

FCC RADIO TEST REPORT

FCC 47 CFR PART 15 SUBPART E

Test Standard	FCC Part 15.247 and RSS-247 Issue 2
FCC ID	PPQ-WCBN4501A
ISED No.	4491A-WCBN4501A
Brand name	LITE-ON
Applicant	Lite-On Technology Corp.
Product name	Wi-Fi (11a/b/g/n/ac 2Tx2R)+BT (V4.1LE) USB Combo Module
Model No.	WCBN4501A
Test Result	Pass

The test Result was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were given in ANSI C63.10: 2013 and compliance standards.

The test results of this report relate only to the tested sample (EUT) identified in this report.

The test Report of full or partial shall not copy. Without written approval of Compliance Certification Services Inc.(Wugu Laboratory)

The sample selected for test was production product and was provided by manufacturer.



Approved by:

A handwritten signature in black ink, appearing to read "Sam Chuang".

Sam Chuang
Manager

Reviewed by:

A handwritten signature in black ink, appearing to read "Ed Chiang".

Ed Chiang
Engineer

Revision History

Rev.	Issue Date	Revisions	Revised By
00	May 4, 2017	Initial Issue	Angel Cheng
01	July 18, 2017	1. Modify test lab address in P.9 2. Add DFS Summary information in P.11. 3. Modify total power unit in P.48. 4. Modify NII-2C PSD limit in P.51. 5. Modify NNII-3 description in P.79. 6. Modify test frequency in P.210 7. Add notice for "below 1G test data" in P.145~146. 8. Add UNII-3 EIRP power in P.50.	Vicki Huang

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1. GENERAL INFORMATION

1.1 EUT INFORMATION

Applicant	Lite-On Technology Corp. Bldg. C, 90, Chien 1 Road, Chung Ho, New Taipei City 23585, Taiwan, R.O.C
Equipment	Wi-Fi (11a/b/g/n/ac 2Tx2R)+BT (V4.1LE) USB Combo Module
Model Name	WCBN4501A
Model Discrepancy	Two kinds of module design: One uses on board antenna + external antenna; the other use two external antennas.
Received Date	March 14, 2017
Date of Test	March 19 ~ May 4, 2017
Power Operation	VDC from host device.
FW Version	V62/V01
Product SW/HW version	1030.12/V02
Radio SW/HW version	1030.12/V02
Test SW Version	1030.12

Output Power(W)	Band	Mode	Frequency Range (MHz)	Output Power (W)	EIRP Output Power (w)
	U-NII-1	IEEE 802.11a	5180 ~ 5240	0.0392	0.0621
		IEEE 802.11n HT 20 MHz	5180 ~ 5240	0.0602	0.0955
		IEEE 802.11n HT 40 MHz	5190 ~ 5230	0.0493	0.0782
		IEEE 802.11ac VHT 80 MHz	5210	0.0132	0.0210
	U-NII-2a	IEEE 802.11a	5260 ~ 5320	0.0423	0.0867
		IEEE 802.11n HT 20 MHz	5260 ~ 5320	0.0514	0.1054
		IEEE 802.11n HT 40 MHz	5270 ~ 5310	0.0489	0.1004
		IEEE 802.11ac VHT 80 MHz	5290	0.0143	0.0293
	U-NII-2c	IEEE 802.11a	5500 ~ 5725	0.0406	0.0834
		IEEE 802.11a	5720	0.0132	0.0271
		IEEE 802.11n HT 20 MHz	5500 ~ 5725	0.0565	0.1159
		IEEE 802.11n HT 20 MHz	5720	0.0220	0.0451
		IEEE 802.11n HT 40 MHz	5510 ~ 5670	0.0423	0.0869
		IEEE 802.11n HT 40 MHz	5710	0.0156	0.0320
		IEEE 802.11ac VHT 80 MHz	5530-5610	0.0227	0.0466
		IEEE 802.11ac VHT 80 MHz	5690	0.0166	0.0341
	U-NII-3	IEEE 802.11a	5720	0.0024	-
		IEEE 802.11a	5745 ~ 5825	0.0541	-
		IEEE 802.11n HT 20 MHz	5720	0.0043	-
		IEEE 802.11n HT 20 MHz	5745 ~ 5825	0.0539	-
		IEEE 802.11n HT 40 MHz	5710	0.0008	-
		IEEE 802.11n HT 40 MHz	5755 ~ 5795	0.0456	-
		IEEE 802.11ac VHT 80 MHz	5690	0.0007	-
		IEEE 802.11ac VHT 80 MHz	5775	0.0245	-

Remark:

1. For Canada the EUT Frequency Range 5600~5650MHz will be disabled.

1.2 EUT CHANNEL INFORMATION

Frequency Range	UNII-1	
	IEEE 802.11a	5180 ~ 5240 MHz
	IEEE 802.11n HT 20 MHz	5180 ~ 5240 MHz
	IEEE 802.11n HT 40 MHz	5190 ~ 5230 MHz
	IEEE 802.11ac VHT 20 MHz	5180 ~ 5240 MHz
	IEEE 802.11ac VHT 40 MHz	5190 ~ 5230 MHz
	IEEE 802.11ac VHT 80 MHz	5210 MHz
	UNII-2a	
	IEEE 802.11a	5260 ~ 5320 MHz
	IEEE 802.11n HT 20 MHz	5260 ~ 5320 MHz
	IEEE 802.11n HT 40 MHz	5270 ~ 5310 MHz
	IEEE 802.11ac VHT 20 MHz	5260 ~ 5320 MHz
	IEEE 802.11ac VHT 40 MHz	5270 ~ 5310 MHz
	IEEE 802.11ac VHT 80 MHz	5290 MHz
	UNII-2c	
	IEEE 802.11a	5500 ~ 5700 MHz
	IEEE 802.11n HT 20 MHz	5500 ~ 5700 MHz
	IEEE 802.11n HT 20 MHz	5720 MHz
	IEEE 802.11n HT 40 MHz	5510 ~ 5670 MHz
	IEEE 802.11n HT 40 MHz	5710 MHz
	IEEE 802.11ac VHT 20 MHz	5500 ~ 5700 MHz
	IEEE 802.11ac VHT 20 MHz	5720 MHz
	IEEE 802.11ac VHT 40 MHz	5510 ~ 5670 MHz
	IEEE 802.11ac VHT 40 MHz	5710 MHz
	IEEE 802.11ac VHT 80 MHz	5530-5610 MHz
	IEEE 802.11ac VHT 80 MHz	5690 MHz
	UNII-3	
	IEEE 802.11a	5745 ~ 5825 MHz
	IEEE 802.11n HT 20 MHz	5745 ~ 5825 MHz
	IEEE 802.11n HT 40 MHz	5755 ~ 5795 MHz
	IEEE 802.11ac VHT 20 MHz	5745 ~ 5825 MHz
	IEEE 802.11ac VHT 40 MHz	5755 ~ 5795 MHz
	IEEE 802.11ac VHT 80 MHz	5775 MHz
Modulation Type	1. IEEE 802.11a mode: OFDM 2. IEEE 802.11n HT 20 MHz mode: OFDM 3. IEEE 802.11n HT 40 MHz mode: OFDM 4. IEEE 802.11ac VHT 20 MHz mode: OFDM 5. IEEE 802.11ac VHT 40 MHz mode: OFDM 5. IEEE 802.11ac VHT 80 MHz mode: OFDM	

Remark:

Refer as ANSI 63.10:2013 clause 5.6.1 Table 4 for test channels

Number of frequencies to be tested		
Frequency range in which device operates	Number of frequencies	Location in frequency range of operation
☐ 1 MHz or less	1	Middle
☐ 1 MHz to 10 MHz	2	1 near top and 1 near bottom
☒ More than 10 MHz	3	1 near top, 1 near middle, and 1 near bottom

1.3 ANTENNA INFORMATION

Antenna Type	☒ PIFA ☐ PCB ☐ Dipole ☐ Coils						
Antenna Gain			Antenna Gain (dBi)				
	Band	Frequency	Ant 1	Ant 2	Power Directional	Power Density Directional	
	5.2GHz	5150 - 5250MHz	2	2	2.00	5.01	
	5.3GHz	5250 - 5350MHz	2.6	2.6	2.60	5.61	
	5.5GHz	5500 - 5720MHz	3.12	3.12	3.12	6.13	
	5.8GHz	5745 - 5850MHz	2.52	2.52	2.52	5.53	
	Item	Brand	P/N	Frequency (MHz)	Gain (dBi)	Cable length	Remark
	1	HongBo	290-10284	5150 - 5250	2	300mm	External Antenna
				5250 - 5350	2.6		
				5500 - 5720	3.12		
				5745 - 5850	2.52		
	2	HongBo	290-10310	5150 - 5250	0.56	500mm	
				5250 - 5350	1.03		
				5500 - 5720	0.31		
				5745 - 5850	0.31		
	3	HongBo	290-10479	5150 - 5250	1.31	700mm	
				5250 - 5350	0.59		
				5500 - 5720	0.45		
5745 - 5850				-0.10			
4	Walsin	RFMTA401035IM LB701	5150 - 5250	2.84	350mm		
			5250 - 5350	2.84			
			5500 - 5720	0.72			
			5745 - 5850	1.72			
5	Walsin	RFMTA401056IM LB701	5150 - 5250	0.54	560mm		
			5250 - 5350	0.54			
			5500 - 5720	-0.52			
			5745 - 5850	0.60			
6	Walsin	RFMTA200700NN LB002	5150 - 5250	2.05	N/A	On Board Antenna	
			5250 - 5350	2.05			
			5500 - 5720	2.62			
			5745 - 5850	0.83			

Notes:1. Power Directional Gain: $10\text{LOG}(((10^{\wedge}(\text{Ant1}/10)+10^{\wedge}(\text{Ant2}/10))/2))$ 2. Power Density Directional Gain: $10\text{LOG}(((10^{\wedge}(\text{Ant1}/10)+10^{\wedge}(\text{Ant2}/10))/2))+10\text{log}(\text{NTX}/\text{NSS})$

1.4 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
Semi Anechoic Chamber (966 Chamber_B) / Radiated Emission, 30 to 1000 MHz	+/- 3.97
Semi Anechoic Chamber (966 Chamber_B) / Radiated Emission, 1 to 18GHz	+/- 3.58
Semi Anechoic Chamber (966 Chamber_B) / Radiated Emission, 18 to 26 GHz	+/- 3.59
Semi Anechoic Chamber (966 Chamber_B) / Radiated Emission, 26 to 40 GHz	+/- 3.81
Conducted Emission (Mains Terminals), 9kHz to 30MHz	+/- 2.48

Remark:

1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$
2. ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report.

1.5 FACILITIES AND TEST LOCATION

All measurement facilities used to collect the measurement data are located at
No.139, Wugong Rd., Wugu Dist., New Taipei City 24886, Taiwan (R.O.C.)-Compliance
Certification Services Inc.

Test site	Test Engineer	Remark
AC Conduction Room	Eric Lee	
Radiation	ED Chiang	
RF Conducted	Eric Lee	

Remark: The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

1.6 INSTRUMENT CALIBRATION

RF Conducted Test Site					
Equipment	Manufacturer	Model	S/N	Cal Date	Cal Due
Power Meter	Anritsu	ML2495A	1012009	07/04/2016	07/03/2017
Power Sensor	Anritsu	MA2411B	917072	07/04/2016	07/03/2017
Spectrum Analyzer	R&S	FSV 40	101073	10/5/2016	10/4/2017

3M 966 Chamber Test Site					
Equipment	Manufacturer	Model	S/N	Cal Date	Cal Due
Bilog Antenna	Sunol Sciences	JB3	A030105	07/03/2016	07/02/2017
Horn Antenna	EMCO	3117	00055165	02/20/2017	02/19/2018
Horn Antenna	ETS LINDGREN	3116	00026370	01/12/2017	01/11/2018
Pre-Amplifier	EMCI	EMC 012635	980151	06/23/2016	06/22/2017
Pre-Amplifier	EMEC	EM330	060609	06/08/2016	06/07/2017
Spectrum Analyzer	Agilent	E4446A	US42510252	12/05/2016	12/04/2017
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R	N.C.R
Controller	CCS	CC-C-1F	N/A	N.C.R	N.C.R
Turn Table	CCS	CC-T-1F	N/A	N.C.R	N.C.R

AC Conducted Emissions Test Site					
Equipment	Manufacturer	Model	S/N	Cal Date	Cal Due
LISN	R&S	ENV216	101054	05/11/2016	05/10/2017
LISN	Schwarzbeck	NSLK8128	5012	04/25/2017	04/24/2018
Receiver	R&S	ESCI	101073	08/20/2016	08/19/2017

Remark: Each piece of equipment is scheduled for calibration once a year.

1.7 SUPPORT AND EUT ACCESSORIES EQUIPMENT

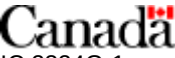
EUT Accessories Equipment					
No.	Equipment	Brand	Model	Series No.	FCC ID
	N/A				

Support Equipment					
No.	Equipment	Brand	Model	Series No.	FCC ID
1	Notebook	Lenovo	Z51-70	N/A	R33275

1.8 TEST METHODOLOGY AND APPLIED STANDARDS

The test methodology, setups and results comply with all requirements in accordance with ANSI C63.10:2013, FCC Part 2, FCC Part 15.407, KDB 662911 D01 v02r01, KDB 789033 D02 v01r03, KDB 644545 D03 v01.

