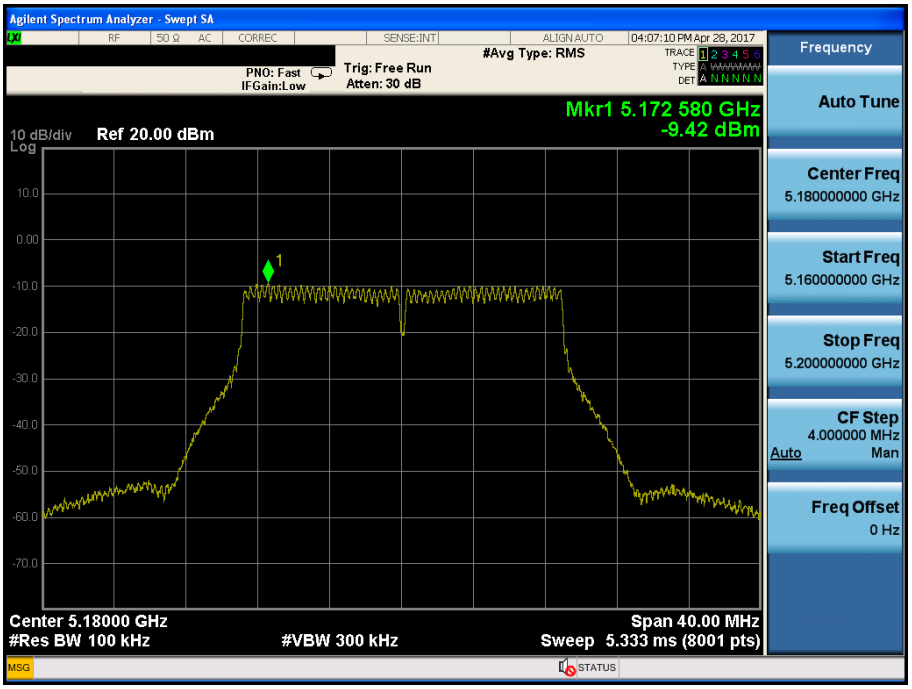
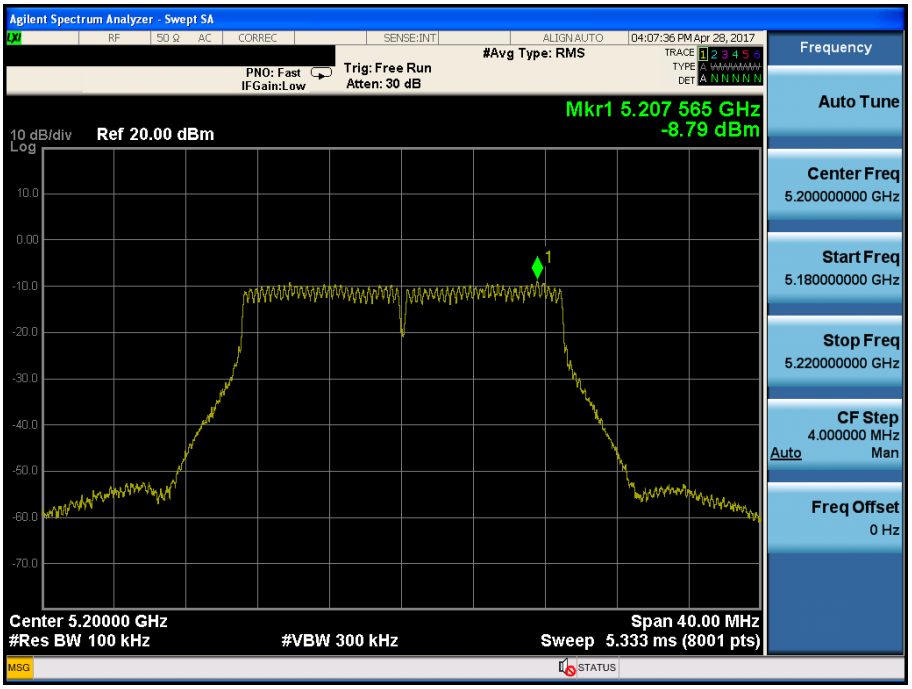
Maximum Power Spectral Density

Test Mode: 802.11n(HT20) & Ch.36



Maximum Power Spectral Density

Test Mode: 802.11n(HT20) & Ch.40



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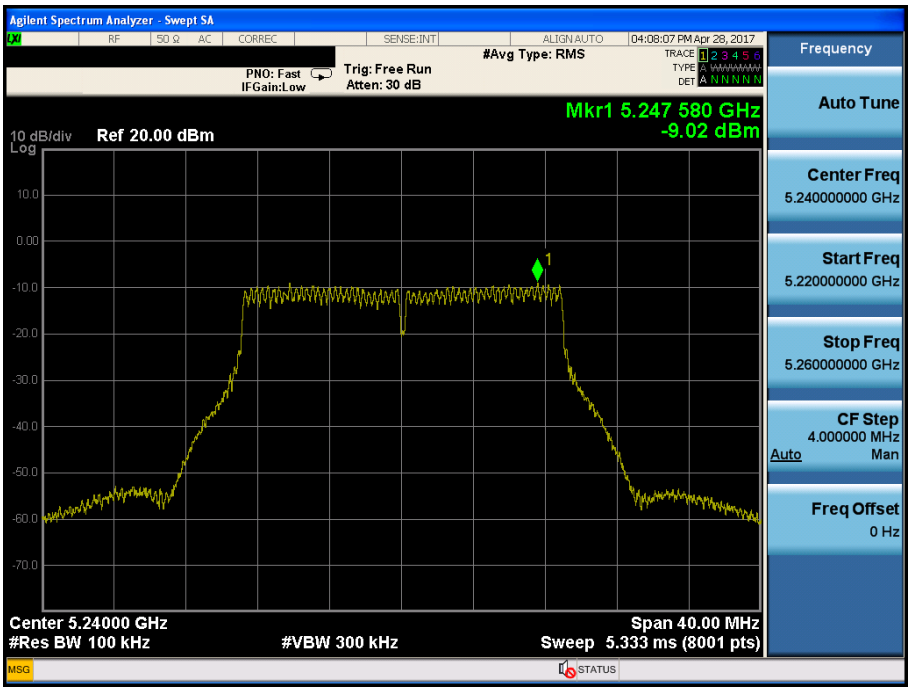

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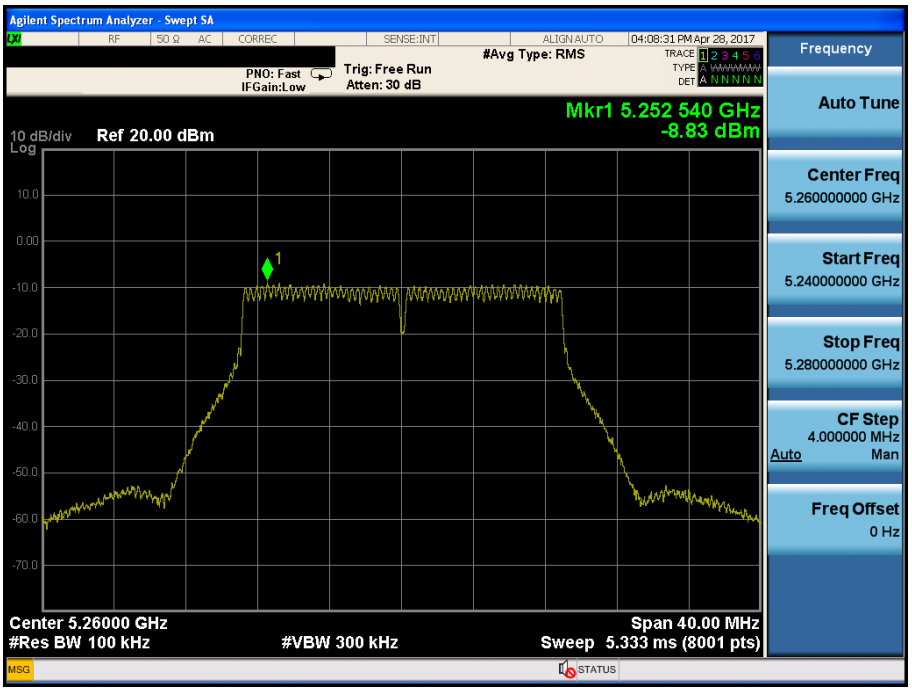

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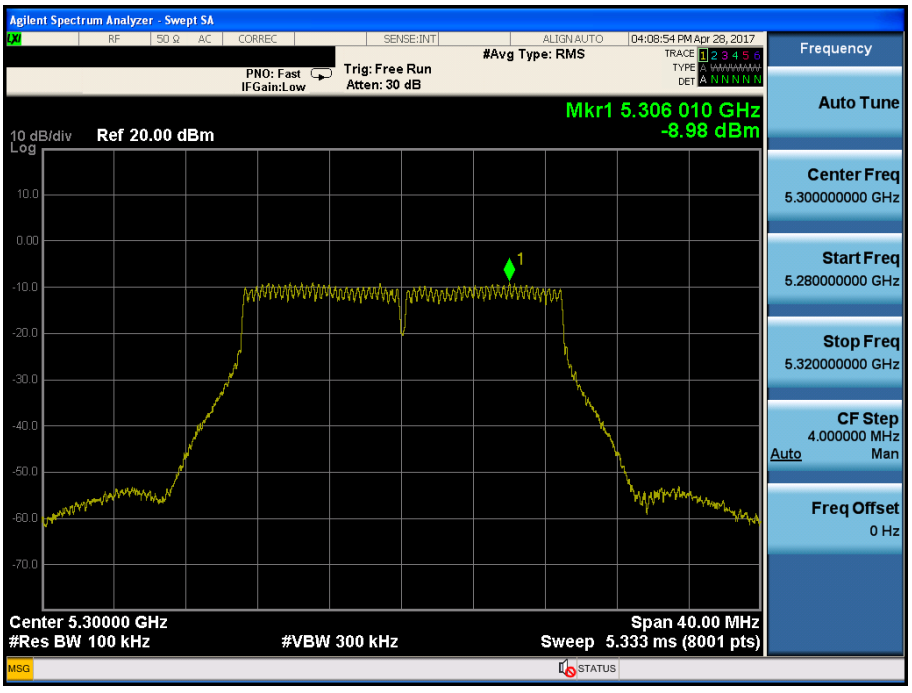
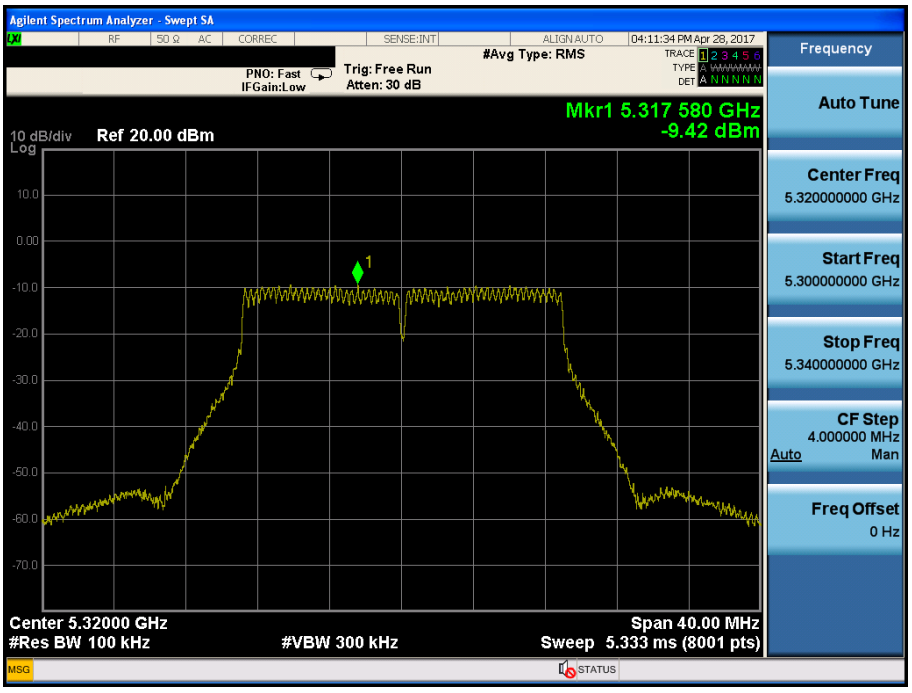
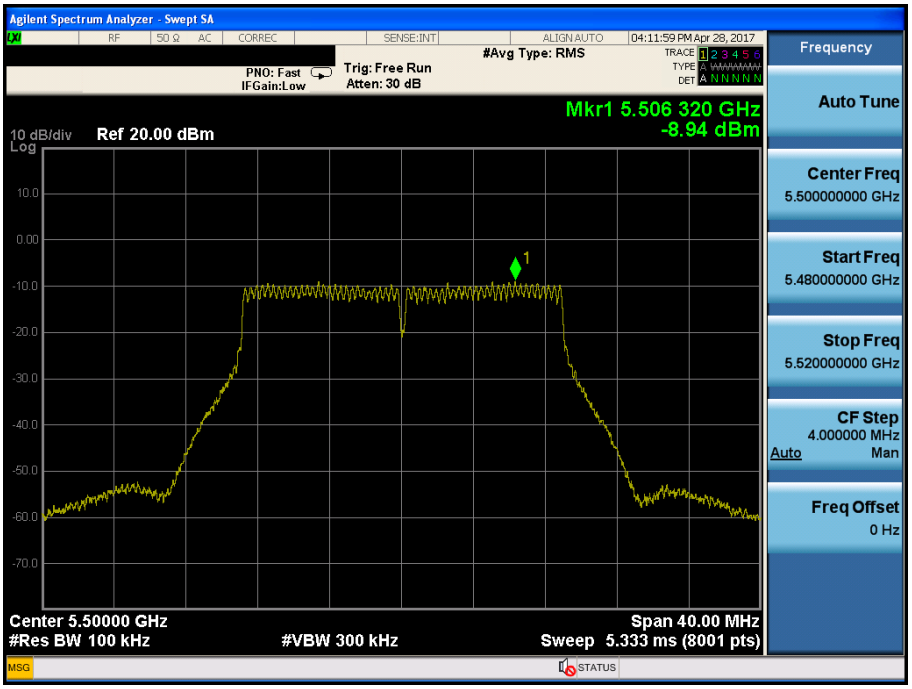


