

## 5.17 PEAK POWER SPECTRAL DENSITY

**Test Requirement:** FCC 47 CFR Part 15 Subpart E Section 15.407 (a)(1)(2)(3)

**Test Method:** KDB 789033 D02 v02r01 Section F

**Limits:**

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 conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).
  - (ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
  - (iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.
  - (iv) For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
2. For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, 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. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

**Test Procedure:**

The output from the transmitter was connected to an attenuator and then to the input of the RF Spectrum Analyzer.

Spectrum analyzer according to the following Settings:

**1. For U-NII-1, U-NII-2A, U-NII-2C band:**

Using method SA-2

- a) Set span to encompass the entire emission bandwidth (EBW) of the signal.

- b) Set RBW = 1 MHz, Set VBW  $\geq$  3 RBW, Detector = RMS
- c) Sweep time = auto, trigger set to "free run".
- d) Trace average at least 100 traces in power averaging mode.
- e) Record the max value and add 10 log (1/duty cycle)

## 2. For U-NII-3 band:

- a) Set span to encompass the entire emission bandwidth (EBW) of the signal.
- b) Set RBW = 500 kHz, Set VBW  $\geq$  3 RBW, Detector = RMS
- c) Use the peak marker function to determine the maximum power level in any 500 kHz band segment within the fundamental EBW.
- d) Sweep time = auto, trigger set to "free run".
- e) Trace average at least 100 traces in power averaging mode.
- f) Record the max value and add 10 log (1/duty cycle)

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

**Test Setup:** Refer to section 4.5.3 for details.

**Instruments Used:** Refer to section 3 for details

**Test Mode:** Transmitter mode

**Test Results:** Pass

**Test Data:**

### Directional gain and the maximum output power limit.

Frequency Band	Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Correlated chains directional gain (dBi)	PSD Limits (dBm/MHz or dBm/500kHz)
U-NII-1	8.00	8.00	11.01	5.99
U-NII-3	8.00	8.00	11.01	24.99

Basic methodology with  $N_{ANT}$  transmit antennas, each with the same directional gain  $G_{ANT}$  dBi, being driven by  $N_{ANT}$  transmitter outputs of equal power. Directional gain is to be computed as follows:

If any transmit signals are *correlated* with each other,

$$\text{Directional gain} = G_{ANT} + 10 \log(N_{ANT}) \text{ dBi}$$

### For U-NII-1 band

Mode	Channel/ Frequency (MHz)	Maximum Power Spectral Density (dBm/MHz)						
		MIMO				Total PSD MIMO_ Chain 0+1	Limits	Pass / Fail
		Chain 0		Chain 1				
		Meas PSD	Corr'd PSD	Meas PSD	Corr'd PSD			
IEEE 802.11n-HT20	36 (5180)	-7.58	-7.58	-6.71	-6.71	-4.11	5.99	Pass
	44 (5220)	-5.89	-5.89	-5.57	-5.57	-2.72	5.99	Pass
	48 (5240)	-5.36	-5.36	-4.80	-4.80	-2.06	5.99	Pass

Mode	Channel/ Frequency (MHz)	Maximum Power Spectral Density (dBm/MHz)						
		MIMO				Total PSD MIMO_ Chain 0+1	Limits	Pass / Fail
		Chain 0		Chain 1				
		Meas PSD	Corr'd PSD	Meas PSD	Corr'd PSD			
IEEE 802.11n-HT40	38 (5190)	-10.58	-10.58	-10.39	-10.39	-7.47	5.99	Pass
	46 (5230)	-9.25	-9.25	-9.14	-9.14	-6.19	5.99	Pass

Mode	Channel/ Frequency (MHz)	Maximum Power Spectral Density (dBm/MHz)						
		MIMO				Total PSD MIMO_ Chain 0+1	Limits	Pass / Fail
		Chain 0		Chain 1				
		Meas PSD	Corr'd PSD	Meas PSD	Corr'd PSD			
IEEE 802.11ac- VHT20	36 (5180)	-7.74	-7.74	-7.72	-7.72	-4.72	5.99	Pass
	44 (5220)	-6.54	-6.54	-6.20	-6.20	-3.35	5.99	Pass
	48 (5240)	-5.93	-5.93	-5.84	-5.84	-2.87	5.99	Pass

#### For U-NII-3 band

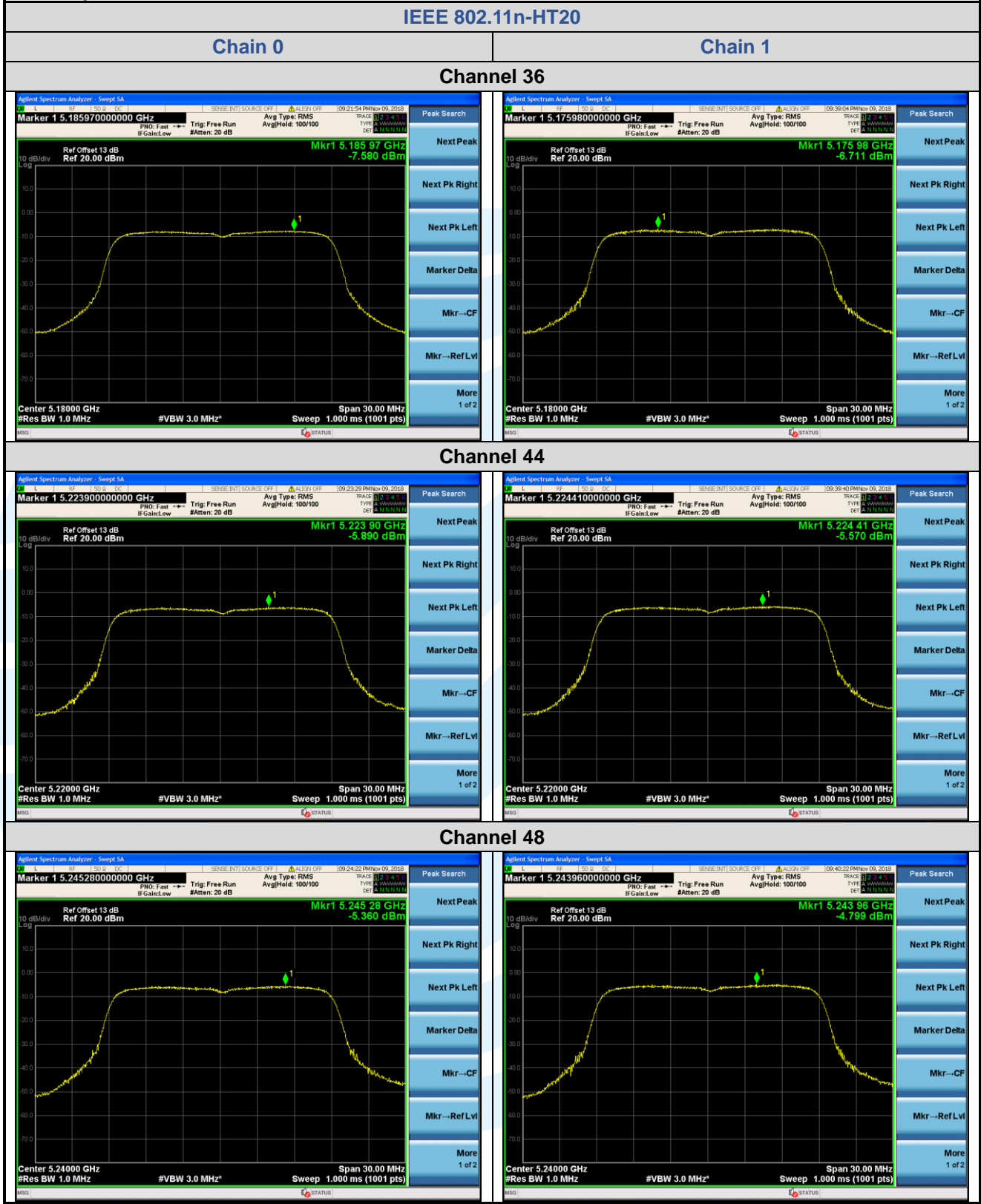
Mode	Channel/ Frequency (MHz)	Maximum Power Spectral Density (dBm/500kHz)						
		MIMO				Total PSD MIMO_ Chain 0+1	Limit	Pass / Fail
		Chain 0		Chain 1				
		Meas PSD	Corr'd PSD	Meas PSD	Corr'd PSD			
IEEE 802.11n-HT20	149 (5745)	-8.73	-8.73	-6.26	-6.26	-4.31	24.99	Pass
	157 (5785)	-10.54	-10.54	-8.20	-8.20	-6.20	24.99	Pass
	165 (5825)	-11.61	-11.61	-9.22	-9.22	-7.24	24.99	Pass
IEEE 802.11n-HT40	151 (5755)	-11.72	-11.72	-9.98	-9.98	-7.75	24.99	Pass
	159 (5795)	-13.50	-13.50	-11.15	-11.15	-9.16	24.99	Pass

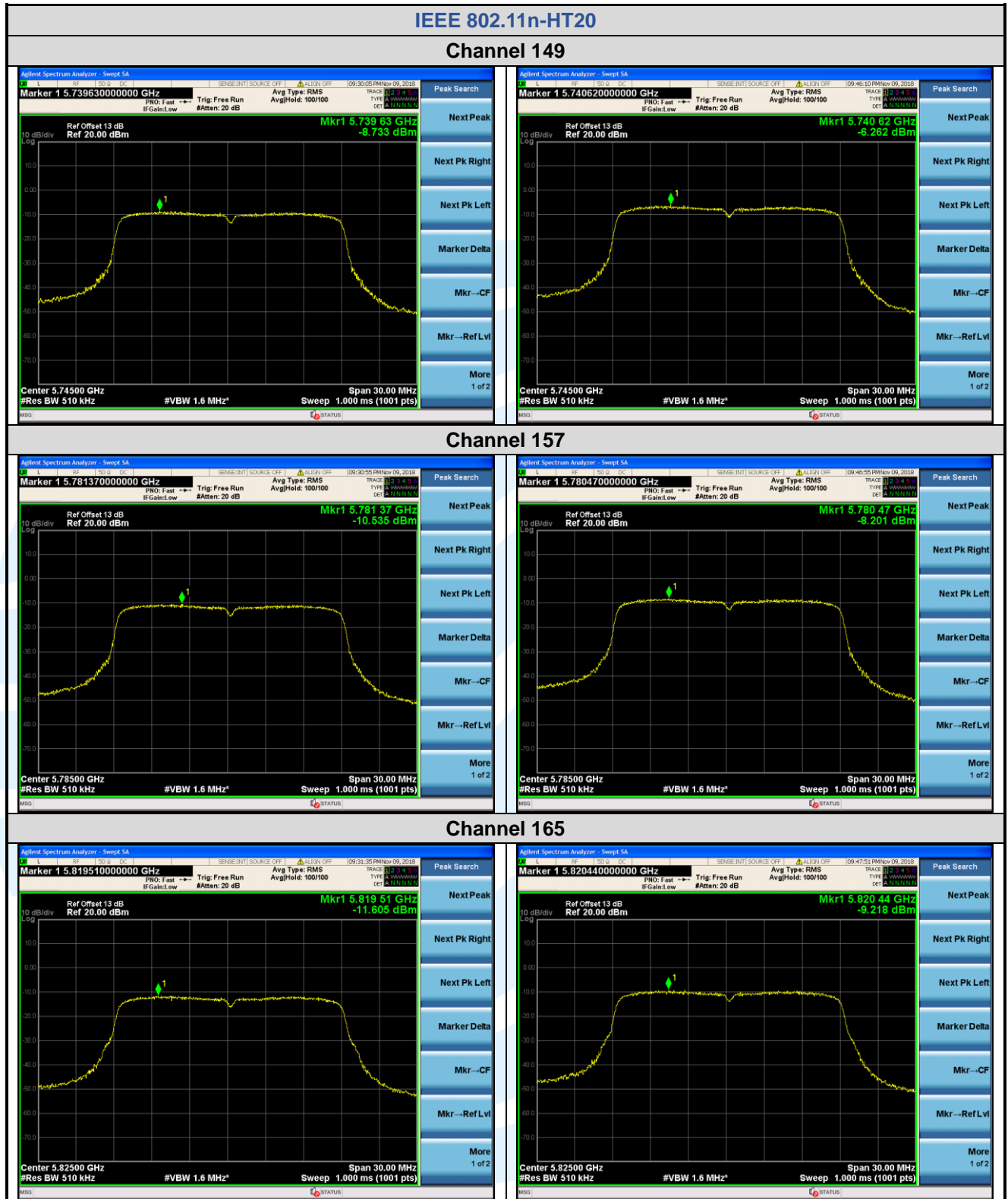
Mode	Channel/ Frequency (MHz)	Maximum Power Spectral Density (dBm/500kHz)						
		MIMO				Total PSD MIMO_ Chain 0+1	Limit	Pass / Fail
		Chain 0		Chain 1				
		Meas PSD	Corr'd PSD	Meas PSD	Corr'd PSD			
IEEE 802.11ac- VHT20	149 (5745)	-8.05	-8.05	-6.09	-6.09	-3.95	24.99	Pass
	157 (5785)	-10.19	-10.19	-7.75	-7.75	-5.79	24.99	Pass
	165 (5825)	-11.27	-11.27	-8.75	-8.75	-6.82	24.99	Pass

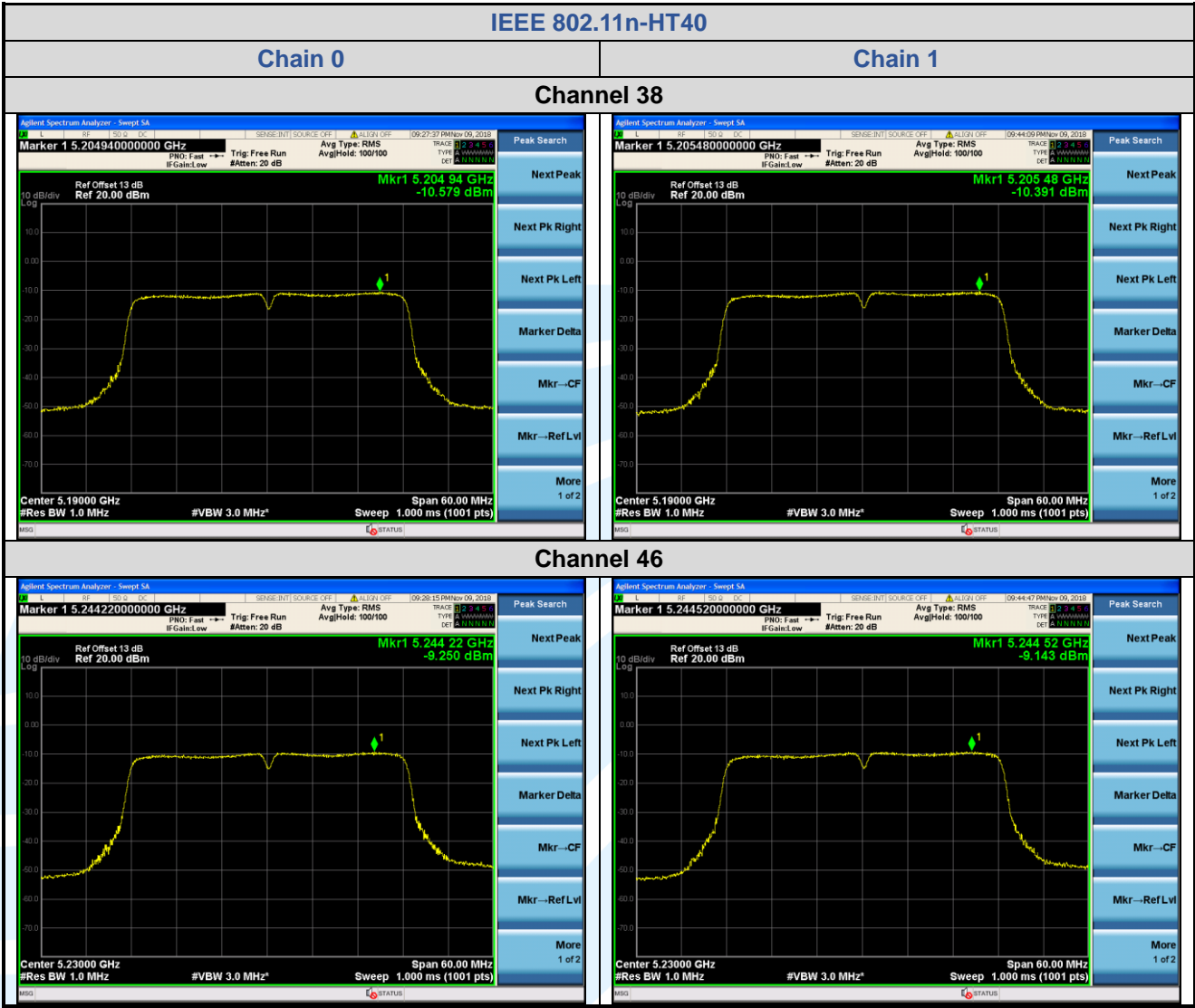
#### Remark:

1. Corr'd PSD = Meas PSD + Duty Cycle Factor
2. Total (Chain 0+1) =  $10 \cdot \log[(10^{\text{Chain 0}/10}) + (10^{\text{Chain 1}/10})]$

