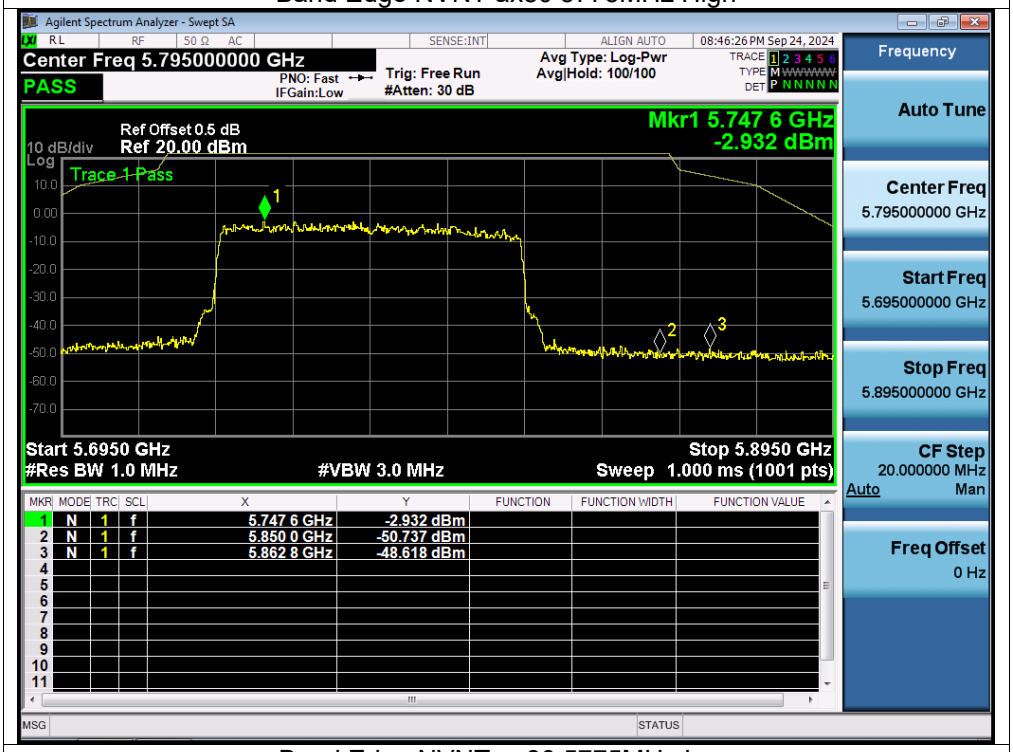
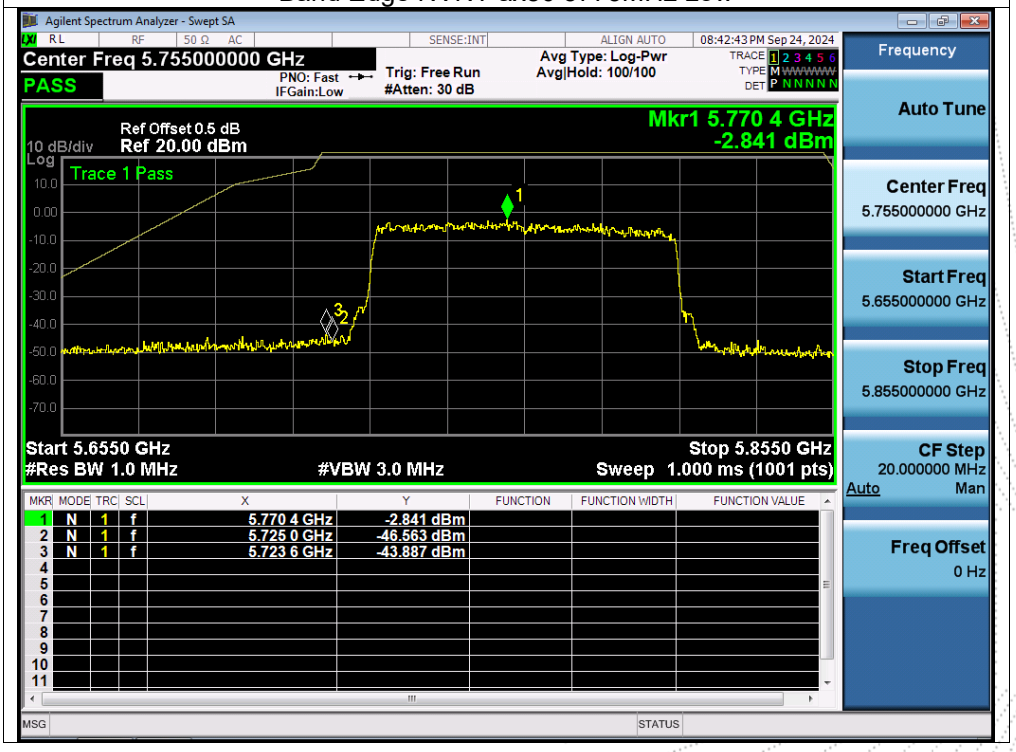
Band Edge NVNT ax80 5775MHz High

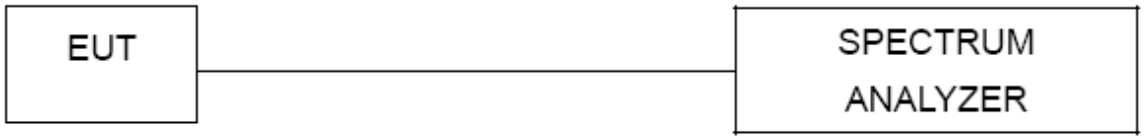


Band Edge NVNT ax80 5775MHz Low



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.

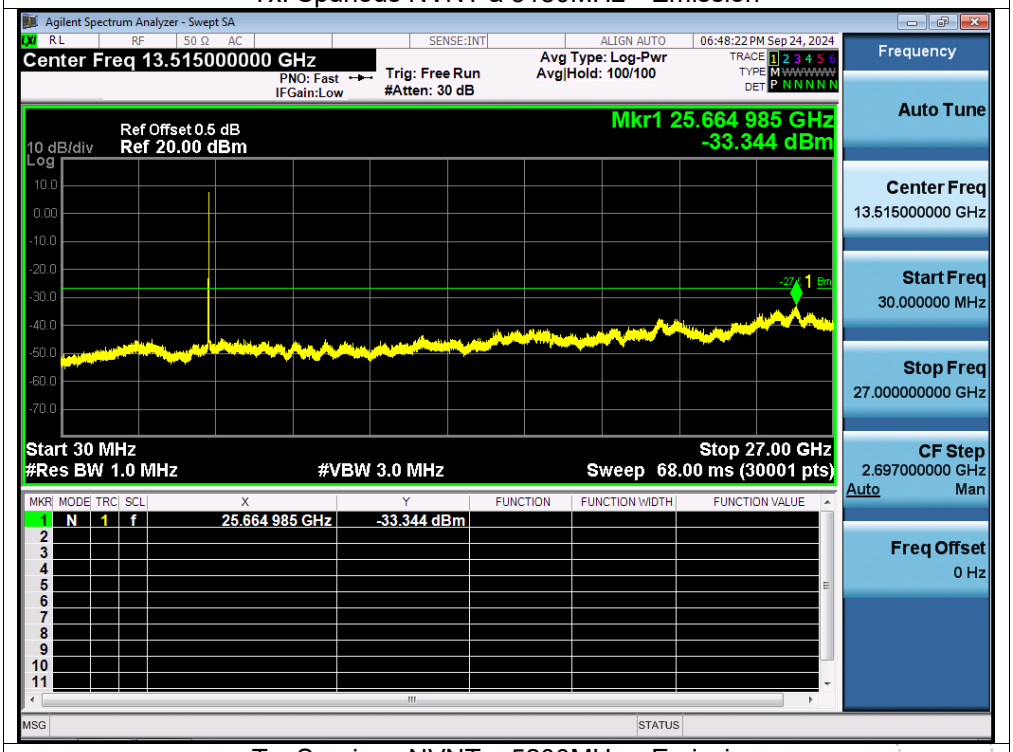
12.4 Test Result

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.

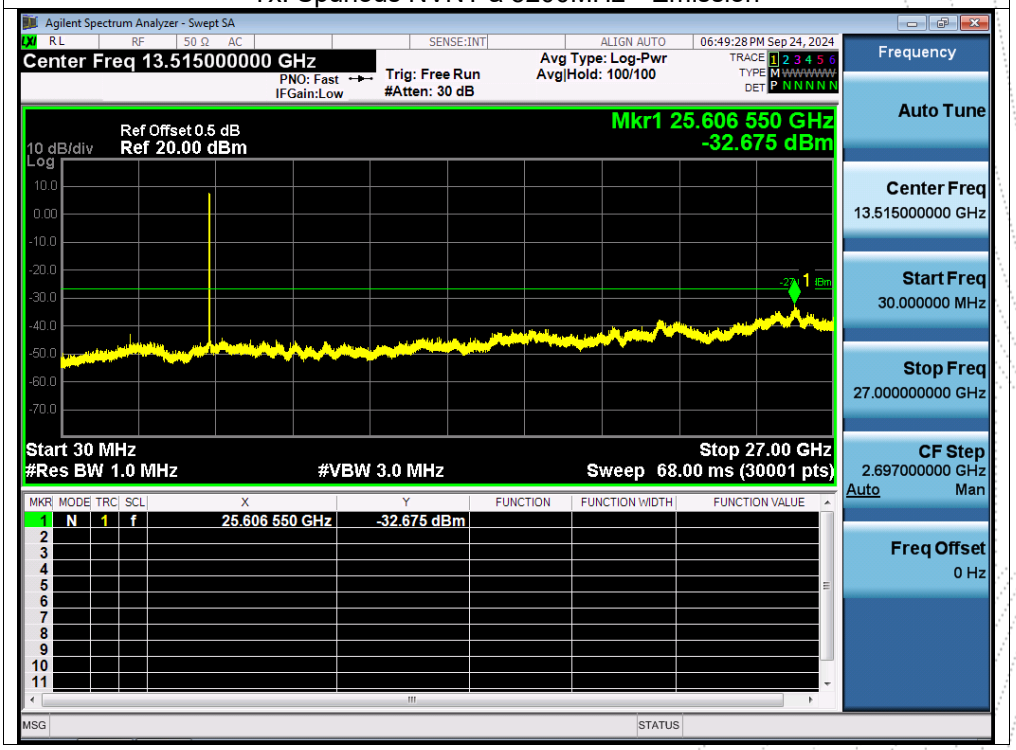
Note: A(B) Represent the value of antenna A and B, The worst data is Antenna A, only shown Antenna A Plot. 5180-5240MHz

