FCC TEST REPORT

Test report No.:	EMC- FCC- R0252
FCC ID:	2AAKFWP300S
Type of equipment:	Wi-Fi Portable Phone
Model Name:	WP300S
Applicant:	Moimstone Co., Ltd.
Max.RF Output Power:	22.19 dBm
FCC Rule Part(s):	FCC Part 15 Subpart E 15.407
Frequency Range:	5 180 ㎒ ~ 5 240 ㎒, 5 260 ㎒ ~ 5 320 ㎒, 5 500 ㎒ ~ 5 700 ㎒, 5 745 ㎒ ~ 5 805 ㎒
Test result:	Complied

The above equipment was tested by EMC compliance Testing Laboratory for compliance with the requirements of FCC Rules and Regulations.
The results of testing in this report apply to the product/system which was tested only.
Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Date of receipt: 2015. 05. 18

Date of test: 2015. 06. 16 ~ 06. 18

Issued date: 2015. 06. 19

Tested by: YOO, YOUNG BIN

Approved by: SON, MIN GI

[Contents]

1. Client information

Applicant:	Moimstone Co., Ltd.
Address:	65, Heungan-daero 439 beon-gil, Dongan-gu, Anyang-si, Gyeonggi-do, KOREA
Telephone number:	+81-70-7791-3750
Facsimile number:	+81-31-426-9539
Contact person:	Yoo Deok Jjae / nunjoa@moimstone.com

Manufacturer:	Moimstone Co., Ltd.
Address:	65, Heungan-daero 439 beon-gil, Dongan-gu, Anyang-si, Gyeonggi-do, KOREA

2. Laboratory information

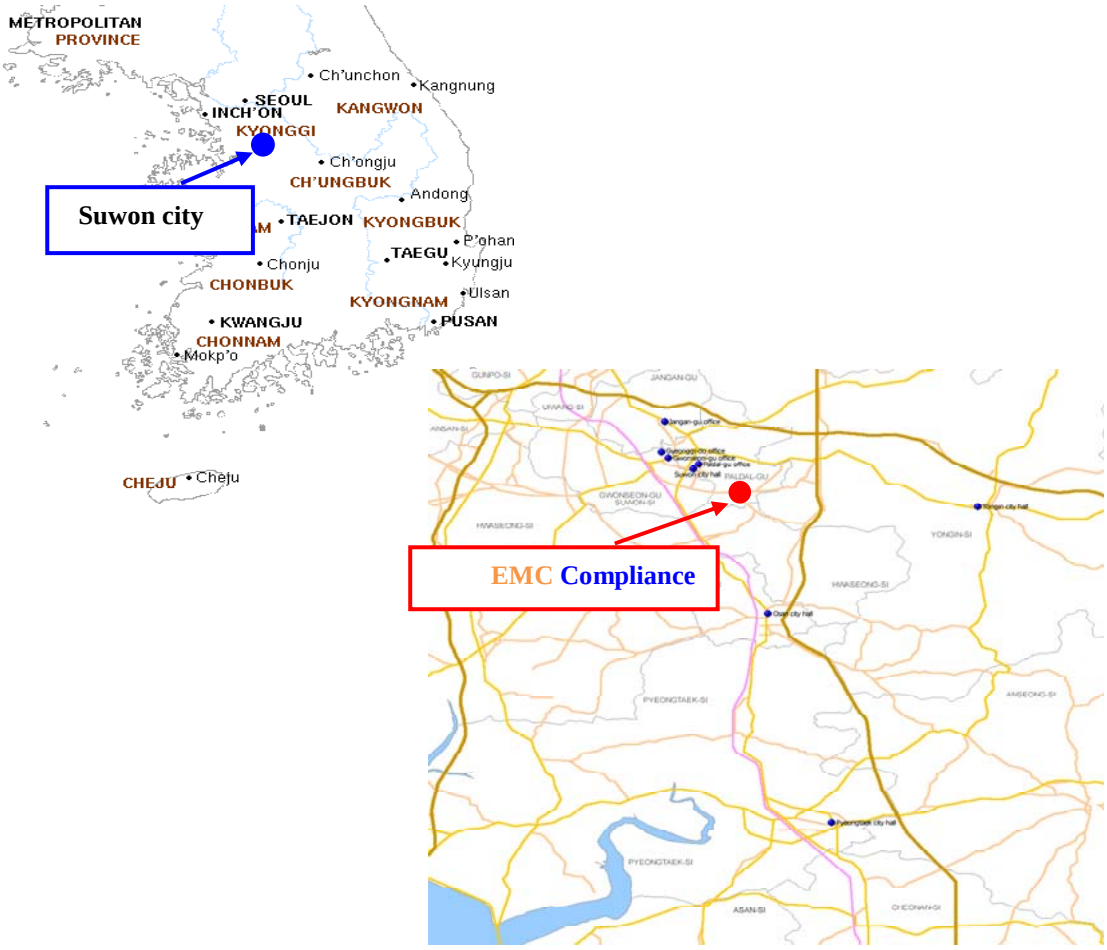
Address

EMC compliance Ltd.
480-5 Shin-dong, Yeongtong-gu, Suwon-city, Gyunggi-do, 443-390, Korea
Telephone Number: 82-31-336-9919 Facsimile Number: 82-505-299-8311

Certificate

KOLAS No.: 231
FCC Site Designation No: KR0040
FCC Site Registration No: 687132
VCCI Site Registration No.: R-3327, G-198, C-3706, T-1849
IC Site Registration No.:8035A-2

SITE MAP



3. Description of E.U.T.

3.1 Basic description

Applicant:	Moimstone Co., Ltd.
Address of Applicant	65, Heungan-daero 439 beon-gil, Dongan-gu, Anyang-si, Gyeonggi-do, KOREA
Manufacturer	Moimstone Co., Ltd.
Address of Manufacturer	65, Heungan-daero 439 beon-gil, Dongan-gu, Anyang-si, Gyeonggi-do, KOREA
Type of equipment	Wi-Fi Portable Phone
Basic Model	WP300S
Serial number	N/A

3.2 General description

Frequency Range	2 412 ㎒ ~ 2 462 ㎒ (802.11b/g/n_HT20) 5 180 ㎒ ~ 5 320 ㎒ (802.11a/n _HT20) 5 260 ㎒ ~ 5 240 ㎒ (802.11a/n _HT20) 5 500 ㎒ ~ 5 700 ㎒ (802.11a/n _HT20) 5 745 ㎒ ~ 5 805 ㎒ (802.11a/n _HT20)
Type of Modulation	CCK(802.11b), OFDM (802.11b/g/a/n_HT20)
Number of Channels	2.0 ㎓: 13 ch (802.11b/g/n_HT20) 5.0 ㎓: 5 150 ㎒ Band: 4 ch (802.11a/n_HT20) 5 250 ㎒ Band: 4 ch (802.11a/n_HT20) 5 470 ㎒ Band: 8 ch (802.11a/n_HT20) 5 725 ㎒ Band: 5 ch (802.11a/n_HT20)
Type of Antenna	PCB Antenna
Antenna Gain	2 ㎓: 1.98 dBi 5 ㎓: 5 150 ㎒ Band: 1.94 dBi, 5 250 ㎒ Band: 1.96 dBi 5 470 ㎒ Band: 1.84 dBi, 5 725 ㎒ Band: 2.08 dBi
Transmit Power	22.19 dBm
Power supply	DC 3.7 V *
Product SW/HW Version	1.0
Radio SW/HW Version	1.0
Test SW Version	TeraTerm
RF power setting in TEST	Band 1 : 19, Band 2: 18, Band 3: 19, Band 4: 20

* Declared by the applicant.

3.3 Available channel list and frequency

* 802.11a/n_HT20

	Frequency			
Low frequency	5 180 ㎒	5 260 ㎒	5 500 ㎒	5 745 ㎒
Middle frequency	5 200 ㎒	5 280 ㎒	5 580 ㎒	5 785 ㎒
High frequency	5 240 ㎒	5 320 ㎒	5 700 ㎒	5 825 ㎒

3.4 Test Voltage

Mode	Voltage
Norminal voltage	DC 3.7 V

3.5 Duty Factor

	Duty cycle	Duty cycle factor
802.11a	37.33	4.28
802.11n HT20	37.75	4.47

* Duty cycle factor=10log(1/Duty cycle)

4. Summary of test results

4.1 Standards & results

FCC Rule	IC Rule (RSS-GEN)	Parameter	Report Section	Test Result
15.203 15.407(a)(1)(2)(3)	-	Antenna Requirement	5.1	C
15.403(i),15.407(e)	RSS-210, A6.6	Bandwidth Measurement	5.2	C
15.407(a)(1)(2)	RSS-210, A9.2	Maximum Conducted Output Power	5.3	C
15.407(a)(1)(2)(5)	-	Peak Power Spectral Density	5.4	C
15.205(a), 15.209(a), 15.407(b)(1), 15.407(b)(2), 15.407(b)(3)	RSS-210, A9.2 RSS-GEN, 8.9 RSS-GEN, 8.10	Spurious Emission, Band Edge and Restricted bands	5.6	C
15.407(g)	RSS-GEN, 6.11	Frequency Stability	5.7	C
15.207(a)	RSS-GEN, 8.8	Conducted Emissions	5.8	C
15.407(h)	RSS-210, A9.3	Dynamic Freqyency Selection	5.9	C

Note: C = complies
NC = Not complies
NT = Not tested
NA = Not Applicable

* The general test methods used to test this device is ANSI C63.10:2013

4.2 Uncertainty

Measurement Item	Expanded Uncertainty U = KUc (K = 2)	
Conducted RF power	± 1.30 dB	
Conducted Spurious Emissions	± 1.52 dB	
Radiated Spurious Emissions	30 ㎒ ~ 300 ㎒:	+ 4.94 dB, - 5.06 dB
		+ 4.93 dB, - 5.05 dB
	300 ㎒ ~ 1 000 ㎒:	+ 4.97 dB, - 5.08 dB
		+ 4.84 dB, - 4.96 dB
	1 ㎓ ~ 40 ㎓:	+ 6.03 dB, - 6.05 dB
Conducted Emissions	9 ㎑ ~ 150 ㎑:	± 3.75 dB
	150 ㎑ ~ 30 ㎒:	± 3.36 dB

5. Test results

5.1 Antenna Requirement

5.1.1 Regulation

According to §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall 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 manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.
And according to §15.407(a)(1)(2)(3), If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

5.1.2 Result

-Complied

The transmitter has an integral PCB antenna.
The total directional peak gain of the antenna does not exceed 6.0 dBi

	5 150 ㎒ Band	5 250 ㎒ Band	5 470 ㎒ Band	5 725 ㎒ Band
ANT Gain	1.94 dBi	1.96 dBi	1.84 dBi	2.08 dBi

5.2 Maximum Conducted Output Power

5.2.1 Regulation

According to §15.407(a) (1) (iv) For mobile and portable client devices in the 5.15-5.25 ㎓ band, the maximum conducted output power over the frequency band of operation shall not exceed 250 ㎽ provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. 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.

According to §15.407(a) (2) For the 5.25-5.35 ㎓ and 5.47-5.725 ㎓ bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 ㎽ or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. 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 dBthat the directional gain of the antenna exceeds 6 dBi.

According to §15.407(a) (3) For the band 5.725-5.85 ㎓, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-㎑ band. 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.

5.2.2 Measurement Procedure

These test measurement settings are specified in section C of 789033 D02 General UNII Test Procedures.

5.2.2.1 Method PM (Measurement using an RF average power meter):

(i) Measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the conditions listed below are satisfied.

- The EUT is configured to transmit continuously or to transmit with a constant duty cycle.
- At all times when the EUT is transmitting, it must be transmitting at its maximum power control level.
- The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.

(ii) If the transmitter does not transmit continuously, measure the duty cycle, x, of the transmitter output signal as described in section II.B.

(iii) Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.

(iv) Adjust the measurement in dBm by adding 10 log(1/x) where x is the duty cycle (e.g., 10 log(1/0.25) if the duty cycle is 25 percent).

5.2.4 Test Result

-Complied

*802.11a

5 150 Band

Frequency [㎒]	Average Power (dBm)	Duty Factor	Result	Limit (dBm)	Margin (dBm)
5 180	17.14	4.28	21.42	24.00	2.58
5 200	17.14	4.28	21.42	24.00	2.58
5 240	17.23	4.28	21.51	24.00	2.49

5 250 Band

Frequency [㎒]	Average Power (dBm)	Duty Factor	Result	Limit (dBm)	Margin (dBm)
5 260	17.30	4.28	21.58	24.00	2.42
5 280	17.76	4.28	22.04	24.00	1.96
5 320	17.76	4.28	22.04	24.00	1.96

5 470 Band

Frequency [㎒]	Average Power (dBm)	Duty Factor	Result	Limit (dBm)	Margin (dBm)
5 500	17.32	4.28	21.60	24.00	2.40
5 580	17.19	4.28	21.47	24.00	2.53
5 700	17.18	4.28	21.46	24.00	2.54

5 725 Band

Frequency [㎒]	Average Power (dBm)	Duty Factor	Result	Limit (dBm)	Margin (dBm)
5 745	17.04	4.28	21.32	30.00	8.68
5 785	17.13	4.28	21.40	30.00	8.60
5 805	17.20	4.28	21.48	30.00	8.52

*802.11n HT20

5 150 Band

Frequency [MHz]	Average Power (dBm)	Duty Factor	Result	Limit (dBm)	Margin (dBm)
5 180	17.05	4.47	21.52	24.00	2.48
5 200	17.08	4.47	21.55	24.00	2.45
5 240	17.18	4.47	21.65	24.00	2.35

5 250 Band

Frequency [MHz]	Average Power (dBm)	Duty Factor	Result	Limit (dBm)	Margin (dBm)
5 260	17.27	4.47	21.73	24.00	2.27
5 280	17.72	4.47	22.19	24.00	1.81
5 320	17.73	4.47	22.19	24.00	1.81

5 470 Band

Frequency [MHz]	Average Power (dBm)	Duty Factor	Result	Limit (dBm)	Margin (dBm)
5 500	17.32	4.47	21.79	24.00	2.21
5 580	17.20	4.47	21.67	24.00	2.33
5 700	17.19	4.47	21.66	24.00	2.34

5 725 Band

Frequency [MHz]	Average Power (dBm)	Duty Factor	Result	Limit (dBm)	Margin (dBm)
5 745	17.04	4.47	21.50	30.00	8.50
5 785	17.05	4.47	21.52	30.00	8.48
5 805	17.07	4.47	21.54	30.00	8.46

-NOTE:

1. Duty Factor : refer to 3.5
2. Result = Total power calculation + Duty Factor

5.3 Bandwidth Measurement

5.3.1 Regulation

According to §15.403,(i) Emission bandwidth. For purposes of this subpart the emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum level of the modulated carrier. Determination of the emissions bandwidth is based on the use of measurement instrumentation employing a peak detector function with an instrument resolution bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement.

According to §15.407,(e) Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

5.3.2 Measurement Procedure

1.Emission Bandwidth (EBW)

a)Set RBW = approximately 1% of the emission bandwidth.
b)Set the VBW > RBW.
c)Detector = Peak.
d)Trace mode = max hold.
e)Measure the maximum width of the emission that is 26 dB down from the maximum of theemission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeatmeasurement as needed until the RBW/EBW ratio is approximately 1%.

2.Minimum Emission Bandwidth for the band 5.725 - 5.85 GHz

Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 kHz for theband 5.715-5.85 GHz. The following procedure shall be used for measuring this bandwidth:

a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 3 × RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associatedwith the two outermost amplitude points (upper and lower frequencies) that are attenuated by6 dB relative to the maximum level measured in the fundamental emission.

Note: The automatic bandwidth measurement capability of a spectrum analyzer or EMI receiver may be employed if it implements the functionality described above.

5.3.3 Test Result

-Complied

*802.11a

5 150 Band

Frequency	26 dB Bandwidth	OBW
5 180	32.67	16.93
5 200	32.76	16.95
5 240	32.76	17.03

5 250 Band

Frequency	26 dB Bandwidth	OBW
5 260	33.02	16.94
5 300	34.23	17.10
5 320	34.23	16.91

5 470 Band

Frequency	26 dB Bandwidth	OBW
5 500	33.11	16.95
5 580	34.41	16.95
5 700	28.25	16.73

5 725 Band

Frequency	6 dB Bandwidth	OBW
5 745	16.64	16.76
5 785	16.73	16.75
5 805	16.73	16.80

*802.11n HT20

5 150 Band

Frequency	26 dB Bandwidth	OBW
5 180	33.97	18.13
5 200	34.84	18.06
5 240	33.97	18.07

5 250 Band

Frequency	26 dB Bandwidth	OBW
5 260	34.67	18.33
5 300	35.53	18.36
5 320	34.58	18.19

5 470 Band

Frequency	26 dB Bandwidth	OBW
5 500	34.06	18.20
5 580	36.05	18.09
5 700	29.12	17.92

5 725 Band

Frequency	6 dB Bandwidth	OBW
5 745	17.85	17.91
5 785	17.85	17.91
5 805	17.85	17.92

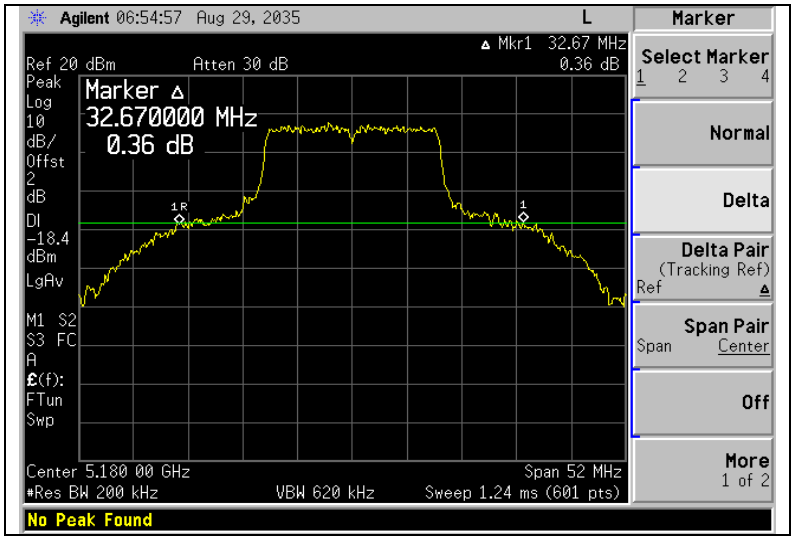
5.3.4 Test Plot

Figure 1. Plot of Bandwidth Measurement

* 802.11a_5 150 Band (26 dB Bandwidth)

-5 180 ㎒

EBW



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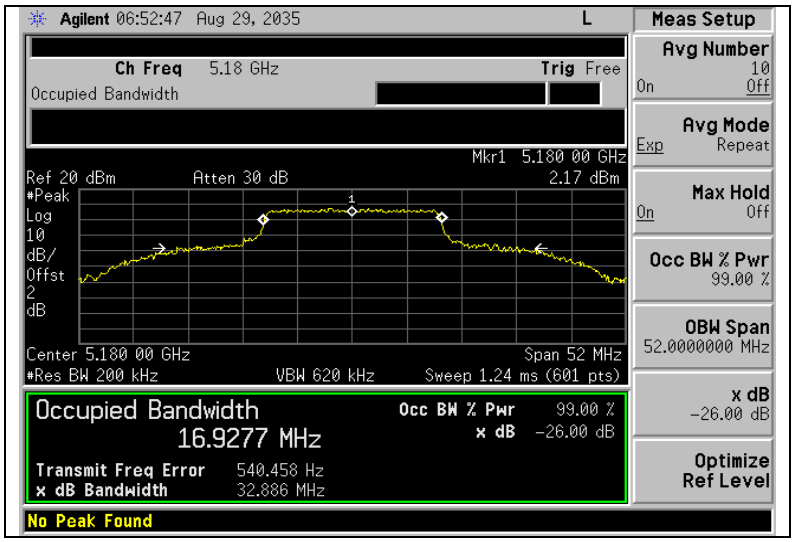
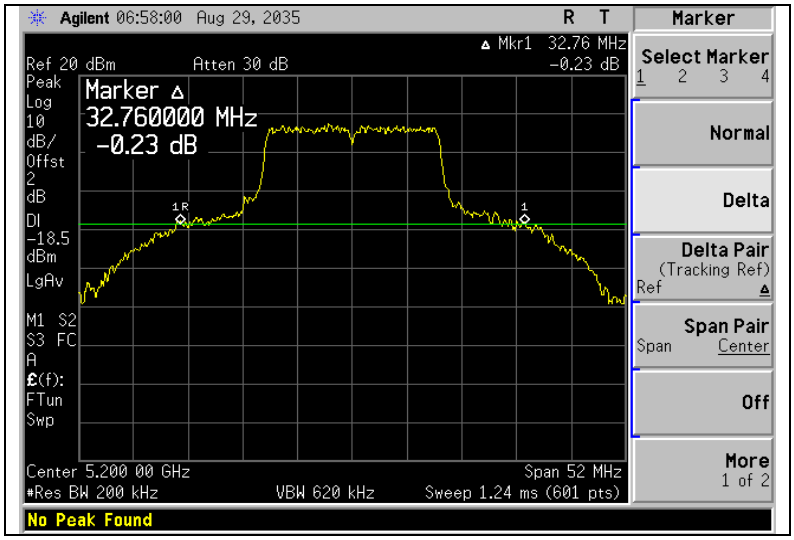


