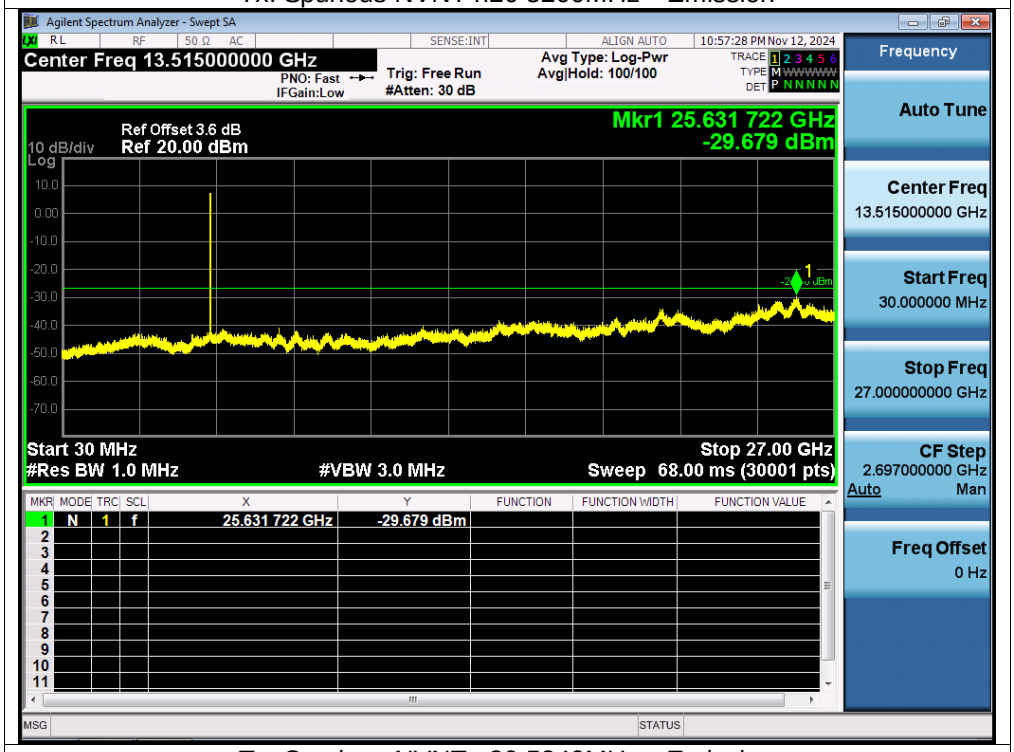
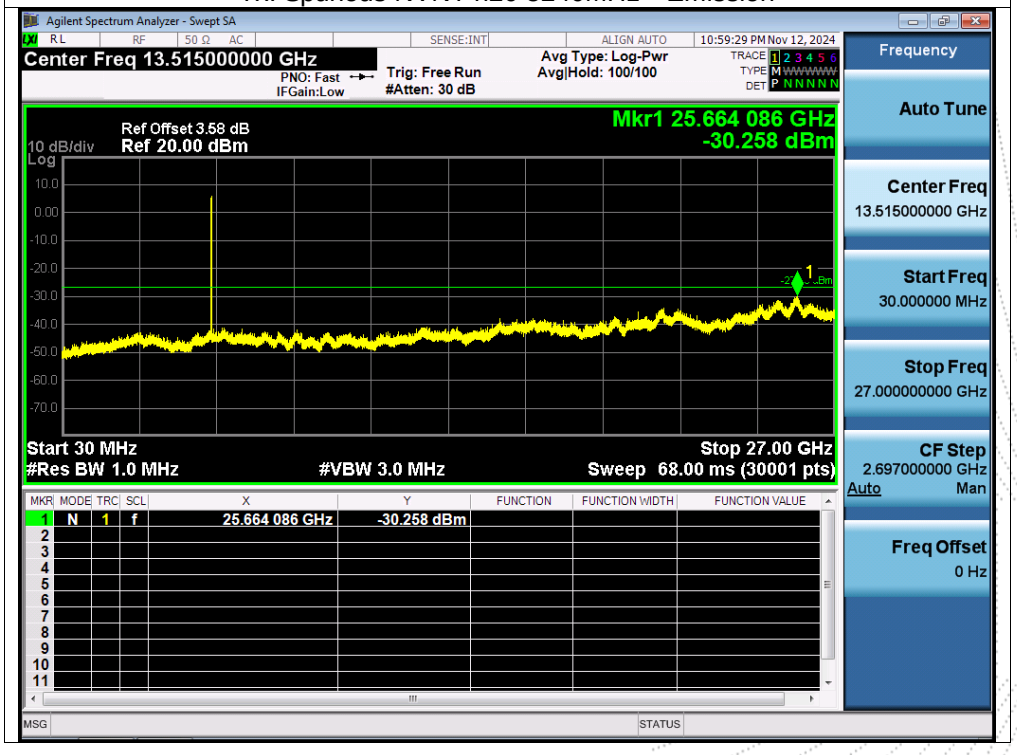
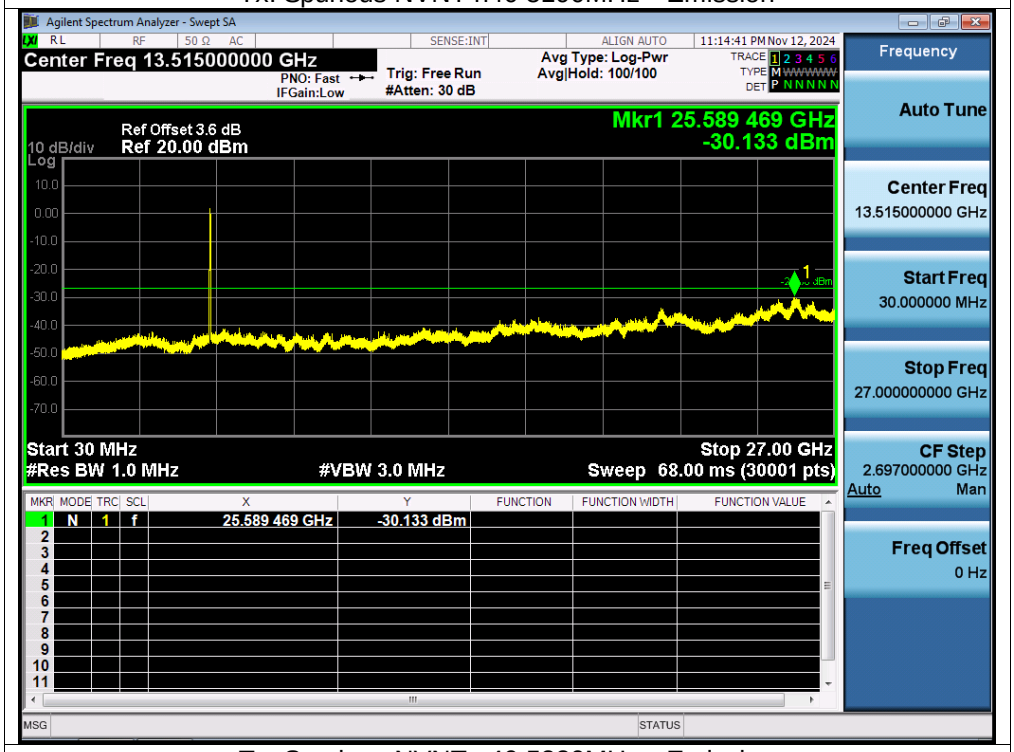
Tx. Spurious NVNT n20 5200MHz Emission



