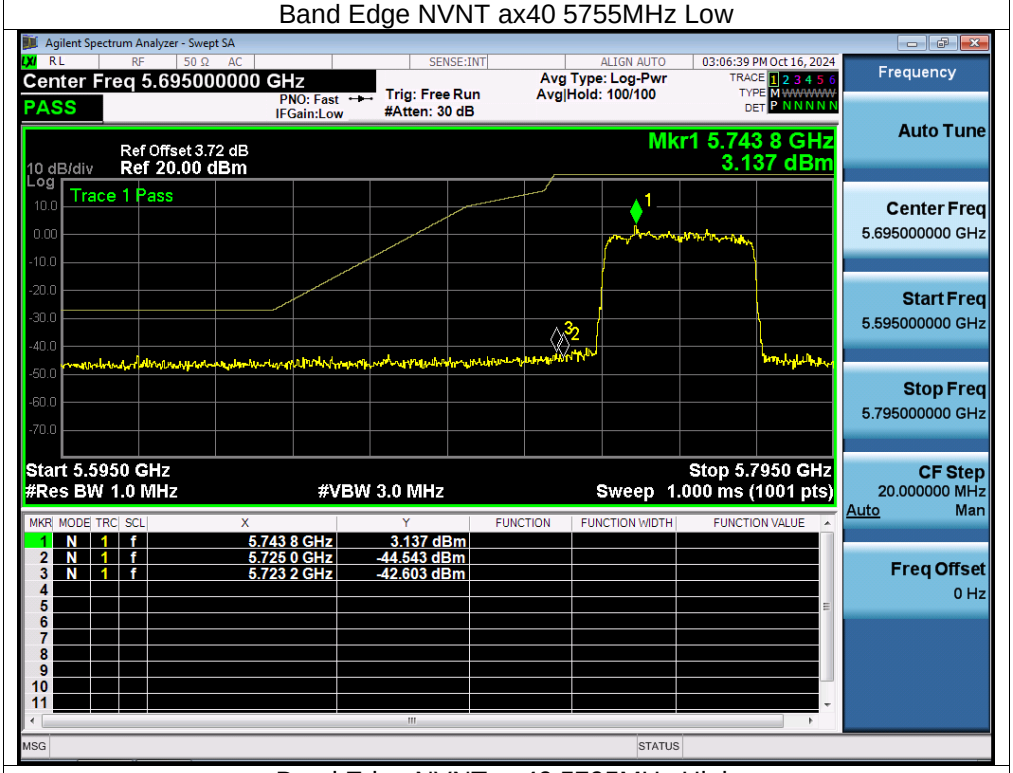
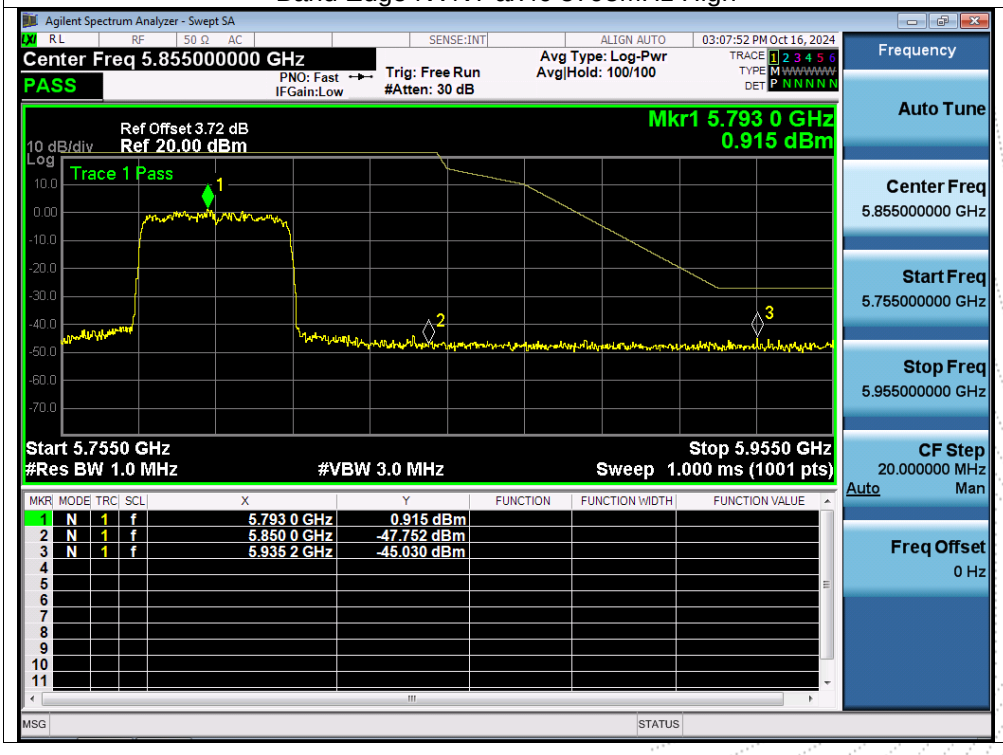
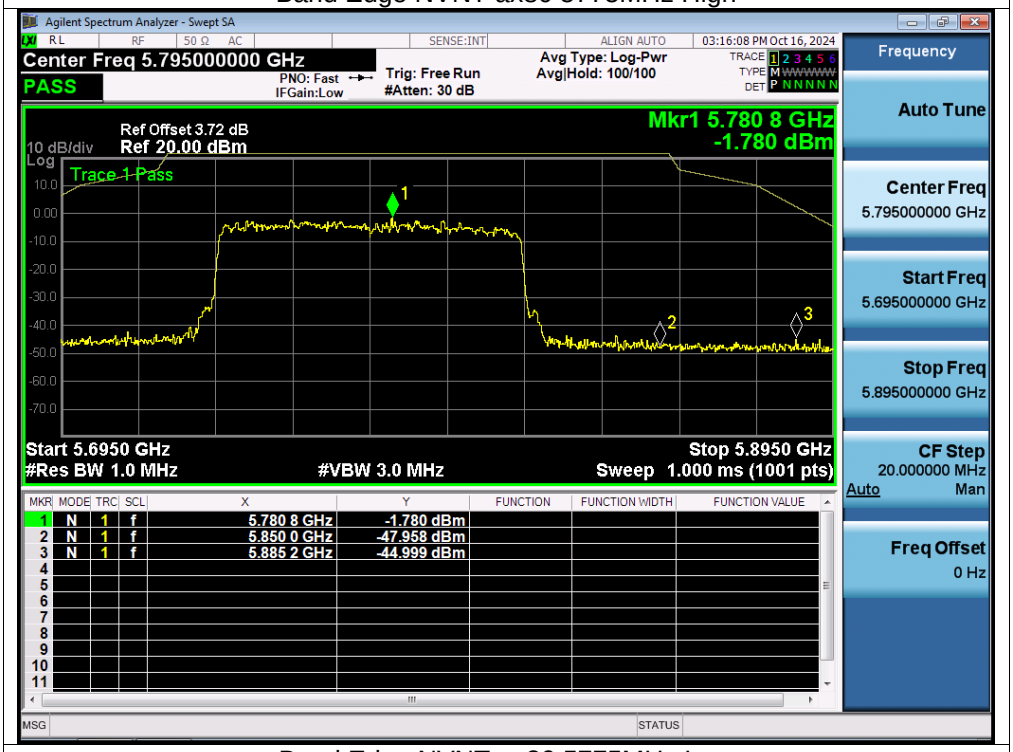
Band Edge NVNT ax40 5755MHz Low



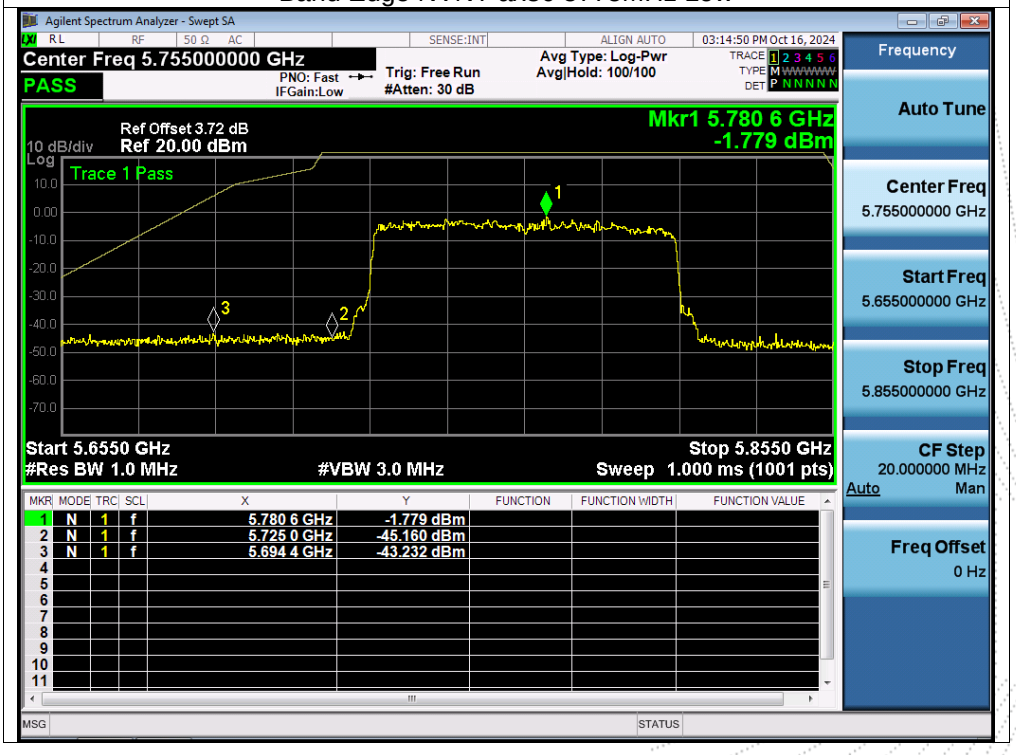
Band Edge NVNT ax40 5795MHz High



Band Edge NVNT ax80 5775MHz High

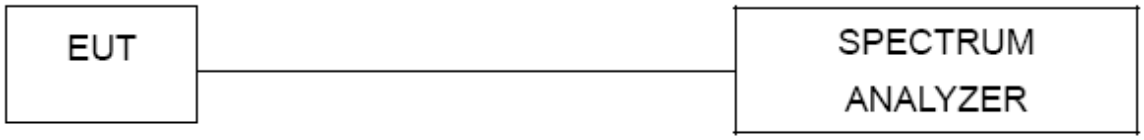


Band Edge NVNT ax80 5775MHz Low



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

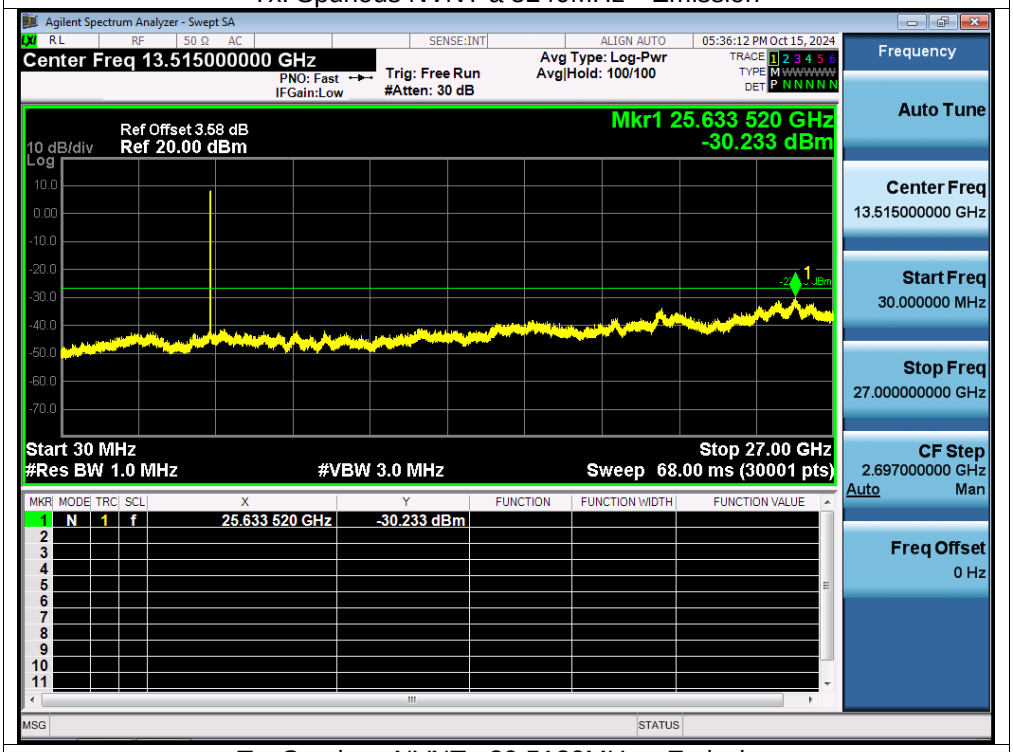
Remark: The measurement frequency range is from 9KHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions and band edge measurement data.
About:26.5GHz-40GHz, The amplitude of spurious emissions which are attenuated by 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

