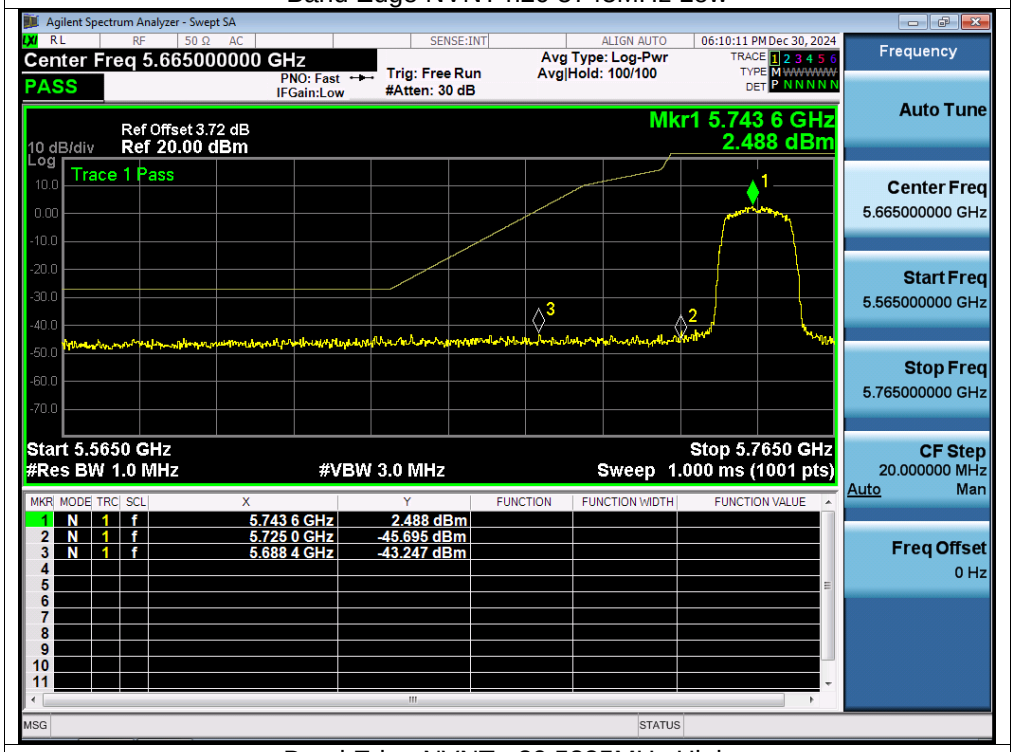
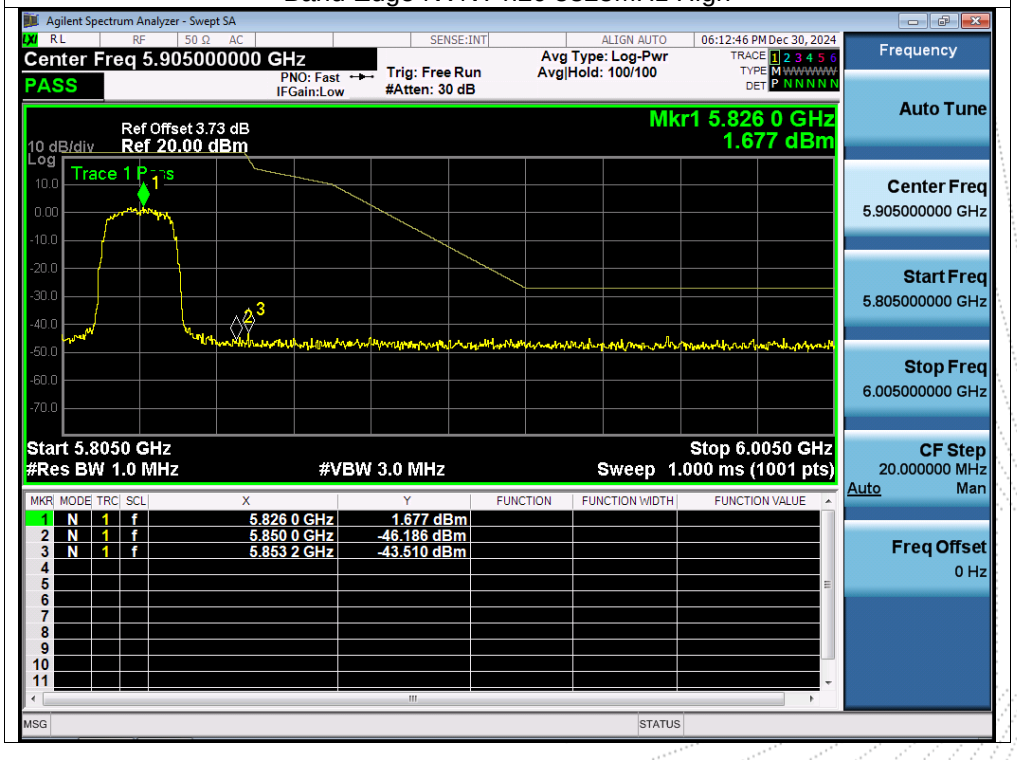
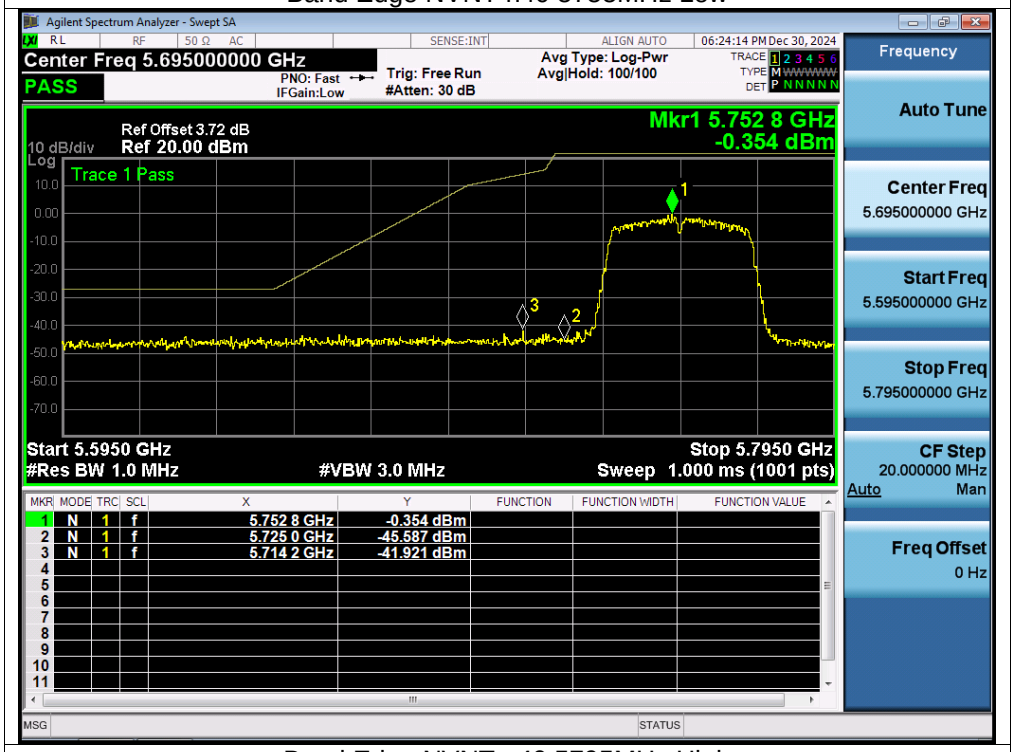
Band Edge NVNT n20 5745MHz Low



