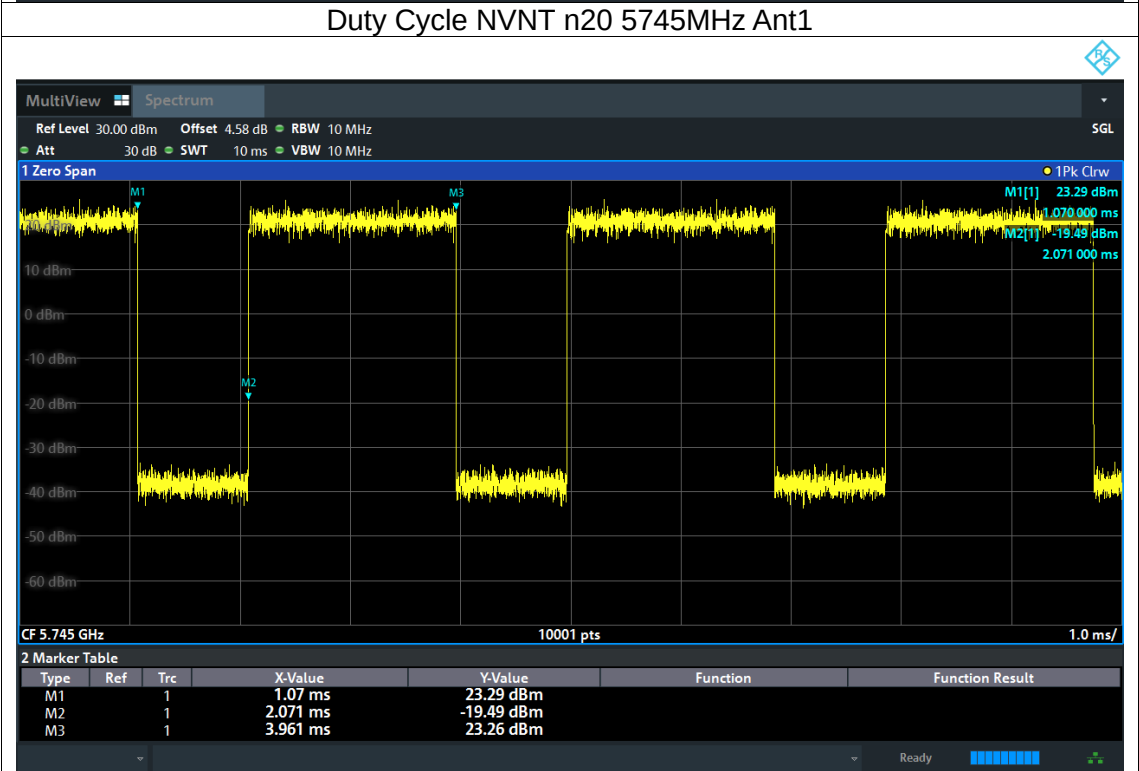
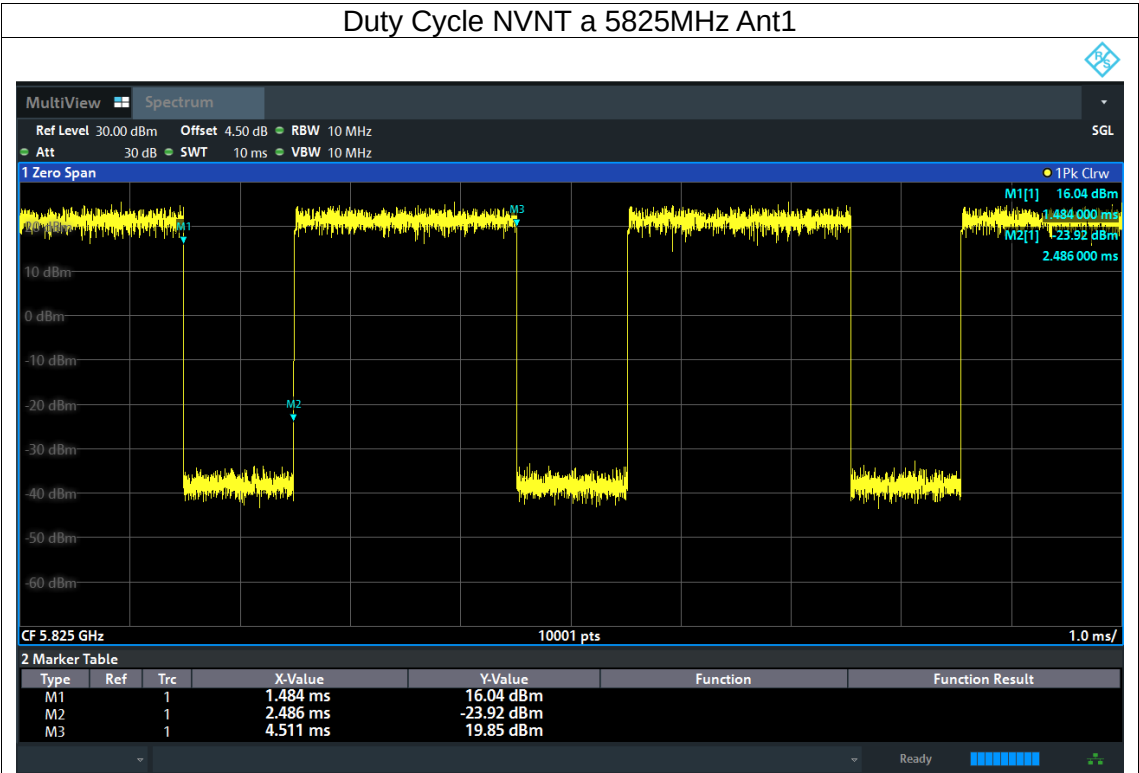
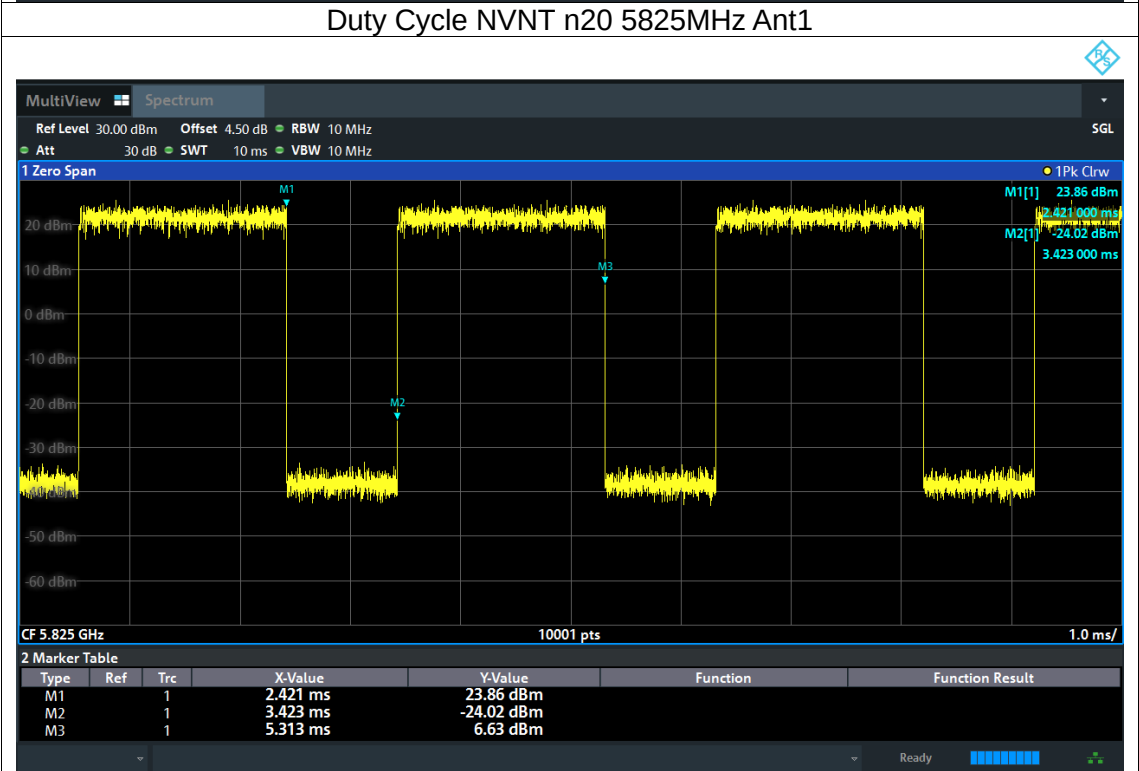
