8.4 Maximum Power Spectral Density

▣ **Test requirements**

(1) For the band 5.15 - 5.25 GHz.

(i) For an outdoor access point operating in the band 5.15 - 5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 MHz band. note1

(ii) For an indoor access point operating in the band 5.15 - 5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 MHz band. note1

(iii) For fixed point-to-point access points operating in the band 5.15 - 5.25 GHz, transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi.

(iv) For mobile and portable client devices in the 5.15 - 5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 MHz band. note1

(2) For the 5.25 - 5.35 GHz and 5.47 - 5.725 GHz bands, the peak power spectral density shall not exceed 11 dBm in any 1 MHz band. note1

(3) For the band 5.725 - 5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500 kHz band. note1,note2

Note1: If transmitting antennas of directional gain greater than 6 dBi are used, the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Note2: fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information.

- Peak Power Spectral Density Limit Calculation

Band	Limit [dBm]	Antenna Gain (Worst case)	Determined Limit [dBm]
U-NII 1	11	2.72	11
U-NII 2A	11	2.72	11
U-NII 2C	11	0.72	11
U-NII 3	30	2.67	30

▣ **Test Configuration**

Refer to the APPENDIX I.

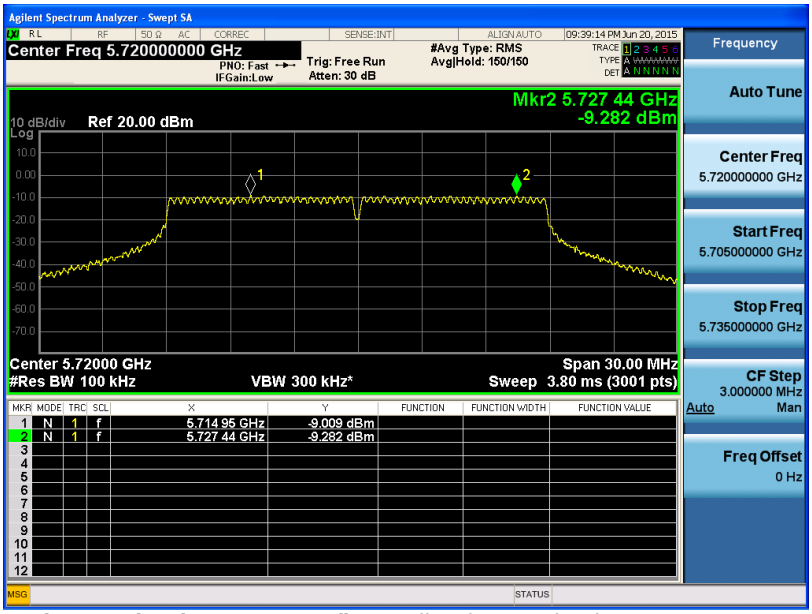
▣ **Test procedure**

Maximum Power Spectral Density is measured using Measurement Procedure **of KDB789033 D02 V01**

1) Create an average power spectrum for the EUT operating mode being tested by following the instructions in section II.E.2. for measuring maximum conducted output power using a spectrum analyzer or EMI receiver: select the appropriate test method (SA-1, SA-2, SA-3, or alternatives to each) and apply it up to, but not including, the step labeled, “Compute power…”. (This procedure is required even if the maximum conducted output power measurement was performed using a power meter, method PM.)
2) Use the peak search function on the instrument to find the peak of the spectrum and record its value.
3) Make the following adjustments to the peak value of the spectrum, if applicable:
   a) If Method SA-2 or SA-2 Alternative was used, add 10 log(1 / x), where x is the duty cycle, to the peak of the spectrum.
   b) If Method SA-3 Alternative was used and the linear mode was used in step II.E.2.g)(viii), add 1 dB to the final result to compensate for the difference between linear averaging and power averaging.
4) The result is the Maximum PSD over 1 MHz reference bandwidth.
5) For devices operating in the bands 5.15 - 5.25 GHz, 5.25 - 5.35 GHz, and 5.47 - 5.725 GHz, the above procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in §15.407(a)(5). For devices operating in the band 5.725 - 5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of a RBWs less than 1 MHz, or 500 kHz, “provided that the measured power is integrated over the full reference bandwidth” to show the total power over the specified measurement bandwidth (i.e., 1 MHz, or 500 kHz). If measurements are performed using a reduced resolution bandwidth (< 1 MHz, or < 500 kHz) and integrated over 1 MHz, or 500 kHz bandwidth, the following adjustments to the procedures apply:
   a) Set RBW ≥ 1 / T, where T is defined in section II.B.1.a). (Refer to Appendix II)
   b) Set VBW ≥ 3 x RBW
   c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10log(500 kHz/RBW) to the measured result, whereas RBW (< 500 kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.
   d) If measurement bandwidth of Maximum PSD is specified in 1 MHz, add 10log(1 MHz/RBW) to the measured result, whereas RBW (< 1 MHz) is the reduced resolution bandwidth of spectrum analyzer set during measurement.
   e) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

Note: As a practical matter, it is recommended to use reduced RBW of 100 kHz for the sections 5.c) and 5.d) above, since RBW = 100 kHz is available on nearly all spectrum analyzers.

▣ Description of test plot (U-NII 2C, 3 & Band-Crossing Channels)



Maker 1 Value (U-NII 2C Band): Reading (-9.009 dBm)
Maker 2 Value (U-NII 3 Band): Reading(-9.282 dBm)

▣ Test results: Comply

Mode (Single Transmit)	Channel	Frequency [MHz]	Reading [dBm]		T.F [dB] Note 1	Test Result [dBm] Note 2	
			ANT 1	ANT 2		ANT 1	ANT 2
802.11a	149	5745	-7.566	-6.008	7.05	-0.516	1.042
	157	5785	-7.253	-7.031	7.05	-0.203	0.019
	165	5825	-8.674	-7.086	7.05	-1.624	-0.036
802.11n HT20	149	5745	-7.998	-8.099	7.06	-0.938	-1.039
	157	5785	-8.652	-9.998	7.06	-1.592	-2.938
	165	5825	-7.548	-8.328	7.06	-0.488	-1.268
802.11n HT40	151	5755	-11.28	-10.56	7.12	-4.160	-3.440
	159	5795	-9.827	-9.67	7.12	-2.707	-2.550
802.11ac VHT80	155	5775	-14.532	-14.54	7.27	-7.262	-7.270

Mode (Multiple Transmit)	Channel	Frequency [MHz]	Reading [dBm]			T.F [dB] Note 1	Test Result [dBm] Note 2
			ANT 1	ANT 2	SUM		
802.11n HT20	149	5745	-13.640	-12.818	-10.199	7.11	-3.089
	157	5785	-12.949	-12.580	-9.750	7.11	-2.640
	165	5825	-13.242	-11.810	-9.457	7.11	-2.347
802.11n HT40	151	5755	-16.020	-16.220	-13.109	7.22	-5.889
	159	5795	-16.110	-14.950	-12.481	7.22	-5.261
802.11ac VHT80	155	5775	-18.110	-16.680	-14.326	7.43	-6.896

Note 1: T.F = 10log(0.5 MHz/100 kHz) + D.C.F
For D.C.F., please refer to appendix II.
Note 2: Test Result = Measurement Data + T.F

Band-Crossing Channels (U-NII 2C)

Mode (Single Transmit)	Channel	Frequency [MHz]	Reading [dBm]		T.F [dB] Note 1	Test Result [dBm] Note 2	
			ANT 1	ANT 2		ANT 1	ANT 2
802.11ac VHT20	144	5720	-9.009	-8.131	10.09	1.081	1.959
802.11ac VHT40	142	5710	-11.893	-9.909	10.15	-1.743	0.241
802.11ac VHT80	138	5690	-15.498	-14.505	10.28	-5.218	-4.225

Mode (Multiple Transmit)	Channel	Frequency [MHz]	Reading [dBm]			T.F [dB] Note 1	Test Result [dBm] Note 2
			ANT 1	ANT 2	SUM		
802.11ac VHT20	144	5720	-14.916	-12.847	-10.749	10.14	-0.609
802.11ac VHT40	142	5710	-16.419	-15.165	-12.737	10.22	-2.517
802.11ac VHT80	138	5690	-19.102	-16.753	-14.760	10.44	-4.320

Note 1: T.F = 10log(1 MHz/100 kHz) + D.C.F
For D.C.F., please refer to appendix II.
Note 2: Test Result = Measurement Data + T.F

Band-Crossing Channels (U-NII 3)

Mode (Single Transmit)	Channel	Frequency [MHz]	Reading [dBm]		T.F [dB] Note 1	Test Result [dBm] Note 2	
			ANT 1	ANT 2		ANT 1	ANT 2
802.11ac VHT20	144	5720	-9.282	-8.282	7.08	-2.202	-1.202
802.11ac VHT40	142	5710	-15.970	-14.384	7.14	-8.830	-7.244
802.11ac VHT80	138	5690	-21.284	-20.496	7.27	-14.014	-13.226

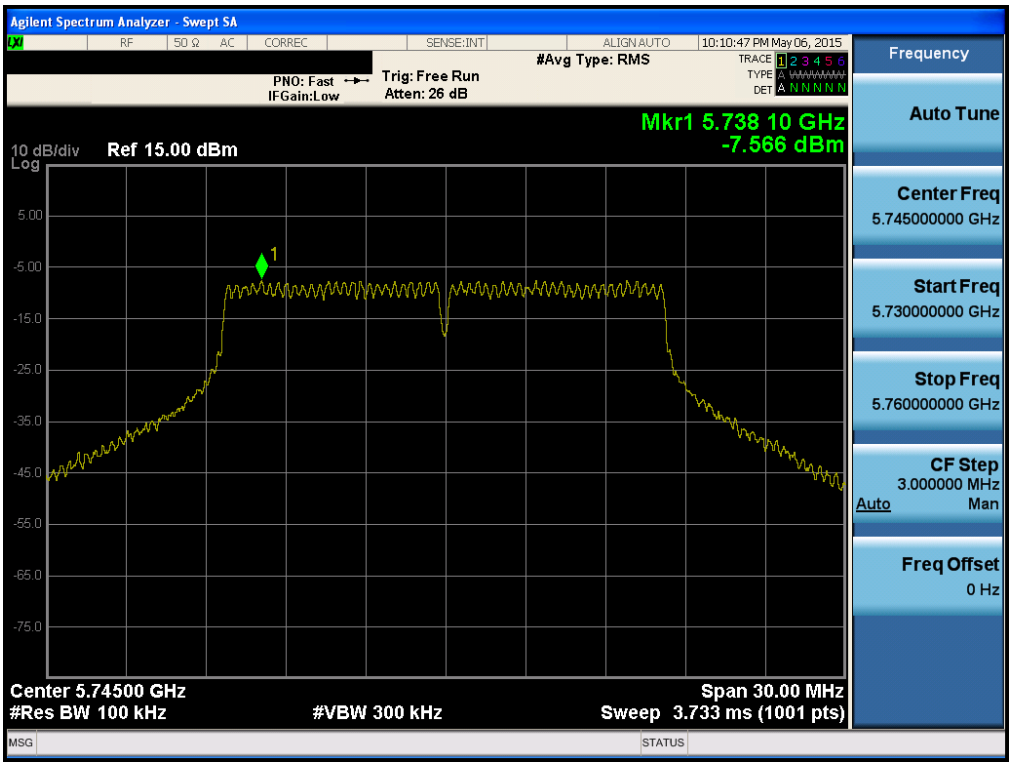
Mode (Multiple Transmit)	Channel	Frequency [MHz]	Reading [dBm]			T.F [dB] Note 1	Test Result [dBm] Note 2
			ANT 1	ANT 2	SUM		
802.11ac VHT20	144	5720	-14.866	-12.697	-10.637	7.13	-3.507
802.11ac VHT40	142	5710	-19.825	-19.000	-16.383	7.21	-9.173
802.11ac VHT80	138	5690	-24.152	-21.357	-19.523	7.43	-12.093

Note 1: T.F = 10log(0.5 MHz/100 kHz) + D.C.F
For D.C.F., please refer to appendix II.
Note 2: Test Result = Measurement Data + T.F

▣ RESULT PLOTS (Single Transmit)

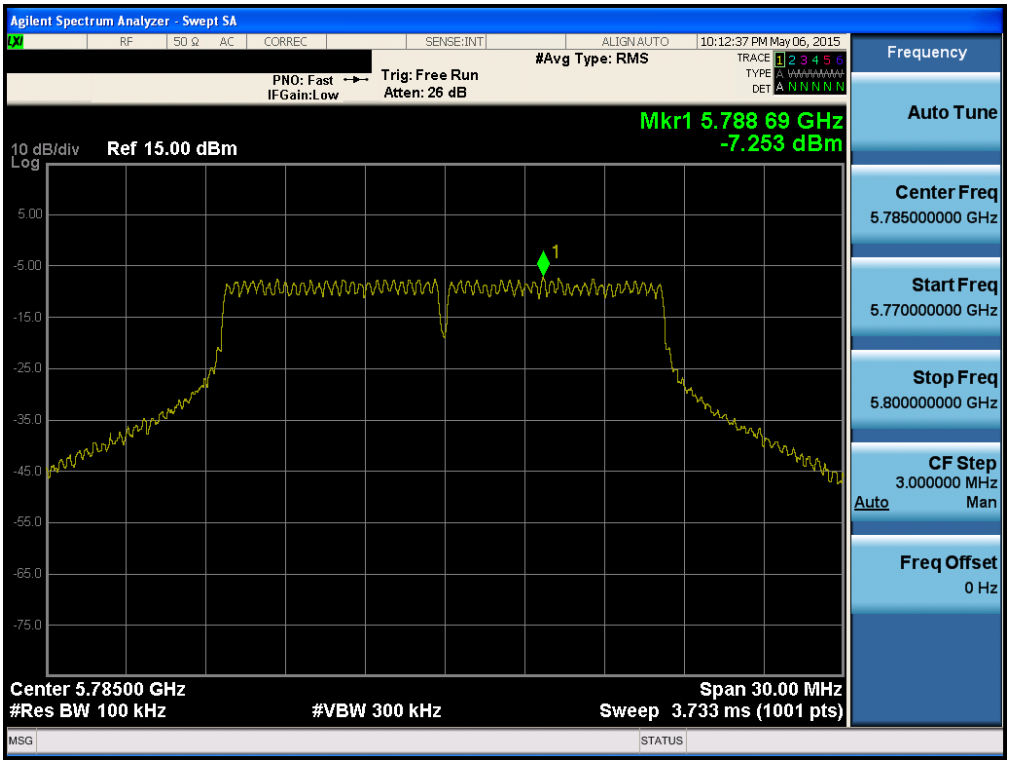
Maximum Power Spectral Density

Test Mode: 802.11a & Ch.149 & ANT 1

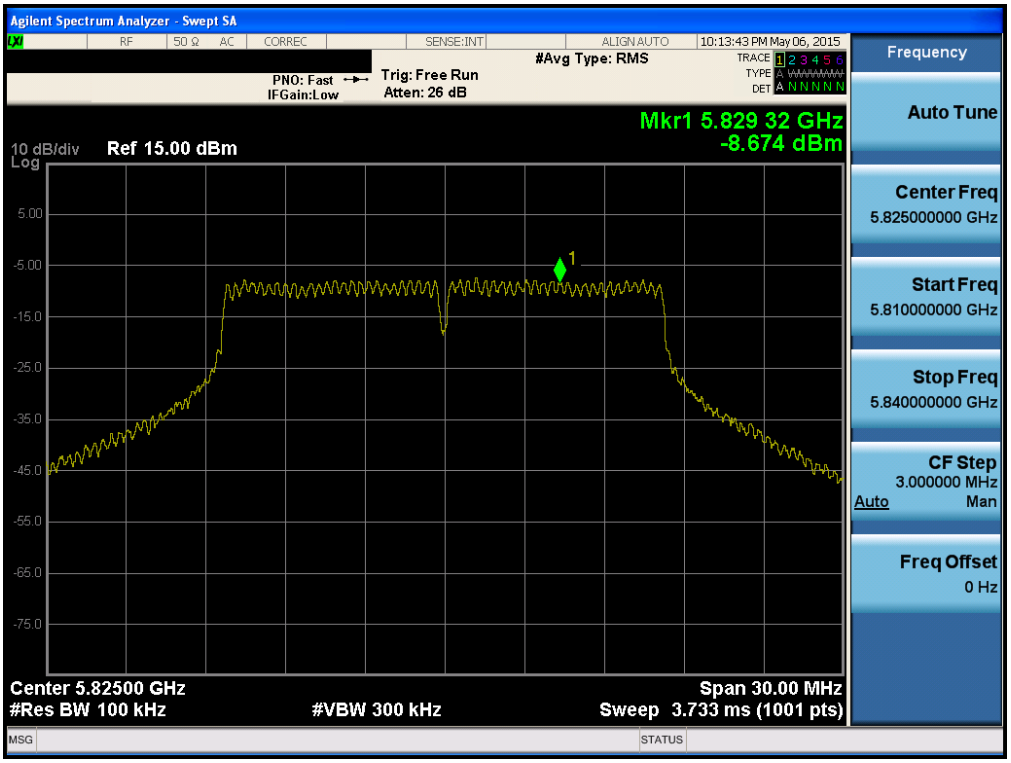


Maximum Power Spectral Density

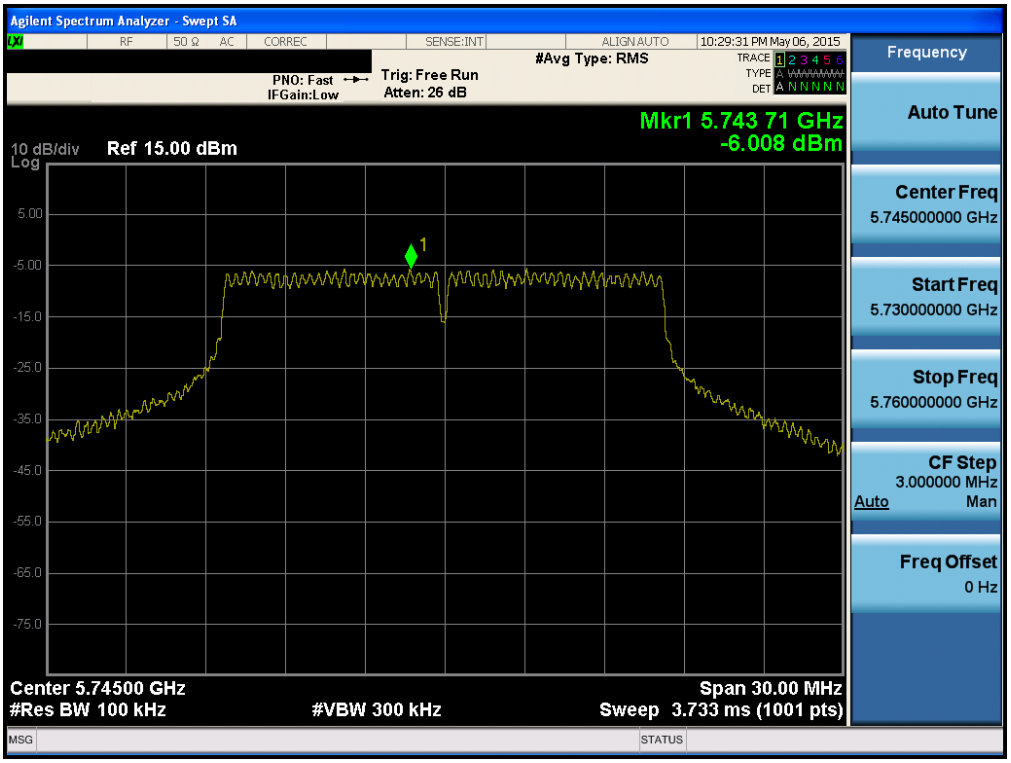
Test Mode: 802.11a & Ch.157 & ANT 1



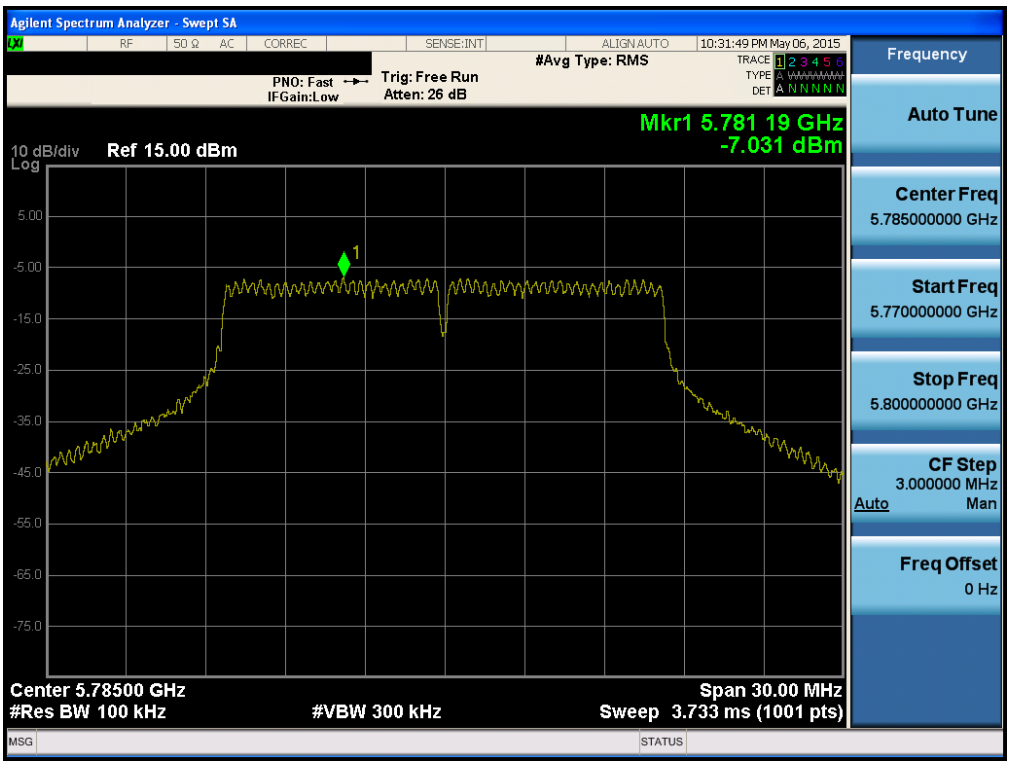
Maximum Power Spectral Density Test Mode: 802.11a & Ch.165 & ANT 1



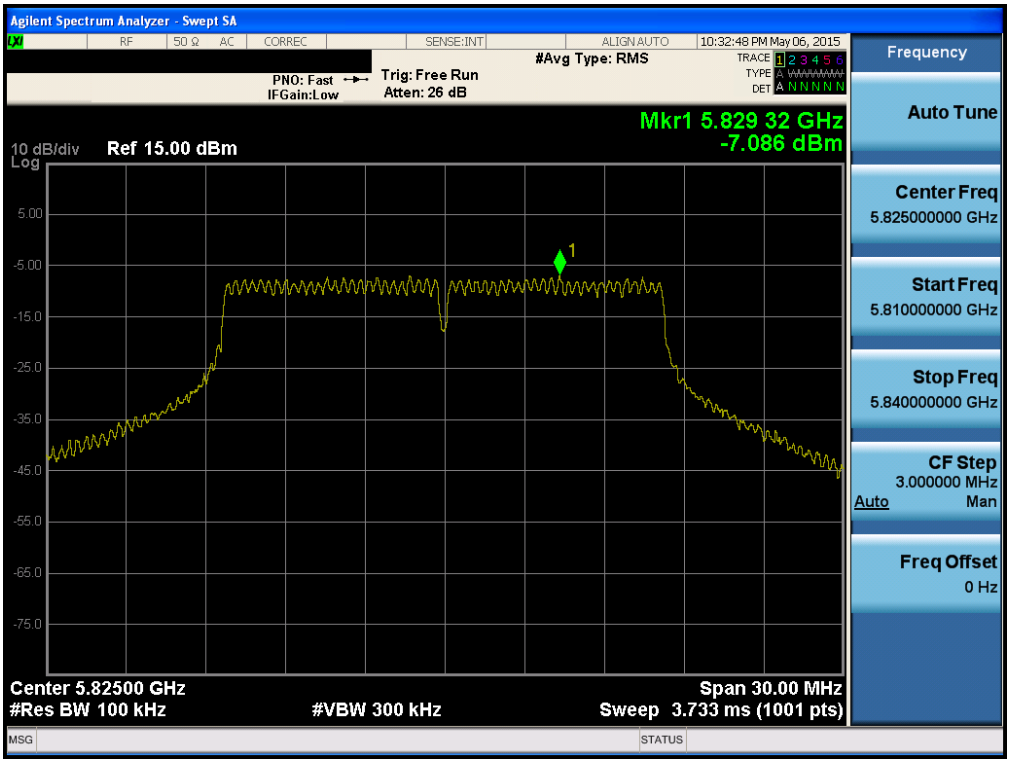
Maximum Power Spectral Density Test Mode: 802.11a & Ch.149 & ANT 2