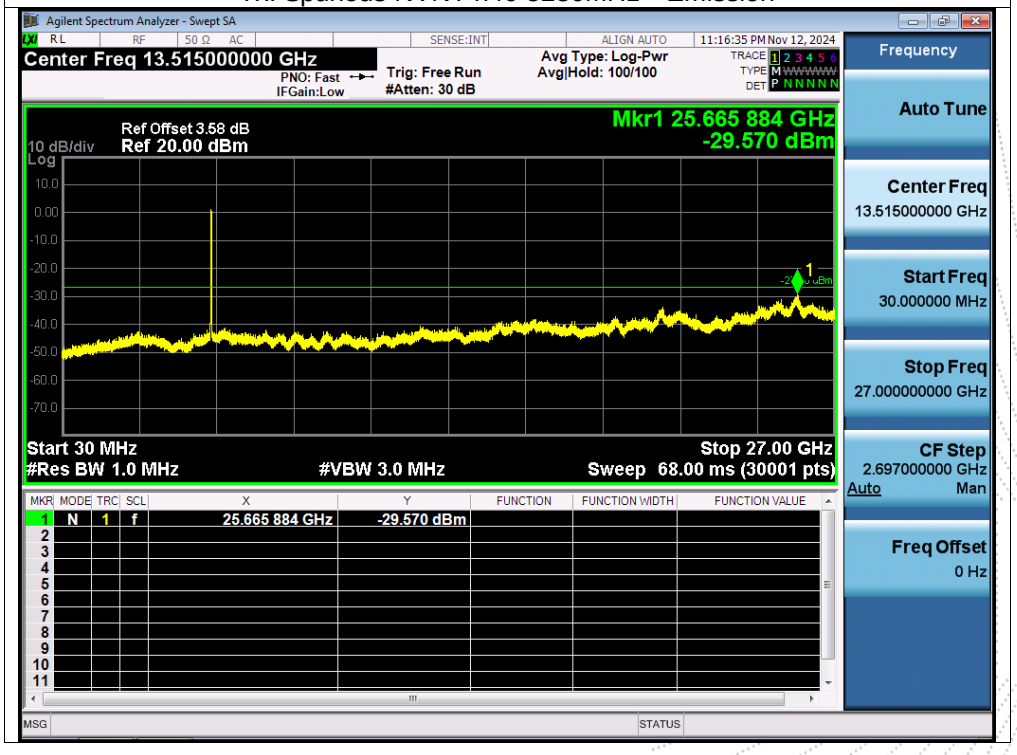
Tx. Spurious NVNT n20 5240MHz Emission



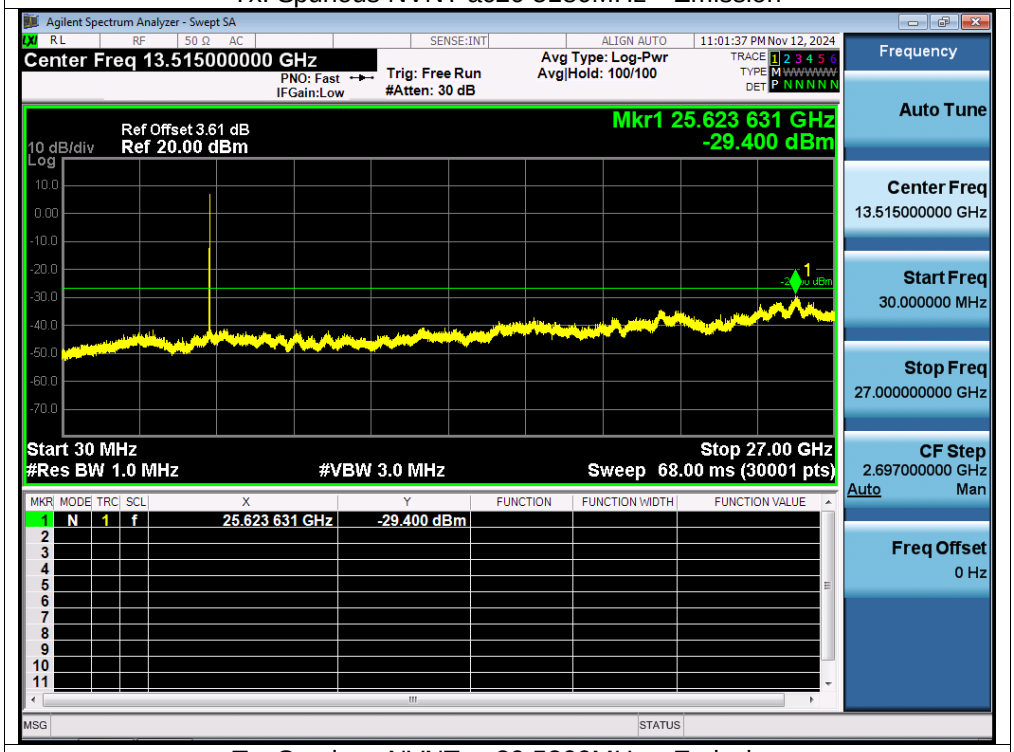
Tx. Spurious NVNT n40 5190MHz Emission



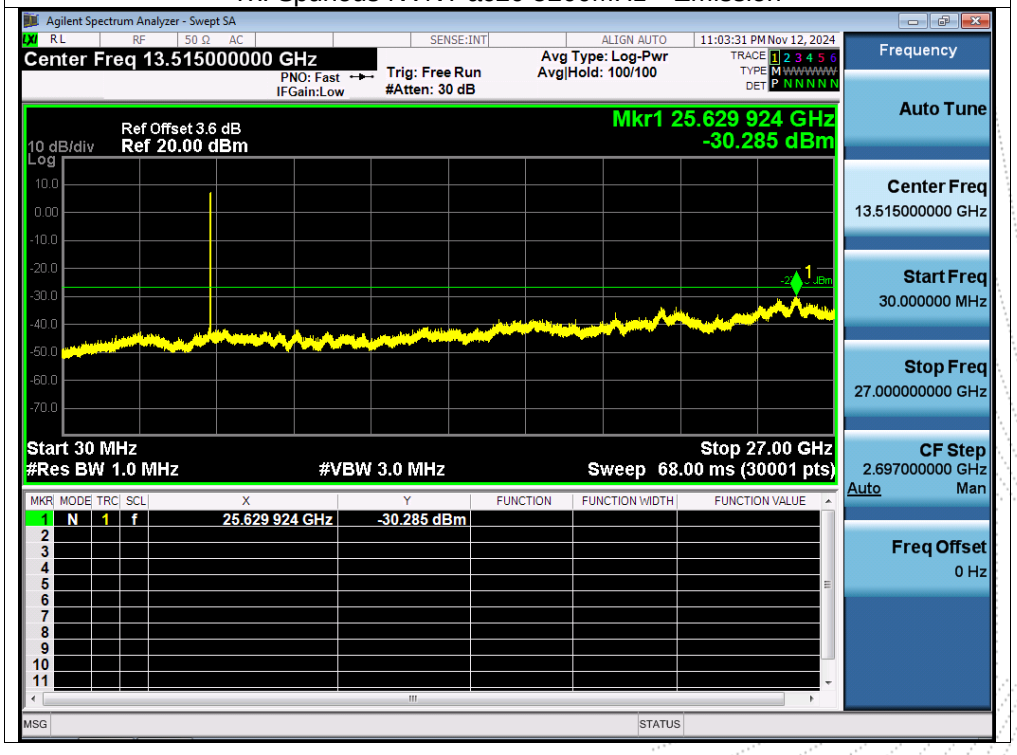
Tx. Spurious NVNT n40 5230MHz Emission



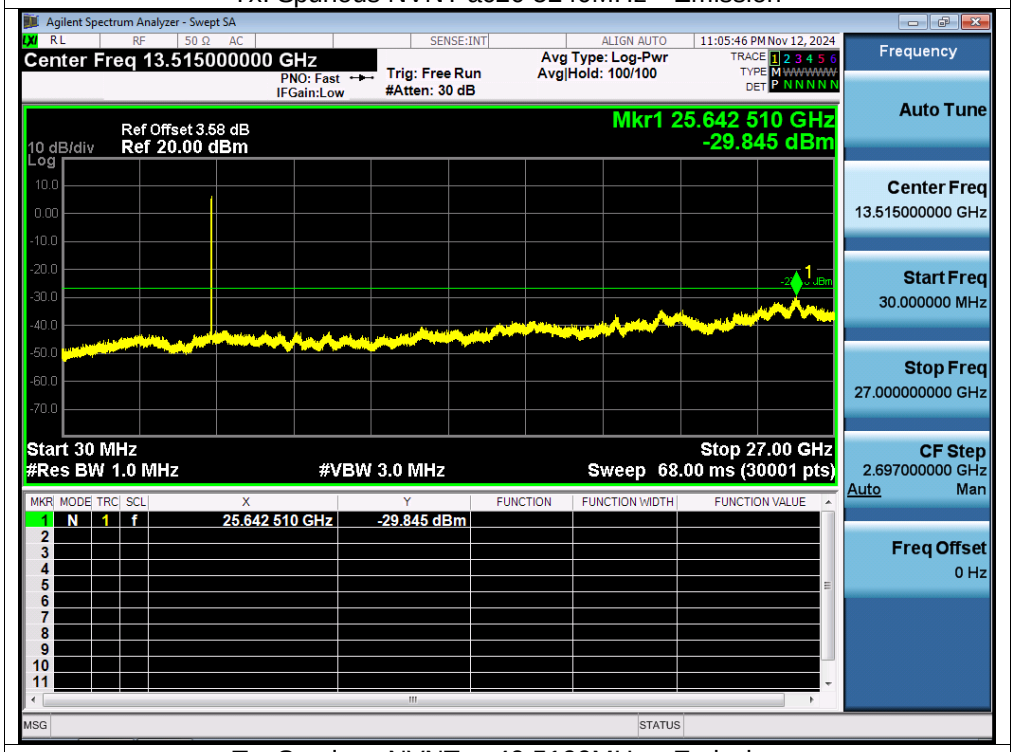
Tx. Spurious NVNT ac20 5180MHz Emission



Tx. Spurious NVNT ac20 5200MHz Emission

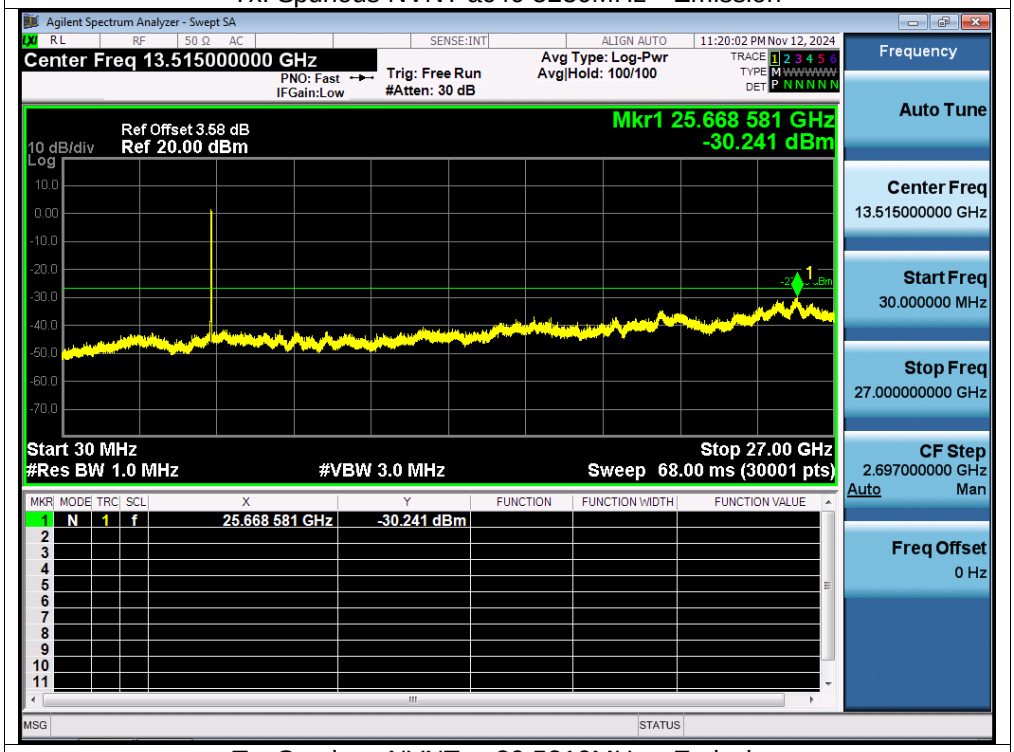


Tx. Spurious NVNT ac20 5240MHz Emission

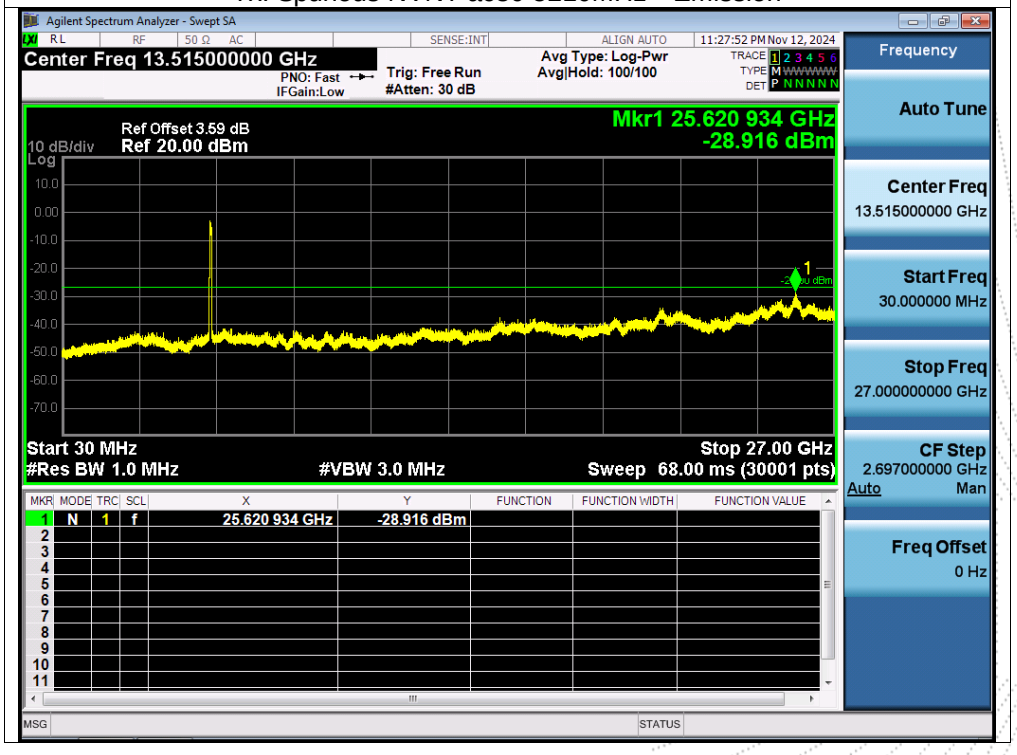


Tx. Spurious NVNT ac40 5190MHz Emission

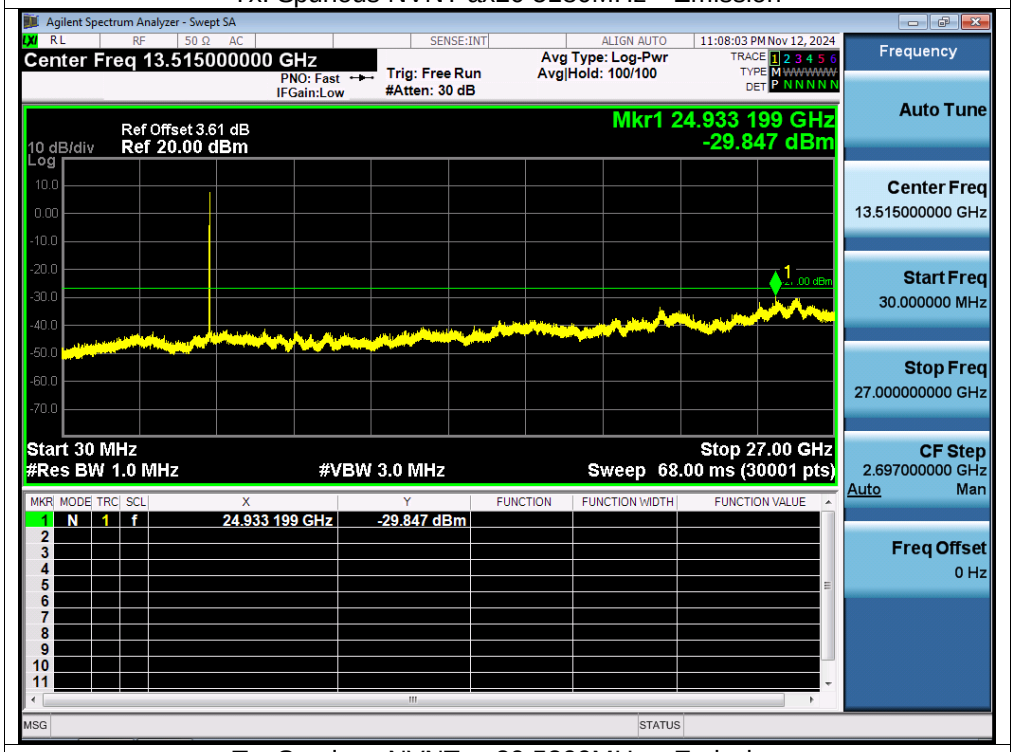
Tx. Spurious NVNT ac40 5230MHz Emission



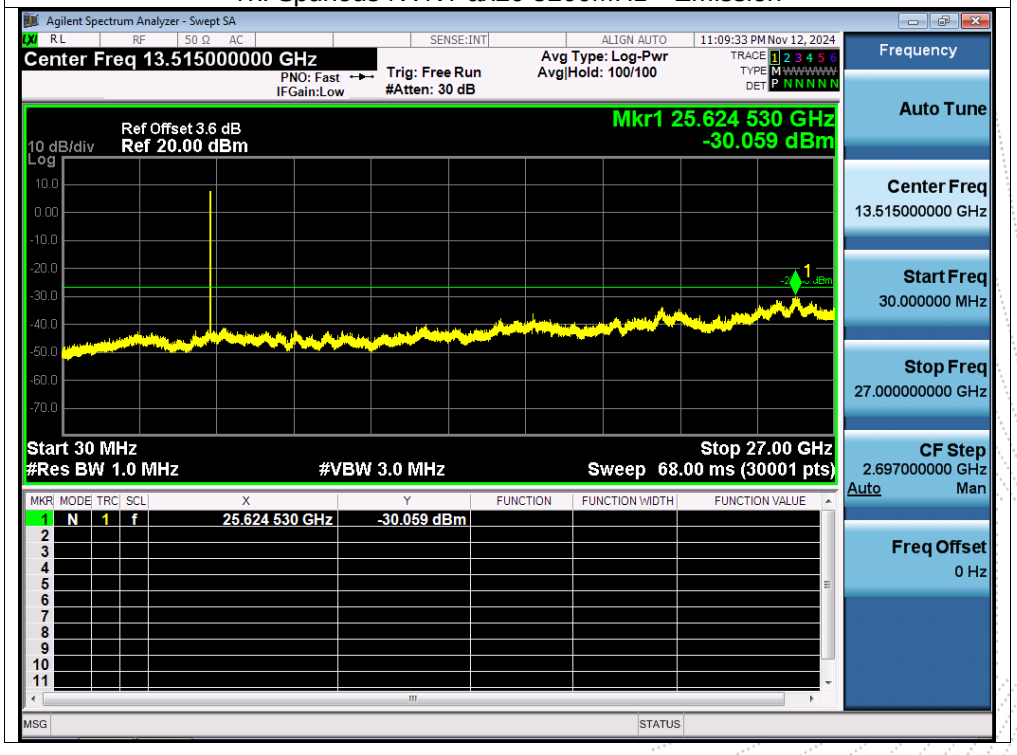
