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Competences and guarantees

DEKRA Testing and Certification is a testing laboratory accredited by the National Accreditation Body (ENAC - Entidad Nacional de Acreditación) to perform the tests indicated in the Certificate No. 51/LE 147.

DEKRA Testing and Certification is an FCC-recognized accredited testing laboratory with appropriate scope of accreditation that covers the performed tests in this report.

DEKRA Testing and Certification is an ISED-recognized accredited testing laboratory, CABid: ES1909, Company Number: 4621A, with the appropriate scope of accreditation that covers the performed tests in this report.

In order to assure the traceability to other national and international laboratories, DEKRA Testing and Certification has a calibration and maintenance program for its measurement equipment.

DEKRA Testing and Certification guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and it is based on the knowledge and technical facilities available at DEKRA Testing and Certification at the time of performance of the test.

DEKRA Testing and Certification is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

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General Conditions

1. This report is only referred to the item that has undergone the test.
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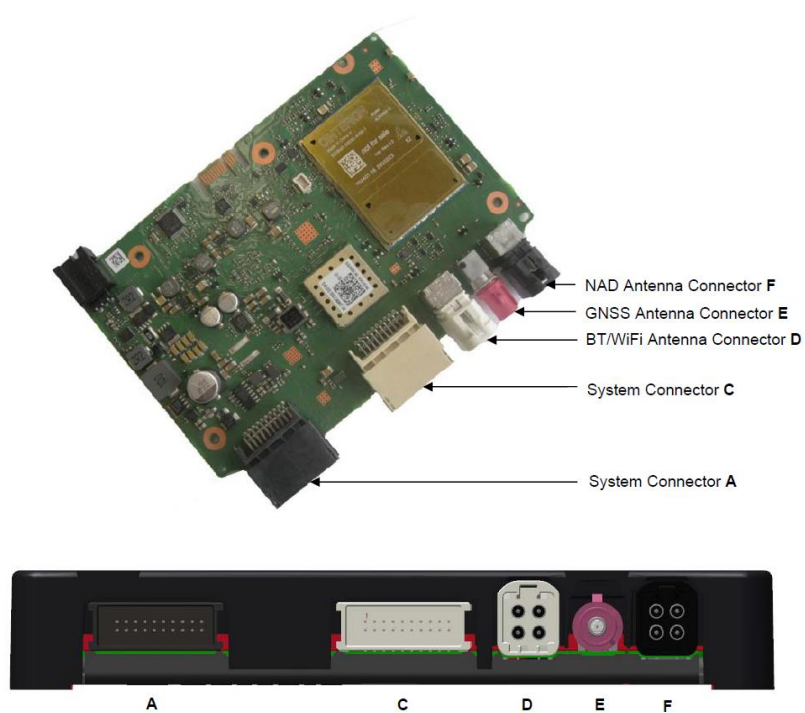
Uncertainty

Uncertainty (factor $k=2$) was calculated according to the DEKRA Testing and Certification S.A.U. internal document PODT000.

Data provided by the client

The following data has been provided by the client:

1. Information relating to the description of the sample ("Identification of the item tested", "Trademark", "Model and/or type reference tested").
2. The sample of the model ConBox HIGH RD is a Telematics control unit with wireless technologies, used in automotive, equipped with one modem, OEM. This unit was designed for automotive usage and contains the following features: GSM, UMTS, LTE, GNSS, Wifi (a, b, g, n, ac), Bluetooth Low Energy (BTLE) and Bluetooth EDR.



3. Declaration of Comparability



Declaration of Comparability

HARMAN BECKER
Automotive Systems GmbH
Becker-Göring-Str. 16
D-76307 Karlsbad, Germany

declares under our sole responsibility, that the product

Description of object	: Telematic system with BT, WLAN, GNSS, GSM, UMTS, LTE
Brand/ Customer	: VW-Group / VW AG/ Audi
Model name	CONBOX-HIGH RD
Variant	: A970, A971, A972, A973, A974, A975, A976, A977, A978, A979, A980, A981, A982, A983, A984, P114, P115, P119
Hardware / Software version	: 045 / 0489 (corresponds CL37)

is comparable to:

Description of object	: Telematic system with BT, WLAN, GNSS, GSM, UMTS, LTE
Customer / Brand	: VW-Group / VW AG/ Audi
Model	CONBOX-HIGH RD
Variant	: A970, A971, A972, A973, A974, A975, A976, A977, A978, A979, A980, A981, A982, A983, A984, P114, P115, P119
Hardware / SW	: 045 / 0494 (corresponds CL37)

We declare as authorized responsible person, that the products above have HW and SW changes which have no impact for the certification activities.

The HW version used on CONBOX-HIGH RD will have the same schematics, the same layout, with the same BT/WLAN-Module and the same country specific NAD module and the HW index will remain 045.

The application SW will be changed to 0494 version. These SW changes do not impact the following parameters: used frequency ranges / used frequency bands, the used modulation type, the maximum RF power, the circumstances under which the transmitter operates, the basic frequency and/or stabilizing circuitry, frequency multiplication stages, the basic modulator circuitry or maximum RF power, the field strength ratings, slew rates for clocking of output pins and drivers.

More details about the HW/SW updates are included in: "CON-BOX-HIGH-RD_temp_test_20230120".

In conclusion, we can say the new SW/HW configuration do not influence the type-approval for all variants (listed above) on CONBOX-High RD - Cluster 37 (045/0494).

Declared by: **checked by:** Thomas Roesch (S-PM) / 28.03.2023

Mr. STOICA Iulian, Product Compliance Expert	<i>i.v. [Signature]</i>
<u>Bucharest</u>	<u>28.03.2023</u>
(Place)	(Date)
	(Signature)

Mr. OLTEANU Marius, Product Compliance Expert.	<i>i.v. [Signature]</i>
<u>Bucharest</u>	<u>28.03.2023</u>
(Place)	(Date)
	(Signature)

HW Changes on TCU side

From HW perspective, the main modifications are :

- replacing of unnecessary coupling capacitors C5940/C5941 220nF in PCIe bus with 0 Ohm resistors
- coupling capacitors are already on Qisda NXP module, therefore not needed on main PCB
- no change is made on the layout of main PCB.

The HW version used on CONBOX-HIGH RD will have the same schematics, the same layout, with the same BT/WLAN-Module and the same country specific NAD module and the HW index will remain 045.

SW Changes on TCU side

From SW perspective, the main updates are :

- change of BT/Wifi driver
- change of PCIe speed

There have been:

- No changes of the used frequency ranges / bands
- No changes of the used modulation type
- No changes of the maximum RF power
- No changes of the circumstances under which the transmitter operates
- No changes of the basic frequency and/or stabilizing circuitry
- No changes of the frequency multiplication stages
- No changes of the basic modulator circuitry or maximum RF power
- No changes of the field strength ratings
- No changes of slew rates for clocking of output pins and drivers

DEKRA Testing and Certification S.A.U. declines any responsibility with respect to the information provided by the client and that may affect the validity of results.

Usage of samples

Samples undergoing test have been selected by: The client.

- Sample S/01 is composed of the following elements:

Control No.	Description	Model	Serial No.	Reception
72779/002	Telematic control unit	ConBox HIGH RD	351998105026439	2022/10/17
72779/054	Harness	-	-	2022/10/17

Auxiliary elements used with the Sample S/01:

Control No.	Description	Model	Serial No.	Reception
72779/011	Ethernet Cable	-	-	2022/10/17
72779/013	OABR-Converter PCB Board	-	-	2022/10/17
72779/014	Power Cable	-	-	2022/10/17
72779/048	Fakra 4 to 1 Cable	-	-	2022/10/17
72779/066	Cable Antenna 4 to 1	-	-	2022/10/17

Sample S/01 has undergone the test(s): The Conducted tests indicated in the Appendixes A, B.

- Sample S/02 is composed of the following elements:

Control No.	Description	Model	Serial No.	Reception
72779/002	Telematic control unit	ConBox HIGH RD	351998105026439	2022/10/17
72779/054	Harness	-	-	2022/10/17
72779/067	Antenna VW ConBox	-	-	2022/10/17
72779/068	Antenna VW ConBox	-	-	2022/10/17
72779/069	Antenna VW ConBox	-	-	2022/10/17
72779/070	Antenna VW ConBox	-	-	2022/10/17

Auxiliary elements used with the Sample S/02:

Control No.	Description	Model	Serial No.	Reception
72779/011	Ethernet Cable	-	-	2022/10/17
72779/013	OABR-Converter PCB Board	-	-	2022/10/17
72779/014	Power Cable	-	-	2022/10/17
72779/048	Fakra 4 to 1 Cable	-	-	2022/10/17
72779/066	Cable Antenna 4 to 1	-	-	2022/10/17

Sample S/02 has undergone the test(s): The Radiated tests indicated in the Appendixes A, B.

Test sample description

Ports.....:	Port name and description	Cable					
		Specified max length [m]	Attached during test	Shielded	Coupled to patient ⁽³⁾		
		RF connector – code	☐	☒	☐		
		RF connector – code	☒	☒	☐		
Supplementary information to the ports.....:							
Rated power supply	Voltage and Frequency		Reference poles				
			L1	L2	L3	N	PE
	☐ AC:		☐	☐	☐	☐	☐
	☒ DC: 12V car battery (4.8 VDC inside of TCU)						
Rated Power.....:	12V DC						
Clock frequencies.....:	25MHz; 26MHz; 32,768kHz; 49,58MHz;						
Other parameters	See Technical description						
Software version.....:	0494						
Hardware version	045						
Dimensions in cm (W x H x D) ...:	--						
Mounting position	☐	Table top equipment					
	☐	Wall/Ceiling mounted equipment					
	☐	Floor standing equipment					
	☐	Hand-held equipment					
	☒	Other: automotive telematics control unit					
Modules/parts.....:	Module/parts of test item		Type	Manufacturer			
	--		-	-			
	--		-	-			
Accessories (not part of the test item)	Description		Type	Manufacturer			
	Cable Harness		-	-			
	2G/3G/4G/5G Antenna		-	Hirschmann/ Molex			
	eCall button/LED		-	-			
	SOS Loudspeaker		-	-			
	Wake-up unit Box		-	-			
Documents as provided by the applicant	Description		File name	Issue date			
	Technical Description		-	-			

⁽³⁾ Only for Medical Equipment

Identification of the client

HARMAN BECKER AUTOMOTIVE SYSTEMS GMBH
BECKER-GOERING-STR. 16; 76307 KARLSBAD GERMANY

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2022-11-01
Date (finish)	2022-11-11

Document history

Report number	Date	Description
72779RRF.008	2022-12-12	First release
72779RRF.008A1	2023-05-04	Second release. Modification due to typos. This modification test report cancels and replaces the test report 72779RRF.008.

Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 75 %

In the semi-anechoic chamber, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 75 %

In the chamber for conducted measurements, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 75 %

Remarks and comments

The tests have been performed by the technical personnel: Miguel Manuel López, Rafael Fernández, Pablo Redondo.

Used instrumentation:

Control No.	Equipment	Model	Manufacturer	Next Calibration
6791	SEMIANECHOIC ABSORBER LINED CHAMBER IV	FACT 3 200 STP	ETS LINDGREN	2024-06-07
6792	SHIELDED ROOM	S101	ETS LINDGREN	N/A
7445	DC POWER SUPPLY 30V/5A	U8002A	KEYSIGHT TECHNOLOGIES	--
7760	DIGITAL MULTIMETER	175	FLUKE	2023-11-14
7817	EMI TEST RECEIVER 2Hz-44GHz	ESW44	ROHDE AND SCHWARZ	2023-12-30
6165	EMI TEST RECEIVER 9kHz-7GHz	ESR7	ROHDE AND SCHWARZ	2023-11-08
4716	SIGNAL AND SPECTRUM ANALYZER 2Hz-50GHz	FSW50	ROHDE AND SCHWARZ	2024-08-12
4611	HORN ANTENNA 1-18GHz	BBHA 9120 D	SCHWARZBECK MESS- ELEKTRONIK	2022-11-18
6496	HORN ANTENNA 1-18GHz	BBHA 9120 D	SCHWARZBECK	2023-08-24
4657	HORN ANTENNA 18-40GHz	BBHA 9170	SCHWARZBECK	2023-05-05
6143	HYBRID BILOG ANTENNA 30MHz-6GHz	3142E	ETS LINDGREN	2023-10-29
8856	PRE-AMPLIFIER G>30dB 18-40GHz	BLMA 1840-4A	BONN ELEKTRONIK	2023-11-02
5705	PRE-AMPLIFIER G>40dB 1-18 GHz	BLMA 0118-1M	BONN ELEKTRONIK	2023-07-21
3783	PRE-AMPLIFIER G>30dB 1GHz-18GHz	BLMA 0118-3A	BONN ELEKTRONIK	2022-12-01
6144	PRE-AMPLIFIER G>40dB 10MHz-6GHz	BLNA 0160-01N	BONN ELEKTRONIK	2023-03-17
4848	SOFTWARE FOR EMC/RF TESTING	EMC32	ROHDE AND SCHWARZ	N/A
6793	SHIELDED ROOM	S101	ETS LINDGREN	N/A
7794	SIGNAL AND SPECTRUM ANALYZER 10Hz-40GHz	FSV40	ROHDE AND SCHWARZ	2023-02-26
8848	OPEN SWITCH UNIT UP TO 7.5 GHz	OSP-B157W8 PLUS	ROHDE & SCHWARZ	2023-08-20
0922	POWER SUPPLY DC 40 V / 40 A	NGPE 40/40	ROHDE AND SCHWARZ	--
7798	EMC/RF MEASUREMENT SOFTWARE	WMS32	ROHDE AND SCHWARZ	N/A

Testing verdicts

Not applicable:	N/A
Pass:	P
Fail:	F
Not measured:	N/M

Summary

A. Common requirements for all Bands:

FCC PART 15 / RSS-247		
Requirement – Test case	Verdict	Remark
Transmitter. Duty Cycle	P	
Transmitter. 99% Occupied Bandwidth	P	
Transmitter. 26 dB Emission Bandwidth (EBW)	P	
<u>Supplementary information and remarks:</u> None.		

B. U-NII-1: 5.15 GHz – 5.25 GHz Band

FCC PART 15 / RSS-247		
Requirement – Test case	Verdict	Remark
FCC 15.407 (a)(1)(ii), (a)(1)(iv) RSS-247 6.2.1.1	Transmitter Maximum Conducted Output Power	P
FCC 15.407 (a)(1)(ii), (a)(1)(iv) RSS-247 6.2.1.1	Transmitter Maximum Power Spectral Density	P
FCC 15.407 (b)(1) RSS-247 6.2.1.2	Transmitter Out of Band Radiated Emissions	P
FCC 15.407 (b)(1) RSS-247 6.2.1.2	Transmitter Band Edge Radiated Emissions	P
<u>Supplementary information and remarks:</u> None.		

C. U-NII-3: 5.725 GHz – 5.85 GHz Band

FCC PART 15 / RSS-247			
Requirement – Test case		Verdict	Remark
FCC 15.407 (e) RSS-247 6.2.4.1	6 dB Bandwidth	P	
FCC 15.407 (a)(3)(i) RSS-247 6.2.4.1	Transmitter Maximum Conducted Output Power	P	
FCC 15.407 (a)(3)(i) RSS-247 6.2.4.1	Transmitter Maximum Power Spectral Density	P	
FCC 15.407 (b)(4) RSS-247 6.2.4.2	Transmitter Out of Band Radiated Emissions	P	
FCC 15.407 (b)(4) RSS-247 6.2.4.2	Transmitter Band Edge Radiated Emissions	P	
<u>Supplementary information and remarks:</u>			
None.			

Appendix A: Test Common requirements for all Bands

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TEST CONDITIONS

(*) Declared by the Client.

POWER SUPPLY (*):

Vnominal: 12 Vdc
Type of Power Supply: External DC (Vehicle Battery).

ANTENNA (*):

Type of Antenna: External.
Maximum Declared Antenna Gain U-NII-1: +2.38 dBi
Maximum Declared Antenna Gain U-NII-3: +2.38 dBi

TEST FREQUENCIES (*):

Technology Tested:	WLAN (IEEE 802.11 a20 / n2040 / ac204080 1x1) U-NII-1	
Modes:	802.11a: 6, 9, 12, 18, 24, 36, 48 & 54 Mbps (SISO, with CDD)	
	802.11n HT20: MCS0 to MCS23 (SISO, 1 spatial stream)	
	802.11n HT40: MCS0 to MCS23 (SISO, 1 spatial stream)	
	802.11ac VHT20: MCS0 to MCS9 (SISO, 1 spatial stream)	
	802.11ac VHT40: MCS0 to MCS9 (SISO, 1 spatial stream)	
	802.11ac VHT80: MCS0 to MCS9 (SISO, 1 spatial stream)	
Setting of cores / ports:	One.	
Beamforming:	No.	
Frequency Range:	5150 - 5250 MHz	
Operating Channel Bandwidth:	20 MHz	
Transmission Channels:	Channels	Channel Frequency (MHz)
	Low (36)	5180
	40	5200
	High (48)	5240
Operating Channel Bandwidth:	40 MHz	
Transmission Channels:	Channels	Channel Frequency (MHz)
	Low (38)	5190
	High (46)	5230
Operating Channel Bandwidth:	80 MHz	
Transmission Channels:	Channels	Channel Frequency (MHz)
	Single (42)	5210

Technology Tested:	WLAN (IEEE 802.11 a20 / n2040 / ac204080 / 1x1) U-NII-3	
Modes:	802.11a: 6, 9, 12, 18, 24, 36, 48 & 54 Mbps (SISO, with CDD)	
	802.11n HT20: MCS0 to MCS23 (SISO, 1 spatial stream)	
	802.11n HT40: MCS0 to MCS23 (SISO, 1 spatial stream)	
	802.11ac VHT20: MCS0 to MCS9 (SISO, 1 spatial stream)	
	802.11ac VHT40: MCS0 to MCS9 (SISO, 1 spatial stream)	
	802.11ac VHT80: MCS0 to MCS9 (SISO, 1 spatial stream)	
Setting of cores / ports:	One.	
Beamforming:	No.	
Frequency Range:	5725 MHz to 5850 MHz	
Operating Channel Bandwidth:	20 MHz	
Transmission Channels:	Channel	Channel Frequency (MHz)
	Low (149)	5745
	Middle (157)	5785
	High (165)	5825
Operating Channel Bandwidth:	40 MHz	
Transmission Channels:	Channel	Channel Frequency (MHz)
	Low (151)	5755
	High (159)	5795
Operating Channel Bandwidth:	80 MHz	
Transmission Channels:	Single (155)	5775

POWER SETTINGS (*):

The next power settings were used to configure the sample for the tests.

U-NII-1. FCC:

Channel	Frequency	a	n	ac
36	5180 MHz	17	17	17
40	5200 MHz	17	17	17
48	5240 MHz	17	17	17
38	5190 MHz		17	17
46	5230 MHz		17	17
42	5210 MHz			17

U-NII-1. RSS:

Channel	Frequency	a	n	ac
36	5180 MHz	13	13	13
40	5200 MHz	13	13	13
48	5240 MHz	13	13	13
38	5190 MHz		13	13
46	5230 MHz		13	13
42	5210 MHz			13

U-NII-3. FCC and RSS:

Channel	Frequency	a	n	ac
149	5745 MHz	17	17	17
157	5785 MHz	17	17	17
165	5825 MHz	19	19	19
151	5755 MHz		17	17
159	5795 MHz		17	17
155	5775 MHz			17

The test set-up was made in accordance to the general provisions of FCC Unlicensed National Information Infrastructure (U-NII) Devices 789033 D02 General U-NII Test Procedures New Rules v02r01 dated Dec 14, 2017.

The EUT was tested in the following operating mode:

- Continuously transmitting with a modulated carrier at maximum power in all required channels using the supported data rates/modulations types.

The field strength at the band edges was evaluated for each mode on the lowest and highest channels at the rated power for the channel under test.

For all modes, the EUT was configured in test mode using a software application. The application was used to enable a continuous transmission and to select the test channels as required. The client supplied instructions to configure the EUT. The customer supplied a document containing the setup instructions.

The worst cases for testing were identified for output power and spurious levels at the band edges which were selected based on preliminary testing. They correspond to the next data rates:

- 802.11a: 6 Mbps SISO 1Tx.
- 802.11n HT20: MCS0 SISO 1Tx.
- 802.11n HT40: MCS0 SISO 1Tx.
- 802.11ac VHT20: MCS0 SISO 1Tx.
- 802.11ac VHT40: MCS0 SISO 1Tx.
- 802.11ac VHT80: MCS0 SISO 1Tx.

CONDUCTED MEASUREMENTS:

The equipment under test was set up in a shielded room and connected to the spectrum analyzer using a low-loss RF cable. The reading in the spectrum analyzer is corrected taking into account the internal and external RF cable loss.

For all modes:



Transmitter Duty Cycle

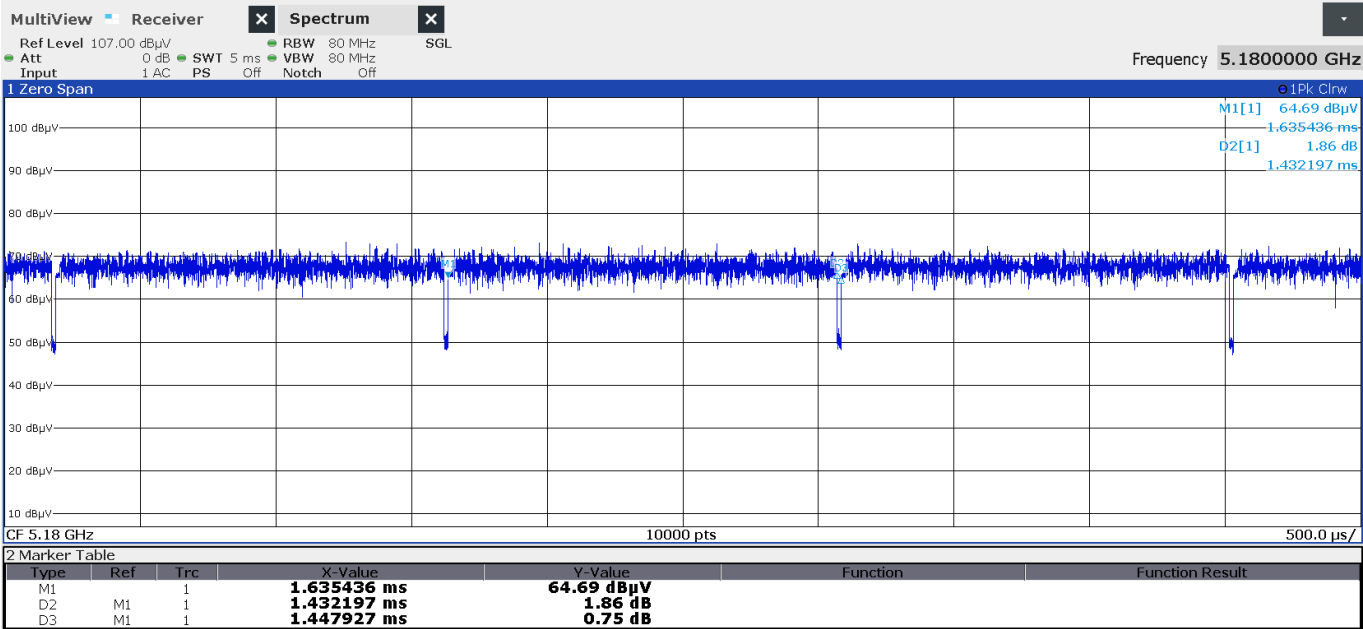
Results

The results below are for data rates with a duty cycle lower than 98%, all the other modes not reported having a duty cycle $\geq 98\%$.