1.9 TABLE OF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3M Semi Anechoic Chamber (FCC MRA: TW1039) to perform FCC Part 15 measurements	 FCC MRA: TW1039
Canada	Industry Canada	3M Semi Anechoic Chamber (IC 2324G-1 / IC 2324G-2) to perform	 IC 2324G-1 IC 2324G-2

2. TEST SUMMERY

FCC Standard Sec.	IC Standard Sec.	Chapter	Test Item	Result
15.203	-	1.2	Antenna Requirement	Pass
15.207	RSS-Gen(8.8)	4.1	AC Conducted Emission	Pass
15.403(i)	-	4.2	26dB Bandwidth	Pass
15.403(i)	RSS-247(6.2.4)	4.2	6dB Bandwidth	Pass
15.403(i)	RSS-Gen(6.6)	4.2	Occupied Bandwidth (99%)	Pass
15.407(a)	RSS-247(6.2.1)(1) RSS-247(6.2.2)(1) RSS-247(6.2.3)(1) RSS-247(6.2.4)(1)	4.3	Output Power Measurement	Pass
15.407(a)	RSS-247(6.2.1)(1) RSS-247(6.2.2)(1) RSS-247(6.2.3)(1) RSS-247(6.2.4)(1)	4.4	Power Spectral Density	Pass
15.407(b)	RSS-247(6.2.1)(2) RSS-247(6.2.2)(2) RSS-247(6.2.3)(2) RSS-247(6.2.4)(2)	4.5	Radiation Band Edge	Pass
15.407(b)	RSS-247(6.2.1)(2) RSS-247(6.2.2)(2) RSS-247(6.2.3)(2) RSS-247(6.2.4)(2)	4.5	Radiation Spurious Emission	Pass
15.407(g)	RSS-Gen(6.11)	4.6	Frequency Stability	Pass
15.407(h)	RSS-247(6.3)	4.7	Dynamic Frequency Selection	Pass

3. DESCRIPTION OF TEST MODES

3.1 THE WORST MODE OF OPERATING CONDITION

Operation mode	1. IEEE 802.11a mode: 6Mbps 2. IEEE 802.11n HT 20 MHz mode: MCS8 3. IEEE 802.11n HT 40 MHz mode: MCS8 4. IEEE 802.11ac VHT 20 MHz mode: MCS8 5. IEEE 802.11ac VHT 40 MHz mode: MCS8 5. IEEE 802.11ac VHT 80 MHz mode: MCS8			
Operating Frequency Range & Number of Channels		Mode	Frequency Range (MHz)	Number of Channels
	U-NII-1	IEEE 802.11a	5180 ~ 5240	4 Channels
		IEEE 802.11n HT 20 MHz	5180 ~ 5240	4 Channels
		IEEE 802.11n HT 40 MHz	5190 ~ 5230	2 Channels
		IEEE 802.11ac VHT 20 MHz	5180 ~ 5240	4 Channels
		IEEE 802.11ac VHT 40 MHz	5190 ~ 5230	2 Channels
		IEEE 802.11ac VHT 80 MHz	5210	1 Channels
	U-NII-2a	IEEE 802.11a	5260 ~ 5320	4 Channels
		IEEE 802.11n HT 20 MHz	5260 ~ 5320	4 Channels
		IEEE 802.11n HT 40 MHz	5270 ~ 5310	2 Channels
		IEEE 802.11ac VHT 20 MHz	5260 ~ 5320	4 Channels
		IEEE 802.11ac VHT 40 MHz	5270 ~ 5310	2 Channels
		IEEE 802.11ac VHT 80 MHz	5290	1 Channels
	U-NII-2c	IEEE 802.11a	5500 ~ 5700	11 Channels
		IEEE 802.11n HT 20 MHz	5500 ~ 5700	11 Channels
		IEEE 802.11n HT 20 MHz	5720	1 Channels
		IEEE 802.11n HT 40 MHz	5510 ~ 5670	5 Channels
		IEEE 802.11n HT 40 MHz	5710	1 Channels
		IEEE 802.11ac VHT 20 MHz	5500 ~ 5700	11 Channels
		IEEE 802.11ac VHT 20 MHz	5720	1 Channels
		IEEE 802.11ac VHT 40 MHz	5510 ~ 5670	5 Channels
		IEEE 802.11ac VHT 40 MHz	5710	1 Channels
		IEEE 802.11ac VHT 80 MHz	5530~5610	2 Channels
		IEEE 802.11ac VHT 80 MHz	5690	1 Channels
	U-NII-3	IEEE 802.11a	5745 ~ 5825	5 Channels
		IEEE 802.11n HT 20 MHz	5745 ~ 5825	5 Channels
		IEEE 802.11n HT 40 MHz	5755 ~ 5795	2 Channels
		IEEE 802.11ac VHT 20 MHz	5745 ~ 5825	5 Channels
		IEEE 802.11ac VHT 40 MHz	5755 ~ 5795	2 Channels
		IEEE 802.11ac VHT 80 MHz	5775	1 Channels

Remark:

1. EUT pre-scanned data rate of output power for each mode, the worst data rate were recorded in this report.
2. Covered modes are test reduction modes. The output powers on the covered modes are equal to or less than the mode referenced and use the same module
3. The mode IEEE 802.11ac VHT20 and VHT40 are only different in control messages with IEEE 802.11n HT20 and HT40, and have same power setting. Therefore, the highest power(IEEE 802.11n HT20 and HT40) were test conducted and radiated measurement and recorded in this report.

3.2 THE WORST MODE OF MEASUREMENT

AC Power Line Conducted Emission	
Test Condition	AC Power line conducted emission for line and neutral
Voltage/Hz	120V/60Hz
Test Mode	Mode 1:EUT power by host system.
Worst Mode	☒ Mode 1 ☐ Mode 2 ☐ Mode 3 ☐ Mode 4

Radiated Emission Measurement Below 1G	
Test Condition	Radiated Emission Below 1G
Voltage/Hz	120V/60Hz
Test Mode	Mode 1:EUT power by host system.
Worst Mode	☒ Mode 1 ☐ Mode 2 ☐ Mode 3 ☐ Mode 4

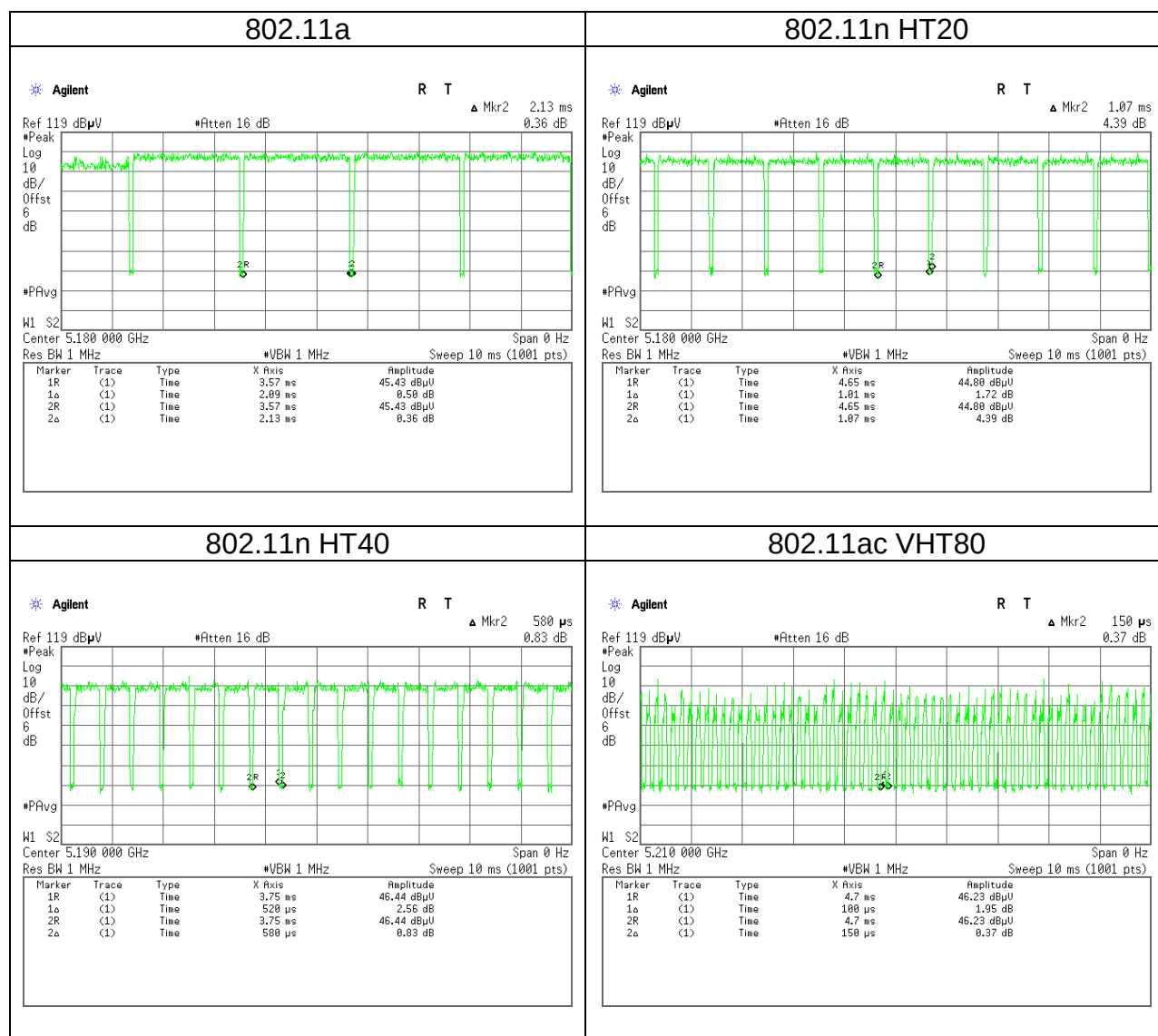
Radiated Emission Measurement Above 1G	
Test Condition	Band edge, Emission for Unwanted and Fundamental
Voltage/Hz	120V/60Hz
Test Mode	Mode 1:EUT power by host system.
Worst Mode	☒ Mode 1 ☐ Mode 2 ☐ Mode 3 ☐ Mode 4
Worst Position	☐ Placed in fixed position. ☒ Placed in fixed position at X-Plane (E2-Plane) ☐ Placed in fixed position at Y-Plane (E1-Plane) ☐ Placed in fixed position at Z-Plane (H-Plane)
Worst Polarity	☒ Horizontal ☐ Vertical

Remark:

1. The worst mode was record in this test report.
2. EUT pre-scanned in three axis ,X,Y, Z and two polarity, Horizontal and Vertical for radiated measurement. The worst case(X-Plane and Horizontal) were recorded in this report
3. For AC power line conducted emission and below 1G radiation emission were performed the EUT transmit at the highest output power channel as worse case.

3.3 EUT DUTY CYCLE

Duty Cycle				
Configuration	TX ON (ms)	TX ALL (ms)	Duty Cycle (%)	Duty Factor(dB)
802.11a	2.0900	2.1300	98.12%	0.08
802.11n HT20	1.0100	1.0700	94.39%	0.25
802.11n HT40	0.5200	0.5800	89.66%	0.47
802.11ac VHT80	0.1000	0.1500	66.67%	1.76



4. TEST RESULT

4.1 AC POWER LINE CONDUCTED EMISSION

4.1.1 Test Limit

According to §15.207(a) and RSS-GEN section 8.8,

Frequency Range (MHz)	Limits(dB μ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

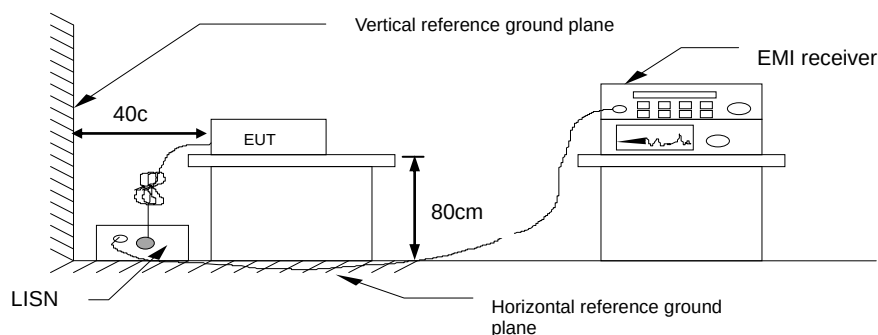
* Decreases with the logarithm of the frequency.

4.1.2 Test Procedure

Test method Refer as ANSI 63.10:2013 clause 6.2,

1. The EUT was placed on a non-conducted table, which is 0.8m above horizontal ground plane and 0.4m above vertical ground plane.
2. EUT connected to the line impedance stabilization network (LISN)
3. Receiver set RBW of 9kHz and Detector Peak, and note as quasi-peak and average.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. Recorded Line for Neutral and Line.

4.1.3 Test Setup

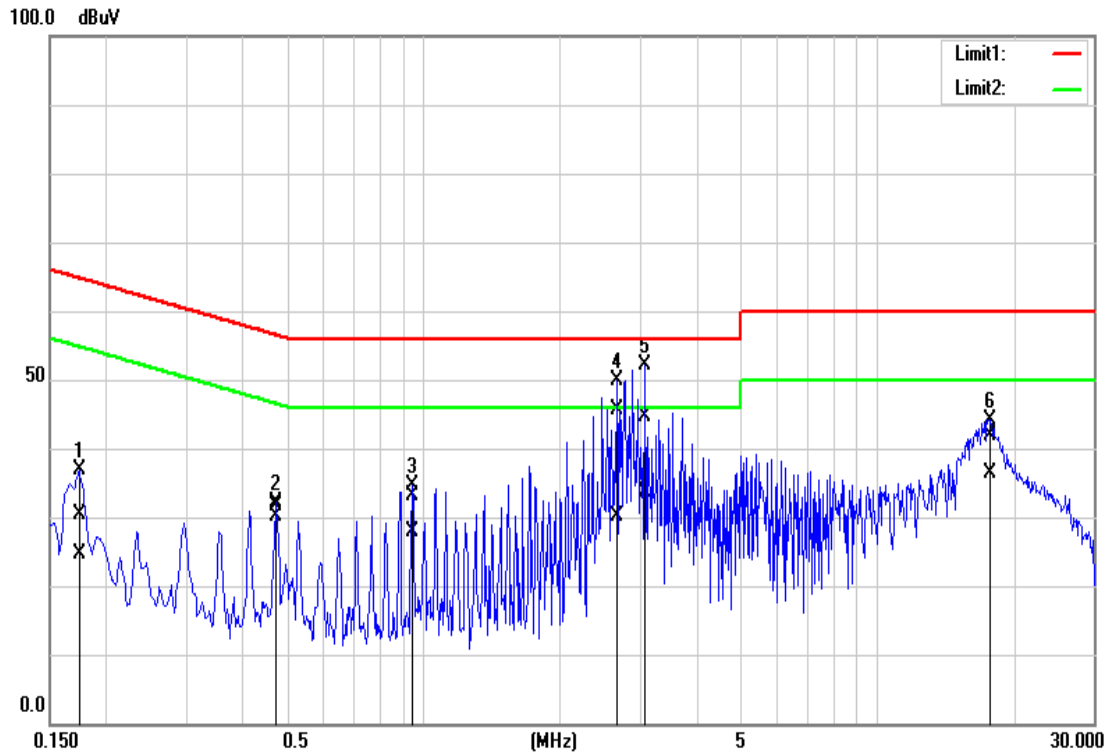


4.1.4 Test Result

Pass.