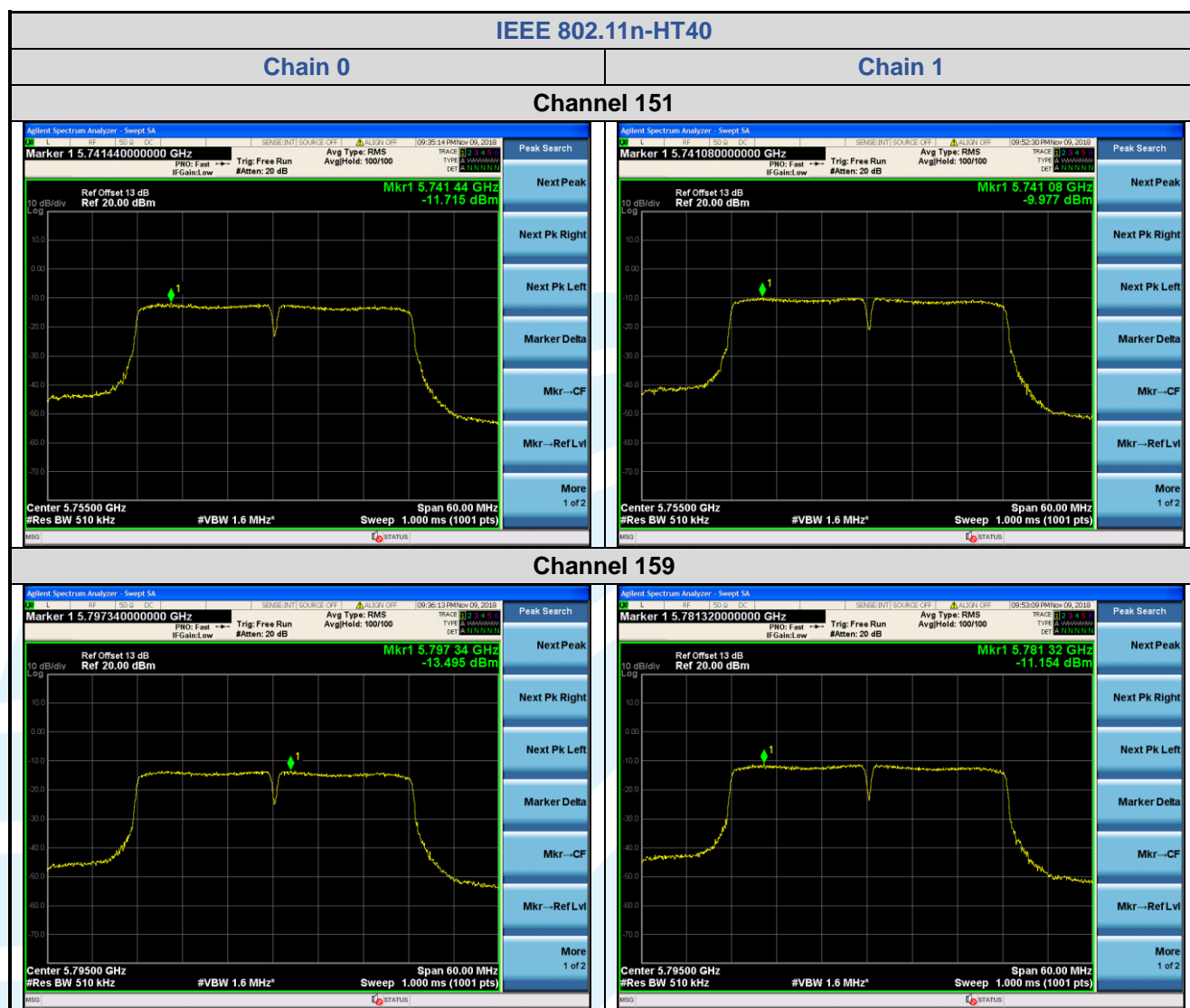
The test plots as follows:

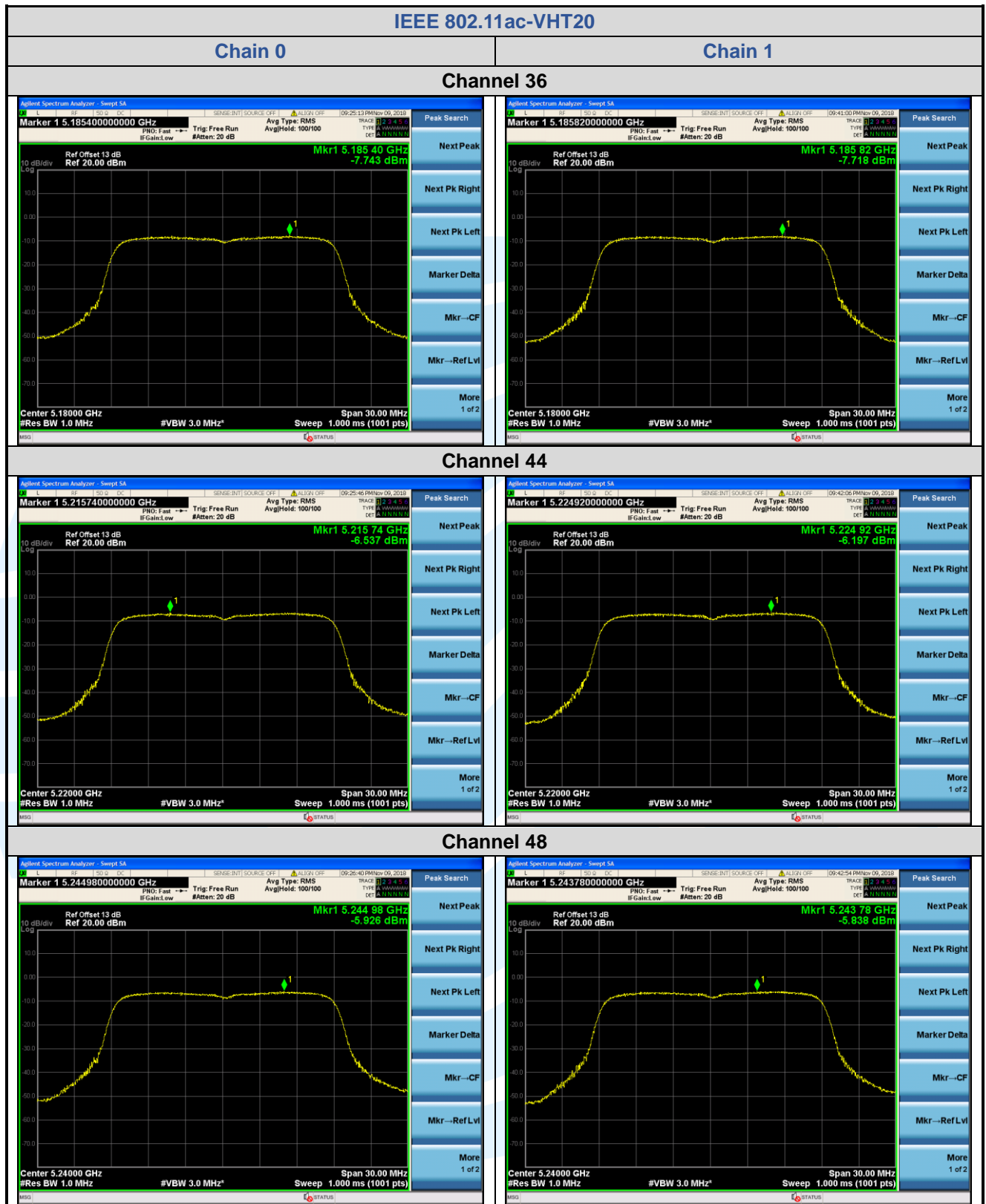




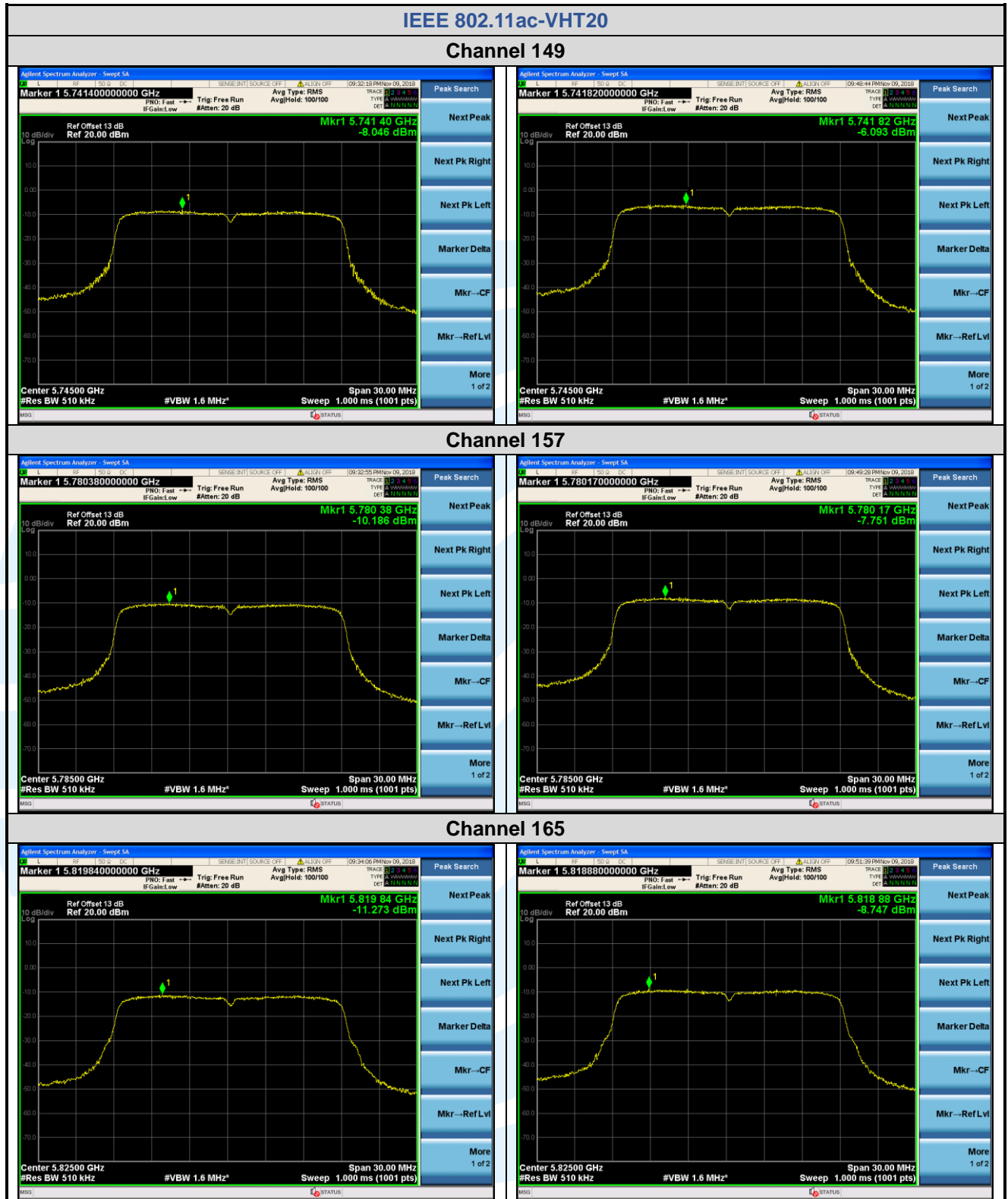












## 5.18 RADIATED EMISSIONS AND BAND EDGE MEASUREMENT

**Test Requirement:** FCC 47 CFR Part 15 Subpart E Section 15.407 (b)(1)(4)(6)  
FCC 47 CFR Part 15 Subpart C Section 15.209/205

**Test Method:** KDB 789033 D02 v02r01 Section G.3, G.4, G.5, and G.6

**Receiver Setup:**

Frequency	RBW
0.009 MHz-0.150 MHz	200/300 kHz
0.150 MHz -30 MHz	9/10 kHz
30 MHz-1 GHz	100/120 kHz
Above 1 GHz	1 MHz

**Limits:**

### 1. Limits of Radiated Emission and Band edge Measurement

Radiated emissions that fall in the restricted bands must comply with the general emissions limits in 15.209(a) as below table. Other emissions shall be at least 20 dB below the highest level of the desired power.

Frequency	Field strength (microvolt/meter)	Limit (dB $\mu$ V/m )	Remark	Measurement distance (m)
0.009 MHz-0.490 MHz	2400/F(kHz)	--	--	300
0.490 MHz-1.705 MHz	24000/F(kHz)	--	--	30
1.705 MHz-30 MHz	30	--	--	30
30 MHz-88 MHz	100	40.0	Quasi-peak	3
88 MHz-216 MHz	150	43.5	Quasi-peak	3
216 MHz-960 MHz	200	46.0	Quasi-peak	3
960MHz-1GHz	500	54.0	Quasi-peak	3
Above 1 GHz	500	54.0	Average	3

**Remark:**

- The lower limit shall apply at the transition frequencies.
- Emission level (dB $\mu$ V/m) = 20 log Emission level (uV/m).
- For frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.

## 2. Limits of Unwanted Emission Out of the Restricted Bands

Applicable To	Limit	
789033 D02 General U-NII Test Procedures New Rules v01r04	Field Strength at 3 m	
	PK: 74 (dBμV/m)	AV: 54 (dBμV/m)
Applicable To	EIRP Limit	Equivalent Field Strength at 3 m
FCC Part 15.407 (b)(1)	PK: -27 (dBm/MHz)	PK: 74 (dBμV/m)
FCC Part 15.407 (b)(2)	PK: -27 (dBm/MHz)	PK: 74 (dBμV/m)
FCC Part 15.407 (b)(3)	PK: -27 (dBm/MHz)	PK: 68.2 (dBμV/m)
FCC Part 15.407 (b)(4)	27 dBm/MHz at frequencies from the band edges decreasing linearly to 15.6 dBm/MHz at 5 MHz above or below the band edges;	PK: 68.2 (dBμV/m)
	15.6 dBm/MHz at 5 MHz above or below the band edges decreasing linearly to 10 dBm/MHz at 25 MHz above or below the band edges;	
	10 dBm/MHz at 25 MHz above or below the band edges decreasing linearly to -27 dBm/MHz at 75 MHz above or below the band edges;	
	-27 dBm/MHz at frequencies more than 75 MHz above or below the band edges.	

**Test Setup:** Refer to section 4.5.1 for details.

### Test Procedures:

- The EUT was placed on the top of a rotating table 0.8 meters (for below 1 GHz) / 1.5 meters (for above 1 GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- The test-receiver system was set to peak and average detected function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

### Remark:

- The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1 GHz.
- The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.
- The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for RMS Average (Duty cycle < 98 %) for Average detection (AV) at frequency above 1 GHz, then the measurement results was added to a correction factor (10 log(1/duty cycle)).
- The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz (Duty cycle ≥ 98 %) or ≥ 1/T(duty cycle is < 98%) for Average detection (AV) at frequency above 1 GHz.
- All modes of operation were investigated and the worst-case emissions are reported.

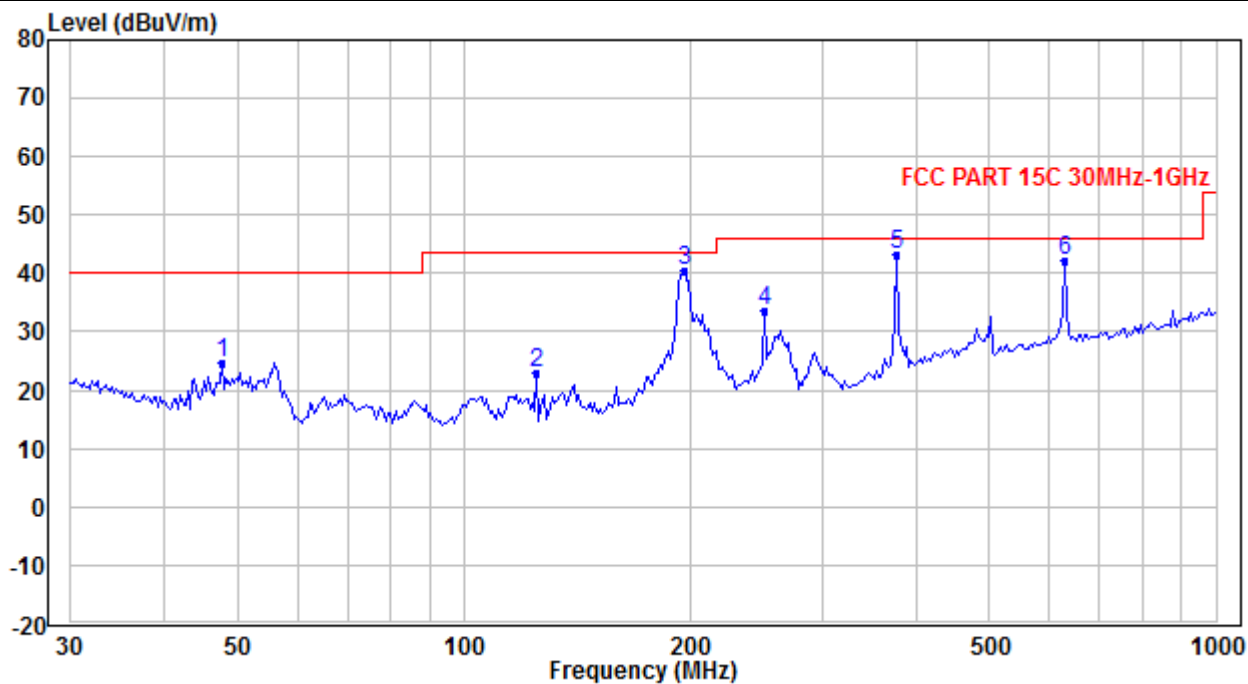
**Equipment Used:** Refer to section 3 for details.