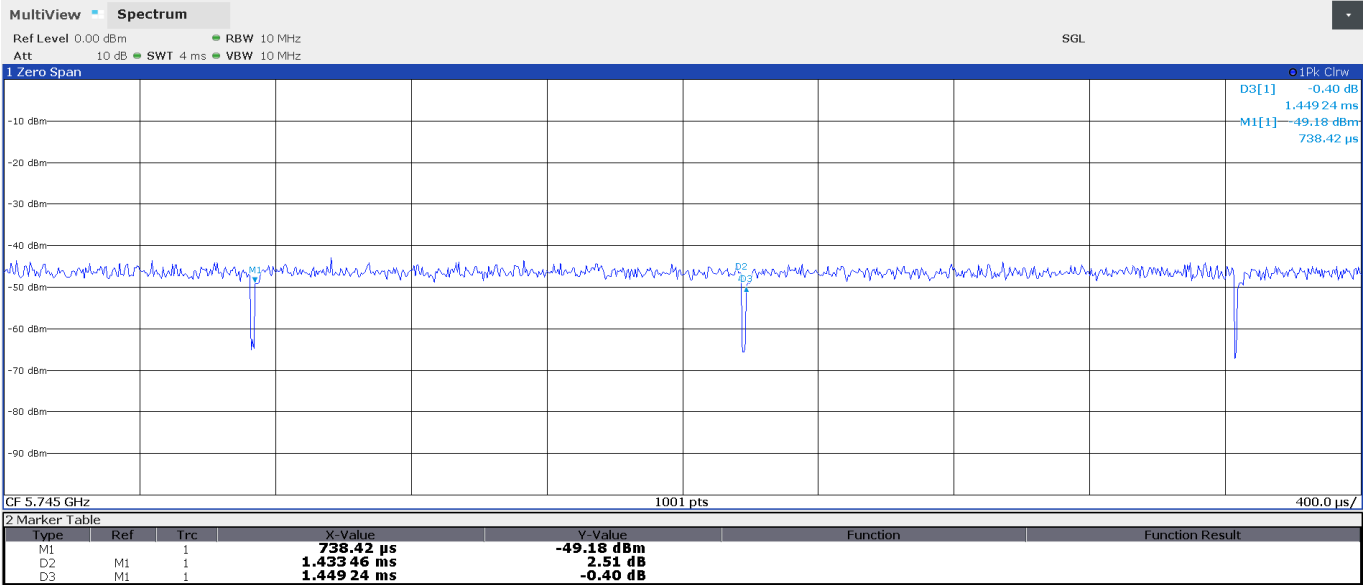
Mode	Sub-band U-NII-1			Sub-band U-NII-3		
	Pulse Duration (ms)	Period (ms)	Duty Cycle Correction (dB)	Pulse Duration (ms)	Period (ms)	Duty Cycle Correction (dB)
802.11 ac80	0.331762	0.348037	0.21	0.331268	0.347479	0.21

Attachments

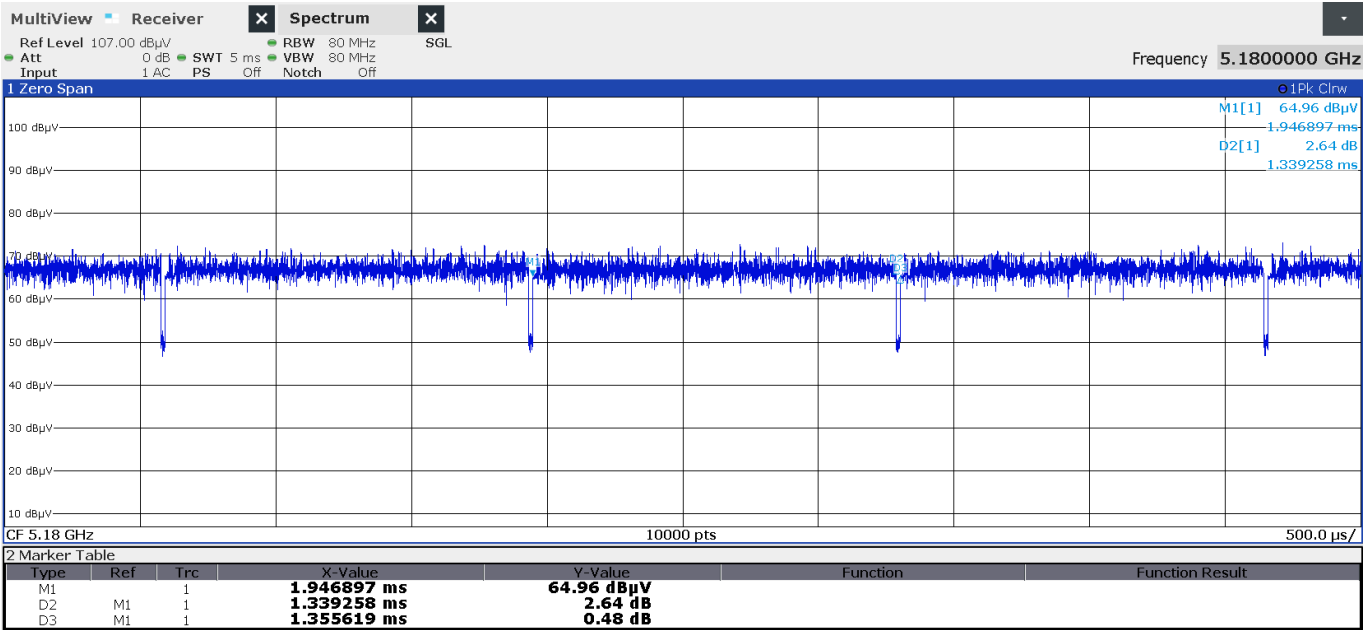
SISO 802.11 a20 (U-NII-1)



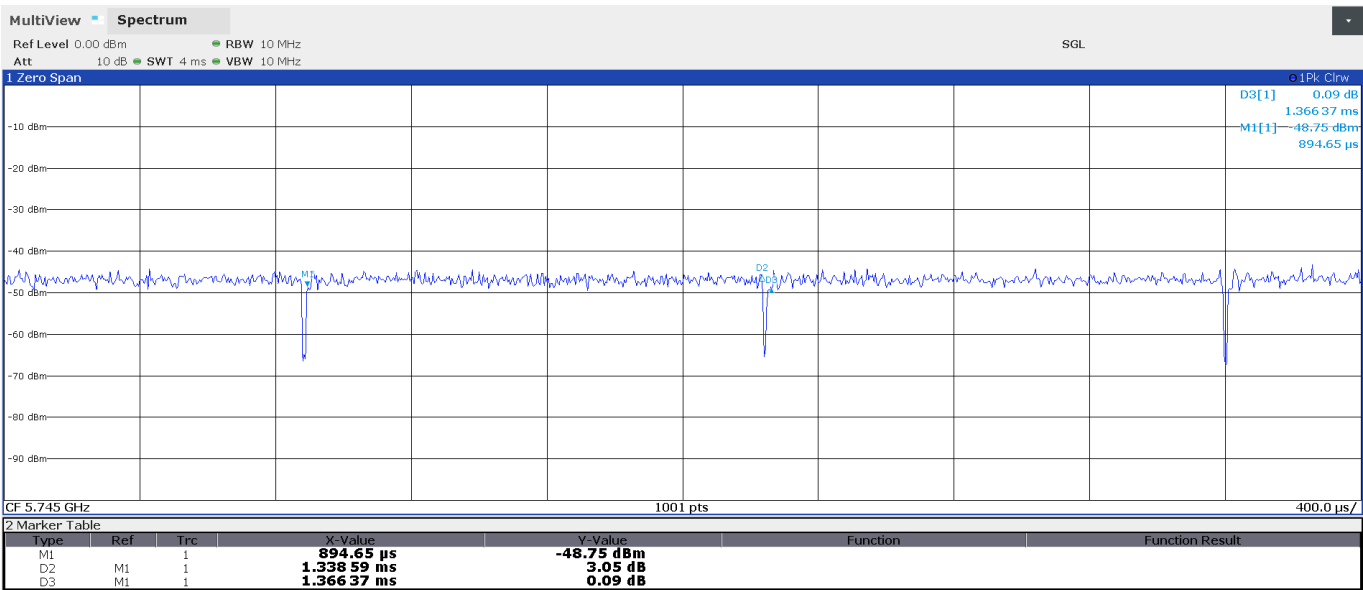
SISO 802.11 a20 (U-NII-3)



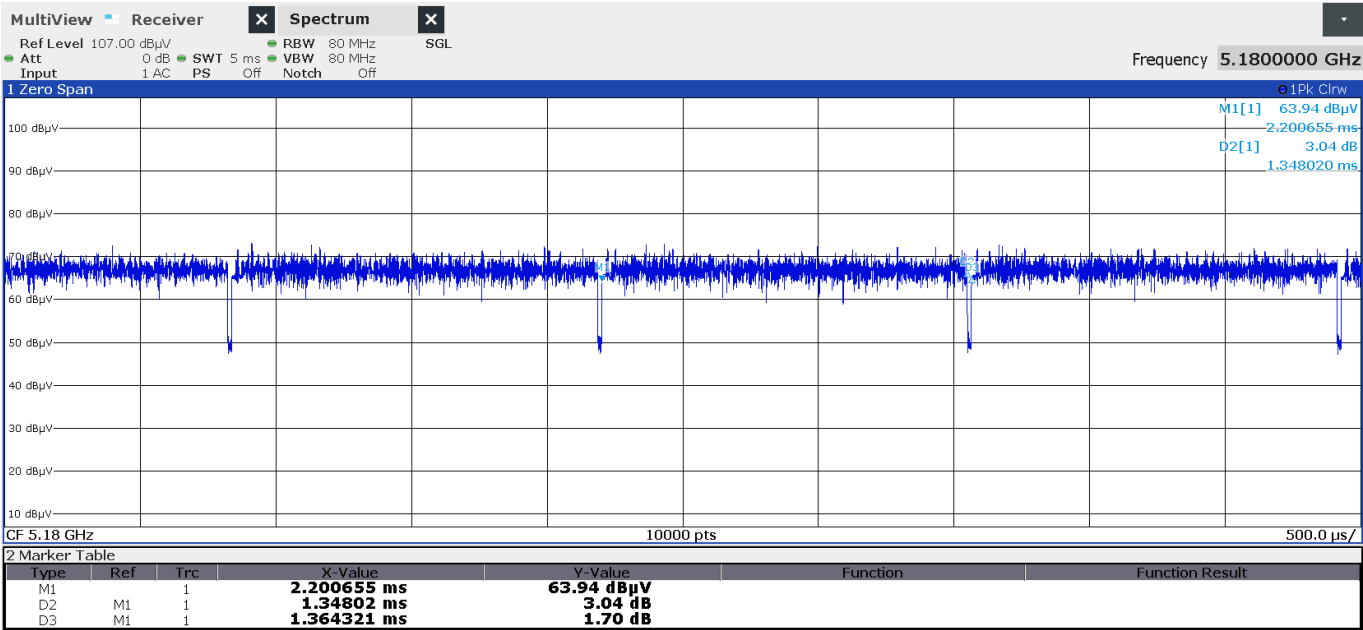
SISO 802.11 n20 (U-NII-1)



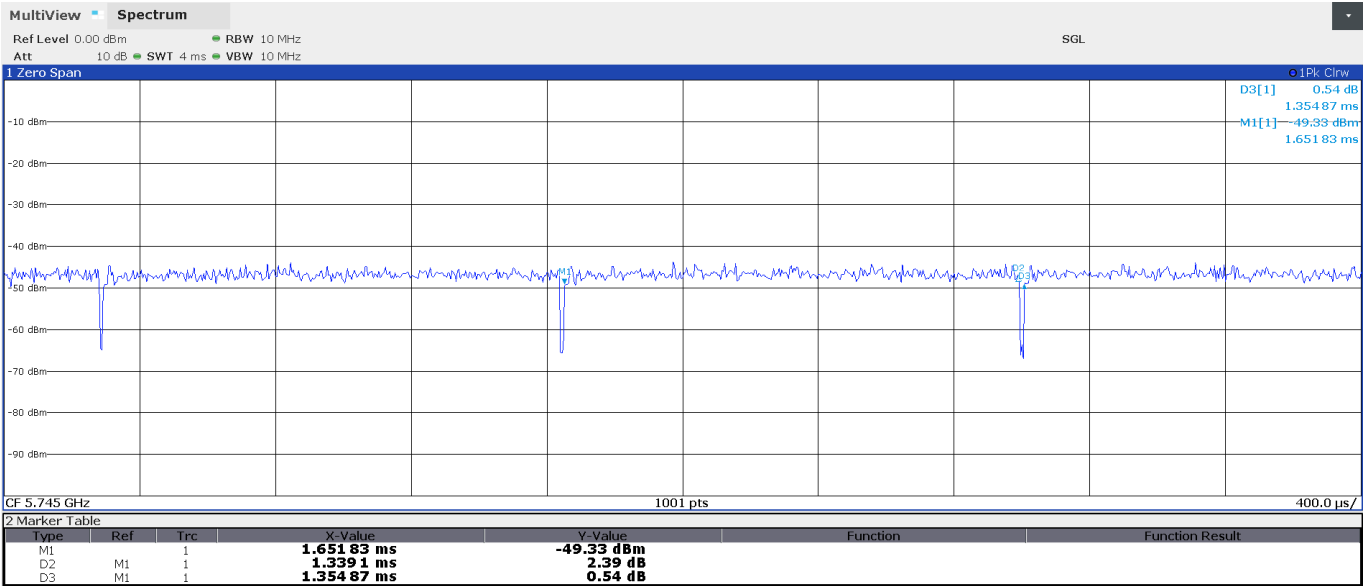
SISO 802.11 n20 (U-NII-3)



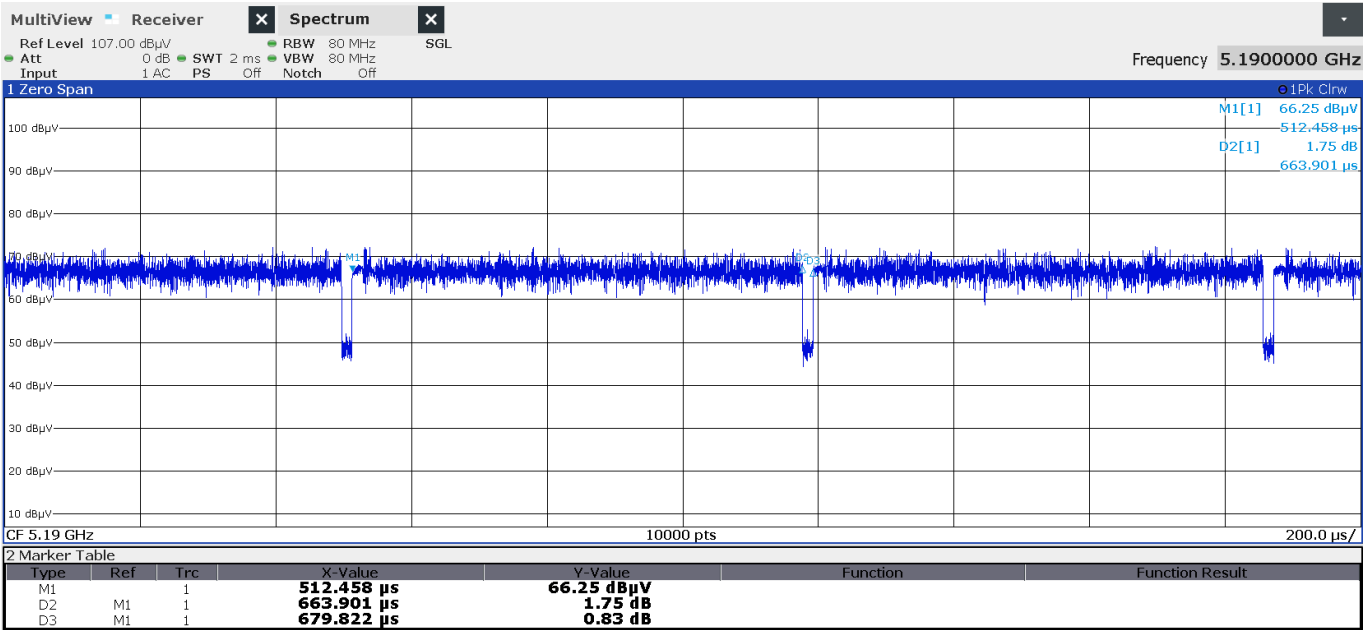
SISO 802.11 ac20 (U-NII-1)



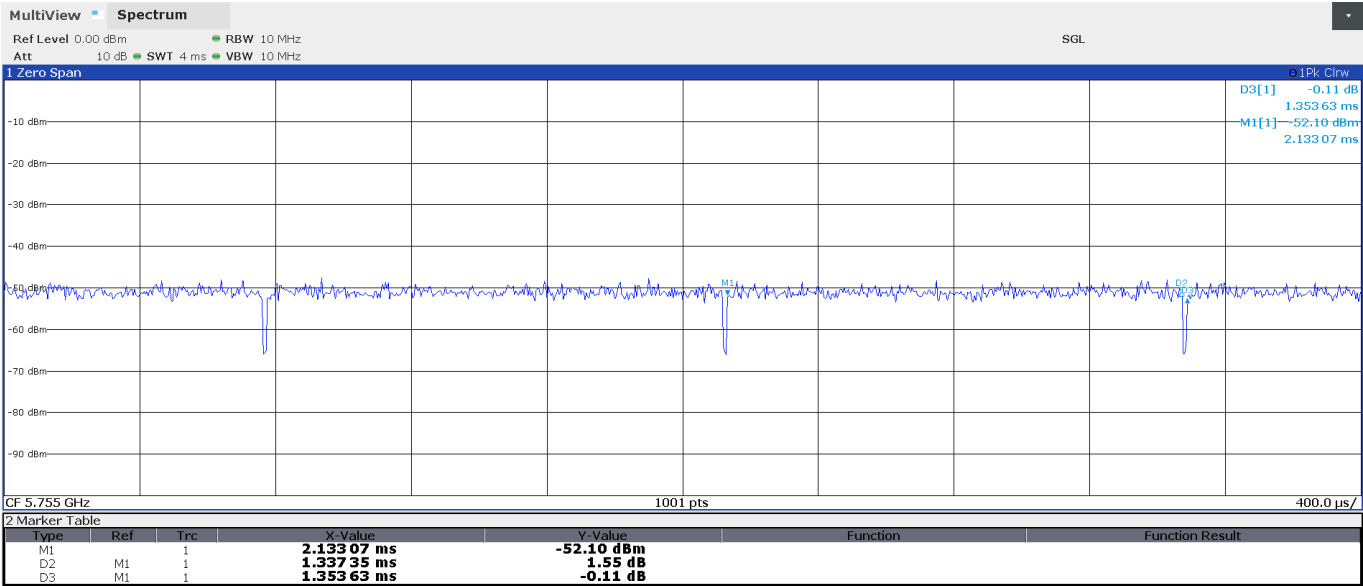
SISO 802.11 ac20 (U-NII-3)



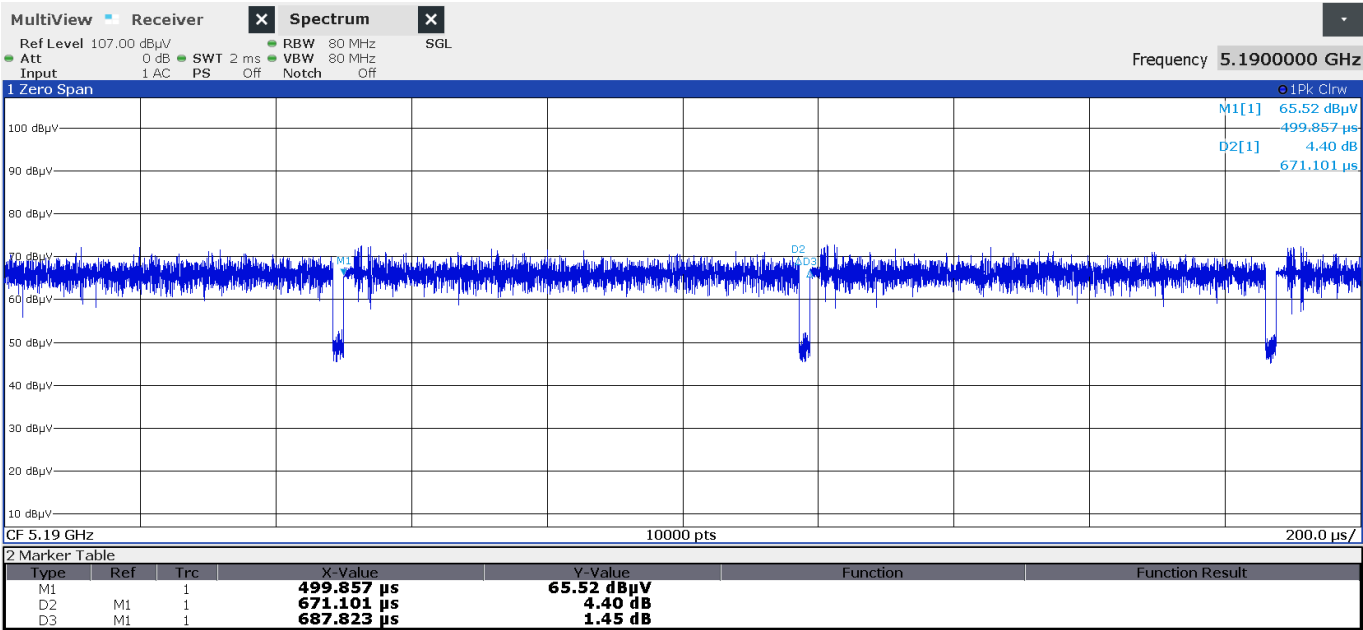
SISO 802.11 n40 (U-NII-1)



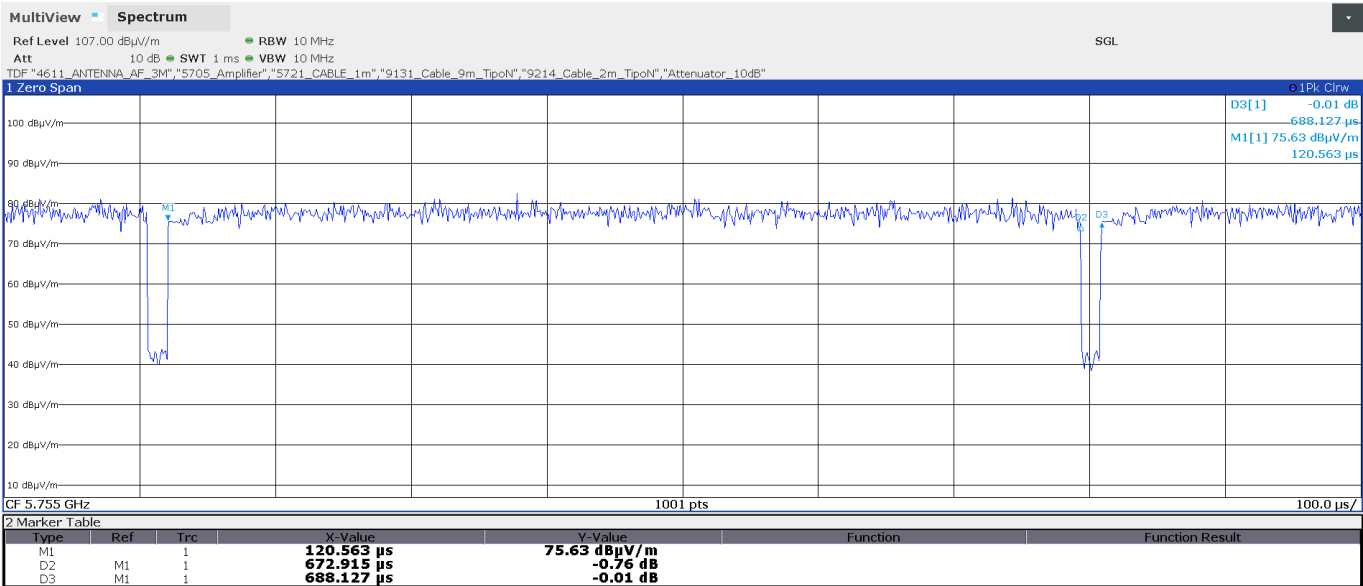
SISO 802.11 n40 (U-NII-3)



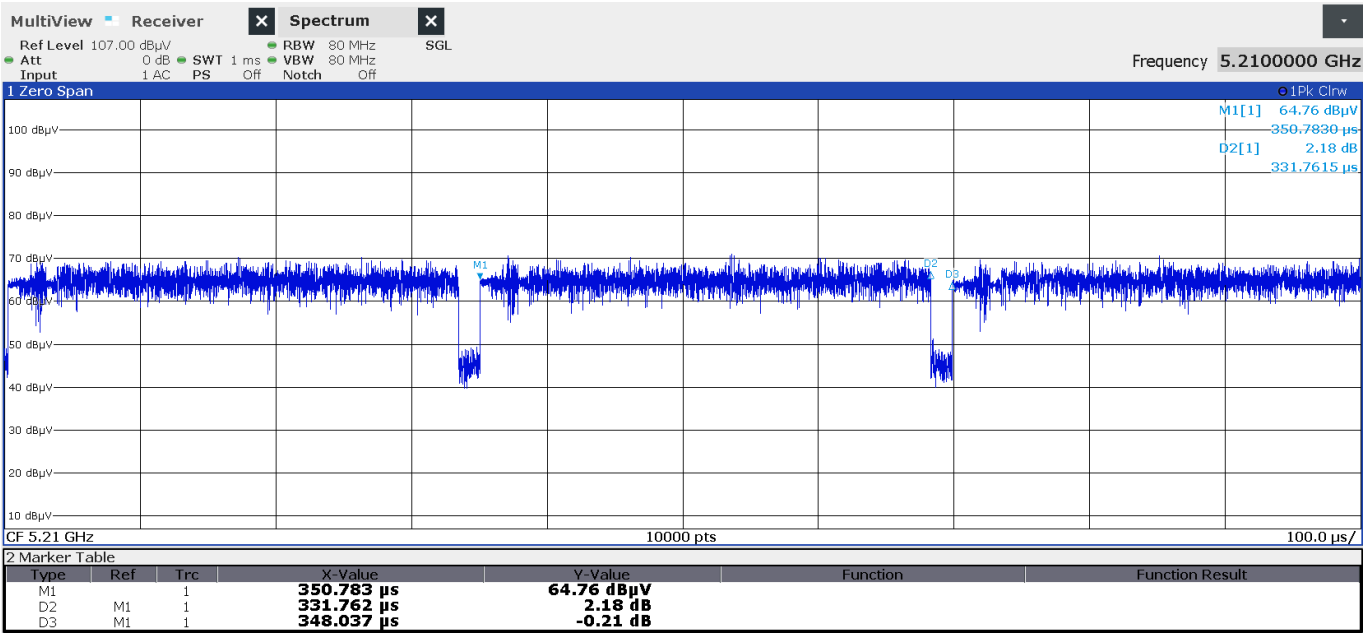
SISO 802.11 ac40 (U-NII-1)



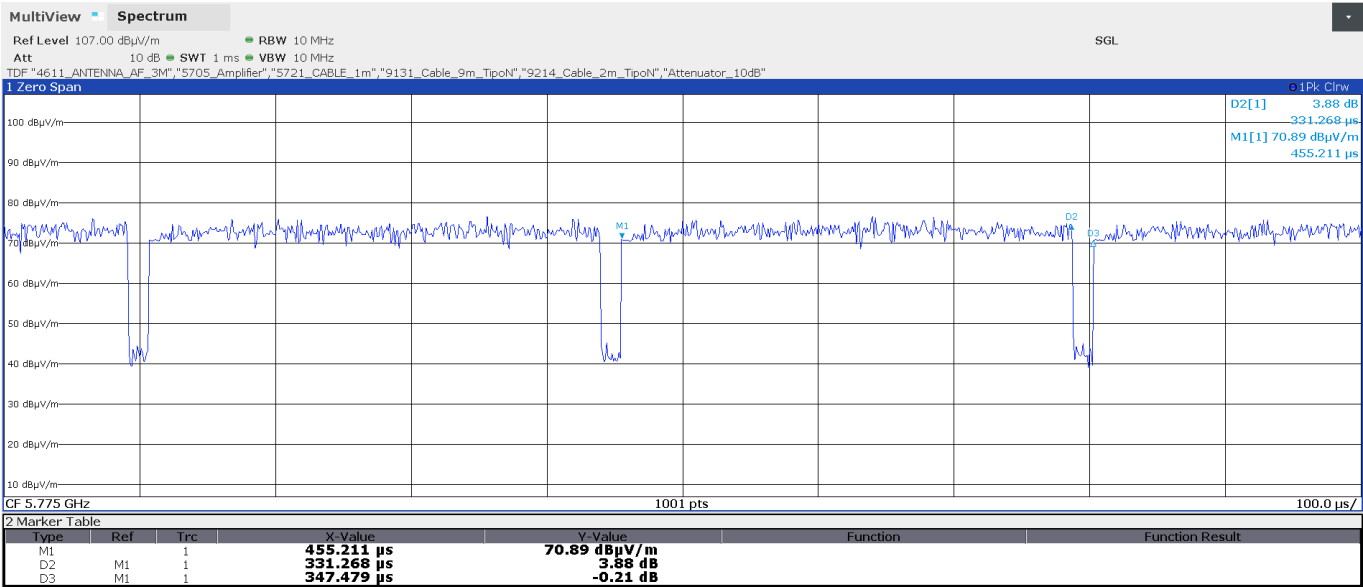
SISO 802.11 ac40 (U-NII-3)



SISO 802.11 ac80 (U-NII-1)



SISO 802.11 ac80 (U-NII-3)



Transmitter. 99% Occupied Bandwidth

Limits

The occupied bandwidth or the “99% emission bandwidth” is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained.

The following conditions shall be observed for measuring the occupied bandwidth:

- The transmitter shall be operated at its maximum carrier power measured under normal test conditions.
- The span of the spectrum analyzer shall be set large enough to capture all products of the modulation process, including the emission skirts, around the carrier frequency, but small enough to avoid having other emissions (e.g. on adjacent channels) within the span.
- The detector of the spectrum analyzer shall be set to “Sample”. However, a peak, or peak hold, may be used in place of the sampling detector since this usually produces a wider bandwidth than the actual bandwidth (worst-case measurement). Use of a peak hold (or “Max Hold”) may be necessary to determine the occupied / x dB bandwidth if the device is not transmitting continuously.
- The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the actual occupied / x dB bandwidth and the video bandwidth (VBW) shall not be smaller than three times the RBW value. Video averaging is not permitted.

Note: It may be necessary to repeat the measurement a few times until the RBW and VBW are in compliance with the above requirement.

For the 99% emission bandwidth, the trace data points are recovered and directly summed in linear power level terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached, and that frequency recorded. The process is repeated for the highest frequency data points (starting at the highest frequency, at the right side of the span, and going down in frequency). This frequency is then recorded. The difference between the two recorded frequencies is the occupied bandwidth (or the 99% emission bandwidth).

Results

This test was performed on all the supported modes of the EUT, in the worst data rates after preliminary testing:

- 802.11a: 6 Mbps SISO 1Tx.
- 802.11n HT20: MCS0 SISO 1Tx.
- 802.11n HT40: MCS0 SISO 1Tx.
- 802.11ac VHT20: MCS0 SISO 1Tx.
- 802.11ac VHT40: MCS0 SISO 1Tx.
- 802.11ac VHT80: MCS0 SISO 1Tx.

