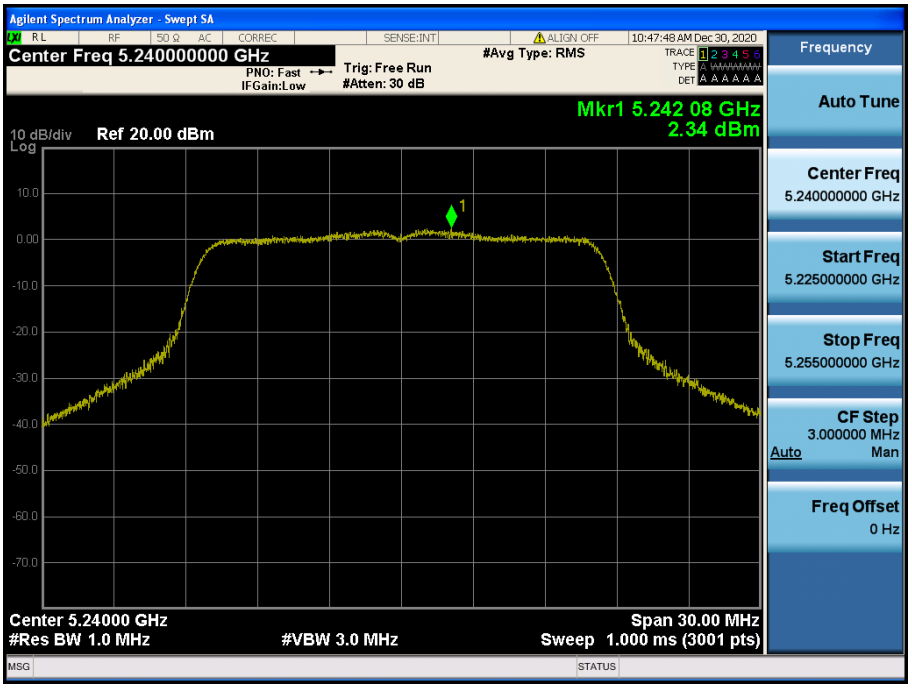
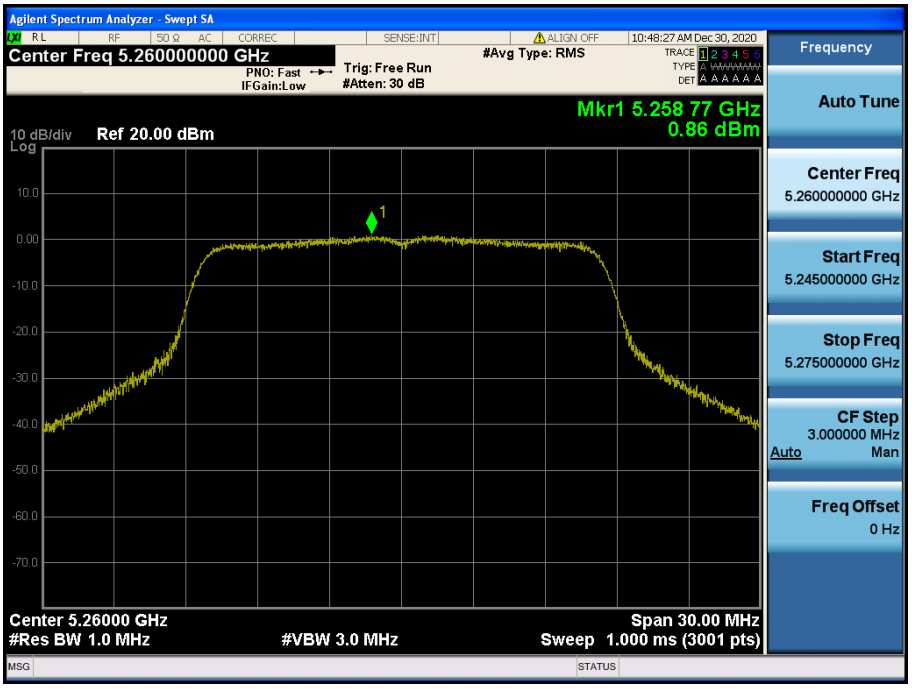
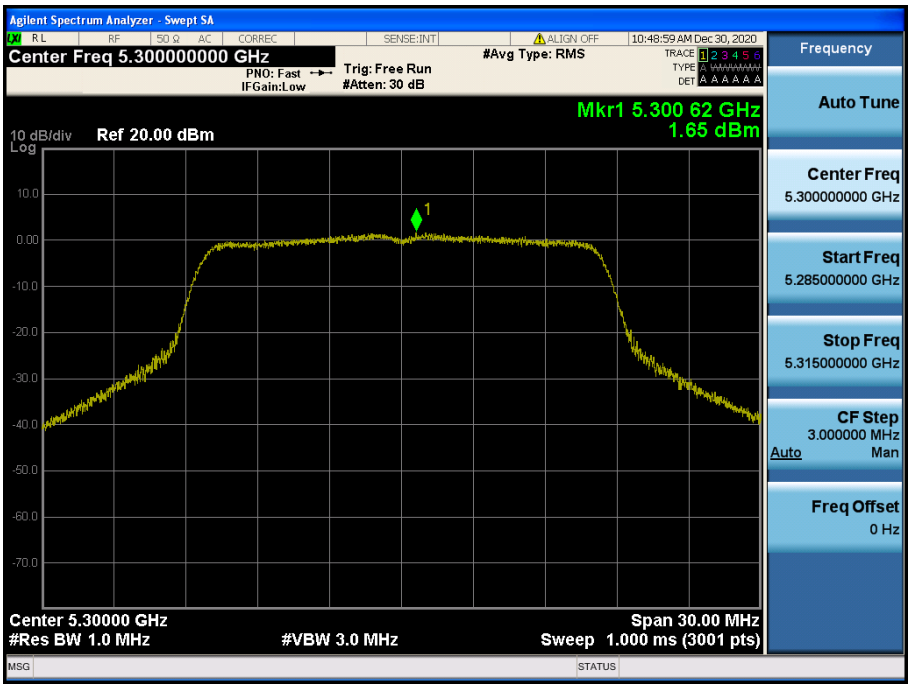
Maximum Power Spectral Density Test Mode: 802.11a & ANT 1 & Ch.48



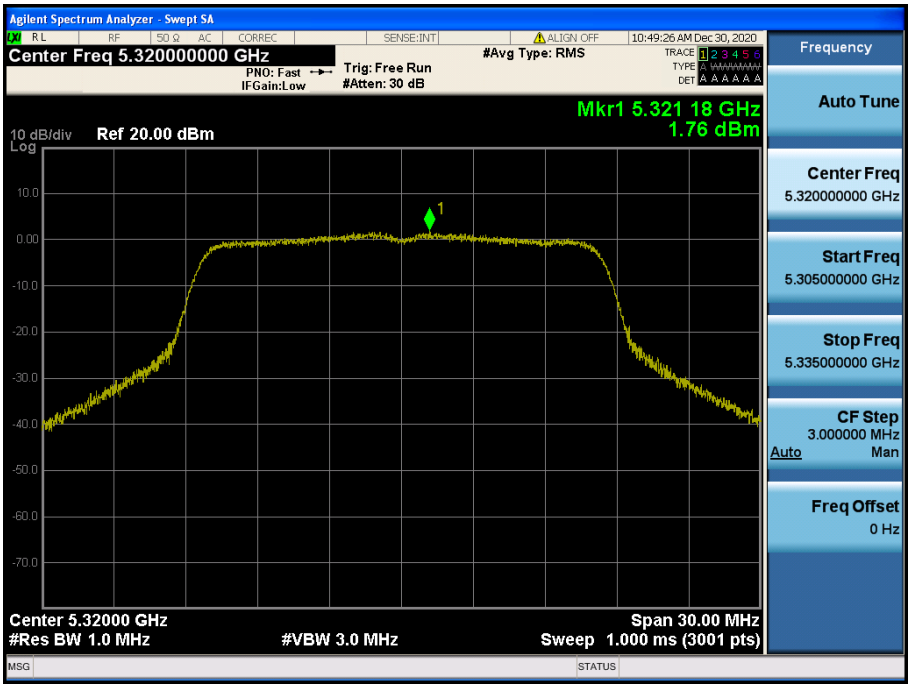
Maximum Power Spectral Density Test Mode: 802.11a & ANT 1 & Ch.52



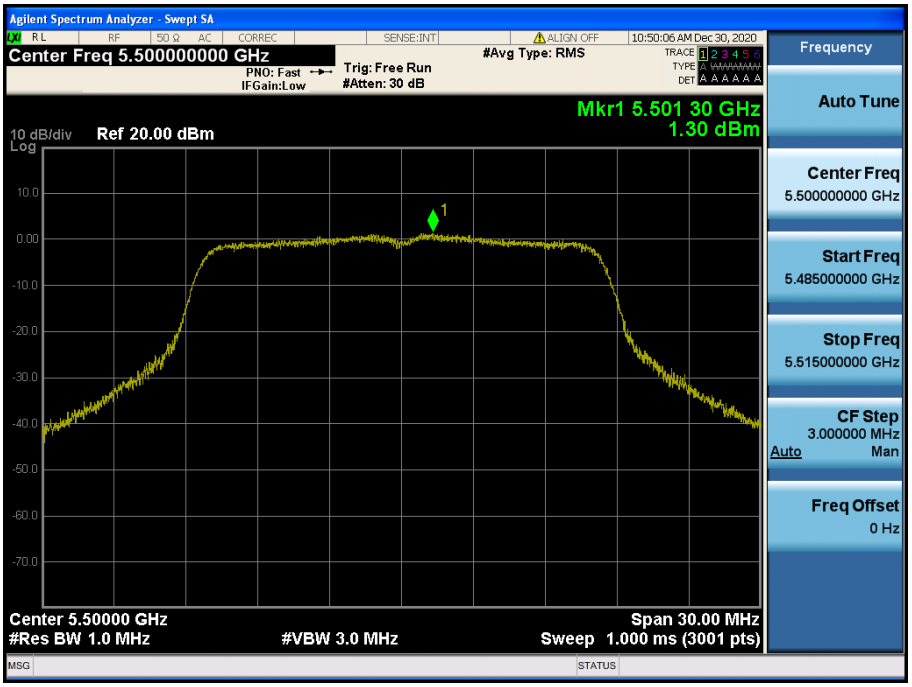
Maximum Power Spectral Density Test Mode: 802.11a & ANT 1 & Ch.60



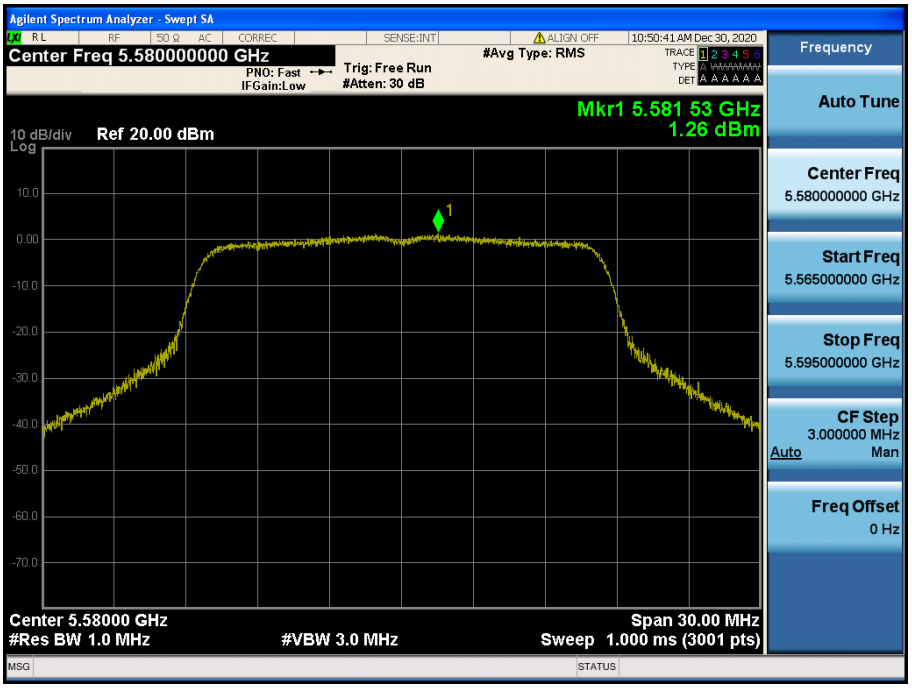
Maximum Power Spectral Density Test Mode: 802.11a & ANT 1 & Ch.64



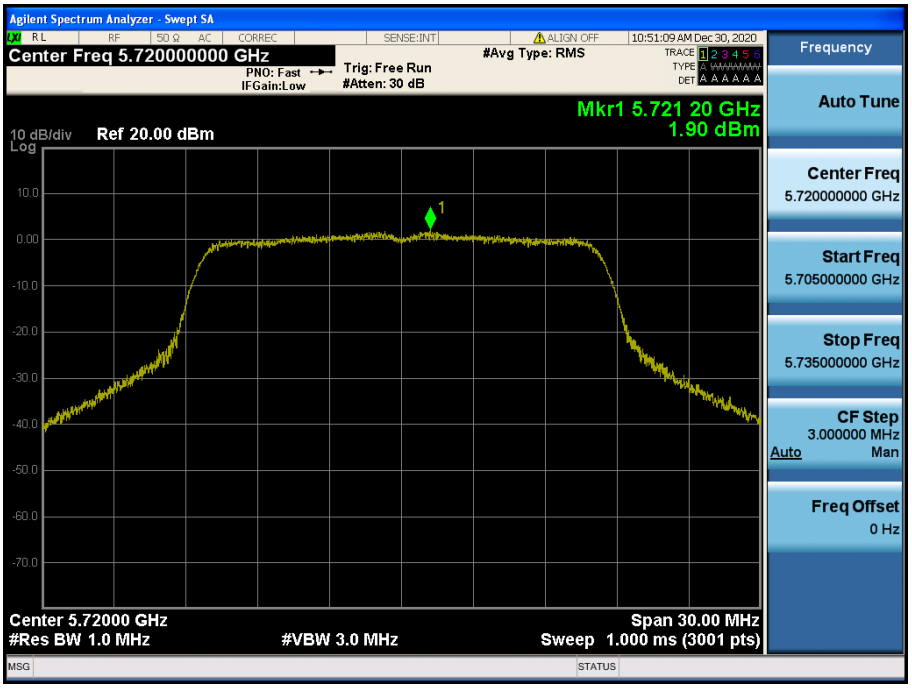
Maximum Power Spectral Density Test Mode: 802.11a & ANT 1 & Ch.100



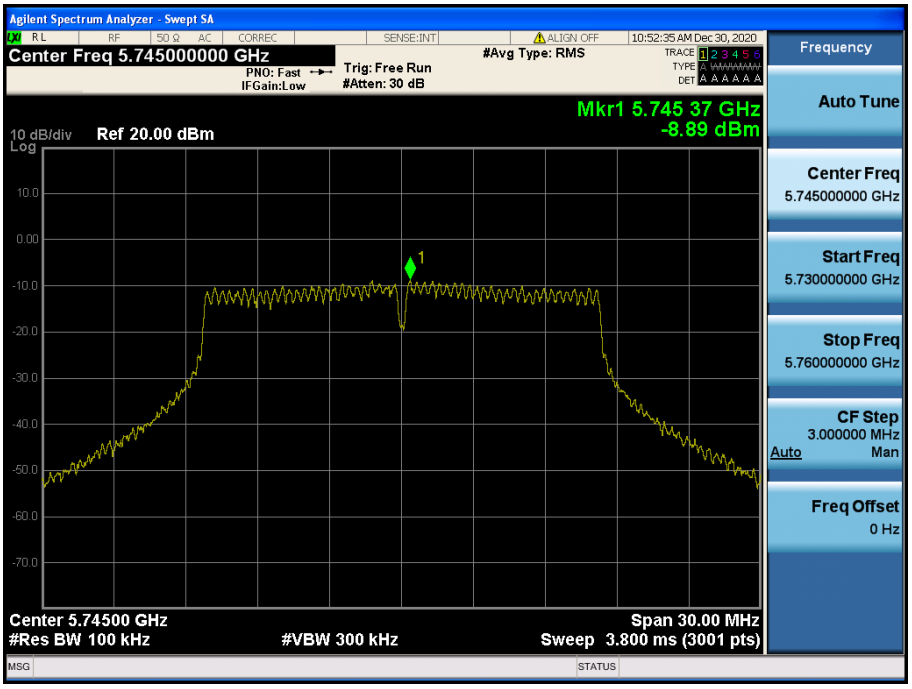
Maximum Power Spectral Density Test Mode: 802.11a & ANT 1 & Ch.116



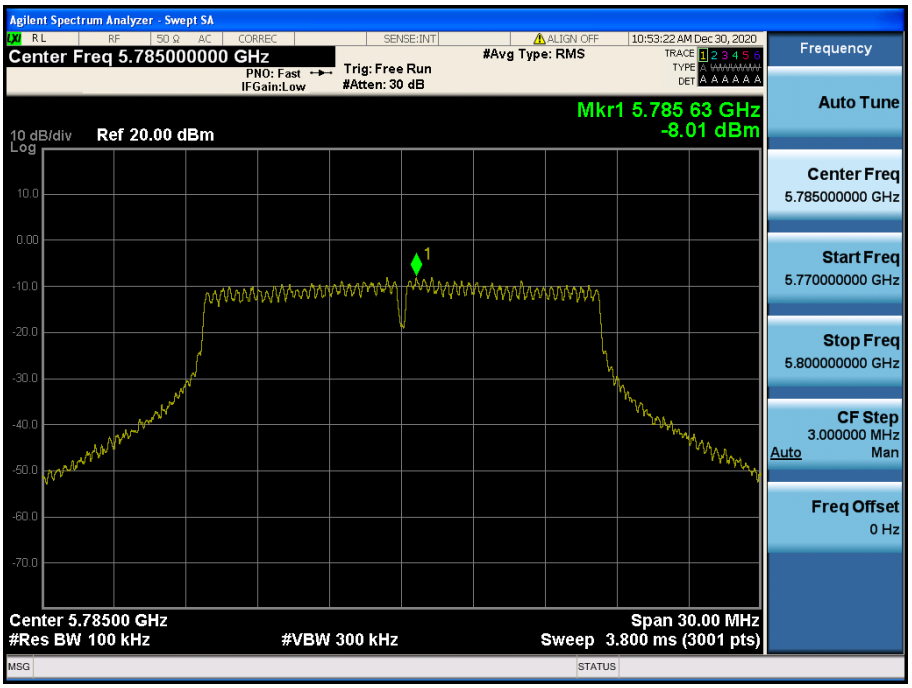
Maximum Power Spectral Density Test Mode: 802.11a & ANT 1 & Ch.144



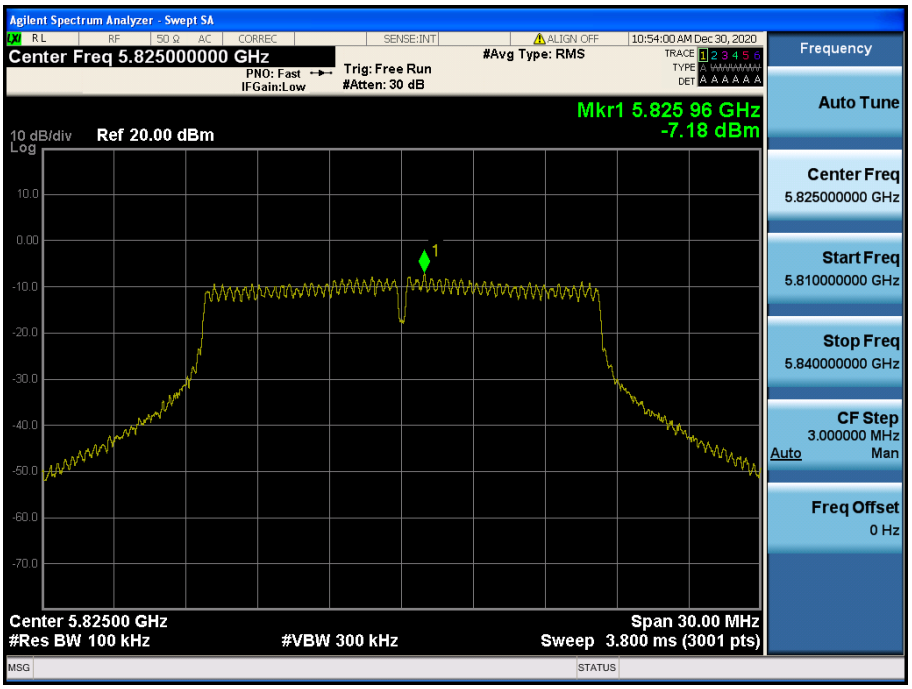
Maximum Power Spectral Density Test Mode: 802.11a & ANT 1 & Ch.149