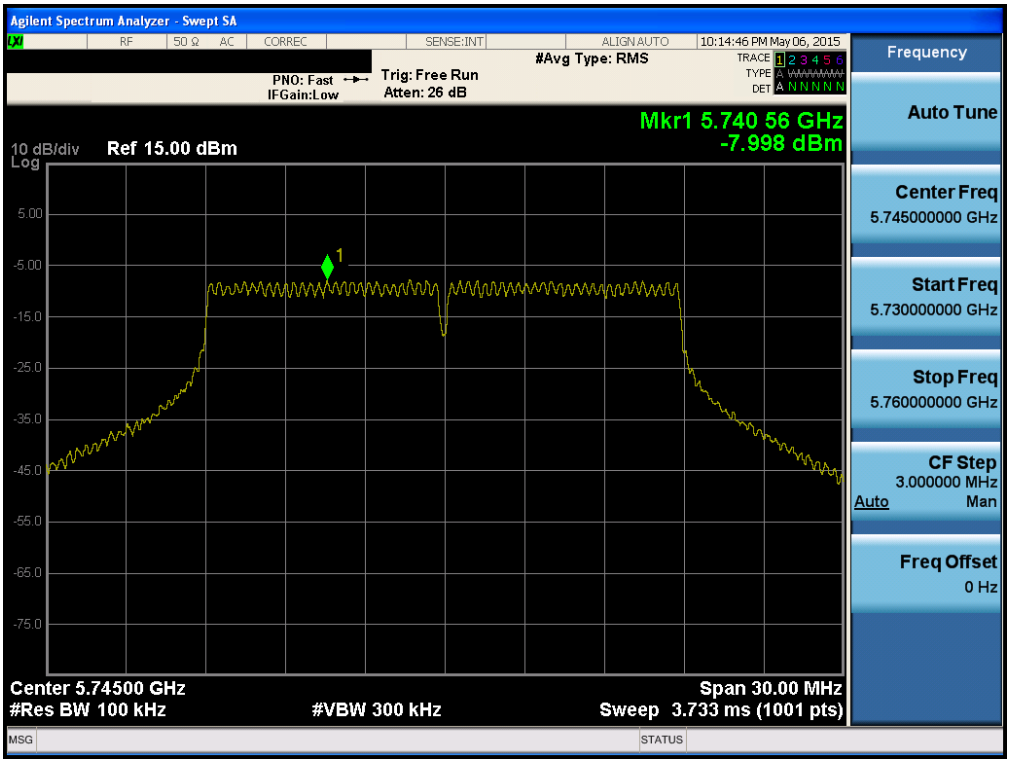
Maximum Power Spectral Density Test Mode: 802.11a & Ch.157 & ANT 2



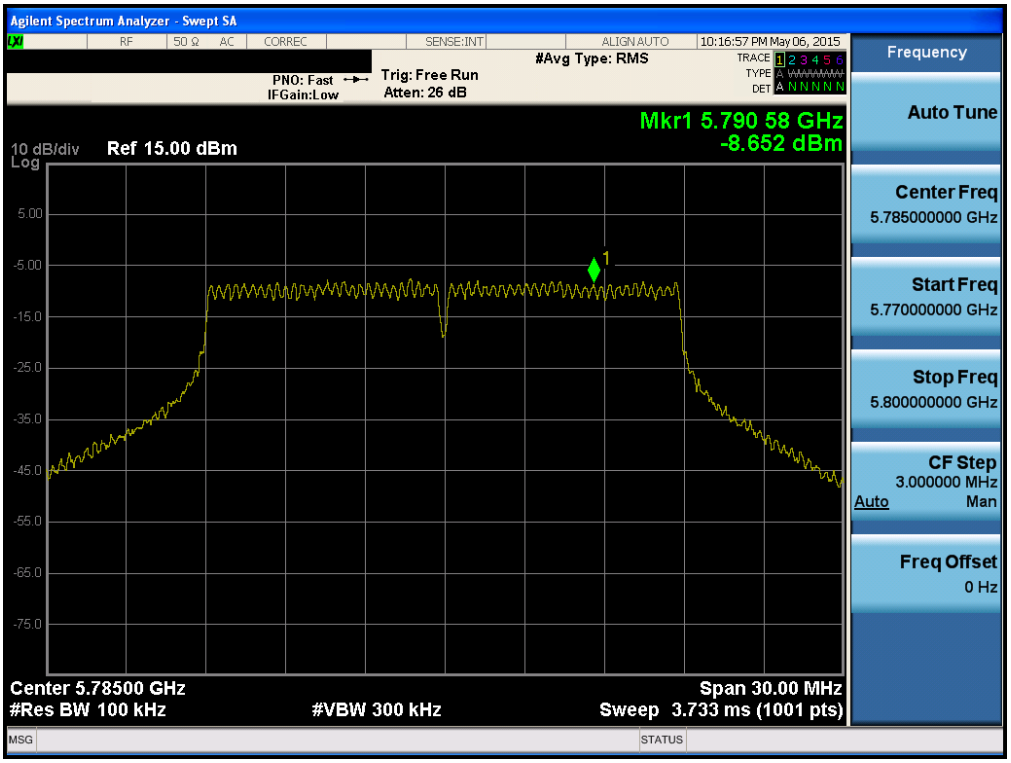
Maximum Power Spectral Density Test Mode: 802.11a & Ch.165 & ANT 2



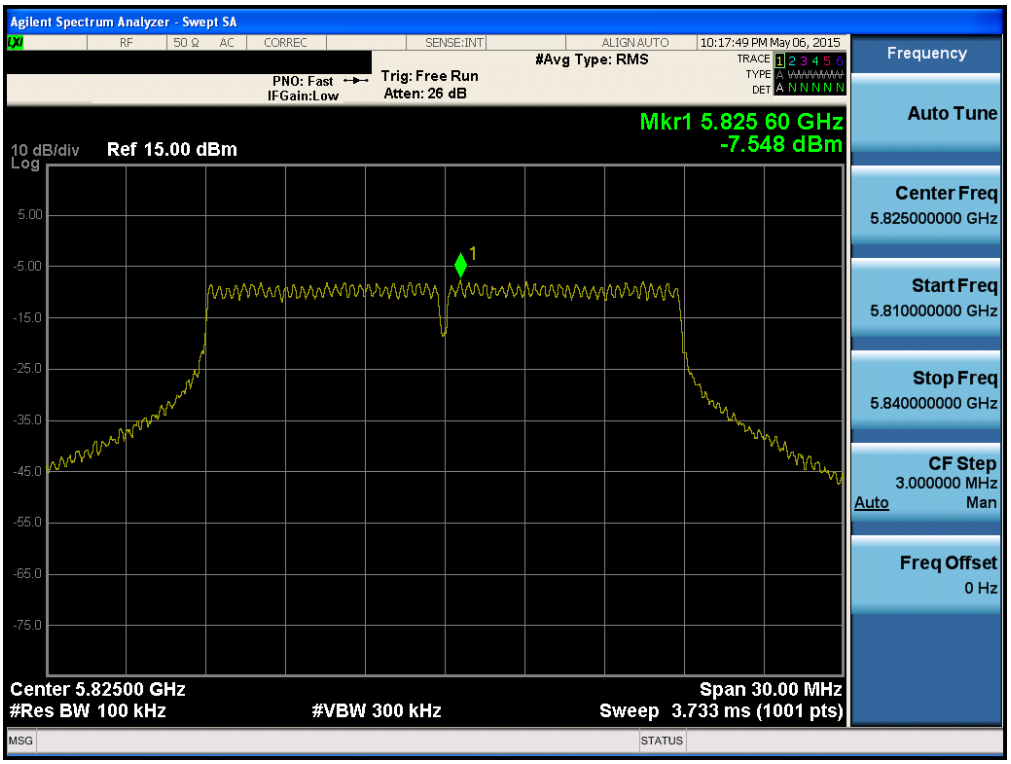
Maximum Power Spectral Density Test Mode: 802.11n HT20 & Ch.149 & ANT 1



Maximum Power Spectral Density Test Mode: 802.11n HT20 & Ch.157 & ANT 1



Maximum Power Spectral Density Test Mode: 802.11n HT20 & Ch.165 & ANT 1



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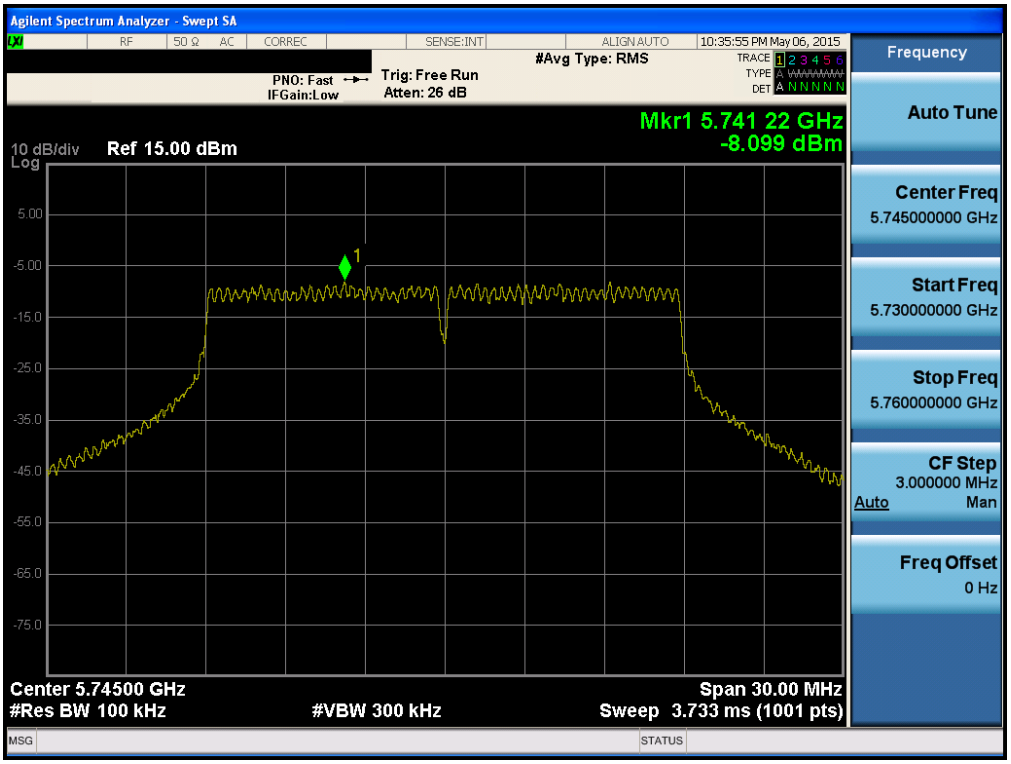
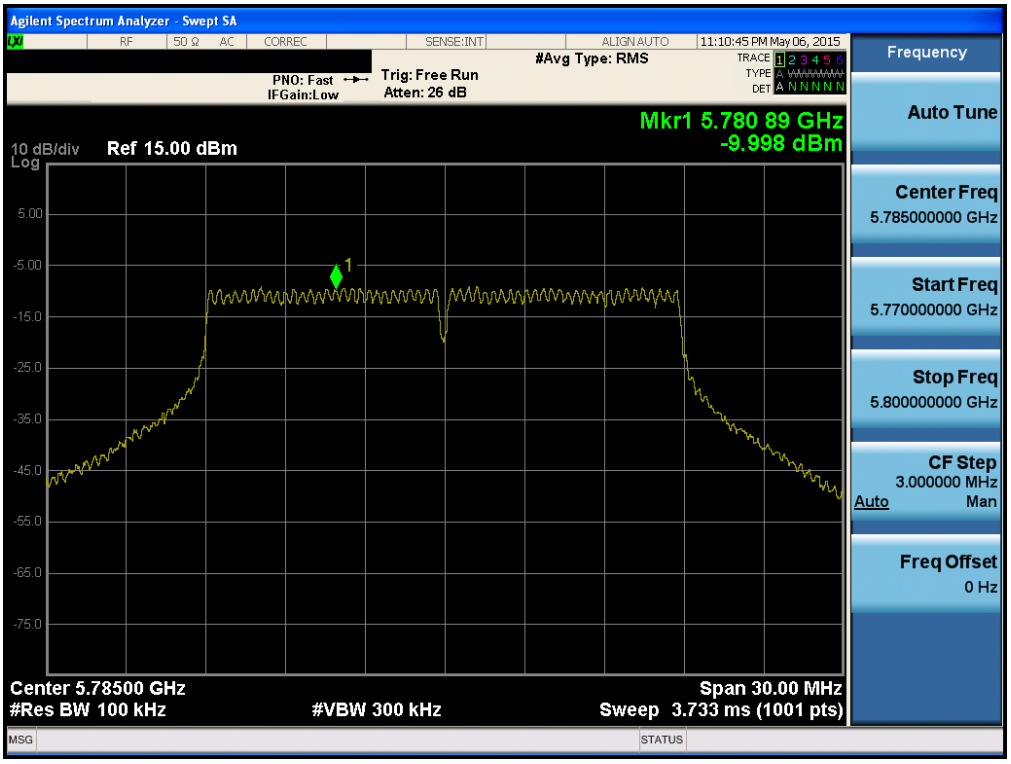
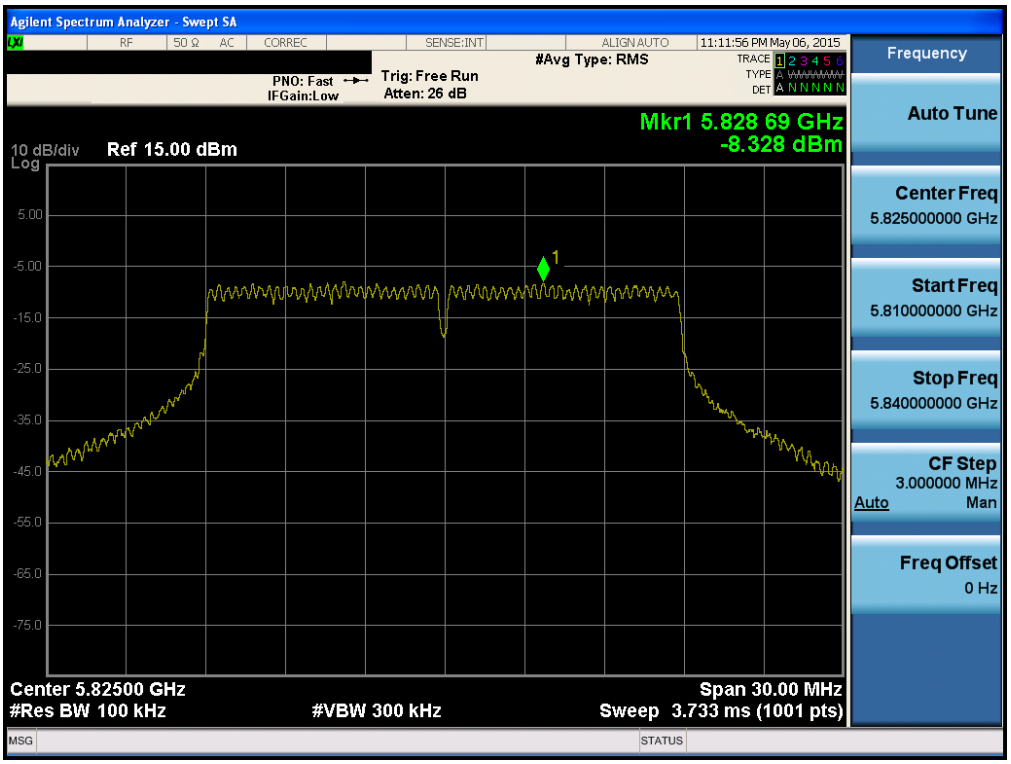


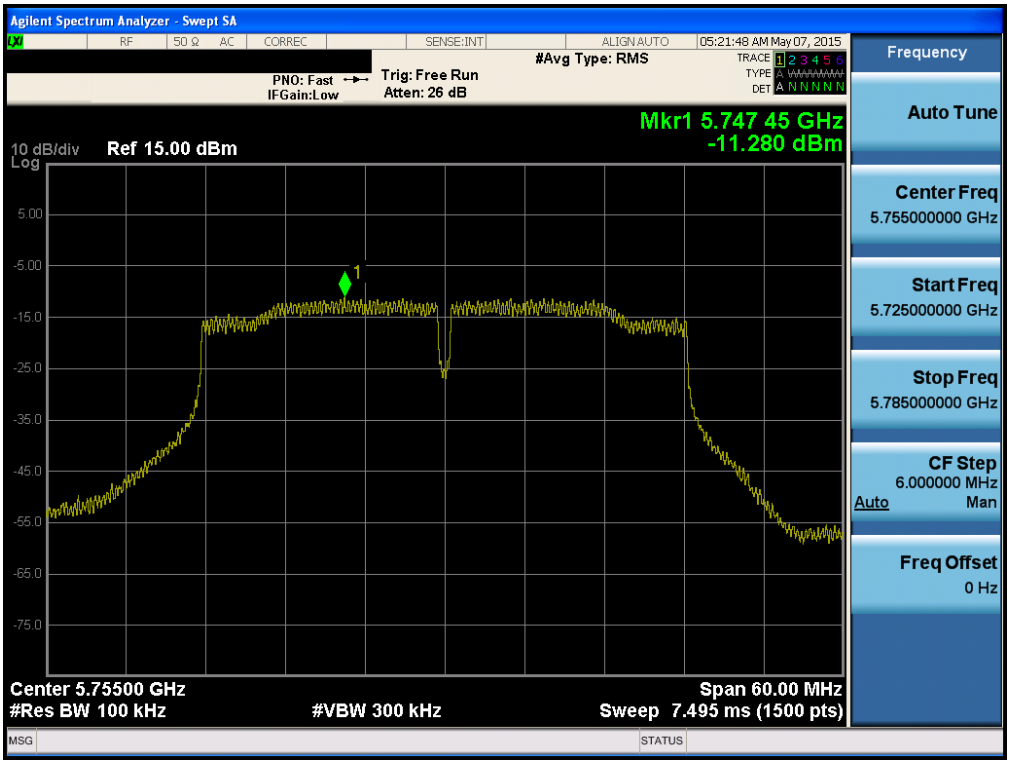
Maximum Power Spectral Density Test Mode: 802.11n HT20 & Ch.157 & ANT 2



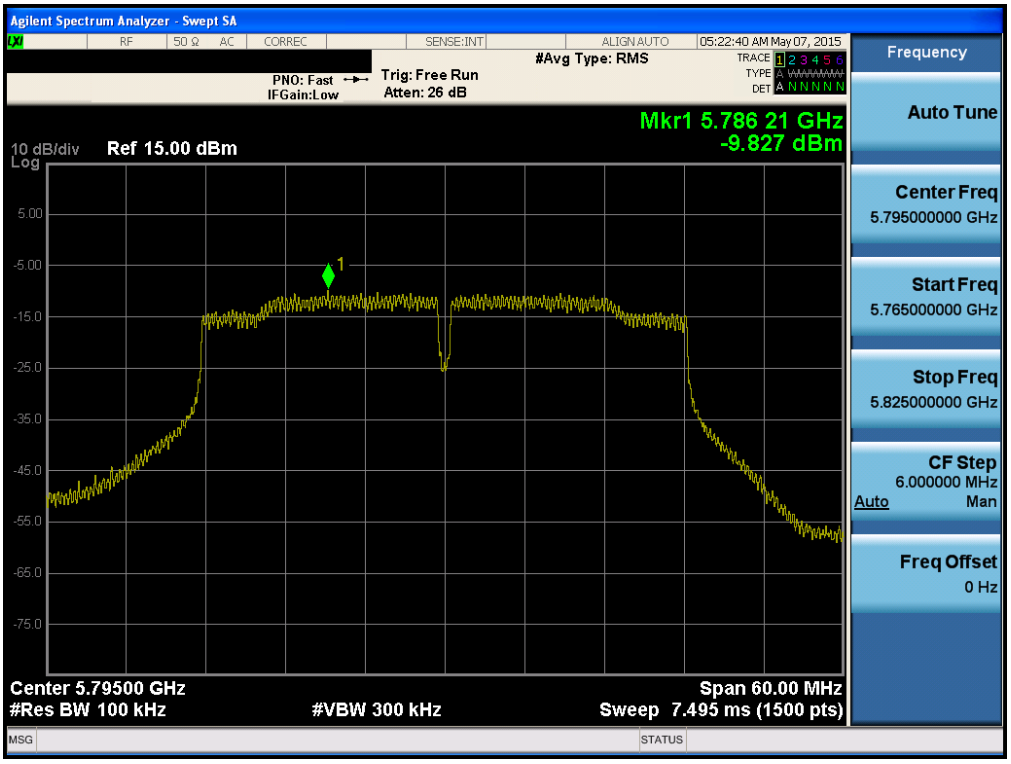
Maximum Power Spectral Density Test Mode: 802.11n HT20 & Ch.165 & ANT 2



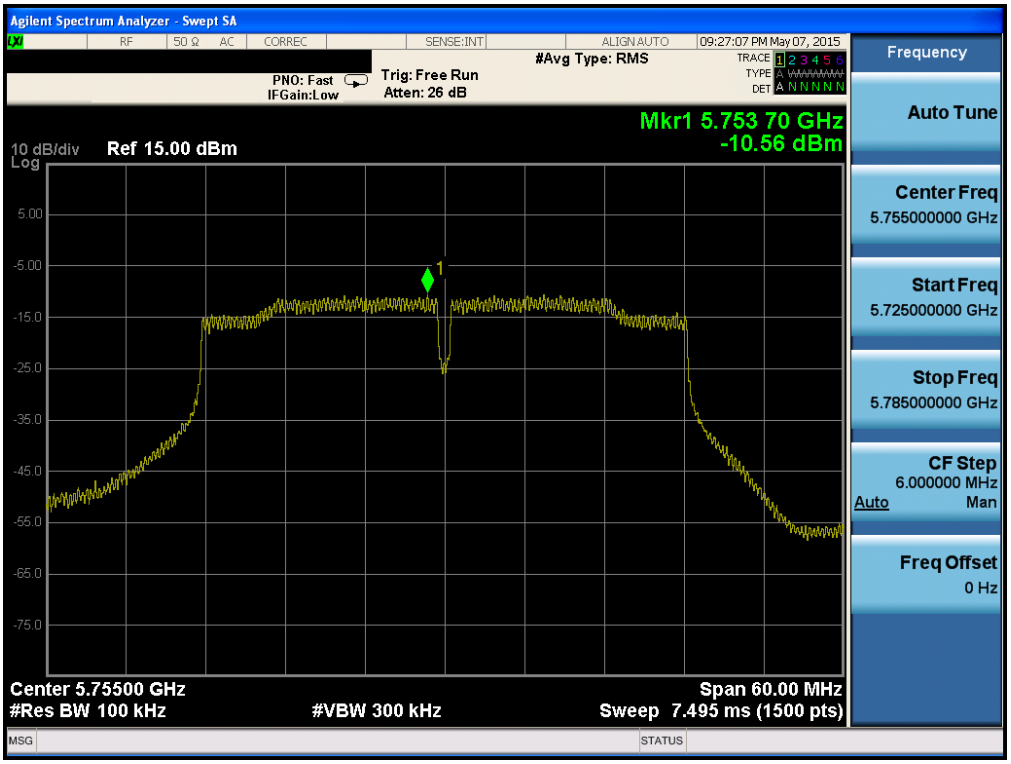
Maximum Power Spectral Density Test Mode: 802.11n HT40 & Ch.151 & ANT 1