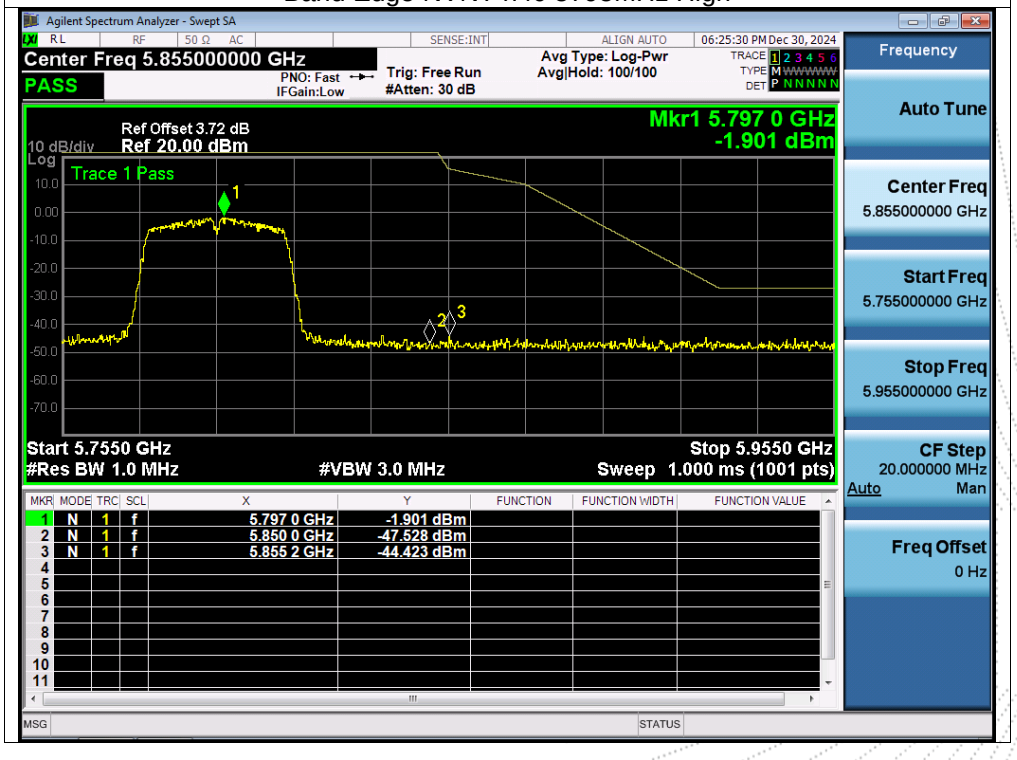
Band Edge NVNT n20 5825MHz High



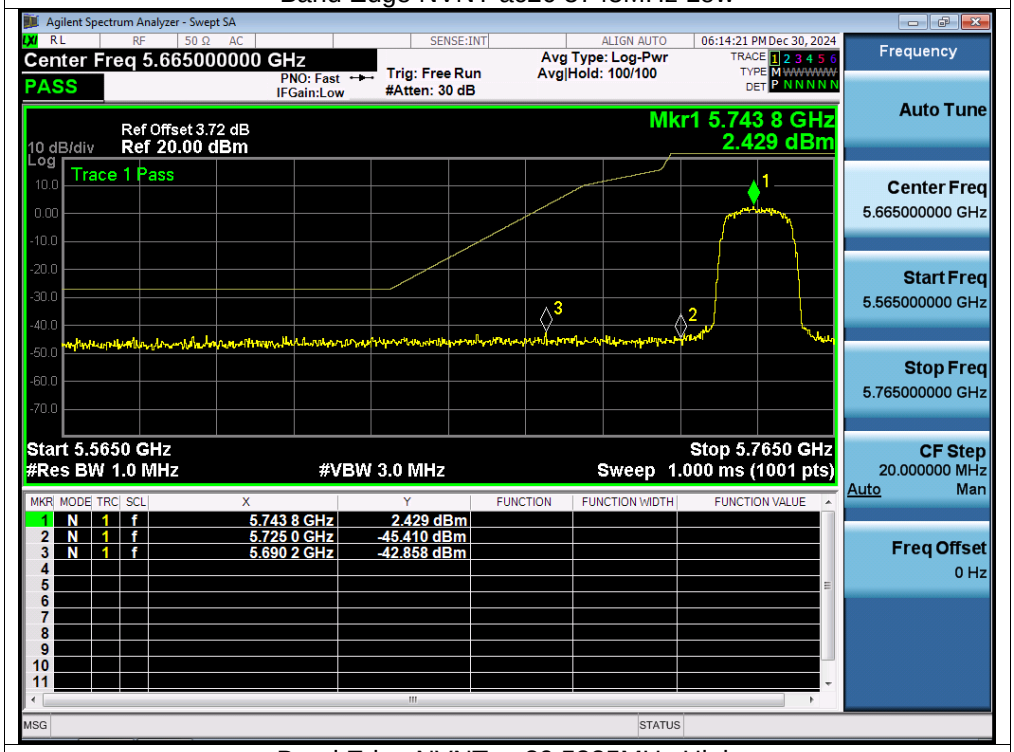
Band Edge NVNT n40 5755MHz Low



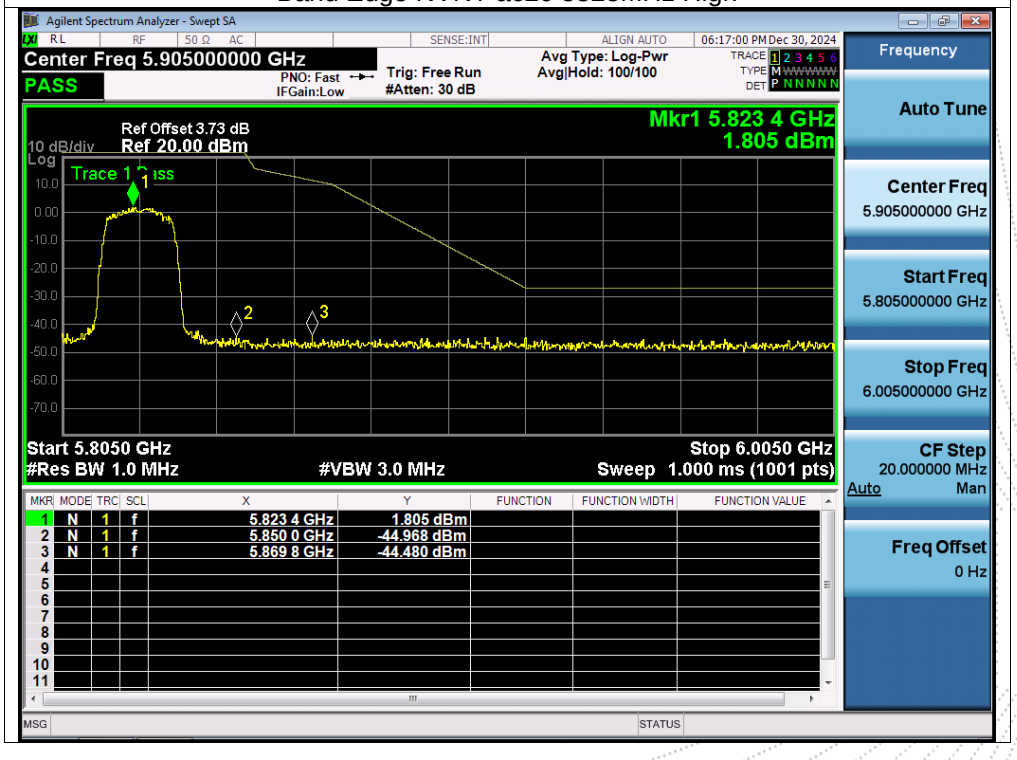
Band Edge NVNT n40 5795MHz High



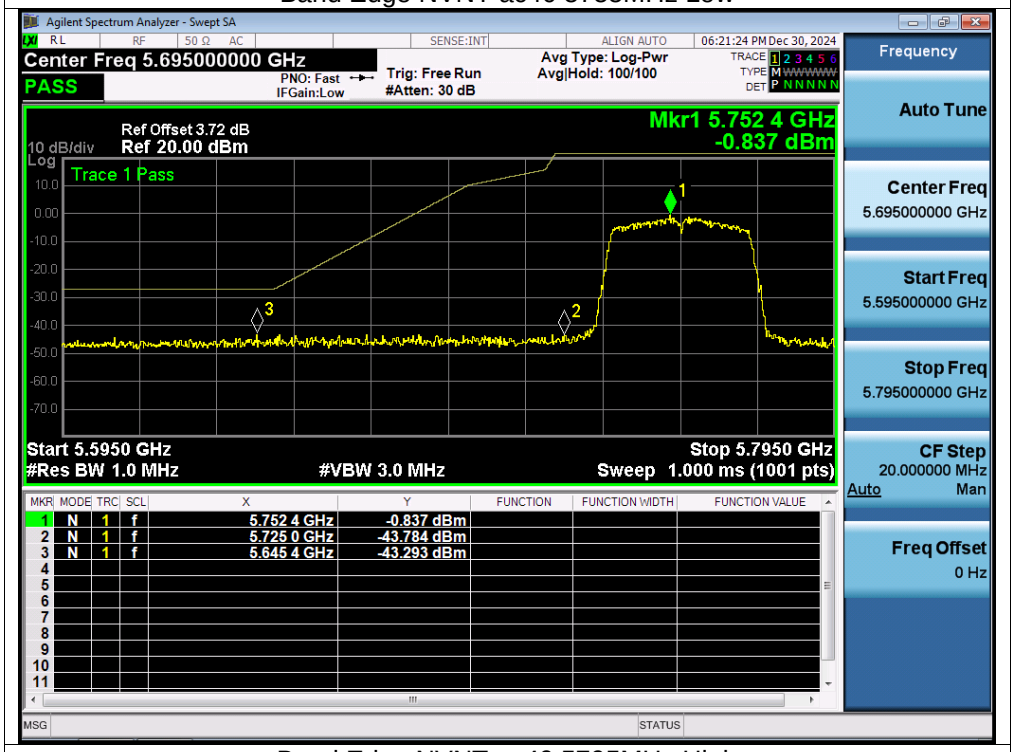
Band Edge NVNT ac20 5745MHz Low



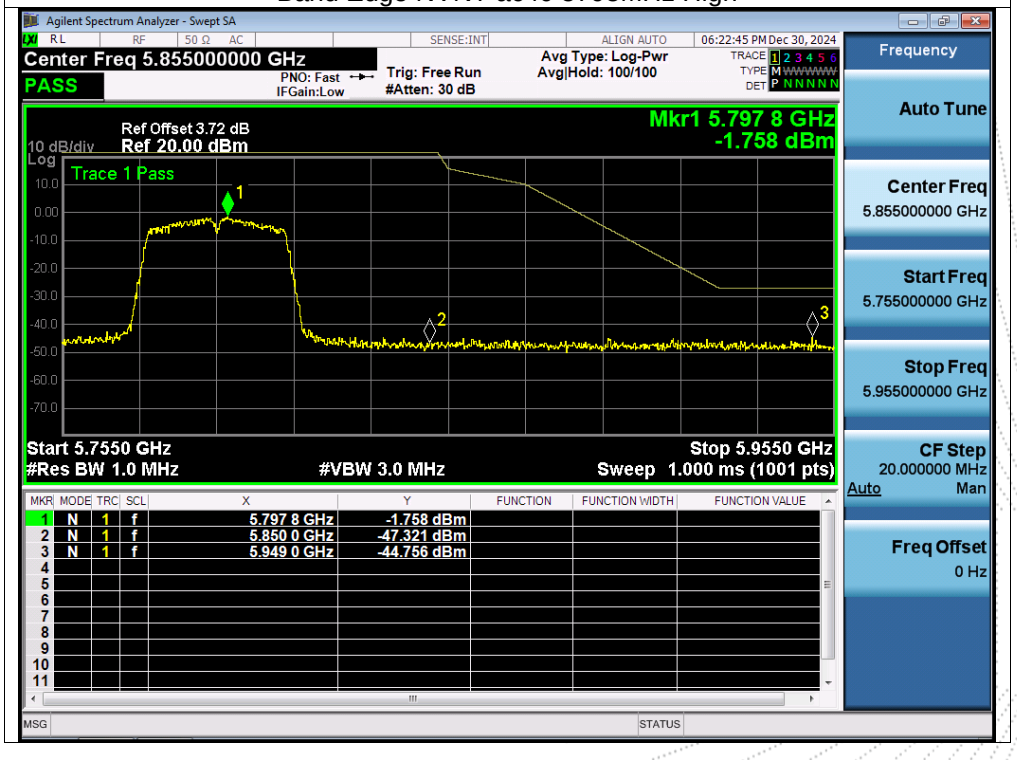
Band Edge NVNT ac20 5825MHz High



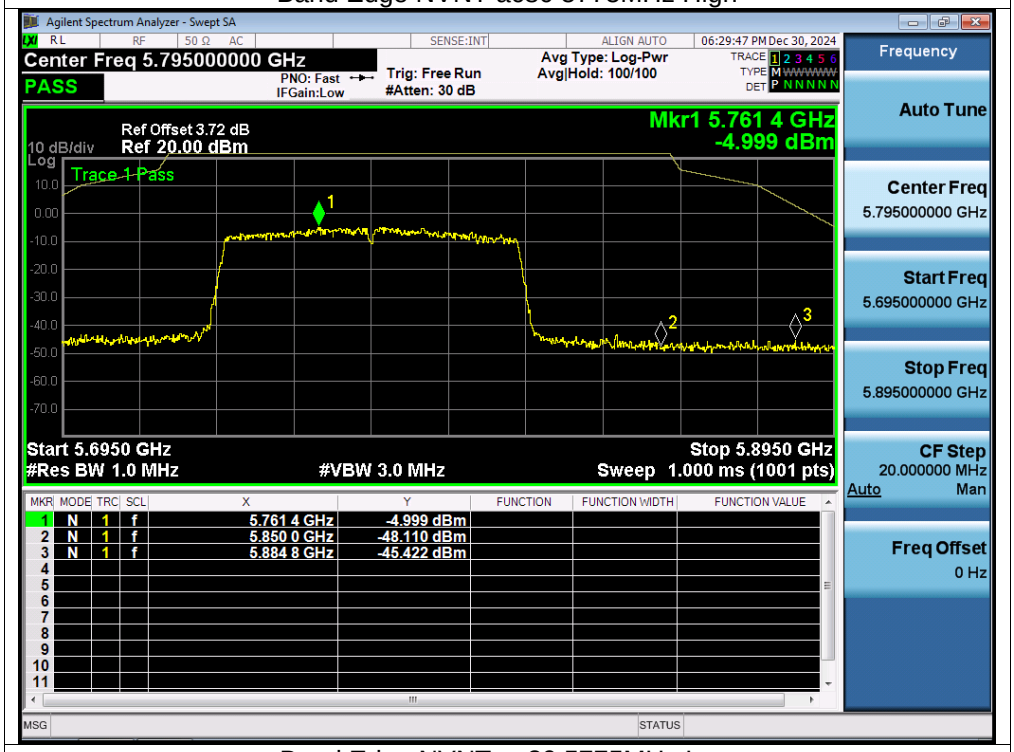
Band Edge NVNT ac40 5755MHz Low



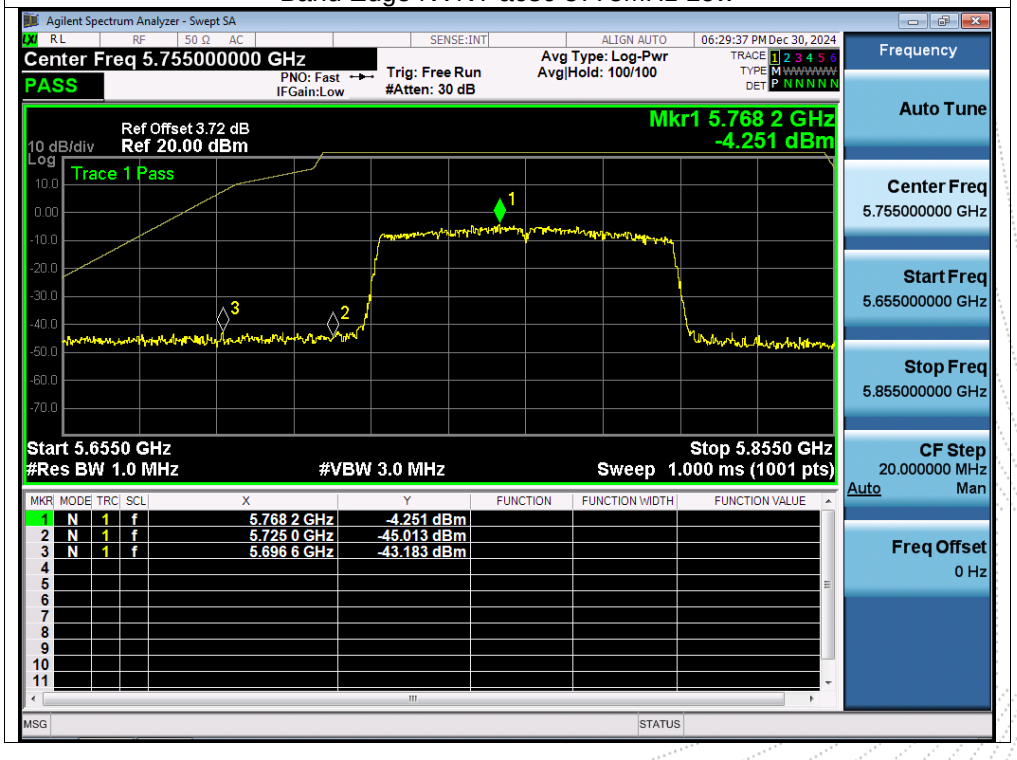
Band Edge NVNT ac40 5795MHz High



Band Edge NVNT ac80 5775MHz High

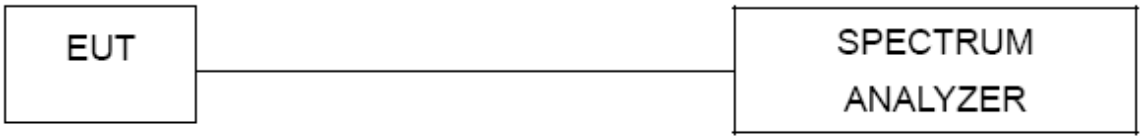


Band Edge NVNT ac80 5775MHz Low



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.

