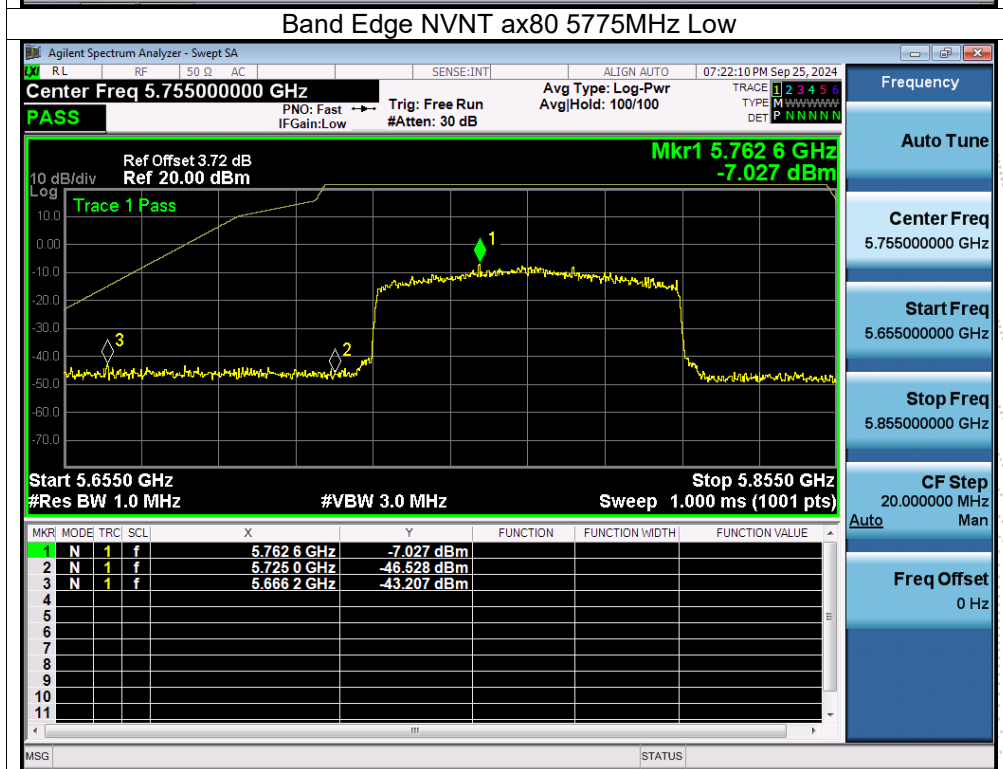
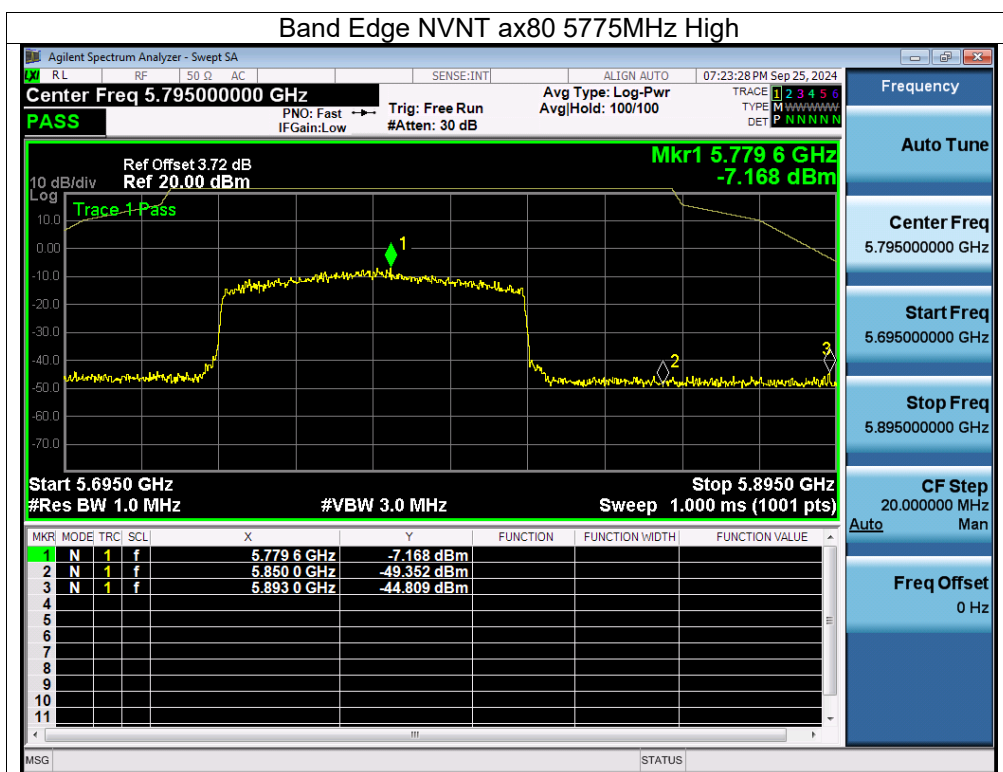




12. Spurious RF Conducted Emissions

12.1 Block Diagram Of Test Setup



12.2 Limit

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 5.725-5.85 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..

12.3 Test Procedure

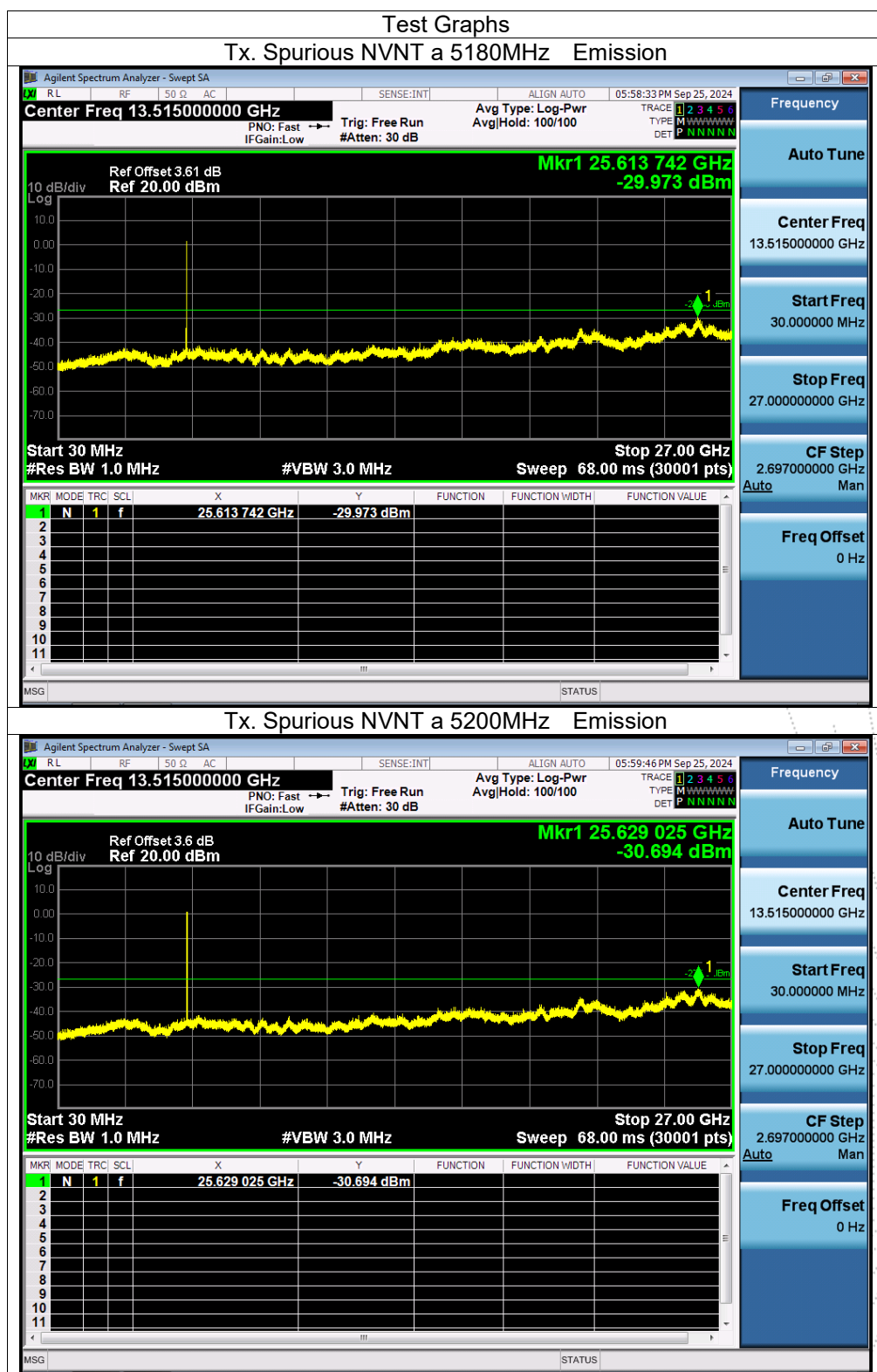
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW of spectrum analyzer to 1 MHz with a convenient frequency span.
4. 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.
5. Repeat above procedures until all measured frequencies were complete.

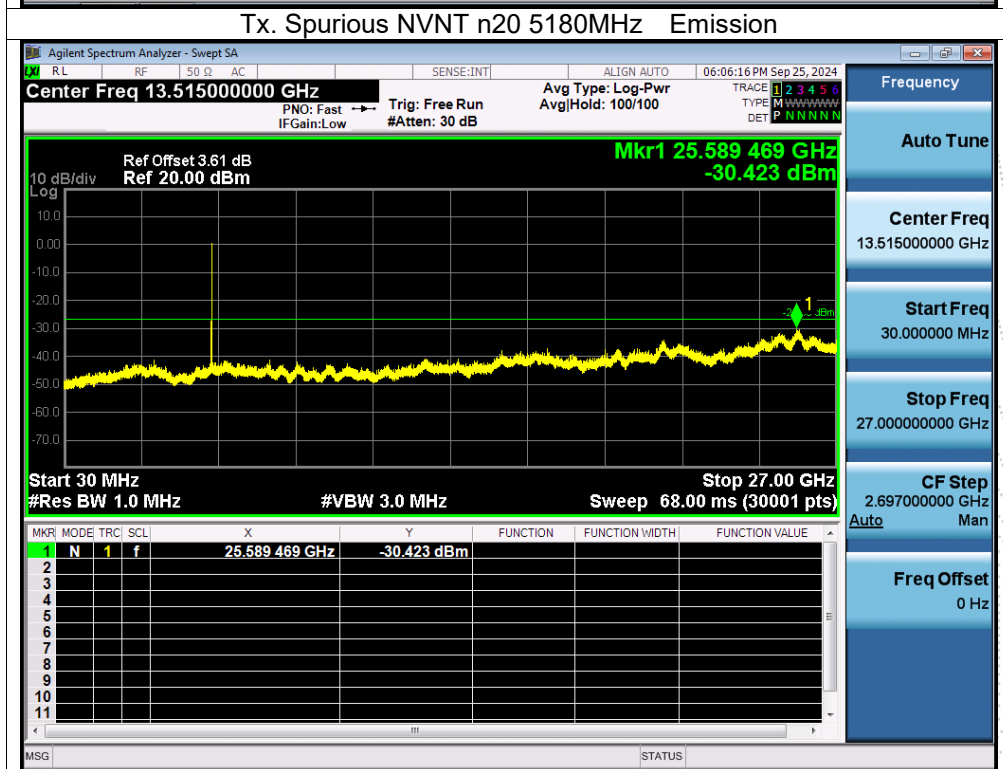
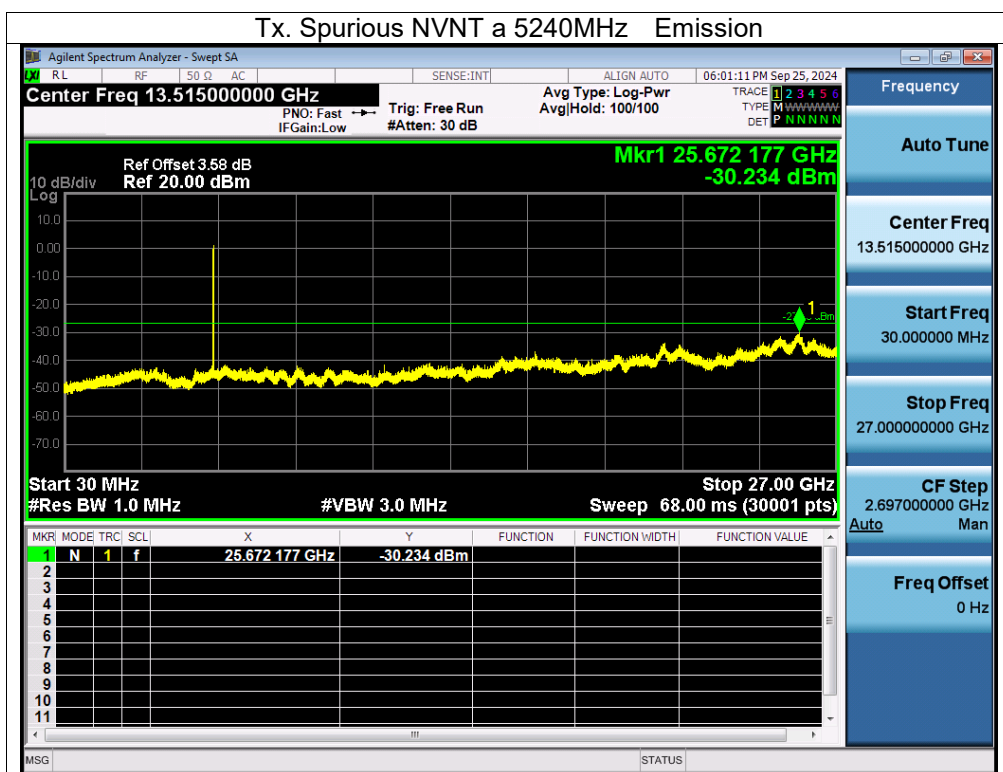
12.4 Test Result

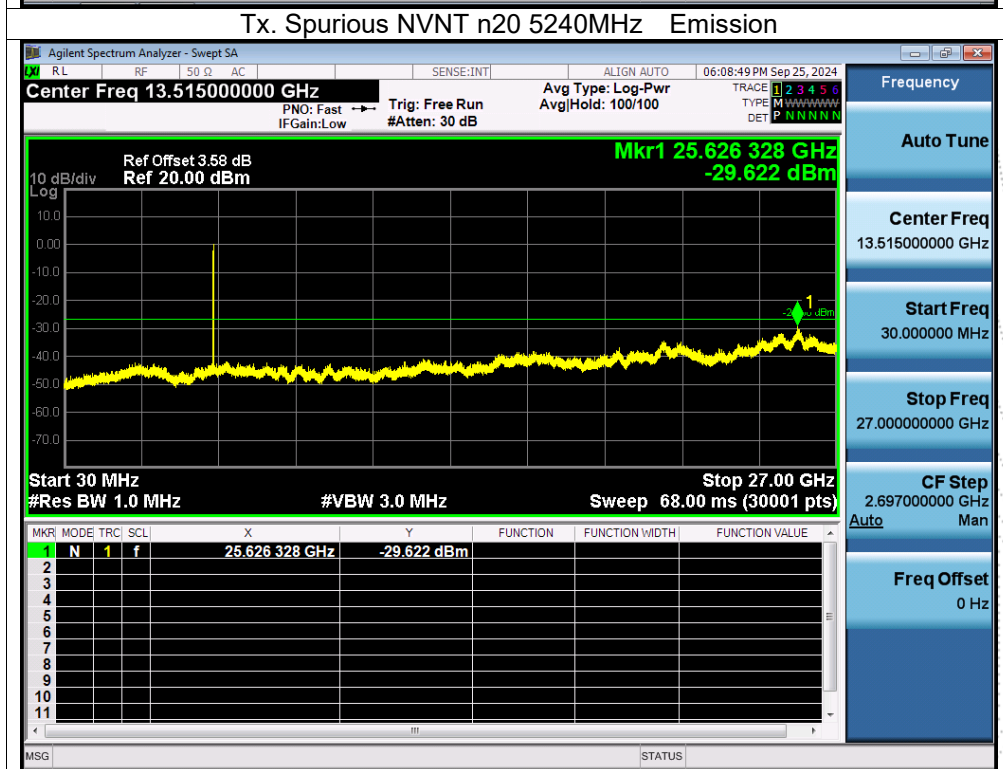
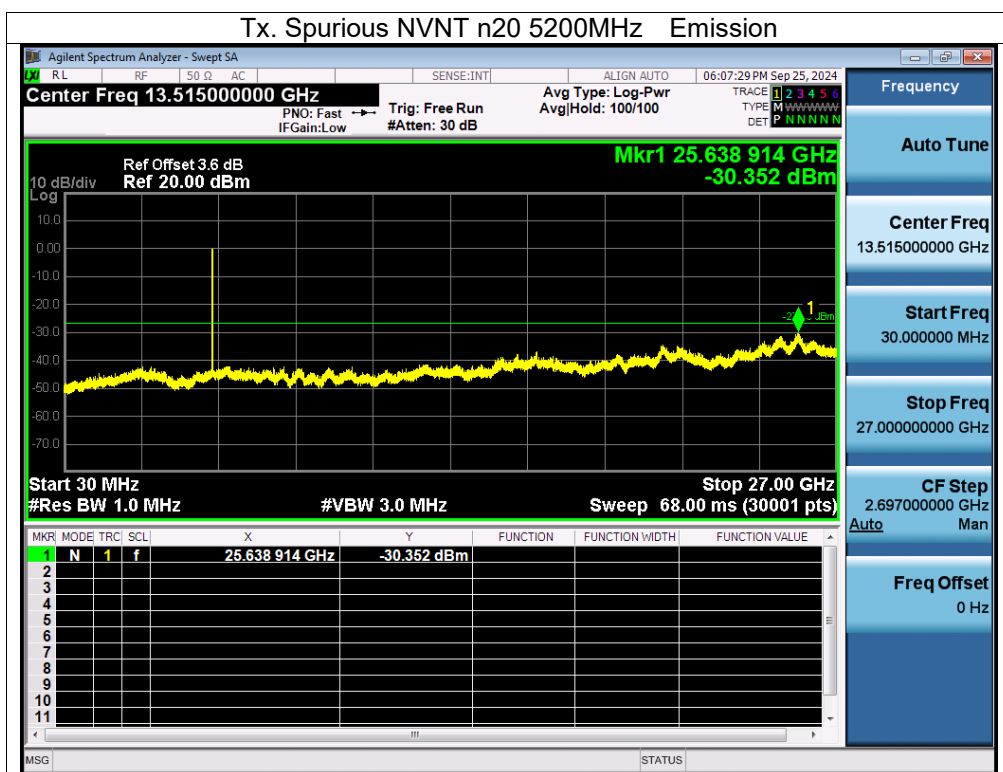
Remark: The measurement frequency range is from 9KHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions and band edge measurement data.

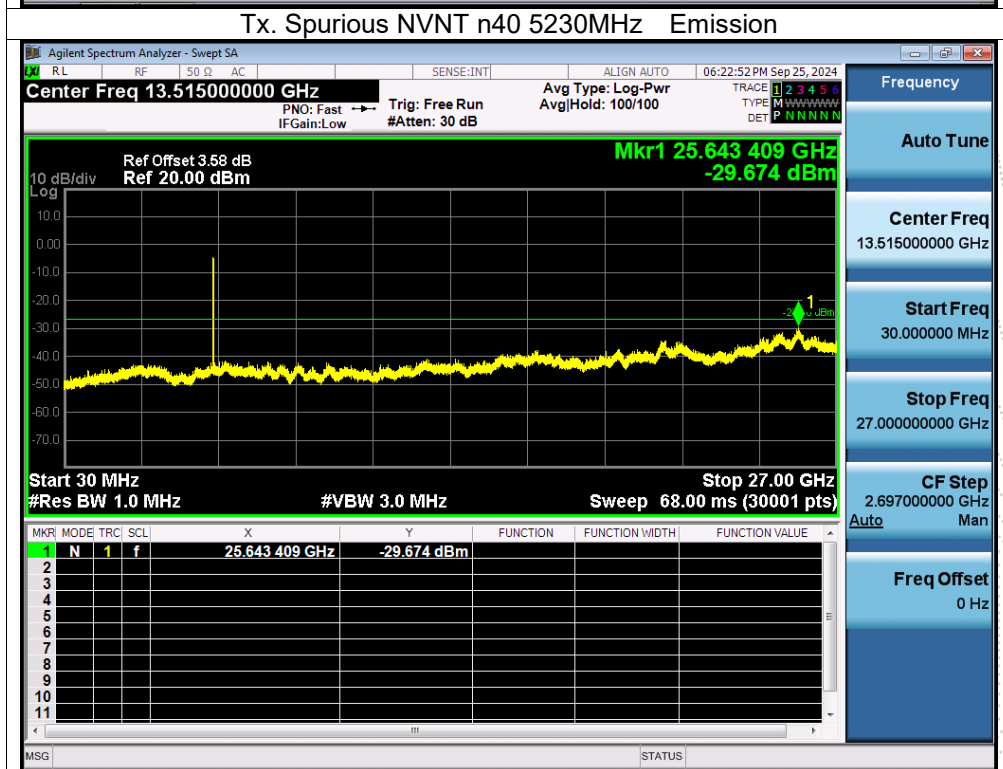
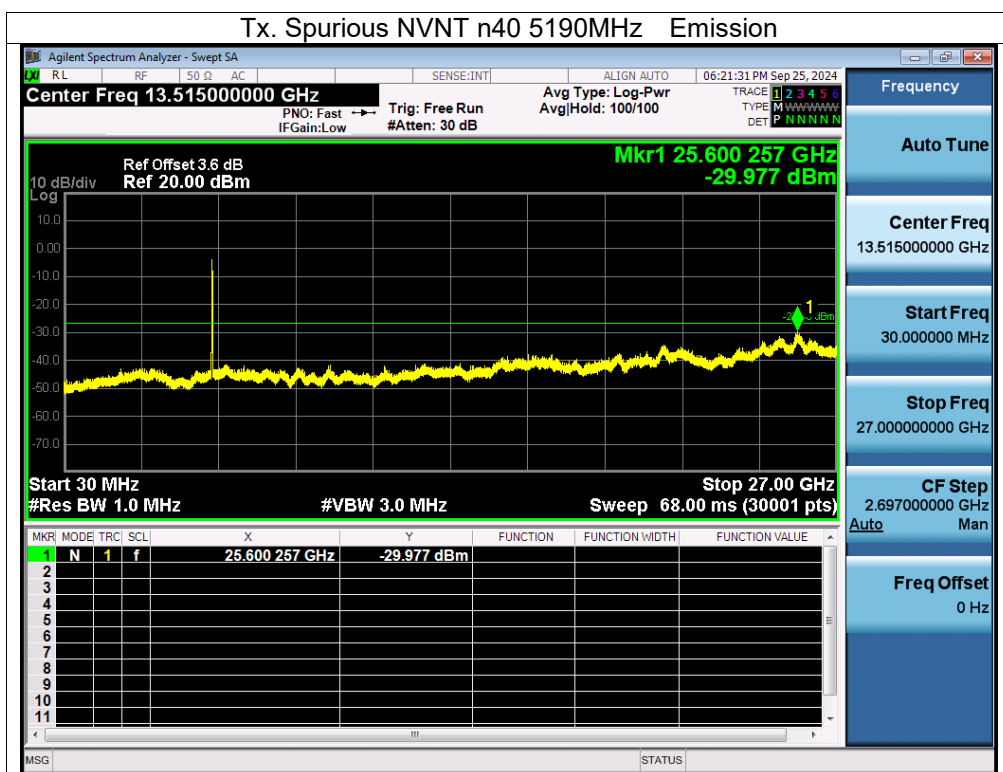
About: 26.5GHz-40GHz, The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