Test Graphs

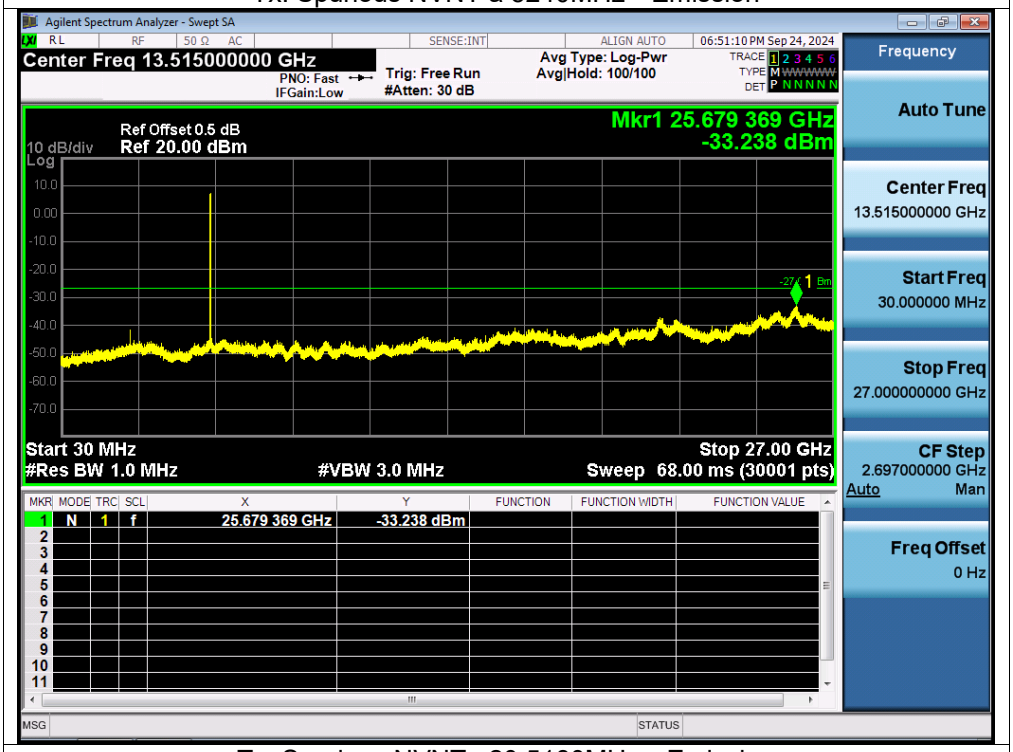
Tx. Spurious NVNT a 5180MHz Emission



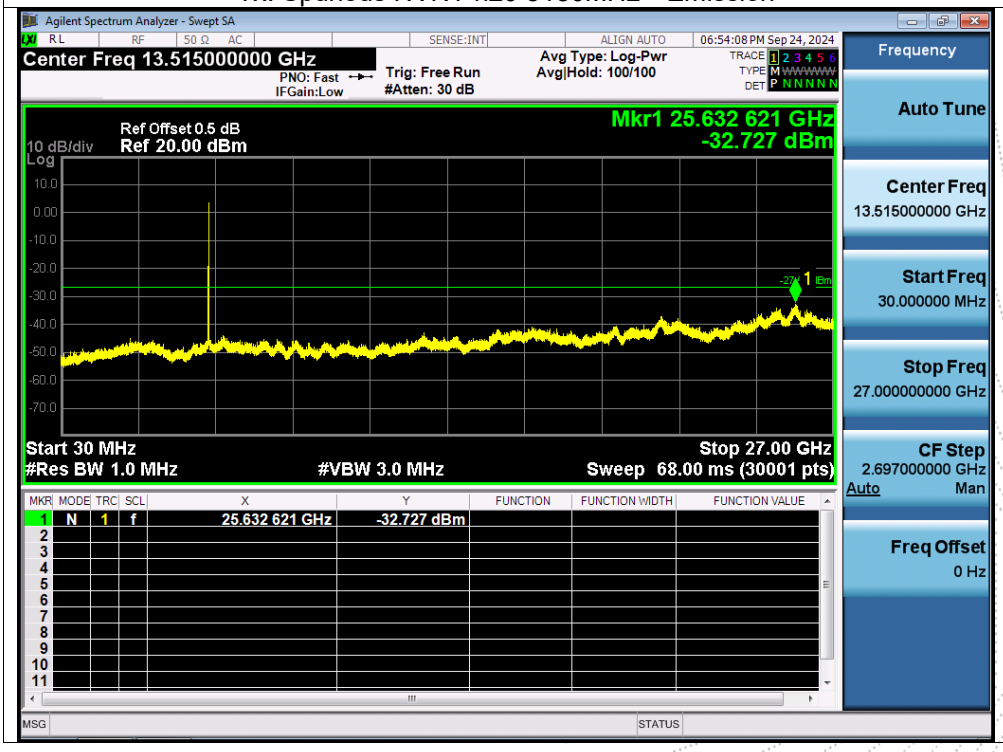
Tx. Spurious NVNT a 5200MHz Emission



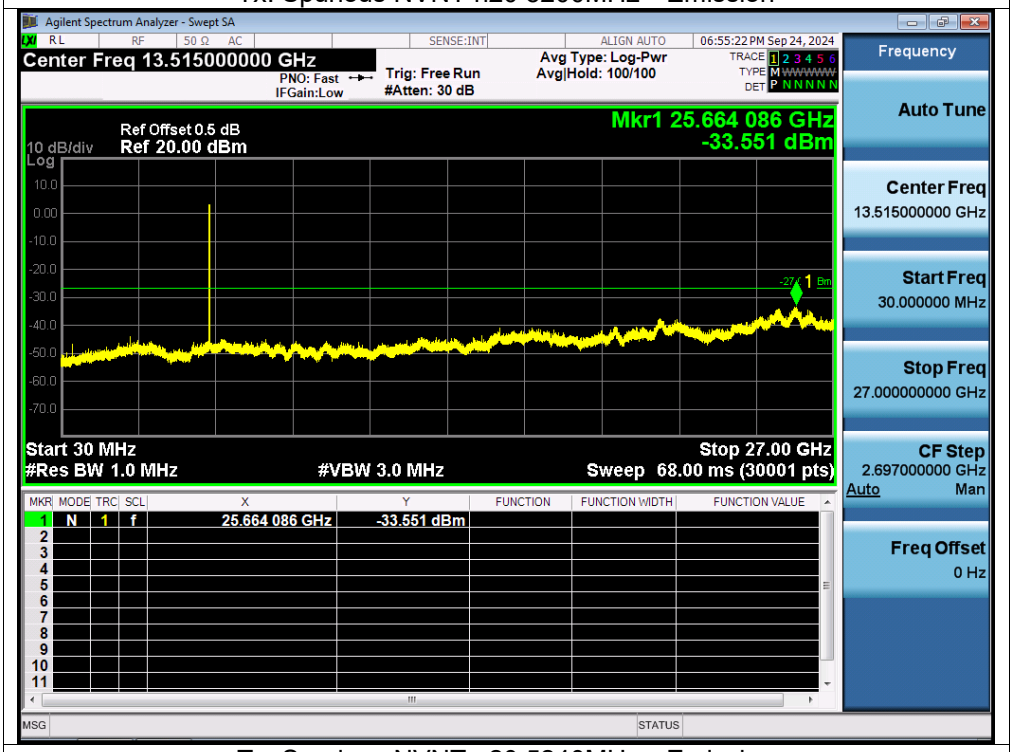
Tx. Spurious NVNT a 5240MHz Emission



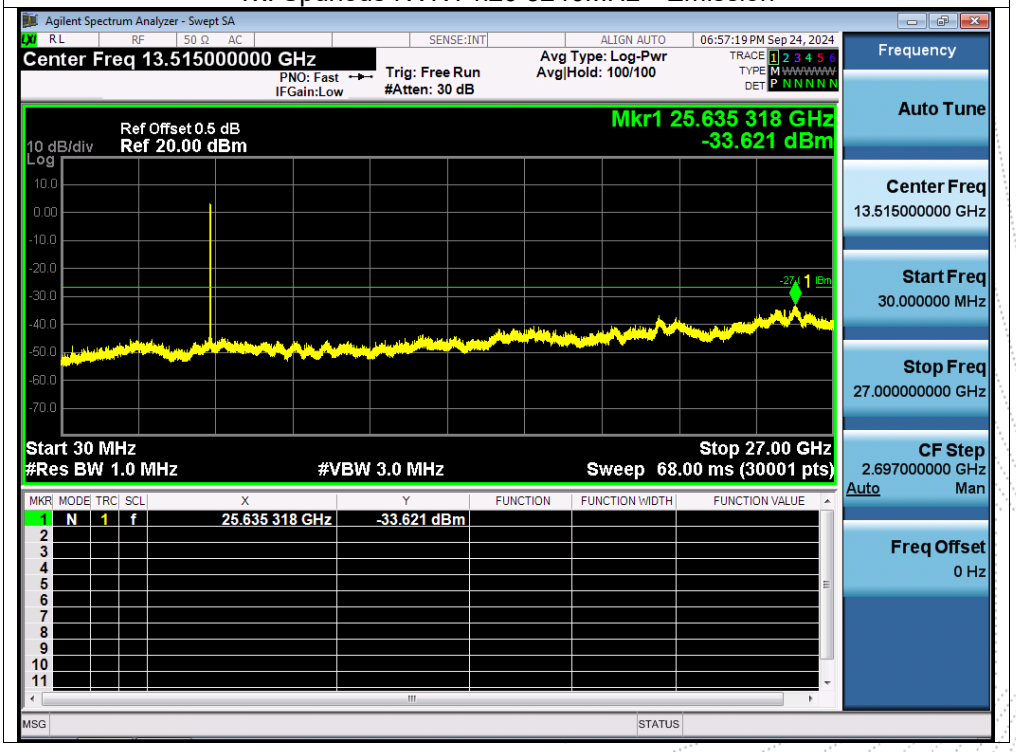
Tx. Spurious NVNT n20 5180MHz Emission



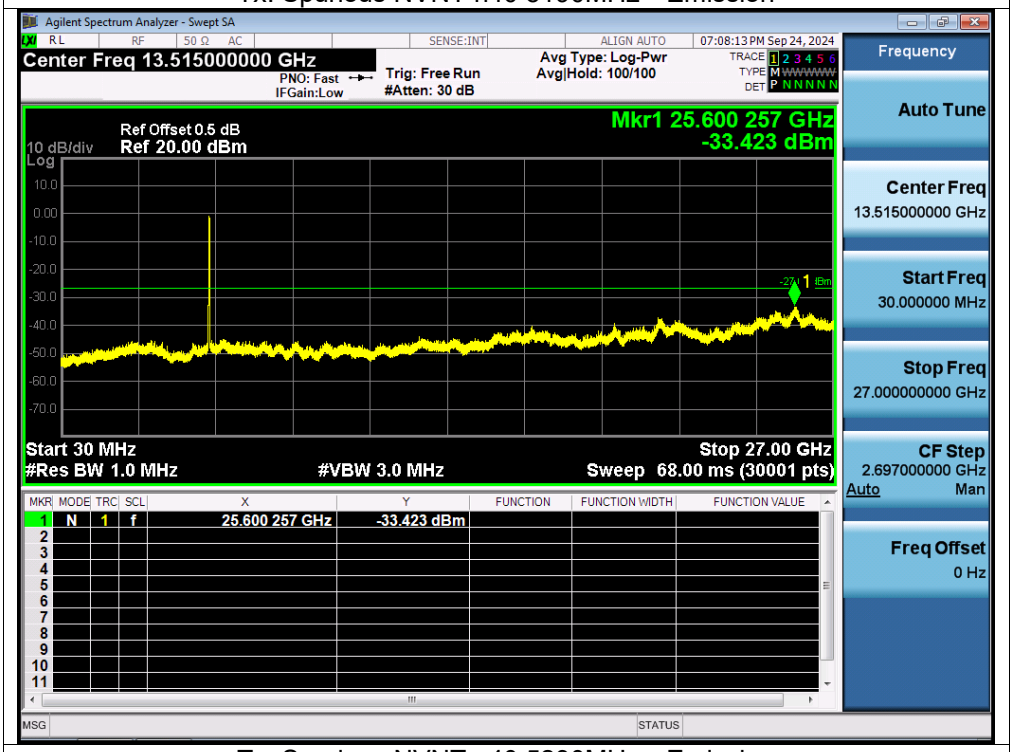
Tx. Spurious NVNT n20 5200MHz Emission



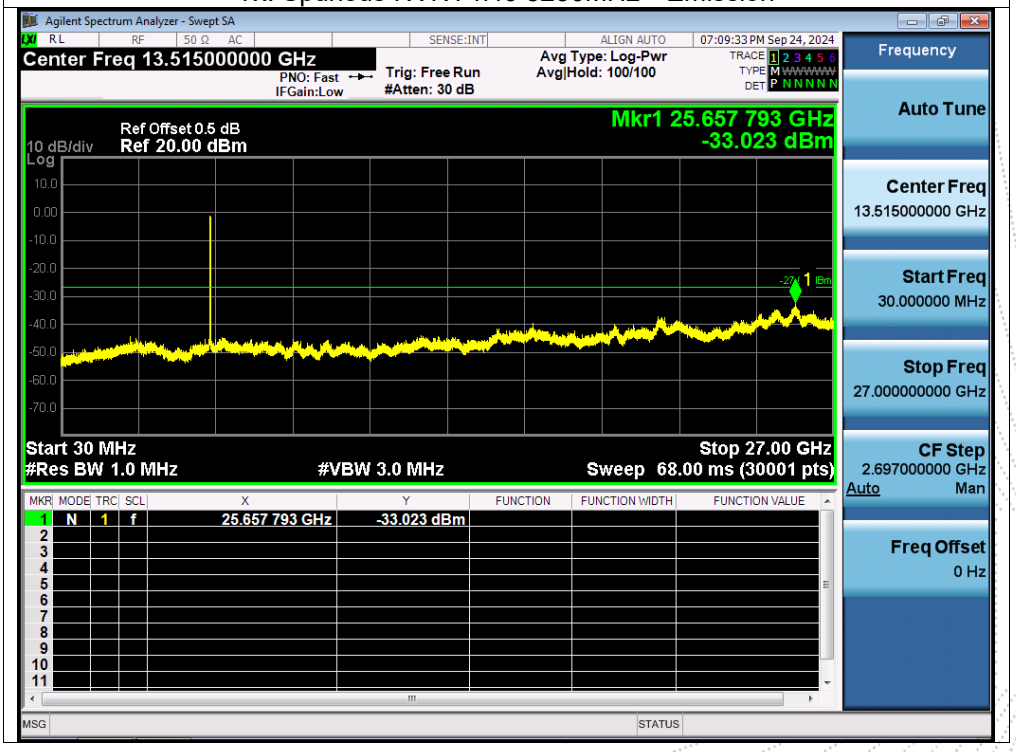
Tx. Spurious NVNT n20 5240MHz Emission



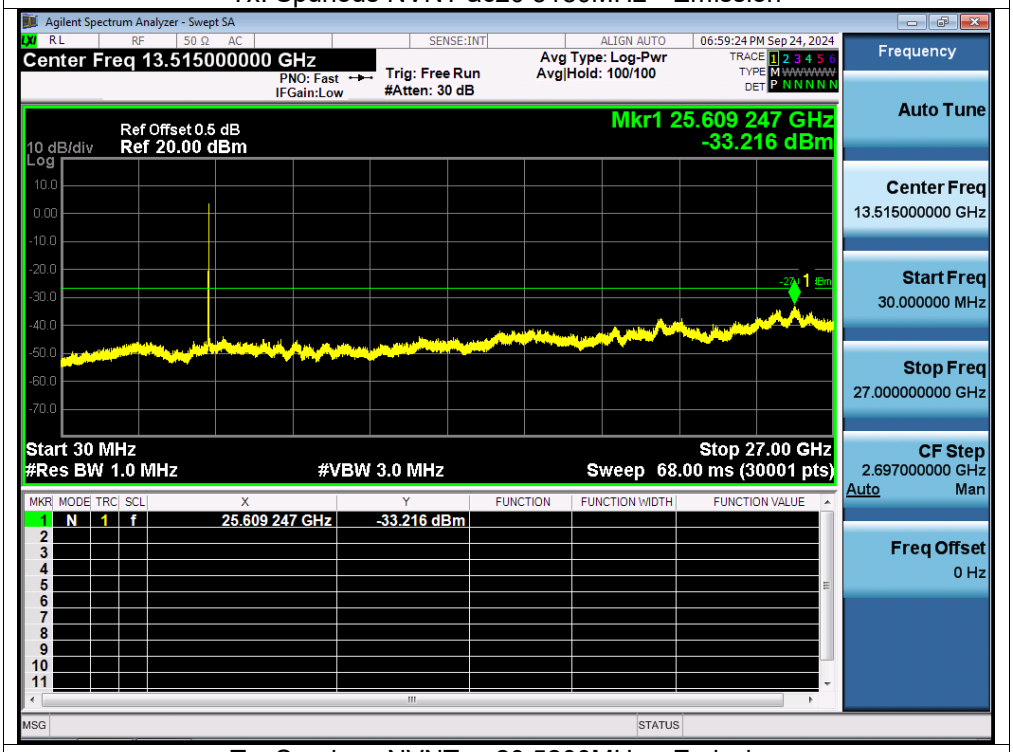
Tx. Spurious NVNT n40 5190MHz Emission



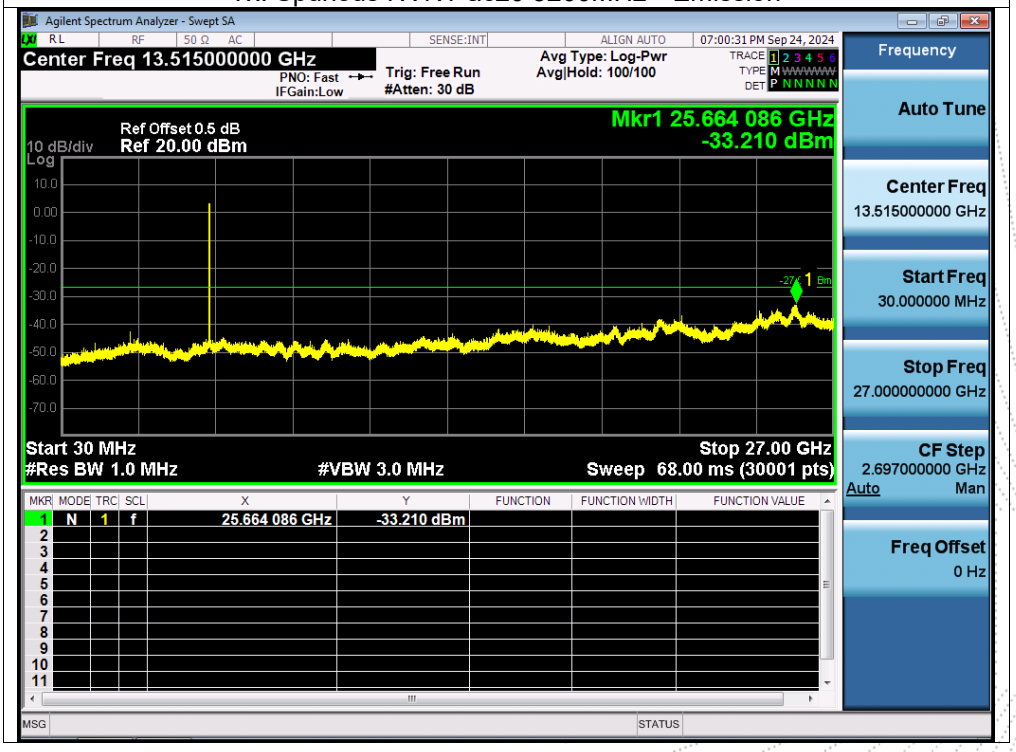
Tx. Spurious NVNT n40 5230MHz Emission



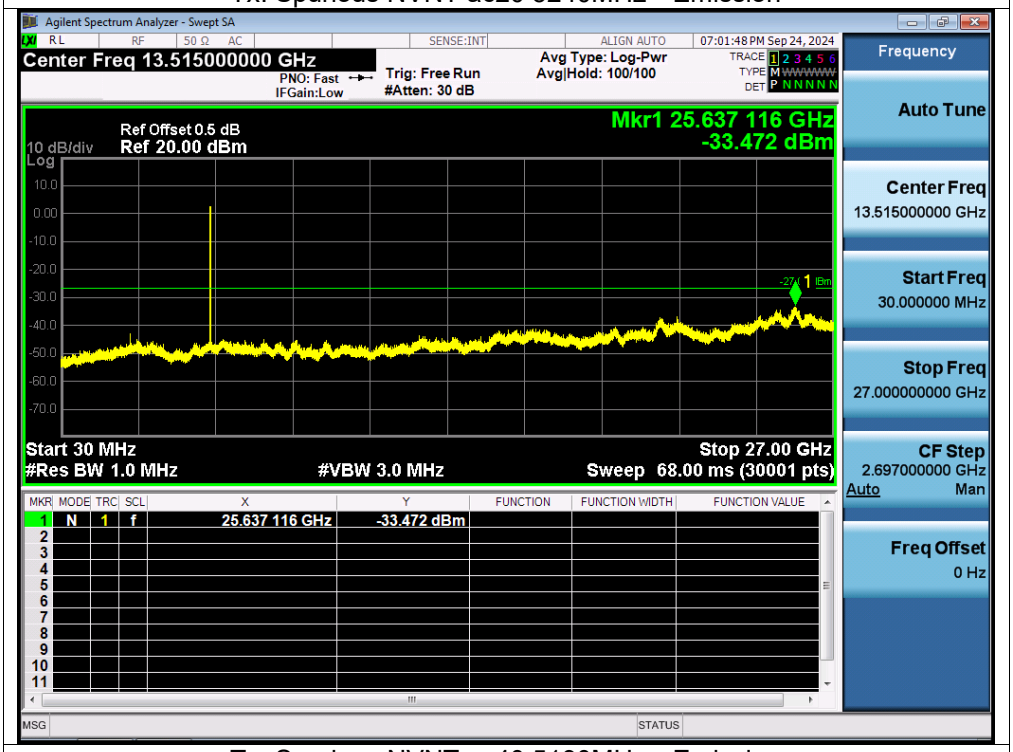
Tx. Spurious NVNT ac20 5180MHz Emission



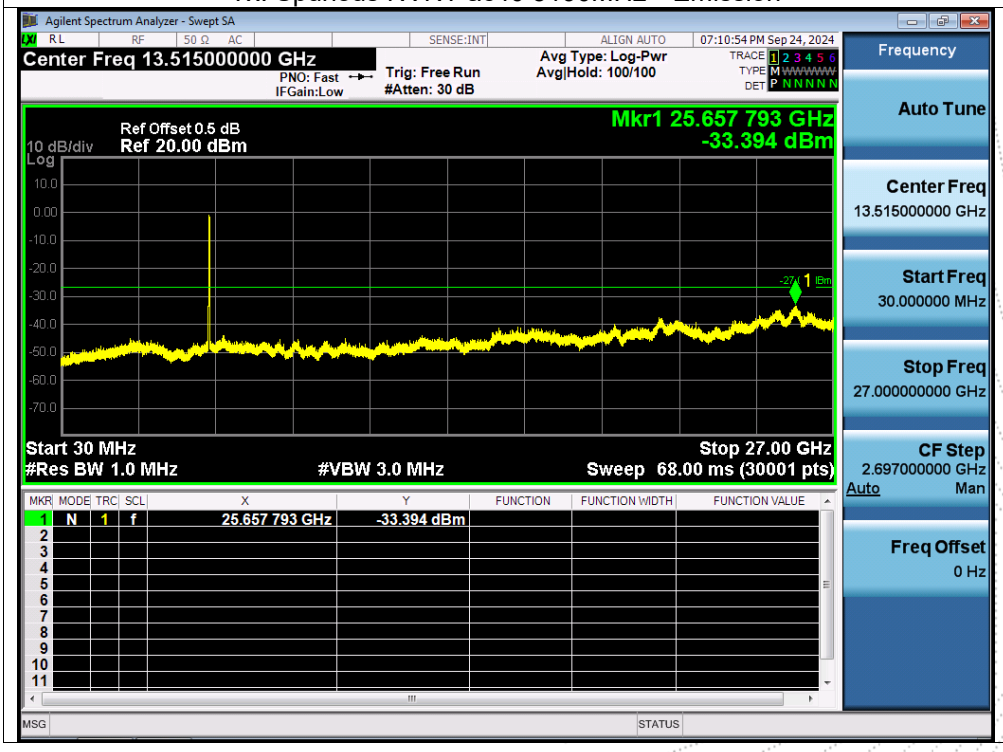
Tx. Spurious NVNT ac20 5200MHz Emission



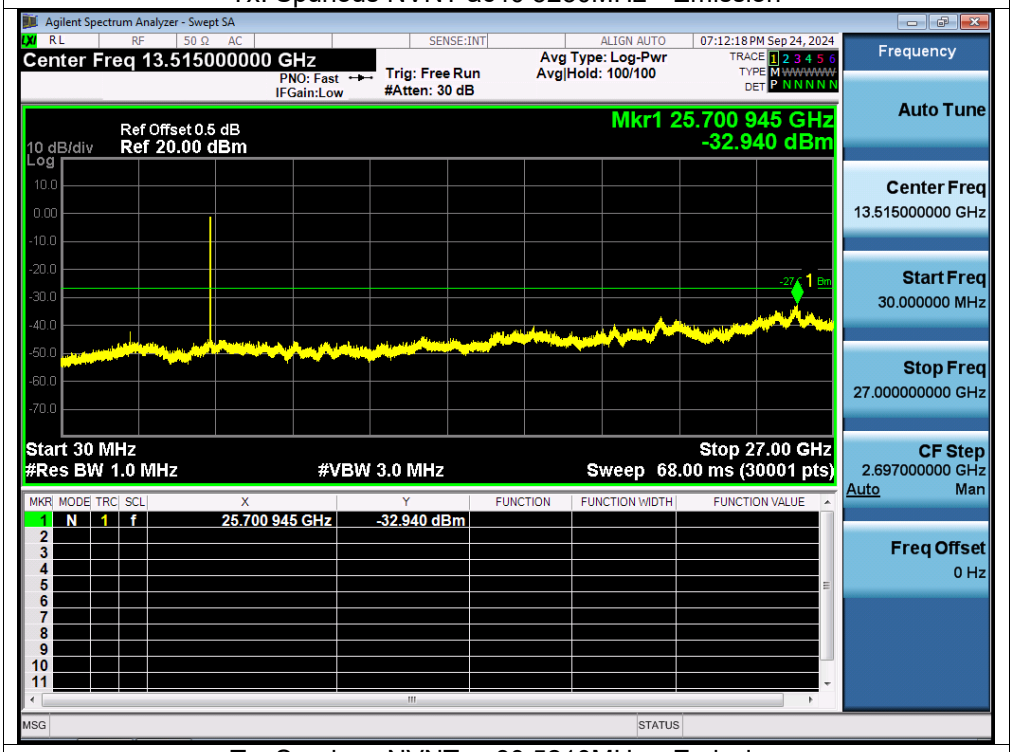
Tx. Spurious NVNT ac20 5240MHz Emission



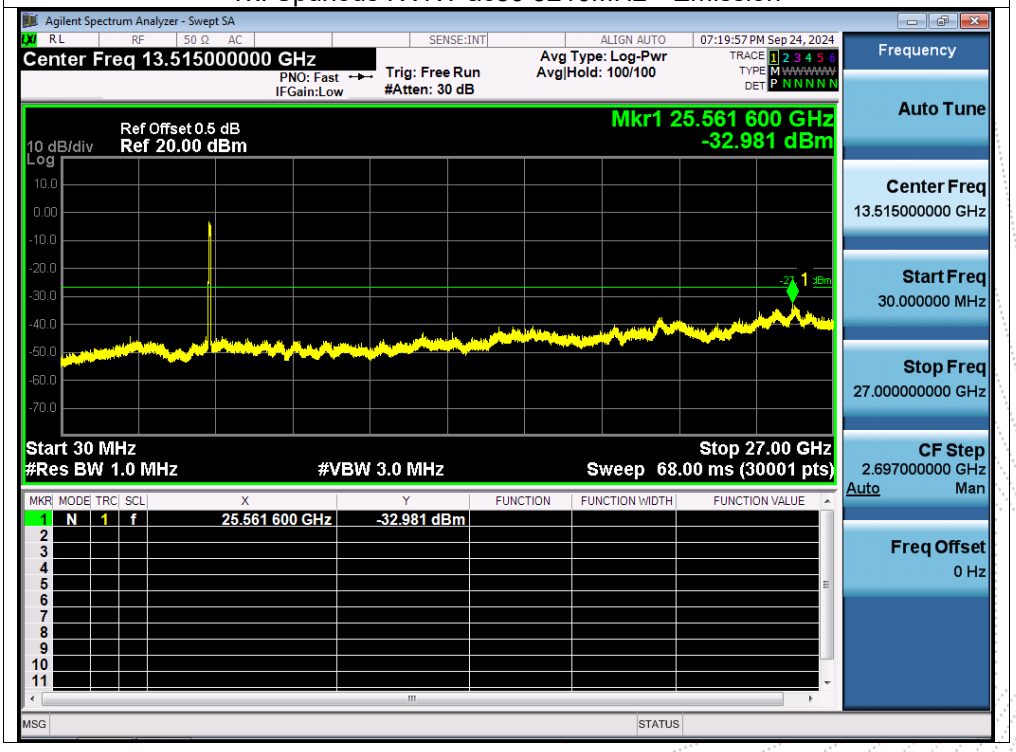