-5 200 ㎒

EBW



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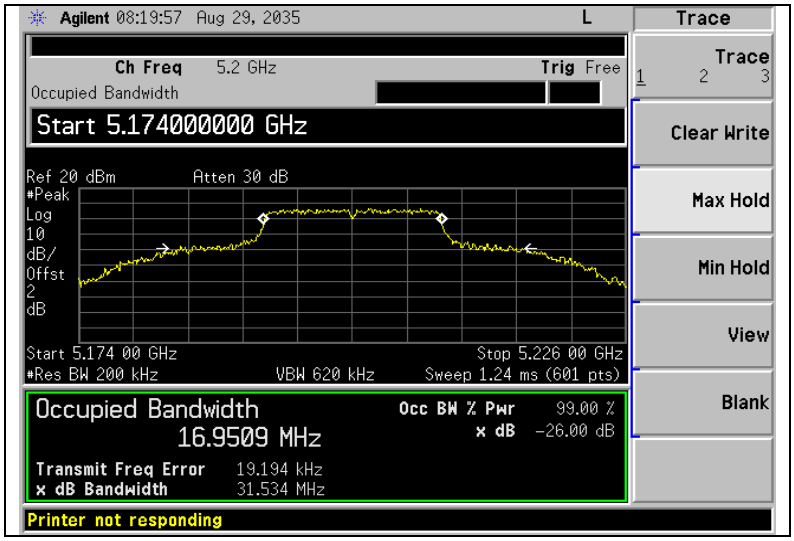
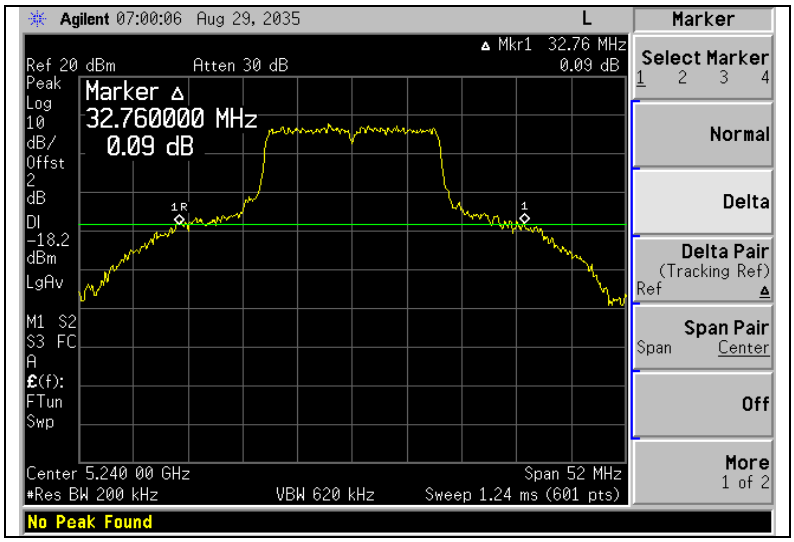


-5 240 ㎒

EBW



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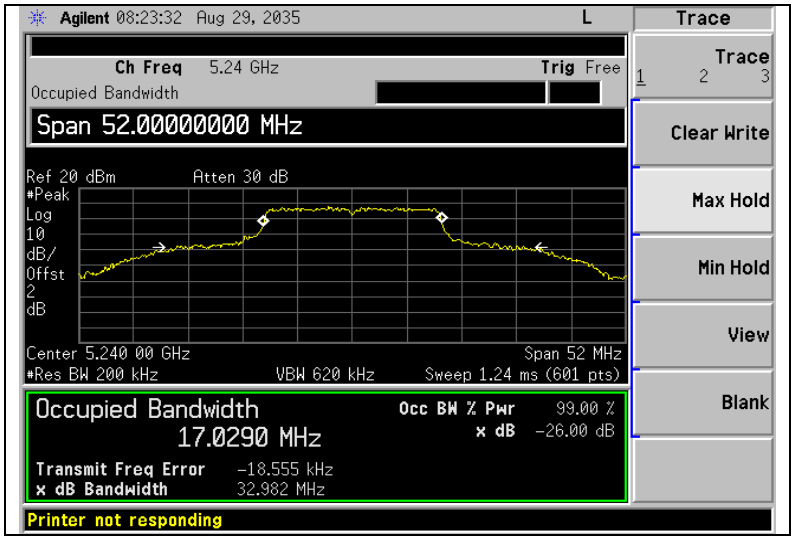
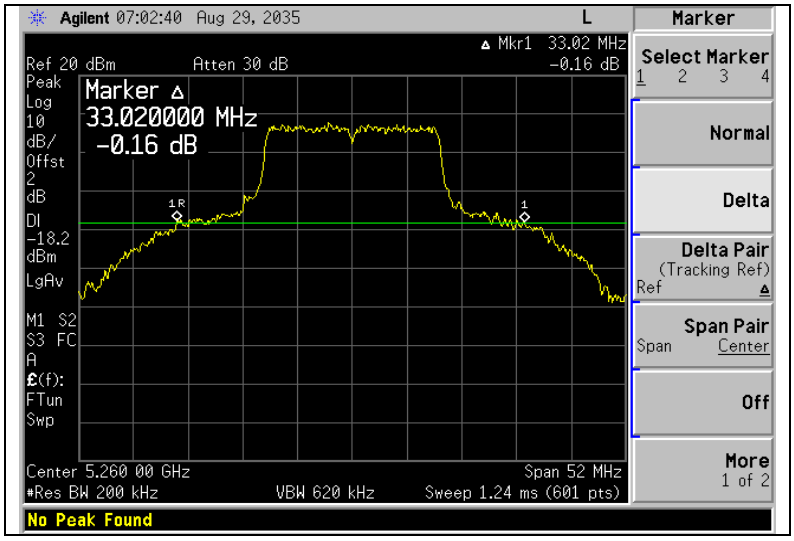


* 802.11a_5 250 Band (26 dB Bandwidth)

-5 260 ㎒

EBW



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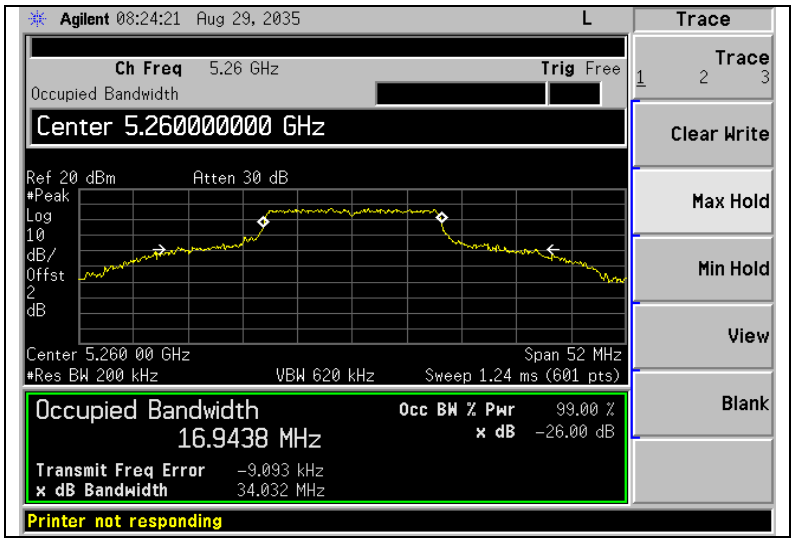

-5 300 ㎒

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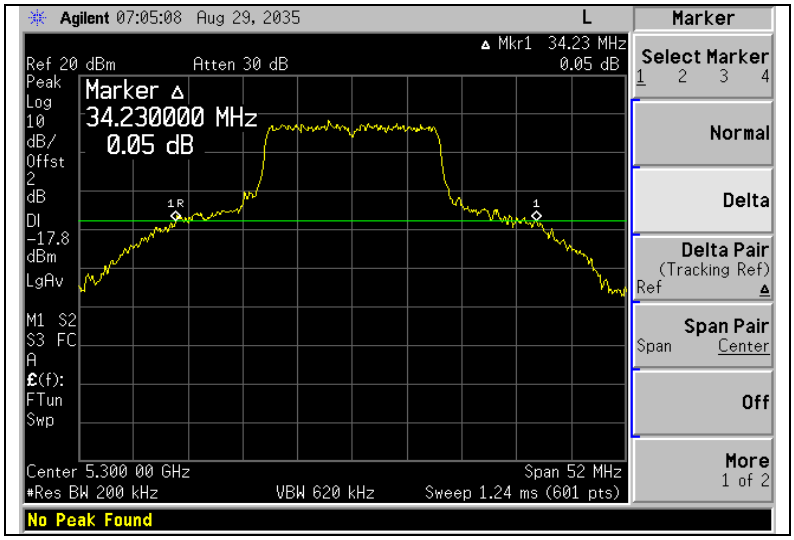

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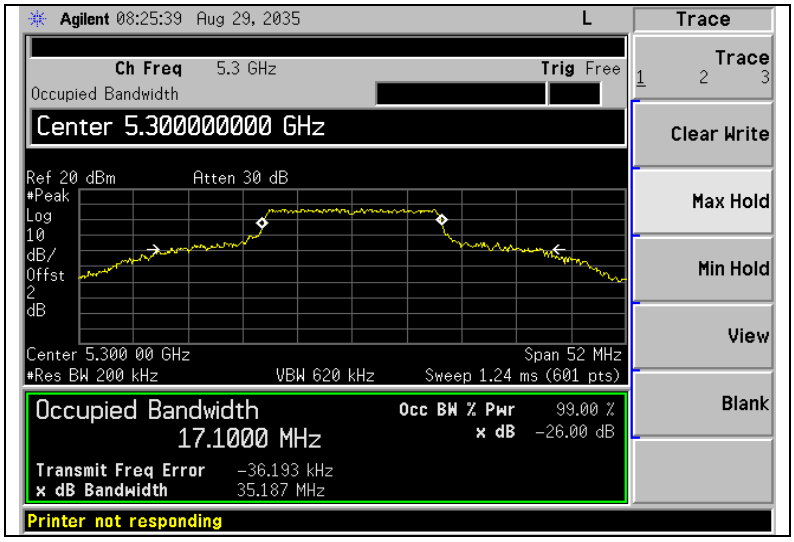

-5 320 ㎒

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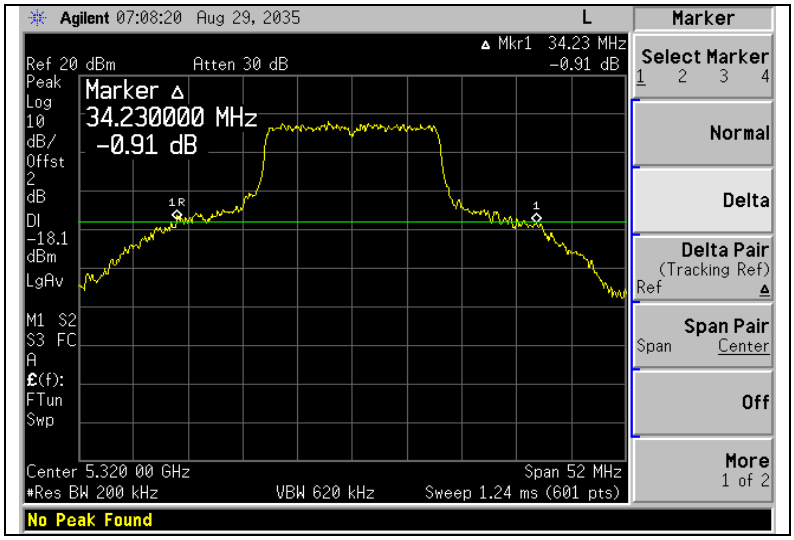

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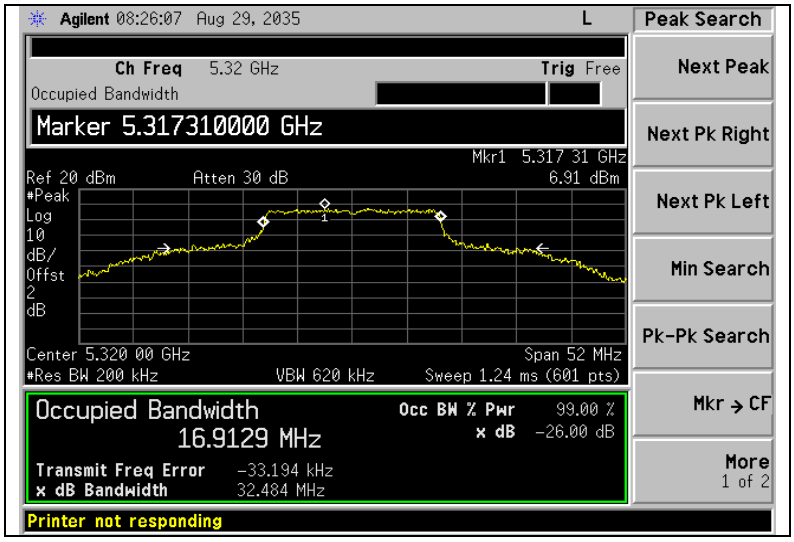
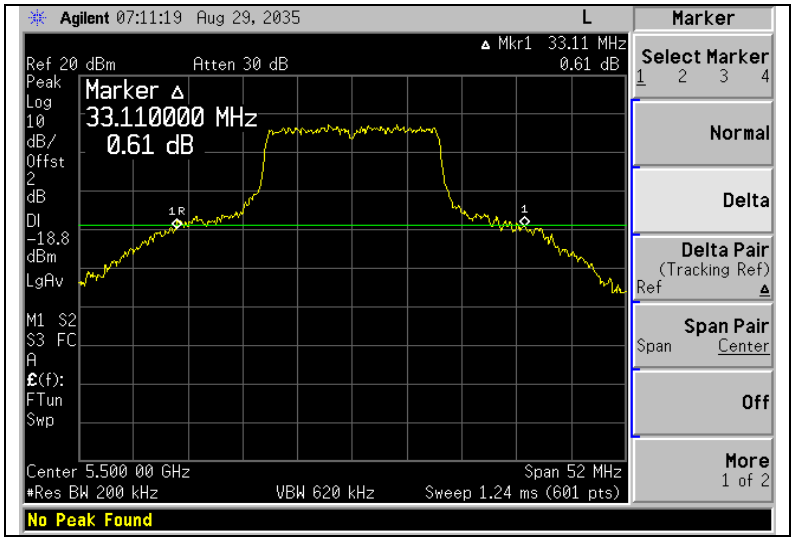


* 802.11a _5 470 Band (26 dB Bandwidth)

-5 500 ㎒

EBW



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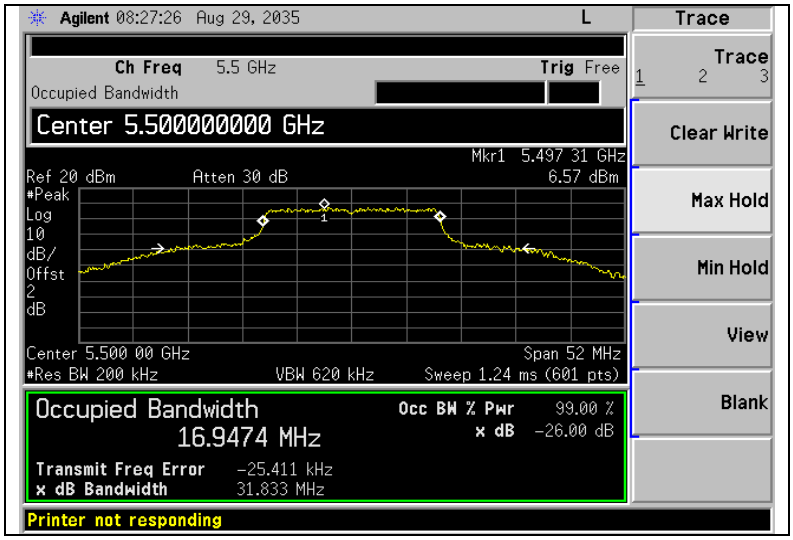

-5 580 ㎒

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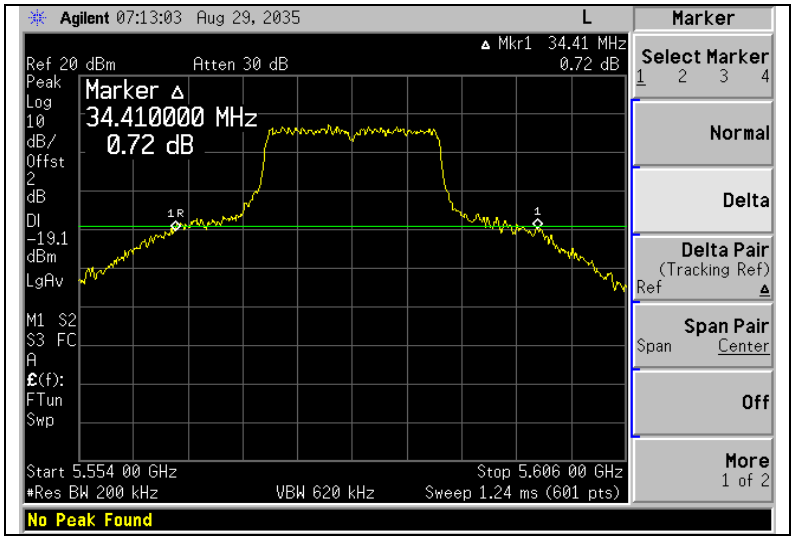

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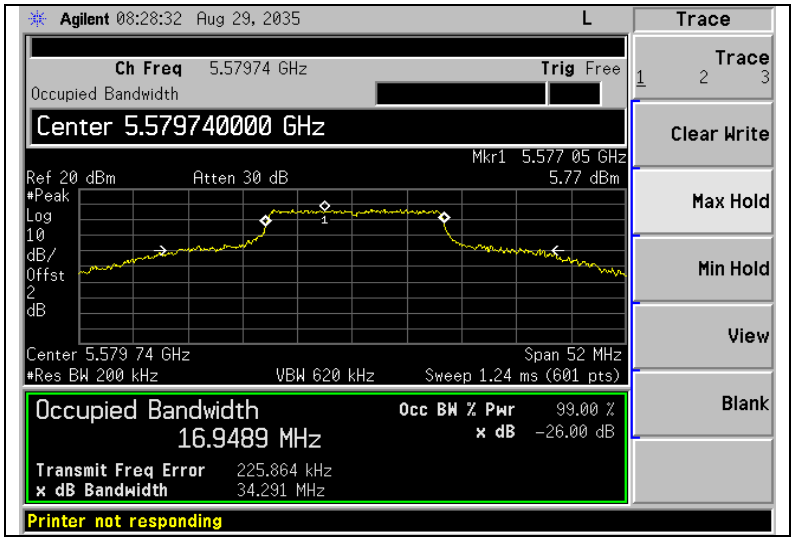
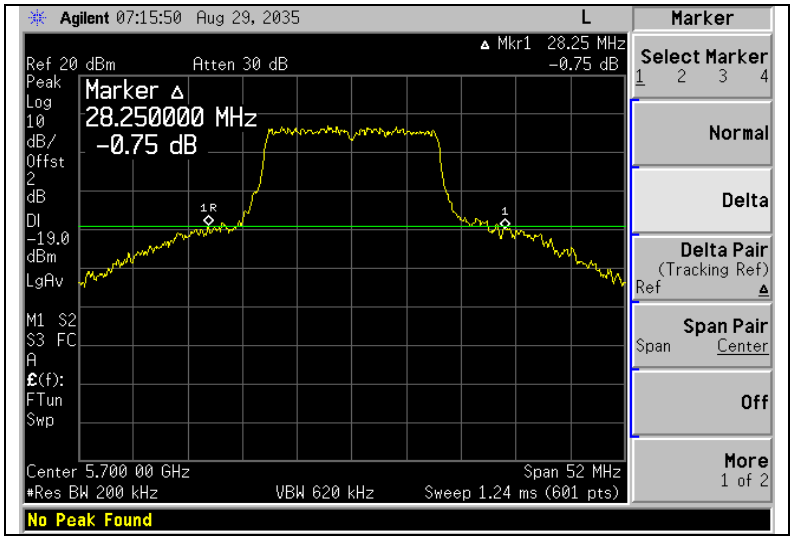


