FCC TEST REPORT

Test report No:	**EMC- FCC- R0084**
FCC ID:	**O6ZHR44**
Type of Equipment:	**SATELLITE RECEIVER**
Model Name:	**HR44-500**
Applicant:	**HUMAX Co., Ltd**
FCC Rule Part(s):	**FCC Part 15 Subpart E** **Section 15.203, Section 15.209** **Section 15.207, Section 15.407**
Frequency Range:	**5 150 MHz ~ 5 250 MHz,** **5 250 MHz ~ 5 350 MHz,** **5 470 MHz ~ 5 725 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: September 24, 2012 ~ October 26, 2012

Issued date: November 2, 2012

Tested by: YU, SANG HOON

Approved by: KIM, CHANG MIN

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

[Contents]

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1. Client information

Applicant:	HUMAX Co., Ltd
Address:	212-1, Yubang-dong, Cheoin-gu Yong-in-si, Gyeonggi-do, Korea
Telephone number:	+82-31-776-6748
Facsimile number :	+82-31-776-6149
Contact person:	Jaeho LEE / Manager

Manufacturer :	HUMAX Co., Ltd
Address:	212-1, Yubang-dong, Cheoin-gu Yong-in-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 31 336 4767

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

SITE MAP

3. Description of E.U.T.

3.1 Basic description

Applicant :	HUMAX Co., Ltd
Address of Applicant:	212-1, Yubang-dong, Cheoin-gu Yong-in-si, Gyeonggi-do, Korea
Manufacturer:	HUMAX Co., Ltd
Address of Manufacturer:	212-1, Yubang-dong, Cheoin-gu Yong-in-si, Gyeonggi-do, Korea
Type of equipment:	SATELLITE RECEIVER
Basic Model:	HR44-500
Serial number:	Proto Type

3.2 General description

Model Name	HR44-500
Communication	2.4 GHz: 802.15.4(RF4CE) 2.4 GHz: 802.11b/g/n(HT20, HT40), 5.0 GHz: 802.11a/n(HT20, HT40)
Frequency Range	2.4 GHz: 2 400.0 ~ 2 483.5 MHz 5.0 GHz: 5 150 ~ 5 350 MHz, 5 470 ~ 5 725 MHz, 5 725 ~ 5 850 MHz
Type of Modulation	O-QPSK, CCK, OFDM
Channel capacity	**2.4 GHz:** 3 ch(RF4CE) **2.4 GHz:** 11 ch(802.11b/g/n_HT20) 7 ch(802.11n_HT40) **5.0 GHz:** 5 150 ~ 5 350 MHz: 8 ch(802.11a/n_HT20), 4 ch(802.11n_HT40) 5 470 ~ 5 725 MHz: 11 ch(802.11a/n_HT20), 5 ch(802.11n_HT40) 5 725 ~ 5 850 MHz: 5 ch(802.11a/n_HT20), 2 ch(802.11n_HT40)
Antenna Gain	2.4 GHz : 2.89 dBi 2.4 GHz : 3.1 dBi, 5.0 GHz : 3.2 dBi
Type of Antenna	PCB Antenna
Firmware version	Wi-Fi Driver Ver: 5.90.188.59, RF4CE Driver Ver:1.5.3.1
Power supply	AC 120 V
Operating temperature	0 ~ 50 °C
Dimension	33 mm x 25 mm x 4 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

2400 ~ 2483.5 (MHz) :802.11b/g/n(HT20, HT40)

	Frequency	Frequency
Band Width	20 MHz	40 MHz
Low frequency	2 412 MHz	2 422 MHz
Middle frequency	2 437 MHz	2 437 MHz
High frequency	2 462 MHz	2 452 MHz

5150~5250 (MHz) : 802.11a/n(HT20, HT40)

	Frequency	Frequency
Band Width	20 MHz	40 MHz
Low frequency	5 180 MHz	5 190 MHz
Middle frequency	5 200 MHz	-
High frequency	5 240 MHz	5 230 MHz

5250~5350 (MHz) : 802.11a/n(HT20, HT40)

	Frequency	Frequency
Band Width	20 MHz	40 MHz
Low frequency	5 260 MHz	5 270 MHz
Middle frequency	5 300 MHz	-
High frequency	5 320 MHz	5 310 MHz

5470~5350 (MHz) : 802.11a/n(HT20, HT40)

	Frequency	Frequency
Band Width	20 MHz	40 MHz
Low frequency	5 500 MHz	5 510 MHz
Middle frequency	5 600 MHz	5 590 MHz
High frequency	5 700 MHz	5 670 MHz

5250~5350 (MHz) : 802.11a/n(HT20, HT40)

	Frequency	Frequency
Band Width	20 MHz	40 MHz
Low frequency	5 745 MHz	5 755 MHz
Middle frequency	5 785 MHz	-
High frequency	5 825 MHz	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
15.403(i),15.407(e)	Bandwidth Measurement	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
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	± 0.75 dB	± 1.3 dB
Radiated disturbance	+ 2.280dB / - 2.278 dB	+ 4.560dB / - 4.556 dB
Conducted disturbance	+ 1.883 dB / - 1.676 dB	+ 3.766dB / - 3.352 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 directional peak gain of the antenna is 3.1 dBi for 2.4 GHz band and 3.2 dBi for 5.0 GHz band.

	Ant0	Ant1	Ant0 + Ant1
2.4 GHz band	3.1	3.1	6.11
5 GHz band	3.2	3.2	6.21

Since the directional gain of the integral antenna declared by the manufacturer exceeds 6.0 dBi (for mimo test mode), there was need to reduce the output power and PPSD.

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.

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5.4.3 Test Result

-Complied

Ant0_802.11a

Frequency Range (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)	Min. Limit (kHz)
5 150 ~ 5 250	Low	5 180	21.000	-
	Mid	5 200	21.000	-
	High	5 240	21.000	-
5 250 ~ 5 350	Low	5 260	21.200	-
	Mid	5 300	21.200	-
	High	5 320	21.200	-
5 470 ~ 5 725	Low	5 500	21.000	-
	Mid	5 600	21.000	-
	High	5 700	20.900	-

Ant0_802.11n 20 MHz

Frequency Range (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)	Min. Limit (kHz)
5 150 ~ 5 250	Low	5 180	21.600	-
	Mid	5 200	21.600	-
	High	5 240	21.400	-
5 250 ~ 5 350	Low	5 260	21.600	-
	Mid	5 300	21.500	-
	High	5 320	21.600	-
5 470 ~ 5 725	Low	5 500	21.400	-
	Mid	5 600	21.500	-
	High	5 700	21.300	-

Ant1_802.11a

Frequency Range (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)	Min. Limit (kHz)
5 150 ~ 5 250	Low	5 180	21.000	-
	Mid	5 200	21.000	-
	High	5 240	20.900	-
5 250 ~ 5 350	Low	5 260	21.100	-
	Mid	5 300	21.200	-
	High	5 320	21.200	-
5 470 ~ 5 725	Low	5 500	21.000	-
	Mid	5 600	21.000	-
	High	5 700	21.000	-

Ant1_802.11n 20 MHz

Frequency Range (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)	Min. Limit (kHz)
5 150 ~ 5 250	Low	5 180	21.400	-
	Mid	5 200	21.400	-
	High	5 240	21.400	-
5 250 ~ 5 350	Low	5 260	21.700	-
	Mid	5 300	21.900	-
	High	5 320	22.200	-
5 470 ~ 5 725	Low	5 500	21.500	-
	Mid	5 600	21.600	-
	High	5 700	21.400	-

Ant0 + Ant1_802.11n 20 MHz

Frequency Range (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)		Min. Limit (kHz)
			Ant0	Ant1	
5 150 ~ 5 250	Low	5 180	21.500	21.200	-
	Mid	5 200	21.000	21.200	-
	High	5 240	21.500	21.200	-
5 250 ~ 5 350	Low	5 260	21.300	21.400	-
	Mid	5 300	21.400	21.200	-
	High	5 320	21.500	21.200	-
5 470 ~ 5 725	Low	5 500	21.400	21.400	-
	Mid	5 600	21.300	21.300	-
	High	5 700	21.500	21.600	-

Ant0 + Ant1_802.11n 40 MHz

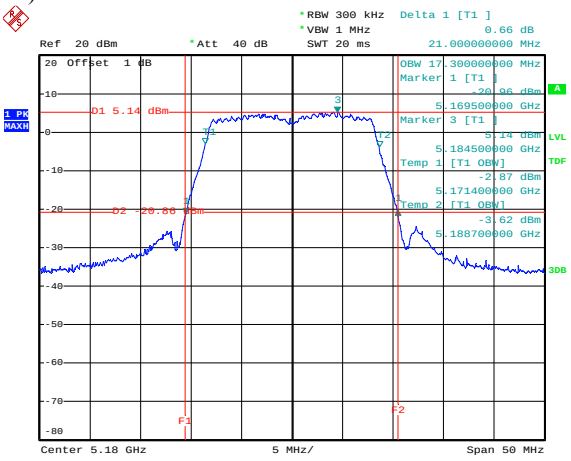
Frequency Range (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)		Min. Limit (kHz)
			Ant0	Ant1	
5 150 ~ 5 250	Low	5 190	40.000	39.500	-
	High	5 230	39.900	39.400	-
5 250 ~ 5 350	Low	5 270	40.300	39.700	
	High	5 310	40.200	39.600	
5 470 ~ 5 725	Low	5 510	40.000	39.700	
	Mid	5 590	39.900	39.800	
	High	5 670	40.000	39.800	

5.2.4 Test Plot

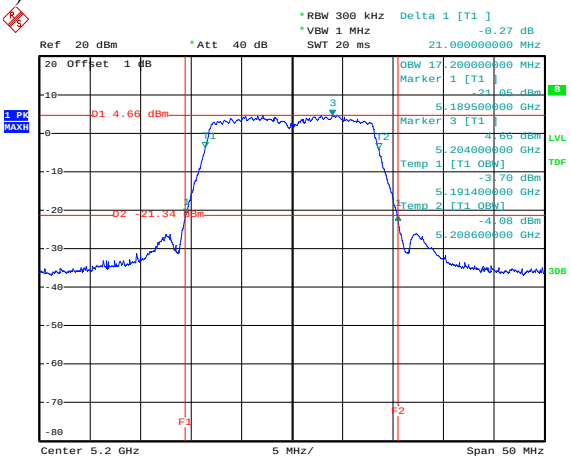
Figure 1. Plot of the 26 dB Bandwidth

Ant0_802.11a _5 150 ~ 5 250 MHz

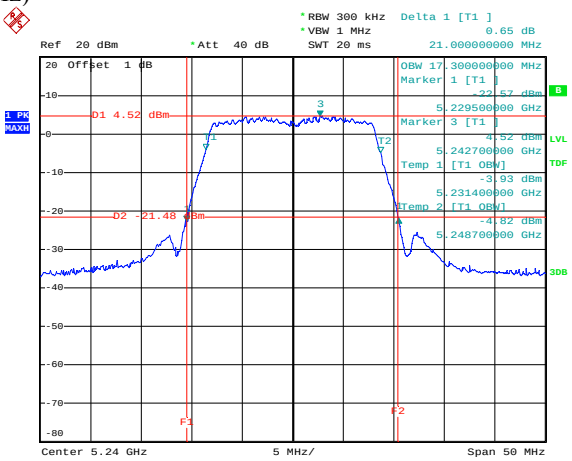
Lowest Channel (5 180 MHz)



Middle Chnnel (5 200 MHz)

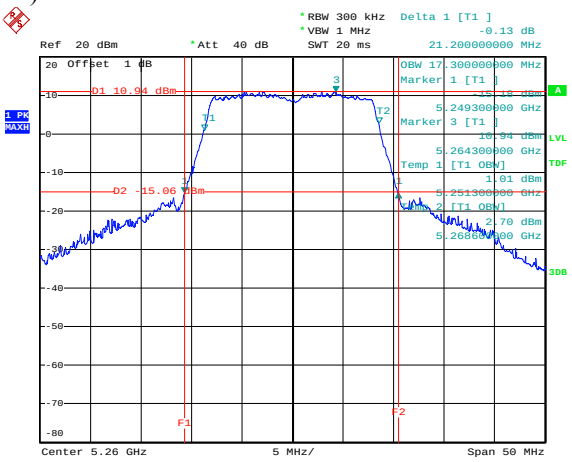


Highest Chnnel (5 240 MHz)

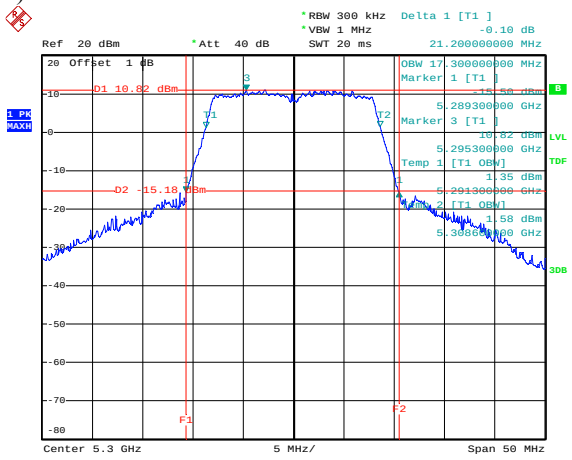


Ant0_802.11a _5 250 ~ 5 350 MHz

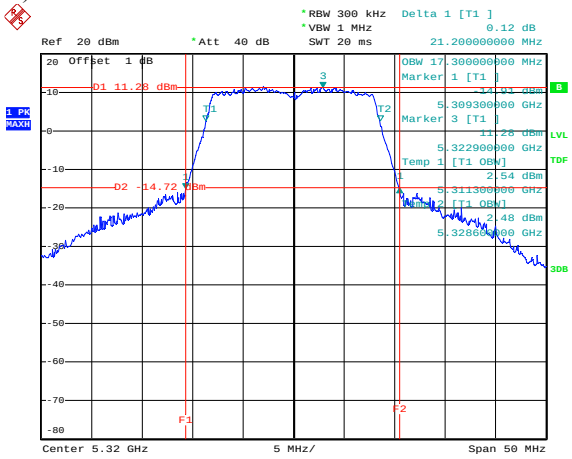
Lowest Channel (5 260 MHz)



Middle Chnnel (5 300 MHz)

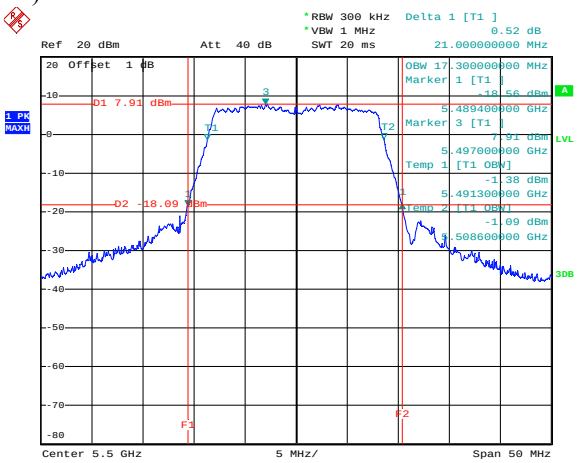


Highest Chnnel (5 320 MHz)

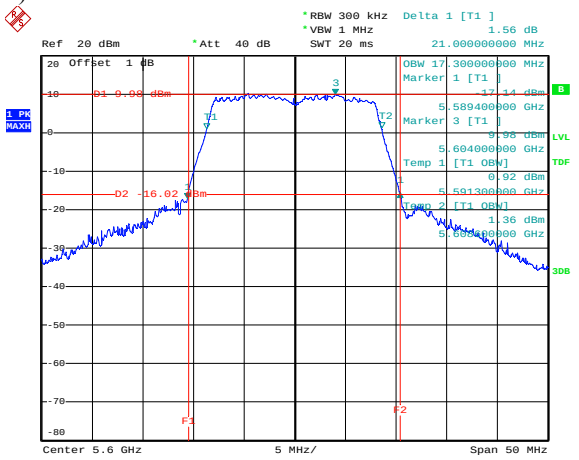


Ant0_802.11a _5 470 ~ 5 725 MHz

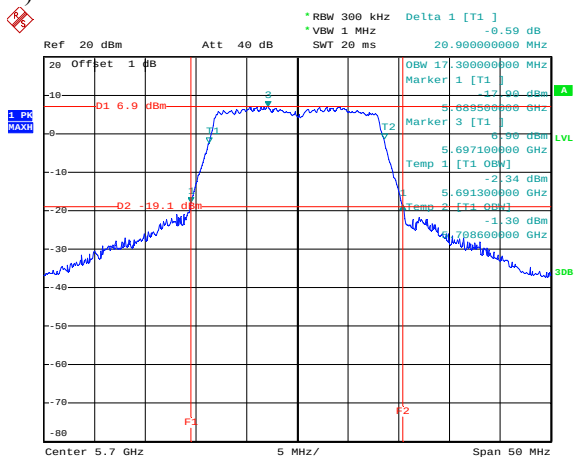
Lowest Channel (5 500 MHz)



Middle Chnnel (5 600 MHz)

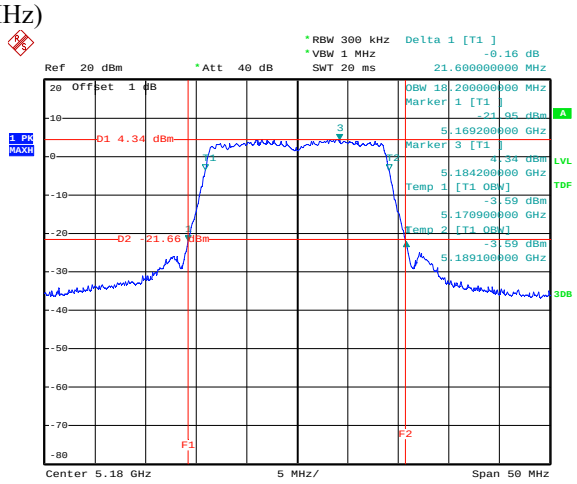


Highest Chnnel (5 700 MHz)

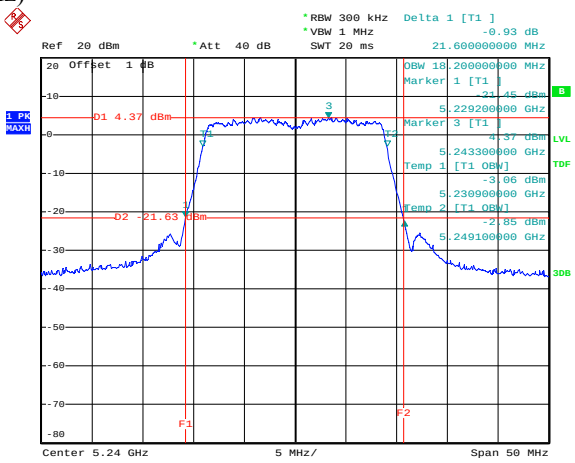


Ant0_802.11n 20 MHz_5 150 ~ 5 250 MHz

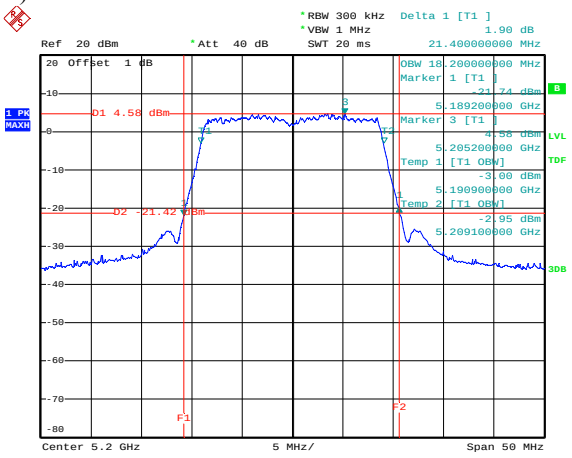
Lowest Channel (5 180 MHz)



Middle Chnnel (5 200 MHz)

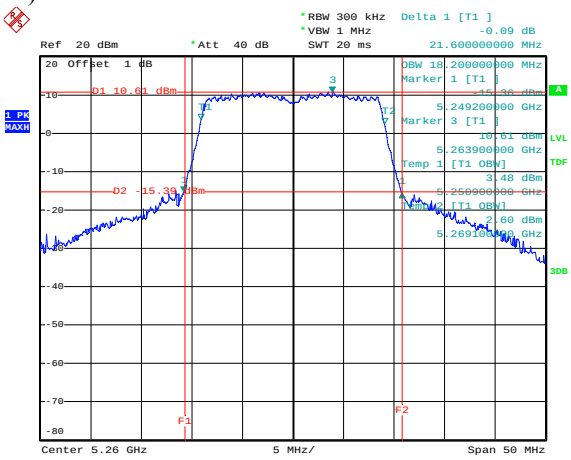


Highest Chnnel (5 240 MHz)

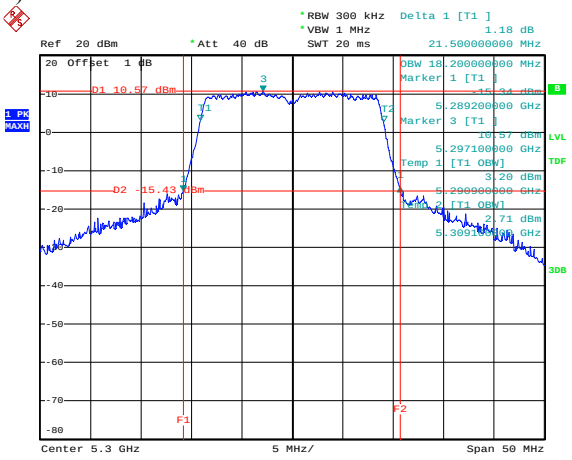


Ant0_802.11n 20 MHz_5 250 ~ 5 350 MHz

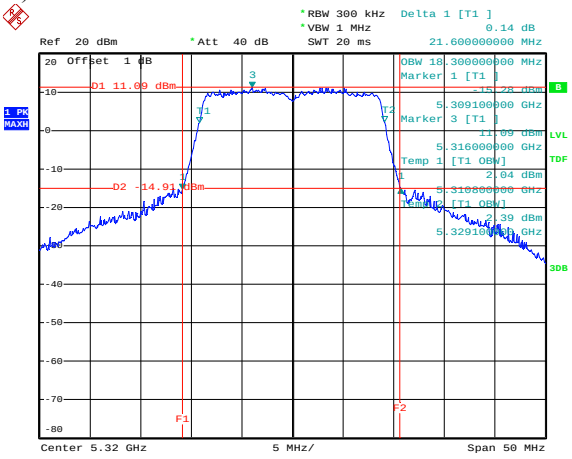
Lowest Channel (5 260 MHz)



Middle Chnnel (5 300 MHz)

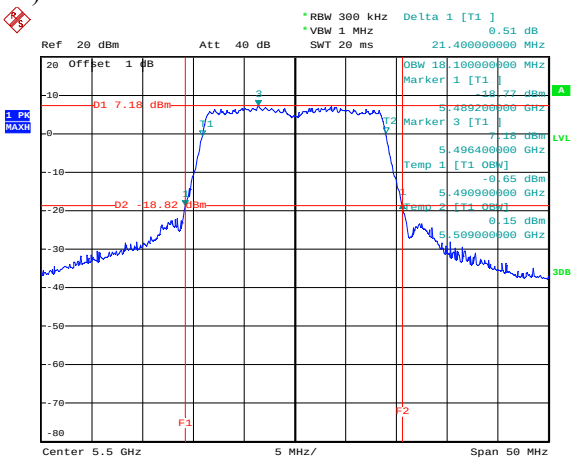


Highest Chnnel (5 320 MHz)

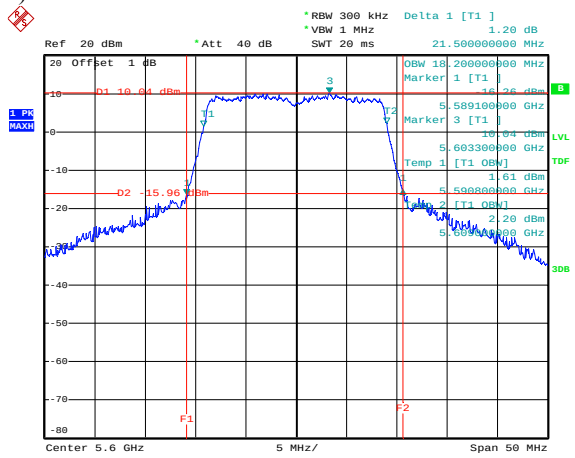


Ant0_802.11n 20 MHz_5 470 ~ 5 725 MHz

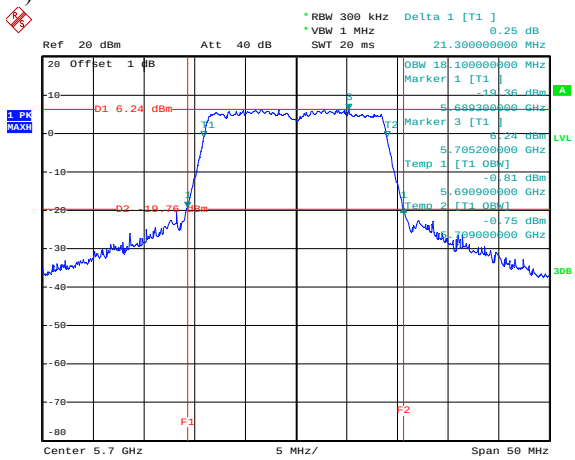
Lowest Channel (5 500 MHz)



Middle Chnnel (5 600 MHz)

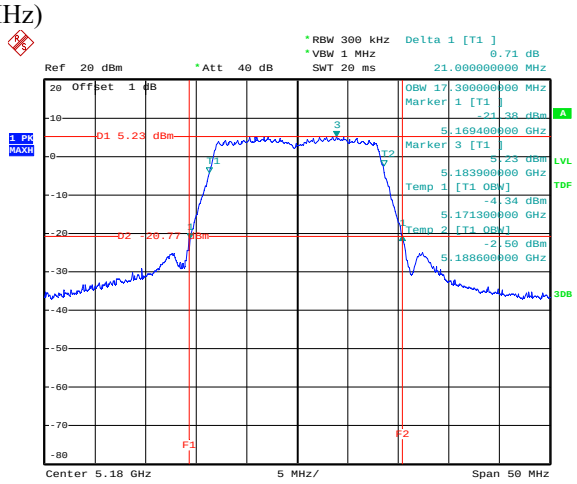


Highest Chnnel (5 700 MHz)

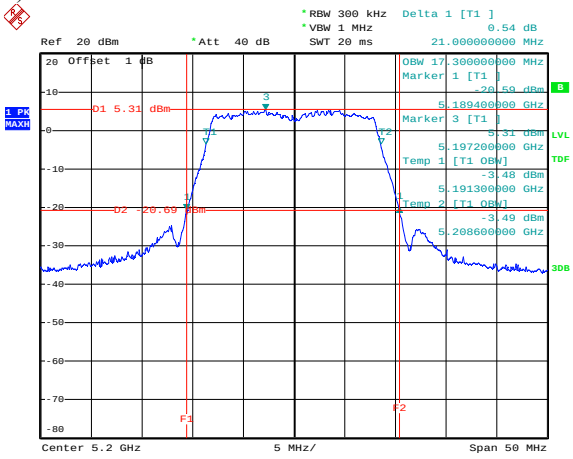


Ant1_802.11a _5 150 ~ 5 250 MHz

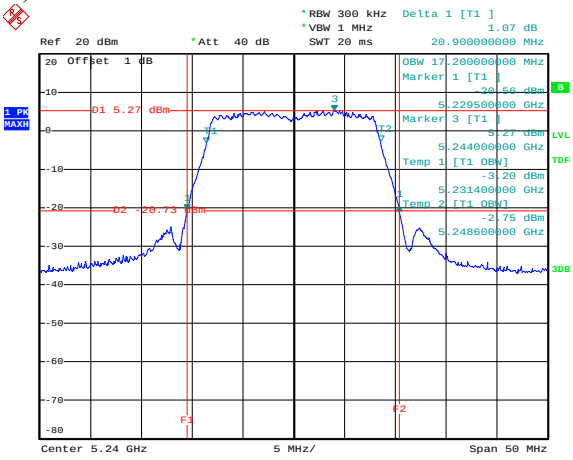
Lowest Channel (5 180 MHz)



Middle Chnnel (5 200 MHz)

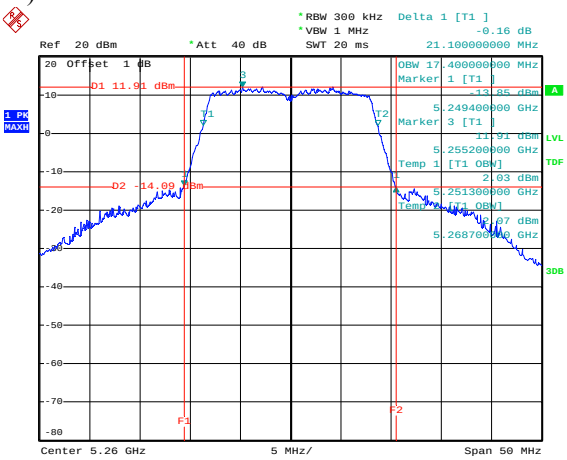


Highest Chnnel (5 240 MHz)

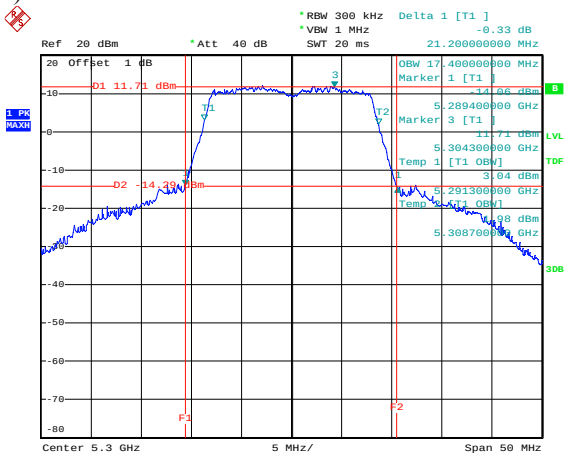


Ant1_802.11a _5 250 ~ 5 350 MHz

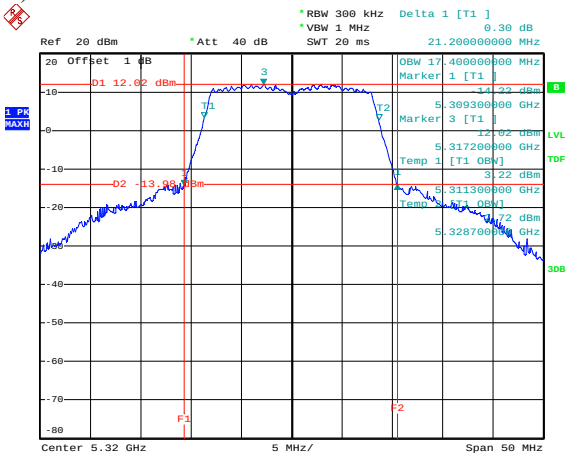
Lowest Channel (5 260 MHz)



Middle Chnnel (5 300 MHz)

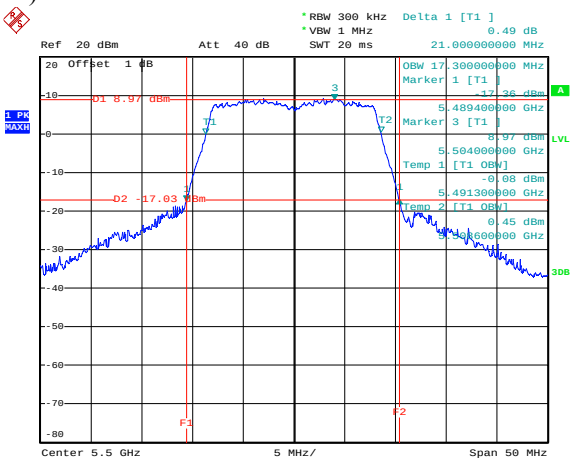


Highest Chnnel (5 320 MHz)

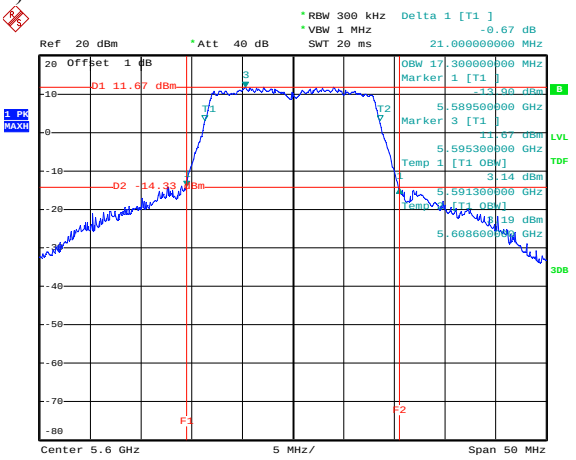


Ant1_802.11a _5 470 ~ 5 725 MHz

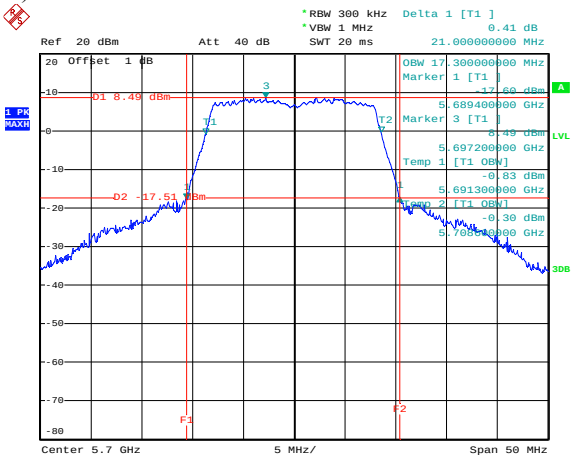
Lowest Channel (5 500 MHz)



Middle Chnnel (5 600 MHz)

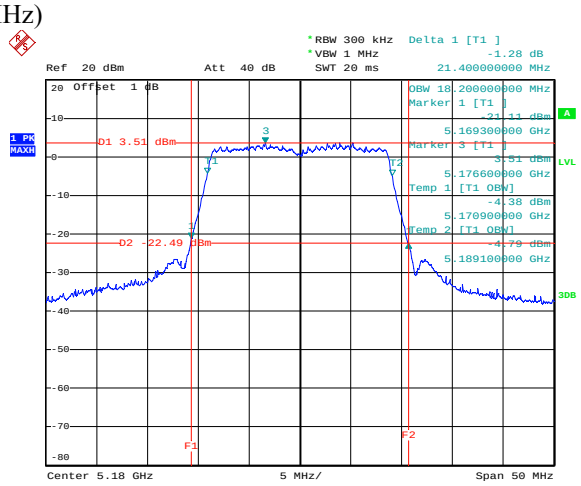


Highest Chnnel (5 700 MHz)

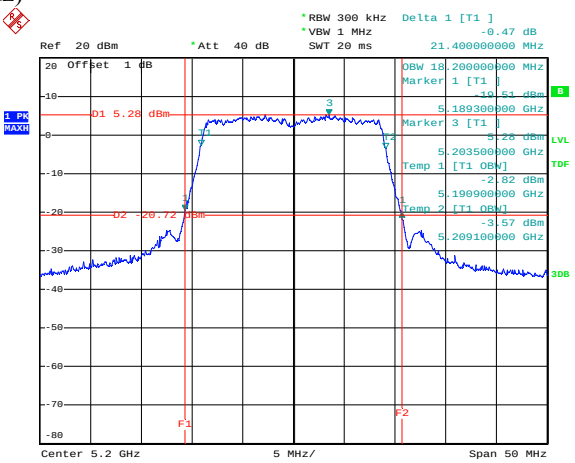


Ant1_802.11n 20 MHz_5 150 ~ 5 250 MHz

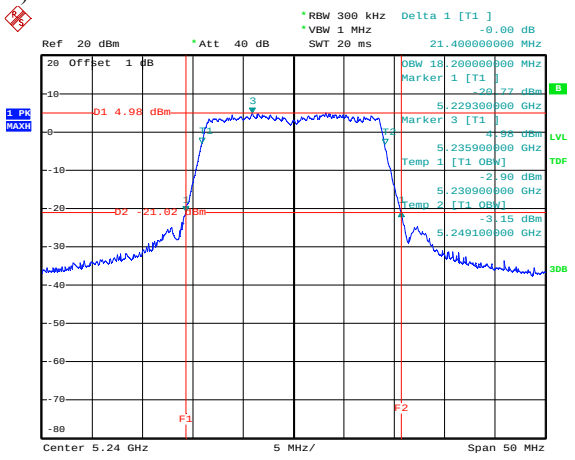
Lowest Channel (5 180 MHz)



Middle Chnnel (5 200 MHz)

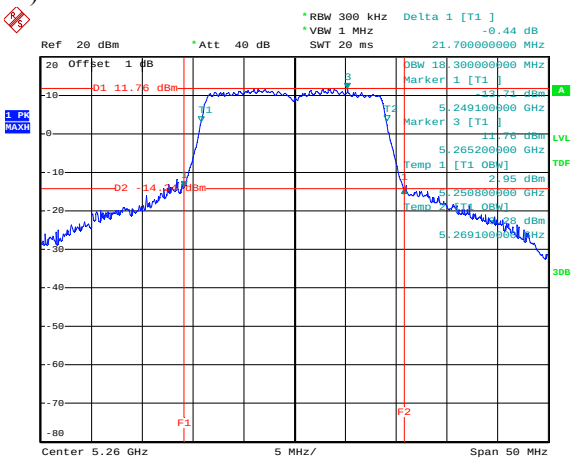


Highest Chnnel (5 240 MHz)