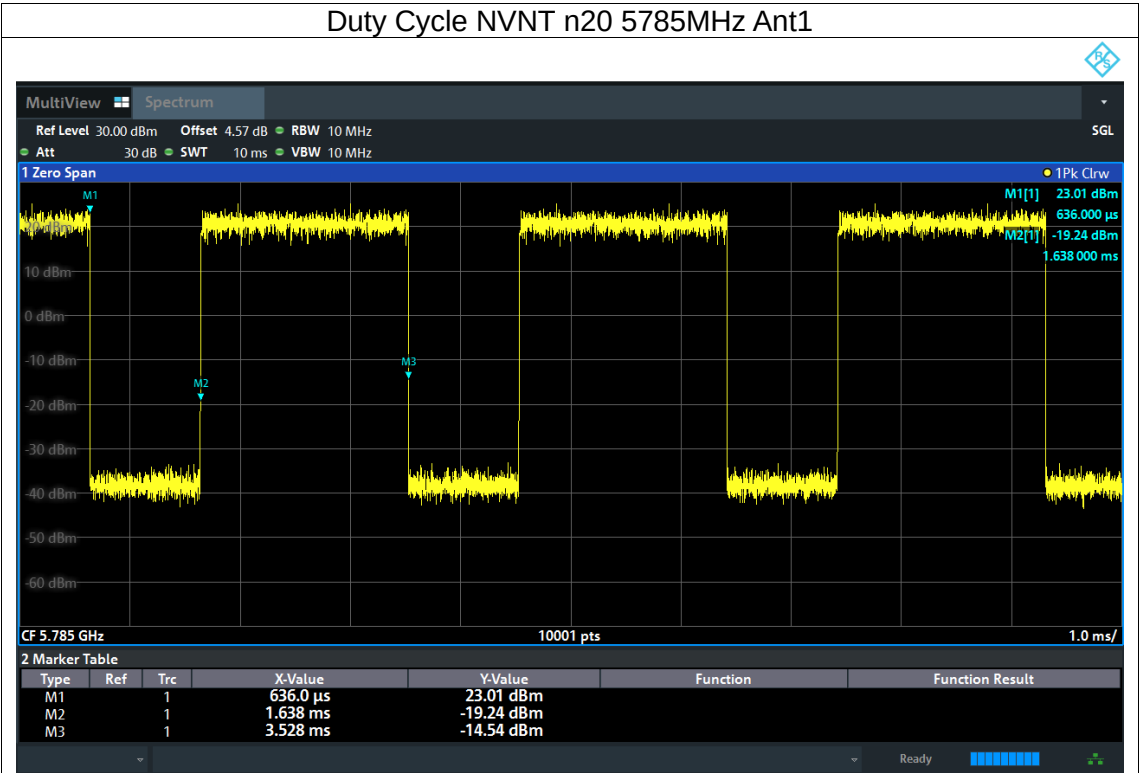
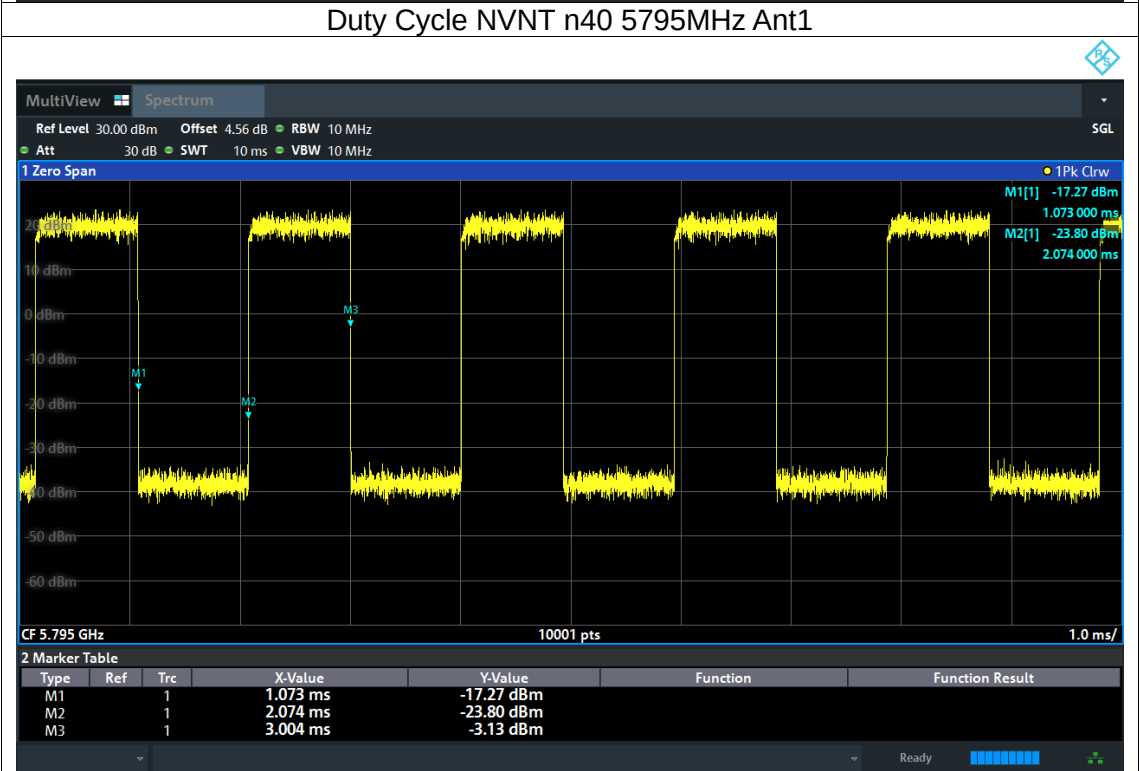
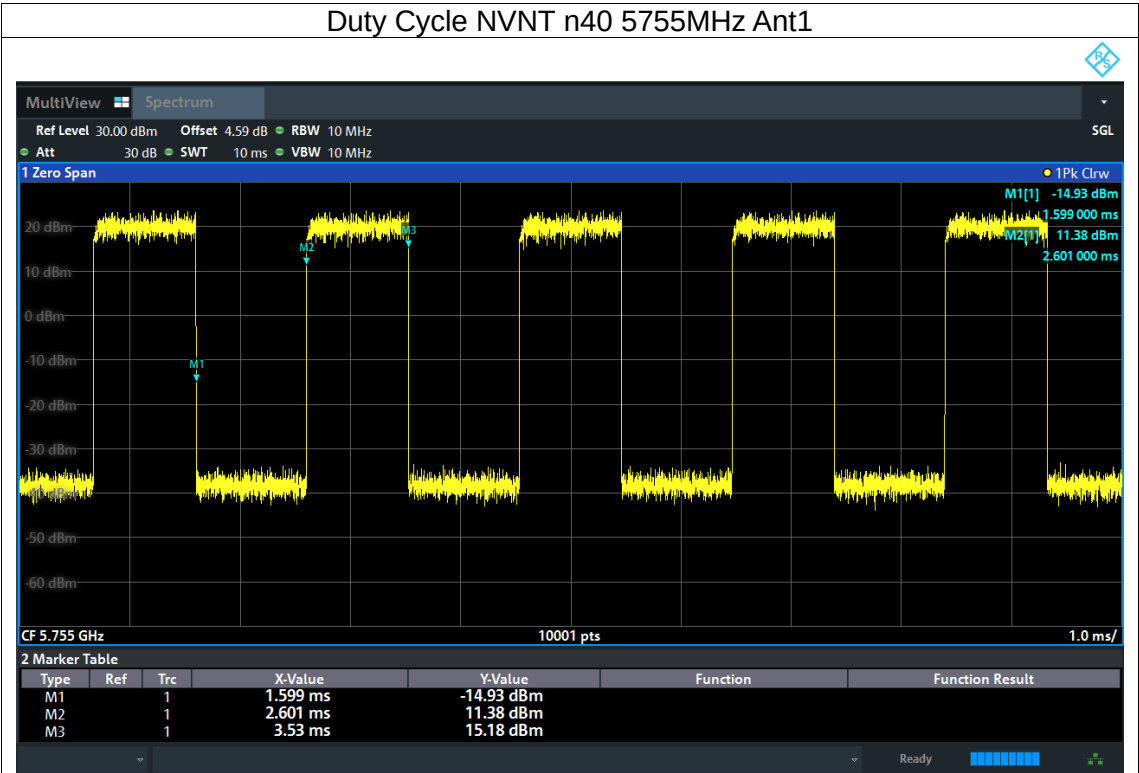








