TEST REPORT

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1. Report No : DRTFCC1803-0052(1)
2. Customer
   - Name : LG Electronics MobileComm USA, Inc.
   - Address : 1000 Sylvan Ave., Englewood Cliffs, New Jersey, United States, 07632
3. Use of Report : FCC Original Grant
4. Product Name / Model Name : Mobile Phone / DS1803
   FCC ID : ZNFDS1803
5. Test Method Used : KDB789033 D02v02r01
   Test Specification : FCC Part 15.407 Subpart E
6. Date of Test : 2018.02.09 ~ 2018.03.15
7. Testing Environment : Refer to appended test report.
8. Test Result : Refer to the attached test result.

Affirmation	Tested by Name : SunGeun Lee (Signature)	Reviewed by Name : Geunki Son (Signature)

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2018 . 03 . 16 .

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If this report is required to confirmation of authenticity, please contact to report@dtnc.net

Test Report Version

Test Report No.	Date	Description
DRTFCC1803-0052	Mar. 12, 2018	Initial issue
DRTFCC1803-0052(1)	Mar. 16, 2018	Revised the section 6.1 and updated OBW plot

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1. EUT DESCRIPTION

FCC Equipment Class	Unlicensed National Information Infrastructure (UNII)
Product	Mobile Phone
Model Name	DS1803
Add Model Name	NA
Power Supply	DC 3.85 V
Modulation type	OFDM
Antenna Specification	**Antenna type:** PIFA Antenna **Antenna gain:** Refer to the clause 7 in test report.

5GHz Band	Mode	Tx frequency (MHz)	Max power(dBm)
U-NII 1	802.11a	5180 ~ 5240	**15.89**
	802.11n(HT20)	5180 ~ 5240	14.97
	802.11ac(VHT20)	5180 ~ 5240	13.89
	802.11n(HT40)	5190 ~ 5230	13.14
	802.11ac(VHT40)	5190 ~ 5230	12.83
	802.11ac(VHT80)	5210	11.79
U-NII 2A	802.11a	5260 ~ 5320	**15.85**
	802.11n(HT20)	5260 ~ 5320	14.95
	802.11ac(VHT20)	5260 ~ 5320	13.80
	802.11n(HT40)	5270 ~ 5310	12.86
	802.11ac(VHT40)	5270 ~ 5310	12.71
	802.11ac(VHT80)	5290	11.58
U-NII 2C	802.11a	5500 ~ 5700	**15.99**
	802.11n(HT20)	5500 ~ 5700	14.92
	802.11ac(VHT20)	5500 ~ 5700	14.11
	802.11n(HT40)	5510 ~ 5670	13.05
	802.11ac(VHT40)	5510 ~ 5670	12.83
	802.11ac(VHT80)	5530 ~ 5610	11.68
U-NII 3	802.11a	5745 ~ 5825	**16.04**
	802.11n(HT20)	5745 ~ 5825	14.94
	802.11ac(VHT20)	5745 ~ 5825	14.10
	802.11n(HT40)	5755 ~ 5795	13.35
	802.11ac(VHT40)	5755 ~ 5795	13.01
	802.11ac(VHT80)	5775	11.88

2. Information about test items

2.1 Transmitting configuration of EUT

Mode	Data rate
802.11a	6~54Mbps
802.11n(HT20)	MCS 0 ~ 7
802.11ac(VHT20)	MCS 0 ~ 8
802.11n(HT40)	MCS 0 ~ 7
802.11ac(VHT40)	MCS 0 ~ 9
802.11ac(VHT80)	MCS 0 ~ 9

2.2 Tested Channel Information

5GHz Band	802.11a/n(HT20)/ ac(VHT20)		802.11n(HT40)/ ac(VHT40)		802.11ac(VHT80)	
	Channel	Frequency [MHz]	Channel	Frequency [MHz]	Channel	Frequency [MHz]
U-NII 1	36	5180	38	5190	42	5210
	40	5200	-	-	-	-
	48	5240	46	5230	-	-
U-NII 2A	52	5260	54	5270	58	5290
	60	5300	-	-	-	-
	64	5320	62	5310	-	-
U-NII 2C	100	5500	102	5510	106	5530
	116	5580	118	5590	122	5610
	140	5700	134	5670	-	-
U-NII 3	149	5745	151	5755	155	5775
	157	5785	-	-	-	-
	165	5825	159	5795	-	-

2.3 Testing Environment

Temperature	:	20 ºC ~ 25 ºC
Relative humidity content	:	40 % ~ 45 % R.H.
Details of power supply	:	DC 3.85 V

2.4 EMI Suppression Device(s)/Modifications

EMI suppression device(s) added and/or modifications made during testing
→ None

2.5 Measurement Uncertainty

The measurement uncertainties shown below were calculated in accordance with requirements of ANSI C 63.4-2014 and ANSI C 63.10-2013. All measurement uncertainty values are shown with a coverage factor of *k* = 2 to indicate a 95 % level of confidence.

Test items	Measurement uncertainty
Transmitter Output Power	± 0.7 dB (The confidence level is about 95 %, k = 2)
Conducted spurious emission	± 1.1 dB (The confidence level is about 95 %, k = 2)
AC conducted emission	± 2.4 dB (The confidence level is about 95 %, k = 2)
Radiated spurious emission (1 GHz Below)	± 5.1 dB (The confidence level is about 95 %, k = 2)
Radiated spurious emission (1 GHz ~ 18 GHz)	± 5.4 dB (The confidence level is about 95 %, k = 2)
Radiated spurious emission (18 GHz Above)	± 5.3 dB (The confidence level is about 95 %, k = 2)

3. SUMMARY OF TESTS

FCC Part Section(s)	Parameter	Limit	Test Condition	Status Note 1
I. Transmitter Mode (TX)				
15.407(a)	Emission Bandwidth (26 dB Bandwidth)	N/A	Conducted	C
15.407(e)	Minimum Emission Bandwidth (6 dB Bandwidth)	> 500 kHz in 5725 ~ 5850 MHz		C
15.407(a)	Maximum Conducted Output Power	5150 ~ 5250 MHz : < 23.97 dBm 5250 ~ 5350 & 5470 ~ 5725 MHz : < 250 mW or < 11 + 10 log10(B) dBm, whichever power is less. (B is the 26dB BW.) 5725 ~ 5850 MHz : < 30 dBm		C
15.407(a)	Peak Power Spectral Density	5150 ~ 5250 MHz : 11 dBm/MHz 5250 ~ 5350 MHz : 11 dBm/MHz 5470 ~ 5725 MHz : 11 dBm/MHz 5725 ~ 5850 MHz : 30 dBm/500kHz		C
15.407(g)	Frequency Stability	N/A		C
15.407(h)	Dynamic Frequency Selection	FCC 15.407(h)		C Note 2
15.407(b)	Undesirable Emissions	5150 ~ 5725 MHz: < -27 dBm/MHz EIRP 5725 ~ 5850 MHz: < -27 dBm/MHz or < 10 dBm/MHz or 15.6 dBm/MHz < 27dBm/MHz EIRP	Radiated	C Note 3
15.205 15.209 15.407(b)	General Field Strength Limits(Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209		C Note 3
15.207	AC Conducted Emissions	FCC 15.207	AC Line Conducted	C
15.203	Antenna Requirements	FCC 15.203	-	C

Note 1: **C** = Comply **NC** = Not Comply **NT** = Not Tested **NA** = Not Applicable

Note 2: Refer to the DFS test report.

Note 3: This test item was performed in each axis and the worst case data was reported.

4. TEST METHODOLOGY

Generally the tests were performed according to the **KDB789033 D02v02r01.** And ANSI C63.10-2013 was used to reference appropriate EUT setup and maximizing procedures of radiated spurious emission and AC line conducted emission testing

4.1 EUT configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

4.2 EUT exercise

The EUT was operated in the test mode to fix the Tx frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.407 under the FCC Rules Part 15 Subpart E.

4.3 General test procedures

Conducted Emissions

The power-line conducted emission test procedure is not described on the KDB789033 D02v02r01. So this test was fulfilled with the requirements in Section 6.2 of ANSI C63.10-2013.

The EUT is placed on the wooden table, which is 0.8 m above ground plane and the conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-peak and Average detector.

Radiated Emissions

Basically the radiated tests were performed with KDB789033 D02v02r01. But some requirements and procedures like test site requirements, EUT setup and maximizing procedure were fulfilled with the requirements in Section 5 and 6 of the ANSI C63.10-2013 as stated on KDB789033 D02v02r01.

The EUT is placed on a non-conductive table, which is 0.8 m above ground plane. For emission measurements above 1 GHz, the table height is 1.5 m. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 1 or 3 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the highest emission, the relative positions of the EUT were rotated through three orthogonal axis.

4.4 Description of test modes

The EUT has been tested with all modes of operating conditions to determine the worst case emission characteristics.

A test program is used to control the EUT for staying in continuous transmitting mode with maximum fixed duty cycle.

5. 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.

6. FACILITIES AND ACCREDITATIONS

6.1 Facilities

DT&C Co., Ltd.		
The 3 m test site and conducted measurement facility used to collect the radiated data are located at the 42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 17042. The test site comply with the requirements of § 2.948 according to ANSI 63.4-2014. **- FCC MRA Accredited Test Firm No. : KR0034**		
www.dtnc.net		
Telephone	:	+ 82-31-321-2664
FAX	:	+ 82-31-321-1664

6.2 Equipment

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, loop, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and peak, 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.”

7. ANTENNA REQUIREMENTS

According to FCC 47 CFR §15.203:

An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

The antenna is attached on the device by means of unique coupling method (Spring Tension).
Therefore this E.U.T Complies with the requirement of §15.203

Directional antenna gain:

Bands	ANT [dBi]
U-NII 1	0.01
U-NII 2A	0.01
U-NII 2C	0.01
U-NII 3	0.01

8. TEST RESULT

8.1 Emission Bandwidth (26 dB Bandwidth)

▣ Test Requirements

The bandwidth at 26 dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies.

The 26 dB bandwidth is used to determine the conducted output power limit.

▣ Test Configuration

Refer to the APPENDIX I.

▣ Test Procedure

The transmitter output is connected to the Spectrum Analyzer and used following test procedure of **KDB789033 D02v02r01**.

1. Set resolution bandwidth (RBW) = approximately **1 %** of the EBW.
2. Set the video bandwidth **(VBW) > RBW**.
3. Detector = **Peak**.
4. Trace mode = **max hold**.

   Measure the maximum width of the emission that is 26 dB down from the peak 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 RESULTS: Comply**

Mode	Band	Channel	Frequency [MHz]	Test Result [MHz]
802.11a	U-NII 1	36	5180	21.21
		40	5200	21.07
		48	5240	20.30
	U-NII 2A	52	5260	21.53
		60	5300	20.81
		64	5320	20.91
	U-NII 2C	100	5500	20.46
		116	5580	20.29
		140	5700	20.54
802.11n (HT20)	U-NII 1	36	5180	21.14
		40	5200	20.68
		48	5240	20.78
	U-NII 2A	52	5260	20.71
		60	5300	20.95
		64	5320	20.94
	U-NII 2C	100	5500	20.78
		116	5580	20.98
		140	5700	20.81
802.11n (HT40)	U-NII 1	38	5190	42.98
		46	5230	43.28
	U-NII 2A	54	5270	42.37
		62	5310	43.07
	U-NII 2C	102	5510	43.11
		118	5590	42.37
		134	5670	42.90
802.11ac (VHT80)	U-NII 1	42	5210	83.21
		-	-	-
	U-NII 2A	58	5290	83.44
		-	-	-
	U-NII 2C	106	5530	83.20
		122	5610	83.77

▣ Result Plots

26 dB Bandwidth Test Mode: 802.11a & Ch.36

26 dB Bandwidth Test Mode: 802.11a & Ch.40

26 dB Bandwidth Test Mode: 802.11a & Ch.48

26 dB Bandwidth Test Mode: 802.11a & Ch.52

26 dB Bandwidth Test Mode: 802.11a & Ch.60

26 dB Bandwidth Test Mode: 802.11a & Ch.64

26 dB Bandwidth Test Mode: 802.11a & Ch.100

26 dB Bandwidth Test Mode: 802.11a & Ch.116

26 dB Bandwidth Test Mode: 802.11a & Ch.140

26 dB Bandwidth Test Mode: 802.11n HT20 & Ch.36

26 dB Bandwidth Test Mode: 802.11n HT20 & Ch.40

26 dB Bandwidth Test Mode: 802.11n HT20 & Ch.48

26 dB Bandwidth Test Mode: 802.11n HT20 & Ch.52

26 dB Bandwidth Test Mode: 802.11n HT20 & Ch.60

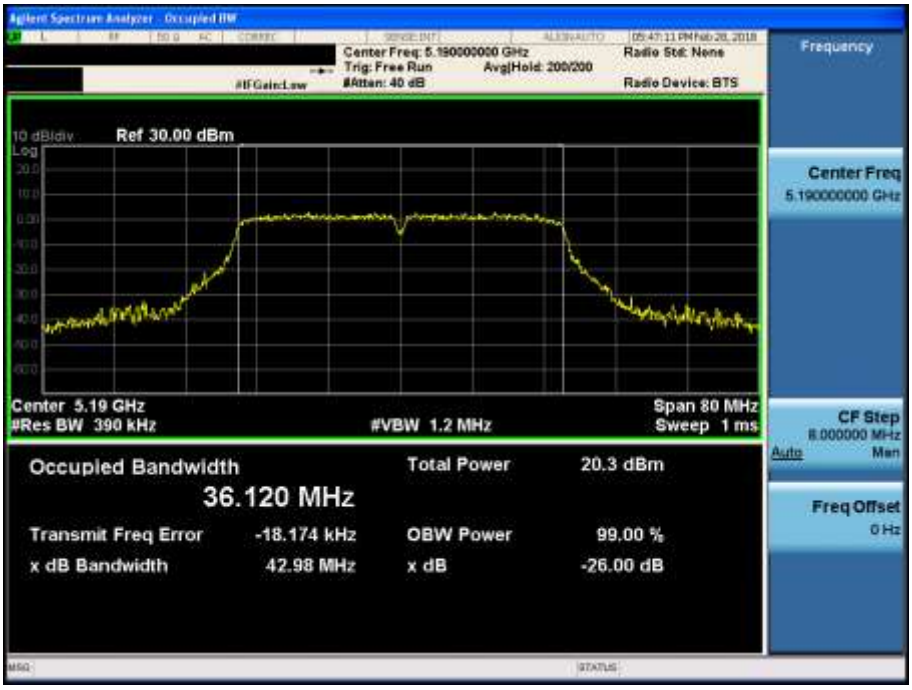
26 dB Bandwidth Test Mode: 802.11n HT20 & Ch.64

26 dB Bandwidth Test Mode: 802.11n HT20 & Ch.100

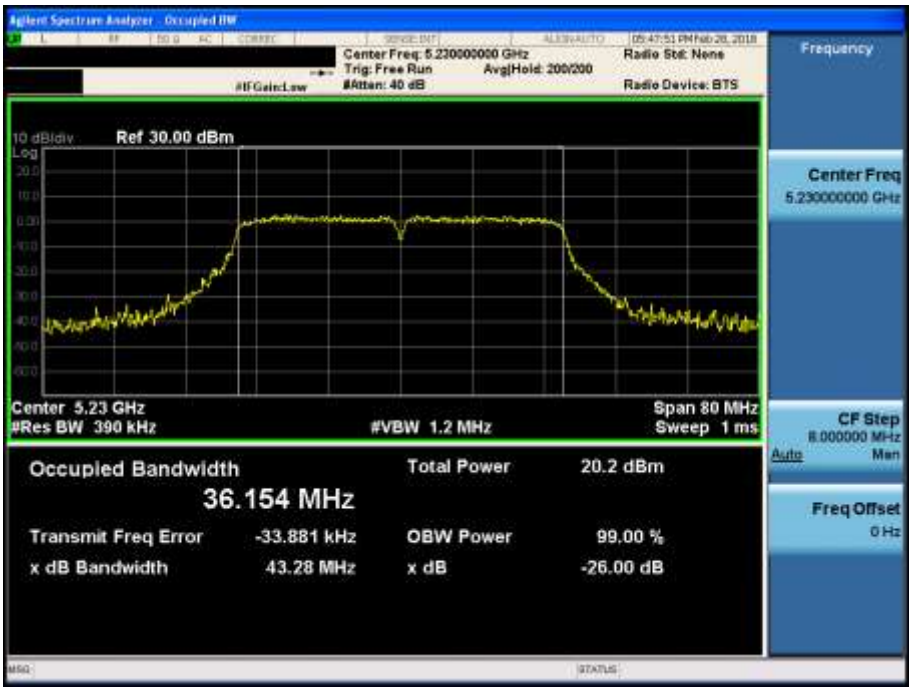
26 dB Bandwidth Test Mode: 802.11n HT20 & Ch.116

26 dB Bandwidth Test Mode: 802.11n HT20 & Ch.140

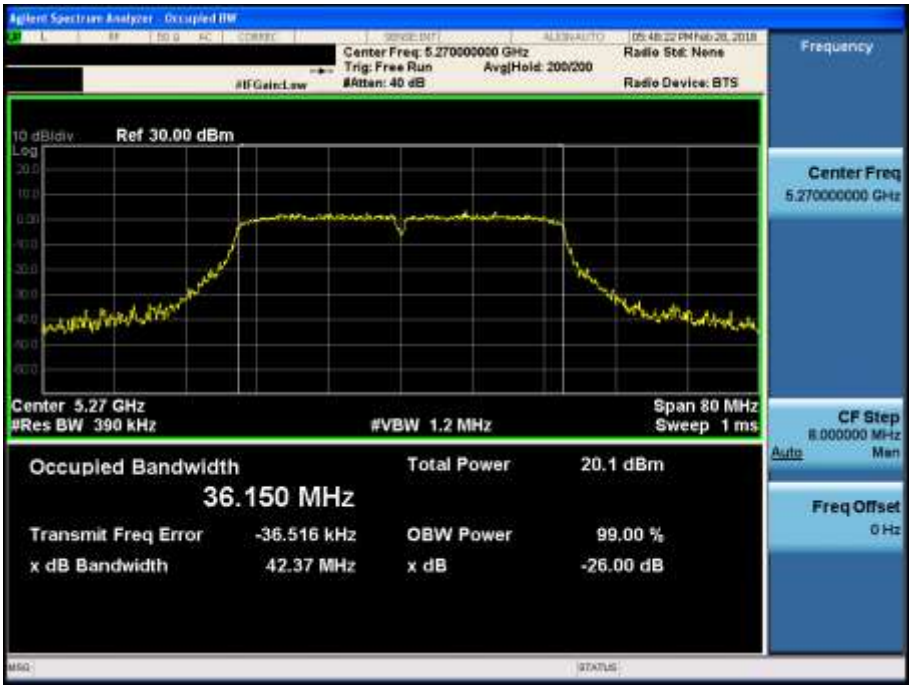
26 dB Bandwidth Test Mode: 802.11n HT40 & Ch.38



26 dB Bandwidth Test Mode: 802.11n HT40 & Ch.46

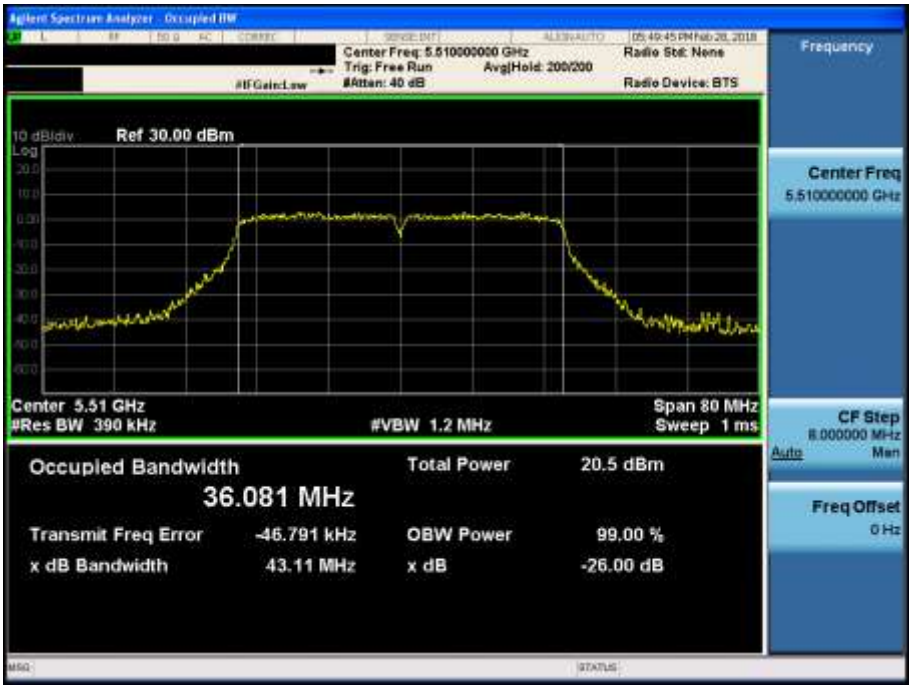


26 dB Bandwidth Test Mode: 802.11n HT40 & Ch.54

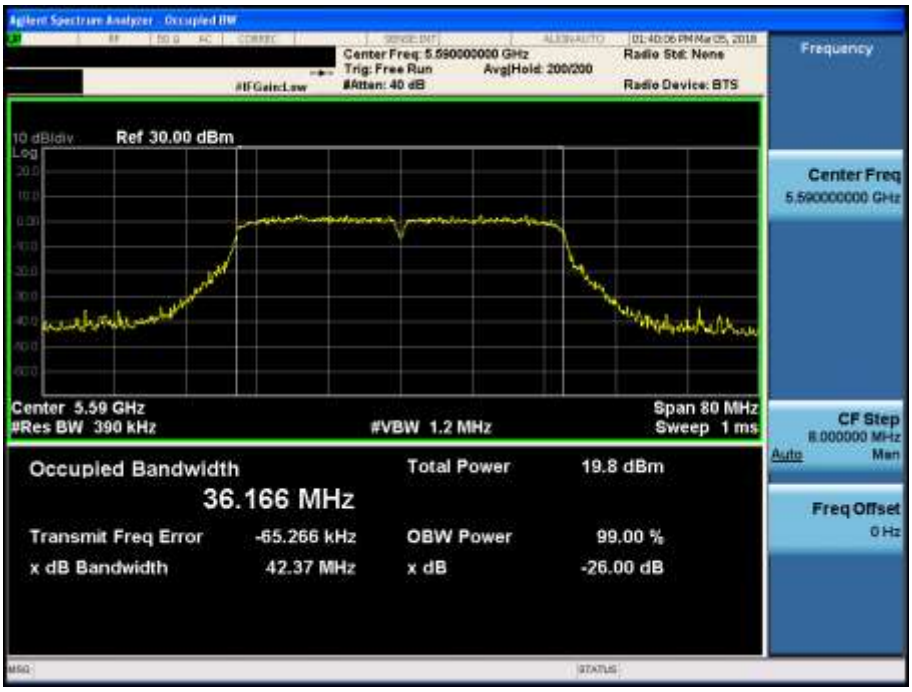


26 dB Bandwidth Test Mode: 802.11n HT40 & Ch.62

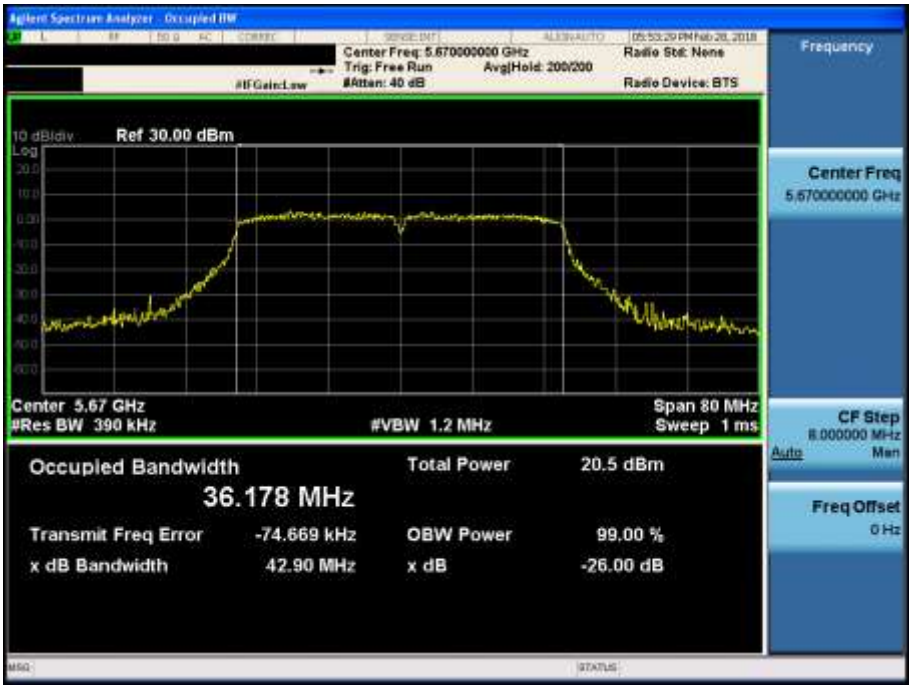
26 dB Bandwidth Test Mode: 802.11n HT40 & Ch.102



26 dB Bandwidth Test Mode: 802.11n HT40 & Ch.118



26 dB Bandwidth Test Mode: 802.11n HT40 & Ch.134



26 dB Bandwidth Test Mode: 802.11ac VHT80 & Ch.42

26 dB Bandwidth Test Mode: 802.11ac VHT80 & Ch.58

26 dB Bandwidth Test Mode: 802.11ac VHT80 & Ch.106

26 dB Bandwidth Test Mode: 802.11ac VHT80 & Ch.122

8.2 Minimum Emission Bandwidth (6 dB Bandwidth)

▣ Test Requirements

Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

▣ Test Configuration

Refer to the APPENDIX I.

▣ TEST PROCEDURE

The transmitter output is connected to the Spectrum Analyzer and used following test procedure of **KDB789033 D02v02r01**.

1. Set resolution bandwidth (RBW) = 100 kHz
2. Set the video bandwidth **≥ 3 x RBW**.
3. Detector = **Peak**.
4. Trace mode = **max hold**.

   Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

▣ TEST RESULTS: Comply

Mode	Band	Channel	Frequency [MHz]	Test Result [MHz]
802.11a	U-NII 3	149	5745	16.32
		157	5785	16.32
		165	5825	16.07
802.11n (HT20)	U-NII 3	149	5745	16.36
		157	5785	16.58
		165	5825	16.32
802.11n (HT40)	U-NII 3	151	5755	35.16
		159	5795	35.50
802.11ac (VHT80)	U-NII 3	155	5775	73.92

▣ RESULT PLOTS

6 dB Bandwidth Test Mode: 802.11a & Ch.149

6 dB Bandwidth Test Mode: 802.11a & Ch.157

6 dB Bandwidth Test Mode: 802.11a & Ch.165

6 dB Bandwidth Test Mode: 802.11n HT20 & Ch.149

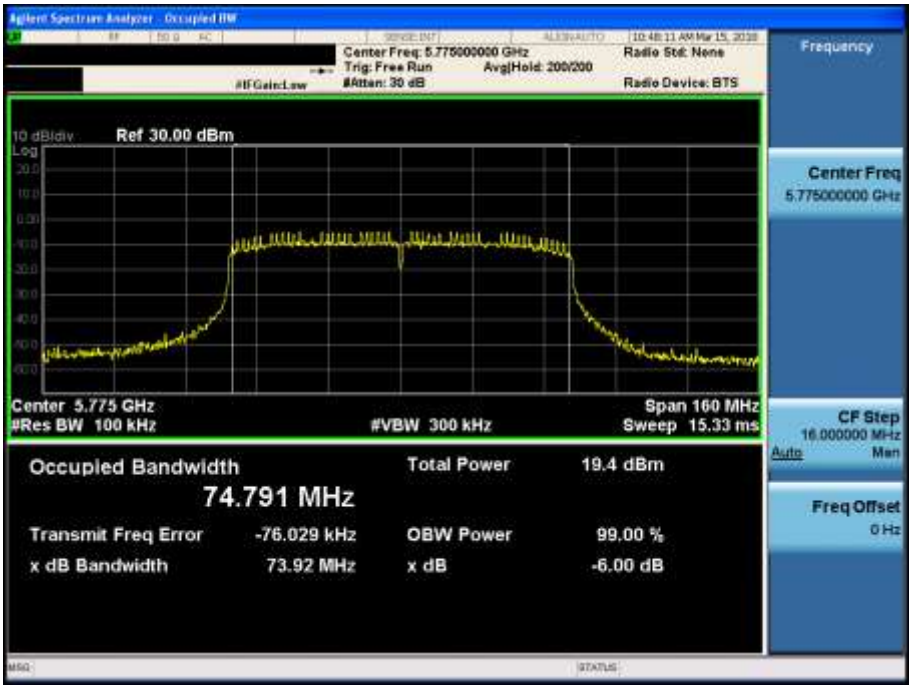
6 dB Bandwidth Test Mode: 802.11n HT20 & Ch.157

6 dB Bandwidth Test Mode: 802.11n HT20 & Ch.165

6 dB Bandwidth Test Mode: 802.11n HT40 & Ch.151

6 dB Bandwidth Test Mode: 802.11n HT40 & Ch.159

6 dB Bandwidth Test Mode: 802.11ac VHT80 & Ch.155



8.3 Maximum Conducted Output Power

▣ Test Requirements

Part. 15.407(a)

(1) For the band 5.15 - 5.25 GHz.