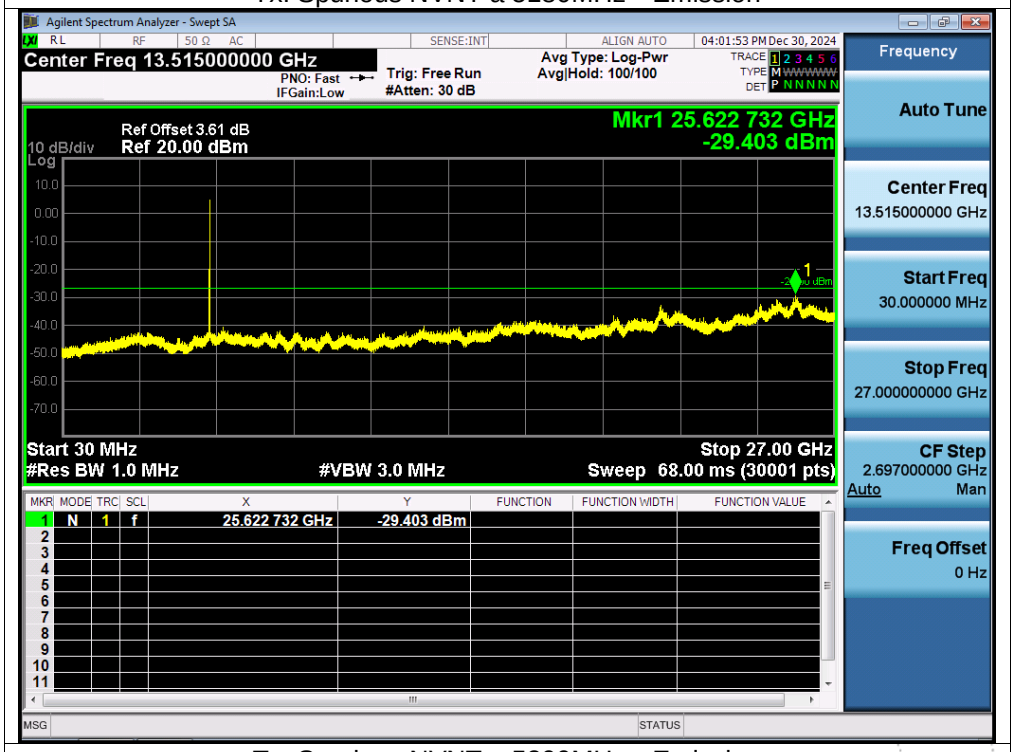
12.4 Test Result

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 bandage 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