Tx. Spurious NVNT ac40 5190MHz Emission



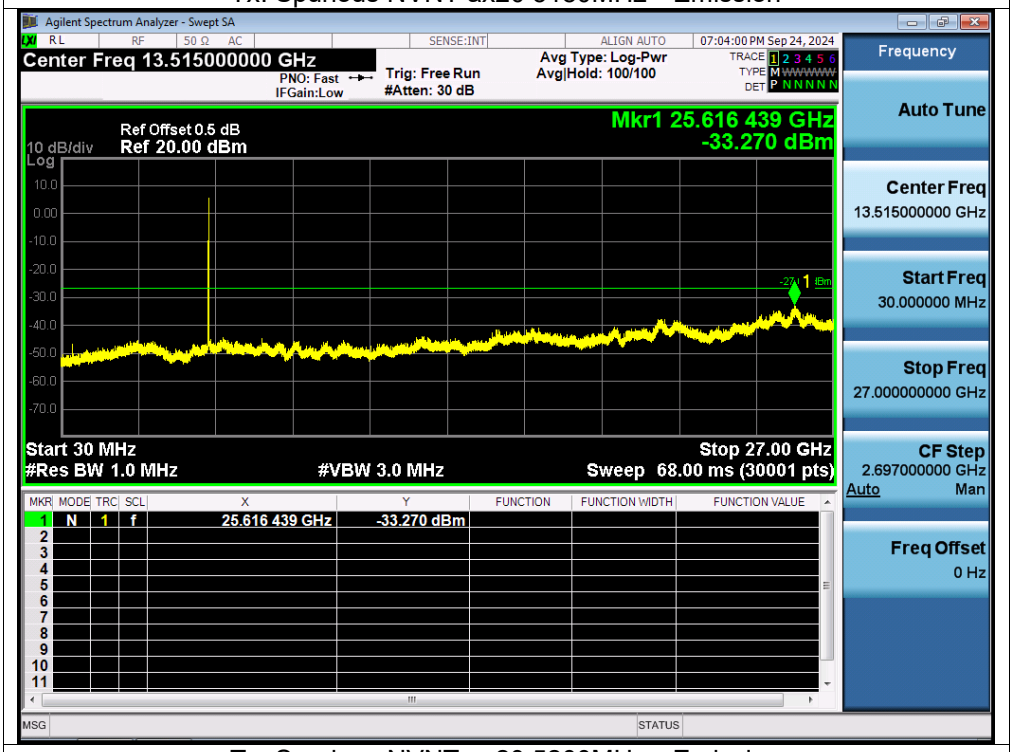
Tx. Spurious NVNT ac40 5230MHz Emission



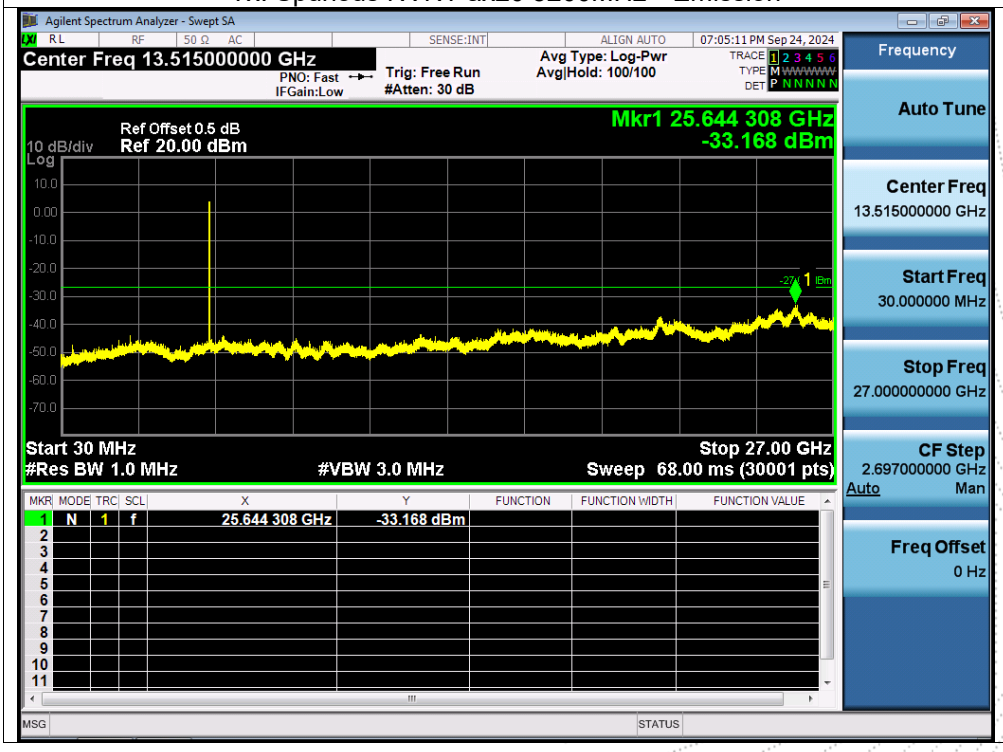
Tx. Spurious NVNT ac80 5210MHz Emission



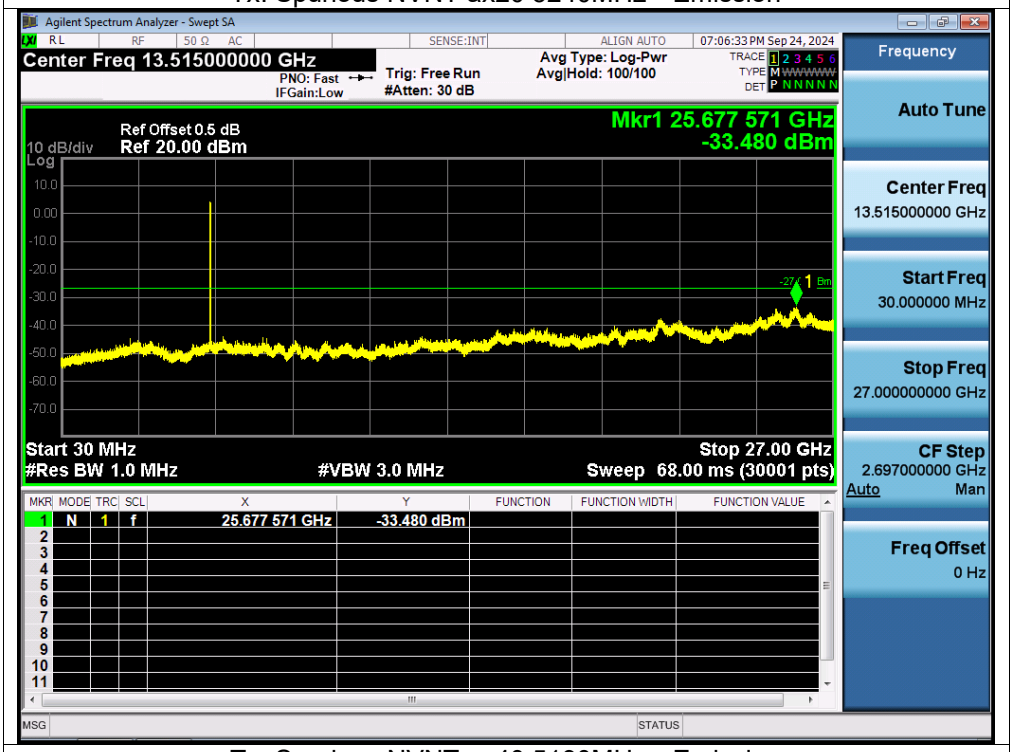
Tx. Spurious NVNT ax20 5180MHz Emission



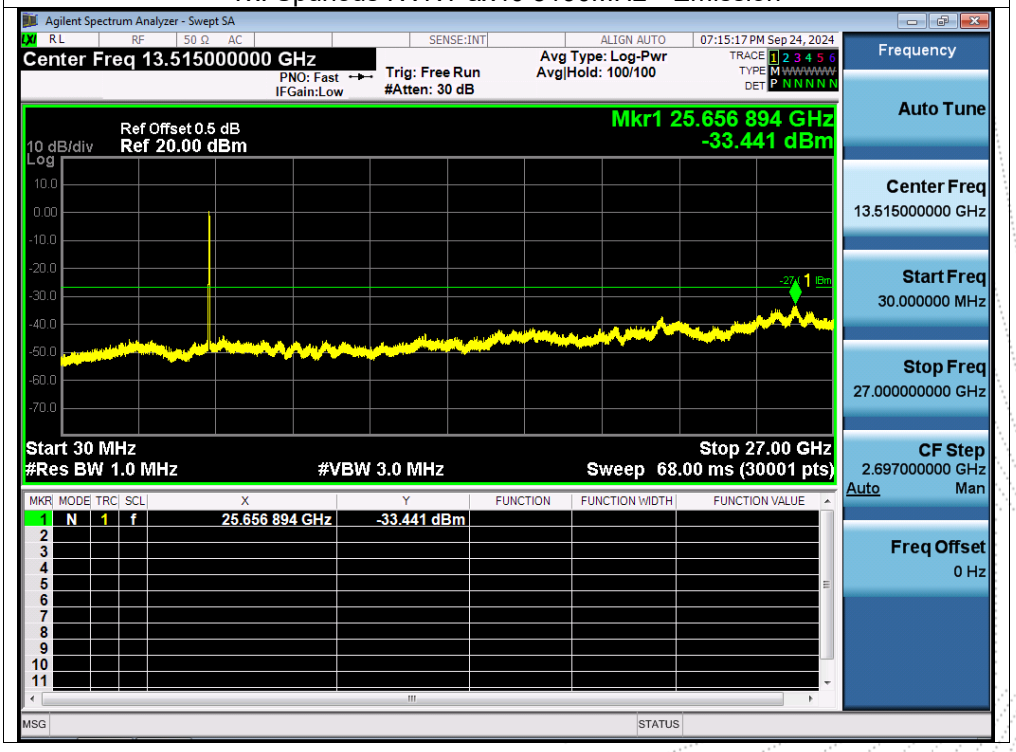
Tx. Spurious NVNT ax20 5200MHz Emission



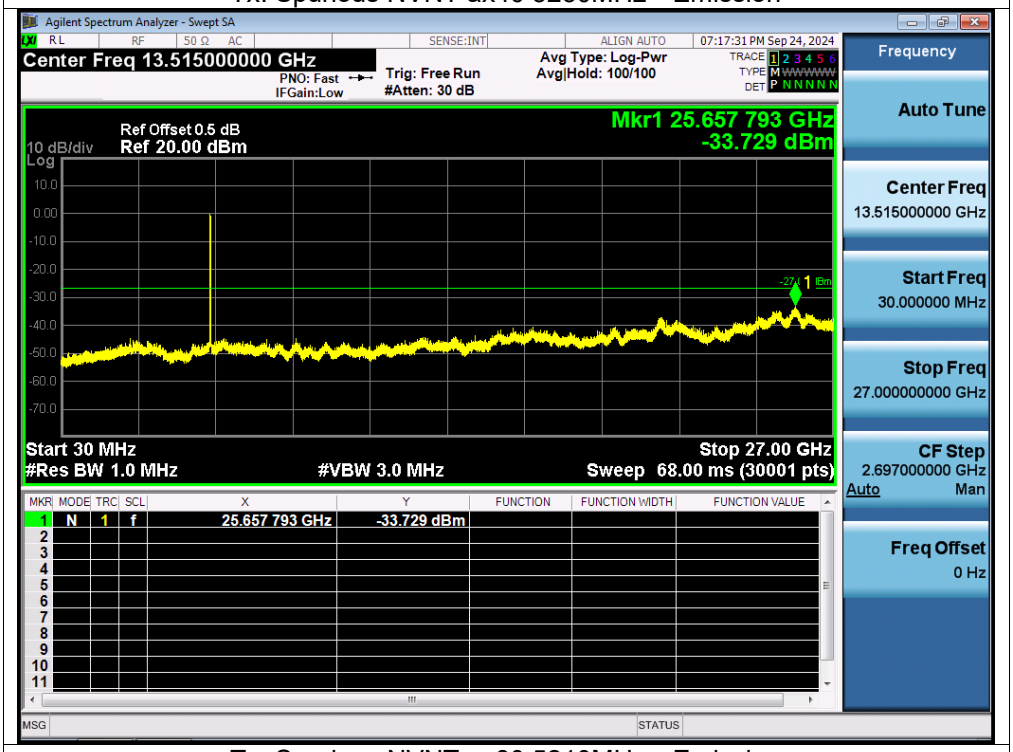
Tx. Spurious NVNT ax20 5240MHz Emission



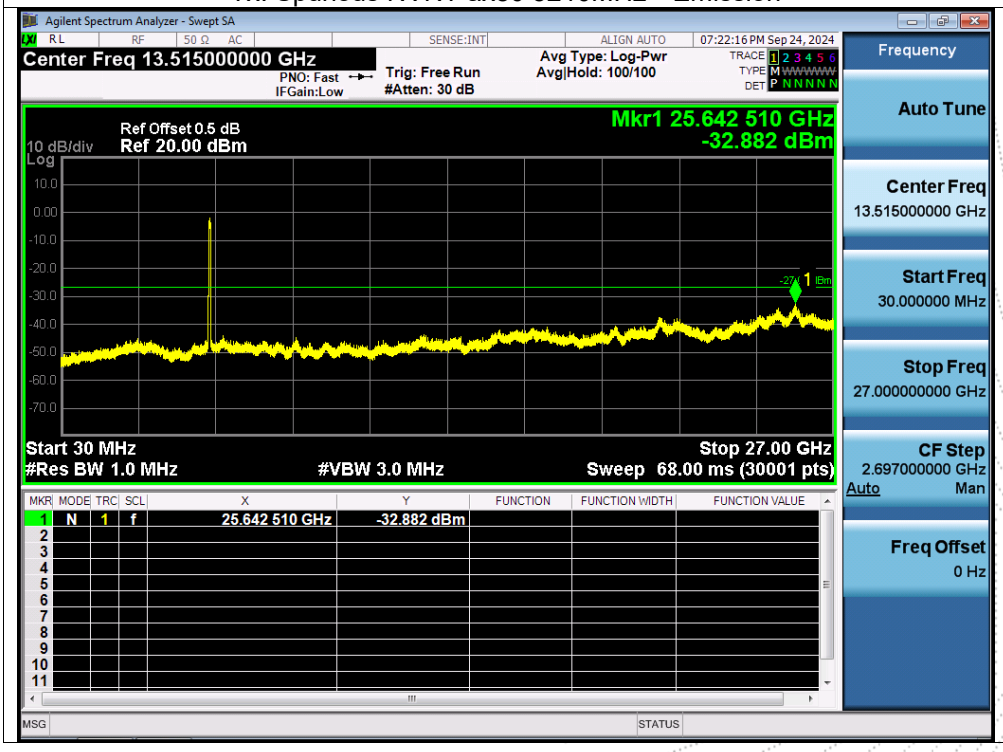
Tx. Spurious NVNT ax40 5190MHz Emission



Tx. Spurious NVNT ax40 5230MHz Emission

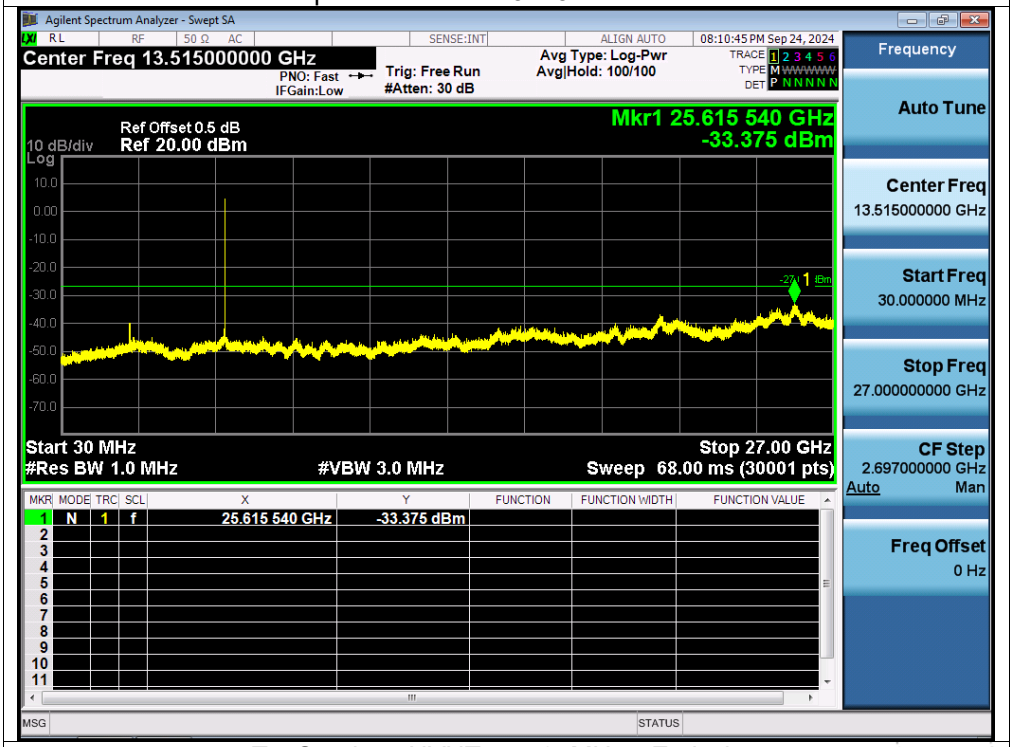


Tx. Spurious NVNT ax80 5210MHz Emission

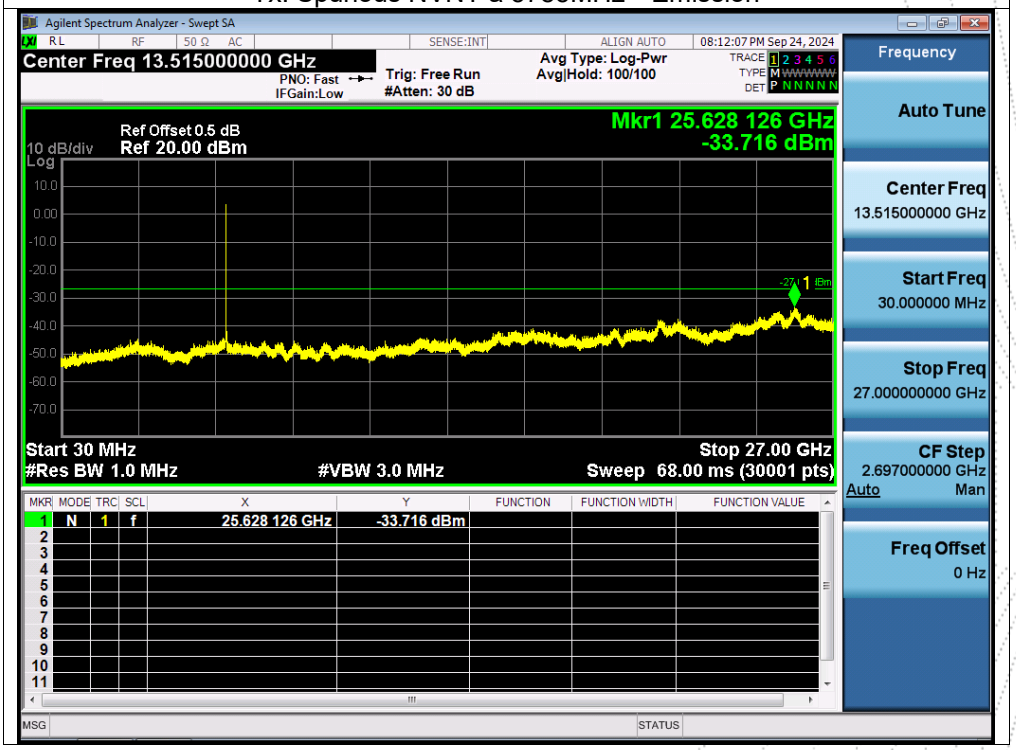


Note: A(B) Represent the value of antenna A and B, The worst data is Antenna A, only shown Antenna A Plot. 5745-58250MHz

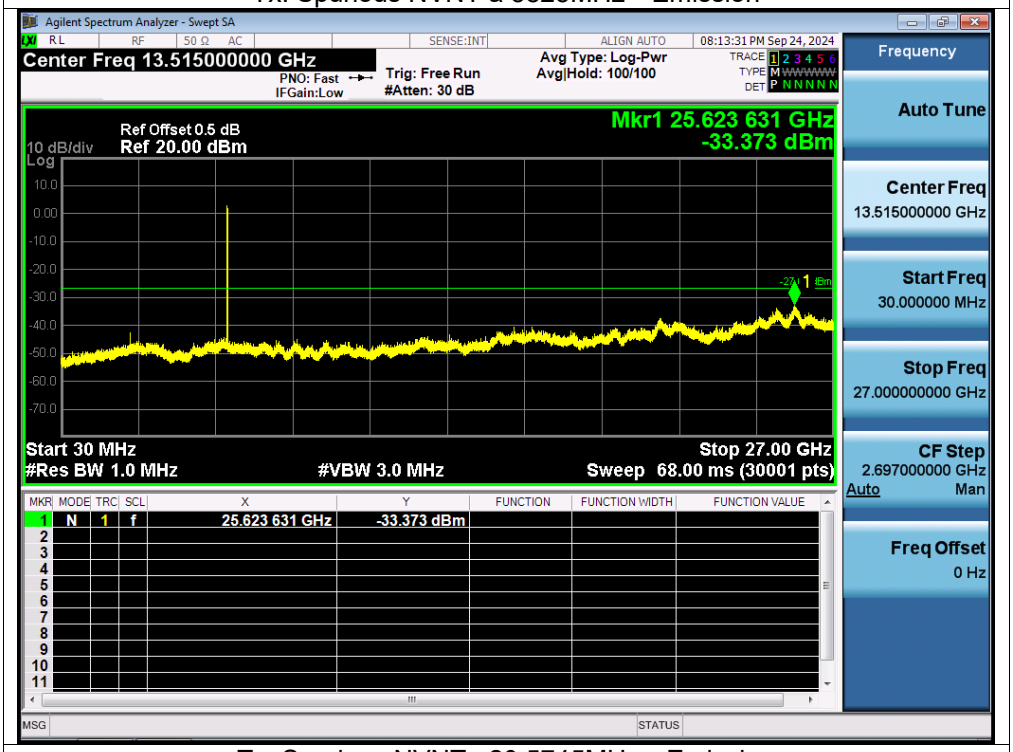
Test Graphs
Tx. Spurious NVNT a 5745MHz Emission



