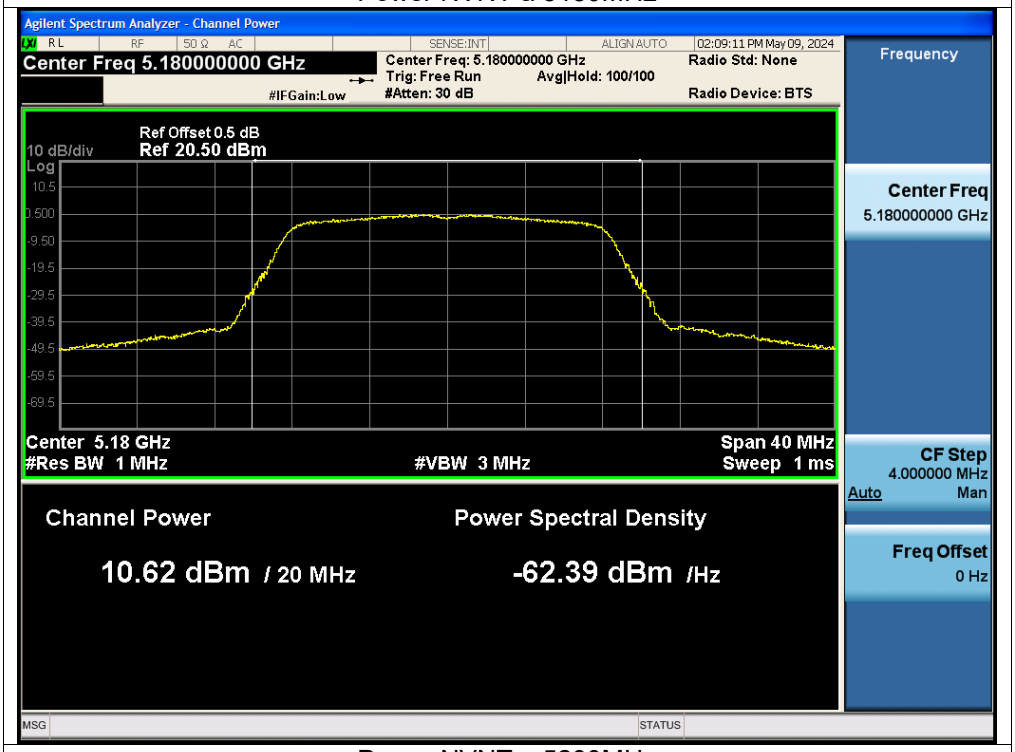
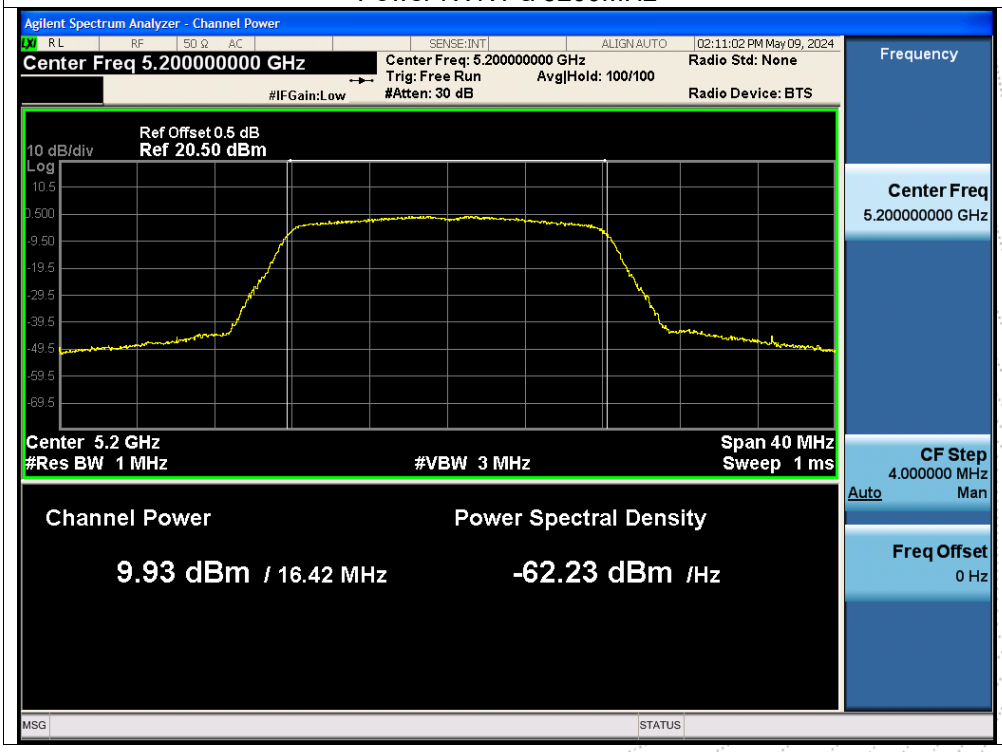
Test Graphs

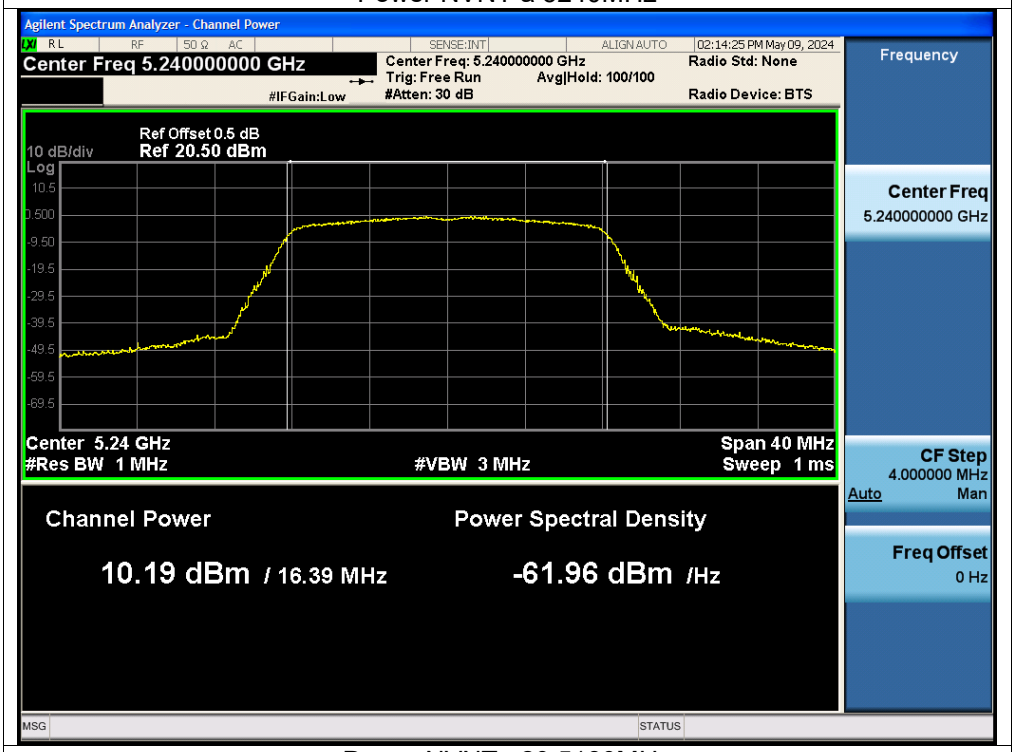