-5 700 ㎒

EBW



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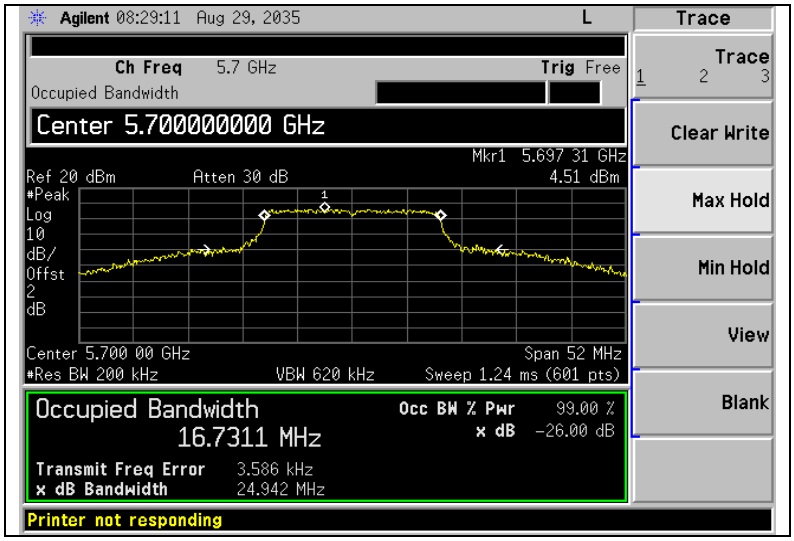
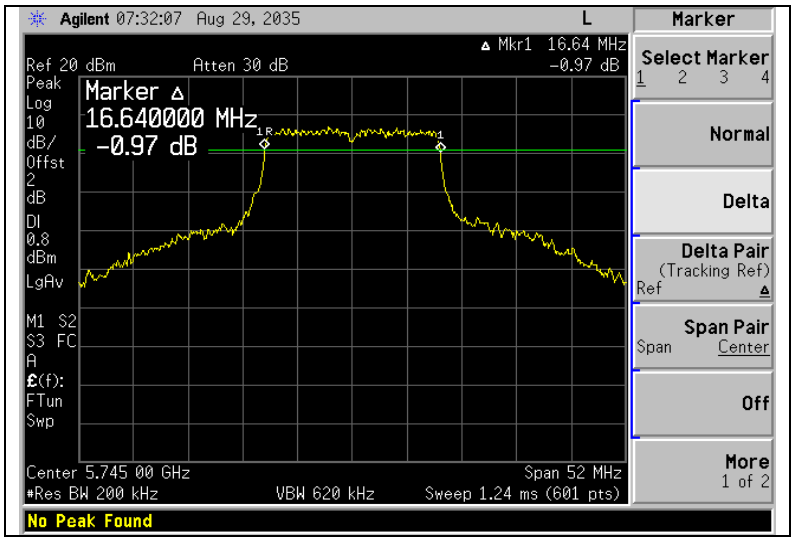


* 802.11a_5 725 Band (6 dB Bandwidth)

- 5 745 ㎒

6 dB Bandwidth



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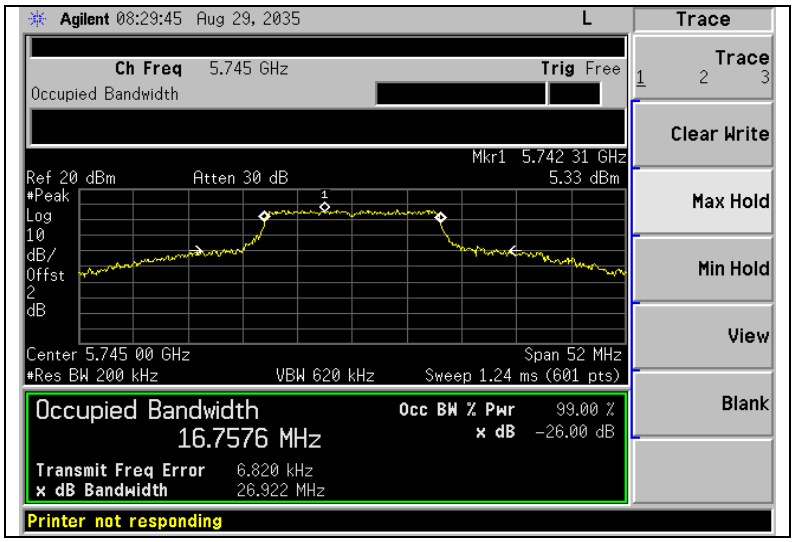
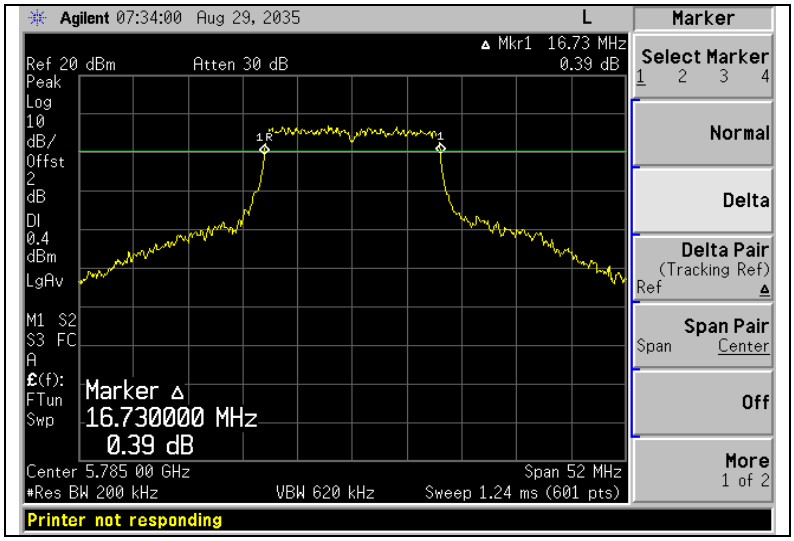
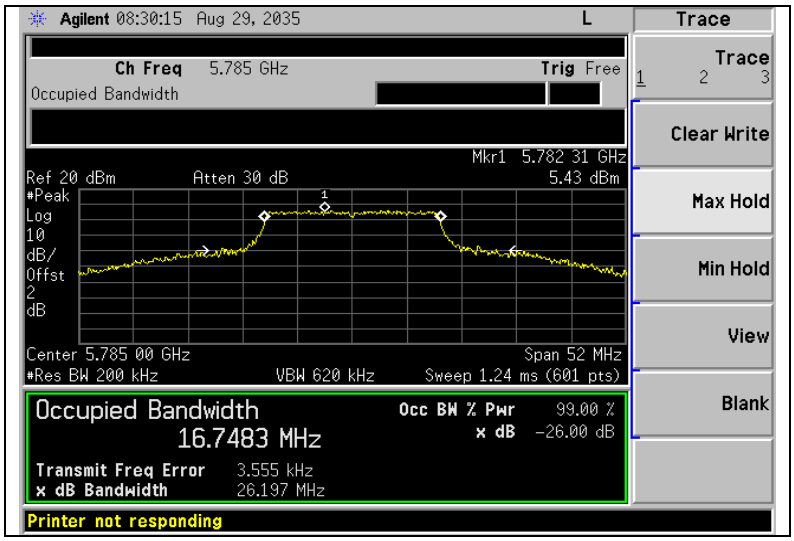


-5 785 ㎒

6 ㏈ Bandwidth

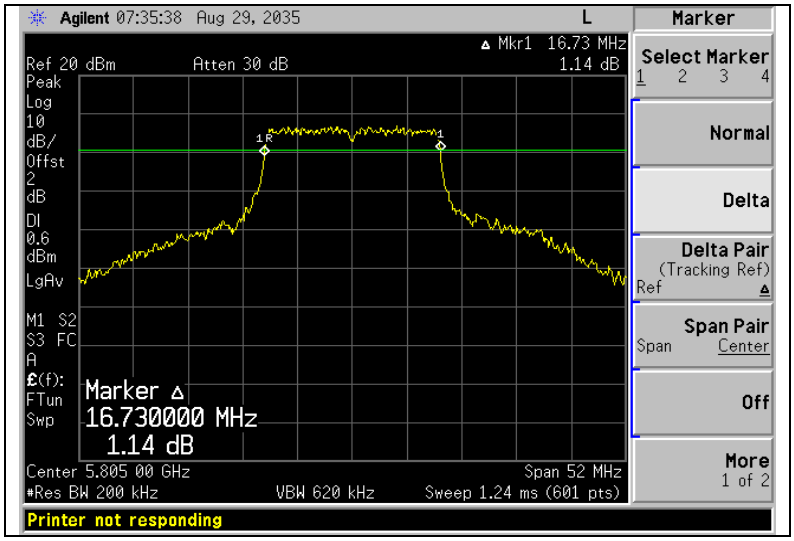


OBW

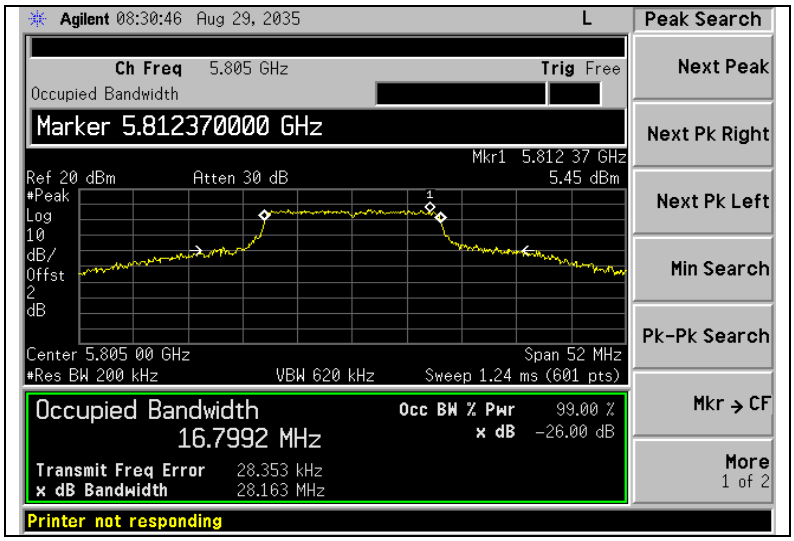


-5 805 ㎒

6 ㏈ Bandwidth



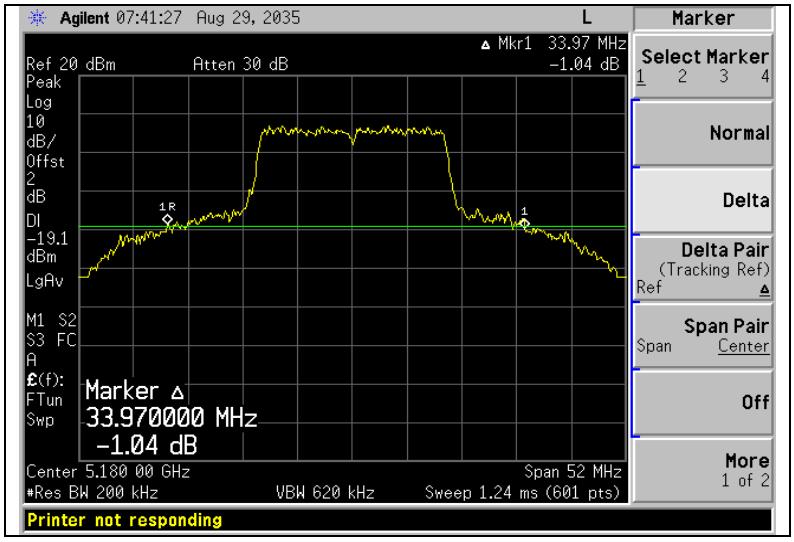
OBW



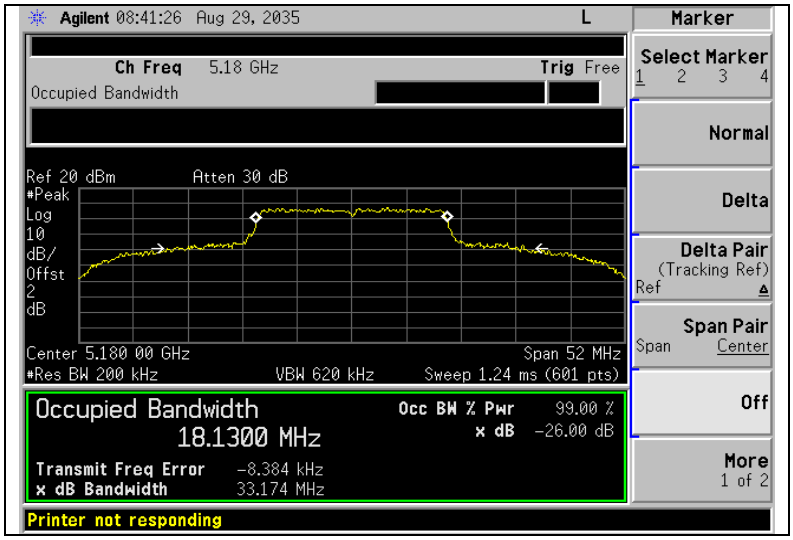
* 802.11n HT20_5 150 Band (26 dB Bandwidth)

-5 180 ㎒

EBW

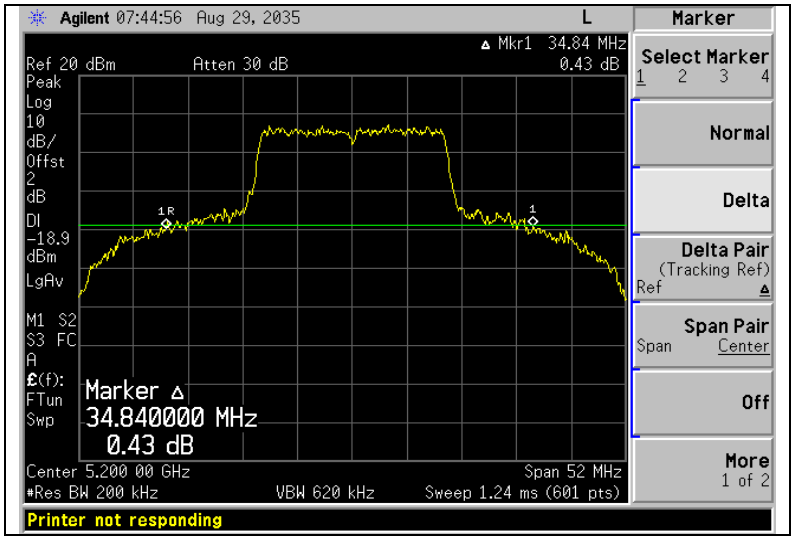


OBW

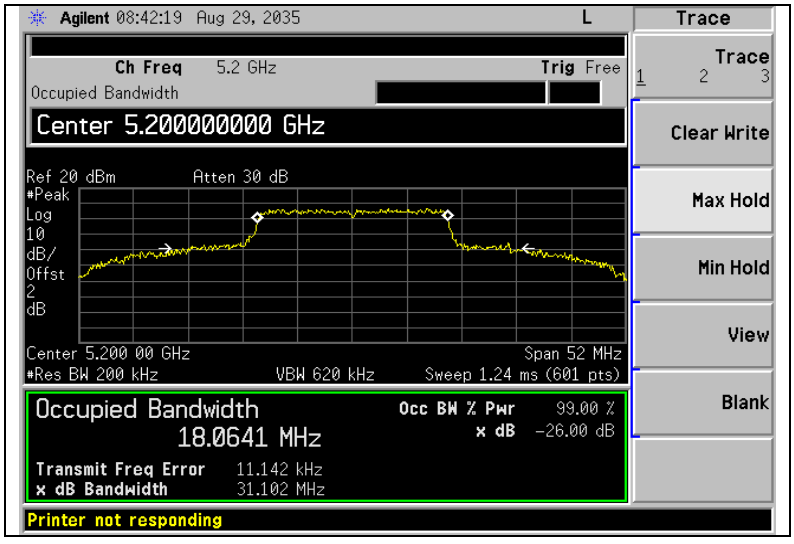


-5 200 ㎒

EBW

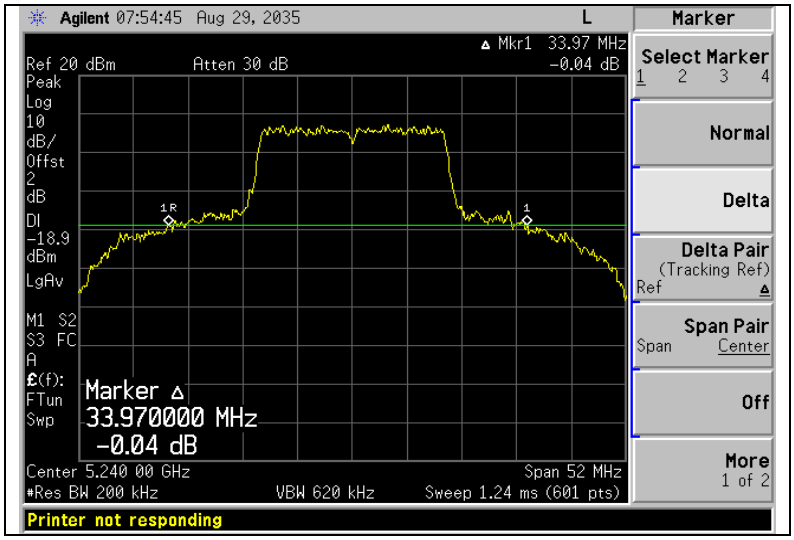


OBW

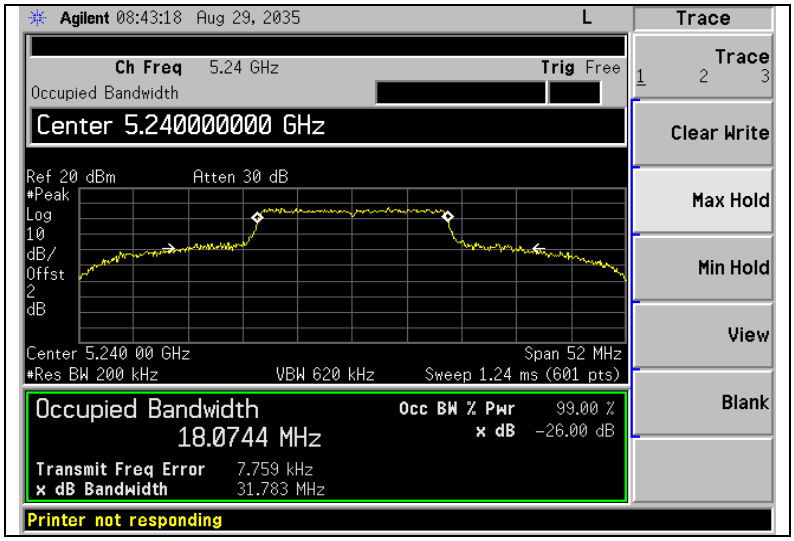


-5 240 ㎒

EBW



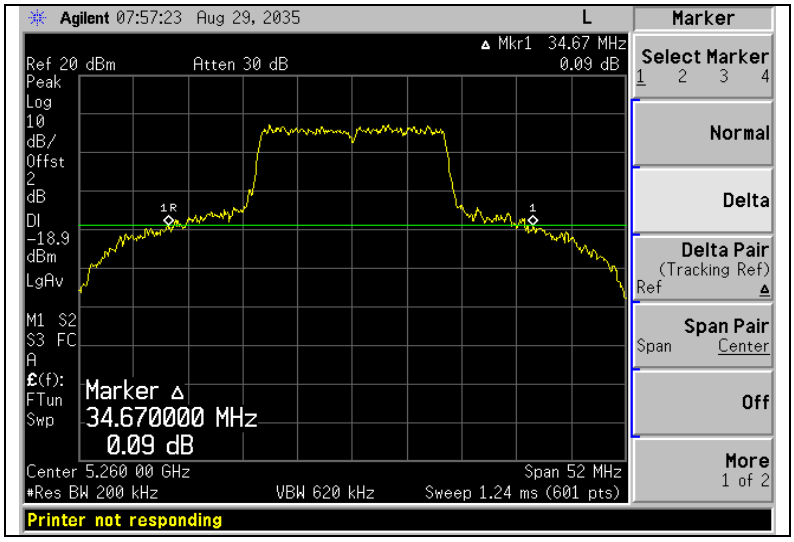
OBW



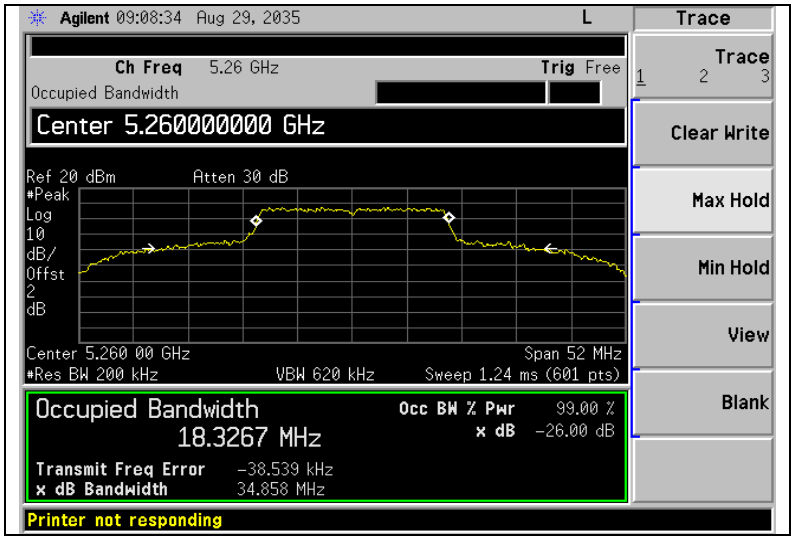
* 802.11n HT20_5 250 Band (26 dB Bandwidth)