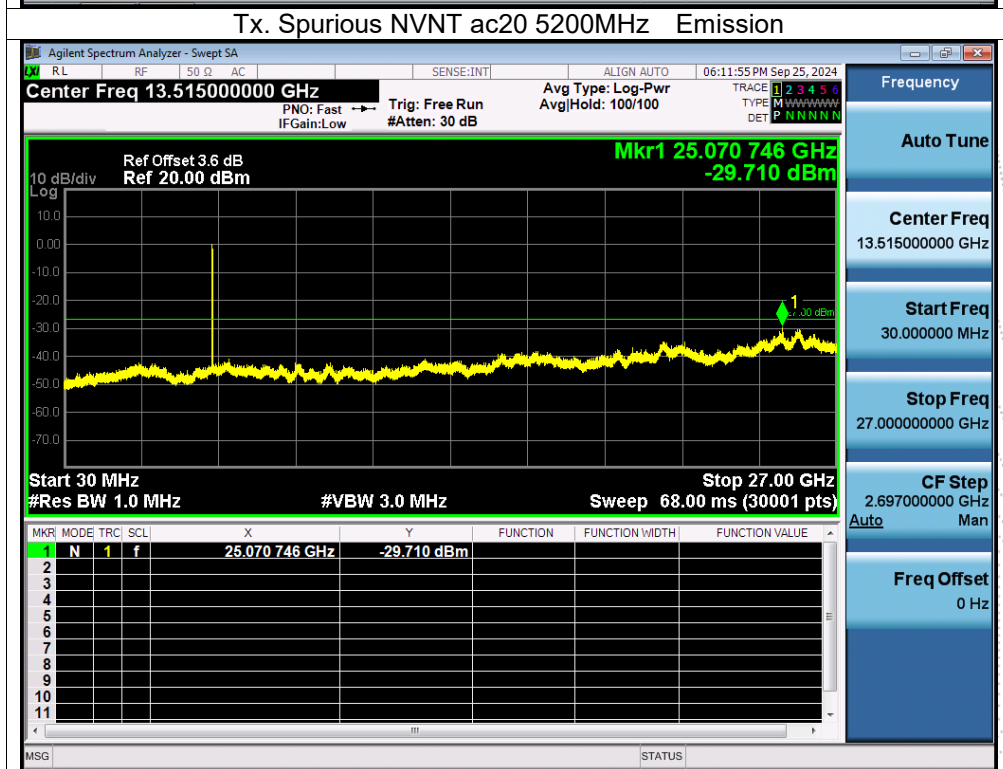
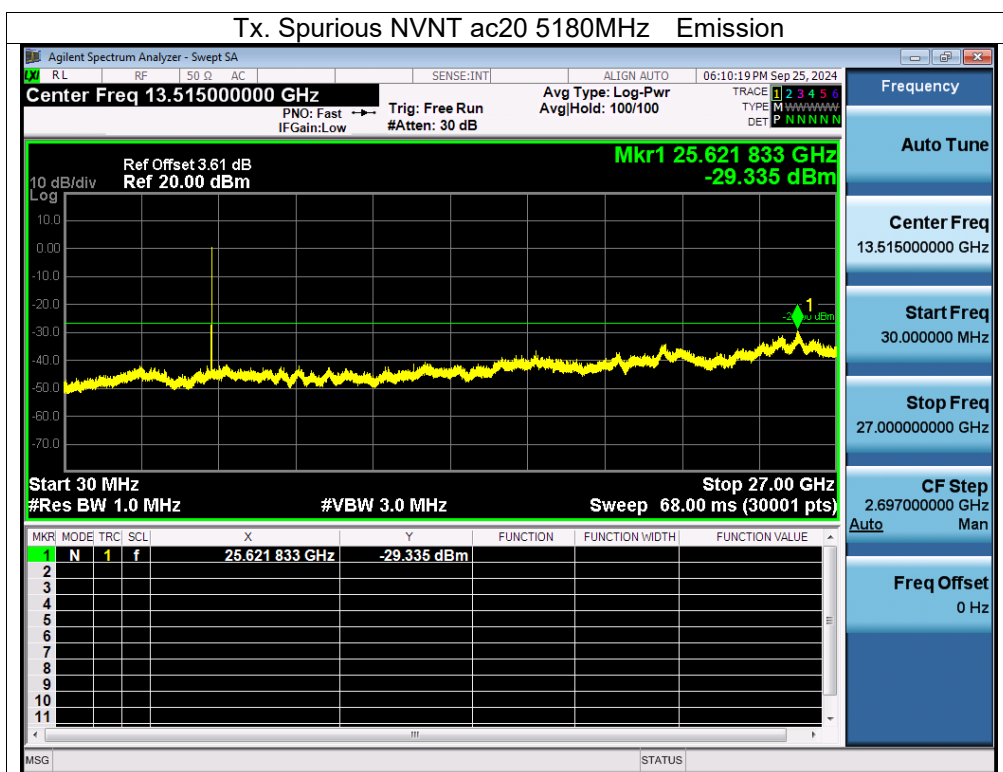
Note: A(B) Represent the value of antenna A and B, The worst data is Antenna A, only shown Antenna A Plot. Antenna A: 5180-5240MHz

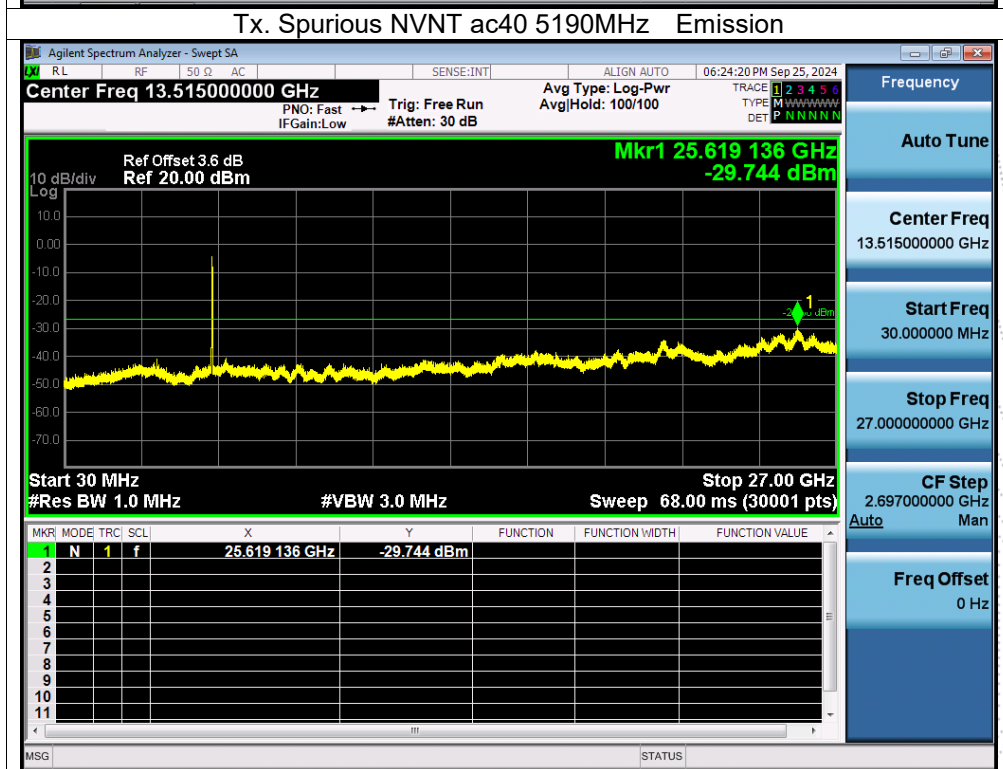
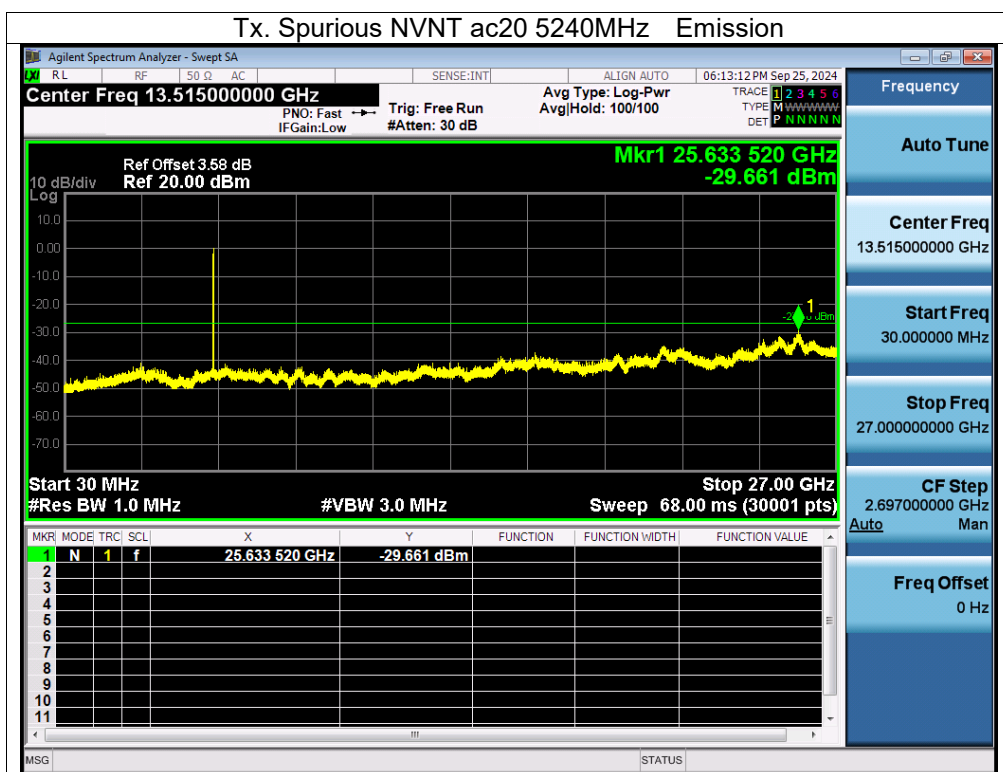


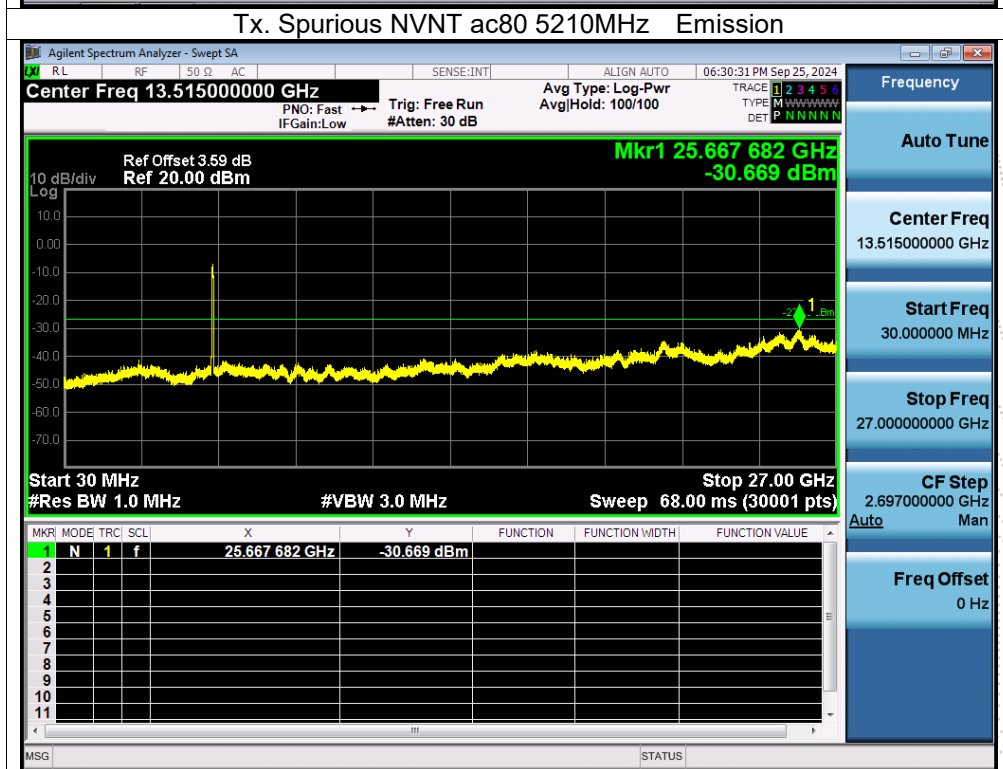
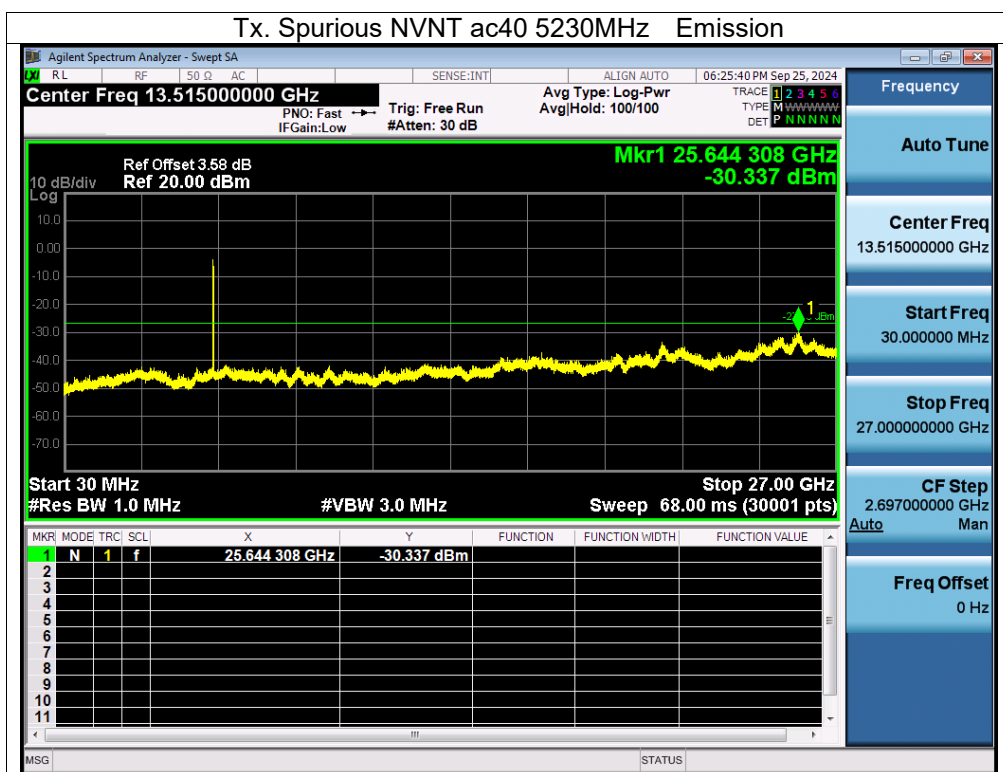


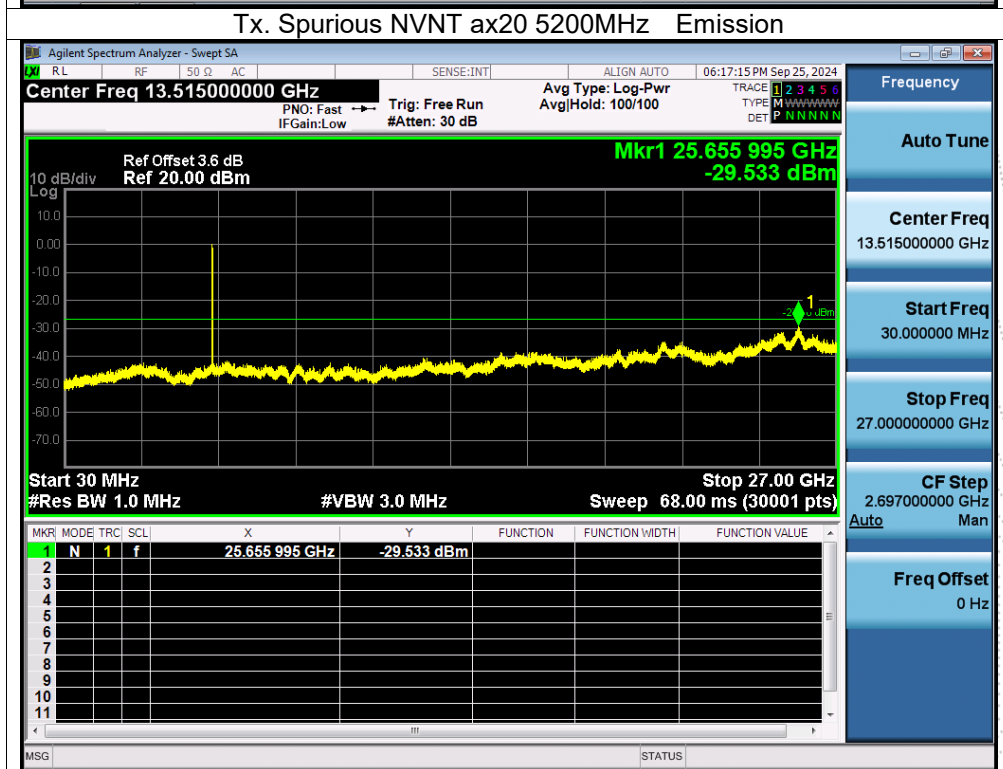
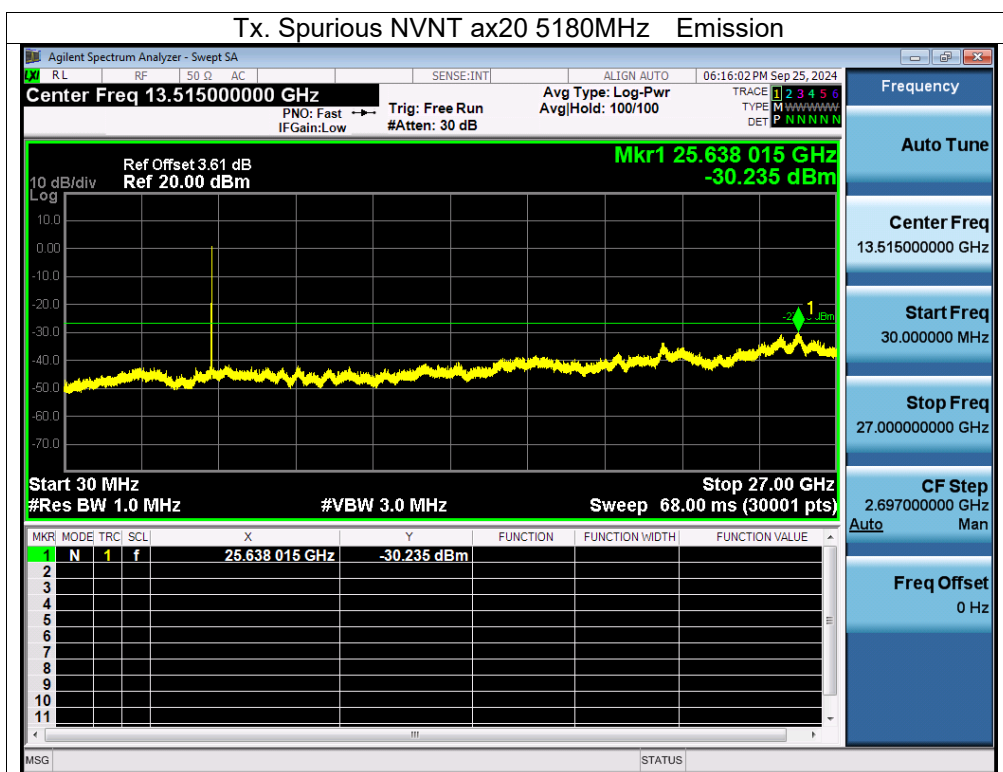


