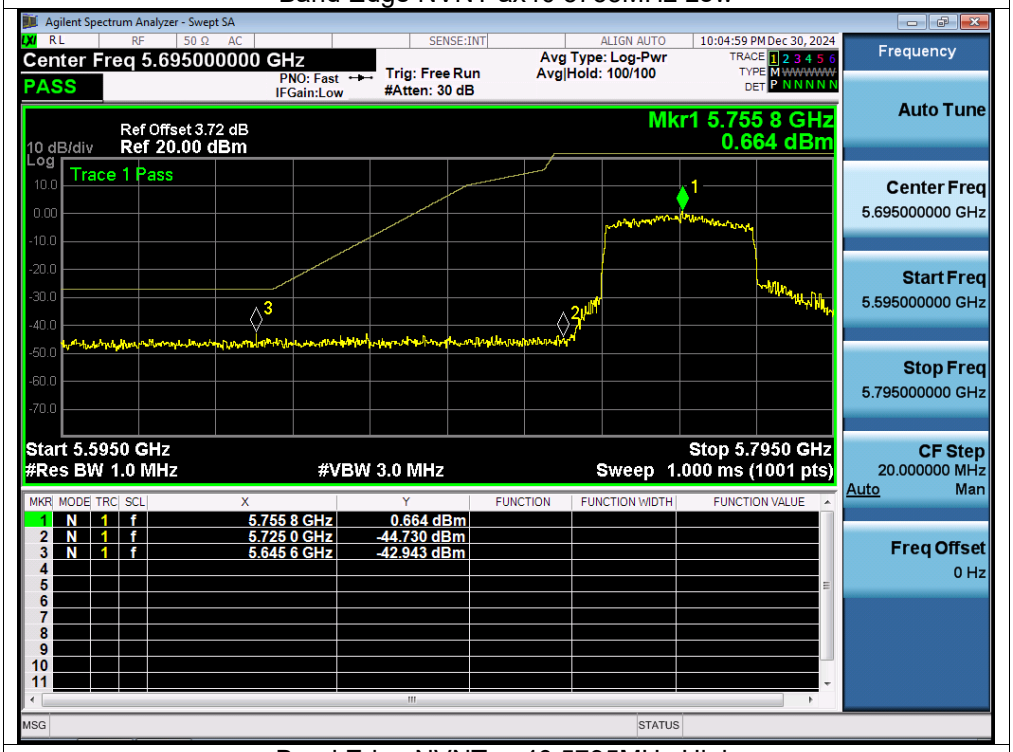
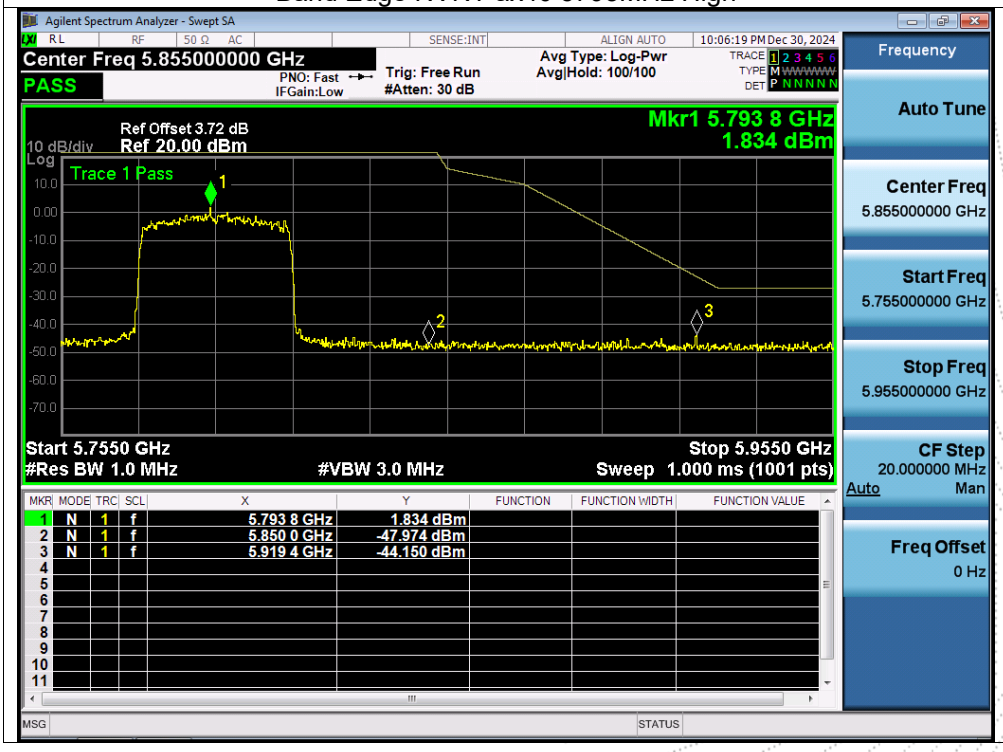
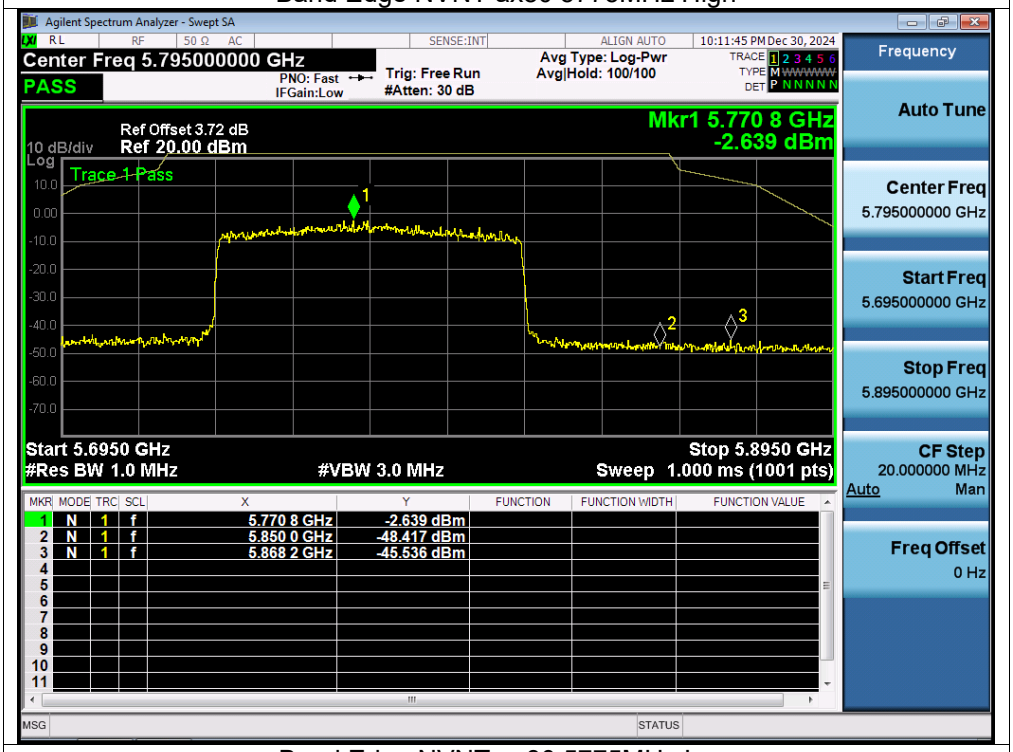
Band Edge NVNT ax40 5755MHz Low



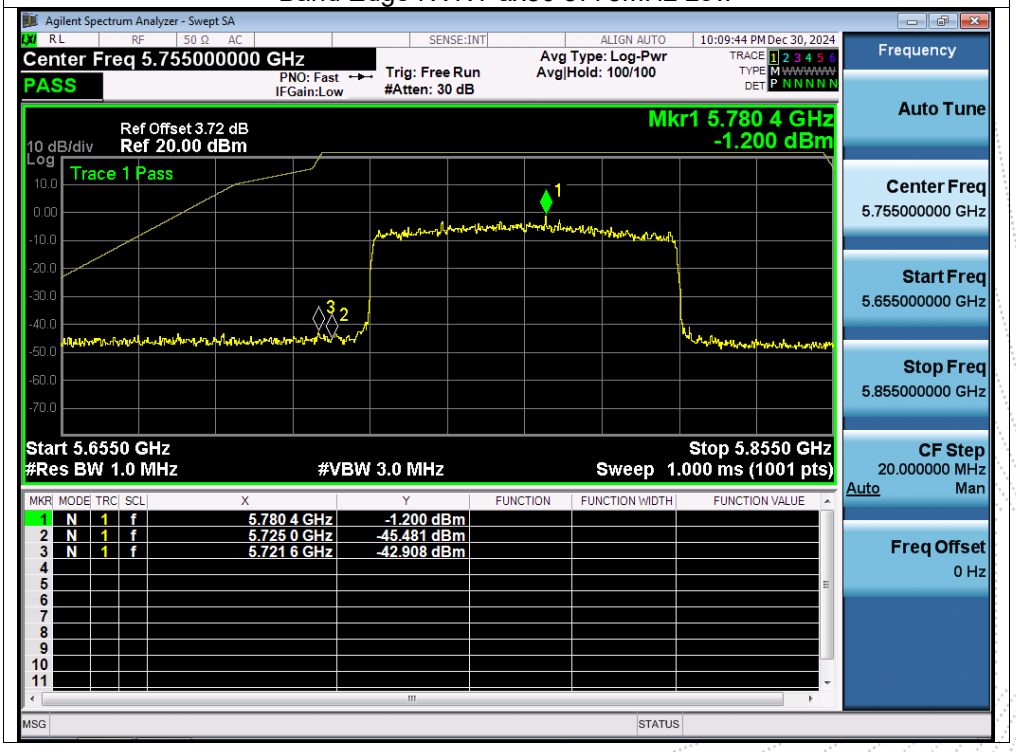
Band Edge NVNT ax40 5795MHz High



Band Edge NVNT ax80 5775MHz High

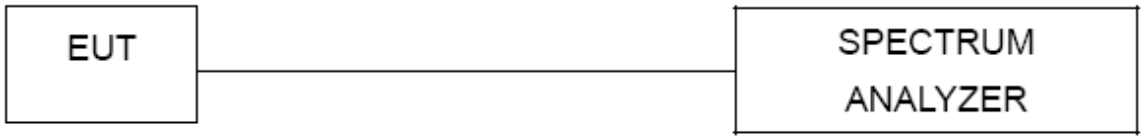


Band Edge NVNT ax80 5775MHz Low



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

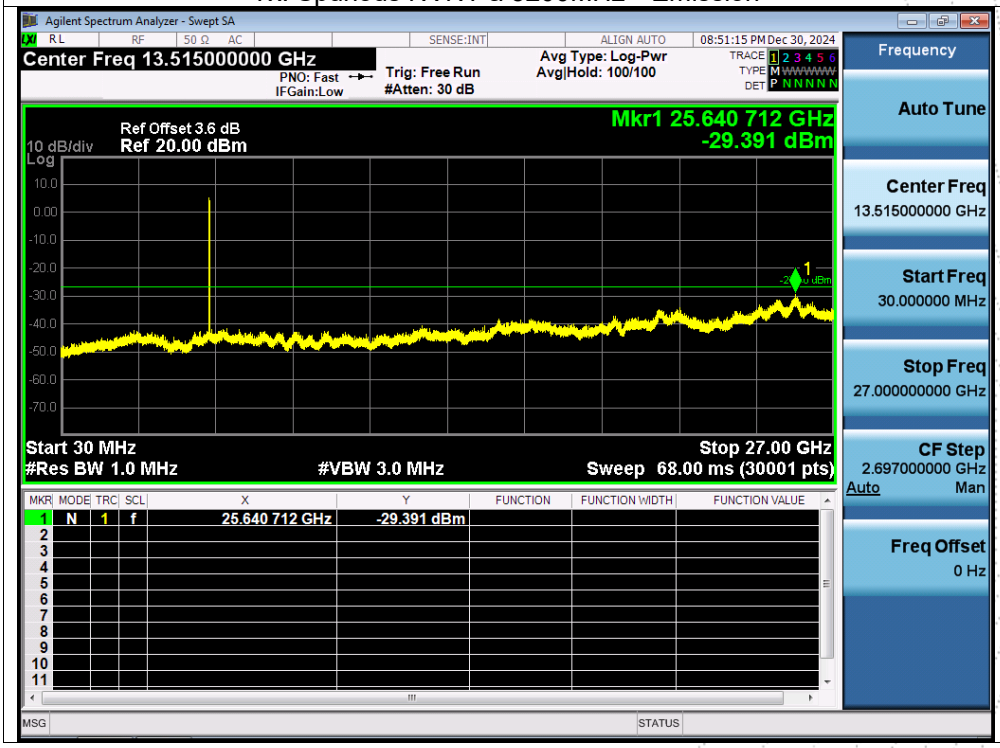
Remark: The measurement frequency range is from 9KHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions and band edge measurement data.
About:26.5GHz-40GHz, The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Note: A(B&C) Represent the value of antenna A and B, The worst data is Antenna A, only shown Antenna A Plot.