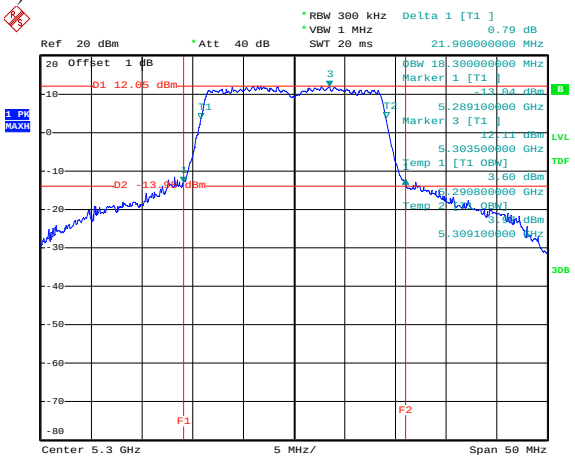


Ant1_802.11n 20 MHz_5 250 ~ 5 350 MHz

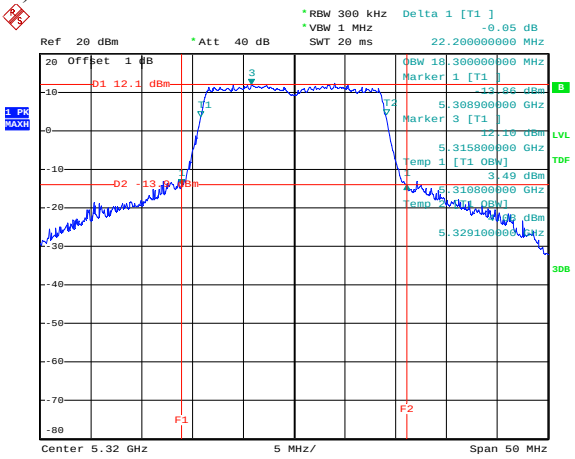
Lowest Channel (5 260 MHz)



Middle Chnnel (5 300 MHz)

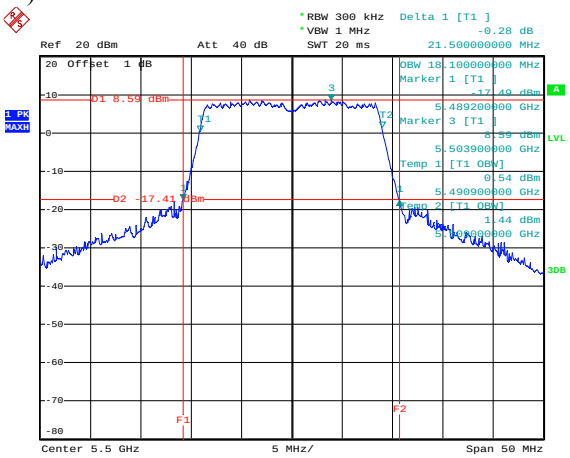


Highest Chnnel (5 320 MHz)

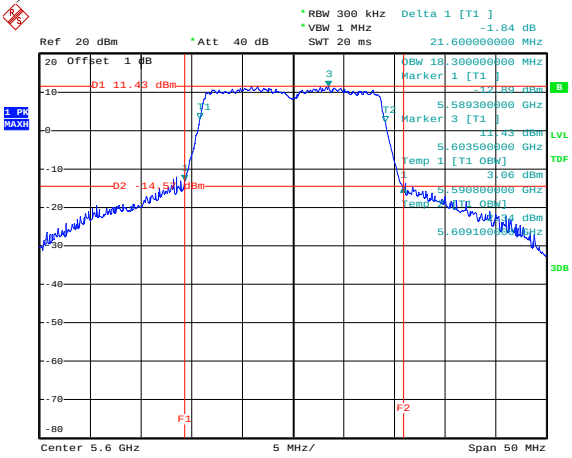


Ant1_802.11n 20 MHz_5 470 ~ 5 725 MHz

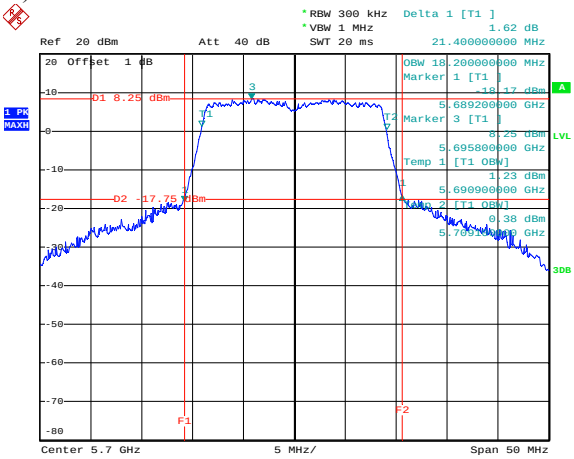
Lowest Channel (5 500 MHz)



Middle Chnnel (5 600 MHz)



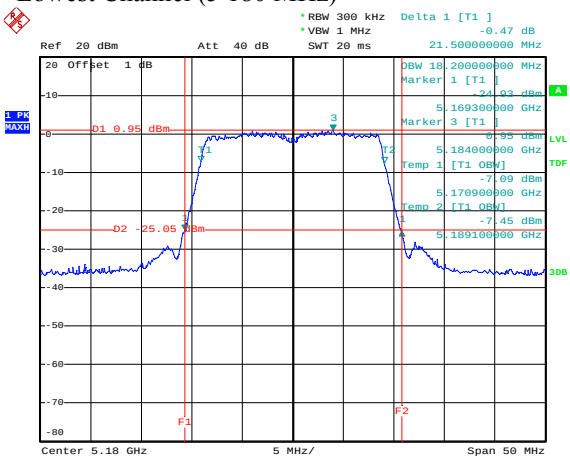
Highest Chnnel (5 700 MHz)



Ant0 + Ant1_802.11n 20 MHz_5 150 ~ 5 250 MHz

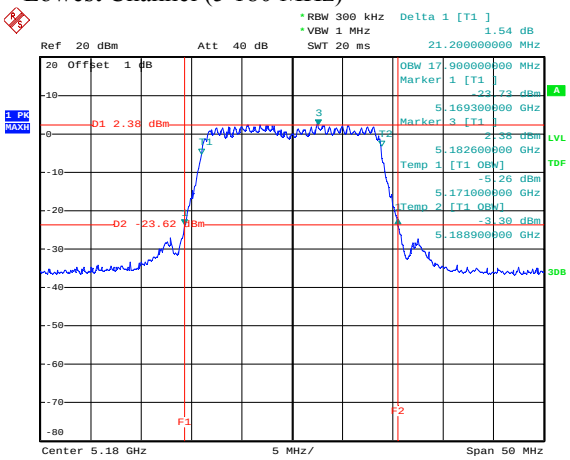
Ant0

Lowest Channel (5 180 MHz)

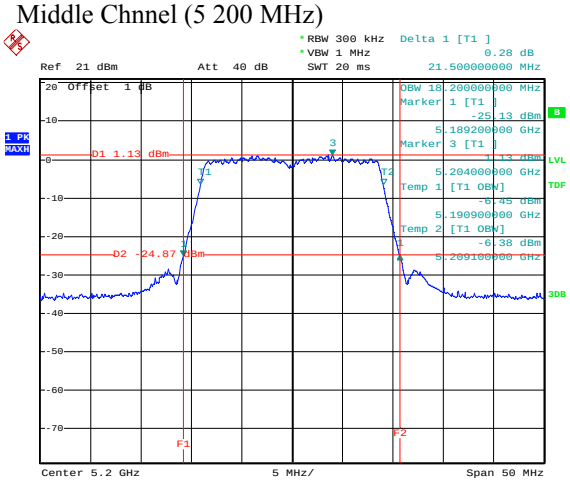


Ant1

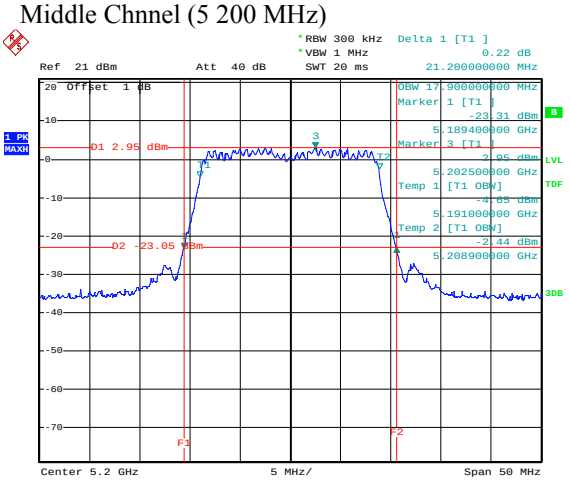
Lowest Channel (5 180 MHz)



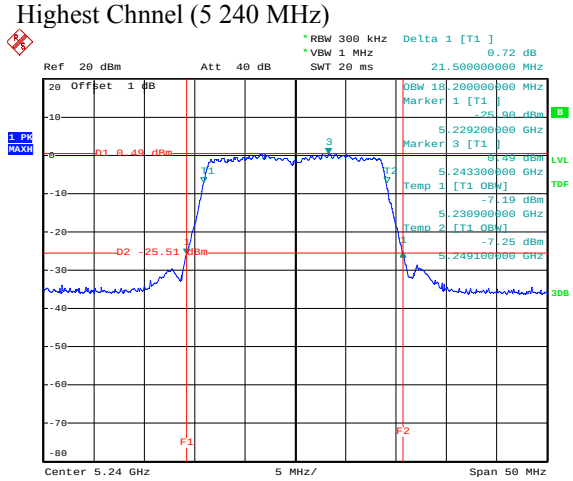
Middle Chnnel (5 200 MHz)



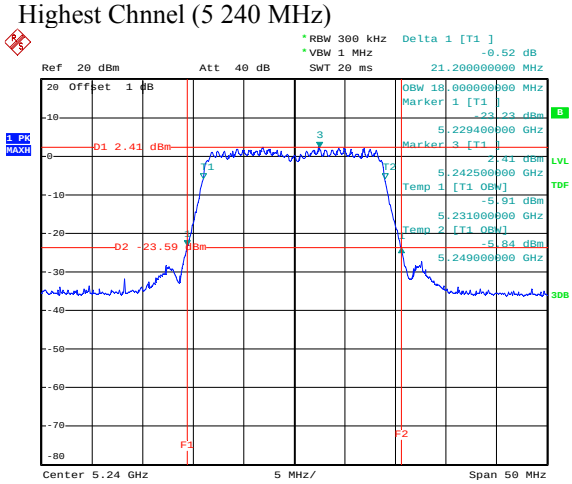
Middle Chnnel (5 200 MHz)



Highest Chnnel (5 240 MHz)



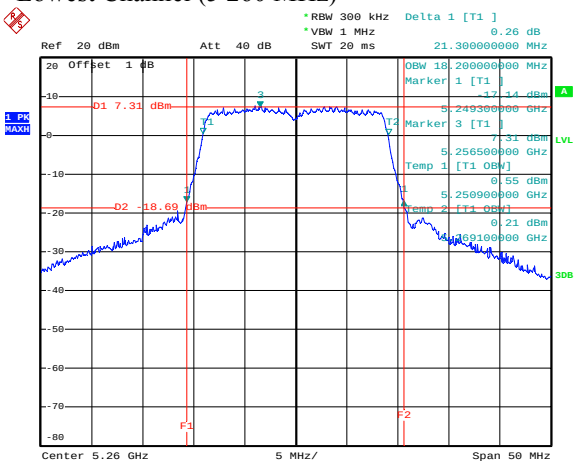
Highest Chnnel (5 240 MHz)



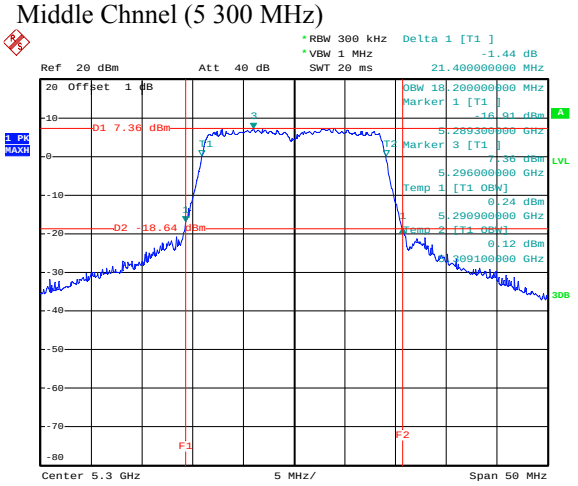
Ant0 + Ant1_802.11n 20 MHz_5 250 ~ 5 350 MHz

Ant0

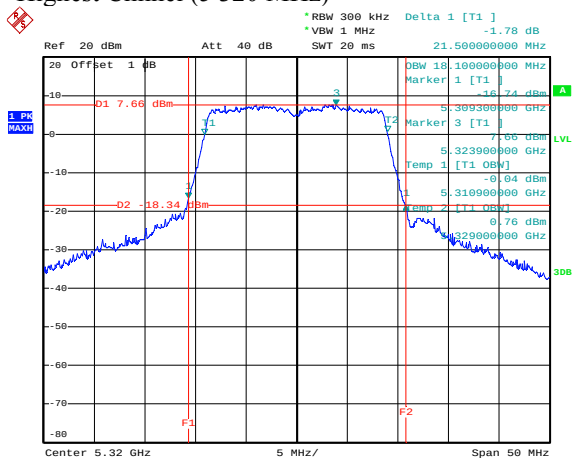
Lowest Channel (5 260 MHz)



Middle Chnnel (5 300 MHz)

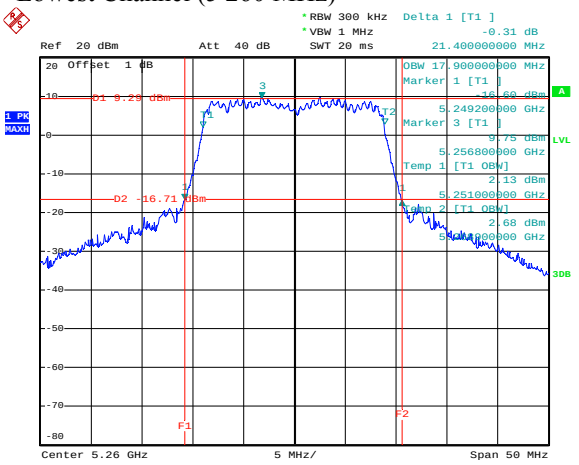


Highest Chnnel (5 320 MHz)

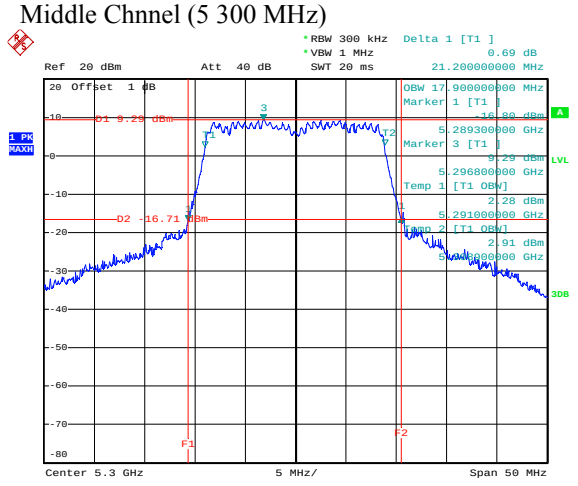


Ant1

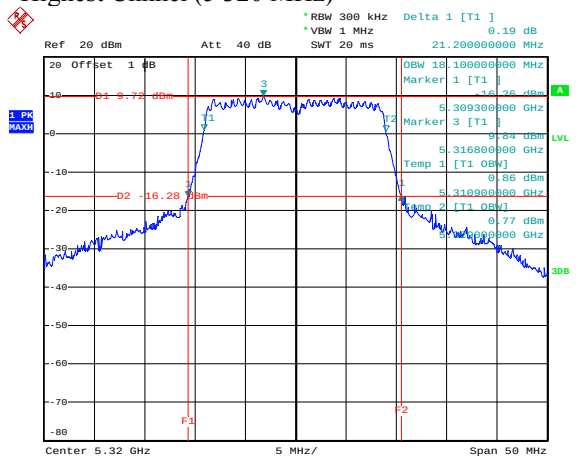
Lowest Channel (5 260 MHz)



Middle Chnnel (5 300 MHz)



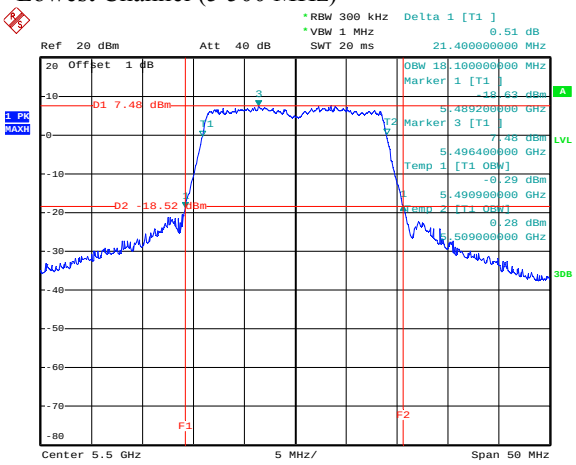
Highest Chnnel (5 320 MHz)



Ant0 + Ant1_802.11n 20 MHz_5 470 ~ 5 725 MHz

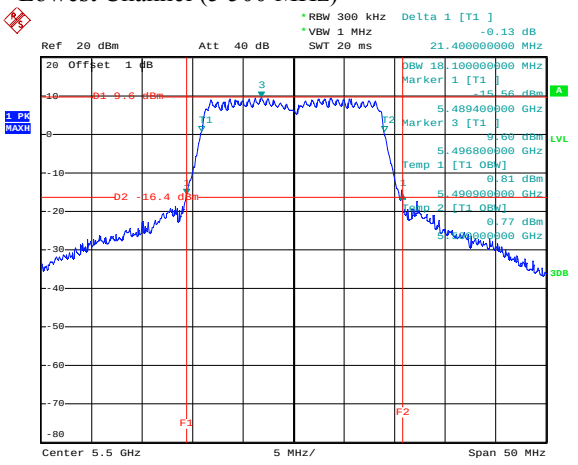
Ant0

Lowest Channel (5 500 MHz)

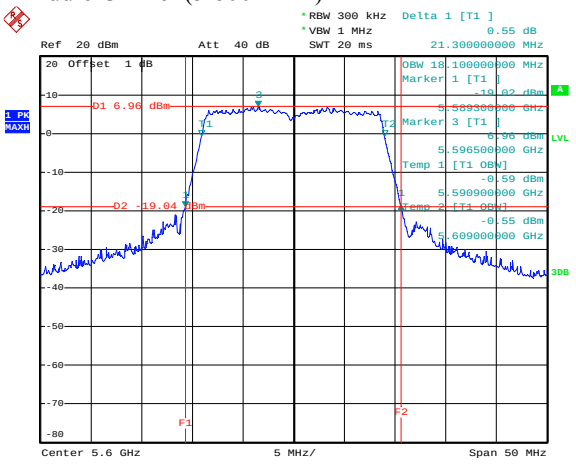


Ant1

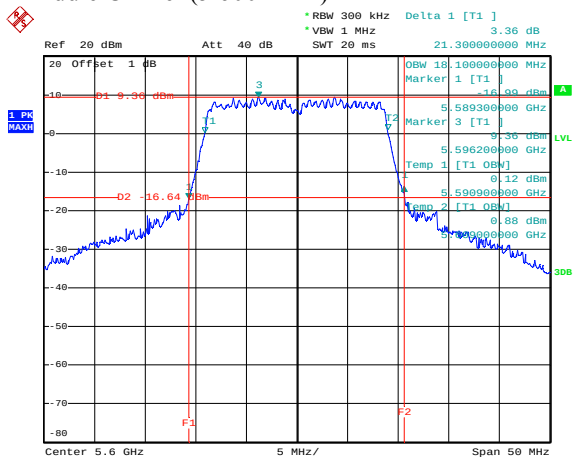
Lowest Channel (5 500 MHz)



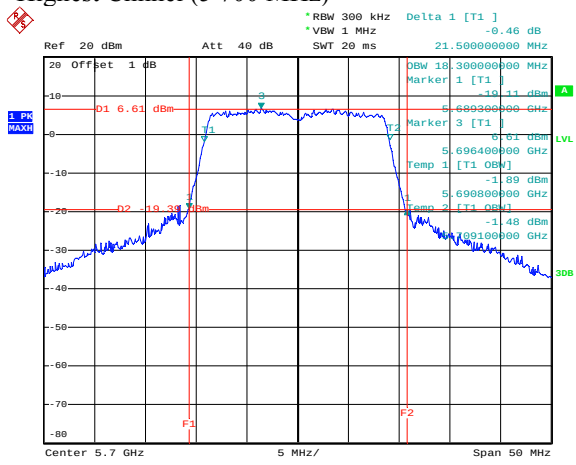
Middle Chnnel (5 600 MHz)



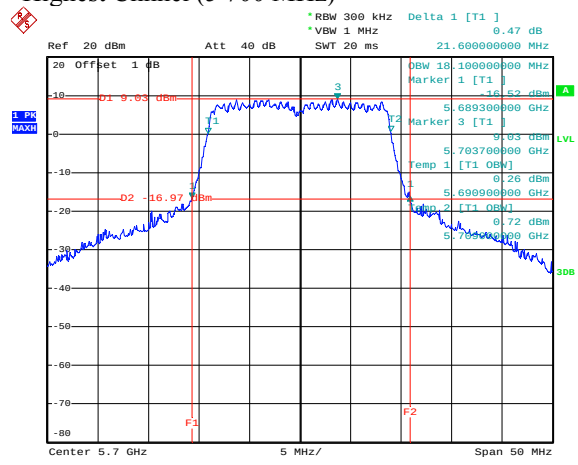
Middle Chnnel (5 600 MHz)



Highest Chnnel (5 700 MHz)



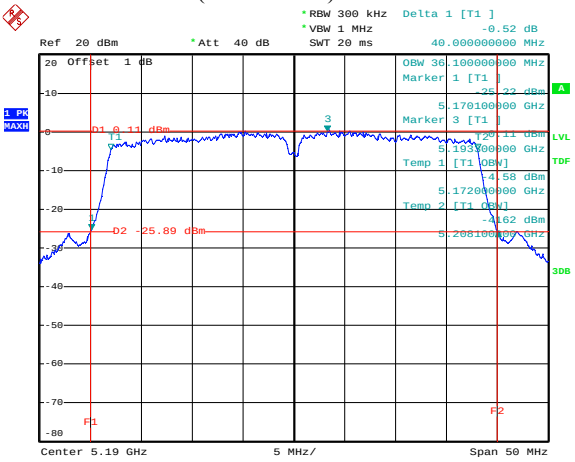
Highest Chnnel (5 700 MHz)



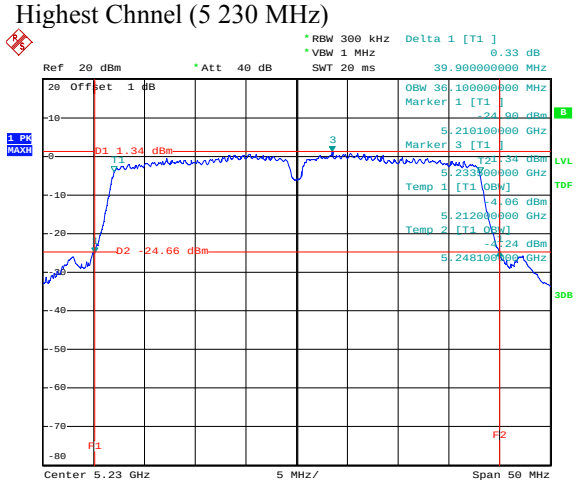
Ant0 + Ant1_802.11n 40 MHz_5 150 ~ 5 250 MHz

Ant0

Lowest Channel (5 190 MHz)

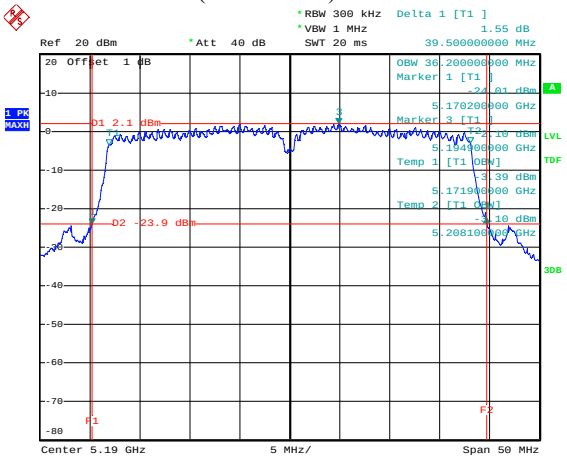


Highest Chnnel (5 230 MHz)

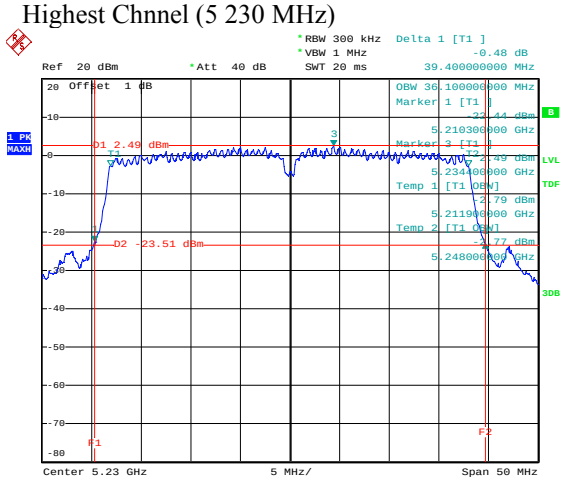


Ant1

Lowest Channel (5 190 MHz)



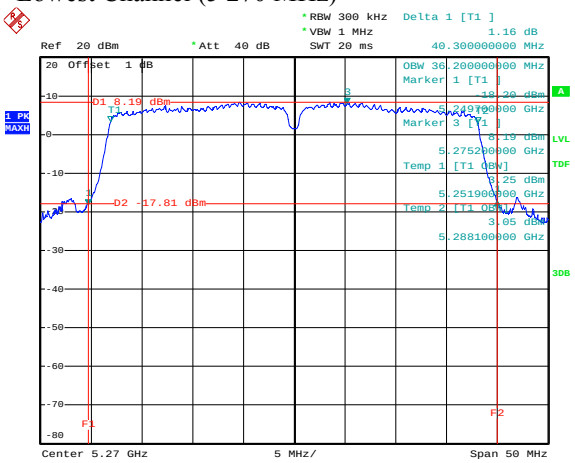
Highest Chnnel (5 230 MHz)



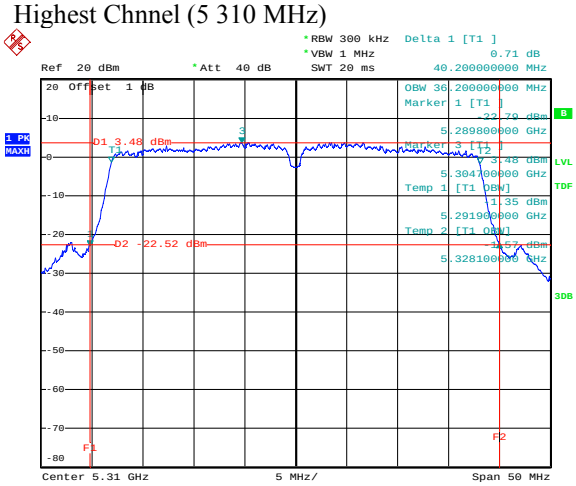
Ant0 + Ant1_802.11n 40 MHz_5 250 ~ 5 350 MHz

Ant0

Lowest Channel (5 270 MHz)

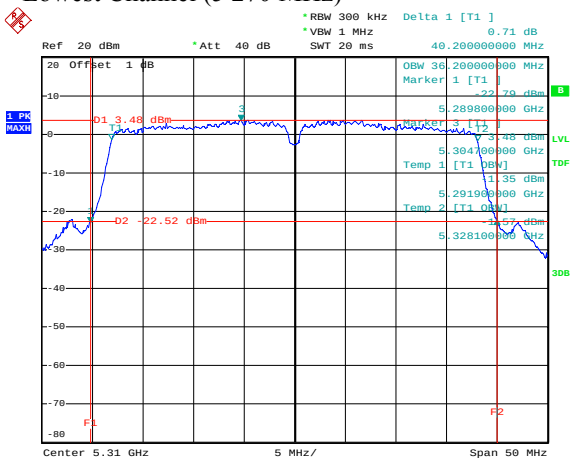


Highest Chnnel (5 310 MHz)

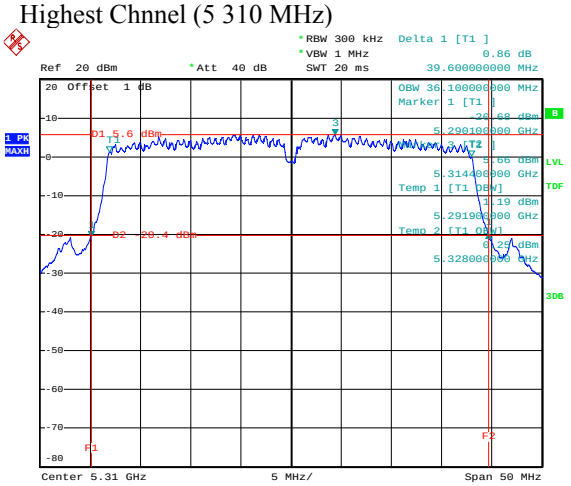


Ant1

Lowest Channel (5 270 MHz)



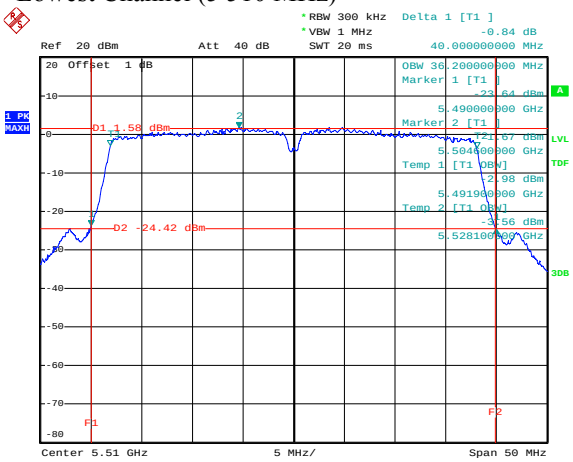
Highest Chnnel (5 310 MHz)



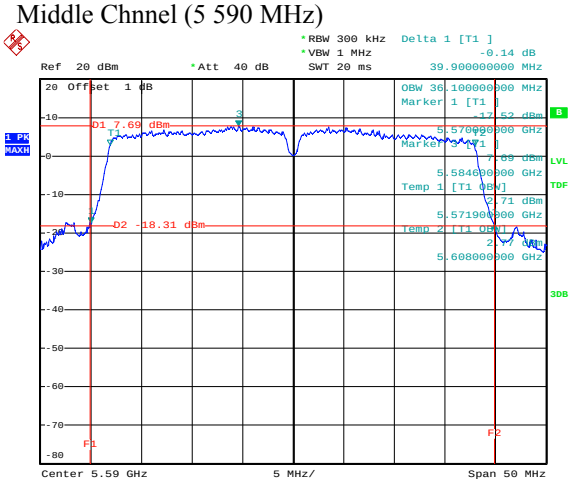
Ant0 + Ant1_802.11n 40 MHz_5 470 ~ 5 725 MHz

Ant0

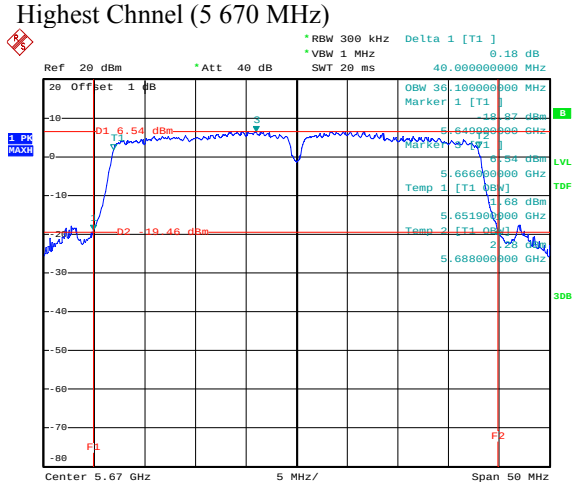
Lowest Channel (5 510 MHz)



Middle Chnnel (5 590 MHz)

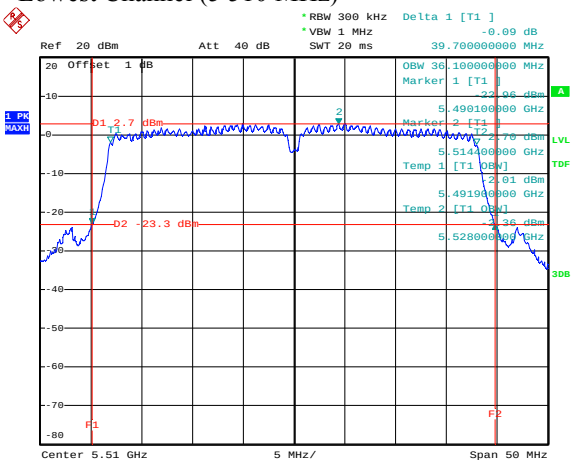


Highest Chnnel (5 670 MHz)

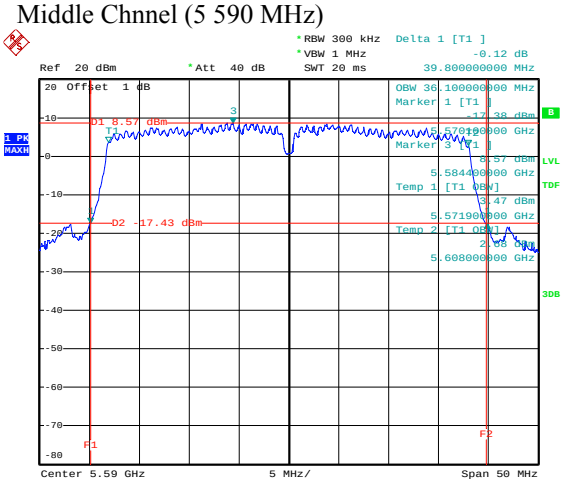


Ant1

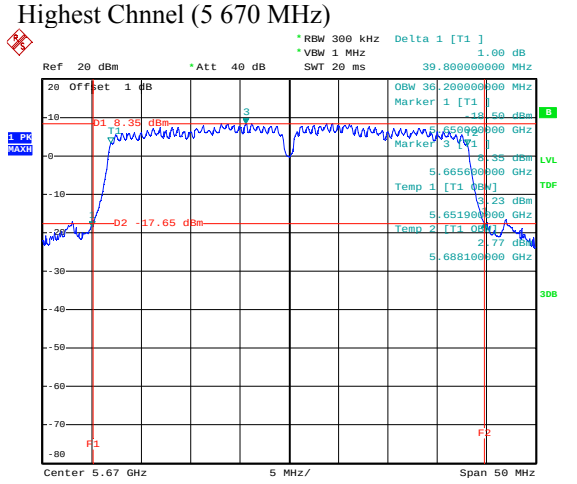
Lowest Channel (5 510 MHz)



Middle Chnnel (5 590 MHz)



Highest Chnnel (5 670 MHz)



5.3 Maximum Conducted Output Power

5.3.1 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 spectral 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 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 SA-2 (trace averaging across on and off times of the EUT transmissions, followed by duty cycle correction).

(1) Measure the duty cycle, x, of the transmitter output signal as described in section B).
(2) Set span to encompass the entire emission bandwidth (EBW) of the signal.
(3) Set RBW = 1 MHz.
(4) Set VBW ≥ 3 MHz.
(5) Number of points in sweep ≥ 2 Span / RBW. (This ensures that bin-to-bin spacing is ≤ RBW/2, so that narrowband signals are not lost between frequency bins.)
(6) Sweep time = auto.
(7) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.
(8) Do not use sweep triggering. Allow the sweep to "free run".
(9) Trace average at least 100 traces in power averaging (i.e., RMS) mode; however, the number of traces to be averaged shall be increased above 100 as needed to ensure that the average accurately represents the true average over the on and off periods of the transmitter.
(10) Compute power by integrating the spectrum across the 26 dB EBW of the signal using the spectrum analyzer's band power measurement function with band limits set equal to the EBW band edges. If the spectrum analyzer does not have a band power function, sum the spectrum levels (in power units) at 1 MHz intervals extending across the 26 dB EBW of the spectrum.
(11) Add 10 log(1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times (because the measurement represents an average over both the on and off times of the transmission). For example, add 10 log(1/0.25) =6 dB if the duty cycle is 25 percent.

5.3.4 Test Result

-Complied

Ant0_802.11a

Range (MHz)	CH	Freq (MHz)	Reading (dBm)	Duty factor (dBm)	Result (dBm)	Limit (dBm)	Margin (dB)
5 150 ~ 5 250	Low	5 180	10.61	0.20	10.81	24.00	6.19
	Mid	5 200	10.24	0.20	10.44	24.00	6.56
	High	5 240	10.35	0.20	10.55	24.00	6.45
5 250 ~ 5 350	Low	5 260	16.45	0.20	16.65	24.00	7.35
	Mid	5 300	16.58	0.20	16.78	24.00	7.22
	High	5 320	16.82	0.20	17.02	24.00	6.98
5 470 ~ 5 725	Low	5 500	15.41	0.20	15.61	24.00	8.39
	Mid	5 600	16.27	0.20	16.47	24.00	7.53
	High	5 700	14.48	0.20	14.68	24.00	9.32

Ant0_802.11n 20 MHz

Range (MHz)	CH	Freq (MHz)	Reading (dBm)	Duty factor (dBm)	Result (dBm)	Limit (dBm)	Margin (dB)
5 150 ~ 5 250	Low	5 180	9.66	0.22	9.88	24.00	14.12
	Mid	5 200	9.69	0.22	9.91	24.00	14.09
	High	5 240	9.72	0.22	9.94	24.00	14.06
5 250 ~ 5 350	Low	5 260	15.86	0.22	16.08	24.00	7.92
	Mid	5 300	15.92	0.22	16.14	24.00	7.86
	High	5 320	16.24	0.22	16.46	24.00	7.54
5 470 ~ 5 725	Low	5 500	14.07	0.22	14.29	24.00	9.71
	Mid	5 600	15.57	0.22	15.79	24.00	8.21
	High	5 700	13.64	0.22	13.86	24.00	10.14

-NOTE:

1. Since the directional gain of the integral antenna declared by the manufacturer (G_{ANT0} = 3.2 dBi, G_{ANT1} = 3.2 dBi,) does not exceed 6.0 dBi, there was no need to reduce the output power.
2. Duty factor 802.11a mode: 10 log(1/x) = 10 log(1/0.953 9) = 0.20 dB.
3. Duty factor 802.11n 20MHz mode: 10 log(1/x) = 10 log(1/0.950 7) = 0.22 dB.
4. We took the insertion loss of the cable loss into consideration within the measuring instrument.