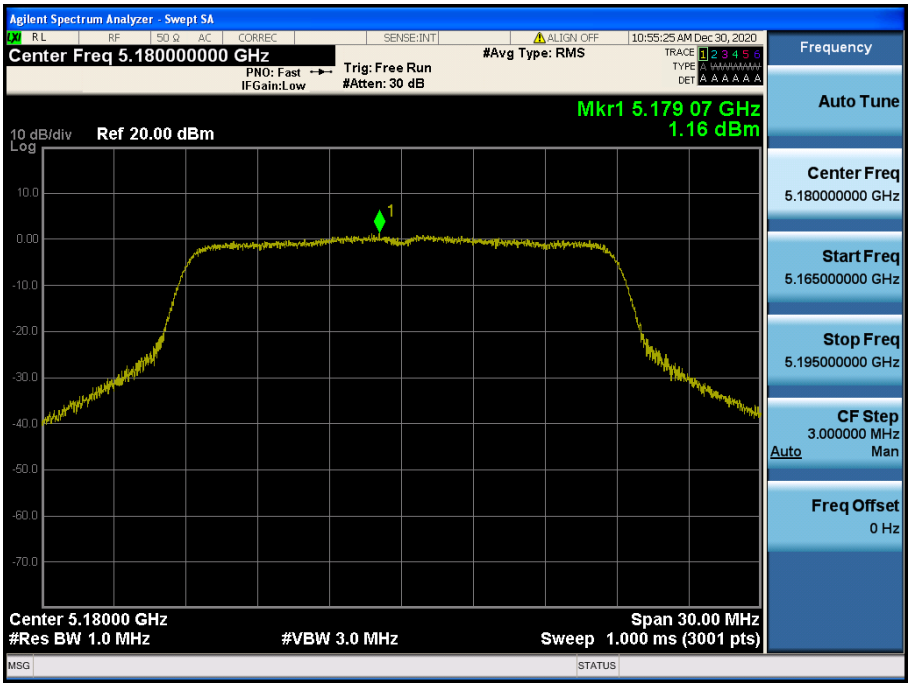
Maximum Power Spectral Density Test Mode: 802.11a & ANT 1 & Ch.157



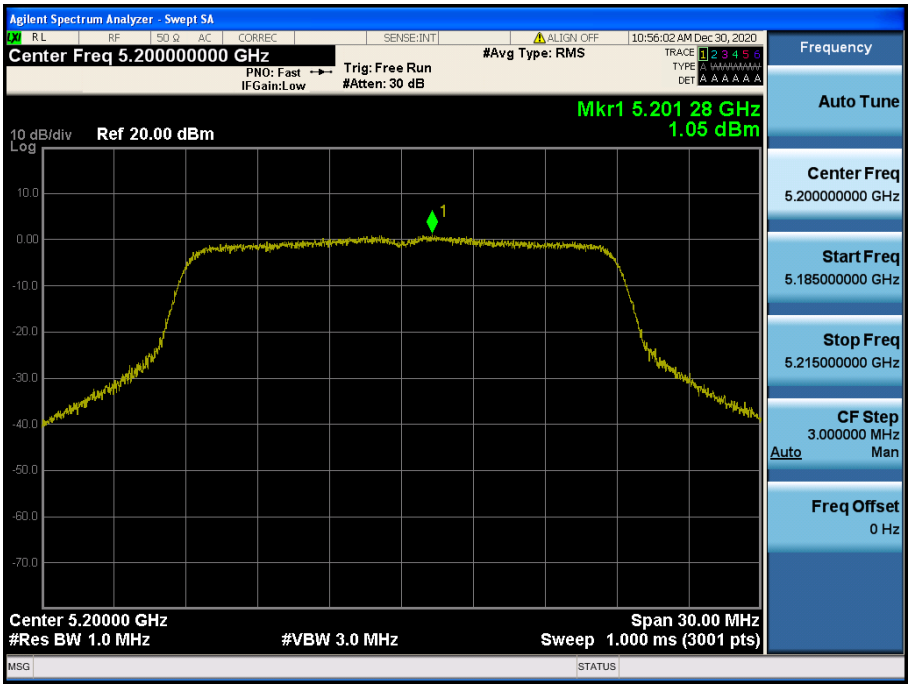
Maximum Power Spectral Density Test Mode: 802.11a & ANT 1 & Ch.165



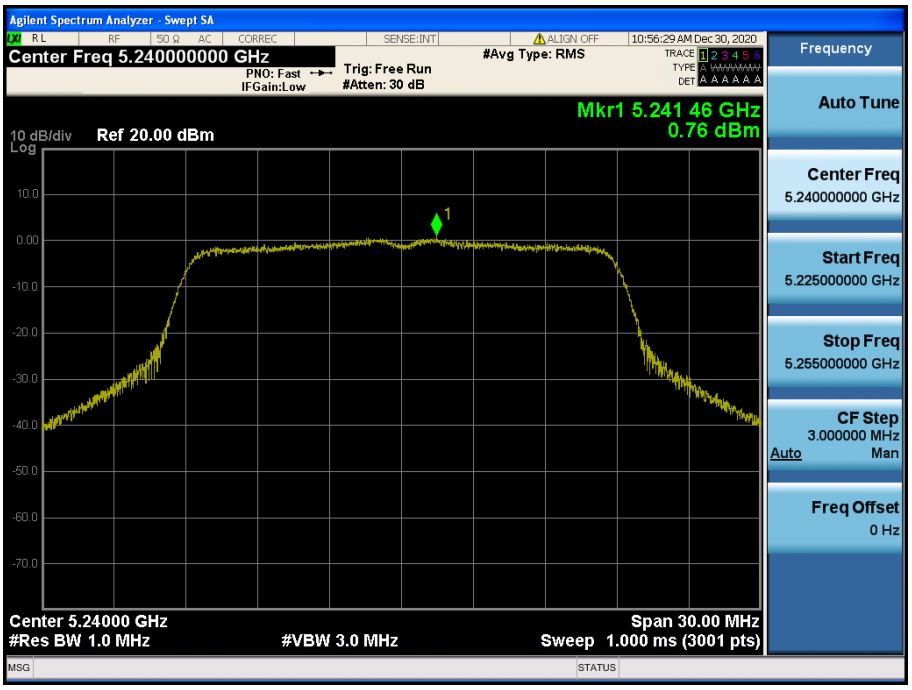
Maximum Power Spectral Density Test Mode: 802.11n HT20 & ANT 1 & Ch.36



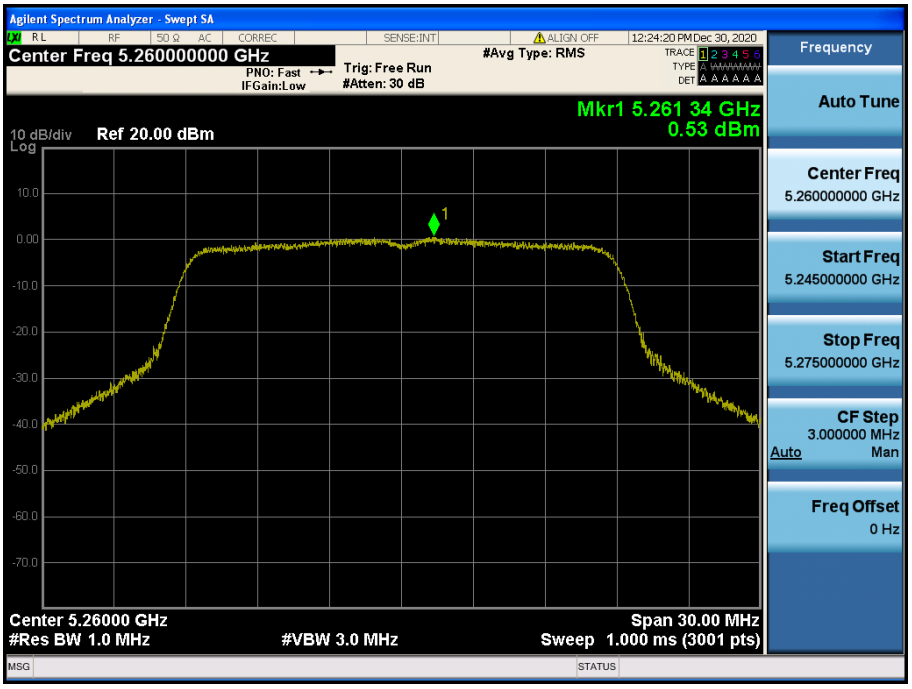
Test Mode: 802.11n HT20 & ANT 1 & Ch.40



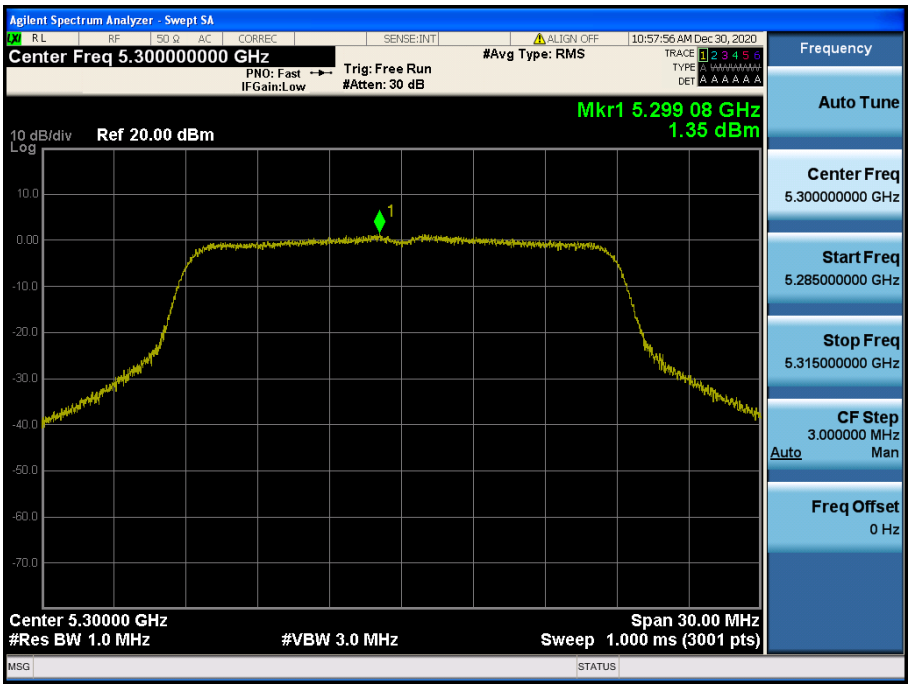
Maximum Power Spectral Density Test Mode: 802.11n HT20 & ANT 1 & Ch.48



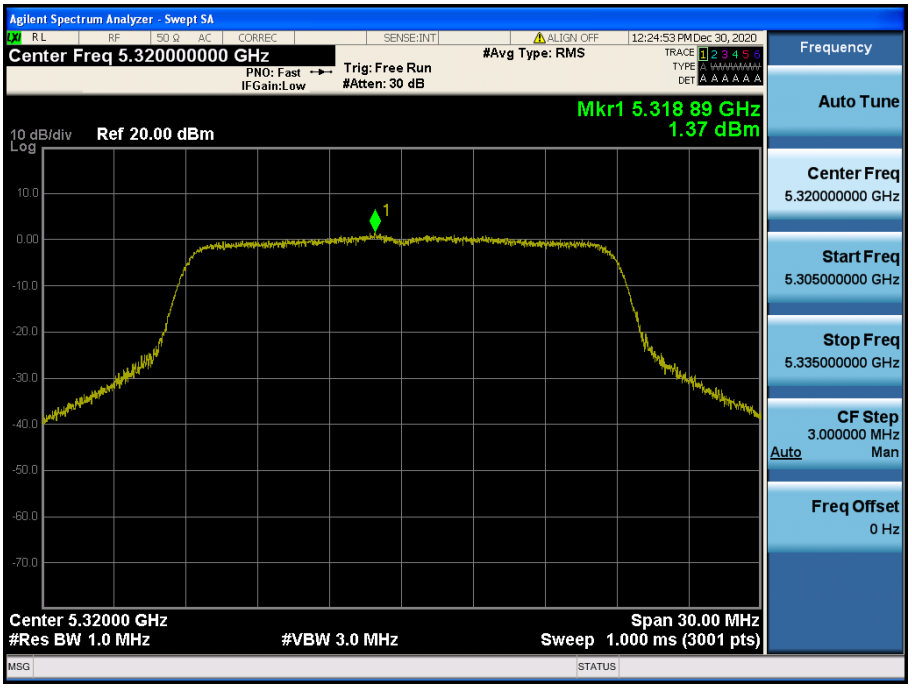
Maximum Power Spectral Density Test Mode: 802.11n HT20 & ANT 1 & Ch.52



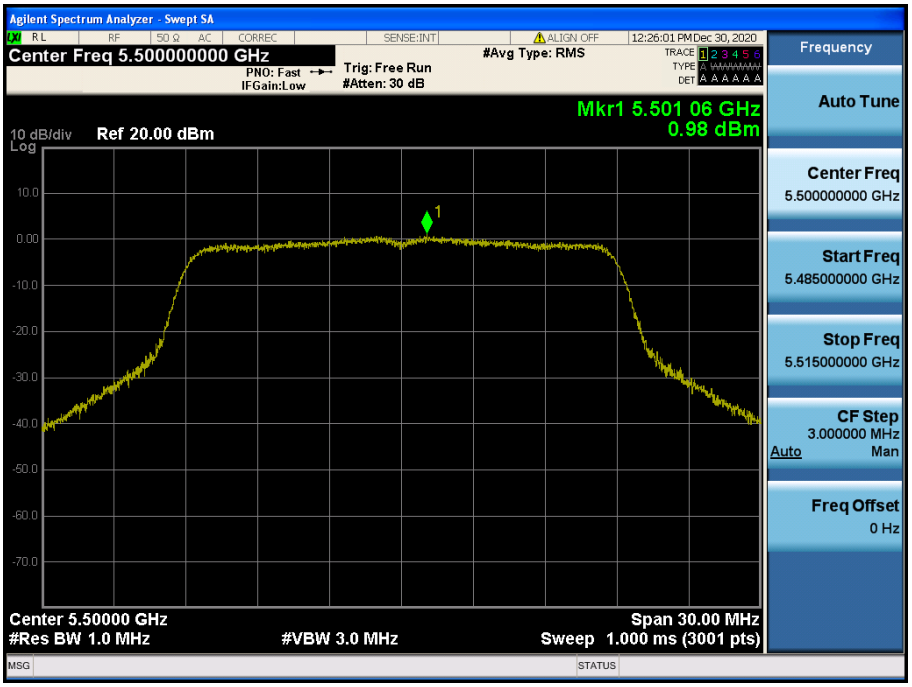
Maximum Power Spectral Density Test Mode: 802.11n HT20 & ANT 1 & Ch.60



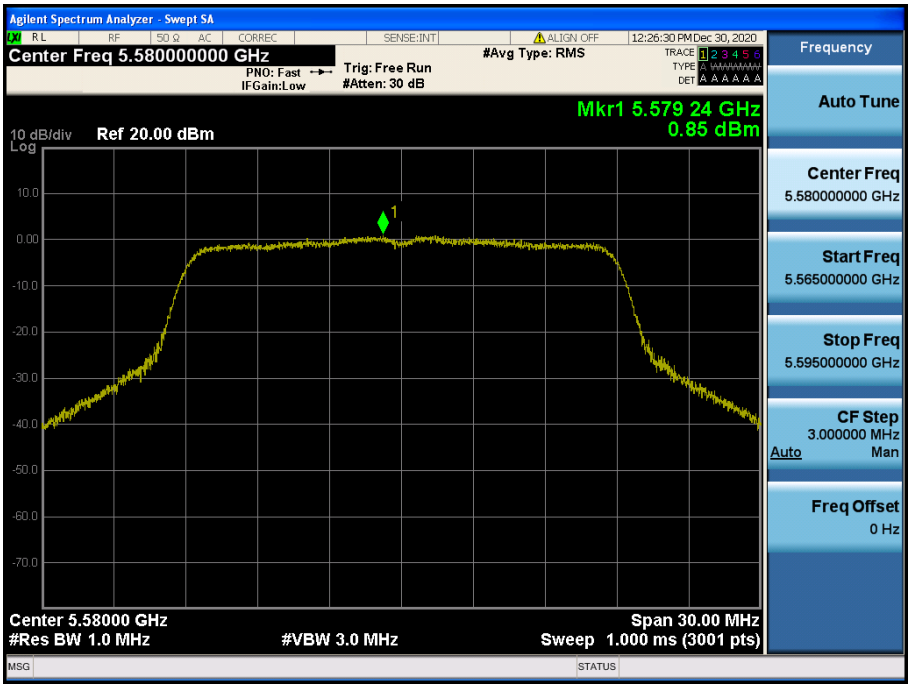
Maximum Power Spectral Density Test Mode: 802.11n HT20 & ANT 1 & Ch.64



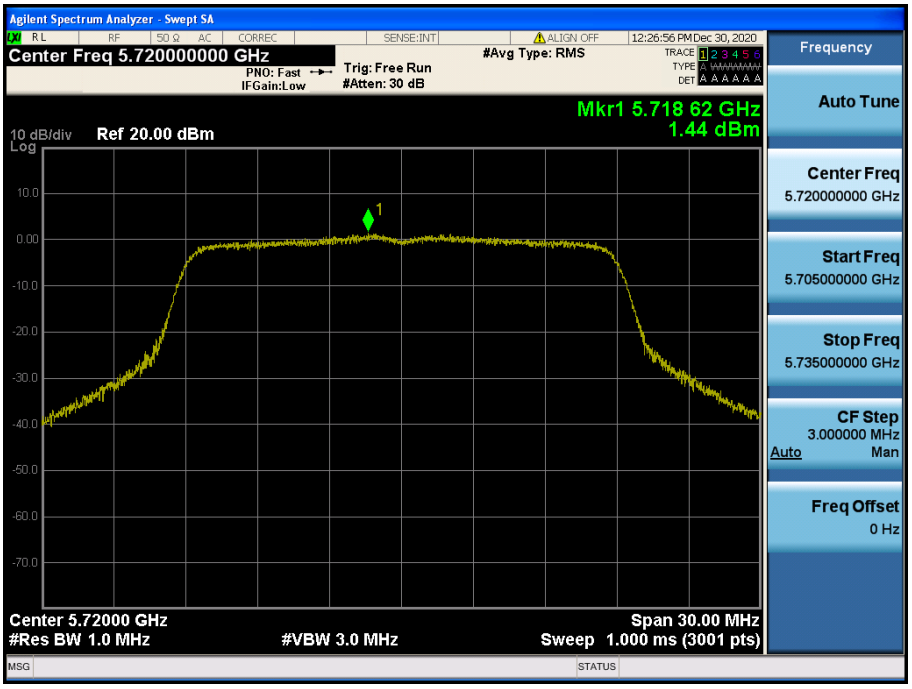
Maximum Power Spectral Density Test Mode: 802.11n HT20 & ANT 1 & Ch.100