Power NVNT a 5180MHz



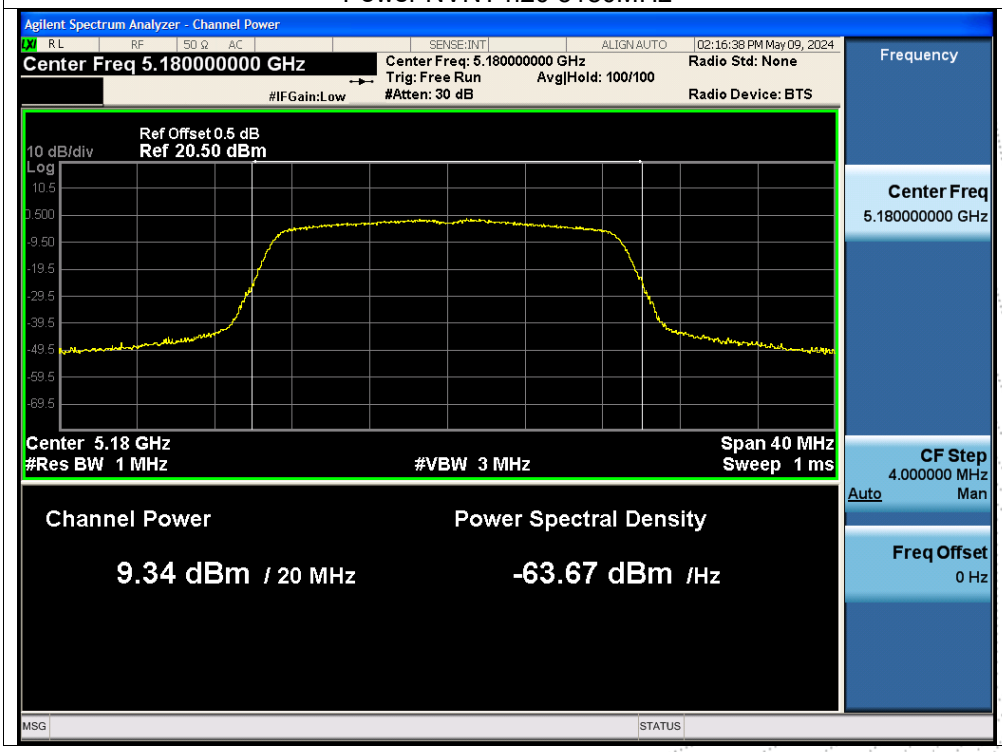
Power NVNT a 5200MHz