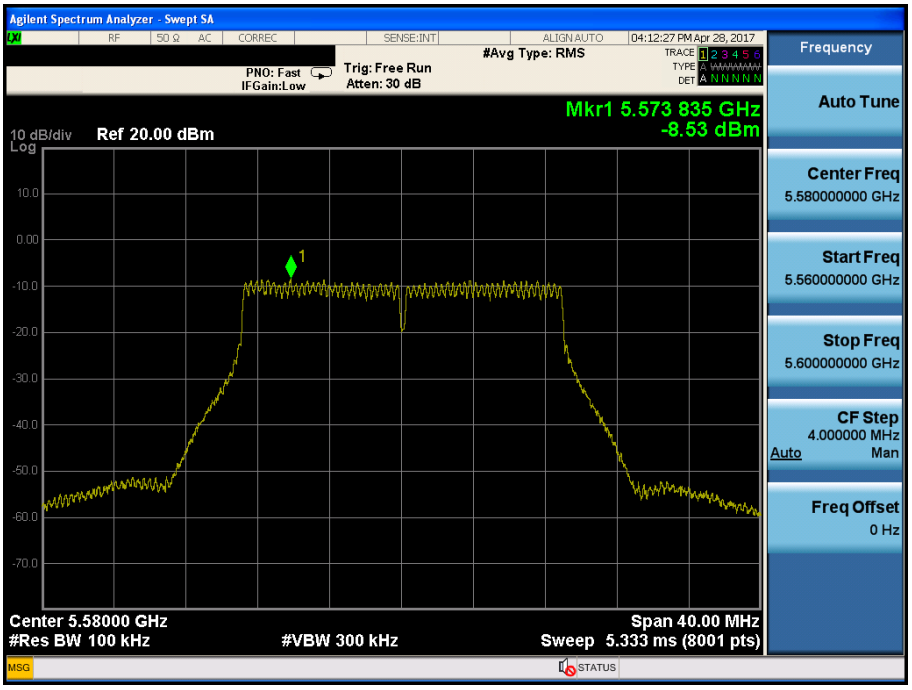
Maximum Power Spectral Density Test Mode: 802.11n(HT20) & Ch.64



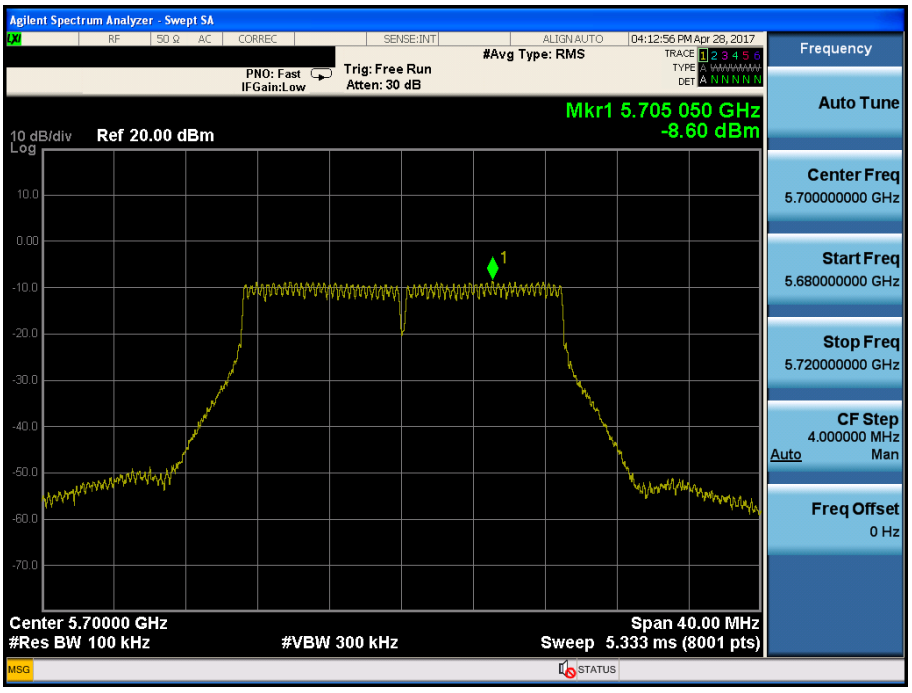
Maximum Power Spectral Density Test Mode: 802.11n(HT20) & Ch.100