Tx. Spurious NVNT ac80 5210MHz Emission



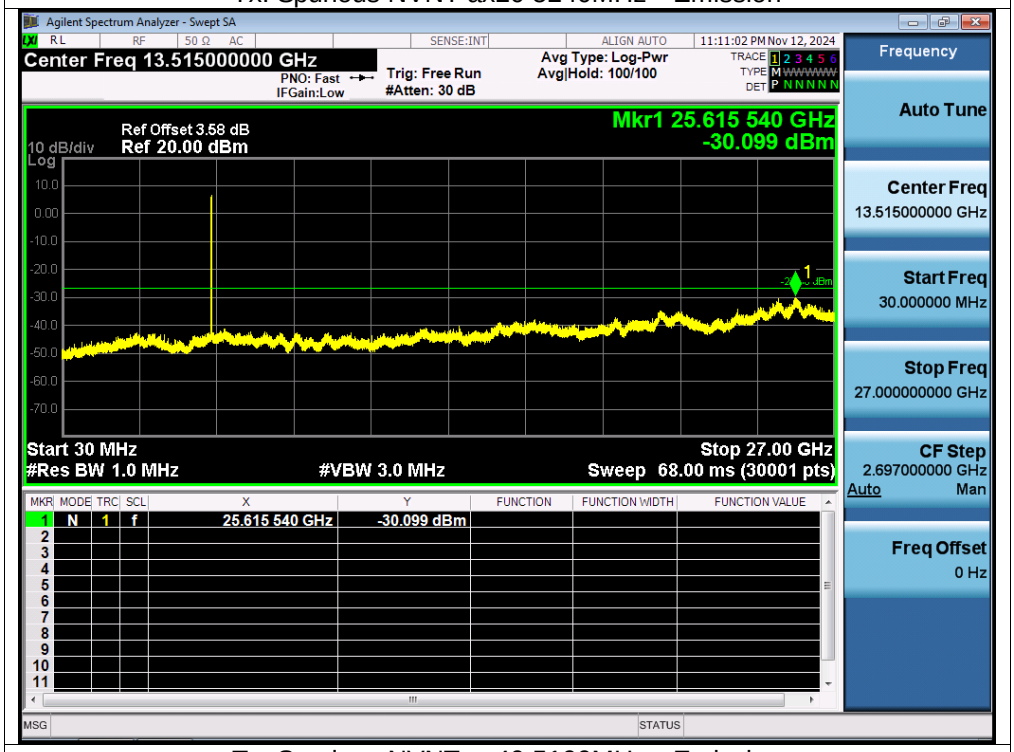
Tx. Spurious NVNT ax20 5180MHz Emission



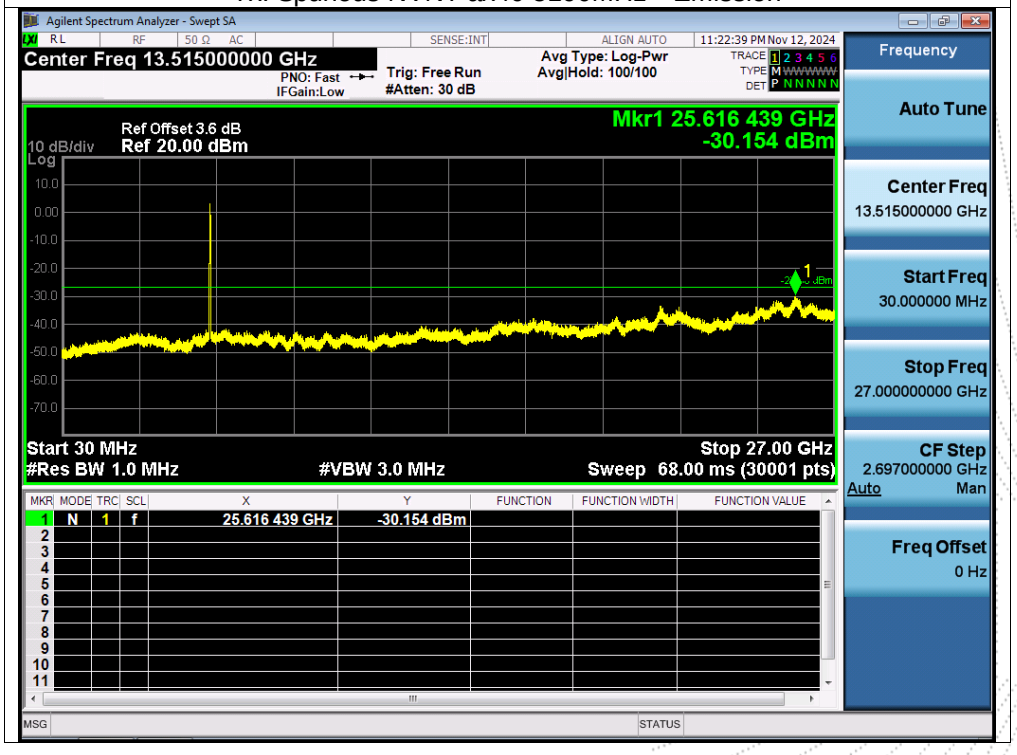
Tx. Spurious NVNT ax20 5200MHz Emission



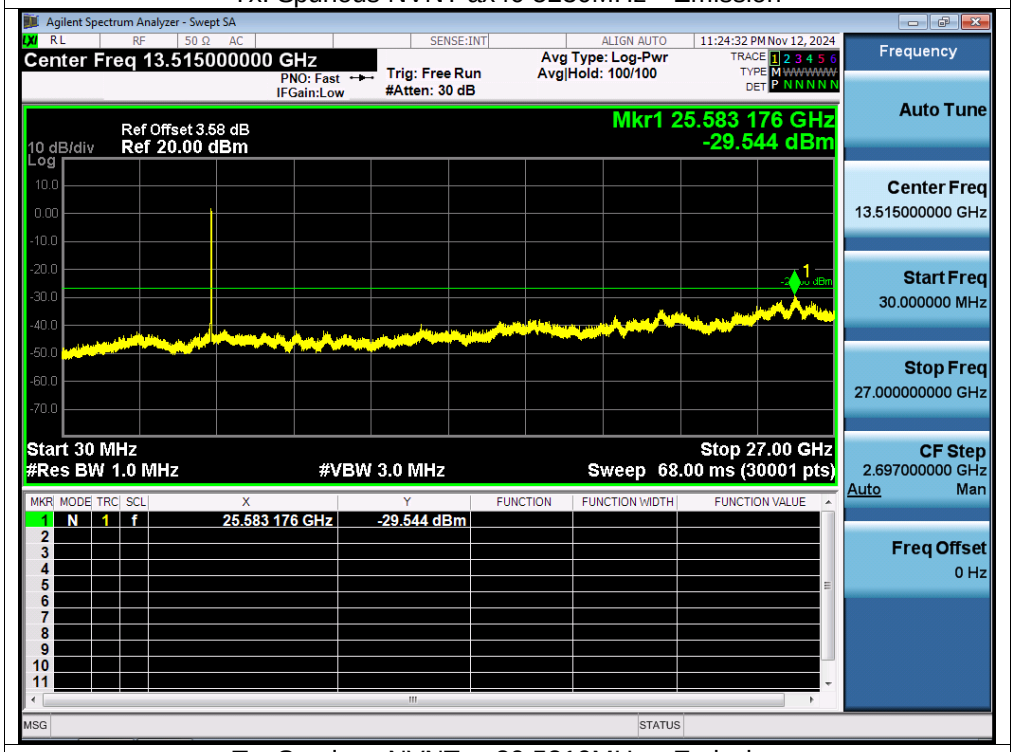
Tx. Spurious NVNT ax20 5240MHz Emission



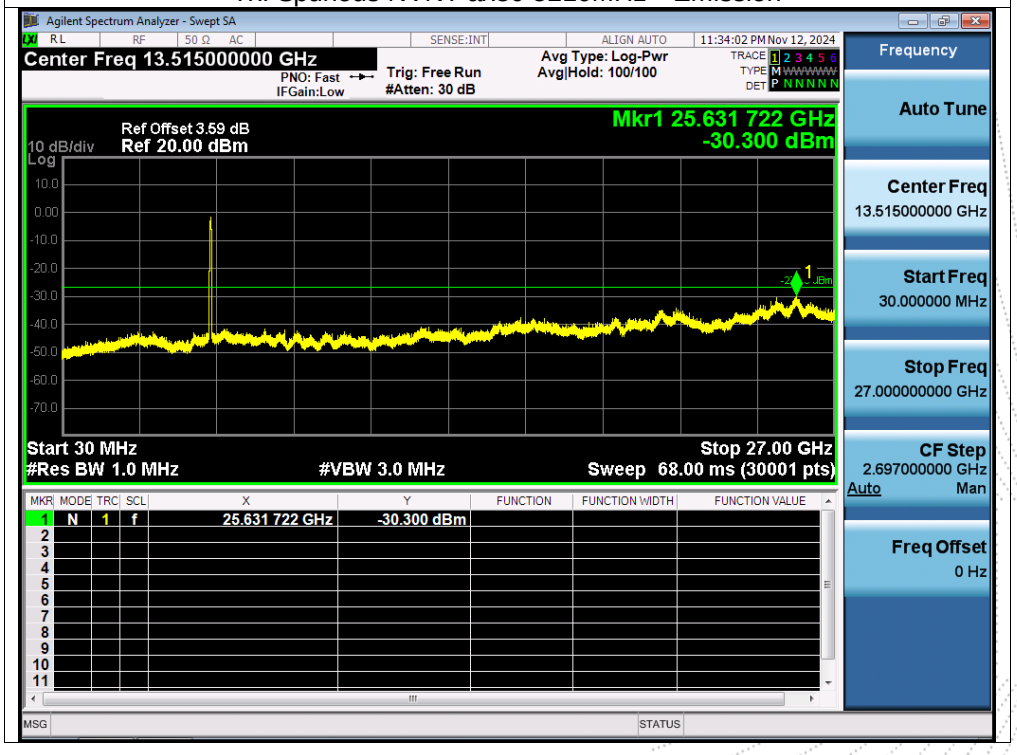
Tx. Spurious NVNT ax40 5190MHz Emission



Tx. Spurious NVNT ax40 5230MHz Emission



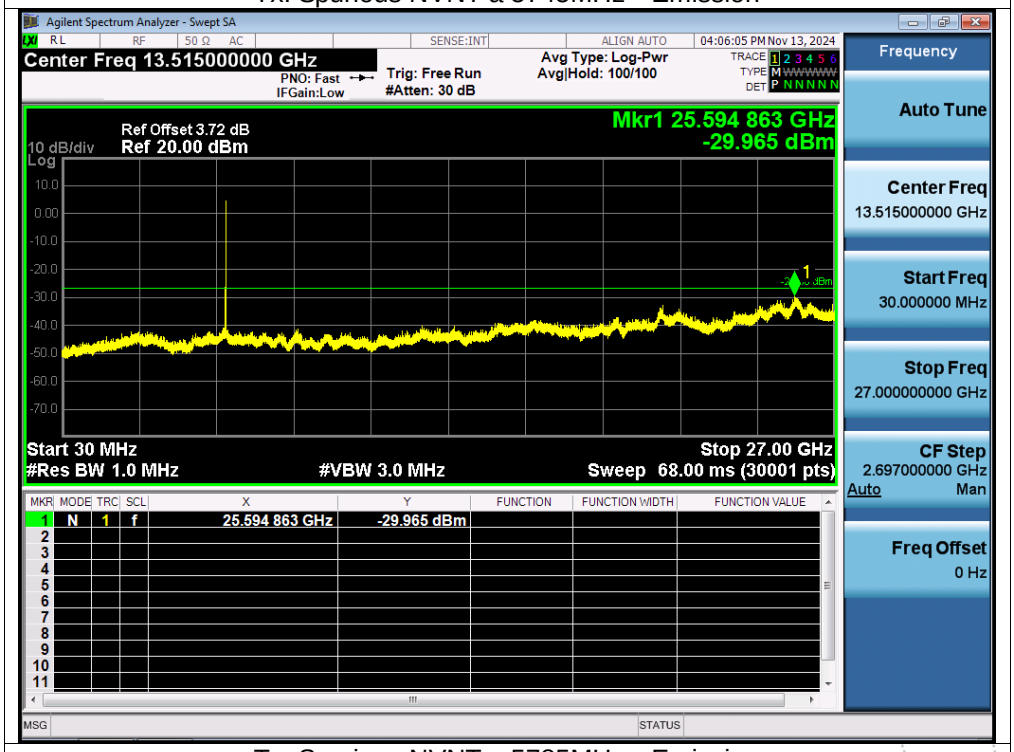
Tx. Spurious NVNT ax80 5210MHz Emission



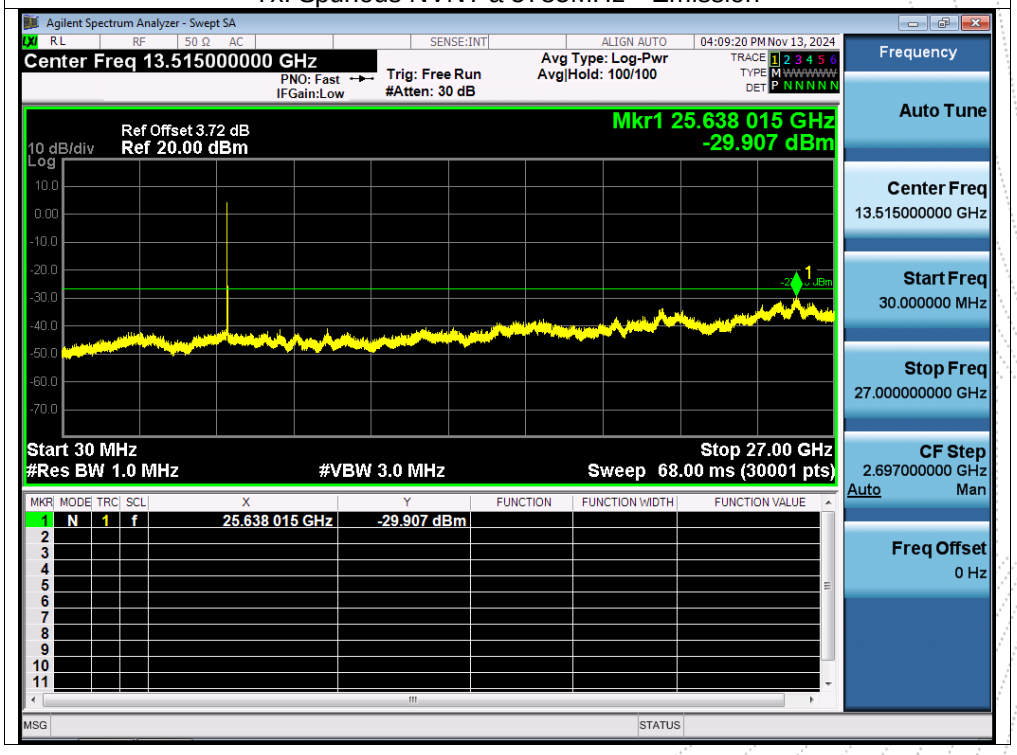
Note: A(B) Represent the value of antenna A and B, The worst data is Antenna A, only shown Antenna A.
Antenna A: 5745-58250MHz