SISO 802.11 a20

U-NII-1 FCC (5150-5250 MHz):

Channels	Low Channel 36 (5180 MHz)	Channel 40 (5200 MHz)	High Channel 48 (5240 MHz)
99% Occupied Bandwidth (MHz)	16.600000	16.600000	16.700000
Measurement uncertainty (%)	< ±1.41		

U-NII-1 RSS (5150-5250 MHz):

Channels	Low Channel 36 (5180 MHz)	Channel 40 (5200 MHz)	High Channel 48 (5240 MHz)
99% Occupied Bandwidth (MHz)	16.600000	16.700000	16.600000
Measurement uncertainty (%)	< ±1.41		

U-NII-3 (5725-5850 MHz):

Channels	Low Channel 149 (5745 MHz)	Middle Channel 157 (5785 MHz)	High Channel 165 (5825 MHz)
99% Occupied Bandwidth (MHz)	16.700000	16.600000	16.600000
Measurement uncertainty (%)	< ±1.41		

SISO 802.11 n20 (HT20)

U-NII-1 FCC (5150-5250 MHz):

Channels	Low Channel 36 (5180 MHz)	Channel 40 (5200 MHz)	High Channel 48 (5240 MHz)
99% Occupied Bandwidth (MHz)	17.600000	17.600000	17.700000
Measurement uncertainty (%)	< ±1.41		

U-NII-1 RSS (5150-5250 MHz):

Channels	Low Channel 36 (5180 MHz)	Channel 40 (5200 MHz)	High Channel 48 (5240 MHz)
99% Occupied Bandwidth (MHz)	17.600000	17.600000	17.600000
Measurement uncertainty (%)	< ±1.41		

U-NII-3 (5725-5850 MHz):

Channels	Low Channel 149 (5745 MHz)	Middle Channel 157 (5785 MHz)	High Channel 165 (5825 MHz)
99% Occupied Bandwidth (MHz)	17.700000	17.600000	17.600000
Measurement uncertainty (%)	< ±1.41		

SISO 802.11 ac20 (VHT20)

U-NII-1 FCC (5150-5250 MHz):

Channels	Low Channel 36 (5180 MHz)	Channel 40 (5200 MHz)	High Channel 48 (5240 MHz)
99% Occupied Bandwidth (MHz)	17.600000	17.600000	17.600000
Measurement uncertainty (%)	< ±1.41		

U-NII-1 RSS (5150-5250 MHz):

Channels	Low Channel 36 (5180 MHz)	Channel 40 (5200 MHz)	High Channel 48 (5240 MHz)
99% Occupied Bandwidth (MHz)	17.600000	17.600000	17.700000
Measurement uncertainty (%)	< ±1.41		

U-NII-3 (5725-5850 MHz):

Channels	Low Channel 149 (5745 MHz)	Middle Channel 157 (5785 MHz)	High Channel 165 (5825 MHz)
99% Occupied Bandwidth (MHz)	17.600000	17.700000	17.600000
Measurement uncertainty (%)	< ±1.41		

SISO 802.11 n40 (HT40)

U-NII-1 FCC (5150-5250 MHz):

Channels	Low Channel 38 (5190 MHz)	High Channel 46 (5230 MHz)
99% Occupied Bandwidth (MHz)	36.250000	36.250000
Measurement uncertainty (%)	< ±1.41	

U-NII-1 RSS (5150-5250 MHz):

Channels	Low Channel 38 (5190 MHz)	High Channel 46 (5230 MHz)
99% Occupied Bandwidth (MHz)	36.250000	36.250000
Measurement uncertainty (%)	< ±1.41	

U-NII-3 (5725-5850 MHz):

Channels	Low Channel 151 (5755 MHz)	High Channel 159 (5795 MHz)
99% Occupied Bandwidth (MHz)	36.250000	36.250000
Measurement uncertainty (%)	< ±1.41	

SISO 802.11 ac40 (VHT40):

U-NII-1 FCC (5150-5250 MHz):

Channels	Low Channel 38 (5190 MHz)	High Channel 46 (5230 MHz)
99% Occupied Bandwidth (MHz)	36.250000	36.250000
Measurement uncertainty (%)	< ±1.41	

U-NII-1 RSS (5150-5250 MHz):

Channels	Low Channel 38 (5190 MHz)	High Channel 46 (5230 MHz)
99% Occupied Bandwidth (MHz)	36.250000	36.250000
Measurement uncertainty (%)	< ±1.41	

U-NII-3 (5725-5850 MHz):

Channels	Low Channel 151 (5755 MHz)	High Channel 159 (5795 MHz)
99% Occupied Bandwidth (MHz)	36.250000	36.250000
Measurement uncertainty (%)	< ±1.41	

SISO 802.11 ac80 (VHT80):

U-NII-1 FCC (5150-5250 MHz):

Channel	Single Channel 42 (5210 MHz)
99% Occupied Bandwidth (MHz)	76.500000
Measurement uncertainty (%)	< ±1.41

U-NII-1 RSS (5150-5250 MHz):

Channel	Single Channel 42 (5210 MHz)
99% Occupied Bandwidth (MHz)	76.500000
Measurement uncertainty (%)	< ±1.41

U-NII-3 (5725-5850 MHz):

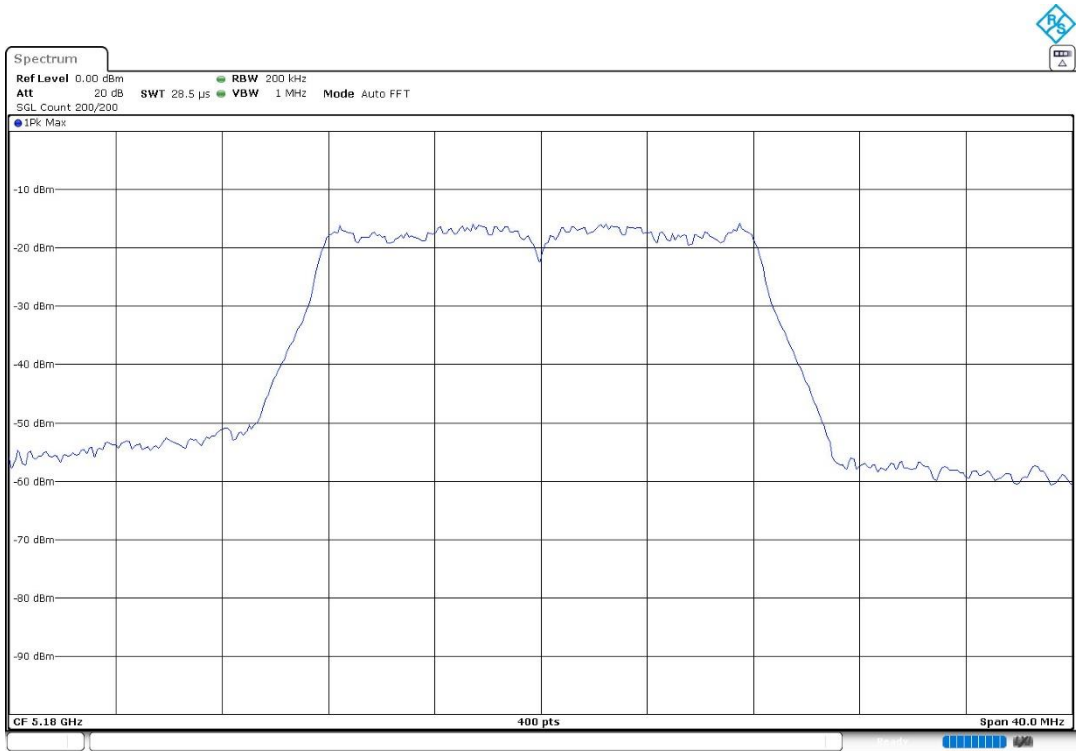
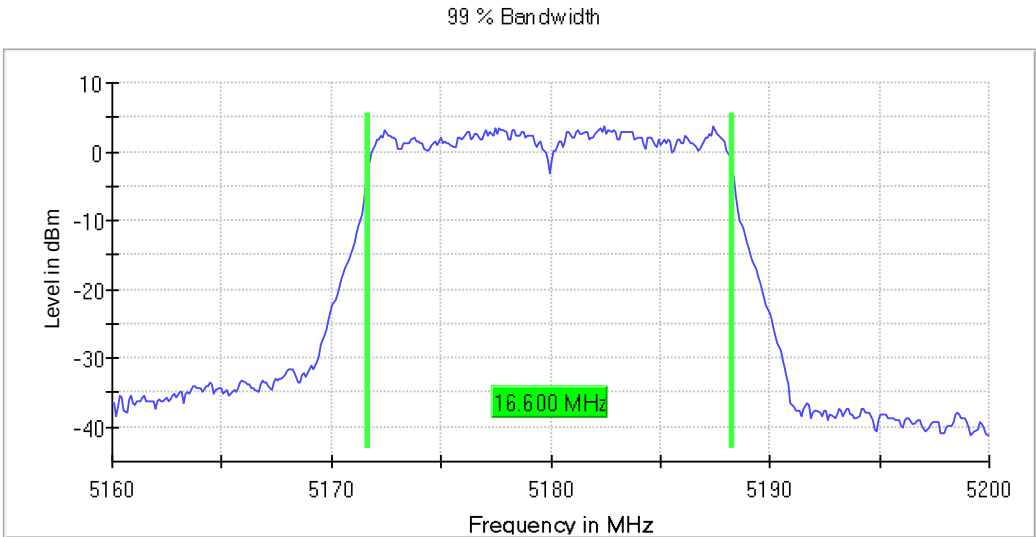
Channel	Single Channel 155 (5775 MHz)
99% Occupied Bandwidth (MHz)	77.000000
Measurement uncertainty (%)	< ±1.41

Attachments

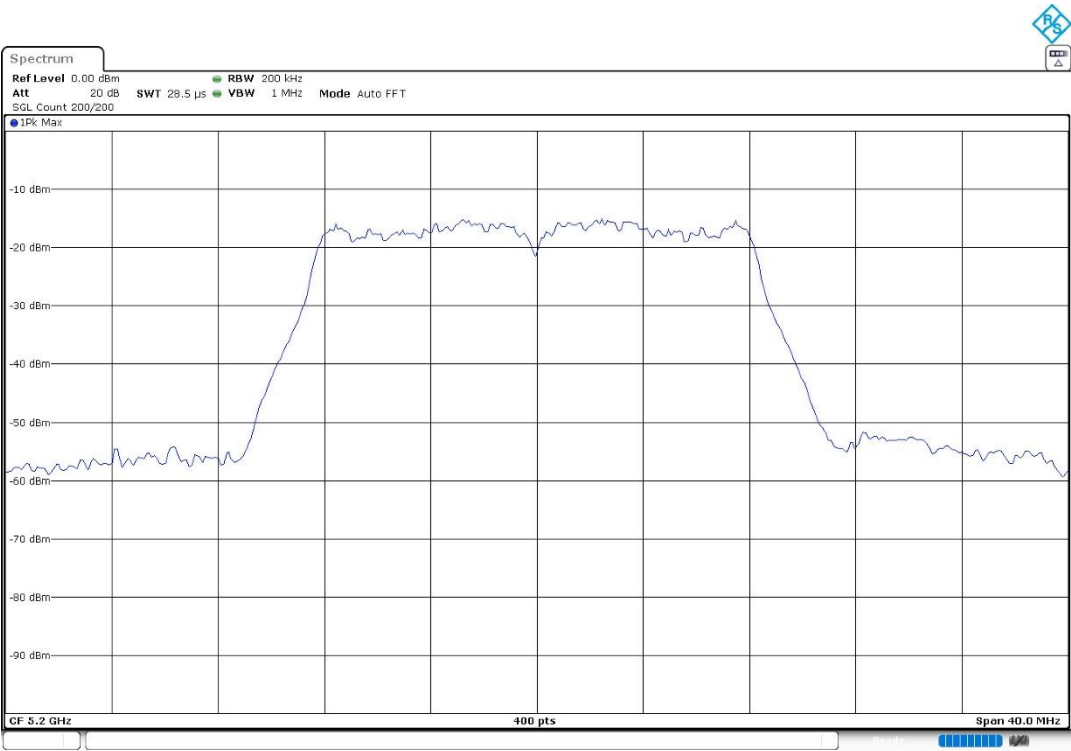
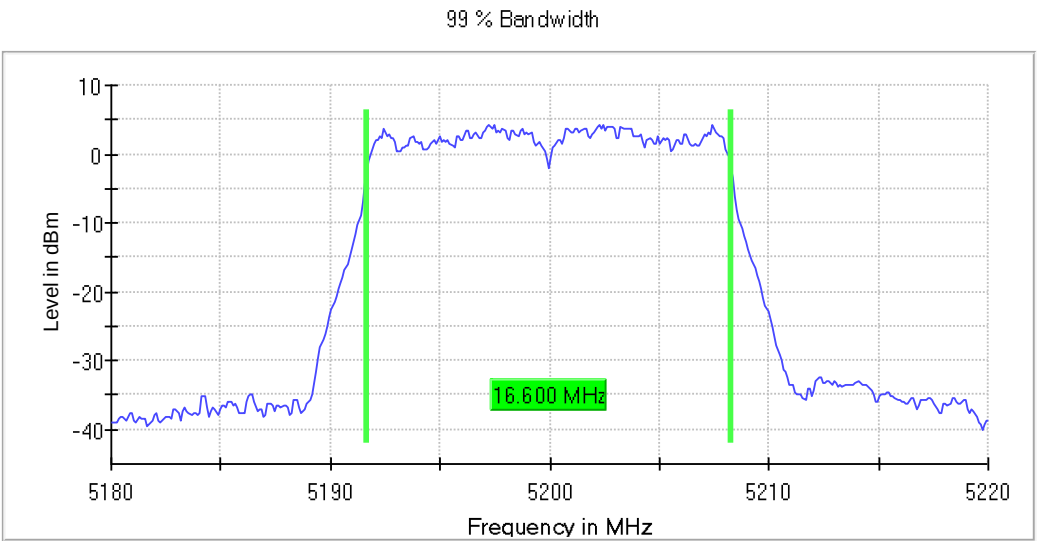
SISO 802.11 a20

U-NII-1 FCC (5150-5250 MHz)

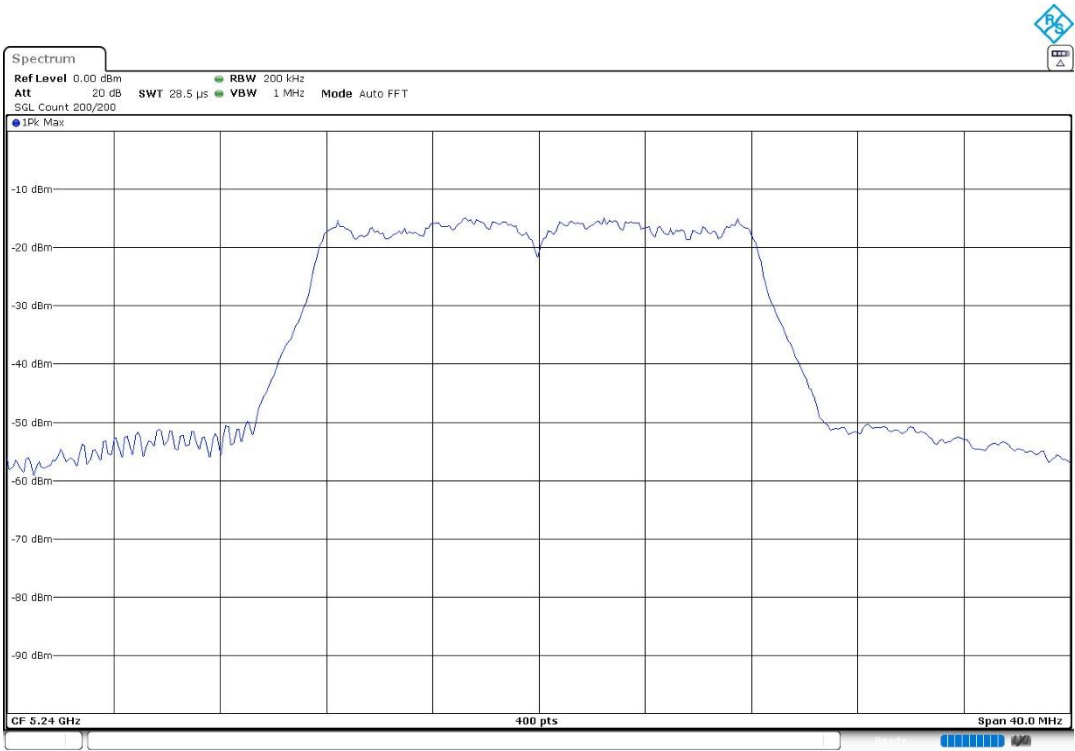
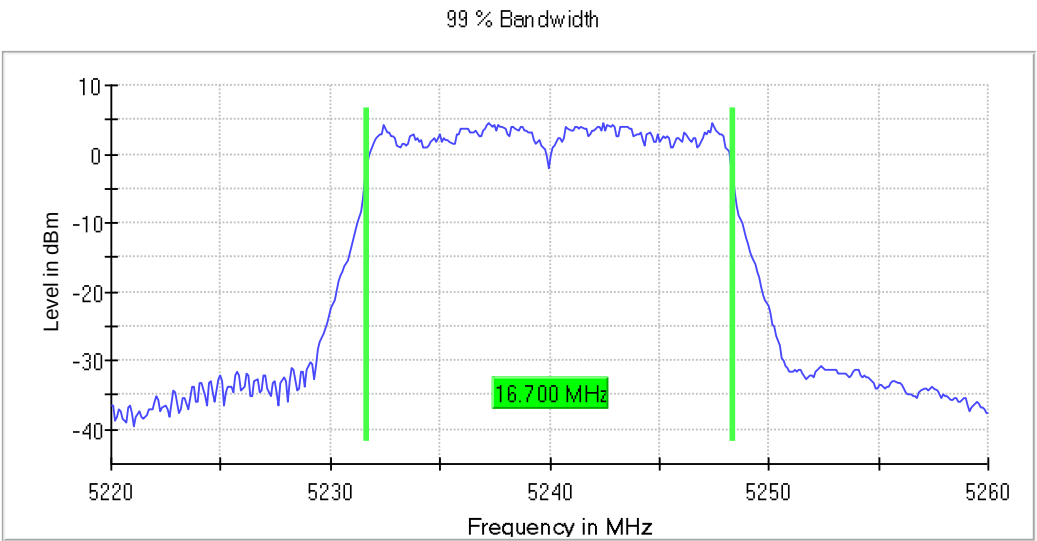
- Low Channel 36 (5180 MHz):



- Channel 40 (5200 MHz):

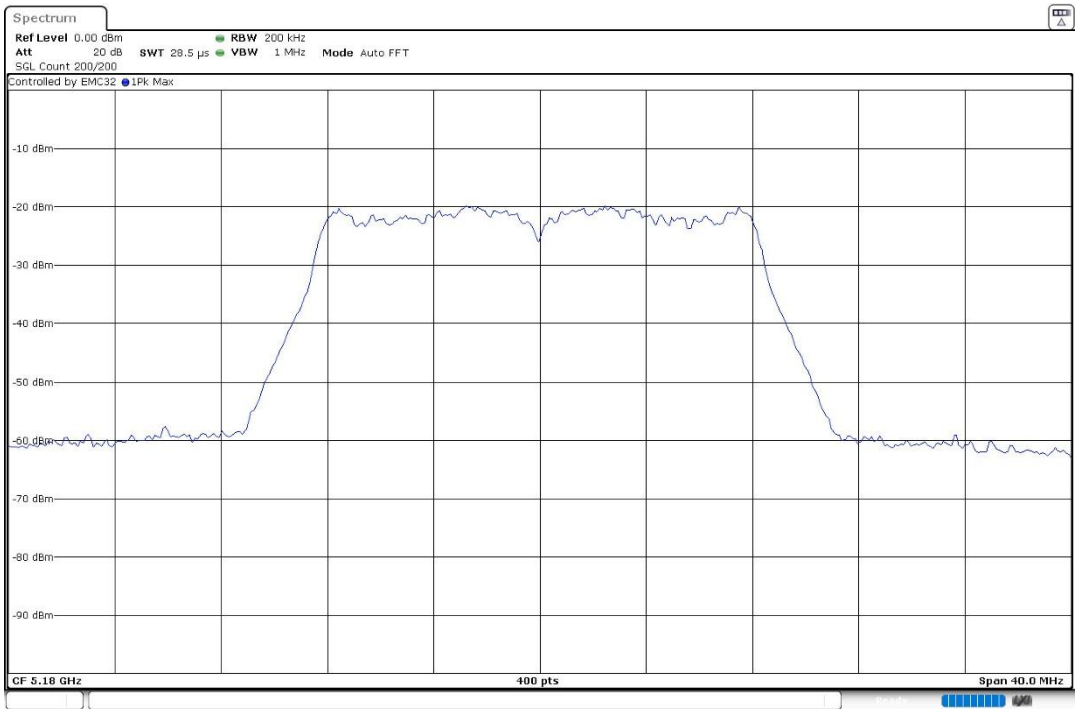
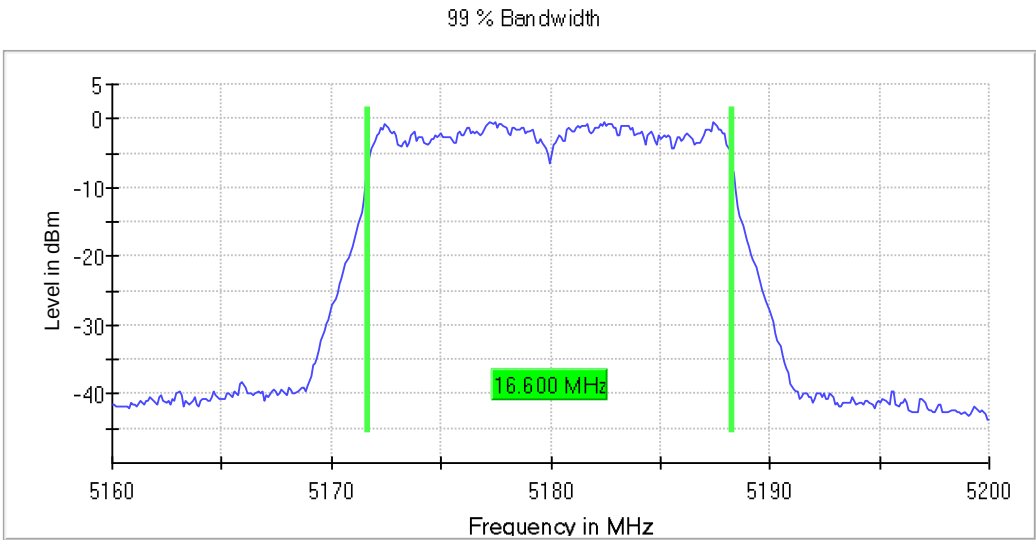


- High Channel 48 (5240 MHz):

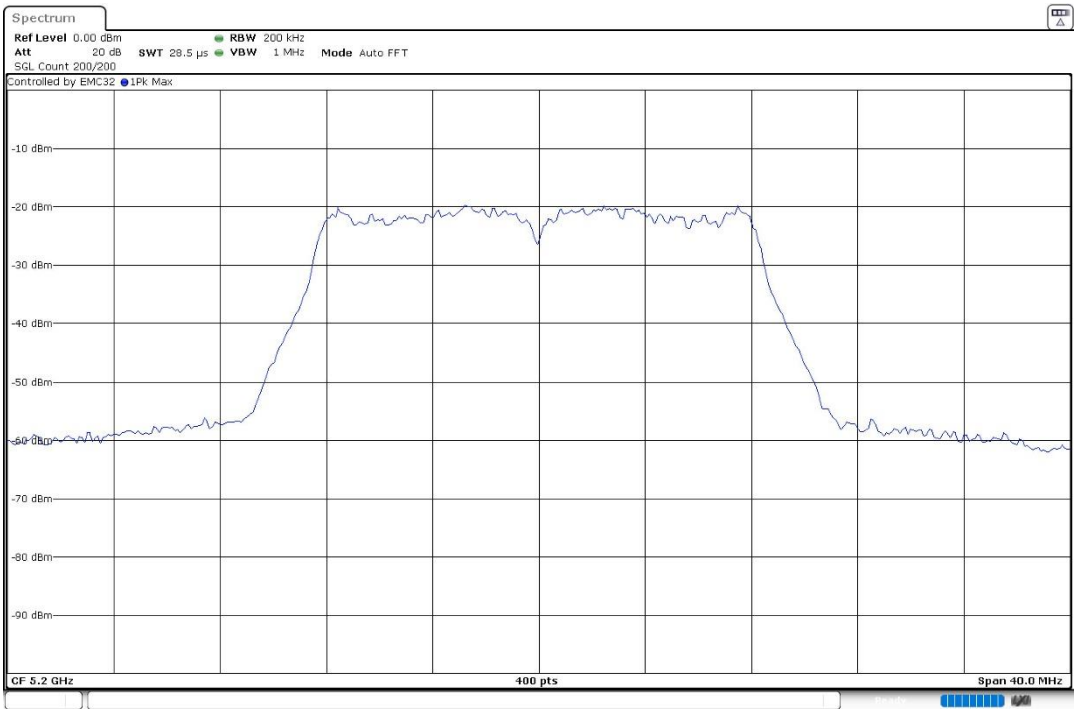
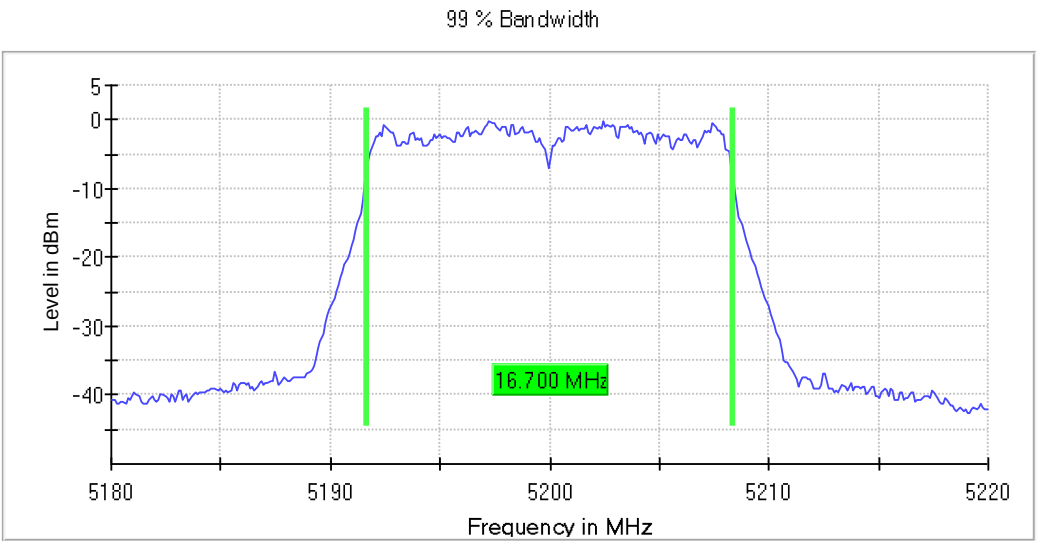


U-NII-1 RSS (5150-5250 MHz)