Ant1_802.11a

Range (MHz)	CH	Freq (MHz)	Reading (dBm)	Duty factor (dBm)	Result (dBm)	Limit (dBm)	Margin (dB)
5 150 ~ 5 250	Low	5 180	11.09	0.20	11.29	24.00	12.71
	Mid	5 200	11.50	0.20	11.70	24.00	12.30
	High	5 240	11.51	0.20	11.71	24.00	12.29
5 250 ~ 5 350	Low	5 260	17.50	0.20	17.70	24.00	6.30
	Mid	5 300	17.71	0.20	17.91	24.00	6.09
	High	5 320	18.09	0.20	18.29	24.00	5.71
5 470 ~ 5 725	Low	5 500	15.87	0.20	16.07	24.00	7.93
	Mid	5 600	16.95	0.20	17.15	24.00	6.85
	High	5 700	15.33	0.20	15.53	24.00	8.47

Ant1_802.11n 20 MHz

Range (MHz)	CH	Freq (MHz)	Reading (dBm)	Duty factor (dBm)	Result (dBm)	Limit (dBm)	Margin (dB)
5 150 ~ 5 250	Low	5 180	10.37	0.22	10.59	24.00	13.41
	Mid	5 200	10.89	0.22	11.11	24.00	12.89
	High	5 240	10.85	0.22	11.07	24.00	12.93
5 250 ~ 5 350	Low	5 260	16.97	0.22	17.19	24.00	6.81
	Mid	5 300	17.23	0.22	17.45	24.00	6.55
	High	5 320	17.59	0.22	17.81	24.00	6.19
5 470 ~ 5 725	Low	5 500	15.49	0.22	15.71	24.00	8.29
	Mid	5 600	16.70	0.22	16.92	24.00	7.08
	High	5 700	15.06	0.22	15.28	24.00	8.72

-NOTE:

1. Since the directional gain of the integral antenna declared by the manufacturer (G_{ANT0} = 3.2 dBi, G_{ANT1} = 3.2 dBi,) does not exceed 6.0 dBi, there was no need to reduce the output power.
2. Duty factor 802.11a mode: 10 log(1/x) = 10 log(1/0.953 9) = 0.20 dB.
3. Duty factor 802.11n 20MHz mode: 10 log(1/x) = 10 log(1/0.950 7) = 0.22 dB.
4. We took the insertion loss of the cable loss into consideration within the measuring instrument.

Ant0 + Ant_1802.11n 20 MHz

Range (MHz)	CH	Freq (MHz)	Reading (dBm)		Duty factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)
			Ant0	Ant1				
5 150 ~ 5 250	Low	5 180	6.33	6.58	0.22	9.69	23.79	14.10
	Mid	5 200	6.40	6.81	0.22	9.84	23.79	13.95
	High	5 240	6.30	6.79	0.22	9.78	23.79	14.01
5 250 ~ 5 350	Low	5 260	14.36	15.28	0.22	18.07	23.79	5.72
	Mid	5 300	14.36	15.09	0.22	17.97	23.79	5.82
	High	5 320	14.60	15.17	0.22	18.12	23.79	5.67
5 470 ~ 5 725	Low	5 500	13.61	14.85	0.22	17.50	23.79	6.29
	Mid	5 600	13.43	14.28	0.22	17.11	23.79	6.68
	High	5 700	13.16	14.21	0.22	16.95	23.79	6.84

Ant0 + Ant_802.11n 40 MHz

Range (MHz)	CH	Freq (MHz)	Reading (dBm)		Duty factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)
			Ant0	Ant1				
5 150 ~ 5 250	Low	5 190	6.38	7.08	0.43	10.19	23.79	13.60
	High	5 230	7.24	8.09	0.43	11.13	23.79	12.66
5 250 ~ 5 350	Low	5 260	14.66	15.28	0.43	18.43	23.79	5.36
	High	5 300	10.35	11.19	0.43	14.23	23.79	9.56
5 470 ~ 5 725	Low	5 500	8.80	8.70	0.43	12.19	23.79	11.60
	Mid	5 600	14.28	14.39	0.43	17.78	23.79	6.01
	High	5 700	13.73	14.30	0.43	17.47	23.79	6.32

-NOTE:

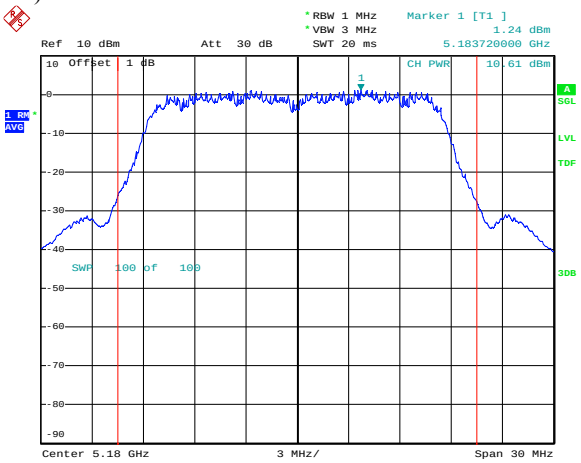
1. Since the directional gain of the integral antenna declared by the manufacturer (G_{ANT0} = 3.2 dBi, G_{ANT1} = 3.2 dBi,) exceed 6.0 dBi, there was need to reduce the output power.
2. Directional gain calculation: G_{ANT} + 10 log(N) dBi = 3.2 + 10 log(2) dBi = 6.21 dBi, Reduce Limit = 24 – (6.210 – 6) = 23.79 dBm.
3. Total power calculation: 10 log(10^(Ant0 power/10)+10^(Ant1 power/10))
4. Duty factor 802.11n 20 MHz mode: 10 log(1/x) = 10 log(1/0.950 7) = 0.22 dB.
5. Duty factor 802.11n 40 MHz mode: 10 log(1/x) = 10 log(1/0.904 9) = 0.43 dB.
6. We took the insertion loss of the cable loss into consideration within the measuring instrument.

5.3.5 Test Plot

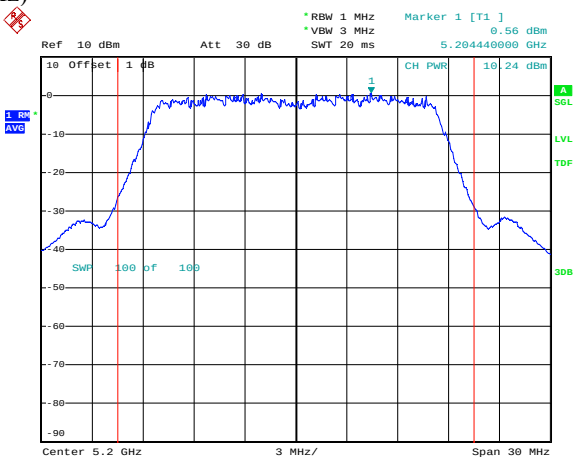
Figure 1. Plot of the Maximum Conducted Output Power and Peak Power Spectral Density.

Ant0_802.11a _5 150 ~ 5 250 MHz

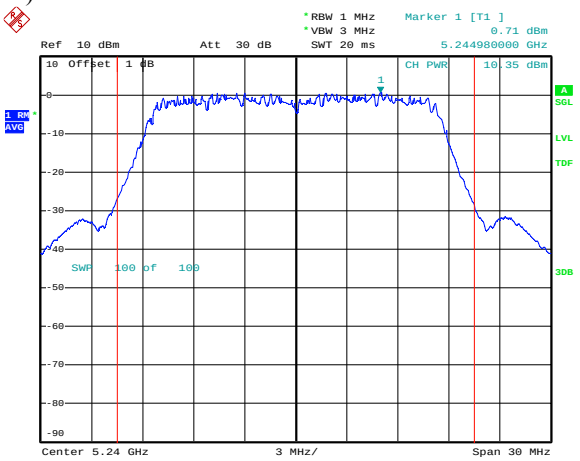
- Lowest Channel (5 180 MHz)



- Middle Chnnel (5 200 MHz)

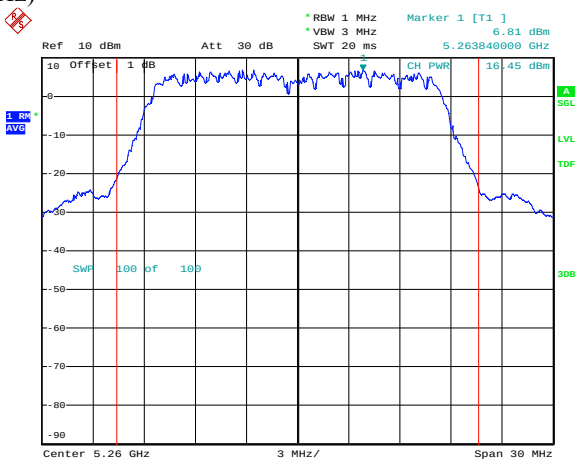


- Highest Chnnel (5 240 MHz)

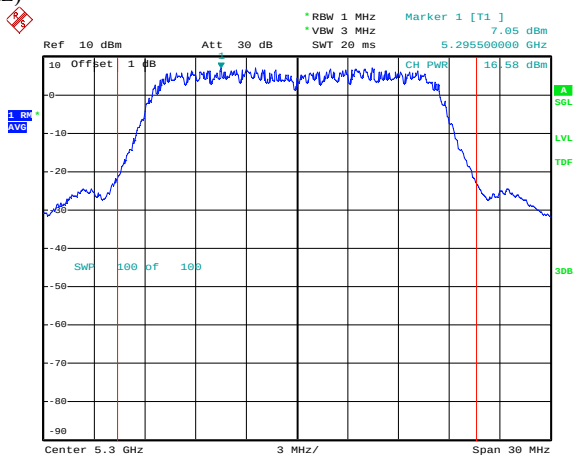


Ant0_802.11a _5 250 ~ 5 350 MHz

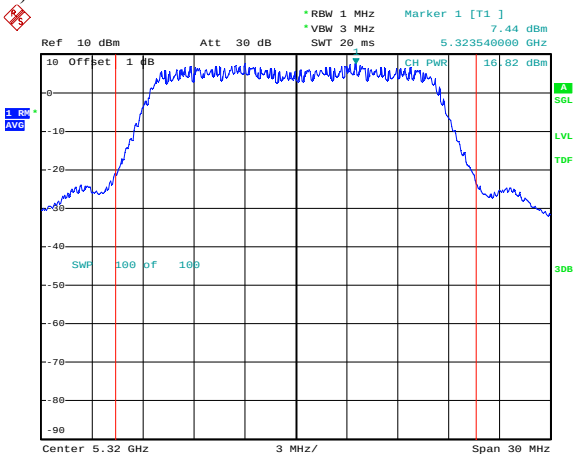
- Lowest Channel (5 260 MHz)



- Middle Chnnel (5 300 MHz)

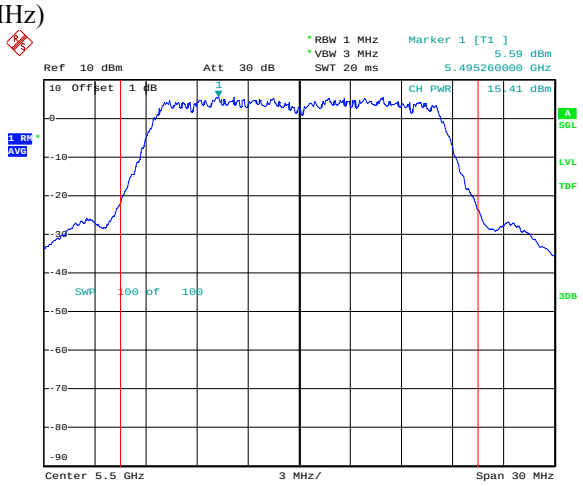


- Highest Chnnel (5 320 MHz)

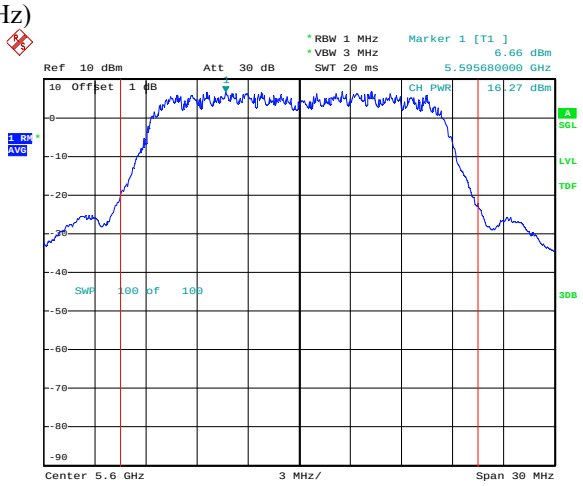


Ant0_802.11a_5 470 ~ 5 725 MHz

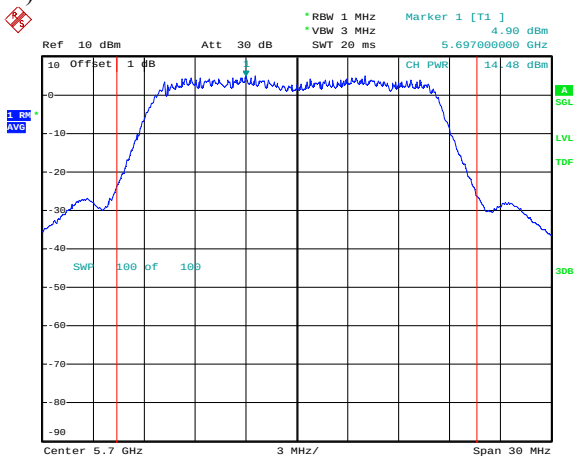
- Lowest Channel (5 500 MHz)



- Middle Chnnel (5 600 MHz)

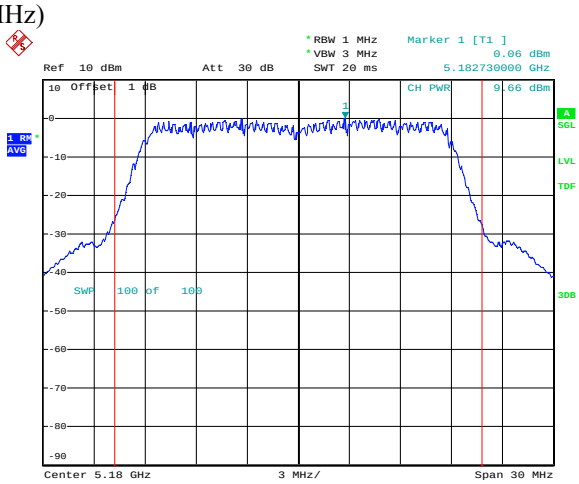


- Highest Chnnel (5 700 MHz)

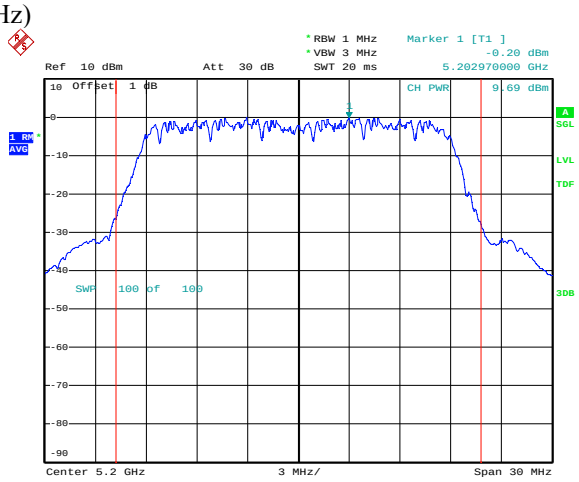


Ant0_802.11n 20 MHz_5 150 ~ 5 250 MHz

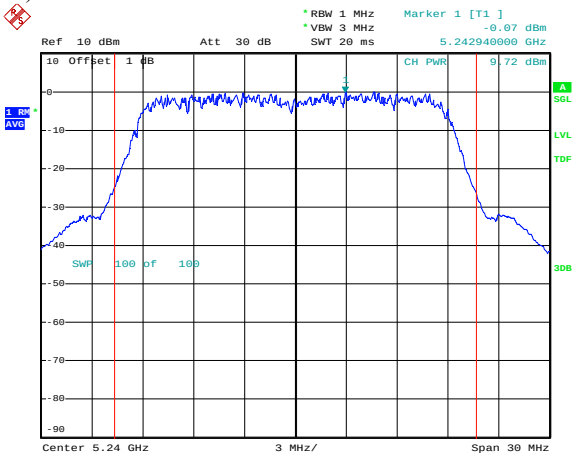
- Lowest Channel (5 180 MHz)



- Middle Chnnel (5 200 MHz)

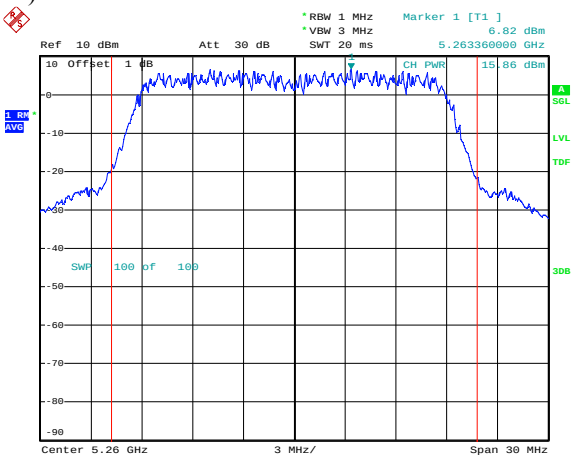


- Highest Chnnel (5 240 MHz)

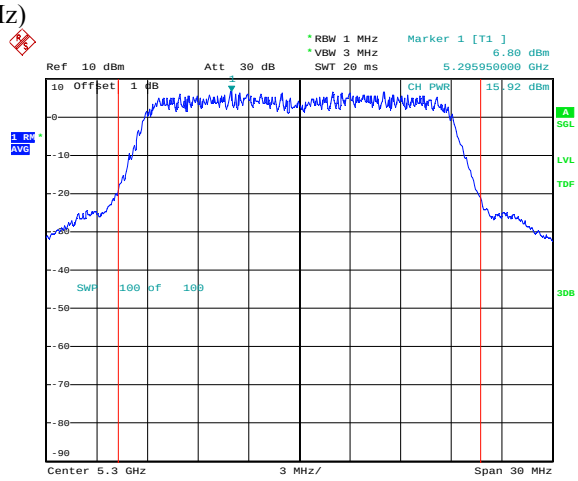


Ant0_802.11a_5 250 ~ 5 350 MHz

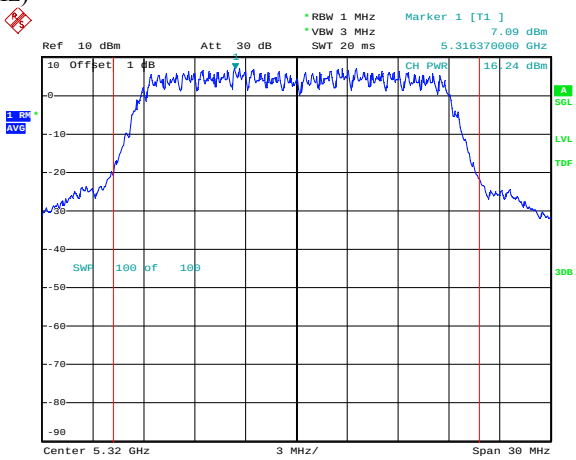
- Lowest Channel (5 260 MHz)



- Middle Chnnel (5 300 MHz)

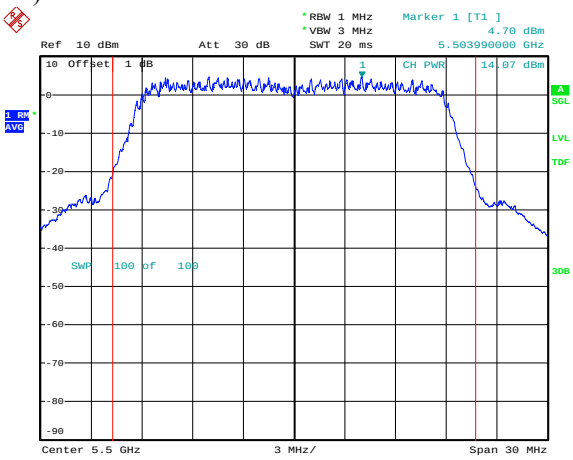


- Highest Chnnel (5 320 MHz)

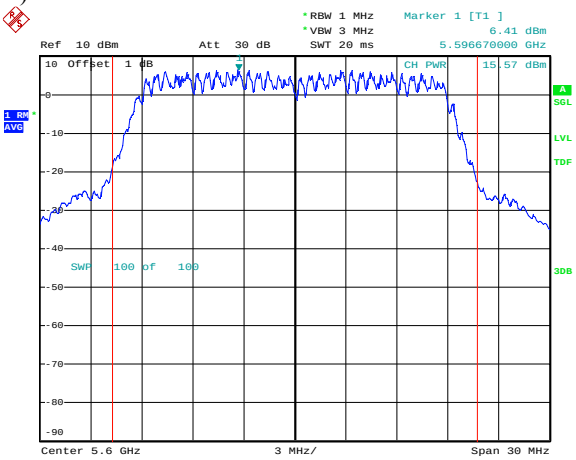


Ant0_802.11a_5 470 ~ 5 725 MHz

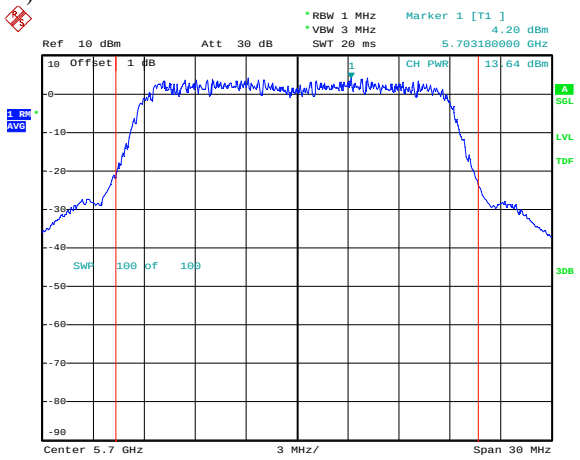
- Lowest Channel (5 500 MHz)



- Middle Chnnel (5 600 MHz)

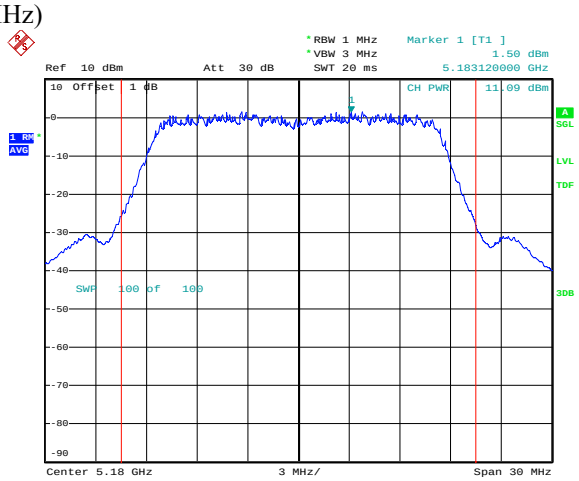


- Highest Chnnel (5 700 MHz)

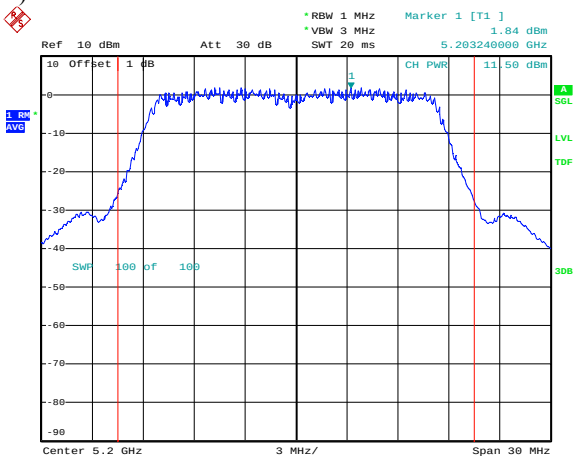


Ant1_802.11a_5 150 ~ 5 250 MHz

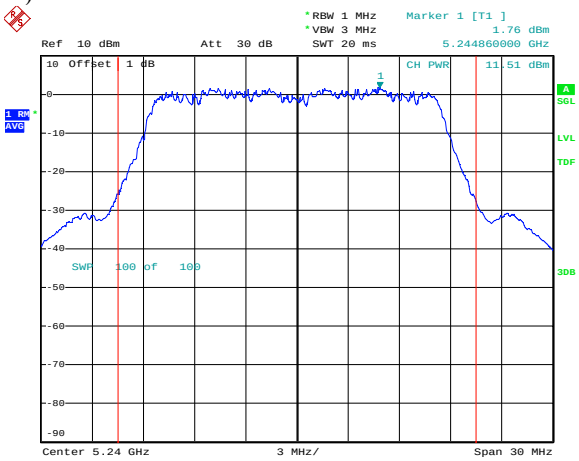
- Lowest Channel (5 180 MHz)



- Middle Chnnel (5 200 MHz)

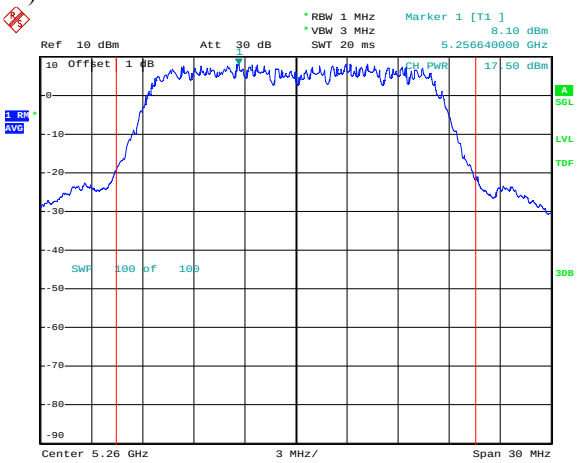


- Highest Chnnel (5 240 MHz)

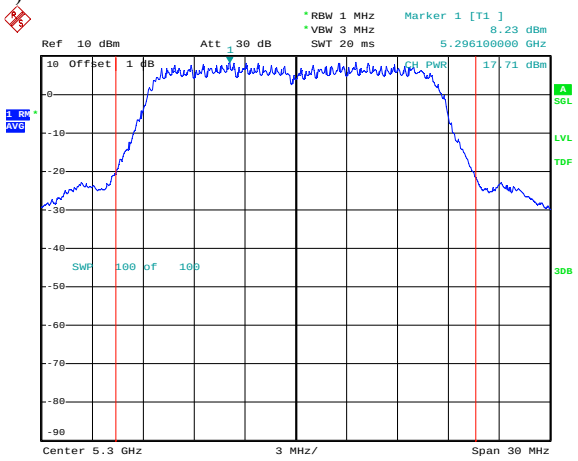


Ant1_802.11a_5 250 ~ 5 350 MHz

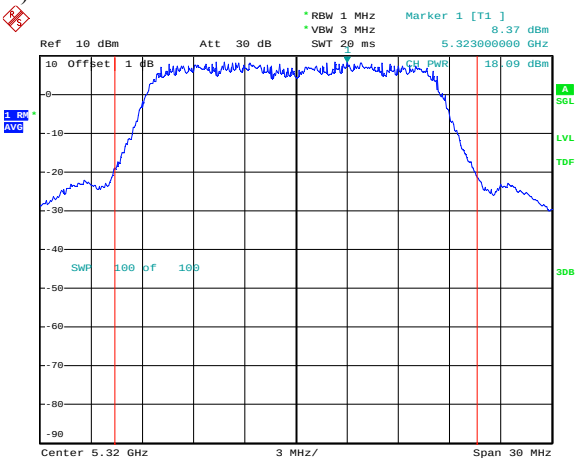
- Lowest Channel (5 260 MHz)



- Middle Chnnel (5 300 MHz)

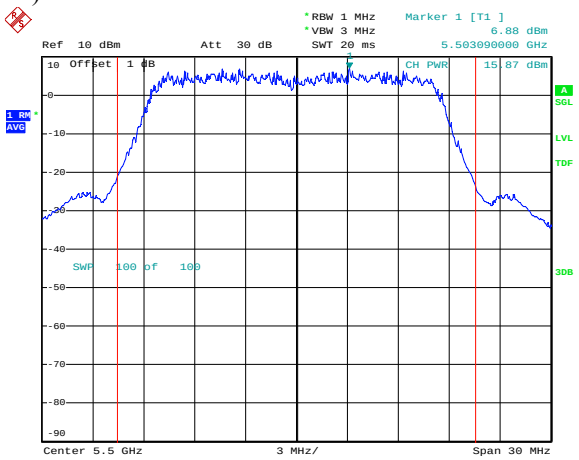


- Highest Chnnel (5 320 MHz)

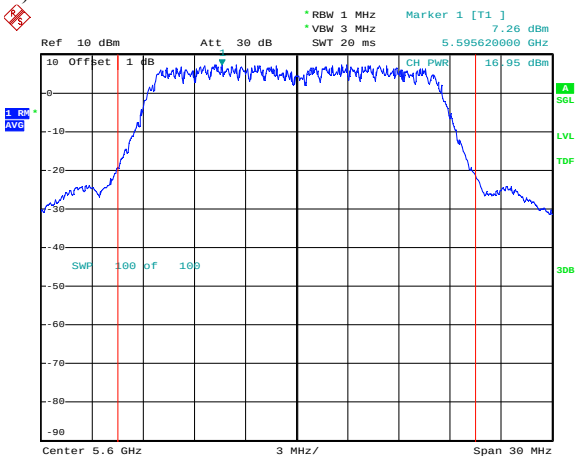


Ant1_802.11a_5 470 ~ 5 725 MHz

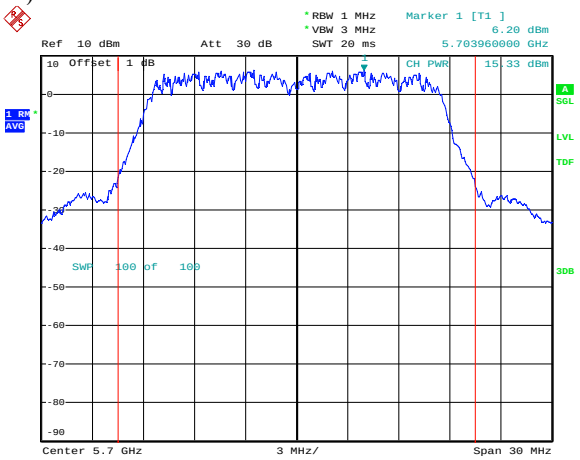
- Lowest Channel (5 500 MHz)



- Middle Chnnel (5 600 MHz)



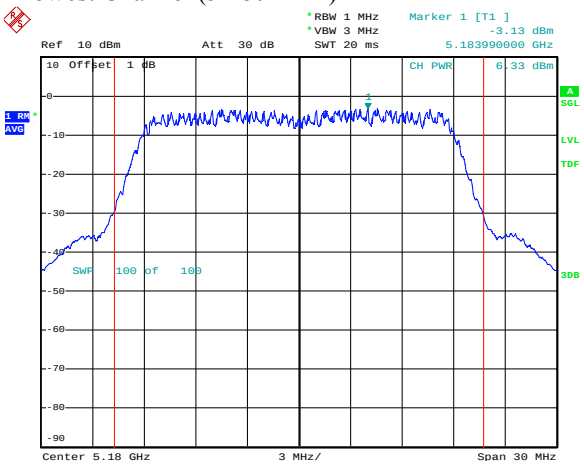
- Highest Chnnel (5 700 MHz)



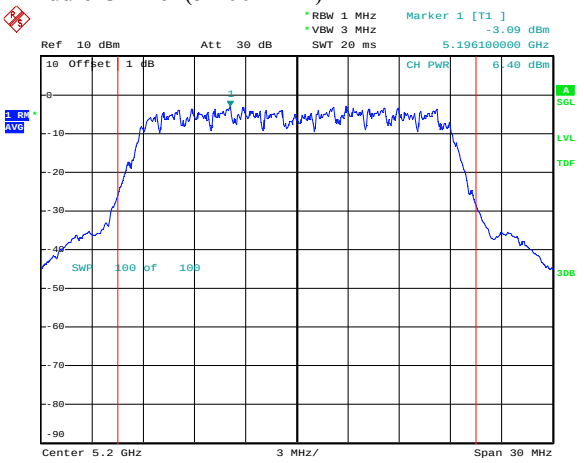
Ant0 + Ant1_802.11n 20 MHz_5 150 ~ 5 250 MHz

Ant0

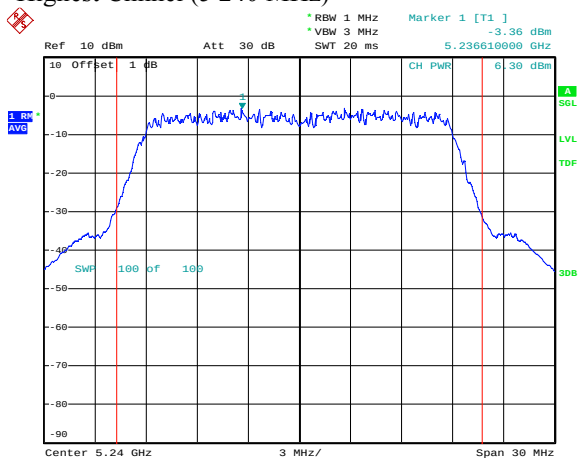
Lowest Channel (5 180 MHz)



Middle Chnnel (5 200 MHz)

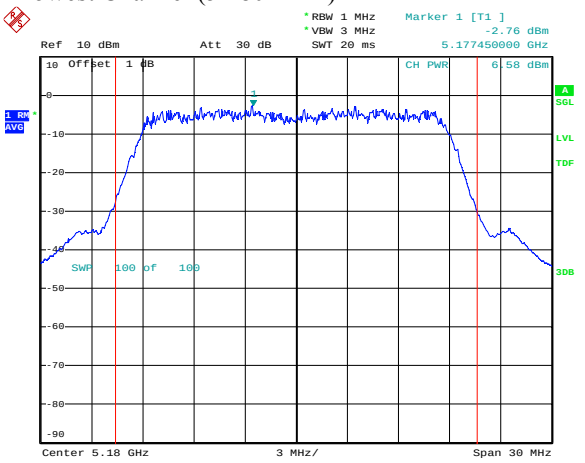


Highest Chnnel (5 240 MHz)

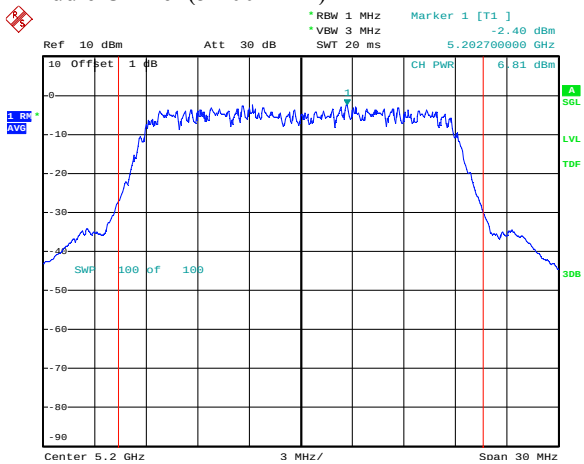


Ant1

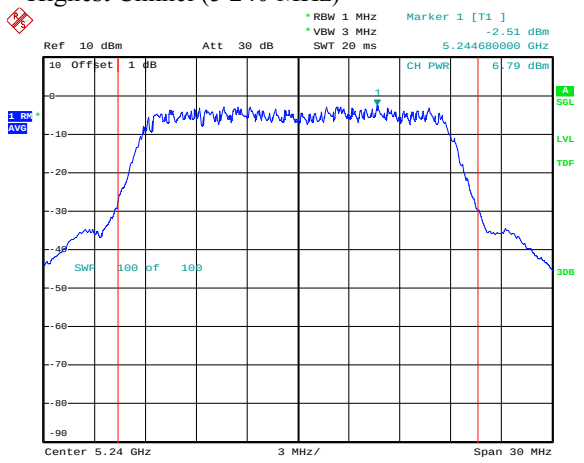
Lowest Channel (5 180 MHz)



Middle Chnnel (5 200 MHz)



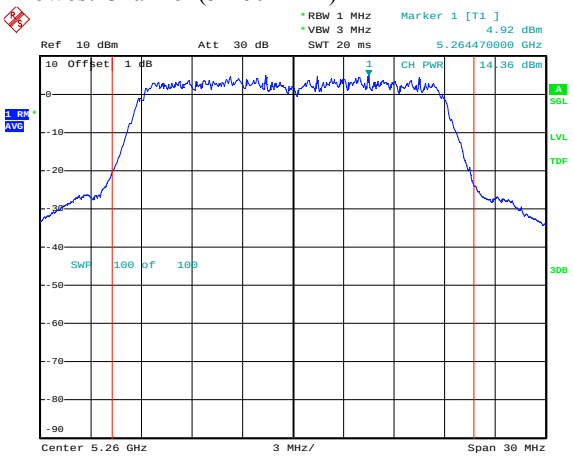
Highest Chnnel (5 240 MHz)



