FCC TEST REPORT

Test report No.:	EMC- FCC- R0108-2
FCC ID:	O6ZC41W-500
Type of equipment:	Wireless Client
Model Name:	C41W-500
Applicant:	HUMAX Co., Ltd.
Max.RF Output Power:	23.07 dBm
FCC Rule Part(s):	FCC Part 15 Subpart C 15.407
Frequency Range:	5 190 MHz ~ 5 230 MHz 5 270 MHz ~ 5 310 MHz 5 510 MHz ~ 5 670 MHz
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 test: February 06, 2013 ~ March 07, 2013

Issued date: April 4, 2013

Tested by: YU, SANG HOON

Approved by: KIM, CHANG MIN

480-5 Shin-dong, Yeongtong-gu, Suwon-city, Gyunggi-do, 443-390, Korea
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[Contents]

1. Client information

Applicant:	HUMAX Co., Ltd
Address:	HUMAX Village, 11-4, Sunae-dong, Bundang-gu, Seongnam-si, Gyeonggi-do, 463-825, KOREA
Telephone number:	+ 82-31-776-6400
Facsimile number :	+ 82-31-776-6149
Contact person:	Inseok Seo / Senior Engineer

Manufacturer :	Flextronics Electronics Technology (ShenZhen) Co., Ltd.
Address:	89, YongFu Rd, TongFuYu Ind Park, FuYong, BaoAn, SHZ, 518103 C

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 31 336 4767

Certificate
CBTL Testing Laboratory, KOLAS NO.: 231
FCC Filing No.: 508785
VCCI Registration No.: C-1713, R-1606, T-258
IC Recognition No.:8035A-2

SITE MAP

3. Description of E.U.T.

3.1 Basic description

Applicant :	HUMAX Co., Ltd
Address of Applicant:	HUMAX Village, 11-4, Sunae-dong, Bundang-gu, Seongnam-si, Gyeonggi-do, 463-825, KOREA
Manufacturer:	HUMAX Co., Ltd
Address of Manufacturer:	HUMAX Village, 11-4, Sunae-dong, Bundang-gu, Seongnam-si, Gyeonggi-do, 463-825, KOREA
Type of equipment:	Wireless Client
Basic Model:	C41W-500
Serial number:	Proto Type

3.2 General description

Communication	802.15.4(RF4CE) 802.11n HT40
Frequency Range	**2.4 GHz RF4CE** : 2 425 ~ 2 475 MHz **5.0 GHz Wi-Fi** : 5 190 ~ 5 230 MHz, 5 270 ~ 5 310 MHz, 5 510 ~ 5 670 MHz, 5 755 ~ 5 795 MHz
Type of Modulation (Technologies)	**2.4 GHz RF4CE** : O-QPSK(DSSS), **5.0 GHz Wi-Fi** : 64QAM, 16QAM, QPSK, BPSK(OFDM)
Channel capacity	**2.4 GHz RF4CE** : 3 ch **5.0 GHz** : 5 190 ~ 5 230 MHz: 2 ch(802.11n_HT40) 5 270 ~ 5 310 MHz: 2 ch(802.11n_HT40) 5 510 ~ 5 670 MHz: 5 ch(802.11n_HT40) 5 755 ~ 5 795 MHz: 2 ch(802.11n_HT40)
Antenna Gain	**2.4 GHz RF4CE** : Ant0 2.89 dBi, Ant1 2.26 dBi **5.0 GHz Wi-Fi :** 5 190 ~ 5 230 MHz: 1.9 dBi 5 270 ~ 5 310 MHz: 2.5 dBi 5 510 ~ 5 670 MHz: 2.9 dBi 5 755 ~ 5 795 MHz: 3.0 dBi
Type of Antenna	Integral Embedded Antenna(Wi-Fi), Integral PCB antenna(RF4CE)
Firmware version	Wi-Fi Driver Ver: v35.1.0.27 RF4CE Driver Ver: GP510 FW v1.1.0.0 CL 00026578
Power supply	AC 120 V
Operating temperature	0 ~ 50 °C
Dimension	176 mm x 116 mm x 28 mm (W x D x H)

3.3 Test frequency

For all teset items, the low, middle and high channels of the modes were tested with above worst case data rate.

2400 ~ 2483.5 (MHz) : 802.15.4(RF4CE)

	CH	Frequency
Low frequency	15	2 425 MHz
Middle frequency	20	2 450 MHz
High frequency	25	2 475 MHz

5150~5250 (MHz) : 802.11n HT40

	CH	Frequency
Band Width	40 MHz	
Low frequency	38	5 190 MHz
Middle frequency	-	-
High frequency	46	5 230 MHz

5250~5350 (MHz) : 802.11n HT40

	CH	Frequency
Band Width	40 MHz	
Low frequency	54	5 270 MHz
Middle frequency	-	-
High frequency	62	5 310 MHz

5470~5350 (MHz) : 802.11n HT40

	CH	Frequency
Band Width	40 MHz	
Low frequency	102	5 510 MHz
Middle frequency	110	5 550 MHz
High frequency	134	5 670 MHz

5250~5350 (MHz) : 802.11n HT40

	CH	Frequency
Band Width	40 MHz	
Low frequency	151	5 755 MHz
Middle frequency	-	-
High frequency	159	5 795 MHz

3.4 Test Voltage

mode	Voltage
Norminal voltage	AC 120V

4. Summary of test results

4.1 Standards & results

Rule Reference	Parameter	Report Section	Test Result
15.203 15.407(a)(1)(2)(3)	Antenna Requirement	5.1	C
N/A	26 dB Bandwidth	5.2	C
15.407(a)(1)(2)	Maximum Conducted Output Power	5.3	C
15.407(a)(1)(2)(5)	Peak Power Spectral Density	5.4	C
15.407(a)(6)	Peak Excursion	5.5	C
15.205(a), 15.209(a), 15.407(b)(1), 15.407(b)(2), 15.407(b)(3)	Spurious Emission, Band Edge, and Restricted bands	5.6	C
15.407(g)	Frequency Stability	5.7	C
15.207(a)	Conducted Emissions	5.8	C
15.407(h)	Dynamic Freqyency Selection	5.9	C (refer to DFS test report)
15.407(f), 1.1307(b)(1)	RF Exposure	5.10	C
RSS-Gen, Issue 3,6	Receiver Spurious Emission (Radiated)	5.11	NA

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

4.2 Uncertainty

Measurement Item	Combined Standard Uncertainty Uc	Expanded Uncertainty U = KUc (K = 2)
Conducted RF power	± 0.29 dB	± 0.58 dB
Radiated disturbance	30 ㎒ ~ 300 ㎒ : + 2.43 dB, - 2.44 dB 300 ㎒~1 000 ㎒ : + 2.49dB, - 2.50 dB 1 ㎓ ~ 6 ㎓ : + 3.10 dB, - 3.10 dB 6 ㎓ ~ 18 ㎓ : + 3.21 dB, - 3.27 dB	30 ㎒ ~ 300 ㎒ : + 4.86 dB, - 4.88 dB 300 ㎒ ~ 1 000 ㎒ + 4.98dB, - 4.99 dB 1 ㎓ ~ 6 ㎓ : + 6.19 dB, - 6.20 dB 6 ㎓ ~ 18 ㎓ : + 6.41 dB, - 6.53 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

	5 150~5 250 MHz	5 250~5 350 MHz	5 470~5 725 MHz	5 725~5 850 MHz
ANT Gain	1.9	2.5	2.9	3.0

According to KDB 662911 D01 Multiple Transmitter Output v01r02
- Directional gain = G_{ANT} + Array Gain, where Array Gain is as follows.

For power spectral density (PSD) measurements on all devices,

Array Gain = 10 log(N_{ANT}/N_{SS}) dB.

For power measurements on IEEE 802.11 devices

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;

Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT};

Array Gain = 5 log(N_{ANT}/N_{SS}) dB or 3 dB, whichever is less for 20-MHz channel widths with $N_{ANT} \geq 5$.

For power measurements on all other devices:

Array Gain = 10 log(N_{ANT}/N_{SS}) dB.

5.2 26 dB Bandwidth

5.1.1 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.

5.1.2 Measurement Procedure

These test measurement settings are specified in section D) of 789033 D01 General UNII Test Procedures.

1) Set RBW = approximately 1% of the emission bandwidth.
2) Set the VBW > RBW.
3) Detector = Peak.
4) Trace mode = max hold.
5) 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%.

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

5.4.3 Test Result

-Complied

802.11n 40 MHz
5 150 ~5 250 MHz

Channel	Frequency (MHz)	26 dB BW ANT1 (MHz)	26 dB BW ANT2 (MHz)	26 dB BW ANT3 (MHz)	26 dB BW ANT4 (MHz)	Min. Limit (kHz)
Low	5 190	44.10	44.36	44.10	42.69	-
High	5 230	43.97	44.36	44.23	43.08	-

5 250 ~5 350 MHz

Channel	Frequency (MHz)	26 dB BW ANT1 (MHz)	26 dB BW ANT2 (MHz)	26 dB BW ANT3 (MHz)	26 dB BW ANT4 (MHz)	Min. Limit (kHz)
Low	5 270	49.36	49.36	49.23	45.64	-
High	5 310	49.10	49.23	49.10	45.64	-

5 470 ~5 725 MHz

Channel	Frequency (MHz)	26 dB BW ANT1 (MHz)	26 dB BW ANT2 (MHz)	26 dB BW ANT3 (MHz)	26 dB BW ANT4 (MHz)	Min. Limit (kHz)
Low	5 510	46.41	45.90	48.72	45.26	-
Mid	5 550	49.23	49.10	49.23	46.54	-
High	5 670	51.28	49.49	49.23	47.69	-

-NOTE:
1. We took the insertion loss of the cable loss into consideration within the measuring instrument.

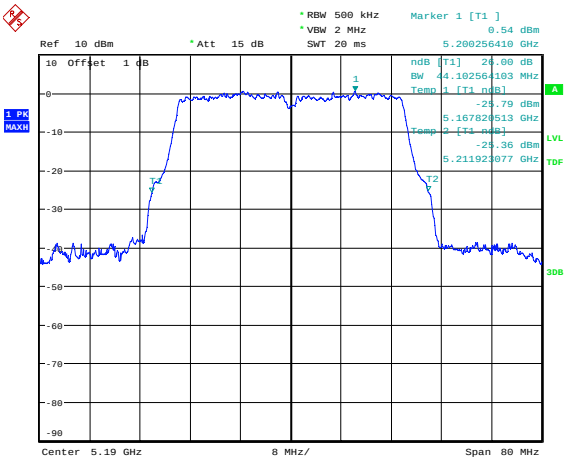
5.2.4 Test Plot

Figure 1. Plot of the 26 dB Bandwidth

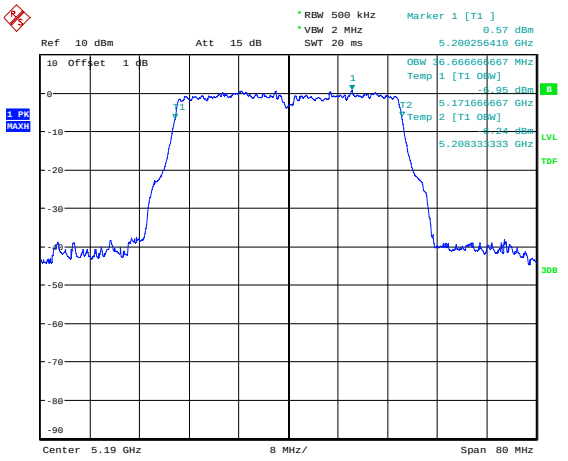
802.11n 40 MHz

Lowest Channel(5 190 MHz)

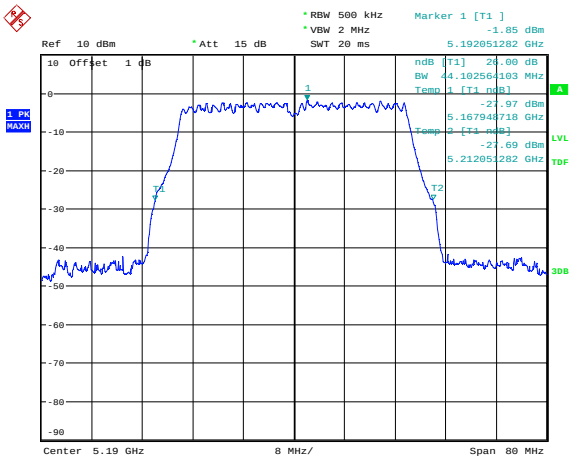
Ant1



Ant2



Ant3



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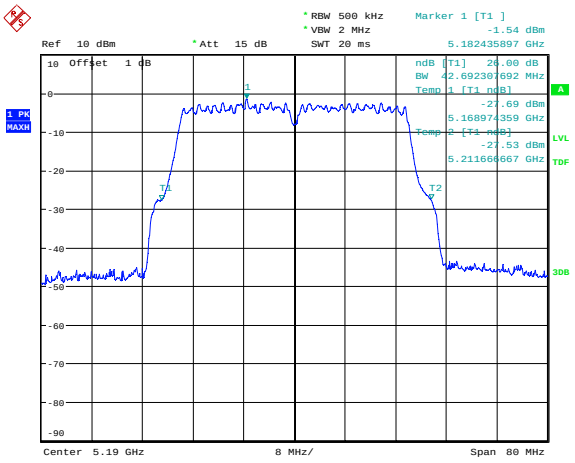
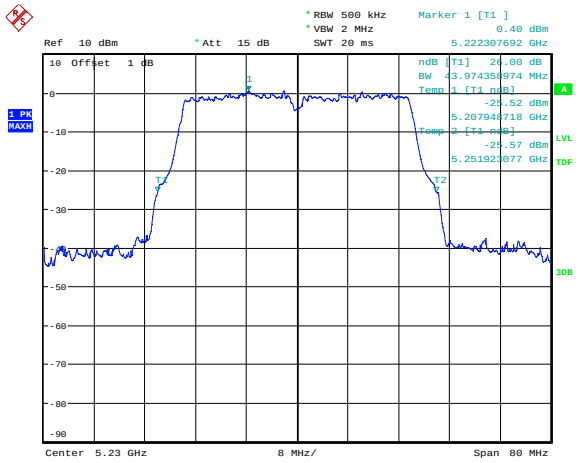


802.11n 40 MHz

Highest Channel(5 230 MHz)

Ant1



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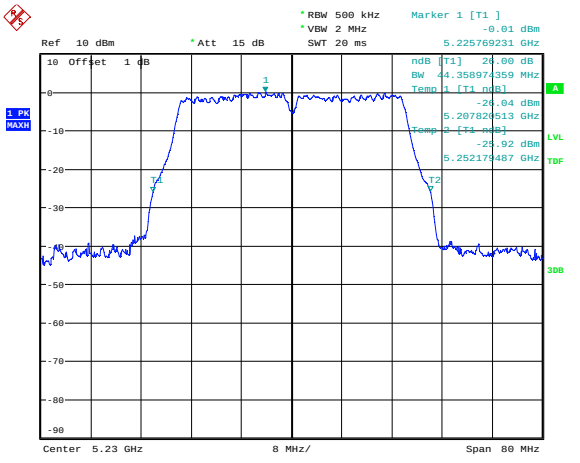

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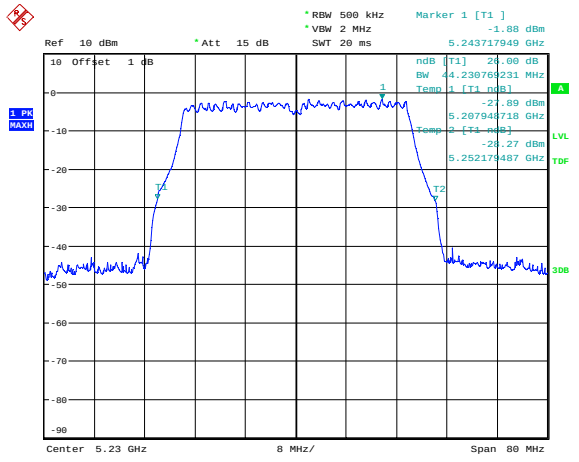

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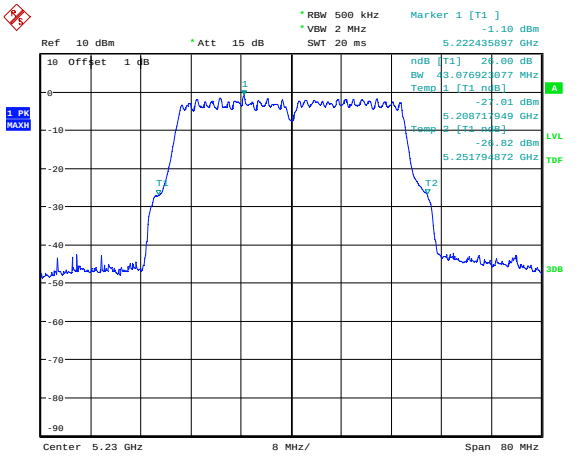
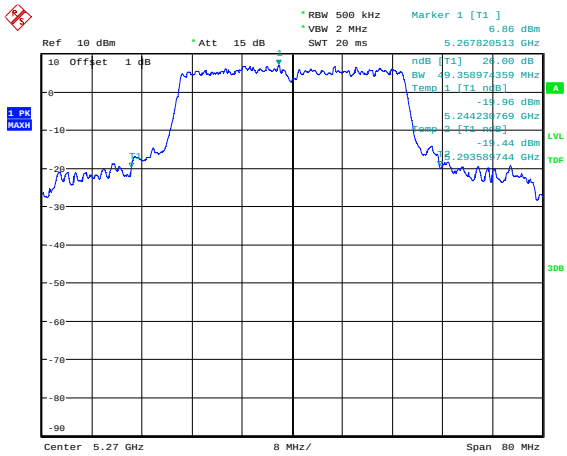


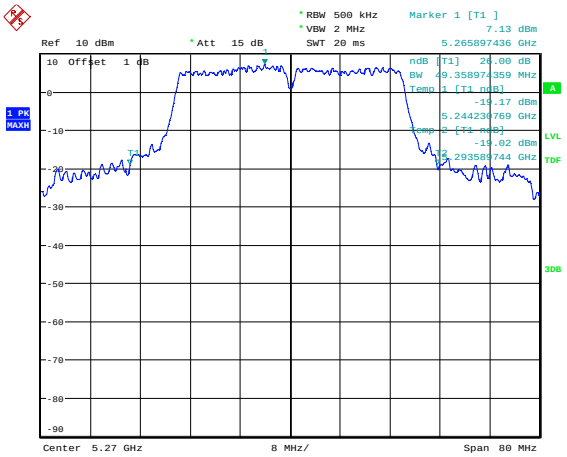
802.11n 40 MHz

Lowest Channel(5 270 MHz)