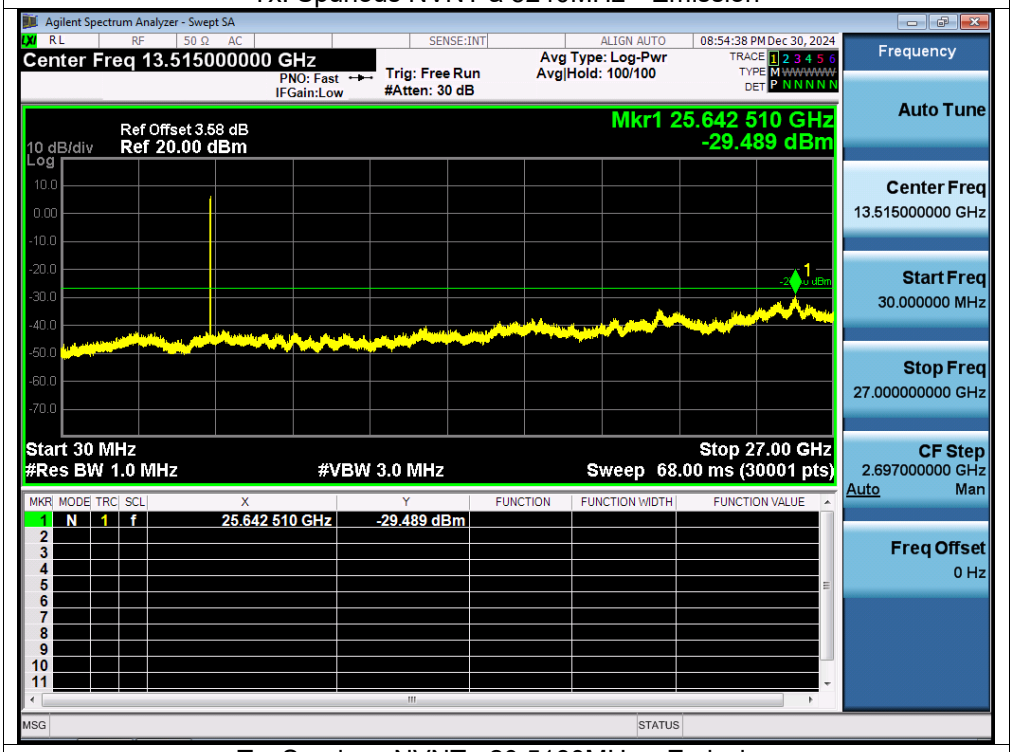
Test Graphs

Tx. Spurious NVNT a 5180MHz Emission

Tx. Spurious NVNT a 5200MHz Emission

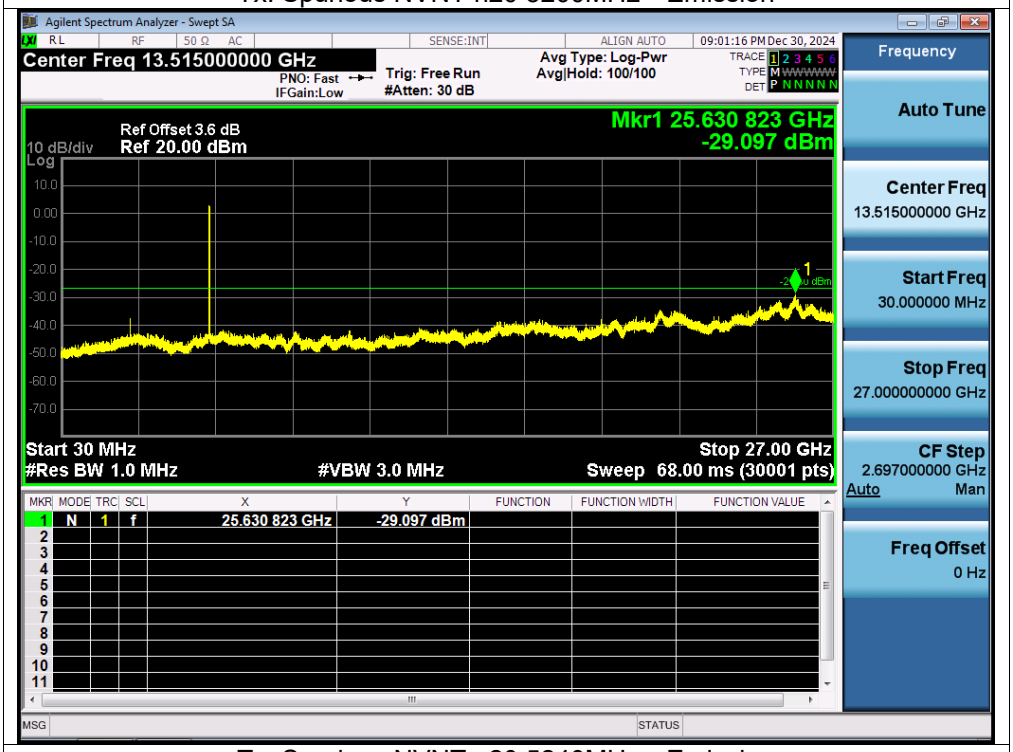


Tx. Spurious NVNT a 5240MHz Emission

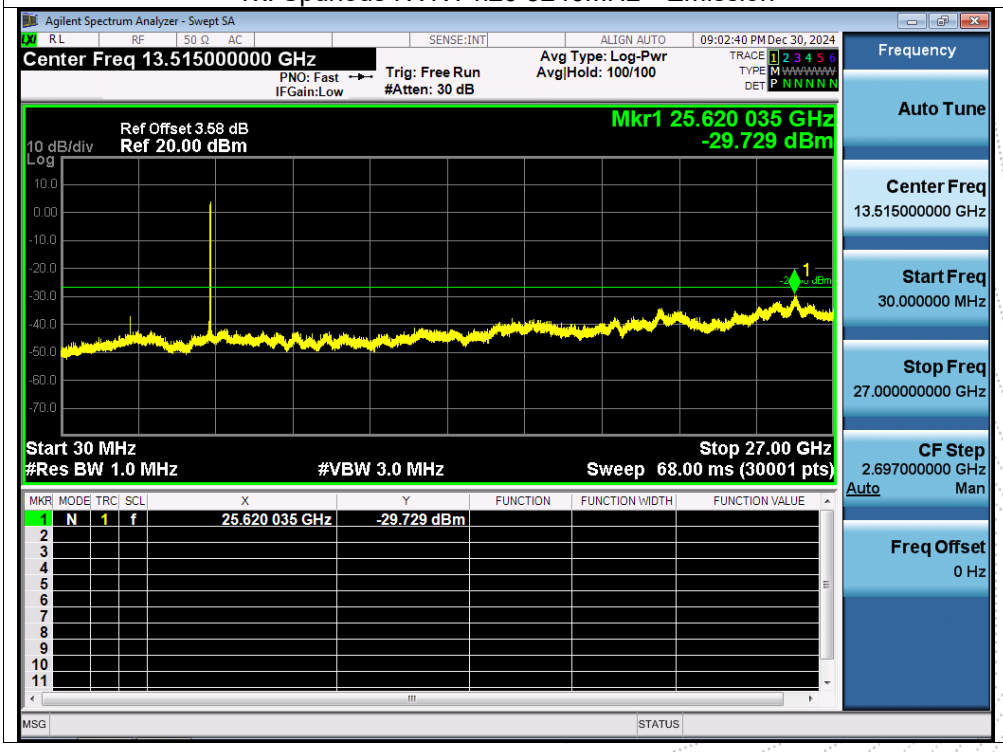


Tx. Spurious NVNT n20 5180MHz Emission

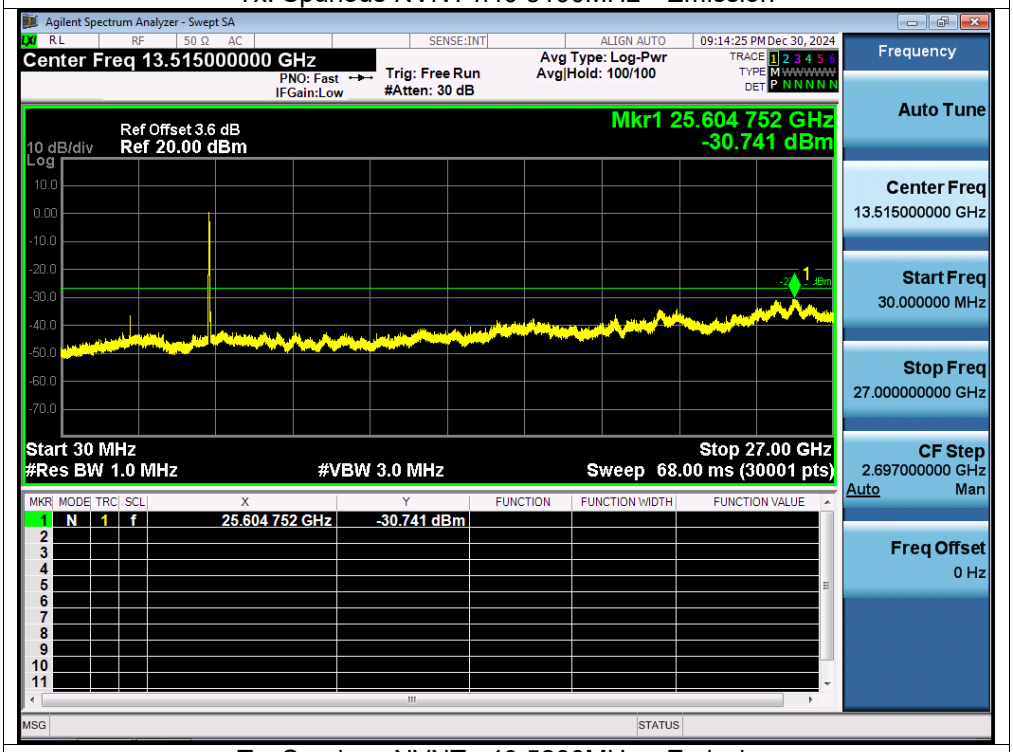
Tx. Spurious NVNT n20 5200MHz Emission



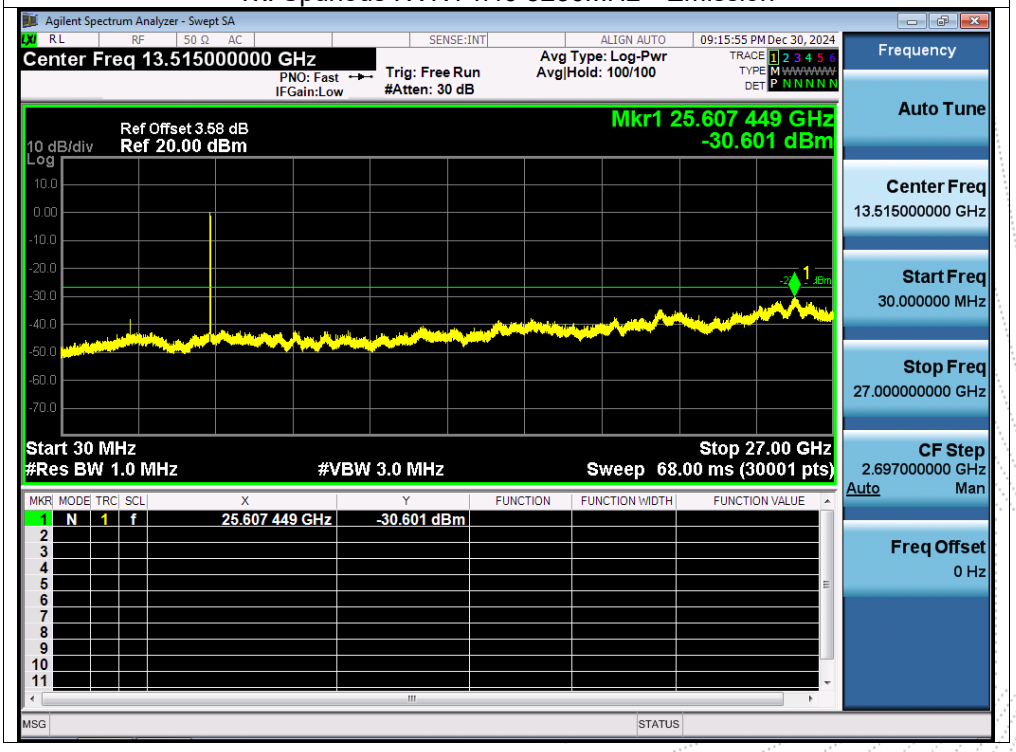
Tx. Spurious NVNT n20 5240MHz Emission



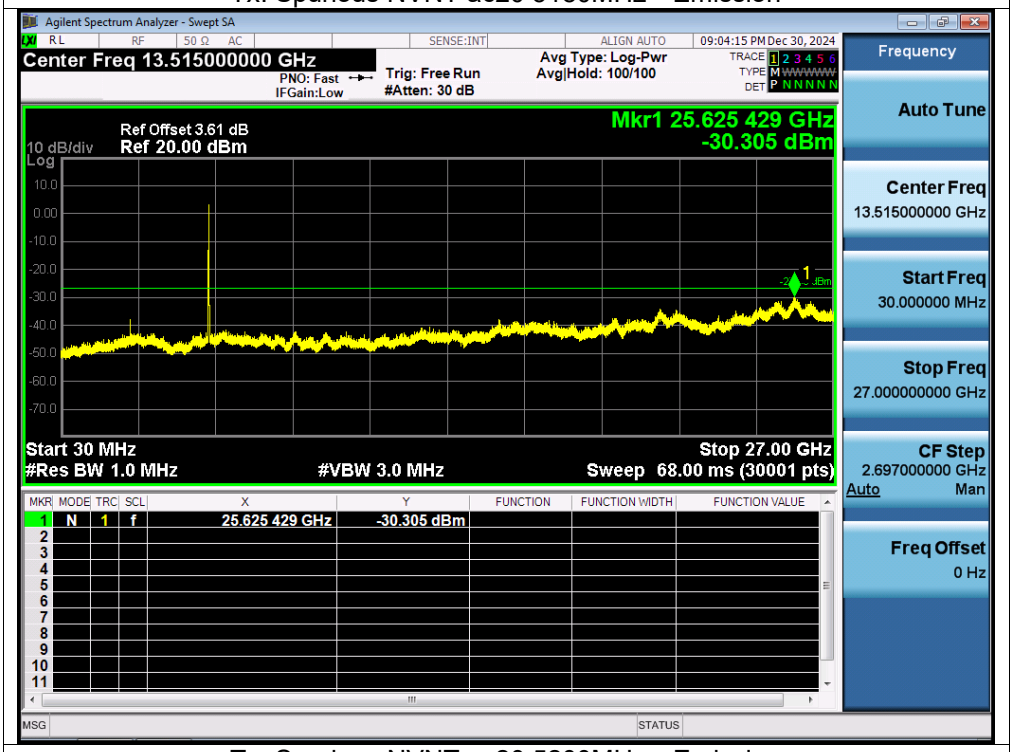
Tx. Spurious NVNT n40 5190MHz Emission



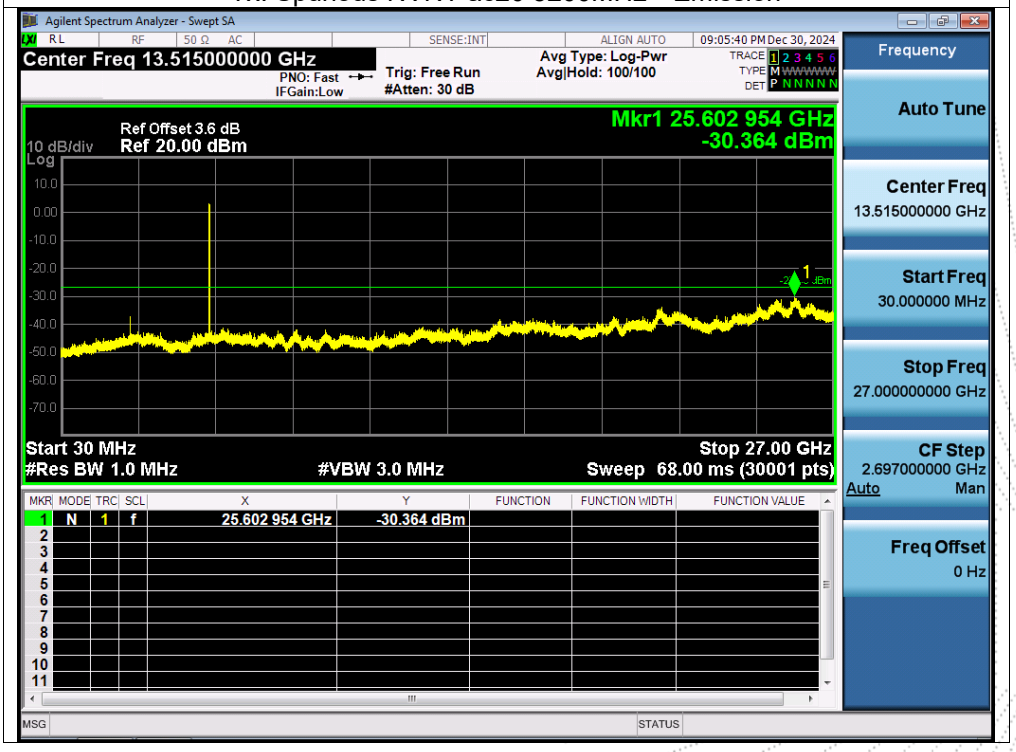
Tx. Spurious NVNT n40 5230MHz Emission



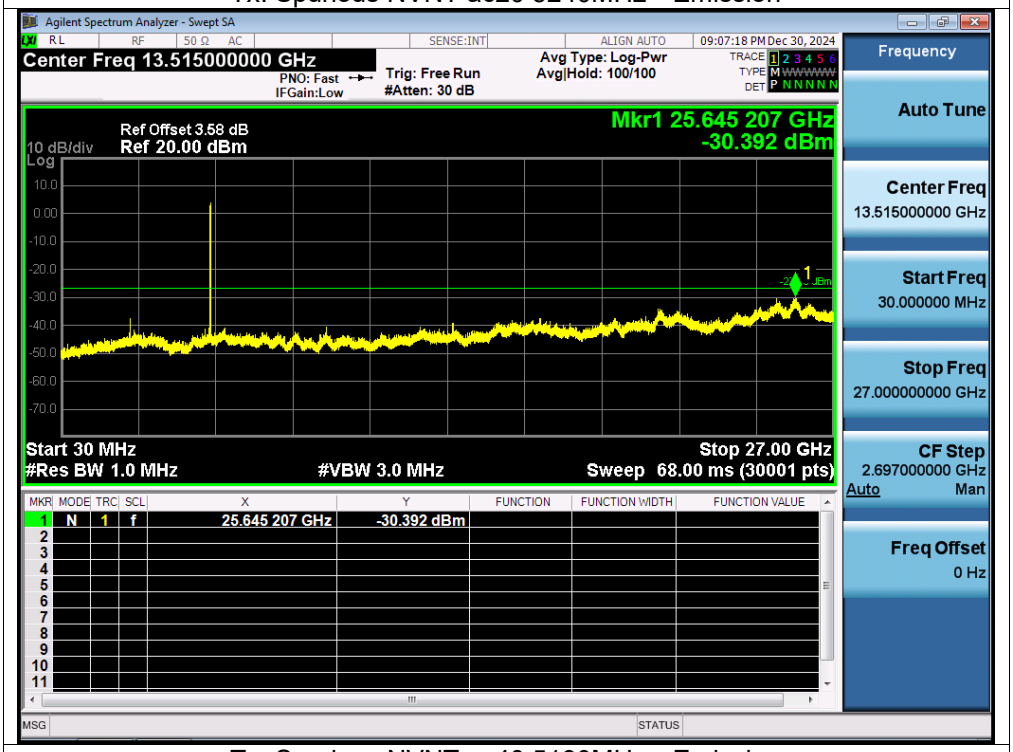
Tx. Spurious NVNT ac20 5180MHz Emission



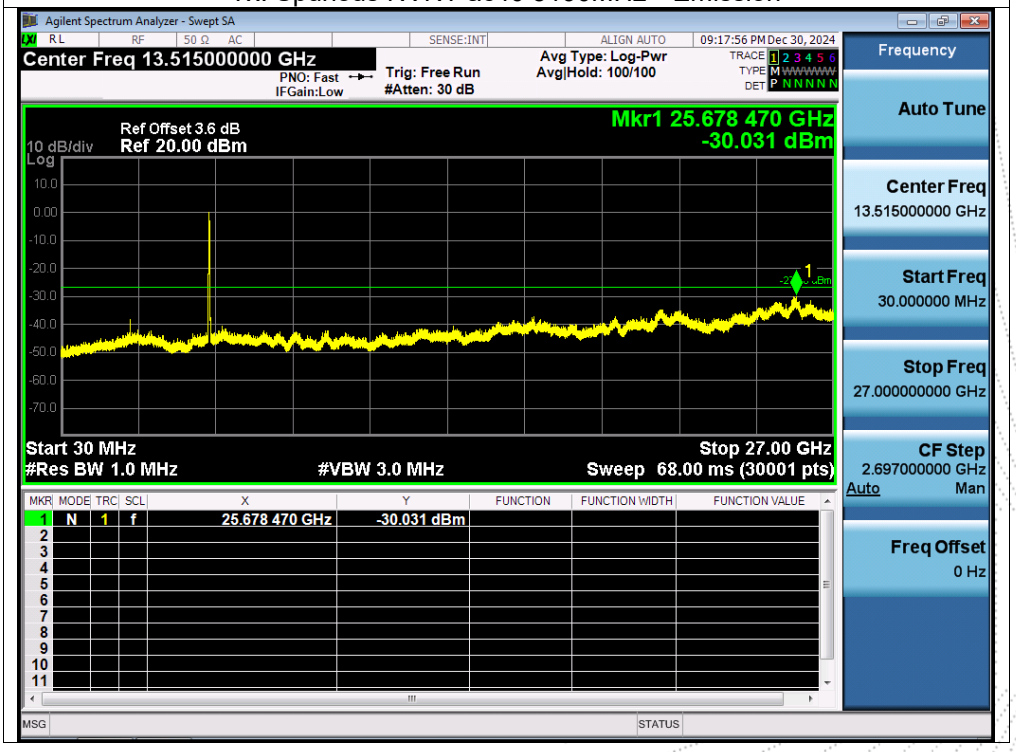
Tx. Spurious NVNT ac20 5200MHz Emission



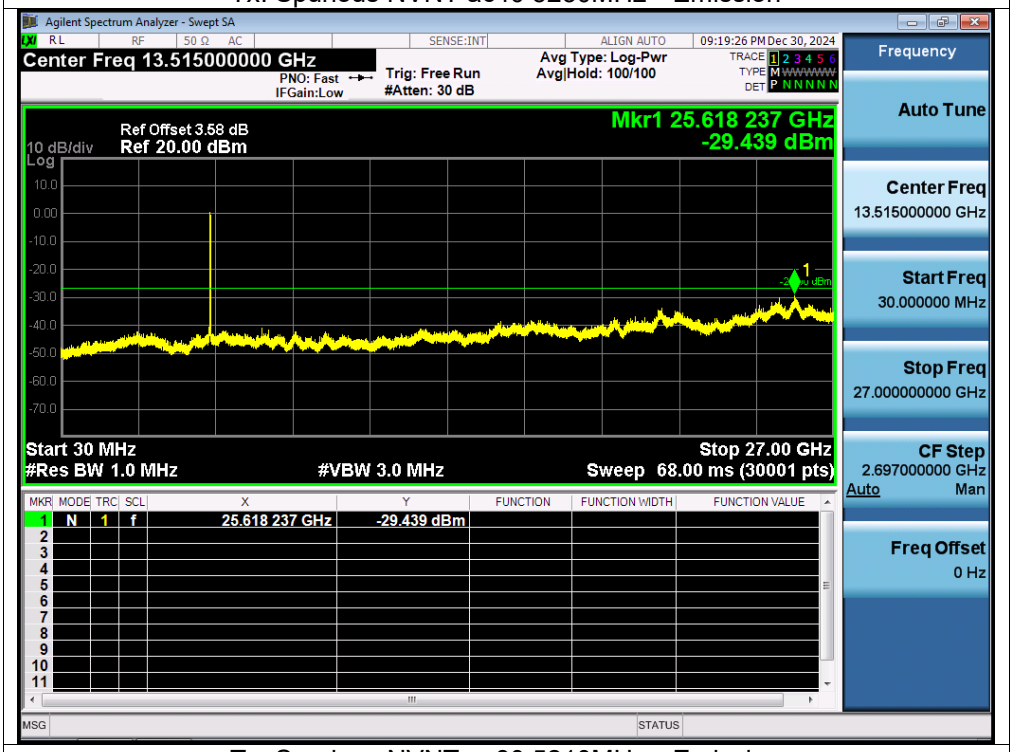
Tx. Spurious NVNT ac20 5240MHz Emission



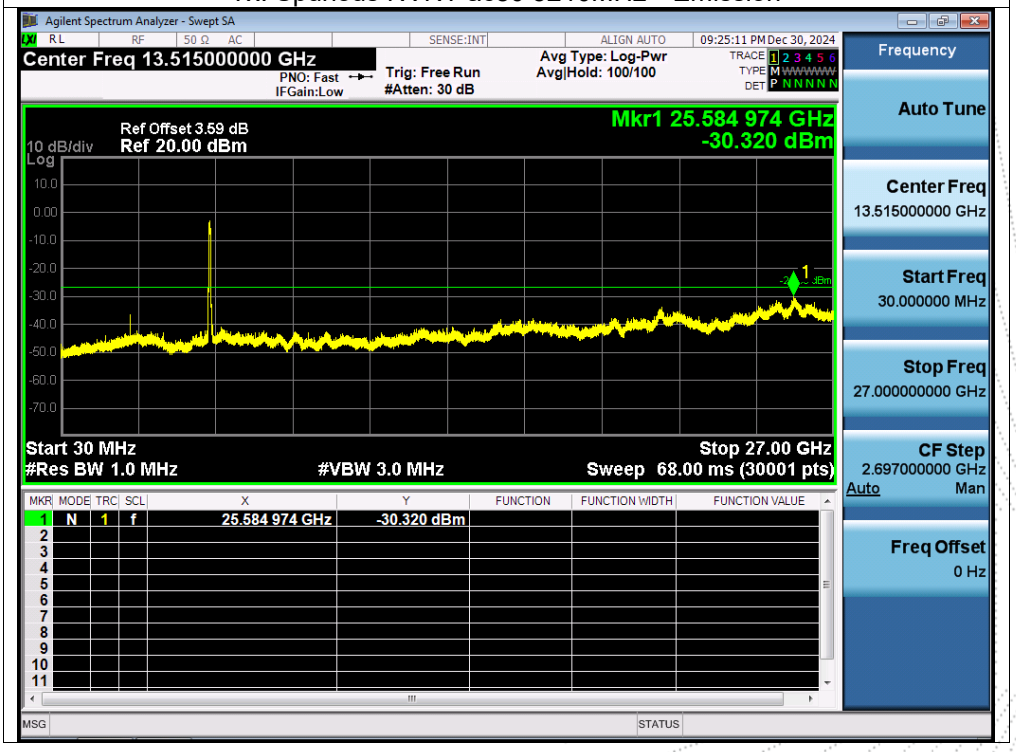
Tx. Spurious NVNT ac40 5190MHz Emission



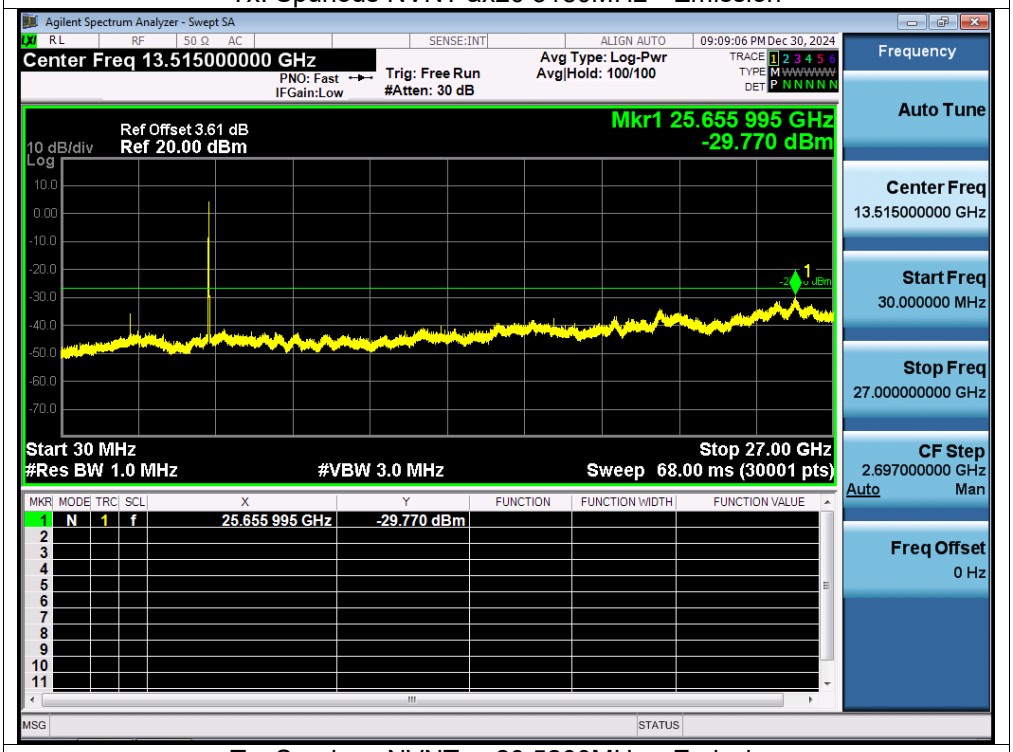
Tx. Spurious NVNT ac40 5230MHz Emission



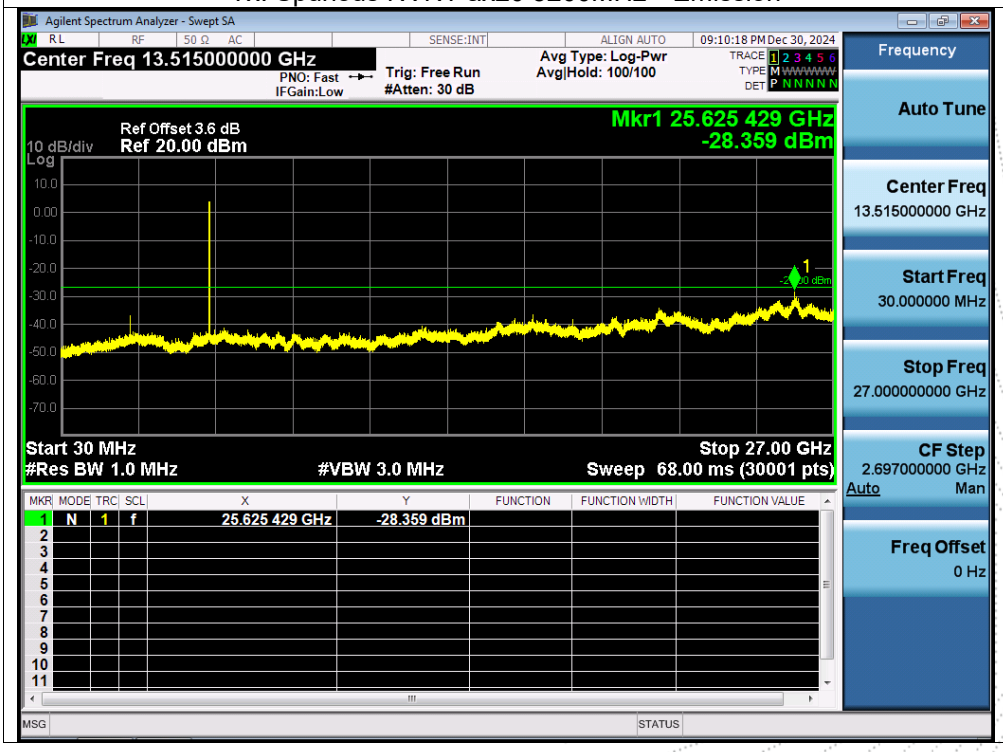
Tx. Spurious NVNT ac80 5210MHz Emission



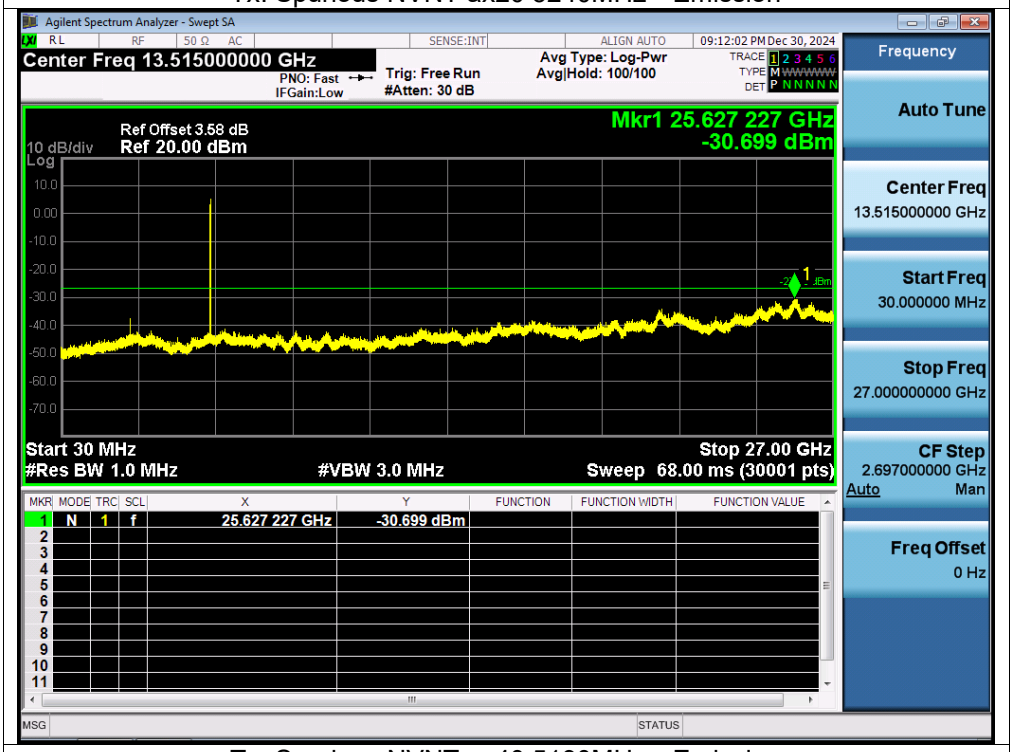
Tx. Spurious NVNT ax20 5180MHz Emission



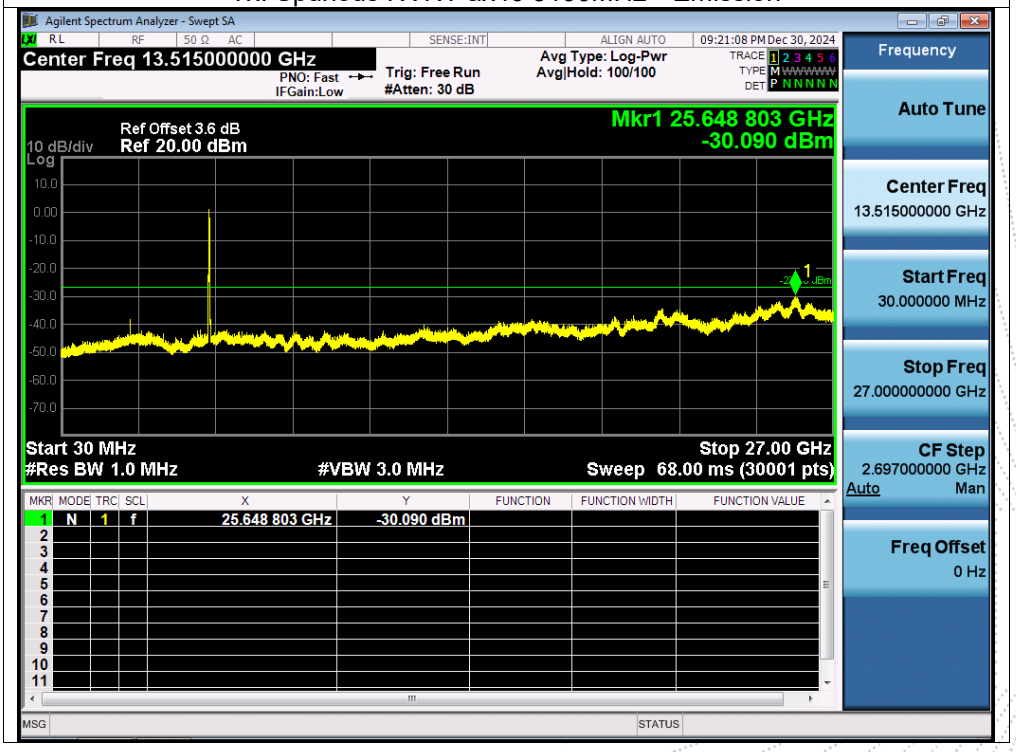
Tx. Spurious NVNT ax20 5200MHz Emission



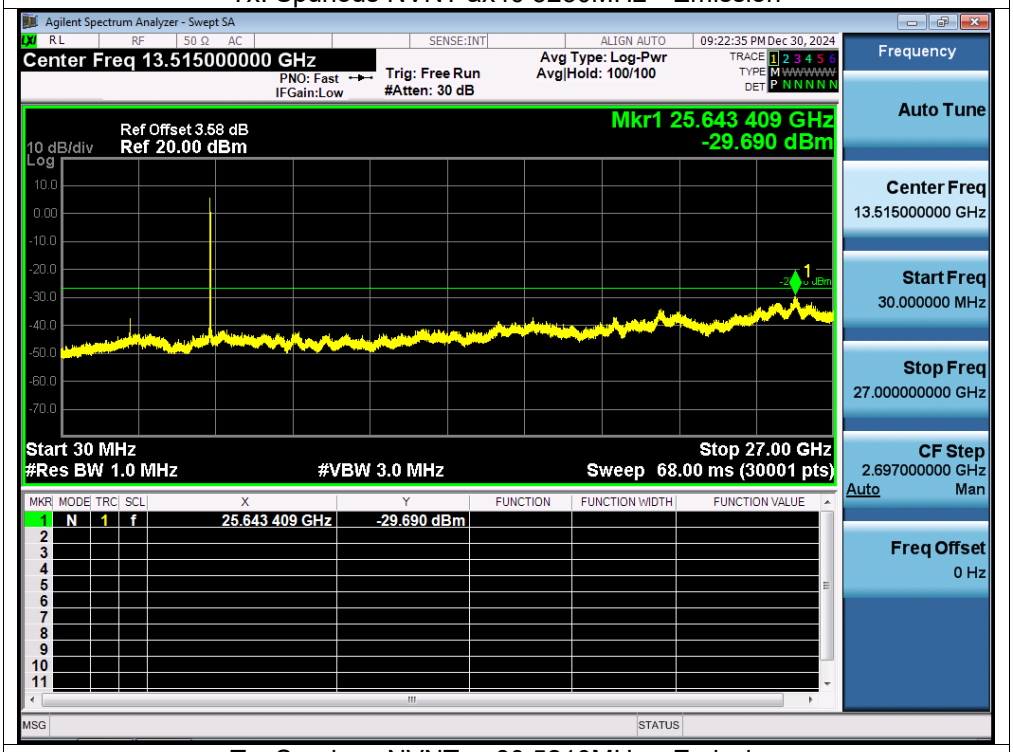
Tx. Spurious NVNT ax20 5240MHz Emission



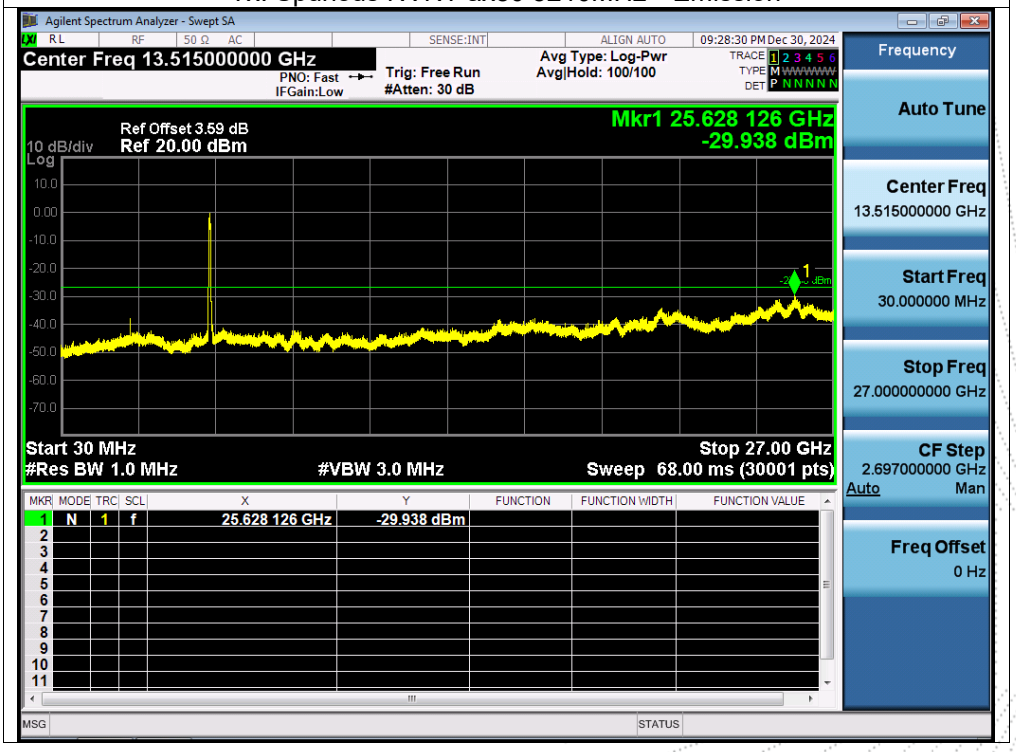
Tx. Spurious NVNT ax40 5190MHz Emission



Tx. Spurious NVNT ax40 5230MHz Emission



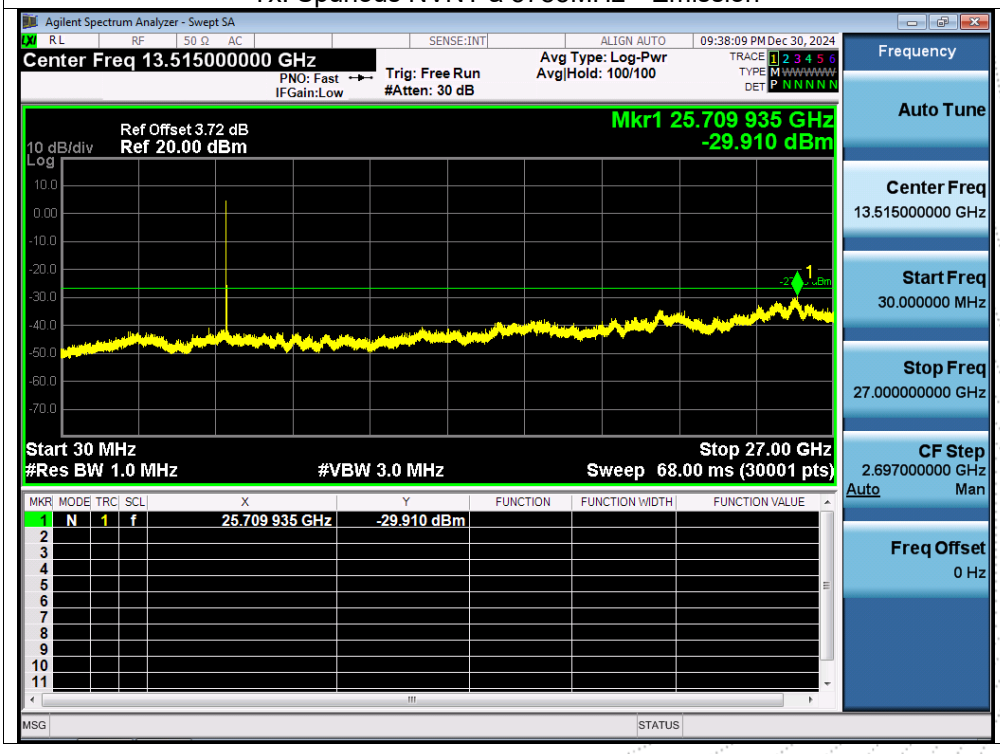
Tx. Spurious NVNT ax80 5210MHz Emission



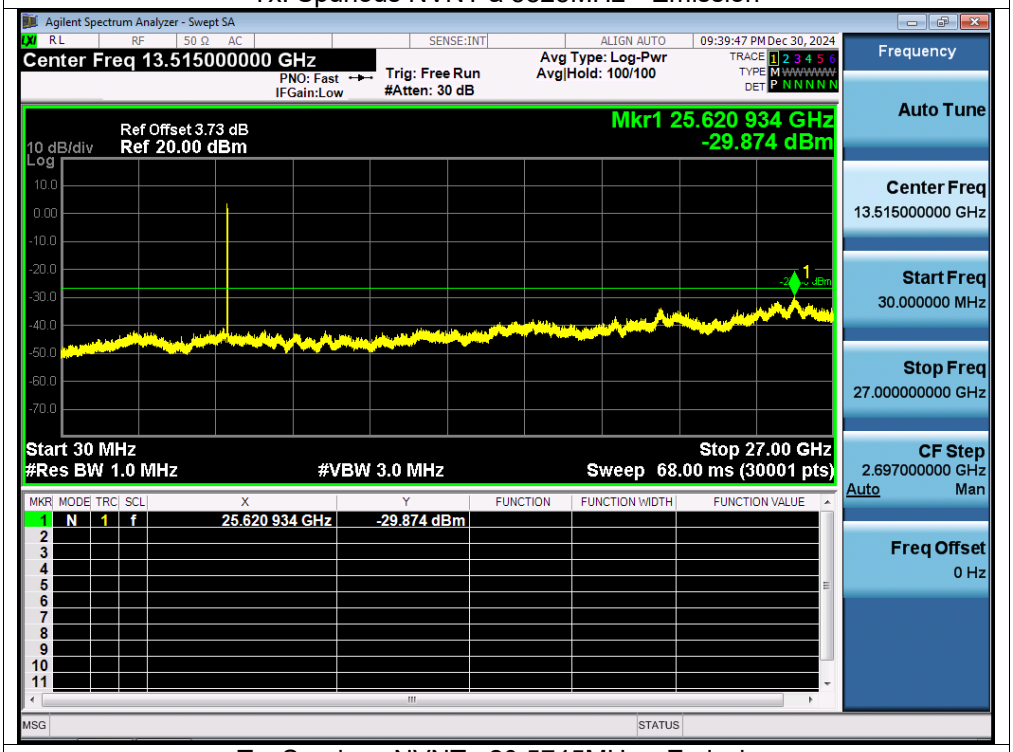
Test Graphs

Tx. Spurious NVNT a 5745MHz Emission

Tx. Spurious NVNT a 5785MHz Emission

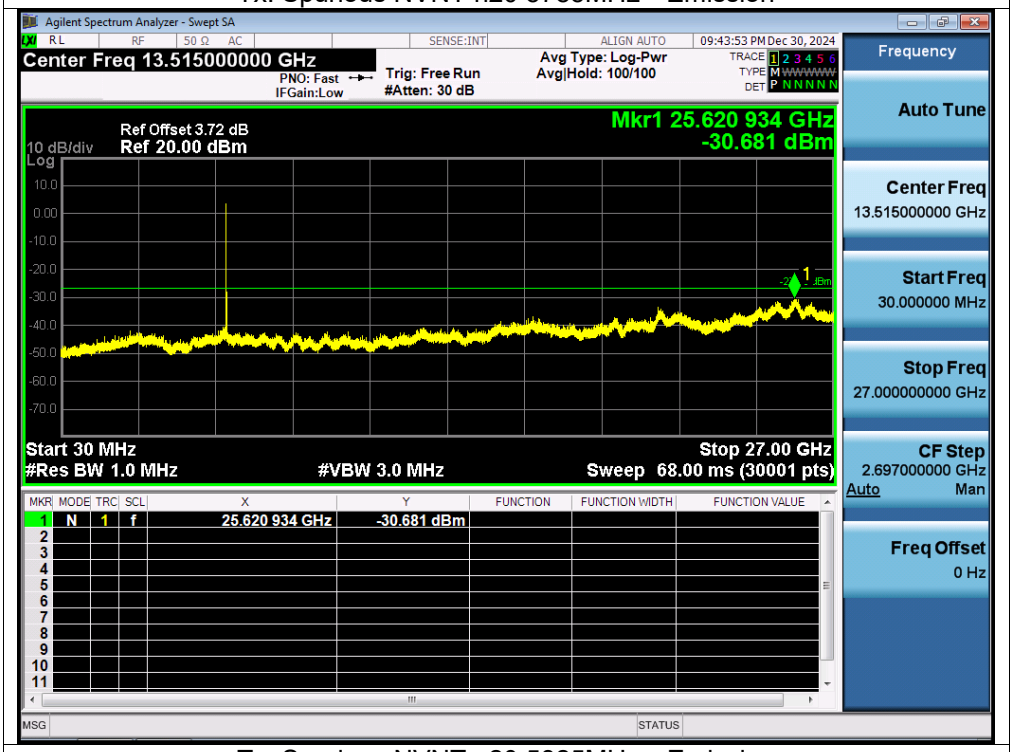


Tx. Spurious NVNT a 5825MHz Emission



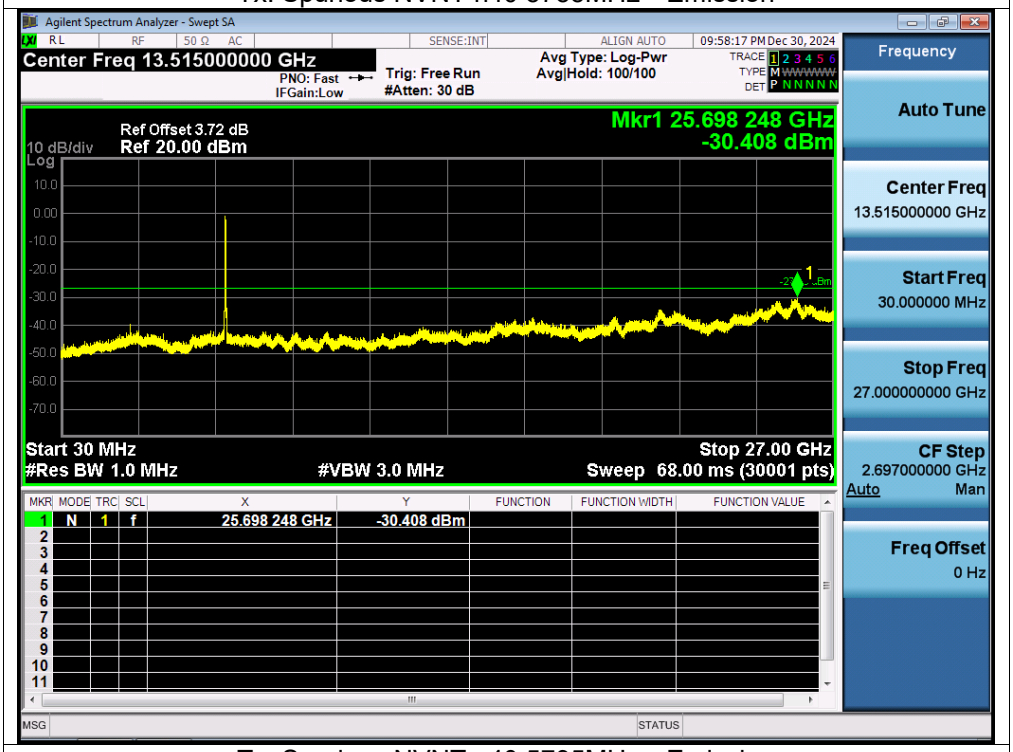
Tx. Spurious NVNT n20 5745MHz Emission

Tx. Spurious NVNT n20 5785MHz Emission



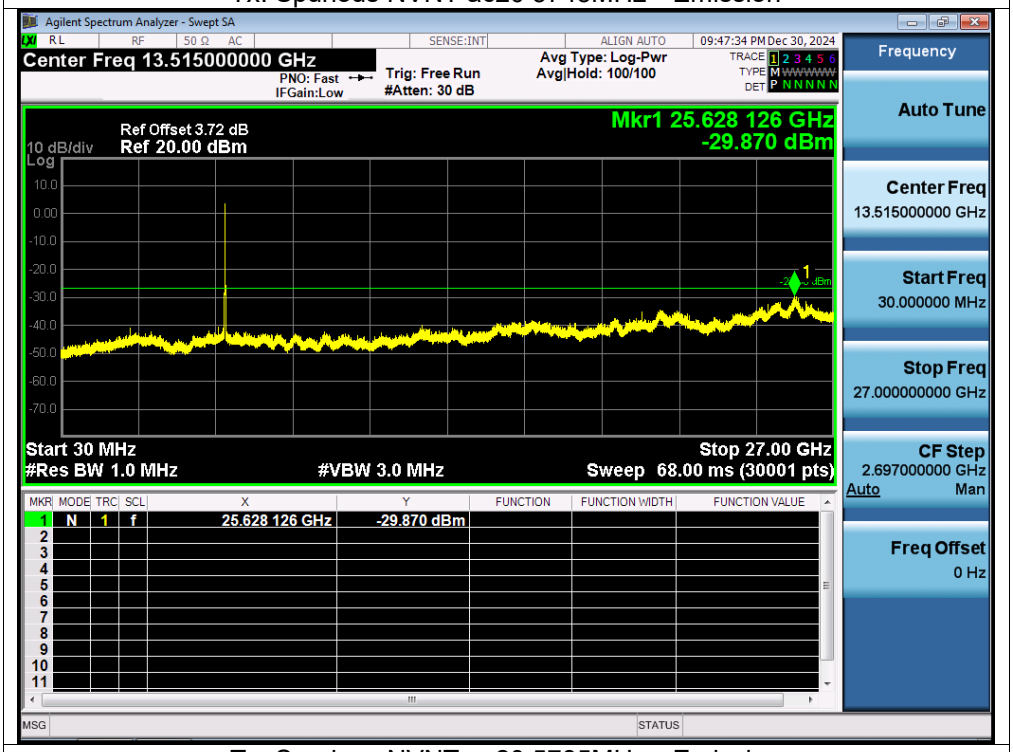
Tx. Spurious NVNT n20 5825MHz Emission

Tx. Spurious NVNT n40 5755MHz Emission

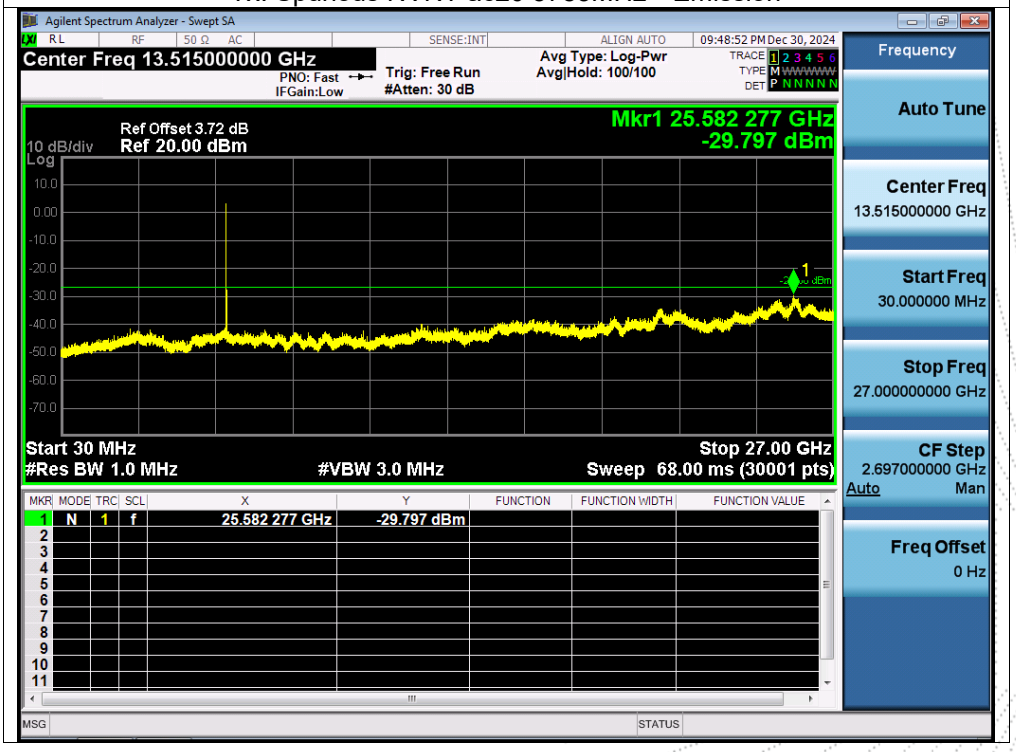


Tx. Spurious NVNT n40 5795MHz Emission

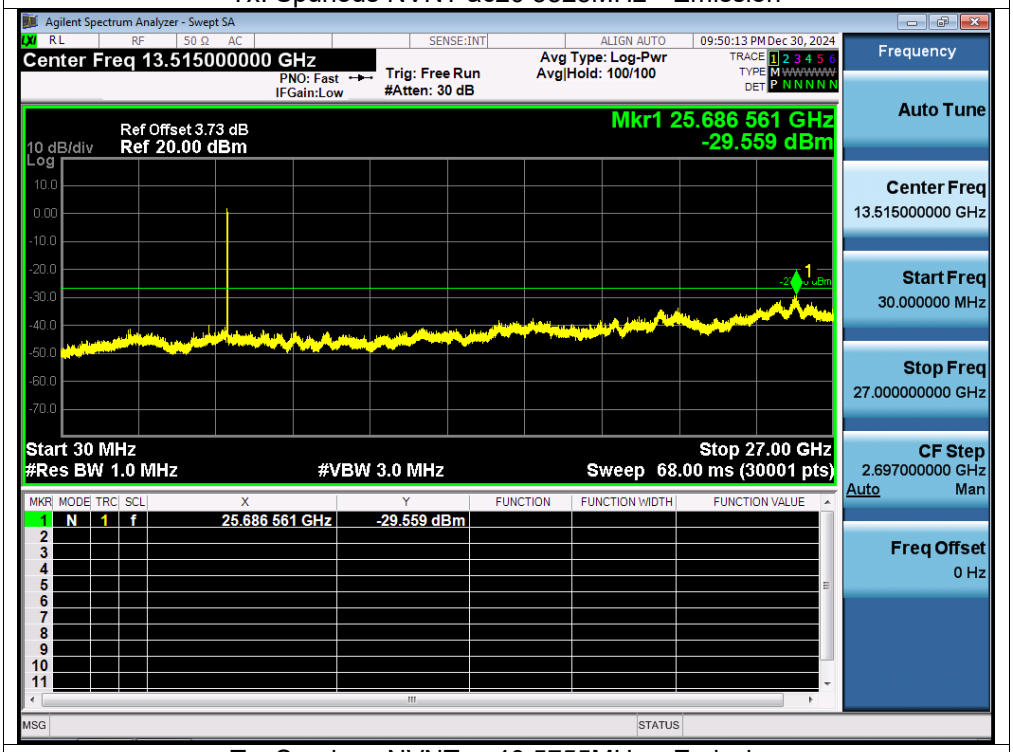
Tx. Spurious NVNT ac20 5745MHz Emission



Tx. Spurious NVNT ac20 5785MHz Emission

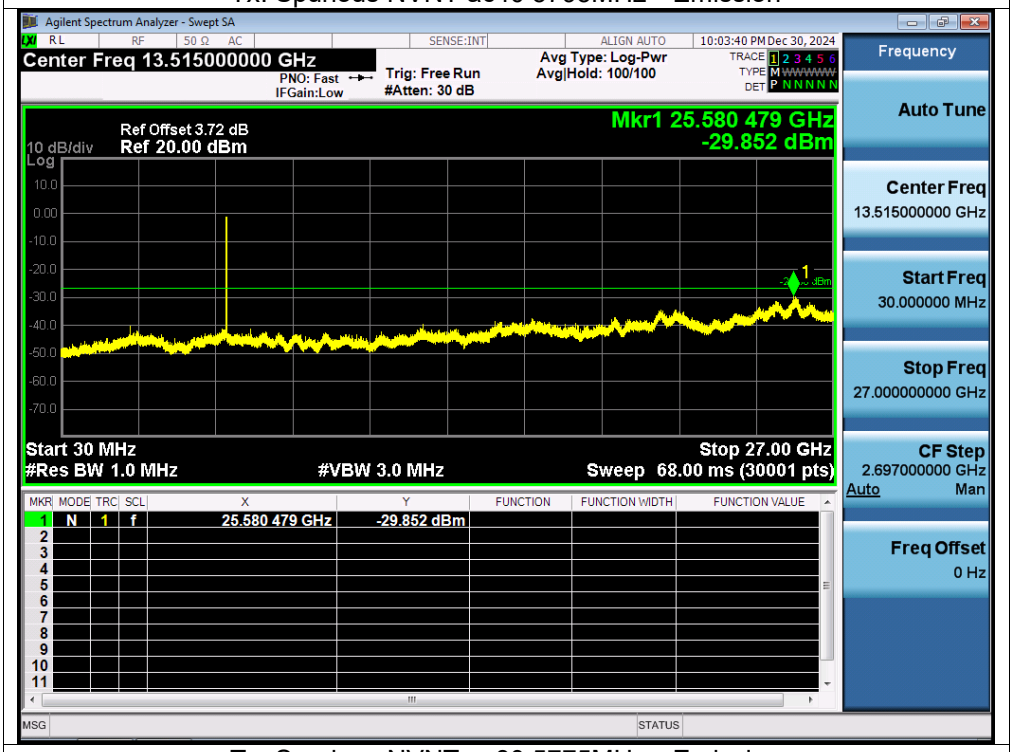


Tx. Spurious NVNT ac20 5825MHz Emission