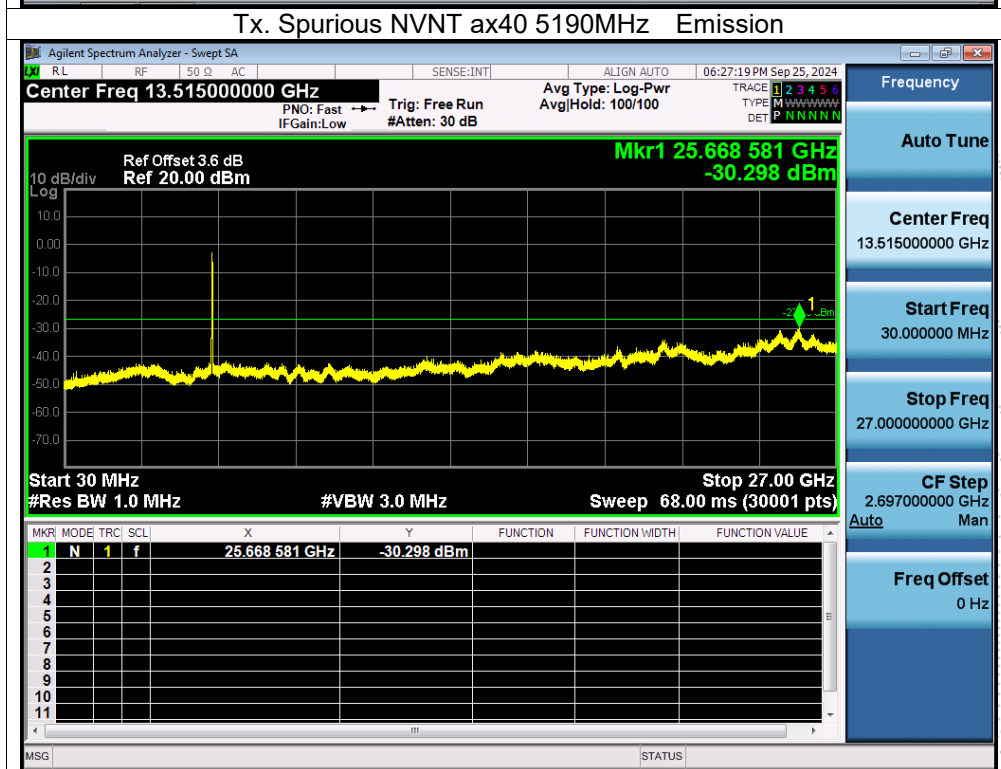
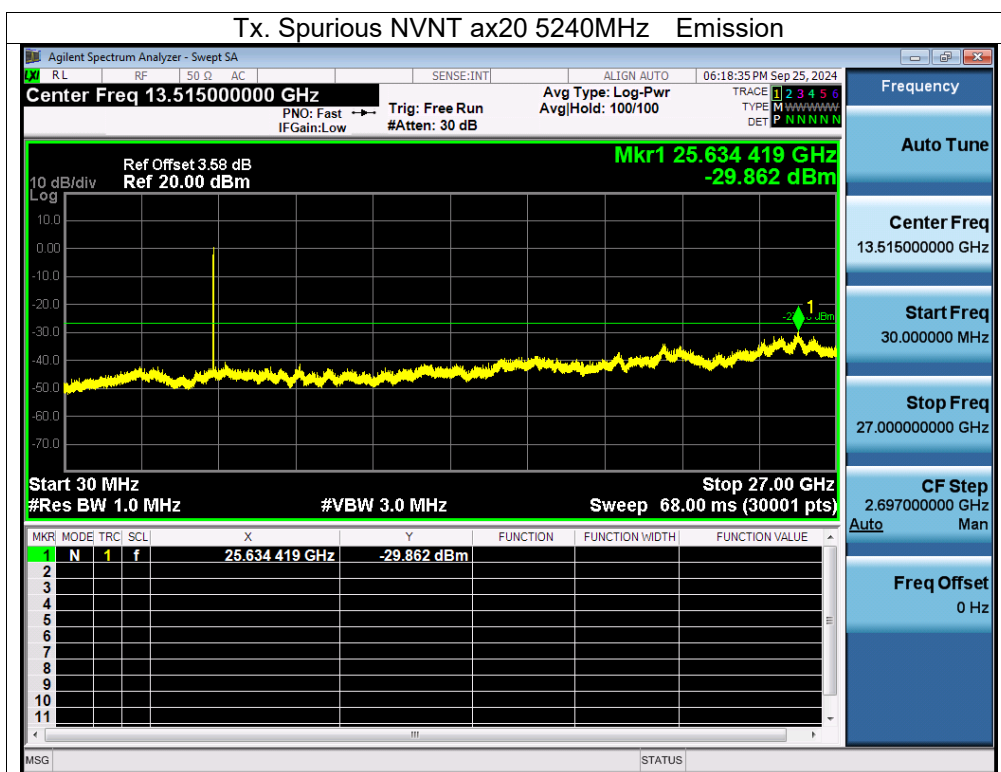


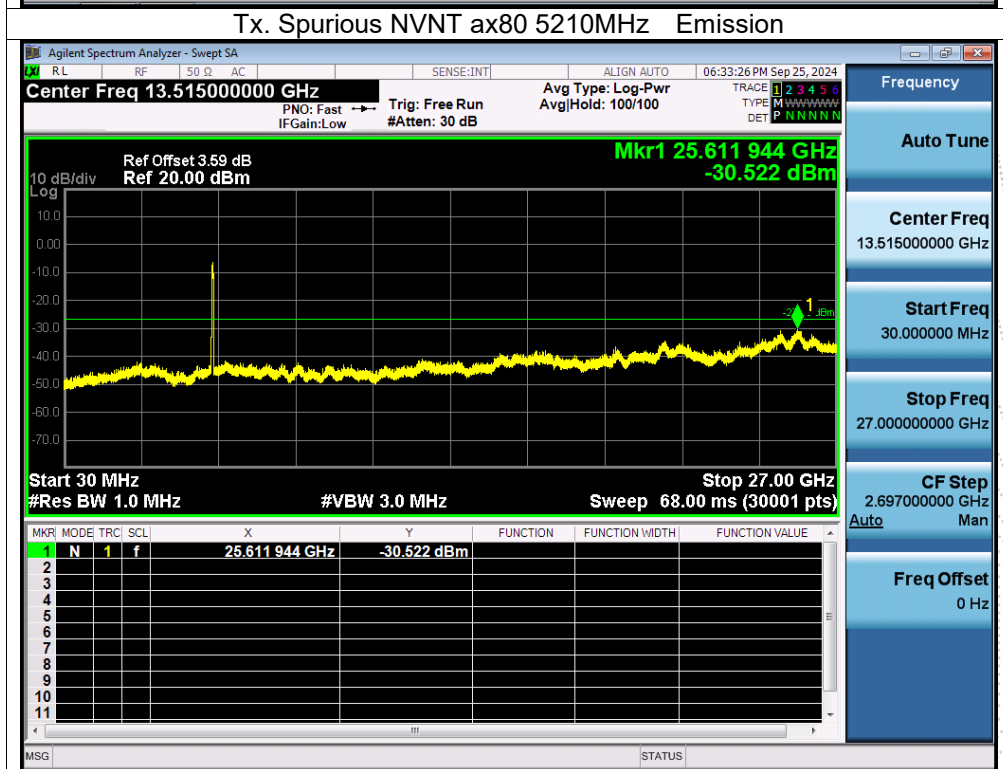
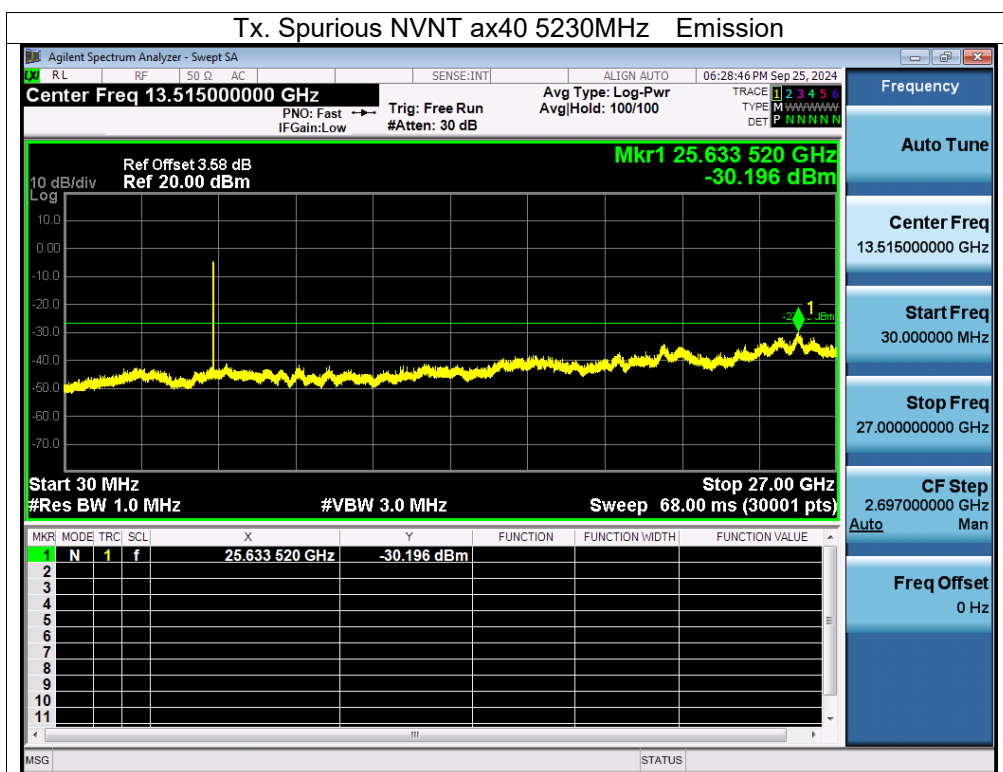




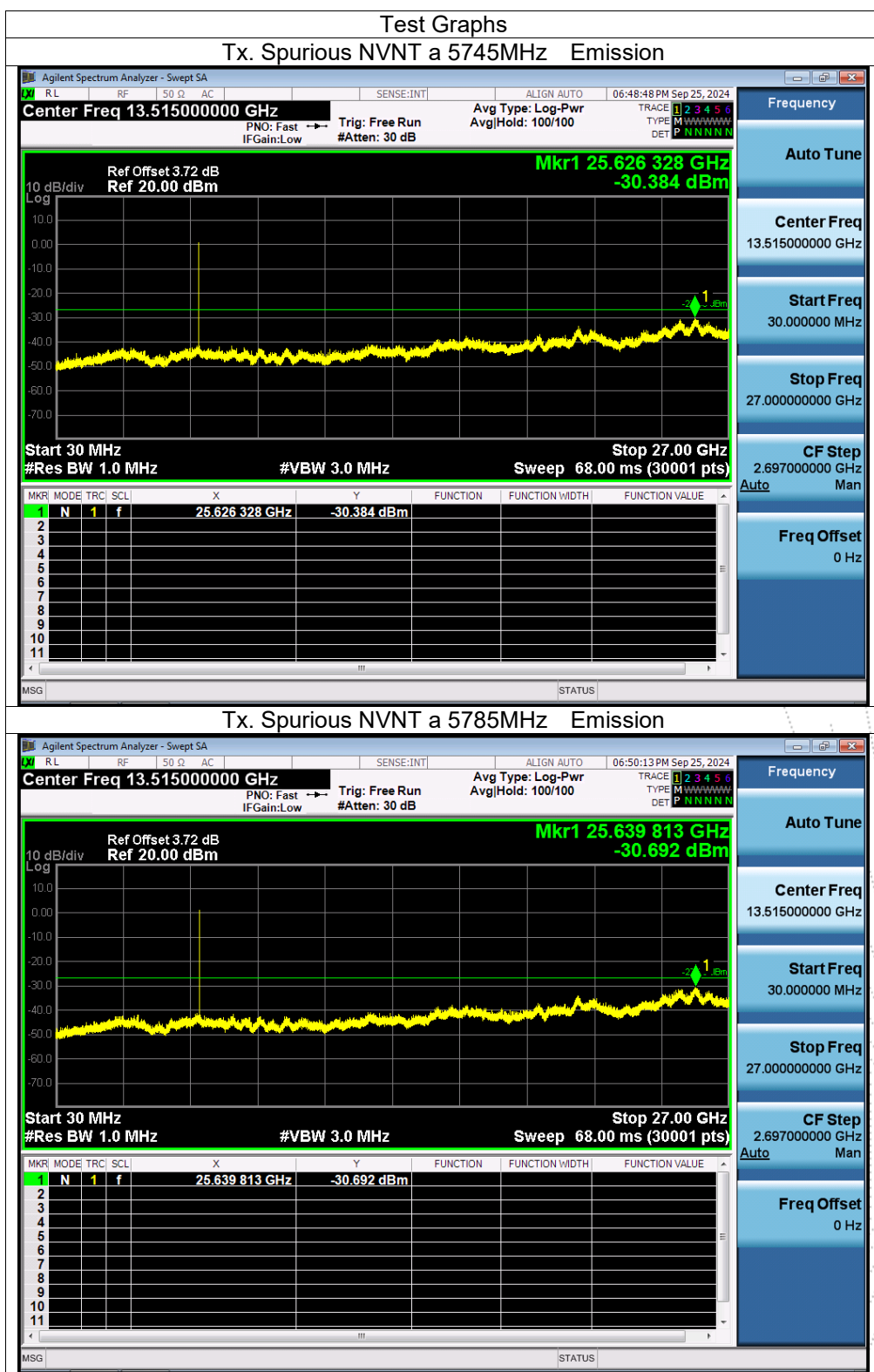


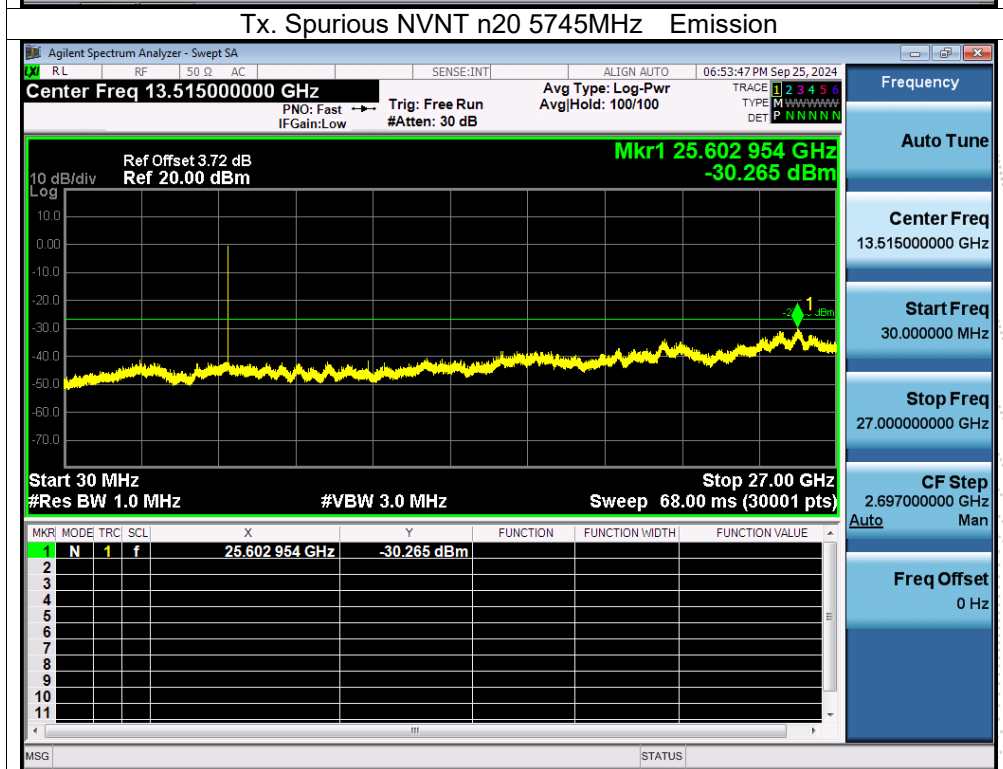
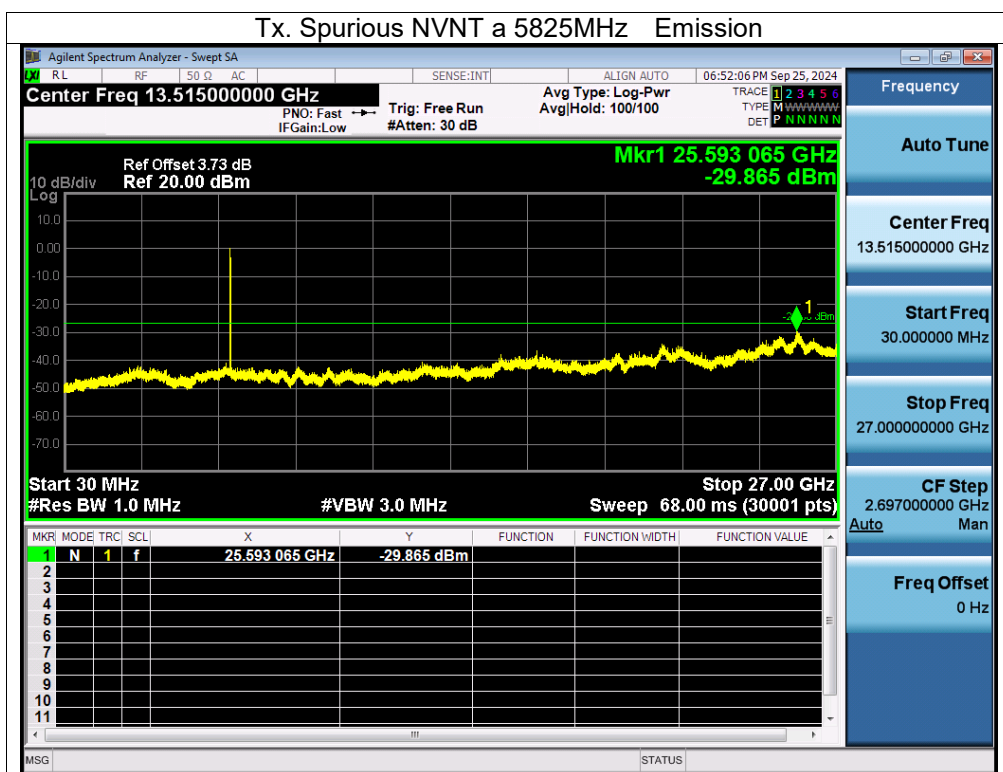


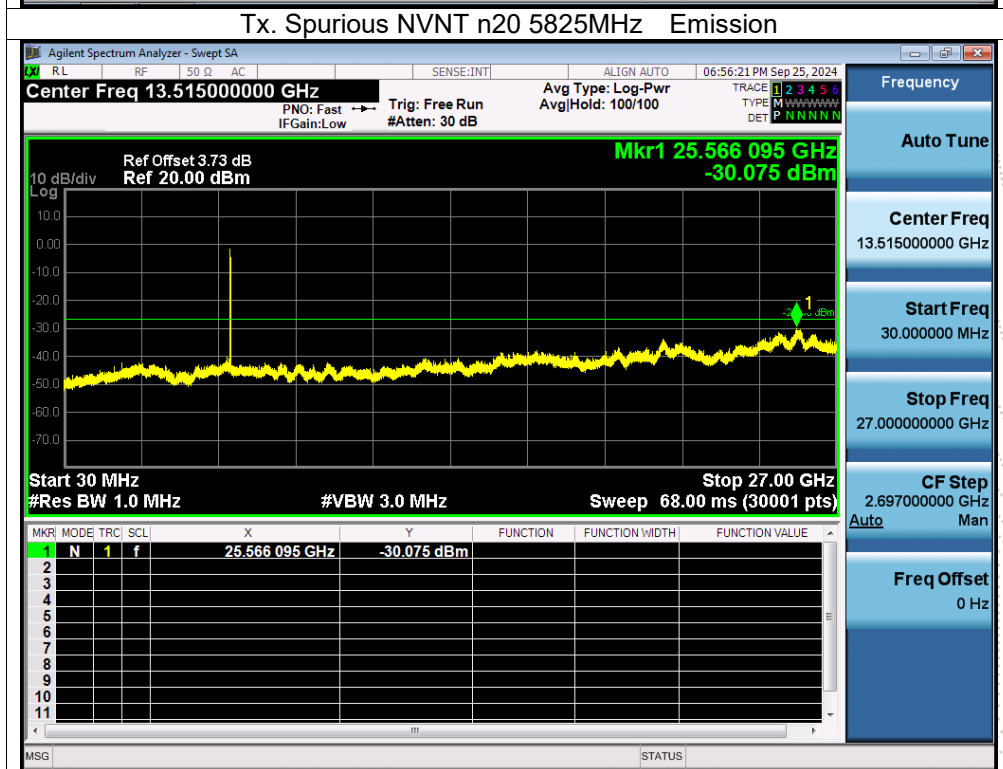
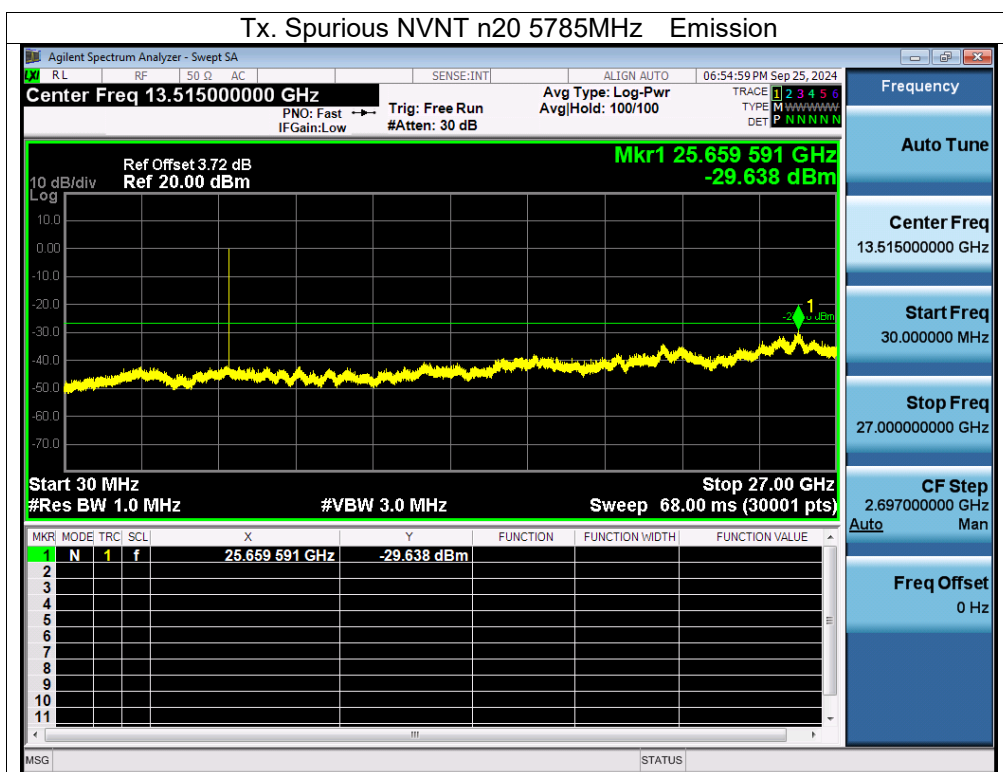


