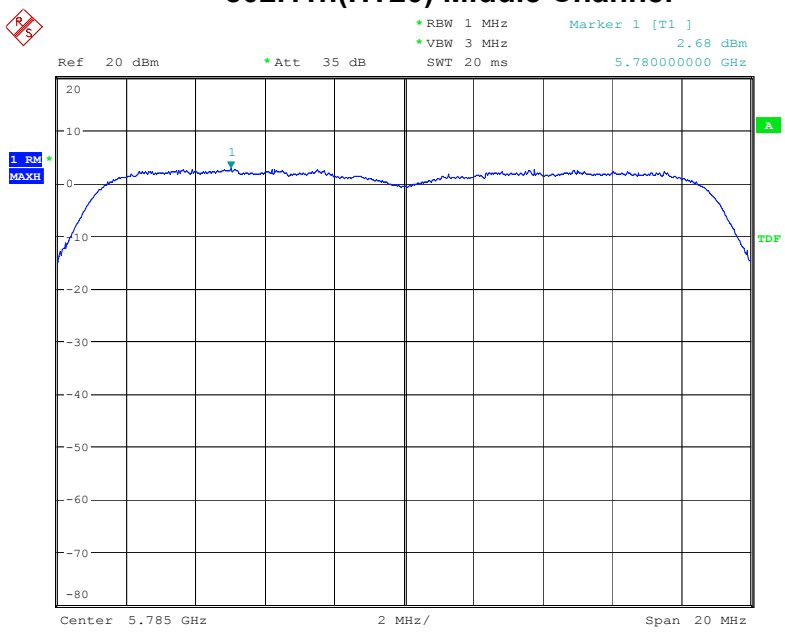
Date: 21.APR.2017 14:02:40

802.11n(HT20) Low Channel

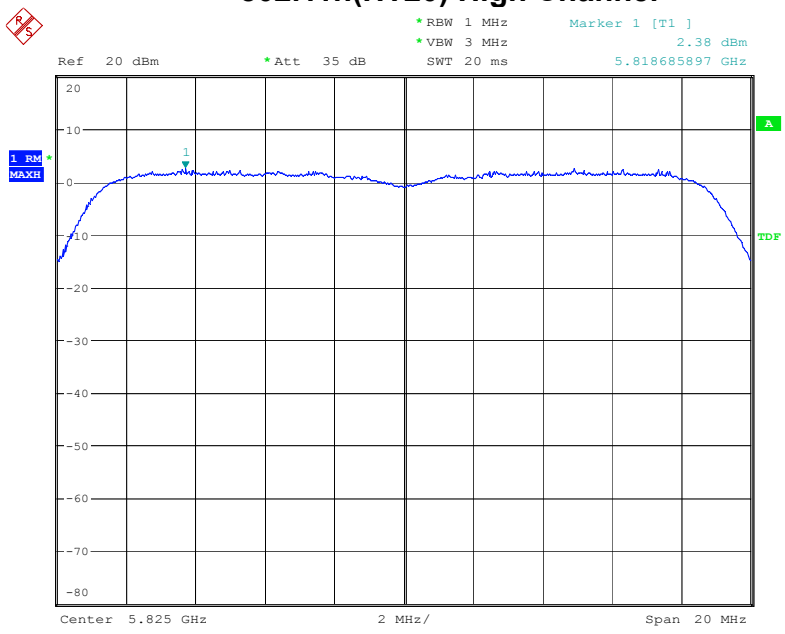


Date: 21.APR.2017 14:03:32

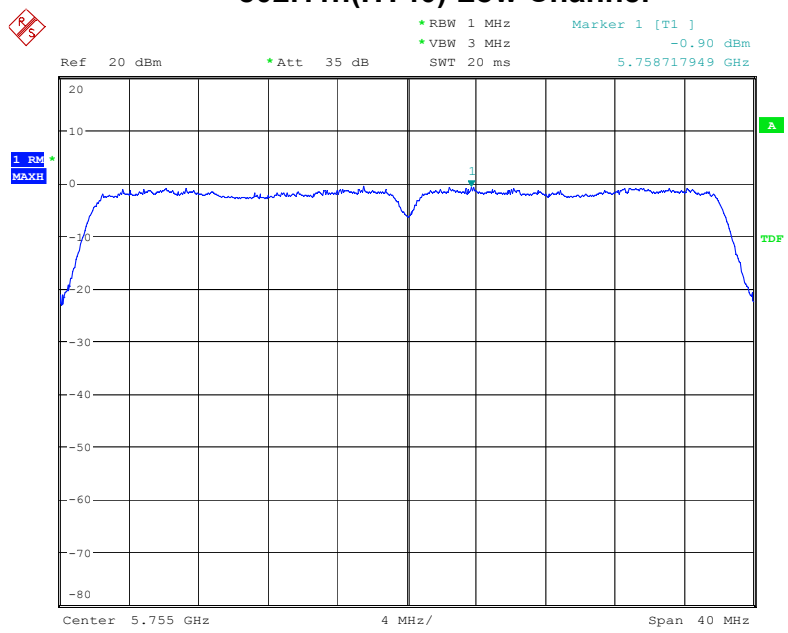
802.11n(HT20) Middle Channel



802.11n(HT20) High Channel

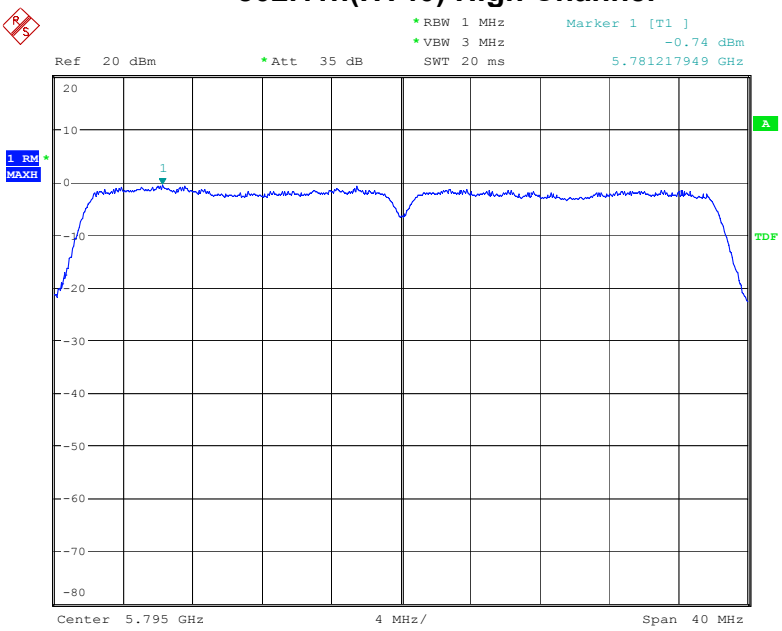


802.11n(HT40) Low Channel



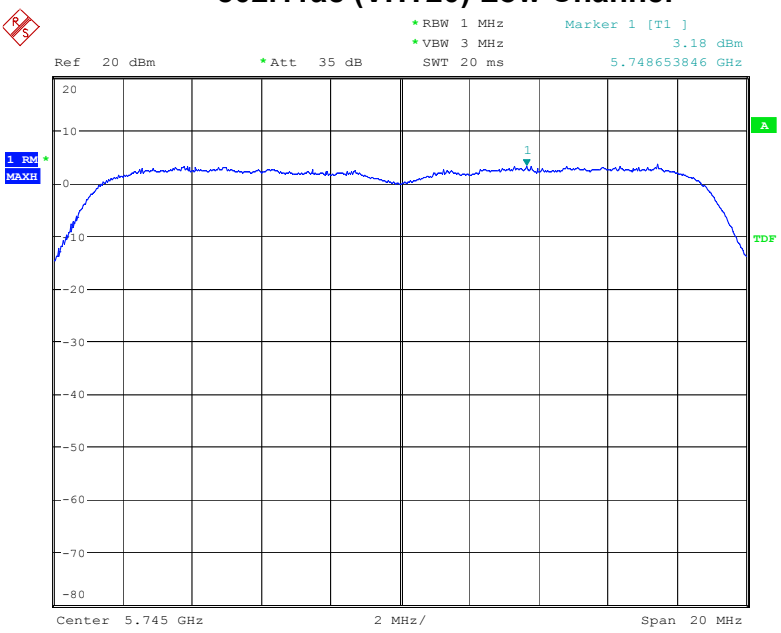
Date: 21.APR.2017 14:07:10

802.11n(HT40) High Channel



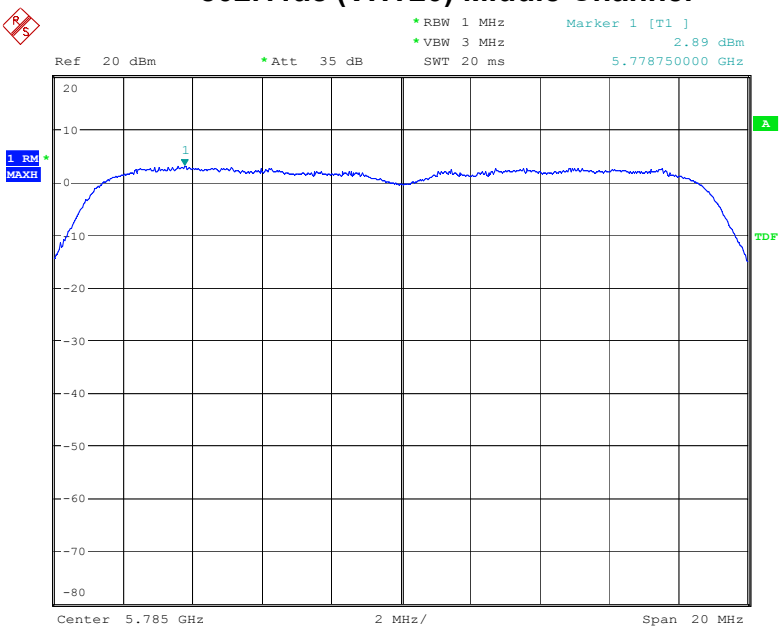
Date: 21.APR.2017 14:07:30

802.11ac (VHT20) Low Channel



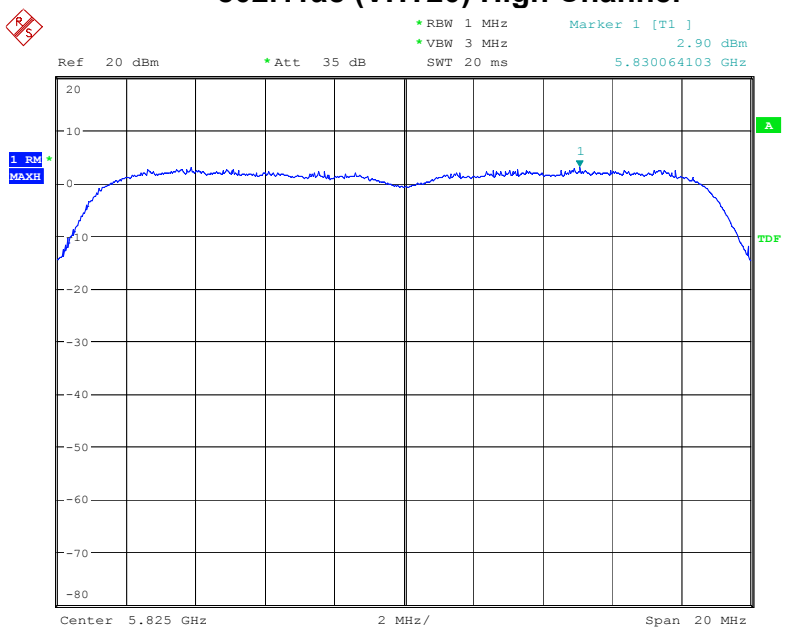
Date: 21.APR.2017 14:05:08

802.11ac (VHT20) Middle Channel



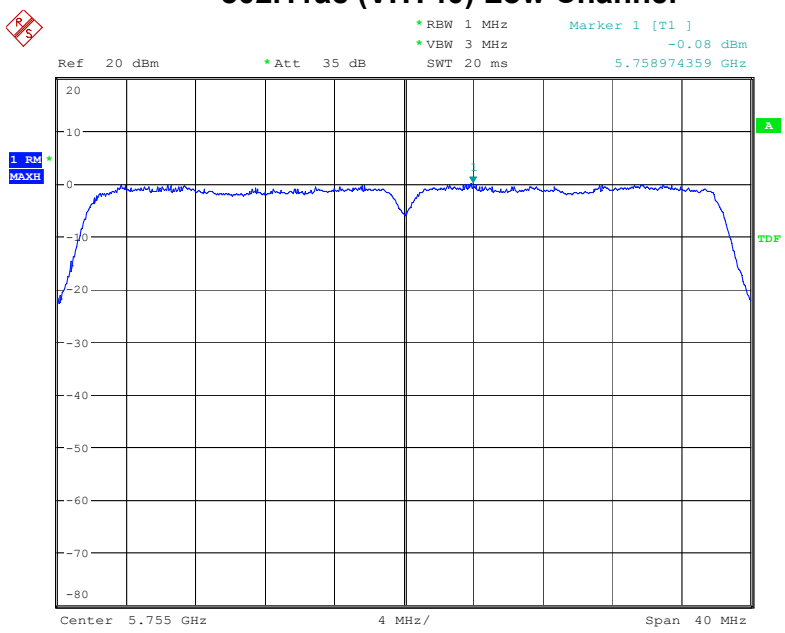
Date: 21.APR.2017 14:05:37

802.11ac (VHT20) High Channel



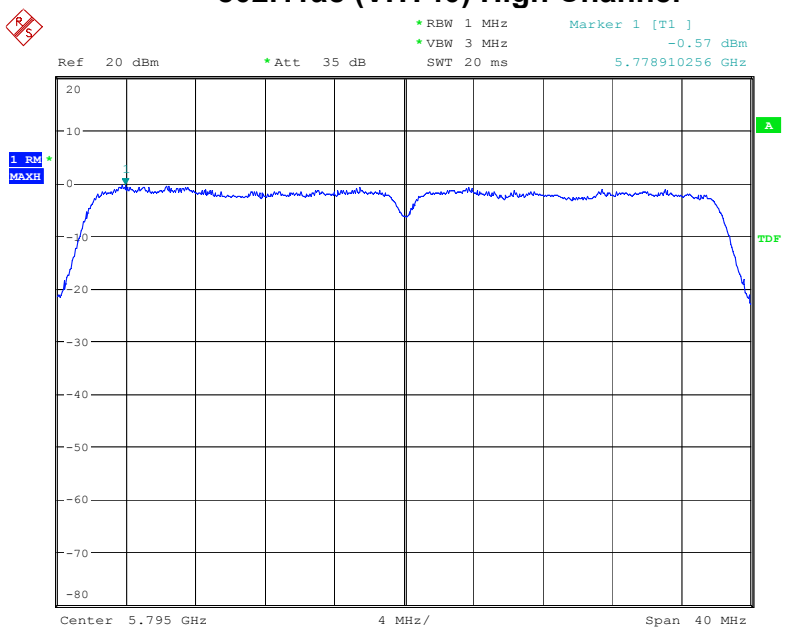