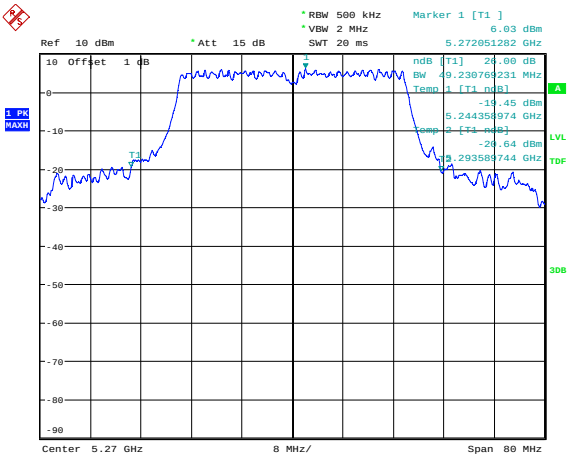
Ant1



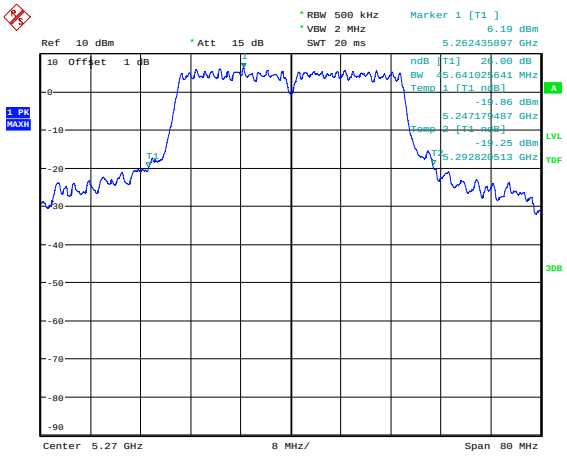
Ant2



Ant3



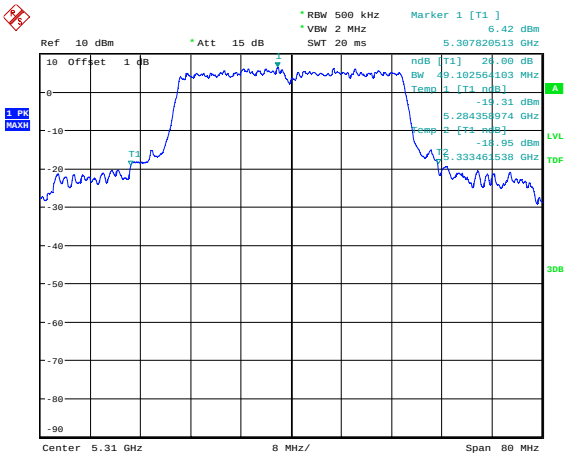
Ant4



802.11n 40 MHz

Highest Channel(5 310 MHz)

Ant1



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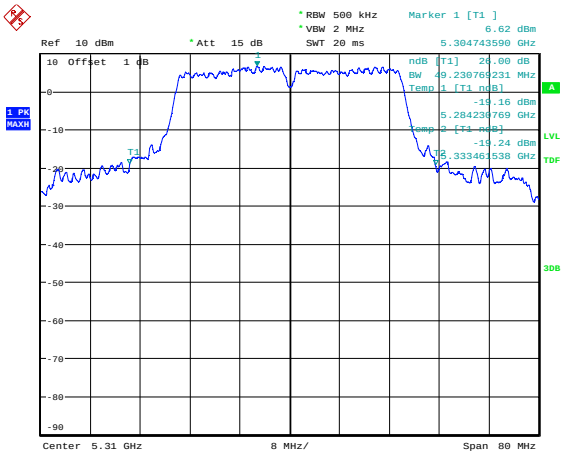
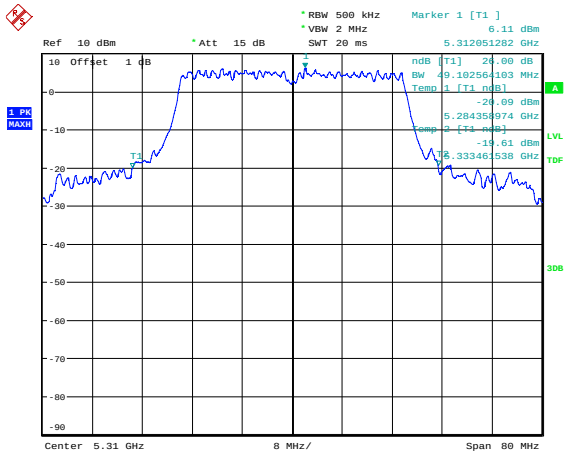


Ant3



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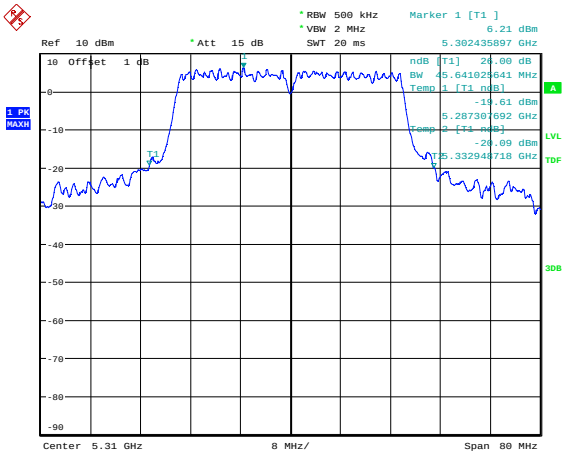
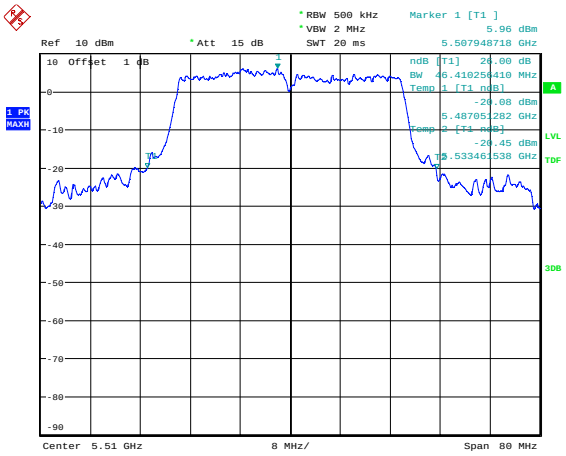


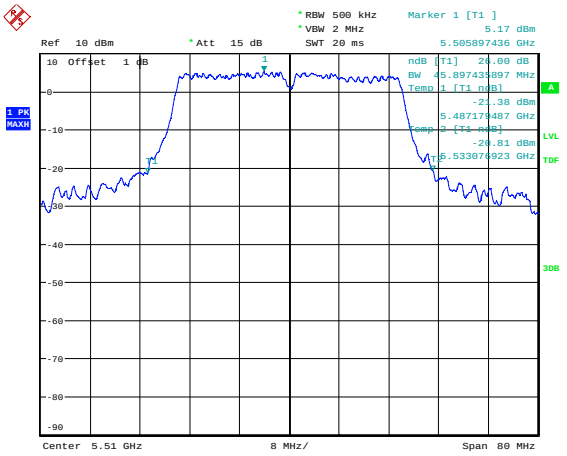
802.11n 40 MHz

lowest Channel(5 510 MHz)

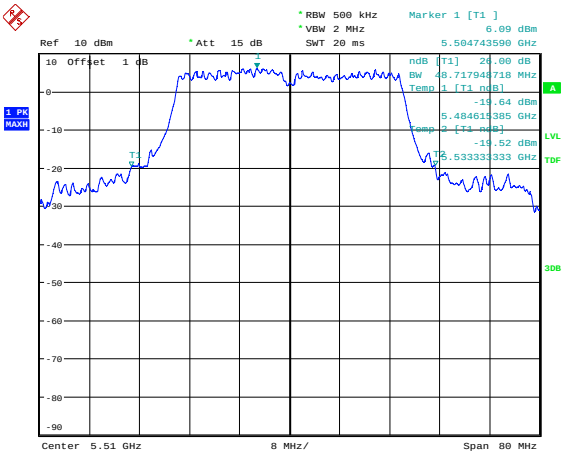
Ant1



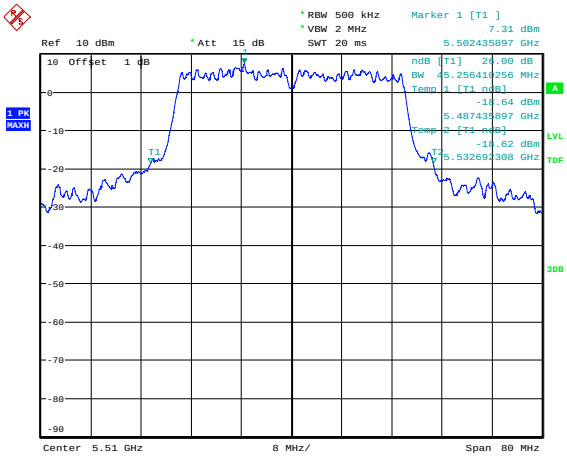
Ant2



Ant3



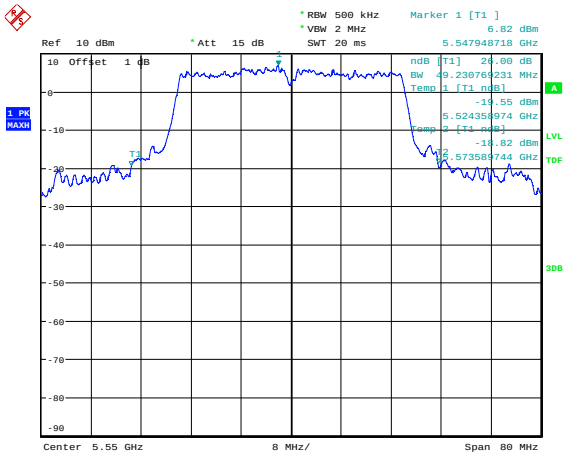
Ant4



802.11n 40 MHz

Middle Channel(5 550 MHz)

Ant1



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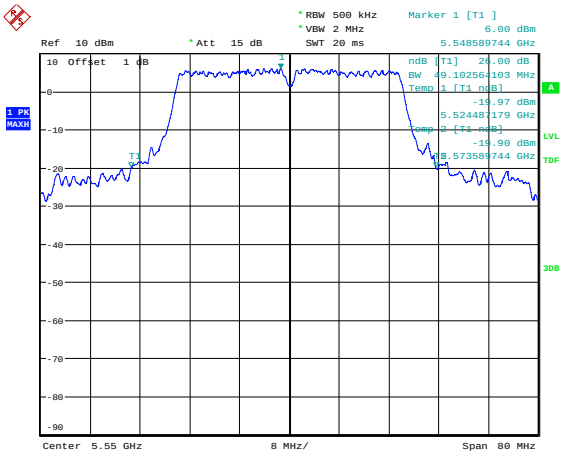

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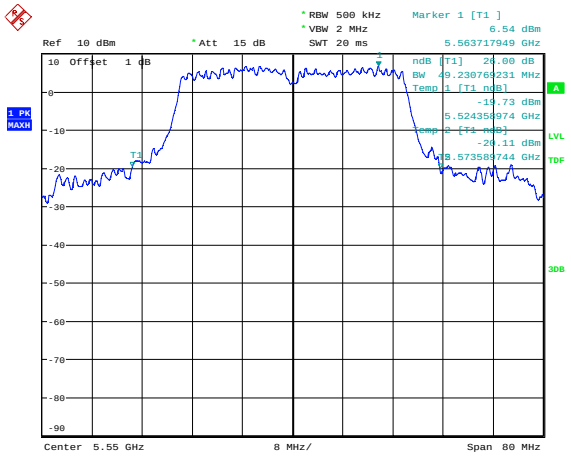

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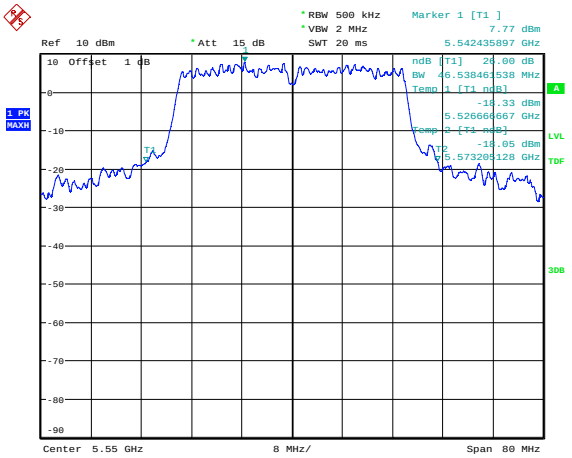
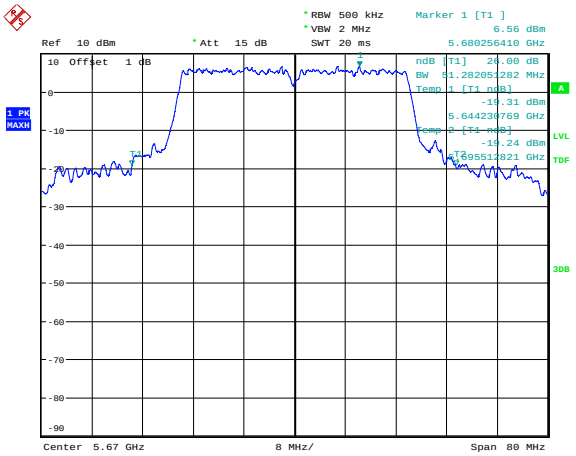


802.11n 40 MHz

Highest Channel(5 670 MHz)

Ant1



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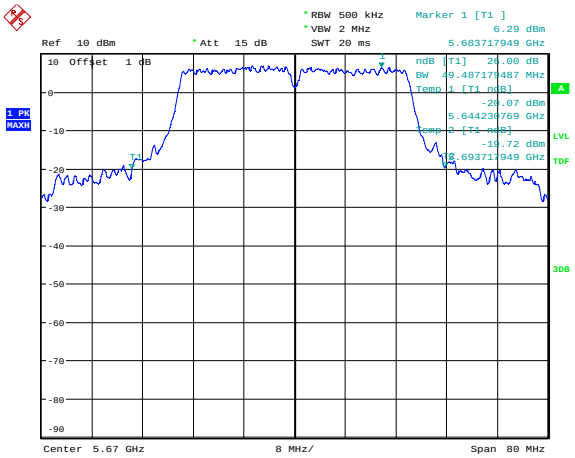
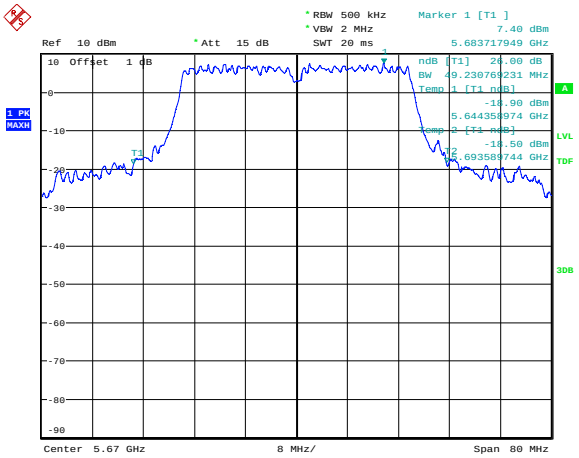
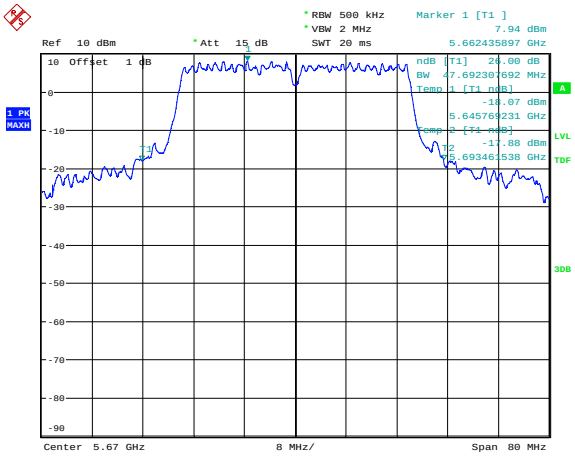


Ant3



Ant4



5.3 Maximum Conducted Output Power

5.3.1 Regulation

According to §15.407(a) (1) For the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or 4 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. 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.

According to §15.407(a) (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 peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

5.3.2 Measurement Procedure

These test measurement settings are specified in f) of section C of 789033 D01 General UNII Test Procedures.

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

(1) As an alternative to spectrum analyzer measurements, 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.
   (i) The EUT is configured to transmit continuously or to transmit with a consistent duty factor.
   (ii) At all times when the EUT is transmitting, it must be transmitting at its maximum power control level.
   (iii) The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.

(2) If the transmitter does not transmit continuously, measure the duty cycle, x, of the transmitter output signal as described in section B).
(3) Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
(4) 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).

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5.3.4 Test Result

-Complied

802.11n 40MHz
5 150 ~5 250 MHz

Frequency (MHz)	Average Power (dBm)				C.L (dB)	Total result (dBm)	Duty cycle (dB)	Total +D.F (dBm)	Limit (dBm)	Margin (dB)
	Ant1	Ant2	Ant3	Ant4						
5 190	8.17	6.98	5.99	4.40	2.71	15.33	0.11	15.44	17.00	1.56
5 230	8.20	7.53	5.53	4.29	2.83	15.51	0.11	15.62	17.00	1.38

5 250 ~5 350 MHz

Frequency (MHz)	Average Power (dBm)				C.L (dB)	Total result (dBm)	Duty cycle (dB)	Total +D.F (dBm)	Limit (dBm)	Margin (dB)
	Ant1	Ant2	Ant3	Ant4						
5 270	14.43	14.18	13.61	13.07	2.79	22.66	0.11	22.77	24.00	1.23
5 310	13.95	14.45	13.70	13.14	2.73	22.59	0.11	22.70	24.00	1.30

5 470 ~5 725 MHz

Frequency (MHz)	Average Power (dBm)				C.L (dB)	Total result (dBm)	Duty cycle (dB)	Total +D.F (dBm)	Limit (dBm)	Margin (dB)
	Ant1	Ant2	Ant3	Ant4						
5 510	13.73	13.94	13.93	14.03	2.84	22.77	0.11	22.88	24.00	1.12
5 550	14.01	14.15	14.32	14.14	2.78	22.96	0.11	23.07	24.00	0.93
5 670	13.48	13.90	14.33	13.85	2.89	22.81	0.11	22.92	24.00	1.08

-NOTE:

1. Since the directional gain of the integral antenna declared by the manufacturer does not exceed 6.0 dBi, there was no need to reduce the output power.(This device is $N_{ANT} = 4$, Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$)
2. Total power calculation = 10 log(10^(Ant1 power/10) + 10^(Ant2 power/10) + 10^(Ant3 power/10) + 10^(Ant4 power/10)).
3. Duty cycle = 0.975, Duty cycle factor = 10log(1/duty cycle) = 10log(1/0.975) = 0.11 dB.