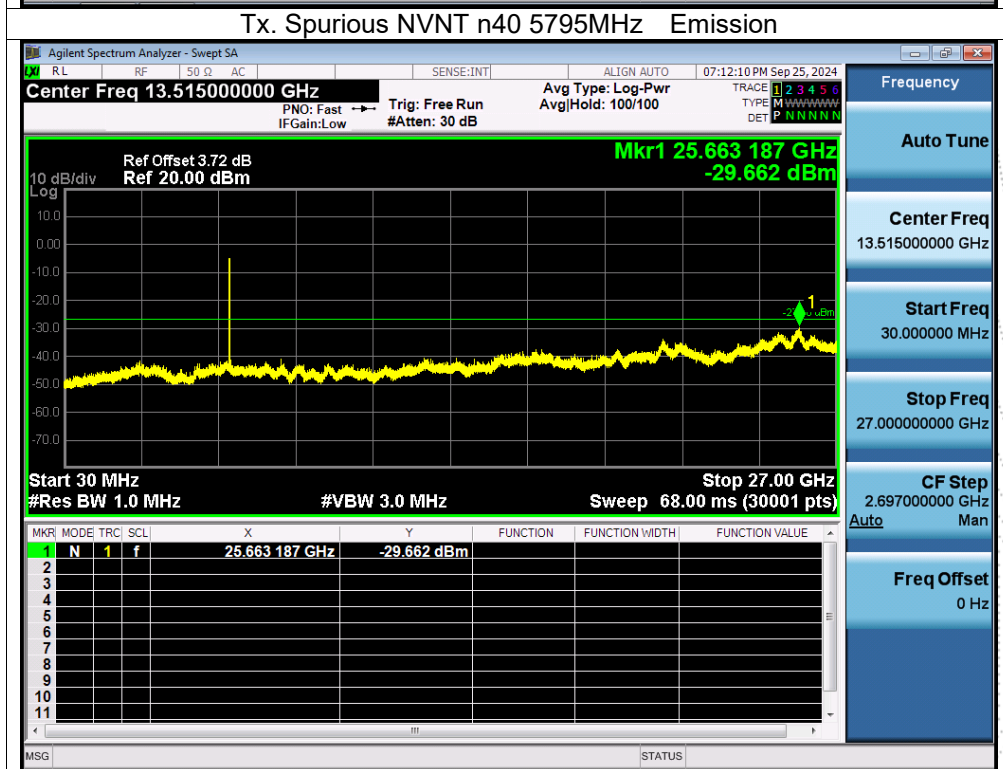
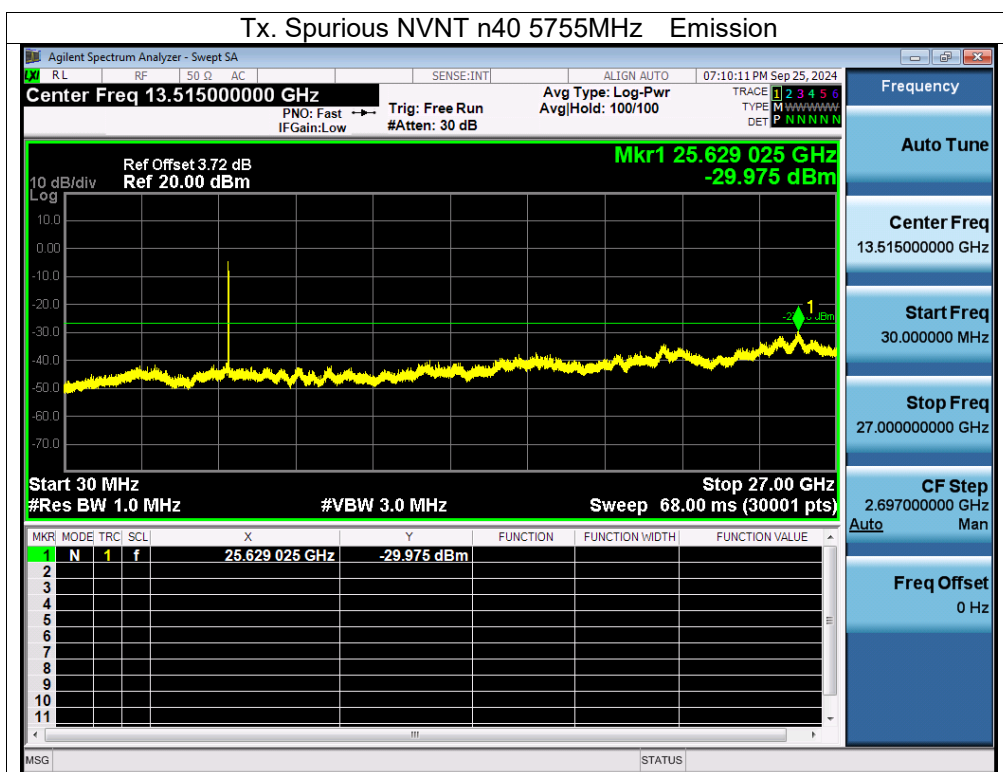


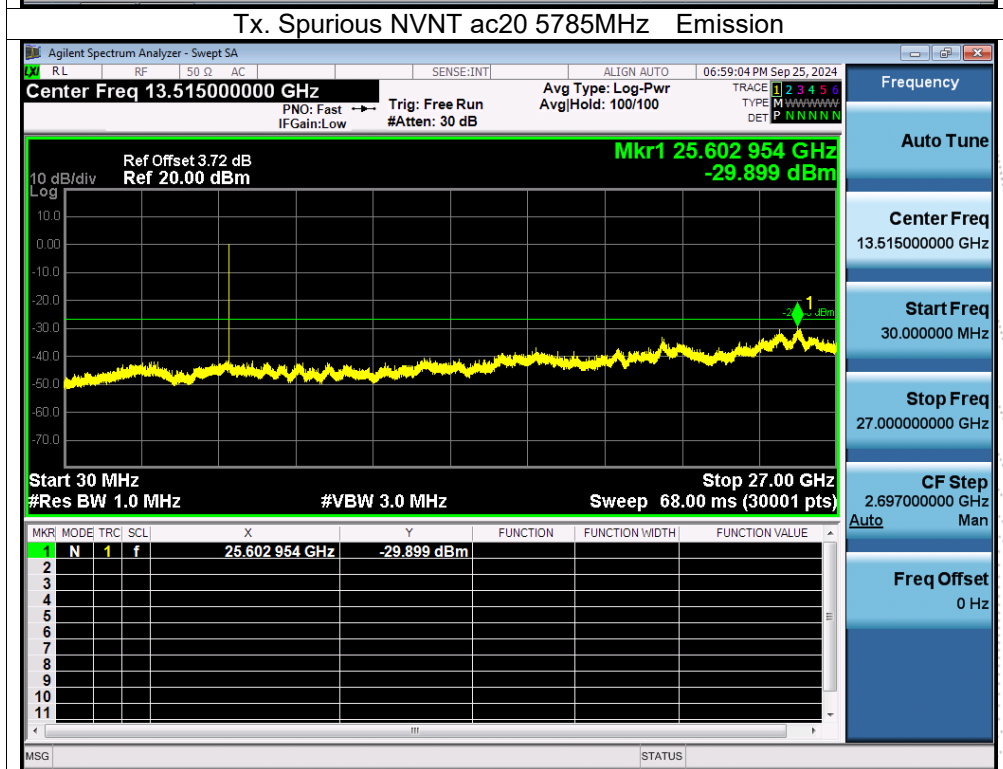
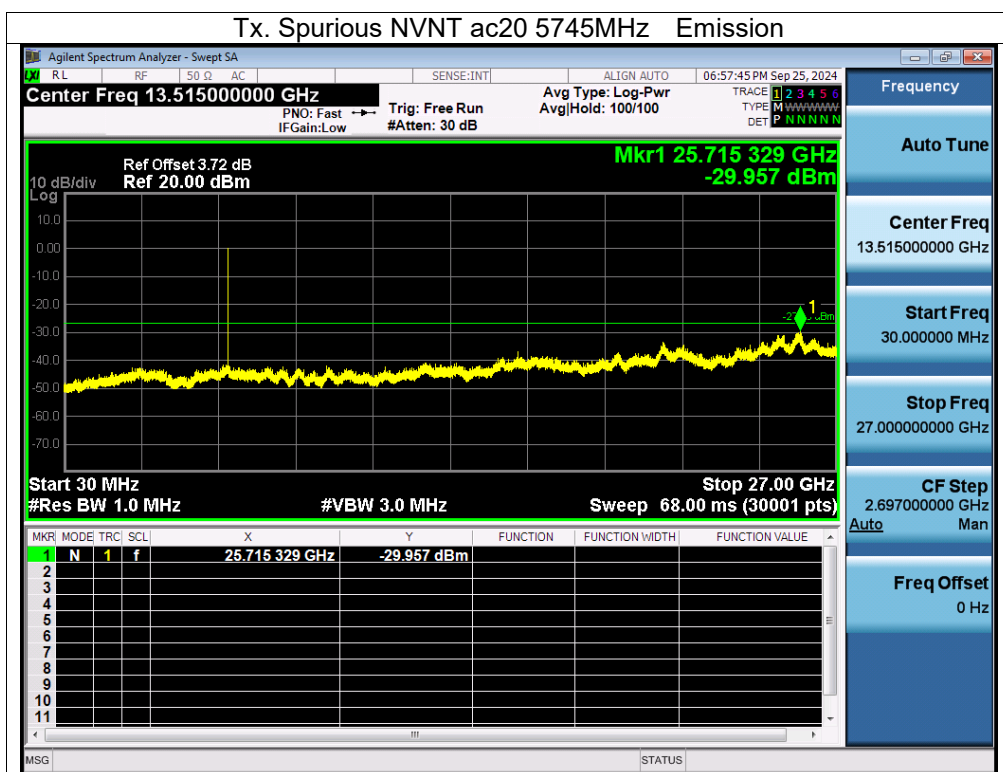
Note: A(B) Represent the value of antenna A and B, The worst data is Antenna A, only shown Antenna A.
Antenna A: 5745-58250MHz

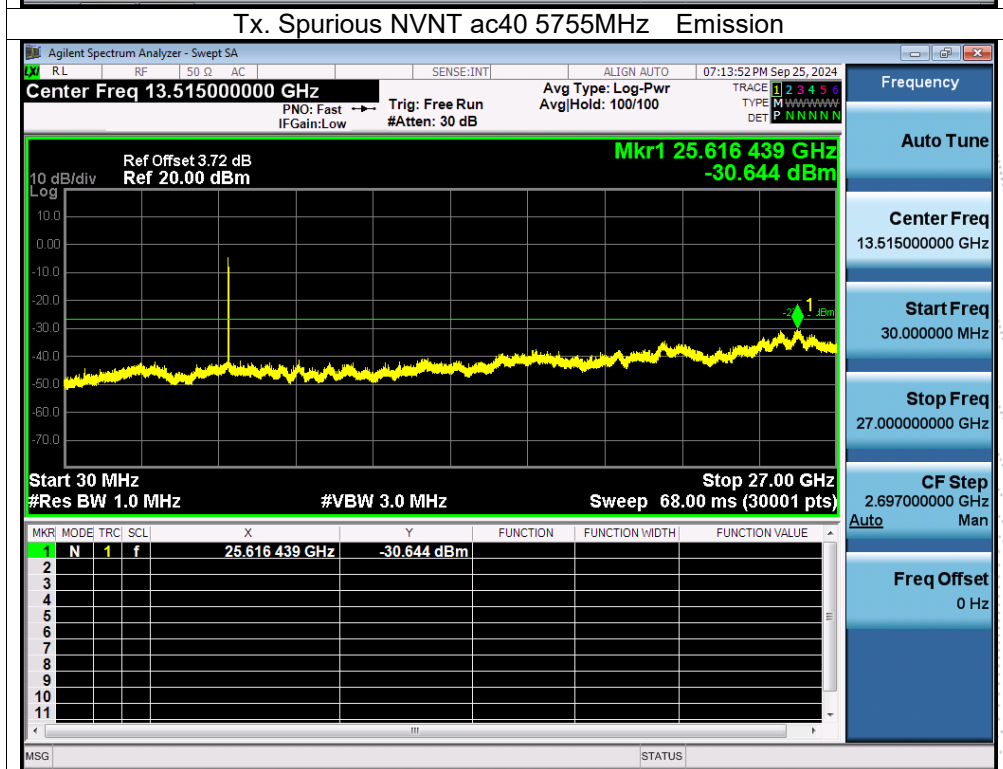
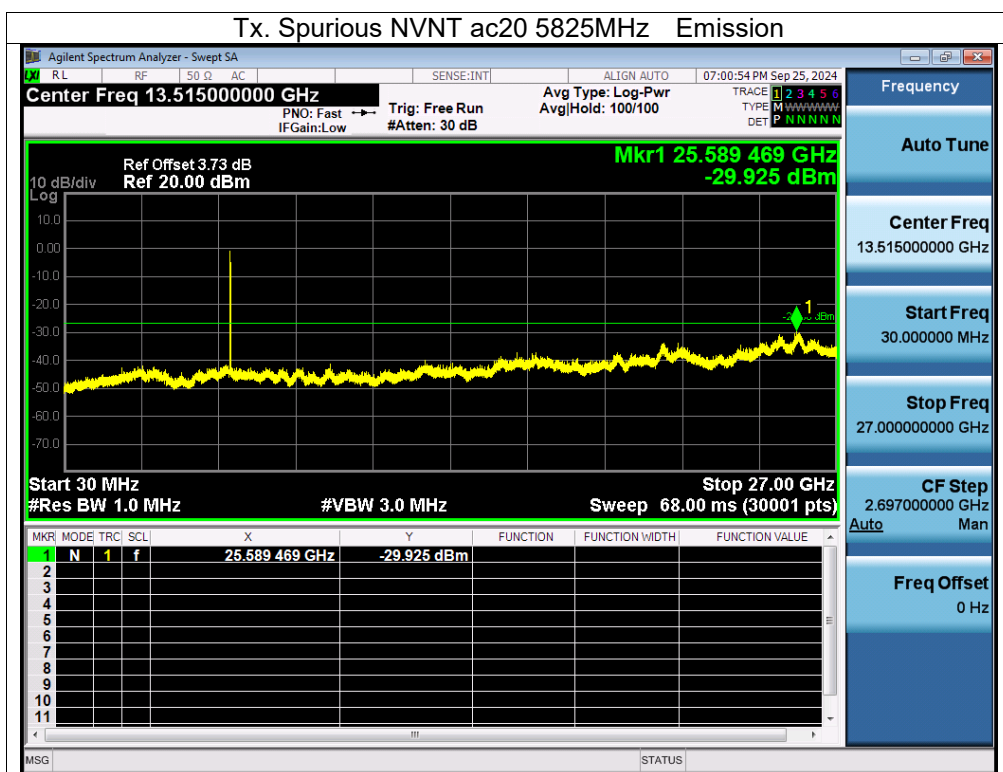


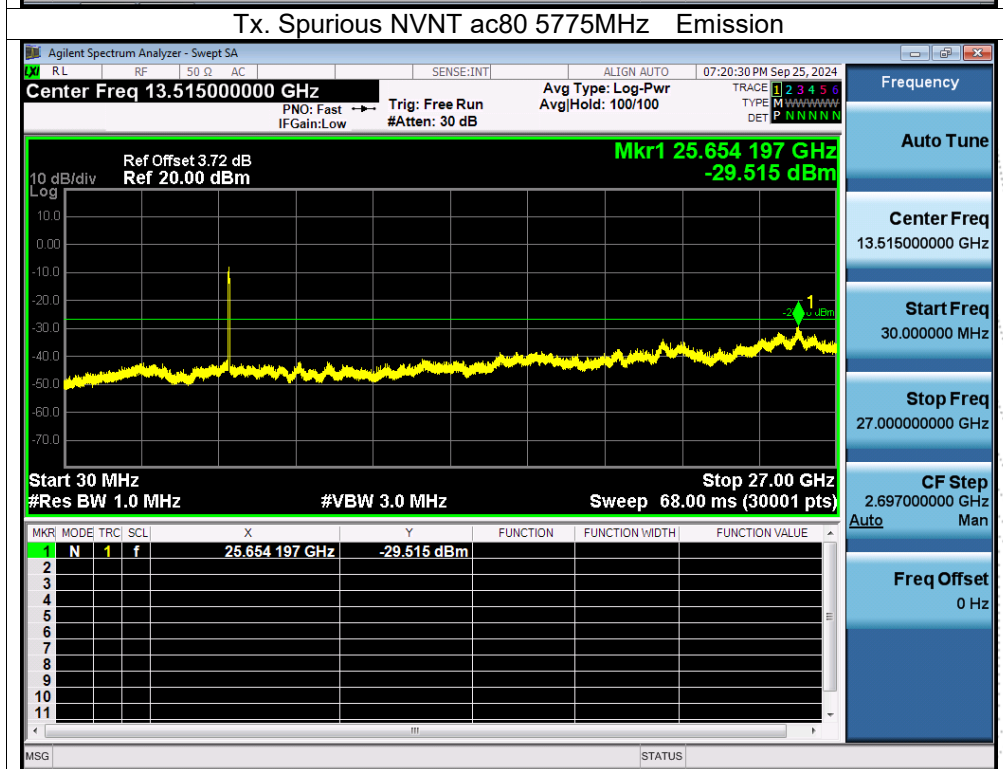
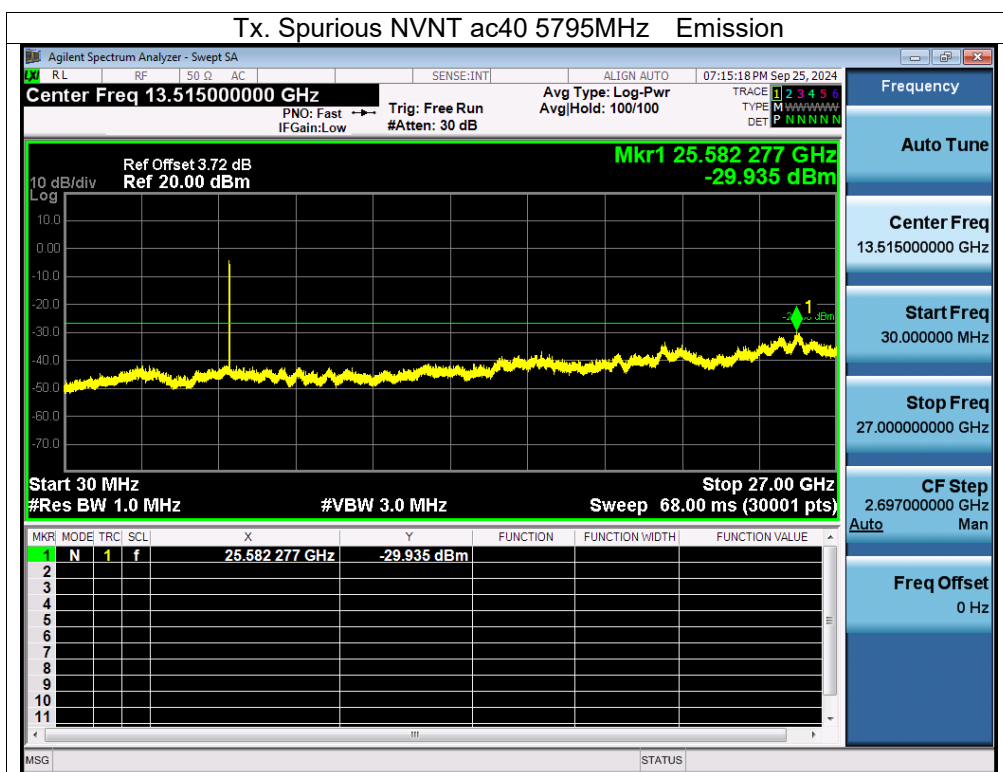


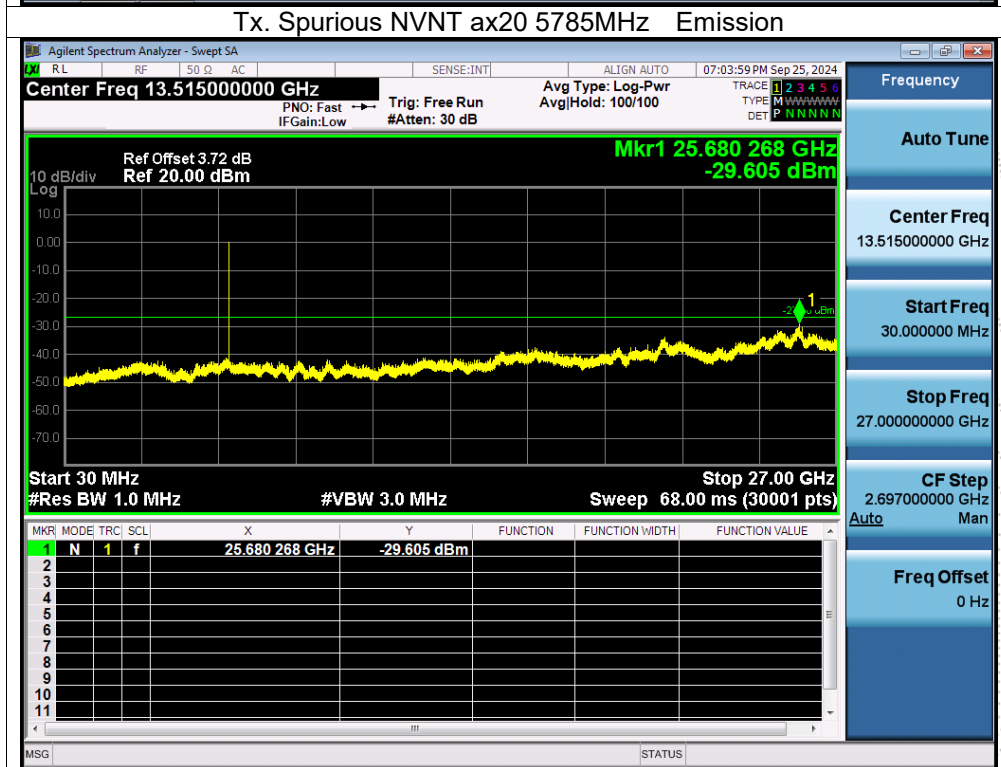
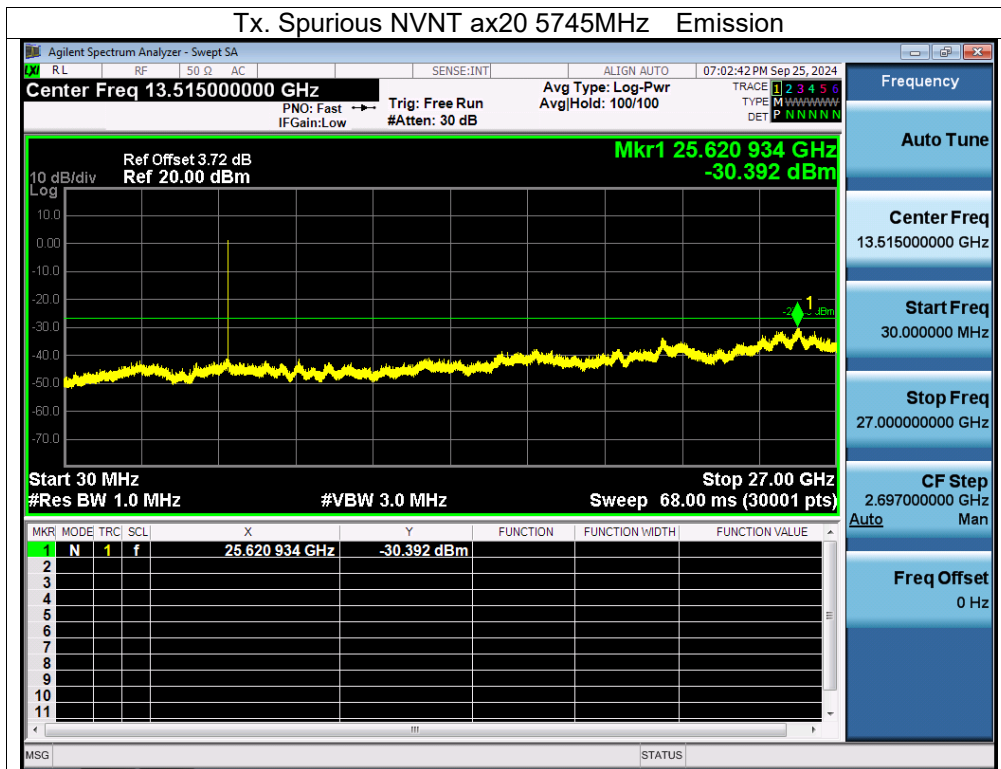