Date: 21.APR.2017 14:06:01

802.11ac (VHT40) Low Channel



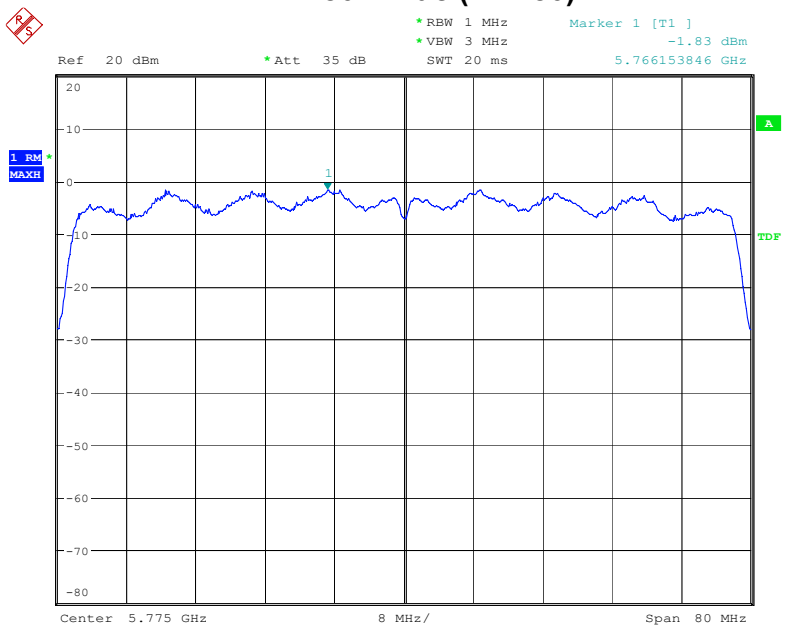
Date: 21.APR.2017 14:08:03

802.11ac (VHT40) High Channel



Date: 21.APR.2017 14:08:27

802.11ac (VHT80)



Date: 21.APR.2017 14:08:58

8. Band Edge

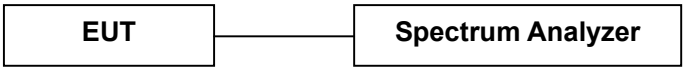
8.1 Limits

For transmitters operating in the 5.15-5.25GHz band: all emissions outside of the 5.15-5.35GHz band shall not exceed an EIRP of -27dBm

For transmitter operating in the 5.25-5.35GHz band: all emissions outside of the 5.15-5.35GHz band shall not exceed an EIRP of -27dBm/MHz. Devices operating in the 5.25-5.35GHz band generate emissions in the 5.15-5.25GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27dBm/MHz in the 5.15-5.25GHz band.