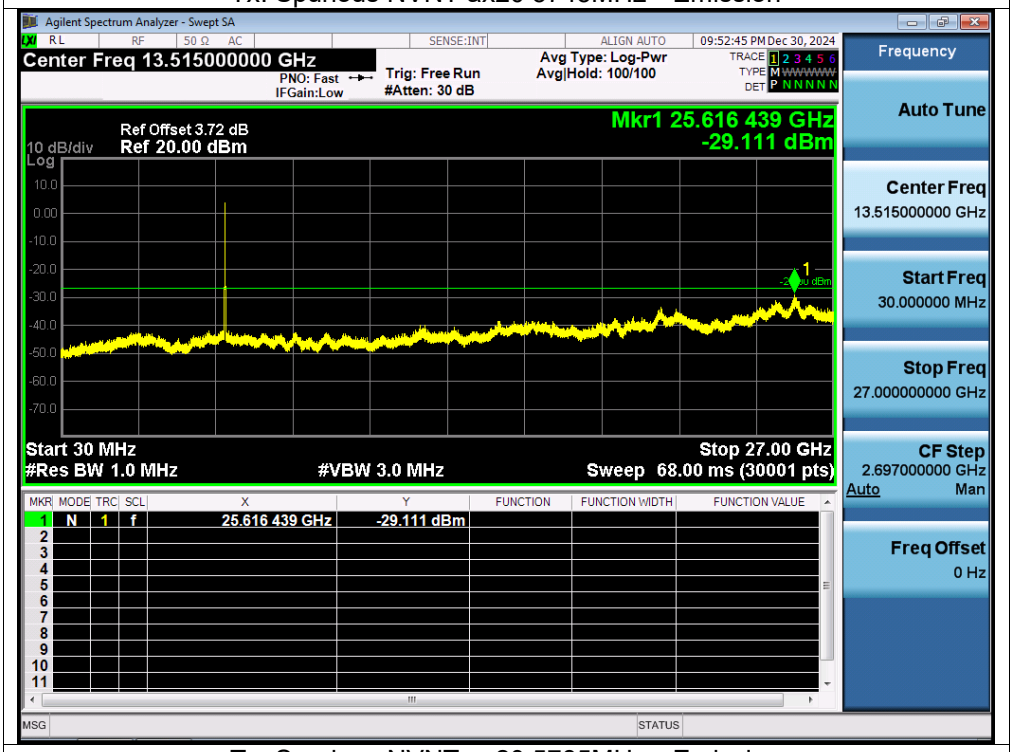
Tx. Spurious NVNT ac40 5755MHz Emission

Tx. Spurious NVNT ac40 5795MHz Emission



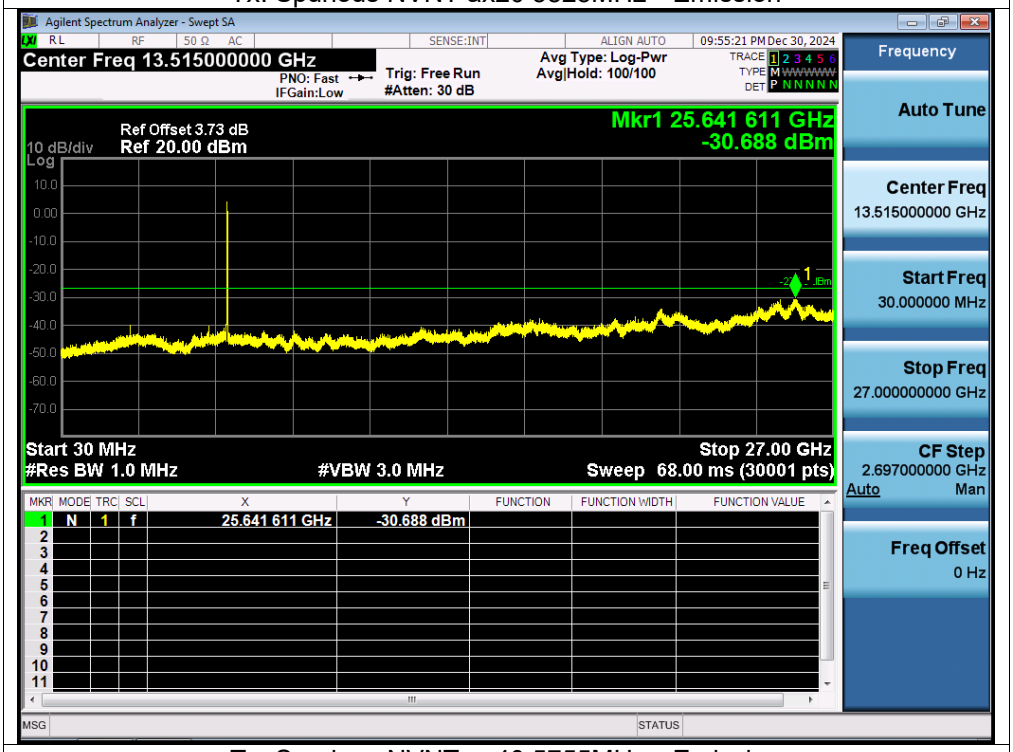
Tx. Spurious NVNT ac80 5775MHz Emission

Tx. Spurious NVNT ax20 5745MHz Emission



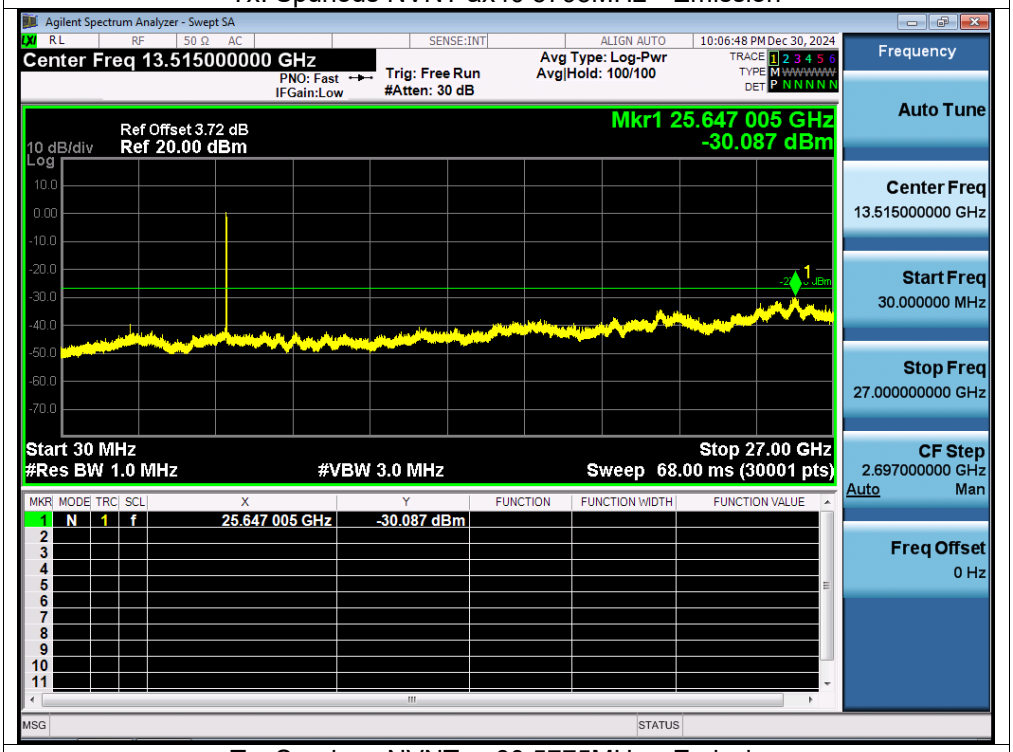
Tx. Spurious NVNT ax20 5785MHz Emission

Tx. Spurious NVNT ax20 5825MHz Emission

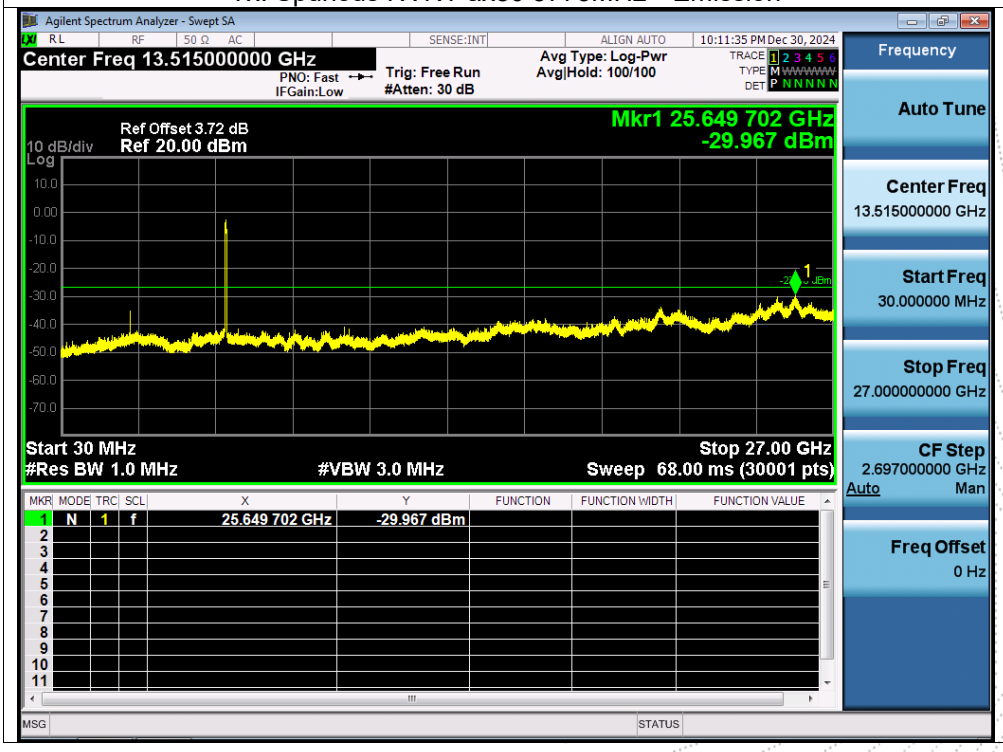


Tx. Spurious NVNT ax40 5755MHz Emission

Tx. Spurious NVNT ax40 5795MHz Emission

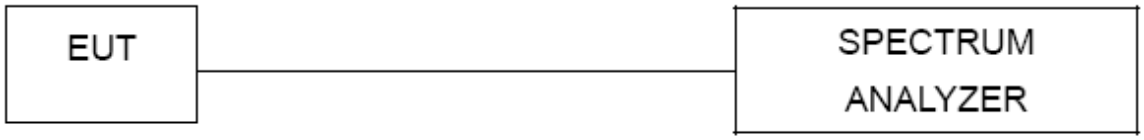


Tx. Spurious NVNT ax80 5775MHz Emission



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	5180.0007	5180	0.0007	0.1351
		V max (V)	13.80	5180.0017	5180	0.0017	0.3282
		V min (V)	10.20	5180.0038	5180	0.0038	0.7336
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	5180.0093	5180	0.0093	1.7954
		T (°C)	-10	5180.0092	5180	0.0092	1.7761
		T (°C)	0	5180.0052	5180	0.0052	1.0039
		T (°C)	10	5180.0036	5180	0.0036	0.6950
		T (°C)	20	5180.0088	5180	0.0088	1.6988
		T (°C)	30	5180.0092	5180	0.0092	1.7761
		T (°C)	40	5180.0043	5180	0.0043	0.8301
		T (°C)	50	5180.0053	5180	0.0053	1.0232
		T (°C)	60	5180.0011	5180	0.0011	0.2124
		T (°C)	70	5180.0077	5180	0.0077	1.4865
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	5200.0062	5200	0.0062	1.1923
		V max (V)	13.80	5200.0061	5200	0.0061	1.1731
		V min (V)	10.20	5200.0115	5200	0.0115	2.2115
Limits				5725-5850 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	5200.00430	5200	0.00430	0.8269
		T (°C)	-10	5200.01340	5200	0.01340	2.5769
		T (°C)	0	5200.00070	5200	0.00070	0.1346
		T (°C)	10	5200.00090	5200	0.00090	0.1731
		T (°C)	20	5200.00390	5200	0.00390	0.7500
		T (°C)	30	5200.00690	5200	0.00690	1.3269
		T (°C)	40	5200.00530	5200	0.00530	1.0192
		T (°C)	50	5200.00580	5200	0.00580	1.1154
		T (°C)	60	5200.01250	5200	0.01250	2.4038
		T (°C)	70	5200.00660	5200	0.00660	1.2692
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	5240.0126	5240	0.0126	2.4046
		V max (V)	13.80	5240.0073	5240	0.0073	1.3931
		V min (V)	10.20	5240.0028	5240	0.0028	0.5344
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	5240.0011	5240	0.0011	0.2099
		T (°C)	-10	5240.0092	5240	0.0092	1.7557
		T (°C)	0	5240.0129	5240	0.0129	2.4618
		T (°C)	10	5240.0012	5240	0.0012	0.2290
		T (°C)	20	5240.0027	5240	0.0027	0.5153
		T (°C)	30	5240.0017	5240	0.0017	0.3244