(i) For an outdoor access point operating in the band 5.15 - 5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15 - 5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15 - 5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For mobile and portable client devices in the 5.15 - 5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(2) For the 5.25 - 5.35 GHz and 5.47 - 5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(3) For the band 5.725 - 5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

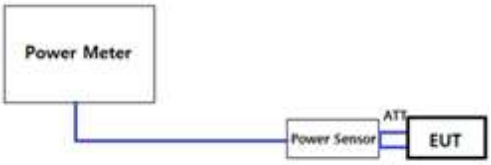
- Output power Limit Calculation

Band	Power Limit [mW]	Calculated Limit [dBm]	Antenna Gain (Worst case) [dBi]	Determined Limit [dBm]
U-NII 1	250	23.97	0.01	23.97

Band	Power Limit [mW] / Least 26 dBc BW [MHz]	Calculated Limit [dBm]	Antenna Gain (Worst case) [dBi]	Determined Limit [dBm]
U-NII 2A	250	23.97	0.01	23.97
	20.71	24.16		
U-NII 2C	250	23.97	0.01	23.97
	20.29	24.07		

Band	Power Limit [mW]	Calculated Limit [dBm]	Antenna Gain [dBi]	Determined Limit [dBm]
U-NII 3	1000	30.00	0.01	30.00

▣ Test Configuration



Method PM-G

▣ Test Configuration

Method PM-G of KDB789033 D02v02r01

Measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

▣ Test Results: Comply

- Output Power

Mode	CH	Freq.[MHz]	Test Result [dBm]
802.11a	36	5180	15.89
	40	5200	15.87
	48	5240	15.88
	52	5260	15.79
	60	5300	15.83
	64	5320	15.85
	100	5500	15.99
	116	5580	15.78
	140	5700	15.82
	149	5745	15.61
	157	5785	15.92
	165	5825	16.04

Mode	CH	Freq.[MHz]	Test Result [dBm]
802.11n (HT20)	36	5180	14.97
	40	5200	14.97
	48	5240	14.92
	52	5260	14.77
	60	5300	14.89
	64	5320	14.95
	100	5500	14.92
	116	5580	14.82
	140	5700	14.84
	149	5745	14.94
	157	5785	14.92
	165	5825	14.93

Mode	CH	Freq.[MHz]	Test Result[dBm]
802.11n(HT40)	38	5190	13.14
	46	5230	12.91
	54	5270	12.70
	62	5310	12.86
	102	5510	13.05
	118	5590	12.91
	134	5670	13.01
	151	5755	13.05
	159	5795	13.35

Mode	CH	Freq.[MHz]	Test Result[dBm]
802.11ac(VHT20)	36	5180	13.89
	40	5200	13.67
	48	5240	13.77
	52	5260	13.59
	60	5300	13.68
	64	5320	13.80
	100	5500	13.88
	116	5580	13.77
	140	5700	14.11
	149	5745	13.85
	157	5785	13.98
	165	5825	14.10

Mode	CH	Freq.[MHz]	Test Result[dBm]
802.11ac(VHT40)	38	5190	12.83
	46	5230	12.75
	54	5270	12.46
	62	5310	12.71
	102	5510	12.63
	118	5590	12.70
	134	5670	12.83
	151	5755	12.87
	159	5795	13.01

Mode	CH	Freq.[MHz]	Test Result[dBm]
802.11ac(VHT80)	42	5210	11.79
	58	5290	11.58
	106	5530	11.67
	122	5610	11.68
	155	5775	11.88

8.4 Maximum Power Spectral Density

▣ Test requirements

Part. 15.407(a)

(1) For the band 5.15 - 5.25 GHz.
(i) For an outdoor access point operating in the band 5.15 - 5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 MHz band. **note1**

(ii) For an indoor access point operating in the band 5.15 - 5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 MHz band. note1

(iii) For fixed point-to-point access points operating in the band 5.15 - 5.25 GHz, transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi.

(iv) For mobile and portable client devices in the 5.15 - 5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 MHz band. note1

(2) For the 5.25 - 5.35 GHz and 5.47 - 5.725 GHz bands, the peak power spectral density shall not exceed 11 dBm in any 1 MHz band. note1

(3) For the band 5.725 - 5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500 kHz band.note1,note2

Note1: If transmitting antennas of directional gain greater than 6 dBi are used, the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Note2: Fixed point - to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information.

- Peak Power Spectral Density Limit Calculation

Band	Limit [dBm]	Antenna Gain (Worst case) [dBi]	Determined Limit [dBm]
U-NII 1	11	0.01	11
U-NII 2A	11	0.01	11
U-NII 2C	11	0.01	11
U-NII 3	30	0.01	30

▣ Test Configuration

Refer to the APPENDIX I.

▣ Test procedure

Maximum Power Spectral Density is measured using Measurement Procedure **of KDB789033 D02v02r01**

1) Create an average power spectrum for the EUT operating mode being tested by following the instructions in section II.E.2. for measuring maximum conducted output power using a spectrum analyzer or EMI receiver: select the appropriate test method (SA - 1, SA - 2, SA - 3, or alternatives to each) and apply it up to, but not including, the step labeled, "Compute power…". (This procedure is required even if the maximum conducted output power measurement was performed using a power meter, method PM.)

2) Use the peak search function on the instrument to find the peak of the spectrum and record its value.

3) Make the following adjustments to the peak value of the spectrum, if applicable:

a) If Method SA - 2 or SA - 2 Alternative was used, add 10 log(1 / x), where x is the duty cycle, to the peak of the spectrum.

b) If Method SA - 3 Alternative was used and the linear mode was used in step II.E.2.g (viii), add 1 dB to the final result to compensate for the difference between linear averaging and power averaging.

4) The result is the Maximum PSD over 1 MHz reference bandwidth.

5) For devices operating in the bands 5.15 - 5.25 GHz, 5.25 - 5.35 GHz, and 5.47 - 5.725 GHz, the above procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in §15.407(a)(5). For devices operating in the band 5.725 - 5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of a RBWs less than 1 MHz, or 500 kHz, "provided that the measured power is integrated over the full reference bandwidth" to show the total power over the specified measurement bandwidth (i.e., 1 MHz, or 500 kHz). If measurements are performed using a reduced resolution bandwidth (< 1 MHz, or < 500 kHz) and integrated over 1 MHz, or 500 kHz bandwidth, the following adjustments to the procedures apply:

a) Set RBW ≥ 1 / T, where T is defined in section II.B.1.a). (Refer to Appendix II)

b) Set VBW ≥ 3 RBW.

c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10 log(500 kHz / RBW) to the measured result, whereas RBW (< 500 kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.

d) If measurement bandwidth of Maximum PSD is specified in 1 MHz, add 10 log(1 MHz / RBW) to the measured result, whereas RBW (< 1 MHz) is the reduced resolution bandwidth of spectrum analyzer set during measurement.

e) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

Note: As a practical matter, it is recommended to use reduced RBW of 100 kHz for the sections 5.c) and 5.d) above, since RBW = 100 kHz is available on nearly all spectrum analyzers.

▣ **Test results: Comply**

- Power spectral density: Single

Mode	Channel	Frequency [MHz]	Reading [dBm]	T.F Note 1 [dB]	Test Result [dBm]
802.11a	36	5180	-3.16	10.05	6.89
	40	5200	-3.49		6.56
	48	5240	-3.24		6.81
	52	5260	-3.27		6.78
	60	5300	-3.43		6.62
	64	5320	-3.19		6.86
	100	5500	-3.21		6.84
	116	5580	-3.43		6.62
	140	5700	-3.20		6.85
	149	5745	-3.12	7.04	3.92
	157	5785	-2.90		4.14
	165	5825	-2.63		4.41
802.11n (HT20)	36	5180	-4.43	10.05	5.62
	40	5200	-4.64		5.41
	48	5240	-4.72		5.33
	52	5260	-4.61		5.44
	60	5300	-4.29		5.76
	64	5320	-4.30		5.75
	100	5500	-4.39		5.66
	116	5580	-4.39		5.66
	140	5700	-4.09		5.96
	149	5745	-4.36	7.04	2.68
	157	5785	-4.16		2.88
	165	5825	-4.04		3.00
802.11n (HT40)	38	5190	-9.54	10.07	0.53
	46	5230	-9.82		0.25
	54	5270	-9.69		0.38
	62	5310	-9.37		0.70
	102	5510	-9.45		0.63
	118	5590	-9.89		0.18
	134	5670	-9.24		0.83
	151	5755	-9.25	7.06	-2.19
	159	5795	-9.00		-1.94
802.11ac (VHT80)	42	5210	-12.90	10.35	-2.55
	58	5290	-12.84		-2.49
	106	5530	-12.64		-2.29
	122	5610	-12.63		-2.28
	155	5775	-12.08	7.34	-4.74

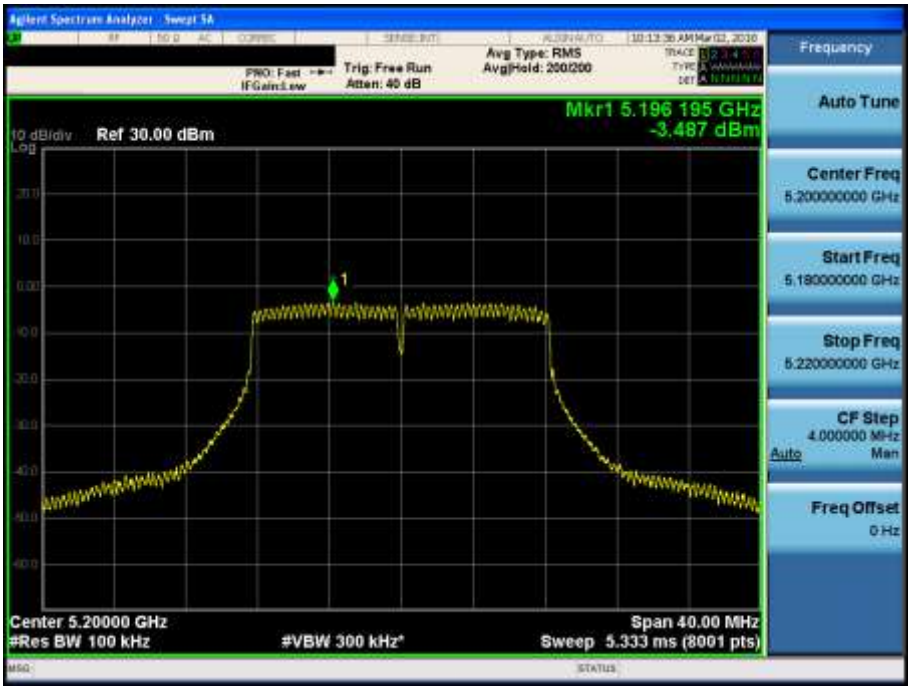
Note 1: "U-NII 1, 2A, 2C [T.F] = 10*LOG(1MHz/100kHz) + DCCF"
"U-NII 3 [T.F] = 10*LOG(500kHz/100kHz) + DCCF"
For DCCF(Duty Cycle Correction Factor) please refer to appendix II.
Note 2: Test Result = Measurement Data + T.F

▣ RESULT PLOTS

- Power spectral density

Maximum Power Spectral Density Test Mode: 802.11a & Ch.36

Maximum Power Spectral Density Test Mode: 802.11a & Ch.40



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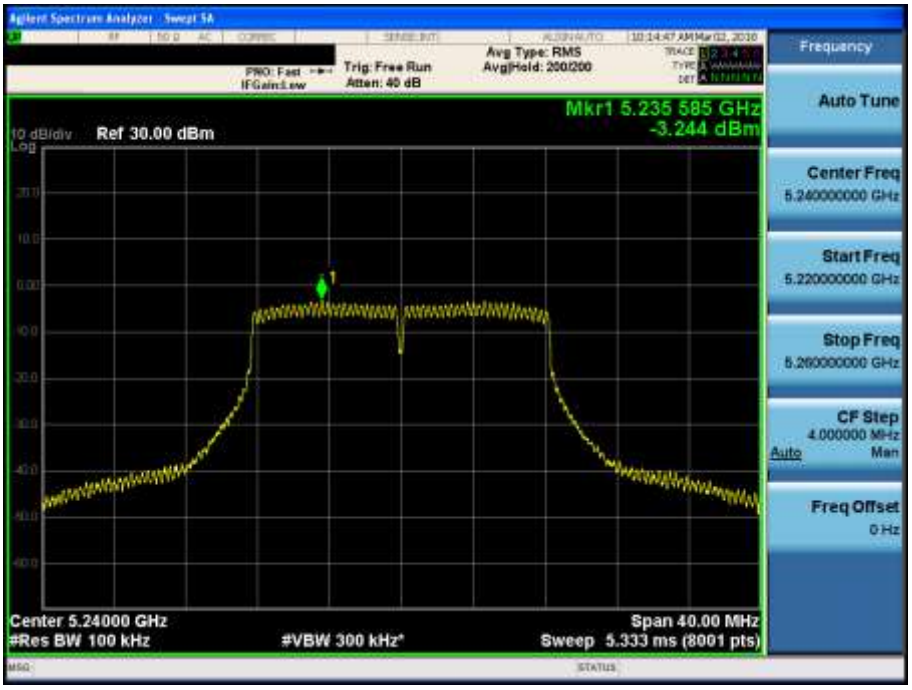
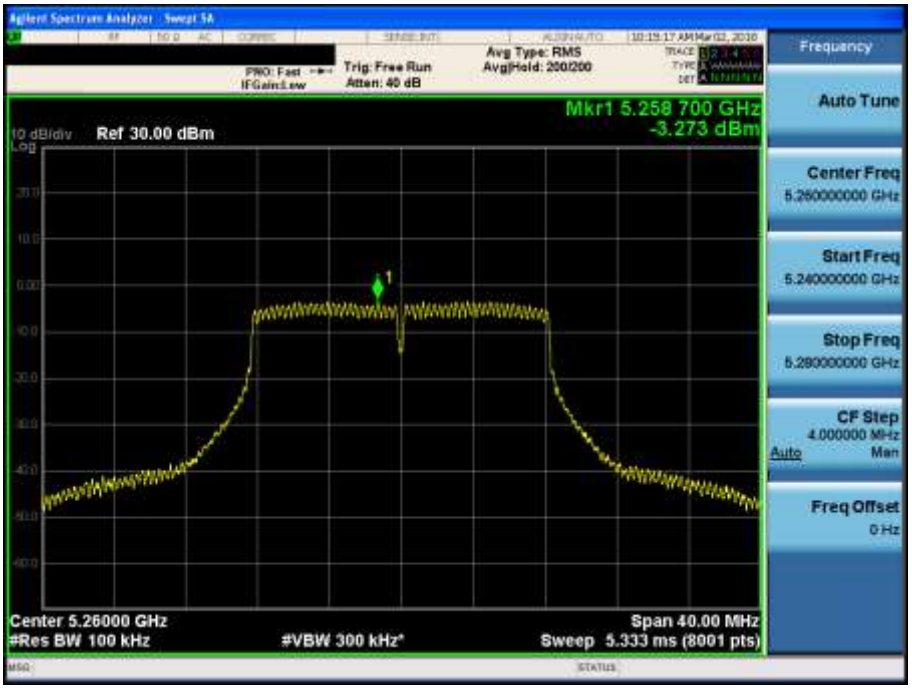
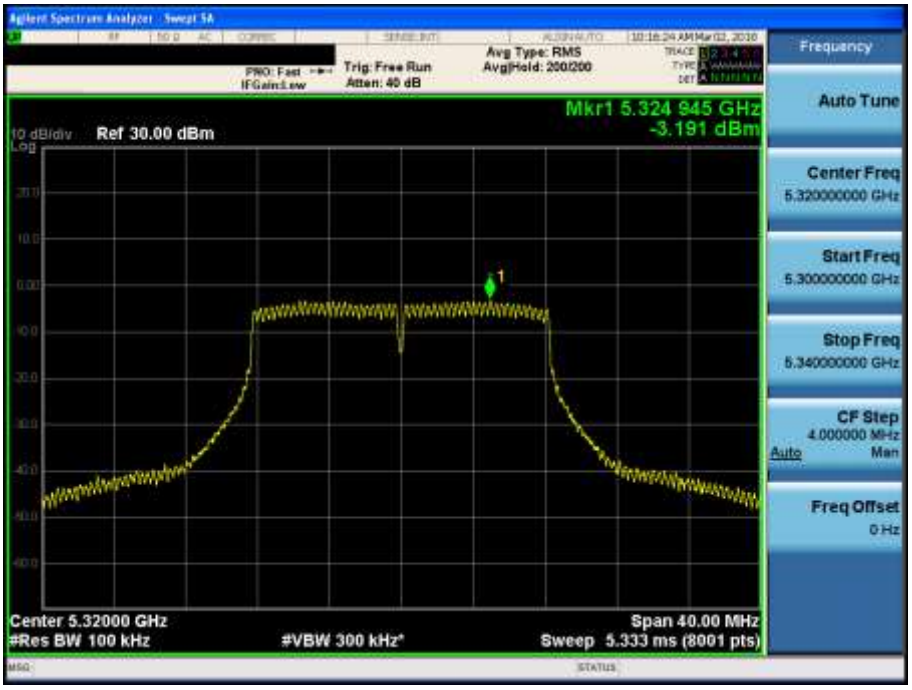


Maximum Power Spectral Density Test Mode: 802.11a & Ch.52



Maximum Power Spectral Density Test Mode: 802.11a & Ch.60

Maximum Power Spectral Density Test Mode: 802.11a & Ch.64



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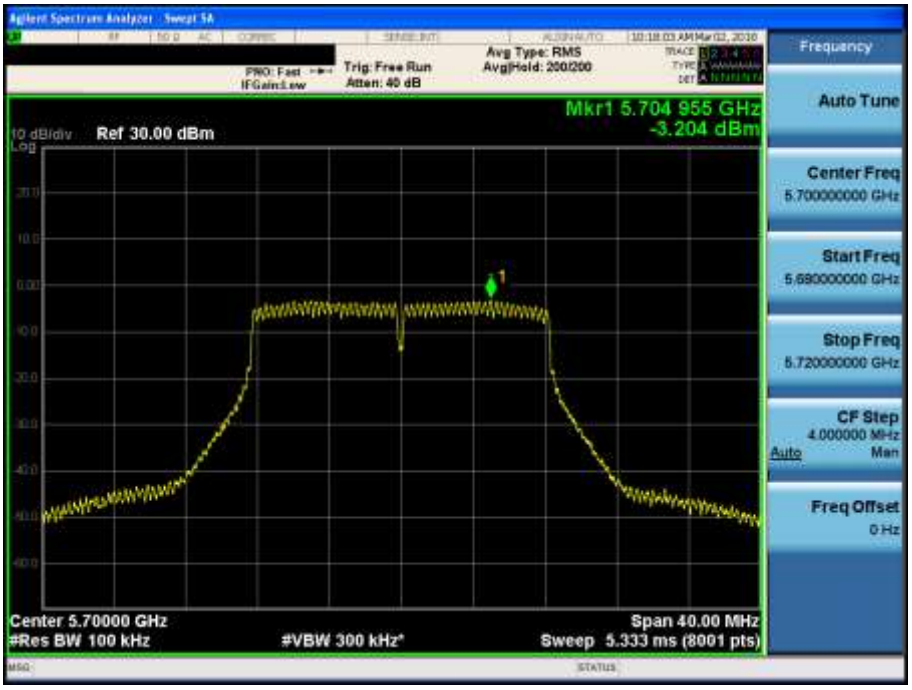
Maximum Power Spectral Density Test Mode: 802.11a & Ch.140



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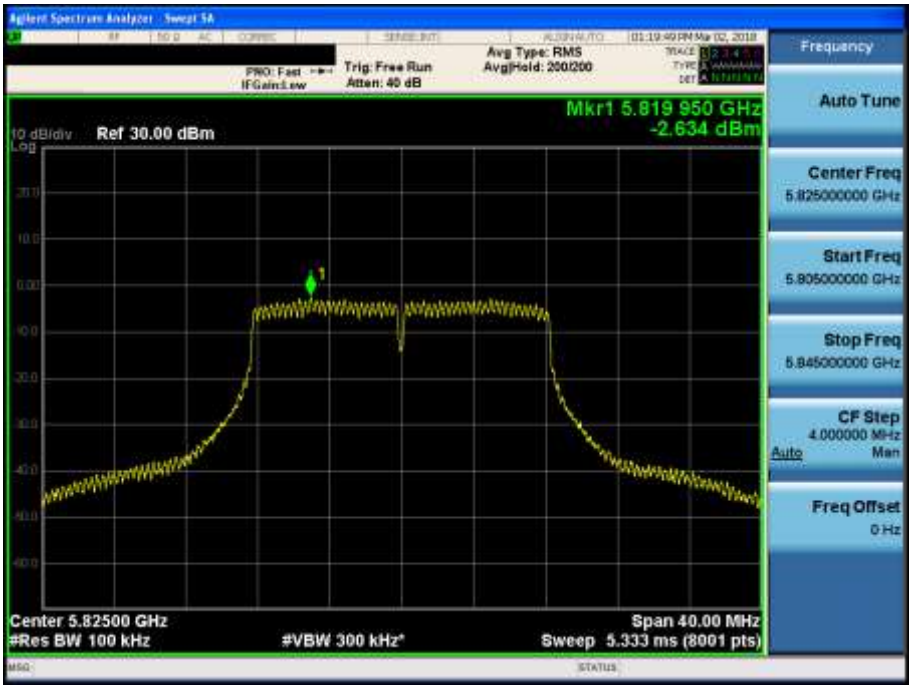
Maximum Power Spectral Density Test Mode: 802.11a & Ch.157

Maximum Power Spectral Density Test Mode: 802.11a & Ch.165



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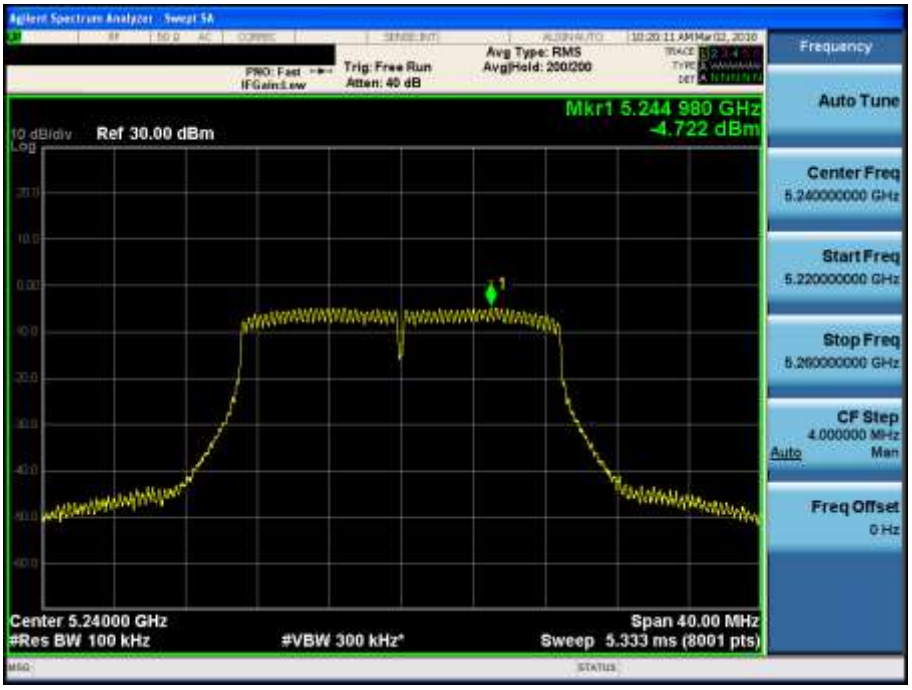
Maximum Power Spectral Density Test Mode: 802.11n HT20 & Ch.40

Maximum Power Spectral Density Test Mode: 802.11n HT20 & Ch.48



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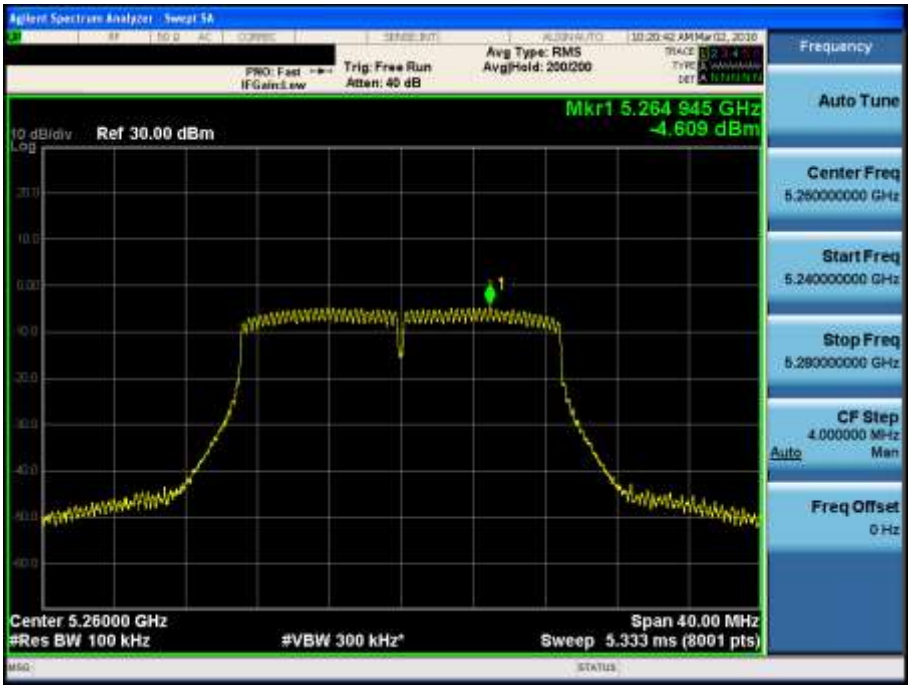

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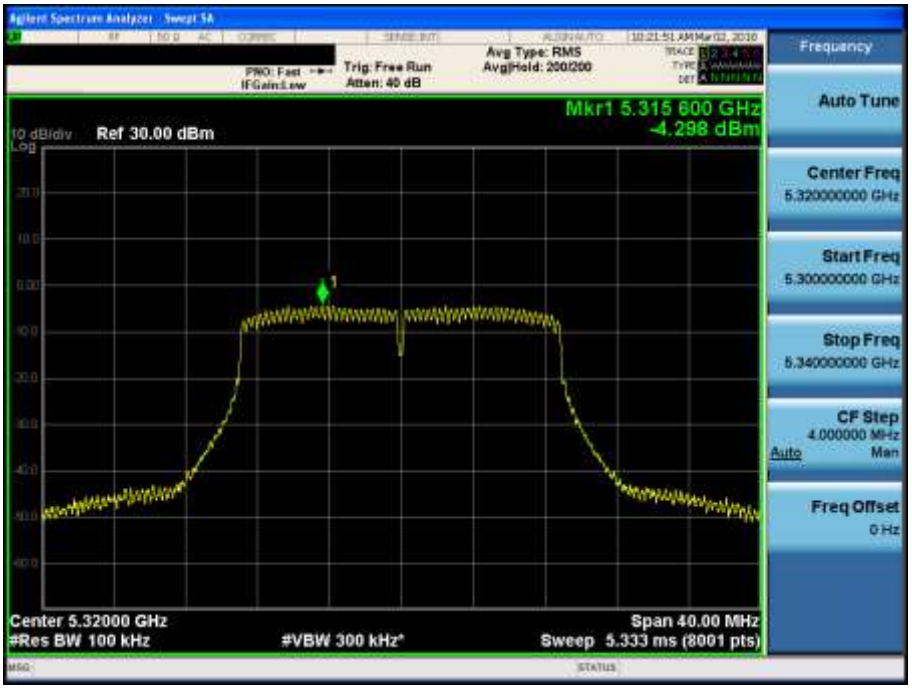

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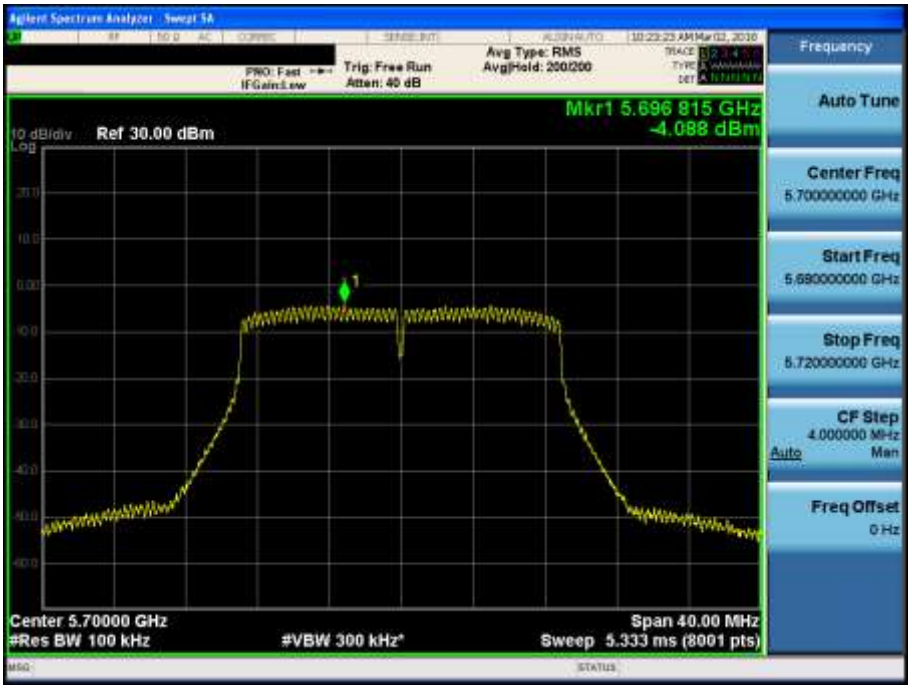
Maximum Power Spectral Density Test Mode: 802.11n HT20 & Ch.116

Maximum Power Spectral Density Test Mode: 802.11n HT20 & Ch.140



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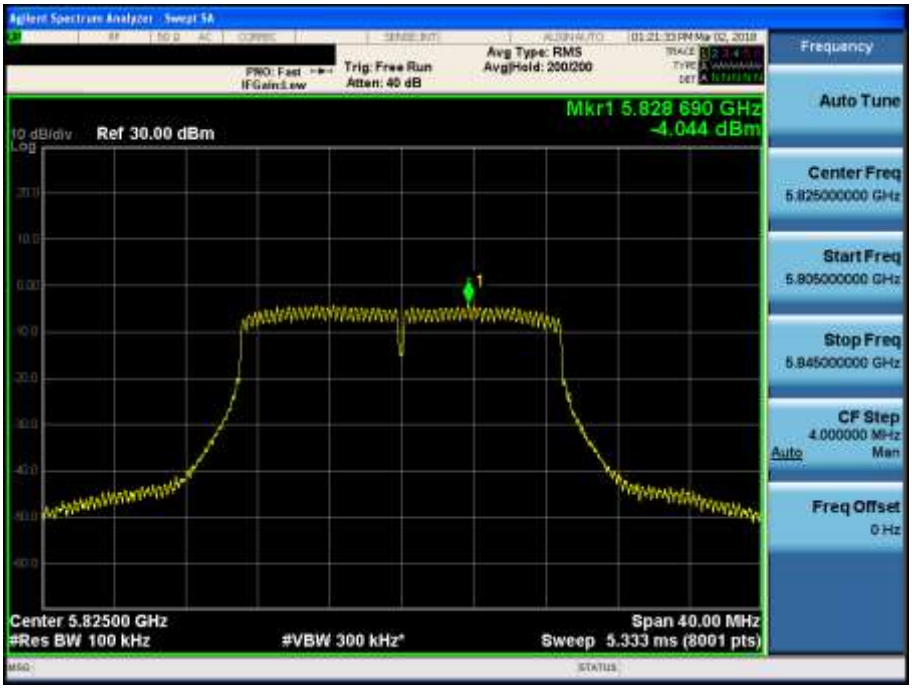
Maximum Power Spectral Density Test Mode: 802.11n HT20 & Ch.165