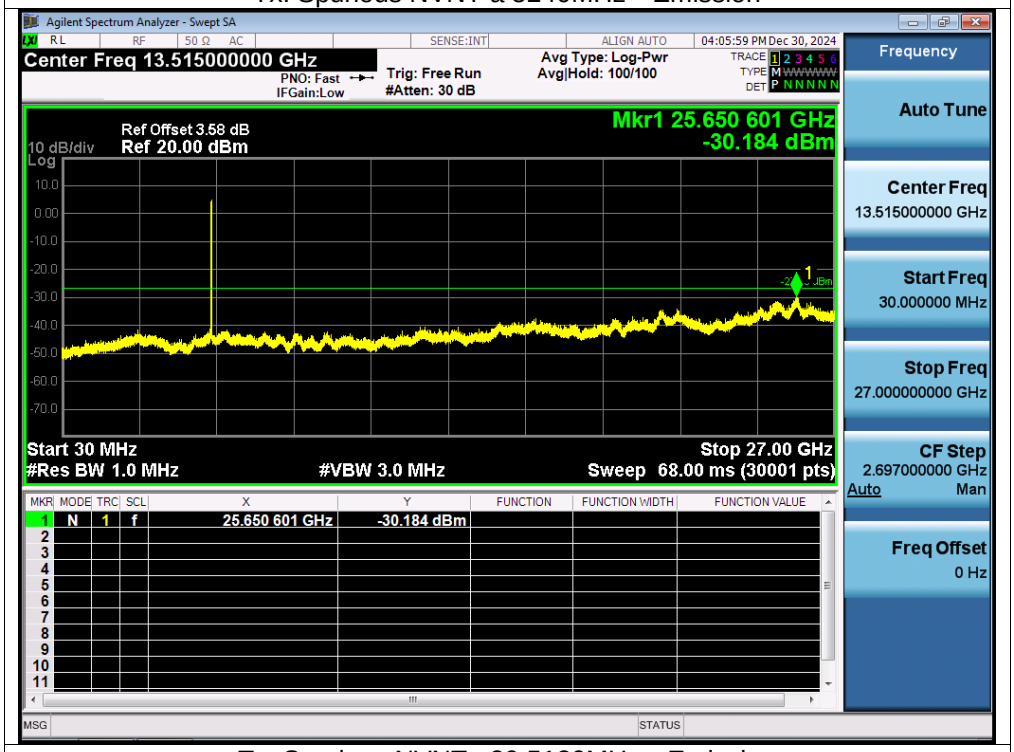
Test Graphs

Tx. Spurious NVNT a 5180MHz Emission



Tx. Spurious NVNT a 5200MHz Emission

Tx. Spurious NVNT a 5240MHz Emission



Tx. Spurious NVNT n20 5180MHz Emission

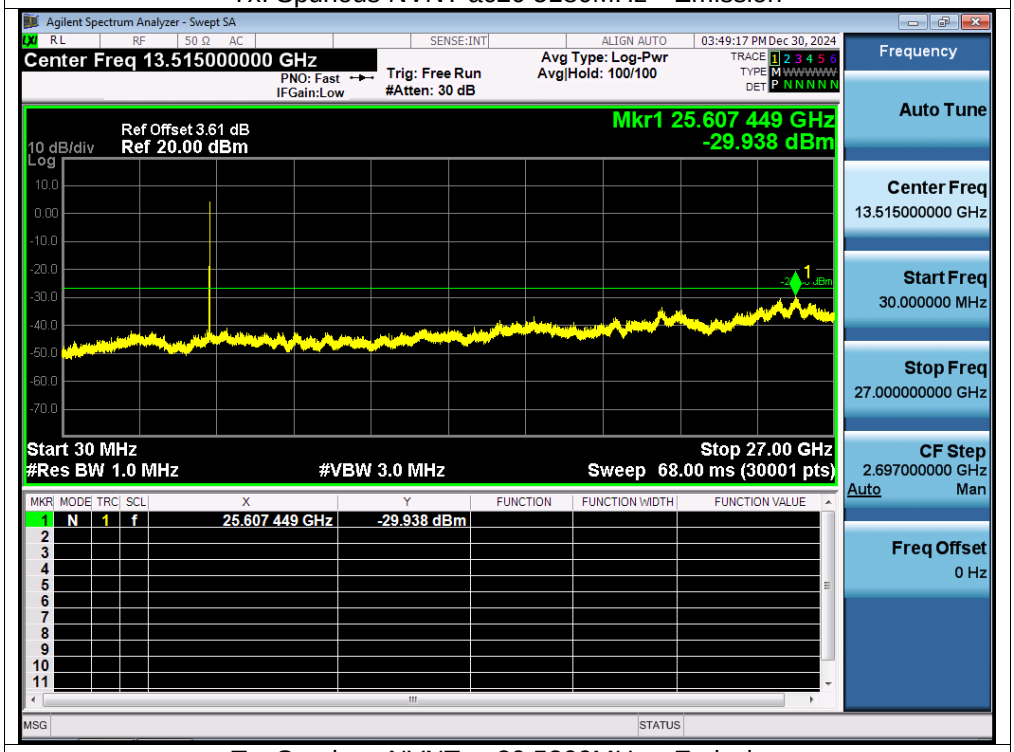
Tx. Spurious NVNT n20 5200MHz Emission

Tx. Spurious NVNT n20 5240MHz Emission

Tx. Spurious NVNT n40 5190MHz Emission

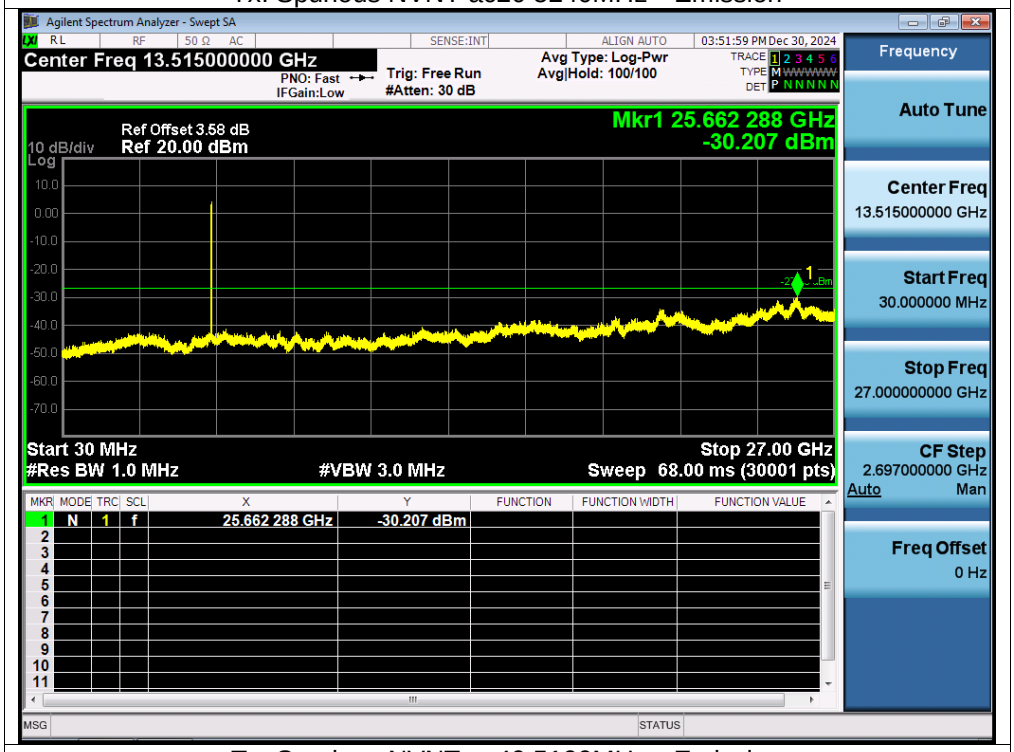
Tx. Spurious NVNT n40 5230MHz Emission

Tx. Spurious NVNT ac20 5180MHz Emission



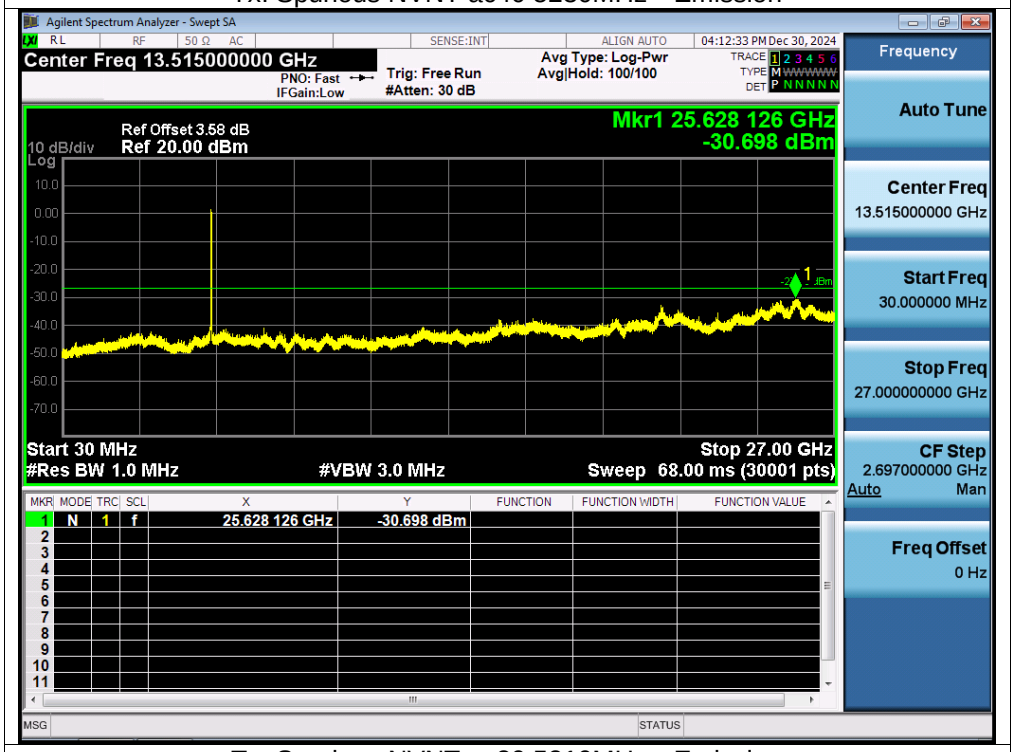
Tx. Spurious NVNT ac20 5200MHz Emission

Tx. Spurious NVNT ac20 5240MHz Emission



Tx. Spurious NVNT ac40 5190MHz Emission

Tx. Spurious NVNT ac40 5230MHz Emission



Tx. Spurious NVNT ac80 5210MHz Emission

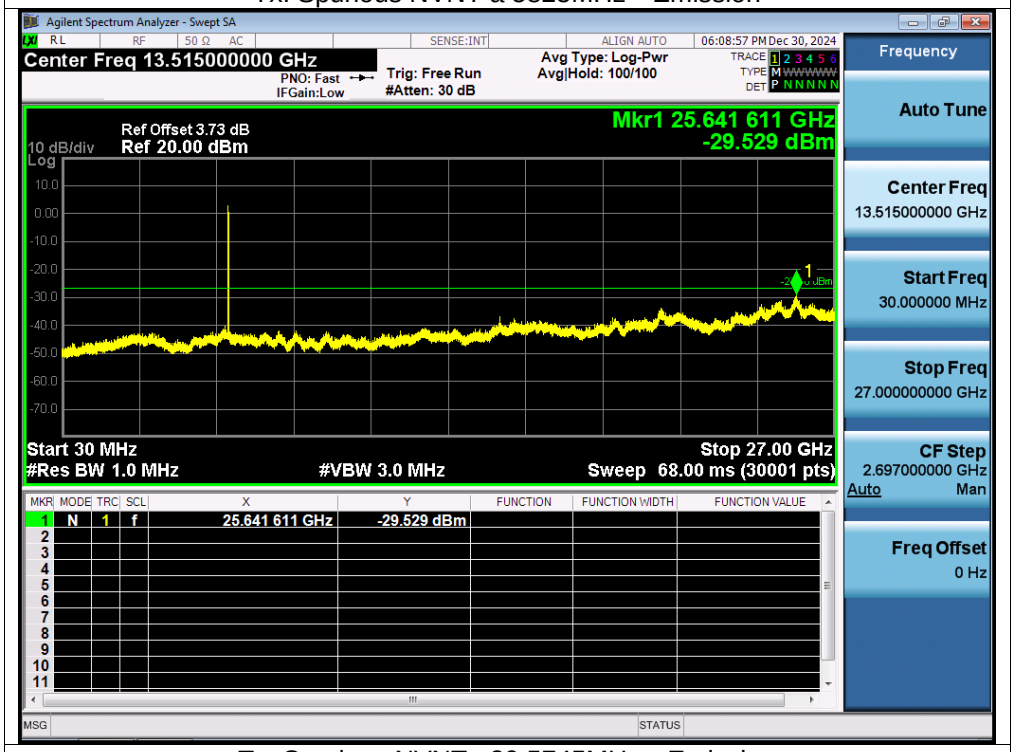
Note: A(B) Represent the value of antenna A and B, The worst data is Antenna A, only shown Antenna A Plot. 5745-58250MHz

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

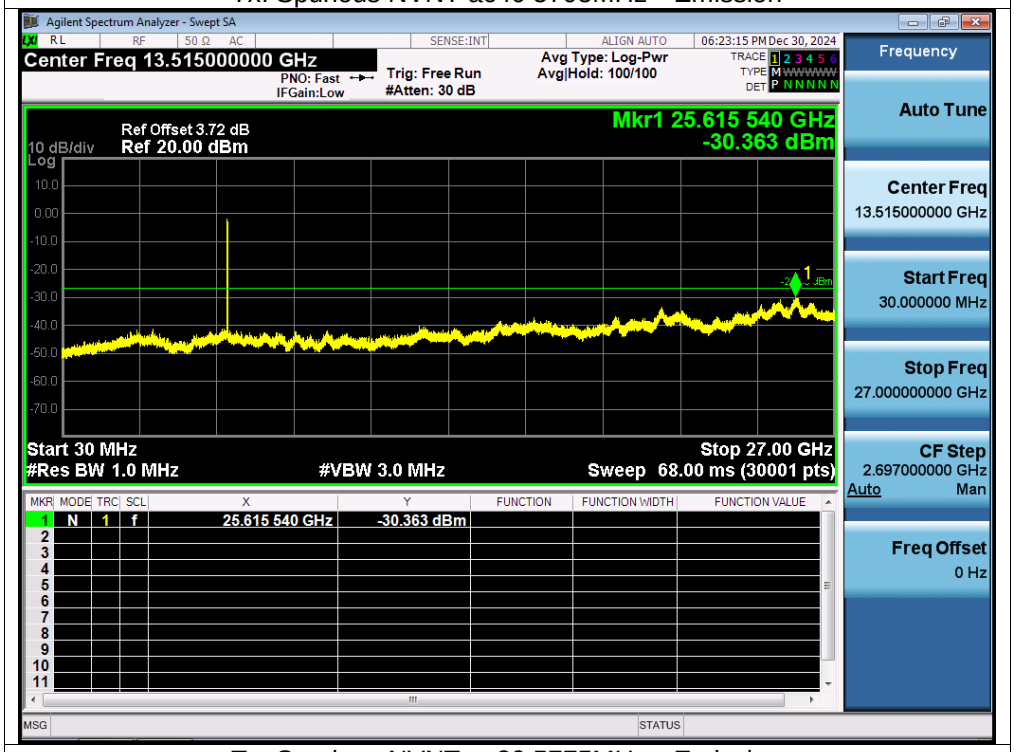
Tx. Spurious NVNT ac20 5745MHz Emission

Tx. Spurious NVNT ac20 5785MHz Emission

Tx. Spurious NVNT ac20 5825MHz Emission

Tx. Spurious NVNT ac40 5755MHz Emission

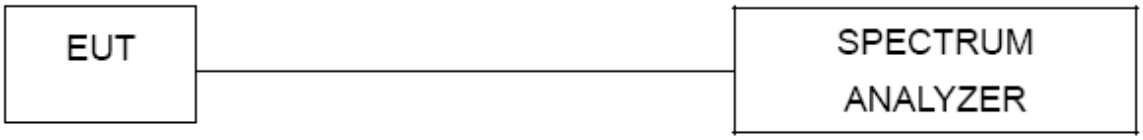
Tx. Spurious NVNT ac40 5795MHz Emission



Tx. Spurious NVNT ac80 5775MHz Emission

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	5180.0038	5180	0.0038	0.7336
		V max (V)	13.80	5180.0008	5180	0.0008	0.1544
		V min (V)	10.20	5180.0062	5180	0.0062	1.1969
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	5180.0003	5180	0.0003	0.0579
		T (°C)	-10	5180.0037	5180	0.0037	0.7143
		T (°C)	0	5180.0072	5180	0.0072	1.3900
		T (°C)	10	5180.0026	5180	0.0026	0.5019
		T (°C)	20	5180.0083	5180	0.0083	1.6023
		T (°C)	30	5180.0042	5180	0.0042	0.8108
		T (°C)	40	5180.0008	5180	0.0008	0.1544
		T (°C)	50	5180.0128	5180	0.0128	2.4710
		T (°C)	60	5180.0102	5180	0.0102	1.9691
		T (°C)	70	5180.0024	5180	0.0024	0.4633
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	5200.0128	5200	0.0128	2.4615
		V max (V)	13.80	5200.0048	5200	0.0048	0.9231
		V min (V)	10.20	5200.0042	5200	0.0042	0.8077
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	5200.00310	5200	0.00310	0.5962
		T (°C)	-10	5200.00730	5200	0.00730	1.4038
		T (°C)	0	5200.00690	5200	0.00690	1.3269
		T (°C)	10	5200.00060	5200	0.00060	0.1154
		T (°C)	20	5200.00230	5200	0.00230	0.4423
		T (°C)	30	5200.01030	5200	0.01030	1.9808
		T (°C)	40	5200.00230	5200	0.00230	0.4423
		T (°C)	50	5200.00540	5200	0.00540	1.0385
		T (°C)	60	5200.01180	5200	0.01180	2.2692
		T (°C)	70	5200.00130	5200	0.00130	0.2500
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	5240.0031	5240	0.0031	0.5916
		V max (V)	13.80	5240.0029	5240	0.0029	0.5534
		V min (V)	10.20	5240.0007	5240	0.0007	0.1336
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	5240.0116	5240	0.0116	2.2137
		T (°C)	-10	5240.0053	5240	0.0053	1.0115
		T (°C)	0	5240.0131	5240	0.0131	2.5000
		T (°C)	10	5240.0075	5240	0.0075	1.4313
		T (°C)	20	5240.0041	5240	0.0041	0.7824
		T (°C)	30	5240.0020	5240	0.0020	0.3817
		T (°C)	40	5240.0075	5240	0.0075	1.4313
		T (°C)	50	5240.0038	5240	0.0038	0.7252
		T (°C)	60	5240.0133	5240	0.0133	2.5382
		T (°C)	70	5240.0120	5240	0.0120	2.2901
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	5745.01050	5745	0.01050	1.8277
		V max (V)	13.80	5745.00690	5745	0.00690	1.2010
		V min (V)	10.20	5745.00380	5745	0.00380	0.6614
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	5745.00650	5745	0.00650	1.1314
		T (°C)	-10	5745.00540	5745	0.00540	0.9399
		T (°C)	0	5745.00140	5745	0.00140	0.2437
		T (°C)	10	5745.00900	5745	0.00900	1.5666
		T (°C)	20	5745.00850	5745	0.00850	1.4795
		T (°C)	30	5745.00900	5745	0.00900	1.5666
		T (°C)	40	5745.01210	5745	0.01210	2.1062
		T (°C)	50	5745.00390	5745	0.00390	0.6789
		T (°C)	60	5745.01150	5745	0.01150	2.0017
		T (°C)	70	5745.00340	5745	0.00340	0.5918
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	5785.00160	5785	0.00160	0.2766
		V max (V)	13.80	5785.01070	5785	0.01070	1.8496
		V min (V)	10.20	5785.00320	5785	0.00320	0.5532
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	5785.01010	5785	0.01010	1.7459
		T (°C)	-10	5785.00130	5785	0.00130	0.2247
		T (°C)	0	5785.01030	5785	0.01030	1.7805
		T (°C)	10	5785.00410	5785	0.00410	0.7087
		T (°C)	20	5785.01280	5785	0.01280	2.2126
		T (°C)	30	5785.00660	5785	0.00660	1.1409
		T (°C)	40	5785.00480	5785	0.00480	0.8297
		T (°C)	50	5785.00120	5785	0.00120	0.2074
		T (°C)	60	5785.00520	5785	0.00520	0.8989
		T (°C)	70	5785.01190	5785	0.01190	2.0570
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	5825.01020	5825	0.01020	1.7511
		V max (V)	13.80	5825.00240	5825	0.00240	0.4120
		V min (V)	10.20	5825.01310	5825	0.01310	2.2489
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	5825.00730	5825	0.00730	1.2532
		T (°C)	-10	5825.00540	5825	0.00540	0.9270
		T (°C)	0	5825.00700	5825	0.00700	1.2017
		T (°C)	10	5825.00420	5825	0.00420	0.7210
		T (°C)	20	5825.00950	5825	0.00950	1.6309
		T (°C)	30	5825.00880	5825	0.00880	1.5107
		T (°C)	40	5825.00470	5825	0.00470	0.8069
		T (°C)	50	5825.00090	5825	0.00090	0.1545
		T (°C)	60	5825.00190	5825	0.00190	0.3262
		T (°C)	70	5825.01230	5825	0.01230	2.1116
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

