

FCC 47 CFR PART 15 SUBPART E

TEST REPORT

For

WLAN + BT Combo Module

Model: WCBN4511R

Trade Name: LITE-ON

Issued to

Lite-On Technology Corp.
Bldg. C, 90, Chien 1 Road, Chung Ho, New Taipei City 23585, Taiwan,
R.O.C

Issued by

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Issued Date: July 20, 2016



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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	July 20, 2016	Initial Issue	ALL	Doris Chu
01	August 24, 2016	1. Added Product SW/HW version, Radio SW/HW version, Test SW Version. 2. Added the worst case power setting parameter. 3. Added 99% bandwidth. 4. Modify peak power spectral density to added duty cycle and duty factor.	P.5, P.10 ~ P.12, P.18 ~ P.56, P.159 ~ P.161	Doris Chu

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1. TEST RESULT CERTIFICATION

Applicant: Lite-On Technology Corp.
Bldg. C, 90, Chien 1 Road, Chung Ho, New Taipei City 23585,
Taiwan, R.O.C

Equipment Under Test: WLAN + BT Combo Module

Model Number: WCBN4511R

Trade Name: LITE-ON

Date of Test: June 20 ~ July 6, 2016

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 15 Subpart E	No non-compliance noted

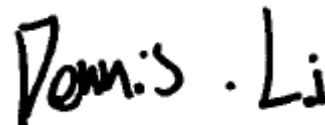
We hereby certify that:

Compliance Certification Services Inc. tested the above equipment. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10: 2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.407.

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

Approved by:

Tested by:



Miller Lee
Manager
Compliance Certification Services Inc.

Dennis Li
Engineer
Compliance Certification Services Inc.

2. EUT DESCRIPTION

Product	WLAN + BT Combo Module				
Model Number	WCBN4511R				
Trade Name	LITE-ON				
Model Discrepancy	N/A				
Received Date	June 8, 2016				
Power supply	Powered from host device.				
Operating Frequency Range & Number of Channels	U-NII-1	IEEE 802.11a	5180 ~ 5240	4 Channels	
		IEEE 802.11n HT 20 MHz	5180 ~ 5240	4 Channels	
	U-NII-2A	IEEE 802.11n HT 40 MHz	5190 ~ 5230	2 Channels	
		IEEE 802.11ac VHT 80 MHz	5210	1 Channels	
		IEEE 802.11a	5260 ~ 5320	4 Channels	
	U-NII-2A	IEEE 802.11n HT 20 MHz	5260 ~ 5320	4 Channels	
		IEEE 802.11n HT 40 MHz	5270 ~ 5310	2 Channels	
		IEEE 802.11ac VHT 80 MHz	5290	1 Channels	
	U-NII-2C	IEEE 802.11a	5500 ~ 5700	8 Channels	
		IEEE 802.11n HT 20 MHz	5500 ~ 5700	8 Channels	
		IEEE 802.11n HT 40 MHz	5510 ~ 5670	5 Channels	
		IEEE 802.11ac VHT 80 MHz	5530	1 Channels	
	Transmit Power	U-NII-1	IEEE 802.11a	5180 ~ 5240	18.63
IEEE 802.11n HT 20 MHz			5180 ~ 5240	18.23	0.0665
IEEE 802.11n HT 40 MHz			5190 ~ 5230	17.30	0.0537
IEEE 802.11ac VHT 80 MHz			5210	12.62	0.0183
U-NII-2A		IEEE 802.11a	5260 ~ 5320	18.47	0.0703
		IEEE 802.11n HT 20 MHz	5260 ~ 5320	16.50	0.0447
		IEEE 802.11n HT 40 MHz	5270 ~ 5310	16.46	0.0443
		IEEE 802.11ac VHT 80 MHz	5290	14.26	0.0267
U-NII-2C		IEEE 802.11a	5500 ~ 5700	19.05	0.0804
		IEEE 802.11n HT 20 MHz	5500 ~ 5700	18.01	0.0632
		IEEE 802.11n HT 40 MHz	5510 ~ 5670	18.66	0.0735
		IEEE 802.11ac VHT 80 MHz	5530	14.03	0.0253
Modulation Technique		OFDM (256QAM, 64QAM, 16QAM, QPSK, BPSK)			
Antenna Specification	LITE-ON / WCBN4511R PIFA Antenna ANT-L: Gain: 2.94dBi ANT-R: Gain: 3.35dBi				
Product SW/HW version	V02/V02				
Radio SW version	V02/V02				
Radio HW version	V1.0.3.19				

Remark: 1. The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10: 2013 and FCC CFR 47 Part 15.207, 15.209, 15.407, KDB 644545 D03 v01 and KDB 789033 D02 v01r02 General UNII Test Procedures New Rules v01r02.

3.1 EUT CONFIGURATION

The EUT configuration for testing is installed for RF field strength measurement to meet the Commissions requirement, and is operated in a manner intended to generate the maximum emission in a continuous normal application.

3.2 EUT EXERCISE

The EUT is operated in the engineering mode to fix the Tx frequency for the purposes of measurement.

According to its specifications, the EUT must comply with the requirements of Section 15.407 under the FCC Rules Part 15 Subpart E.

3.3 GENERAL TEST PROCEDURES

Conducted Emissions

According to the requirements in ANSI C63.10: 2013, the conducted emission from the EUT is measured in the frequency range between 0.15 MHz and 30MHz, using the CISPR Quasi-Peak detector mode.

Radiated Emissions

The EUT is placed on the turntable, which is 1.5 m above the ground plane. The turntable is then rotated for 360 degrees to determine the proper orientation for the maximum emission level. The EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission level. And, each emission is to be maximized by changing the horizontal and vertical polarization of the receiving antenna. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in ANSI C63.10: 2013.

3.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	(²)
13.36 - 13.41	322 - 335.4		

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

3.5 DESCRIPTION OF TEST MODES

The EUT (model: WCBN4511R) had been tested under operating condition.

The EUT is a 2x2 configuration spatial MIMO (2Tx & 2Rx) without beam forming function that operate in double TX chains and double RX chains. The 2x2 configuration is implemented with two outside TX & RX chains (Chain 0 and 1).

Software used to control the EUT for staying in continuous transmitting mode was programmed.

After verification, all tests were carried out with the worst case test modes as shown below except radiated spurious emission below 1GHz, which worst case was in normal link mode only.

U-NII-1:

IEEE 802.11a for 5180 ~ 5240MHz:

Channel Low (5180MHz), Channel Mid (5220MHz) and Channel High (5240MHz) with 6Mbps data rate were chosen for full testing.

IEEE 802.11n HT 20 MHz for 5180 ~ 5240MHz:

Channel Low (5180MHz), Channel Mid (5220MHz) and Channel High (5240MHz) with 6.5Mbps data rate were chosen for full testing.

IEEE 802.11n HT 40 MHz Channel for 5190 ~ 5230MHz:

Channel Low (5190MHz) and Channel High (5230MHz) with 13.5Mbps data rate were chosen for full testing.

IEEE 802.11ac VHT 80 MHz Channel for 5210MHz:

Channel Mid (5210MHz) with 29.3Mbps data rate were chosen for full testing.

U-NII-2A:

IEEE 802.11a for 5260 ~ 5320MHz:

Channel Low (5260MHz), Channel Mid (5280MHz) and Channel High (5320MHz) with 6Mbps data rate were chosen for full testing.

IEEE 802.11n HT 20 MHz for 5260 ~ 5320MHz:

Channel Low (5260MHz), Channel Mid (5280MHz) and Channel High (5320MHz) with 6.5Mbps data rate were chosen for full testing.

IEEE 802.11n HT 40 MHz for 5270 ~ 5310MHz:

Channel Low (5270MHz) and Channel High (5310MHz) with 13.5Mbps data rate were chosen for full testing.

IEEE 802.11ac VHT 80 MHz for 5290MHz:

Channel Mid (5290MHz) with 13.5Mbps data rate was chosen for full testing.

U-NII-2C:**IEEE 802.11a for 5500 ~ 5700MHz:**

Channel Low (5500MHz), Channel Mid (5580MHz) and Channel High (5700MHz) with 6Mbps data rate were chosen for full testing.

IEEE 802.11n HT 20 MHz for 5500 ~ 5700MHz:

Channel Low (5500MHz), Channel Mid (5580MHz) and Channel High (5700MHz) with 6.5Mbps data rate were chosen for full testing.

IEEE 802.11n HT 40 MHz for 5510 ~ 5670MHz:

Channel Low (5510MHz), Channel Mid (5550MHz) and Channel High (5670MHz) with 13.5Mbps data rate were chosen for full testing.

IEEE 802.11ac VHT 80 MHz for 5530MHz:

Channel Low (5530MHz) with 13.5Mbps data rate was chosen for full testing.

The field strength of spurious emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in lie-down position (Y axis) and the worst case was recorded.

3.6 THE WORST CASE POWER SETTING PARAMETER

Test mode: IEEE 802.11a mode / 5180 ~ 5240MHz

Channel	Frequency (MHz)	RF power setting in TEST SW (Chin 0)	RF power setting in TEST SW (Chin 1)
Low	5180	20	20
Mid	5220	1E	1E
High	5240	23	23

Test mode: IEEE 802.11n HT 20 MHz mode / 5180 ~ 5240MHz

Channel	Frequency (MHz)	RF power setting in TEST SW (Chin 0)	RF power setting in TEST SW (Chin 1)
Low	5180	24	24
Mid	5220	21	21
High	5240	21	21

Test mode: IEEE 802.11n HT 40 MHz mode / 5190 ~ 5230MHz

Channel	Frequency (MHz)	RF power setting in TEST SW (Chin 0)	RF power setting in TEST SW (Chin 1)
Low	5190	1B	1B
High	5230	23	23

Test mode: IEEE 802.11ac VHT 80 MHz mode / 5210MHz

Channel	Frequency (MHz)	RF power setting in TEST SW (Chin 0)	RF power setting in TEST SW (Chin 1)
Mid	5210	1C	1C

Test mode: IEEE 802.11a mode / 5260 ~ 5320MHz

Channel	Frequency (MHz)	RF power setting in TEST SW (Chin 0)	RF power setting in TEST SW (Chin 1)
Low	5260	23	23
Mid	5280	1C	1C
High	5320	1B	1B

Test mode: IEEE 802.11n HT 20 MHz mode / 5260 ~ 5320MHz

Channel	Frequency (MHz)	RF power setting in TEST SW (Chin 0)	RF power setting in TEST SW (Chin 1)
Low	5260	20	20
Mid	5280	1F	1F
High	5320	1F	1F

Test mode: IEEE 802.11n HT 40 MHz mode / 5270 ~ 5310MHz

Channel	Frequency (MHz)	RF power setting in TEST SW (Chin 0)	RF power setting in TEST SW (Chin 1)
Low	5270	21	21
High	5310	1C	1C

Test mode: IEEE 802.11ac VHT 80 MHz mode / 5290MHz

Channel	Frequency (MHz)	RF power setting in TEST SW (Chin 0)	RF power setting in TEST SW (Chin 1)
Mid	5290	20	20

Test mode: IEEE 802.11a mode / 5500 ~ 5700MHz

Channel	Frequency (MHz)	RF power setting in TEST SW (Chin 0)	RF power setting in TEST SW (Chin 1)
Low	5500	1C	1C
Mid	5580	22	22
High	5700	1D	1D

Test mode: IEEE 802.11n HT 20 MHz mode / 5500 ~ 5720MHz

Channel	Frequency (MHz)	RF power setting in TEST SW (Chin 0)	RF power setting in TEST SW (Chin 1)
Low	5500	22	22
Mid	5580	22	22
High	5700	20	20

Test mode: IEEE 802.11n HT 40 MHz mode / 5510 ~ 5670MHz

Channel	Frequency (MHz)	RF power setting in TEST SW (Chin 0)	RF power setting in TEST SW (Chin 1)
Low	5510	1A	1A
Mid	5550	22	22
High	5670	25	25

Test mode: IEEE 802.11ac VHT 80 MHz mode / 5530MHz

Channel	Frequency (MHz)	RF power setting in TEST SW (Chin 0)	RF power setting in TEST SW (Chin 1)
Mid	5530	1E	1E

4. INSTRUMENT CALIBRATION

4.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

4.2 MEASUREMENT EQUIPMENT USED

Equipment Used for Emissions Measurement

Conducted Emissions Test Site					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
DC Power Supplies	GW Instek	SPS-3610	GPE880163	01/19/2016	01/18/2017
Power Meter	Anritsu	ML2495A	1012009	07/04/2016	07/03/2017
Power Sensor	Anritsu	MA2411B	917072	07/04/2016	07/03/2017
Signal Analyzer	R&S	FSV 40	101073	07/20/2015	07/19/2016
Spectrum Analyzer	Agilent	E4446A	US42510268	02/15/2016	02/14/2017
Thermostatic/Hrgrosatic Chamber	TAICHY	MHG-150LF	930619	10/08/2015	10/07/2016
Vector Signal Generator	R&S	SMU 200A	102239	03/10/2016	03/09/2017
AC Power Source	EXTECH	6205	1140845	N.C.R	N.C.R

Wugu 966 Chamber A					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Bilog Antenna	Sunol Sciences	JB3	A030105	08/06/2015	08/05/2016
EMI Test Receiver	R&S	ESCI	100064	05/31/2016	05/30/2017
Horn Antenna	EMCO	3117	55165	02/24/2016	02/23/2017
Horn Antenna	EMCO	3116	26370	01/15/2016	01/14/2017
K Type Cable	Huber+Suhner	SUCOFLEX 102	29406/2	01/12/2016	01/11/2017
K Type Cable	Huber+Suhner	SUCOFLEX 102	22470/2	01/12/2016	01/11/2017
Pre-Amplifier	MITEQ	AMF-6F-2604 00-40-8P	985646	01/14/2016	01/13/2017
Pre-Amplifier	EMCI	EMC 012635	980151	06/23/2016	06/22/2017
Pre-Amplifier	EMCI	EM330	N/A	06/08/2016	06/07/2017
Spectrum Analyzer	Agilent	E4446A	US42510252	12/08/2015	12/07/2016
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
Software	EZ-EMC (CCS-3A1RE)				

Conducted Emission Room # B					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
EMI Test Receiver	R&S	ESCI	101073	09/09/2015	09/08/2016
LISN	SCHWARZBECK	NSLK 8127	8127-541	11/23/2015	11/22/2016
LISN	R&S	ENV216	101054	05/11/2016	05/10/2017
Capacitive Voltage Probe	FCC	F-CVP-1	100185	03/09/2016	03/08/2017
Test S/W	CCS-3A1-CE				

4.3 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
Powerline Conducted Emission	+/- 1.2575
3M Semi Anechoic Chamber / 30M~200M	+/- 4.0138
3M Semi Anechoic Chamber / 200M~1000M	+/- 3.9483
3M Semi Anechoic Chamber / 1G~8G	+/- 2.5975
3M Semi Anechoic Chamber / 8G~18G	+/- 2.6112
3M Semi Anechoic Chamber / 18G~26G	+/- 2.7389
3M Semi Anechoic Chamber / 26G~40G	+/- 2.9683

Remark: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

- No.199, Chunghsen Road, Hsintien City, Taipei Hsien, Taiwan, R.O.C.
Tel: 886-2-2217-0894 / Fax: 886-2-2217-1029
- No.11, Wugong 6th Rd., Wugu Dist., New Taipei City 24891, Taiwan. (R.O.C.)
Tel: 886-2-2299-9720 / Fax: 886-2-2298-4045
- No.81-1, Lane 210, Bade 2nd Rd., Luchu Hsiang, Taoyuan Hsien 338, Taiwan
Tel: 886-3-324-0332 / Fax: 886-3-324-5235

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.10: 2013 and CISPR Publication 22.

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, ridged waveguide, horn and/or Loop. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.




Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

5.3 LABORATORY ACCREDITATIONS AND LISTING

The test facilities used to perform radiated and conducted emissions tests are accredited by American Association for Laboratory Accreditation Program for the specific scope accreditation under Lab Code: 0824-01 to perform Electromagnetic Interference tests according to FCC Part 15 and CISPR 22 requirements. In addition, the test facilities are listed with Industry Canada, Certification and Engineering Bureau, IC 2324G-1 for 3M Semi Anechoic Chamber A, 2324G-2 for 3M Semi Anechoic Chamber B.

5.4 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
Taiwan	TAF	LP0002, RTTE01, FCC Method-47 CFR Part 15 Subpart C, D, E, RSS-247, RSS-310 IDA TS SRD, AS/NZS 4268, AS/NZS 4771, TS 12.1 & 12.2, ETSI EN 300 440-1, ETSI EN 300 440-2, ETSI EN 300 328, ETSI EN 300 220-1, ETSI EN 300 220-2, ETSI EN 301 893, ETSI EN 301 489-1/3/7/17 FCC OET Bulletin 65 + Supplement C, EN 50360, EN 50361, EN 50371, RSS 102, EN 50383, EN 50385, EN 50392, IEC 62209, CNS 14958-1, CNS 14959 FCC Method -47 CFR Part 15 Subpart B IEC / EN 61000-3-2, IEC / EN 61000-3-3, IEC / EN 61000-4-2/3/4/5/6/8/11	 Testing Laboratory 1309
Canada	Industry Canada	3M Semi Anechoic Chamber (IC 2324G-1 / IC 2324G-2) to perform	 IC 2324G-1 IC 2324G-2

** No part of this report may be used to claim or imply product endorsement by A2LA or any agency of the US Government.*

6. SETUP OF EQUIPMENT UNDER TEST

6.1 SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix I for the actual connections between EUT and support equipment.

6.2 SUPPORT EQUIPMENT

No	Equipment	Brand	Model	Series No.	FCC ID	Data Cable	Power Cord
1	Notebook PC	ASUS	M5200AE	5BN0AG019631	PD9WM3B2100	N/A	AC I/P: Unshielded, 1.8m with a core DC O/P: Unshielded, 1.8m
2	Notebook PC	SONY	PCG-6GEP	J000WFF4	N/A	N/A	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core

Remark:

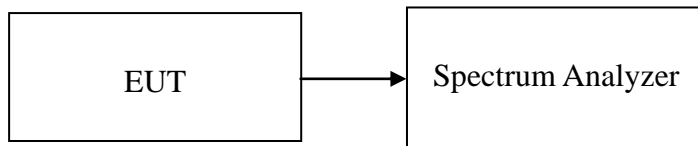
1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

7. FCC PART 15 REQUIREMENTS

7.1 99% BANDWIDTH

Test Configuration

TEST PROCEDURE



The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used since a peak or, peak hold.

TEST RESULTS

Test mode: IEEE 802.11a mode / 5180 ~ 5240MHz / Chain 0

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5180	17.2937
Mid	5220	17.0767
High	5240	18.8856

Test mode: IEEE 802.11a mode / 5180 ~ 5240MHz / Chain 1

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5180	17.0043
Mid	5220	16.8596
High	5240	17.2214

Test mode: IEEE 802.11n HT 20 MHz mode / 5180 ~ 5240MHz / Chain 0

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5180	18.6685
Mid	5220	18.6685
High	5240	17.9450

Test mode: IEEE 802.11n HT 20 MHz mode / 5180 ~ 5240MHz / Chain 1

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5180	17.8726
Mid	5220	17.8002
High	5240	17.7279

Test mode: IEEE 802.11n HT 40 MHz mode / 5190 ~ 5230MHz / Chain 0

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5190	36.5846
High	5230	37.0477

Test mode: IEEE 802.11n HT 40 MHz mode / 5190 ~ 5230MHz / Chain 1

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5190	36.5846
High	5230	38.3502

Test mode: IEEE 802.11ac VHT 80 MHz mode / 5210MHz / Chain 0

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Mid	5210	75.0217

Test mode: IEEE 802.11ac VHT 80 MHz mode / 5210MHz / Chain 1

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Mid	5210	75.0217

Test mode: IEEE 802.11a mode / 5260 ~ 5320MHz/ Chain 0

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5260	20.4052
Mid	5280	16.9319
High	5320	16.8596

Test mode: IEEE 802.11a mode / 5260 ~ 5320MHz/ Chain 1

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5260	17.2937
Mid	5280	16.9319
High	5320	16.9319

Test mode: IEEE 802.11n HT 20 MHz mode / 5260 ~ 5320MHz/ Chain 0

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5260	17.7279
Mid	5280	17.9450
High	5320	17.8002

Test mode: IEEE 802.11n HT 20 MHz mode / 5260 ~ 5320MHz/ Chain 1

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5260	17.7279
Mid	5280	17.7279
High	5320	17.8002

Test mode: IEEE 802.11n HT 40 MHz mode / 5270 ~ 5310MHz/ Chain 0

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5270	36.9319
High	5310	36.3531

Test mode: IEEE 802.11n HT 40 MHz mode / 5270 ~ 5310MHz/ Chain 1

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5270	37.1924
High	5310	36.7004

Test mode: IEEE 802.11ac VHT 80 MHz mode / 5290MHz / Chain 0

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Mid	5290	75.2532

Test mode: IEEE 802.11ac VHT 80 MHz mode / 5290MHz / Chain 1

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Mid	5290	75.0217

Test mode: IEEE 802.11a mode / 5500 ~ 5700MHz / Chain 0

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5500	16.8596
Mid	5580	28.6541
High	5700	17.2214

Test mode: IEEE 802.11a mode / 5500 ~ 5700MHz / Chain 1

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5500	16.6425
Mid	5580	28.4370
High	5700	16.9319

Test mode: IEEE 802.11n HT 20 MHz mode / 5500 ~ 5700MHz / Chain 0

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5500	17.9450
Mid	5580	27.8581
High	5700	17.8726

Test mode: IEEE 802.11n HT 20 MHz mode / 5500 ~ 5700MHz / Chain 1

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5500	17.9450
Mid	5580	20.9117
High	5700	17.8002

Test mode: IEEE 802.11n HT 40 MHz mode / 5510 ~ 5670MHz / Chain 0

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5510	36.4688
Mid	5550	47.0622
High	5670	47.0622

Test mode: IEEE 802.11n HT 40 MHz mode / 5510 ~ 5670MHz / Chain 1

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5510	36.5846
Mid	5550	60.7814
High	5670	44.2836

Test mode: IEEE 802.11ac VHT 80 MHz mode / 5530 MHz / Chain 0

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Mid	5530	75.0217

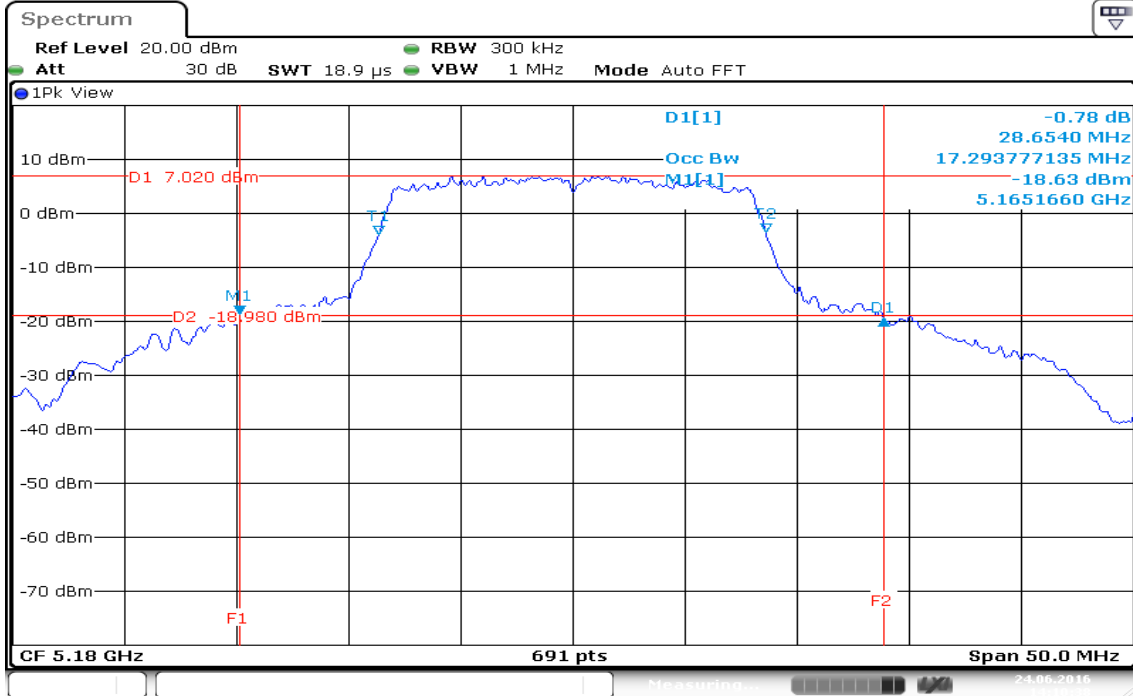
Test mode: IEEE 802.11ac VHT 80 MHz mode / 5530 MHz / Chain 1

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Mid	5530	75.2532

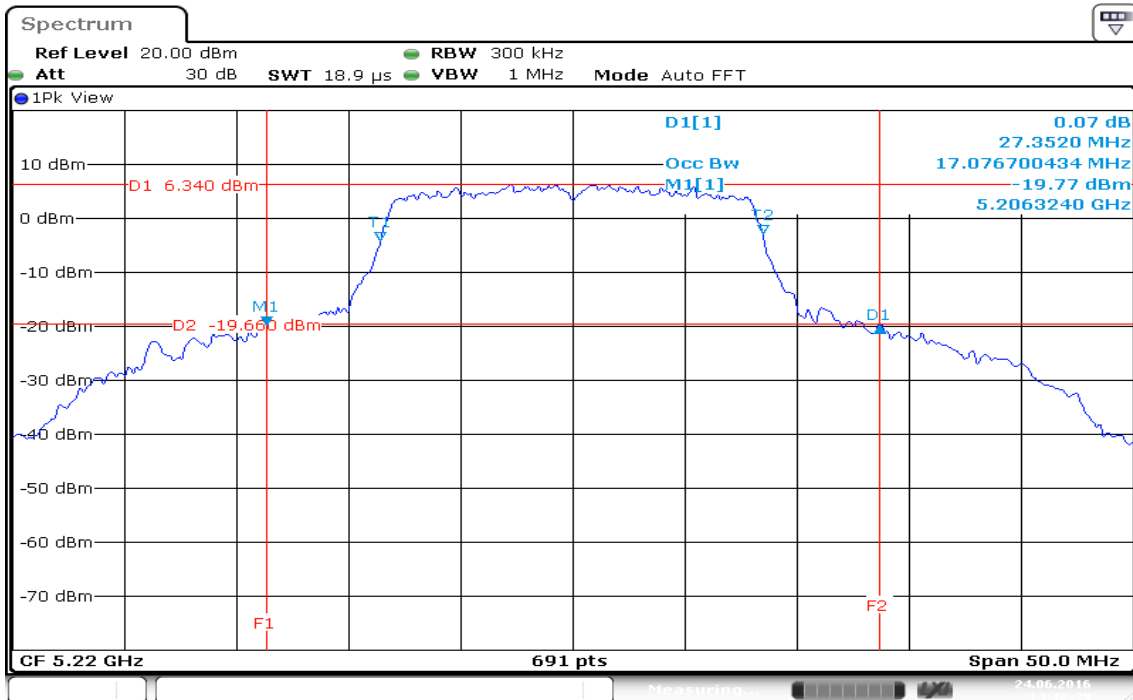
Test Plot

IEEE 802.11a for 5180 ~ 5240MHz/ Chain 0

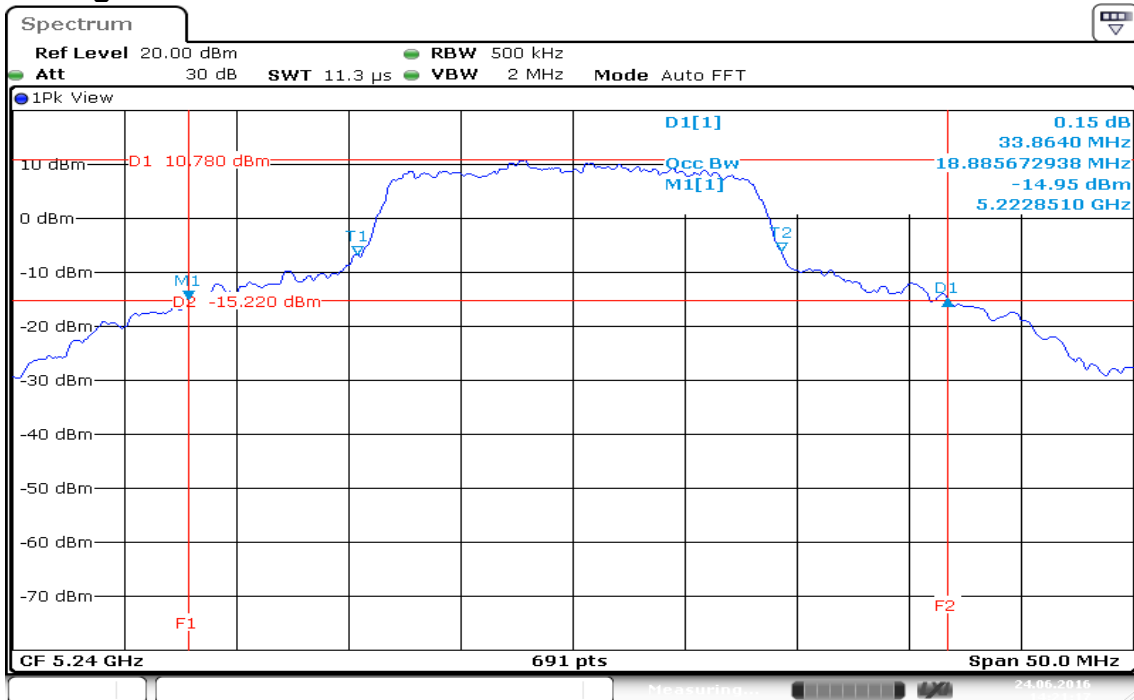
CH Low



CH Mid



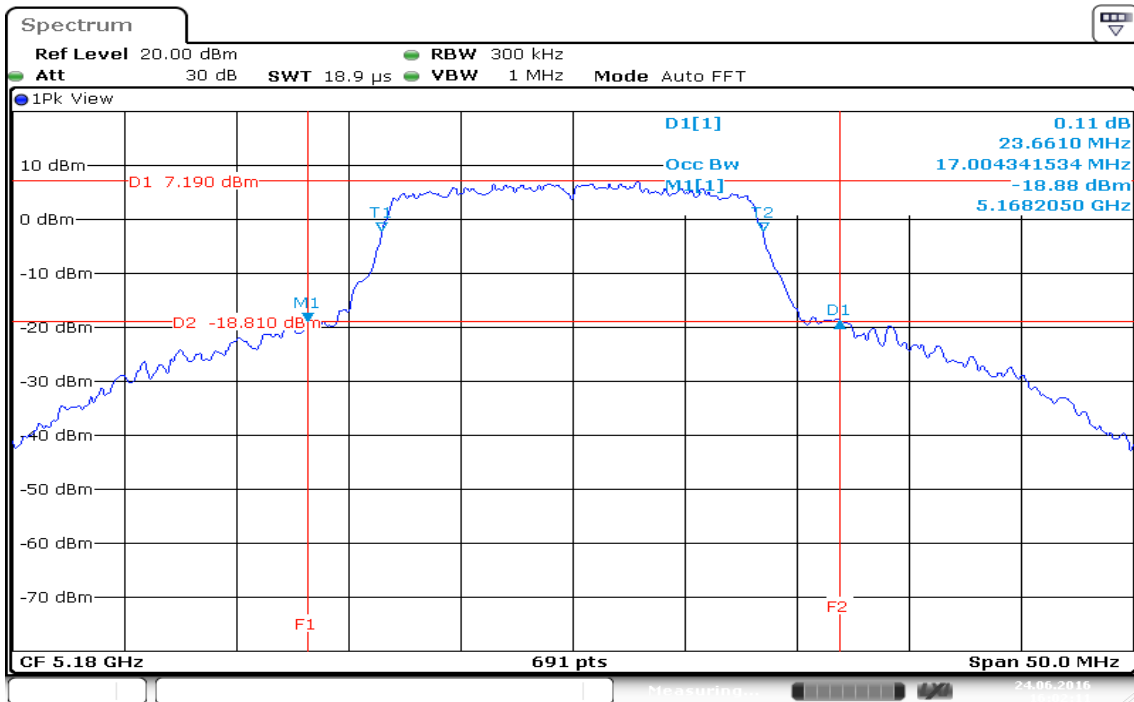
CH High



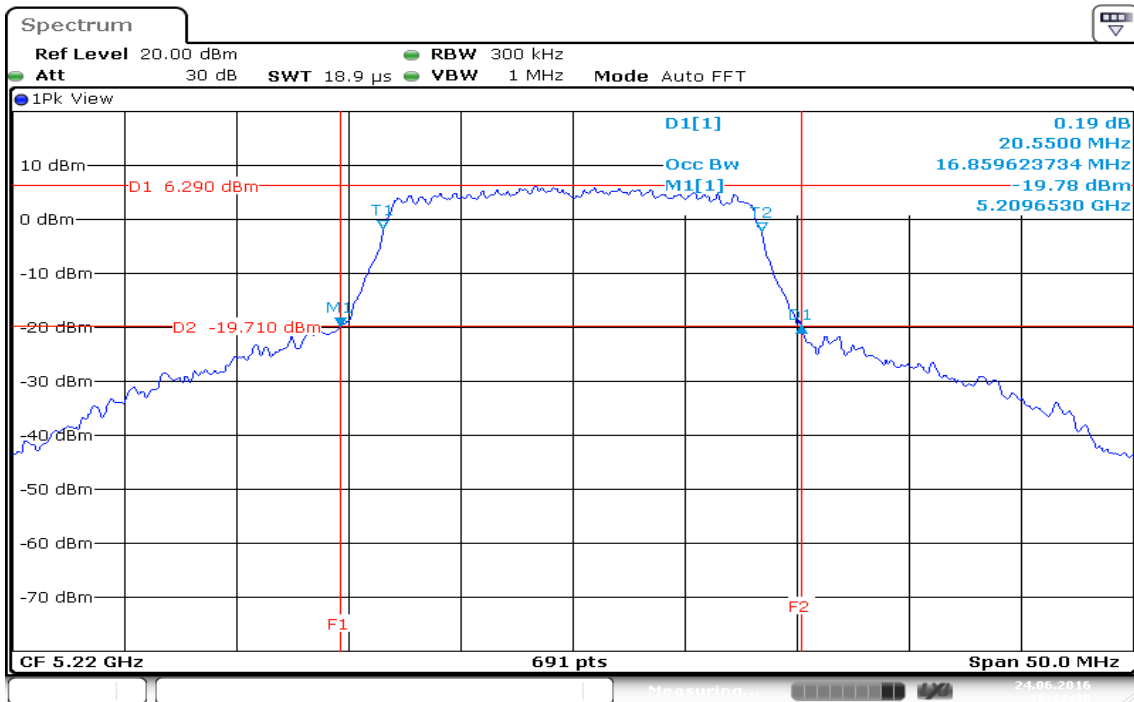
Date: 24.JUN.2016 14:21:18

IEEE 802.11a for 5180 ~ 5240MHz/ Chain 1

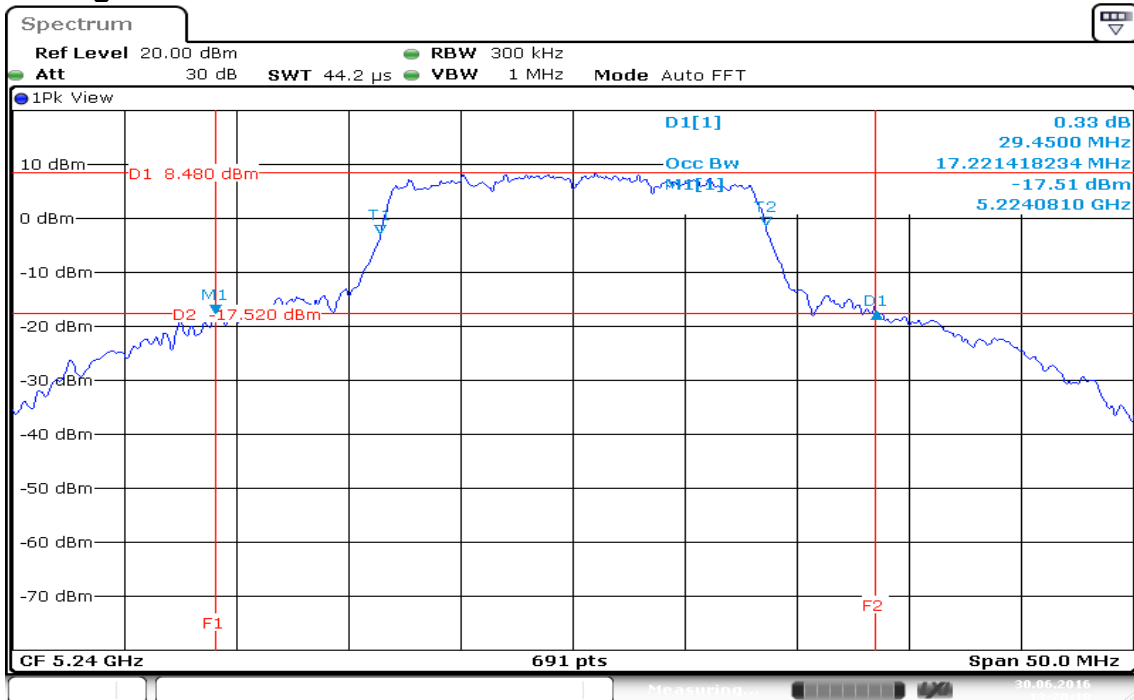
CH Low



CH Mid



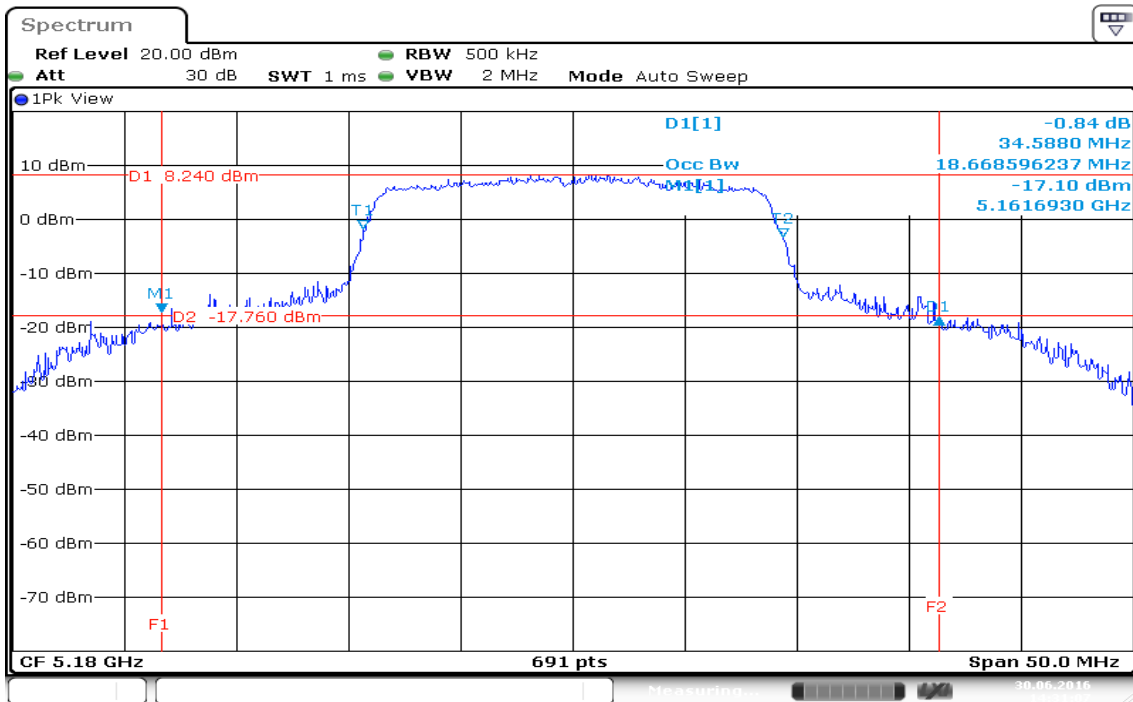
CH High



Date: 30 JUN 2016 13:20:18

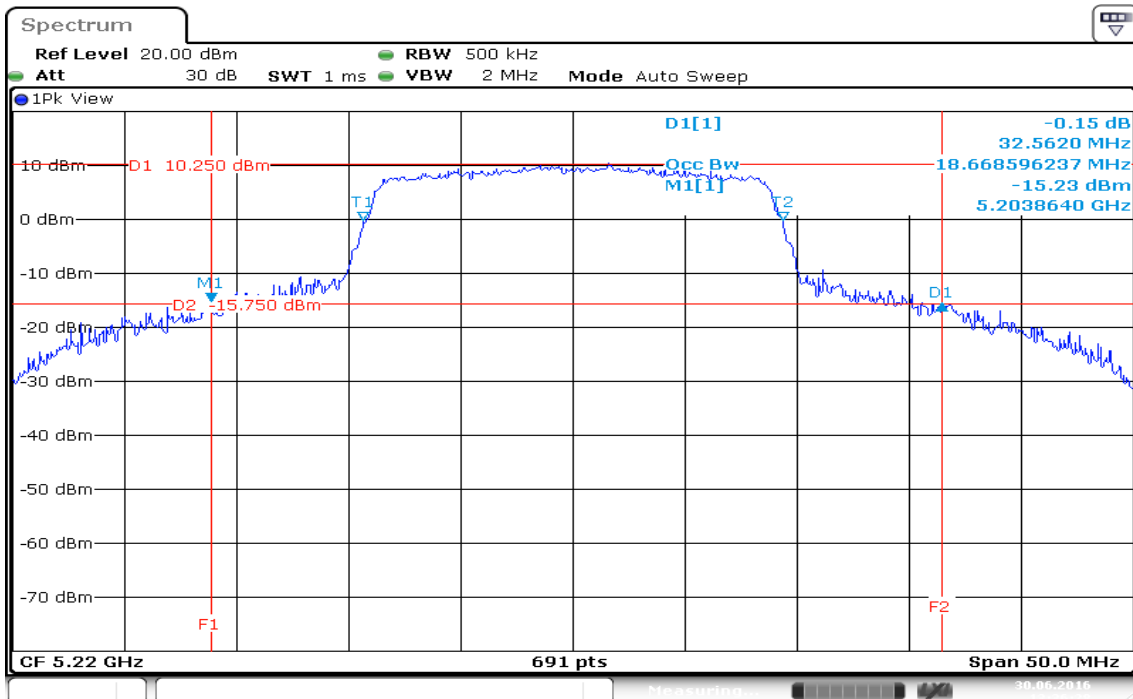
IEEE 802.11n HT 20 MHz mode / 5180 ~ 5240MHz/ Chain 0