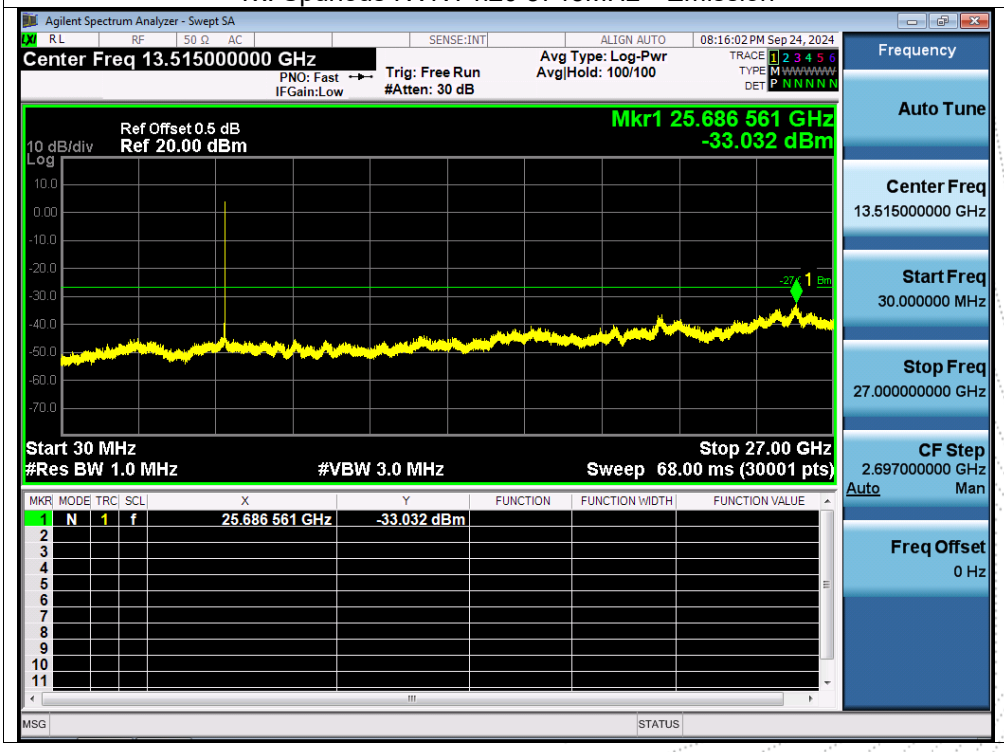
Tx. Spurious NVNT a 5785MHz Emission



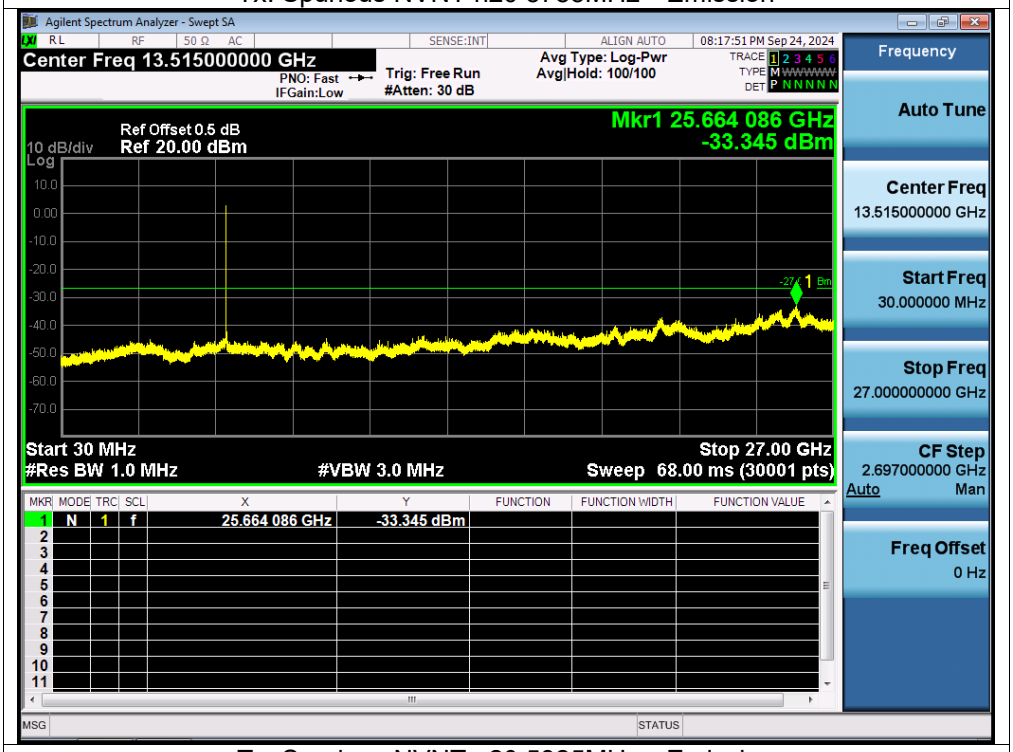
Tx. Spurious NVNT a 5825MHz Emission



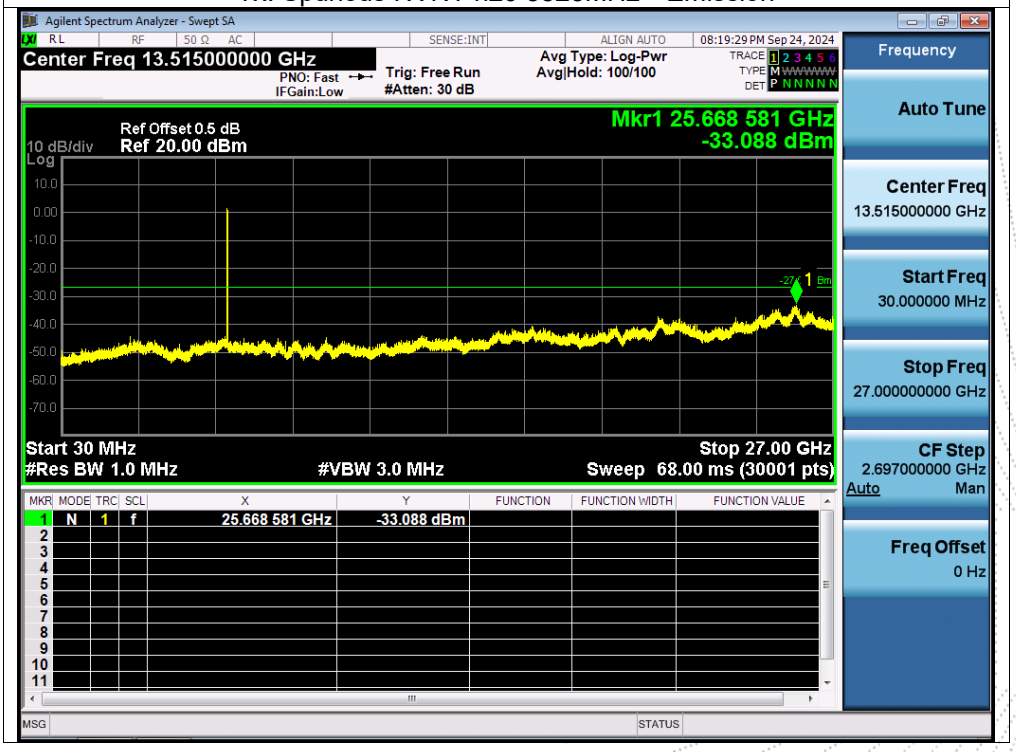
Tx. Spurious NVNT n20 5745MHz Emission



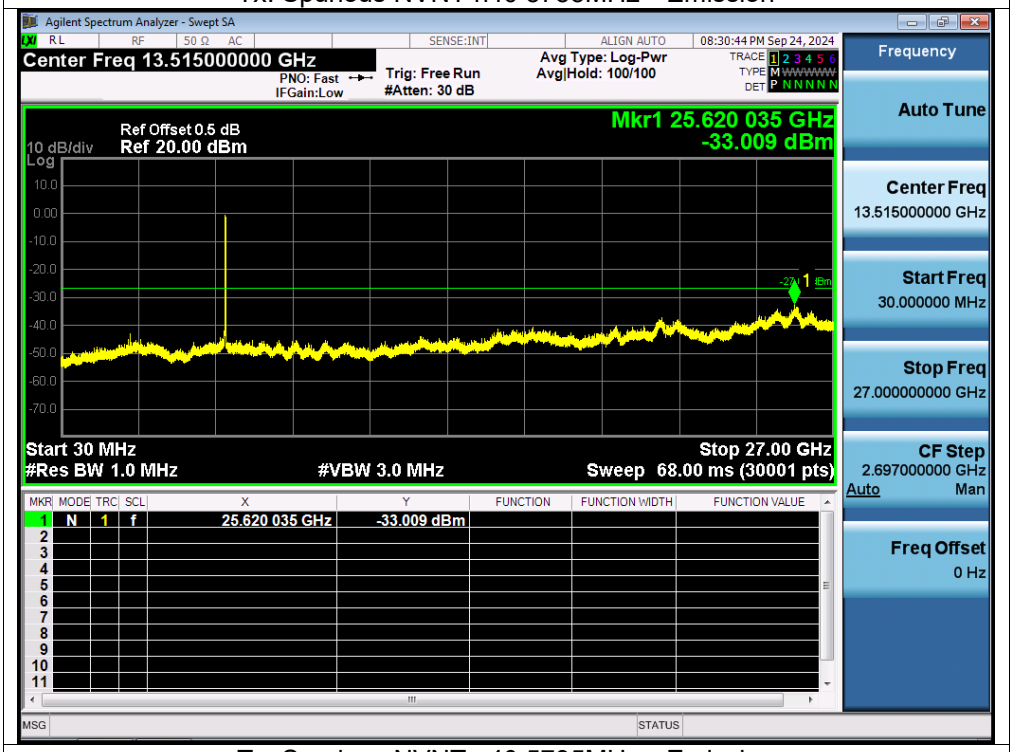
Tx. Spurious NVNT n20 5785MHz Emission



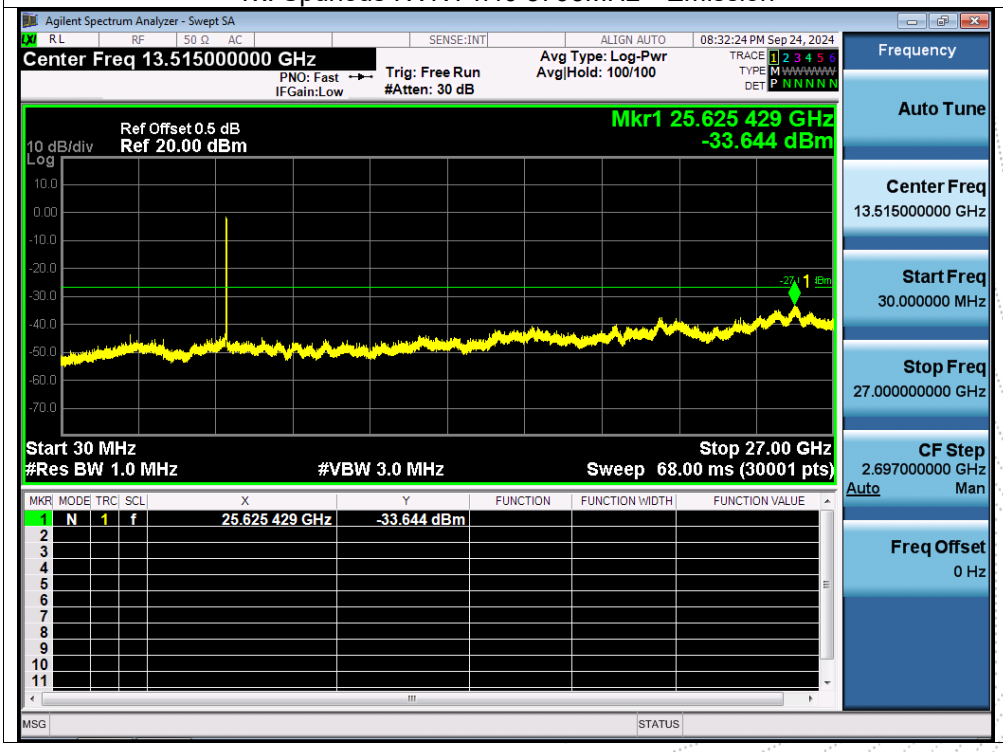
Tx. Spurious NVNT n20 5825MHz Emission



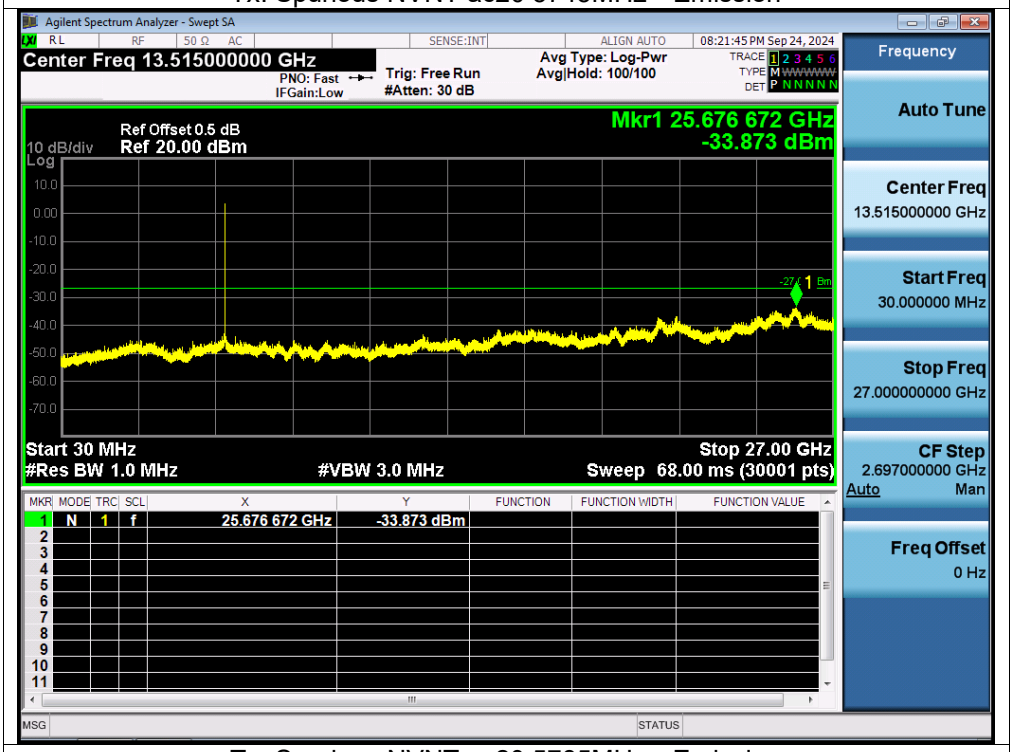
Tx. Spurious NVNT n40 5755MHz Emission



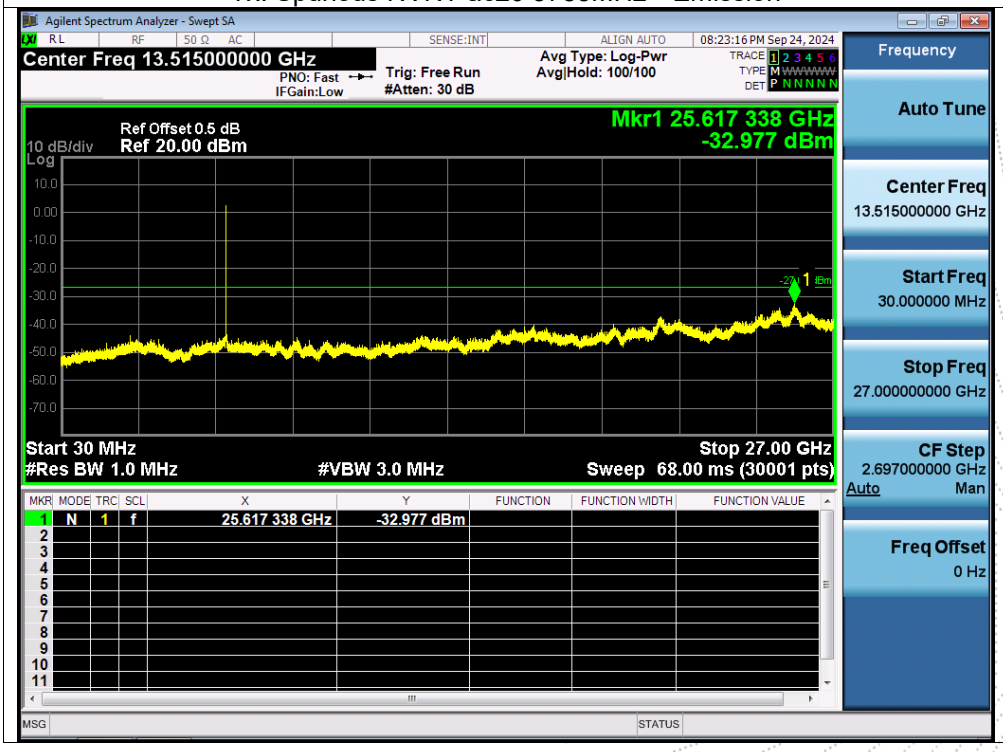
Tx. Spurious NVNT n40 5795MHz Emission



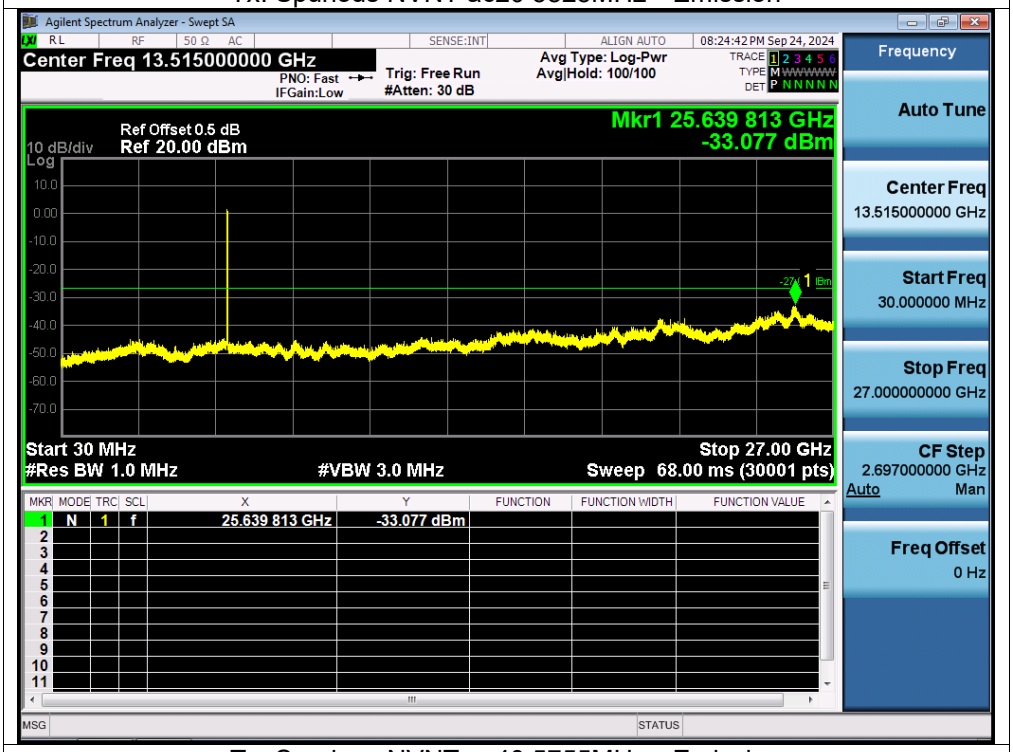
Tx. Spurious NVNT ac20 5745MHz Emission



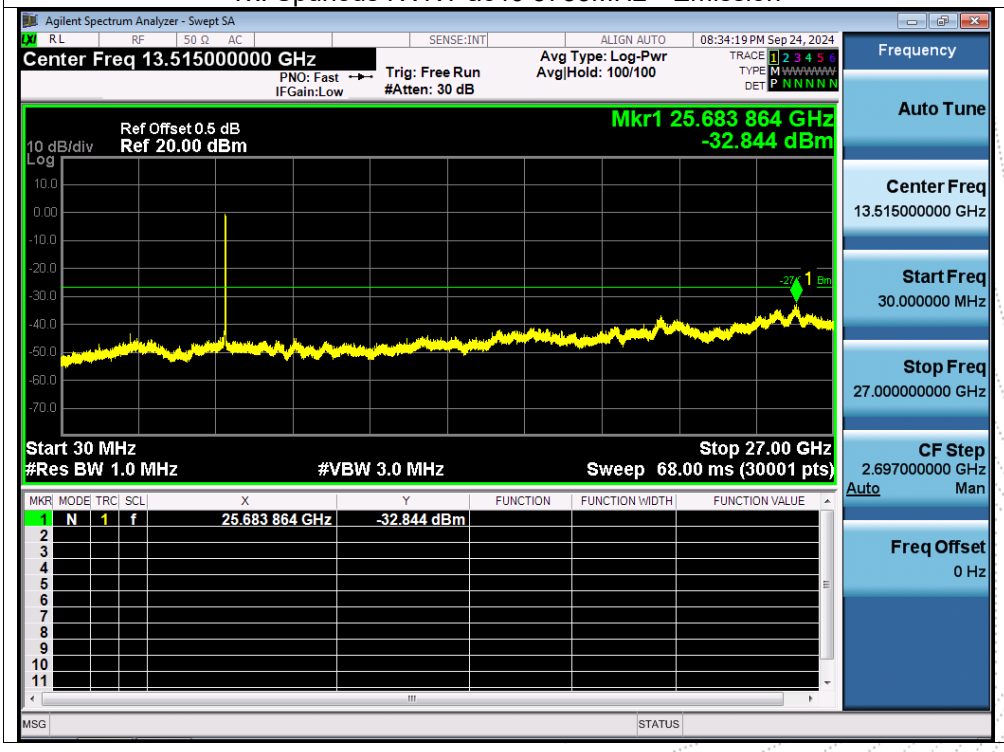
Tx. Spurious NVNT ac20 5785MHz Emission



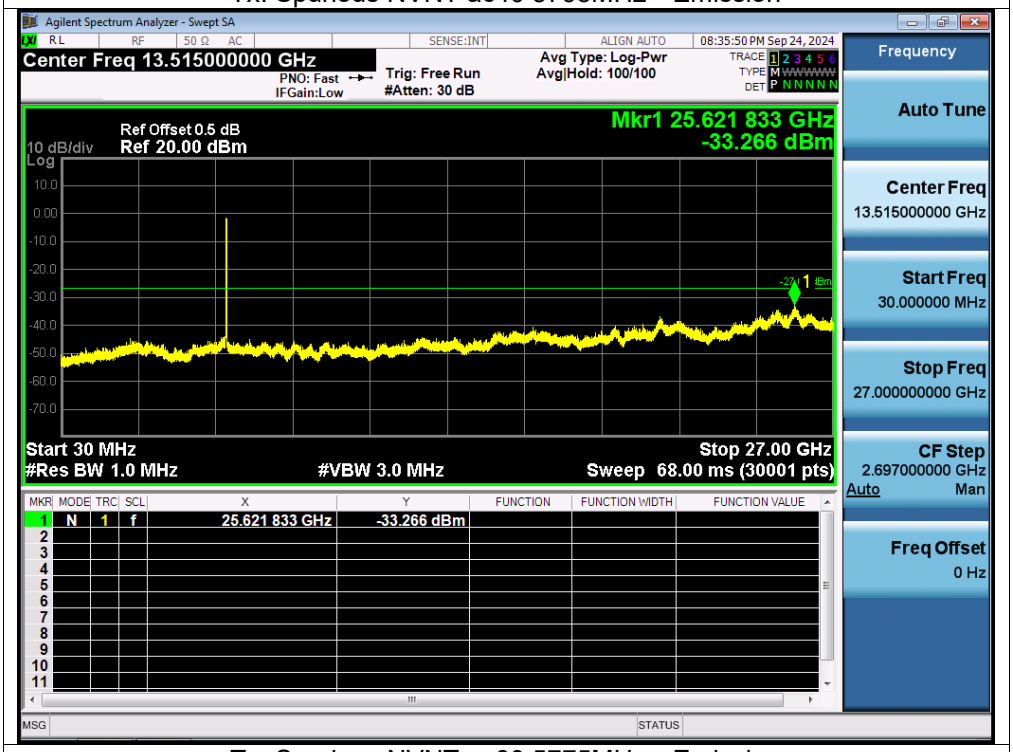
Tx. Spurious NVNT ac20 5825MHz Emission



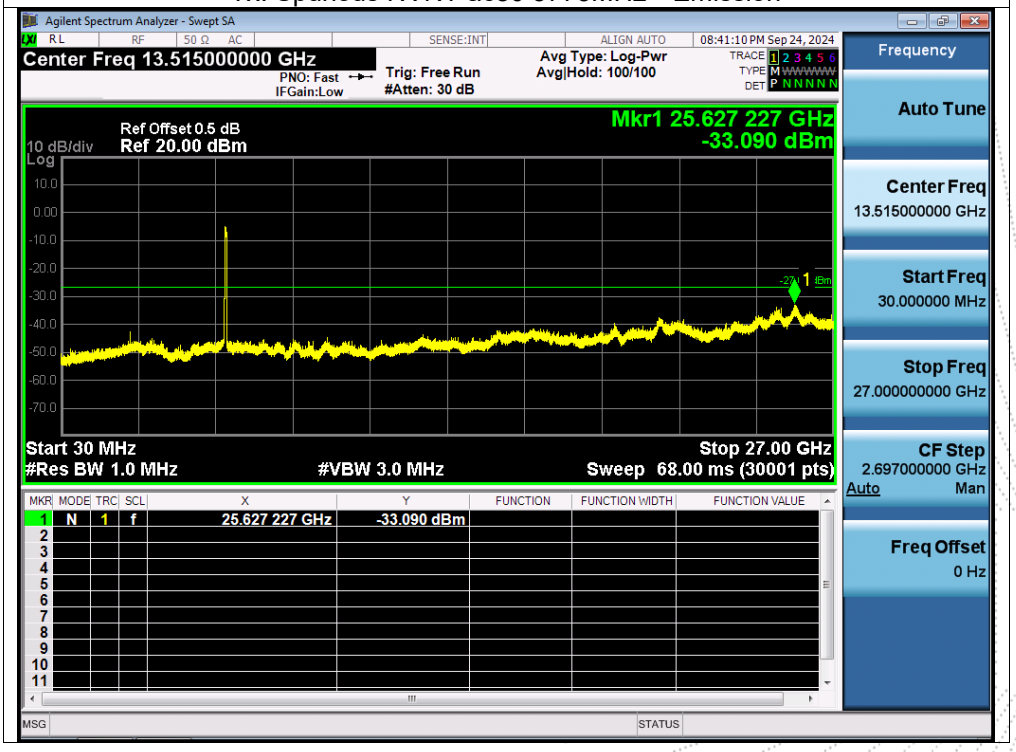
Tx. Spurious NVNT ac40 5755MHz Emission



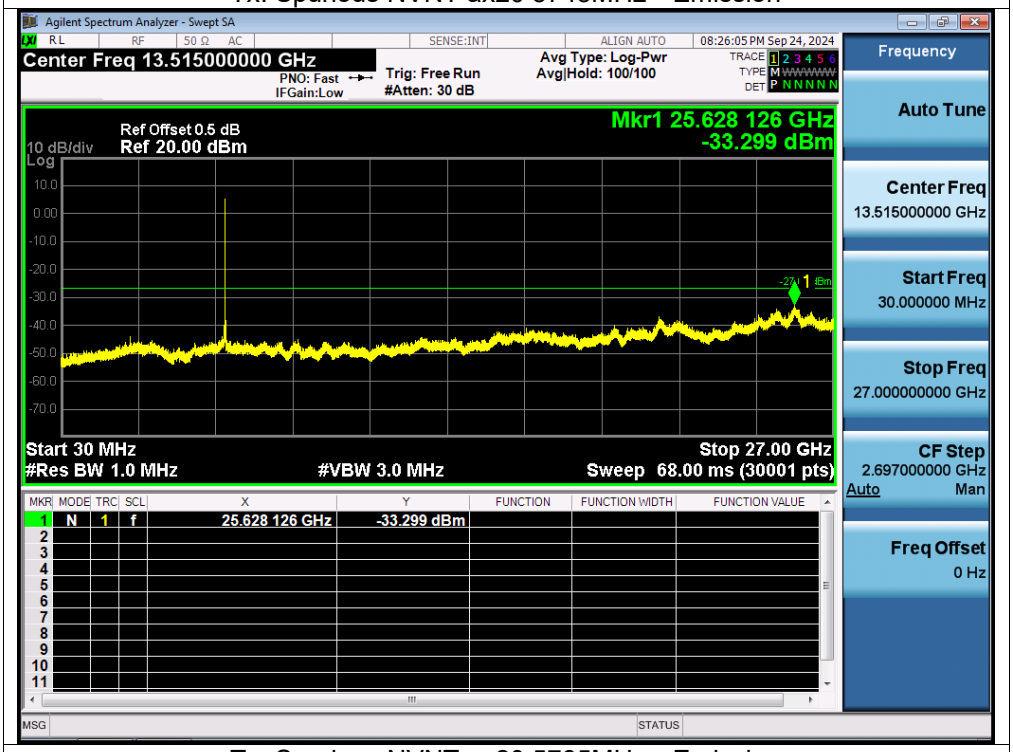
Tx. Spurious NVNT ac40 5795MHz Emission



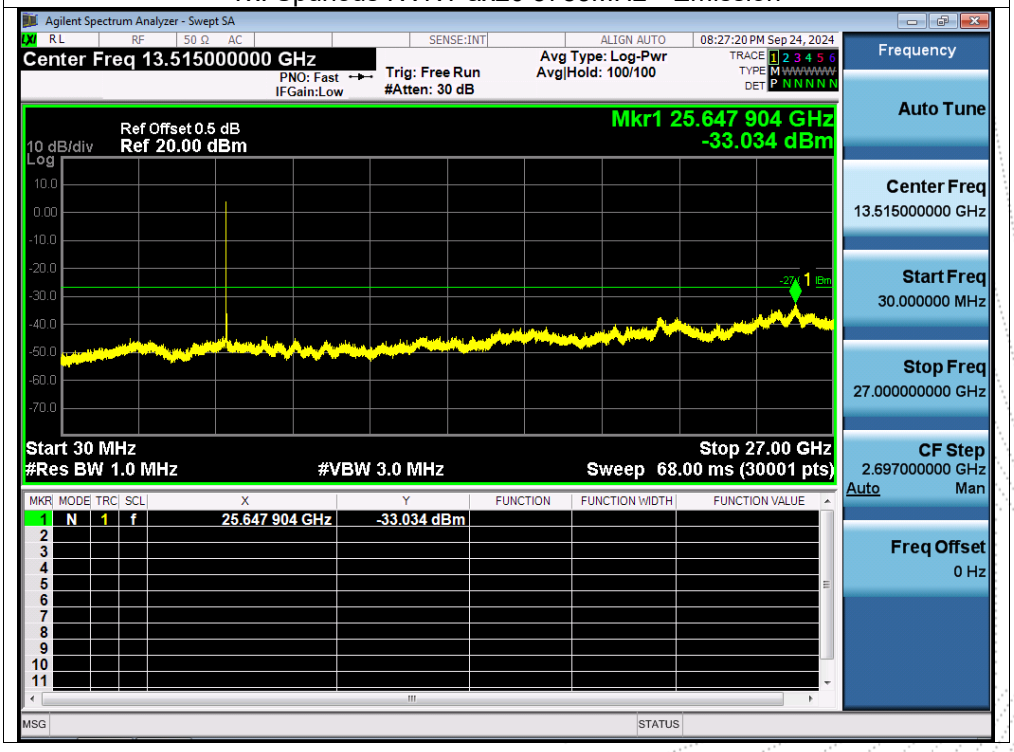
Tx. Spurious NVNT ac80 5775MHz Emission



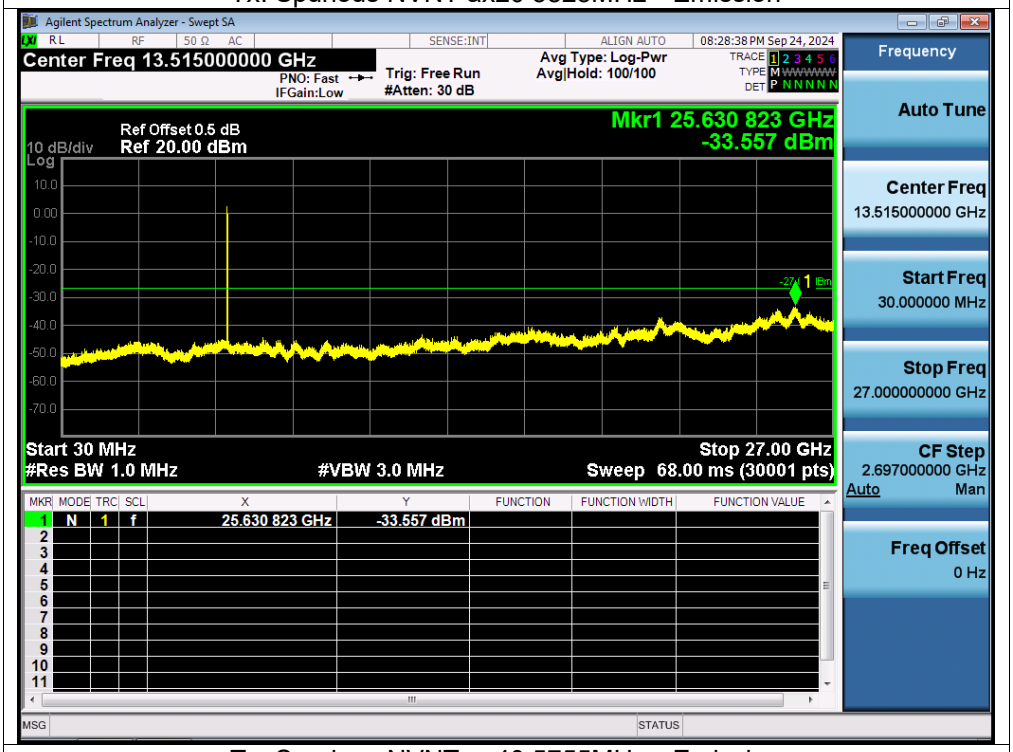
Tx. Spurious NVNT ax20 5745MHz Emission



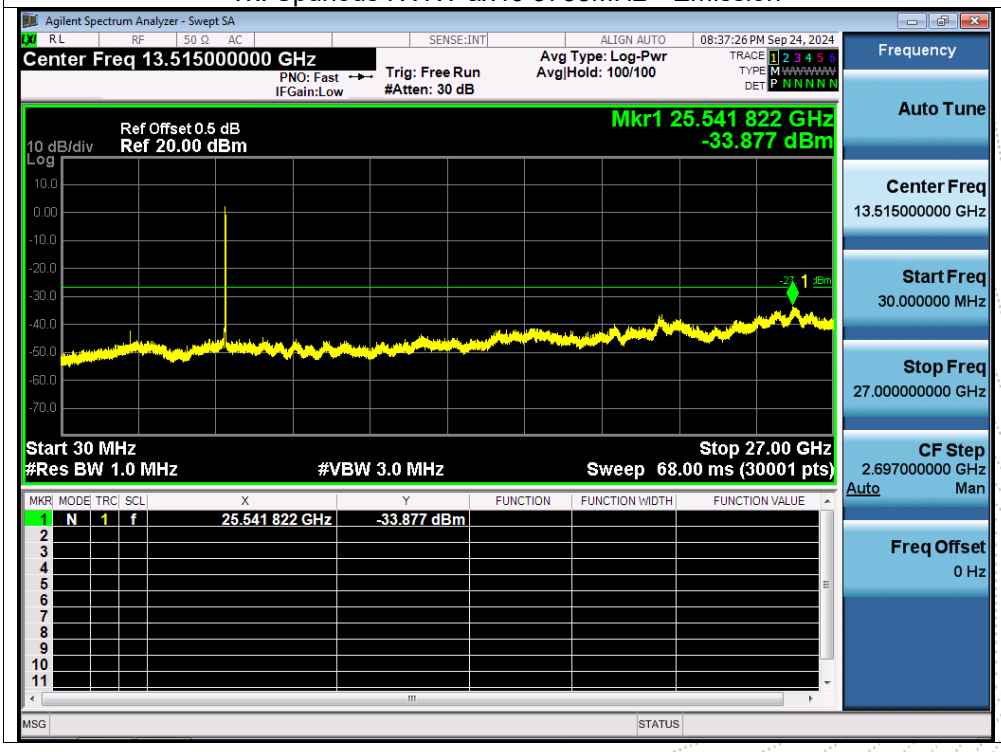
Tx. Spurious NVNT ax20 5785MHz Emission



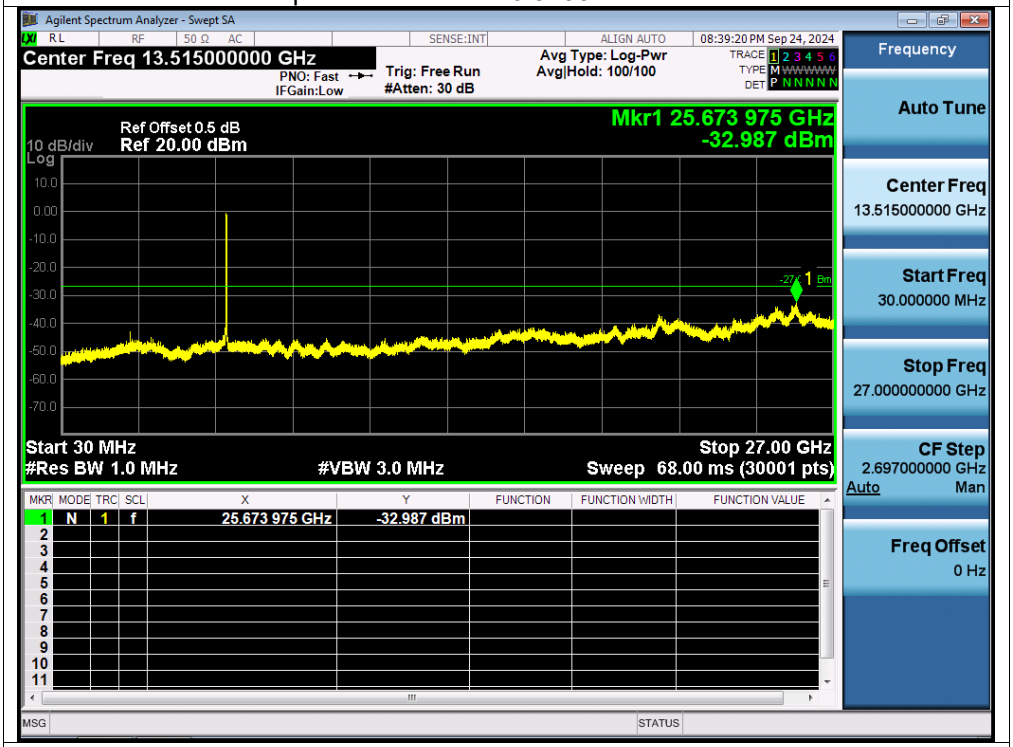
Tx. Spurious NVNT ax20 5825MHz Emission



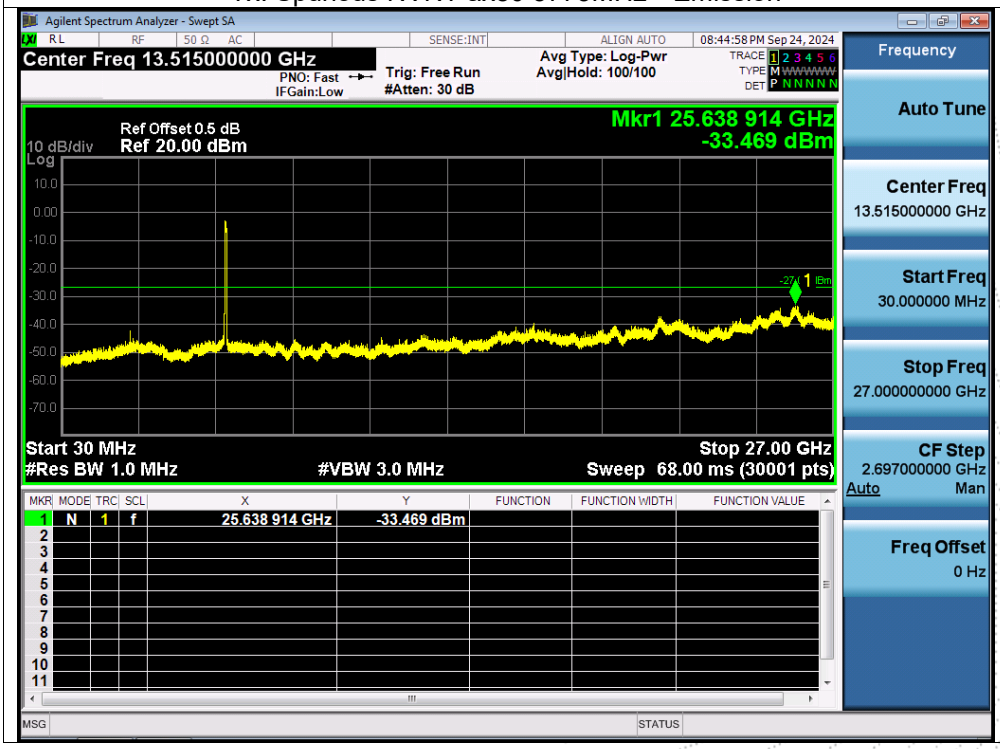
Tx. Spurious NVNT ax40 5755MHz Emission



Tx. Spurious NVNT ax40 5795MHz Emission

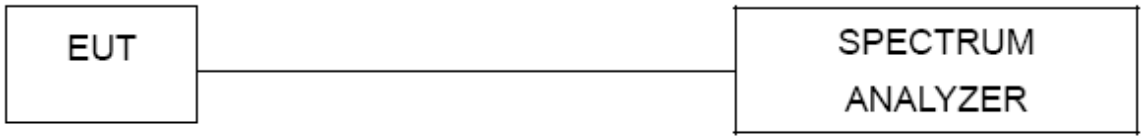


Tx. Spurious NVNT ax80 5775MHz Emission



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. fc is declaring of channel frequency. Then the frequency error formula is (fc-f)/fc × 106 ppm and he limit is less than ±20ppm (IEEE 802.11nspecification).
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°C~70°C.

13.4 Test Result

Temperature:	26 ℃	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	5180.0082	5180	0.0082	1.5830
		V max (V)	13.80	5180.0094	5180	0.0094	1.8147
		V min (V)	10.20	5180.0123	5180	0.0123	2.3745
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	5180.0028	5180	0.0028	0.5405
		T (°C)	-10	5180.0116	5180	0.0116	2.2394
		T (°C)	0	5180.0107	5180	0.0107	2.0656
		T (°C)	10	5180.0004	5180	0.0004	0.0772
		T (°C)	20	5180.0057	5180	0.0057	1.1004
		T (°C)	30	5180.0073	5180	0.0073	1.4093
		T (°C)	40	5180.0058	5180	0.0058	1.1197
		T (°C)	50	5180.0030	5180	0.0030	0.5792
		T (°C)	60	5180.0062	5180	0.0062	1.1969
		T (°C)	70	5180.0108	5180	0.0108	2.0849
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	5200.0005	5200	0.0005	0.0962
		V max (V)	13.80	5200.0012	5200	0.0012	0.2308
		V min (V)	10.20	5200.0078	5200	0.0078	1.5000
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	5200.01270	5200	0.01270	2.4423
		T (°C)	-10	5200.01160	5200	0.01160	2.2308
		T (°C)	0	5200.01340	5200	0.01340	2.5769
		T (°C)	10	5200.01260	5200	0.01260	2.4231
		T (°C)	20	5200.01120	5200	0.01120	2.1538
		T (°C)	30	5200.01280	5200	0.01280	2.4615
		T (°C)	40	5200.01310	5200	0.01310	2.5192