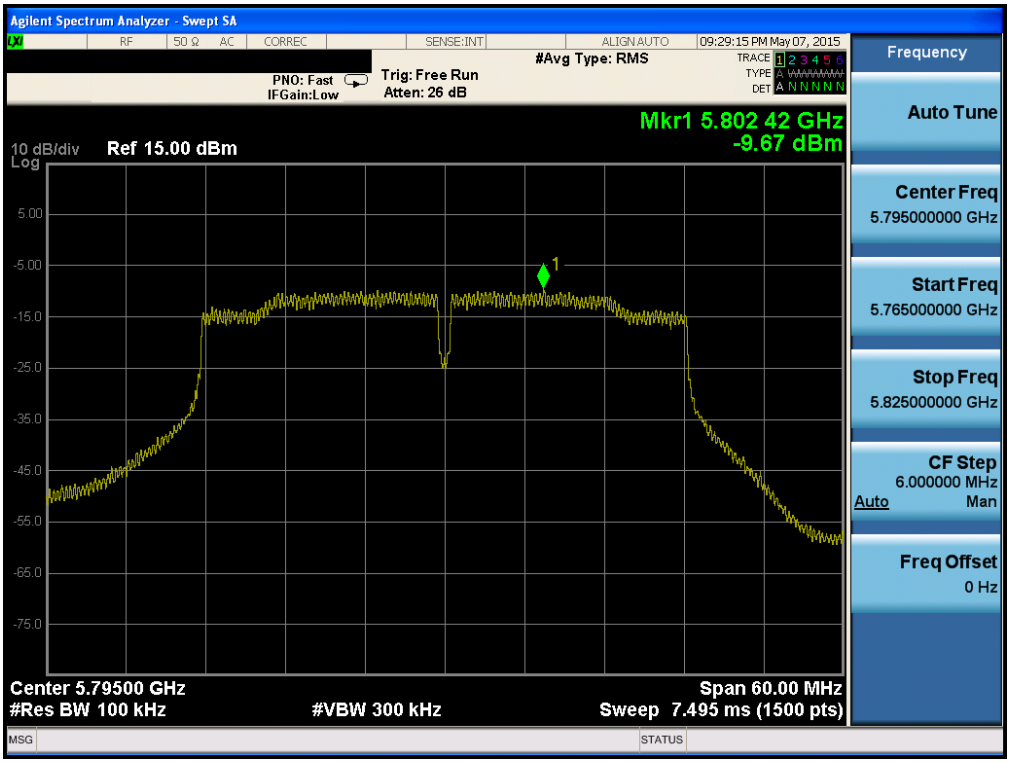
Maximum Power Spectral Density Test Mode: 802.11n HT40 & Ch.159 & ANT 1



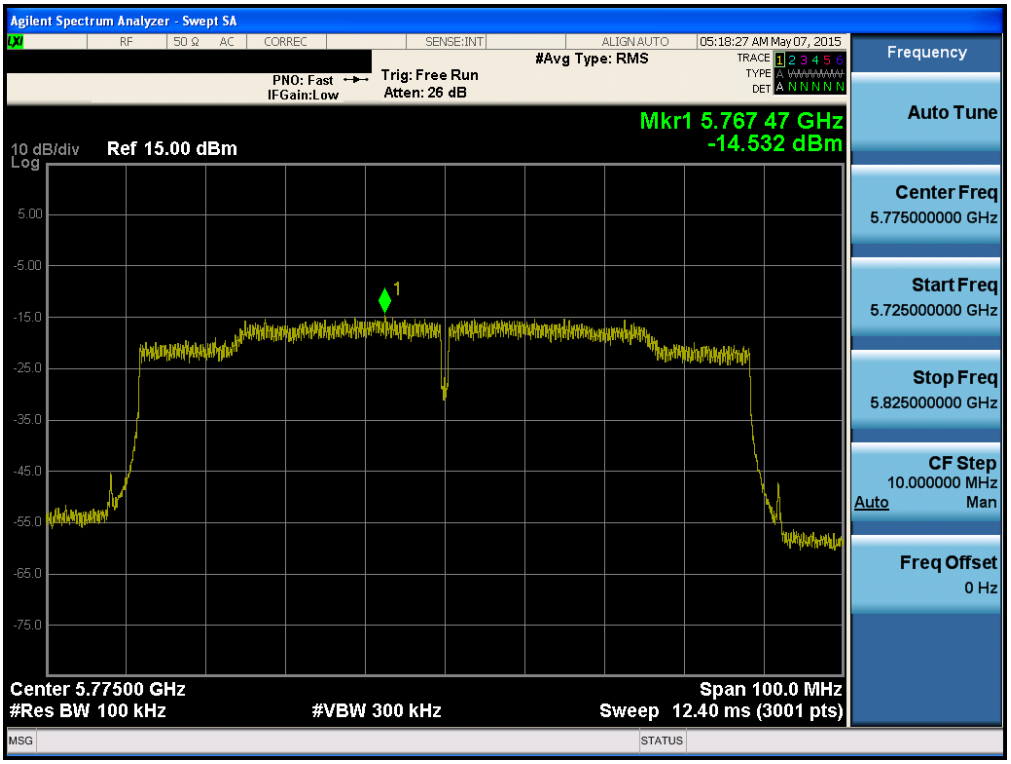
Maximum Power Spectral Density Test Mode: 802.11n HT40 & Ch.151 & ANT 2



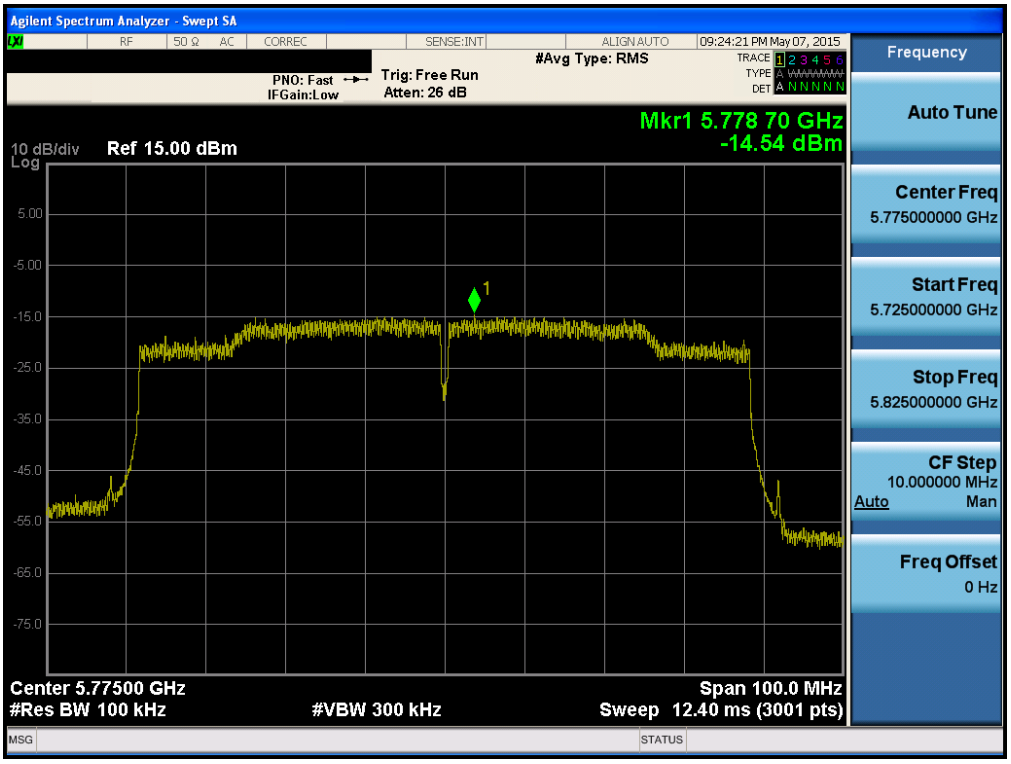
Maximum Power Spectral Density Test Mode: 802.11n HT40 & Ch.159 & ANT 2



Maximum Power Spectral Density Test Mode: 802.11ac VHT80 & Ch.155 & ANT 1



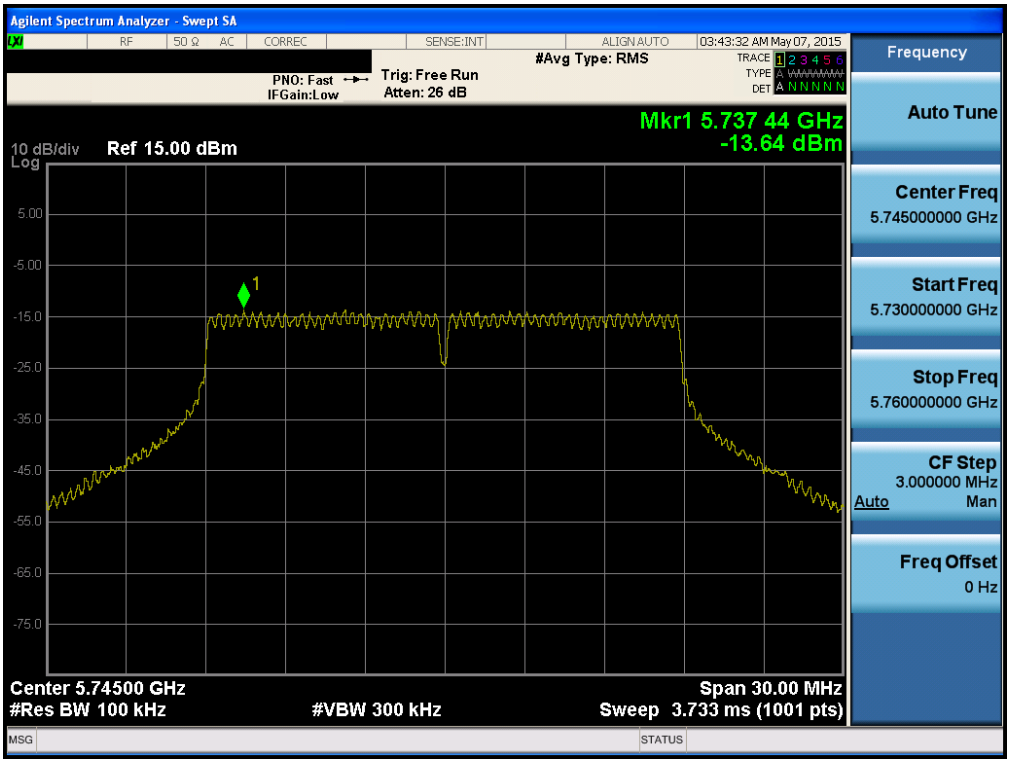
Maximum Power Spectral Density Test Mode: 802.11ac VHT80 & Ch.155 & ANT 2



▣ RESULT PLOTS(Multiple Transmit)

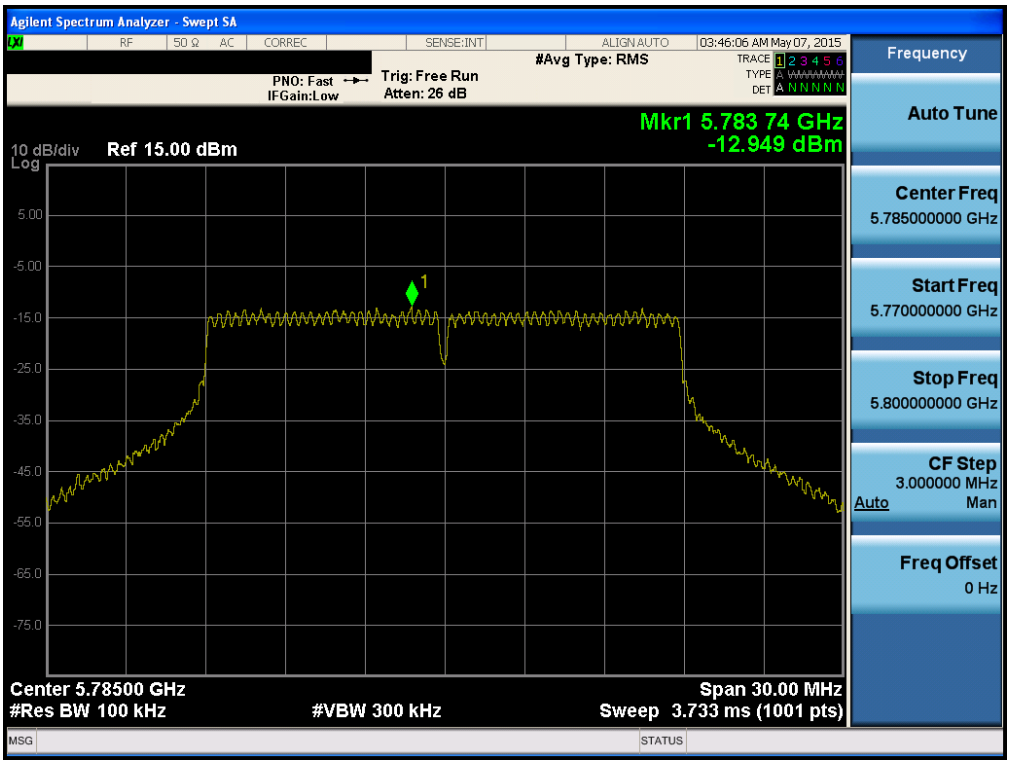
Maximum Power Spectral Density

Test Mode: 802.11n HT20 & Ch.149 & ANT 1

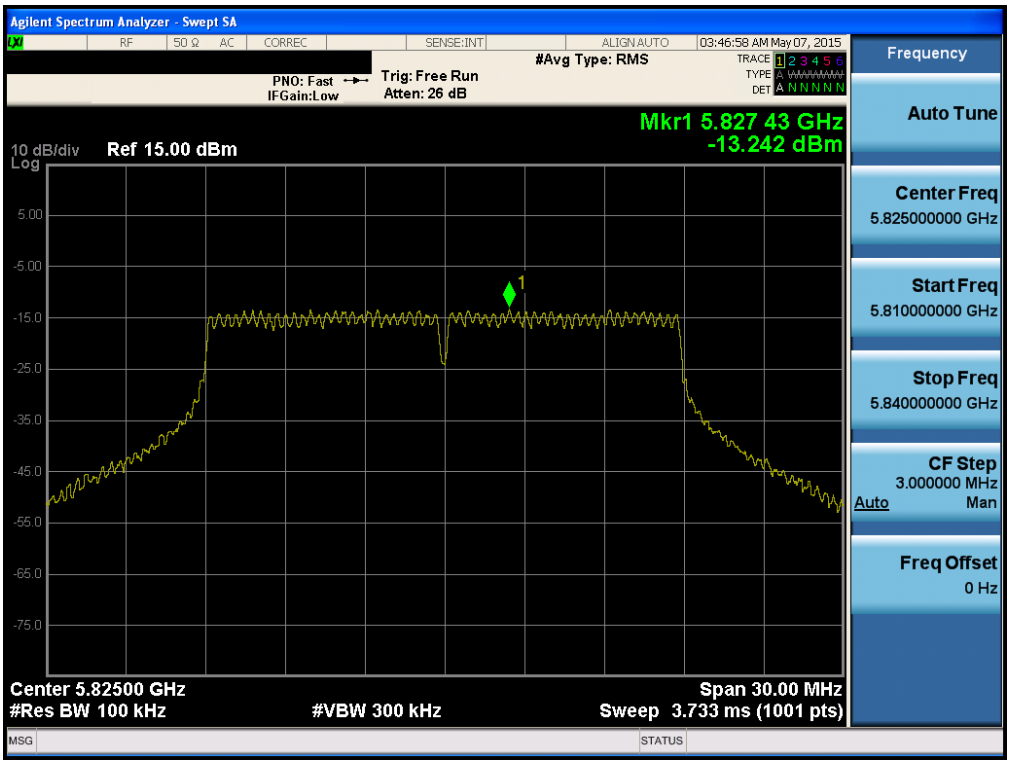


Maximum Power Spectral Density

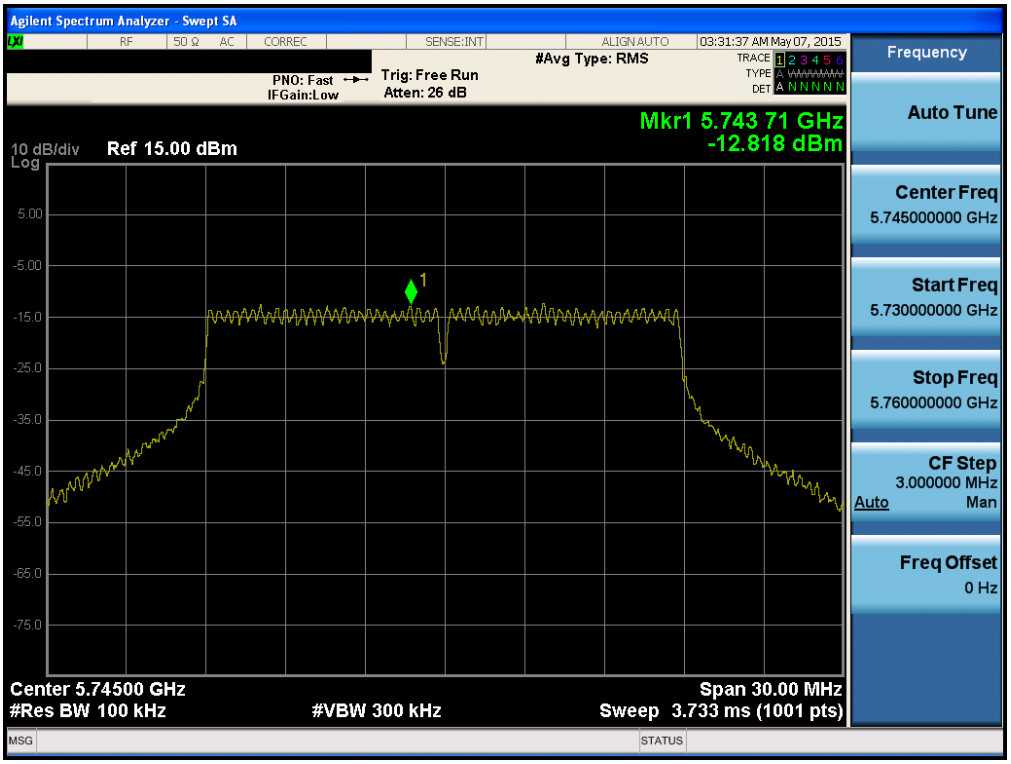
Test Mode: 802.11n HT20 & Ch.157 & ANT 1



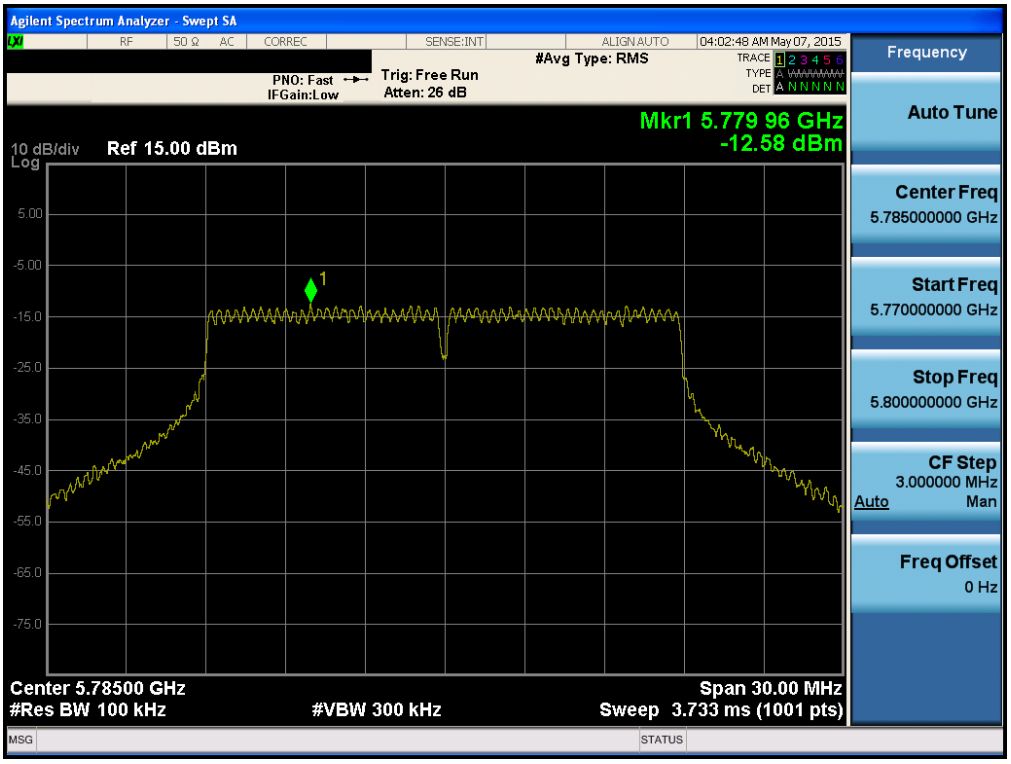
Maximum Power Spectral Density Test Mode: 802.11n HT20 & Ch.165 & ANT 1



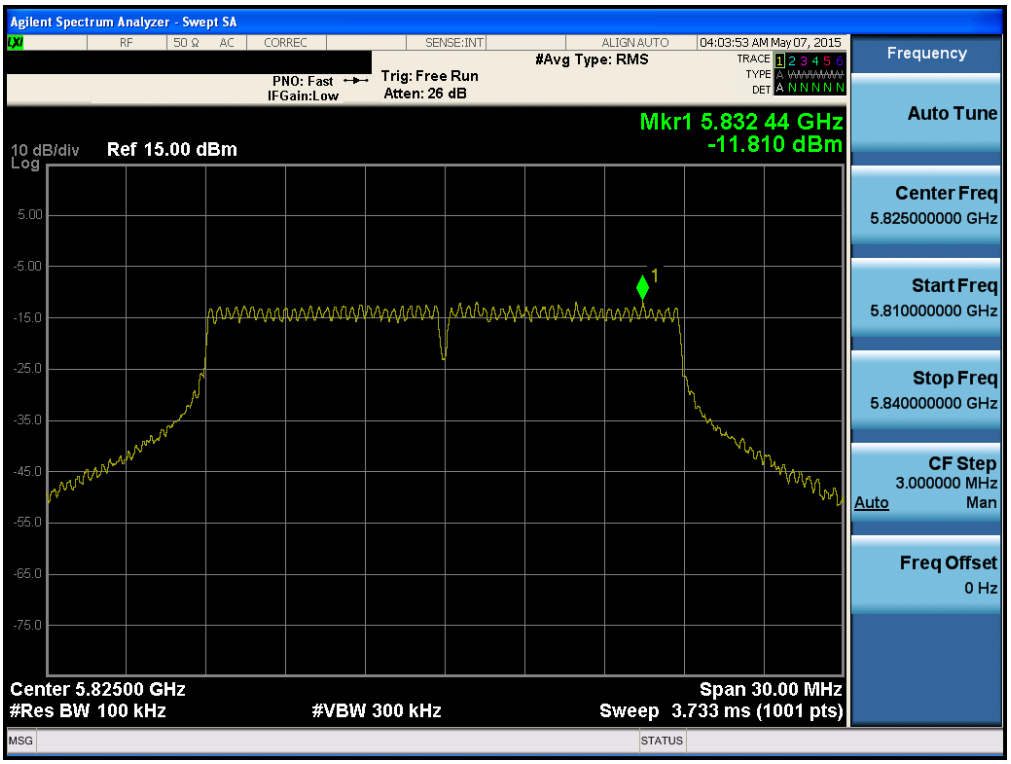
Maximum Power Spectral Density Test Mode: 802.11n HT20 & Ch.149 & ANT 2



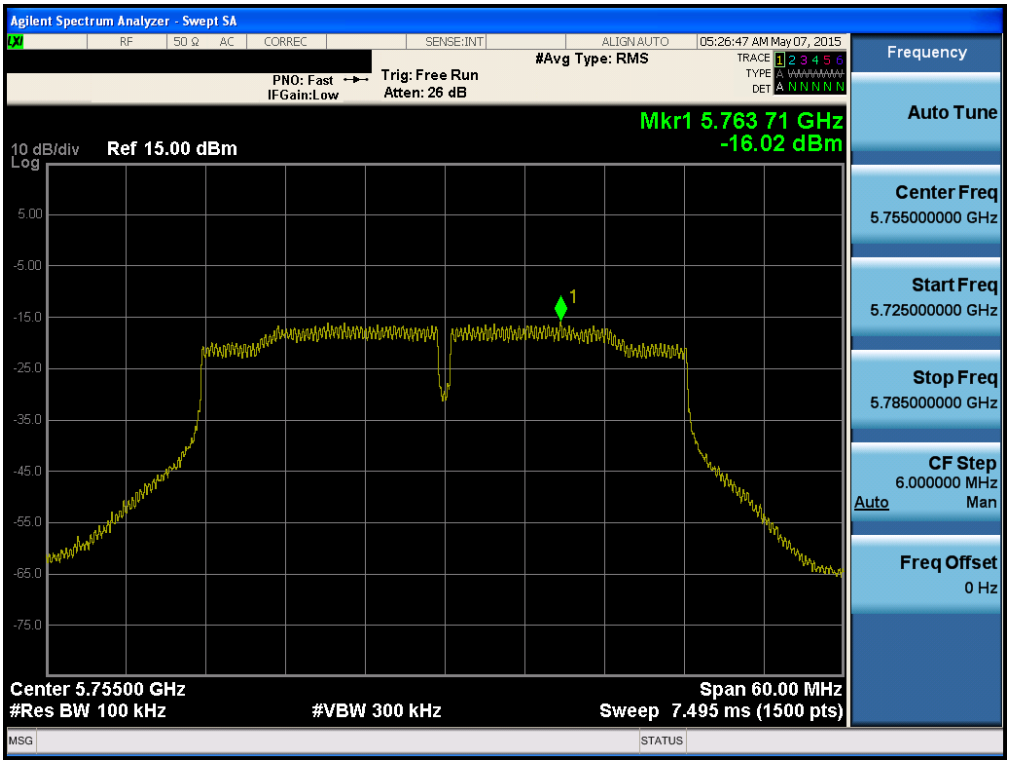
Maximum Power Spectral Density Test Mode: 802.11n HT20 & Ch.157 & ANT 2