5.9 Out Of Band Emission

5.9.1 Limit

According to FCC §15.407(b).

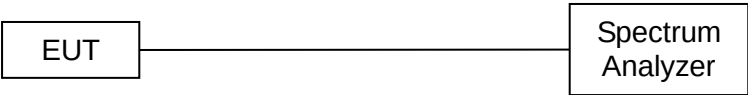
Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

- (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 e.i.r.p. 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 e.i.r.p. 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 e.i.r.p. of –27 dBm/MHz.
- (4) For transmitters operating solely in the 5.725–5.850 GHz band:
 - (i) 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.

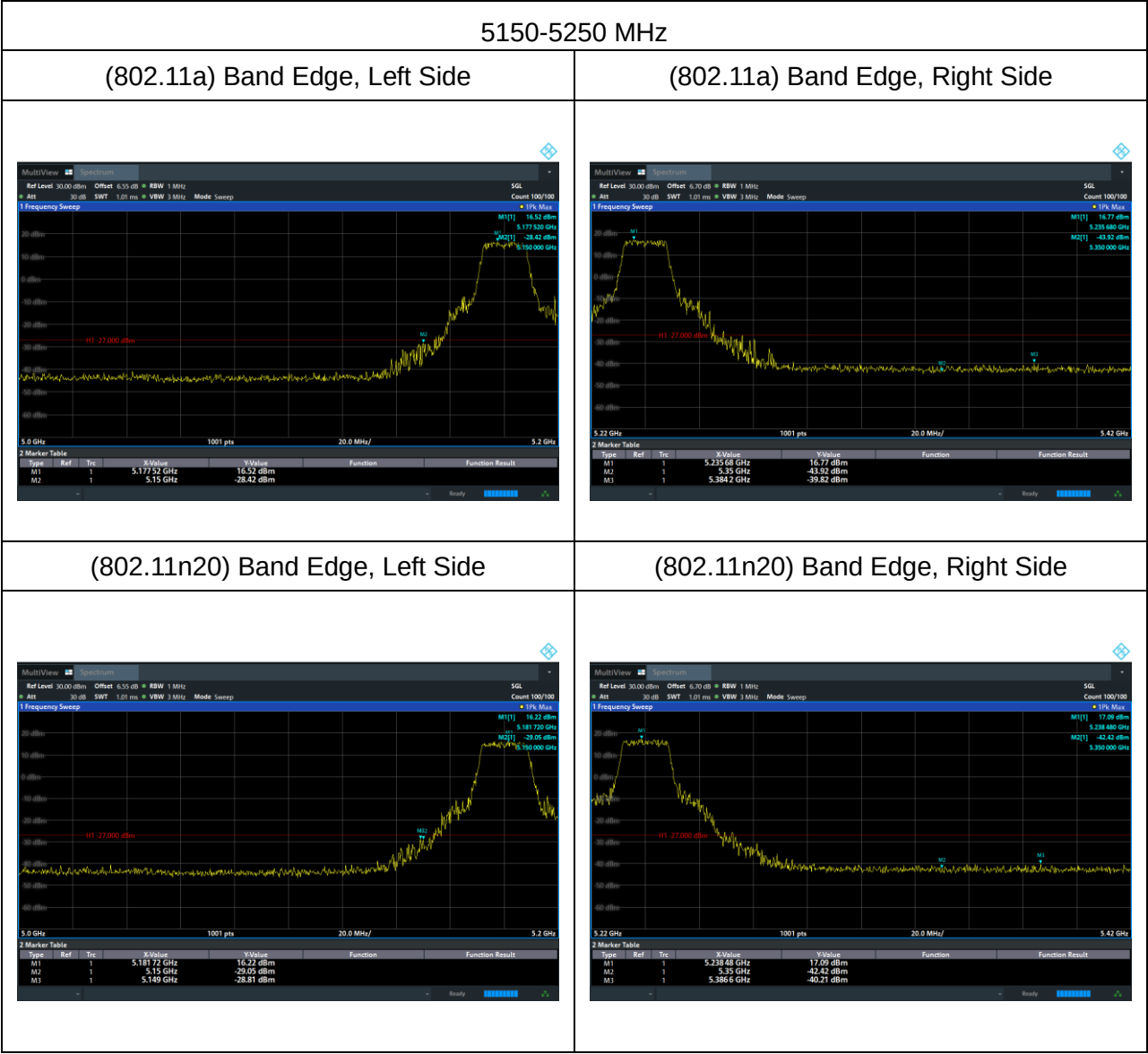
5.9.2 Test Procedure

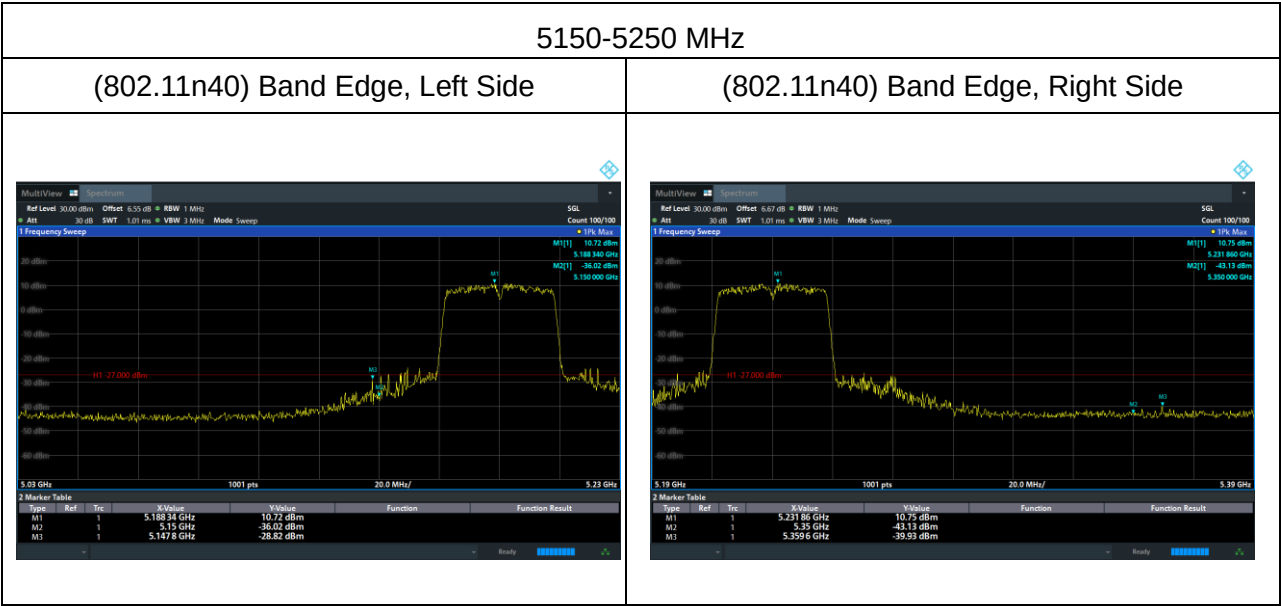
- a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- b. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
- c. Set RBW of spectrum analyzer to 1 MHz with a convenient frequency span.
- d. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
- e. Repeat above procedures until all measured frequencies were complete.