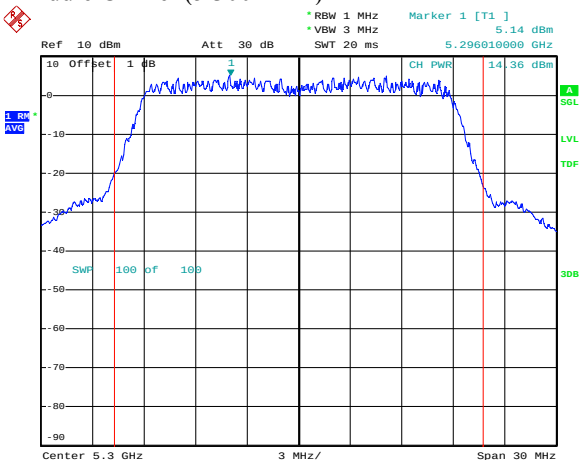
Ant0 + Ant1_802.11n 20 MHz_5 250 ~ 5 350 MHz

Ant0

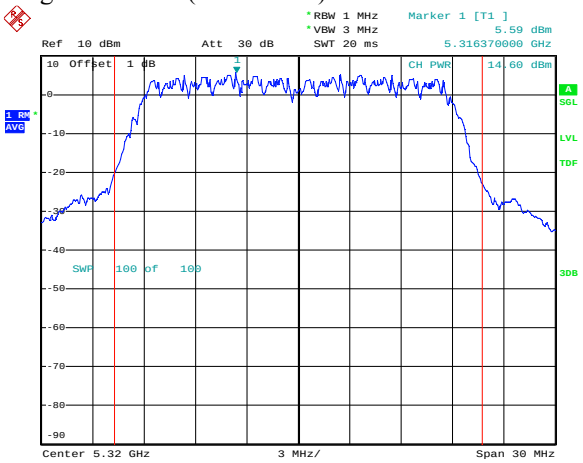
Lowest Channel (5 260 MHz)



Middle Chnnel (5 300 MHz)

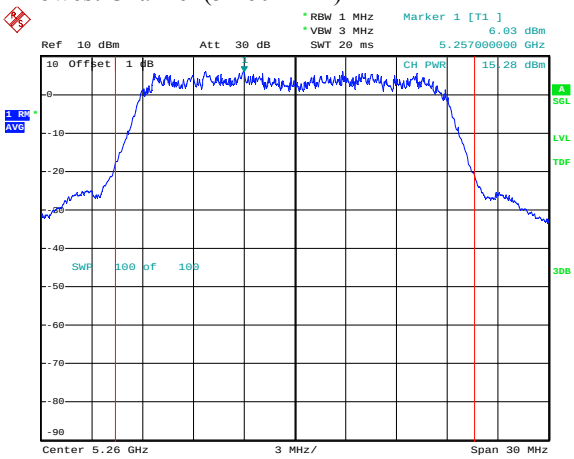


Highest Chnnel (5 320 MHz)

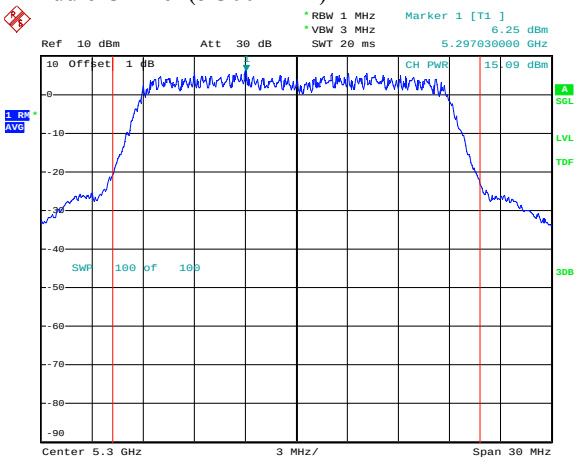


Ant1

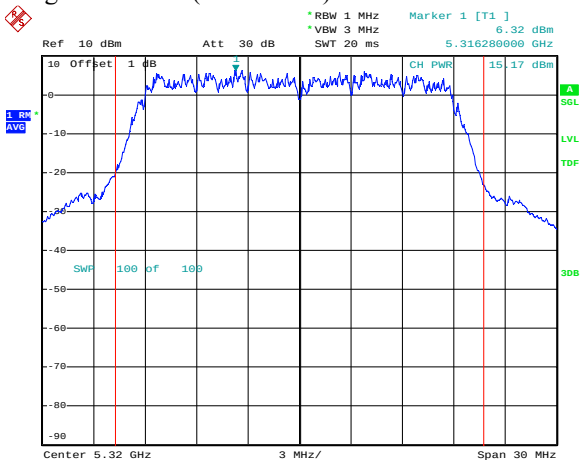
Lowest Channel (5 260 MHz)



Middle Chnnel (5 300 MHz)



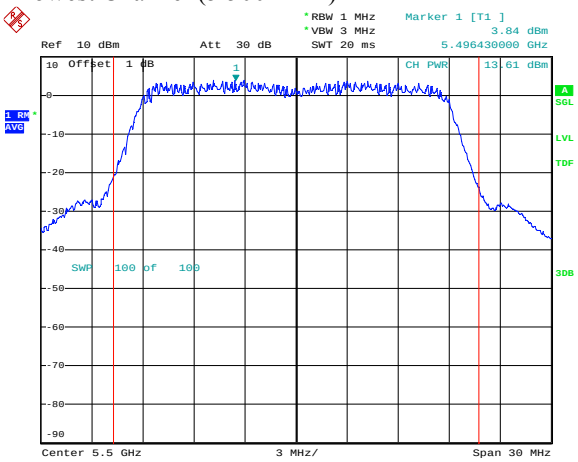
Highest Chnnel (5 320 MHz)



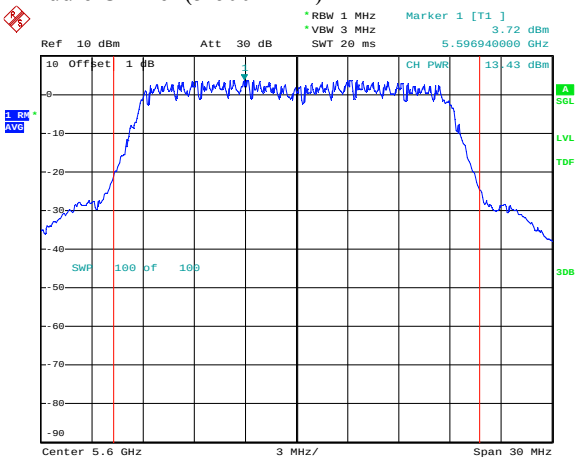
Ant0 + Ant1_802.11n 20 MHz_5 470 ~ 5 725 MHz

Ant0

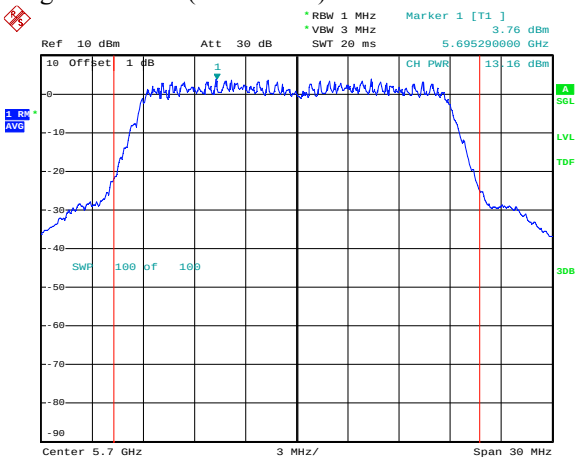
Lowest Channel (5 500 MHz)



Middle Chnnel (5 600 MHz)

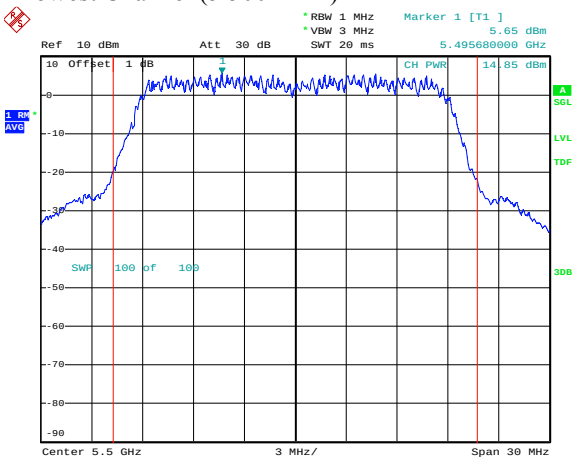


Highest Chnnel (5 700 MHz)

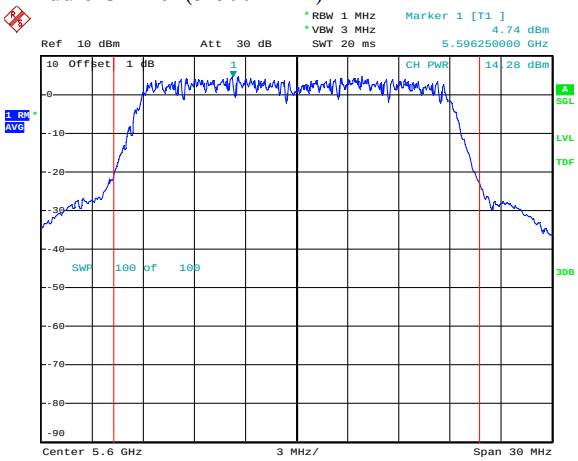


Ant1

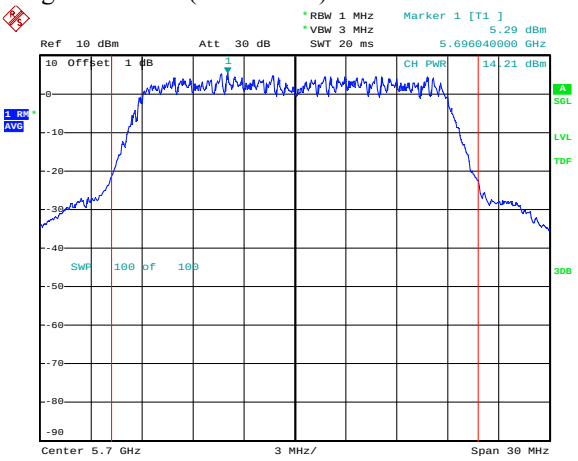
Lowest Channel (5 500 MHz)



Middle Chnnel (5 600 MHz)



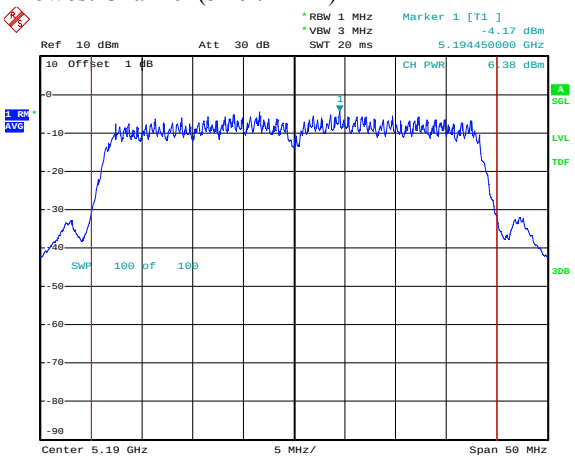
Highest Chnnel (5 700 MHz)



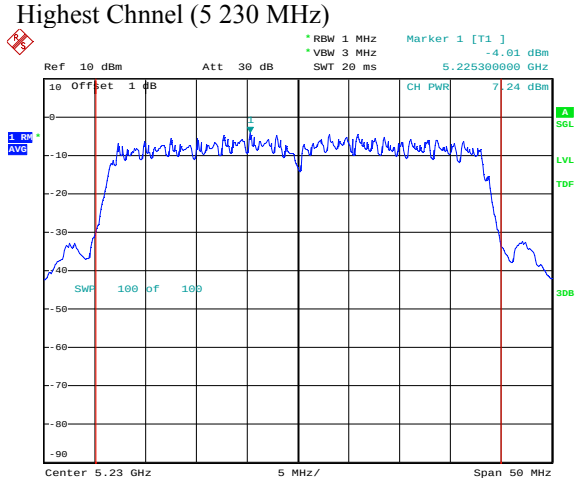
Ant0 + Ant1_802.11n 40 MHz_5 150 ~ 5 250 MHz

Ant0

Lowest Channel (5 190 MHz)

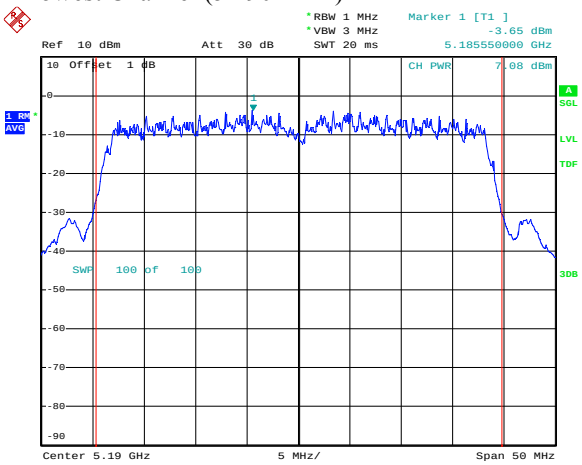


Highest Chnnel (5 230 MHz)

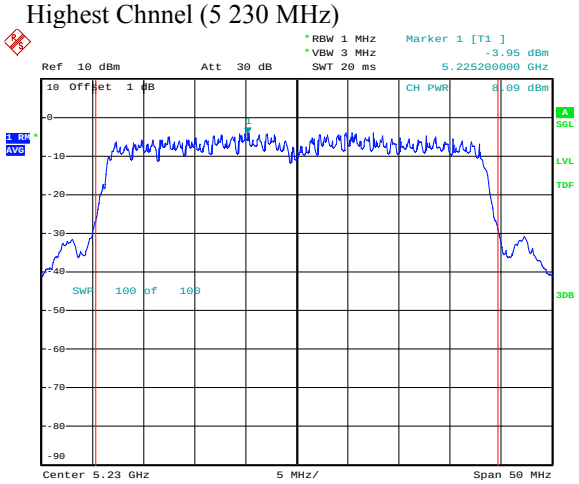


Ant1

Lowest Channel (5 190 MHz)



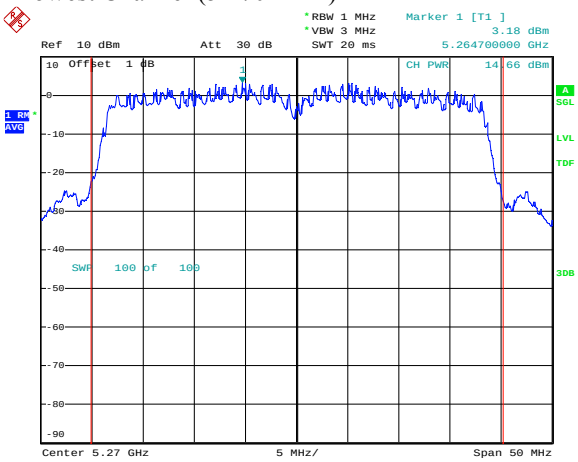
Highest Chnnel (5 230 MHz)



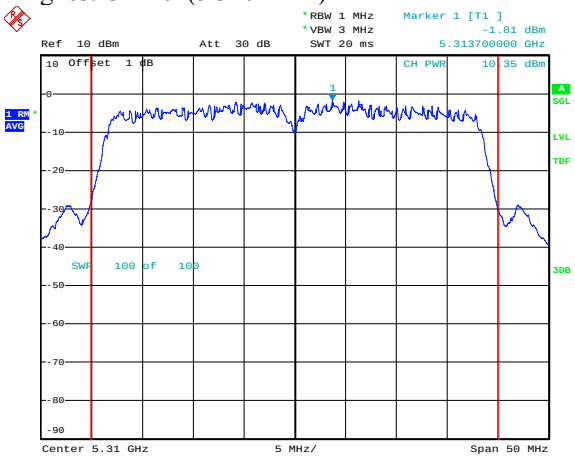
Ant0 + Ant1_802.11n 40 MHz_5 250 ~ 5 350 MHz

Ant0

Lowest Channel (5 270 MHz)

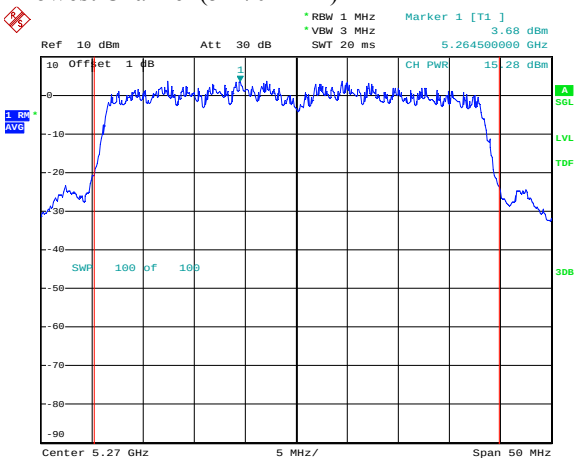


Highest Chnnel (5 310 MHz)

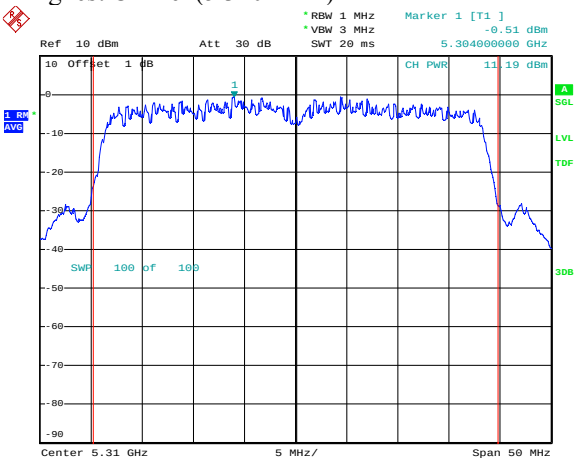


Ant1

Lowest Channel (5 270 MHz)



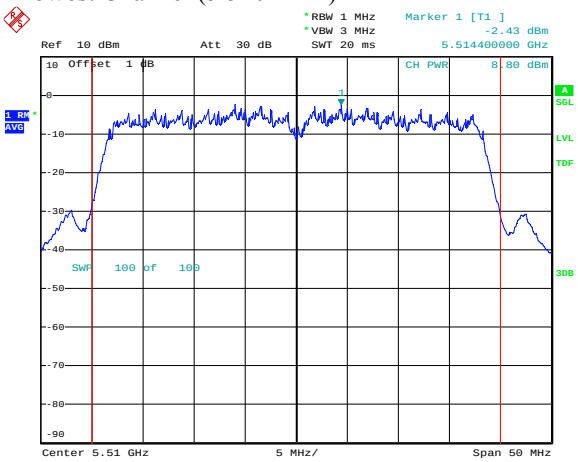
Highest Chnnel (5 310 MHz)



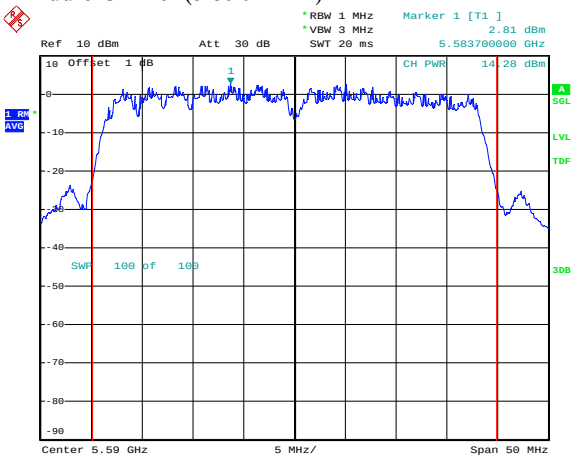
Ant0 + Ant1_802.11n 40 MHz_5 470 ~ 5 725 MHz

Ant0

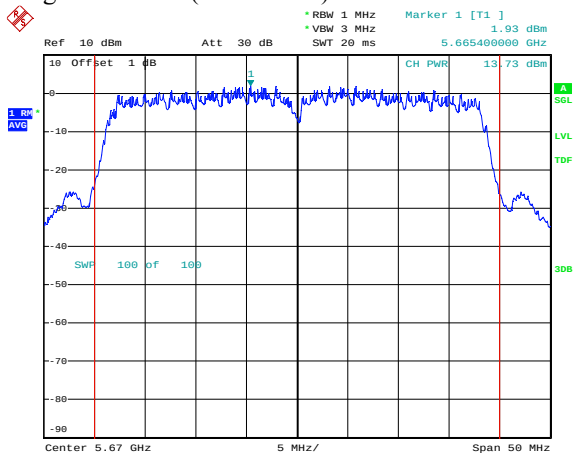
Lowest Channel (5 510 MHz)



Middle Chnnel (5 590 MHz)

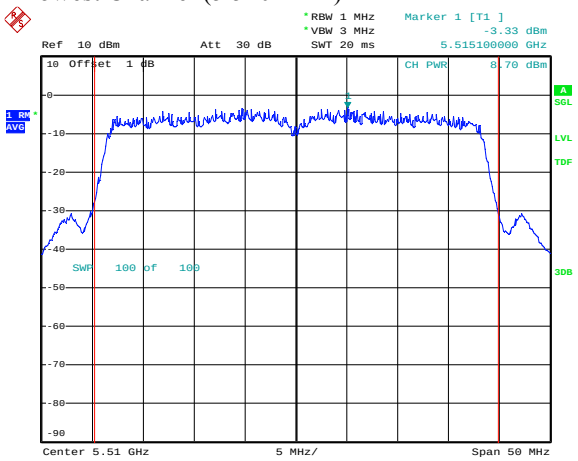


Highest Chnnel (5 670 MHz)

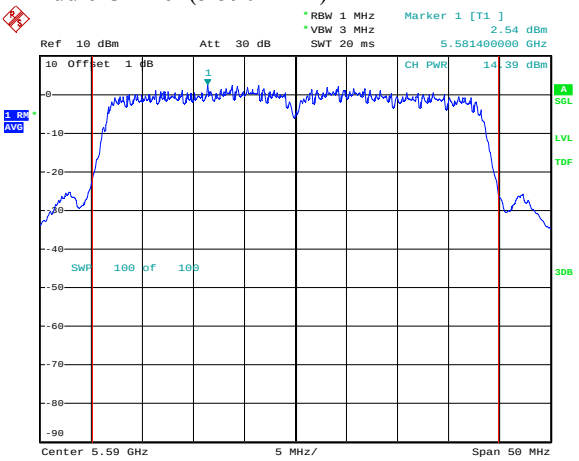


Ant1

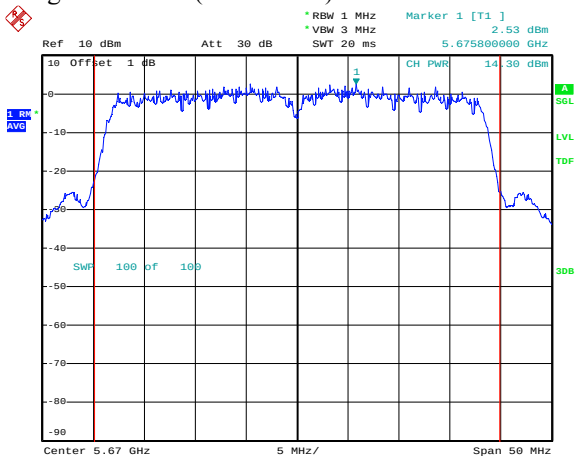
Lowest Channel (5 510 MHz)



Middle Chnnel (5 590 MHz)



Highest Chnnel (5 670 MHz)



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 spectral 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 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.

NOTE. Plot of the Peak Power Spectral Density refer to 5.3.5 test plot

5.4.3 Test Result

-Complied

Ant0_802.11a

Range (MHz)	CH	Freq (MHz)	Reading (dBm)	Duty factor (dBm)	Result (dBm)	Limit (dBm)	Margin (dB)
5 150 ~ 5 250	Low	5 180	1.24	0.20	1.44	11.00	9.56
	Mid	5 200	0.56	0.20	0.76	11.00	10.24
	High	5 240	0.71	0.20	0.91	11.00	10.09
5 250 ~ 5 350	Low	5 260	6.81	0.20	7.01	11.00	3.99
	Mid	5 300	7.05	0.20	7.25	11.00	3.75
	High	5 320	7.44	0.20	7.64	11.00	3.36
5 470 ~ 5 725	Low	5 500	5.59	0.20	5.79	11.00	5.21
	Mid	5 600	6.66	0.20	6.86	11.00	4.14
	High	5 700	4.90	0.20	5.10	11.00	5.90

Ant0_802.11n 20MHz

Range (MHz)	CH	Freq (MHz)	Reading (dBm)	Duty factor (dBm)	Result (dBm)	Limit (dBm)	Margin (dB)
5 150 ~ 5 250	Low	5 180	0.06	0.22	0.28	11.00	10.72
	Mid	5 200	-0.20	0.22	0.02	11.00	10.98
	High	5 240	-0.07	0.22	0.15	11.00	10.85
5 250 ~ 5 350	Low	5 260	6.82	0.22	7.04	11.00	3.96
	Mid	5 300	6.80	0.22	7.02	11.00	3.98
	High	5 320	7.09	0.22	7.31	11.00	3.69
5 470 ~ 5 725	Low	5 500	4.70	0.22	4.92	11.00	6.08
	Mid	5 600	6.41	0.22	6.63	11.00	4.37
	High	5 700	4.20	0.22	4.42	11.00	6.58

-NOTE:

1. Since the directional gain of the integral antenna declared by the manufacturer (G_{ANT0} = 3.2 dBi, G_{ANT1} = 3.2 dBi,) does not exceed 6.0 dBi, there was no need to reduce the output power.
2. Duty factor 802.11a mode: 10 log(1/x) = 10 log(1/0.953 9) = 0.20 dB.
3. Duty factor 802.11n 20MHz mode: 10 log(1/x) = 10 log(1/0.950 7) = 0.22 dB.
4. We took the insertion loss of the cable loss into consideration within the measuring instrument.

Ant1_802.11a

Range (MHz)	CH	Freq (MHz)	Reading (dBm)	Duty factor (dBm)	Result (dBm)	Limit (dBm)	Margin (dB)
5 150 ~ 5 250	Low	5 180	1.50	0.20	1.70	11.00	9.3
	Mid	5 200	1.84	0.20	2.04	11.00	8.96
	High	5 240	1.76	0.20	1.96	11.00	9.04
5 250 ~ 5 350	Low	5 260	8.10	0.20	8.30	11.00	2.70
	Mid	5 300	8.23	0.20	8.43	11.00	2.57
	High	5 320	8.37	0.20	8.57	11.00	2.43
5 470 ~ 5 725	Low	5 500	6.88	0.20	7.08	11.00	3.92
	Mid	5 600	7.26	0.20	7.46	11.00	3.54
	High	5 700	6.20	0.20	6.40	11.00	4.60

Ant1_802.11n 20MHz

Range (MHz)	CH	Freq (MHz)	Reading (dBm)	Duty factor (dBm)	Result (dBm)	Limit (dBm)	Margin (dB)
5 150 ~ 5 250	Low	5 180	0.06	0.22	1.15	11.00	9.85
	Mid	5 200	-0.20	0.22	1.71	11.00	9.29
	High	5 240	-0.07	0.22	1.58	11.00	9.42
5 250 ~ 5 350	Low	5 260	6.82	0.22	8.05	11.00	2.95
	Mid	5 300	6.80	0.22	7.96	11.00	3.04
	High	5 320	7.09	0.22	8.73	11.00	2.27
5 470 ~ 5 725	Low	5 500	4.70	0.22	6.62	11.00	4.38
	Mid	5 600	6.41	0.22	7.56	11.00	3.44
	High	5 700	4.20	0.22	5.77	11.00	5.23

-NOTE:

1. Since the directional gain of the integral antenna declared by the manufacturer (G_{ANT0} = 3.2 dBi, G_{ANT1} = 3.2 dBi,) does not exceed 6.0 dBi, there was no need to reduce the output power.
2. Duty factor 802.11a mode: 10 log(1/x) = 10log (1/0.953 9) = 0.20 dB.
3. Duty factor 802.11n 20MHz mode: 10 log(1/x) = 10 log(1/0.950 7) = 0.22 dB.
4. We took the insertion loss of the cable loss into consideration within the measuring instrument.

Ant0 + Ant1_802.11n 20 MHz

Range (MHz)	CH	Freq (MHz)	Reading (dBm)		Duty factor (dBm)	Result (dBm)	Limit (dBm)	Margin (dB)
			Ant0	Ant1				
5 150 ~ 5 250	Low	5 180	3.84	5.65	0.22	0.29	10.79	10.50
	Mid	5 200	3.72	4.74	0.22	0.50	10.79	10.29
	High	5 240	3.76	5.29	0.22	0.32	10.79	10.47
5 250 ~ 5 350	Low	5 260	4.92	6.03	0.22	8.74	10.79	2.05
	Mid	5 300	5.14	6.25	0.22	8.96	10.79	1.83
	High	5 320	5.59	6.32	0.22	9.20	10.79	1.59
5 470 ~ 5 725	Low	5 500	3.84	5.65	0.22	8.07	10.79	2.72
	Mid	5 600	3.72	4.74	0.22	7.49	10.79	3.30
	High	5 700	3.76	5.29	0.22	7.82	10.79	2.97

Ant0 + Ant1_802.11n 40 MHz

Range (MHz)	CH	Freq (MHz)	Reading (dBm)		Duty factor (dBm)	Result (dBm)	Limit (dBm)	Margin (dB)
			Ant0	Ant1				
5 150 ~ 5 250	Low	5 190	-4.17	-3.65	0.43	-0.46	10.79	11.25
	High	5 230	-4.01	-3.95	0.43	-0.54	10.79	11.33
5 250 ~ 5 350	Low	5 270	3.18	3.68	0.43	6.88	10.79	3.91
	High	5 310	-1.81	-0.51	0.43	2.33	10.79	8.46
5 470 ~ 5 725	Low	5 510	-2.43	-3.33	0.43	0.58	10.79	10.21
	Mid	5 590	2.81	2.54	0.43	6.12	10.79	4.67
	High	5 670	1.93	2.53	0.43	5.68	10.79	5.11

-NOTE:

1. Since the directional gain of the integral antenna declared by the manufacturer (G_{ANT0} = 3.2 dBi, G_{ANT1} = 3.2 dBi,) exceed 6.0 dBi, there was need to reduce the output power.
2. Directional gain calculation: G_{ANT} + 10 log(N) dBi = 3.2 + 10 log(2) dBi = 6.210 dBi, Reduce Limit = 24 – (6.210 – 6) = 23.79 dBm.
3. Total PPSD calculation: 10 log(10^(Ant0 PPSD/10)+10^(Ant1 PPSD/10))
4. Duty factor 802.11n 20 MHz mode: 10 log(1/x) = 10 log(1/0.950 7) = 0.22 dB.
5. Duty factor 802.11n 40 MHz mode: 10 log(1/x) = 10 log(1/0.904 9) = 0.43 dB.
6. We took the insertion loss of the cable loss into consideration within the measuring instrument.

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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82 31 336 9919 (Main) 82 31 336 4767 (Fax)

5.5.3 Test Result
-Complied

Ant0_802.11a

Frequency Range (MHz)	Channel	Frequency (MHz)	Reading (dBm)	Limit (dBm)	Margin (dBm)
5 150 ~ 5 250	Low	5 180	9.02	13.00	3.98
	Mid	5 200	9.24	13.00	3.76
	High	5 240	8.95	13.00	4.05
5 250 ~ 5 350	Low	5 260	9.01	13.00	3.99
	Mid	5 300	8.74	13.00	4.26
	High	5 320	9.24	13.00	3.76
5 470 ~ 5 725	Low	5 500	9.18	13.00	3.82
	Mid	5 600	8.84	13.00	4.16
	High	5 700	8.66	13.00	4.34

Ant0_802.11n 20 MHz

Frequency Range (MHz)	Channel	Frequency (MHz)	Reading (dBm)	Limit (dBm)	Margin (dBm)
5 150 ~ 5 250	Low	5 180	9.10	13.00	3.90
	Mid	5 200	8.91	13.00	4.09
	High	5 240	8.88	13.00	4.12
5 250 ~ 5 350	Low	5 260	9.08	13.00	3.92
	Mid	5 300	9.24	13.00	3.76
	High	5 320	9.02	13.00	3.98
5 470 ~ 5 725	Low	5 500	9.03	13.00	3.97
	Mid	5 600	8.66	13.00	4.34
	High	5 700	8.81	13.00	4.19

Ant1_802.11a

Frequency Range (MHz)	Channel	Frequency (MHz)	Reading (dBm)	Limit (dBm)	Margin (dBm)
5 150 ~ 5 250	Low	5 180	9.31	13.00	3.69
	Mid	5 200	8.82	13.00	4.18
	High	5 240	8.87	13.00	4.13
5 250 ~ 5 350	Low	5 260	8.75	13.00	4.25
	Mid	5 300	8.74	13.00	4.26
	High	5 320	9.12	13.00	3.88
5 470 ~ 5 725	Low	5 500	8.94	13.00	4.06
	Mid	5 600	9.18	13.00	3.82
	High	5 700	9.23	13.00	3.77

Ant1_802.11n 20 MHz

Frequency Range (MHz)	Channel	Frequency (MHz)	Reading (dBm)	Limit (dBm)	Margin (dBm)
5 150 ~ 5 250	Low	5 180	9.17	13.00	3.83
	Mid	5 200	8.79	13.00	4.21
	High	5 240	9.00	13.00	4.00
5 250 ~ 5 350	Low	5 260	9.04	13.00	3.96
	Mid	5 300	9.04	13.00	3.96
	High	5 320	9.18	13.00	3.82
5 470 ~ 5 725	Low	5 500	8.82	13.00	4.18
	Mid	5 600	9.05	13.00	3.95
	High	5 700	8.54	13.00	4.46

Ant0 + Ant1_802.11n 20 MHz

Range (MHz)	CH	Frequency (MHz)	Reading (dBm)		Limit (dBm)	Margin (dBm)	
			Ant0	Ant1		Ant0	Ant1
5 150 ~ 5 250	Low	5 180	8.74	8.89	13.00	4.26	4.11
	Mid	5 200	9.09	9.12	13.00	3.91	3.88
	High	5 240	8.83	8.96	13.00	4.17	4.04
5 250 ~ 5 350	Low	5 260	9.03	9.35	13.00	3.97	3.65
	Mid	5 300	8.79	9.44	13.00	4.21	3.56
	High	5 320	9.03	9.12	13.00	3.97	3.88
5 470 ~ 5 725	Low	5 500	8.90	8.86	13.00	4.10	4.14
	Mid	5 600	8.46	8.98	13.00	4.54	4.02
	High	5 700	9.05	8.88	13.00	3.95	4.12

Ant0 + Ant1_802.11n 40 MHz

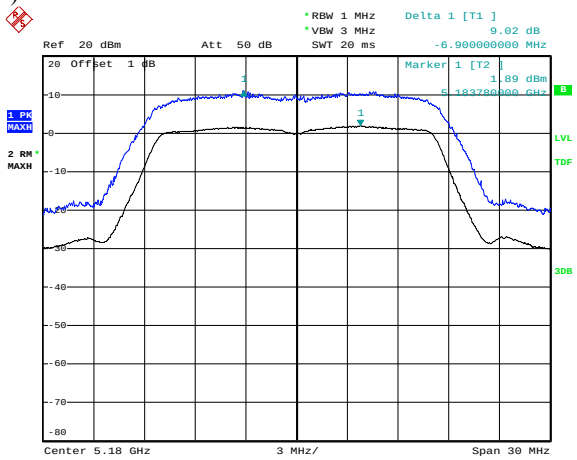
Range (MHz)	CH	Frequency (MHz)	Reading (dBm)		Limit (dBm)	Margin (dBm)	
			Ant0	Ant1		Ant0	Ant1
5 150 ~ 5 250	Low	5 190	9.59	8.48	13.00	3.41	4.52
	High	5 230	9.74	9.02	13.00	3.26	3.98
5 150 ~ 5 250	Low	5 270	9.45	8.74	13.00	3.55	4.26
	High	5 310	10.02	9.21	13.00	2.98	3.79
5 470 ~ 5 725	Low	5 510	9.46	9.15	13.00	3.54	3.85
	Mid	5 590	9.87	9.00	13.00	3.13	4.00
	High	5 670	9.95	8.78	13.00	3.05	4.22

5.5.4 Test Plot

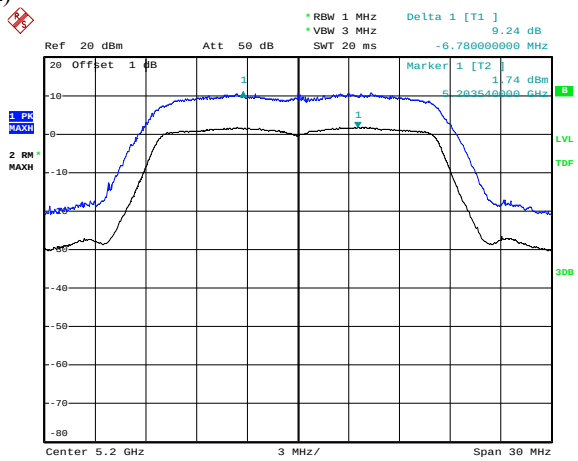
Figure 3. Plot of the Peak excursion

Ant0_802.11a

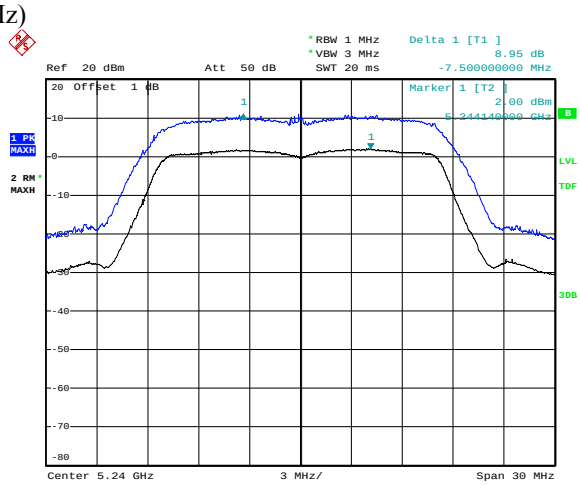
- Lowest Channel (5 180 MHz)