CH Low



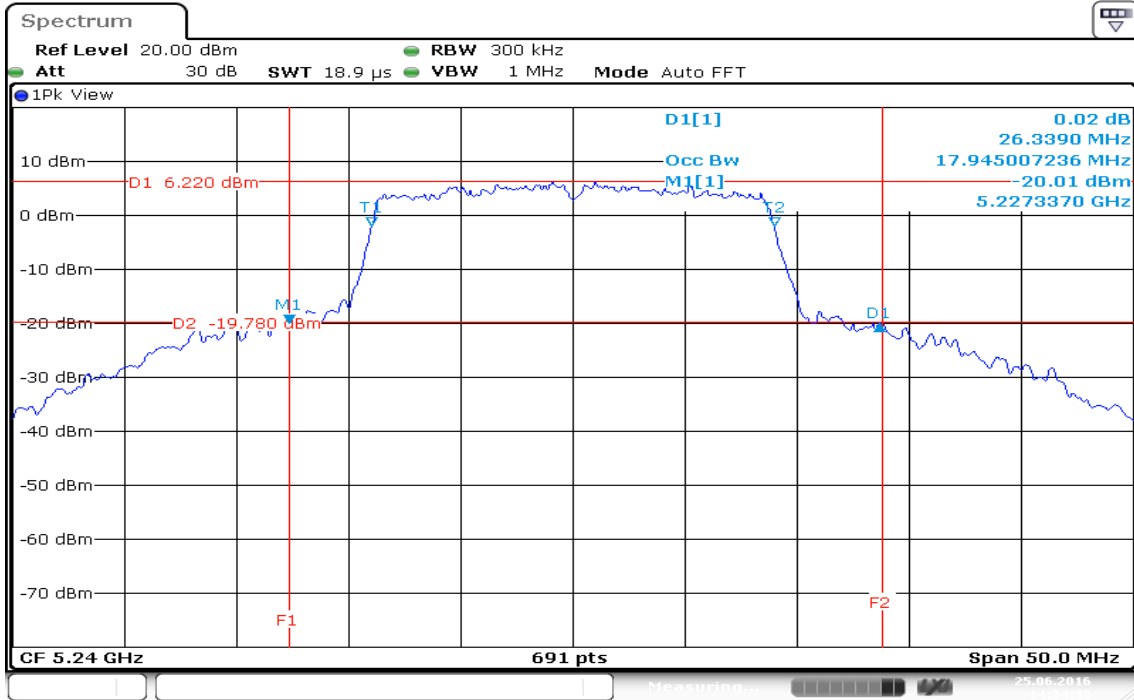
Date: 30 JUN 2016 14:31:08

CH Mid



Date: 30 JUN 2016 13:36:29

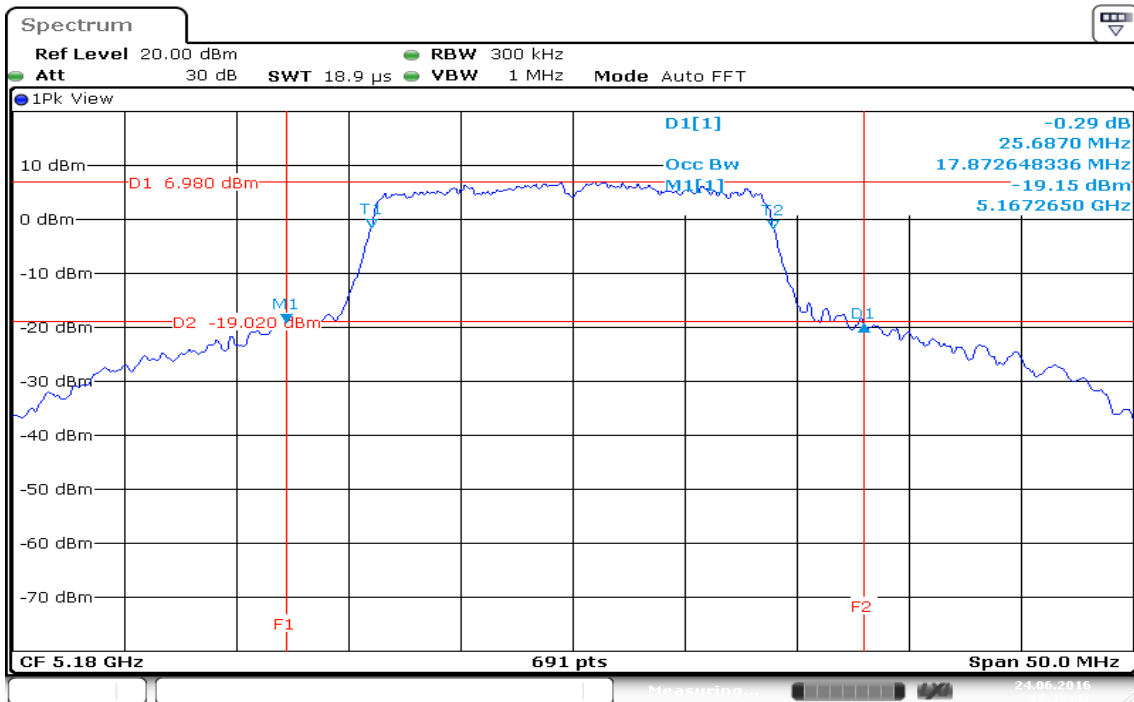
CH High



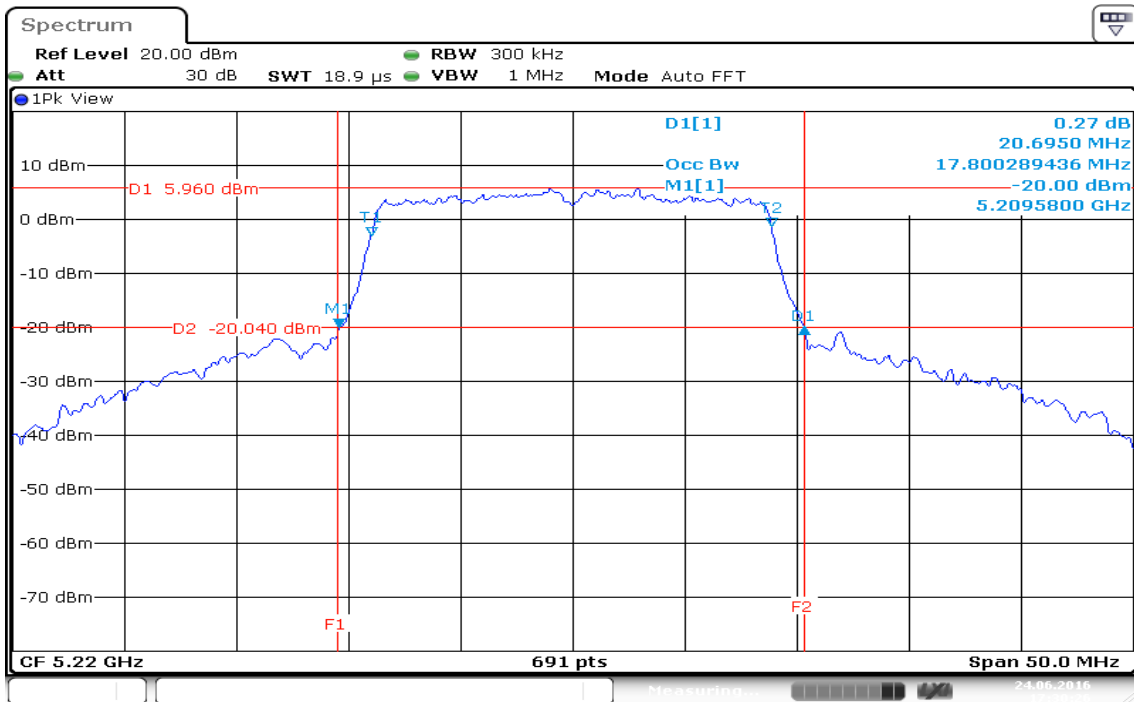
Date: 25.JUN.2016 14:34:33

IEEE 802.11n HT 20 MHz mode / 5180 ~ 5240MHz/ Chain 1

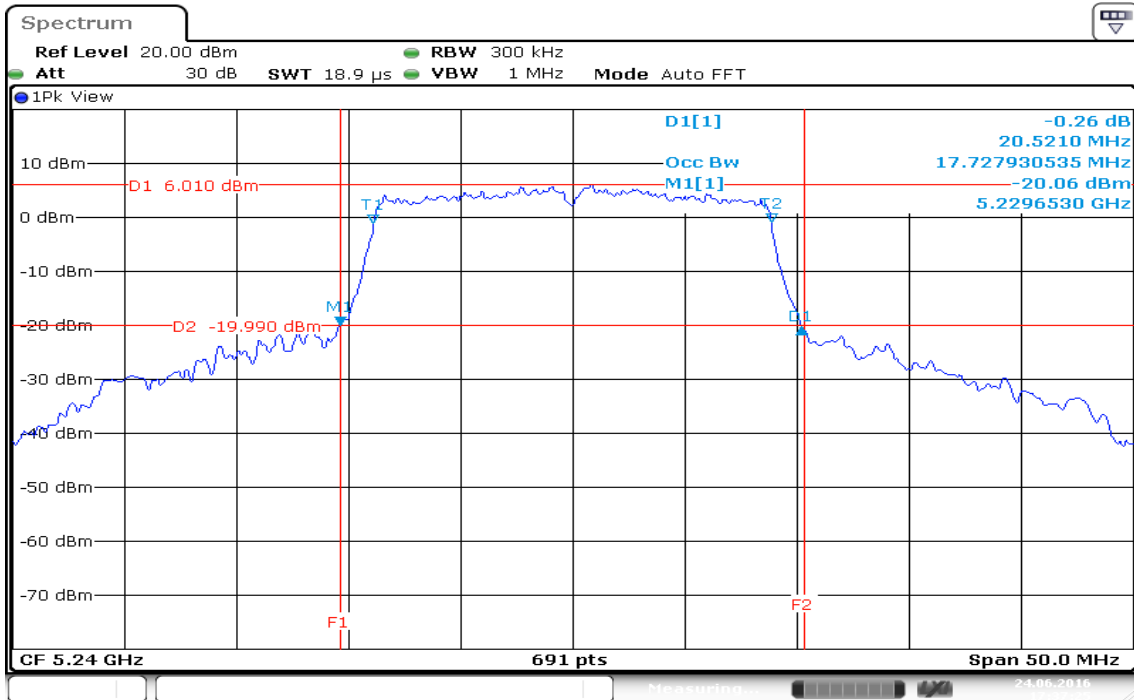
CH Low



CH Mid



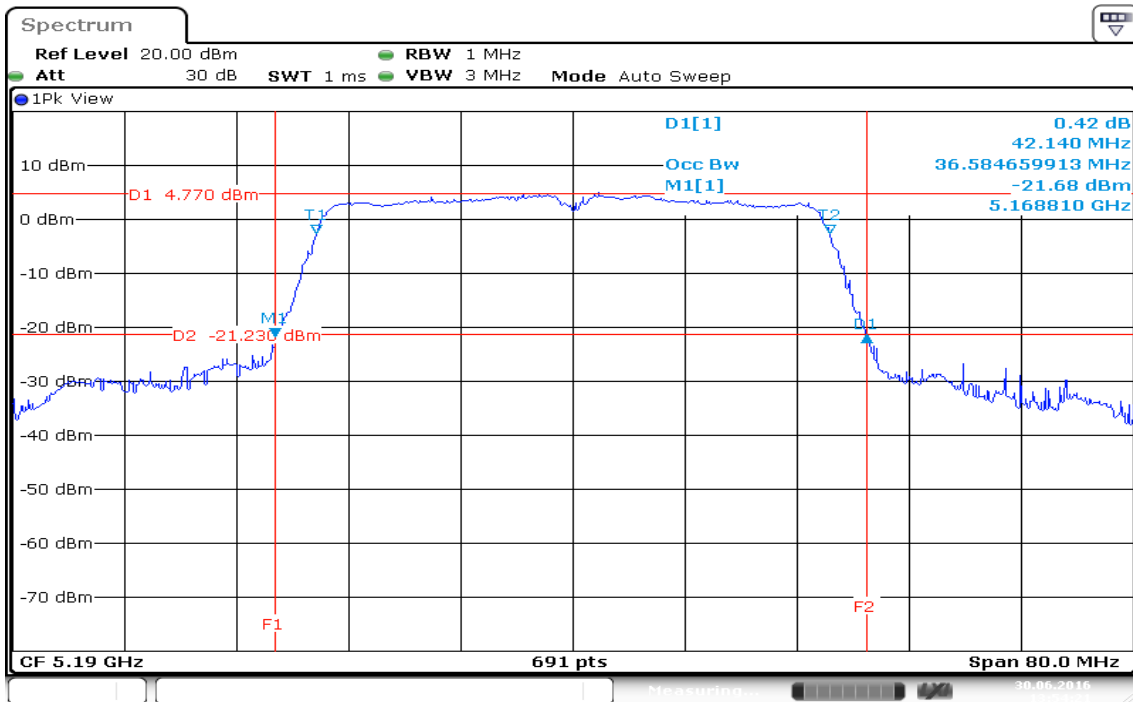
CH High



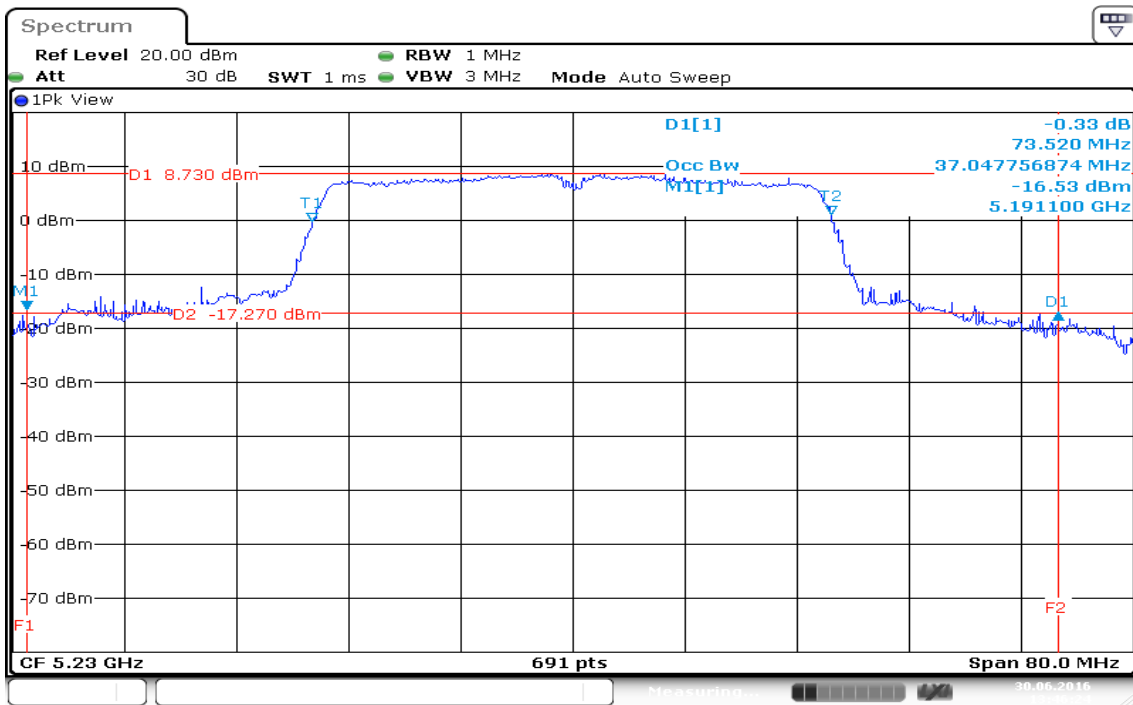
Date: 24.JUN.2016 17:37:25

IEEE 802.11n HT 40 MHz mode / 5190 ~ 5230MHz/ Chain 0

CH Low

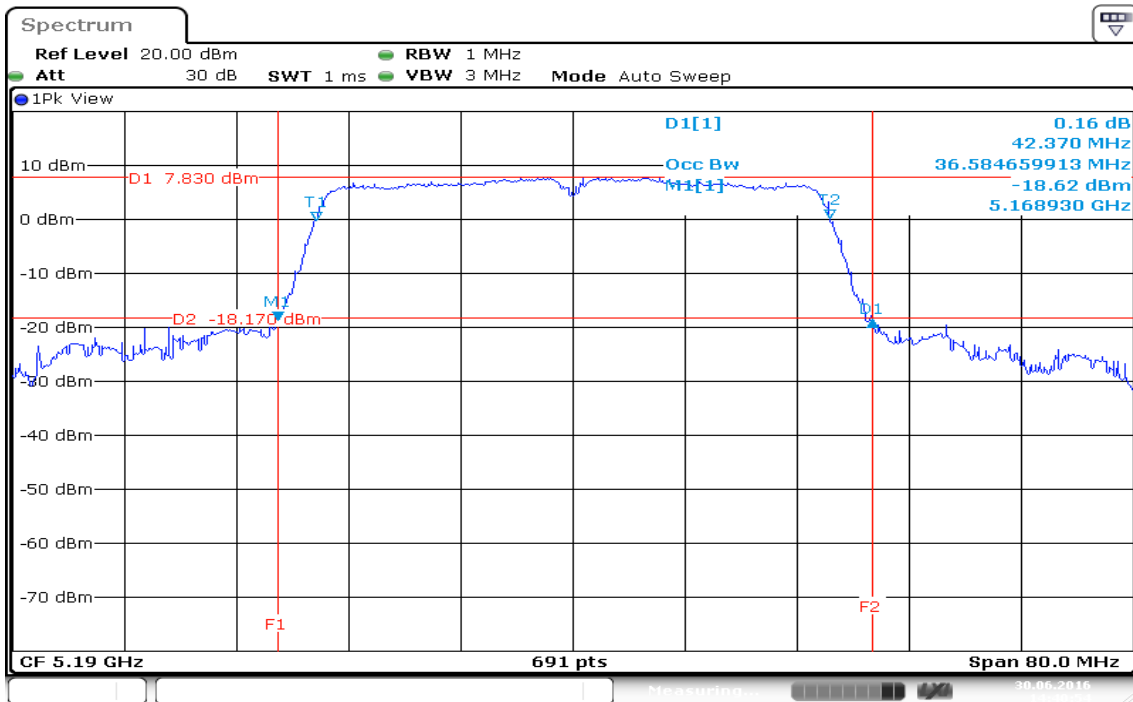


CH High

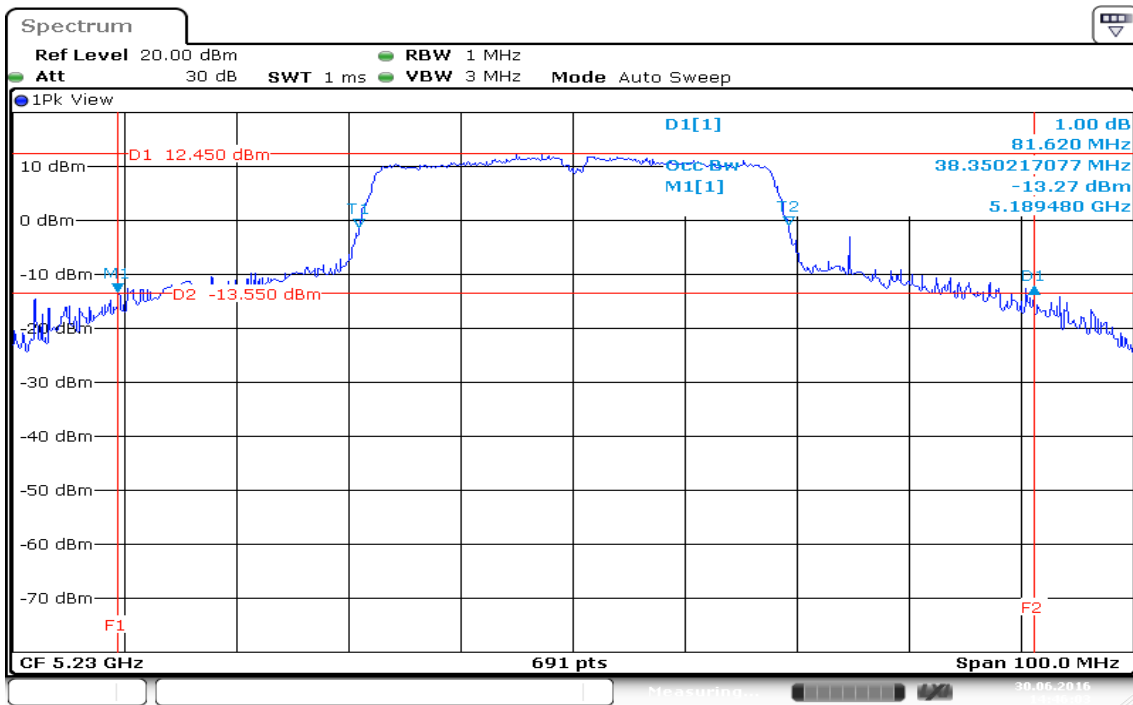


IEEE 802.11n HT 40 MHz mode / 5190 ~ 5230MHz/ Chain 1

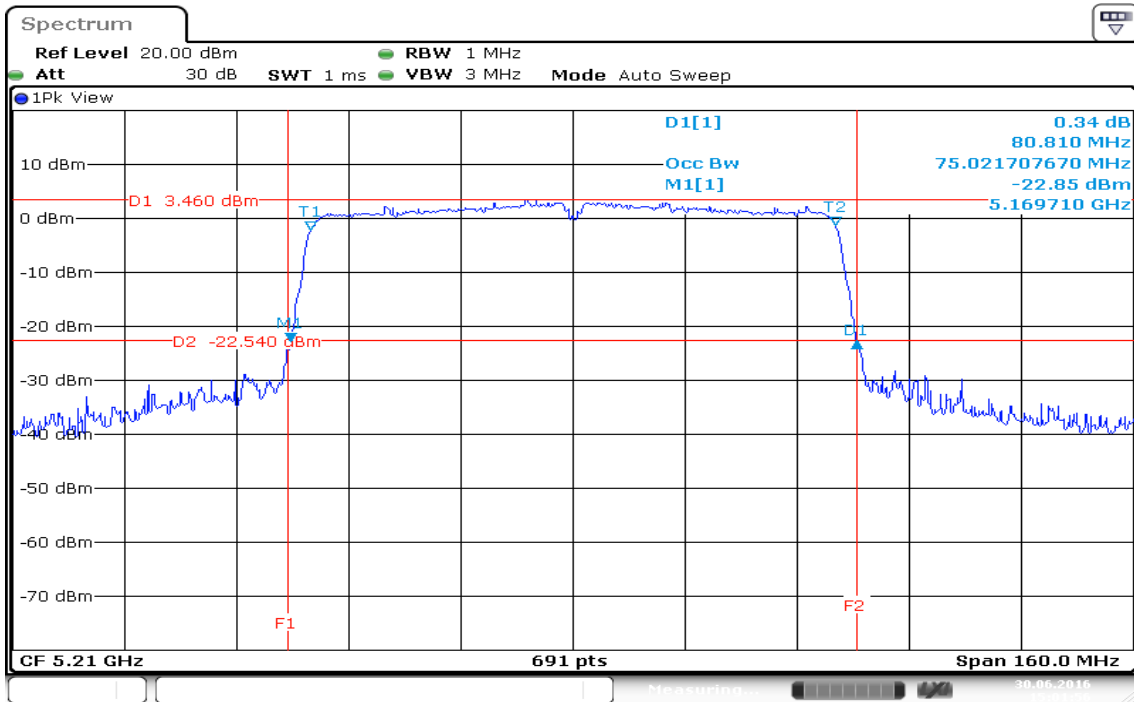
CH Low



CH High

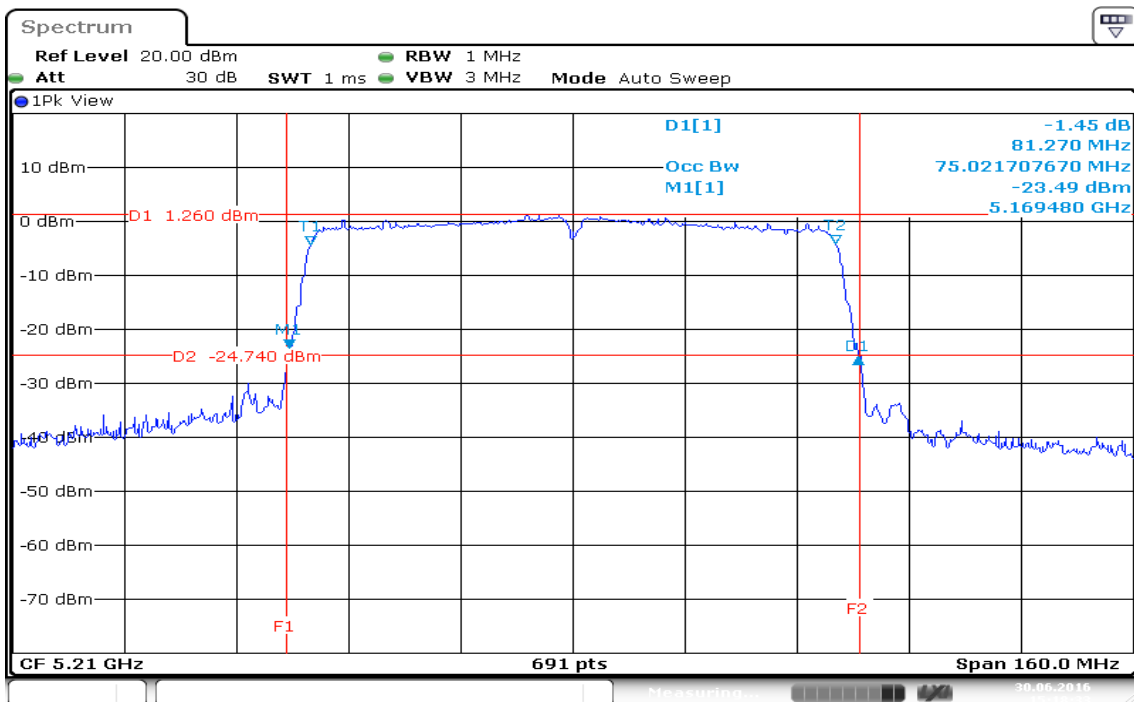


IEEE 802.11ac VHT 80 MHz mode / 5210MHz / Chain 0
99% Bandwidth (CH Mid)



Date: 30 JUN 2016 15:01:56

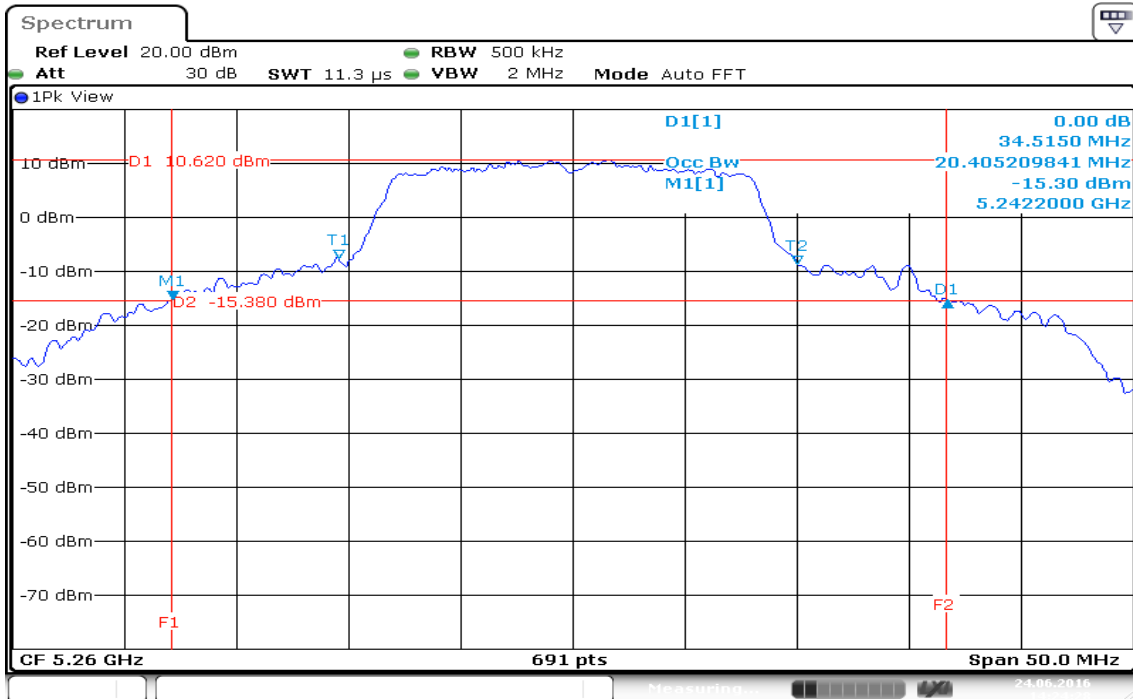
IEEE 802.11ac VHT 80 MHz mode / 5210MHz / Chain 1
99% Bandwidth (CH Mid)



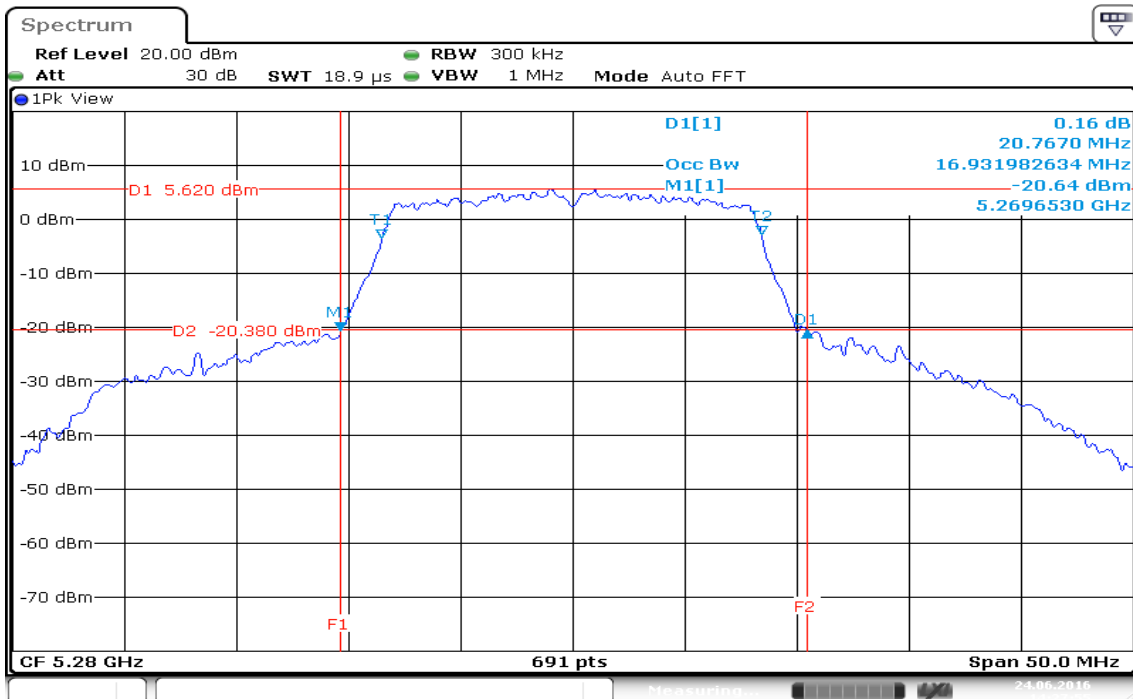
Date: 30 JUN 2016 15:18:33

IEEE 802.11a mode / 5260 ~ 5320MHz/ Chain 0

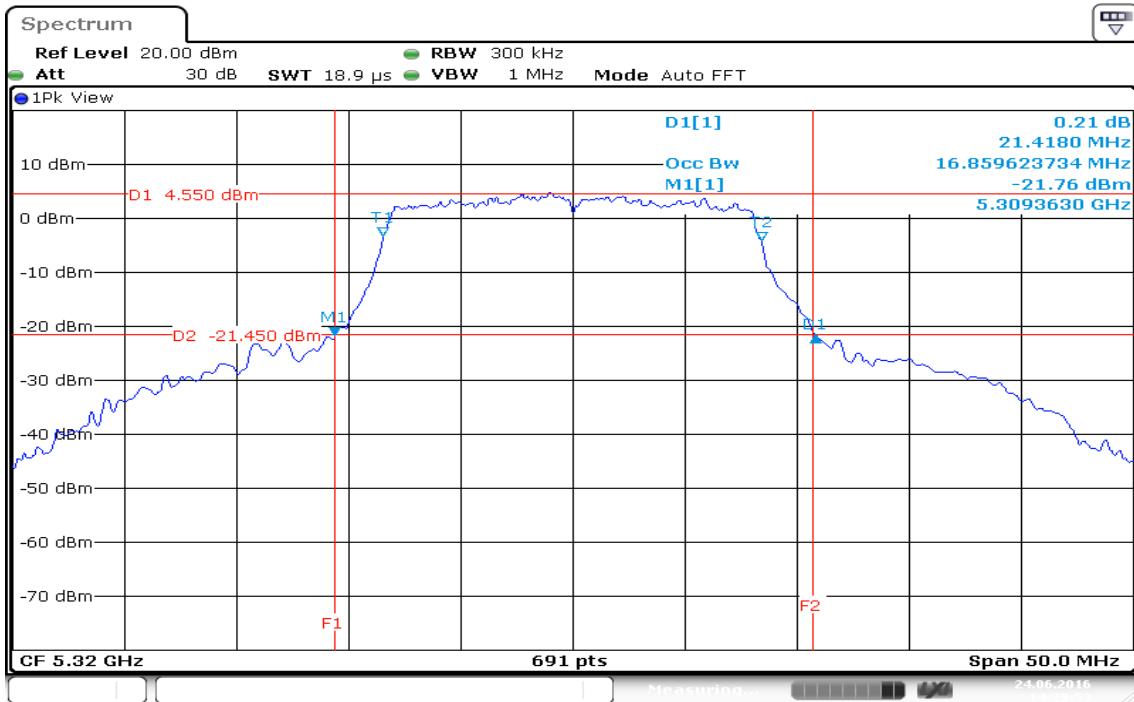
CH Low



CH Mid

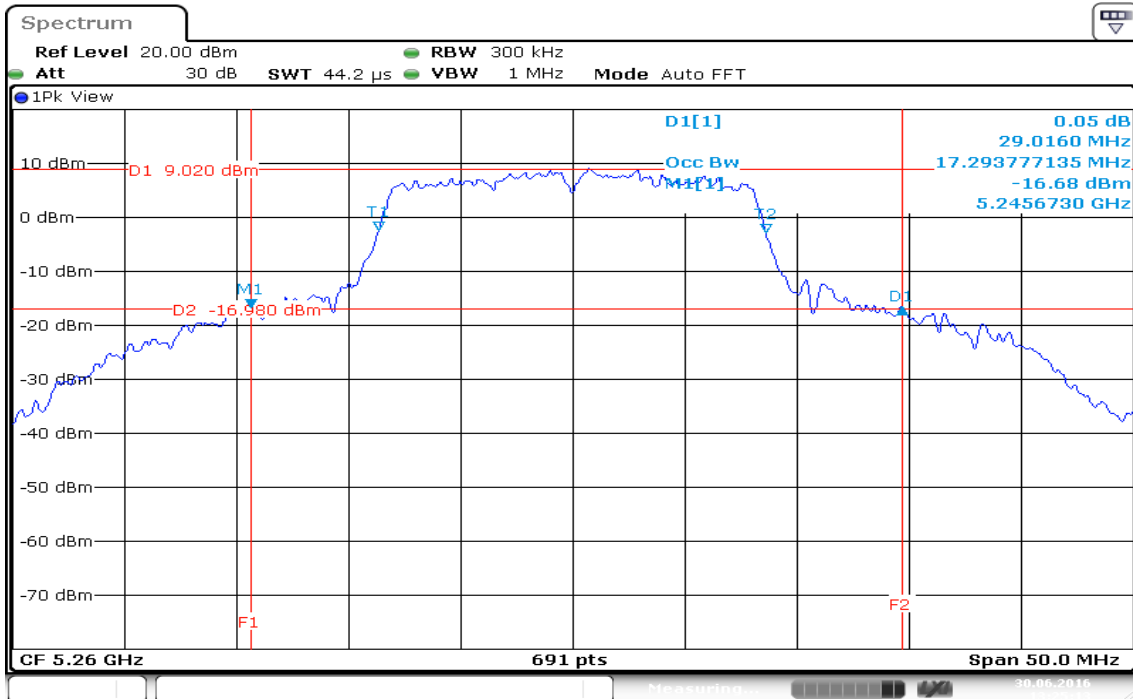


CH High

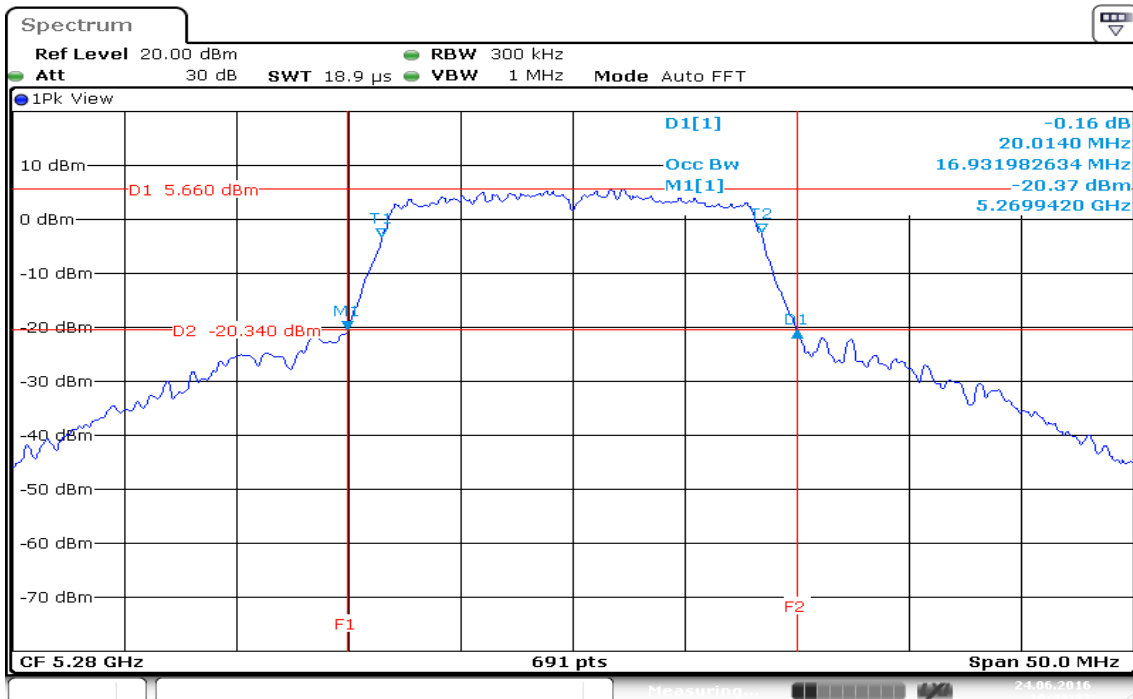


IEEE 802.11a mode / 5260 ~ 5320MHz/ Chain 1

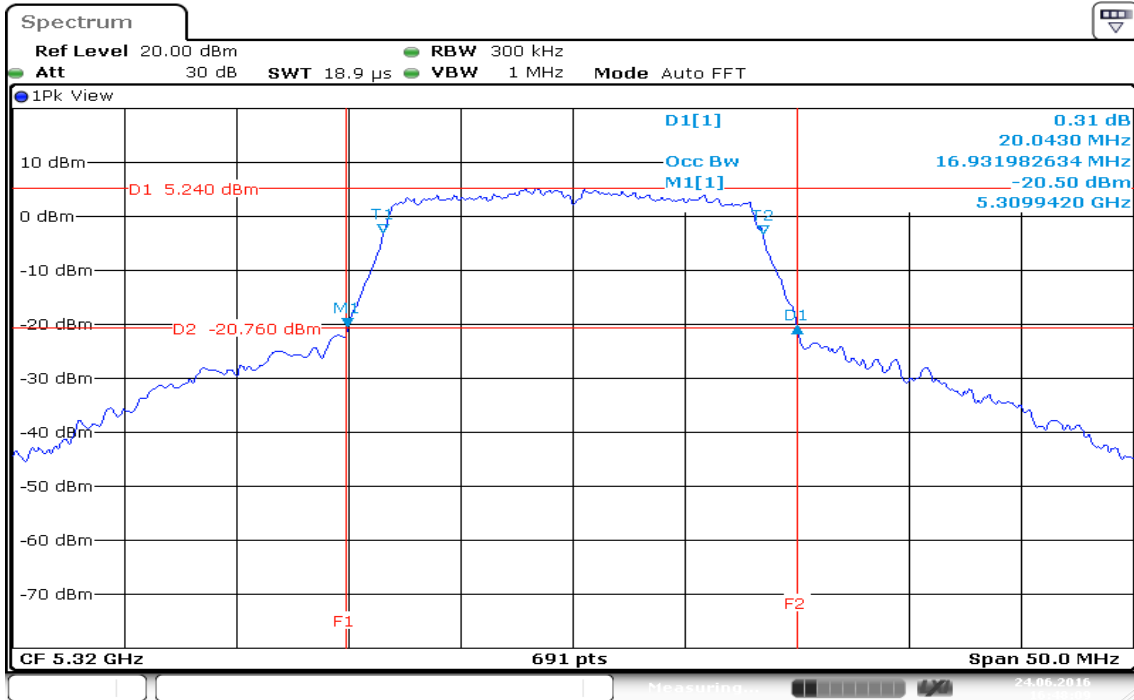
CH Low



CH Mid

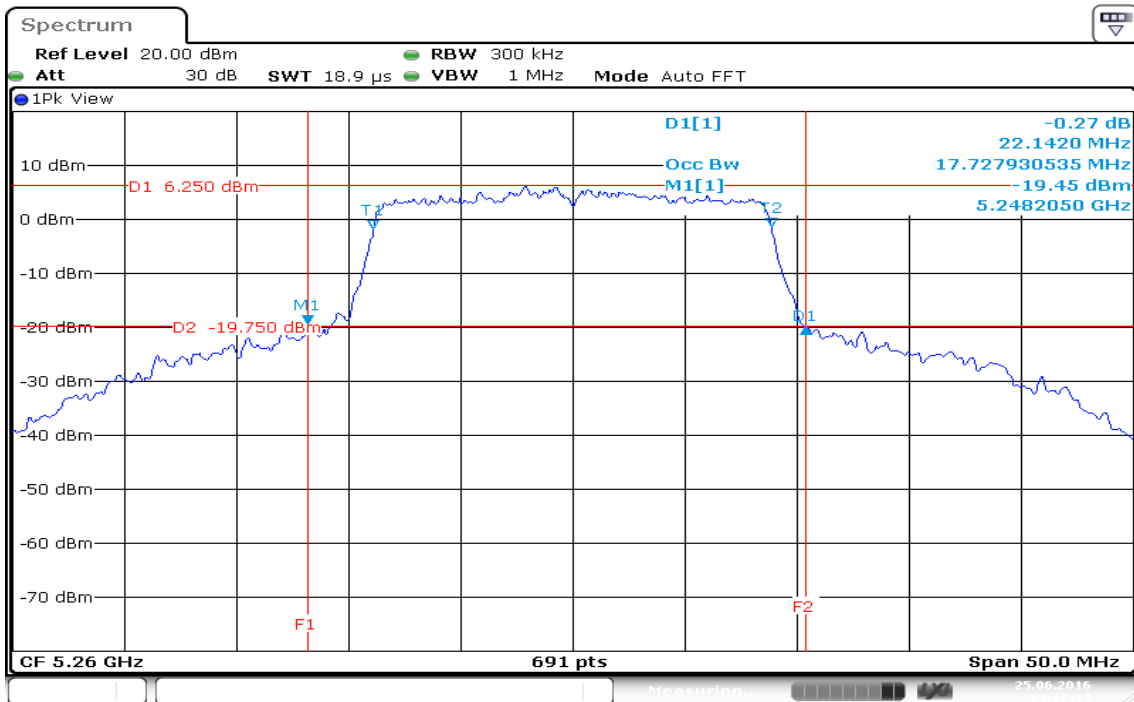


CH High

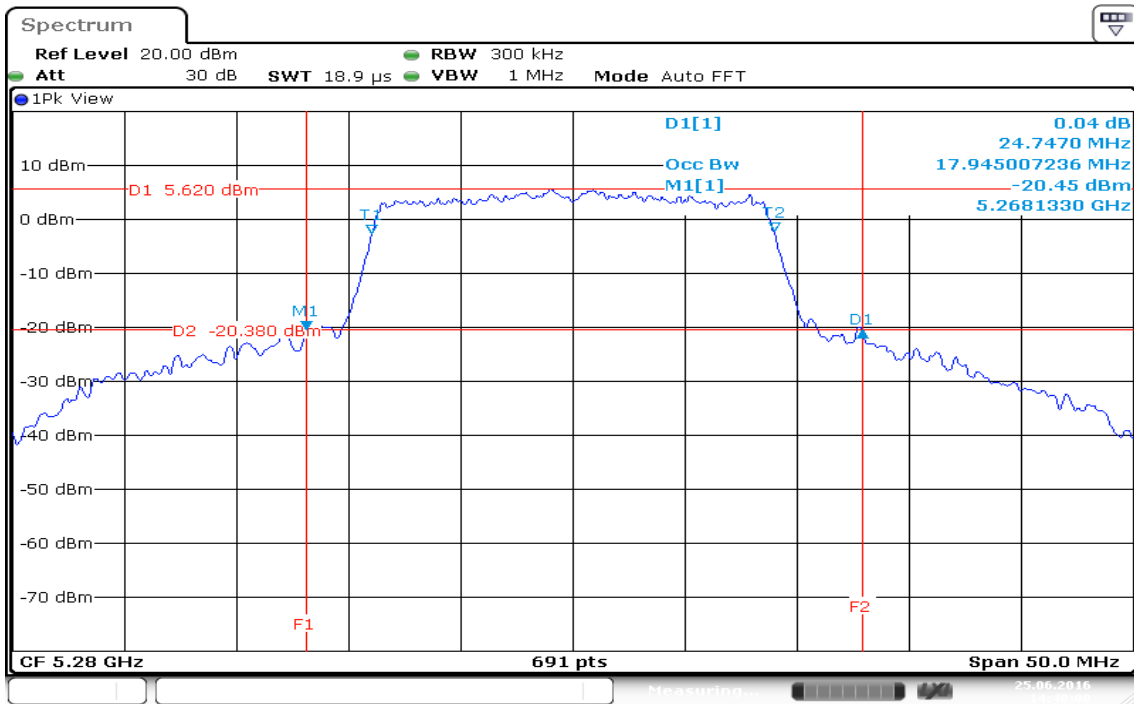


IEEE 802.11n HT 20 MHz mode / 5260 ~ 5320MHz/ Chain 0

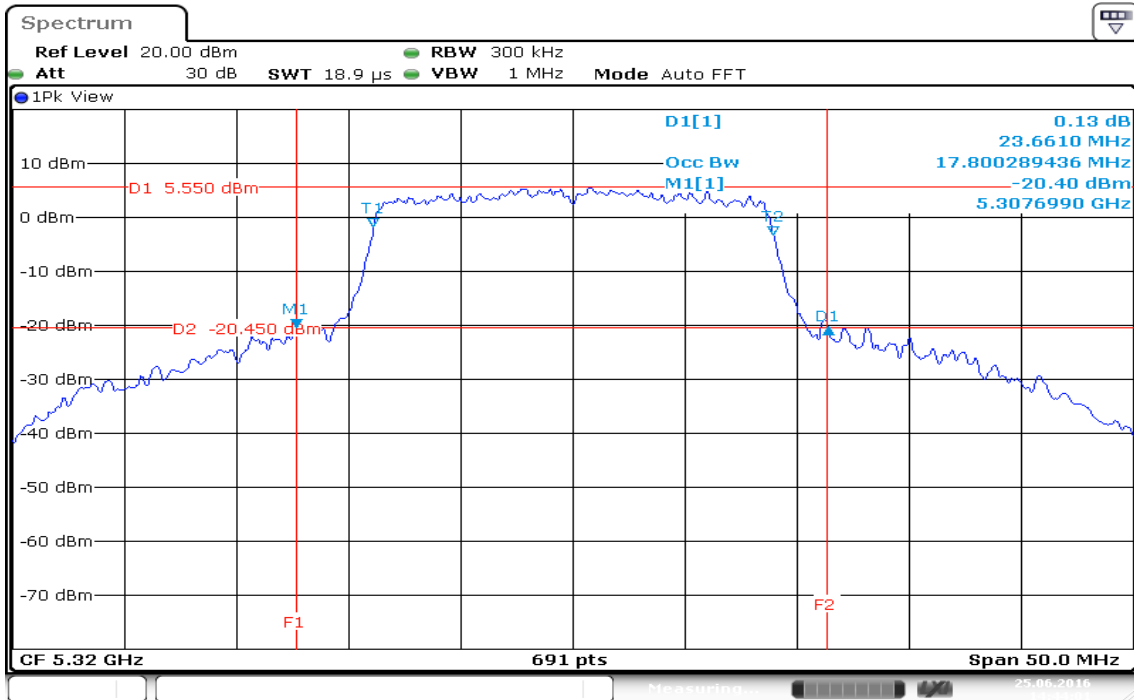
CH Low



CH Mid



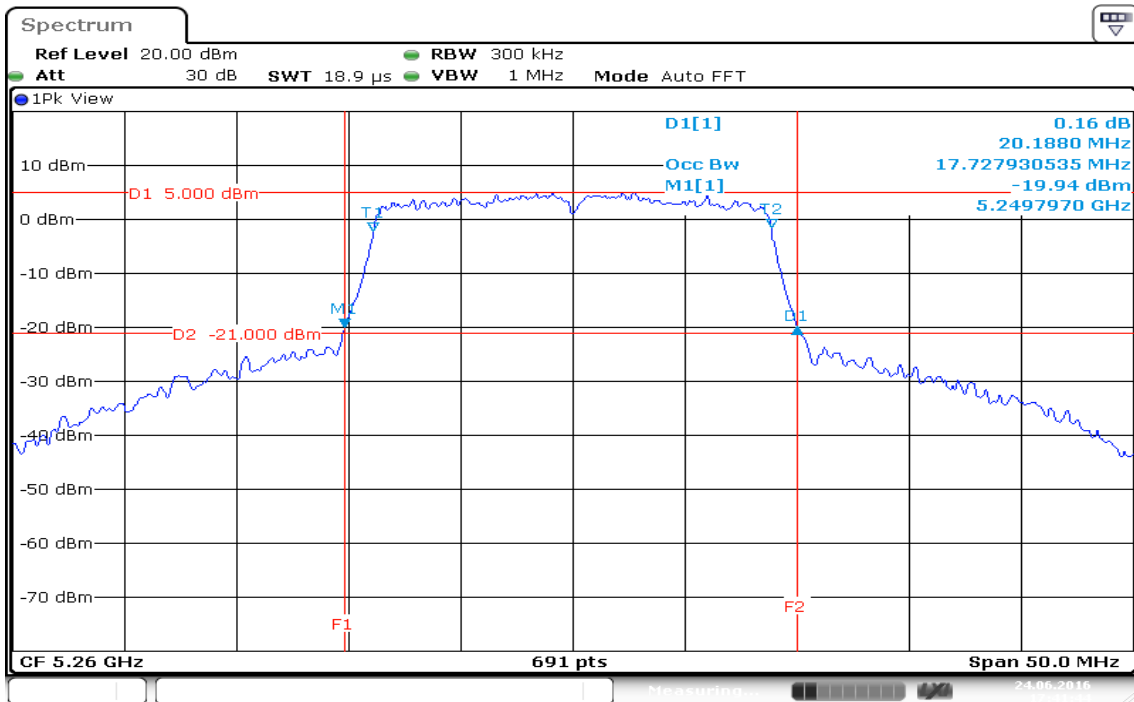
CH High



Date: 25.JUN.2016 14:44:01

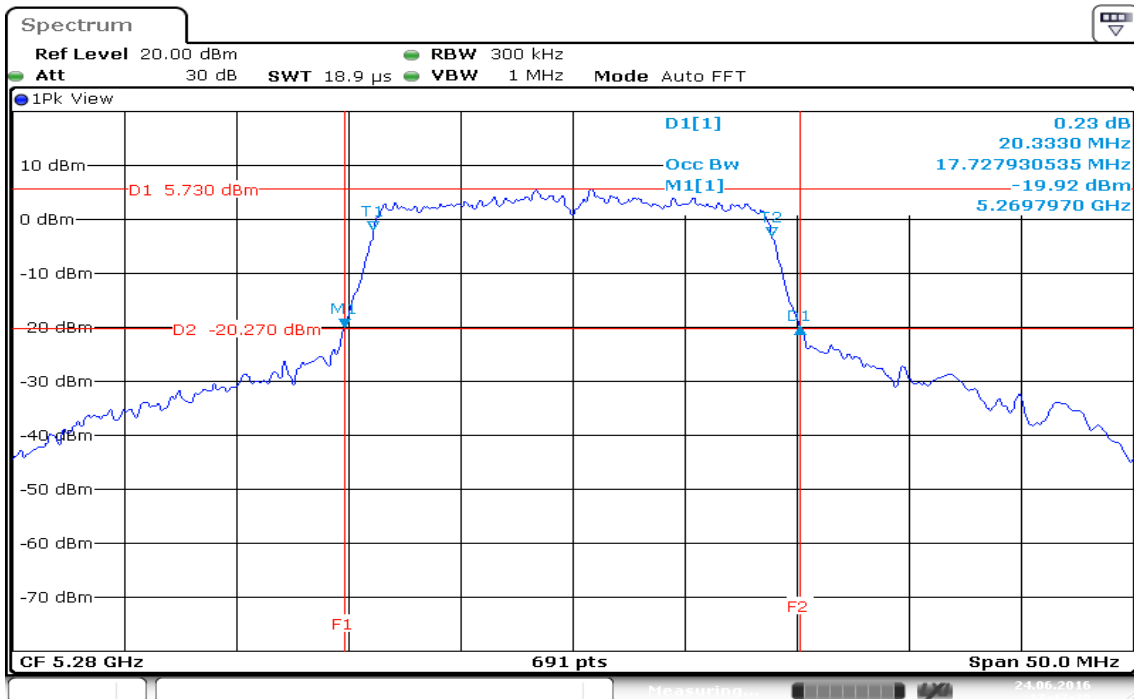
IEEE 802.11n HT 20 MHz mode / 5260 ~ 5320MHz/ Chain 1

CH Low



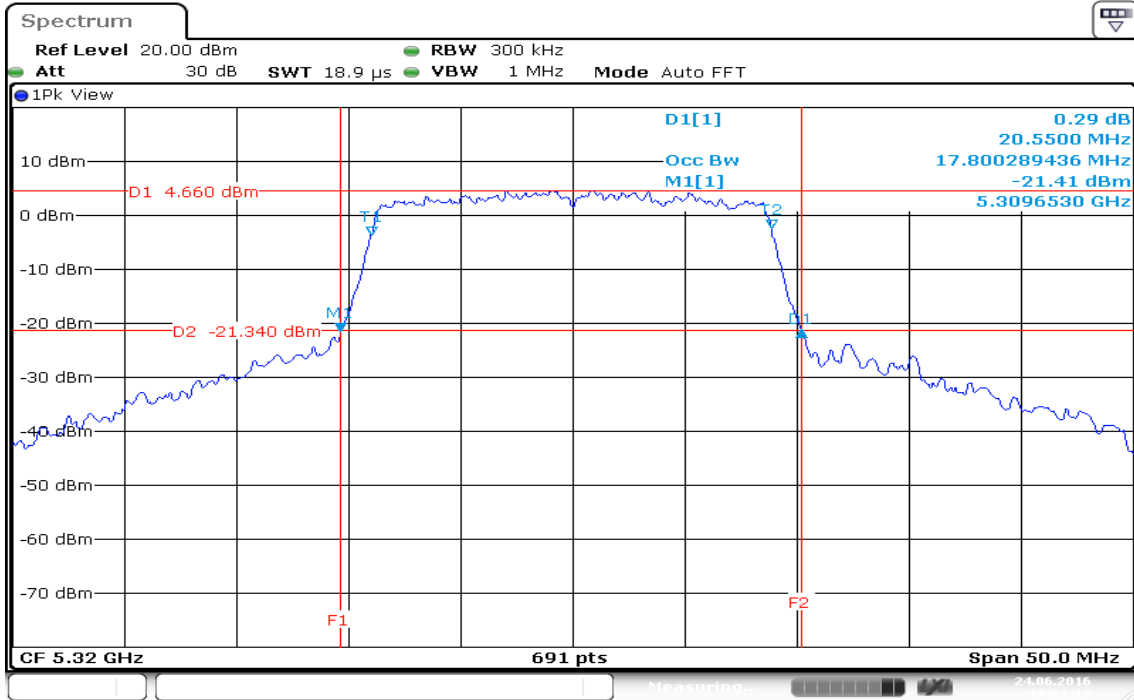
Date: 24.JUN.2016 17:41:44

CH Mid



Date: 24.JUN.2016 17:47:39

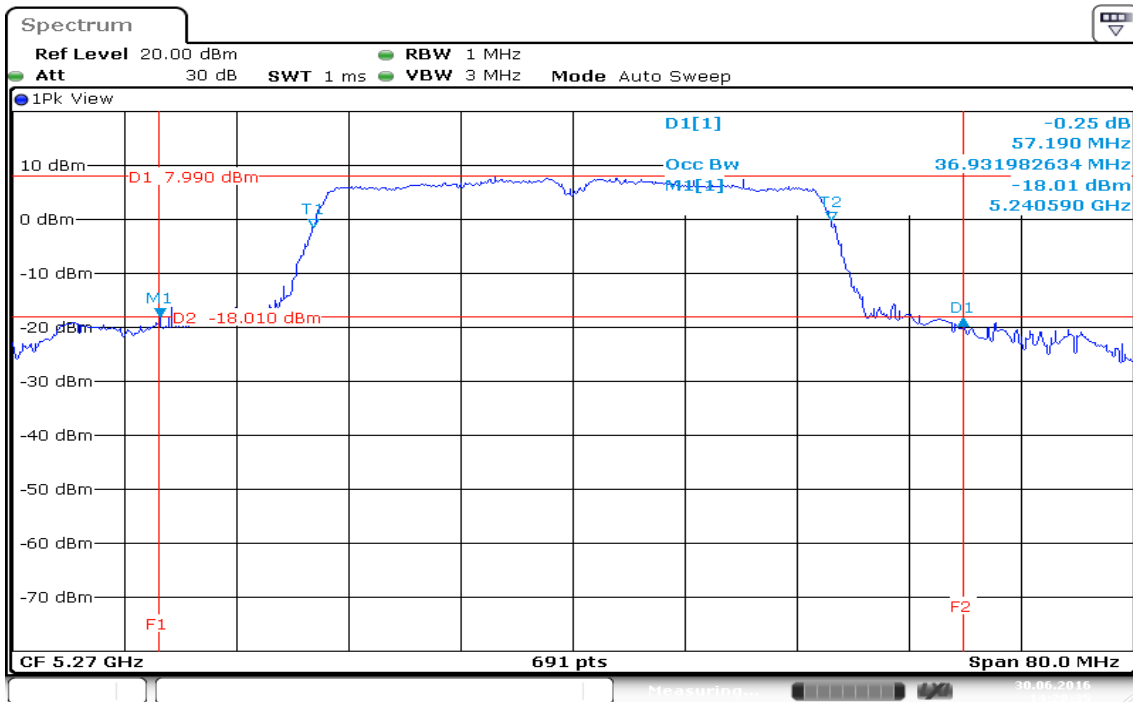
CH High



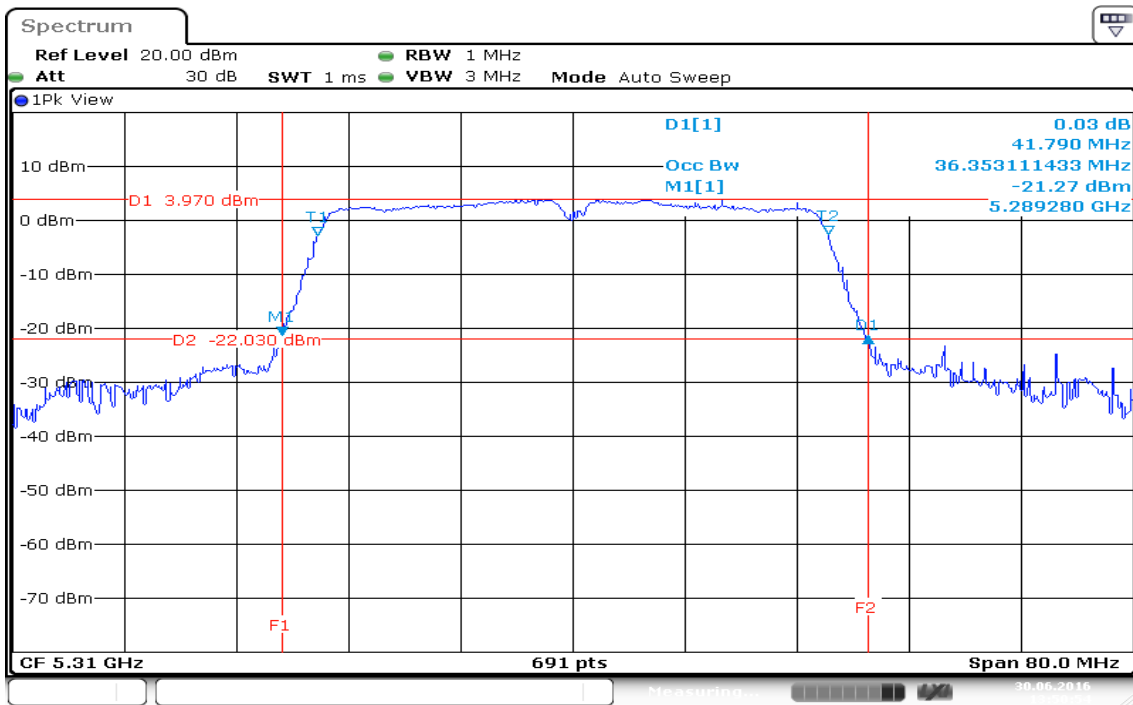
Date: 24.JUN.2016 17:51:17

IEEE 802.11n HT 40 MHz mode / 5270 ~ 5310MHz/ Chain 0

CH Low

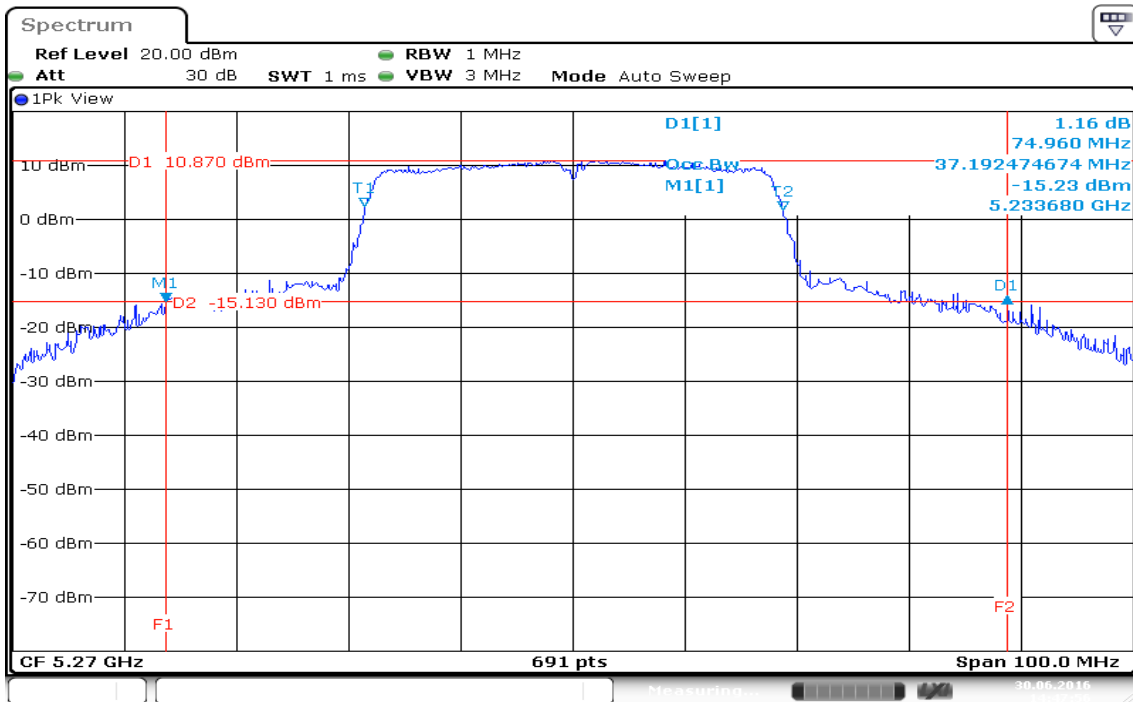


CH High



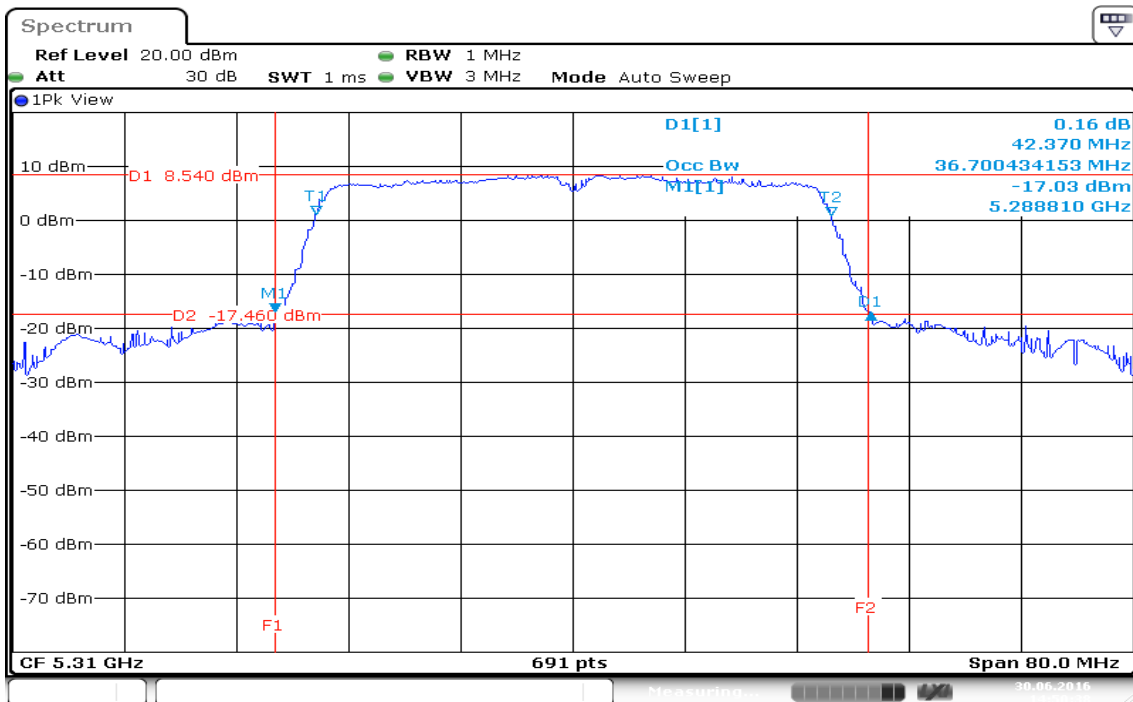
IEEE 802.11n HT 40 MHz mode / 5270 ~ 5310MHz/ Chain 1