For transmitters operating in the 5.725-5.850GHz band: all emissions shall be limited to a level of -27dBm/MHz at 75MHz or more above or below the band edge increasing linearly to 10dBm/MHz at 25MHz above or below the band edge, and from 25MHz above or below the band edge increasing linearly to a level of 15.6dBm/MHz at 5MHz above or below the band edge, and from 5MHz above or below the band increasing linearly to a level of 27dBm/MHz at the band edge.

8.2 Test SET-UP (Block Diagram of Configuration)



8.3 Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibration or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 1MHz and VBW to 3MHz of spectrum analyzer.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

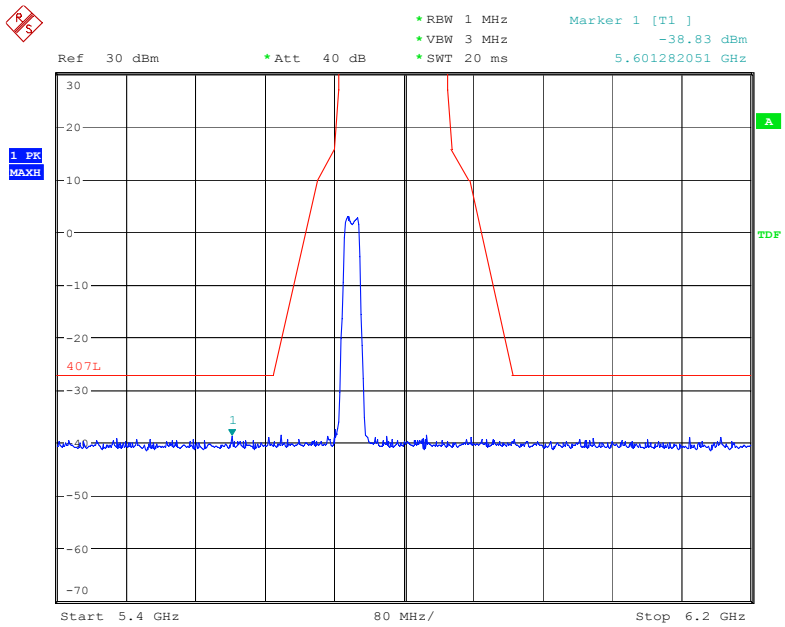
8.4 Measurement Results

Pass

Please refer to following plots.