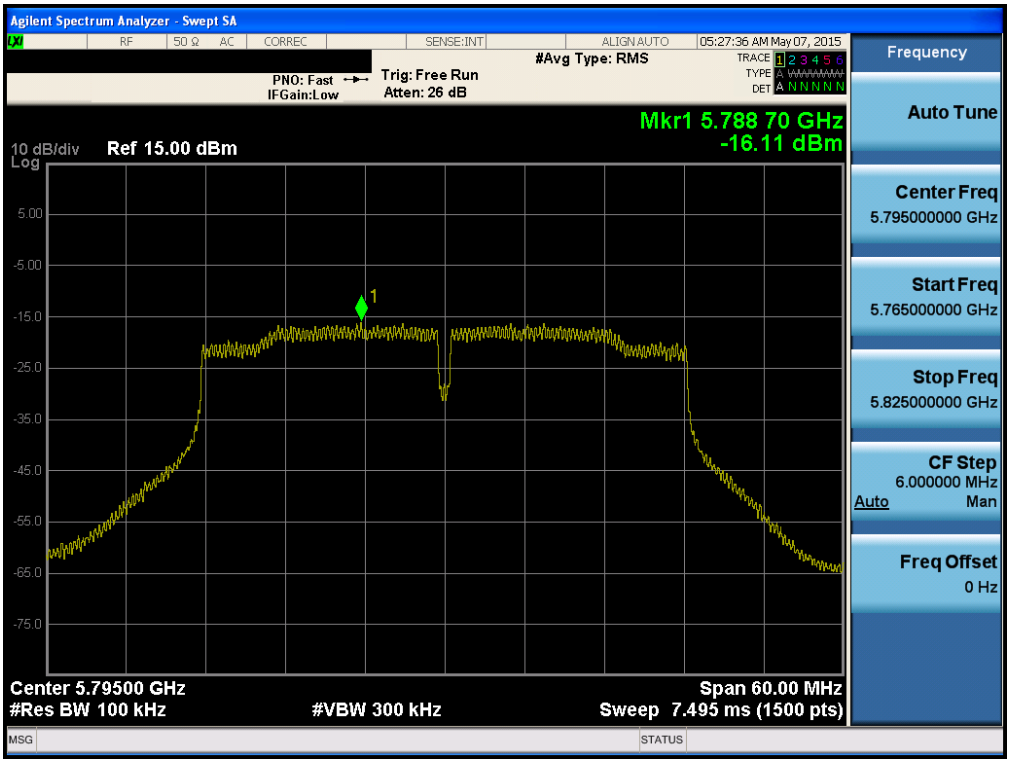
Maximum Power Spectral Density Test Mode: 802.11n HT20 & Ch.165 & ANT 2



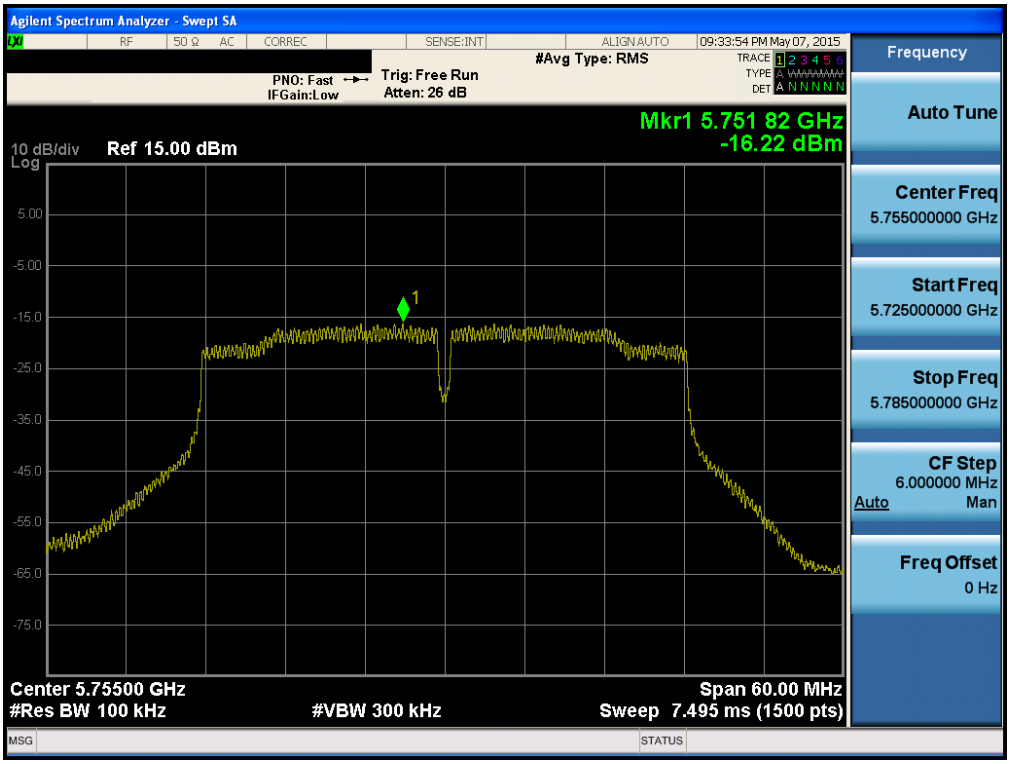
Maximum Power Spectral Density Test Mode: 802.11n HT40 & Ch.151 & ANT 1



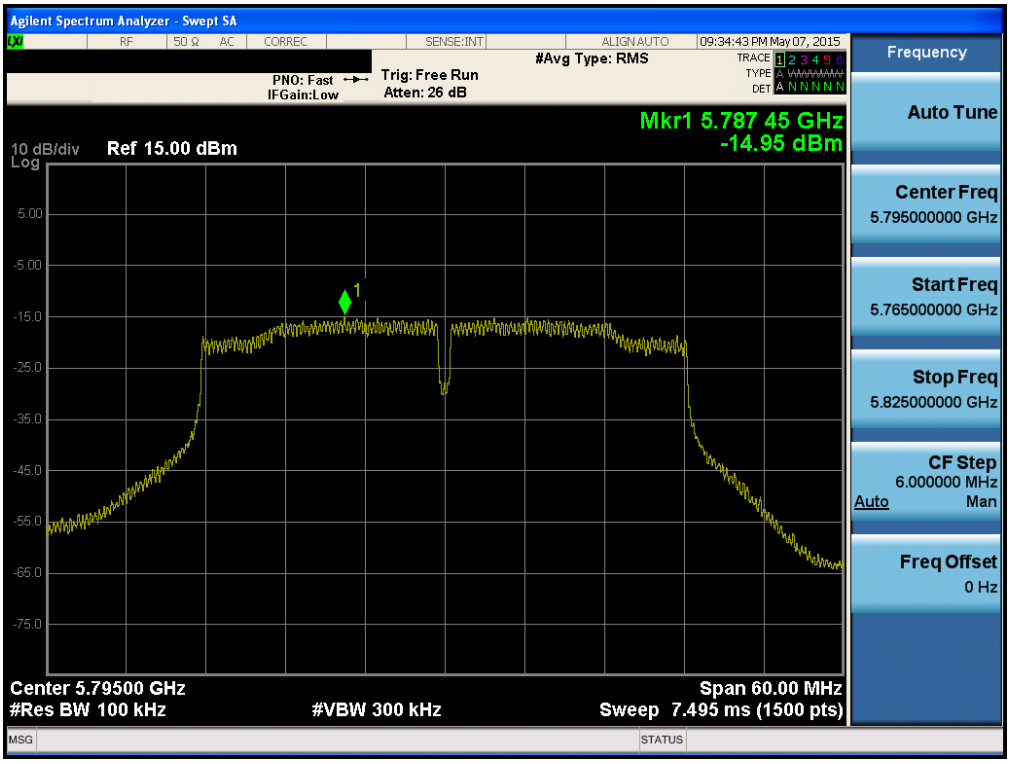
Maximum Power Spectral Density Test Mode: 802.11n HT40 & Ch.159 & ANT 1



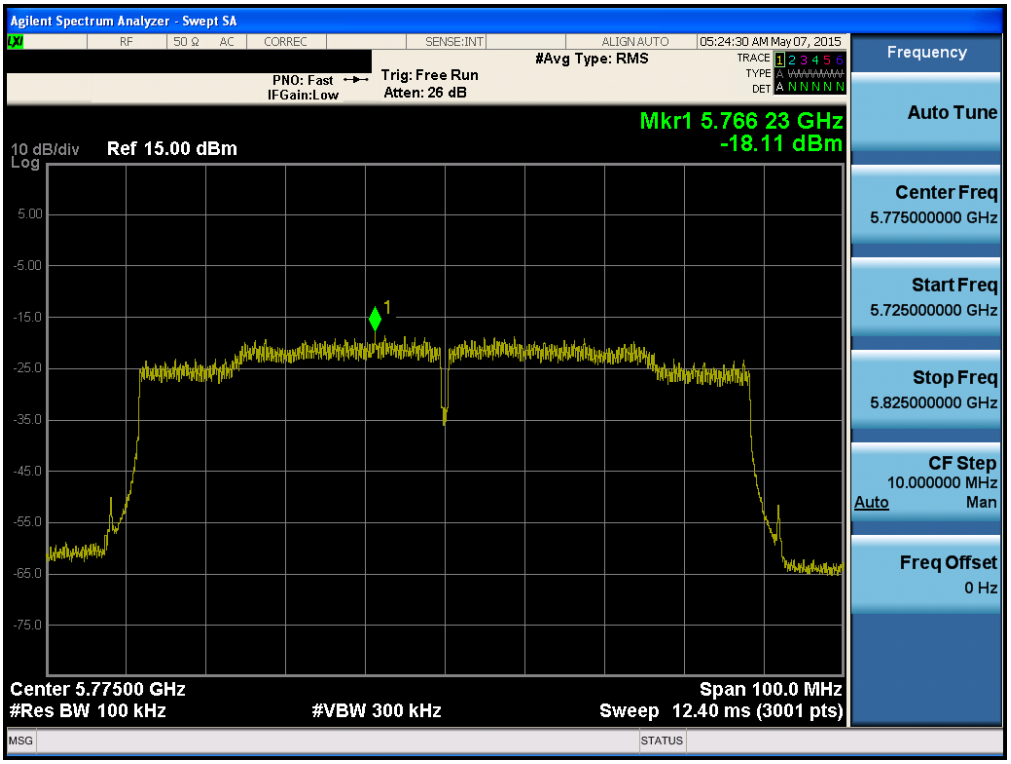
Maximum Power Spectral Density Test Mode: 802.11n HT40 & Ch.151 & ANT 2



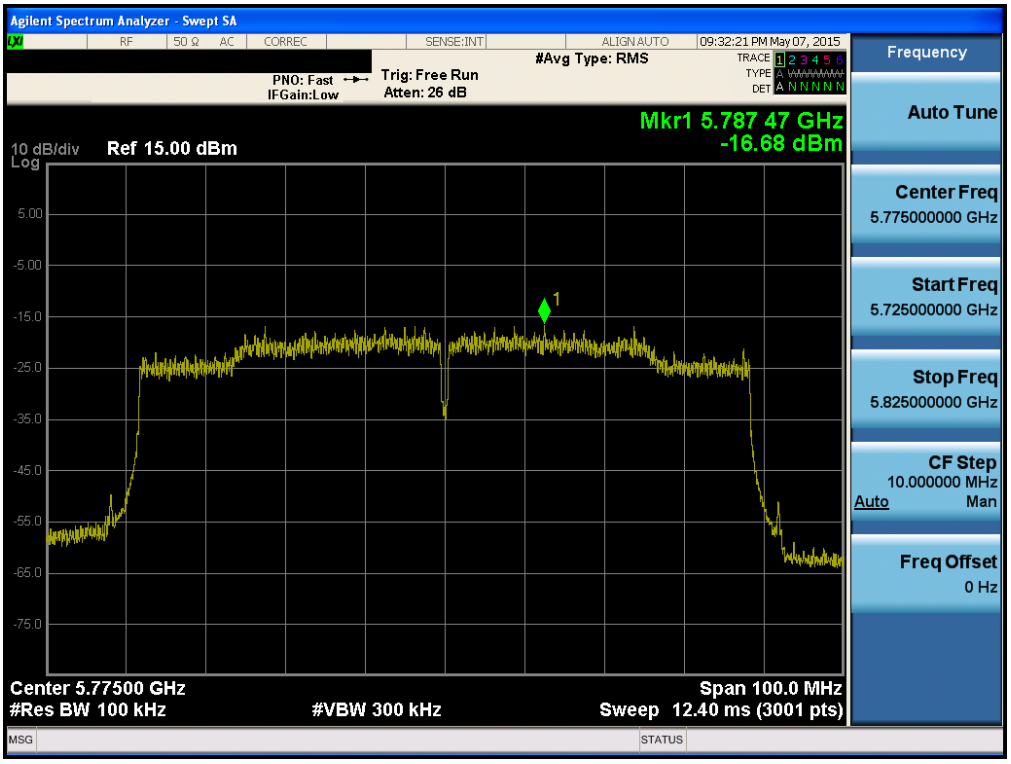
Maximum Power Spectral Density Test Mode: 802.11n HT40 & Ch.159 & ANT 2



Maximum Power Spectral Density Test Mode: 802.11ac VHT80 & Ch.155 & ANT 1



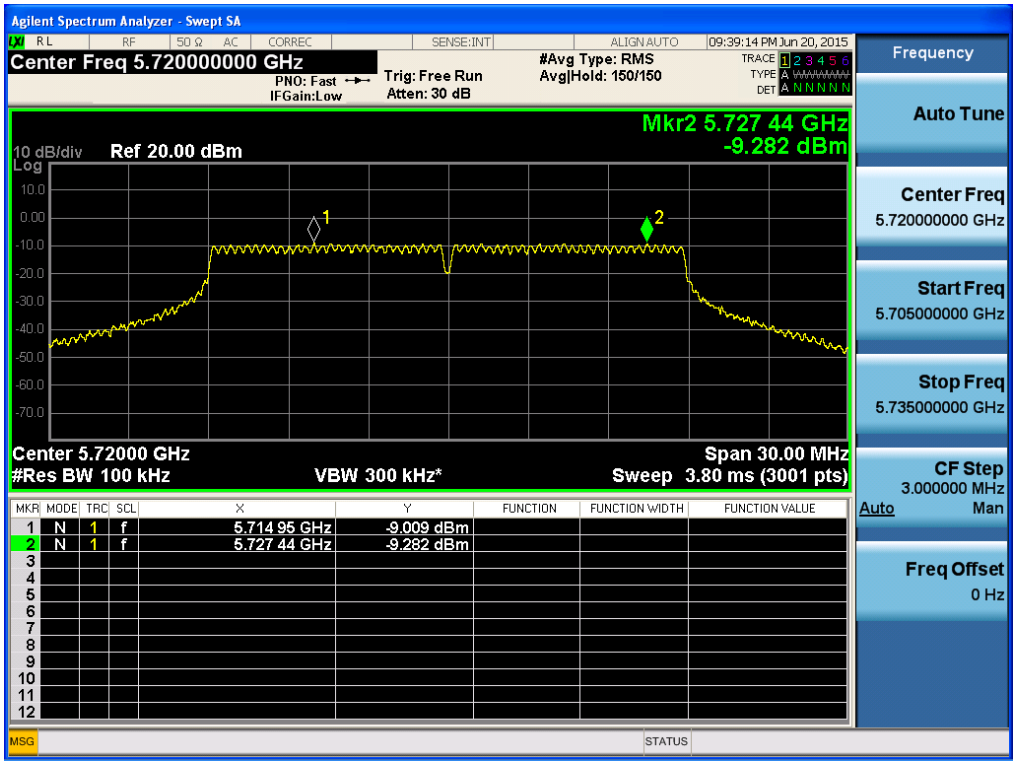
Maximum Power Spectral Density Test Mode: 802.11ac VHT80 & Ch.155 & ANT 2



▣ RESULT PLOTS (Band-Crossing Channels & Single Transmit)

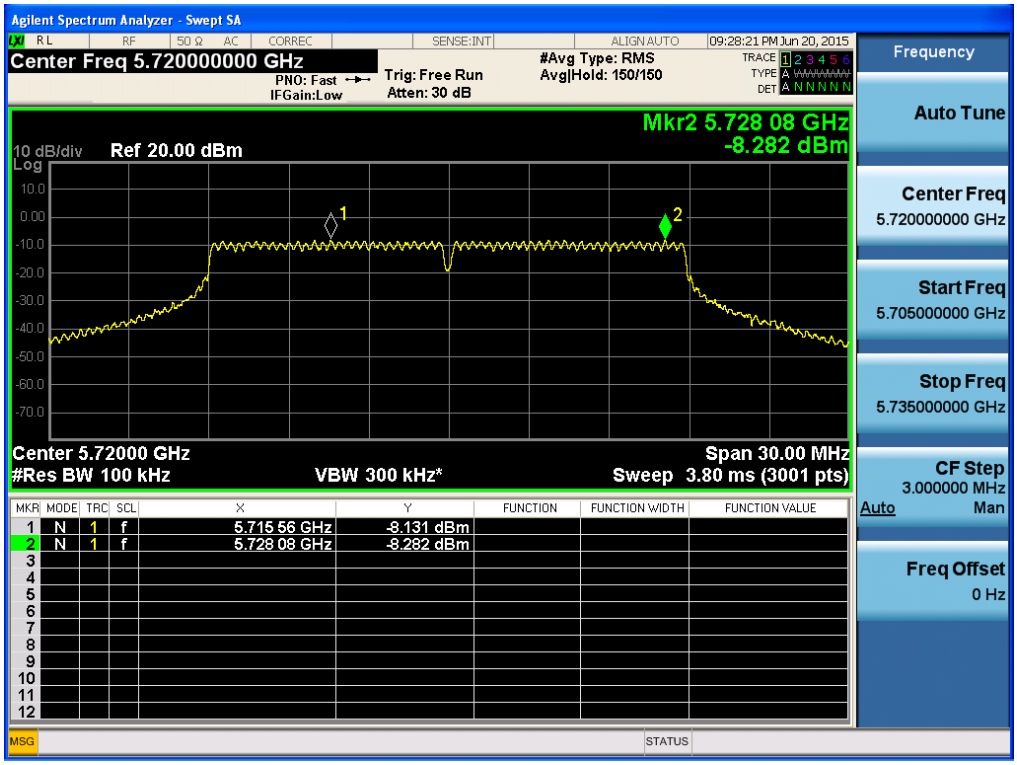
Maximum Power Spectral Density

Test Mode: 802.11ac VHT20 & Ch.144 & ANT 1

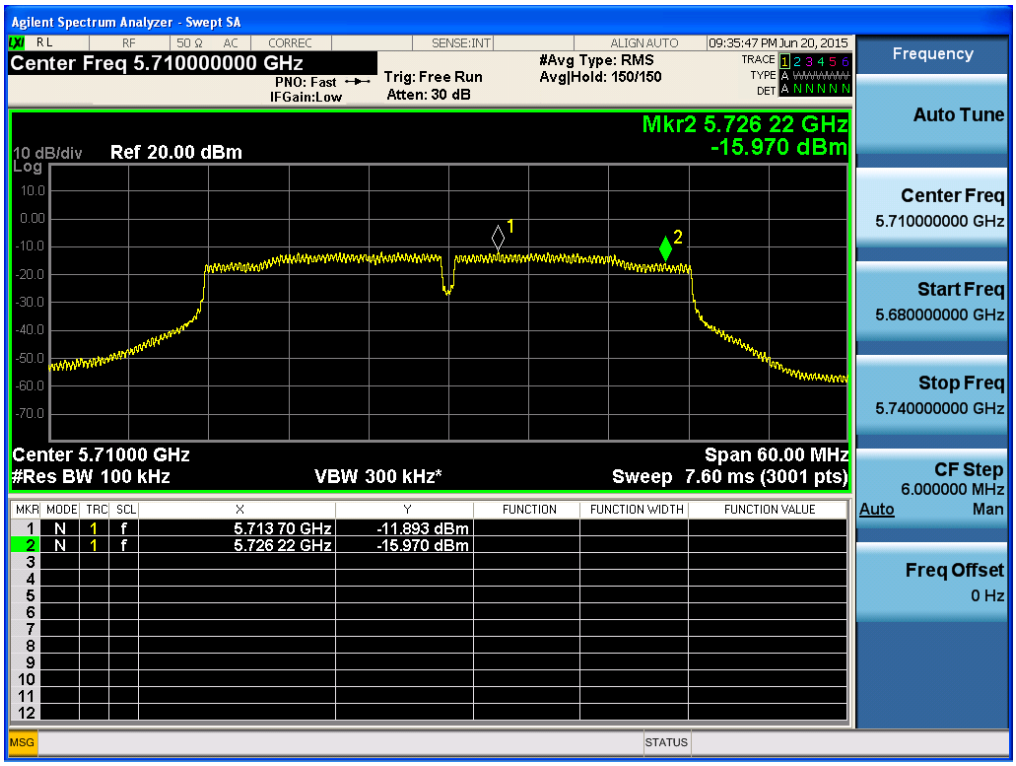


Maximum Power Spectral Density

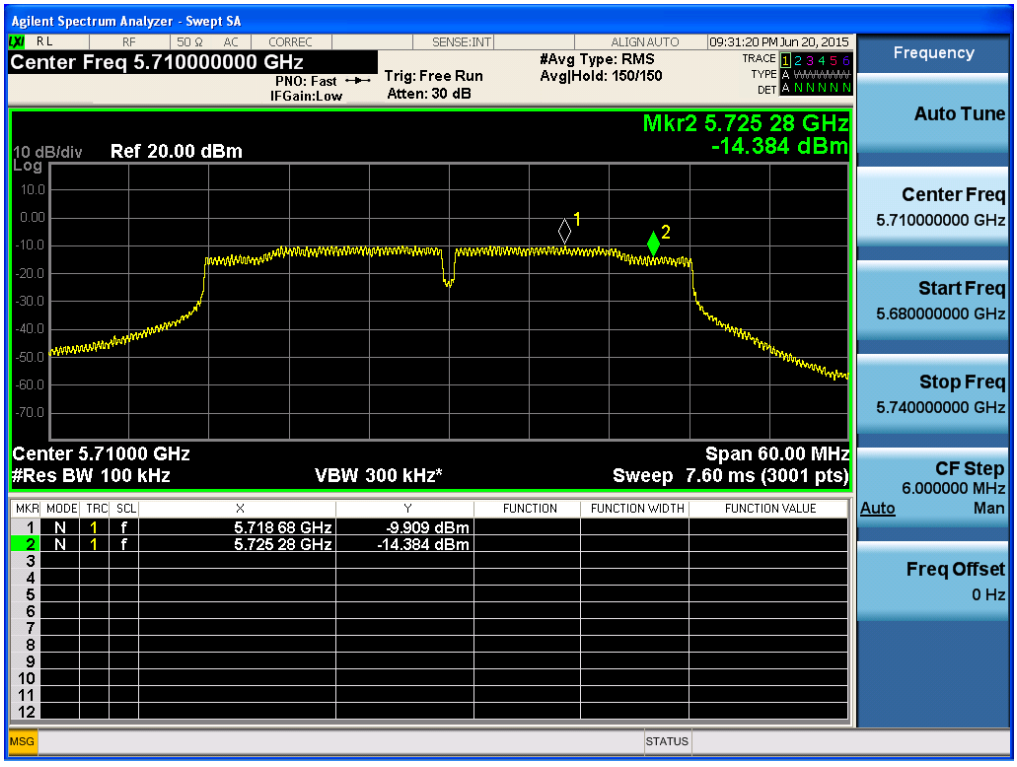
Test Mode: 802.11 ac VHT20 & Ch.144 & ANT 2