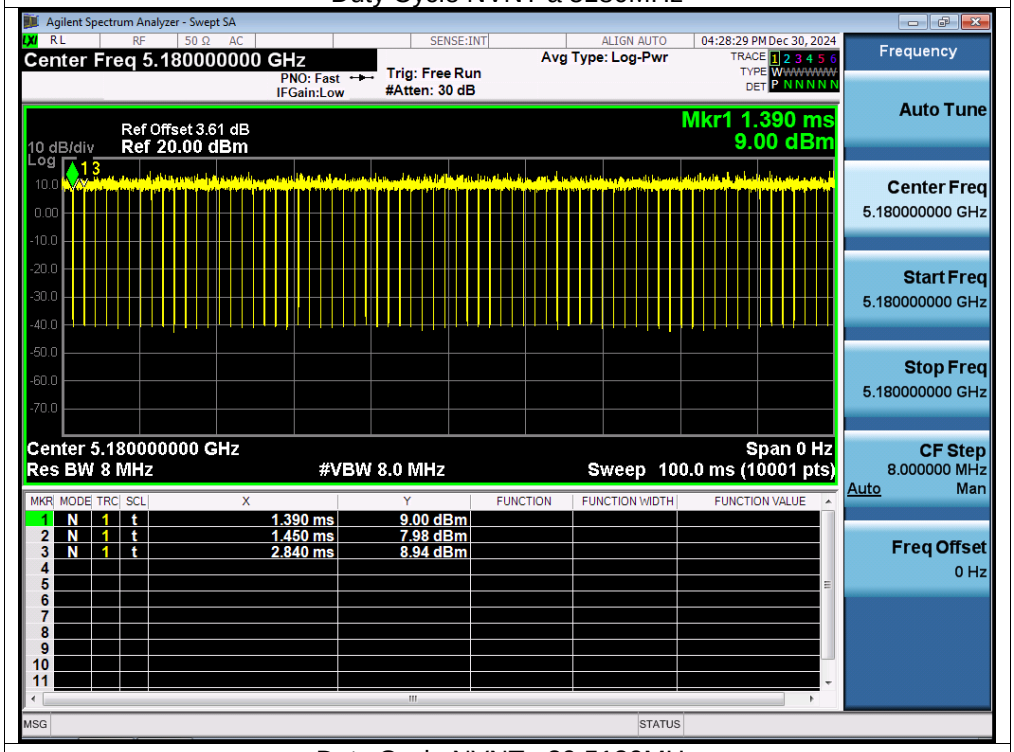
14.4 Test Result

ANT A

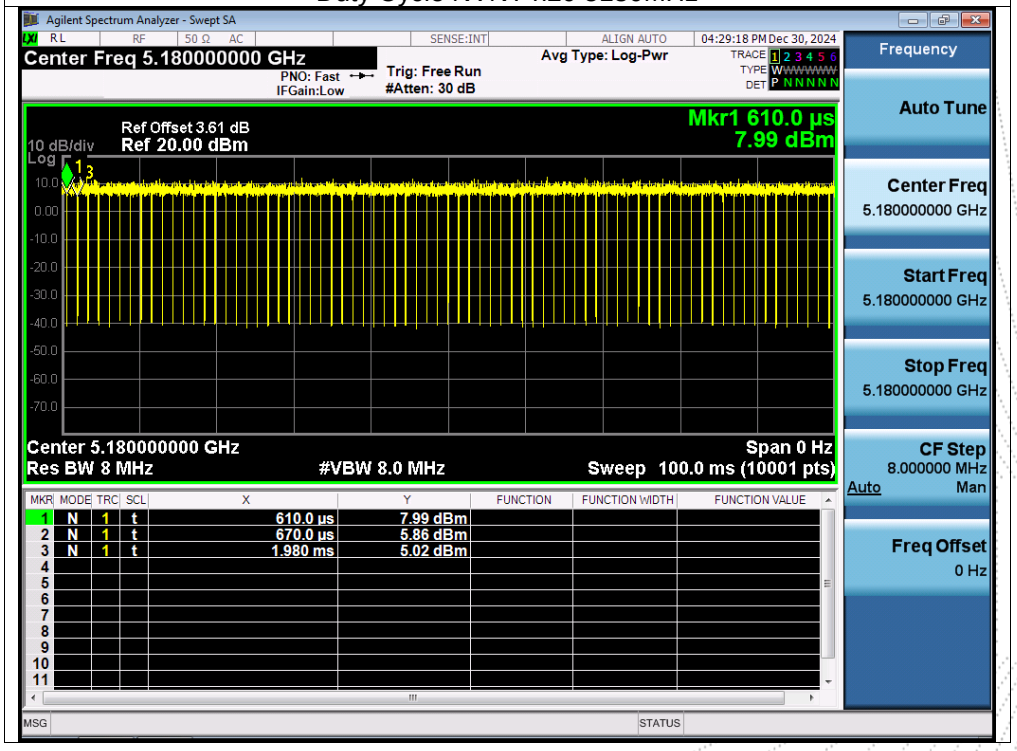
Condition	Mode	Frequency (MHz)	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	a	5200	95.86	0.18	0.72
NVNT	n20	5200	95.62	0.19	0.76
NVNT	n40	5190	91.67	0.38	1.52
NVNT	ac20	5200	95.65	0.19	0.76
NVNT	ac40	5190	91.55	0.38	1.54
NVNT	ac80	5210	84.21	0.75	3.13