- Middle Channel (5 200MHz)

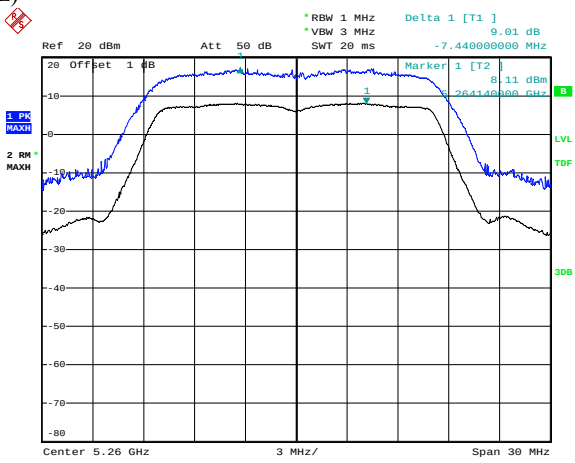


- Highest Channel (5 240 MHz)

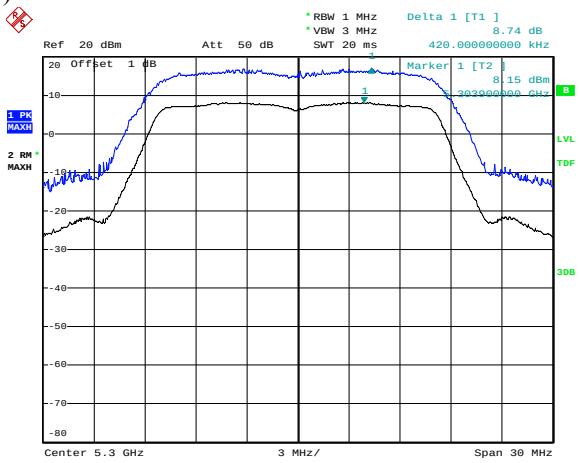


Ant0_802.11a

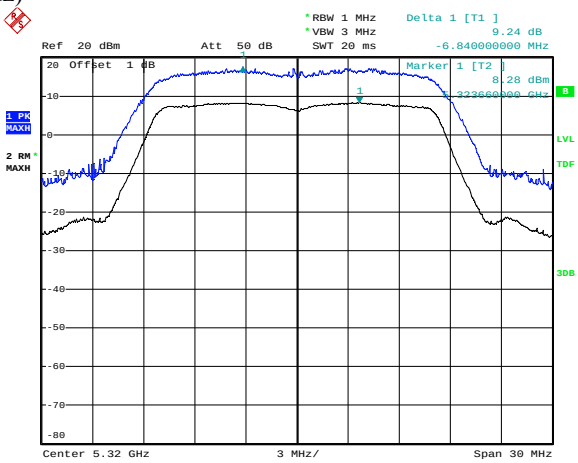
- Lowest Channel (5 260 MHz)



- Middle Channel (5 300MHz)

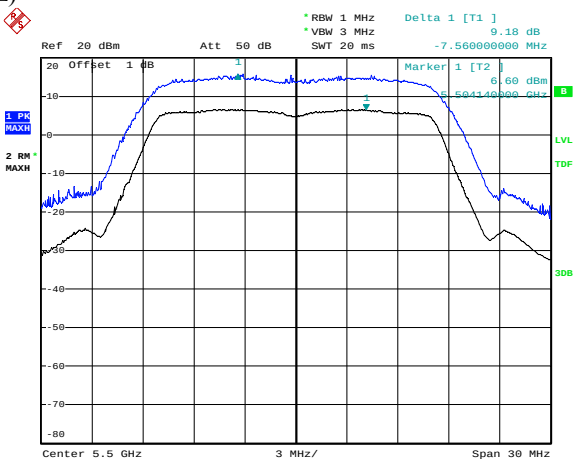


- Highest Channel (5 320 MHz)

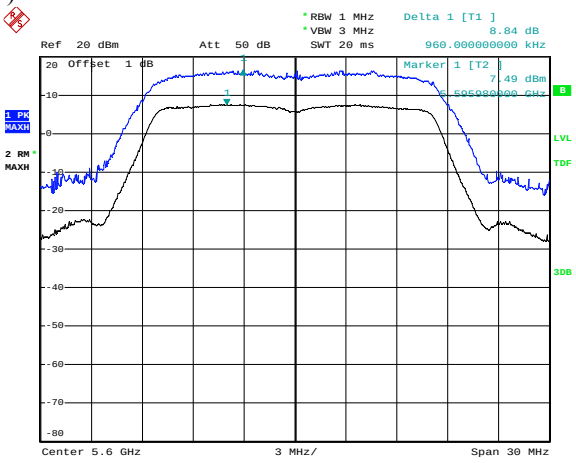


Ant0_802.11a

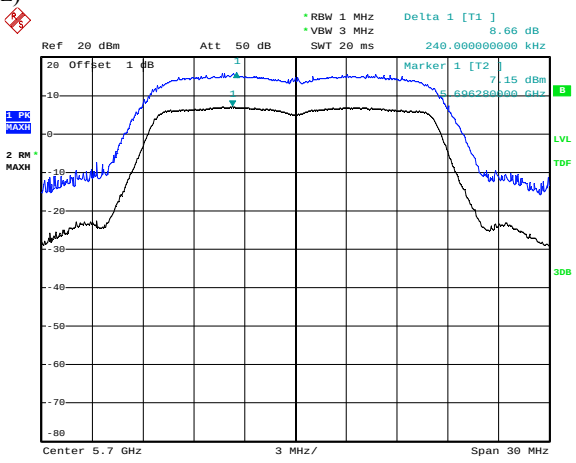
- Lowest Channel (5 500 MHz)



- Middle Channel (5 600 MHz)

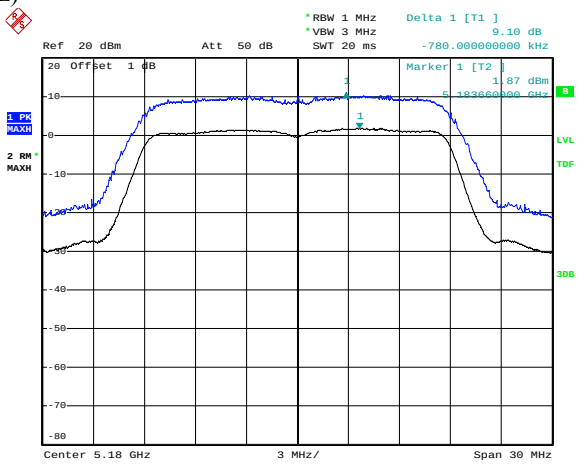


- Highest Channel (5 700 MHz)

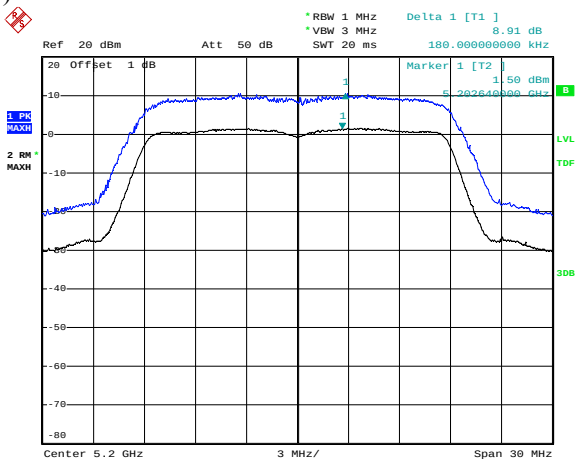


Ant0_802.11n 20 MHz

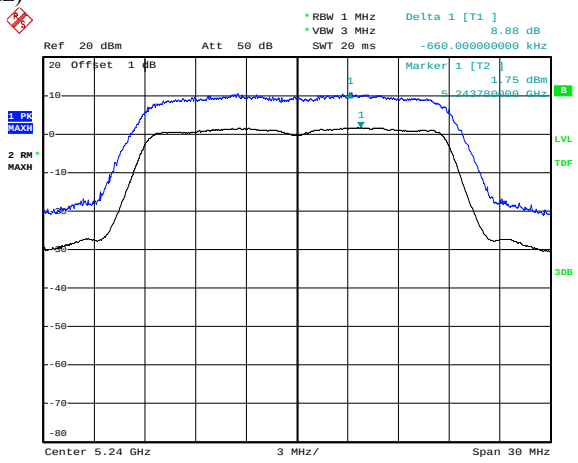
- Lowest Channel (5 180 MHz)



- Middle Channel (5 200MHz)

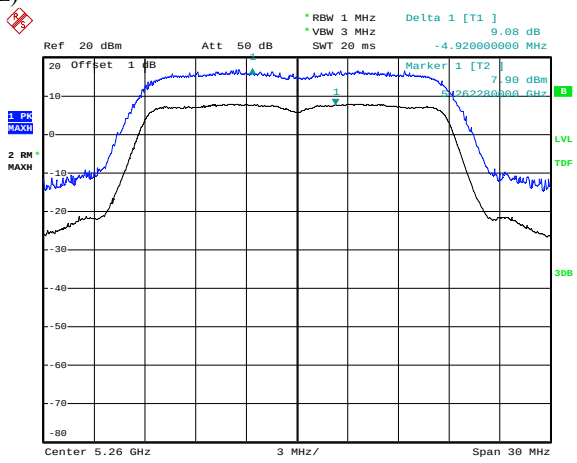


- Highest Channel (5 240 MHz)

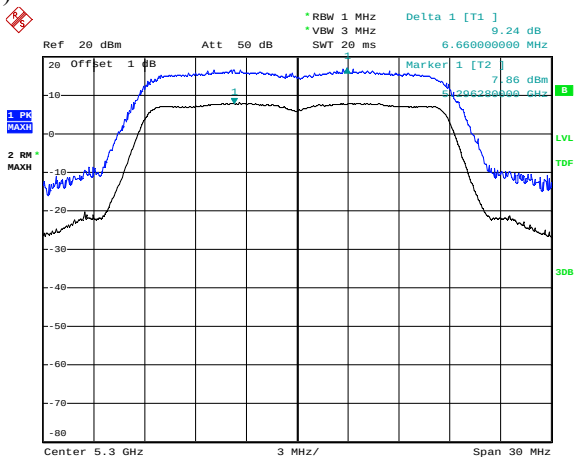


Ant0_802.11n 20 MHz

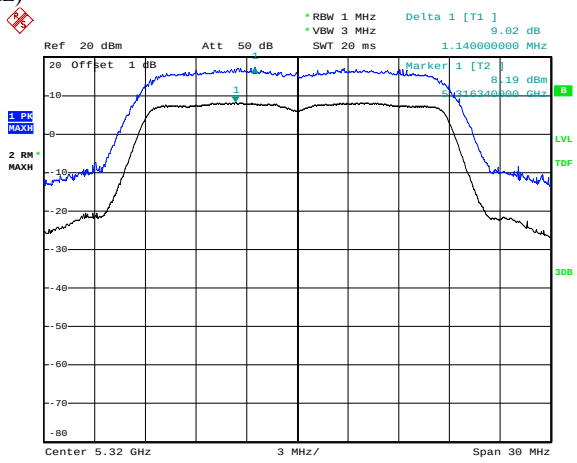
- Lowest Channel (5 260 MHz)



- Middle Channel (5 300MHz)

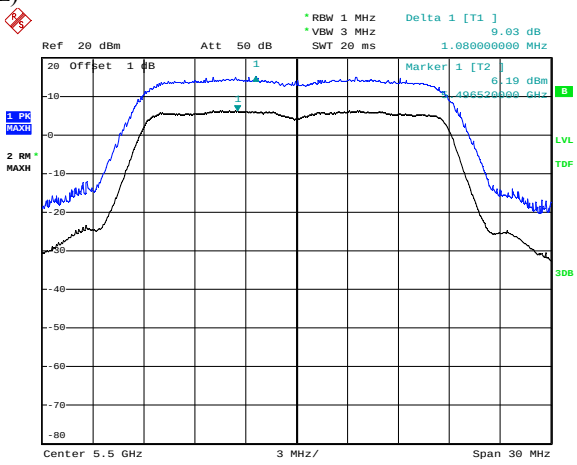


- Highest Channel (5 320 MHz)

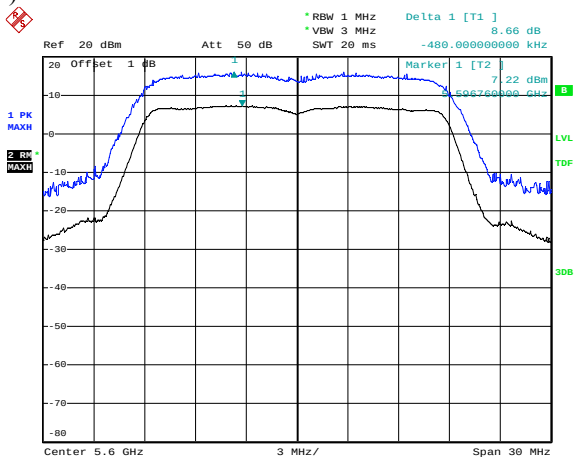


Ant0_802.11n 20 MHz

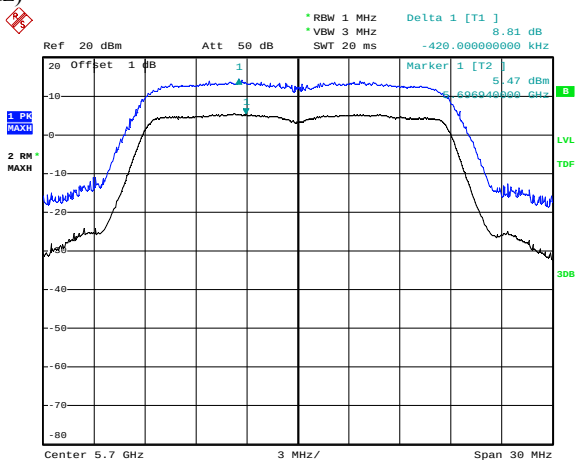
- Lowest Channel (5 500 MHz)



- Middle Channel (5 600 MHz)

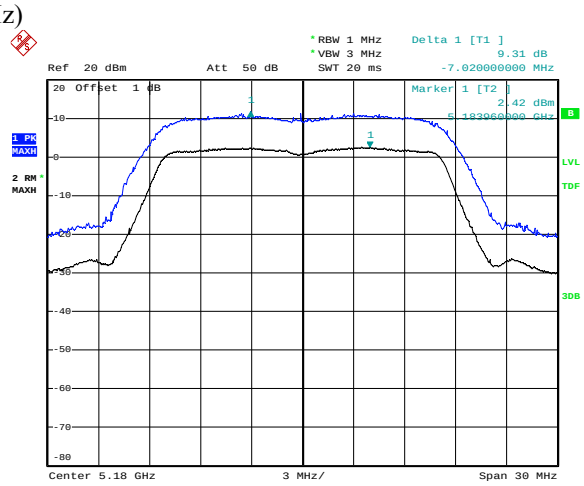


- Highest Channel (5 700 MHz)

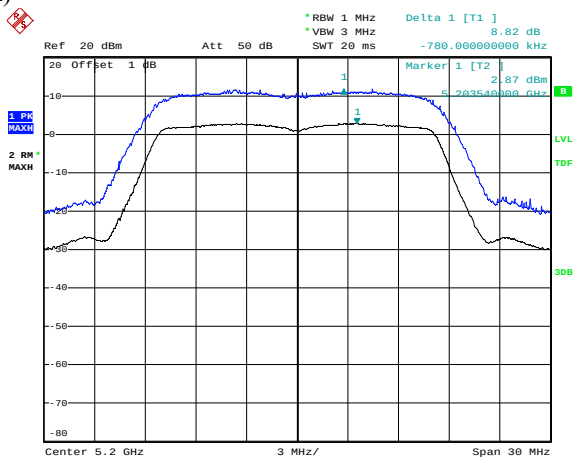


Ant1_802.11a

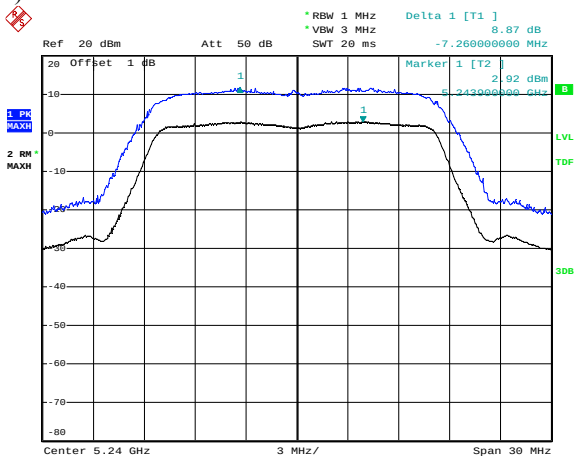
- Lowest Channel (5 180 MHz)



- Middle Channel (5 200MHz)

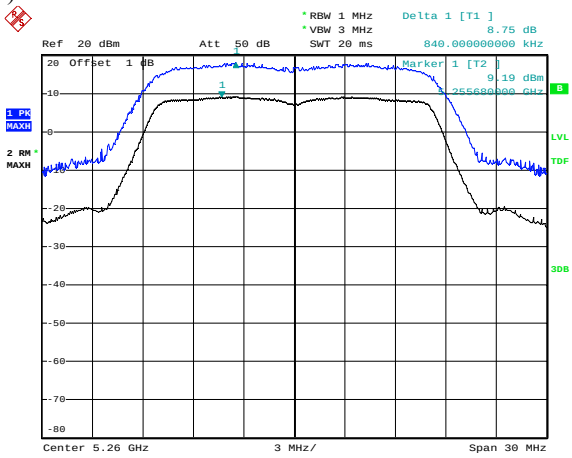


- Highest Channel (5 240 MHz)

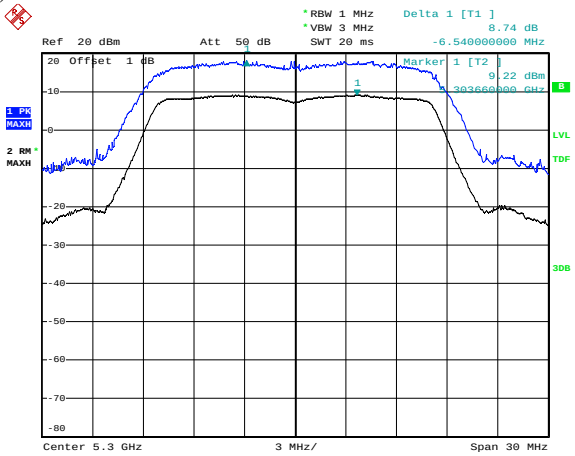


Ant1_802.11a

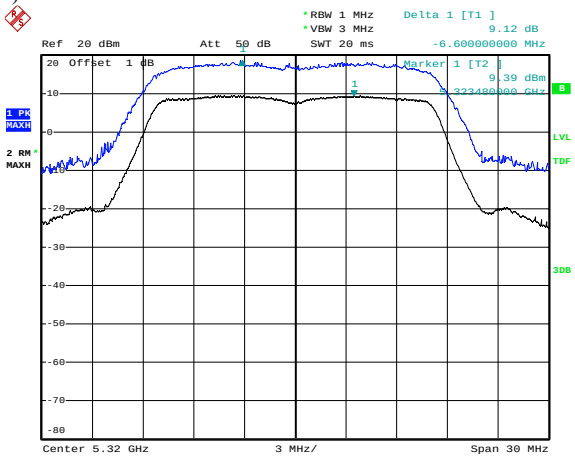
- Lowest Channel (5 260 MHz)



- Middle Channel (5 300MHz)

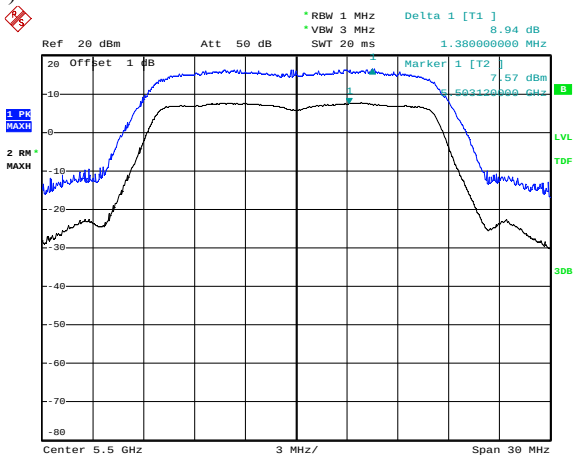


- Highest Channel (5 320 MHz)

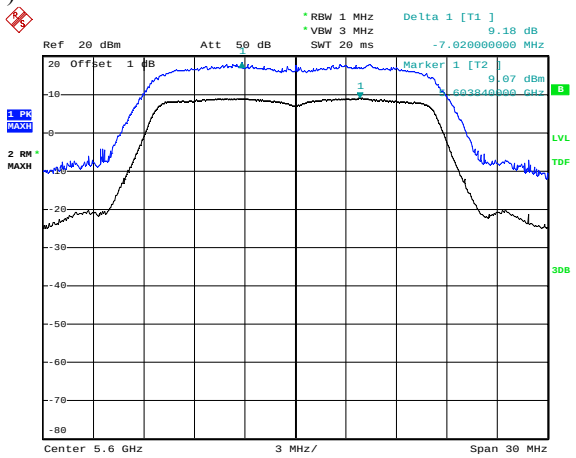


Ant1_802.11a

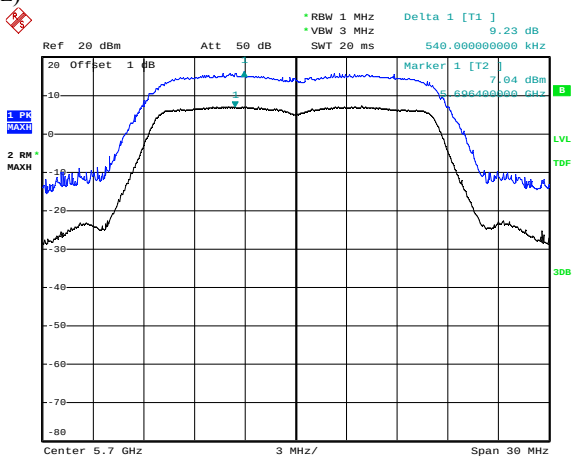
- Lowest Channel (5 500 MHz)



- Middle Channel (5 600 MHz)

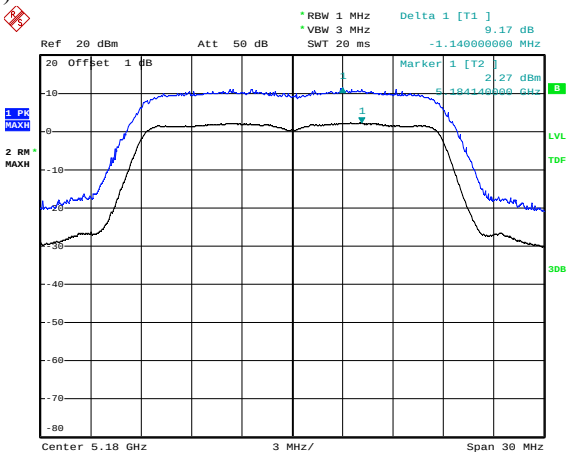


- Highest Channel (5 700 MHz)

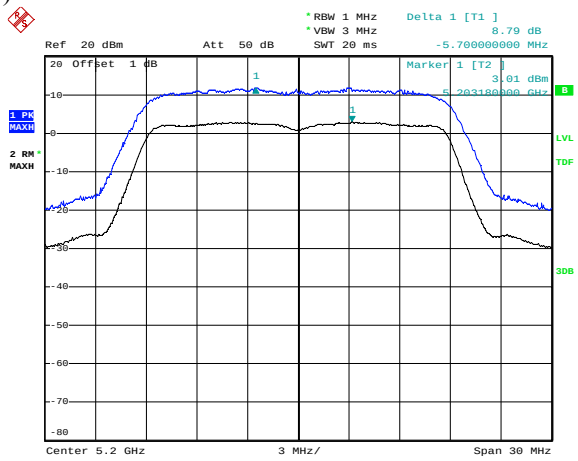


Ant1_802.11n 20 MHz

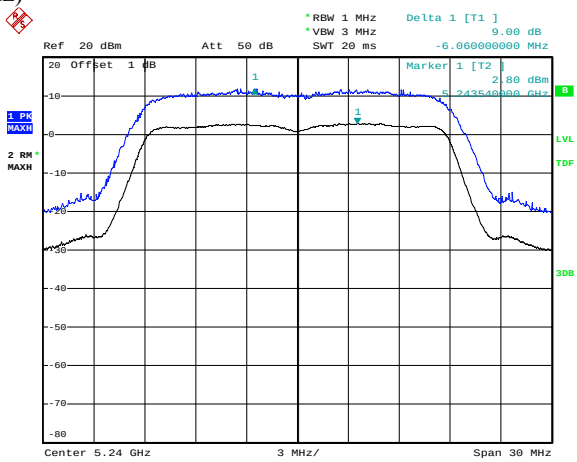
- Lowest Channel (5 180 MHz)



- Middle Channel (5 200MHz)

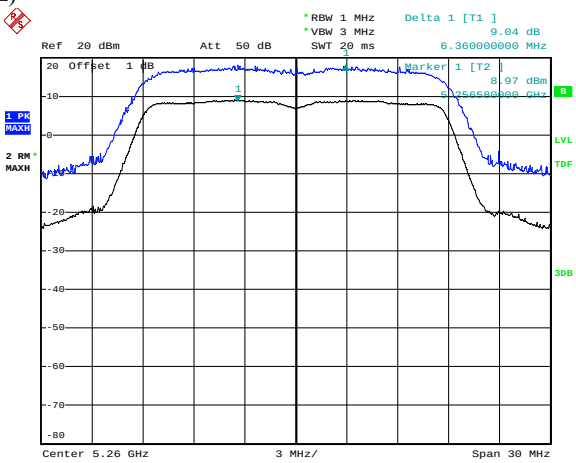


- Highest Channel (5 240 MHz)

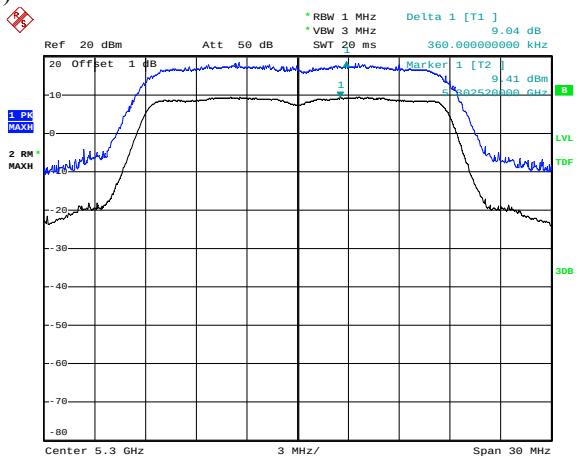


Ant1_802.11n 20 MHz

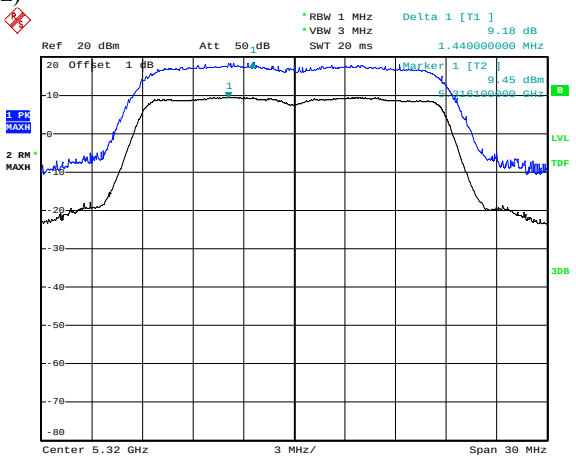
- Lowest Channel (5 260 MHz)



- Middle Channel (5 300MHz)

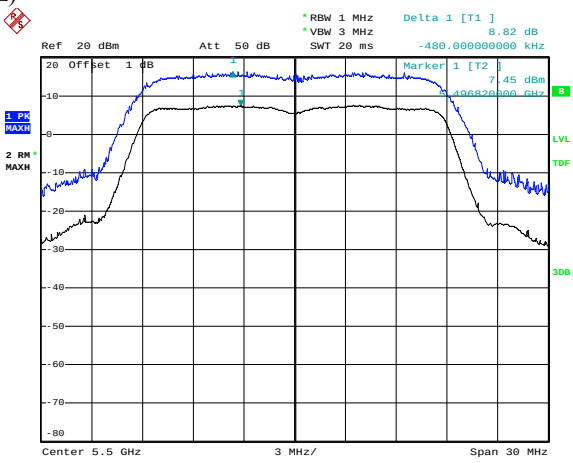


- Highest Channel (5 320 MHz)

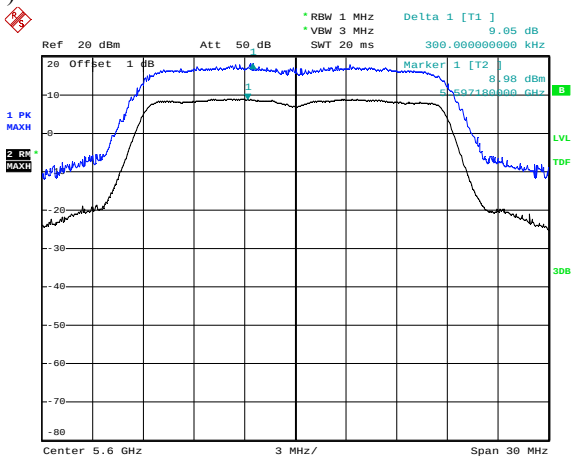


Ant1_802.11n 20 MHz

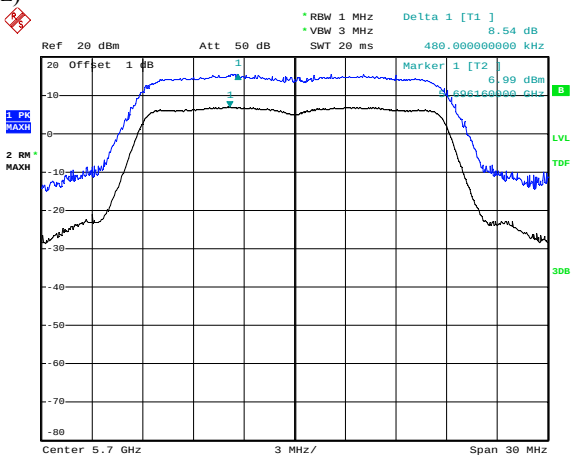
- Lowest Channel (5 500 MHz)



- Middle Channel (5 600 MHz)



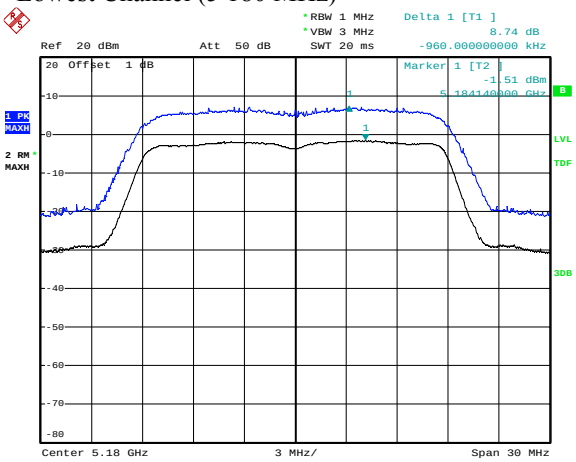
- Highest Channel (5 700 MHz)



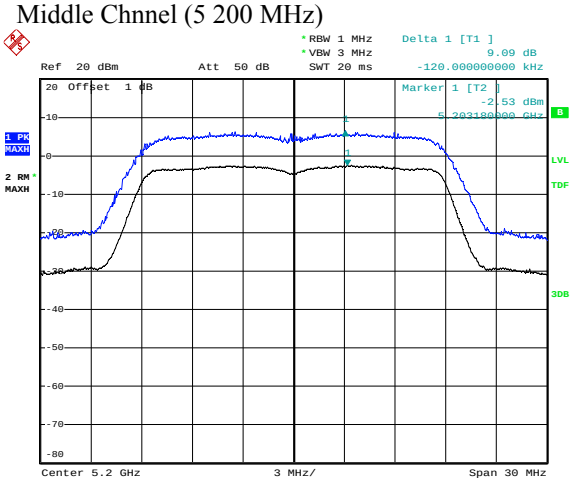
Ant0 + Ant1_802.11n 20 MHz_5 150 ~ 5 250 MHz

Ant0

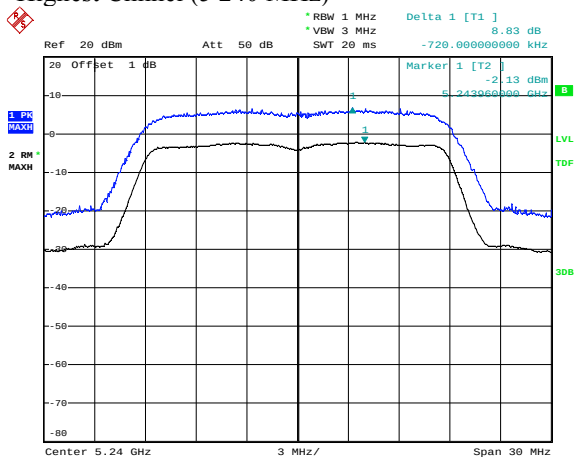
Lowest Channel (5 180 MHz)



Middle Chnnel (5 200 MHz)

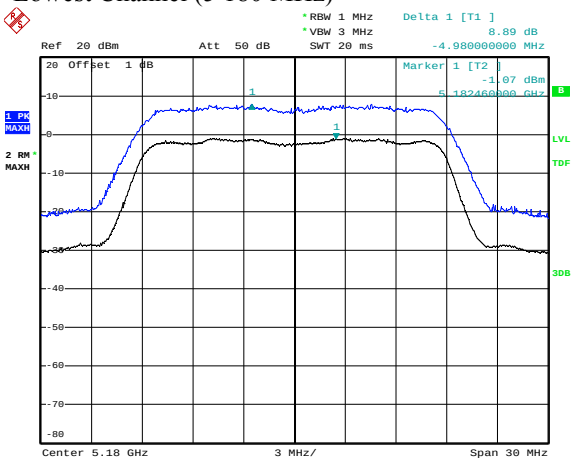


Highest Chnnel (5 240 MHz)

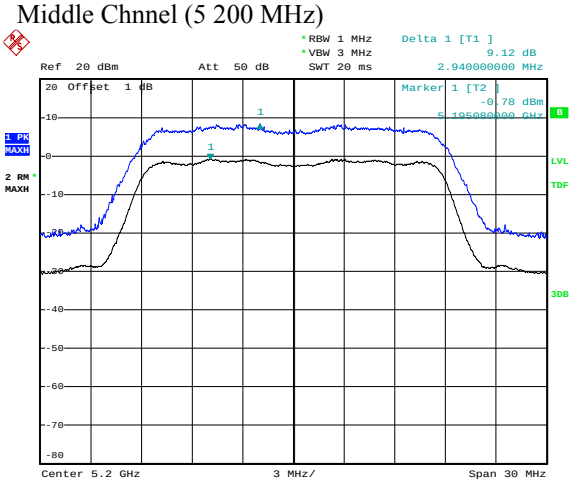


Ant1

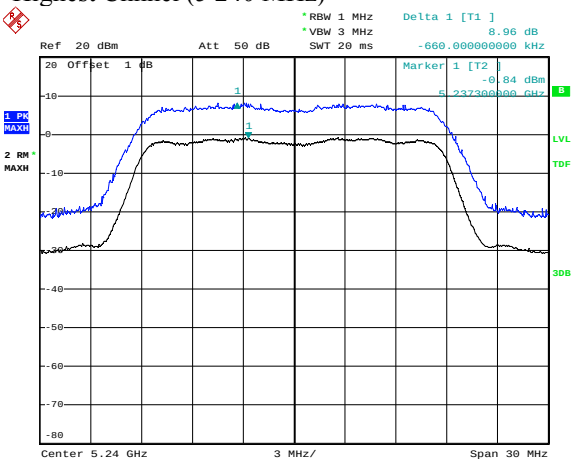
Lowest Channel (5 180 MHz)



Middle Chnnel (5 200 MHz)



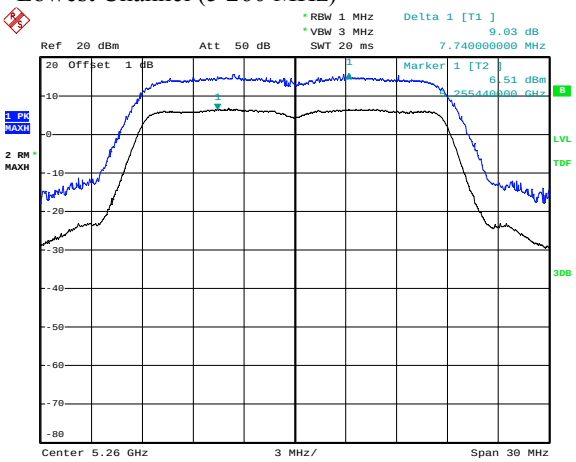
Highest Chnnel (5 240 MHz)



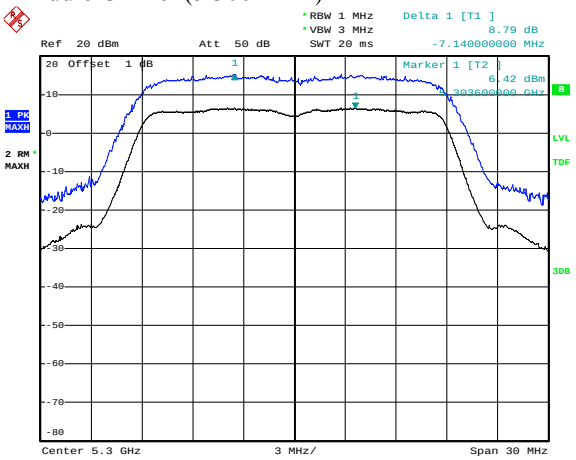
Ant0 + Ant1_802.11n 20 MHz_5 250 ~ 5 350 MHz