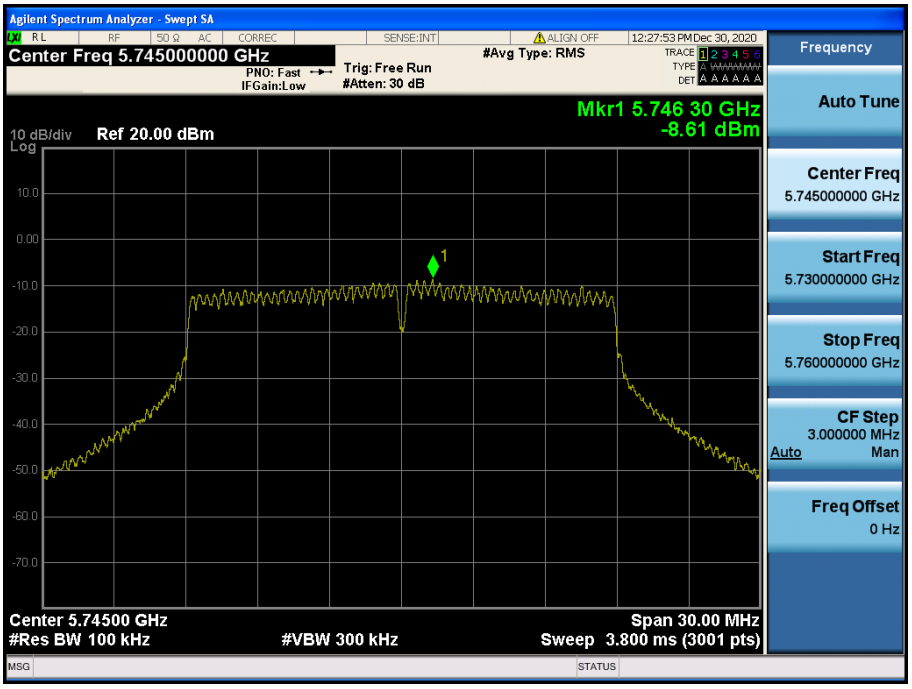
Maximum Power Spectral Density Test Mode: 802.11n HT20 & ANT 1 & Ch.116



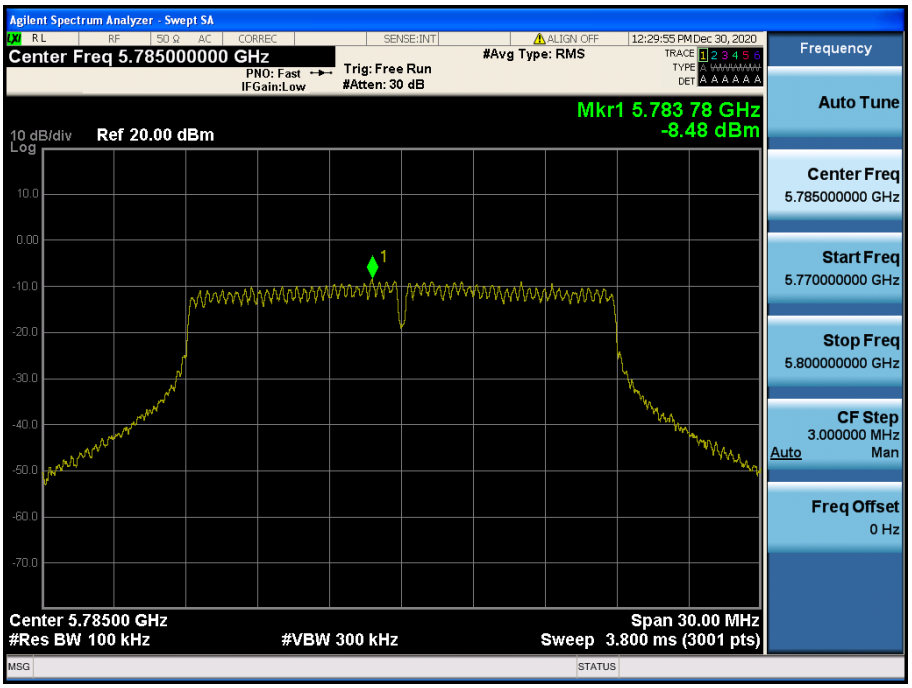
Maximum Power Spectral Density Test Mode: 802.11n HT20 & ANT 1 & Ch.144



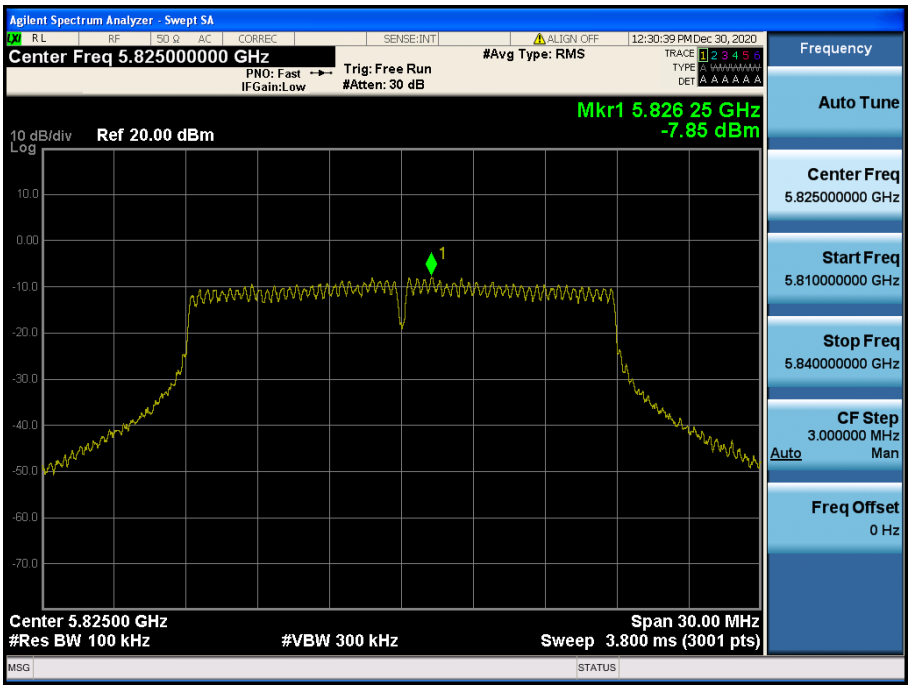
Maximum Power Spectral Density Test Mode: 802.11n HT20 & ANT 1 & Ch.149



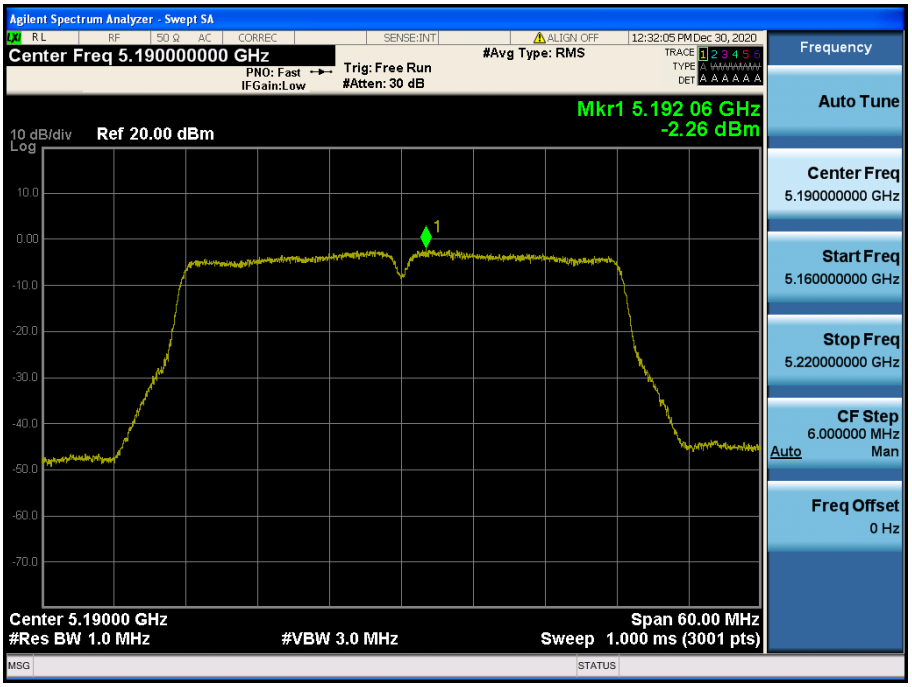
Maximum Power Spectral Density Test Mode: 802.11n HT20 & ANT 1 & Ch.157



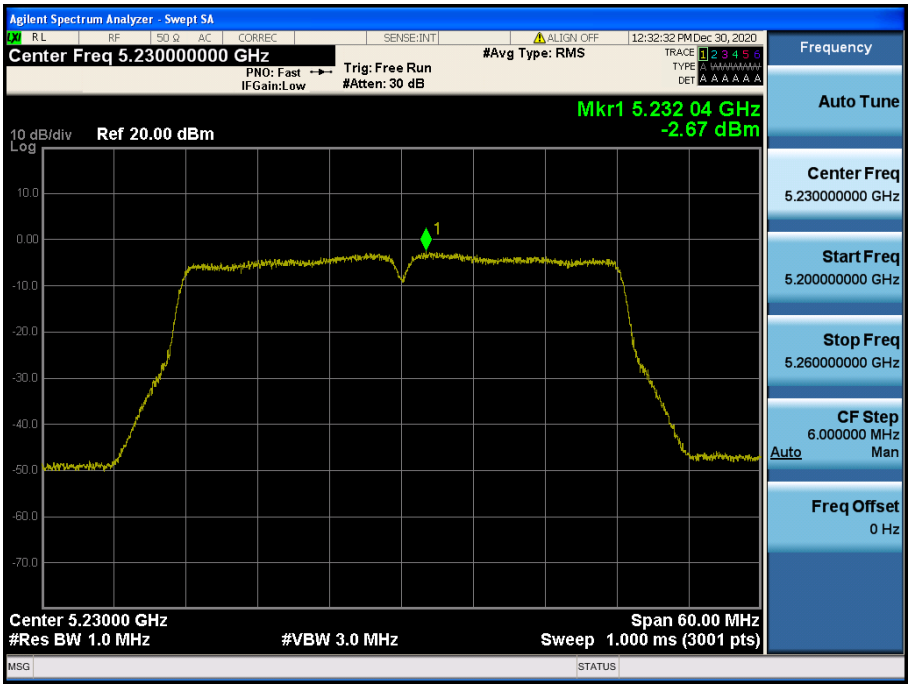
Maximum Power Spectral Density Test Mode: 802.11ac VHT20 & ANT 1 & Ch.165



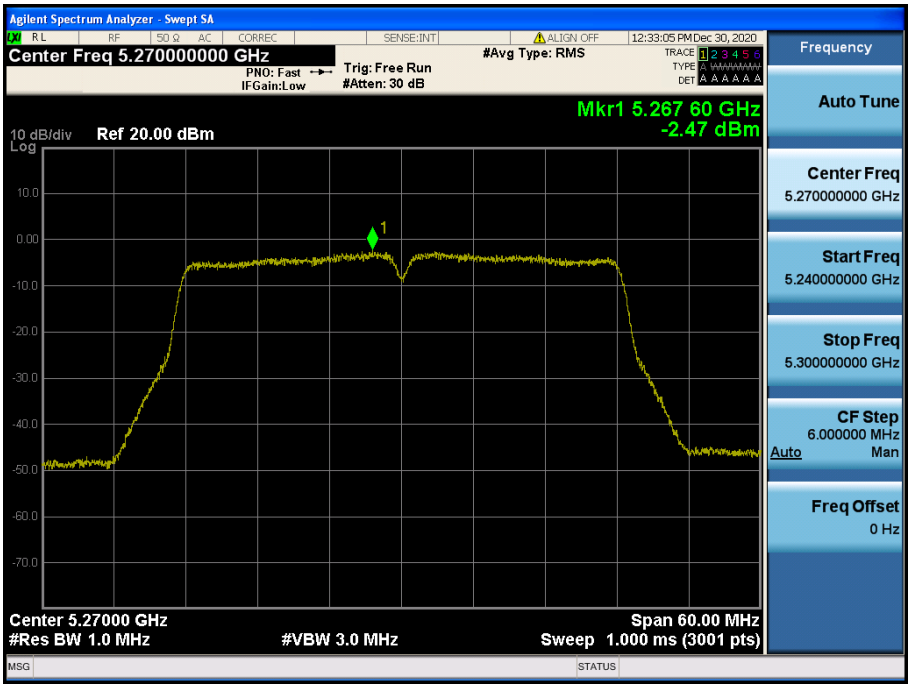
Maximum Power Spectral Density Test Mode: 802.11ac VHT40 & ANT 1 & Ch.38



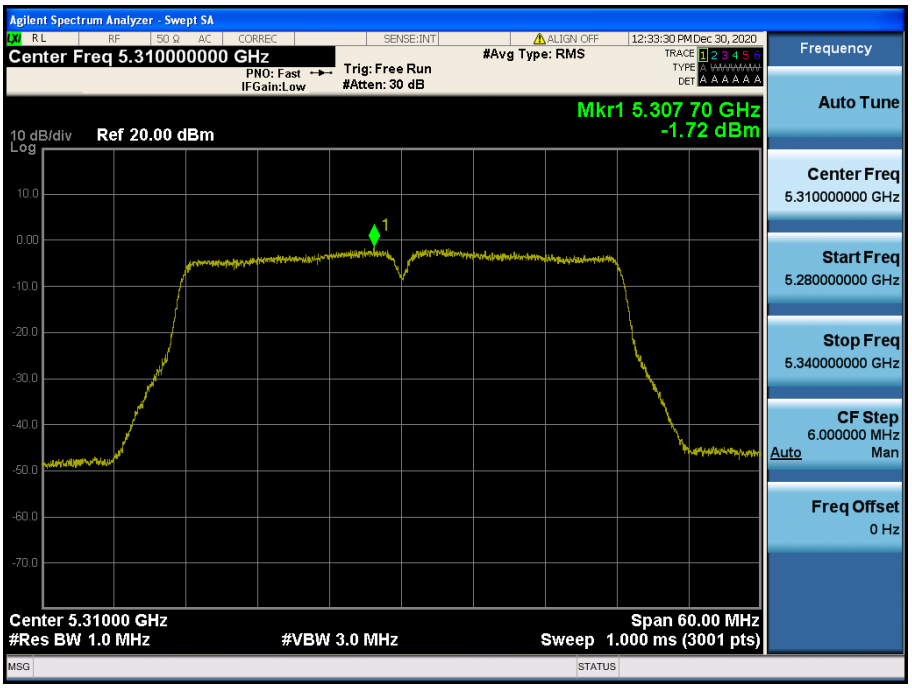
Maximum Power Spectral Density Test Mode: 802.11ac VHT40 & ANT 1 & Ch.46



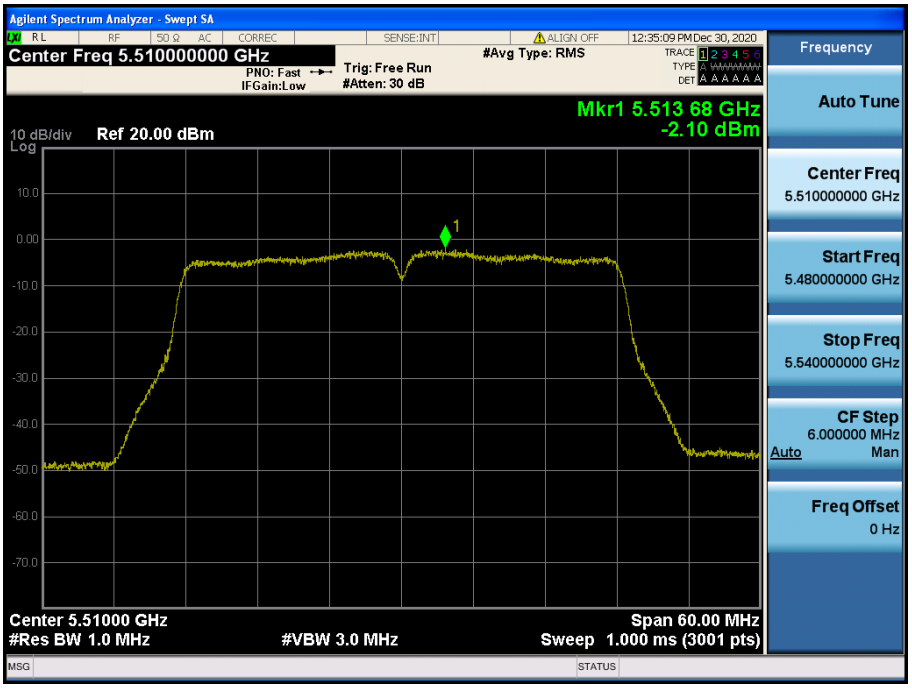
Maximum Power Spectral Density Test Mode: 802.11ac VHT40 & ANT 1 & Ch.54



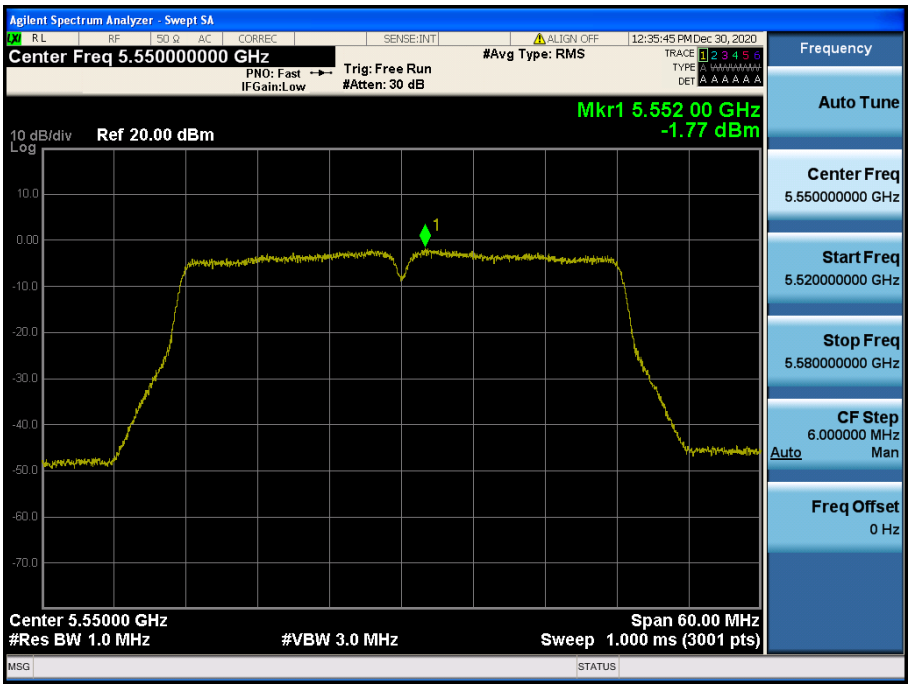
Maximum Power Spectral Density Test Mode: 802.11ac VHT40 & ANT 1 & Ch.62