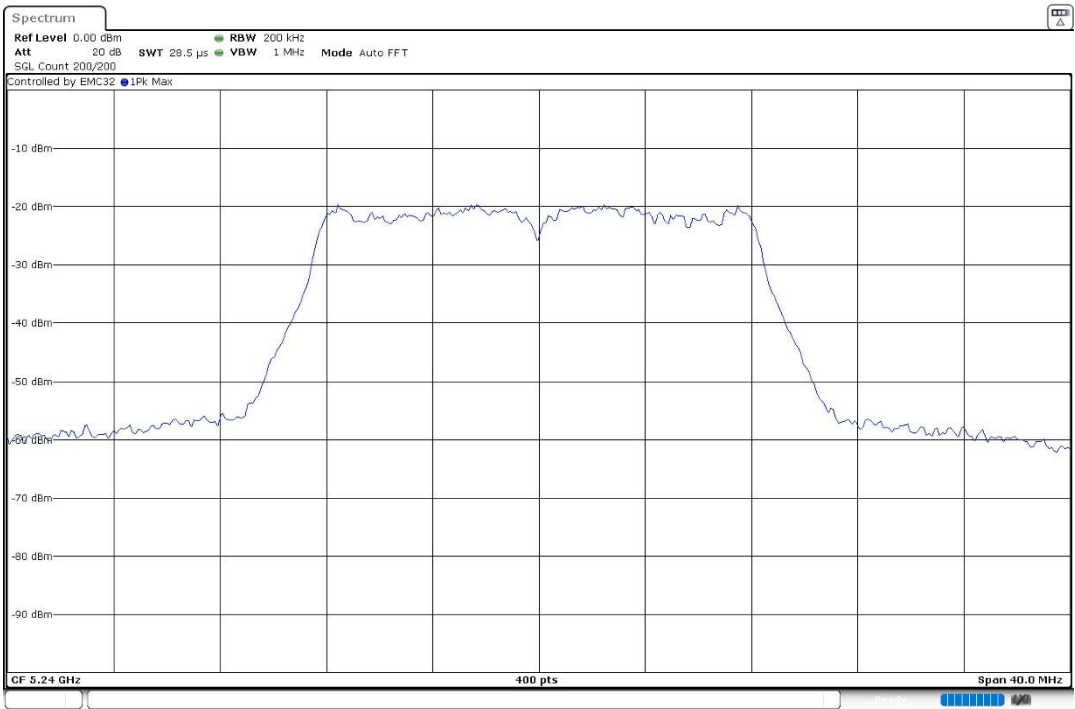
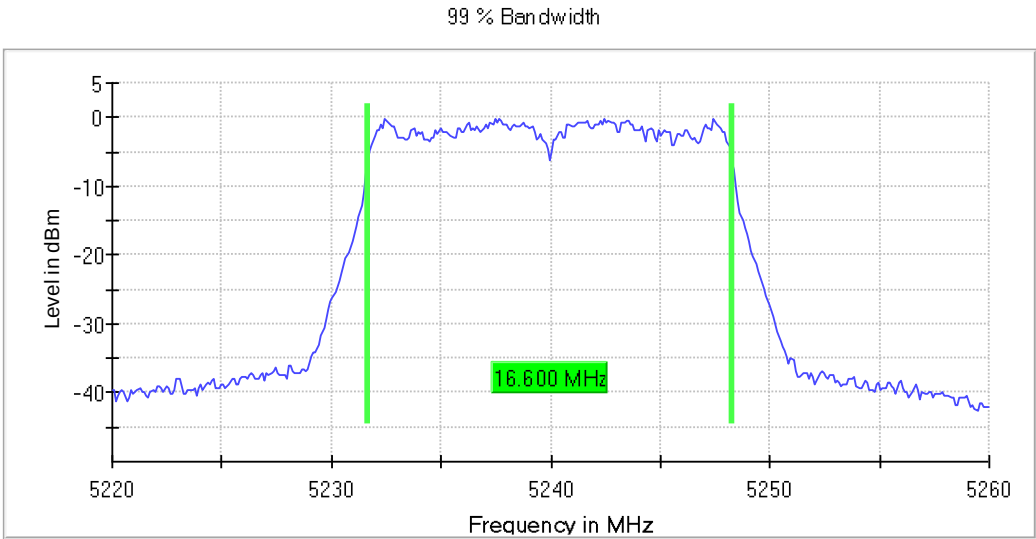
- Low Channel 36 (5180 MHz):



- Channel 40 (5200 MHz):

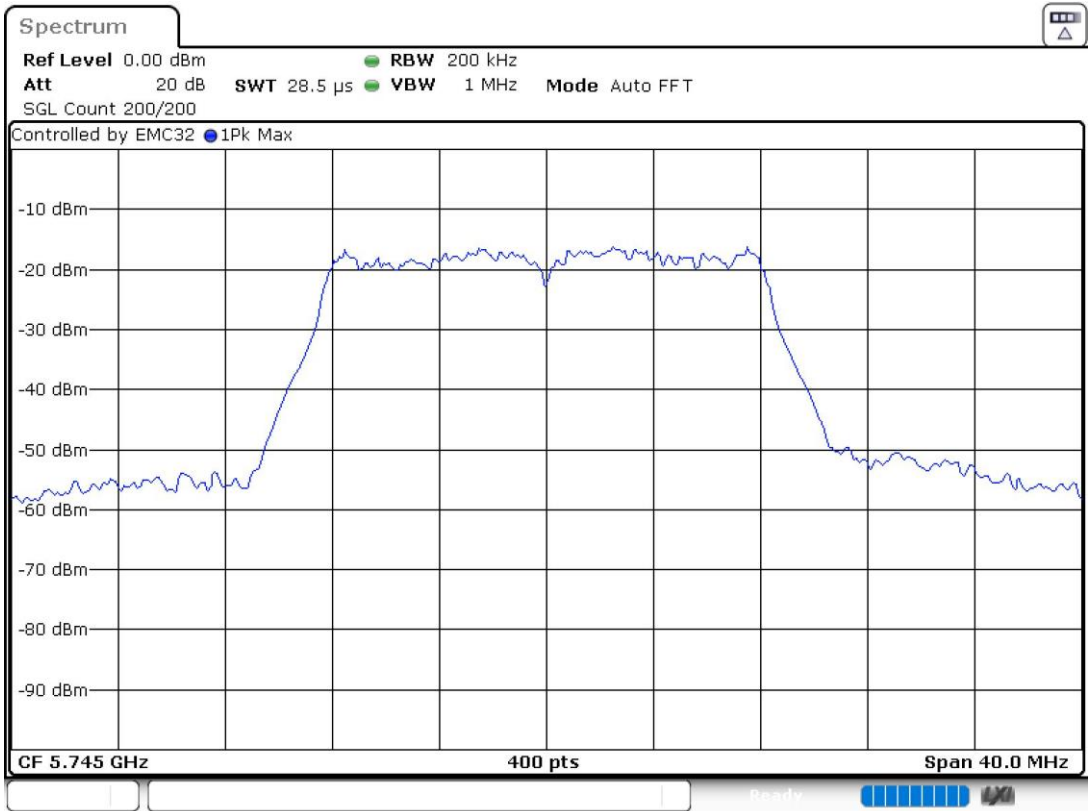
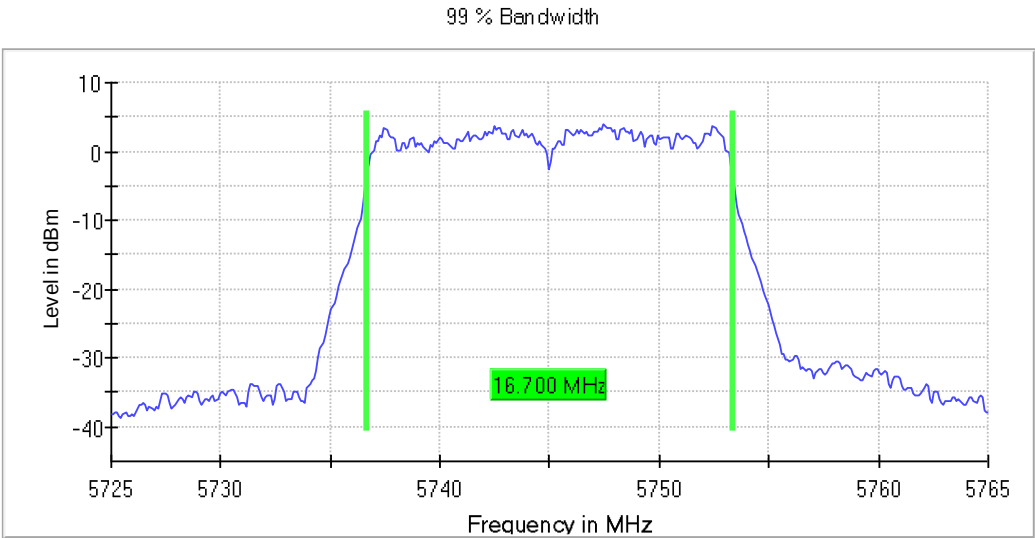


- High Channel 48 (5240 MHz):

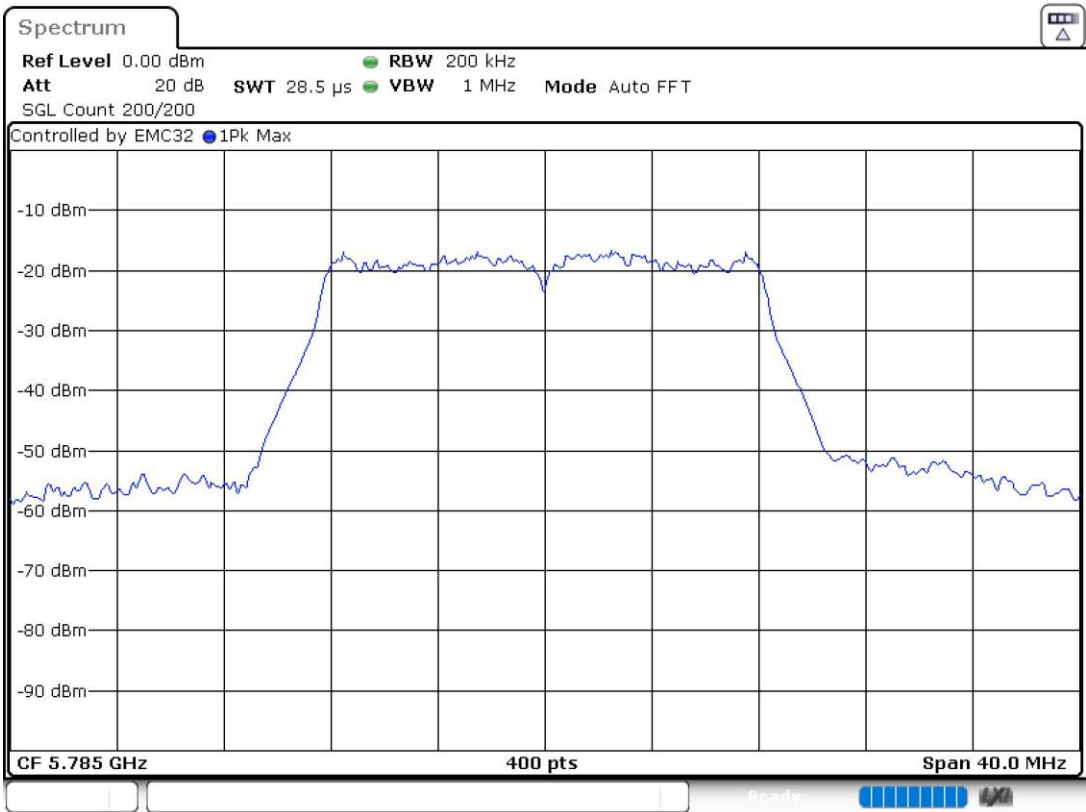
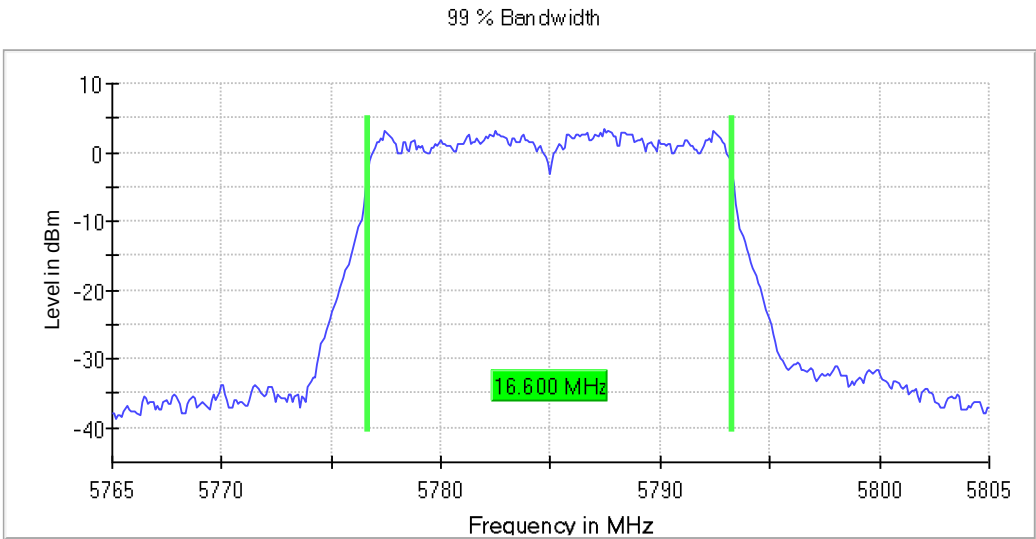


U-NII-3 (5725-5850 MHz)

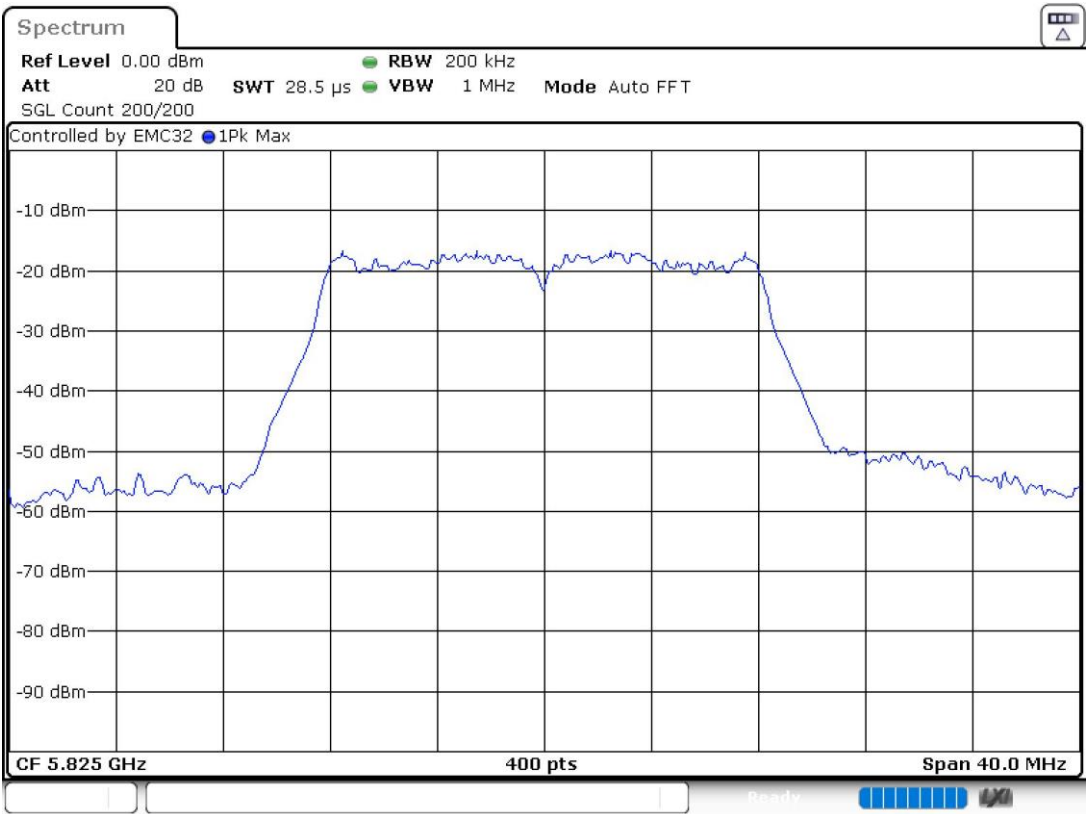
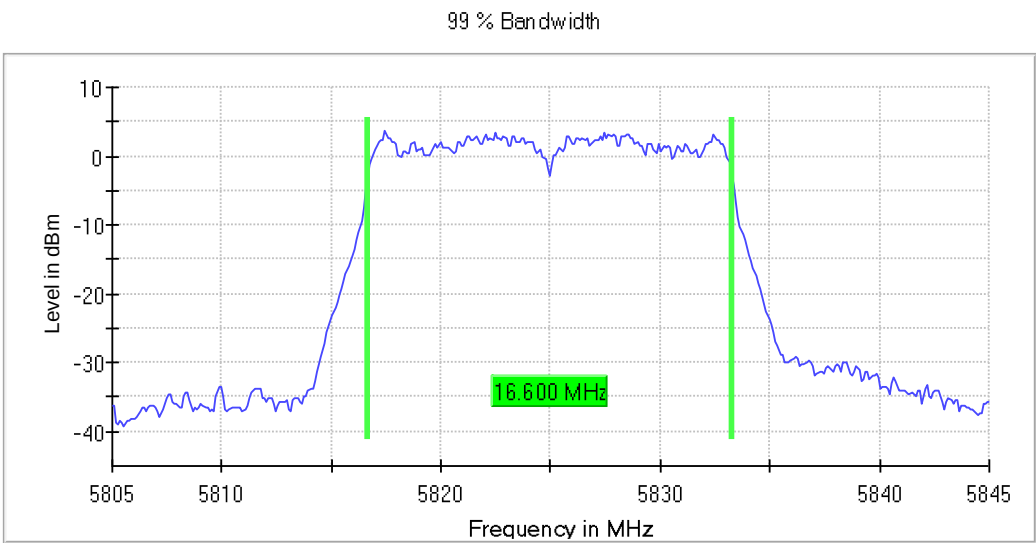
- Low Channel 149 (5745 MHz):



- Middle Channel 157 (5785 MHz):



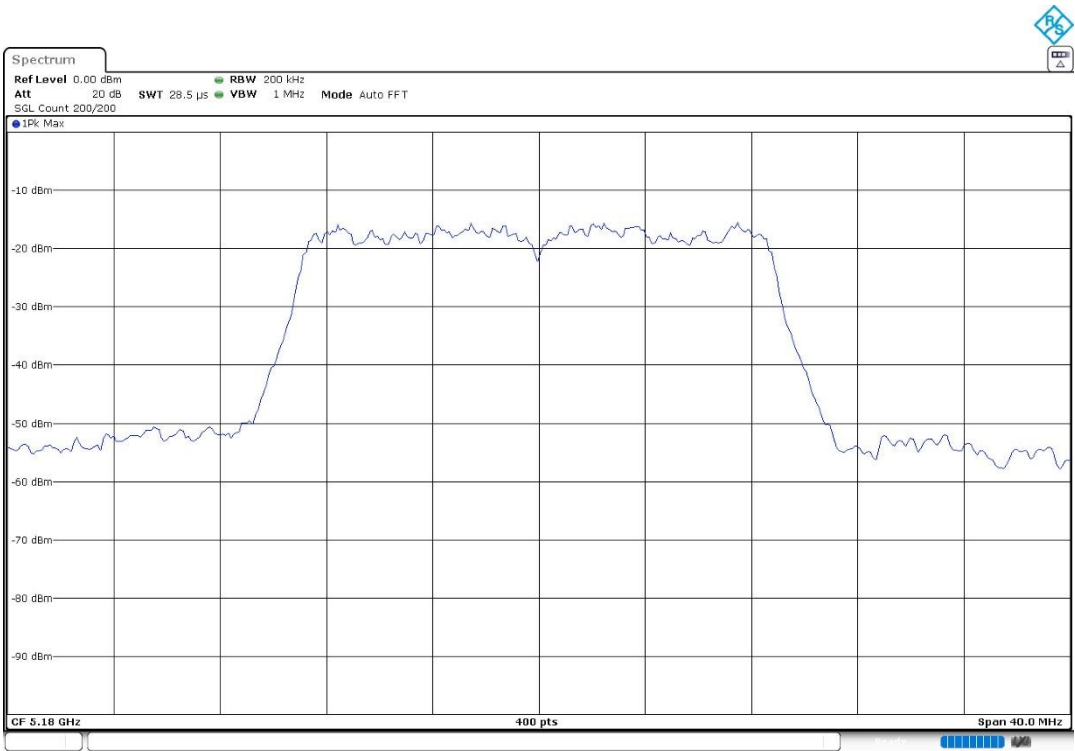
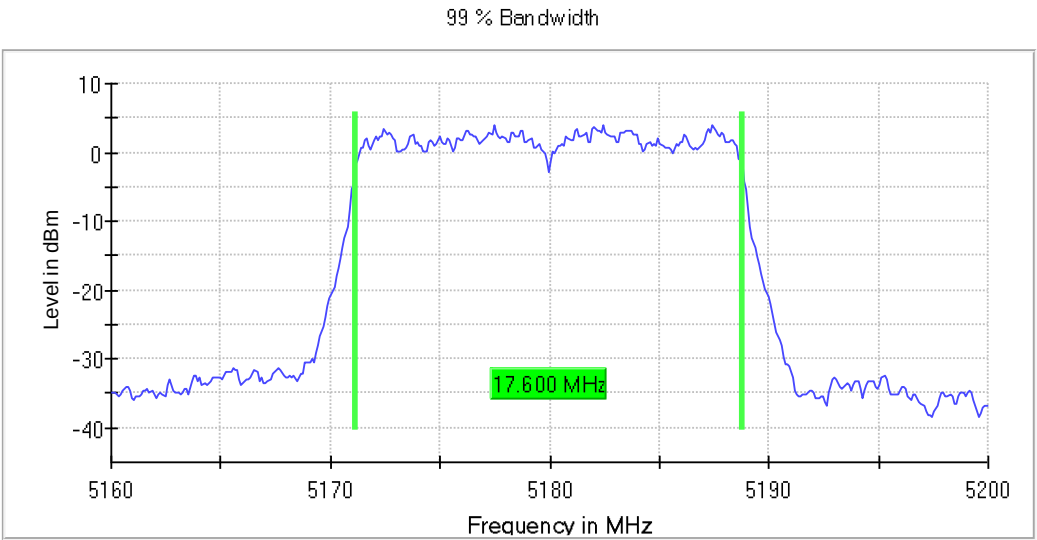
- High Channel 165 (5825 MHz):



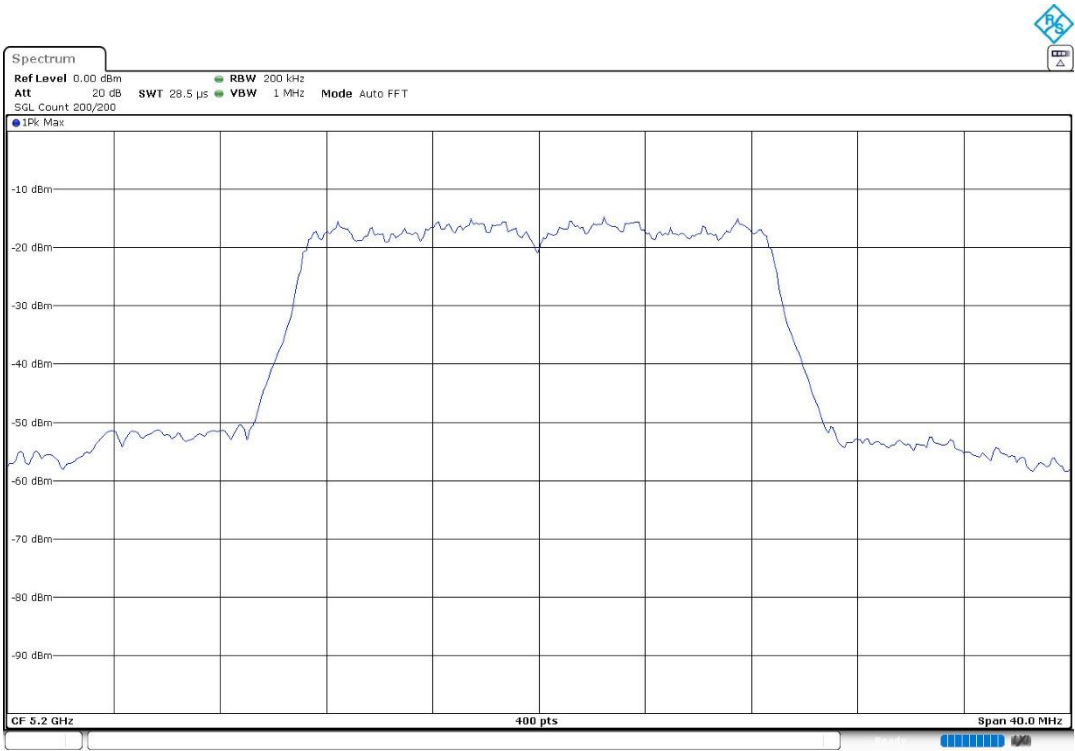
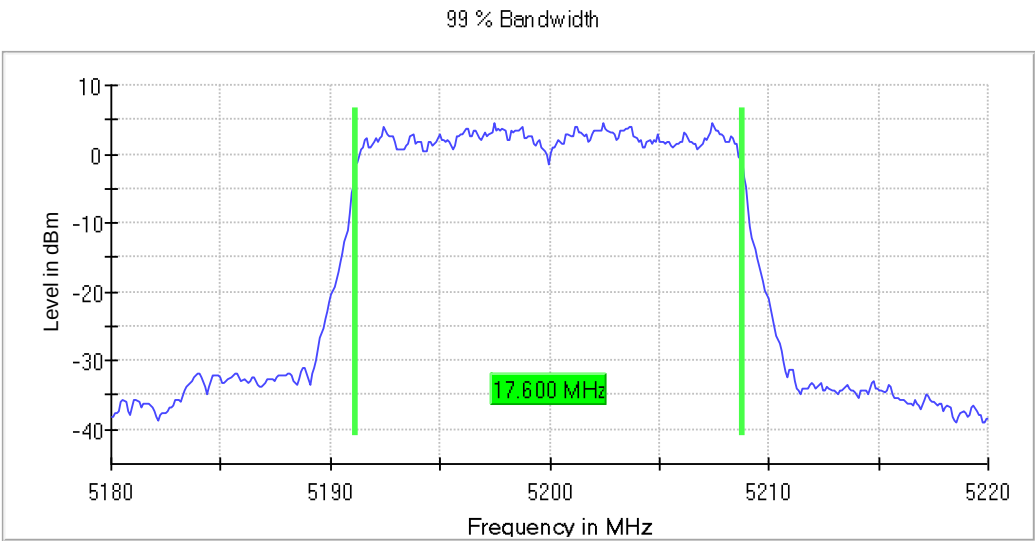
SISO 802.11 n20 (HT20)

U-NII-1 FCC (5150-5250 MHz)