Test Graphs

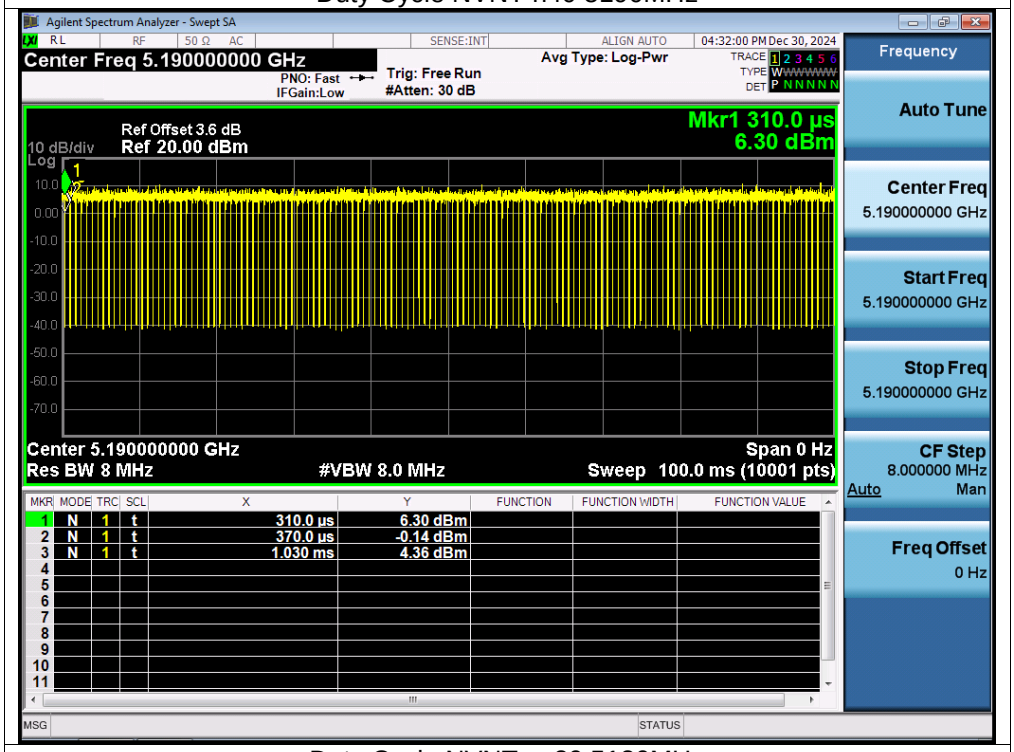
Duty Cycle NVNT a 5180MHz



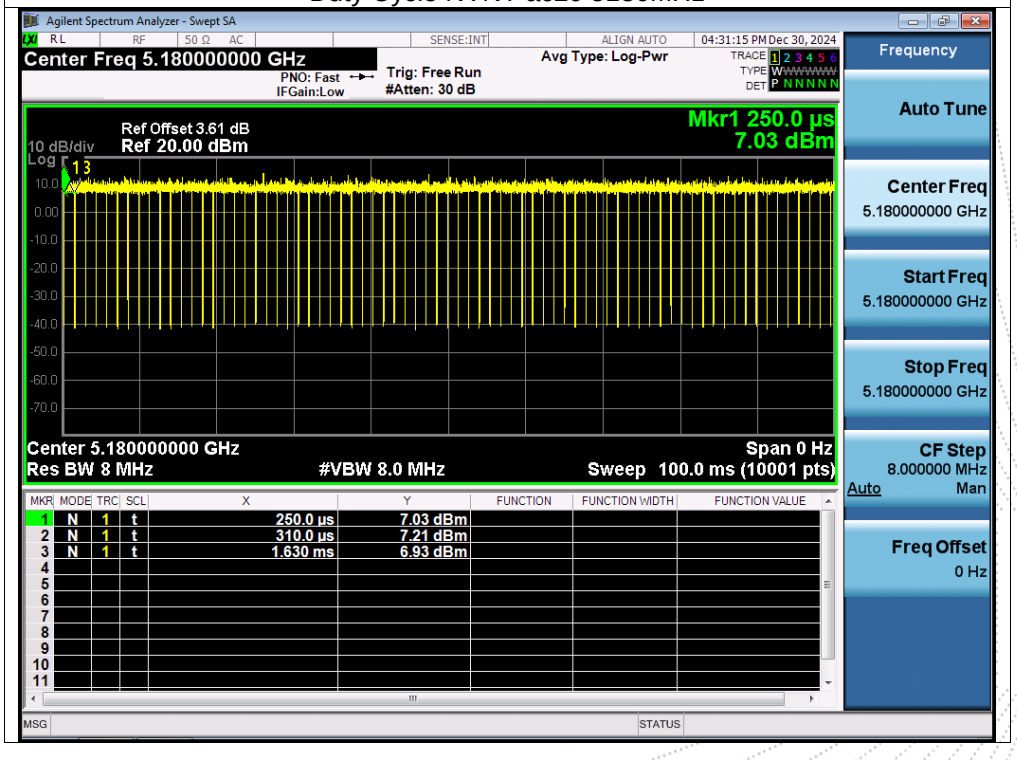
Duty Cycle NVNT n20 5180MHz



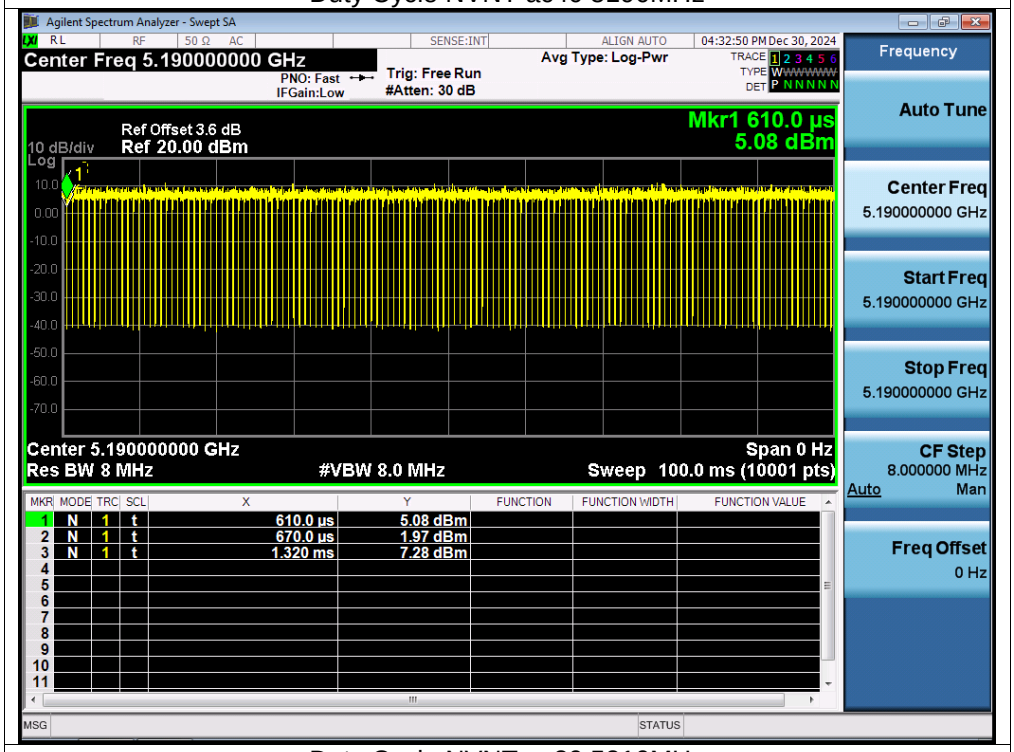
Duty Cycle NVNT n40 5190MHz



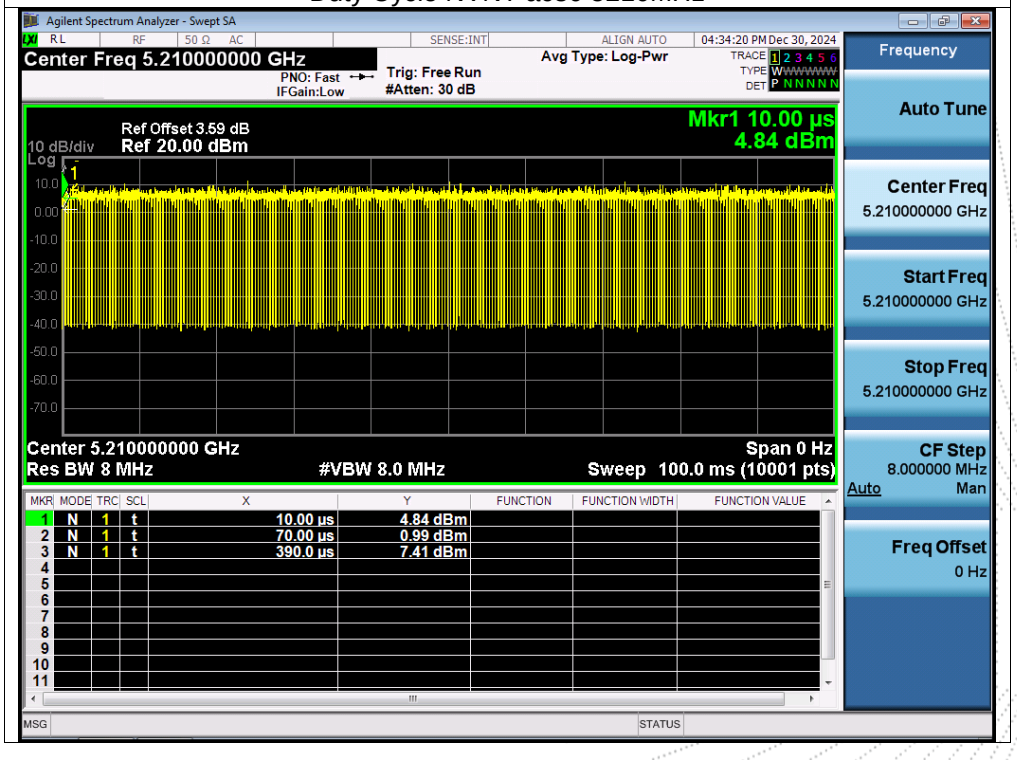
Duty Cycle NVNT ac20 5180MHz



Duty Cycle NVNT ac40 5190MHz



Duty Cycle NVNT ac80 5210MHz

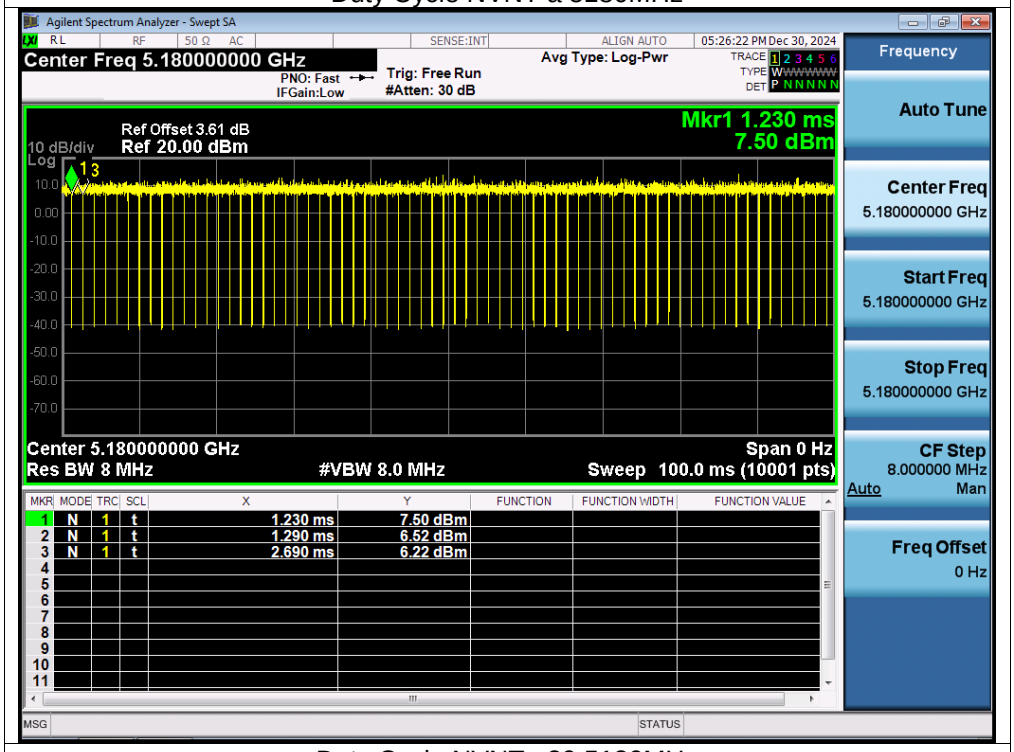


ANT B

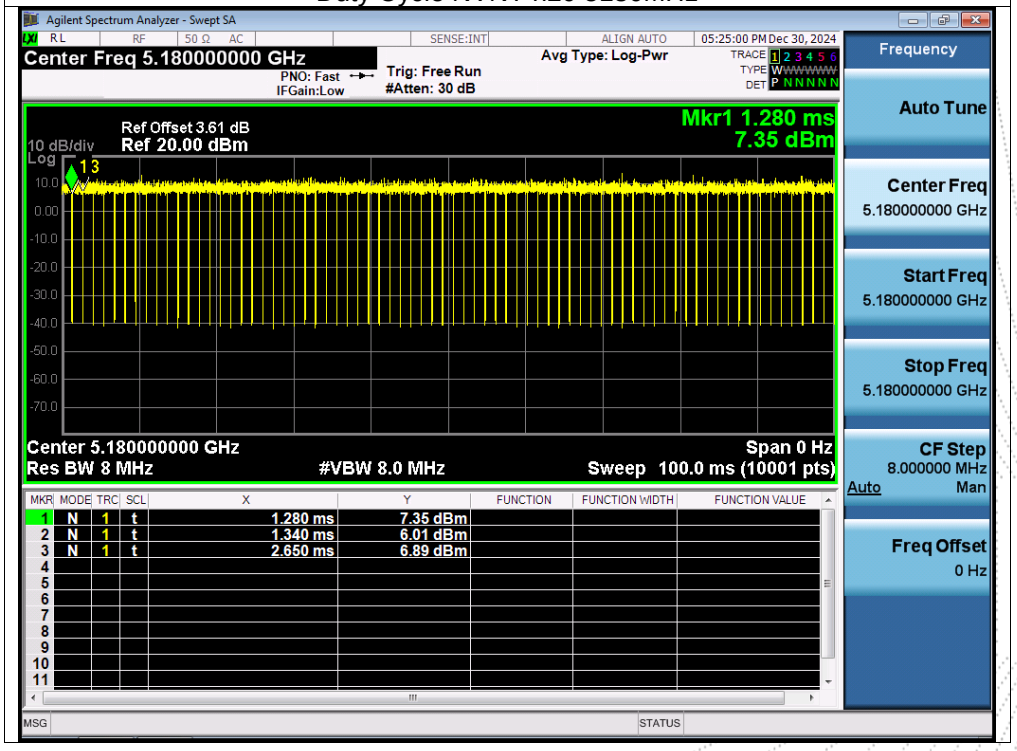
Condition	Mode	Frequency (MHz)	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	a	5200	95.89	0.18	0.71
NVNT	n20	5200	95.62	0.19	0.76
NVNT	n40	5190	91.55	0.38	1.54
NVNT	ac20	5200	95.65	0.19	0.76
NVNT	ac40	5190	91.55	0.38	1.54
NVNT	ac80	5210	84.62	0.73	3.03