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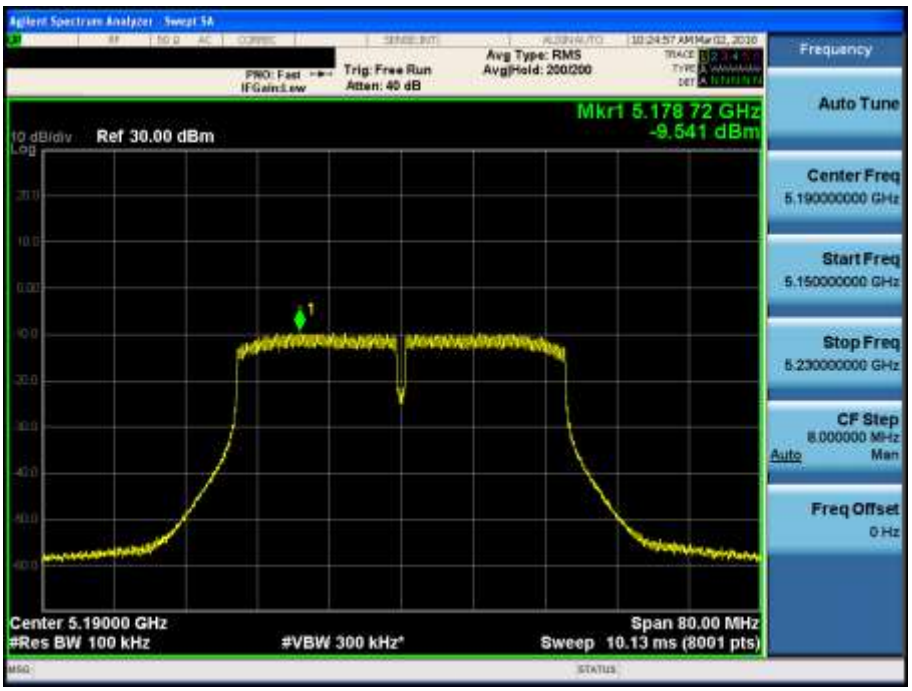

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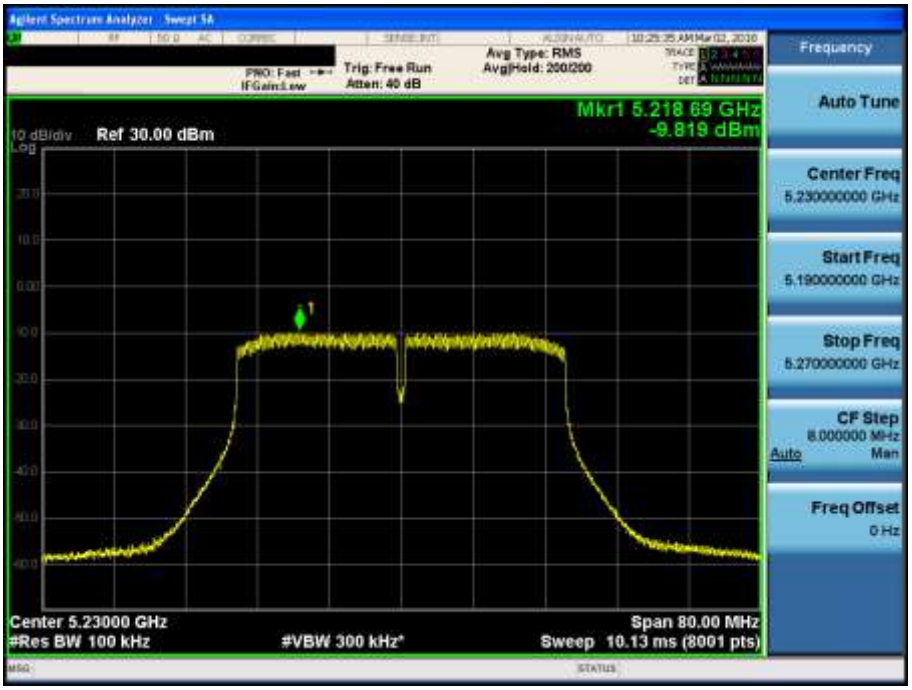

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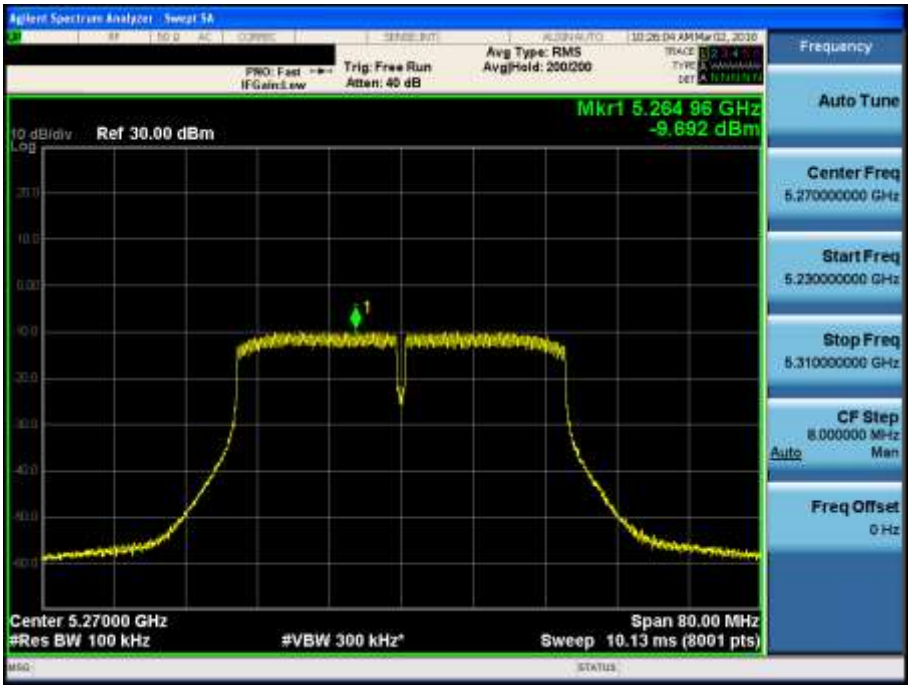

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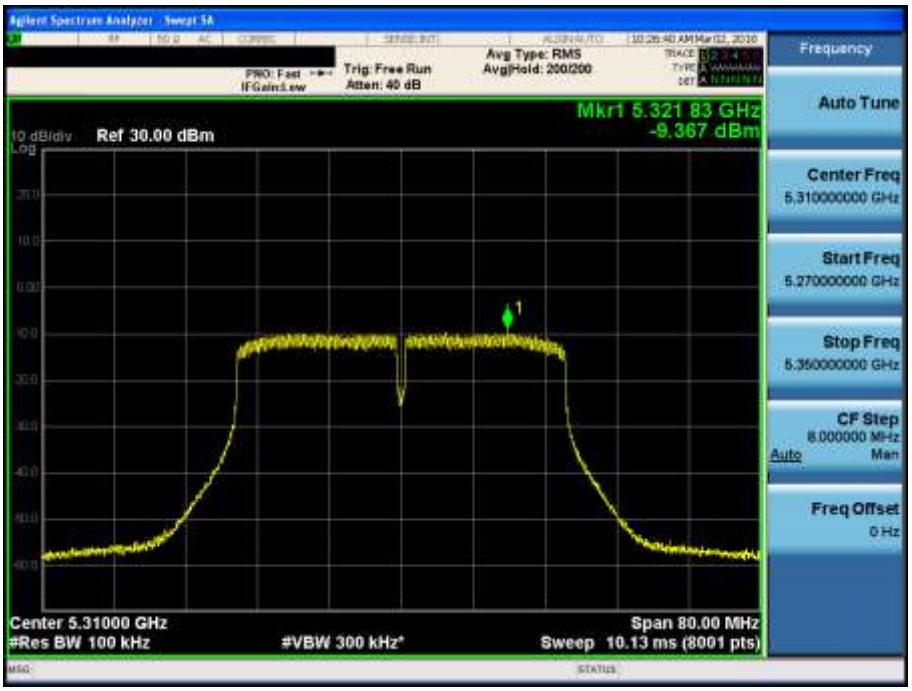

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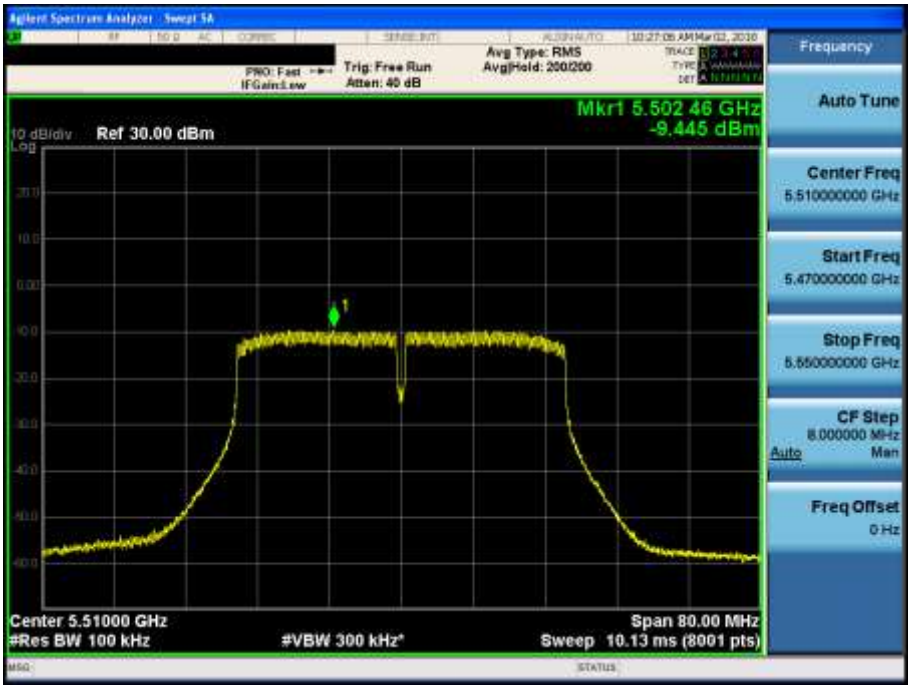
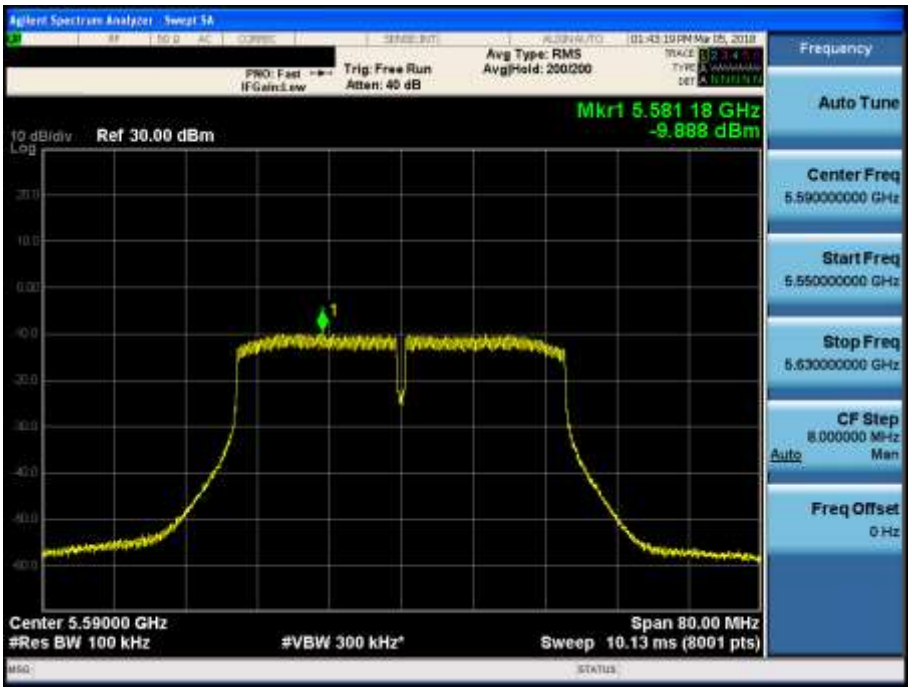


Maximum Power Spectral Density Test Mode: 802.11n HT40 & Ch.118



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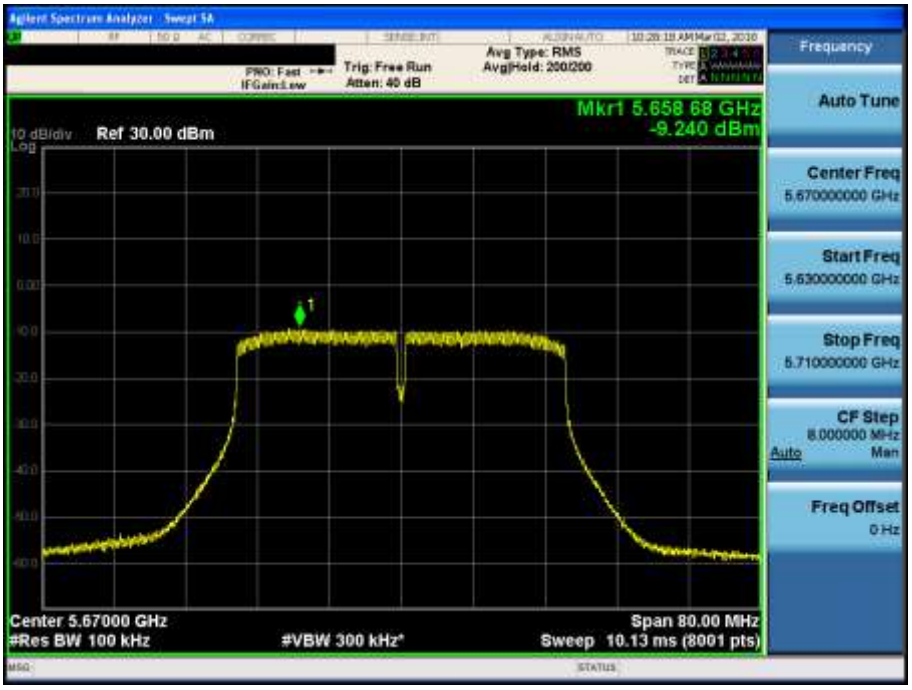

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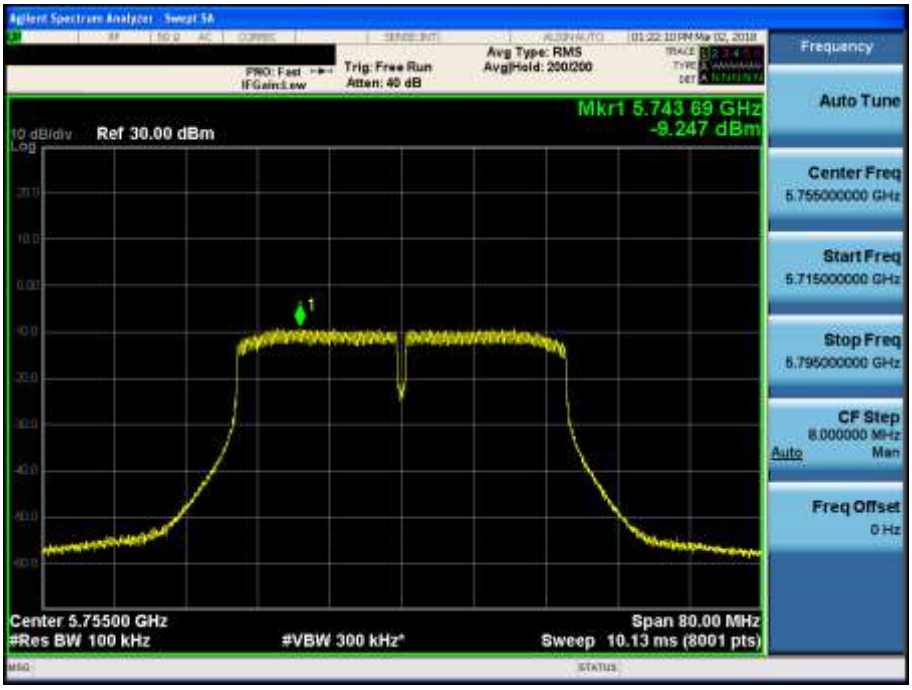
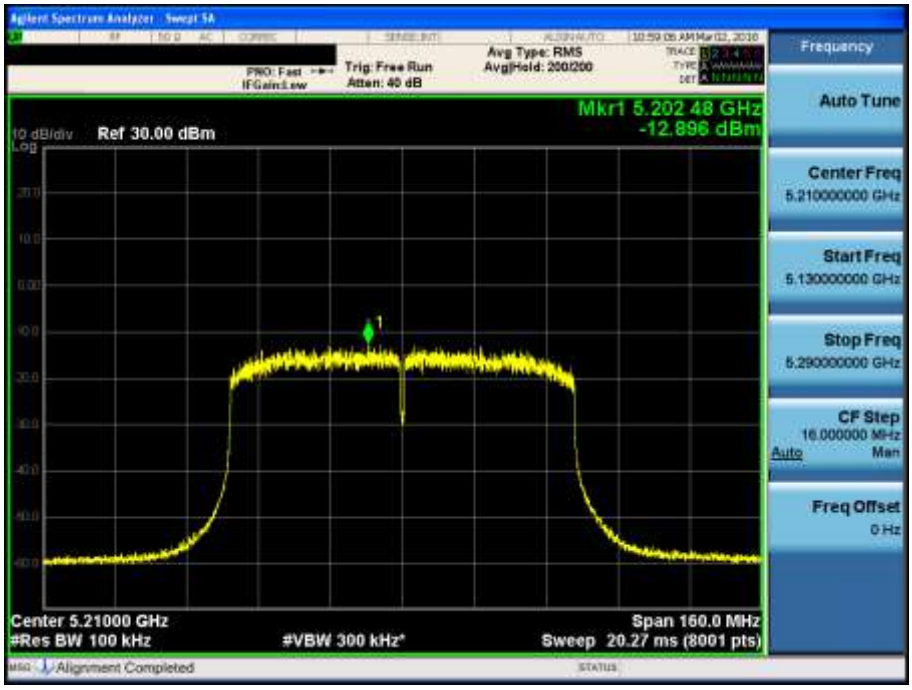


Maximum Power Spectral Density Test Mode: 802.11n HT40 & Ch.159

Maximum Power Spectral Density Test Mode: 802.11ac VHT80 & Ch.42



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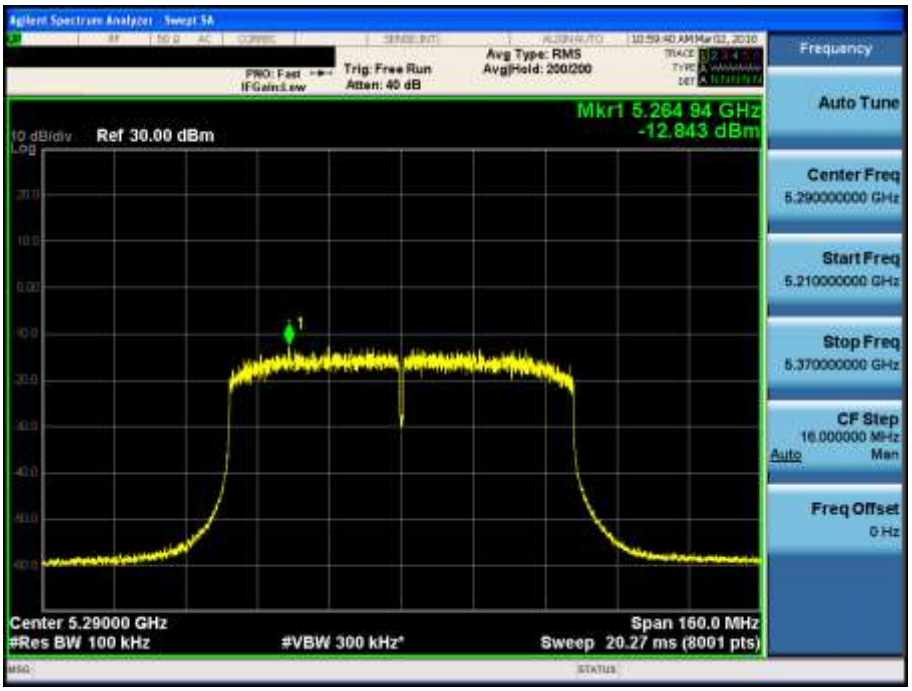

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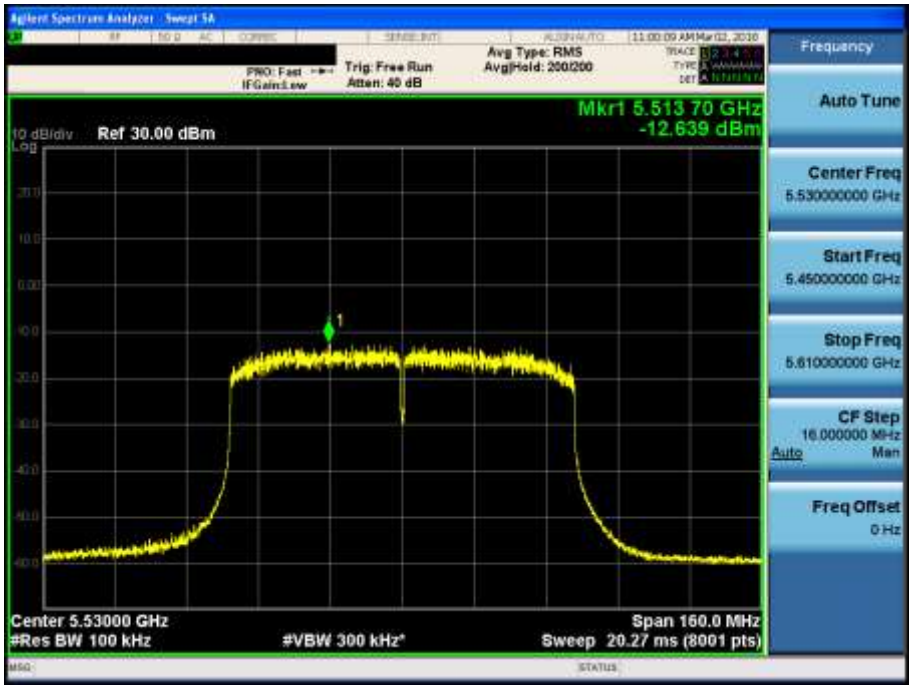

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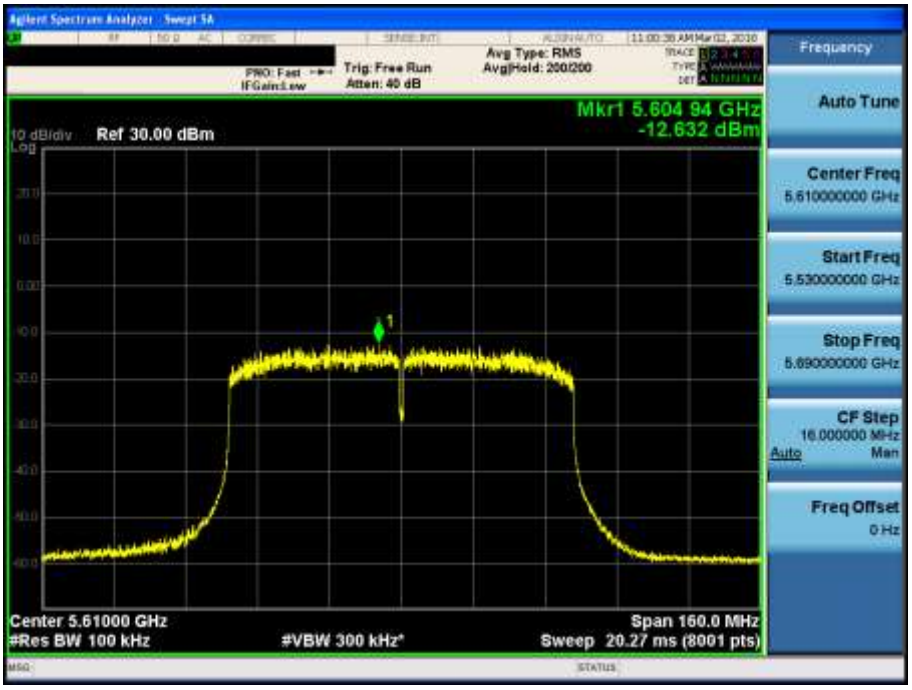

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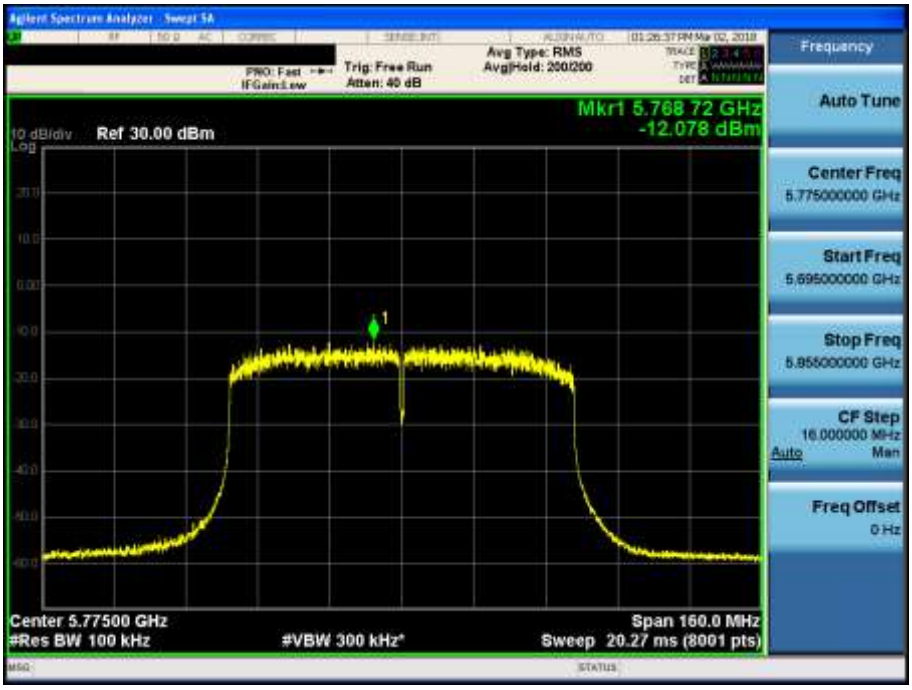


8.5 Frequency Stability

▣ Test requirements

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

▣ Test Procedure

The EUT was placed inside of an environmental chamber as the temperature in the chamber was varied between -20℃ and +50℃. The temperature was incremented by 10℃ intervals and the unit was allowed to stabilize at each measurement. And the edge point of EBW (26dB or 6dB bandwidth) was reported.

▣ Test Results: Comply

U-NII 1 & U-NII 2A : (5150 MHz ~ 5350 MHz)

Supply Voltage (V DC)	TEMP (℃)	Operating Frequency	
		5180 MHz	5320 MHz
		26dBc low edge (Hz)	26dBc High edge(Hz)
3.850	+20(Ref)	5,169,303,750	5,331,206,250
	+50	5,169,301,250	5,331,210,000
	+40	5,169,296,250	5,331,207,500
	+30	5,169,297,500	5,331,213,750
	+20	5,169,303,750	5,331,206,250
	+10	5,169,300,000	5,331,210,000
	0	5,169,298,750	5,331,213,750
	-10	5,169,287,500	5,331,211,250
	-20	5,169,290,000	5,331,217,500
3.550	+20	5,169,298,750	5,331,210,000
4.428	+20	5,169,296,250	5,331,211,250

U-NII 2C : (5470 MHz ~ 5725 MHz)

Supply Voltage (V DC)	TEMP (℃)	Operating Frequency	
		5500 MHz	5700 MHz
		26dBc low edge (Hz)	26dBc High edge(Hz)
3.850	+20(Ref)	5,489,590,000	5,710,131,250
	+50	5,489,585,000	5,710,135,000
	+40	5,489,587,500	5,710,138,750
	+30	5,489,580,000	5,710,141,250
	+20	5,489,590,000	5,710,131,250
	+10	5,489,578,750	5,710,142,500
	0	5,489,582,500	5,710,138,750
	-10	5,489,573,750	5,710,136,250
	-20	5,489,568,750	5,710,132,500
3.550	+20	5,489,586,250	5,710,133,750
4.428	+20	5,489,585,000	5,710,140,000

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

Supply Voltage (V DC)	TEMP (℃)	Operating Frequency
		5745 MHz
		6dBc low edge (Hz)
3.850	+20(Ref)	5,736,793,000
	+50	5,736,790,000
	+40	5,736,784,000
	+30	5,736,787,000
	+20	5,736,793,000
	+10	5,736,786,000
	0	5,736,781,000
	-10	5,736,774,000
	-20	5,736,777,000
3.550	+20	5,736,791,000
4.428	+20	5,736,792,000

8.6 Radiated Spurious Emission Measurements

▣ Test Procedure

▪ **FCC Part 15.209(a) and (b)**

Frequency (MHz)	Limit (uV/m)	Measurement Distance (meter)
0.009 – 0.490	2400/F(KHz)	300
0.490 – 1.705	24000/F(KHz)	30
1.705 – 30.0	30	30
30 ~ 88	100 **	3
88 ~ 216	150 **	3
216 ~ 960	200 **	3
Above 960	500	3

** Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.

▪ **FCC Part 15.205 (a):** Only spurious emissions are permitted in any of the frequency bands listed below:

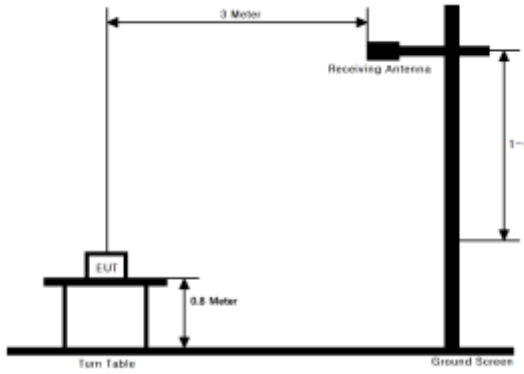
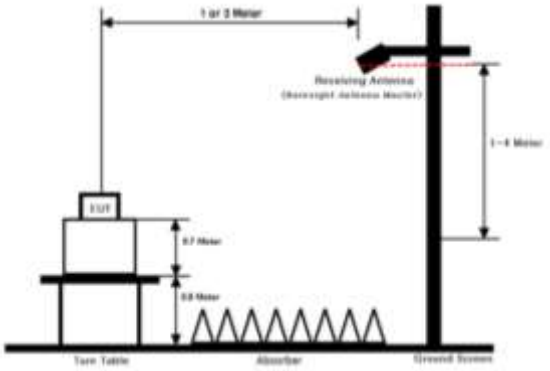
MHz	MHz	MHz	MHz	GHz	GHz
0.009 ~ 0.110	8.41425 ~ 8.41475	108 ~ 121.94	1300 ~ 1427	4.5 ~ 5.15	14.47 ~ 14.5
0.495 ~ 0.505	12.29 ~ 12.293	123 ~ 138	1435 ~ 1626.5	5.35 ~ 5.46	15.35 ~ 16.2
2.1735 ~ 2.1905	12.51975 ~ 12.52025	149.9 ~ 150.05	1645.5 ~ 1646.5	7.25 ~ 7.75	17.7 ~ 21.4
4.125 ~ 4.128	12.57675 ~ 12.57725	160.52475 ~ 160.52525	1660 ~ 1710	8.025 ~ 8.5	22.01 ~ 23.12
4.17725 ~ 4.17775	13.36 ~ 13.41	160.7 ~ 160.9	1718.8 ~ 1722.2	9.0 ~ 9.2	23.6 ~ 24.0
4.20725 ~ 4.20775	16.42 ~ 16.423	162.0125 ~ 167.17	2200 ~ 2300	9.3 ~ 9.5	31.2 ~ 31.8
6.215 ~ 6.218	16.69475 ~ 16.69525	167.72 ~ 173.2	2310 ~ 2390	10.6 ~ 12.7	36.43 ~ 36.5
6.26775 ~ 6.26825	16.80425 ~ 16.80475	240 ~ 285	2483.5 ~ 2500	13.25 ~ 13.4	Above 38.6
6.31175 ~ 6.31225	25.5 ~ 25.67	322 ~ 335.4	2655 ~ 2900		
8.291 ~ 8.294	37.5 ~ 38.25	399.90 ~ 410	3260 ~ 3267		
8.362 ~ 8.366	73 ~ 74.6	608 ~ 614	3332 ~ 3339		
8.37625 ~ 8.38675	74.8 ~ 75.2	960 ~ 1240	3345.8 ~ 3358		
			3600 ~ 4000		

▪ **FCC Part 15.205(b):** The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.