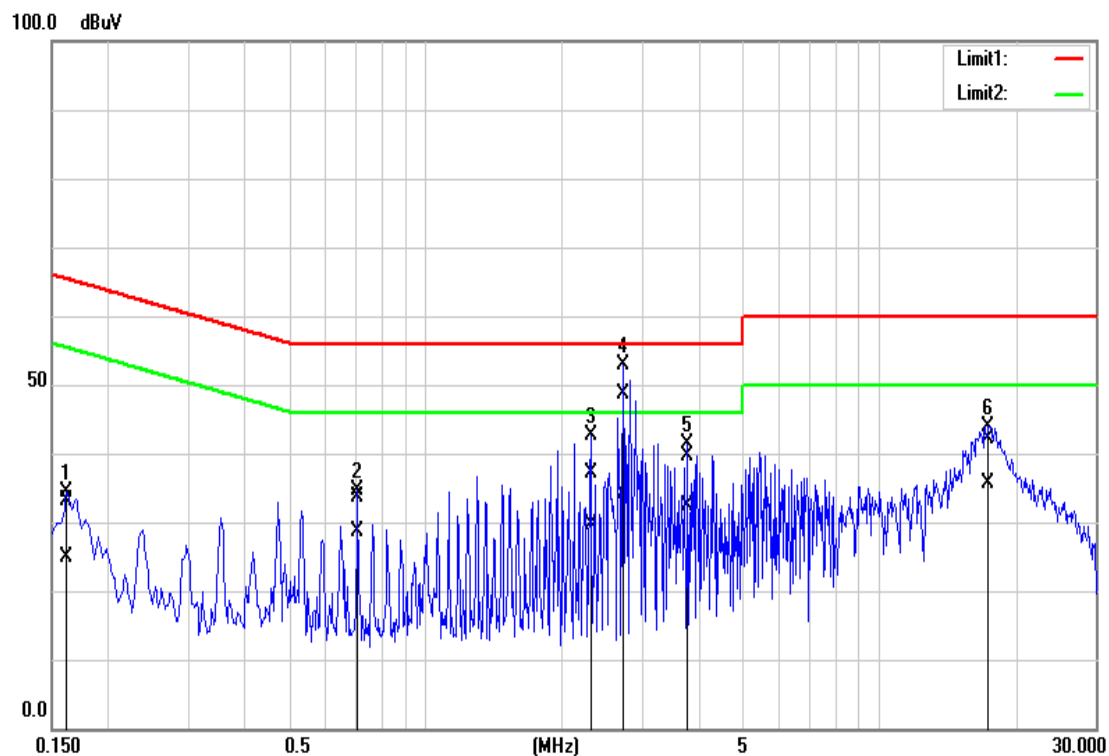
Test Data

Test Mode:	Mode 1	Temp/Hum	24(°C)/ 50%RH
Test Voltage:	120Vac / 60Hz	Test Date	May 4, 2017
Phase:	Line	Test Engineer	Eric Lee



Frequency (MHz)	Quasi Peak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	Quasi Peak result (dBuV)	Average result (dBuV)	Quasi Peak limit (dBuV)	Average limit (dBuV)	Quasi Peak margin (dB)	Average margin (dB)	Remark
0.1740	20.62	14.81	9.70	30.32	24.51	64.77	54.77	-34.45	-30.26	Pass
0.4740	21.95	20.36	9.68	31.63	30.04	56.44	46.44	-24.81	-16.40	Pass
0.9460	23.35	18.19	9.69	33.04	27.88	56.00	46.00	-22.96	-18.12	Pass
2.6660	35.81	20.55	9.70	45.51	30.25	56.00	46.00	-10.49	-15.75	Pass
3.0780	34.85	23.91	9.71	44.56	33.62	56.00	46.00	-11.44	-12.38	Pass
17.6900	32.08	26.54	9.84	41.92	36.38	60.00	50.00	-18.08	-13.62	Pass

Test Mode:	Mode 1	Temp/Hum	24(°C)/ 50%RH
Test Voltage:	120Vac / 60Hz	Test Date	May 4, 2017
Phase:	Neutral	Test Engineer	Eric Lee



Frequency (MHz)	Quasi Peak reading (dBuV)	Average reading (dBu)	Correction factor (dB)	Quasi Peak result (dBuV)	Average result (dBuV)	Quasi Peak limit (dBuV)	Average limit (dBuV)	Quasi Peak margin (dB)	Average margin (dB)	Remark
0.1620	23.41	15.15	9.71	33.12	24.86	65.36	55.36	-32.24	-30.50	Pass
0.7100	23.98	19.02	9.69	33.67	28.71	56.00	46.00	-22.33	-17.29	Pass
2.3100	27.45	19.92	9.70	37.15	29.62	56.00	46.00	-18.85	-16.38	Pass
2.7220	38.88	24.38	9.70	48.58	34.08	56.00	46.00	-7.42	-11.92	Pass
3.7820	29.93	22.69	9.71	39.64	32.40	56.00	46.00	-16.36	-13.60	Pass
17.4460	32.28	25.76	9.89	42.17	35.65	60.00	50.00	-17.83	-14.35	Pass

4.2 26DB BANDWIDTH, 6DB BANDWIDTH AND OCCUPIED BANDWIDTH(99%)

4.2.1 Test Limit

26 dB Bandwidth : For reporting purposes only.

6 dB Bandwidth : Least 500kHz.

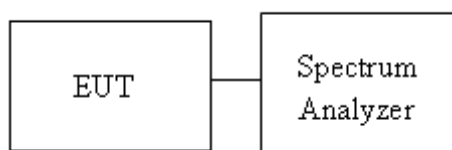
Occupied Bandwidth(99%) : For reporting purposes only.

4.2.2 Test Procedure

Test method Refer as KDB 789033 D02 v01r03 Section C, D, and ANSI 63.10:2013 clause 6.9.2,

1. The EUT RF output connected to the spectrum analyzer by RF cable.
2. Setting maximum power transmit of EUT
3. UNII-1, UNII-2a and UNII-2c,
 - (1) BW=20MHz : SA set RBW = 300kHz, VBW = 1MHz and Detector = Peak, to measurement 26 dB Bandwidth and 99% Bandwidth
 - (2) BW=40MHz : SA set RBW = 1MHz, VBW = 3MHz and Detector = Peak, to measurement 26 dB Bandwidth and 99% Bandwidth
 - (3) BW=80MHz : SA set RBW = 1MHz, VBW = 3MHz and Detector = Peak, to measurement 26 dB Bandwidth and 99% Bandwidth
4. UNII-3, SA set RBW = 100kHz, VBW = 300kHz and Detector = Peak, to measurement 26 dB Bandwidth and 99% Bandwidth
5. Measure and record the result of 6 dB Bandwidth and 99% Bandwidth. in the test report.

4.2.3 Test Setup



4.2.4 Test Result

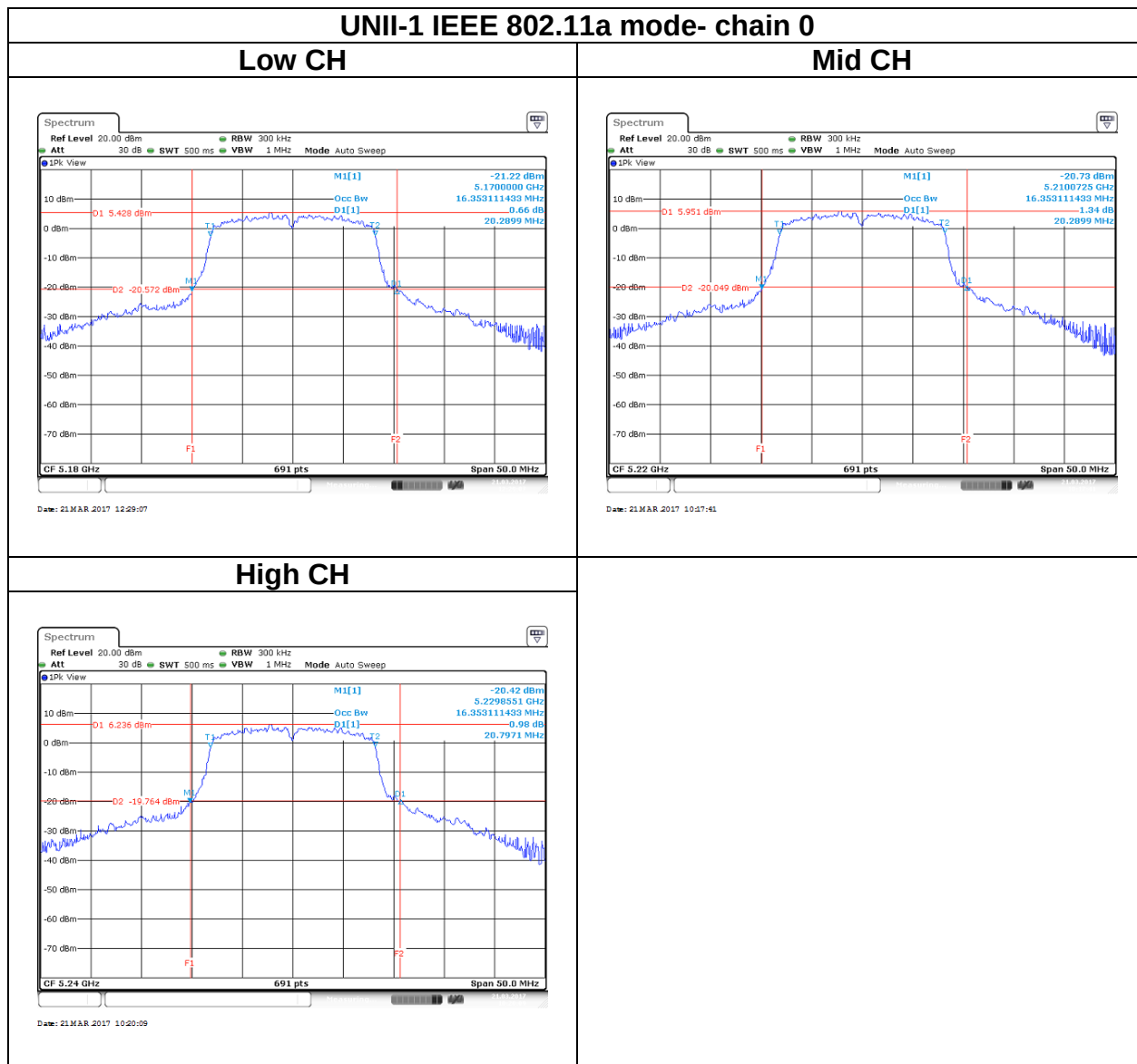
UNII-1 5150-5250 MHz					
Test mode: IEEE 802.11a mode					
Channel	Frequency (MHz)	Chain 0 OBW(99%) (MHz)	Chain 1 OBW(99%) (MHz)	Chain 0 26dB BW (MHz)	Chain 1 26dB BW (MHz)
Low	5180	16.3531	-	20.2899	-
Mid	5220	16.3531	-	20.7971	-
High	5240	16.3531	-	20.2899	-
Test mode: IEEE 802.11n HT20 mode					
Channel	Frequency (MHz)	Chain 0 OBW(99%) (MHz)	Chain 1 OBW(99%) (MHz)	Chain 0 26dB BW (MHz)	Chain 1 26dB BW (MHz)
Low	5180	17.5108	17.5108	21.5217	20.7263
Mid	5220	17.5108	17.5108	23.1159	20.9420
High	5240	17.5108	17.5108	22.6812	20.8696
Test mode: IEEE 802.11n HT40 mode					
Channel	Frequency (MHz)	Chain 0 OBW(99%) (MHz)	Chain 1 OBW(99%) (MHz)	Chain 0 26dB BW (MHz)	Chain 1 26dB BW (MHz)
Low	5190	36.4544	36.2952	48.623	48.304
High	5230	36.6136	36.2952	51.971	51.971
Test mode: IEEE 802.11ac VHT80 mode					
Channel	Frequency (MHz)	Chain 0 OBW(99%) (MHz)	Chain 1 OBW(99%) (MHz)	Chain 0 26dB BW (MHz)	Chain 1 26dB BW (MHz)
Mid	5210	76.6425	76.4109	91.594	86.261