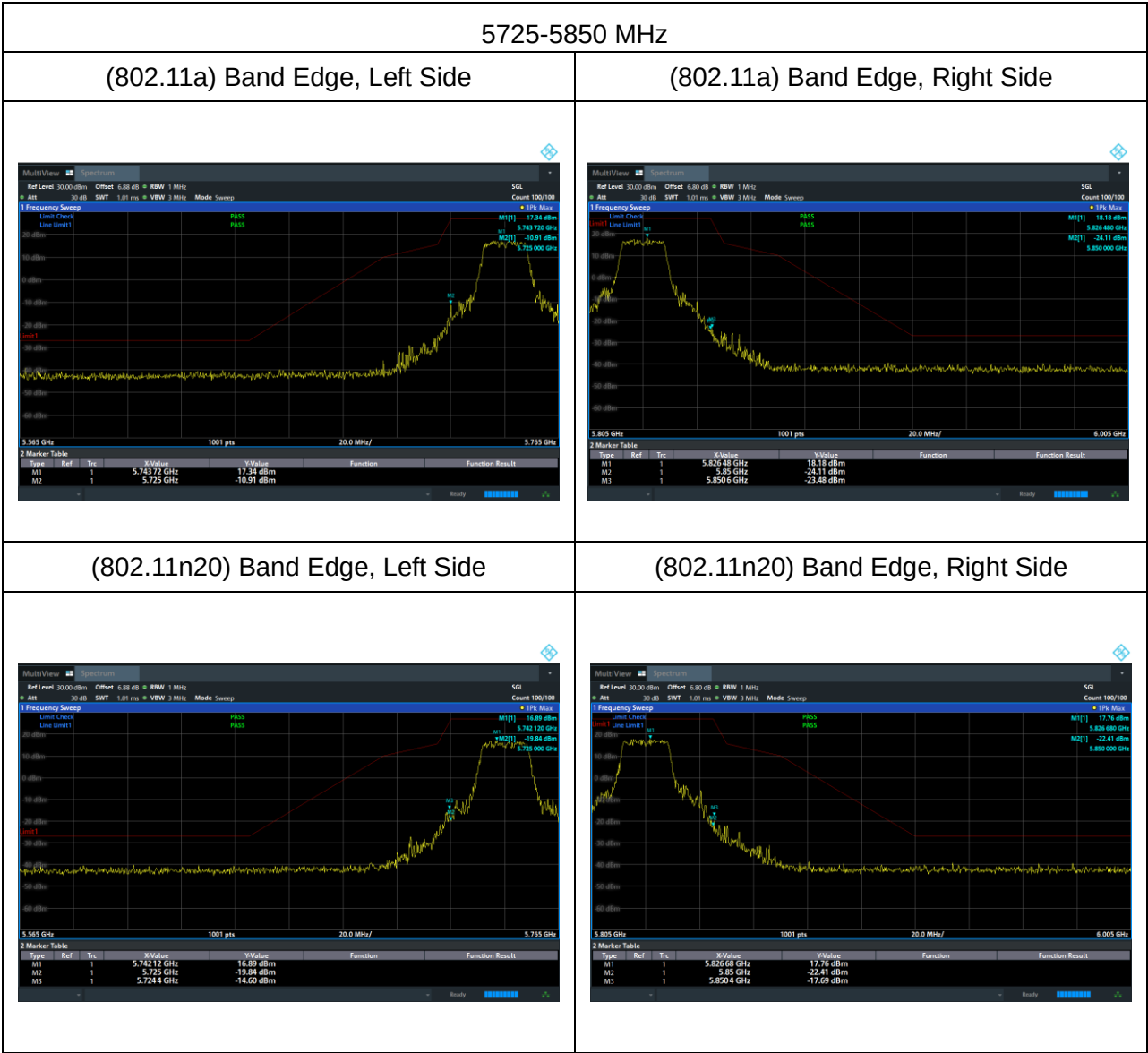
5.9.3 Test Setup

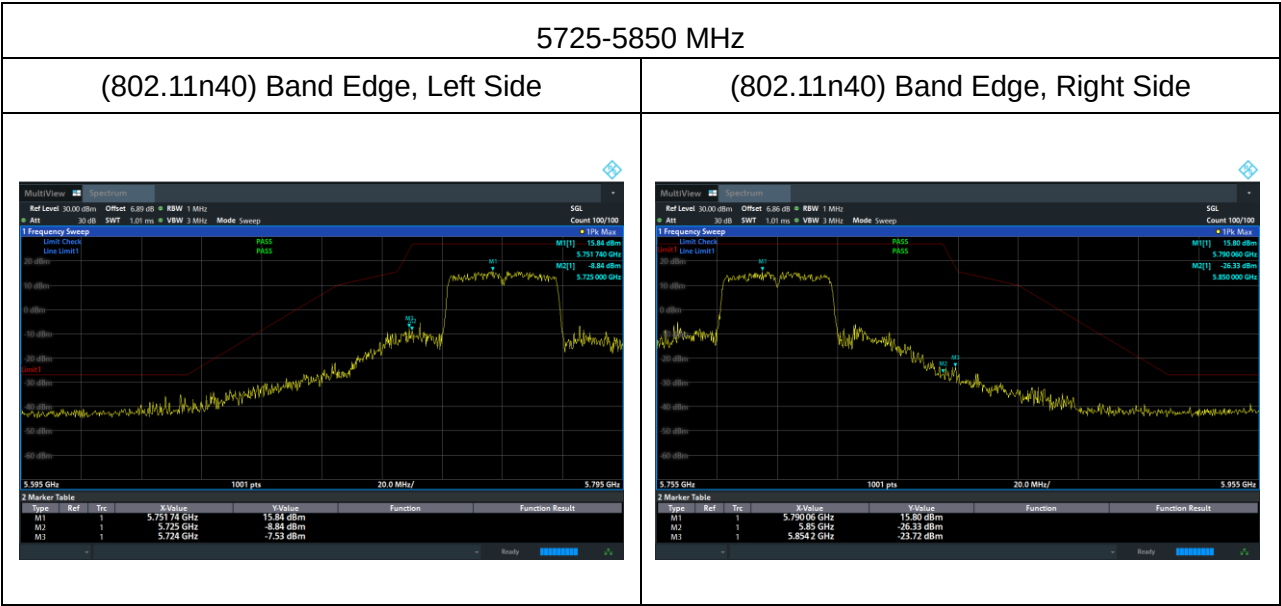


5.9.4 Test Results









5.10 Spurious RF Conducted Emissions

5.10.1 Limit

According to FCC §15.407(b).

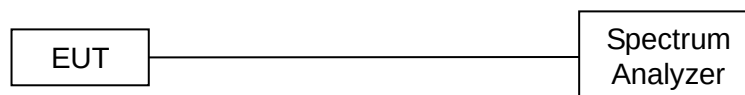
Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

- (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 e.i.r.p. 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 e.i.r.p. 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 e.i.r.p. of -27 dBm/MHz.
- (4) For transmitters operating solely in the 5.725–5.850 GHz band:
 - (i) 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.

5.10.2 Test Procedure

The Spurious RF conducted emissions compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10-2020+Cor. 1-2023 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW=100kHz and VBW= 300kHz to measure the avg field strength, and measure frequency range from 9kHz to 26.5GHz.