		T (°C)	40	5240.0093	5240	0.0093	1.7748
		T (°C)	50	5240.0049	5240	0.0049	0.9351
		T (°C)	60	5240.0104	5240	0.0104	1.9847
		T (°C)	70	5240.0006	5240	0.0006	0.1145
Limits				5150-5250 MHz			
Result				Complies			

Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101KPa	Test Voltage:	DC 12V
Test Mode:	TX (5.8G) Mode 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	5745.00860	5745	0.00860	1.4970
		V max (V)	13.80	5745.01110	5745	0.01110	1.9321
		V min (V)	10.20	5745.00910	5745	0.00910	1.5840
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	5745.00990	5745	0.00990	1.7232
		T (°C)	-10	5745.00650	5745	0.00650	1.1314
		T (°C)	0	5745.00690	5745	0.00690	1.2010
		T (°C)	10	5745.00880	5745	0.00880	1.5318
		T (°C)	20	5745.01250	5745	0.01250	2.1758
		T (°C)	30	5745.00320	5745	0.00320	0.5570
		T (°C)	40	5745.00110	5745	0.00110	0.1915
		T (°C)	50	5745.01030	5745	0.01030	1.7929
		T (°C)	60	5745.00060	5745	0.00060	0.1044
		T (°C)	70	5745.00630	5745	0.00630	1.0966
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	5785.00770	5785	0.00770	1.3310
		V max (V)	13.80	5785.00280	5785	0.00280	0.4840
		V min (V)	10.20	5785.00790	5785	0.00790	1.3656
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	5785.00990	5785	0.00990	1.7113
		T (°C)	-10	5785.00630	5785	0.00630	1.0890
		T (°C)	0	5785.00860	5785	0.00860	1.4866
		T (°C)	10	5785.00860	5785	0.00860	1.4866
		T (°C)	20	5785.00690	5785	0.00690	1.1927
		T (°C)	30	5785.00280	5785	0.00280	0.4840
		T (°C)	40	5785.00090	5785	0.00090	0.1556
		T (°C)	50	5785.00190	5785	0.00190	0.3284
		T (°C)	60	5785.00220	5785	0.00220	0.3803
		T (°C)	70	5785.01060	5785	0.01060	1.8323
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	5825.00440	5825	0.00440	0.7554
		V max (V)	13.80	5825.00010	5825	0.00010	0.0172
		V min (V)	10.20	5825.00760	5825	0.00760	1.3047
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	5825.01040	5825	0.01040	1.7854
		T (°C)	-10	5825.00640	5825	0.00640	1.0987
		T (°C)	0	5825.01270	5825	0.01270	2.1803
		T (°C)	10	5825.00510	5825	0.00510	0.8755
		T (°C)	20	5825.01030	5825	0.01030	1.7682
		T (°C)	30	5825.01340	5825	0.01340	2.3004
		T (°C)	40	5825.00550	5825	0.00550	0.9442
		T (°C)	50	5825.01280	5825	0.01280	2.1974
		T (°C)	60	5825.00080	5825	0.00080	0.1373
		T (°C)	70	5825.00500	5825	0.00500	0.8584
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