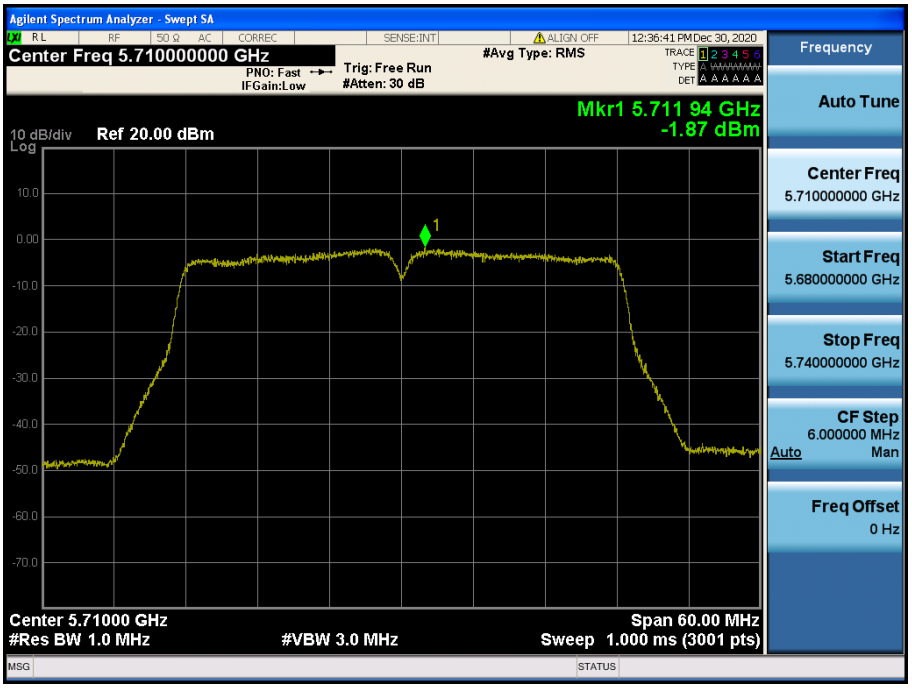
Maximum Power Spectral Density Test Mode: 802.11ac VHT40 & ANT 1 & Ch.102



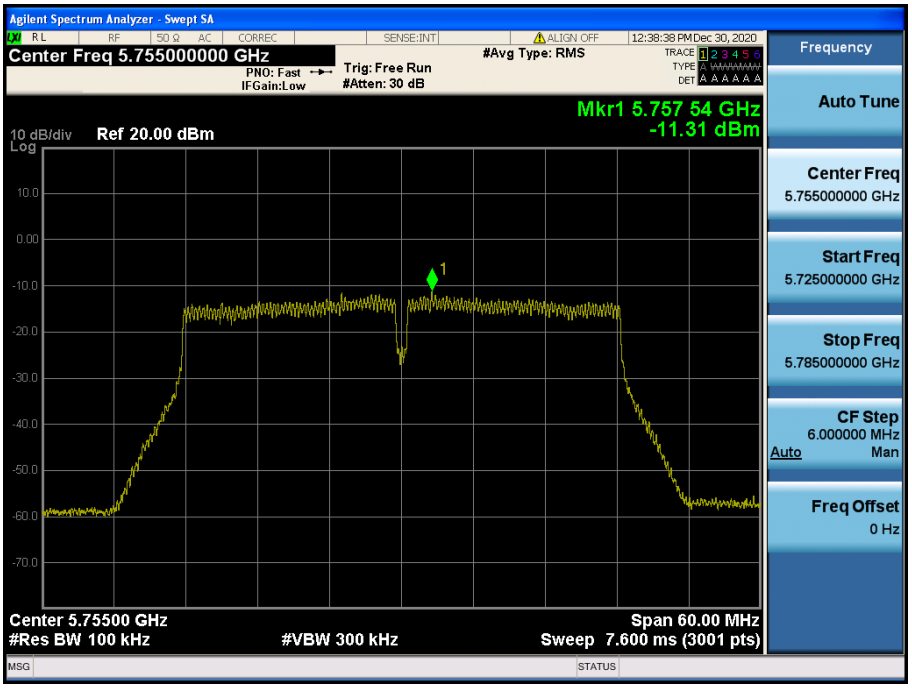
Maximum Power Spectral Density Test Mode: 802.11ac VHT40 & ANT 1 & Ch.110



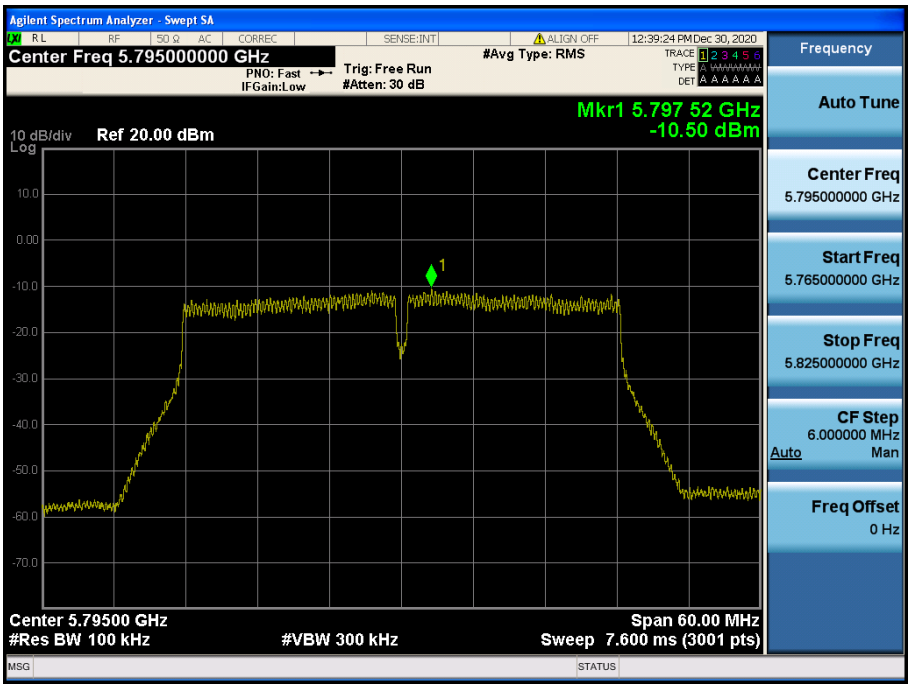
Maximum Power Spectral Density Test Mode: 802.11ac VHT40 & ANT 1 & Ch.142



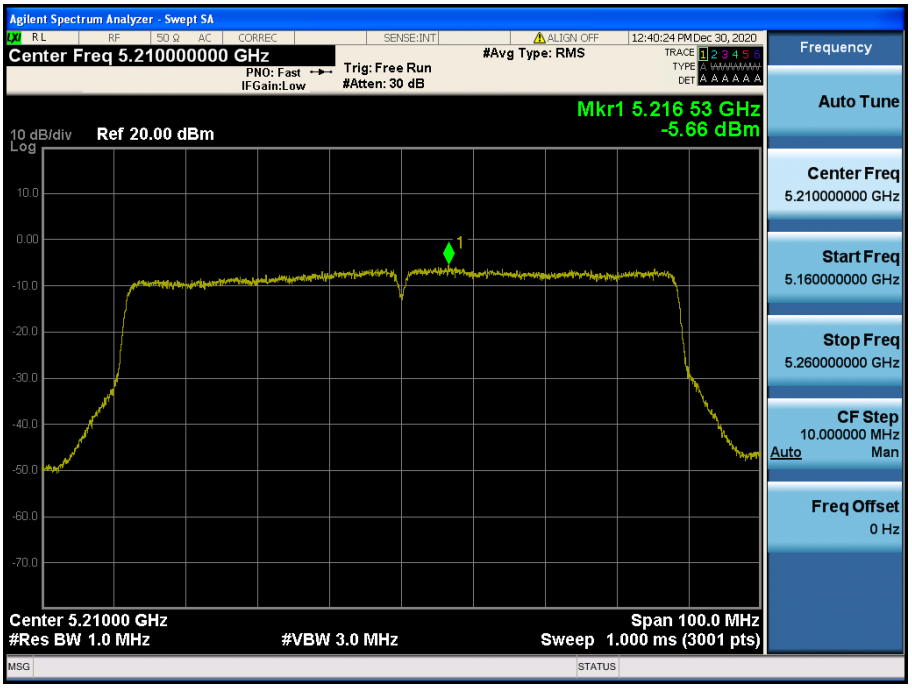
Maximum Power Spectral Density Test Mode: 802.11ac VHT40 & ANT 1 & Ch.151



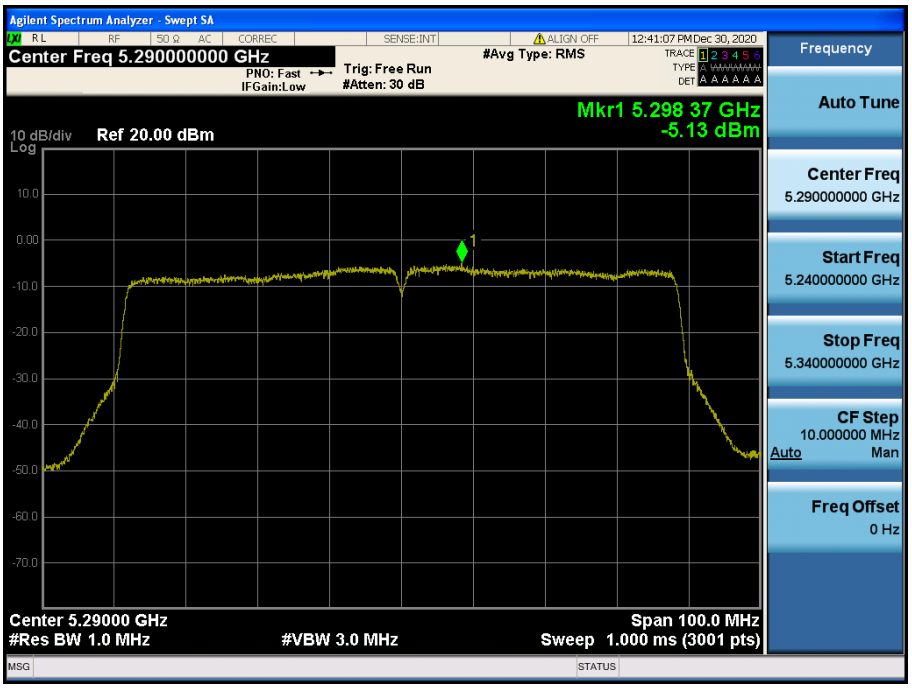
Maximum Power Spectral Density Test Mode: 802.11ac VHT40 & ANT 1 & Ch.159



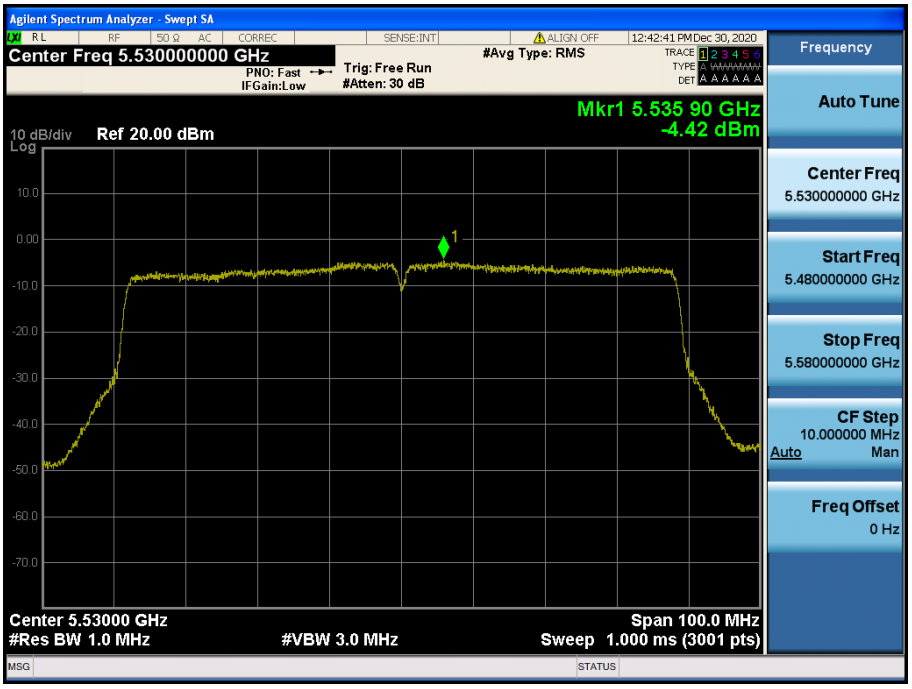
Maximum Power Spectral Density Test Mode: 802.11ac VHT80 & ANT 1 & Ch.42



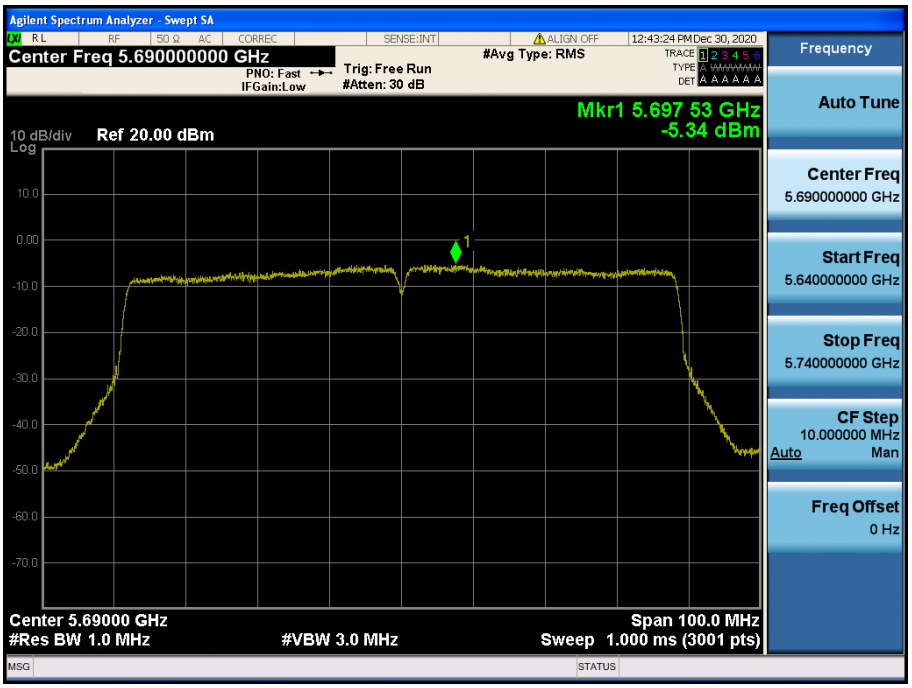
Maximum Power Spectral Density Test Mode: 802.11ac VHT80 & ANT 1 & Ch.58



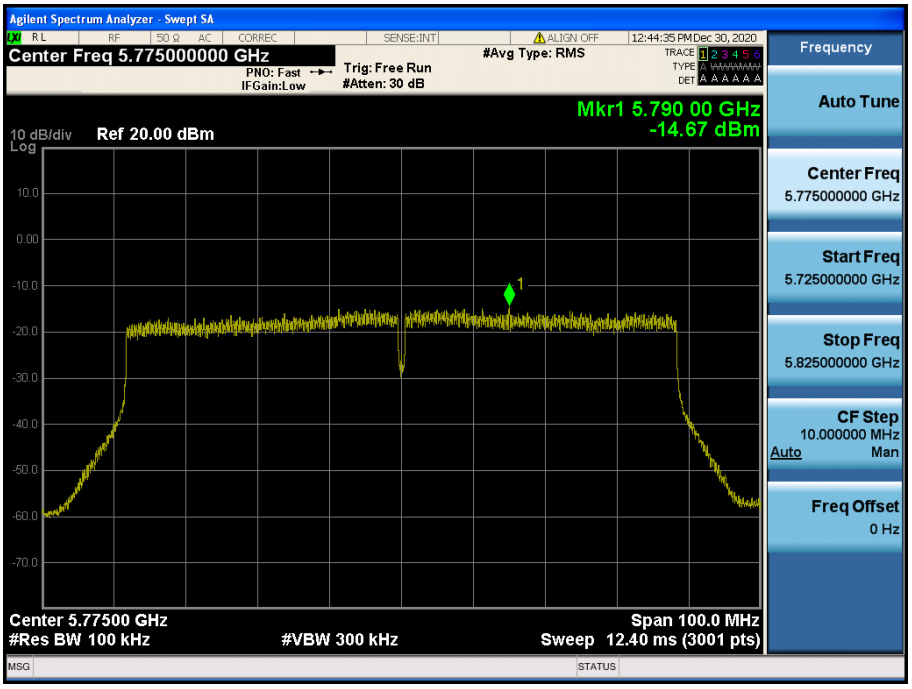
Maximum Power Spectral Density Test Mode: 802.11ac VHT80 & ANT 1 & Ch.106



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

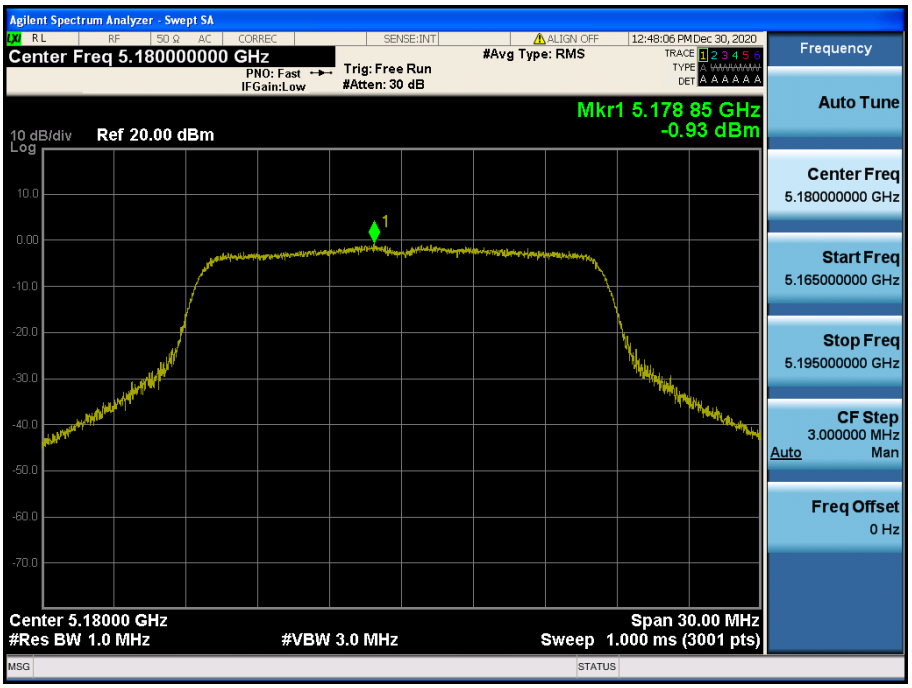


Maximum Power Spectral Density Test Mode: 802.11ac VHT80 & ANT 1 & Ch.155

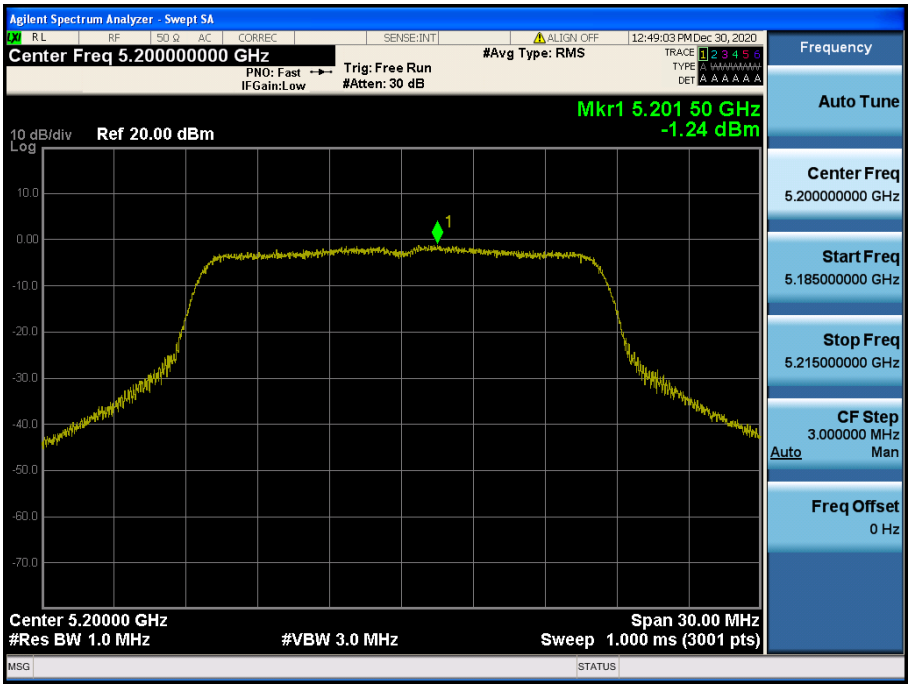


- Power spectral density: Antenna 2

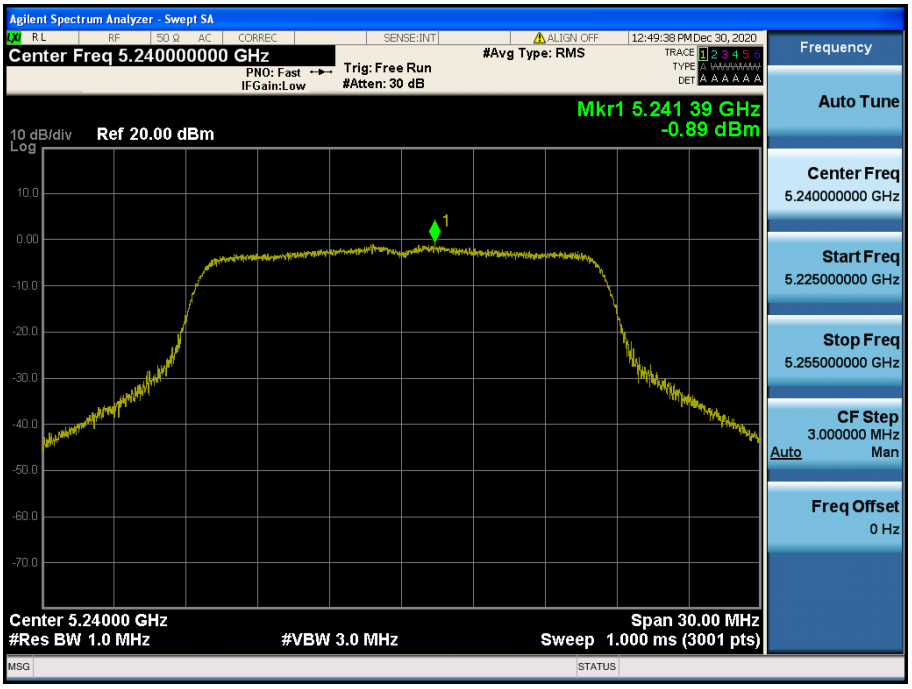
Maximum Power Spectral Density Test Mode: 802.11a & ANT 2 & Ch.36