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5.4 Peak Power Spectral Density

5.4.1 Regulation

According to §15.407(a)(1) For the band 5.15–5.25 GHz, the peak power spectral density shall not exceed 4 dBm in any 1–MHz band.

According to §15.407(a)(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 megahertz band.

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.

5.4.2 Measurement Procedure

These test measurement settings are specified in section E of 789033 D01 General UNII Test Procedures.

5.4.2.1 Peak power spectral density (PPSD)

(1) Create an average power spectrum for the EUT operating mode being tested by following the instructions in section C)3) for measuring maximum conducted output power using a spectrum analyzer: 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 spectrum analyzer to find the peak of the spectrum.
(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 C)3)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 PPSD.
(5) The above procedure involves use of 1 MHz resolution bandwidth to satisfy the 1 MHz measurement bandwidth specified in the 15.407(a)(5). That rule section also permits use of resolution bandwidths less than 1 MHz "provided that the measured power is integrated to show the total power over the measurement bandwidth" (i.e., 1 MHz). If measurements are performed using a reduced resolution bandwidth and integrated over 1 MHz bandwidth, care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

5.4.3 Test Result

-Complied

802.11n 40MHz
5 150 ~5 250 MHz

Frequency (MHz)	Average Power (dBm)				C.L (dB)	Total result (dBm)	Duty cycle (dB)	Total +D.F (dBm)	Limit (dBm)	Margin (dB)
	Ant1	Ant2	Ant3	Ant4						
5 190	-8.03	-9.04	-11.03	-11.65	2.71	-0.96	0.11	-0.85	4.00	4.85
5 230	-8.05	-8.83	-11.58	-11.38	2.83	-0.84	0.11	-0.73	4.00	4.73

5 250 ~5 350 MHz

Frequency (MHz)	Average Power (dBm)				C.L (dB)	Total result (dBm)	Duty cycle (dB)	Total +D.F (dBm)	Limit (dBm)	Margin (dB)
	Ant1	Ant2	Ant3	Ant4						
5 270	-1.75	-1.51	-2.26	-2.96	2.71	6.65	0.11	6.76	11.00	4.24
5 310	-2.01	-2.00	-3.08	-3.46	2.83	6.26	0.11	6.37	11.00	4.63

5 470 ~5 725 MHz

Frequency (MHz)	Average Power (dBm)				C.L (dB)	Total result (dBm)	Duty cycle (dB)	Total +D.F (dBm)	Limit (dBm)	Margin (dB)
	Ant1	Ant2	Ant3	Ant4						
5 510	-2.90	-3.51	-2.71	-2.70	2.84	5.92	0.11	6.03	11.00	4.97
5 550	-1.76	-2.42	-1.88	-1.81	2.78	6.84	0.11	6.95	11.00	4.05
5 670	-2.73	-2.22	-2.10	-2.04	2.89	6.65	0.11	6.76	11.00	4.24

-NOTE:

1. Since the directional gain of the integral antenna declared by the manufacturer does not exceed 6.0 dBi, there was no need to reduce the Peak Power Spectral Density. (This device is NSS = 4, Array Gain = 10 log(NANT/NSS) dB = 0.)
2. Total PPSD calculation = 10log(10^(Ant1 PSD / 10) + 10^(Ant2 PSD / 10) + 10^(Ant3 PSD / 10) + 10^(Ant4 PSD / 10))
3. Duty cycle = 0.975, Duty cycle factor = 10log(1/duty cycle) = 10log(1/0.975) = 0.11 dB.

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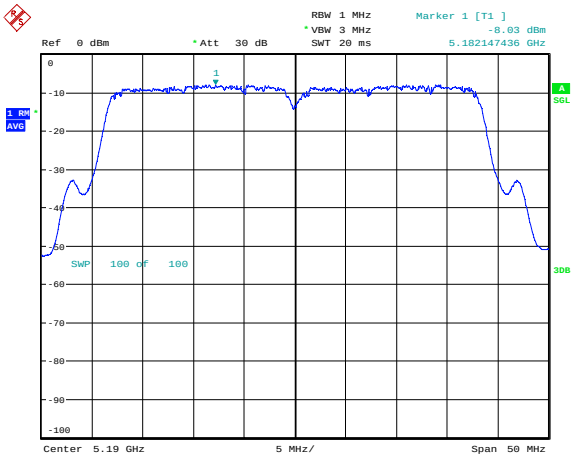
5.4.4 Test Plot

Figure 2. Plot of the Peak Power Spectral Density (Conducted)

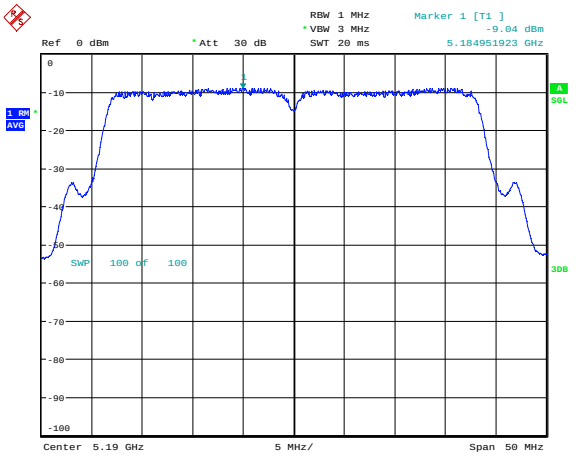
802.11n 40 MHz

- Lowest Channel (5 190 MHz)

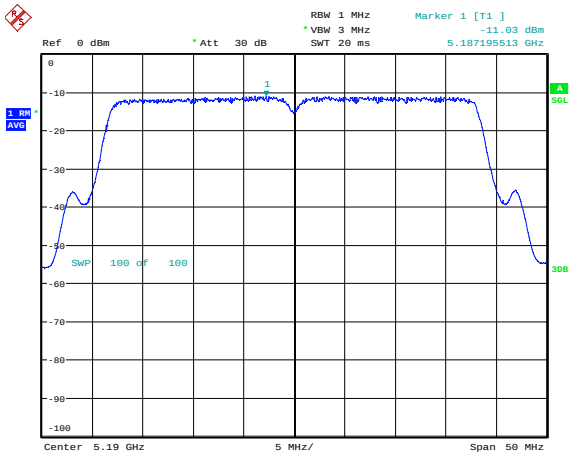
Ant1



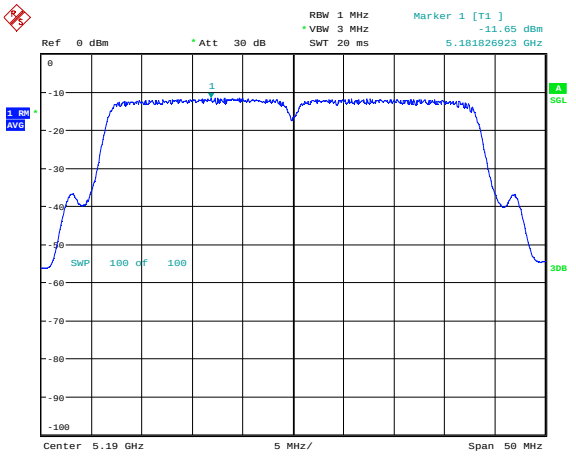
Ant2



Ant3



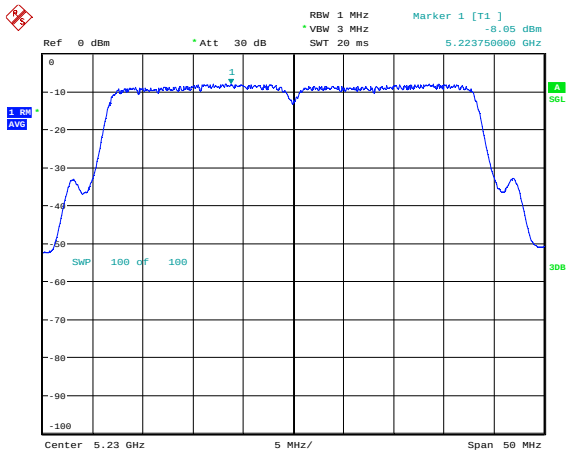
Ant4



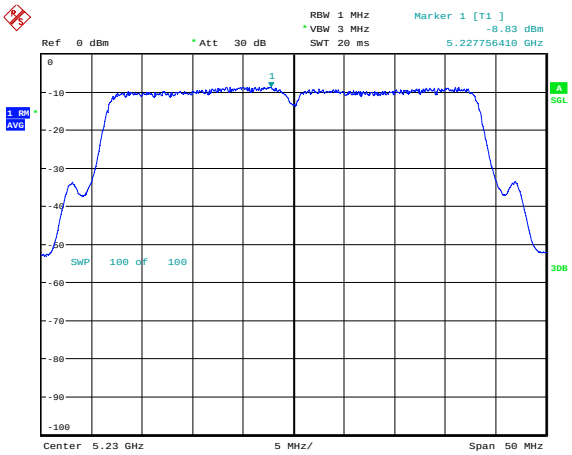
802.11n 40 MHz

- Highest Channel (5 230 MHz)

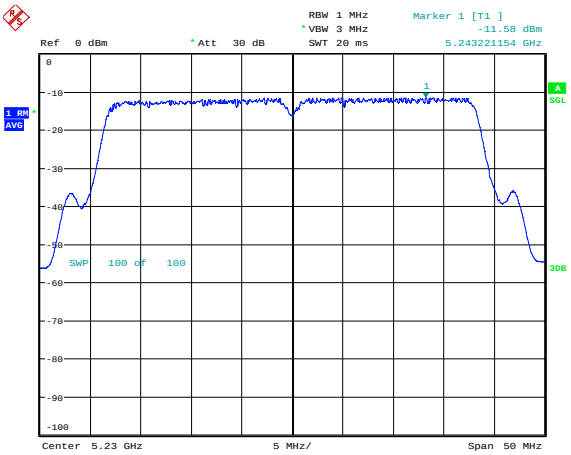
Ant1



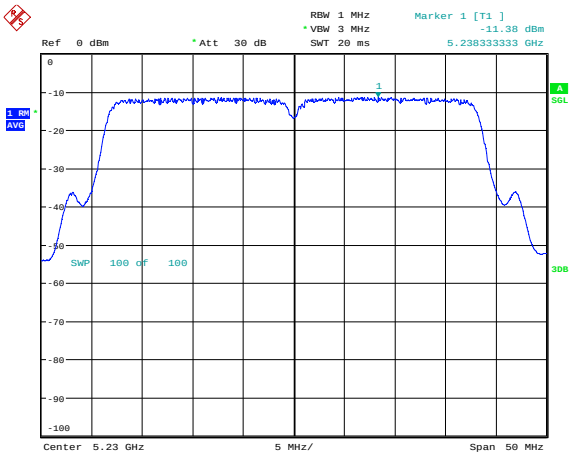
Ant2



Ant3



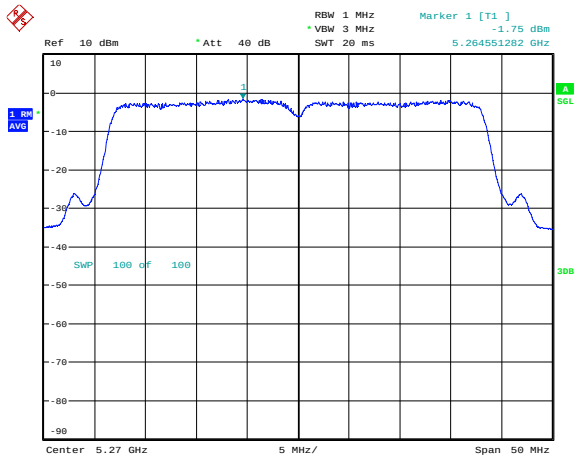
Ant4



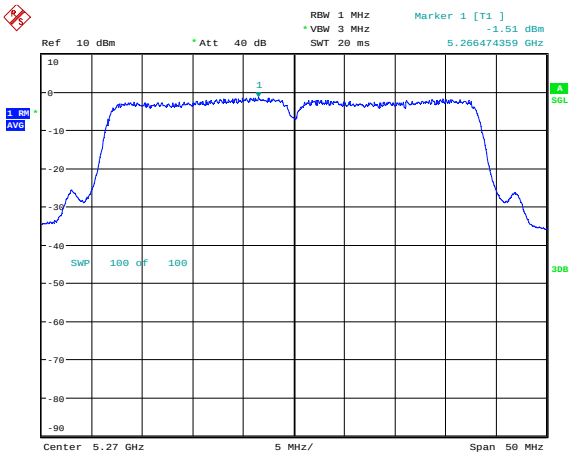
802.11n 40 MHz

- Lowest Channel (5 270 MHz)

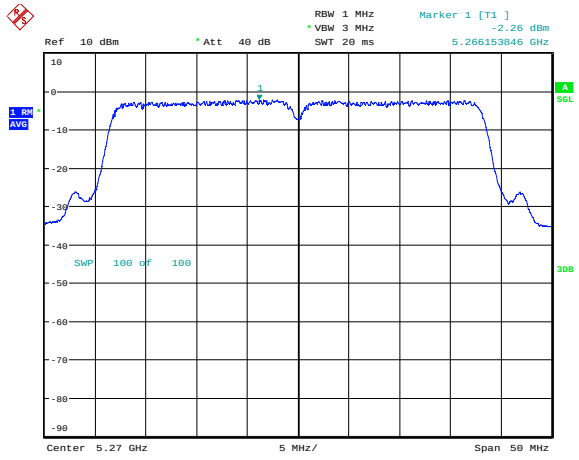
Ant1



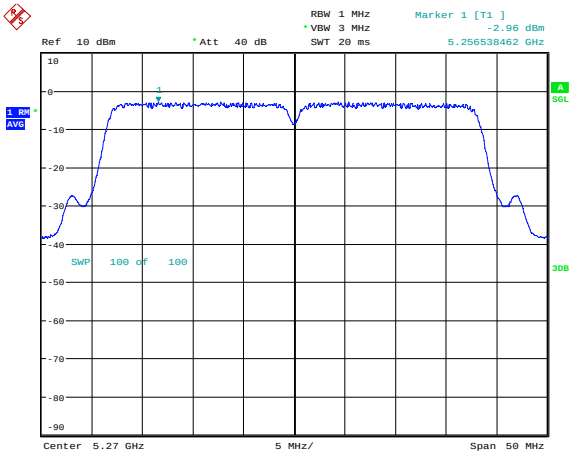
Ant2



Ant3



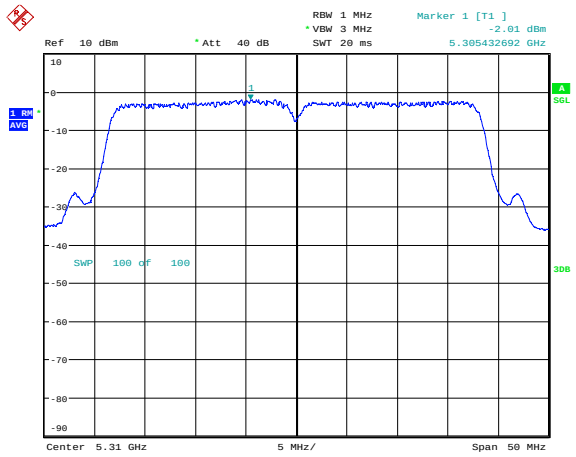
Ant4



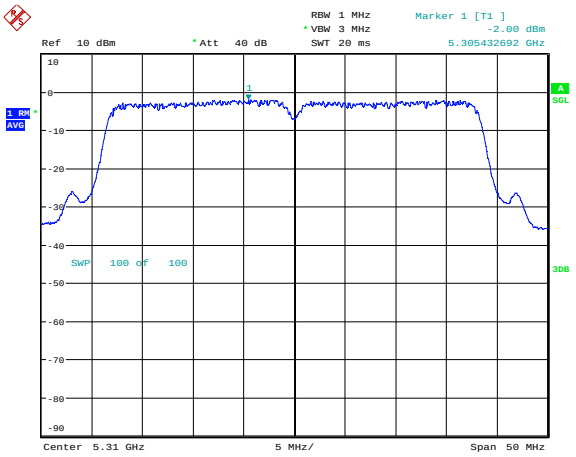
802.11n 40 MHz

- Highest Channel (5 310 MHz)

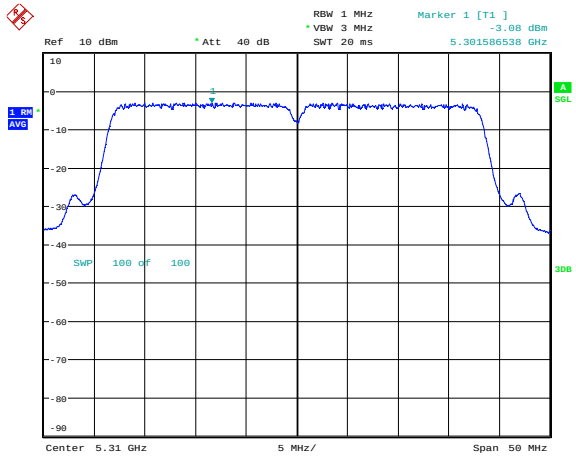
Ant1



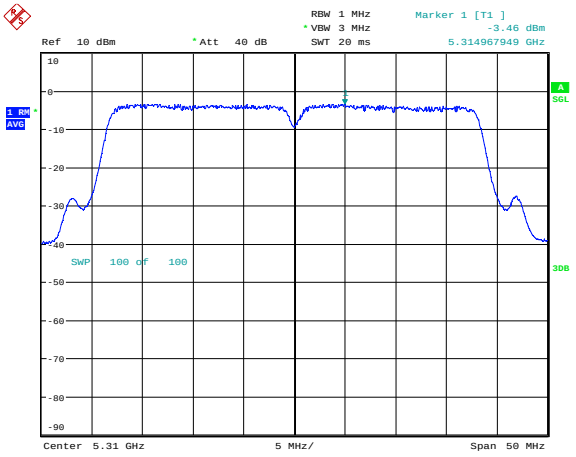
Ant2



Ant3



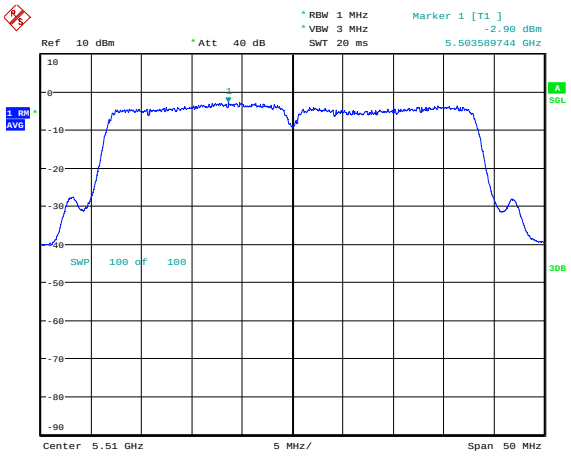
Ant4



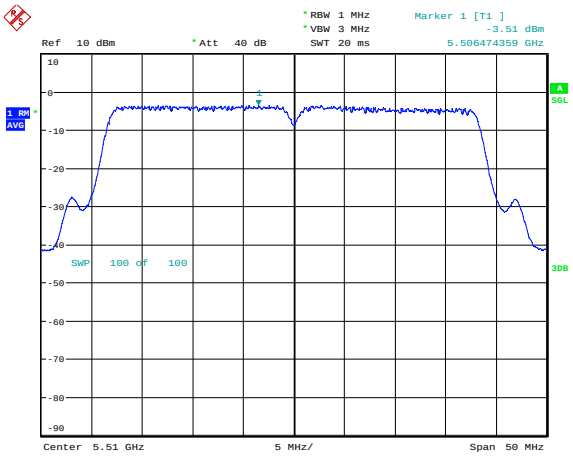
802.11n 40 MHz

- Lowest Channel (5 510 MHz)