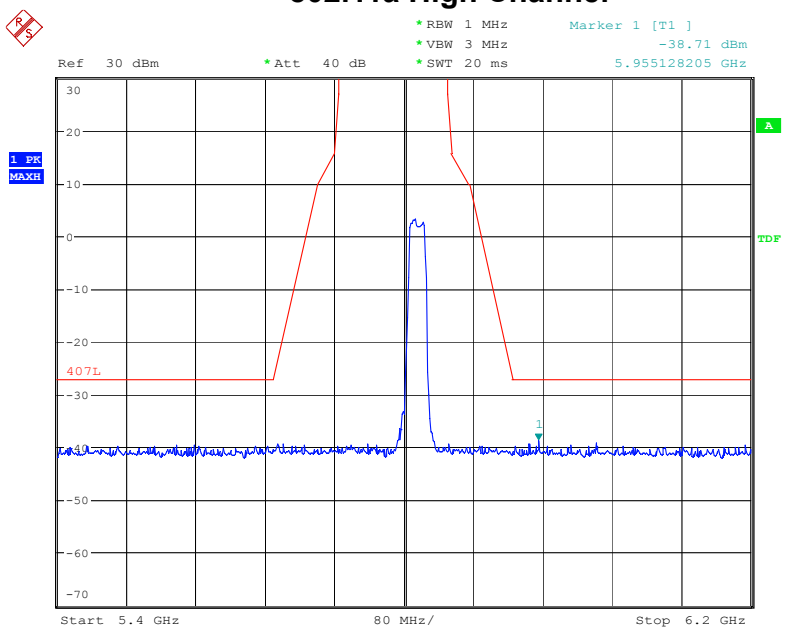
Band Edge

802.11a Low Channel



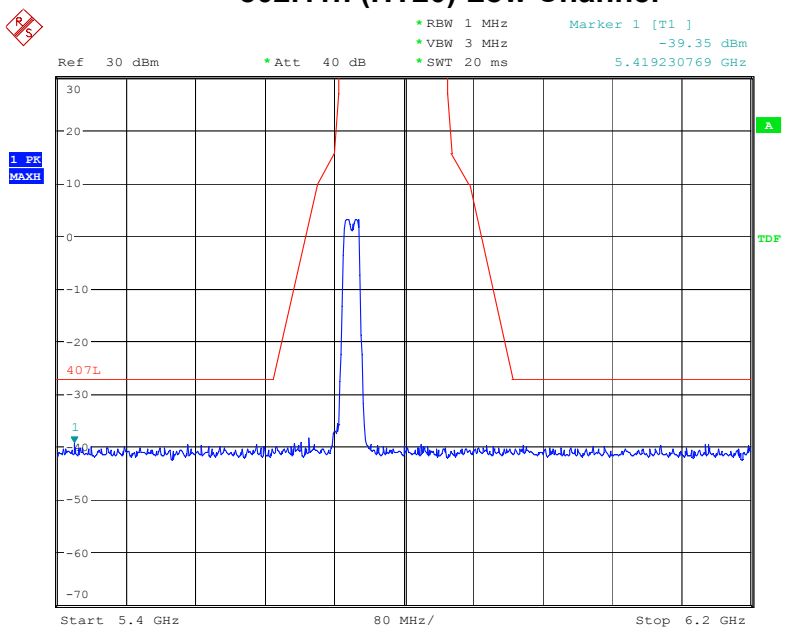
Date: 21.APR.2017 16:06:09

802.11a High Channel



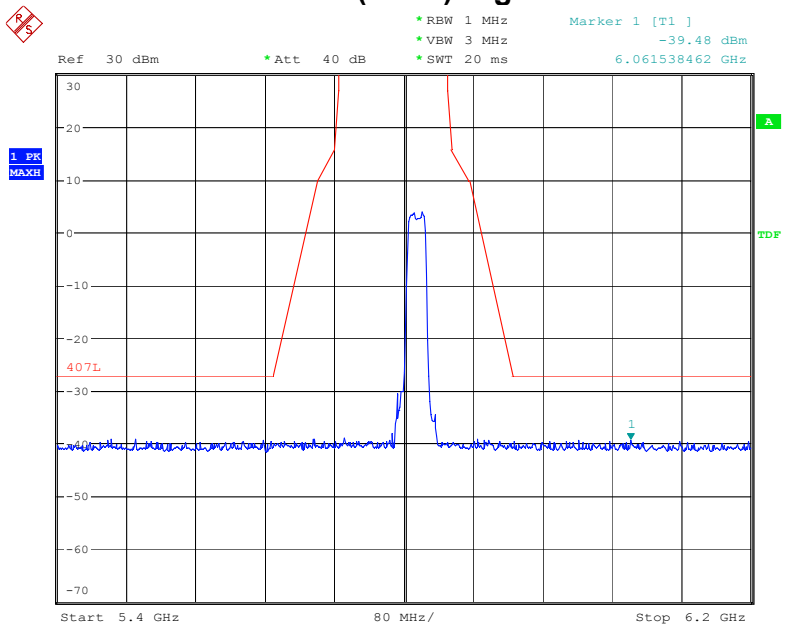
Date: 21.APR.2017 16:06:41

802.11n (HT20) Low Channel



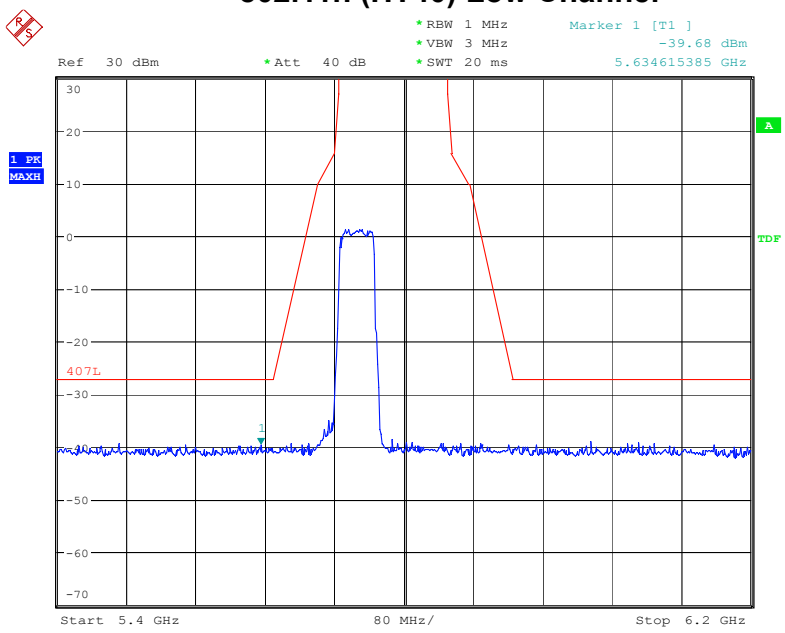
Date: 21.APR.2017 16:08:13

802.11n (HT20) High Channel



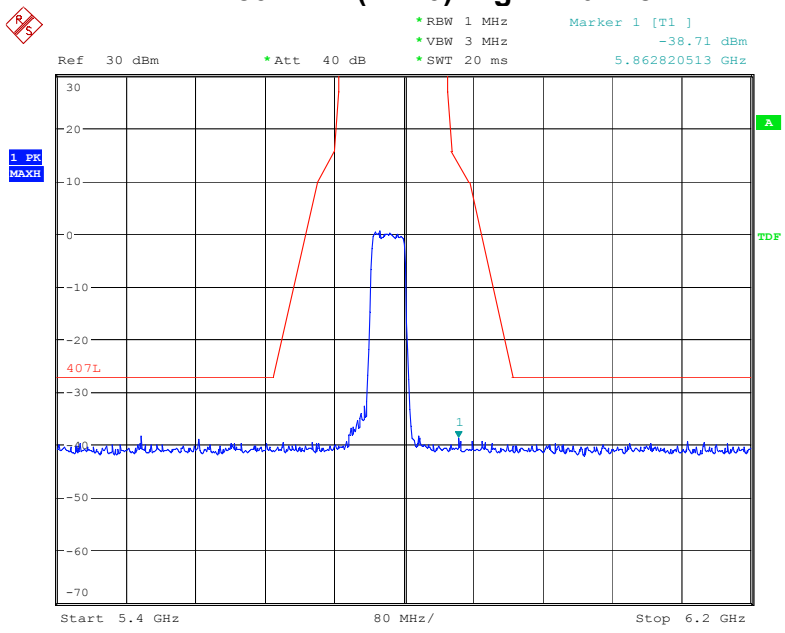
Date: 21.APR.2017 16:09:06

802.11n (HT40) Low Channel



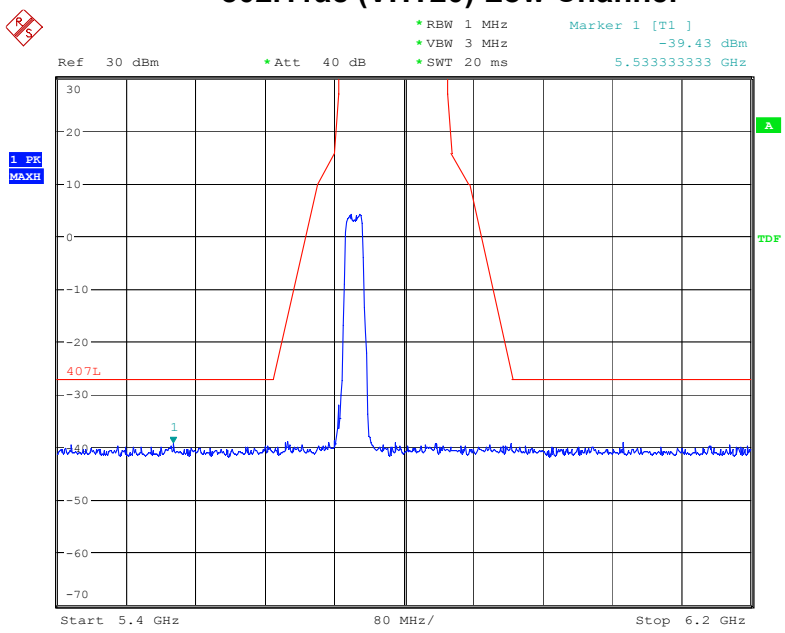
Date: 21.APR.2017 16:12:51