▪ **FCC Part 15.407 (b):** Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the **5.15-5.25 GHz band**: all emissions outside of the **5.15-5.35 GHz band** shall not exceed an **EIRP of -27 dBm/MHz**.
(2) For transmitters operating in the **5.25-5.35 GHz band**: all emissions outside of the **5.15-5.35 GHz band** shall not exceed an **EIRP of -27 dBm/MHz**.
(3) For transmitters operating in the **5.47-5.725 GHz band**: all emissions outside of the **5.47-5.725 GHz band** shall not exceed an **EIRP of -27 dBm/MHz.**
(4) For transmitters operating in the **5.725-5.85 GHz band**: All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.
(5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.
(6) Unwanted emissions **below 1 GHz** must comply with the general field strength limits set forth in **Section 15.209**. Further, any U-NII devices using an **AC power line** are required to comply also with the conducted limits set forth in **Section 15.207**.
(7) The provisions of §15.205 apply to intentional radiators operating under this section
(8) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency band edges as the design of the equipment permits.

▣ Test Procedure

Below 1GHz	Above 1GHz
	

▣ Test Procedure

1. The EUT is placed on a non-conductive table. For emission measurements at or below 1 GHz, the table height is 80 cm. For emission measurements above 1 GHz, the table height is 1.5 m.
2. The turn table shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 1m or 3 m away from the receiving antenna, which is varied from 1m to 4 m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.

Radiated spurious emission measured using following Measurement Procedure **of KDB789033 D02v02r01**

► **General Requirements for Unwanted Emissions Measurements**

The following requirements apply to all unwanted emissions measurements, both in and outside of the restricted bands:

- EUT Duty Cycle

(1) The EUT shall be configured or modified to **transmit continuously** except as stated in (ii), below. The intent is to test at 100 percent duty cycle; however a small reduction in duty cycle (**to no lower than 98 percent**) is permitted if required by the EUT for amplitude control purposes. Manufacturers are expected to provide software to the test lab to permit such continuous operation.

(2) If **continuous transmission (or at least 98 percent duty cycle) cannot be achieved** due to hardware limitations of the EUT (e.g., overheating), the following additions to the measurement and reporting procedures are required:

- The EUT shall be configured to operate at the maximum achievable duty cycle.
- Measure the duty cycle, x, of the transmitter output signal.
- Adjustments to measurement procedures (e.g., increasing test time and number of traces averaged) shall be performed as described in the procedures below.
- The test report shall include the following additional information:
  - The reason for the duty cycle limitation.
  - The duty cycle achieved for testing and the associated transmit duration and interval between transmissions.
  - The sweep time and the amount of time used for trace stabilization during max-hold measurements for peak emission measurements.

(3) Reduction of the measured emission amplitude levels to account for operational duty factor is not permitted. Compliance is based on emission levels occurring during transmission - not on an average across on and off times of the transmitter.

► **Measurements below 1000 MHz**

a) Follow the requirements in section II.G.3, "General Requirements for Unwanted Emissions Measurements".

b) Compliance shall be demonstrated using **CISPR quasi-peak detection**; however, **peak detection** is permitted as an alternative to quasi-peak detection.

► Measurements Above 1000 MHz (Peak)

a) Follow the requirements in section II.G.3, "General Requirements for Unwanted Emissions Measurements".

b) Peak emission levels are measured by setting the analyzer as follows:

(i) **RBW = 1 MHz.**

(ii) **VBW ≥ 3 MHz.**

(iii) **Detector = Peak.**

(iv) Sweep time = Auto.

(v) Trace mode = Max hold.

(vi) Allow sweeps to continue until the trace stabilizes. Note that if the transmission is not continuous, the time required for the trace to stabilize will increase by a factor of approximately 1/x, where x is the duty cycle. For example, at 50 percent duty cycle, the measurement time will increase by a factor of two relative to measurement time for continuous transmission.

► **Measurements Above 1000 MHz (Method AD)**

(i) **RBW = 1 MHz.**

(ii) **VBW ≥ 3 MHz.**

(iii) **Detector = RMS**, if span / (# of points in sweep) ≤ RBW / 2. Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If the condition is not satisfied, the detector mode shall be set to peak.

(iv) Averaging type = power (i.e., RMS)

- As an alternative, the detector and averaging type may be set for linear voltage averaging. Some analyzers require linear display mode in order to use linear voltage averaging. Log or dB averaging shall not be used.

(v) Sweep time = Auto.

(vi) Perform a trace average of at least 100 traces if the transmission is continuous. If the transmission is not continuous, the number of traces shall be increased by a factor of 1/x, where x is the duty cycle. For example, with 50 percent duty cycle, at least 200 traces shall be averaged.

(vii) If tests are performed with the EUT transmitting at a duty cycle less than 98 percent, a correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle. The correction factor is computed as follows:

- **If power averaging (RMS) mode was used in step (iv) above, the correction factor is 10 log(1/x), where x is the duty cycle.** For example, if the transmit duty cycle was 50 percent, then 3 dB must be added to the measured emission levels.
- If linear voltage averaging mode was used in step (iv) above, the correction factor is 20 log (1/x), where x is the duty cycle. For example, if the transmit duty cycle was 50 percent, then 6 dB must be added to the measured emission levels.
- If a specific emission is demonstrated to be continuous (100 percent duty cycle) rather than turning on and off with the transmit cycle, no duty cycle correction is required for that emission.

Please refer to Appendix II for the duty correction factor

▣ Measurement Data:

Radiated Spurious Emissions data(9 kHz ~ 40 GHz) : *802.11a*

Band	Tested Channel	Freq. (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
U-NII 1	36 (5180 MHz)	5149.30	V	Y	PK	49.55	6.47	N/A	N/A	56.02	74.00	17.98
		5149.99	V	Y	AV	37.07	6.47	N/A	N/A	43.54	54.00	10.46
		10359.45	V	Z	PK	45.80	10.66	N/A	N/A	56.46	68.20	11.74
	40 (5200 MHz)	10400.05	H	Y	PK	44.94	10.76	N/A	N/A	55.70	68.20	12.50
	48 (5240 MHz)	10480.25	V	Z	PK	44.70	10.94	N/A	N/A	55.64	68.20	12.56
U-NII 2A	52 (5260 MHz)	10520.06	V	Z	PK	44.54	11.05	N/A	N/A	55.59	68.20	12.61
	60 (5300 MHz)	10601.87	V	Z	PK	44.80	11.30	N/A	N/A	56.10	74.00	17.90
		10600.18	V	Z	AV	34.02	11.30	N/A	N/A	45.32	54.00	8.68
	64 (5320 MHz)	5350.00	V	Y	PK	53.51	6.54	N/A	N/A	60.05	74.00	13.95
		5350.62	V	Y	AV	38.91	6.54	N/A	N/A	45.45	54.00	8.55
		10639.66	V	Z	PK	44.65	11.42	N/A	N/A	56.07	74.00	17.93
		10639.65	V	Z	AV	33.86	11.42	N/A	N/A	45.28	54.00	8.72

Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.
2. Sample Calculation.
   Margin = Limit – Result / Result = Reading + T.F+ DCCF + DCF / T.F = AF + CL – AG
   Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,
   DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
3. Measurement Distance = 3 m for below 18 GHz, Measurement Distance = 1 m for above 18 GHz.
   Therefore Distance Correction Factor(DCF) : - 9.54 dB = 20*log(1m/3m)
4. The limit is converted to field strength.
   E[dBuV/m] = EIRP[dBm] + 95.2 dB = -27 dBm + 95.2 = 68.2 dBuV/m

Radiated Spurious Emissions data(9 kHz ~ 40 GHz) : *802.11a*

Band	Tested Channel	Freq. (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
U-NII 2C	100 (5500 MHz)	5459.48	V	Y	PK	45.57	6.71	N/A	N/A	52.28	74.00	21.72
		5459.70	V	Y	AV	33.87	6.71	N/A	N/A	40.58	54.00	13.42
		5469.29	V	Y	PK	49.17	6.73	N/A	N/A	55.90	68.20	12.30
		11000.13	V	Z	PK	44.14	12.54	N/A	N/A	56.68	74.00	17.32
		11000.31	V	Z	AV	33.88	12.54	N/A	N/A	46.42	54.00	7.58
	116 (5580 MHz)	11160.08	V	Z	PK	44.86	12.67	N/A	N/A	57.53	74.00	16.47
		11159.54	V	Z	AV	34.33	12.67	N/A	N/A	47.00	54.00	7.00
	140 (5700 MHz)	5725.31	V	Y	PK	51.89	6.86	N/A	N/A	58.75	68.20	9.45
		11399.42	V	Z	PK	44.60	12.86	N/A	N/A	57.46	74.00	16.54
		11399.85	V	Z	AV	35.63	12.86	N/A	N/A	48.49	54.00	5.51
U-NII 3	149 (5745 MHz)	5714.36	H	X	PK	47.06	6.65	N/A	N/A	53.71	68.20	14.49
		5724.92	H	X	PK	66.20	6.86	N/A	N/A	73.06	78.20	5.14
		11489.62	V	Z	PK	44.91	12.93	N/A	N/A	57.84	74.00	16.16
		11489.92	V	Z	AV	36.36	12.93	N/A	N/A	49.29	54.00	4.71
	157 (5785 MHz)	11569.64	V	Z	PK	45.50	12.99	N/A	N/A	58.49	74.00	15.51
		11569.72	V	Z	AV	36.99	12.99	N/A	N/A	49.98	54.00	4.02
	165 (5825 MHz)	5850.53	H	X	PK	52.12	7.40	N/A	N/A	59.52	78.20	18.68
		5860.30	H	X	PK	44.93	7.45	N/A	N/A	52.38	68.20	15.82
		11649.60	V	Z	PK	45.73	13.05	N/A	N/A	58.78	74.00	15.22
		11649.88	V	Z	AV	36.66	13.05	N/A	N/A	49.71	54.00	4.29

Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.
2. Sample Calculation.
   Margin = Limit – Result / Result = Reading + T.F+ DCCF + DCF / T.F = AF + CL – AG
   Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,
   DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
3. Measurement Distance = 3 m for below 18 GHz, Measurement Distance = 1 m for above 18 GHz.
   Therefore Distance Correction Factor(DCF) : - 9.54 dB = 20*log(1m/3m)
4. The limit is converted to field strength.
   E[dBuV/m] = EIRP[dBm] + 95.2 dB = -27 dBm + 95.2 = 68.2 dBuV/m

Radiated Spurious Emissions data(9 kHz ~ 40 GHz) : *802.11n(HT20)*

Band	Tested Channel	Freq. (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
U-NII 1	36 (5180 MHz)	5149.68	V	Y	PK	47.17	6.47	N/A	N/A	53.64	74.00	20.36
		5150.00	V	Y	AV	35.00	6.47	N/A	N/A	41.47	54.00	12.53
		10360.24	H	Y	PK	44.54	10.66	N/A	N/A	55.20	68.20	13.00
	40 (5200 MHz)	10399.80	V	Z	PK	44.92	10.76	N/A	N/A	55.68	68.20	12.52
	48 (5240 MHz)	10479.88	H	Y	PK	44.78	10.94	N/A	N/A	55.72	68.20	12.48
U-NII 2A	52 (5260 MHz)	10520.84	H	Y	PK	45.32	11.05	N/A	N/A	56.37	68.20	11.83
	60 (5300 MHz)	10600.63	V	Z	PK	43.73	11.30	N/A	N/A	55.03	74.00	18.97
		10600.04	V	Z	AV	33.44	11.30	N/A	N/A	44.74	54.00	9.26
	64 (5320 MHz)	5350.23	V	Y	PK	50.76	6.54	N/A	N/A	57.30	74.00	16.70
		5350.45	V	Y	AV	36.88	6.54	N/A	N/A	43.42	54.00	10.58
		10639.78	V	Z	PK	43.87	11.42	N/A	N/A	55.29	74.00	18.71
		10640.10	V	Z	AV	33.92	11.42	N/A	N/A	45.34	54.00	8.66

Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.
2. Sample Calculation.
   Margin = Limit – Result / Result = Reading + T.F+ DCCF + DCF / T.F = AF + CL – AG
   Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,
   DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
3. Measurement Distance = 3 m for below 18 GHz, Measurement Distance = 1 m for above 18 GHz.
   Therefore Distance Correction Factor(DCF) : - 9.54 dB = 20*log(1m/3m)
4. The limit is converted to field strength.
   E[dBuV/m] = EIRP[dBm] + 95.2 dB = -27 dBm + 95.2 = 68.2 dBuV/m

Radiated Spurious Emissions data(9 kHz ~ 40 GHz) : *802.11n(HT20)*

Band	Tested Channel	Freq. (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
U-NII 2C	100 (5500 MHz)	5458.61	H	X	PK	43.53	6.71	N/A	N/A	50.24	74.00	23.76
		5459.68	H	X	AV	34.12	6.71	N/A	N/A	40.83	54.00	13.17
		5469.64	H	X	PK	50.34	6.73	N/A	N/A	57.07	68.20	11.13
		11001.09	V	Z	PK	45.25	12.54	N/A	N/A	57.79	74.00	16.21
		10999.46	V	Z	AV	33.69	12.54	N/A	N/A	46.23	54.00	7.77
	116 (5580 MHz)	11160.66	V	Z	PK	44.44	12.67	N/A	N/A	57.11	74.00	16.89
		11159.54	V	Z	AV	34.36	12.67	N/A	N/A	47.03	54.00	6.97
	140 (5700 MHz)	5725.13	H	X	PK	52.42	6.86	N/A	N/A	59.28	68.20	8.92
		11399.81	V	Z	PK	44.77	12.86	N/A	N/A	57.63	74.00	16.37
		11399.89	V	Z	AV	35.27	12.86	N/A	N/A	48.13	54.00	5.87
U-NII 3	149 (5745 MHz)	5714.32	H	X	PK	46.39	6.65	N/A	N/A	53.04	68.20	15.16
		5723.20	H	X	PK	66.52	6.86	N/A	N/A	73.38	78.20	4.82
		11490.01	V	Z	PK	46.04	12.93	N/A	N/A	58.97	74.00	15.03
		11489.93	V	Z	AV	36.32	12.93	N/A	N/A	49.25	54.00	4.75
	157 (5785 MHz)	11570.14	V	Z	PK	45.67	12.99	N/A	N/A	58.66	74.00	15.34
		11569.86	V	Z	AV	36.76	12.99	N/A	N/A	49.75	54.00	4.25
	165 (5825 MHz)	5850.16	H	X	PK	49.37	7.40	N/A	N/A	56.77	78.20	21.43
		5860.94	H	X	PK	44.47	7.45	N/A	N/A	51.92	68.20	16.28
		11649.85	V	Z	PK	46.55	13.05	N/A	N/A	59.60	74.00	14.40
		11649.90	V	Z	AV	37.17	13.05	N/A	N/A	50.22	54.00	3.78

Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.
2. Sample Calculation.
   Margin = Limit – Result / Result = Reading + T.F+ DCCF + DCF / T.F = AF + CL – AG
   Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,
   DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
3. Measurement Distance = 3 m for below 18 GHz, Measurement Distance = 1 m for above 18 GHz.
   Therefore Distance Correction Factor(DCF) : - 9.54 dB = 20*log(1m/3m)
4. The limit is converted to field strength.
   E[dBuV/m] = EIRP[dBm] + 95.2 dB = -27 dBm + 95.2 = 68.2 dBuV/m

Radiated Spurious Emissions data(9 kHz ~ 40 GHz) : *802.11n(HT40)*

Band	Tested Channel	Freq. (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
U-NII 1	38 (5190 MHz)	5148.81	H	X	PK	50.92	6.47	N/A	N/A	57.39	74.00	16.61
		5149.71	H	X	AV	35.92	6.47	N/A	N/A	42.39	54.00	11.61
		10379.86	V	Z	PK	44.08	10.71	N/A	N/A	54.79	68.20	13.41
	46 (5230 MHz)	10459.49	V	Z	PK	44.66	10.89	N/A	N/A	55.55	68.20	12.65
U-NII 2A	54 (5270 MHz)	10540.42	H	Y	PK	45.35	11.11	N/A	N/A	56.46	68.20	11.74
	62 (5310 MHz)	5350.19	V	Y	PK	51.04	6.54	N/A	N/A	57.58	74.00	16.42
		5350.21	V	Y	AV	37.61	6.54	N/A	N/A	44.15	54.00	9.85
		10620.10	V	Z	PK	44.20	11.36	N/A	N/A	55.56	74.00	18.44
		10620.13	V	Z	AV	33.54	11.36	N/A	N/A	44.90	54.00	9.10

Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.
2. Sample Calculation.
   Margin = Limit – Result / Result = Reading + T.F+ DCCF + DCF / T.F = AF + CL – AG
   Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,
   DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
3. Measurement Distance = 3 m for below 18 GHz, Measurement Distance = 1 m for above 18 GHz.
   Therefore Distance Correction Factor(DCF) : - 9.54 dB = 20*log(1m/3m)
4. The limit is converted to field strength.
   E[dBuV/m] = EIRP[dBm] + 95.2 dB = -27 dBm + 95.2 = 68.2 dBuV/m

Radiated Spurious Emissions data(9 kHz ~ 40 GHz) : *802.11n(HT40)*

Band	Tested Channel	Freq. (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
U-NII 2C	102 (5510 MHz)	5457.37	H	X	PK	45.36	6.71	N/A	N/A	52.07	74.00	21.93
		5458.29	H	X	AV	34.57	6.71	N/A	N/A	41.28	54.00	12.72
		5467.92	H	X	PK	49.16	6.73	N/A	N/A	55.89	68.20	12.31
		11020.18	V	Z	PK	44.20	12.56	N/A	N/A	56.76	74.00	17.24
		11020.18	V	Z	AV	34.08	12.56	N/A	N/A	46.64	54.00	7.36
	118 (5590 MHz)	11180.78	V	Z	PK	44.01	12.68	N/A	N/A	56.69	74.00	17.31
		11179.84	V	Z	AV	34.37	12.68	N/A	N/A	47.05	54.00	6.95
	134 (5670 MHz)	5726.08	H	X	PK	44.39	6.86	N/A	N/A	51.25	68.20	16.95
		11340.07	V	Z	PK	44.41	12.81	N/A	N/A	57.22	74.00	16.78
		11339.76	V	Z	AV	34.68	12.81	N/A	N/A	47.49	54.00	6.51
U-NII 3	151 (5755 MHz)	5712.56	H	X	PK	55.65	6.65	N/A	N/A	62.30	68.20	5.90
		5723.11	H	X	PK	61.83	6.86	N/A	N/A	68.69	78.20	9.51
		11509.65	V	Z	PK	44.97	12.95	N/A	N/A	57.92	74.00	16.08
		11509.82	V	Z	AV	36.43	12.95	N/A	N/A	49.38	54.00	4.62
	159 (5795 MHz)	5850.86	H	X	PK	44.80	7.40	N/A	N/A	52.20	78.20	26.00
		5863.16	H	X	PK	43.59	7.45	N/A	N/A	51.04	68.20	17.16
		11589.87	V	Z	PK	45.40	13.01	N/A	N/A	58.41	74.00	15.59
		11590.05	V	Z	AV	36.72	13.01	N/A	N/A	49.73	54.00	4.27

Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.
2. Sample Calculation.
   Margin = Limit – Result / Result = Reading + T.F+ DCCF + DCF / T.F = AF + CL – AG
   Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,
   DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
3. Measurement Distance = 3 m for below 18 GHz, Measurement Distance = 1 m for above 18 GHz.
   Therefore Distance Correction Factor(DCF) : - 9.54 dB = 20*log(1m/3m)
4. The limit is converted to field strength.
   E[dBuV/m] = EIRP[dBm] + 95.2 dB = -27 dBm + 95.2 = 68.2 dBuV/m

Radiated Spurious Emissions data(9 kHz ~ 40 GHz) : *802.11ac(VHT80)*

Band	Tested Channel	Freq. (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
U-NII 1	42 (5210 MHz)	5149.55	V	Y	PK	51.17	6.47	N/A	N/A	57.64	74.00	16.36
		5149.89	V	Y	AV	32.84	6.47	0.35	N/A	39.66	54.00	14.34
		10419.00	V	Z	PK	44.35	10.80	N/A	N/A	55.15	68.20	13.05
U-NII 2A	58 (5290 MHz)	5350.48	H	X	PK	49.69	6.54	N/A	N/A	56.23	74.00	17.77
		5350.62	H	X	AV	37.74	6.54	0.35	N/A	44.63	54.00	9.37
		10579.67	V	Z	PK	44.09	11.23	N/A	N/A	55.32	68.20	12.88

Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.
2. Sample Calculation.
   Margin = Limit – Result / Result = Reading + T.F+ DCCF + DCF / T.F = AF + CL – AG
   Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,
   DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
3. Measurement Distance = 3 m for below 18 GHz, Measurement Distance = 1 m for above 18 GHz.
   Therefore Distance Correction Factor(DCF) : - 9.54 dB = 20*log(1m/3m)
4. The limit is converted to field strength.
   E[dBuV/m] = EIRP[dBm] + 95.2 dB = -27 dBm + 95.2 = 68.2 dBuV/m

Radiated Spurious Emissions data(9 kHz ~ 40 GHz) *802.11ac(VHT80)*

Band	Tested Channel	Freq. (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
U-NII 2C	106 (5530 MHz)	5458.83	H	X	PK	46.13	6.71	N/A	N/A	52.84	74.00	21.16
		5458.22	H	X	AV	35.66	6.71	0.35	N/A	42.72	54.00	11.28
		5463.62	H	X	PK	46.57	6.73	N/A	N/A	53.30	68.20	14.90
		11060.48	V	Z	PK	45.08	12.59	N/A	N/A	57.67	74.00	16.33
		11059.81	V	Z	AV	34.26	12.59	0.35	N/A	47.20	54.00	6.80
	122 (5610 MHz)	5726.52	H	X	PK	43.27	6.86	N/A	N/A	50.13	68.20	18.07
		11219.77	V	Z	PK	44.00	12.72	N/A	N/A	56.72	74.00	17.28
		11219.79	V	Z	AV	34.50	12.72	0.35	N/A	47.57	54.00	6.43
U-NII 3	155 (5775 MHz)	5705.65	H	X	PK	52.72	6.65	N/A	N/A	59.37	68.20	8.83
		5723.47	H	X	PK	52.94	6.86	N/A	N/A	59.80	78.20	18.40
		5850.47	H	X	PK	46.70	7.40	N/A	N/A	54.10	78.20	24.10
		5861.06	H	X	PK	47.31	7.45	N/A	N/A	54.76	68.20	13.44
		11550.34	V	Z	PK	45.89	12.98	N/A	N/A	58.87	74.00	15.13
		11549.96	V	Z	AV	36.42	12.98	0.35	N/A	49.75	54.00	4.25

Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.
2. Sample Calculation.
   Margin = Limit – Result / Result = Reading + T.F+ DCCF + DCF / T.F = AF + CL – AG
   Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,
   DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
3. Measurement Distance = 3 m for below 18 GHz, Measurement Distance = 1 m for above 18 GHz.
   Therefore Distance Correction Factor(DCF) : - 9.54 dB = 20*log(1m/3m)
4. The limit is converted to field strength.
   E[dBuV/m] = EIRP[dBm] + 95.2 dB = -27 dBm + 95.2 = 68.2 dBuV/m

8.7 AC Conducted Emissions

▣ Test Requirements and limit, §15.207

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN).

Frequency Range (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15 ~ 0.5	66 to 56 *	56 to 46 *
0.5 ~ 5	56	46
5 ~ 30	60	50

* Decreases with the logarithm of the frequency

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

▣ Test Configuration

See test photographs for the actual connections between EUT and support equipment.

▣ Test Procedure

Conducted emissions from the EUT were measured according to the ANSI C63.10-2013.

1. The test procedure is performed in a 6.5 m × 3.5 m × 3.5 m (L × W × H) shielded room. The EUT along with its peripherals were placed on a 1.0 m (W) × 1.5 m (L) and 0.8 m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane.
2. The EUT was connected to power mains through a line impedance stabilization network (LISN) which provides 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room.
3. All peripherals were connected to the second LISN and the chassis ground also bounded to the horizontal ground plane of shielded room.
4. The excess power cable between the EUT and the LISN was bundled. The power cables of peripherals were unbundled. All connecting cables of EUT and peripherals were moved to find the maximum emission.

▣ Measurement Data: Comply

Note 1: See next pages for actual measured spectrum plots and data for worst case result.

AC Line Conducted Emissions (Graph)

Test Mode: U-NII 1 & 802.11a & 5180 MHz

Results of Conducted Emission

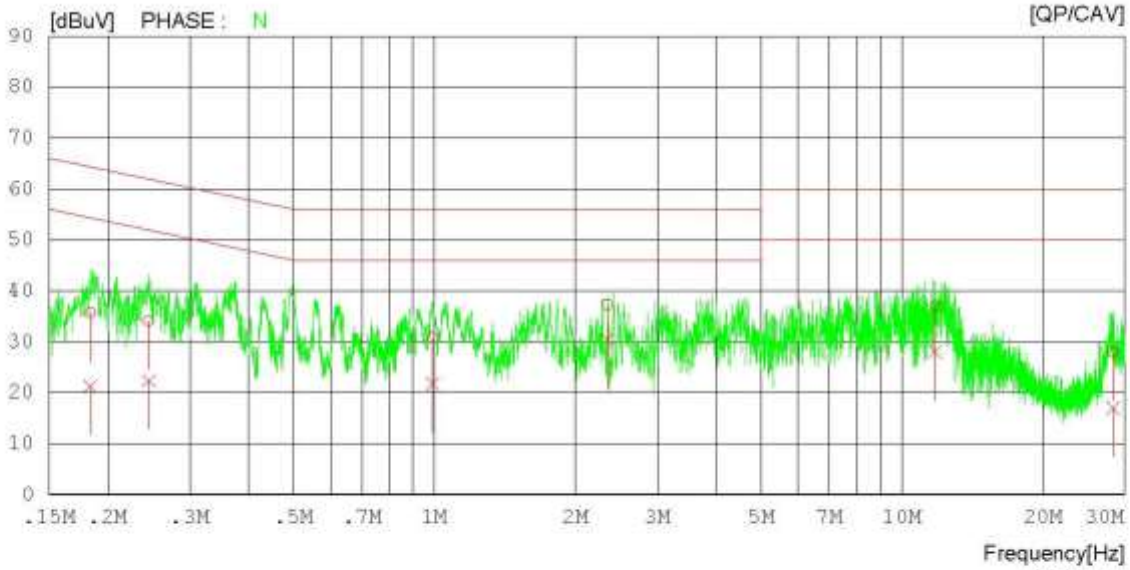
DTNC

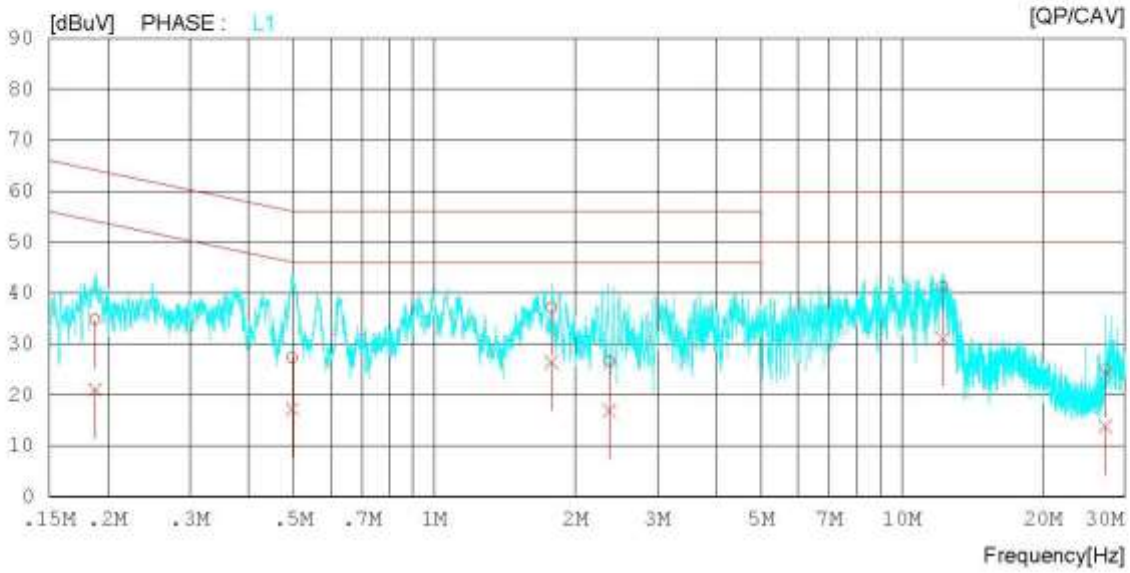
Date 2018-03-09

Order No.	DTNC1802-01142	Referrence No.	
Model No.	DS1803	Power Supply	
Serial No.		Temp/Humi.	23/44
Test Condition	5.1GHz	Operator	S.G.LEE

Memo

LIMIT : FCC P15.207 QP
FCC P15.207 AV





AC Line Conducted Emissions (Data List)

Test Mode: U-NII 1 & 802.11a & 5180 MHz

Results of Conducted Emission

DTNC Date 2018-03-09

Order No.	DTNC1802-01142	Referrence No.	
Model No.	DS1803	Power Supply	
Serial No.		Temp/Humi.	23/44
Test Condition	5.1GHz	Operator	S.G.LEE