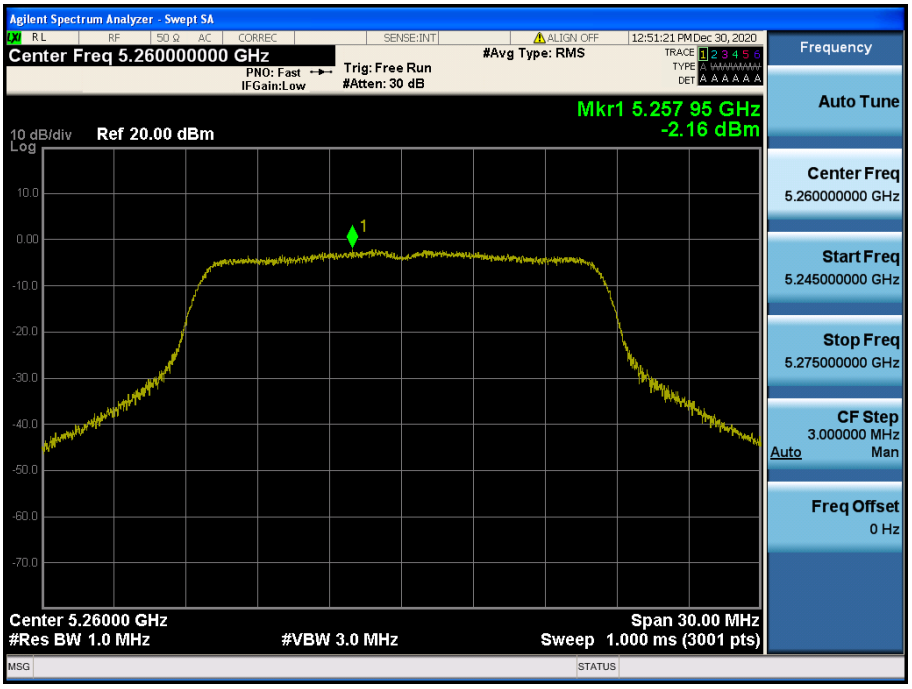
Maximum Power Spectral Density Test Mode: 802.11a & ANT 2 & Ch.40



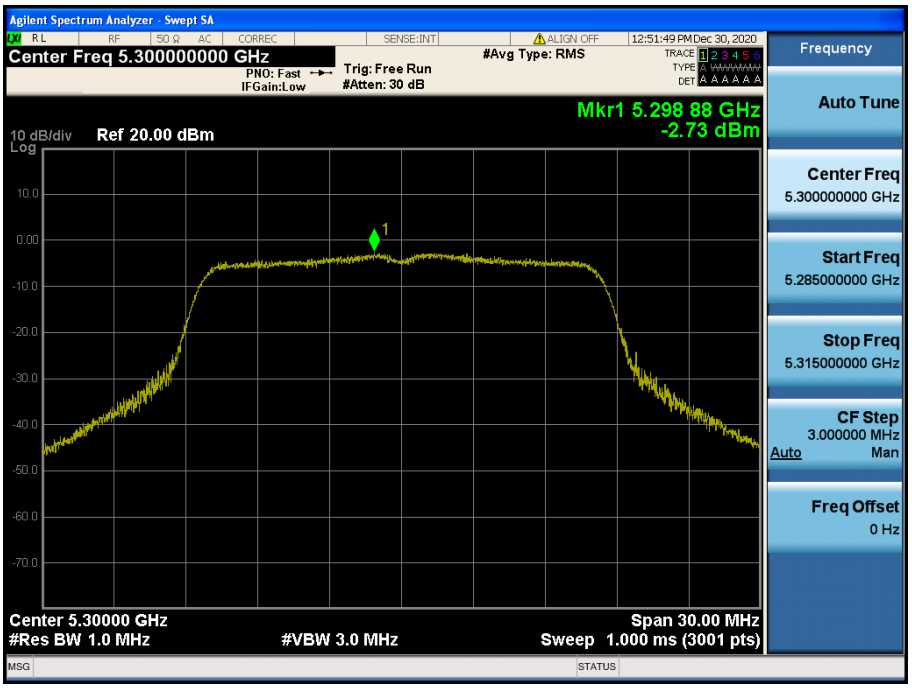
Maximum Power Spectral Density Test Mode: 802.11a & ANT 2 & Ch.48



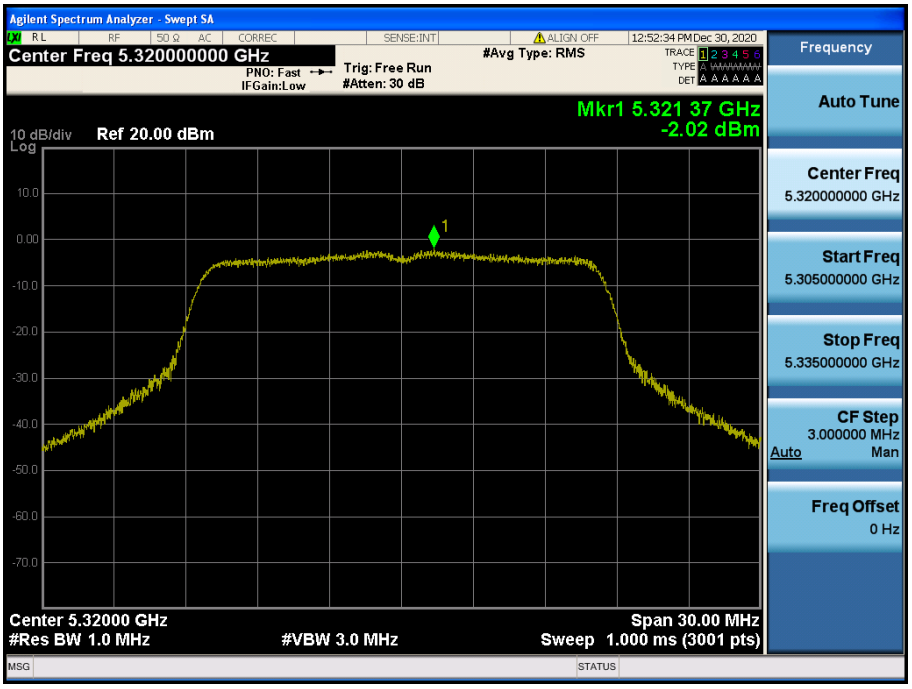
Maximum Power Spectral Density Test Mode: 802.11a & ANT 2 & Ch.52



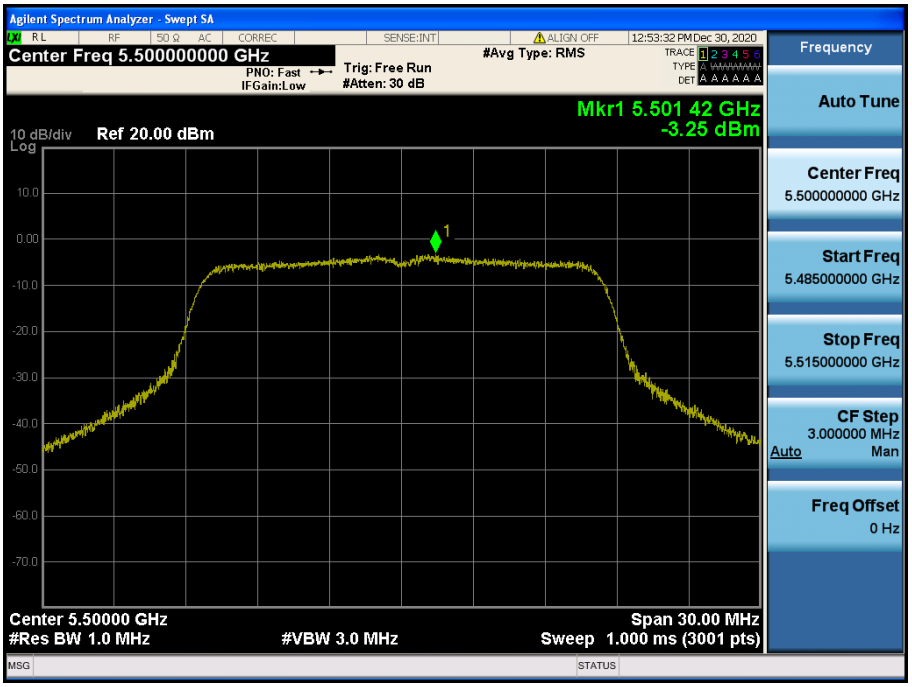
Maximum Power Spectral Density Test Mode: 802.11a & ANT 2 & Ch.60



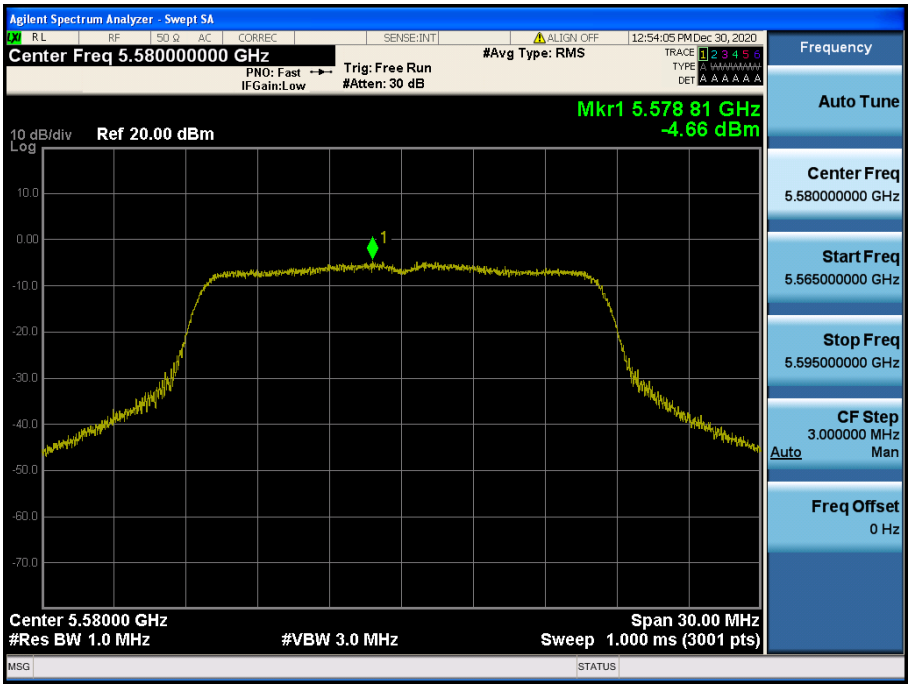
Maximum Power Spectral Density Test Mode: 802.11a & ANT 2 & Ch.64



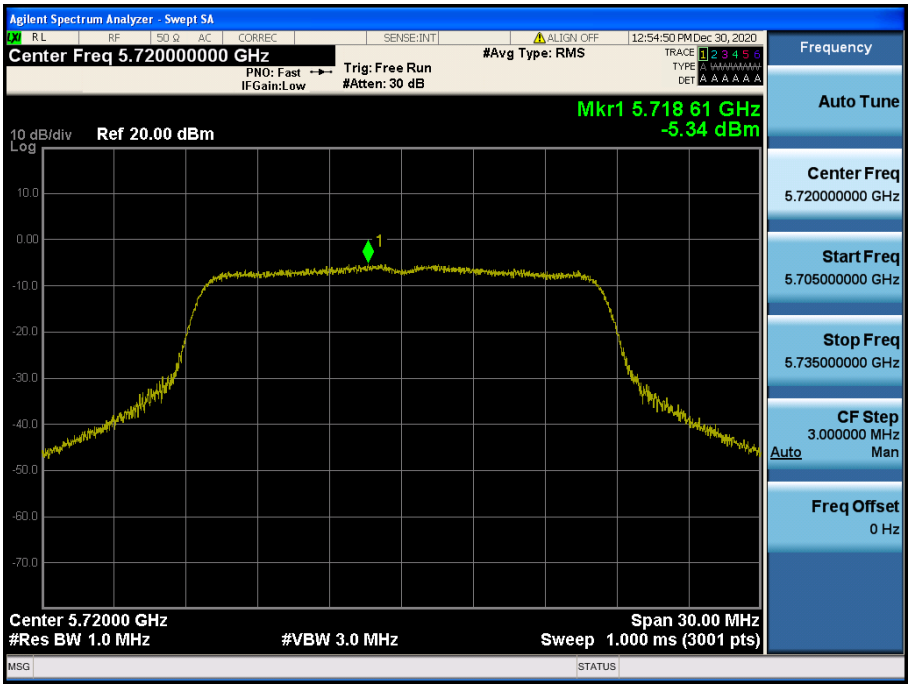
Maximum Power Spectral Density Test Mode: 802.11a & ANT 2 & Ch.100



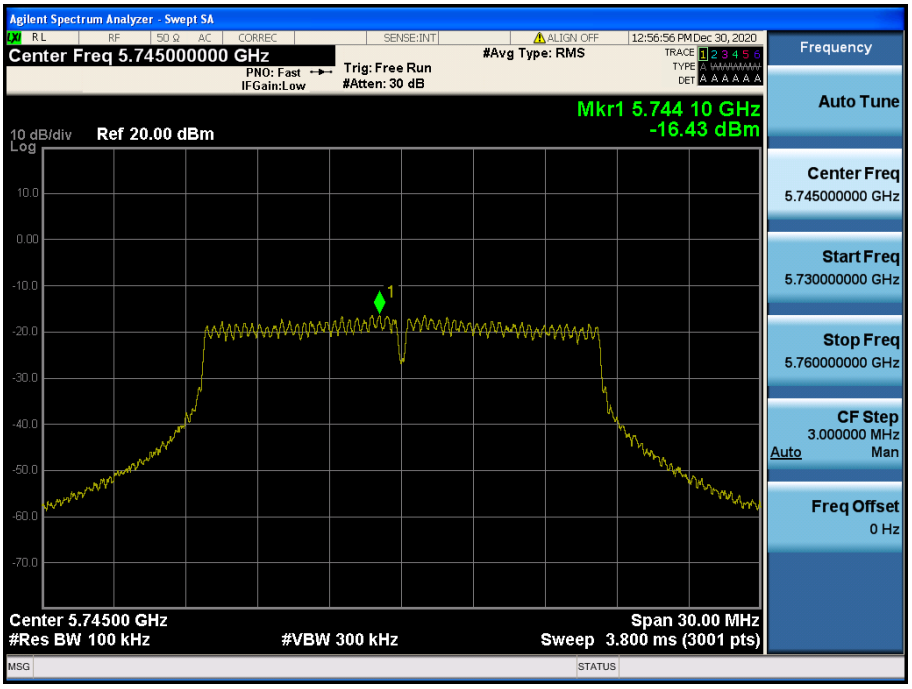
Maximum Power Spectral Density Test Mode: 802.11a & ANT 2 & Ch.116



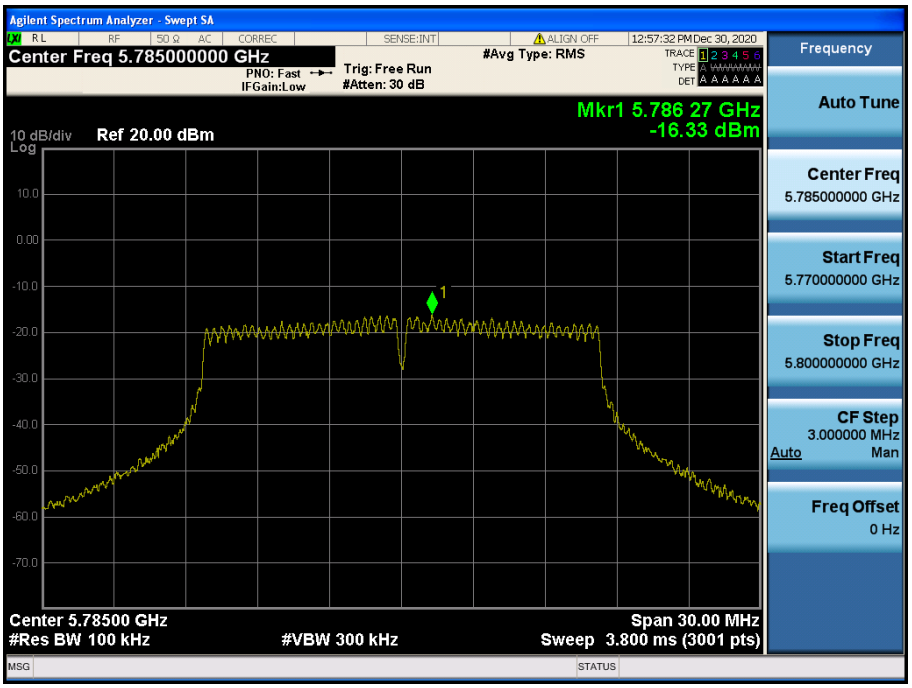
Maximum Power Spectral Density Test Mode: 802.11a & ANT 2 & Ch.144