**Test Result:** Pass

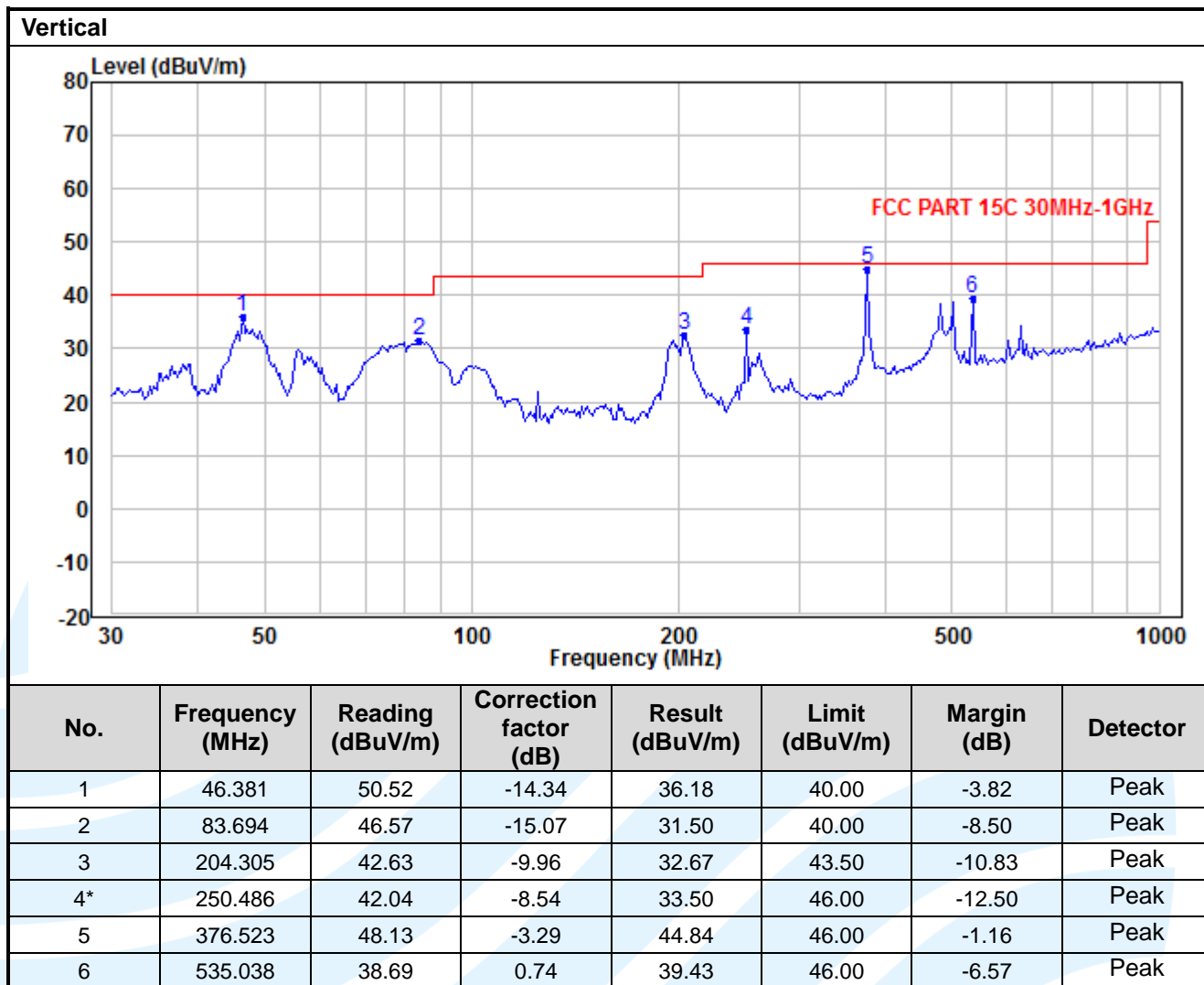
**The measurement data as follows:**

**Radiated Emission Test Data (9 KHz ~ 30 MHz):**

The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

**Radiated Emission Test Data (30 MHz ~ 1 GHz):**
**Worst-Case Configuration**
**Horizontal**


No.	Frequency (MHz)	Reading (dBuV/m)	Correction factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	47.703	39.67	-14.92	24.75	40.00	-15.25	Peak
2*	124.925	35.84	-12.78	23.06	43.50	-20.44	Peak
3	195.870	50.75	-10.18	40.57	43.50	-2.93	Peak
4	250.486	42.29	-8.54	33.75	46.00	-12.25	Peak
5	376.523	46.64	-3.29	43.35	46.00	-2.65	Peak
6	628.894	39.92	2.32	42.24	46.00	-3.76	Peak



**Radiated Emission Test Data (Above 1GHz):**
**MIMO\_Chain 0+1\_IIEEE 802.11n-HT20\_Channel 36**

No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	10360.00	49.85	74.00	-24.15	Peak	Horizontal
2	10360.00	37.67	54.00	-16.33	Average	Horizontal
3	15540.00	51.62	74.00	-22.38	Peak	Horizontal
4	15540.00	39.50	54.00	-14.50	Average	Horizontal
5	10360.00	52.35	74.00	-21.65	Peak	Vertical
6	10360.00	37.81	54.00	-16.19	Average	Vertical
7	15540.00	51.98	74.00	-22.02	Peak	Vertical
8	15540.00	39.80	54.00	-14.20	Average	Vertical

**MIMO\_Chain 0+1\_IIEEE 802.11n-HT20\_Channel 44**

No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	10440.00	52.42	74.00	-21.58	Peak	Horizontal
2	10440.00	39.09	54.00	-14.91	Average	Horizontal
3	15660.00	52.42	74.00	-21.58	Peak	Horizontal
4	15660.00	40.13	54.00	-13.87	Average	Horizontal
5	10440.00	53.50	74.00	-20.50	Peak	Vertical
6	10440.00	39.73	54.00	-14.27	Average	Vertical
7	15660.00	53.96	74.00	-20.04	Peak	Vertical
8	15660.00	40.41	54.00	-13.59	Average	Vertical

**MIMO\_Chain 0+1\_IIEEE 802.11n-HT20\_Channel 48**

No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	10480.00	53.93	74.00	-20.07	Peak	Horizontal
2	10480.00	38.72	54.00	-15.28	Average	Horizontal
3	15720.00	52.96	74.00	-21.04	Peak	Horizontal
4	15720.00	40.14	54.00	-13.86	Average	Horizontal
5	10480.00	52.76	74.00	-21.24	Peak	Vertical
6	10480.00	38.83	54.00	-15.17	Average	Vertical
7	15720.00	53.14	74.00	-20.86	Peak	Vertical
8	15720.00	40.14	54.00	-13.86	Average	Vertical

**MIMO\_Chain 0+1\_ IEEE 802.11n-HT20\_Channel 149**

No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	11490.00	52.43	74.00	-21.57	Peak	Horizontal
2	11490.00	40.70	54.00	-13.30	Average	Horizontal
3	17235.00	53.14	74.00	-20.86	Peak	Horizontal
4	17235.00	40.52	54.00	-13.48	Average	Horizontal
5	11490.00	52.04	74.00	-21.96	Peak	Vertical
6	11490.00	40.32	54.00	-13.68	Average	Vertical
7	17235.00	53.64	74.00	-20.36	Peak	Vertical
8	17235.00	40.52	54.00	-13.48	Average	Vertical

**MIMO\_Chain 0+1\_ IEEE 802.11n-HT20\_Channel 157**

No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	11570.00	56.62	74.00	-17.38	Peak	Horizontal
2	11570.00	41.33	54.00	-12.67	Average	Horizontal
3	17355.00	54.94	74.00	-19.06	Peak	Horizontal
4	17355.00	42.60	54.00	-11.40	Average	Horizontal
5	11570.00	55.87	74.00	-18.13	Peak	Vertical
6	11570.00	40.74	54.00	-13.26	Average	Vertical
7	17355.00	54.53	74.00	-19.47	Peak	Vertical
8	17355.00	42.60	54.00	-11.40	Average	Vertical

**MIMO\_Chain 0+1\_ IEEE 802.11n-HT20\_Channel 165**

No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	11650.00	54.52	74.00	-19.48	Peak	Horizontal
2	11650.00	40.30	54.00	-13.70	Average	Horizontal
3	17475.00	56.19	74.00	-17.81	Peak	Horizontal
4	17475.00	42.74	54.00	-11.26	Average	Horizontal
5	11650.00	52.74	74.00	-21.26	Peak	Vertical
6	11650.00	39.91	54.00	-14.09	Average	Vertical
7	17475.00	54.93	74.00	-19.07	Peak	Vertical
8	17475.00	42.74	54.00	-11.26	Average	Vertical



**MIMO\_Chain 0+1\_ IEEE 802.11n-HT40\_Channel 38**

No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	10380.00	50.11	74.00	-23.89	Peak	Horizontal
2	10380.00	39.11	54.00	-14.89	Average	Horizontal
3	15570.00	51.58	74.00	-22.42	Peak	Horizontal
4	15570.00	40.58	54.00	-13.42	Average	Horizontal
5	10380.00	50.84	74.00	-23.16	Peak	Vertical
6	10380.00	38.84	54.00	-15.16	Average	Vertical
7	15570.00	51.04	74.00	-22.96	Peak	Vertical
8	15570.00	40.04	54.00	-13.96	Average	Vertical

**MIMO\_Chain 0+1\_ IEEE 802.11n-HT40\_Channel 46**

No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	10460.00	51.72	74.00	-22.28	Peak	Horizontal
2	10460.00	38.72	54.00	-15.28	Average	Horizontal
3	15690.00	52.17	74.00	-21.83	Peak	Horizontal
4	15690.00	40.17	54.00	-13.83	Average	Horizontal
5	10460.00	51.85	74.00	-22.15	Peak	Vertical
6	10460.00	39.85	54.00	-14.15	Average	Vertical
7	15690.00	53.60	74.00	-20.40	Peak	Vertical
8	15690.00	39.60	54.00	-14.40	Average	Vertical

**MIMO\_Chain 0+1\_ IEEE 802.11n-HT40\_Channel 151**

No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	11510.00	59.03	74.00	-14.97	Peak	Horizontal
2	11510.00	45.03	54.00	-8.97	Average	Horizontal
3	17265.00	52.51	74.00	-21.49	Peak	Horizontal
4	17265.00	41.51	54.00	-12.49	Average	Horizontal
5	11510.00	56.74	74.00	-17.26	Peak	Vertical
6	11510.00	43.74	54.00	-10.26	Average	Vertical
7	17265.00	54.61	74.00	-19.39	Peak	Vertical
8	17265.00	40.61	54.00	-13.39	Average	Vertical

**MIMO\_Chain 0+1\_ IEEE 802.11n-HT40\_Channel 159**

No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Detector
1	11590.00	54.38	74.00	-19.62	Peak	Horizontal
2	11590.00	41.38	54.00	-12.62	Average	Horizontal
3	17385.00	54.79	74.00	-19.21	Peak	Horizontal
4	17385.00	41.79	54.00	-12.21	Average	Horizontal
5	11590.00	56.14	74.00	-17.86	Peak	Vertical
6	11590.00	42.14	54.00	-11.86	Average	Vertical
7	17385.00	54.11	74.00	-19.89	Peak	Vertical
8	17385.00	42.11	54.00	-11.89	Average	Vertical

**MIMO\_Chain 0+1\_ IEEE 802.11ac-VHT20\_Channel 36**

No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	10360.00	52.10	74.00	-21.90	Peak	Horizontal
2	10360.00	39.10	54.00	-14.90	Average	Horizontal
3	15540.00	51.43	74.00	-22.57	Peak	Horizontal
4	15540.00	40.43	54.00	-13.57	Average	Horizontal
5	10360.00	51.07	74.00	-22.93	Peak	Vertical
6	10360.00	39.07	54.00	-14.93	Average	Vertical
7	15540.00	52.73	74.00	-21.27	Peak	Vertical
8	15540.00	39.73	54.00	-14.27	Average	Vertical

**MIMO\_Chain 0+1\_ IEEE 802.11ac-VHT20\_Channel 44**

No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	10440.00	52.44	74.00	-21.56	Peak	Horizontal
2	10440.00	38.44	54.00	-15.56	Average	Horizontal
3	15660.00	52.52	74.00	-21.48	Peak	Horizontal
4	15660.00	40.52	54.00	-13.48	Average	Horizontal
5	10440.00	54.37	74.00	-19.63	Peak	Vertical
6	10440.00	39.37	54.00	-14.63	Average	Vertical
7	15660.00	52.66	74.00	-21.34	Peak	Vertical
8	15660.00	39.66	54.00	-14.34	Average	Vertical

**MIMO\_Chain 0+1\_ IEEE 802.11ac-VHT20\_Channel 48**

No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	10480.00	52.67	74.00	-21.33	Peak	Horizontal
2	10480.00	38.67	54.00	-15.33	Average	Horizontal
3	15720.00	52.29	74.00	-21.71	Peak	Horizontal
4	15720.00	40.29	54.00	-13.71	Average	Horizontal
5	10480.00	55.81	74.00	-18.19	Peak	Vertical
6	10480.00	38.81	54.00	-15.19	Average	Vertical
7	15720.00	52.03	74.00	-21.97	Peak	Vertical
8	15720.00	40.03	54.00	-13.97	Average	Vertical

**MIMO\_Chain 0+1\_ IEEE 802.11ac-VHT20\_Channel 149**

No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	11490.00	57.33	74.00	-16.67	Peak	Horizontal
2	11490.00	41.33	54.00	-12.67	Average	Horizontal
3	17235.00	52.46	74.00	-21.54	Peak	Horizontal
4	17235.00	40.46	54.00	-13.54	Average	Horizontal
5	11490.00	60.16	74.00	-13.84	Peak	Vertical
6	11490.00	42.16	54.00	-11.84	Average	Vertical
7	17235.00	54.51	74.00	-19.49	Peak	Vertical
8	17235.00	40.51	54.00	-13.49	Average	Vertical

**MIMO\_Chain 0+1\_ IEEE 802.11ac-VHT20\_Channel 157**

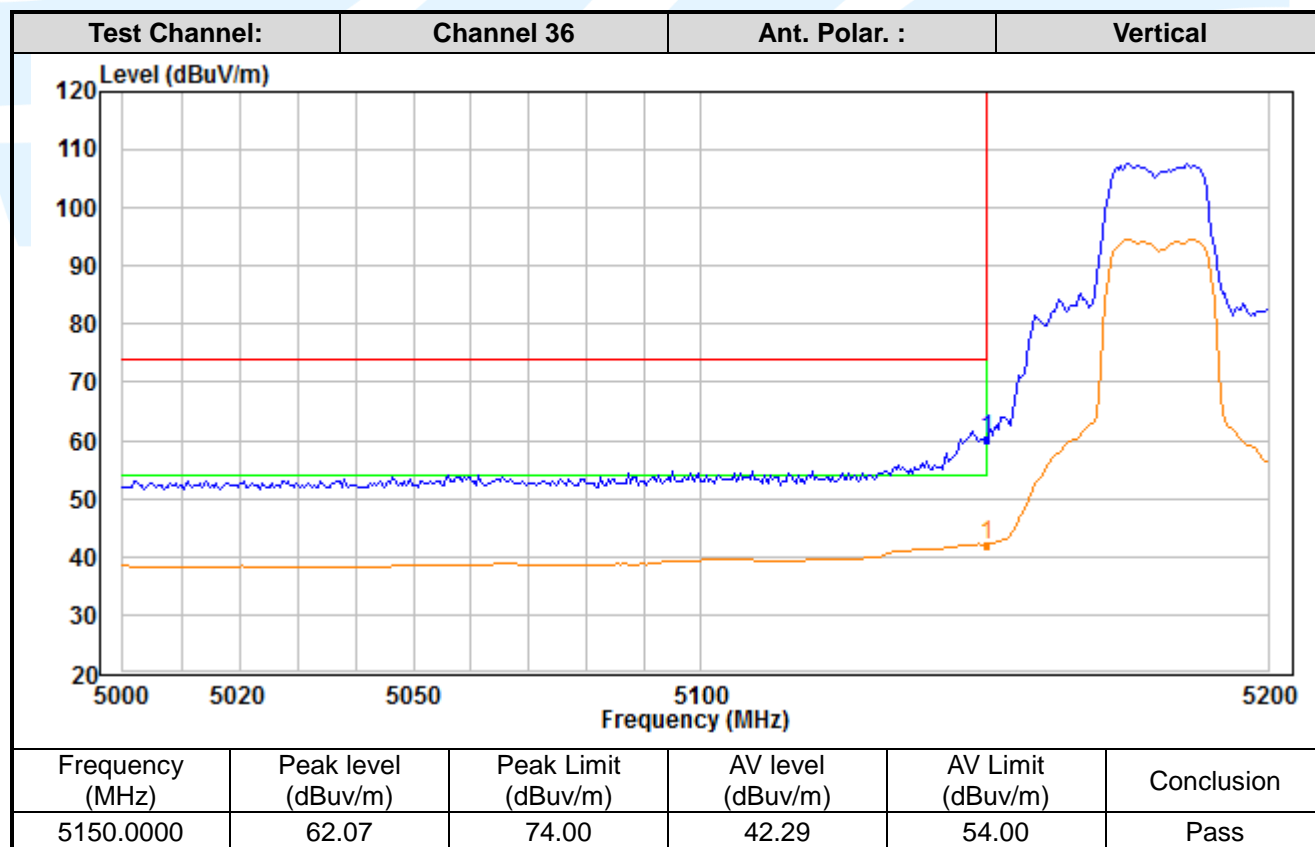
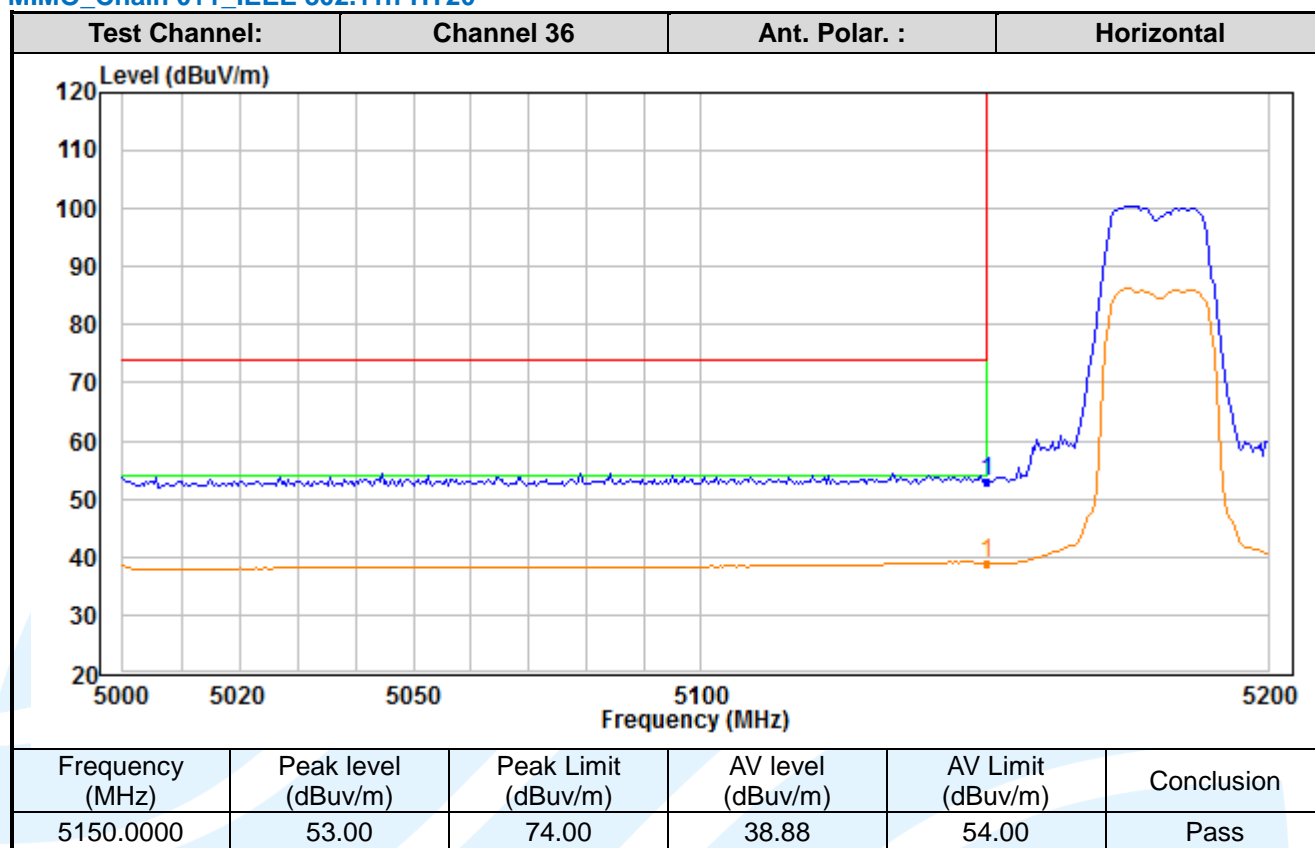
No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	11570.00	55.66	74.00	-18.34	Peak	Horizontal
2	11570.00	40.66	54.00	-13.34	Average	Horizontal
3	17355.00	54.76	74.00	-19.24	Peak	Horizontal
4	17355.00	42.76	54.00	-11.24	Average	Horizontal
5	11570.00	61.79	74.00	-12.21	Peak	Vertical
6	11570.00	41.79	54.00	-12.21	Average	Vertical
7	17355.00	55.83	74.00	-18.17	Peak	Vertical
8	17355.00	42.83	54.00	-11.17	Average	Vertical