-5 260 ㎒

EBW

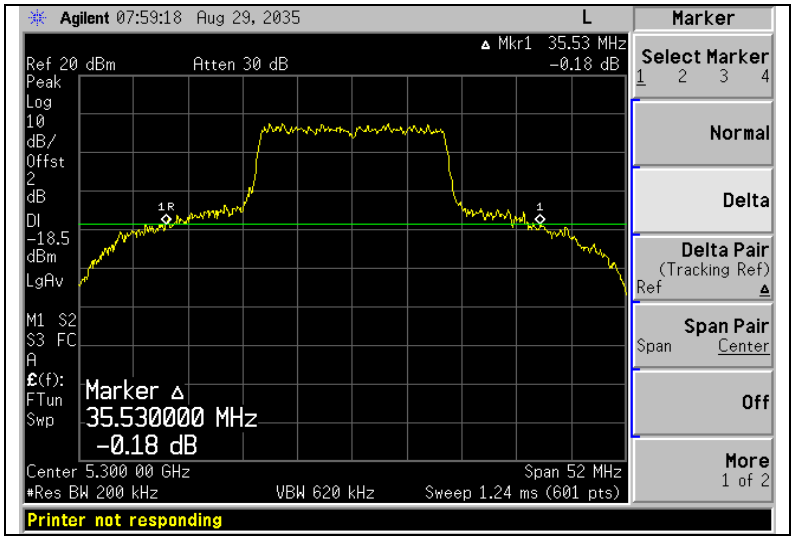


OBW

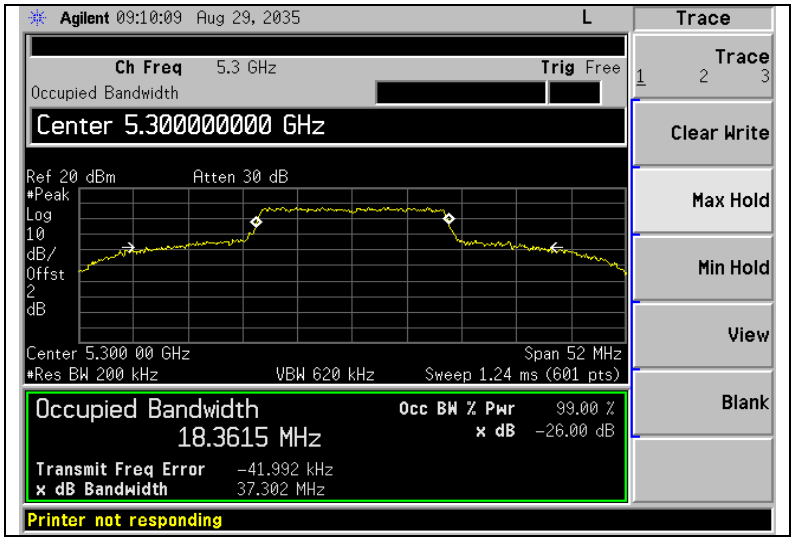


-5 300 ㎒

EBW

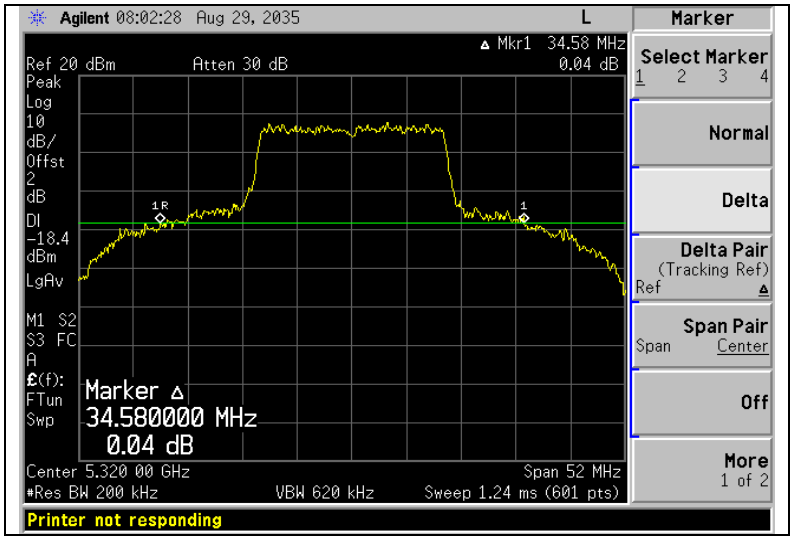


OBW

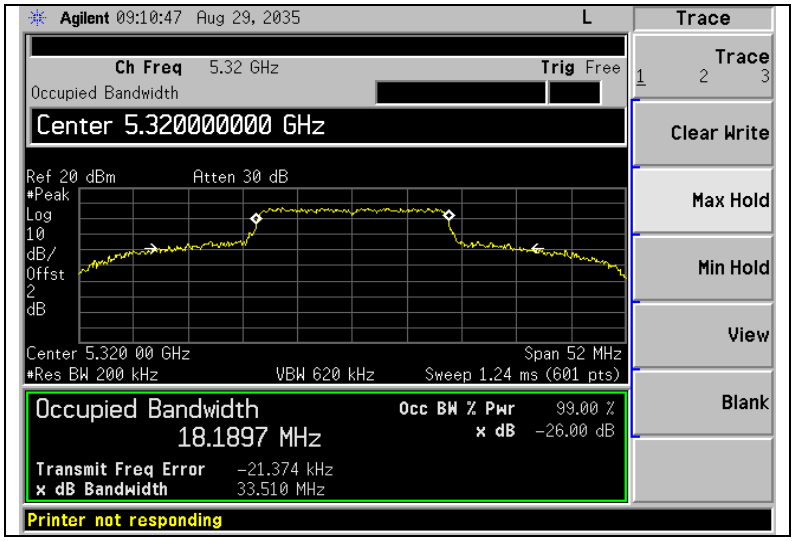


-5 320 ㎒

EBW



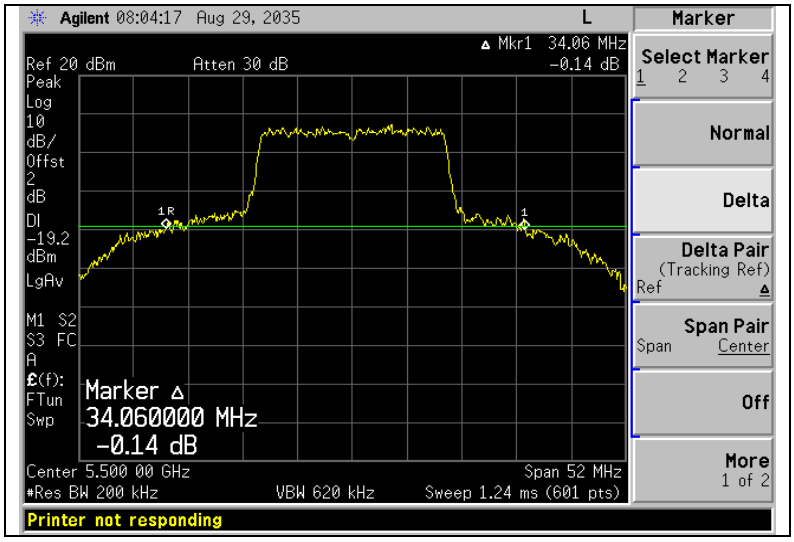
OBW



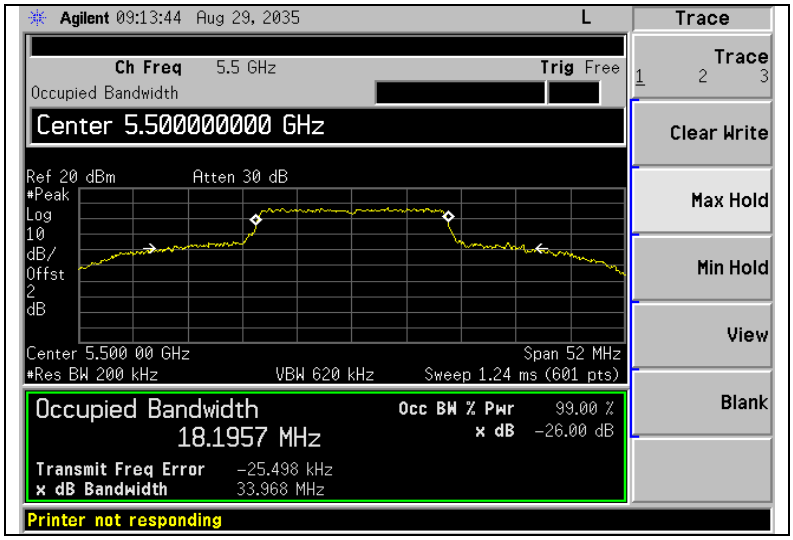
* 802.11n HT20_5 470 Band (26 dB Bandwidth)

-5 500 ㎒

EBW

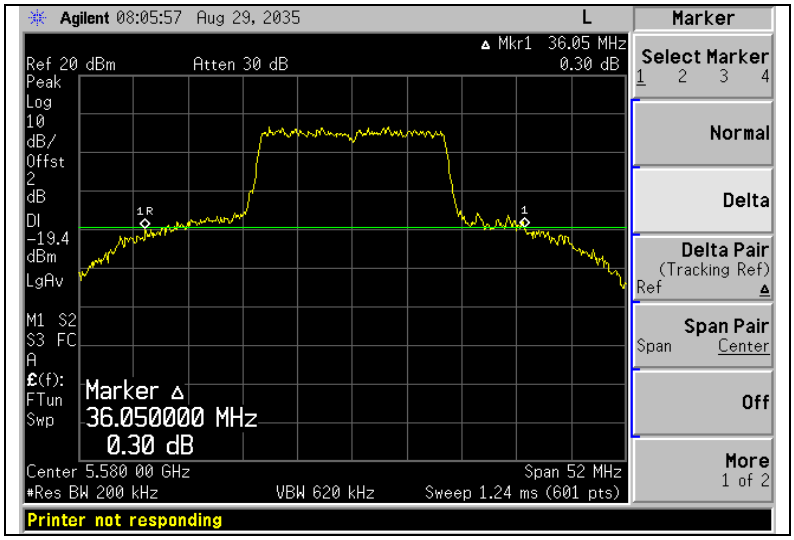


OBW

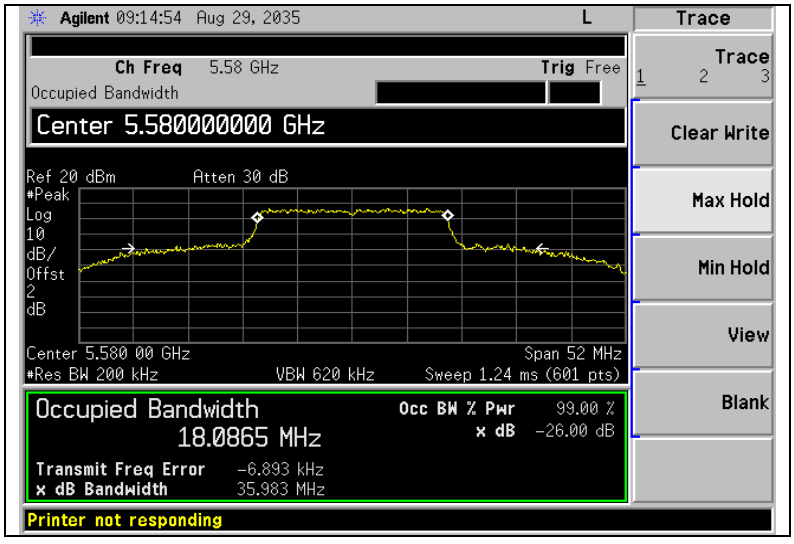


-5 580 ㎒

EBW

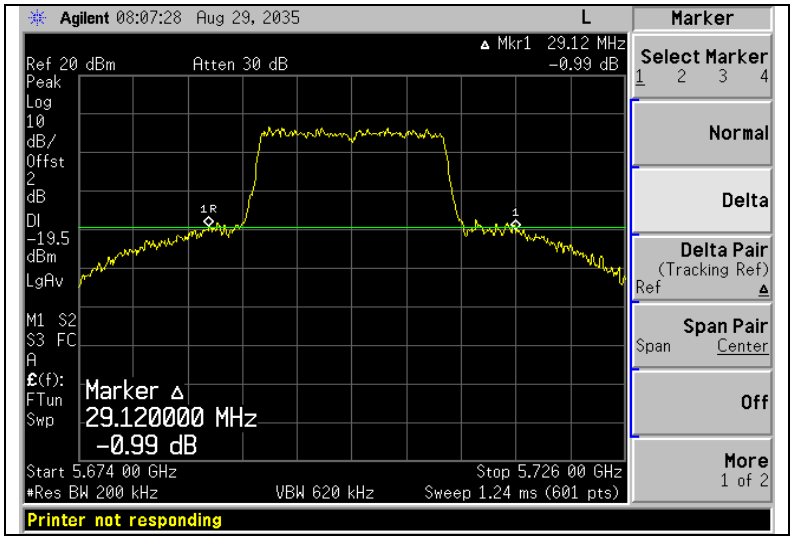


OBW

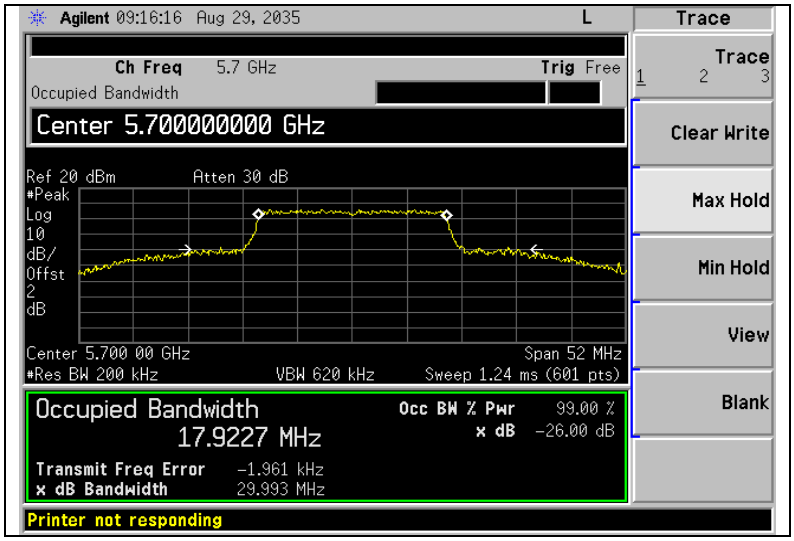


-5 700 ㎒

EBW



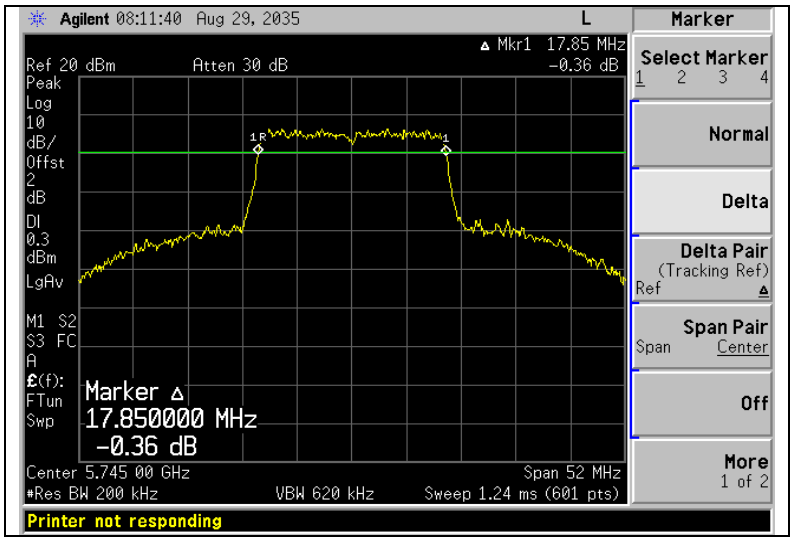
OBW



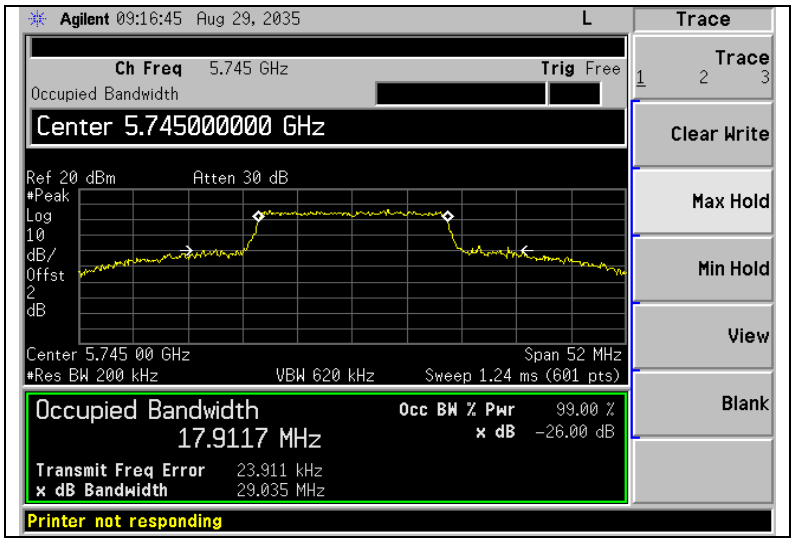
* 802.11n HT20_5 725 Band (6 dB Bandwidth)

-5 745 ㎒

6 dB Bandwidth

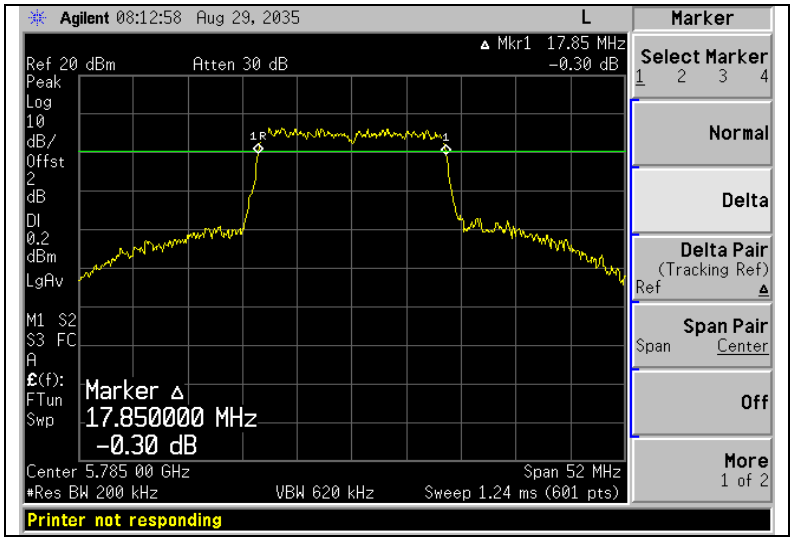


OBW

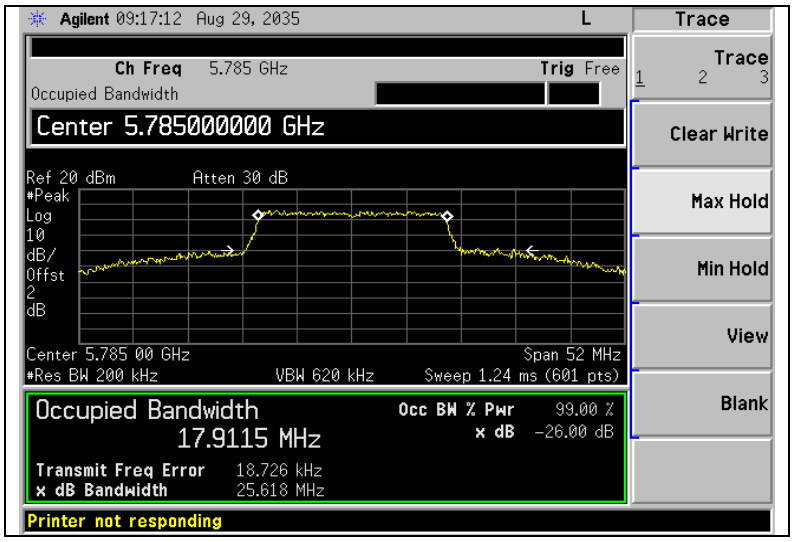


-5 785 ㎒

6 ㏈ Bandwidth

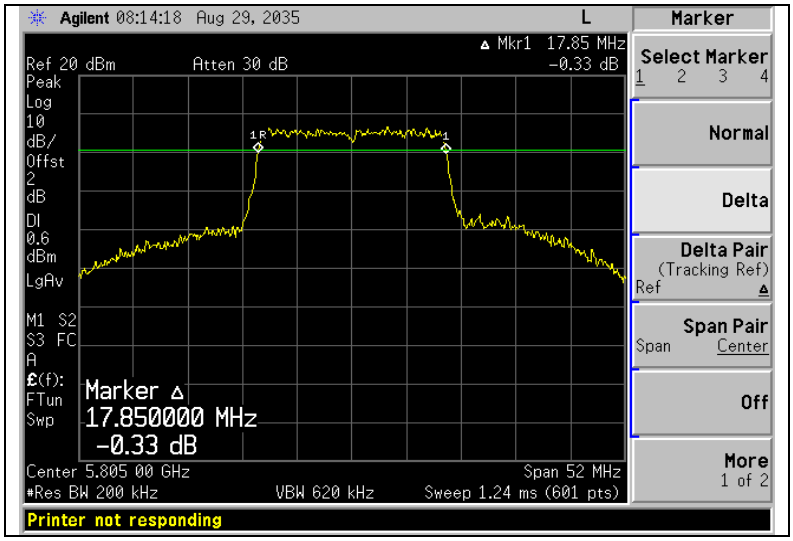


OBW

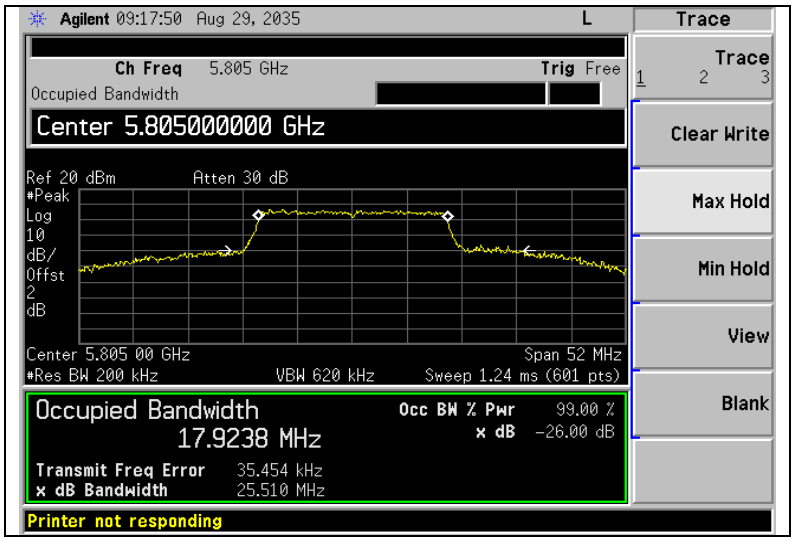


-5 805 ㎒

6 ㏈ Bandwidth



OBW



5.4 Peak Power Spectral Density

5.4.1 Regulation

According to §15.407(a) (1) (iv) For mobile and portable client devices in the 5.15-5.25 ㎓ band, the maximum conducted output power over the frequency band of operation shall not exceed 250 ㎽ provided the maximum antenna gain does not exceed 6 ㏈i. In addition, the maximum power spectral density shall not exceed 11 ㏈m in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 ㏈i are used, both the maximum conducted output power and the maximum power pectral density shall be reduced by the amount in ㏈ that the directional gain of the antenna exceeds 6 ㏈i.
According to §15.407(a) (2) For the 5.25-5.35 ㎓ and 5.47-5.725 ㎓ bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 ㎽ or 11 ㏈m + 10 log B, where B is the 26 ㏈ emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 ㏈m in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 ㏈i are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in ㏈that the directional gain of the antenna exceeds 6 ㏈i.
According to §15.407(a) (3) For the band 5.725-5.85 ㎓, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 ㏈m in any 500-㎑ band. If transmitting antennas of directional gain greater than 6 ㏈i are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in ㏈ that the directional gain of the antenna exceeds 6 ㏈i. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 ㏈i 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.