Memo

LIMIT : FCC P15.207 QP
FCC P15.207 AV

NO	FREQ [MHz]	READING QP [dBuV]	READING CAV [dBuV]	C.FACTOR [dB]	RESULT QP [dBuV]	RESULT CAV [dBuV]	LIMIT QP [dBuV]	LIMIT CAV [dBuV]	MARGIN QP [dBuV]	MARGIN CAV [dBuV]	PHASE
1	0.18355	25.71	11.28	9.96	35.67	21.24	64.32	54.32	28.65	33.08	N
2	0.24458	24.16	12.44	9.95	34.11	22.39	61.94	51.94	27.83	29.55	N
3	0.99246	20.85	11.79	9.99	30.84	21.78	56.00	46.00	25.16	24.22	N
4	2.34680	27.29	20.34	10.04	37.33	30.38	56.00	46.00	18.67	15.62	N
5	11.78660	26.82	17.81	10.23	37.05	28.04	60.00	50.00	22.95	21.96	N
6	28.32640	17.46	6.48	10.48	27.94	16.96	60.00	50.00	32.06	33.04	N
7	0.18790	24.81	11.03	9.95	34.76	20.98	64.13	54.13	29.37	33.15	L1
8	0.49650	17.28	7.13	9.99	27.27	17.12	56.06	46.06	28.79	28.94	L1
9	1.78080	27.13	16.34	10.03	37.16	26.37	56.00	46.00	18.84	19.63	L1
10	2.36800	16.46	6.78	10.04	26.50	16.82	56.00	46.00	29.50	29.18	L1
11	12.23340	31.00	20.85	10.24	41.24	31.09	60.00	50.00	18.76	18.91	L1
12	27.27180	14.59	3.28	10.49	25.08	13.77	60.00	50.00	34.92	36.23	L1

AC Line Conducted Emissions (Graph)

Test Mode: U-NII 2A & 802.11a & 5260 MHz

Results of Conducted Emission

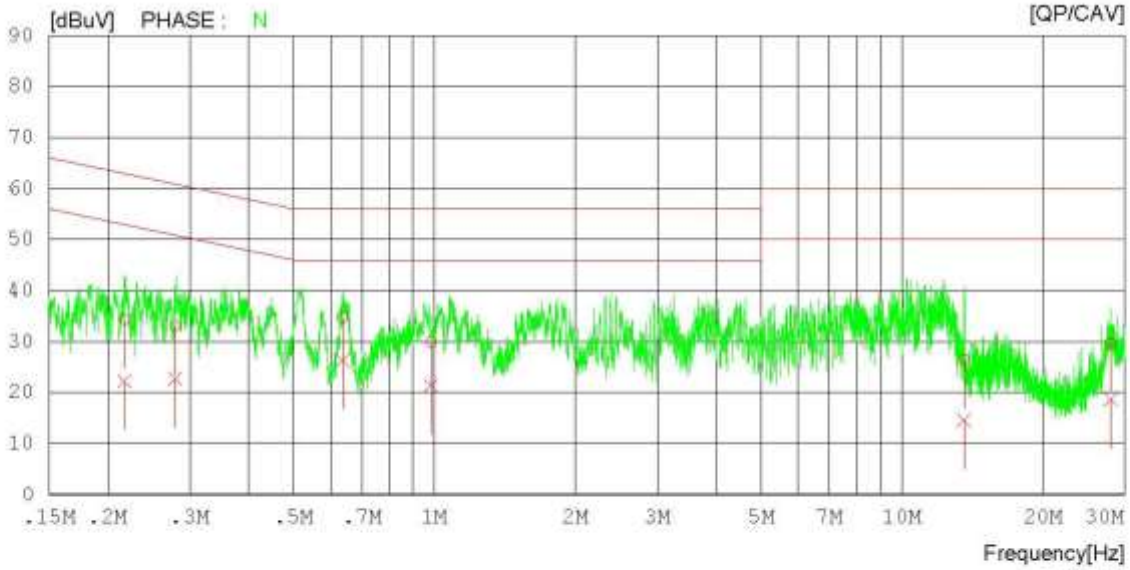
DTNC

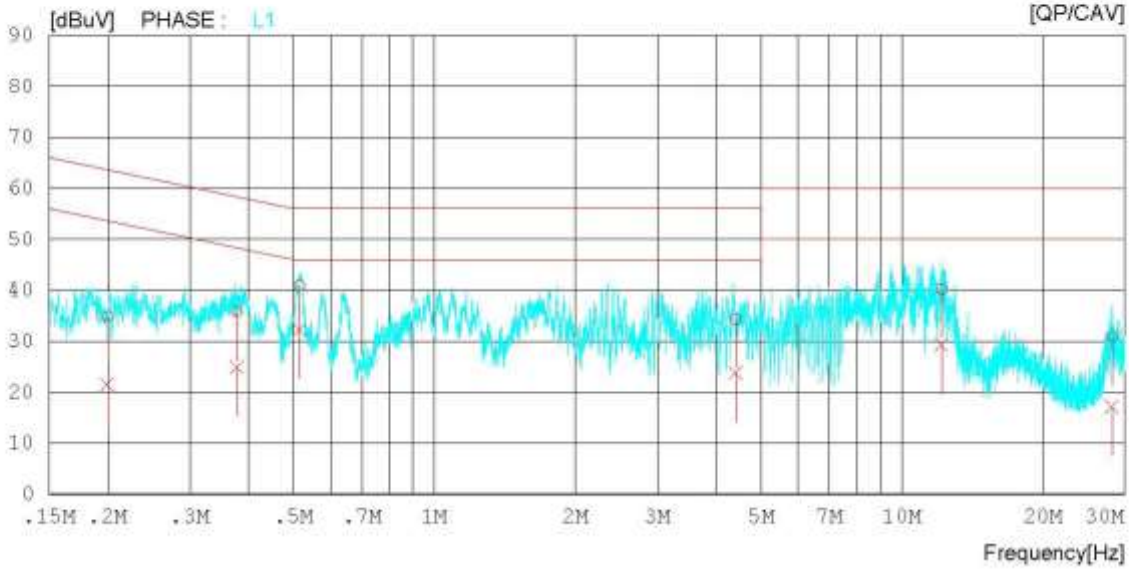
Date 2018-03-09

Order No.	DTNC1802-01142	Referrence No.	
Model No.	DS1803	Power Supply	
Serial No.		Temp/Humi.	23/44
Test Condition	5.3GHz	Operator	S.G.LEE

Memo

LIMIT : FCC P15.207 QP
FCC P15.207 AV





AC Line Conducted Emissions (Data List)

Test Mode: U-NII 2A & 802.11a & 5260 MHz

Results of Conducted Emission

DTNC

Date 2018-03-09

Order No.	DTNC1802-01142	Referrence No.	
Model No.	DS1803	Power Supply	
Serial No.		Temp/Humi.	23/44
Test Condition	5.3GHz	Operator	S.G.LEE

Memo

LIMIT : FCC P15.207 QP
FCC P15.207 AV

NO	FREQ [MHz]	READING QP [dBuV]	READING CAV [dBuV]	C.FACTOR [dB]	RESULT QP [dBuV]	RESULT CAV [dBuV]	LIMIT QP [dBuV]	LIMIT CAV [dBuV]	MARGIN QP [dBuV]	MARGIN CAV [dBuV]	PHASE
1	0.21729	24.42	12.27	9.94	34.36	22.21	62.92	52.92	28.56	30.71	N
2	0.27901	23.01	12.76	9.95	32.96	22.71	60.85	50.85	27.89	28.14	N
3	0.63727	24.74	16.33	9.97	34.71	26.30	56.00	46.00	21.29	19.70	N
4	0.98440	19.91	11.37	9.99	29.90	21.36	56.00	46.00	26.10	24.64	N
5	13.58840	16.13	4.29	10.28	26.41	14.57	60.00	50.00	33.59	35.43	N
6	27.99200	19.20	8.19	10.49	29.69	18.68	60.00	50.00	30.31	31.32	N
7	0.19995	24.89	11.58	9.94	34.83	21.52	63.61	53.61	28.78	32.09	L1
8	0.37750	25.73	14.91	9.97	35.70	24.88	58.33	48.33	22.63	23.45	L1
9	0.51461	30.91	22.15	9.99	40.90	32.14	56.00	46.00	15.10	13.86	L1
10	4.40680	24.12	13.69	10.07	34.19	23.76	56.00	46.00	21.81	22.24	L1
11	12.15340	30.02	19.00	10.23	40.25	29.23	60.00	50.00	19.75	20.77	L1
12	28.13620	20.35	6.56	10.49	30.84	17.05	60.00	50.00	29.16	32.95	L1

AC Line Conducted Emissions (Graph)

Test Mode: U-NII 2C & 802.11a & 5500 MHz

Results of Conducted Emission

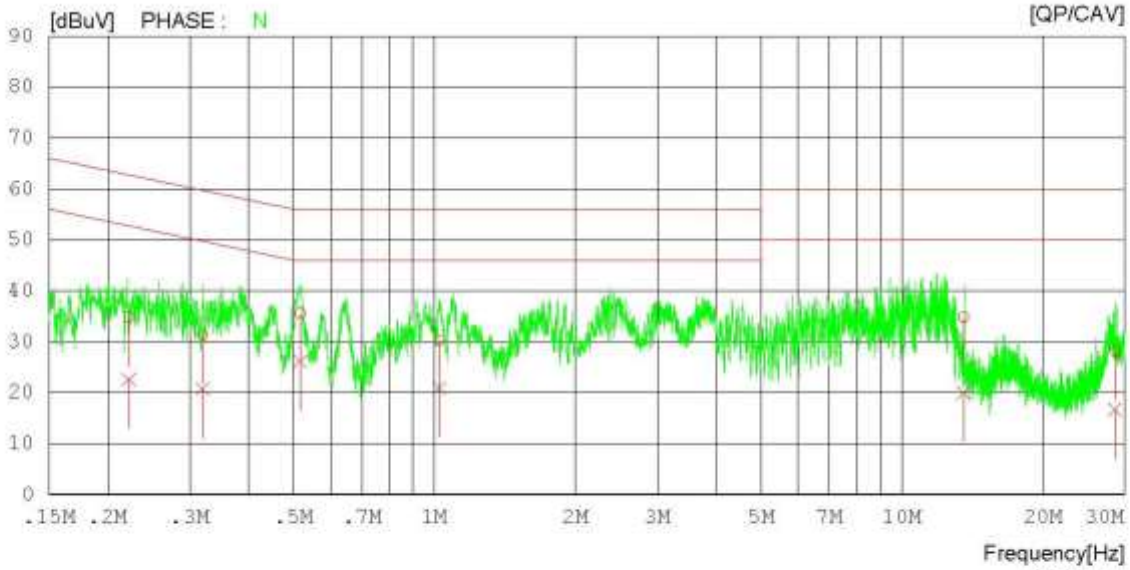
DTNC

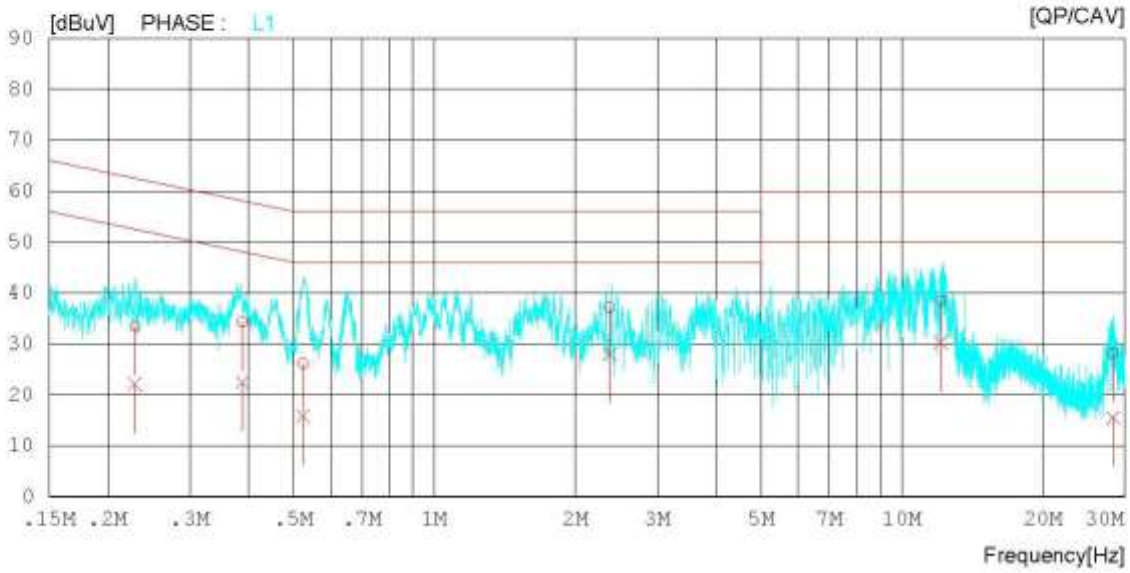
Date 2018-03-09

Order No.	DTNC1802-01142	Referrence No.	
Model No.	DS1803	Power Supply	
Serial No.		Temp/Humi.	23/44
Test Condition	5.5GHz	Operator	S.G.LEE

Memo

LIMIT : FCC P15.207 QP
FCC P15.207 AV





AC Line Conducted Emissions (Data List)

Test Mode: U-NII 2C & 802.11a & 5500 MHz

Results of Conducted Emission

DTNC Date 2018-03-09

Order No.	DTNC1802-01142	Referrence No.	
Model No.	DS1803	Power Supply	
Serial No.		Temp/Humi.	23/44
Test Condition	5.5GHz	Operator	S.G.LEE

Memo

LIMIT : FCC P15.207 QP
FCC P15.207 AV

NO	FREQ [MHz]	READING QP [dBuV]	READING CAV [dBuV]	C.FACTOR [dB]	RESULT QP [dBuV]	RESULT CAV [dBuV]	LIMIT QP [dBuV]	LIMIT CAV [dBuV]	MARGIN QP [dBuV]	MARGIN CAV [dBuV]	PHASE
1	0.22203	24.81	12.68	9.94	34.75	22.62	62.74	52.74	27.99	30.12	N
2	0.31965	21.35	10.76	9.96	31.31	20.72	59.72	49.72	28.41	29.00	N
3	0.51578	25.53	16.15	9.99	35.52	26.14	56.00	46.00	20.48	19.86	N
4	1.02400	20.26	10.90	9.99	30.25	20.89	56.00	46.00	25.75	25.11	N
5	13.54980	24.45	9.70	10.28	34.73	19.98	60.00	50.00	25.27	30.02	N
6	28.56960	17.64	6.12	10.48	28.12	16.60	60.00	50.00	31.88	33.40	N
7	0.22876	23.47	12.08	9.94	33.41	22.02	62.49	52.49	29.08	30.47	L1
8	0.38815	24.31	12.44	9.97	34.28	22.41	58.10	48.10	23.82	25.69	L1
9	0.52407	16.09	5.86	9.99	26.08	15.85	56.00	46.00	29.92	30.15	L1
10	2.36920	27.06	17.96	10.04	37.10	28.00	56.00	46.00	18.90	18.00	L1
11	12.12000	28.31	19.97	10.23	38.54	30.20	60.00	50.00	21.46	19.80	L1
12	28.33380	17.71	4.94	10.48	28.19	15.42	60.00	50.00	31.81	34.58	L1

AC Line Conducted Emissions (Graph)

Test Mode: U-NII 3 & 802.11a & 5785 MHz

Results of Conducted Emission

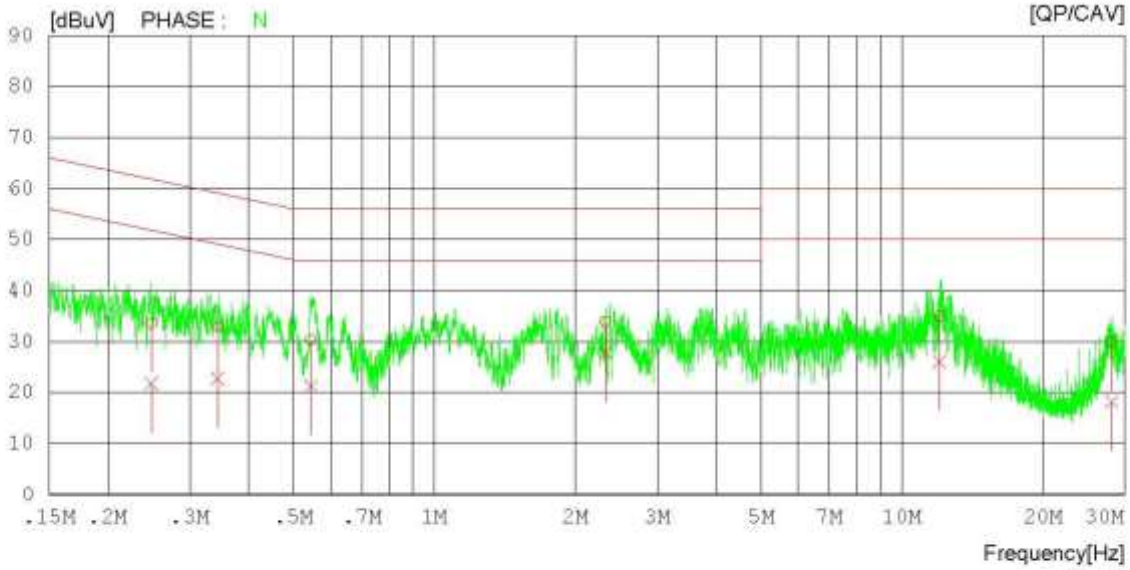
DTNC

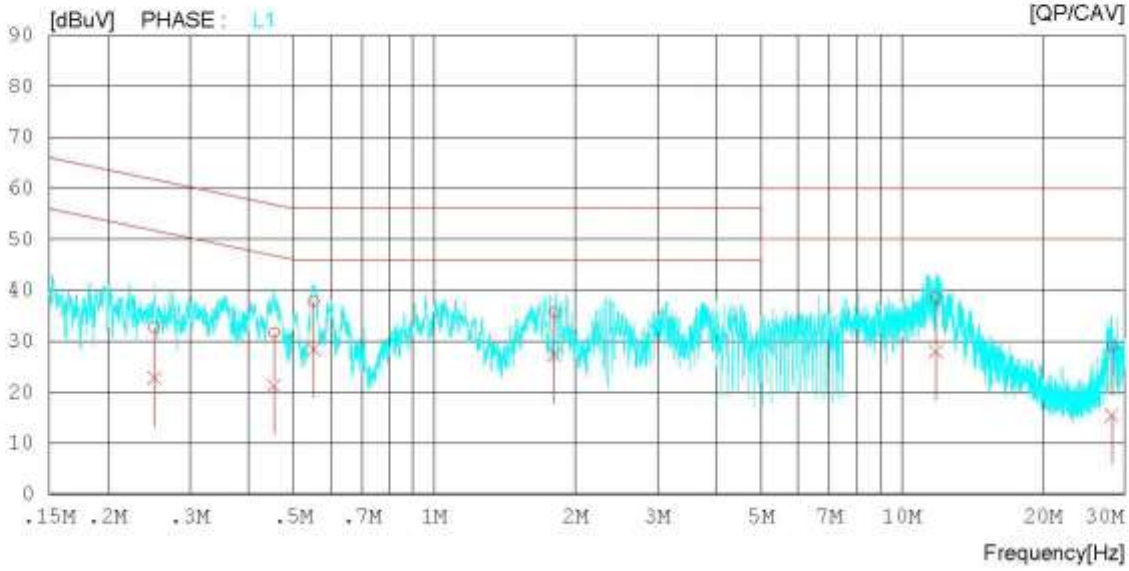
Date 2018-03-09

Order No.	DTNC1802-01142	Referrence No.	
Model No.	DS1803	Power Supply	
Serial No.		Temp/Humi.	23/44
Test Condition	5.7GHz	Operator	S.G.LEE

Memo

LIMIT : FCC P15.207 QP
FCC P15.207 AV





AC Line Conducted Emissions (Data List)

Test Mode: U-NII 3 & 802.11a & 5785 MHz

Results of Conducted Emission

DTNC Date 2018-03-09

Order No.	DTNC1802-01142	Referrence No.	
Model No.	DS1803	Power Supply	
Serial No.		Temp/Humi.	23/44
Test Condition	5.7GHz	Operator	S.G.LEE

Memo

LIMIT : FCC P15.207 QP
FCC P15.207 AV

NO	FREQ [MHz]	READING QP [dBuV]	READING CAV [dBuV]	C.FACTOR [dB]	RESULT QP [dBuV]	RESULT CAV [dBuV]	LIMIT QP [dBuV]	LIMIT CAV [dBuV]	MARGIN QP [dBuV]	MARGIN CAV [dBuV]	PHASE
1	0.24845	23.56	11.80	9.95	33.51	21.75	61.81	51.81	28.30	30.06	N
2	0.34425	22.87	12.76	9.96	32.83	22.72	59.10	49.10	26.27	26.38	N
3	0.54451	20.32	11.17	9.98	30.30	21.15	56.00	46.00	25.70	24.85	N
4	2.32120	23.77	17.79	10.04	33.81	27.83	56.00	46.00	22.19	18.17	N
5	12.03740	24.74	15.79	10.23	34.97	26.02	60.00	50.00	25.03	23.98	N
6	28.12020	19.23	7.60	10.49	29.72	18.09	60.00	50.00	30.28	31.91	N
7	0.25190	22.70	12.81	9.95	32.65	22.76	61.69	51.69	29.04	28.93	L1
8	0.45404	21.72	11.28	9.98	31.70	21.26	56.80	46.80	25.10	25.54	L1
9	0.55250	27.84	18.49	9.98	37.82	28.47	56.00	46.00	18.18	17.53	L1
10	1.80660	25.62	17.24	10.03	35.65	27.27	56.00	46.00	20.35	18.73	L1
11	11.83300	28.21	17.70	10.23	38.44	27.93	60.00	50.00	21.56	22.07	L1
12	28.14600	18.40	4.89	10.49	28.89	15.38	60.00	50.00	31.11	34.62	L1

9. LIST OF TEST EQUIPMENT

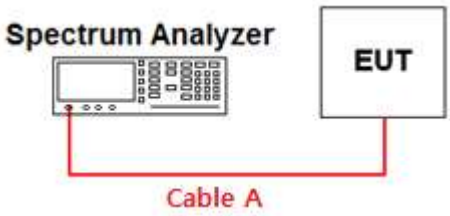
Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
Spectrum Analyzer	Agilent Technologies	N9020A	17/07/12	18/07/12	MY46471601
Spectrum Analyzer	Agilent Technologies	N9020A	17/09/05	18/09/05	MY46471251
Spectrum Analyzer	Agilent Technologies	N9030A	17/09/07	18/09/07	MY53310140
Multimeter	FLUKE	17B	17/12/26	18/12/26	26030065WS
DC Power Supply	Agilent	66332A	17/09/05	18/09/05	MY43000719
DC Power Supply	Agilent	66332A	17/12/27	18/12/27	US37473833
Signal Generator	Rohde Schwarz	SMBV100A	17/12/27	18/12/27	255571
Signal Generator	Rohde Schwarz	SMF100A	17/12/27	18/12/27	102341
Thermohygrometer	BODYCOM	BJ5478	18/01/03	19/01/03	120612-2
50W 10dB ATT	SMAJK	SMAJK-50-10	17/09/06	18/09/06	2-50-10
Loop Antenna	ETS	6502	17/03/24	19/03/24	3471
BILOG ANTENNA	Schwarzbeck	VULB 9160	16/08/05	18/08/05	9160-3362
Horn Antenna	ETS-LINDGREN	3117	16/05/03	18/05/03	00140394
Horn Antenna	A.H.Systems Inc.	SAS-574	17/07/31	19/07/31	155
PreAmplifier	Agilent	8449B	17/09/05	18/09/05	3008A02108
PreAmplifier	H.P	8447D	17/12/26	18/12/26	2944A07774
PreAmplifier	A.H.Systems Inc.	PAM-1840VH	17/09/17	18/09/17	163
EMI Test Receiver	Rohde Schwarz	ESR7	17/02/16 18/02/13	18/02/16 19/02/13	101061
High-pass filter	Wainwright	WHKX12-2580-3000-18000-80SS	17/09/05	18/09/05	3
High-pass filter	Wainwright	WHNX6-6320-8000-26500-40CC	17/09/05	18/09/05	1
Power Meter & Wide Bandwidth Sensor	Anritsu	ML2496A MA2411B	17/12/27	18/12/27	1338004 1306053
EMI TEST RECEIVER	Rohde Schwarz	ESCI7	17/02/16 18/02/12	18/02/16 19/02/12	100910
PULSE LIMITER	Rohde Schwarz	ESH3-Z2	17/09/29	18/09/29	101333
LISN	SCHWARZBECK	NNLK 8121	17/04/03	18/04/03	06183
Temp & Humi Test Chamber	SJ Science	SJ-TH-S50	17/09/07	18/09/07	U5542113

Note: The measurement antennas were calibrated in accordance to the requirements of ANSI C63.5-2017.

APPENDIX I

Conducted Test set up Diagram

▪ **Conducted Measurement**



APPENDIX II

Duty Cycle Information

▣ Test Procedure

Duty Cycle [X = On Time / (On + Off time)] is measured using Measurement Procedure **of KDB789033 D02v02r01**

1. Set the center frequency of the spectrum analyzer to the center frequency of the transmission.
2. Set RBW ≥ EBW if possible; otherwise, set RBW to the largest available value.
3. Set VBW ≥ RBW. Set detector = peak.
4. Note : The zero-span measurement method shall not be used unless both **RBW and VBW are > 50/*T***, where *T* is defined in section II.B.1.a), and **the number of sweep points across duration *T* exceeds 100**. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if *T* ≤ 16.7 microseconds.)

   T : The minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.
   (***T* = On time** of the above table since the EUT operates with above fixed Duty Cycle and it is the minimum On time)

▣ Test Results:

Duty cycle

Mode	Data Rate	Tested Frequency [MHz]	Maximum Achievable Duty Cycle (*x*) = On / (On+Off)			Duty Cycle Correction Factor [dB]	50/*T* [kHz]
			On Time [ms]	(On+Off) Time [ms]	*x*		
802.11a	6Mbps	5180	2.03	2.05	99.07	0.05	24.62
802.11n (HT20)	MCS0	5180	1.88	1.90	99.00	0.05	26.61
802.11n (HT40)	MCS0	5190	1.24	1.26	98.42	0.07	42.23
802.11ac (VHT80)	MCS0	5210	0.25	0.27	92.36	0.35	201.69

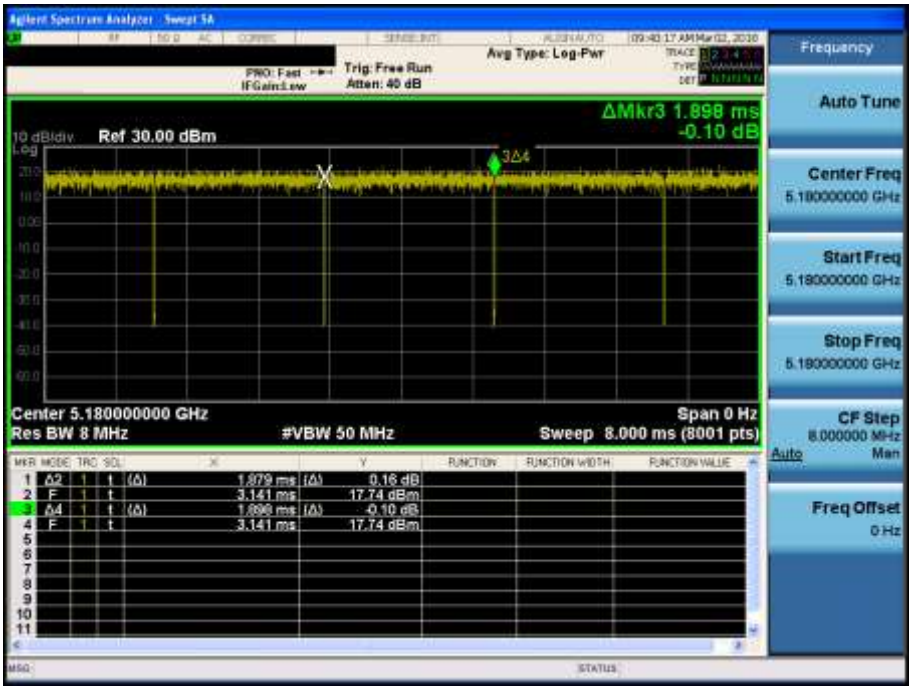
Single Transmit

Duty Cycle

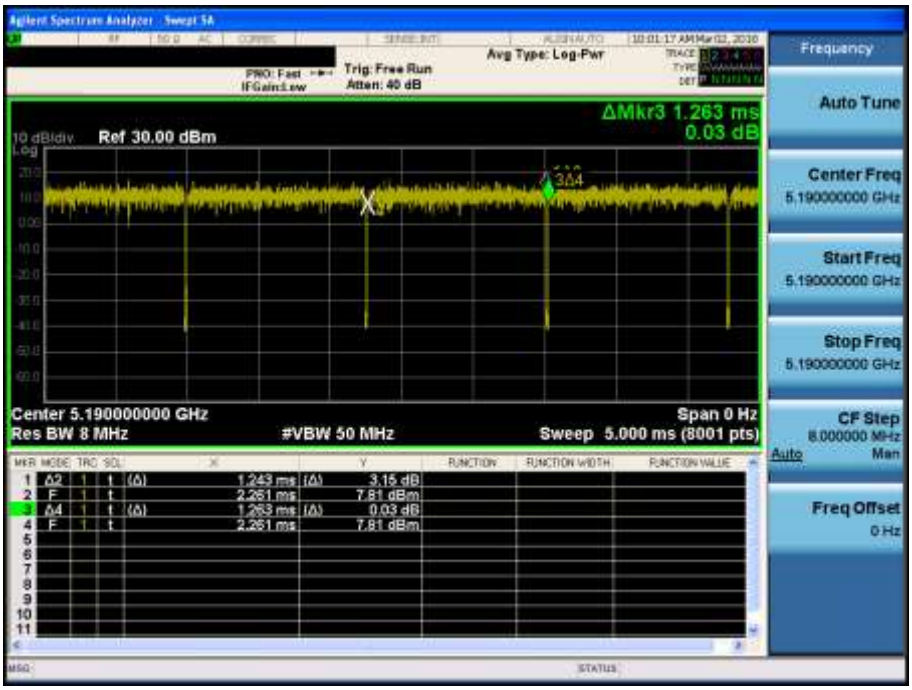
Test Mode: 802.11a & Ch.36

Duty Cycle

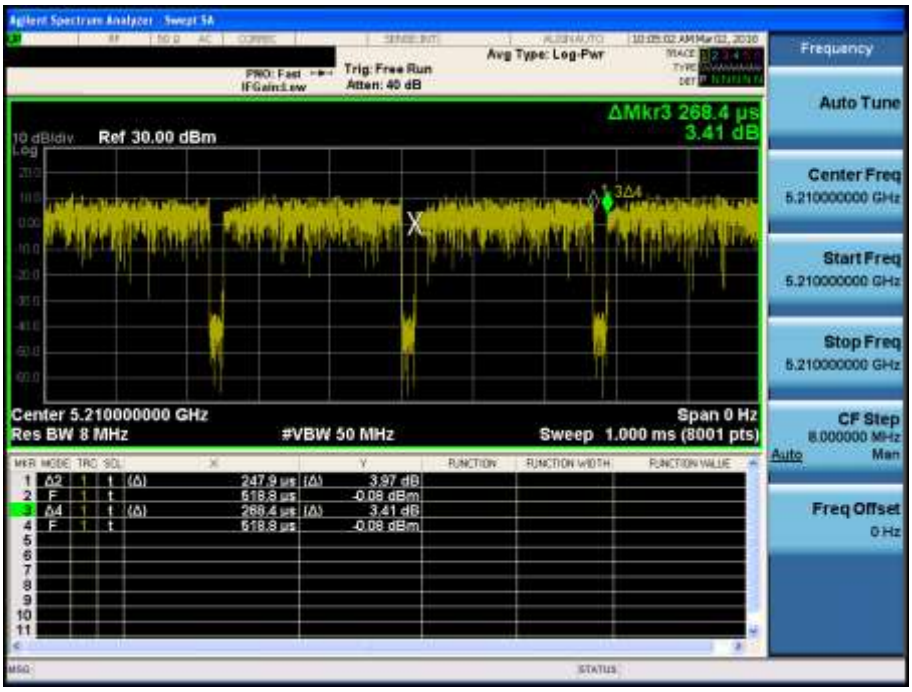
Test Mode: 802.11n HT20 & Ch.36



Duty Cycle Test Mode: 802.11n HT40 & Ch.38



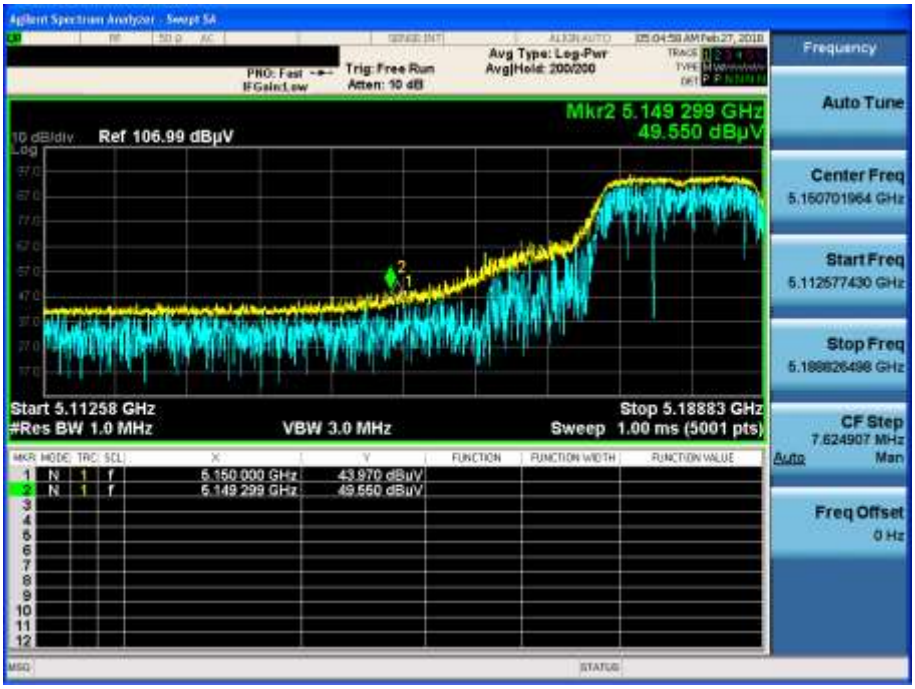
Duty Cycle Test Mode: 802.11ac VHT80 & Ch.42