Test Graphs

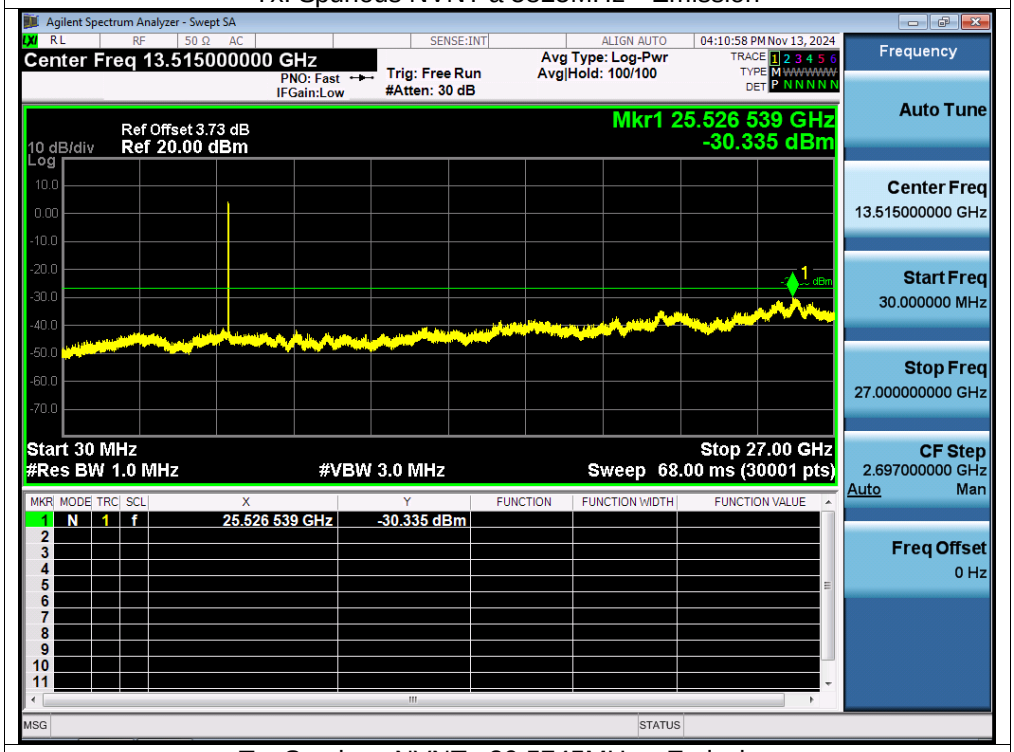
Tx. Spurious NVNT a 5745MHz Emission



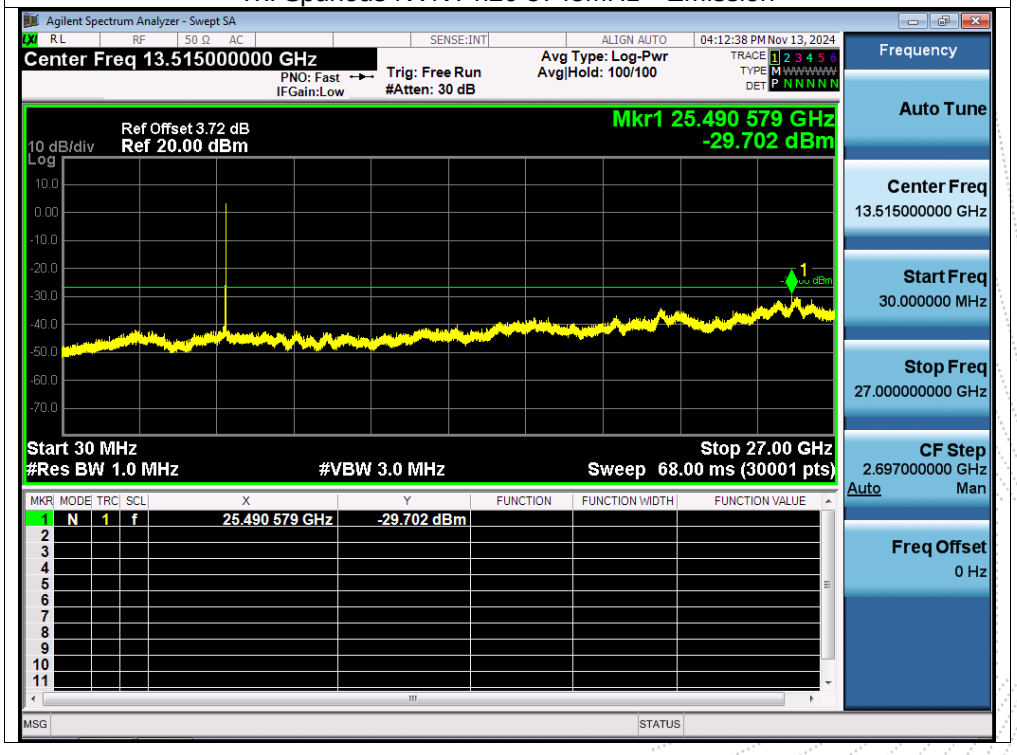
Tx. Spurious NVNT a 5785MHz Emission



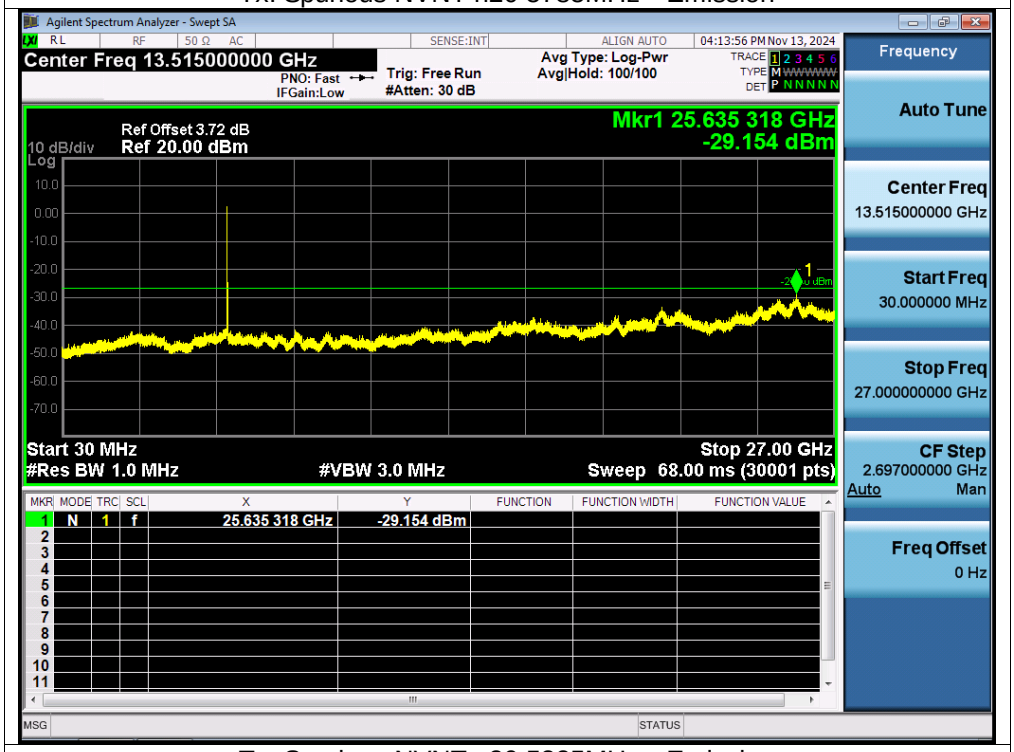
Tx. Spurious NVNT a 5825MHz Emission



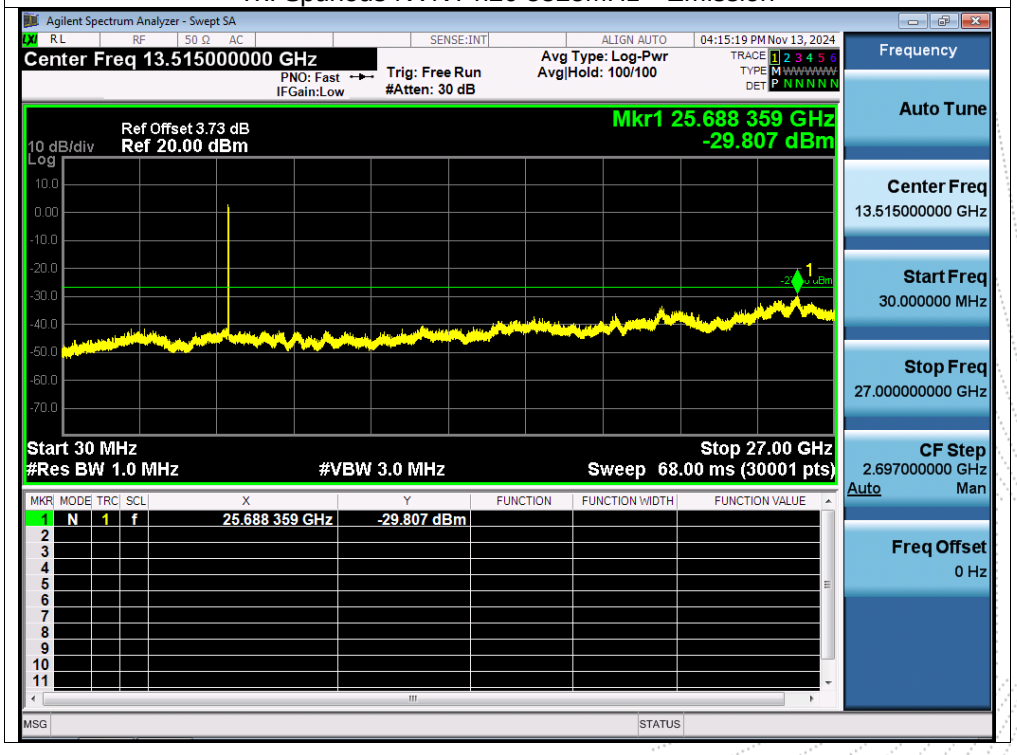
Tx. Spurious NVNT n20 5745MHz Emission



Tx. Spurious NVNT n20 5785MHz Emission



Tx. Spurious NVNT n20 5825MHz Emission



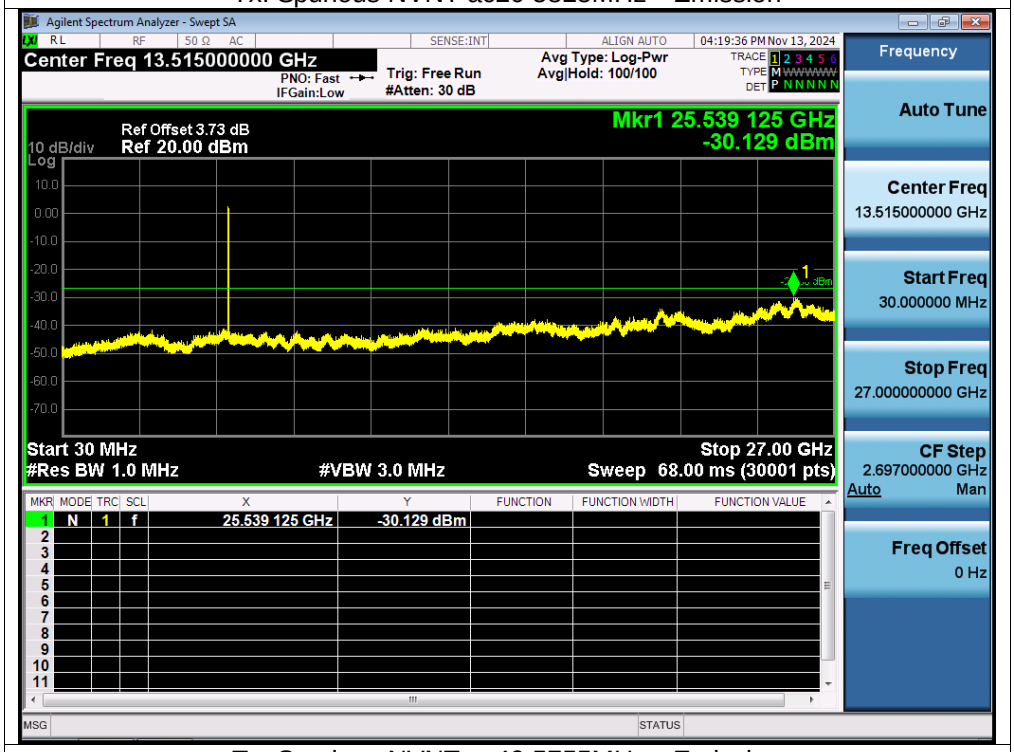
Tx. Spurious NVNT n40 5755MHz Emission

Tx. Spurious NVNT n40 5795MHz Emission

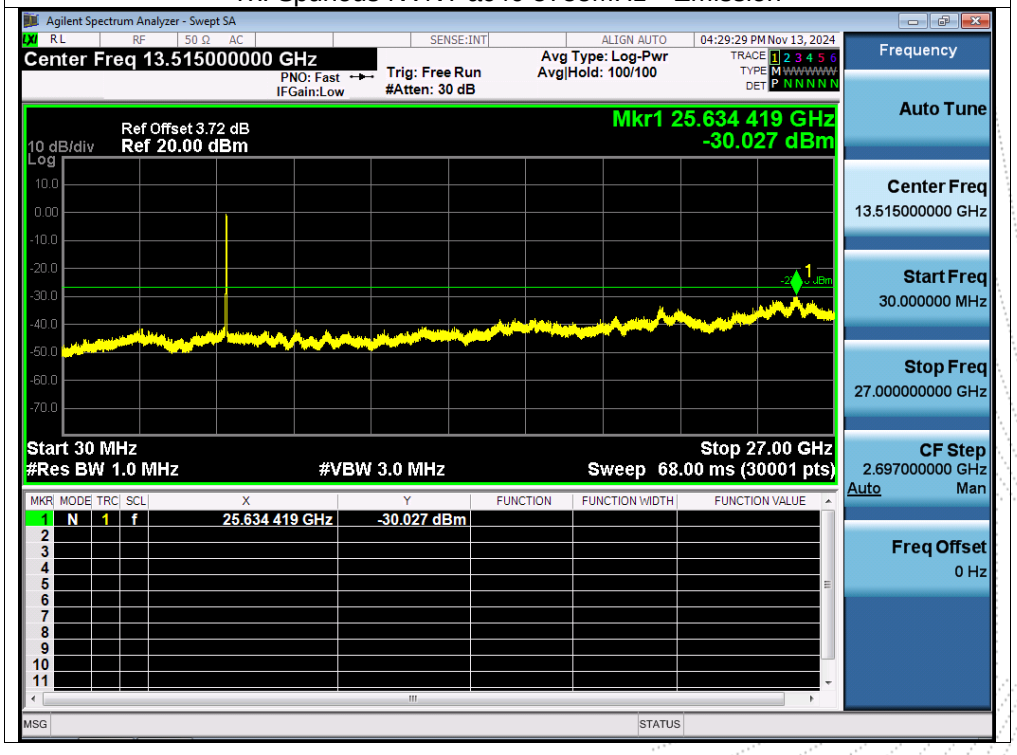
Tx. Spurious NVNT ac20 5745MHz Emission

Tx. Spurious NVNT ac20 5785MHz Emission

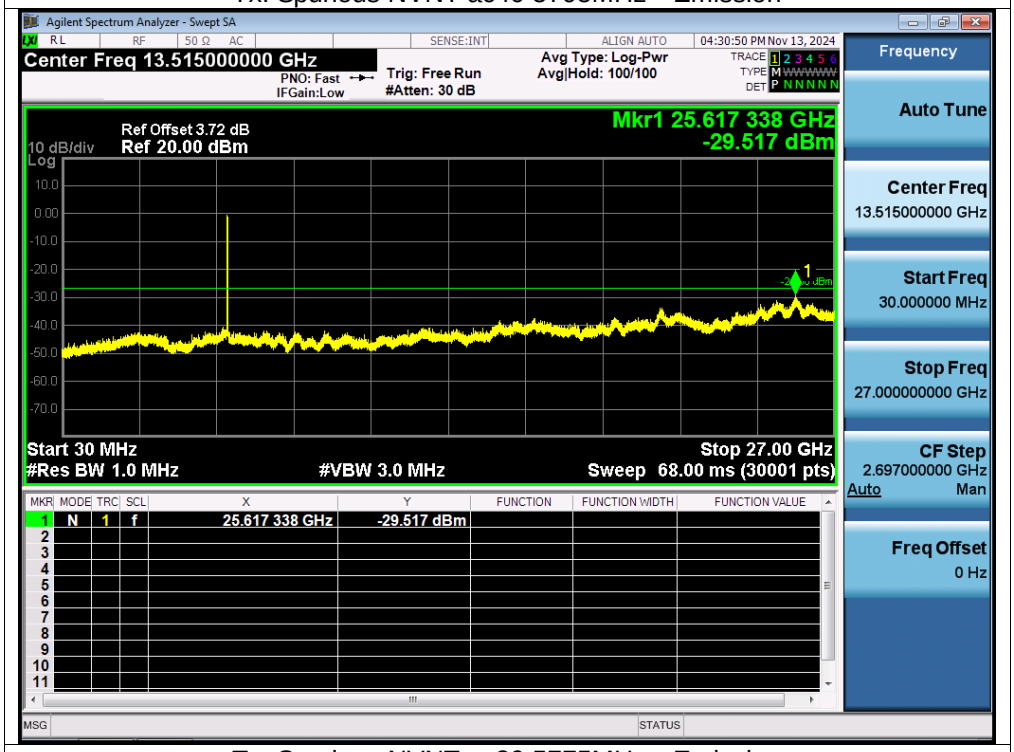
Tx. Spurious NVNT ac20 5825MHz Emission



Tx. Spurious NVNT ac40 5755MHz Emission



Tx. Spurious NVNT ac40 5795MHz Emission

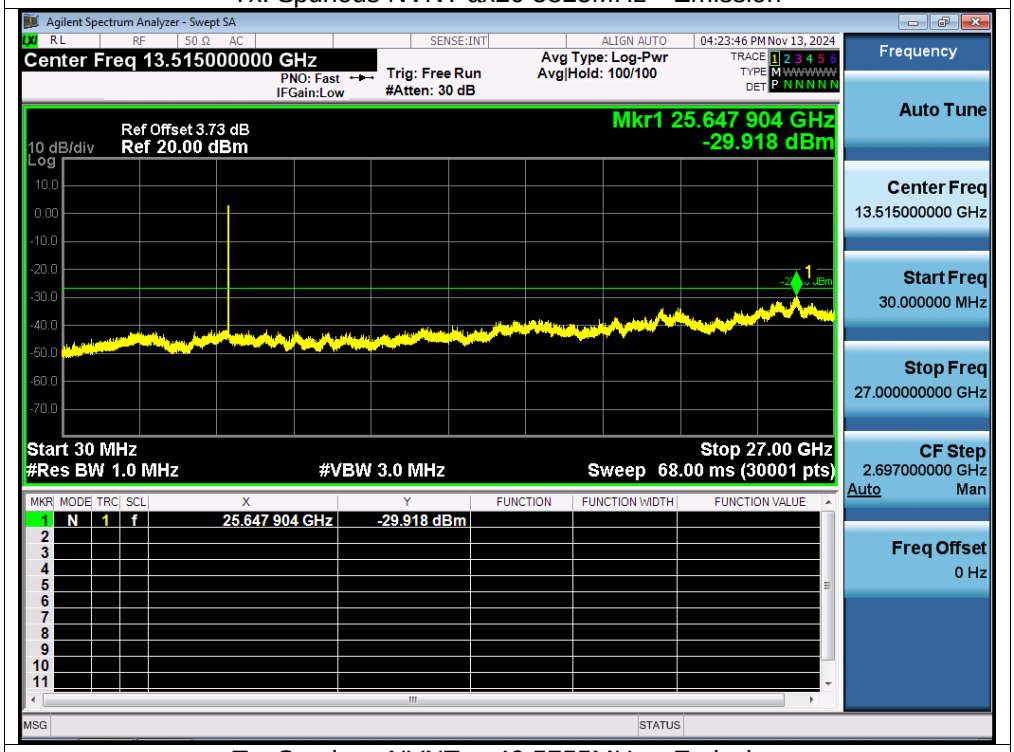


Tx. Spurious NVNT ac80 5775MHz Emission

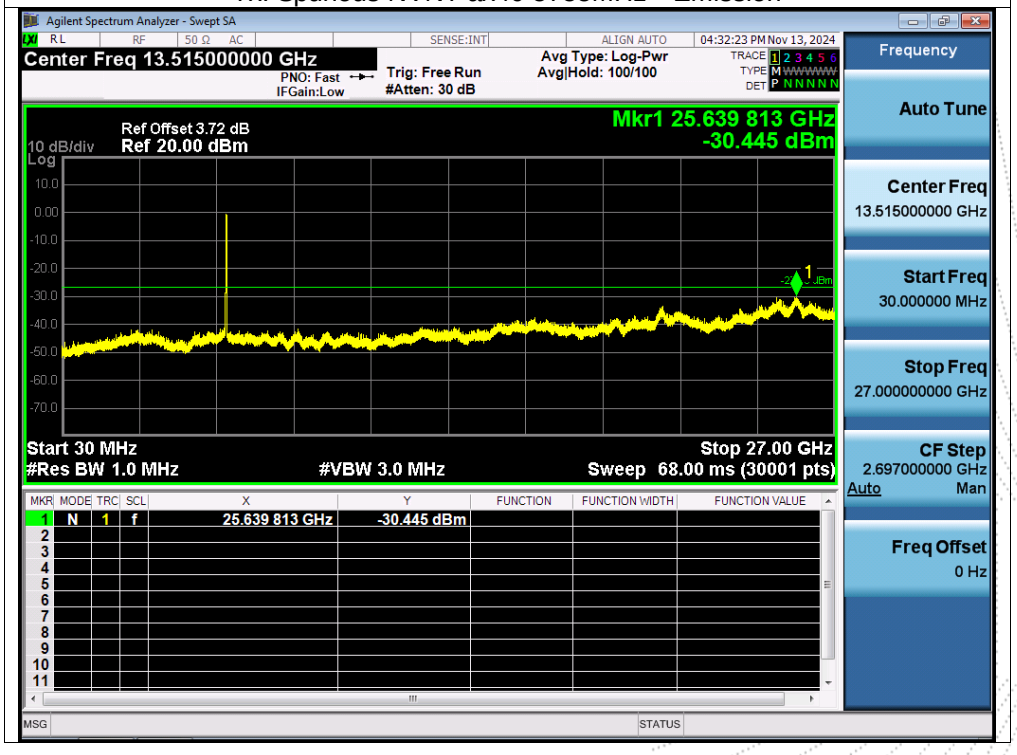
Tx. Spurious NVNT ax20 5745MHz Emission

Tx. Spurious NVNT ax20 5785MHz Emission

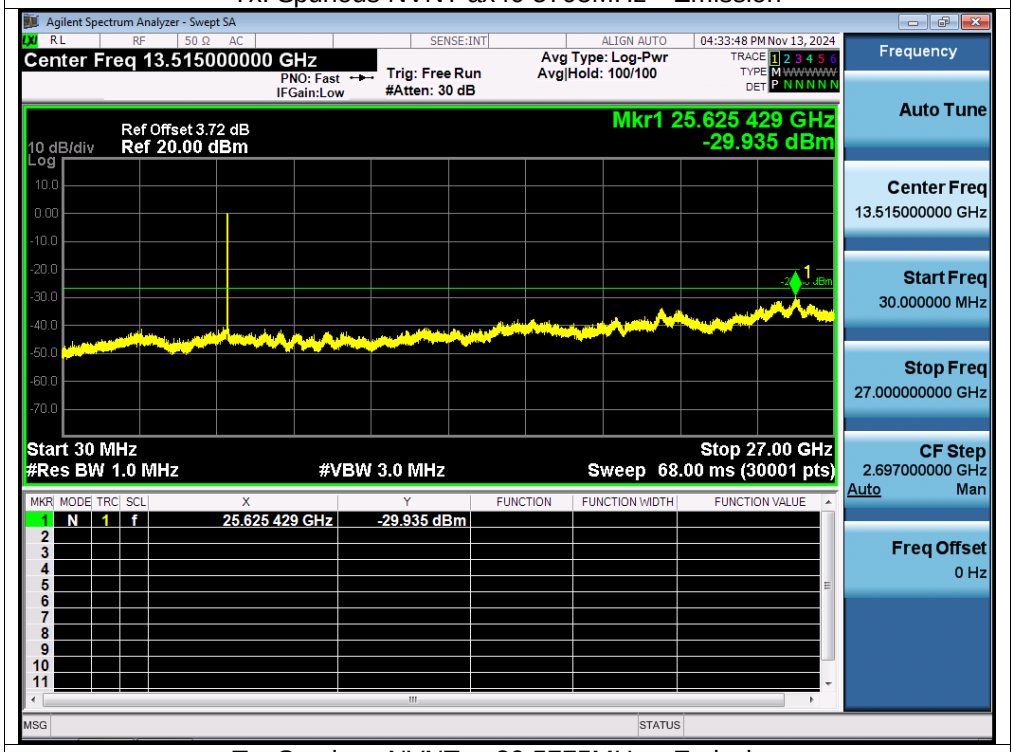
Tx. Spurious NVNT ax20 5825MHz Emission



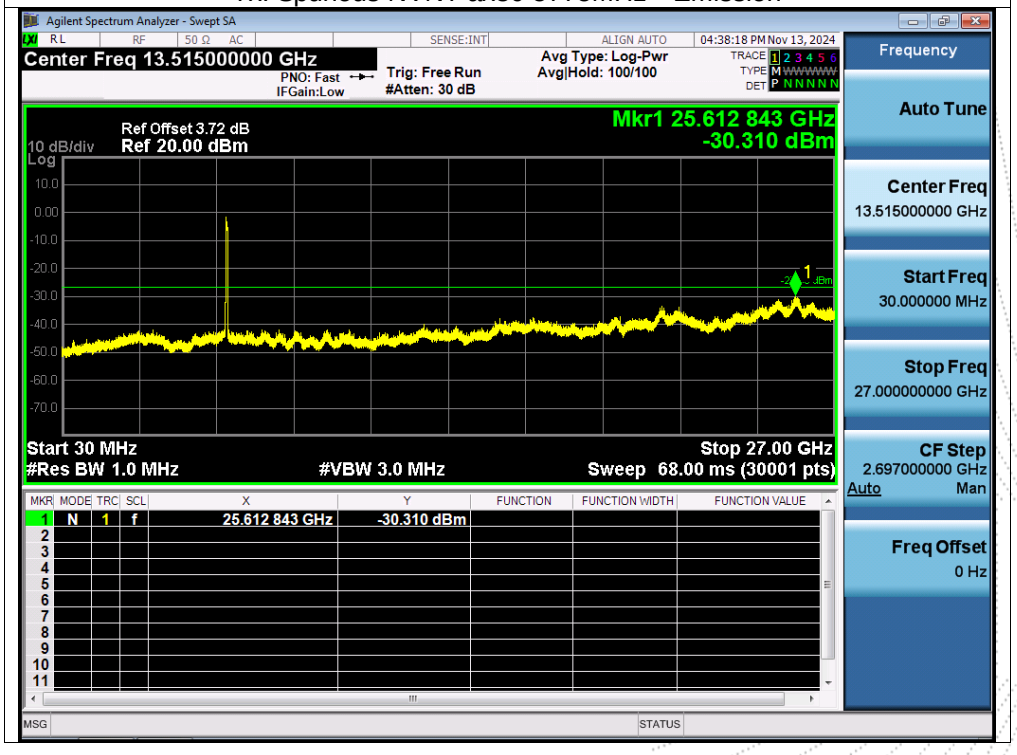
Tx. Spurious NVNT ax40 5755MHz Emission



Tx. Spurious NVNT ax40 5795MHz Emission

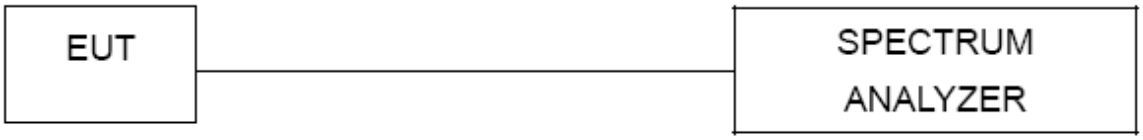


Tx. Spurious NVNT ax80 5775MHz Emission



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 11.4V
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)	11.40	5180.0066	5180	0.0066	1.2741
		V max (V)	12.54	5180.0134	5180	0.0134	2.5869
		V min (V)	10.26	5180.0072	5180	0.0072	1.3900
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)	11.4	T (°C)	-20	5180.0076	5180	0.0076	1.4672
		T (°C)	-10	5180.0076	5180	0.0076	1.4672
		T (°C)	0	5180.0080	5180	0.0080	1.5444
		T (°C)	10	5180.0115	5180	0.0115	2.2201
		T (°C)	20	5180.0077	5180	0.0077	1.4865
		T (°C)	30	5180.0007	5180	0.0007	0.1351
		T (°C)	40	5180.0098	5180	0.0098	1.8919
		T (°C)	50	5180.0046	5180	0.0046	0.8880
		T (°C)	60	5180.0129	5180	0.0129	2.4903