**MIMO\_Chain 0+1\_ IEEE 802.11ac-VHT20\_Channel 165**

No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	11650.00	53.23	74.00	-20.77	Peak	Horizontal
2	11650.00	40.23	54.00	-13.77	Average	Horizontal
3	17475.00	55.71	74.00	-18.29	Peak	Horizontal
4	17475.00	42.71	54.00	-11.29	Average	Horizontal
5	11650.00	56.39	74.00	-17.61	Peak	Vertical
6	11650.00	40.39	54.00	-13.61	Average	Vertical
7	17475.00	54.71	74.00	-19.29	Peak	Vertical
8	17475.00	42.71	54.00	-11.29	Average	Vertical

# Band Edge Measurements (Radiated)

MIMO\_Chain 0+1\_IEEE 802.11n-HT20



## Shenzhen UnionTrust Quality and Technology Co., Ltd.

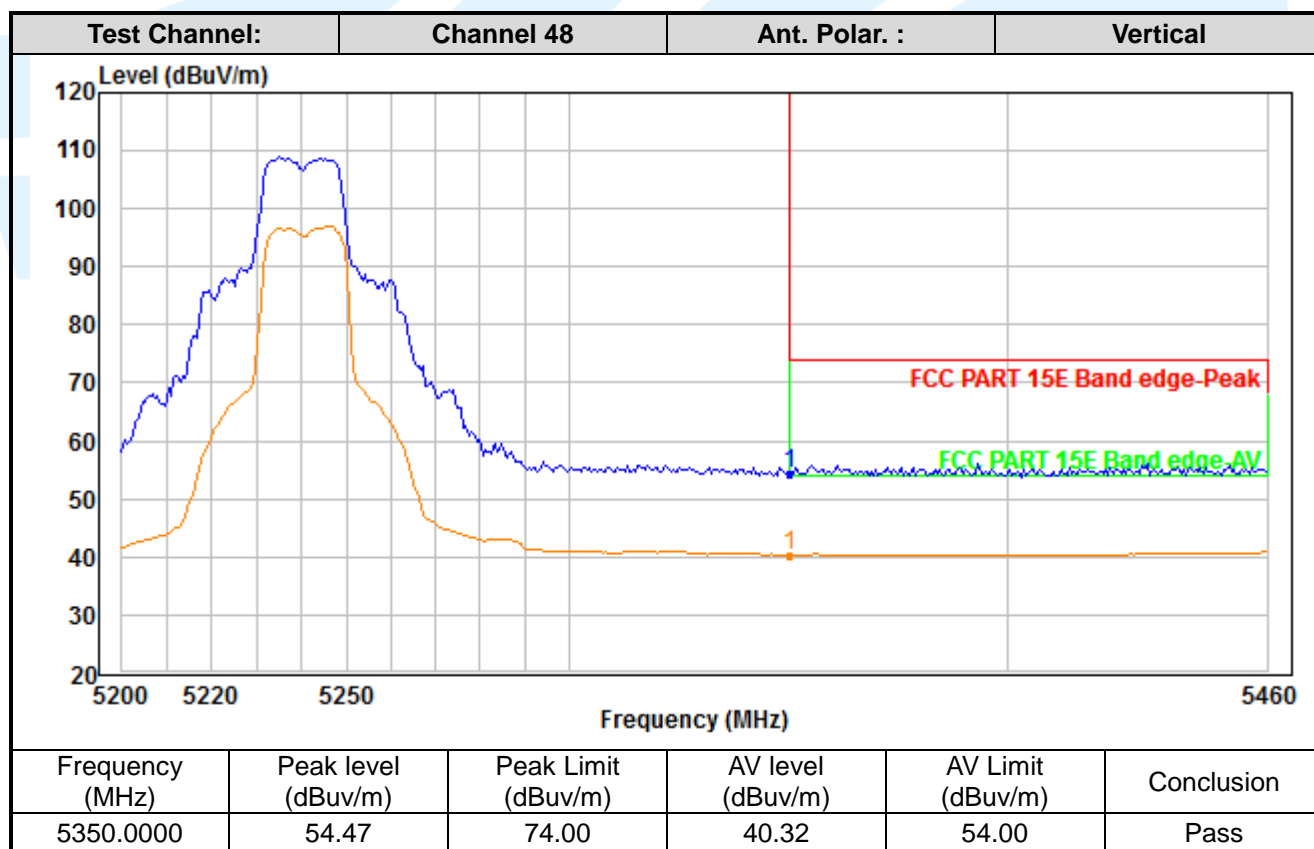
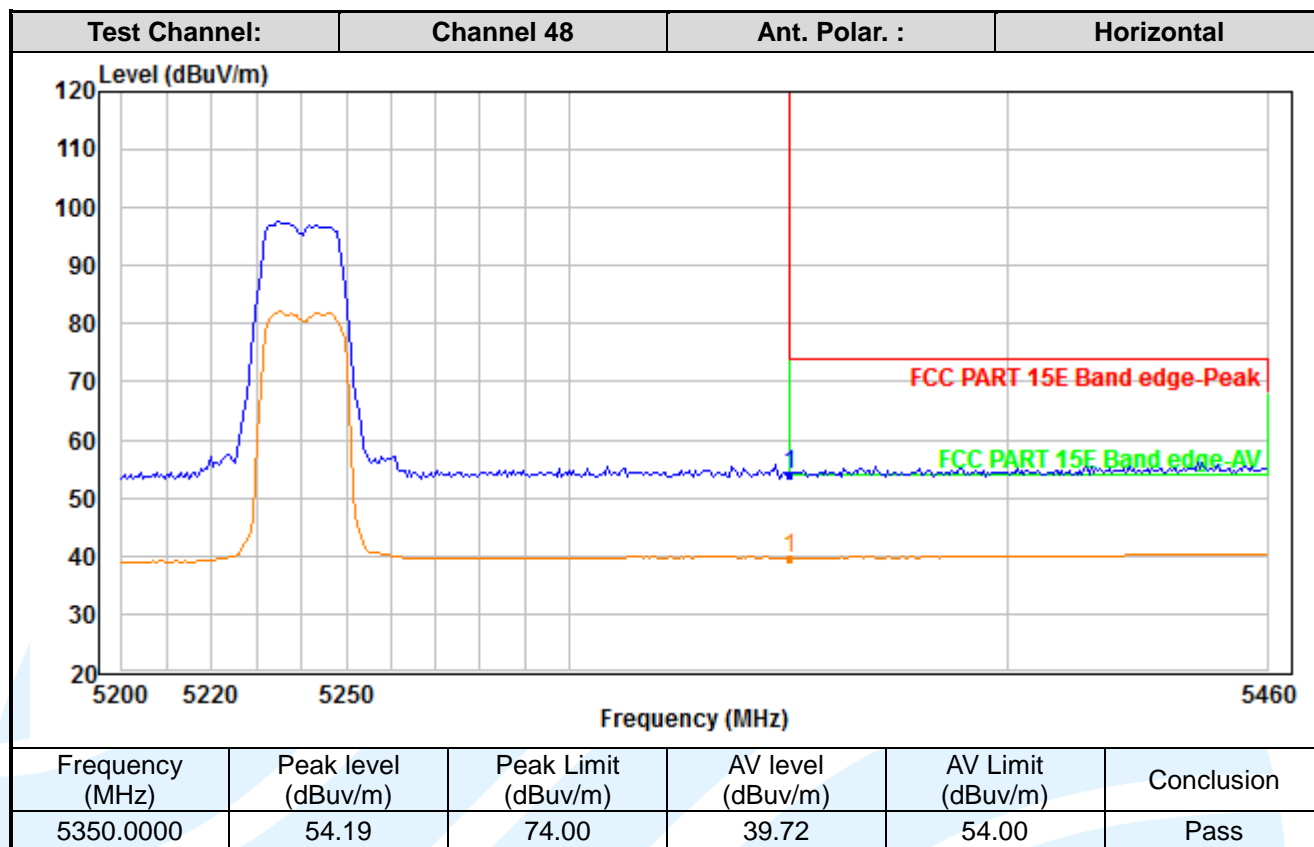
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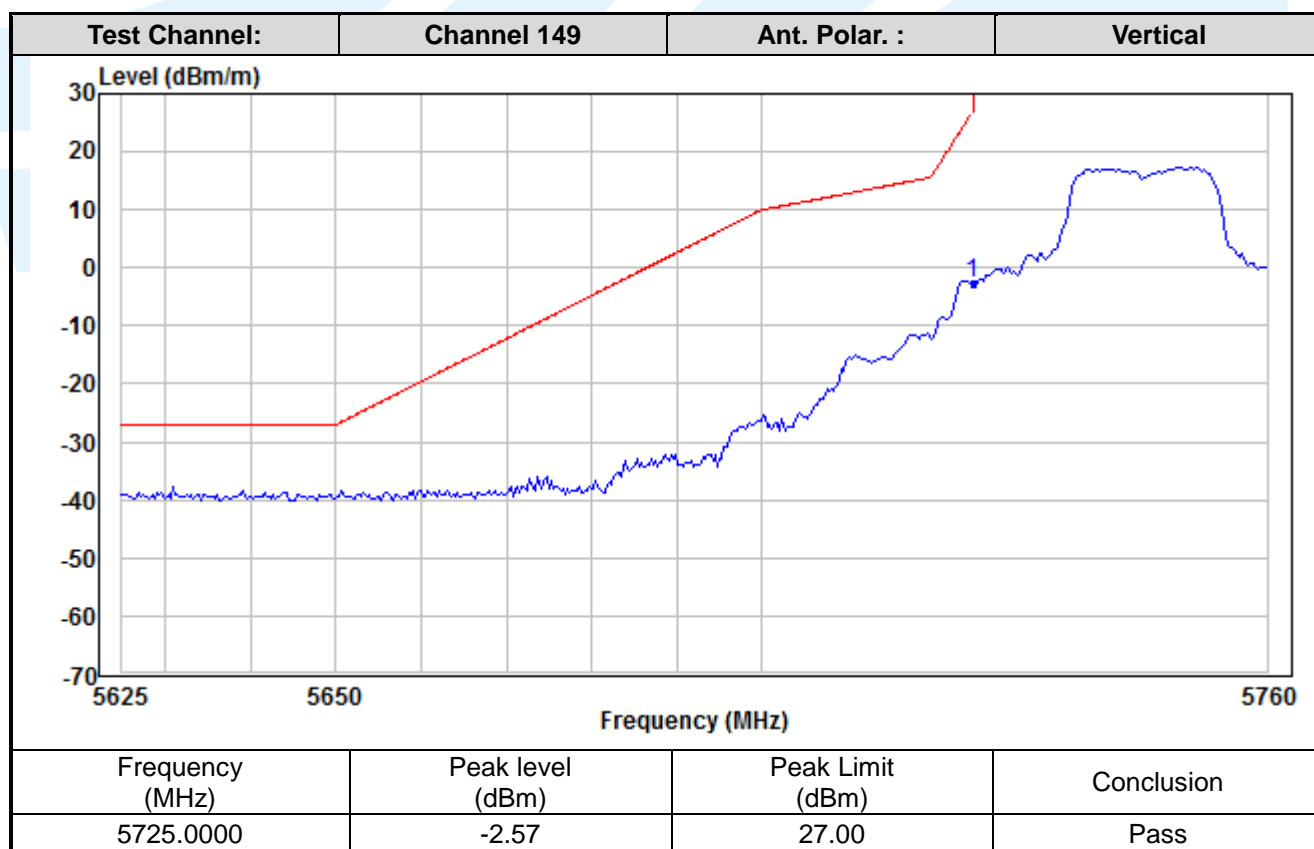
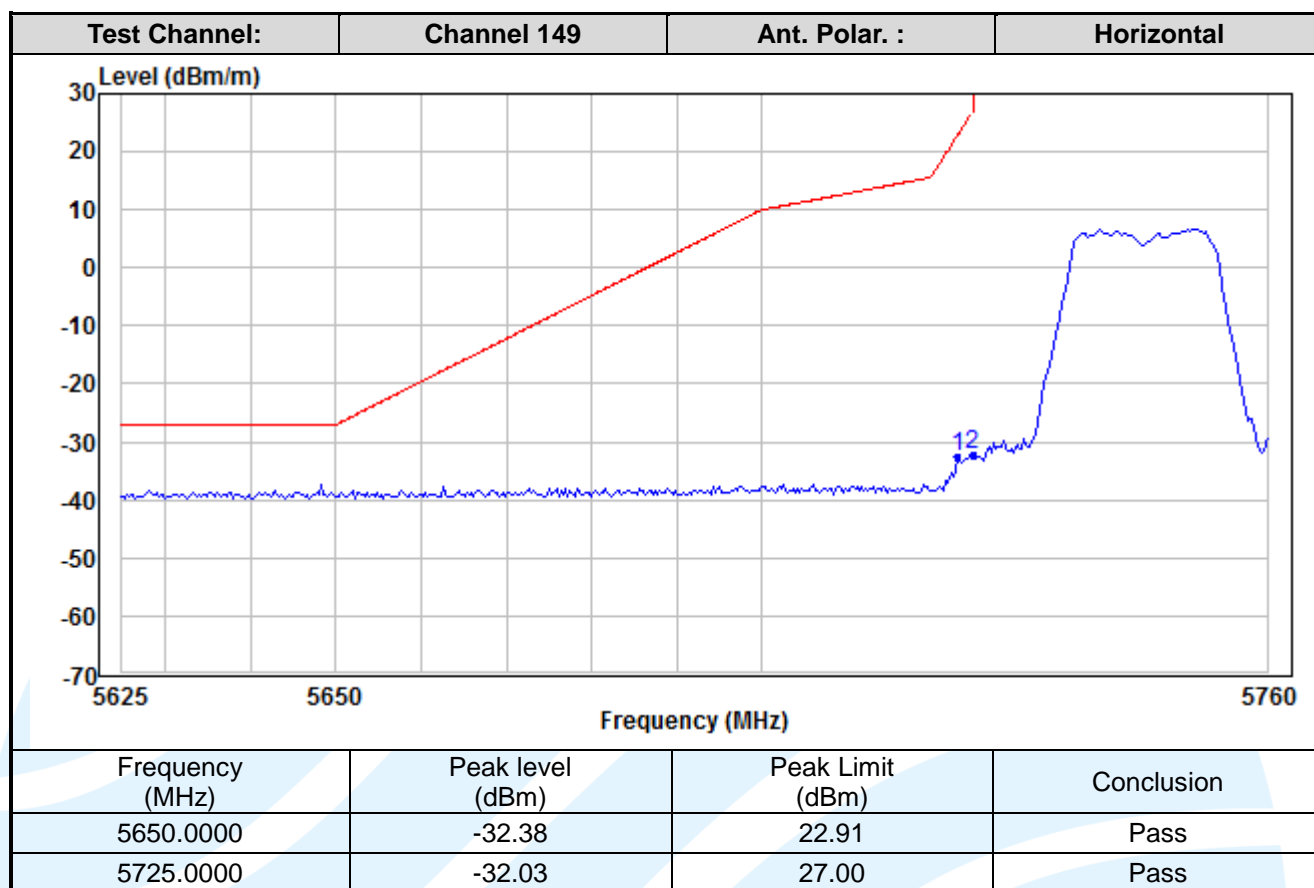
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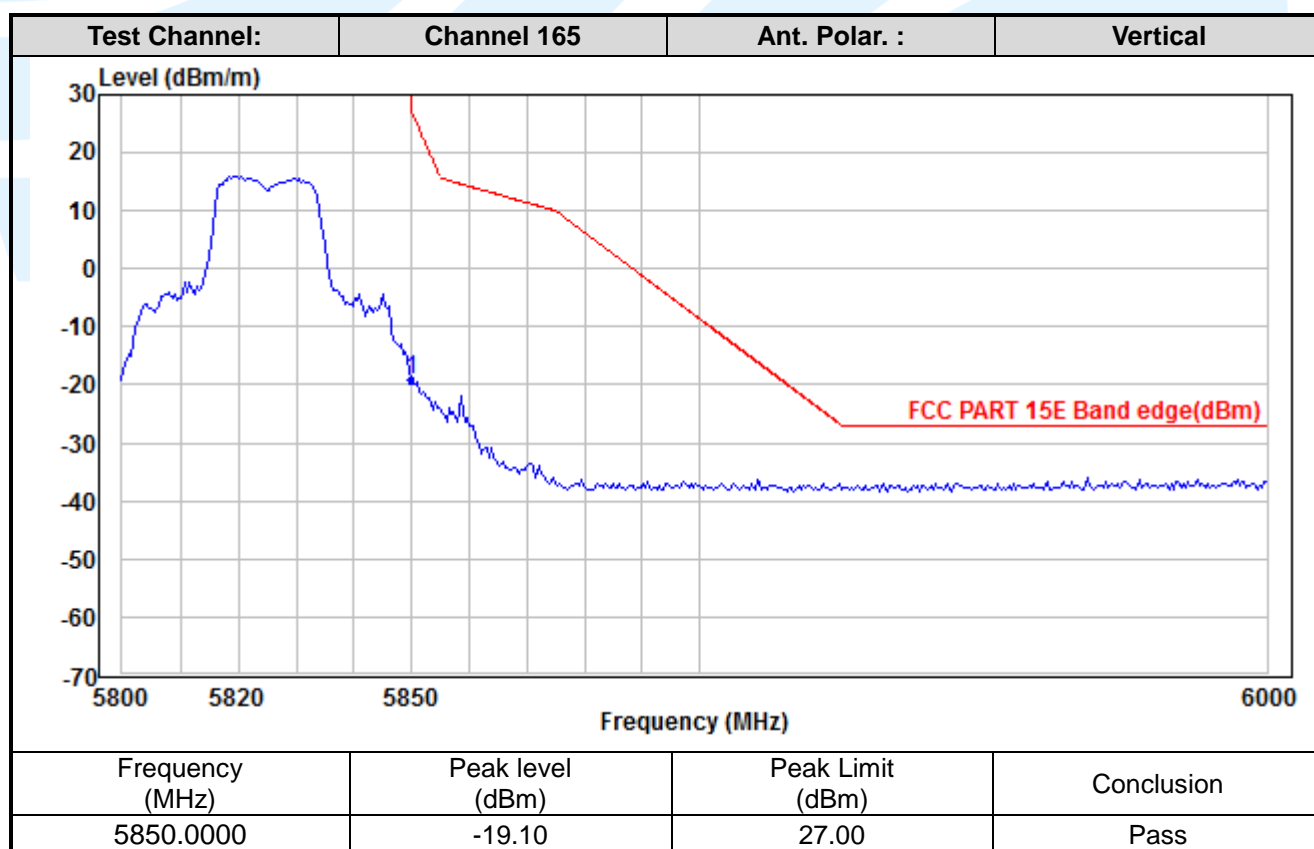
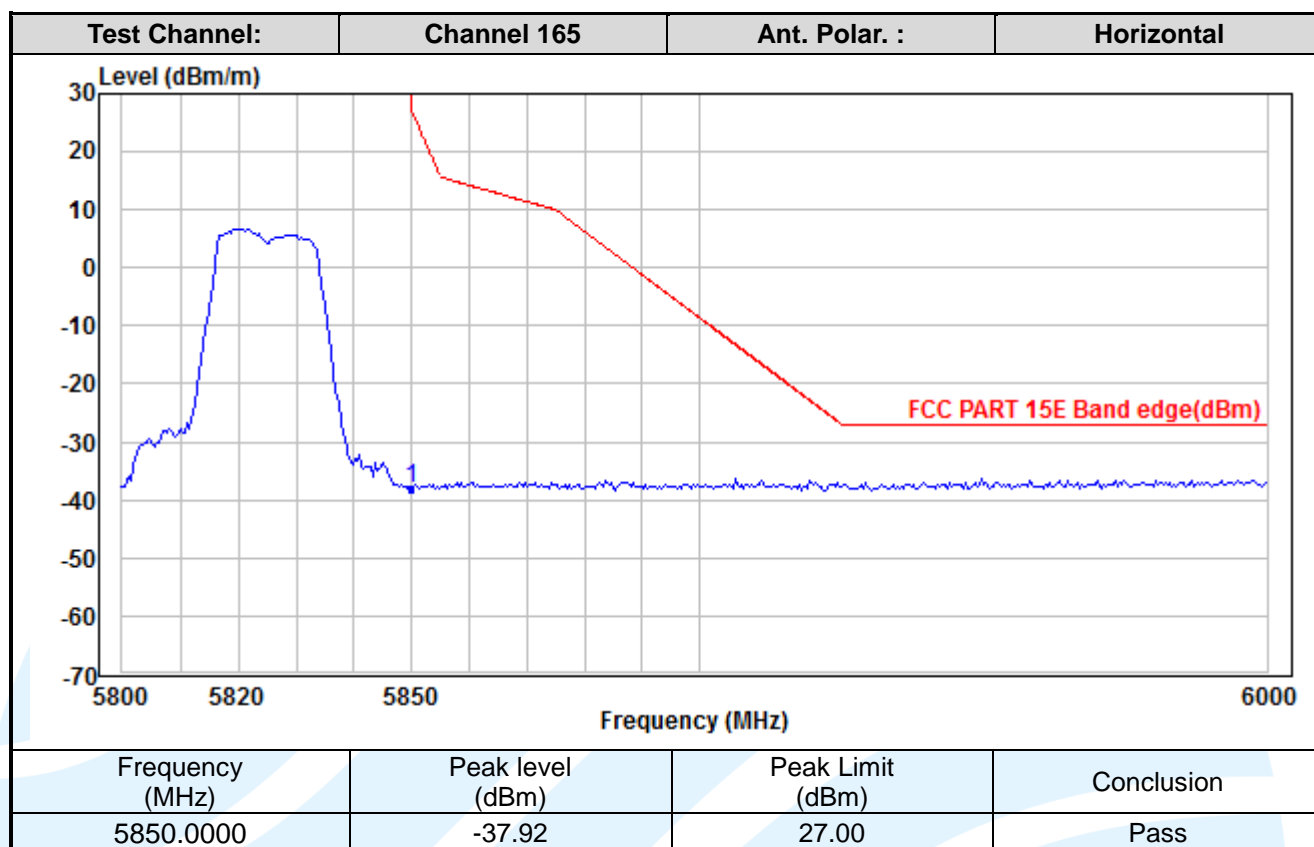
Fax: +86-755-28230886