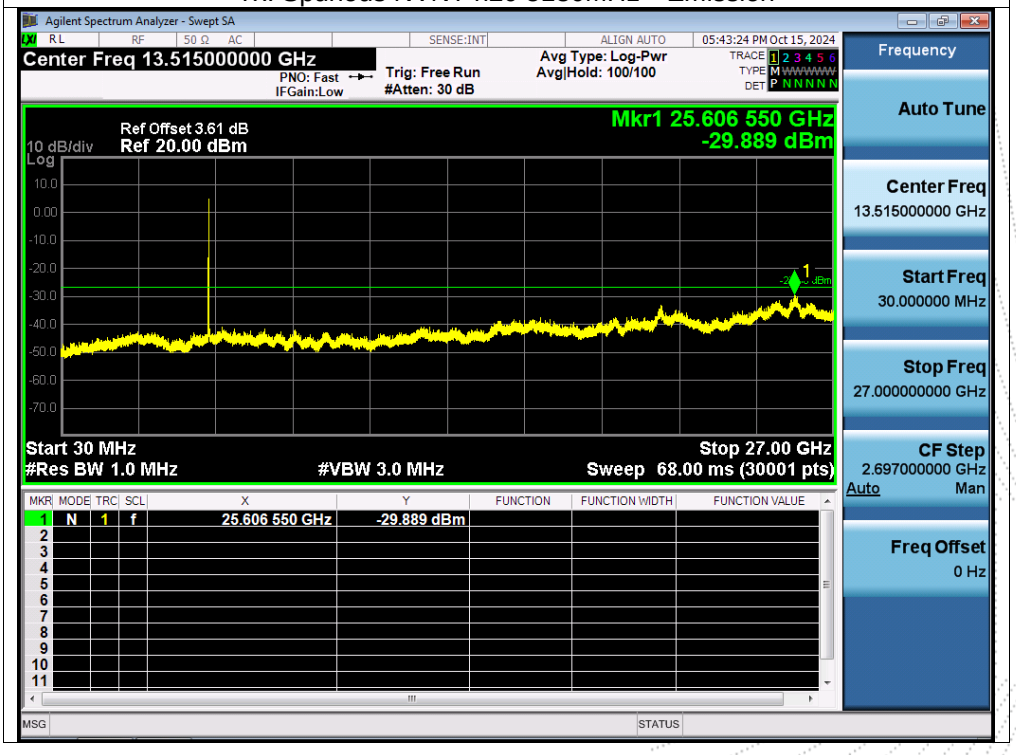
Test Graphs
Tx. Spurious NVNT a 5180MHz Emission