UNII-2a 5250-5350 MHz					
Test mode: IEEE 802.11a mode					
Channel	Frequency (MHz)	Chain 0 OBW(99%) (MHz)	Chain 1 OBW(99%) (MHz)	Chain 0 26dB BW (MHz)	Chain 1 26dB BW (MHz)
Low	5260	16.4978	-	21.5942	-
Mid	5280	16.3531	-	20.7246	-
High	5320	16.4254	-	20.7971	-
Test mode: IEEE 802.11n HT20 mode					
Channel	Frequency (MHz)	Chain 0 OBW(99%) (MHz)	Chain 1 OBW(99%) (MHz)	Chain 0 26dB BW (MHz)	Chain 1 26dB BW (MHz)
Low	5260	17.5108	20.7246	22.6087	20.7246
Mid	5280	17.5832	21.3043	24.3478	21.3043
High	5320	18.1620	23.1884	23.8406	23.1884
Test mode: IEEE 802.11n HT40 mode					
Channel	Frequency (MHz)	Chain 0 OBW(99%) (MHz)	Chain 1 OBW(99%) (MHz)	Chain 0 26dB BW (MHz)	Chain 1 26dB BW (MHz)
Low	5270	36.2373	36.2373	48.812	46.957
High	5310	36.3531	36.2373	48.464	46.957
Test mode: IEEE 802.11ac VHT80 mode					
Channel	Frequency (MHz)	Chain 0 OBW(99%) (MHz)	Chain 1 OBW(99%) (MHz)	Chain 0 26dB BW (MHz)	Chain 1 26dB BW (MHz)
Mid	5290	76.8740	76.4109	92.058	86.725

UNII-2c 5475-5725 MHz					
Test mode: IEEE 802.11a mode					
Channel	Frequency (MHz)	Chain 0 OBW(99%) (MHz)	Chain 1 OBW(99%) (MHz)	Chain 0 26dB BW (MHz)	Chain 1 26dB BW (MHz)
Low	5500	16.4254	-	20.4348	-
Mid	5580	16.4254	-	19.8851	-
High	5700	16.4978	-	21.4493	-
Cross	5720	16.3531	-	19.7101	-
Test mode: IEEE 802.11n HT20 mode					
Channel	Frequency (MHz)	Chain 0 OBW(99%) (MHz)	Chain 1 OBW(99%) (MHz)	Chain 0 26dB BW (MHz)	Chain 1 26dB BW (MHz)
Low	5500	17.5976	17.5976	20.986	20.870
Mid	5580	17.5976	17.5976	21.101	21.681
High	5700	17.5976	17.5976	21.217	20.870
Cross	5720	17.5976	17.5976	22.493	20.638
Test mode: IEEE 802.11n HT40 mode					
Channel	Frequency (MHz)	Chain 0 OBW(99%) (MHz)	Chain 1 OBW(99%) (MHz)	Chain 0 26dB BW (MHz)	Chain 1 26dB BW (MHz)
Low	5510	36.6425	36.2952	49.217	47.652
High	5670	36.6425	36.2952	47.652	50.609
Cross	5710	36.4688	36.2952	50.957	47.653
Test mode: IEEE 802.11ac VHT80 mode					
Channel	Frequency (MHz)	Chain 0 OBW(99%) (MHz)	Chain 1 OBW(99%) (MHz)	Chain 0 26dB BW (MHz)	Chain 1 26dB BW (MHz)
Mid	5530	76.6425	76.4109	92.058	84.870
Cross	5690	76.8740	76.4109	97.623	85.797

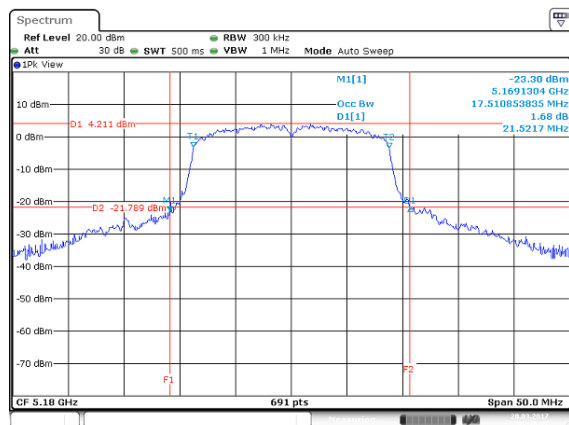
UNII-3 5725-5825MHz					
Test mode: IEEE 802.11a mode					
Channel	Frequency (MHz)	Chain 0 OBW(99%) (MHz)	Chain 1 OBW(99%) (MHz)	Chain 0 6dB BW (MHz)	Chain 1 6dB BW (MHz)
Low	5745	16.4109	-	15.1304	-
Mid	5785	16.7149	-	15.2174	-
High	5825	16.3241	-	15.2173	-
Cross	5720	16.3675	-	15.2174	-
Test mode: IEEE 802.11n HT20 mode					
Channel	Frequency (MHz)	Chain 0 OBW(99%) (MHz)	Chain 1 OBW(99%) (MHz)	Chain 0 6dB BW (MHz)	Chain 1 6dB BW (MHz)
Low	5745	17.6700	17.4095	15.1739	15.7826
Mid	5785	17.4529	17.8002	15.1739	16.3470
High	5825	17.5397	17.5832	15.1739	16.9110
Cross	5720	17.4095	17.7134	15.1739	16.3040
Test mode: IEEE 802.11n HT40 mode					
Channel	Frequency (MHz)	Chain 0 OBW(99%) (MHz)	Chain 1 OBW(99%) (MHz)	Chain 0 6dB BW (MHz)	Chain 1 6dB BW (MHz)
Low	5755	36.8162	36.3531	35.130	35.130
High	5795	36.4688	36.3531	35.130	35.130
Cross	5710	35.6584	36.3531	35.246	35.130
Test mode: IEEE 802.11ac VHT80 mode					
Channel	Frequency (MHz)	Chain 0 OBW(99%) (MHz)	Chain 1 OBW(99%) (MHz)	Chain 0 6dB BW (MHz)	Chain 1 6dB BW (MHz)
Mid	5775	76.1794	75.9479	76.522	76.522
Cross	5690	75.9479	75.7163	76.520	76.291

Test Data



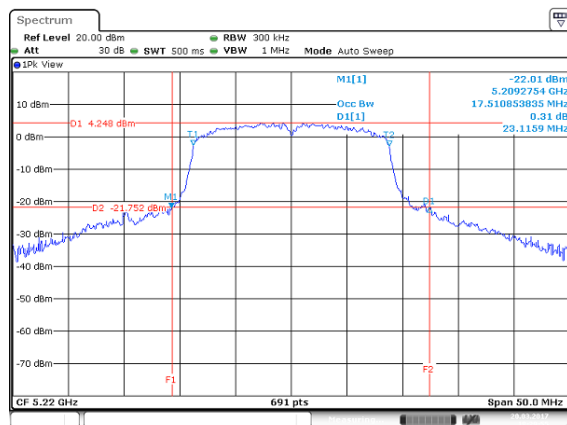
UNII-1 IEEE 802.11n HT20 mode- chain 0

Low CH



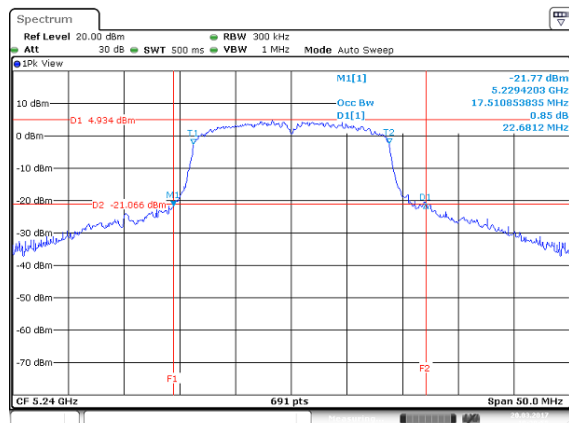
Date: 20 MAR 2017 18:30:37

Mid CH



Date: 20 MAR 2017 18:29:55

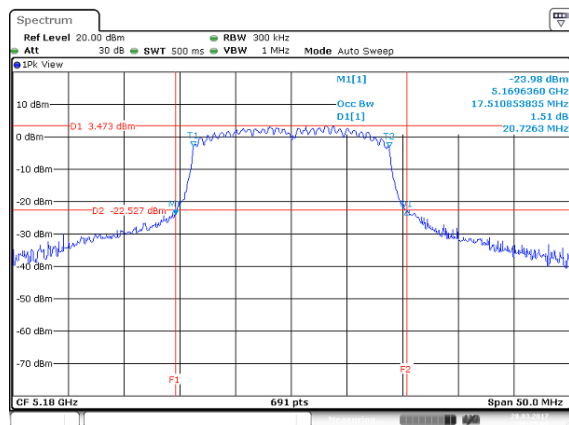
High CH



Date: 20 MAR 2017 18:28:55

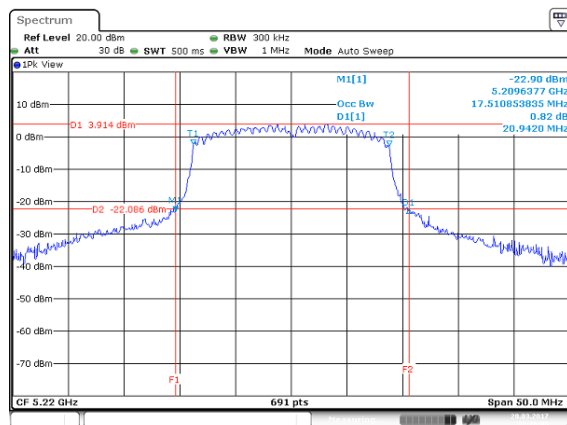
UNII-1 IEEE 802.11n HT20 mode- chain 1

Low CH



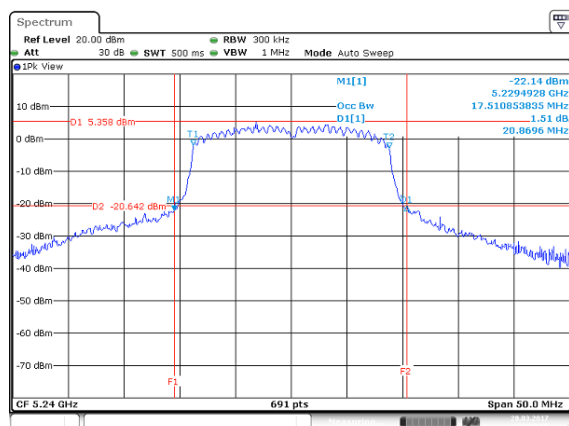
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Mid CH



Date: 20 MAR 2017 18:26:05

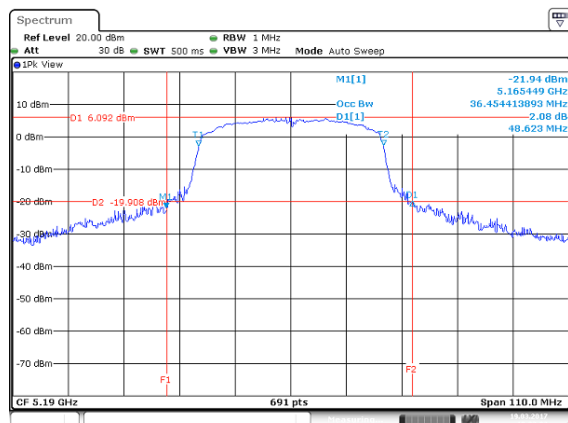
High CH



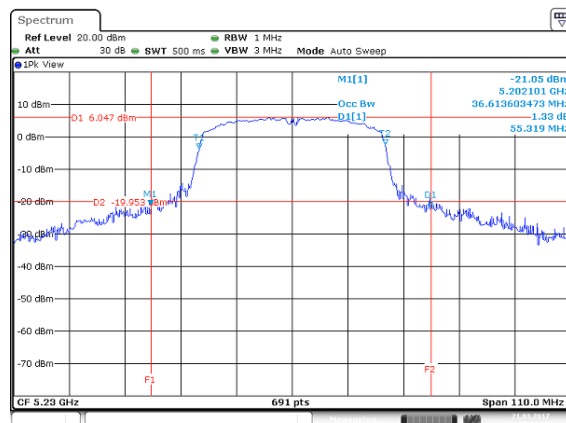
Date: 20 MAR 2017 18:27:56

UNII-1 IEEE 802.11n HT40 mode- chain 0

Low CH

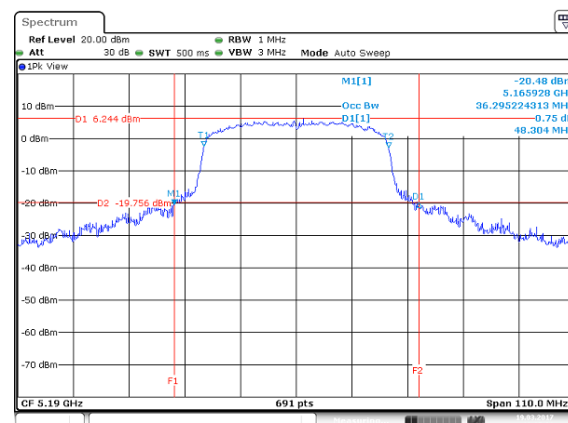


High CH

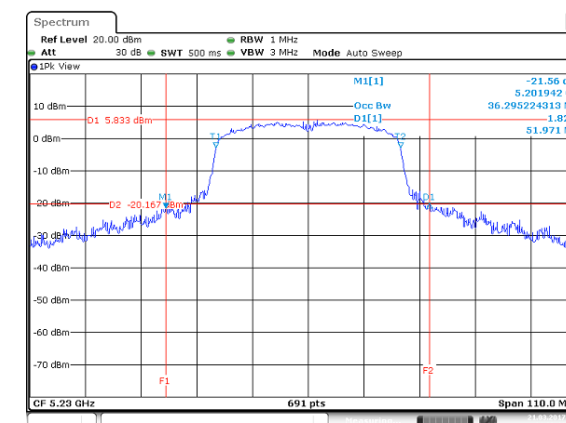


UNII-1 IEEE 802.11n HT40 mode- chain 1

Low CH

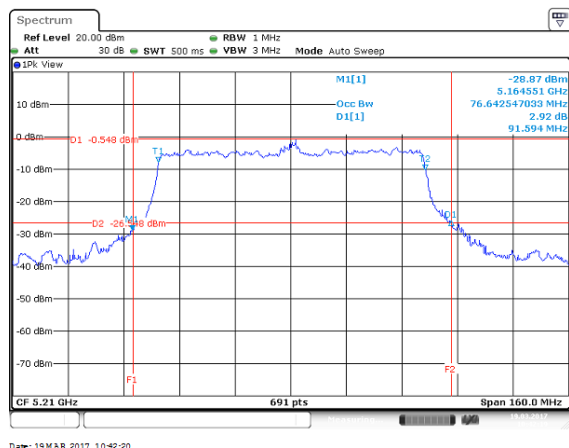


High CH



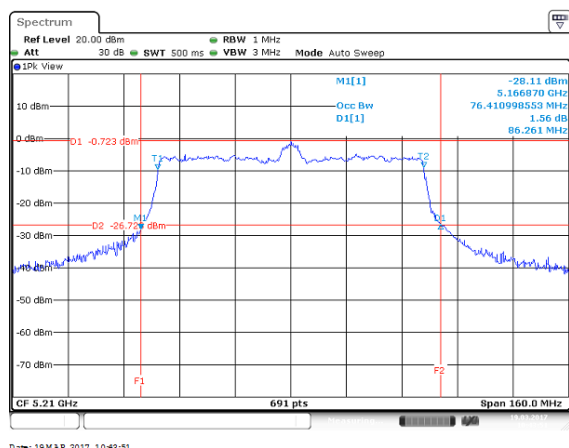
UNII-1 IEEE 802.11ac VHT80 mode- chain 0