Ant0

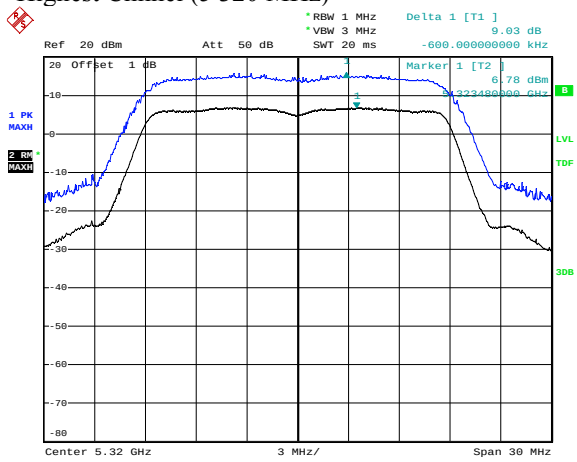
Lowest Channel (5 260 MHz)



Middle Chnnel (5 300 MHz)

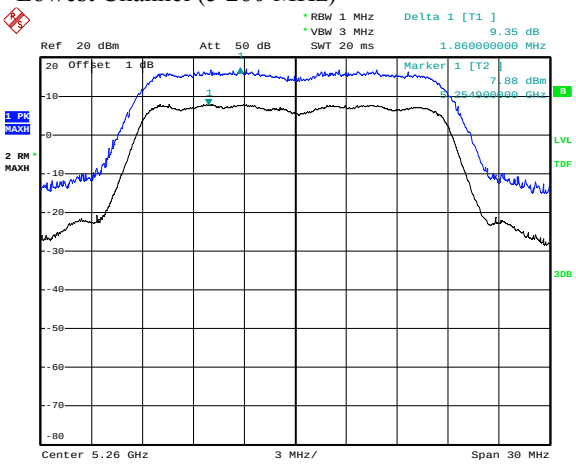


Highest Chnnel (5 320 MHz)

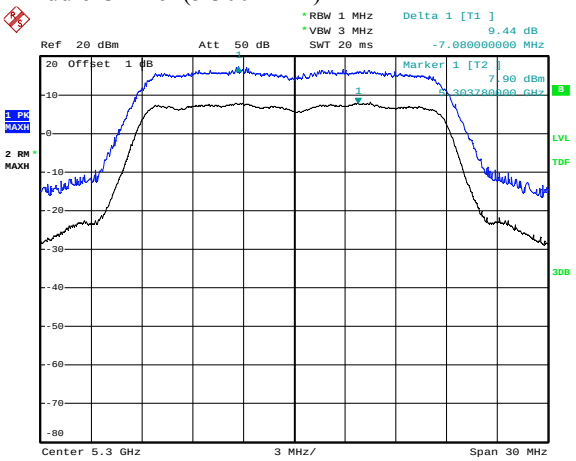


Ant1

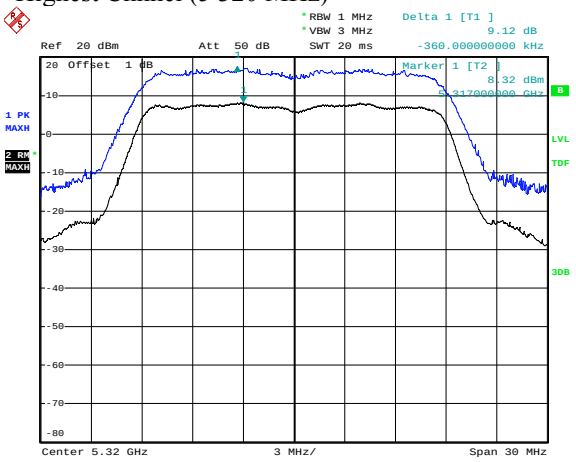
Lowest Channel (5 260 MHz)



Middle Chnnel (5 300 MHz)



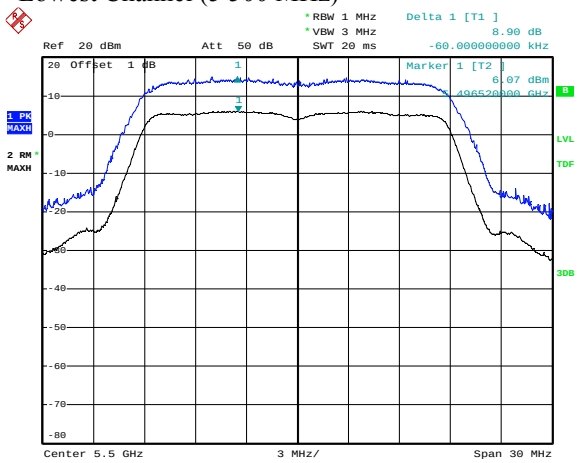
Highest Chnnel (5 320 MHz)



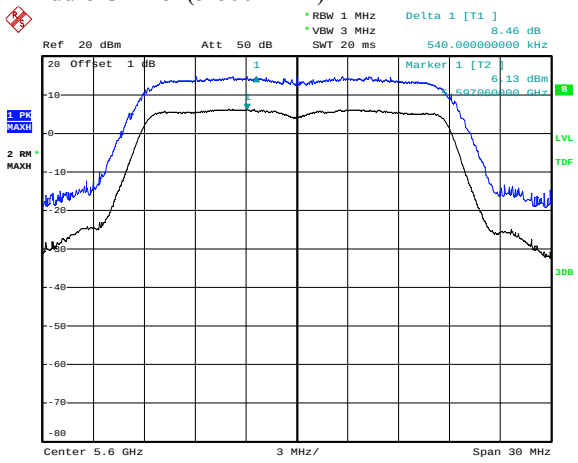
Ant0 + Ant1_802.11n 20 MHz_5 470 ~ 5 725 MHz

Ant0

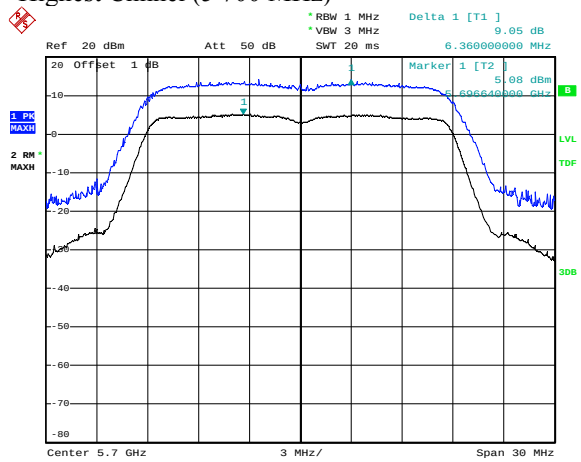
Lowest Channel (5 500 MHz)



Middle Chnnel (5 600 MHz)

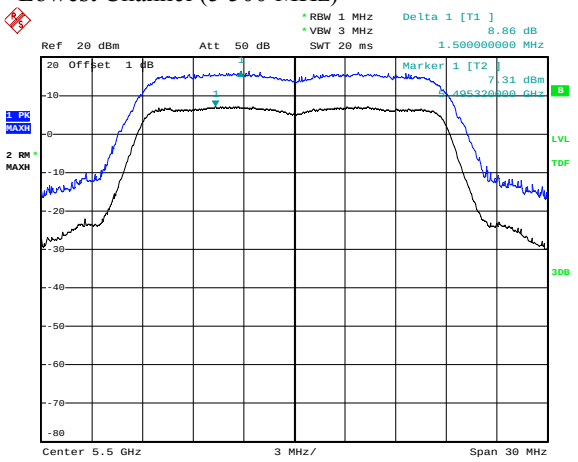


Highest Chnnel (5 700 MHz)

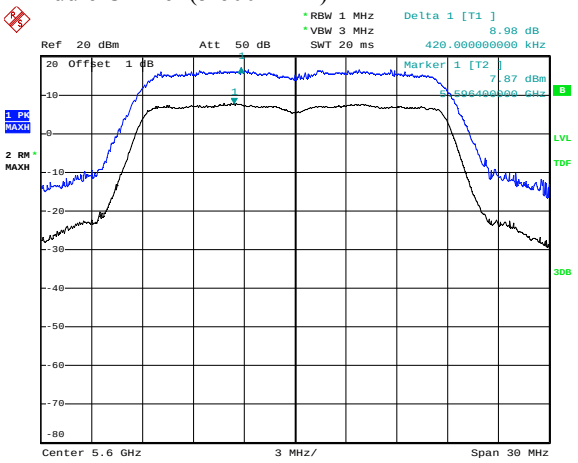


Ant1

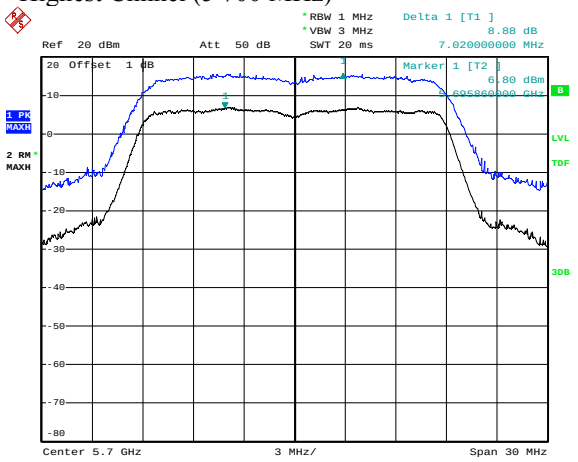
Lowest Channel (5 500 MHz)



Middle Chnnel (5 600 MHz)



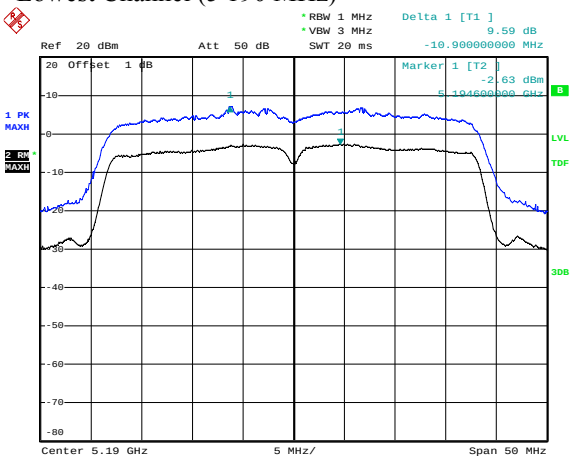
Highest Chnnel (5 700 MHz)



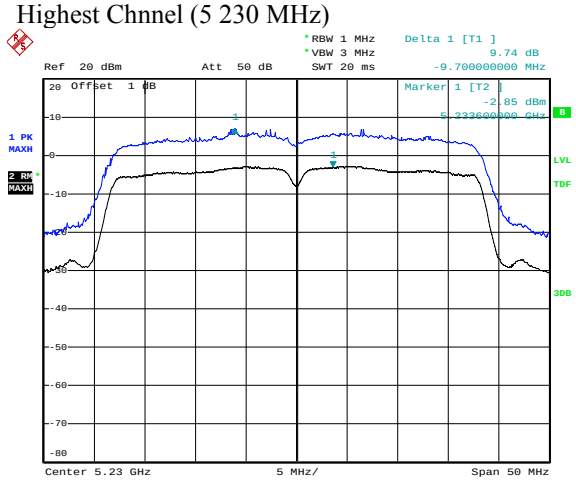
Ant0 + Ant1_802.11n 40 MHz_5 150 ~ 5 250 MHz

Ant0

Lowest Channel (5 190 MHz)

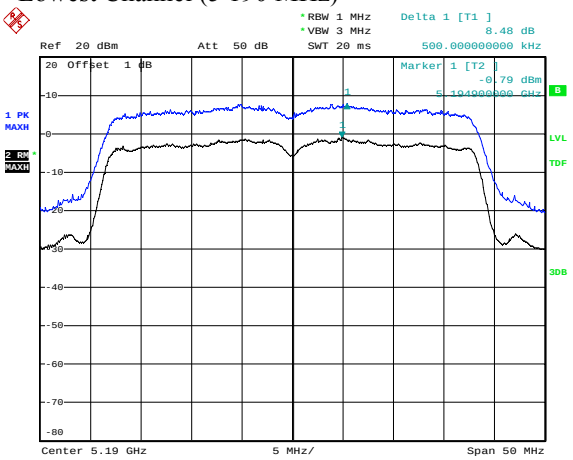


Highest Chnnel (5 230 MHz)

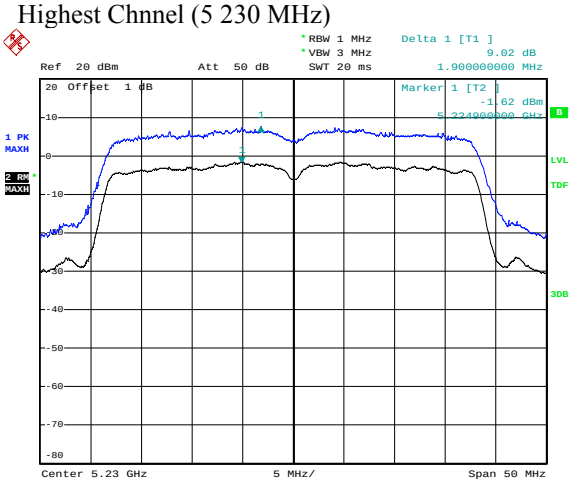


Ant1

Lowest Channel (5 190 MHz)



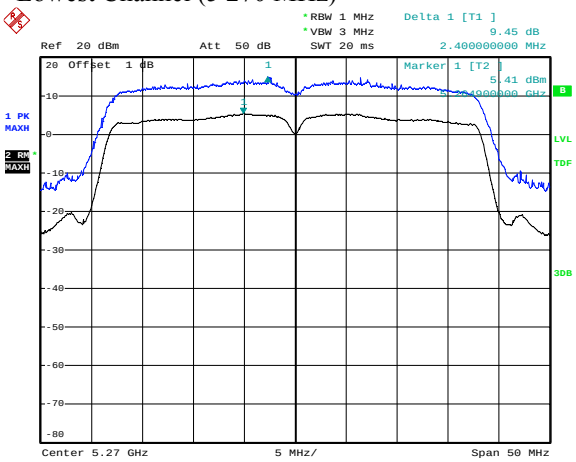
Highest Chnnel (5 230 MHz)



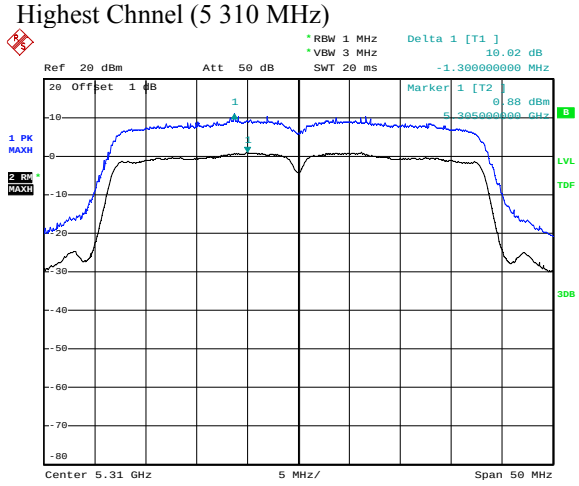
Ant0 + Ant1_802.11n 40 MHz_5 250 ~ 5 350 MHz

Ant0

Lowest Channel (5 270 MHz)

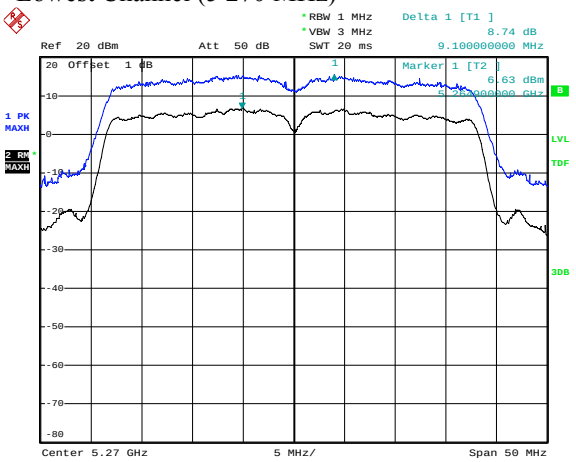


Highest Chnnel (5 310 MHz)

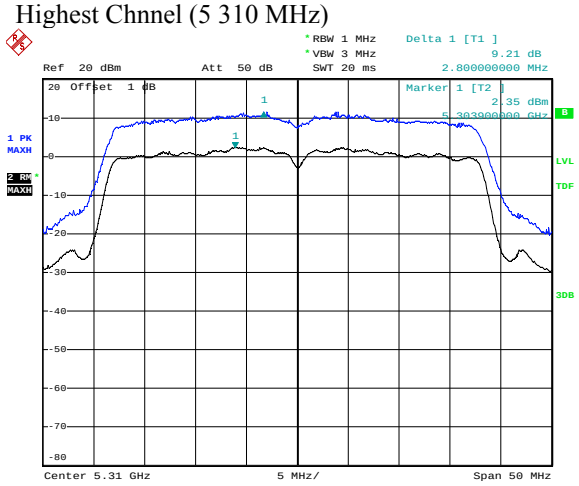


Ant1

Lowest Channel (5 270 MHz)



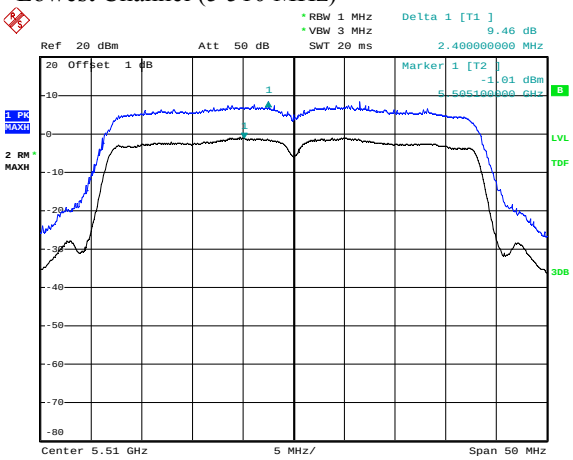
Highest Chnnel (5 310 MHz)



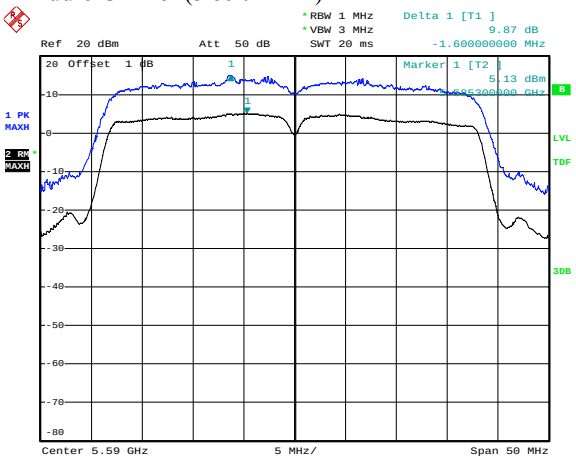
Ant0 + Ant1_802.11n 40 MHz_5 470 ~ 5 725 MHz

Ant0

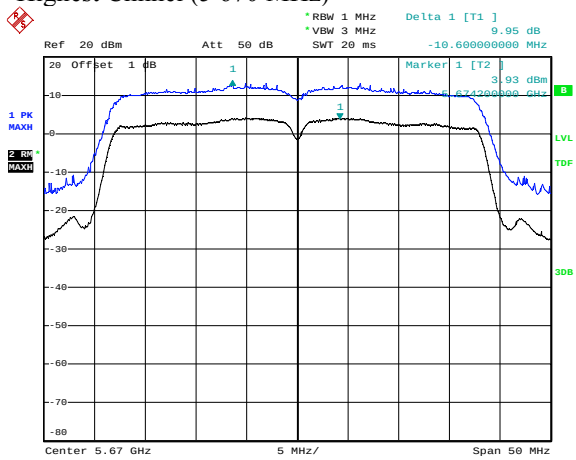
Lowest Channel (5 510 MHz)



Middle Chnnel (5 590 MHz)

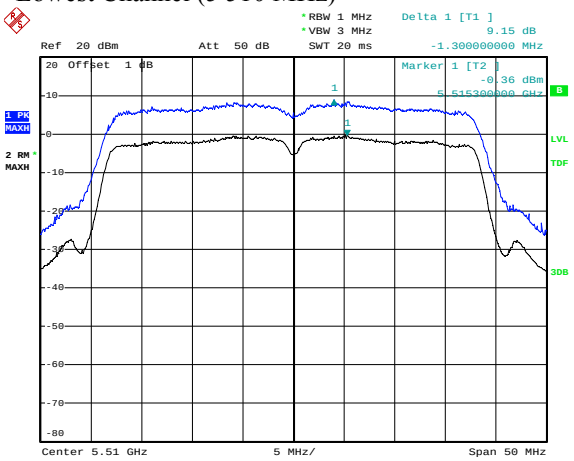


Highest Chnnel (5 670 MHz)

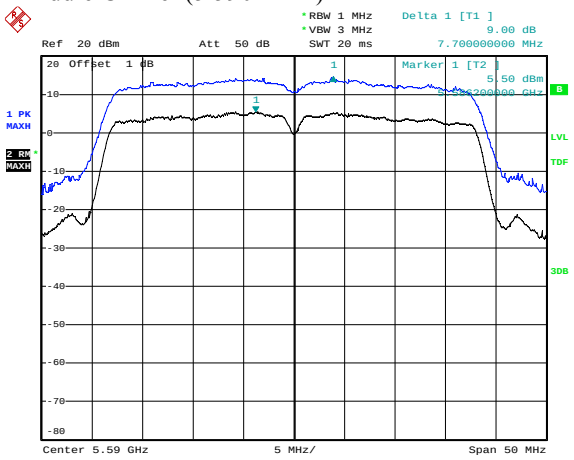


Ant1

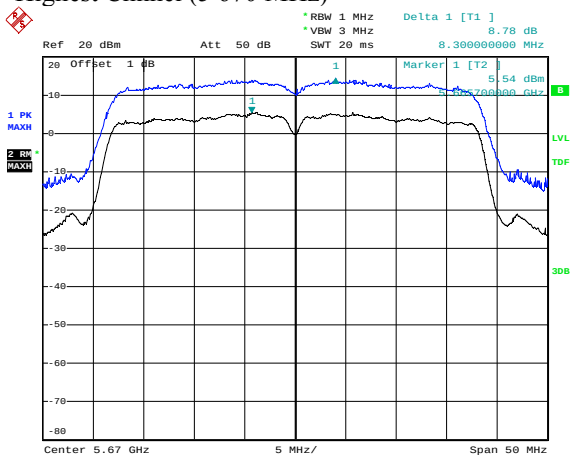
Lowest Channel (5 510 MHz)



Middle Chnnel (5 590 MHz)



Highest Chnnel (5 670 MHz)



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), for an intentional device, the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency (MHz)	Field strength (μV/m @ 3m)	Field strength (dBμV/m @ 3m)
30–88	100	40.0
88–216	150	43.5
216–960	200	46.0
Above 960	500	54.0

According to §15.109(a), for an unintentional device, except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the above table.

** 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),4),5),6)

(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.

b) 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.

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(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.

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) + D.F
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
D.F = Duty Cycle Factor
If M.R is 30 dB, A.F 12 dB, C.L 5 dB, 3 dB, A.G 35 dB D.F 0.2
The result is Peak and Quasi-peak: 30 + 12 + 5 + 3 – 35 = 15 dB(μV/m)
The result is Average: 30 + 12 + 5 + 3 – 35 + 0.2 = 15.2 dB(μV/m)

5.6.3 Test Result

-complied

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

Ant0_802.11a (5 150 ~ 5 250 MHz)

Low channel (5 180 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
145.67	120	H	38.70	- 11.20	-	27.50	43.50	16.00
822.61	120	V	32.50	4.30	-	36.80	46.00	9.20
835.22	120	H	34.70	4.60	-	39.30	46.00	6.70
Peak DATA. Emissions above 1GHz								
5 144.80	1 000	V	50.02	7.40	-	57.42	74.00	16.58
7 573.81	1 000	V	35.90	19.60	-	55.50	74.00	18.50
Above 8 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
5 147.40	1 000	V	36.36	7.40	0.41	44.17	54.00	9.83
7 573.81	1 000	V	24.80	19.60	-	44.40	54.00	9.60
Above 8 000.00	**Not Detected**	-	-	-	-	-	-	-

Note:

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

2. Duty Factor Calculration: 20 log(1/x) = 20 log(1/0.953 9) = 0.41.

3.Out of band measurement limit of 3 meters distance: EIRP[dBm] = E[dBμV/m] - 95.2 = 74 – 95.2 = 68.2.

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Ant0_802.11a (5 150 ~ 5 250 MHz)

Mid channel (5 200 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
147.37	120	V	34.30	-11.10	-	23.20	43.50	20.30
833.04	120	H	32.80	4.60	-	37.40	46.00	8.60
834.13	120	V	33.20	4.60	-	37.80	46.00	8.20
Peak DATA. Emissions above 1GHz								
7 573.81	1 000	V	41.60	19.60	-	61.20	74.00	12.80
Above 8 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
7 573.81	1 000	V	22.50	19.60	-	42.10	54.00	11.90
Above 8 000.00	**Not Detected**	-	-	-	-	-	-	-

Ant0_802.11a (5 150 ~ 5 250 MHz)

High channel (5 240 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
851.83	120	V	33.20	5.00	-	38.20	46.00	7.80
833.04	120	V	32.60	4.60	-	37.20	46.00	8.80
833.04	120	H	31.70	4.60	-	36.30	46.00	9.70
Peak DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-

Ant0_802.11a (5 250 ~ 5 350 MHz)

Low channel (5 260 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
147.37	120	V	33.10	-11.10	-	22.00	43.50	21.50
833.04	120	V	32.60	4.60	-	37.20	46.00	8.80
833.04	120	H	33.50	4.60	-	38.10	46.00	7.90
Peak DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-

Ant0_802.11a (5 250 ~ 5 350 MHz)

Mid channel (5 300 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
827.83	120	V	34.20	4.40	-	38.60	46.00	7.40
833.04	120	H	33.60	4.60	-	38.20	46.00	7.80
851.83	120	V	32.60	5.00	-	37.40	46.00	8.60
Peak DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-

Ant0_802.11a (5 250 ~ 5 350 MHz)

High channel (5 320 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
147.37	120	H	31.20	-11.10	-	20.10	43.50	23.40
830.86	120	V	33.50	4.50	-	38.00	46.00	8.00
833.04	120	H	33.70	4.60	-	38.30	46.00	7.70
Peak DATA. Emissions above 1GHz								
5 351.32	1 000	V	54.29	8.00	-	62.29	74.00	11.71
Above 6 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
5350.00	1 000	V	38.68	8.00	0.41	47.09	54.00	6.91
Above 6 000.00	**Not Detected**	-	-	-	-	-	-	-

Ant0_802.11a (5 470 ~ 5 725 MHz)

Low channel (5 500 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
147.25	120	H	32.60	-11.20	-	21.40	43.50	22.10
833.00	120	V	34.20	4.60	-	38.80	46.00	7.20
833.04	120	H	31.80	4.60	-	36.40	46.00	9.60
Peak DATA. Emissions above 1GHz								
5 377.50	1 000	V	49.72	8.70	-	58.42	74.00	15.58
5 467.60	1 000	V	56.02	8.70	-	64.72	68.20	3.48
Above 6 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
5 377.50	1 000	V	35.68	8.70	0.41	44.79	54.00	9.21
-	-	-	-	-	-	-	-	-
Above 6 000.00	**Not Detected**	-	-	-	-	-	-	-

Ant0_802.11a (5 470 ~ 5 725 MHz)

Mid channel (5 600 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
269.95	120	H	35.70	-9.50	-	26.20	46.00	19.80
826.61	120	H	32.80	4.40	-	37.20	46.00	8.80
833.04	120	V	33.70	4.60	-	38.30	46.00	7.70
Peak DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-

Ant0_802.11a (5 470 ~ 5 725 MHz)

High channel (5 700 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
350.95	120	H	36.50	-7.00	-	29.50	46.00	16.50
826.49	120	H	32.90	4.40	-	37.30	46.00	8.70
840.92	120	V	31.10	4.80	-	35.90	46.00	10.10
Peak DATA. Emissions above 1GHz								
5 725.00	1 000	V	55.28	9.70	-	64.98	68.20	3.22
Above 6 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 6 000.00	**Not Detected**	-	-	-	-	-	-	-

Ant0_802.11n 20 MHz (5 150 ~ 5 250 MHz)

Low channel (5 180 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
223.88	120	H	35.80	-12.30	-	235.00	46.00	22.50
828.07	120	V	32.50	4.40	-	36.90	46.00	9.10
833.04	120	H	34.80	4.60	-	39.40	46.00	6.60
Peak DATA. Emissions above 1GHz								
5 138.30	1 000	V	49.36	7.40	-	56.76	74.00	17.24
-	-	-	-	-	-	-	-	-
Above 6 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
5 146.10	1 000	V	35.79	8.00	0.44	44.23	54.00	9.77
-	-	-	-	-	-	-	-	-
Above 6 000.00	**Not Detected**	-	-	-	-	-	-	-

Note:

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

2. Duty Factor Calculration: 20 log(1/x) = 20 log(1/0.950 7) = 0.44.

3. Out of band measurement limit of 3 meters distance: EIRP[dBm] = E[dBμV/m] - 95.2 = 74 – 95.2 = 68.2.

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Ant0_802.11n 20 MHz (5 150 ~ 5 250 MHz)

Mid channel (5 200 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
147.25	120	V	34.50	-11.20	-	23.30	43.50	20.20
832.92	120	V	32.90	4.60	-	37.50	46.00	8.50
833.04	120	H	31.40	4.60	-	36.00	46.00	10.00
Peak DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-

Ant0_802.11n 20 MHz (5 150 ~ 5 250 MHz)

High channel (5 240 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
147.37	120	H	38.60	-11.10	-	27.50	43.50	16.00
830.37	120	V	32.50	4.50	-	37.00	46.00	9.00
833.04	120	H	31.90	4.60	-	36.50	46.00	9.50
Peak DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**				-			

Ant0_802.11n 20 MHz (5 250 ~ 5 350 MHz)

Low channel (5 260 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
350.95	120	H	35.90	-7.00	-	28.90	46.00	17.10
405.03	120	V	32.80	-5.40	-	27.40	46.00	18.60
833.04	120	V	31.50	4.60	-	36.10	46.00	9.90
Peak DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-

Ant0_802.11n 20 MHz (5 250 ~ 5 350 MHz)

Mid channel (5 300 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
147.25	120	H	36.50	-11.20	-	25.30	43.50	18.20
269.95	120	H	37.40	-9.50	-	27.90	46.00	18.10
833.04	120	H	31.50	4.60	-	36.10	46.00	9.90
Peak DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-

Ant0_802.11n 20 MHz (5 250 ~ 5 350 MHz)

High channel (5 320 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
147.79	120	H	35.40	-11.20	-	24.20	43.50	19.30
833.04	120	V	31.50	4.60	-	36.10	46.00	9.90
833.04	120	H	31.80	4.60	-	36.40	46.00	9.60
Peak DATA. Emissions above 1GHz								
5 350.88	1 000	V	54.77	8.00	-	62.77	74.00	11.23
Above 6 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
5 350.00	1 000	V	38.80	8.00	0.44	47.24	54.00	6.76
Above 6 000.00	**Not Detected**	-	-	-	-	-	-	-

Ant0_802.11n 20 MHz (5 470 ~ 5 725 MHz)

Low channel (5 500 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
269.95	120	H	35.90	-9.50	-	26.40	46.00	19.60
833.04	120	V	32.40	4.60	-	37.00	46.00	9.00
833.04	120	H	34.60	4.60	-	39.20	46.00	6.80
Peak DATA. Emissions above 1GHz								
5 452.74	1 000	V	50.20	8.70	-	58.90	74.00	15.10
5 468.20	1 000	V	57.19	8.70	-	65.89	68.20	2.31
Above 6 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
5 432.06	1 000	V	36.32	8.70	0.44	45.46	54.00	8.54
-	-	-	-	-	-	-	-	-
Above 6 000.00	**Not Detected**	-	-	-	-	-	-	-

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Ant0_802.11n 20 MHz (5 470 ~ 5 725 MHz)

Mid channel (5 600 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
106.15	120	V	37.90	-15.60	-	22.30	43.50	21.20
833.04	120	H	34.80	4.60	-	39.40	46.00	6.60
835.22	120	V	31.40	4.60	-	36.00	46.00	10.00
Peak DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-

Ant0_802.11n 20 MHz(5 470 ~ 5 725 MHz)

High channel (5 700 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
405.03	120	V	39.50	-9.30	-	30.20	46.00	15.80
827.92	120	V	26.10	-0.40	-	25.70	46.00	20.30
833.04	120	H	36.80	0.30	-	36.50	46.00	9.50
Peak DATA. Emissions above 1GHz								
5 725.00	1 000	V	56.05	9.70	-	65.75	68.20	2.45
Above 6 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 6 000.00	**Not Detected**	-	-	-	-	-	-	-

Ant1_802.11a (5 150 ~ 5 250 MHz)

Low channel (5 180 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
147.37	120	H	32.60	-11.10	-	21.50	43.50	22.00
833.04	120	V	32.90	4.60	-	37.50	46.00	8.50
833.16	120	H	32.40	4.60	-	37.00	46.00	9.00
Peak DATA. Emissions above 1GHz								
5 092.80	1 000	V	49.00	7.40	-	56.40	74.00	17.60
-	-	-	-	-	-	-	-	-
Above 6 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
5 125.30	1 000	V	35.55	7.40	0.41	43.36	54.00	10.64
-	-	-	-	-	-	-	-	-
Above 6 000.00	**Not Detected**	-	-	-	-	-	-	-

Note:

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

2. Duty Factor Calculration: 20 log(1/x) = 20 log(1/0.953 9) = 0.41.

3. Out of band measurement limit of 3 meters distance: EIRP[dBm] = E[dBμV/m] - 95.2 = 74 – 95.2 = 68.2.

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Ant1_802.11a (5 150 ~ 5 250 MHz)

Mid channel (5 200 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
147.25	120	H	32.90	-11.20	-	21.70	43.50	21.80
833.04	120	H	32.70	4.60	-	37.30	46.00	8.70
833.04	120	V	33.40	4.60	-	38.00	46.00	8.00
Peak DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 8 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 8 000.00	**Not Detected**	-	-	-	-	-	-	-

Ant1_802.11a (5 150 ~ 5 250 MHz)

High channel (5 240 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
147.37	120	H	32.90	-11.10	-	21.80	43.50	21.70
833.04	120	H	32.50	4.60	-	37.10	46.00	8.90
833.16	120	V	32.80	4.60	-	37.40	46.00	8.60
Peak DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-

Ant1_802.11a (5 250 ~ 5 350 MHz)

Low channel (5 260 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
147.37	120	V	32.90	-11.10	-	21.80	43.50	21.70
830.86	120	V	32.40	4.50	-	36.90	46.00	9.10
837.40	120	H	32.70	4.70	-	37.40	46.00	8.60
Peak DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-

Ant1_802.11a (5 250 ~ 5 350 MHz)

Mid channel (5 300 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
147.25	120	H	32.80	-11.20	-	21.60	43.50	21.90
833.04	120	H	32.60	4.60	-	37.20	46.00	8.80
837.40	120	V	31.50	4.70	-	36.20	46.00	9.80
Peak DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-

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Ant1_802.11a (5 250 ~ 5 350 MHz)

High channel (5 320 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
147.25	120	V	32.40	-11.20	-	21.20	43.50	22.30
828.43	120	V	33.50	4.50	-	38.00	46.00	8.00
833.04	120	H	32.60	4.60	-	37.20	46.00	8.80
Peak DATA. Emissions above 1GHz								
5 350.88	1 000	V	52.87	8.00	-	60.87	74.00	13.13
Above 6 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
5 350.00	1 000	V	35.83	8.00	0.41	44.24	54.00	9.76
Above 6 000.00	**Not Detected**	-	-	-	-	-	-	-

Ant1_802.11a (5 470 ~ 5 725 MHz)

Low channel (5 500 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
147.13	120	H	32.50	-11.20	-	21.30	43.50	22.20
405.03	120	V	33.20	-5.40	-	27.80	46.00	18.20
843.22	120	H	33.70	4.80	-	38.50	46.00	7.50
Peak DATA. Emissions above 1GHz								
5 431.40	1 000	V	49.40	8.70	-	58.10	74.00	15.90
5 470.00	1 000	V	53.43	8.70	-	62.13	68.20	6.07
Above 6 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
5 430.74	1 000	V	34.82	8.70	0.41	43.93	54.00	10.07
-	-	-	-	-	-	-	-	-
Above 6 000.00	**Not Detected**	-	-	-	-	-	-	-

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Ant1_802.11a (5 470 ~ 5 725 MHz)

Mid channel (5 600 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
147.25	120	H	32.60	-11.20	-	21.40	43.50	22.10
833.04	120	V	32.40	4.60	-	37.00	46.00	9.00
833.04	120	H	33.90	4.60	-	38.50	46.00	7.50
Peak DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-

Ant1_802.11a (5 470 ~ 5 725 MHz)

High channel (5 700 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
269.95	120	H	31.50	-9.50	-	22.00	46.00	24.00
826.61	120	H	33.70	4.40	-	38.10	46.00	7.90
826.61	120	V	31.80	4.40	-	36.20	46.00	9.80
Peak DATA. Emissions above 1GHz								
5 725.80	1 000	V	55.84	9.70	-	65.54	68.20	2.66
Above 6 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 6 000.00	**Not Detected**	-	-	-	-	-	-	-

Ant1_802.11n 20 MHz (5 150 ~ 5 250 MHz)