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

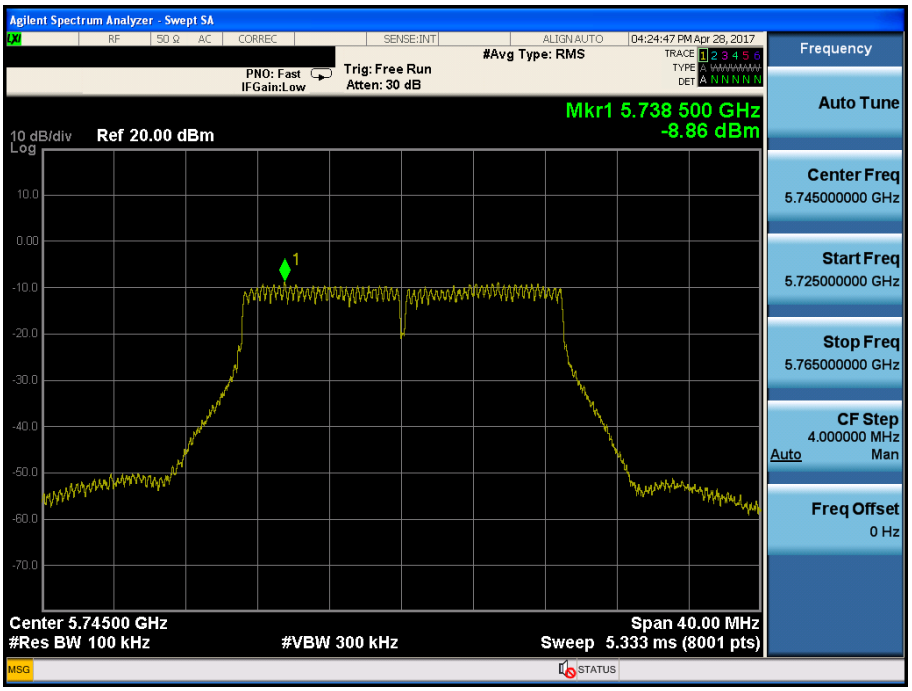


Maximum Power Spectral Density Test Mode: 802.11n(HT20) & Ch.140



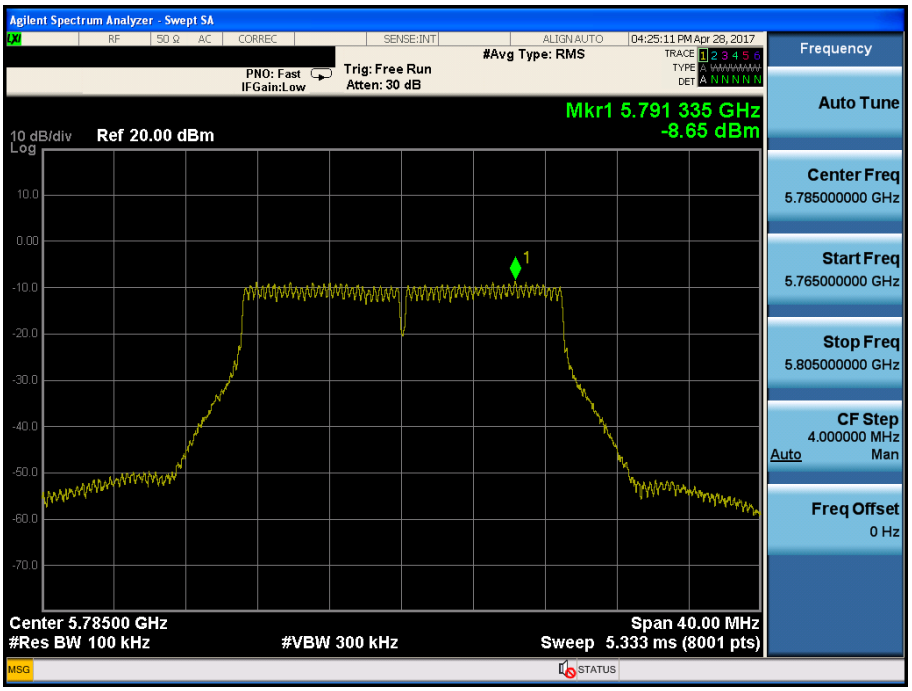
Maximum Power Spectral Density

Test Mode: 802.11n(HT20) & Ch.149

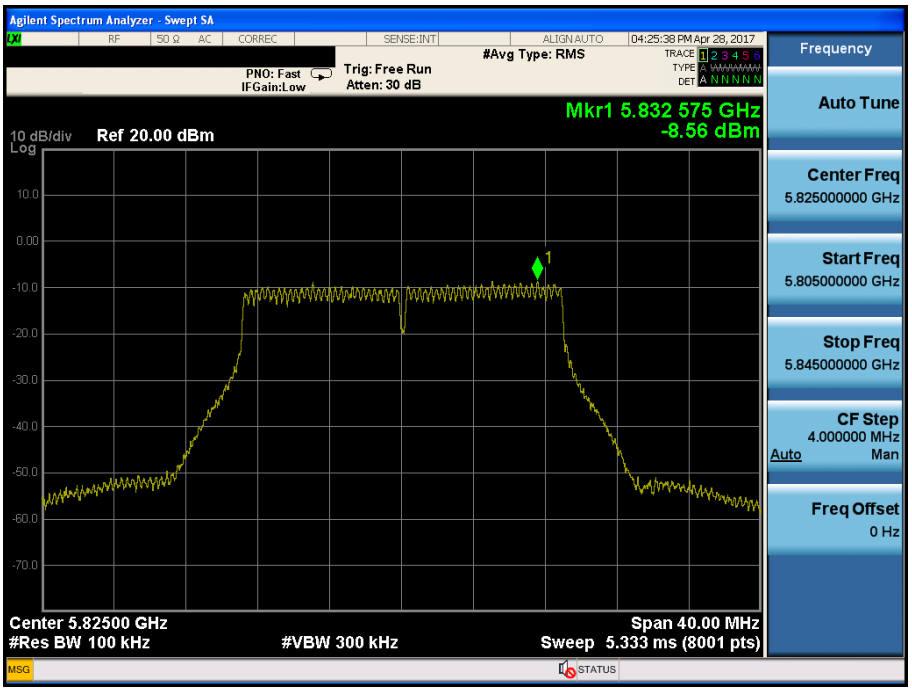


Maximum Power Spectral Density

Test Mode: 802.11n(HT20) & Ch.157

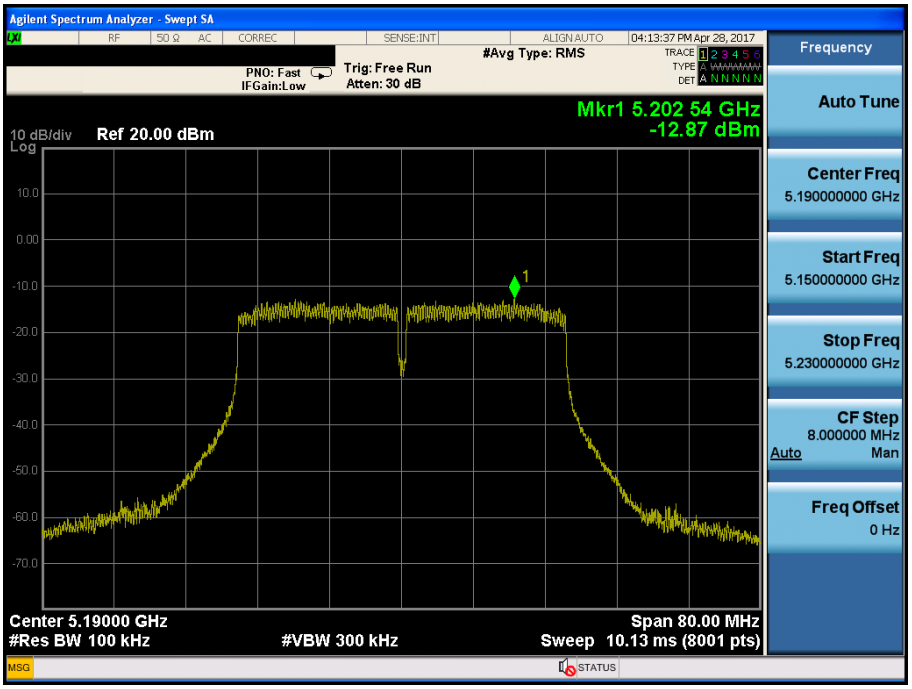


Maximum Power Spectral Density Test Mode: 802.11n(HT20) & Ch.165



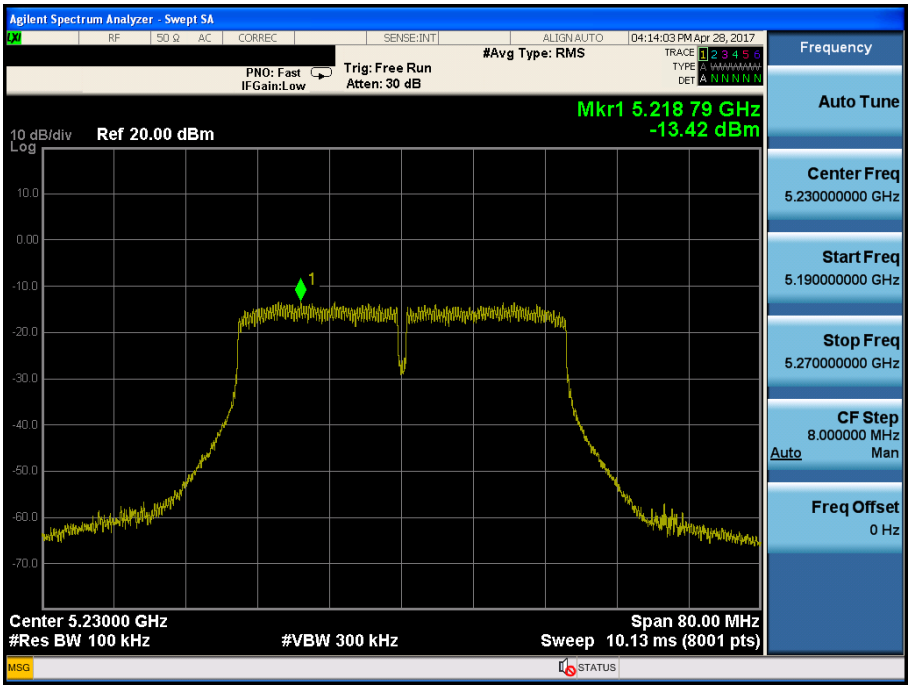
Maximum Power Spectral Density

Test Mode: 802.11n(HT40) & Ch.38

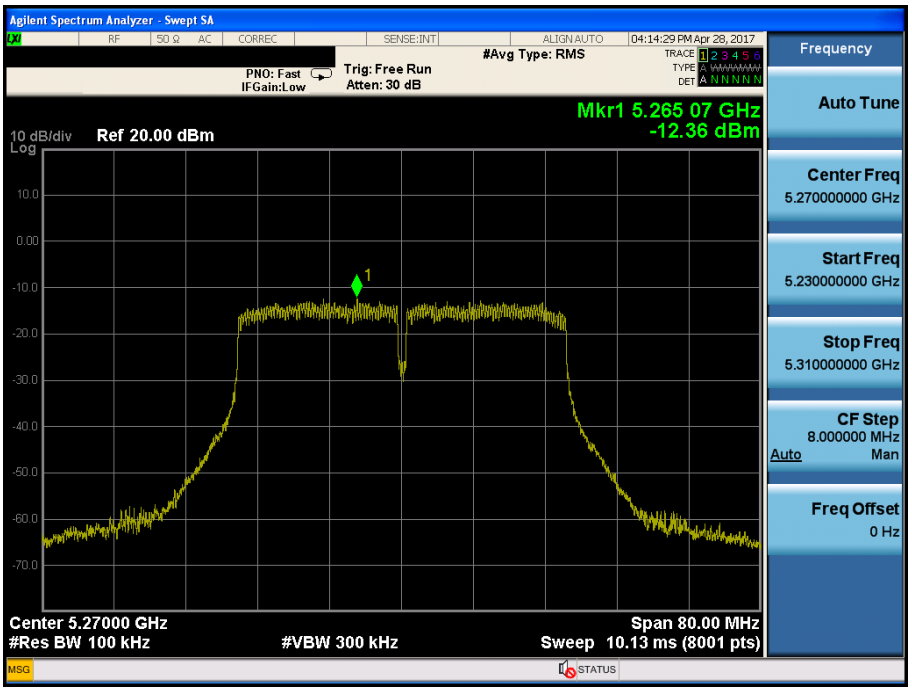


Maximum Power Spectral Density

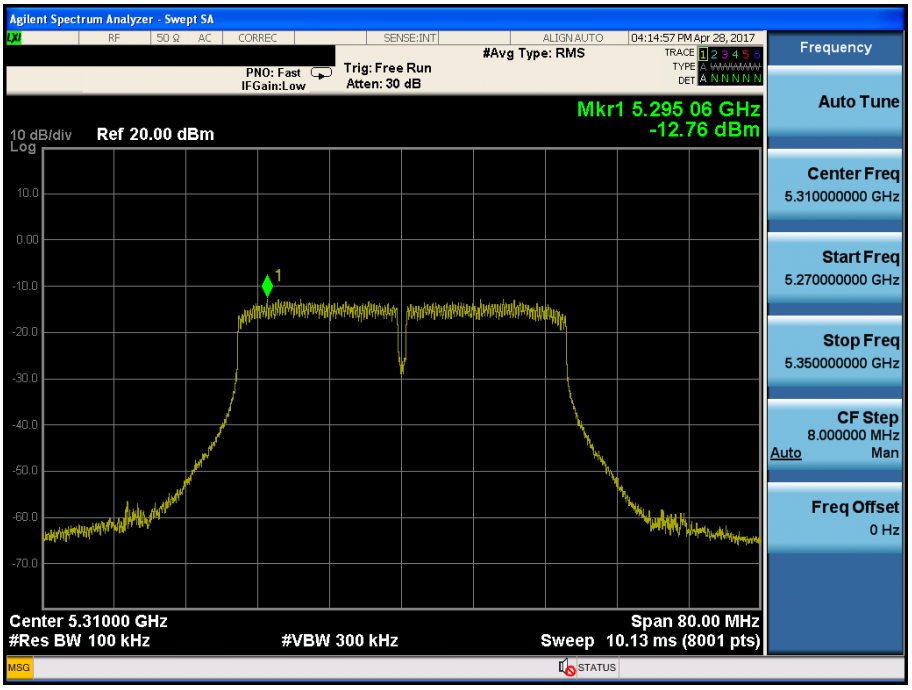
Test Mode: 802.11n(HT40) & Ch.46



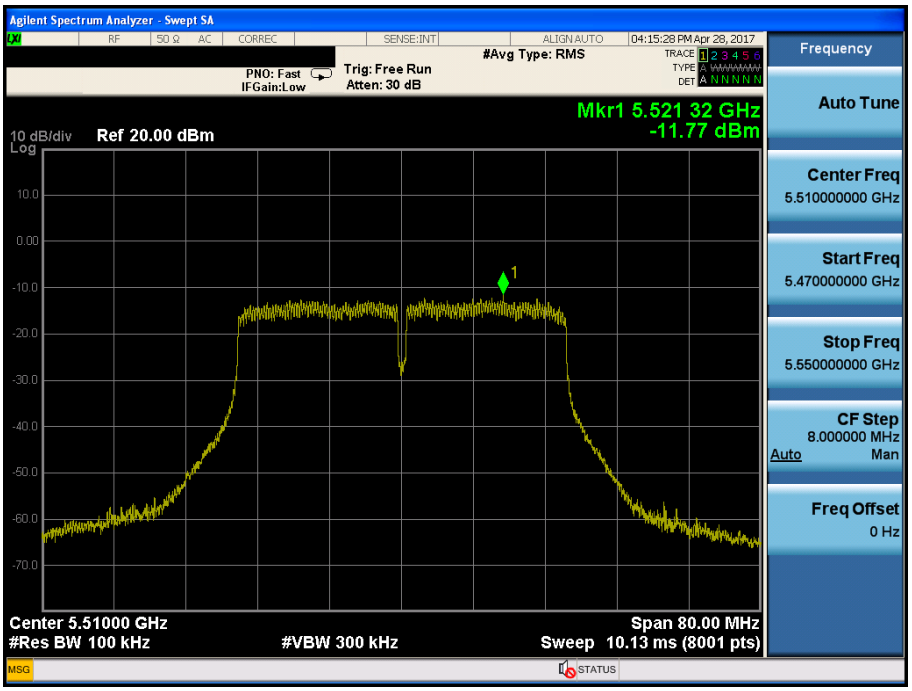
Maximum Power Spectral Density Test Mode: 802.11n(HT40) & Ch.54



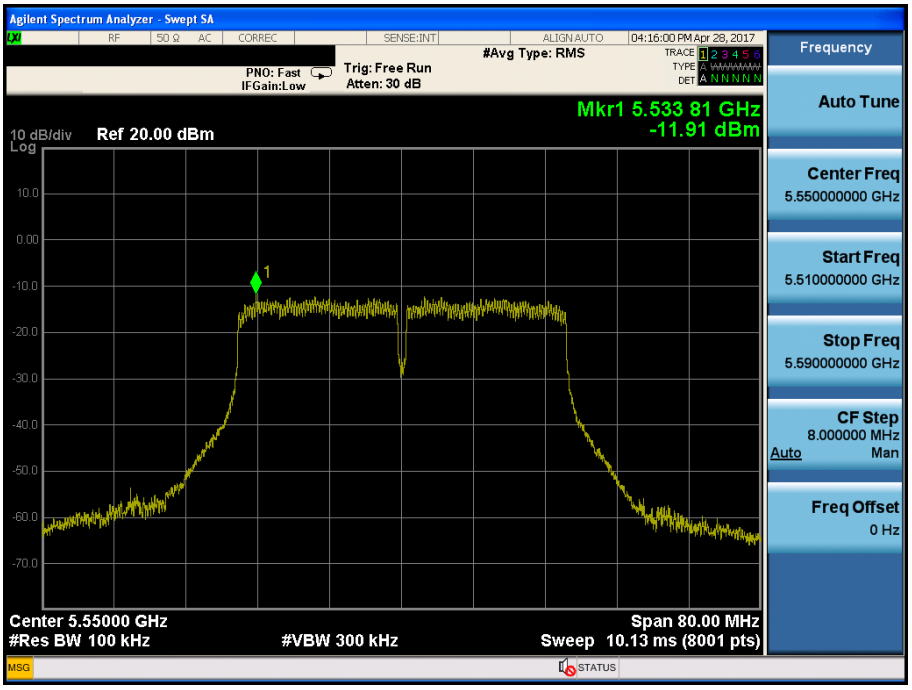
Maximum Power Spectral Density Test Mode: 802.11n(HT40) & Ch.62