Mid CH

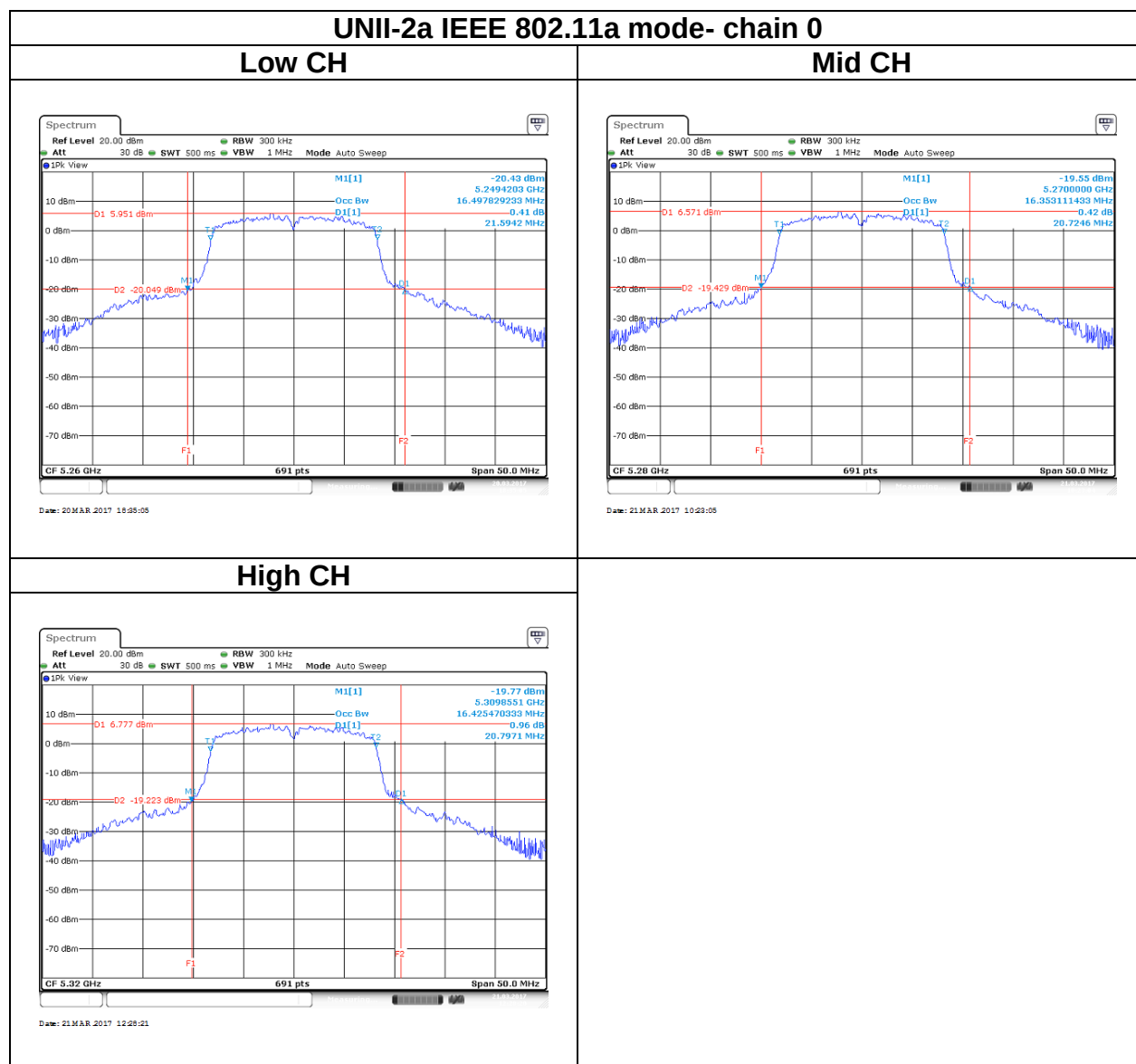


UNII-1 IEEE 802.11ac VHT80 mode- chain 1

Mid CH

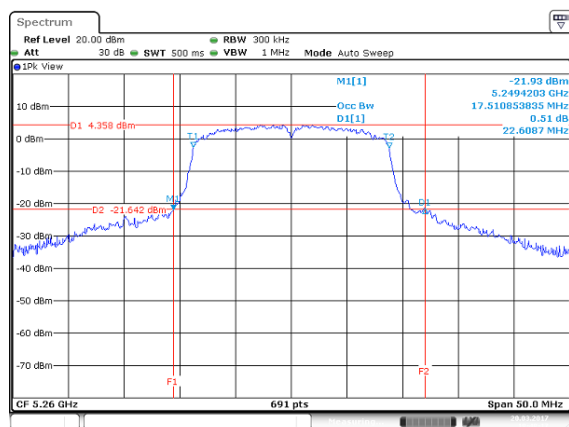


Test Data

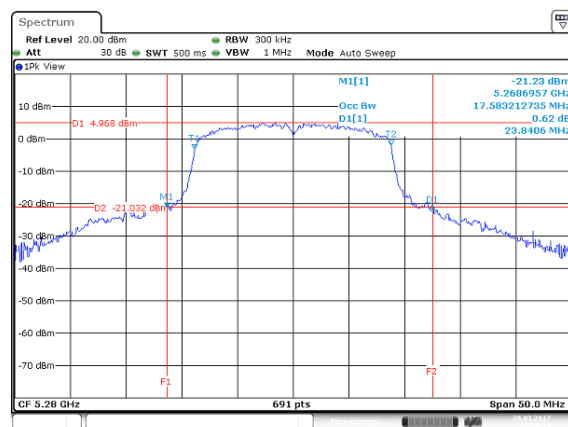


UNII-2a IEEE 802.11n HT20 mode- chain 0

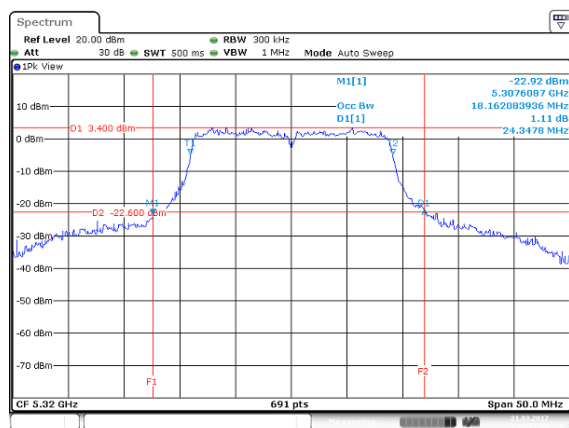
Low CH



Mid CH

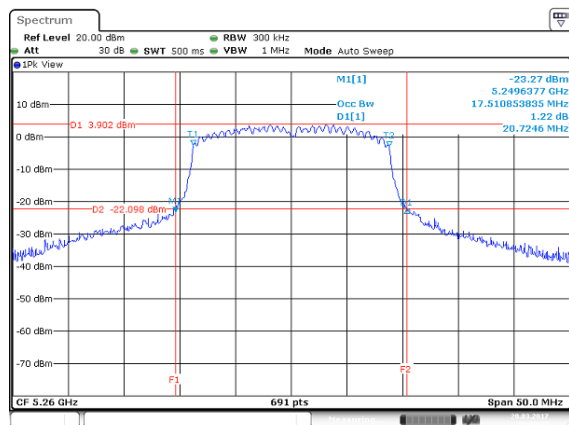


High CH



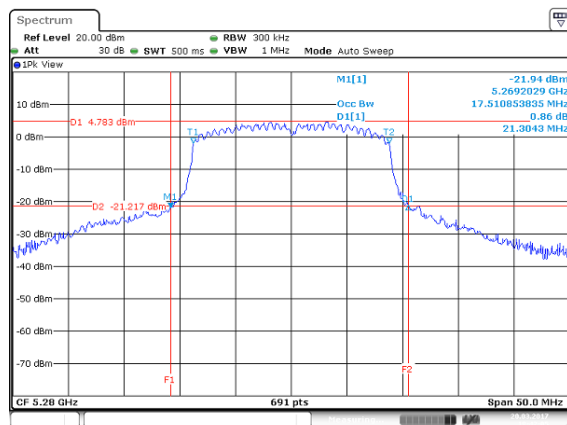
UNII-2a IEEE 802.11n HT20 mode- chain 1

Low CH



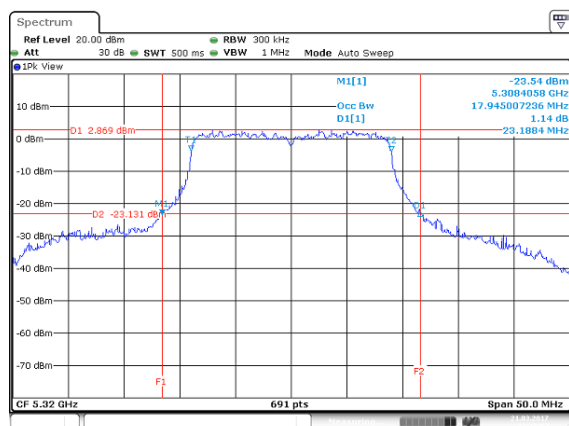
Date: 20 MAR 2017 18:39:37

Mid CH



Date: 20 MAR 2017 18:42:05

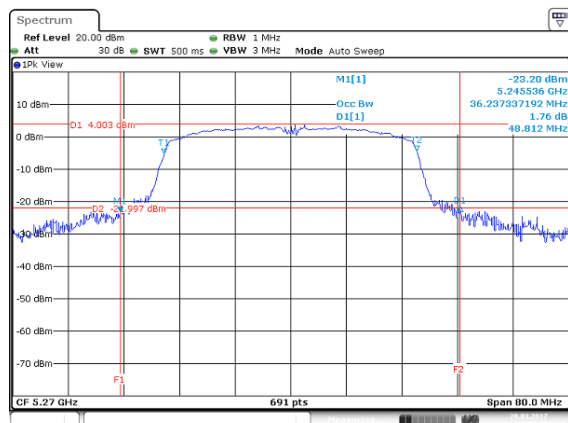
High CH



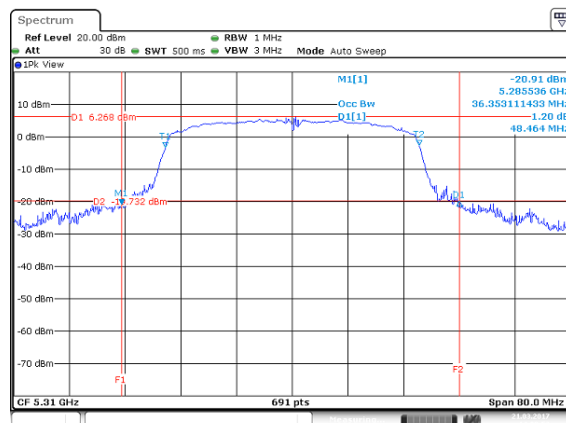
Date: 21 MAR 2017 19:15:52

UNII-2a IEEE 802.11n HT40 mode- chain 0

Low CH

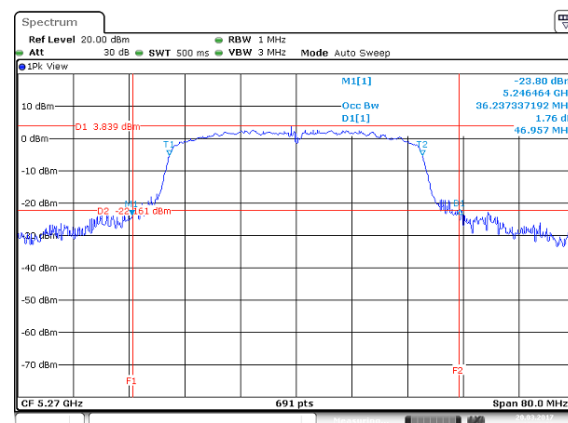


High CH

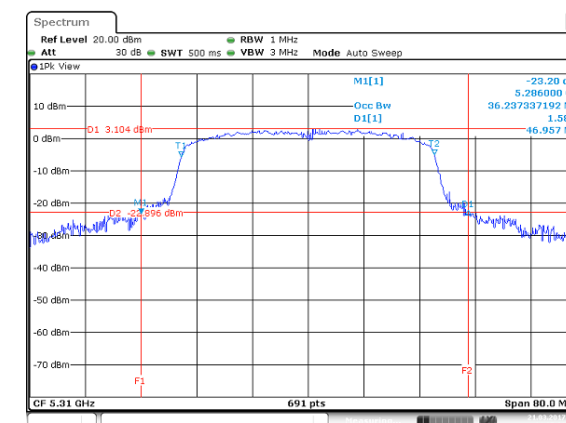


UNII-2a IEEE 802.11n HT40 mode- chain 1

Low CH

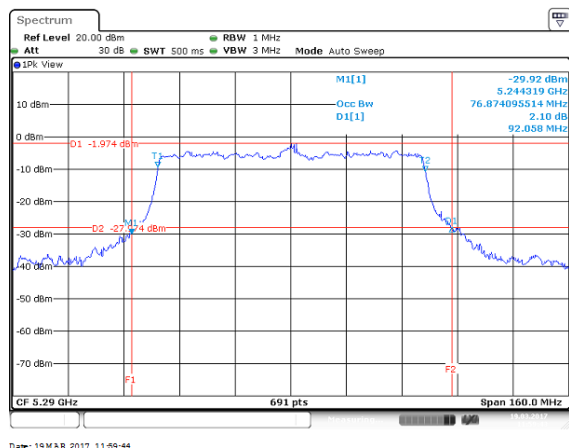


High CH



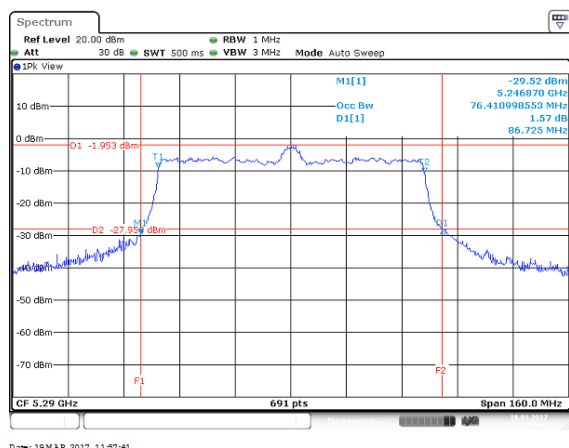
UNII-2a IEEE 802.11ac VHT80 mode- chain 0