E-mail: info@uttlab.com

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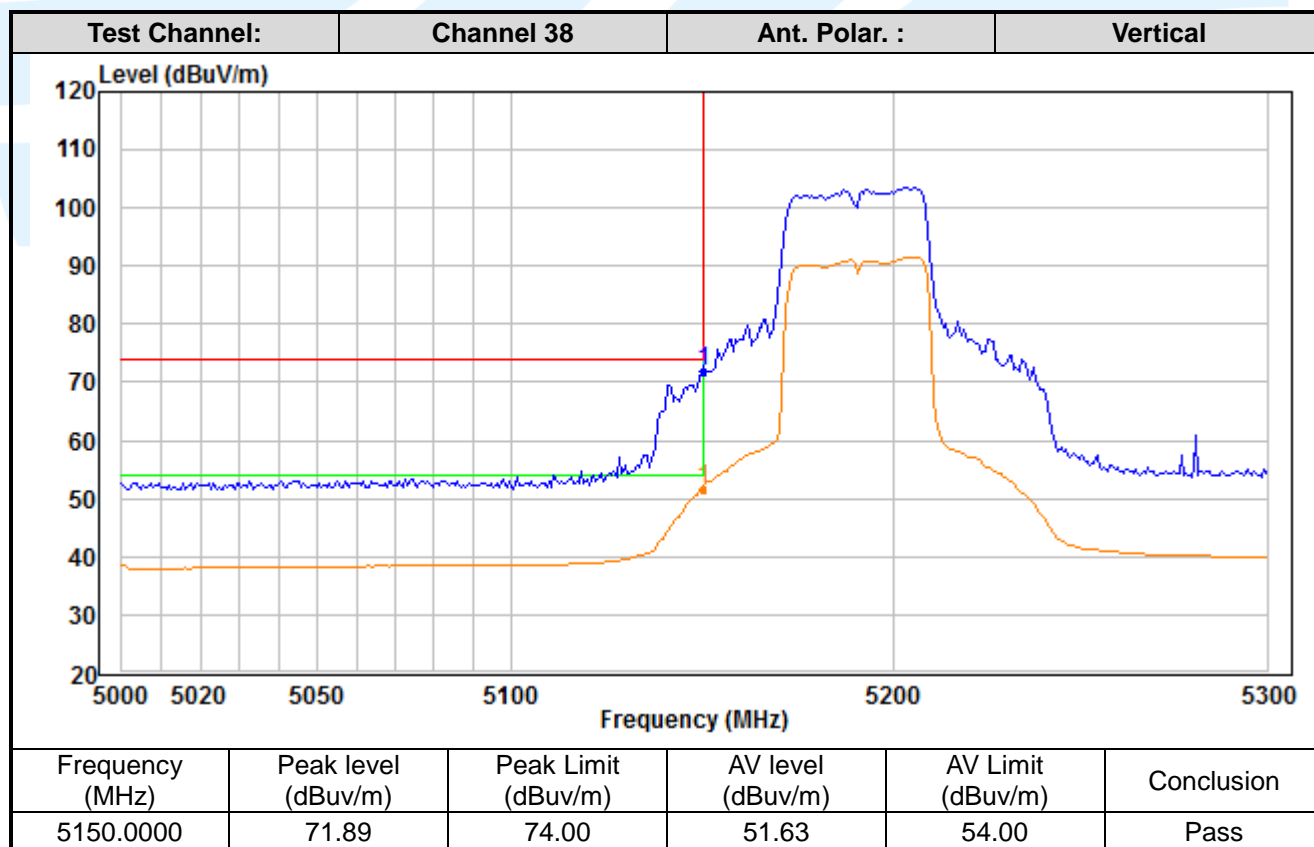
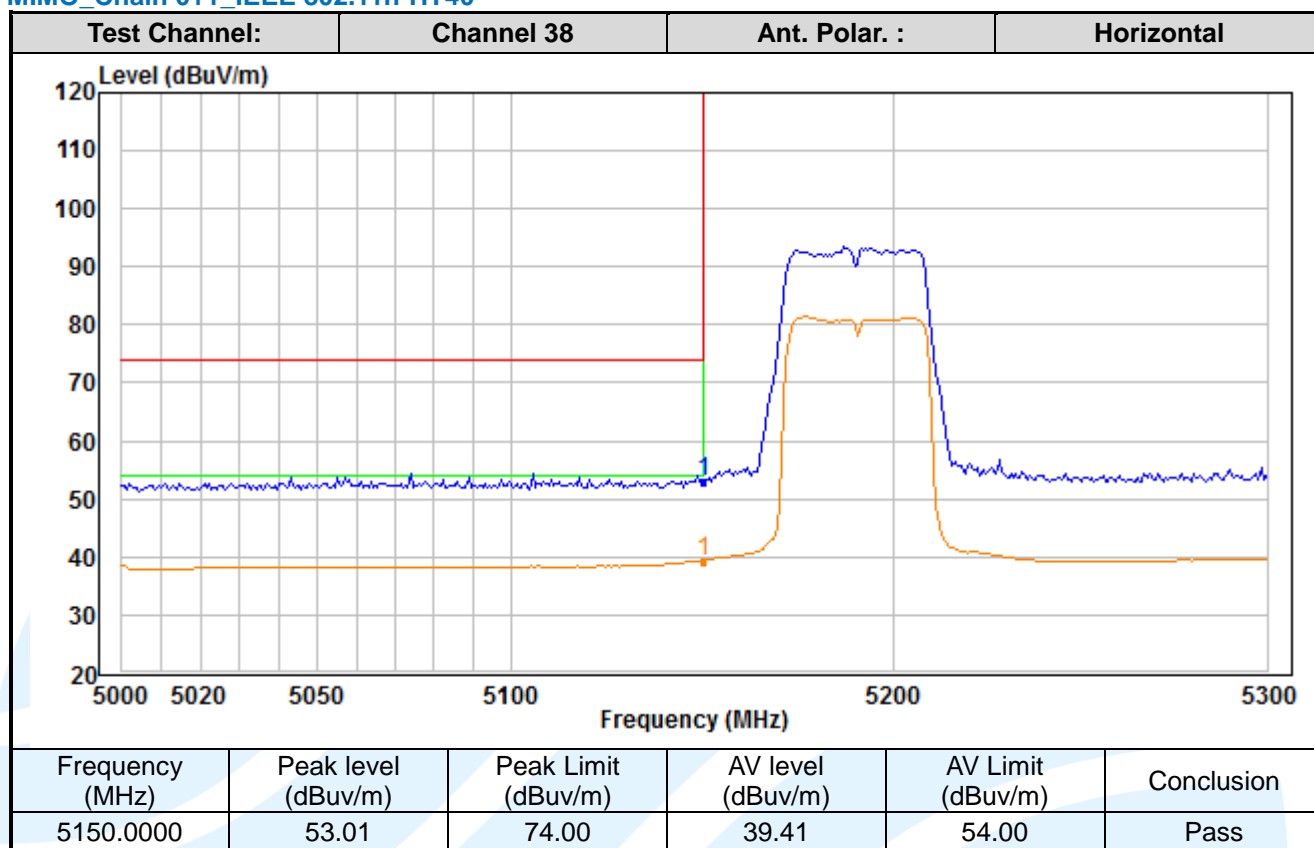