Test Graphs

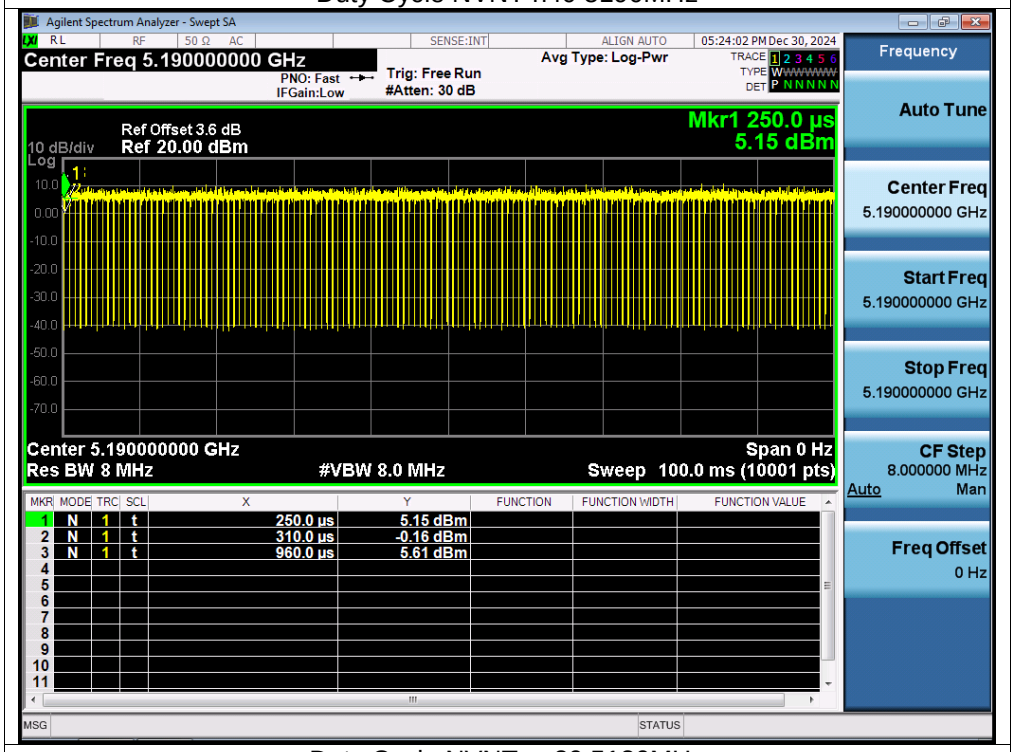
Duty Cycle NVNT a 5180MHz



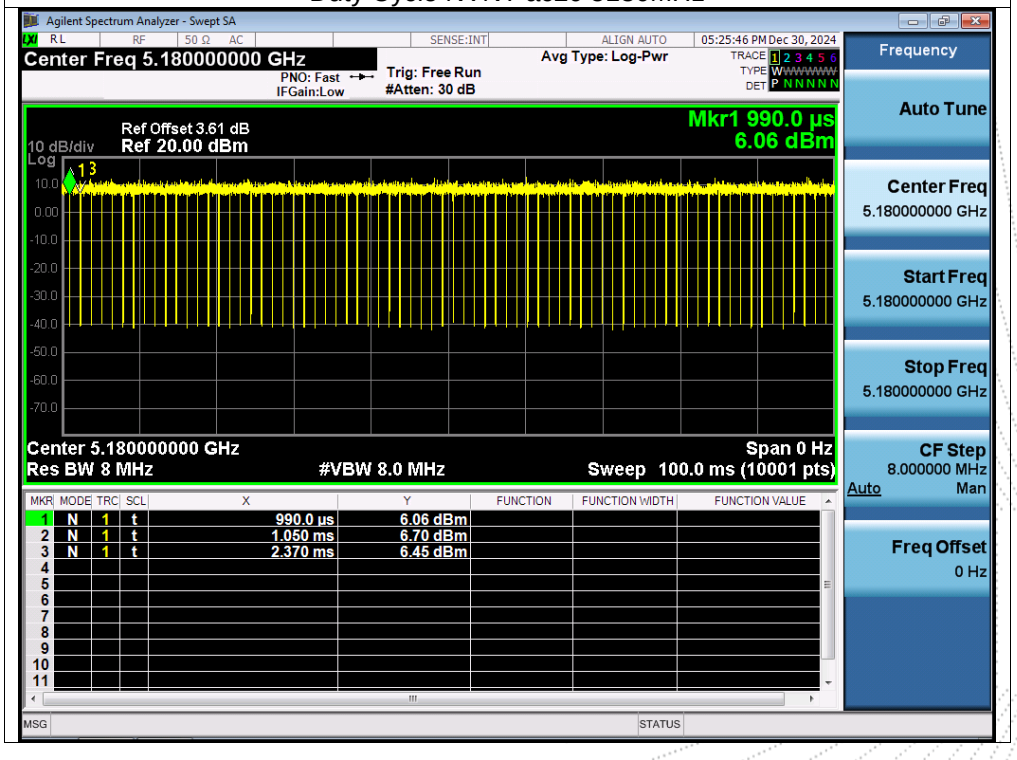
Duty Cycle NVNT n20 5180MHz



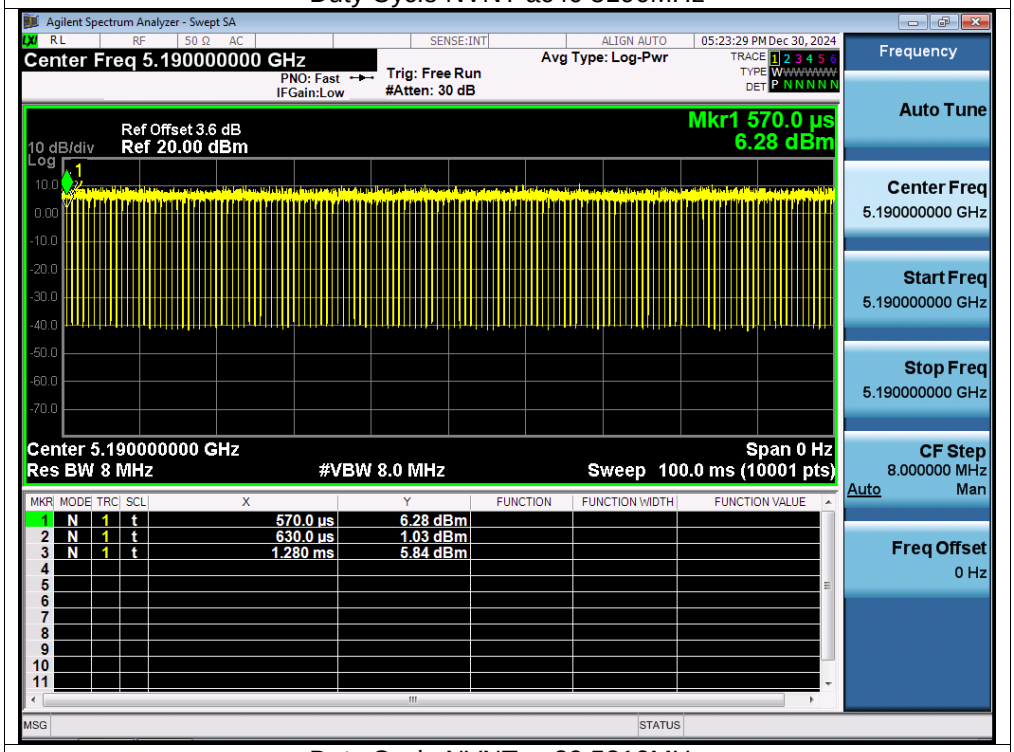
Duty Cycle NVNT n40 5190MHz



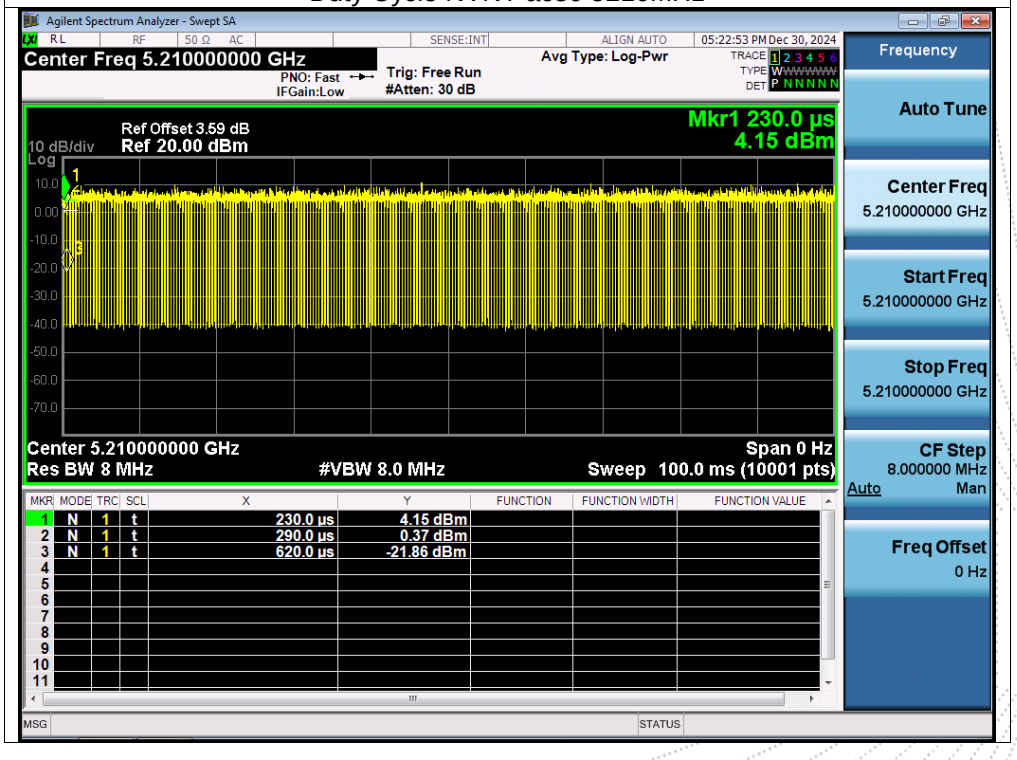
Duty Cycle NVNT ac20 5180MHz



Duty Cycle NVNT ac40 5190MHz



Duty Cycle NVNT ac80 5210MHz

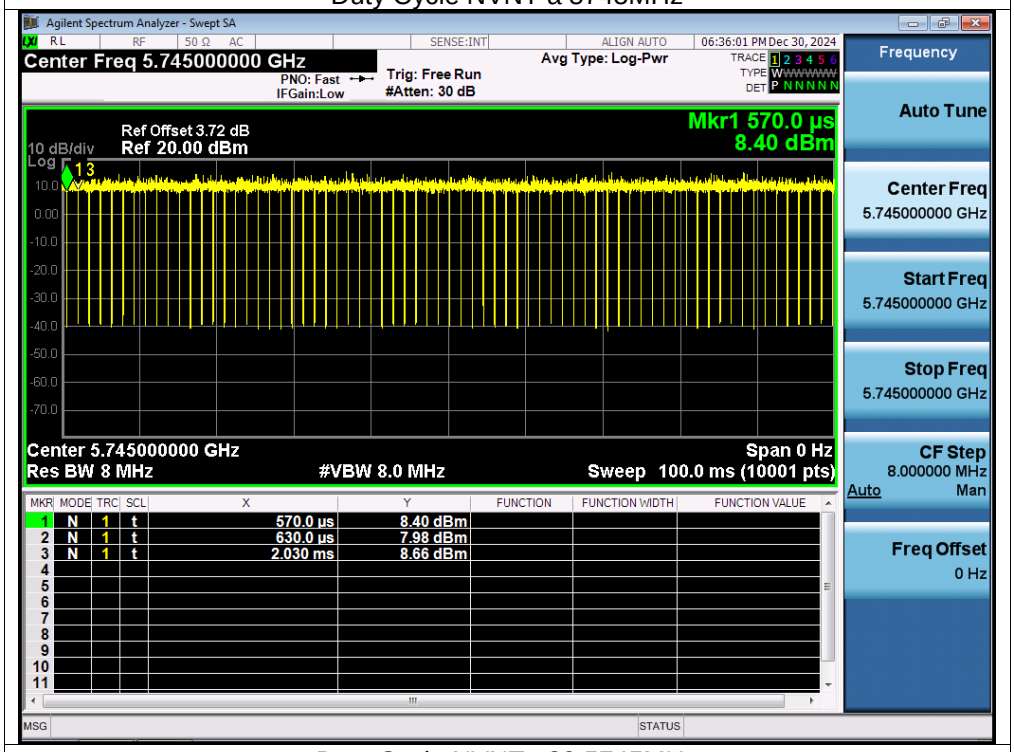


ANT A

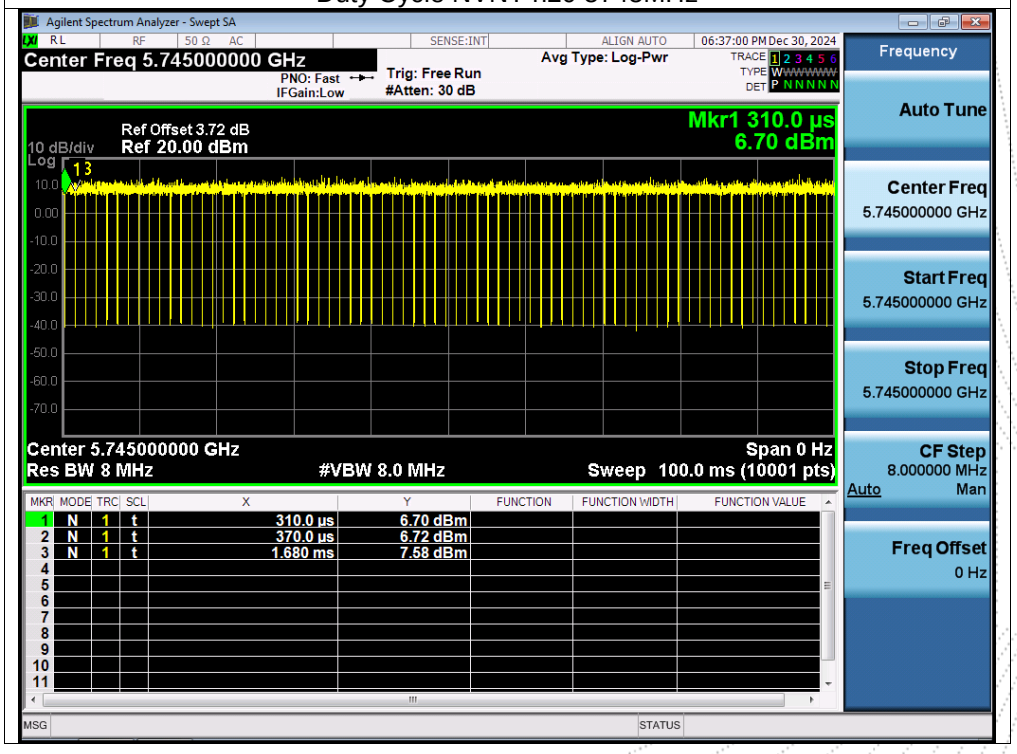
Condition	Mode	Frequency (MHz)	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	a	5785	95.89	0.18	0.71
NVNT	n20	5785	95.62	0.19	0.76
NVNT	n40	5755	91.67	0.38	1.52
NVNT	ac20	5785	95.59	0.2	0.77
NVNT	ac40	5755	91.67	0.38	1.52
NVNT	ac80	5775	84.21	0.75	3.13