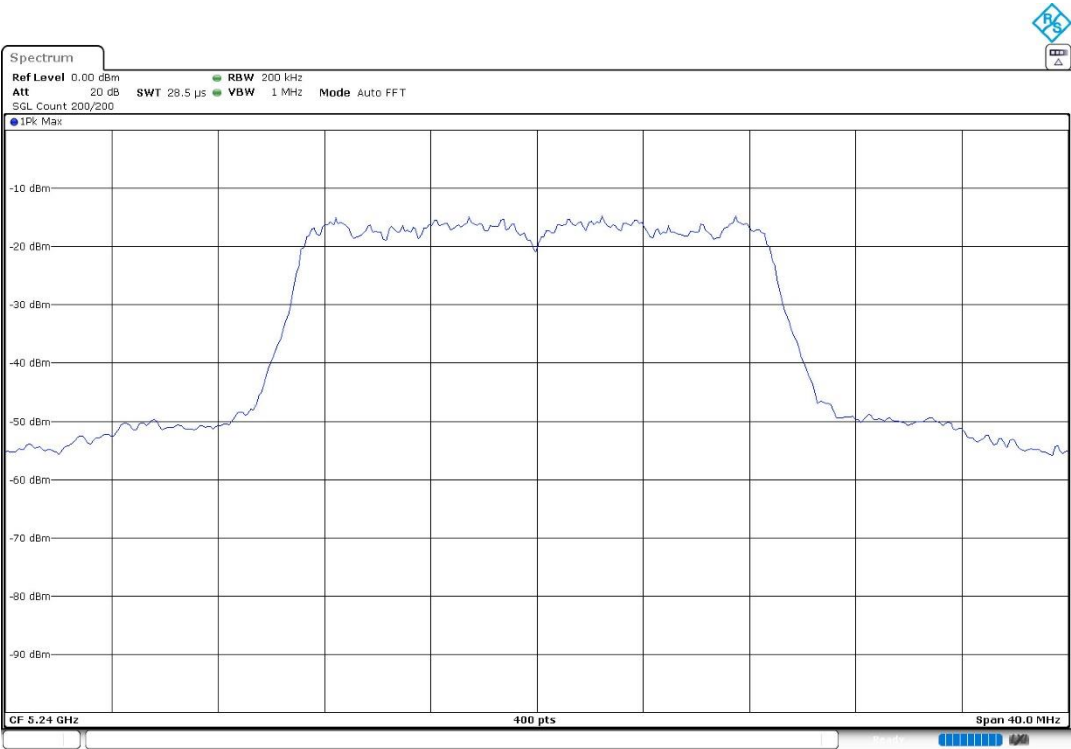
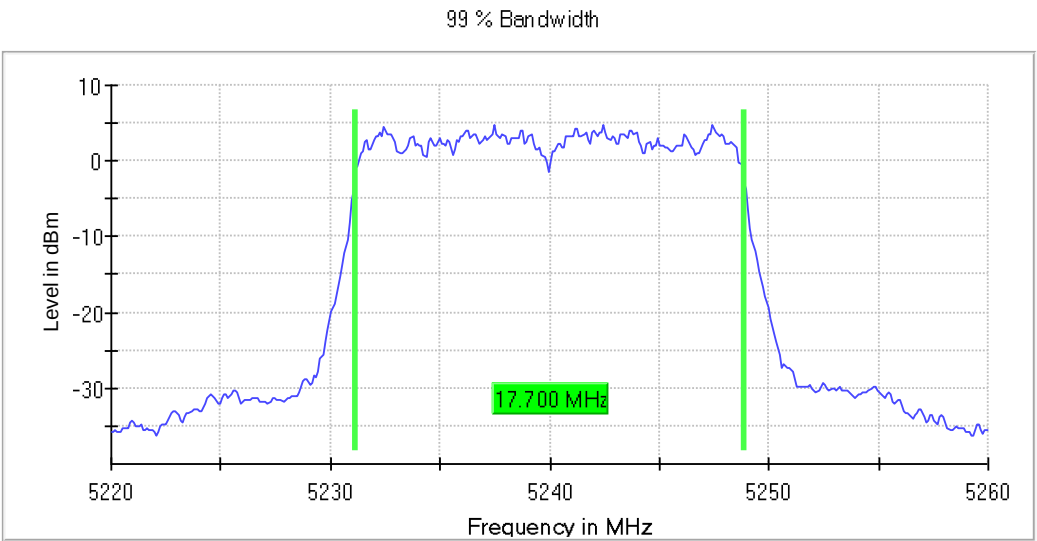
- Low Channel 36 (5180 MHz):



- Channel 40 (5200 MHz):

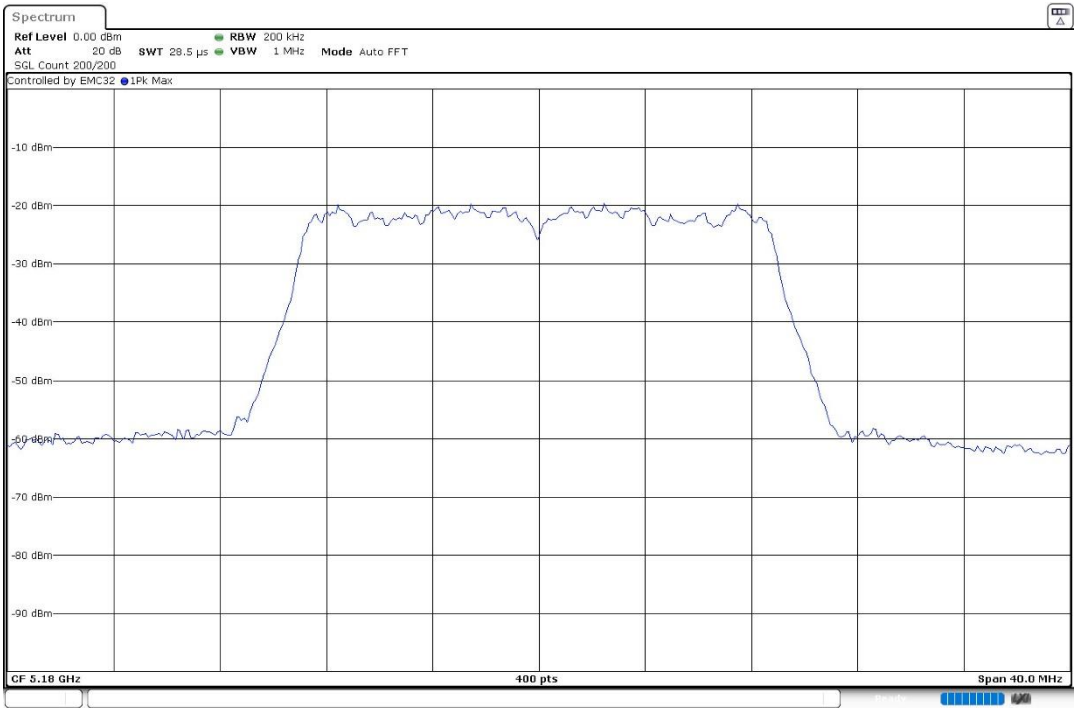
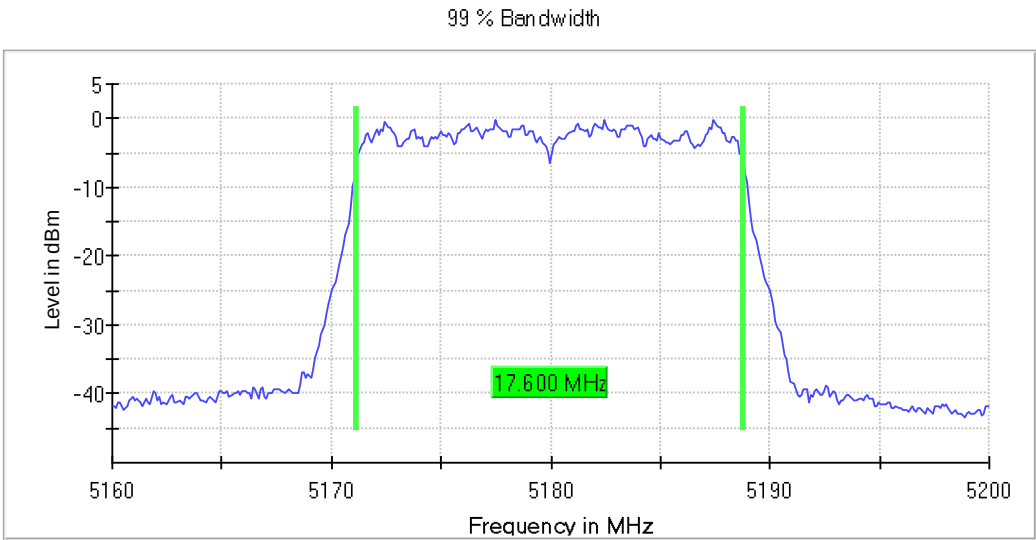


- High Channel 48 (5240 MHz):

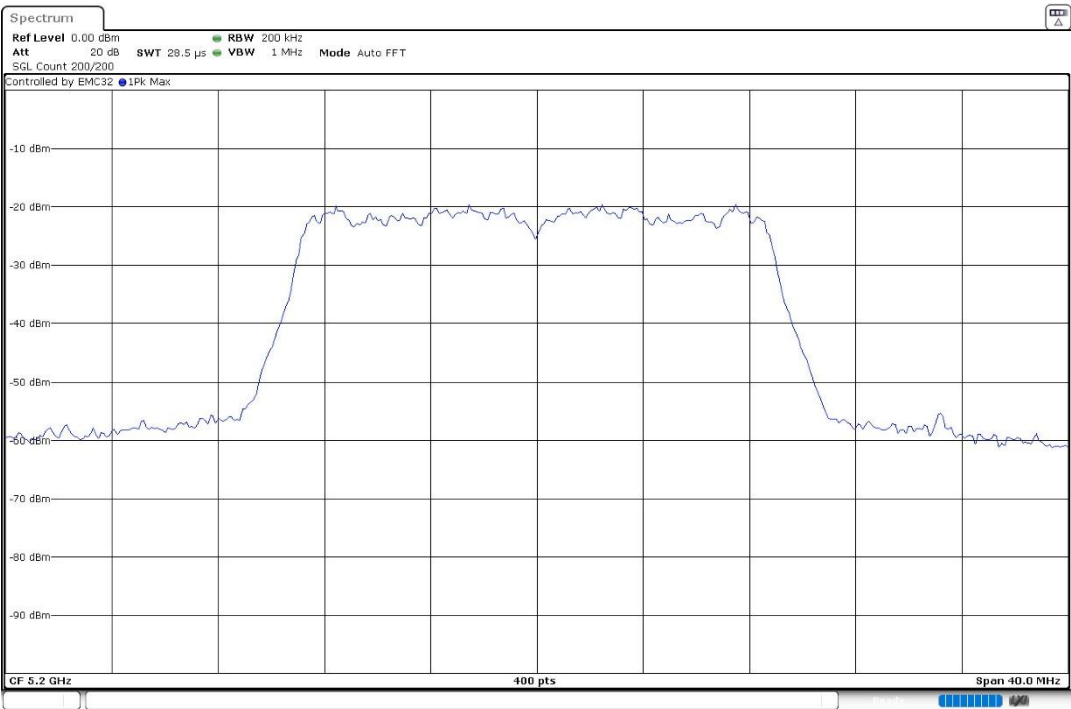
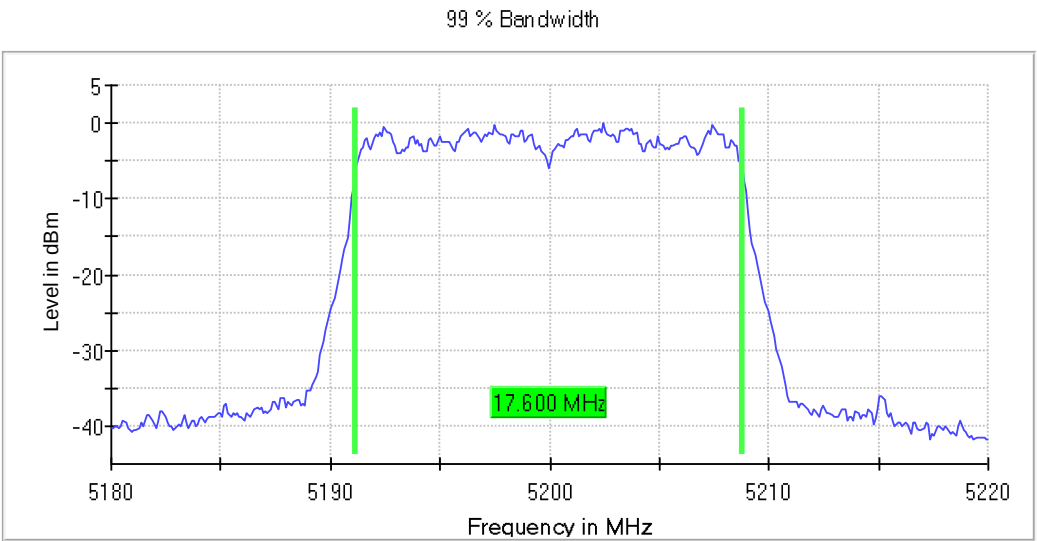


U-NII-1 RSS (5150-5250 MHz)

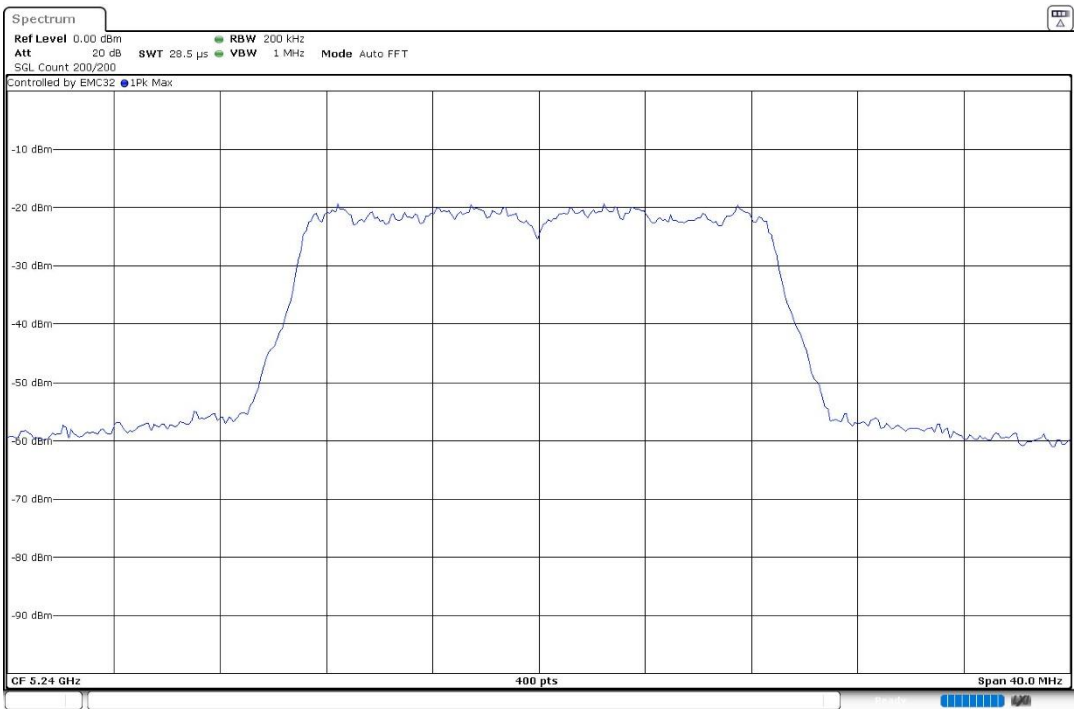
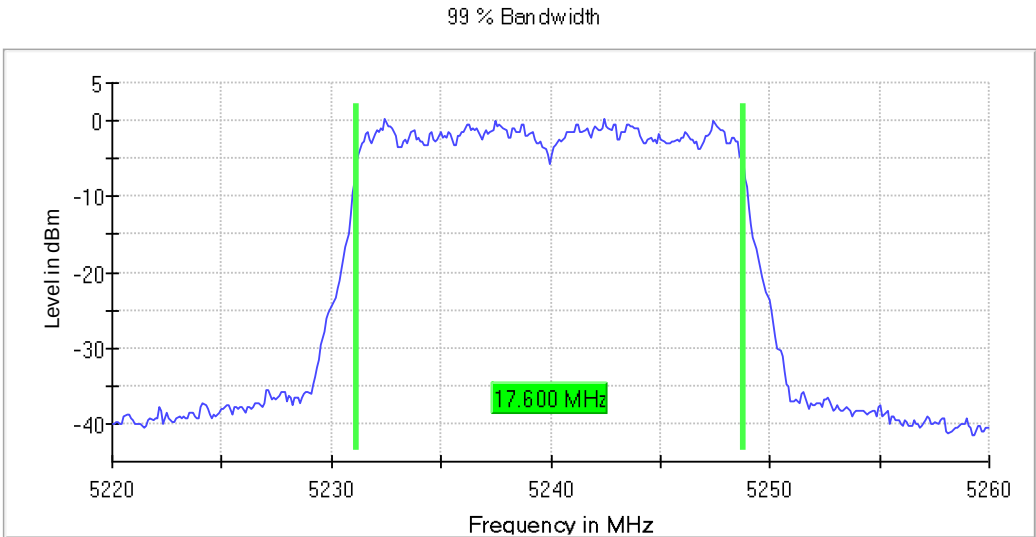
- Low Channel 36 (5180 MHz):



- Channel 40 (5200 MHz):

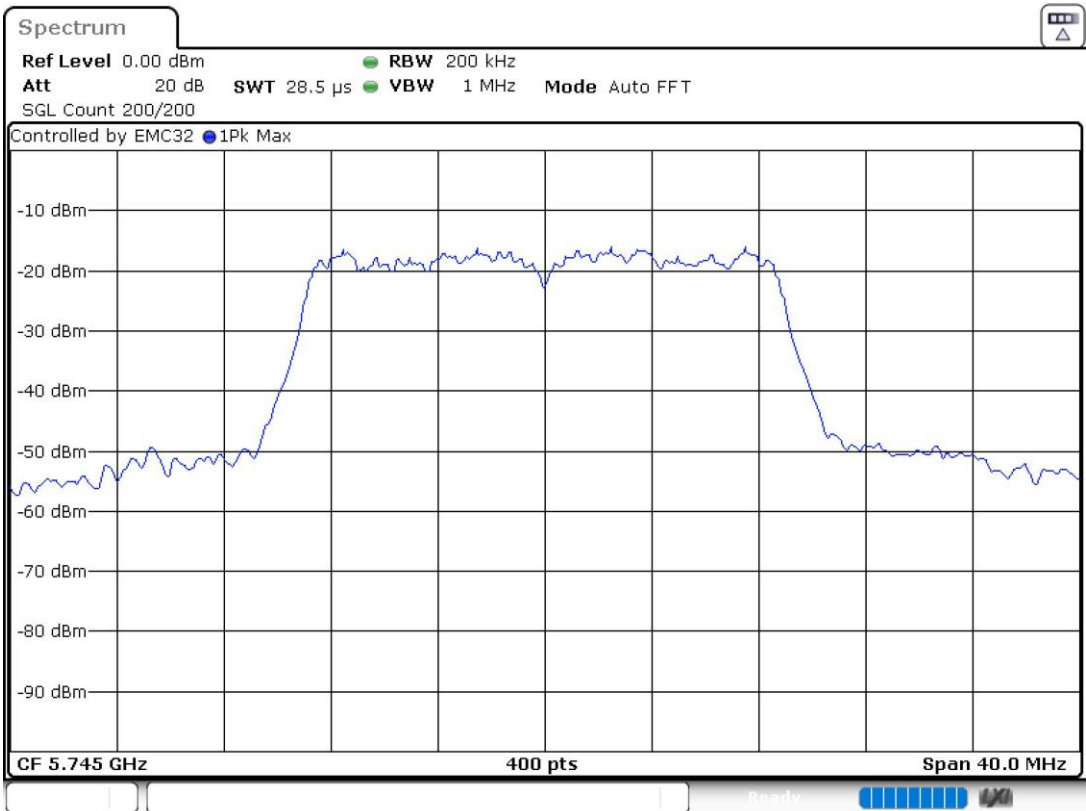
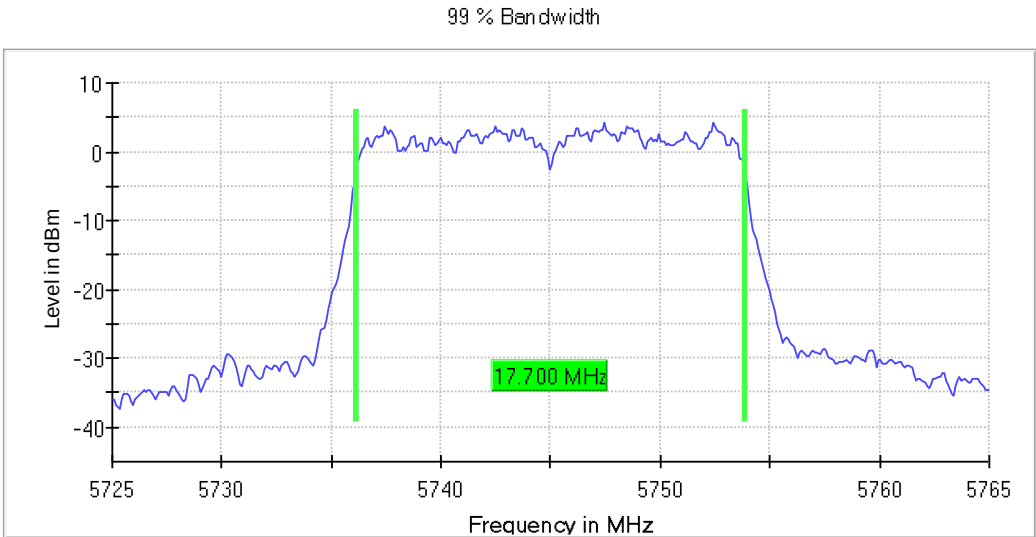


- High Channel 48 (5240 MHz):

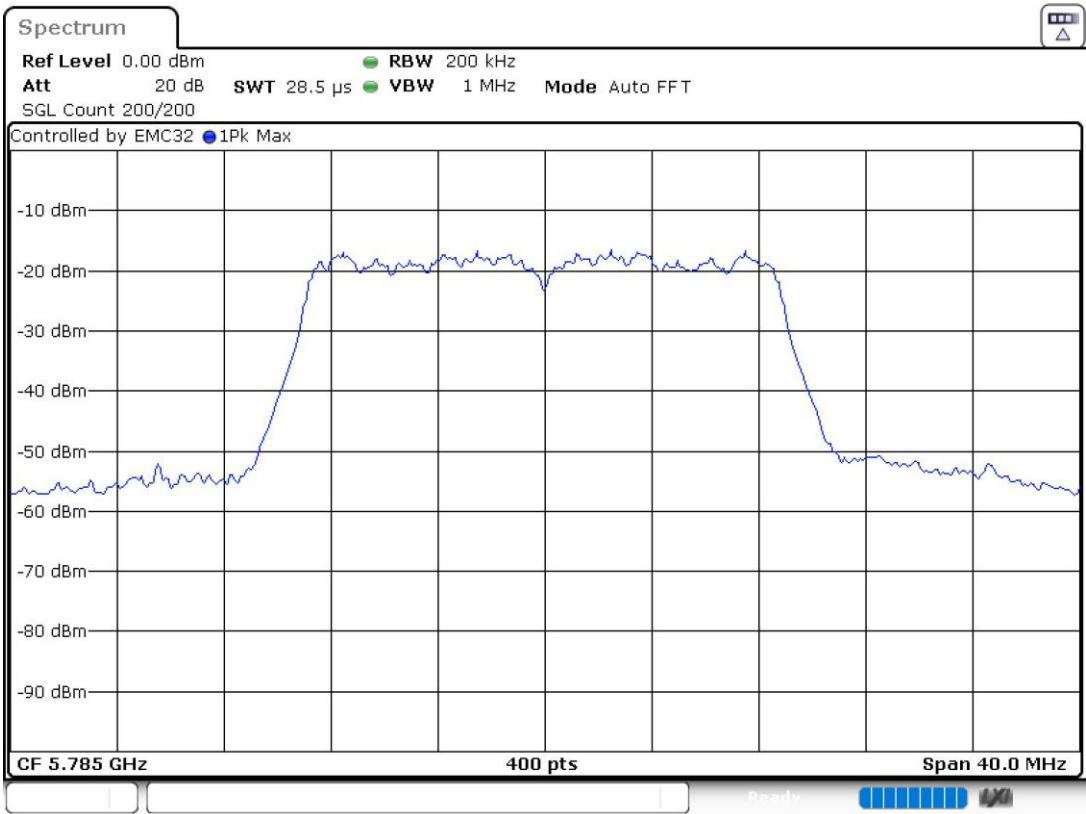
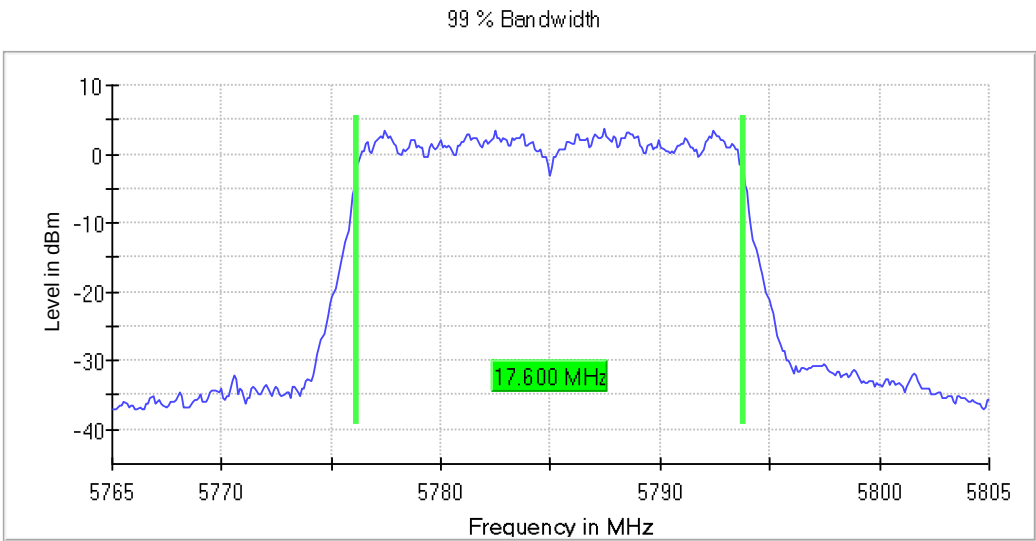


U-NII-3 (5725-5850 MHz)

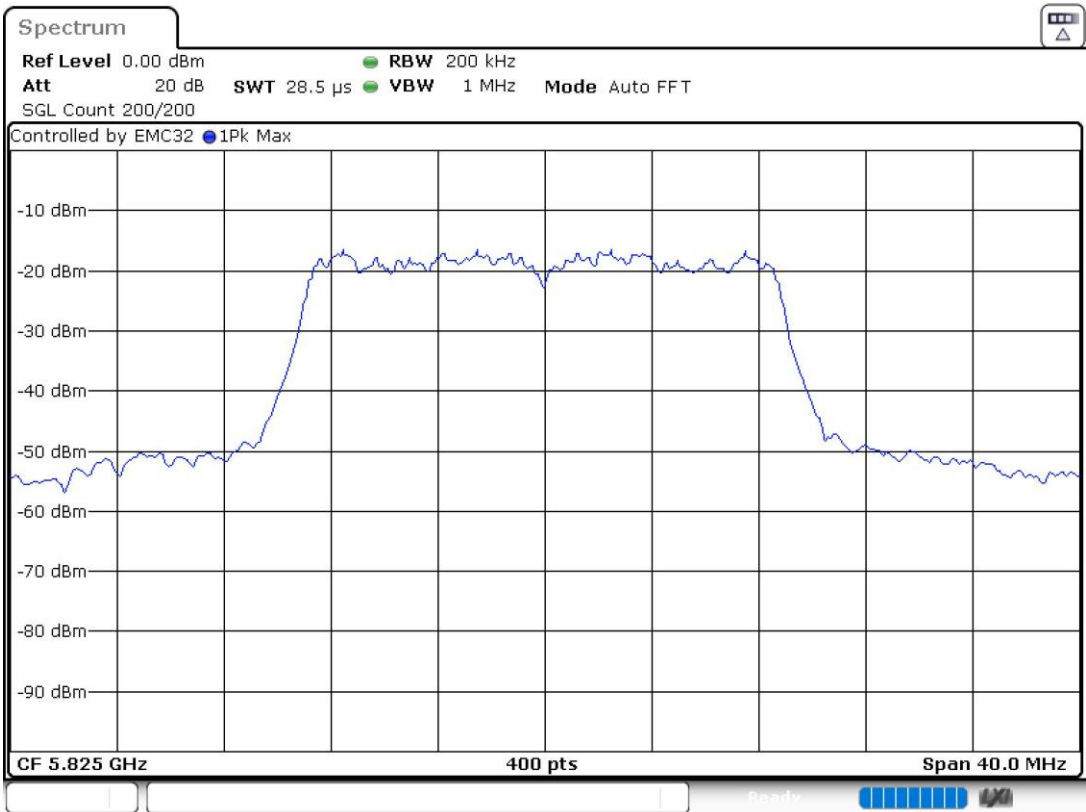
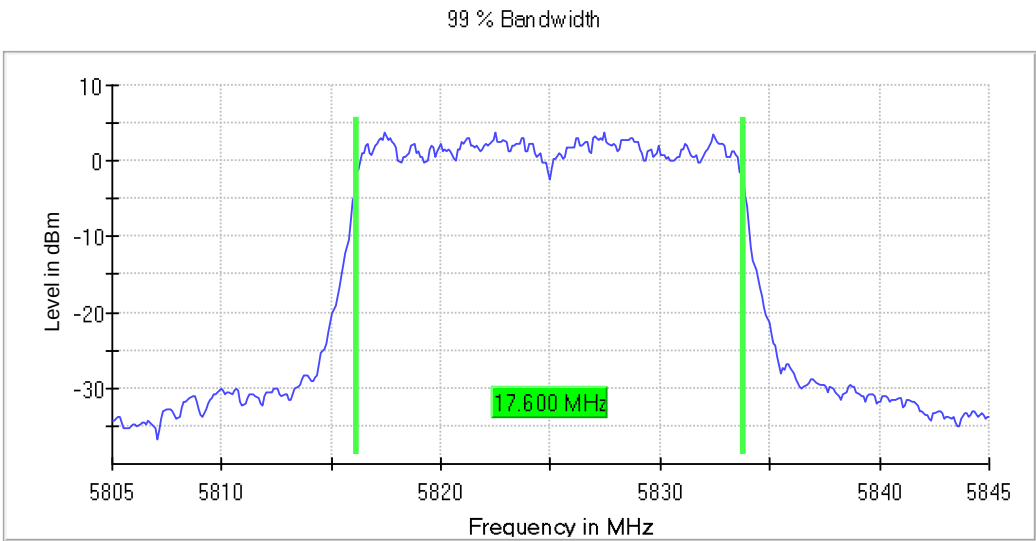
- Low Channel 149 (5745 MHz):



