TEST REPORT

Dt&C

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1. Report No : DRTFCC1701-0010(1)
2. Customer
   - Name : LG Electronics USA
   - Address : 1000 Sylvan Avenue, Englewood Cliffs, New Jersey 07632
3. Use of Report : Class II Permissive change
4. Product Name / Model Name : RF Module / LGSWFAC73

   FCC ID : BEJLGSWFAC73
5. Test Method Used : KDB 789033, KDB 662911, ANSI C63.10-2013

   Test Specification : FCC Part 15.407 Subpart E
6. Date of Test : 2016-11-21 ~ 2016-11-28
7. Testing Environment : See appended test report.
8. Test Result : Refer to the attached test result.

Affirmation	Tested by Name : Jaejin Lee (Signature)	Technical Manager Name : Geunki Son (Signature)

2017 . 01 . 26 .

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Test Report Version

Test Report No.	Date	Description
DRTFCC1701-0010	Jan. 12, 2017	Initial issue
DRTFCC1701-0010(1)	Jan. 26, 2017	Separated the report for FCC and IC(Delete the IC).

CONTENTS

1. EUT DESCRIPTION

FCC Equipment Class	Unlicensed National Information Infrastructure (UNII)
Product	RF Module
Model Name	LGSWFAC73
Add Model Name	N/A
Software version	1.0
Hardware version	1.0
Host product	Flat Panel Digital X-ray Detector
Host Marketing Name	14HJ701D
Power Supply	DC 7.5 V
Frequency Range	**U-NII 1(5150 ~ 5250 MHz)** ▪ 802.11a/n(HT20)/ac(VHT20): 5180 ~ 5240 MHz ▪ 802.11n(HT40)/ac(VHT40): 5190 ~ 5230 MHz ▪ 802.11ac(VHT80): 5210 MHz **U-NII 2A(5250 ~ 5350 MHz)** ▪ 802.11a/n(HT20)/ac(VHT20): 5260 ~ 5320 MHz ▪ 802.11n(HT40)/ac(VHT40): 5270 ~ 5310 MHz ▪ 802.11ac(VHT80): 5290 MHz **U-NII 2C(5470 ~ 5725 MHz)** ▪ 802.11a/n(HT20)/ac(VHT20): 5500 ~ 5720 MHz ▪ 802.11n(HT40)/ac(VHT40): 5510 ~ 5710 MHz ▪ 802.11ac(VHT80): 5530, 5690 MHz **U-NII 3(5725 ~ 5850MHz)** ▪ 802.11a/n(HT20)/ac(VHT20): 5745 ~ 5825 MHz ▪ 802.11n(HT40)/ac(VHT40): 5755 ~ 5795 MHz ▪ 802.11ac(VHT80): 5775 MHz
Modulation type	OFDM
Antenna Specification	**Antenna type**: FPCB wireless Antenna **Antenna gain** ▪ U-NII 1 band: ANT 1: 0.75 dBi & ANT 2: 1.19 dBi ▪ U-NII 2A band: ANT 1: 0.62 dBi & ANT 2: 1.10 dBi ▪ U-NII 2C band: ANT 1: 0.92 dBi & ANT 2: -0.60 dBi ▪ U-NII 3 band: ANT 1: 0.94 dBi & ANT 2: -0.78 dBi **Antenna Configuration** ▪ 802.11a: Single Transmitting (ANT 1 or ANT 2) ▪ 802.11a: Multiple Transmitting (ANT 1 and ANT 2) ▪ 802.11a/n(MCS 0 ~ 7, HT20/40) : Single Transmitting (ANT 1 or ANT 2) ▪ 802.11n(MCS 8 ~ 15, HT20/40) : Multiple Transmitting (ANT 1 and ANT 2) ▪ 802.11ac(NSS1 MCS 0 ~ 8, VHT20) : Single Transmitting (ANT 1 or ANT 2) ▪ 802.11ac(NSS2 MCS 0 ~ 8, VHT20) : Multiple Transmitting (ANT 1 and ANT 2) ▪ 802.11ac(NSS1 MCS 0 ~ 9, VHT40/80) : Single Transmitting (ANT 1 or ANT 2) ▪ 802.11ac(NSS2 MCS 0 ~ 9, VHT40/80) : Multiple Transmitting (ANT 1 and ANT 2)

2. Information about test items

2.1 Test mode

5GHz Band	Mode	Data Rate
		Multiple transmitting
U-NII 1	802.11a	6Mbps
	802.11n(HT20)	MCS 8
	802.11n(HT40)	MCS 8
	802.11ac(VHT20)	NSS2 MCS 0
	802.11ac(VHT40)	NSS2 MCS 0
	802.11ac(VHT80)	NSS2 MCS 0
U-NII 2A	802.11a	6Mbps
	802.11n(HT20)	MCS 8
	802.11n(HT40)	MCS 8
	802.11ac(VHT20)	NSS2 MCS 0
	802.11ac(VHT40)	NSS2 MCS 0
	802.11ac(VHT80)	NSS2 MCS 0
U-NII 2C	802.11a	6Mbps
	802.11n(HT20)	MCS 8
	802.11n(HT40)	MCS 8
	802.11ac(VHT20)	NSS2 MCS 0
	802.11ac(VHT40)	NSS2 MCS 0
	802.11ac(VHT80)	NSS2 MCS 0
U-NII 3	802.11a	6Mbps
	802.11n(HT20)	MCS 8
	802.11n(HT40)	MCS 8
	802.11ac(VHT20)	NSS2 MCS 0
	802.11ac(VHT40)	NSS2 MCS 0
	802.11ac(VHT80)	NSS2 MCS 0

Note 1: The worst case data rate is determined as above test mode according to the power measurements.
And all test items were performed at the worst case data rate.
Note 2: In case of radiated test, we have done all tx case. We attached the result of only MIMO mode (Worst case).

2.2 Tested Channel Information

5GHz Band	802.11a/n(HT20)		802.11ac(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	-	-
	144	5720	142	5710	138	5690
U-NII 3	149	5745	151	5755	155	5775
	157	5785	-	-	-	-
	165	5825	159	5795	-	-

Note : Above channel is applied the KDB644545 D03.

2.3 Auxiliary equipment

Equipment	Model No.	Serial No.	Manufacturer	Note
Control Box	LG Control Box	-	LG	-

2.4 Tested environment

Temperature	:	20 °C ~ 23 °C
Relative humidity content	:	41 % ~ 48 % R.H.
Details of power supply	:	DC 7.5 V

2.5 EMI Suppression Device(s)/Modifications

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

2.6 Measurement Uncertainty

Test items	Measurement uncertainty
Transmitter Output Power	0.71 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	NT Note 2
15.407(e)	Minimum Emission Bandwidth (6 dB Bandwidth)	> 500 kHz in 5725 ~ 5850 MHz		NT Note 2
15.407(a)	Maximum Conducted Output Power	5150 ~ 5250 MHz : < 30 dBm or < 23.97 dBm 5250 ~ 5350 & 5470 ~ 5725 MHz : <250 mW or < 11 + 10 log10(B) dBm, whichever power is less. 5725 ~ 5850 MHz : < 30 dBm Note: B is the 26dB BW.		C Note 3
15.407(a)	Peak Power Spectral Density	5150 ~ 5250 MHz : 11 dBm/MHz or 17 dBm/MHz 5250 ~ 5350 & 5470 ~ 5725 MHz: 11 dBm/MHz 5725 ~ 5850 MHz: 30 dBm/500kHz		NT Note 2,4
15.407(g)	Frequency Stability	N/A		NT Note 2
15.407(h)	Dynamic Frequency Selection	FCC 15.407(h)		NT 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 5
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
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: Please refer to original test report.
(Report number: DRTFCC1607-0104, DRTFCC1607-0105)

Note 3: (i) For access point operating in the band 5.15-5.25 GHz: < 30 dBm
(ii) For mobile and portable client devices in the 5.15-5.25 GHz band: < 23.97 dBm

Note 4: (i) For access point operating in the band 5.15-5.25 GHz: < 17 dBm/MHz
(ii) For mobile and portable client devices in the 5.15-5.25 GHz band: < 11 dBm/MHz

Note 5: 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.

Note 6: The module was installed into host product during test. (Model name: 14HJ701D)

Note 7: The test items were performed according to the KDB789033 D02 V01r03, KDB662911 D01 v02r01, KDB644545 D03 v01 and ANSI C63.10-2013

4. TEST METHODOLOGY

Generally the tests were performed according to the KDB789033 D02 v01r03. 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 C.

4.3 General test procedures

Conducted Emissions

The power-line conducted emission test procedure is not described on the KDB789033 D02. 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 D02. 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 D02.

The EUT is placed on a non-conductive table, which is 0.8 m above ground plane. 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

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 equipments, which is traceable to recognized national standards.

6. FACILITIES AND ACCREDITATIONS

6.1 Facilities

The open area test site(OATS) or semi anechoic chamber and conducted measurement facility used to collect the radiated and conducted test data are located at the 42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 449-935. The site is constructed in conformance with the requirements.

- Semi anechoic chamber registration Number: 165783 (FCC) & 5740A-3 (IC)

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

7.1 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 EUT used unique antenna connector.

Therefore this module complies with the requirement of §15.203

7.2 Directional antenna gain(Worst case):

Bands	ANT 1 [dBi]	ANT 2 [dBi]	Directional Gain [dBi]
U-NII 1	0.750	1.190	0.976 Note 2.
U-NII 2A	0.620	1.100	0.867 Note 2.
U-NII 2C	0.920	-0.600	0.226 Note 2.
U-NII 3	0.940	-0.780	0.165 Note 2.

Note 1. Directional gain(correlated signal with unequal antenna gain and equal transmit power)

$$10 \log [(10^{G_1/20} + 10^{G_2/20} + \ldots + 10^{G_N/20})^2 / N^{ANT}] \text{ dBi}$$

Note 2. Directional gain(completely uncorrelated signal with unequal antenna gain and equal transmit power)

$$10 \log [(10^{G_1/10} + 10^{G_2/10} + \ldots + 10^{G_N/10}) / N^{ANT}] \text{ dBi}$$

Note 3. Directional gain(spatial multiplexing)

$$G_{ANT\,MAX} + 10 \log (N_{ANT} / N_{SS}) \text{ dBi}$$

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: NA

▣ Test Procedure

The transmitter output is connected to the Spectrum Analyzer and used following test procedure of **KDB789033 D02**.

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: NT

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: NA

▣ TEST PROCEDURE

The transmitter output is connected to the Spectrum Analyzer and used following test procedure of **KDB789033 D02**.

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: NT

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.

▣ **Test Results: Comply**

Mode	CH	Freq. [MHz]	Test Result [dBm]		
			ANT 1	ANT 2	SUM
802.11a (Multiple Transmit)	36	5180	11.370	10.460	13.949
	40	5200	11.240	10.650	13.965
	48	5240	11.980	11.310	**14.668**
	52	5260	12.060	11.270	14.693
	60	5300	12.370	11.370	14.909
	64	5320	13.270	12.260	**15.805**
	100	5500	12.220	11.790	**15.021**
	116	5580	10.470	10.640	13.566
	144	5720	10.190	10.360	13.286
	149	5745	10.470	10.370	13.431
	157	5785	13.320	13.220	**16.281**
	165	5825	8.550	9.230	11.914

Mode	CH	Freq. [MHz]	Test Result [dBm]		
			ANT 1	ANT 2	SUM
802.11n(HT20) (Multiple Transmit)	36	5180	11.310	10.330	13.858
	40	5200	11.470	10.410	13.983
	48	5240	11.990	11.380	**14.706**
	52	5260	12.640	11.580	15.153
	60	5300	13.110	12.270	15.721
	64	5320	13.750	12.940	**16.374**
	100	5500	12.240	11.680	**14.979**
	116	5580	10.680	10.710	13.705
	144	5720	10.260	10.440	13.361
	149	5745	10.550	10.920	**13.749**
	157	5785	10.240	10.310	13.285
	165	5825	8.310	9.120	11.744

Mode	CH	Freq. [MHz]	Test Result [dBm]		
			ANT 1	ANT 2	SUM
802.11n(HT40) (Multiple Transmit)	38	5190	9.110	8.610	11.877
	46	5230	14.480	13.680	**17.109**
	54	5270	11.450	10.610	**14.061**
	62	5310	10.120	9.550	12.855
	102	5510	7.580	7.210	10.409
	118	5590	13.160	12.770	**15.980**
	142	5710	11.580	11.990	14.800
	151	5755	12.770	11.850	**15.345**
	159	5795	11.680	12.280	15.001

Mode	CH	Freq. [MHz]	Test Result [dBm]		
			ANT 1	ANT 2	SUM
802.11ac(VHT20) (Multiple Transmit)	36	5180	11.580	10.270	13.985
	40	5200	11.520	11.250	14.397
	48	5240	12.330	11.620	**15.000**
	52	5260	12.570	11.510	15.083
	60	5300	13.040	12.310	**15.701**
	64	5320	13.840	12.820	16.370
	100	5500	10.690	11.580	**14.168**
	116	5580	10.660	10.740	13.710
	144	5720	10.330	10.960	13.667
	149	5745	10.550	10.740	**13.656**
	157	5785	10.520	10.310	13.427
	165	5825	8.660	9.190	11.943

Mode	CH	Freq. [MHz]	Test Result [dBm]		
			ANT 1	ANT 2	SUM
802.11ac(VHT40) (Multiple Transmit)	38	5190	9.520	8.550	12.072
	46	5230	14.620	13.820	**17.249**
	54	5270	14.760	14.660	**17.721**
	62	5310	10.580	9.770	13.204
	102	5510	7.220	7.120	10.181
	118	5590	13.190	12.810	16.014
	142	5710	13.150	13.160	**16.165**
	151	5755	12.780	12.170	**15.496**
	159	5795	11.720	12.150	14.951

Mode	CH	Freq. [MHz]	Test Result [dBm]		
			ANT 1	ANT 2	SUM
802.11ac(VHT80) (Multiple Transmit)	42	5210	8.670	7.660	**11.205**
	58	5290	11.200	10.380	**13.820**
	106	5530	7.580	7.240	10.424
	138	5690	12.120	12.350	**15.247**
	155	5775	8.410	7.680	**11.071**

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.

▣ **Test procedure**

Maximum Power Spectral Density is measured using Measurement Procedure **of KDB789033 D02**

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 configuration: NA**

▣ **Test results: NT**

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 0 ℃ and +60 ℃. The temperature was incremented by 10 ℃ intervals and the unit was allowed to stabilize at each measurement. The center frequency of the transmitting channel was evaluated at each temperature and the frequency deviation from the channel's center frequency was recorded.

▣ **Test Results: NT**

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:

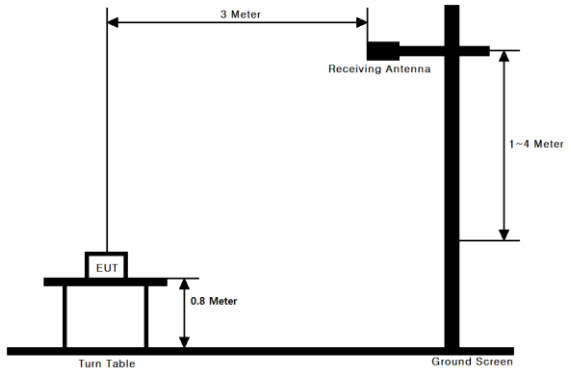
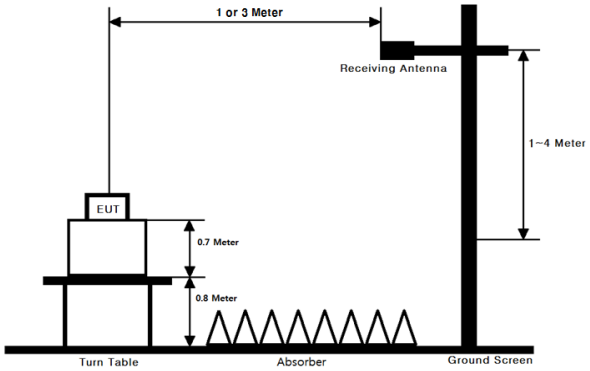
MHz	MHz	MHz	MHz	GHz	GHz
0.009 ~ 0.110	8.41425 ~ 8.41475	108 ~ 121.94	1300 ~ 1427	4.5 ~ 5.15	14.47 ~ 14.5
0.495 ~ 0.505	12.29 ~ 12.293	123 ~ 138	1435 ~ 1626.5	5.35 ~ 5.46	15.35 ~ 16.2
2.1735 ~ 2.1905	12.51975 ~	149.9 ~ 150.05	1645.5 ~ 1646.5	7.25 ~ 7.75	17.7 ~ 21.4
4.125 ~ 4.128	12.52025	160.52475 ~	1660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

▪ **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 Configuration

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 D02**

► **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.

Multiple Transmit

Mode	Data rate	Maximum Achievable Duty Cycle (*x*) = On / (On+Off)			Duty Cycle Correction Factor [dB]	$50/T$ [kHz]
		On Time [ms]	On+OffTime [ms]	*x*		
802.11a	6Mbps	2.07	2.17	95.07	0.22	2.07
802.11n(HT20)	MCS8	0.98	1.08	90.75	0.43	0.98
802.11ac(VHT40)	MCS0	0.50	0.53	94.33	0.26	0.50
802.11ac(VHT80)	MCS0	0.26	0.29	89.67	0.48	0.26

Note: Please refer to the test report of the granted module.

▣ **Test Results: Comply**

Please refer to next page for data table and the appendix I for worst data plots.

▣ Measurement Data:

Multiple transmit

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)	5148.60	V	X	PK	48.00	8.11	N/A	N/A	56.11	74.00	17.89
		5147.90	V	X	AV	37.30	8.11	0.22	N/A	45.63	54.00	8.37
		10359.05	H	Y	PK	50.46	14.49	N/A	-9.54	55.41	68.20	12.79
		15545.60	V	Z	PK	40.23	22.45	N/A	-9.54	53.14	74.00	20.86
		15545.45	V	Z	AV	29.37	22.45	0.22	-9.54	42.50	54.00	11.50
	40 (5200 MHz)	10399.45	H	Y	PK	50.62	14.56	N/A	-9.54	55.64	68.20	12.56
		15602.30	V	Z	PK	40.45	22.55	N/A	-9.54	53.46	74.00	20.54
		15602.95	V	Z	AV	28.80	22.55	0.22	-9.54	42.03	54.00	11.97
	48 (5240 MHz)	10479.10	H	Y	PK	48.96	14.70	N/A	-9.54	54.12	68.20	14.08
		15730.60	V	Z	PK	39.67	22.77	N/A	-9.54	52.90	74.00	21.10
		15731.60	V	Z	AV	29.03	22.77	0.22	-9.54	42.48	54.00	11.52
U-NII 2A	52 (5260 MHz)	10522.40	H	Y	PK	47.90	14.77	N/A	-9.54	53.13	68.20	15.07
		15778.10	V	Z	PK	44.59	22.85	N/A	-9.54	57.90	74.00	16.10
		15777.55	V	Z	AV	32.74	22.85	0.22	-9.54	46.27	54.00	7.73
	60 (5300 MHz)	10602.75	H	Y	PK	45.79	14.92	N/A	-9.54	51.17	74.00	22.83
		10602.20	H	Y	AV	34.10	14.92	0.22	-9.54	39.70	54.00	14.30
		15897.50	V	Z	PK	43.11	23.06	N/A	-9.54	56.63	74.00	17.37
		15896.90	V	Z	AV	31.87	23.06	0.22	-9.54	45.61	54.00	8.39
	64 (5320 MHz)	5374.00	V	X	PK	47.40	8.36	N/A	N/A	55.76	74.00	18.24
		5375.20	V	X	AV	36.36	8.36	0.22	N/A	44.94	54.00	9.06
		10638.85	H	Y	PK	47.83	14.98	N/A	-9.54	53.27	74.00	20.73
		10639.65	H	Y	AV	36.24	14.98	0.22	-9.54	41.90	54.00	12.10
		15963.45	V	Z	PK	44.70	23.18	N/A	-9.54	58.34	74.00	15.66
		15962.40	V	Z	AV	32.67	23.18	0.22	-9.54	46.53	54.00	7.47

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 10 GHz, Measurement Distance = 1 m for above 10 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
5. The measured data for U-NII 3 band is satisfied with the emissions mask in 15.407(b)(4)(i), too.
   The old rule 15.407(b)(4) is more tight than the new rule 15.407(b)(4)(i).