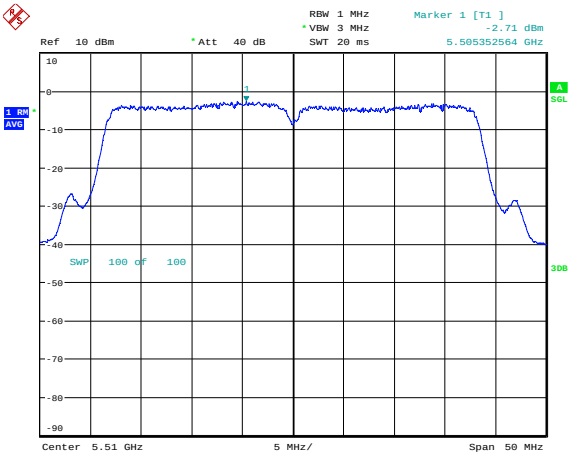
Ant1



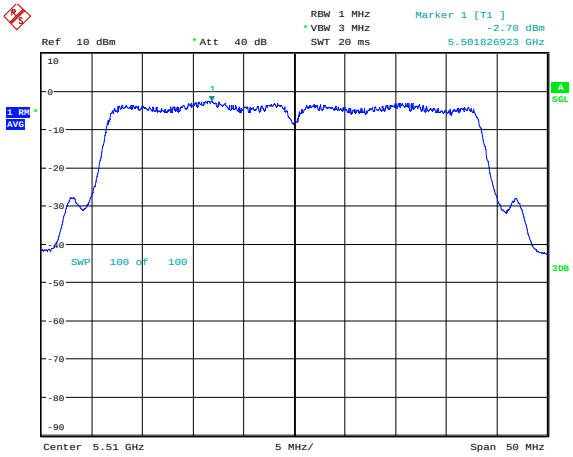
Ant2



Ant3



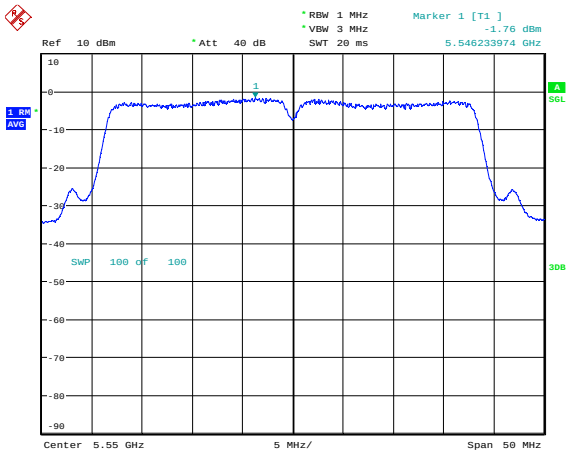
Ant4



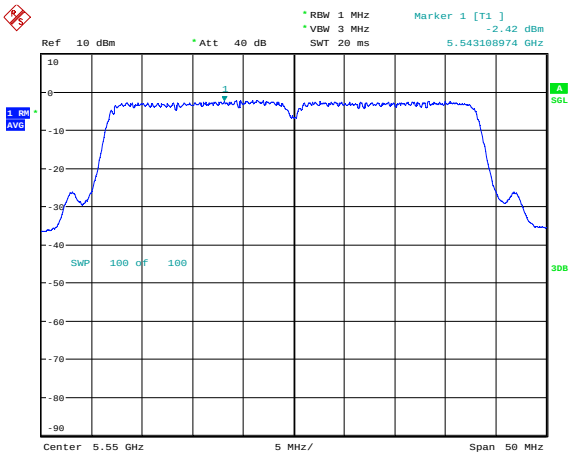
802.11n 40 MHz

- Middle Channel (5 550 MHz)

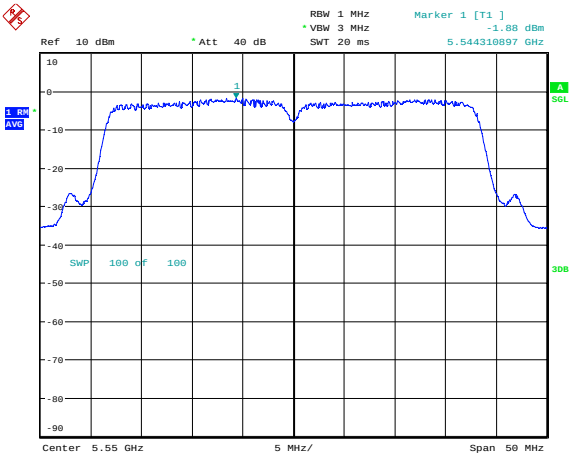
Ant1



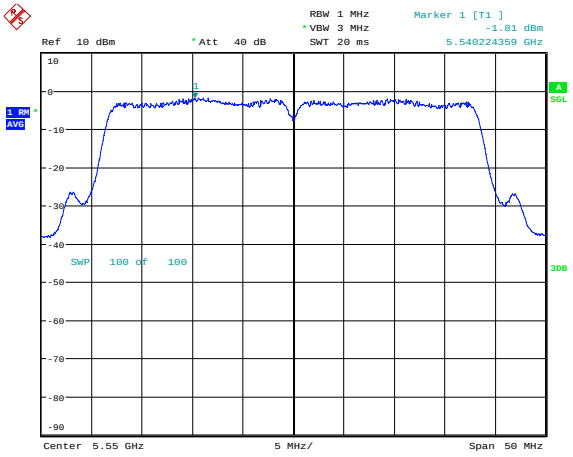
Ant2



Ant3



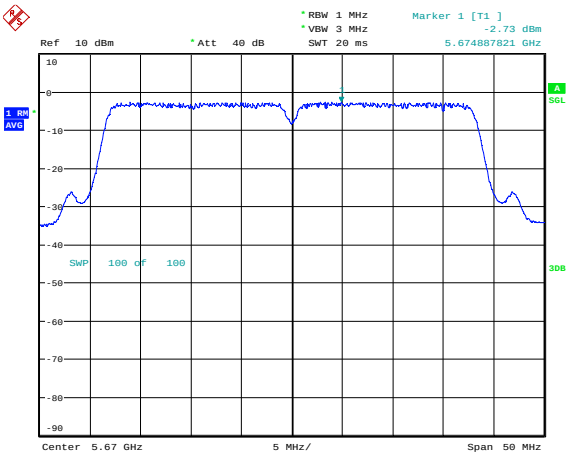
Ant4



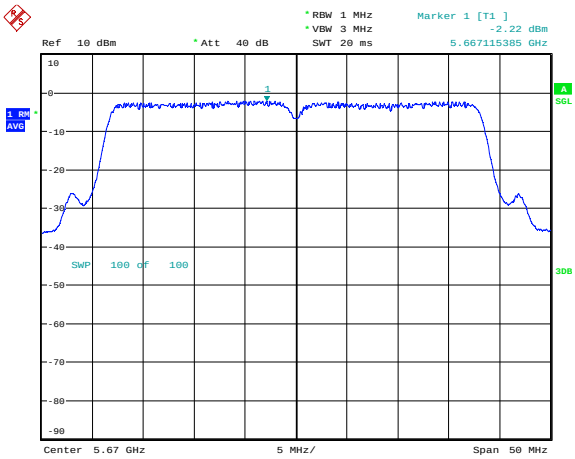
802.11n 40 MHz

- Highest Channel (5 670 MHz)

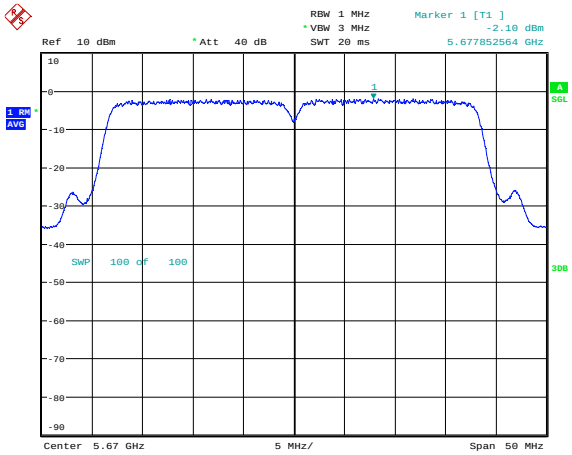
Ant1



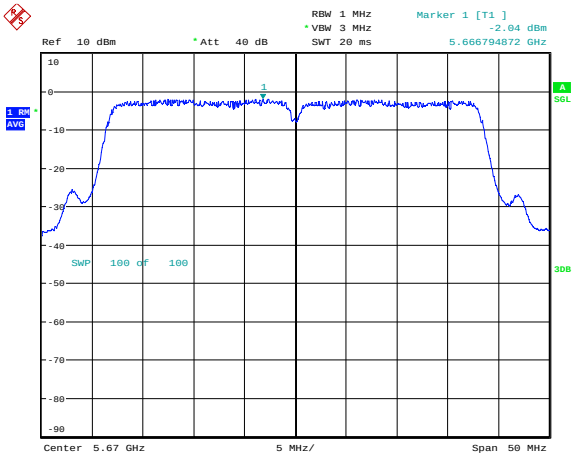
Ant2



Ant3



Ant4



5.5 Peak excursion measurement

5.5.1 Regulation

According to §15.407(a)(6) The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the maximum conducted output power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

5.5.2 Measurement Procedure

These test measurement settings are specified in section F of 789033 D01 General UNII Test Procedures.

5.5.2.1 Peak excursion measurement

(1) Set the spectrum analyzer span to view the entire emission bandwidth.

(2) Find the maximum of the peak-max-hold spectrum.

a) Set RBW = 1 MHz.

b) VBW ≥ 3 MHz.

c) Detector = peak.

d) Trace mode = max-hold.

e) Allow the sweeps to continue until the trace stabilizes.

f) Use the peak search function to find the peak of the spectrum.

(3) Use the procedure found under E) to measure the PPSD.

(4) Compute the ratio of the maximum of the peak-max-hold spectrum to the PPSD.

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5.5.3 Test Result
-Complied

802.11n 40MHz

5 150 ~5 250 MHz

Frequency (MHz)	Result (dB)				Limit (dB)	Margin (dB)			
	Ant1	Ant2	Ant3	Ant4		Ant1	Ant2	Ant3	Ant4
5 190	8.94	8.56	8.94	8.81	13.00	4.06	4.44	4.06	4.19
5 230	9.02	8.49	9.01	9.09	13.00	3.98	4.51	3.99	3.91

5 250 ~5 350 MHz

Frequency (MHz)	Result (dB)				Limit (dB)	Margin (dB)			
	Ant1	Ant2	Ant3	Ant4		Ant1	Ant2	Ant3	Ant4
5 270	8.89	8.41	9.04	9.06	13.00	4.11	4.59	3.96	3.94
5 310	8.93	8.58	8.92	8.89	13.00	4.07	4.42	4.08	4.11

5 470 ~5 725 MHz

Frequency (MHz)	Result (dB)				Limit (dB)	Margin (dB)			
	Ant1	Ant2	Ant3	Ant4		Ant1	Ant2	Ant3	Ant4
5 510	8.87	8.78	8.94	8.66	13.00	4.13	4.22	4.06	4.34
5 550	8.86	8.67	8.77	8.62	13.00	4.14	4.33	4.23	4.38
5 670	9.26	8.78	9.10	8.85	13.00	3.74	4.22	3.90	4.15

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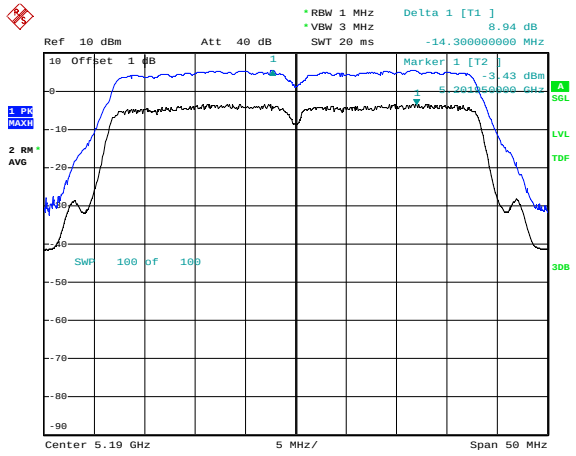
5.5.4 Test Plot

Figure 3. Plot of the Peak excursion

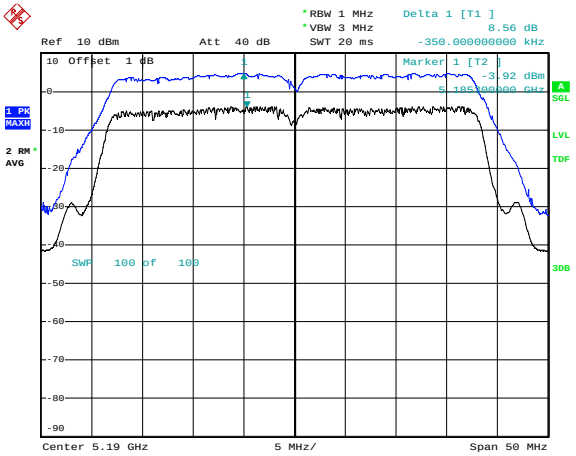
802.11n 40 MHz

- Lowest Channel (5 190 MHz)

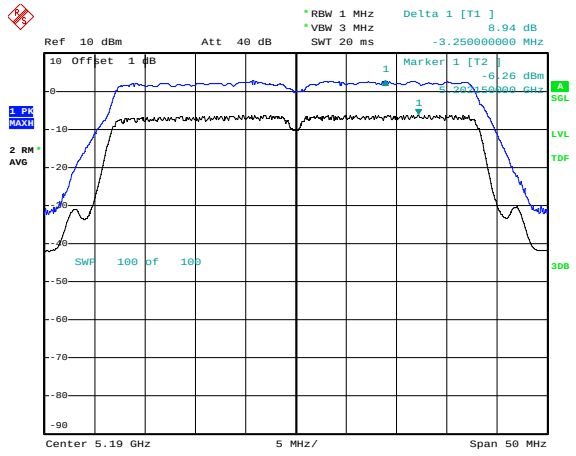
Ant1



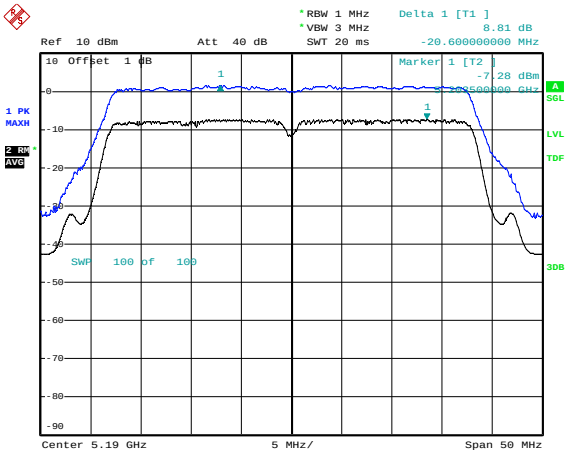
Ant2



Ant3



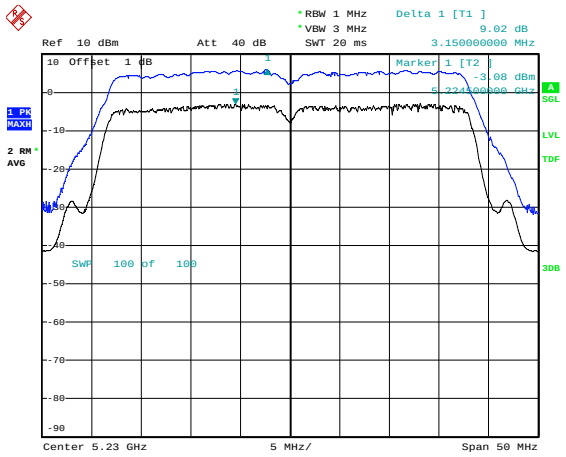
Ant4



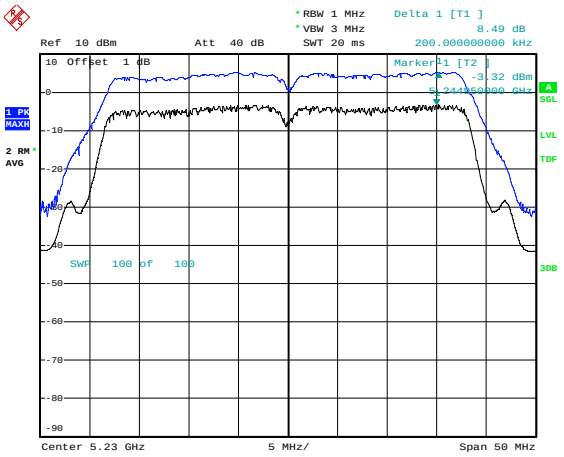
802.11n 40 MHz

- Highest Channel (5 230 MHz)