5.4.2 Measurement Procedure

These test measurement settings are specified in section F of 789033 D02 General UNII Test Procedures New Rules v01.

5.4.2.1 Maximum power spectral density (PSD)

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 ㏈ to the final result to compensate for the difference between linear averaging and power averaging.

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

5. For devices operating in the bands 5.15-5.25 ㎓, 5.25-5.35 ㎓, and 5.47-5.725 ㎓, the above procedures make use of 1 ㎒ RBW to satisfy directly the 1 ㎒ reference bandwidth specified in § 15.407(a)(5). For devices operating in the band 5.725-5.85 ㎓, the rules specify a measurement bandwidth of 500 ㎑. Many spectrum analyzers do not have 500 ㎑ RBW, thus a narrower RBW may need to be used. The rules permit the use of a RBWs less than 1 ㎒, or 500 ㎑, "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 ㎒, or 500 ㎑). If measurements are performed using a reduced resolution bandwidth (< 1 ㎒, or < 500 ㎑) and integrated over 1 ㎒, or 500 ㎑ bandwidth, the following adjustments to the procedures apply: a) Set RBW ≥ 1/T, where T is defined in section II.B.l.a).
c) Set VBW ≥ 3 RBW.
d) If measurement bandwidth of Maximum PSD is specified in 500 ㎑, add 10log(500㎑/RBW) to the measured result, whereas RBW (< 500 ㎑) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.
e) If measurement bandwidth of Maximum PSD is specified in 1 ㎒, add 10log(1㎒/RBW) to the measured result, whereas RBW (< 1 ㎒) is the reduced resolution bandwidth of spectrum analyzer set during measurement.
f) 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 ㎑ for the sections 5.c) and 5.d) above, since RBW=100 ㎑ is available on nearly all spectrum analyzers.

5.4.3 Test Result

-Complied

802.11a

5 150 Band

Frequency (㎒)	Reading (dBm)	Duty Cycle (dB)	Total result (dBm)	Limit (dBm)	Margin (dB)
5 180	6.57	4.28	10.85	11.00	0.15
5 200	6.48	4.28	10.76	11.00	0.24
5 240	6.61	4.28	10.89	11.00	0.11

5 250 Band

Frequency (㎒)	Reading (dBm)	Duty Cycle (dB)	Total result (dBm)	Limit (dBm)	Margin (dB)
5 260	5.81	4.28	10.09	11.00	0.91
5 300	6.16	4.28	10.44	11.00	0.56
5 320	6.44	4.28	10.72	11.00	0.28

5 470 Band

Frequency (㎒)	Reading (dBm)	Duty Cycle (dB)	Total result (dBm)	Limit (dBm)	Margin (dB)
5 500	6.45	4.28	10.72	11.00	0.28
5 580	6.20	4.28	10.48	11.00	0.52
5 700	6.12	4.28	10.40	11.00	0.60

5 725 Band

Frequency (㎒)	Reading (dBm)	Duty Cycle (dB)	Total result (dBm)	Limit (dBm)	Margin (dB)
5 745	6.02	4.28	10.30	30.00	19.70
5 785	6.19	4.28	10.47	30.00	19.53
5 805	6.22	4.28	10.50	30.00	19.50

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5 150 Band

Frequency (㎒)	Reading (dBm)	Duty Cycle (dB)	Total result (dBm)	Limit (dBm)	Margin (dB)
5 180	6.25	4.47	10.71	11.00	0.29
5 200	6.31	4.47	10.78	11.00	0.22
5 240	6.29	4.47	10.76	11.00	0.24

5 250 Band

Frequency (㎒)	Reading (dBm)	Duty Cycle (dB)	Total result (dBm)	Limit (dBm)	Margin (dB)
5 260	5.91	4.47	10.38	11.00	0.62
5 300	5.89	4.47	10.36	11.00	0.64
5 320	6.01	4.47	10.48	11.00	0.52

5 470 Band

Frequency (㎒)	Reading (dBm)	Duty Cycle (dB)	Total result (dBm)	Limit (dBm)	Margin (dB)
5 500	6.20	4.47	10.67	11.00	0.33
5 580	6.01	4.47	10.47	11.00	0.53
5 700	5.85	4.47	10.32	11.00	0.68

5 725 Band

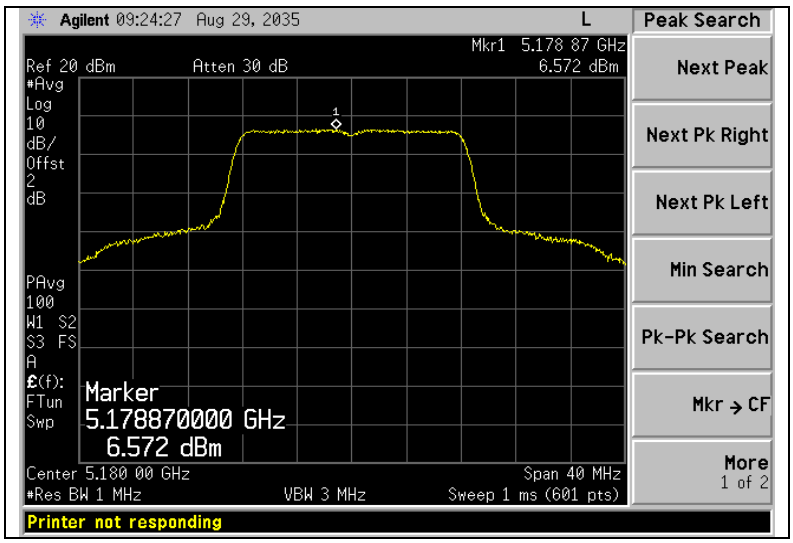
Frequency (㎒)	Reading (dBm)	Duty Cycle (dB)	Total result (dBm)	Limit (dBm)	Margin (dB)
5 745	5.86	4.47	10.33	30.00	19.67
5 785	5.82	4.47	10.29	30.00	19.71
5 805	5.97	4.47	10.43	30.00	19.57

5.4.4 Test Plot

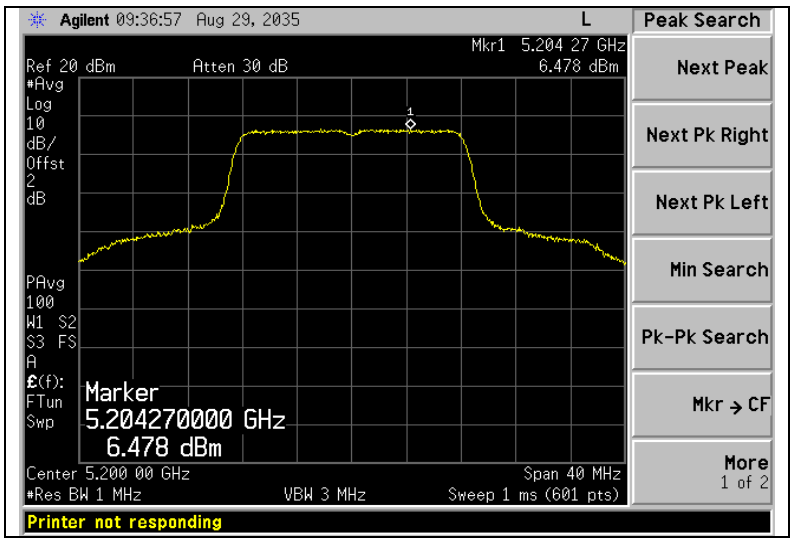
Figure 2. Plot of the Power Spectral Density