- Middle Channel 157 (5785 MHz):



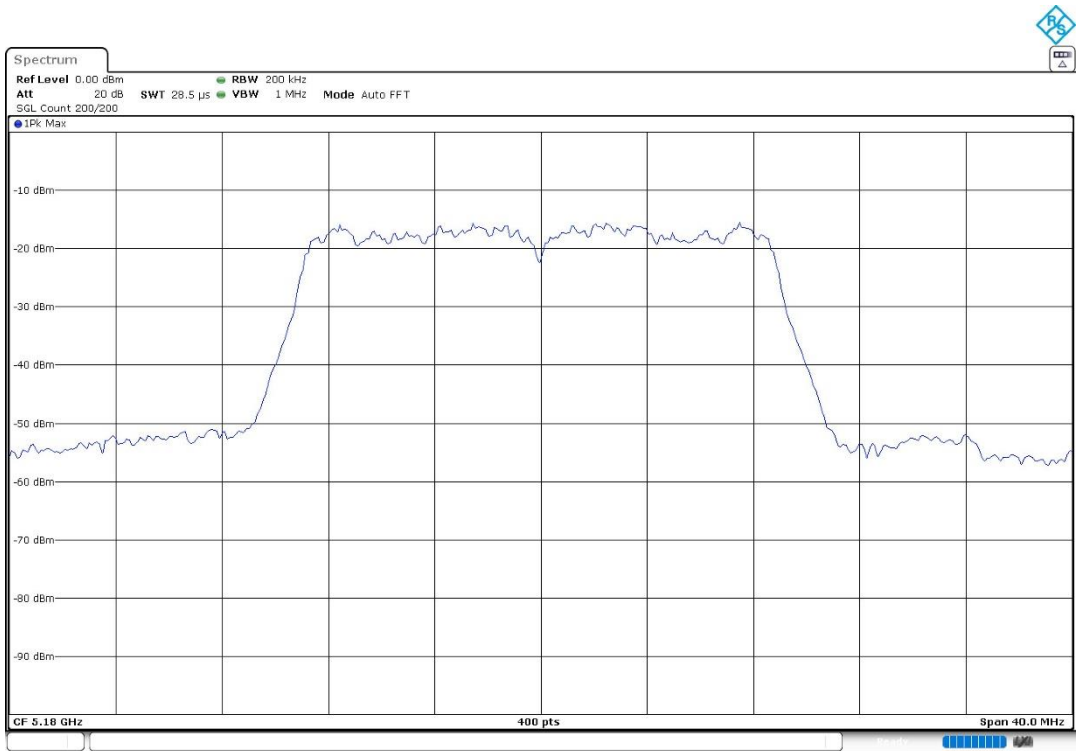
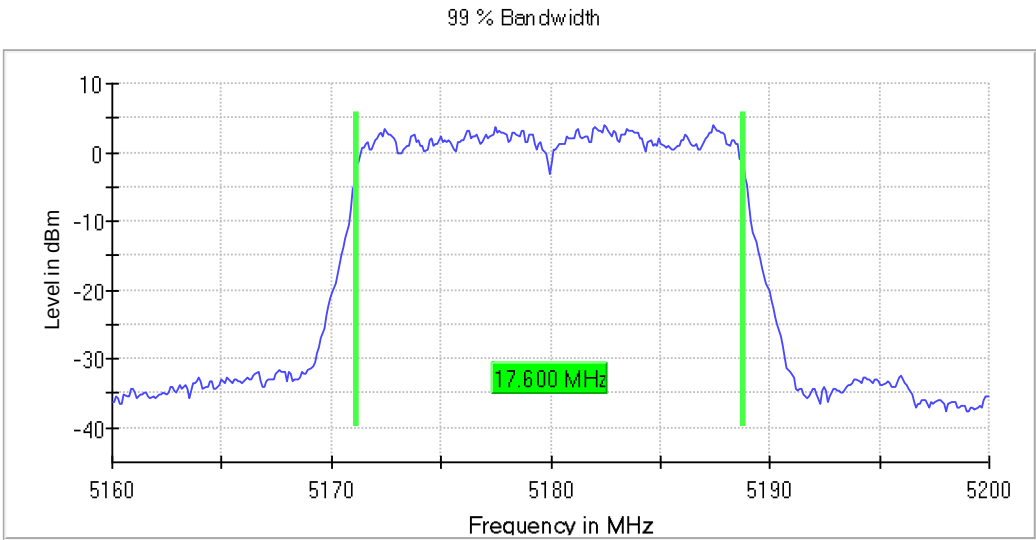
- High Channel 165 (5825 MHz):



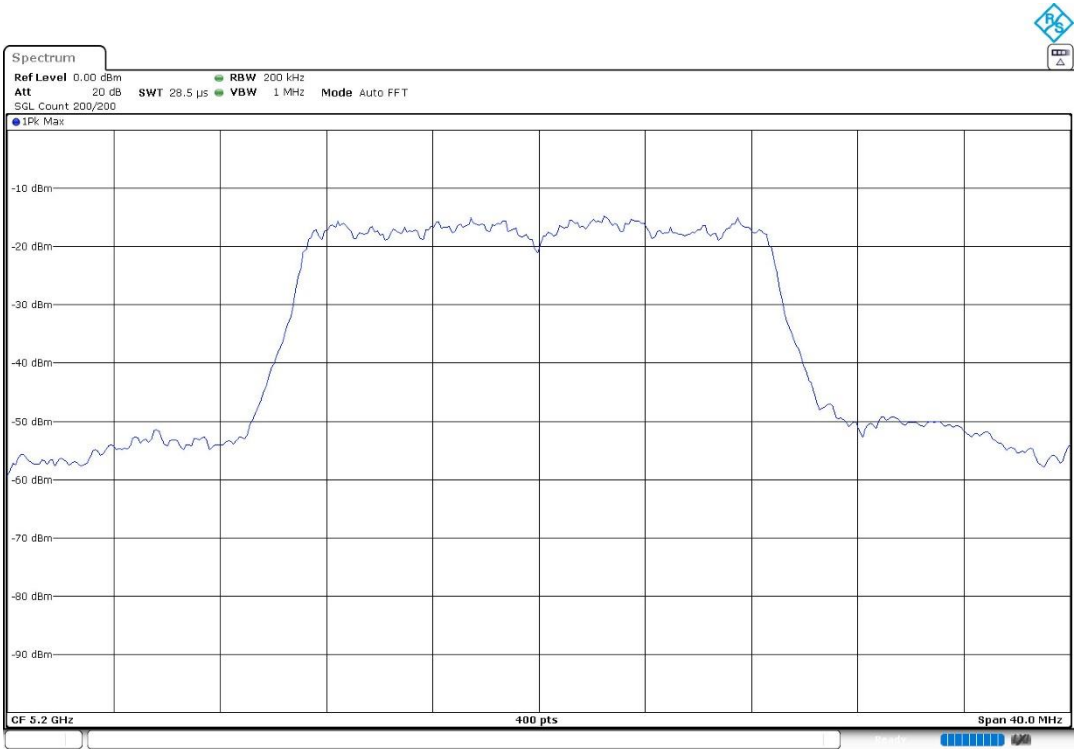
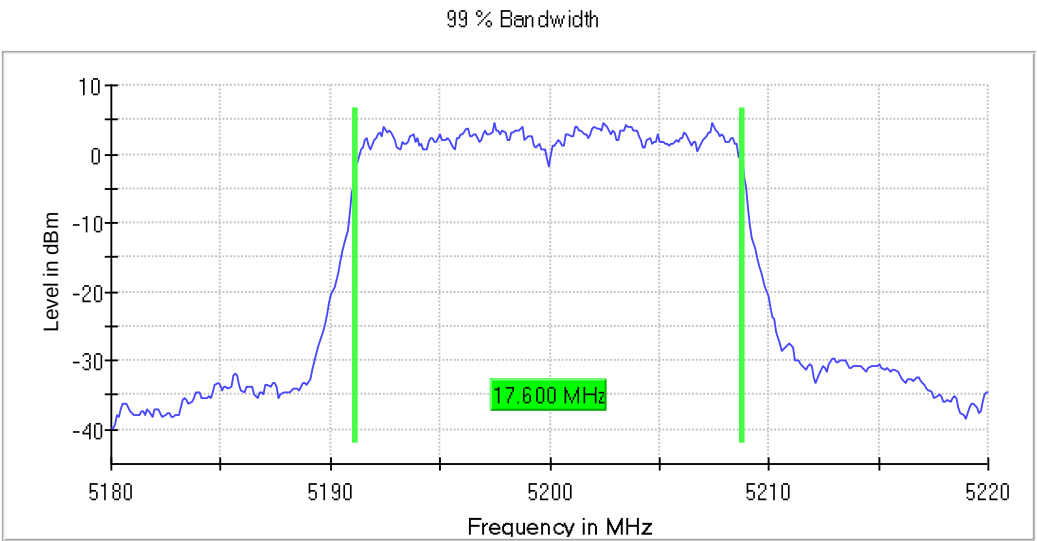
SISO 802.11 ac20 (VHT20)

U-NII-1 FCC (5150-5250 MHz)

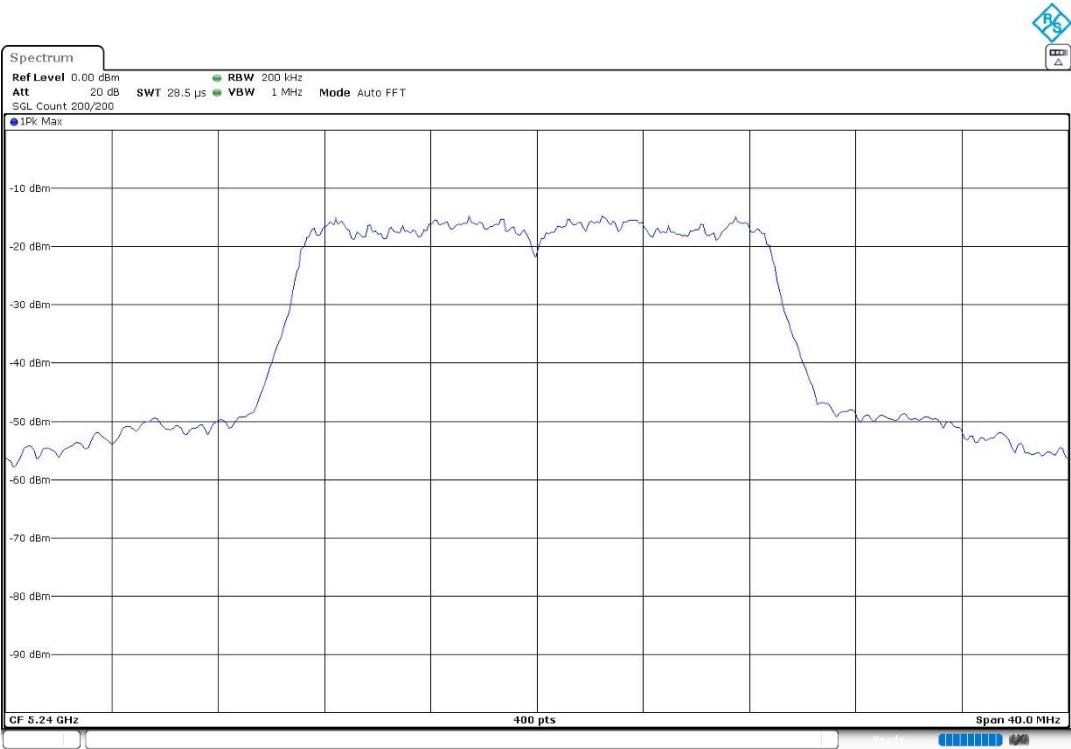
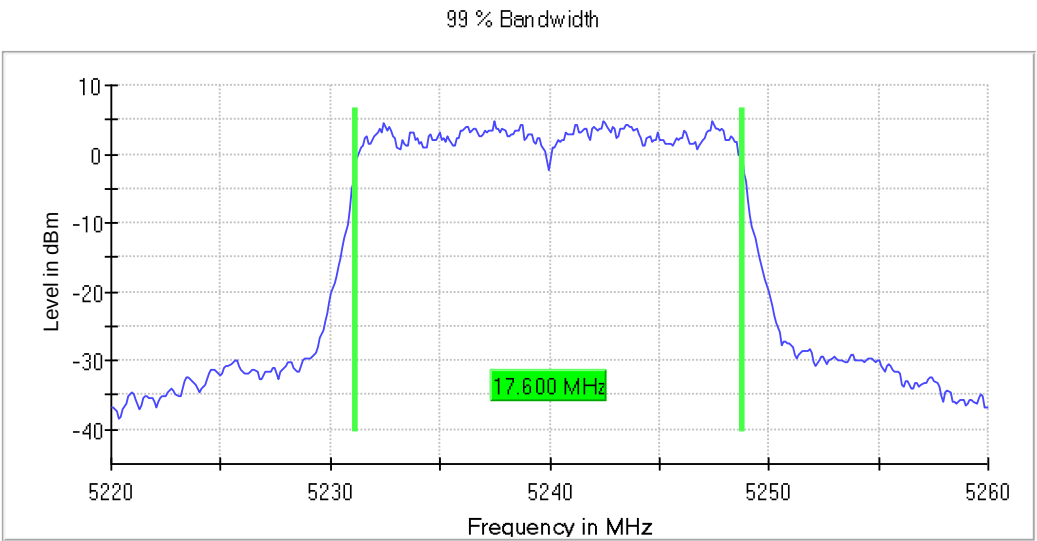
- Low Channel 36 (5180 MHz):



- Channel 40 (5200 MHz):

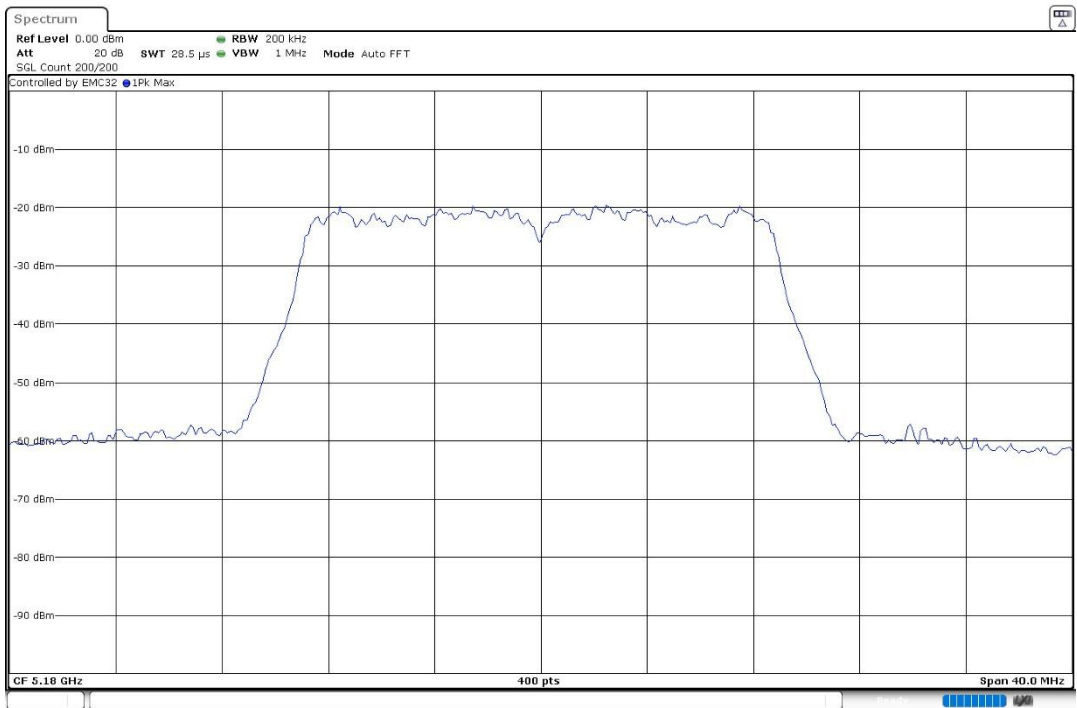
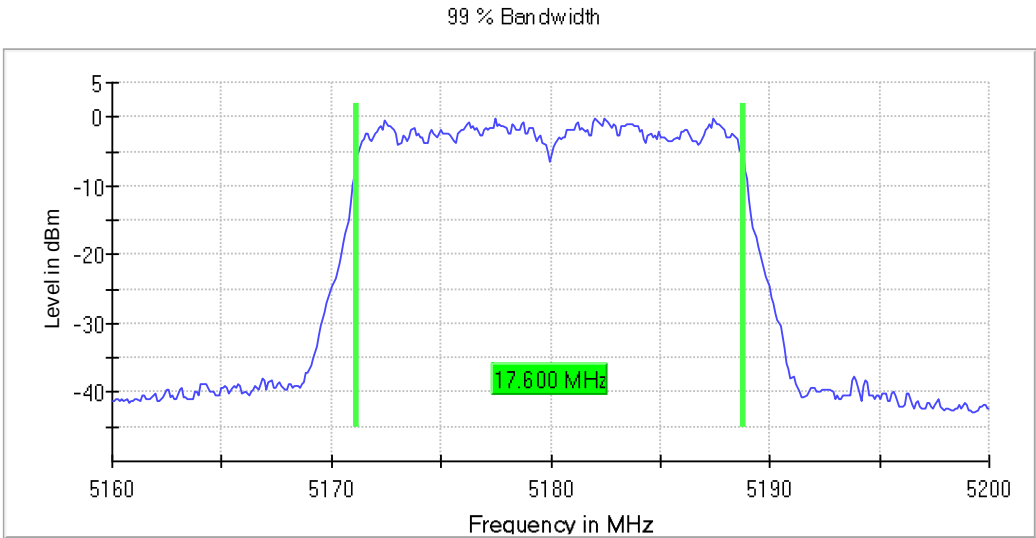


- High Channel 48 (5240 MHz):

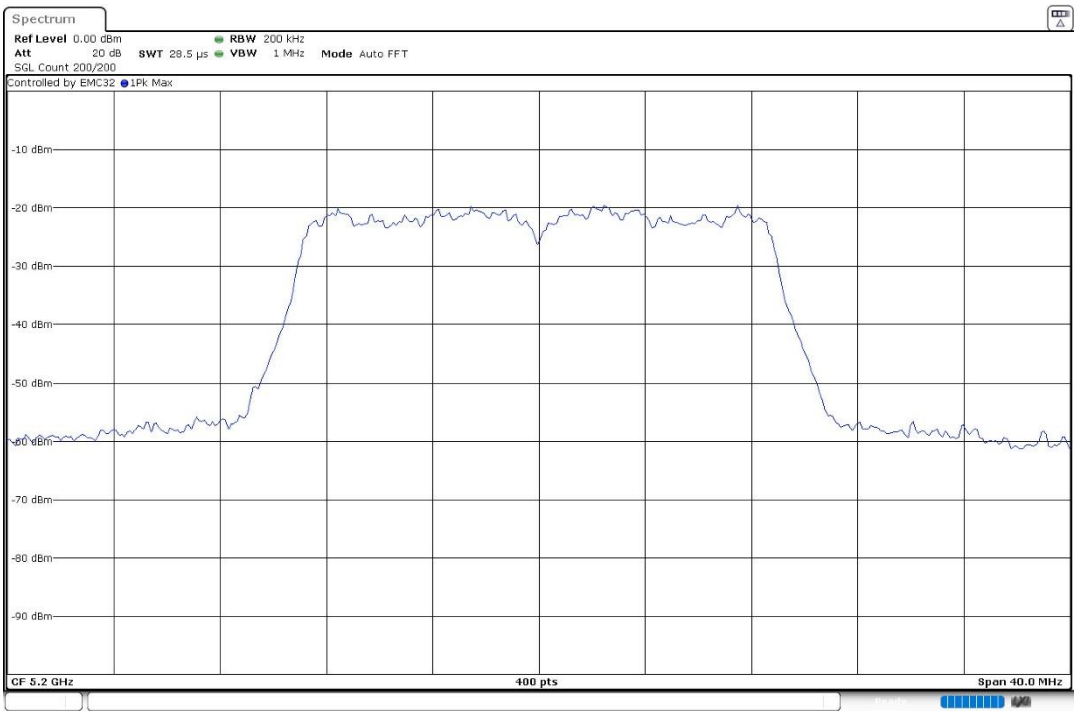
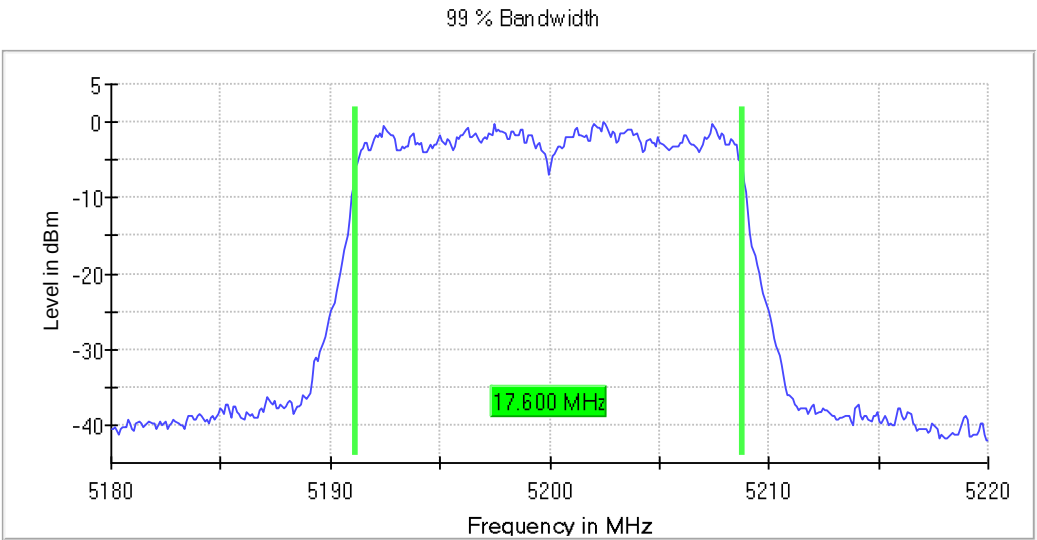


U-NII-1 RSS (5150-5250 MHz)

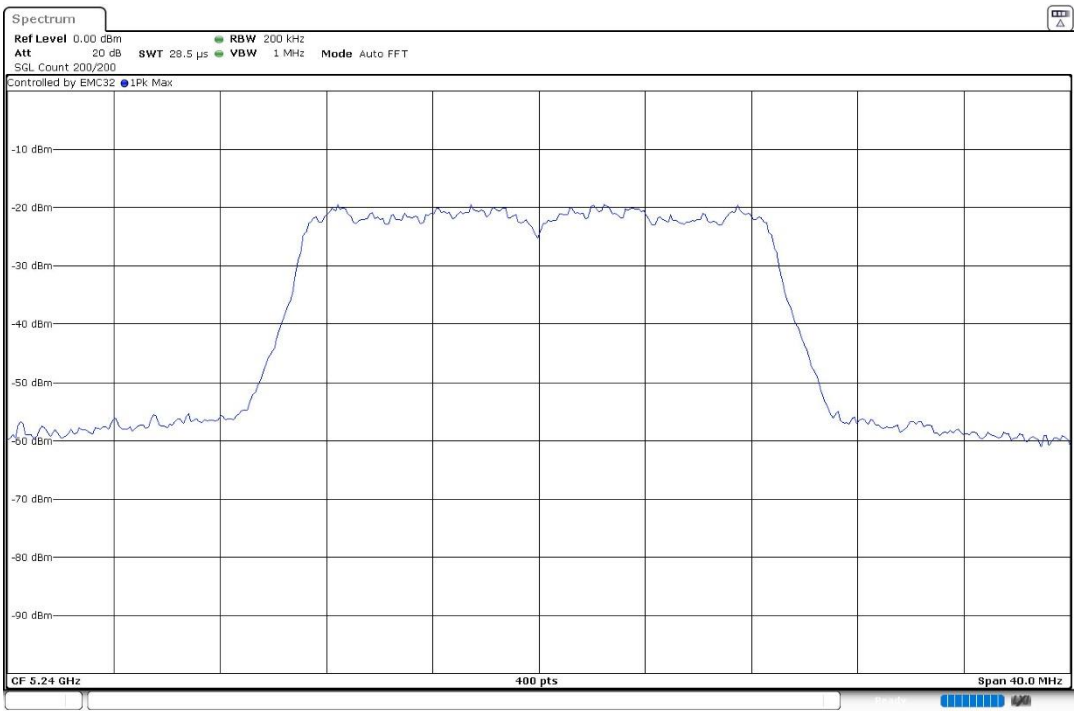
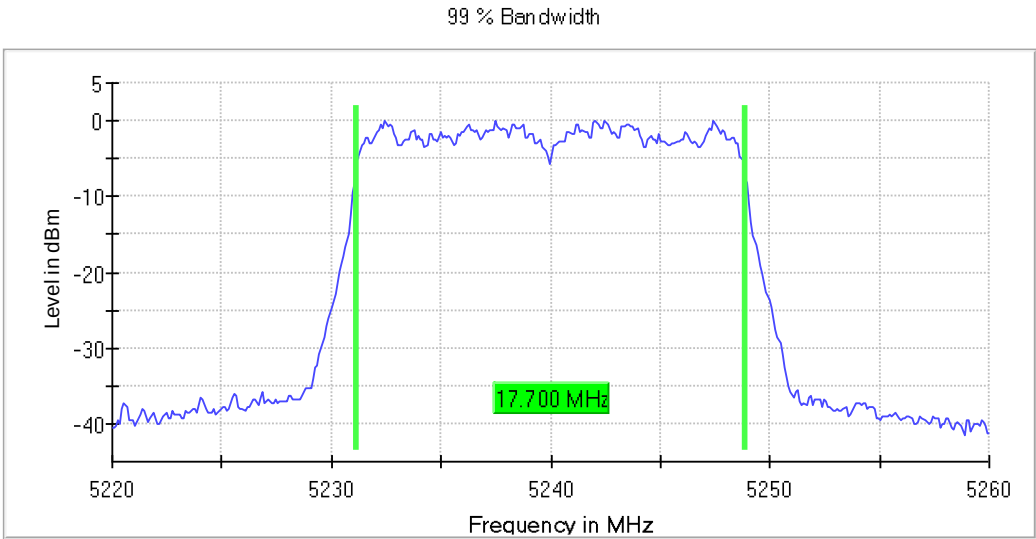
- Low Channel 36 (5180 MHz):