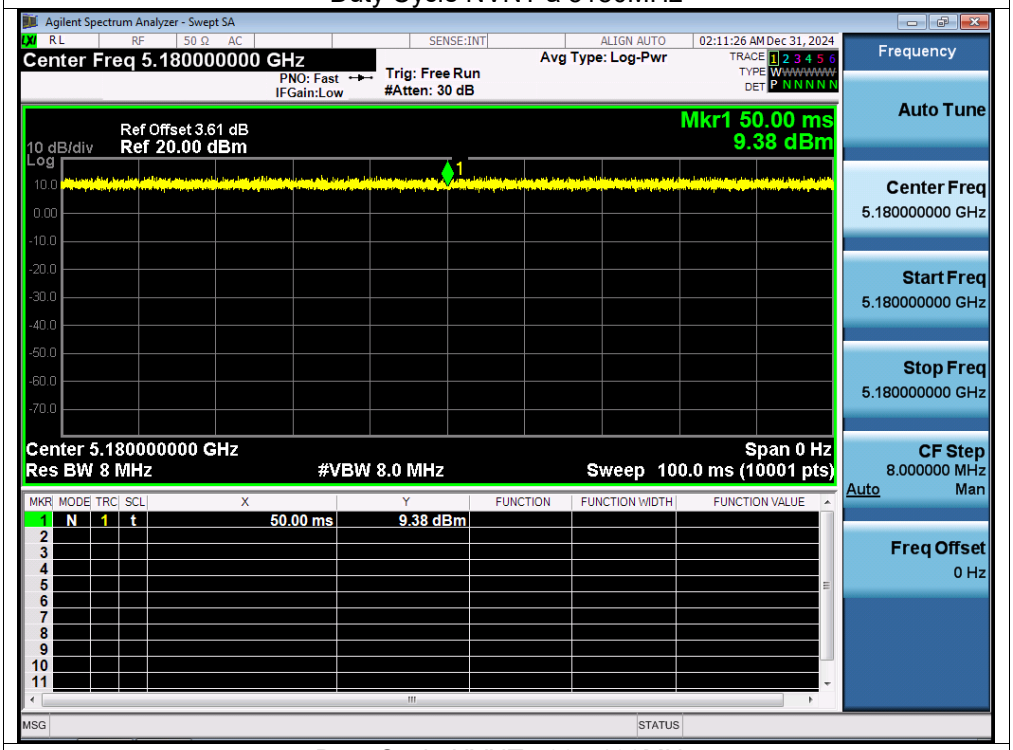
14.4 Test Result

ANT A

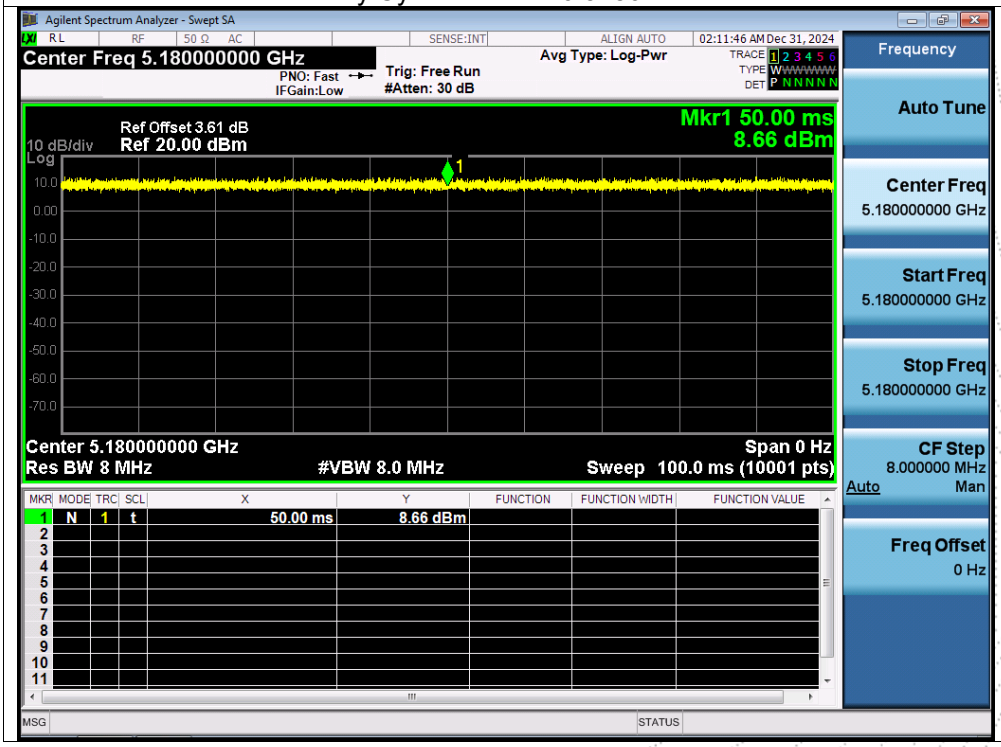
Condition	Mode	Frequency (MHz)	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	a	5180	100	0	0
NVNT	n20	5180	100	0	0
NVNT	n40	5190	100	0	0
NVNT	ac20	5180	100	0	0
NVNT	ac40	5190	100	0	0
NVNT	ac80	5210	100	0	0
NVNT	ax20	5180	100	0	0
NVNT	ax40	5190	100	0	0
NVNT	ax80	5210	100	0	0