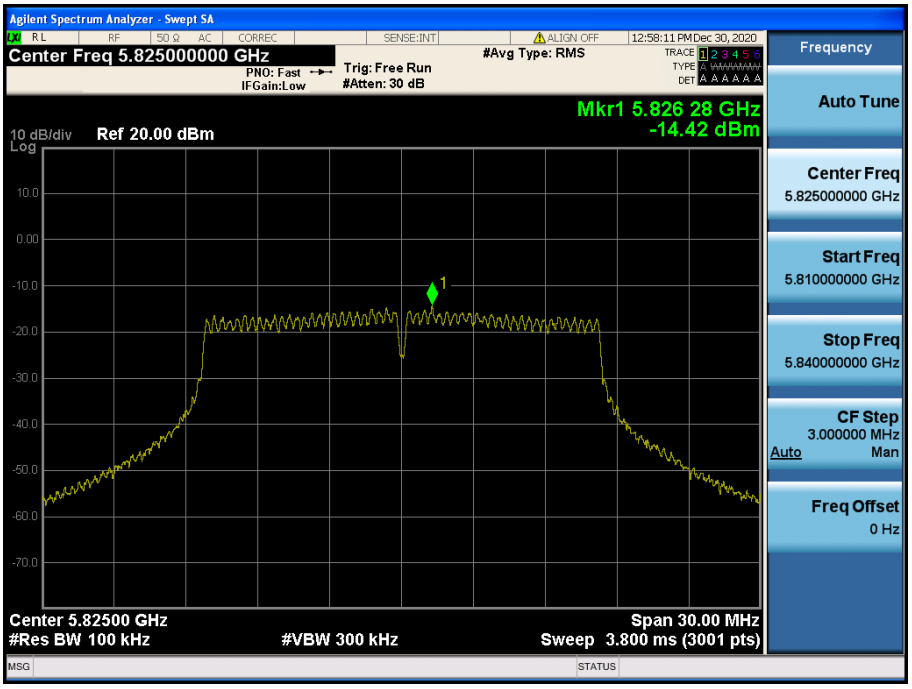
Maximum Power Spectral Density Test Mode: 802.11a & ANT 2 & Ch.149



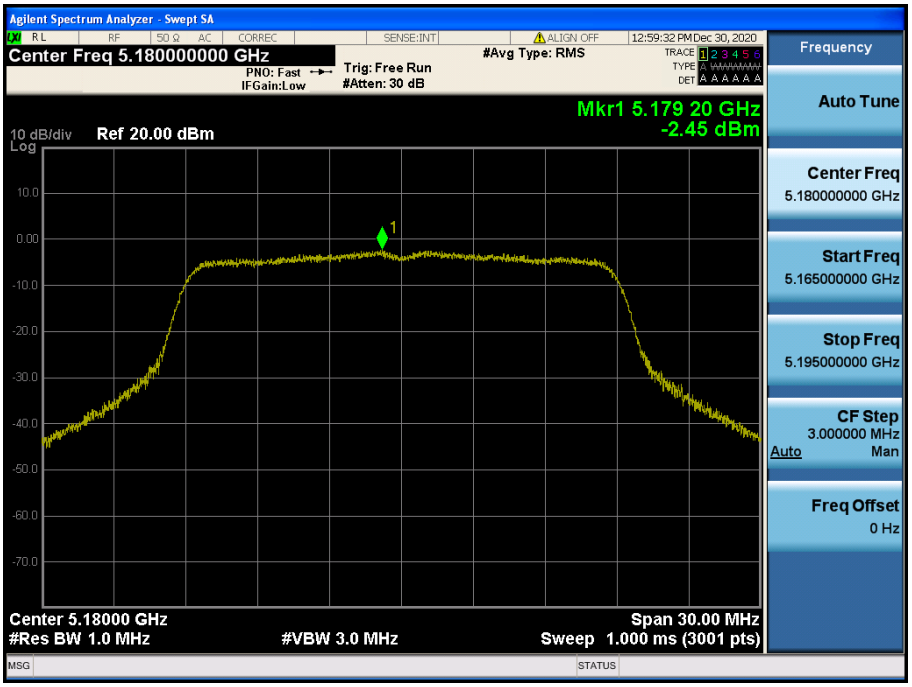
Maximum Power Spectral Density Test Mode: 802.11a & ANT 2 & Ch.157



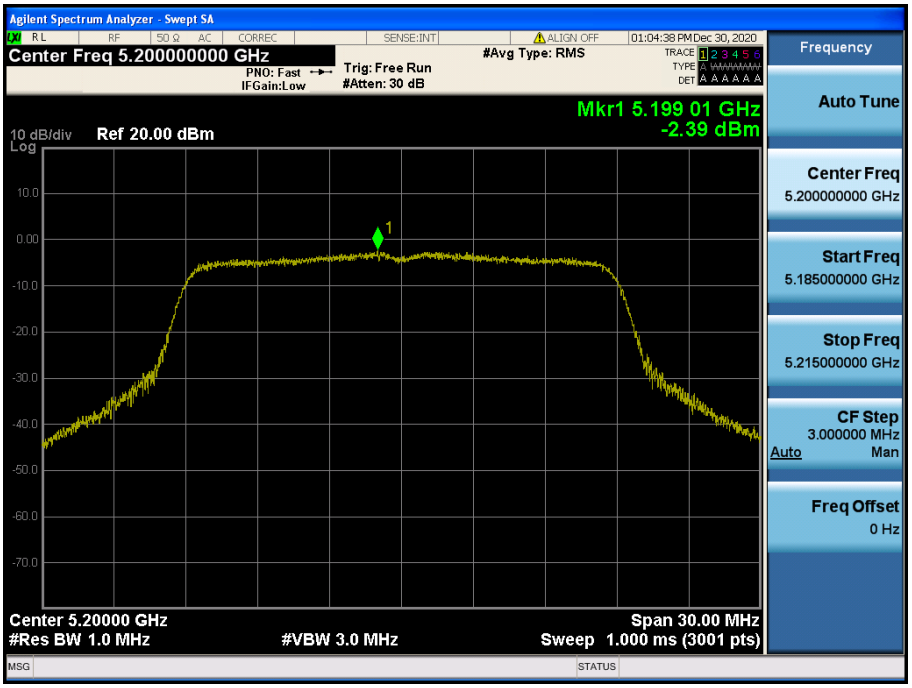
Maximum Power Spectral Density Test Mode: 802.11a & ANT 2 & Ch.165



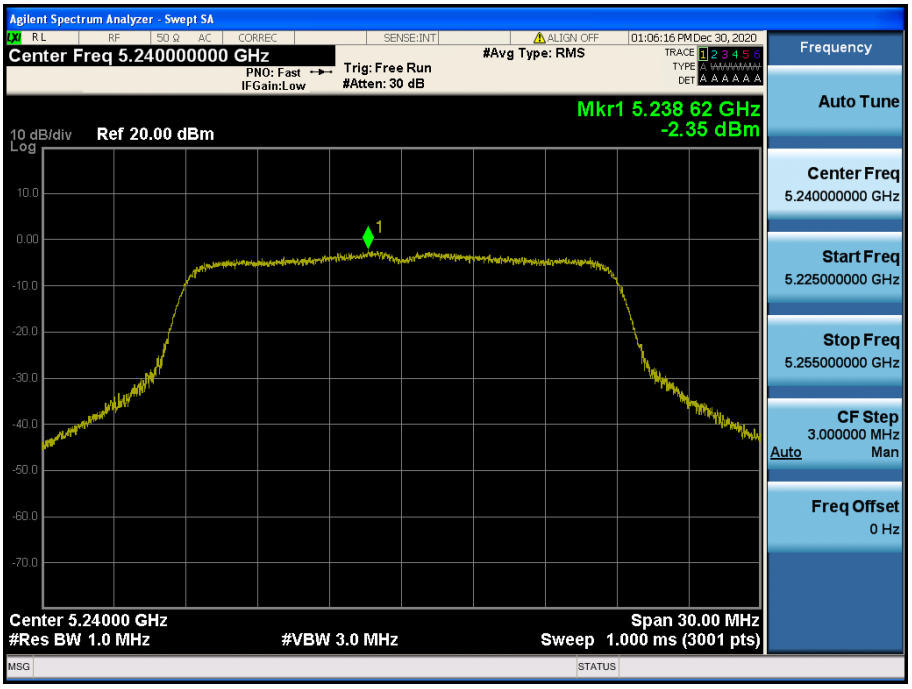
Maximum Power Spectral Density Test Mode: 802.11n HT20 & ANT 2 & Ch.36



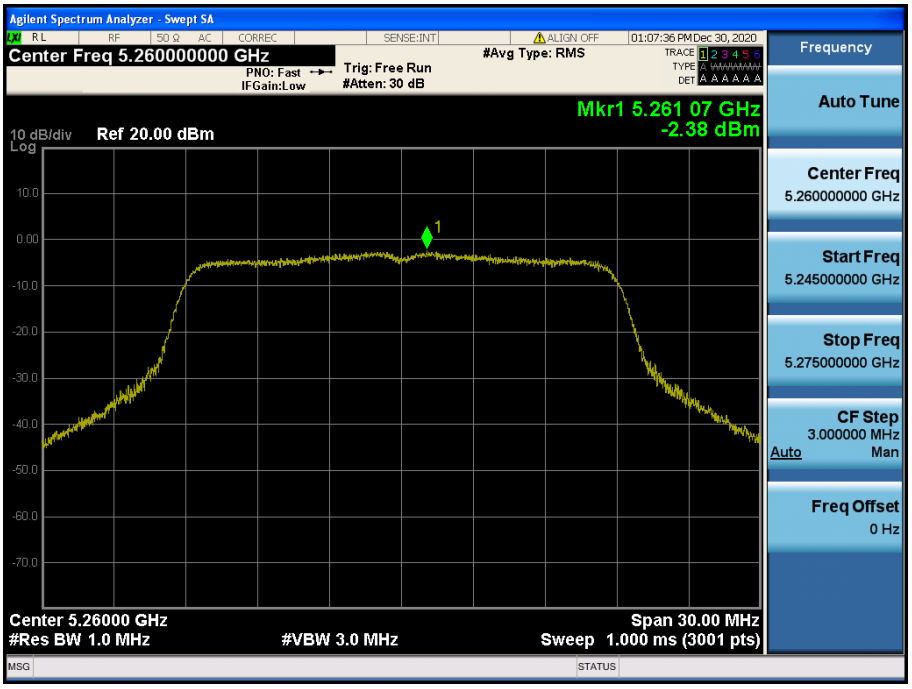
Maximum Power Spectral Density Test Mode: 802.11n HT20 & ANT 2 & Ch.40



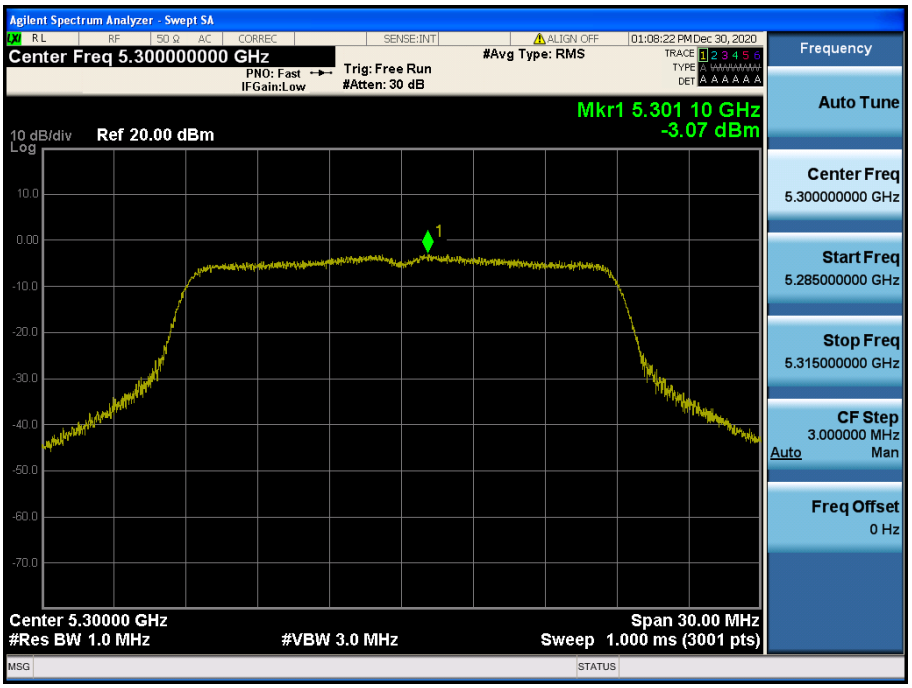
Maximum Power Spectral Density Test Mode: 802.11n HT20 & ANT 2 & Ch.48



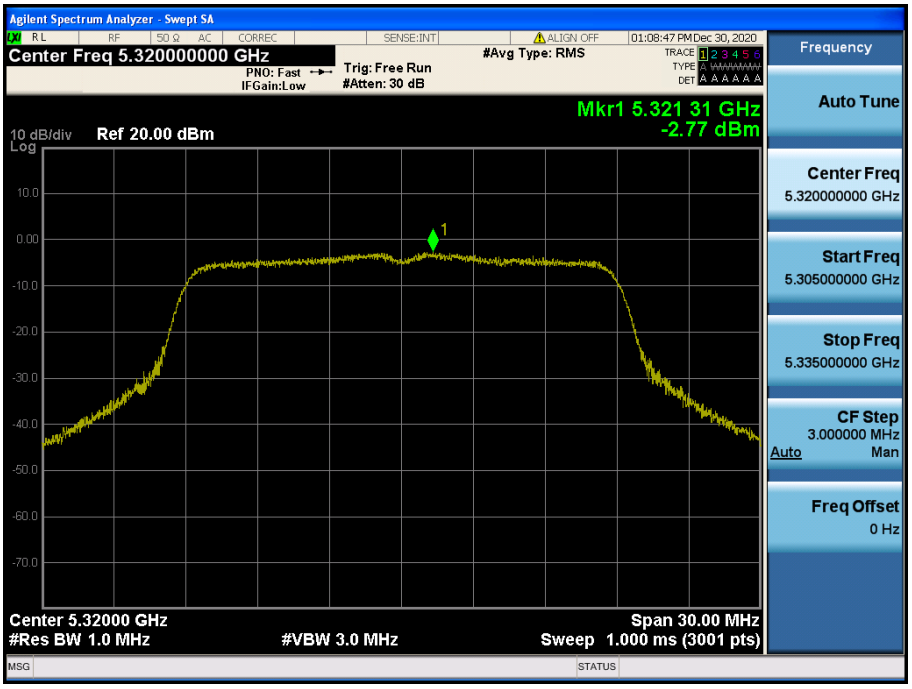
Maximum Power Spectral Density Test Mode: 802.11n HT20 & ANT 2 & Ch.52



Maximum Power Spectral Density Test Mode: 802.11n HT20 & ANT 2 & Ch.60



Maximum Power Spectral Density Test Mode: 802.11n HT20 & ANT 2 & Ch.64



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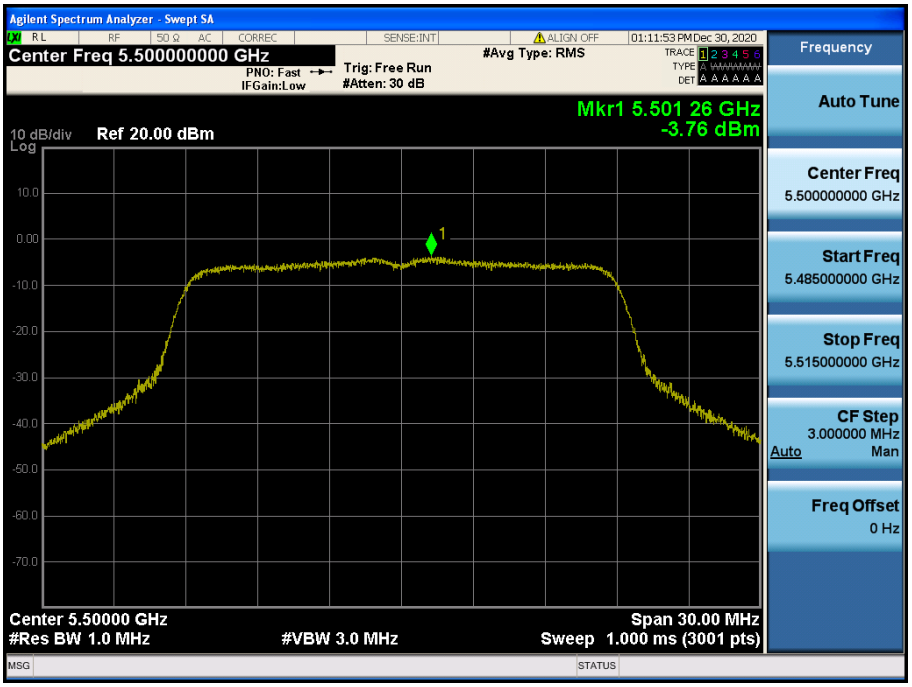

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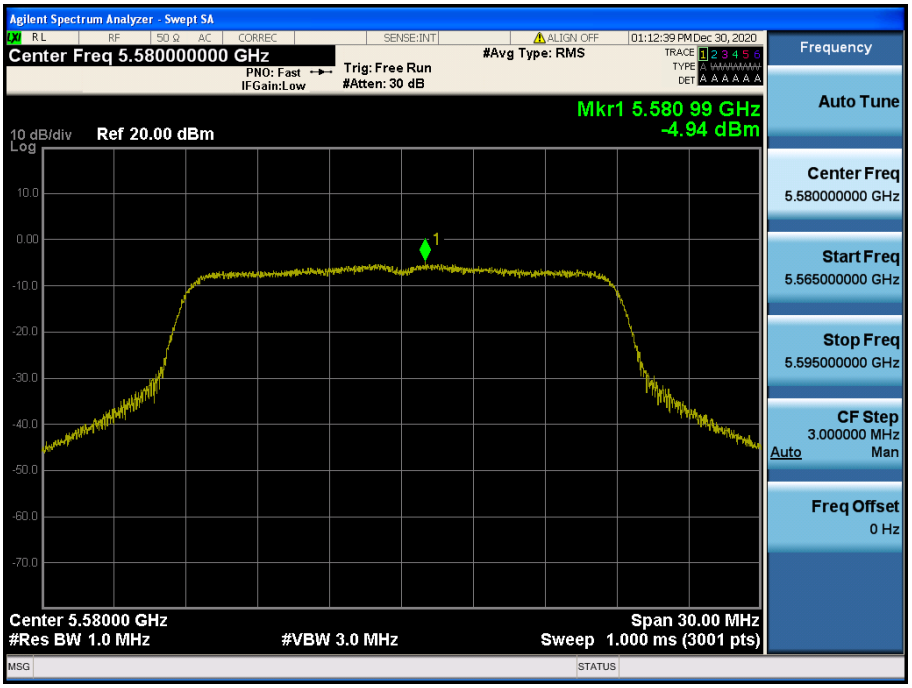