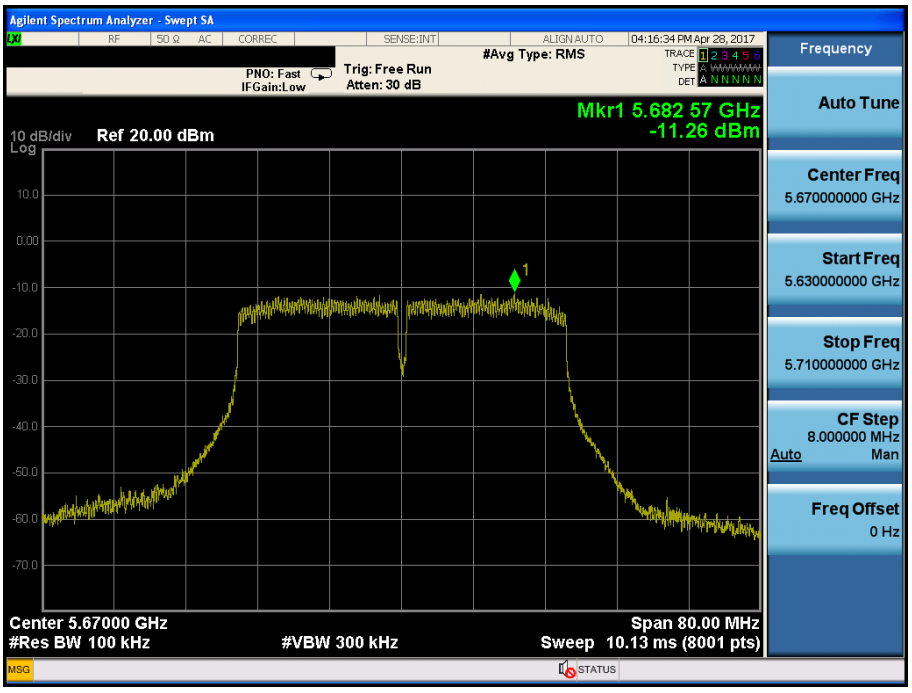
Maximum Power Spectral Density Test Mode: 802.11n(HT40) & Ch.102



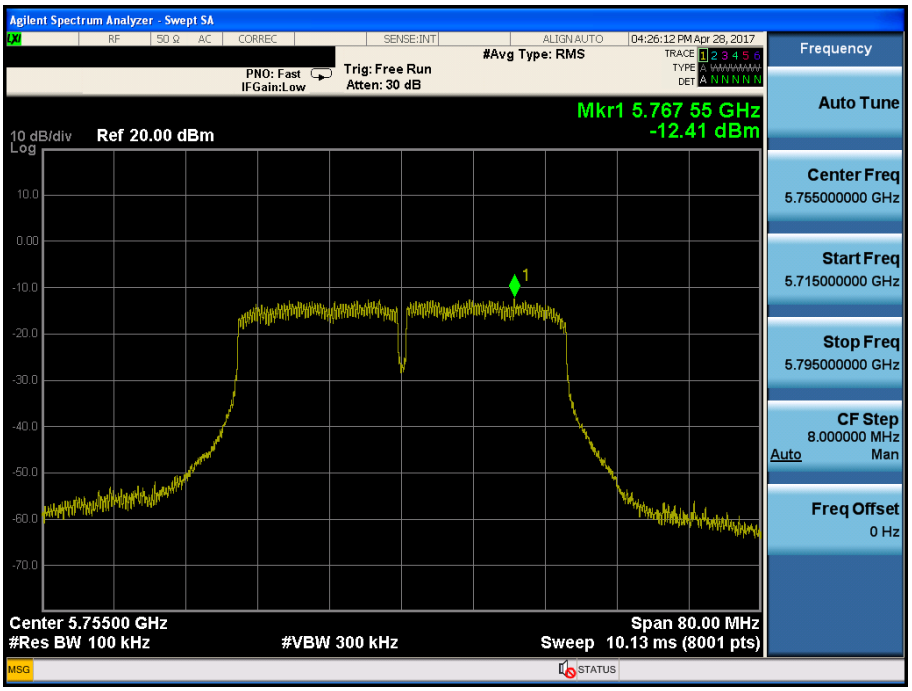
Maximum Power Spectral Density Test Mode: 802.11n(HT40) & Ch.110



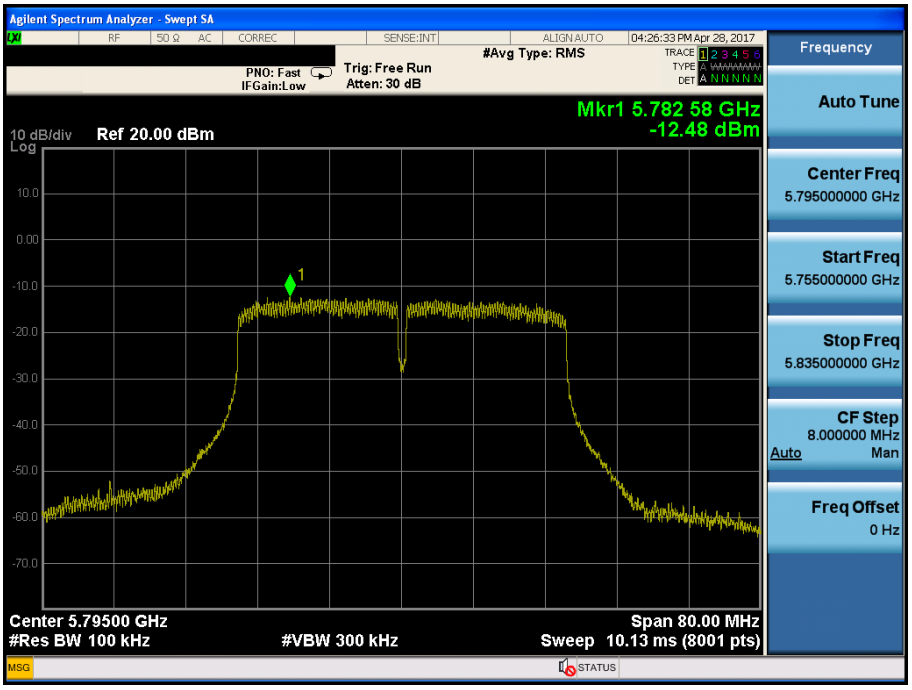
Maximum Power Spectral Density Test Mode: 802.11n(HT40) & Ch.134



Maximum Power Spectral Density Test Mode: 802.11n(HT40) & Ch.151



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



7.5 Frequency Stability

▣ **Test requirements**

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

▣ **Test Procedure**

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

▣ **Test Result : Comply**

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

Supply Voltage (V DC)	TEMP (℃)	Operating Frequency	
		5180 MHz	5320 MHz
		26dBc low edge (Hz)	26dBc High edge(Hz)
3.800	+20(Ref)	5,172,785,000	5,330,895,000
	+50	5,172,755,000	5,330,975,000
	+40	5,172,810,000	5,330,900,000
	+30	5,172,920,000	5,330,810,500
	+20	5,172,785,000	5,330,895,000
	+10	5,172,775,000	5,330,910,000
	0	5,172,950,000	5,330,820,000
	-10	5,172,750,000	5,330,775,000
	-20	5,172,635,000	5,330,980,000
3.500 (Bat end)	+20	5,172,875,000	5,331,025,000
4.370	+20	5,172,665,000	5,330,710,000

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

Supply Voltage (V DC)	TEMP (℃)	Operating Frequency	
		5500 MHz	**5700 MHz**
		26dBc low edge (Hz)	**26dBc High edge**(Hz)
3.800	+20(Ref)	5,489,100,000	5,710,880,000
	+50	5,489,250,000	5,710,785,000
	+40	5,489,245,000	5,710,890,000
	+30	5,489,290,000	5,710,905,000
	+20	5,489,100,000	5,710,880,000
	+10	5,489,030,000	5,710,925,000
	0	5,489,185,000	5,711,045,000
	-10	5,489,125,000	5,711,010,000
	-20	5,489,060,000	5,710,765,000
3.500 (Bat end)	+20	5,489,250,000	5,710,945,000
4.370	+20	5,489,045,000	5,710,750,000

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

Supply Voltage (V DC)	TEMP (℃)	Operating Frequency	
		5745 MHz	**5825 MHz**
		26dBc low edge (Hz)	**26dBc High edge**(Hz)
3.800	+20(Ref)	5,736,265,000	5,833,930,000
	+50	5,736,425,000	5,833,855,000
	+40	5,736,430,000	5,833,690,000
	+30	5,736,190,000	5,833,875,000
	+20	5,736,265,000	5,833,930,000
	+10	5,736,290,000	5,833,685,000
	0	5,736,150,000	5,833,645,000
	-10	5,736,345,000	5,833,740,000
	-20	5,736,325,000	5,833,875,000
3.500 (Bat end)	+20	5,736,340,000	5,833,665,000
4.370	+20	5,736,100,000	5,833,665,000

7.6 Radiated Spurious Emission Measurements

▣ Test Requirements

▪ **FCC Part 15.209(a) and (b)**

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

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

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

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

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

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

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

▣ Test Configuration

Refer to the APPENDIX I.

▣ Test Procedure

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

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

► General Requirements for Unwanted Emissions Measurements

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

- EUT Duty Cycle

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

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

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

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

► **Measurements below 1000 MHz**

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

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

► **Measurements Above 1000 MHz (Peak)**

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

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

(i) **RBW = 1 MHz.**
(ii) **VBW ≥ 3 MHz.**
(iii) **Detector = Peak.**
(iv) Sweep time = Auto.
(v) Trace mode = Max hold.
(vi) Allow sweeps to continue until the trace stabilizes. Note that if the transmission is not continuous, the time required for the trace to stabilize will increase by a factor of approximately 1/x, where x is the duty cycle. For example, at 50 percent duty cycle, the measurement time will increase by a factor of two relative to measurement time for continuous transmission.

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

(i) **RBW = 1 MHz.**
(ii) **VBW ≥ 3 MHz.**
(iii) **Detector = RMS**, if span / (# of points in sweep) ≤ RBW / 2. Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If the condition is not satisfied, the detector mode shall be set to peak.
(iv) Averaging type = power (i.e., RMS)
- As an alternative, the detector and averaging type may be set for linear voltage averaging. Some analyzers require linear display mode in order to use linear voltage averaging. Log or dB averaging shall not be used.

(v) Sweep time = Auto.
(vi) Perform a trace average of at least 100 traces if the transmission is continuous. If the transmission is not continuous, the number of traces shall be increased by a factor of 1/x, where x is the duty cycle. For example, with 50 percent duty cycle, at least 200 traces shall be averaged.
(vii) If tests are performed with the EUT transmitting at a duty cycle less than 98 percent, a correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle. The correction factor is computed as follows:
- **If power averaging (RMS) mode was used in step (iv) above, the correction factor is 10 log(1/x), where x is the duty cycle.** For example, if the transmit duty cycle was 50 percent, then 3 dB must be added to the measured emission levels.
- If linear voltage averaging mode was used in step (iv) above, the correction factor is 20 log (1/x), where x is the duty cycle. For example, if the transmit duty cycle was 50 percent, then 6 dB must be added to the measured emission levels.
- If a specific emission is demonstrated to be continuous (100 percent duty cycle) rather than turning on and off with the transmit cycle, no duty cycle correction is required for that emission.