802.11n (HT40) High Channel



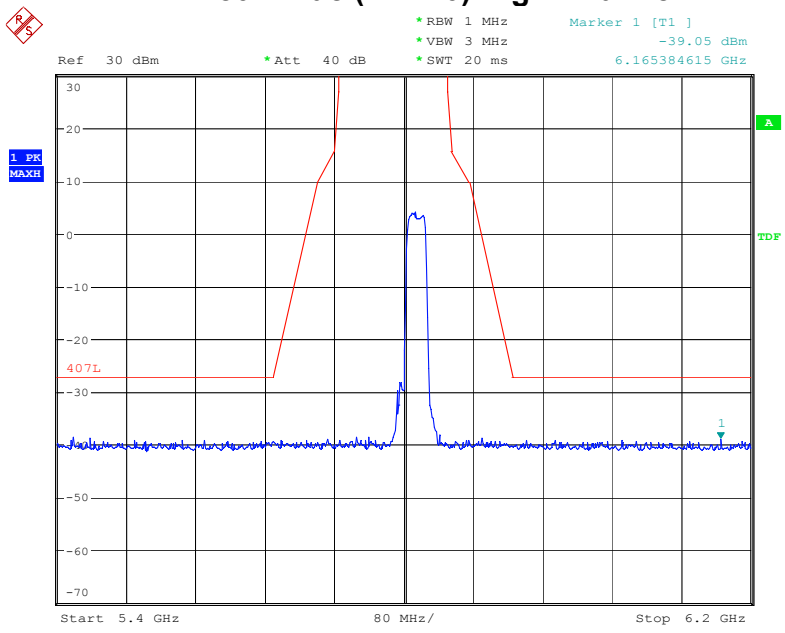
Date: 21.APR.2017 16:13:19

802.11ac (VHT20) Low Channel



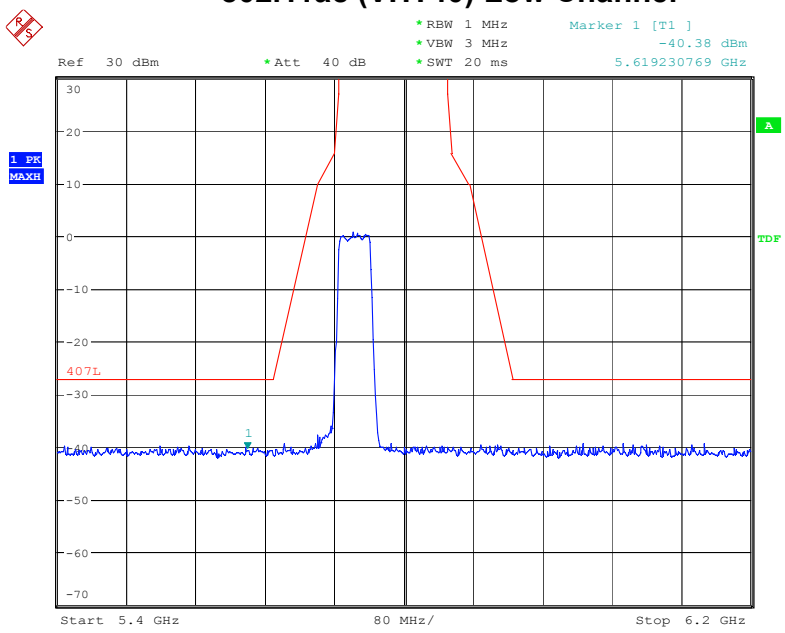
Date: 21.APR.2017 16:09:59

802.11ac (VHT20) High Channel



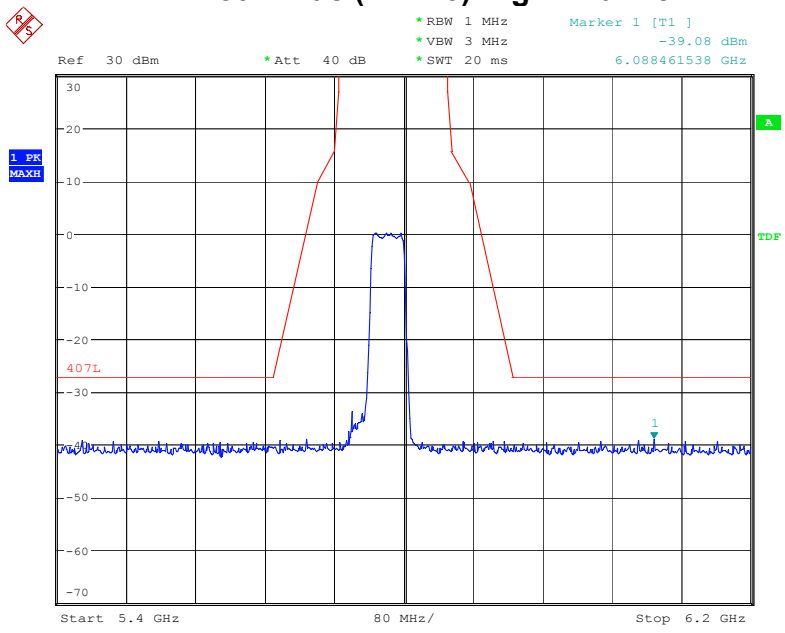
Date: 21.APR.2017 16:11:46

802.11ac (VHT40) Low Channel



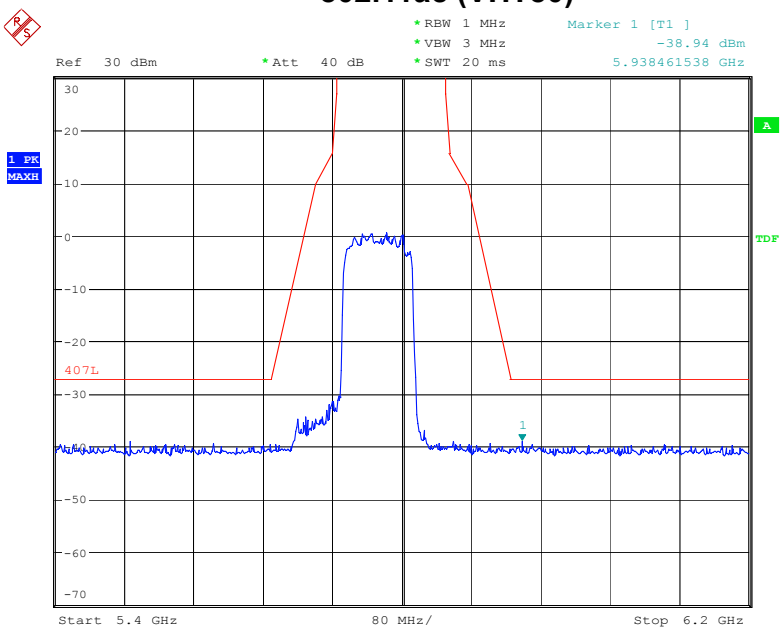
Date: 21.APR.2017 16:14:09

802.11ac (VHT40) High Channel

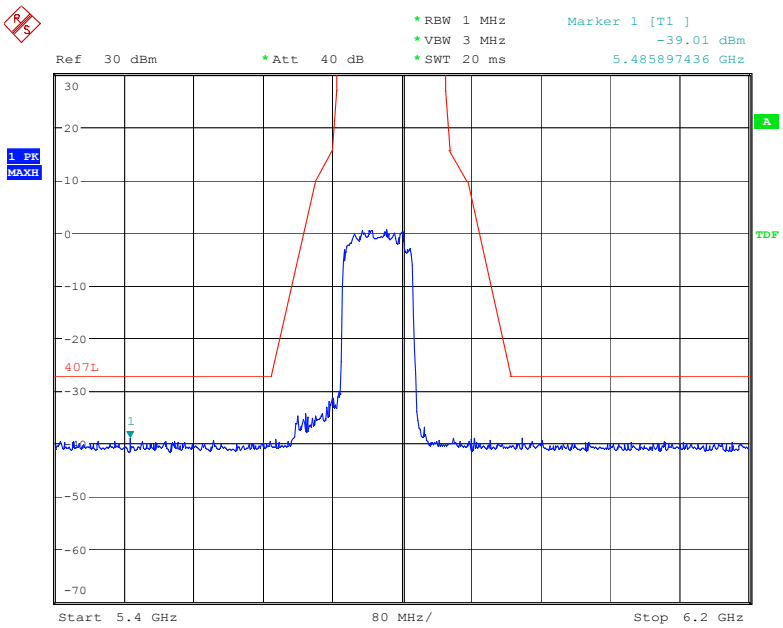


Date: 21.APR.2017 16:14:37

802.11ac (VHT80)