Mid CH

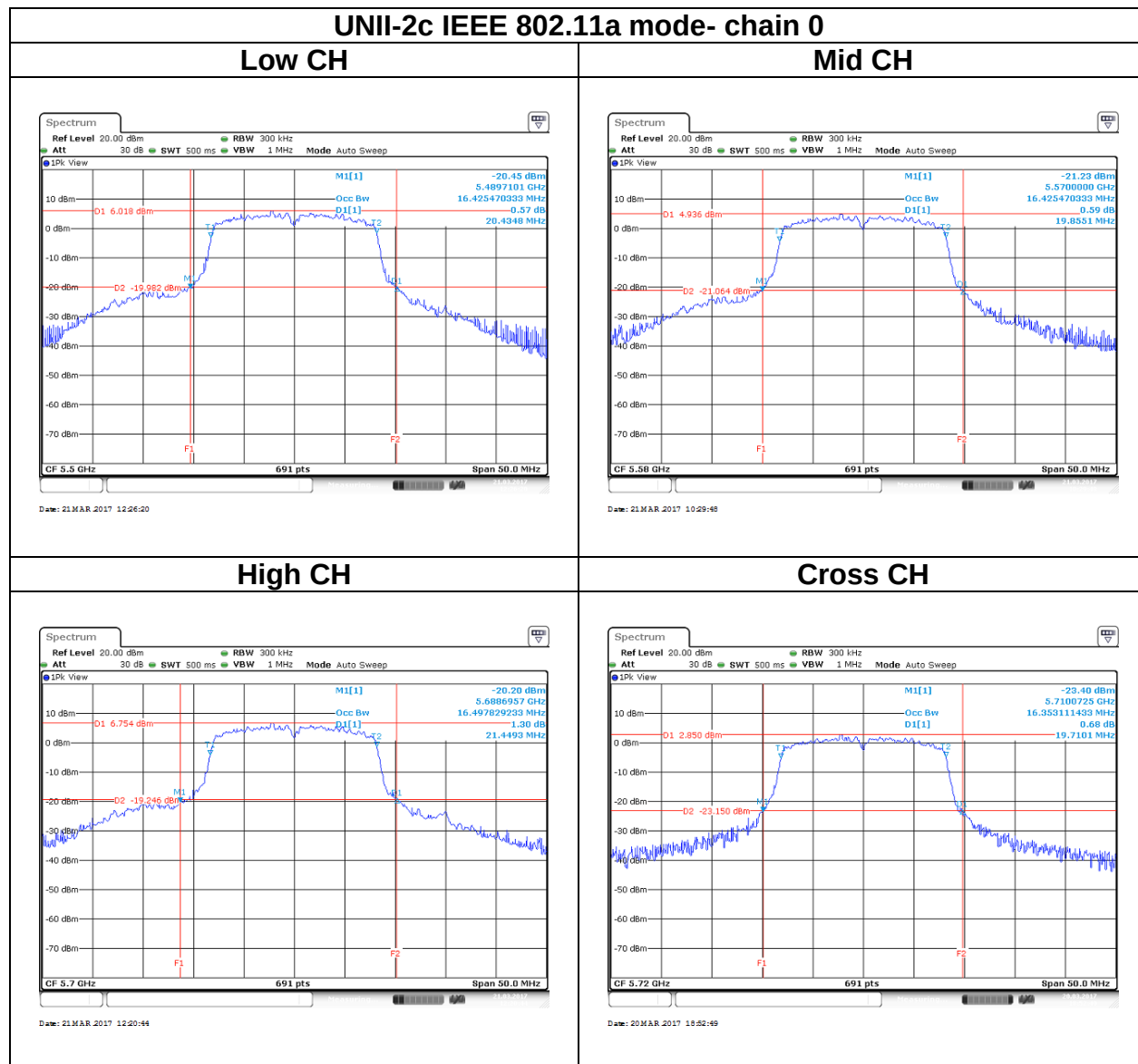


UNII-2a IEEE 802.11ac VHT80 mode- chain 1

Mid CH

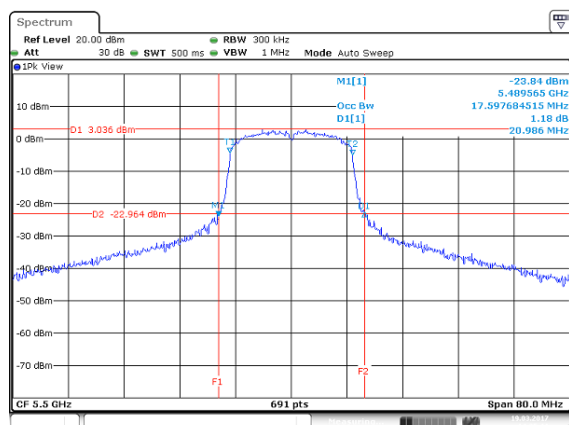


Test Data

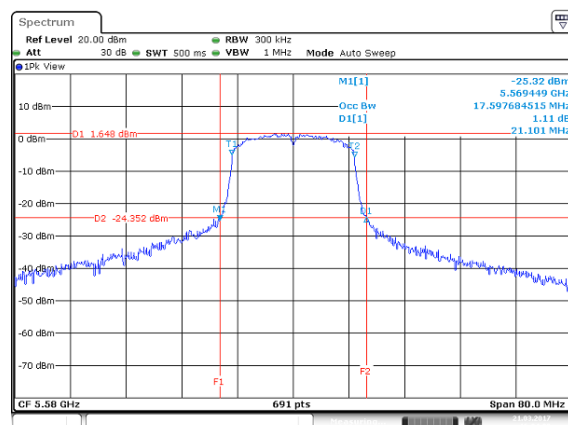


UNII-2c IEEE 802.11n HT20 mode- chain 0

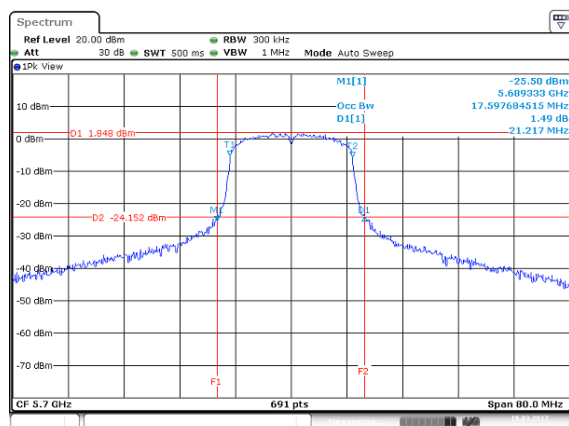
Low CH



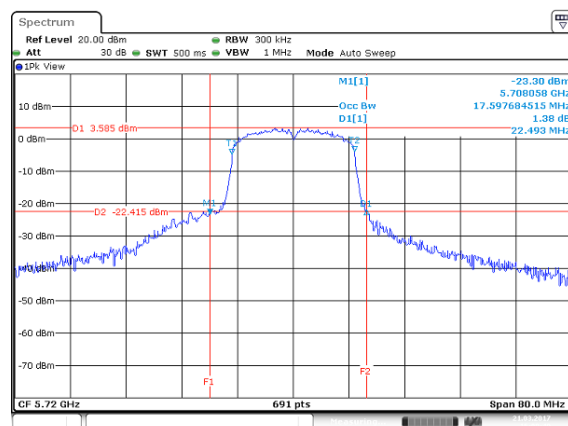
Mid CH



High CH

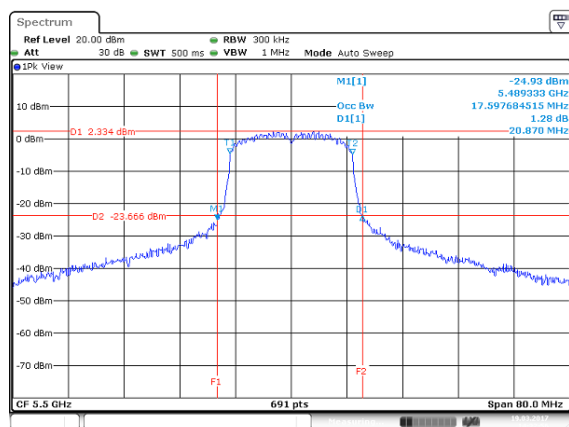


Cross CH



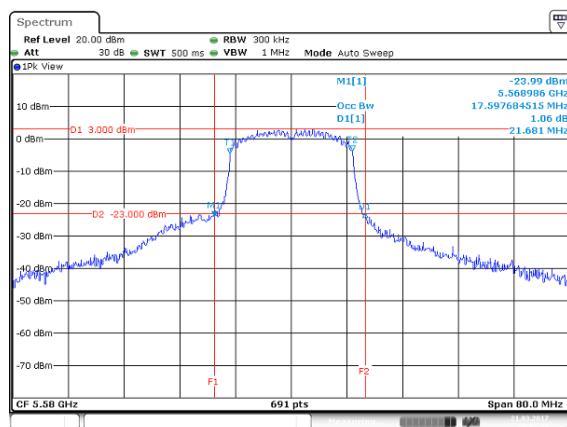
UNII-2c IEEE 802.11n HT20 mode- chain 1

Low CH



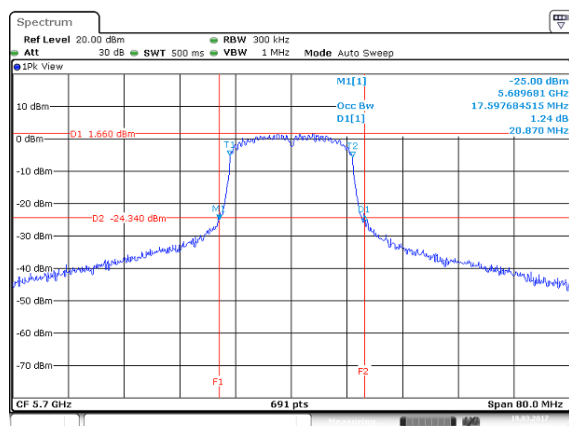
Date: 19 MAR 2017 14:32:57

Mid CH



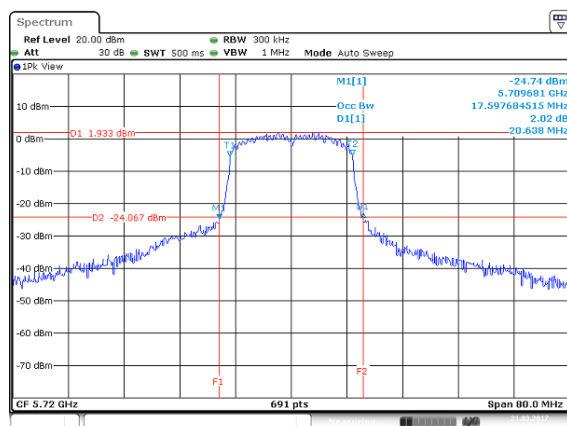
Date: 21 MAR 2017 16:05:27

High CH



Date: 19 MAR 2017 14:40:09

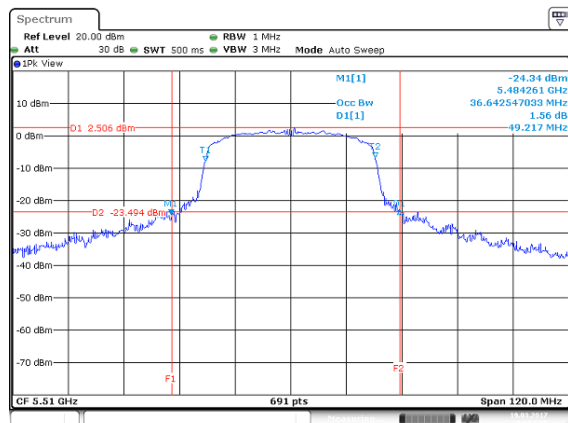
Cross CH



Date: 21 MAR 2017 16:06:21

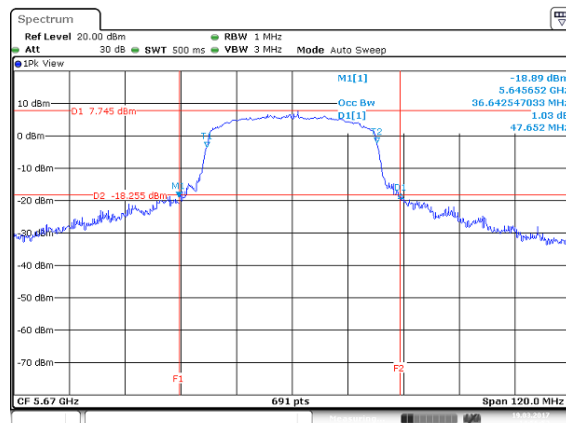