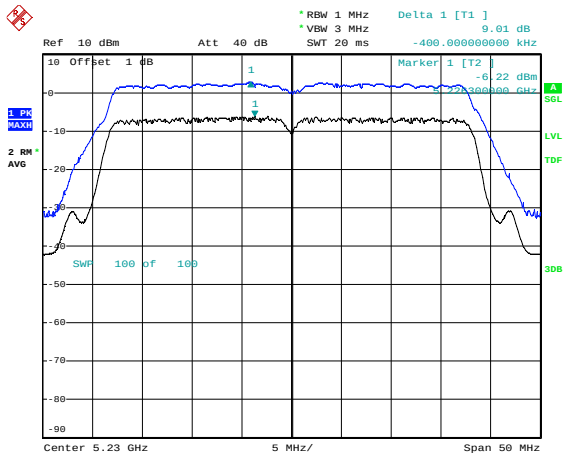
Ant1



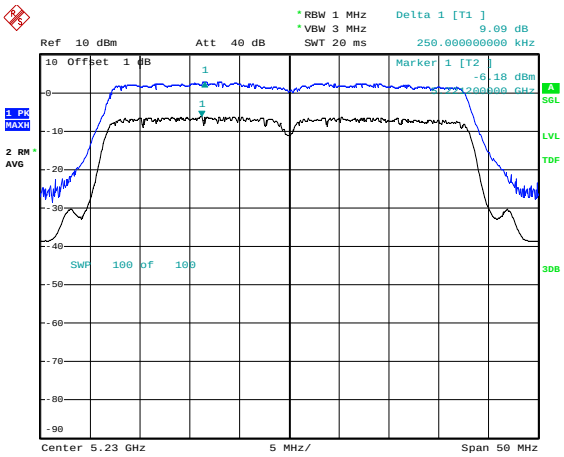
Ant2



Ant3



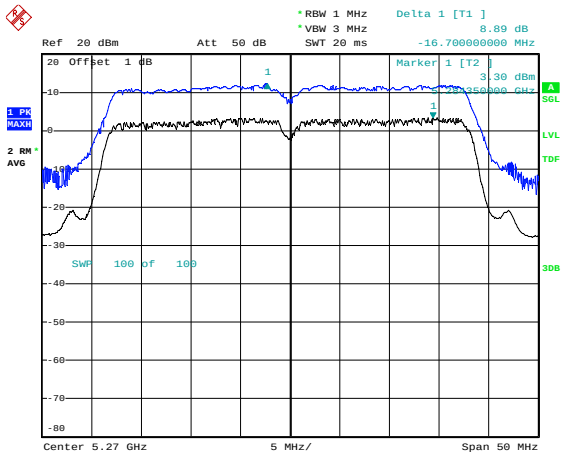
Ant4



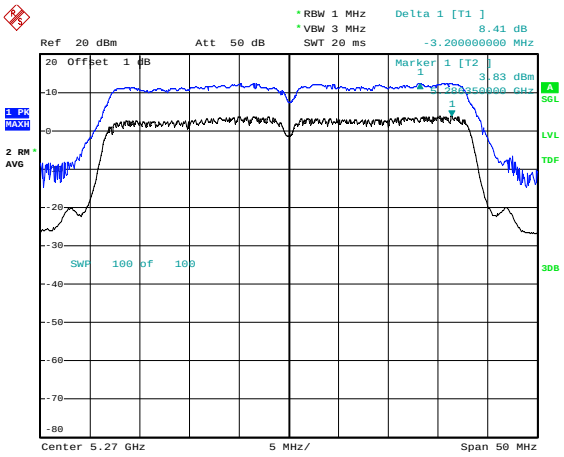
802.11n 40 MHz

- Lowest Channel (5 270 MHz)

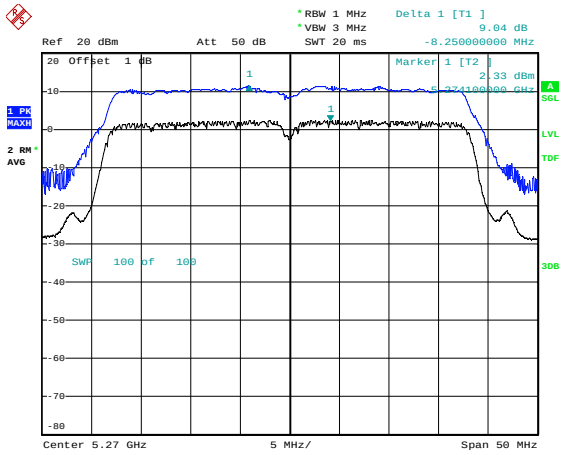
Ant1



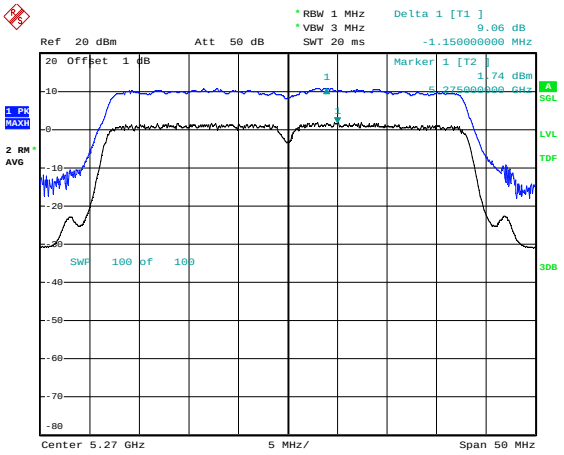
Ant2



Ant3



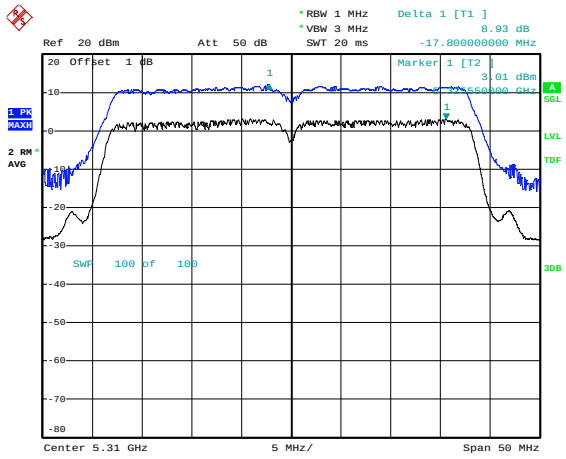
Ant4



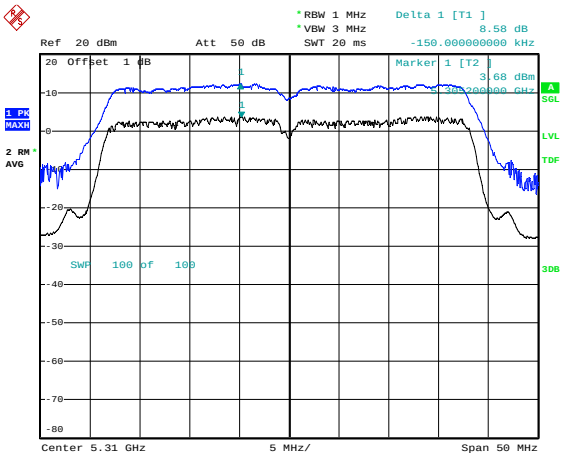
802.11n 40 MHz

- Highest Channel (5 310 MHz)

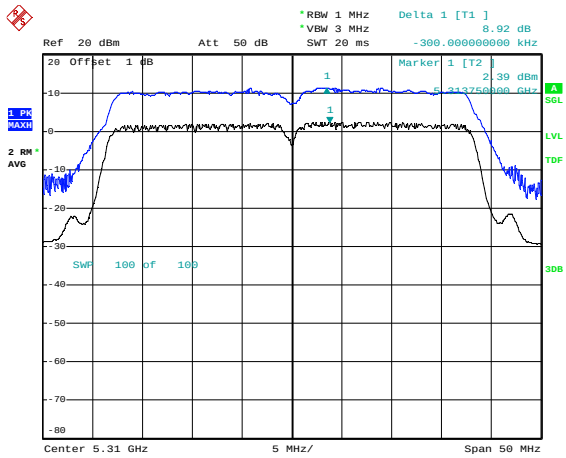
Ant1



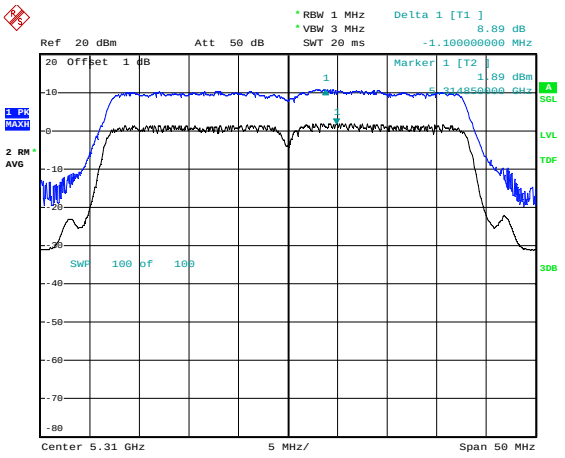
Ant2



Ant3



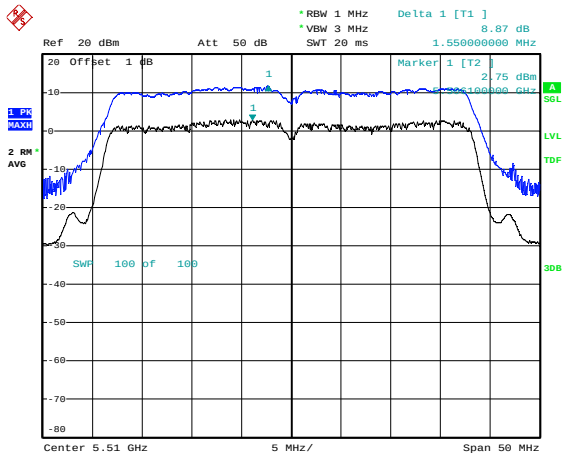
Ant4



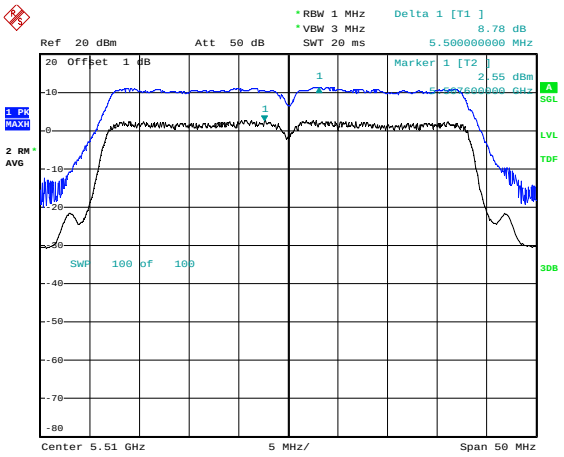
802.11n 40 MHz

- Lowest Channel (5 510 MHz)

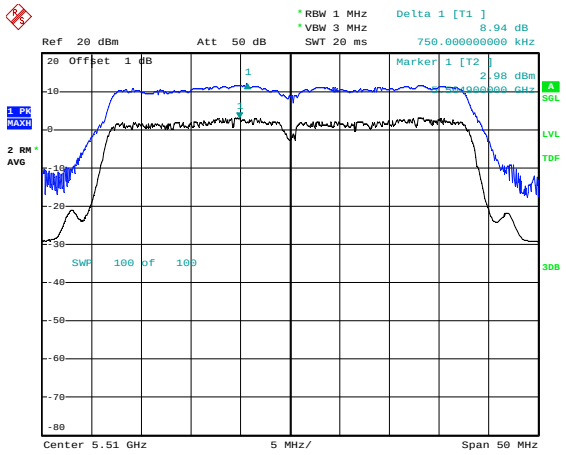
Ant1



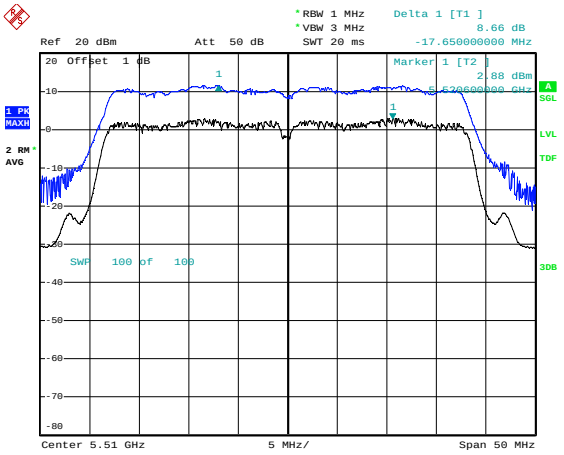
Ant2



Ant3



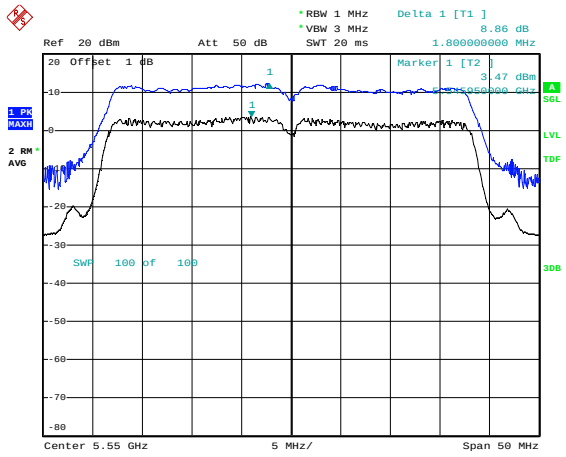
Ant4



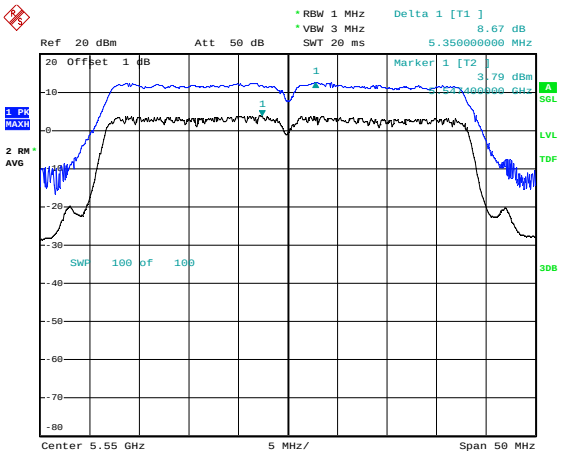
802.11n 40 MHz

- Middle Channel (5 550 MHz)

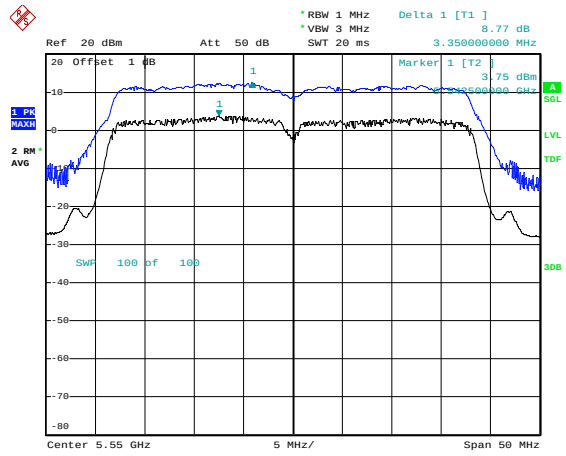
Ant1



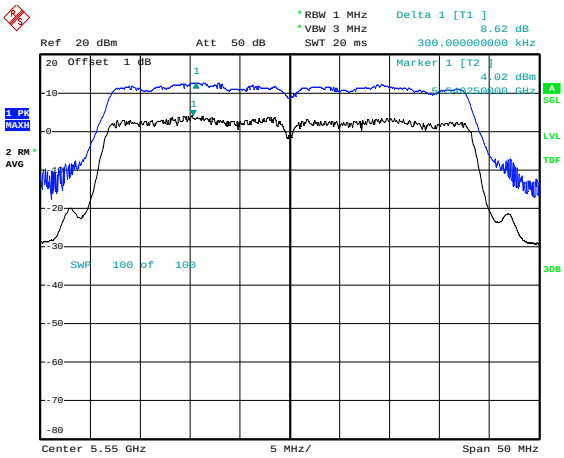
Ant2



Ant3



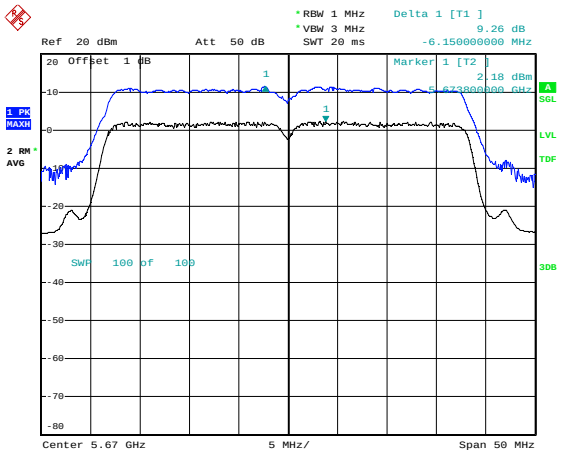
Ant4



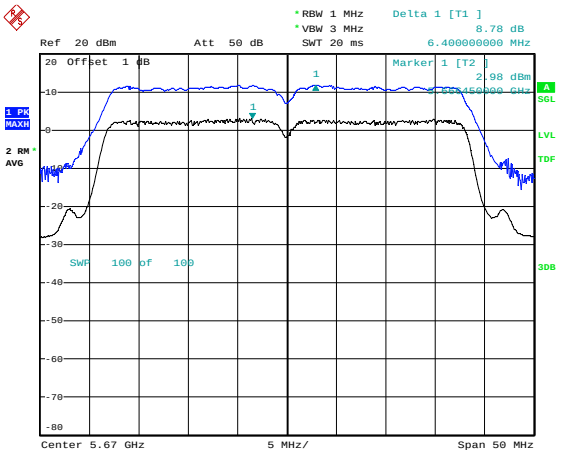
802.11n 40 MHz

- Highest Channel (5 670 MHz)

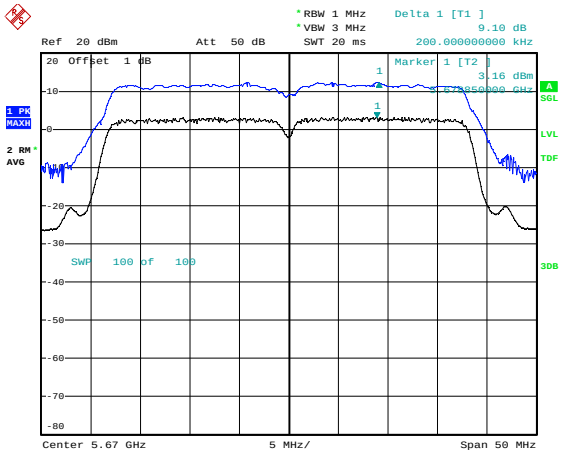
Ant1



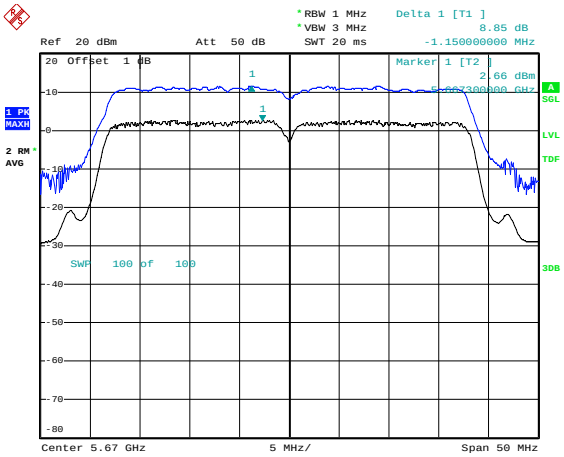
Ant2



Ant3



Ant4



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 GHz band: all emissions outside of the 5.15–5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.