Test Graphs

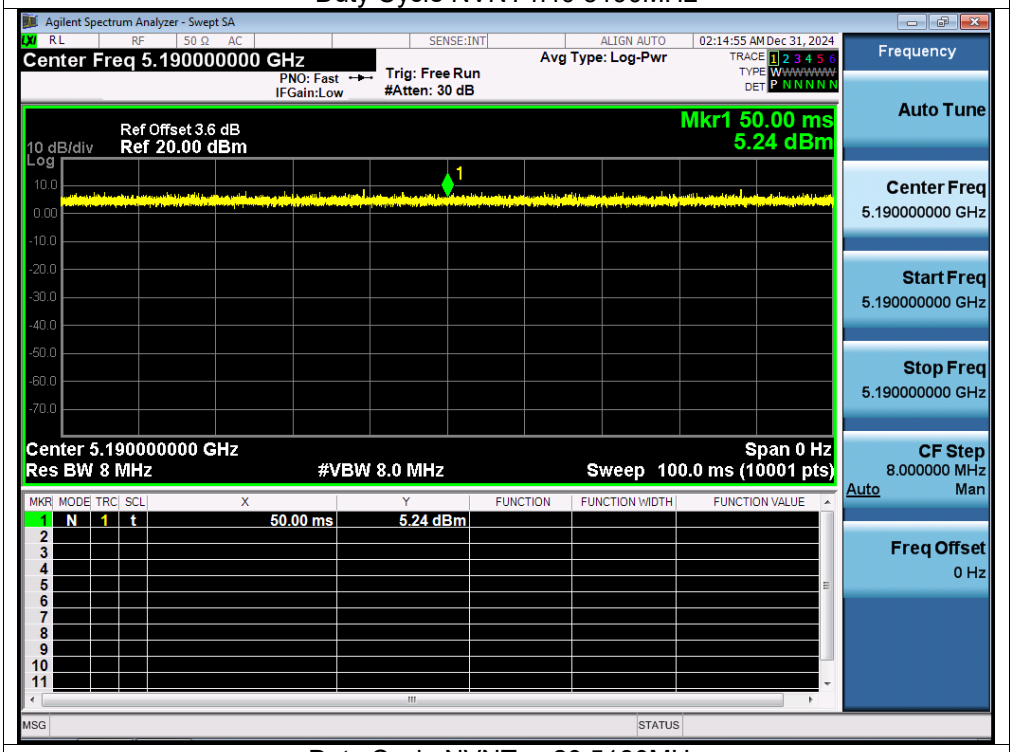
Duty Cycle NVNT a 5180MHz



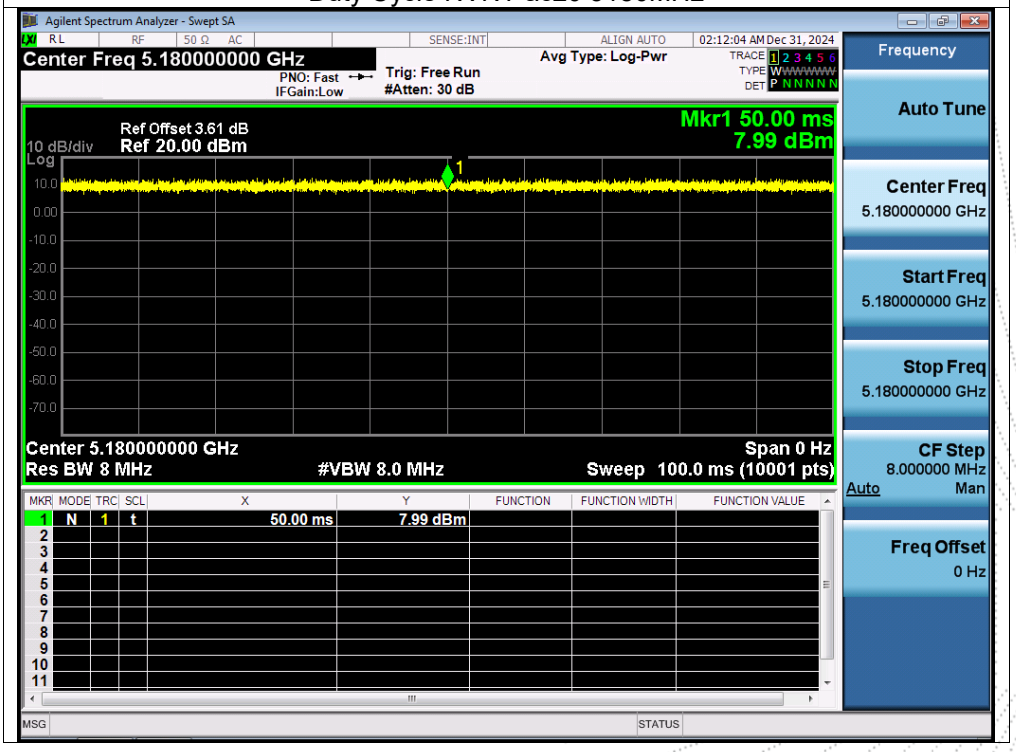
Duty Cycle NVNT n20 5180MHz



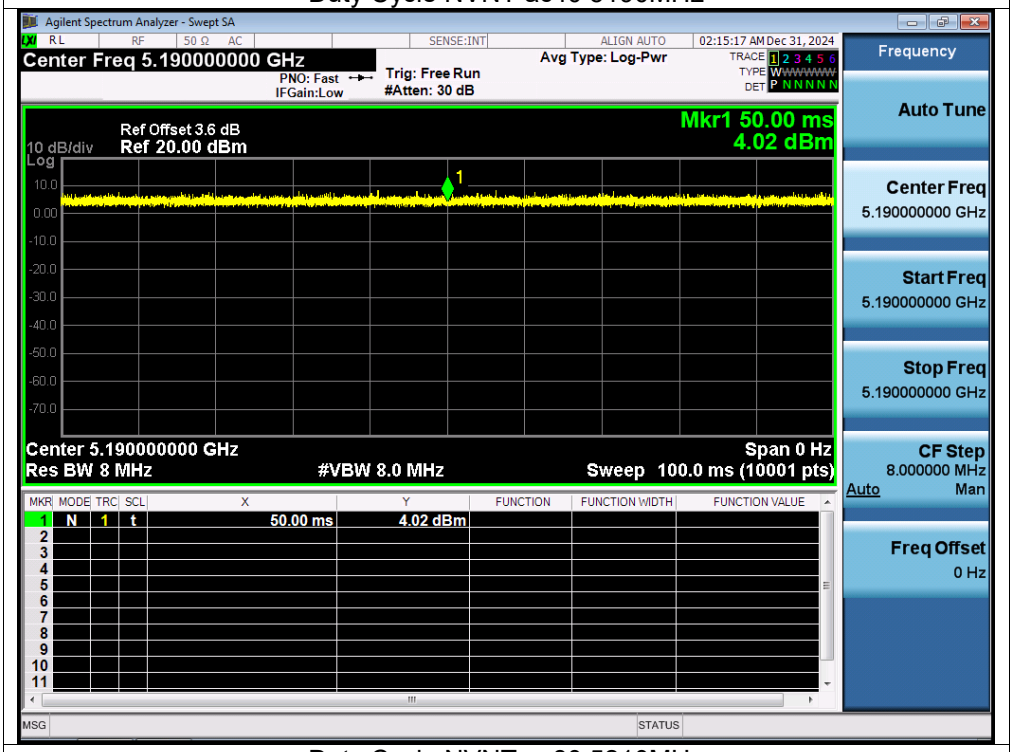
Duty Cycle NVNT n40 5190MHz



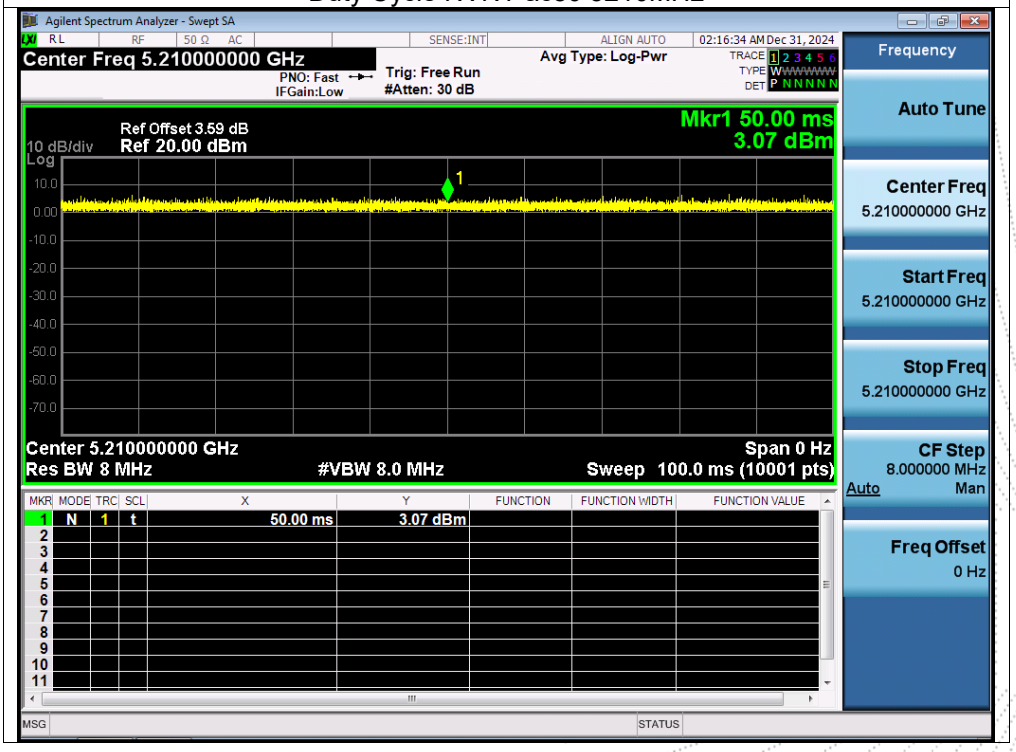
Duty Cycle NVNT ac20 5180MHz



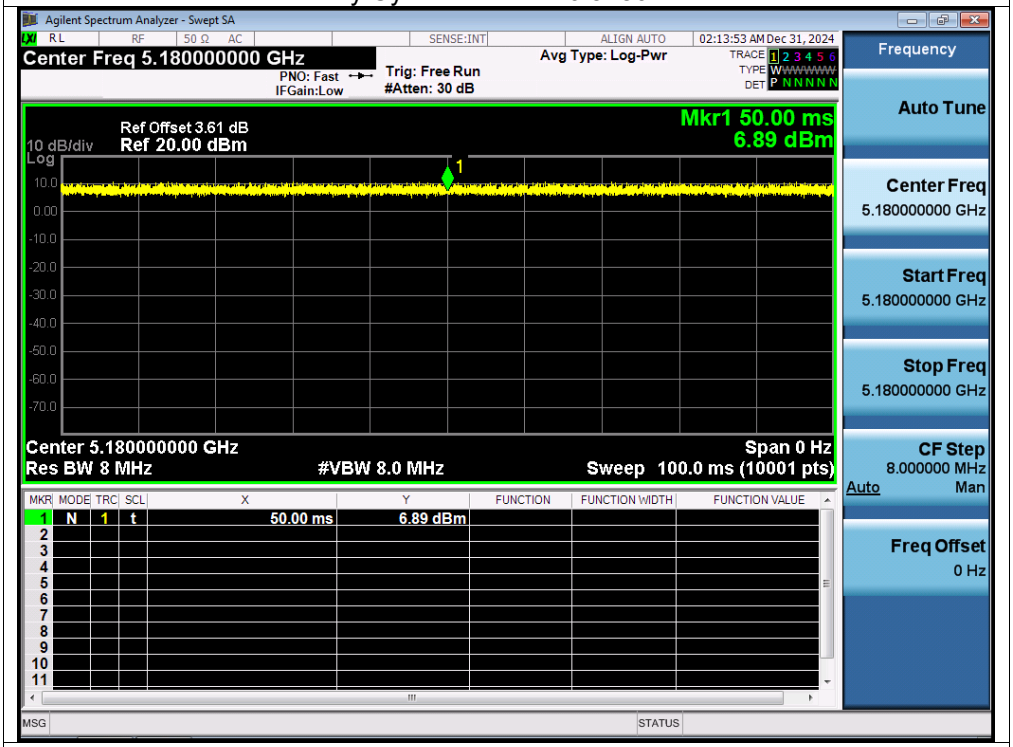
Duty Cycle NVNT ac40 5190MHz



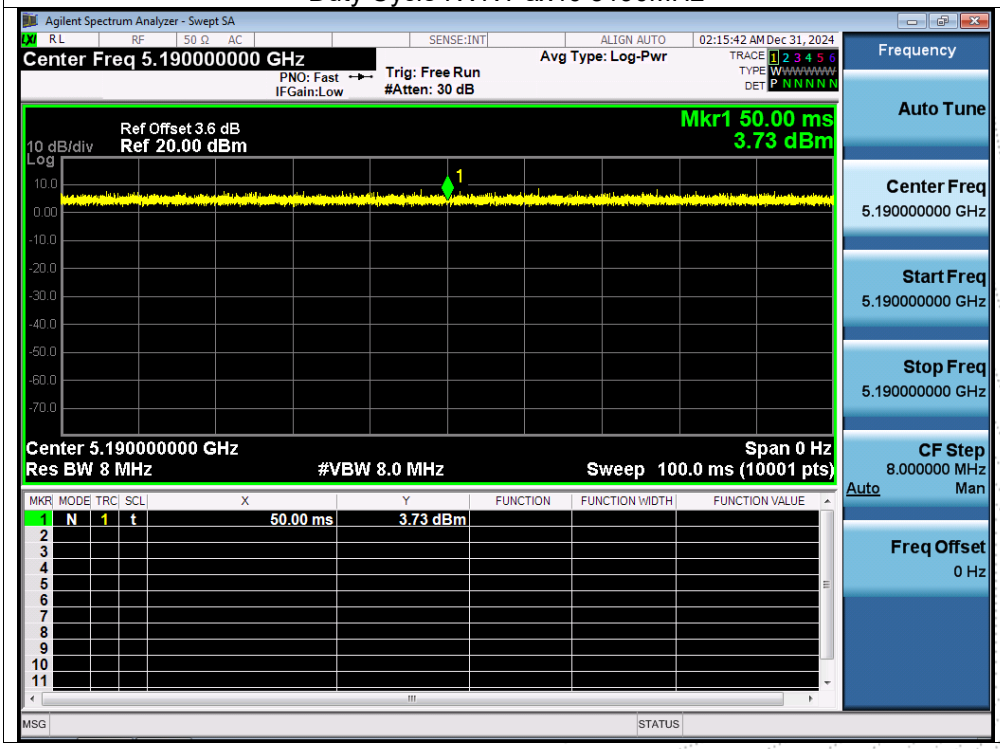
Duty Cycle NVNT ac80 5210MHz



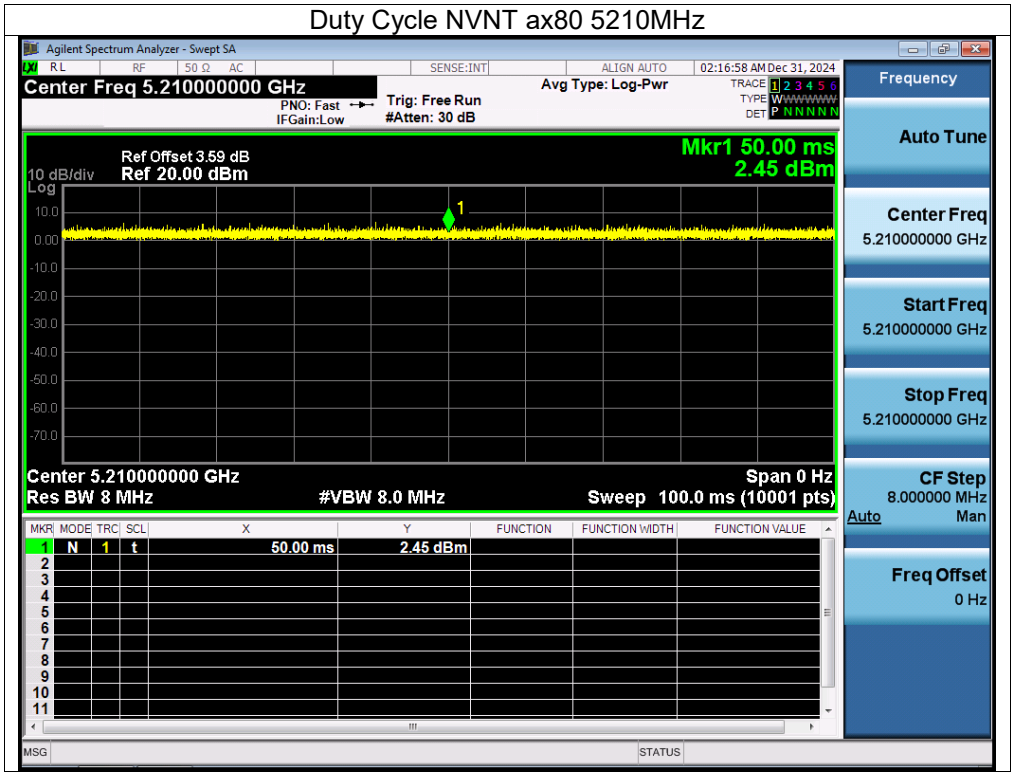
Duty Cycle NVNT ax20 5180MHz



Duty Cycle NVNT ax40 5190MHz



Duty Cycle NVNT ax80 5210MHz

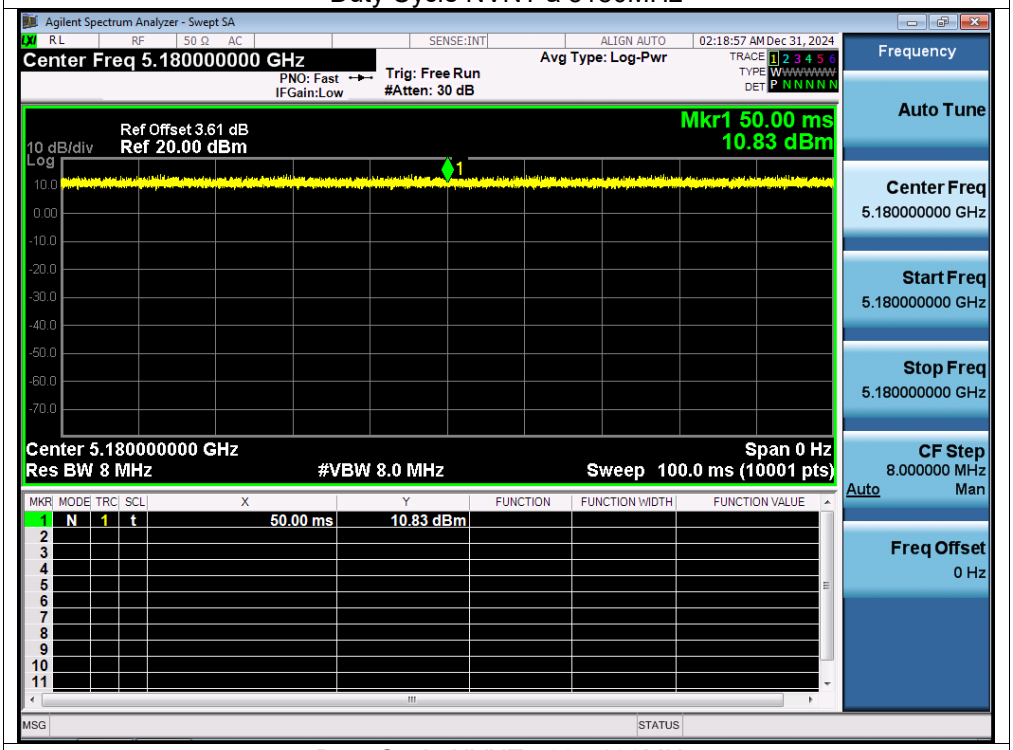


ANT B

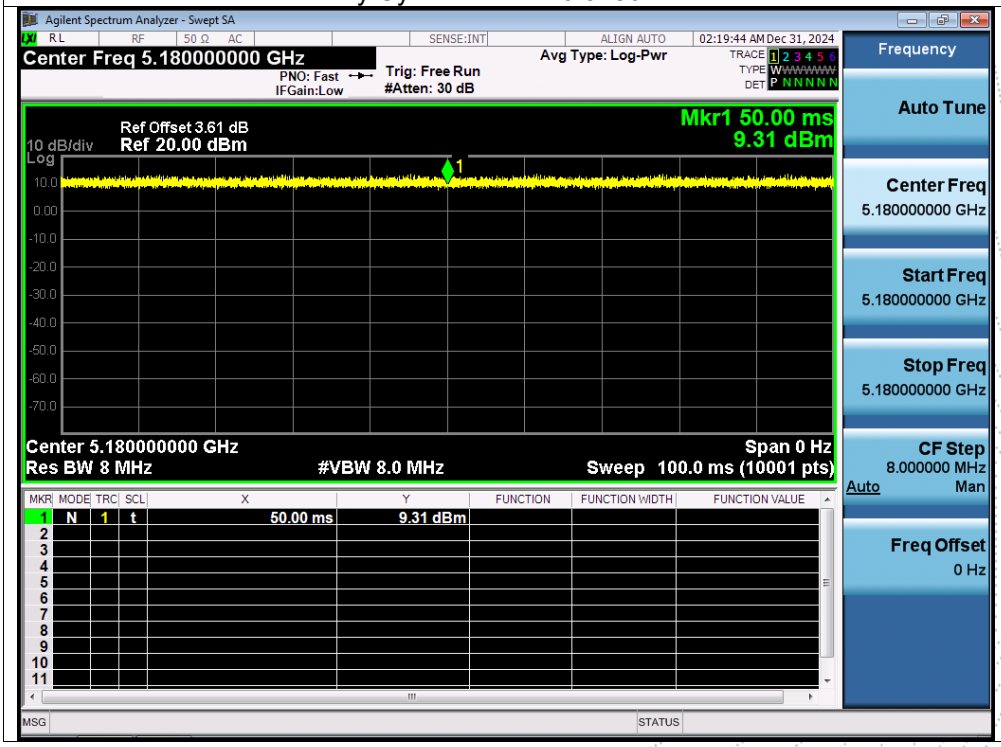
Condition	Mode	Frequency (MHz)	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	a	5180	100	0	0
NVNT	n20	5180	100	0	0
NVNT	n40	5190	100	0	0
NVNT	ac20	5180	100	0	0
NVNT	ac40	5190	100	0	0
NVNT	ac80	5210	100	0	0
NVNT	ax20	5180	100	0	0
NVNT	ax40	5190	100	0	0
NVNT	ax80	5210	100	0	0