		T (°C)	70	5180.0102	5180	0.0102	1.9691
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)	11.40	5200.0036	5200	0.0036	0.6923
		V max (V)	12.54	5200.0092	5200	0.0092	1.7692
		V min (V)	10.26	5200.0127	5200	0.0127	2.4423
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)	11.4	T (°C)	-20	5200.00960	5200	0.00960	1.8462
		T (°C)	-10	5200.00080	5200	0.00080	0.1538
		T (°C)	0	5200.00290	5200	0.00290	0.5577
		T (°C)	10	5200.00650	5200	0.00650	1.2500
		T (°C)	20	5200.00080	5200	0.00080	0.1538
		T (°C)	30	5200.00340	5200	0.00340	0.6538
		T (°C)	40	5200.00510	5200	0.00510	0.9808
		T (°C)	50	5200.00520	5200	0.00520	1.0000
		T (°C)	60	5200.00300	5200	0.00300	0.5769
		T (°C)	70	5200.00830	5200	0.00830	1.5962
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)	11.40	5240.0031	5240	0.0031	0.5916
		V max (V)	12.54	5240.0079	5240	0.0079	1.5076
		V min (V)	10.26	5240.0123	5240	0.0123	2.3473
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)	11.4	T (°C)	-20	5240.0063	5240	0.0063	1.2023
		T (°C)	-10	5240.0051	5240	0.0051	0.9733
		T (°C)	0	5240.0009	5240	0.0009	0.1718
		T (°C)	10	5240.0086	5240	0.0086	1.6412
		T (°C)	20	5240.0003	5240	0.0003	0.0573
		T (°C)	30	5240.0125	5240	0.0125	2.3855
		T (°C)	40	5240.0135	5240	0.0135	2.5763
		T (°C)	50	5240.0096	5240	0.0096	1.8321
		T (°C)	60	5240.0059	5240	0.0059	1.1260
		T (°C)	70	5240.0084	5240	0.0084	1.6031
Limits				5150-5250 MHz			
Result				Complies			

Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101kPa	Test Voltage:	DC 11.4V
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)	11.40	5745.00570	5745	0.00570	0.9922
		V max (V)	12.54	5745.01150	5745	0.01150	2.0017
		V min (V)	10.26	5745.01060	5745	0.01060	1.8451
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)	11.4	T (°C)	-20	5745.00880	5745	0.00880	1.5318
		T (°C)	-10	5745.01130	5745	0.01130	1.9669
		T (°C)	0	5745.00040	5745	0.00040	0.0696
		T (°C)	10	5745.00290	5745	0.00290	0.5048
		T (°C)	20	5745.01070	5745	0.01070	1.8625
		T (°C)	30	5745.00960	5745	0.00960	1.6710