### MIMO\_Chain 0+1\_ IEEE 802.11n-HT40



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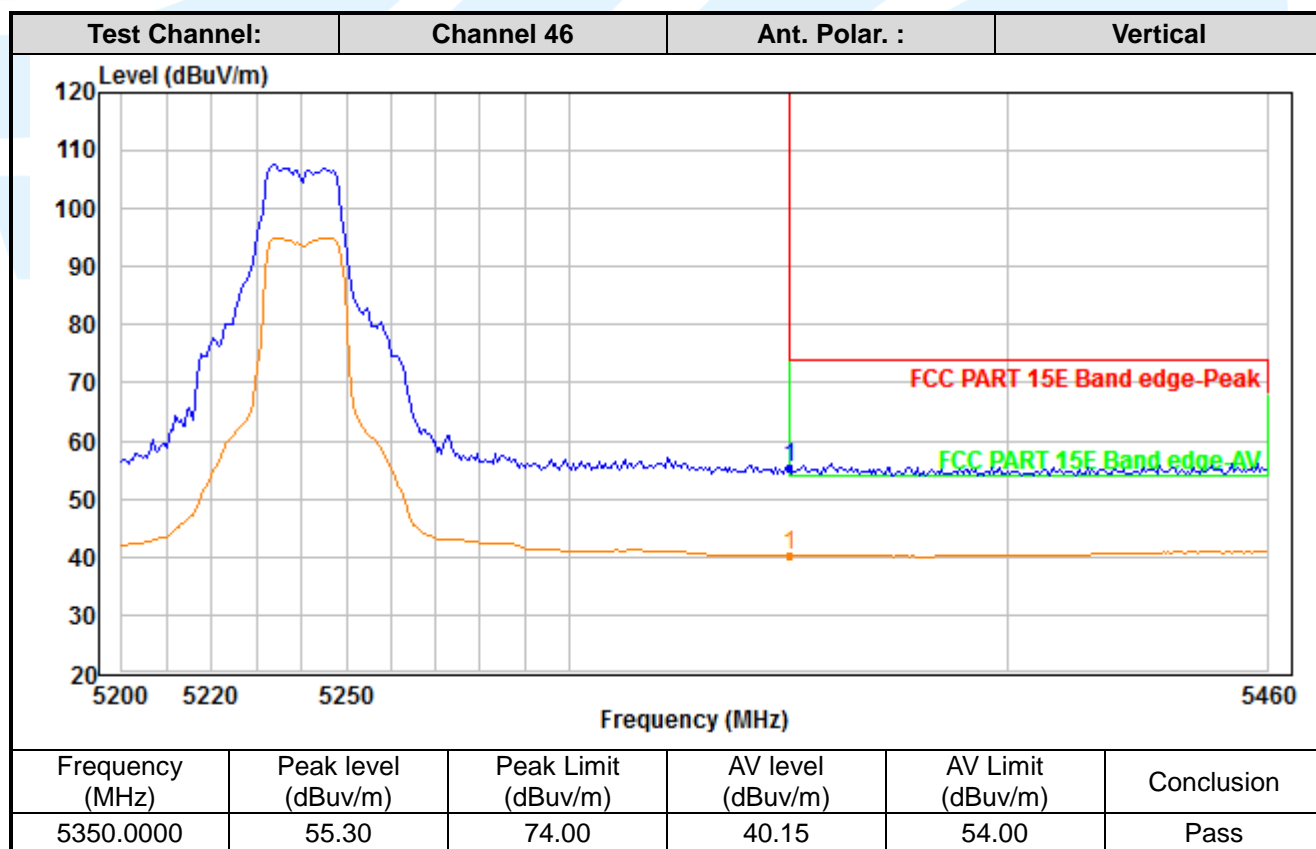
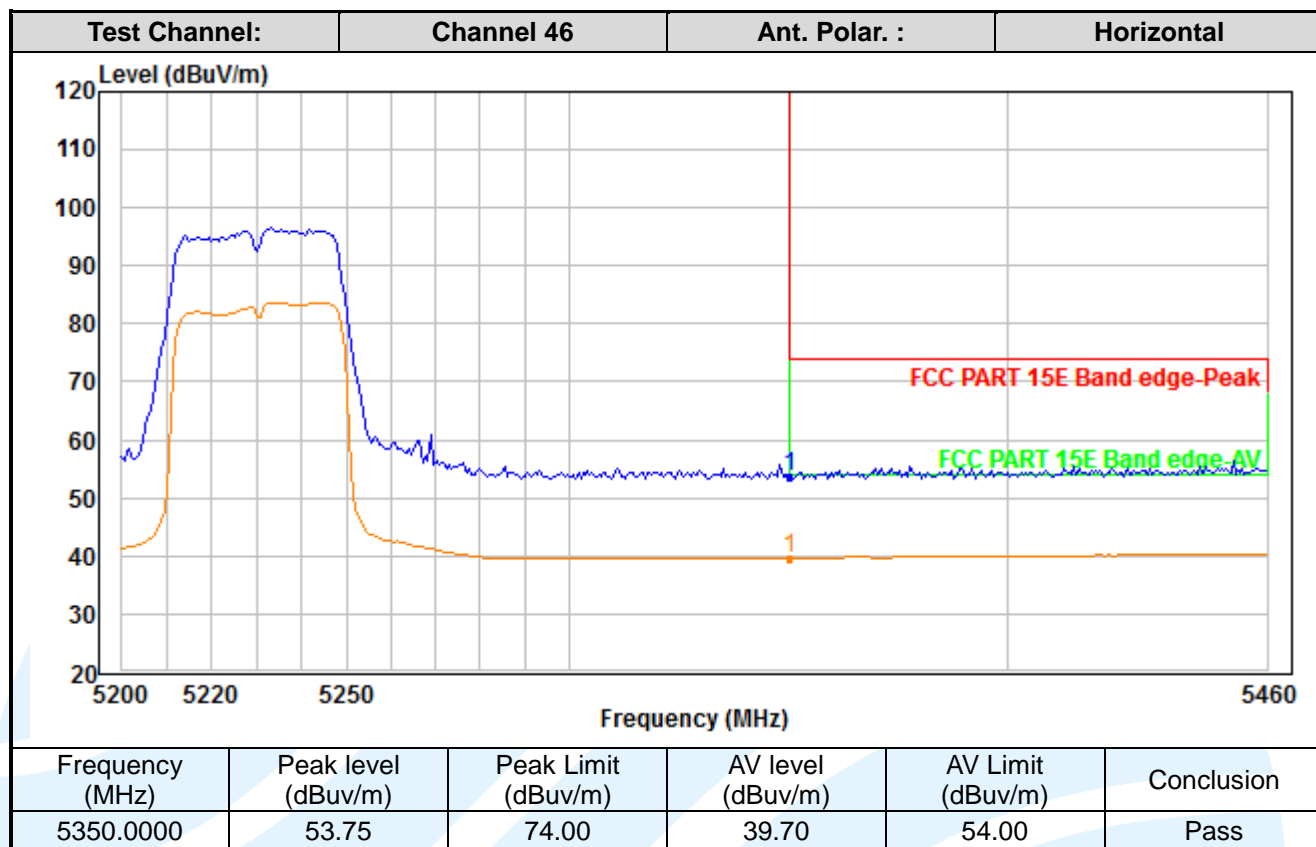
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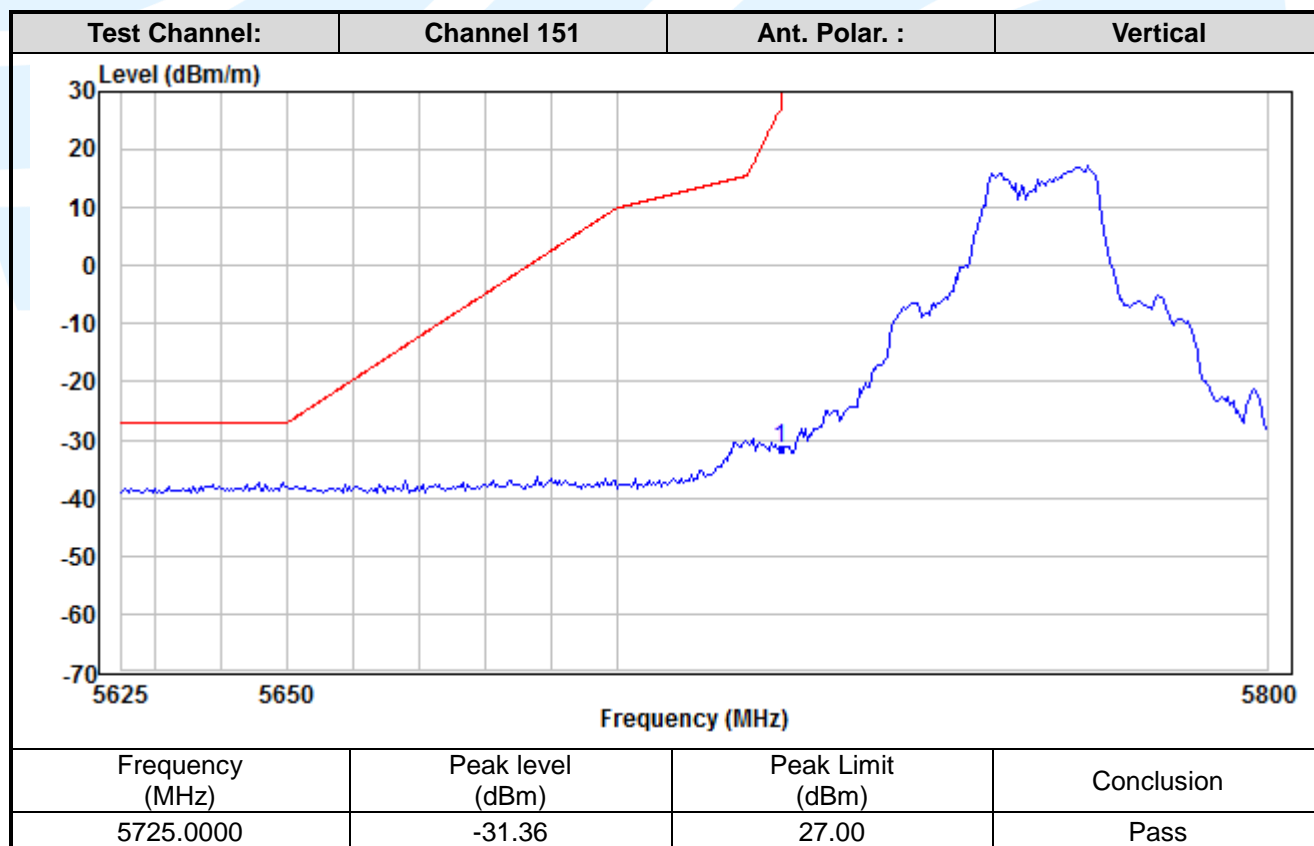
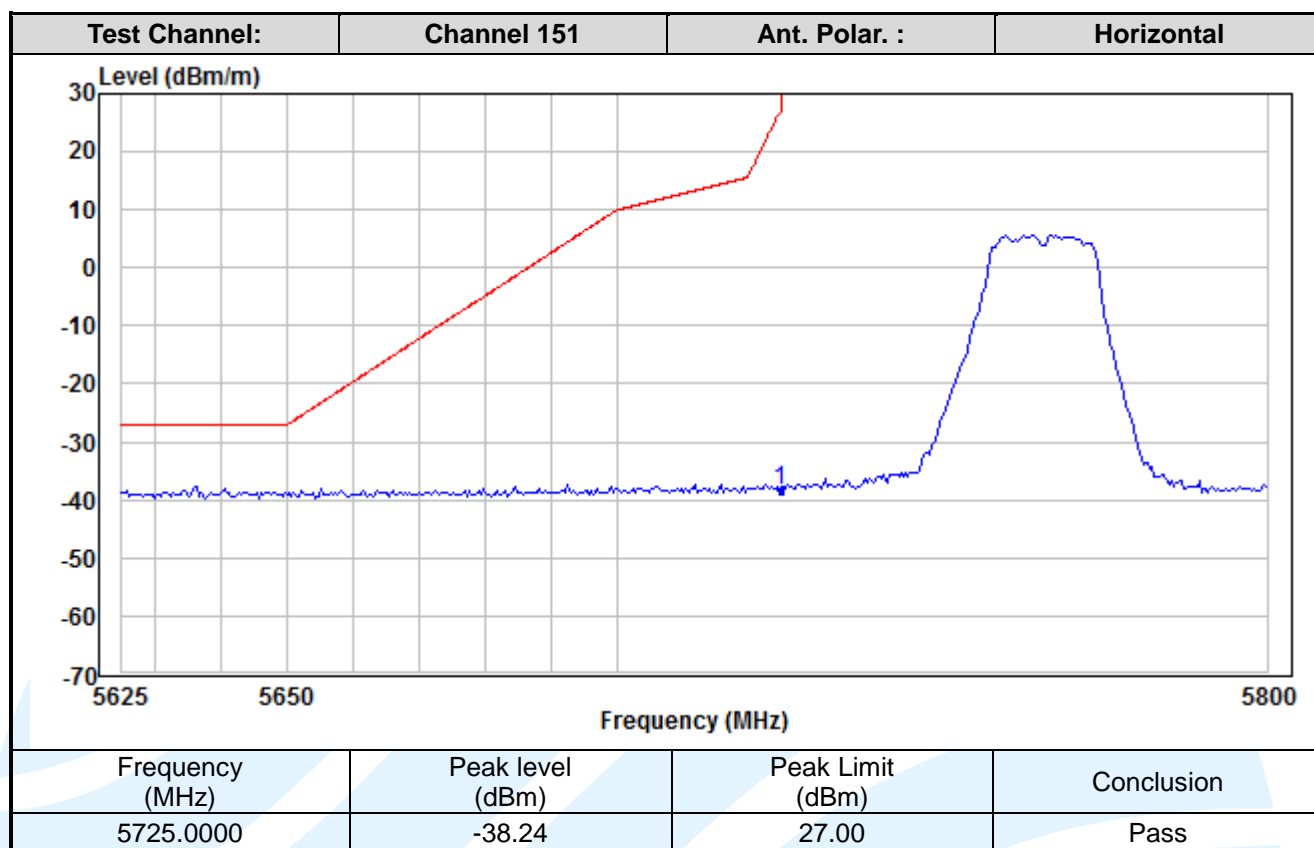
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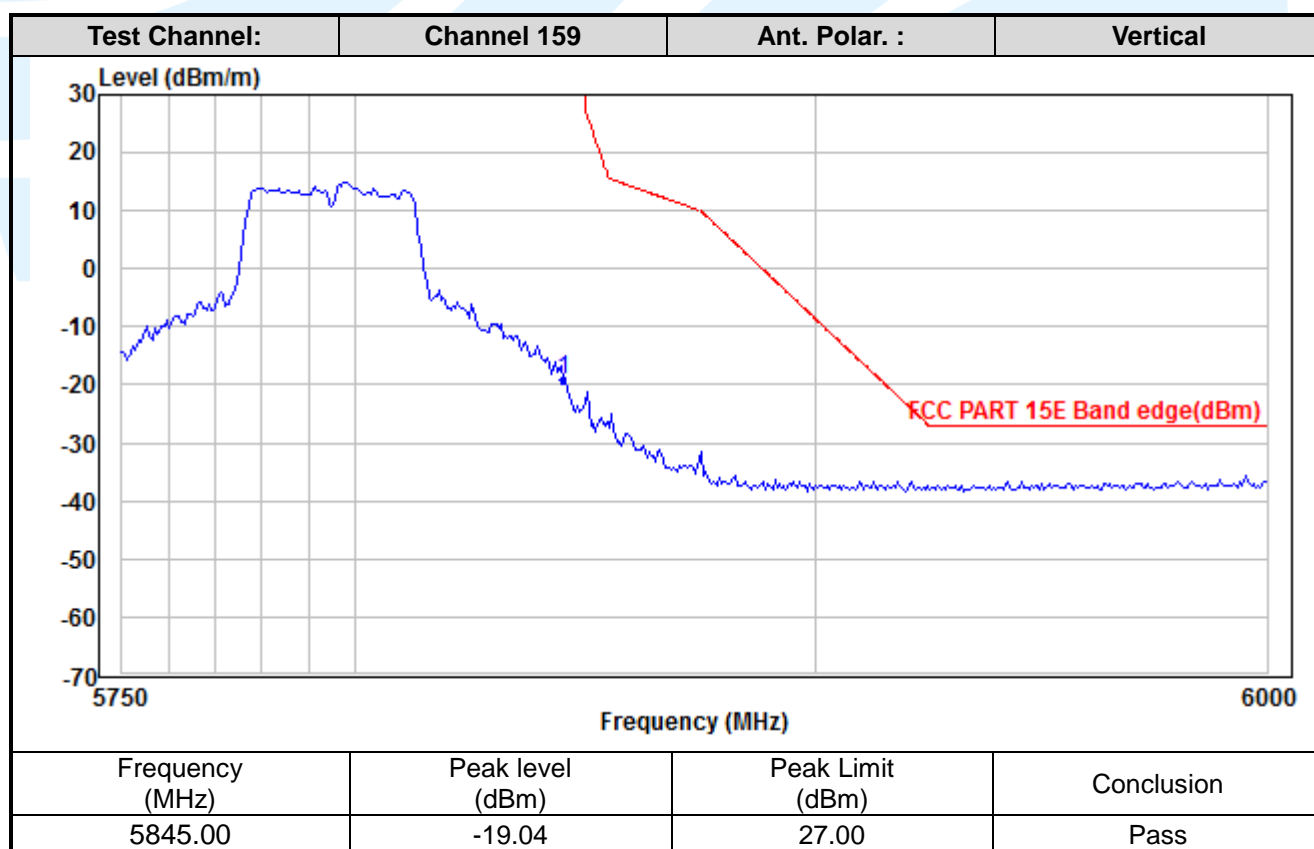
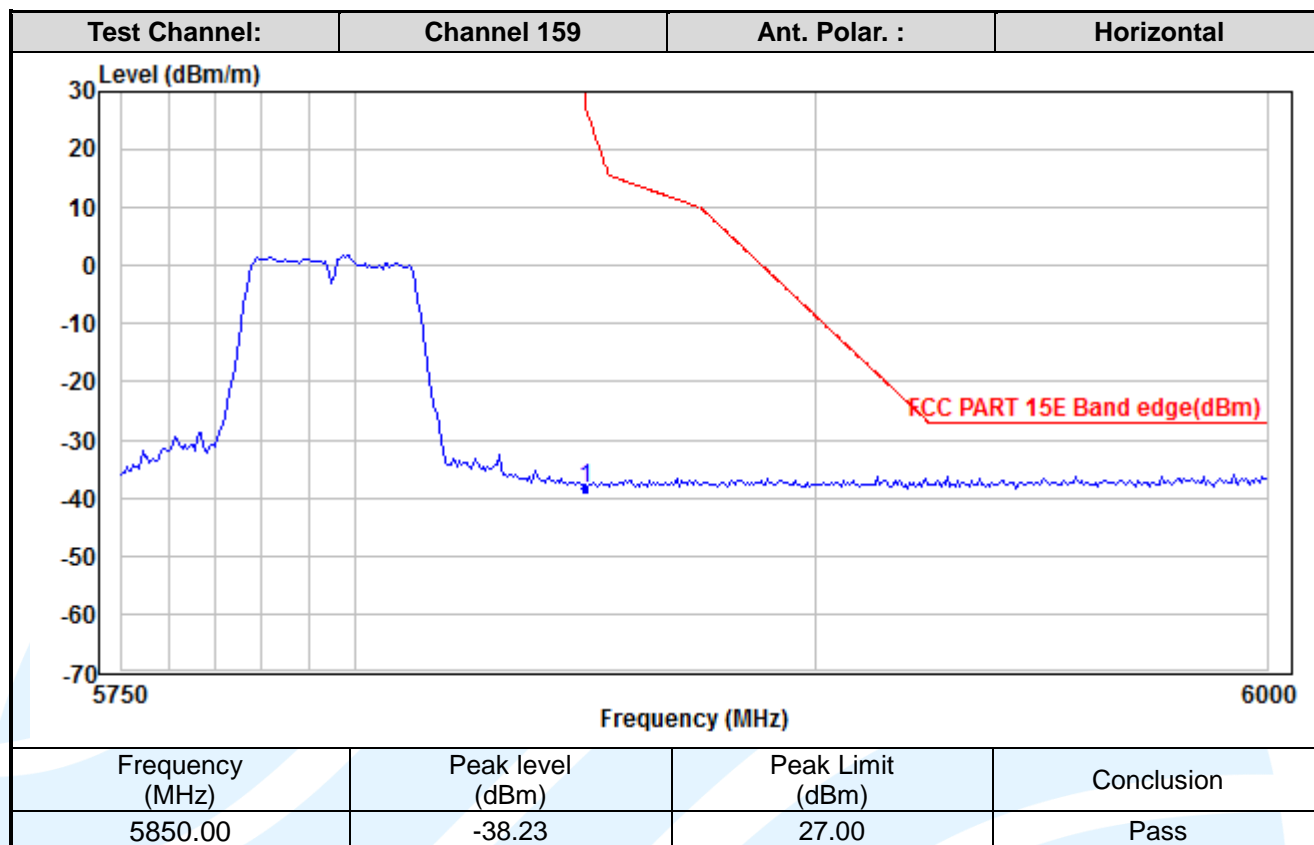
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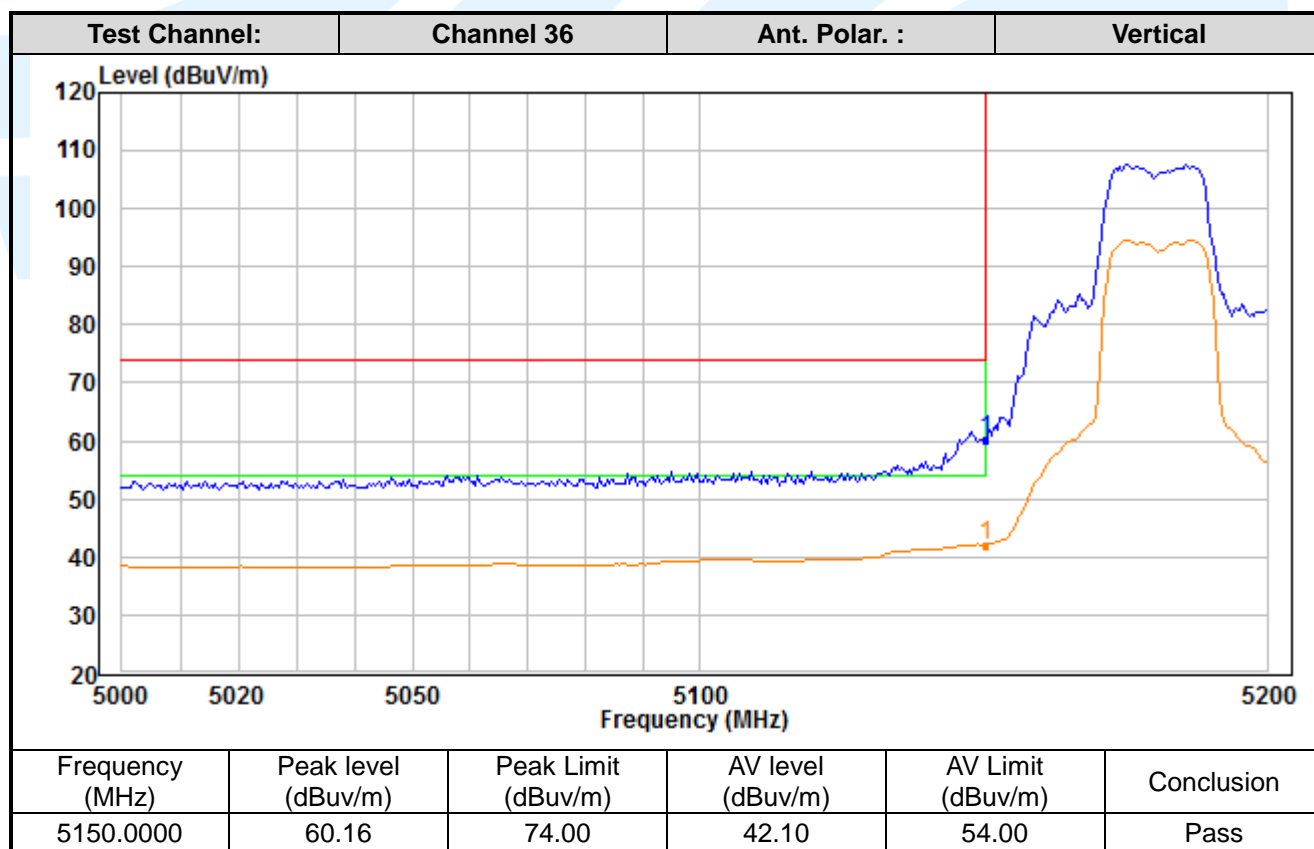
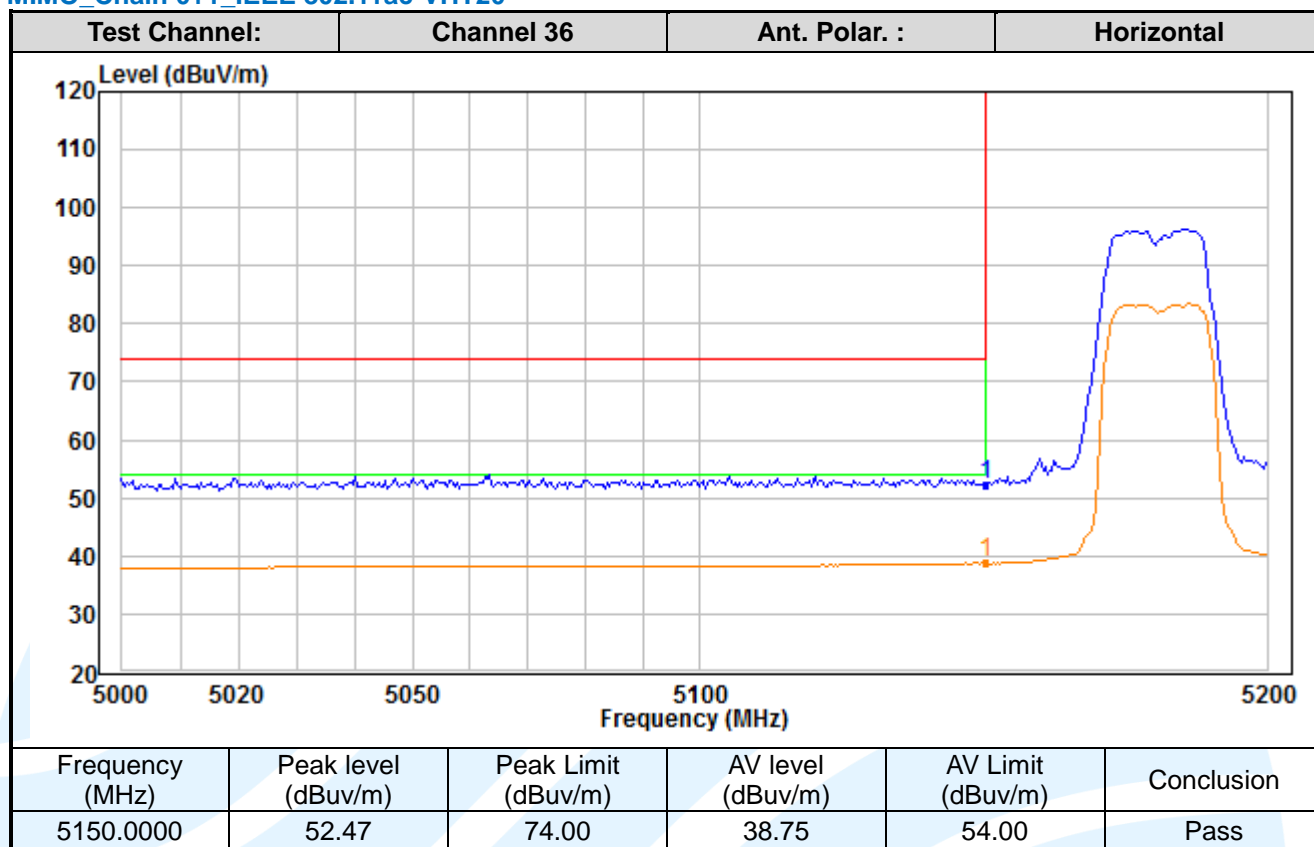
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### MIMO\_Chain 0+1\_ IEEE 802.11ac-VHT20