Please refer to Appendix II for the duty correction factor

▣ Measurement Data:

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

Band	Tested Channel	Freq. (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
U-NII 1	36 (5180 MHz)	5148.588	H	X	PK	43.60	7.81	N/A	N/A	51.41	74.00	22.59
		5148.462	H	X	AV	33.22	7.81	N/A	N/A	41.03	54.00	12.97
		10360.140	V	Z	PK	48.09	12.18	N/A	-9.54	50.73	68.20	17.47
	40 (5200 MHz)	10399.992	V	Z	PK	47.94	12.35	N/A	-9.54	50.75	68.20	17.45
	48 (5240 MHz)	10480.224	V	Z	PK	48.57	12.69	N/A	-9.54	51.72	68.20	16.48
U-NII 2A	52 (5260 MHz)	10519.990	V	Z	PK	48.24	12.80	N/A	-9.54	51.50	68.20	16.70
	60 (5300 MHz)	10600.102	V	Z	PK	47.77	12.93	N/A	-9.54	51.16	74.00	22.84
		10600.162	V	Z	AV	42.03	12.93	N/A	-9.54	45.42	54.00	8.58
	64 (5320 MHz)	5351.789	V	X	PK	43.16	7.99	N/A	N/A	51.15	74.00	22.85
		5351.827	V	X	AV	33.74	7.99	N/A	N/A	41.73	54.00	12.27
		10639.828	V	Z	PK	47.66	12.99	N/A	-9.54	51.11	68.20	17.09
		10640.024	V	Z	AV	42.46	12.99	N/A	-9.54	45.91	54.00	8.09
U-NII 2C	100 (5500 MHz)	5447.890	V	X	PK	42.37	7.71	N/A	N/A	50.08	74.00	23.92
		5448.210	V	X	AV	33.69	7.71	N/A	N/A	41.40	54.00	12.60
		11000.196	V	Z	PK	47.80	13.55	N/A	-9.54	51.81	74.00	22.19
		11000.094	V	Z	AV	42.66	13.55	N/A	-9.54	46.67	54.00	7.33
	116 (5600 MHz)	11160.246	V	Z	PK	48.58	13.75	N/A	-9.54	52.79	74.00	21.21
		11160.076	V	Z	AV	42.82	13.75	N/A	-9.54	47.03	54.00	6.97
	140 (5700 MHz)	5725.448	V	X	PK	43.26	8.96	N/A	N/A	52.22	68.20	15.98
		11400.176	V	Z	PK	51.44	14.06	N/A	-9.54	55.96	74.00	18.04
		11400.064	V	Z	AV	45.30	14.06	N/A	-9.54	49.82	54.00	4.18
U-NII 3	149 (5745 MHz)	5714.860	V	Z	PK	43.64	8.95	N/A	N/A	52.59	68.20	15.61
		5724.510	V	Z	PK	51.71	8.98	N/A	N/A	60.69	78.20	17.51
		11490.268	V	Z	PK	48.52	14.18	N/A	-9.54	53.16	74.00	20.84
		11490.026	V	Z	AV	43.01	14.18	N/A	-9.54	47.65	54.00	6.35
	157 (5785 MHz)	11569.920	V	Z	PK	48.38	14.24	N/A	-9.54	53.08	74.00	20.92
		11570.004	V	Z	AV	41.94	14.24	N/A	-9.54	46.64	54.00	7.36
	165 (5825 MHz)	5850.339	V	Z	PK	43.82	9.42	N/A	N/A	53.24	78.20	24.96
		5860.530	V	Z	PK	43.46	9.47	N/A	N/A	52.93	68.20	15.27
		11650.188	H	Y	PK	49.65	14.29	N/A	-9.54	54.40	74.00	19.60
		11650.072	H	Y	AV	41.85	14.29	N/A	-9.54	46.60	54.00	7.40

Note.

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

▣ Measurement Data:

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

Band	Tested Channel	Freq. (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
U-NII 1	36 (5180 MHz)	5148.516	H	X	PK	42.71	7.81	N/A	N/A	50.52	74.00	23.48
		5148.516	H	X	AV	33.22	7.81	N/A	N/A	41.03	54.00	12.97
		10360.092	V	Z	PK	48.22	12.18	N/A	-9.54	50.86	68.20	17.34
	40 (5200 MHz)	10400.288	V	Z	PK	47.76	12.35	N/A	-9.54	50.57	68.20	17.63
	48 (5240 MHz)	10479.724	V	Z	PK	47.89	12.69	N/A	-9.54	51.04	68.20	17.16
U-NII 2A	52 (5260 MHz)	10519.778	V	Z	PK	48.31	12.80	N/A	-9.54	51.57	68.20	16.63
	60 (5300 MHz)	10600.190	V	Z	PK	48.16	12.93	N/A	-9.54	51.55	74.00	22.45
		10600.038	V	Z	AV	42.29	12.93	N/A	-9.54	45.68	54.00	8.32
	64 (5320 MHz)	5350.721	V	X	PK	43.34	7.99	N/A	N/A	51.33	74.00	22.67
		5351.199	V	X	AV	33.19	7.99	N/A	N/A	41.18	54.00	12.82
		10640.168	V	Z	PK	48.45	12.99	N/A	-9.54	51.90	74.00	22.10
		10640.026	V	Z	AV	42.47	12.99	N/A	-9.54	45.92	54.00	8.08
U-NII 2C	100 (5500 MHz)	5447.890	V	X	PK	43.12	7.71	N/A	N/A	50.83	74.00	23.17
		5448.530	V	X	AV	33.83	7.71	N/A	N/A	41.54	54.00	12.46
		11000.000	V	Z	PK	47.93	13.55	N/A	-9.54	51.94	74.00	22.06
		11000.088	V	Z	AV	42.91	13.55	N/A	-9.54	46.92	54.00	7.08
	116 (5600 MHz)	11160.056	V	Z	PK	49.19	13.75	N/A	-9.54	53.40	74.00	20.60
		11160.038	V	Z	AV	44.95	13.75	N/A	-9.54	49.16	54.00	4.84
	140 (5700 MHz)	5725.400	V	X	PK	43.90	8.96	N/A	N/A	52.86	68.20	15.34
		11400.078	V	Z	PK	51.11	14.06	N/A	-9.54	55.63	74.00	18.37
		11400.110	V	Z	AV	45.19	14.06	N/A	-9.54	49.71	54.00	4.29
U-NII 3	149 (5745 MHz)	5714.630	V	Z	PK	45.55	8.95	N/A	N/A	54.50	68.20	13.70
		5724.650	V	Z	PK	53.08	8.98	N/A	N/A	62.06	78.20	16.14
		11489.788	V	Z	PK	49.40	14.18	N/A	-9.54	54.04	74.00	19.96
		11490.026	V	Z	AV	43.46	14.18	N/A	-9.54	48.10	54.00	5.90
	157 (5785 MHz)	11570.114	V	Z	PK	48.43	14.24	N/A	-9.54	53.13	74.00	20.87
		11570.186	V	Z	AV	42.92	14.24	N/A	-9.54	47.62	54.00	6.38
	165 (5825 MHz)	5850.402	H	Y	PK	46.16	9.42	N/A	N/A	55.58	78.20	22.62
		5861.592	H	Y	PK	43.66	9.47	N/A	N/A	53.13	68.20	15.07
		11650.290	V	Z	PK	48.43	14.29	N/A	-9.54	53.18	74.00	20.82
		11650.114	V	Z	AV	42.62	14.29	N/A	-9.54	47.37	54.00	6.63

Note.

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

▣ **Measurement Data:**

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

Band	Tested Channel	Freq. (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
U-NII 1	38 (5190 MHz)	5148.340	H	X	PK	43.39	7.71	N/A	N/A	51.10	74.00	22.90
		5149.088	H	X	AV	33.54	7.71	N/A	N/A	41.25	54.00	12.75
		10380.164	V	Z	PK	47.71	12.27	N/A	-9.54	50.44	68.20	17.76
	46 (5230 MHz)	10459.878	V	Z	PK	48.07	12.60	N/A	-9.54	51.13	68.20	17.07
U-NII 2A	54 (5270 MHz)	10540.056	V	Z	PK	47.60	12.83	N/A	-9.54	50.89	68.20	17.31
	62 (5310 MHz)	5351.363	H	X	PK	45.70	7.98	N/A	N/A	53.68	74.00	20.32
		5350.935	H	X	AV	34.97	7.98	N/A	N/A	42.95	54.00	11.05
		10619.882	V	Z	PK	47.51	12.96	N/A	-9.54	50.93	74.00	23.07
		10620.064	V	Z	AV	41.81	12.96	N/A	-9.54	45.23	54.00	8.77
U-NII 2C	102 (5510 MHz)	5449.510	H	X	PK	45.64	7.71	N/A	N/A	53.35	74.00	20.65
		5450.660	H	X	AV	33.34	7.71	N/A	N/A	41.05	54.00	12.95
		11020.058	V	Z	PK	48.60	13.57	N/A	-9.54	52.63	74.00	21.37
		11020.118	V	Z	AV	43.02	13.57	N/A	-9.54	47.05	54.00	6.95
	110 (5590 MHz)	11099.838	V	Z	PK	49.71	13.67	N/A	-9.54	53.84	74.00	20.16
		11100.074	V	Z	AV	45.15	13.67	N/A	-9.54	49.28	54.00	4.72
	134 (5670 MHz)	5729.781	H	Y	PK	47.71	8.98	N/A	N/A	56.69	68.20	11.51
		11339.762	V	Z	PK	49.66	13.98	N/A	-9.54	54.10	74.00	19.90
		11340.054	V	Z	AV	44.86	13.98	N/A	-9.54	49.30	54.00	4.70
U-NII 3	151 (5755 MHz)	5713.584	V	Z	PK	48.37	8.96	N/A	N/A	57.33	68.20	10.87
		5724.636	V	Z	PK	57.46	8.98	N/A	N/A	66.44	78.20	11.76
		11509.926	V	Z	PK	48.33	14.20	N/A	-9.54	52.99	74.00	21.01
		11510.080	V	Z	AV	42.59	14.20	N/A	-9.54	47.25	54.00	6.75
	159 (5795 MHz)	5854.695	V	Z	PK	48.52	9.44	N/A	N/A	57.96	78.20	20.24
		5862.728	V	Z	PK	43.27	9.56	N/A	N/A	52.83	68.20	15.37
		11589.778	V	Z	PK	47.63	14.25	N/A	-9.54	52.34	74.00	21.66
		11590.042	V	Z	AV	41.24	14.25	N/A	-9.54	45.95	54.00	8.05

Note.

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

7.7 AC Conducted Emission

▣ **Test Requirements and limit, §15.207**

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

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

* Decreases with the logarithm of the frequency

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

▣ **Test Configuration**

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

▣ **Test Procedure**

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

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

▣ **Test Results: Comply**

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

▣ **Measurement Data**

AC Line Conducted Emissions (Graph)