According to §15.407(b)(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. Devices operating in the 5.25–5.35 GHz band that generate emissions in the 5.15–5.25 GHz band must meet all applicable technical requirements for operation in the 5.15–5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5.15–5.25 GHz band.

According to §15.407(b)(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.

According to §15.407(b)(6) Unwanted emissions below 1 GHz 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 (MHz)	Field strength (μV/m)	Measurement distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 -1.705	24000/F(kHz)	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 MHz 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 D01 General UNII Test Procedures.

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 measurement.

(1) Unwanted emissions in the restricted bands.

a) For all measurements, follow the requirements in section G)3),4),5),6)

(2) Unwanted emissions that fall outside of the restricted bands.

a) For all measurements, follow the requirements in section G)3), *"General Requirements for Unwanted Emissions Measurements"*.

b) At frequencies below 1000 MHz, use the procedure described in section G)4), *"Procedure for Unwanted Emissions Measurements Below 1000 MHz"*.

c) At frequencies above 1000 MHz, use the procedure for peak emissions described in section G)5), *"Procedure for Peak Unwanted Emissions Measurements Above 1000 MHz"*.

(i) As specified in 15.407(b), emissions above 1000 MHz that are outside of the restricted bands are subject to a peak emission limit of -27 dBm/MHz (or -17 dBm/MHz as specified in 15.407(b)(4)). However, an out-of-band emission that complies with both the average and peak limits of 15.209 is not required to satisfy the -27 dBm/MHz or -17 dBm/MHz peak emission limit.[2]
(or Limit of unwanted Emission out of the restricted bands shall apply to the radiated emission limit of 15.209 (a).)

d) 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

(3) General Requirements for Unwanted Emissions Measurements.

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

a) EUT Duty Cycle

(i) 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.

(ii) 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 as described in section B).
- 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.

(iii) 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.

(4) Procedure for Unwanted Emissions Measurements Below 1000 MHz.

a) Follow the requirements in section G)3).

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

(5) Procedure for Peak Unwanted Emissions Measurements Above 1000 MHz.

a) Follow the requirements in section G)3).

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.

(6) Procedures for Average Unwanted Emissions Measurements above 1000 MHz.

a) Follow the requirements in section G)3).

b) Average emission levels shall be measured using one of the following two methods.

c) **Method AD** (Average Detection): Primary method.

(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 should 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.

- 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.

d) **Method VB** (Averaging using reduced video bandwidth): Alternative method.

(i) RBW = 1 MHz.

(ii) Video bandwidth.

- If the EUT is configured to transmit with duty cycle ≥ 98 percent, set VBW ≤ RBW/100 (i.e., 10 kHz) but not less than 10 Hz.
- If the EUT duty cycle is < 98 percent, set VBW ≥ 1/*T*, where *T* is defined in section B)1)a).

(iii) Video bandwidth mode or display mode

The analyzer shall be set to ensure that video filtering is applied in the power domain.

Typically, this requires setting the detector mode to RMS and setting the Average-VBW Type to Power (RMS).

As an alternative, the analyzer may be set to linear detector mode. Ensure that video filtering is applied in linear voltage domain (rather than in a log or dB domain). Some analyzers require linear display mode in order to accomplish this. Others have a setting for Average-VBW Type, which can be set to "Voltage" regardless of the display mode.

(iv) Detector = Peak.

(v) Sweep time = auto.

(vi) Trace mode = max hold.

(vii) Allow max hold to run for at least 50 traces if the transmitted signal is continuous or has at least 98 percent duty cycle. For lower duty cycles, increase the minimum number of traces by a factor of 1/x, where x is the duty cycle. For example, use at least 200 traces if the duty cycle is 25 percent.

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 kHz to 30 MHz using the loop antenna, and from 30 to 1000 MHz using the TRILOG broadband antenna, and from 1 000 MHz to 40 000 MHz 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.

- Sample calculation

The field strength is calculated adding the antenna Factor, cable loss and, Antenna pad adding, subtracting the amplifier gain from the measured reading.

The sample calculation is as follow:

Result = M.R + C.F(A.F + C.L +3 dB Att – A.G)
M.R = Meter Reading
C.F = Correction Factor
A.F = Antenna Factor
C.L = Cable Loss
A.G = Amplifier Gain
3 dB Att = 3 dB Attenuator
If M.R is 30 dB, A.F 12 dB, C.L 5 dB, 3 dB, A.G 35 dB

The result is Peak and Quasi-peak: 30 + 12 + 5 + 3 – 35 = 15 dB(μV/m)

5.6.3 Test Result
-complied

Measured value of the Field strength of spurious Emissions and outside of the restricted bands (Radiated).

- The Measuring below 30 MHz was detected too small. (More than 20 dB below the limit)

802.11n 40 MHz (5 150 ~ 5 350 MHz)

Low channel (5 190 MHz)

Frequency [MHz]	Receiver Bandwidth [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 30 MHz (3m Distance)							
below 30 MHz	**Not Detected**	-	-	-	-	-	-
Quasi-Peak DATA. Emissions below 1GHz							
319.97	120	H	46.3	-8.0	38.3	46.0	7.7
622.43	120	H	38.2	0.6	38.8	46.0	7.2
Peak DATA. Emissions above 1GHz							
1 846.75	1 000	V	55.0	-3.0	52.0	74.0	22.0
2 162.50	1 000	V	50.0	-1.5	48.5	74.0	25.5
2 413.75	1 000	V	54.4	-1.2	53.2	74.0	20.8
2 434.75	1 000	H	52.4	-1.1	51.3	74.0	22.7
5 147.40	1 000	V	48.2	7.4	55.6	74.0	18.4
Above 6 GHz	**Not Detected**	-	-	-	-	-	-
Average DATA. Emissions above 1GHz							
1 846.75	1 000	V	38.6	-3.0	35.6	54.0	18.4
2 162.50	1 000	V	37.5	-1.5	36.0	54.0	18.0
2 413.75	1 000	V	36.9	-1.2	35.7	54.0	18.3
2 434.75	1 000	H	37.4	-1.1	36.3	54.0	17.7
5 120.10	1 000	V	35.4	7.4	42.8	54.0	11.2
Above 6 GHz	**Not Detected**	-	-	-	-	-	-

Note:

1. This measurement was performed the worst case data were reported.

480-5 Shin-dong, Yeongtong-gu, Suwon-city, Gyunggi-do, 443-390, Korea
82 31 336 9919 (Main) 82 31 336 4767 (Fax)

802.11n 40 MHz (5 150 ~ 5 350 MHz)

Low channel (5 230 MHz)

Frequency [MHz]	Receiver Bandwidth [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 30 MHz (3m Distance)							
below 30 MHz	**Not Detected**	-	-	-	-	-	-
Quasi-Peak DATA. Emissions below 1GHz							
125.33	120	V	42.5	-13.6	28.9	43.5	14.6
316.68	120	H	44.9	-8.1	36.8	46.0	9.2
-	-	-	-	-	-	-	-
Peak DATA. Emissions above 1GHz							
1 842.25	1 000	H	55.6	-3.0	52.6	74.0	21.4
2 162.50	1 000	V	50.6	-1.5	49.1	74.0	24.9
2 431.00	1 000	H	55.6	-1.1	54.5	74.0	19.5
Above 3 GHz	**Not Detected**	-	-	-	-	-	-
Average DATA. Emissions above 1GHz							
1 842.25	1 000	H	38.5	-3.0	35.5	54.0	18.5
2 162.50	1 000	V	50.6	-1.5	49.1	74.0	24.9
2 431.00	1 000	H	38.1	-1.1	37.0	54.0	17.0
Above 3 GHz	**Not Detected**	-	-	-	-	-	-

Note:

1. This measurement was performed the worst case data were reported.

802.11n 40 MHz (5 250 ~ 5 350 MHz)

Low channel (5 270 MHz)

Frequency [MHz]	Receiver Bandwidth [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 30 MHz (3m Distance)							
below 30 MHz	**Not Detected**	-	-	-	-	-	-
Quasi-Peak DATA. Emissions below 1GHz							
30.24	120	V	44.6	-15.0	29.6	40.0	10.4
125.55	120	V	45.2	-13.5	31.7	43.5	11.8
183.50	120	V	41.1	-12.4	28.7	43.5	14.8
314.94	120	H	47.4	-8.1	39.3	46.0	6.7
661.59	120	V	34.1	1.2	35.3	46.0	10.7
Peak DATA. Emissions above 1GHz							
1 440.25	1 000	H	48.1	-5.5	42.6	74.0	31.4
1 842.25	1 000	V	55.6	-3.0	52.6	74.0	21.4
2 167.00	1 000	V	49.9	-1.4	48.5	74.0	25.5
2 347.75	1 000	H	48.0	-1.2	46.8	74.0	27.2
Above 3 GHz	**Not Detected**	-	-	-	-	-	-
Average DATA. Emissions above 1GHz							
1 440.25	1 000	H	34.5	-5.5	29.0	54.0	25.0
1 842.25	1 000	V	35.6	-3.0	32.6	54.0	21.4
2 167.00	1 000	V	36.5	-1.4	35.1	54.0	18.9
2 347.75	1 000	H	38.7	-1.2	37.5	54.0	16.5
Above 3 GHz	**Not Detected**	-	-	-	-	-	-

Note:

1. This measurement was performed the worst case data were reported.

480-5 Shin-dong, Yeongtong-gu, Suwon-city, Gyunggi-do, 443-390, Korea
82 31 336 9919 (Main) 82 31 336 4767 (Fax)

802.11n 40 MHz (5 250 ~ 5 350 MHz)

Low channel (5 310 MHz)

Frequency [MHz]	Receiver Bandwidth [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 30 MHz (3m Distance)							
below 30 MHz	**Not Detected**	-	-	-	-	-	-
Quasi-Peak DATA. Emissions below 1GHz							
30.24	120	V	44.6	-15.0	29.6	40.0	10.4
125.55	120	V	45.2	-13.5	31.7	43.5	11.8
183.50	120	V	41.1	-12.4	28.7	43.5	14.8
314.94	120	H	47.4	-8.1	39.3	46.0	6.7
661.59	120	V	34.1	1.2	35.3	46.0	10.7
Peak DATA. Emissions above 1GHz							
1 849.00	1 000	V	53.5	-3.0	50.5	74.0	23.5
2 158.00	1 000	V	48.9	-1.5	47.4	74.0	26.6
2 443.00	1 000	V	53.9	-1.1	52.8	74.0	21.2
2 473.75	1 000	H	58.2	-1.0	57.2	74.0	16.8
5 351.54	1 000	V	61.8	8.0	69.8	74.0	4.2
Above 3 GHz	**Not Detected**	-	-	-	-	-	-
Average DATA. Emissions above 1GHz							
1 849.00	1 000	V	38.5	-3.0	35.5	54.0	18.5
2 158.00	1 000	V	38.9	-1.5	37.4	54.0	16.6
2 443.00	1 000	V	35.9	-1.1	34.8	54.0	19.2
2 473.75	1 000	H	36.8	-1.0	35.8	54.0	18.2
5 350.00	1 000	V	42.1	8.0	50.1	54.0	3.9
Above 3 GHz	**Not Detected**	-	-	-	-	-	-

Note:

1. This measurement was performed the worst case data were reported.

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802.11n 40 MHz (5 470 ~ 5 725 MHz)

Low channel (5 510 MHz)

Frequency [MHz]	Receiver Bandwidth [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 30 MHz (3m Distance)							
below 30 MHz	**Not Detected**	-	-	-	-	-	-
Quasi-Peak DATA. Emissions below 1GHz							
30.24	120	V	44.6	-15.0	29.6	40.0	10.4
125.55	120	V	45.2	-13.5	31.7	43.5	11.8
183.50	120	V	41.1	-12.4	28.7	43.5	14.8
314.94	120	H	47.4	-8.1	39.3	46.0	6.7
661.59	120	V	34.1	1.2	35.3	46.0	10.7
Peak DATA. Emissions above 1GHz							
1 849.00	1 000	V	53.5	-3.0	50.5	74.0	23.5
2 158.00	1 000	V	48.9	-1.5	47.4	74.0	26.6
2 443.00	1 000	V	53.9	-1.1	52.8	74.0	21.2
2 473.75	1 000	H	58.2	-1.0	57.2	74.0	16.8
5 459.60	1 000	V	63.7	8.0	72.5	74.0	1.5
Above 6 GHz	**Not Detected**	-	-	-	-	-	-
Average DATA. Emissions above 1GHz							
1 849.00	1 000	V	38.5	-3.0	35.5	54.0	18.5
2 158.00	1 000	V	38.9	-1.5	37.4	54.0	16.6
2 443.00	1 000	V	35.9	-1.1	34.8	54.0	19.2
2 473.75	1 000	H	36.8	-1.0	35.8	54.0	18.2
5 459.65	1 000	V	43.1	8.0	51.9	54.0	2.1
Above 6 GHz	**Not Detected**	-	-	-	-	-	-

Note:

1. This measurement was performed the worst case data were reported.

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802.11n 40 MHz (5 470 ~ 5 725 MHz)

Low channel (5 550 MHz)

Frequency [MHz]	Receiver Bandwidth [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 30 MHz (3m Distance)							
below 30 MHz	**Not Detected**	-	-	-	-	-	-
Quasi-Peak DATA. Emissions below 1GHz							
30.24	120	V	44.6	-15.0	29.6	40.0	10.4
125.55	120	V	45.2	-13.5	31.7	43.5	11.8
183.50	120	V	41.1	-12.4	28.7	43.5	14.8
314.94	120	H	47.4	-8.1	39.3	46.0	6.7
661.59	120	V	34.1	1.2	35.3	46.0	10.7
Peak DATA. Emissions above 1GHz							
1 849.00	1 000	V	53.5	-3.0	50.5	74.0	23.5
2 158.00	1 000	V	48.9	-1.5	47.4	74.0	26.6
2 443.00	1 000	V	53.9	-1.1	52.8	74.0	21.2
2 473.75	1 000	H	58.2	-1.0	57.2	74.0	16.8
Above 3 GHz	**Not Detected**	-	-	-	-	-	-
Average DATA. Emissions above 1GHz							
1 849.00	1 000	V	38.5	-3.0	35.5	54.0	18.5
2 158.00	1 000	V	38.9	-1.5	37.4	54.0	16.6
2 443.00	1 000	V	35.9	-1.1	34.8	54.0	19.2
2 473.75	1 000	H	36.8	-1.0	35.8	54.0	18.2
Above 3 GHz	**Not Detected**	-	-	-	-	-	-

Note:

1. This measurement was performed the worst case data were reported.

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802.11n 40 MHz (5 470 ~ 5 725 MHz)

Low channel (5 670 MHz)

Frequency [MHz]	Receiver Bandwidth [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 30 MHz (3m Distance)							
below 30 MHz	**Not Detected**	-	-	-	-	-	-
Quasi-Peak DATA. Emissions below 1GHz							
30.24	120	V	44.6	-15.0	29.6	40.0	10.4
125.55	120	V	45.2	-13.5	31.7	43.5	11.8
183.50	120	V	41.1	-12.4	28.7	43.5	14.8
314.94	120	H	47.4	-8.1	39.3	46.0	6.7
661.59	120	V	34.1	1.2	35.3	46.0	10.7
Peak DATA. Emissions above 1GHz							
1 849.00	1 000	V	53.5	-3.0	50.5	74.0	23.5
2 158.00	1 000	V	48.9	-1.5	47.4	74.0	26.6
2 443.00	1 000	V	53.9	-1.1	52.8	74.0	21.2
2 473.75	1 000	H	58.2	-1.0	57.2	74.0	16.8
5 725.60	1 000	V	52.6	9.6	62.2	74.0	11.8
Above 3 GHz	**Not Detected**	-	-	-	-	-	-
Average DATA. Emissions above 1GHz							
1 849.00	1 000	V	38.5	-3.0	35.5	54.0	18.5
2 158.00	1 000	V	38.9	-1.5	37.4	54.0	16.6
2 443.00	1 000	V	35.9	-1.1	34.8	54.0	19.2
2 473.75	1 000	H	36.8	-1.0	35.8	54.0	18.2
5 725.63	1 000	V	33.7	9.6	43.3	54.0	10.7
Above 3 GHz	**Not Detected**	-	-	-	-	-	-

Note:

1. This measurement was performed the worst case data were reported.

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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

- 5 150 ~ 5 250 MHz

Channel	Frequency (Hz)	Voltage (AC)
CH38(Low)	5 190 000 000	120

Voltage (%)	Power (VAC)	Temp. (°C)	Reading Frequency (Hz)	Frequency Error (Hz)	Frequency Error (%)
100	120	-20	5 190 019 728	-19 728	-0.000 4
100		-10	5 189 990 810	9 190	0.000 2
100		0	5 189 975 597	24 403	0.000 5
100		10	5 189 960 532	39 468	0.000 8
100		20	5 189 945 439	54 561	0.001 1
100		30	5 189 939 700	60 300	0.001 2
100		40	5 189 940 013	59 987	0.001 2
100		50	5 189 953 377	46 623	0.000 9
85	102	20	5 189 950 955	49 045	0.000 9
115	138	20	5 189 950 437	49 563	0.001 0

Channel	Frequency (Hz)	Voltage (AC)
CH46(High)	5 230 000 000	120

Voltage (%)	Power (VAC)	Temp. (°C)	Reading Frequency (Hz)	Frequency Error (Hz)	Frequency Error (%)
100	120	-20	5 230 018 499	-18 499	-0.000 4
100		-10	5 229 990 645	9 355	0.000 2
100		0	5 229 975 480	24 520	0.000 5
100		10	5 229 960 325	39 675	0.000 8
100		20	5 229 945 074	54 926	0.001 1
100		30	5 229 939 304	60 696	0.001 2
100		40	5 229 939 908	60 092	0.001 1
100		50	5 229 953 172	46 828	0.000 9
85	102	20	5 229 949 217	50 783	0.001 0
115	138	20	5 229 949 459	50 541	0.001 0