UNII-2c IEEE 802.11n HT40 mode- chain 0

Low CH



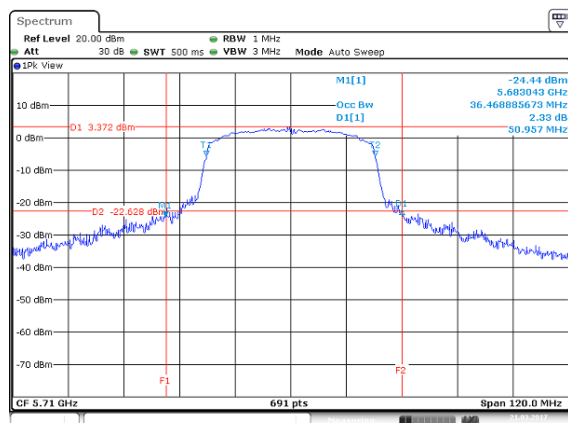
Date: 19 MAR 2017 14:54:55

High CH



Date: 19 MAR 2017 14:56:54

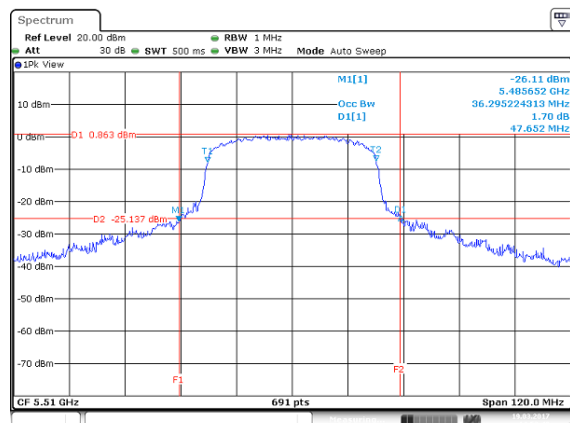
Cross CH



Date: 21 MAR 2017 15:59:29

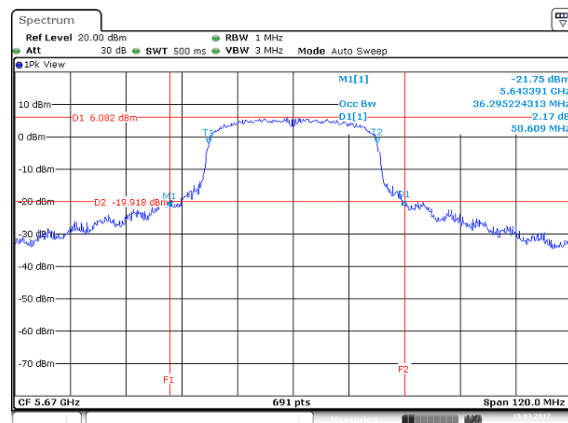
UNII-2c IEEE 802.11n HT40 mode- chain 1

Low CH



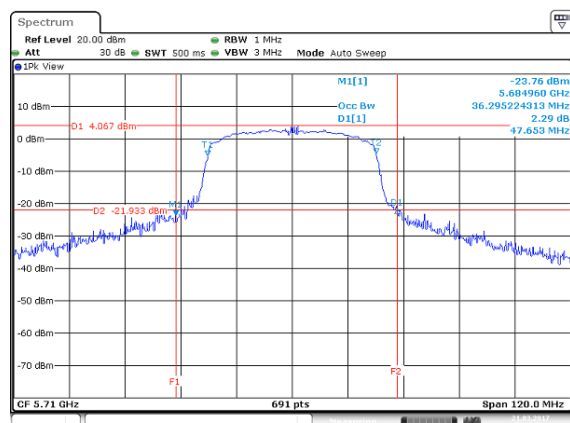
Date: 19 MAR 2017 14:52:49

High CH



Date: 19 MAR 2017 14:58:36

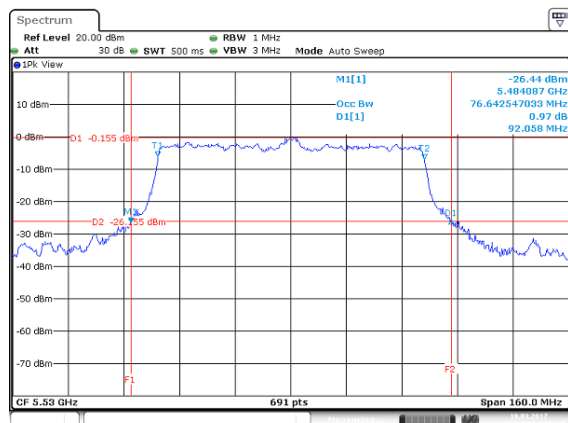
Cross CH



Date: 21 MAR 2017 14:21:59

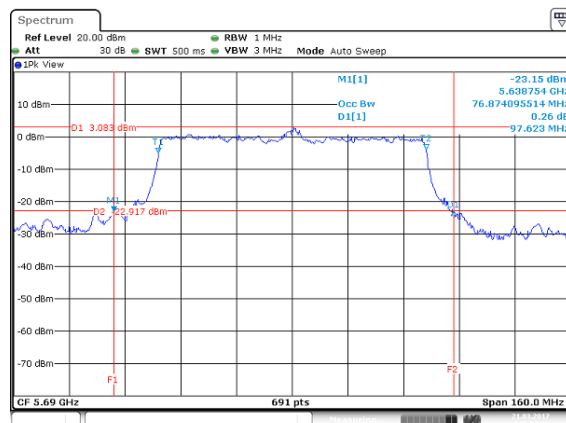
UNII-2c IEEE 802.11ac VHT80 mode- chain 0

Mid CH



Date: 19 MAR 2017 15:56:05

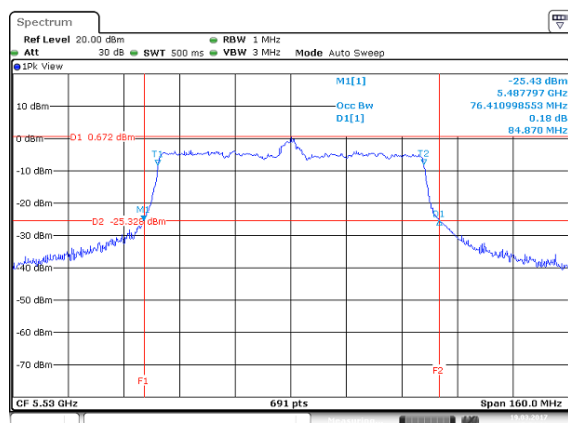
Cross CH



Date: 21 MAR 2017 15:57:29

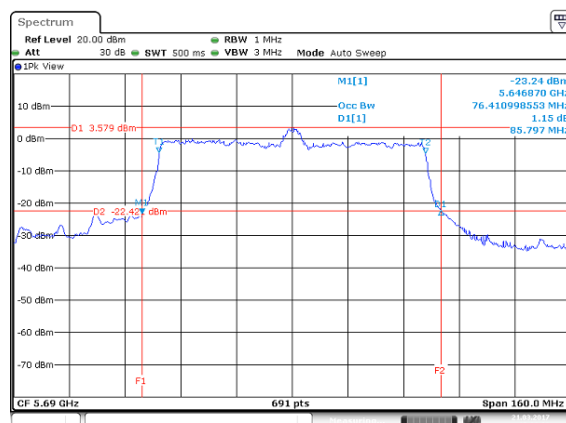
UNII-2c IEEE 802.11ac VHT80 mode- chain 1