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)	5449.90	V	X	PK	45.86	8.44	N/A	N/A	54.30	74.00	19.70
		5451.20	V	X	AV	35.40	8.44	0.22	N/A	44.06	54.00	9.94
		5469.70	V	X	PK	47.59	8.46	N/A	N/A	56.05	68.20	12.15
		11005.90	H	Y	PK	47.86	15.63	N/A	-9.54	53.95	74.00	20.05
		11005.45	H	Y	AV	35.95	15.63	0.22	-9.54	42.26	54.00	11.74
		16492.40	V	Z	PK	40.25	24.33	N/A	-9.54	55.04	68.20	13.16
	116 (5580 MHz)	11162.70	H	Y	PK	46.03	15.91	N/A	-9.54	52.40	74.00	21.60
		11162.30	H	Y	AV	35.18	15.91	0.22	-9.54	41.77	54.00	12.23
		16722.70	V	Z	PK	40.00	24.84	N/A	-9.54	55.30	68.20	12.90
	144 (5720 MHz)	11438.85	H	Y	PK	46.95	16.40	N/A	-9.54	53.81	74.00	20.19
		11438.00	H	Y	AV	36.06	16.40	0.22	-9.54	43.14	54.00	10.86
		17146.60	V	Z	PK	39.39	25.72	N/A	-9.54	55.57	68.20	12.63
U-NII 3	149 (5745 MHz)	5713.40	V	X	PK	47.34	9.10	N/A	N/A	56.44	68.20	11.76
		5724.84	V	X	PK	55.17	9.12	N/A	N/A	64.29	78.20	13.91
		11492.50	H	Y	PK	51.21	16.66	N/A	-9.54	58.33	74.00	15.67
		11493.25	H	Y	AV	39.87	16.66	0.22	-9.54	47.21	54.00	6.79
		17241.05	V	Z	PK	39.33	25.89	N/A	-9.54	55.68	68.20	12.52
	157 (5785 MHz)	11572.80	H	Y	PK	54.13	16.82	N/A	-9.54	61.41	74.00	12.59
		11572.60	H	Y	AV	42.85	16.82	0.22	-9.54	50.35	54.00	3.65
		17354.45	V	Z	PK	42.20	26.09	N/A	-9.54	58.75	68.20	9.45
	165 (5825 MHz)	5858.29	V	X	PK	45.56	9.51	N/A	N/A	55.07	78.20	23.13
		5867.47	V	X	PK	46.70	9.53	N/A	N/A	56.23	68.20	11.97
		11648.50	H	Y	PK	46.86	16.98	N/A	-9.54	54.30	74.00	19.70
		11648.05	H	Y	AV	35.15	16.98	0.22	-9.54	42.81	54.00	11.19
		17484.80	V	Z	PK	38.46	26.33	N/A	-9.54	55.25	68.20	12.95

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 10 GHz, Measurement Distance = 1 m for above 10 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
5. The measured data for U-NII 3 band is satisfied with the emissions mask in 15.407(b)(4)(i), too.
   The old rule 15.407(b)(4) is more tight than the new rule 15.407(b)(4)(i).

▣ Measurement Data:

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)	5148.60	V	X	PK	46.31	8.11	N/A	N/A	54.42	74.00	19.58
		5149.10	V	X	AV	36.42	8.11	0.43	N/A	44.96	54.00	9.04
		10354.65	H	Y	PK	49.76	14.48	N/A	-9.54	54.70	68.20	13.50
		15558.60	V	Z	PK	40.38	22.47	N/A	-9.54	53.31	74.00	20.69
		15559.35	V	Z	AV	29.16	22.47	0.43	-9.54	42.52	54.00	11.48
	40 (5200 MHz)	10401.90	H	Y	PK	48.96	14.56	N/A	-9.54	53.98	68.20	14.22
		15585.45	V	Z	PK	39.94	22.51	N/A	-9.54	52.91	74.00	21.09
		15585.30	V	Z	AV	28.78	22.51	0.43	-9.54	42.18	54.00	11.82
	48 (5240 MHz)	10482.10	H	Y	PK	48.85	14.70	N/A	-9.54	54.01	68.20	14.19
		15718.30	V	Z	PK	40.14	22.75	N/A	-9.54	53.35	74.00	20.65
		15718.75	V	Z	AV	28.83	22.75	0.43	-9.54	42.47	54.00	11.53
U-NII 2A	52 (5260 MHz)	10520.30	H	Y	PK	47.03	14.77	N/A	-9.54	52.26	68.20	15.94
		15775.90	V	Z	PK	44.73	22.85	N/A	-9.54	58.04	74.00	15.96
		15776.45	V	Z	AV	33.43	22.85	0.43	-9.54	47.17	54.00	6.83
	60 (5300 MHz)	10600.45	H	Y	PK	44.76	14.91	N/A	-9.54	50.13	74.00	23.87
		10601.35	H	Y	AV	34.31	14.91	0.43	-9.54	40.11	54.00	13.89
		15894.40	V	Z	PK	43.53	23.05	N/A	-9.54	57.04	74.00	16.96
		15896.40	V	Z	AV	32.63	23.05	0.43	-9.54	46.57	54.00	7.43
	64 (5320 MHz)	5352.60	V	X	PK	47.29	8.33	N/A	N/A	55.62	74.00	18.38
		5350.80	V	X	AV	36.59	8.33	0.43	N/A	45.35	54.00	8.65
		10640.20	H	Y	PK	45.21	14.98	N/A	-9.54	50.65	74.00	23.35
		10641.35	H	Y	AV	33.86	14.98	0.43	-9.54	39.73	54.00	14.27
		15958.85	V	Z	PK	42.72	23.17	N/A	-9.54	56.35	74.00	17.65
		15960.75	V	Z	AV	31.94	23.17	0.43	-9.54	46.00	54.00	8.00

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 10 GHz, Measurement Distance = 1 m for above 10 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
5. The measured data for U-NII 3 band is satisfied with the emissions mask in 15.407(b)(4)(i), too.
   The old rule 15.407(b)(4) is more tight than the new rule 15.407(b)(4)(i).

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)	5452.00	V	X	PK	46.19	8.44	N/A	N/A	54.63	74.00	19.37
		5450.90	V	X	AV	35.53	8.44	0.43	N/A	44.40	54.00	9.60
		5467.30	V	X	PK	46.85	8.46	N/A	N/A	55.31	68.20	12.89
		11000.10	H	Y	PK	47.26	15.62	N/A	-9.54	53.34	74.00	20.66
		11000.85	H	Y	AV	34.19	15.62	0.43	-9.54	40.70	54.00	13.30
		16499.20	V	Z	PK	39.25	24.35	N/A	-9.54	54.06	68.20	14.14
	116 (5580 MHz)	11161.30	H	Y	PK	44.35	15.96	N/A	-9.54	50.77	74.00	23.23
		11161.65	H	Y	AV	33.62	15.96	0.43	-9.54	40.47	54.00	13.53
		16758.10	V	Z	PK	39.28	24.92	N/A	-9.54	54.66	68.20	13.54
	144 (5720 MHz)	11441.65	H	Y	PK	46.45	16.55	N/A	-9.54	53.46	74.00	20.54
		11439.90	H	Y	AV	34.75	16.55	0.43	-9.54	42.19	54.00	11.81
		17155.70	V	Z	PK	38.93	25.74	N/A	-9.54	55.13	68.20	13.07
U-NII 3	149 (5745 MHz)	5712.12	V	X	PK	46.15	9.10	N/A	N/A	55.25	68.20	12.95
		5724.04	V	X	PK	54.80	9.12	N/A	N/A	63.92	78.20	14.28
		11490.00	H	Y	PK	44.28	16.65	N/A	-9.54	51.39	74.00	22.61
		11490.15	H	Y	AV	33.72	16.65	0.43	-9.54	41.26	54.00	12.74
		17232.95	V	Z	PK	39.38	25.88	N/A	-9.54	55.72	68.20	12.48
	157 (5785 MHz)	11570.30	H	Y	PK	49.75	16.82	N/A	-9.54	57.03	74.00	16.97
		11570.20	H	Y	AV	39.26	16.82	0.43	-9.54	46.97	54.00	7.03
		17350.25	V	Z	PK	39.62	26.09	N/A	-9.54	56.17	68.20	12.03
	165 (5825 MHz)	5856.67	V	X	PK	46.24	9.51	N/A	N/A	55.75	78.20	22.45
		5869.99	V	X	PK	46.35	9.53	N/A	N/A	55.88	68.20	12.32
		11651.75	H	Y	PK	44.02	16.99	N/A	-9.54	51.47	74.00	22.53
		11649.60	H	Y	AV	33.14	16.99	0.43	-9.54	41.02	54.00	12.98
		17470.65	V	Z	PK	39.70	26.30	N/A	-9.54	56.46	68.20	11.74

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 10 GHz, Measurement Distance = 1 m for above 10 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
5. The measured data for U-NII 3 band is satisfied with the emissions mask in 15.407(b)(4)(i), too.
   The old rule 15.407(b)(4) is more tight than the new rule 15.407(b)(4)(i).

▣ Measurement Data:

Radiated Spurious Emissions data(9 kHz ~ 40 GHz) : *802.11ac(VHT40)*

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)	5147.24	V	X	PK	50.33	8.11	N/A	N/A	58.44	74.00	15.56
		5149.88	V	X	AV	38.79	8.11	0.26	N/A	47.16	54.00	6.84
		10376.80	H	Y	PK	42.99	14.52	N/A	-9.54	47.97	68.20	20.23
		15572.80	V	Z	PK	42.21	22.49	N/A	-9.54	55.16	74.00	18.84
		15573.40	V	Z	AV	30.53	22.49	0.26	-9.54	43.74	54.00	10.26
	46 (5230 MHz)	10458.80	H	Y	PK	48.04	14.66	N/A	-9.54	53.16	68.20	15.04
		15686.00	V	Z	PK	46.09	22.69	N/A	-9.54	59.24	74.00	14.76
		15684.70	V	Z	AV	35.08	22.69	0.26	-9.54	48.49	54.00	5.51
U-NII 2A	54 (5270 MHz)	10539.90	H	Y	PK	47.85	14.80	N/A	-9.54	53.11	68.20	15.09
		15802.70	V	Z	PK	45.32	22.90	N/A	-9.54	58.68	74.00	15.32
		15804.60	V	Z	AV	34.28	22.90	0.26	-9.54	47.90	54.00	6.10
	62 (5310 MHz)	5351.84	V	X	PK	47.40	8.33	N/A	N/A	55.73	74.00	18.27
		5350.88	V	X	PK	36.68	8.33	N/A	N/A	45.01	74.00	28.99
		10625.50	H	Y	PK	42.61	14.96	N/A	-9.54	48.03	74.00	25.97
		10627.00	H	Y	AV	31.36	14.96	0.26	-9.54	37.04	54.00	16.96
		15925.45	V	Z	PK	39.53	23.11	N/A	-9.54	53.10	74.00	20.90
		15924.20	V	Z	AV	28.71	23.11	0.26	-9.54	42.54	54.00	11.46

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 10 GHz, Measurement Distance = 1 m for above 10 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
5. The measured data for U-NII 3 band is satisfied with the emissions mask in 15.407(b)(4)(i), too.
   The old rule 15.407(b)(4) is more tight than the new rule 15.407(b)(4)(i).

Radiated Spurious Emissions data(9 kHz ~ 40 GHz) : *802.11ac(VHT40)*

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)	5459.72	V	X	PK	46.67	8.45	N/A	N/A	55.12	74.00	18.88
		5458.88	V	X	AV	34.94	8.45	0.26	N/A	43.65	54.00	10.35
		5468.70	V	X	AV	48.37	8.46	0.26	N/A	57.09	68.20	11.11
		11024.60	H	Y	PK	40.23	15.67	N/A	-9.54	46.36	74.00	27.64
		11026.10	H	Y	PK	29.52	15.67	N/A	-9.54	35.65	74.00	38.35
		16530.85	V	Z	AV	38.87	24.42	0.26	-9.54	54.01	68.20	14.19
	118 (5590 MHz)	11106.30	H	Y	PK	45.01	15.85	N/A	-9.54	51.32	74.00	22.68
		11108.00	H	Y	PK	33.24	15.85	N/A	-9.54	39.55	74.00	34.45
		16651.30	V	Z	AV	39.17	24.69	0.26	-9.54	54.58	68.20	13.62
	142 (5710 MHz)	11416.60	H	Y	PK	46.23	16.50	N/A	-9.54	53.19	74.00	20.81
		11418.50	H	Y	AV	34.36	16.50	0.26	-9.54	41.58	54.00	12.42
		17120.45	V	Z	PK	39.05	25.69	N/A	-9.54	55.20	68.20	13.00
U-NII 3	151 (5755 MHz)	5714.04	V	X	PK	56.92	9.10	N/A	N/A	66.02	68.20	2.18
		5724.52	V	X	PK	59.97	9.12	N/A	N/A	69.09	78.20	9.11
		11507.00	H	Y	PK	46.13	16.68	N/A	-9.54	53.27	74.00	20.73
		11508.80	H	Y	AV	34.18	16.68	0.26	-9.54	41.58	54.00	12.42
		17269.05	V	Z	PK	38.92	25.94	N/A	-9.54	55.32	68.20	12.88
	159 (5795 MHz)	5853.37	V	X	PK	46.89	9.51	N/A	N/A	56.40	78.20	21.80
		5864.76	V	X	PK	47.13	9.53	N/A	N/A	56.66	68.20	11.54
		11583.80	H	Y	PK	43.41	16.85	N/A	-9.54	50.72	74.00	23.28
		11584.80	H	Y	AV	32.56	16.85	0.26	-9.54	40.13	54.00	13.87
		17376.70	V	Z	PK	39.31	26.13	N/A	-9.54	55.90	68.20	12.30

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 10 GHz, Measurement Distance = 1 m for above 10 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
5. The measured data for U-NII 3 band is satisfied with the emissions mask in 15.407(b)(4)(i), too.
   The old rule 15.407(b)(4) is more tight than the new rule 15.407(b)(4)(i).

▣ Measurement Data:

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)	5137.00	V	X	PK	50.08	8.09	N/A	N/A	58.17	74.00	15.83
		5135.00	V	X	AV	38.86	8.09	0.48	N/A	47.43	54.00	6.57
		10436.80	H	Y	PK	41.70	14.62	N/A	-9.54	46.78	68.20	21.42
		15616.20	V	Z	PK	41.20	22.57	N/A	-9.54	54.23	74.00	19.77
		15616.10	V	Z	AV	29.02	22.57	0.48	-9.54	42.53	54.00	11.47
U-NII 2A	58 (5290 MHz)	5352.60	V	X	PK	47.18	8.33	N/A	N/A	55.51	74.00	18.49
		5352.20	V	X	AV	36.59	8.33	0.48	N/A	45.40	54.00	8.60
		10603.00	H	Y	PK	40.72	14.92	N/A	-9.54	46.10	74.00	27.90
		10606.20	H	Y	AV	30.78	14.92	0.48	-9.54	36.64	54.00	17.36
		15864.70	V	Z	PK	40.13	22.69	N/A	-9.54	53.28	74.00	20.72
		15863.70	V	Z	AV	28.57	22.69	0.48	-9.54	42.20	54.00	11.80
U-NII 2C	106 (5530 MHz)	5457.78	V	X	PK	46.00	8.45	N/A	N/A	54.45	74.00	19.55
		5458.88	V	X	AV	36.36	8.45	0.48	N/A	45.29	54.00	8.71
		5465.42	V	X	PK	46.59	8.46	N/A	N/A	55.05	68.20	13.15
		11044.60	H	Y	PK	40.47	15.71	N/A	-9.54	46.64	74.00	27.36
		11046.00	H	Y	AV	29.70	15.71	0.48	-9.54	36.35	54.00	17.65
		16589.90	V	Z	PK	39.32	24.55	N/A	-9.54	54.33	68.20	13.87
	138 (5690 MHz)	11396.60	H	Y	PK	42.97	16.46	N/A	-9.54	49.89	74.00	24.11
		11398.80	H	Y	AV	31.96	16.46	0.48	-9.54	39.36	54.00	14.64
		17044.30	V	Z	PK	40.25	25.54	N/A	-9.54	56.25	68.20	11.95
U-NII 3	155 (5775 MHz)	5707.20	V	X	PK	48.49	9.10	N/A	N/A	57.59	78.20	20.61
		5719.00	V	X	PK	48.22	9.12	N/A	N/A	57.34	68.20	10.86
		5859.46	V	X	PK	45.76	9.51	N/A	N/A	55.27	78.20	22.93
		5873.20	V	X	PK	45.95	9.53	N/A	N/A	55.48	68.20	12.72
		11569.00	H	Y	PK	41.66	16.81	N/A	-9.54	48.93	74.00	25.07
		11569.20	H	Y	AV	30.43	16.81	0.48	-9.54	38.18	54.00	15.82
		17290.60	V	Z	PK	39.04	25.98	N/A	-9.54	55.48	68.20	12.72

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 10 GHz, Measurement Distance = 1 m for above 10 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
5. The measured data for U-NII 3 band is satisfied with the emissions mask in 15.407(b)(4)(i), too.
   The old rule 15.407(b)(4) is more tight than the new rule 15.407(b)(4)(i).

8.7 AC Conducted Emissions

▣ Test Procedure

The conducted emissions are measured in the shielded room with a spectrum analyzer in peak hold. Emissions closest to the limit are measured in the quasi-peak mode (QP) and average mode (AV) with the tuned receiver using a bandwidth of 9 kHz. The emissions are maximized further by cable manipulation and Exerciser operation. The highest emissions relative to the limit are listed.