Test Mode: U-NII 1 & 802.11n(HT20) & 5240 MHz

Results of Conducted Emission

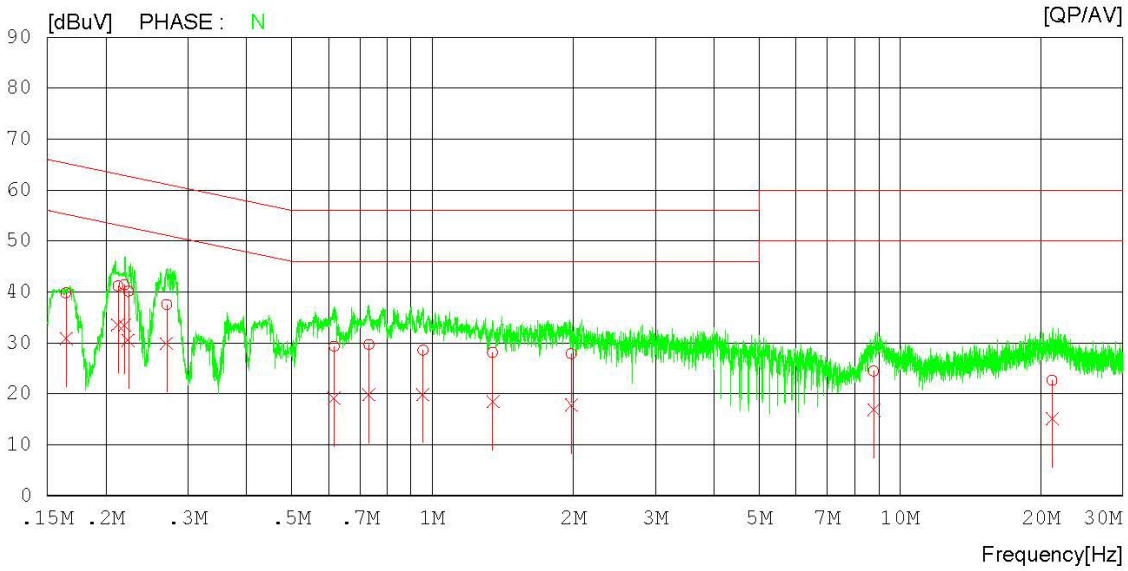
DTNC

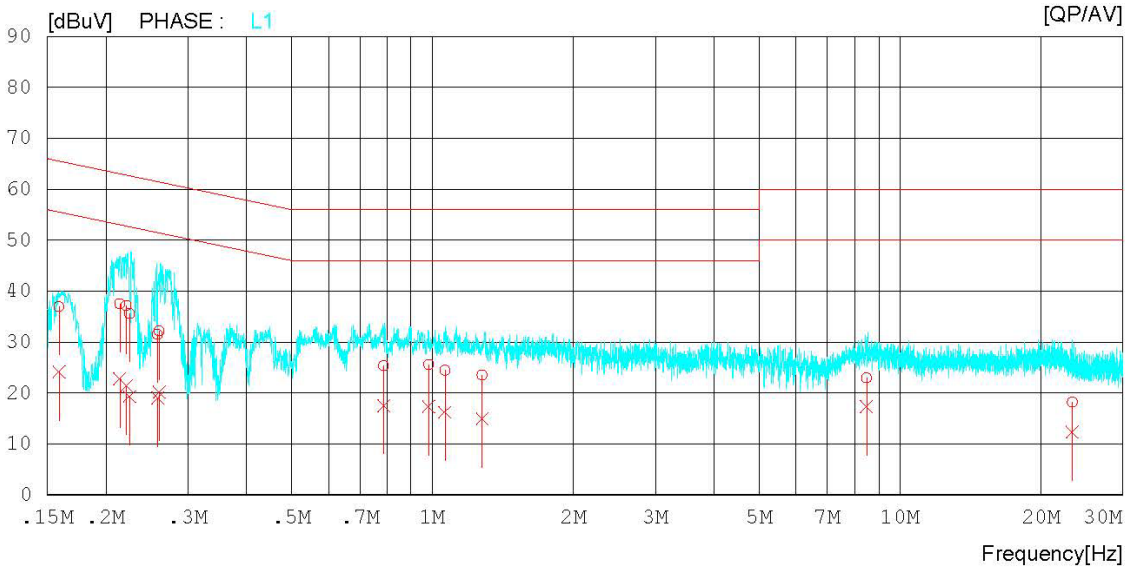
Date : 2017-04-27

Order No.	:	DTNC1703-01704	:	
Power Supply	:	AC 120V 60Hz	:	
Temp/Humi	:	23 ℃ / 45 %	:	
Test Codition	:	802.11 n20 / 5240 MHz	:	

Memo :

LIMIT : CISPR class B QP
CISPR class B AV





AC Line Conducted Emissions (Data List)

Test Mode: U-NII 1 & 802.11n(HT20) & 5240 MHz

Results of Conducted Emission

DTNC

Date : 2017-04-27

Order No.	:	DTNC1703-01704	:	
Power Supply	:	AC 120V 60Hz	:	
Temp/Humi	:	23 ℃ / 45 %	:	
Test Codition	:	802.11 n20 / 5240 MHz	:	

Memo :

LIMIT : CISPR class B QP
CISPR class B AV

NO	FREQ	READING QP	READING AV	C.FACTOR	RESULT QP	RESULT AV	LIMIT QP	LIMIT AV	MARGIN QP	MARGIN AV	PHASE
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	
1	0.16450	29.6	20.7	10.2	39.8	30.9	65.2	55.2	25.4	24.3	N
2	0.21233	30.9	23.3	10.2	41.1	33.5	63.1	53.1	22.0	19.6	N
3	0.21942	31.2	23.2	10.2	41.4	33.4	62.8	52.8	21.4	19.4	N
4	0.22348	29.9	20.3	10.2	40.1	30.5	62.7	52.7	22.6	22.2	N
5	0.26983	27.3	19.7	10.2	37.5	29.9	61.1	51.1	23.6	21.2	N
6	0.61588	19.1	9.0	10.2	29.3	19.2	56.0	46.0	26.7	26.8	N
7	0.73130	19.4	9.6	10.2	29.6	19.8	56.0	46.0	26.4	26.2	N
8	0.95314	18.4	9.7	10.2	28.6	19.9	56.0	46.0	27.4	26.1	N
9	1.34640	17.9	8.2	10.2	28.1	18.4	56.0	46.0	27.9	27.6	N
10	1.98320	17.6	7.5	10.3	27.9	17.8	56.0	46.0	28.1	28.2	N
11	8.79640	13.8	6.2	10.7	24.5	16.9	60.0	50.0	35.5	33.1	N
12	21.19240	10.9	3.4	11.7	22.6	15.1	60.0	50.0	37.4	34.9	N
13	0.15887	26.8	14.0	10.1	36.9	24.1	65.5	55.5	28.6	31.4	L1
14	0.21424	27.4	12.7	10.1	37.5	22.8	63.0	53.0	25.5	30.2	L1
15	0.22149	27.1	11.3	10.1	37.2	21.4	62.8	52.8	25.6	31.4	L1
16	0.22495	25.4	9.2	10.1	35.5	19.3	62.6	52.6	27.1	33.3	L1
17	0.25821	21.3	8.9	10.1	31.4	19.0	61.5	51.5	30.1	32.5	L1
18	0.25996	22.0	10.0	10.1	32.1	20.1	61.4	51.4	29.3	31.3	L1
19	0.78678	15.1	7.3	10.2	25.3	17.5	56.0	46.0	30.7	28.5	L1
20	0.98100	15.4	7.1	10.2	25.6	17.3	56.0	46.0	30.4	28.7	L1
21	1.06320	14.2	6.0	10.2	24.4	16.2	56.0	46.0	31.6	29.8	L1
22	1.27800	13.2	4.7	10.2	23.4	14.9	56.0	46.0	32.6	31.1	L1
23	8.47520	12.1	6.5	10.8	22.9	17.3	60.0	50.0	37.1	32.7	L1
24	23.36660	6.1	0.2	12.0	18.1	12.2	60.0	50.0	41.9	37.8	L1

AC Line Conducted Emissions (Graph)

Test Mode: U-NII 2A & 802.11n(HT20) & 5320 MHz

Results of Conducted Emission

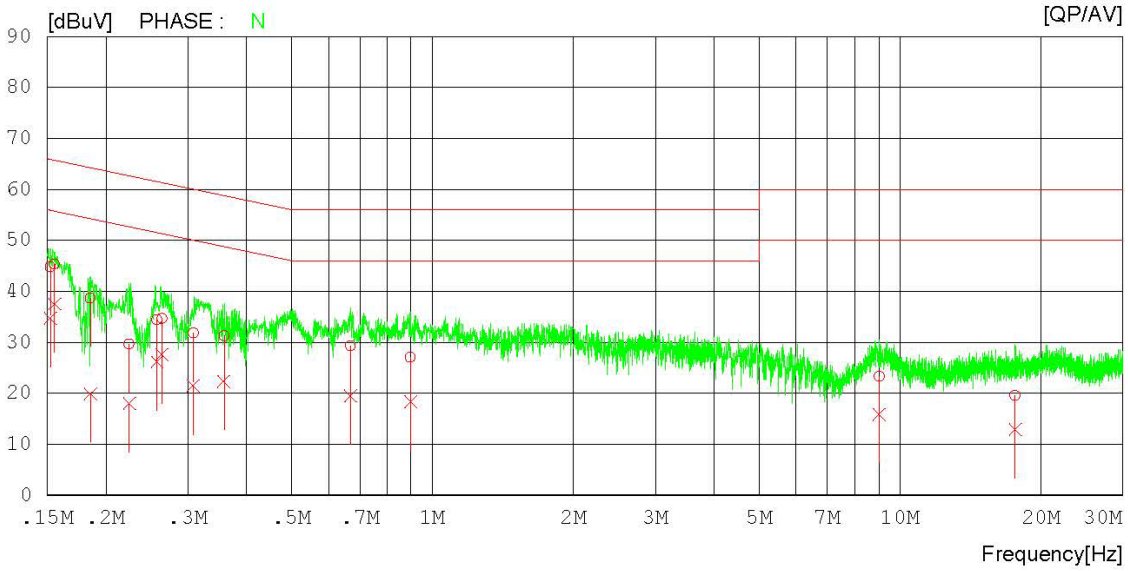
DTNC

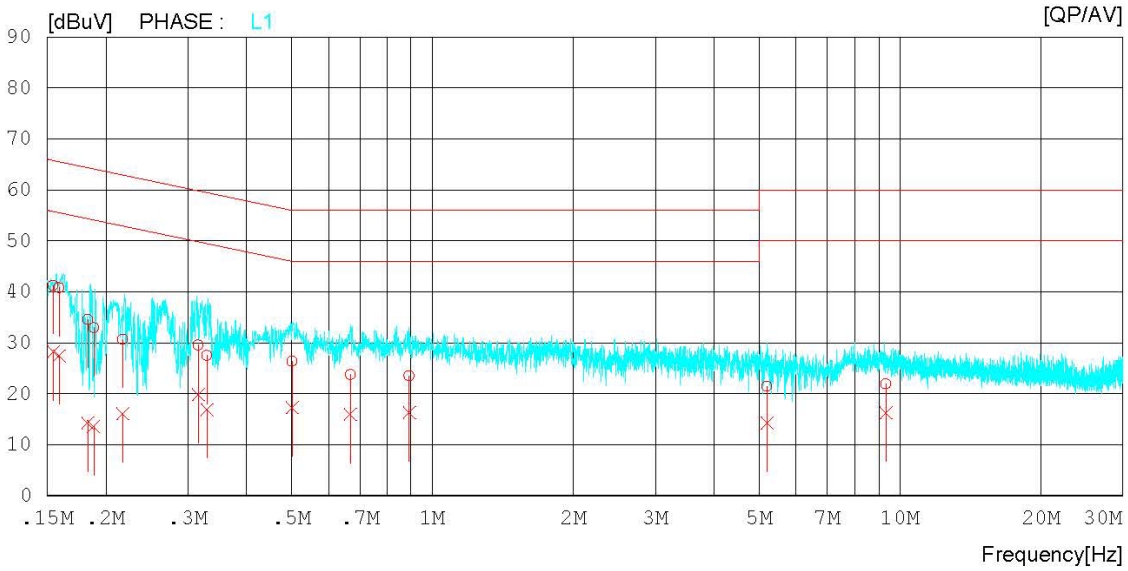
Date : 2017-04-27

Order No.	:	DTNC1703-01704	:	
Power Supply	:	AC 120V 60Hz	:	
Temp/Humi	:	23 ℃ / 45 %	:	
Test Codition	:	802.11 n20 / 5320 MHz	:	

Memo :

LIMIT : CISPR class B QP
CISPR class B AV





AC Line Conducted Emissions (Data List)

Test Mode: U-NII 2A & 802.11n(HT20) & 5320 MHz

Results of Conducted Emission

DTNC

Date : 2017-04-27

Order No.	:	DTNC1703-01704	:	
Power Supply	:	AC 120V 60Hz	:	
Temp/Humi	:	23 ℃ / 45 %	:	
Test Codition	:	802.11 n20 / 5320 MHz	:	

Memo :