* 802.11a_5 150 Band

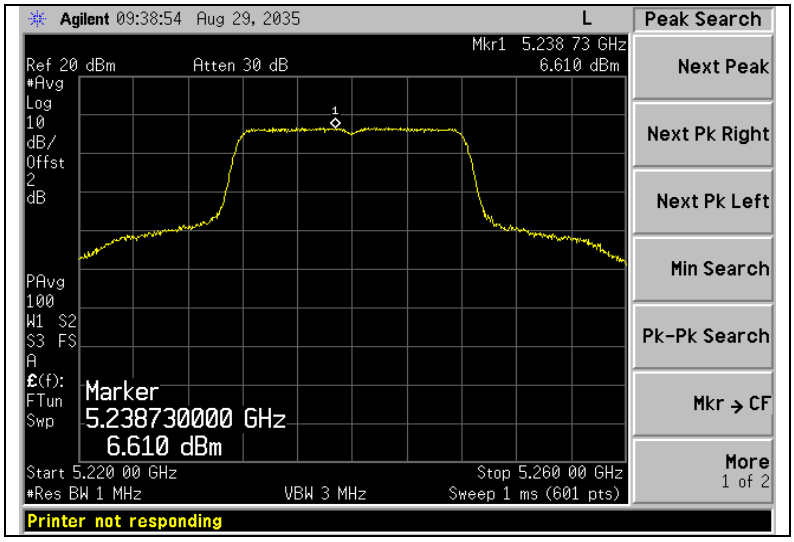
-5 180 ㎒



-5 200 ㎒

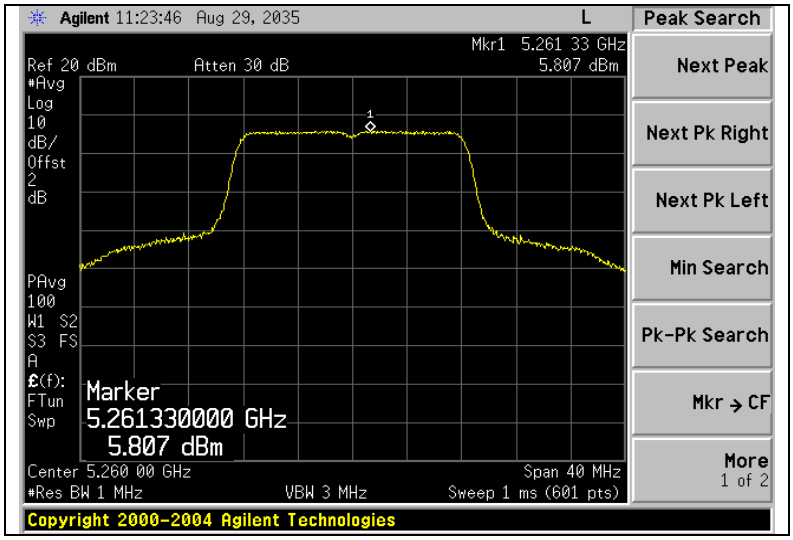


-5 240 ㎒

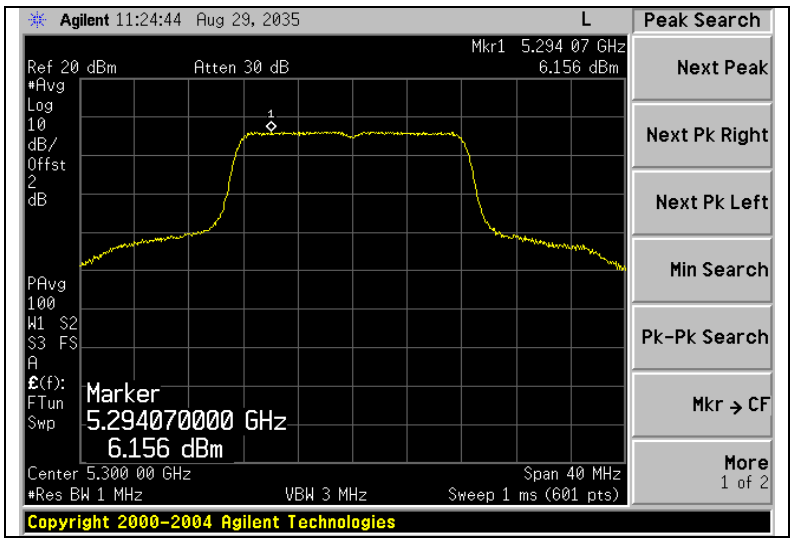


* 802.11a_5 250 Band

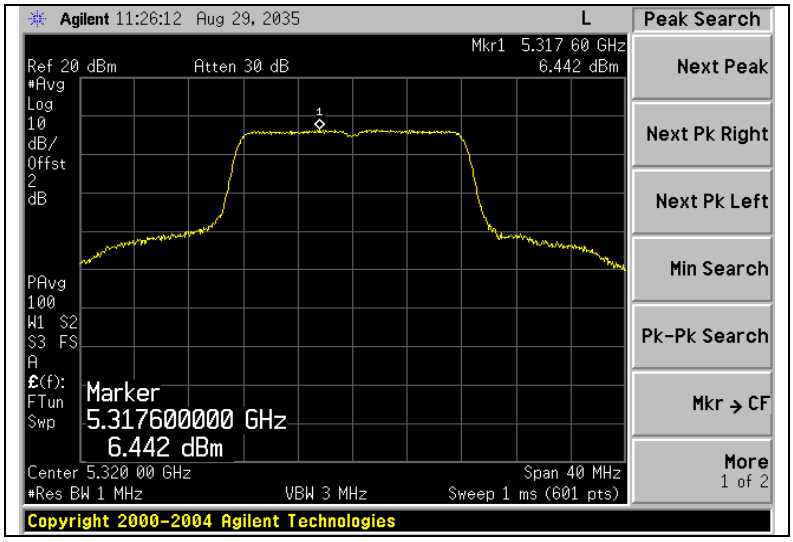
-5 260 ㎒



-5 300 ㎒

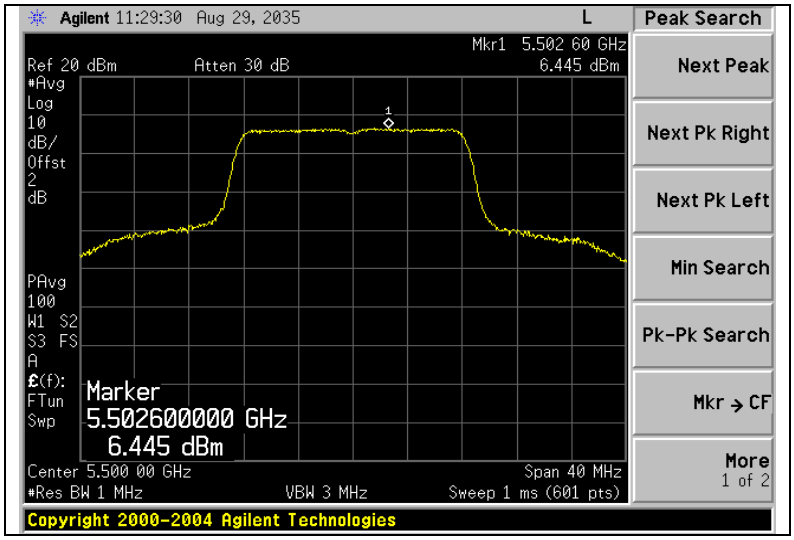


-5 320 ㎒

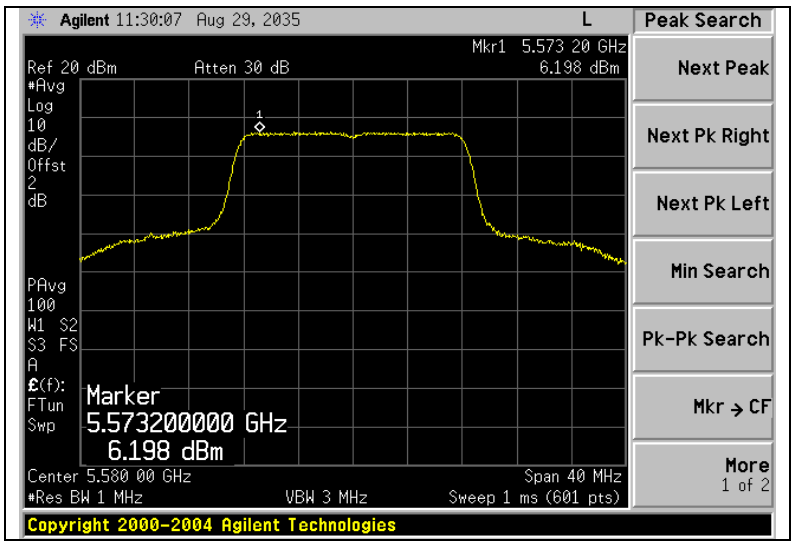


* 802.11a_5 470 Band

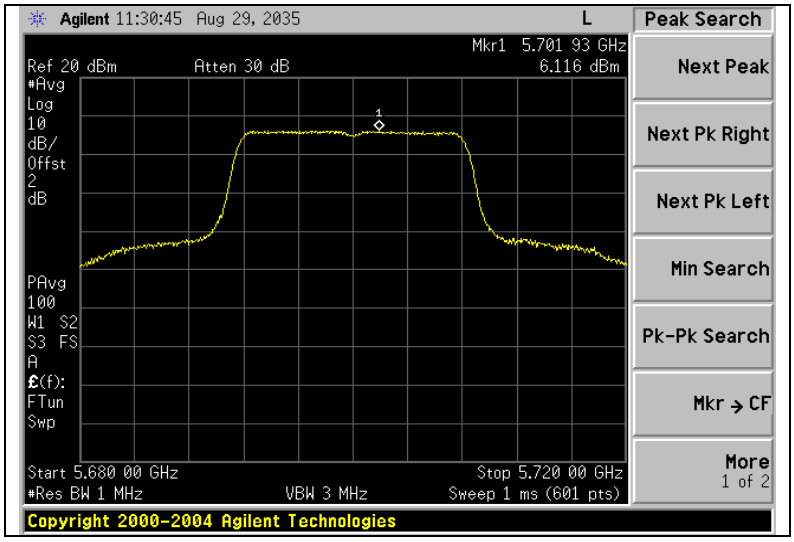
-5 500 ㎒



-5 580 ㎒

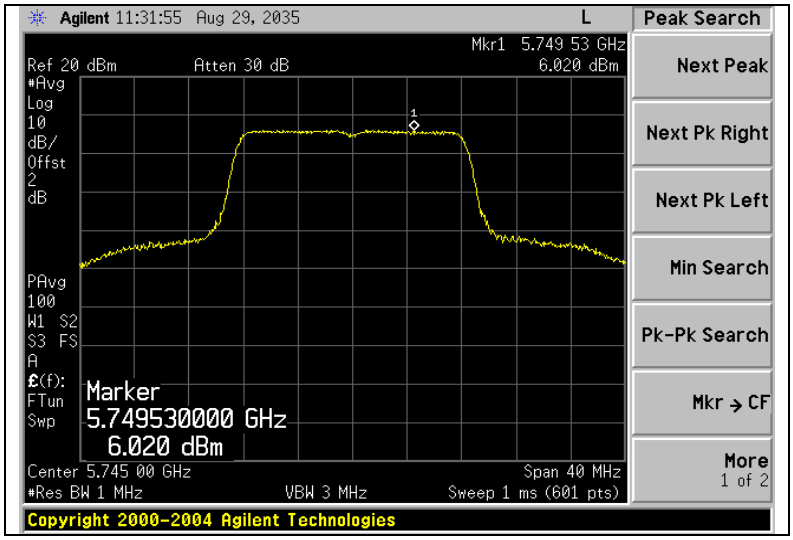


-5 700 ㎒

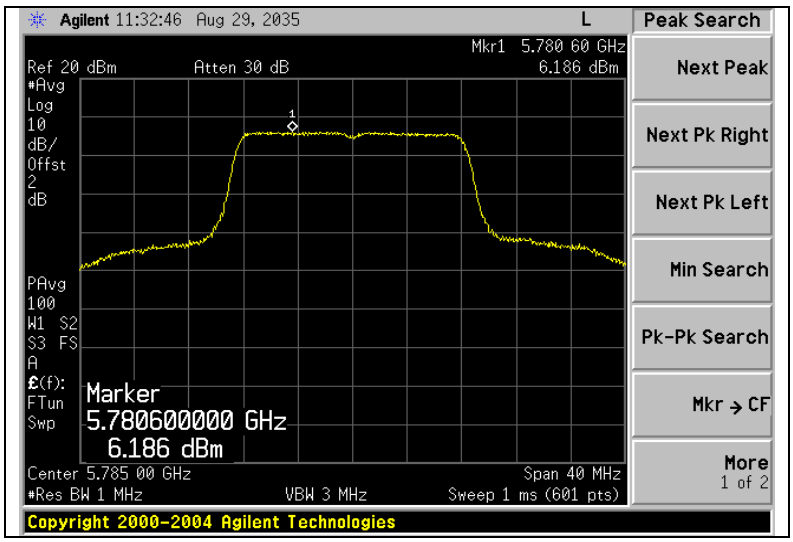


* 802.11a_5 725 Band

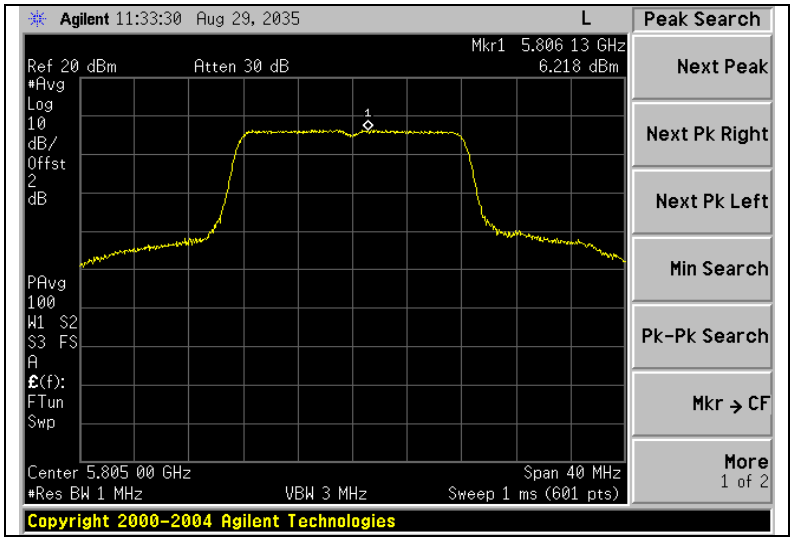
-5 745 ㎒



-5 785 ㎒

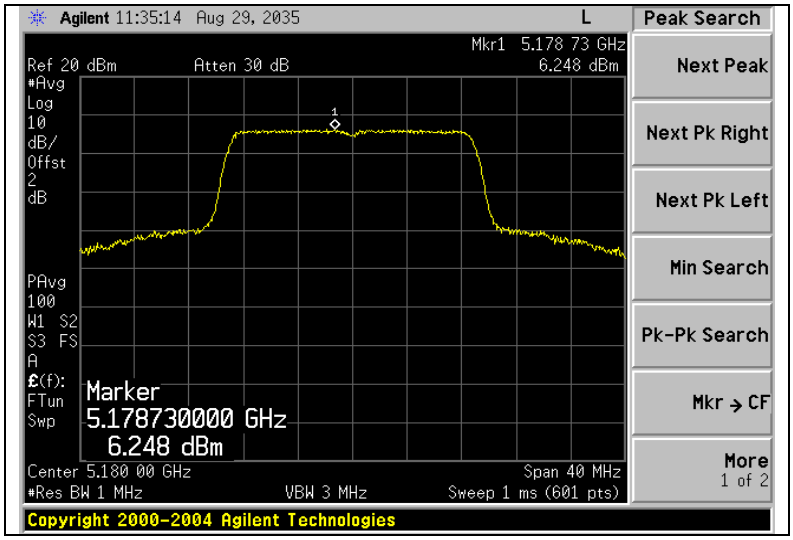


-5 825 ㎒

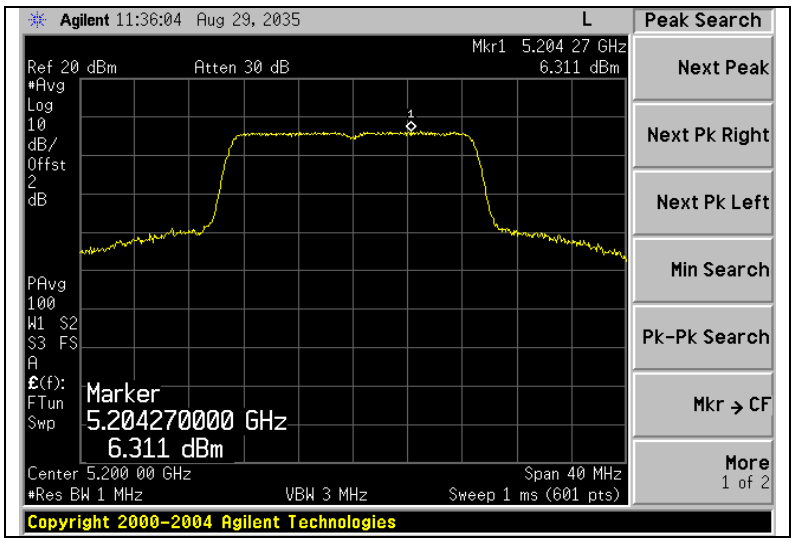


* 802.11n HT20 _5 150 Band

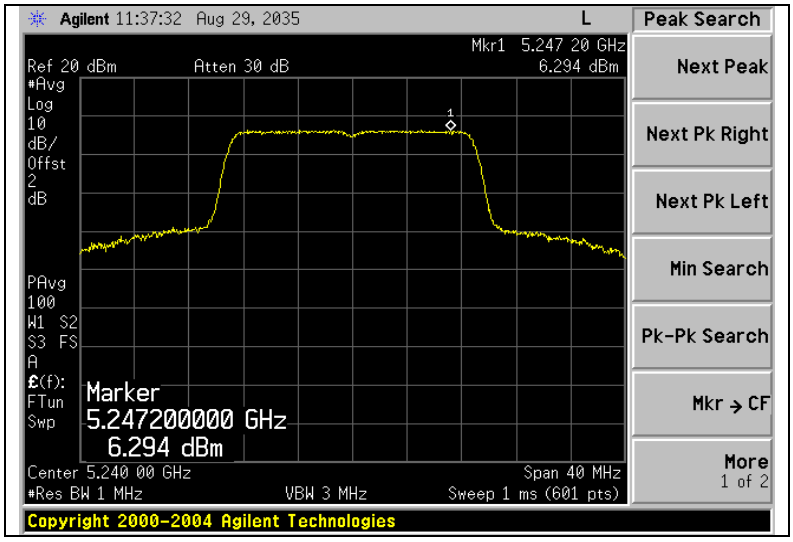
-5 180 ㎒



-5 200 ㎒

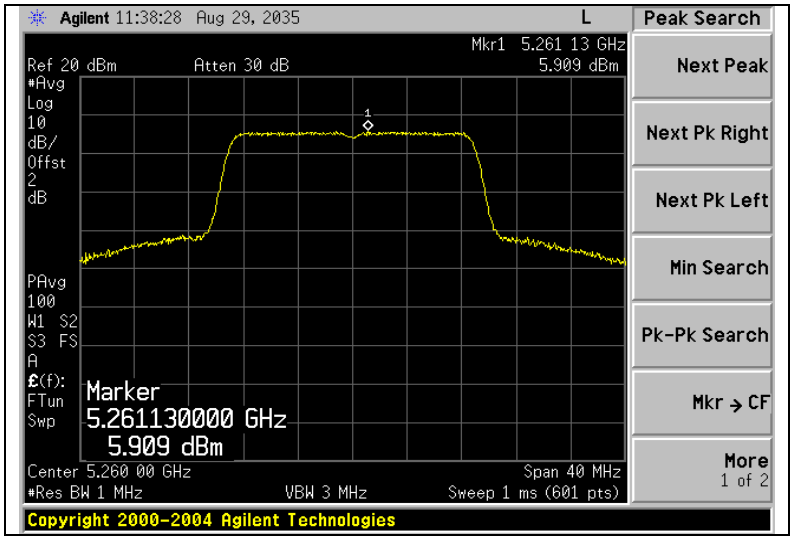


-5 240 ㎒

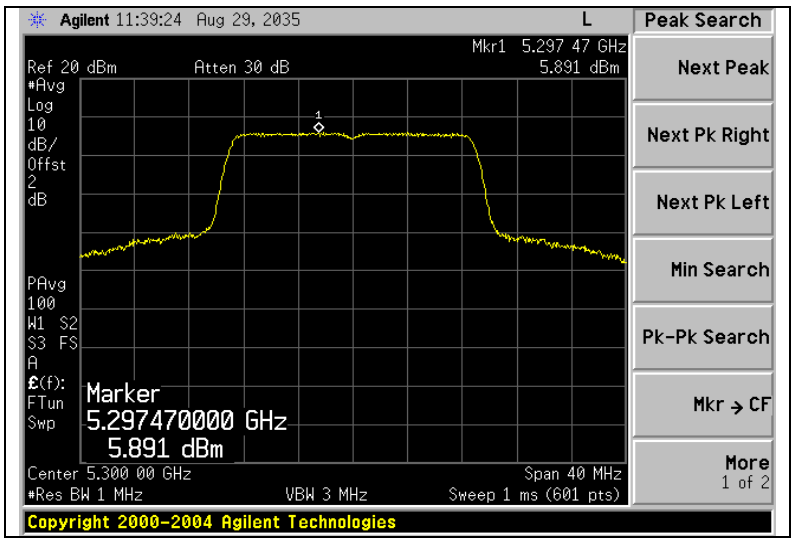


* 802.11n HT20_5 250 Band

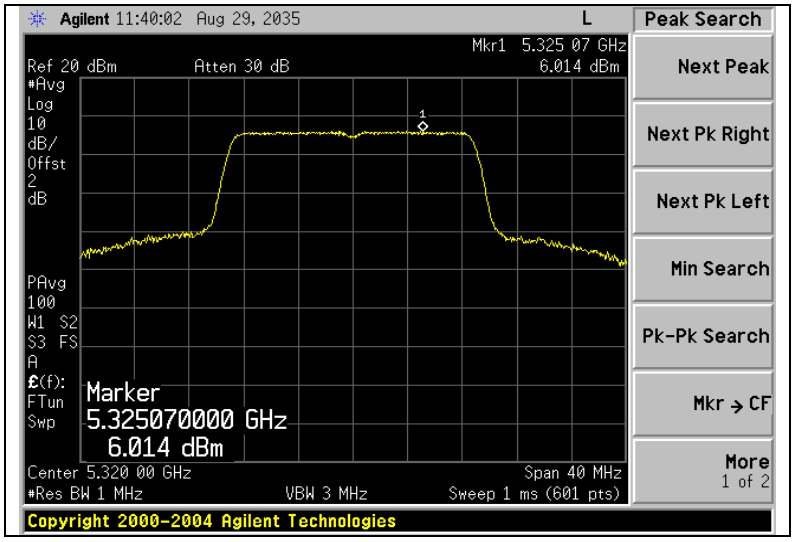
-5 260 ㎒



-5 300 ㎒

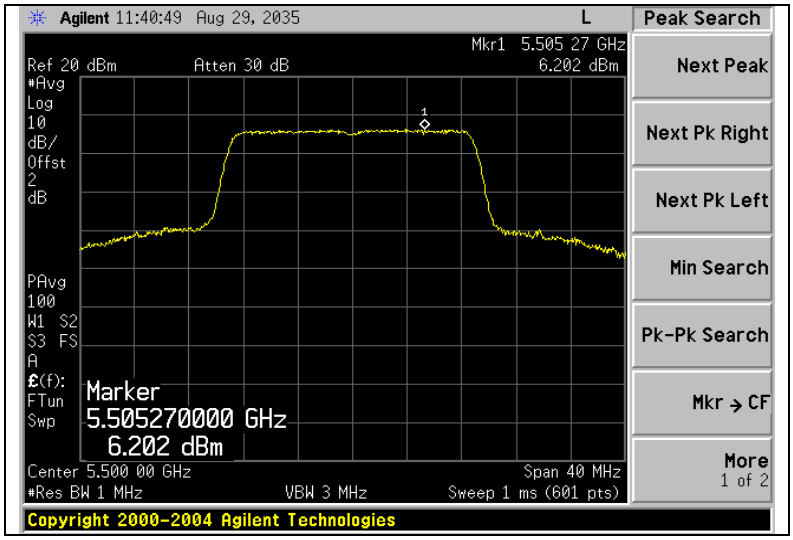


-5 320 ㎒

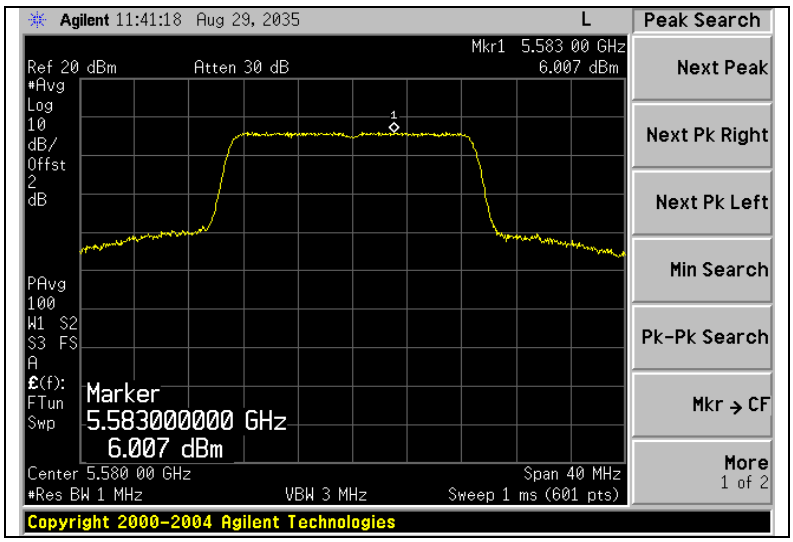


* 802.11n HT20_5 470 Band

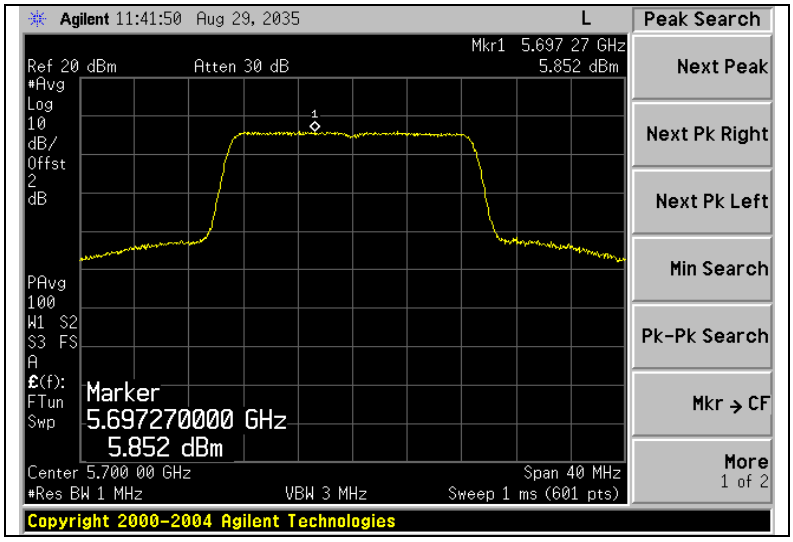
-5 500 ㎒



-5 580 ㎒

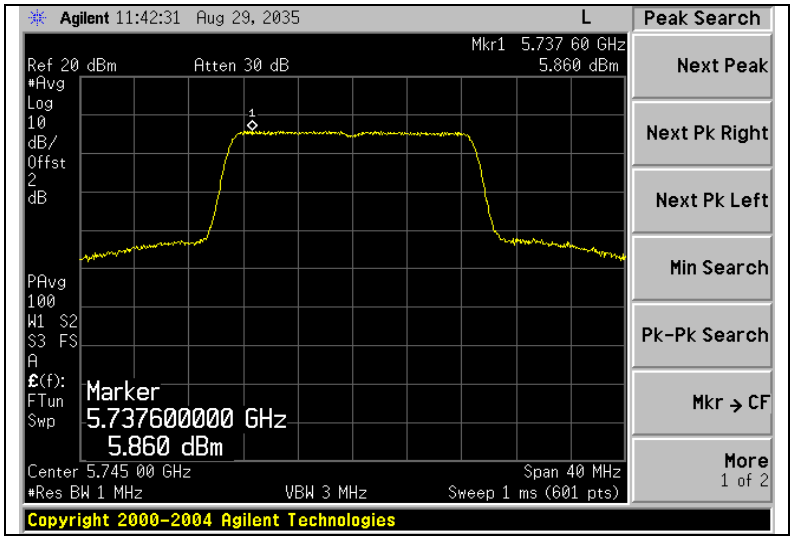


-5 700 ㎒

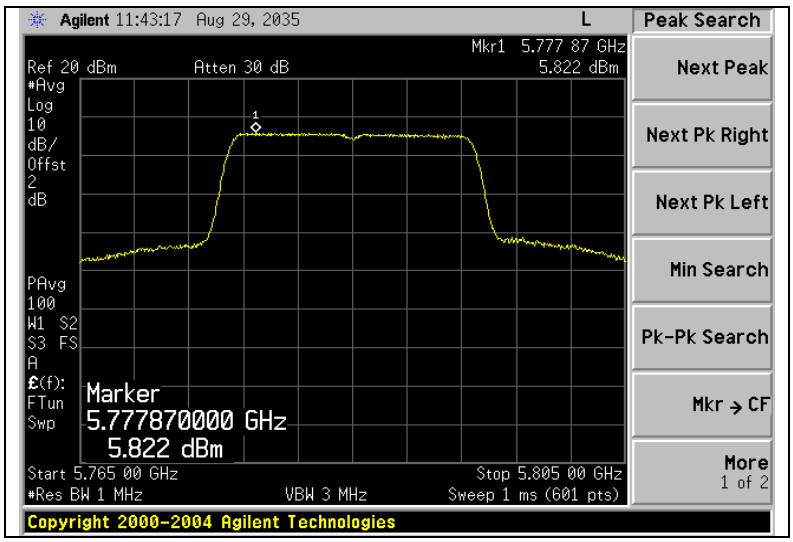


* 802.11n HT20_ 5 725 Band

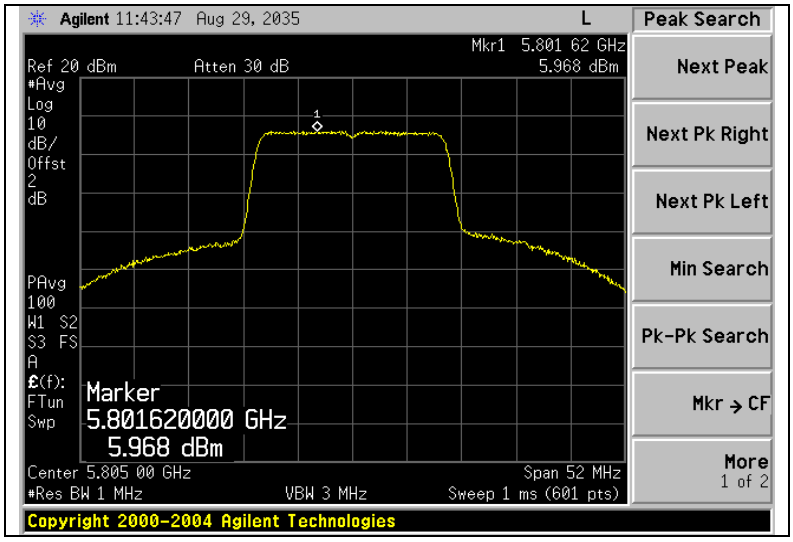
-5 745 ㎒



-5 785 ㎒



-5 805 ㎒



5.6 Spurious Emission, Band Edge And Restricted Bands

5.6.1 Regulation

According to §15.407(b)(1) For transmitters operating in the 5.15–5.25 ㎓ band: all emissions outside of the 5.15–5.35 ㎓ band shall not exceed an EIRP of -27 dBm/㎒.