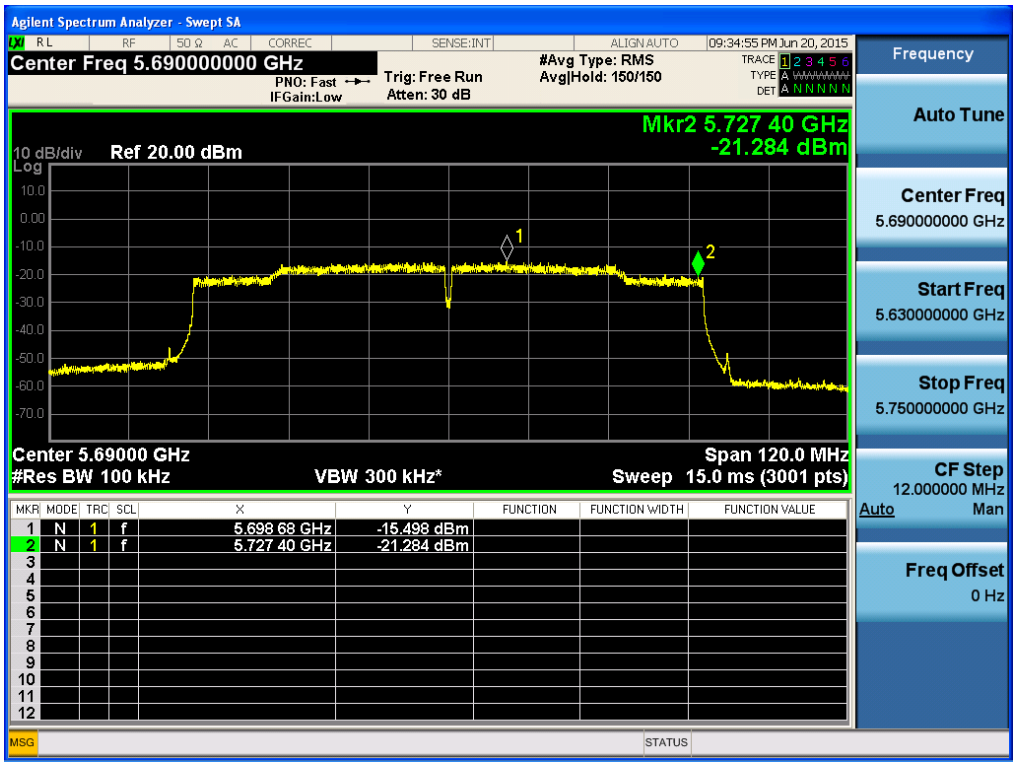
Maximum Power Spectral Density Test Mode: 802.11ac VHT40 & Ch.142 & ANT 1



Maximum Power Spectral Density Test Mode: 802.11 ac VHT40 & Ch.142 & ANT 2



Maximum Power Spectral Density Test Mode: 802.11ac VHT80 & Ch.138 & ANT 1



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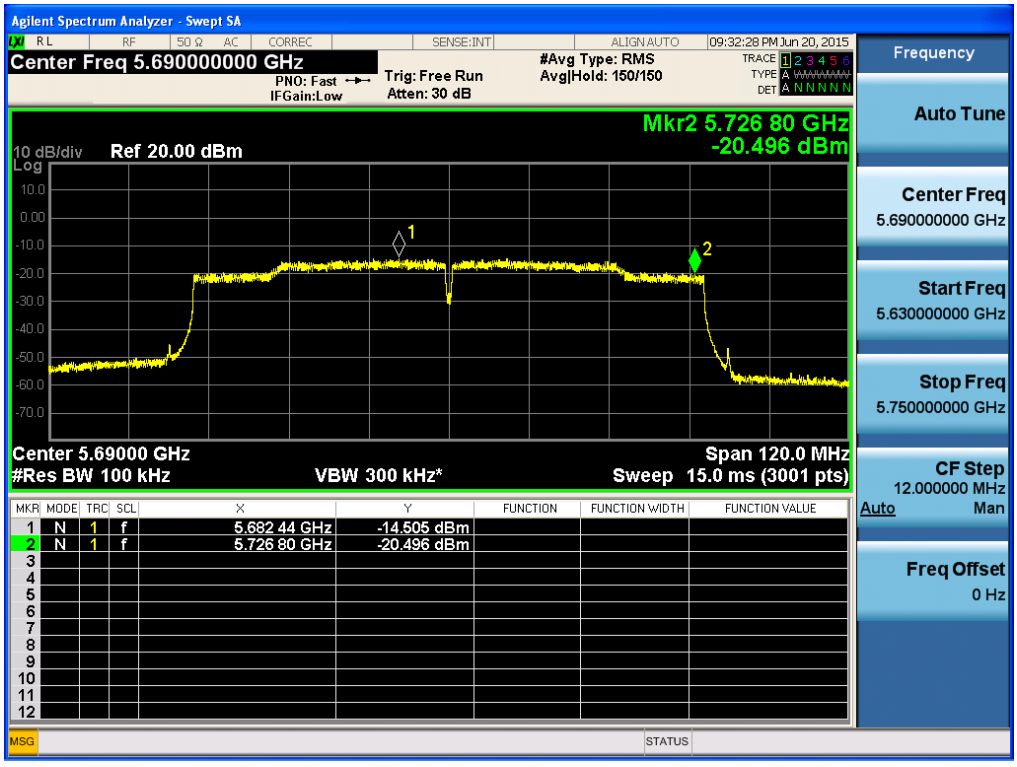
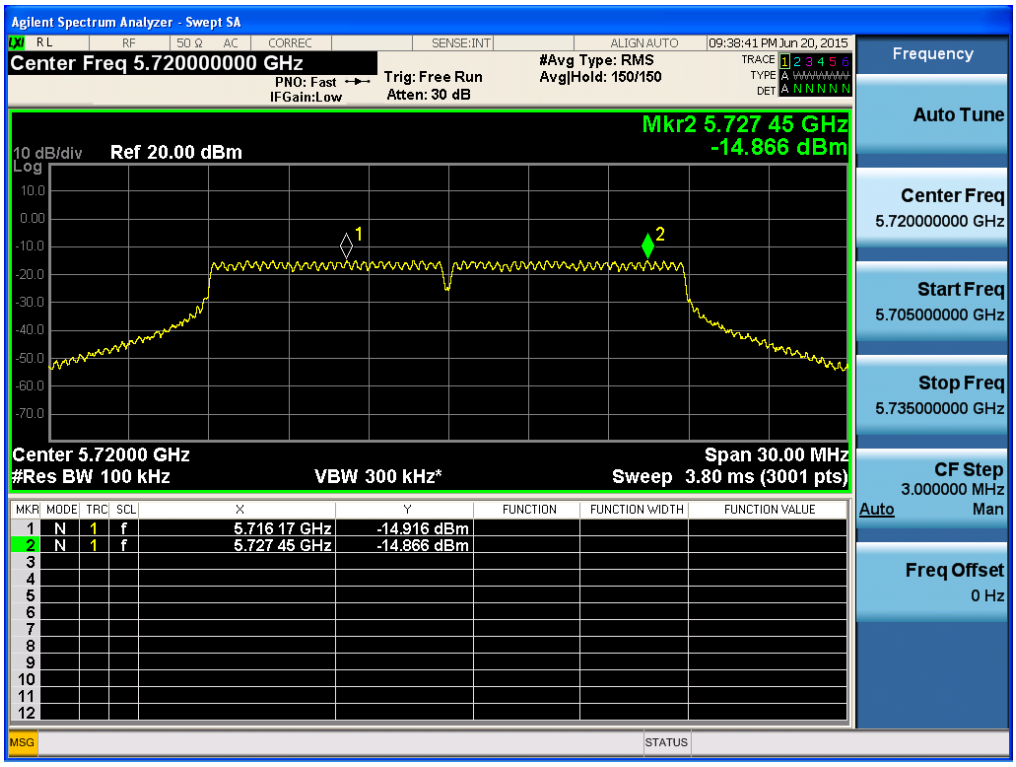
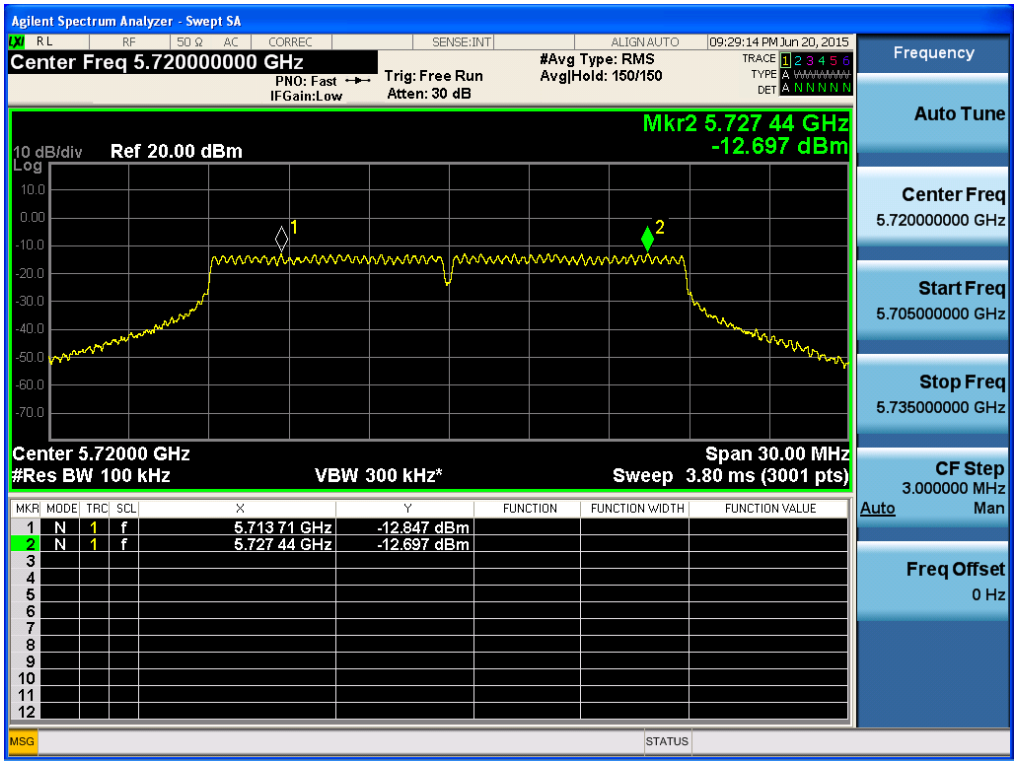


▣ RESULT PLOTS(Band-Crossing Channels & Multiple Transmit)

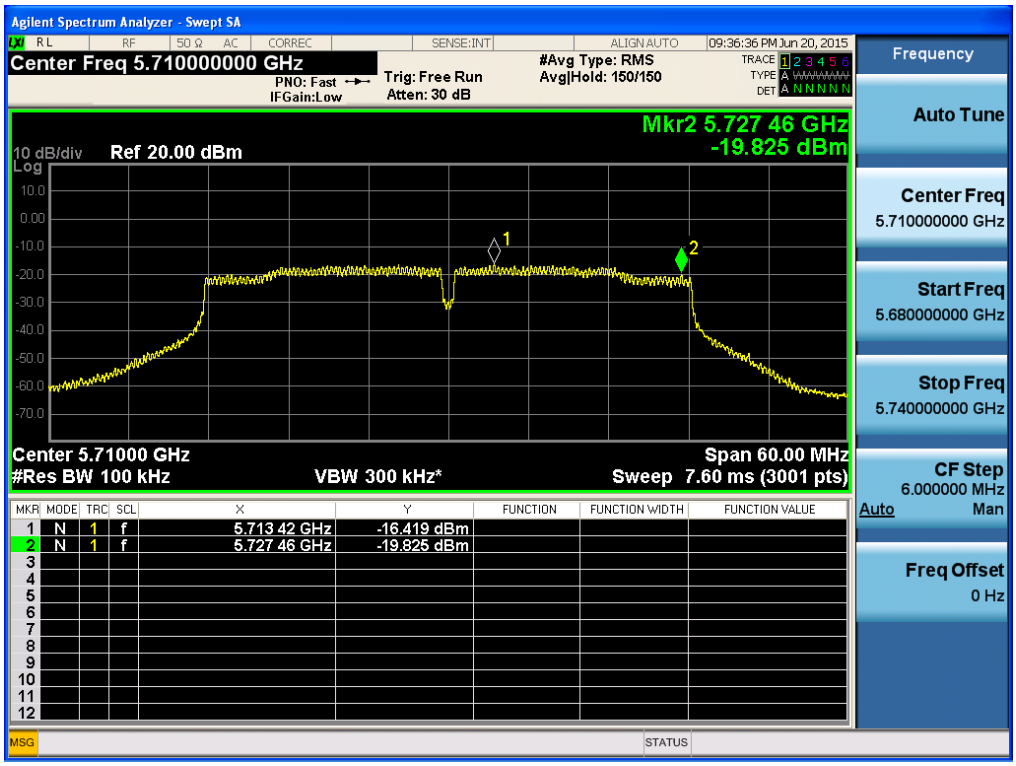
Maximum Power Spectral Density Test Mode: 802.11ac VHT20 & Ch.144 & ANT 1



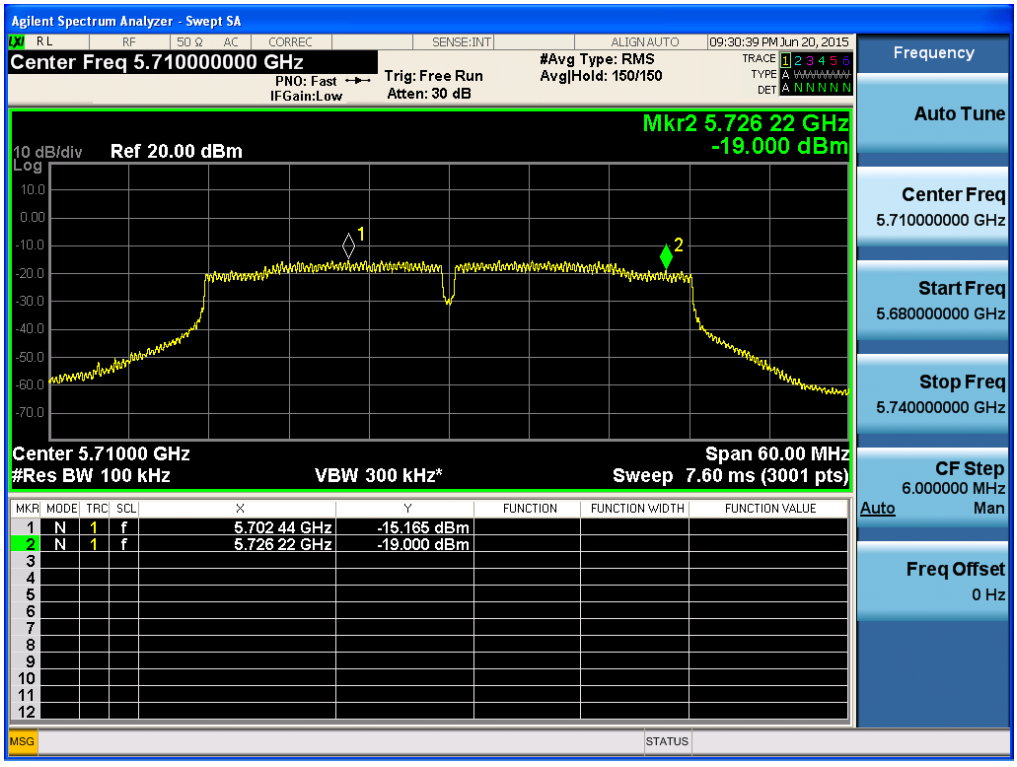
Maximum Power Spectral Density Test Mode: 802.11 ac VHT20 & Ch.144 & ANT 2



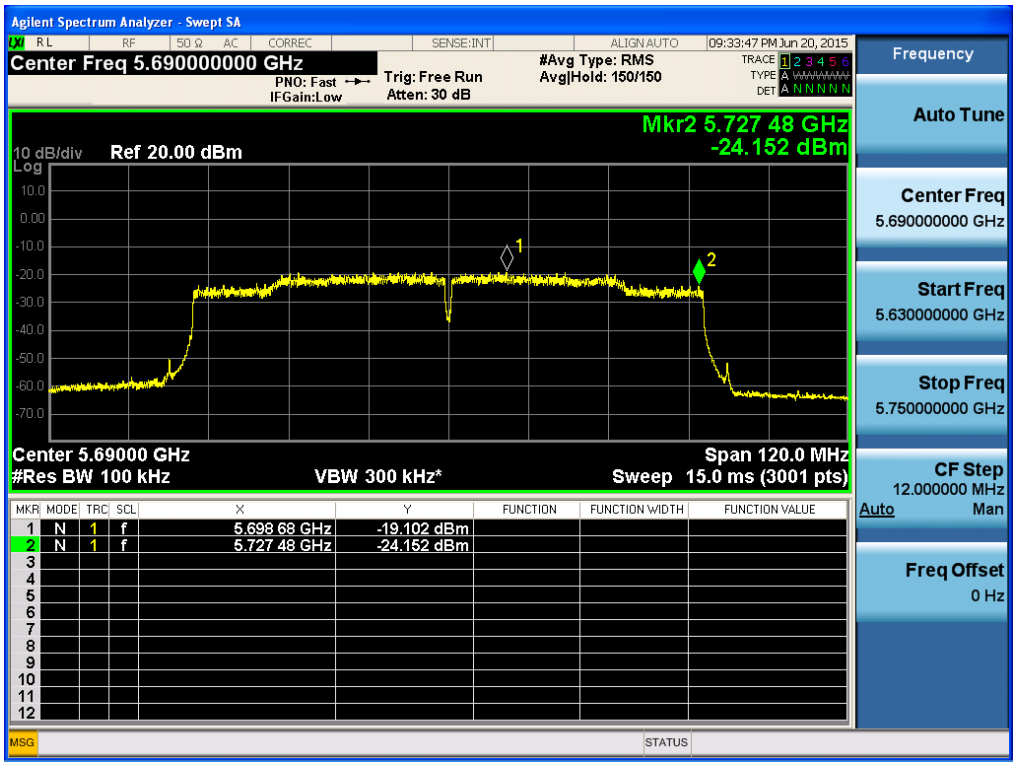
Maximum Power Spectral Density Test Mode: 802.11ac VHT40 & Ch.142 & ANT 1



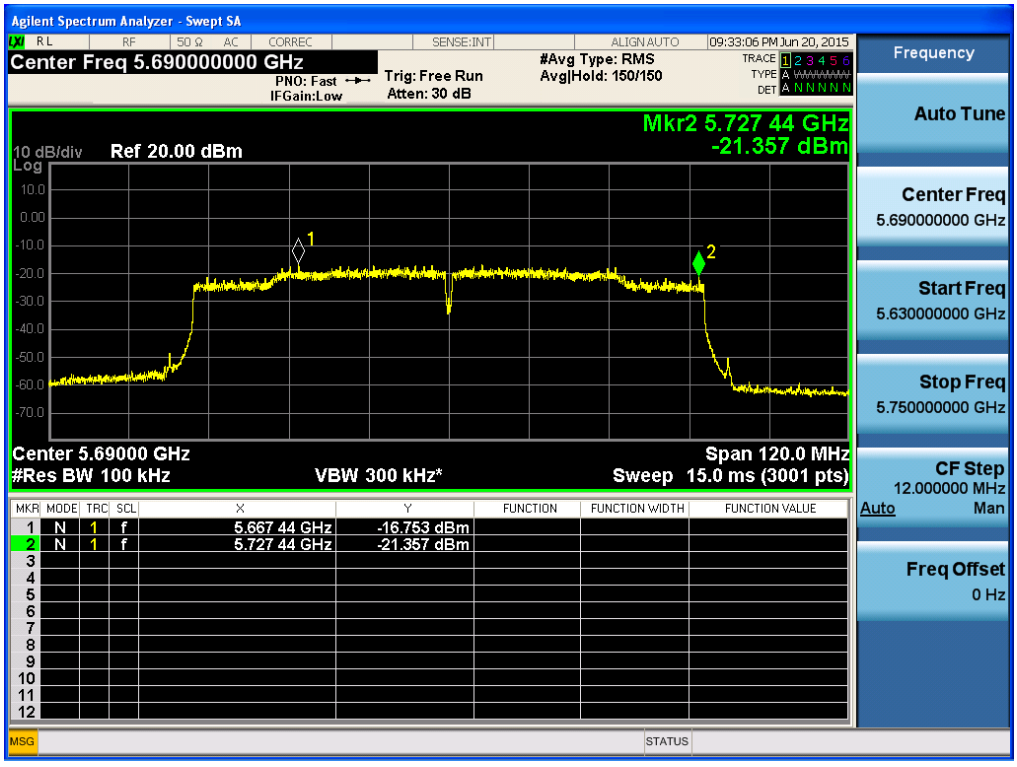
Maximum Power Spectral Density Test Mode: 802.11 ac VHT40 & Ch.142 & ANT 2



Maximum Power Spectral Density Test Mode: 802.11ac VHT80 & Ch.138 & ANT 1



Maximum Power Spectral Density Test Mode: 802.11 ac VHT80 & Ch.138 & ANT 2



8.5 Frequency Stability

▣ Test requirements

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

▣ Test Procedure

The EUT was placed inside of an environmental chamber as the temperature in the chamber was varied between -30 ℃ and +50 ℃. The temperature was incremented by 10 ℃ intervals and the unit was allowed to stabilize at each measurement. The center frequency of the transmitting channel was evaluated at each temperature and the frequency deviation from the channel's center frequency was recorded.

▣ Test Results: Comply

6 dB Bandwidth Reference Note 1	
Low edge	High edge
5,736,798,750	5,833,138,750

Supply Voltage (V AC)	TEMP (℃)	Operating Frequency					
		5745 MHz			5825 MHz		
		Measured Frequency (Hz)	Deviation (%)	6 dBc low edge Note 2 (Hz)	Measured Frequency (Hz)	Deviation (%)	6 dBc high edge Note 3 (Hz)
120	+25(Ref)	5,744,951,050	-0.000852	5,736,798,750	5,824,949,486	-0.000867	5,833,138,750
	+50	5,744,961,430	-0.000671	5,736,809,130	5,824,960,532	-0.000678	5,833,149,796
	+40	5,744,955,438	-0.000776	5,736,803,138	5,824,954,321	-0.000784	5,833,143,585
	+30	5,744,953,287	-0.000813	5,736,800,987	5,824,952,949	-0.000808	5,833,142,213
	+20	5,744,951,948	-0.000836	5,736,799,648	5,824,951,850	-0.000827	5,833,141,114
	+10	5,744,965,936	-0.000593	5,736,813,636	5,824,963,744	-0.000622	5,833,153,008
	0	5,744,969,465	-0.000532	5,736,817,165	5,824,969,312	-0.000527	5,833,158,576
	-10	5,744,975,430	-0.000428	5,736,823,130	5,824,975,536	-0.000420	5,833,164,800
	-20	5,744,981,487	-0.000322	5,736,829,187	5,824,981,287	-0.000321	5,833,170,551
	-30	5,744,983,261	-0.000291	5,736,830,961	5,824,982,371	-0.000303	5,833,171,635
102	+25	5,744,951,505	-0.000844	5,736,799,205	5,824,949,368	-0.000869	5,833,138,632
132	+25	5,744,951,326	-0.000847	5,736,799,026	5,824,949,346	-0.000870	5,833,138,610

Note 1: Please refer to test plot.

Note 2: 6 dB Bandwidth Reference Low edge (Hz) + (Measured Frequency (Hz) - Operating Frequency (Hz)) = 6 dBc low edge (Hz)

Note 3: 6 dB Bandwidth Reference High edge (Hz) + (Measured Frequency (Hz) - Operating Frequency (Hz)) = 6 dBc High edge (Hz)

8.6 Radiated Spurious Emission Measurements

▣ Test Procedure

▪ **FCC Part 15.209(a) and (b)**

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

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

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

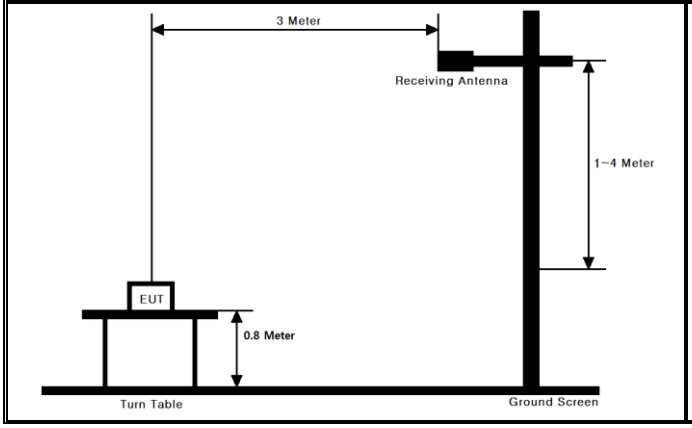
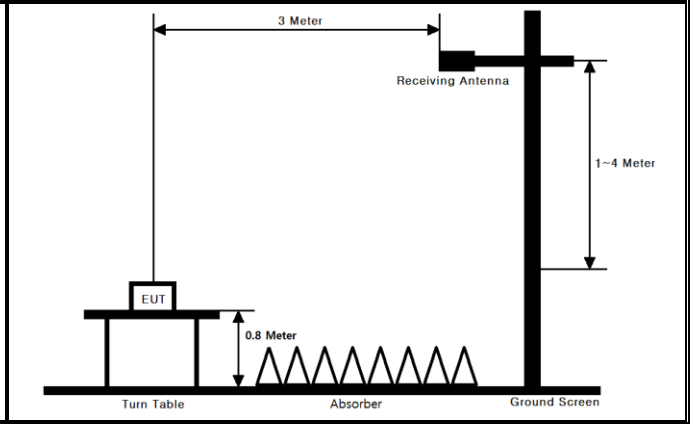
MHz	MHz	MHz	MHz	GHz	GHz
0.009 ~ 0.110	8.41425 ~ 8.41475	108 ~ 121.94	1300 ~ 1427	4.5 ~ 5.15	14.47 ~ 14.5
0.495 ~ 0.505	12.29 ~ 12.293	123 ~ 138	1435 ~ 1626.5	5.35 ~ 5.46	15.35 ~ 16.2
2.1735 ~ 2.1905	12.51975 ~	149.9 ~ 150.05	1645.5 ~ 1646.5	7.25 ~ 7.75	17.7 ~ 21.4
4.125 ~ 4.128	12.52025	160.52475 ~	1660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

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

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

(1) For transmitters operating in the **5.15-5.25 GHz band**: all emissions outside of the **5.15-5.35 GHz band** shall not exceed an **EIRP of -27 dBm/MHz**.
(2) For transmitters operating in the **5.25-5.35 GHz band**: all emissions outside of the **5.15-5.35 GHz band** shall not exceed an **EIRP of -27 dBm/MHz**.
(3) For transmitters operating in the **5.47-5.725 GHz band**: all emissions outside of the **5.47-5.725 GHz band** shall not exceed an **EIRP of -27 dBm/MHz.**
(4) For transmitters operating in the **5.725-5.85 GHz band**: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of −17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of −27 dBm/MHz.
(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 Procedure

Below 1 GHz	Above 1 GHz
	

▣ Test Procedure

1. The EUT was placed on a 0.8 m high non-conductive table inside a shielded enclosure.
2. The turn table shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3 m away from the receiving antenna, which is varied from 1 m to 4 m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.