		T (°C)	40	5745.01010	5745	0.01010	1.7581
		T (°C)	50	5745.00800	5745	0.00800	1.3925
		T (°C)	60	5745.00740	5745	0.00740	1.2881
		T (°C)	70	5745.00830	5745	0.00830	1.4447
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)	11.40	5785.00360	5785	0.00360	0.6223
		V max (V)	12.54	5785.00430	5785	0.00430	0.7433
		V min (V)	10.26	5785.00560	5785	0.00560	0.9680
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)	11.4	T (°C)	-20	5785.00450	5785	0.00450	0.7779
		T (°C)	-10	5785.01130	5785	0.01130	1.9533
		T (°C)	0	5785.01060	5785	0.01060	1.8323
		T (°C)	10	5785.00600	5785	0.00600	1.0372
		T (°C)	20	5785.00880	5785	0.00880	1.5212
		T (°C)	30	5785.00920	5785	0.00920	1.5903
		T (°C)	40	5785.00120	5785	0.00120	0.2074
		T (°C)	50	5785.00470	5785	0.00470	0.8124
		T (°C)	60	5785.00090	5785	0.00090	0.1556
		T (°C)	70	5785.01170	5785	0.01170	2.0225
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)	11.40	5825.01240	5825	0.01240	2.1288
		V max (V)	12.54	5825.00320	5825	0.00320	0.5494
		V min (V)	10.26	5825.00660	5825	0.00660	1.1330
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)	11.4	T (°C)	-20	5825.00190	5825	0.00190	0.3262
		T (°C)	-10	5825.01310	5825	0.01310	2.2489
		T (°C)	0	5825.01100	5825	0.01100	1.8884
		T (°C)	10	5825.00960	5825	0.00960	1.6481
		T (°C)	20	5825.00260	5825	0.00260	0.4464
		T (°C)	30	5825.01330	5825	0.01330	2.2833
		T (°C)	40	5825.00410	5825	0.00410	0.7039
		T (°C)	50	5825.00730	5825	0.00730	1.2532
		T (°C)	60	5825.01070	5825	0.01070	1.8369
		T (°C)	70	5825.01010	5825	0.01010	1.7339
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

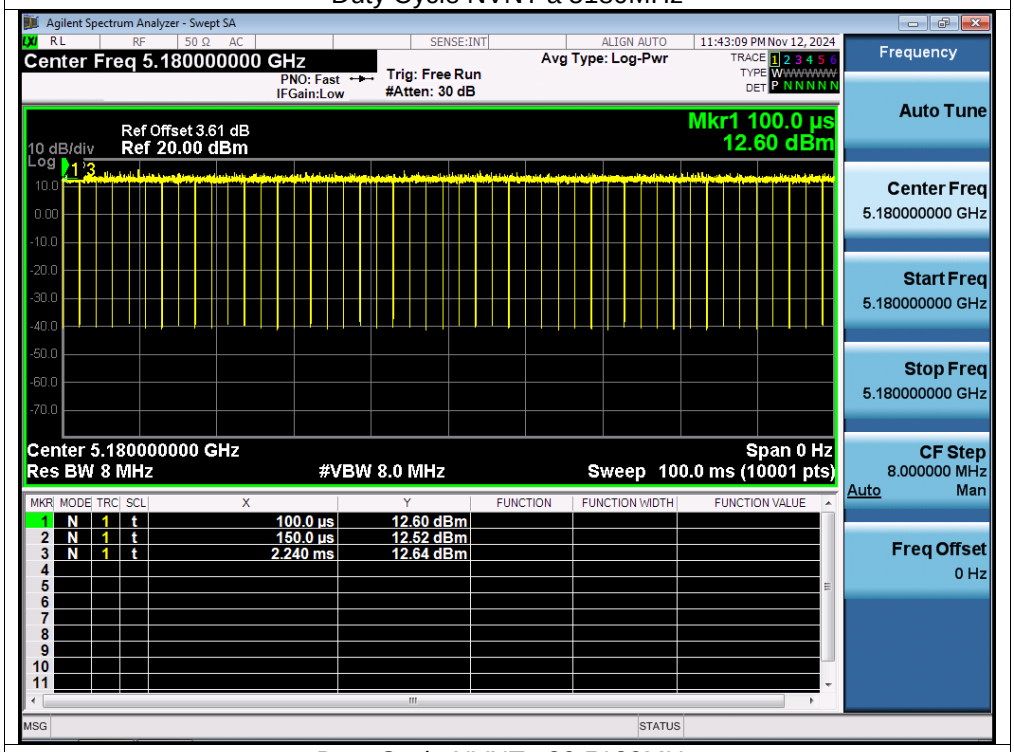
14.4 Test Result

ANT A

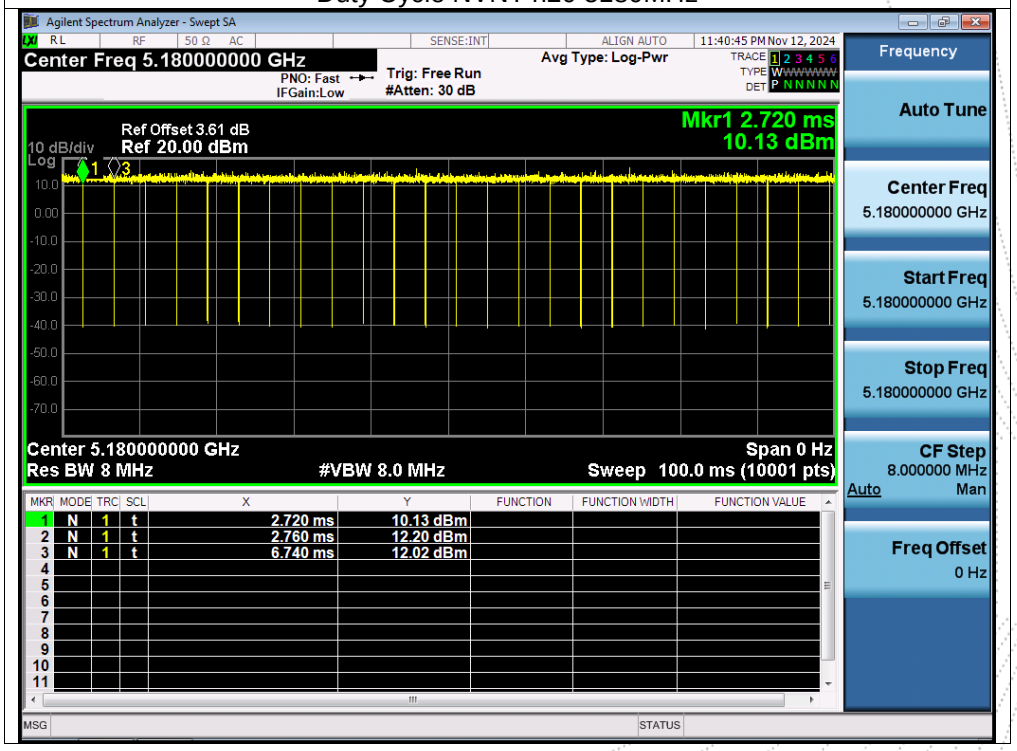
Condition	Mode	Frequency (MHz)	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	a	5180	97.66	0.1	0.48
NVNT	n20	5180	99	0	0.25
NVNT	n40	5190	99	0	0.25
NVNT	ac20	5180	98.76	0	0.25
NVNT	ac40	5190	98.75	0	0.25
NVNT	ac80	5210	98.76	0	0.25
NVNT	ax20	5180	98.76	0	0.25
NVNT	ax40	5190	98.75	0	0.25
NVNT	ax80	5210	98.76	0	0.25