- Channel 40 (5200 MHz):

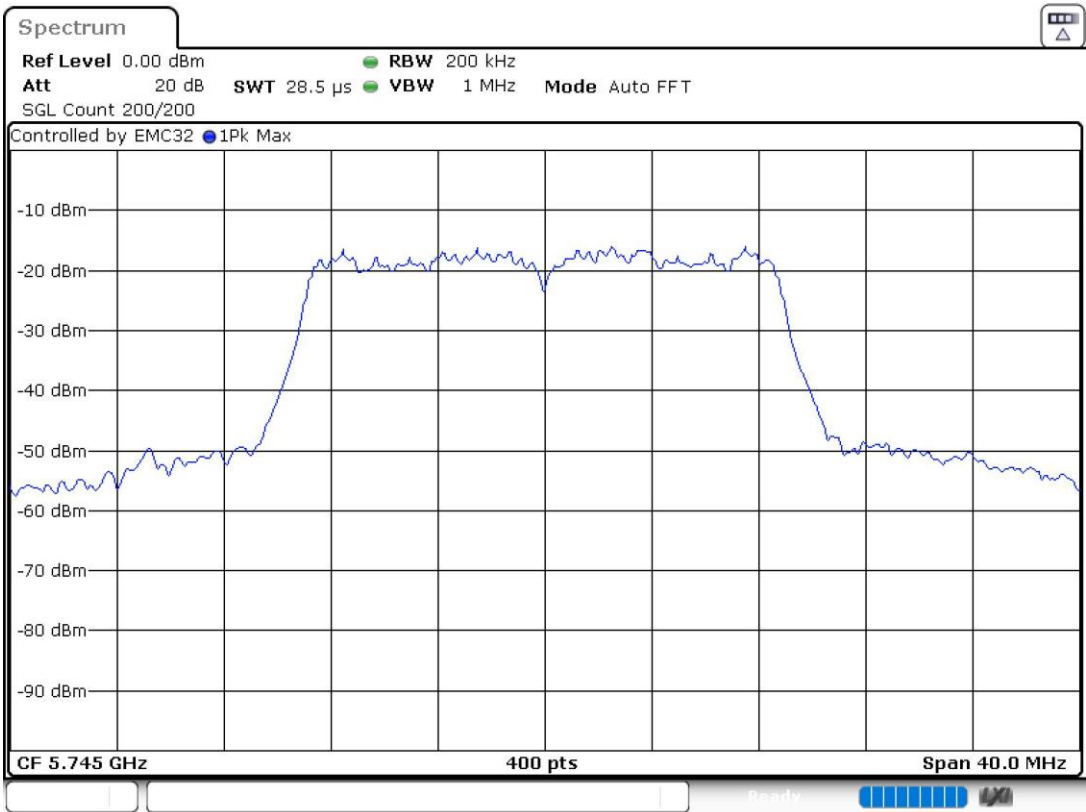
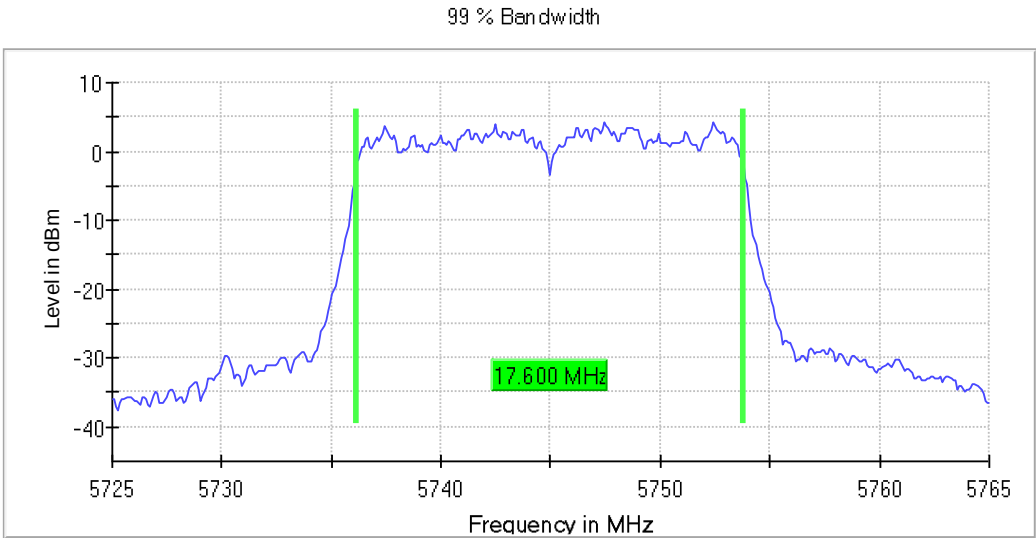


- High Channel 48 (5240 MHz):

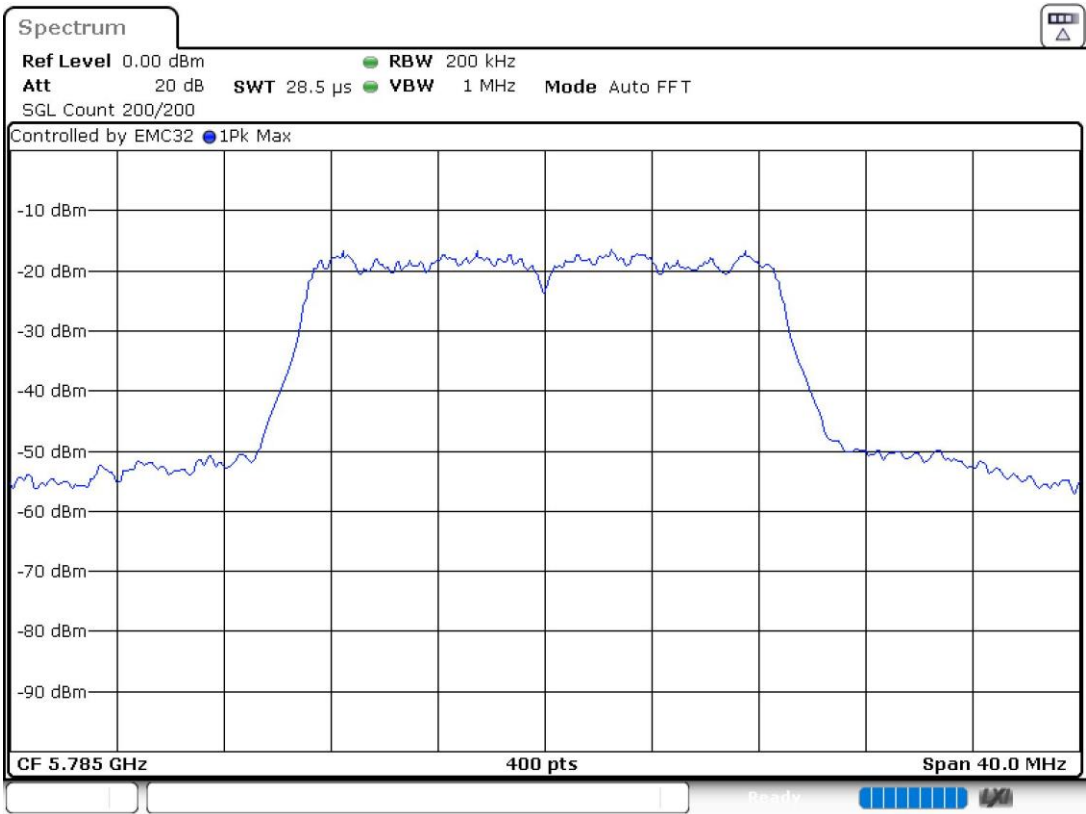
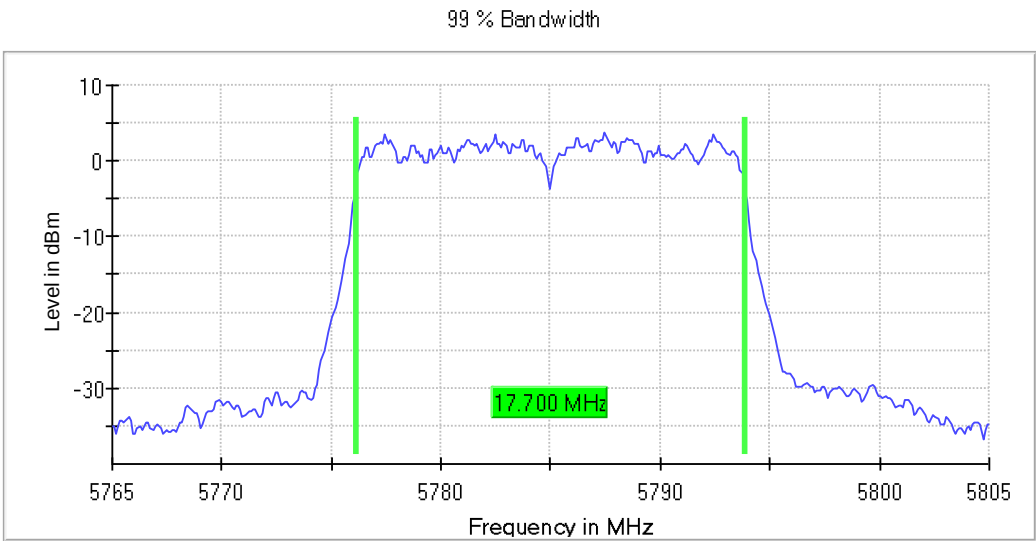


U-NII-3 (5725-5850 MHz)

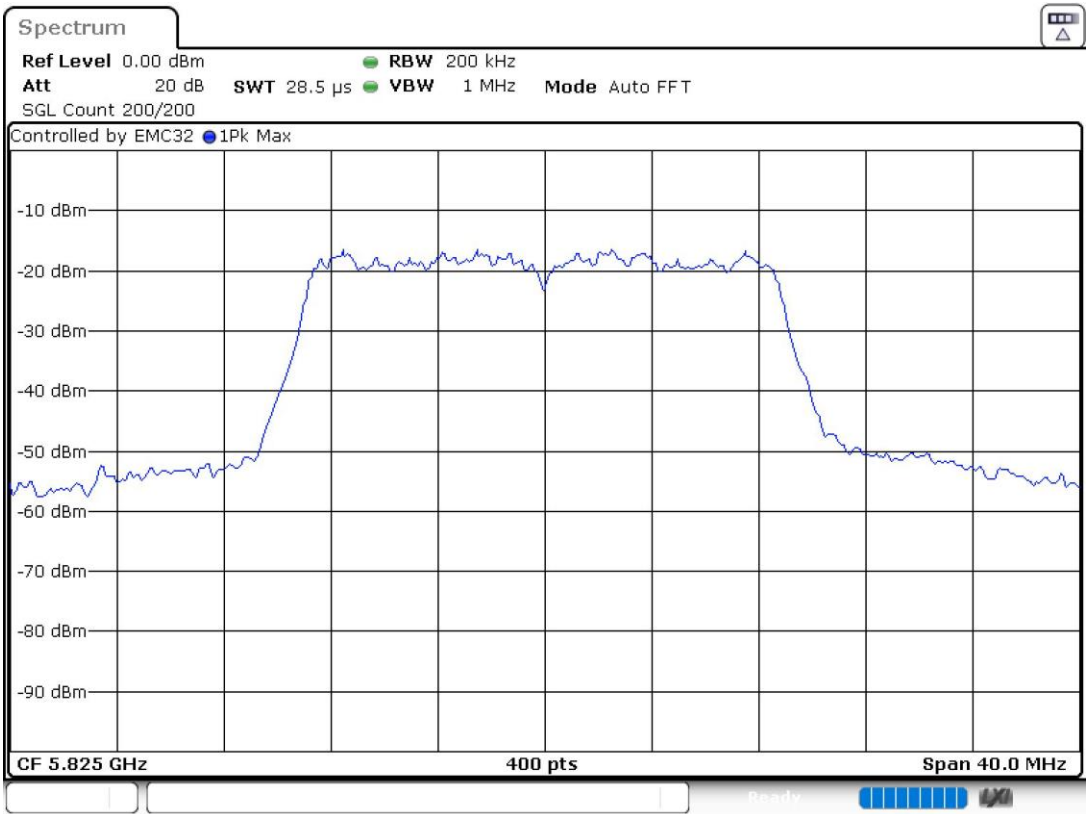
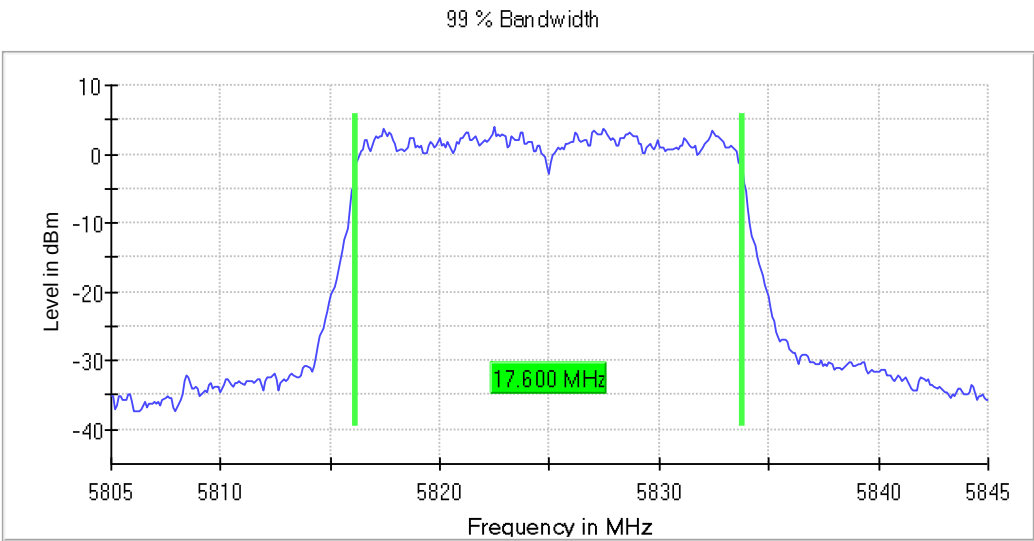
- Low Channel 149 (5745 MHz):



- Middle Channel 157 (5785 MHz):



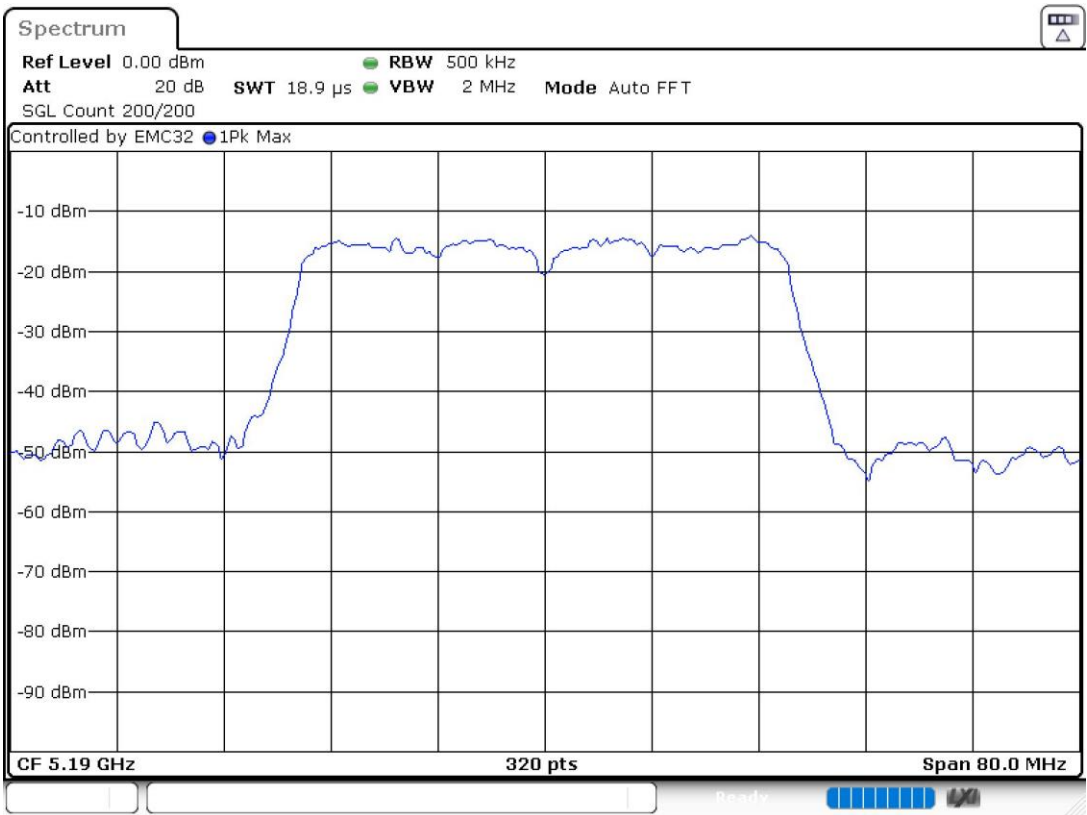
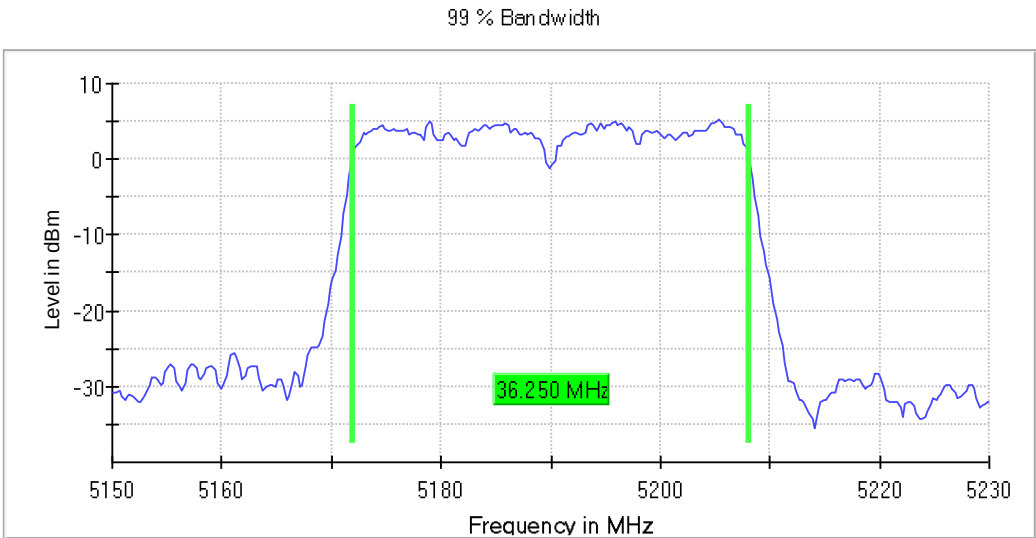
- High Channel 165 (5825 MHz):



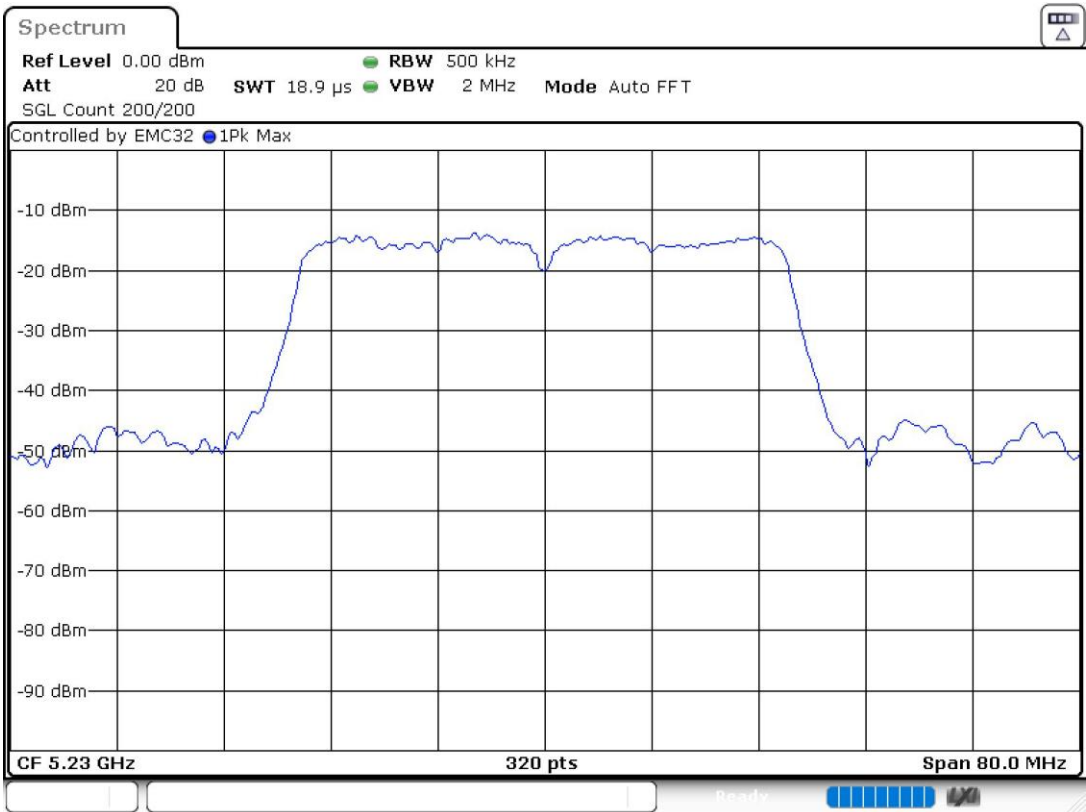
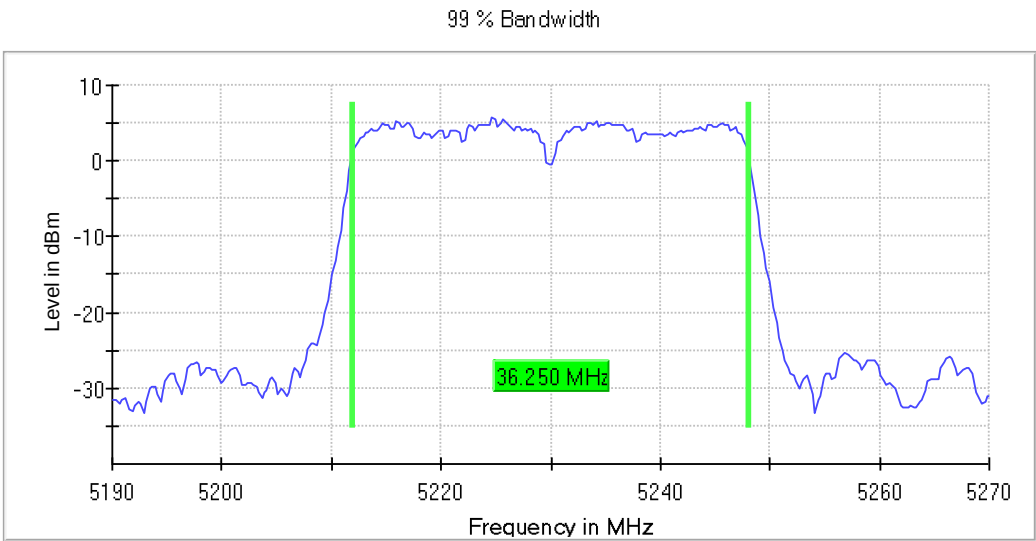
SISO 802.11 n40 (HT40)

U-NII-1 FCC (5150-5250 MHz)

- Low Channel 38 (5190 MHz):

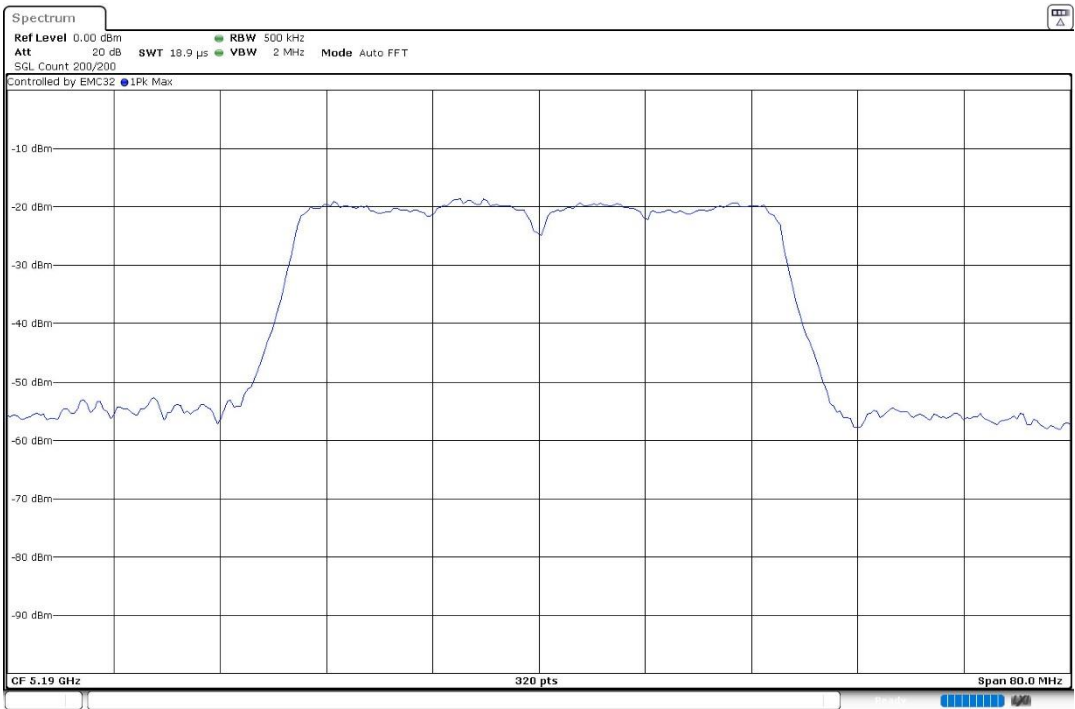
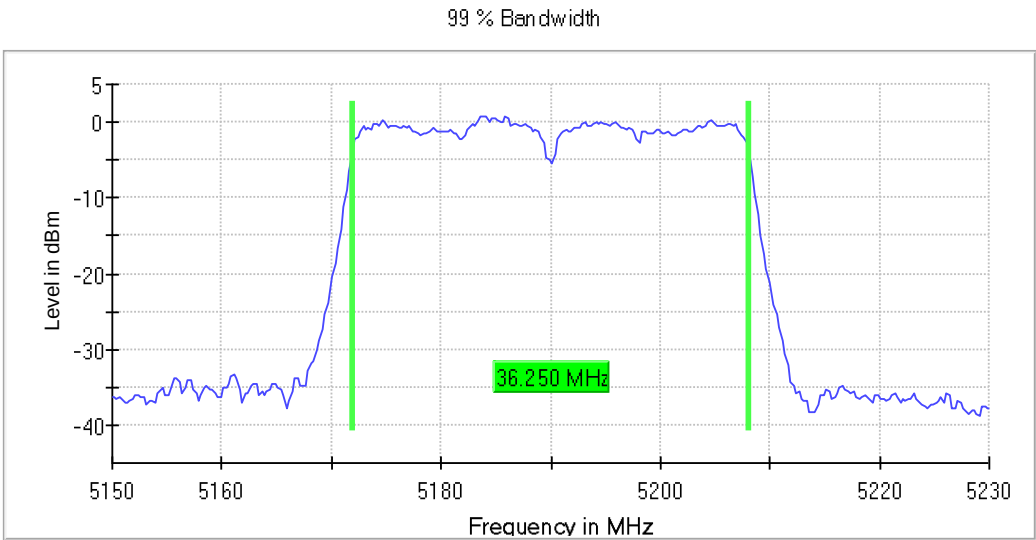