Low channel (5 180 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
405.03	120	V	38.60	-9.30	-	29.30	46.00	16.70
746.59	120	V	35.80	-2.00	-	33.80	46.00	12.20
832.99	120	V	38.60	-0.30	-	38.30	46.00	7.70
Peak DATA. Emissions above 1GHz								
5 146.10	1 000	V	48.49	8.00	-	56.49	74.00	17.51
-	-	-	-	-	-	-	-	-
Above 6 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
5 146.10	1 000	V	34.85	8.00	0.44	43.29	54.00	10.71
-	-	-	-	-	-	-	-	-
Above 6 000.00	**Not Detected**	-	-	-	-	-	-	-

Note:

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

2. Duty Factor Calculration: 20 log(1/x) = 20 log(1/0.950 7) = 0.44.

3. Out of band measurement limit of 3 meters distance: EIRP[dBm] = E[dBμV/m] - 95.2 = 74 – 95.2 = 68.2.

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Ant1_802.11n 20 MHz (5 150 ~ 5 250 MHz)

Mid channel (5 200 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
269.95	120	H	38.50	-13.20	-	25.30	46.00	20.70
749.74	120	H	36.90	-1.90	-	35.00	46.00	11.00
833.39	120	H	37.80	-0.30	-	37.50	46.00	8.50
Peak DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-

Ant1_802.11n 20 MHz (5 150 ~ 5 250 MHz)

High channel (5 240 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
147.37	120	V	36.90	-11.10	-	25.80	43.50	17.70
746.83	120	H	31.50	2.70	-	34.20	46.00	11.80
827.83	120	V	31.80	4.40	-	36.20	46.00	9.80
Peak DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**				-			

Ant1_802.11n 20 MHz (5 250 ~ 5 350 MHz)

Low channel (5 260 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
147.25	120	V	41.50	-11.20	-	30.30	43.50	13.20
405.03	120	H	-5.40	-5.40	-	29.50	46.00	16.50
833.16	120	V	32.40	4.60	-	37.00	46.00	9.00
Peak DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-

Ant1_802.11n 20 MHz (5 250 ~ 5 350 MHz)

Mid channel (5 300 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
147.13	120	V	35.70	-11.20	-	24.50	43.50	19.00
749.86	120	V	31.40	2.80	-	34.20	46.00	11.80
833.04	120	H	32.80	4.60	-	33.50	46.00	8.60
Peak DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-

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Ant1_802.11n 20 MHz (5 250 ~ 5 350 MHz)

High channel (5 320 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
147.13	120	V	38.50	-11.20	-	27.30	43.50	16.20
405.03	120	V	36.80	-5.40	-	31.40	46.00	14.60
836.31	120	V	33.60	4.70	-	38.30	46.00	7.70
Peak DATA. Emissions above 1GHz								
5 350.44	1 000	V	53.47	8.00	-	61.47	74.00	12.53
Above 6 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
5 350.00	1 000	V	35.71	8.00	0.44	44.15	54.00	9.85
Above 6 000.00	**Not Detected**	-	-	-	-	-	-	-

Ant1_802.11n 20 MHz (5 470 ~ 5 725 MHz)

Low channel (5 500 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
147.25	120	V	39.70	-11.20	-	28.50	43.50	15.00
405.03	120	V	35.60	-5.40	-	30.20	46.00	15.80
833.04	120	H	32.10	4.60	-	36.70	46.00	9.30
Peak DATA. Emissions above 1GHz								
5 455.38	1 000	V	47.97	8.70	-	56.67	74.00	17.33
5 466.60	1 000	V	56.44	8.70	-	65.14	68.20	3.06
Above 6 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
5 430.74	1 000	V	34.74	8.70	0.44	43.88	54.00	10.12
-	-	-	-	-	-	-	-	-
Above 6 000.00	**Not Detected**	-	-	-	-	-	-	-

Ant1_802.11n 20 MHz (5 470 ~ 5 725 MHz)

Mid channel (5 600 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
350.95	120	H	38.50	-7.00	-	31.50	46.00	14.50
746.83	120	H	30.60	2.70	-	33.30	46.00	12.70
833.04	120	H	31.50	4.60	-	36.10	46.00	9.90
Peak DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-

Ant1_802.11n 20 MHz(5 470 ~ 5 725 MHz)

High channel (5 700 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
147.25	120	H	38.70	-11.20	-	27.50	43.50	16.00
749.86	120	H	29.70	2.80	-	32.50	46.00	13.50
833.04	120	H	32.40	4.60	-	37.00	46.00	9.00
Peak DATA. Emissions above 1GHz								
5 725.00	1 000	V	56.05	9.70	-	65.75	68.20	2.45
Above 6 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 6 000.00	**Not Detected**	-	-	-	-	-	-	-

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Ant0 + Ant1_802.11n 20 MHz (5 150 ~ 5 250 MHz)

Low channel (5 180 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
147.25	120	H	38.50	-11.20	-	27.30	43.50	16.20
350.95	120	H	39.80	-7.00	-	32.80	46.00	13.20
833.04	120	V	32.50	4.60	-	37.10	46.00	8.90
Peak DATA. Emissions above 1GHz								
4 536.30	1 000	V	49.13	7.40	-	56.53	74.00	17.47
-	-	-	-	-	-	-	-	-
Above 6 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
5 139.60	1 000	V	35.22	7.40	0.44	43.06	54.00	10.94
-	-	-	-	-	-	-	-	-
Above 6 000.00	**Not Detected**	-	-	-	-	-	-	-

Note:

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

2. Duty Factor Calculration: 20 log(1/x) = 20 log(1/0.950 7) = 0.44.

3. Out of band measurement limit of 3 meters distance: EIRP[dBm] = E[dBμV/m] - 95.2 = 74 – 95.2 = 68.2.

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Ant0 + Ant1_802.11n 20 MHz (5 150 ~ 5 250 MHz)

Mid channel (5 200 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
147.13	120	H	38.70	-11.20	-	27.50	43.50	16.00
308.75	120	H	38.10	-8.30	-	29.80	46.00	16.20
833.04	120	V	31.40	4.60	-	36.00	46.00	10.00
Peak DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-

Ant0 + Ant1_802.11n 20 MHz (5 150 ~ 5 250 MHz)

High channel (5 240 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
269.95	120	H	38.40	-9.50	-	28.90	46.00	17.10
746.59	120	H	29.40	2.70	-	32.10	46.00	13.90
833.39	120	H	35.40	4.60	-	40.00	46.00	6.00
Peak DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**				-			

Ant0 + Ant1_802.11n 20 MHz (5 250 ~ 5 350 MHz)

Low channel (5 260 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
148.22	120	H	38.70	-11.10	-	27.60	43.50	15.90
749.62	120	H	28.90	2.80	-	31.70	46.00	14.30
838.01	120	H	32.50	4.70	-	37.20	46.00	8.80
Peak DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-

Ant0 + Ant1_802.11n 20 MHz (5 250 ~ 5 350 MHz)

Mid channel (5 300 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
405.03	120	V	35.70	-5.40	-	30.30	46.00	15.70
749.86	120	V	32.40	2.80	-	35.20	46.00	10.80
833.04	120	H	32.40	4.60	-	37.00	46.00	9.00
Peak DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-

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Ant0 + Ant1_802.11n 20 MHz (5 250 ~ 5 350 MHz)

High channel (5 320 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
148.098	120	H	39.8	-11.1	-	28.7	43.5	14.8
405.026	120	H	34.7	-5.4	-	29.3	46	16.7
839.586	120	H	34.5	4.7	-	39.2	46	6.8
Peak DATA. Emissions above 1GHz								
5 350.00	1 000	V	57.14	8.00	-	65.14	74.00	8.86
Above 6 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
5 350.66	1 000	V	39.55	8.00	0.44	47.99	54.00	6.01
Above 6 000.00	**Not Detected**	-	-	-	-	-	-	-

Ant0 + Ant1_802.11n 20 MHz (5 470 ~ 5 725 MHz)

Low channel (5 500 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
148.10	120	V	37.80	-11.10	-	26.70	43.50	16.80
405.03	120	H	35.80	-5.40	-	30.40	46.00	15.60
833.04	120	H	31.40	4.60	-	36.00	46.00	10.00
Peak DATA. Emissions above 1GHz								
5 377.50	1 000	V	49.68	8.70	-	58.38	74.00	15.62
5 469.20	1 000	V	55.56	8.70	-	64.26	68.20	3.94
Above 6 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
5 368.48	1 000	V	35.50	8.70	0.44	44.64	54.00	9.36
-	-	-	-	-	-	-	-	-
Above 6 000.00	**Not Detected**	-	-	-	-	-	-	-

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Ant0 + Ant1_802.11n 20 MHz (5 470 ~ 5 725 MHz)

Mid channel (5 600 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
148.10	120	H	38.70	-11.10	-	27.60	43.50	15.90
749.74	120	V	32.40	2.80	-	35.20	46.00	10.80
833.04	120	H	31.60	4.60	-	36.20	46.00	9.80
Peak DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-

Ant0 + Ant1_802.11n 20 MHz(5 470 ~ 5 725 MHz)

High channel (5 700 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
148.10	120	H	37.50	-11.10	-	26.40	43.50	17.10
405.03	120	H	38.60	-5.40	-	33.20	46.00	12.80
833.04	120	V	29.70	4.60	-	34.30	46.00	11.70
Peak DATA. Emissions above 1GHz								
5 725.00	1 000	V	55.26	9.70	-	64.96	68.20	3.24
Above 6 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 6 000.00	**Not Detected**	-	-	-	-	-	-	-

Ant0 + Ant1_802.11n 40 MHz (5 150 ~ 5 250 MHz)

Low channel (5 190 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
350.95	120	H	38.70	-7.00	-	31.70	46.00	14.30
749.86	120	V	33.80	2.80	-	36.60	46.00	9.40
843.22	120	V	31.50	4.80	-	36.30	46.00	9.70
Peak DATA. Emissions above 1GHz								
5 146.10	1 000	V	51.65	7.40	-	59.05	74.00	14.95
-	-	-	-	-	-	-	-	-
Above 6 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
5 146.10	1 000	V	37.80	7.40	0.87	46.07	54.00	7.93
-	-	-	-	-	-	-	-	-
Above 6 000.00	**Not Detected**	-	-	-	-	-	-	-

Note:

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

2. Duty Factor Calculration : 20 log(1/x) = 20 log(1/0.904 9) = 0.87.

3. Out of band measurement limit of 3 meters distance: EIRP[dBm] = E[dBμV/m] - 95.2 = 74 – 95.2 = 68.2.

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Ant0 + Ant1_802.11n 40 MHz (5 150 ~ 5 250 MHz)

High channel (5 230 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
148.34	120	V	37.90	-11.10	-	26.80	43.50	16.70
749.86	120	V	33.50	2.80	-	36.30	46.00	9.70
833.04	120	H	31.60	4.60	-	36.20	46.00	9.80
Peak DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-

Ant0 + Ant1_802.11n 40 MHz (5 250 ~ 5 350 MHz)

Low channel (5 270 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
746.48	120	H	29.80	2.70	-	32.50	46.00	13.50
749.86	120	V	31.40	2.80	-	34.20	46.00	11.80
838.25	120	V	31.40	4.70	-	36.10	46.00	9.90
Peak DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-

Ant0 + Ant1_802.11n 40 MHz (5 250 ~ 5 350 MHz)

High channel (5 310 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
148.22	120	H	36.90	-11.10	-	25.80	43.50	17.70
405.03	120	V	34.70	-5.40	-	29.30	46.00	16.70
833.04	120	H	31.90	4.60	-	36.50	46.00	9.50
Peak DATA. Emissions above 1GHz								
5 354.18	1 000	V	55.26	8.00	-	63.26	74.00	10.74
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
5 351.54	1 000	V	37.44	8.00	0.87	46.31	54.00	7.69
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-

Ant0 + Ant1_802.11n 40 MHz (5 470 ~ 5 725 MHz)

Low channel (5 510 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
146.76	120	V	36.80	-11.20	-	25.60	43.50	17.90
405.03	120	V	33.90	-5.40	-	28.50	46.00	17.50
833.04	120	V	30.60	4.60	-	35.20	46.00	10.80
Peak DATA. Emissions above 1GHz								
5 460.00	1 000	V	50.24	8.80	-	59.04	74.00	14.96
5 468.00	1 000	V	57.41	8.80	-	66.21	68.20	1.99
Above 6 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
5 460.00	1 000	V	35.20	8.80	0.87	44.87	54.00	9.13
Above 6 000.00	**Not Detected**	-	-	-	-	-	-	-

Ant0 + Ant1_802.11n 40 MHz (5 250 ~ 5 350 MHz)

Mid channel (5 590 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
183.50	120	V	36.90	-12.40	-	24.50	43.50	19.00
416.55	120	H	37.50	-5.10	-	32.40	46.00	13.60
833.04	120	H	30.60	4.60	-	35.20	46.00	10.80
Peak DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
Above 1 000.00	**Not Detected**	-	-	-	-	-	-	-

Ant0 + Ant1_802.11n 40 MHz (5 470 ~ 5 725 MHz)

High channel (5 670 MHz)

Frequency [MHz]	RBW [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Duty factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 1GHz								
269.95	120	H	41.50	-9.50	-	32.00	46.00	14.00
412.54	120	V	34.50	-5.20	-	29.30	46.00	16.70
838.13	120	H	31.40	4.70	-	36.10	46.00	9.90
Peak DATA. Emissions above 1GHz								
5 725.60	1 000	V	54.69	9.50	-	64.19	68.20	4.01
-	-	-	-	-	-	-	-	-
Above 6 000.00	**Not Detected**	-	-	-	-	-	-	-
Average DATA. Emissions above 1GHz								
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
Above 6 000.00	**Not Detected**	-	-	-	-	-	-	-

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.

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5.7.3 Test Result

-complied

- 5 150 ~ 5 250 MHz

Channel	Frequency (Hz)	Voltage (AC)
CH36(Low)	5 180 000 000	120

Voltage (%)	Power (VAC)	Temp. (°C)	Reading Frequency (Hz)	Frequency Error (Hz)	Frequency Error (%)
100	120	20	5 179 989 512	10488	0.000 202
100		-30	-	-	-
100		-20	-	-	-
100		-10	-	-	-
100		0	5 179 967 710	32 290	0.000 623
100		10	5 179 963 424	36 576	0.000 706
100		20	5 179 962 704	37 296	0.000 720
100		30	5 179 969 549	30 451	0.000 588
100		40	5 179 984 555	15 445	0.000 298
100		50	5 180 014 651	-14 651	-0.000 283
85	102	20	5 179 986 416	13 584	0.000 262
115	138	20	5 179 991 205	8 795	0.000 170

Channel	Frequency (Hz)	Voltage (AC)
CH40(Mid)	5 200 000 000	120

Voltage (%)	Power (VAC)	Temp. (°C)	Reading Frequency (Hz)	Frequency Error (Hz)	Frequency Error (%)
100	120	20	5 199 990 153	9 847	0.0001 89
100		-30	-	-	-
100		-20	-	-	-
100		-10	-	-	-
100		0	5 199 967 967	32 033	0.000 616
100		10	5 199 963 224	36 776	0.000 707
100		20	5 199 962 611	37 389	0.000 719
100		30	5 199 970 064	29 936	0.000 576
100		40	5 199 983 951	16 049	0.000 309
100		50	5 200 015 312	-15 312	-0.000 294
85	102	20	5 199 986 782	13 218	0.000 254
115	138	20	5 199 993 521	6 479	0.000 125

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Channel	Frequency (Hz)	Voltage (AC)
CH48(High)	5 240 000 000	120

Voltage (%)	Power (VAC)	Temp. (°C)	Reading Frequency (Hz)	Frequency Error (Hz)	Frequency Error (%)
100	120	20	5 259 990 156	9 844	0.000 187
100		-30	-	-	-
100		-20	-	-	-
100		-10	-	-	-
100		0	5 259 967 998	32 002	0.000 608
100		10	5 259 962 858	37 142	0.000 706
100		20	5 259 962 262	37 738	0.000 717
100		30	5 259 968 084	31 916	0.000 607
100		40	5 259 984 012	15 988	0.000 304
100		50	5 260 014 670	-14 670	-0.000 279
85	102	20	5 259 987 403	12 597	0.000 239
115	138	20	5 259 995 513	4 487	0.000 085

- 5 250 ~ 5 350 MHz

Channel	Frequency (Hz)	Voltage (AC)
CH52(Low)	5 260 000 000	120

Voltage (%)	Power (VAC)	Temp. (°C)	Reading Frequency (Hz)	Frequency Error (Hz)	Frequency Error (%)
100	120	20	5 259 990 156	9 844	0.000 187
100		-30	-	-	-
100		-20	-	-	-
100		-10	-	-	-
100		0	5 259 967 998	32 002	0.000 608
100		10	5 259 962 858	37 142	0.000 706
100		20	5 259 962 262	37 738	0.000 717
100		30	5 259 968 084	31 916	0.000 607
100		40	5 259 984 012	15 988	0.000 304
100		50	5 260 014 670	-14 670	-0.000 279
85	102	20	5 259 987 403	12 597	0.000 239
115	138	20	5 259 995 513	4 487	0.000 085

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Channel	Frequency (Hz)	Voltage (AC)
CH60(Mid)	5 300 000 000	120

Voltage (%)	Power (VAC)	Temp. (°C)	Reading Frequency (Hz)	Frequency Error (Hz)	Frequency Error (%)
100	120	20	5 299 991 953	8 047	0.000 152
100		-30	-	-	-
100		-20	-	-	-
100		-10	-	-	-
100		0	5 299 968 160	31 840	0.000 601
100		10	5 299 962 462	37 538	0.000 708
100		20	5 299 962 061	37 939	0.000 716
100		30	5 299 969 071	30 929	0.000 584
100		40	5 299 983 813	16 187	0.000 305
100		50	5 300 014 926	-14 926	-0.000 282
85	102	20	5 299 988 029	11 971	0.000 226
115	138	20	5 299 995 656	4 344	0.000 082

Channel	Frequency (Hz)	Voltage (AC)
CH64(High)	5 320 000 000	120

Voltage (%)	Power (VAC)	Temp. (°C)	Reading Frequency (Hz)	Frequency Error (Hz)	Frequency Error (%)
100	120	20	5 319 980 165	19 835	0.000 373
100		-30	-	-	-
100		-20	-	-	-
100		-10	-	-	-
100		0	5 319 968 221	31 779	0.000 597
100		10	5 319 962 439	37 561	0.000 706
100		20	5 319 961 943	38 057	0.000 715
100		30	5 319 968 513	31 487	0.000 592
100		40	5 319 980 539	19 461	0.000 366
100		50	5 320 014 914	-14 914	-0.000 280
85	102	20	5 319 988 177	11 823	0.000 222
115	138	20	5 319 991 527	8 473	0.000 159

- 5 470 ~ 5 725 MHz

Channel	Frequency (Hz)	Voltage (AC)
CH100(Low)	5 500 000 000	120

Voltage (%)	Power (VAC)	Temp. (°C)	Reading Frequency (Hz)	Frequency Error (Hz)	Frequency Error (%)
100	120	20	5 499 987 015	12 985	0.000 236
100		-30	-	-	-
100		-20	-	-	-
100		-10	-	-	-
100		0	5 499 967 184	32 816	0.000 597
100		10	5 499 961 385	38 615	0.000 702
100		20	5 499 960 584	39 416	0.000 717
100		30	5 499 966 954	33 046	0.000 601
100		40	5 499 980 055	19 945	0.000 363
100		50	5 500 011 204	-11 204	-0.000 204
85	102	20	5 499 986 517	13 483	0.000 245
115	138	20	5 499 988 890	11 110	0.000 202

Channel	Frequency (Hz)	Voltage (AC)
CH120(Mid)	5 600 000 000	120

Voltage (%)	Power (VAC)	Temp. (°C)	Reading Frequency (Hz)	Frequency Error (Hz)	Frequency Error (%)
100	120	20	5 599 986 910	13 090	0.000 234
100		-30	-	-	-
100		-20	-	-	-
100		-10	-	-	-
100		0	5 599 966 529	33 471	0.000 598
100		10	5 599 960 886	39 114	0.000 698
100		20	5 599 959 806	40 194	0.000 718
100		30	5 599 965 856	34 144	0.000 610
100		40	5 599 979 770	20 230	0.000 361
100		50	5 600 010 642	-10 642	-0.000 190
85	102	20	5 599 985 765	14 235	0.000 254
115	138	20	5 599 988 623	11 377	0.000 203

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Channel	Frequency (Hz)	Voltage (AC)
CH140(High)	5 700 000 000	120

Voltage (%)	Power (VAC)	Temp. (°C)	Reading Frequency (Hz)	Frequency Error (Hz)	Frequency Error (%)
100	120	20	5 699 987 520	12 480	0.000 219
100		-30	-	-	-
100		-20	-	-	-
100		-10	-	-	-
100		0	5 699 965 823	34 177	0.000 600
100		10	5 699 960 282	39 718	0.000 697
100		20	5 699 958 944	41 056	0.000 720
100		30	5 699 965 008	34 992	0.000 614
100		40	5 699 979 319	20 681	0.000 363
100		50	5 700 010 795	-10 795	-0.000 189
85	102	20	5 699 985 330	14 670	0.000 257
115	138	20	5 699 988 785	11 215	0.000 197

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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

802.11a (5 150 ~5 250 MHz)

5 240 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]
0.171	9.81	0.03	H	64.91	35.65	45.49	19.42	54.91	30.22	40.06	14.85
0.174	9.82	0.03	N	64.77	36.86	46.71	18.06	54.77	31.01	40.86	13.91
0.195	9.84	0.03	H	63.82	30.04	39.91	23.91	53.82	25.95	35.82	18.00
0.348	9.89	0.03	H	59.01	23.30	33.22	25.79	49.01	20.80	30.72	18.29
0.483	10.00	0.04	N	56.29	29.96	40.00	16.29	46.29	24.46	34.50	11.79
0.486	10.00	0.04	H	56.24	30.54	40.58	15.66	46.24	26.68	36.72	9.52
0.519	10.00	0.04	N	56.00	31.16	41.20	14.80	46.00	27.11	37.15	8.85
0.522	10.00	0.04	H	56.00	31.84	41.88	14.12	46.00	28.11	38.15	7.85
0.942	9.82	0.06	H	56.00	26.40	36.28	19.72	46.00	20.70	30.58	15.42
1.350	9.78	0.06	N	56.00	26.37	36.21	19.79	46.00	19.66	29.50	16.50
1.365	9.78	0.06	H	56.00	27.66	37.50	18.50	46.00	20.28	30.12	15.88
1.563	9.66	0.06	H	56.00	28.51	38.23	17.77	46.00	22.94	32.66	13.34
1.818	9.66	0.06	N	56.00	26.96	36.68	19.32	46.00	21.20	30.92	15.08
12.260	9.65	0.11	H	60.00	30.90	40.66	19.34	50.00	25.26	35.02	14.98
12.420	9.67	0.11	N	60.00	30.54	40.32	19.68	50.00	24.42	34.20	15.80
13.010	9.66	0.12	H	60.00	31.94	41.72	18.28	50.00	26.18	35.96	14.04
13.360	9.67	0.12	N	60.00	29.89	39.68	20.32	50.00	23.55	33.34	16.66

Note:

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

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802.11n 20 MHz (5 250 ~5 350 MHz)

5 300 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]
0.174	9.82	0.03	N	64.77	36.68	46.53	18.24	54.77	31.08	40.93	13.84
0.177	9.84	0.03	H	64.63	35.58	45.45	19.18	54.63	29.91	39.78	14.85
0.195	9.85	0.03	N	63.82	36.74	46.62	17.20	53.82	26.53	36.41	17.41
0.456	9.95	0.04	H	56.77	27.08	37.07	19.70	46.77	23.37	33.36	13.41
0.489	10.00	0.04	H	56.77	29.73	39.77	17.00	46.77	25.86	35.90	10.87
0.489	10.00	0.04	N	56.18	30.31	40.35	15.83	46.18	26.10	36.14	10.04
0.528	10.00	0.04	H	56.00	32.14	42.18	13.82	46.00	28.75	38.79	7.21
0.528	10.00	0.04	N	56.00	31.63	41.67	14.33	46.00	28.15	38.19	7.81
0.738	9.89	0.05	H	56.00	26.36	36.30	19.70	46.00	22.06	32.00	14.00
0.738	9.90	0.05	N	56.00	26.46	36.41	19.59	46.00	21.55	31.50	14.50
1.158	9.78	0.06	N	56.00	27.00	36.84	19.16	46.00	22.81	32.65	13.35
1.365	9.78	0.06	N	56.00	28.36	38.20	17.80	46.00	23.04	32.88	13.12
1.368	9.78	0.06	H	56.00	28.92	38.76	17.24	46.00	24.01	33.85	12.15
12.020	9.65	0.11	H	60.00	30.84	40.60	19.40	50.00	25.10	34.86	15.14
12.760	9.67	0.12	N	60.00	31.59	41.38	18.62	50.00	26.02	35.81	14.19
13.390	9.66	0.12	H	60.00	31.72	41.50	18.50	50.00	25.74	35.52	14.48
13.520	9.68	0.12	N	60.00	28.94	38.74	21.26	50.00	22.98	32.78	17.22

Note:

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

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802.11n 20 MHz (5 470 ~5 725 MHz)

5 600 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]
0.174	9.82	0.03	N	64.77	36.80	46.65	18.12	54.77	30.18	40.03	14.74
0.177	9.84	0.03	H	64.63	35.54	45.41	19.22	54.63	5.12	14.99	39.64
0.195	9.84	0.03	H	63.82	30.12	39.99	23.83	53.82	26.01	35.88	17.94
0.195	9.85	0.03	N	63.82	30.76	40.64	23.18	53.82	26.53	36.41	17.41
0.486	10.00	0.04	H	56.24	29.73	39.77	16.47	46.24	24.76	34.80	11.44
0.492	10.00	0.04	N	56.13	28.37	38.41	17.72	46.13	21.72	31.76	14.37
0.525	10.00	0.04	H	56.00	32.24	42.28	13.72	46.00	28.83	38.87	7.13
0.528	10.00	0.04	N	56.00	31.61	41.65	14.35	46.00	27.00	37.04	8.96
0.948	9.82	0.06	H	56.00	26.60	36.48	19.52	46.00	20.41	30.29	15.71
0.948	9.85	0.06	N	56.00	26.22	36.13	19.87	46.00	21.70	31.61	14.39
1.368	9.78	0.06	H	56.00	28.55	38.39	17.61	46.00	22.43	32.27	13.73
1.368	9.78	0.06	N	56.00	28.28	38.12	17.88	46.00	23.46	33.30	12.70
12.560	9.66	0.12	H	60.00	32.04	41.82	18.18	50.00	26.88	36.66	13.34
12.620	9.67	0.12	N	60.00	31.43	41.22	18.78	50.00	25.94	35.73	14.27
13.270	9.67	0.12	N	60.00	30.27	40.06	19.94	50.00	24.26	34.05	15.95
13.490	9.66	0.12	H	60.00	31.03	40.81	19.19	50.00	24.66	34.44	15.56

Note:

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

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5.8.4 Test plot

802.11a (5 150 ~5 350 MHz)

5 240 MHz_H

EMC Compliance LTD

EUT:
Manuf: H
Op Cond:
Operator:
Test Spec: FCC Class B Conducted Emission
Comment:

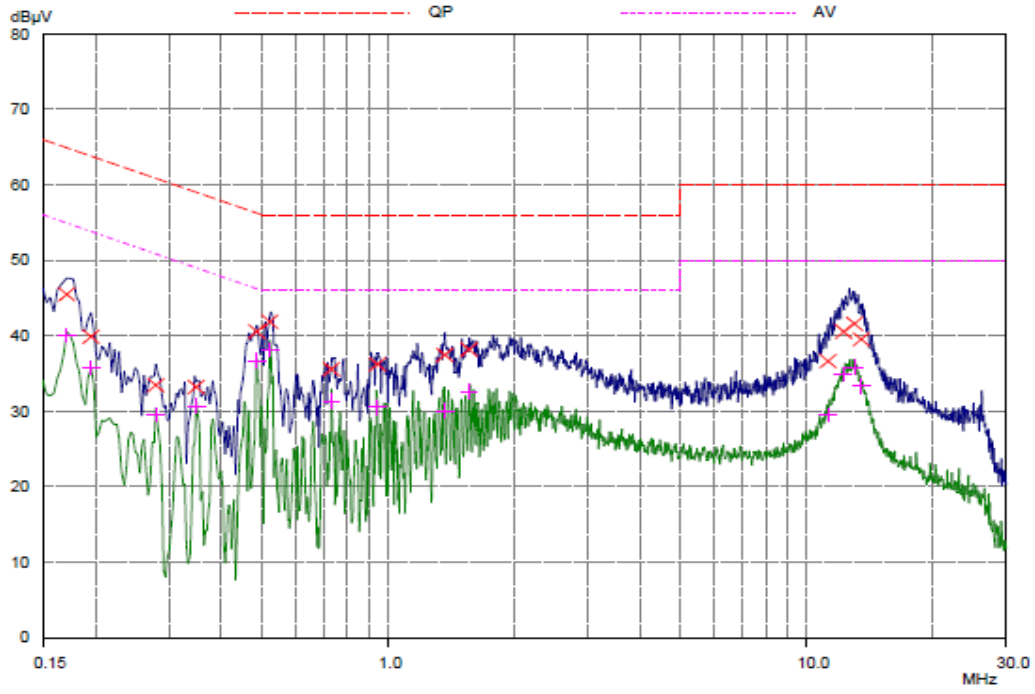
Result File: #39_h_f.dat :

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



802.11a (5 150 ~5 350 MHz)

5 240 MHz_N

EMC Compliance LTD

EUT:
Manuf: N
Op Cond:
Operator:
Test Spec: FCC Class B Conducted Emission
Comment:

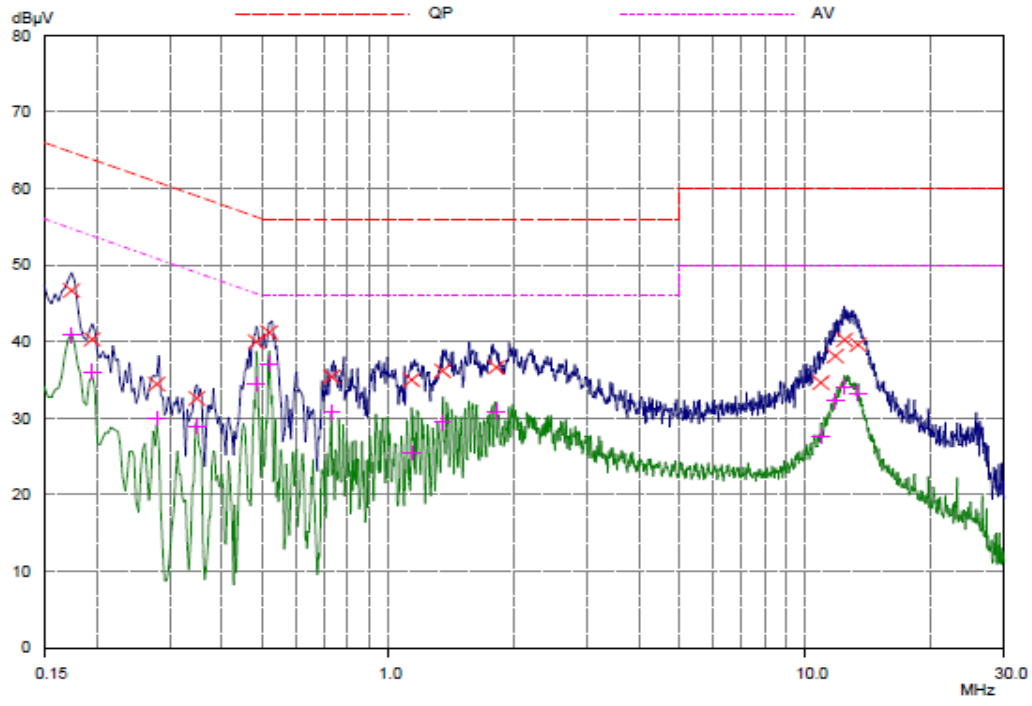
Result File: #39_n_f.dat :

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 20 MHz (5 250 ~5 350 MHz)

5 300 MHz_H

EMC Compliance LTD

EUT:
Manuf: H
Op Cond:
Operator:
Test Spec: FCC Class B Conducted Emission
Comment:

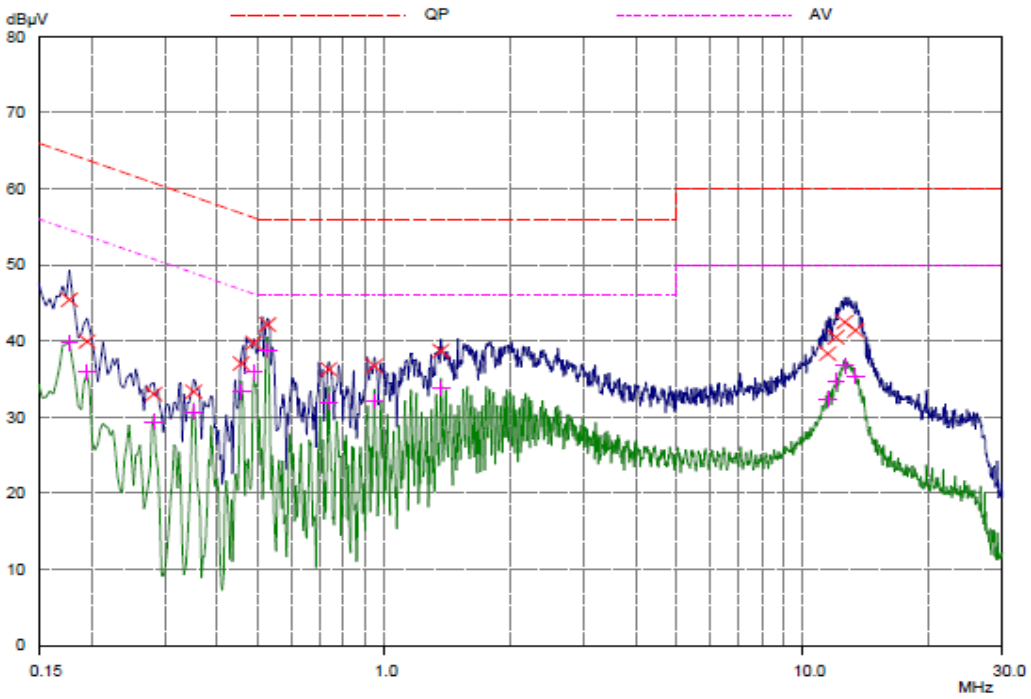
Result File: #65_h_f.dat :

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 20 MHz (5 250 ~5 350 MHz)

5 300 MHz_N

EMC Compliance LTD

EUT:
Manuf: N
Op Cond:
Operator:
Test Spec: FCC Class B Conducted Emission
Comment:

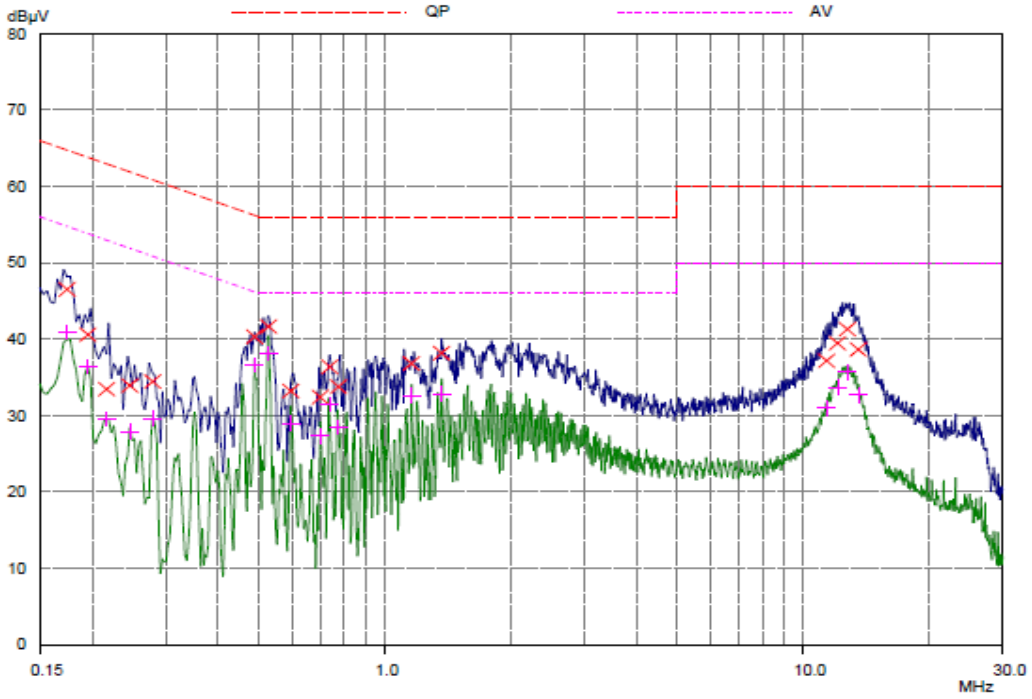
Result File: #65_n_f.dat :

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 20 MHz (5 470 ~5 725 MHz)

5 600 MHz_H

EMC Compliance LTD

EUT:
Manuf: H
Op Cond:
Operator:
Test Spec: FCC Class B Conducted Emission
Comment:

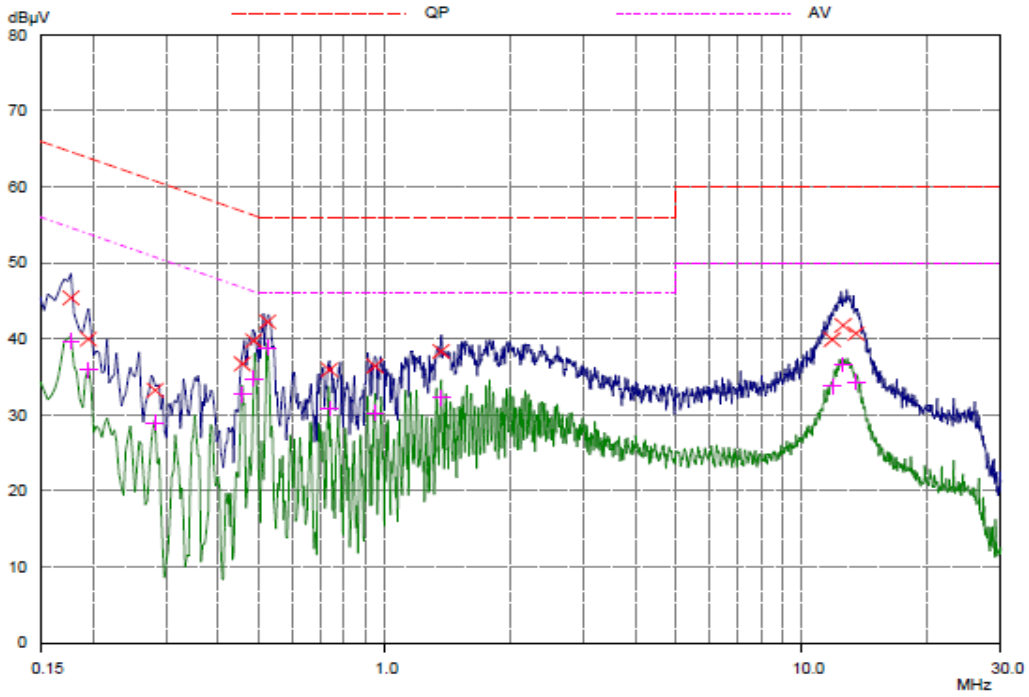
Result File: #68_h_f.dat :

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 20 MHz (5 470 ~5 725 MHz)

5 600 MHz_N

EMC Compliance LTD

EUT:
Manuf: N
Op Cond:
Operator:
Test Spec: FCC Class B Conducted Emission
Comment:

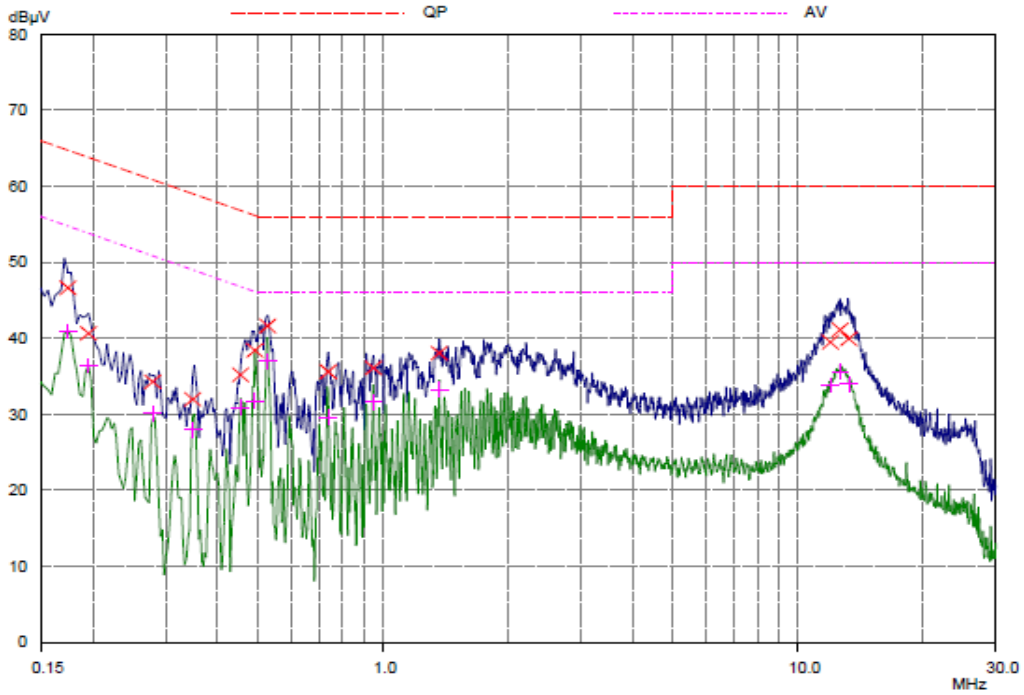
Result File: #68_n_f.dat :

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.