▣ Measurement Data: Comply

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

▣ Minimum Standard: FCC Part 15.207(a)

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

AC Line Conducted Emissions (Graph)

Test Mode: U-NII 1 & 802.11a & MIMO & 5200 MHz

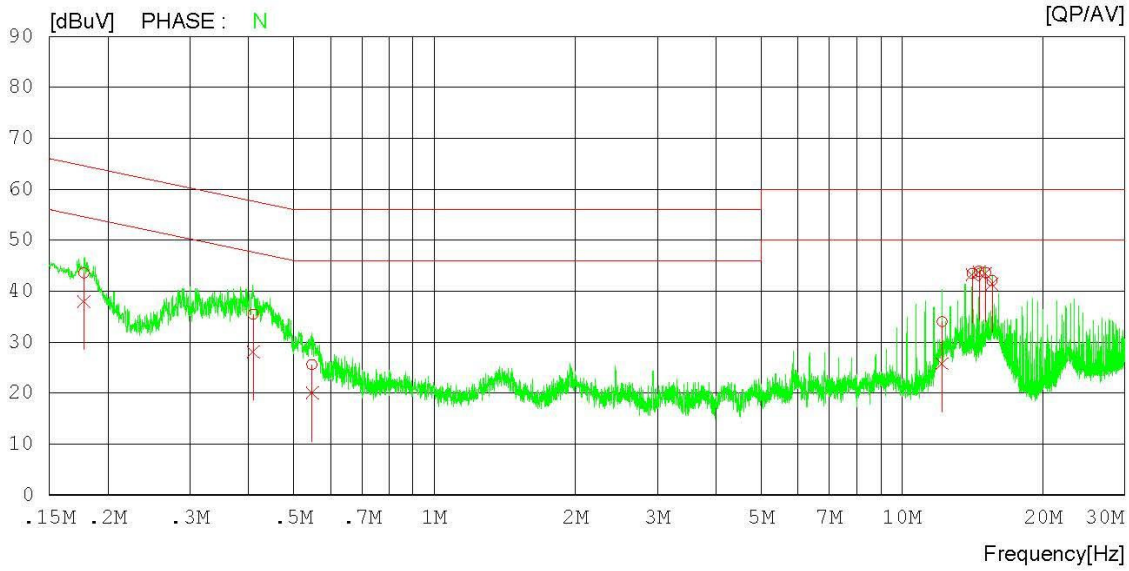
Results of Conducted Emission

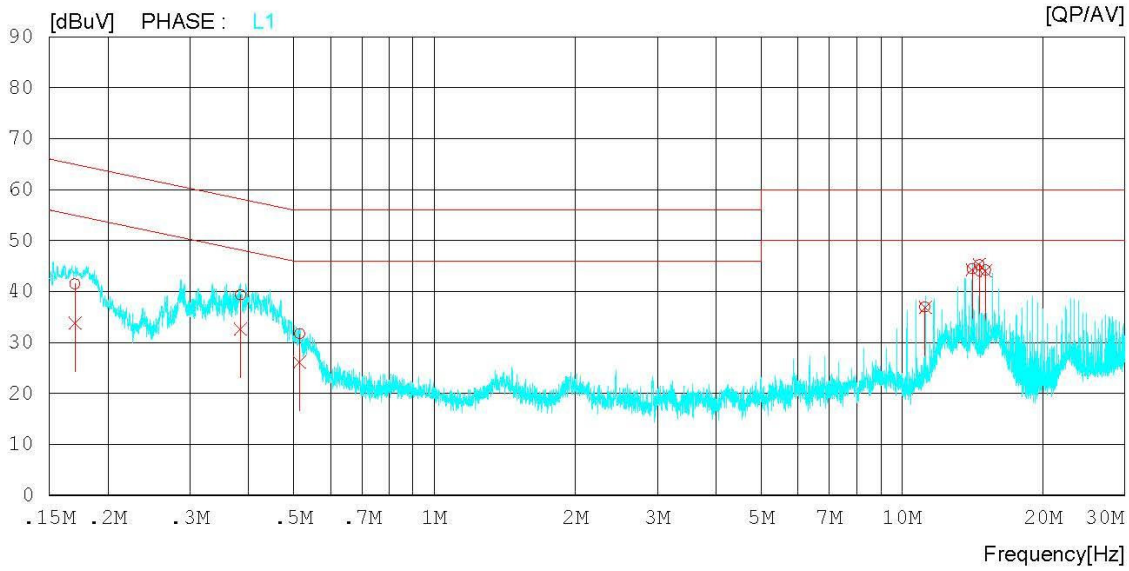
DTNC

Date : 2016-11-28

Order No.	:		Referrence No.	:	
Model No.	:	14HJ701D	Power Supply	:	120 V 60 Hz
Serial No.	:	Identical prototype	Temp/Humi.	:	23 'C 41 %
Test Condition	:	WLAN(5.1GHz)	Operator	:	J.J.LEE
Memo	:	802.11a / 5200MHz			

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





AC Line Conducted Emissions (Data List)

Test Mode: U-NII 1 & & 802.11a & MIMO & 5200 MHz

Results of Conducted Emission

DTNC

Date : 2016-11-28

Order No.	:		Referrence No.	:	
Model No.	:	14HJ701D	Power Supply	:	120 V 60 Hz
Serial No.	:	Identical prototype	Temp/Humi.	:	23 'C 41 %
Test Condition	:	WLAN(5.1GHz)	Operator	:	J.J.LEE

Memo : 802.11a / 5200MHz

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

NO	FREQ	READING		C.FACTOR	RESULT		LIMIT		MARGIN		PHASE
		QP	AV		QP	AV	QP	AV	QP	AV	
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	
1	0.17779	33.5	27.9	10.1	43.6	38.0	64.6	54.6	21.0	16.6	N
2	0.40968	25.3	18.0	10.1	35.4	28.1	57.7	47.7	22.3	19.6	N
3	0.54733	15.5	9.9	10.1	25.6	20.0	56.0	46.0	30.4	26.0	N
4	12.18320	23.2	15.0	10.8	34.0	25.8	60.0	50.0	26.0	24.2	N
5	14.14000	32.4	32.3	11.0	43.4	43.3	60.0	50.0	16.6	6.7	N
6	14.62840	32.9	32.8	11.0	43.9	43.8	60.0	50.0	16.1	6.2	N
7	15.11240	32.7	32.5	11.0	43.7	43.5	60.0	50.0	16.3	6.5	N
8	15.60000	30.9	30.3	11.1	42.0	41.4	60.0	50.0	18.0	8.6	N
9	0.17030	31.5	23.7	10.0	41.5	33.7	64.9	54.9	23.4	21.2	L1
10	0.38458	29.2	22.6	10.1	39.3	32.7	58.2	48.2	18.9	15.5	L1
11	0.51492	21.6	16.1	10.1	31.7	26.2	56.0	46.0	24.3	19.8	L1
12	11.21080	26.0	26.0	10.8	36.8	36.8	60.0	50.0	23.2	13.2	L1
13	14.13660	33.4	33.2	11.0	44.4	44.2	60.0	50.0	15.6	5.8	L1
14	14.62460	34.2	34.2	11.0	45.2	45.2	60.0	50.0	14.8	4.8	L1
15	15.11240	33.1	32.9	11.1	44.2	44.0	60.0	50.0	15.8	6.0	L1

AC Line Conducted Emissions (Graph)

Test Mode: U-NII 2A & 802.11a & MIMO & 5300 MHz

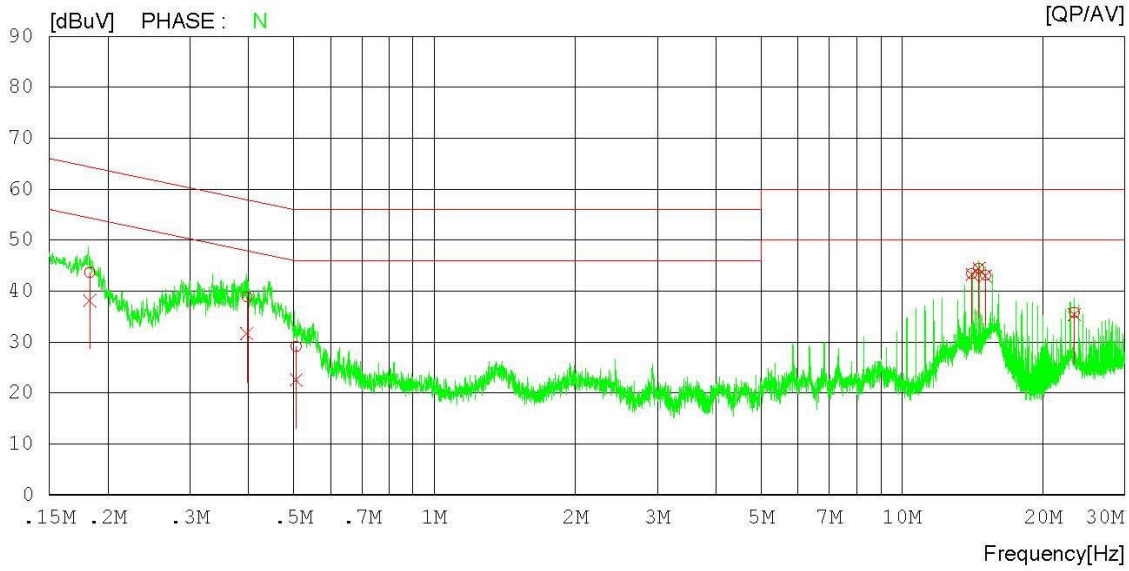
Results of Conducted Emission

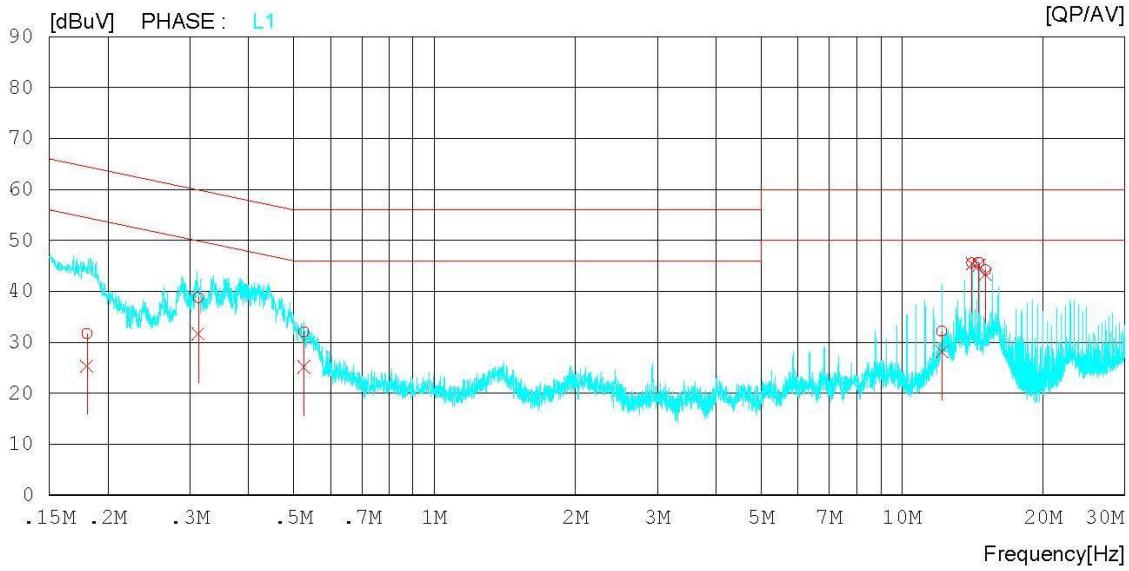
DTNC

Date : 2016-11-28

Order No.	:		Referrence No.	:	
Model No.	:	14HJ701D	Power Supply	:	120 V 60 Hz
Serial No.	:	Identical prototype	Temp/Humi.	:	23 'C 41 %
Test Condition	:	WLAN(5.3GHz)	Operator	:	J.J.LEE
Memo	:	802.11a / 5300MHz			

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





AC Line Conducted Emissions (Data List)

Test Mode: U-NII 2A & 802.11a & MIMO & 5300 MHz

Results of Conducted Emission

DTNC

Date : 2016-11-28

Order No.	:		Referrence No.	:	
Model No.	:	14HJ701D	Power Supply	:	120 V 60 Hz
Serial No.	:	Identical prototype	Temp/Humi.	:	23 'C 41 %
Test Condition	:	WLAN(5.3GHz)	Operator	:	J.J.LEE

Memo : 802.11a / 5300MHz

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

NO	FREQ	READING QP	READING AV	C.FACTOR	RESULT QP	RESULT AV	LIMIT QP	LIMIT AV	MARGIN QP	MARGIN AV	PHASE
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	
1	0.18310	33.5	28.1	10.1	43.6	38.2	64.3	54.3	20.7	16.1	N
2	0.39693	28.7	21.6	10.1	38.8	31.7	57.9	47.9	19.1	16.2	N
3	0.50656	19.0	12.5	10.1	29.1	22.6	56.0	46.0	26.9	23.4	N
4	14.12980	32.4	32.3	11.0	43.4	43.3	60.0	50.0	16.6	6.7	N
5	14.61700	33.4	33.4	11.0	44.4	44.4	60.0	50.0	15.6	5.6	N
6	15.10200	32.1	31.9	11.0	43.1	42.9	60.0	50.0	16.9	7.1	N
7	23.38300	24.1	23.7	11.7	35.8	35.4	60.0	50.0	24.2	14.6	N
8	0.18050	21.6	15.3	10.0	31.6	25.3	64.5	54.5	32.9	29.2	L1
9	0.31239	28.6	21.5	10.1	38.7	31.6	59.9	49.9	21.2	18.3	L1
10	0.52564	21.9	15.0	10.1	32.0	25.1	56.0	46.0	24.0	20.9	L1
11	12.17660	21.3	17.4	10.8	32.1	28.2	60.0	50.0	27.9	21.8	L1
12	14.12940	34.5	34.3	11.0	45.5	45.3	60.0	50.0	14.5	4.7	L1
13	14.61640	34.6	34.1	11.0	45.6	45.1	60.0	50.0	14.4	4.9	L1
14	15.10080	33.1	32.2	11.1	44.2	43.3	60.0	50.0	15.8	6.7	L1

AC Line Conducted Emissions (Graph)

Test Mode: U-NII 2C & 802.11a & MIMO & 5580 MHz

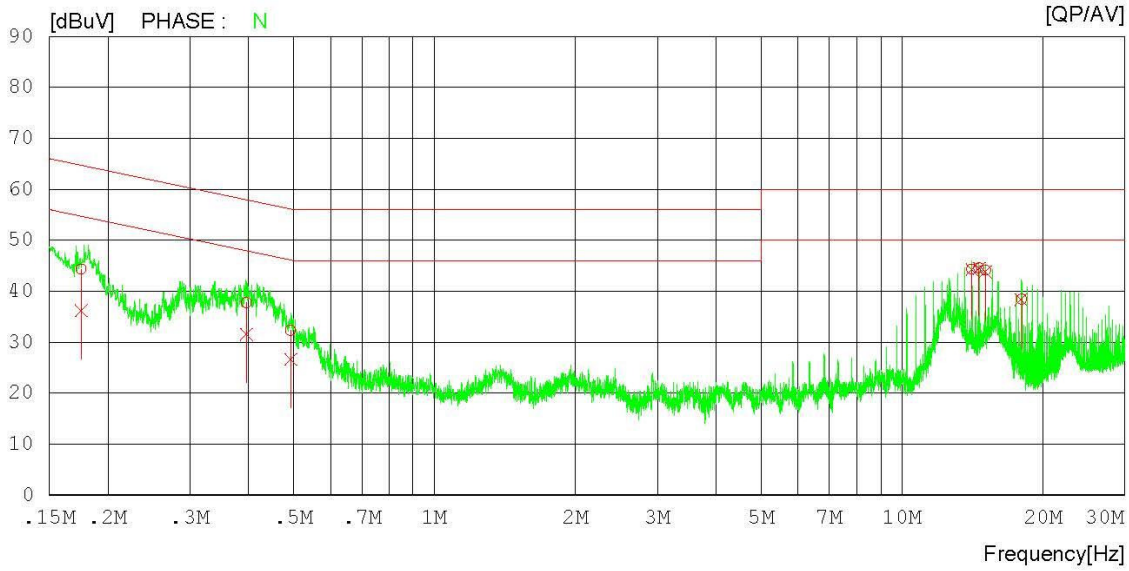
Results of Conducted Emission

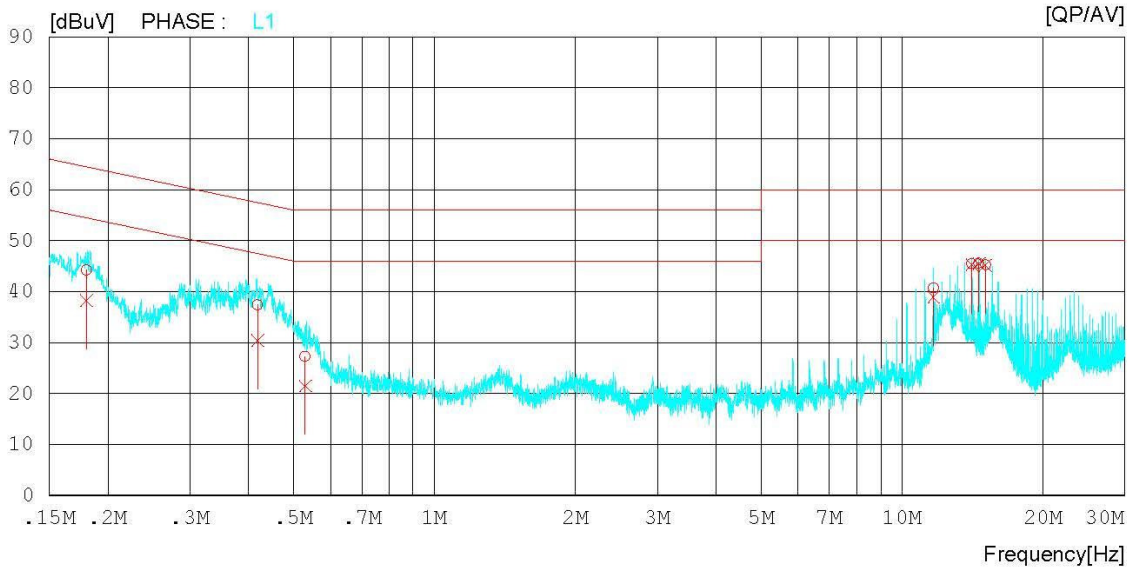
DTNC

Date : 2016-11-28

Order No.	:		Referrence No.	:	
Model No.	:	14HJ701D	Power Supply	:	120 V 60 Hz
Serial No.	:	Identical prototype	Temp/Humi.	:	23 'C 41 %
Test Condition	:	WLAN(5.5GHz)	Operator	:	J.J.LEE
Memo	:	802.11a / 5580MHz			

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





AC Line Conducted Emissions (Data List)

Test Mode: U-NII 2C & 802.11a & MIMO & 5580 MHz

Results of Conducted Emission

DTNC

Date : 2016-11-28

Order No.	:		Referrence No.	:	
Model No.	:	14HJ701D	Power Supply	:	120 V 60 Hz
Serial No.	:	Identical prototype	Temp/Humi.	:	23 'C 41 %
Test Condition	:	WLAN(5.5GHz)	Operator	:	J.J.LEE

Memo : 802.11a / 5580MHz

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

NO	FREQ	READING QP	READING AV	C.FACTOR	RESULT QP	RESULT AV	LIMIT QP	LIMIT AV	MARGIN QP	MARGIN AV	PHASE
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	
1	0.17573	34.3	26.1	10.1	44.4	36.2	64.7	54.7	20.3	18.5	N
2	0.39617	27.6	21.4	10.1	37.7	31.5	57.9	47.9	20.2	16.4	N
3	0.49296	22.1	16.5	10.1	32.2	26.6	56.1	46.1	23.9	19.5	N
4	14.12680	33.4	33.3	11.0	44.4	44.3	60.0	50.0	15.6	5.7	N
5	14.61380	33.6	33.5	11.0	44.6	44.5	60.0	50.0	15.4	5.5	N
6	15.10240	33.1	32.8	11.0	44.1	43.8	60.0	50.0	15.9	6.2	N
7	18.02440	27.2	27.2	11.2	38.4	38.4	60.0	50.0	21.6	11.6	N
8	0.18024	34.1	28.1	10.0	44.1	38.1	64.5	54.5	20.4	16.4	L1
9	0.41850	27.3	20.2	10.1	37.4	30.3	57.5	47.5	20.1	17.2	L1
10	0.52908	17.2	11.3	10.1	27.3	21.4	56.0	46.0	28.7	24.6	L1
11	11.68720	29.8	28.1	10.8	40.6	38.9	60.0	50.0	19.4	11.1	L1
12	14.12700	34.4	34.3	11.0	45.4	45.3	60.0	50.0	14.6	4.7	L1
13	14.61300	34.5	34.5	11.0	45.5	45.5	60.0	50.0	14.5	4.5	L1
14	15.10060	34.1	34.1	11.1	45.2	45.2	60.0	50.0	14.8	4.8	L1

AC Line Conducted Emissions (Graph)