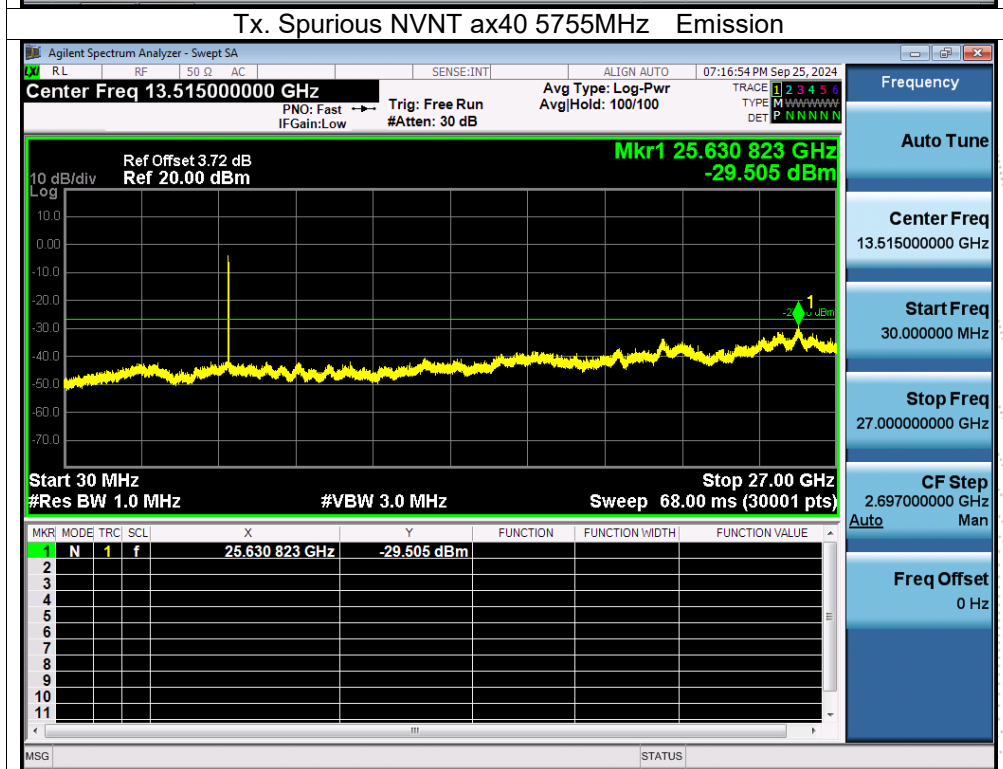
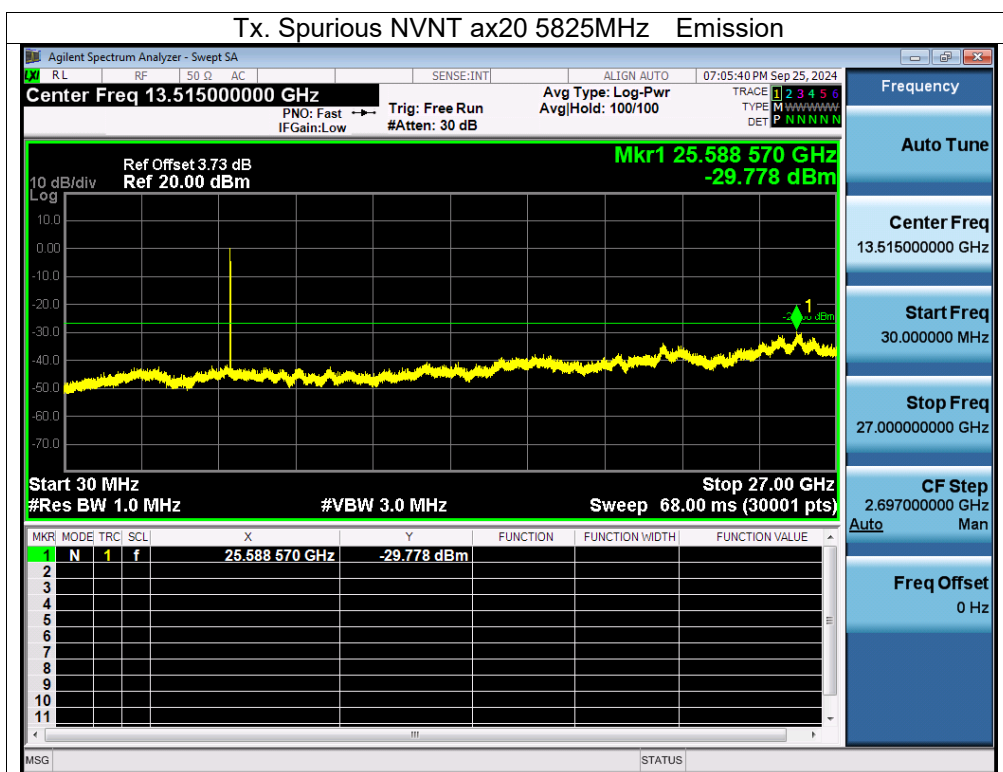


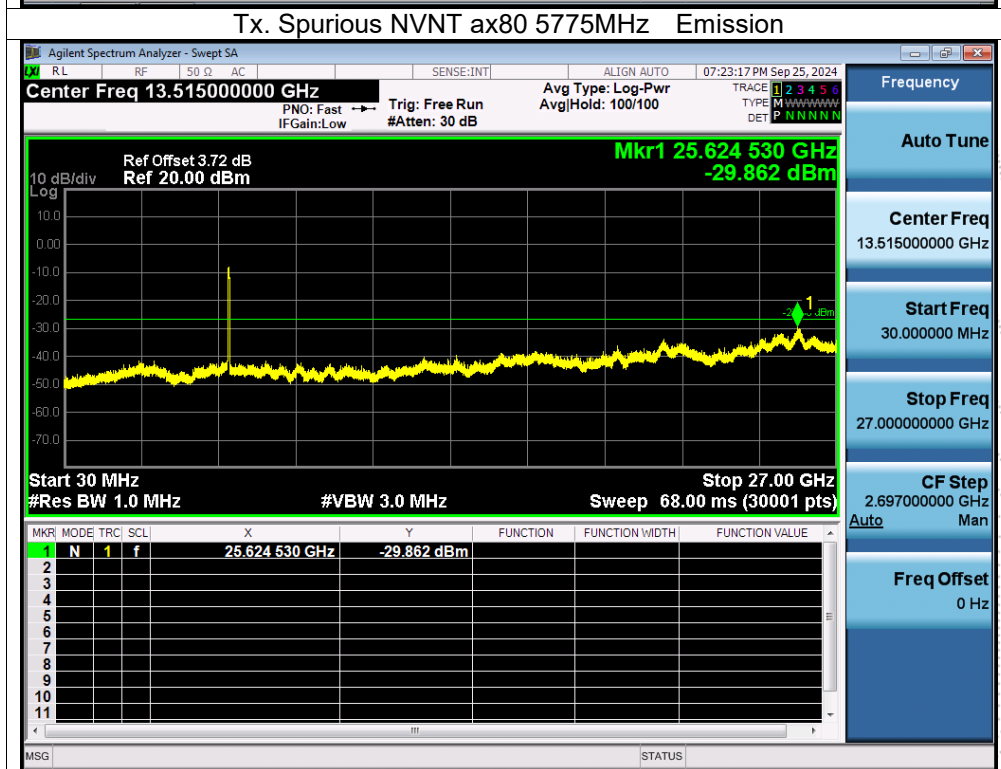
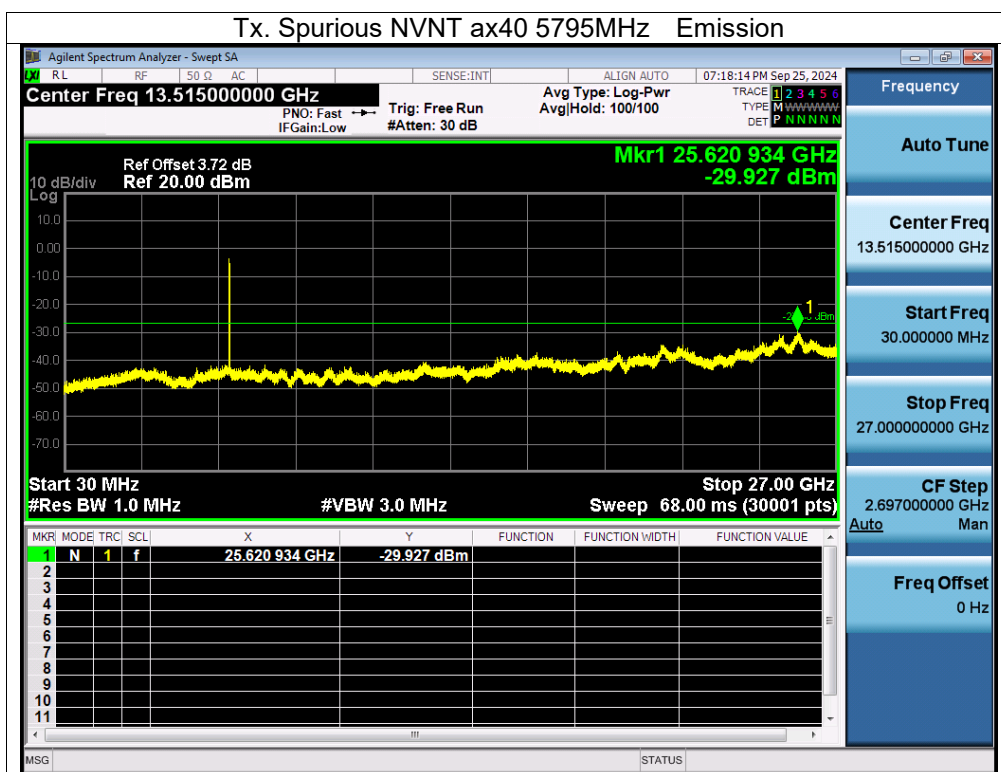












13. Frequency Stability Measurement

13.1 Block Diagram Of Test Setup



13.2 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)..

13.3 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 he 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 $-20^\circ\text{C} \sim 70^\circ\text{C}$.

13.4 Test Result

Temperature:	26 °C	Relative Humidity:	54%
Pressure:	101kPa	Test Voltage:	DC 12V
Test Mode:	TX Frequency U-NII-1 (5180-5240MHz)		

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5180MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	12.00	5180.0115	5180	0.0115	2.2201
		V max (V)	13.80	5180.0051	5180	0.0051	0.9846
		V min (V)	10.20	5180.0044	5180	0.0044	0.8494
Limits				5150-5250 MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5180MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	12	T (°C)	-20	5180.0021	5180	0.0021	0.4054
		T (°C)	-10	5180.0097	5180	0.0097	1.8726
		T (°C)	0	5180.0005	5180	0.0005	0.0965
		T (°C)	10	5180.0114	5180	0.0114	2.2008
		T (°C)	20	5180.0073	5180	0.0073	1.4093
		T (°C)	30	5180.0036	5180	0.0036	0.6950
		T (°C)	40	5180.0086	5180	0.0086	1.6602
		T (°C)	50	5180.0082	5180	0.0082	1.5830
		T (°C)	60	5180.0085	5180	0.0085	1.6409
		T (°C)	70	5180.0114	5180	0.0114	2.2008
Limits				5150-5250 MHz			
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)	12.00	5200.0006	5200	0.0006	0.1154
		V max (V)	13.80	5200.0027	5200	0.0027	0.5192
		V min (V)	10.20	5200.0016	5200	0.0016	0.3077
Limits				5150-5250 MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5200MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	12	T (°C)	-20	5200.00850	5200	0.00850	1.6346
		T (°C)	-10	5200.00910	5200	0.00910	1.7500
		T (°C)	0	5200.01270	5200	0.01270	2.4423
		T (°C)	10	5200.00730	5200	0.00730	1.4038
		T (°C)	20	5200.00450	5200	0.00450	0.8654
		T (°C)	30	5200.01060	5200	0.01060	2.0385
		T (°C)	40	5200.00750	5200	0.00750	1.4423
		T (°C)	50	5200.00400	5200	0.00400	0.7692
		T (°C)	60	5200.00100	5200	0.00100	0.1923
		T (°C)	70	5200.00510	5200	0.00510	0.9808
Limits				5150-5250 MHz			
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)	12.00	5240.0055	5240	0.0055	1.0496
		V max (V)	13.80	5240.0109	5240	0.0109	2.0802
		V min (V)	10.20	5240.0013	5240	0.0013	0.2481
Limits				5150-5250 MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5240MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	12	T (°C)	-20	5240.0128	5240	0.0128	2.4427
		T (°C)	-10	5240.0026	5240	0.0026	0.4962
		T (°C)	0	5240.0113	5240	0.0113	2.1565
		T (°C)	10	5240.0066	5240	0.0066	1.2595
		T (°C)	20	5240.0010	5240	0.0010	0.1908
		T (°C)	30	5240.0005	5240	0.0005	0.0954
		T (°C)	40	5240.0024	5240	0.0024	0.4580
		T (°C)	50	5240.0050	5240	0.0050	0.9542
		T (°C)	60	5240.0121	5240	0.0121	2.3092
		T (°C)	70	5240.0027	5240	0.0027	0.5153
Limits				5150-5250 MHz			
Result				Complies			

Temperature:	26 °C	Relative Humidity:	54%
Pressure:	101kPa	Test Voltage:	DC 12V
Test Mode:	TX Frequency U-NII-3 (5745-5825MHz)		

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5745MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	12.00	5745.01140	5745	0.01140	1.9843
		V max (V)	13.80	5745.00210	5745	0.00210	0.3655
		V min (V)	10.20	5745.00440	5745	0.00440	0.7659
Limits				5725-5850 MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5745MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	12	T (°C)	-20	5745.00520	5745	0.00520	0.9051
		T (°C)	-10	5745.00780	5745	0.00780	1.3577
		T (°C)	0	5745.00220	5745	0.00220	0.3829
		T (°C)	10	5745.01120	5745	0.01120	1.9495
		T (°C)	20	5745.00040	5745	0.00040	0.0696
		T (°C)	30	5745.00520	5745	0.00520	0.9051
		T (°C)	40	5745.00950	5745	0.00950	1.6536
		T (°C)	50	5745.00380	5745	0.00380	0.6614
		T (°C)	60	5745.00380	5745	0.00380	0.6614
		T (°C)	70	5745.00110	5745	0.00110	0.1915
Limits				5725-5850 MHz			
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)	12.00	5785.00090	5785	0.00090	0.1556
		V max (V)	13.80	5785.00650	5785	0.00650	1.1236
		V min (V)	10.20	5785.00700	5785	0.00700	1.2100
Limits				5725-5850 MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5785MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	12	T (°C)	-20	5785.00690	5785	0.00690	1.1927
		T (°C)	-10	5785.01230	5785	0.01230	2.1262
		T (°C)	0	5785.00620	5785	0.00620	1.0717
		T (°C)	10	5785.01130	5785	0.01130	1.9533
		T (°C)	20	5785.00930	5785	0.00930	1.6076
		T (°C)	30	5785.00240	5785	0.00240	0.4149
		T (°C)	40	5785.01150	5785	0.01150	1.9879
		T (°C)	50	5785.00500	5785	0.00500	0.8643
		T (°C)	60	5785.00810	5785	0.00810	1.4002
		T (°C)	70	5785.01040	5785	0.01040	1.7978
Limits				5725-5850 MHz			
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)	12.00	5825.00680	5825	0.00680	1.1674
		V max (V)	13.80	5825.01010	5825	0.01010	1.7339
		V min (V)	10.20	5825.01140	5825	0.01140	1.9571
Limits				5725-5850 MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5825MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	12	T (°C)	-20	5825.01000	5825	0.01000	1.7167
		T (°C)	-10	5825.00380	5825	0.00380	0.6524
		T (°C)	0	5825.00090	5825	0.00090	0.1545
		T (°C)	10	5825.00110	5825	0.00110	0.1888
		T (°C)	20	5825.00410	5825	0.00410	0.7039
		T (°C)	30	5825.00170	5825	0.00170	0.2918
		T (°C)	40	5825.00190	5825	0.00190	0.3262
		T (°C)	50	5825.00740	5825	0.00740	1.2704
		T (°C)	60	5825.00340	5825	0.00340	0.5837
		T (°C)	70	5825.00570	5825	0.00570	0.9785
Limits				5725-5850 MHz			
Result				Complies			

14. Duty Cycle Of Test Signal

14.1 Standard Requirement

Pre-analysis Check: While conducting average power measurement, duty cycle of each mode shall be checked to ensure its duty cycle in order to compensate for the loss due to insufficient ratio of duty cycle. All duty cycle is pre-scanned, and result as obtained below shows only the most representative ones where duty cycle is conducted as the given transmission with given virtual operation that expresses the percentage.

14.2 Formula

Duty Cycle = $T_{on} / (T_{on} + T_{off})$

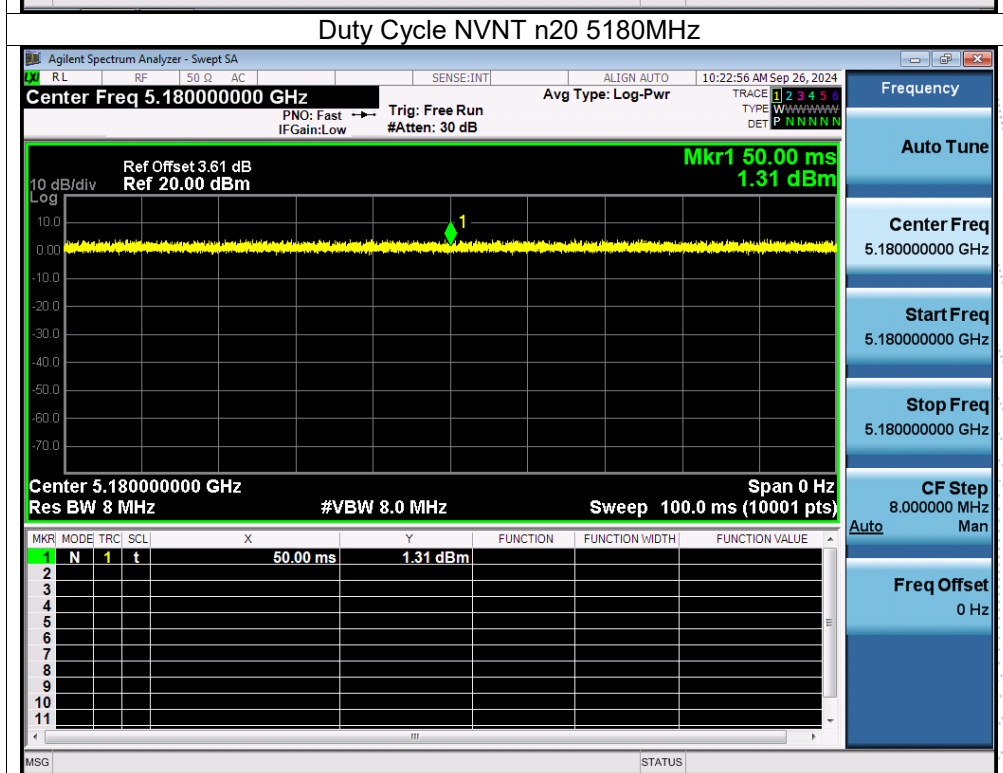
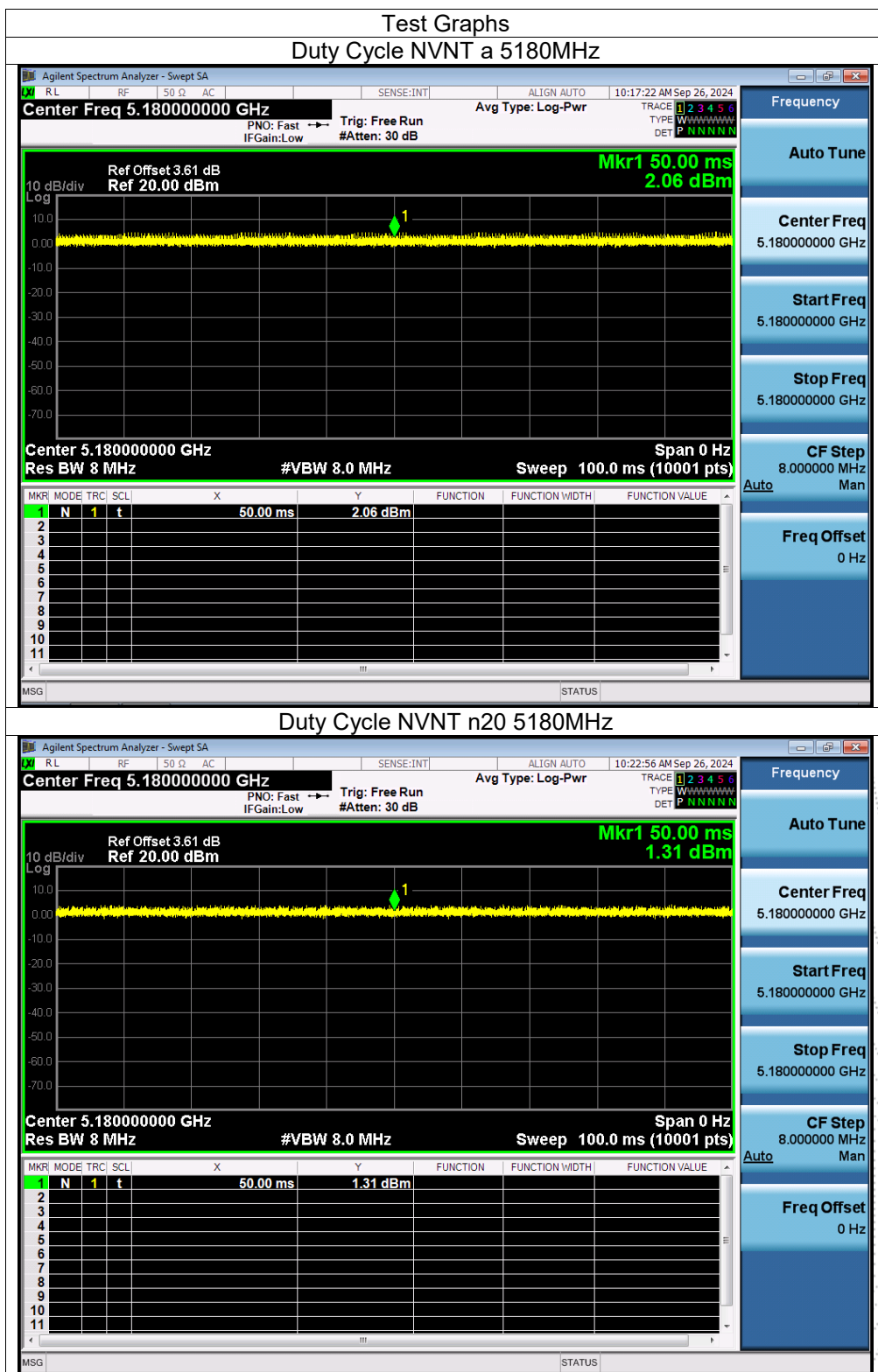
14.3 Test Procedure