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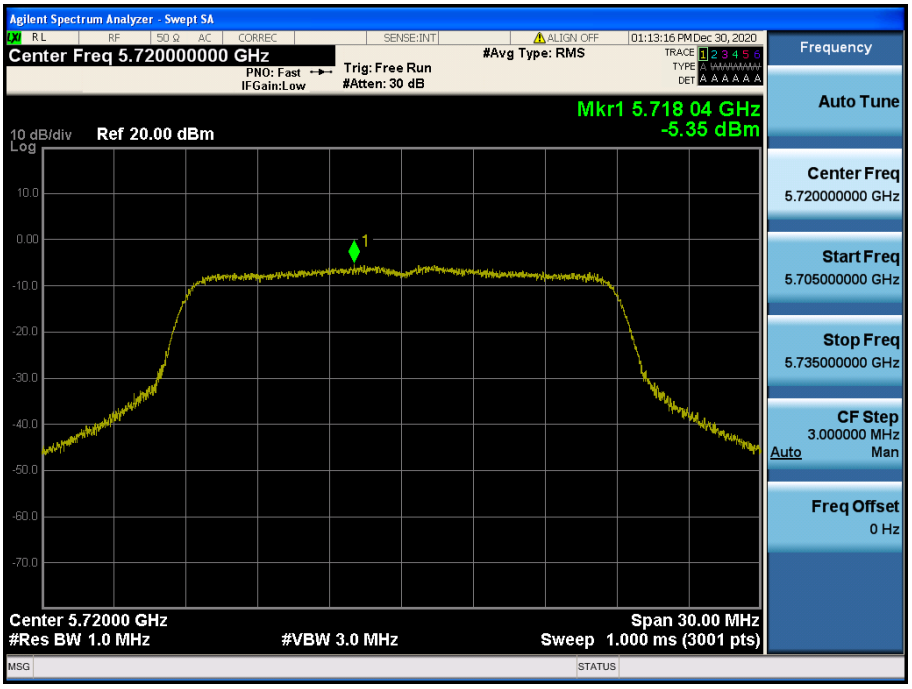

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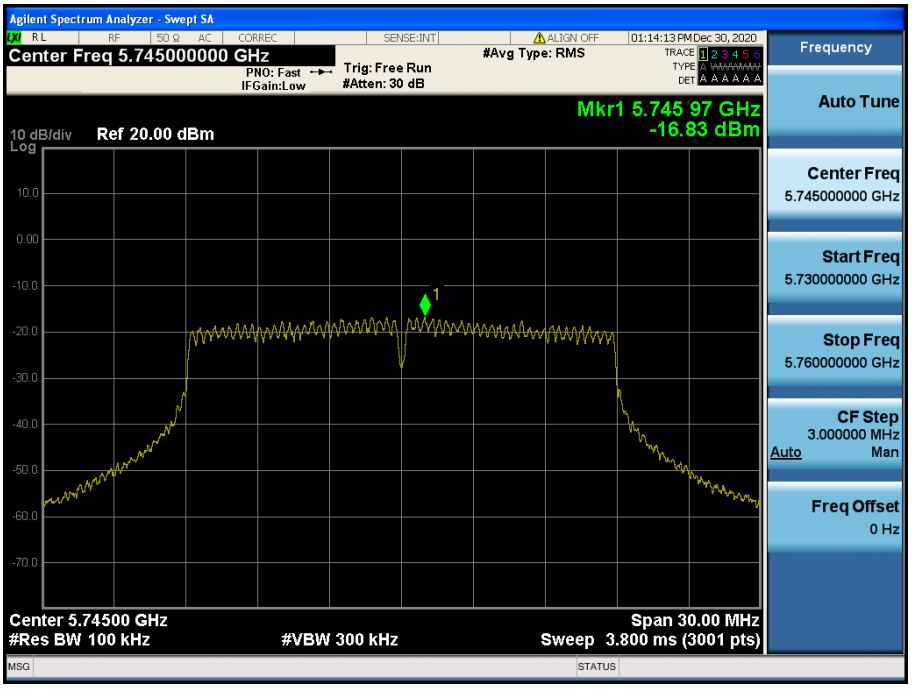
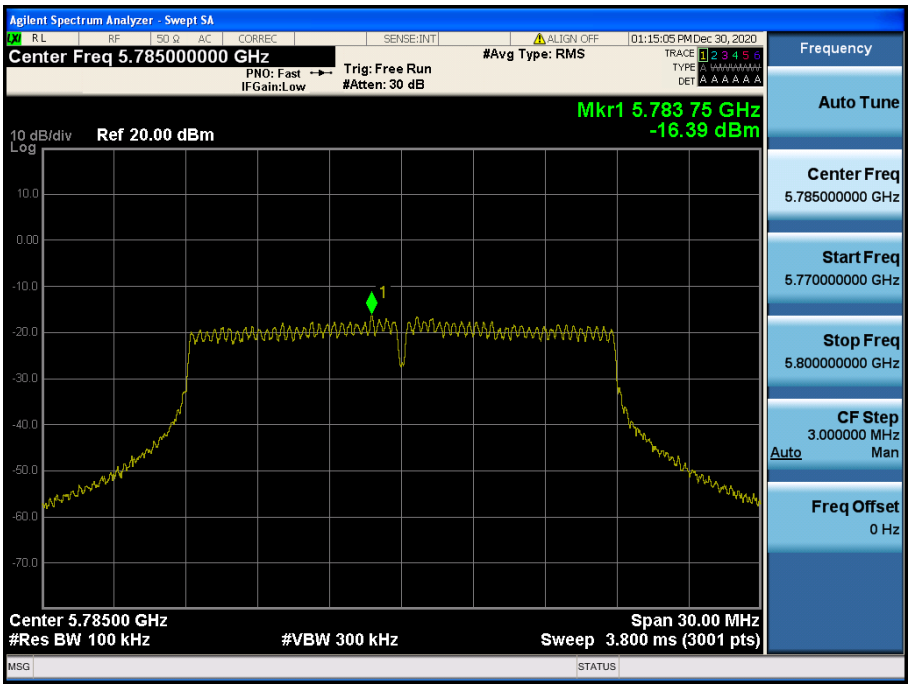
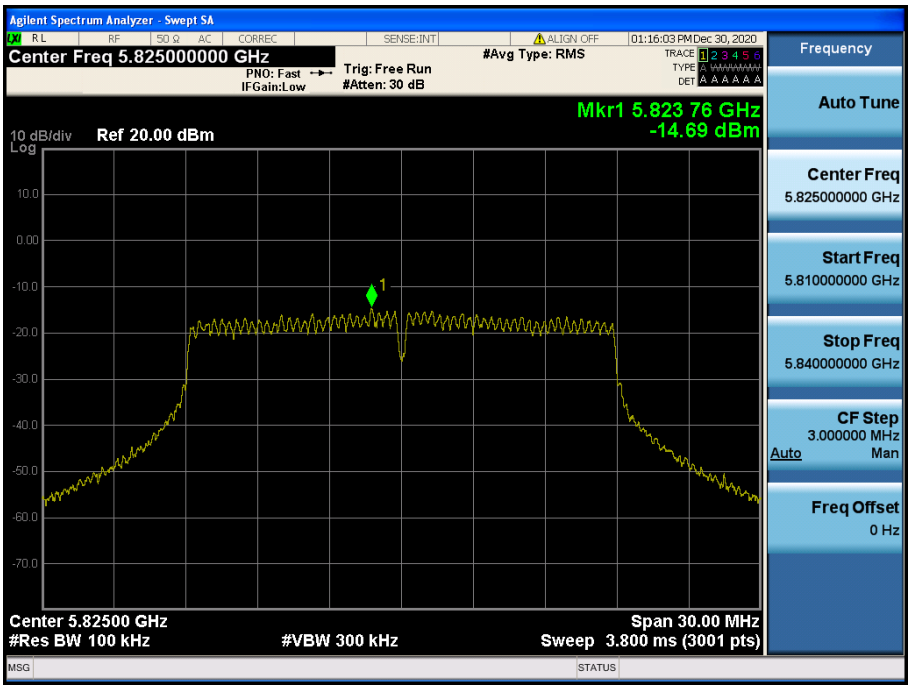


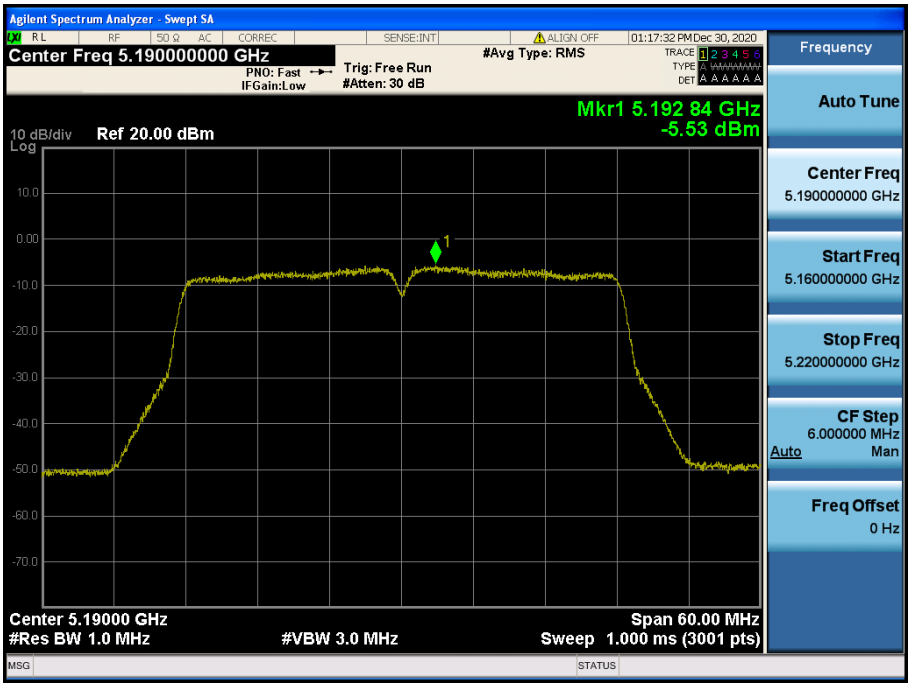
Maximum Power Spectral Density Test Mode: 802.11n HT20 & ANT 2 & Ch.157



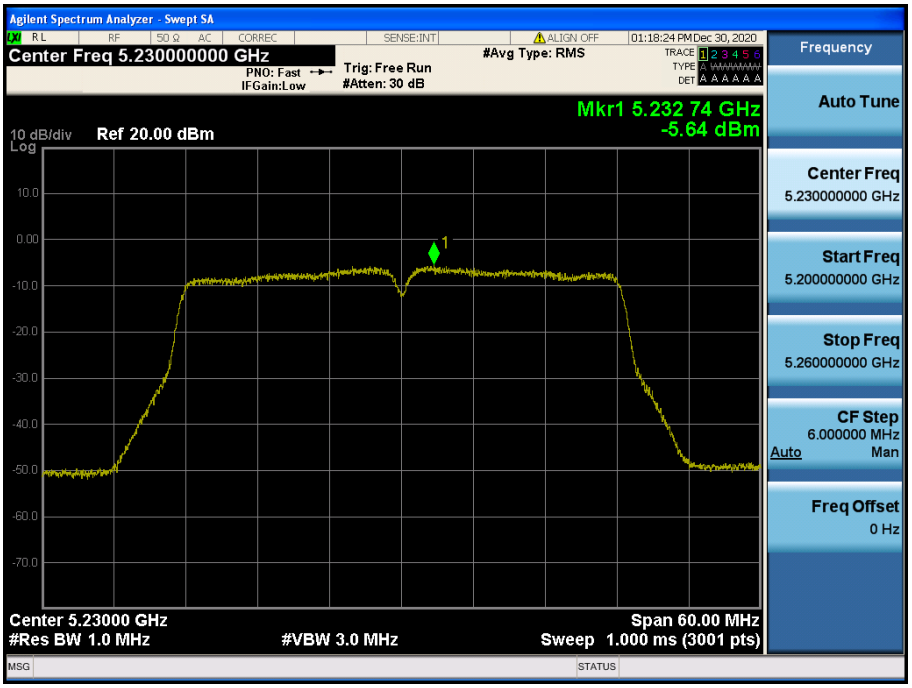
Maximum Power Spectral Density Test Mode: 802.11n HT20 & ANT 2 & Ch.165



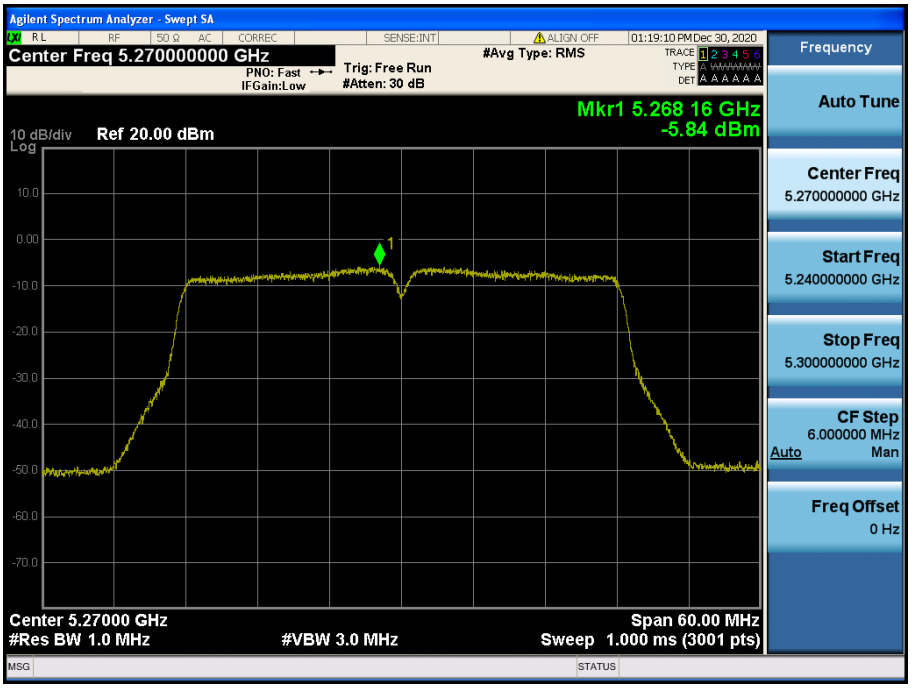
Maximum Power Spectral Density Test Mode: 802.11ac VHT40 & ANT 2 & Ch.38



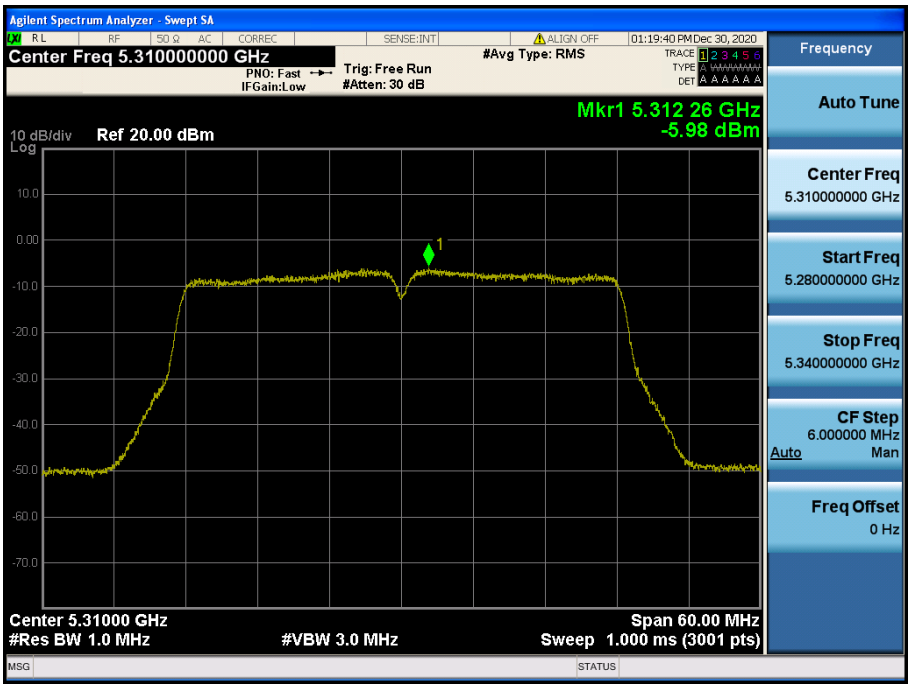
Maximum Power Spectral Density Test Mode: 802.11ac VHT40 & ANT 2 & Ch.46



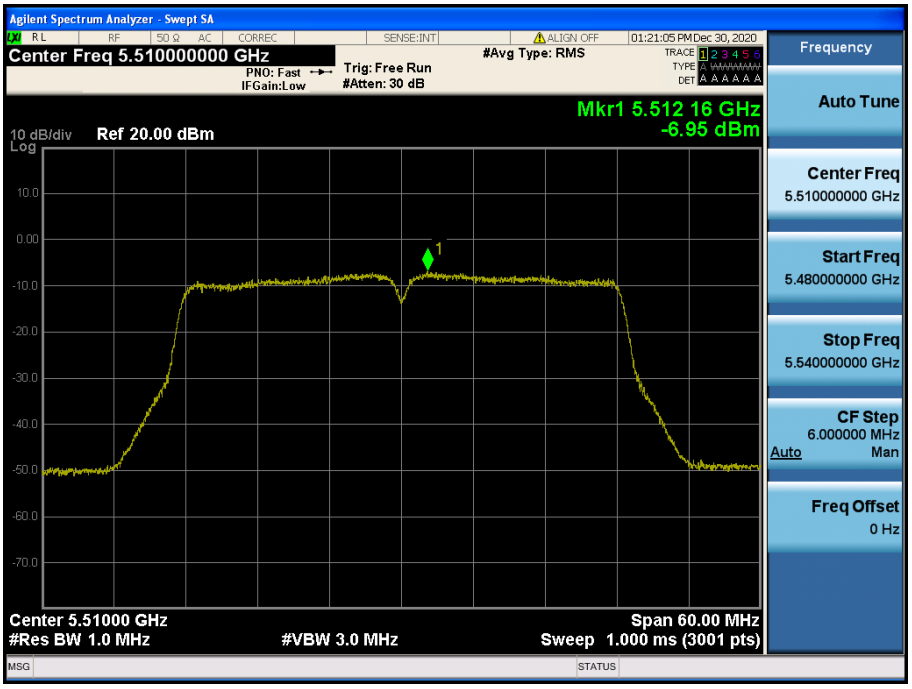
Maximum Power Spectral Density Test Mode: 802.11ac VHT40 & ANT 2 & Ch.54



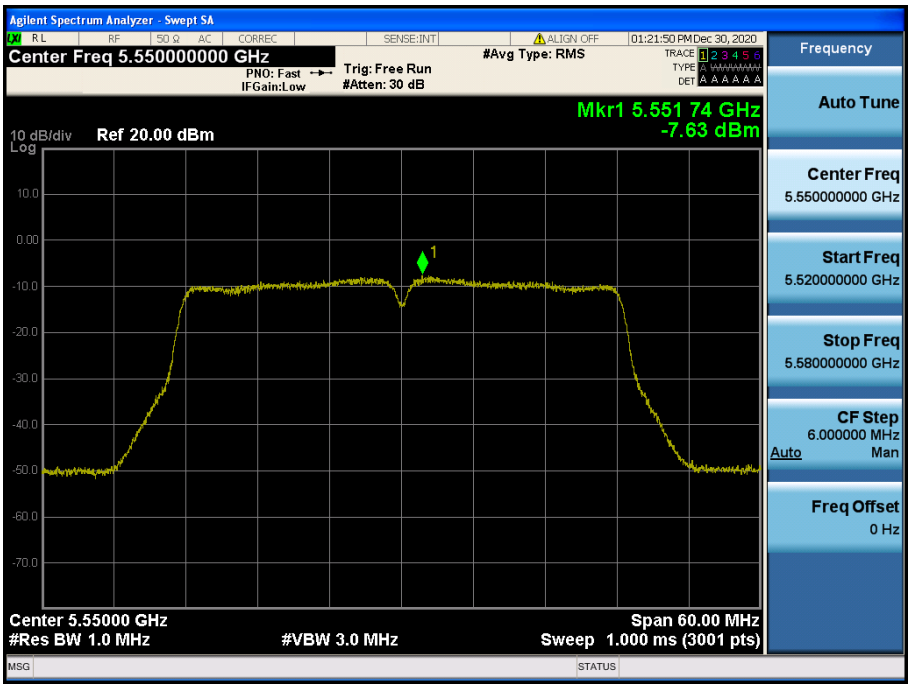
Maximum Power Spectral Density Test Mode: 802.11ac VHT40 & ANT 2 & Ch.62