Tx. Spurious NVNT a 5200MHz Emission

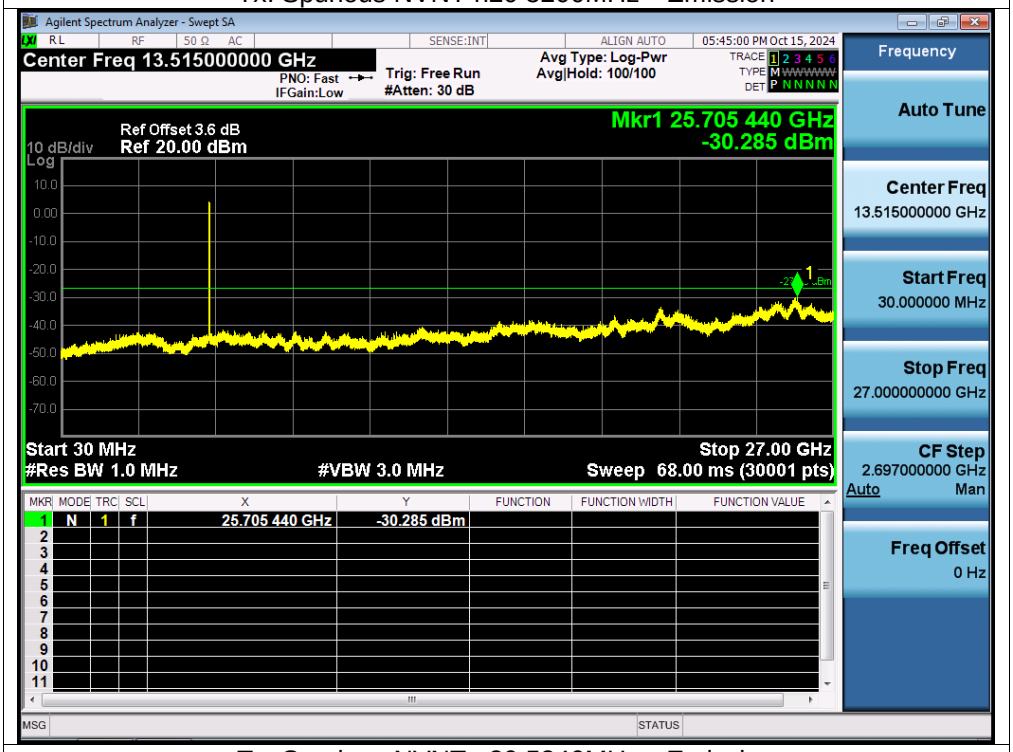
Tx. Spurious NVNT a 5240MHz Emission



Tx. Spurious NVNT n20 5180MHz Emission

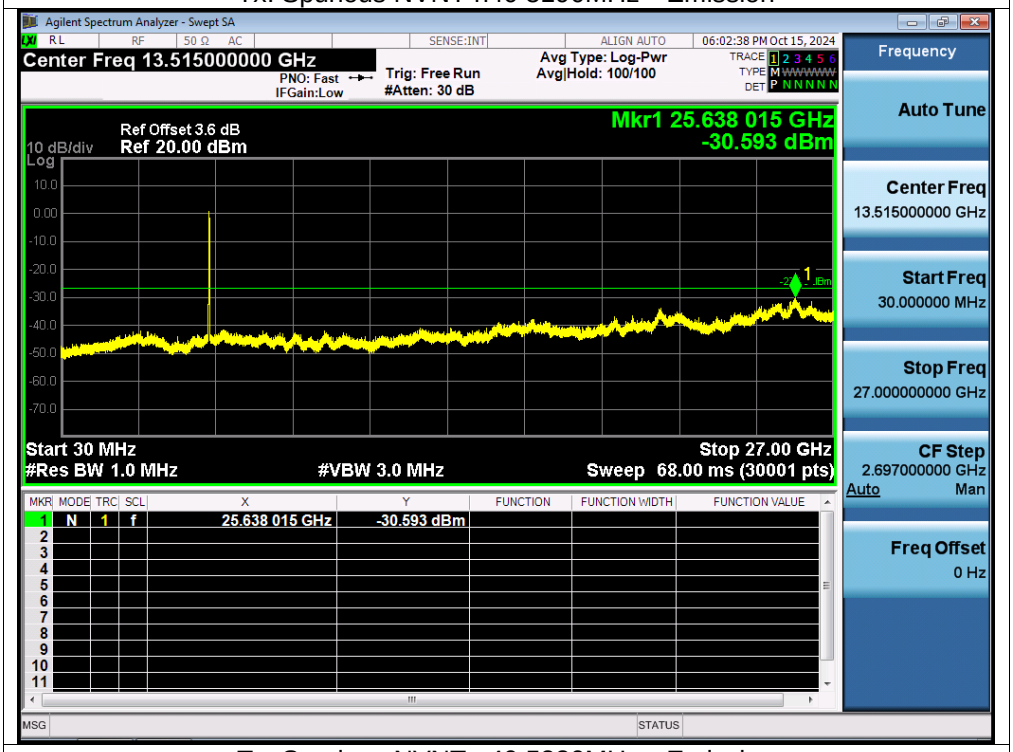


Tx. Spurious NVNT n20 5200MHz Emission



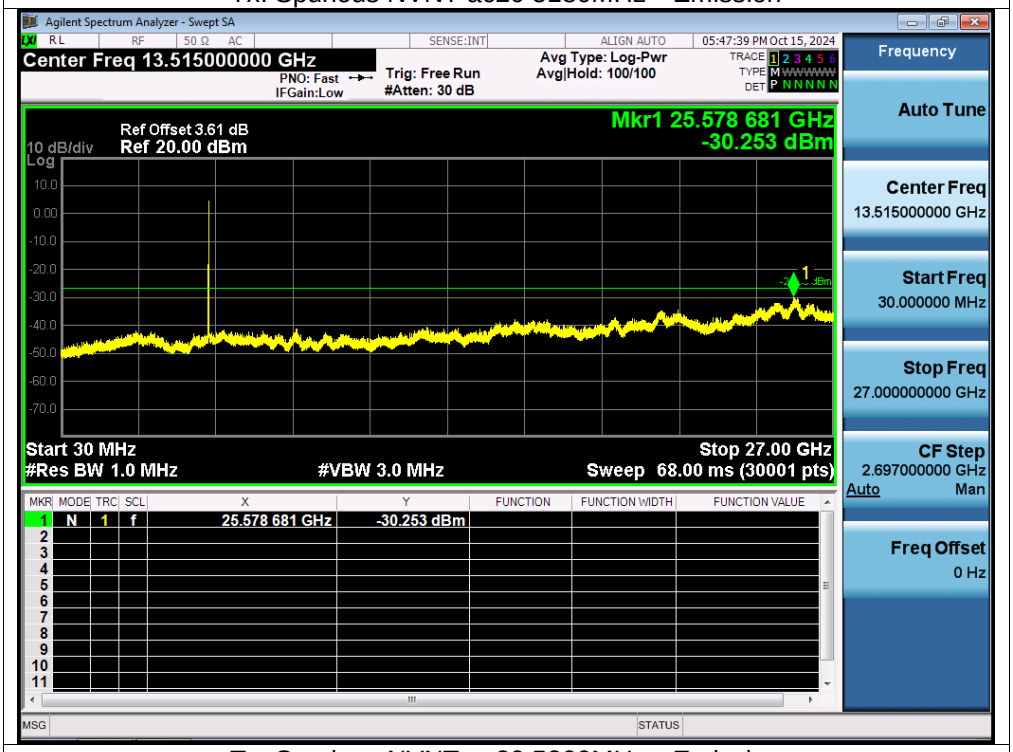
Tx. Spurious NVNT n20 5240MHz Emission

Tx. Spurious NVNT n40 5190MHz Emission



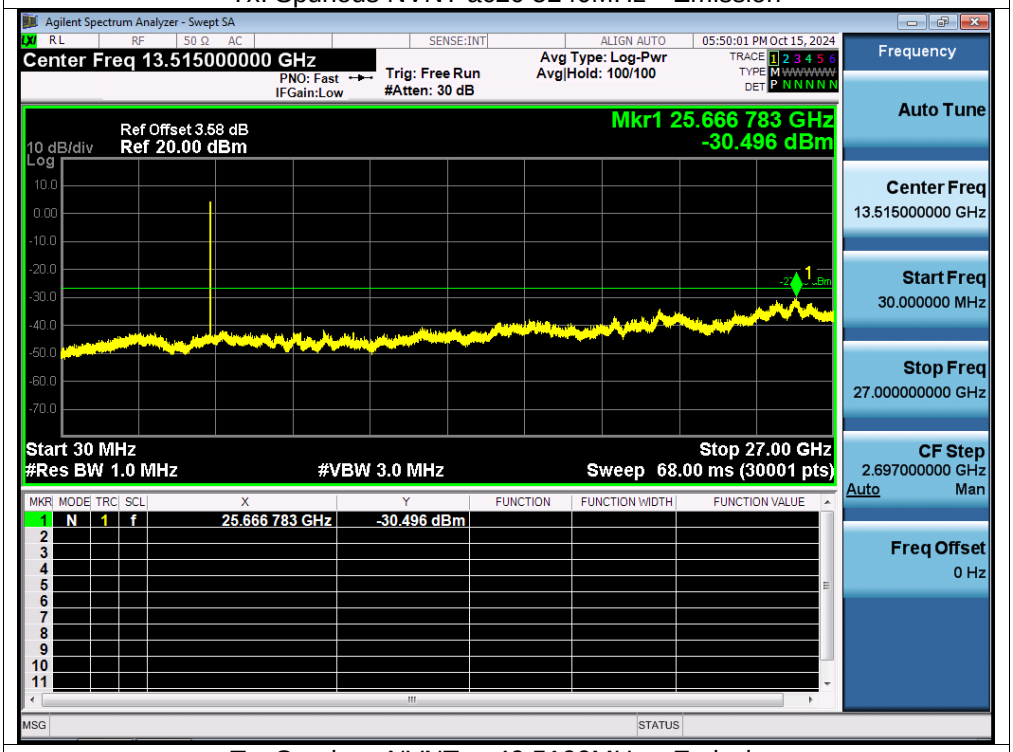
Tx. Spurious NVNT n40 5230MHz Emission

Tx. Spurious NVNT ac20 5180MHz Emission



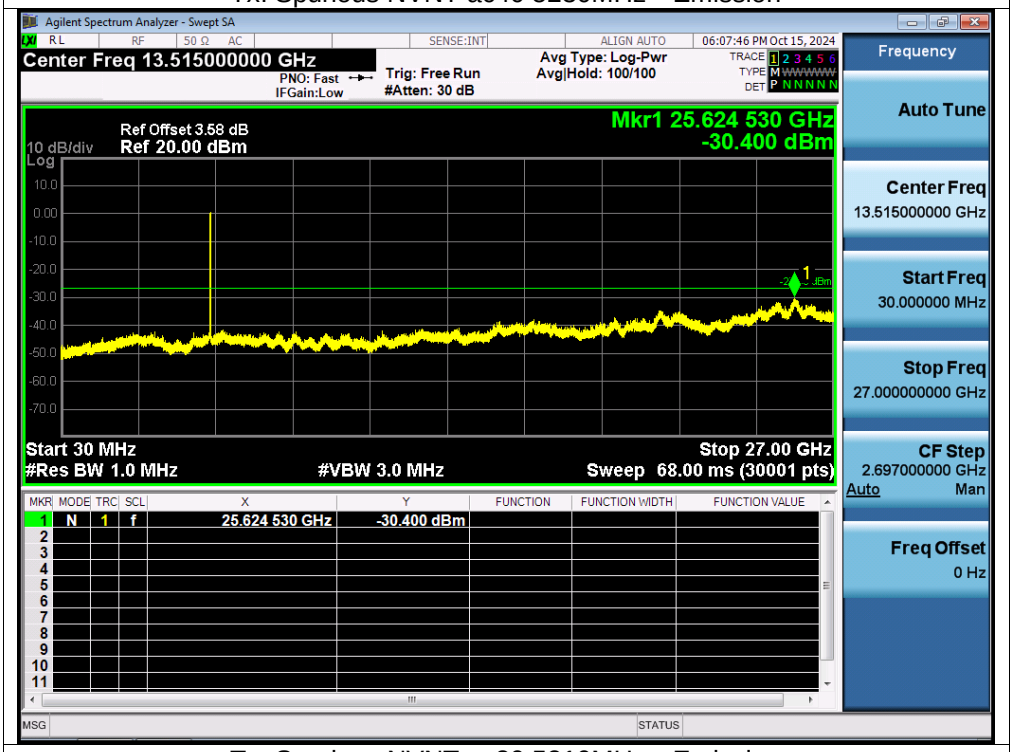
Tx. Spurious NVNT ac20 5200MHz Emission

Tx. Spurious NVNT ac20 5240MHz Emission

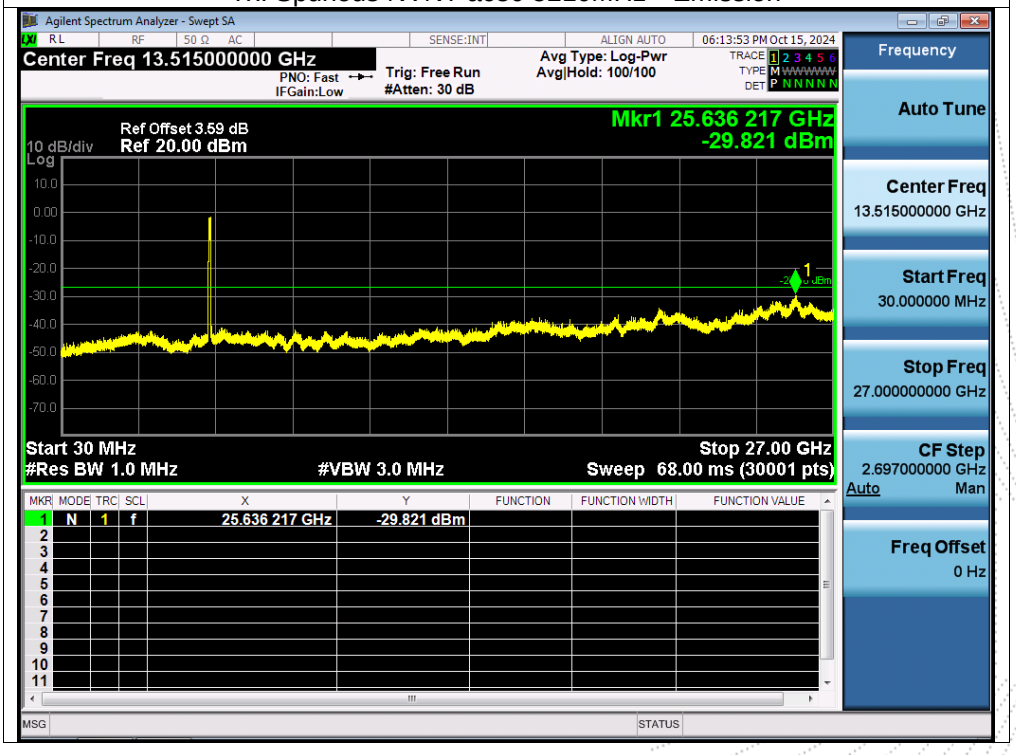


Tx. Spurious NVNT ac40 5190MHz Emission

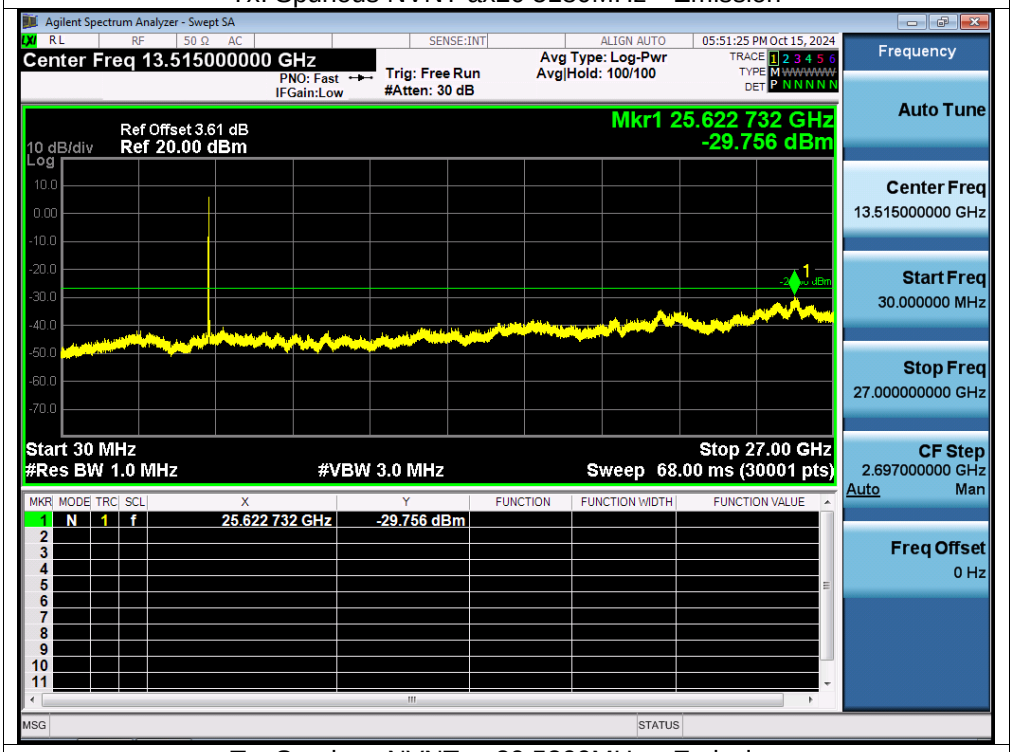