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- 5 250 ~ 5 350 MHz

Channel	Frequency (Hz)	Voltage (AC)
CH54(Low)	5 270 000 000	120

Voltage (%)	Power (VAC)	Temp. (°C)	Reading Frequency (Hz)	Frequency Error (Hz)	Frequency Error (%)
100	120	-20	5 270 016 990	-16 990	-0.000 3
100		-10	5 269 990 765	9 235	0.000 2
100		0	5 269 975 211	24 789	0.000 5
100		10	5 269 959 921	40 079	0.000 8
100		20	5 269 944 647	55 353	0.001 1
100		30	5 269 938 946	61 054	0.001 2
100		40	5 269 939 804	60 196	0.001 1
100		50	5 269 952 977	47 023	0.000 9
85	102	20	5 269 948 293	51 707	0.001 0
115	138	20	5 269 948 051	51 949	0.001 0

Channel	Frequency (Hz)	Voltage (AC)
CH62(High)	5 310 000 000	120

Voltage (%)	Power (VAC)	Temp. (°C)	Reading Frequency (Hz)	Frequency Error (Hz)	Frequency Error (%)
100	120	-20	5 310 014 207	-14 207	-0.000 3
100		-10	5 309 990 505	9 495	0.000 2
100		0	5 309 975 039	24 961	0.000 5
100		10	5 309 959 588	40 412	0.000 8
100		20	5 309 944 225	55 775	0.001 1
100		30	5 309 938 594	61 406	0.001 2
100		40	5 309 939 350	60 650	0.001 1
100		50	5 309 953 028	46 972	0.000 9
85	102	20	5 309 947 120	52 880	0.001 0
115	138	20	5 309 946 930	53 070	0.001 0

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- 5 470 ~ 5 725 MHz

Channel	Frequency (Hz)	Voltage (AC)
CH102(Low)	5 510 000 000	120

Voltage (%)	Power (VAC)	Temp. (°C)	Reading Frequency (Hz)	Frequency Error (Hz)	Frequency Error (%)
100	120	-20	5 510 013 855	-13 855	-0.000 3
100		-10	5 509 989 721	10 279	0.000 2
100		0	5 509 973 875	26 125	0.000 5
100		10	5 509 957 892	42 108	0.000 8
100		20	5 509 942 068	57 932	0.001 1
100		30	5 509 936 354	63 646	0.001 2
100		40	5 509 937 146	62 854	0.001 1
100		50	5 509 951 424	48 576	0.000 9
85	102	20	5 509 944 371	55 629	0.001 0
115	138	20	5 509 944 200	55 800	0.001 0

Channel	Frequency (Hz)	Voltage (AC)
CH110(Mid)	5 550 000 000	120

Voltage (%)	Power (VAC)	Temp. (°C)	Reading Frequency (Hz)	Frequency Error (Hz)	Frequency Error (%)
100	120	-20	5 550 013 405	-13 405	-0.000 2
100		-10	5 549 989 478	10 522	0.000 2
100		0	5 549 972 885	27 115	0.000 5
100		10	5 549 957 604	42 396	0.000 8
100		20	5 549 941 664	58 336	0.001 1
100		30	5 549 935 988	64 012	0.001 2
100		40	5 549 936 693	63 307	0.001 1
100		50	5 549 951 138	48 862	0.000 9
85	102	20	5 549 943 276	56 724	0.001 0
115	138	20	5 549 943 140	56 860	0.001 0

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- 5 470 ~ 5 725 MHz

Channel	Frequency (Hz)	Voltage (AC)
CH134(High)	5 670 000 000	120

Voltage (%)	Power (VAC)	Temp. (°C)	Reading Frequency (Hz)	Frequency Error (Hz)	Frequency Error (%)
100	120	-20	5 670 013 489	-13 489	-0.000 2
100		-10	5 669 989 215	10 785	0.000 2
100		0	5 669 973 079	26 921	0.000 5
100		10	5 669 956 725	43 275	0.000 8
100		20	5 669 940 425	59 575	0.001 1
100		30	5 669 934 791	65 209	0.001 2
100		40	5 669 935 369	64 631	0.001 1
100		50	5 669 950 294	49 706	0.000 9
85	102	20	5 669 941 590	58 410	0.001 0
115	138	20	5 669 941 420	58 580	0.001 0

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5.8 Conducted Emission

5.8.1 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 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50μH/50Ω 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 (MHz)	Conducted limit (dBμV)	
	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.

5.8.2 Measurement Procedure

1. The EUT was placed on a wooden table of size, 1 m by 1.5 m, raised 80 cm in which is located 40 cm 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 MHz to 30 MHz.
5. The measurements were made with the detector set to PEAK amplitude within a bandwidth of 10 kHz or to QUASI-PEAK and AVERAGE within a bandwidth of 9 kHz. The EUT was in transmitting mode during the measurements.

5.8.3 Test Result
-complied

802.11n 40 MHz (5 150 ~5 250 MHz)

5 230 MHz

Frequency [MHz]	Correction Factor		Line	Quasi-peak				Average			
	LISN	Cable		Limit [dBuV]	Reading [dBuV]	Result [dBuV]	Margin [dB]	Limit [dBuV]	Reading [dBuV]	Result [dBuV]	Margin [dB]
0.150	9.83	0.01	N	66.00	37.75	47.59	18.41	56.00	23.80	33.64	22.36
0.153	9.82	0.01	H	65.84	39.01	48.84	17.00	55.84	25.35	35.18	20.66
0.156	9.83	0.01	N	65.67	37.42	47.26	18.41	55.67	24.73	34.57	21.10
0.198	9.90	0.03	N	63.69	26.06	35.99	27.70	53.69	10.51	20.44	33.25
0.210	9.90	0.03	H	63.21	25.20	35.13	28.08	53.21	12.28	22.21	31.00
0.255	9.90	0.03	H	61.59	19.51	29.44	32.15	51.59	9.93	19.86	31.73
0.447	9.95	0.03	N	56.93	20.07	30.05	26.88	46.93	13.84	23.82	23.11
0.453	9.95	0.03	H	56.82	19.30	29.28	27.54	46.82	13.52	23.50	23.32
0.507	9.97	0.03	H	56.00	15.38	25.38	30.62	46.00	9.04	19.04	26.96
0.663	9.92	0.03	H	56.00	12.63	22.58	33.42	46.00	7.12	17.07	28.93
0.804	9.84	0.03	H	56.00	10.18	20.05	35.95	46.00	3.57	13.44	32.56
14.200	9.70	0.10	N	60.00	18.33	28.13	31.87	50.00	11.90	21.70	28.30
14.320	9.67	0.10	H	60.00	17.78	27.55	32.45	50.00	11.62	21.39	28.61
23.130	9.79	0.13	N	60.00	12.98	22.90	37.10	50.00	8.52	18.44	31.56
26.610	9.80	0.14	N	60.00	13.27	23.21	36.79	50.00	9.01	18.95	31.05
29.040	9.80	0.15	N	60.00	14.23	24.18	35.82	50.00	8.71	18.66	31.34
29.770	9.67	0.15	H	60.00	13.95	23.77	36.23	50.00	9.22	19.04	30.96

Note:

1. This measurement was performed the worst case data were reported.(Test Mode, Frequency)

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802.11n 40 MHz (5 250 ~5 350 MHz)

5 310 MHz

Frequency [MHz]	Correction Factor		Line	Quasi-peak				Average			
	LISN	Cable		Limit [dBuV]	Reading [dBuV]	Result [dBuV]	Margin [dB]	Limit [dBuV]	Reading [dBuV]	Result [dBuV]	Margin [dB]
0.156	9.82	0.01	H	65.67	36.95	46.78	18.89	55.67	25.64	35.47	20.20
0.156	9.83	0.01	N	65.67	36.98	46.82	18.85	55.67	24.51	34.35	21.32
0.204	9.90	0.03	N	63.45	26.66	36.59	26.86	53.45	12.63	22.56	30.89
0.207	9.90	0.03	H	63.32	26.10	36.03	27.29	53.32	13.54	23.47	29.85
0.258	9.90	0.03	H	61.50	18.87	28.80	32.70	51.50	9.24	19.17	32.33
0.261	9.90	0.03	N	61.40	18.77	28.70	32.70	51.40	10.39	20.32	31.08
0.369	9.92	0.03	H	58.52	17.83	27.78	30.74	48.52	11.46	21.41	27.11
0.453	9.95	0.03	H	56.82	18.94	28.92	27.90	46.82	12.88	22.86	23.96
0.501	9.97	0.03	H	56.00	15.89	25.89	30.11	46.00	9.10	19.10	26.90
0.660	9.92	0.03	H	56.00	12.74	22.69	33.31	46.00	7.06	17.01	28.99
0.858	9.84	0.03	H	56.00	10.89	20.76	35.24	46.00	4.86	14.73	31.27
0.939	9.80	0.03	H	56.00	11.43	21.26	34.74	46.00	4.13	13.96	32.04
1.992	9.65	0.04	H	56.00	14.17	23.86	32.14	46.00	5.68	15.37	30.63
14.340	9.70	0.10	N	60.00	18.55	28.35	31.65	50.00	11.96	21.76	28.24
14.420	9.67	0.10	H	60.00	17.45	27.22	32.78	50.00	11.43	21.20	28.80
23.130	9.71	0.13	H	60.00	12.26	22.09	37.91	50.00	8.14	17.97	32.03
25.000	9.80	0.14	N	60.00	13.33	23.26	36.75	50.00	8.71	18.64	31.37
30.000	9.67	0.15	H	60.00	14.62	24.44	35.56	50.00	9.90	19.72	30.28

Note:

1. This measurement was performed the worst case data were reported.(Test Mode, Frequency)

802.11n 40 MHz (5 470 ~5 725 MHz)

5 550 MHz

Frequency [MHz]	Correction Factor		Line	Quasi-peak				Average			
	LISN	Cable		Limit [dBuV]	Reading [dBuV]	Result [dBuV]	Margin [dB]	Limit [dBuV]	Reading [dBuV]	Result [dBuV]	Margin [dB]
0.153	9.82	0.01	H	65.84	38.33	48.16	17.68	55.84	25.42	35.25	20.59
0.153	9.83	0.01	N	65.84	38.74	48.58	17.26	55.84	25.28	35.12	20.72
0.201	9.90	0.03	H	63.57	27.29	37.22	26.35	53.57	13.93	23.86	29.71
0.207	9.90	0.03	N	63.32	25.88	35.81	27.51	53.32	12.05	21.98	31.34
0.255	9.90	0.03	H	61.59	20.61	30.54	31.05	51.59	10.20	20.13	31.46
0.369	9.92	0.03	H	58.52	17.49	27.44	31.08	48.52	11.06	21.01	27.51
0.372	9.92	0.03	N	58.46	20.08	30.03	28.43	48.46	13.25	23.20	25.26
0.450	9.95	0.03	N	56.88	20.85	30.83	26.05	46.88	14.75	24.73	22.15
0.453	9.95	0.03	H	56.82	19.50	29.48	27.34	46.82	13.40	23.38	23.44
0.501	9.97	0.03	H	56.00	15.79	25.79	30.21	46.00	9.25	19.25	26.75
0.513	9.97	0.03	N	56.00	14.93	24.93	31.07	46.00	8.92	18.92	27.08
0.657	9.92	0.03	H	56.00	12.89	22.84	33.16	46.00	7.18	17.13	28.87
0.858	9.84	0.03	H	56.00	10.79	20.66	35.34	46.00	5.02	14.89	31.11
0.882	9.81	0.03	N	56.00	16.88	26.72	29.28	46.00	10.87	20.71	25.29
1.689	9.66	0.04	N	56.00	14.92	24.62	31.38	46.00	9.48	19.18	26.82
2.016	9.65	0.04	H	56.00	15.99	25.68	30.32	46.00	5.68	15.37	30.63
3.060	9.65	0.05	N	56.00	14.35	24.05	31.95	46.00	9.03	18.73	27.27
26.580	9.69	0.14	H	60.00	7.43	17.25	42.75	50.00	3.49	13.31	36.69

Note:

1. This measurement was performed the worst case data were reported.(Test Mode, Frequency)

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5.8.4 Test plot

Figure 4. Plot of the Conducted Emission
802.11n 40 MHz (5 150 ~5 250 MHz)

5 230 MHz_H

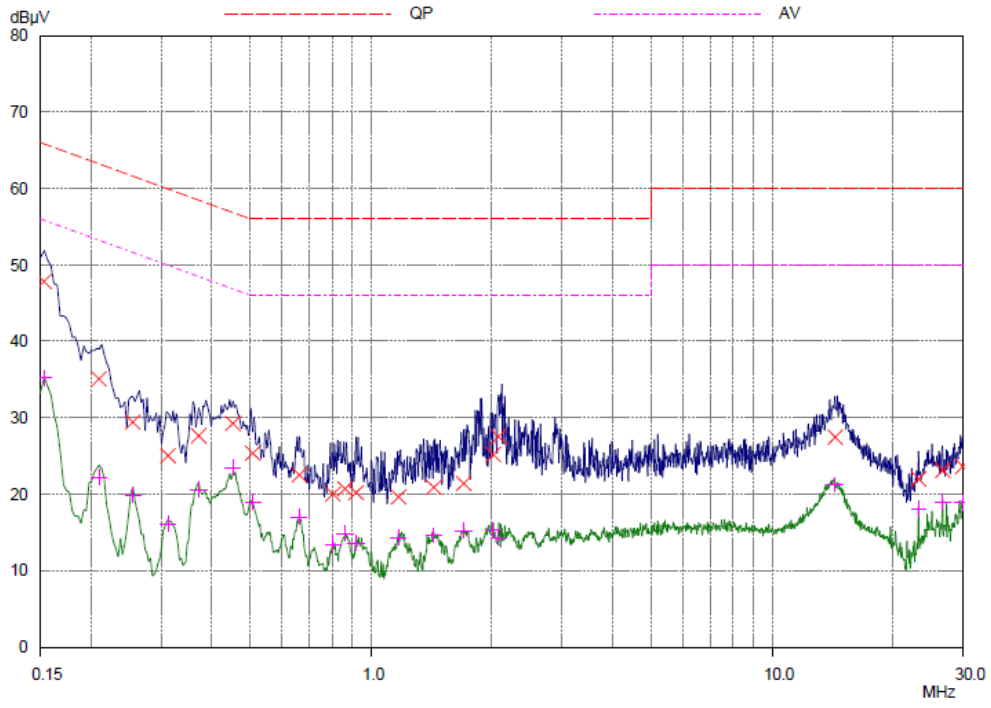
EMC Compliance LTD

EUT:	C41W-500
Manuf:	5230
Op Cond:	H
Operator:	
Test Spec:	FCC Class B Conducted Emission
Comment:	
Result File:	5230_h.dat :
Scan Settings	(2 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	3MHz	3kHz	10kHz	PK+AV	10msec	Auto	OFF	60dB
3MHz	30MHz	10kHz	10kHz	PK+AV	5msec	Auto	OFF	60dB

Transducer	No.	Start	Stop	Name
	22	9kHz	30MHz	HI_ON_H

Final Measurement:	Detectors:	X QP / + AV
	Meas Time:	1sec
	Peaks:	8
	Acc Margin:	25 dB



802.11n 40 MHz (5 150 ~5 250 MHz)

5 230 MHz_N

EMC Compliance LTD

EUT: C41W-500
Manuf: 5230
Op Cond: N
Operator:
Test Spec: FCC Class B Conducted Emission
Comment:

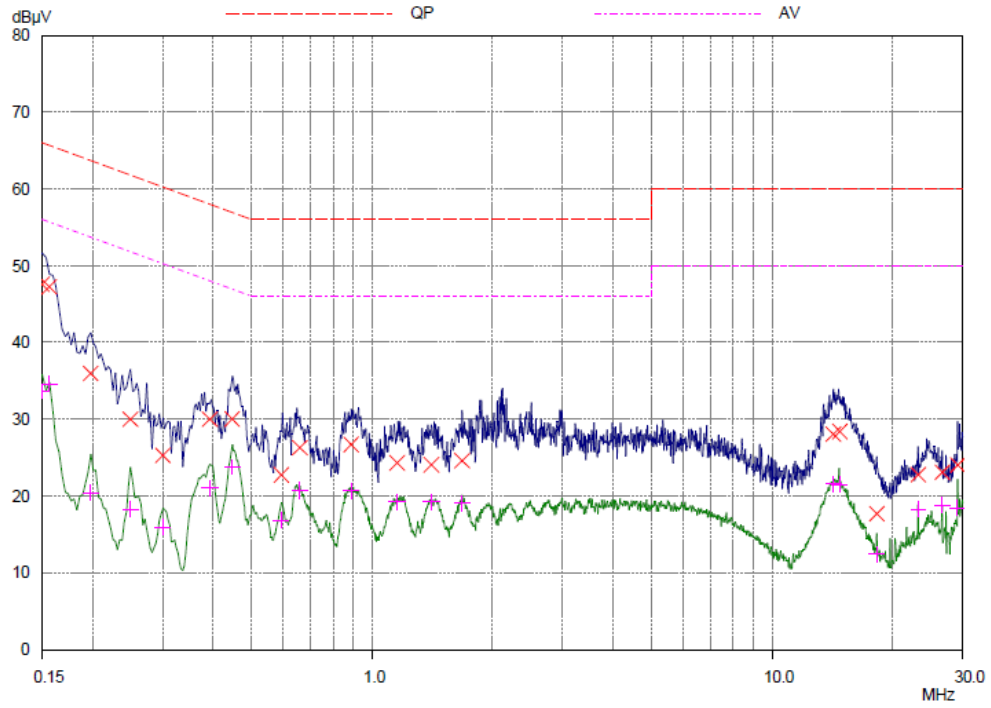
Result File: 5230_n.dat :

Scan Settings (2 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	3MHz	3kHz	10kHz	PK+AV	10msec	Auto	OFF	60dB
3MHz	30MHz	10kHz	10kHz	PK+AV	5msec	Auto	OFF	60dB

Transducer	No.	Start	Stop	Name
	22	9kHz	30MHz	HI_ON_N

Final Measurement: Detectors: X QP / + AV
Meas Time: 1sec
Peaks: 8
Acc Margin: 25 dB



802.11n 40 MHz (5 250 ~5 350 MHz)

5 310 MHz_H

EMC Compliance LTD

EUT: C41W-500
Manuf: 5310
Op Cond: H
Operator:
Test Spec: FCC Class B Conducted Emission
Comment:

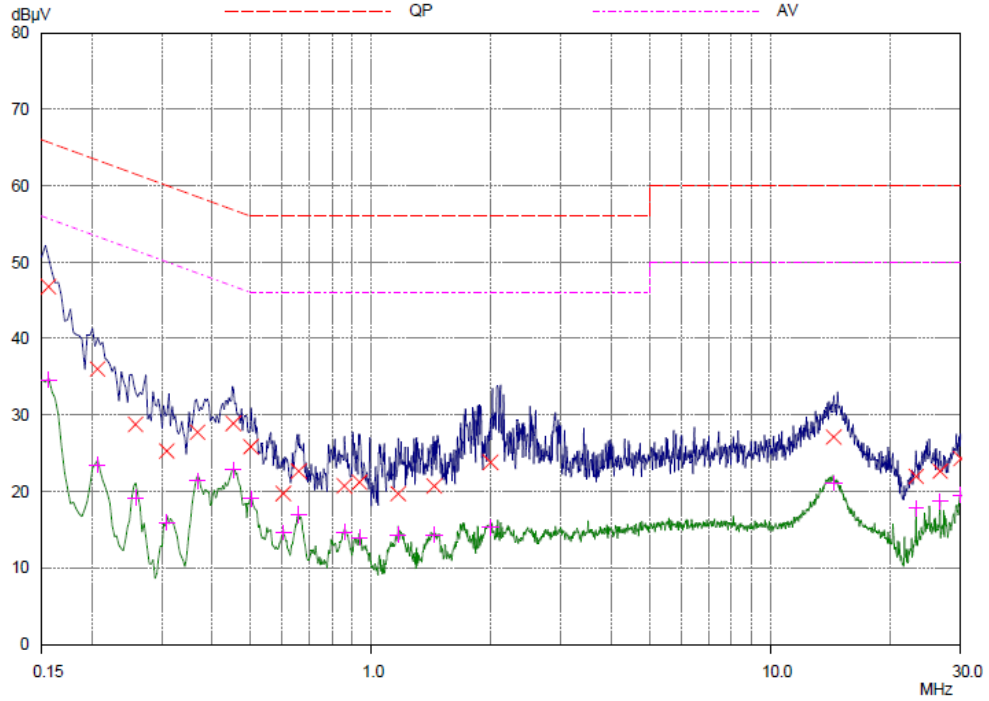
Result File: 5310_h.dat :

Scan Settings (2 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	3MHz	3kHz	10kHz	PK+AV	10msec	Auto	OFF	60dB
3MHz	30MHz	10kHz	10kHz	PK+AV	5msec	Auto	OFF	60dB

Transducer	No.	Start	Stop	Name
	22	9kHz	30MHz	HI_ON_H

Final Measurement: Detectors: X QP / + AV
Meas Time: 1sec
Peaks: 8
Acc Margin: 25 dB



802.11n 40 MHz (5 250 ~5 350 MHz)

5 310 MHz_N

EMC Compliance LTD

EUT: C41W-500
Manuf: 5310
Op Cond: N
Operator:
Test Spec: FCC Class B Conducted Emission
Comment:

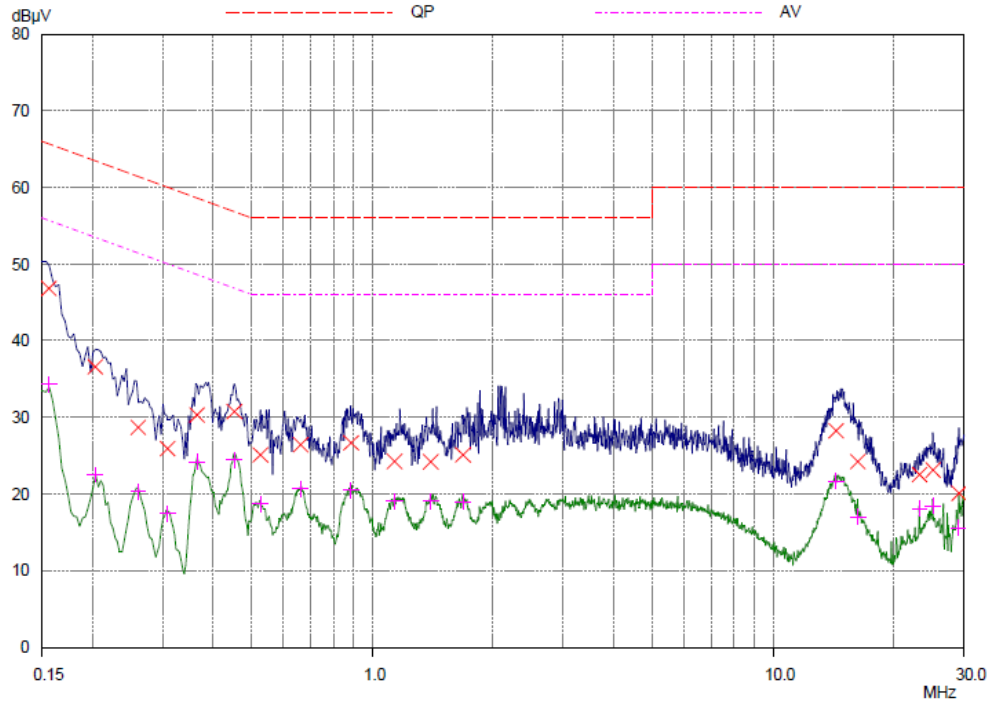
Result File: 5310_n.dat :

Scan Settings (2 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	3MHz	3kHz	10kHz	PK+AV	10msec	Auto	OFF	60dB
3MHz	30MHz	10kHz	10kHz	PK+AV	5msec	Auto	OFF	60dB

Transducer	No.	Start	Stop	Name
	22	9kHz	30MHz	HI_ON_N

Final Measurement: Detectors: X QP / + AV
Meas Time: 1sec
Peaks: 8
Acc Margin: 25 dB



802.11n 40 MHz (5 470 ~5 725 MHz)

5 550 MHz_H

EMC Compliance LTD

EUT: C41W-500
Manuf: 5550
Op Cond: H
Operator:
Test Spec: FCC Class B Conducted Emission
Comment:

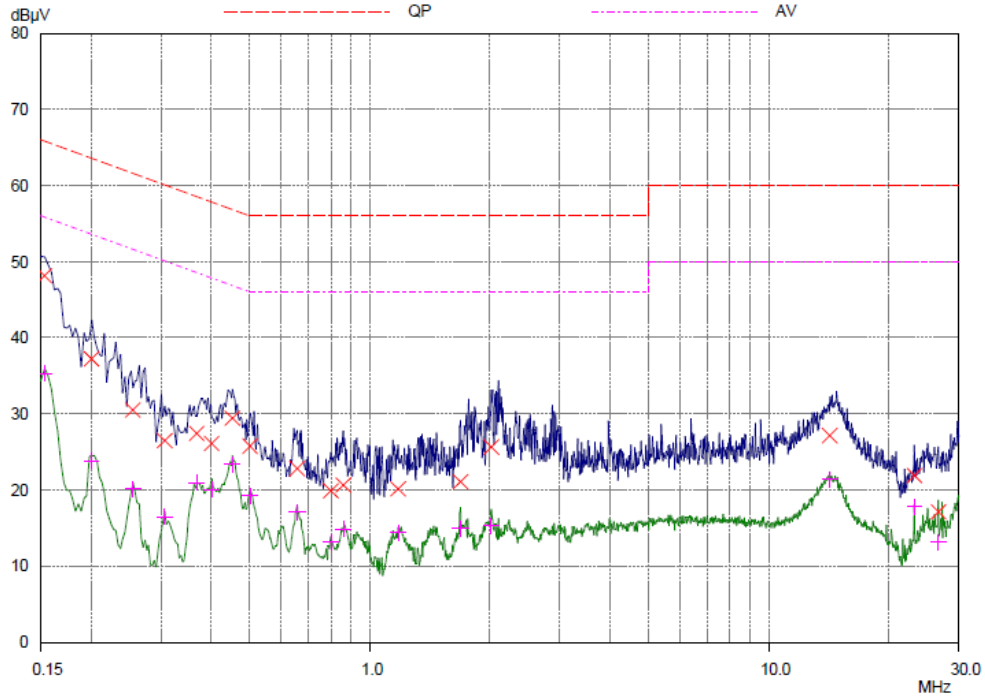
Result File: 5550_h.dat :

Scan Settings (2 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	3MHz	3kHz	10kHz	PK+AV	10msec	Auto	OFF	60dB
3MHz	30MHz	10kHz	10kHz	PK+AV	5msec	Auto	OFF	60dB

Transducer	No.	Start	Stop	Name
	22	9kHz	30MHz	HI_ON_H

Final Measurement: Detectors: X QP / + AV
Meas Time: 1sec
Peaks: 8
Acc Margin: 25 dB



802.11n 40 MHz (5 470 ~5 725 MHz)

5 550 MHz_N

EMC Compliance LTD

EUT: C41W-500
Manuf: 5550
Op Cond: N
Operator:
Test Spec: FCC Class B Conducted Emission
Comment:

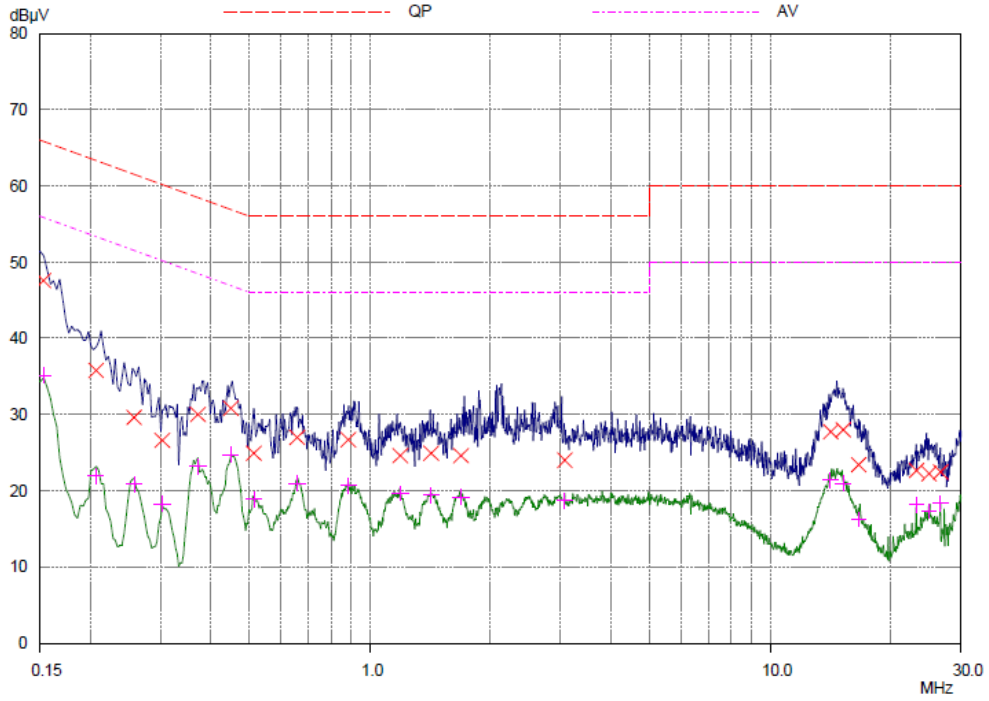
Result File: 5550_n.dat :

Scan Settings (2 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	3MHz	3kHz	10kHz	PK+AV	10msec	Auto	OFF	60dB
3MHz	30MHz	10kHz	10kHz	PK+AV	5msec	Auto	OFF	60dB

Transducer	No.	Start	Stop	Name
	22	9kHz	30MHz	HI_ON_N

Final Measurement: Detectors: X QP / + AV
Meas Time: 1sec
Peaks: 8
Acc Margin: 25 dB



5.9 DFS(Dynamic Frequency Selection)

5.9.1 Regulation

According to §15.407(h)(2) Radar Detection Function of Dynamic Frequency Selection (DFS). U-NII devices operating in the 5.25–5.35 GHz and 5.47–5.725 GHz bands shall employ a DFS radar detection mechanism to detect the presence of radar systems and to avoid co-channel operation with radar systems. The minimum DFS detection threshold for devices with a maximum e.i.r.p. of 200 mW to 1 W is -64 dBm. For devices that operate with less than 200 mW e.i.r.p. the minimum detection threshold is -62 dBm. The detection threshold is the received power averaged over 1 microsecond referenced to a 0 dBi antenna. The DFS process shall be required to provide a uniform spreading of the loading over all the available channels.

(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 part, 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.

5.9.2 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.

5.9.3 Test Result

-Refer to DFS test report

5.10 RF Exposure

5.10.1 Regulation

According to §15.247(i), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See § 1.1307(b)(1) of this Chapter.

Limits for Maximum Permissive Exposure: RF exposure is calculated.

Frequency Range	Electric Field Strength [V/m]	Magnetic Field Strength [A/m]	Power Density [mW/cm^2]	Averaging Time [minute]
Limits for General Population / Uncontrolled Exposure				
0.3 ~ 1.34	614	1.63	*(100)	30
1.34 ~ 30	824 /f	2.19/f	*(180/f^2)	30
30 ~ 300	27.5	0.073	0.2	30
300 ~ 1500	/	/	f/1500	30
1500 ~ 15000	/	/	1.0	30

*f=frequency in MHz, *= plane-wave equivalent power density*

MPE (Maximum Permissive Exposure) Prediction
Predication of MPE limit at a given distance: Equation from page 18 of OET Bulletin 65, Edition 97-01

$S = PG/4\pi R^2 \quad \left(\Rightarrow R = \sqrt{PG/4\pi S}\right)$

S=power density [mW/cm^2]
P=Power input to antenna [mW]
G=Power gain of the antenna in the direction of interest relative to an isotropic radiator
R= distance to the center of radiation of the antenna [cm]

5.10.2 RF Exposure Compliance Issue

The information should be included in the user's manual:
This appliance and its antenna must not be co-located or operation in conjunction with any other antenna or transmitter. A minimum separation distance of 20 cm must be maintained between the antenna and the person for this appliance to satisfy the RF exposure requirements.

Band [MHz]	Mode	Antenna Selection	Channel Frequency [MHz]	Ant Gain [dBi]	Conducted power [dBm]	E.I.R.P power [dBm]	Power Density at 20 cm [mW/Cm2]
2 400 ~ 2 483.5	RF4CE	ANT0+1	2 425	5.59	2.28	7.87	0.001 22
5 725 ~ 5 850	11n 40	ANT1+2+3+4	5 755	3.00	25.90	28.90	0.154 43
							0.155 65

5.10.3 Calculation Result of RF Exposure

- 2 400 ~ 2 483.5 MHz (RF4CE)

Channel	Antenna Selection	Channel Frequency [MHz]	Ant Gain [dBi]	Conducted power [dBm]	E.I.R.P power [dBm]	Power Density at 20 cm [mW/Cm2]
Lowest	ANT0+1	2 425	5.59	2.28	7.87	**0.001 22**
Middle		2 450	5.59	2.10	7.69	0.001 17
Highest		2 475	5.59	2.23	7.82	0.001 20

- 5 150 ~ 5 250 MHz (Wi-Fi)

mode	Antenna Selection	Channel	Channel Frequency [MHz]	Ant Gain [mW]	power [dBm]	power [mW]	Power Density at 20 cm [mW/Cm2]
11n 40MHz	ANT1+2+3+4	Lowest	5 190	1.55	15.44	34.99	0.010 78
		Highest	5 230	1.55	15.62	36.48	0.011 24

- 5 250 ~ 5 350 MHz (Wi-Fi)

mode	Antenna Selection	Channel	Channel Frequency [MHz]	Ant Gain [mW]	power [dBm]	power [mW]	Power Density at 20 cm [mW/Cm2]
11n 40MHz	ANT1+2+3+4	Lowest	5 270	1.78	22.77	189.23	0.066 95
		Highest	5 310	1.78	22.70	186.21	0.065 88

- 5 470 ~ 5 725 MHz (Wi-Fi)

mode	Antenna Selection	Channel	Channel Frequency [MHz]	Ant Gain [mW]	power [dBm]	power [mW]	Power Density at 20 cm [mW/Cm2]
11n 40MHz	ANT1+2+3+4	Lowest	5 510	1.95	22.88	194.09	0.075 29
		Middle	5 550	1.95	23.07	202.77	0.078 66
		Highest	5 670	1.95	22.92	195.88	0.075 99

- 5 750 ~ 5 850 MHz (Wi-Fi)

mode	Antenna Selection	Channel	Channel Frequency [MHz]	Ant Gain [mW]	power [dBm]	power [mW]	Power Density at 20 cm [mW/Cm2]
11n 40MHz	ANT1+2+3+4	Lowest	5 755	2.00	25.90	389.05	**0.154 43**
		Highest	5 795	2.00	25.89	388.15	0.154 07

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6. Test equipment used for test

	Description	Manufacture	Model No.	Serial No.	Next Cal Date.
■	Temp & humidity chamber	Taekwang	TK-04	TK001	13.12.07
□	Temp & humidity chamber	Taekwang	TK-500	TK002	13.09.03
□	Frequency Counter	HP	53150A	US39250565	13.09.04
□	Spectrum Analyzer	Agilent	E4440A	MY46186407	13.06.27
■	Spectrum Analyzer	R & S	FSP40	100209	13.10.23
■	Spectrum Analyzer	R & S	FSG13	100051	14.02.15
■	Signal Generator	R & S	SMR40	100007	13.06.27
□	Vector Signal Generator	R & S	SMBV100A	257566	14.01.07
■	Wideband Power Sensor	R & S	NRP-Z81	100677	13.05.04
□	Modulation Analyzer	HP	8901B	3538A05527	13.10.25
□	Audio Analyzer	HP	8903B	3729A19213	13.10.23
■	AC Power Supply	Kikusui	PCR2000W	GB001619	13.10.23
□	DC Power Supply	Tektronix	PS2520G	TW50517	14.03.02
□	DC Power Supply	Tektronix	PS2521G	TW53135	13.10.23
□	Attenuator	HP	8494A	2631A09825	13.10.24
□	Attenuator	HP	8496A	3308A16640	13.10.24
□	Attenuator	BIRD	50-A-MFN-20	0403002	13.10.24
□	Power Divider	Weinschel	1580-1	NX375	13.10.23
□	Power Divider	Weinschel	1580-1	NX380	13.09.09
□	Power Divider	Weinschel	1594	671	13.09.10
□	Power Divider	Krytar	7005265	143244	13.09.03
■	EMI Test Receiver	R&S	ESCI	100710	13.11.06
■	LOOP Antenna	EMCO	EMCO6502	9205-2745	13.05.23
■	BILOG Antenna	Schwarzbeck	VULB 9168	9168-440	13.10.04
■	HORN Antenna	ETS	3115	00086706	13.11.21
■	HORN Antenna	ETS	3116	00086632	13.11.15
■	Amplifier	Sonoma	310N	293004	13.11.06
■	Amplifier	Agilent	8449B	3008A01802	13.05.04
■	Attenuator	HP	8491A	27444	13.11.06
■	Antenna Mast	Innco Systems	MA4000-EP	303	-
■	Turn Table	Innco Systems	DT2000S-1t	079	-
■	Test Receiver	R & S	844827/011	ESHS30	13.08.06
■	LISN	R & S	101352	ENV216	14.01.07
■	LISN	PMM	0120J20305	L3-32	-

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