Mid CH



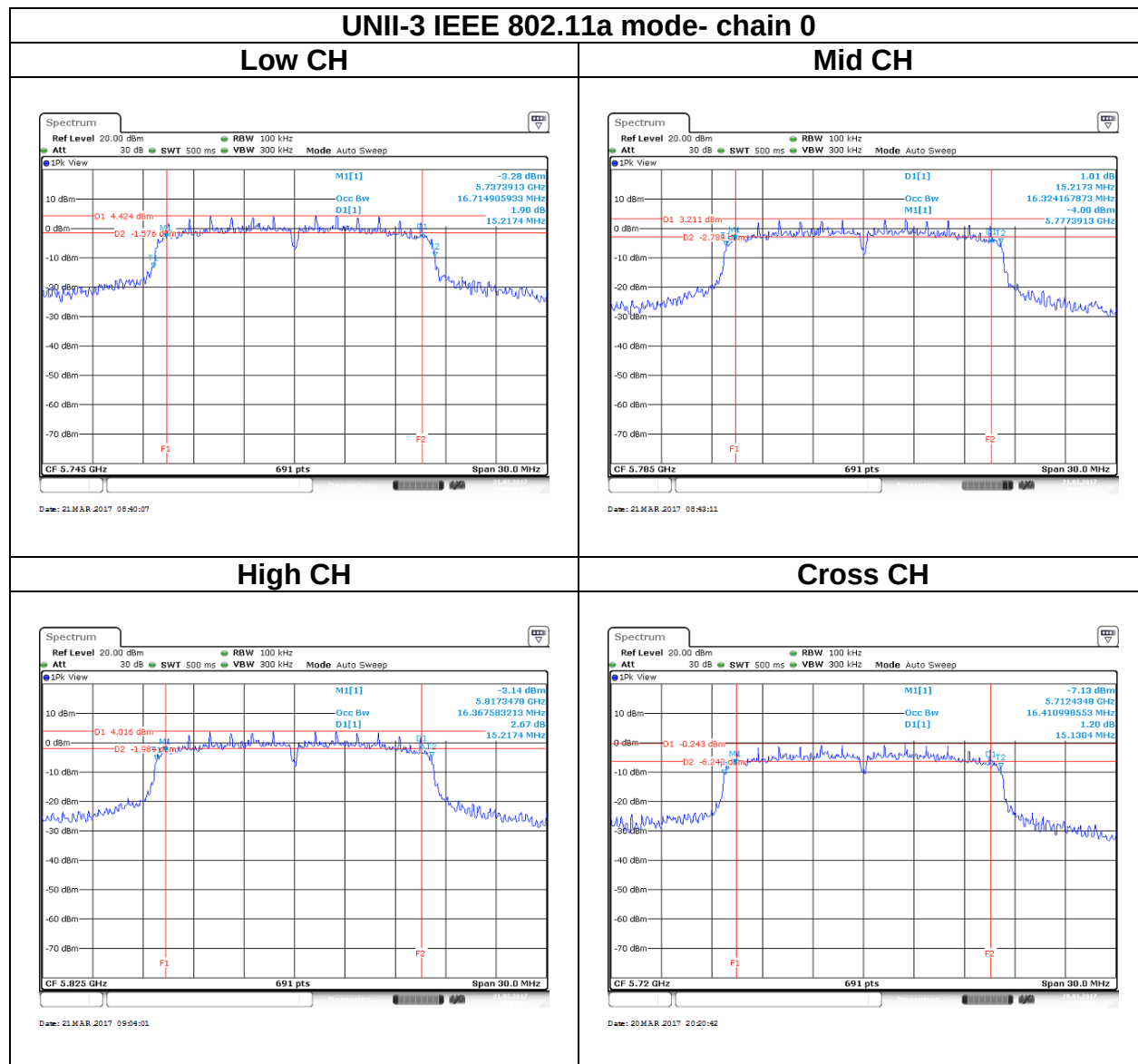
Date: 19 MAR 2017 15:54:28

Cross CH



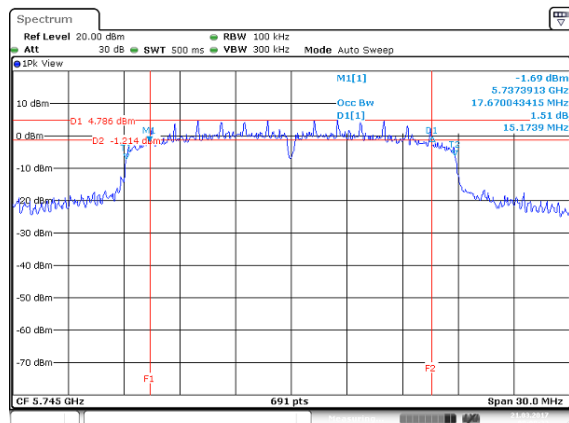
Date: 21 MAR 2017 15:56:34

Test Data

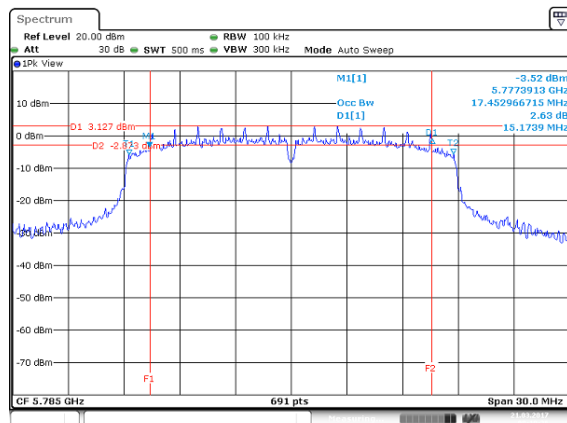


UNII-3 IEEE 802.11n HT20 mode- chain 0

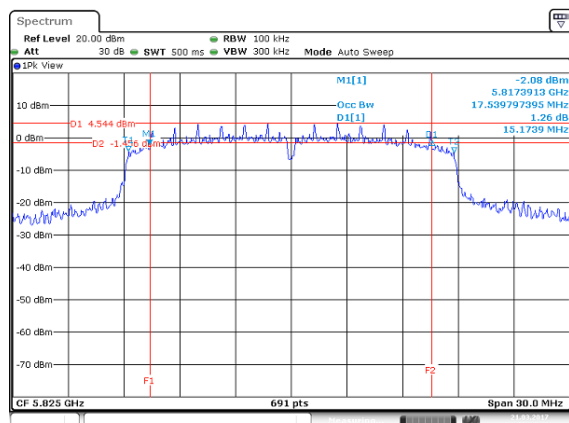
Low CH



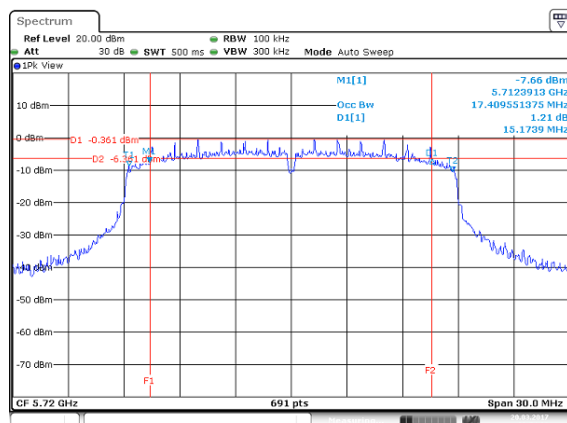
Mid CH



High CH

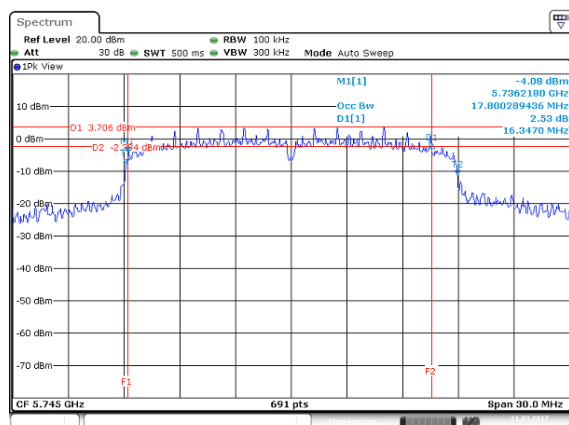


Cross CH

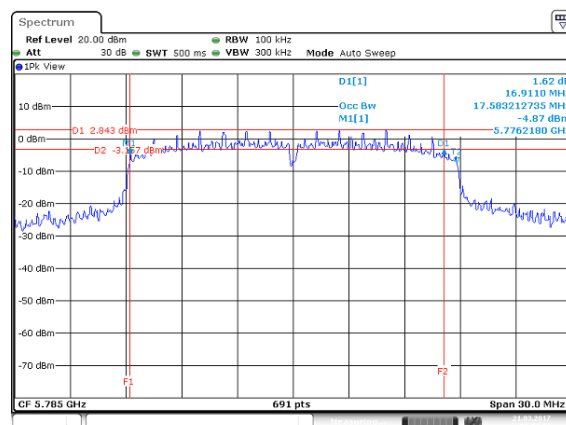


UNII-3 IEEE 802.11n HT20 mode- chain 1

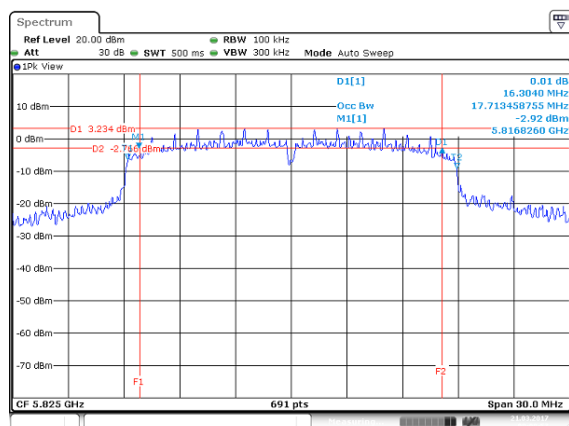
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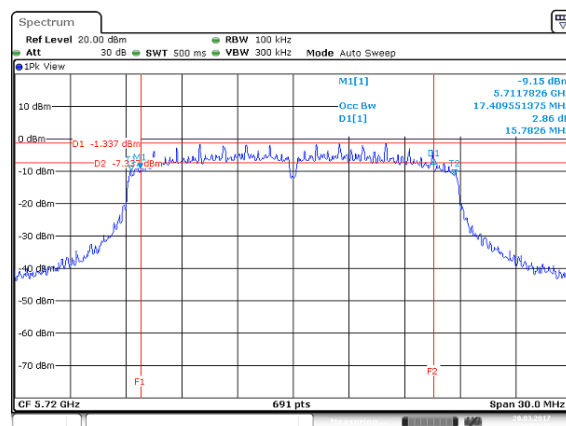
Mid CH



High CH

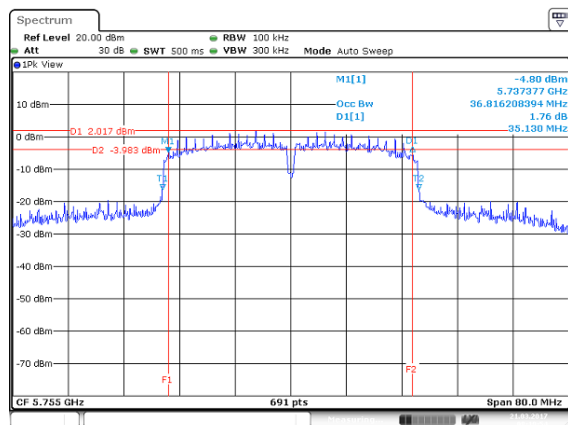


Cross CH



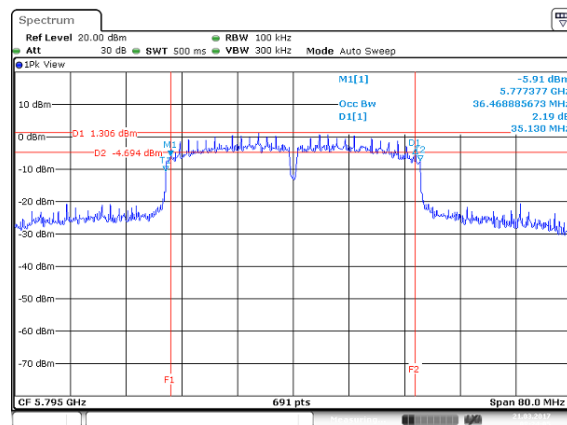
UNII-3 IEEE 802.11n HT40 mode- chain 0

Low CH



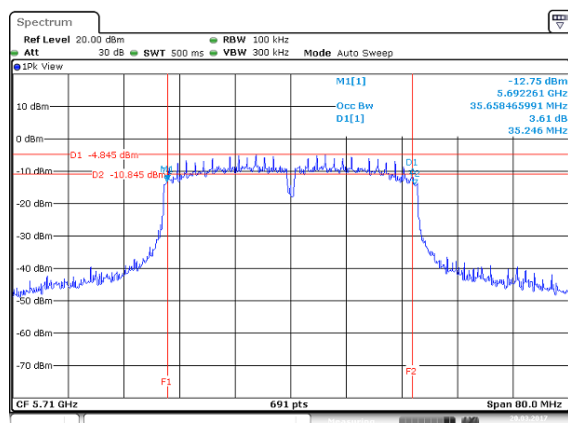
Date: 21 MAR 2017 08:19:54

High CH



Date: 21 MAR 2017 08:24:06

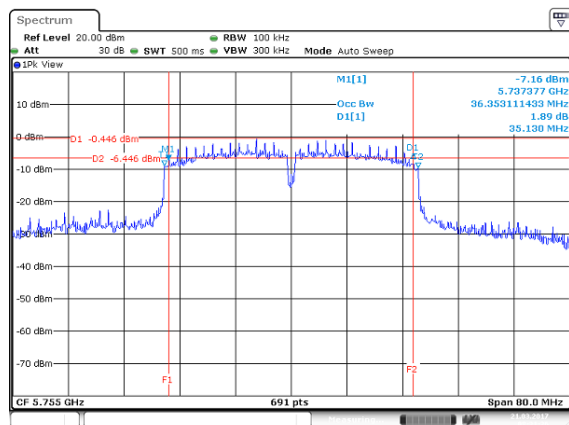
Cross CH



Date: 20 MAR 2017 20:50:00

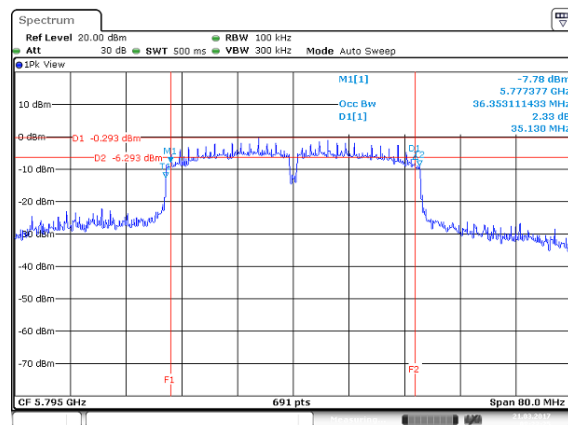
UNII-3 IEEE 802.11n HT40 mode- chain 1

Low CH



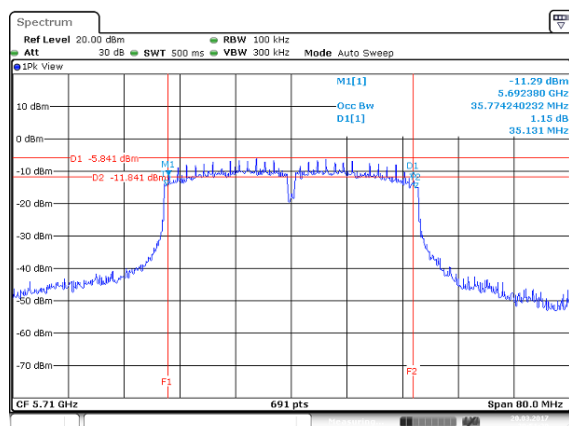
Date: 21 MAR 2017 08:21:37

High CH



Date: 21 MAR 2017 08:23:25

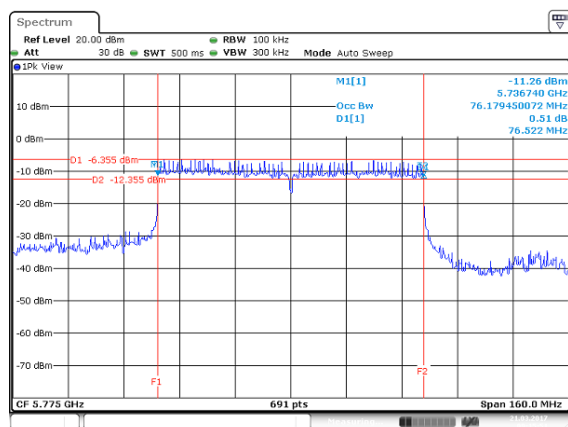
Cross CH



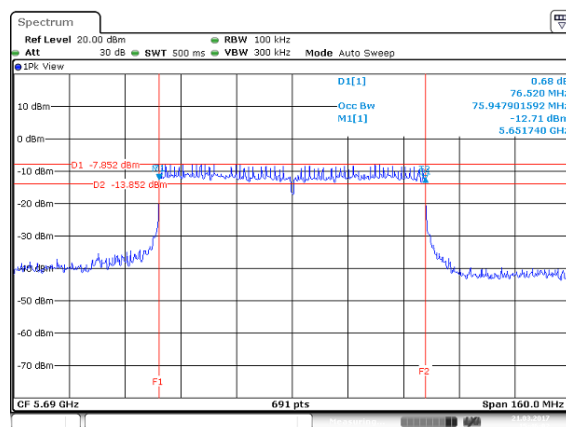
Date: 20 MAR 2017 20:51:29

UNII-3 IEEE 802.11ac VHT80 mode- chain 0

Mid CH

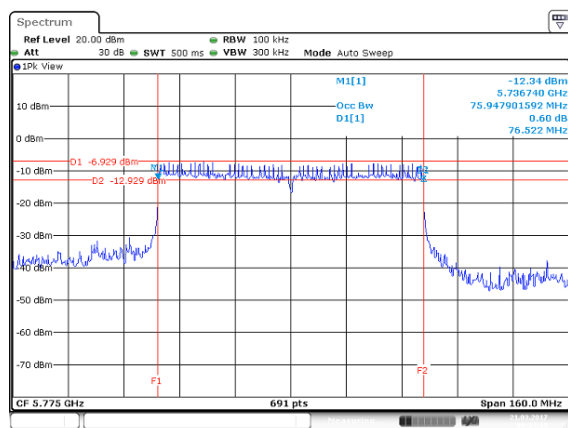


Cross CH



UNII-3 IEEE 802.11ac VHT80 mode- chain 1

Mid CH



Cross CH