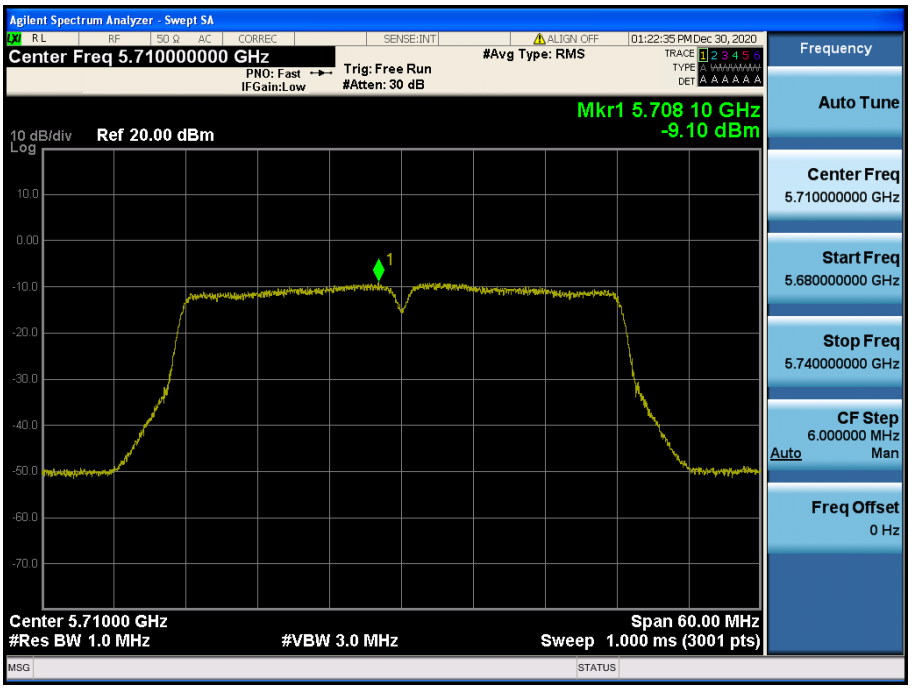
Maximum Power Spectral Density Test Mode: 802.11ac VHT40 & ANT 2 & Ch.102



Maximum Power Spectral Density Test Mode: 802.11ac VHT40 & ANT 2 & Ch.110



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



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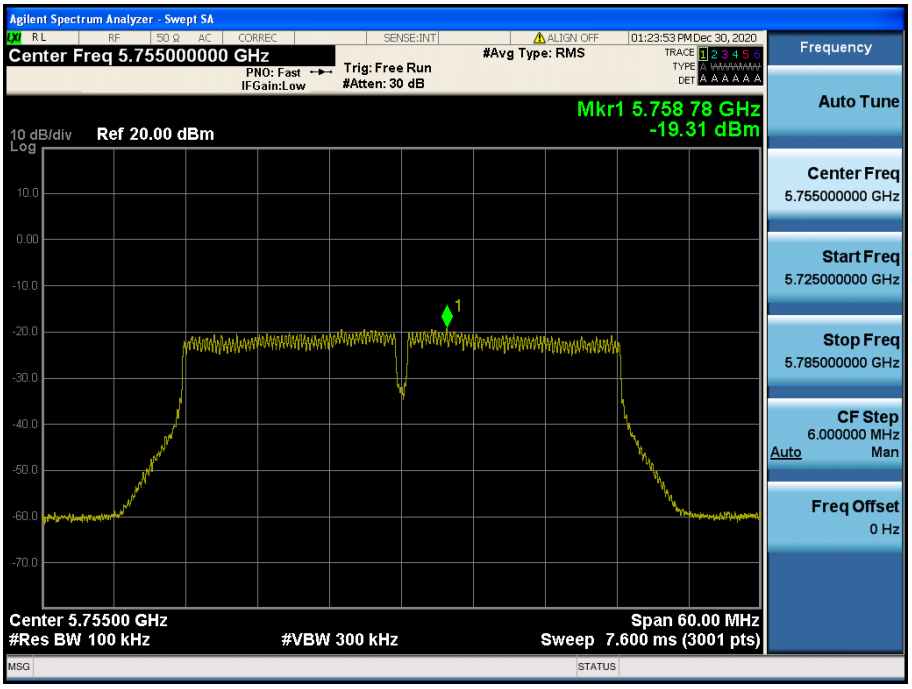
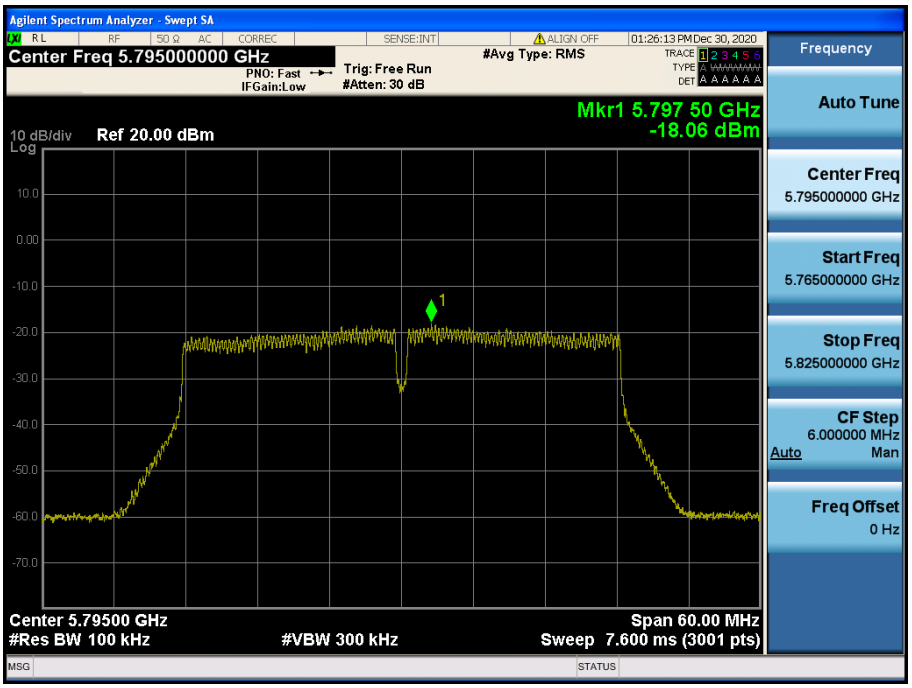
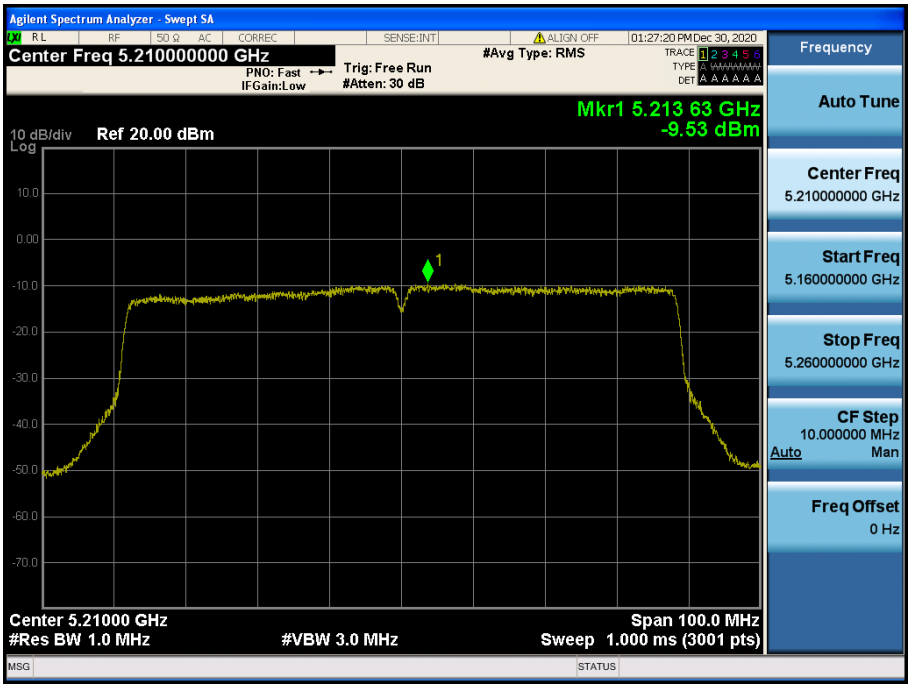


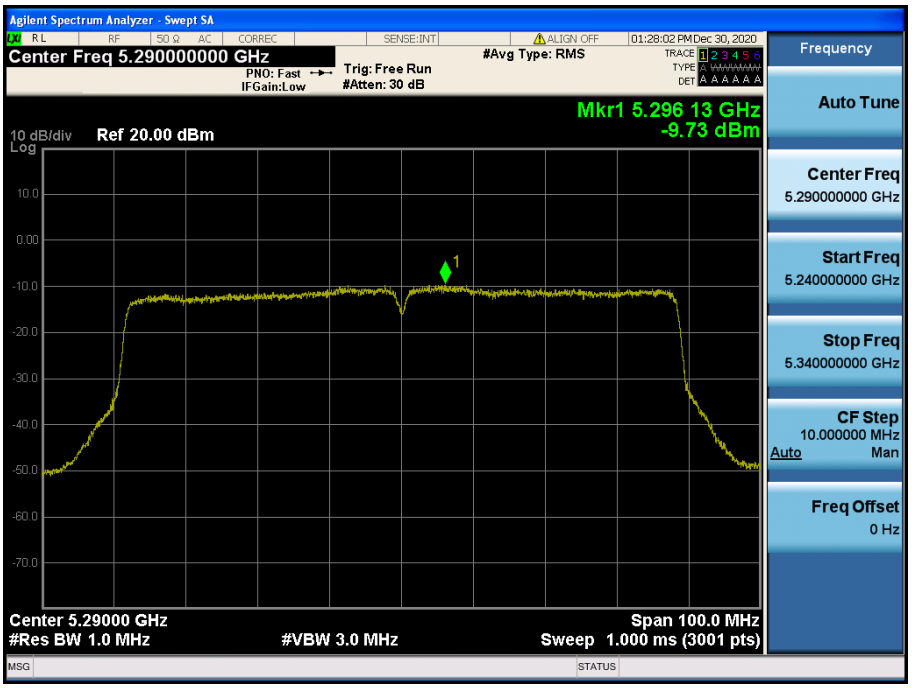
Maximum Power Spectral Density Test Mode: 802.11ac VHT40 & ANT 2 & Ch.159



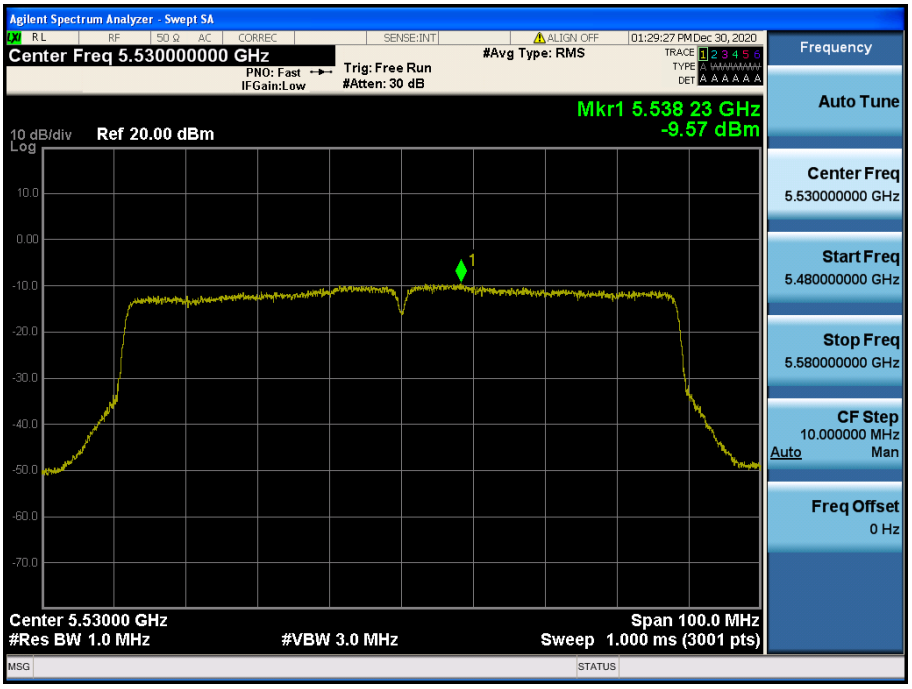
Maximum Power Spectral Density Test Mode: 802.11ac VHT80 & ANT 2 & Ch.42



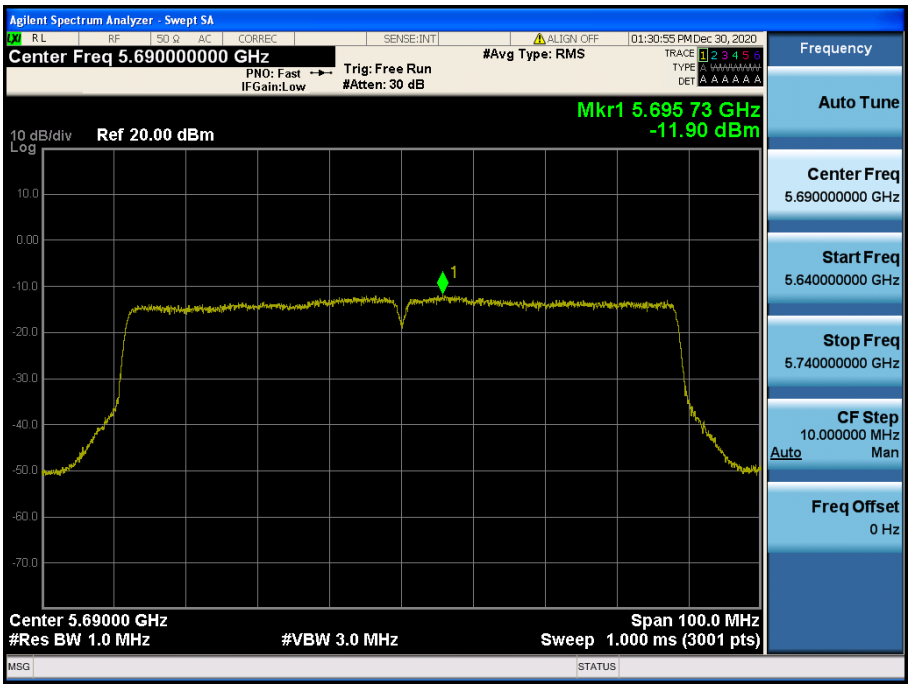
Maximum Power Spectral Density Test Mode: 802.11ac VHT80 & ANT 2 & Ch.58



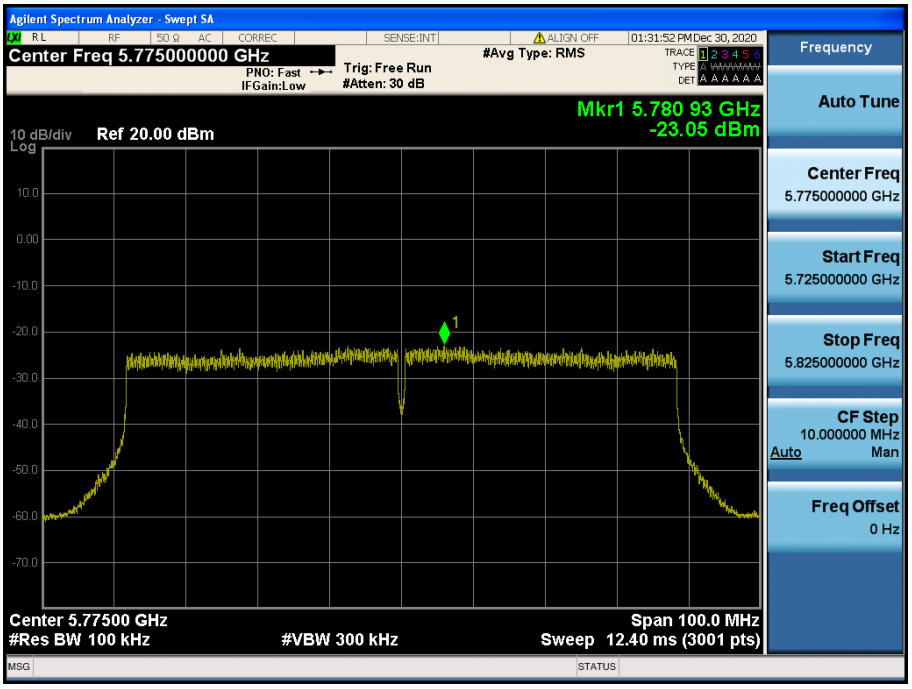
Maximum Power Spectral Density Test Mode: 802.11ac VHT80 & ANT 2 & Ch.106



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



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



8.5 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 MHz - 72 MHz, 76 MHz - 88 MHz, 174 MHz - 216 MHz or 470 MHz - 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:

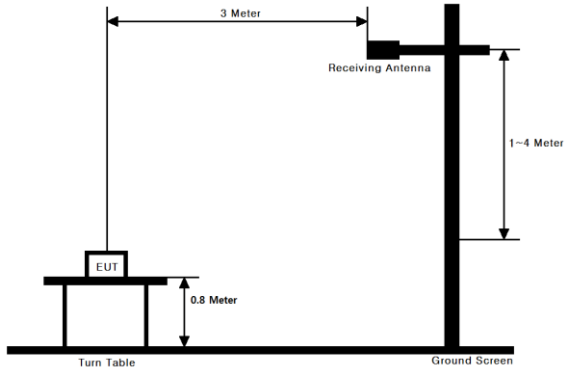
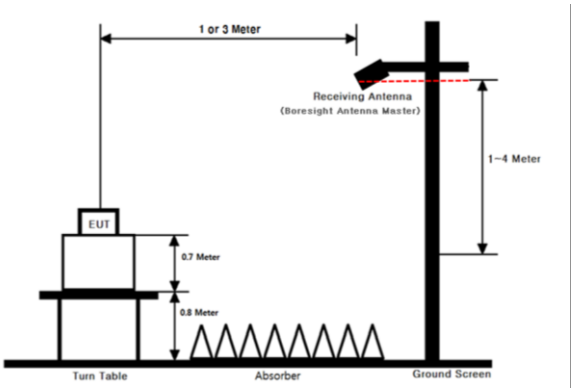
MHz	MHz	MHz	MHz	GHz	GHz
0.009 ~ 0.110	8.41425 ~ 8.41475	108 ~ 121.94	1300 ~ 1427	4.5 ~ 5.15	14.47 ~ 14.5
0.495 ~ 0.505	12.29 ~ 12.293	123 ~ 138	1435 ~ 1626.5	5.35 ~ 5.46	15.35 ~ 16.2
2.1735 ~ 2.1905	12.51975 ~	149.9 ~ 150.05	1645.5 ~ 1646.5	7.25 ~ 7.75	17.7 ~ 21.4
4.125 ~ 4.128	12.52025	160.52475 ~	1660 ~ 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 1 000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1 000 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 GHz - 5.25 GHz band**: all emissions outside of the **5.15 GHz - 5.35 GHz band** shall not exceed an **EIRP of -27 dBm/MHz**.
(2) For transmitters operating in the **5.25 GHz - 5.35 GHz band**: all emissions outside of the **5.15 GHz - 5.35 GHz band** shall not exceed an **EIRP of -27 dBm/MHz**.
(3) For transmitters operating in the **5.47 GHz - 5.725 GHz band**: all emissions outside of the **5.47 GHz - 5.725 GHz band** shall not exceed an **EIRP of -27 dBm/MHz.**
(4) For transmitters operating in the **5.725 GHz - 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

Below 1 GHz	Above 1 GHz
	

▣ 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 1 m or 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 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 1 000 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 1 000 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 cycle correction factor