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

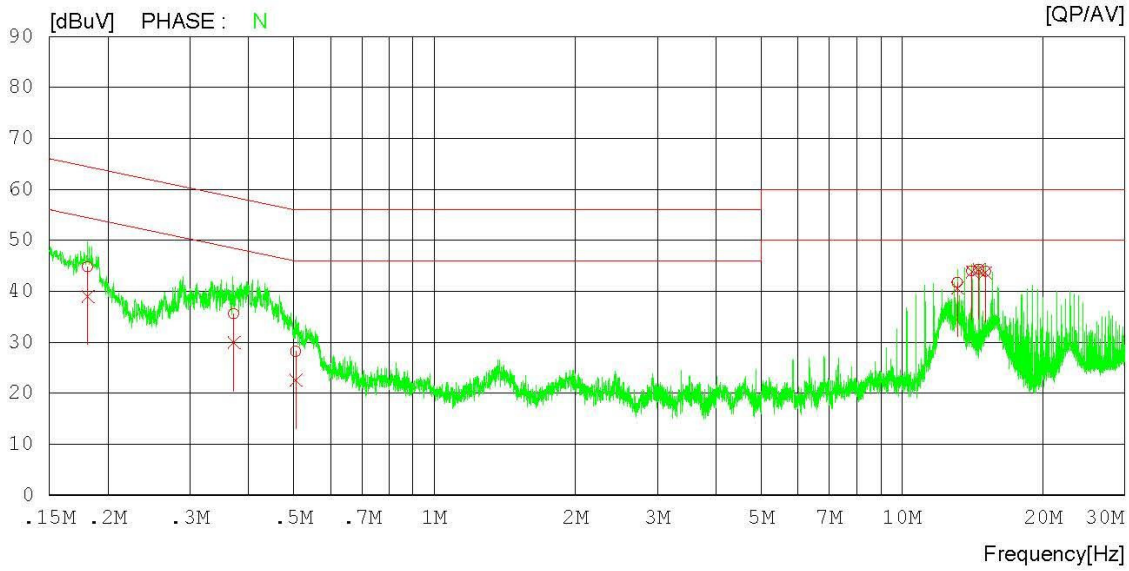
Results of Conducted Emission

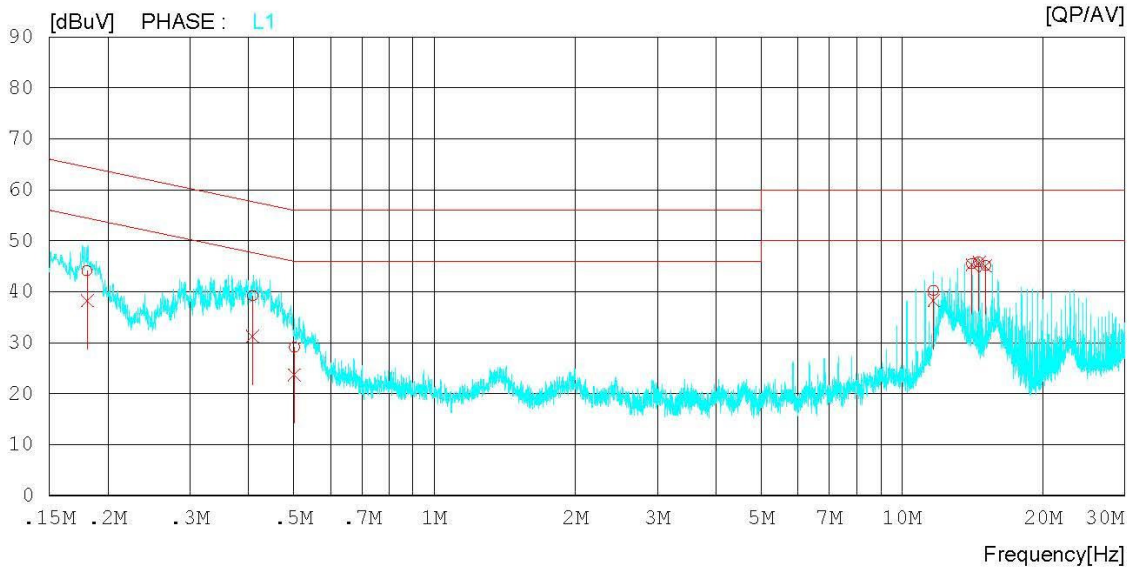
DTNC

Date : 2016-11-28

Order No.	:		Referrence No.	:	
Model No.	:	14HJ701D	Power Supply	:	120 V 60 Hz
Serial No.	:	Identical prototype	Temp/Humi.	:	23 'C 41 %
Test Condition	:	WLAN(5.7GHz)	Operator	:	J.J.LEE
Memo	:	802.11a / 5785MHz			

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





AC Line Conducted Emissions (Data List)

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

Results of Conducted Emission

DTNC

Date : 2016-11-28

Order No.	:		Referrence No.	:	
Model No.	:	14HJ701D	Power Supply	:	120 V 60 Hz
Serial No.	:	Identical prototype	Temp/Humi.	:	23 'C 41 %
Test Condition	:	WLAN(5.7GHz)	Operator	:	J.J.LEE

Memo : 802.11a / 5785MHz

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

NO	FREQ	READING		C.FACTOR	RESULT		LIMIT		MARGIN		PHASE
		QP	AV		QP	AV	QP	AV	QP	AV	
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	
1	0.18123	34.7	29.0	10.1	44.8	39.1	64.4	54.4	19.6	15.3	N
2	0.37209	25.5	19.8	10.1	35.6	29.9	58.5	48.5	22.9	18.6	N
3	0.50565	18.1	12.5	10.1	28.2	22.6	56.0	46.0	27.8	23.4	N
4	13.15460	30.9	29.8	10.9	41.8	40.7	60.0	50.0	18.2	9.3	N
5	14.12760	33.0	32.8	11.0	44.0	43.8	60.0	50.0	16.0	6.2	N
6	14.61540	33.4	33.3	11.0	44.4	44.3	60.0	50.0	15.6	5.7	N
7	15.10220	32.9	32.6	11.0	43.9	43.6	60.0	50.0	16.1	6.4	N
8	0.18072	34.1	28.2	10.0	44.1	38.2	64.5	54.5	20.4	16.3	L1
9	0.40849	29.0	21.1	10.1	39.1	31.2	57.7	47.7	18.6	16.5	L1
10	0.50177	18.9	13.6	10.1	29.0	23.7	56.0	46.0	27.0	22.3	L1
11	11.68800	29.4	27.4	10.8	40.2	38.2	60.0	50.0	19.8	11.8	L1
12	14.12920	34.4	34.3	11.0	45.4	45.3	60.0	50.0	14.6	4.7	L1
13	14.61620	34.7	34.7	11.0	45.7	45.7	60.0	50.0	14.3	4.3	L1
14	15.10140	34.0	34.0	11.1	45.1	45.1	60.0	50.0	14.9	4.9	L1

9. LIST OF TEST EQUIPMENT

Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
MXA Signal Analyzer	Agilent Technologies	N9020A	16/10/11	17/10/11	MY46471251
PXA Signal Analyzer	Agilent Technologies	N9030A	16/10/18	17/10/18	MY53310140
DC Power Supply	Agilent Technologies	66332A	16/09/08	17/09/08	US37473422
Multimeter	FLUKE	17B	16/04/21	17/04/21	26030065WS
Vector Signal Generator	R&S	SMBV100A	16/01/05	17/01/05	255571
Signal Generator	R&S	SMF100A	16/06/23	17/06/23	102341
Power Meter & Wide Bandwidth Sensor	Anritsu	ML2496A/ MA2411B	16/06/23	17/06/23	1338004/ 1306053
50W 10dB ATT	SMAJK	SMAJK-50-10	16/10/18	17/10/18	2-50-10
Thermohygrometer	BODYCOM	BJ5478	16/02/25	17/02/25	1209
Loop Antenna	Schwarzbeck	FMZB1513	16/04/22	18/04/22	1513-128
Biglog Antenna	SCHAFFNER	CBL6112B	14/12/10	16/12/10	2737
Horn Antenna	ETS	3117	16/05/03	18/05/03	140394
Horn Antenna	A.H.Systems.	SAS-574	15/04/30	17/04/30	154
Low Noise Pre Amplifier	tsj	MLA-010K01-B01-27	16/03/10	17/03/10	1844539
Amplifier	Agilent	8449B	16/02/24	17/02/24	3008A00370
Amplifier	A.H. SYSTEMS	PAM-1840VH	15/12/03	16/12/03	163
High-pass filter	Wainwright	WHKX12-2580-3000-18000-80SS	16/09/09	17/09/09	3
High-pass filter	Wainwright	WHNX6-6320-8000-26500-40CC	16/09/13	17/09/13	1
EMI TEST RECEIVER	R&S	ESR7	16/02/25	17/02/25	101061
EMI TEST RECEIVER	R&S	ESCI	16/02/25	17/02/25	100364
PULSE LIMITER	Rohde Schwarz	ESH3-Z2	16/01/05	17/01/05	101334
SINGLE-PHASE MASTER	NF	4420	16/09/08	17/09/08	3049354420023
Artificial Mains Network	Narda S.T.S. / PMM	PMM L2-16B	16/06/22	17/06/22	000WX20305

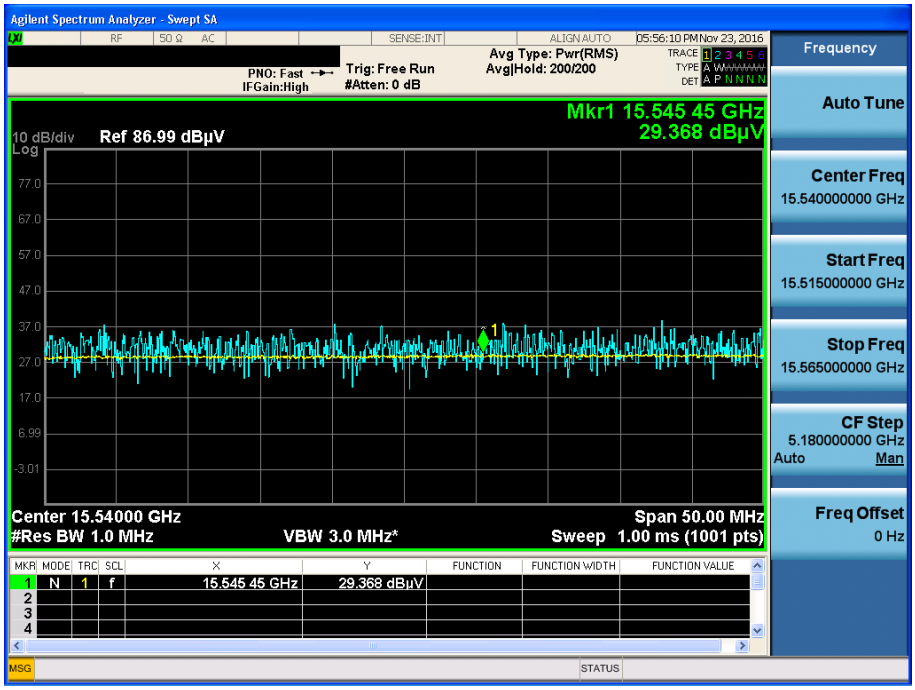
APPENDIX I

Unwanted Emissions (Radiated) Test Plot _ Multiple Transmit

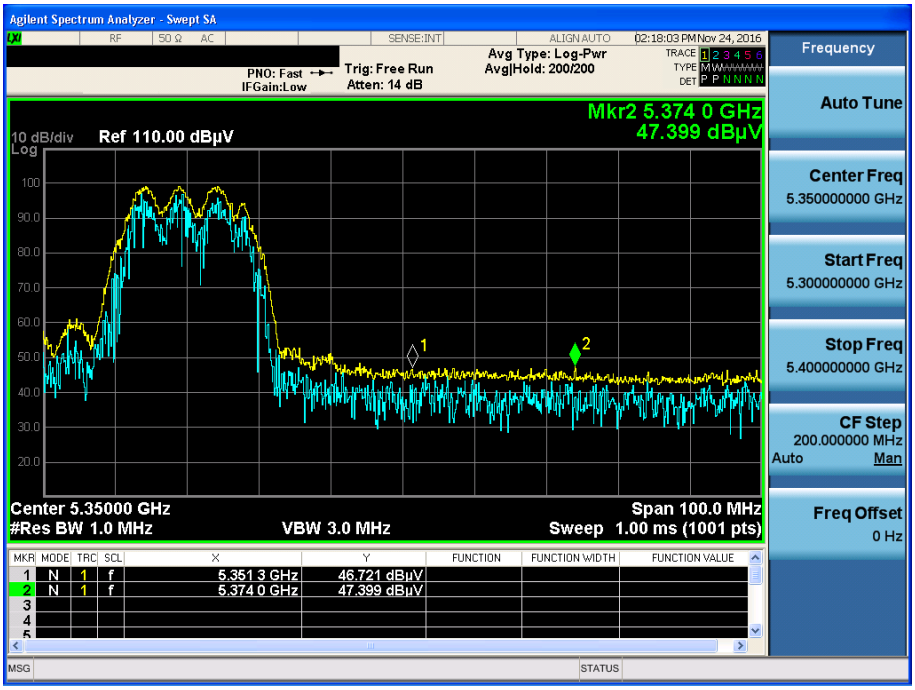
802.11a & U-NII 1 & Ch.36 & X axis & Ver Detector Mode : PK

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

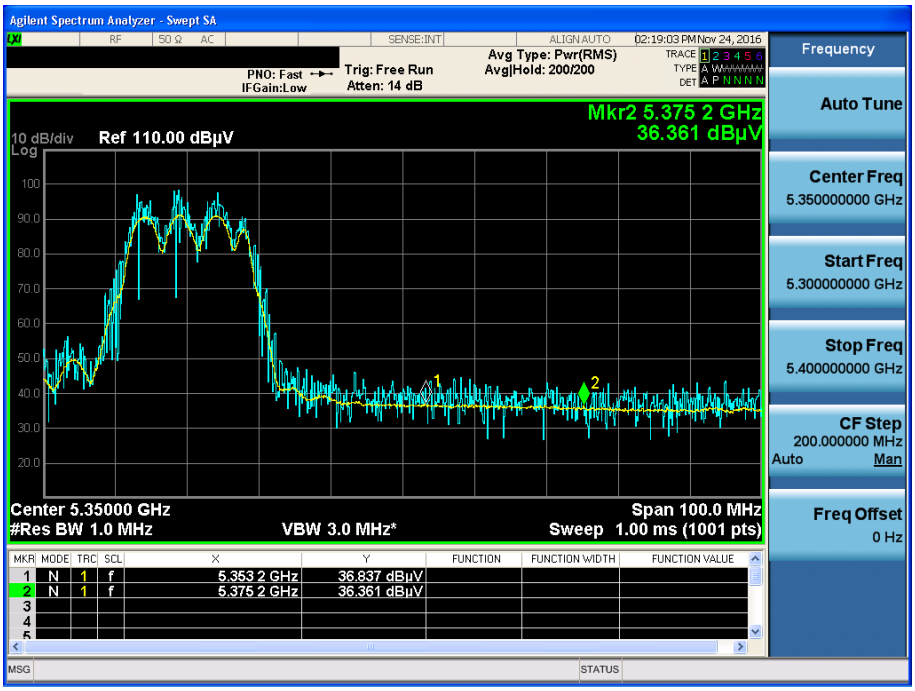
802.11a & U-NII 1 & Ch.36 & Z axis & Ver **Detector Mode : AV**



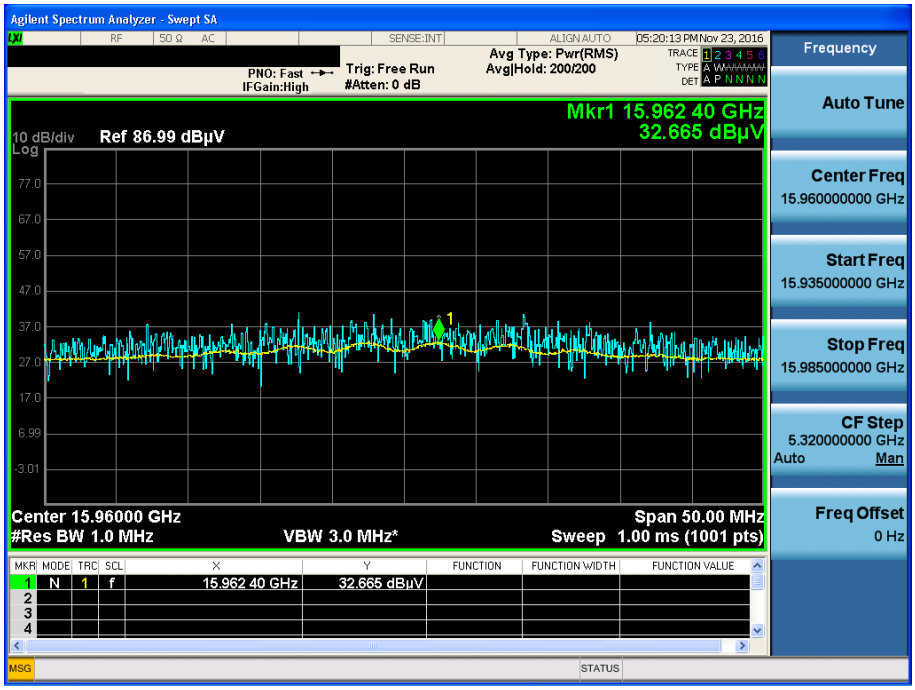
802.11a & U-NII 2A & Ch.64 & X axis & Ver **Detector Mode : PK**



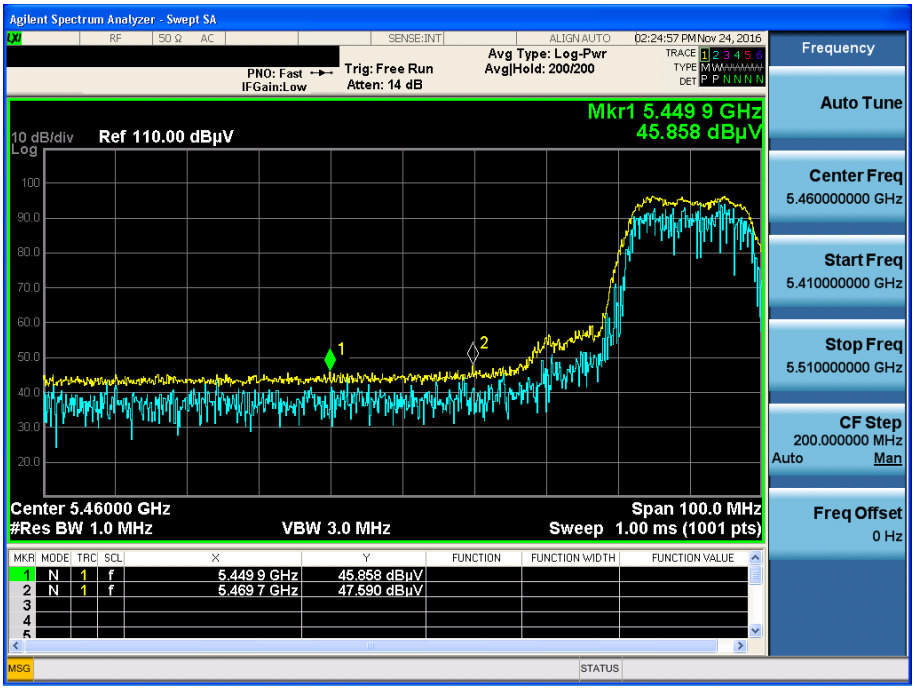
802.11a & U-NII 2A & Ch.64 & X axis & Ver **Detector Mode : AV**



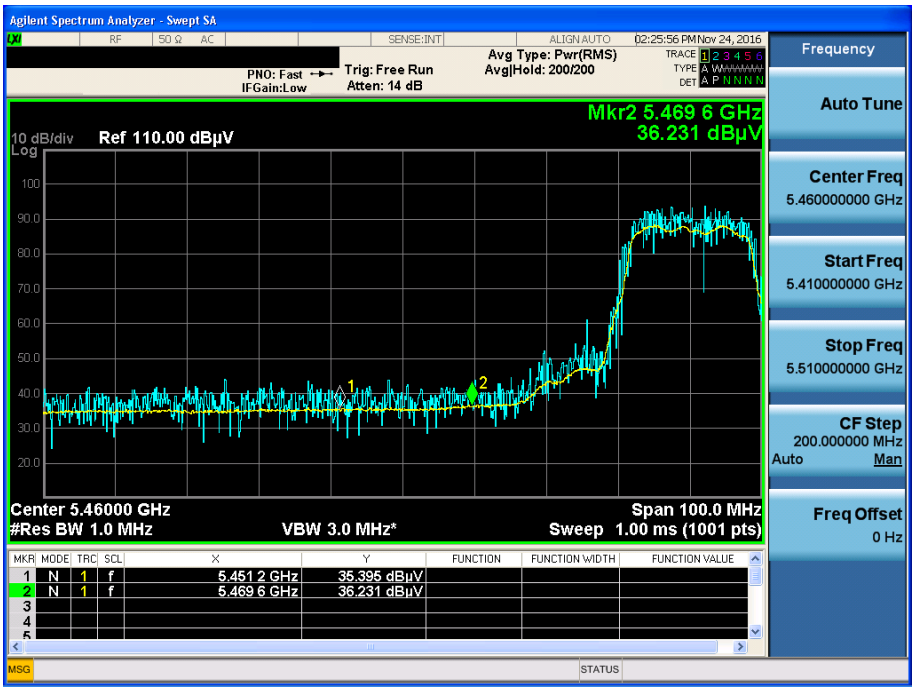
802.11a & U-NII 2A & Ch.64 & Z axis & Ver **Detector Mode : AV**