- High Channel 46 (5230 MHz):

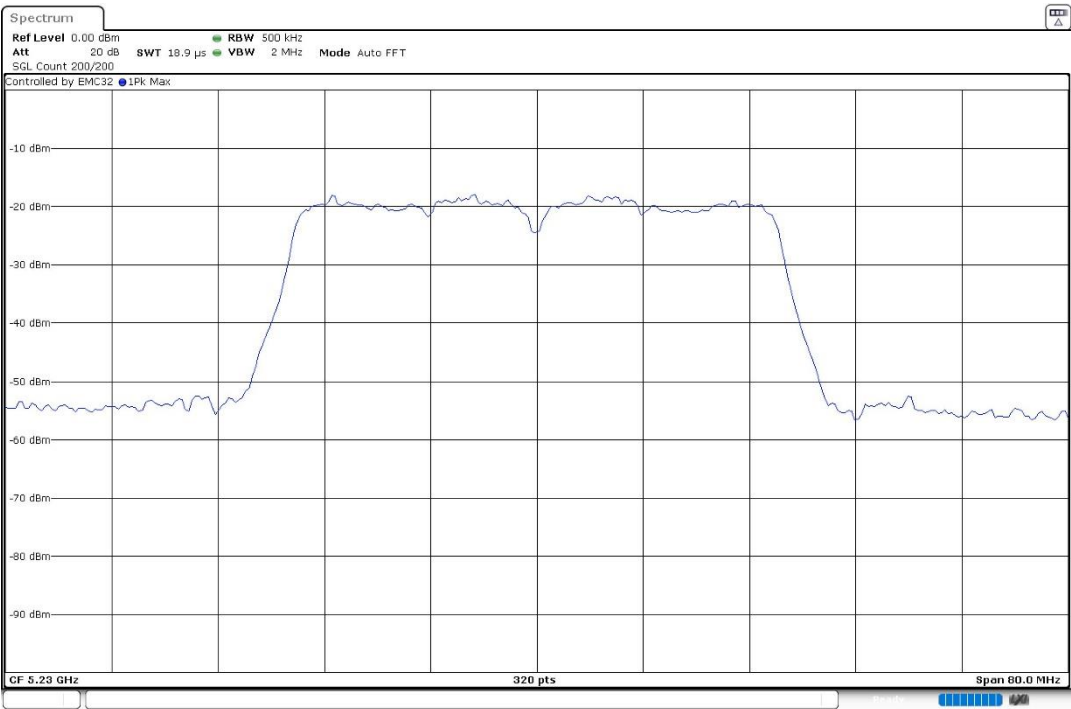
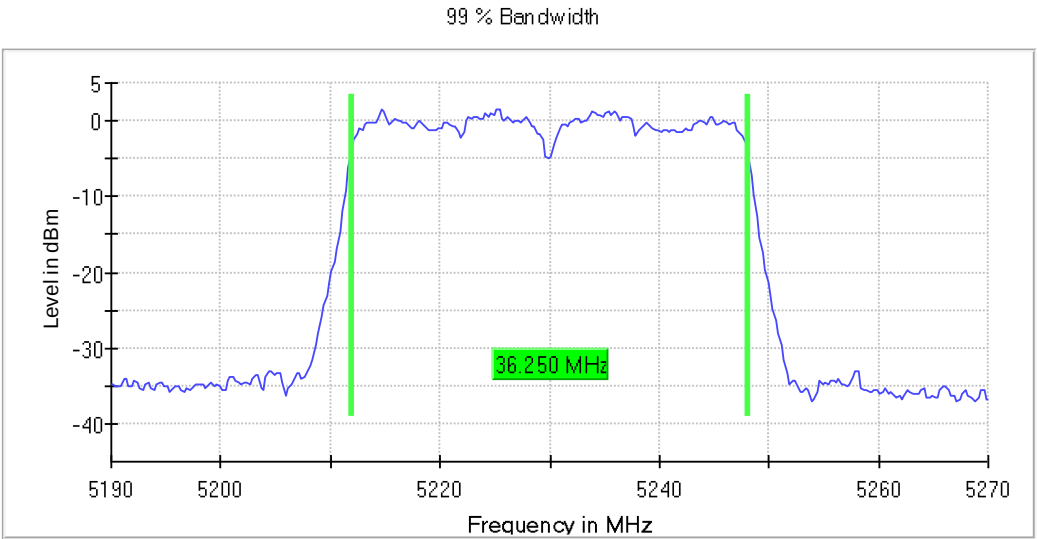


U-NII-1 RSS (5150-5250 MHz)

- Low Channel 38 (5190 MHz):

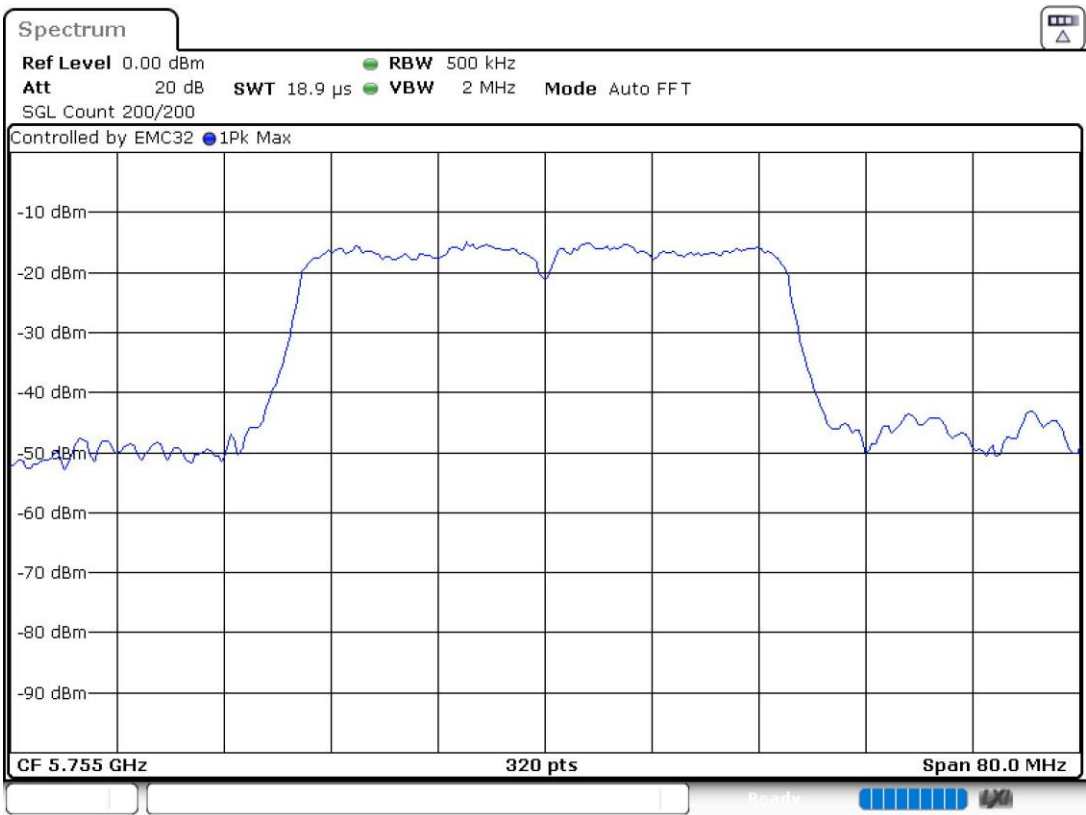
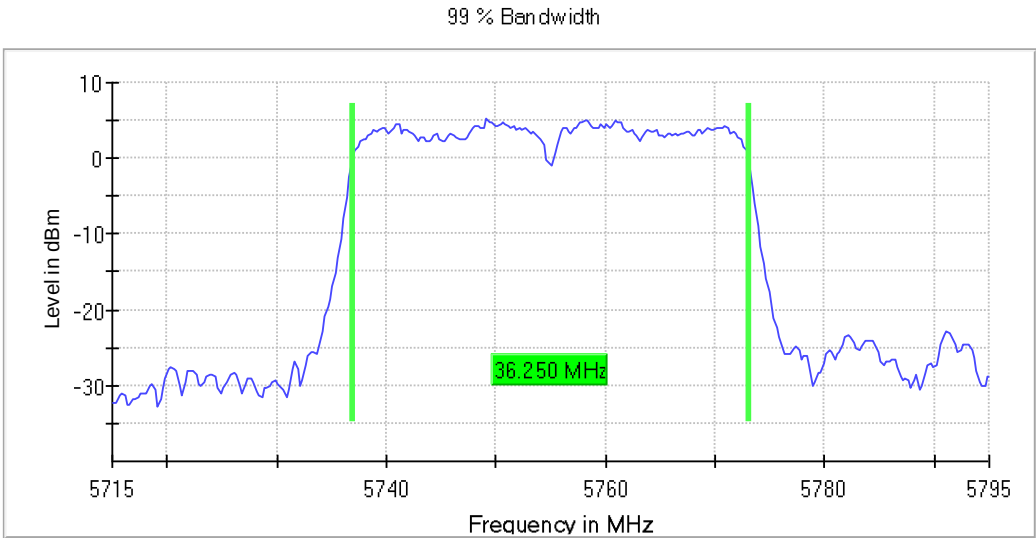


- High Channel 46 (5230 MHz):

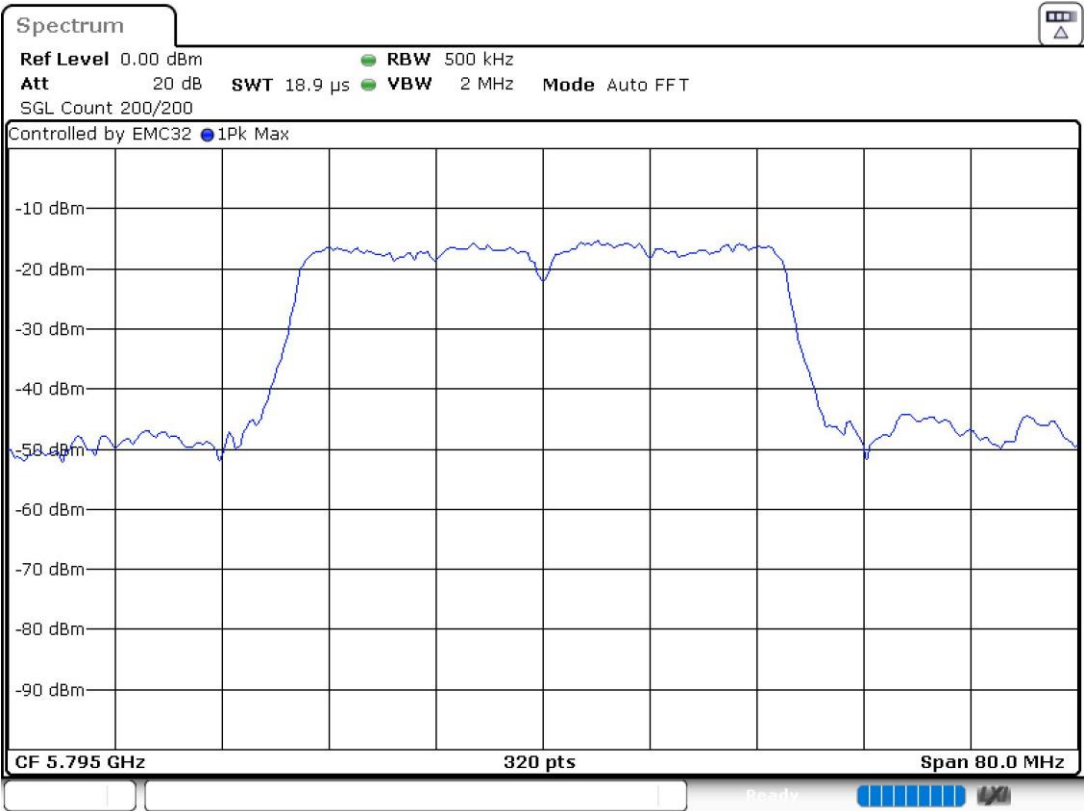
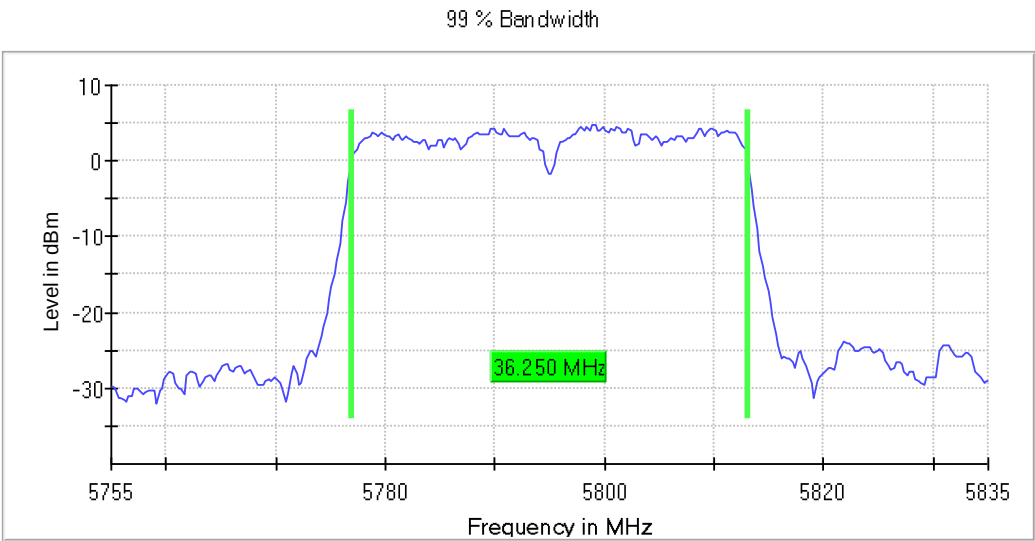


U-NII-3 (5725-5850 MHz)

- Low Channel 151 (5755 MHz):



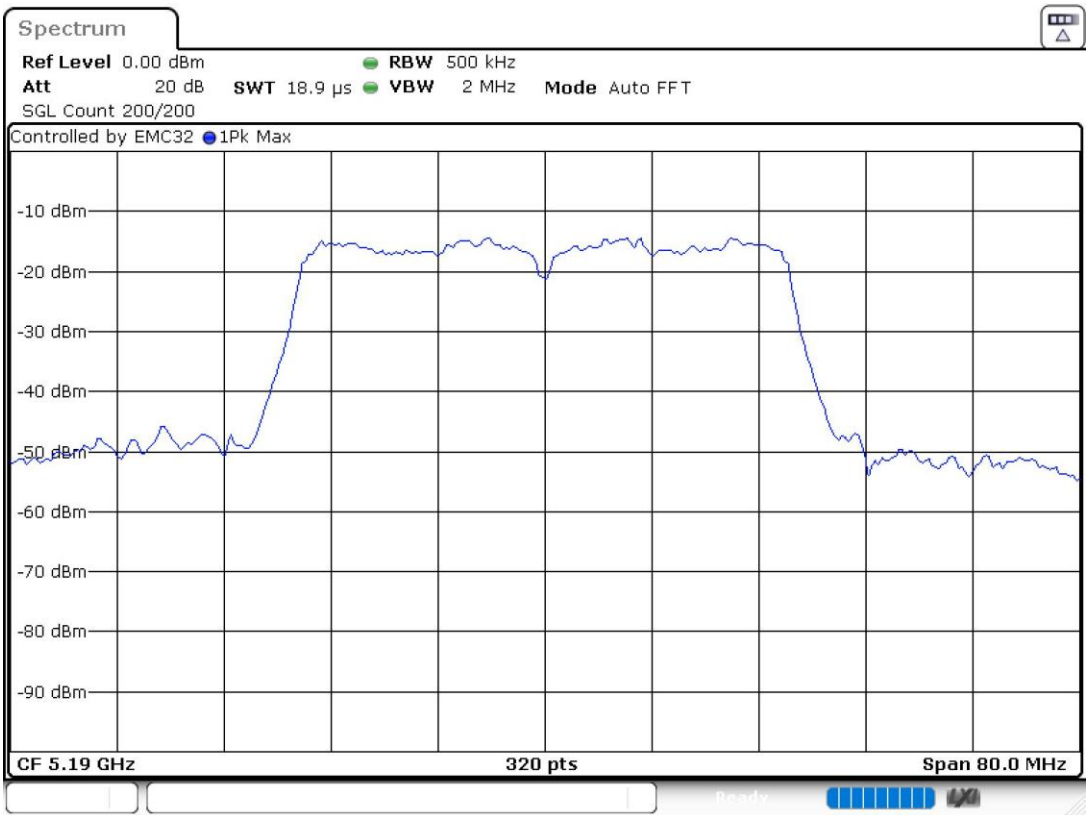
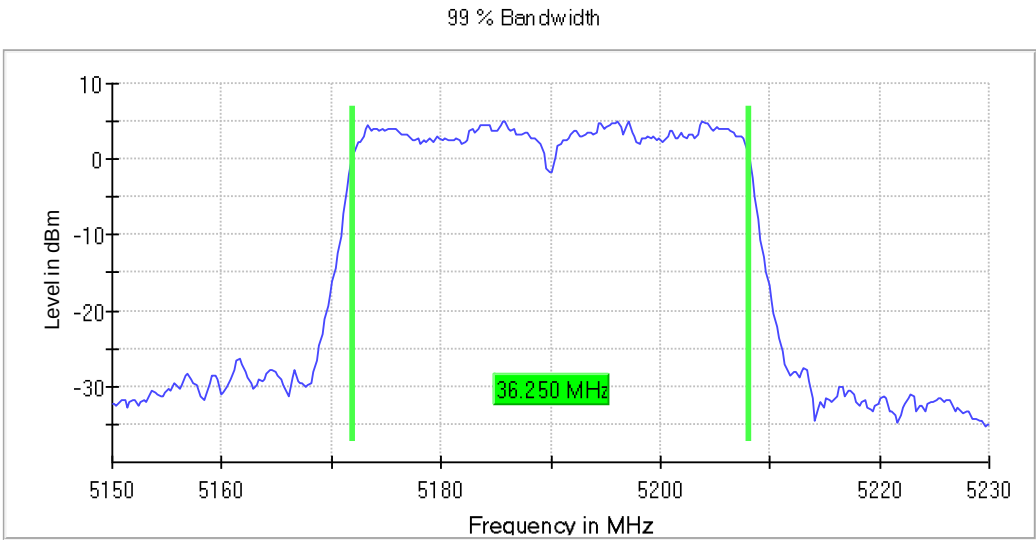
- High Channel 159 (5795 MHz):



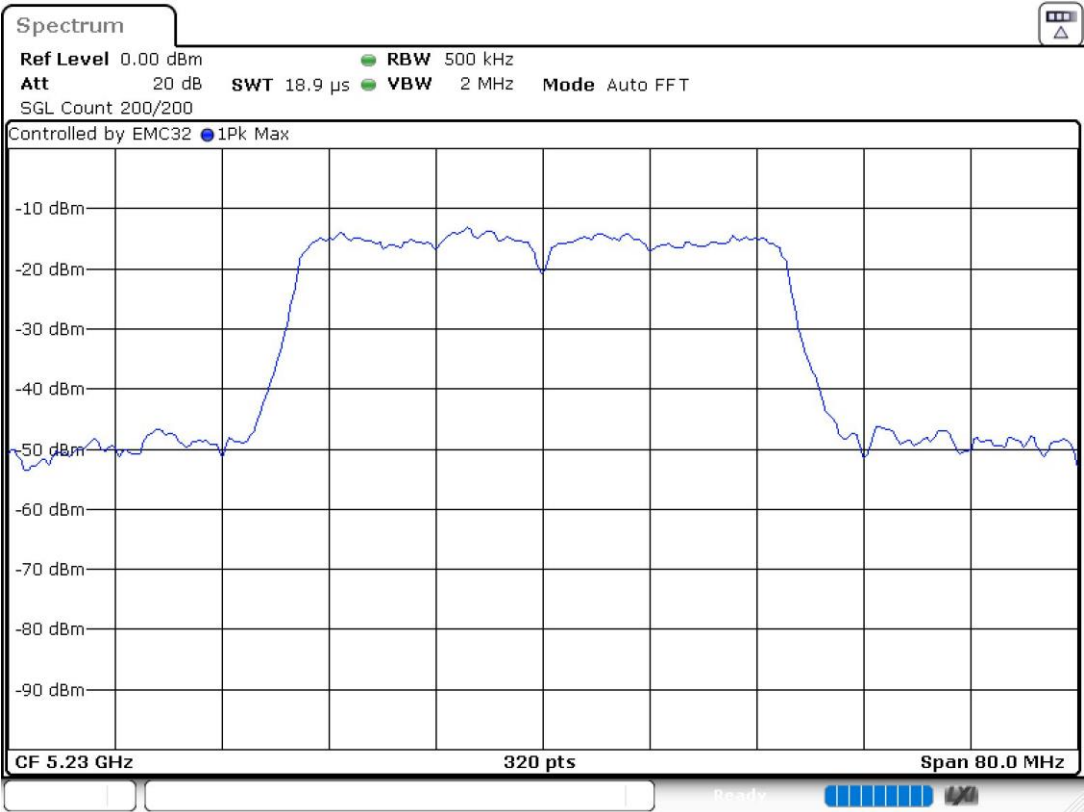
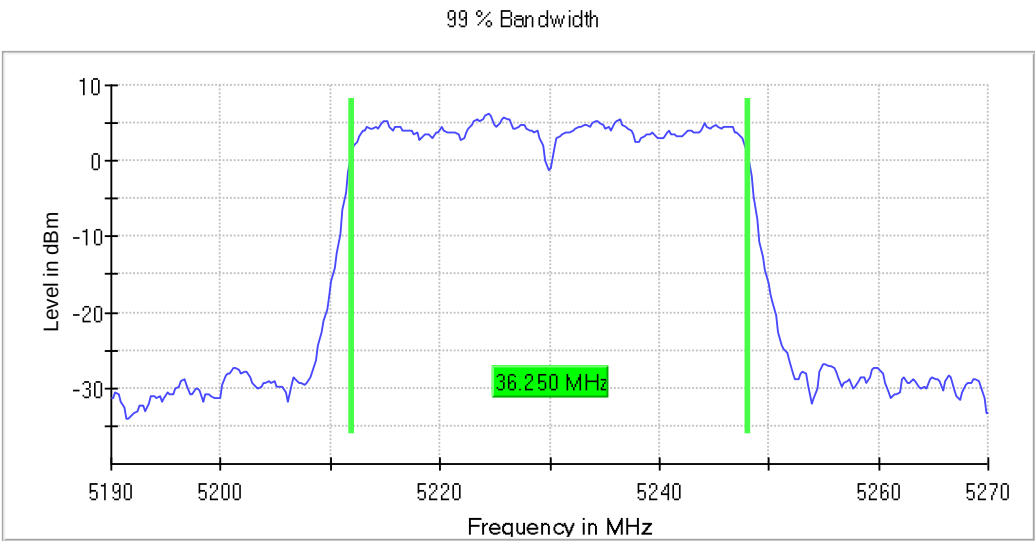
SISO 802.11 ac40 (VHT40)

U-NII-1 FCC (5150-5250 MHz)

- Low Channel 38 (5190 MHz):

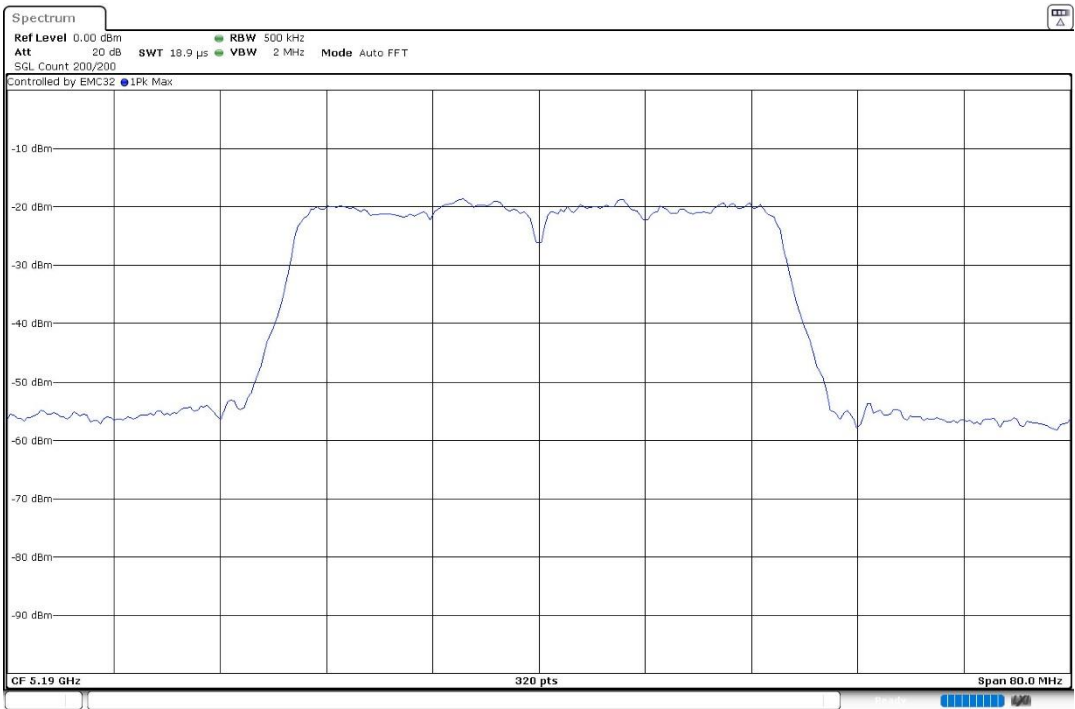
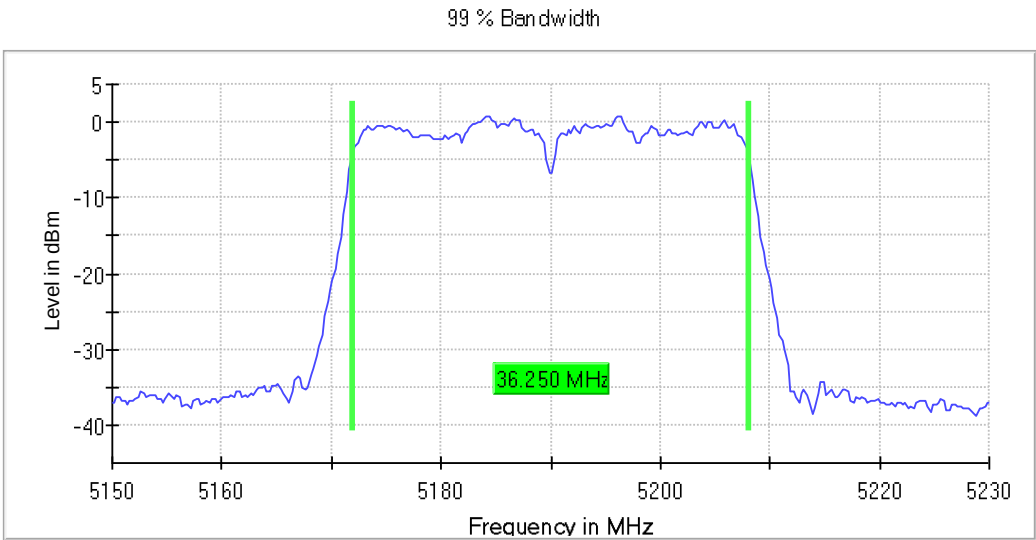


- High Channel 46 (5230 MHz):



U-NII-1 RSS (5150-5250 MHz)

- Low Channel 38 (5190 MHz):



- High Channel 46 (5230 MHz):