### Shenzhen UnionTrust Quality and Technology Co., Ltd.

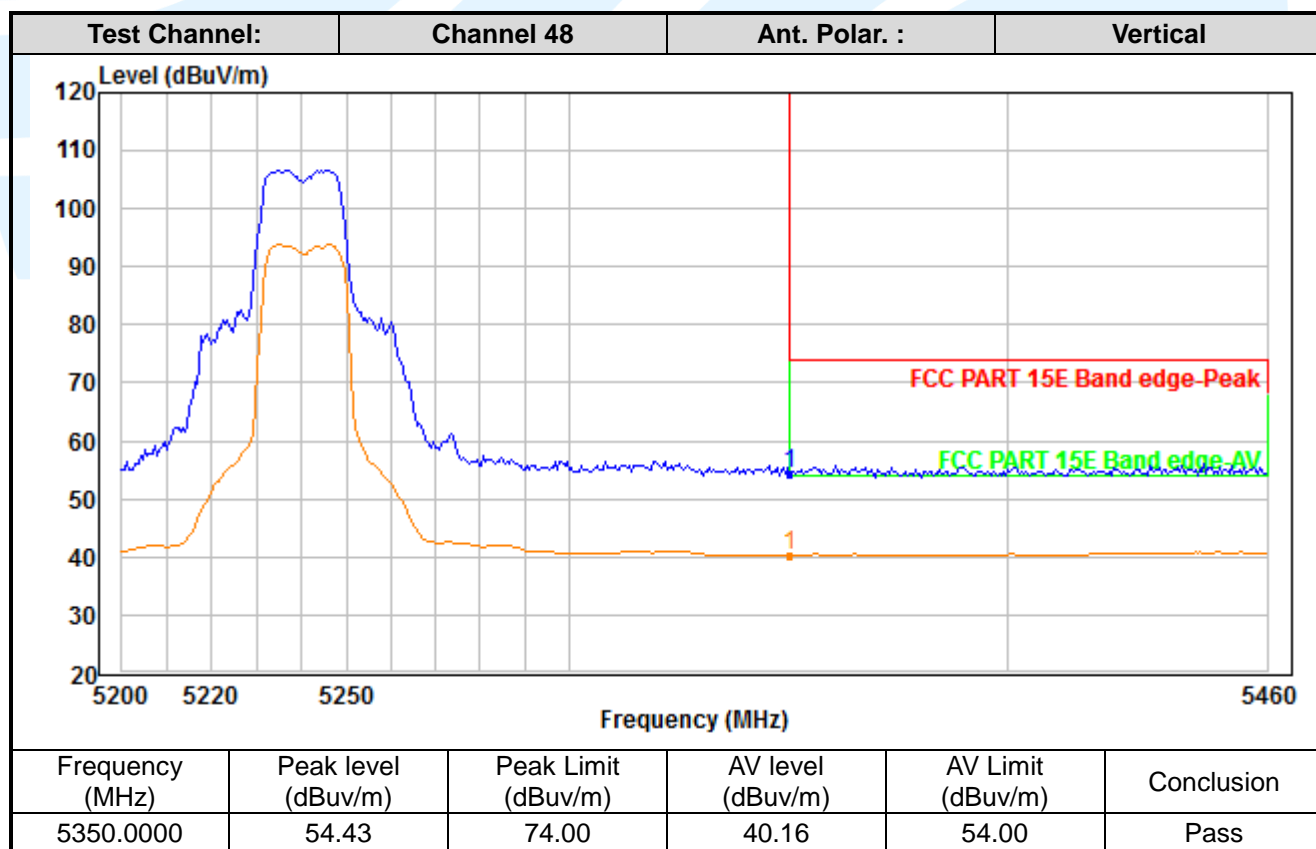
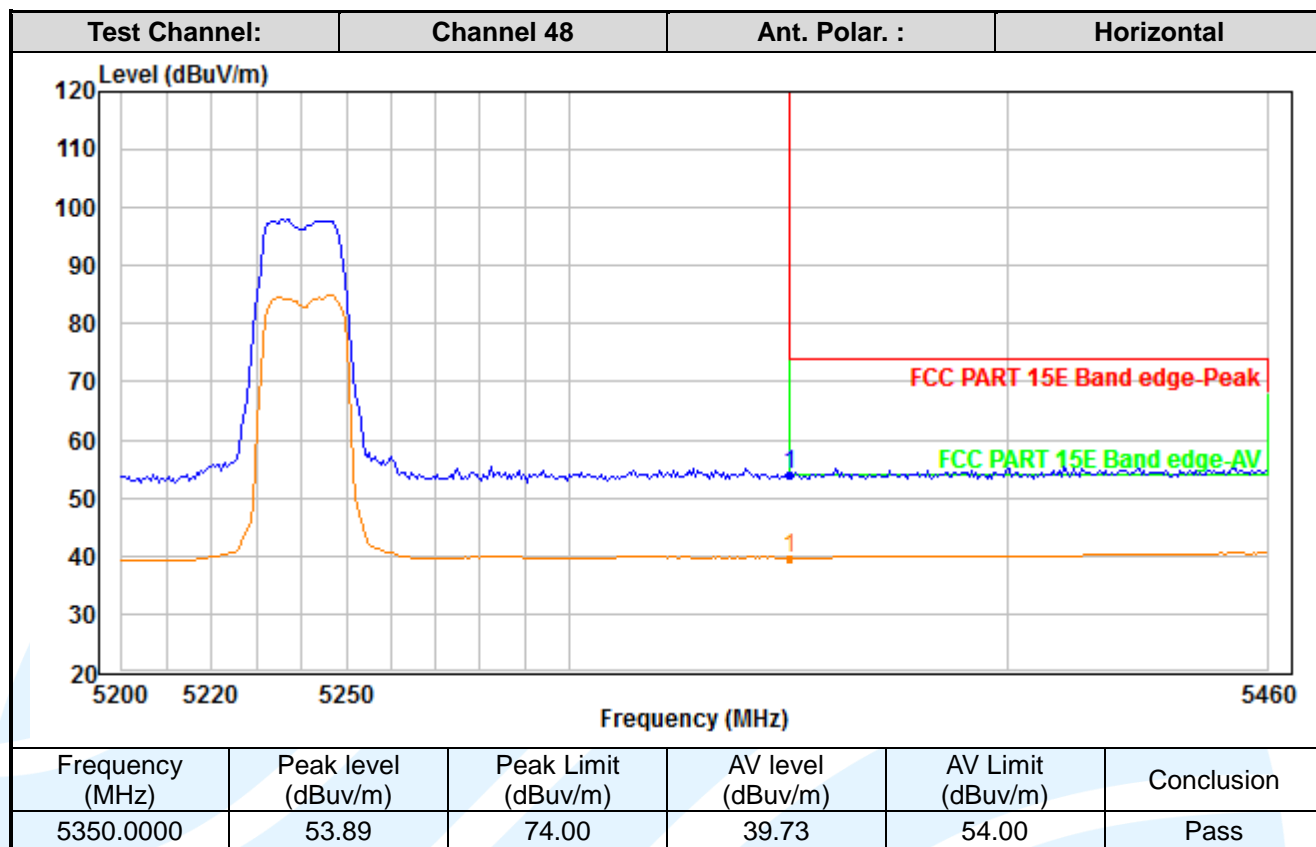
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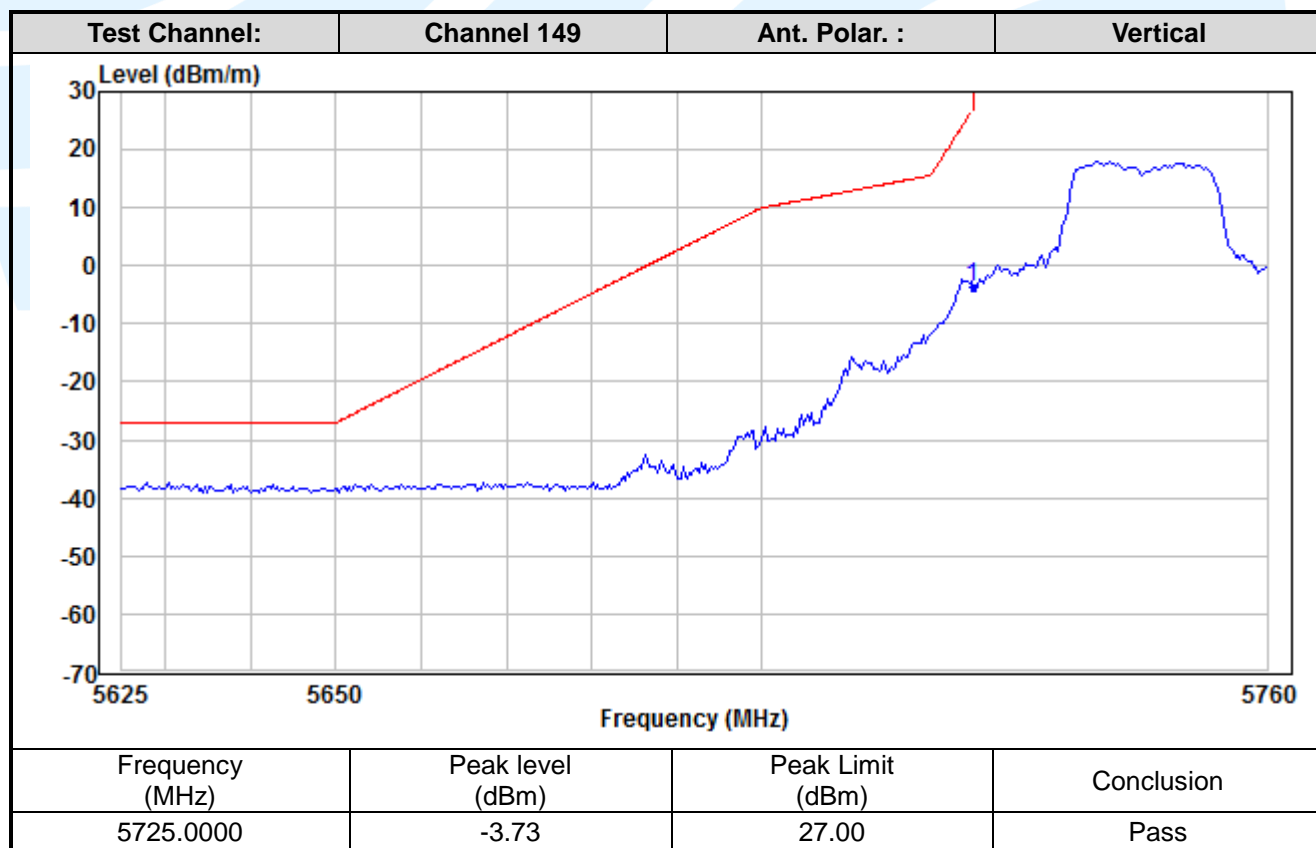
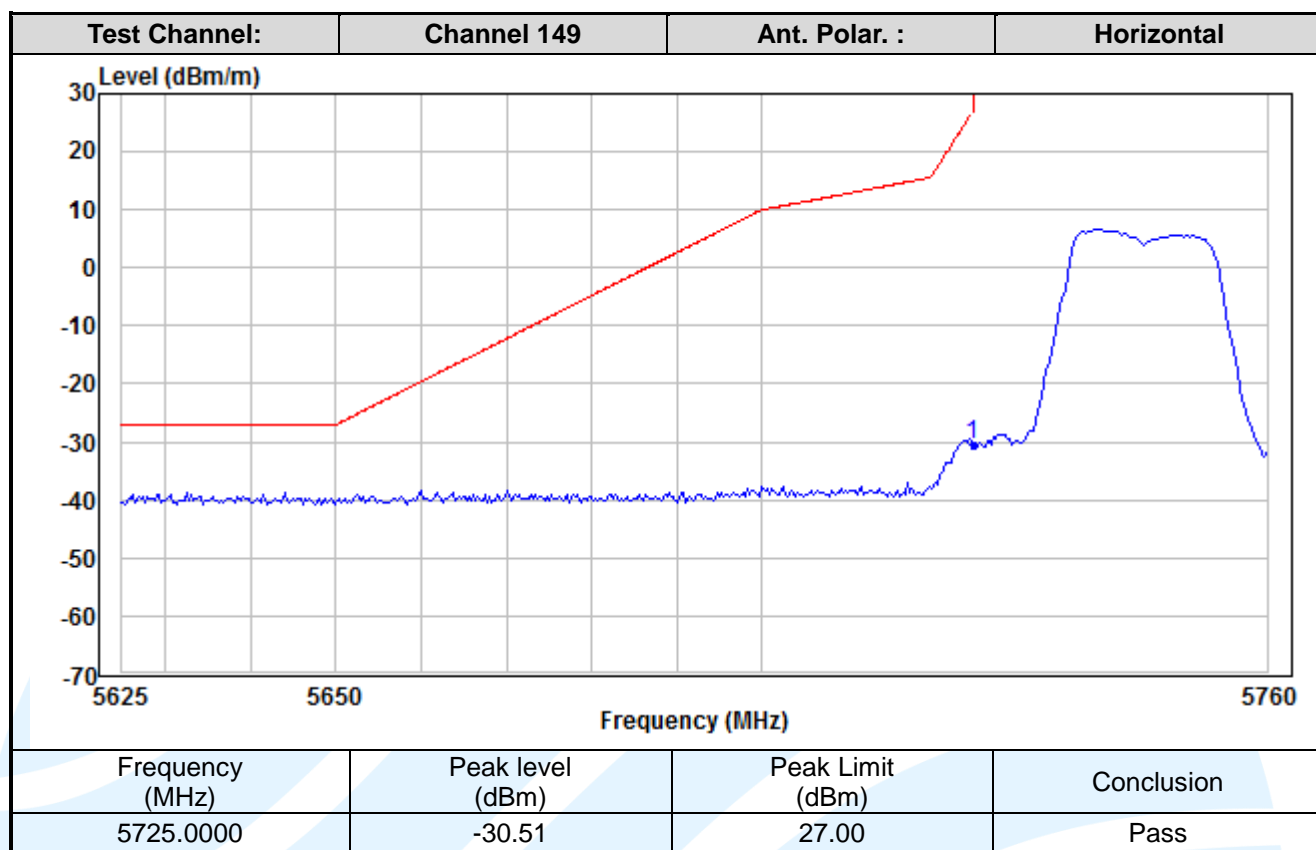
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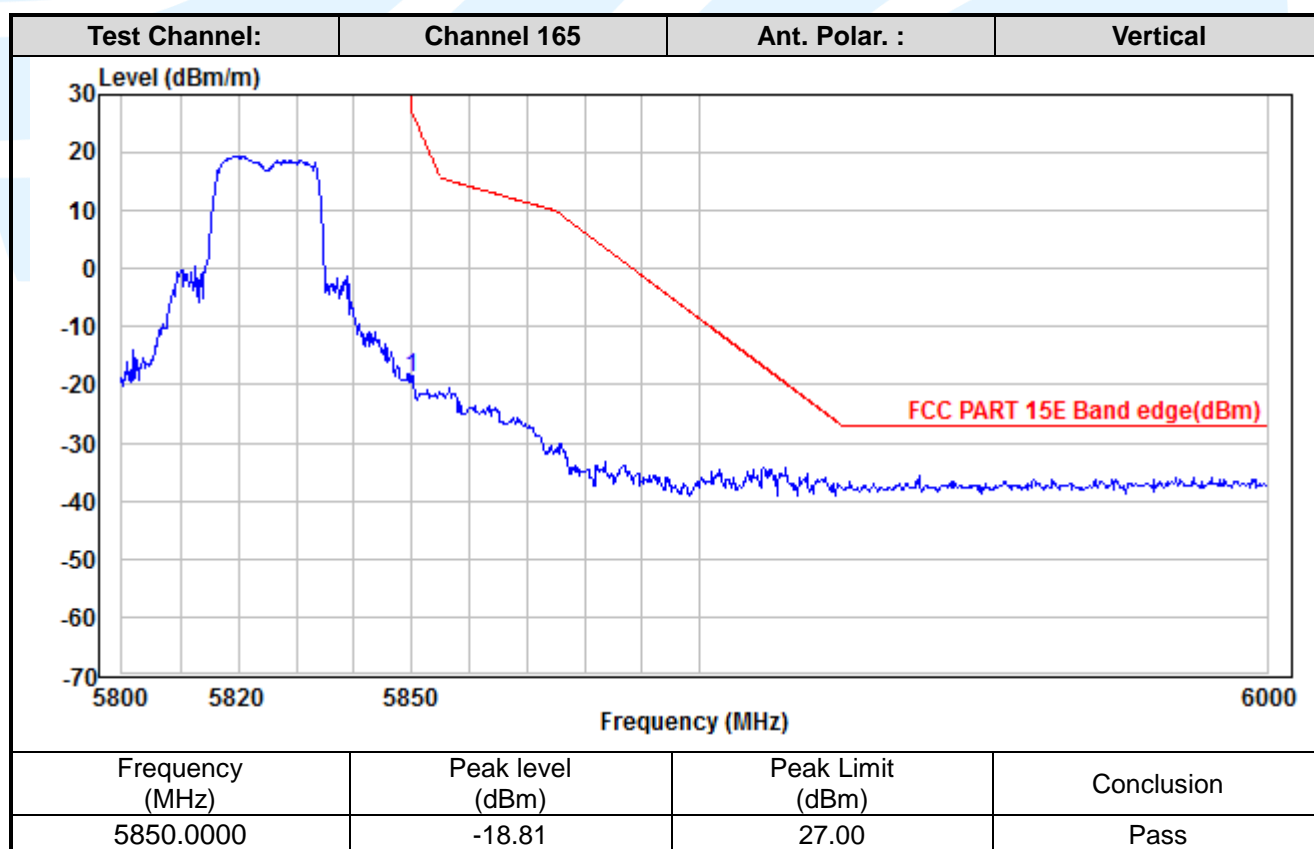
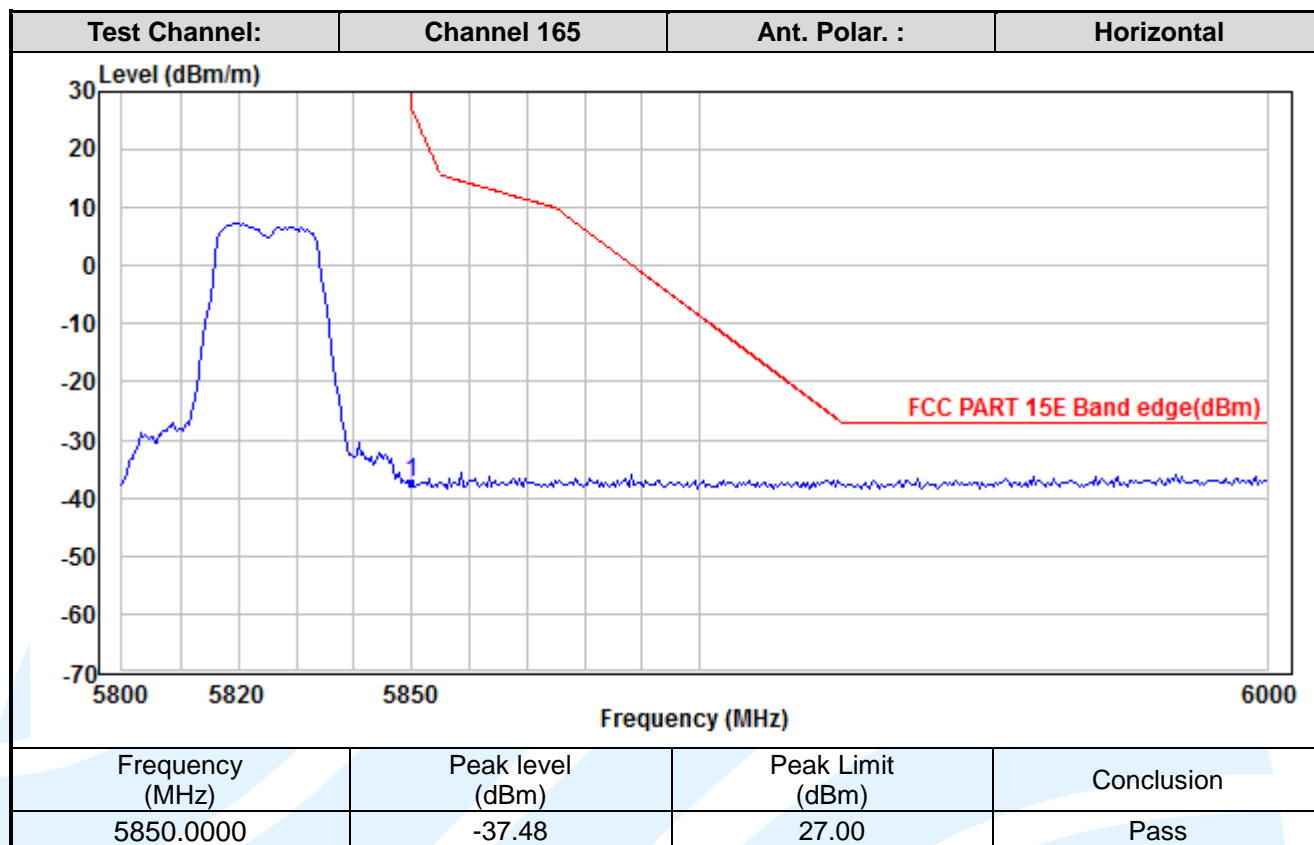
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## 5.19 AC POWER LINE CONDUCTED EMISSION