		T (°C)	50	5200.00560	5200	0.00560	1.0769
		T (°C)	60	5200.00010	5200	0.00010	0.0192
		T (°C)	70	5200.00230	5200	0.00230	0.4423
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	5240.0100	5240	0.0100	1.9084
		V max (V)	13.80	5240.0043	5240	0.0043	0.8206
		V min (V)	10.20	5240.0046	5240	0.0046	0.8779
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	5240.0130	5240	0.0130	2.4809
		T (°C)	-10	5240.0007	5240	0.0007	0.1336
		T (°C)	0	5240.0072	5240	0.0072	1.3740
		T (°C)	10	5240.0116	5240	0.0116	2.2137
		T (°C)	20	5240.0095	5240	0.0095	1.8130
		T (°C)	30	5240.0004	5240	0.0004	0.0763
		T (°C)	40	5240.0051	5240	0.0051	0.9733
		T (°C)	50	5240.0099	5240	0.0099	1.8893
		T (°C)	60	5240.0070	5240	0.0070	1.3359
		T (°C)	70	5240.0069	5240	0.0069	1.3168
Limits				5150-5250 MHz			
Result				Complies			

Temperature:	26 ℃	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	5745.01080	5745	0.01080	1.8799
		V max (V)	13.80	5745.00010	5745	0.00010	0.0174
		V min (V)	10.20	5745.01250	5745	0.01250	2.1758
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	5745.00760	5745	0.00760	1.3229
		T (°C)	-10	5745.01240	5745	0.01240	2.1584
		T (°C)	0	5745.01020	5745	0.01020	1.7755
		T (°C)	10	5745.01190	5745	0.01190	2.0714
		T (°C)	20	5745.00380	5745	0.00380	0.6614
		T (°C)	30	5745.00190	5745	0.00190	0.3307
		T (°C)	40	5745.01050	5745	0.01050	1.8277
		T (°C)	50	5745.00380	5745	0.00380	0.6614
		T (°C)	60	5745.00800	5745	0.00800	1.3925
		T (°C)	70	5745.01170	5745	0.01170	2.0366
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	5785.00720	5785	0.00720	1.2446
		V max (V)	13.80	5785.00570	5785	0.00570	0.9853
		V min (V)	10.20	5785.00680	5785	0.00680	1.1755
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	5785.01000	5785	0.01000	1.7286
		T (°C)	-10	5785.01260	5785	0.01260	2.1780
		T (°C)	0	5785.00400	5785	0.00400	0.6914
		T (°C)	10	5785.00860	5785	0.00860	1.4866
		T (°C)	20	5785.00070	5785	0.00070	0.1210
		T (°C)	30	5785.01350	5785	0.01350	2.3336
		T (°C)	40	5785.00910	5785	0.00910	1.5730
		T (°C)	50	5785.00560	5785	0.00560	0.9680
		T (°C)	60	5785.00360	5785	0.00360	0.6223
		T (°C)	70	5785.00470	5785	0.00470	0.8124
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	5825.01090	5825	0.01090	1.8712
		V max (V)	13.80	5825.01240	5825	0.01240	2.1288
		V min (V)	10.20	5825.01230	5825	0.01230	2.1116
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	5825.00740	5825	0.00740	1.2704
		T (°C)	-10	5825.01280	5825	0.01280	2.1974
		T (°C)	0	5825.01330	5825	0.01330	2.2833
		T (°C)	10	5825.00760	5825	0.00760	1.3047
		T (°C)	20	5825.00030	5825	0.00030	0.0515
		T (°C)	30	5825.00150	5825	0.00150	0.2575
		T (°C)	40	5825.01300	5825	0.01300	2.2318
		T (°C)	50	5825.00190	5825	0.00190	0.3262
		T (°C)	60	5825.00340	5825	0.00340	0.5837
		T (°C)	70	5825.00400	5825	0.00400	0.6867
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 = Ton / (Ton+Toff)

14.3 Test Procedure

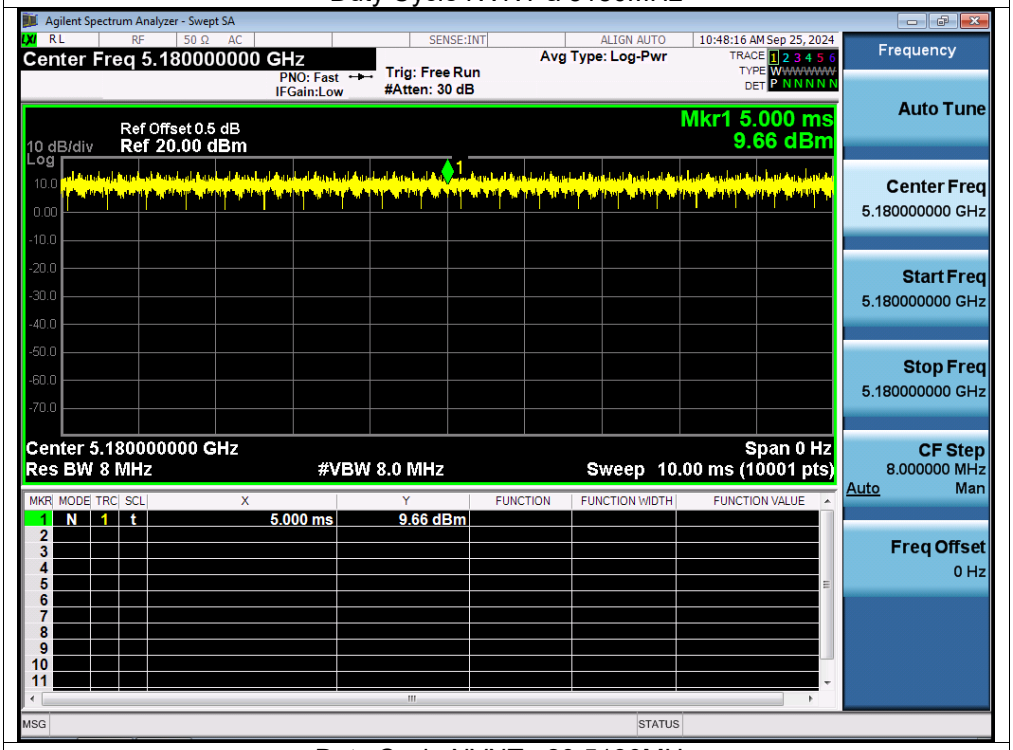
1.Set span = Zero
2. RBW = 8MHz
3. VBW = 8MHz,
4. Detector = Peak