Tx. Spurious NVNT ac40 5230MHz Emission



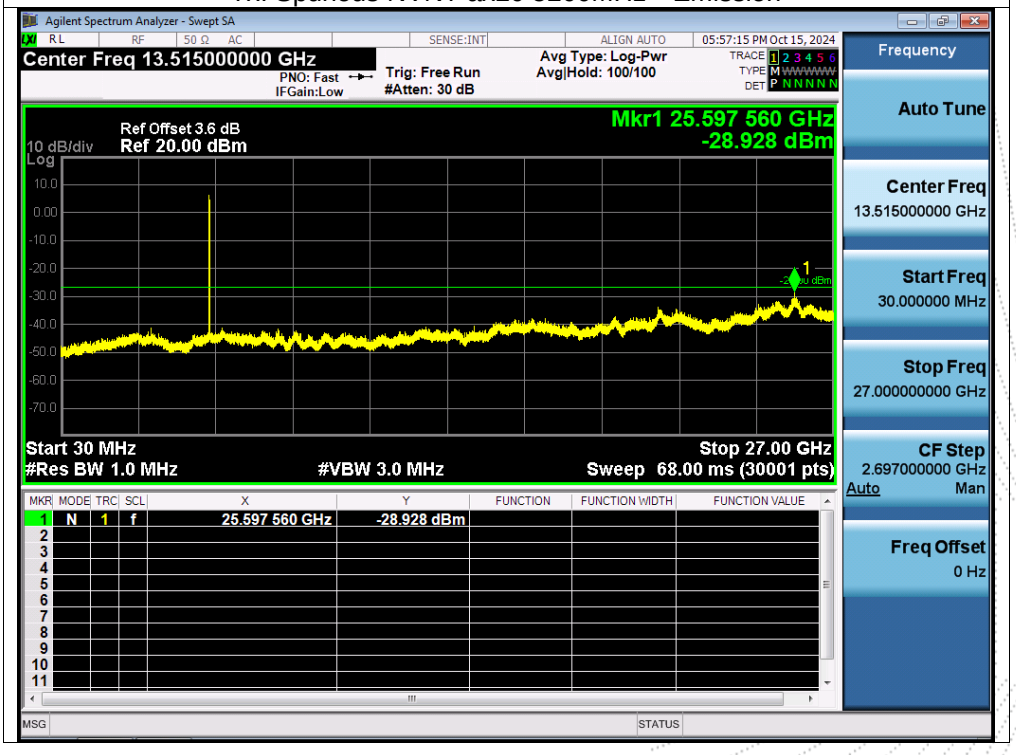
Tx. Spurious NVNT ac80 5210MHz Emission



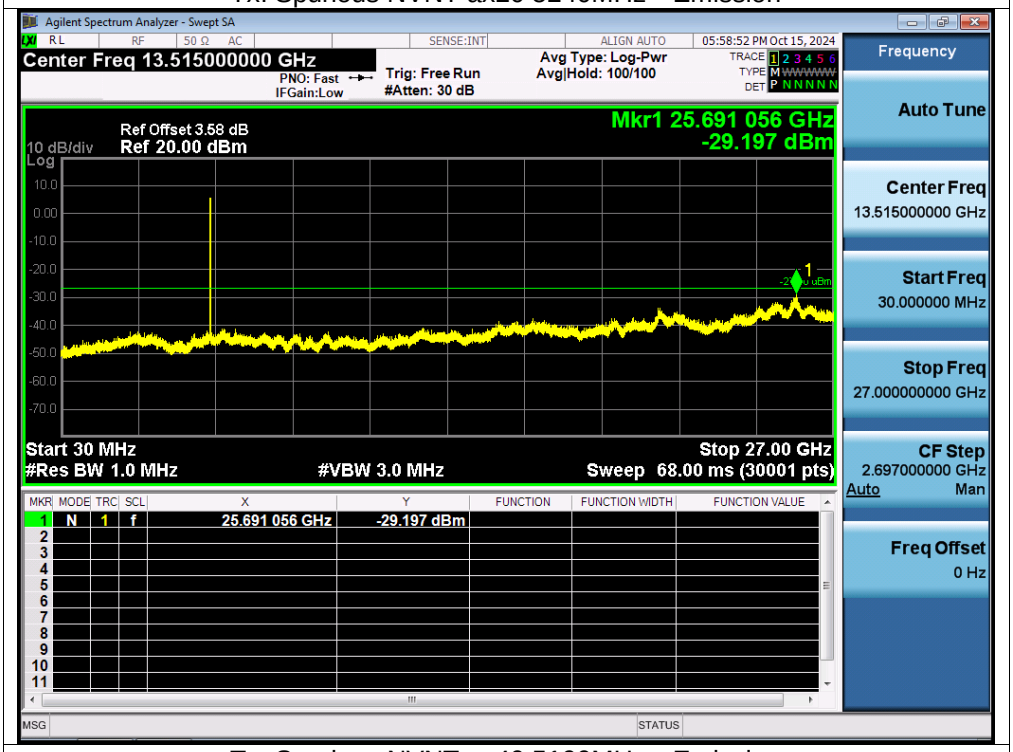
Tx. Spurious NVNT ax20 5180MHz Emission



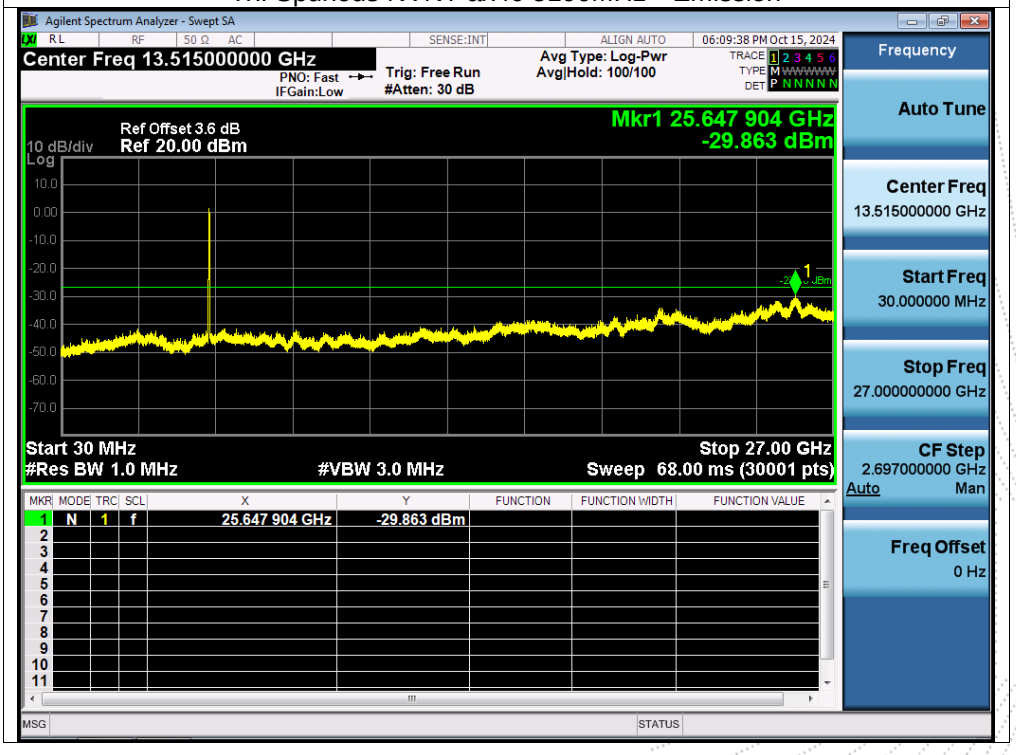
Tx. Spurious NVNT ax20 5200MHz Emission



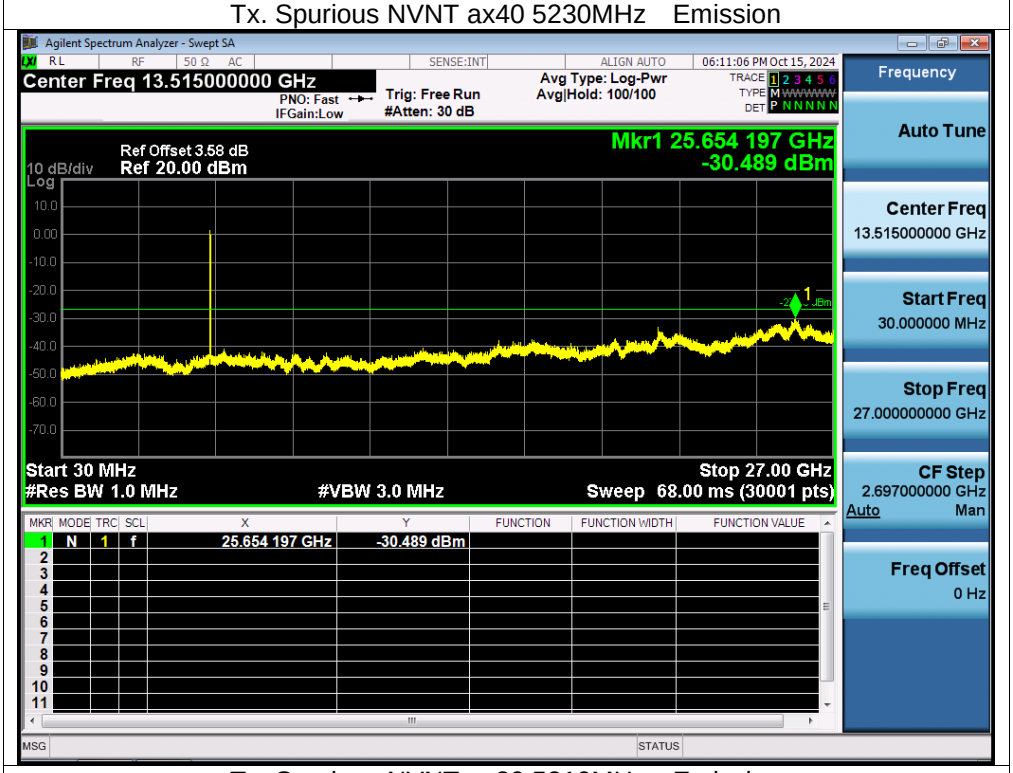
Tx. Spurious NVNT ax20 5240MHz Emission



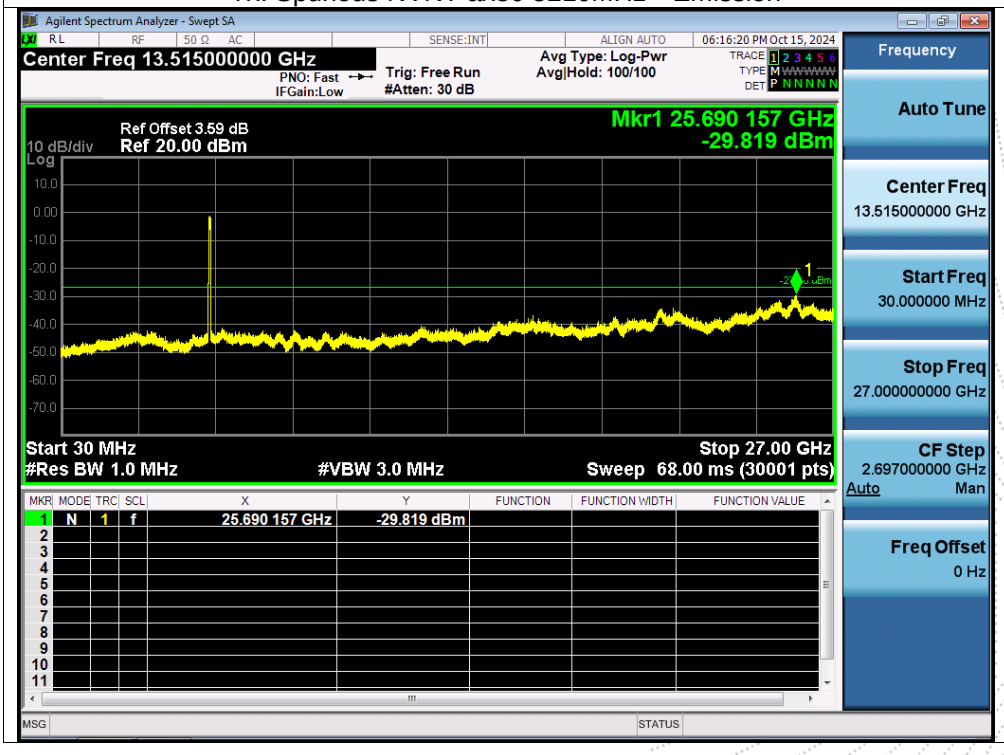
Tx. Spurious NVNT ax40 5190MHz Emission



Tx. Spurious NVNT ax40 5230MHz Emission



Tx. Spurious NVNT ax80 5210MHz Emission

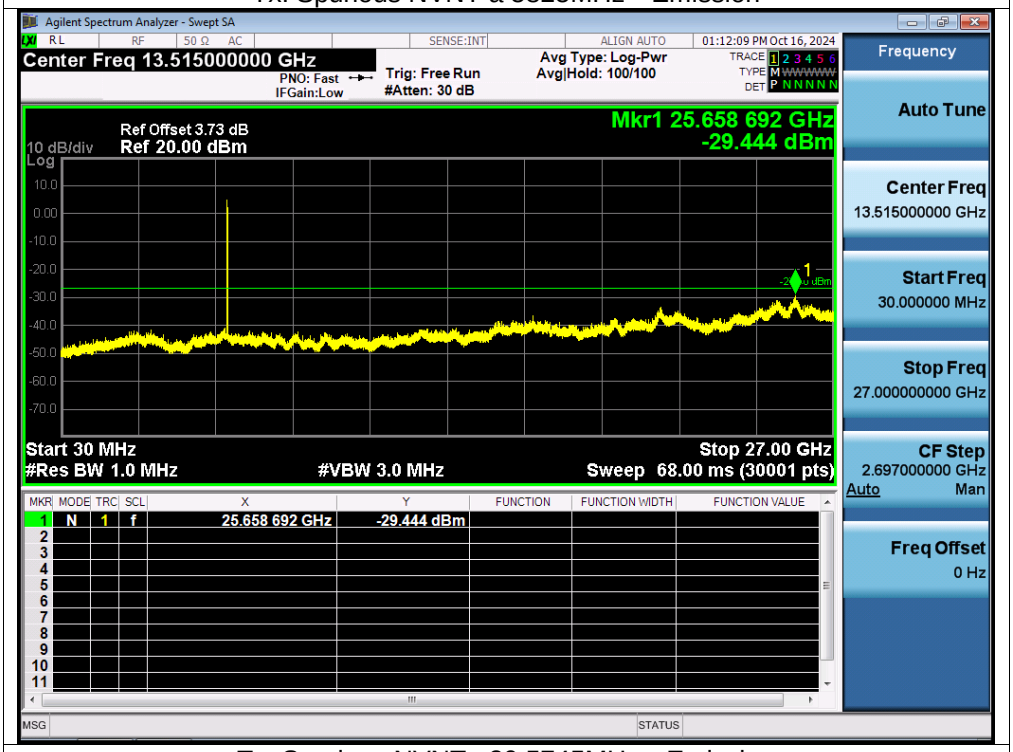


Note: A(B) Represent the value of antenna A and B, The worst data is Antenna A, only shown Antenna A Plot. 5745-58250MHz