LIMIT : CISPR class B QP
CISPR class B AV

NO	FREQ	READING QP	READING AV	C.FACTOR	RESULT QP	RESULT AV	LIMIT QP	LIMIT AV	MARGIN QP	MARGIN AV	PHASE
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	
1	0.15221	34.6	24.6	10.2	44.8	34.8	65.9	55.9	21.1	21.1	N
2	0.15533	35.1	27.3	10.2	45.3	37.5	65.7	55.7	20.4	18.2	N
3	0.18546	28.5	9.7	10.2	38.7	19.9	64.2	54.2	25.5	34.3	N
4	0.22449	19.5	7.8	10.2	29.7	18.0	62.7	52.7	33.0	34.7	N
5	0.25727	24.3	16.0	10.2	34.5	26.2	61.5	51.5	27.0	25.3	N
6	0.26386	24.5	17.3	10.2	34.7	27.5	61.3	51.3	26.6	23.8	N
7	0.30790	21.6	11.2	10.2	31.8	21.4	60.0	50.0	28.2	28.6	N
8	0.35814	21.0	12.1	10.2	31.2	22.3	58.8	48.8	27.6	26.5	N
9	0.66772	19.1	9.2	10.2	29.3	19.4	56.0	46.0	26.7	26.6	N
10	0.89716	16.8	8.1	10.2	27.0	18.3	56.0	46.0	29.0	27.7	N
11	9.02920	12.7	5.2	10.7	23.4	15.9	60.0	50.0	36.6	34.1	N
12	17.64520	8.3	1.6	11.3	19.6	12.9	60.0	50.0	40.4	37.1	N
13	0.15450	31.1	18.1	10.1	41.2	28.2	65.8	55.8	24.6	27.6	L1
14	0.15891	30.7	17.3	10.1	40.8	27.4	65.5	55.5	24.7	28.1	L1
15	0.18303	24.4	4.1	10.1	34.5	14.2	64.3	54.3	29.8	40.1	L1
16	0.18837	22.8	3.4	10.1	32.9	13.5	64.1	54.1	31.2	40.6	L1
17	0.21754	20.6	5.9	10.1	30.7	16.0	62.9	52.9	32.2	36.9	L1
18	0.31551	19.3	9.6	10.2	29.5	19.8	59.8	49.8	30.3	30.0	L1
19	0.32949	17.3	6.6	10.2	27.5	16.8	59.5	49.5	32.0	32.7	L1
20	0.50109	16.1	7.0	10.2	26.3	17.2	56.0	46.0	29.7	28.8	L1
21	0.66718	13.5	5.7	10.2	23.7	15.9	56.0	46.0	32.3	30.1	L1
22	0.89169	13.3	6.1	10.2	23.5	16.3	56.0	46.0	32.5	29.7	L1
23	5.19980	11.0	3.7	10.5	21.5	14.2	60.0	50.0	38.5	35.8	L1
24	9.33760	11.0	5.5	10.8	21.8	16.3	60.0	50.0	38.2	33.7	L1

AC Line Conducted Emissions (Graph)

Test Mode: U-NII 2C & 802.11n(HT20) & 5700 MHz

Results of Conducted Emission

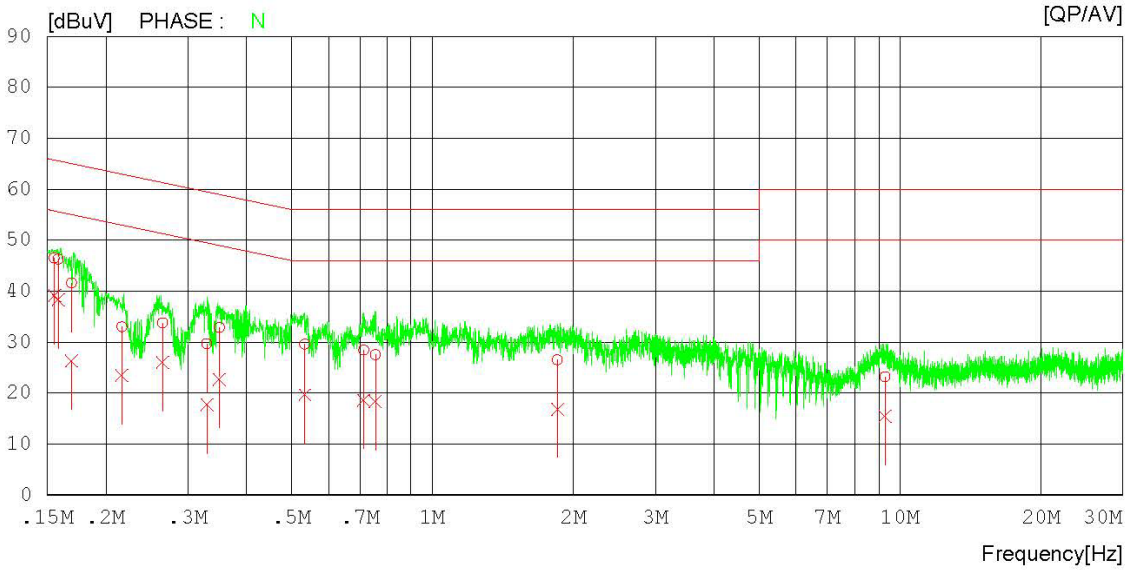
DTNC

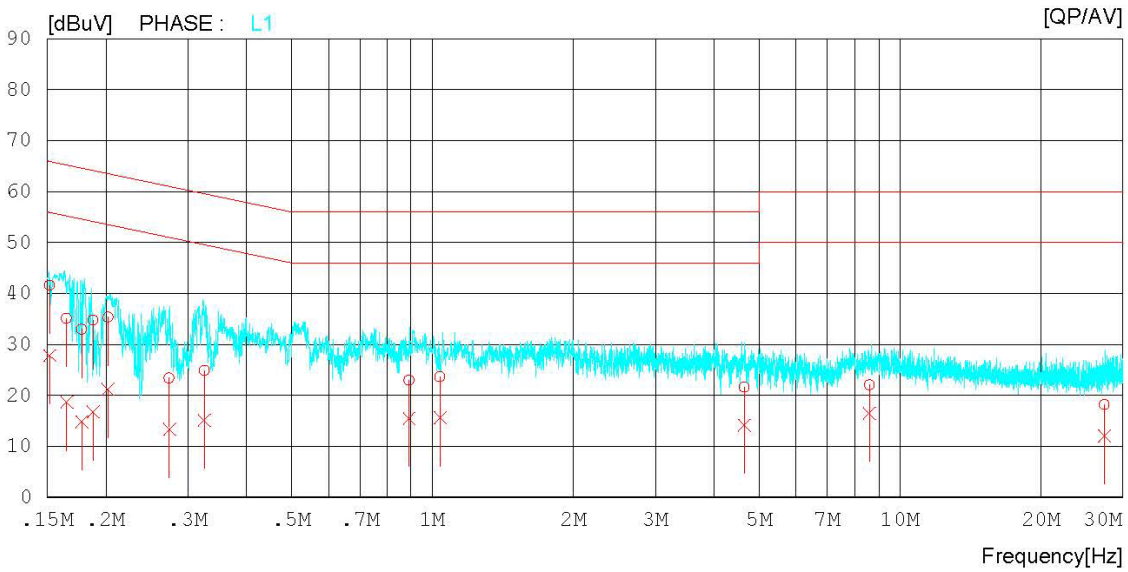
Date : 2017-04-27

Order No.	:	DTNC1703-01704	:	
Power Supply	:	AC 120V 60Hz	:	
Temp/Humi	:	23 ℃ / 45 %	:	
Test Codition	:	802.11 n20 / 5700 MHz	:	

Memo :

LIMIT : CISPR class B QP
CISPR class B AV





AC Line Conducted Emissions (Data List)

Test Mode: U-NII 2C & 802.11n(HT20) & 5700 MHz

Results of Conducted Emission

DTNC

Date : 2017-04-27

Order No.	:	DTNC1703-01704	:	
Power Supply	:	AC 120V 60Hz	:	
Temp/Humi	:	23 ℃ / 45 %	:	
Test Codition	:	802.11 n20 / 5700 MHz	:	

Memo :

LIMIT : CISPR class B QP
CISPR class B AV

NO	FREQ	READING QP	READING AV	C.FACTOR	RESULT QP	RESULT AV	LIMIT QP	LIMIT AV	MARGIN QP	MARGIN AV	PHASE
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	
1	0.15533	36.3	29.0	10.2	46.5	39.2	65.7	55.7	19.2	16.5	N
2	0.15825	36.0	28.1	10.2	46.2	38.3	65.6	55.6	19.4	17.3	N
3	0.16908	31.4	16.1	10.2	41.6	26.3	65.0	55.0	23.4	28.7	N
4	0.21655	22.7	13.3	10.2	32.9	23.5	63.0	53.0	30.1	29.5	N
5	0.26450	23.6	15.7	10.2	33.8	25.9	61.3	51.3	27.5	25.4	N
6	0.32930	19.5	7.5	10.2	29.7	17.7	59.5	49.5	29.8	31.8	N
7	0.34998	22.6	12.5	10.2	32.8	22.7	59.0	49.0	26.2	26.3	N
8	0.53299	19.4	9.5	10.2	29.6	19.7	56.0	46.0	26.4	26.3	N
9	0.71269	18.2	8.4	10.2	28.4	18.6	56.0	46.0	27.6	27.4	N
10	0.75475	17.3	8.1	10.2	27.5	18.3	56.0	46.0	28.5	27.7	N
11	1.85300	16.2	6.6	10.3	26.5	16.9	56.0	46.0	29.5	29.1	N
12	9.29200	12.5	4.7	10.7	23.2	15.4	60.0	50.0	36.8	34.6	N
13	0.15184	31.5	17.7	10.1	41.6	27.8	65.9	55.9	24.3	28.1	L1
14	0.16492	25.0	8.6	10.1	35.1	18.7	65.2	55.2	30.1	36.5	L1
15	0.17773	22.9	4.7	10.1	33.0	14.8	64.6	54.6	31.6	39.8	L1
16	0.18786	24.6	6.6	10.1	34.7	16.7	64.1	54.1	29.4	37.4	L1
17	0.20232	25.2	11.0	10.1	35.3	21.1	63.5	53.5	28.2	32.4	L1
18	0.27354	13.3	3.2	10.1	23.4	13.3	61.0	51.0	37.6	37.7	L1
19	0.32515	14.7	4.9	10.2	24.9	15.1	59.6	49.6	34.7	34.5	L1
20	0.89160	12.7	5.2	10.2	22.9	15.4	56.0	46.0	33.1	30.6	L1
21	1.03760	13.4	5.3	10.2	23.6	15.5	56.0	46.0	32.4	30.5	L1
22	4.64760	11.2	3.7	10.4	21.6	14.1	56.0	46.0	34.4	31.9	L1
23	8.60060	11.2	5.7	10.8	22.0	16.5	60.0	50.0	38.0	33.5	L1
24	27.40800	5.7	-0.4	12.4	18.1	12.0	60.0	50.0	41.9	38.0	L1

AC Line Conducted Emissions (Graph)