14.4 Test Result

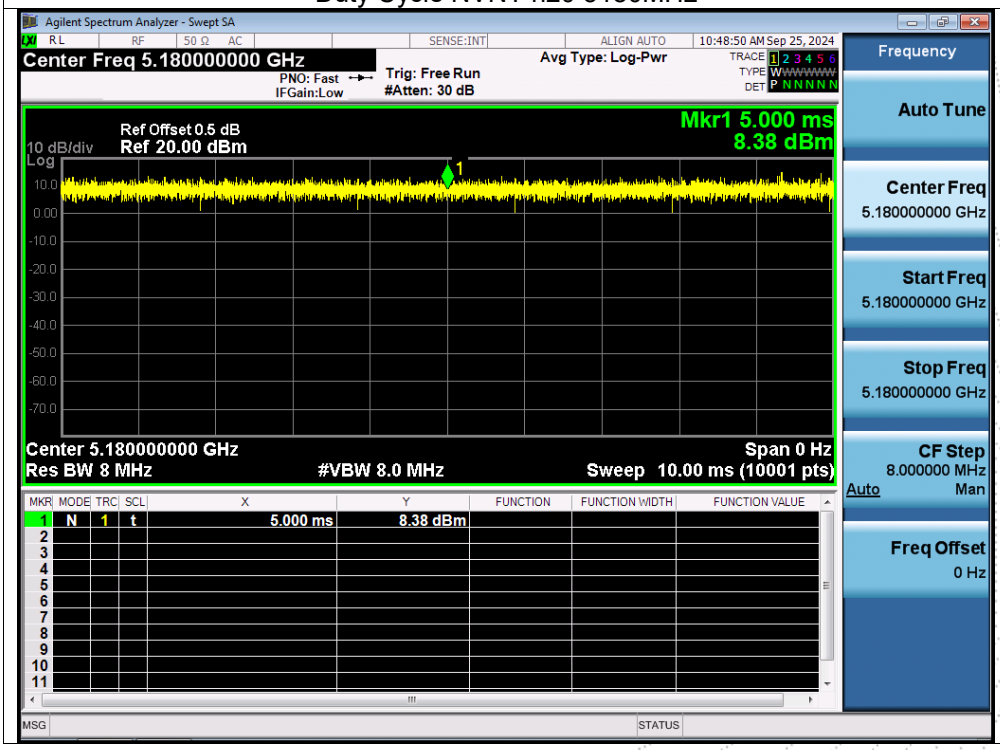
ANT A

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

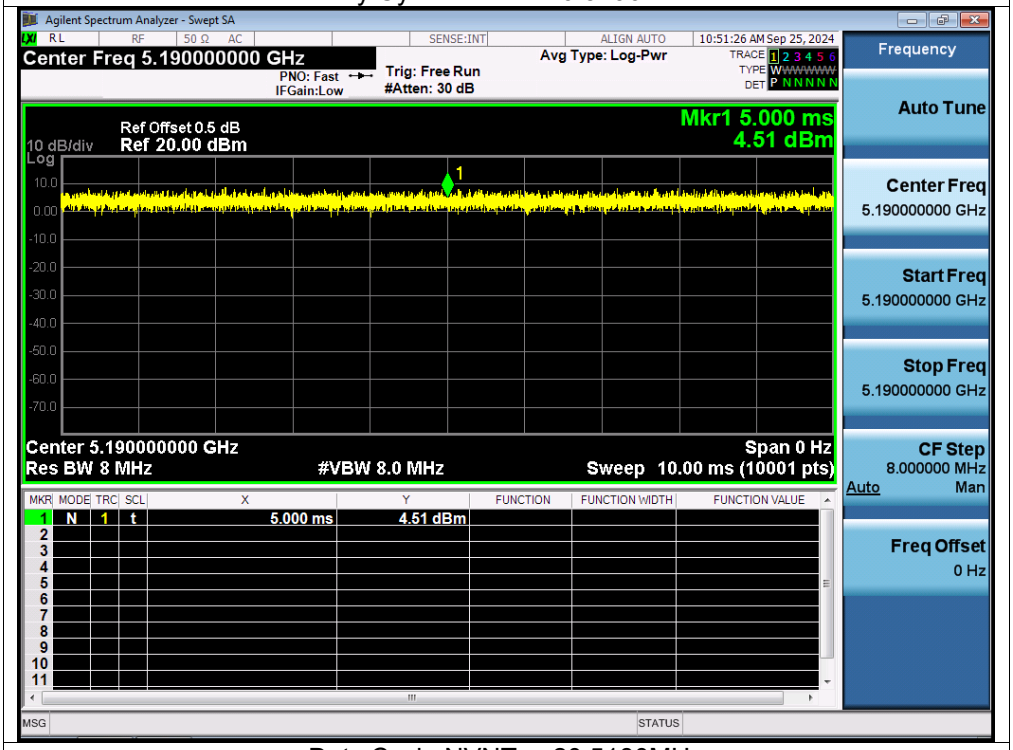
Test Graphs
Duty Cycle NVNT a 5180MHz



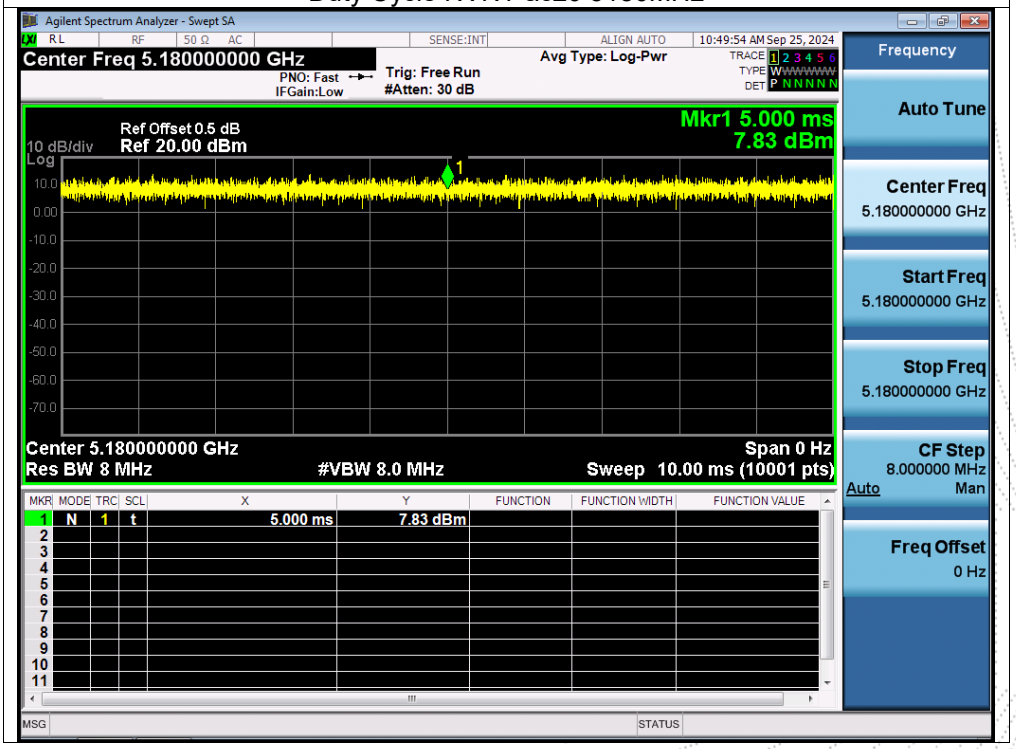
Duty Cycle NVNT n20 5180MHz



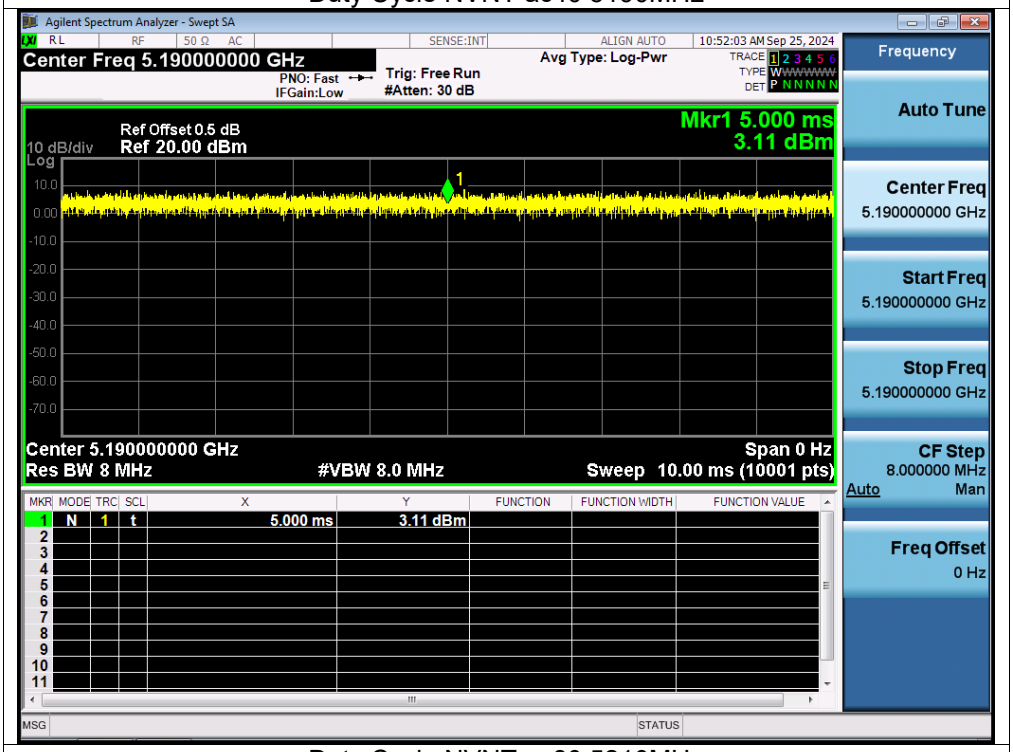
Duty Cycle NVNT n40 5190MHz



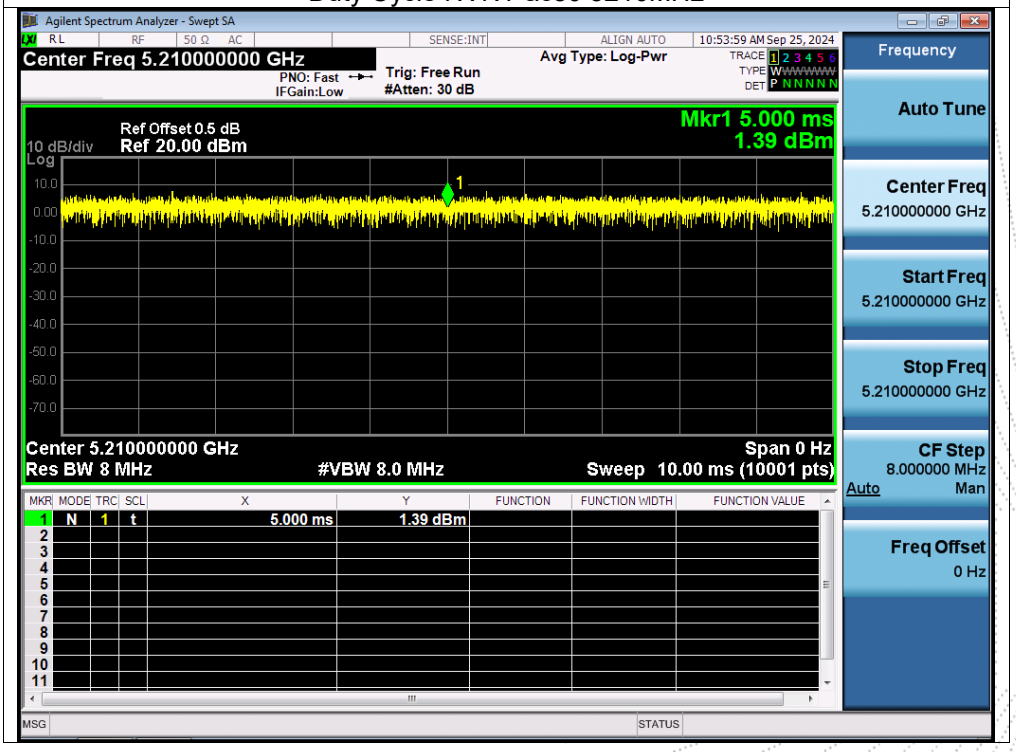
Duty Cycle NVNT ac20 5180MHz



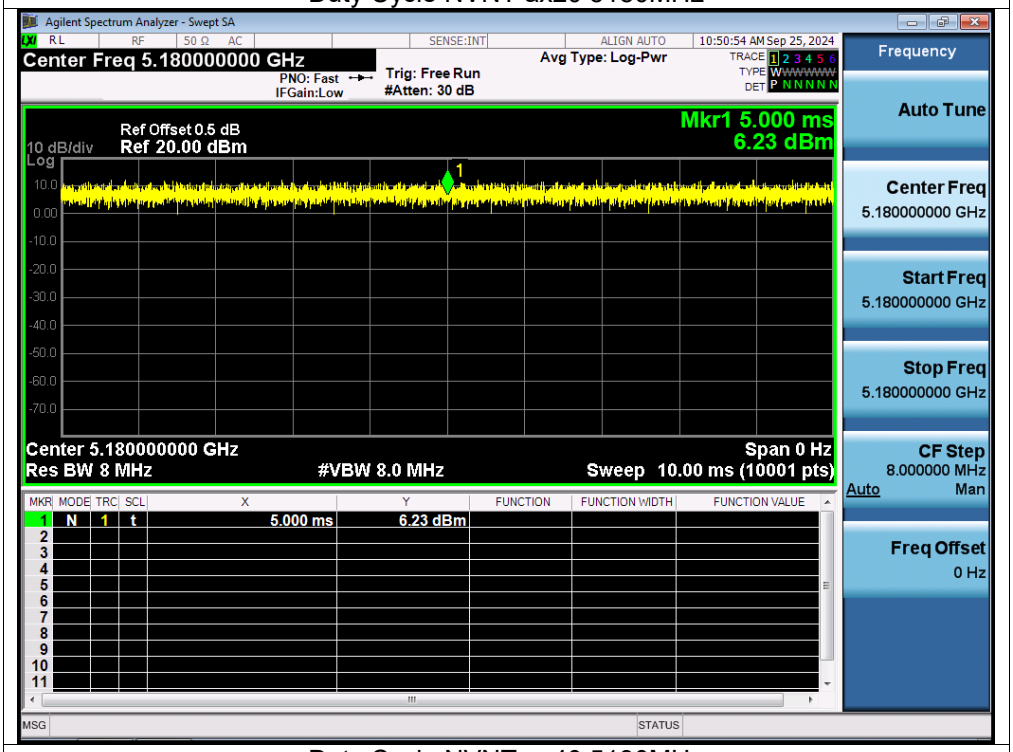
Duty Cycle NVNT ac40 5190MHz



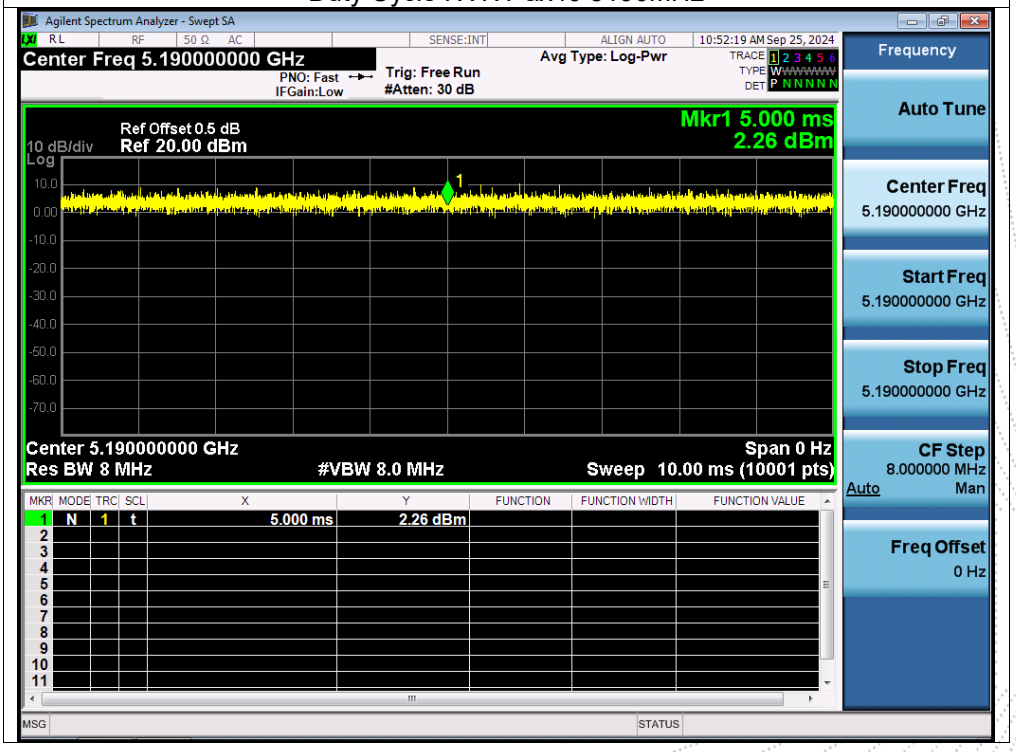
Duty Cycle NVNT ac80 5210MHz



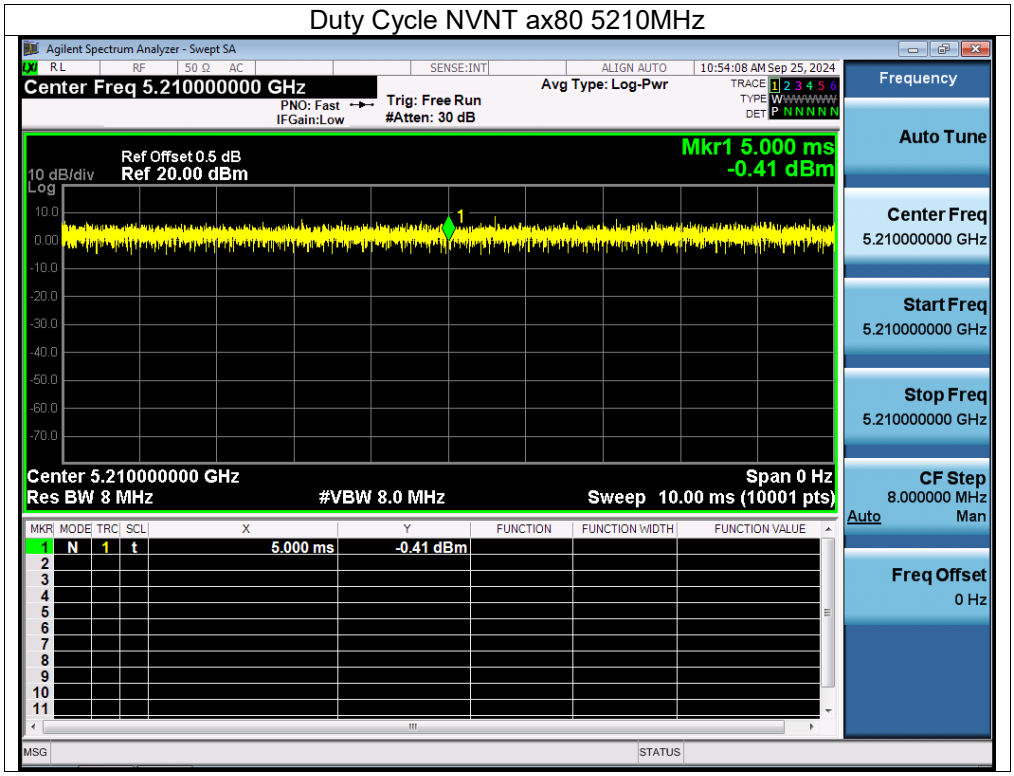
Duty Cycle NVNT ax20 5180MHz



Duty Cycle NVNT ax40 5190MHz



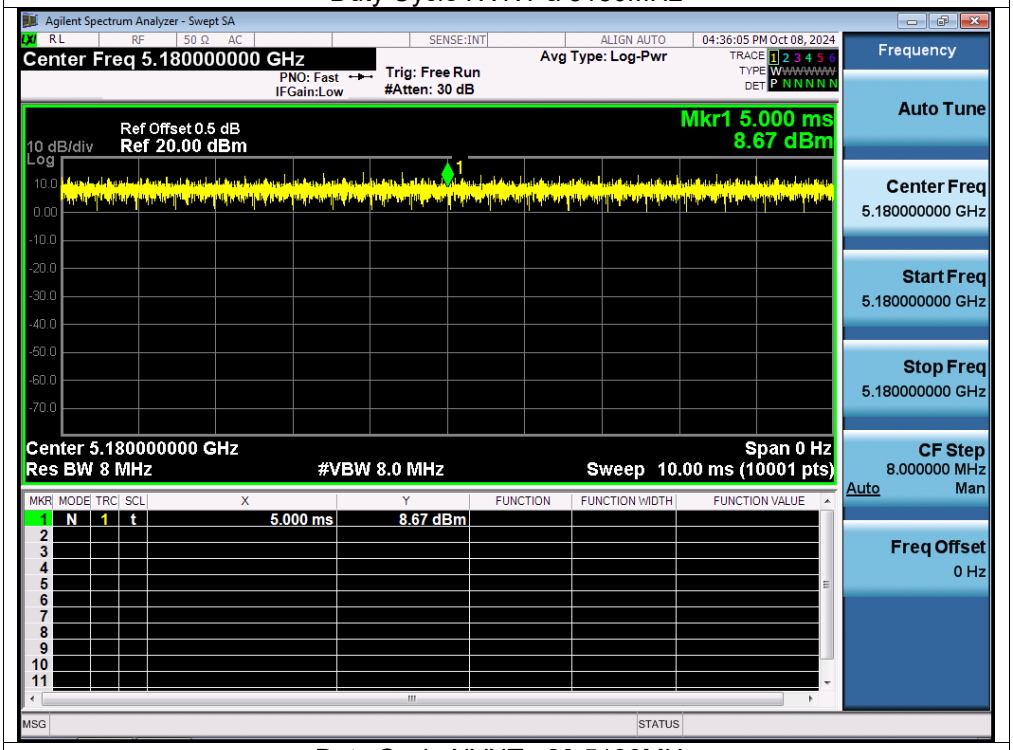
Duty Cycle NVNT ax80 5210MHz



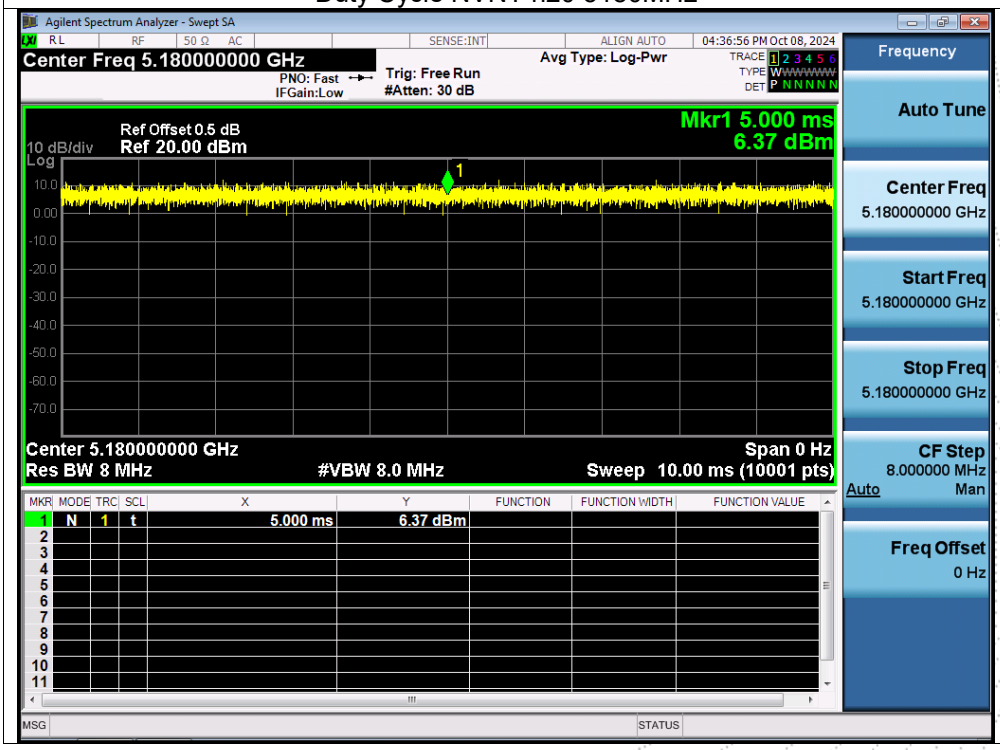
ANT B

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

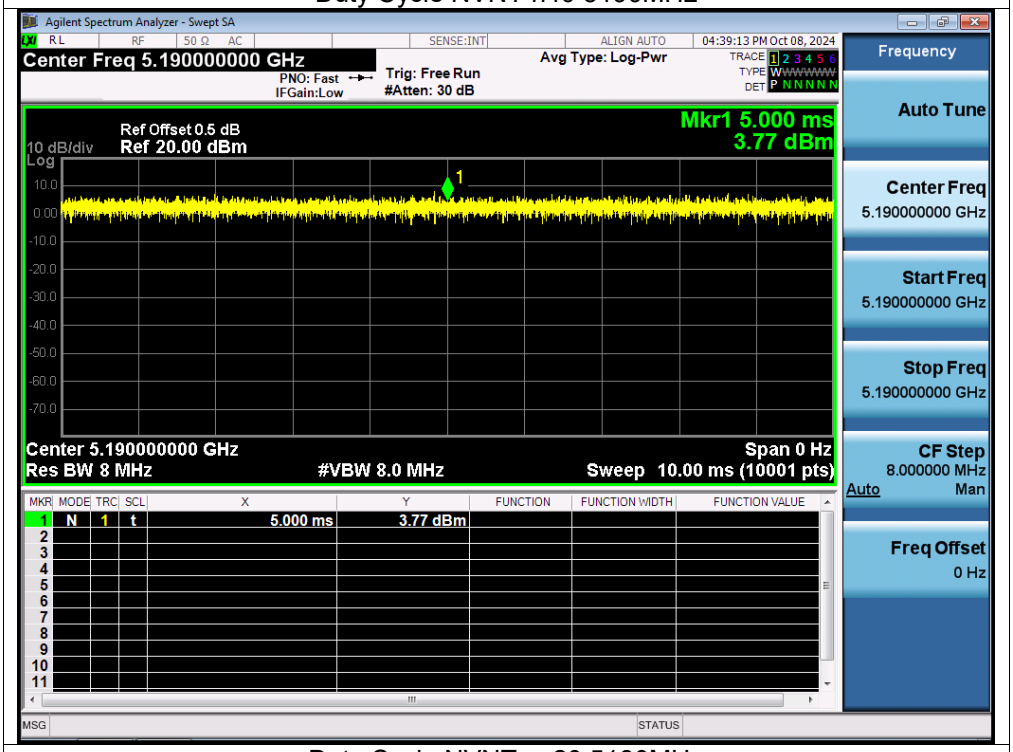
Test Graphs
Duty Cycle NVNT a 5180MHz