Test Graphs
Tx. Spurious NVNT a 5745MHz Emission

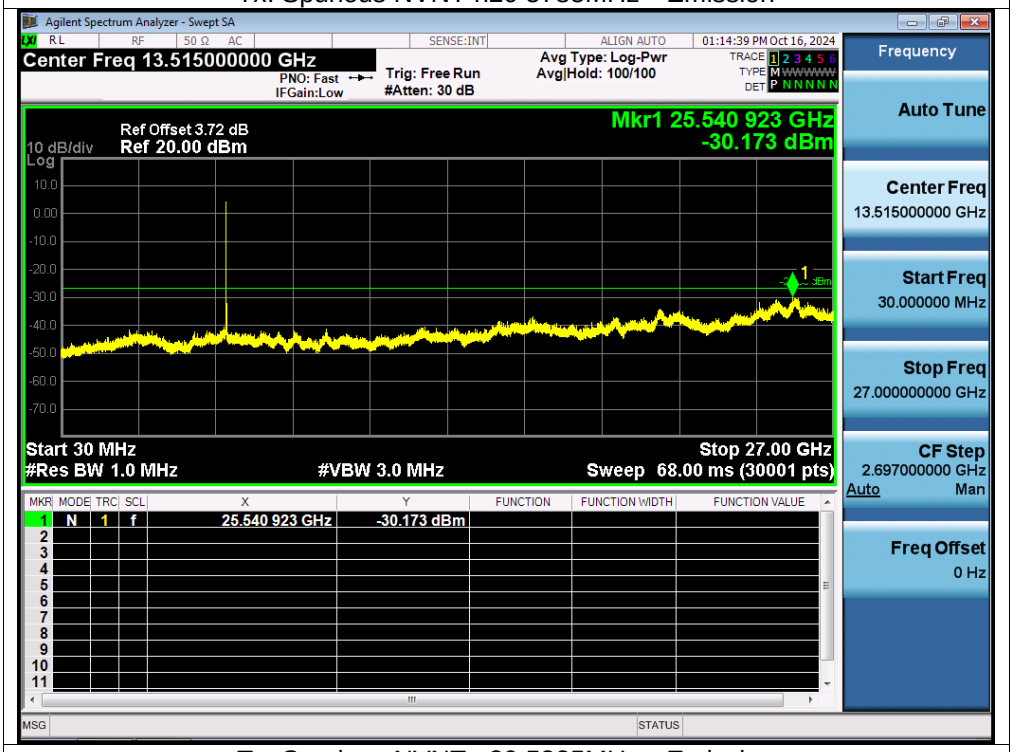
Tx. Spurious NVNT a 5785MHz Emission

Tx. Spurious NVNT a 5825MHz Emission



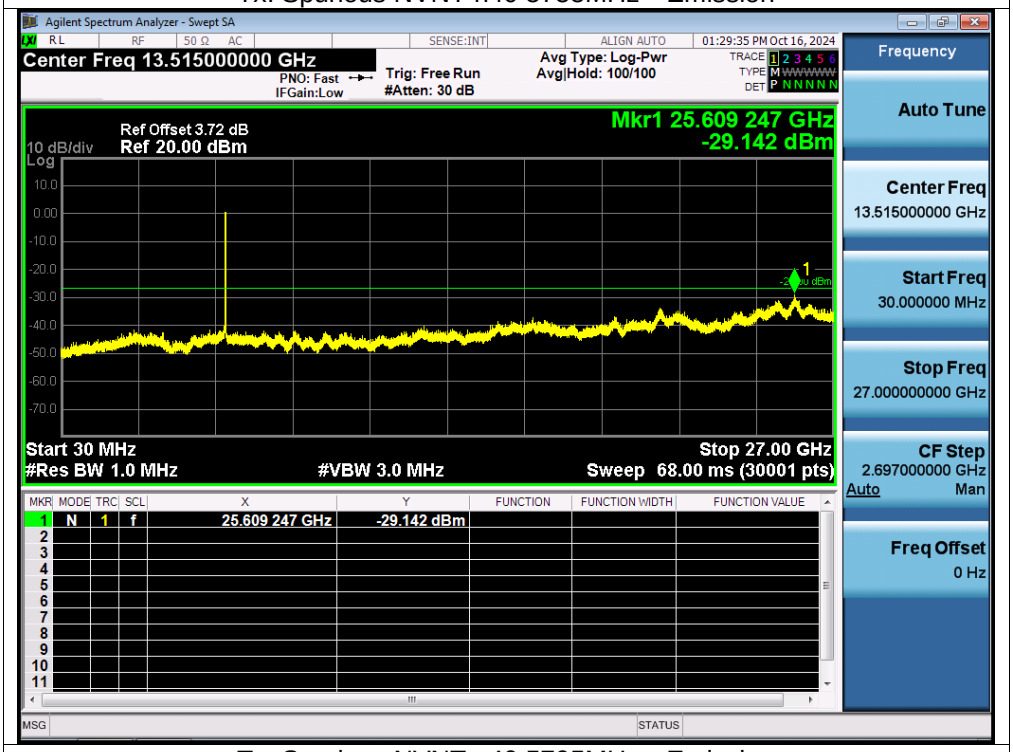
Tx. Spurious NVNT n20 5745MHz Emission

Tx. Spurious NVNT n20 5785MHz Emission

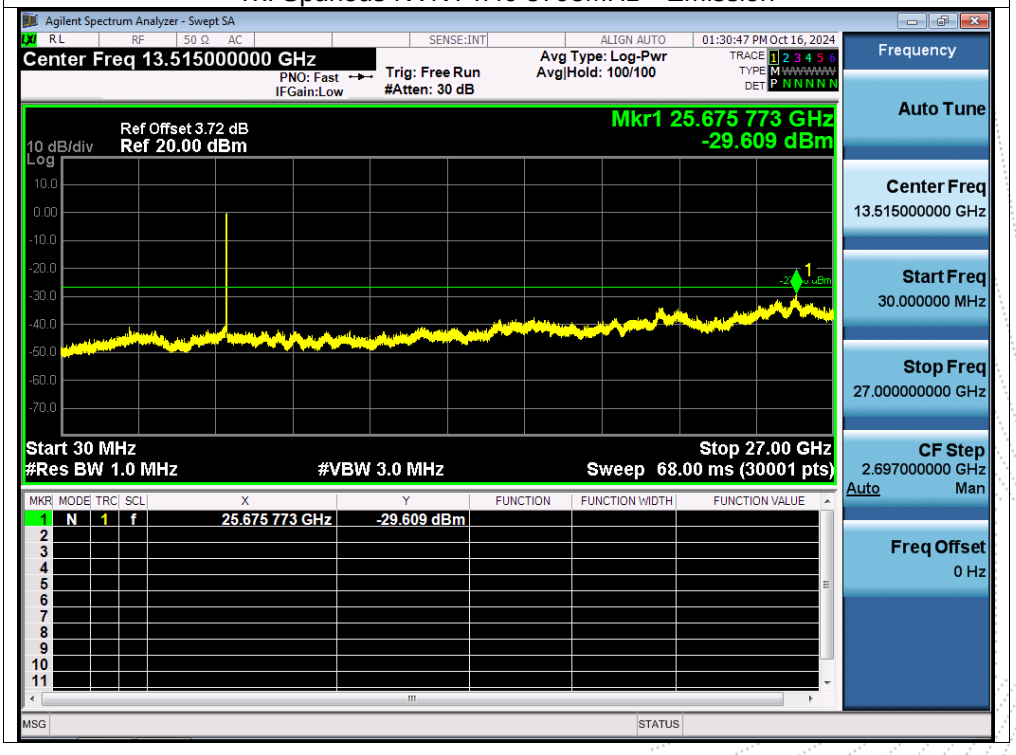


Tx. Spurious NVNT n20 5825MHz Emission

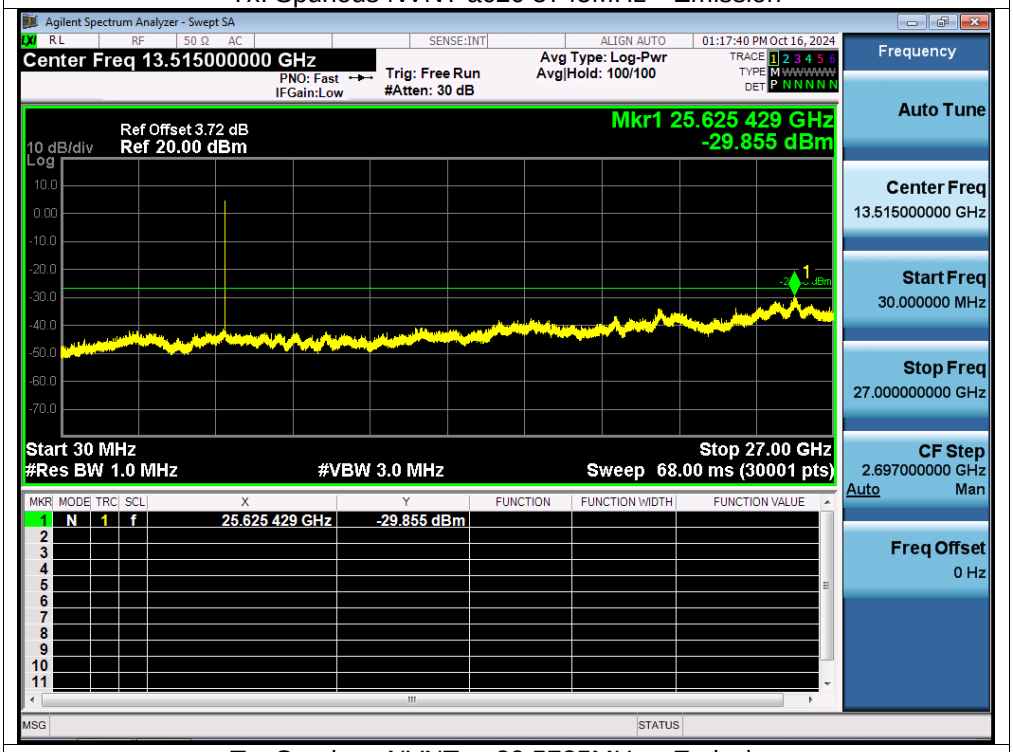
Tx. Spurious NVNT n40 5755MHz Emission



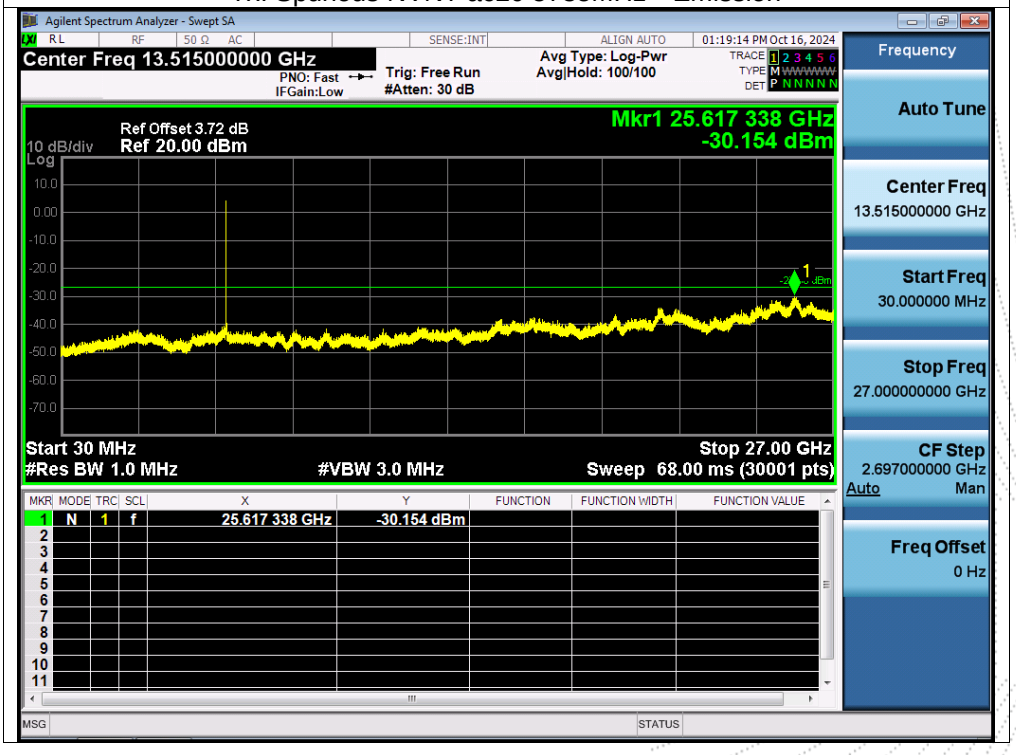
Tx. Spurious NVNT n40 5795MHz Emission



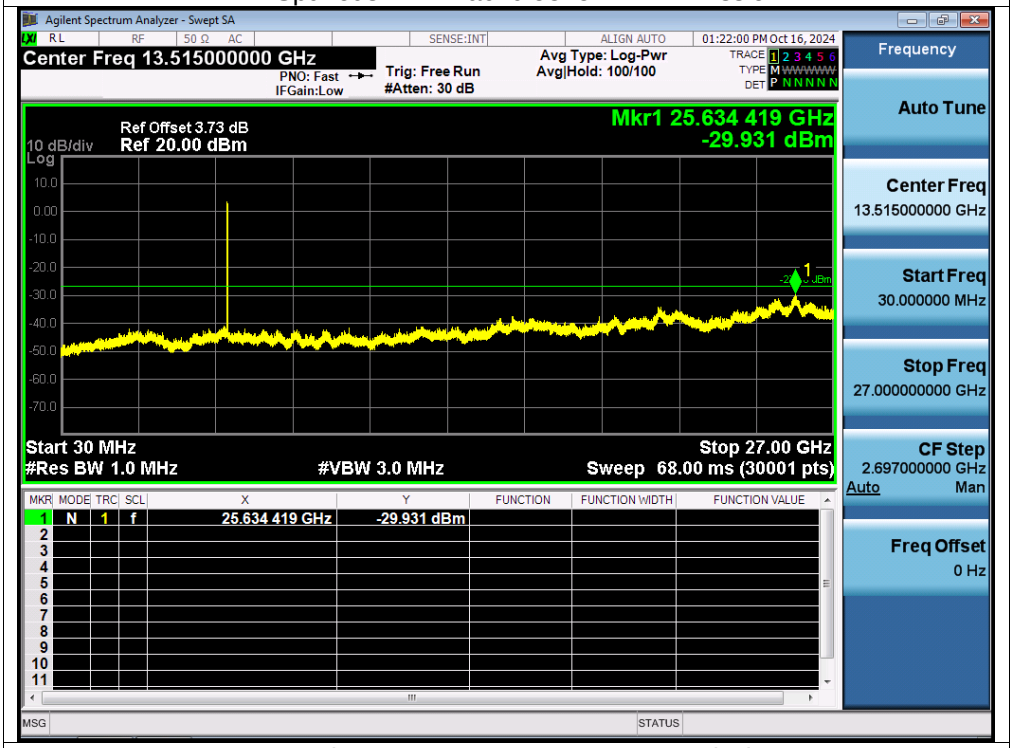
Tx. Spurious NVNT ac20 5745MHz Emission



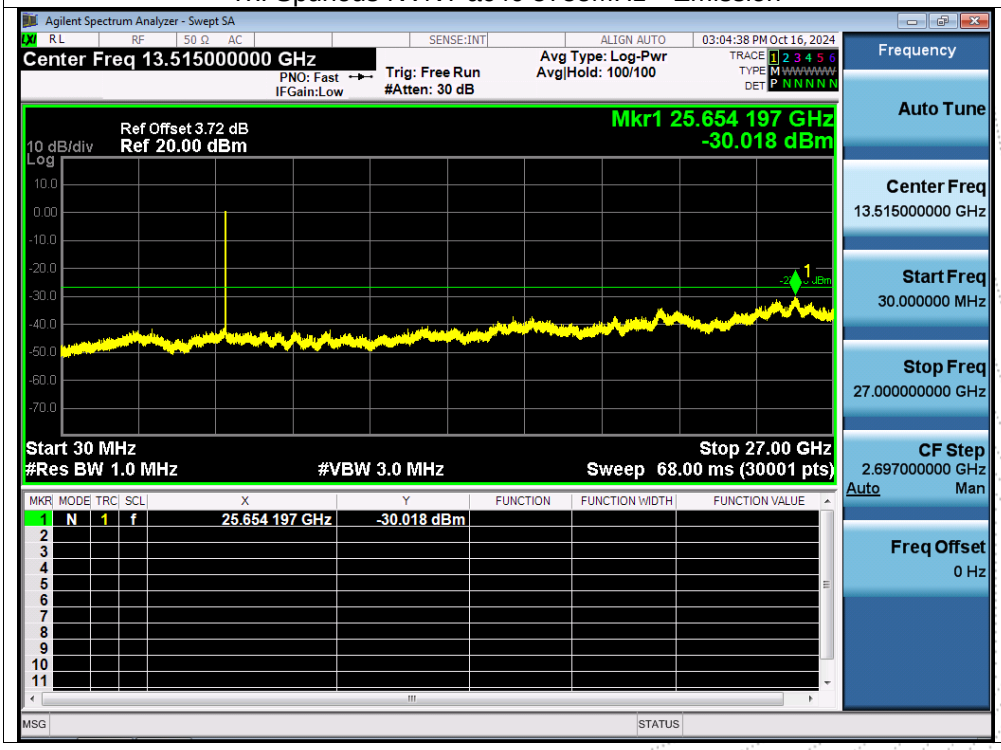
Tx. Spurious NVNT ac20 5785MHz Emission



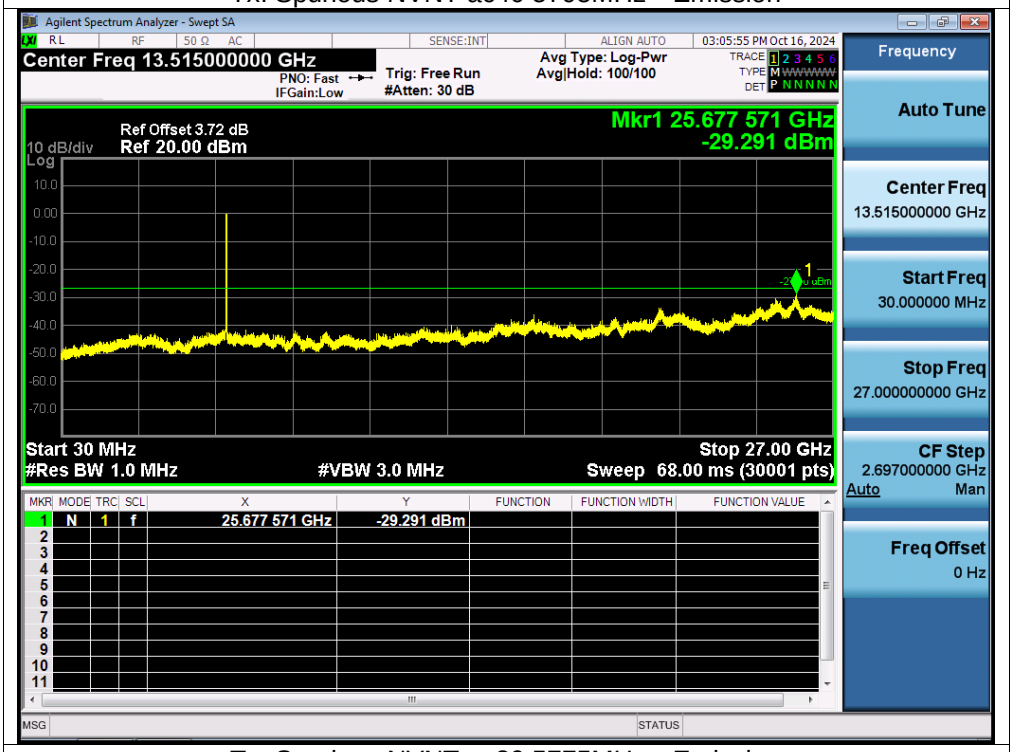
Tx. Spurious NVNT ac20 5825MHz Emission



Tx. Spurious NVNT ac40 5755MHz Emission

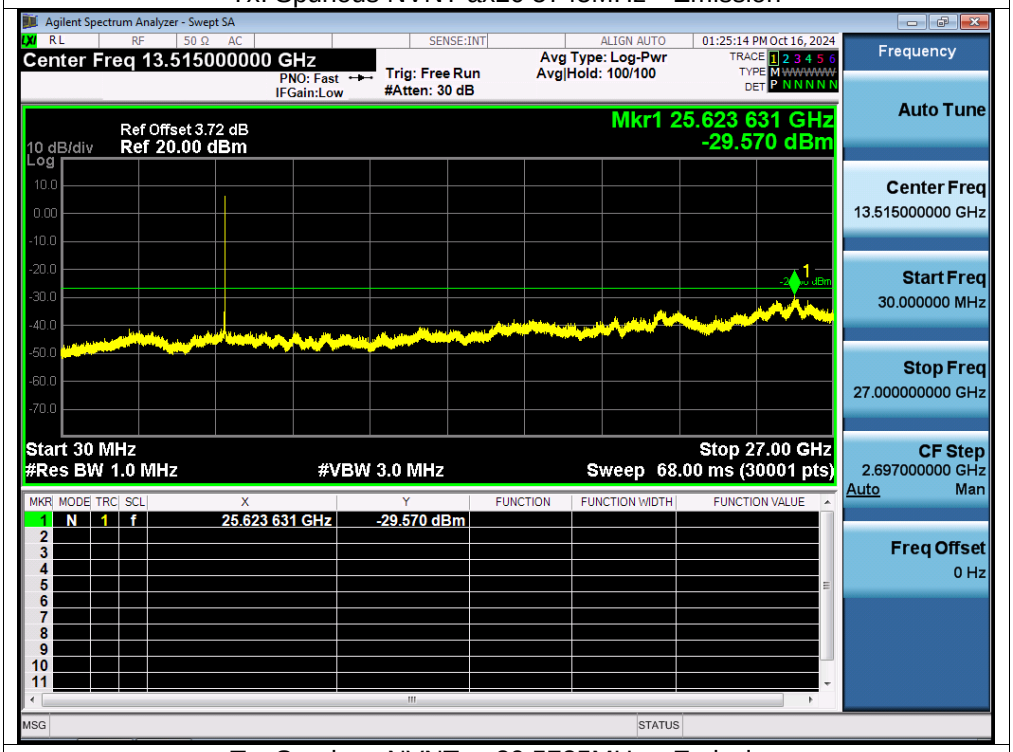


Tx. Spurious NVNT ac40 5795MHz Emission



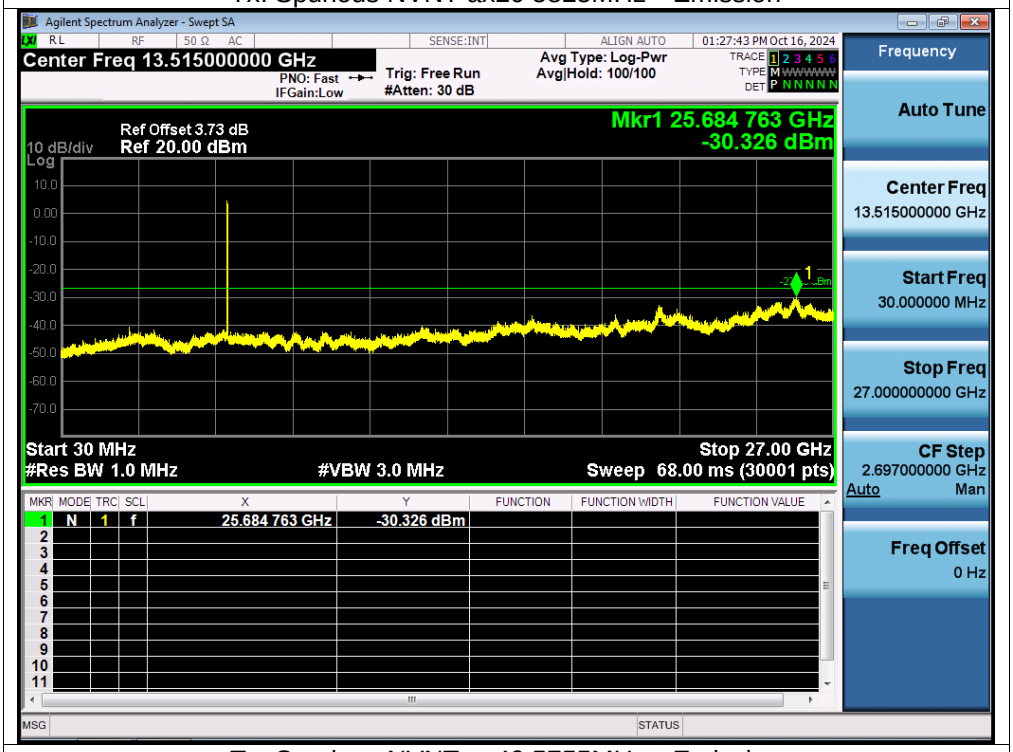
Tx. Spurious NVNT ac80 5775MHz Emission

Tx. Spurious NVNT ax20 5745MHz Emission



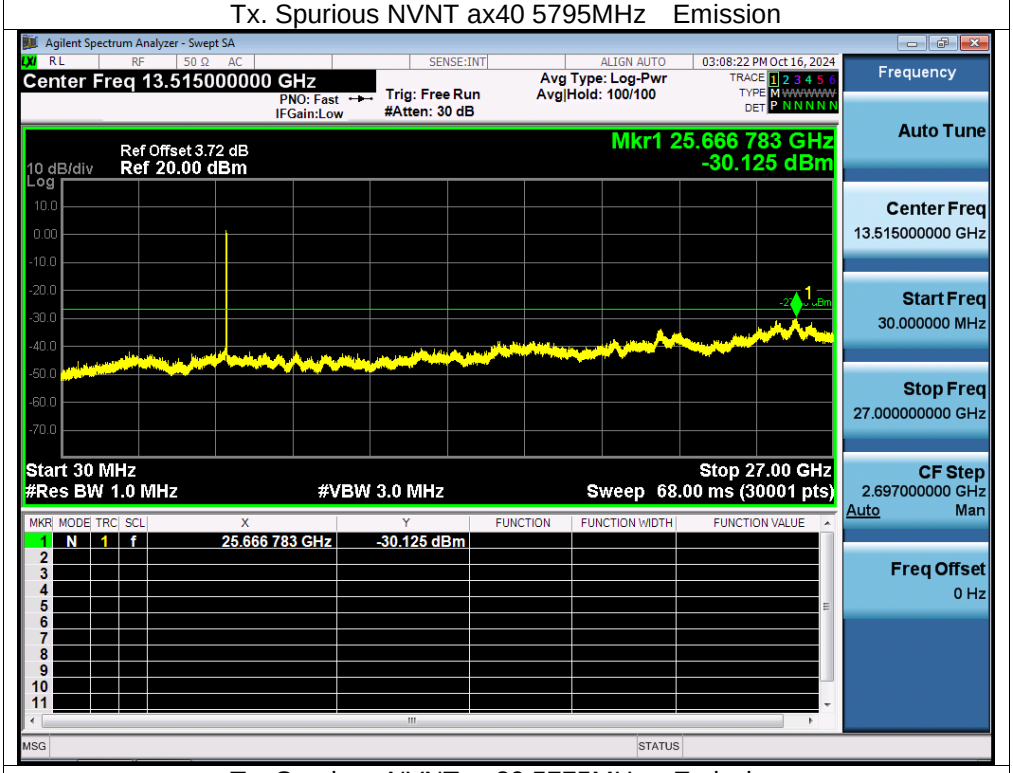
Tx. Spurious NVNT ax20 5785MHz Emission

Tx. Spurious NVNT ax20 5825MHz Emission

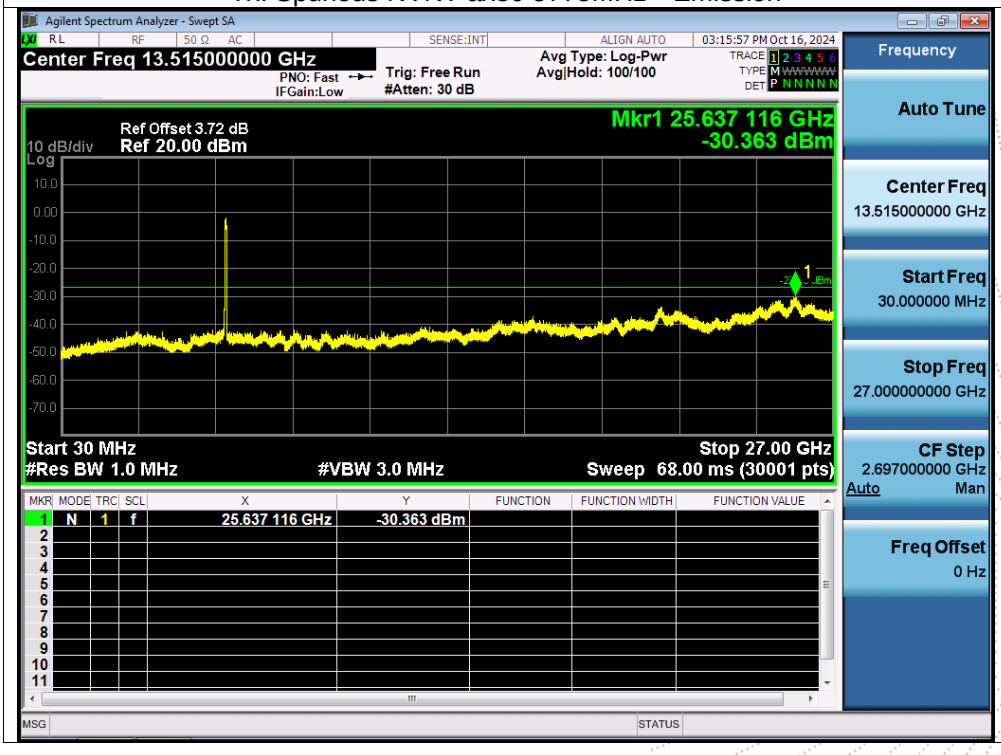


Tx. Spurious NVNT ax40 5755MHz Emission

Tx. Spurious NVNT ax40 5795MHz Emission

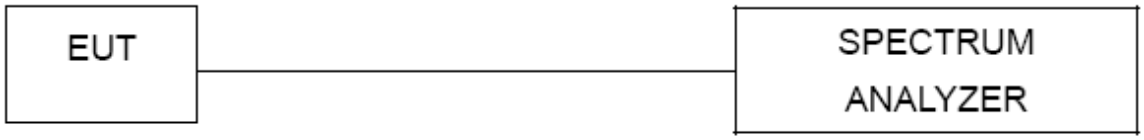


Tx. Spurious NVNT ax80 5775MHz Emission



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	5180.0036	5180	0.0036	0.6950
		V max (V)	13.80	5180.0001	5180	0.0001	0.0193
		V min (V)	10.20	5180.0011	5180	0.0011	0.2124
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	5180.0086	5180	0.0086	1.6602