Test Graphs

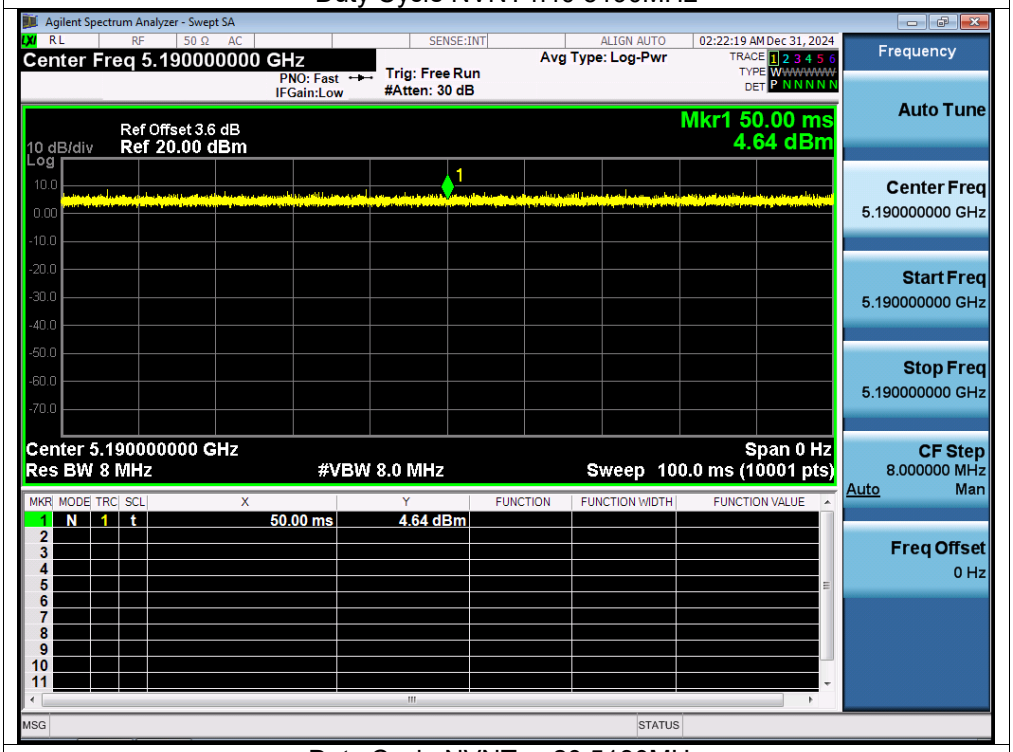
Duty Cycle NVNT a 5180MHz



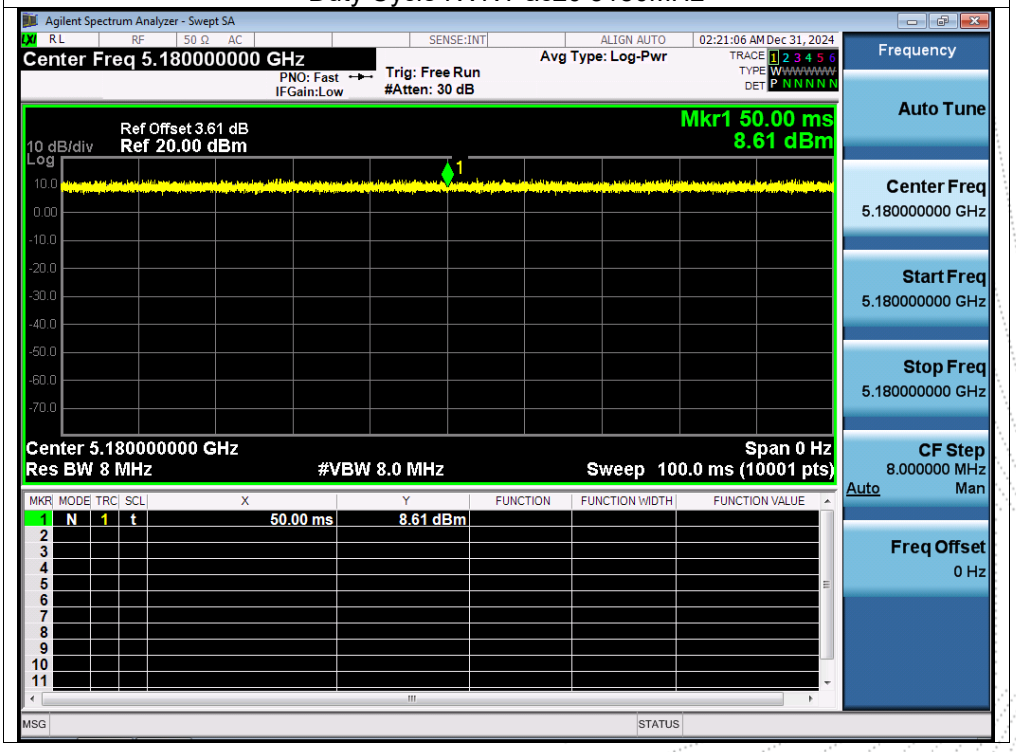
Duty Cycle NVNT n20 5180MHz



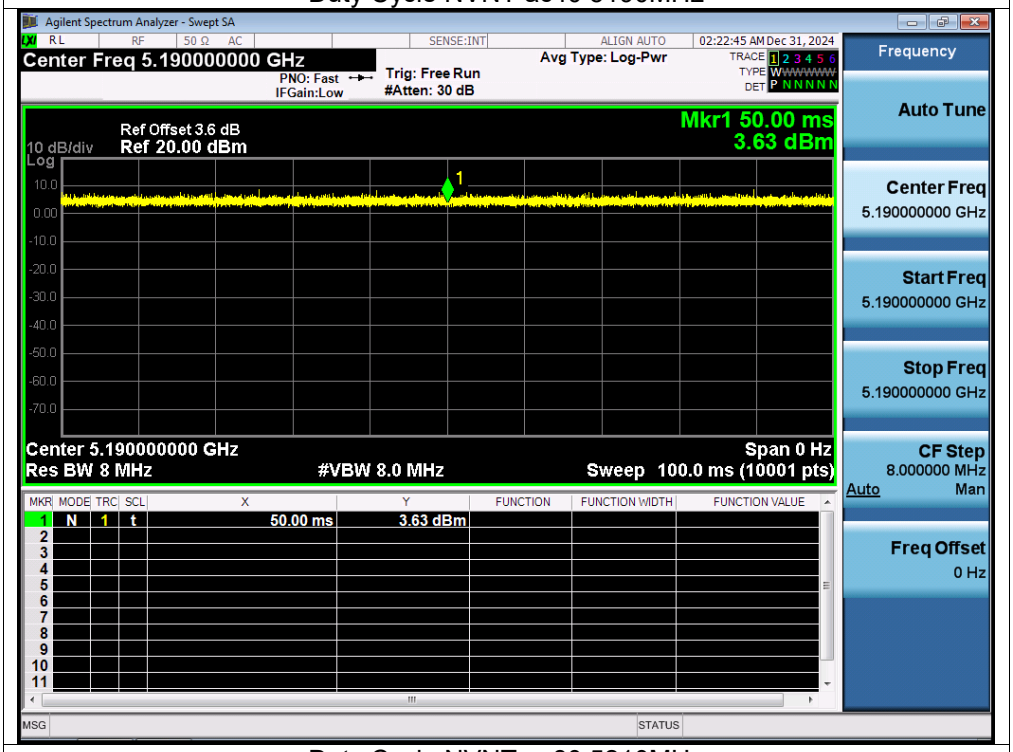
Duty Cycle NVNT n40 5190MHz



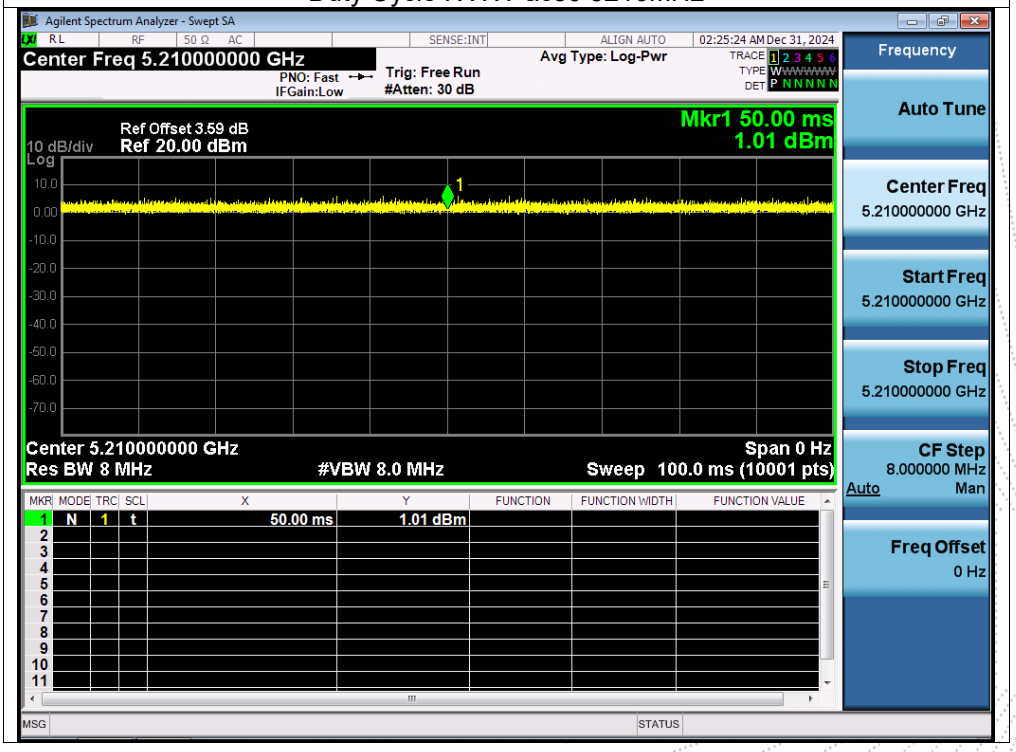
Duty Cycle NVNT ac20 5180MHz



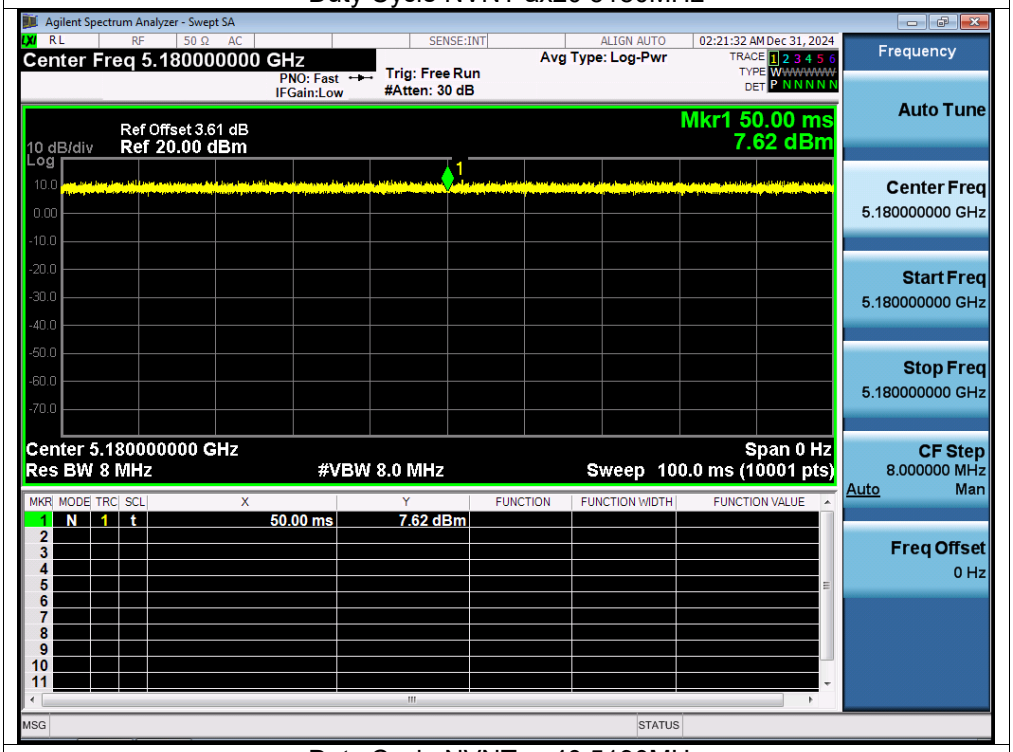
Duty Cycle NVNT ac40 5190MHz



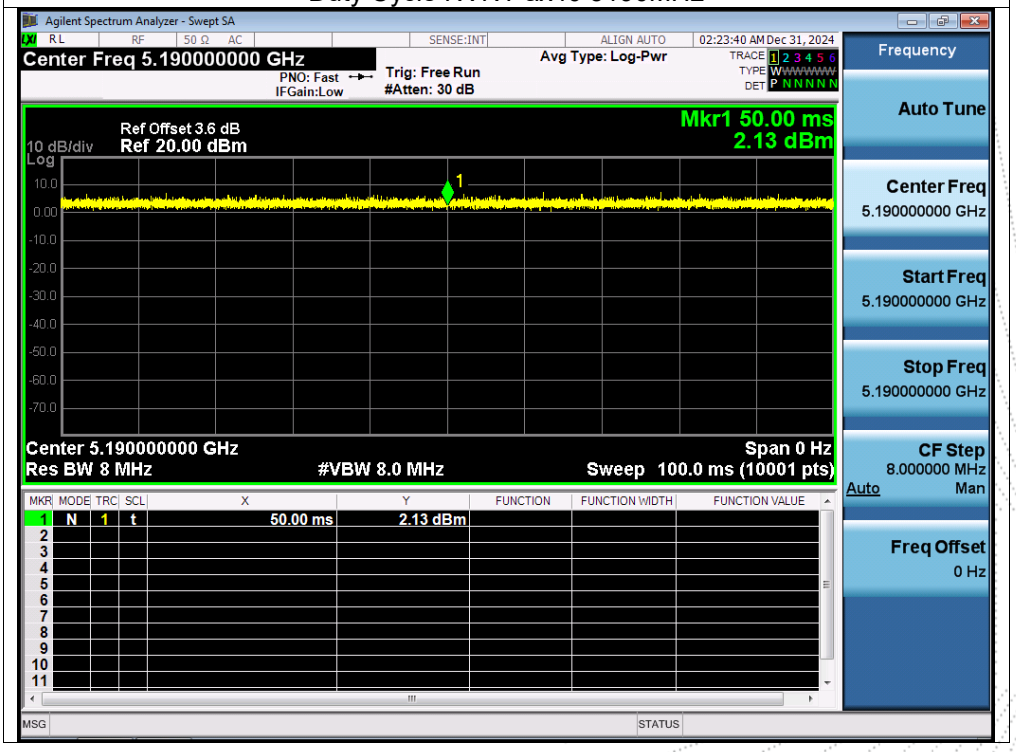
Duty Cycle NVNT ac80 5210MHz



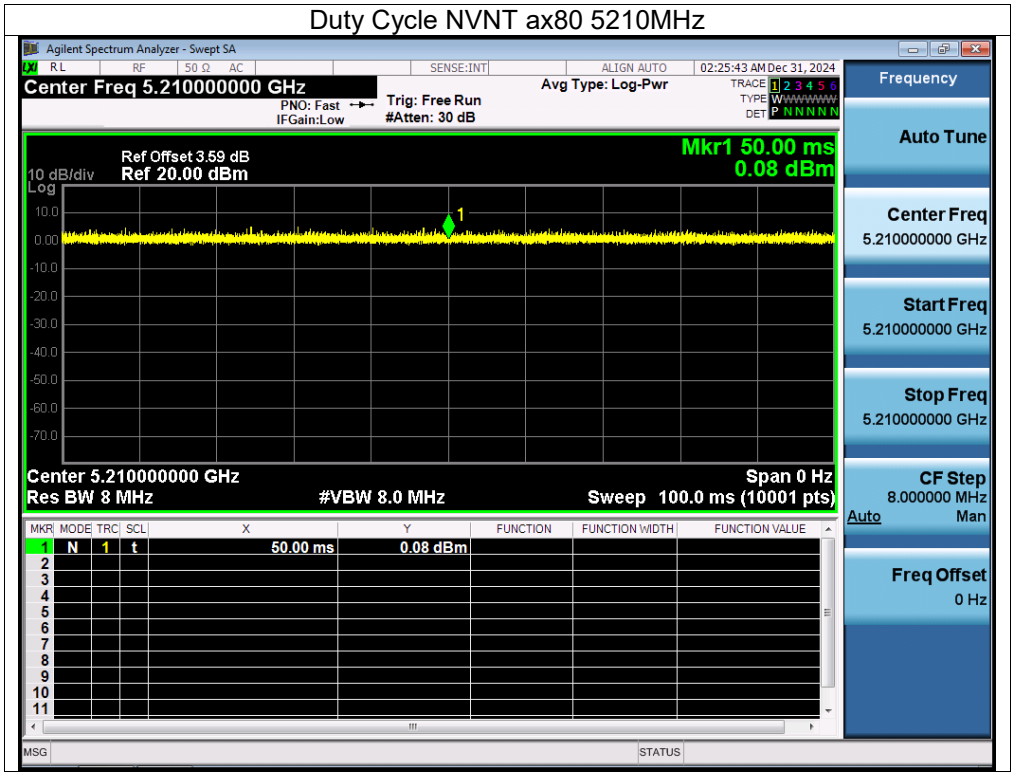
Duty Cycle NVNT ax20 5180MHz



Duty Cycle NVNT ax40 5190MHz



Duty Cycle NVNT ax80 5210MHz

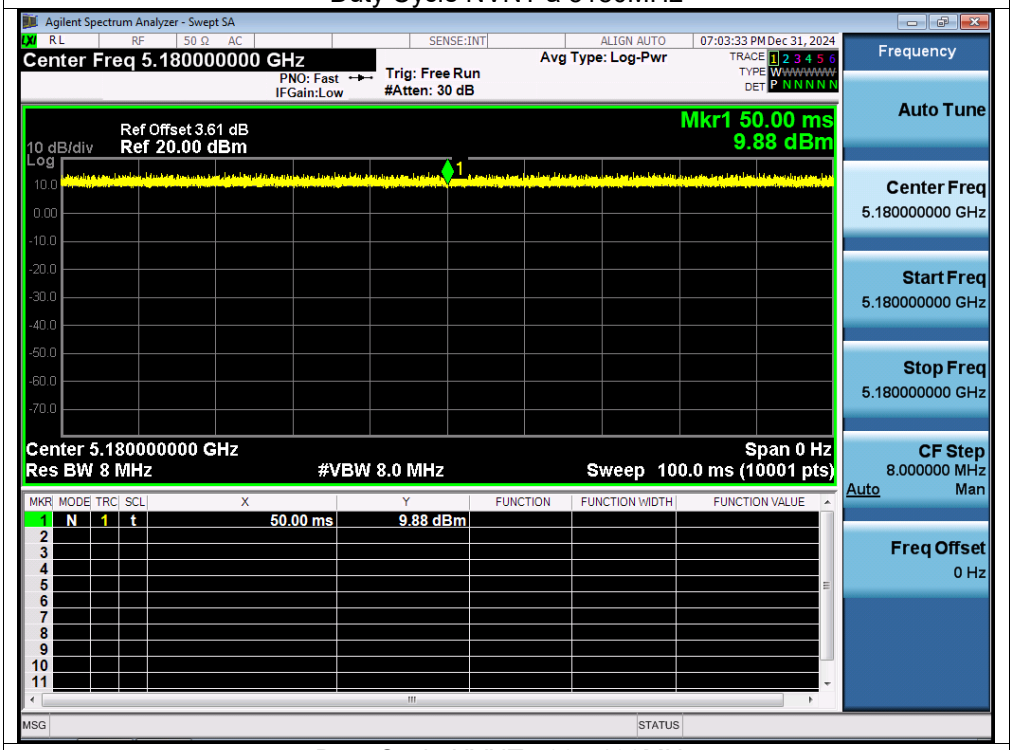


ANT C

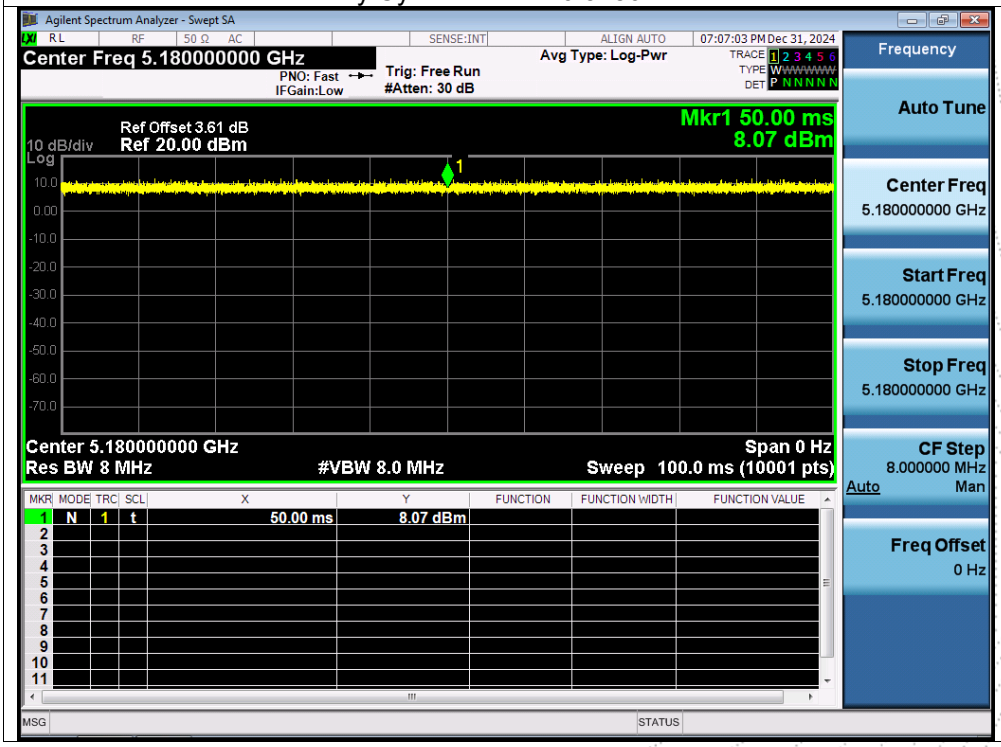
Condition	Mode	Frequency (MHz)	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	a	5180	100	0	0
NVNT	n20	5180	100	0	0
NVNT	n40	5190	100	0	0
NVNT	ac20	5180	100	0	0
NVNT	ac40	5190	100	0	0
NVNT	ac80	5210	100	0	0
NVNT	ax20	5180	100	0	0
NVNT	ax40	5190	100	0	0
NVNT	ax80	5210	100	0	0