CH Low



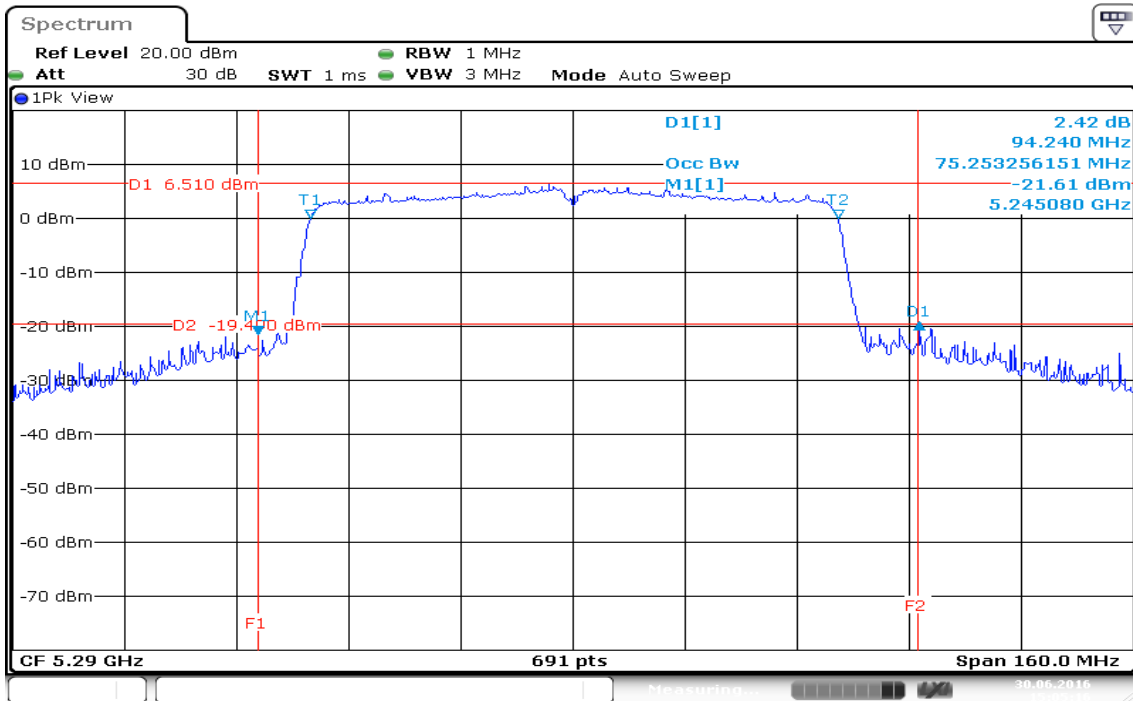
Date: 30 JUN 2016 14:47:57

CH High

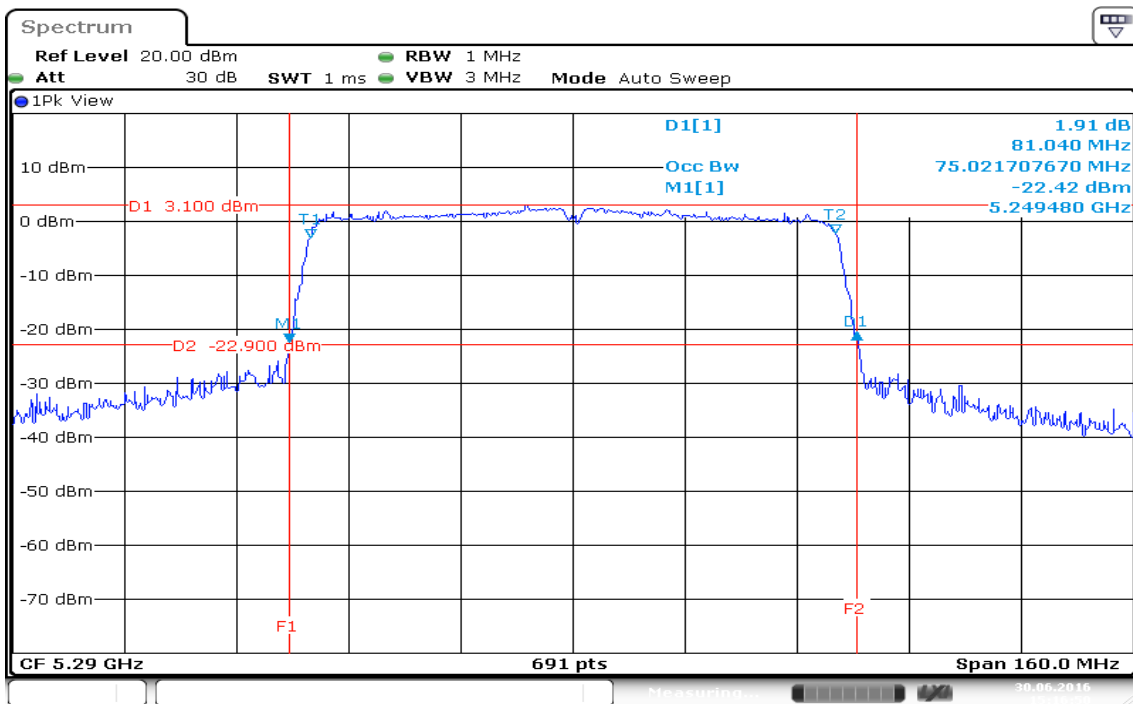


Date: 30 JUN 2016 14:50:38

IEEE 802.11ac VHT 80 MHz mode / 5290MHz / Chain 0
99% Bandwidth (CH Mid)

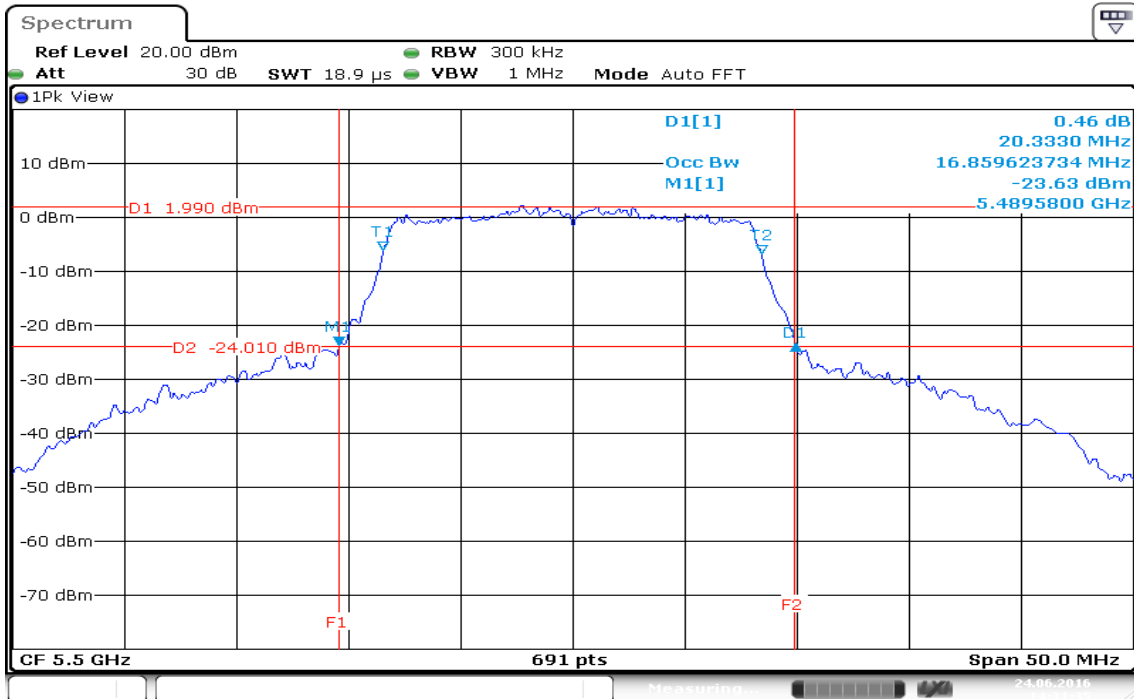


IEEE 802.11ac VHT 80 MHz mode / 5290MHz / Chain 1
99% Bandwidth (CH Mid)



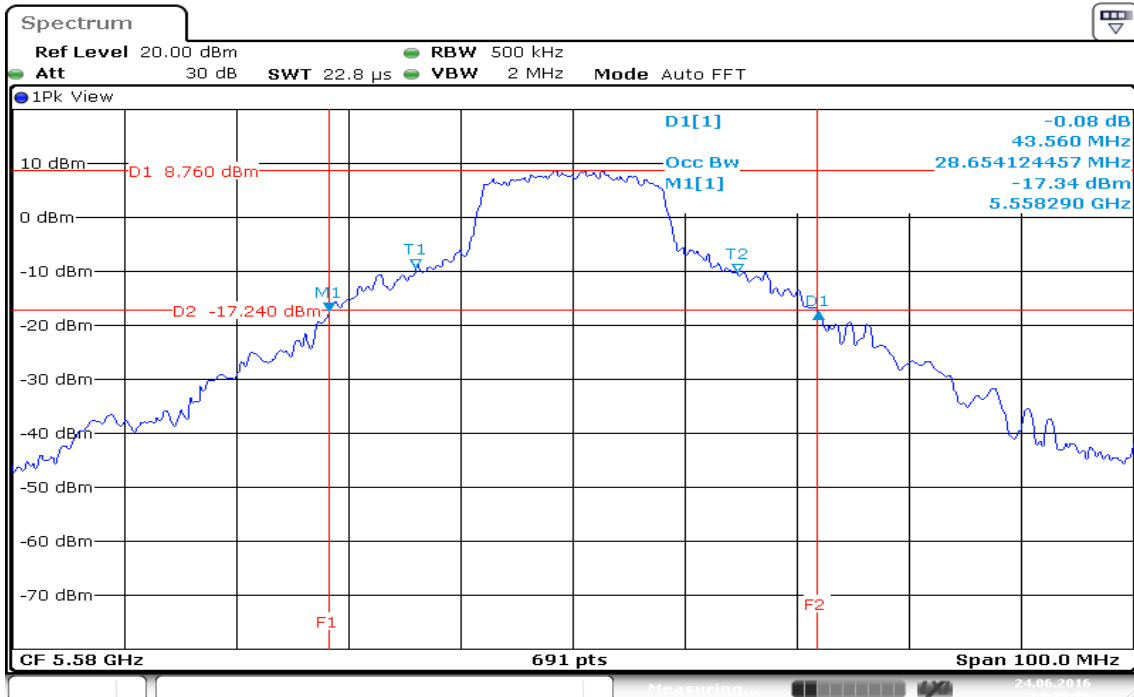
Test mode: IEEE 802.11a mode / 5500 ~ 5700MHz / Chain 0

CH Low



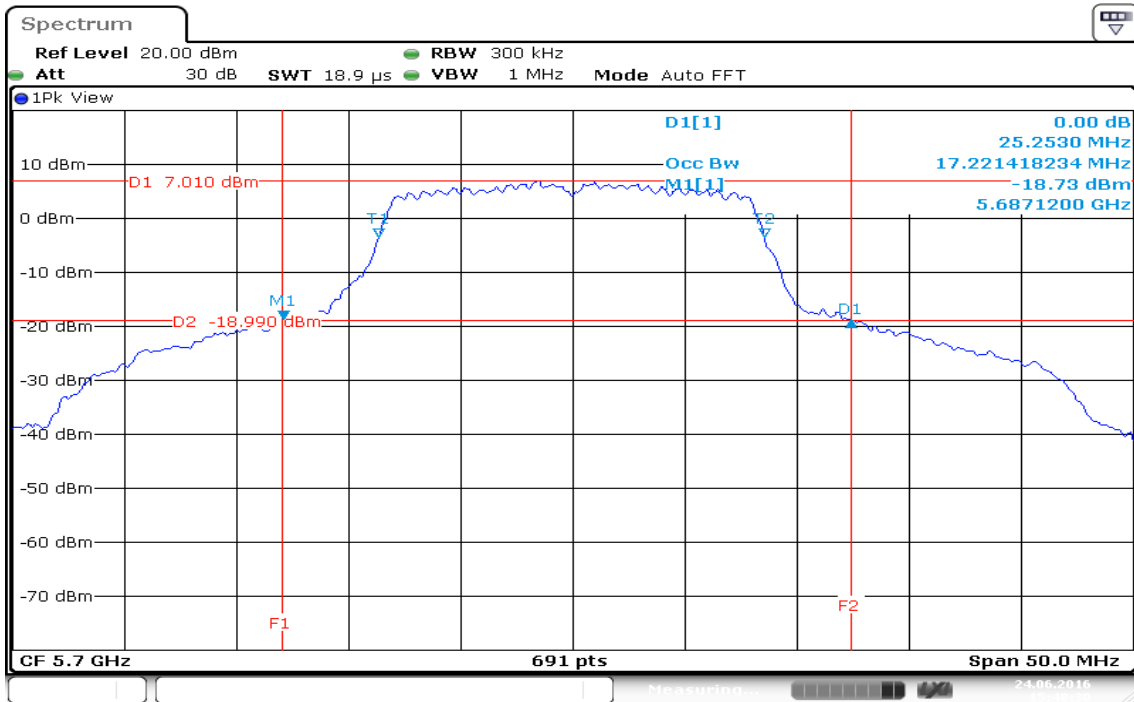
Date: 24.JUN.2016 14:31:36

CH Mid



Date: 24.JUN.2016 14:33:36

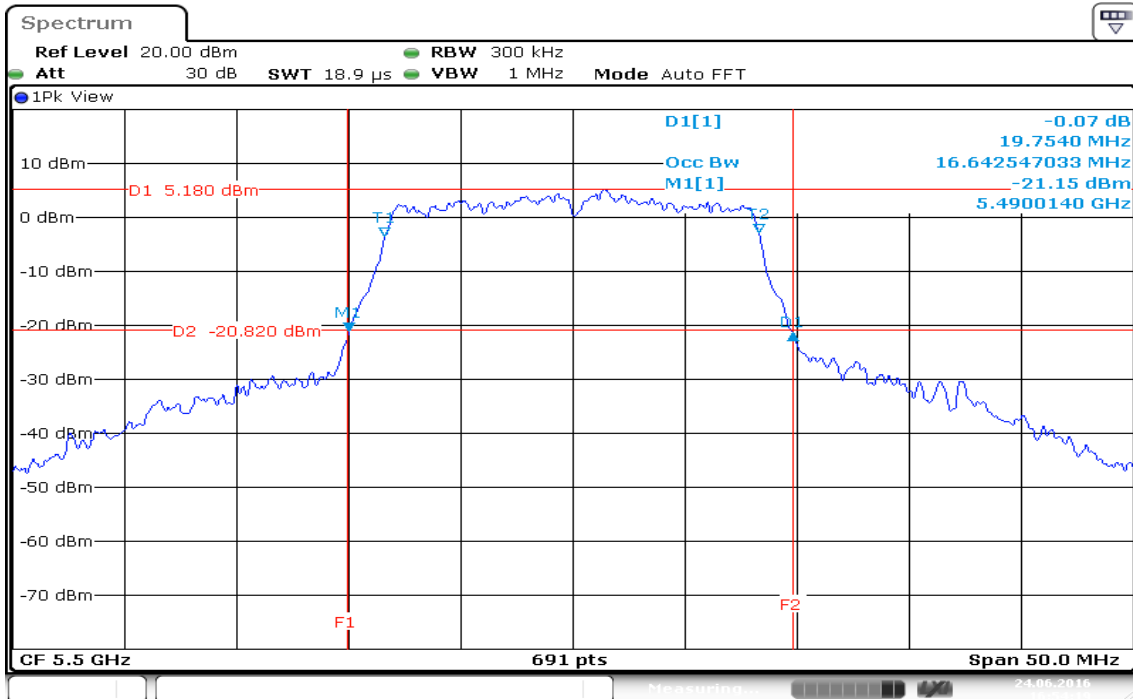
CH High



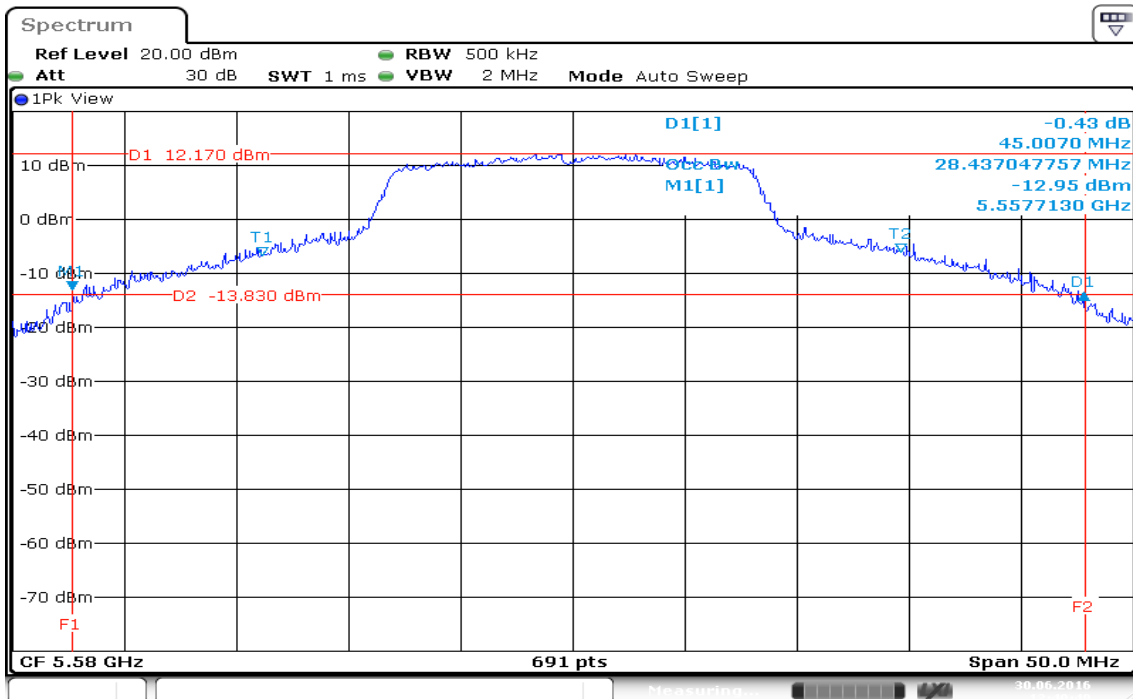
Date: 24.JUN.2016 15:48:30

Test mode: IEEE 802.11a mode / 5500 ~ 5700MHz / Chain 1

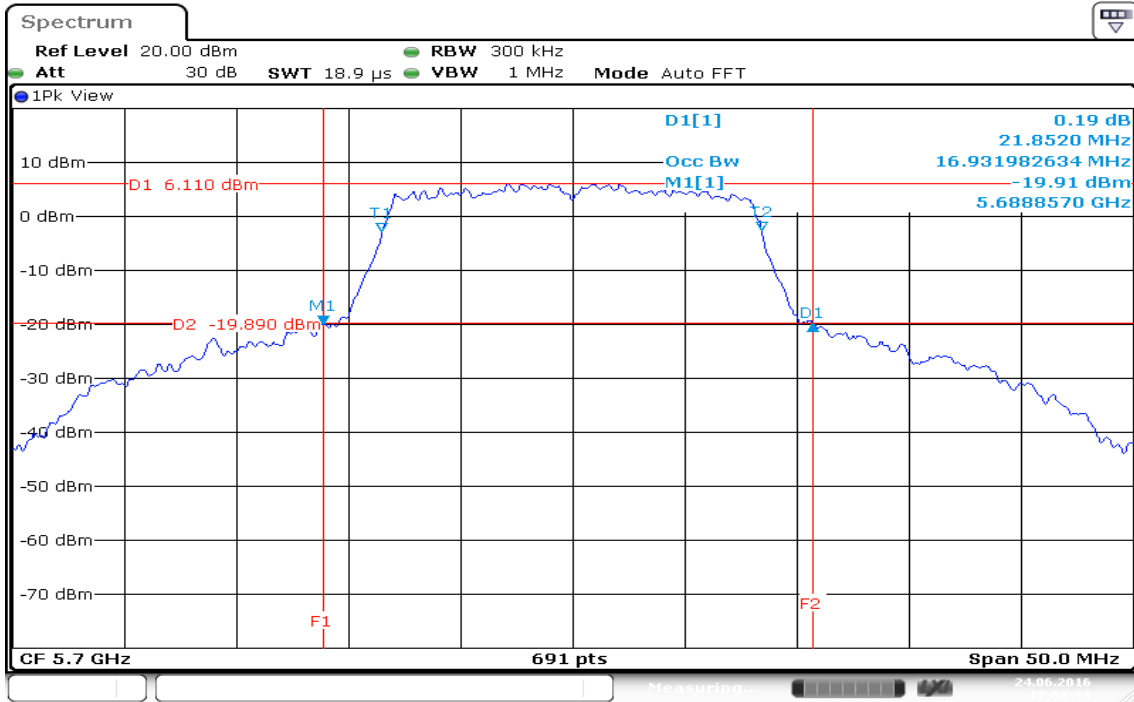
CH Low



CH Mid



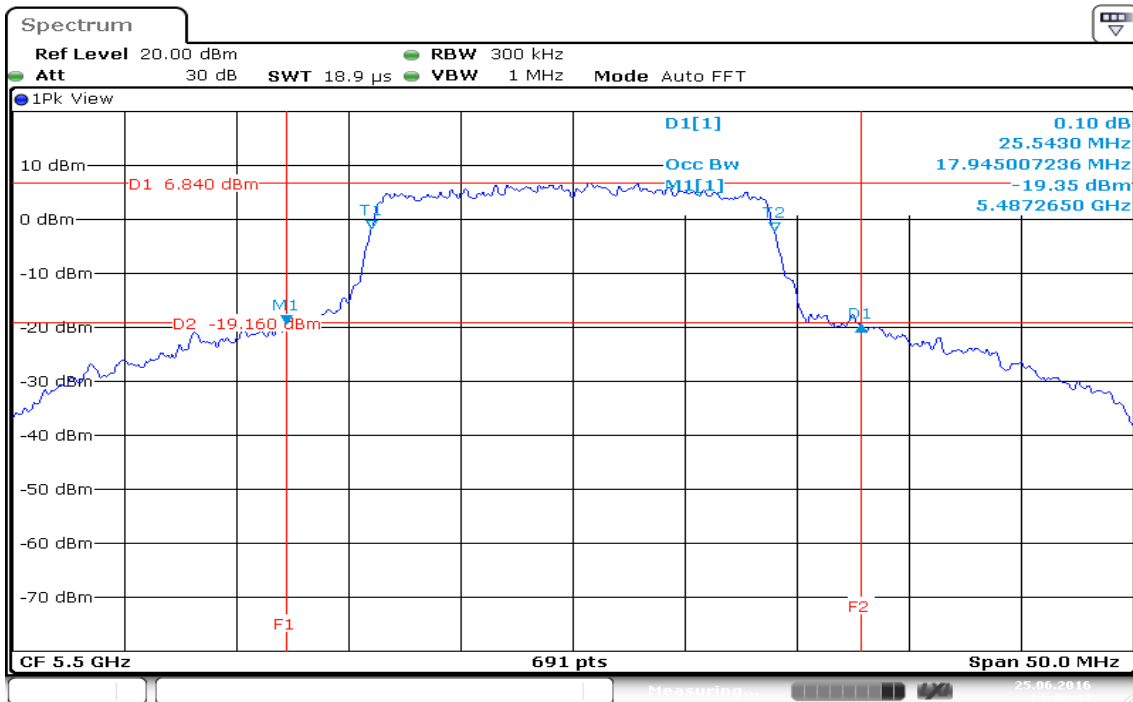
CH High



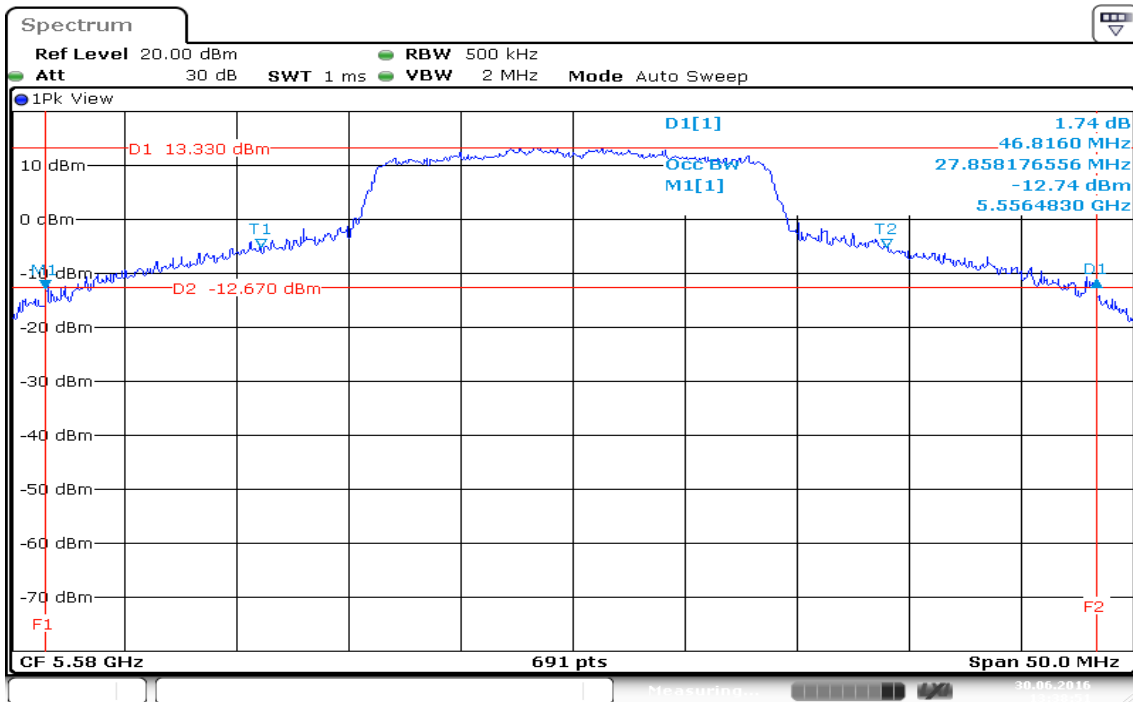
Date: 24.JUN.2016 17:08:53

IEEE 802.11n HT 20 MHz mode / 5500 ~ 5700MHz / Chain 0

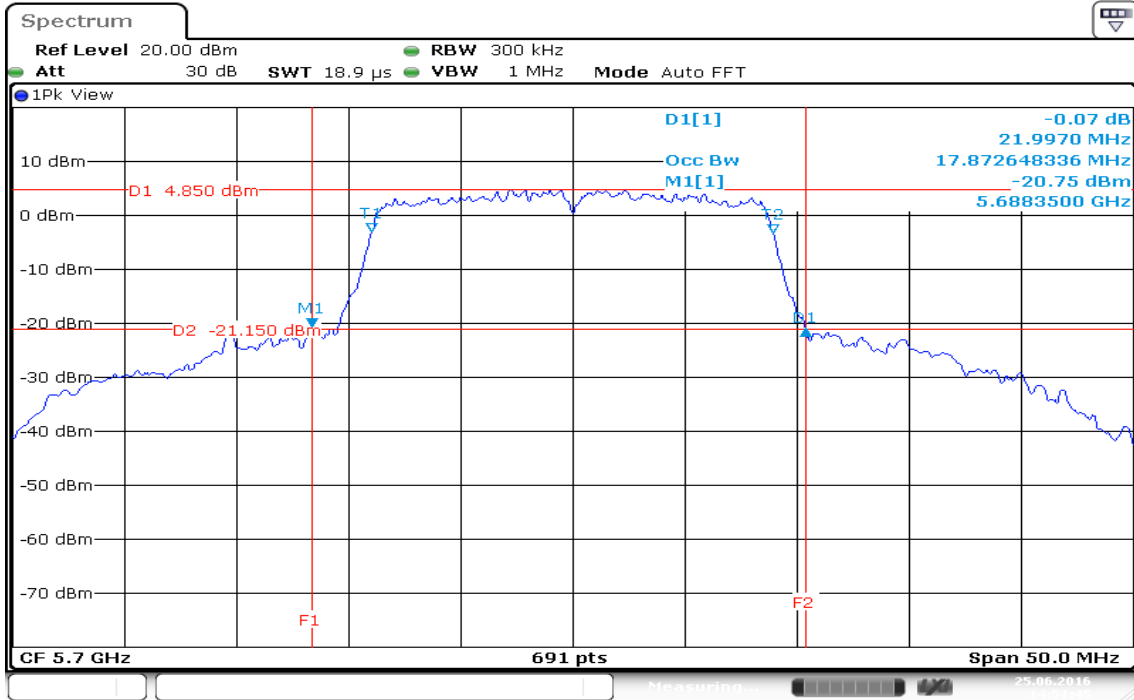
CH Low



CH Mid



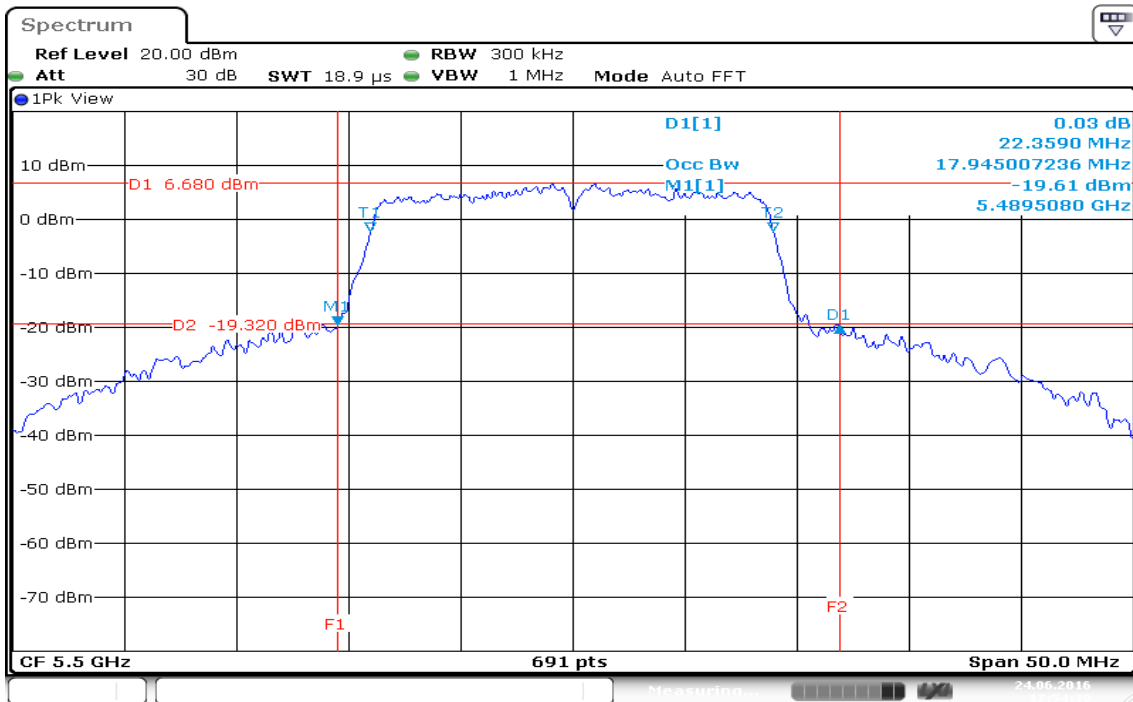
CH High



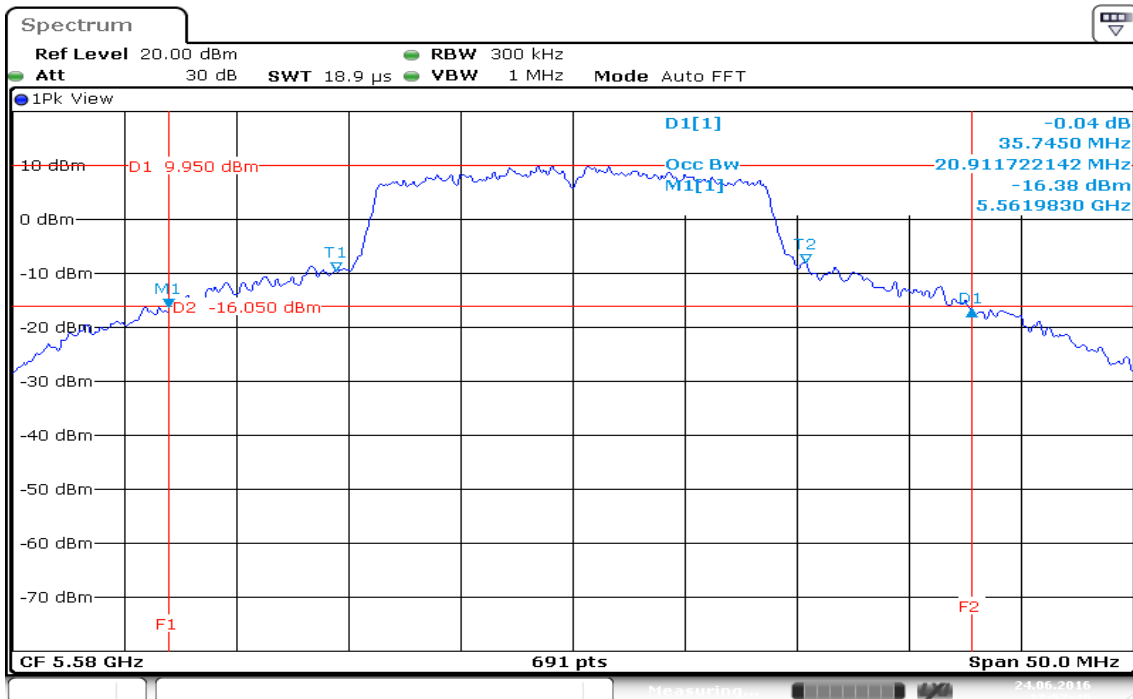
Date: 25.JUN.2016 14:51:45

IEEE 802.11n HT 20 MHz mode / 5500 ~ 5700MHz / Chain 1

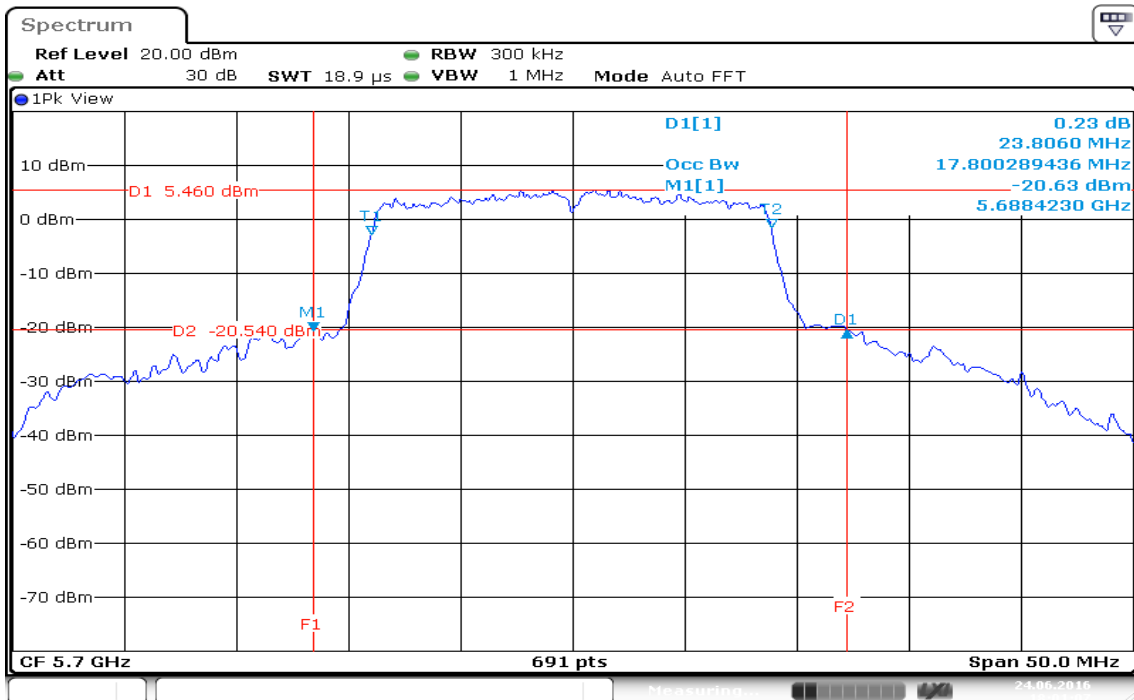
CH Low



CH Mid



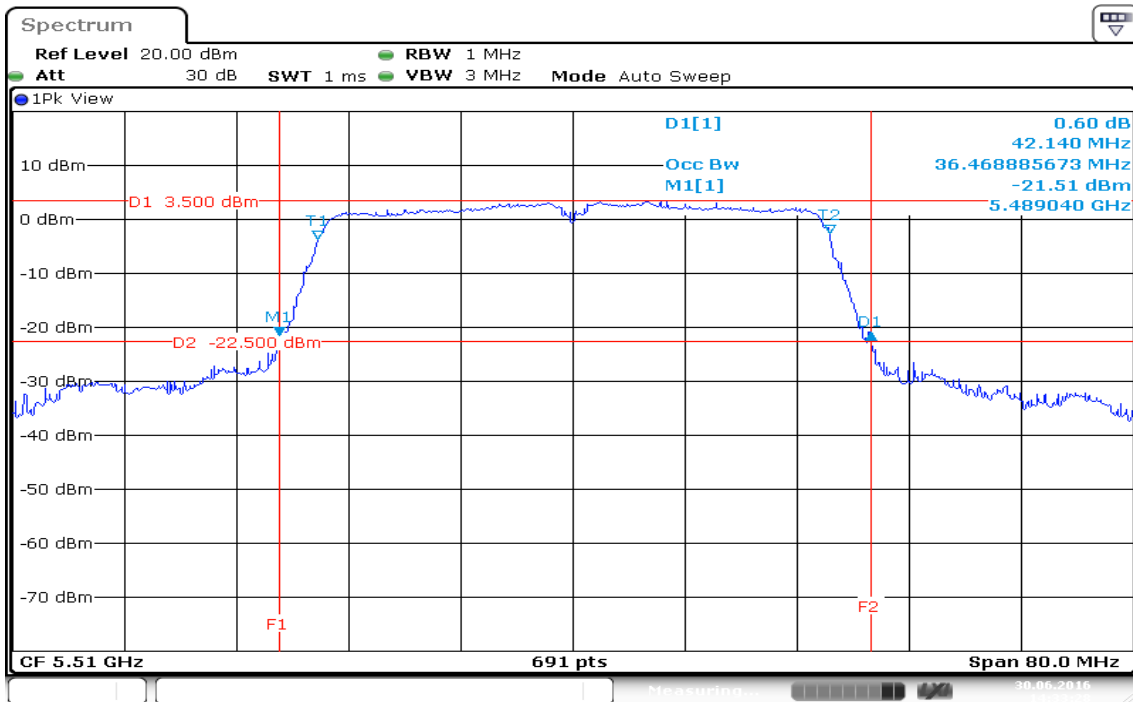
CH High



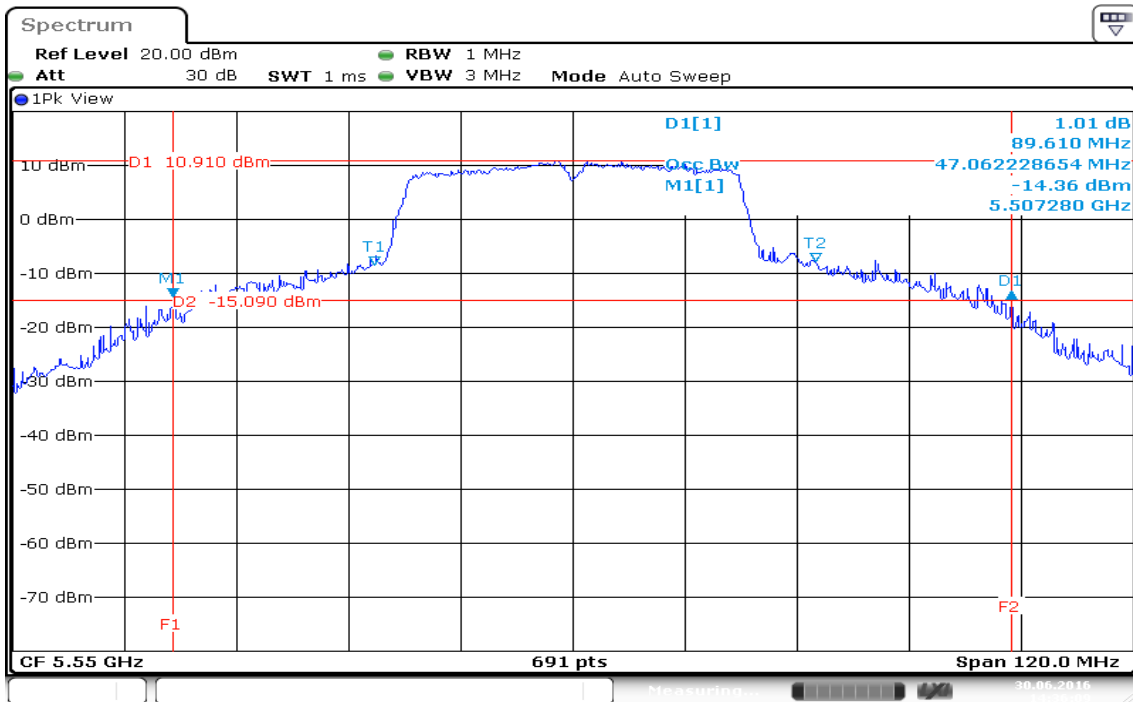
Date: 24.JUN.2016 18:01:08

IEEE 802.11n HT 40 MHz mode / 5510 ~ 5670MHz / Chain 0

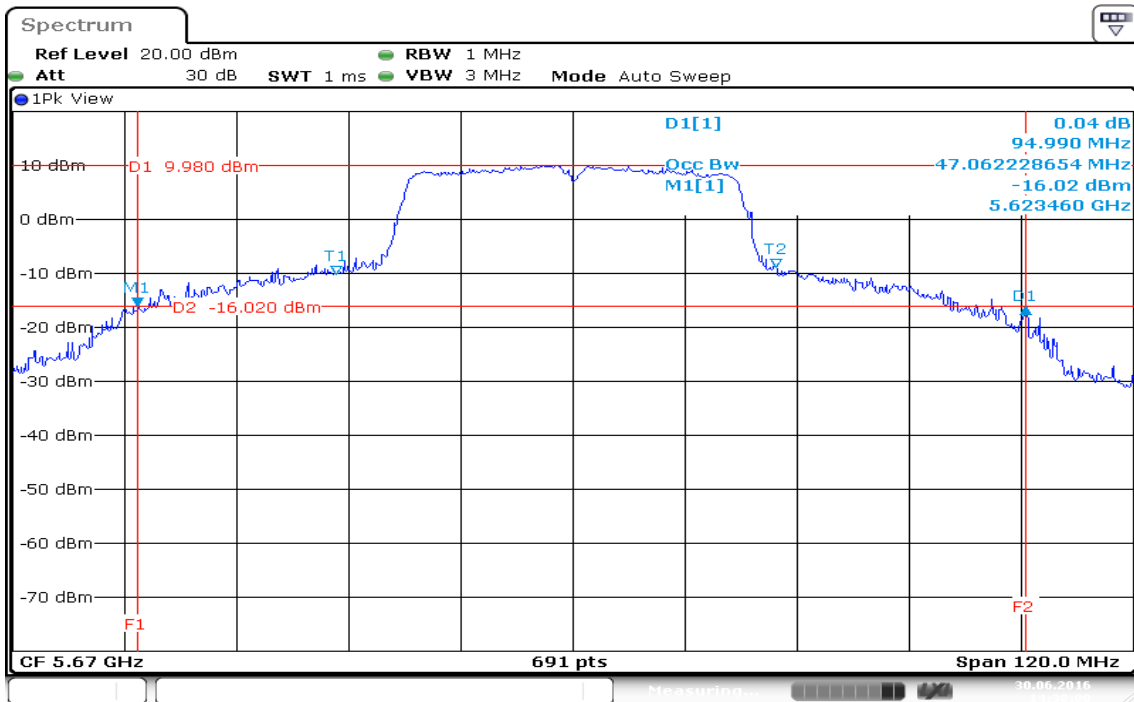
CH Low



CH Mid



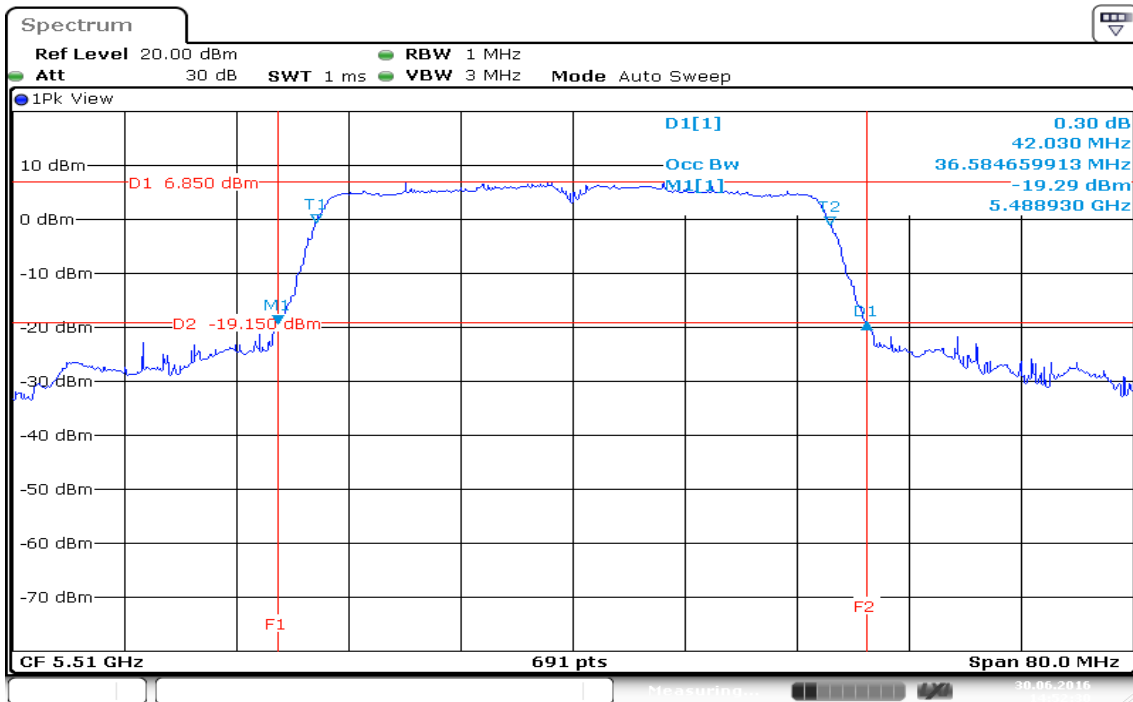
CH High



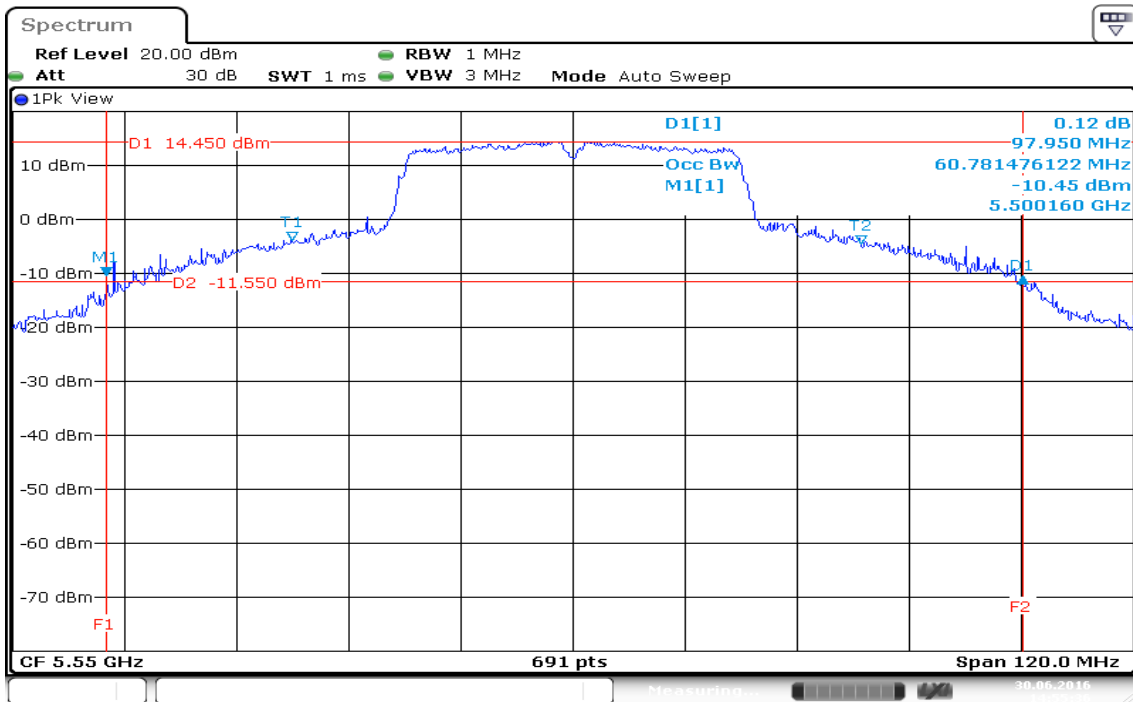
Date: 30 JUN 2016 14:38:01

IEEE 802.11n HT 40 MHz mode / 5510 ~ 5670MHz / Chain 1

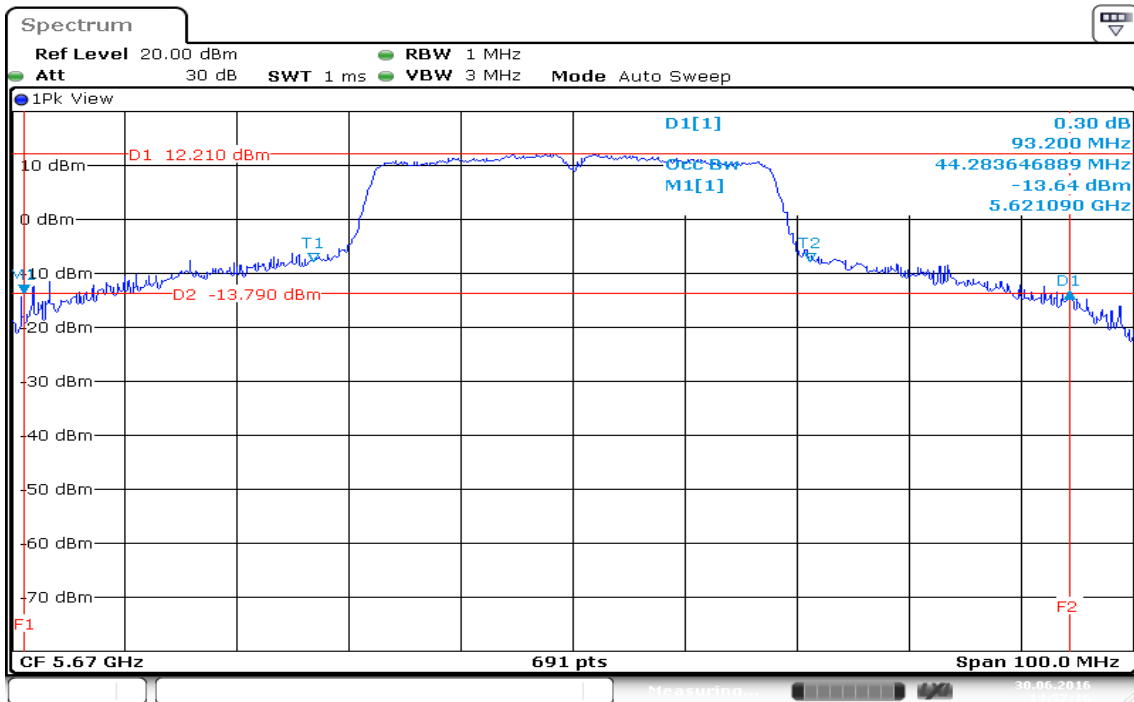
CH Low



CH Mid

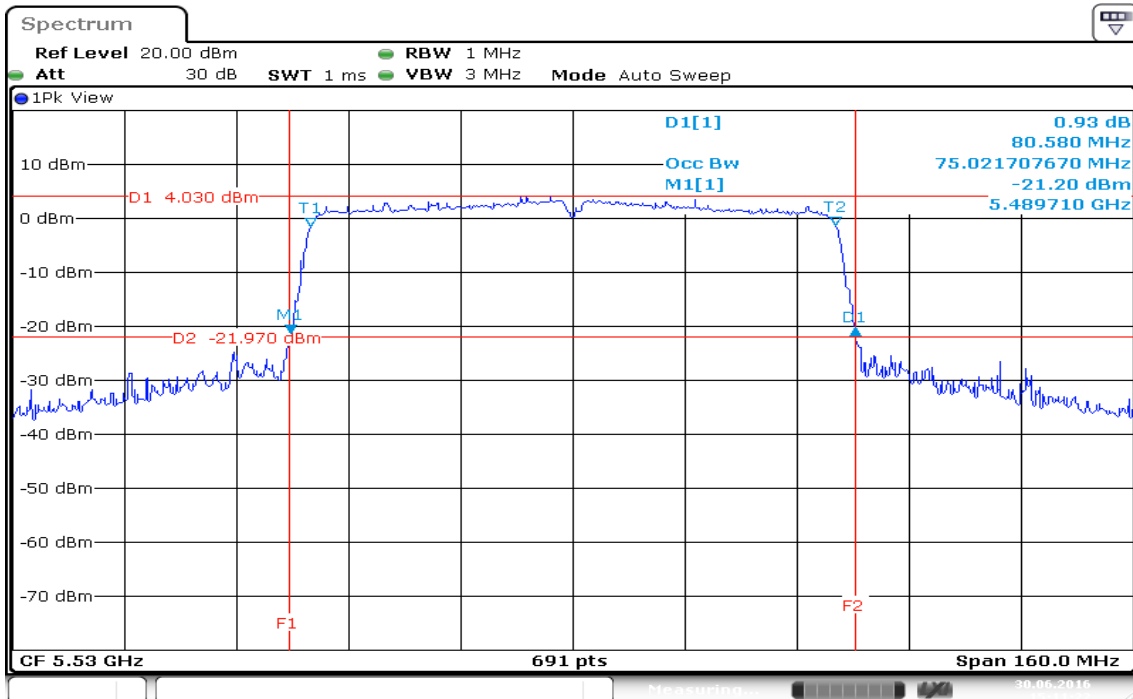


CH High



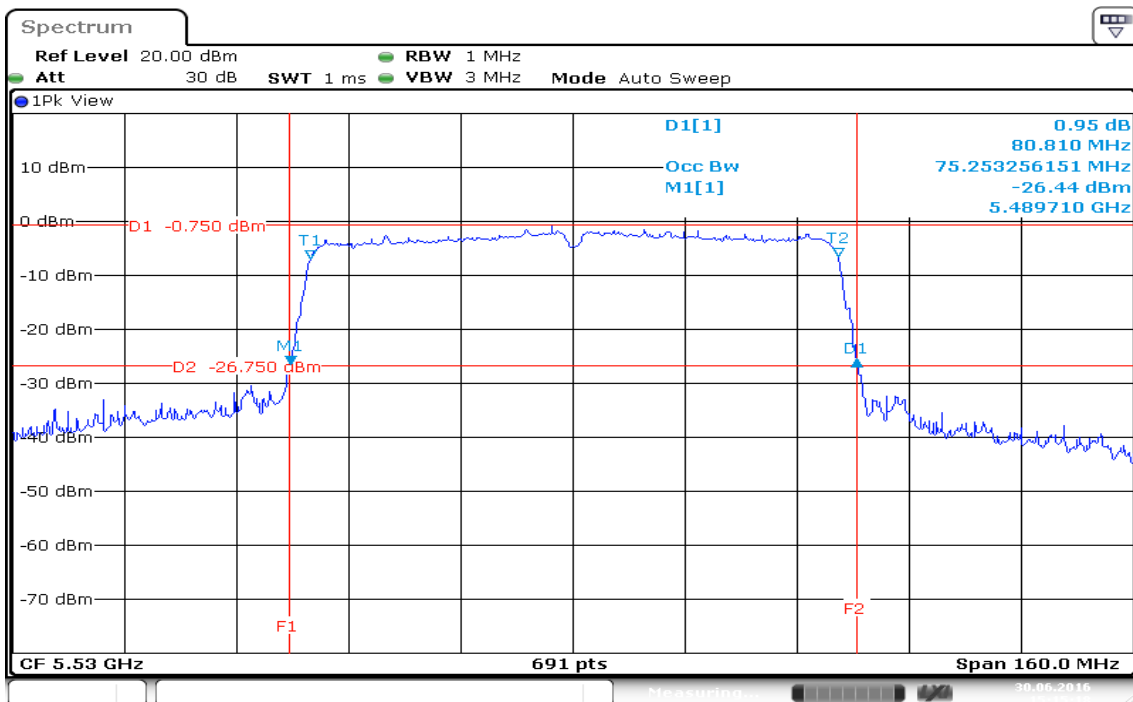
Date: 30 JUN 2016 14:57:16

IEEE 802.11ac VHT 80 MHz mode / 5530 MHz/ Chain 0
99% Bandwidth (CH Mid)



Date: 30 JUN 2016 15:11:22

IEEE 802.11ac VHT 80 MHz mode / 5530 MHz/ Chain 1
99% Bandwidth (CH Mid)



Date: 30 JUN 2016 15:15:18

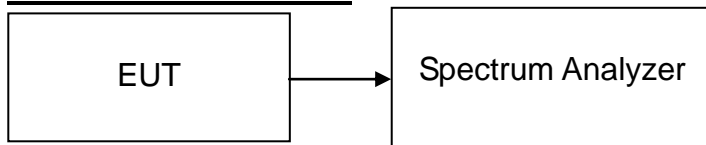
7.2 26 DB EMISSION BANDWIDTH

LIMIT

Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

Test Configuration

TEST PROCEDURE



1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low-loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW > 1%EBW, VBW > RBW, Span >26dB bandwidth, and Sweep = auto.
4. Mark the peak frequency and -26dB (upper and lower) frequency.
5. Repeat until all the rest channels were investigated.