According to §15.407(b) (2) For transmitters operating in the 5.25-5.35 ㎓band: All emissions outside of the 5.15-5.35 ㎓band shall not exceed an e.i.r.p. of −27 dBm/㎒.

According to §15.407(b) For transmitters operating in the 5.47-5.725 ㎓band: All emissions outside of the 5.47-5.725 ㎓band shall not exceed an e.i.r.p. of −27 dBm/㎒.

According to §15.407(b) (4) For transmitters operating in the 5.725-5.85 ㎓ band: All emissions within the frequency range from the band edge to 10 ㎒ above or below the band edge shall not exceed an e.i.r.p. of −17 dBm/㎒; for frequencies 10 ㎒ or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of −27 dBm/㎒.

According to §15.407(b)(6) Unwanted emissions below 1 ㎓ must comply with the general field strength limits set forth in §15.209.

According to §15.209(a), Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall notexceed the field strength levels specified in the following table:

Frequency (㎒)	Field strength (μV/m)	Measurement distance (m)
0.009 - 0.490	2400/F(㎑)	300
0.490 -1.705	24000/F(㎑)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

** The emission limits shown in the above table are based on measurement instrumentation employing a CISPR quasi-peak detector and above 1000 ㎒ are based on the average value of measured emissions.

According to §15.407(b)(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 block edges as the design of the equipment permits.

5.6.2 Measurement Procedure

These test measurement settings are specified in section G of 789033 D02 General UNII Test Procedures New Rules v01.
For all radiated emissions tests, measurements must correspond to the direction of maximum emission level for each measured emission (see ANSI C63.10 for guidance).

5.6.2.1 Unwanted Emissions in the Restricted Bands & Outside of the Restricted Bands

(1) For all measurements, follow the requirements in section II.G.3.,
"General Requirements for Unwanted Emissions Measurements".
(2) At frequencies below 1 000 ㎒, use the procedure described in section II.G.4.,
"Procedure for Unwanted Emissions Measurements Below 1000 ㎒".
(3) At frequencies above 1 000 ㎒, measurements performed using the peak and average measurement procedures described in sections II.G.5. and II.G.6, respectively, must satisfy the respective peak and average limits. If all peak measurements satisfy the average limit, then average measurements are not required.

(4) Unwanted Emissions that fall Outside of the Restricted Bands
As specified in § 15.407(b), emissions above 1000 ㎒ that are outside of the restricted bands are subject to a maximum emission limit of -27 dBm/㎒ (or -17 dBm/㎒ as specified in § 15.407(b)(4)).
However, an out-of-band emission that complies with both the peak and average limits of § 15.209 is not required to satisfy the -27 dBm/㎒ or -17 dBm/㎒ maximum emission limit.

a) If radiated measurements are performed, field strength is then converted to EIRP as follows:
(i) EIRP = ((E*d)^2) / 30
where: • E is the field strength in V/m; • d is the measurement distance in meters;
• EIRP is the equivalent isotropically radiated power in watts.
(ii) Working in dB units, the above equation is equivalent to:
EIRP[dBm] = E[dBμV/m] + 20 log(d[meters]) - 104.77
(iii) Or, if d is 3 meters:
EIRP[dBm] = E[dBμV/m] - 95.2

5.6.2.2 Spurious Radiated Emissions:

1. The preliminary and final rdiated measurements were performed to determine the frequency producing the maximum emissions in at a 10m anechoic chamber. The EUT was tested at a distance 3 meters.
2. The EUT was placed on the top of the 0.8-meter height, 1 × 1.5 meter non-metallic table. To find the maximum emission levels, the height of a measuring antenna was changed and the turntable was rotated 360˚.
3. The antenna polarization was also changed from vertical to horizontal. The spectrum was scanned from 9 ㎑ to 30 ㎒ using the loop antenna, and from 30 to 1000 ㎒ using the TRILOG broadband antenna, and from 1 000 ㎒ to 40 000 ㎒ using the horn antenna.
4. Each frequency found during preliminary measurements was re-examined and investigated. The test-receiver system was set up to average, peak, and quasi-peak detector function with specified bandwidth.

Note

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 ㎑ for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1 ㎓.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 ㎒ for Peak detection and frequency above 1 ㎓.
   The resolution bandwidth of test receiver/spectrum analyzer is 1 ㎒ and the video bandwidth is 1 ㎑(≥1/T) for Average detection (AV) at frequency above 1 ㎓. (where T = pulse width)

5.6.3 Test Result

-complied

1. Band-edge & Conducted Spurious Emissions was shown in figure 3.
   Note: We took the insertion loss of the cable into consideration within the measuring instrument.
2. Measured value of the Field strength of spurious Emissions (Radiated)
3. It tested x,y and z – 3 axis each, mentioned only worst case data at this report.

*** Below 1 ㎓ data (Worst-case: 802.11n_HT20_5 250 Band_Middle Channel)**

802.11n HT20

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(㎶)]	Factor [dB]	Result [dB(㎶/m)]	Limit [dB(㎶/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 30 ㎒ (3m Distance)							
below 30.00	**Not Detected**	-	-	-	-	-	-
Quasi-Peak DATA. Emissions below 1 ㎓							
354.89	120	H	46.1	-13.2	32.9	46.0	13.1
480.00	120	H	43.6	-10.3	33.3	46.0	12.7
905.53	120	V	18.4	-2.6	15.8	46.0	30.2
-	Not Detected	-	-	-	-	-	-

*** Above 1 ㎓ data_5 150 Band**

802.11a (5 180 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(㎶)]	Factor [dB]	Result [dB(㎶/m)]	Limit [dB(㎶/m)]	Margin [dB]
Peak DATA. Emissions above 1 ㎓							
* 5 092.00	1 000	H	51.8	5.5	57.3	74.0	16.7
6 906.81	1 000	H	49.1	10.9	60.0	74.0	14.0
Above 7 000.00	Not Detected	-	-	-	-	-	-
Average DATA. Emissions above 1 ㎓							
* 5 092.00	1 000	H	38.2	5.5	43.7	54.0	10.3
6 906.81	1 000	H	36.6	10.9	47.5	54.0	6.5
Above 7 000.00	Not Detected	-	-	-	-	-	-

* This asterisk means restricted band.

802.11a (5 200 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(㎶)]	Factor [dB]	Result [dB(㎶/m)]	Limit [dB(㎶/m)]	Margin [dB]
Peak DATA. Emissions above 1 ㎓							
6 932.69	1 000	H	47.8	11.0	58.8	74.0	15.2
Above 7 000.00	Not Detected	-	-	-	-	-	-
Average DATA. Emissions above 1 ㎓							
6 932.69	1 000	H	37.4	11.0	48.4	54.0	5.6
Above 7 000.00	Not Detected	-	-	-	-	-	-

802.11a (5 240 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(㎶)]	Factor [dB]	Result [dB(㎶/m)]	Limit [dB(㎶/m)]	Margin [dB]
Peak DATA. Emissions above 1 ㎓							
6 985.88	1 000	H	46.5	11.1	57.6	74.0	16.4
Above 7 000.00	Not Detected	-	-	-	-	-	-
Average DATA. Emissions above 1 ㎓							
6 985.88	1 000	H	36.9	11.1	48.0	54.0	6.0
Above 7 000.00	Not Detected	-	-	-	-	-	-

802.11n HT20 (5 180 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Peak DATA. Emissions above 1 ㎓							
*5 070.69	1 000	H	51.8	5.4	57.2	74.0	16.8
6 906.81	1 000	H	49.1	10.9	60.0	74.0	14.0
Above 7 000.00	Not Detected	-	-	-	-	-	-
Average DATA. Emissions above 1 ㎓							
*5 070.69	1 000	H	42.7	5.4	48.1	54.0	5.9
6 906.81	1 000	H	38.9	10.9	49.8	54.0	4.2
Above 7 000.00	Not Detected	-	-	-	-	-	-

* This asterisk means restricted band.

802.11n HT20 (5 200 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Peak DATA. Emissions above 1 ㎓							
6 932.69	1 000	H	47.8	11.0	58.8	74.0	15.2
Above 7 000.00	Not Detected	-	-	-	-	-	-
Average DATA. Emissions above 1 ㎓							
6 932.69	1 000	H	38.1	11.0	49.1	54.0	4.9
Above 7 000.00	Not Detected	-	-	-	-	-	-

802.11n HT20 (5 240 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Peak DATA. Emissions above 1 ㎓							
6 985.88	1 000	H	46.5	11.1	57.6	74.0	16.4
Above 8 000.00	Not Detected	-	-	-	-	-	-
Average DATA. Emissions above 1 ㎓							
6 985.88	1 000	H	37.2	11.1	48.3	54.0	5.7
Above 8 000.00	Not Detected	-	-	-	-	-	-

*** Above 1 ㎓ data_5 250 Band**

802.11n HT20 (5 180 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Peak DATA. Emissions above 1 ㎓							
7 013.19	1 000	H	47.1	11.1	58.2	74.0	15.8
Above 8 000.00	Not Detected	-	-	-	-	-	-
Average DATA. Emissions above 1 ㎓							
7 013.19	1 000	H	37.0	11.1	48.1	54.0	5.9
Above 8 000.00	Not Detected	-	-	-	-	-	-

802.11n HT20 (5 200 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Peak DATA. Emissions above 1 ㎓							
7 039.06	1 000	H	47.7	11.2	58.9	74.0	15.1
Above 8 000.00	Not Detected	-	-	-	-	-	-
Average DATA. Emissions above 1 ㎓							
7 039.06	1 000	H	38.5	11.2	49.7	54.0	4.3
Above 8 000.00	Not Detected	-	-	-	-	-	-

802.11n HT20 (5 240 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Peak DATA. Emissions above 1 ㎓							
*5 365.63	1 000	H	52.4	5.8	58.2	74.0	15.8
7 092.25	1 000	H	46.6	11.3	57.9	74.0	16.1
Above 8 000.00	Not Detected	-	-	-	-	-	-
Average DATA. Emissions above 1 ㎓							
*5 365.63	1 000	H	41.1	5.8	46.9	54.0	7.1
7 092.25	1 000	H	37.2	11.3	48.5	54.0	5.5
Above 8 000.00	Not Detected	-	-	-	-	-	-

* This asterisk means restricted band.

802.11n HT20 (5 260 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Peak DATA. Emissions above 1 ㎓							
7 013.19	1 000	H	47.6	11.1	58.7	74.0	15.3
Above 8 000.00	Not Detected	-	-	-	-	-	-
Average DATA. Emissions above 1 ㎓							
7 013.19	1 000	H	37.7	11.1	48.8	54.0	5.2
Above 8 000.00	Not Detected	-	-	-	-	-	-

802.11n HT20 (5 300 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Peak DATA. Emissions above 1 ㎓							
7 039.06	1 000	H	47.7	11.2	58.9	74.0	15.1
Above 8 000.00	Not Detected	-	-	-	-	-	-
Average DATA. Emissions above 1 ㎓							
7 039.06	1 000	H	39.0	11.2	50.2	54.0	3.8
Above 8 000.00	Not Detected	-	-	-	-	-	-

802.11n HT20 (5 320 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Peak DATA. Emissions above 1 ㎓							
*5 389.69	1 000	H	51.8	5.9	57.7	74.0	16.3
7 093.69	1 000	H	47.3	11.3	58.6	74.0	15.4
Above 8 000.00	Not Detected	-	-	-	-	-	-
Average DATA. Emissions above 1 ㎓							
*5 389.69	1 000	H	43.9	5.9	49.8	54.0	4.2
7 093.69	1 000	H	38.6	11.3	49.9	54.0	4.1
Above 8 000.00	Not Detected	-	-	-	-	-	-

* This asterisk means restricted band.

*** Above 1 ㎓ data_5 470 Band**

802.11a (5 500 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Peak DATA. Emissions above 1 ㎓							
#5 468.75	1 000	H	50.3	6.0	56.3	78.2	21.9
7 332.31	1 000	H	45.1	11.7	56.8	74.0	17.2
Above 8 000.00	Not Detected	-	-	-	-	-	-
Average DATA. Emissions above 1 ㎓							
7 332.31	1 000	H	36.1	11.7	47.8	54.0	6.2
Above 8 000.00	Not Detected	-	-	-	-	-	-

This hash means Out of Band.

802.11a (5 580 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Peak DATA. Emissions above 1 ㎓							
7 440.13	1 000	H	42.4	11.8	54.2	74.0	19.8
Above 8 000.00	Not Detected	-	-	-	-	-	-
Average DATA. Emissions above 1 ㎓							
7 440.13	1 000	H	35.1	11.8	46.9	54.0	7.1
Above 8 000.00	Not Detected	-	-	-	-	-	-

802.11a (5 700 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Peak DATA. Emissions above 1 ㎓							
# 5 725.19	1 000	H	54.2	6.6	60.8	78.2	17.4
7 599.69	1 000	H	40.3	12.0	52.3	74.0	21.7
Above 8 000.00	Not Detected	-	-	-	-	-	-
Average DATA. Emissions above 1 ㎓							
7 599.69	1 000	H	34.5	12.0	46.5	54.0	7.5
Above 8 000.00	Not Detected	-	-	-	-	-	-

This hash means Out of Band.

802.11n HT20 (5 500 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Peak DATA. Emissions above 1 ㎓							
# 5 461.19	1 000	H	50.9	6.0	56.9	78.2	21.3
7 332.31	1 000	H	46.7	11.7	58.4	74.0	15.6
Above 8 000.00	Not Detected	-	-	-	-	-	-
Average DATA. Emissions above 1 ㎓							
7 332.31	1 000	H	37.7	11.7	49.4	54.0	4.6
Above 8 000.00	Not Detected	-	-	-	-	-	-

This hash means Out of Band.

802.11n HT20 (5 580 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Peak DATA. Emissions above 1 ㎓							
7 438.69	1 000	H	44.1	11.8	55.9	74.0	18.1
11 151.75	1 000	H	42.6	14.8	57.4	74.0	16.6
-	Not Detected	-	-	-	-	-	-
Average DATA. Emissions above 1 ㎓							
7 438.69	1 000	H	37.1	11.8	48.9	54.0	5.1
11 151.75	1 000	H	34.9	14.8	49.7	54.0	4.3
-	Not Detected	-	-	-	-	-	-

802.11n HT20 (5 700 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Peak DATA. Emissions above 1 ㎓							
# 5 725.19	1 000	H	51.6	6.6	58.2	78.2	20.0
7 599.69	1 000	H	40.3	12.0	52.3	74.0	21.7
11 391.81	1 000	H	43.6	14.9	58.5	74.0	15.5
-	Not Detected	-	-	-	-	-	-
Average DATA. Emissions above 1 ㎓							
7 599.69	1 000	H	35.9	12.0	47.9	54.0	6.1
11 391.81	1 000	H	35.8	14.9	50.7	54.0	3.3
-	Not Detected	-	-	-	-	-	-

This hash means Out of Band.

*** Above 1 ㎓ data_5 725 Band**

802.11a (5 745 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Peak DATA. Emissions above 1 ㎓							
# 5 724.50	1 000	H	58.5	6.6	65.1	68.2	3.1
7 660.06	1 000	H	40.1	12.0	52.1	74.0	21.9
Above 8 000.00	Not Detected	-	-	-	-	-	-
Average DATA. Emissions above 1 ㎓							
7 660.06	1 000	H	33.8	12.0	45.8	54.0	8.2
Above 8 000.00	Not Detected	-	-	-	-	-	-

This hash means Out of Band.

802.11a (5 785 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Peak DATA. Emissions above 1 ㎓							
7 713.25	1 000	H	40.4	12.1	52.5	74.0	21.5
Above 8 000.00	Not Detected	-	-	-	-	-	-
Average DATA. Emissions above 1 ㎓							
7 713.25	1 000	H	34.3	12.1	46.4	54.0	7.6
Above 8 000.00	Not Detected	-	-	-	-	-	-

802.11a (5 805 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Peak DATA. Emissions above 1 ㎓							
# 5 855.13	1 000	H	51.2	7.0	58.2	68.2	10.0
7 766.44	1 000	H	39.2	12.1	51.3	74.0	22.7
Above 8 000.00	Not Detected	-	-	-	-	-	-
Average DATA. Emissions above 1 ㎓							
7 766.44	1 000	H	30.3	12.1	42.4	54.0	11.6
Above 8 000.00	Not Detected	-	-	-	-	-	-

This hash means Out of Band.

802.11n HT20 (5 745 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Peak DATA. Emissions above 1 ㎓							
# 5 724.50	1 000	H	58.3	6.6	64.9	68.2	3.3
7 660.06	1 000	H	40.2	12.0	52.2	74.0	21.8
Above 8 000.00	Not Detected	-	-	-	-	-	-
Average DATA. Emissions above 1 ㎓							
7 660.06	1 000	H	35.5	12.0	47.5	54.0	6.5
Above 8 000.00	Not Detected	-	-	-	-	-	-

This hash means Out of Band.

802.11n HT20 (5 785 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Peak DATA. Emissions above 1 ㎓							
7 713.25	1 000	H	40.4	12.1	52.5	74.0	21.5
Above 8 000.00	Not Detected	-	-	-	-	-	-
Average DATA. Emissions above 1 ㎓							
7 713.25	1 000	H	35.7	12.1	47.8	54.0	6.2
Above 8 000.00	Not Detected	-	-	-	-	-	-

802.11n HT20 (5 825 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Peak DATA. Emissions above 1 ㎓							
# 5 856.50	1 000	V	50.6	7.0	57.6	68.2	10.6
7 766.44	1 000	V	38.8	12.1	50.9	74.0	23.1
Above 8 000.00	Not Detected	-	-	-	-	-	-
Average DATA. Emissions above 1 ㎓							
7 766.44	1 000	V	26.6	12.1	38.7	54.0	15.3
Above 8 000.00	Not Detected	-	-	-	-	-	-

This hash means Out of Band.

5.7 Frequency Stability

5.7.1 Regulation

According to §15.407 (g) 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 users manual.

5.7.2 Measurement Procedure

The frequency stability of the carrier frequency of the intentional radiator shall be maintained all conditions of normal operation as specified in the users manual. The frequency stability shall be maintained over a temperature variation of specified in the users manual at normal supply voltage, and over a variation in the primary supply voltage of specified in the users manual of the rated supply voltage at a temperature of 20 °C. For equipment that is capable only of operating from a battery, the frequency stability tests shall be performed using a new battery without any further requirement to vary supply voltage.

1. The EUT was placed inside the environmental test chamber.
2. The temperature was incremented by 10 °C intervals from lowest temperature.
3. Each increase step of temperature measured the frequency.
4. The test temperature was set 20°C and the supply voltage was then adjusted on the EUT from 85 % to 115% and the frequency record.

5.7.3 Test Result

-complied

-5 180 ㎒ BW

Voltage (%)	Power (VDC)	Temp. (°C)	Reading Frequency (㎐)	Frequency Error (㎐)	Frequency Error (%)
100	3.7	-10	5 179 998 491	-1 509	-0.000 029 13
100		0	5 180 000 010	10	0.000 000 19
100		10	5 180 000 824	824	0.000 015 91
100		20	5 180 000 702	702	0.000 013 55
100		30	5 180 000 237	237	0.000 004 58
100		40	5 179 999 892	-108	-0.000 002 08
100		50	5 179 999 953	-47	-0.000 000 91
100		Normal	5 180 000 702	702	0.000 013 55
85	3.145	Normal	5 180 000 688	688	0.000 013 28
115	4.255	Normal	5 180 000 750	750	0.000 014 48

-5 250 ㎒ BW

Voltage (%)	Power (VDC)	Temp. (°C)	Reading Frequency (㎐)	Frequency Error (㎐)	Frequency Error (%)
100	3.7	-10	5 259 998 983	-1 017	-0.000 019 33
100		0	5 260 000 133	133	0.000 002 53
100		10	5 260 000 859	859	0.000 016 33
100		20	5 260 000 761	761	0.000 014 47
100		30	5 260 000 240	240	0.000 004 56
100		40	5 259 999 892	-108	-0.000 002 05
100		50	5 259 999 998	-2	-0.000 000 04
100		Normal	5 260 000 761	761	0.000 014 47
85	3.145	Normal	5 260 000 784	784	0.000 014 90
115	4.255	Normal	5 260 000 738	738	0.000 014 03

-5 470 ㎒ BW

Voltage (%)	Power (VDC)	Temp. (°C)	Reading Frequency (㎐)	Frequency Error (㎐)	Frequency Error (%)
100	3.7	-10	5 499 998 850	-1 150	-0.000 020 91
100		0	5 500 000 190	190	0.000 003 45
100		10	5 500 000 899	899	0.000 016 35
100		20	5 500 000 751	751	0.000 013 65
100		30	5 500 000 262	262	0.000 004 76
100		40	5 499 999 801	-199	-0.000 003 62
100		50	5 500 000 650	650	0.000 011 82
100		Normal	5 500 000 751	751	0.000 013 65
85	3.145	Normal	5 500 000 794	794	0.000 014 44
115	4.255	Normal	5 500 000 731	731	0.000 013 29

-5 725 ㎒ BW

Voltage (%)	Power (VDC)	Temp. (°C)	Reading Frequency (㎐)	Frequency Error (㎐)	Frequency Error (%)
100	3.7	-10	5 744 998 858	-1 142	-0.000 019 88
100		0	5 745 000 308	308	0.000 005 36
100		10	5 745 000 966	966	0.000 016 81
100		20	5 745 000 756	756	0.000 013 16
100		30	5 745 000 240	240	0.000 004 18
100		40	5 744 999 799	-201	-0.000 003 50
100		50	5 744 999 949	-51	-0.000 000 89
100		Normal	5 745 000 756	756	0.000 013 16
85	3.145	Normal	5 745 000 838	838	0.000 014 59
115	4.255	Normal	5 745 000 722	722	0.000 012 57

5.8 DFS(Dynamic Frequency Selection)

5.8.1 Regulation

Transmit Power Control (TPC) and Dynamic Frequency Selection (DFS).