Radiated spurious emission measured using following Measurement Procedure **of KDB789033 D02 V01**

► **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 (2), 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)	Test Ant of Worst data Note2
U-NII 1	36 (5180 MHz)	37.07	V	Z	QP	51.10	-16.10	N/A	N/A	35.00	40.00	5.00	1
		5148.60	V	Z	PK	57.33	3.77	N/A	N/A	61.10	74.00	12.90	1
		5149.80	V	Z	AV	46.08	3.77	0.06	N/A	49.91	54.00	4.09	1
		10359.52	V	Z	PK	45.41	9.36	N/A	-9.54	45.23	68.20	22.97	1
	40 (5200MHz)	38.03	V	Z	QP	50.70	-16.10	N/A	N/A	34.60	40.00	5.40	1
		10400.67	V	Z	PK	45.20	9.49	N/A	-9.54	45.15	68.20	23.05	1
	48 (5240 MHz)	38.06	V	Z	QP	50.50	-16.10	N/A	N/A	34.40	40.00	5.60	2
		10479.57	V	Z	PK	44.78	9.51	N/A	-9.54	44.75	68.20	23.45	2
U-NII 2A	52 (5260MHz)	37.99	V	Z	QP	51.60	-16.10	N/A	N/A	35.50	40.00	4.50	2
		10518.88	H	Y	PK	45.90	9.61	N/A	-9.54	45.97	68.20	22.23	2
	60 (5300 MHz)	37.92	V	Z	QP	51.10	-16.10	N/A	N/A	35.00	40.00	5.00	2
		10599.71	H	Y	PK	45.73	9.02	N/A	-9.54	45.21	74.00	28.79	2
		10600.02	H	Y	AV	35.90	9.02	0.06	-9.54	35.44	54.00	18.56	2
	64 (5320 MHz)	38.04	V	Z	QP	51.30	-16.10	N/A	N/A	35.20	40.00	4.80	1
		5350.87	V	Z	PK	59.27	3.97	N/A	N/A	63.24	74.00	10.76	1
		5350.10	V	Z	AV	46.45	3.97	0.06	N/A	50.48	54.00	3.52	1
		10640.45	H	Y	PK	45.83	9.45	N/A	-9.54	45.74	74.00	28.26	2
		10640.44	H	Y	AV	34.74	9.45	0.06	-9.54	34.71	54.00	19.29	2
U-NII 2C	100 (5500 MHz)	38.08	V	Z	QP	51.40	-16.10	N/A	N/A	35.30	40.00	4.70	1
		5459.64	V	Z	PK	51.76	3.96	N/A	N/A	55.72	74.00	18.28	1
		5460.00	V	Z	AV	40.23	3.96	0.06	N/A	44.25	54.00	9.75	1
		5469.21	V	Z	PK	55.03	3.97	N/A	N/A	59.00	68.20	9.20	1
		10999.81	H	Y	PK	46.56	9.99	N/A	-9.54	47.01	74.00	26.99	2
		10999.79	H	Y	AV	36.45	9.99	0.06	-9.54	36.96	54.00	17.04	2
	116 (5580 MHz)	37.95	V	Z	QP	51.10	-16.10	N/A	N/A	35.00	40.00	5.00	2
		11159.94	H	Y	PK	47.49	10.46	N/A	-9.54	48.41	74.00	25.59	2
		11159.95	H	Y	AV	37.22	10.46	0.06	-9.54	38.20	54.00	15.80	2
	140 (5700 MHz)	37.96	V	Z	QP	50.90	-16.10	N/A	N/A	34.80	40.00	5.20	1
		5725.40	V	Z	PK	52.04	4.37	N/A	N/A	56.41	68.20	11.79	1
		11398.58	H	Y	PK	46.63	10.70	N/A	-9.54	47.79	74.00	26.21	2
		11399.56	H	Y	AV	36.04	10.70	0.06	-9.54	37.26	54.00	16.74	2
U-NII 3	149 (5745 MHz)	38.10	V	Z	QP	50.70	-16.10	N/A	N/A	34.60	40.00	5.40	1
		11488.96	V	Z	PK	48.22	10.74	N/A	-9.54	49.42	74.00	24.58	1
		11490.34	V	Z	AV	37.89	10.74	0.06	-9.54	39.15	54.00	14.85	1
	157 (5785 MHz)	37.94	V	Z	QP	51.10	-16.10	N/A	N/A	35.00	40.00	5.00	1
		11569.63	V	Z	PK	47.58	11.49	N/A	-9.54	49.53	74.00	24.47	1
		11570.29	V	Z	AV	37.79	11.49	0.06	-9.54	39.80	54.00	14.20	1
	165 (5825 MHz)	37.99	V	Z	QP	50.80	-16.10	N/A	N/A	34.70	40.00	5.30	1
		11651.37	V	Z	PK	48.10	11.59	N/A	-9.54	50.15	74.00	23.85	1
		11649.89	V	Z	AV	37.13	11.59	0.06	-9.54	39.24	54.00	14.76	1

Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.
2. This device was tested under single transmitting (Ant 1, 2) and the worst case data are reported in the table above.
3. 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
4. Measurement Distance = 3 m for below 10 GHz, Measurement Distance = 1 m for above 10 GHz.
   Therefore Distance Correction Factor (DCF) : - 9.54 dB = 20*log(1 m/3 m)
5. 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)	Test Ant of Worst data Note2
U-NII 1	36 (5180 MHz)	38.00	V	Z	QP	50.80	-16.10	N/A	N/A	34.70	40.00	5.30	1
		5148.60	V	Z	PK	58.66	3.77	N/A	N/A	62.43	74.00	11.57	1
		5149.80	V	Z	AV	46.30	3.77	0.07	N/A	50.14	54.00	3.86	1
		10362.12	V	Z	PK	45.28	9.36	N/A	-9.54	45.10	68.20	23.10	1
	40 (5200 MHz)	38.06	V	Z	QP	51.50	-16.10	N/A	N/A	35.40	40.00	4.60	1
		10400.75	V	Z	PK	45.05	9.49	N/A	-9.54	45.00	68.20	23.20	1
	48 (5240 MHz)	37.91	V	Z	QP	50.90	-16.10	N/A	N/A	34.80	40.00	5.20	1
		10479.65	V	Z	PK	45.32	9.51	N/A	-9.54	45.29	68.20	22.91	1
U-NII 2A	52 (5260 MHz)	37.99	V	Z	QP	51.40	-16.10	N/A	N/A	35.30	40.00	4.70	1+2
		10519.30	H	Z	PK	46.32	9.61	N/A	-9.54	46.39	68.20	21.81	1+2
	60 (5300 MHz)	37.94	V	Z	QP	51.60	-16.10	N/A	N/A	35.50	40.00	4.50	1+2
		10599.07	H	Z	PK	46.17	9.02	N/A	-9.54	45.65	74.00	28.35	1+2
		10600.01	H	Z	AV	36.22	9.02	0.12	-9.54	35.82	54.00	18.18	1+2
	64 (5320 MHz)	37.97	V	Z	QP	51.10	-16.10	N/A	N/A	35.00	40.00	5.00	1
		5351.95	V	Z	PK	59.93	3.97	N/A	N/A	63.90	74.00	10.10	1
		5350.00	V	Z	AV	46.24	3.97	0.07	N/A	50.28	54.00	3.72	1
		10638.29	H	Z	PK	44.89	9.45	N/A	-9.54	44.80	74.00	29.20	1+2
		10640.06	H	Z	AV	34.90	9.45	0.12	-9.54	34.93	54.00	19.07	1+2
U-NII 2C	100 (5500 MHz)	38.02	V	Z	QP	50.80	-16.10	N/A	N/A	34.70	40.00	5.30	1
		5457.92	V	Z	PK	53.88	3.96	N/A	N/A	57.84	74.00	16.16	1
		5459.00	V	Z	AV	40.85	3.96	0.07	N/A	44.88	54.00	9.12	1
		5467.97	V	Z	PK	54.97	3.97	N/A	N/A	58.94	68.20	9.26	1
		10999.38	H	Z	PK	46.45	9.99	N/A	-9.54	46.90	74.00	27.10	1+2
		10999.78	H	Z	AV	36.50	9.99	0.12	-9.54	37.07	54.00	16.93	1+2
	116 (5580 MHz)	37.98	V	Z	QP	51.50	-16.10	N/A	N/A	35.40	40.00	4.60	2
		11160.03	H	Z	PK	47.50	10.46	N/A	-9.54	48.42	74.00	25.58	1+2
		11159.93	H	Z	AV	37.03	10.46	0.12	-9.54	38.07	54.00	15.93	1+2
	140 (5700 MHz)	37.97	V	Z	QP	51.40	-16.10	N/A	N/A	35.30	40.00	4.70	1
		5727.85	V	Z	PK	53.02	4.37	N/A	N/A	57.39	68.20	10.81	1
		11399.34	H	Z	PK	47.67	10.70	N/A	-9.54	48.83	74.00	25.17	1+2
		11398.72	H	Z	AV	36.87	10.70	0.12	-9.54	38.15	54.00	15.85	1+2
U-NII 3	149 (5745 MHz)	38.07	V	Z	QP	51.00	-16.10	N/A	N/A	34.90	40.00	5.10	1
		11489.31	V	Z	PK	47.60	10.74	N/A	-9.54	48.80	74.00	25.20	1
		11489.95	V	Z	AV	37.93	10.74	0.07	-9.54	39.20	54.00	14.80	1
	157 (5785 MHz)	38.04	V	Z	QP	50.60	-16.10	N/A	N/A	34.50	40.00	5.50	1
		11570.77	V	Z	PK	47.58	11.49	N/A	-9.54	49.53	74.00	24.47	1
		11569.80	V	Z	AV	37.79	11.49	0.07	-9.54	39.81	54.00	14.19	1
	165 (5825 MHz)	38.05	V	Z	QP	51.10	-16.10	N/A	N/A	35.00	40.00	5.00	1
		11649.48	V	Z	PK	47.77	11.59	N/A	-9.54	49.82	74.00	24.18	1
		11649.97	V	Z	AV	37.84	11.59	0.07	-9.54	39.96	54.00	14.04	1

Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.
2. This device was tested under single transmitting (Ant 1, 2) and multiple transmitting (Ant 1+2) and the worst case data are reported in the table above.
3. 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
4. Measurement Distance = 3 m for below 10 GHz, Measurement Distance = 1 m for above 10 GHz.
   Therefore Distance Correction Factor (DCF) : - 9.54 dB = 20*log(1m/3m)
5. The limit is converted to field strength.
   E[dBuV/m] = EIRP[dBm] + 95.2 dB = -27dBm + 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)	Test Ant of Worst data Note2
U-NII 1	38 (5190 MHz)	37.96	V	Z	QP	51.30	-16.10	N/A	N/A	35.20	40.00	4.80	1
		5148.60	V	Z	PK	58.09	3.77	N/A	N/A	61.86	74.00	12.14	1
		5150.00	V	Z	AV	46.64	3.77	0.13	N/A	50.54	54.00	3.46	1
		10381.22	V	Z	PK	45.06	9.43	N/A	-9.54	44.95	68.20	23.25	1
	46 (5230 MHz)	37.94	V	Z	QP	50.20	-16.10	N/A	N/A	34.10	40.00	5.90	1
		10458.95	V	Z	PK	44.84	9.51	N/A	-9.54	44.81	68.20	23.39	1
U-NII 2A	54 (5270 MHz)	37.95	V	Z	QP	51.50	-16.10	N/A	N/A	35.40	40.00	4.60	1+2
		10539.21	H	Z	PK	44.62	9.46	N/A	-9.54	44.54	68.20	23.66	1+2
	62 (5310 MHz)	38.04	V	Z	QP	50.80	-16.10	N/A	N/A	34.70	40.00	5.30	1
		5351.40	V	Z	PK	59.55	3.97	N/A	N/A	63.52	74.00	10.48	1
		5350.20	V	Z	AV	46.87	3.97	0.13	N/A	50.97	54.00	3.03	1
		10620.28	H	Z	PK	44.48	9.24	N/A	-9.54	44.18	74.00	29.82	1+2
		10620.84	H	Z	AV	35.12	9.24	0.23	-9.54	35.05	54.00	18.95	1+2
U-NII 2C	102 (5510 MHz)	38.06	V	Z	QP	51.10	-16.10	N/A	N/A	35.00	40.00	5.00	1
		5459.88	V	Z	PK	49.43	3.96	N/A	N/A	53.39	74.00	20.61	1
		5459.10	V	Z	AV	38.84	3.96	0.13	N/A	42.93	54.00	11.07	1
		5468.18	V	Z	PK	52.16	3.97	N/A	N/A	56.13	68.20	12.07	1
		11091.81	H	Z	PK	45.73	10.09	N/A	-9.54	46.28	74.00	27.72	1+2
		11019.66	H	Z	AV	36.27	10.09	0.23	-9.54	37.05	54.00	16.95	1+2
	110 (5550 MHz)	37.98	V	Z	QP	51.00	-16.10	N/A	N/A	34.90	40.00	5.10	2
		11099.37	H	Z	PK	46.52	10.43	N/A	-9.54	47.41	74.00	26.59	1+2
		11099.16	H	Z	AV	36.26	10.43	0.23	-9.54	37.38	54.00	16.62	1+2
	134 (5670 MHz)	38.03	V	Z	QP	50.70	-16.10	N/A	N/A	34.60	40.00	5.40	1
		5727.72	V	Z	PK	48.45	4.37	N/A	N/A	52.82	68.20	15.38	1
		11338.63	H	Z	PK	46.56	10.59	N/A	-9.54	47.61	74.00	26.39	1+2
		11339.48	H	Z	AV	35.87	10.59	0.23	-9.54	37.15	54.00	16.85	1+2
U-NII 3	151 (5755 MHz)	38.02	V	Z	QP	51.00	-16.10	N/A	N/A	34.90	40.00	5.10	1
		11510.66	V	Z	PK	46.98	10.93	N/A	-9.54	48.37	74.00	25.63	1
		11510.11	V	Z	AV	36.14	10.93	0.13	-9.54	37.66	54.00	16.34	1
	159 (5795 MHz)	37.99	V	Z	QP	51.40	-16.10	N/A	N/A	35.30	40.00	4.70	1
		11589.70	V	Z	PK	47.19	11.52	N/A	-9.54	49.17	74.00	24.83	1
		11590.04	V	Z	AV	36.35	11.52	0.13	-9.54	38.46	54.00	15.54	1

Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.
2. This device was tested under single transmitting (Ant 1, 2) and multiple transmitting (Ant 1+2) and the worst case data are reported in the table above.
3. 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
4. Measurement Distance = 3 m for below 10 GHz, Measurement Distance = 1 m for above 10 GHz.
   Therefore Distance Correction Factor (DCF) : - 9.54 dB = 20*log(1m/3m)
5. 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) : *802.11ac(VHT20)*

Band	Tested Channel	Freq. (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCC (dB)	DCCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Test Ant of Worst data Note2
U-NII 2C	144 (5720 MHz)	37.84	V	Z	QP	51.40	-16.10	N/A	N/A	35.30	40.00	4.70	1
		11439.84	V	Z	PK	48.21	10.72	N/A	-9.54	49.39	74.00	24.61	1
		11440.32	V	Z	AV	38.36	10.72	0.07	-9.54	39.61	54.00	14.39	1

Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.
2. This device was tested under single transmitting (Ant 1, 2) and multiple transmitting (Ant 1+2) and the worst case data are reported in the table above.
3. 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
4. Measurement Distance = 3 m for below 10 GHz, Measurement Distance = 1 m for above 10 GHz.
   Therefore Distance Correction Factor(DCF) : - 9.54 dB = 20*log(1m/3m)
5. The limit is converted to field strength.
   E[dBuV/m] = EIRP[dBm] + 95.2 dB = -27 dBm + 95.2 = 68.2 dBuV/m

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

Band	Tested Channel	Freq. (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	DCCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Test Ant of Worst data Note2
U-NII 2C	142 (5710 MHz)	38.10	V	Z	QP	50.60	-16.10	N/A	N/A	34.50	40.00	5.50	1
		11423.20	V	Z	PK	47.23	10.71	N/A	-9.54	48.40	74.00	25.60	1
		11422.85	V	Z	AV	37.02	10.71	0.13	-9.54	38.32	54.00	15.68	1

Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.
2. This device was tested under single transmitting (Ant 1, 2) and multiple transmitting (Ant 1+2) and the worst case data are reported in the table above.
3. 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
4. Measurement Distance = 3 m for below 10 GHz, Measurement Distance = 1 m for above 10 GHz.
   Therefore Distance Correction Factor(DCF) : - 9.54 dB = 20*log(1m/3m)
5. 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) : *802.11ac(VHT80)*

Band	Tested Channel	Freq. (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Test Ant of Worst data Note2
U-NII 1	42 (5210 MHz)	38.09	V	Z	QP	50.20	-16.10	N/A	N/A	34.10	40.00	5.90	1
		5149.00	V	Z	PK	60.23	3.77	N/A	N/A	64.00	74.00	10.00	1
		5148.70	V	Z	AV	47.39	3.77	0.28	N/A	51.44	54.00	2.56	1
		10420.10	V	Z	PK	44.88	9.50	N/A	-9.54	44.84	68.20	23.36	1
U-NII 2A	58 (5290 MHz)	38.04	V	Z	QP	50.90	-16.10	N/A	N/A	34.80	40.00	5.20	1
		5350.15	V	Z	PK	60.36	3.97	N/A	N/A	64.33	74.00	9.67	1
		5351.20	V	Z	AV	47.56	3.97	0.28	N/A	51.81	54.00	2.19	1
		10578.99	H	Y	PK	44.60	9.17	N/A	-9.54	44.23	68.20	23.97	1+2
U-NII 2C	106 (5530 MHz)	38.10	V	Z	QP	51.10	-16.10	N/A	N/A	35.00	40.00	5.00	1
		5457.72	V	Z	PK	53.77	3.96	N/A	N/A	57.73	74.00	16.27	1
		5456.36	V	Z	AV	41.22	3.96	0.28	N/A	45.46	54.00	8.54	1
		5468.81	V	Z	PK	53.58	3.97	N/A	N/A	57.55	68.20	10.65	1
		11060.55	H	Y	PK	46.85	10.31	N/A	-9.54	47.62	74.00	26.38	1+2
		11059.06	H	Y	AV	35.44	10.31	0.44	-9.54	36.65	54.00	17.35	1+2
U-NII 2C	138 (5690 MHz)	38.01	V	Z	QP	50.90	-16.10	N/A	N/A	34.80	40.00	5.20	1
		11380.23	V	Z	PK	47.78	10.66	N/A	-9.54	48.90	74.00	25.10	1
		11381.45	V	Z	AV	36.45	10.66	0.28	-9.54	37.85	54.00	16.15	1
U-NII 3	155 (5775 MHz)	37.98	V	Z	QP	50.80	-16.10	N/A	N/A	34.70	40.00	5.30	1
		11548.92	V	Z	PK	46.13	11.30	N/A	-9.54	47.89	74.00	26.11	1
		11548.46	V	Z	AV	35.47	11.30	0.28	-9.54	37.51	54.00	16.49	1

Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.
2. This device was tested under single transmitting (Ant 1, 2) and multiple transmitting (Ant 1+2) and the worst case data are reported in the table above.
3. 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
4. Measurement Distance = 3 m for below 10 GHz, Measurement Distance = 1 m for above 10 GHz.
   Therefore Distance Correction Factor (DCF) : - 9.54 dB = 20*log(1 m/3 m)
5. The limit is converted to field strength.
   E[dBuV/m] = EIRP[dBm] + 95.2 dB = -27 dBm + 95.2 = 68.2 dBuV/m

8.7 AC Conducted Emissions

▣ **Test Procedure**

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

▣ **Measurement Data: Comply**

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

▣ **Minimum Standard: FCC Part 15.207(a)**

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

* Decreases with the logarithm of the frequency

AC Line Conducted Emissions (Graph)

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

Results of Conducted Emission

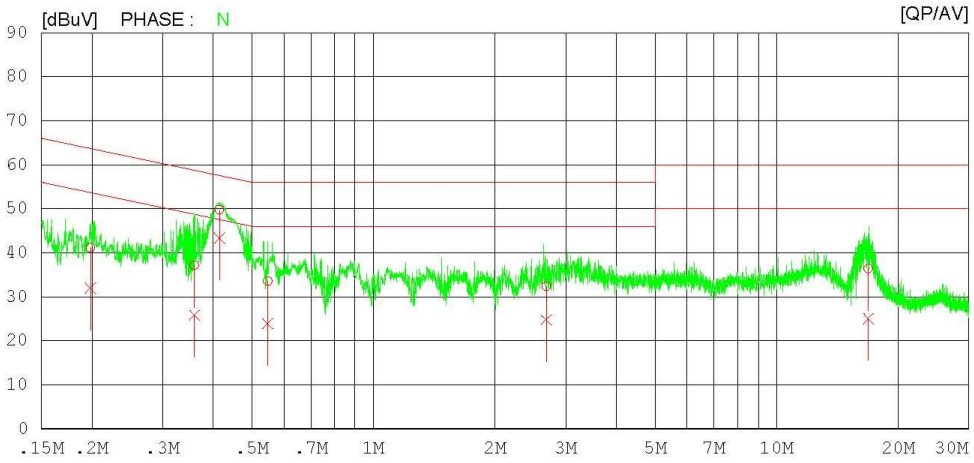
DTNC

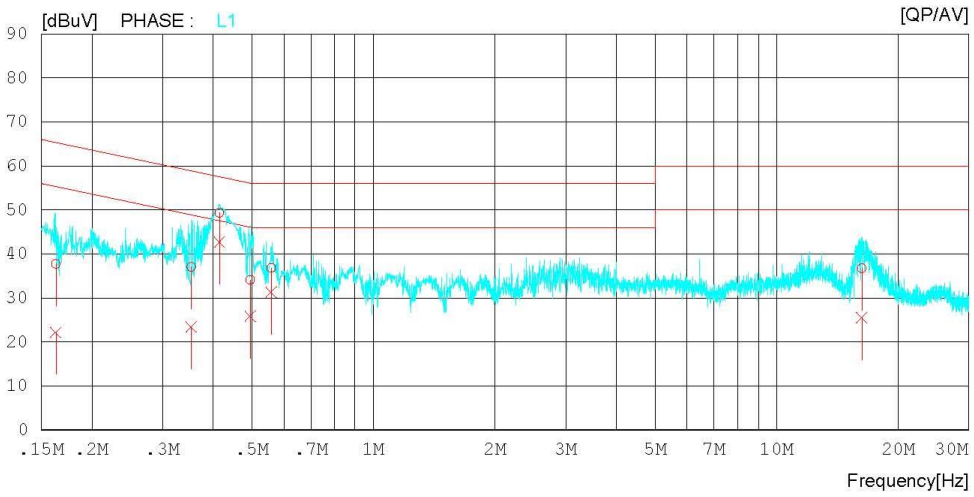
Date : 2015-05-05

Order No.	:		Referrence No.	:	
Model No.	:	LG13Z94	Power Supply	:	120 V 60 Hz
Serial No.	:	Identical prototype	Temp/Humi.	:	22 'C 49 % R.H.
Test Condition	:	WLAN	Operator	:	J.J.LEE

Memo : 5.1GHz / 802.11a / ANT1

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





AC Line Conducted Emissions (Data List)