TEST RESULTS

No non-compliance noted

Test Data

Test mode: IEEE 802.11a mode / 5180 ~ 5240MHz / Chain 0

Channel	Frequency (MHz)	26db Bandwidth (MHz)
Low	5180	28.6540
Mid	5220	27.3520
High	5240	33.8640

Test mode: IEEE 802.11a mode / 5180 ~ 5240MHz / Chain 1

Channel	Frequency (MHz)	26db Bandwidth (MHz)
Low	5180	23.6610
Mid	5220	20.5500
High	5240	29.4500

Test mode: IEEE 802.11n HT 20 MHz mode / 5180 ~ 5240MHz / Chain 0

Channel	Frequency (MHz)	26db Bandwidth (MHz)
Low	5180	34.5880
Mid	5220	32.5620
High	5240	26.3390

Test mode: IEEE 802.11n HT 20 MHz mode / 5180 ~ 5240MHz / Chain 1

Channel	Frequency (MHz)	26db Bandwidth (MHz)
Low	5180	25.6870
Mid	5220	20.6950
High	5240	20.5210

Test mode: IEEE 802.11n HT 40 MHz mode / 5190 ~ 5230MHz / Chain 0

Channel	Frequency (MHz)	26db Bandwidth (MHz)
Low	5190	42.1400
Mid	5230	73.5200

Test mode: IEEE 802.11n HT 40 MHz mode / 5190 ~ 5230MHz / Chain 1

Channel	Frequency (MHz)	26db Bandwidth (MHz)
Low	5190	42.3700
Mid	5230	81.6200

Test mode: IEEE 802.11ac VHT 80 MHz mode / 5210MHz / Chain 0

Channel	Frequency (MHz)	26db Bandwidth (MHz)
Mid	5210	80.8100

Test mode: IEEE 802.11ac VHT 80 MHz mode / 5210MHz / Chain 1

Channel	Frequency (MHz)	26db Bandwidth (MHz)
Mid	5210	81.2700

Test mode: IEEE 802.11a mode / 5260 ~ 5320MHz/ Chain 0

Channel	Frequency (MHz)	26db Bandwidth (MHz)
Low	5260	34.5150
Mid	5280	20.7670
High	5320	21.4180

Test mode: IEEE 802.11a mode / 5260 ~ 5320MHz/ Chain 1

Channel	Frequency (MHz)	26db Bandwidth (MHz)
Low	5260	29.0160
Mid	5280	20.0140
High	5320	20.0430

Test mode: IEEE 802.11n HT 20 MHz mode / 5260 ~ 5320MHz/ Chain 0

Channel	Frequency (MHz)	26db Bandwidth (MHz)
Low	5260	22.1420
Mid	5280	24.7470
High	5320	23.6610

Test mode: IEEE 802.11n HT 20 MHz mode / 5260 ~ 5320MHz/ Chain 1

Channel	Frequency (MHz)	26db Bandwidth (MHz)
Low	5260	20.1880
Mid	5280	20.3330
High	5320	20.5500

Test mode: IEEE 802.11n HT 40 MHz mode / 5270 ~ 5310MHz/ Chain 0

Channel	Frequency (MHz)	26db Bandwidth (MHz)
Low	5270	57.1900
Mid	5310	41.7900

Test mode: IEEE 802.11n HT 40 MHz mode / 5270 ~ 5310MHz/ Chain 1

Channel	Frequency (MHz)	26db Bandwidth (MHz)
Low	5270	74.9600
Mid	5310	42.3700

Test mode: IEEE 802.11ac VHT 80 MHz mode / 5290MHz / Chain 0

Channel	Frequency (MHz)	26db Bandwidth (MHz)
Mid	5290	94.2400

Test mode: IEEE 802.11ac VHT 80 MHz mode / 5290MHz / Chain 1

Channel	Frequency (MHz)	26db Bandwidth (MHz)
Mid	5290	81.0400

Test mode: IEEE 802.11a mode / 5500 ~ 5700MHz / Chain 0

Channel	Frequency (MHz)	26db Bandwidth (MHz)
Low	5500	20.3330
Mid	5580	43.5600
High	5700	25.2530

Test mode: IEEE 802.11a mode / 5500 ~ 5700MHz / Chain 1

Channel	Frequency (MHz)	26db Bandwidth (MHz)
Low	5500	19.7540
Mid	5580	45.0070
High	5700	21.8520

Test mode: IEEE 802.11n HT 20 MHz mode / 5500 ~ 5700MHz / Chain 0

Channel	Frequency (MHz)	26db Bandwidth (MHz)
Low	5500	25.5430
Mid	5580	46.8160
High	5700	21.9970

Test mode: IEEE 802.11n HT 20 MHz mode / 5500 ~ 5700MHz / Chain 1

Channel	Frequency (MHz)	26db Bandwidth (MHz)
Low	5500	22.3590
Mid	5580	35.7450
High	5700	23.8060

Test mode: IEEE 802.11n HT 40 MHz mode / 5510 ~ 5670MHz / Chain 0

Channel	Frequency (MHz)	26db Bandwidth (MHz)
Low	5510	42.1400
Mid	5550	89.6100
High	5670	94.9900

Test mode: IEEE 802.11n HT 40 MHz mode / 5510 ~ 5670MHz / Chain 1

Channel	Frequency (MHz)	26db Bandwidth (MHz)
Low	5510	42.0300
Mid	5550	97.9500
High	5670	93.2000

Test mode: IEEE 802.11ac VHT 80 MHz mode / 5530 MHz / Chain 0

Channel	Frequency (MHz)	26db Bandwidth (MHz)
Mid	5530	80.5800

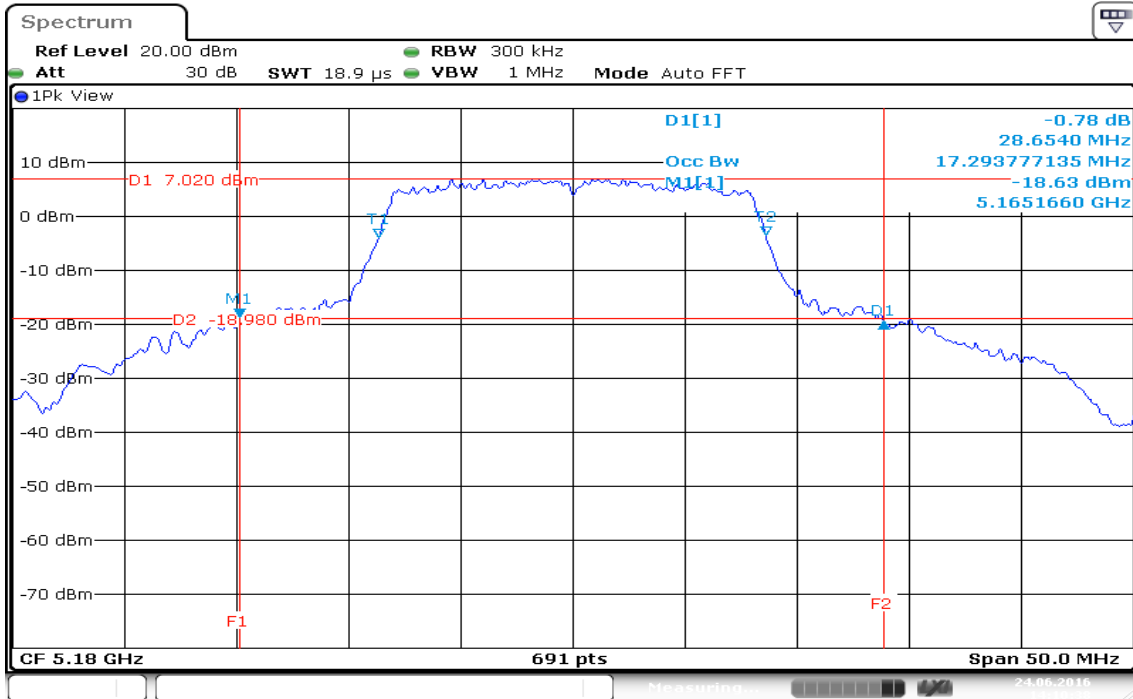
Test mode: IEEE 802.11ac VHT 80 MHz mode / 5530 MHz / Chain 1

Channel	Frequency (MHz)	26db Bandwidth (MHz)
Mid	5530	80.8100

Test Plot

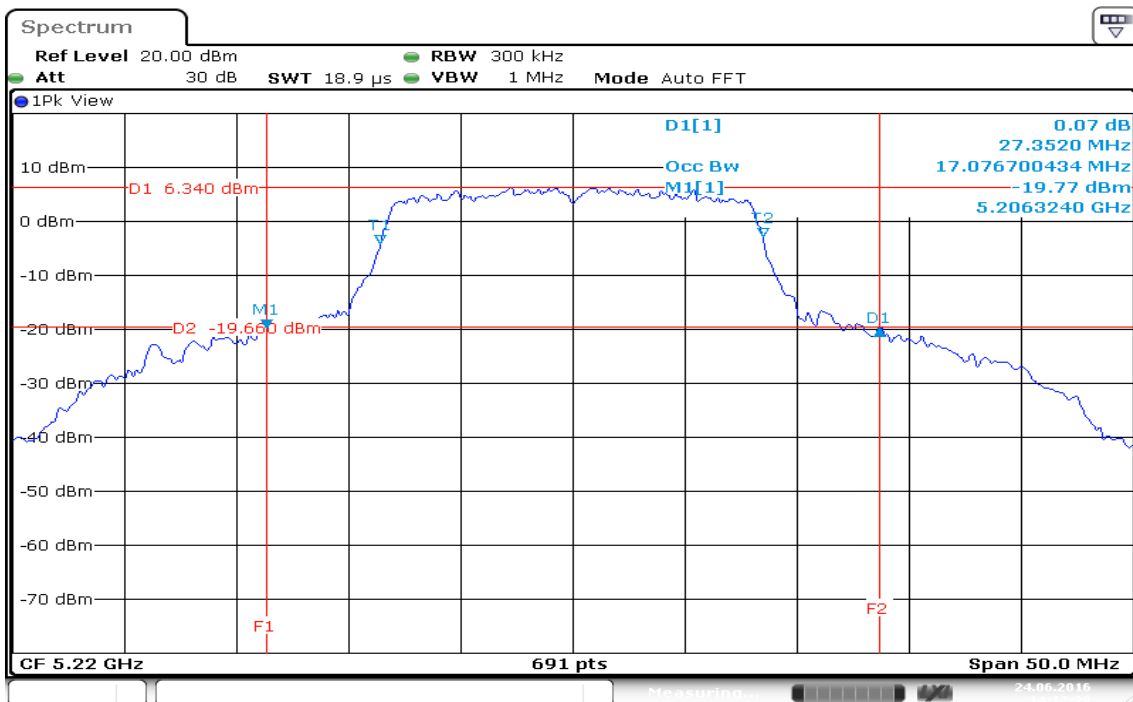
IEEE 802.11a for 5180 ~ 5240MHz/ Chain 0

CH Low



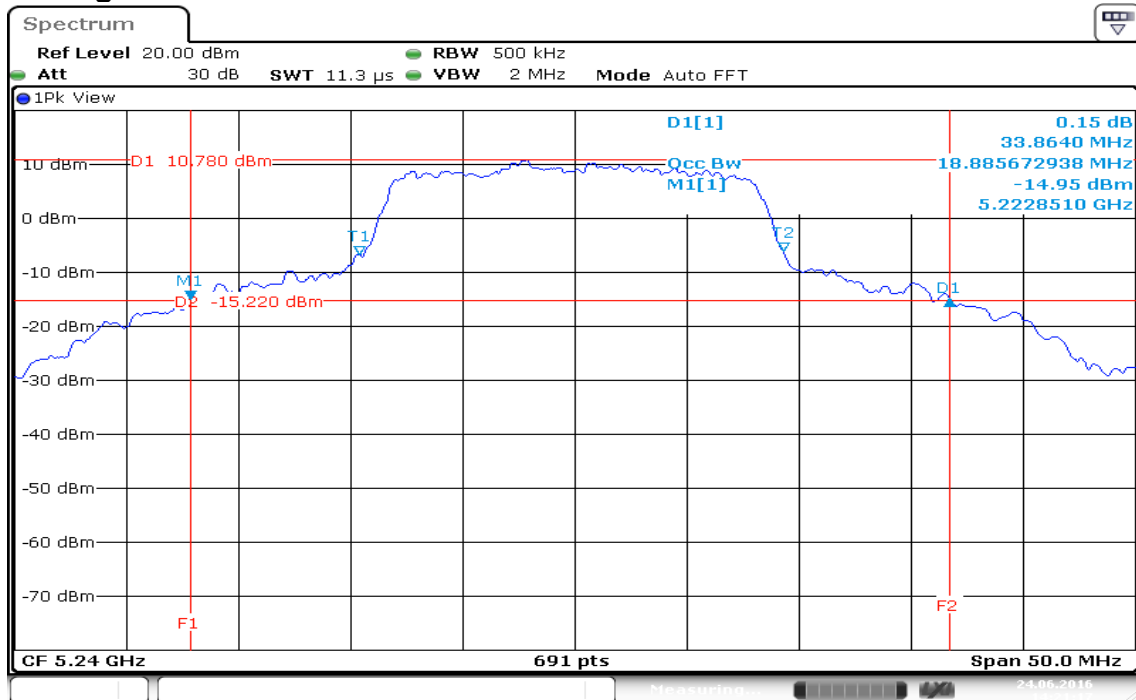
Date: 24.JUN.2016 14:10:38

CH Mid



Date: 24.JUN.2016 14:12:40

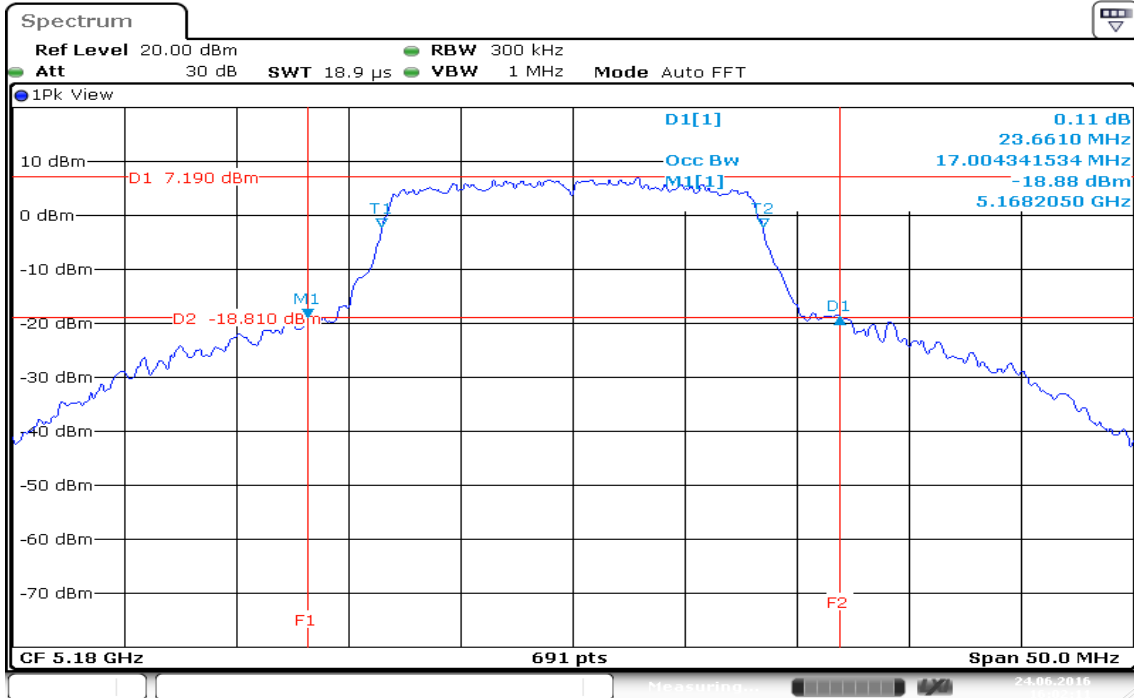
CH High



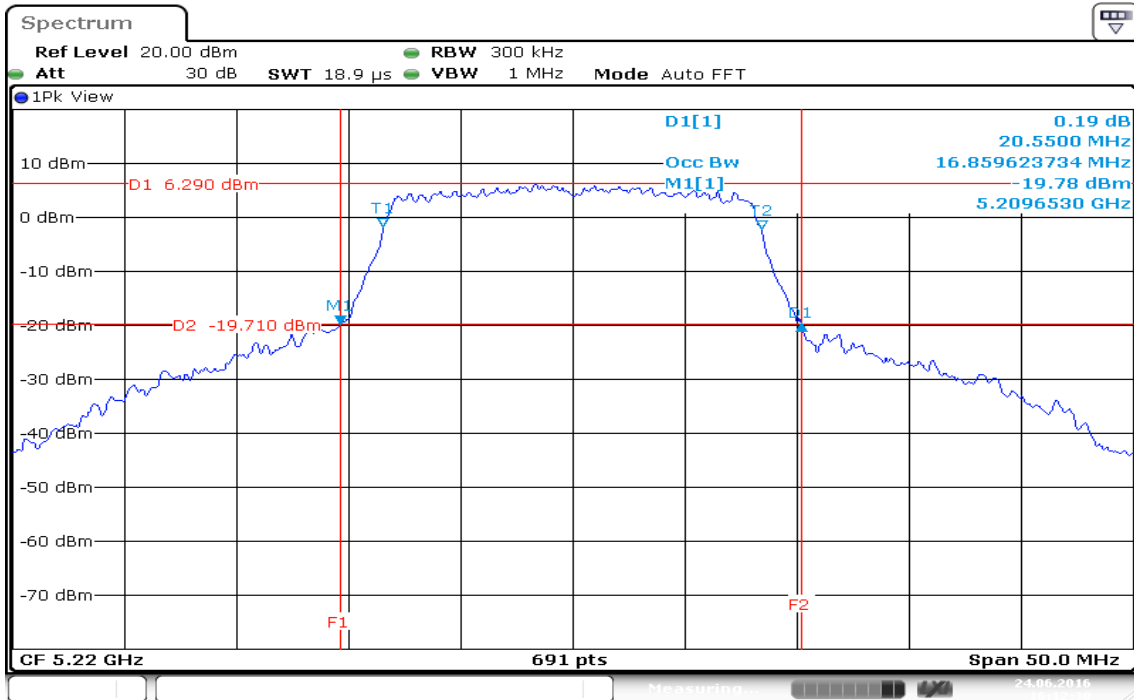
Date: 24.JUN.2016 14:21:18

IEEE 802.11a for 5180 ~ 5240MHz/ Chain 1

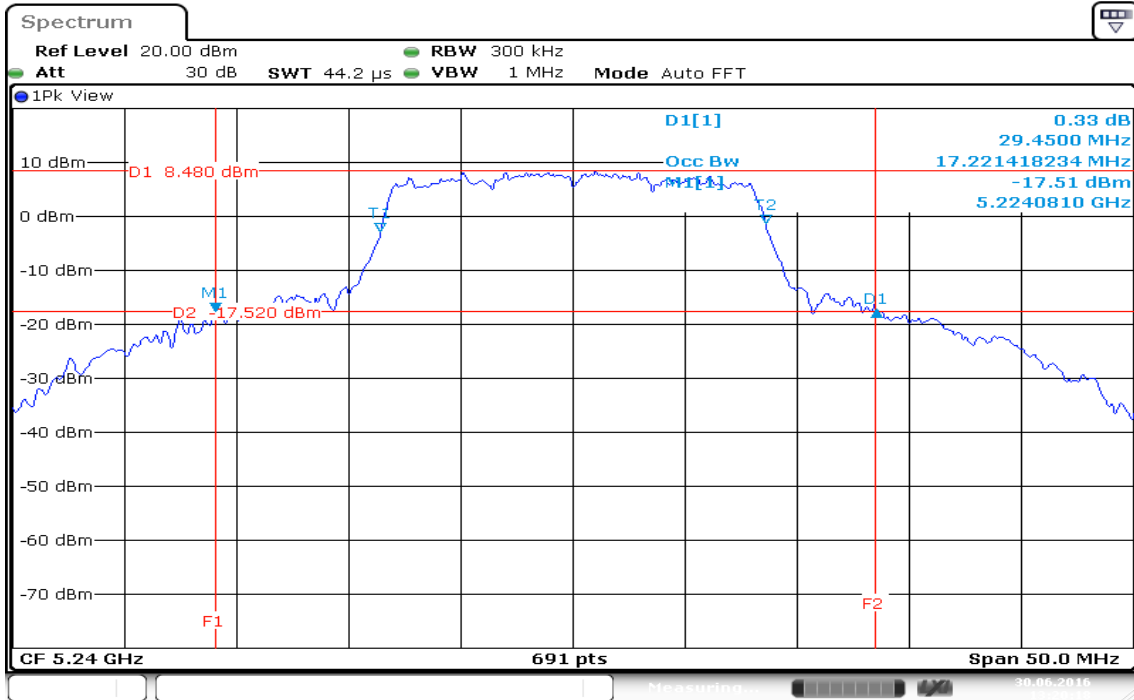
CH Low



CH Mid



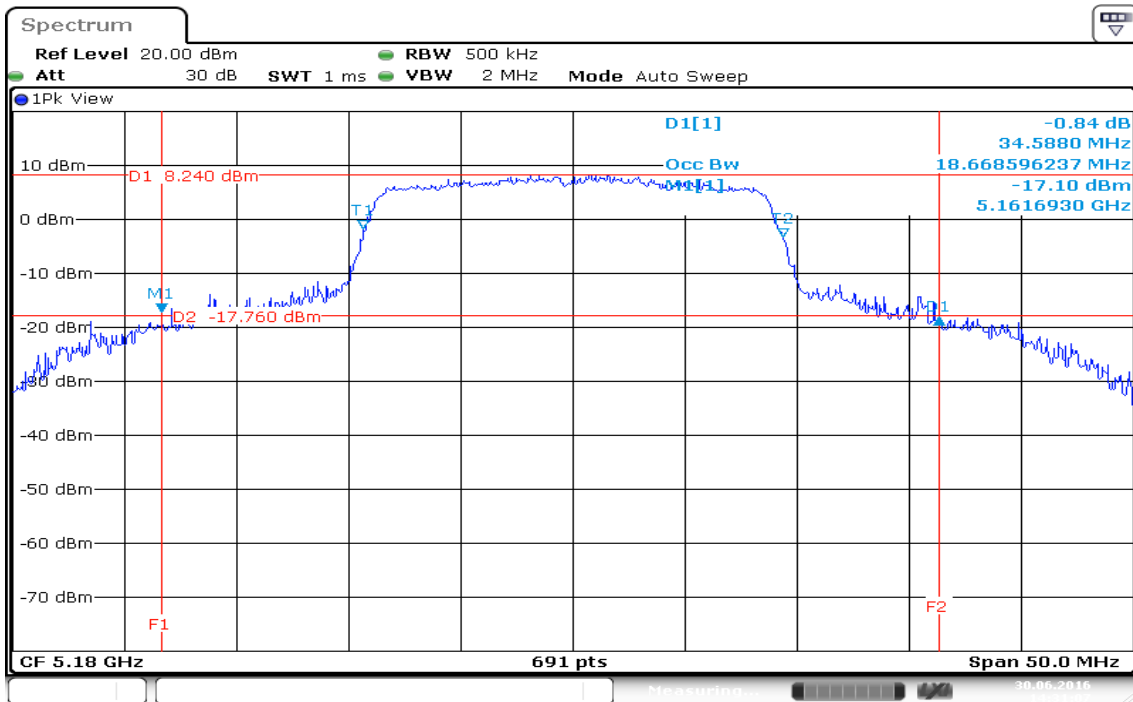
CH High



Date: 30 JUN 2016 13:20:18

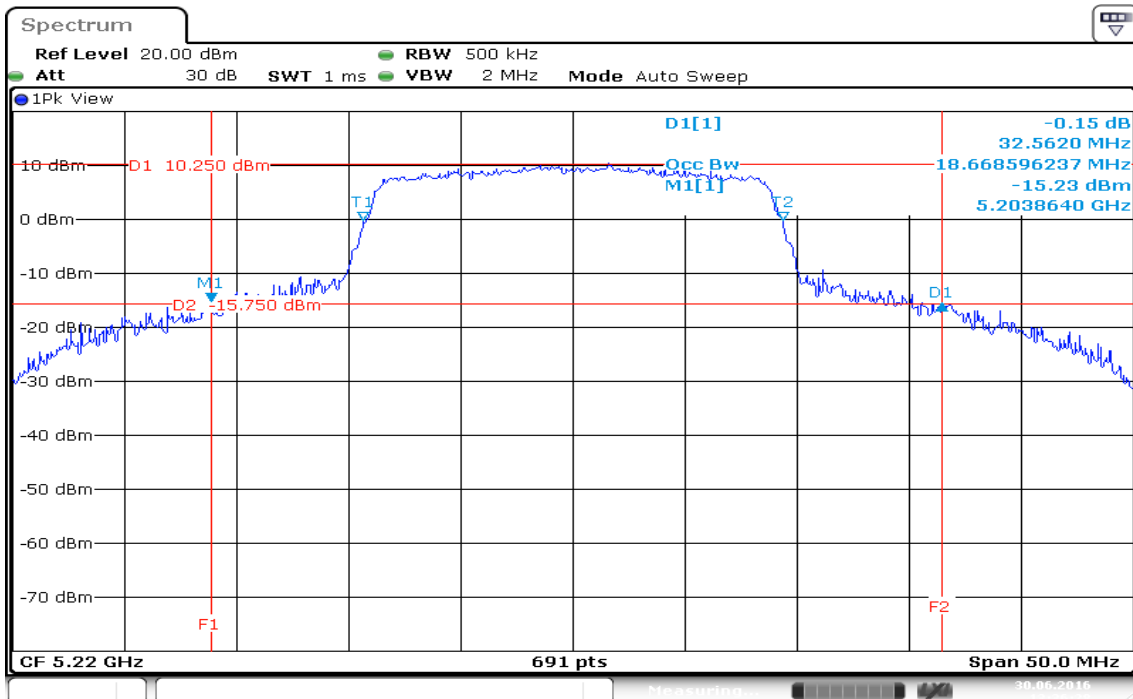
IEEE 802.11n HT 20 MHz mode / 5180 ~ 5240MHz/ Chain 0

CH Low



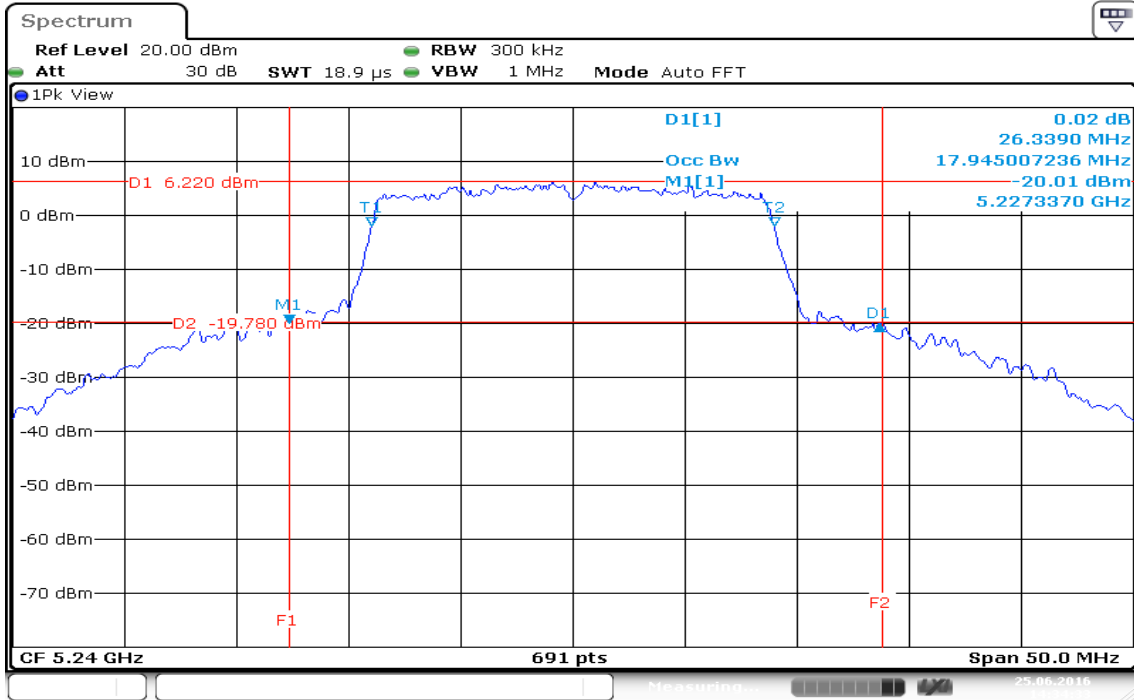
Date: 30 JUN 2016 14:31:08

CH Mid



Date: 30 JUN 2016 13:36:29

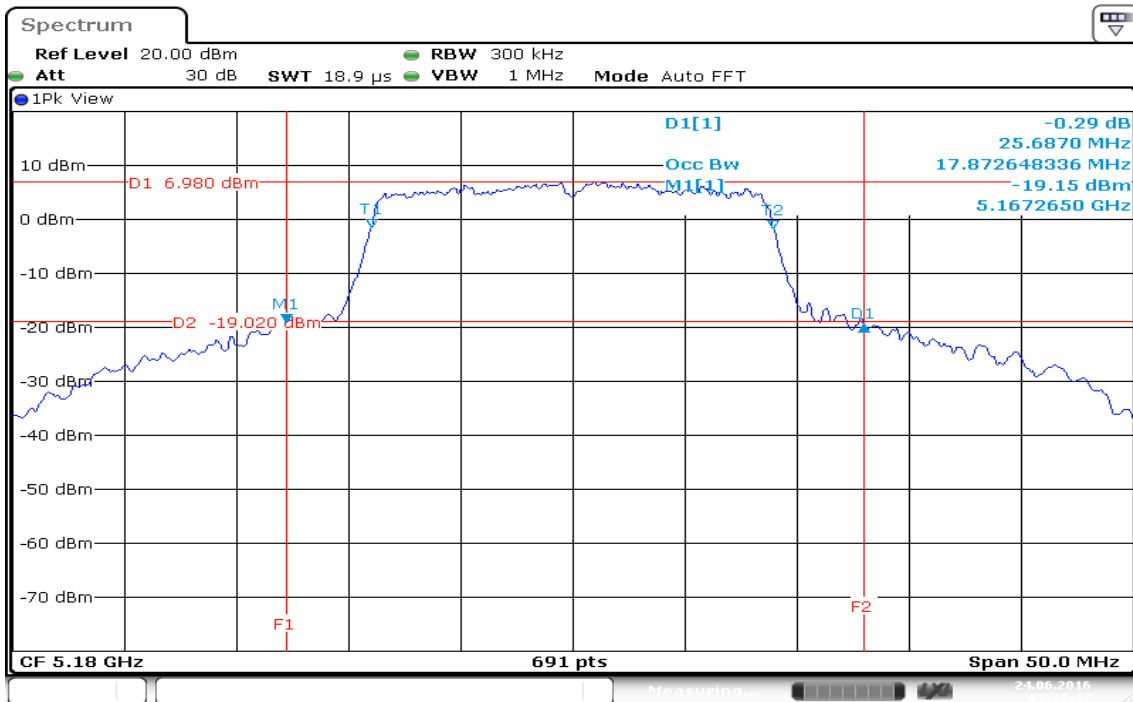
CH High



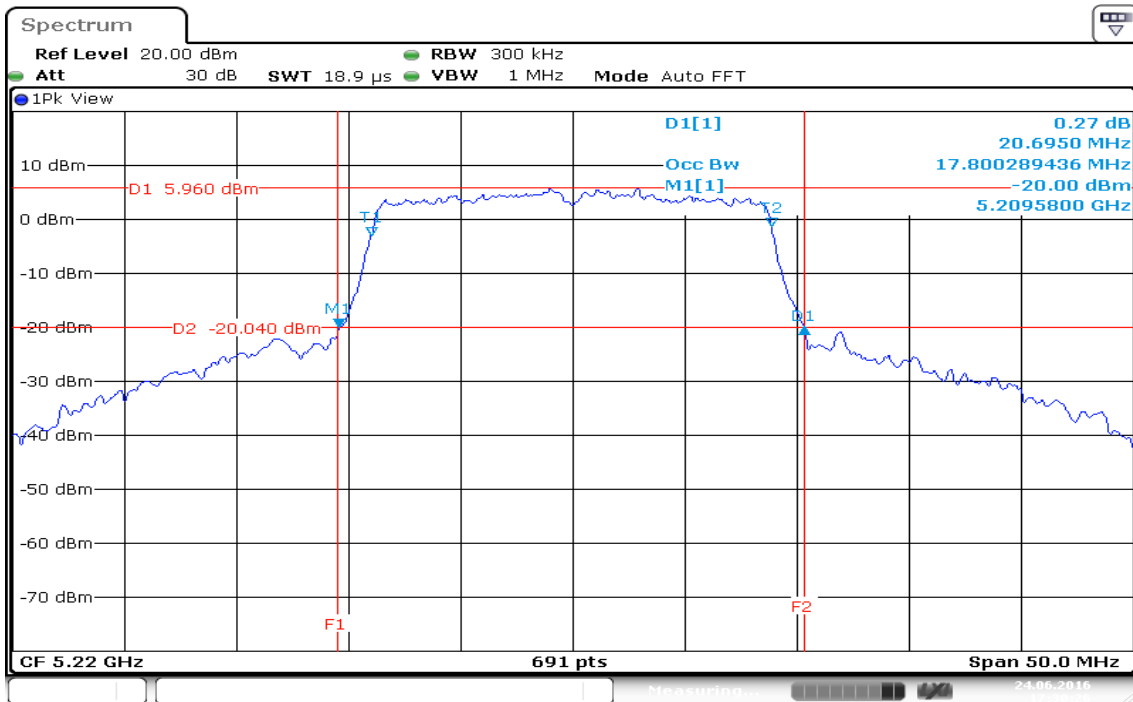
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IEEE 802.11n HT 20 MHz mode / 5180 ~ 5240MHz/ Chain 1

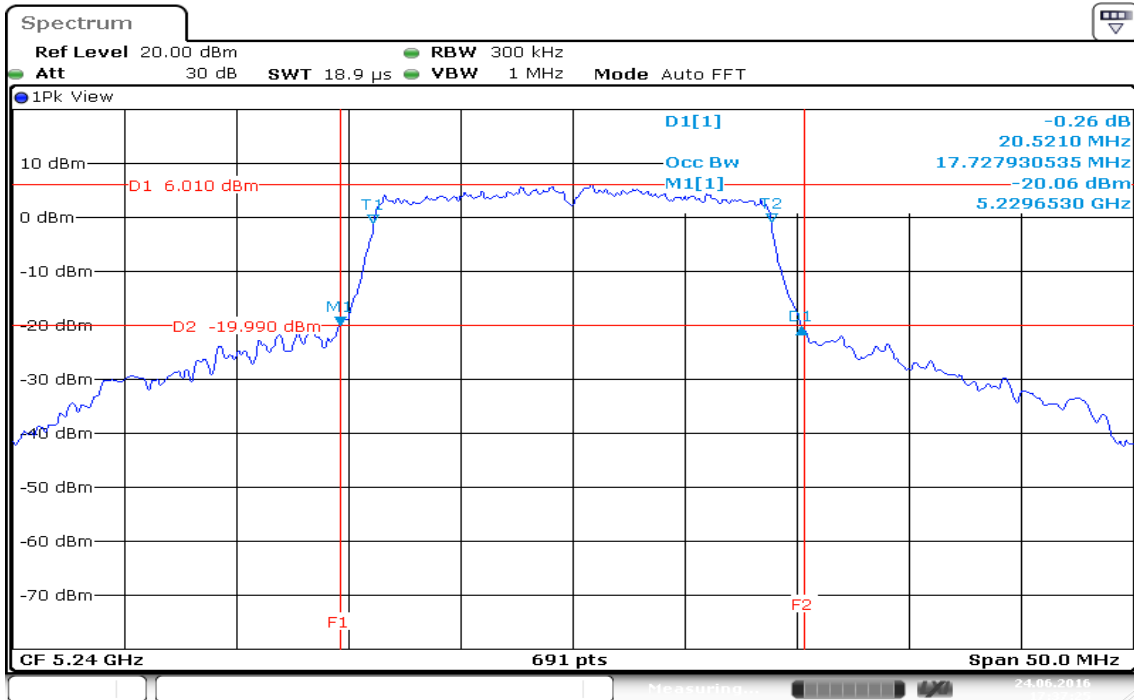
CH Low



CH Mid



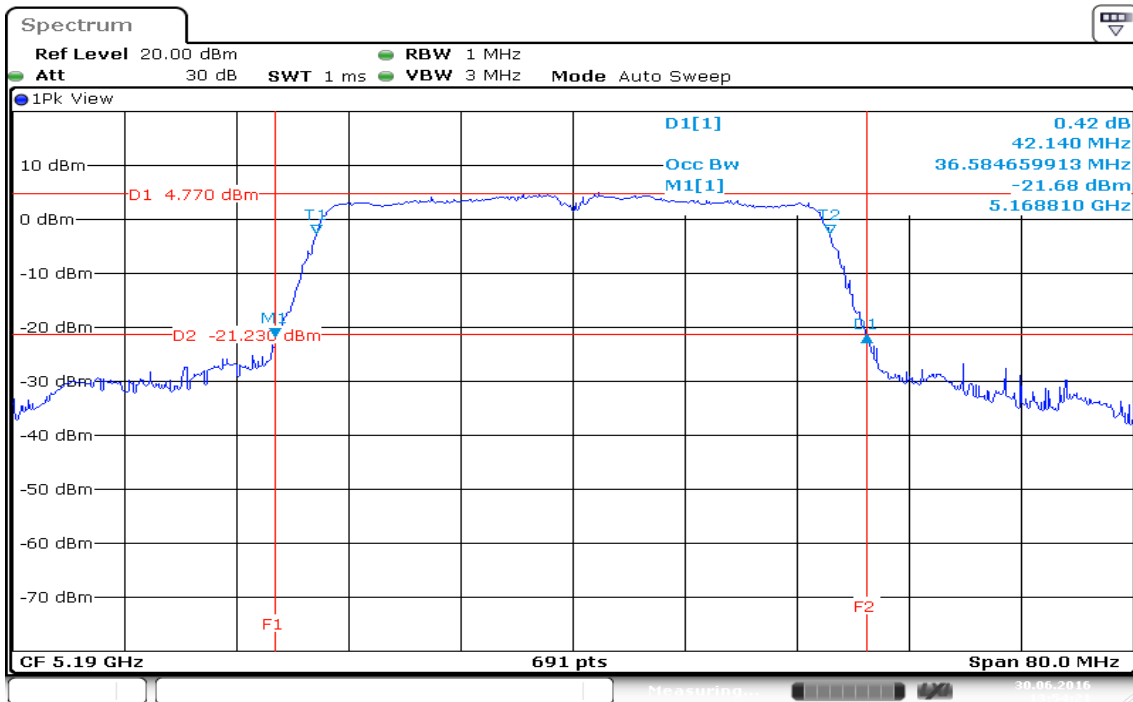
CH High



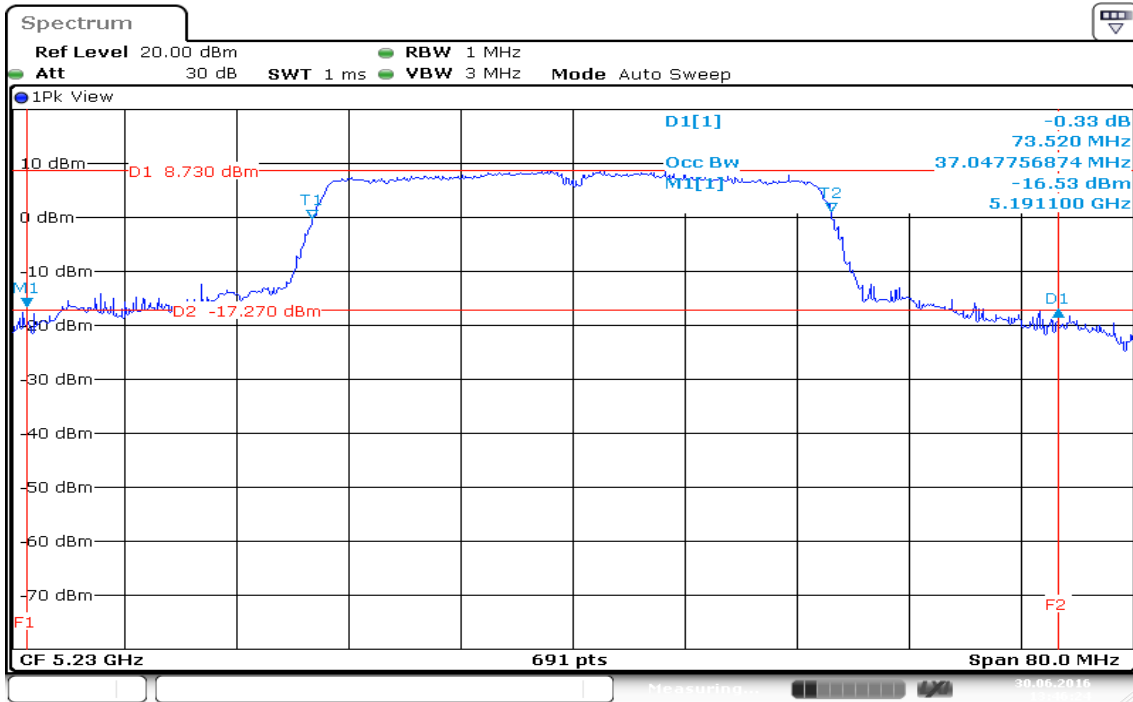
Date: 24.JUN.2016 17:37:25

IEEE 802.11n HT 40 MHz mode / 5190 ~ 5230MHz/ Chain 0

CH Low

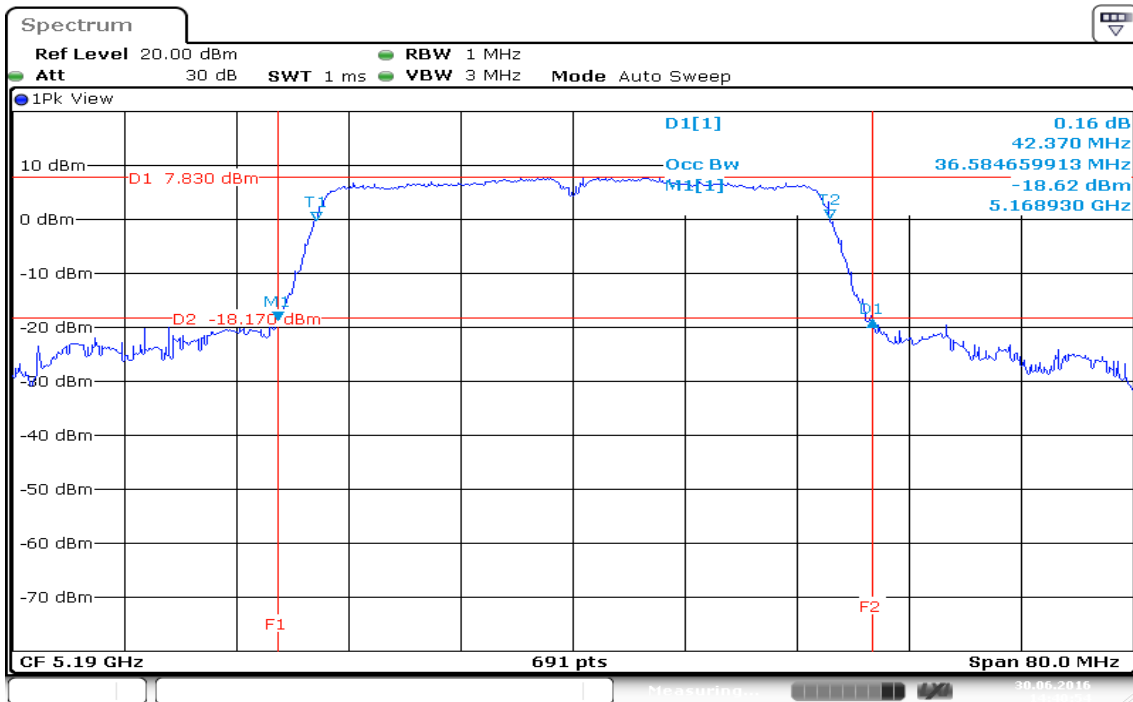


CH High

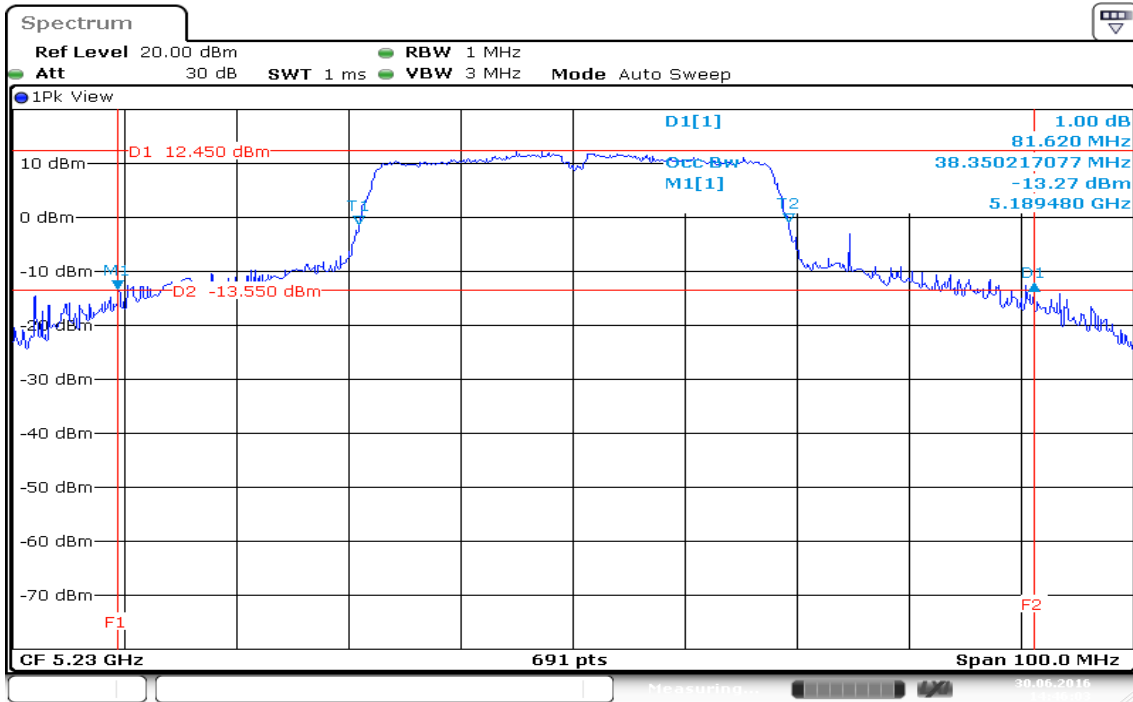


IEEE 802.11n HT 40 MHz mode / 5190 ~ 5230MHz/ Chain 1

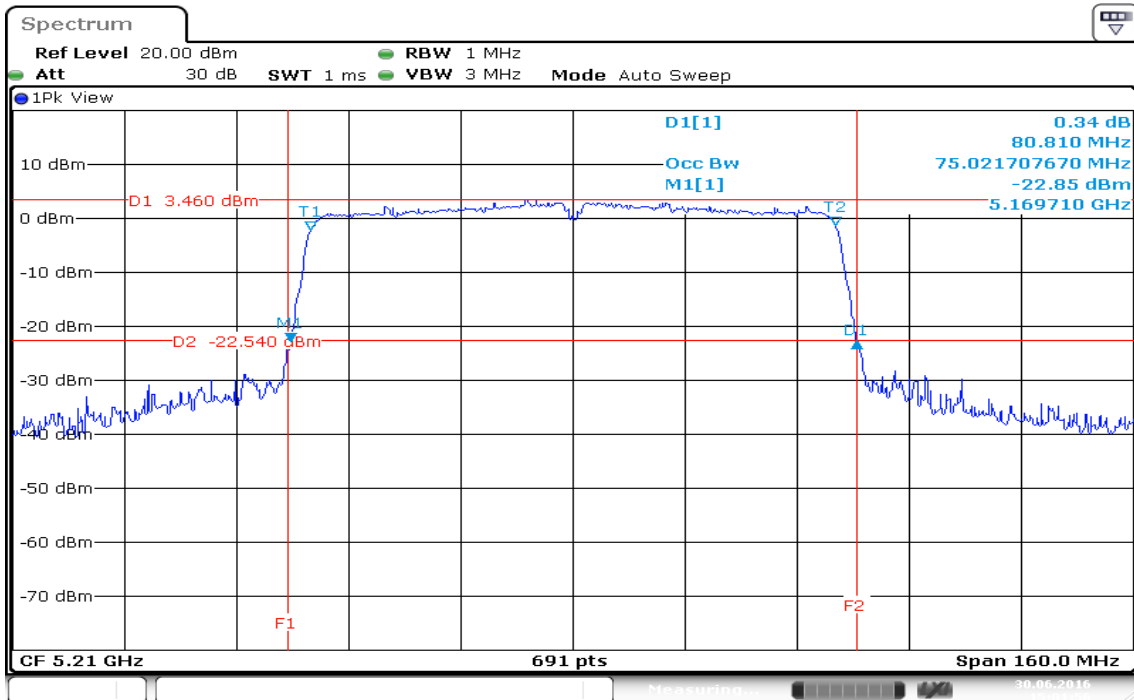
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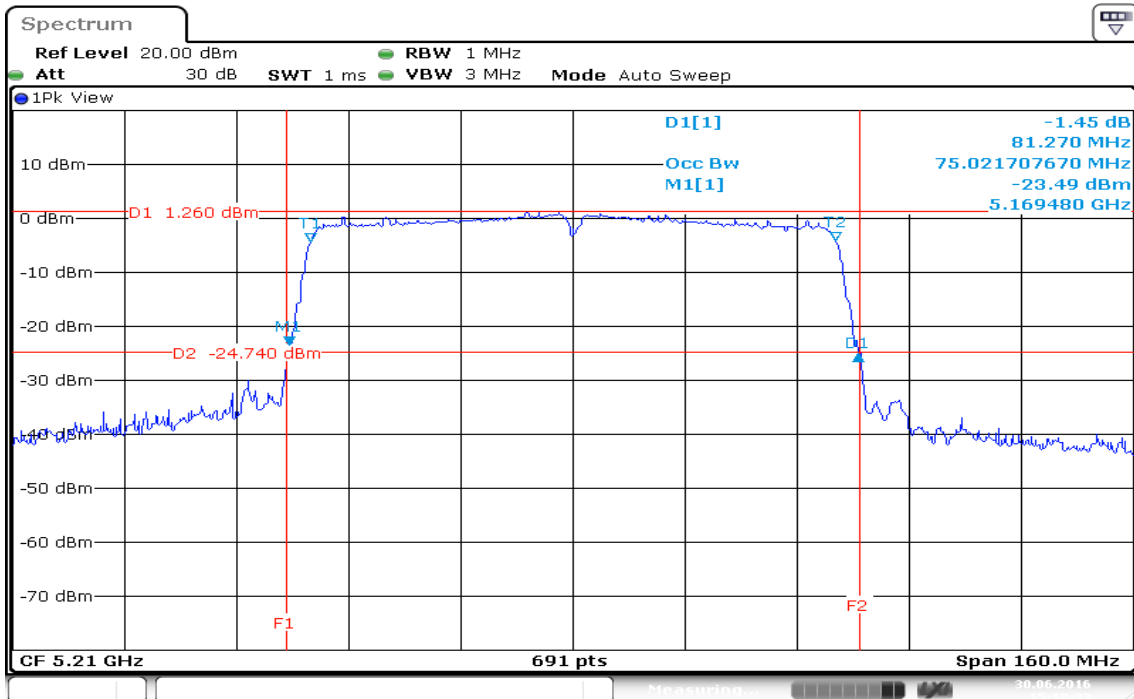
CH High



IEEE 802.11ac VHT 80 MHz mode / 5210MHz / Chain 0
99% Bandwidth (CH Mid)

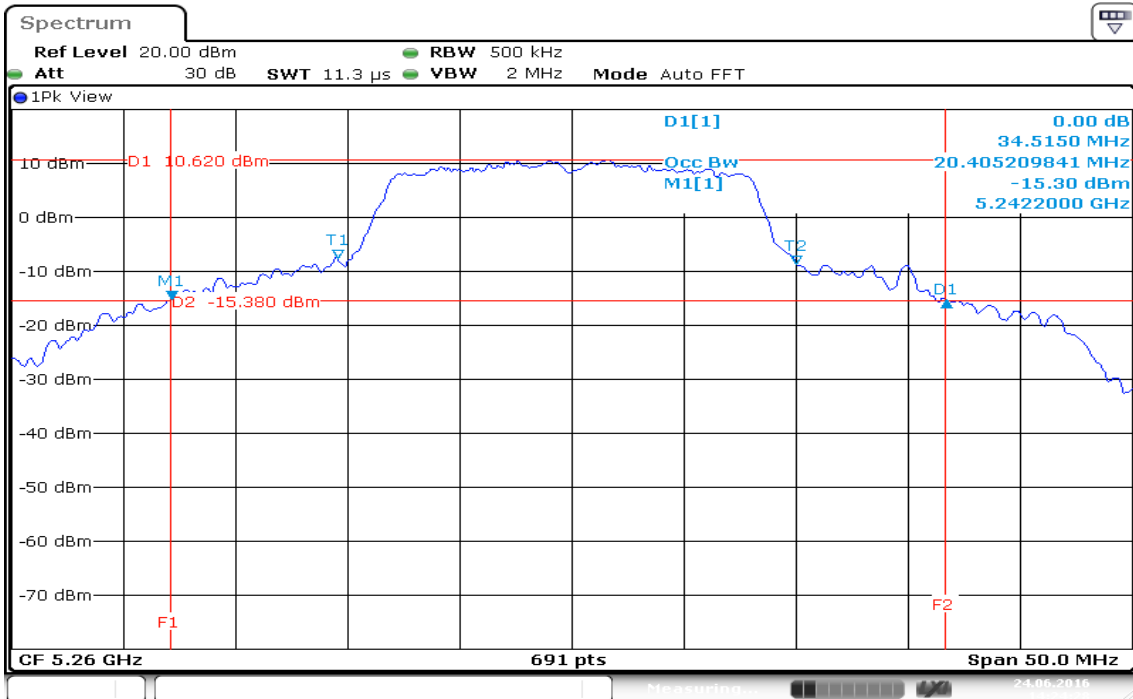


IEEE 802.11ac VHT 80 MHz mode / 5210MHz / Chain 1
99% Bandwidth (CH Mid)