		T (°C)	-10	5180.0114	5180	0.0114	2.2008
		T (°C)	0	5180.0106	5180	0.0106	2.0463
		T (°C)	10	5180.0072	5180	0.0072	1.3900
		T (°C)	20	5180.0058	5180	0.0058	1.1197
		T (°C)	30	5180.0132	5180	0.0132	2.5483
		T (°C)	40	5180.0040	5180	0.0040	0.7722
		T (°C)	50	5180.0060	5180	0.0060	1.1583
		T (°C)	60	5180.0119	5180	0.0119	2.2973
		T (°C)	70	5180.0001	5180	0.0001	0.0193
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	5200.0056	5200	0.0056	1.0769
		V max (V)	13.80	5200.0077	5200	0.0077	1.4808
		V min (V)	10.20	5200.0012	5200	0.0012	0.2308
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	5200.01020	5200	0.01020	1.9615
		T (°C)	-10	5200.01230	5200	0.01230	2.3654
		T (°C)	0	5200.00700	5200	0.00700	1.3462
		T (°C)	10	5200.01180	5200	0.01180	2.2692
		T (°C)	20	5200.00350	5200	0.00350	0.6731
		T (°C)	30	5200.01140	5200	0.01140	2.1923
		T (°C)	40	5200.00550	5200	0.00550	1.0577
		T (°C)	50	5200.00820	5200	0.00820	1.5769
		T (°C)	60	5200.00310	5200	0.00310	0.5962
		T (°C)	70	5200.00860	5200	0.00860	1.6538
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	5240.0101	5240	0.0101	1.9275
		V min (V)	10.20	5240.0023	5240	0.0023	0.4389
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	5240.0044	5240	0.0044	0.8397
		T (°C)	-10	5240.0126	5240	0.0126	2.4046
		T (°C)	0	5240.0118	5240	0.0118	2.2519
		T (°C)	10	5240.0022	5240	0.0022	0.4198
		T (°C)	20	5240.0033	5240	0.0033	0.6298
		T (°C)	30	5240.0036	5240	0.0036	0.6870
		T (°C)	40	5240.0103	5240	0.0103	1.9656
		T (°C)	50	5240.0098	5240	0.0098	1.8702
		T (°C)	60	5240.0052	5240	0.0052	0.9924
		T (°C)	70	5240.0088	5240	0.0088	1.6794
Limits				5150-5250 MHz			
Result				Complies			

Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101kPa	Test Voltage:	AC 120V/60Hz
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	5745.00340	5745	0.00340	0.5918
		V max (V)	13.80	5745.00180	5745	0.00180	0.3133
		V min (V)	10.20	5745.00450	5745	0.00450	0.7833
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	5745.00460	5745	0.00460	0.8007
		T (°C)	-10	5745.00290	5745	0.00290	0.5048
		T (°C)	0	5745.01050	5745	0.01050	1.8277
		T (°C)	10	5745.00340	5745	0.00340	0.5918
		T (°C)	20	5745.00060	5745	0.00060	0.1044
		T (°C)	30	5745.01100	5745	0.01100	1.9147
		T (°C)	40	5745.00950	5745	0.00950	1.6536
		T (°C)	50	5745.00500	5745	0.00500	0.8703
		T (°C)	60	5745.01010	5745	0.01010	1.7581
		T (°C)	70	5745.00380	5745	0.00380	0.6614
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	5785.00950	5785	0.00950	1.6422
		V max (V)	13.80	5785.01010	5785	0.01010	1.7459
		V min (V)	10.20	5785.01100	5785	0.01100	1.9015
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	5785.00110	5785	0.00110	0.1901
		T (°C)	-10	5785.00100	5785	0.00100	0.1729
		T (°C)	0	5785.01240	5785	0.01240	2.1435
		T (°C)	10	5785.00530	5785	0.00530	0.9162
		T (°C)	20	5785.00850	5785	0.00850	1.4693
		T (°C)	30	5785.00340	5785	0.00340	0.5877
		T (°C)	40	5785.01140	5785	0.01140	1.9706
		T (°C)	50	5785.00450	5785	0.00450	0.7779
		T (°C)	60	5785.01350	5785	0.01350	2.3336
		T (°C)	70	5785.00720	5785	0.00720	1.2446
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	5825.00290	5825	0.00290	0.4979
		V max (V)	13.80	5825.00610	5825	0.00610	1.0472
		V min (V)	10.20	5825.00880	5825	0.00880	1.5107
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	5825.00350	5825	0.00350	0.6009
		T (°C)	-10	5825.00910	5825	0.00910	1.5622
		T (°C)	0	5825.01330	5825	0.01330	2.2833
		T (°C)	10	5825.01050	5825	0.01050	1.8026
		T (°C)	20	5825.01290	5825	0.01290	2.2146
		T (°C)	30	5825.00080	5825	0.00080	0.1373
		T (°C)	40	5825.00680	5825	0.00680	1.1674
		T (°C)	50	5825.00350	5825	0.00350	0.6009
		T (°C)	60	5825.00490	5825	0.00490	0.8412
		T (°C)	70	5825.01140	5825	0.01140	1.9571
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

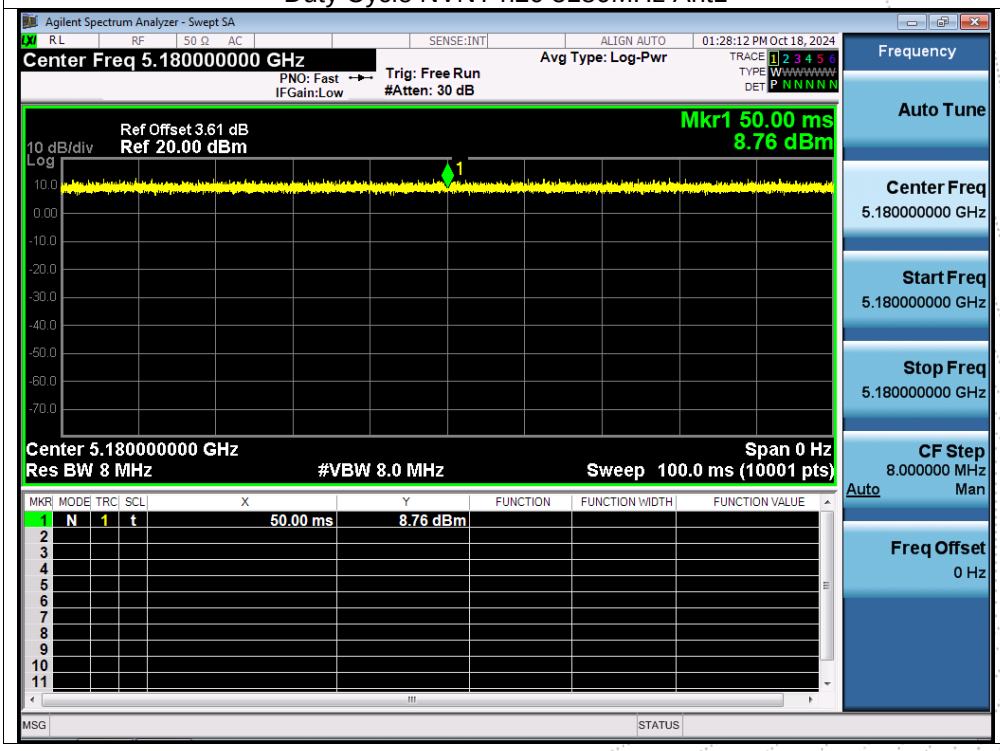
ANT A

Condition	Mode	Frequency (MHz)	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	a	5180	100	0	0.01
NVNT	n20	5180	100	0	0.01
NVNT	n40	5190	100	0	0.01
NVNT	ac20	5180	100	0	0.01
NVNT	ac40	5190	100	0	0.01
NVNT	ac80	5210	100	0	0.01
NVNT	ax20	5180	100	0	0.01
NVNT	ax40	5190	100	0	0.01
NVNT	ax80	5210	100	0	0.01