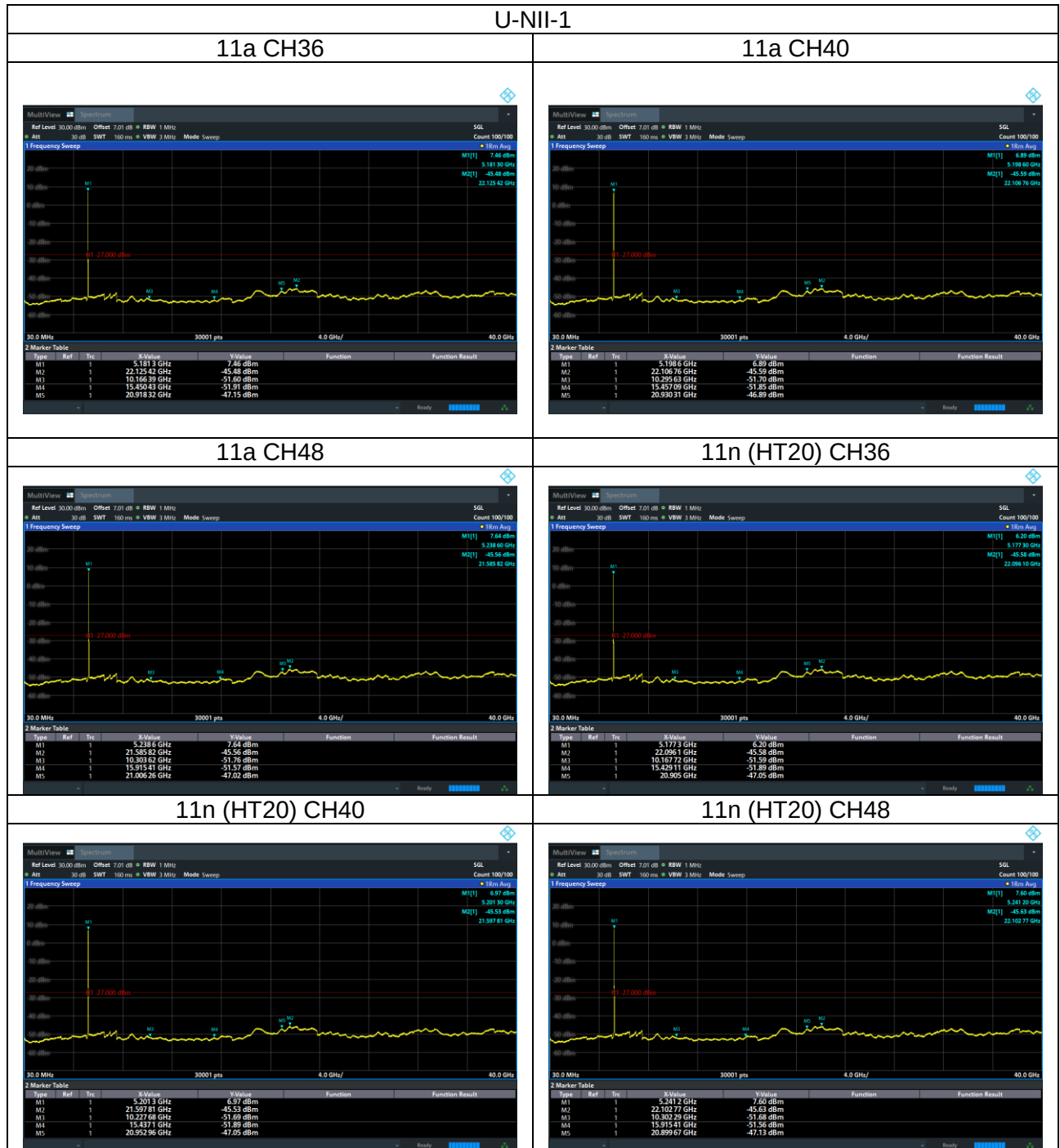
5.10.3 Test Setup

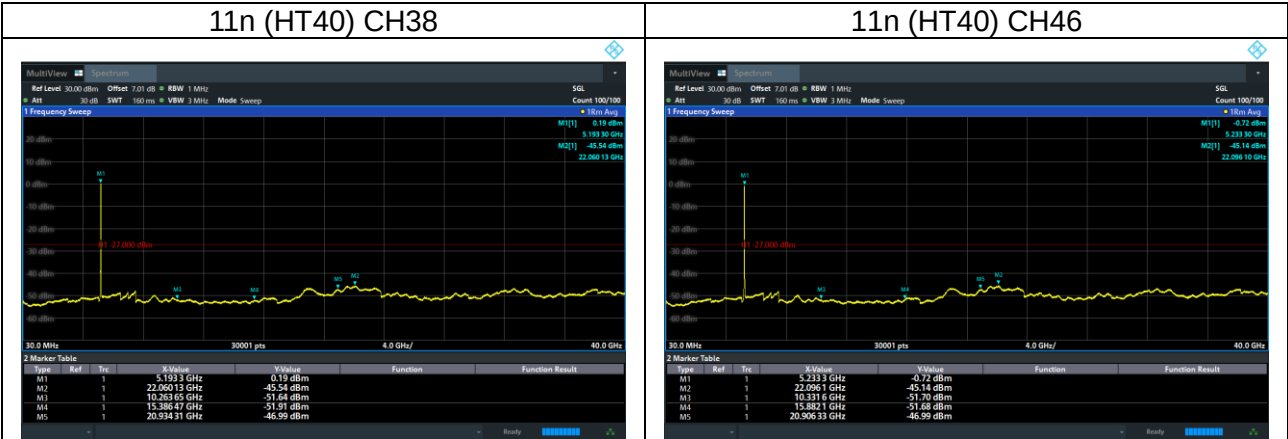


5.10.4 Test Results

Note: The measurement frequency range is from 9kHz to the 10th harmonic of the fundamental frequency; The lowest, middle and highest channels are tested to verify the spurious emissions and

band edge measurement data.