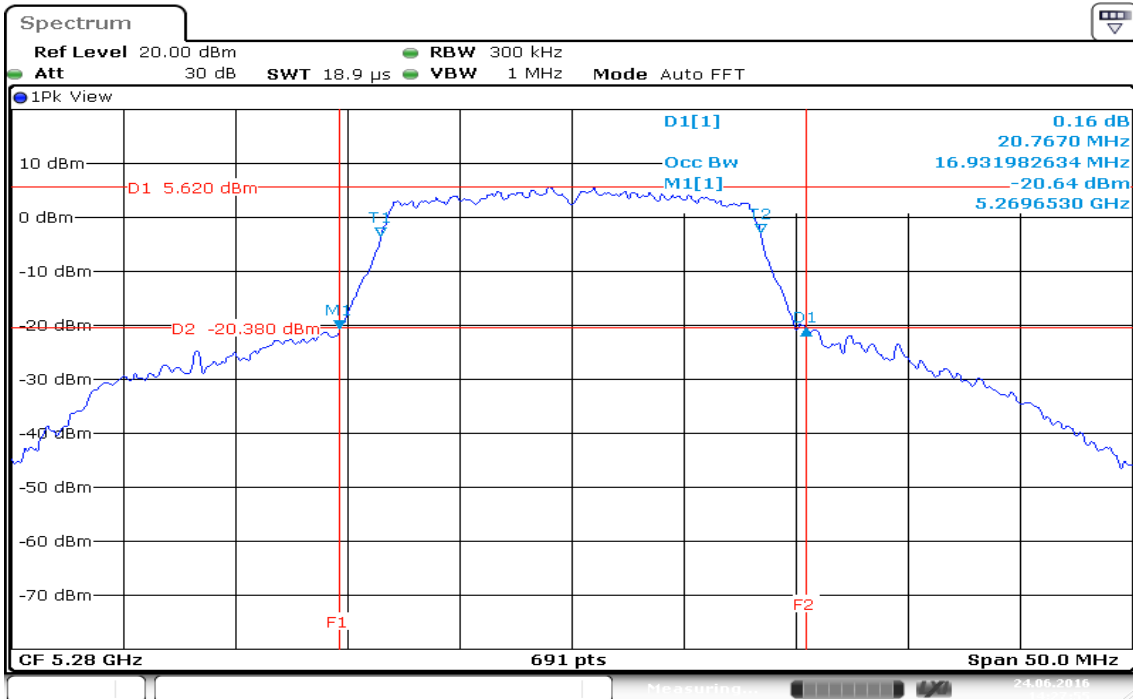


IEEE 802.11a mode / 5260 ~ 5320MHz/ Chain 0

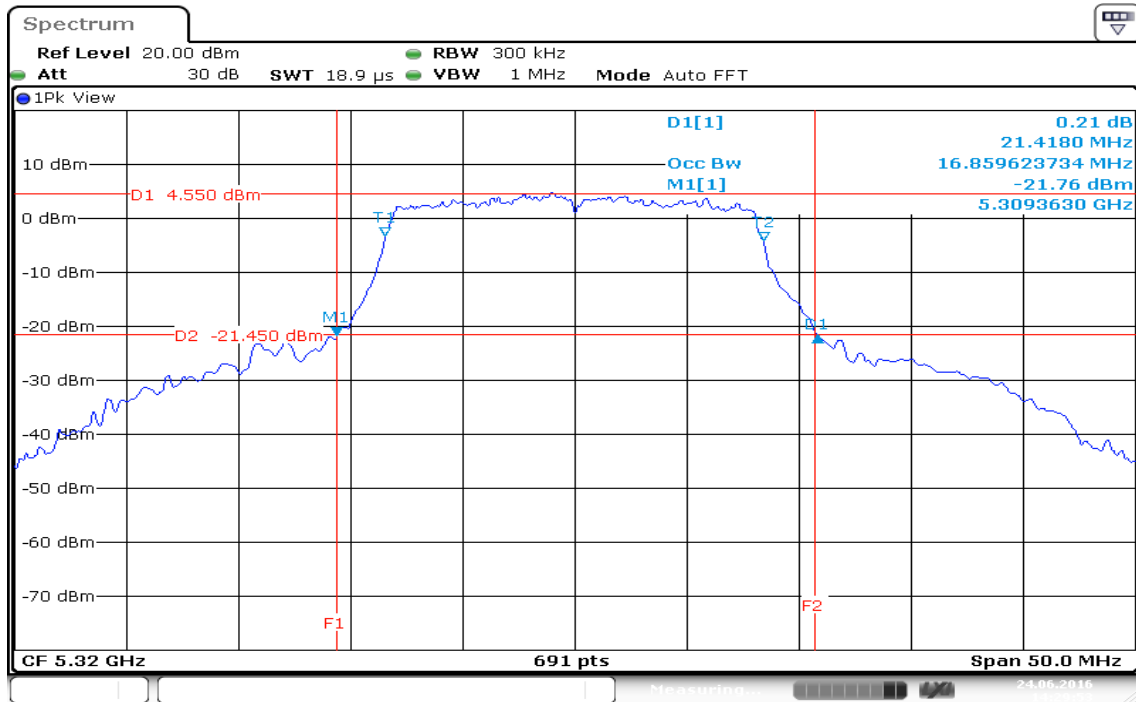
CH Low



CH Mid

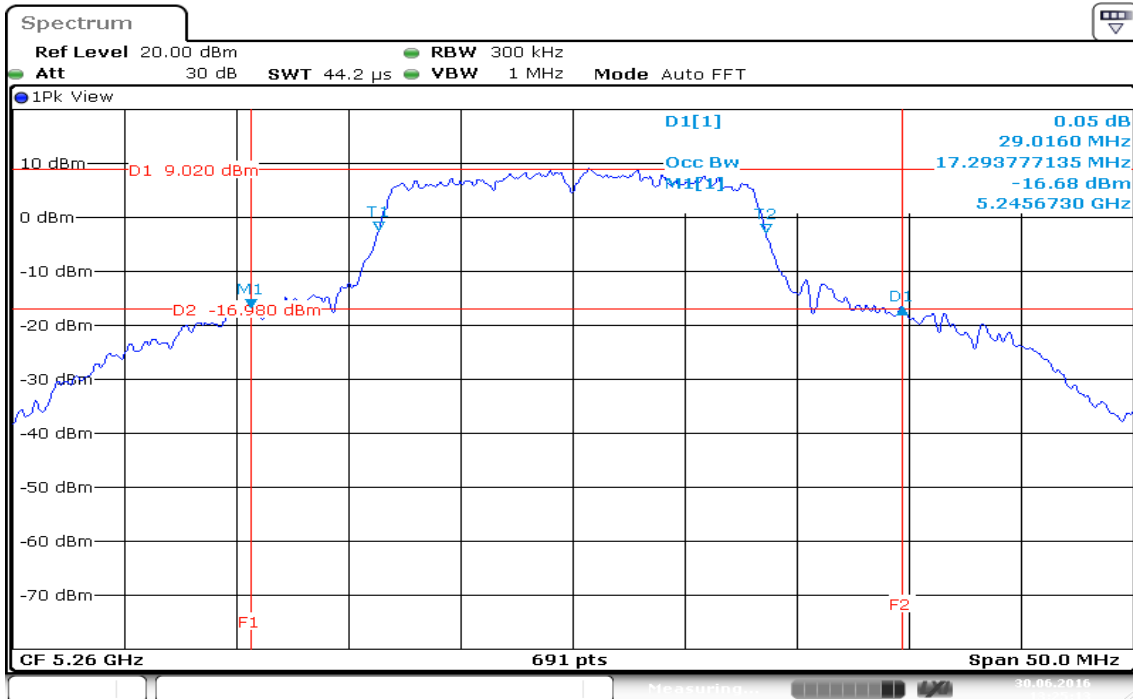


CH High

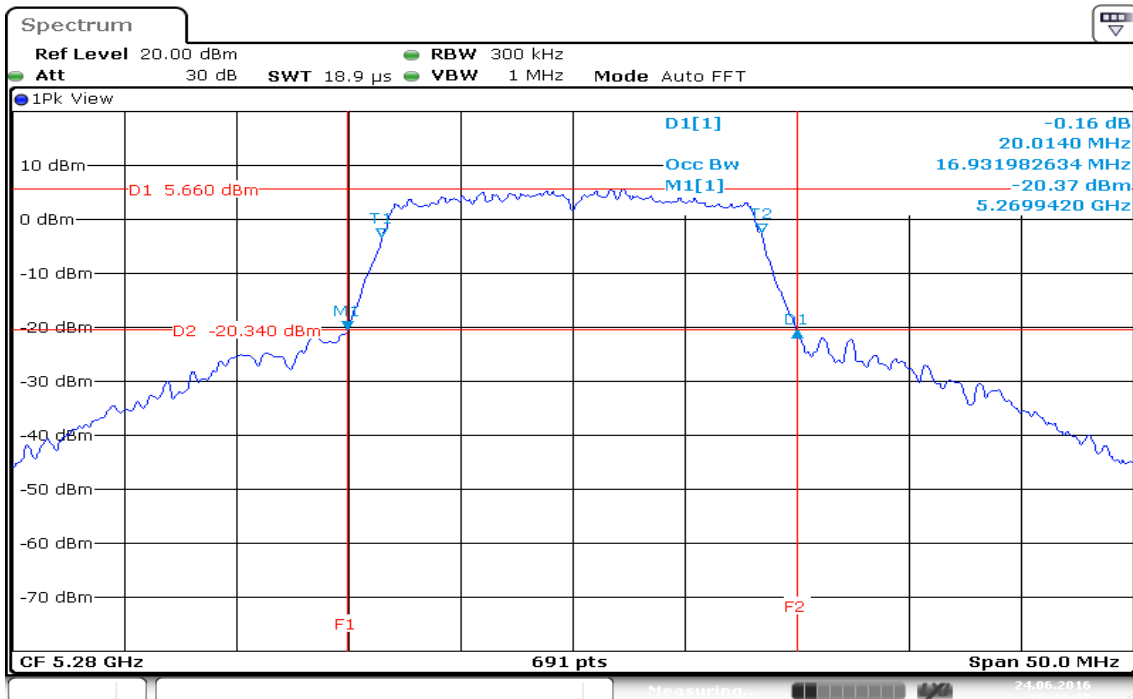


IEEE 802.11a mode / 5260 ~ 5320MHz/ Chain 1

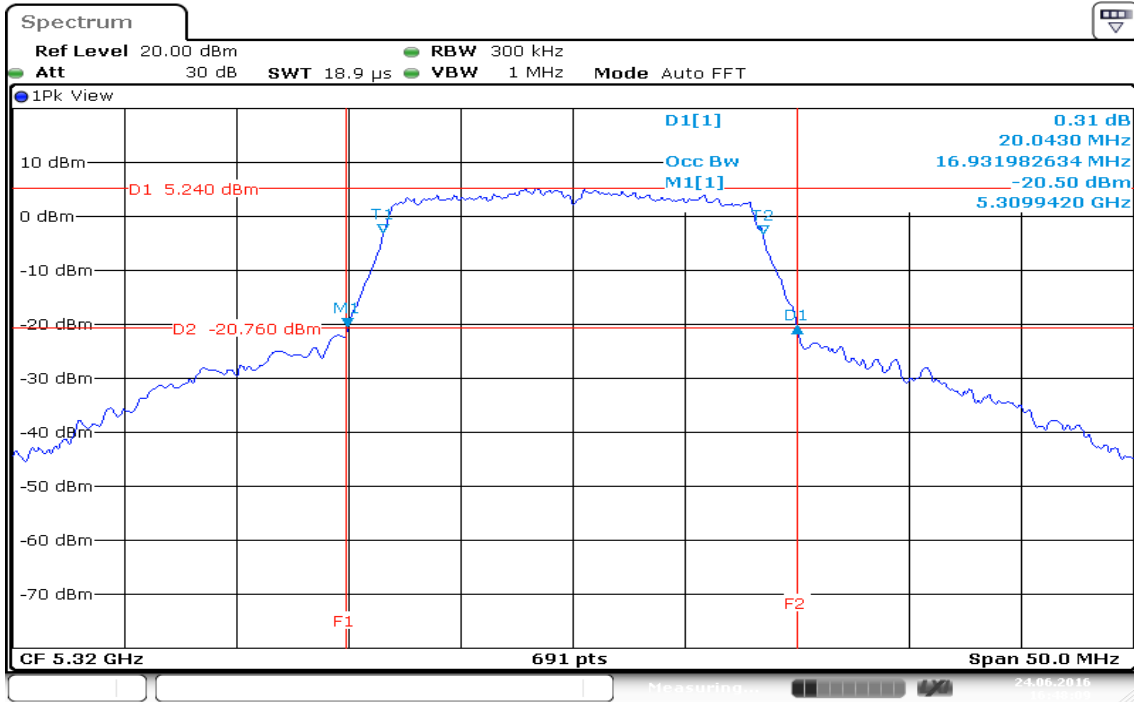
CH Low



CH Mid

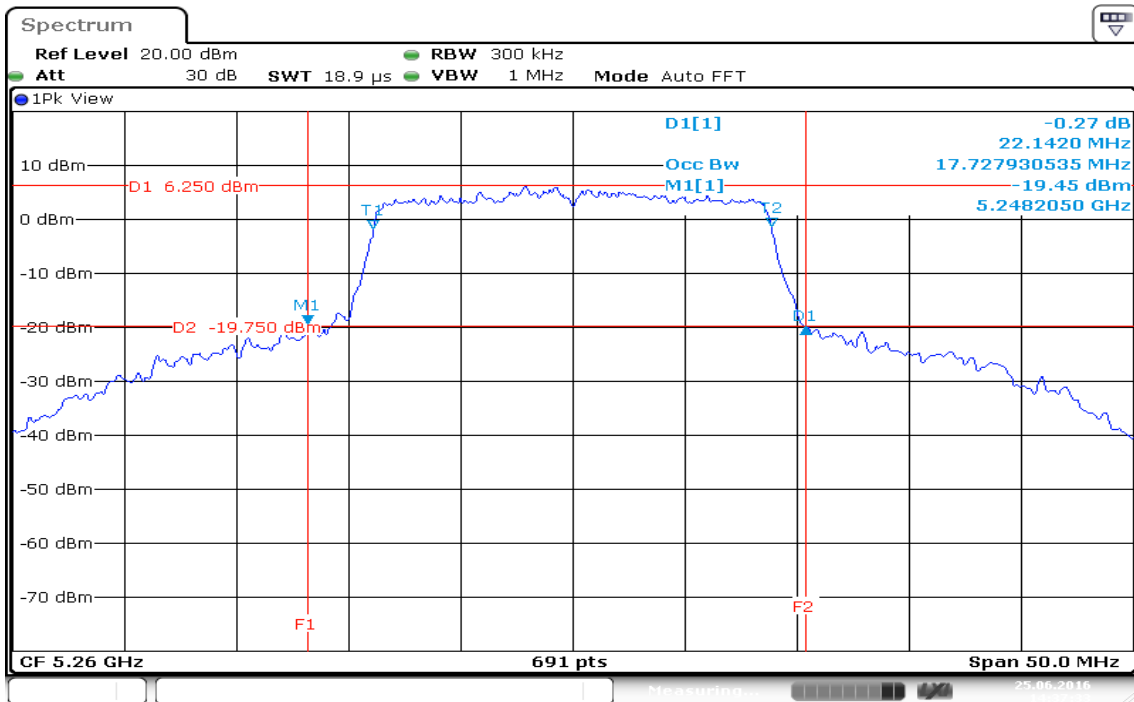


CH High

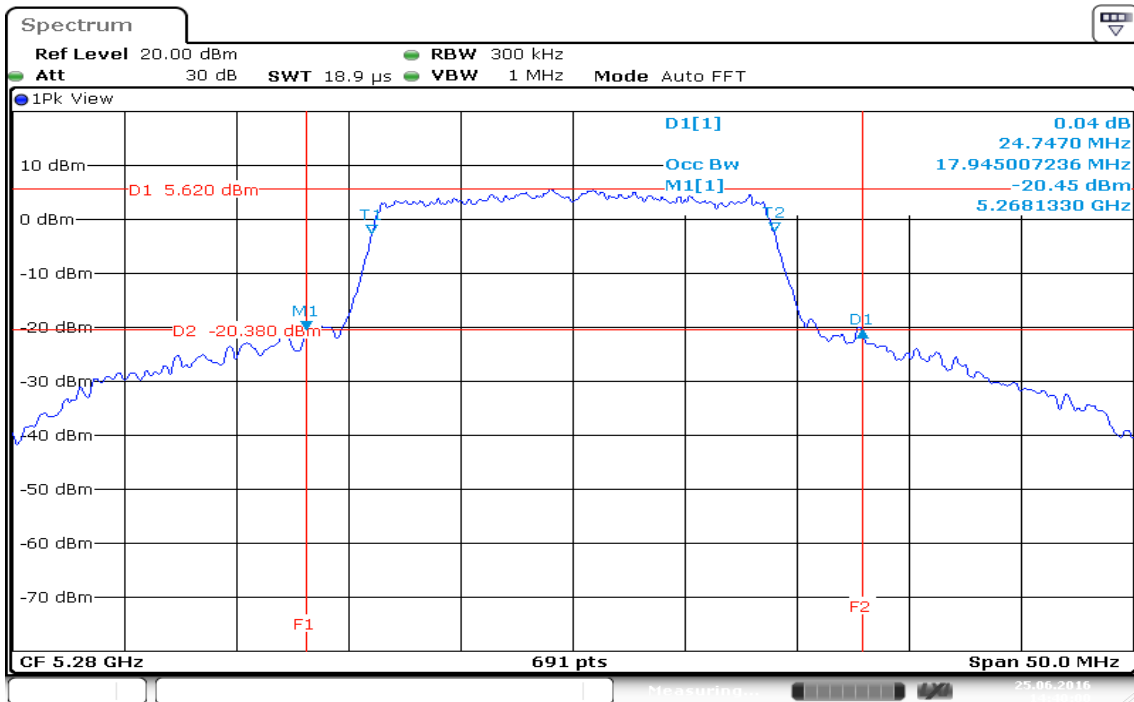


IEEE 802.11n HT 20 MHz mode / 5260 ~ 5320MHz/ Chain 0

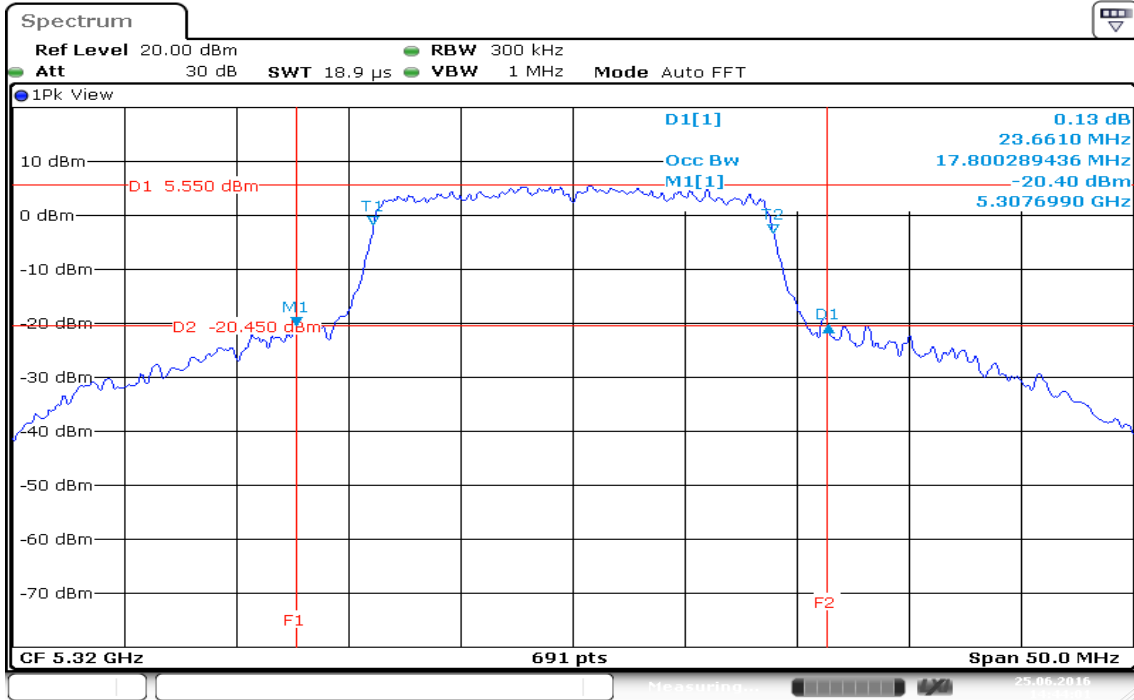
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CH Mid



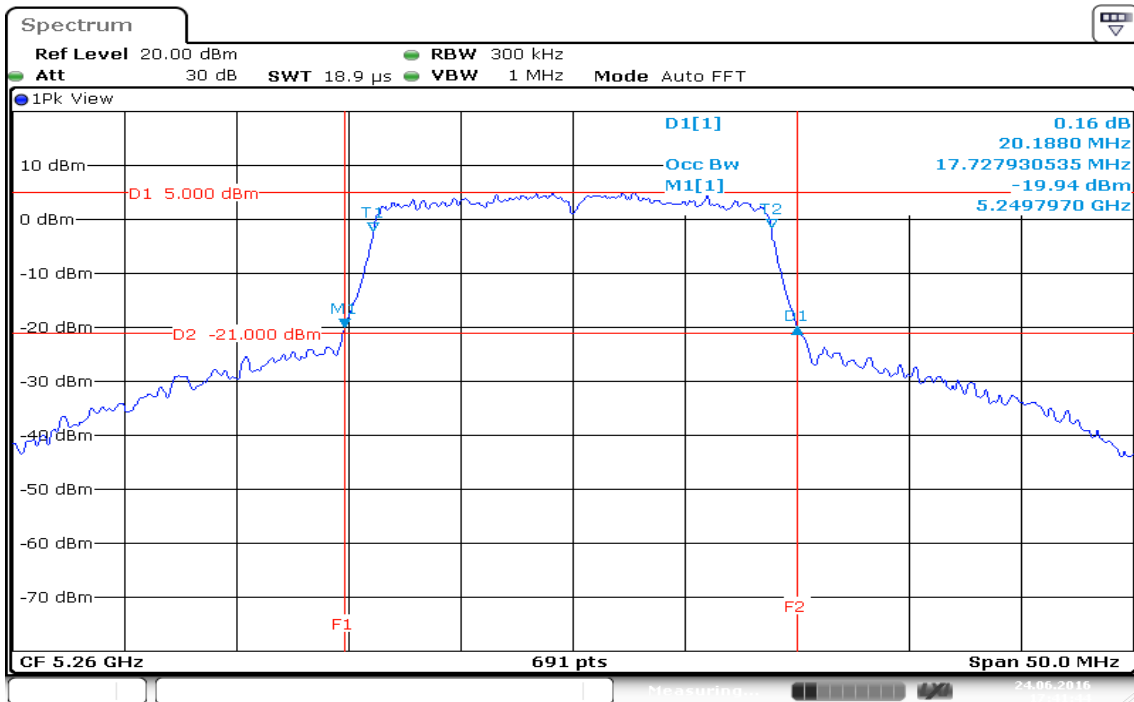
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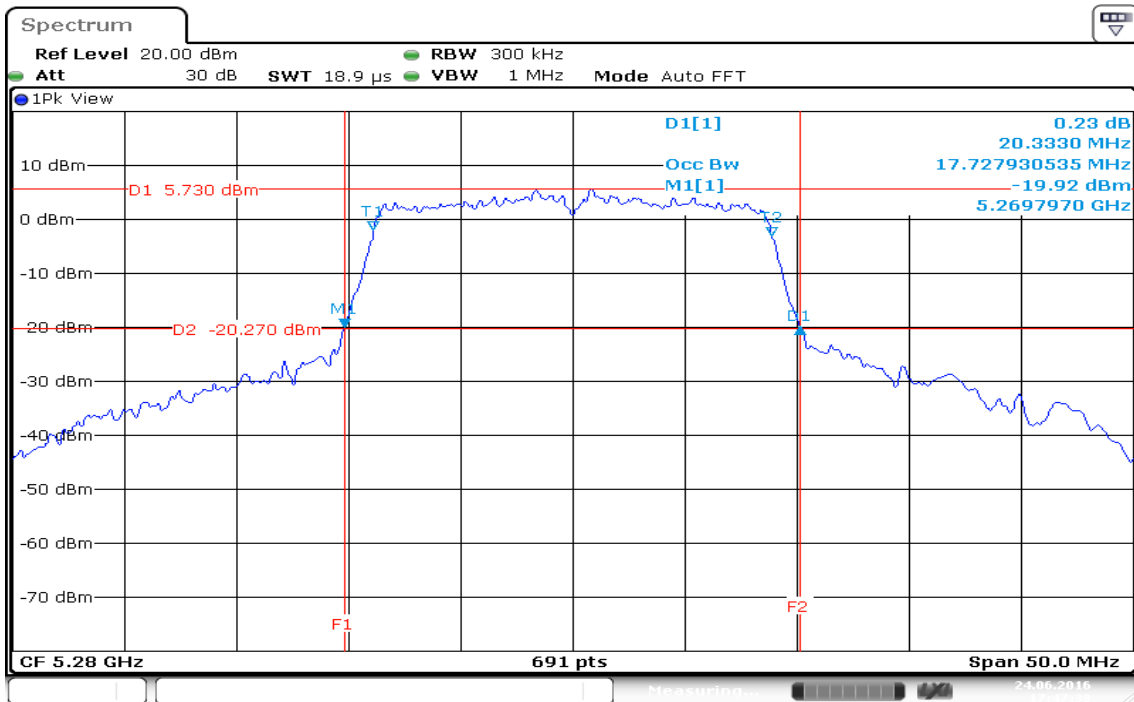
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IEEE 802.11n HT 20 MHz mode / 5260 ~ 5320MHz/ Chain 1

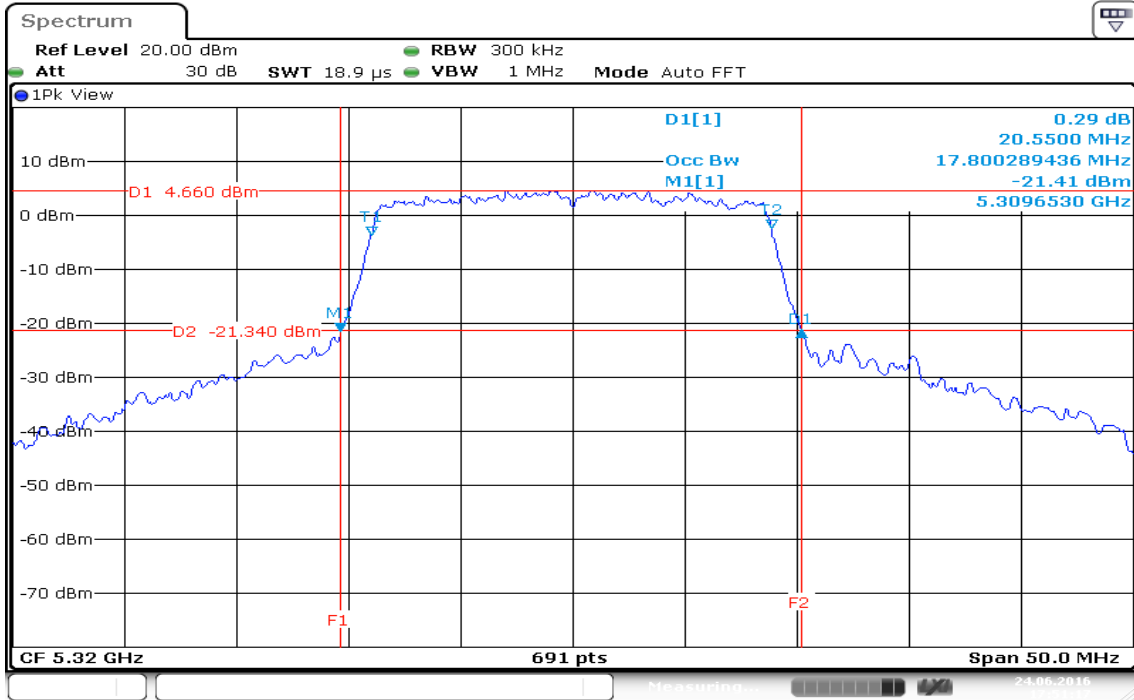
CH Low



CH Mid



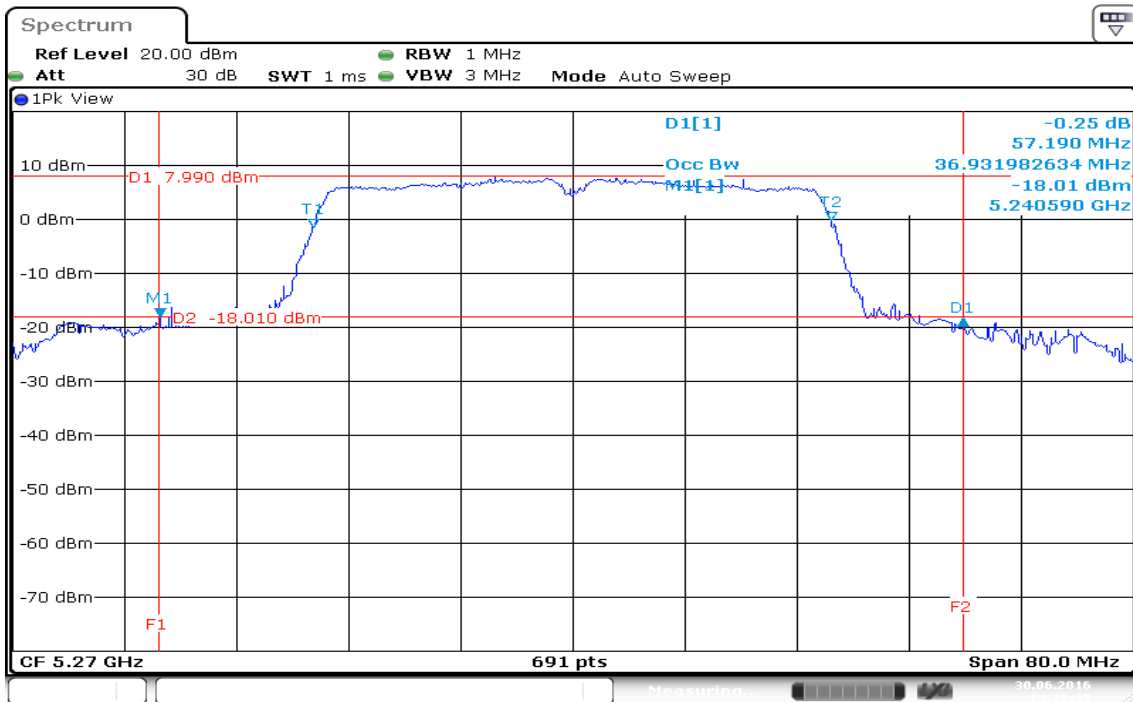
CH High



Date: 24.JUN.2016 17:51:17

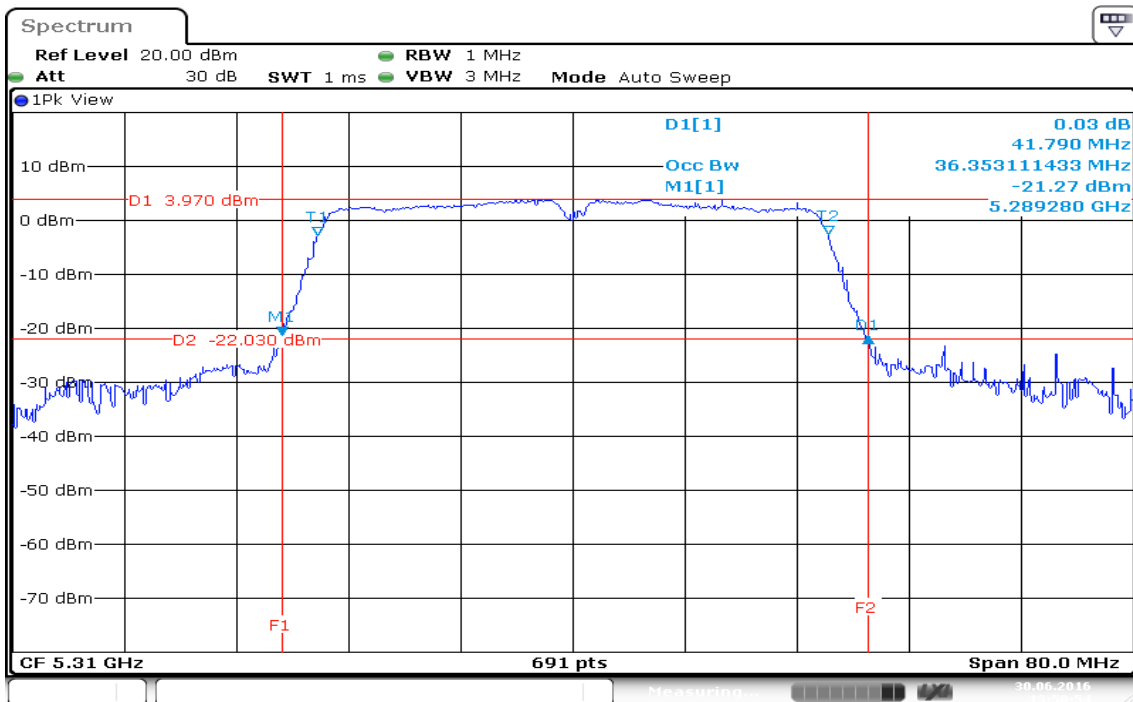
IEEE 802.11n HT 40 MHz mode / 5270 ~ 5310MHz/ Chain 0

CH Low



Date: 30 JUN 2016 14:28:36

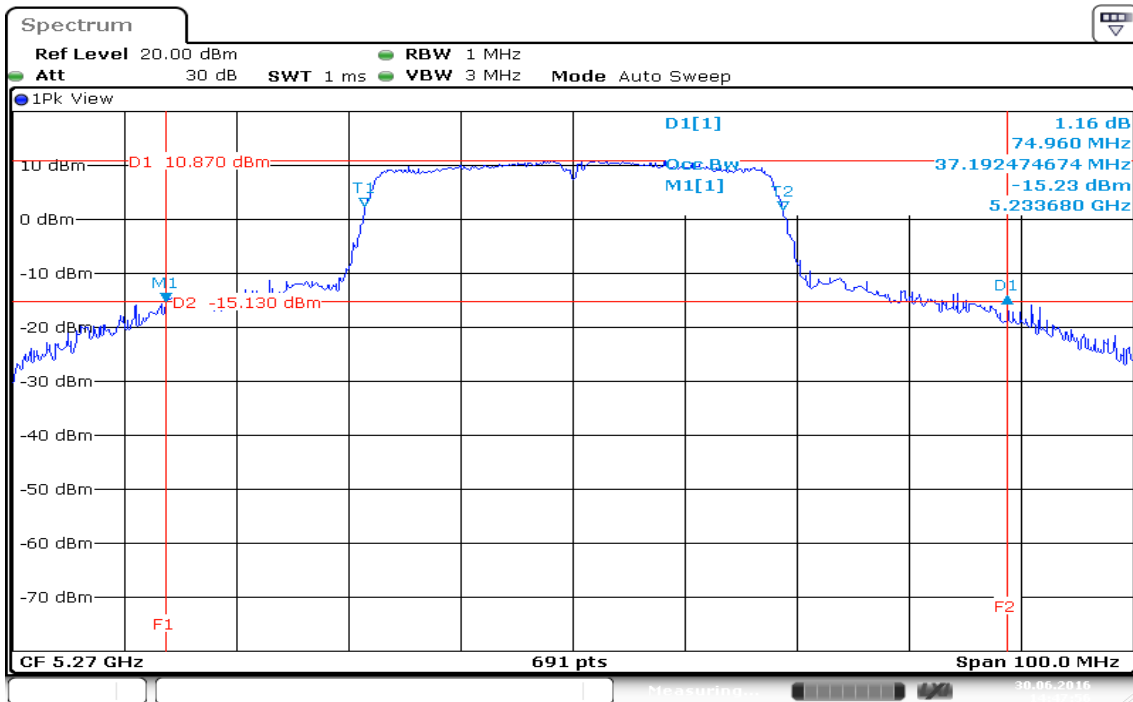
CH High



Date: 30 JUN 2016 13:50:55

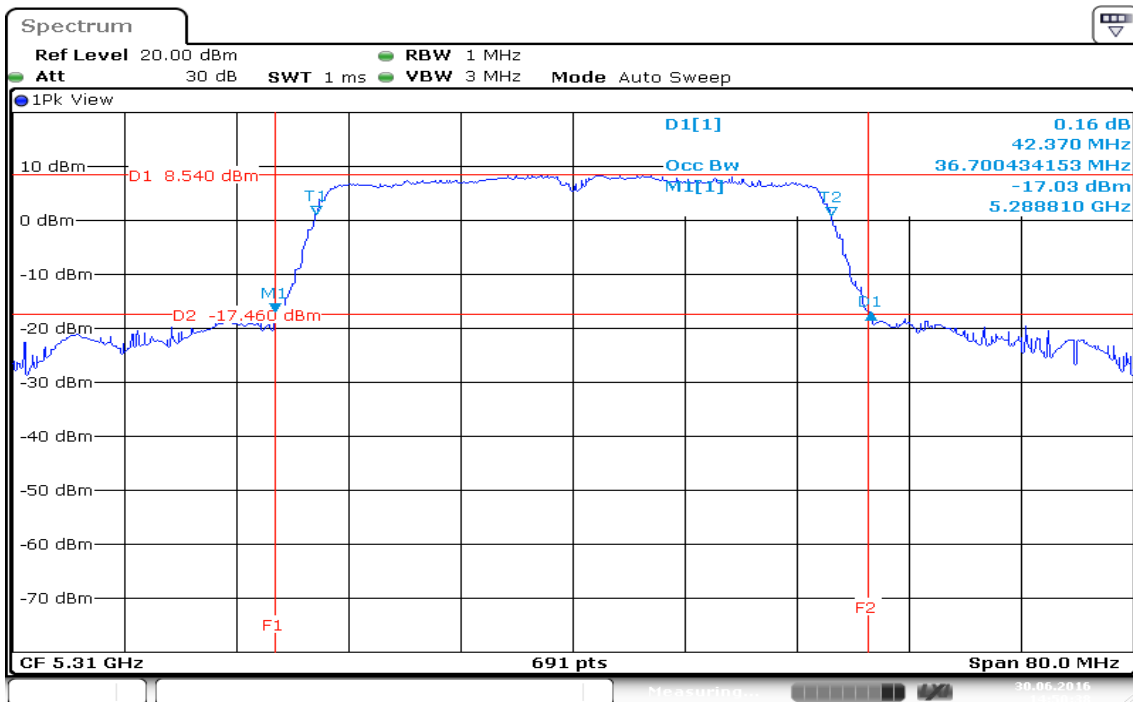
IEEE 802.11n HT 40 MHz mode / 5270 ~ 5310MHz/ Chain 1

CH Low



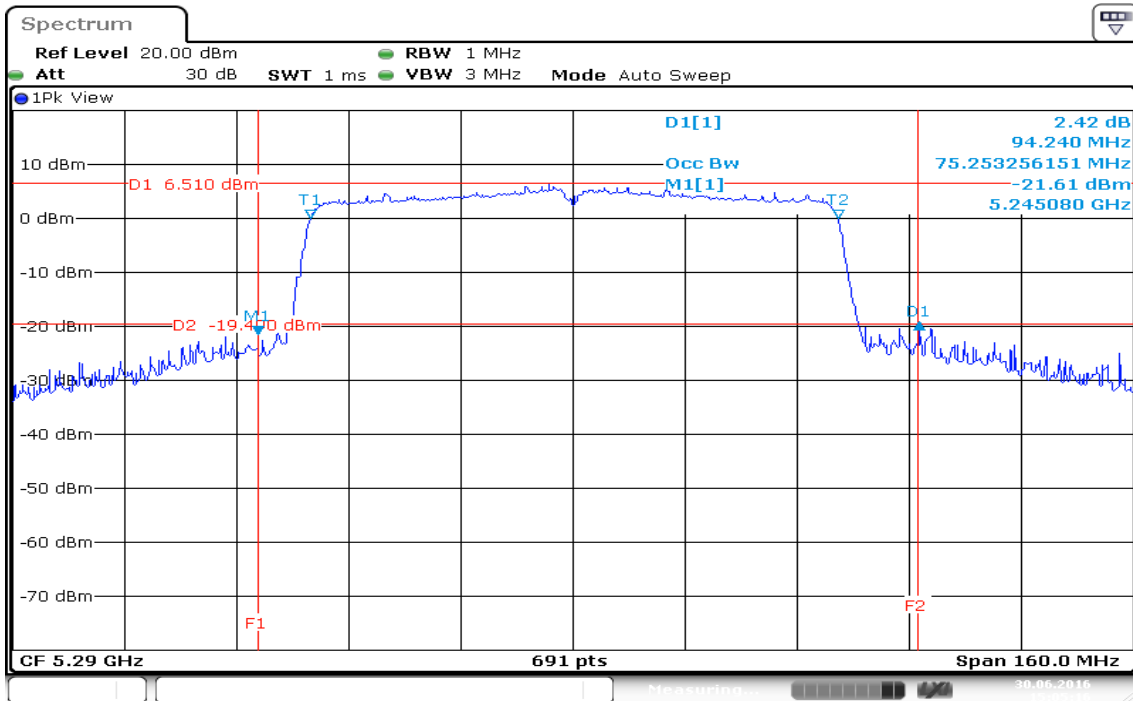
Date: 30 JUN 2016 14:47:57

CH High

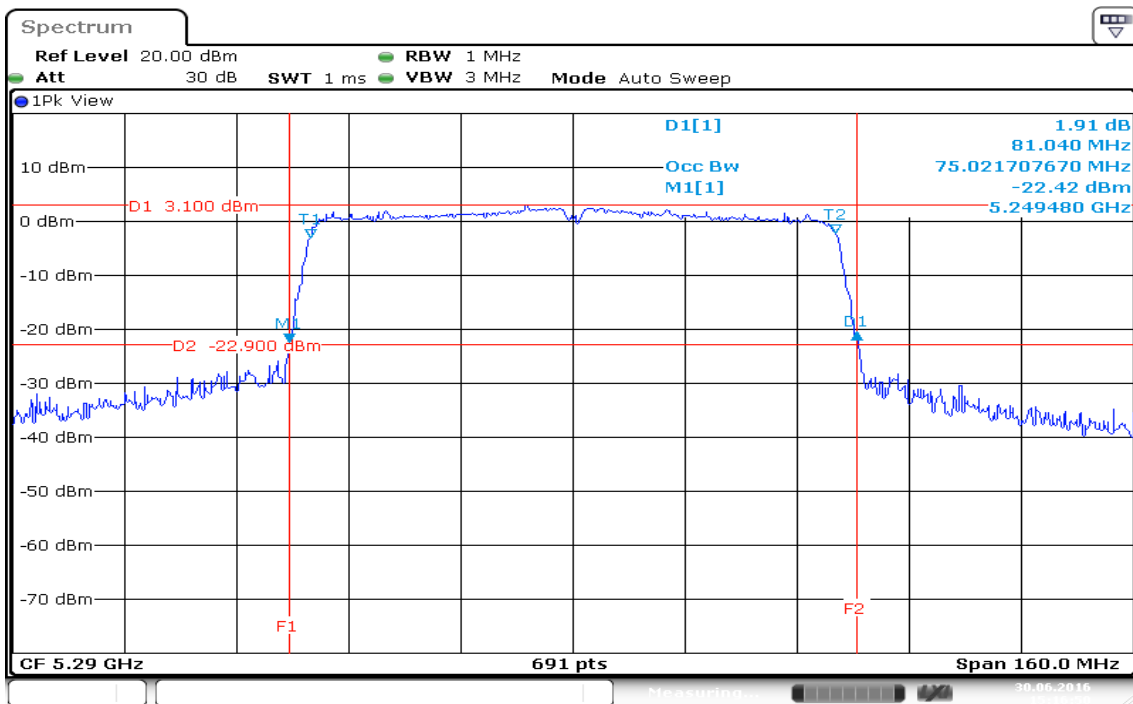


Date: 30 JUN 2016 14:50:38

IEEE 802.11ac VHT 80 MHz mode / 5290MHz / Chain 0
99% Bandwidth (CH Mid)

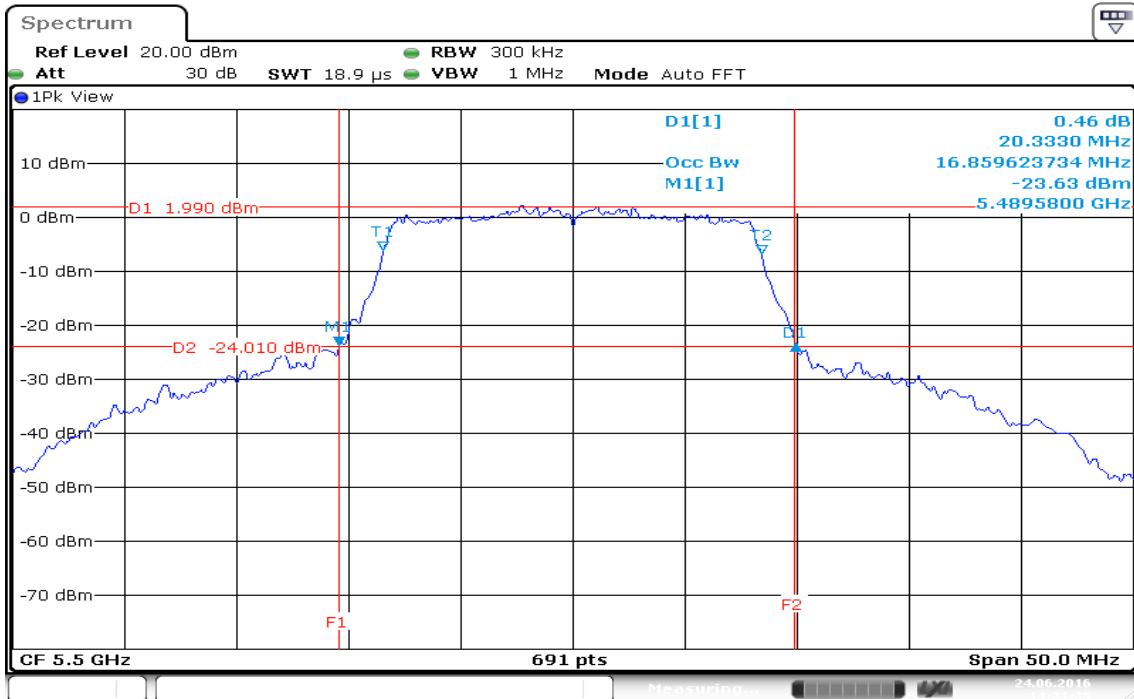


IEEE 802.11ac VHT 80 MHz mode / 5290MHz / Chain 1
99% Bandwidth (CH Mid)