Date: 21.APR.2017 16:17:14



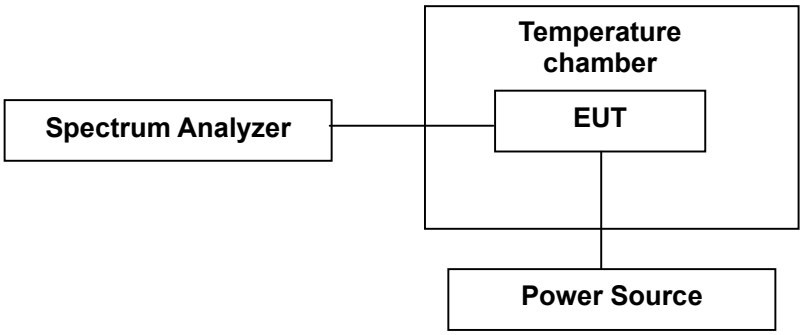
Date: 21.APR.2017 16:17:26

9. Frequency Stability

9.1 Limits

Manufactures of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the users manual.

9.2 Test SET-UP (Block Diagram of Configuration)



9.3 Test Procedure

1. The EUT was placed inside the environmental test chamber and powered by Power source.
2. Turn the EUT on and couple its output to a spectrum analyzer.
3. Turn the EUT off and set the chamber to the highest temperature specified.
4. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 minutes.
5. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
6. The chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.
   Note: The EUT set at un-modulation mode during frequency stability test.

9.4 Measurement Results

Pass

Please refer to following tables.

Temperature :	23 ℃	Humidity :	59 %
Test By:	Sance	Test Date :	April 21, 2017

5725~5850MHz Band

Lowest channel
5745MHz

Temperature (℃)	Power Supplied (Vdc)	Measured Frequency (MHz)				Test Result
		0 Minute	2 Minute	5 Minute	10 Minute	
-10	3.7	5745.0027	5745.0027	5745.0076	5745.0086	Pass
0		5745.0019	5745.0064	5745.0083	5745.0072	Pass
10		5745.0012	5745.0077	5745.0061	5745.0065	Pass
20		5745.0029	5745.0036	5745.0065	5745.0099	Pass
30		5745.0016	5745.0053	5745.0070	5745.0102	Pass
45		5745.0034	5745.0029	5745.0058	5745.0082	Pass
20	4.2	5745.0023	5745.0048	5745.0090	5745.0075	Pass
	3.2	5745.0017	5745.0061	5745.0085	5745.0027	Pass

Note: EUT temperature working range is -10 to 45.

Temperature :	23 ℃	Humidity :	59 %
Test By:	Sance	Test Date :	April 21, 2017

5725~5850MHz Band

Highest channel
5850MHz

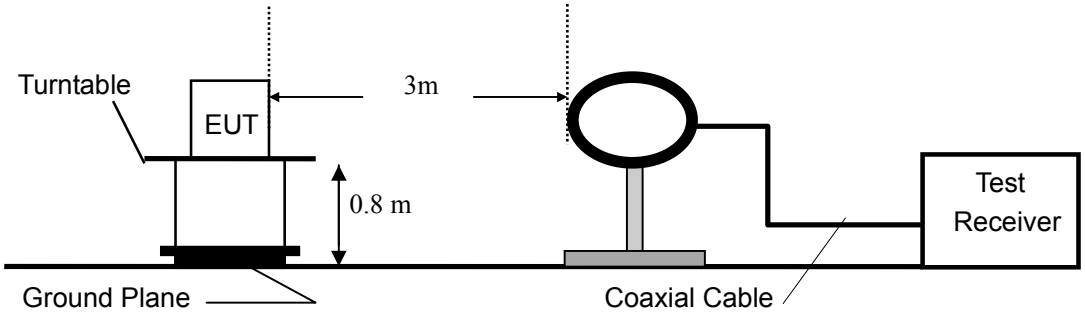
Temperature (℃)	Power Supplied (Vdc)	Measured Frequency (MHz)				Test Result
		0 Minute	2 Minute	5 Minute	10 Minute	
-10	3.7	5825.0149	5825.0126	5825.0171	5825.0183	Pass
0		5825.0139	5825.0182	5825.0169	5825.0175	Pass
10		5825.0163	5825.0157	5825.0177	5825.0203	Pass
20		5825.0152	5825.0155	5825.0134	5825.0189	Pass
30		5825.0177	5825.0140	5825.0152	5825.0172	Pass
45		5825.0189	5825.0127	5825.0144	5825.0183	Pass
20	4.2	5825.0165	5825.0169	5825.0130	5825.0196	Pass
	3.2	5825.0110	5825.0148	5825.0179	5825.0180	Pass

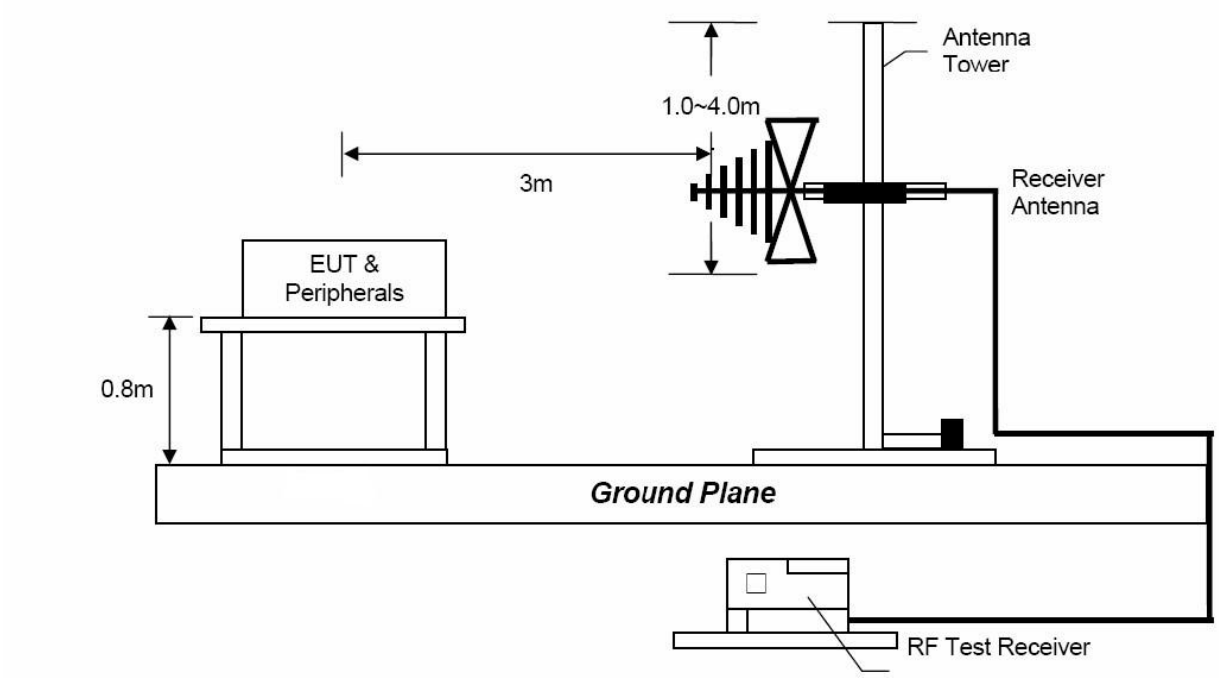
Note: EUT temperature working range is -10 to 45.