Test Graphs

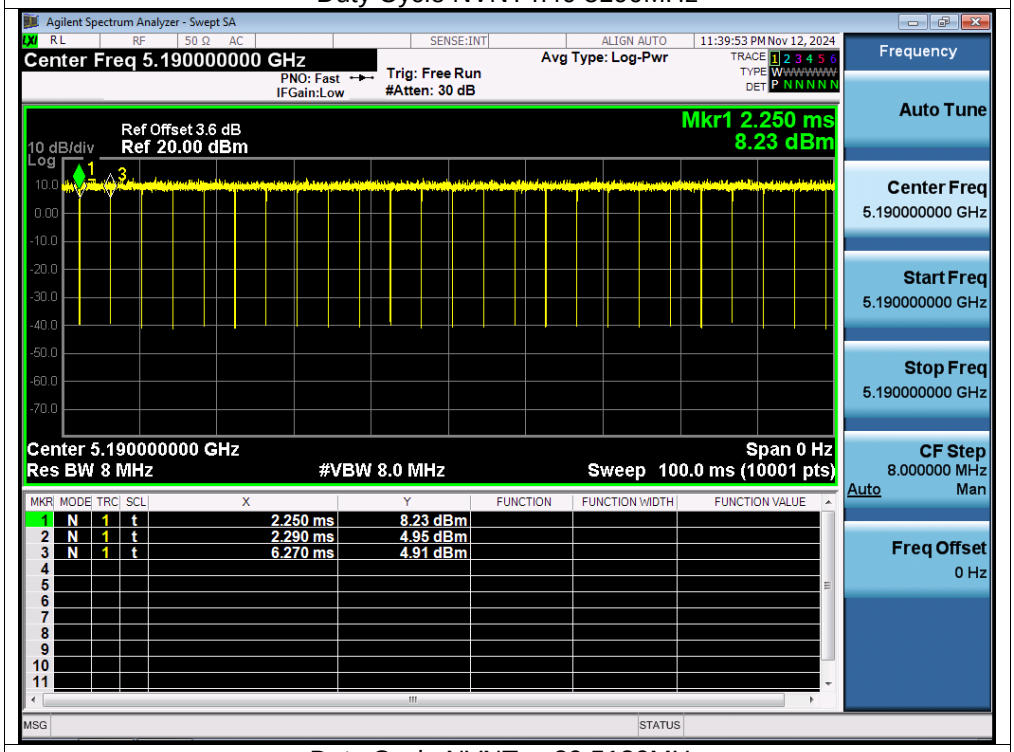
Duty Cycle NVNT a 5180MHz



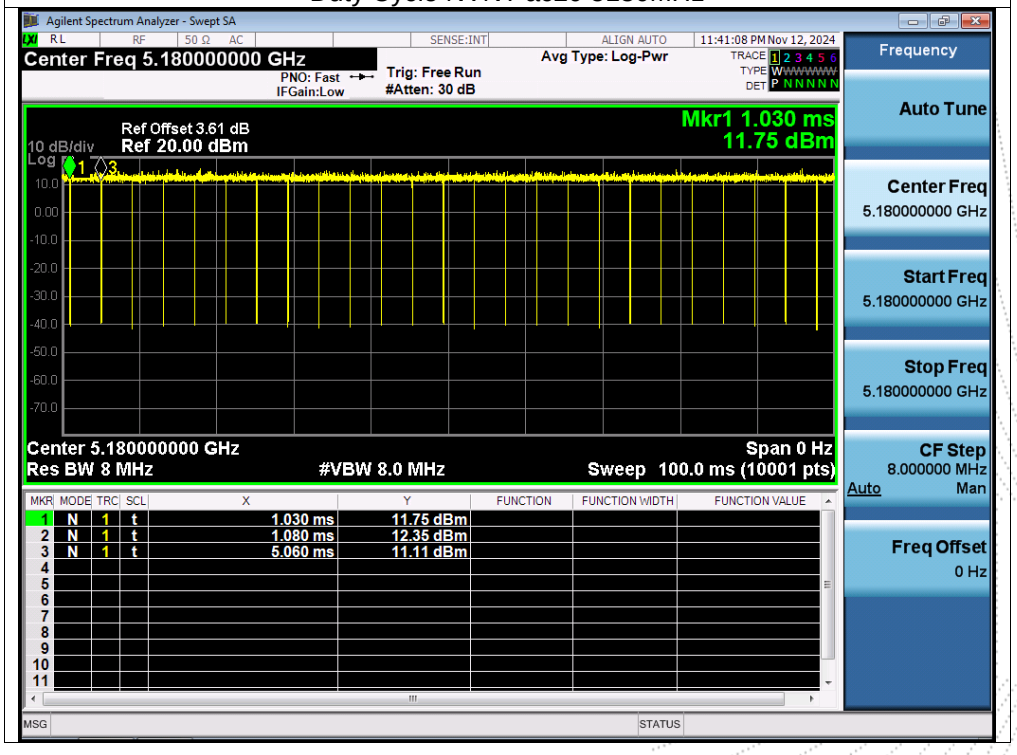
Duty Cycle NVNT n20 5180MHz



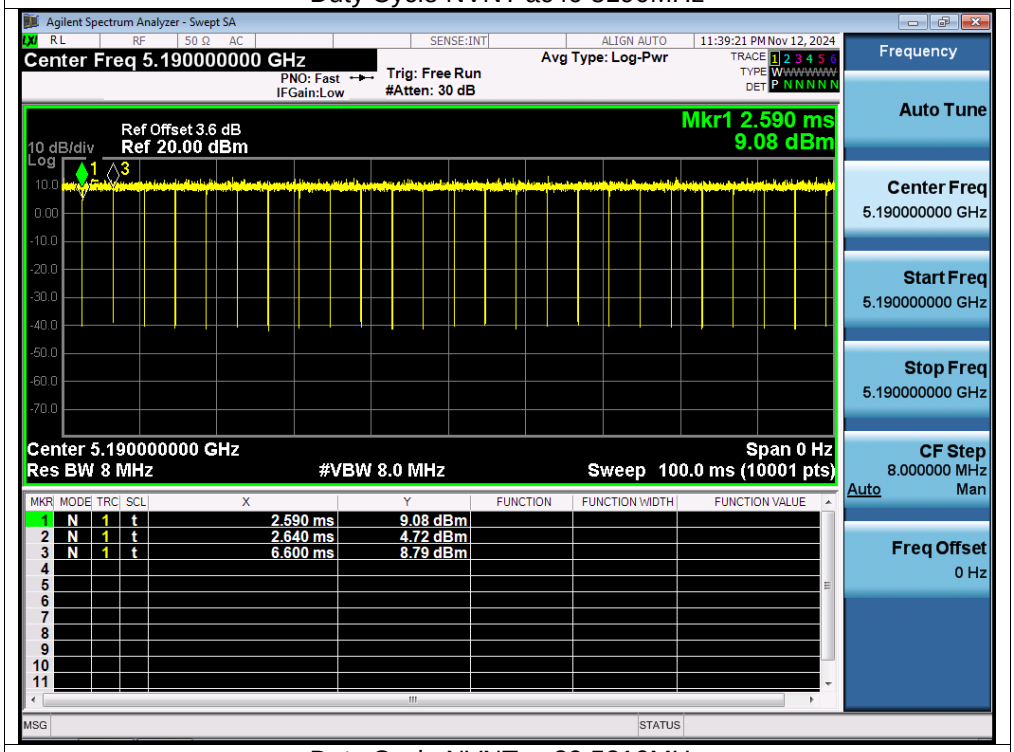
Duty Cycle NVNT n40 5190MHz



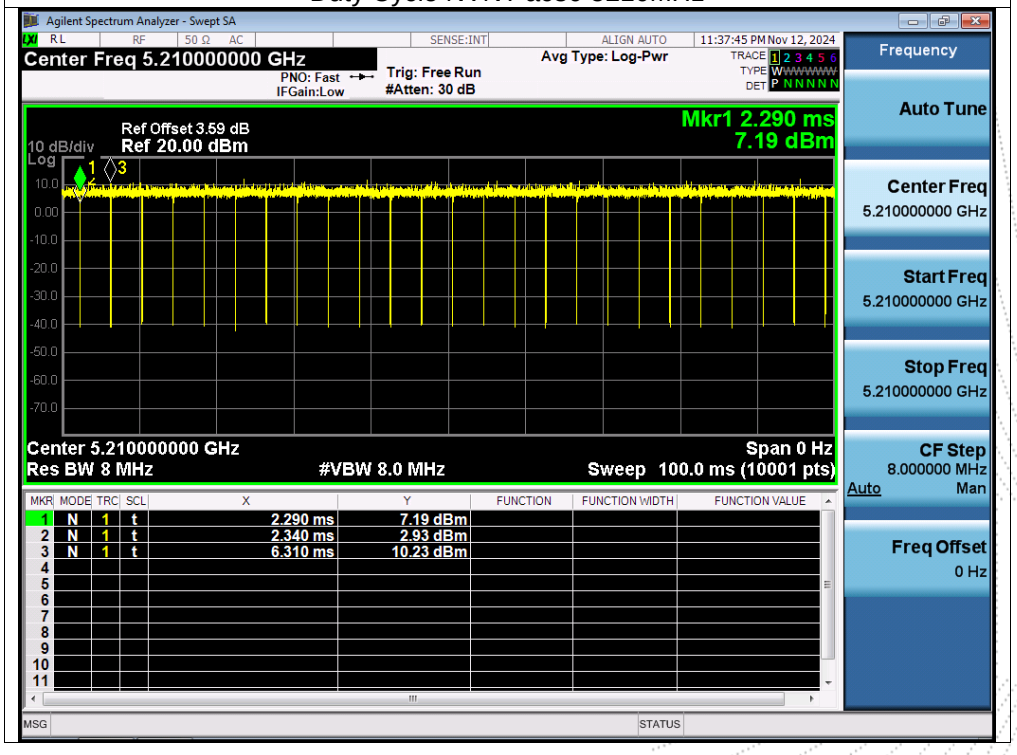
Duty Cycle NVNT ac20 5180MHz



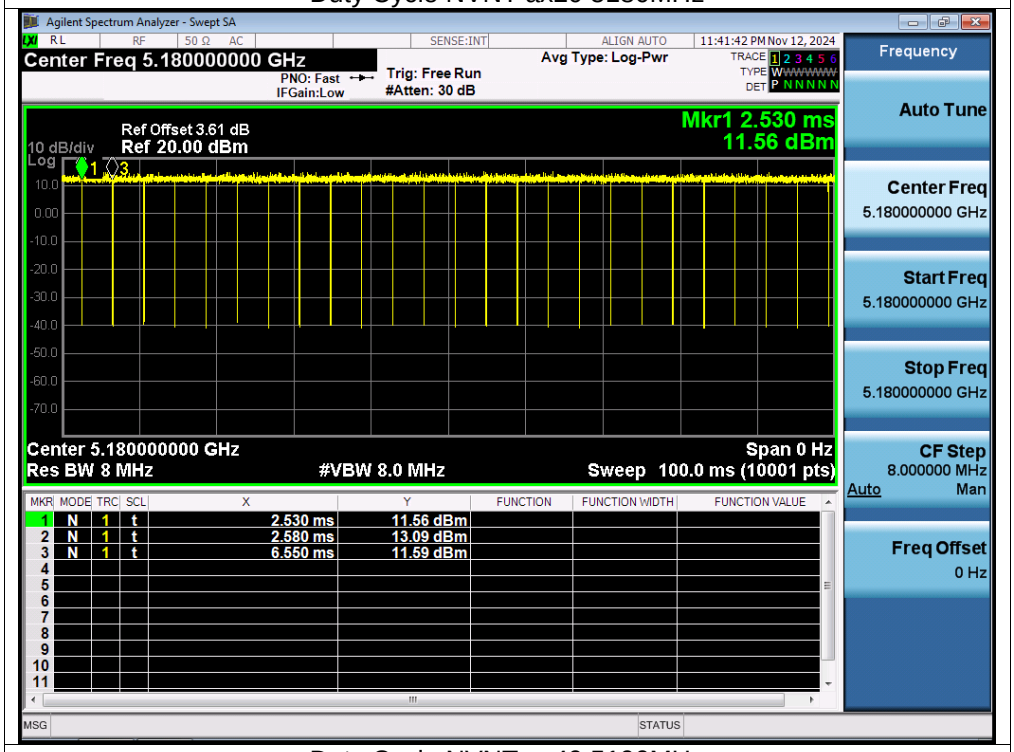
Duty Cycle NVNT ac40 5190MHz



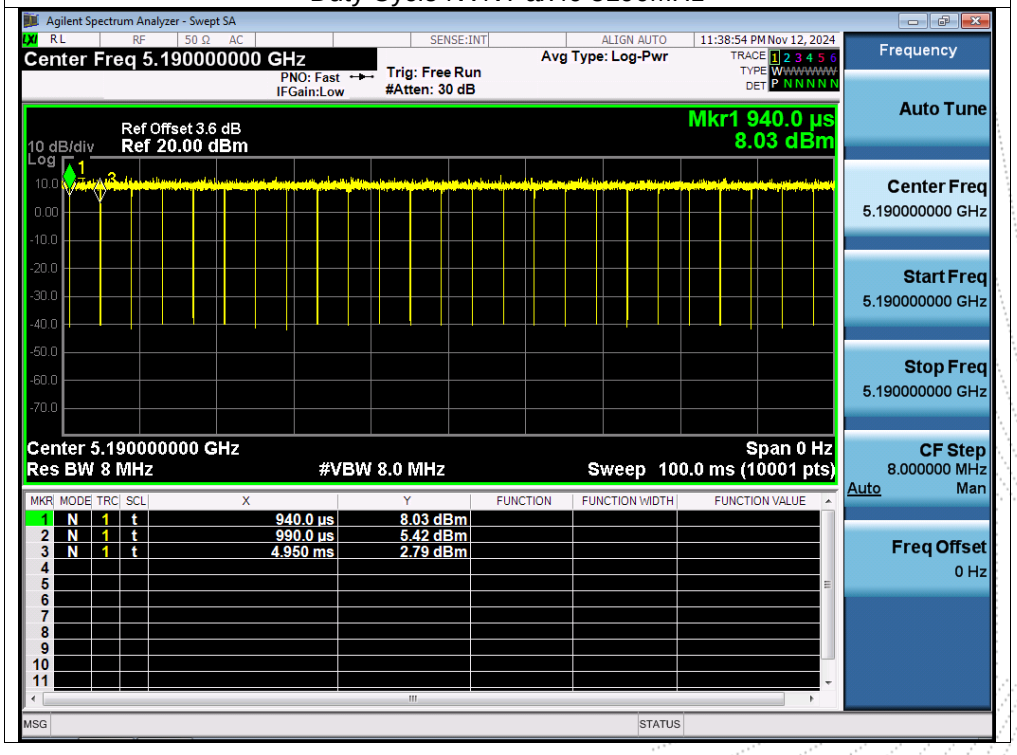
Duty Cycle NVNT ac80 5210MHz



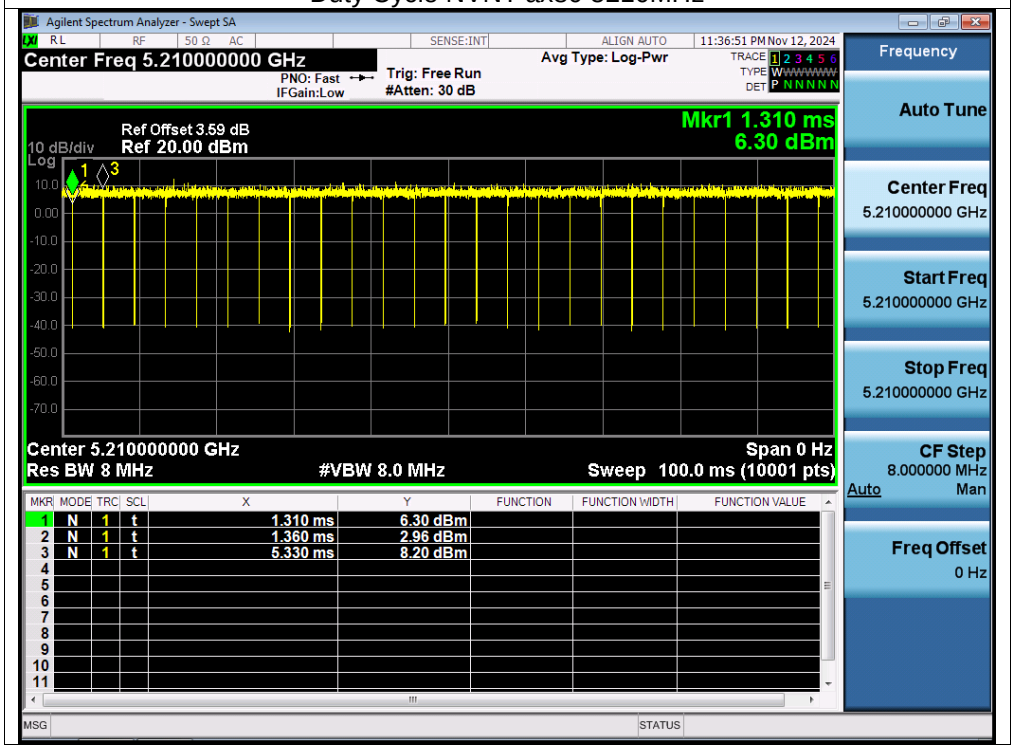
Duty Cycle NVNT ax20 5180MHz



Duty Cycle NVNT ax40 5190MHz



Duty Cycle NVNT ax80 5210MHz

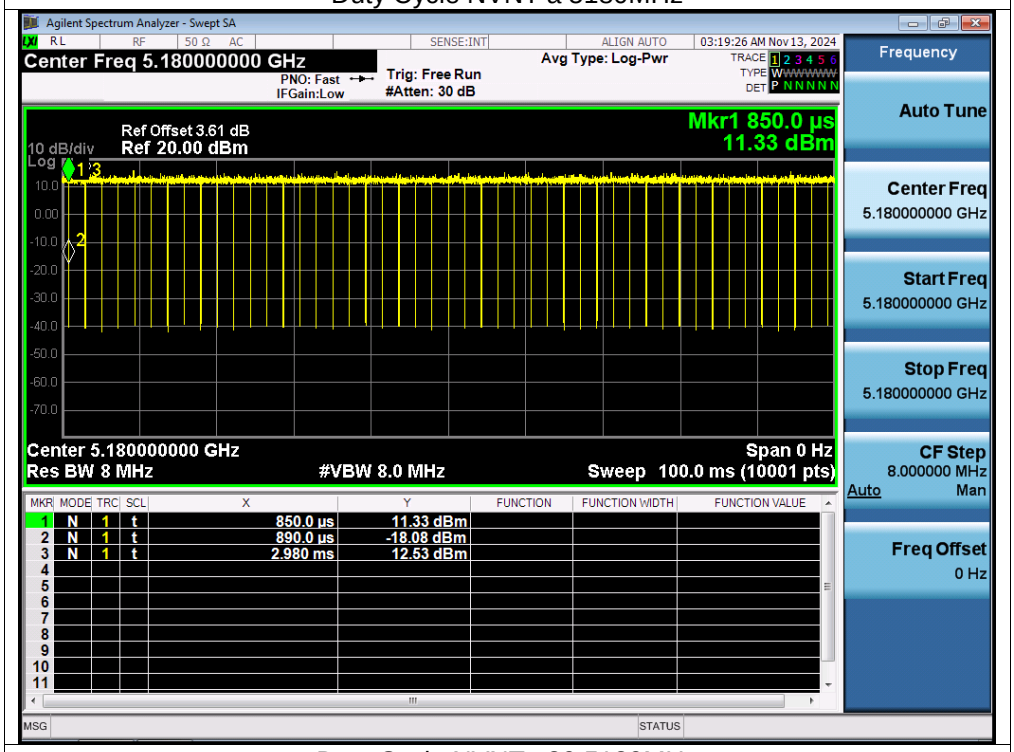


ANT B

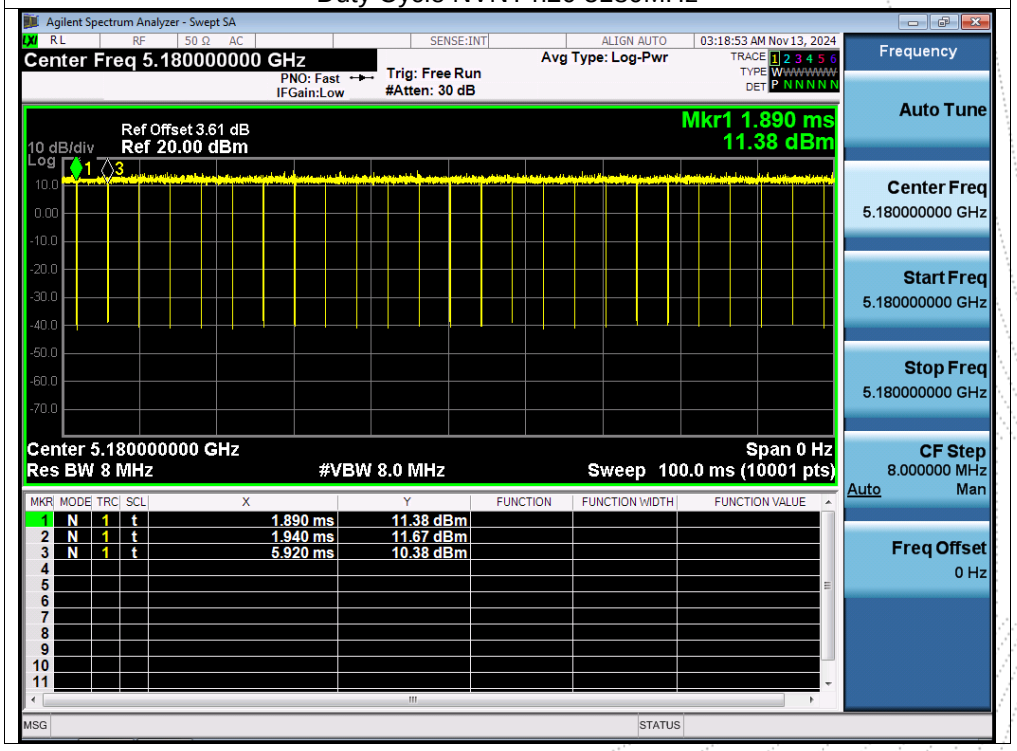
Condition	Mode	Frequency (MHz)	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	a	5180	98.12	0	0.48
NVNT	n20	5180	98.76	0	0.25
NVNT	n40	5190	98.76	0	0.25
NVNT	ac20	5180	99	0	0.25
NVNT	ac40	5190	98.75	0	0.25
NVNT	ac80	5210	99	0	0.25
NVNT	ax20	5180	98.76	0	0.25
NVNT	ax40	5190	98.76	0	0.25
NVNT	ax80	5210	98.76	0	0.25