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

Results of Conducted Emission

DTNC Date : 2015-05-05

Order No.	:		Referrence No.	:	
Model No.	:	LG13Z94	Power Supply	:	120 V 60 Hz
Serial No.	:	Identical prototype	Temp/Humi.	:	22 'C 49 % R.H.
Test Condition	:	WLAN	Operator	:	J.J.LEE

Memo : 5.1GHz / 802.11a / ANT1

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

NO	FREQ	READING QP	READING AV	C.FACTOR	RESULT QP	RESULT AV	LIMIT QP	LIMIT AV	MARGIN QP	MARGIN AV	PHASE
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	
1	0.19856	31.3	22.1	9.9	41.2	32.0	63.7	53.7	22.5	21.7	N
2	0.35947	27.0	15.7	10.1	37.1	25.8	58.7	48.7	21.6	22.9	N
3	0.41510	39.7	33.3	10.1	49.8	43.4	57.5	47.5	7.7	4.1	N
4	0.54642	23.5	13.8	10.1	33.6	23.9	56.0	46.0	22.4	22.1	N
5	2.68240	22.4	14.8	10.0	32.4	24.8	56.0	46.0	23.6	21.2	N
6	16.89320	25.9	14.5	10.5	36.4	25.0	60.0	50.0	23.6	25.0	N
7	0.16287	27.7	12.1	10.0	37.7	22.1	65.3	55.3	27.6	33.2	L1
8	0.35313	26.9	13.3	10.1	37.0	23.4	58.9	48.9	21.9	25.5	L1
9	0.41471	39.3	32.6	10.0	49.3	42.6	57.6	47.6	8.3	5.0	L1
10	0.49450	24.1	15.8	10.0	34.1	25.8	56.1	46.1	22.0	20.3	L1
11	0.55767	26.8	21.3	10.0	36.8	31.3	56.0	46.0	19.2	14.7	L1
12	16.27320	25.8	14.7	10.8	36.6	25.5	60.0	50.0	23.4	24.5	L1

AC Line Conducted Emissions (Graph)

Test Mode: U-NII 2A & 802.11a & ANT 1 & 5300 MHz

Results of Conducted Emission

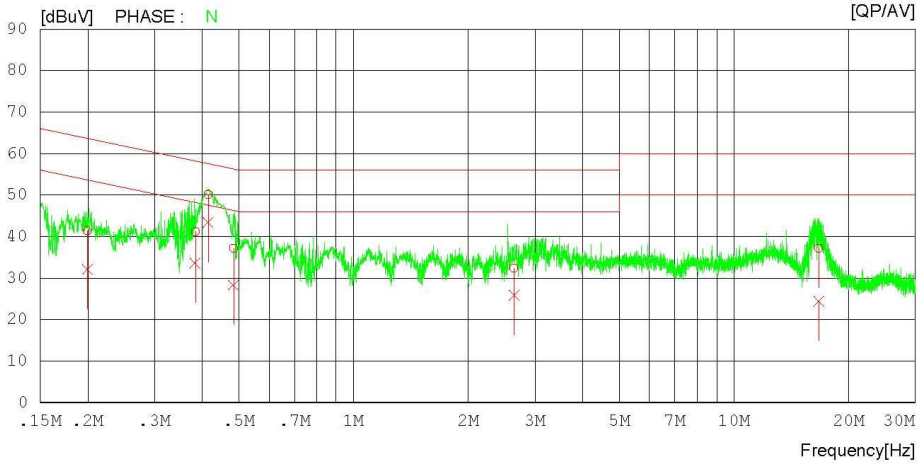
DTNC

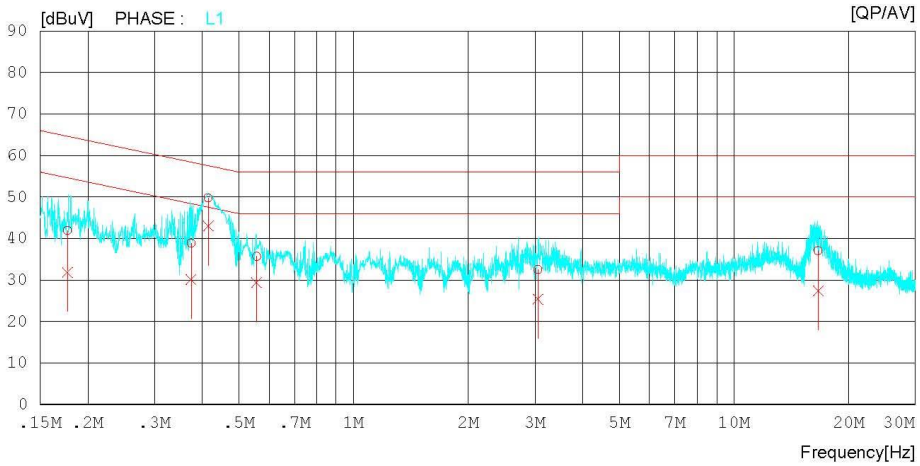
Date : 2015-05-05

Order No.	:		Referrence No.	:	
Model No.	:	LG13Z94	Power Supply	:	120 V 60 Hz
Serial No.	:	Identical prototype	Temp/Humi.	:	22 'C 49 % R.H.
Test Condition	:	WLAN	Operator	:	J.J.LEE

Memo : 5.3GHz / 802.11a / ANT1

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





AC Line Conducted Emissions (Data List)

Test Mode: U-NII 2A & 802.11a & ANT 1 & 5300 MHz

Results of Conducted Emission

DTNC

Date : 2015-05-05

Order No.	:		Referrence No.	:	
Model No.	:	LG13Z94	Power Supply	:	120 V 60 Hz
Serial No.	:	Identical prototype	Temp/Humi.	:	22 'C 49 % R.H.
Test Condition	:	WLAN	Operator	:	J.J.LEE

Memo : 5.3GHz / 802.11a / ANT1

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

NO	FREQ	READING QP	READING AV	C.FACTOR	RESULT QP	RESULT AV	LIMIT QP	LIMIT AV	MARGIN QP	MARGIN AV	PHASE
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	
1	0.19966	31.5	22.2	9.9	41.4	32.1	63.6	53.6	22.2	21.5	N
2	0.38345	31.0	23.5	10.1	41.1	33.6	58.2	48.2	17.1	14.6	N
3	0.41457	40.1	33.3	10.1	50.2	43.4	57.6	47.6	7.4	4.2	N
4	0.48350	27.1	18.2	10.1	37.2	28.3	56.3	46.3	19.1	18.0	N
5	2.64040	22.4	15.8	10.0	32.4	25.8	56.0	46.0	23.6	20.2	N
6	16.71300	26.7	13.9	10.5	37.2	24.4	60.0	50.0	22.8	25.6	N
7	0.17689	31.8	21.8	10.0	41.8	31.8	64.6	54.6	22.8	22.8	L1
8	0.37369	28.7	20.0	10.1	38.8	30.1	58.4	48.4	19.6	18.3	L1
9	0.41501	39.7	32.9	10.0	49.7	42.9	57.5	47.5	7.8	4.6	L1
10	0.55580	25.6	19.3	10.0	35.6	29.3	56.0	46.0	20.4	16.7	L1
11	3.05320	22.2	15.1	10.2	32.4	25.3	56.0	46.0	23.6	20.7	L1
12	16.66580	26.2	16.6	10.8	37.0	27.4	60.0	50.0	23.0	22.6	L1

AC Line Conducted Emissions (Graph)

Test Mode: U-NII 2C & 802.11a & ANT 1 & 5580 MHz

Results of Conducted Emission

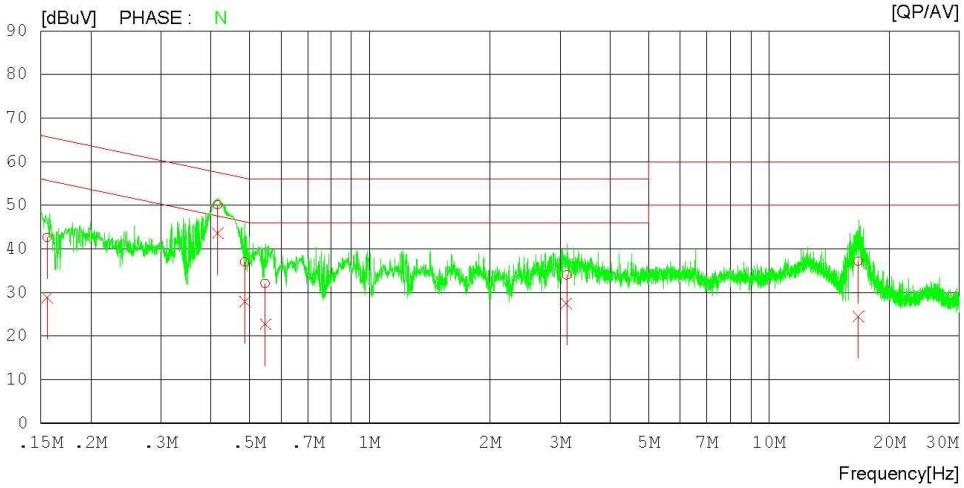
DTNC

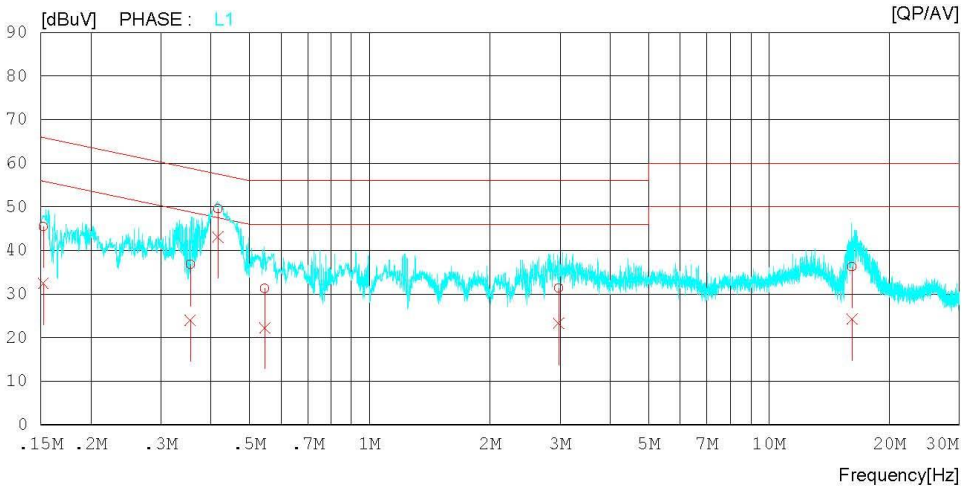
Date : 2015-05-05

Order No.	:		Referrence No.	:	
Model No.	:	LG13Z94	Power Supply	:	120 V 60 Hz
Serial No.	:	Identical prototype	Temp/Humi.	:	22 'C 49 % R.H.
Test Condition	:	WLAN	Operator	:	J.J.LEE

Memo : 5.5GHz / 802.11a / ANT1

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





AC Line Conducted Emissions (Data List)

Test Mode: U-NII 2C & 802.11a & ANT 1 & 5580 MHz

Results of Conducted Emission

DTNC Date : 2015-05-05

Order No.	:		Referrence No.	:	
Model No.	:	LG13Z94	Power Supply	:	120 V 60 Hz
Serial No.	:	Identical prototype	Temp/Humi.	:	22 'C 49 % R.H.
Test Condition	:	WLAN	Operator	:	J.J.LEE

Memo : 5.5GHz / 802.11a / ANT1

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

NO	FREQ	READING QP	READING AV	C.FACTOR	RESULT QP	RESULT AV	LIMIT QP	LIMIT AV	MARGIN QP	MARGIN AV	PHASE
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	
1	0.15579	32.7	18.8	10.0	42.7	28.8	65.7	55.7	23.0	26.9	N
2	0.41627	40.0	33.5	10.1	50.1	43.6	57.5	47.5	7.4	3.9	N
3	0.48693	26.9	17.8	10.1	37.0	27.9	56.2	46.2	19.2	18.3	N
4	0.54737	21.9	12.6	10.1	32.0	22.7	56.0	46.0	24.0	23.3	N
5	3.11280	23.9	17.4	10.0	33.9	27.4	56.0	46.0	22.1	18.6	N
6	16.77660	26.6	14.0	10.5	37.1	24.5	60.0	50.0	22.9	25.5	N
7	0.15220	35.4	22.4	10.0	45.4	32.4	65.9	55.9	20.5	23.5	L1
8	0.35525	26.6	13.9	10.1	36.7	24.0	58.8	48.8	22.1	24.8	L1
9	0.41680	39.5	33.1	10.0	49.5	43.1	57.5	47.5	8.0	4.4	L1
10	0.54564	21.2	12.2	10.0	31.2	22.2	56.0	46.0	24.8	23.8	L1
11	2.97200	21.2	13.0	10.2	31.4	23.2	56.0	46.0	24.6	22.8	L1
12	16.14420	25.4	13.4	10.8	36.2	24.2	60.0	50.0	23.8	25.8	L1

AC Line Conducted Emissions (Graph)

Test Mode: U-NII 3 & 802.11a & ANT 1 & 5785 MHz

Results of Conducted Emission

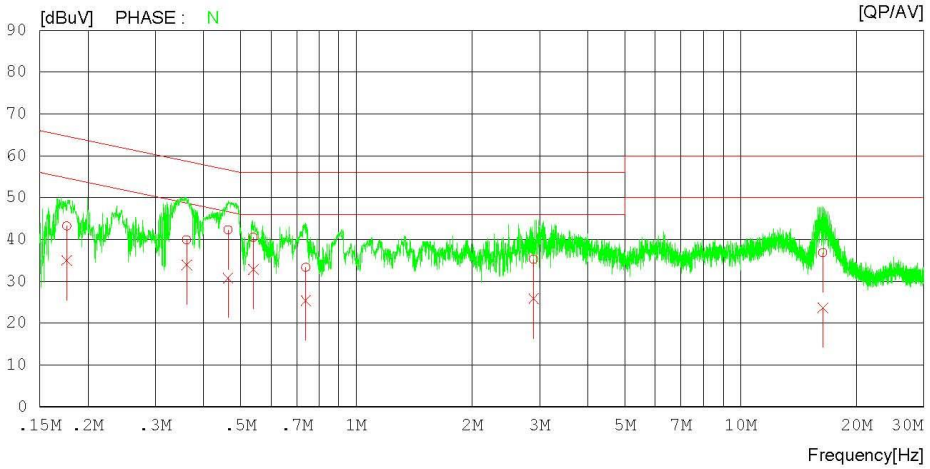
DTNC

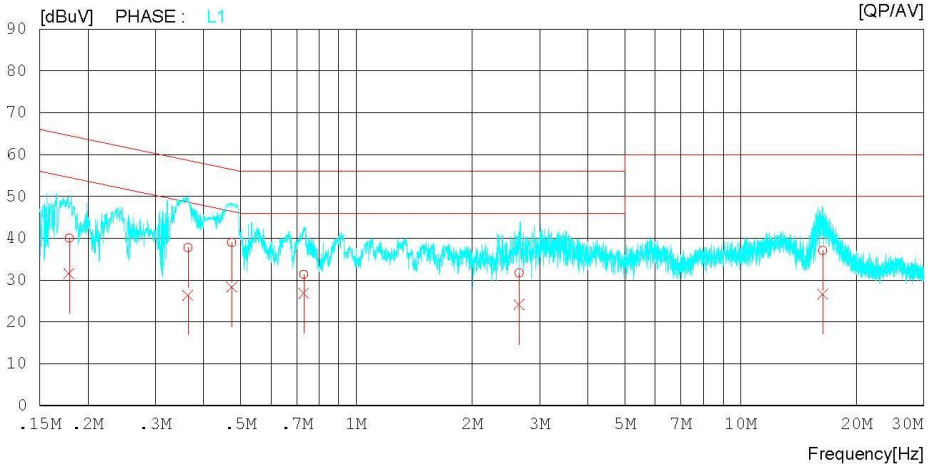
Date : 2015-05-05

Order No.	:		Referrence No.	:	
Model No.	:	LG13Z94	Power Supply	:	120 V 60 Hz
Serial No.	:	Identical prototype	Temp/Humi.	:	22 'C 49 % R.H.
Test Condition	:	WLAN	Operator	:	J.J.LEE

Memo : 5.8GHz / 802.11a / ANT1

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





AC Line Conducted Emissions (Data List)

Test Mode: U-NII 3 & 802.11a & ANT 1 & 5785 MHz

Results of Conducted Emission

DTNC Date : 2015-05-05

Order No.	:		Referrence No.	:	
Model No.	:	LG13Z94	Power Supply	:	120 V 60 Hz
Serial No.	:	Identical prototype	Temp/Humi.	:	22 'C 49 % R.H.
Test Condition	:	WLAN	Operator	:	J.J.LEE

Memo : 5.8GHz / 802.11a / ANT1

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

NO	FREQ	READING QP	READING AV	C.FACTOR	RESULT QP	RESULT AV	LIMIT QP	LIMIT AV	MARGIN QP	MARGIN AV	PHASE
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	
1	0.17643	33.3	25.1	9.9	43.2	35.0	64.7	54.7	21.5	19.7	N
2	0.36186	29.8	23.8	10.1	39.9	33.9	58.7	48.7	18.8	14.8	N
3	0.46343	32.2	20.7	10.1	42.3	30.8	56.6	46.6	14.3	15.8	N
4	0.53986	30.4	22.8	10.1	40.5	32.9	56.0	46.0	15.5	13.1	N
5	0.73807	23.2	15.3	10.1	33.3	25.4	56.0	46.0	22.7	20.6	N
6	2.89200	25.2	15.9	10.0	35.2	25.9	56.0	46.0	20.8	20.1	N
7	16.36620	26.3	13.1	10.5	36.8	23.6	60.0	50.0	23.2	26.4	N
8	0.17885	30.0	21.5	10.0	40.0	31.5	64.5	54.5	24.5	23.0	L1
9	0.36422	27.6	16.2	10.1	37.7	26.3	58.6	48.6	20.9	22.3	L1
10	0.47474	28.9	18.3	10.0	38.9	28.3	56.4	46.4	17.5	18.1	L1
11	0.73002	21.3	16.8	10.0	31.3	26.8	56.0	46.0	24.7	19.2	L1
12	2.65320	21.4	13.9	10.2	31.6	24.1	56.0	46.0	24.4	21.9	L1
13	16.37420	26.2	15.8	10.8	37.0	26.6	60.0	50.0	23.0	23.4	L1

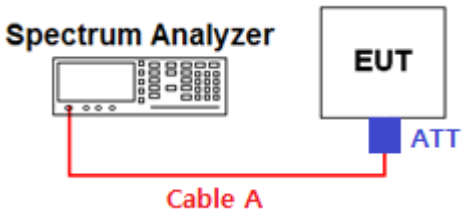
9. LIST OF TEST EQUIPMENT

Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
Spectrum Analyzer	Agilent Technologies	N9020A	14/08/21	15/08/21	MY49060056
PXA Signal Analyzer	Agilent Technologies	N9030A	14/10/21	15/10/21	MY53310140
Temp & Humi Test Chamber	SJ Science	SJ-TH-S50	14/10/21	15/10/21	SJ-TH-S50-130930
Power Meter & Wide Bandwidth Sensor	Anritsu	ML2495A/ MA2411B	14/10/21	15/10/21	1338004/ 1306053
Thermohygrometer	BODYCOM	BJ5478	15/02/26	16/02/26	1209
Digital Multimeter	FLUKE	17B	15/04/27	16/04/27	26030065WS
Signal Generator	Rohde Schwarz	SMF100A	14/07/01	15/07/01	102341
Vector Signal Generator	Rohde Schwarz	SMBV100A	15/01/06	16/01/06	255571
3dB Attenuator	SMAJK	SMAJK-2-3	14/10/21	15/10/21	3
High-pass filter	Wainwright	WHNX8.5	14/09/11	15/09/11	1
Low Noise Pre Amplifier	TSJ	MLA-010K01-B01-27	15/04/09	16/04/09	1844538
Amplifier	Agilent Technologies	8449B	14/11/06	15/11/06	3008A02108
PreAmplifier	A.H. SYSTEMS	PAM-1840VH	14/12/12	15/12/12	163
Loop Antenna	Rohde Schwarz	FMZB1513	14/04/29	16/04/29	1513-128
TRILOG Broadband Test-Antenna	Schwarzbeck	VULB 9160	14/04/04	16/04/04	3357
HORN ANT	ETS	3117	14/05/12	16/05/12	140394
HORN ANT	ETS-Lindgren	3160-09	13/10/13	15/10/13	00158433
HORN ANT	Custom Microwave, Inc.	CMI/HO28S	13/11/14	15/11/14	Ka100224-1
EMI TEST RECEIVER	Rohde Schwarz	ESR7	14/10/21	15/10/21	101109
EMI TEST RECEIVER	Rohde Schwarz	ESCI	15/02/25	16/02/25	100364
FREQUENCY CONVERTER	Taejin Electronic	CVCF	14/09/11	15/09/11	ZU0033
ARTIFICIAL MAINS NETWORK	Narda S.T.S. / PMM	PMM L2-16B	14/06/26	15/06/26	000WX20305

APPENDIX I

Conducted Test set up Diagram

- **Conducted Measurement**



APPENDIX II

Duty Cycle Information

▣ **Test Procedure**

Duty Cycle [X = On Time / (On + Off time)] is measured using Measurement Procedure **of KDB789033 D02 V01**

1. Set the center frequency of the spectrum analyzer to the center frequency of the transmission.
2. Set RBW ≥ EBW if possible; otherwise, set RBW to the largest available value.
3. Set VBW ≥ RBW. Set detector = peak.
4. Note : The zero-span measurement method shall not be used unless both **RBW and VBW are > 50/*T***, where *T* is defined in section II.B.1.a), and **the number of sweep points across duration *T* exceeds 100**. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if *T* ≤ 16.7 microseconds.)