10. Radiated Spurious Emissions and Restricted Bands

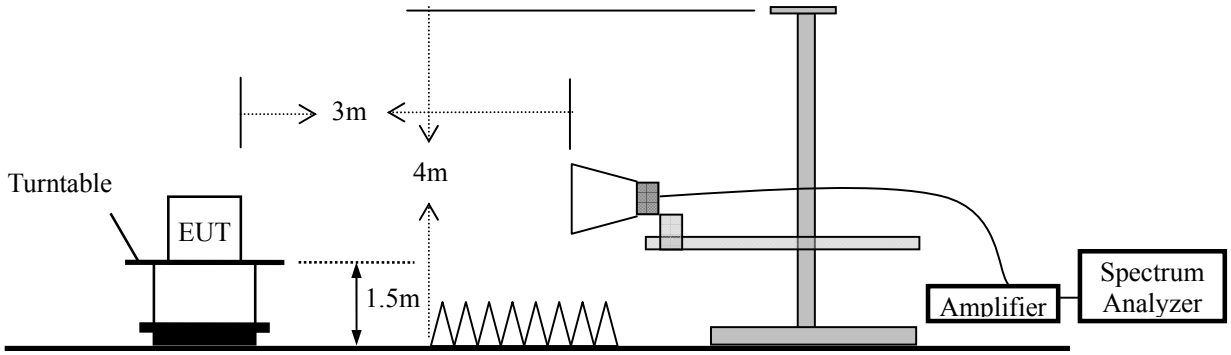
10.1 Test SET-UP (Block Diagram of Configuration)

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





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



10.2 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.
b. For the radiated emission test above 1GHz:
The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter full anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
c. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
d. 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.
e. 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.
f. A Quasi-peak measurement was then made for that frequency point for below 1GHz test. PK and AV for above 1GHz emission test.

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	1/T

10.3 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.

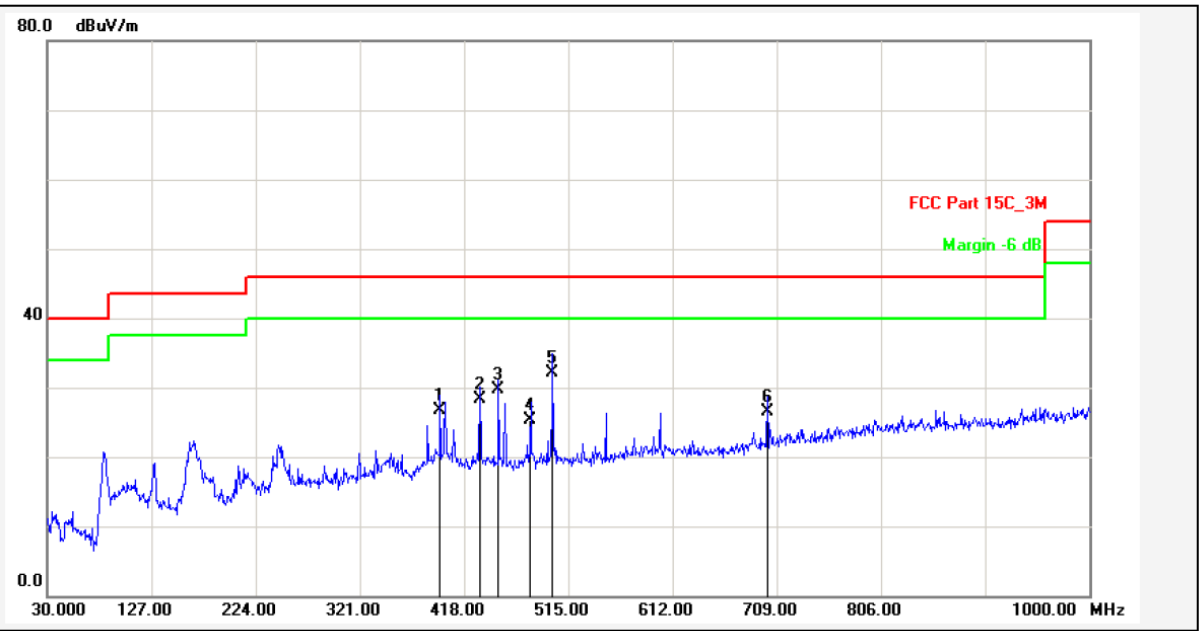
10.4 Measurement Results

Please refer to following plots of the worst case: 802.11n(HT20) Low channel.

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

Site: Radiation

Test Time: 2017-3-22 16:21:59



Report No.:	IPC032HB		
Test Standard:	FCC Part 15C_3M	Test Distance:	3m
Test item:	Radiation Emission	Ant. Polarization:	Horizontal
Applicant:	Shuoying	Temp.(C)/Hum.(%):	22(C) / 54 %
Product:	IP Camera	Power Rating:	AC 120V/60Hz
Model No.:	IPC032HB	Test Engineer:	Knight

Test Mode: Charging+5.8G WIFI Mode

Remark:

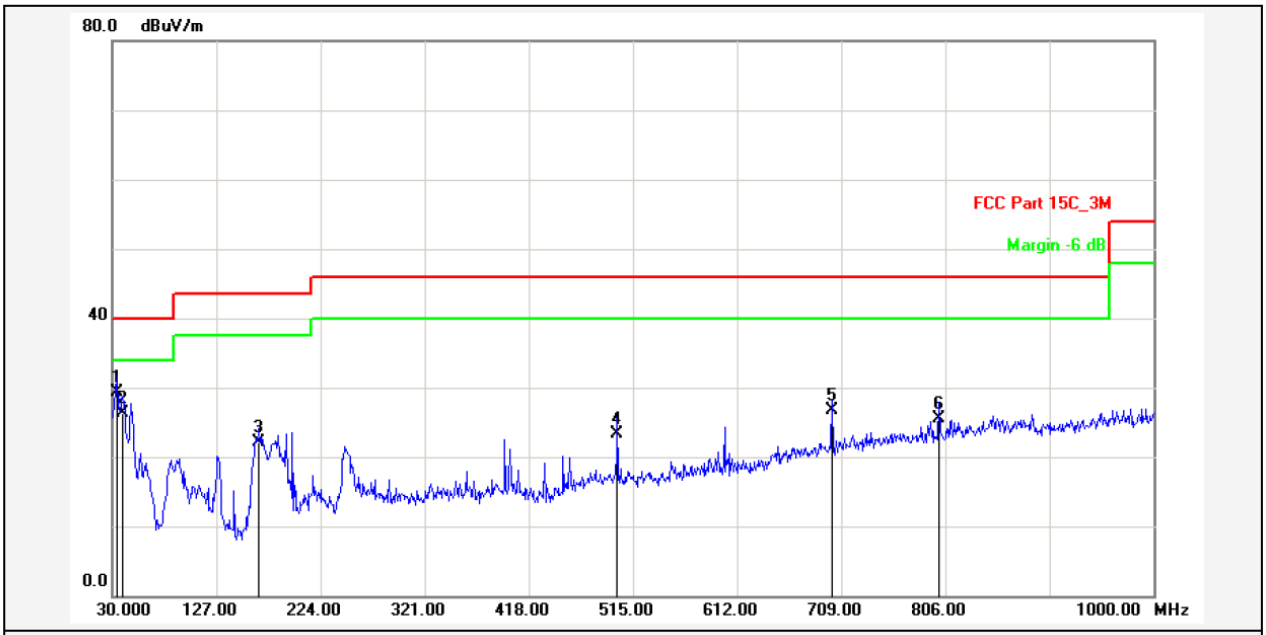
No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	395.6899	-9.13	35.83	26.70	46.00	-19.30	QP			P	
2	432.5500	-8.37	36.77	28.40	46.00	-17.60	QP			P	
3	450.0099	-7.95	37.75	29.80	46.00	-16.20	QP			P	
4	480.0799	-7.21	32.61	25.40	46.00	-20.60	QP			P	
5	500.4500	-6.76	38.86	32.10	46.00	-13.90	QP			P	
6	700.2698	-3.84	30.44	26.60	46.00	-19.40	QP			P	

Note: Below 30MHz, the emissions are lower than 20dB below the allowable limit.