**Test Requirement:** FCC 47 CFR Part 15 Subpart C Section 15.207

**Test Method:** ANSI C63.10-2013 Section 6.2

**Limits:**

Frequency range (MHz)	Limits (dB(μV))	
	Quasi-peak	Average
0,15 to 0,50	66 to 56	56 to 46
0,50 to 5	56	46
5 to 30	60	50

**Remark:**

1. The lower limit shall apply at the transition frequencies.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 to 0.50 MHz.

**Test Setup:** Refer to section 4.4.2 for details.

**Test Procedures:**

Test frequency range :150KHz-30MHz

- 1) The mains terminal disturbance voltage test was conducted in a shielded room.
- 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
- 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,
- 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.
- 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

**Equipment Used:** Refer to section 3 for details.

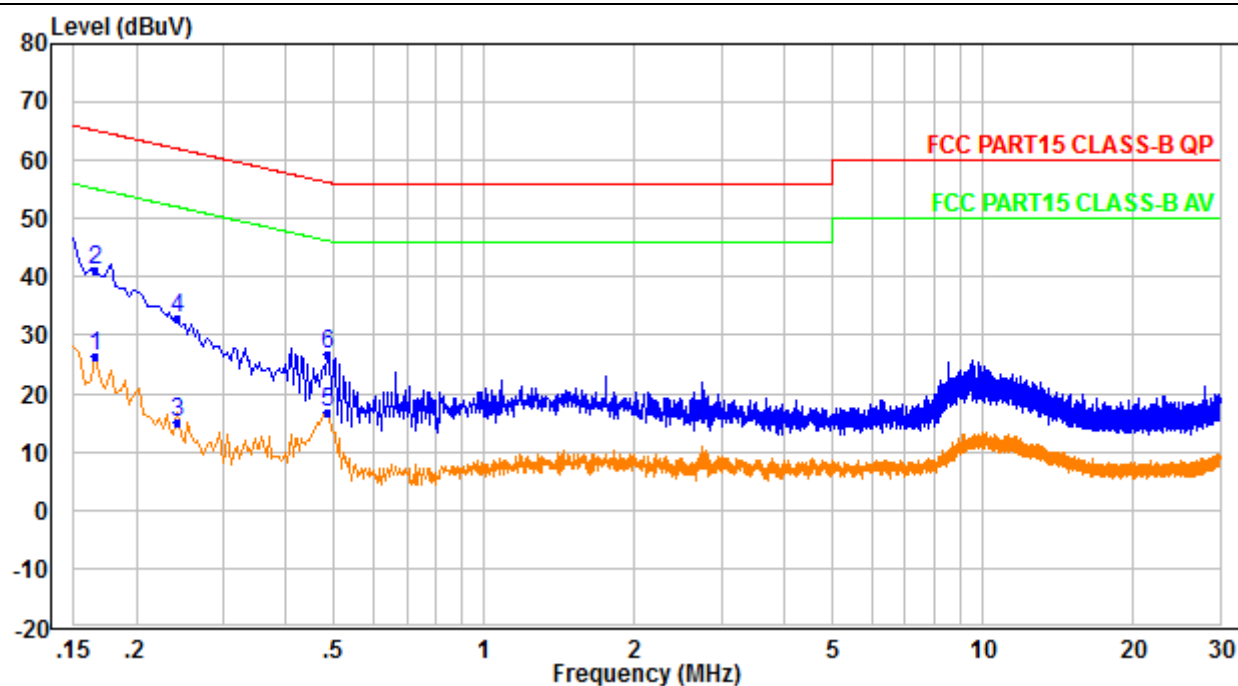
**Test Result:** Pass

The measurement data as follows:

Quasi Peak and Average:

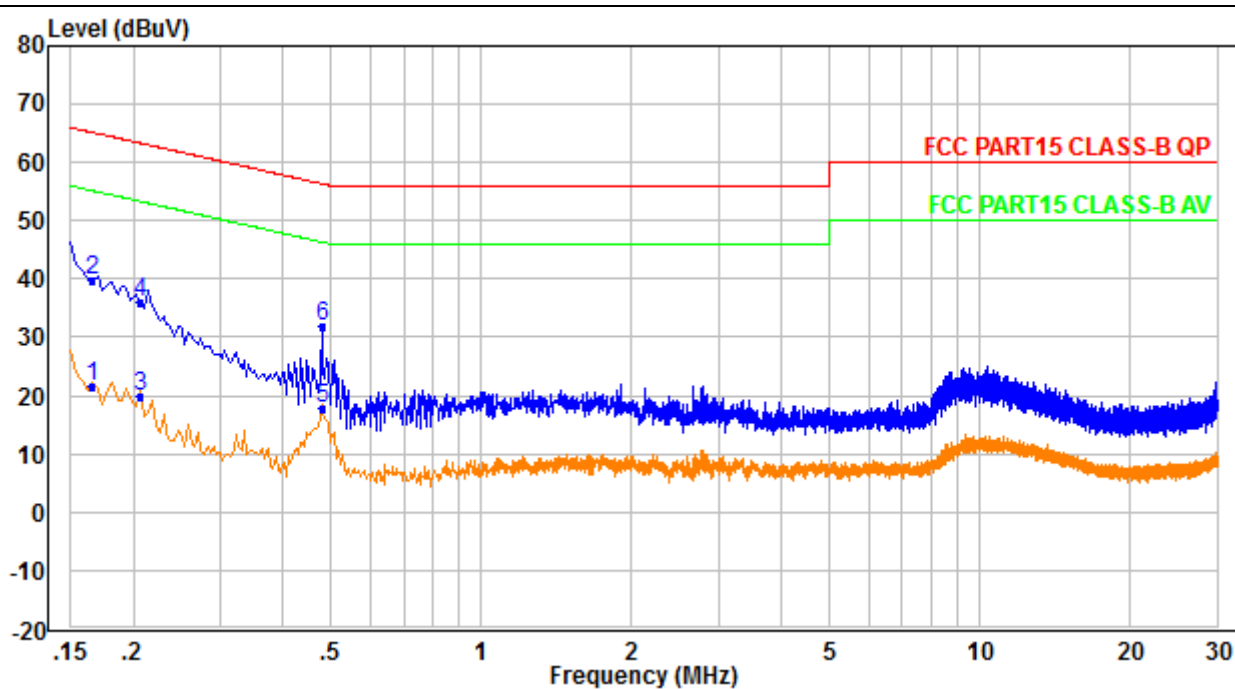
Mode: WIFI Link

Live Line



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.166	17.00	9.26	26.26	55.16	-28.90	Average
2	0.166	32.08	9.26	41.34	65.16	-23.82	QP
3*	0.242	5.90	9.18	15.08	52.03	-36.95	Average
4	0.242	23.83	9.18	33.01	62.03	-29.02	QP
5	0.486	7.61	9.24	16.85	46.24	-29.39	Average
6	0.486	17.66	9.24	26.90	56.24	-29.34	QP

### Neutral Line



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.166	12.31	9.39	21.70	55.16	-33.46	Average
2	0.166	30.35	9.39	39.74	65.16	-25.42	QP
3*	0.206	10.51	9.35	19.86	53.37	-33.51	Average
4	0.206	26.60	9.35	35.95	63.37	-27.42	QP
5	0.478	8.59	9.29	17.88	46.37	-28.49	Average
6	0.478	22.53	9.29	31.82	56.37	-24.55	QP

### Remark:

1. An initial pre-scan was performed on the Phase and neutral lines with peak detector. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

## APPENDIX 1 PHOTOS OF TEST SETUP

See test photos attached in Appendix 1 for the actual connections between Product and support equipment.

## APPENDIX 2 PHOTOS OF EUT CONSTRUCTIONAL DETAILS

Refer to Appendix 2 for EUT external and internal photos.

\*\*\* End of Report \*\*\*

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