Test Graphs

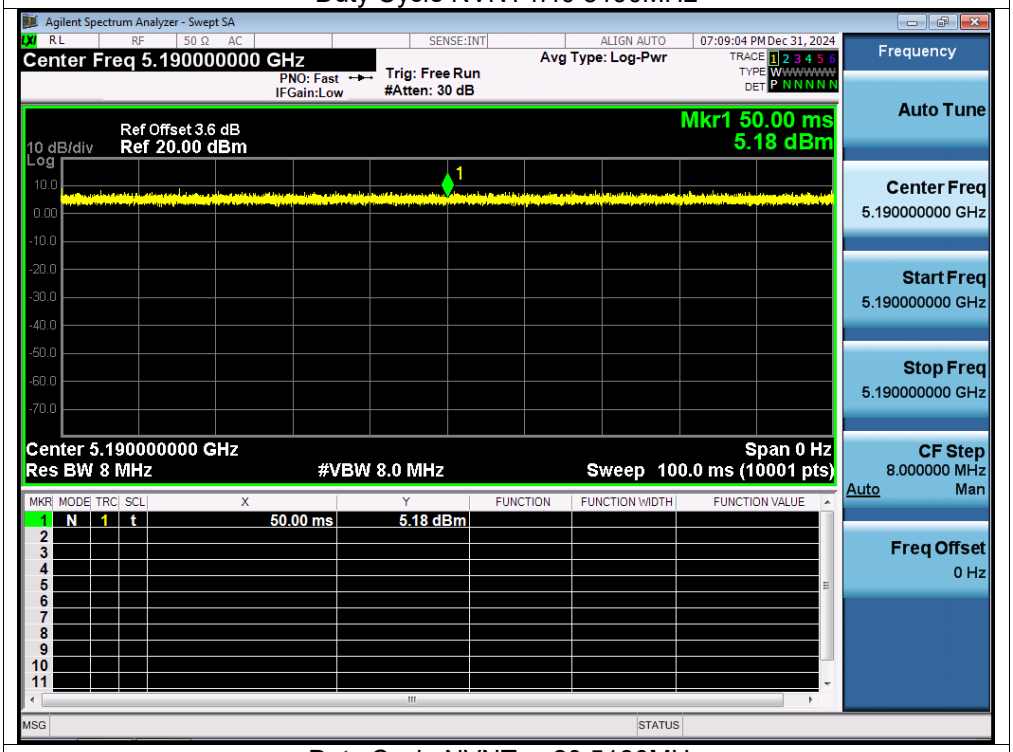
Duty Cycle NVNT a 5180MHz



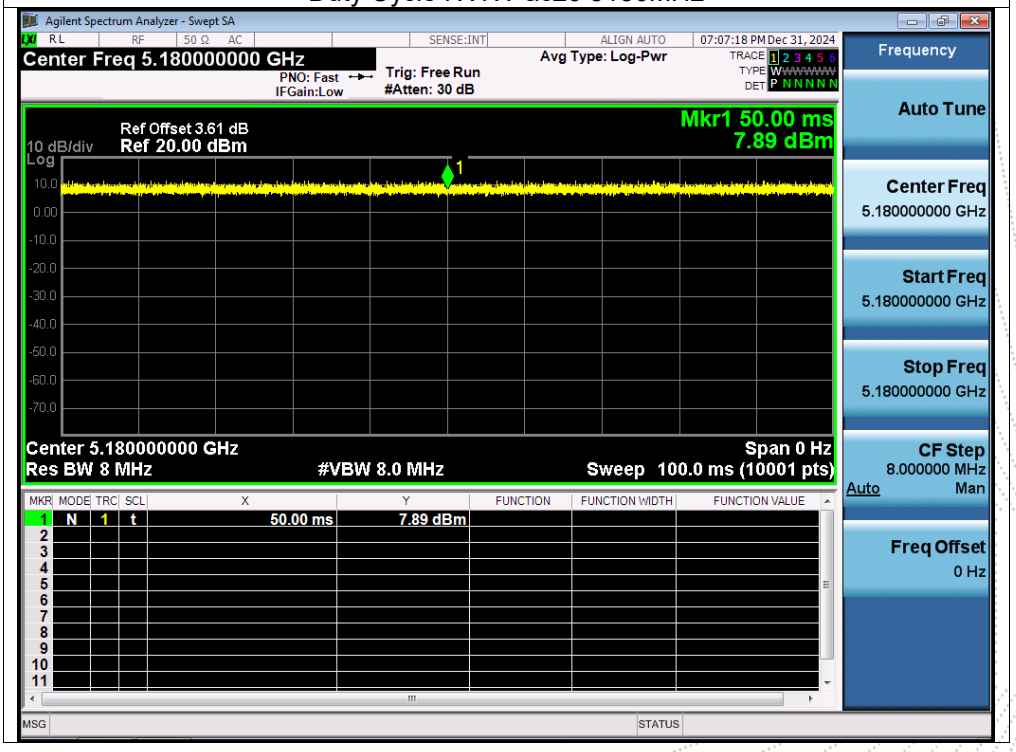
Duty Cycle NVNT n20 5180MHz



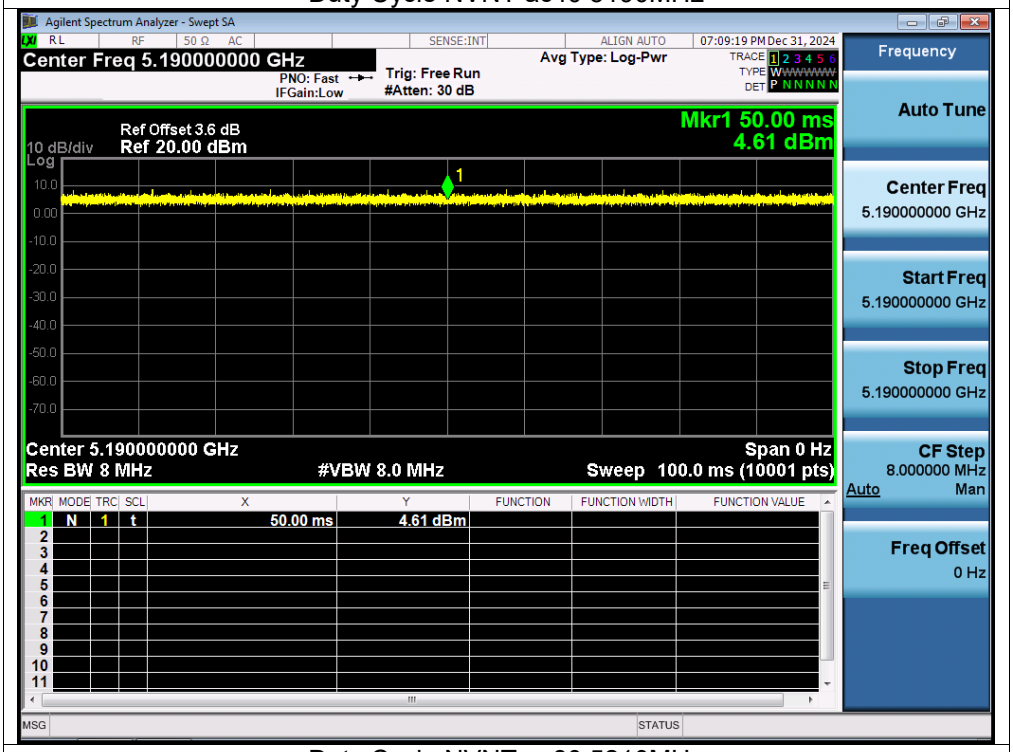
Duty Cycle NVNT n40 5190MHz



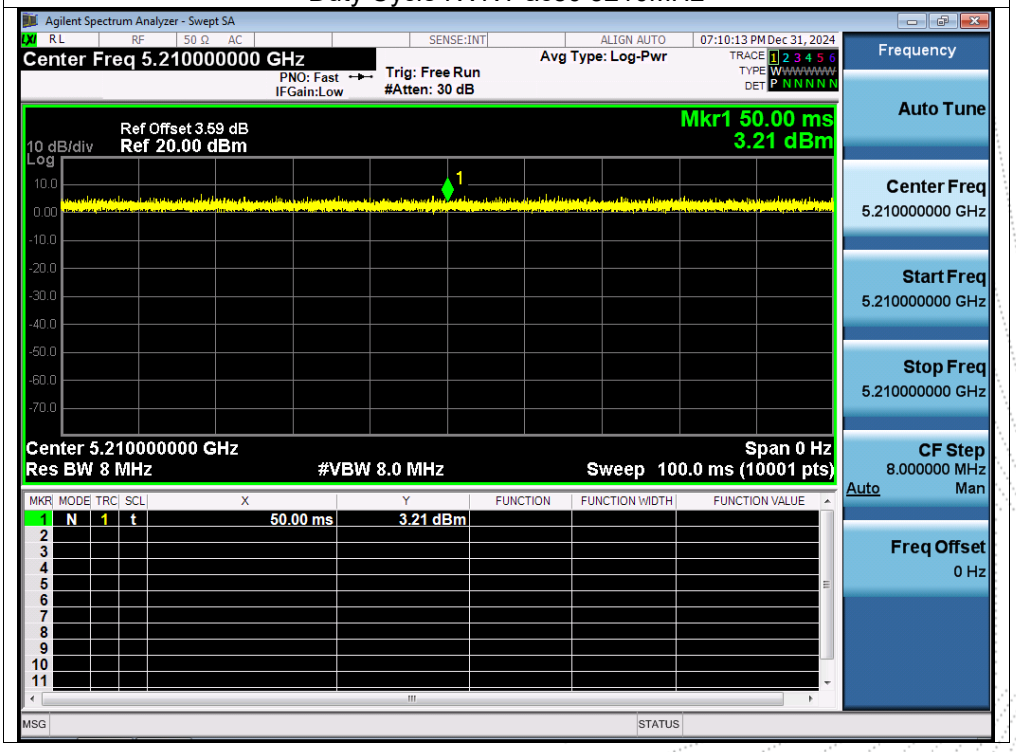
Duty Cycle NVNT ac20 5180MHz



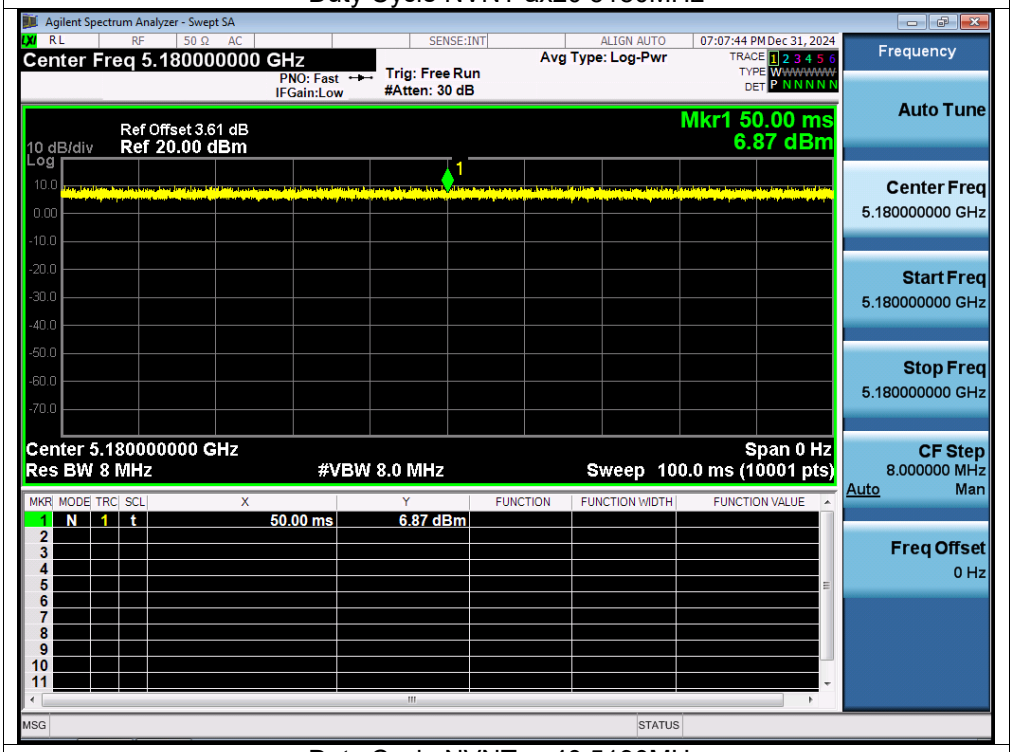
Duty Cycle NVNT ac40 5190MHz



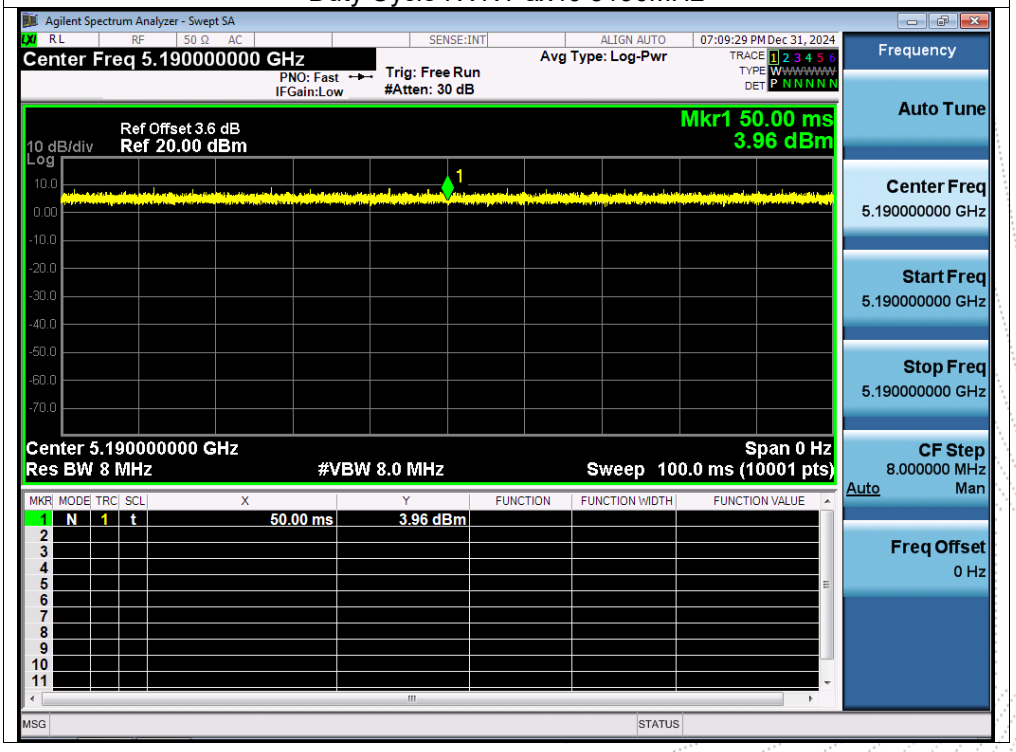
Duty Cycle NVNT ac80 5210MHz



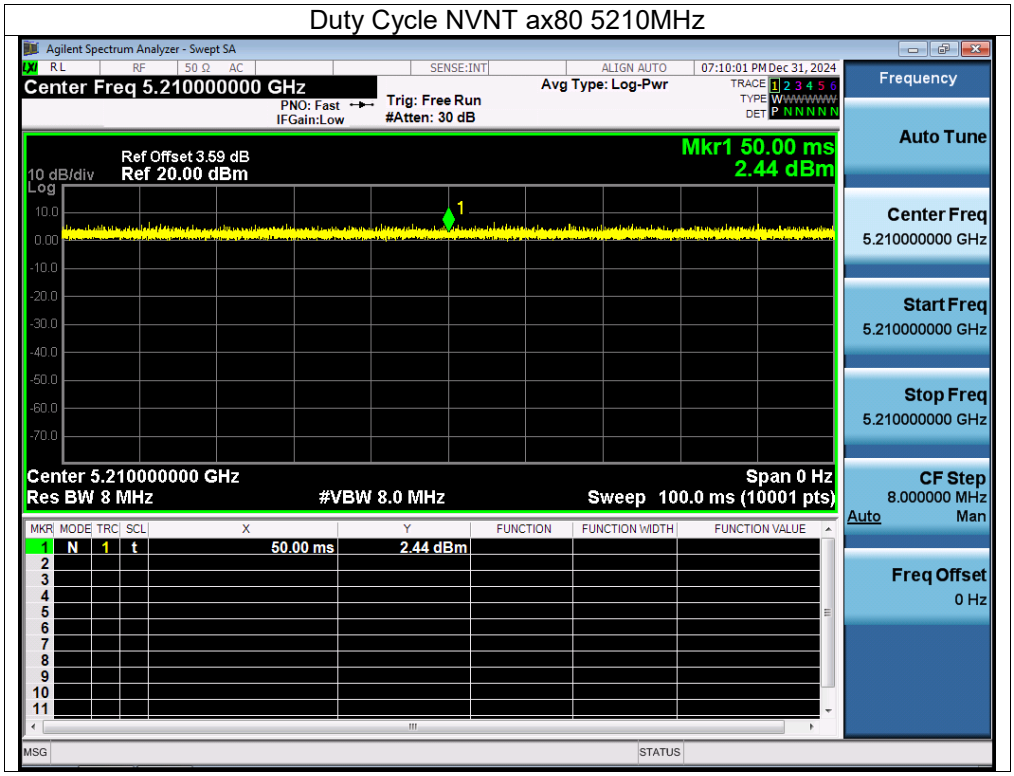
Duty Cycle NVNT ax20 5180MHz



Duty Cycle NVNT ax40 5190MHz



Duty Cycle NVNT ax80 5210MHz

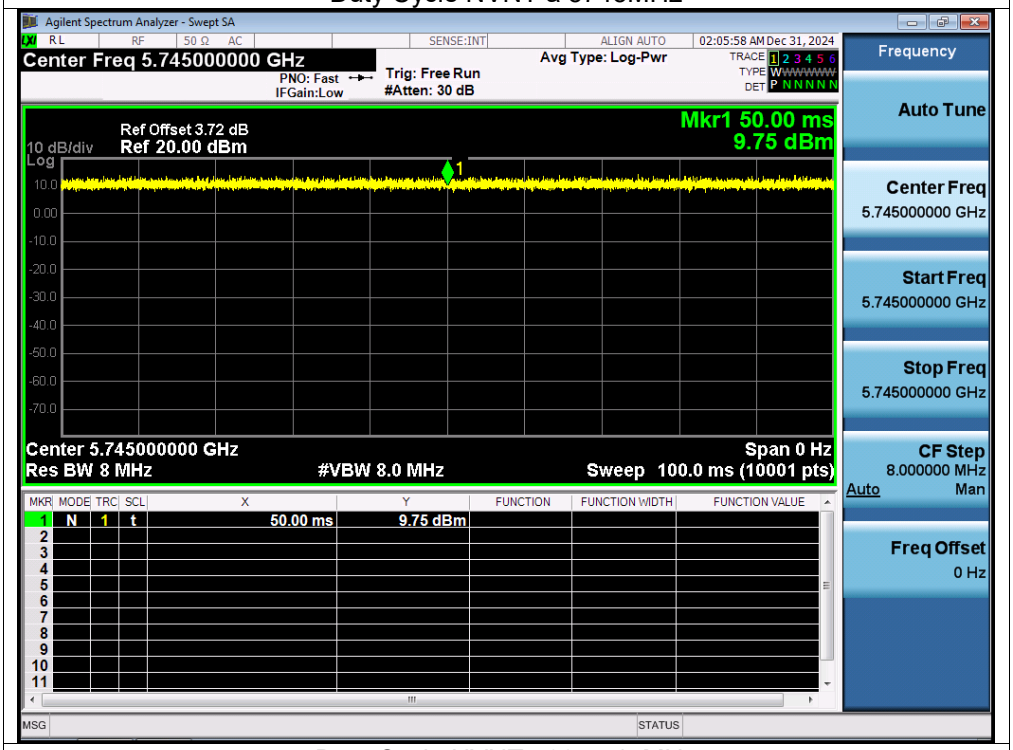


ANT A

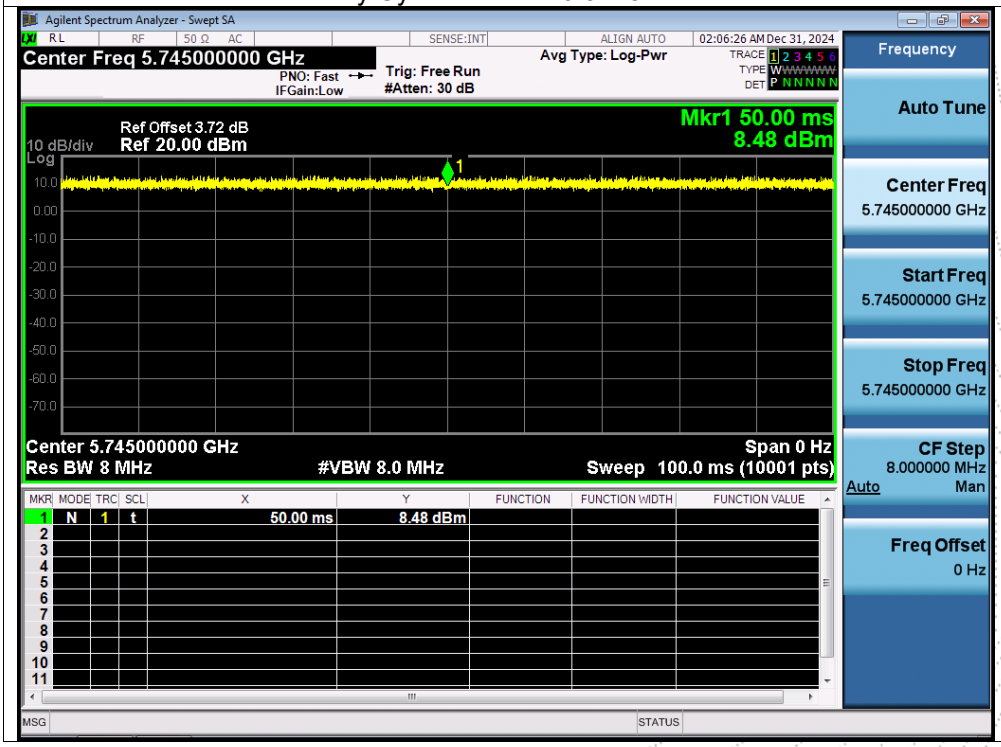
Condition	Mode	Frequency (MHz)	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	a	5745	100	0	0
NVNT	n20	5745	100	0	0
NVNT	n40	5755	100	0	0
NVNT	ac20	5745	100	0	0
NVNT	ac40	5755	100	0	0
NVNT	ac80	5775	100	0	0
NVNT	ax20	5745	100	0	0
NVNT	ax40	5755	100	0	0
NVNT	ax80	5775	100	0	0

Test Graphs

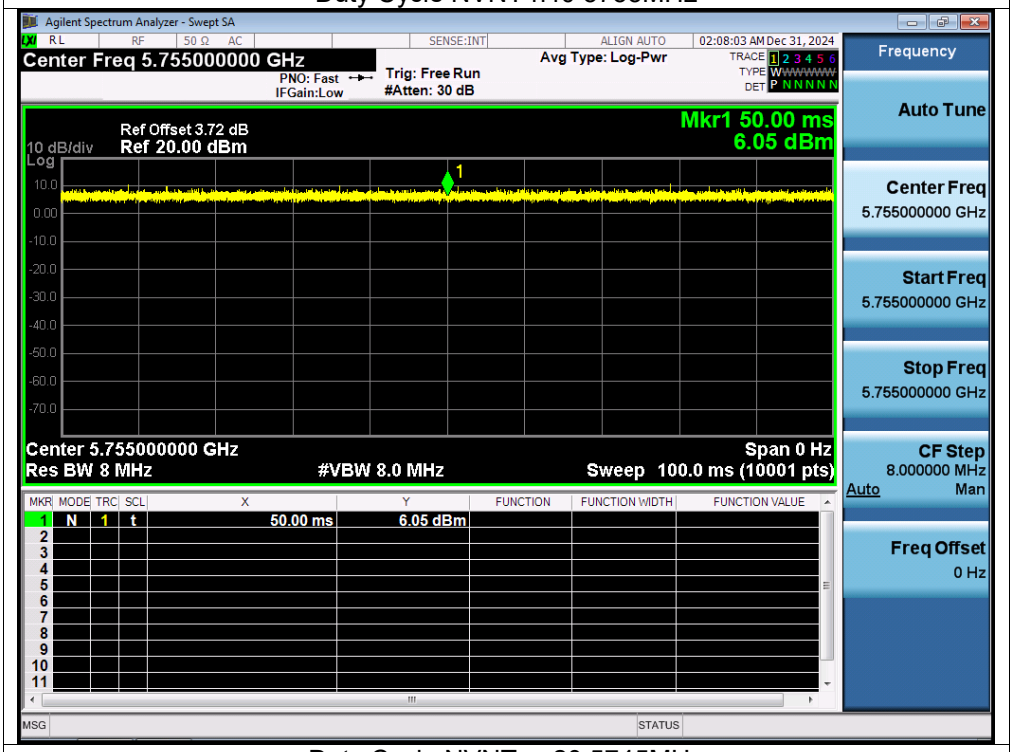
Duty Cycle NVNT a 5745MHz



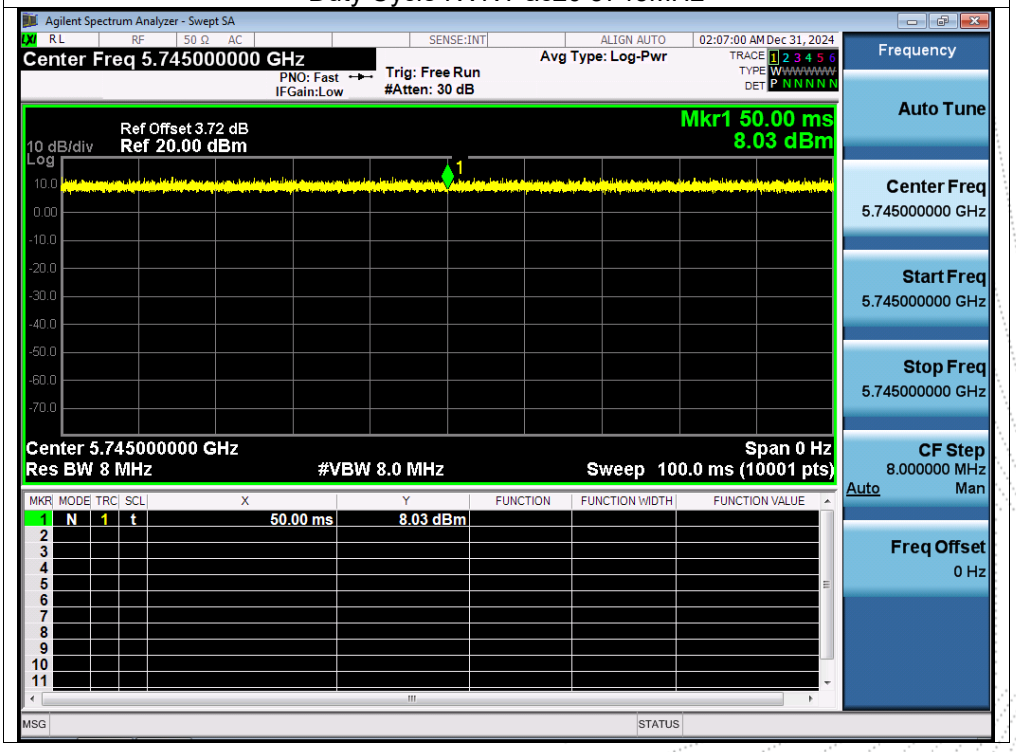
Duty Cycle NVNT n20 5745MHz



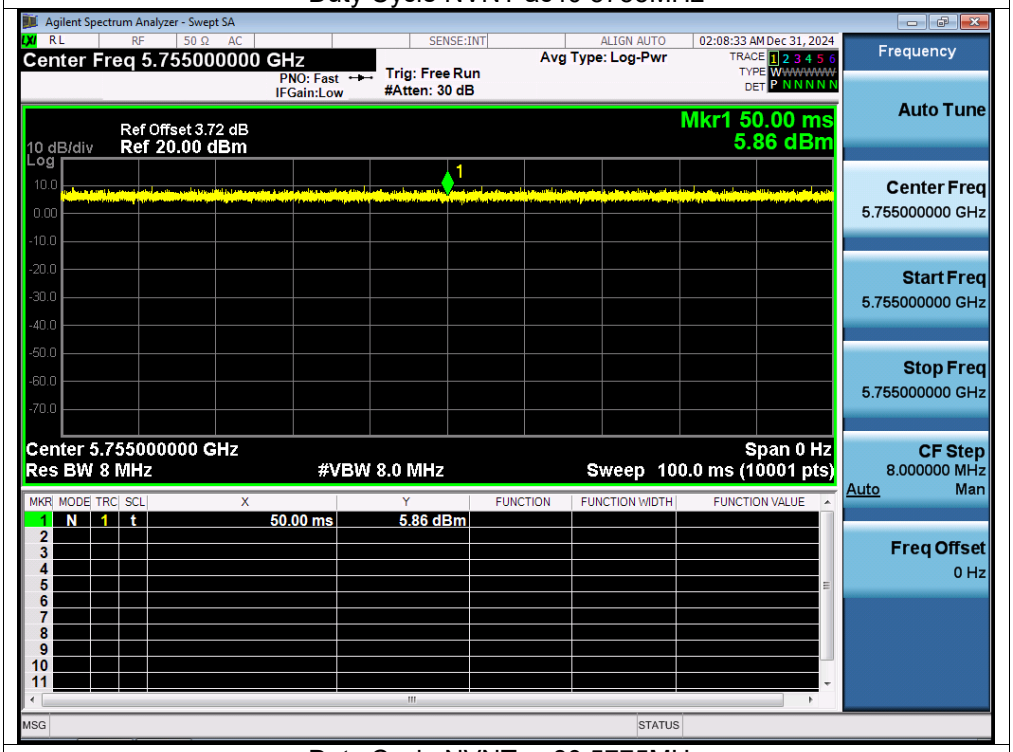
Duty Cycle NVNT n40 5755MHz



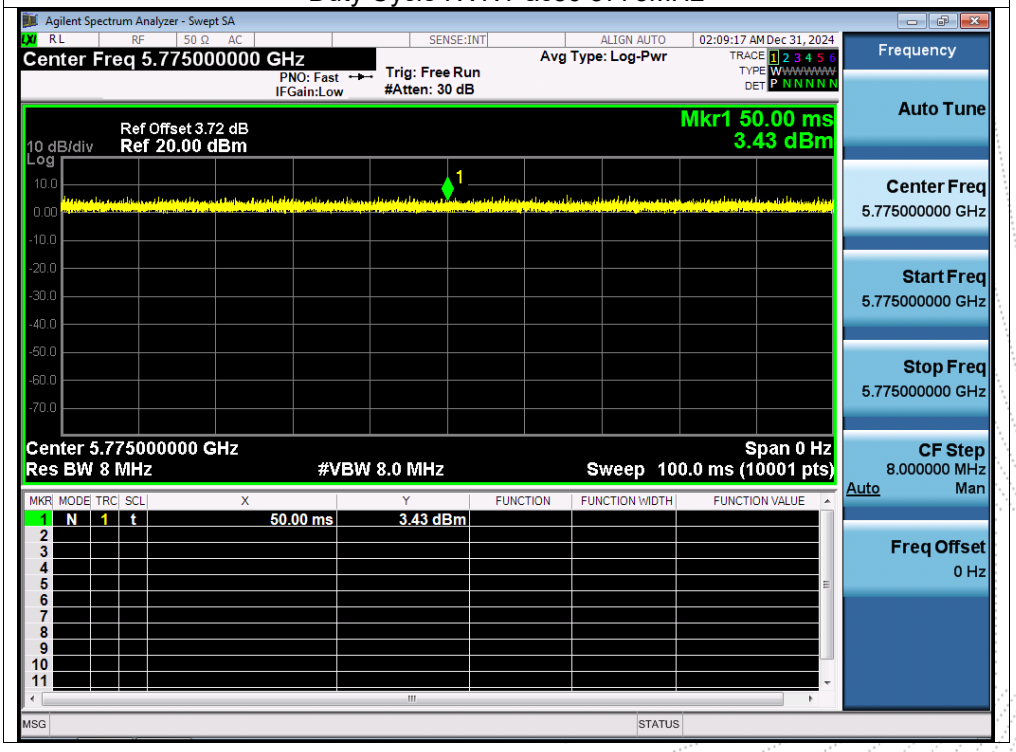
Duty Cycle NVNT ac20 5745MHz



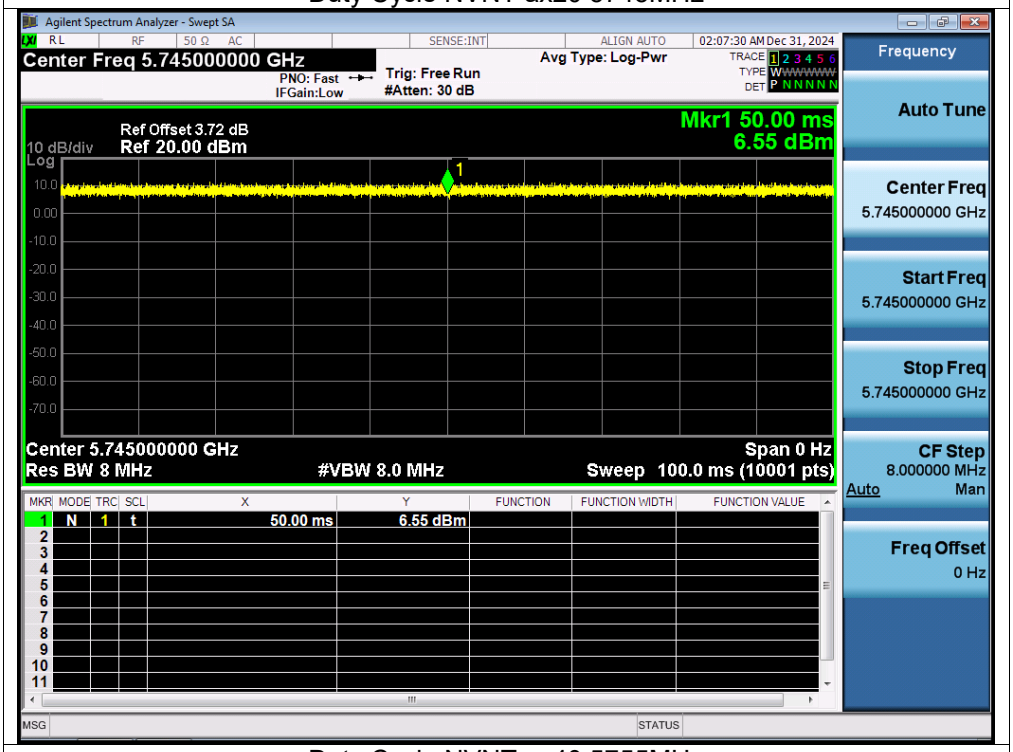
Duty Cycle NVNT ac40 5755MHz



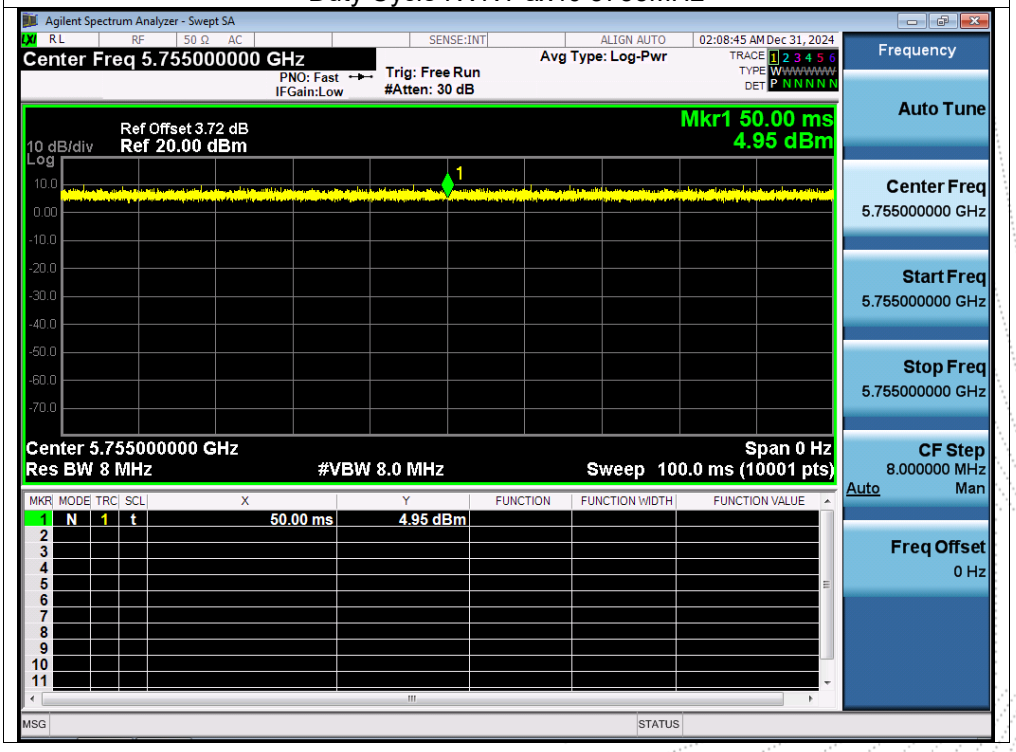
Duty Cycle NVNT ac80 5775MHz



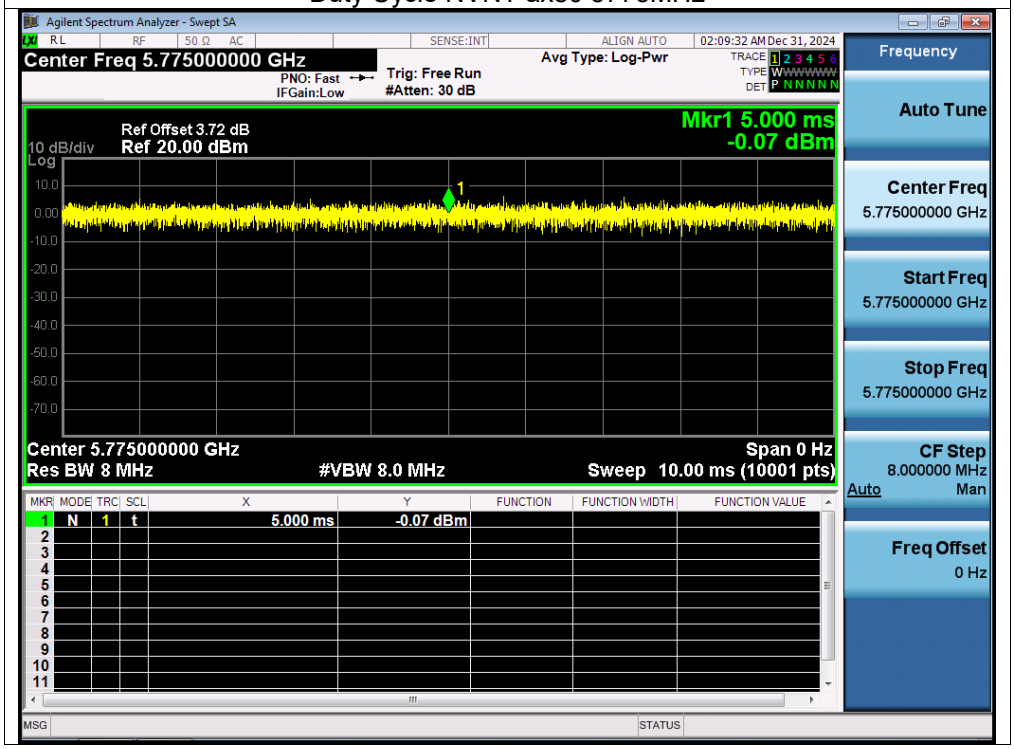
Duty Cycle NVNT ax20 5745MHz



Duty Cycle NVNT ax40 5755MHz



Duty Cycle NVNT ax80 5775MHz



ANT B

Condition	Mode	Frequency (MHz)	Duty Cycle (%)	Correction Factor (dB)	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