Test Graphs

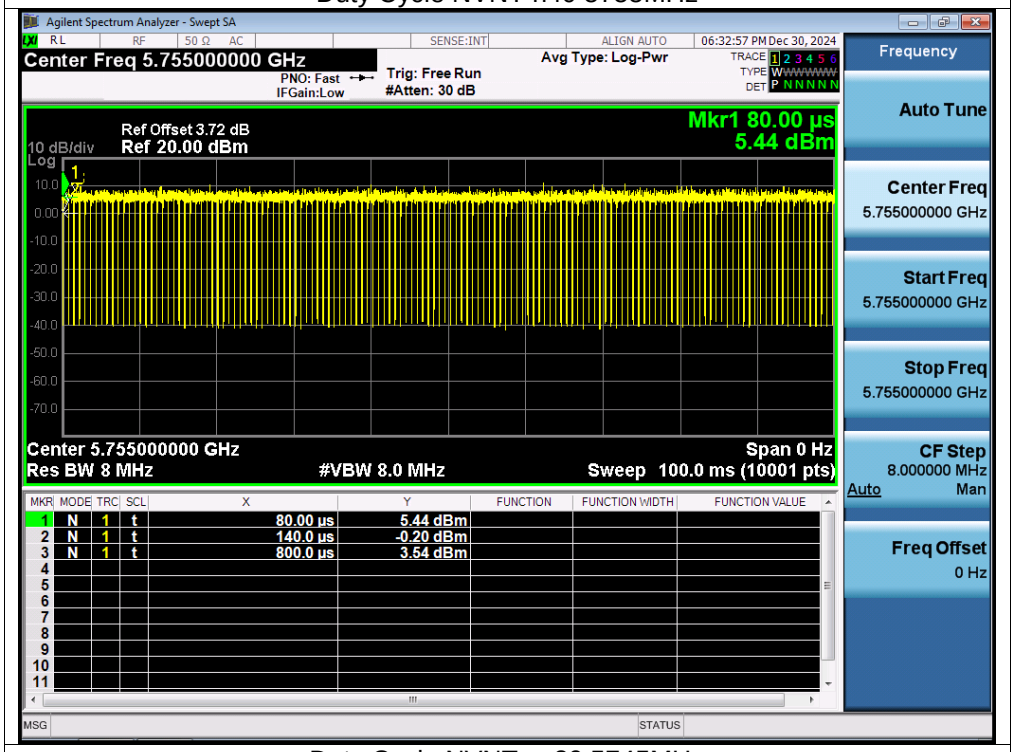
Duty Cycle NVNT a 5745MHz



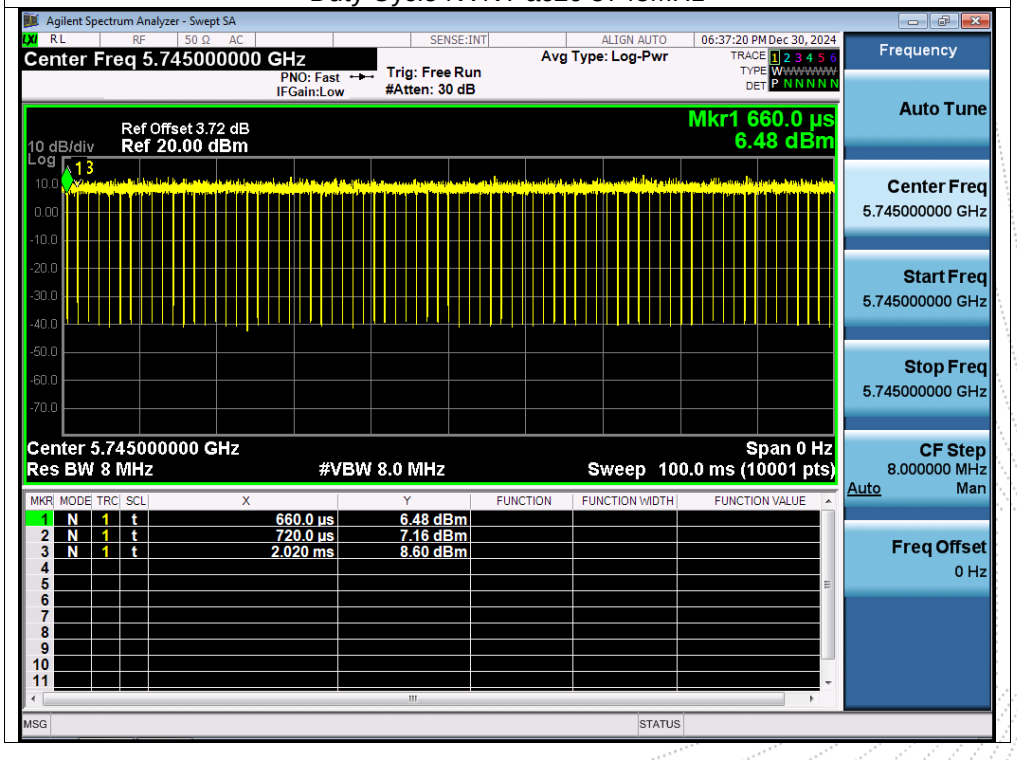
Duty Cycle NVNT n20 5745MHz



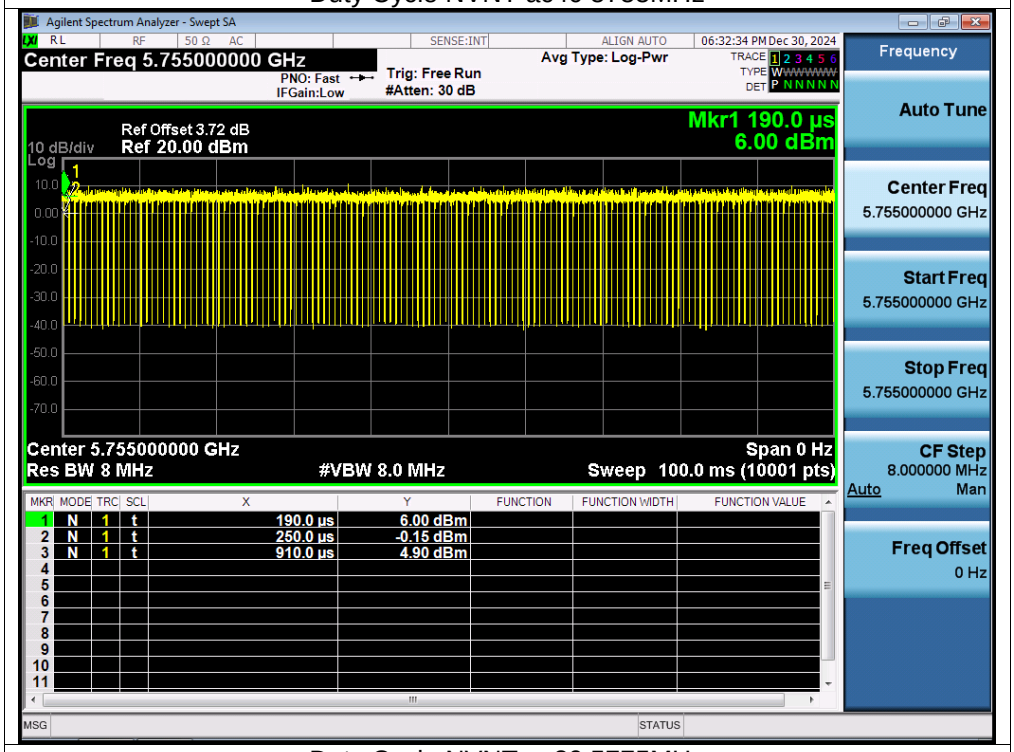
Duty Cycle NVNT n40 5755MHz



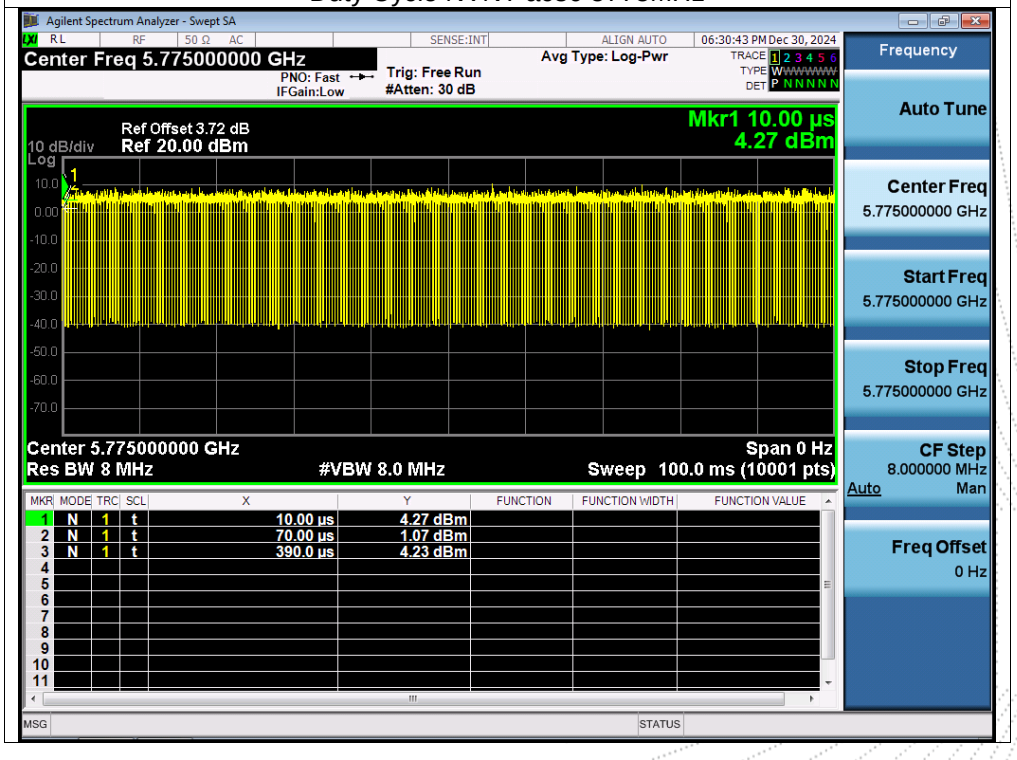
Duty Cycle NVNT ac20 5745MHz



Duty Cycle NVNT ac40 5755MHz



Duty Cycle NVNT ac80 5775MHz

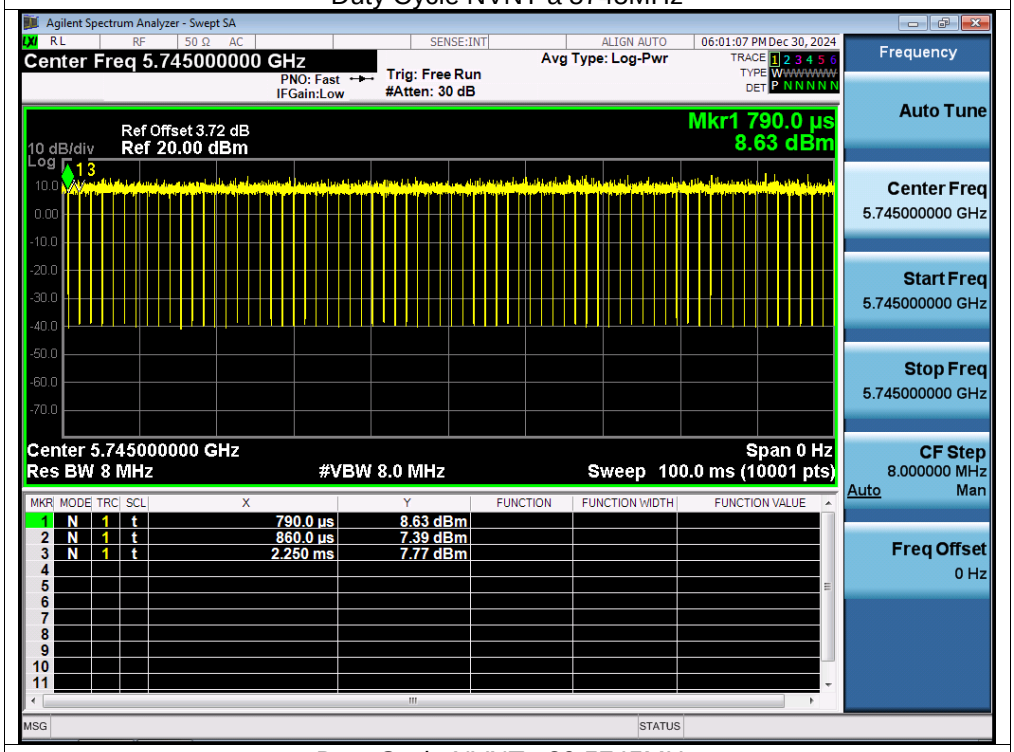
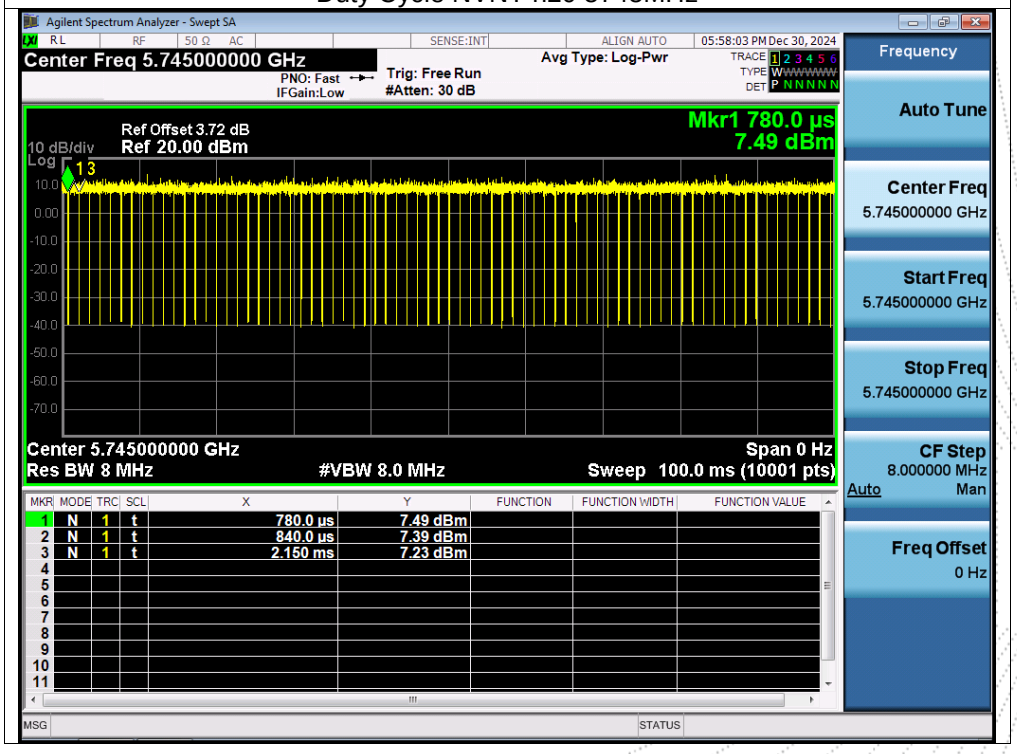


ANT B

Condition	Mode	Frequency (MHz)	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	a	5785	95.21	0.21	0.72
NVNT	n20	5785	95.62	0.19	0.76
NVNT	n40	5755	91.55	0.38	1.54
NVNT	ac20	5785	95.62	0.19	0.76
NVNT	ac40	5755	91.55	0.38	1.54
NVNT	ac80	5775	84.62	0.73	3.03

Test Graphs

Duty Cycle NVNT a 5745MHz



Duty Cycle NVNT n20 5745MHz