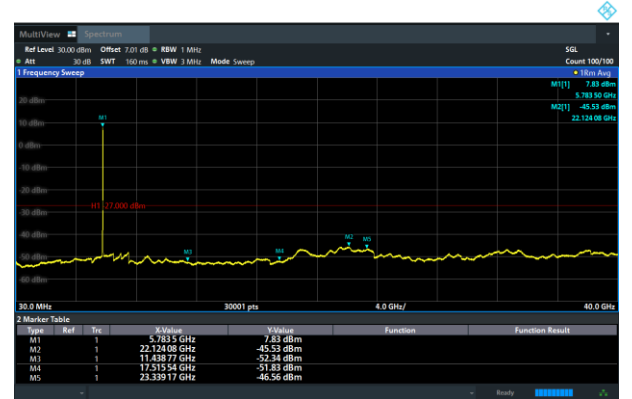


U-NII-3

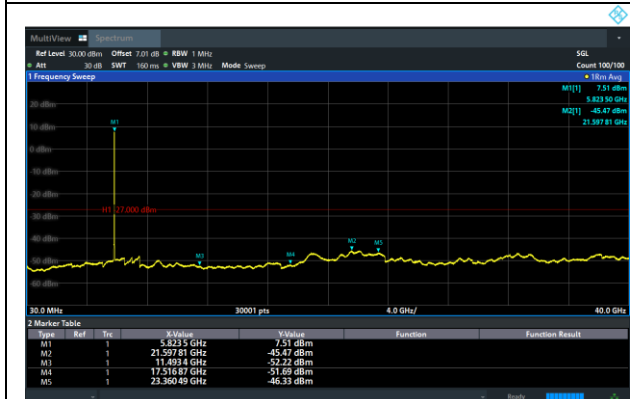
11a CH149



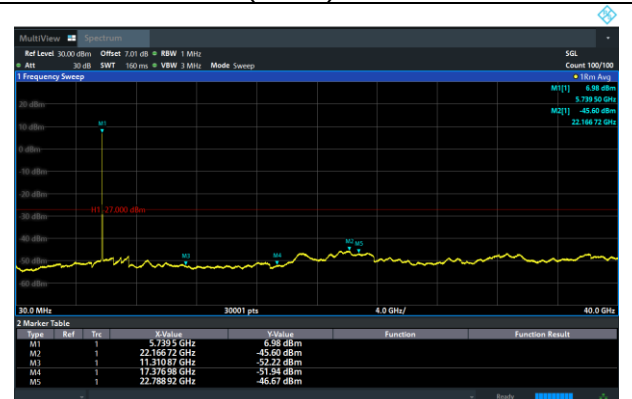
11a CH157



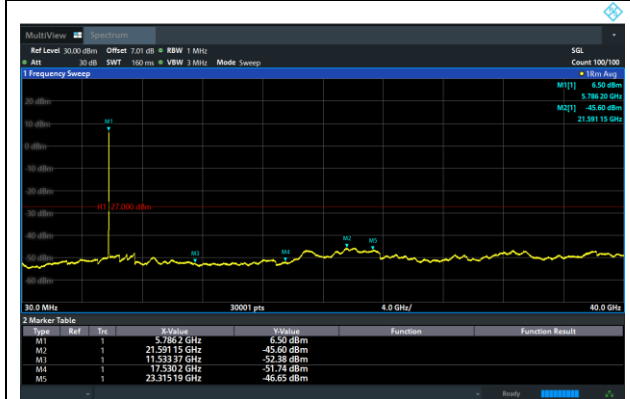
11a CH165



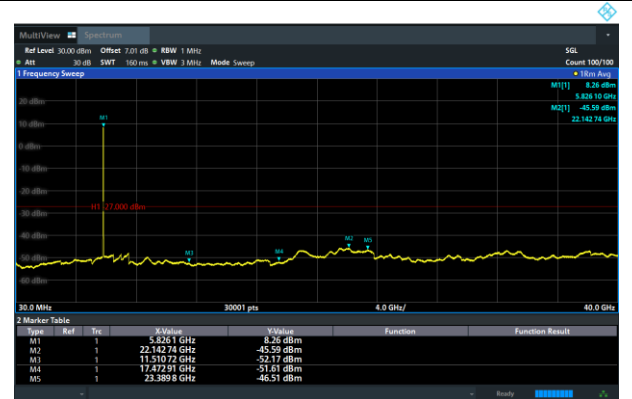
11n(HT20) CH149

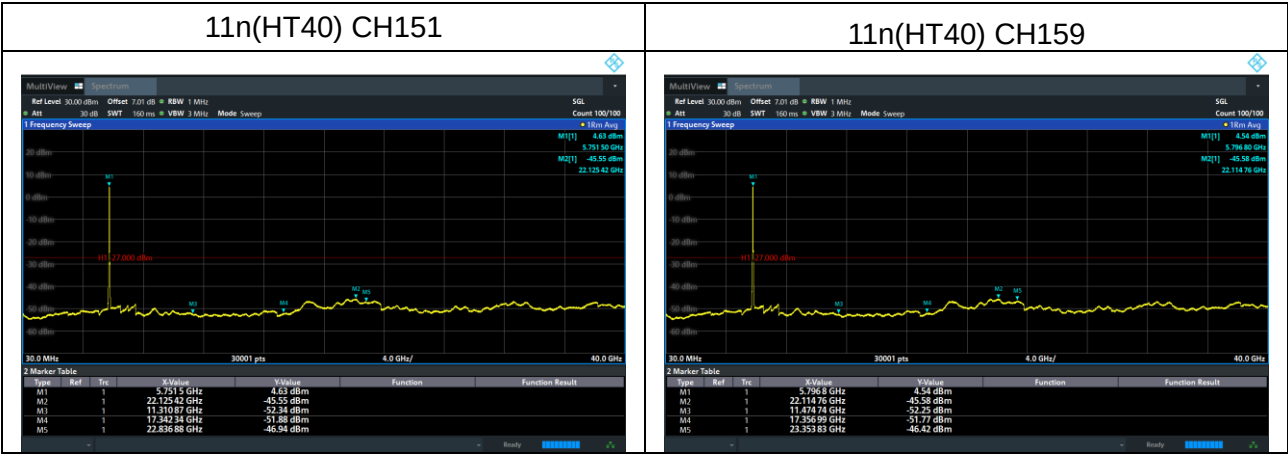


11n(HT20) CH157



11n(HT20) CH165





5.11 Frequency Stability

5.11.1 Limit

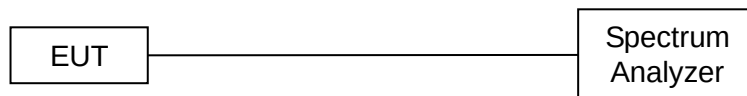
Manufactures of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

The transmitter center frequency tolerance shall be ± 20 ppm maximum for the 5 GHz band (IEEE 802.11n specification).

5.11.2 Test Procedure

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. EUT have transmitted absence of modulation signal and fixed channelize.
3. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth.
4. Set RBW = 10 kHz, VBW = 10 kHz with peak detector and maxhold settings.
5. f_c is declaring of channel frequency. Then the frequency error formula is $(f_c - f)/f_c \times 10^6$ ppm and the limit is less than ± 20 ppm (IEEE 802.11n specification).
6. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value
7. Extreme temperature is $-20^{\circ}\text{C} \sim 70^{\circ}\text{C}$.

5.11.3 Test Setup



5.11.4 Test Results

EUT:	Ruune Magnetic AI Recorder Device	Model Name:	IOHRNC1
Test Mode:	TX Mode(5150-5250MHz)	Test Voltage:	DC 3.87V from battery