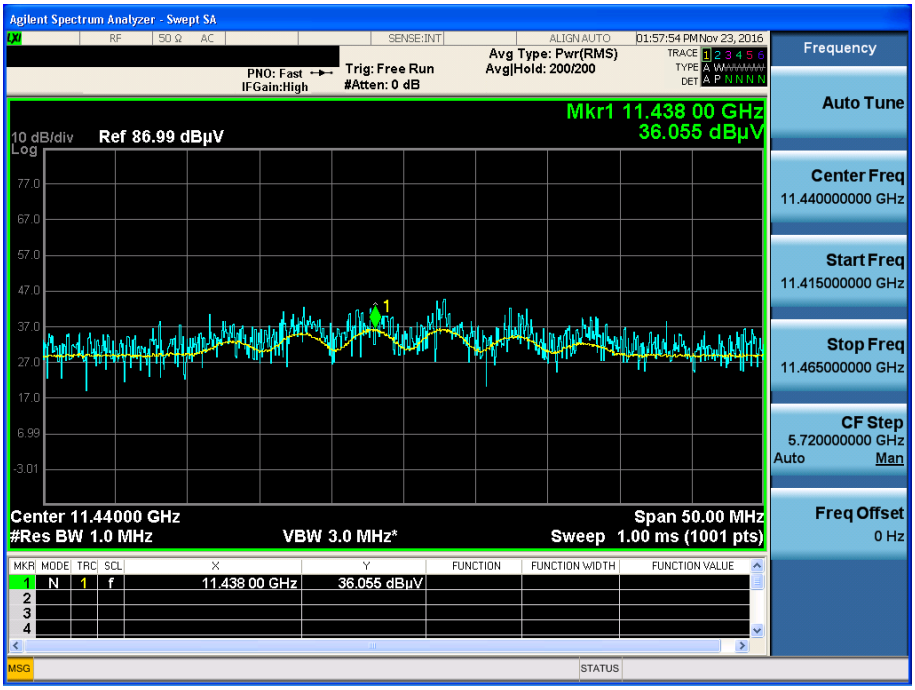
802.11a & U-NII 2C & Ch.100 & X axis & Ver **Detector Mode : PK**



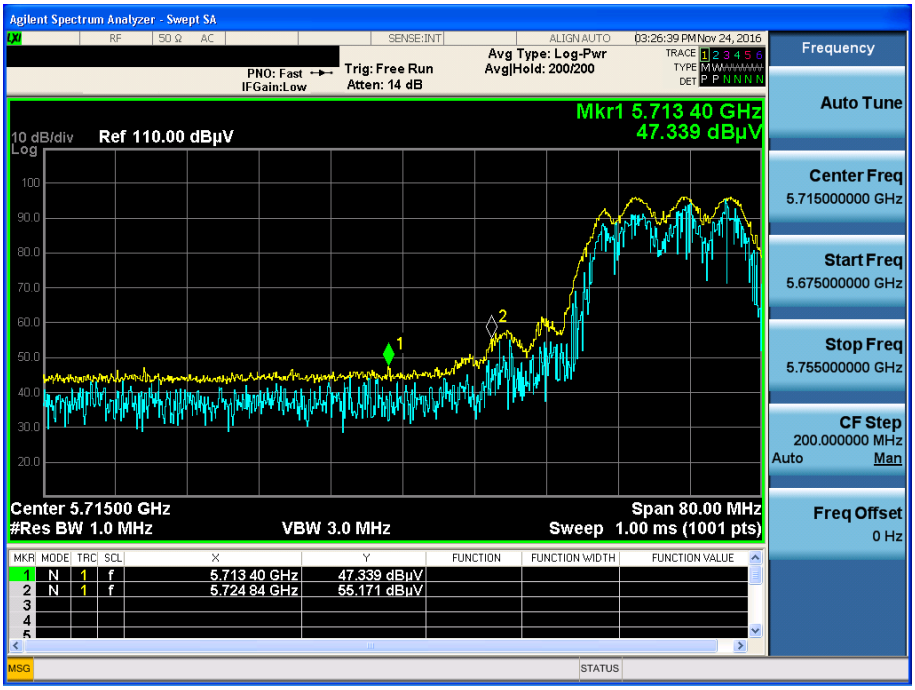
802.11a & U-NII 2C & Ch.100 & X axis & Ver **Detector Mode : AV**



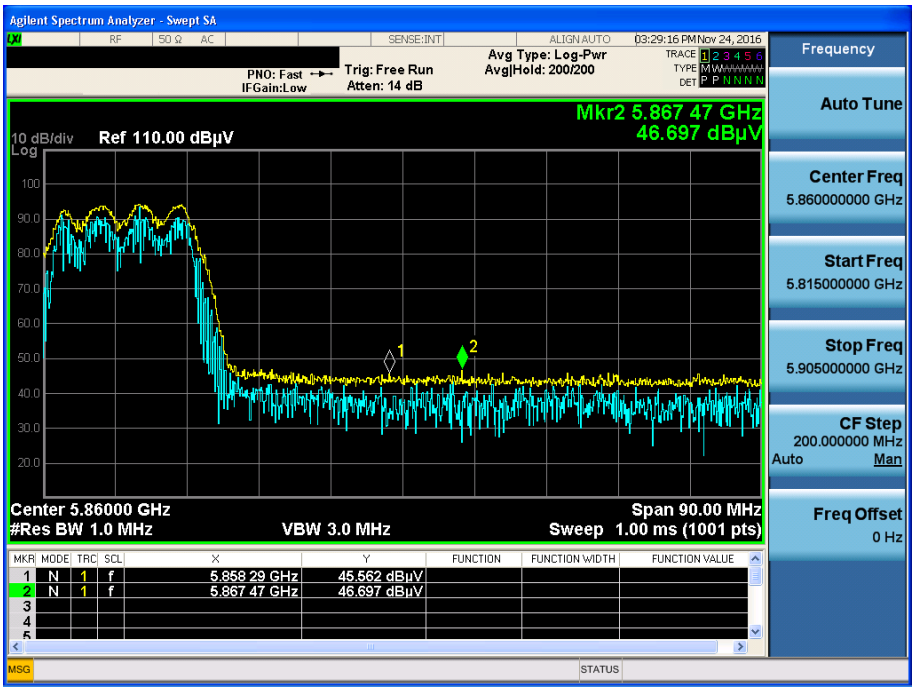
802.11a & U-NII 2C & Ch.144 & Y axis & Hor **Detector Mode : AV**



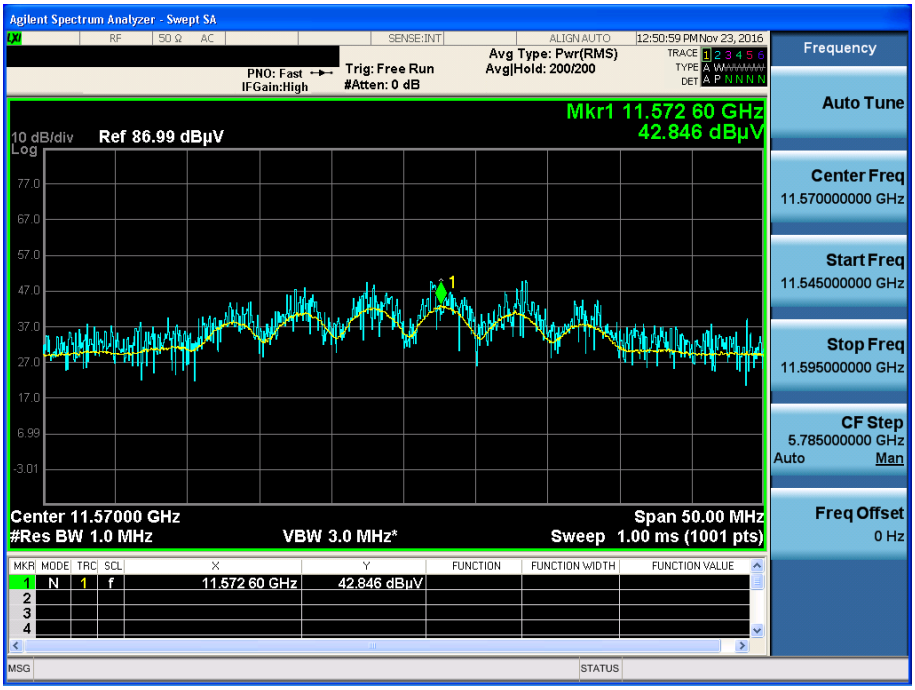
802.11a & U-NII 3 & Ch.149 & X axis & Ver **Detector Mode : PK**



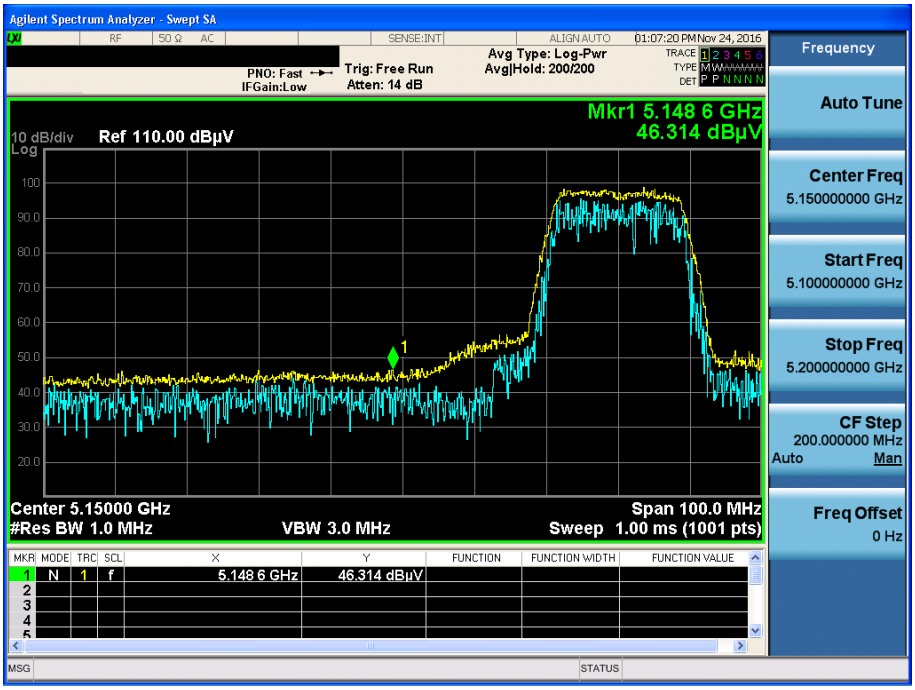
802.11a & U-NII 3 & Ch.165 & Z axis & Ver **Detector Mode : PK**



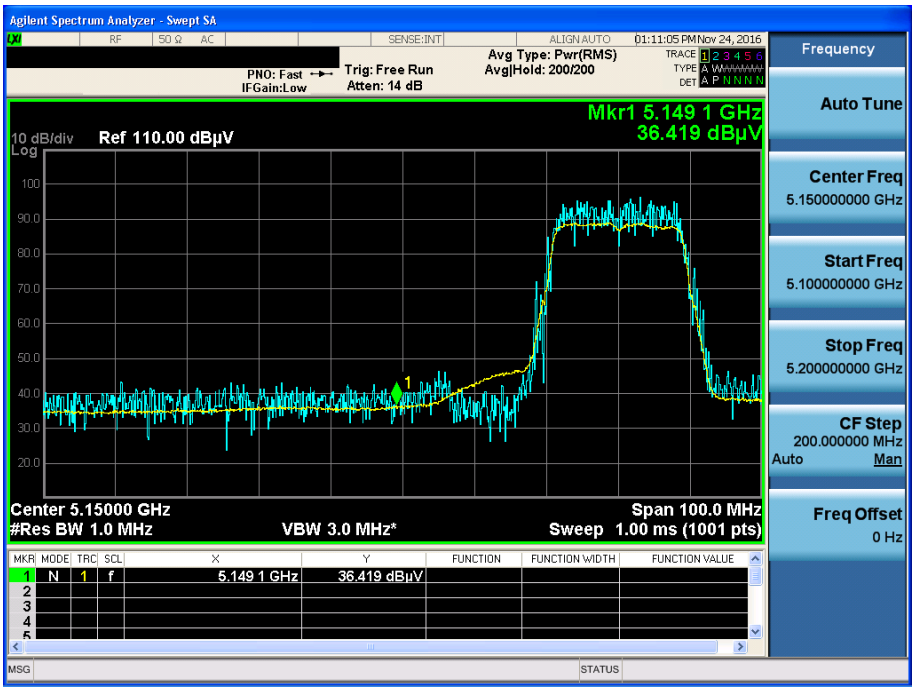
802.11a & U-NII 3 & Ch.157 & Y axis & Hor **Detector Mode : AV**



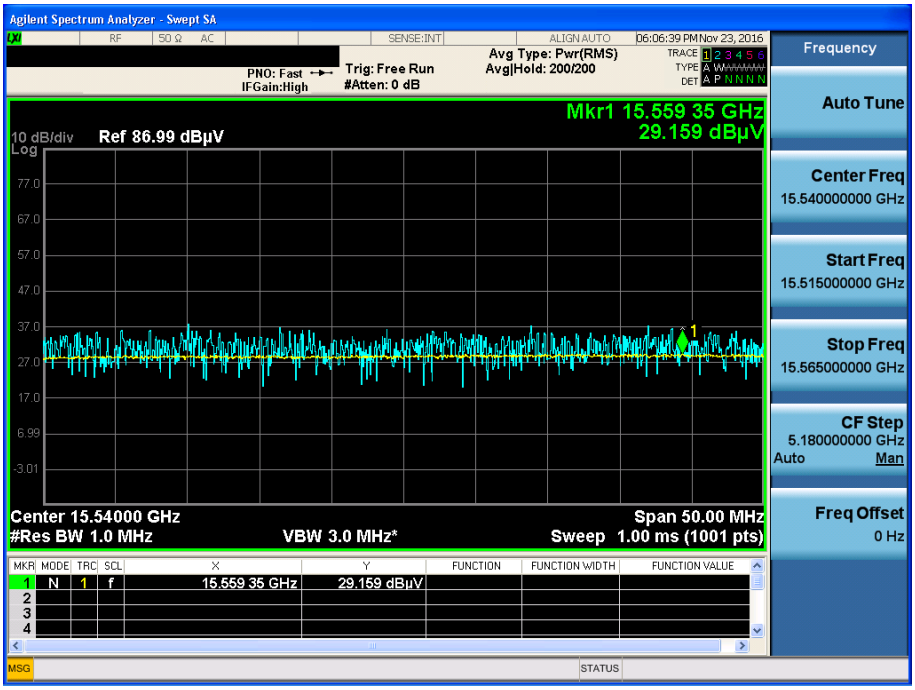
802.11n(HT20) & U-NII 1 & Ch.36 & X axis & Ver **Detector Mode : PK**



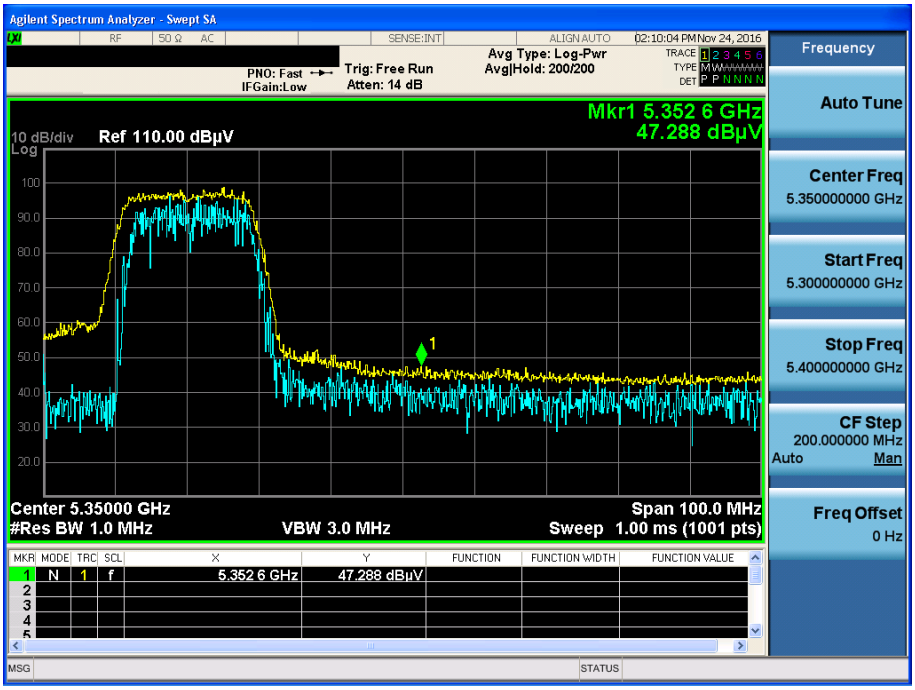
802.11n(HT20) & U-NII 1 & Ch.36 & X axis & Ver **Detector Mode : AV**



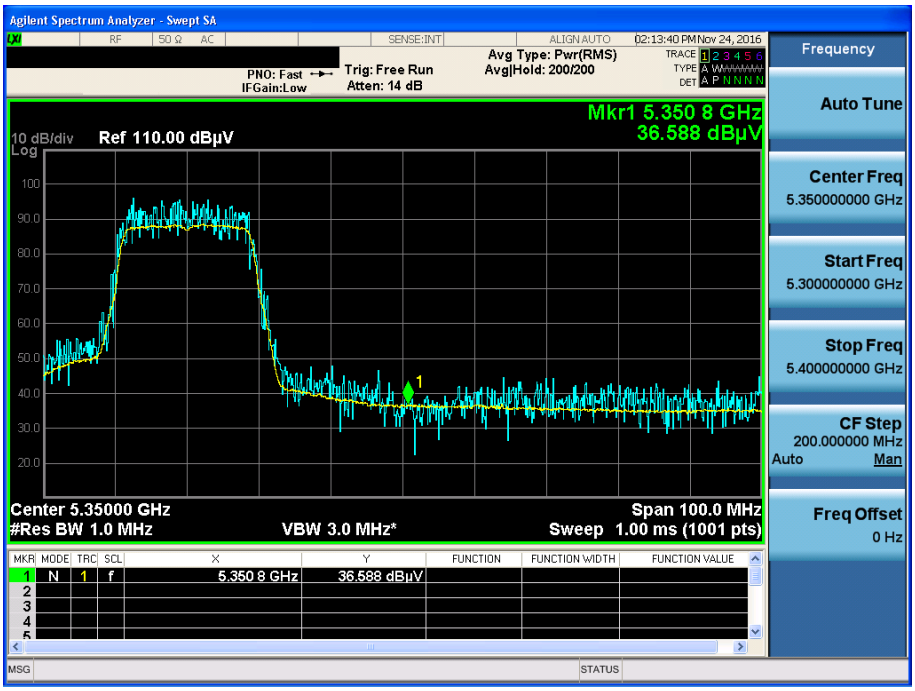
802.11n(HT20) & U-NII 1 & Ch.36 & Z axis & Ver Detector Mode : AV



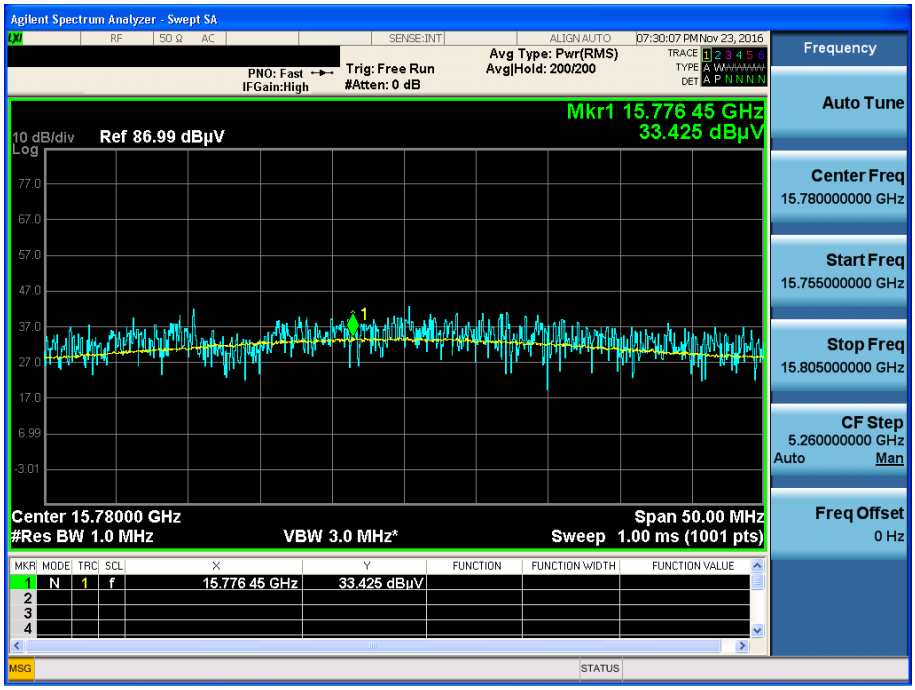
802.11n(HT20) & U-NII 2A & Ch.64 & X axis & Ver Detector Mode : PK