Test Graphs

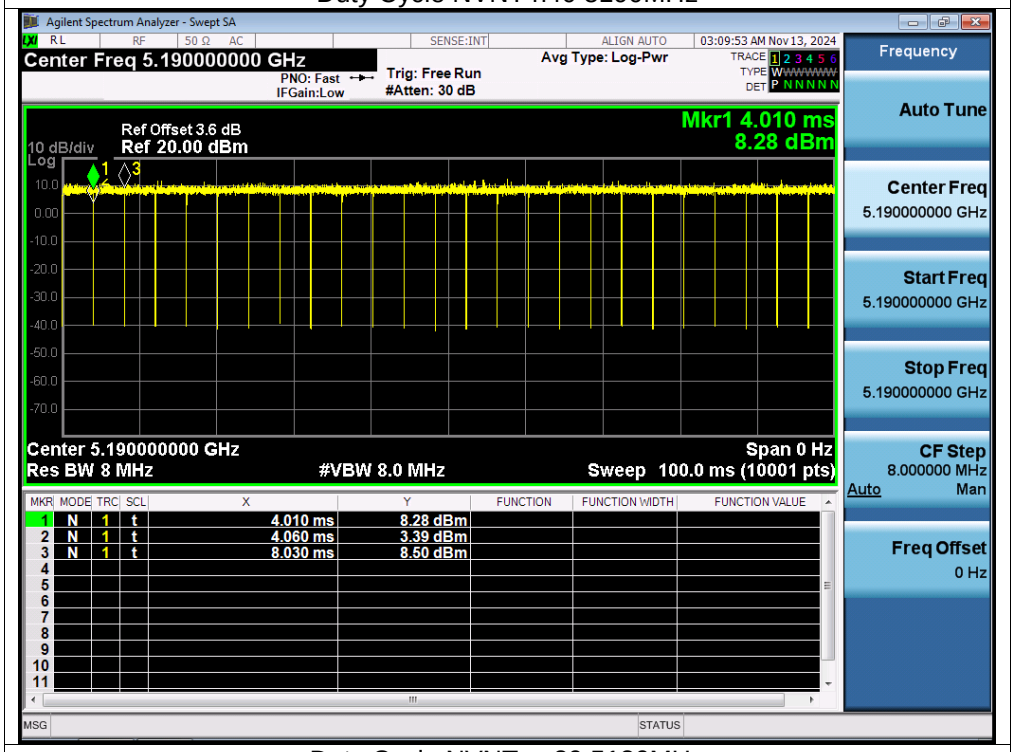
Duty Cycle NVNT a 5180MHz



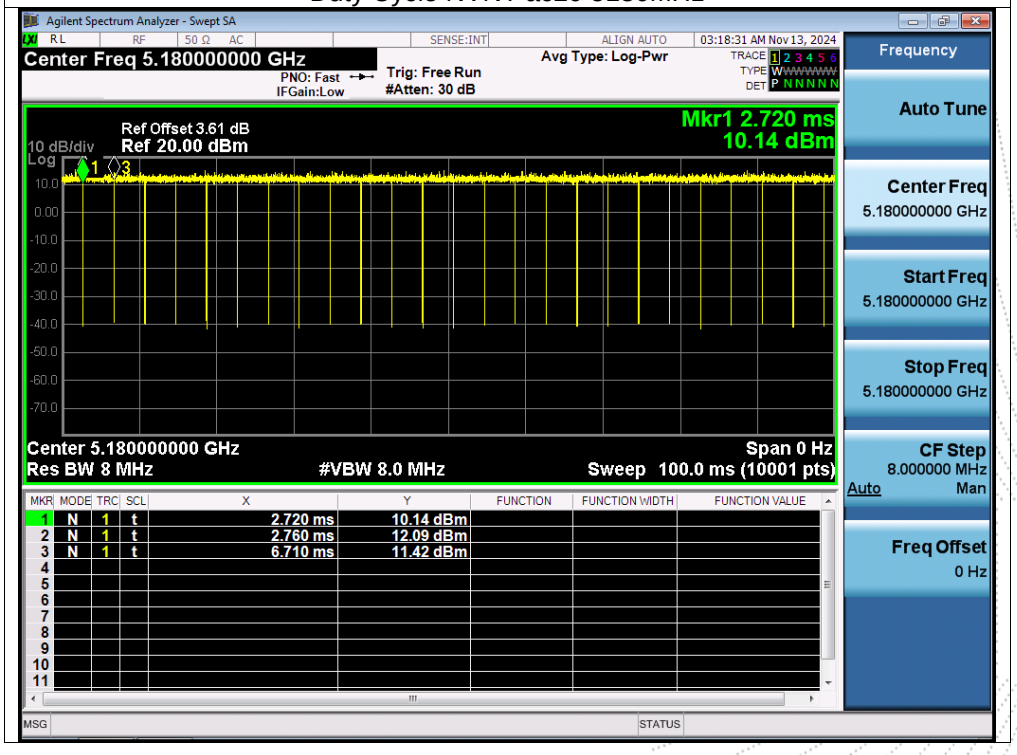
Duty Cycle NVNT n20 5180MHz



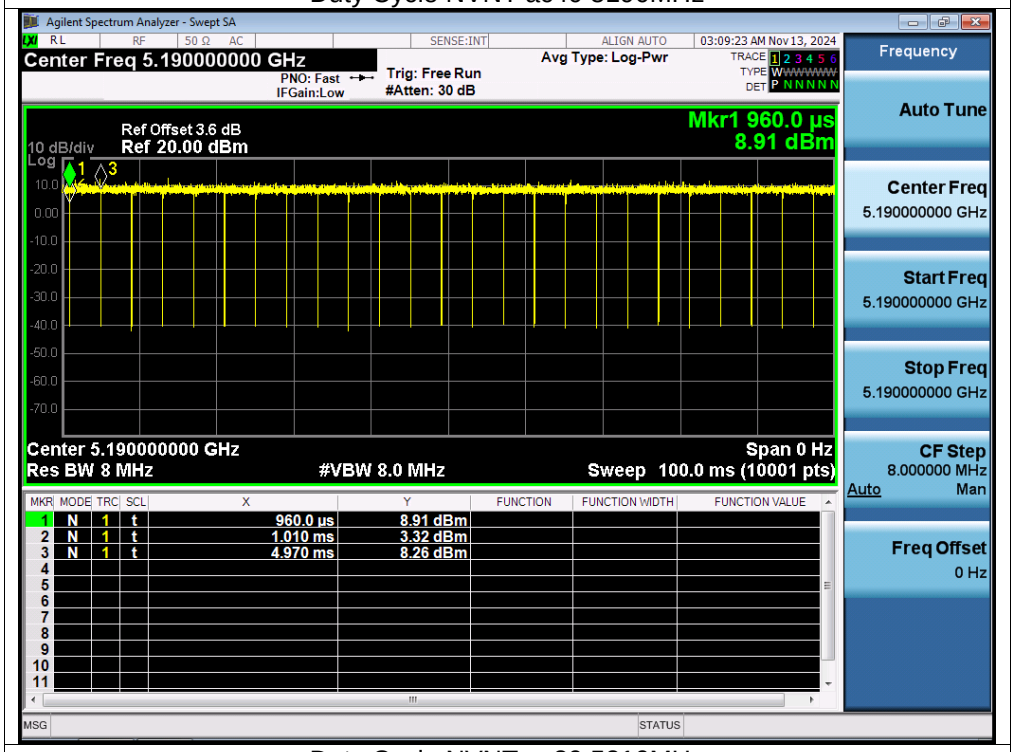
Duty Cycle NVNT n40 5190MHz



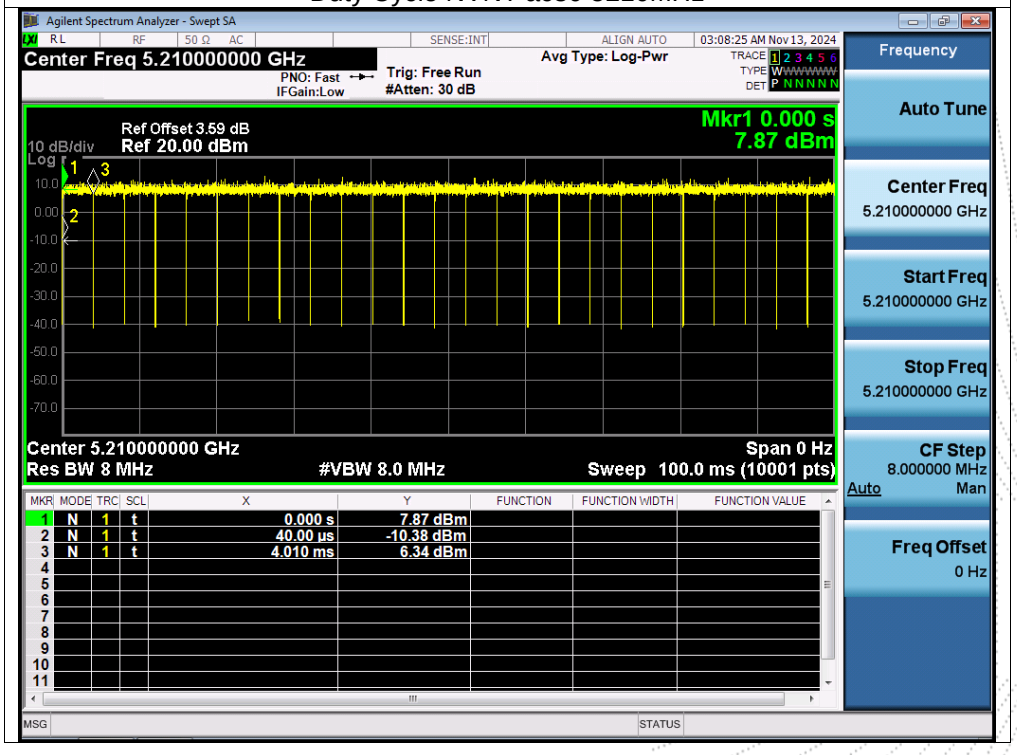
Duty Cycle NVNT ac20 5180MHz



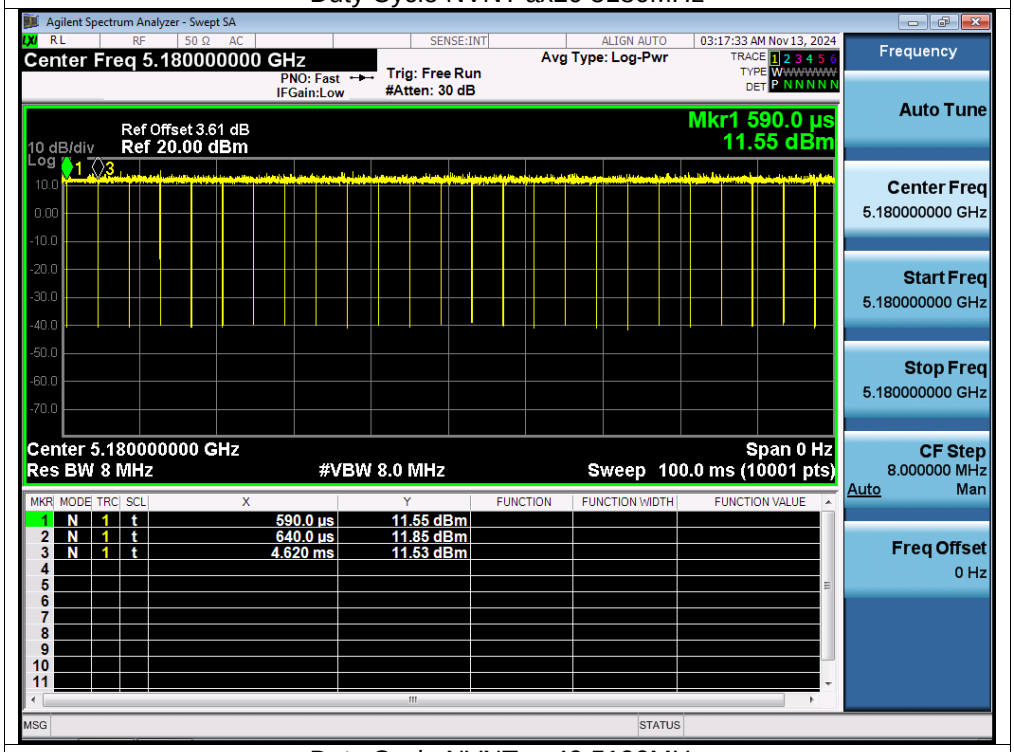
Duty Cycle NVNT ac40 5190MHz



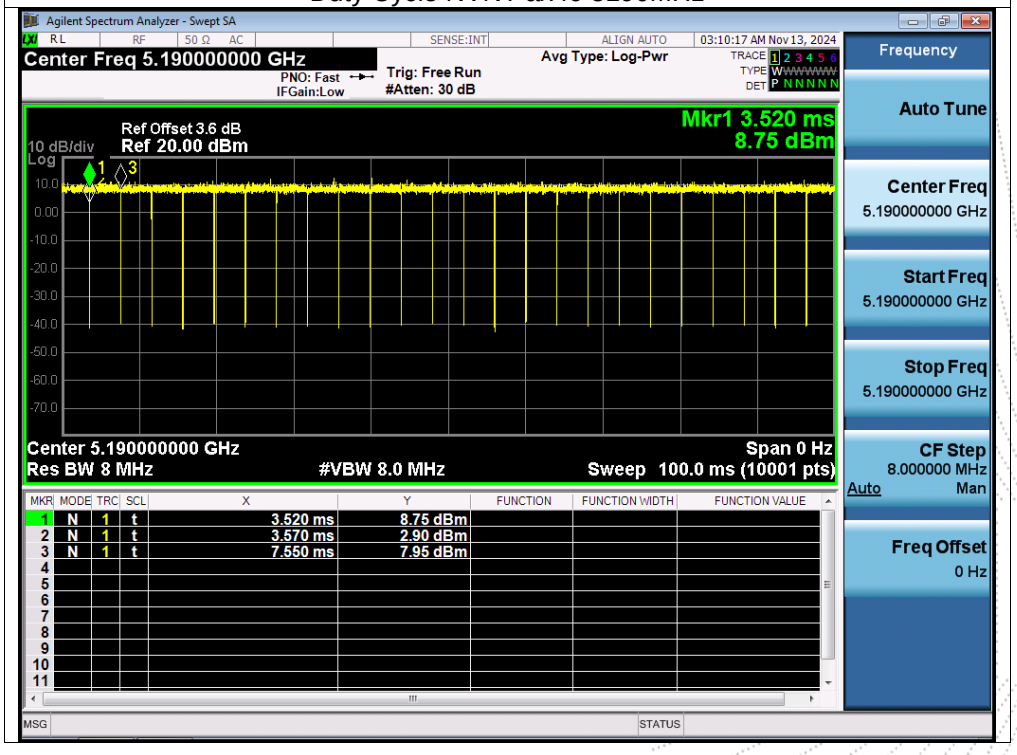
Duty Cycle NVNT ac80 5210MHz



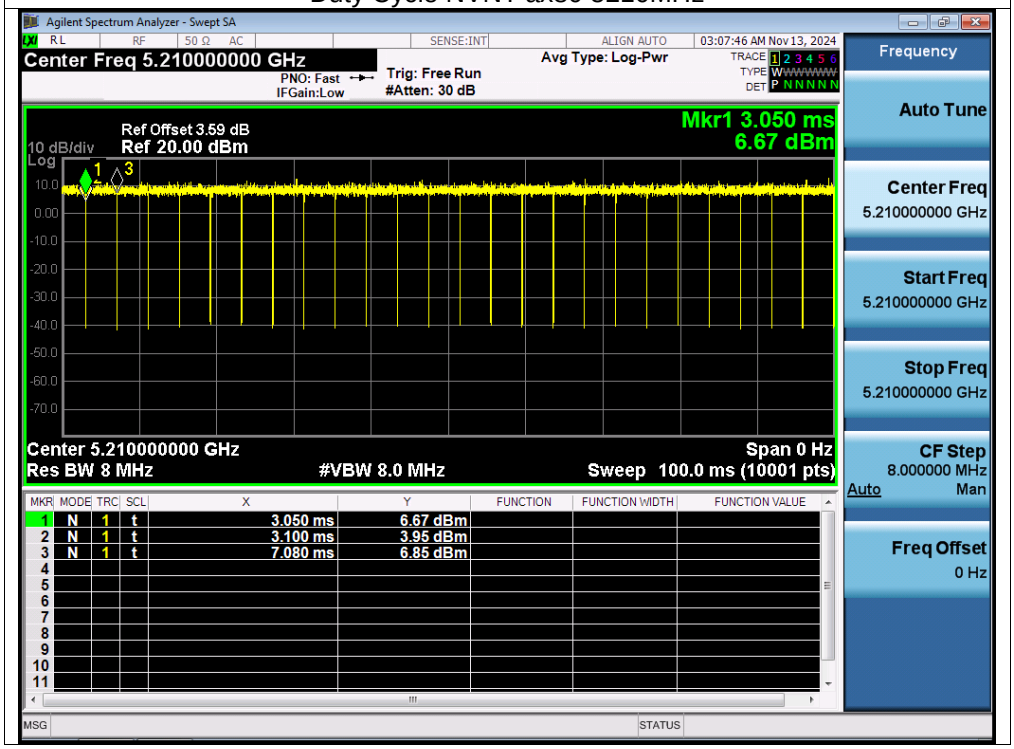
Duty Cycle NVNT ax20 5180MHz



Duty Cycle NVNT ax40 5190MHz



Duty Cycle NVNT ax80 5210MHz

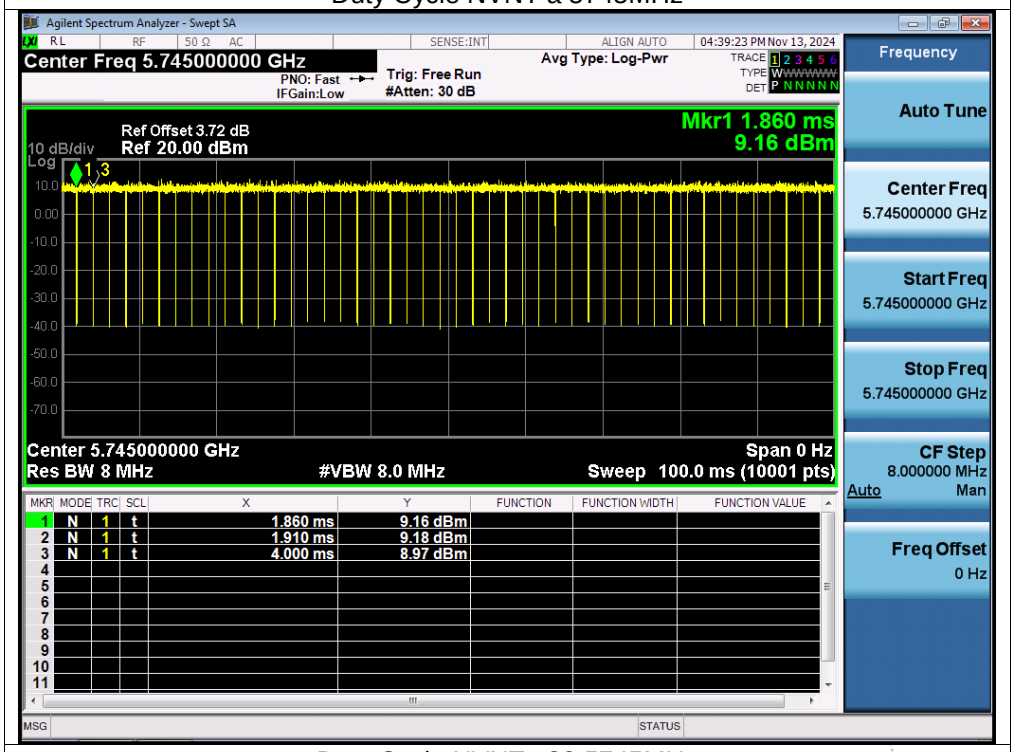
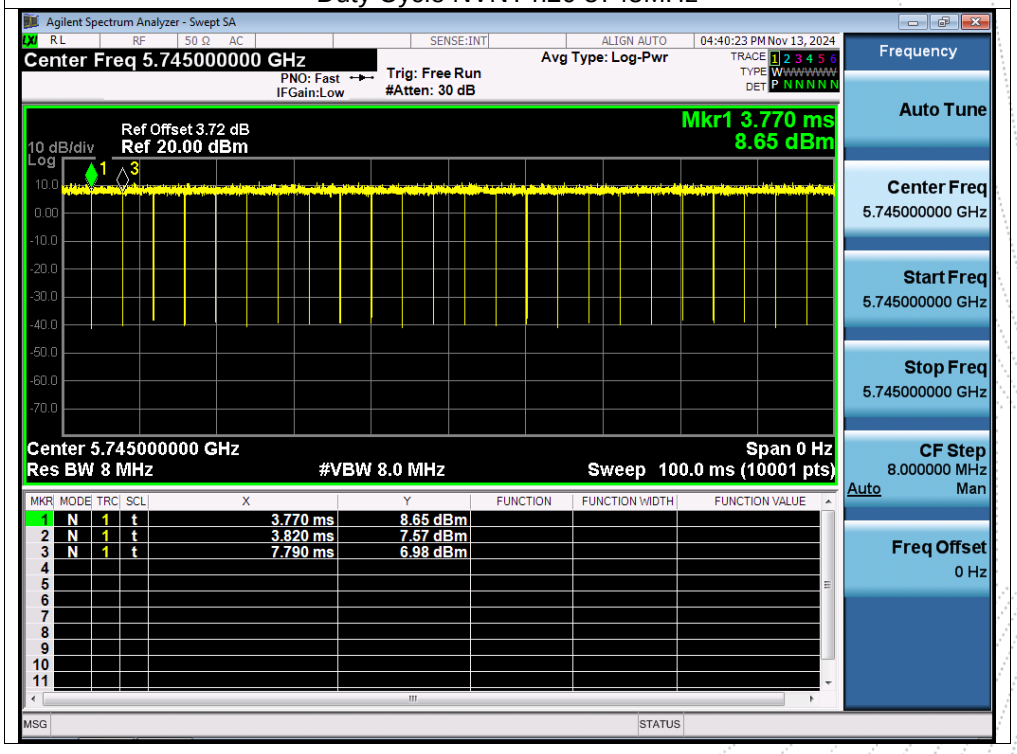


ANT A

Condition	Mode	Frequency (MHz)	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	a	5745	97.66	0.1	0.48
NVNT	n20	5745	98.76	0	0.25
NVNT	n40	5755	98.75	0	0.25
NVNT	ac20	5745	98.76	0	0.25
NVNT	ac40	5755	98.75	0	0.25
NVNT	ac80	5775	98.75	0	0.25
NVNT	ax20	5745	98.76	0	0.25
NVNT	ax40	5755	99	0	0.25
NVNT	ax80	5775	98.83	0	0.25

Test Graphs

Duty Cycle NVNT a 5745MHz



Duty Cycle NVNT n20 5745MHz