5.9.2.1 Applicability

Table 1: Applicability of DFS Requirements Prior to Use of a Channel

Requirement	Operational Mode		
	Master	Client Without Radar Detection	Client With Radar Detection
Non-Occupancy Period	Yes	Not required	Yes
DFS Detection Threshold	Yes	Not required	Yes
Channel Availability Check Time	Yes	Not required	Not required
Uniform Spreading	Yes	Not required	Not required
U-NII Detection Bandwidth	Yes	Not required	Yes

Table 2: Applicability of DFS requirements during normal operation

Requirement	Operational Mode		
	Master	Client Without Radar Detection	Client With Radar Detection
DFS Detection Threshold	Yes	Not required	Yes
Channel Closing Transmission Time	Yes	Yes	Yes
Channel Move Time	Yes	Yes	Yes
U-NII Detection Bandwidth	Yes	Not required	Yes

5.9.2.2 Requirements

Client Devices

a) A Client Device will not transmit before having received appropriate control signals from a Master Device.

b) A Client Device will stop all its transmissions whenever instructed by a Master Device to which it is associated and will meet the Channel Move Time and Channel Closing Transmission Time requirements. The Client Device will not resume any transmissions until it has again received control signals from a Master Device.

c) If a Client Device is performing In-Service Monitoring and detects a Radar Waveform above the DFS Detection Threshold, it will inform the Master Device. This is equivalent to the Master Device detecting the Radar Waveform and d) through f) of section 5.1.1 apply.

d) Irrespective of Client Device or Master Device detection the Channel Move Time and Channel Closing Transmission Time requirements remain the same.

5.9.2.3 DFS Detection Thresholds

Table 3: DFS Detection Thresholds for Master Devices and Client Devices With Radar Detection

Maximum Transmit Power	Value (See Notes 1 and 2)
≥ 200 milliwatt	-64 dBm
< 200 milliwatt	-62 dBm

Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna.

Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response.

Table 4: DFS Response Requirement Values

Parameter	Value
Non-occupancy period	Minimum 30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds See Note 1.
Channel Closing Transmission Time	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2.
U-NII Detection Bandwidth	Minimum 80% of the U-NII 99% transmission power bandwidth. See Note 3.

Note 1: The instant that the Channel Move Time and the Channel Closing Transmission Time begins is as follows:

- For the Short Pulse Radar Test Signals this instant is the end of the Burst.
- For the Frequency Hopping radar Test Signal, this instant is the end of the last radar Burst generated.
- For the Long Pulse Radar Test Signal this instant is the end of the 12 second period defining the Radar Waveform.

Note 2: The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required to facilitate a Channel move (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.

Note 3: During the U-NII Detection Bandwidth detection test, radar type 1 is used and for each frequency step the minimum percentage of detection is 90 percent. Measurements are performed with no data traffic.

5.9.2.4 Radar Test Waveforms

Table 5 – Short Pulse Radar Test Waveforms

Radar Type	Pulse Width (μsec)	PRI (μsec)	Number of Pulses	Minimum Percentage of Successful Detection	Minimum Number of Trials
1	1	1428	18	60%	30
2	1-5	150-230	23-29	60%	30
3	6-10	200-500	16-18	60%	30
4	11-20	200-500	12-16	60%	30
Aggregate (Radar Types 1-4)				80%	120

A minimum of 30 unique waveforms are required for each of the Short Pulse Radar Types 2 through 4. For Short Pulse Radar Type 1, the same waveform is used a minimum of 30 times. If more than 30 waveforms are used for Short Pulse Radar Types 2 through 4, then each additional waveform must also be unique and not repeated from the previous waveforms.
The aggregate is the average of the percentage of successful detections of Short Pulse Radar Types 1-4.

Table 6 – Long Pulse Radar Test Waveform

Radar Type	Pulse Width (μsec)	Chirp Width (MHz)	PRI (μsec)	Number of Pulses per Burst	Number of Bursts	Minimum Percentage of Successful Detection	Minimum Number of Trials
5	50-100	5-20	1000-2000	1-3	8-20	80%	30

Each waveform is defined as follows:

1) The transmission period for the Long Pulse Radar test signal is 12 seconds.
2) There are a total of 8 to 20 Bursts in the 12 second period, with the number of Bursts being randomly chosen. This number is Burst_Count.
3) Each Burst consists of 1 to 3 pulses, with the number of pulses being randomly chosen. Each Burst within the 12 second sequence may have a different number of pulses.
4) The pulse width is between 50 and 100 microseconds, with the pulse width being randomly chosen. Each pulse within a Burst will have the same pulse width. Pulses in different Bursts may have different pulse widths.
5) Each pulse has a linear frequency modulated chirp between 5 and 20 MHz, with the chirp width being randomly chosen. Each pulse within a Burst will have the same chirp width. Pulses in different Bursts may have different chirp widths. The chirp is centered on the pulse. For example, with a radar frequency of 5300 MHz and a 20 MHz chirped signal, the chirp starts at 5290 MHz and ends at 5310 MHz.
6) If more than one pulse is present in a Burst, the time between the pulses will be between 1000 and 2000 microseconds, with the time being randomly chosen. If three pulses are present in a Burst, the random time interval between the first and second pulses is chosen independently of the random time interval between the second and third pulses.
7) The 12 second transmission period is divided into even intervals. The number of intervals is equal to Burst_Count. Each interval is of length (12,000,000 / Burst_Count) microseconds. Each interval contains one Burst. The start time for the Burst, relative to the beginning of the interval, is between 1 and [(12,000,000 / Burst_Count) – (Total Burst Length) + (One Random PRI Interval)] microseconds, with the start time being randomly chosen. The step interval for the start time is 1 microsecond. The start time for each Burst is chosen randomly.

A representative example of a Long Pulse Radar Type waveform:

1) The total test waveform length is 12 seconds.
2) Eight (8) Bursts are randomly generated for the Burst_Count.
3) Burst 1 has 2 randomly generated pulses.
4) The pulse width (for both pulses) is randomly selected to be 75 microseconds.
5) The PRI is randomly selected to be at 1213 microseconds.
6) Bursts 2 through 8 are generated using steps 3 – 5.
7) Each Burst is contained in even intervals of 1,500,000 microseconds. The starting location for Pulse 1, Burst 1 is randomly generated (1 to 1,500,000 minus the total Burst 1 length + 1 random PRI interval) at the 325,001 microsecond step. Bursts 2 through 8 randomly fall in successive 1,500,000 microsecond intervals (i.e. Burst 2 falls in the 1,500,001 – 3,000,000 microsecond range).

Table 7 – Frequency Hopping Radar Test Waveform

Radar Type	Pulse Width (µsec)	PRI (µsec)	Pulses per Hop	Hopping Rate (kHz)	Hopping Sequence Length (msec)	Minimum Percentage of Successful Detection	Minimum Number of Trials
6	1	333	9	0.333	300	70%	30

For the Frequency Hopping Radar Type, the same Burst parameters are used for each waveform. The hopping sequence is different for each waveform and a 100-length segment is selected from the hopping sequence defined by the following algorithm:

The first frequency in a hopping sequence is selected randomly from the group of 475 integer frequencies from 5250 – 5724 MHz. Next, the frequency that was just chosen is removed from the group and a frequency is randomly selected from the remaining 474 frequencies in the group. This process continues until all 475 frequencies are chosen for the set. For selection of a random frequency, the frequencies remaining within the group are always treated as equally likely.

5.9.3 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 21.47 dBm(140.29 mW) EIRP in the 5250 ~ 5350 MHz band and 21.68dBm(147.19 mW) EIRP in the 5470 ~ 5725 MHz band.

The gain antenna assembly utilized with the master has a gain of 3.5 dBi.

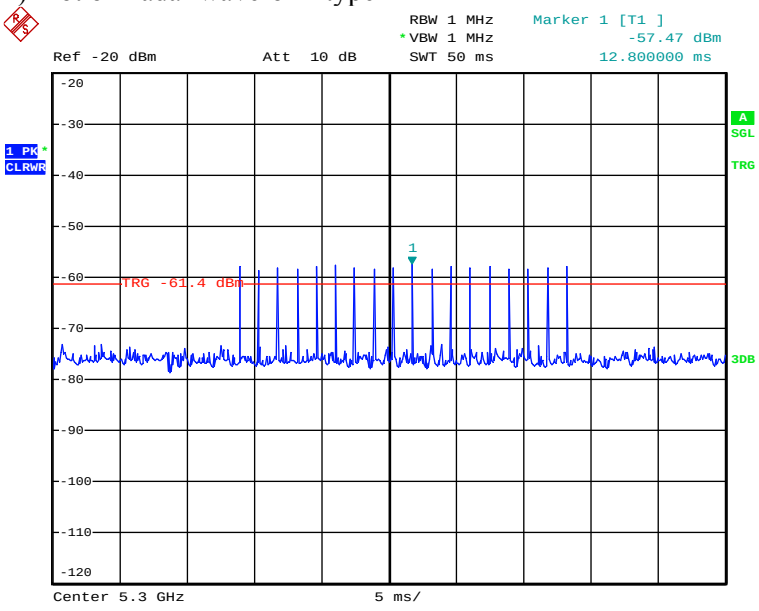
The calibrated conducted DFS detection threshold level is set to -57.5 dBm.(-62 + 1 + 3.5 = -57.5)

5 250 ~ 5 350 MHz band

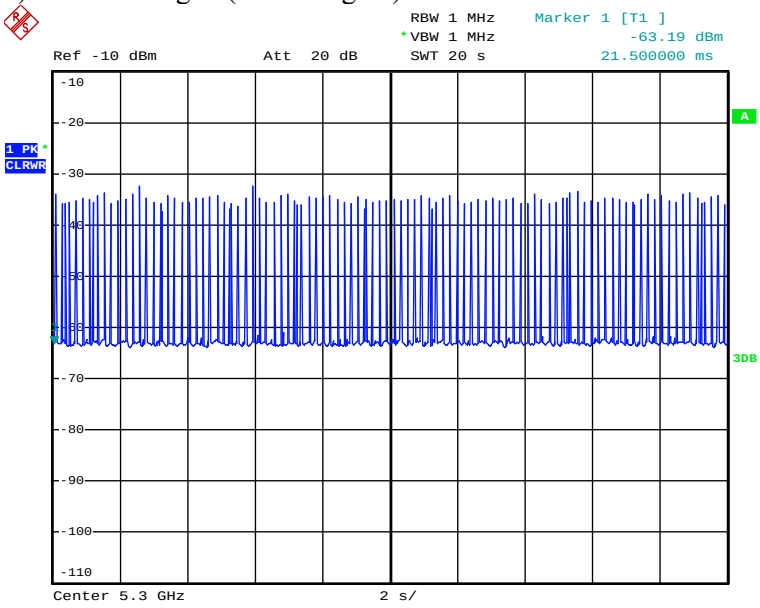
Frequency (MHz)	Channel move time(s)		channel closing transmission time(ms)	
	Measured	Limit	Measured	Limit
5 300	2.24	10	6.60	60

Note. Channel closing transmission time: 79 * 83.6 us = 6.60 ms

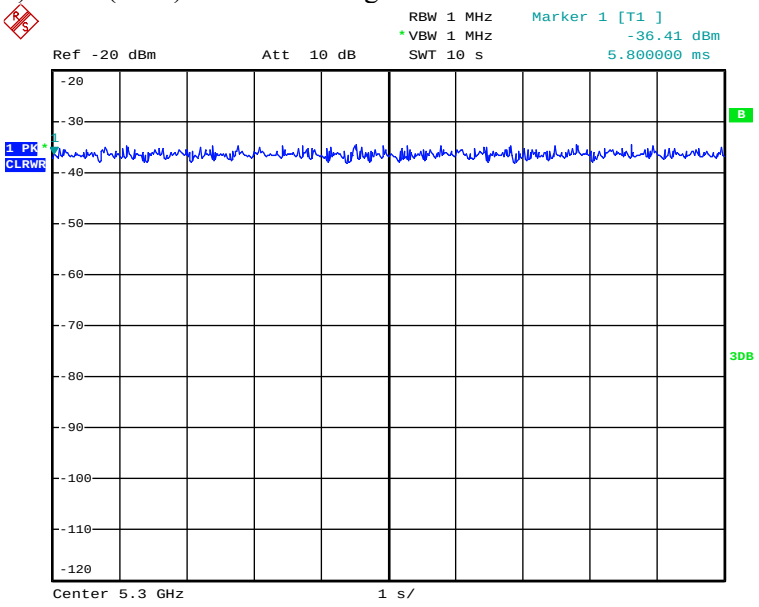
1) Plot of Radar waveform type1



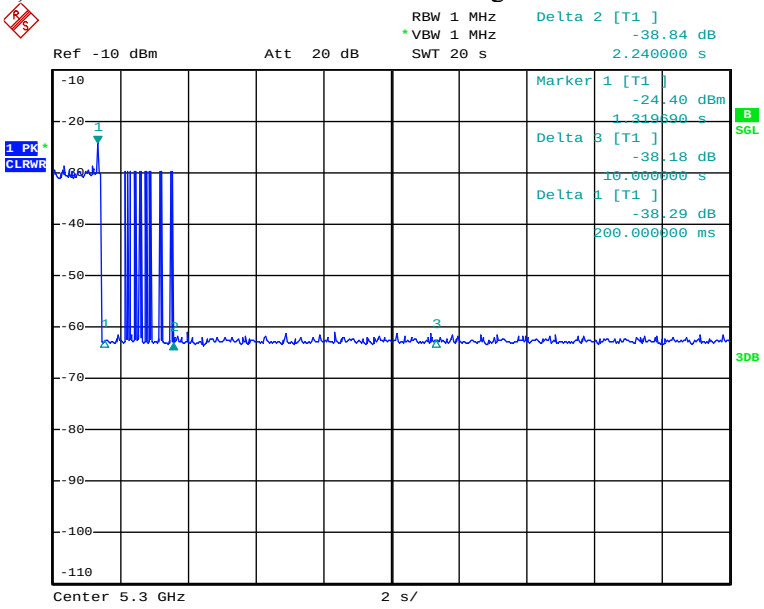
2) No traffic signal(master signal)



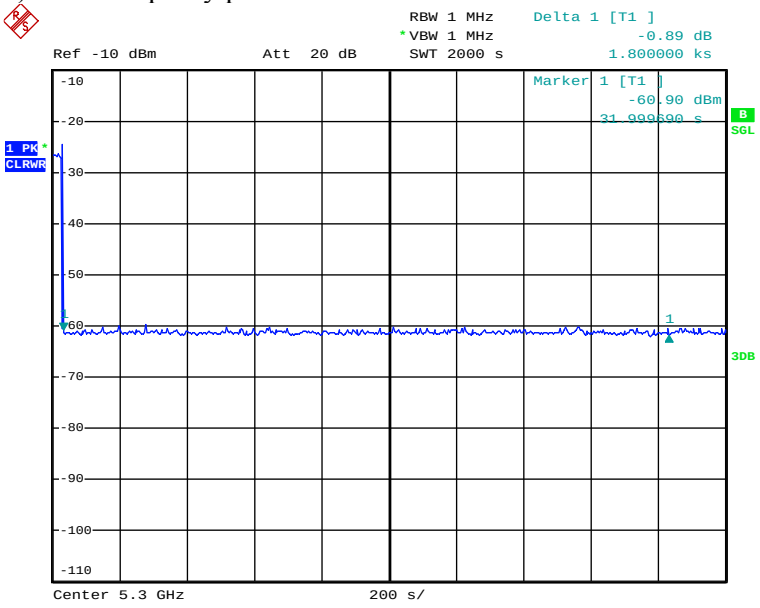
3) Client(EUT) Data Traffic Signal



4) Channel move time and channel closing transmission time



5) Non occupancy period

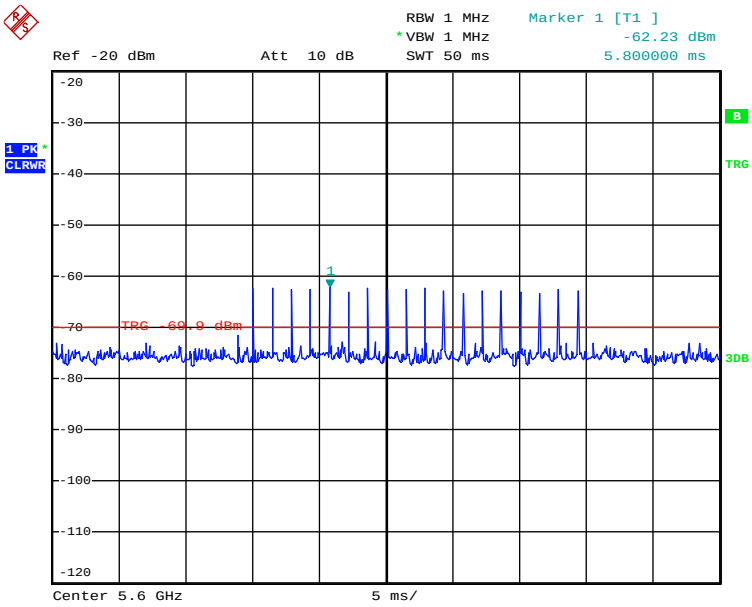


5 470 ~ 5 725 MHz band

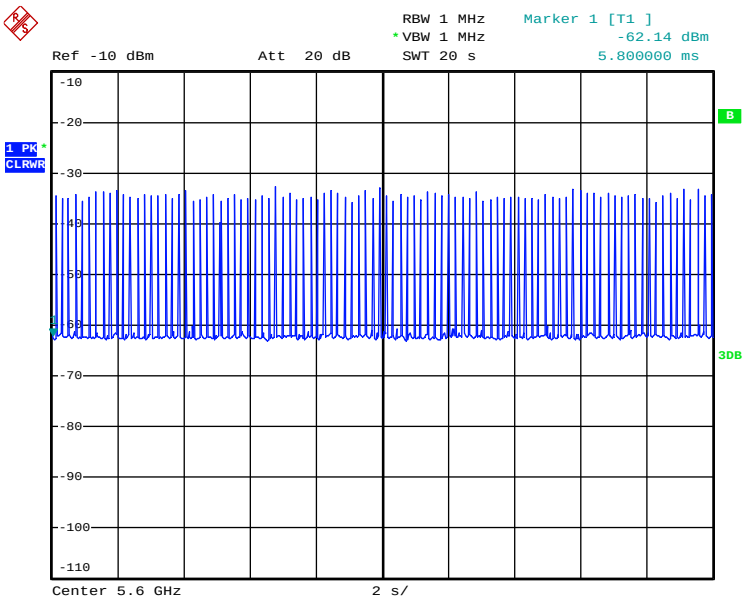
Frequency (MHz)	Channel move time(s)		channel closing transmission time(ms)	
	Measured	Limit	Measured	Limit
5 600	2.48	10	6.44	60

Note. Channel closing transmission time: 77 * 83.6 us = 6.44 ms

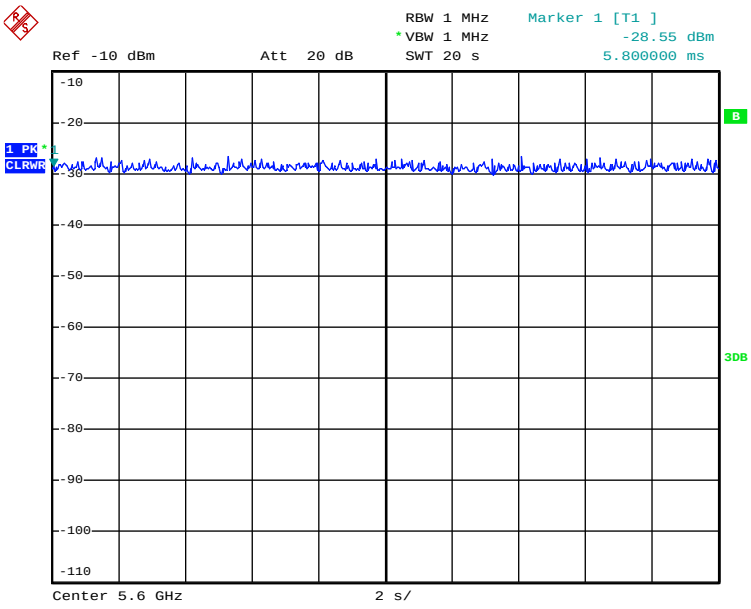
1) Plot of Radar waveform type1



2) No traffic signal(master signal)



3) Client(EUT) Data Traffic Signal



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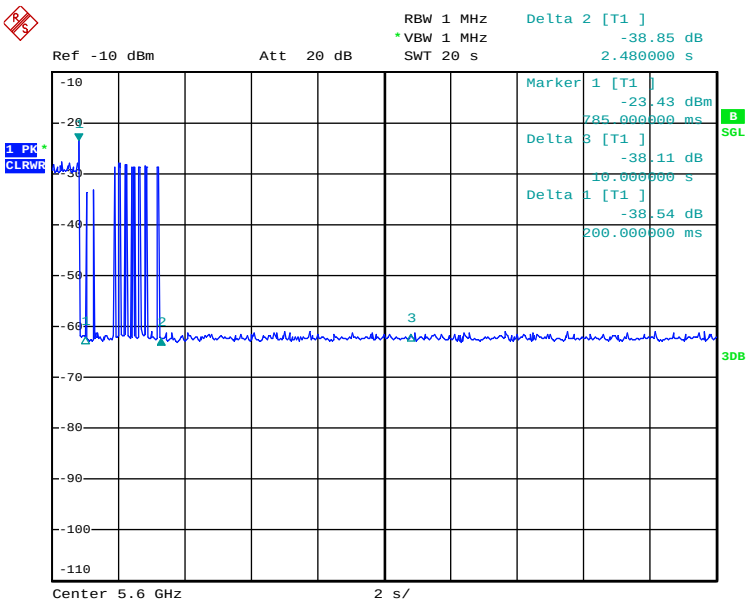
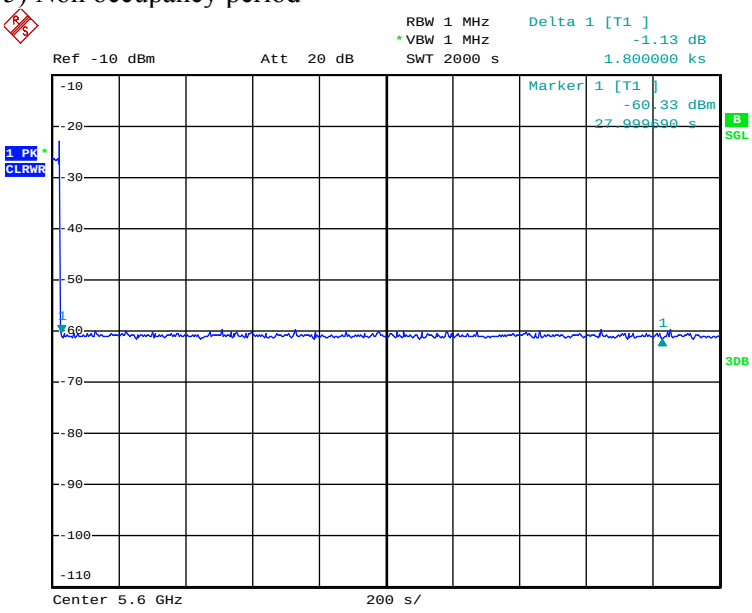
4) Channel move time and channel closing transmission time



5) Non occupancy period



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	Channel Frequency [MHz]	Ant Gain [mW]	power [dBm]	power [mW]	Power Density at 20 cm [mW/Cm2]
2 400 ~ 2 483.5	11n HT40	ANT0+ANT1	Middle	2 437	4.08	27.71	589.78	0.479 09
5 745 ~ 5 850	11n HT20	ANT0+ANT1	Highest	5 825	4.18	27.78	600.03	0.498 78
								0.977 87

5.10.3 Calculation Result of RF Exposure

- 2 400 ~ 2 483.5 MHz (RF4CE)

Channel	Channel Frequency [MHz]	Ant Gain [mW]	power [dBm]	power [mW]	Power Density at 20 cm [mW/Cm2]
Lowest	2 425	1.95	24.64	291.07	0.112 65
Middle	2 450	1.95	24.52	283.14	0.109 58
Highest	2 475	1.95	24.22	264.24	0.102 27

- 2 400 ~ 2 483.5 MHz (WIFI)

mode	Antenna Selection	Channel	Channel Frequency [MHz]	Ant Gain [mW]	power [dBm]	power [mW]	Power Density at 20 cm [mW/Cm2]
11b	ANT0	Lowest	2 412	2.04	24.64	291.07	0.118 23
		Middle	2 437	2.04	24.52	283.14	0.115 01
		Highest	2 462	2.04	24.22	264.24	0.107 33
	ANT1	Lowest	2 412	2.04	23.95	248.31	0.100 86
		Middle	2 437	2.04	23.80	239.88	0.097 44
		Highest	2 462	2.04	23.76	237.68	0.096 55
11g	ANT0	Lowest	2 412	2.04	27.53	566.24	0.230 00
		Middle	2 437	2.04	27.30	537.03	0.218 14
		Highest	2 462	2.04	26.20	416.87	0.169 33
	ANT1	Lowest	2 412	2.04	27.29	535.80	0.217 64
		Middle	2 437	2.04	27.27	533.33	0.216 64
		Highest	2 462	2.04	25.50	354.81	0.144 12
11n HT20	ANT0	Lowest	2 412	2.04	27.11	514.04	0.208 80
		Middle	2 437	2.04	27.98	628.06	0.255 11
		Highest	2 462	2.04	27.28	534.56	0.217 14
	ANT1	Lowest	2 412	2.04	27.18	522.40	0.212 19
		Middle	2 437	2.04	27.80	602.56	0.244 75
		Highest	2 462	2.04	27.31	538.27	0.218 64
	ANT0 + ANT1	Lowest	2 412	4.08	27.33	540.30	0.438 90
		Middle	2 437	4.08	27.65	581.75	0.472 57
		Highest	2 462	4.08	26.95	495.51	0.402 51
11n HT40	ANT0 + ANT1	Lowest	2 422	4.08	27.51	563.67	0.457 88
		Middle	2 437	4.08	27.71	589.78	0.479 09
		Highest	2 452	4.08	27.65	582.54	0.473 21

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- 5 150 ~ 5 250 MHz

mode	Antenna Selection	Channel	Channel Frequency [MHz]	Ant Gain [mW]	power [dBm]	power [mW]	Power Density at 20 cm [mW/Cm2]
11a	ANT0	Lowest	5 180	2.09	12.56	18.03	0.007 49
		Middle	5 200	2.09	12.57	18.07	0.007 51
		Highest	5 240	2.09	12.72	18.71	0.007 78
	ANT1	Lowest	5 180	2.09	13.38	21.78	0.009 05
		Middle	5 200	2.09	13.68	23.33	0.009 70
		Highest	5 240	2.09	13.75	23.71	0.009 86
11n HT20	ANT0	Lowest	5 180	2.09	12.94	19.68	0.008 18
		Middle	5 200	2.09	12.61	18.24	0.007 58
		Highest	5 240	2.09	12.79	19.01	0.007 90
	ANT1	Lowest	5 180	2.09	13.47	22.23	0.009 24
		Middle	5 200	2.09	13.91	24.60	0.010 23
		Highest	5 240	2.09	14.02	25.23	0.010 49
	ANT0 + ANT1	Lowest	5 180	4.18	12.78	18.95	0.015 76
		Middle	5 200	4.18	12.88	19.40	0.016 13
		Highest	5 240	4.18	12.58	18.10	0.015 05
11n HT40	ANT0 + ANT1	Lowest	5 190	4.18	14.49	28.14	0.023 39
		Middle	5 230	4.18	14.38	27.42	0.022 79

- 5 250 ~ 5 350 MHz

mode	Antenna Selection	Channel	Channel Frequency [MHz]	Ant Gain [mW]	power [dBm]	power [mW]	Power Density at 20 cm [mW/Cm2]
11a	ANT0	Lowest	5 260	2.09	18.90	77.62	0.032 26
		Middle	5 300	2.09	19.03	79.98	0.033 25
		Highest	5 320	2.09	19.19	82.99	0.034 49
	ANT1	Lowest	5 260	2.09	20.06	101.39	0.042 14
		Middle	5 300	2.09	20.11	102.57	0.042 63
		Highest	5 320	2.09	20.30	107.15	0.044 54
11n HT20	ANT0	Lowest	5 260	2.09	19.22	83.56	0.034 73
		Middle	5 300	2.09	19.34	85.90	0.035 71
		Highest	5 320	2.09	19.54	89.95	0.037 39
	ANT1	Lowest	5 260	2.09	20.28	106.66	0.044 33
		Middle	5 300	2.09	20.70	117.49	0.048 83
		Highest	5 320	2.09	20.88	122.46	0.050 90
	ANT0 + ANT1	Lowest	5 260	4.18	21.17	131.04	0.108 93
		Middle	5 300	4.18	21.30	135.02	0.112 24
		Highest	5 320	4.18	21.47	140.29	0.116 61
11n HT40	ANT0 + ANT1	Lowest	5 270	4.18	21.26	133.53	0.111 00
		Middle	5 310	4.18	18.64	73.12	0.060 78

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- 5 470 ~ 5 725 MHz

mode	Antenna Selection	Channel	Channel Frequency [MHz]	Ant Gain [mW]	power [dBm]	power [mW]	Power Density at 20 cm [mW/Cm2]
11a	ANT0	Lowest	5 500	2.09	17.52	56.49	0.023 48
		Middle	5 600	2.09	18.37	68.71	0.028 56
		Highest	5 700	2.09	17.98	62.81	0.026 11
	ANT1	Lowest	5 500	2.09	18.60	72.44	0.030 11
		Middle	5 600	2.09	19.93	98.40	0.040 90
		Highest	5 700	2.09	18.12	64.86	0.026 96
11n HT20	ANT0	Lowest	5 500	2.09	17.38	54.70	0.022 74
		Middle	5 600	2.09	18.40	69.18	0.028 76
		Highest	5 700	2.09	16.61	45.81	0.019 04
	ANT1	Lowest	5 500	2.09	18.50	70.79	0.029 43
		Middle	5 600	2.09	20.13	103.04	0.042 83
		Highest	5 700	2.09	18.15	65.31	0.027 15
	ANT0 + ANT1	Lowest	5 500	4.18	20.74	118.53	0.098 53
		Middle	5 600	4.18	21.17	130.84	0.108 76
		Highest	5 700	4.18	20.20	104.73	0.087 05
11n HT40	ANT0 + ANT1	Lowest	5 510	4.18	15.78	37.88	0.031 49
		Middle	5 590	4.18	21.68	147.19	0.122 35
		Highest	5 670	4.18	21.59	144.15	0.119 82

- 5 725 ~ 5 850 MHz

mode	Antenna Selection	Channel	Channel Frequency [MHz]	Ant Gain [mW]	power [dBm]	power [mW]	Power Density at 20 cm [mW/Cm2]
11a	ANT0	Lowest	5 745	2.09	25.57	360.58	0.149 88
		Middle	5 785	2.09	25.95	393.55	0.163 58
		Highest	5 825	2.09	25.97	395.37	0.164 34
	ANT1	Lowest	5 745	2.09	27.42	552.08	0.229 47
		Middle	5 785	2.09	27.47	558.47	0.232 13
		Highest	5 825	2.09	27.99	629.51	0.261 66
11n HT20	ANT0	Lowest	5 745	2.09	25.46	351.56	0.146 13
		Middle	5 785	2.09	25.62	364.75	0.151 61
		Highest	5 825	2.09	26.06	403.65	0.167 78
	ANT1	Lowest	5 745	2.09	27.43	553.35	0.230 00
		Middle	5 785	2.09	27.59	574.12	0.238 63
		Highest	5 825	2.09	27.94	622.30	0.258 66
	ANT0 + ANT1	Lowest	5 745	4.18	27.52	565.52	0.470 09
		Middle	5 785	4.18	27.63	579.51	0.481 71
		Highest	5 825	4.18	27.78	600.03	0.498 78
11n HT40	ANT0 + ANT1	Lowest	5 755	4.18	27.59	574.72	0.477 74
		Middle	5 795	4.18	27.61	576.97	0.479 61

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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	12.12.10
■	Temp & humidity chamber	taekwang	TK-500	TK002	13.09.03
□	Power Meter	Agilent	E4416A	GB41292365	12.10.26
□	Frequency Counter	HP	53150A	US39250565	12.09.07
□	Spectrum Analyzer	Agilent	E4407B	US39010142	13.10.23
■	Spectrum Analyzer	R & S	FSP40	100209	13.10.23
■	Signal Generator	R & S	SMR40	100007	13.06.27
■	Vector Signal Generator	R & S	SMBV100A	257566	13.01.31
□	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	12.10.25
□	DC Power Supply	Tektronix	PS2521G	TW53135	13.02.23
□	Dummy Load	BIRD	8141	7560	-
□	Dummy Load	BIRD	8401-025	799	-
■	EMI Test Receiver	R&S	ESCI	100001	13.07.10
■	Attenuator	HP	8494A	2631A09825	13.10.24
■	Attenuator	HP	8496A	3308A16640	13.10.24
■	Attenuator set	HP	11581A	42946/29738	13.01.13
□	Attenuator	R&S	RBS1000	D67079	13.10.24
□	Power sensor	Agilent	E9321A	US40390422	12.10.26
■	EMI Test Receiver	R&S	ESCI	100710	12.11.28
■	LOOP Antenna	EMCO	EMCO6502	9205-2745	13.05.23
■	BILOG Antenna	Schwarzbeck	VULB 9168	9168-440	13.09.21
■	HORN Antenna	ETS	3115	00086706	13.11.21
■	HORN Antenna	ETS	3116	00086632	13.11.15
■	Amplifier	SONOMA	310N	293004	12.11.28
■	Amplifier	AGILENT	8449B	3008A01802	13.05.04
■	Power Divider	Weinschel	1580-1	NX375	13.10.23
■	Power Divider	Weinschel	1580-1	NX380	13.09.09
□	Power Divider	Weinschel	1594	671	13.09.14
■	Test Receiver	R&S	ESHS10	843276/003	13.06.15
■	LISN	R&S	ESH3-Z5	100267	13.07.05
■	LISN	Schwarzbeck	NNLK8121	8121-472	13.07.13

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