(1) Transmit power control (TPC). U-NII devices operating in the 5.25-5.35 ㎓ band and the 5.47-5.725 ㎓ band shall employ a TPC mechanism. The U-NII device is required to have the capability to operate at least 6 ㏈ below the mean EIRP value of 30 ㏈m. A TPC mechanism is not required for systems with an e.i.r.p. of less than 500 ㎽.

(2) Radar Detection Function of Dynamic Frequency Selection (DFS). U-NII devices operating with any part of its 26 dB emission bandwidth in the 5.25-5.35 ㎓ and 5.47-5.725 ㎓ bands shall employ a DFS radar detection mechanism to detect the presence of radar systems and to avoid co-channel operation with radar systems. Operators shall only use equipment with a DFS mechanism that is turned on when operating in these bands. The device must sense for radar signals at 100 percent of its emission bandwidth. The minimum DFS detection threshold for devices with a maximum e.i.r.p. of 200 ㎽ to 1 ㏗ is −64 ㏈m. For devices that operate with less than 200 ㎽ e.i.r.p. and a power spectral density of less than 10 ㏈m in a 1 MHz band, the minimum detection threshold is −62 ㏈m. The detection threshold is the received power averaged over 1 microsecond referenced to a 0 ㏈i antenna. For the initial channel setting, the manufacturers shall be permitted to provide for either random channel selection or manual channel selection.

(i) Operational Modes. The DFS requirement applies to the following operational modes:
(A) The requirement for channel availability check time applies in the master operational mode.
(B) The requirement for channel move time applies in both the master and slave operational modes.
(ii) Channel Availability Check Time. A U-NII device shall check if there is a radar system already operating on the channel before it can initiate a transmission on a channel and when it has to move to a new channel. The U-NII device may start using the channel if no radar signal with a power level greater than the interference threshold values listed in paragraph (h)(2) of this section, is detected within 60 seconds.
(iii) Channel Move Time. After a radar's presence is detected, all transmissions shall cease on the operating channel within 10 seconds. Transmissions during this period shall consist of normal traffic for a maximum of 200 ms after detection of the radar signal. In addition, intermittent management and control signals can be sent during the remaining time to facilitate vacating the operating channel.
(iv) Non-occupancy Period. A channel that has been flagged as containing a radar system, either by a channel availability check or in-service monitoring, is subject to a non-occupancy period of at least 30 minutes. The non-occupancy period starts at the time when the radar system is detected.
(i) Device Security. All U-NII devices must contain security features to protect against modification of software by unauthorized parties.

5.8.2 Measurement Procedure

The following table from FCC 06-96 lists the applicable requirements for the DFS testing.
The device evaluated in this report is considered a client device without radar detection capability.

5.8.3 Support Equipment

Product	Manufacture	Model No.	Serial No.	FCCID.
Cisco Aironet IOS Access Point	Cisco	AIR-CAP2702E-A-K9	FGL1848X4LC	LDK102091

Note. This device was functioned as a Master device during the DFS test.

5.8.4 Test Result

The UUT is a U-NII Device operating in Client mode without radar detection. The radar test signals are injected into the Master Device.

The highest power level within these bands in 22.19 dBm (165.58 ㎽) EIRP in the 5 250 ~ 5 350 ㎒ band and 21.79 dBm (151.01 ㎽) EIRP in the 5 470 ~ 5 725 ㎒ band.

The gain antenna assembly utilized with the master has a gain of 2.08 dBi.

The calibrated conducted DFS detection threshold level is set to -58.92 dBm.(-62 + 1 + 2.08 = -58.92)

* 802.11n HT20

5 250 Band

Channel Move Time

Frequency (㎒)	Channel Move Time	Limit
5 520	< 10 s	10 s

Channel Closing Time

Frequency (㎒)	Channel Move Time	Limit
5 260	< 60 ㎳	60 ㎳

* 802.11n HT20

5 470 Band

Channel Move Time

Frequency (㎒)	Channel Move Time	Limit
5 300	< 10 s	10 s

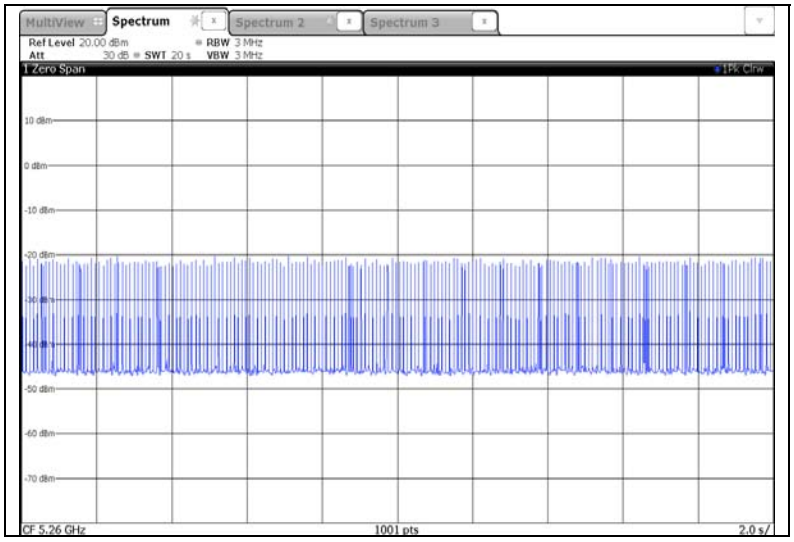
Channel Closing Time

Frequency (㎒)	Channel Move Time	Limit
5 500	< 60 ㎳	60 ㎳

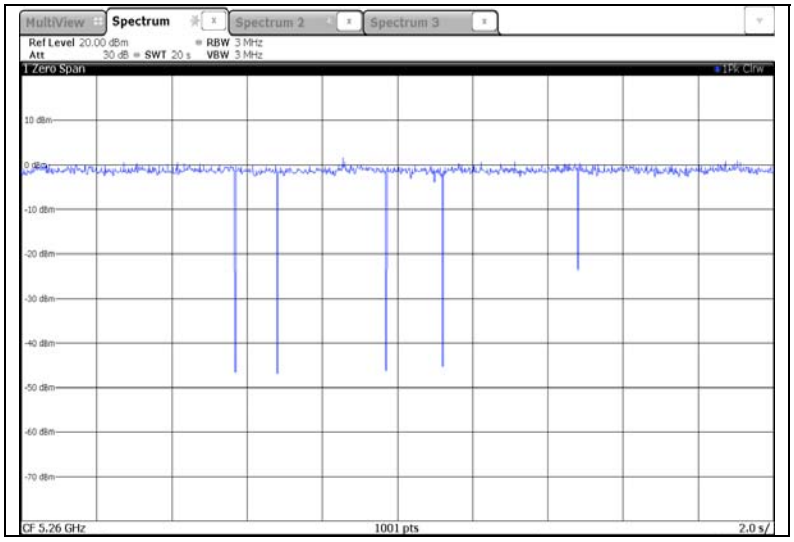
5.8.5 Test Plot

Figure 3. Plot of the DFS

No traffic signal(master signal)



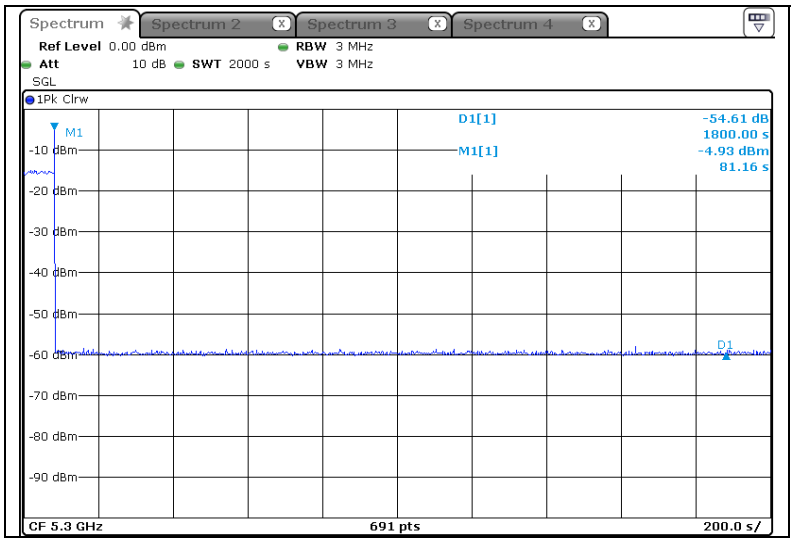
Client(EUT) Data Traffic Signal



Non-Occupancy Period

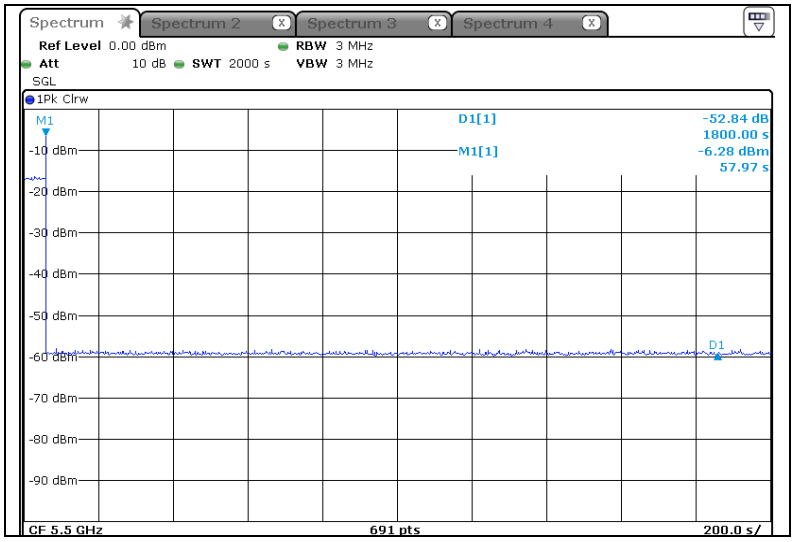
* 802.11n HT20

- 5 300 ㎒



* 802.11n HT20

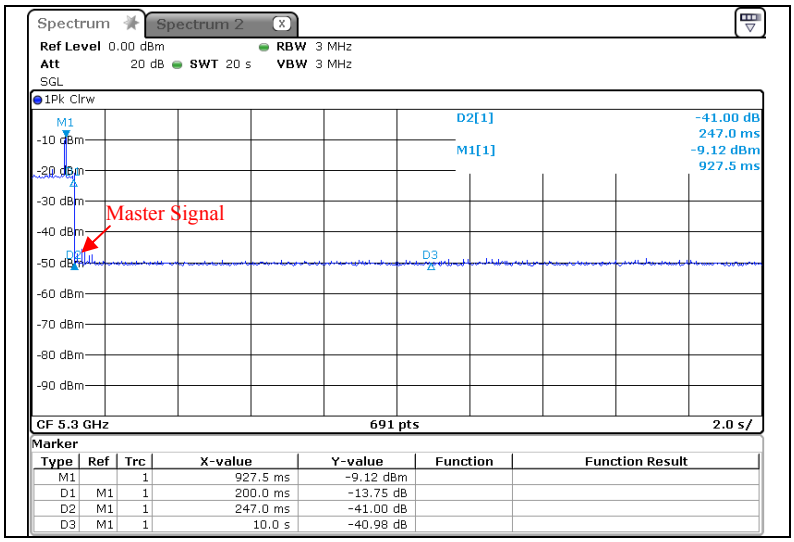
- 5 500 ㎒



Channel Moving time and Closing Time

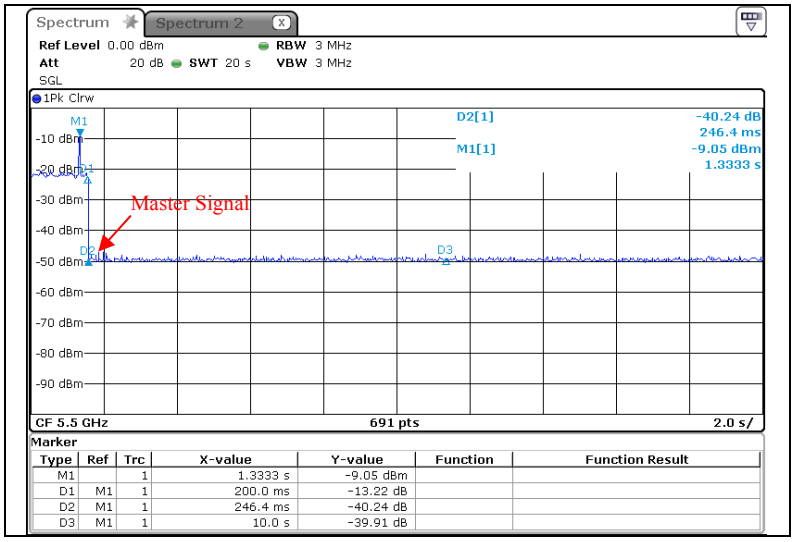
* 802.11n HT20

- 5 300 ㎒



* 802.11n HT20

- 5 500 ㎒



5.9 Conducted Emission

5.9.1 Regulation

According to §15.207(a), 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 ㎑ to 30 ㎒, shall not exceed the limits in the following table, as measured using a 50 µH/50 Ω line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of emission (㎒)	Conducted limit (dB㎶)	
	Qausi-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.

According to §15.107(a), for unintentional device, except for Class A digital devices, line conducted emission limits are the same as the above table.

5.9.2 Measurement Procedure

1) The EUT was placed on a wooden table of size, 1 m by 1.5 m, raised 80 ㎝ in which is located 40 ㎝ away from the vertical wall and 1.5m away from the side wall of the shielded room.

2) Each current-carrying conductor of the EUT power cord was individually connected through a 50Ω/50µH LISN, which is an input transducer to a Spectrum Analyzer or an EMI/Field Intensity Meter, to the input power source.

3) Exploratory measurements were made to identify the frequency of the emission that had the highest amplitude relative to the limit by operating the EUT in a range of typical modes of operation, cable position, and with a typical system equipment configuration and arrangement. Based on the exploratory tests of the EUT, the one EUT cable configuration and arrangement and mode of operation that had produced the emission with the highest amplitude relative to the limit was selected for the final measurement.

4) The final test on all current-carrying conductors of all of the power cords to the equipment that comprises the EUT (but not the cords associated with other non-EUT equipment is the system) was then performed over the frequency range of 0.15 ㎒ to 30 ㎒.

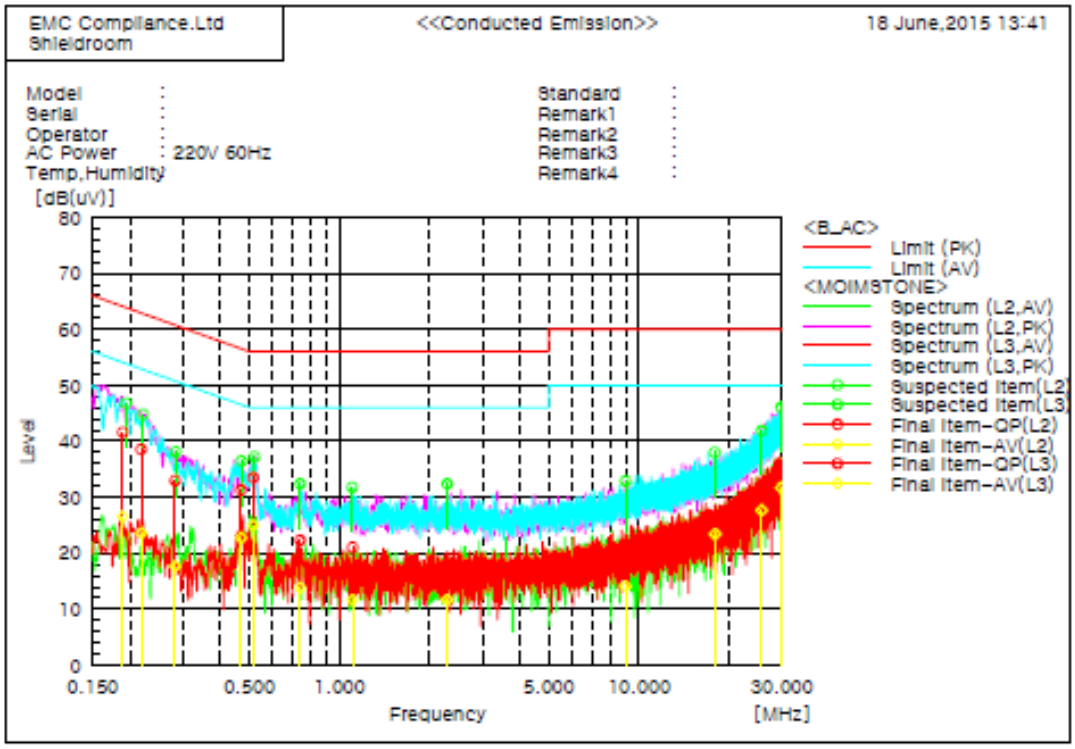
5) The measurements were made with the detector set to PEAK amplitude within a bandwidth of 10 ㎑ or to QUASI-PEAK and AVERAGE within a bandwidth of 9 ㎑. The EUT was in transmitting mode during the measurements.

5.9.3 Test Result

- Complied

Figure 4. plot of Conducted Emission

*Conducted worst-case data : 802.11n_HT20_Middle Channel (5 280 ㎒)



Final Result

L2 Phase

No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	o.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]
1	29.81164	4.7	4.3	27.4	32.1	31.7	60.0	50.0	27.9	18.3
2	9.00277	8.1	1.0	18.1	21.2	14.1	60.0	50.0	38.8	35.9
3	0.28259	23.3	8.0	9.7	33.0	17.7	60.7	50.7	27.7	33.0
4	0.21752	28.8	13.8	9.8	38.6	23.6	62.9	52.9	24.3	29.3

L3 Phase

No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	o.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]
1	17.92888	5.2	4.8	18.6	23.8	23.4	60.0	50.0	36.2	26.6
2	25.72111	4.8	3.7	24.0	28.8	27.7	60.0	50.0	31.2	22.3
3	2.28757	6.4	1.7	10.0	16.4	11.7	56.0	46.0	39.6	34.3
4	1.10787	11.2	1.9	9.8	21.0	11.7	56.0	46.0	35.0	34.3
5	0.73819	12.5	4.1	9.8	22.3	13.9	56.0	46.0	33.7	32.1
6	0.46854	21.4	12.8	9.9	31.3	22.7	56.5	46.5	25.2	23.8
7	0.51506	23.6	15.1	9.9	33.5	25.0	56.0	46.0	22.5	21.0
8	0.18888	31.7	18.7	9.9	41.6	28.6	64.1	54.1	22.5	27.5

6. Test equipment used for test

	Description	Manufacturer	Model No.	Serial No.	Next Cal Date.
■	Wideband Power Sensor	R&S	NRP-Z81	102398	15.11.27
■	Attenuator	HP	8491A	18591	16.05.14
■	Spectrum Analyzer	R&S	FSV30	101437	15.12.11
■	Signal Generator	R&S	SMR40	100007	16.06.15
■	Spectrum Analyzer	AGILENT	E4440A	MY44303500	16.06.15
■	DC Power Supply	Agilent	E3632A	MY51220373	15.12.11
■	Amplifier	HP	8447D	2944A07626	16.01.19
■	BiLog Antenna	Schwarzbeck	VULB 9163	552	16.05.14
■	Loop Antenna	R&S	HFH2-Z2	100355	17.03.03
■	Horn Antenna	ETS-LINDGREN	3117	155787	16.02.05
■	Broadband Preamplifier	SCHWARZBECK	BBV9718	216	15.08.12
■	Highpass Filter	Wainwright Instrumens GmbH	WHKX3.0/ 18G-12SS	44	16.02.02
■	Two-Line-V-Network	R&S	ENV216	10358	15.10.04
■	Attenuator	HP	8491A	MY52460424	-
■	EMI Test Receiver	Schwarzbeck	ESR7	101078	16.02.16
■	Antenna Mast	Innco Systems	MA4000-EP	303	-
■	Turn Table	Innco Systems	DT2000S-1t	79	-