APPENDIX III

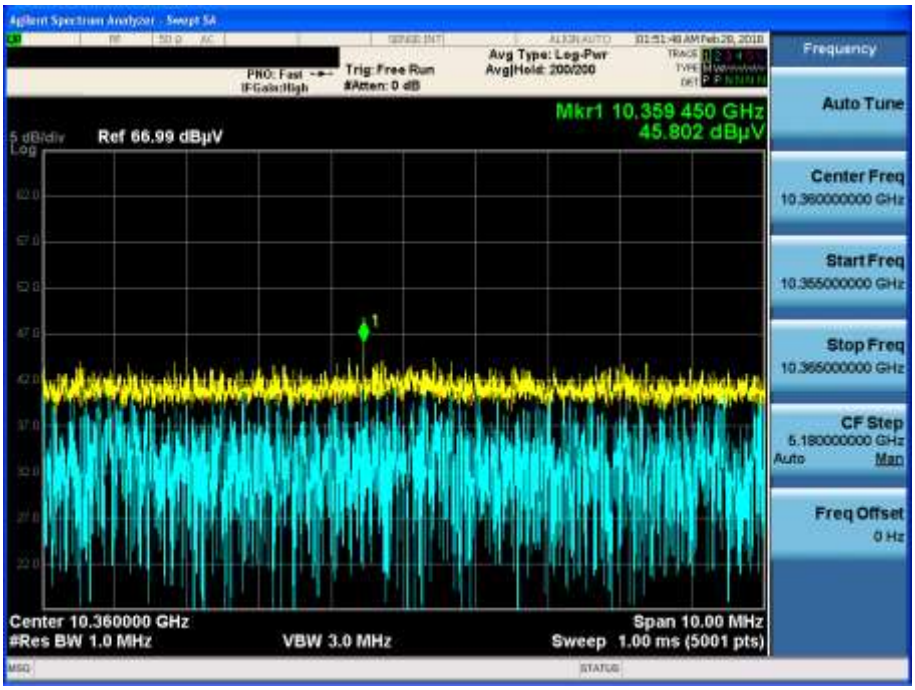
Unwanted Emissions (Radiated) Test Plot

802.11a & U-NII 1 & Ch.36 & Y axis & Ver **Detector Mode : PK**

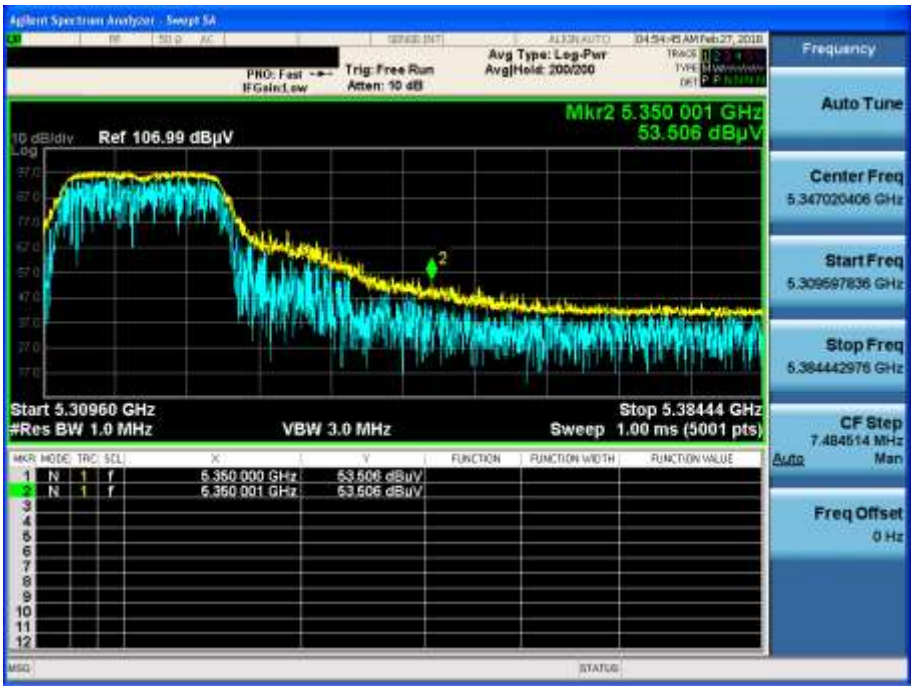


802.11a & U-NII 1 & Ch.36 & Y axis & Ver **Detector Mode : AV**

802.11a & U-NII 1 & Ch.36 & Z axis & Ver **Detector Mode : PK**

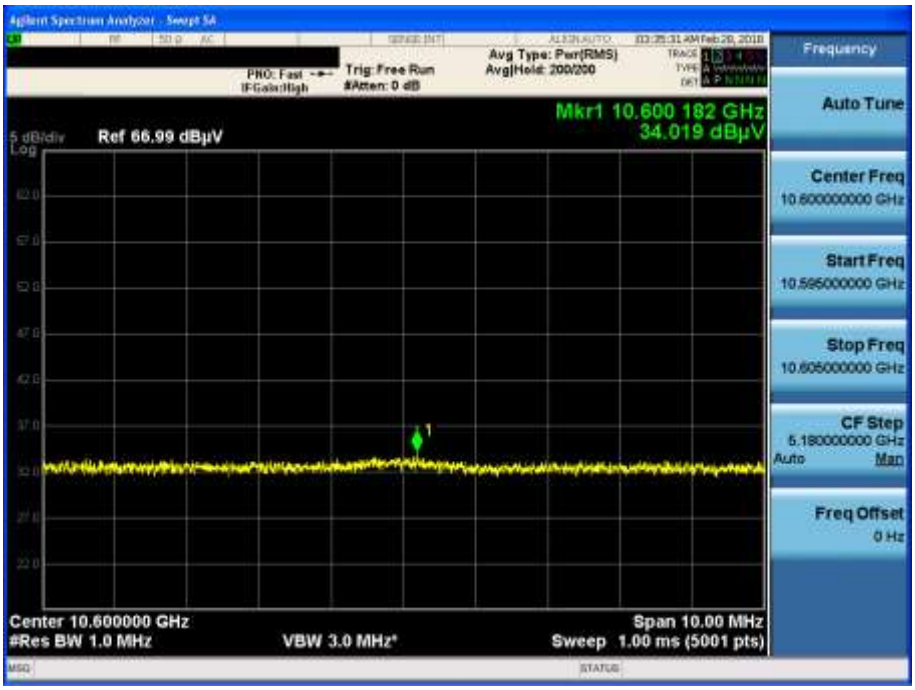


802.11a & U-NII 2A & Ch.64 & Y axis & Ver **Detector Mode : PK**

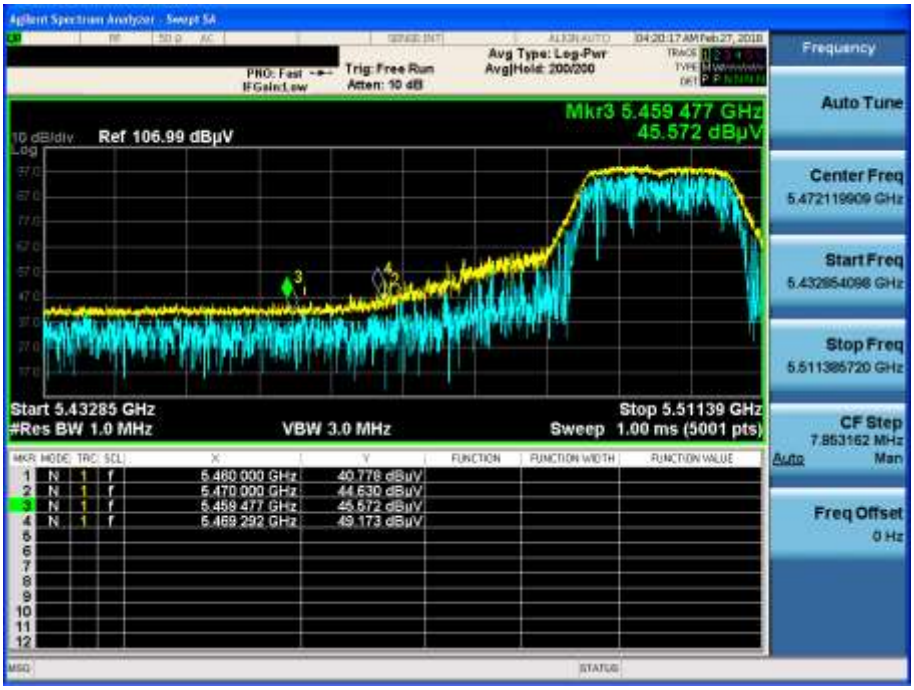


802.11a & U-NII 2A & Ch.64 & Y axis & Ver **Detector Mode : AV**

802.11a & U-NII 2A & Ch.60 & Z axis & Ver **Detector Mode : AV**

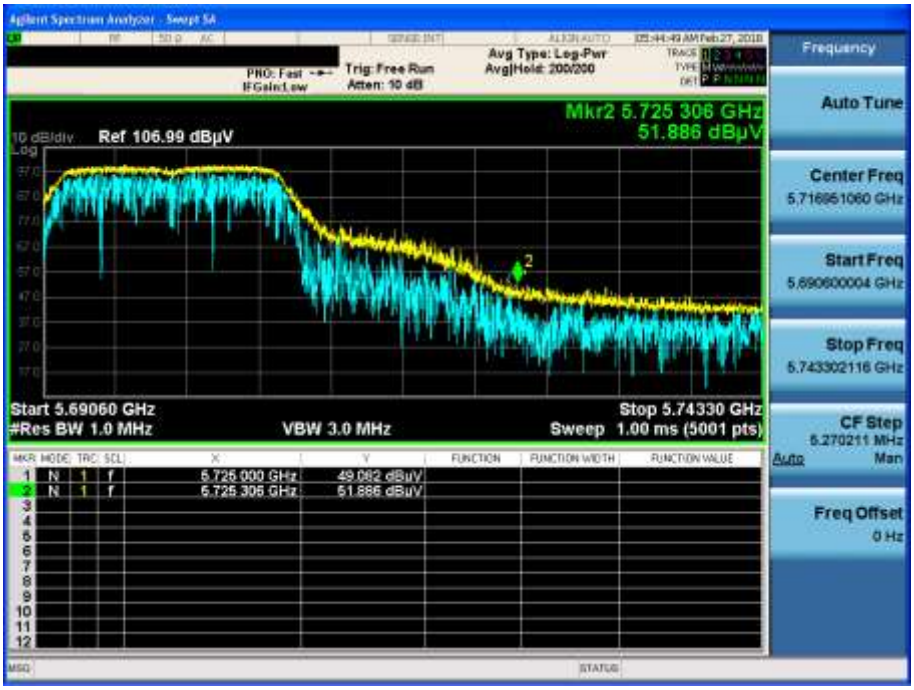


802.11a & U-NII 2C & Ch.100 & Y axis & Ver **Detector Mode : PK**

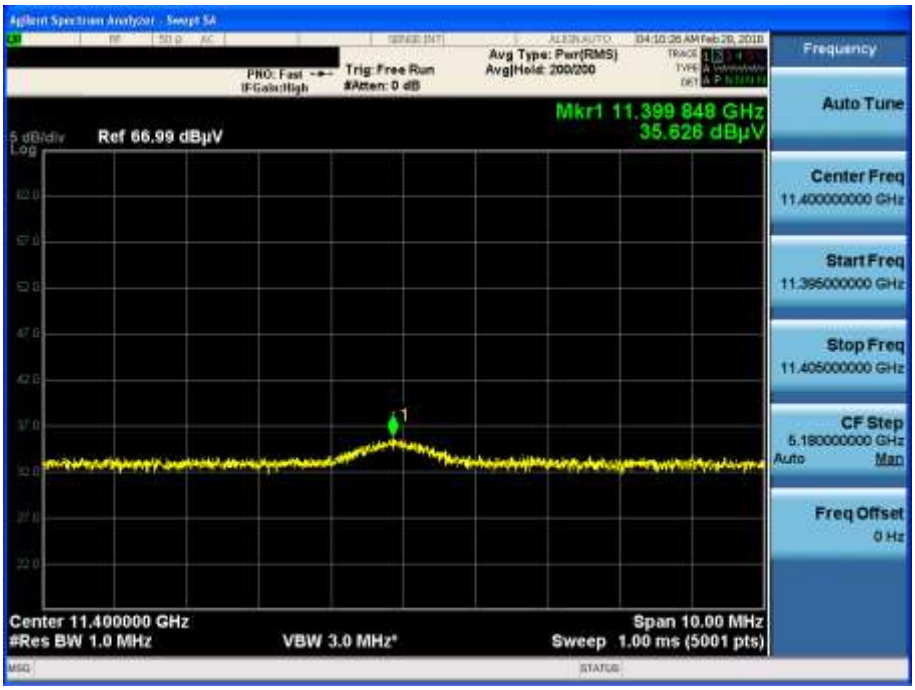


802.11a & U-NII 2C & Ch.100 & Y axis & Ver **Detector Mode : AV**

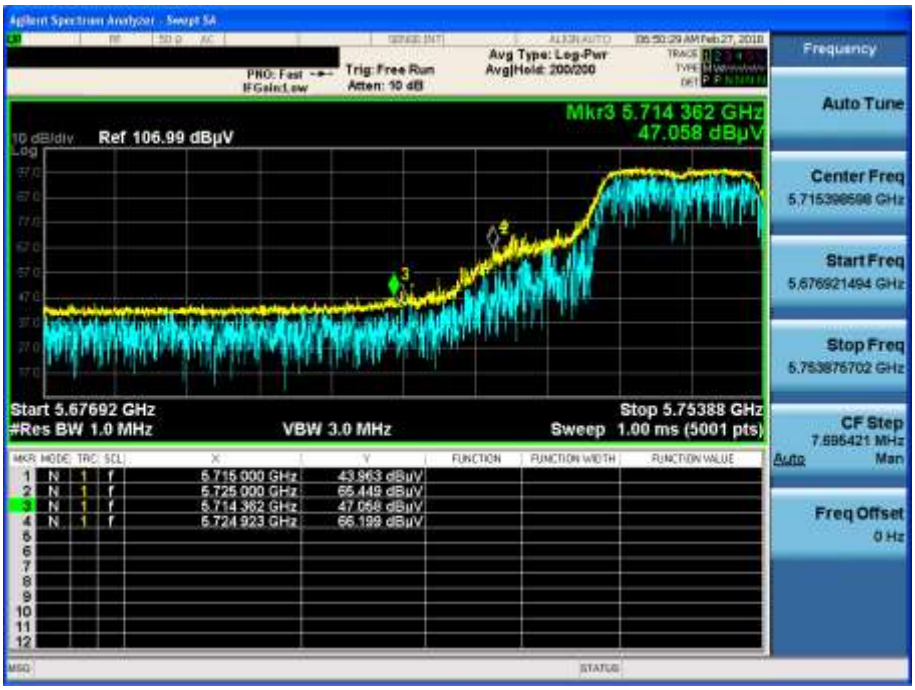
802.11a & U-NII 2C & Ch.140 & Y axis & Ver **Detector Mode : PK**



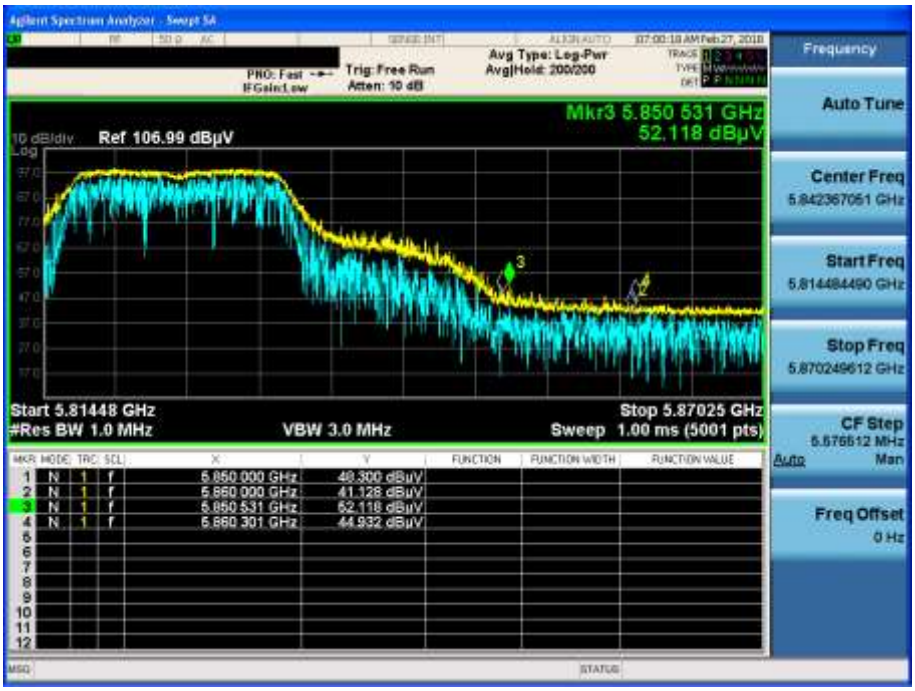
802.11a & U-NII 2C & Ch.140 & Z axis & Ver **Detector Mode : AV**



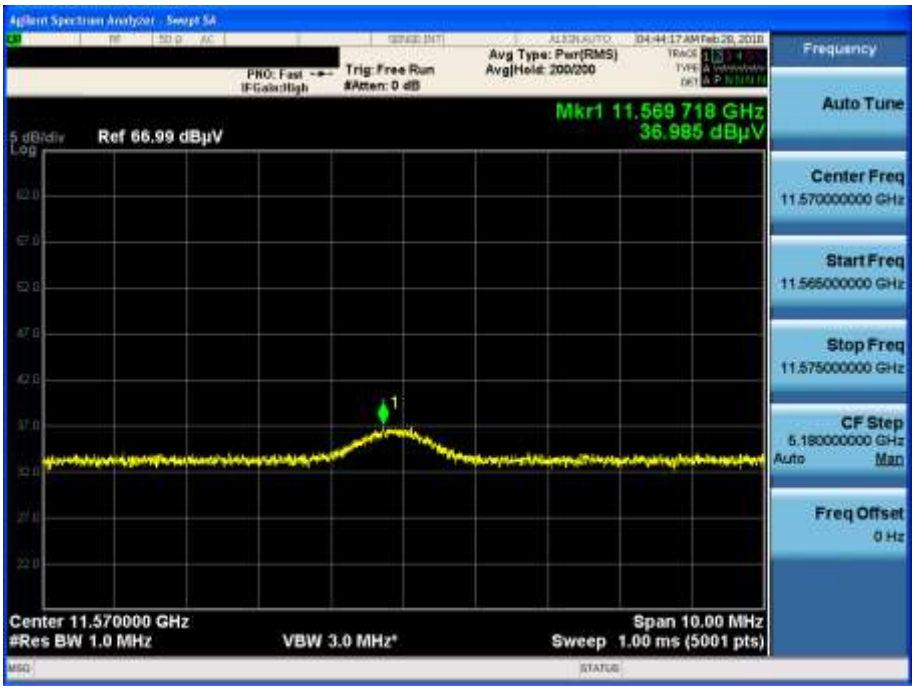
802.11a & U-NII 3 & Ch.149 & X axis & Hor **Detector Mode : PK**



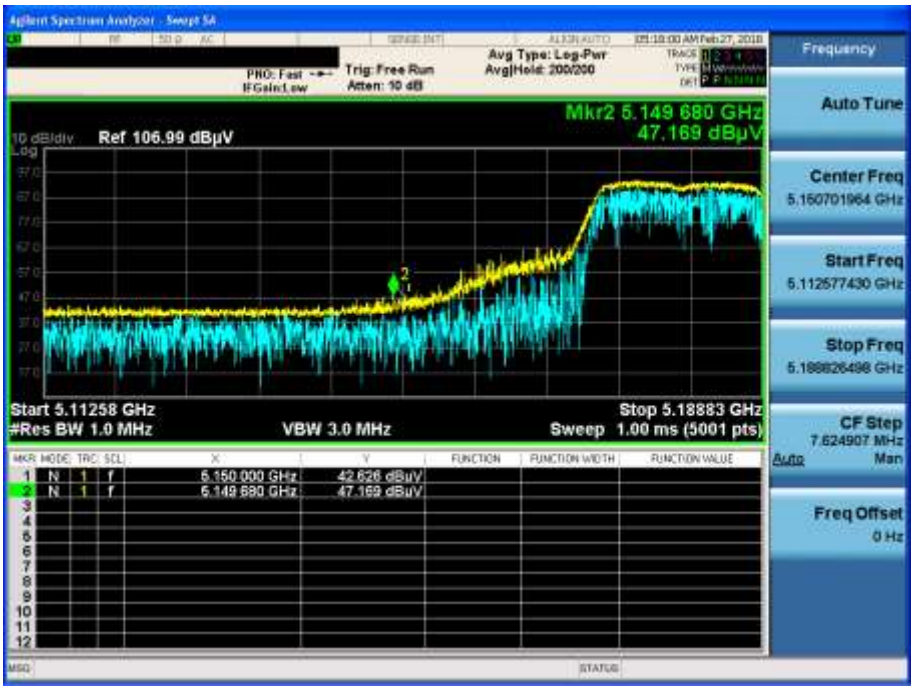
802.11a & U-NII 3 & Ch.165 & X axis & Hor **Detector Mode : PK**