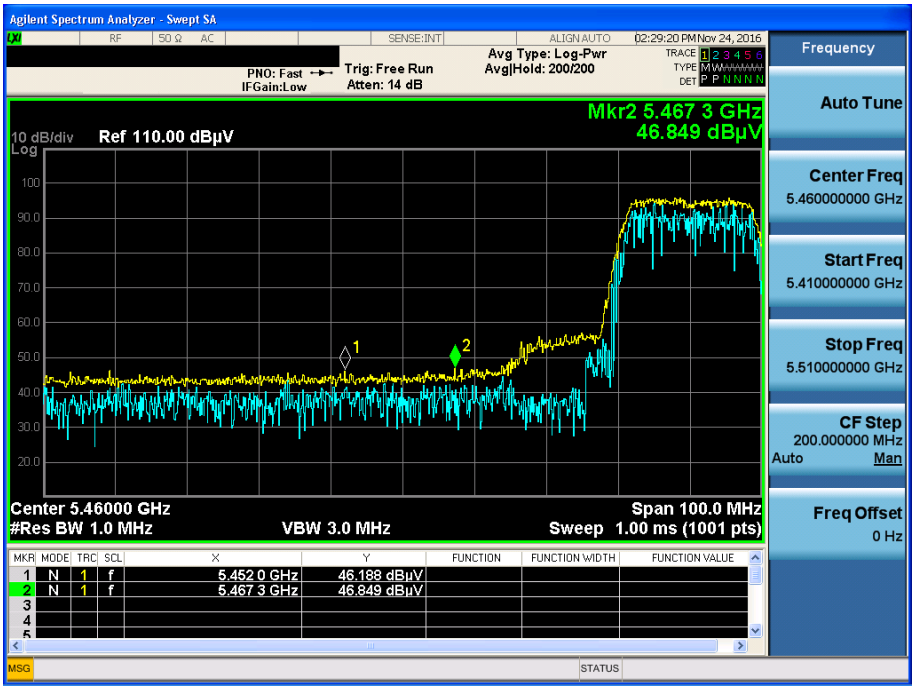
802.11n(HT20) & U-NII 2A & Ch.64 & X axis & Ver Detector Mode : AV



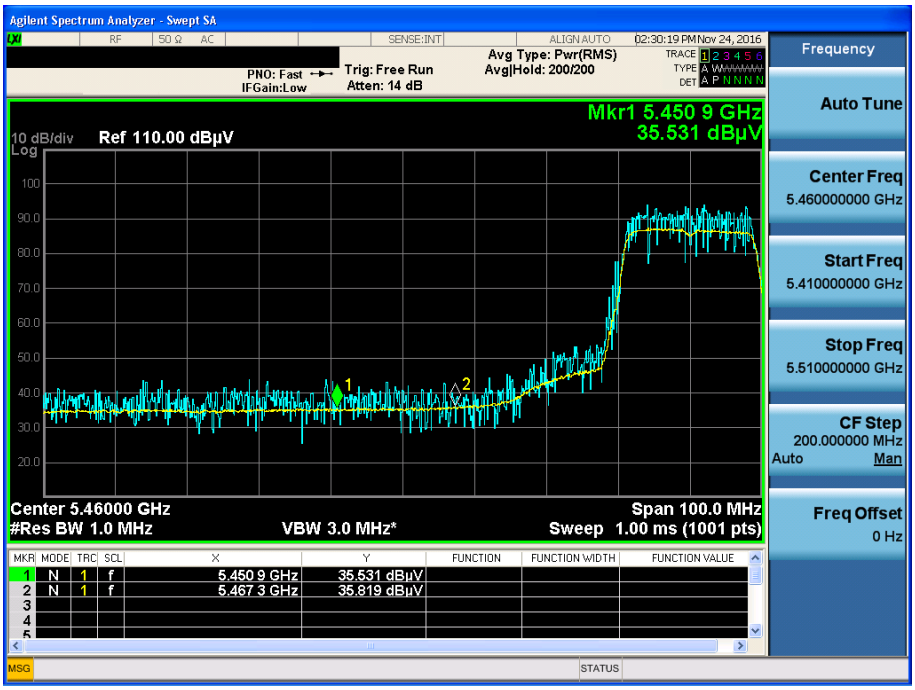
802.11n(HT20) & U-NII 2A & Ch.52 & Z axis & Ver Detector Mode : AV



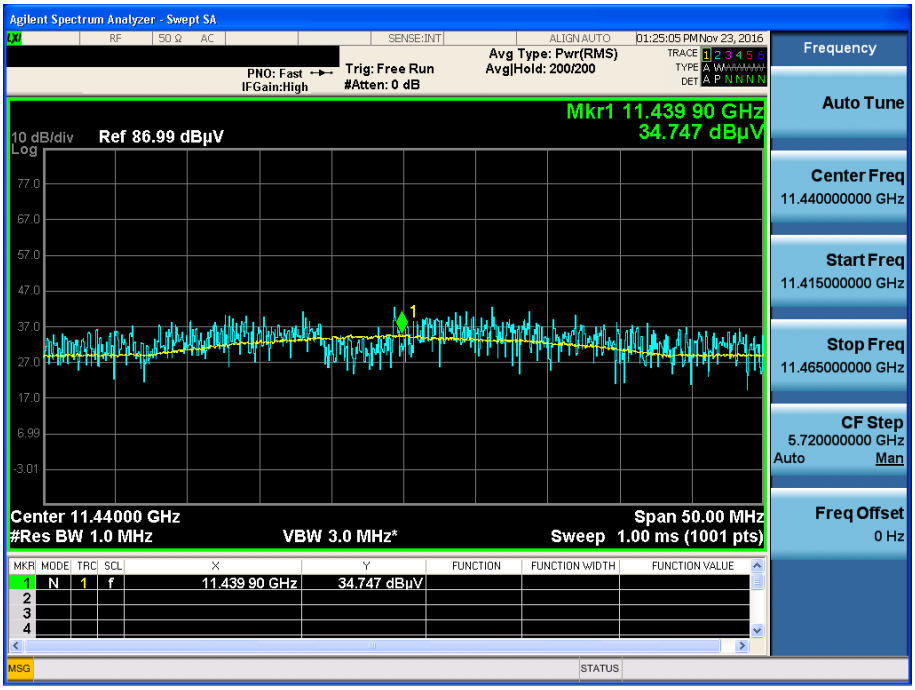
802.11n(HT20) & U-NII 2C & Ch.100 & X axis & Ver Detector Mode : PK



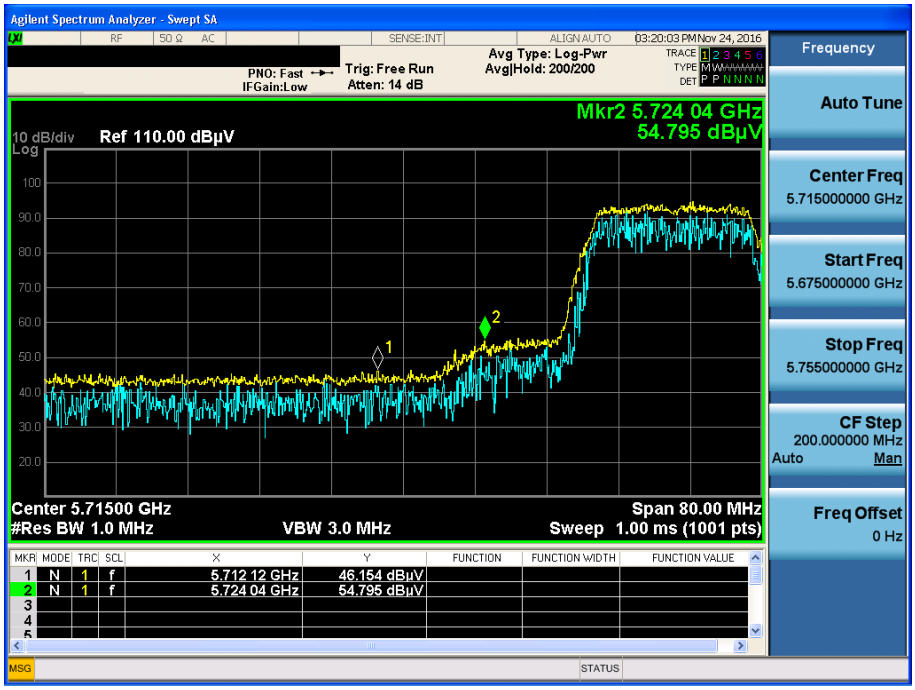
802.11n(HT20) & U-NII 2C & Ch.100 & X axis & Ver Detector Mode : AV



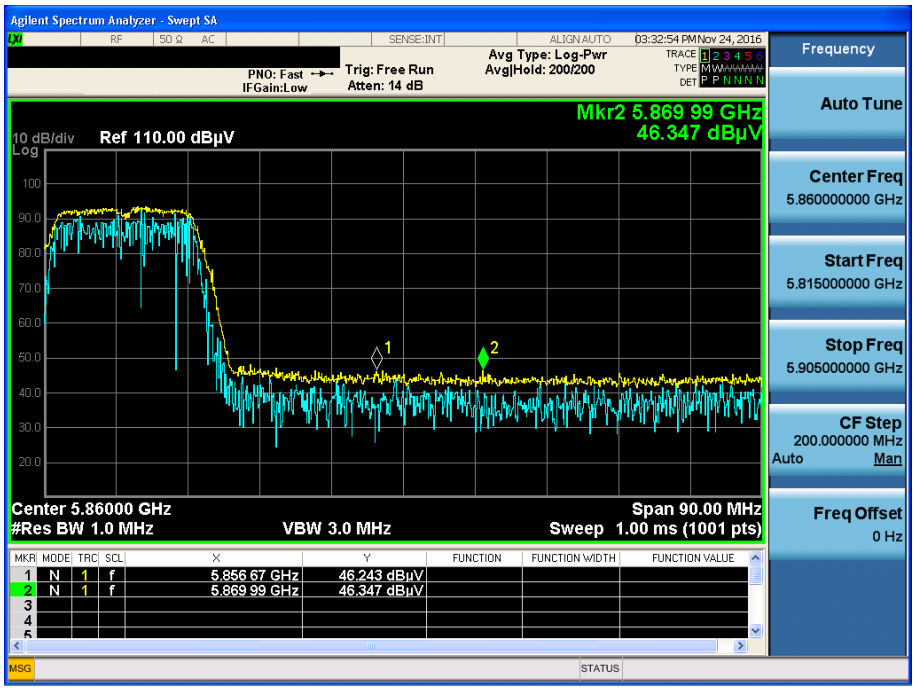
802.11n(HT20) & U-NII 2C & Ch.144 & Y axis & Hor Detector Mode : AV



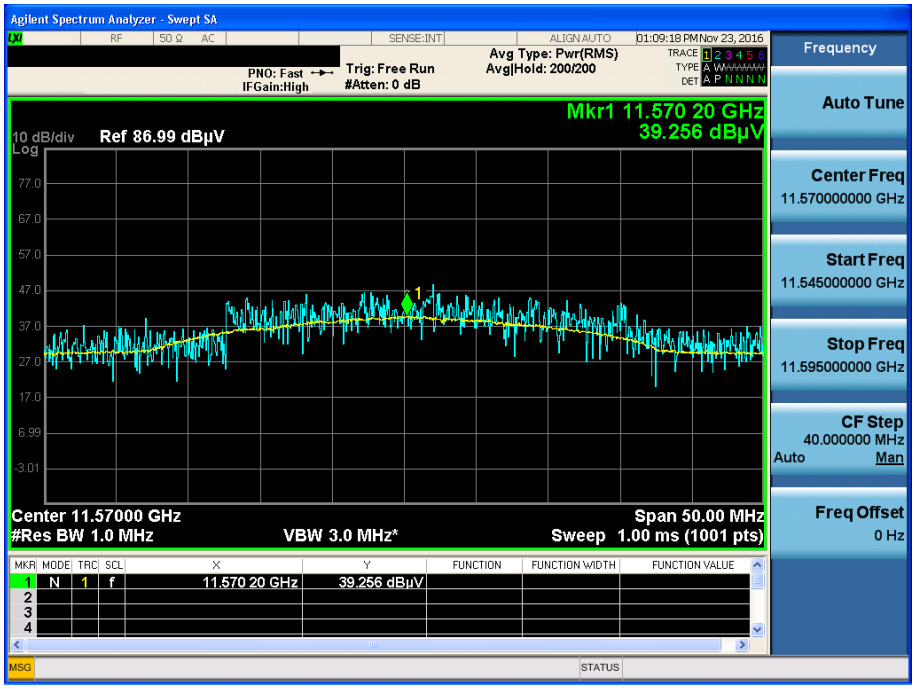
802.11n(HT20) & U-NII 3 & Ch.149 & X axis & Ver Detector Mode : PK



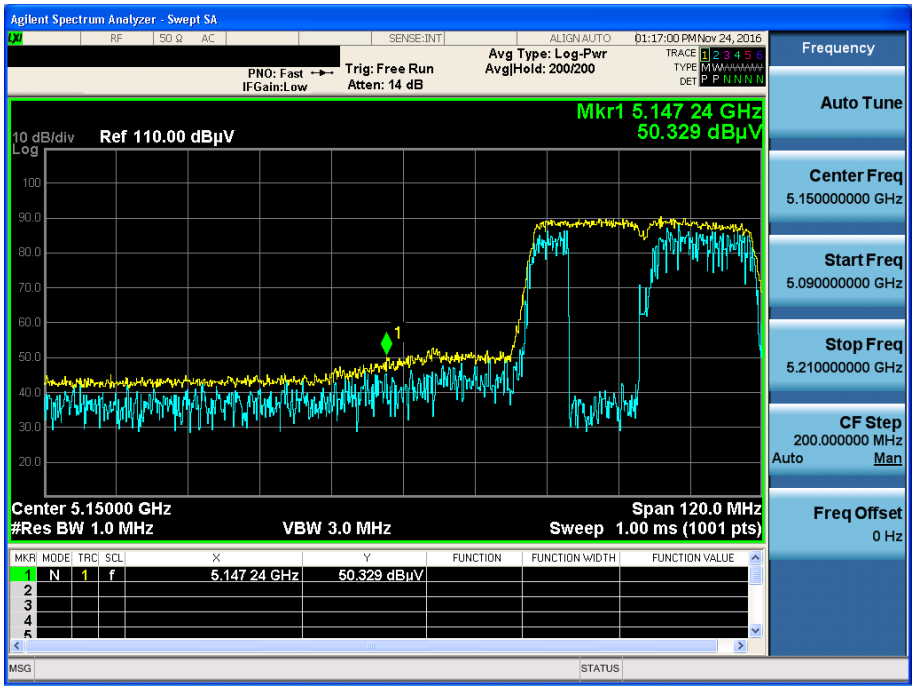
802.11n(HT20) & U-NII 3 & Ch.165 & X axis & Ver Detector Mode : PK



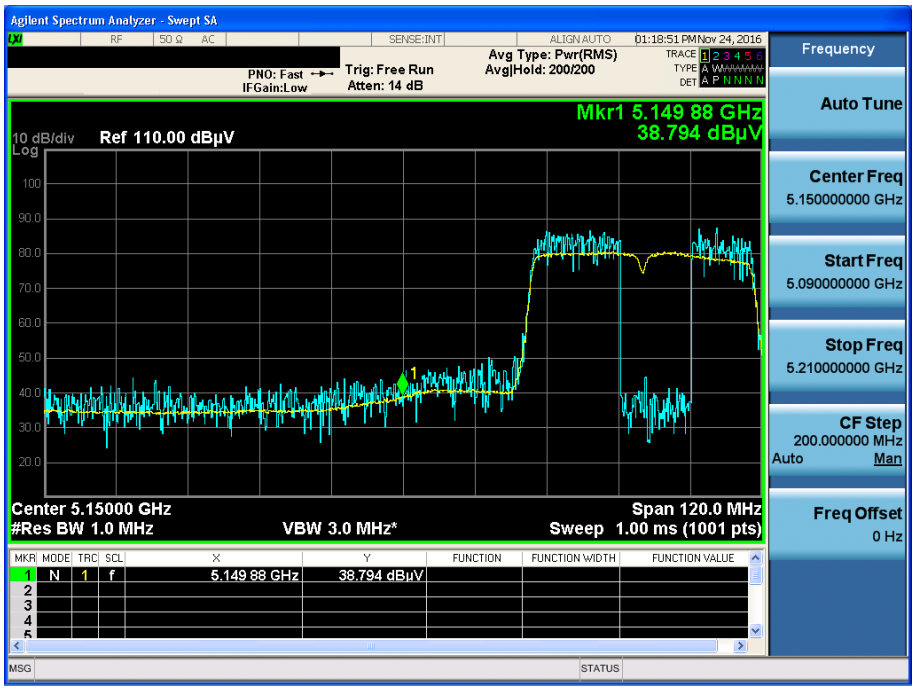
802.11n(HT20) & U-NII 3 & Ch.157 & Y axis & Hor Detector Mode : AV



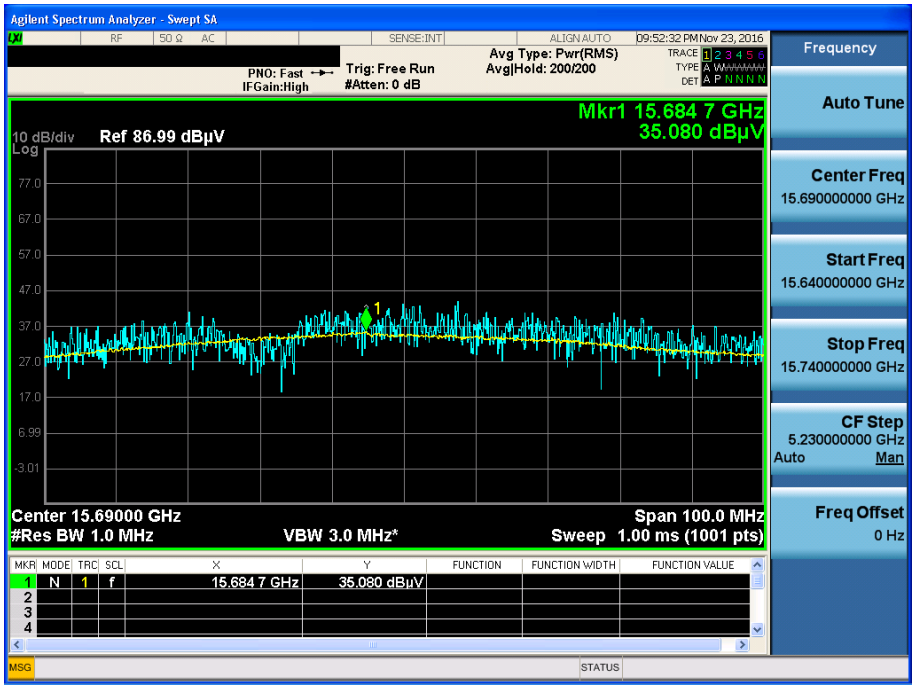
802.11ac(VHT40) & U-NII 1 & Ch.38 & X axis & Ver Detector Mode : PK



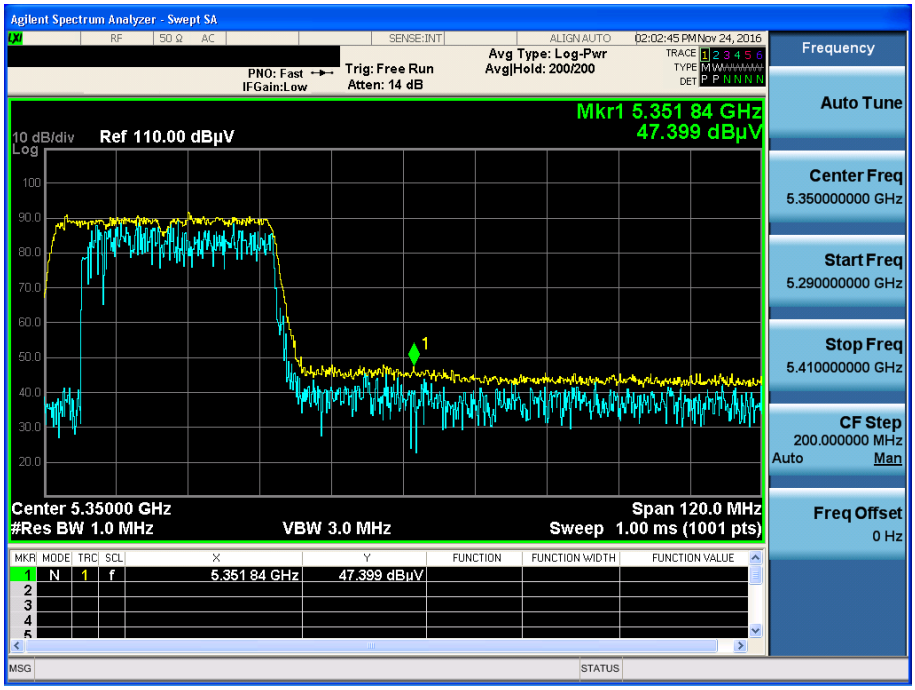
802.11ac(VHT40) & U-NII 1 & Ch.38 & X axis & Ver Detector Mode : AV