Test Mode: U-NII 3 & 802.11n(HT20) & 5825 MHz

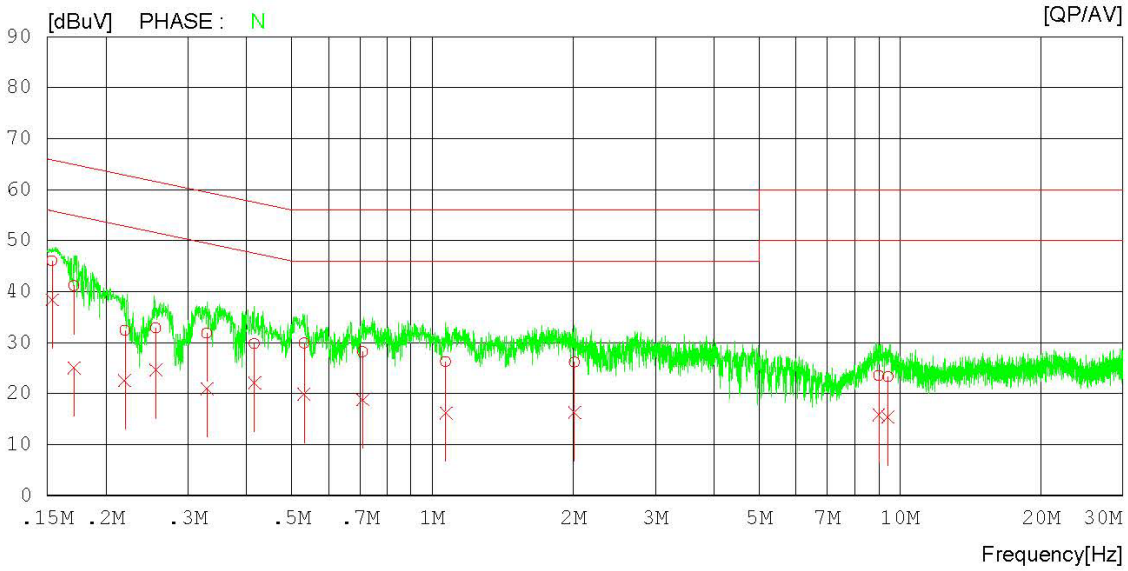
Results of Conducted Emission

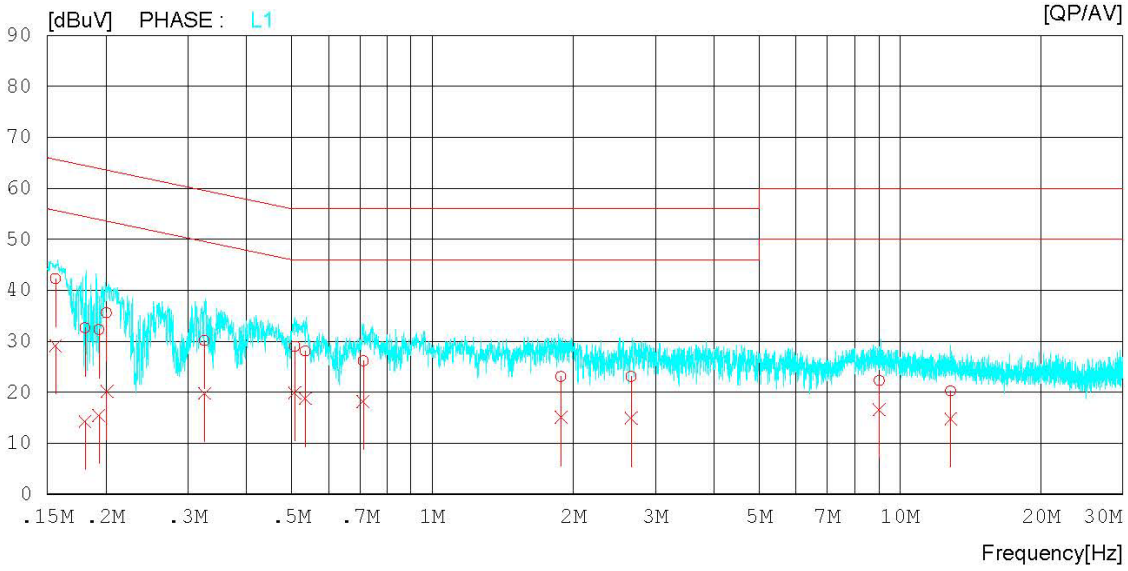
DTNC

Date : 2017-04-27

Order No.	:	DTNC1703-01704	:
Power Supply	:	AC 120V 60Hz	:
Temp/Humi	:	23 ℃ / 45 %	:
Test Codition	:	802.11 n20 / 5825 MHz	:
Memo	:		

LIMIT : CISPR class B QP
CISPR class B AV





AC Line Conducted Emissions (Data List)

Test Mode: U-NII 3 & 802.11n(HT20) & 5825 MHz

Results of Conducted Emission

DTNC

Date : 2017-04-27

Order No.	:	DTNC1703-01704	:	
Power Supply	:	AC 120V 60Hz	:	
Temp/Humi	:	23 ℃ / 45 %	:	
Test Codition	:	802.11 n20 / 5825 MHz	:	

Memo :

LIMIT : CISPR class B QP
CISPR class B AV

NO	FREQ	READING QP	READING AV	C.FACTOR	RESULT QP	RESULT AV	LIMIT QP	LIMIT AV	MARGIN QP	MARGIN AV	PHASE
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	
1	0.15350	35.9	28.2	10.2	46.1	38.4	65.8	55.8	19.7	17.4	N
2	0.17131	30.9	14.8	10.2	41.1	25.0	64.9	54.9	23.8	29.9	N
3	0.21974	22.2	12.3	10.2	32.4	22.5	62.8	52.8	30.4	30.3	N
4	0.25598	22.6	14.4	10.2	32.8	24.6	61.6	51.6	28.8	27.0	N
5	0.32919	21.6	10.8	10.2	31.8	21.0	59.5	49.5	27.7	28.5	N
6	0.41598	19.5	11.9	10.2	29.7	22.1	57.5	47.5	27.8	25.4	N
7	0.53121	19.7	9.6	10.2	29.9	19.8	56.0	46.0	26.1	26.2	N
8	0.70978	18.0	8.6	10.2	28.2	18.8	56.0	46.0	27.8	27.2	N
9	1.06780	16.0	6.0	10.2	26.2	16.2	56.0	46.0	29.8	29.8	N
10	2.01440	15.8	6.0	10.3	26.1	16.3	56.0	46.0	29.9	29.7	N
11	9.01480	12.8	5.2	10.7	23.5	15.9	60.0	50.0	36.5	34.1	N
12	9.42660	12.6	4.7	10.7	23.3	15.4	60.0	50.0	36.7	34.6	N
13	0.15609	32.2	19.0	10.1	42.3	29.1	65.7	55.7	23.4	26.6	L1
14	0.18060	22.5	4.2	10.1	32.6	14.3	64.5	54.5	31.9	40.2	L1
15	0.19333	22.2	5.4	10.1	32.3	15.5	63.9	53.9	31.6	38.4	L1
16	0.20087	25.4	10.0	10.1	35.5	20.1	63.6	53.6	28.1	33.5	L1
17	0.32542	19.9	9.5	10.2	30.1	19.7	59.6	49.6	29.5	29.9	L1
18	0.50782	18.8	9.7	10.2	29.0	19.9	56.0	46.0	27.0	26.1	L1
19	0.53479	17.8	8.5	10.2	28.0	18.7	56.0	46.0	28.0	27.3	L1
20	0.71044	15.9	7.9	10.2	26.1	18.1	56.0	46.0	29.9	27.9	L1
21	1.88560	12.8	4.7	10.3	23.1	15.0	56.0	46.0	32.9	31.0	L1
22	2.66040	12.7	4.6	10.3	23.0	14.9	56.0	46.0	33.0	31.1	L1
23	9.02700	11.4	5.8	10.8	22.2	16.6	60.0	50.0	37.8	33.4	L1
24	12.83880	9.1	3.7	11.1	20.2	14.8	60.0	50.0	39.8	35.2	L1

7.8 Occupied Bandwidth

▣ Test Requirements

When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99% emission bandwidth, as calculated or measured

▣ Test Configuration

Refer to the APPENDIX I.

▣ Test Procedure

RSS-Gen[6.7]

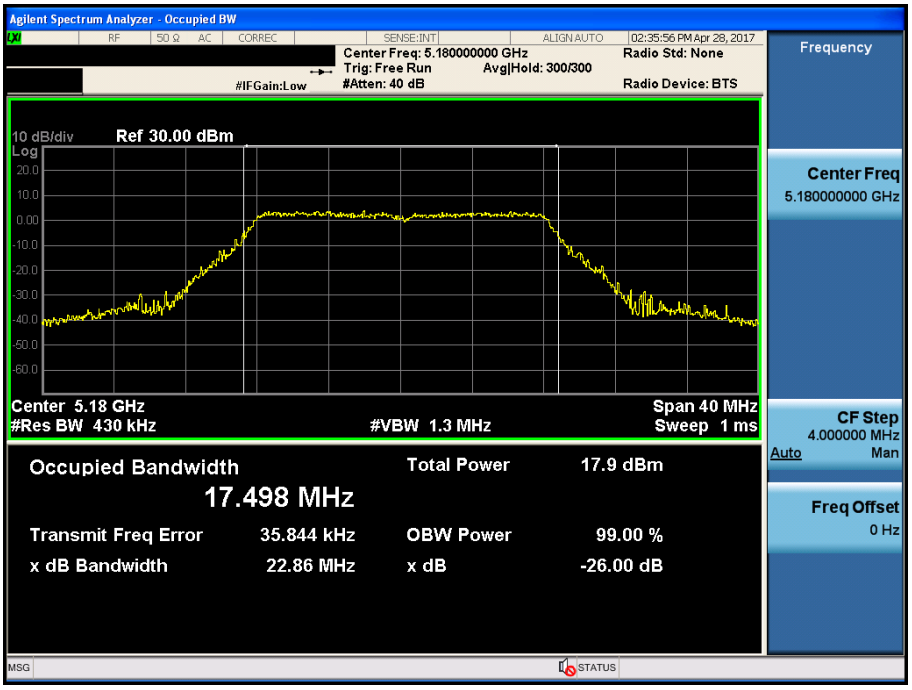
- The transmitter shall be operated at its maximum carrier power measured under normal test conditions.
- The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.
- The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the occupied bandwidth (OBW) and video bandwidth (VBW) shall be approximately 3x RBW.

▣ Test Results : Comply

Mode	Bands	Channel	Frequency [MHz]	Test Result [MHz]
802.11a	U-NII 1	36	5180	17.498
		40	5200	17.382
		48	5240	17.475
	U-NII 2A	52	5260	17.455
		60	5300	17.475
		64	5320	17.473
	U-NII 2C	100	5500	17.506
		116	5580	17.400
		140	5700	17.432
	U-NII 3	149	5745	17.568
		157	5785	17.360
		165	5825	17.486
802.11n HT20	U-NII 1	36	5180	18.336
		40	5200	18.347
		48	5240	18.421
	U-NII 2A	52	5260	18.313
		60	5300	18.333
		64	5320	18.427
	U-NII 2C	100	5500	18.446
		116	5580	18.379
		140	5700	18.433
	U-NII 3	149	5745	18.356
		157	5785	18.363
		165	5825	18.301
802.11n HT40	U-NII 1	38	5190	36.599
		46	5230	36.613
	U-NII 2A	54	5270	36.619
		62	5310	36.516
	U-NII 2C	102	5510	36.588
		110	5550	36.612
		134	5670	36.492
	U-NII 3	151	5755	36.505
		159	5795	36.472

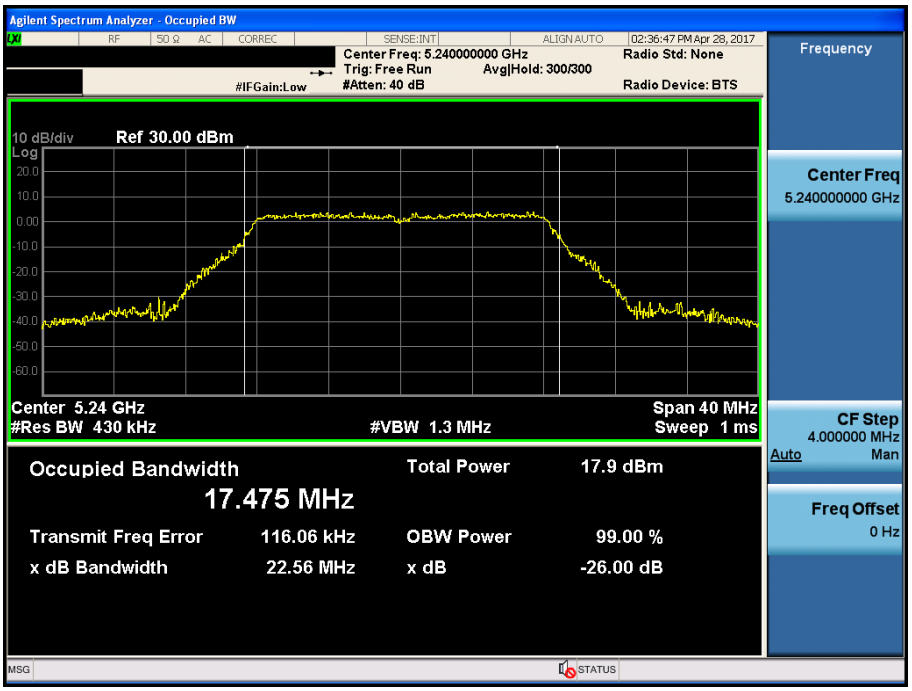
▣ RESULT PLOTS

Occupied Bandwidth 99% Test Mode: 802.11a & Ch.36



Occupied Bandwidth 99% Test Mode: 802.11a & Ch.40

Occupied Bandwidth 99% Test Mode: 802.11a & Ch.48



Occupied Bandwidth 99% Test Mode: 802.11a & Ch.52

Occupied Bandwidth 99% Test Mode: 802.11a & Ch.60

Occupied Bandwidth 99% Test Mode: 802.11a & Ch.64

Occupied Bandwidth 99% Test Mode: 802.11a & Ch.100

Occupied Bandwidth 99% Test Mode: 802.11a & Ch.116