802.11a & U-NII 3 & Ch.157 & Z axis & Ver **Detector Mode : AV**

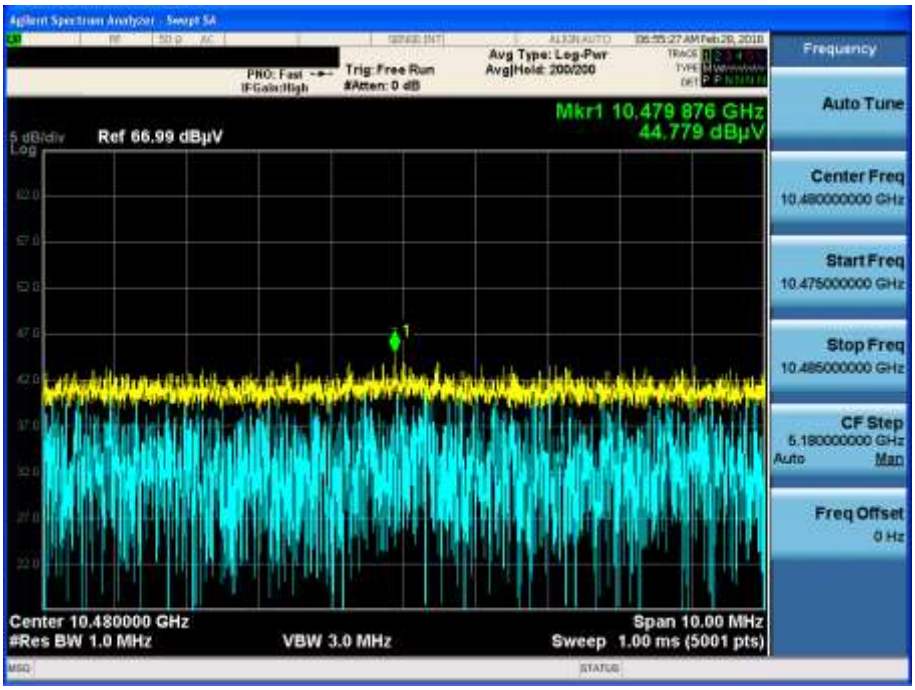


802.11n(HT20) & U-NII 1 & Ch.36 & Y axis & Ver Detector Mode : PK

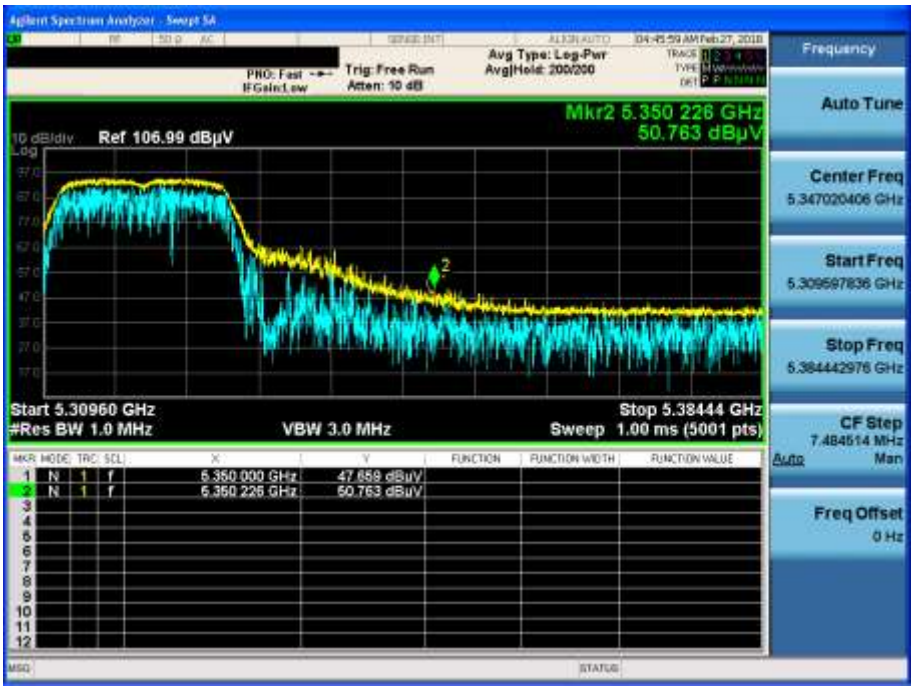


802.11n(HT20) & U-NII 1 & Ch.36 & Y axis & Ver Detector Mode : AV

802.11n(HT20) & U-NII 1 & Ch.48 & Y axis & Hor Detector Mode : PK

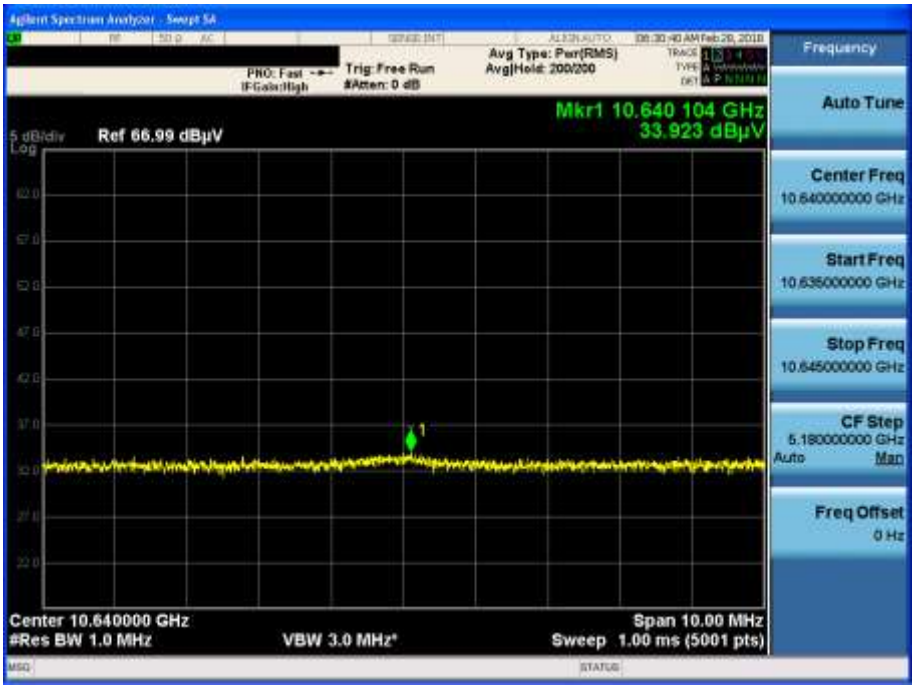


802.11n(HT20) & U-NII 2A & Ch.64 & Y axis & Ver Detector Mode : PK



802.11n(HT20) & U-NII 2A & Ch.64 & Y axis & Ver Detector Mode : AV

802.11n(HT20) & U-NII 2A & Ch.64 & Z axis & Ver Detector Mode : AV



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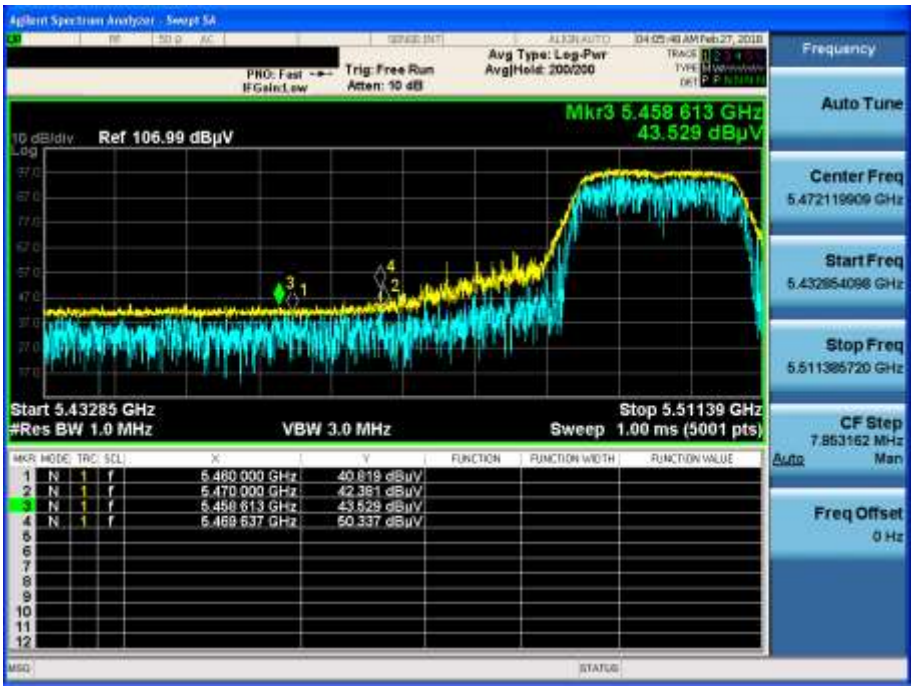
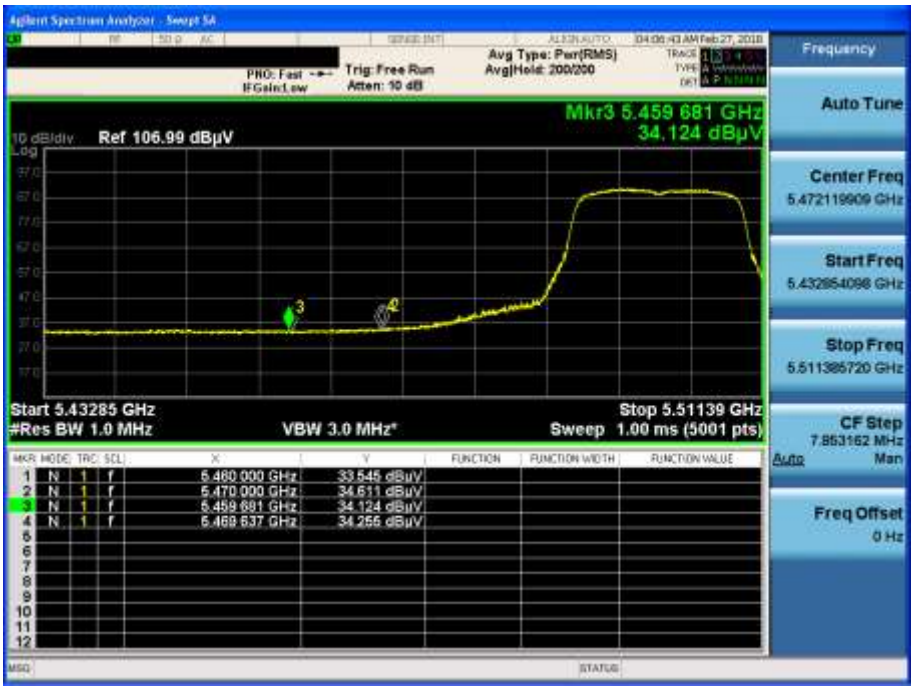
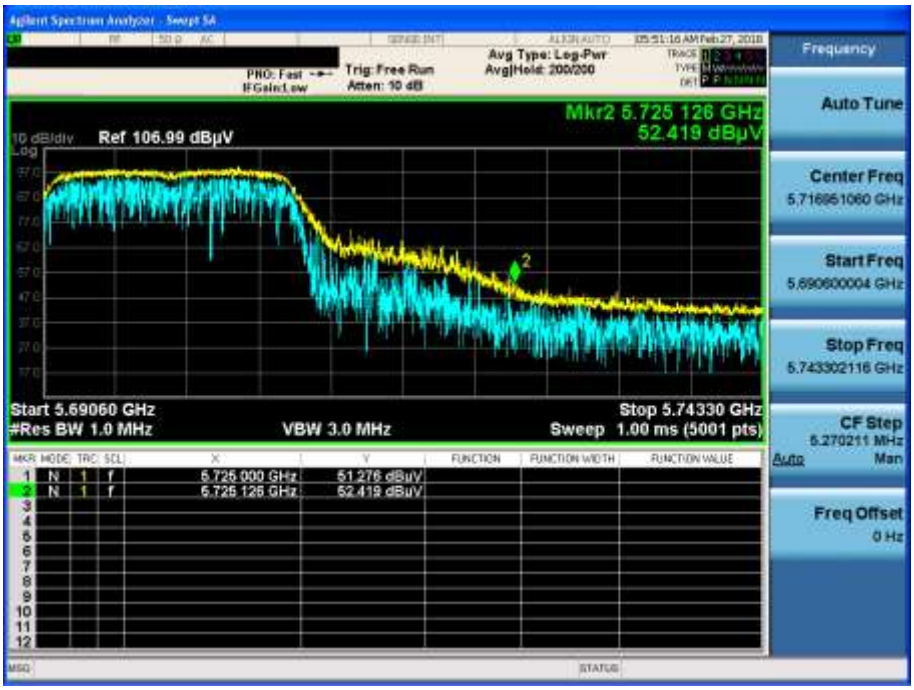


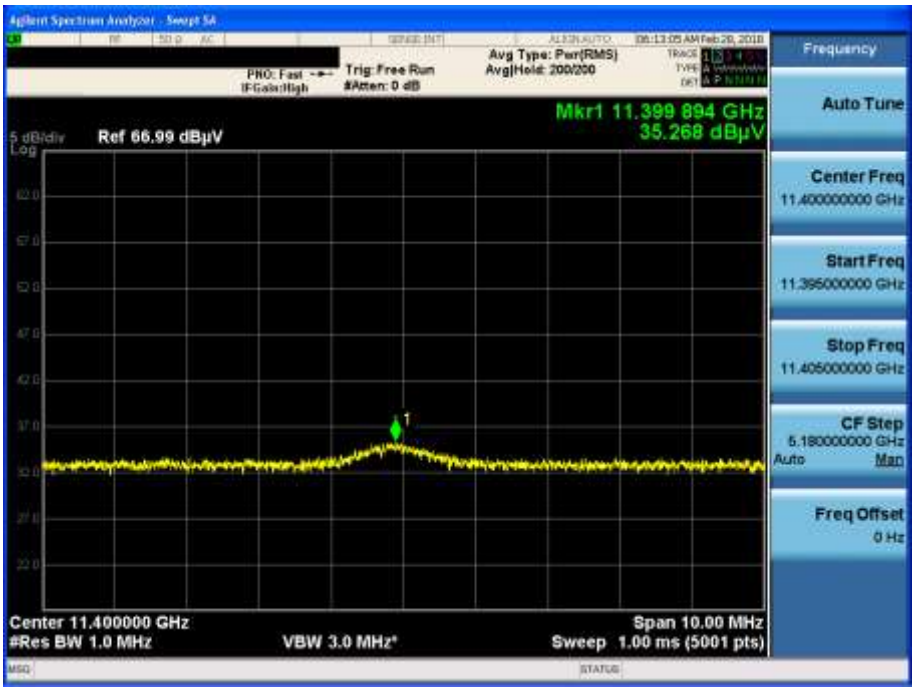
802.11n(HT20) & U-NII 2C & Ch.100 & X axis & Hor Detector Mode : AV



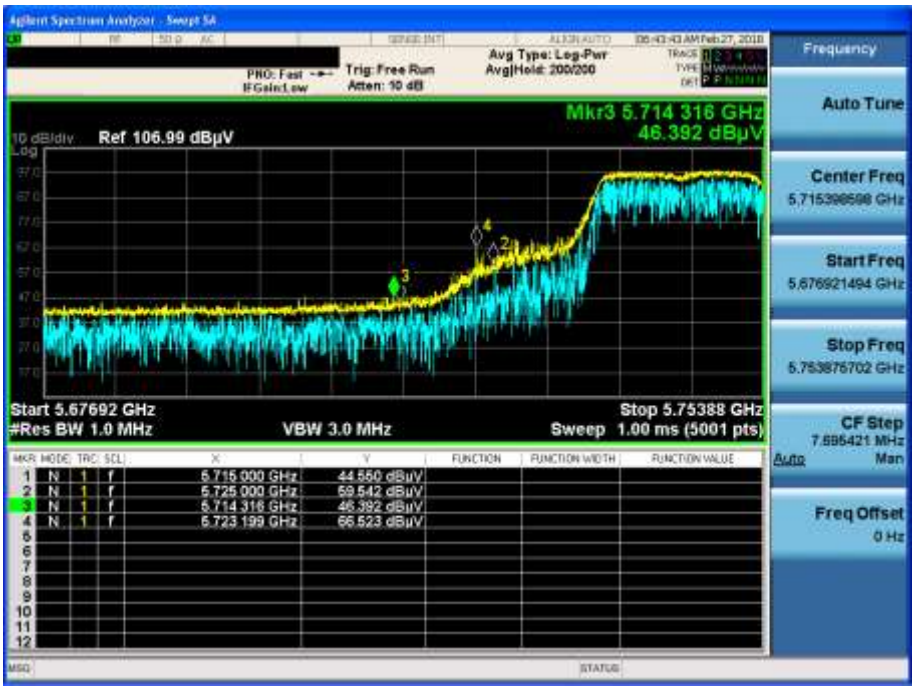
802.11n(HT20) & U-NII 2C & Ch.140 & X axis & Hor Detector Mode : PK



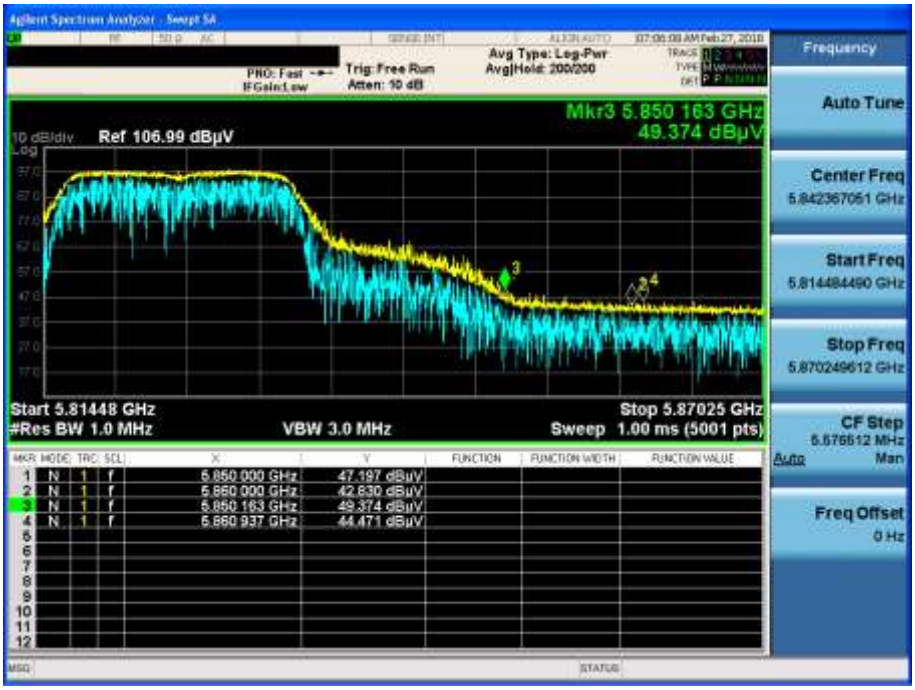
802.11n(HT20) & U-NII 2C & Ch.140 & Z axis & Ver Detector Mode : AV



802.11n(HT20) & U-NII 3 & Ch.149 & X axis & Hor Detector Mode : PK



802.11n(HT20) & U-NII 3 & Ch.165 & X axis & Hor Detector Mode : PK



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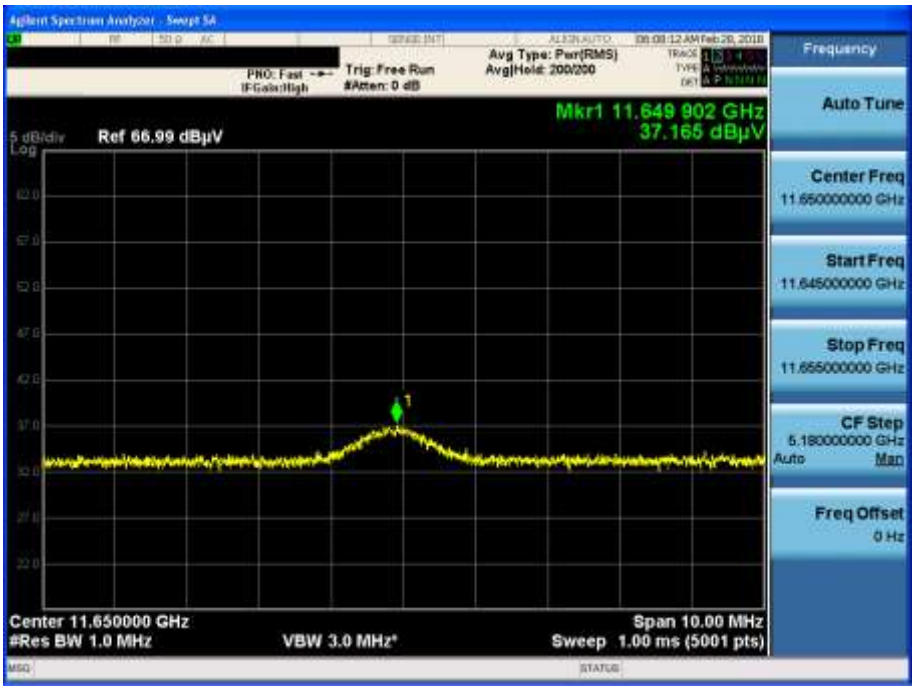
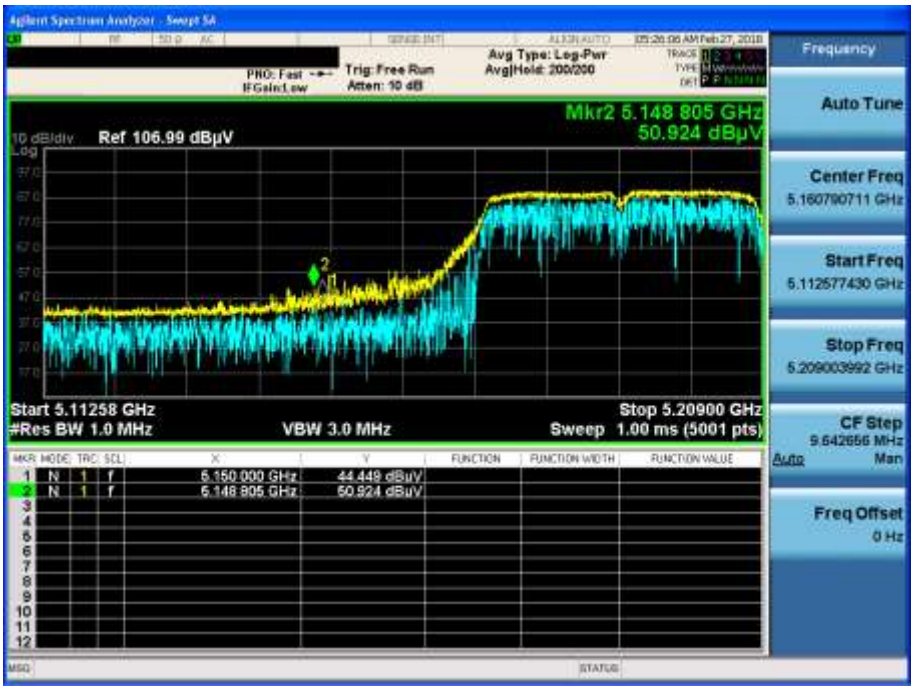
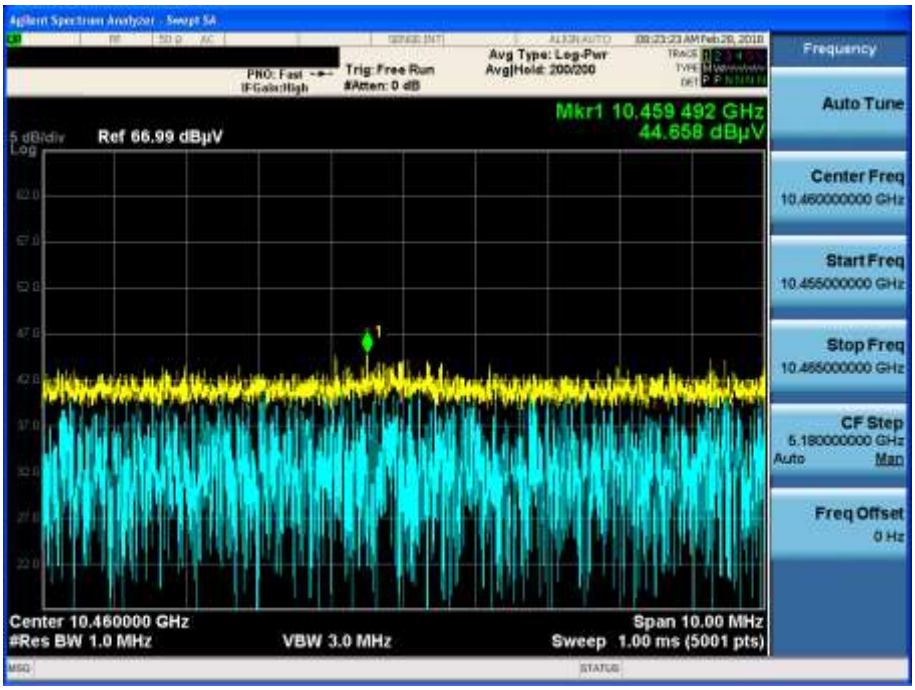


802.11n(HT40) & U-NII 1 & Ch.38 & X axis & Hor Detector Mode : PK

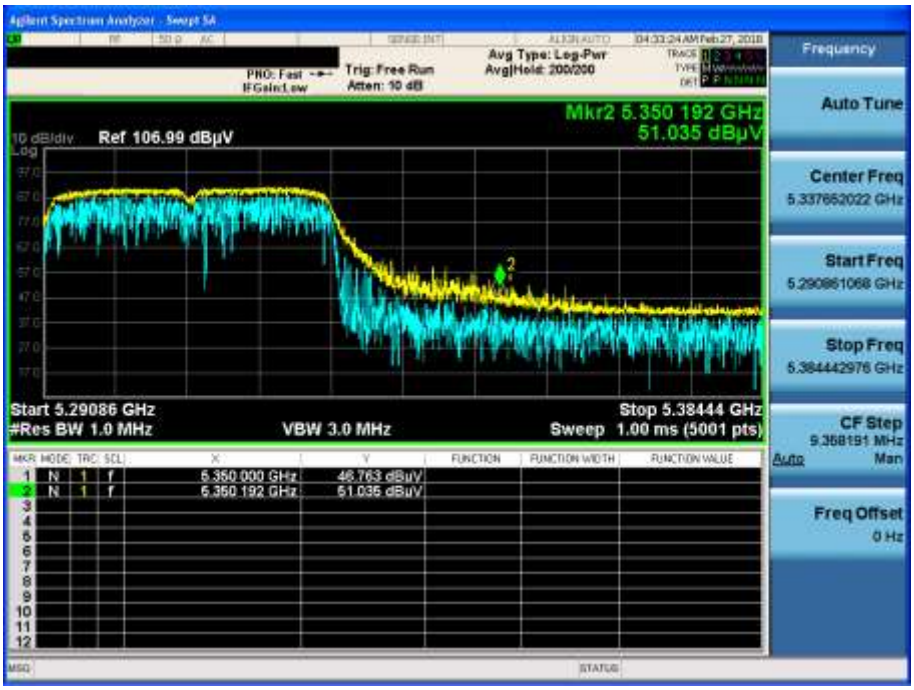


802.11n(HT40) & U-NII 1 & Ch.38 & X axis & Hor Detector Mode : AV

802.11n(HT40) & U-NII 1 & Ch.46 & Z axis & Ver Detector Mode : PK

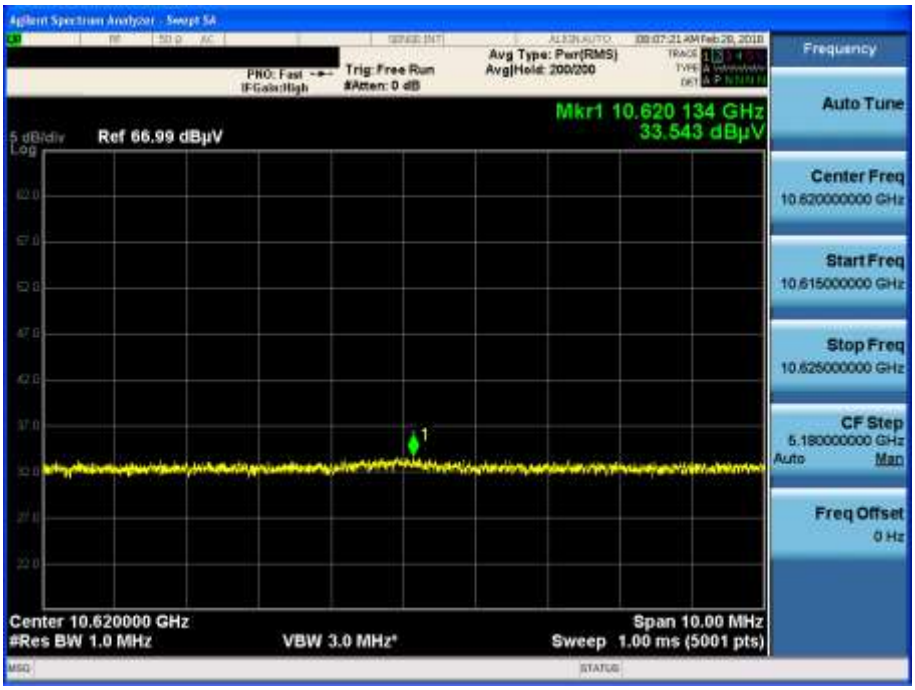


802.11n(HT40) & U-NII 2A & Ch.62 & Y axis & Ver Detector Mode : PK

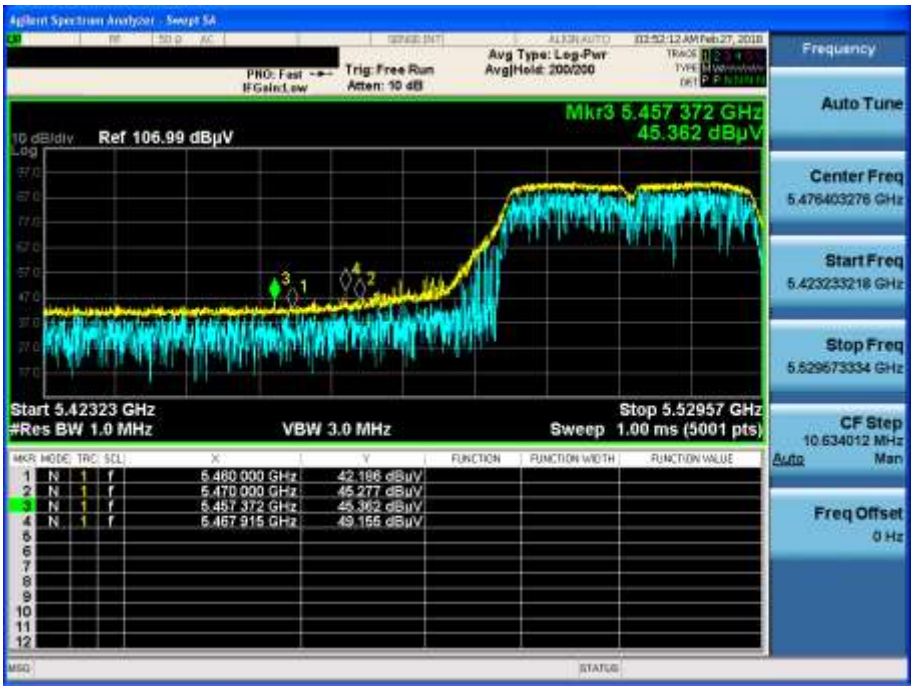


802.11n(HT40) & U-NII 2A & Ch.62 & Y axis & Ver Detector Mode : AV

802.11n(HT40) & U-NII 2A & Ch.62 & Z axis & Ver Detector Mode : AV

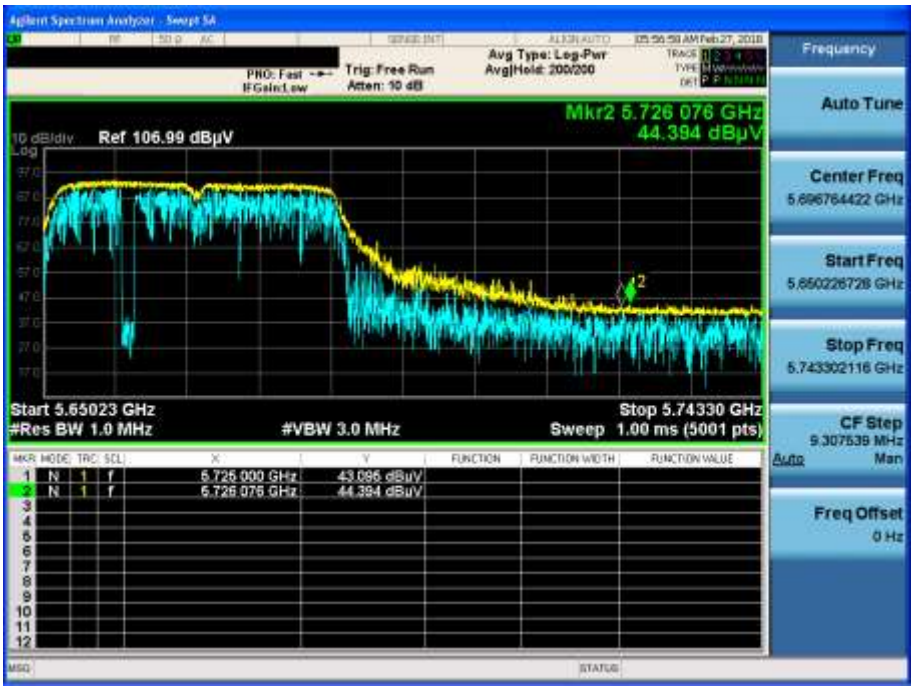


802.11n(HT40) & U-NII 2C & Ch.102 & X axis & Hor Detector Mode : PK

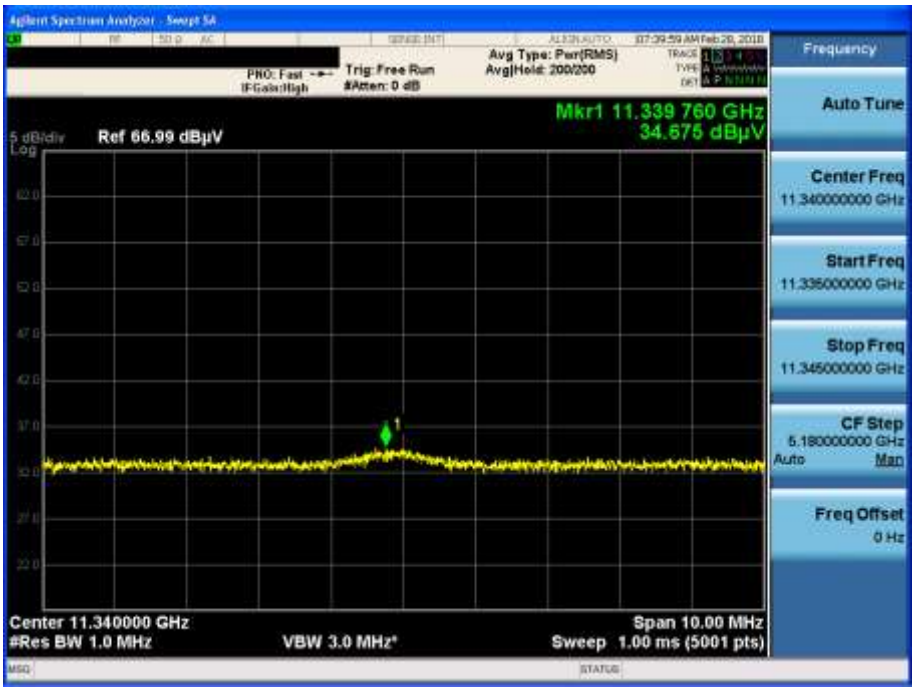


802.11n(HT40) & U-NII 2C & Ch.102 & X axis & Hor Detector Mode : AV

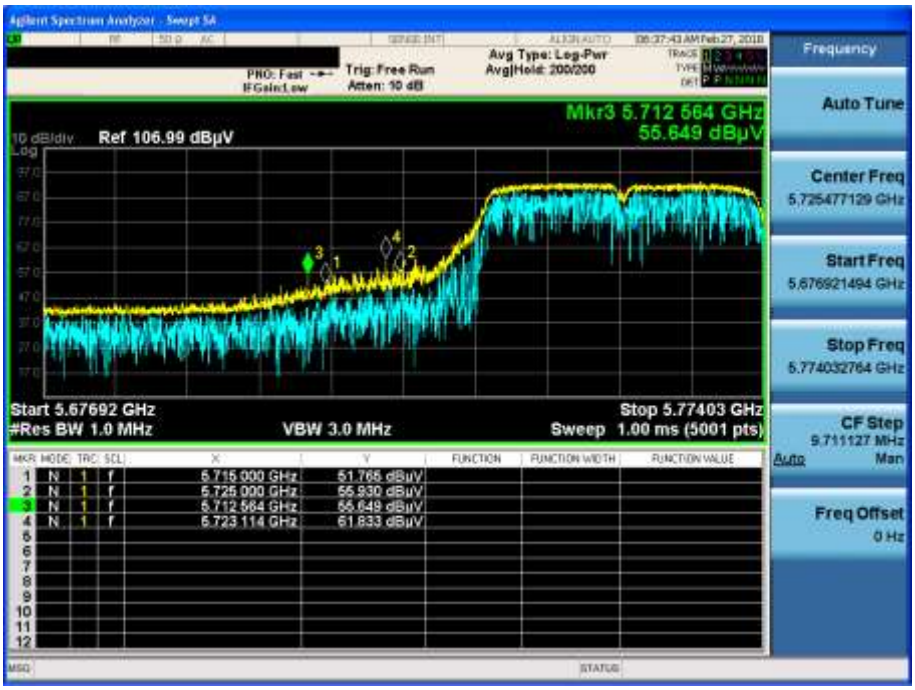
802.11n(HT40) & U-NII 2C & Ch.134 & X axis & Hor Detector Mode : PK