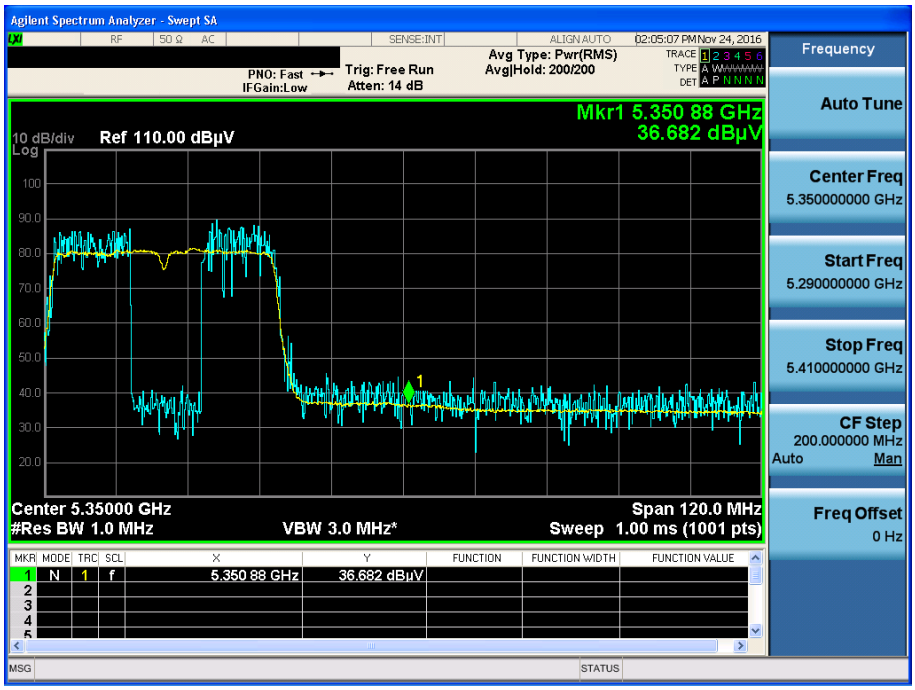
802.11ac(VHT40) & U-NII 1 & Ch.46 & Z axis & Ver Detector Mode : AV



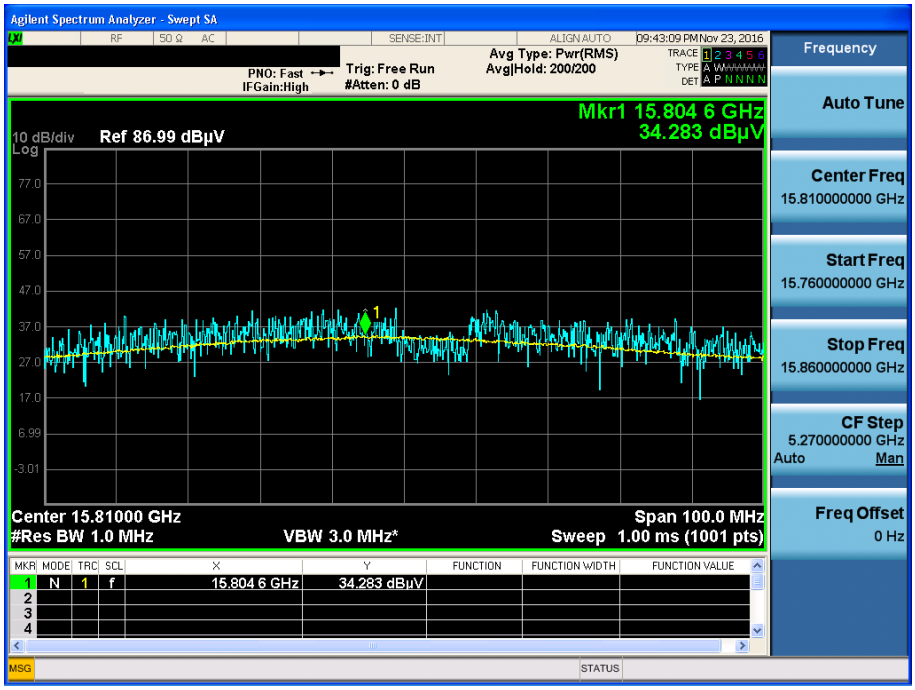
802.11ac(VHT40) & U-NII 2A & Ch.62 & X axis & Ver Detector Mode : PK



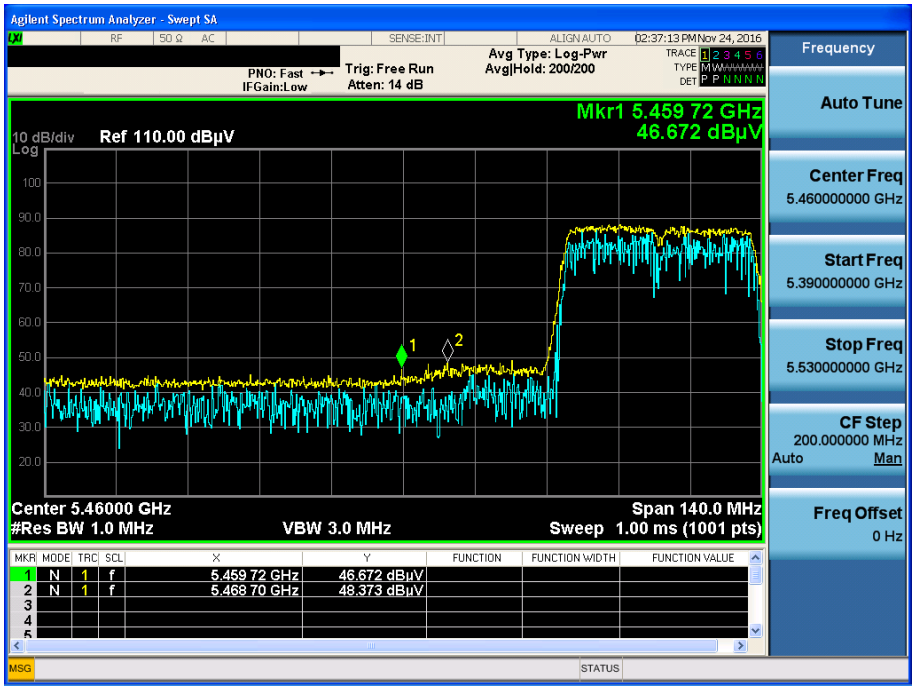
802.11ac(VHT40) & U-NII 2A & Ch.62 & X axis & Ver Detector Mode : AV



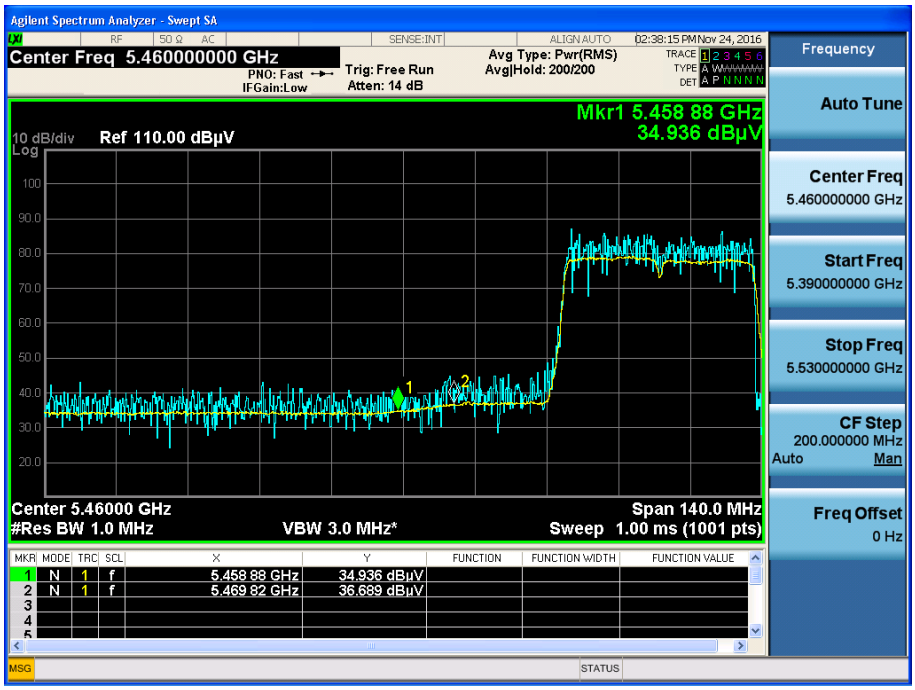
802.11ac(VHT40) & U-NII 2A & Ch.54 & Z axis & Ver Detector Mode : AV



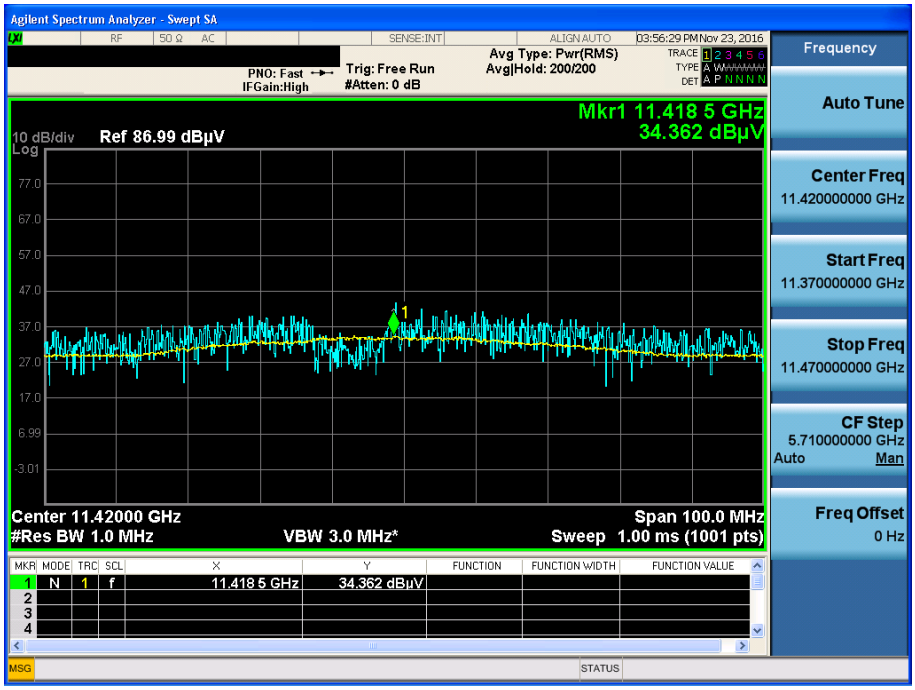
802.11ac(VHT40) & U-NII 2C & Ch.102 & X axis & Ver Detector Mode : PK



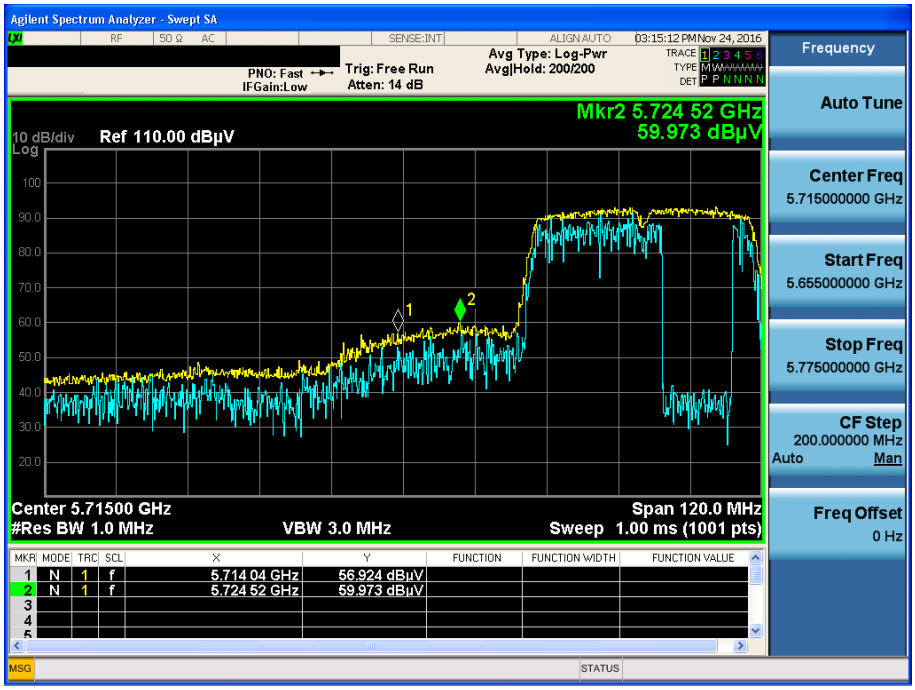
802.11ac(VHT40) & U-NII 2C & Ch.102 & X axis & Ver Detector Mode : AV



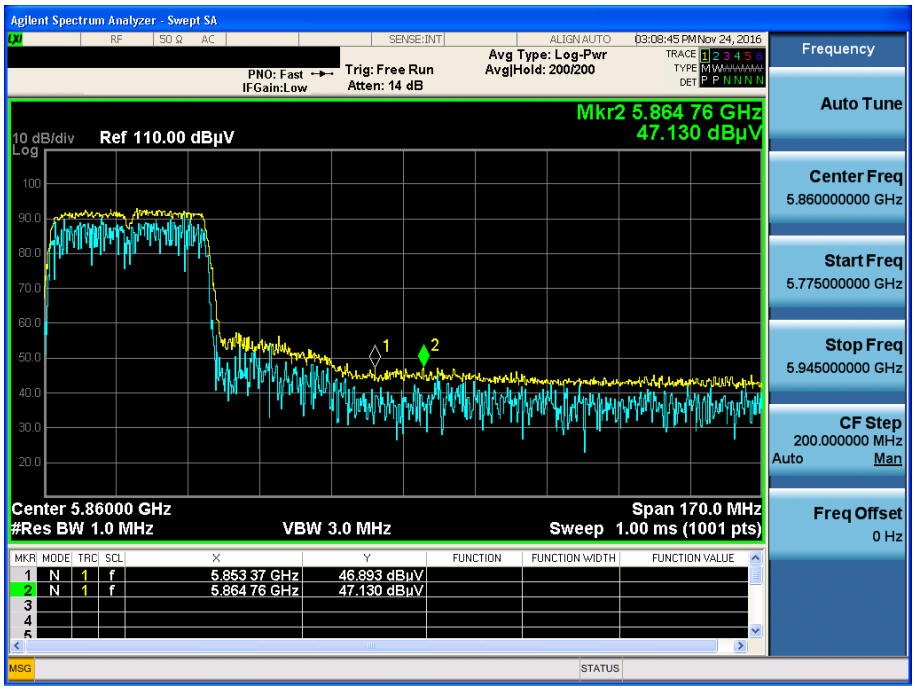
802.11ac(VHT40) & U-NII 2C & Ch.142 & Y axis & Hor Detector Mode : AV



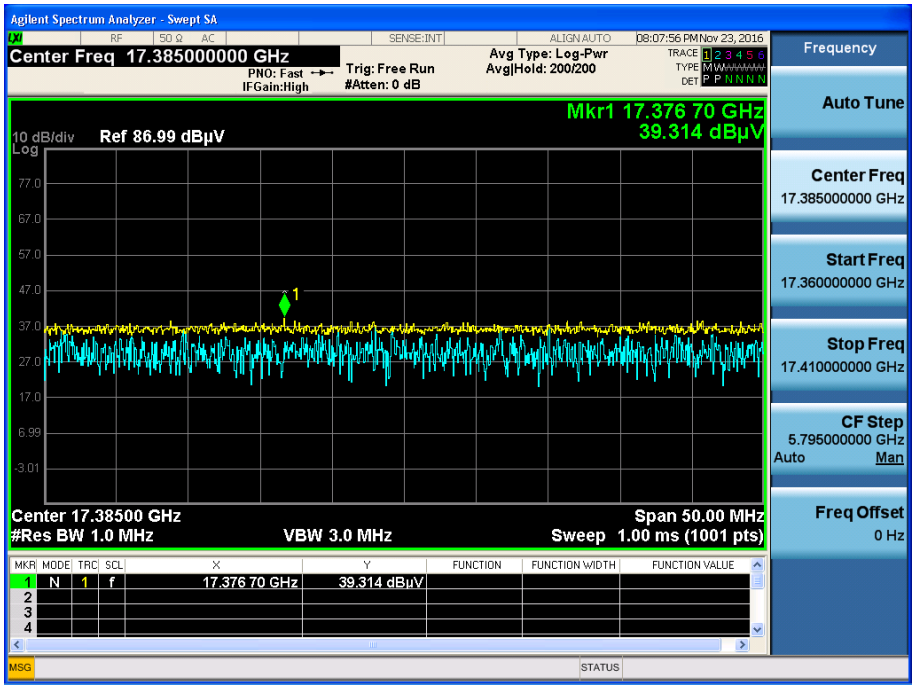
802.11ac(VHT40) & U-NII 3 & Ch.151 & X axis & Ver Detector Mode : PK



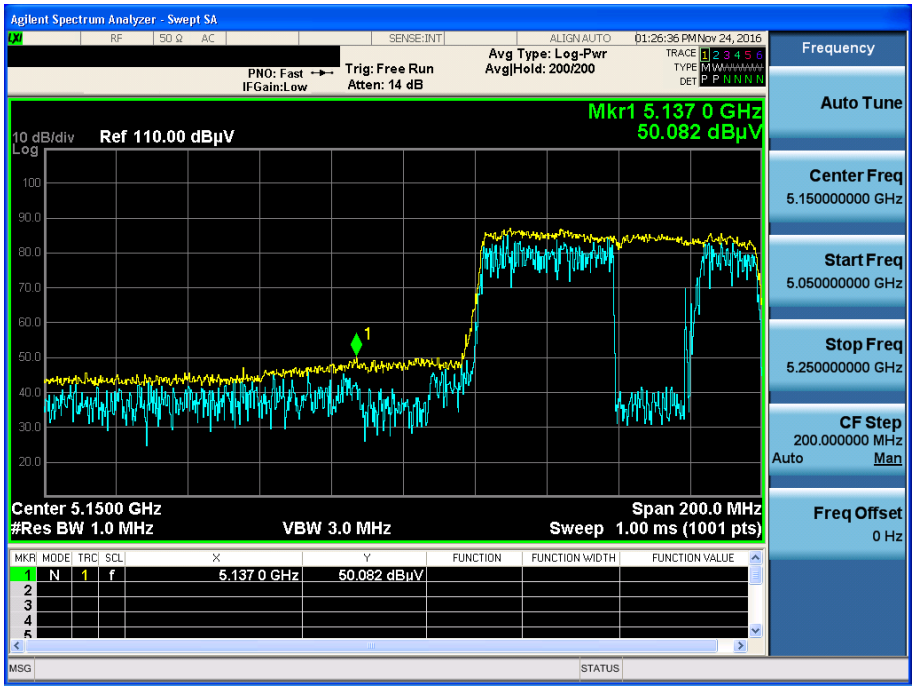
802.11ac(VHT40) & U-NII 3 & Ch.159 & X axis & Ver Detector Mode : PK