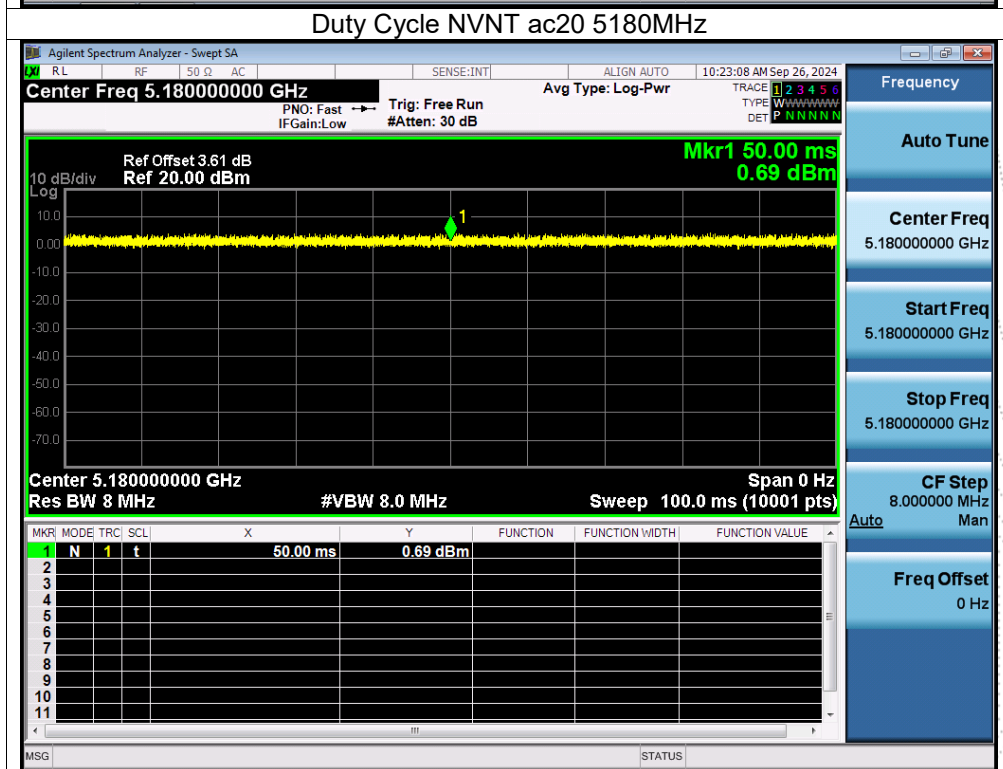
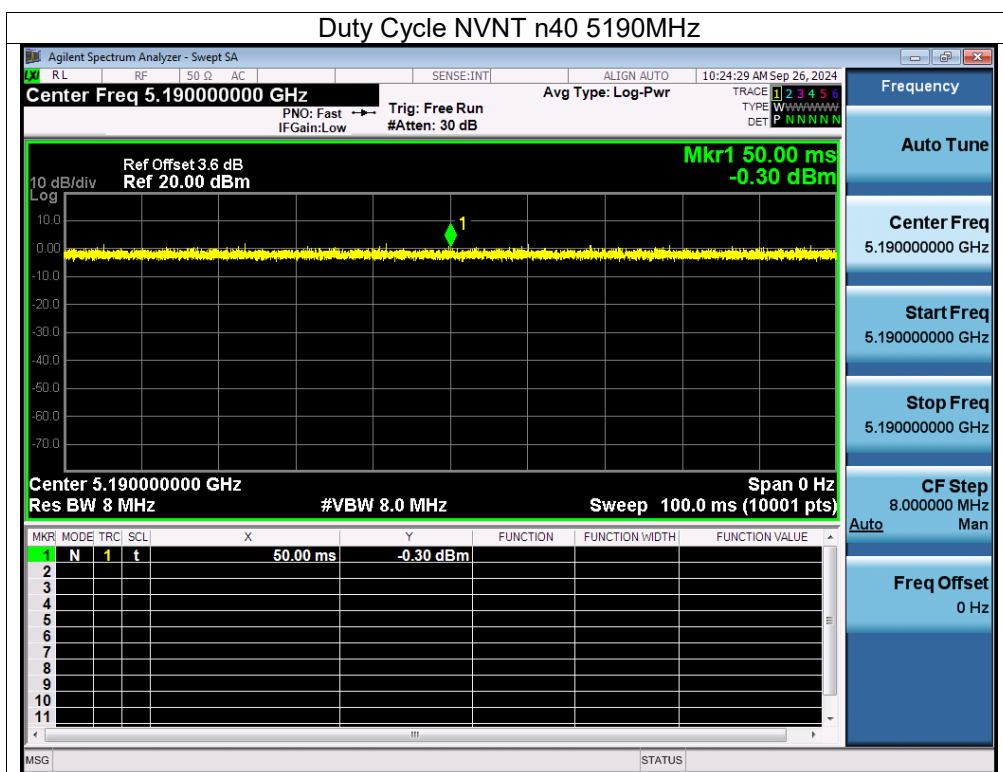
1. Set span = Zero
2. RBW = 8MHz
3. VBW = 8MHz,
4. Detector = Peak

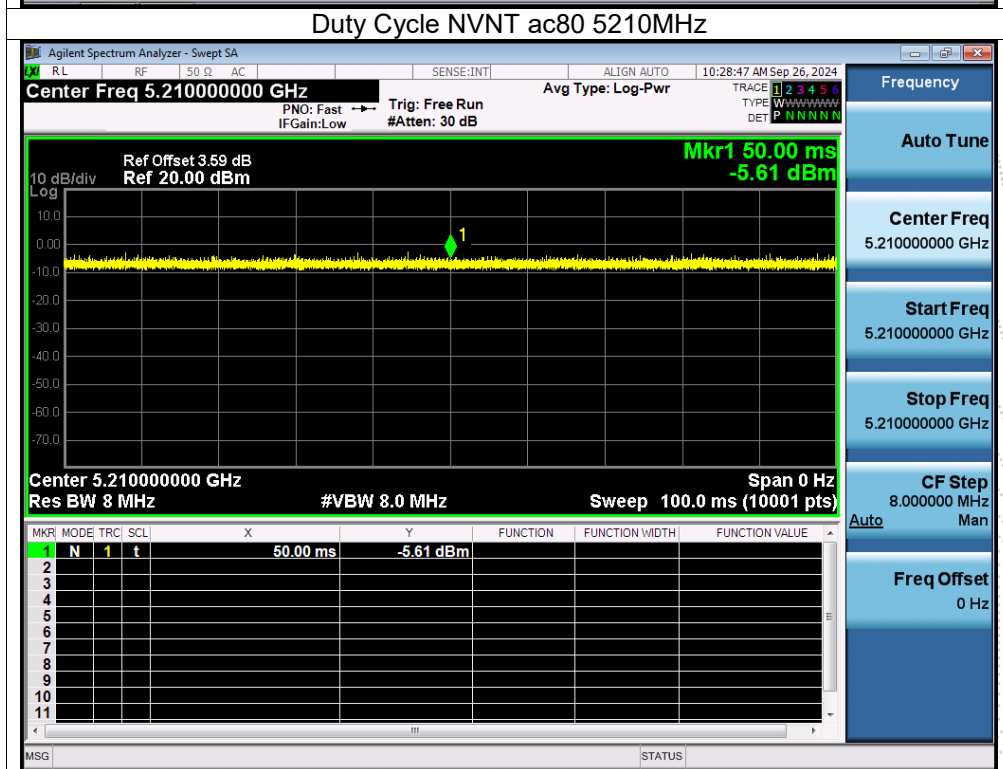
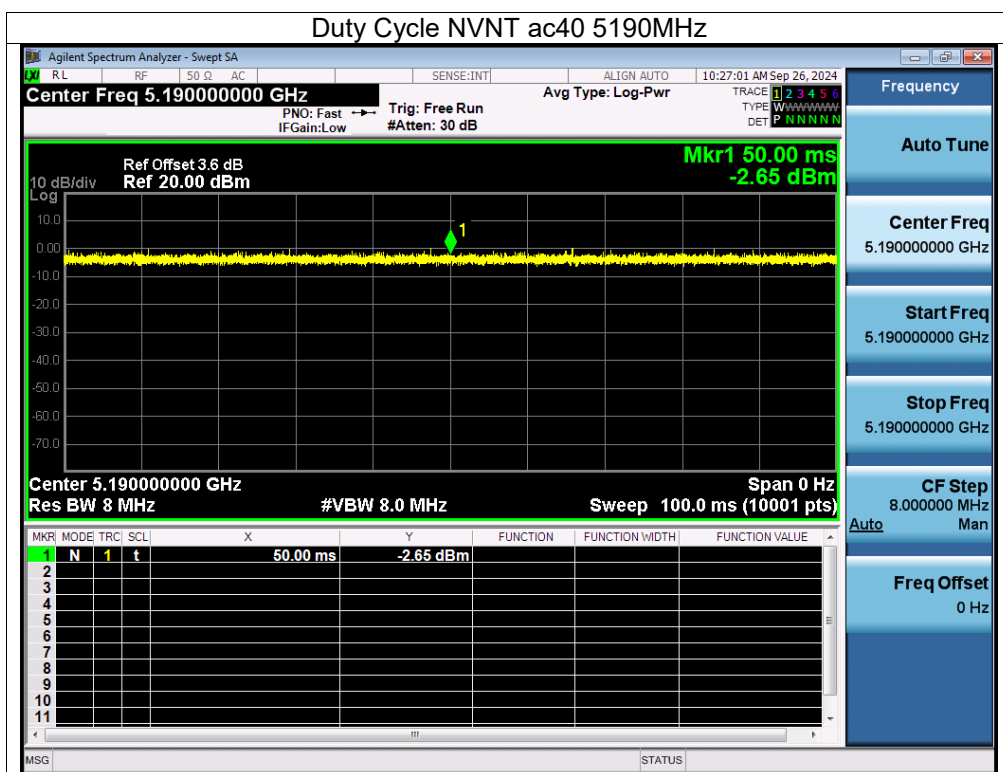
14.4 Test Result

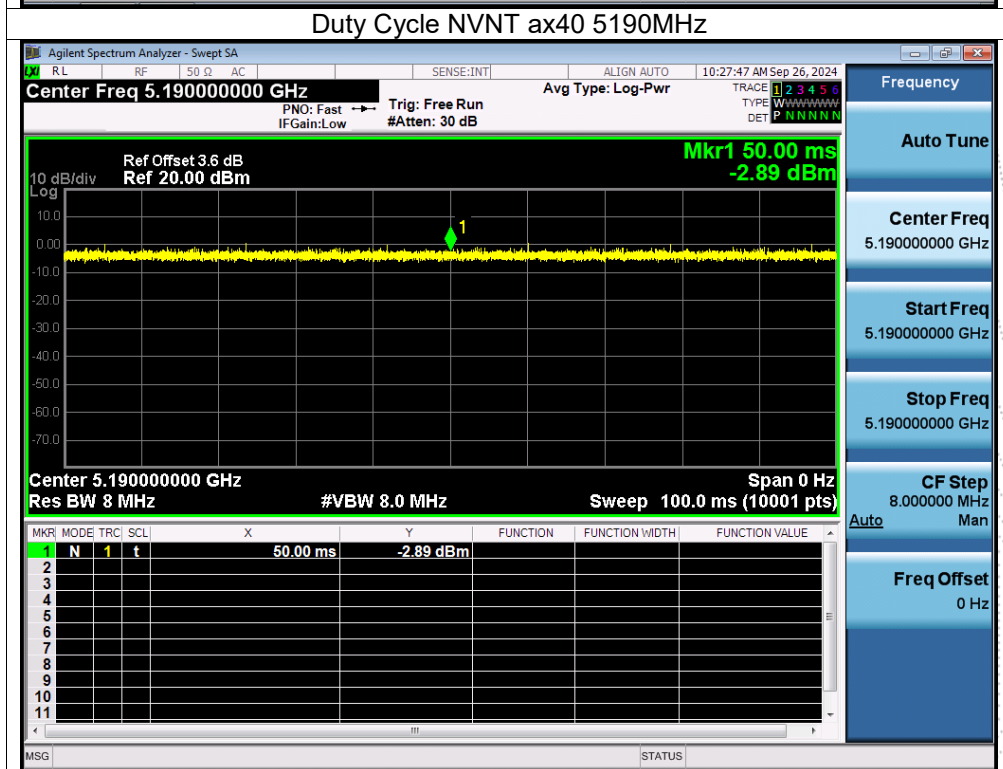
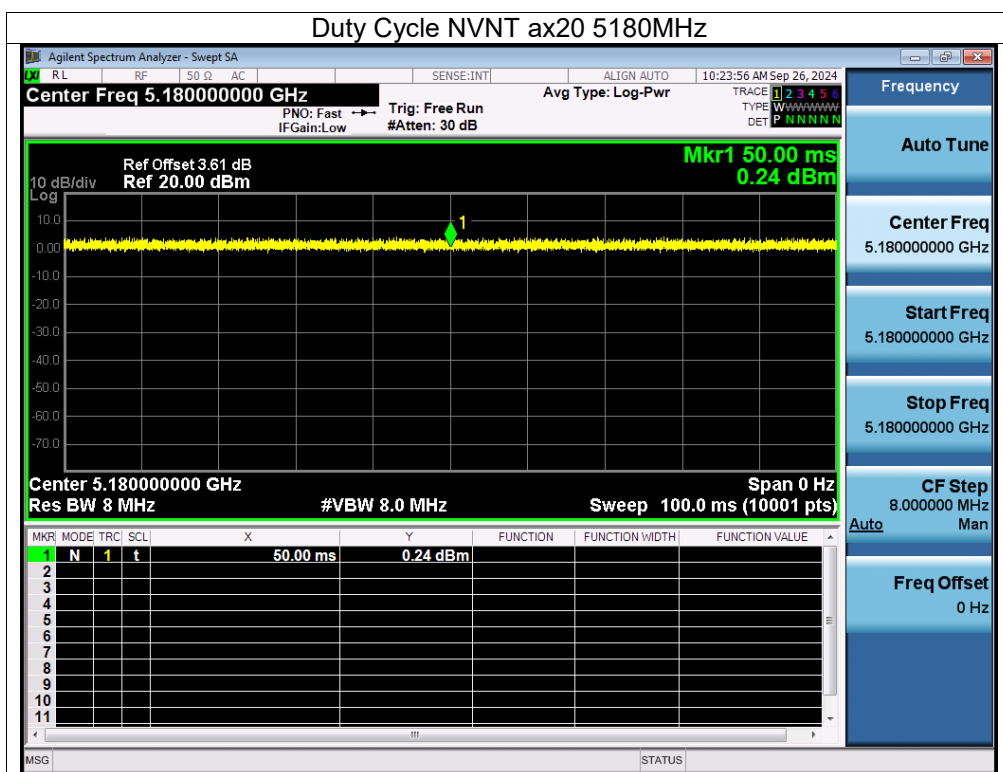
ANT A

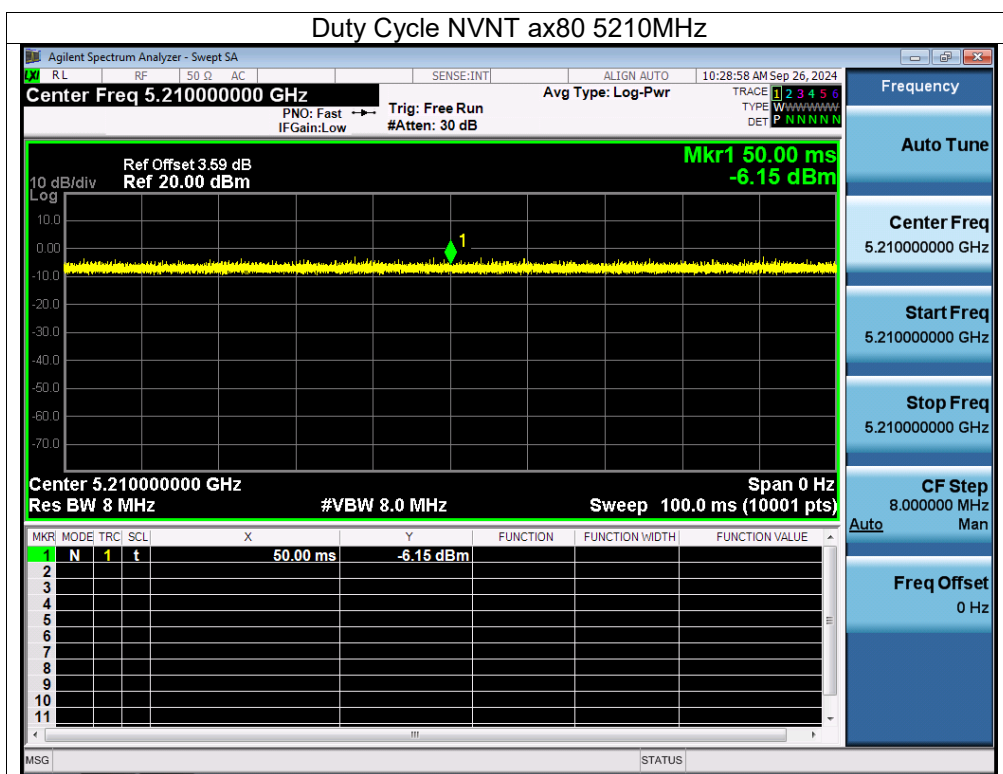
Condition	Mode	Frequency (MHz)	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	a	5180	100	0	0
NVNT	n20	5180	100	0	0
NVNT	n40	5190	100	0	0
NVNT	ac20	5180	100	0	0
NVNT	ac40	5190	100	0	0
NVNT	ac80	5210	100	0	0
NVNT	ax20	5180	100	0	0
NVNT	ax40	5190	100	0	0
NVNT	ax80	5210	100	0	0