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

Site: Radiation

Test Time: 2017-3-22 16:14:35



Report No.:	IPC032HB		
Test Standard:	FCC Part 15C_3M	Test Distance:	3m
Test item:	Radiation Emission	Ant. Polarization:	Vertical
Applicant:	Shuoying	Temp.(C)/Hum.(%):	22(C) / 54 %
Product:	IP Camera	Power Rating:	AC 120V/60Hz
Model No.:	IPC032HB	Test Engineer:	Knight

Test Mode: Charging+5.8G WIFI Mode

Remark:

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	33.8800	-15.57	44.87	29.30	40.00	-10.70	QP			P	
2	39.7000	-15.94	42.34	26.40	40.00	-13.60	QP			P	
3	166.7700	-17.92	40.02	22.10	43.50	-21.40	QP			P	
4	500.4499	-8.76	32.16	23.40	46.00	-22.60	QP			P	
5	700.2698	-3.84	30.54	26.70	46.00	-19.30	QP			P	
6	800.1799	-1.95	27.45	25.50	46.00	-20.50	QP			P	

Note: Below 30MHz, the emissions are lower than 20dB below the allowable limit.

Test Mode:	The worst case: 802.11n(HT20)	Test Date :	April 21, 2017
Frequency Range:	Above 1GHz	Temperature :	23℃
Test Result:	PASS	Humidity :	59 %
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)										
5745	V	106.53	95.11	6.12	112.65	101.23	/	/	/	/
11490	V	47.84	37.32	12.65	60.49	49.97	74.00	54.00	-13.51	-4.03
17235	V	43.00	32.12	16.84	59.84	48.96	74.00	54.00	-14.16	-5.04

5745	H	112.83	100.35	6.12	118.95	106.47	/	/	/	/
11490	H	49.27	37.42	12.65	61.92	50.07	74.00	54.00	-12.08	-3.93
17235	H	41.92	30.85	16.84	58.76	47.69	74.00	54.00	-15.24	-6.31

Operation Mode: TX Mode (Mid)										
5785	V	103.51	92.6	6.14	109.65	98.74	/	/	/	/
11570	V	47.77	36.83	12.79	60.56	49.62	74.00	54.00	-13.44	-4.38
17355	V	41.78	31.25	16.90	58.68	48.15	74.00	54.00	-15.32	-5.85

5785	H	109.18	98.66	6.14	115.32	104.80	/	/	/	/
11570	H	46.28	36.99	12.79	59.07	49.78	74.00	54.00	-14.93	-4.22
17355	H	42.36	31.22	16.90	59.26	48.12	74.00	54.00	-14.74	-5.88

Operation Mode: TX Mode (High)										
5825	V	104.43	92.87	6.15	110.58	99.02	/	/	/	/
11650	V	47.93	36.95	12.86	60.79	49.81	74.00	54.00	-13.21	-4.19
17475	V	42.53	31.34	16.99	59.52	48.33	74.00	54.00	-14.48	-5.67

5825	H	110.3	98.46	6.15	116.45	104.61	/	/	/	/
11650	H	46.49	35.43	12.86	59.35	48.29	74.00	54.00	-14.65	-5.71
17475	H	43.08	31.33	16.99	60.07	48.32	74.00	54.00	-13.93	-5.68

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.

11. Antenna Application

11.1 Antenna requirement

According to of FCC part 15C section 15.203:

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. The structure and application of the EUT were analyzed to determine compliance with section 15.203 of the rules.

And according to 47 CFR section 15.407(a), if the transmitting antennas of directional gain greater than 6dBi are used, the transmit power and power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

11.2 Measurement Results

The antenna is FPC antenna and no consideration of replacement, and the best case gain of the antenna is -0.09dBi. So, the antenna is consider meet the requirement.

12. Test Equipment List

Description	Manufacturer	Model Number	Serial Number	Characteristics	Calibration Date	Calibration Due Date
Test Receiver	Rohde & Schwarz	ESCI7	100837	9KHz~7GHz	Nov. 22, 2016	Nov. 21, 2017
Antenna	Schwarzbeck	VULB9162	9162-010	30MHz~7GHz	Nov. 25, 2016	Nov. 24, 2017
Cable	Huber+Suhner	CBL2-NN-1M	22390001	9KHz~7GHz	Nov. 06, 2016	Nov. 05, 2017
Cable	Huber+Suhner	CIL02	N/A	9KHz~7GHz	Nov. 06, 2016	Nov. 05, 2017
RF Cable	Huber+Suhner	SF-104	MY16559/4	9KHz~25GHz	Mar. 05, 2017	Mar. 04, 2018
Power Amplifier	HP	HP 8447D	1145A00203	100KHz~1.3GHz	Nov. 06, 2016	Nov. 05, 2017
Horn Antenna	Schwarzbeck	BBHA9170	9170-242	15GHz~40GHz	Feb.23, 2017	Feb.22, 2018
Horn Antenna	Com-Power	AH-118	071078	1GHz~18GHz	April. 05, 2017	April. 05, 2018
RF Cable	Huber+Suhner	SF-106	N/A	9KHz~40GHz	April. 06, 2016	April. 04, 2017
Loop antenna	Daze	ZA30900A	0708	9KHz~30MHz	Oct.09, 2016	Oct.08, 2017
Spectrum Analyzer	Rohde & Schwarz	FSU26	200409/026	20Hz~26.5GHz	Aug. 31, 2016	Aug. 30, 2017
Spectrum Analyzer	Rohde & Schwarz	FSV40	101003	10Hz~40GHz	April. 05, 2017	April. 05, 2018
Pre-Amplifier	EMCI	EMC 184045	980102	18GHz~40GHz	Nov. 04, 2016	Nov. 03, 2017
Pre-Amplifier	Agilent	8449B	3008A02964	1GHz~26.5GHz	Nov. 02, 2016	Nov. 01, 2017
L.I.S.N.	Rohde & Schwarz	ENV 216	101317	9KHz~30MHz	Nov. 06, 2016	Nov. 07, 2017
Temporary antenna connector	TESCOM	SS402	N/A	9KHz-25GHz	N/A	N/A
Power Meter	Anritsu	ML2495A	1139001	100k-65GHz	Nov. 04, 2016	Nov. 03, 2017
Power Sensor	Anritsu	MA2411B	100345	300M-40GHz	Nov. 04, 2016	Nov. 03, 2017
Temperature & Humidity Chamber	BELL	BE-TH-408	N/A	---	Dec. 24, 2016	Dec. 23, 2017
DC Source	HUAYI	HY5003-2	N/A	---	Dec. 24, 2016	Dec. 23, 2017

Note: The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

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