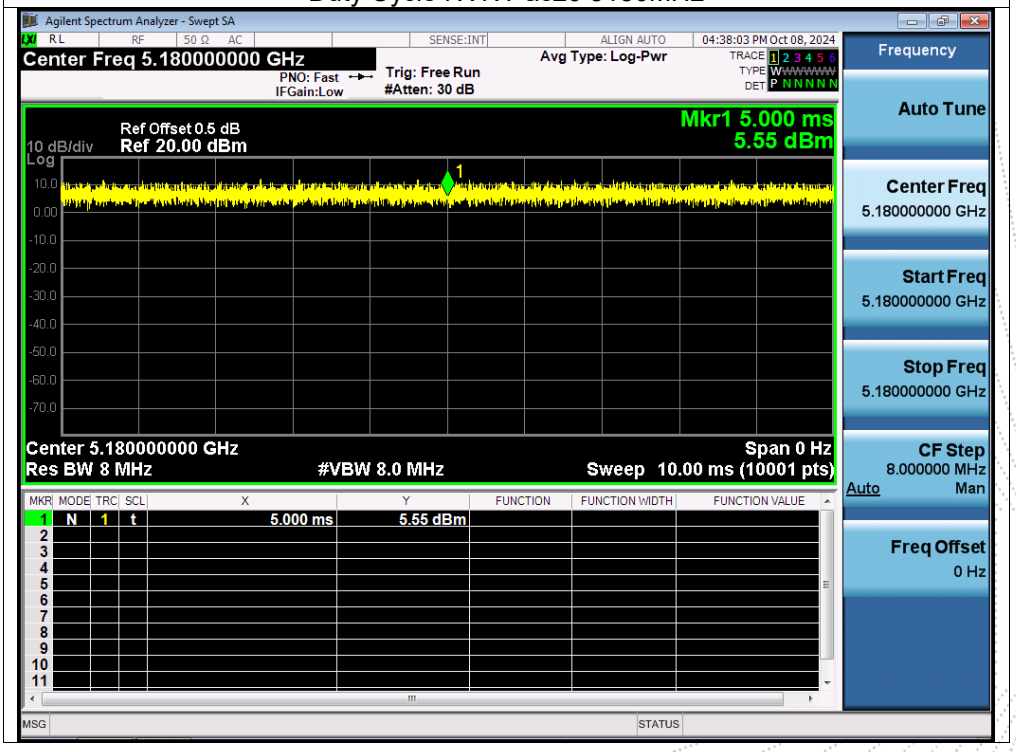
Duty Cycle NVNT n20 5180MHz



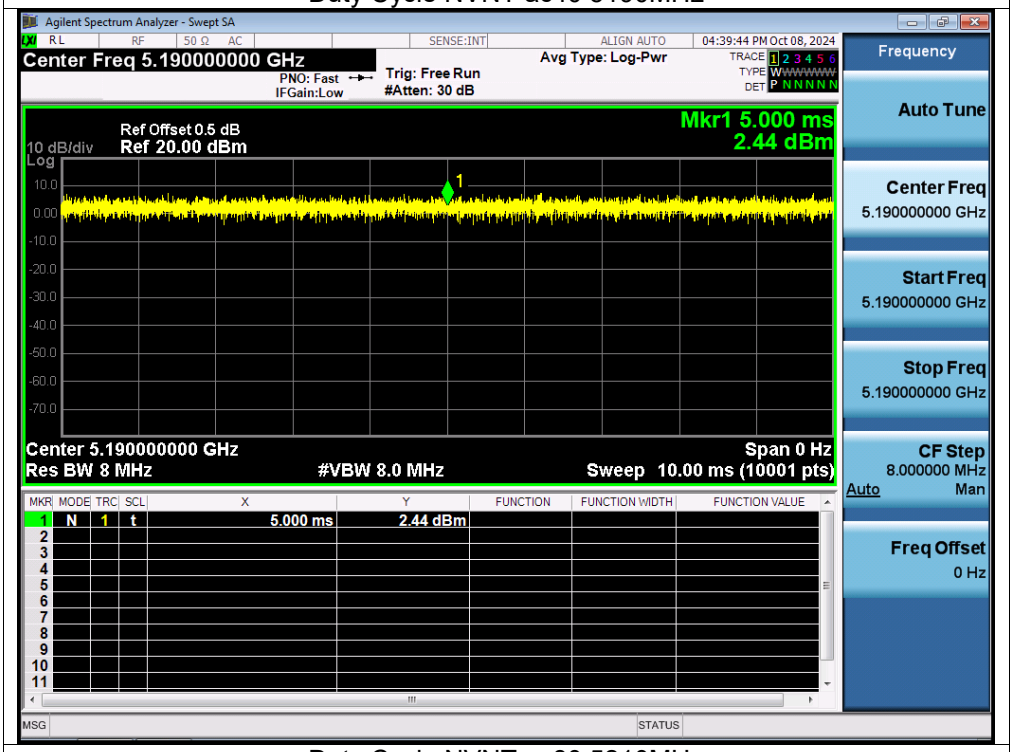
Duty Cycle NVNT n40 5190MHz



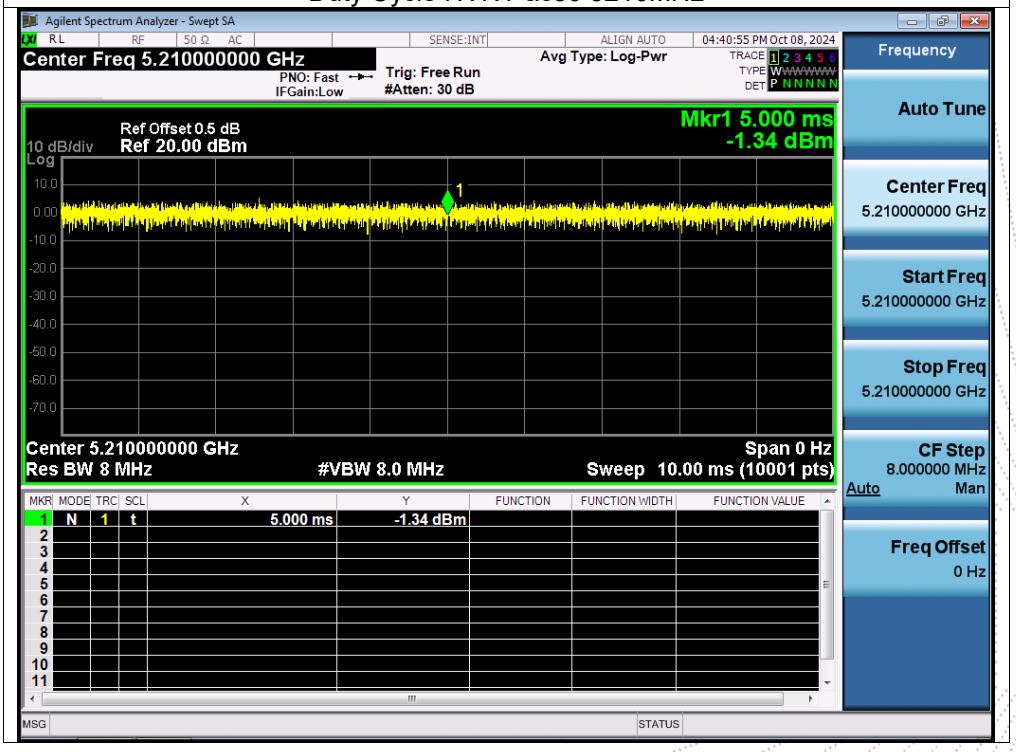
Duty Cycle NVNT ac20 5180MHz



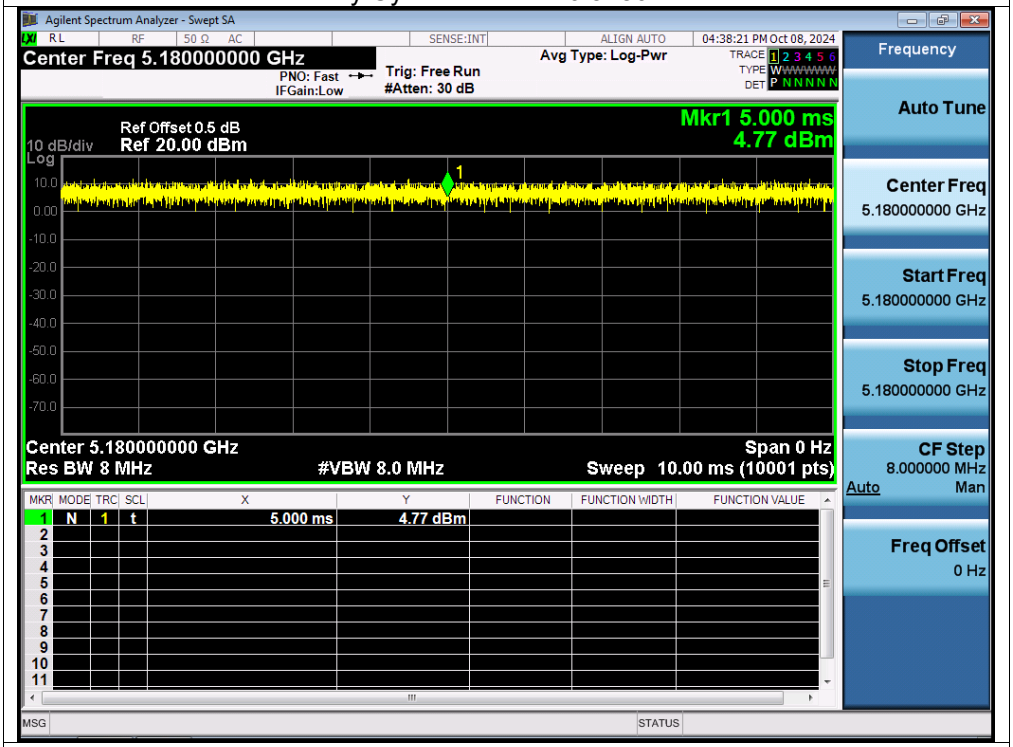
Duty Cycle NVNT ac40 5190MHz



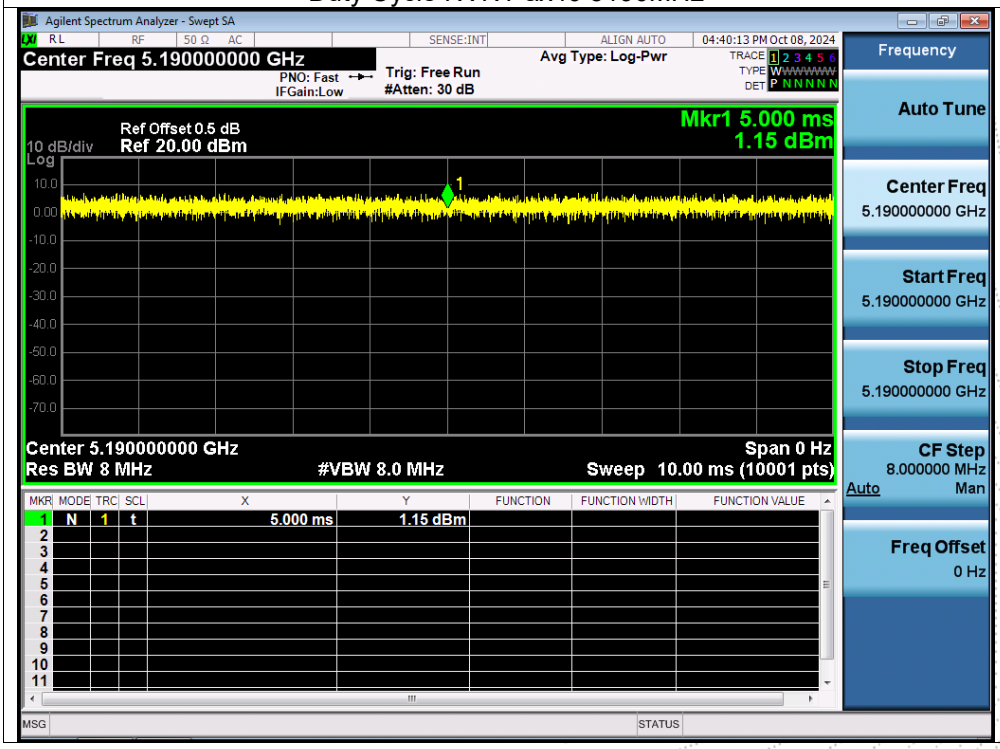
Duty Cycle NVNT ac80 5210MHz



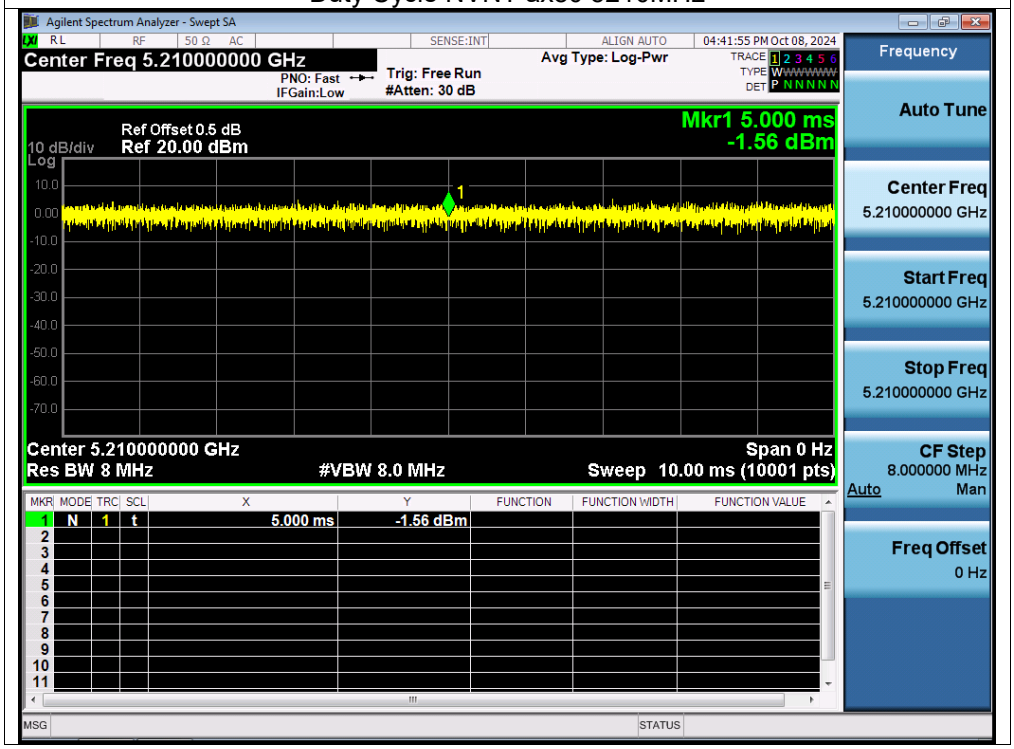
Duty Cycle NVNT ax20 5180MHz



Duty Cycle NVNT ax40 5190MHz



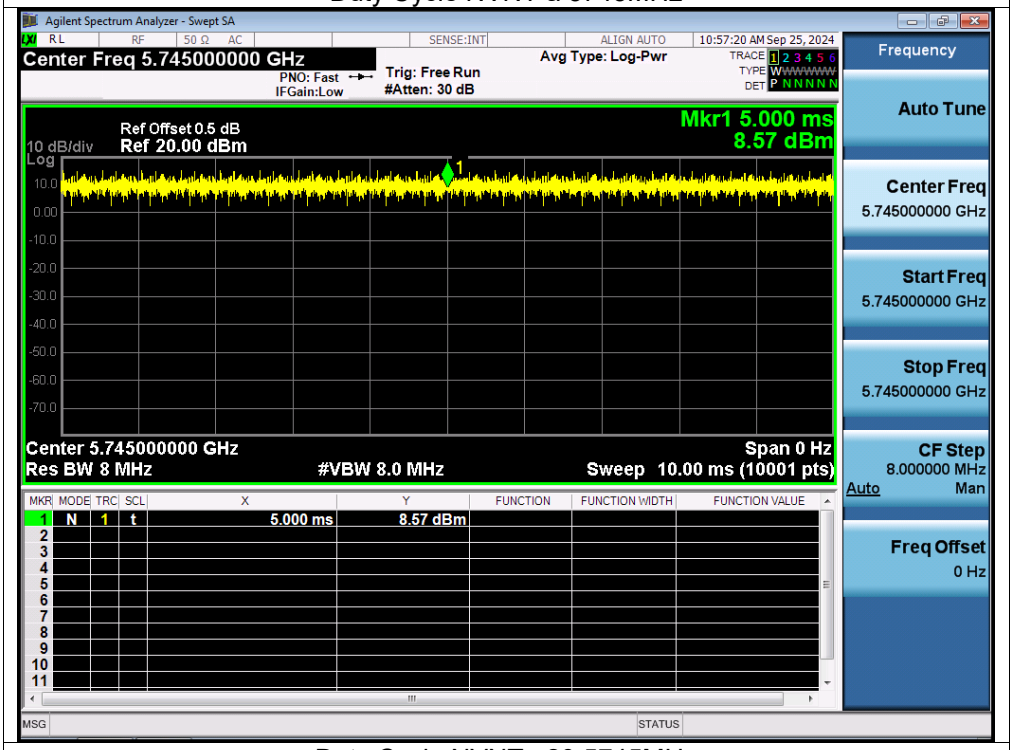
Duty Cycle NVNT ax80 5210MHz



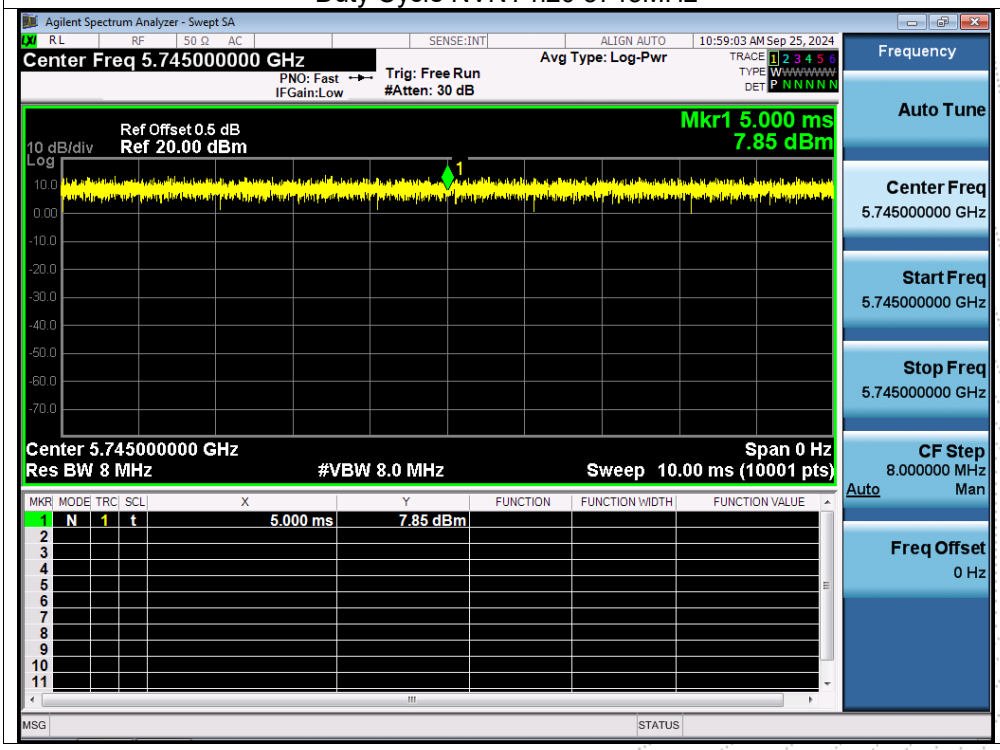
ANT A

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

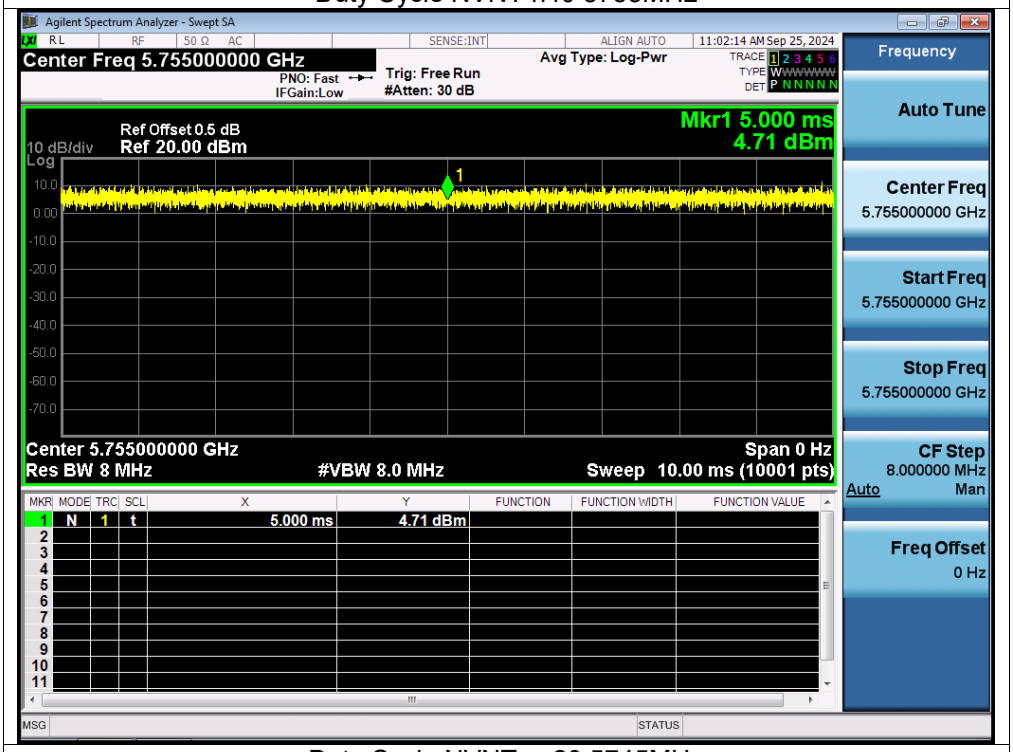
Test Graphs
Duty Cycle NVNT a 5745MHz



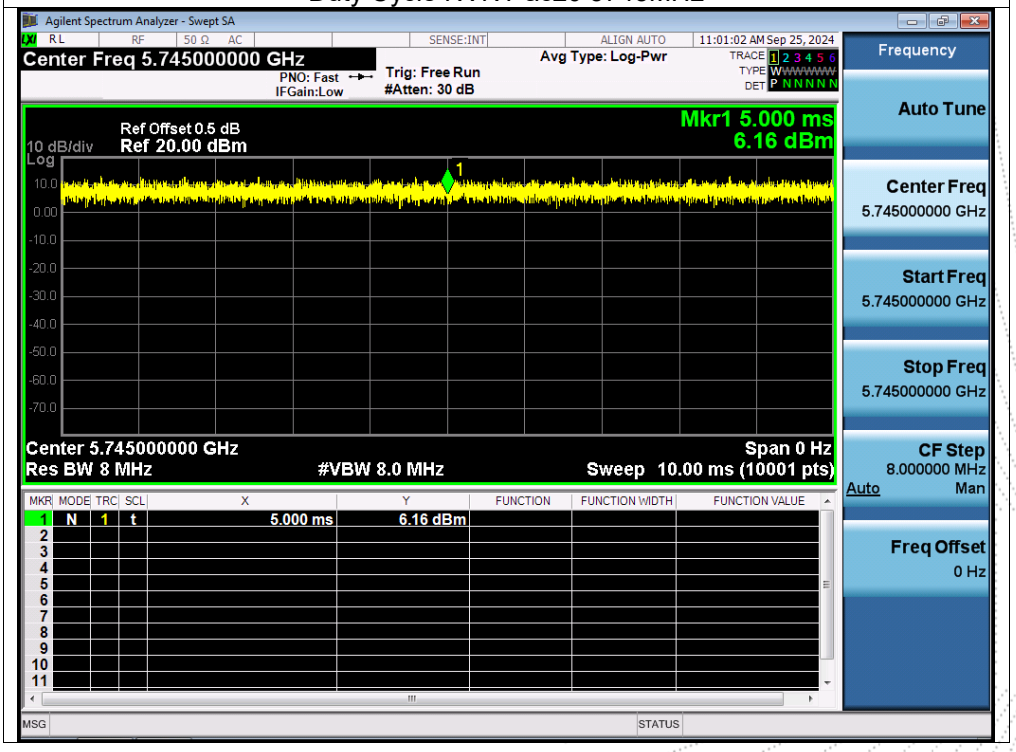
Duty Cycle NVNT n20 5745MHz



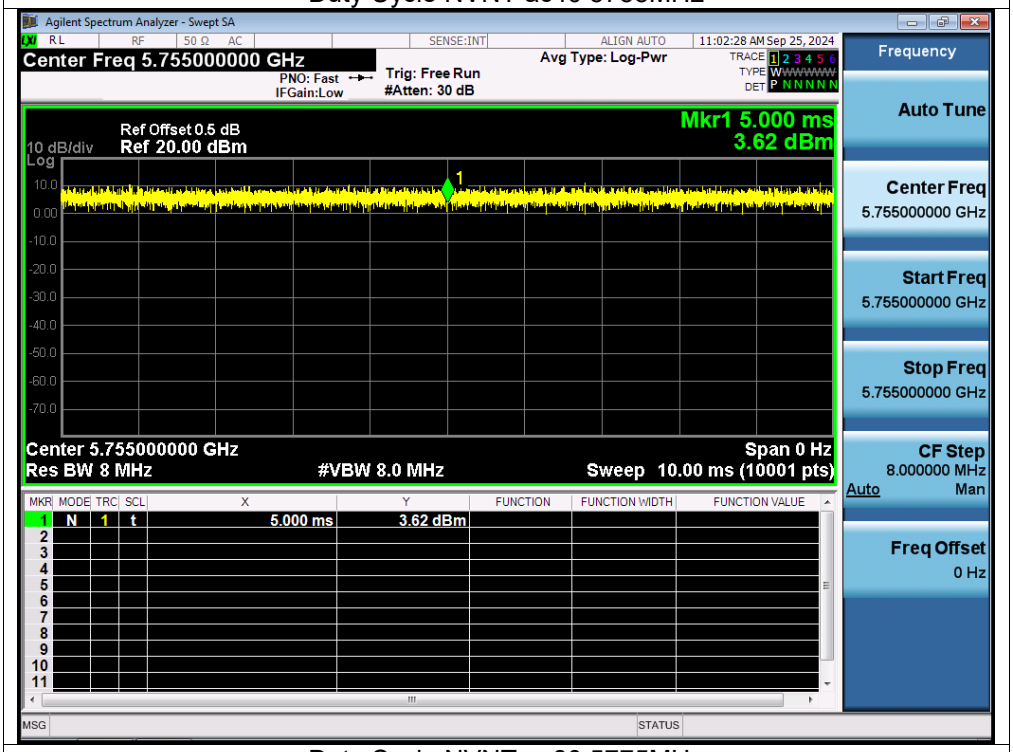
Duty Cycle NVNT n40 5755MHz



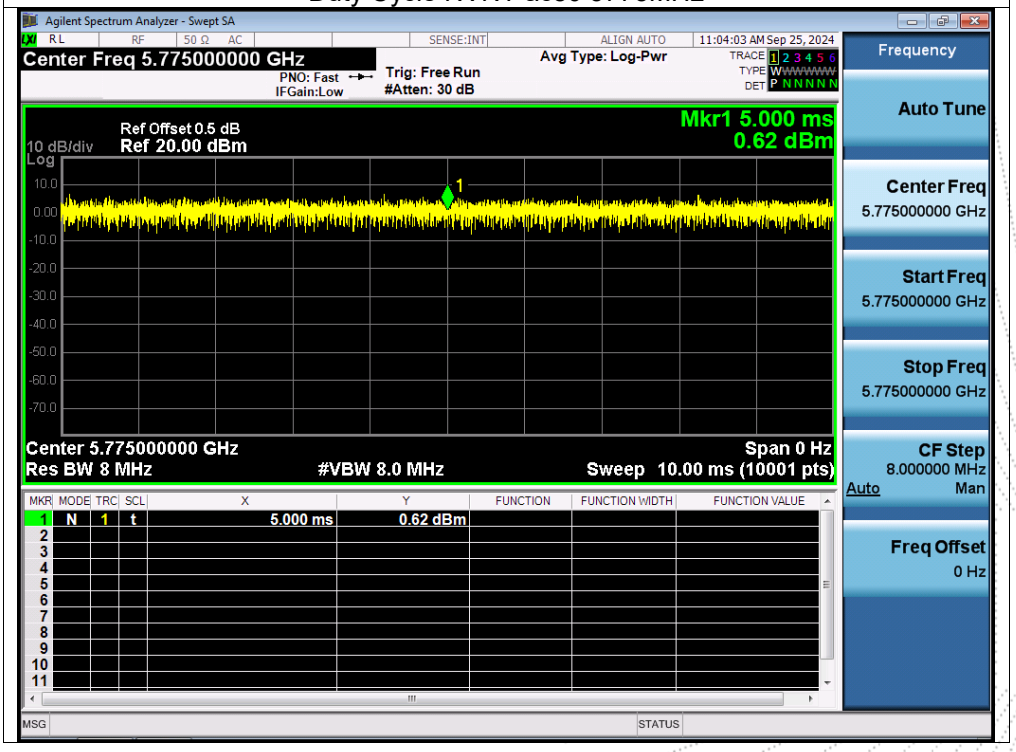
Duty Cycle NVNT ac20 5745MHz