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5180MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	3.87	5180.028	5180	0.028	5.36
		V max (V)	4.26	5180.015	5180	0.015	2.92
		V min (V)	3.48	5180.025	5180	0.025	4.91
Limits				± 20 ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5180MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	5	T (°C)	-20	5180.008	5180	0.008	1.57
		T (°C)	-10	5180.047	5180	0.047	9.09
		T (°C)	0	5180.040	5180	0.040	7.68
		T (°C)	10	5180.010	5180	0.010	1.92
		T (°C)	20	5180.021	5180	0.021	4.01
		T (°C)	30	5180.034	5180	0.034	6.64
		T (°C)	40	5180.024	5180	0.024	4.70
		T (°C)	50	5180.015	5180	0.015	2.85
		T (°C)	60	5180.013	5180	0.013	2.54
		T (°C)	70	5180.050	5180	0.050	9.61
Limits				± 20 ppm			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5200MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	3.87	5200.024	5200	0.024	4.66
		V max (V)	4.26	5200.010	5200	0.010	1.92
		V min (V)	3.48	5200.005	5200	0.005	0.95
Limits				± 20 ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5200MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	5	T (°C)	-20	5200.021	5200	0.021	4.04
		T (°C)	-10	5200.029	5200	0.029	5.56
		T (°C)	0	5200.025	5200	0.025	4.71
		T (°C)	10	5200.041	5200	0.041	7.80
		T (°C)	20	5200.009	5200	0.009	1.67
		T (°C)	30	5200.047	5200	0.047	9.12
		T (°C)	40	5200.003	5200	0.003	0.57
		T (°C)	50	5200.007	5200	0.007	1.34
		T (°C)	60	5200.022	5200	0.022	4.24
		T (°C)	70	5200.019	5200	0.019	3.69
Limits				± 20 ppm			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5240MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	3.87	5240.030	5240	0.030	5.72
		V max (V)	4.26	5240.022	5240	0.022	4.11
		V min (V)	3.48	5240.011	5240	0.011	2.01
Limits				± 20 ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5240MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	5	T (°C)	-20	5240.047	5240	0.047	9.02
		T (°C)	-10	5240.018	5240	0.018	3.40
		T (°C)	0	5240.013	5240	0.013	2.49
		T (°C)	10	5240.049	5240	0.049	9.39
		T (°C)	20	5240.008	5240	0.008	1.45
		T (°C)	30	5240.036	5240	0.036	6.79
		T (°C)	40	5240.001	5240	0.001	0.27
		T (°C)	50	5240.031	5240	0.031	5.96
		T (°C)	60	5240.023	5240	0.023	4.42
		T (°C)	70	5240.028	5240	0.028	5.36
Limits				± 20 ppm			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5190MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	3.87	5190.048	5190	0.048	9.28
		V max (V)	4.26	5190.011	5190	0.011	2.19
		V min (V)	3.48	5190.024	5190	0.024	4.54
Limits				± 20 ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5190MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	5	T (°C)	-20	5190.050	5190	0.050	9.58
		T (°C)	-10	5190.049	5190	0.049	9.46
		T (°C)	0	5190.041	5190	0.041	7.97
		T (°C)	10	5190.005	5190	0.005	1.02
		T (°C)	20	5190.047	5190	0.047	9.01
		T (°C)	30	5190.011	5190	0.011	2.04
		T (°C)	40	5190.024	5190	0.024	4.65
		T (°C)	50	5190.031	5190	0.031	6.04
		T (°C)	60	5190.011	5190	0.011	2.18
		T (°C)	70	5190.009	5190	0.009	1.82
Limits				± 20 ppm			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5230MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	3.87	5230.043	5230	0.043	8.26
		V max (V)	4.26	5230.019	5230	0.019	3.65
		V min (V)	3.48	5230.002	5230	0.002	0.36
Limits				± 20 ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5230MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	5	T (°C)	-20	5230.004	5230	0.004	0.82
		T (°C)	-10	5230.004	5230	0.004	0.78
		T (°C)	0	5230.040	5230	0.040	7.62
		T (°C)	10	5230.000	5230	0.000	0.07
		T (°C)	20	5230.020	5230	0.020	3.82
		T (°C)	30	5230.026	5230	0.026	4.90
		T (°C)	40	5230.031	5230	0.031	5.98
		T (°C)	50	5230.009	5230	0.009	1.69
		T (°C)	60	5230.032	5230	0.032	6.16
		T (°C)	70	5230.046	5230	0.046	8.80
Limits				± 20 ppm			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5745MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	3.87	5745.033	5745	0.033	5.74