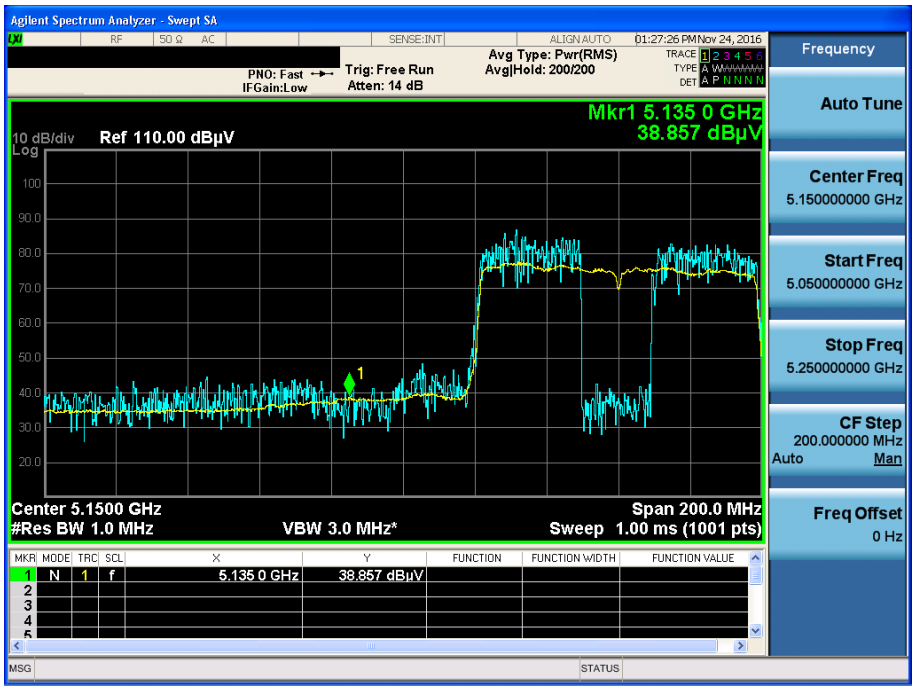
802.11ac(VHT40) & U-NII 3 & Ch.159 & Z axis & Ver Detector Mode : PK



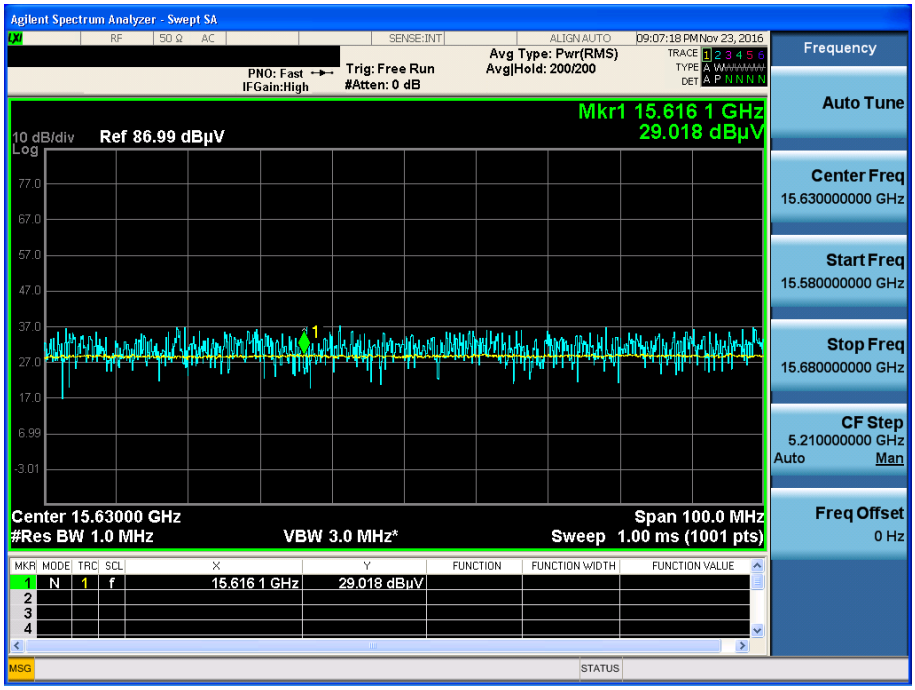
802.11ac(VHT80) & U-NII 1 & Ch.42 & X axis & Ver Detector Mode : PK



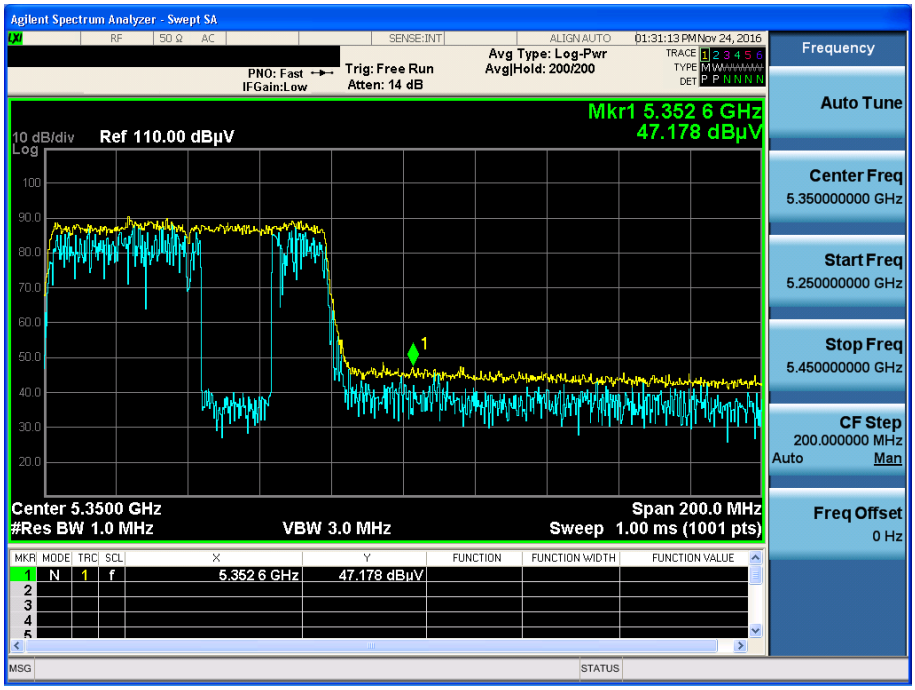
802.11ac(VHT80) & U-NII 1 & Ch.42 & X axis & Ver Detector Mode : AV



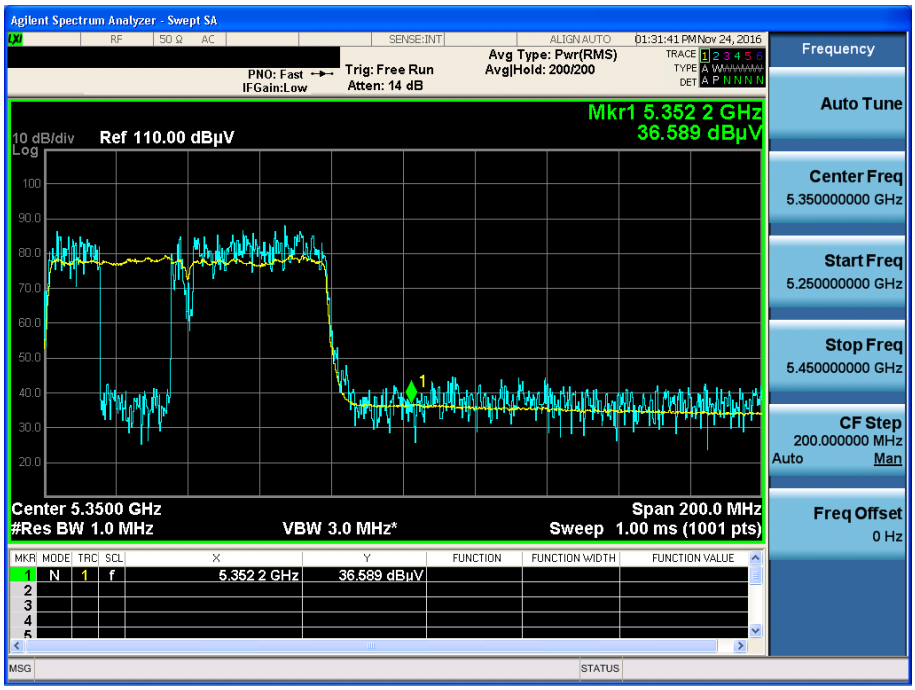
802.11ac(VHT80) & U-NII 1 & Ch.42 & Z axis & Ver Detector Mode : AV



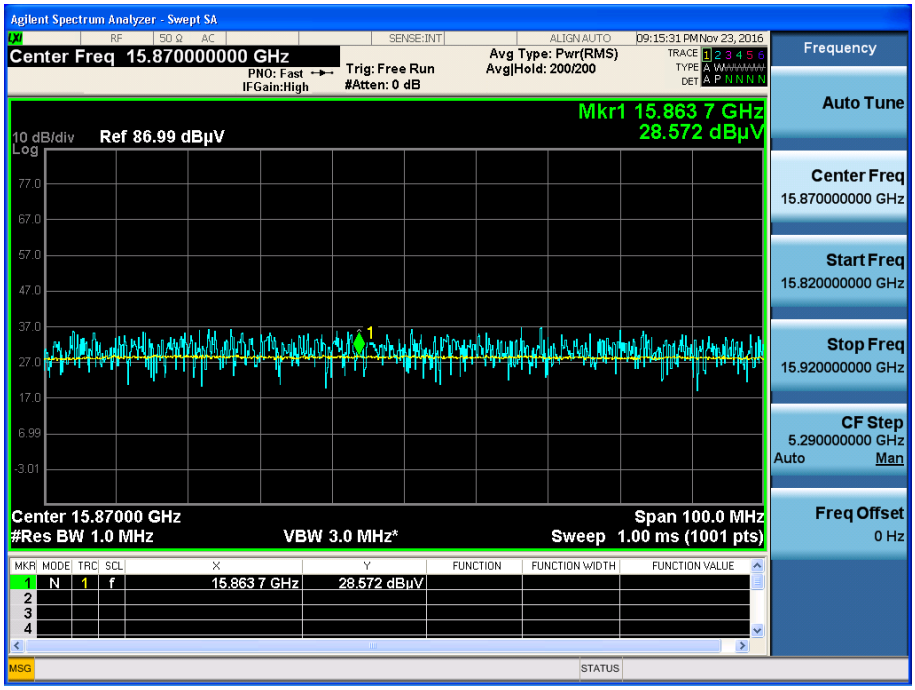
802.11ac(VHT80) & U-NII 2A & Ch.58 & X axis & Ver Detector Mode : PK



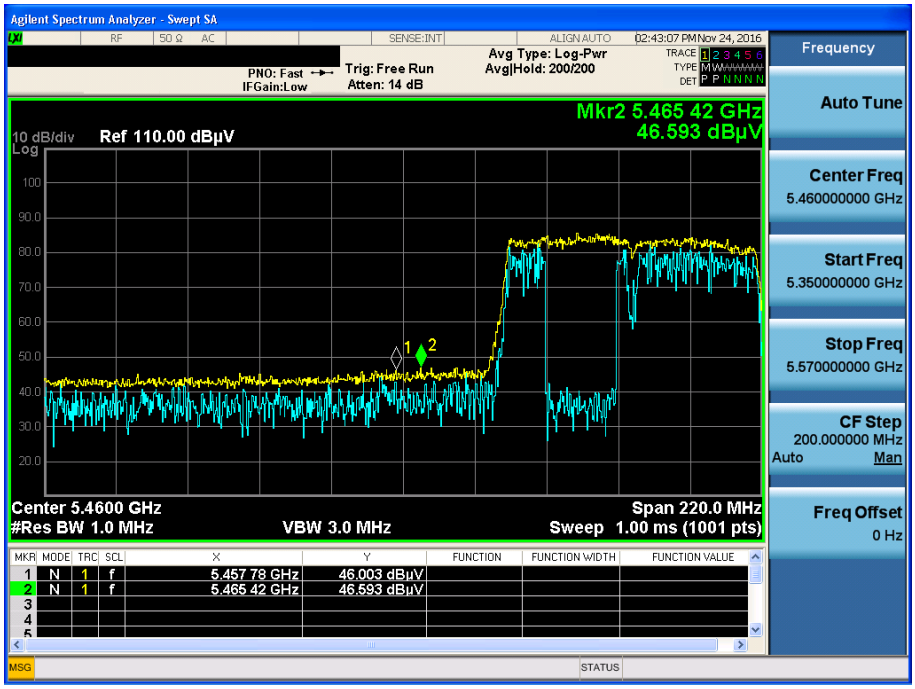
802.11ac(VHT80) & U-NII 2A & Ch.58 & X axis & Ver Detector Mode : AV



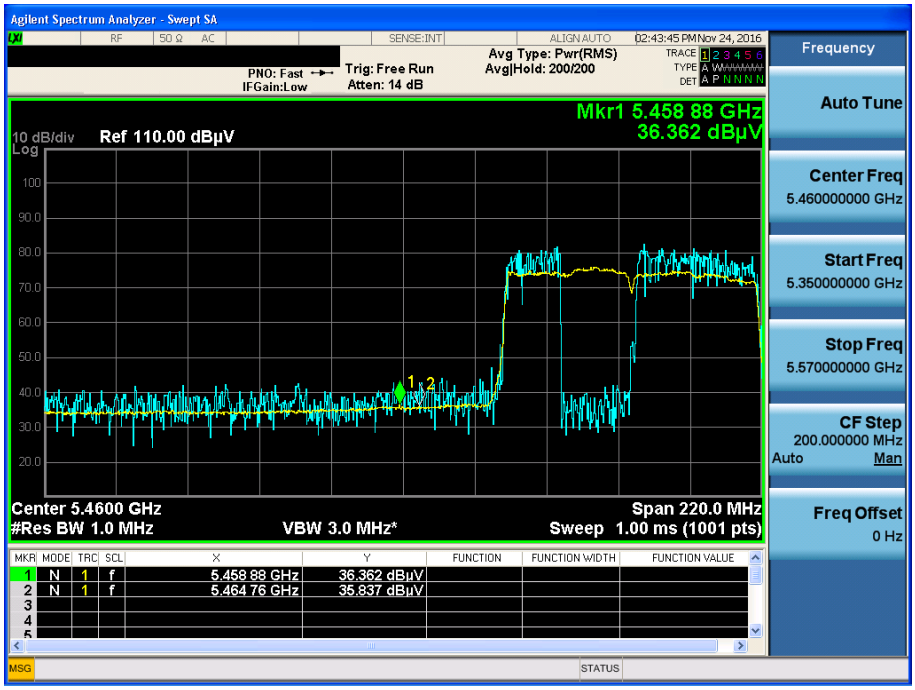
802.11ac(VHT80) & U-NII 2A & Ch.58 & Z axis & Ver Detector Mode : AV



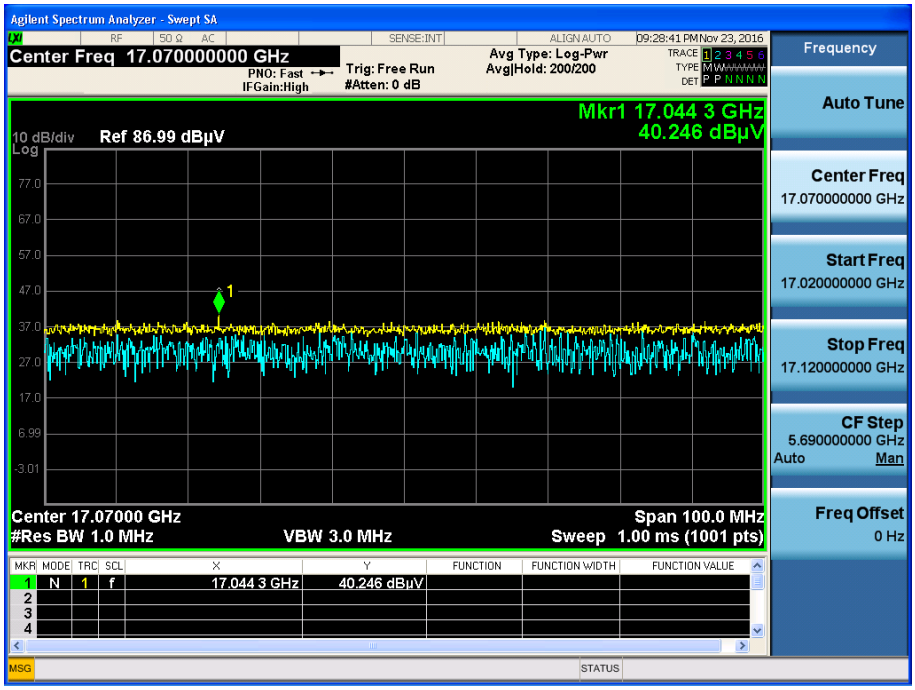
802.11ac(VHT80) & U-NII 2A & Ch.106 & X axis & Ver Detector Mode : PK



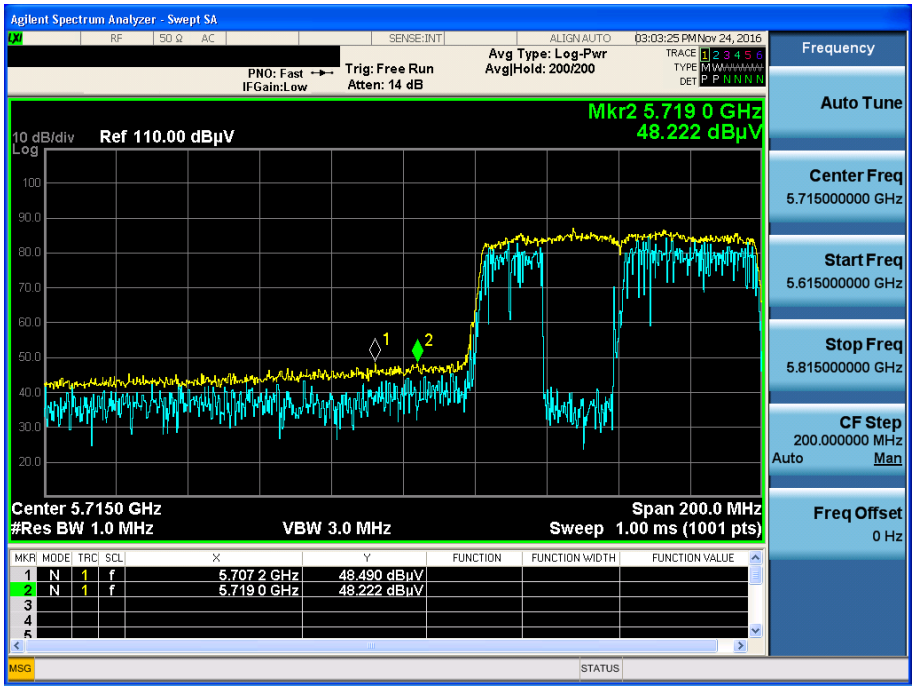
802.11ac(VHT80) & U-NII 2A & Ch.106 & X axis & Ver Detector Mode : AV



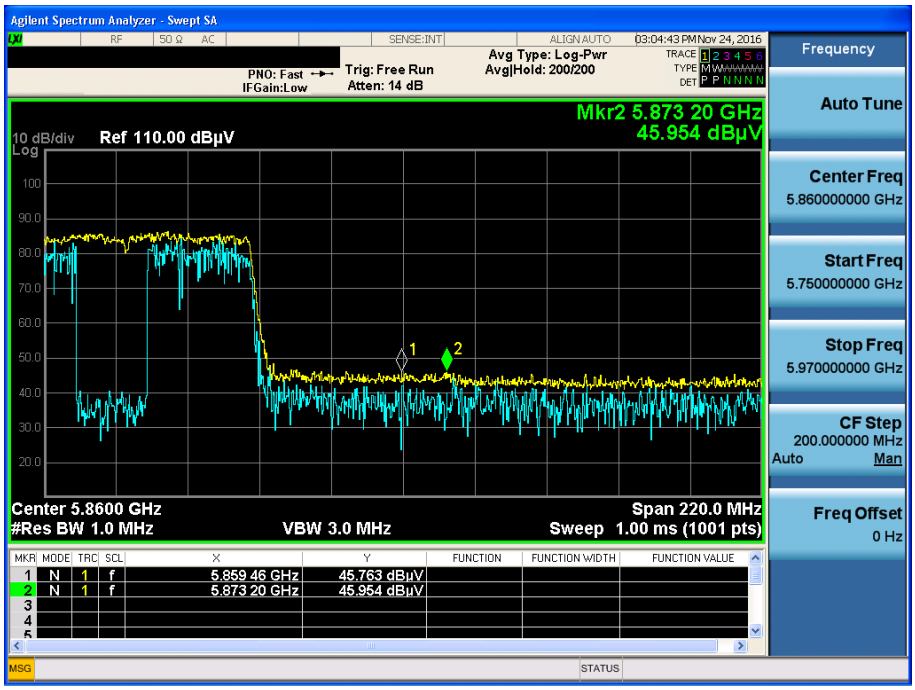
802.11ac(VHT80) & U-NII 2A & Ch.138 & Z axis & Ver Detector Mode : PK



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



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



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