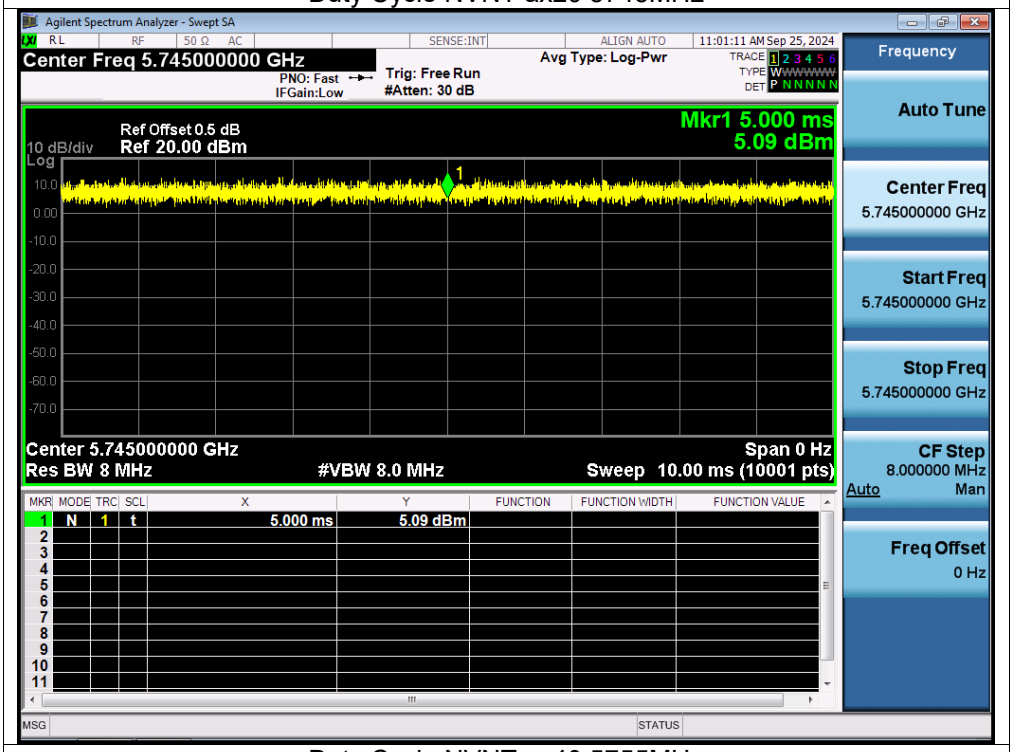
Duty Cycle NVNT ac40 5755MHz



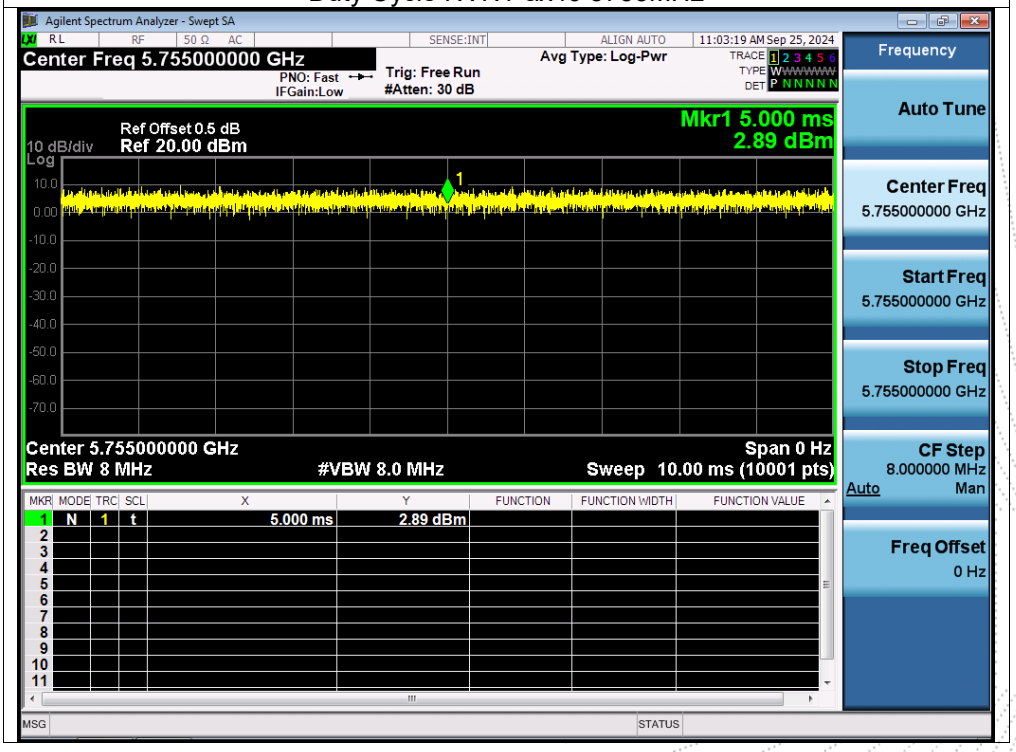
Duty Cycle NVNT ac80 5775MHz



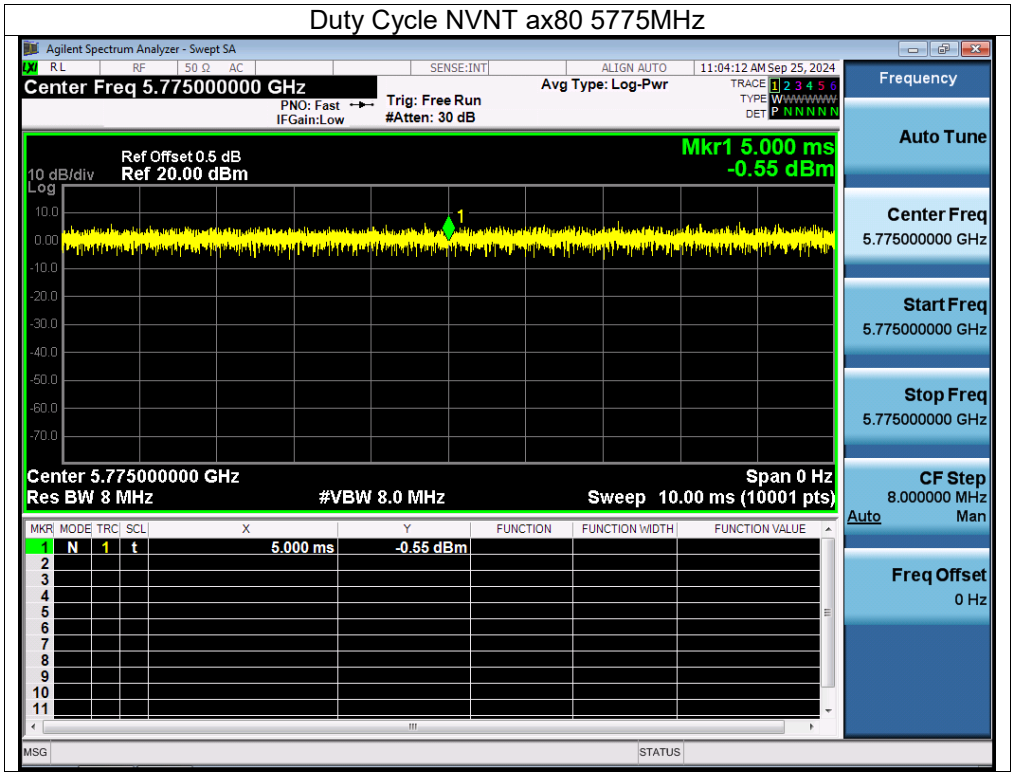
Duty Cycle NVNT ax20 5745MHz



Duty Cycle NVNT ax40 5755MHz



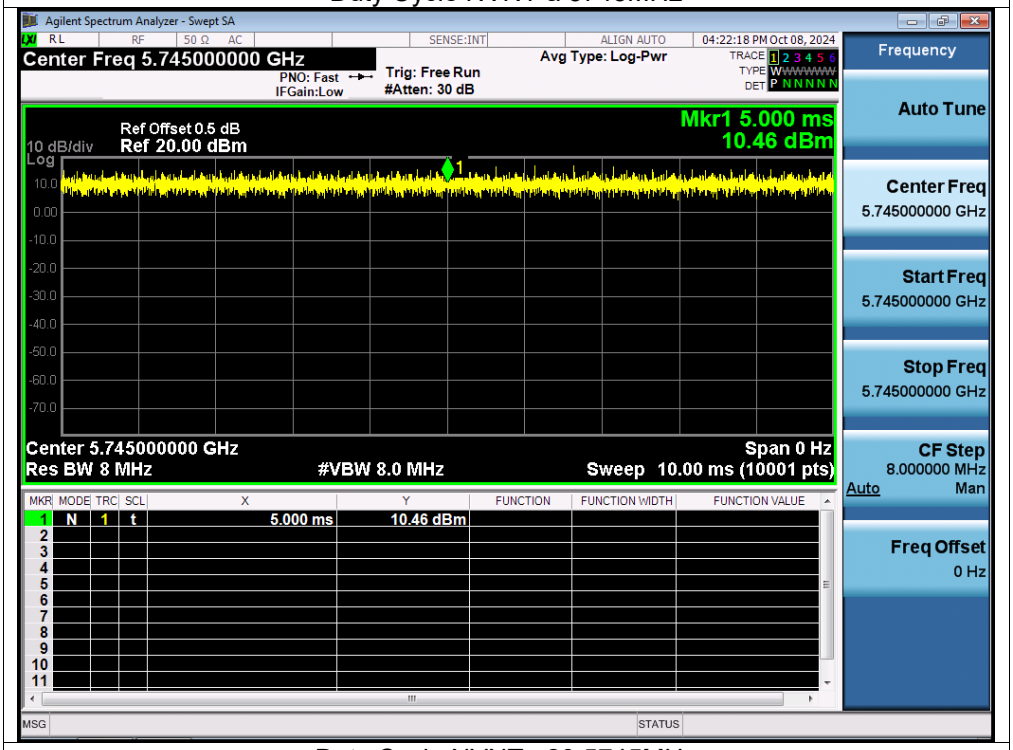
Duty Cycle NVNT ax80 5775MHz



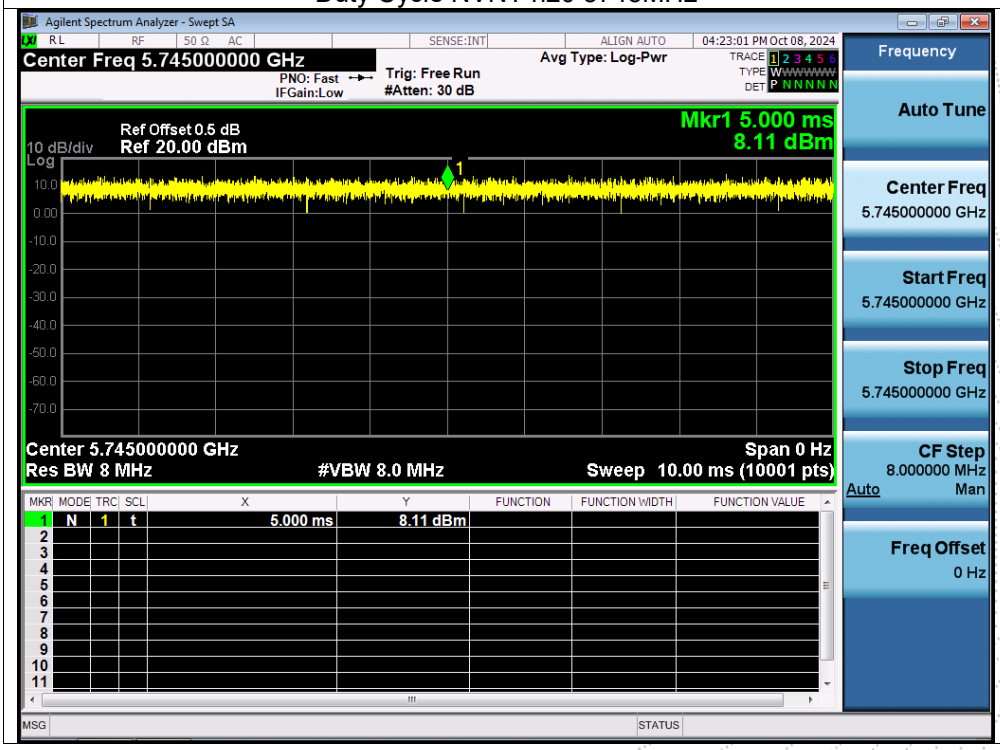
ANT B

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

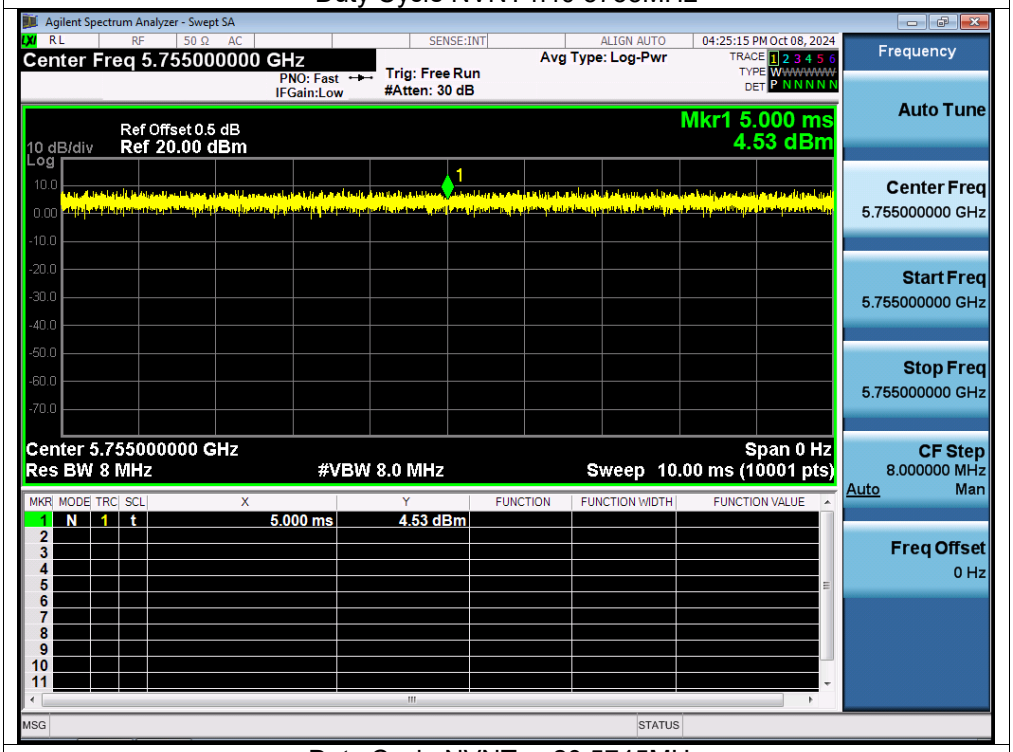
Test Graphs
Duty Cycle NVNT a 5745MHz



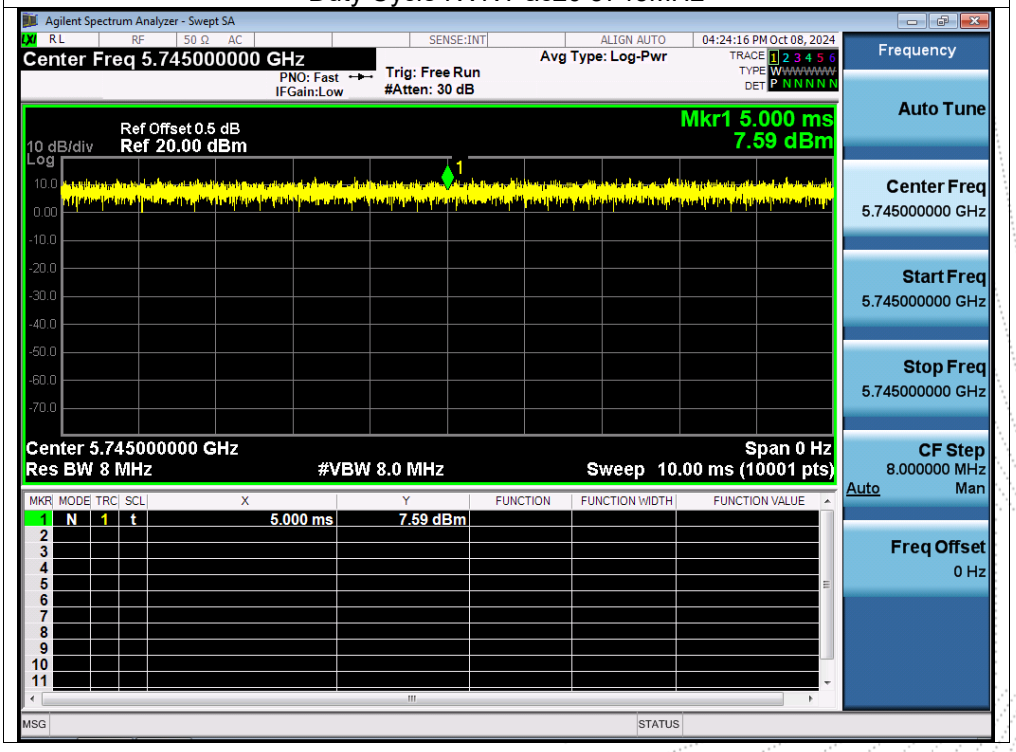
Duty Cycle NVNT n20 5745MHz



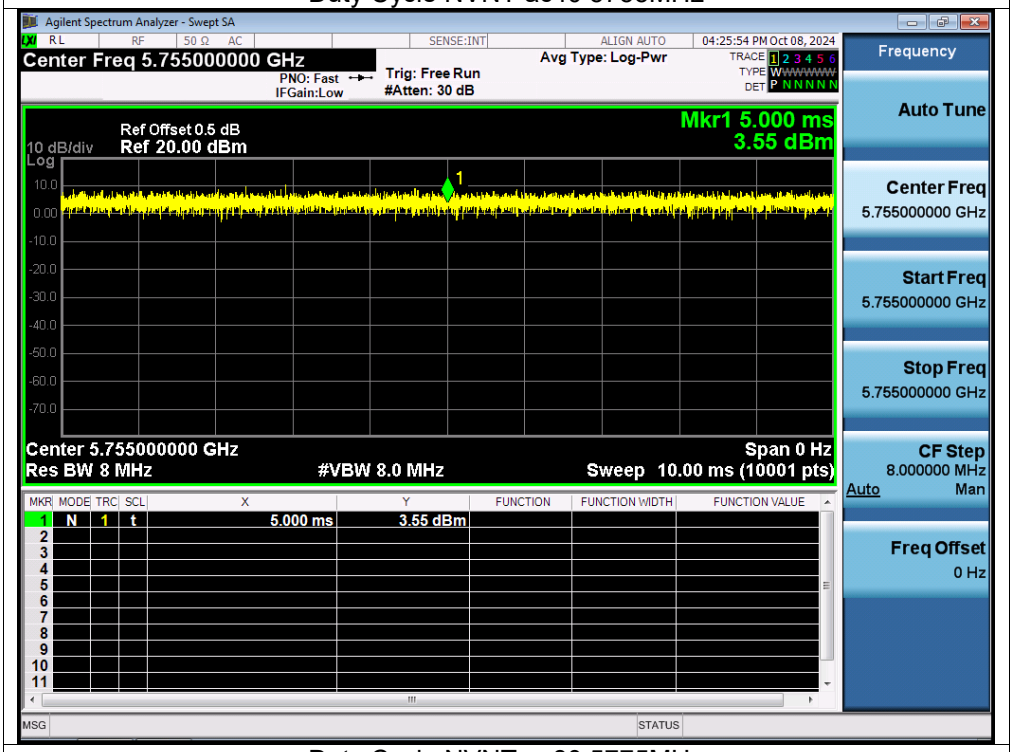
Duty Cycle NVNT n40 5755MHz



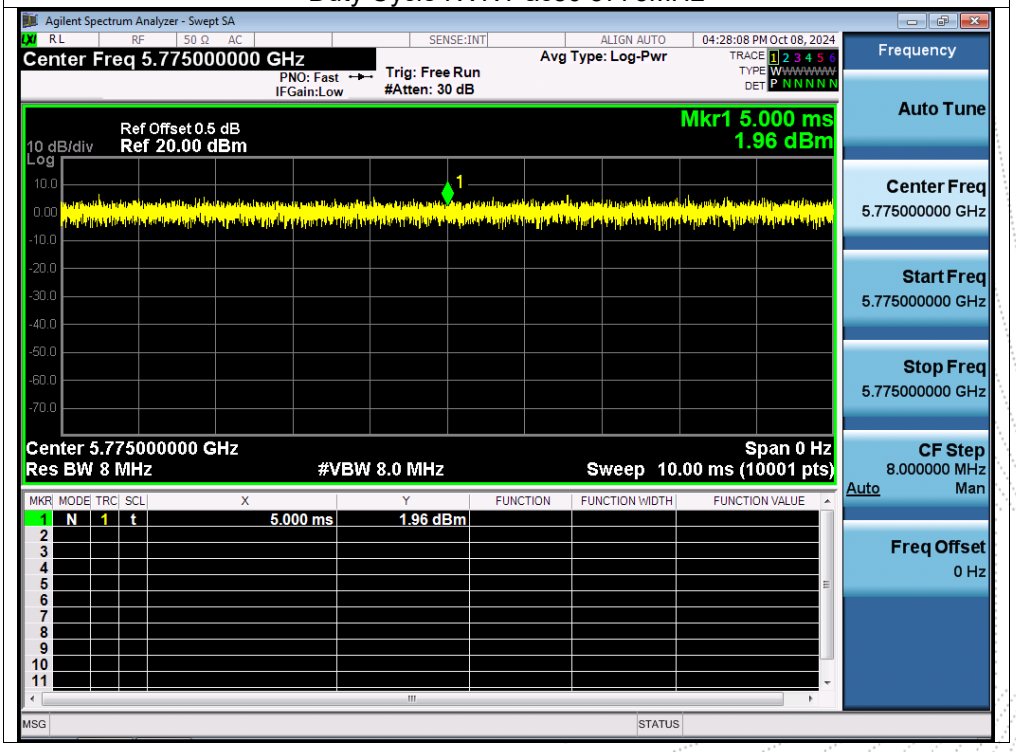
Duty Cycle NVNT ac20 5745MHz



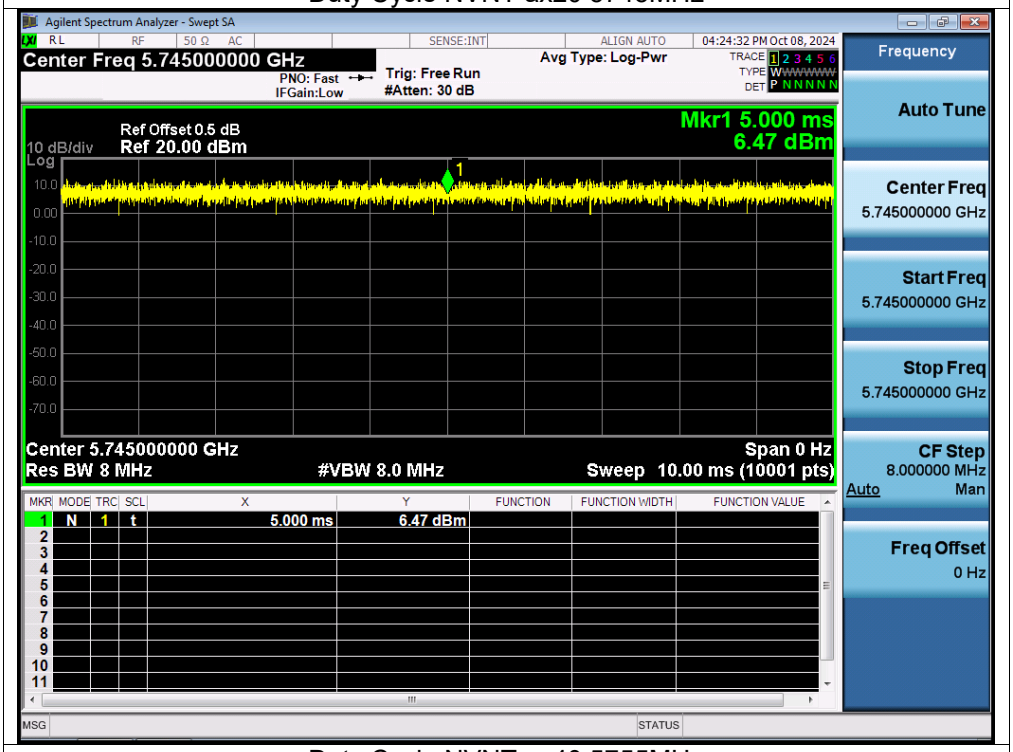
Duty Cycle NVNT ac40 5755MHz



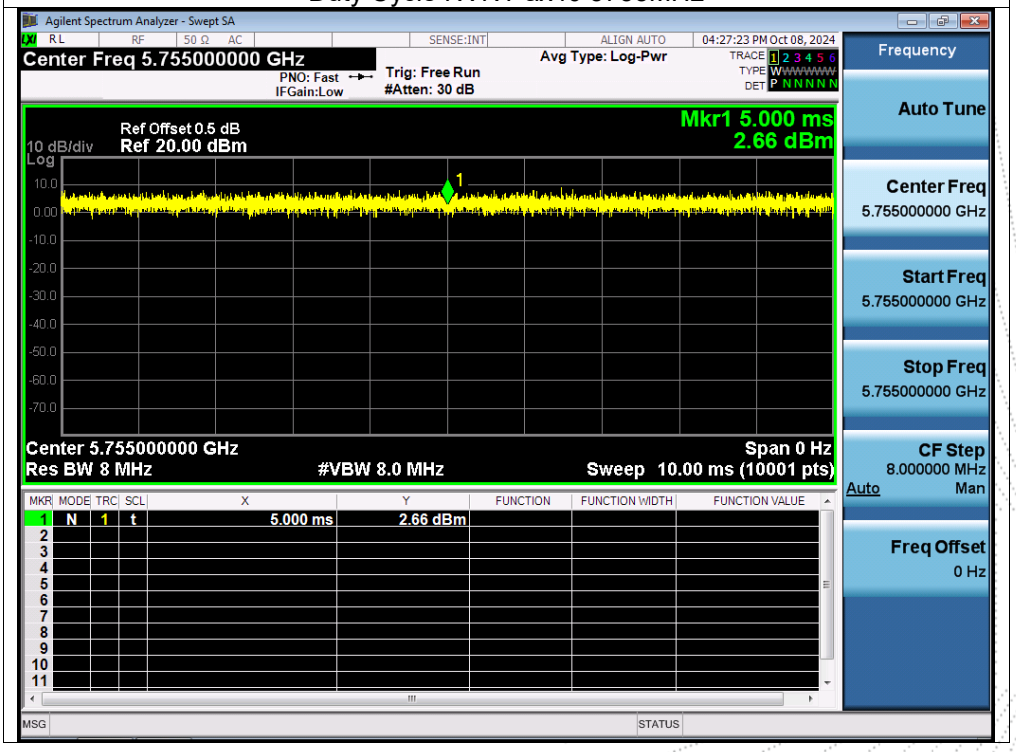
Duty Cycle NVNT ac80 5775MHz



Duty Cycle NVNT ax20 5745MHz



Duty Cycle NVNT ax40 5755MHz



Duty Cycle NVNT ax80 5775MHz