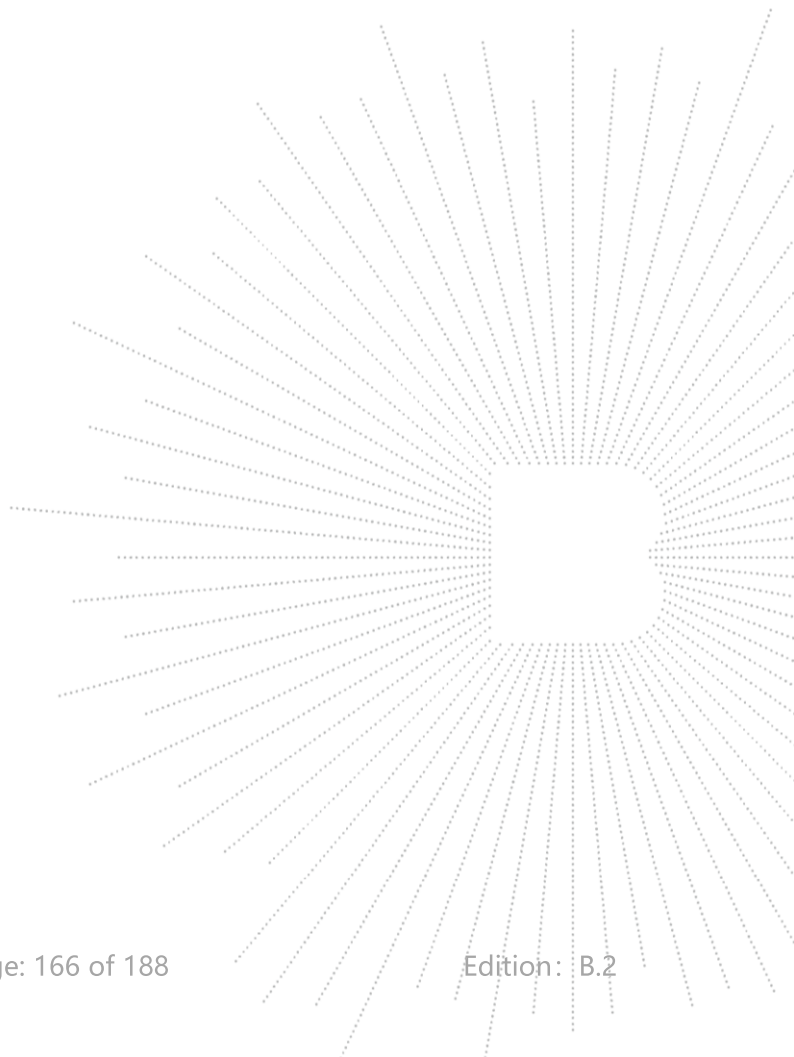


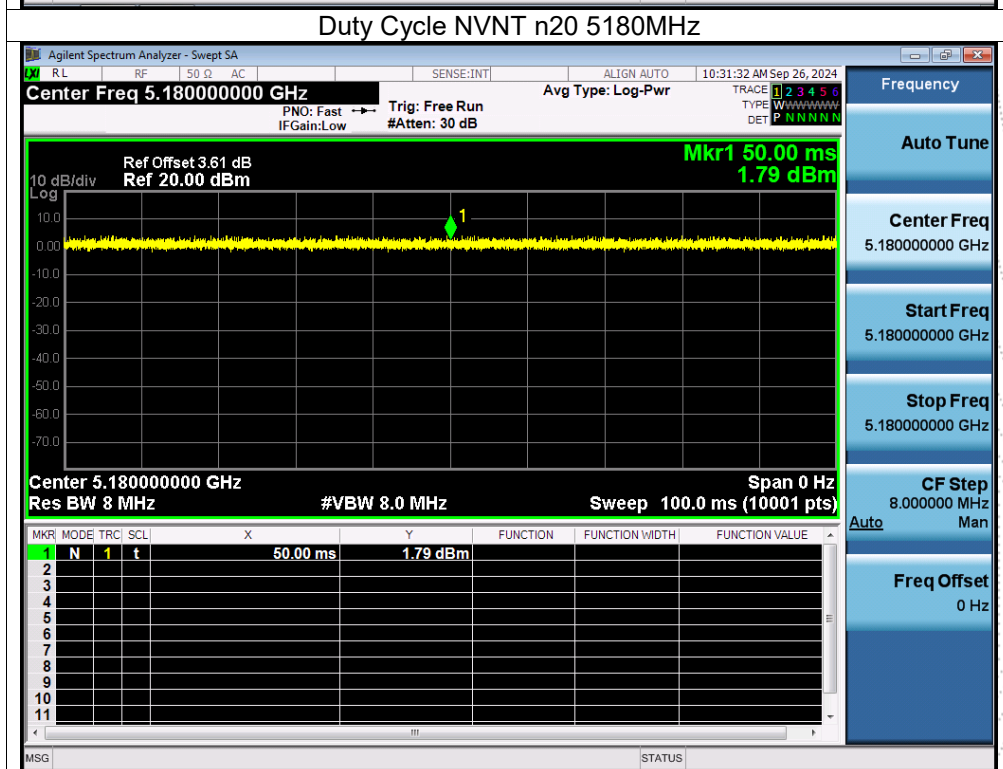
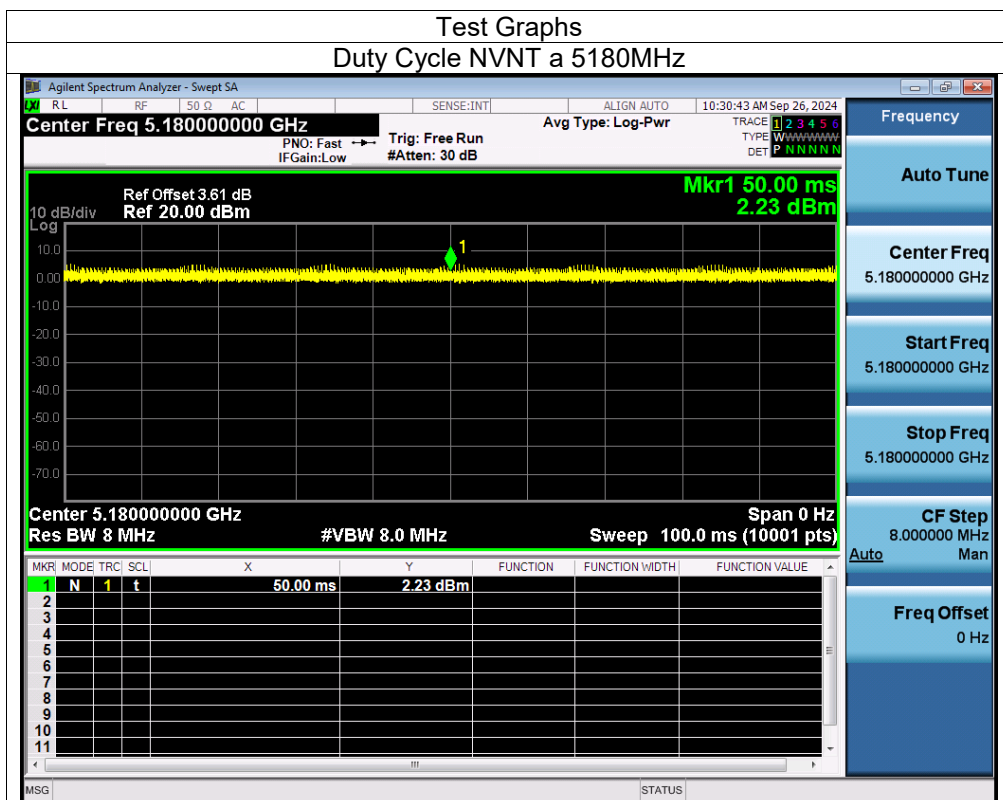


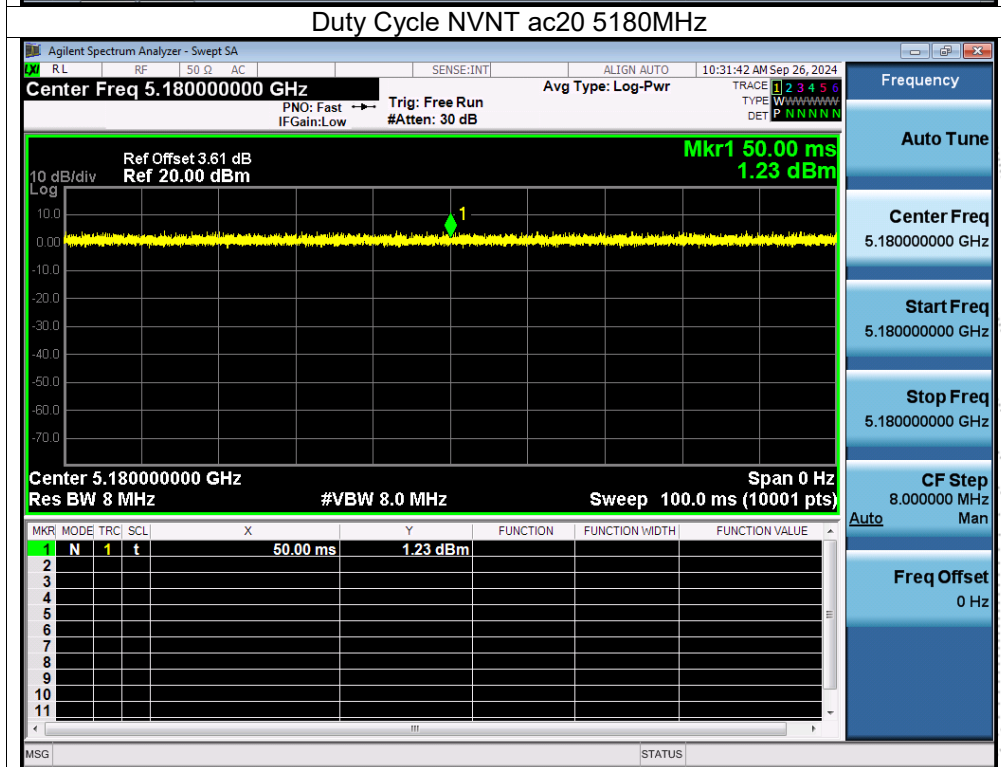
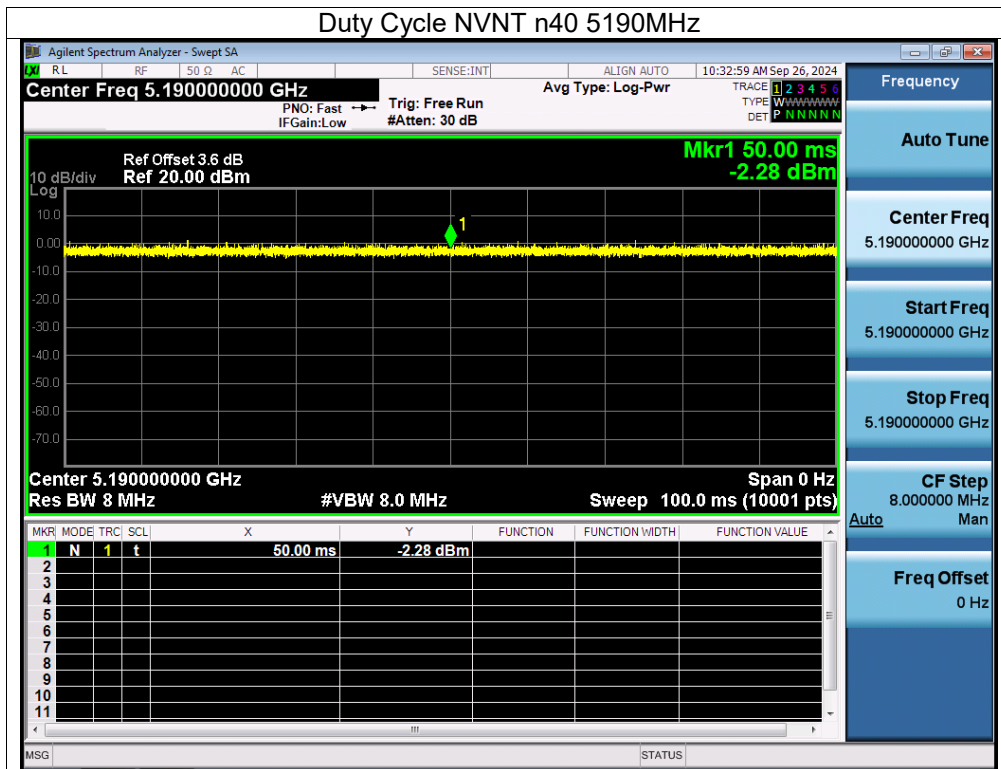


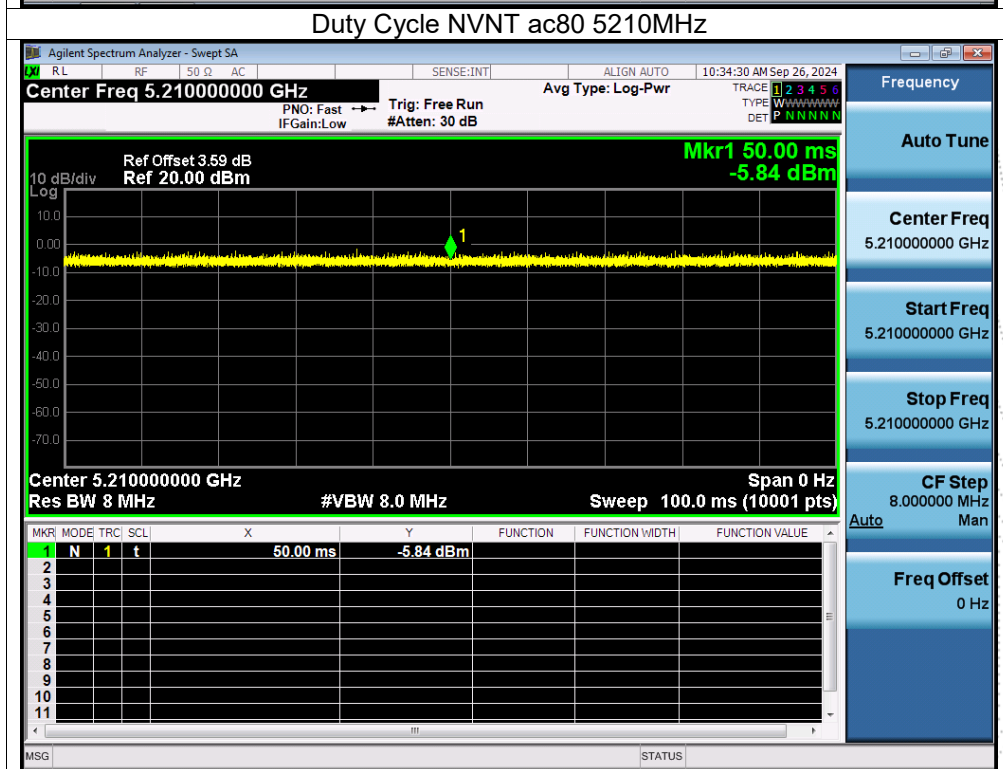
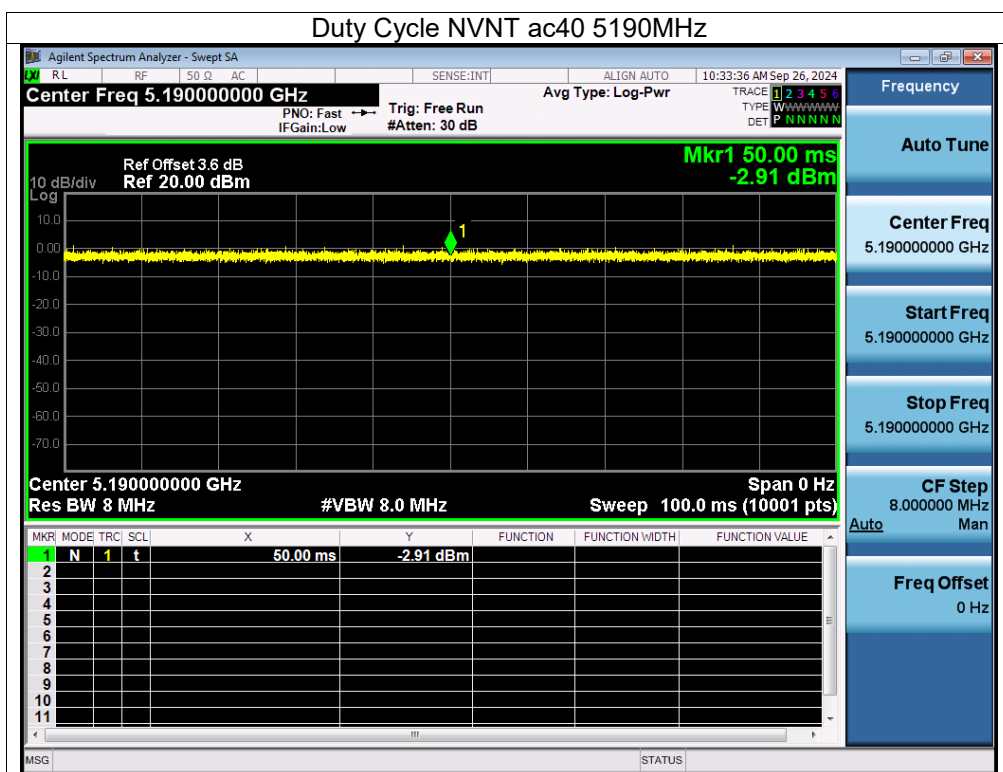
ANT B

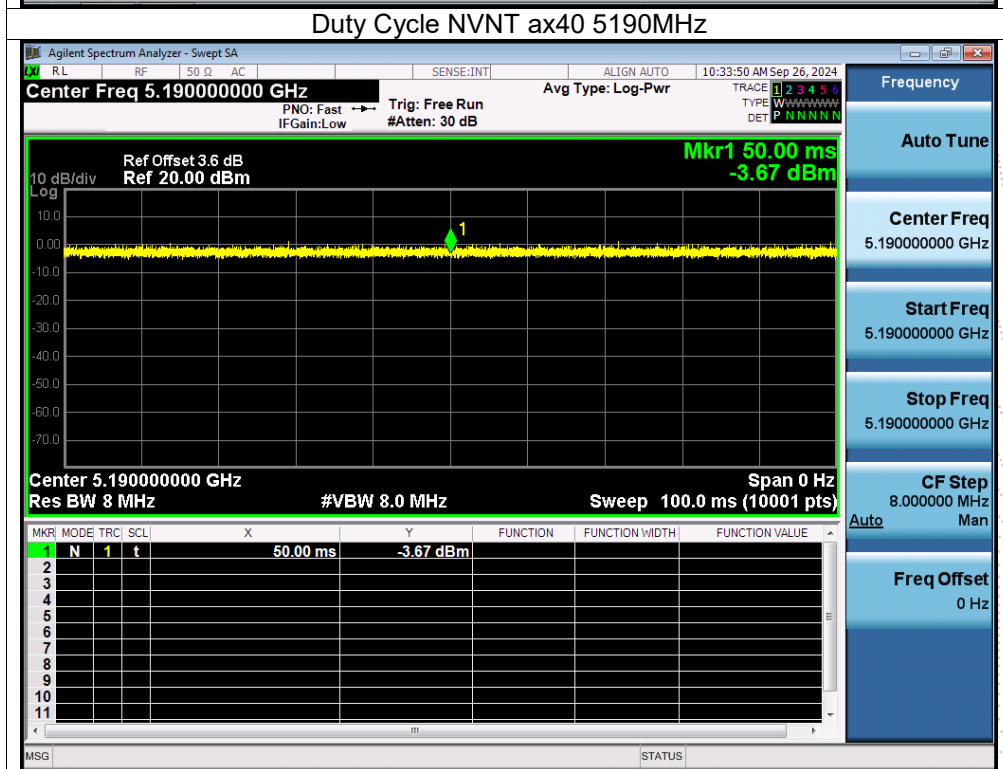
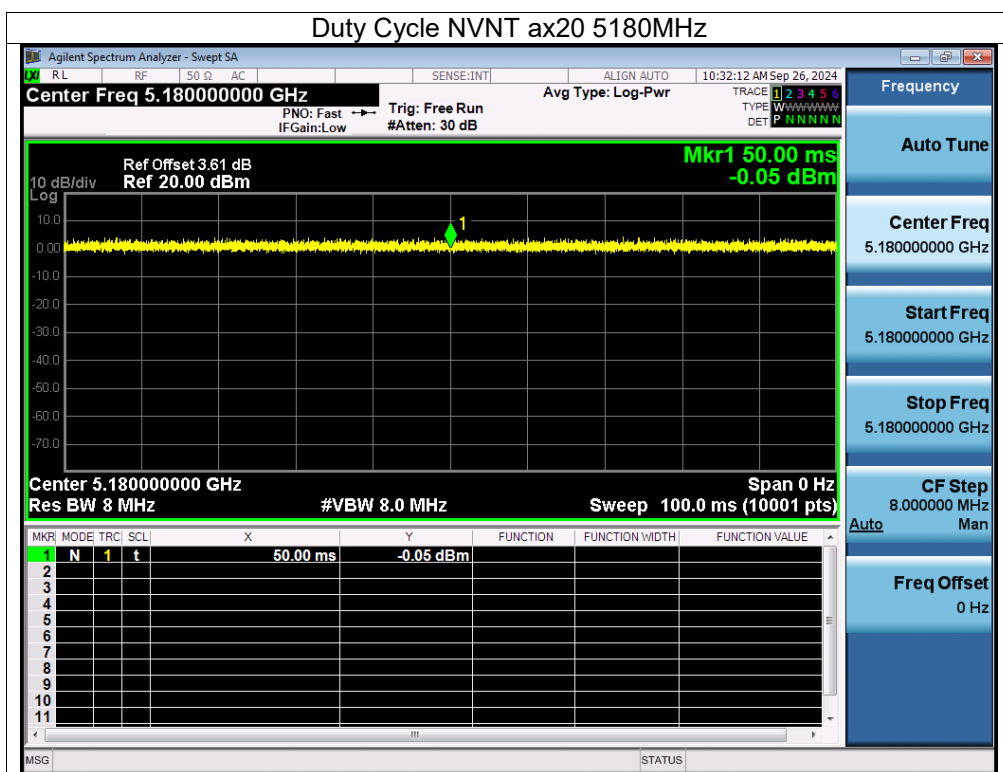
Condition	Mode	Frequency (MHz)	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	a	5180	100	0	0
NVNT	n20	5180	100	0	0
NVNT	n40	5190	100	0	0
NVNT	ac20	5180	100	0	0
NVNT	ac40	5190	100	0	0
NVNT	ac80	5210	100	0	0
NVNT	ax20	5180	100	0	0
NVNT	ax40	5190	100	0	0
NVNT	ax80	5210	100	0	0