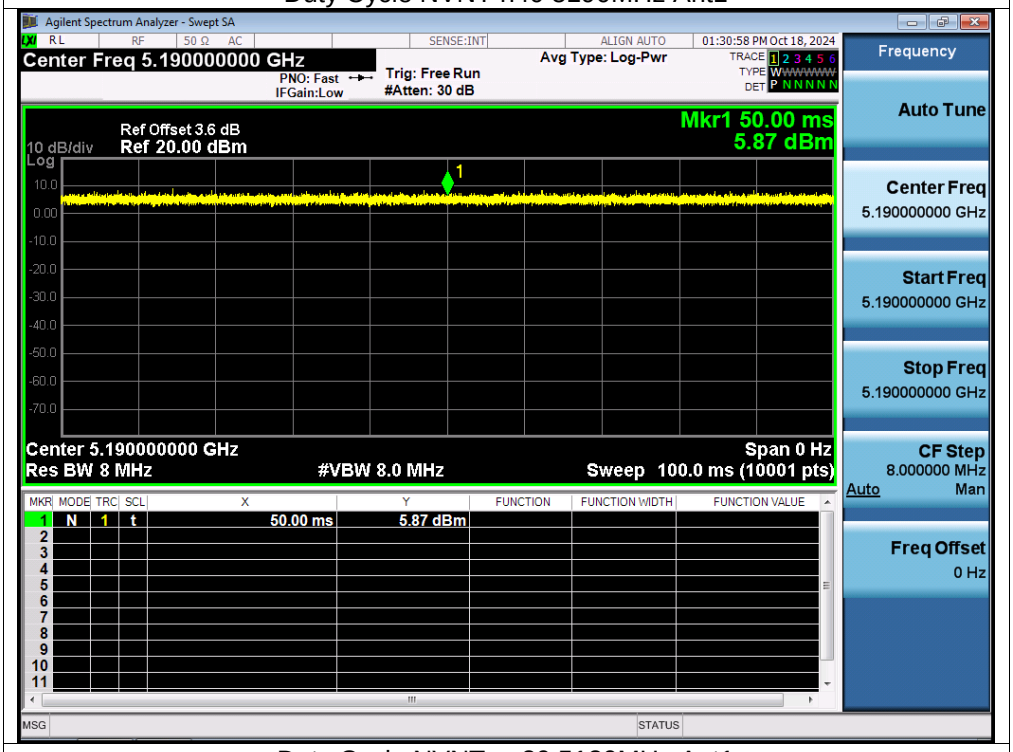
Test Graphs

Duty Cycle NVNT a 5180MHz Ant1

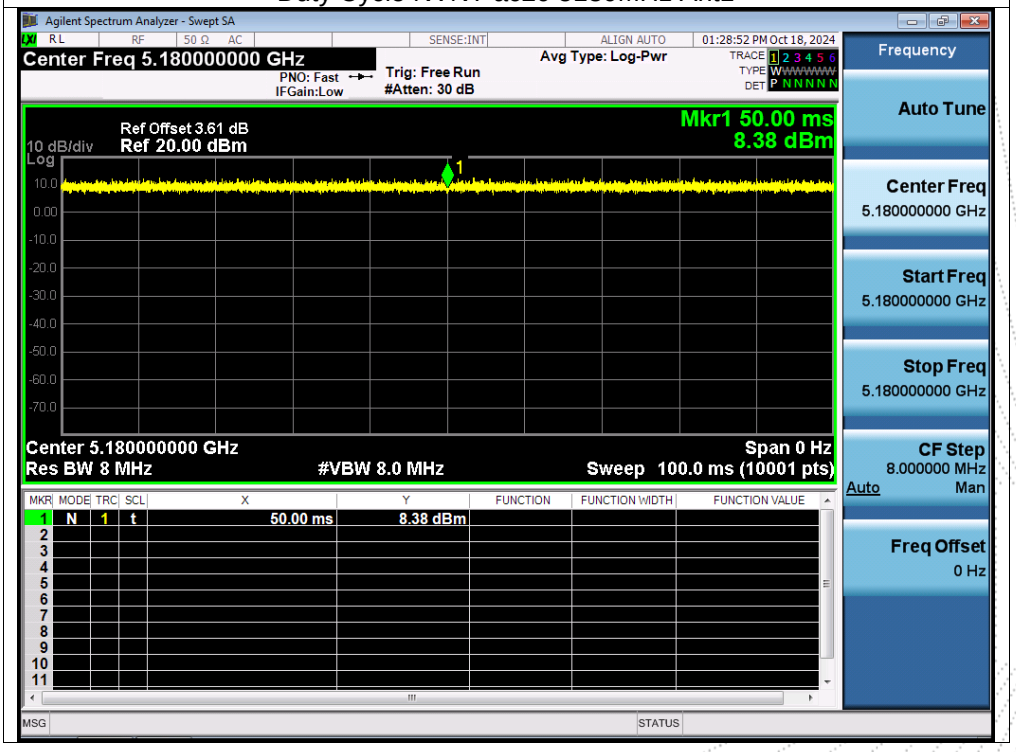
Duty Cycle NVNT n20 5180MHz Ant1



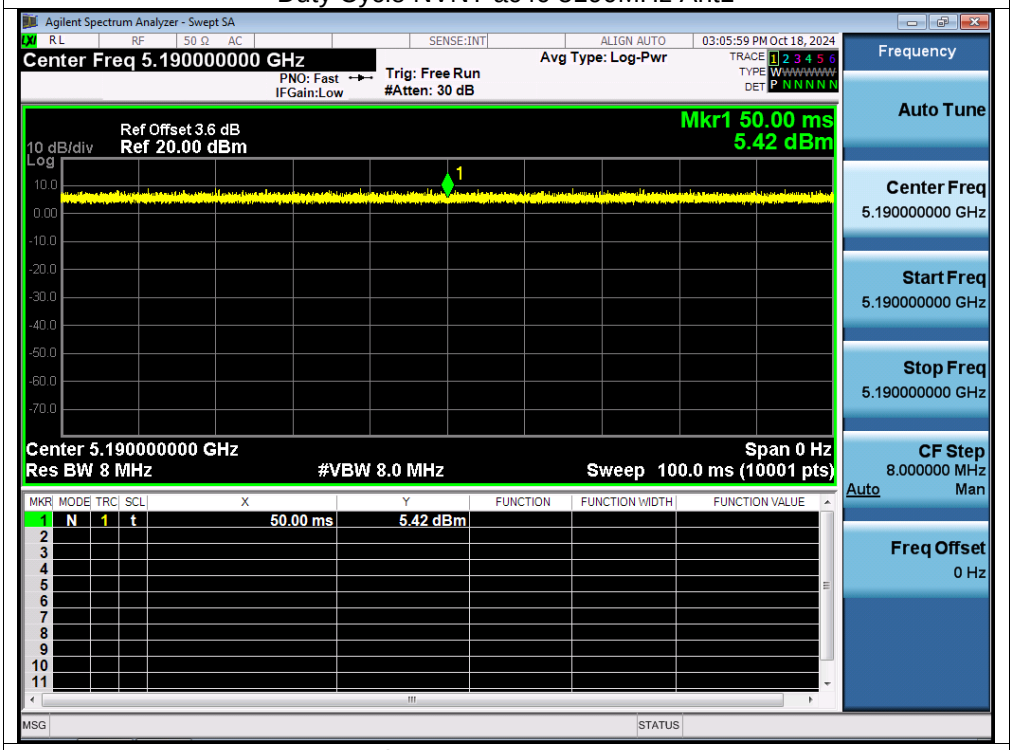
Duty Cycle NVNT n40 5190MHz Ant1



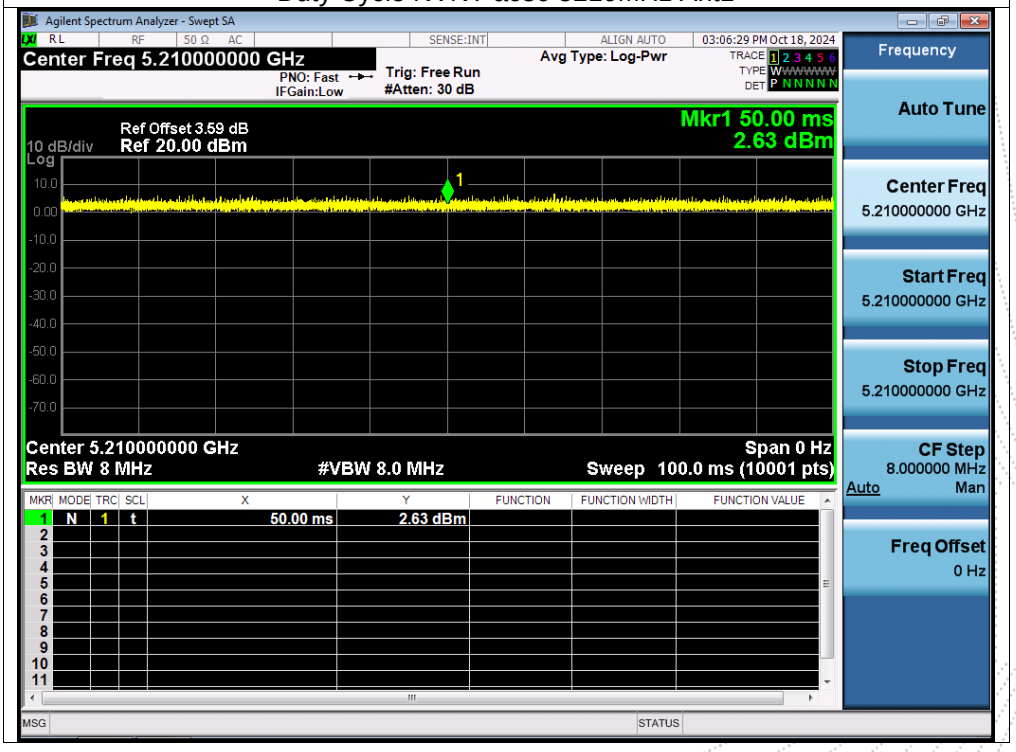
Duty Cycle NVNT ac20 5180MHz Ant1



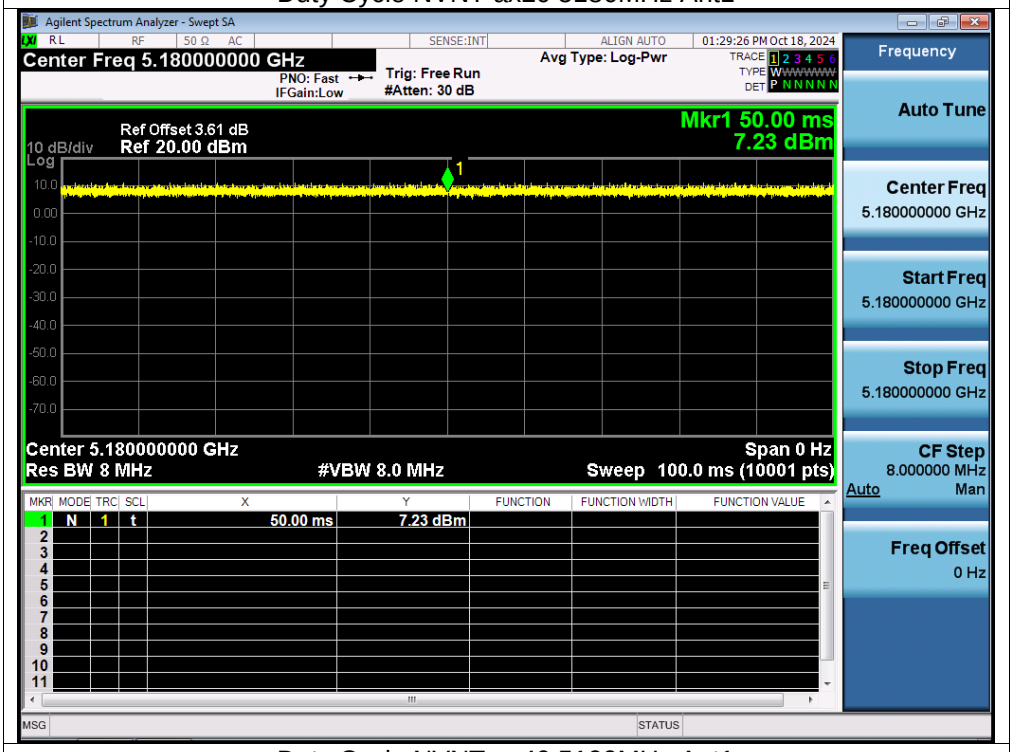
Duty Cycle NVNT ac40 5190MHz Ant1



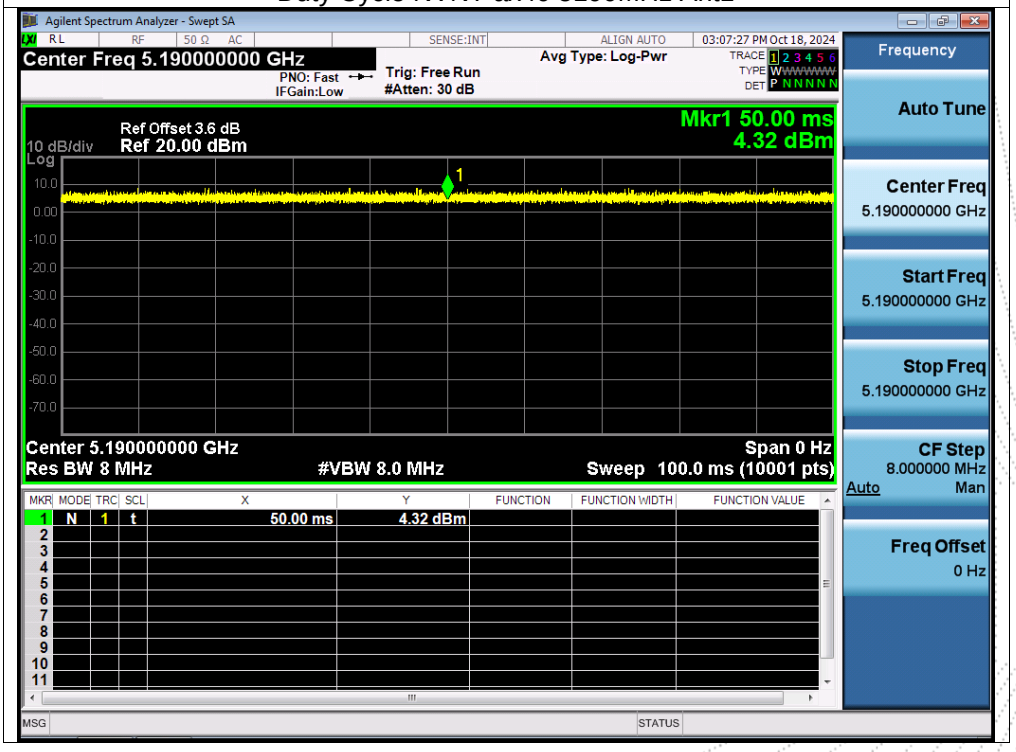
Duty Cycle NVNT ac80 5210MHz Ant1



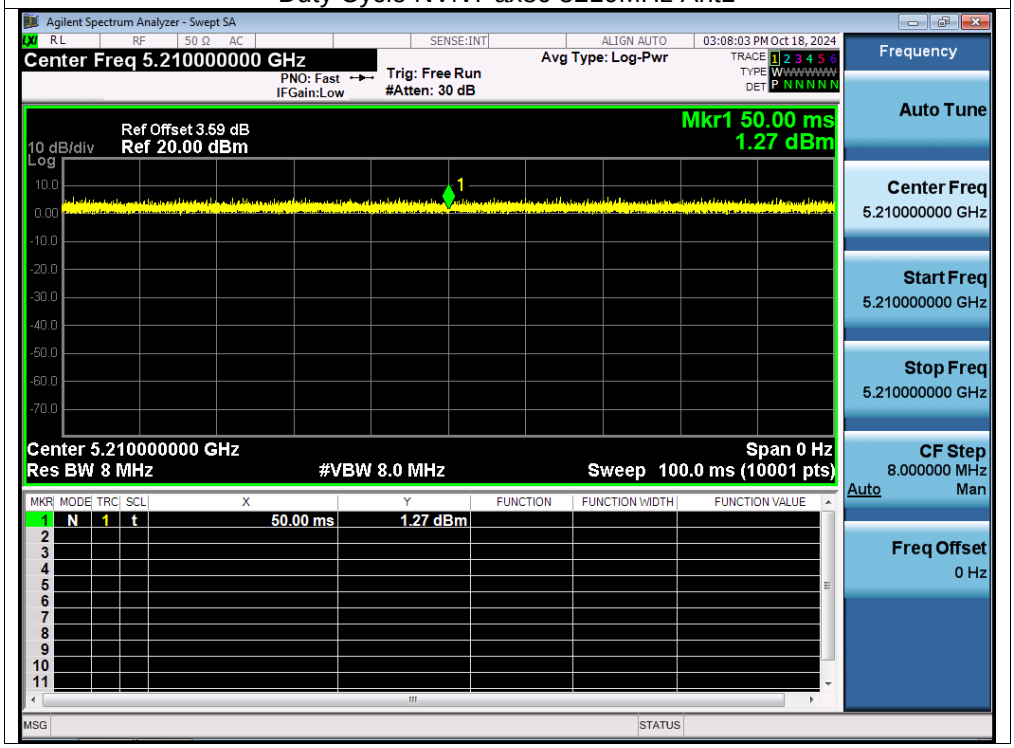
Duty Cycle NVNT ax20 5180MHz Ant1



Duty Cycle NVNT ax40 5190MHz Ant1



Duty Cycle NVNT ax80 5210MHz Ant1



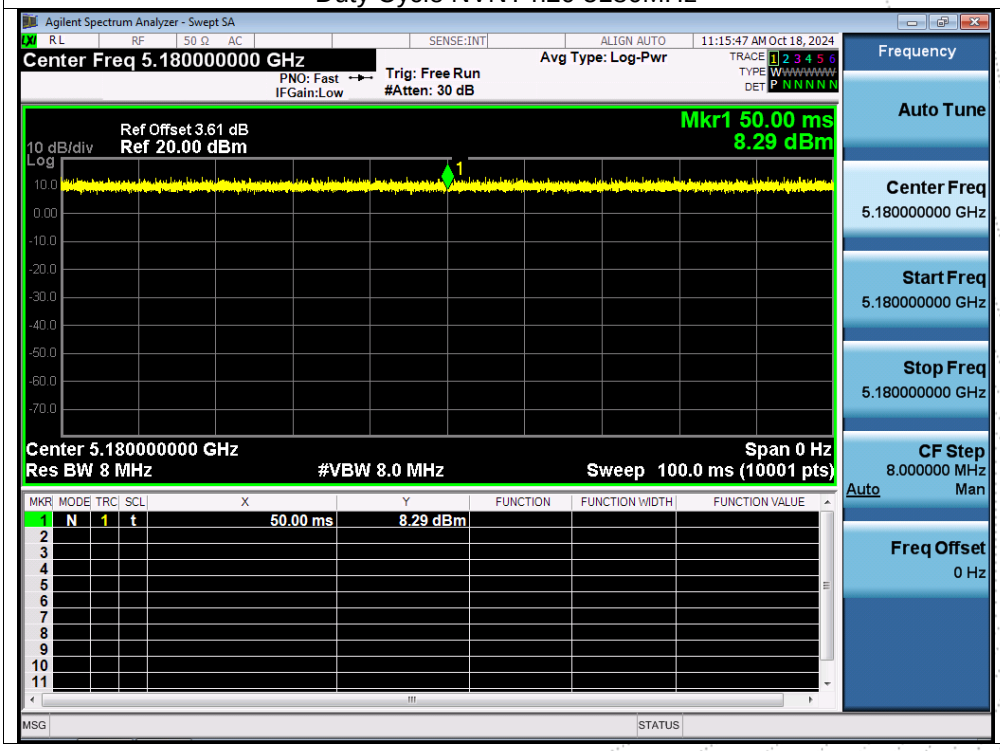
ANT B

Condition	Mode	Frequency (MHz)	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	a	5180	100	0	0.01
NVNT	n20	5180	100	0	0.01
NVNT	n40	5190	100	0	0.01
NVNT	ac20	5180	100	0	0.01
NVNT	ac40	5190	100	0	0.01
NVNT	ac80	5210	100	0	0.01
NVNT	ax20	5180	100	0	0.01
NVNT	ax40	5190	100	0	0.01
NVNT	ax80	5210	100	0	0.01

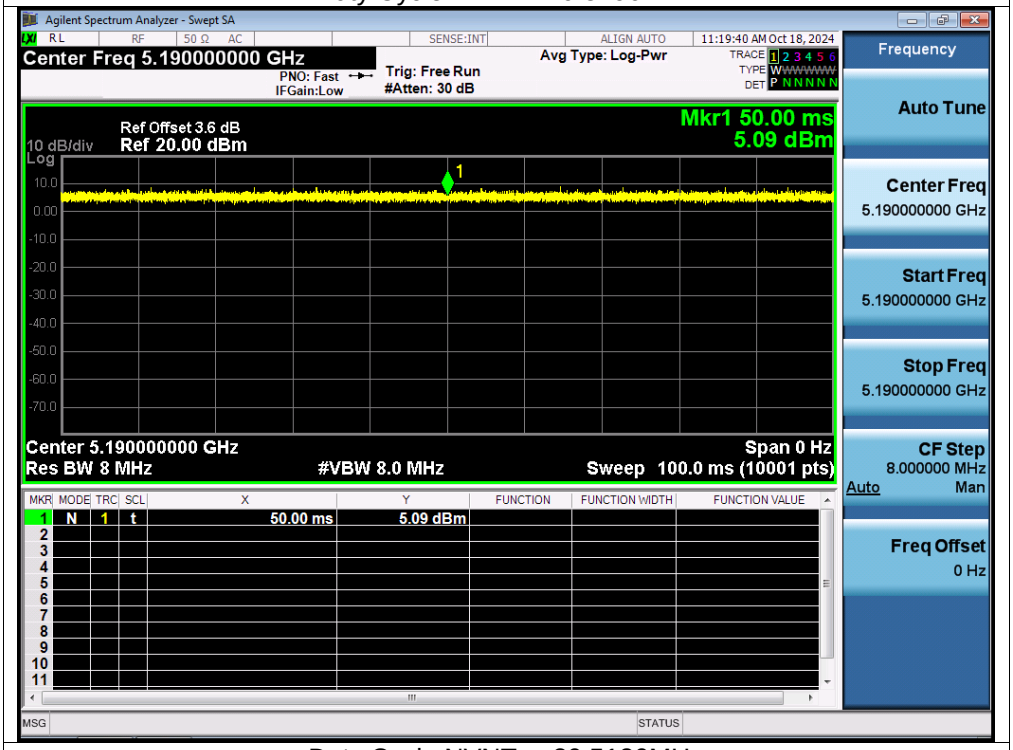
Test Graphs

Duty Cycle NVNT a 5180MHz

Duty Cycle NVNT n20 5180MHz



Duty Cycle NVNT n40 5190MHz



Duty Cycle NVNT ac20 5180MHz