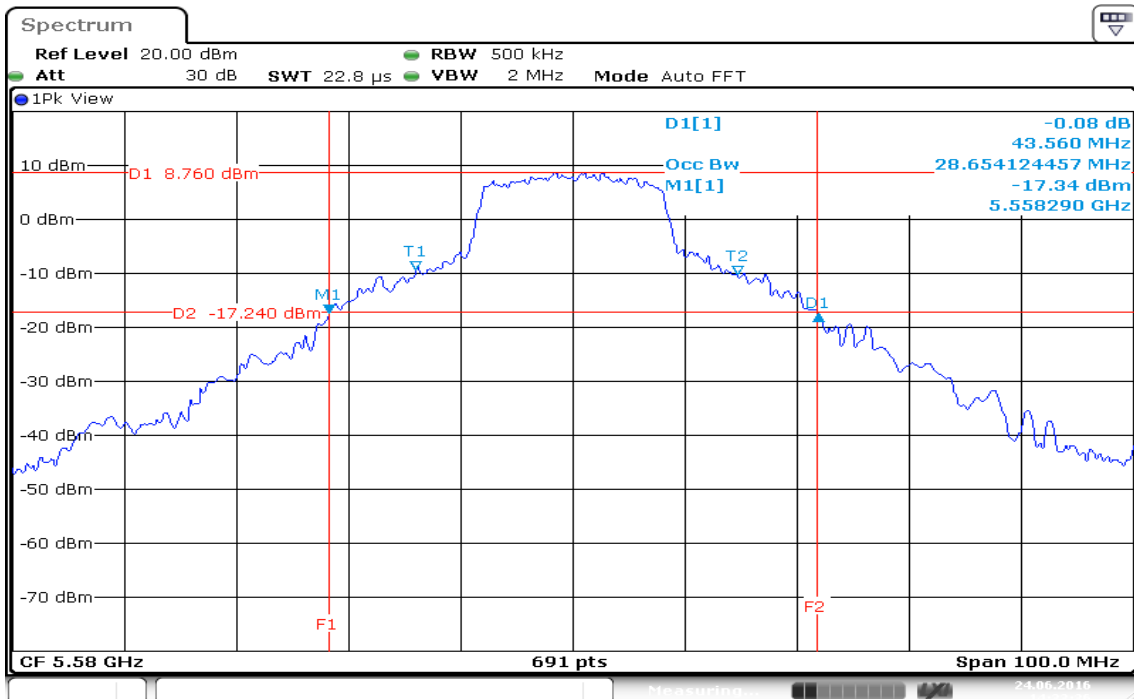


Test mode: IEEE 802.11a mode / 5500 ~ 5700MHz / Chain 0

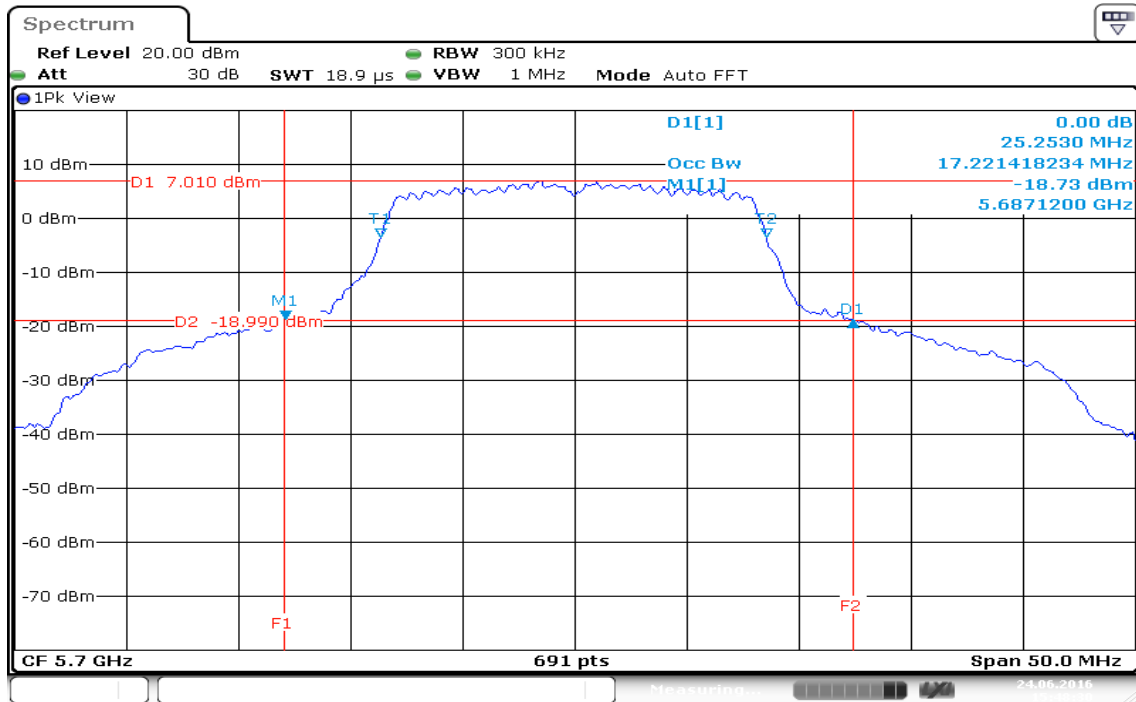
CH Low



CH Mid



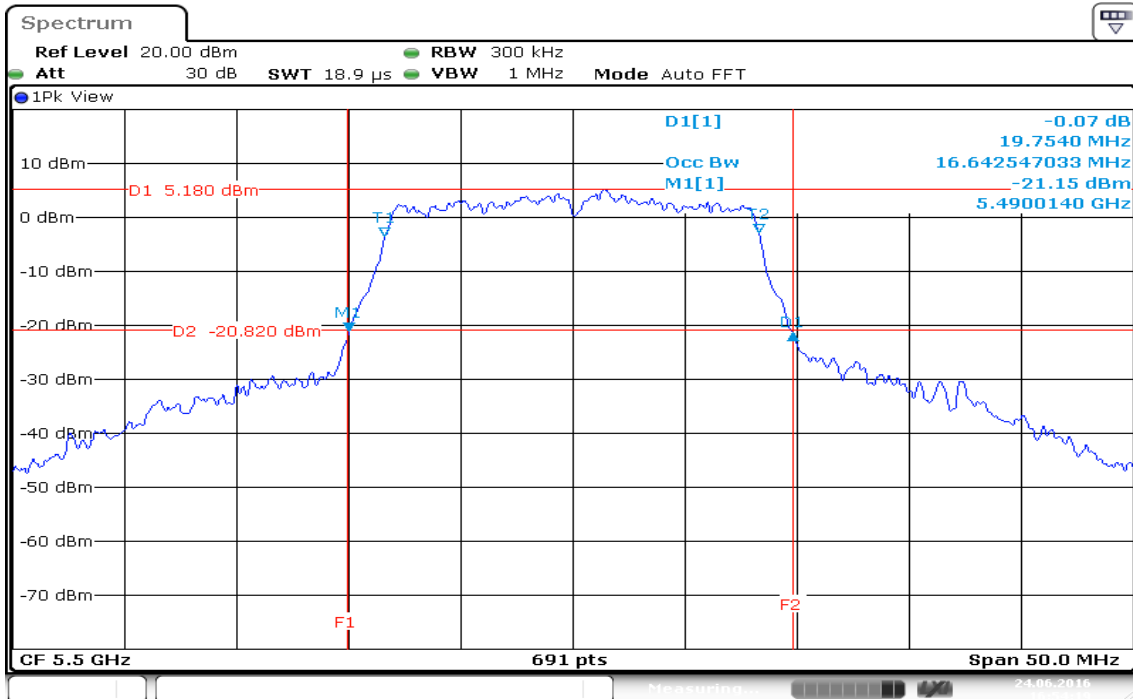
CH High



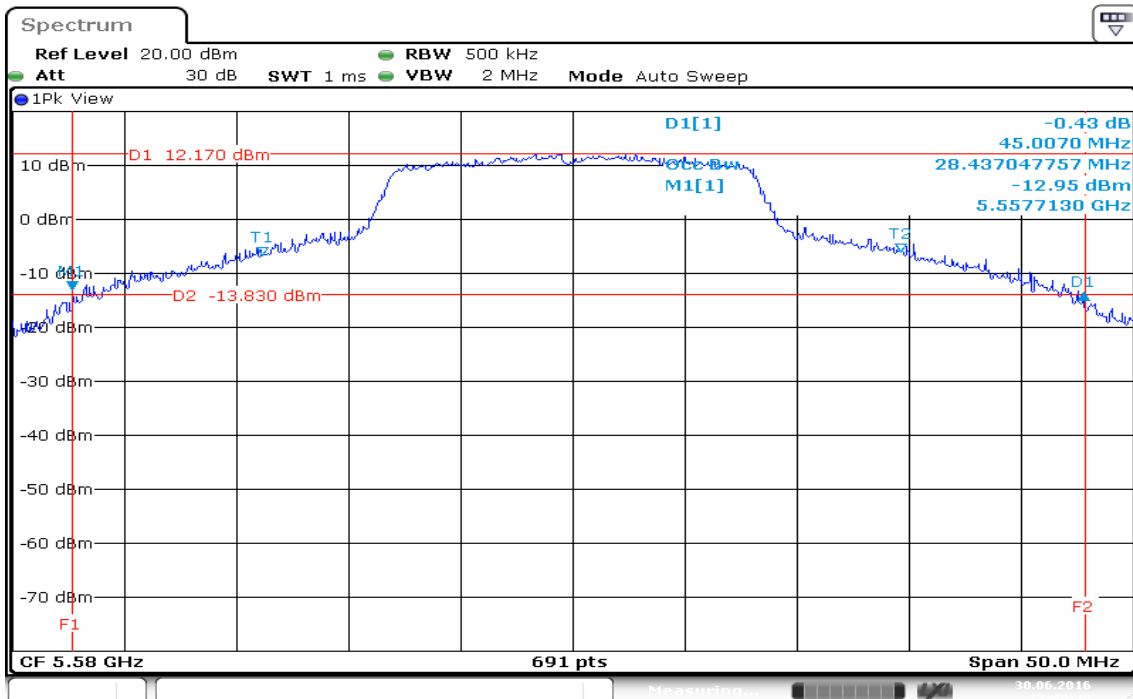
Date: 24.JUN.2016 15:48:30

Test mode: IEEE 802.11a mode / 5500 ~ 5700MHz / Chain 1

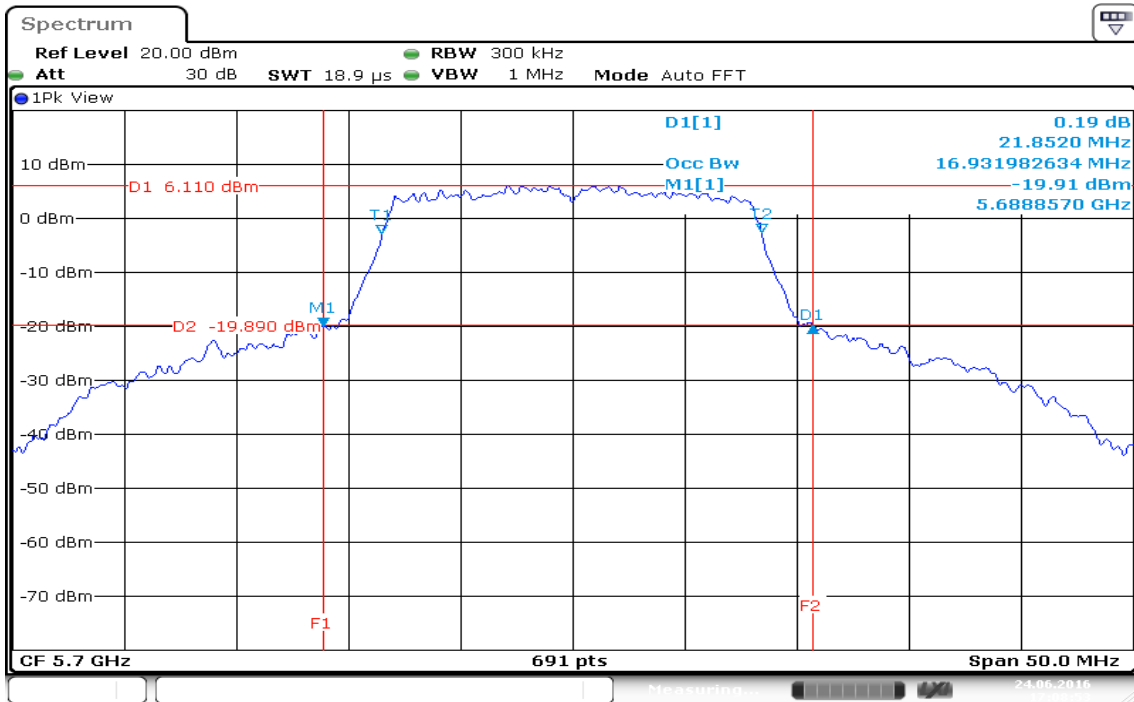
CH Low



CH Mid

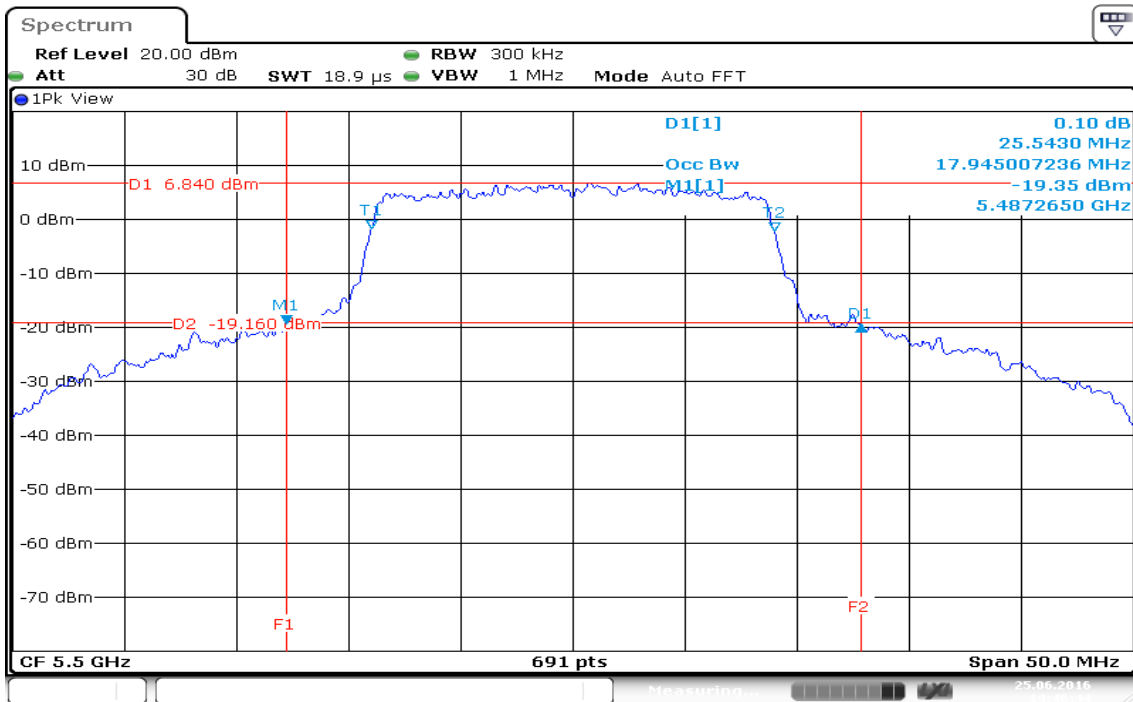


CH High

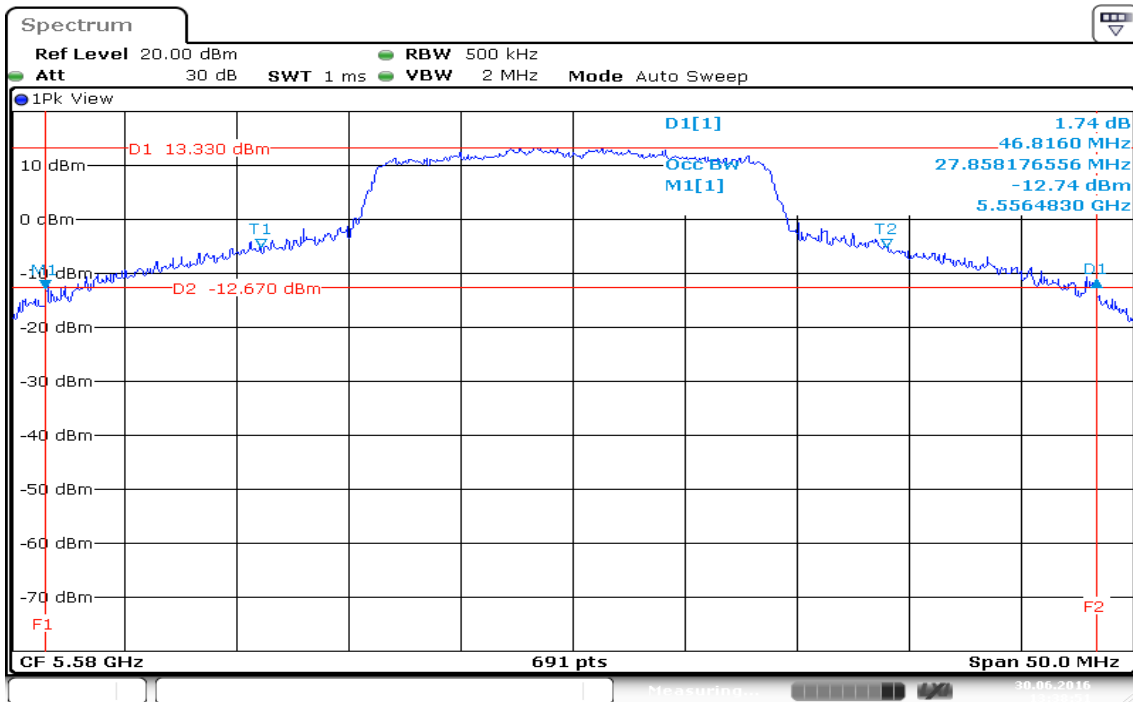


IEEE 802.11n HT 20 MHz mode / 5500 ~ 5700MHz / Chain 0

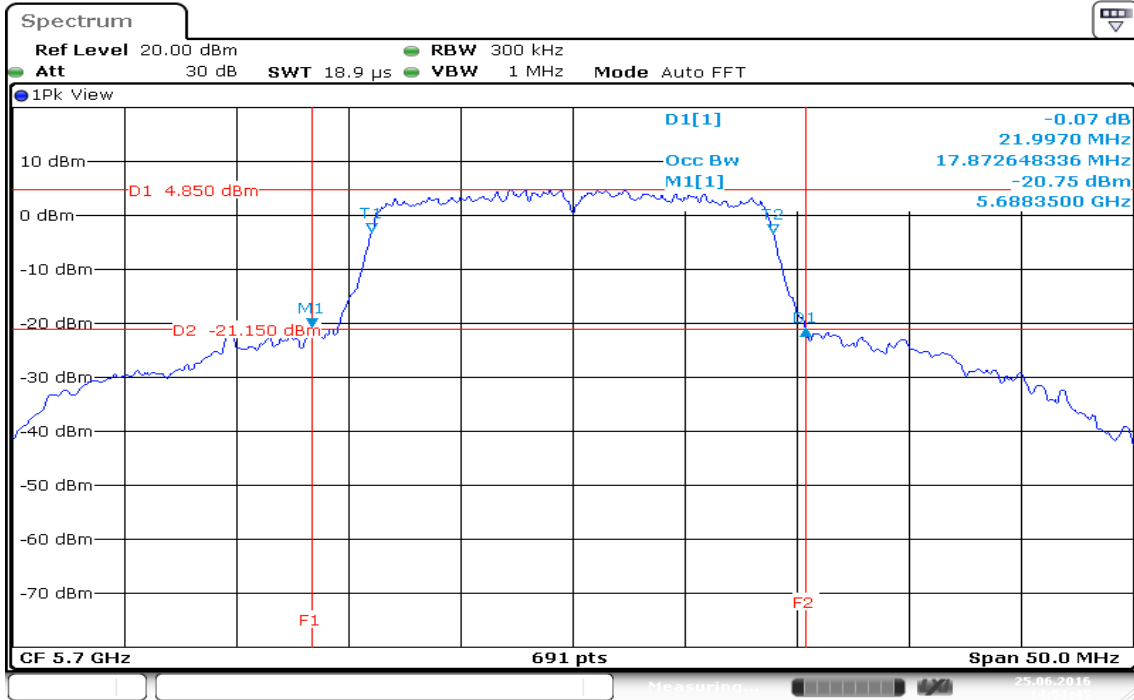
CH Low



CH Mid



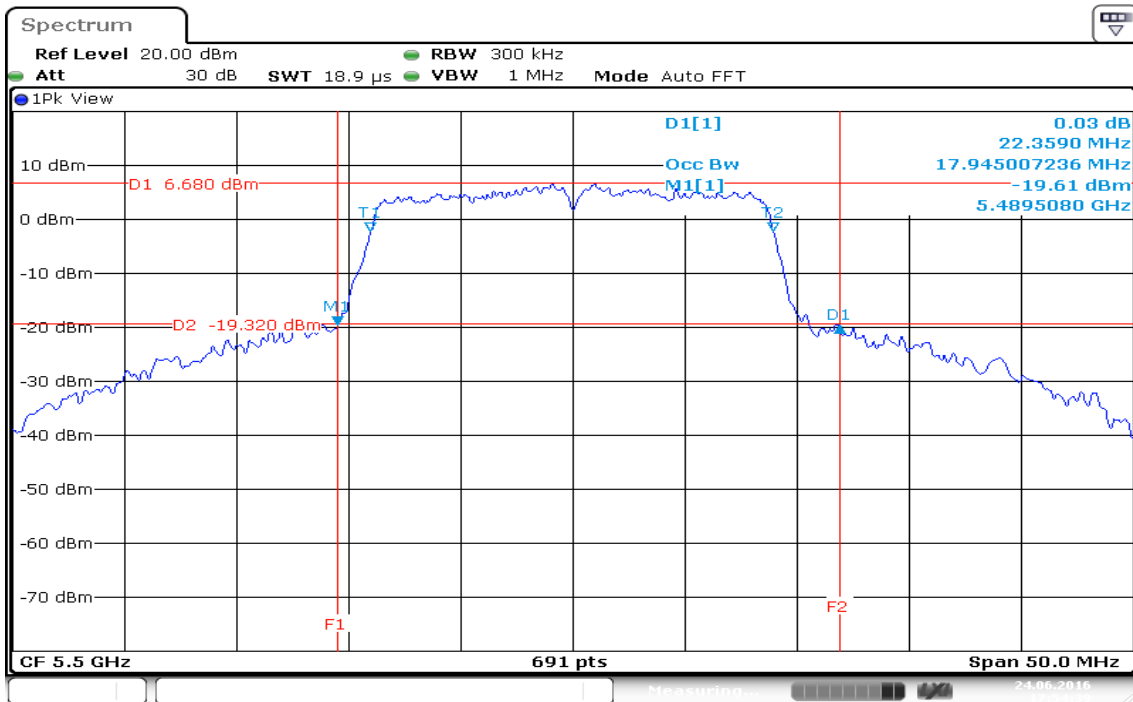
CH High



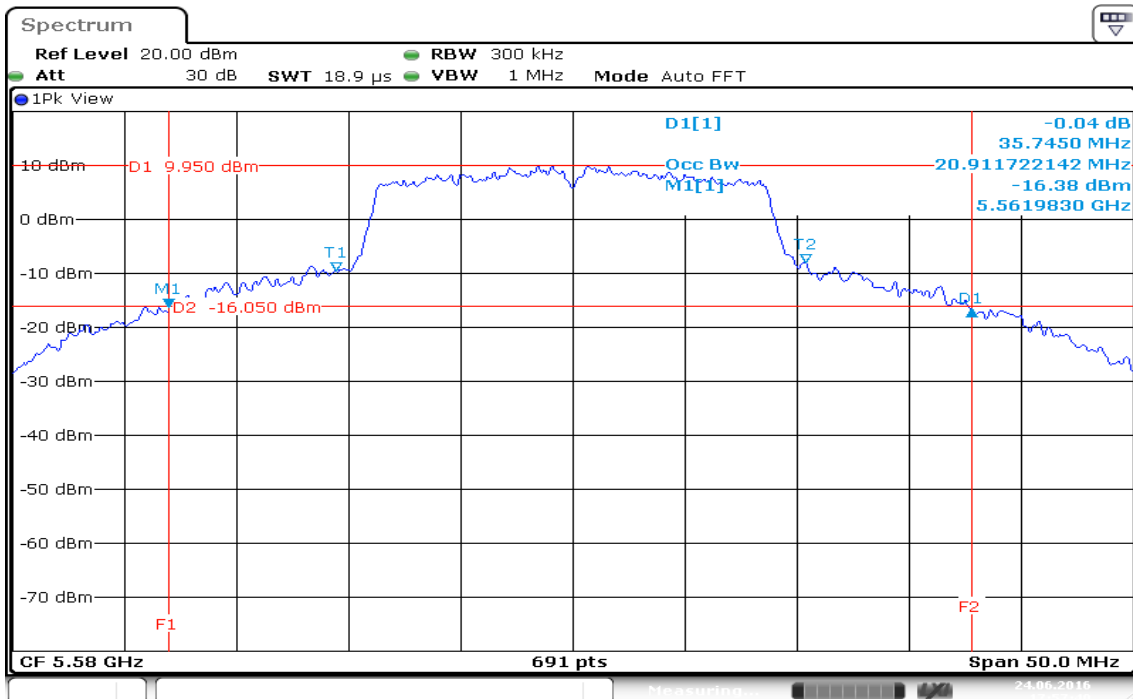
Date: 25.JUN.2016 14:51:45

IEEE 802.11n HT 20 MHz mode / 5500 ~ 5700MHz / Chain 1

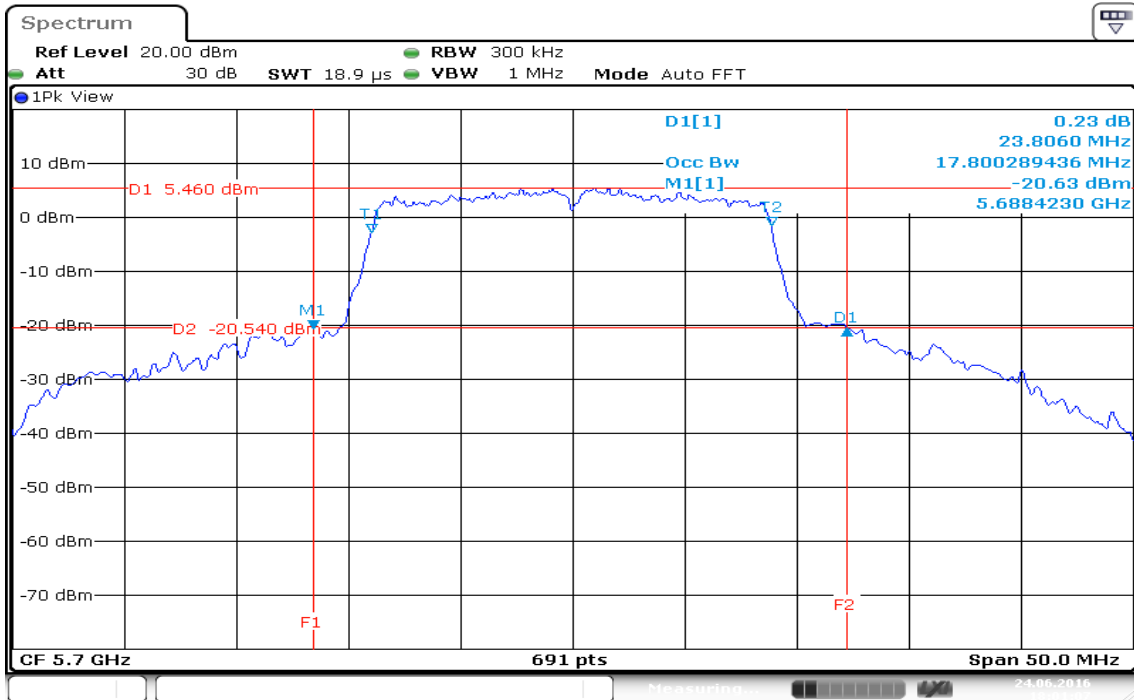
CH Low



CH Mid



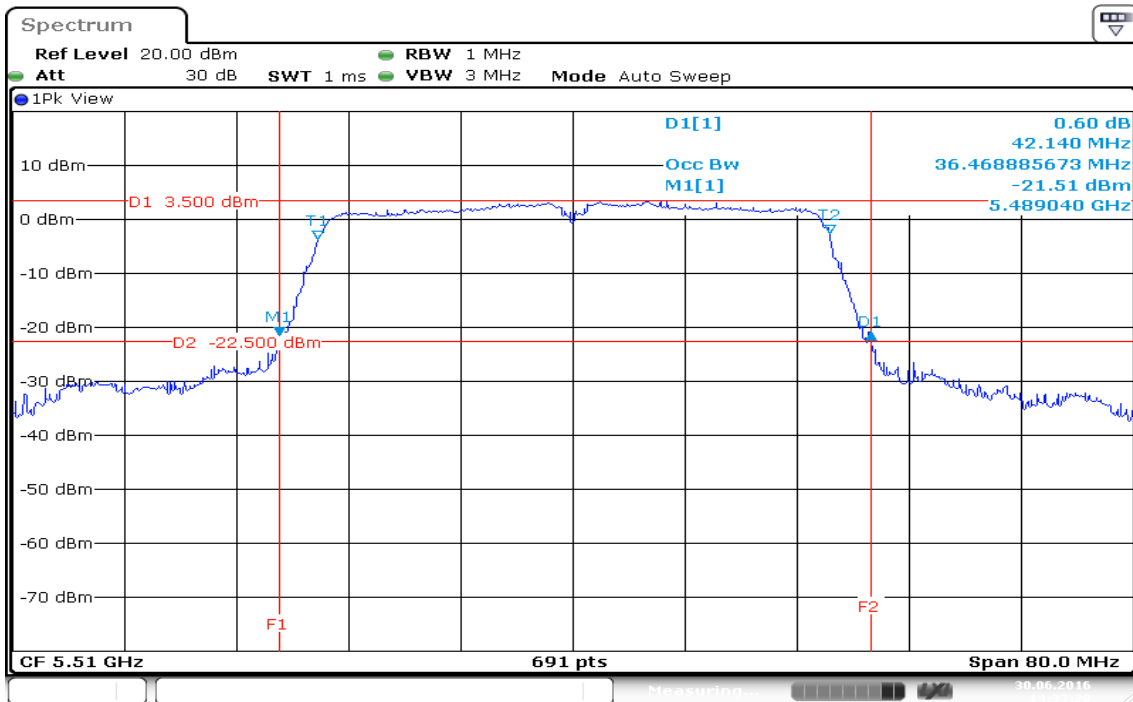
CH High



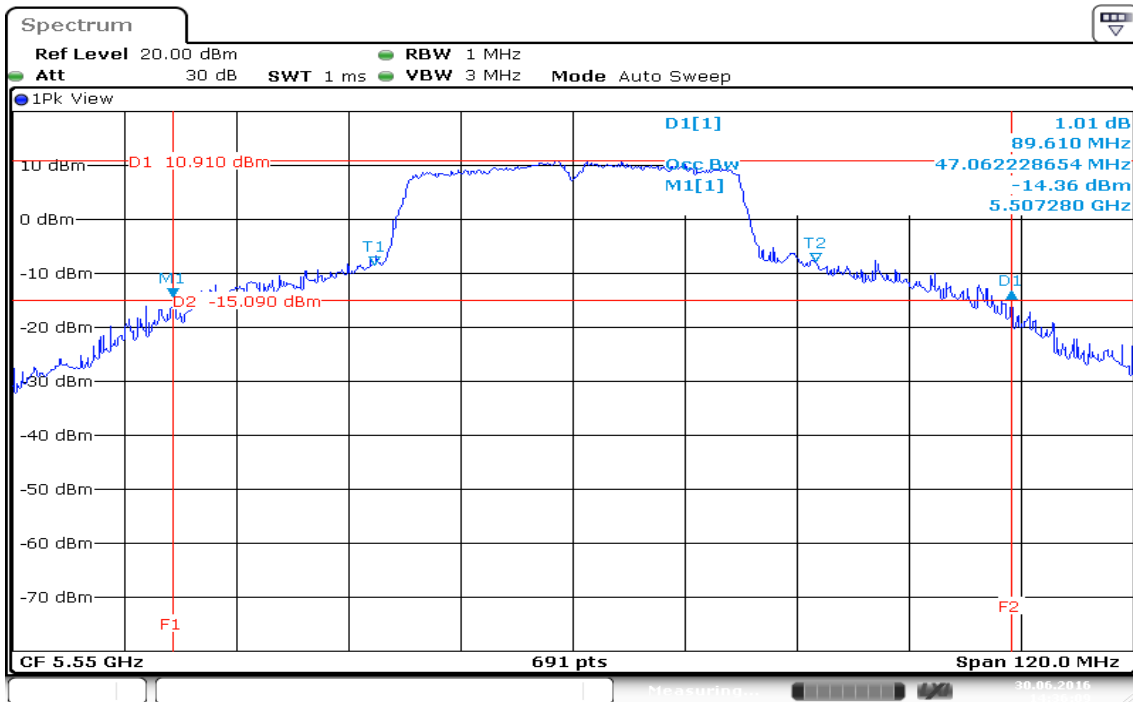
Date: 24.JUN.2016 18:01:08

IEEE 802.11n HT 40 MHz mode / 5510 ~ 5670MHz / Chain 0

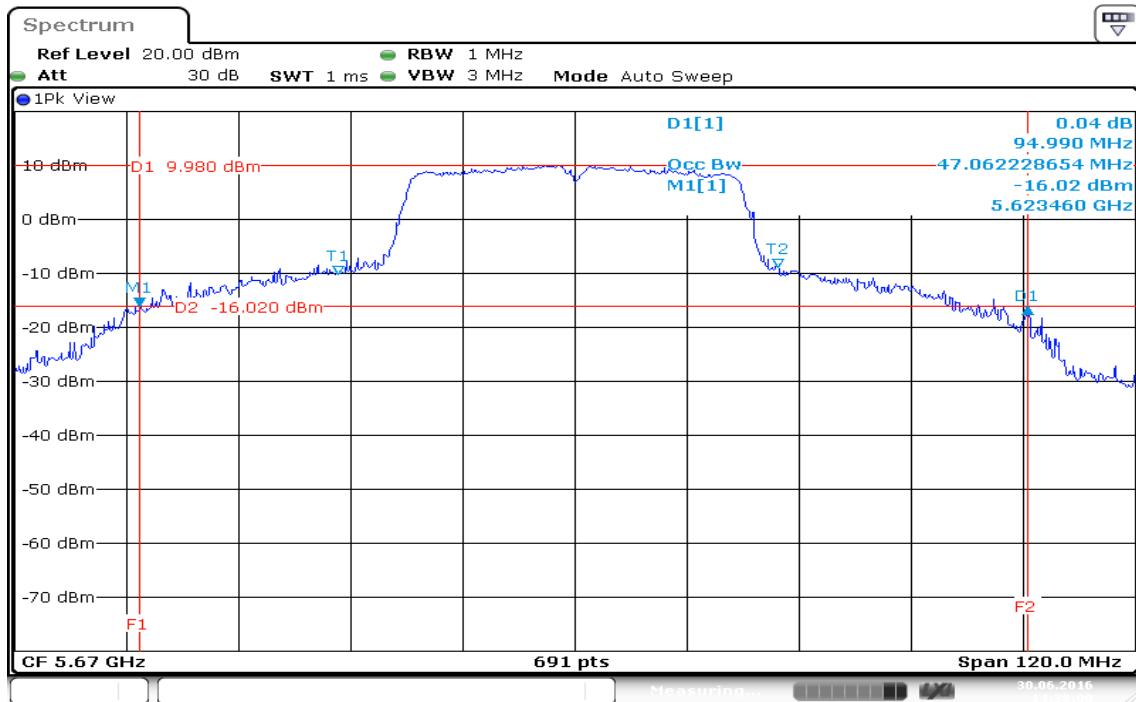
CH Low



CH Mid



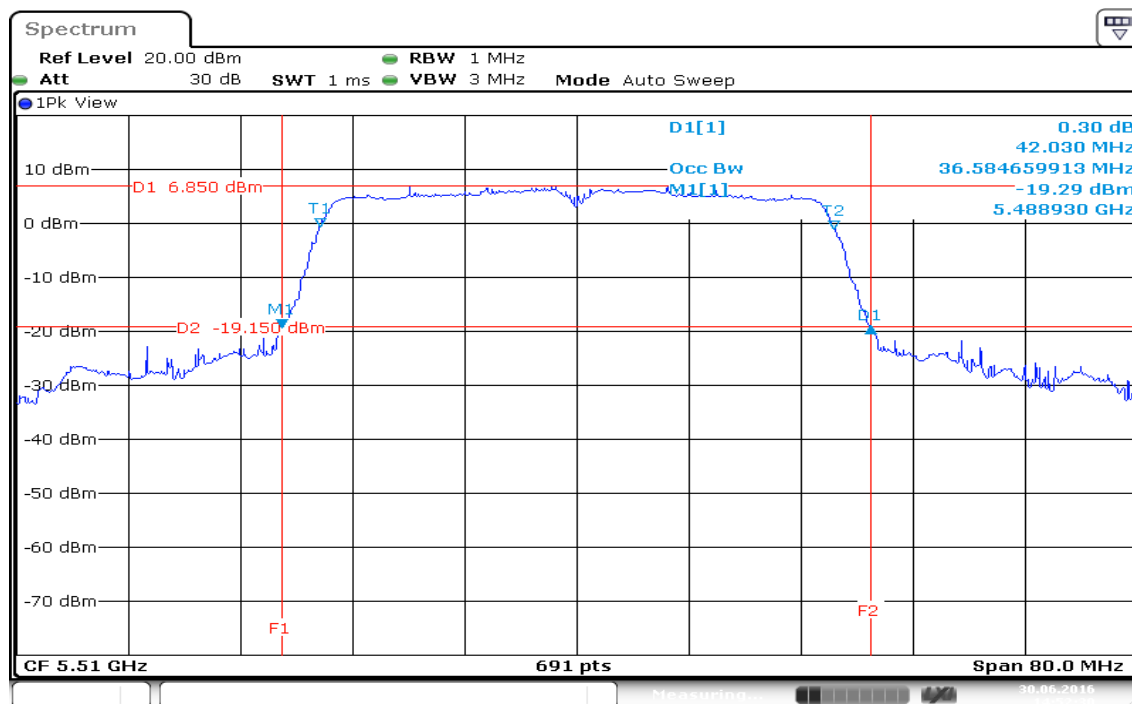
CH High



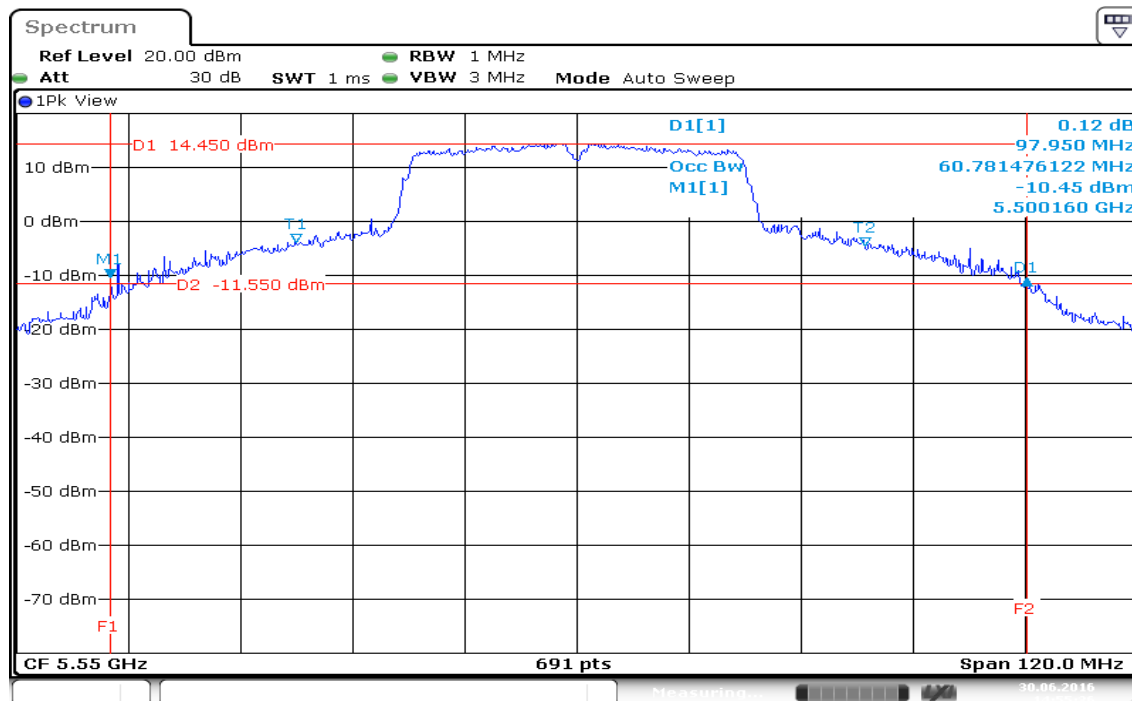
Date: 30 JUN 2016 14:38:01

IEEE 802.11n HT 40 MHz mode / 5510 ~ 5670MHz / Chain 1

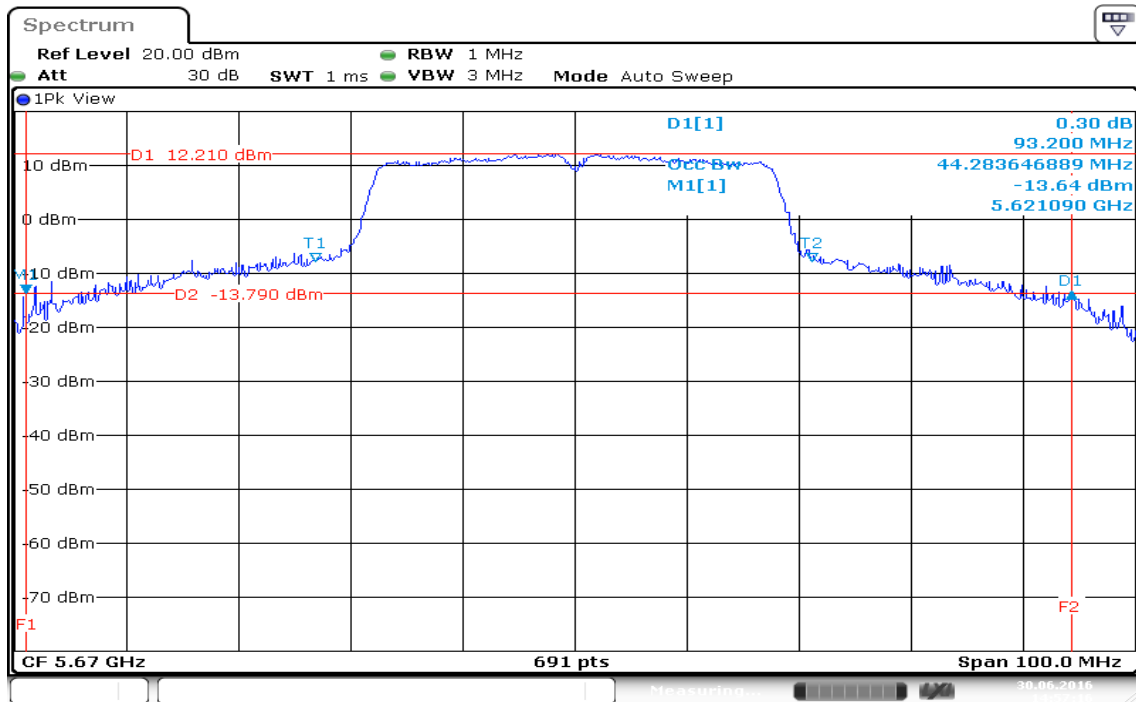
CH Low



CH Mid

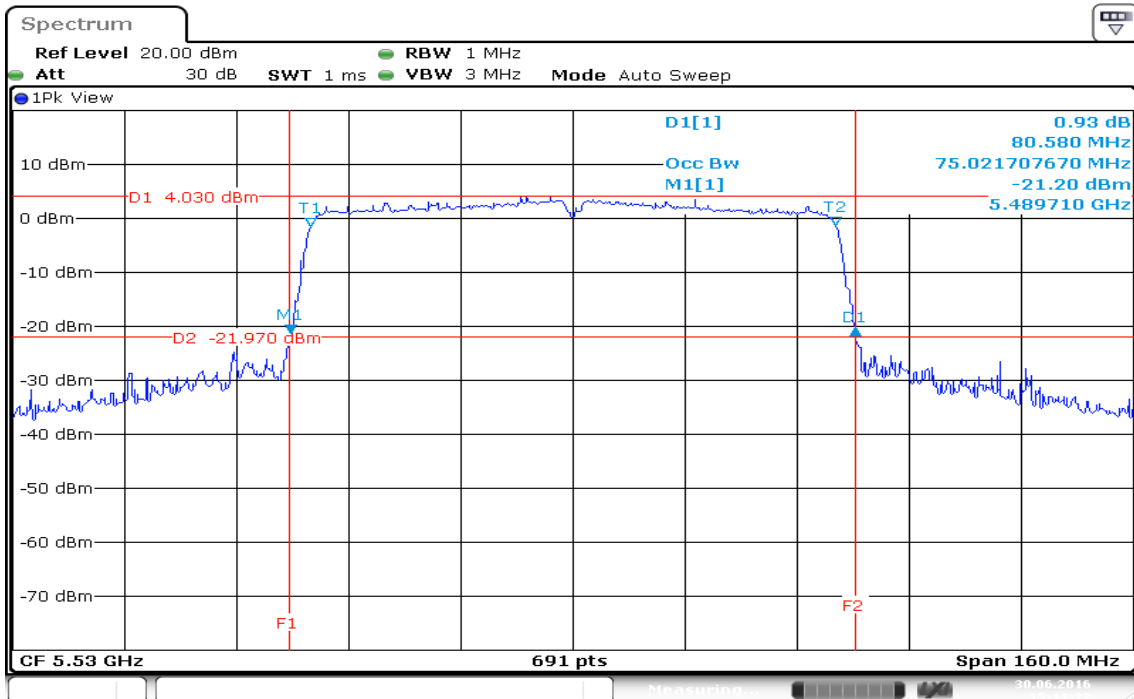


CH High



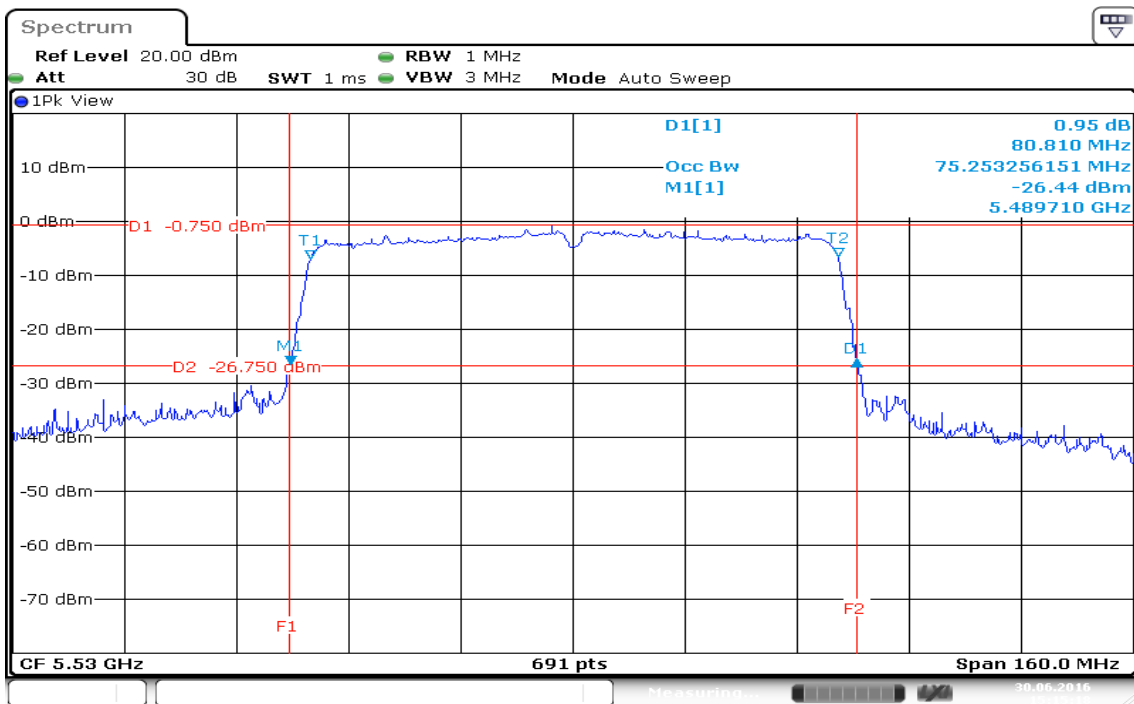
Date: 30 JUN 2016 14:57:16

IEEE 802.11ac VHT 80 MHz mode / 5530 MHz/ Chain 0
99% Bandwidth (CH Mid)



Date: 30 JUN 2016 15:11:22

IEEE 802.11ac VHT 80 MHz mode / 5530 MHz/ Chain 1
99% Bandwidth (CH Mid)



Date: 30 JUN 2016 15:15:18

7.3 MAXIMUM CONDUCTED OUTPUT POWER

LIMIT

According to §15.407(a)

For the band 5.15-5.25 GHz, 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in MHz.

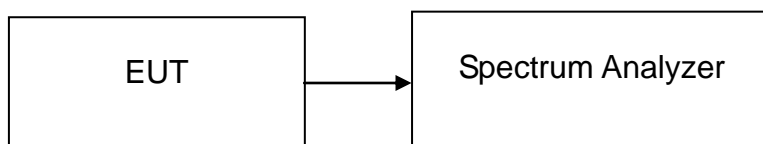
If transmitting antennas of directional gain greater than 6dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi

In addition, devices with maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W. The peak power shall not exceed the limit as follow:

Test Configuration

The EUT was connected to a spectrum analyzer through a 50Ω RF cable.

TEST PROCEDURE



Set span to encompass the entire emission bandwidth (EBW) of the signal.

Set RBW = 1 MHz / Set VBW = 3 MHz.

Use sample detector mode if bin width (i.e., span/number of points in spectrum display) < 0.5 RBW. Otherwise use peak detector mode. Use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at full control power for entire sweep of every sweep. If the device transmits continuously, with no off intervals or reduced power intervals, the trigger may be set to "free run". Trace average 100 traces in power averaging mode. Compute power by integrating the spectrum across the 26 dB EBW of the signal. The integration can be performed using the spectrum analyzer's band power measurement function with band limits set equal to the EBW band edges or by summing power levels in each 1 MHz band in linear power terms. The 1 MHz band power levels to be summed can be obtained by averaging, in linear power terms, power levels in each frequency bin across the 1 MHz.

TEST RESULTS

No non-compliance noted

Test Data

Test mode: IEEE 802.11a mode / 5180 ~ 5240MHz

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Total Maximum Conducted Output Power (dBm)	Limit (dBm)
Low	5180	13.97	14.58	17.30	24.00
Mid	5220	13.31	13.82	16.58	24.00
High	5240	15.26	15.95	*18.63	24.00

Test mode: IEEE 802.11n HT 20 MHz mode / 5180 ~ 5240MHz

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Total Maximum Conducted Output Power (dBm)	Limit (dBm)
Low	5180	15.32	15.11	*18.23	24.00
Mid	5220	14.23	13.64	16.96	24.00
High	5240	14.17	13.28	16.76	24.00

Test mode: IEEE 802.11n HT 40 MHz mode / 5190 ~ 5230MHz

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Total Maximum Conducted Output Power (dBm)	Limit (dBm)
Low	5190	10.67	10.32	13.51	24.00
High	5230	14.63	13.93	*17.30	24.00

Test mode: IEEE 802.11ac VHT 80 MHz mode / 5210MHz

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Total Maximum Conducted Output Power (dBm)	Limit (dBm)
Mid	5210	9.78	9.43	*12.62	24.00

Remark:

1. Total Output Power (w) = Chain 0 (10^{^(Output Power /10)}/1000)+ Chain 1 (10^{^(Output Power /10)}/1000)

Test mode: IEEE 802.11a mode / 5260 ~ 5320MHz

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Total Maximum Conducted Output Power (dBm)	Limit (dBm)
Low	5260	14.74	16.07	*18.47	24.00
Mid	5280	11.23	12.96	15.19	24.00
High	5320	9.87	12.69	14.52	24.00

Test mode: IEEE 802.11n HT 20 MHz mode / 5260 ~ 5320MHz

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Total Maximum Conducted Output Power (dBm)	Limit (dBm)
Low	5260	13.92	13.02	*16.50	24.00
Mid	5280	13.39	12.52	15.99	24.00
High	5320	13.05	13.13	16.10	24.00

Test mode: IEEE 802.11n HT 40 MHz mode / 5270 ~ 5310MHz

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Total Maximum Conducted Output Power (dBm)	Limit (dBm)
Low	5270	13.64	13.25	*16.46	24.00
High	5310	10.69	11.44	14.09	24.00

Test mode: IEEE 802.11ac VHT 80 MHz mode / 5290MHz

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Total Maximum Conducted Output Power (dBm)	Limit (dBm)
Mid	5290	11.17	11.32	*14.26	24.00

Remark:

1. Total Output Power (w) = Chain 0 (10^(Output Power /10)/1000)+ Chain 1 (10^(Output Power /10)/1000)

Test mode: IEEE 802.11a mode / 5500 ~ 5700MHz

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Total Maximum Conducted Output Power (dBm)	Limit (dBm)
Low	5500	10.17	13.08	14.87	24.00
Mid	5580	15.62	16.43	*19.05	24.00
High	5700	13.05	13.46	16.27	24.00

Test mode: IEEE 802.11n HT 20 MHz mode / 5500 ~ 5720MHz

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Total Maximum Conducted Output Power (dBm)	Limit (dBm)
Low	5500	10.52	14.14	15.71	24.00
Mid	5580	13.97	15.83	*18.01	24.00
High	5700	12.69	13.79	16.29	24.00

Test mode: IEEE 802.11n HT 40 MHz mode / 5510 ~ 5670MHz

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Total Maximum Conducted Output Power (dBm)	Limit (dBm)
Low	5510	6.39	10.01	11.58	24.00
Mid	5550	14.17	16.75	*18.66	24.00
High	5670	13.08	15.42	17.42	24.00

Test mode: IEEE 802.11ac VHT 80 MHz mode / 5530MHz

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Total Maximum Conducted Output Power (dBm)	Limit (dBm)
Mid	5530	11.33	10.69	*14.03	24.00

Remark:

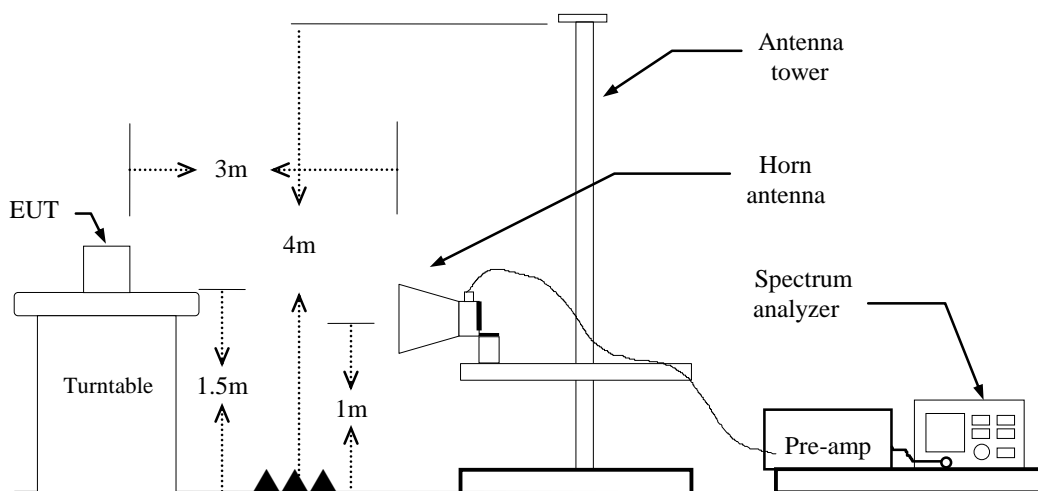
1. Total Output Power (w) = Chain 0 (10^(Output Power /10)/1000)+ Chain 1 (10^(Output Power /10)/1000)

7.4 BAND EDGES MEASUREMENT

LIMIT

According to §15.407(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a) (see Section 15.205(c)).

Test Configuration



TEST PROCEDURE

1. The EUT is placed on a turntable, which is 1.5m above the ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
 - (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO
 - (b) AVERAGE: RBW=1MHz,
if duty cycle $\geq 98\%$, VBW=10Hz.
if duty cycle $< 98\%$ VBW=1/T.
IEEE 802.11a mode: =94%, VBW=680Hz
IEEE 802.11n HT 20 MHz mode: =89%, VBW=750Hz
IEEE 802.11n HT 40 MHz mode: =81%, VBW=1.5kHz
IEEE 802.11ac VHT 80 MHz mode: =68%, VBW=3kHz
5. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.
6. Result = Spectrum Reading + cable loss(spectrum to Amp) - Amp Gain + Cable loss(Amp to receive Ant)+ Receive Ant

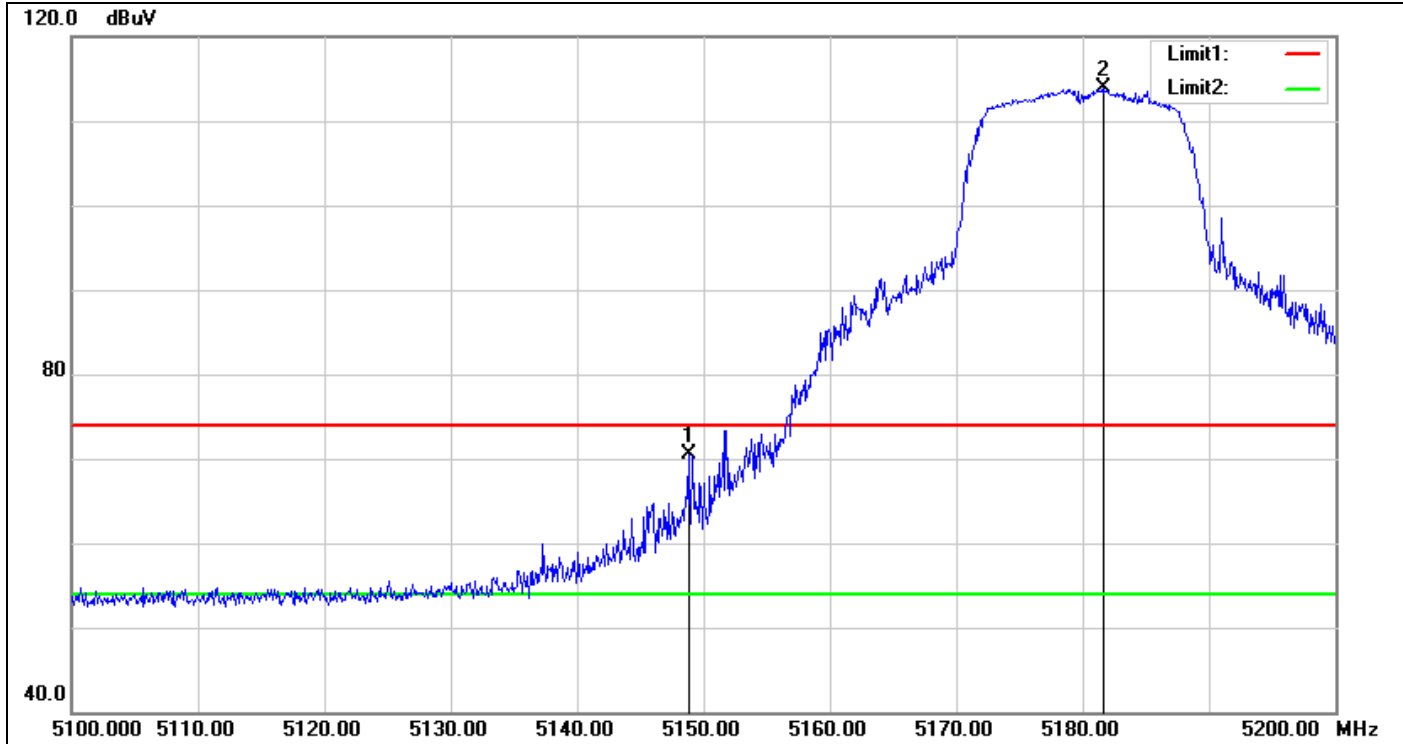
TEST RESULTS

Refer to attach spectrum analyzer data chart.