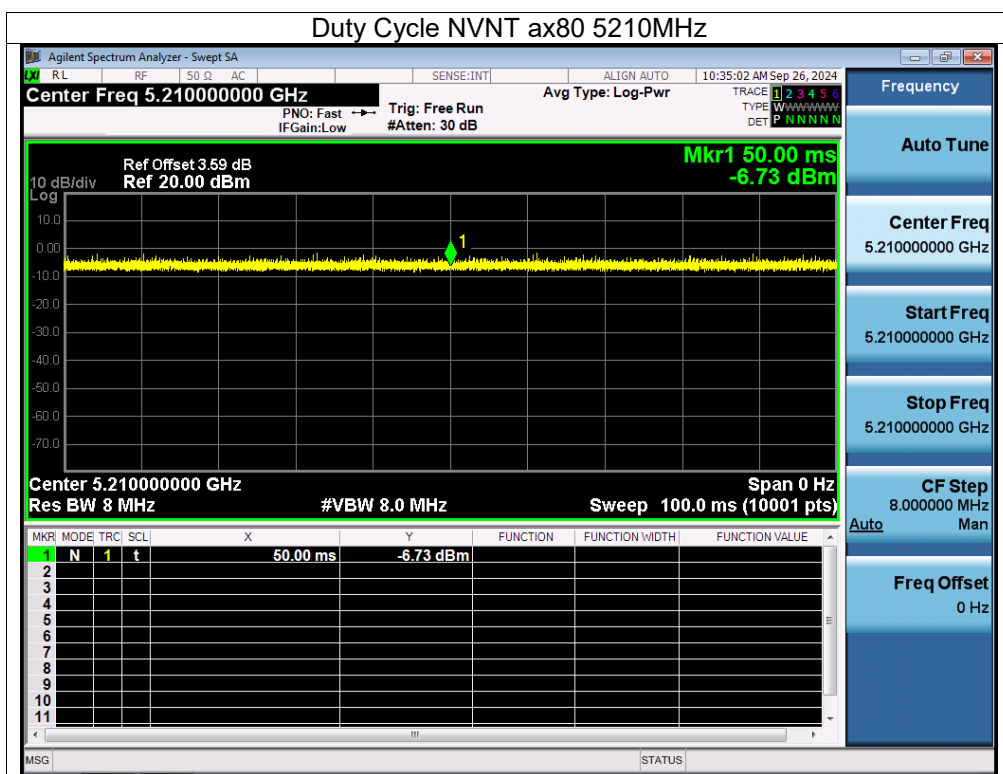






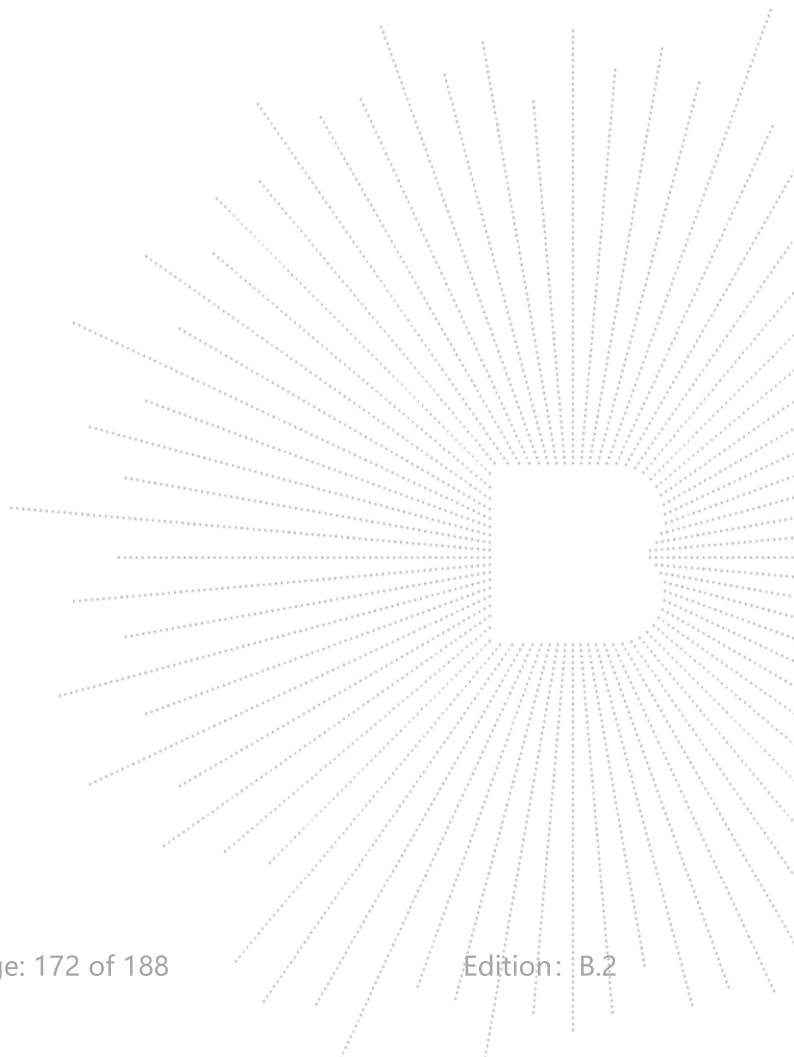


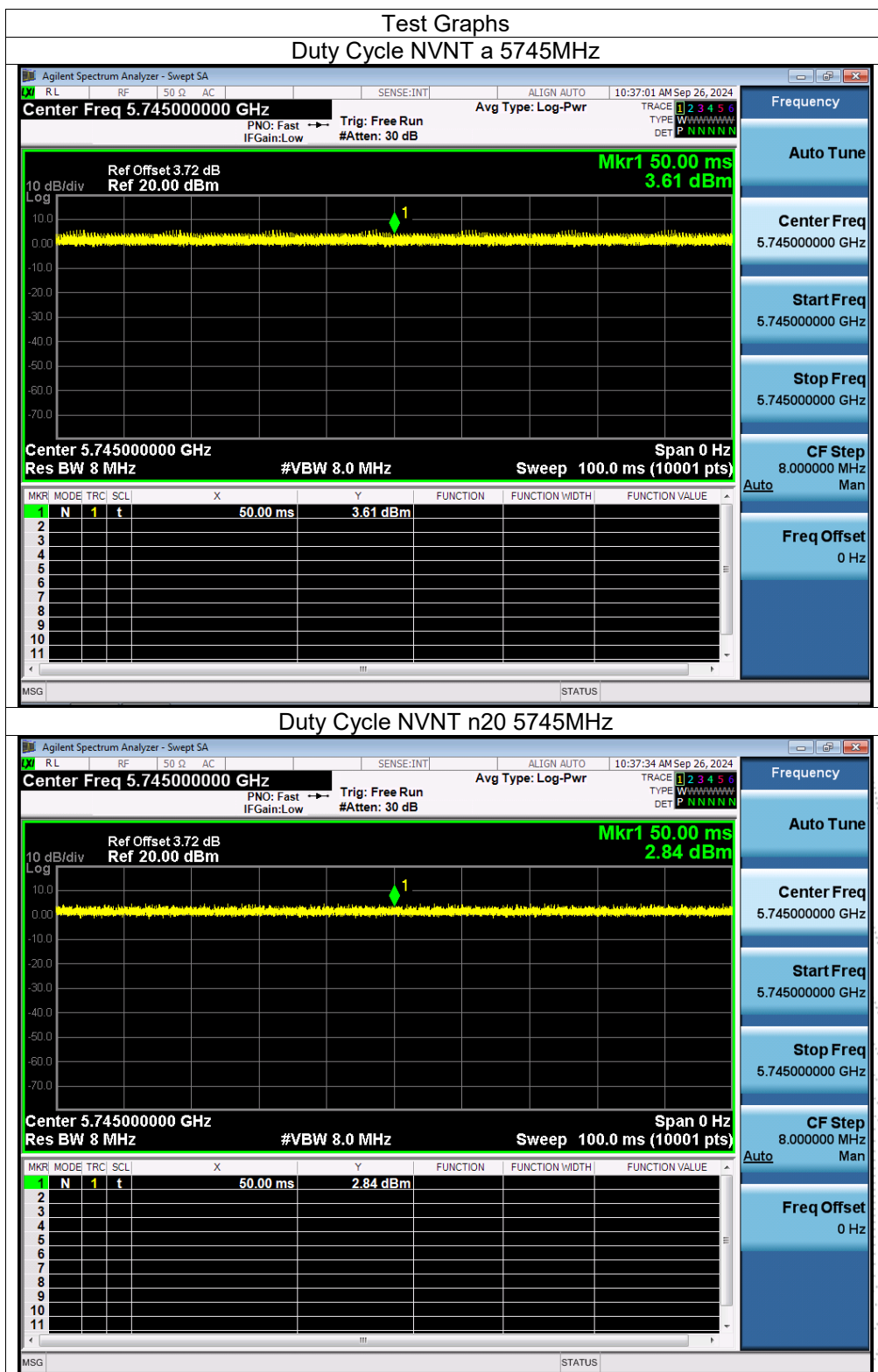


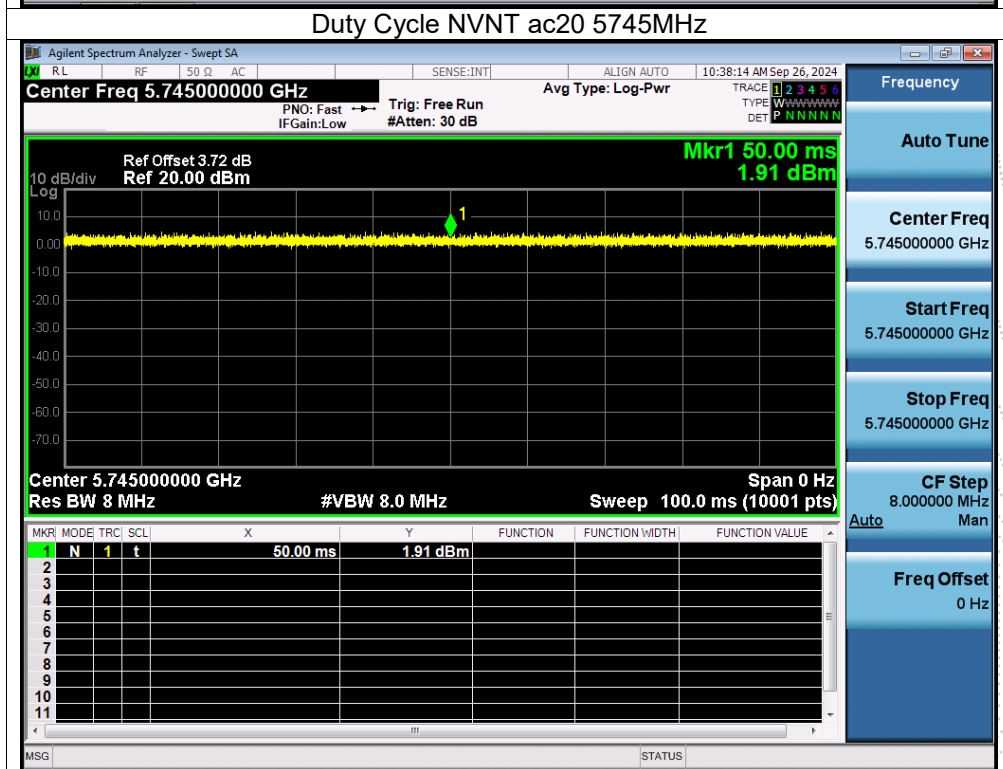
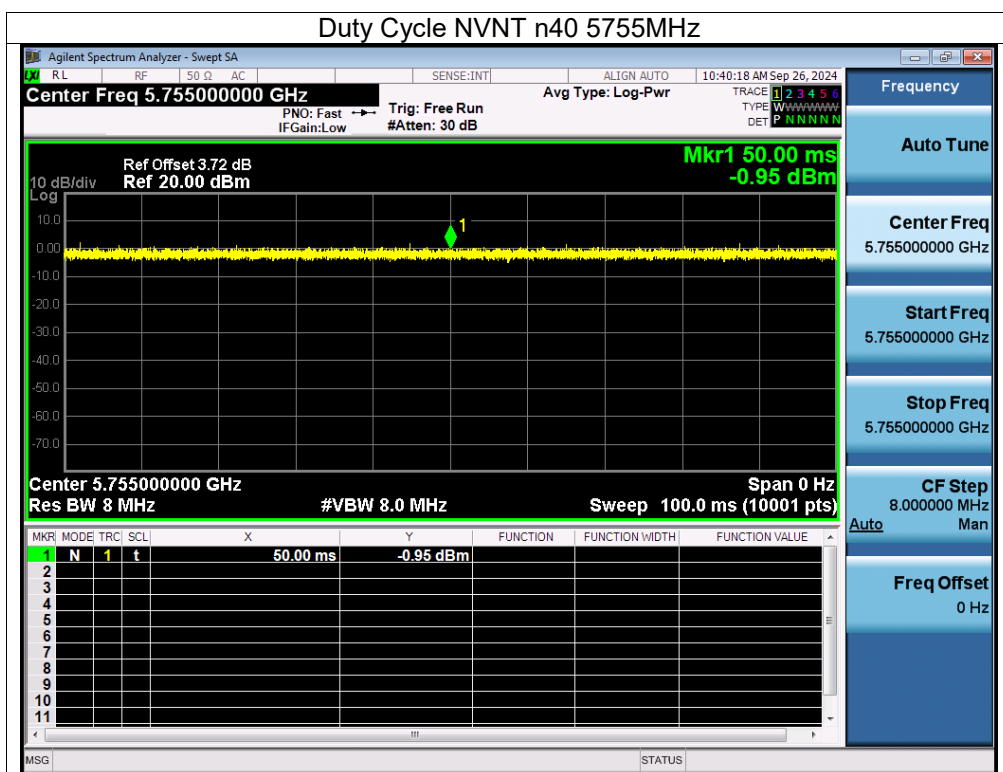


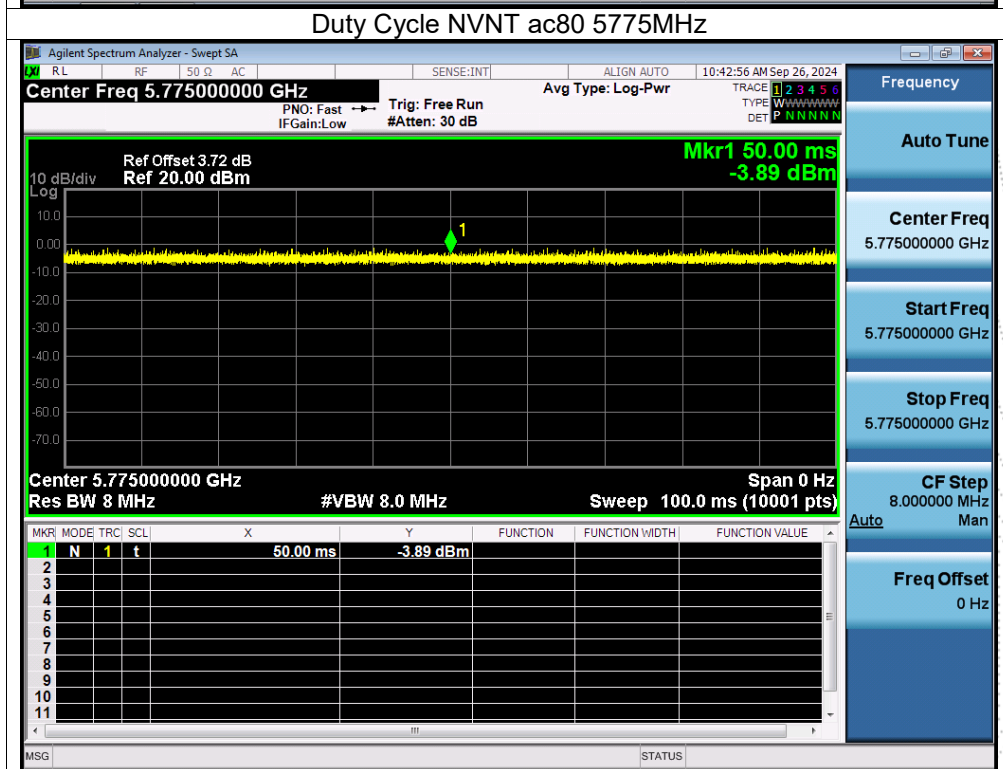
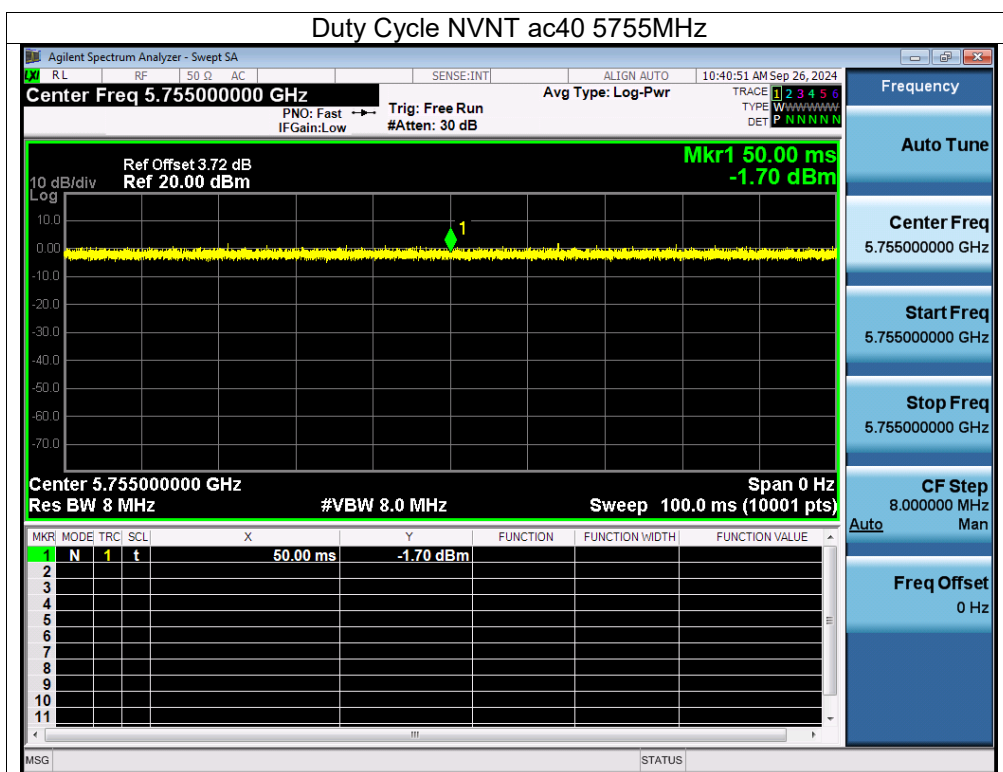
ANT A

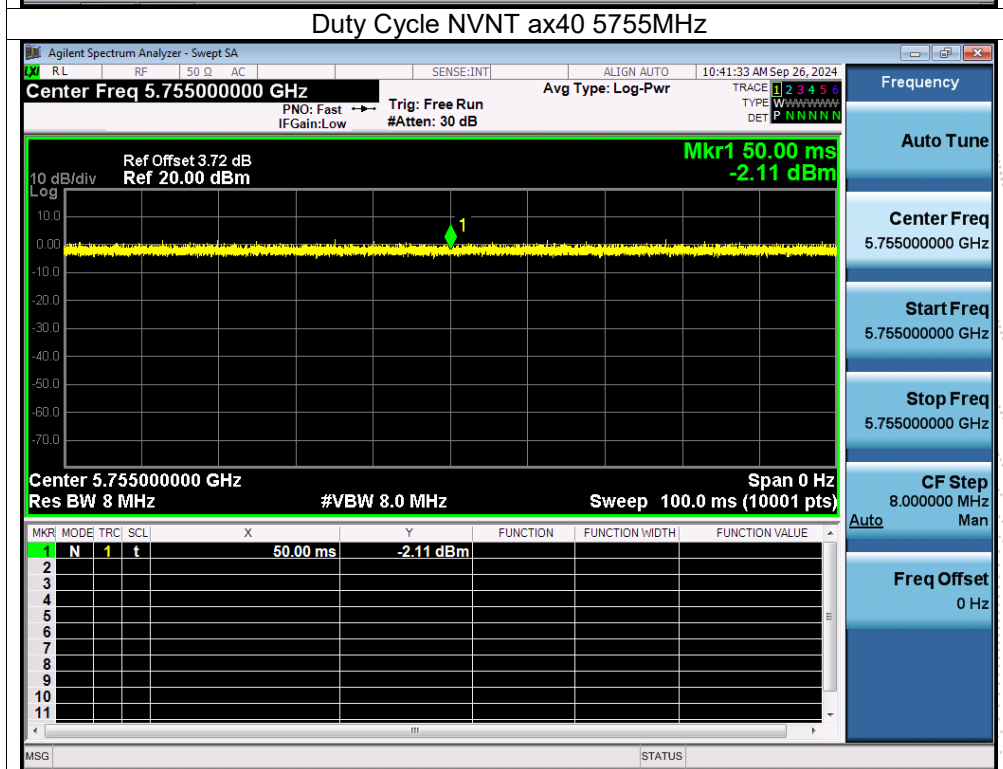
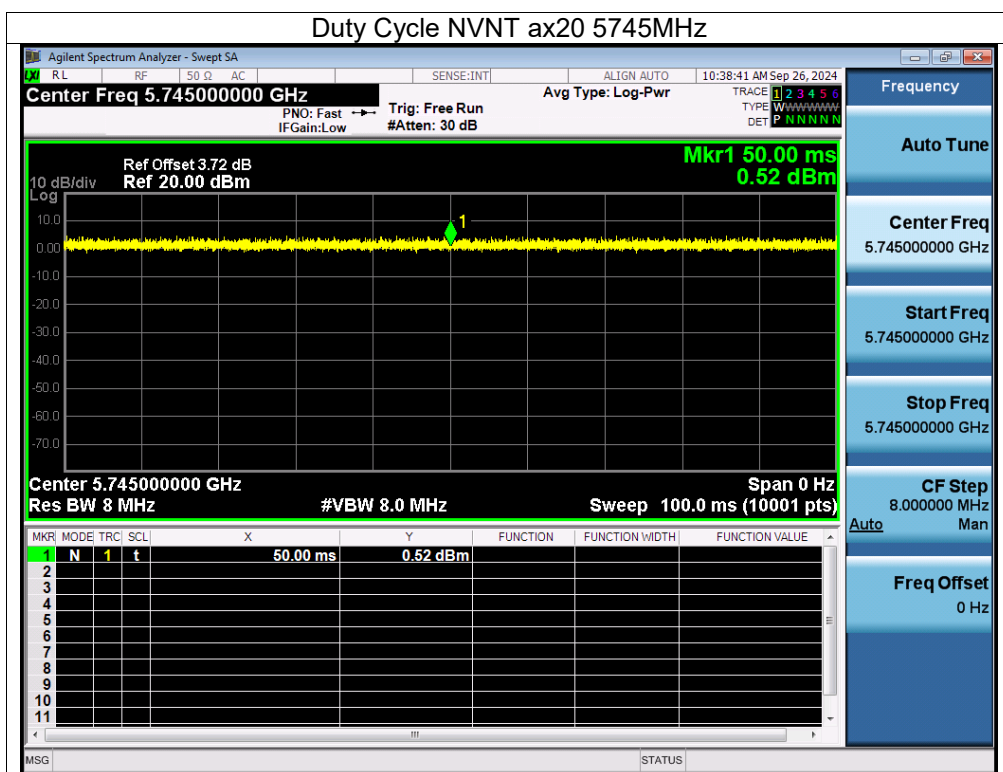
Condition	Mode	Frequency (MHz)	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	a	5745	100	0	0
NVNT	n20	5745	100	0	0
NVNT	n40	5755	100	0	0
NVNT	ac20	5745	100	0	0
NVNT	ac40	5755	100	0	0
NVNT	ac80	5775	100	0	0
NVNT	ax20	5745	100	0	0
NVNT	ax40	5755	100	0	0
NVNT	ax80	5775	100	0	0

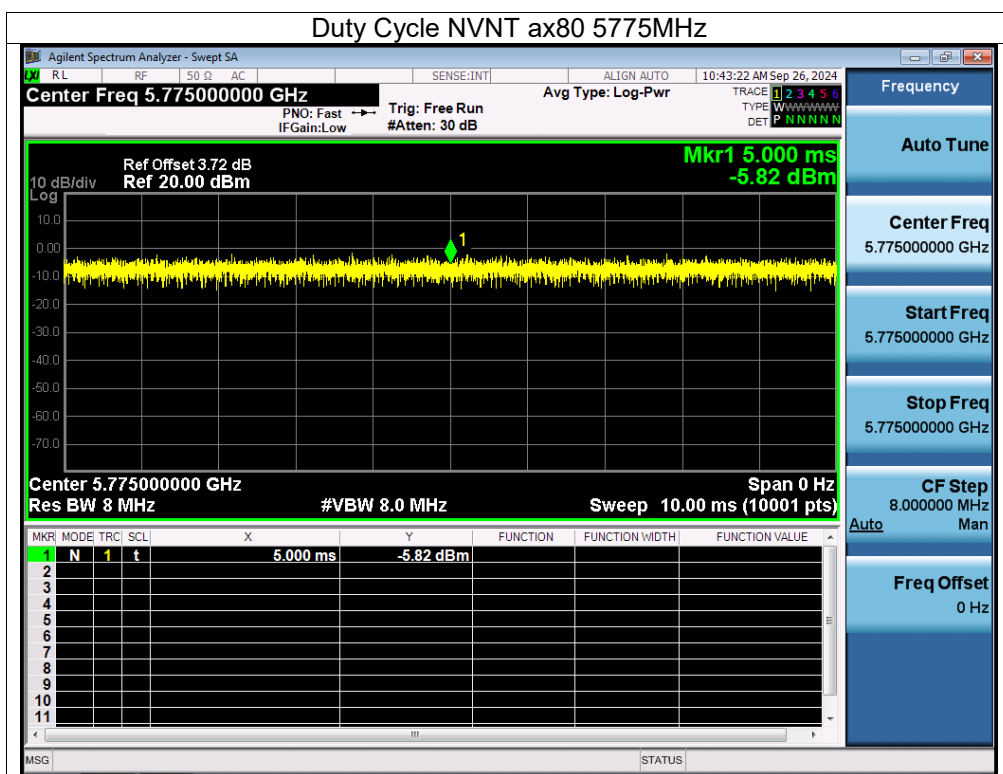












ANT B

Condition	Mode	Frequency (MHz)	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	a	5745	100	0	0
NVNT	n20	5745	100	0	0
NVNT	n40	5755	100	0	0
NVNT	ac20	5745	100	0	0
NVNT	ac40	5755	100	0	0
NVNT	ac80	5775	100	0	0
NVNT	ax20	5745	100	0	0
NVNT	ax40	5755	100	0	0
NVNT	ax80	5775	100	0	0