		V max (V)	4.26	5745.018	5745	0.018	3.18
		V min (V)	3.48	5745.039	5745	0.039	6.76
Limits				± 20 ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5745MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	5	T (°C)	-20	5745.041	5745	0.041	7.19
		T (°C)	-10	5745.017	5745	0.017	2.92
		T (°C)	0	5745.021	5745	0.021	3.67
		T (°C)	10	5745.008	5745	0.008	1.44
		T (°C)	20	5745.037	5745	0.037	6.44
		T (°C)	30	5745.014	5745	0.014	2.50
		T (°C)	40	5745.011	5745	0.011	1.86
		T (°C)	50	5745.012	5745	0.012	2.11
		T (°C)	60	5745.038	5745	0.038	6.59
		T (°C)	70	5745.029	5745	0.029	4.97
Limits				± 20 ppm			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5785MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	3.87	5785.039	5785	0.039	6.79
		V max (V)	4.26	5785.019	5785	0.019	3.37
		V min (V)	3.48	5785.010	5785	0.010	1.67
Limits				± 20 ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5785MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	5	T (°C)	-20	5785.027	5785	0.027	4.67
		T (°C)	-10	5785.038	5785	0.038	6.63
		T (°C)	0	5785.019	5785	0.019	3.34
		T (°C)	10	5785.028	5785	0.028	4.86
		T (°C)	20	5785.028	5785	0.028	4.90
		T (°C)	30	5785.034	5785	0.034	5.91
		T (°C)	40	5785.014	5785	0.014	2.41
		T (°C)	50	5785.044	5785	0.044	7.68
		T (°C)	60	5785.010	5785	0.010	1.80
		T (°C)	70	5785.034	5785	0.034	5.94
Limits				± 20 ppm			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5825MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	3.87	5825.039	5825	0.039	6.71
		V max (V)	4.26	5825.015	5825	0.015	2.61
		V min (V)	3.48	5825.048	5825	0.048	8.26
Limits				± 20 ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5825MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	5	T (°C)	-20	5825.044	5825	0.044	7.64
		T (°C)	-10	5825.007	5825	0.007	1.20
		T (°C)	0	5825.017	5825	0.017	2.91
		T (°C)	10	5825.042	5825	0.042	7.28
		T (°C)	20	5825.049	5825	0.049	8.35
		T (°C)	30	5825.041	5825	0.041	6.96
		T (°C)	40	5825.034	5825	0.034	5.87
		T (°C)	50	5825.042	5825	0.042	7.22
		T (°C)	60	5825.027	5825	0.027	4.59
		T (°C)	70	5825.049	5825	0.049	8.42
Limits				± 20 ppm			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5755MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	3.87	5755.036	5755	0.036	6.20
		V max (V)	4.26	5755.005	5755	0.005	0.80
		V min (V)	3.48	5755.017	5755	0.017	2.89
Limits				± 20 ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5755MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	5	T (°C)	-20	5755.039	5755	0.039	6.73
		T (°C)	-10	5755.044	5755	0.044	7.59
		T (°C)	0	5755.003	5755	0.003	0.48
		T (°C)	10	5755.041	5755	0.041	7.16
		T (°C)	20	5755.003	5755	0.003	0.56
		T (°C)	30	5755.019	5755	0.019	3.33
		T (°C)	40	5755.005	5755	0.005	0.91
		T (°C)	50	5755.036	5755	0.036	6.32
		T (°C)	60	5755.025	5755	0.025	4.43
		T (°C)	70	5755.044	5755	0.044	7.70
Limits				± 20 ppm			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5795MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	3.87	5795.029	5795	0.029	4.96
		V max (V)	4.26	5795.015	5795	0.015	2.67
		V min (V)	3.48	5795.022	5795	0.022	3.73
Limits				± 20 ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5795MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	5	T (°C)	-20	5795.020	5795	0.020	3.53
		T (°C)	-10	5795.046	5795	0.046	7.92
		T (°C)	0	5795.043	5795	0.043	7.37
		T (°C)	10	5795.006	5795	0.006	1.04
		T (°C)	20	5795.025	5795	0.025	4.28
		T (°C)	30	5795.011	5795	0.011	1.95
		T (°C)	40	5795.044	5795	0.044	7.57
		T (°C)	50	5795.036	5795	0.036	6.15
		T (°C)	60	5795.032	5795	0.032	5.52
		T (°C)	70	5795.032	5795	0.032	5.54
Limits				± 20 ppm			
Result				Complies			

6 Photographs of the Test Setup

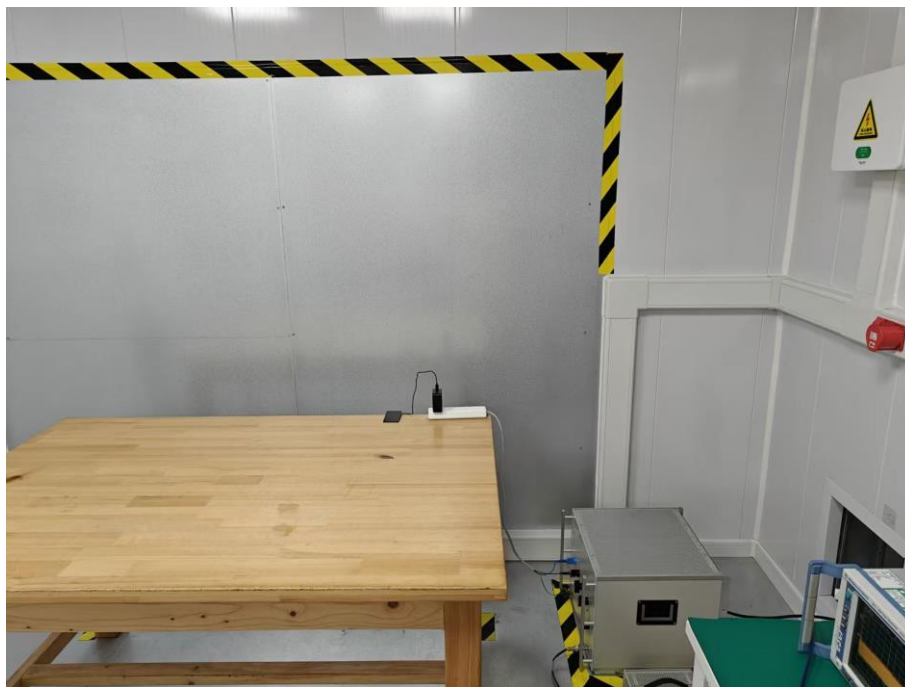
Radiated Emission Below 1GHz



Radiated Emission Above 1GHz



Conducted Emission



7 Photographs of the EUT

Please refer to report HB20260525013E-01 for product photos.

******* END OF REPORT *******