T : The minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.
(***T* = On time** of the above table since the EUT operates with above fixed Duty Cycle and it is the minimum On time)

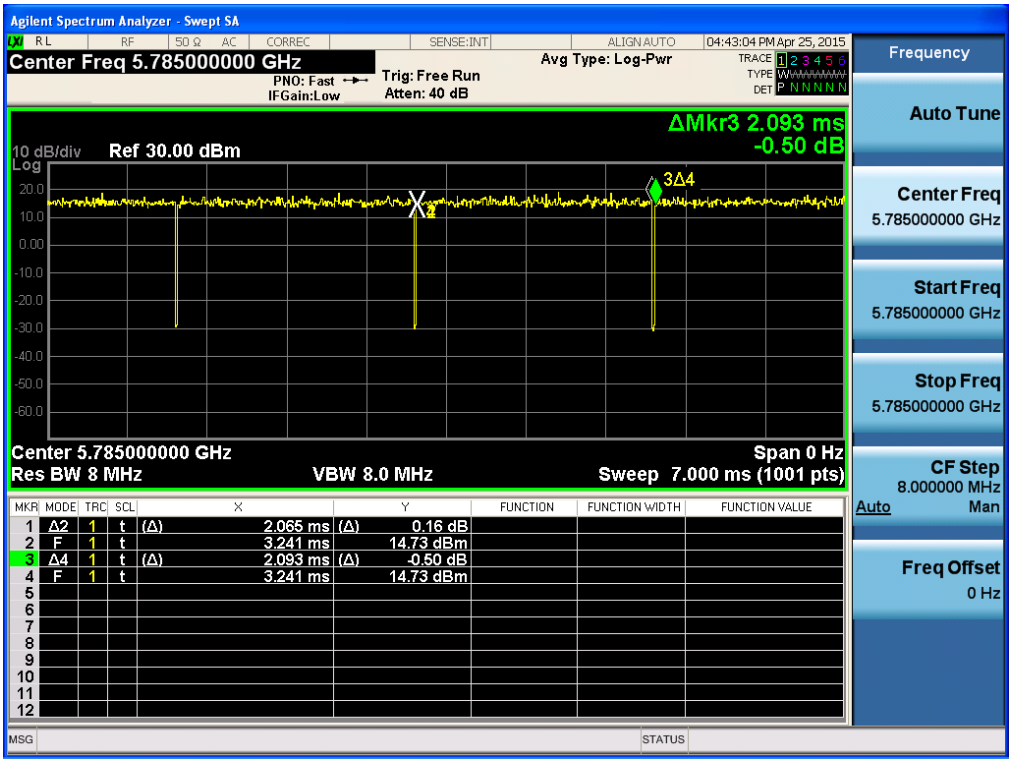
▣ Test Results:

Mode	Channel	Rate	Tested Frequency [MHz]	Maximum Achievable Duty Cycle (*x*) = On / (On+Off)			Duty Cycle Correction Factor [dB]	50/*T* [KHz]
				On Time [ms]	On+Off Time [ms]	*x*		
802.11a	157	6 Mbps	5795	2.0650	2.0930	0.9866	0.06	24.21
802.11n (HT20)	157	MCS 0	5795	1.9180	1.9460	0.9856	0.07	26.07
	157	MCS 8	5795	0.9840	1.0110	0.9733	0.12	50.81
802.11n (HT40)	151	MCS 0	5755	0.9420	0.9690	0.9721	0.13	53.08
	151	MCS 8	5755	0.4968	0.5229	0.9501	0.23	100.64
802.11ac (VHT20)	144	NSS1 & MCS 0	5720	1.9200	1.9600	0.9796	0.09	26.04
	144	NSS2 & MCS 0	5720	0.9880	1.0200	0.9686	0.14	50.61
802.11ac (VHT40)	142	NSS1 & MCS 0	5710	0.9440	0.9760	0.9672	0.15	52.97
	142	NSS2 & MCS 0	5710	0.5000	0.5250	0.9524	0.22	100.00
802.11ac (VHT80)	155	NSS1 & MCS 0	5775	0.4401	0.4692	0.9380	0.28	113.61
	155	NSS2 & MCS 0	5775	0.2560	0.2832	0.9040	0.44	195.31

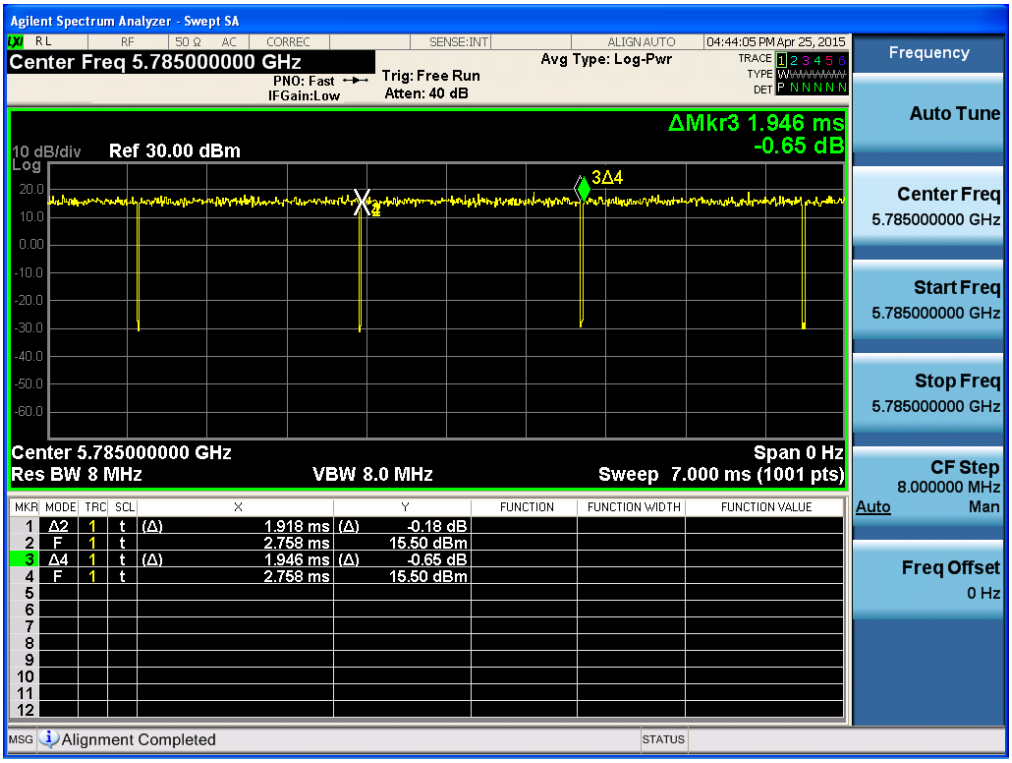
▣ Result Plots

Duty Cycle

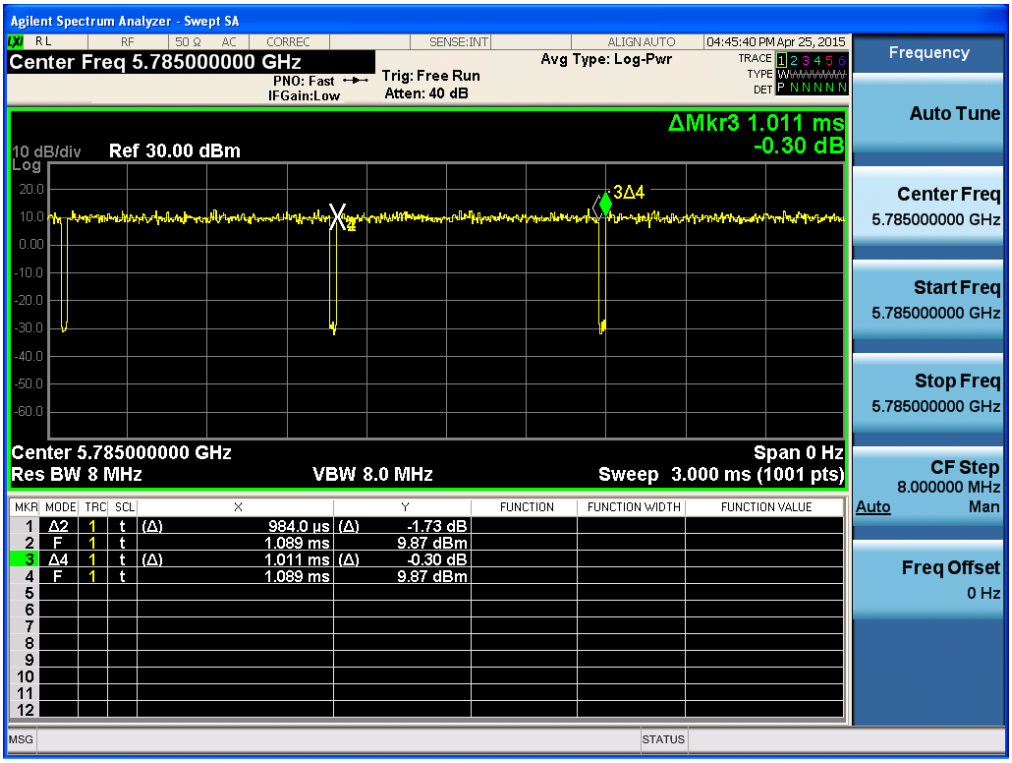
Test Mode: 802.11a & Ch.157 & 6 Mbps



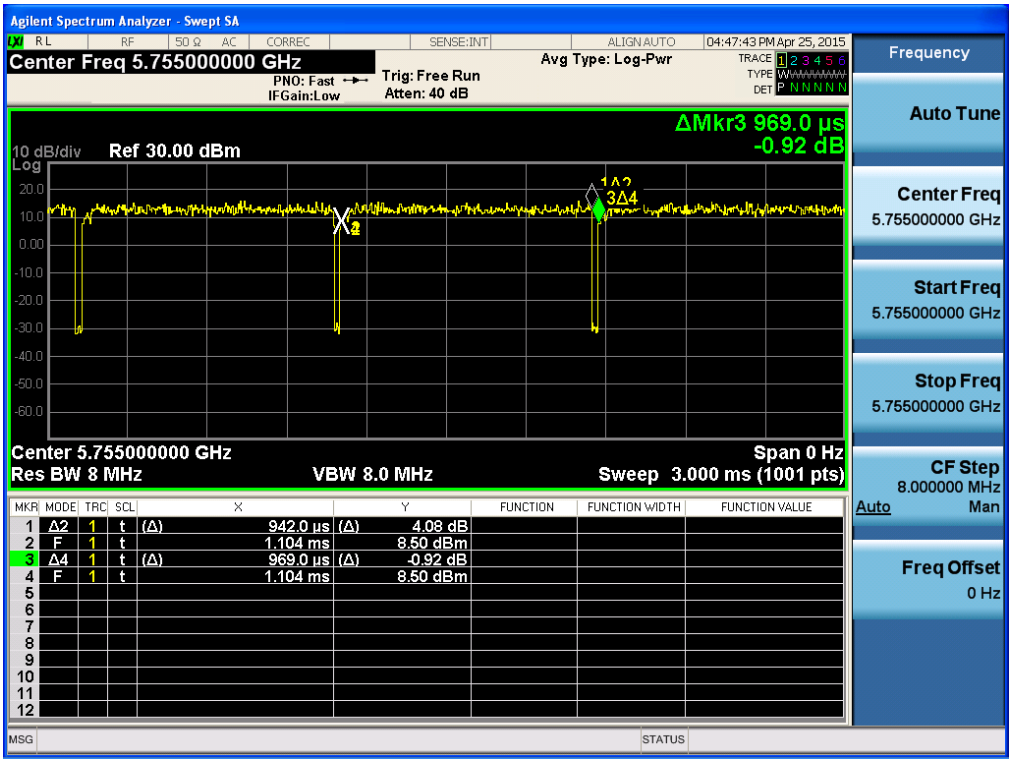
Duty Cycle Test Mode: 802.11n(HT20) & Ch.157 & MCS 0



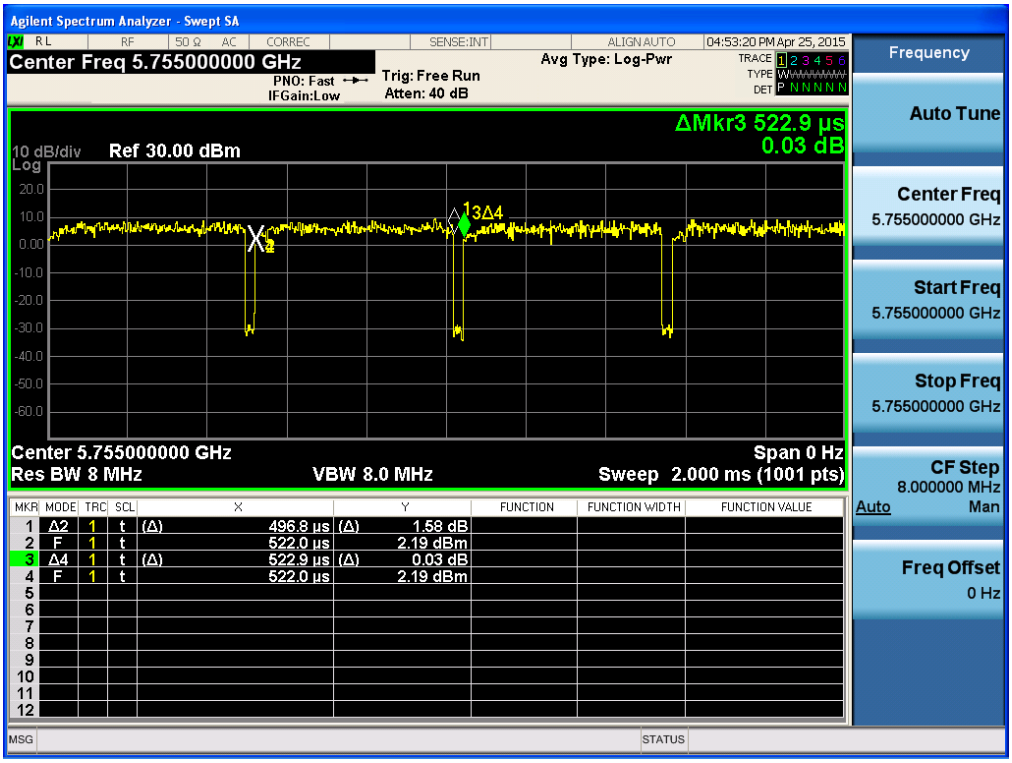
Duty Cycle Test Mode: 802.11n(HT20) & Ch.157 & MCS 8



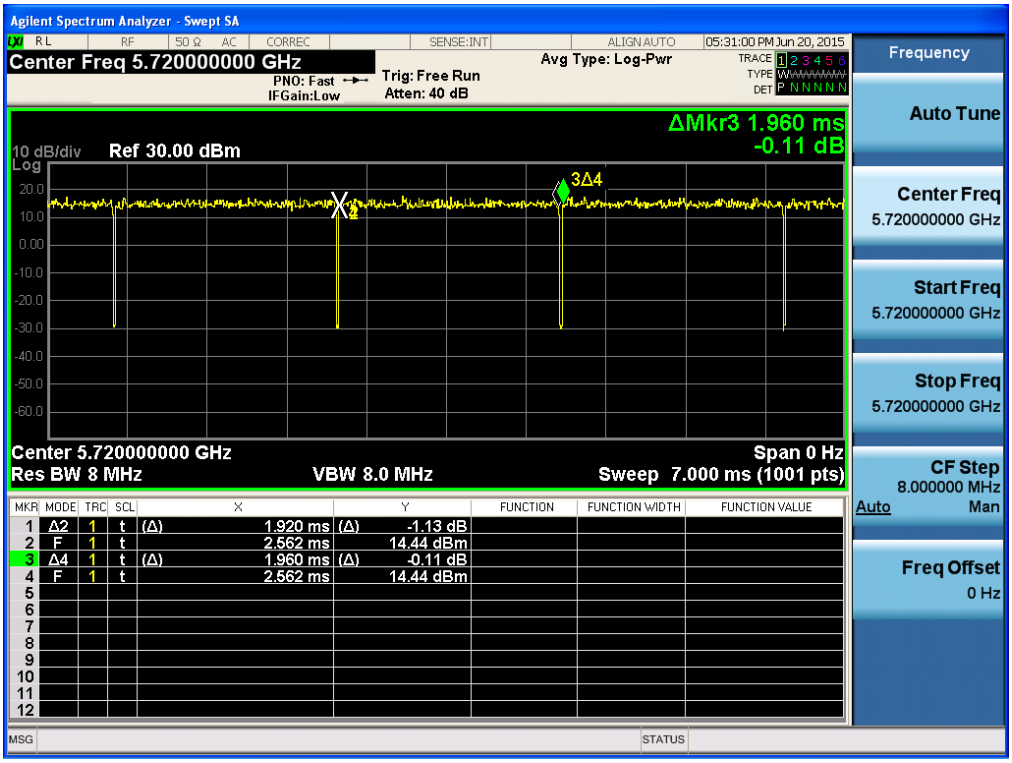
Duty Cycle Test Mode: 802.11n(HT40) & Ch.151 & MCS 0



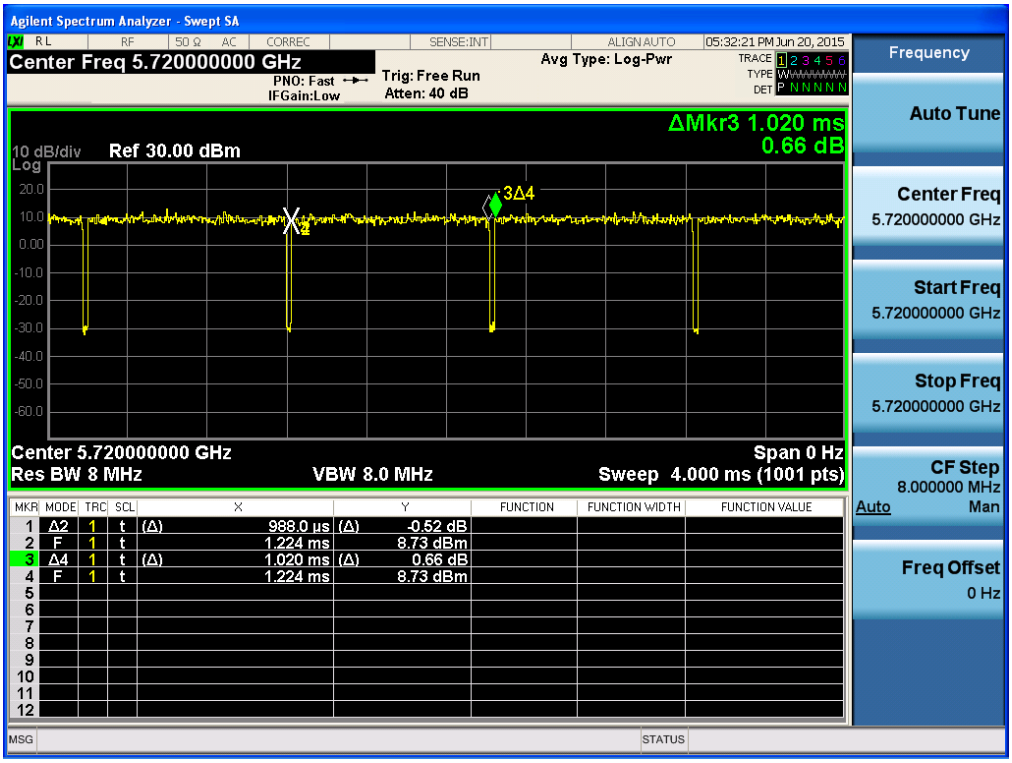
Duty Cycle Test Mode: 802.11n(HT40) & Ch.151 & MCS 8



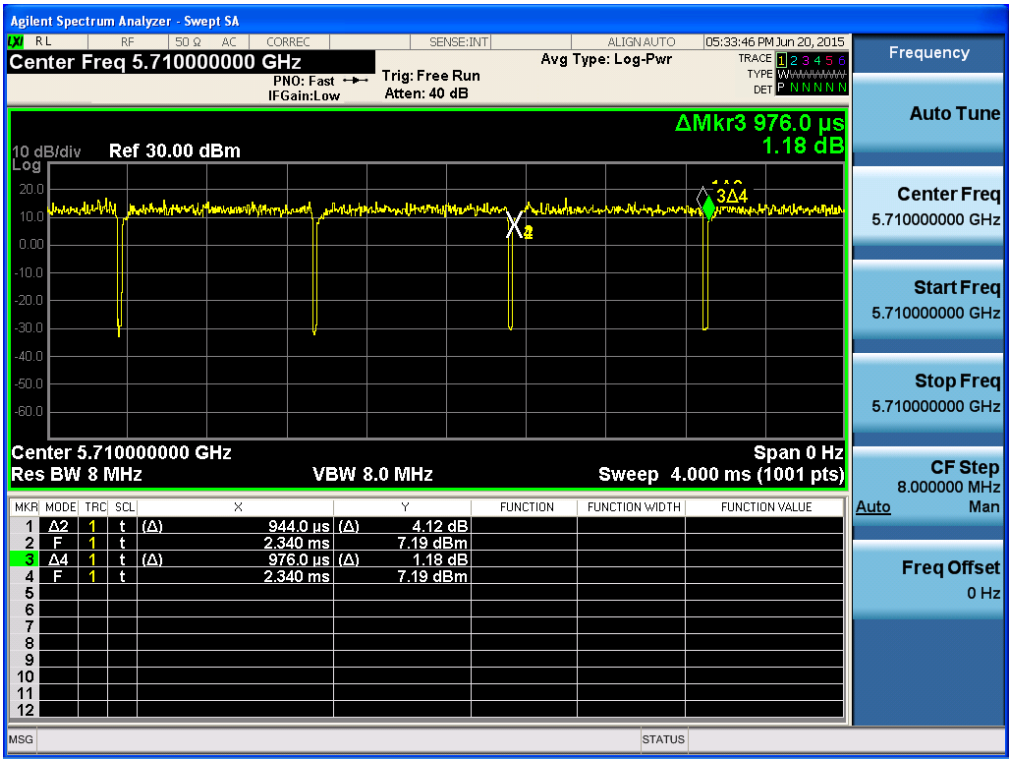
Duty Cycle Test Mode: 802.11ac(VHT20) & Ch.144 & NSS1 MCS 0



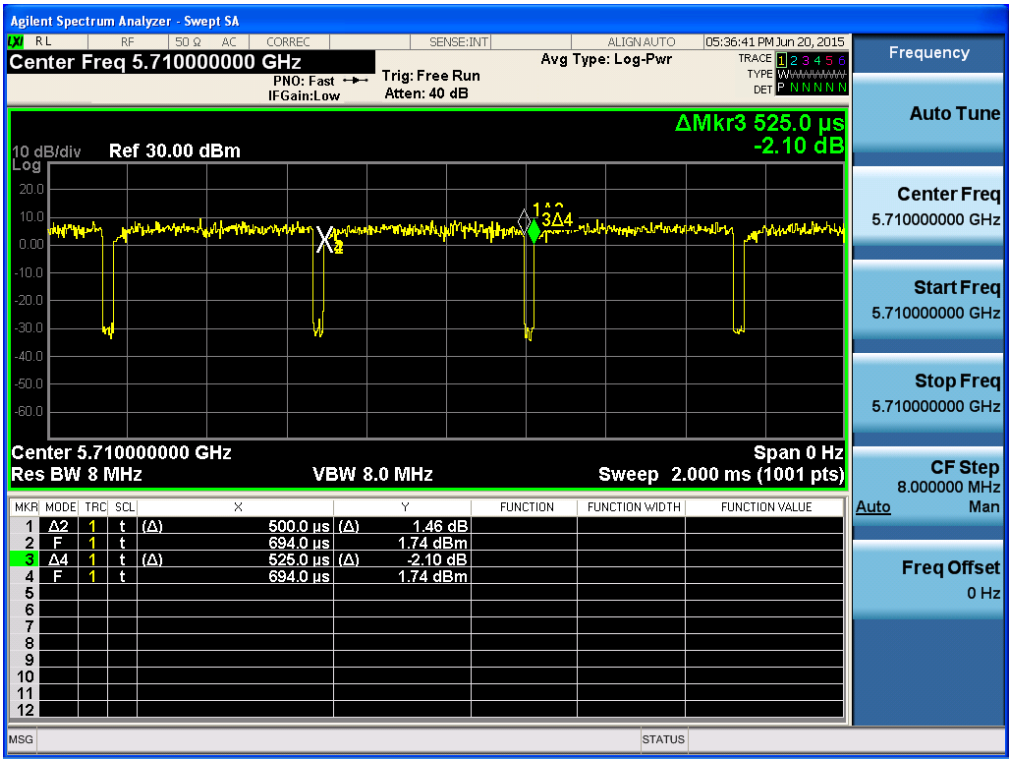
Duty Cycle Test Mode: 802.11ac(VHT20) & Ch.144 & NSS2 MCS 0



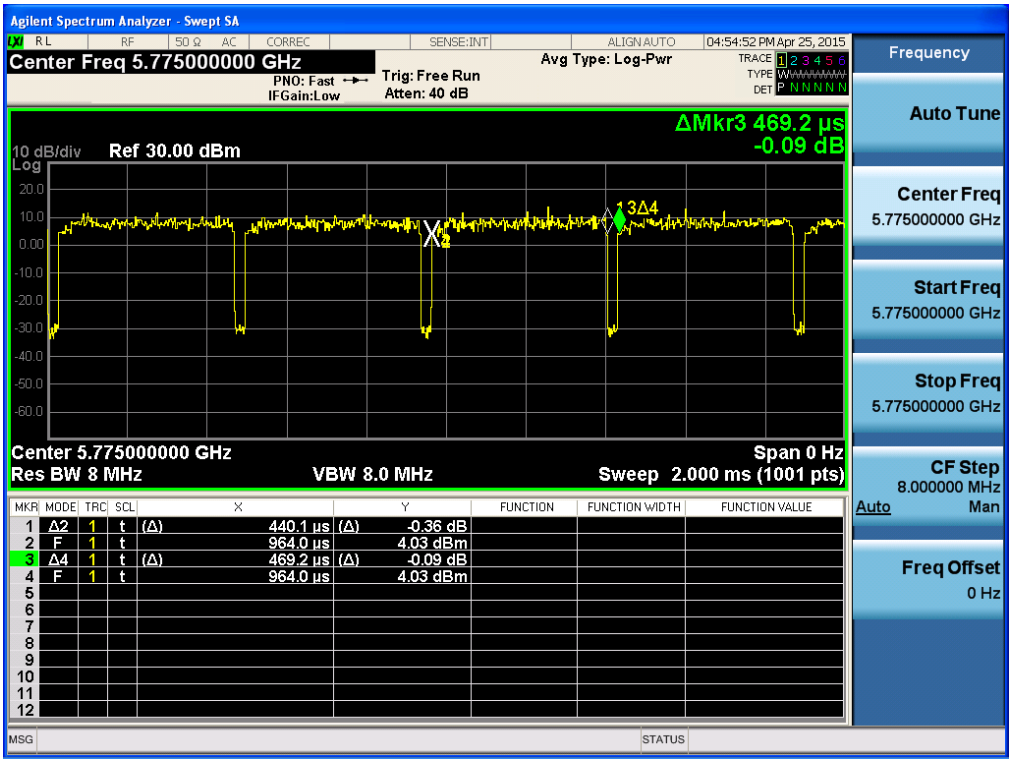
Duty Cycle Test Mode: 802.11ac(VHT40) & Ch.142 & NSS1 MCS 0



Duty Cycle Test Mode: 802.11ac(VHT40) & Ch.142 & NSS2 MCS 0



Duty Cycle Test Mode: 802.11ac(VHT80) & Ch.155 & NSS1 MCS 0



Duty Cycle Test Mode: 802.11ac(VHT80) & Ch.155 & NSS2 MCS 0