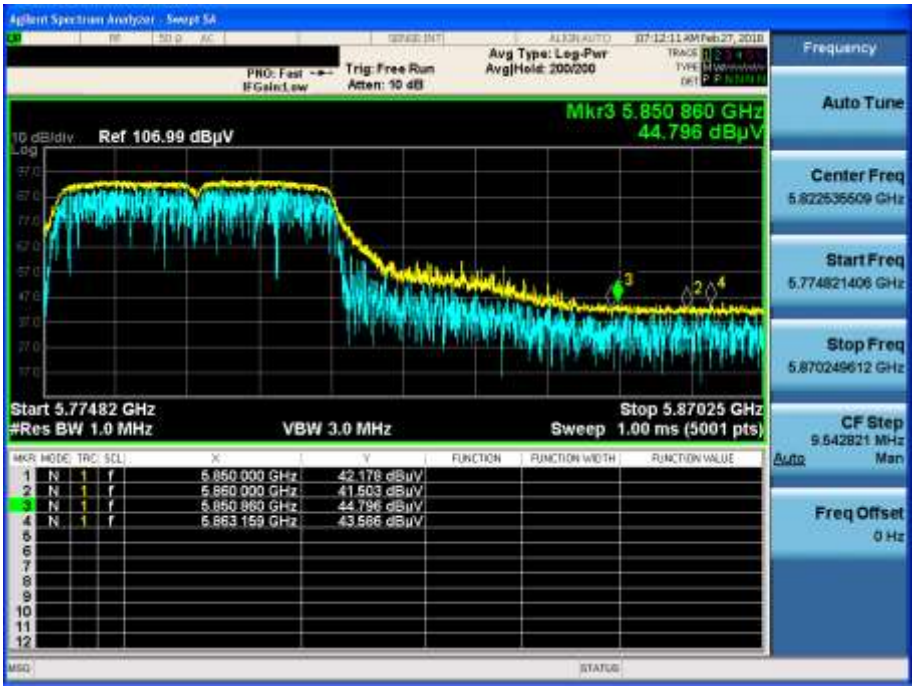
802.11n(HT40) & U-NII 2C & Ch.134 & Z axis & Ver Detector Mode : AV



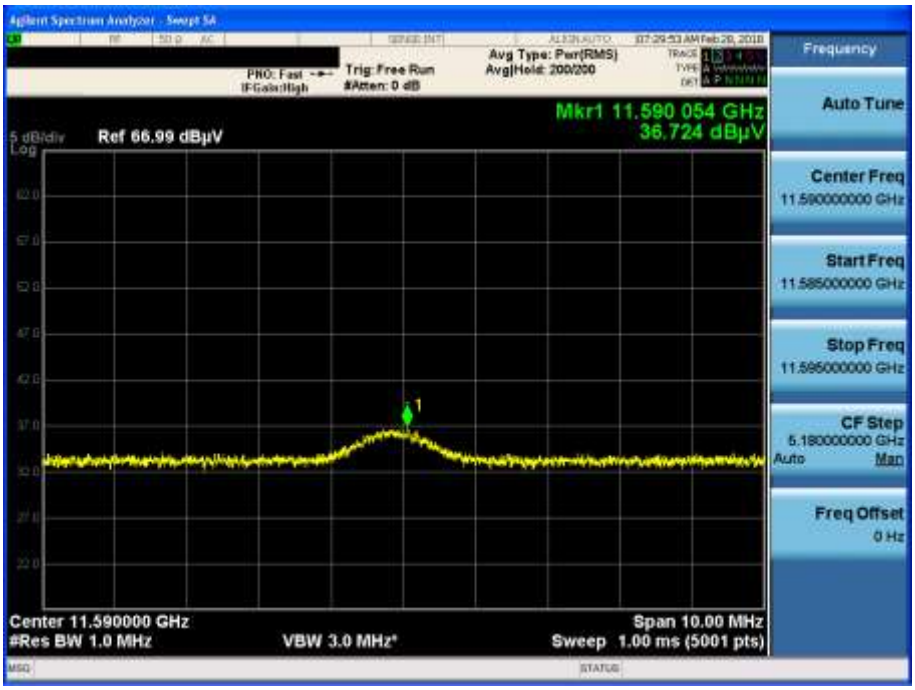
802.11n(HT40) & U-NII 3 & Ch.151 & X axis & Hor Detector Mode : PK



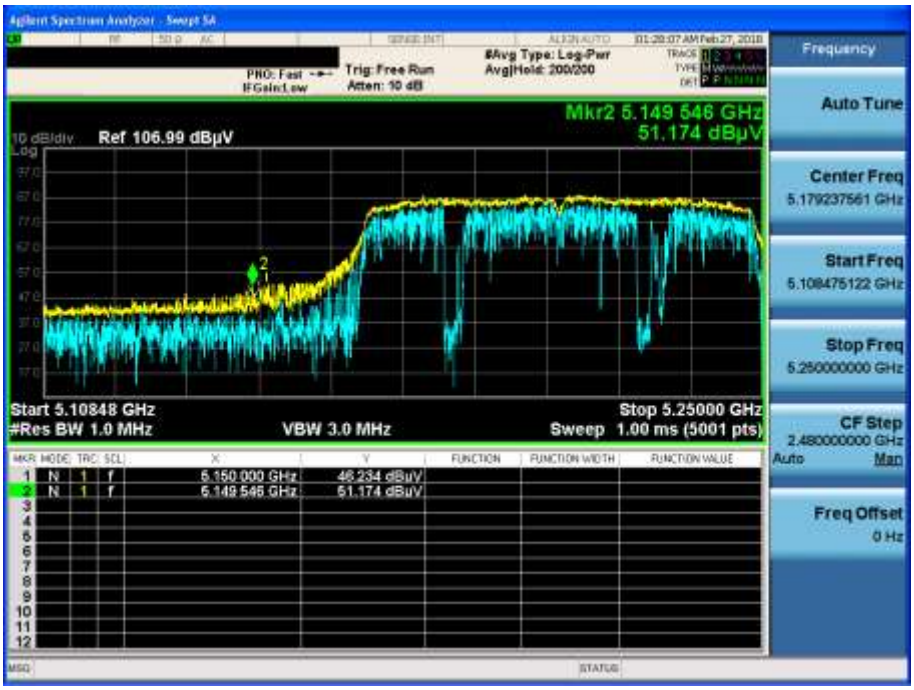
802.11n(HT40) & U-NII 3 & Ch.159 & X axis & Hor Detector Mode : PK



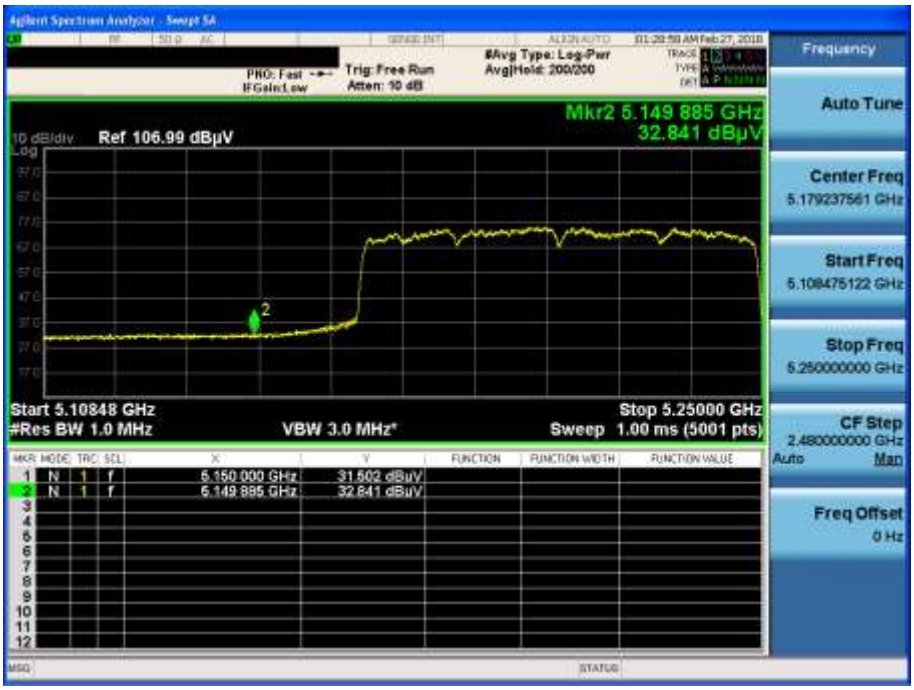
802.11n(HT40) & U-NII 3 & Ch.159 & Z axis & Ver Detector Mode : AV



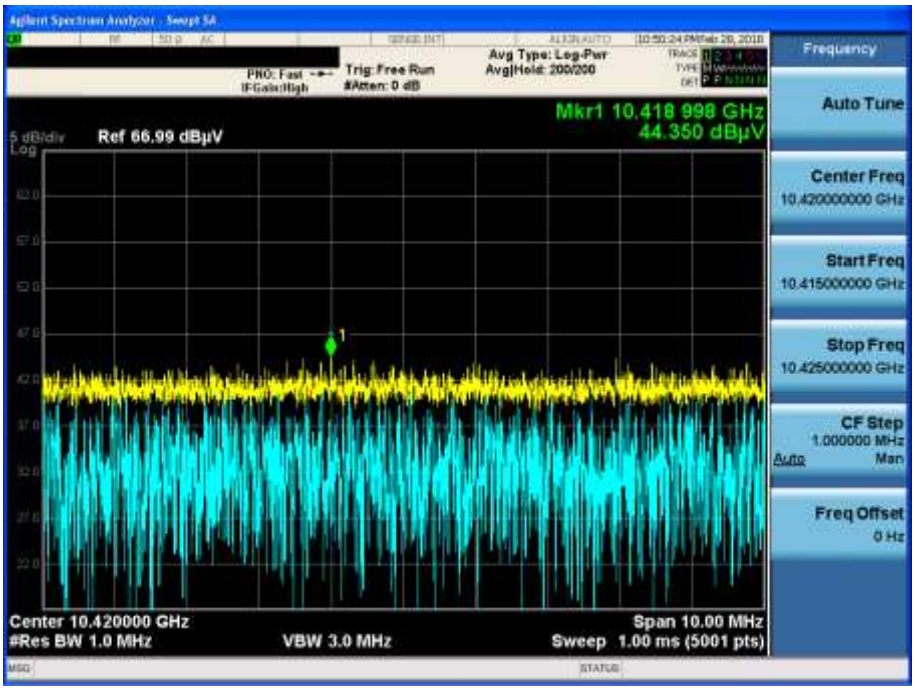
802.11ac(VHT80) & U-NII 1 & Ch.42 & Y axis & Ver Detector Mode : PK



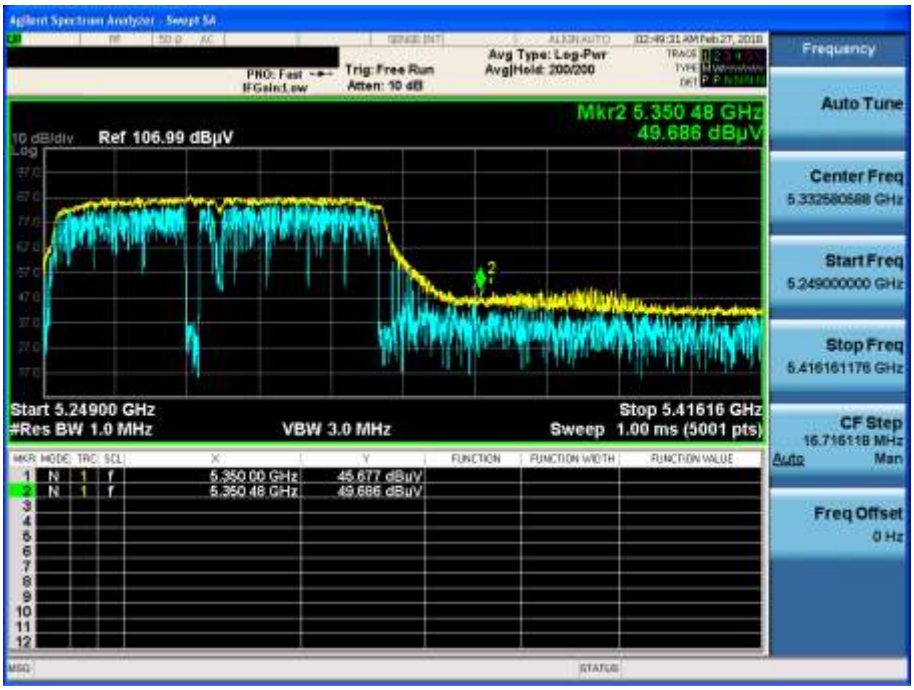
802.11ac(VHT80) & U-NII 1 & Ch.42 & Y axis & Ver Detector Mode : AV



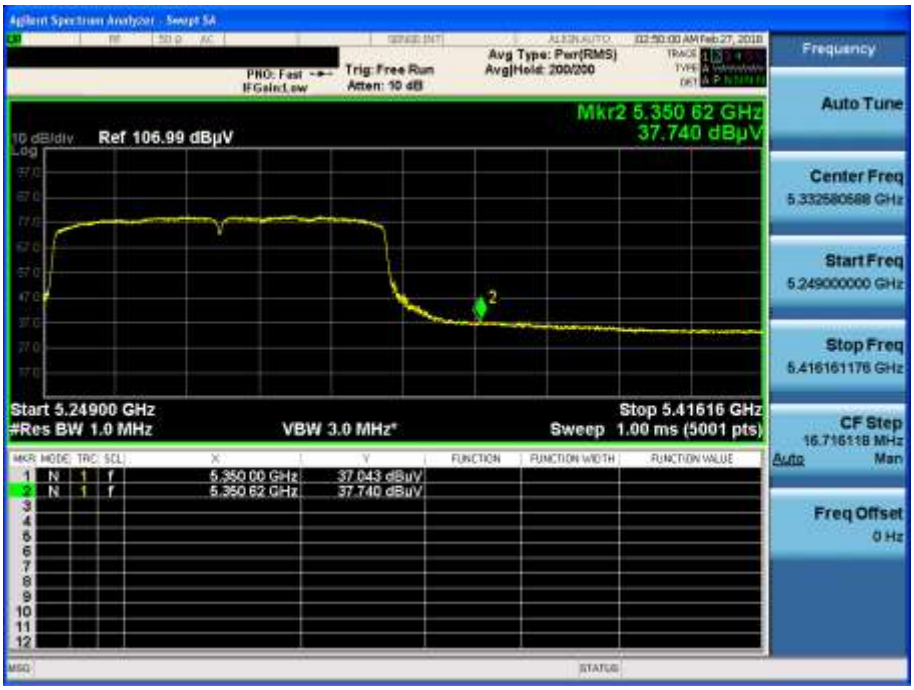
802.11ac(VHT80) & U-NII 1 & Ch.42 & Z axis & Ver Detector Mode : PK



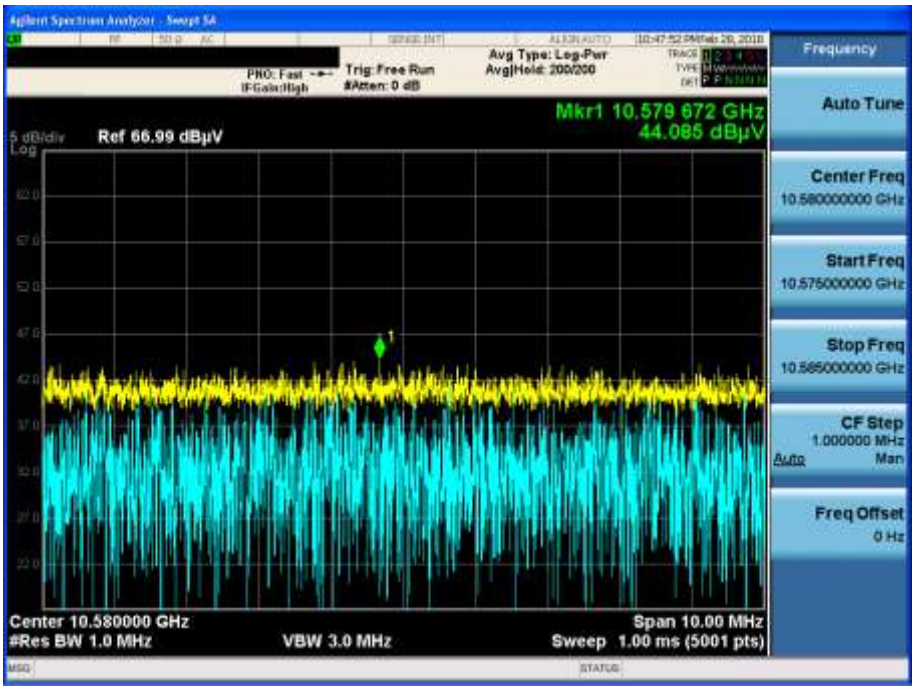
802.11ac(VHT80) & U-NII 2A & Ch.58 & X axis & Hor Detector Mode : PK



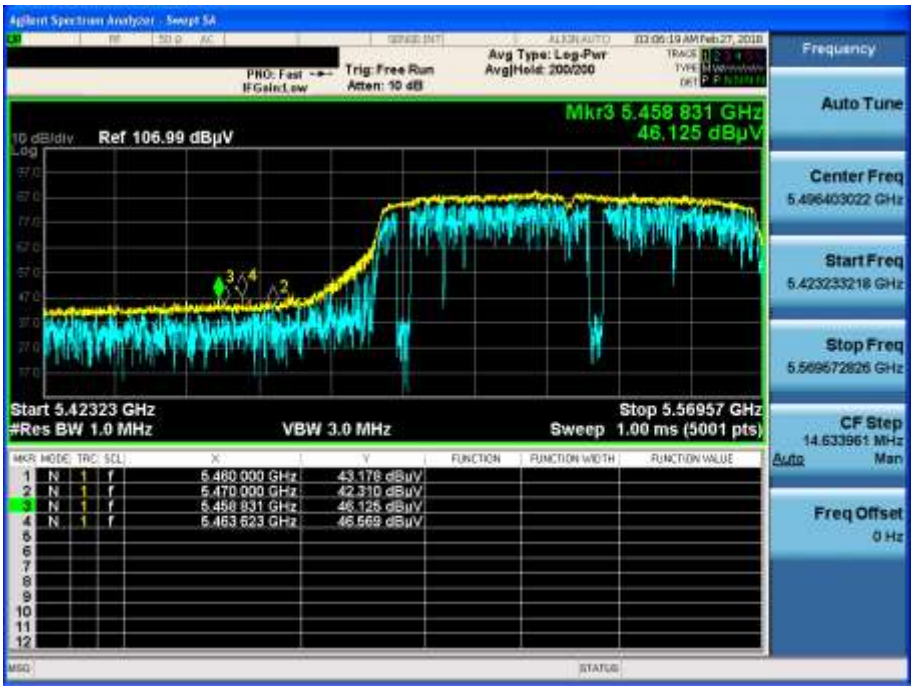
802.11ac(VHT80) & U-NII 2A & Ch.58 & X axis & Hor Detector Mode : AV



802.11ac(VHT80) & U-NII 2A & Ch.58 & Z axis & Ver Detector Mode : PK

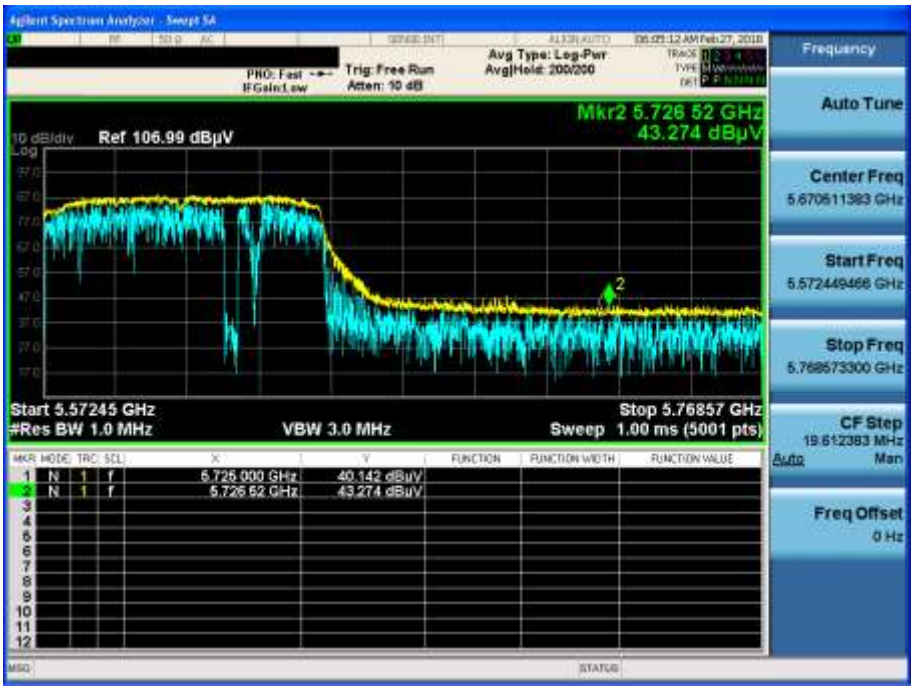


802.11ac(VHT80) & U-NII 2C & Ch.106 & X axis & Hor Detector Mode : PK

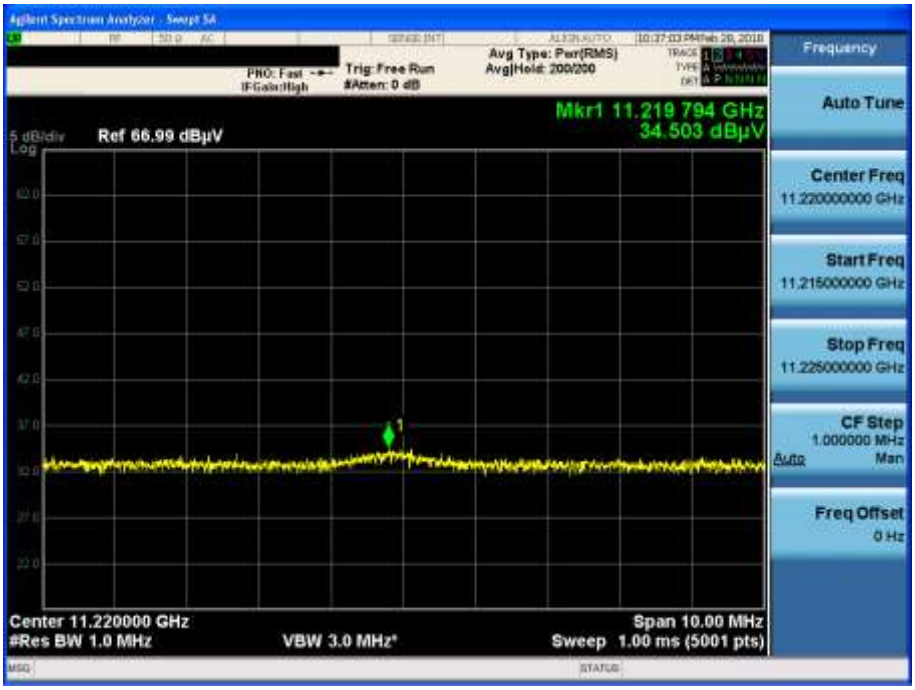


802.11ac(VHT80) & U-NII 2C & Ch.106 & X axis & Hor Detector Mode : AV

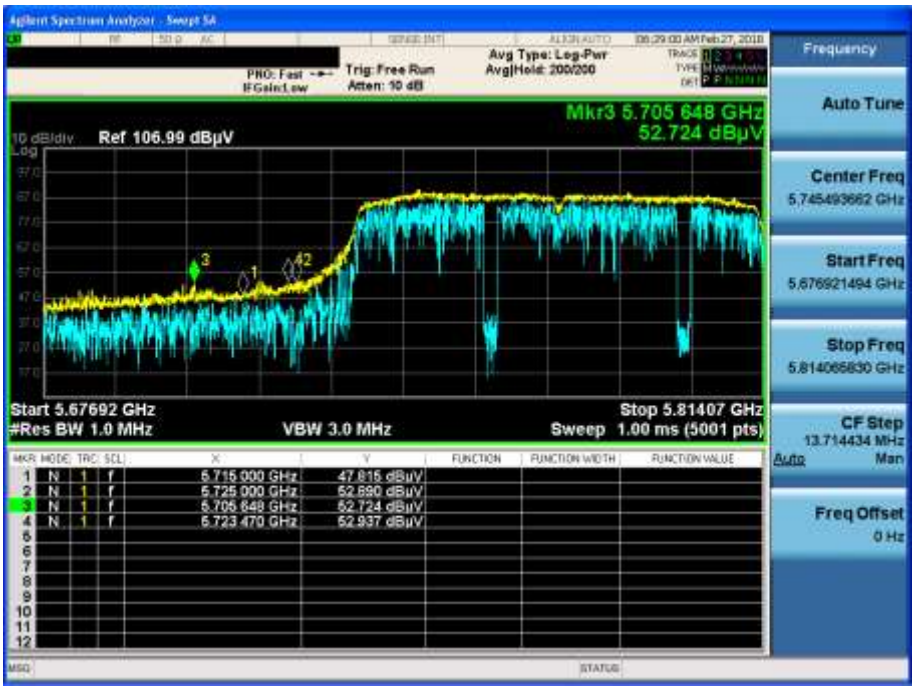
802.11ac(VHT80) & U-NII 2C & Ch.122 & X axis & Hor Detector Mode : PK



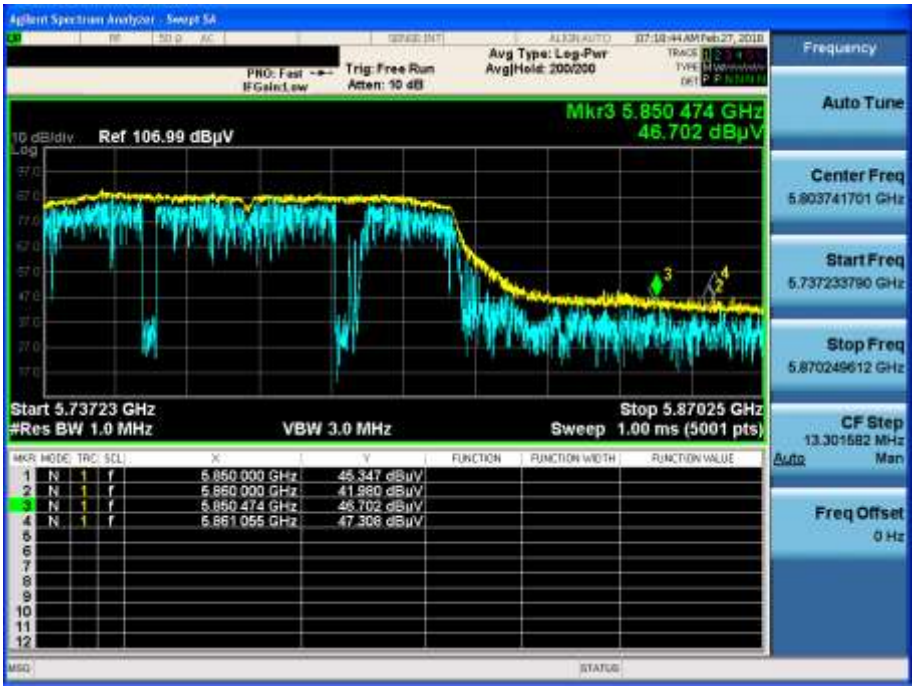
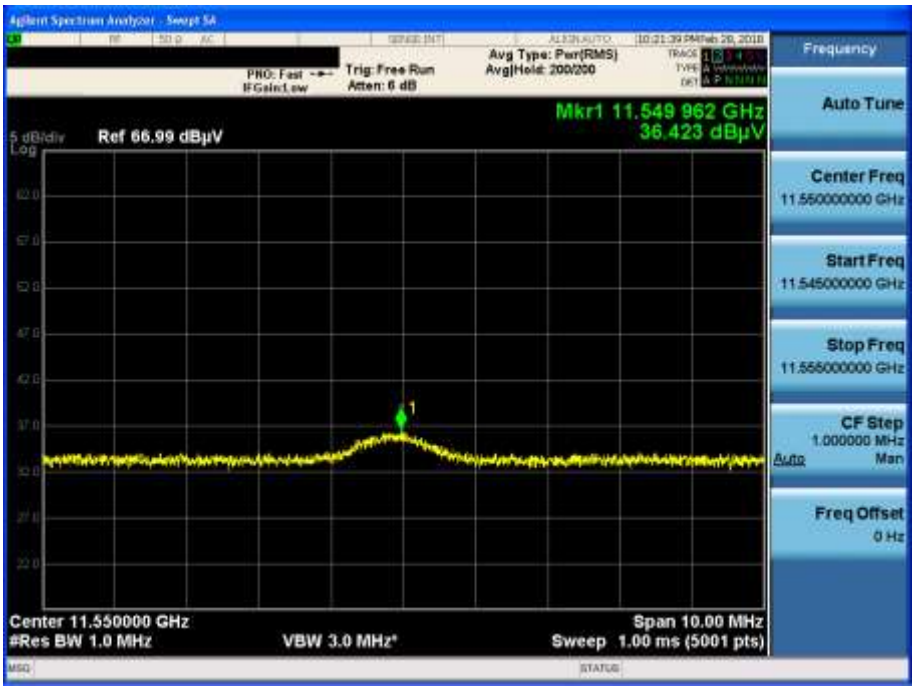
802.11ac(VHT80) & U-NII 2C & Ch.122 & Z axis & Ver Detector Mode : AV



802.11ac(VHT80) & U-NII 3 & Ch.155 & X axis & Hor Detector Mode : PK



802.11ac(VHT80) & U-NII 3 & Ch.155 & X axis & Hor Detector Mode : PK



802.11ac(VHT80) & U-NII 3 & Ch.155 & Z axis & Ver Detector Mode : AV