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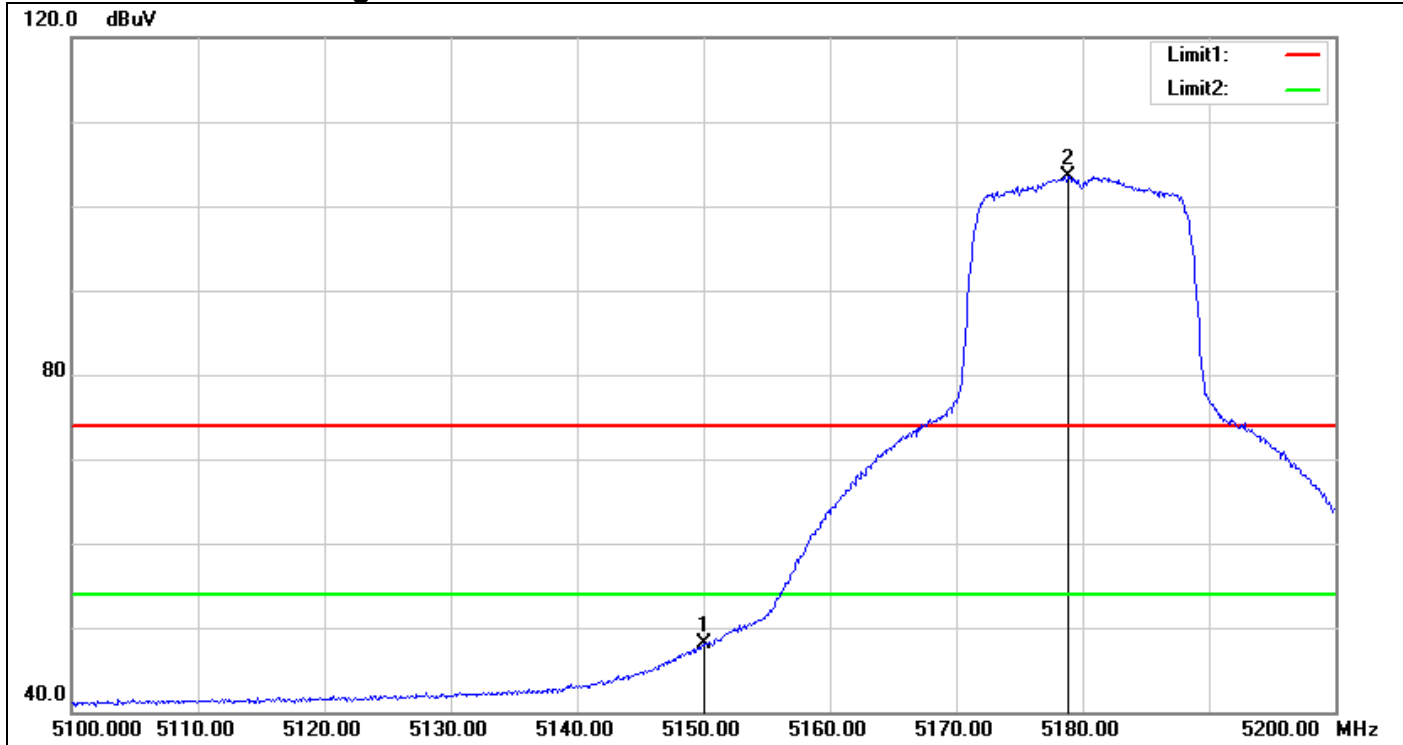
IEEE 802.11a Mode / CH Low

Detector mode: Peak



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	5148.800	67.51	3.03	70.54	74.00	-3.46	peak
2	5181.600	110.00	3.96	113.96	-	-	peak

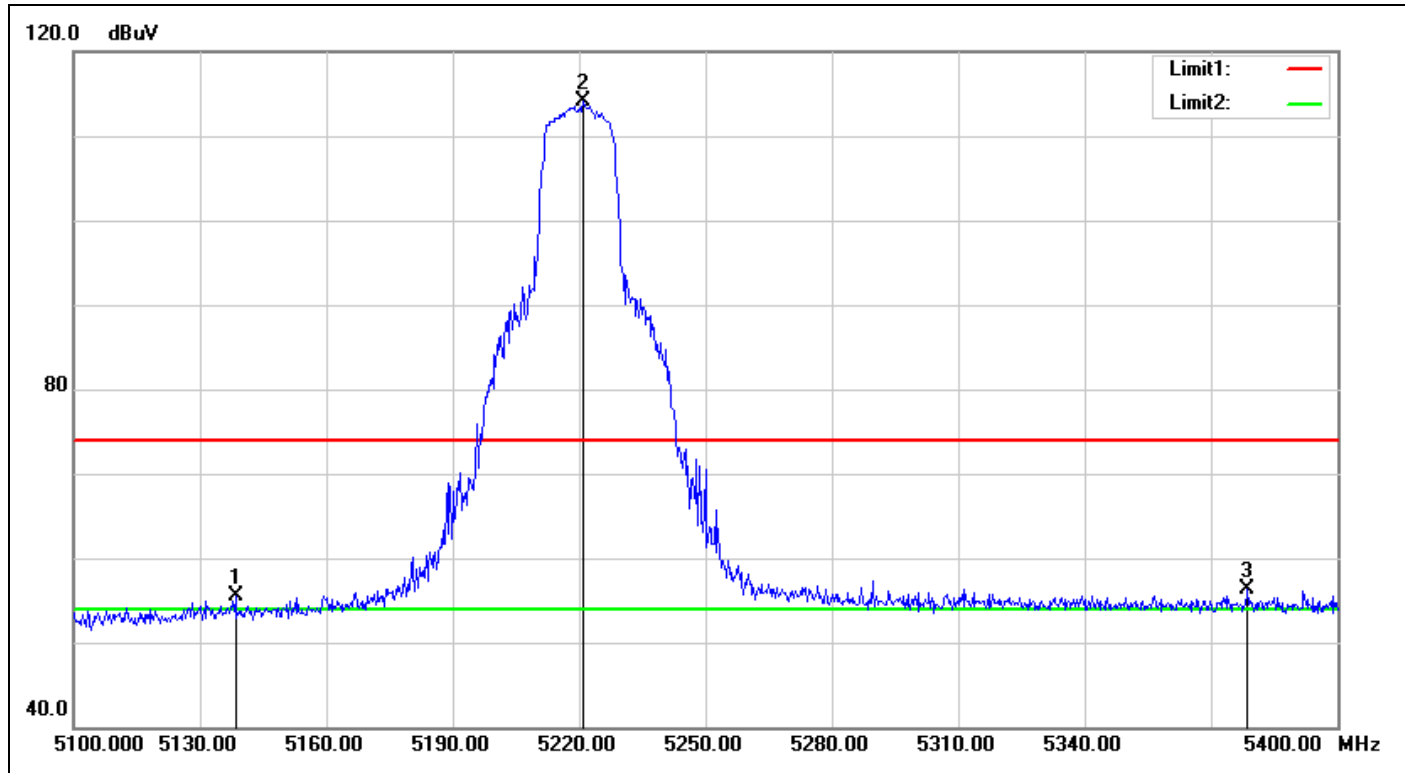
Detector mode: Average



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	5150.100	44.98	3.04	48.02	54.00	-5.98	AVG
2	5178.800	99.60	3.88	103.48	-	-	AVG

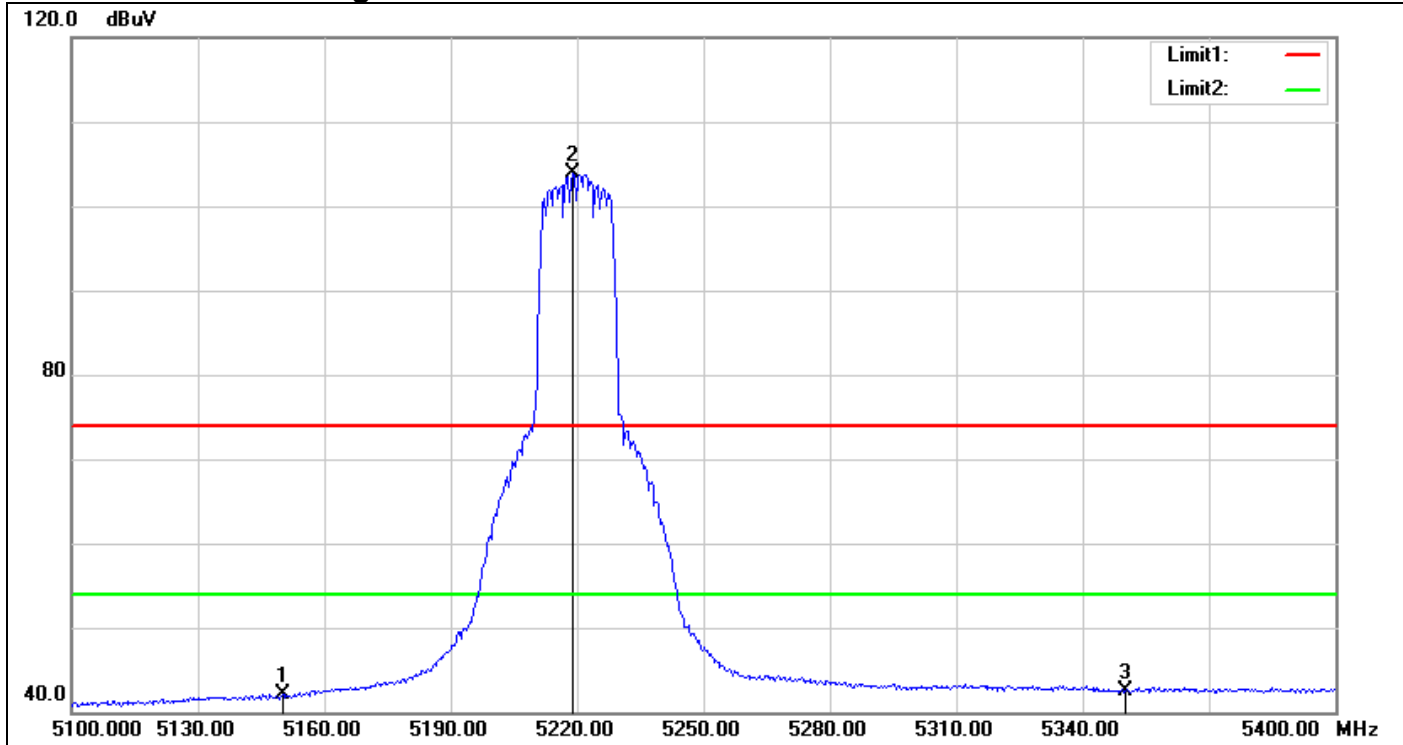
IEEE 802.11a Mode / CH Mid

Detector mode: Peak



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	5138.400	52.53	2.96	55.49	74.00	-18.51	peak
2	5220.900	109.61	4.56	114.17	-	-	peak
3	5378.700	50.72	5.55	56.27	74.00	-17.73	peak

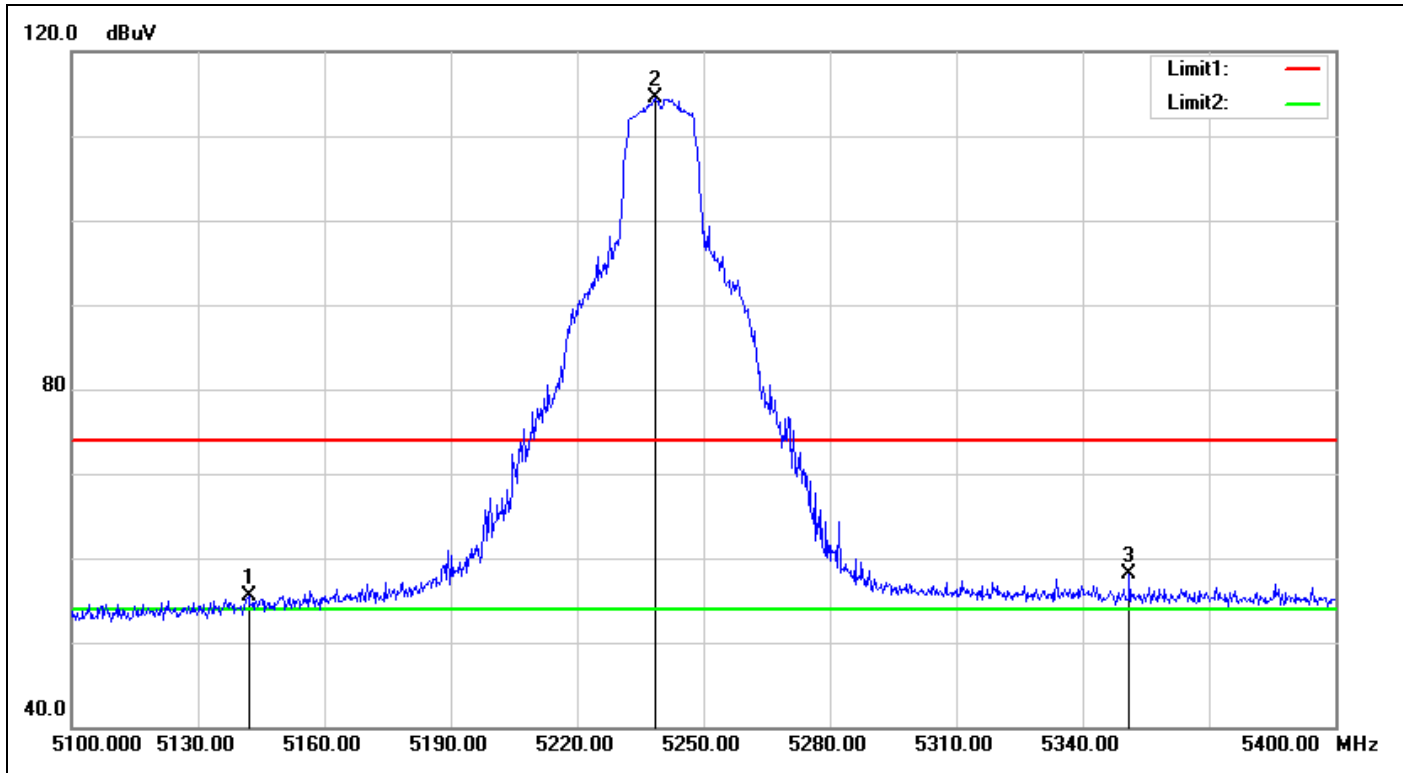
Detector mode: Average



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	5150.000	39.01	3.04	42.05	54.00	-11.95	AVG
2	5219.100	99.27	4.55	103.82	-	-	AVG
3	5350.000	37.24	5.31	42.55	54.00	-11.45	AVG

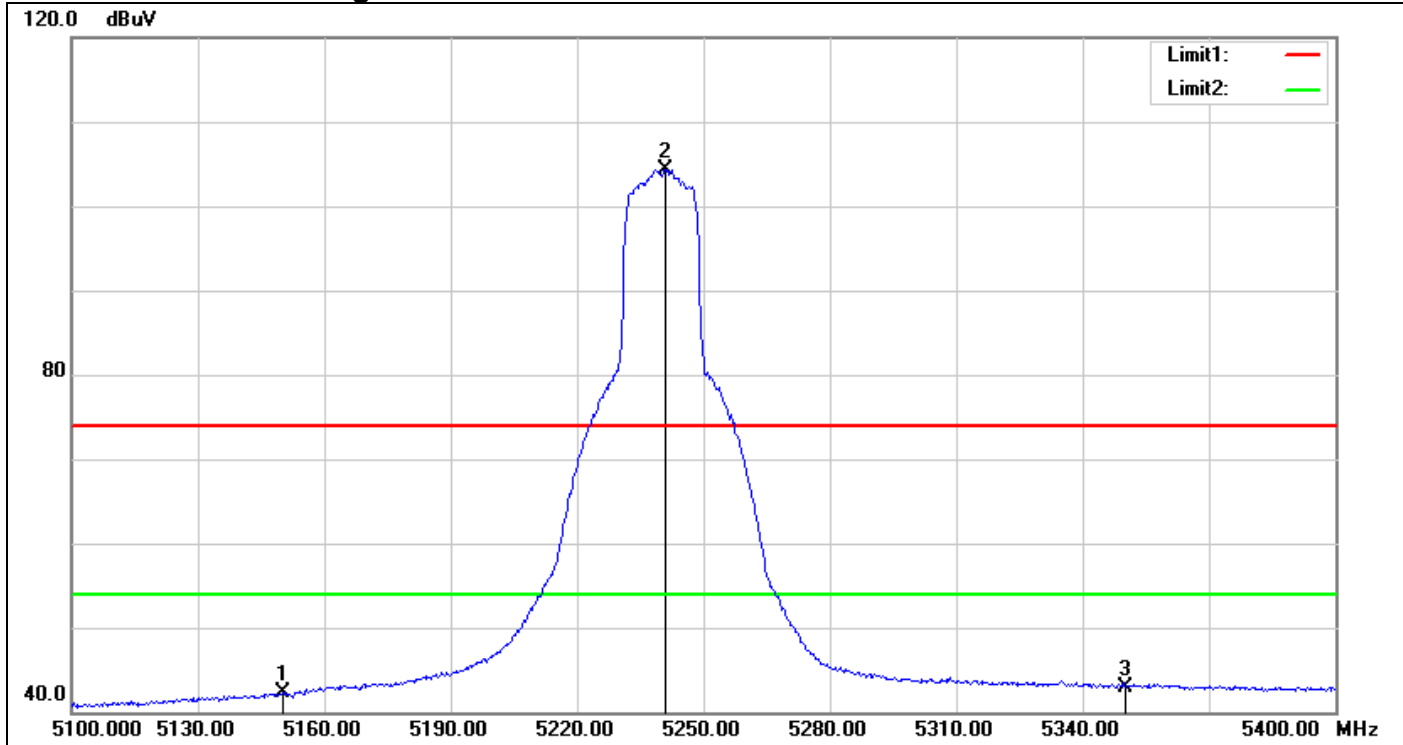
IEEE 802.11a Mode / CH High

Detector mode: Peak



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	5142.000	52.42	2.99	55.41	74.00	-18.59	peak
2	5238.600	109.87	4.62	114.49	-	-	peak
3	5351.100	52.75	5.32	58.07	74.00	-15.93	peak

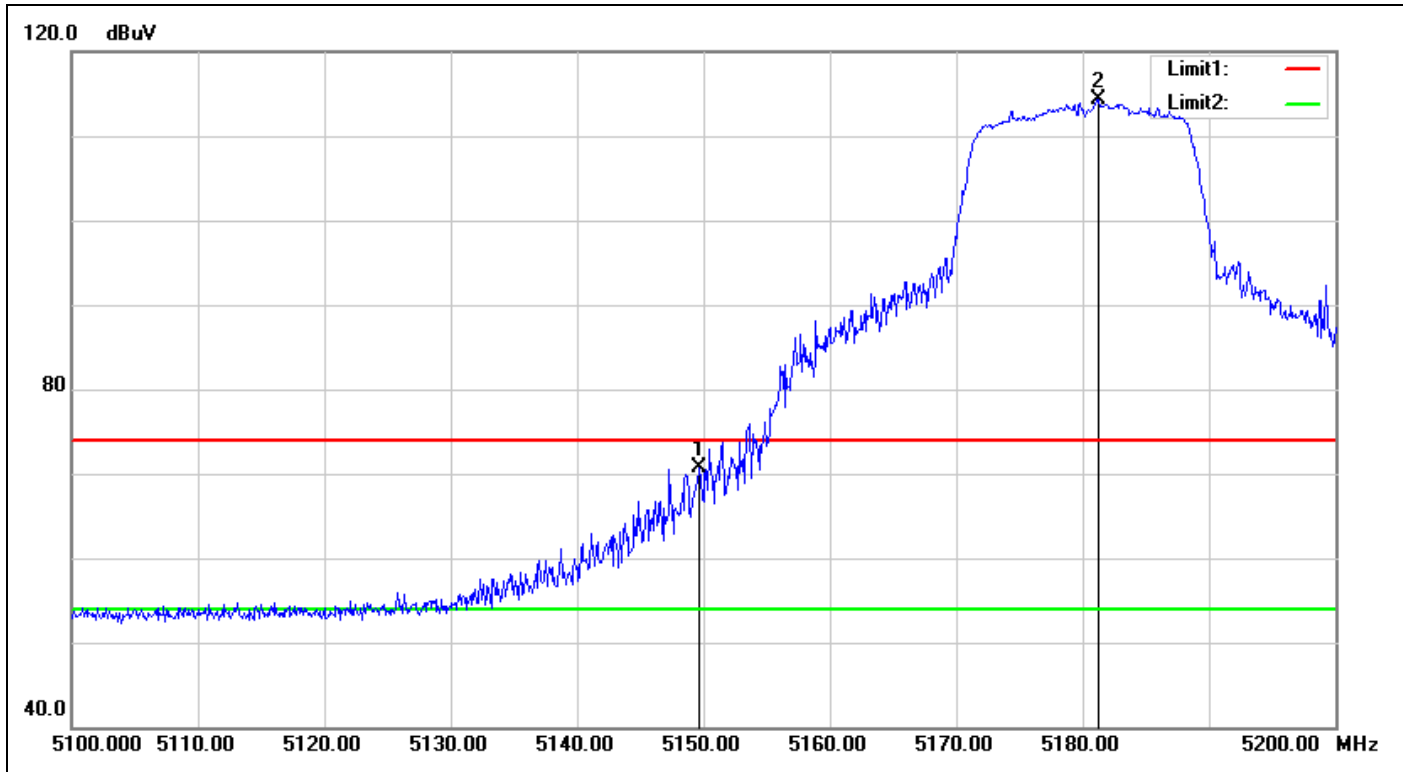
Detector mode: Average



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	5150.000	39.17	3.04	42.21	54.00	-11.79	AVG
2	5241.000	99.71	4.63	104.34	-	-	AVG
3	5350.000	37.66	5.31	42.97	54.00	-11.03	AVG

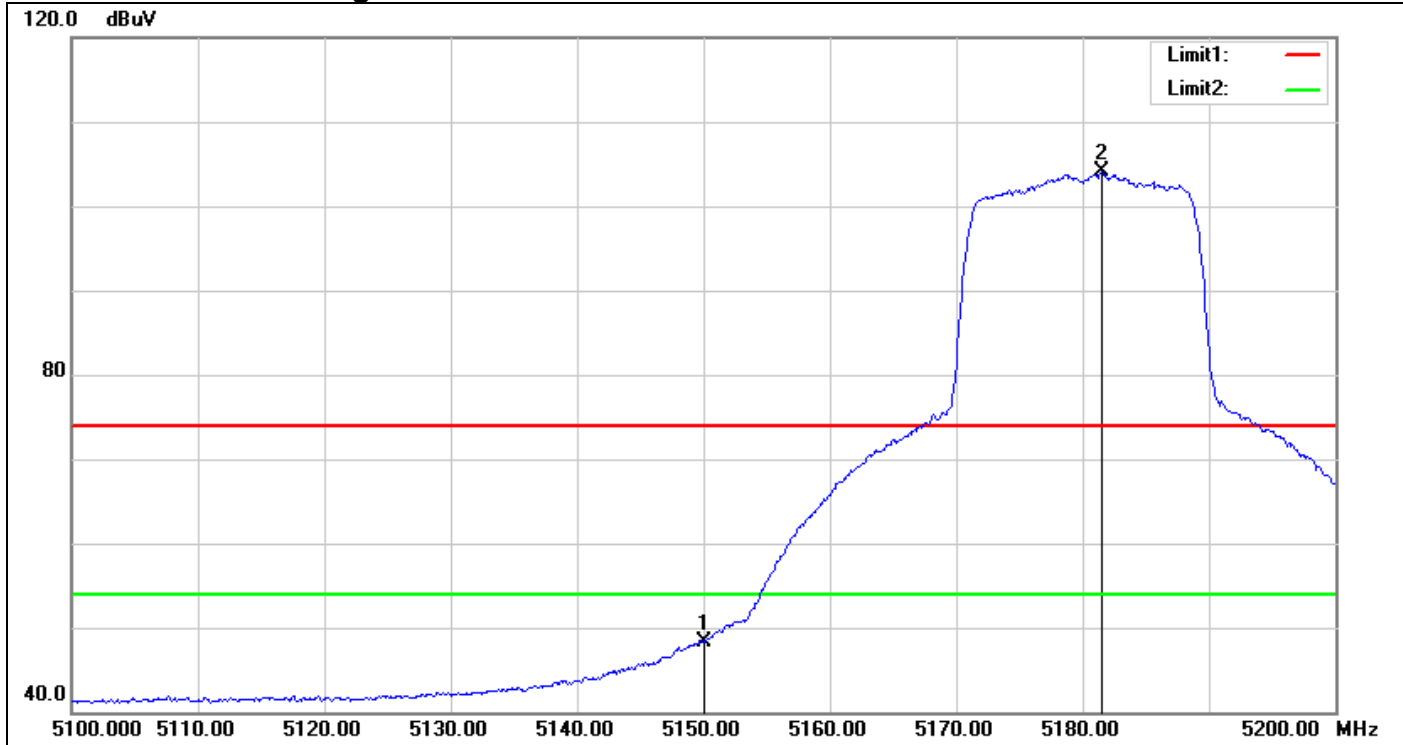
IEEE 802.11n HT20 MHz Mode / CH Low

Detector mode: Peak



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	5149.700	67.75	3.04	70.79	74.00	-3.21	peak
2	5181.300	110.43	3.95	114.38	-	-	peak

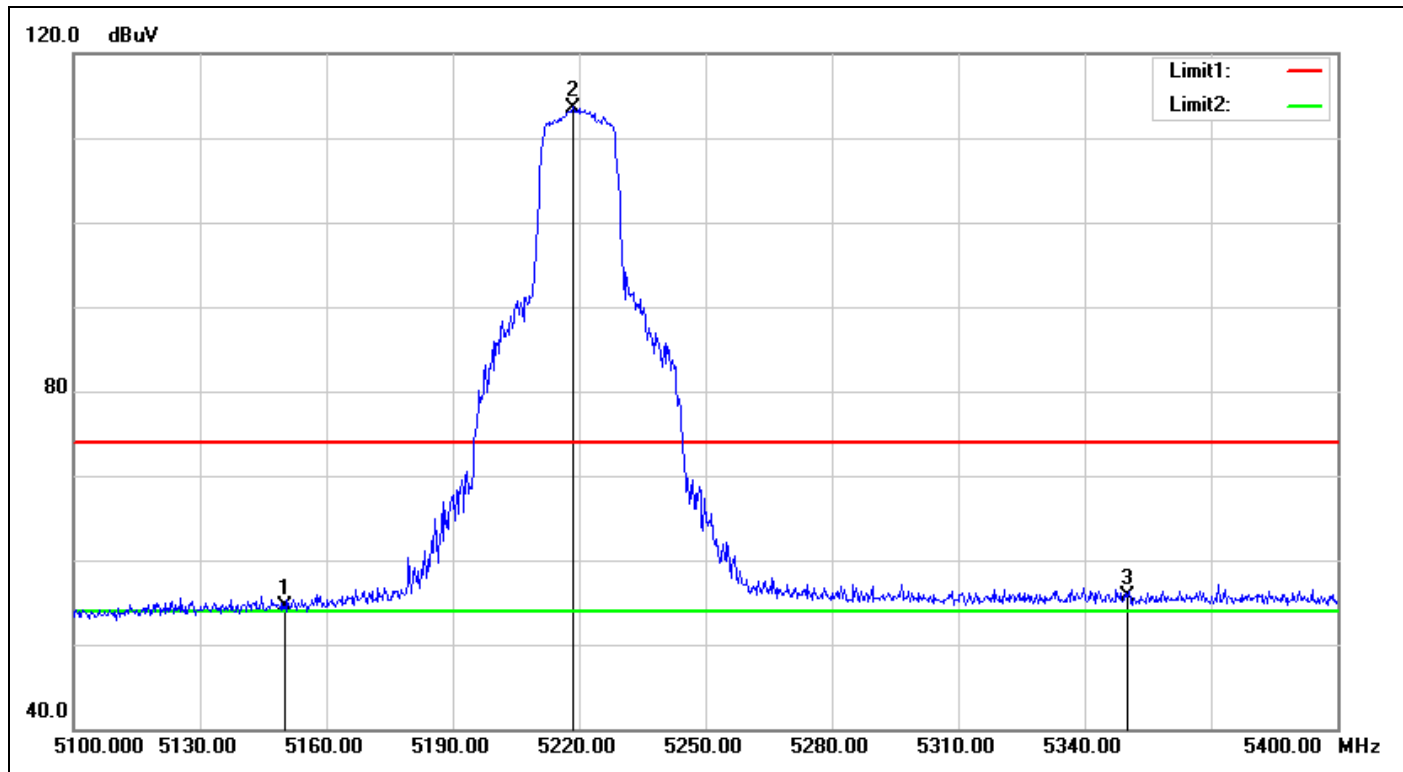
Detector mode: Average



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	5150.000	45.35	3.04	48.39	54.00	-5.61	AVG
2	5181.500	100.12	3.95	104.07	-	-	AVG

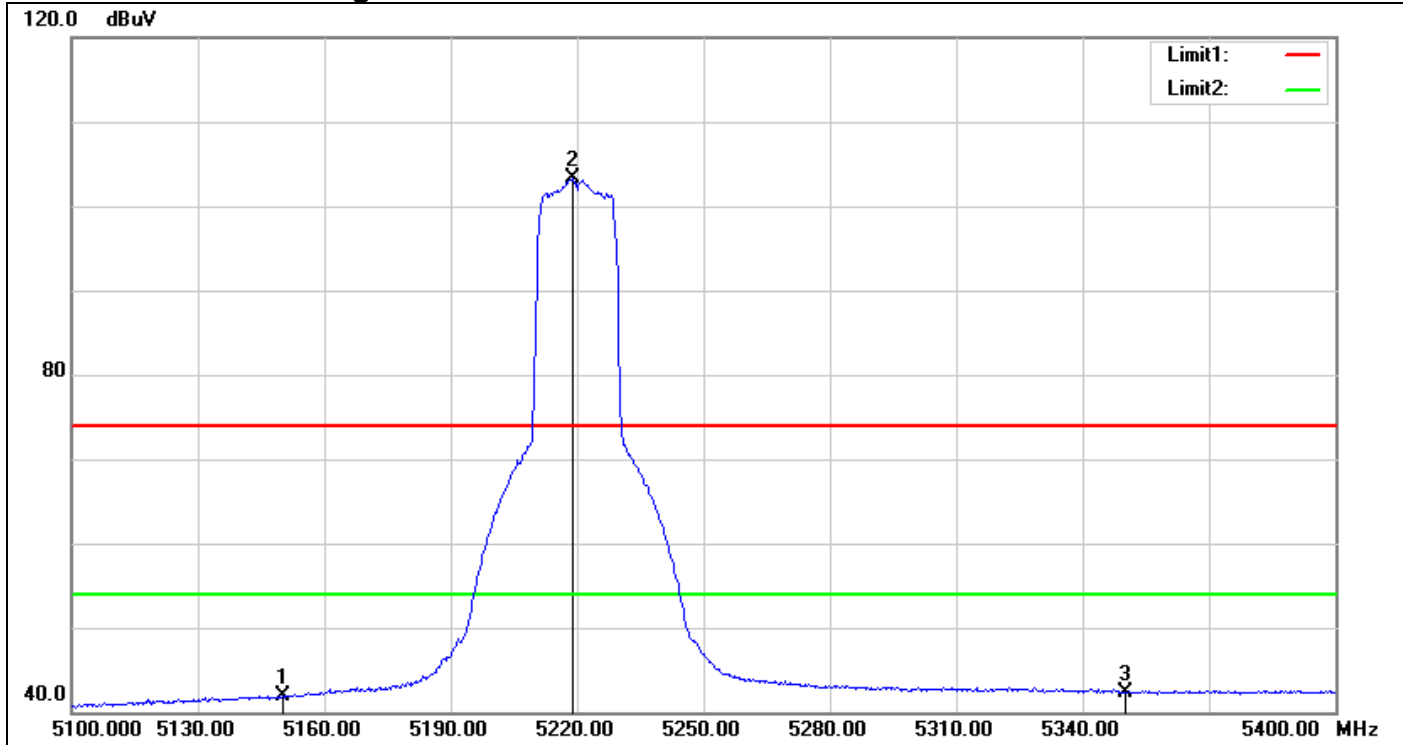
IEEE 802.11n HT20 MHz Mode / CH Mid

Detector mode: Peak



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	5150.000	51.51	3.04	54.55	74.00	-19.45	peak
2	5218.500	109.05	4.55	113.60	-	-	peak
3	5350.000	50.40	5.31	55.71	74.00	-18.29	peak

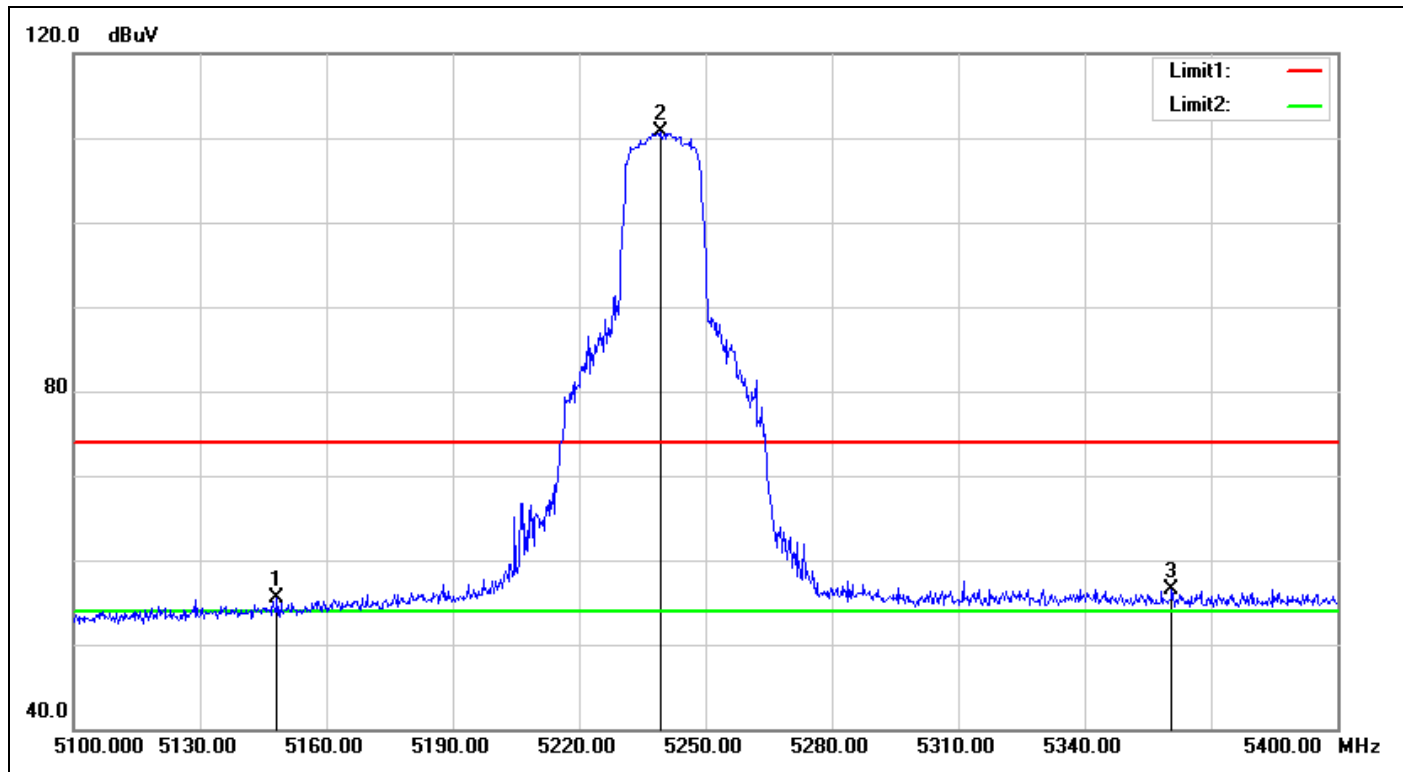
Detector mode: Average



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	5150.000	38.92	3.04	41.96	54.00	-12.04	AVG
2	5219.100	98.70	4.55	103.25	-	-	AVG
3	5350.000	37.08	5.31	42.39	54.00	-11.61	AVG

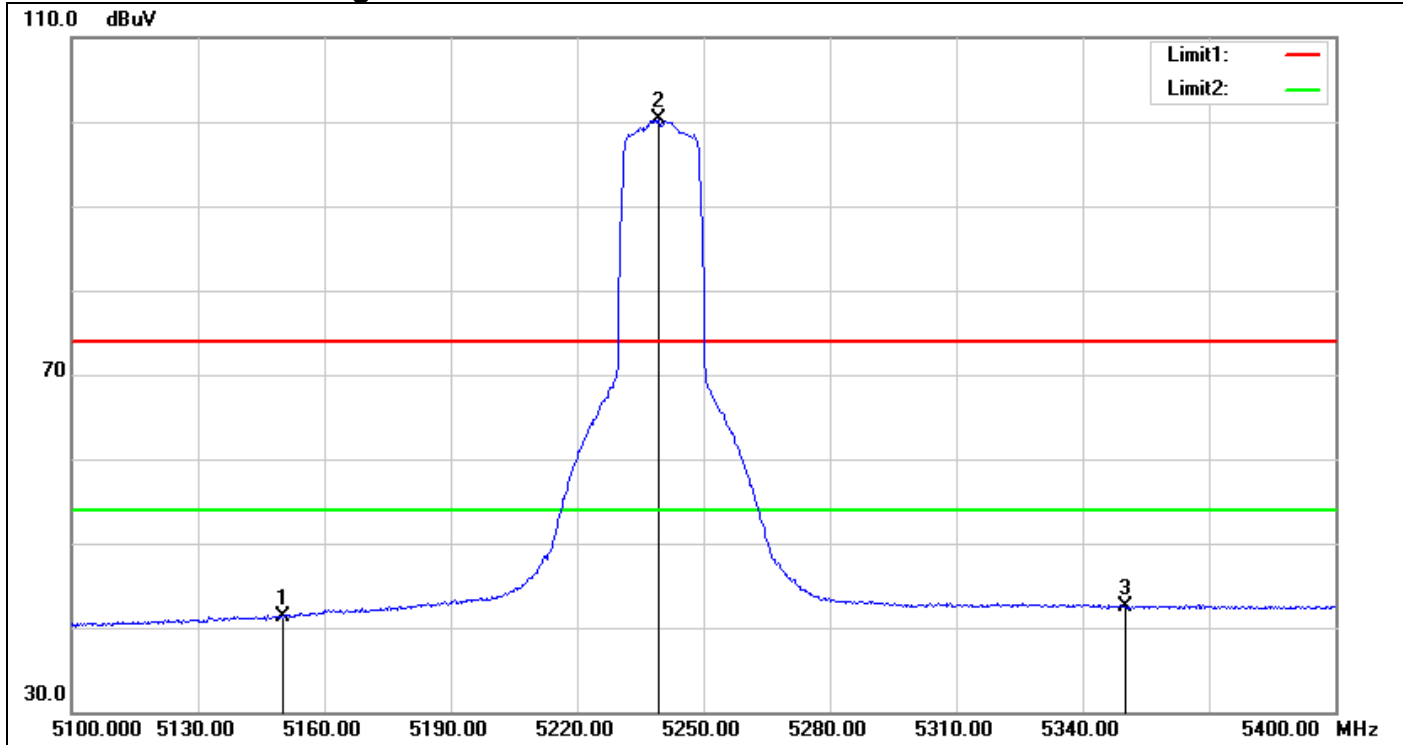
IEEE 802.11n HT20 MHz Mode / CH High

Detector mode: Peak



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	5148.300	52.53	3.03	55.56	74.00	-18.44	peak
2	5239.200	106.11	4.62	110.73	-	-	peak
3	5360.700	51.08	5.40	56.48	74.00	-17.52	peak

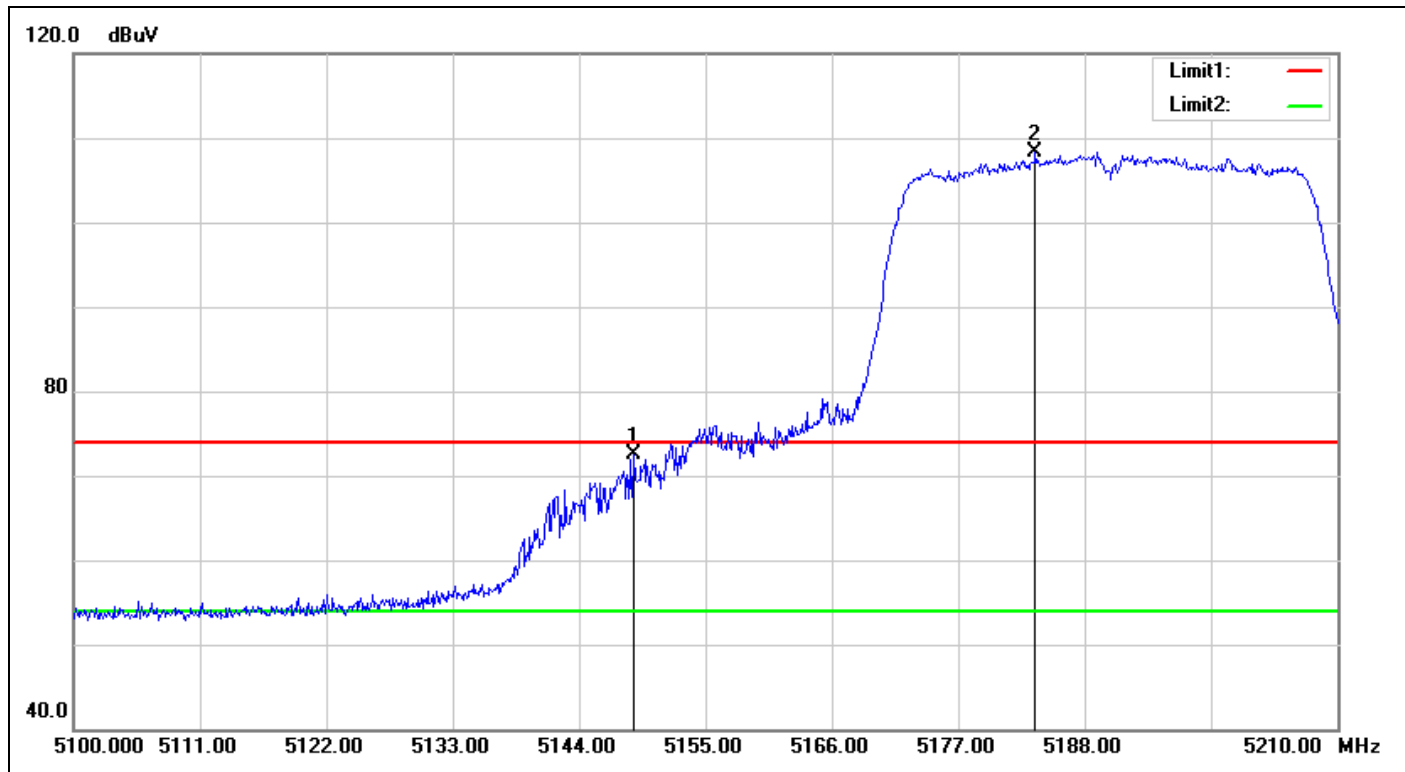
Detector mode: Average



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	5150.000	38.16	3.04	41.20	54.00	-12.80	AVG
2	5239.200	95.63	4.62	100.25	-	-	AVG
3	5350.000	37.22	5.31	42.53	54.00	-11.47	AVG

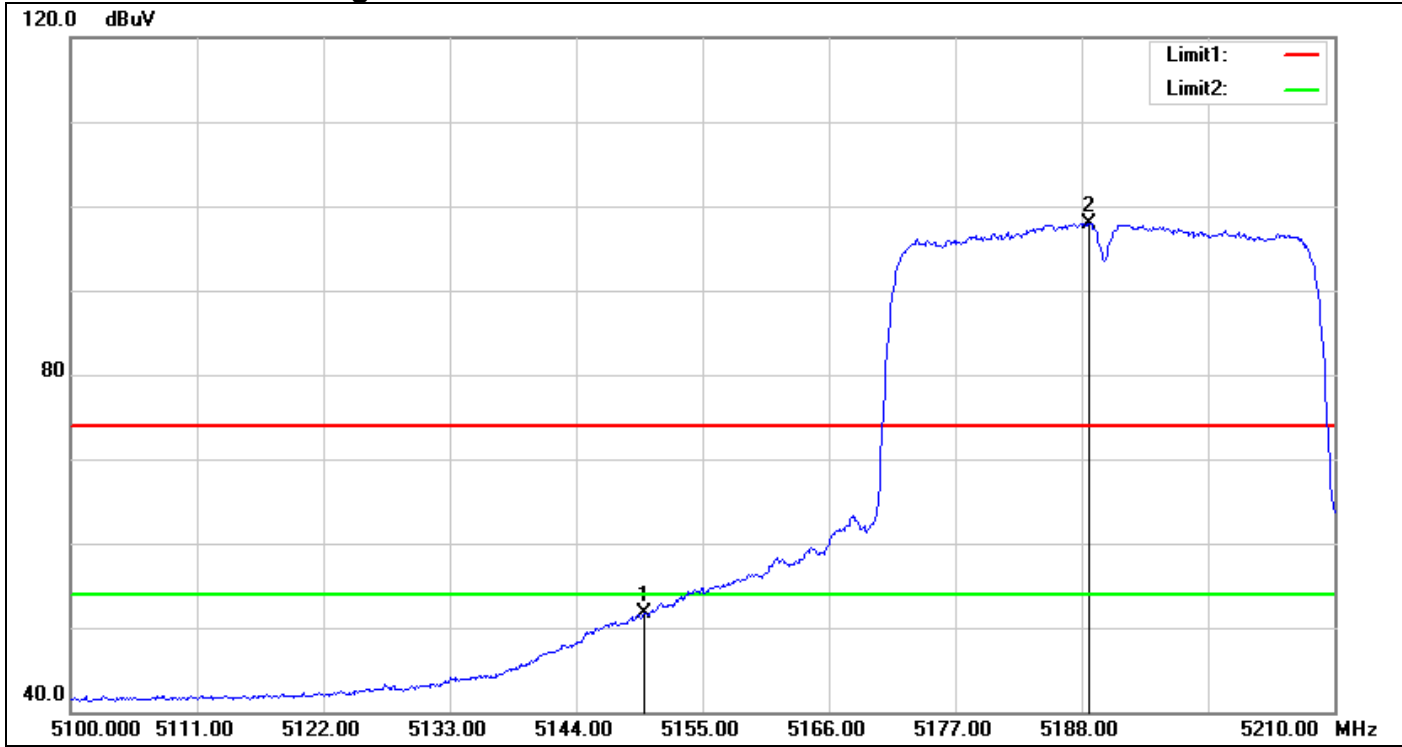
IEEE 802.11n HT40 MHz Mode / CH Low

Detector mode: Peak



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	5148.730	69.42	3.03	72.45	74.00	-1.55	peak
2	5183.710	104.29	4.02	108.31	-	-	peak

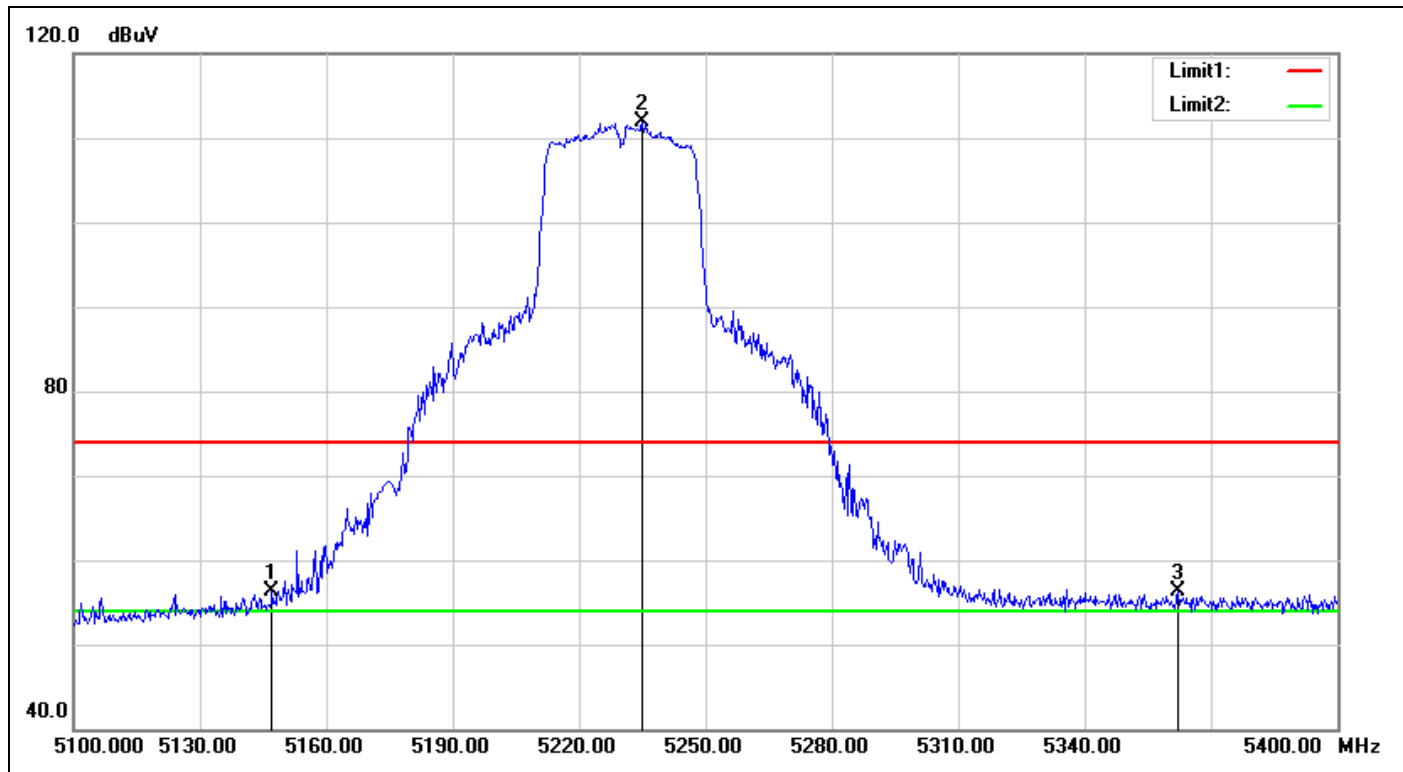
Detector mode: Average



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	5149.940	48.58	3.04	51.62	54.00	-2.38	AVG
2	5188.660	93.83	4.16	97.99	-	-	AVG

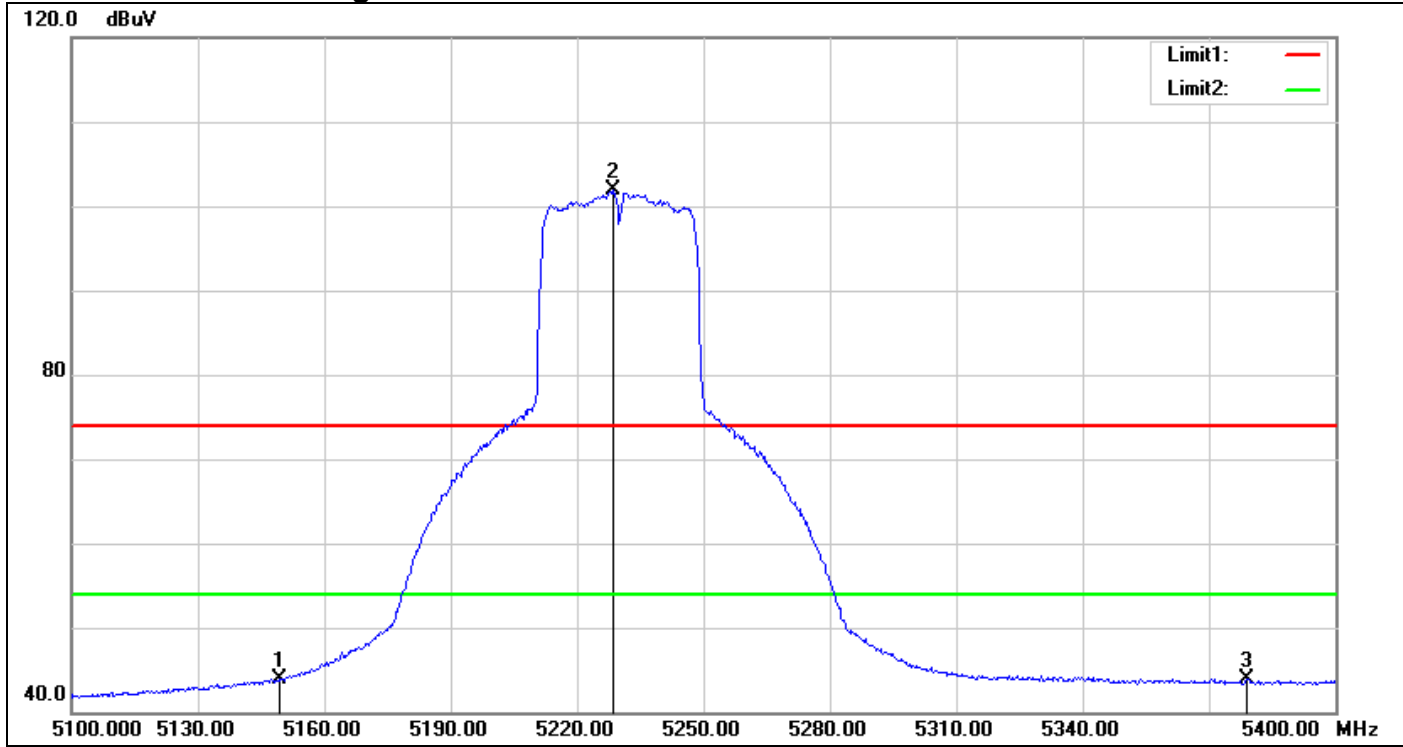
IEEE 802.11n HT40 MHz Mode / CH High

Detector mode: Peak



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	5147.100	53.36	3.02	56.38	74.00	-17.62	peak
2	5235.000	107.35	4.61	111.96	-	-	peak
3	5362.200	50.97	5.41	56.38	74.00	-17.62	peak

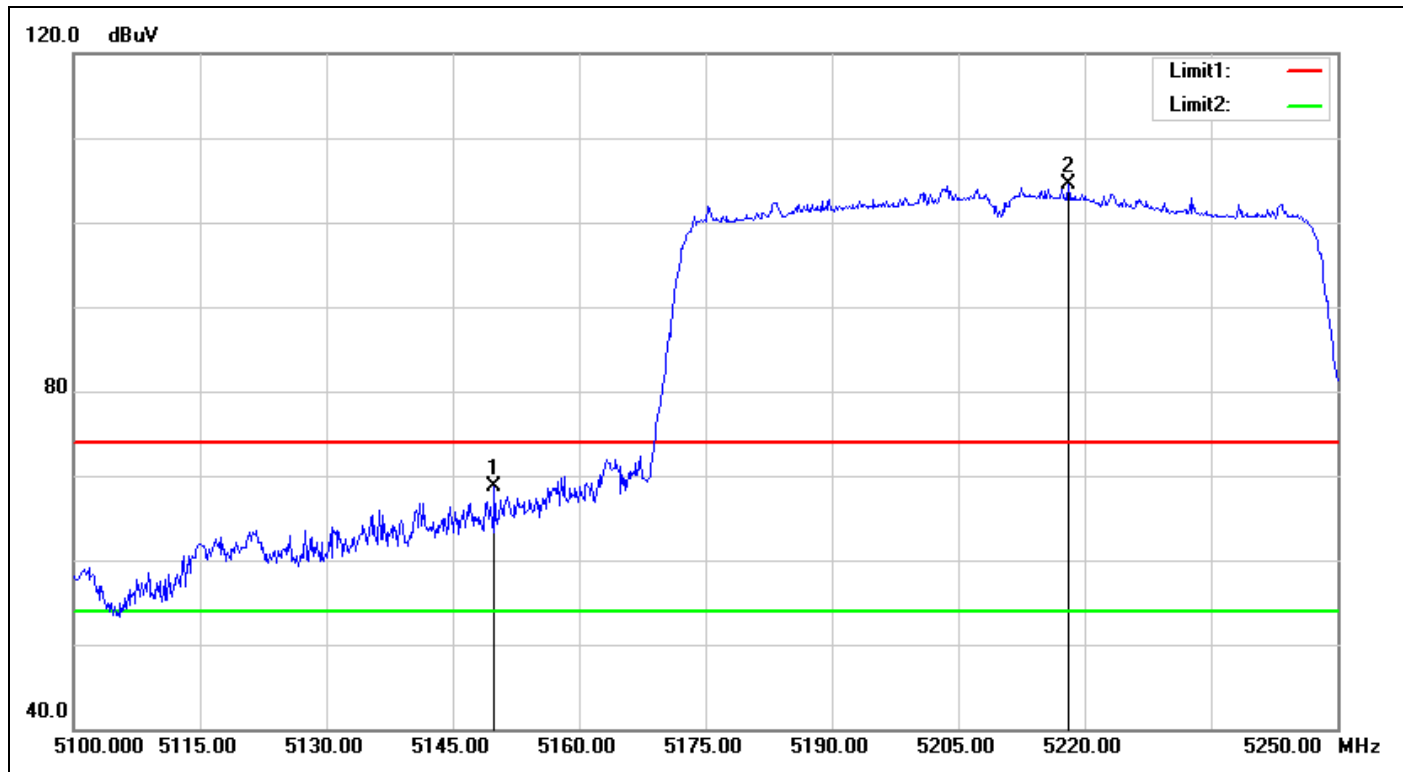
Detector mode: Average



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	5149.200	40.85	3.03	43.88	54.00	-10.12	AVG
2	5228.400	97.28	4.59	101.87	-	-	AVG
3	5379.000	38.44	5.55	43.99	54.00	-10.01	AVG

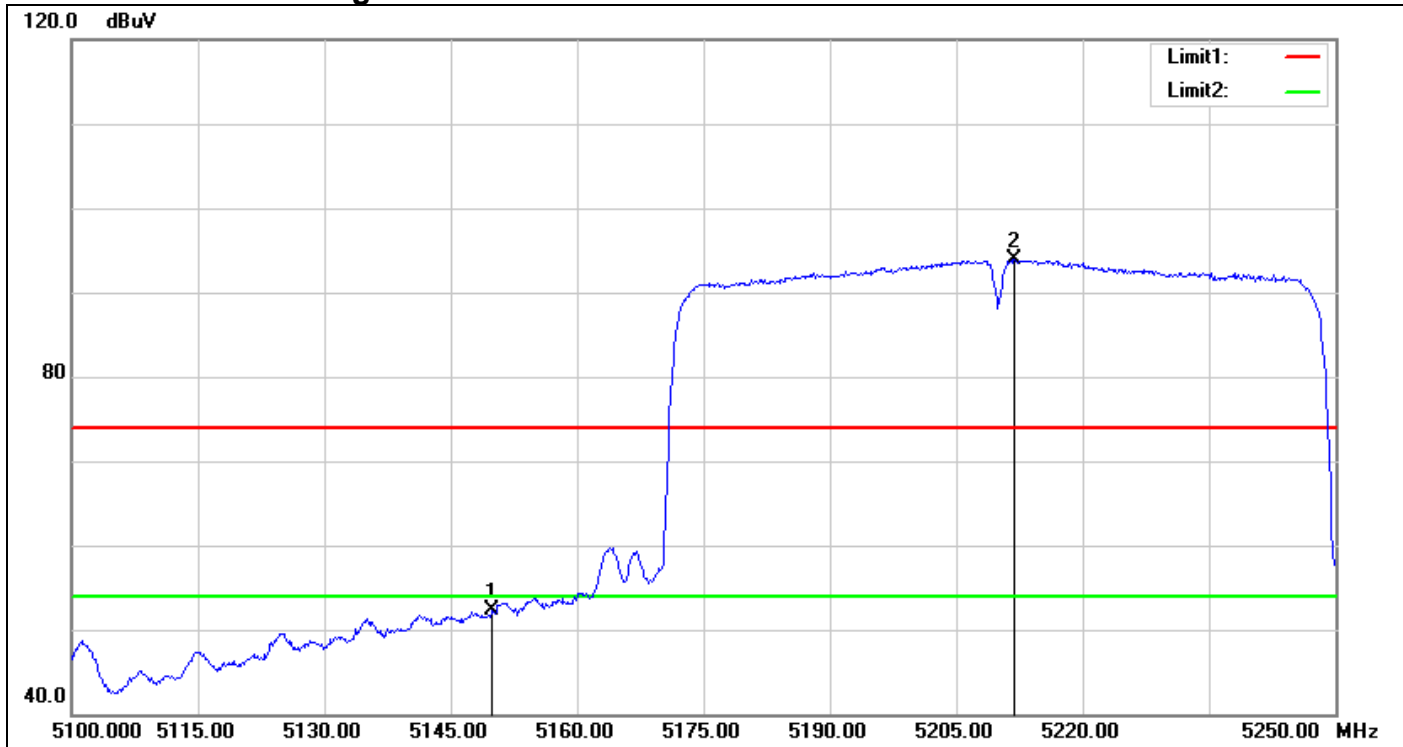
IEEE 802.11 ac VHT 80 MHz Mode / CH Mid

Detector mode: Peak



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	5149.950	65.62	3.04	68.66	74.00	-5.34	peak
2	5218.050	100.04	4.55	104.59	-	-	peak

Detector mode: Average

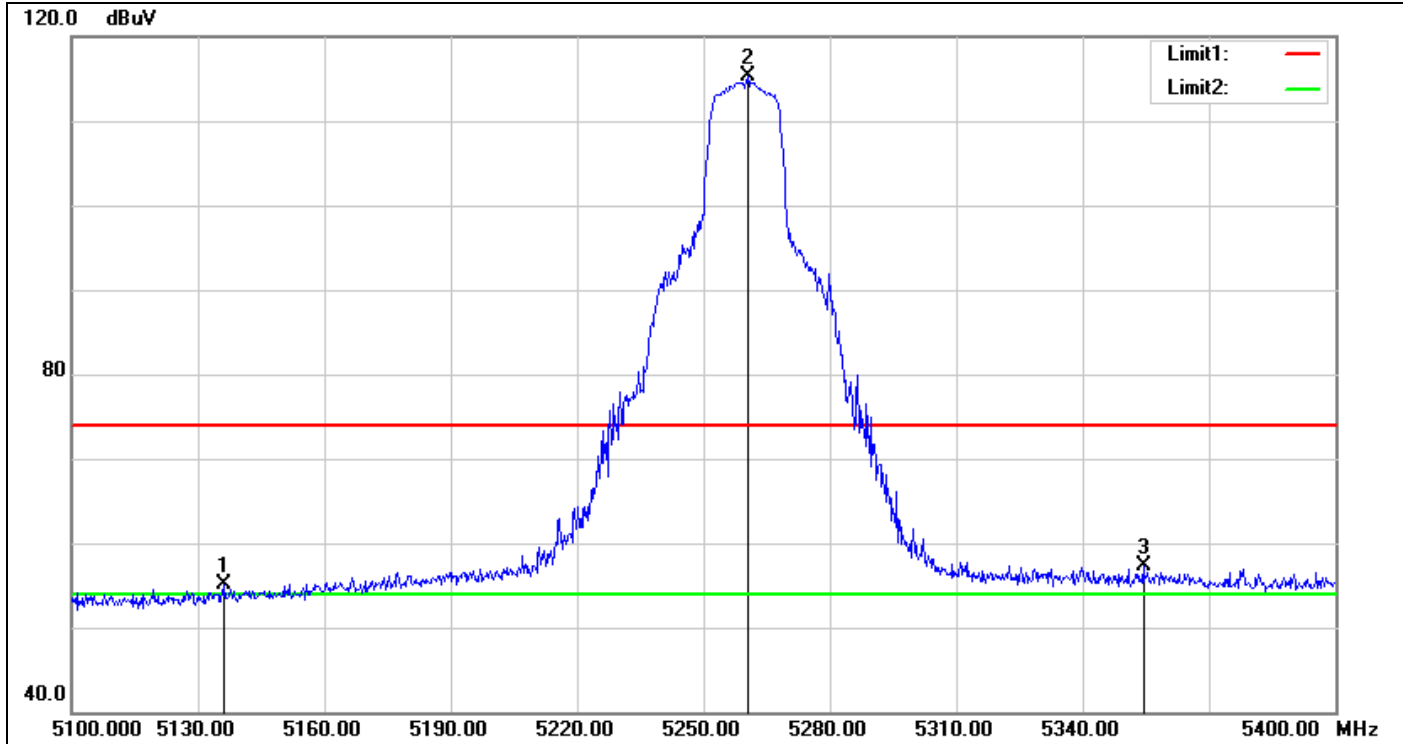


No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	5149.950	49.20	3.04	52.24	54.00	-1.76	AVG
2	5211.900	89.40	4.53	93.93	-	-	AVG

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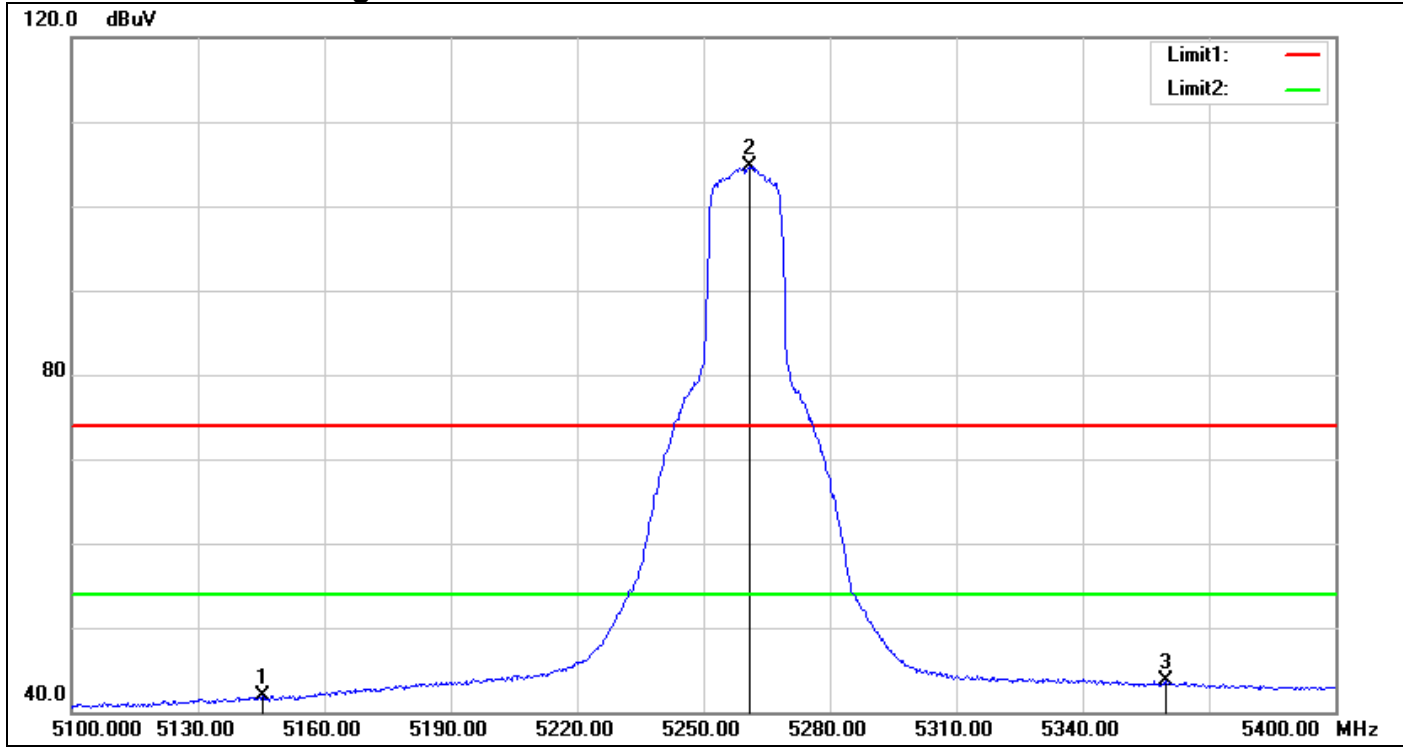
IEEE 802.11a Mode / CH Low

Detector mode: Peak



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	5136.300	52.21	2.95	55.16	74.00	-18.84	peak
2	5260.500	110.59	4.70	115.29	-	-	peak
3	5354.400	52.04	5.35	57.39	74.00	-16.61	peak

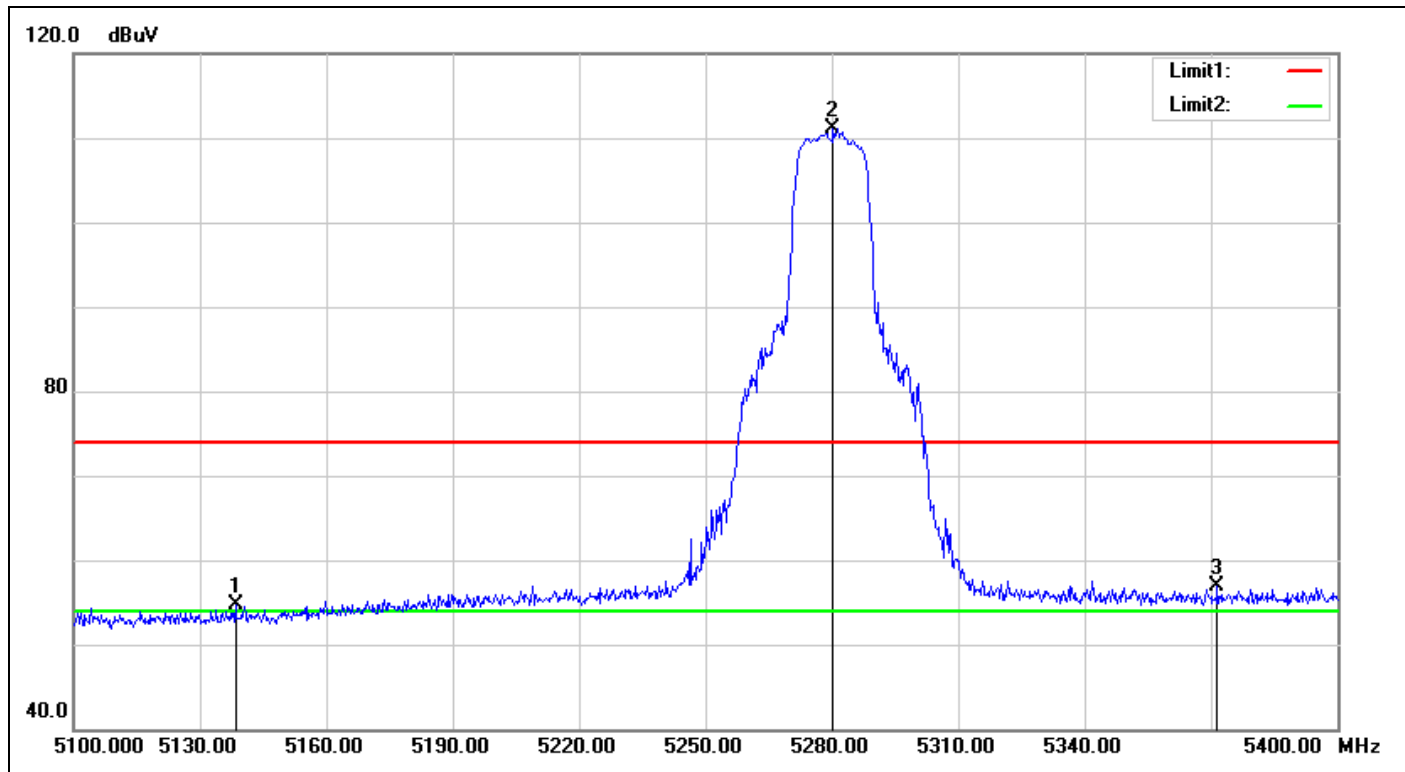
Detector mode: Average



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	5145.300	38.90	3.01	41.91	54.00	-12.09	AVG
2	5260.800	99.99	4.70	104.69	-	-	AVG
3	5359.800	38.32	5.39	43.71	54.00	-10.29	AVG

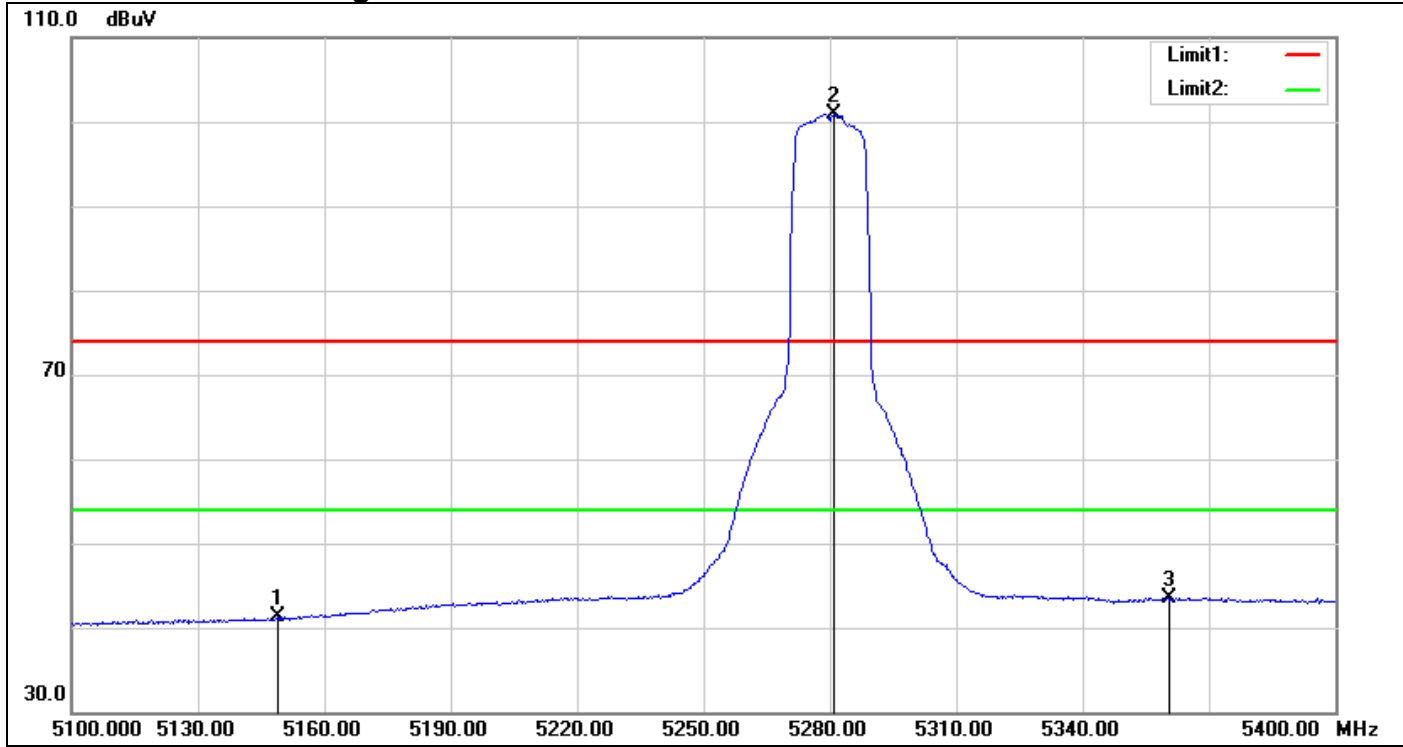
IEEE 802.11a Mode / CH Mid

Detector mode: Peak



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	5138.400	51.76	2.96	54.72	74.00	-19.28	peak
2	5280.300	106.44	4.76	111.20	-	-	peak
3	5371.500	51.39	5.49	56.88	74.00	-17.12	peak

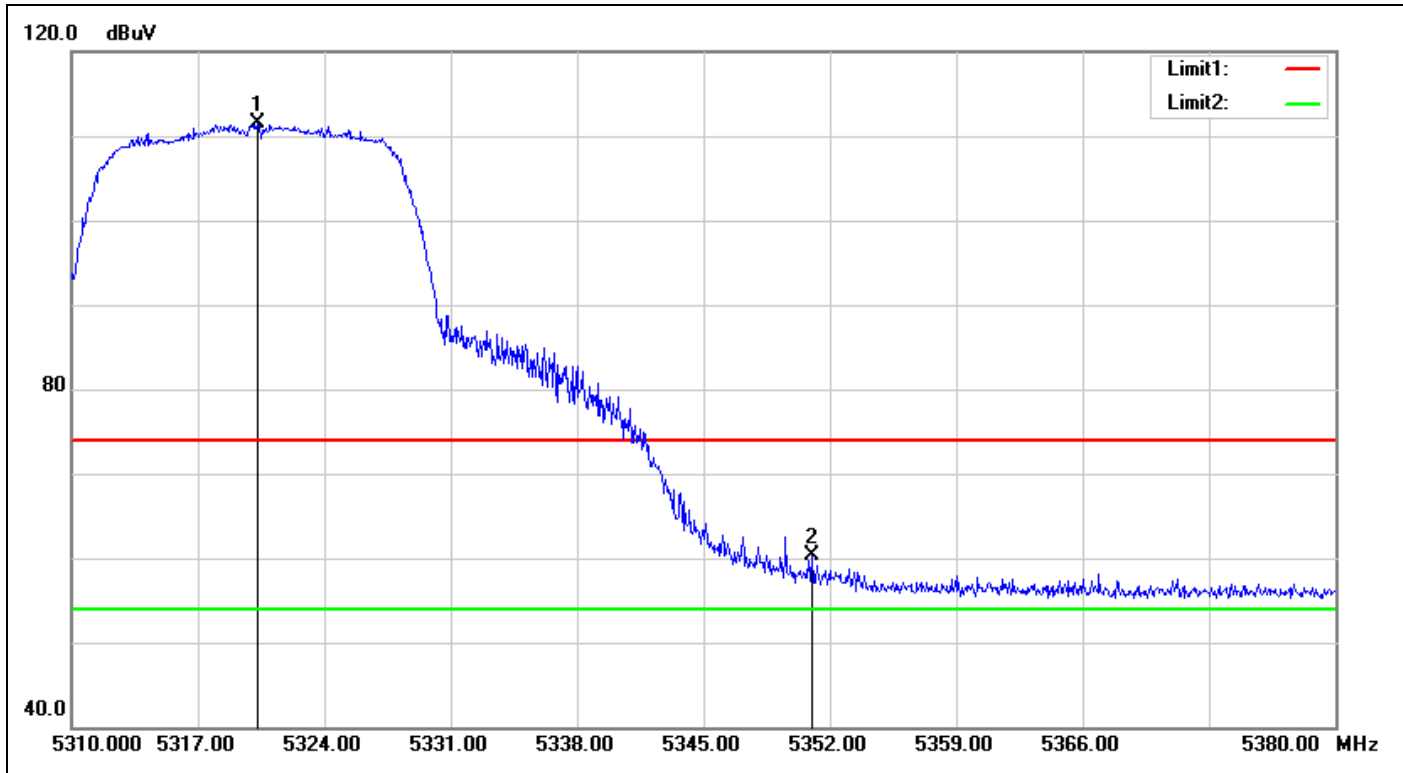
Detector mode: Average



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	5148.900	38.17	3.03	41.20	54.00	-12.80	AVG
2	5280.900	96.20	4.77	100.97	-	-	AVG
3	5360.400	38.19	5.40	43.59	54.00	-10.41	AVG

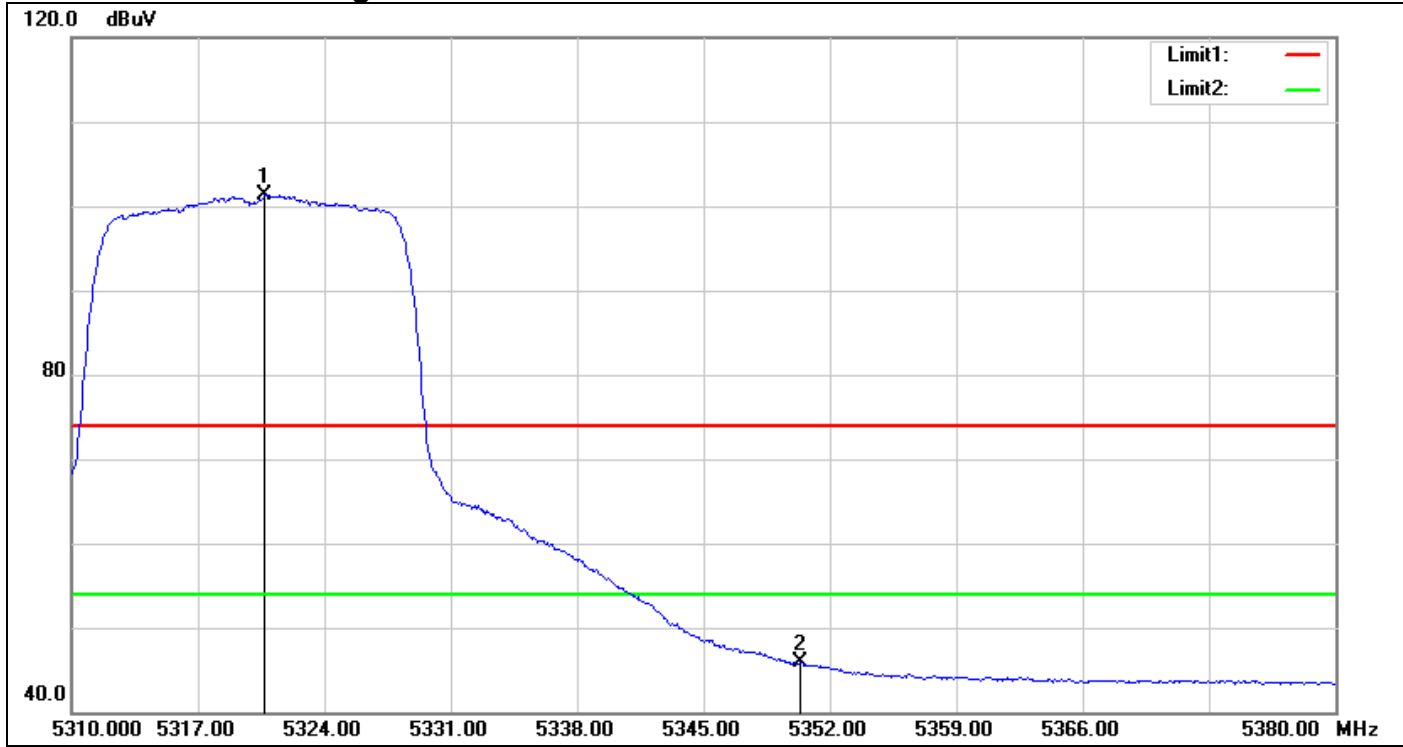
IEEE 802.11a Mode / CH High

Detector mode: Peak



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	5320.290	106.56	5.02	111.58	-	-	peak
2	5351.020	55.04	5.32	60.36	74.00	-13.64	peak

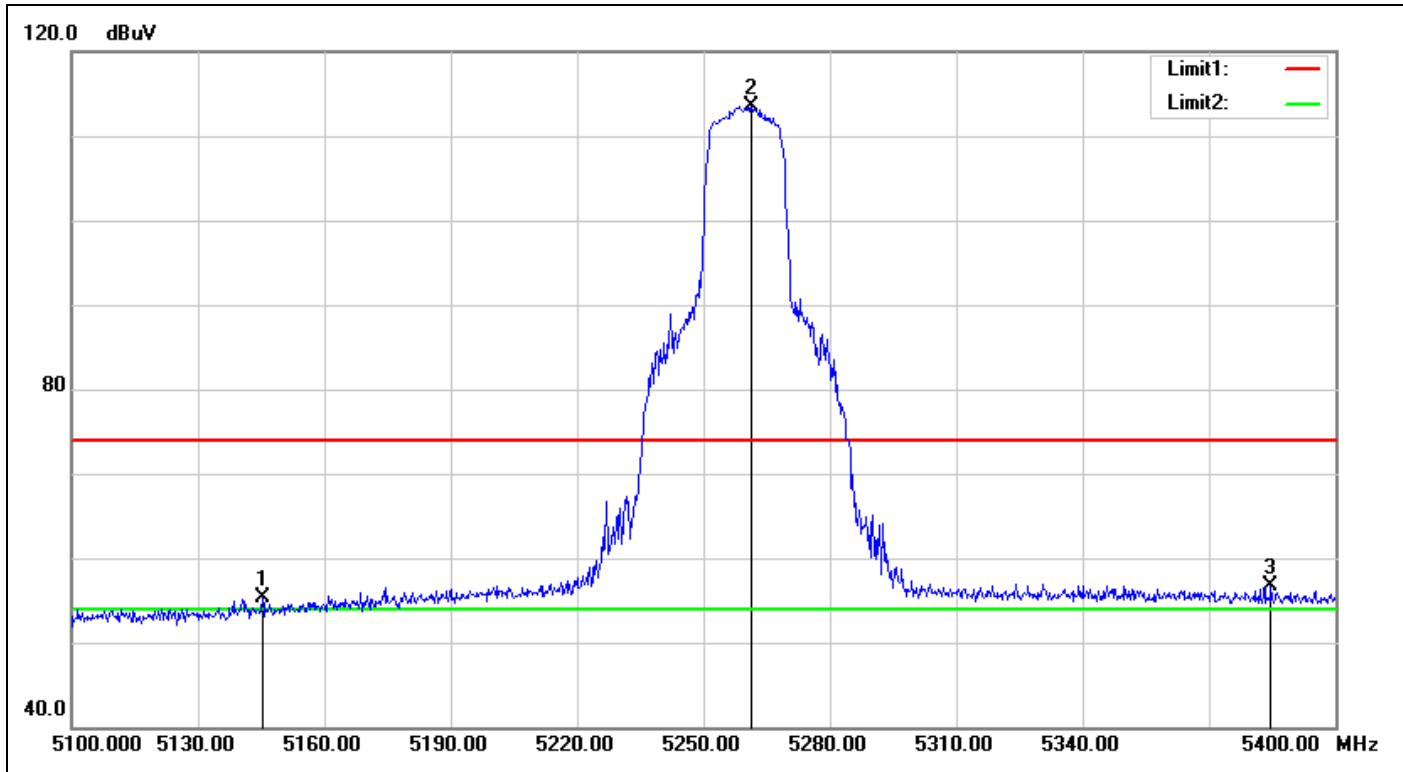
Detector mode: Average



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	5320.710	96.32	5.03	101.35	-	-	AVG
2	5350.390	40.64	5.31	45.95	54.00	-8.05	AVG

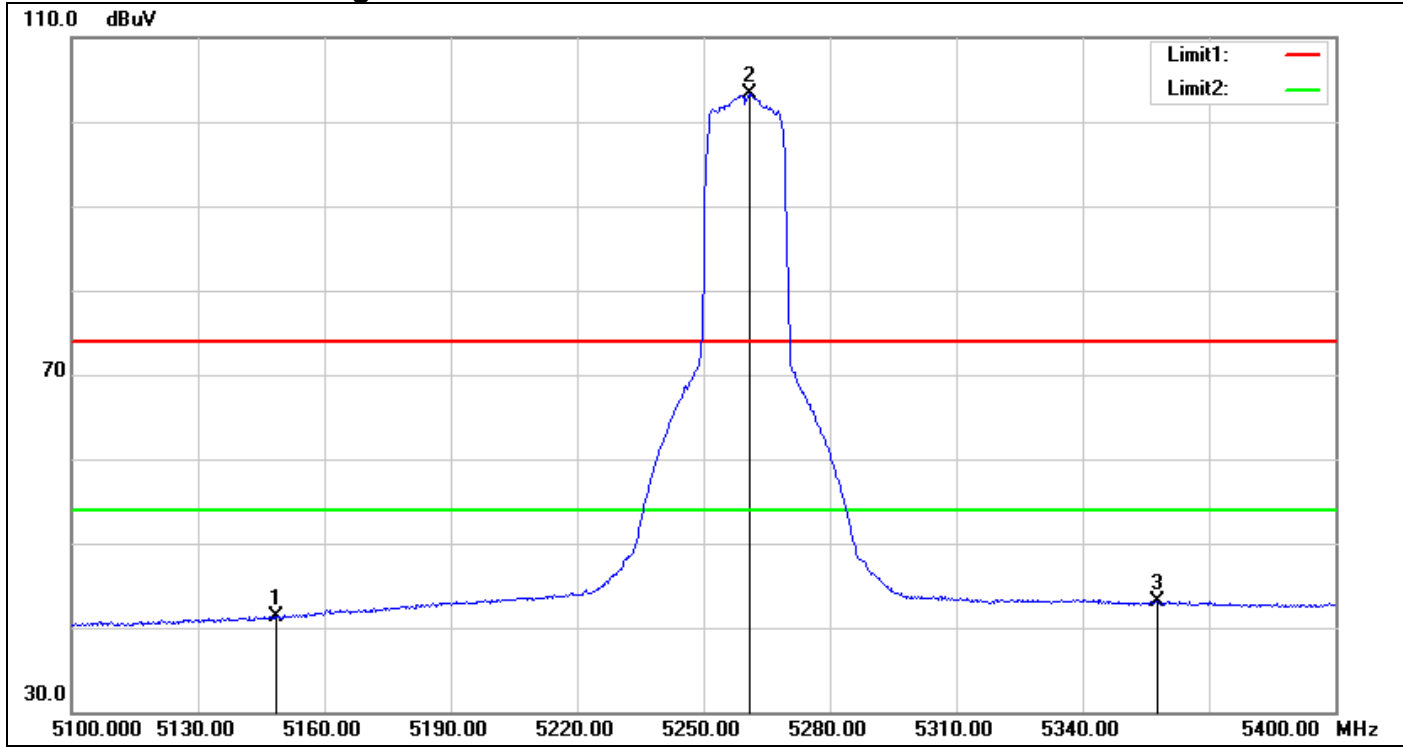
IEEE 802.11n HT 20 MHz Mode / CH Low

Detector mode: Peak



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	5145.300	52.33	3.01	55.34	74.00	-18.66	peak
2	5261.400	108.89	4.70	113.59	-	-	peak
3	5384.700	51.10	5.59	56.69	74.00	-17.31	peak

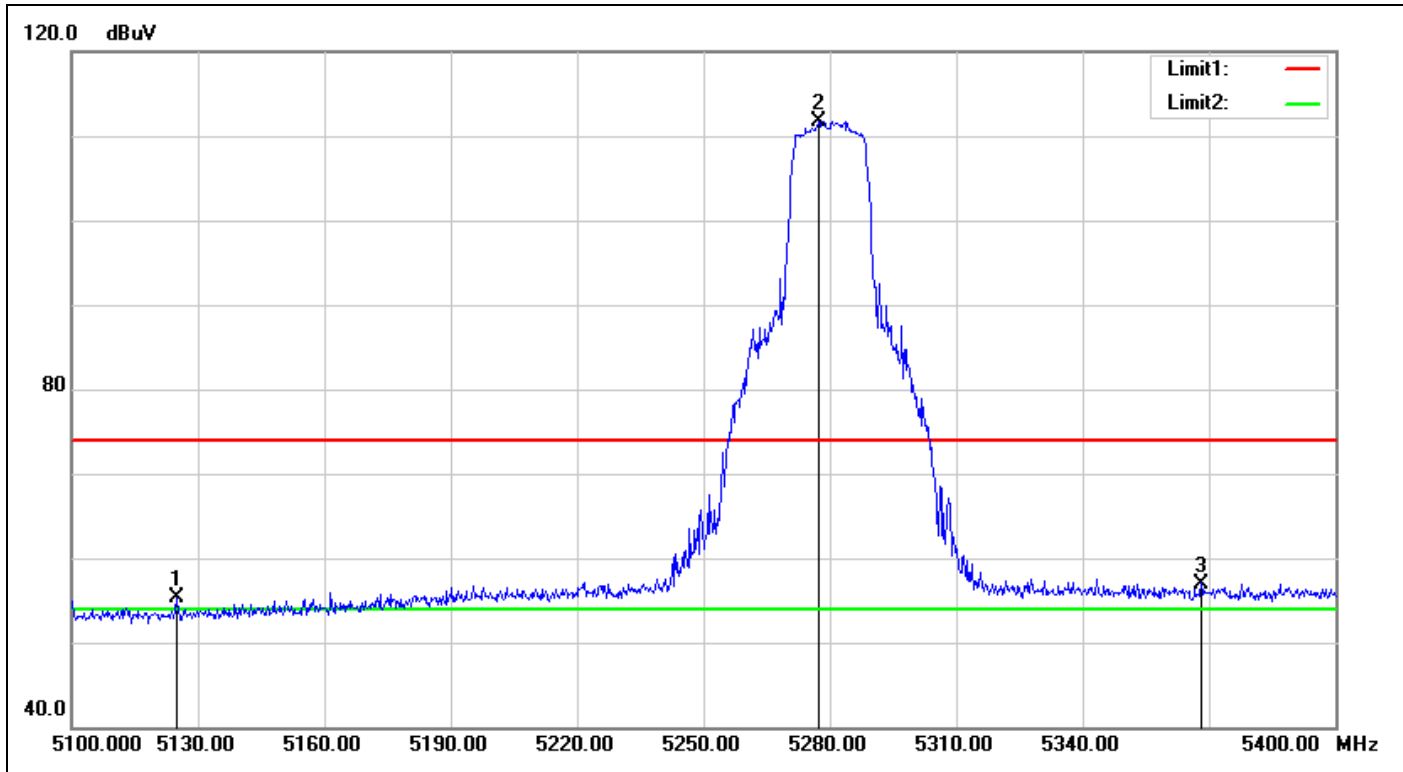
Detector mode: Average



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	5148.600	38.35	3.03	41.38	54.00	-12.62	AVG
2	5260.800	98.61	4.70	103.31	-	-	AVG
3	5357.700	37.81	5.37	43.18	54.00	-10.82	AVG

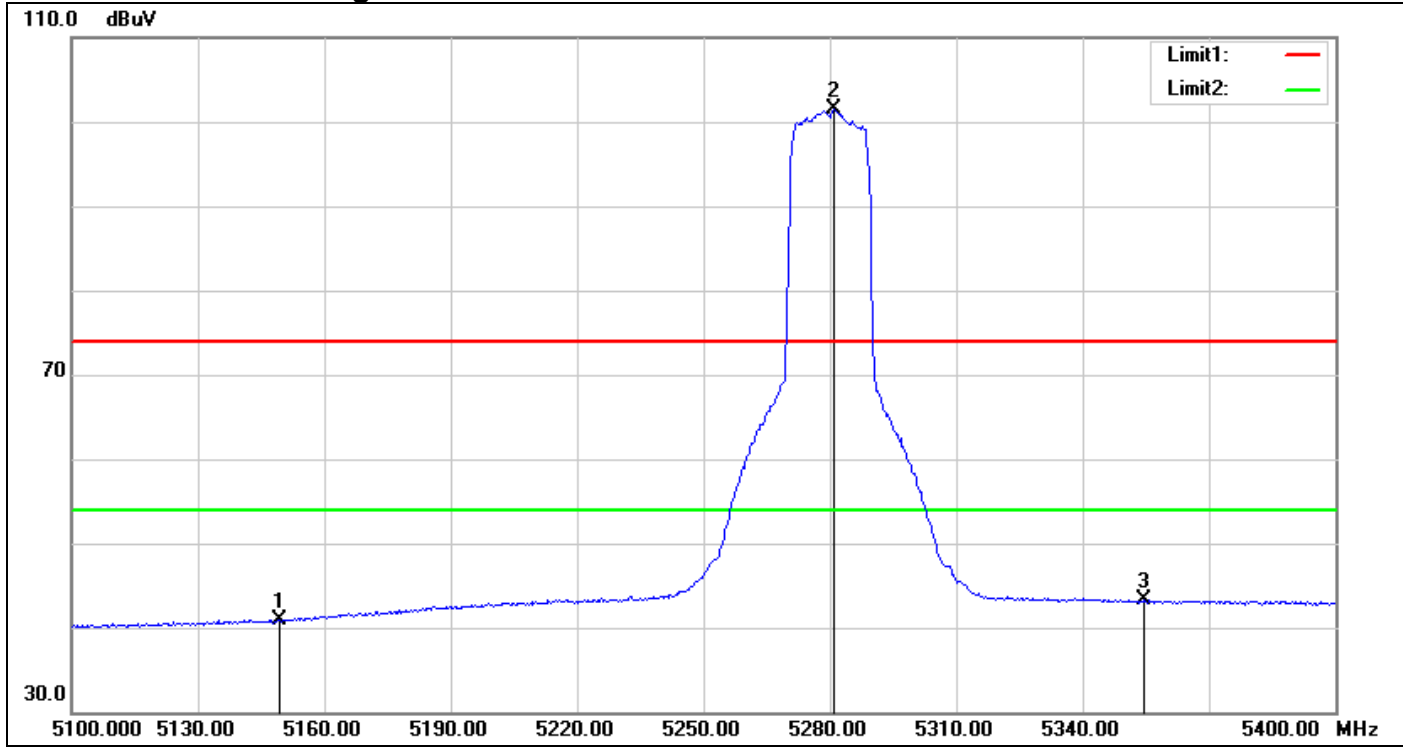
IEEE 802.11n HT 20 MHz Mode / CH Mid

Detector mode: Peak



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	5124.900	52.41	2.87	55.28	74.00	-18.72	peak
2	5277.300	107.03	4.75	111.78	-	-	peak
3	5368.200	51.54	5.46	57.00	74.00	-17.00	peak

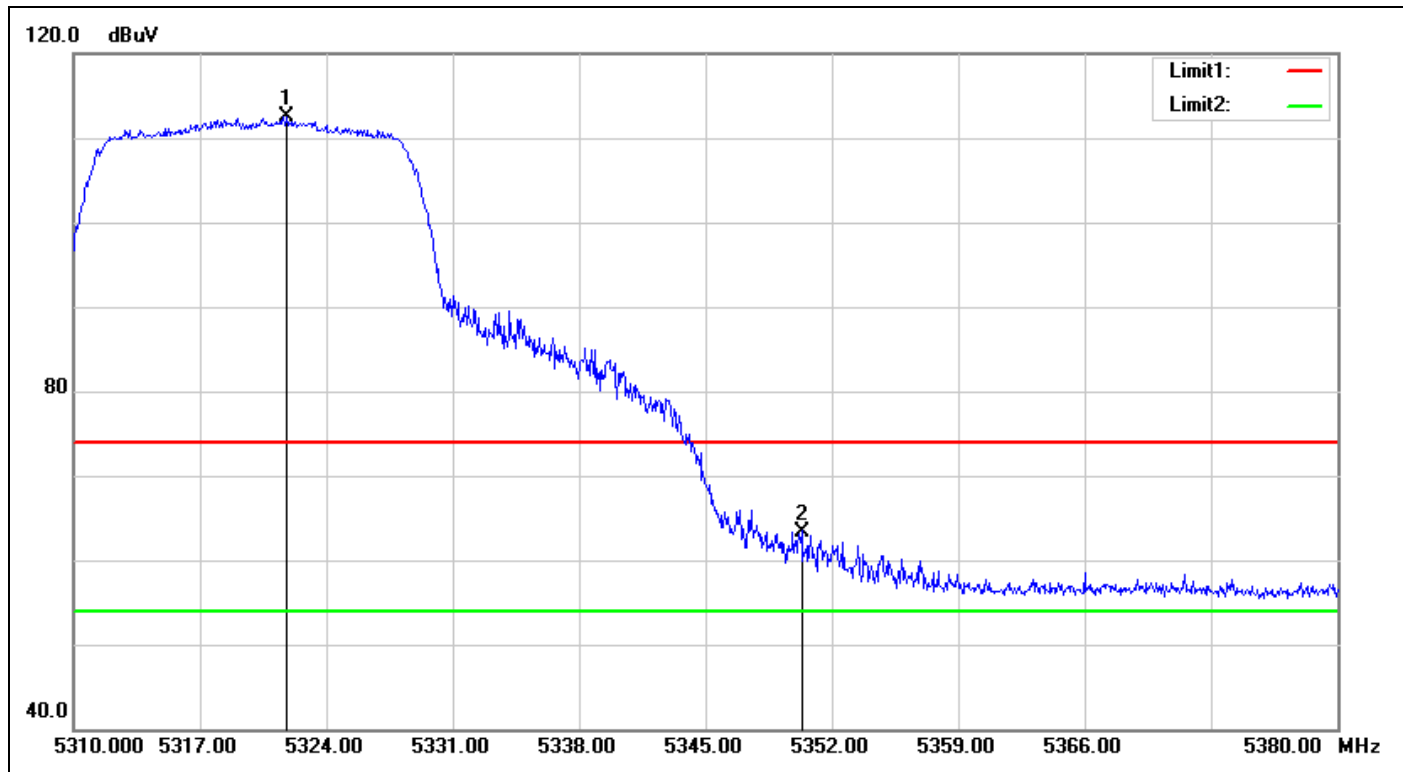
Detector mode: Average



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	5149.500	37.90	3.04	40.94	54.00	-13.06	AVG
2	5280.900	96.68	4.77	101.45	-	-	AVG
3	5354.400	37.88	5.35	43.23	54.00	-10.77	AVG

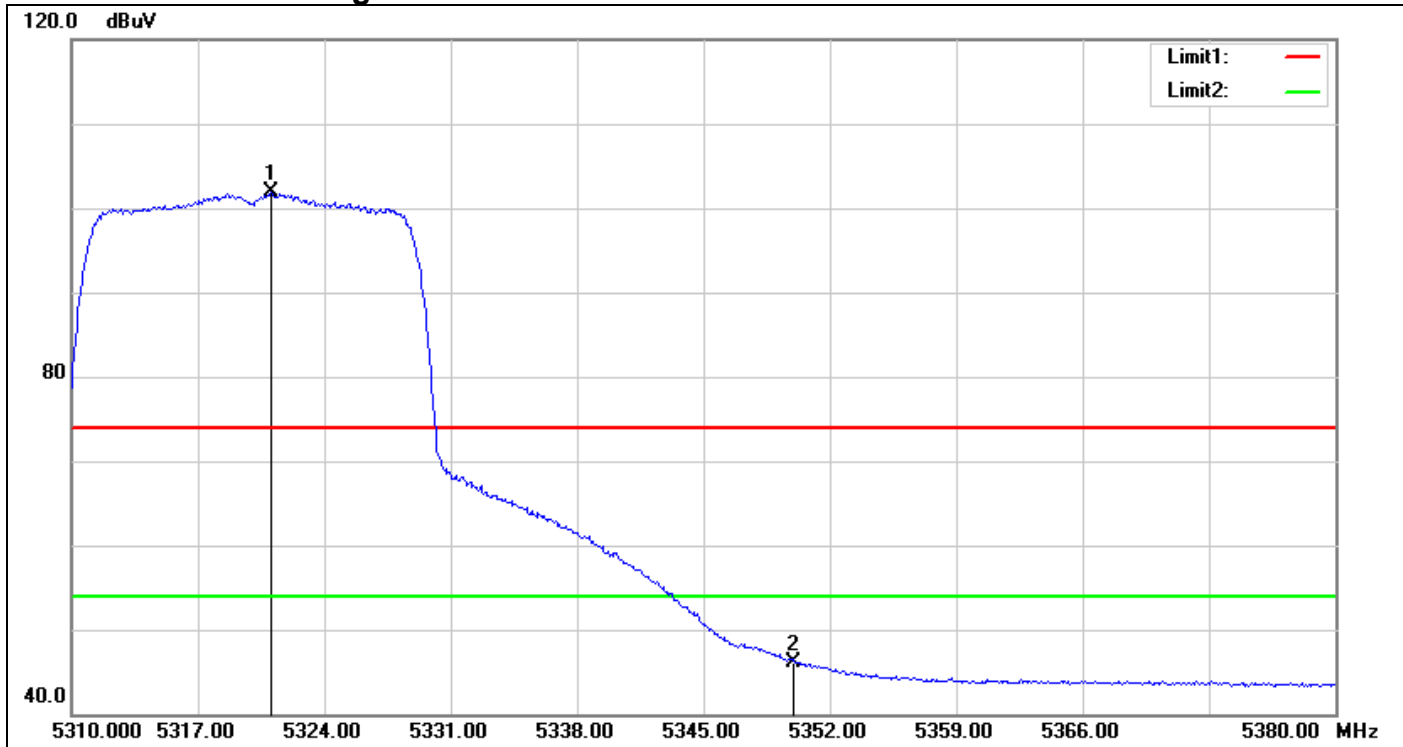
IEEE 802.11n HT 20 MHz Mode / CH High

Detector mode: Peak



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	5321.830	107.51	5.04	112.55	-	-	peak
2	5350.320	58.09	5.31	63.40	74.00	-10.60	peak

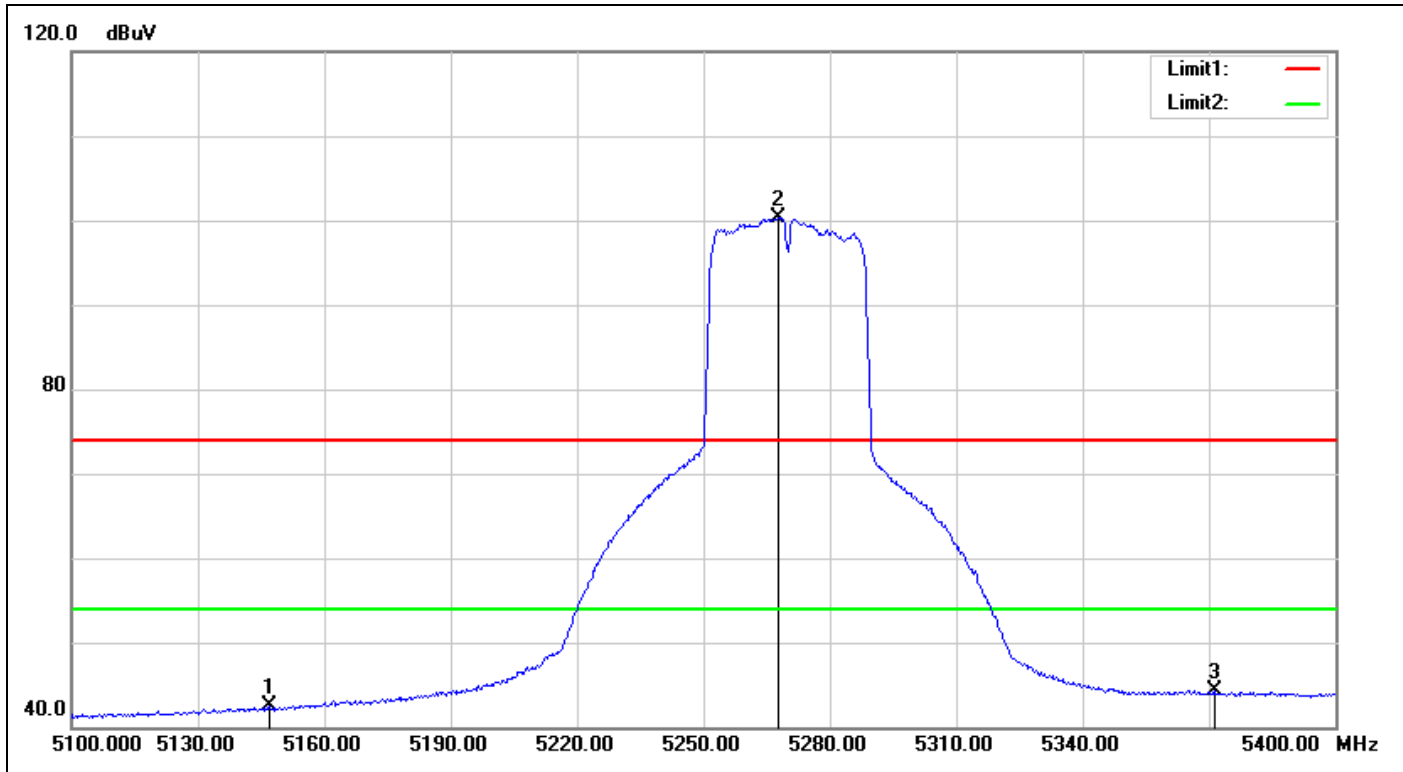
Detector mode: Average



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	5321.060	96.78	5.03	101.81	-	-	AVG
2	5350.000	40.85	5.31	46.16	54.00	-7.84	AVG

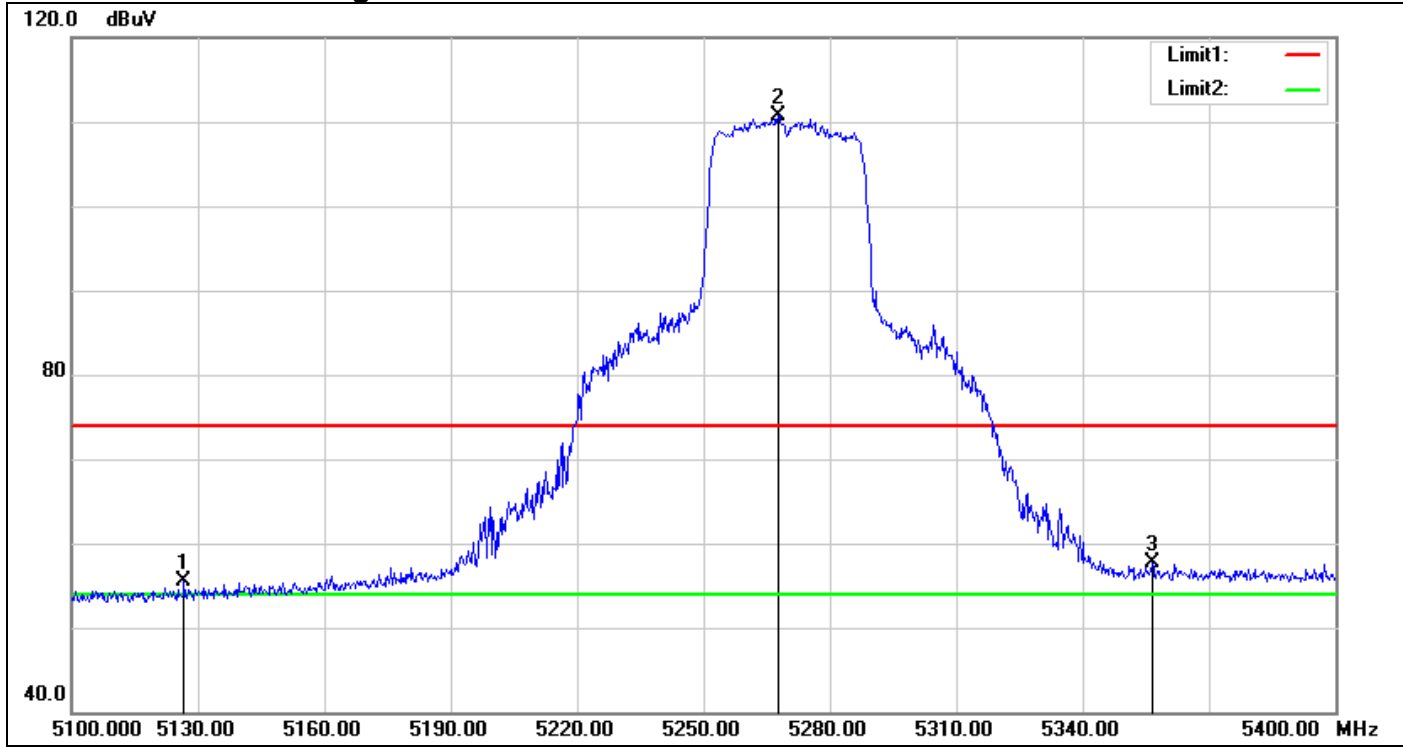
IEEE 802.11n HT 40 MHz Mode / CH Low

Detector mode: Peak



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	5146.800	39.44	3.02	42.46	54.00	-11.54	AVG
2	5267.700	95.65	4.72	100.37	-	-	AVG
3	5371.200	38.91	5.48	44.39	54.00	-9.61	AVG

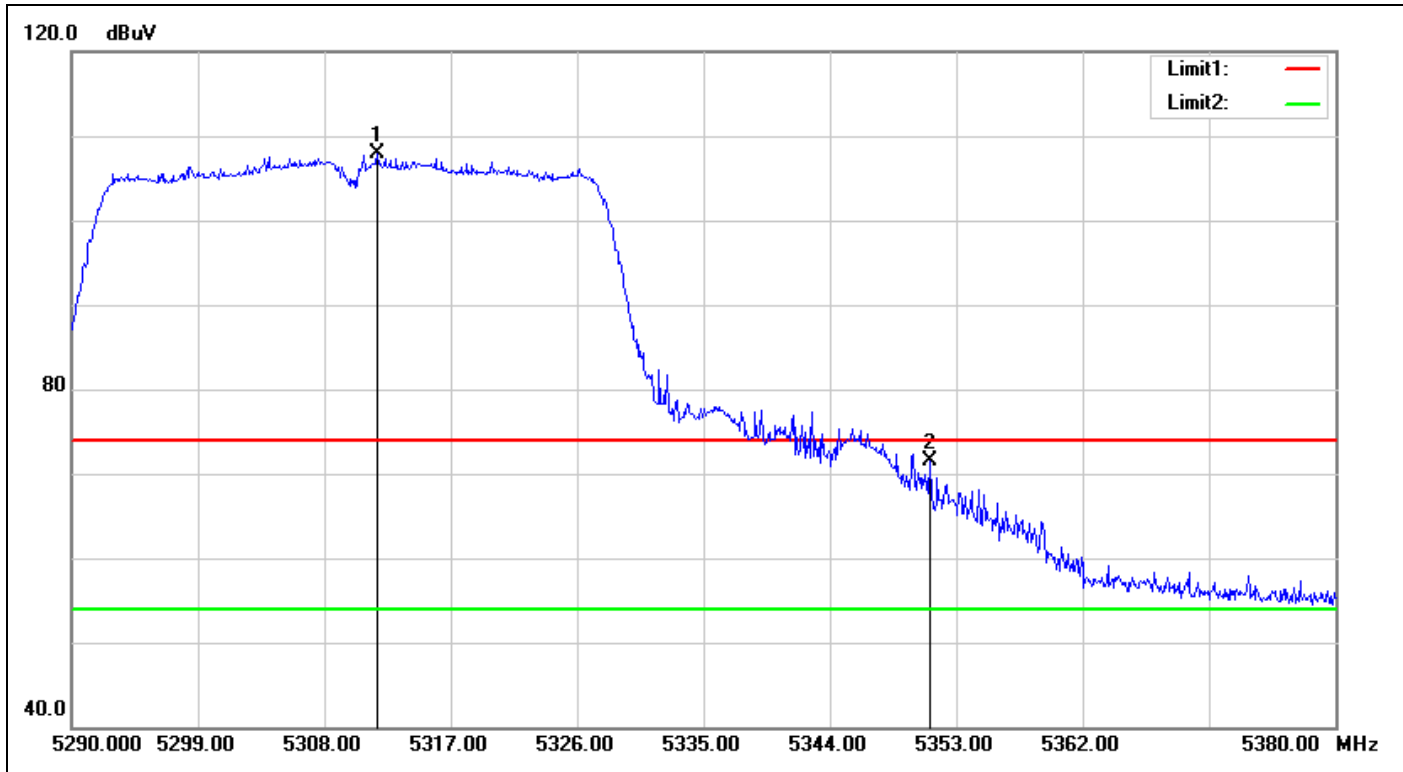
Detector mode: Average



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	5126.700	52.56	2.88	55.44	74.00	-18.56	peak
2	5267.700	105.94	4.72	110.66	-	-	peak
3	5356.500	52.26	5.36	57.62	74.00	-16.38	peak

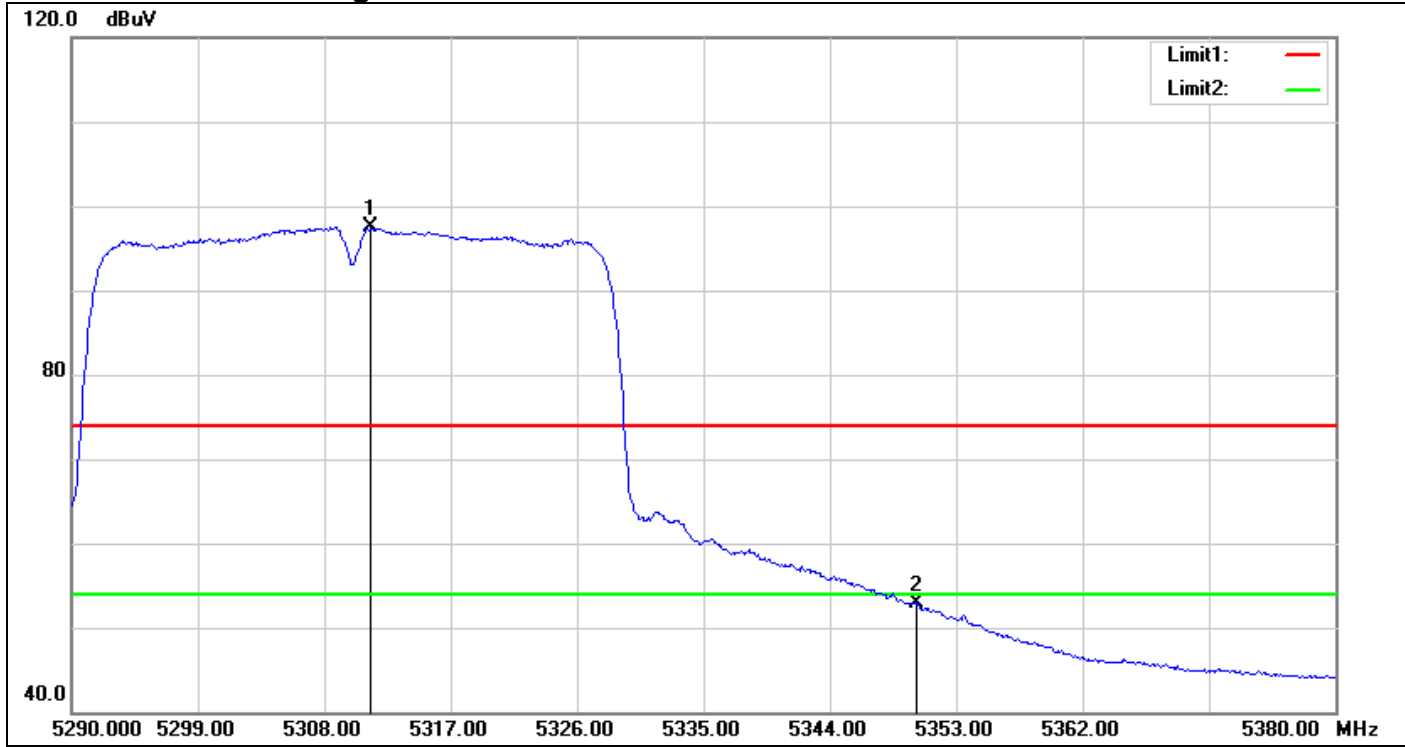
IEEE 802.11n HT 40 MHz Mode / CH High

Detector mode: Peak



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	5311.780	102.93	4.94	107.87	-	-	peak
2	5351.110	66.13	5.32	71.45	74.00	-2.55	peak

Detector mode: Average



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	5311.330	92.53	4.94	97.47	-	-	AVG
2	5350.210	47.59	5.31	52.90	54.00	-1.10	AVG