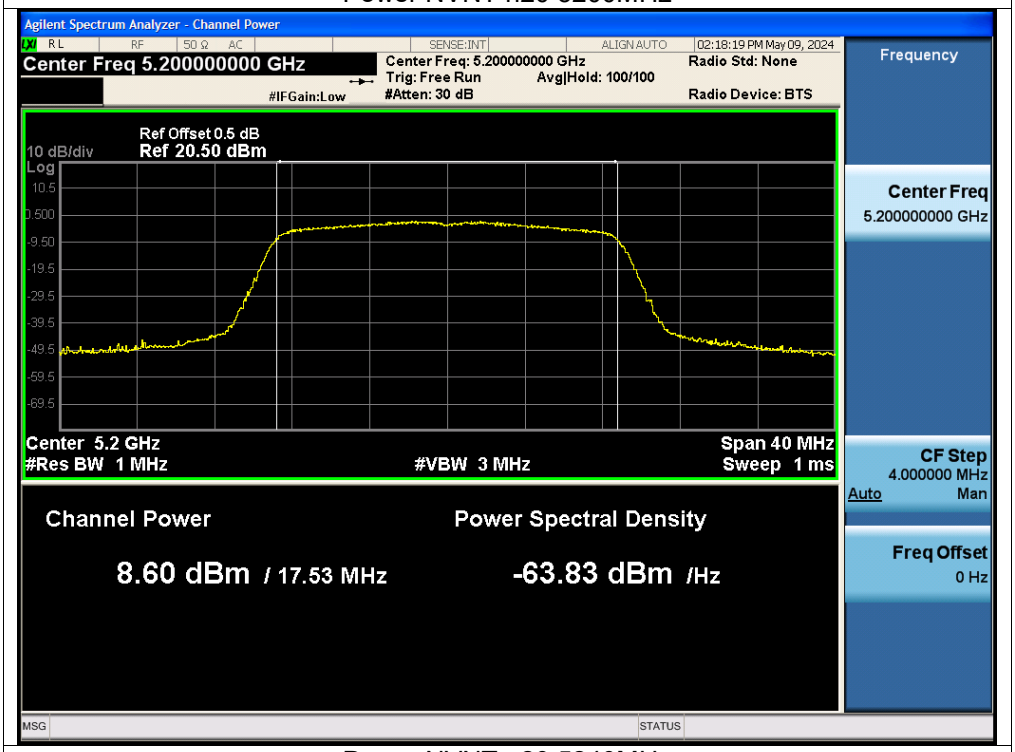
Power NVNT a 5240MHz



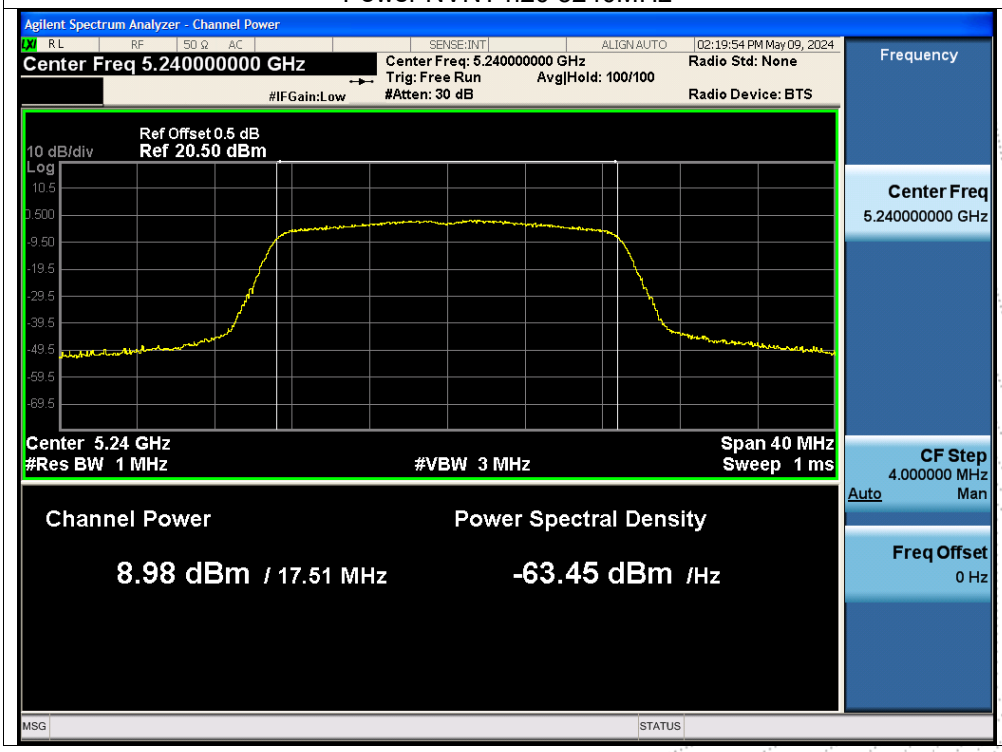
Power NVNT n20 5180MHz



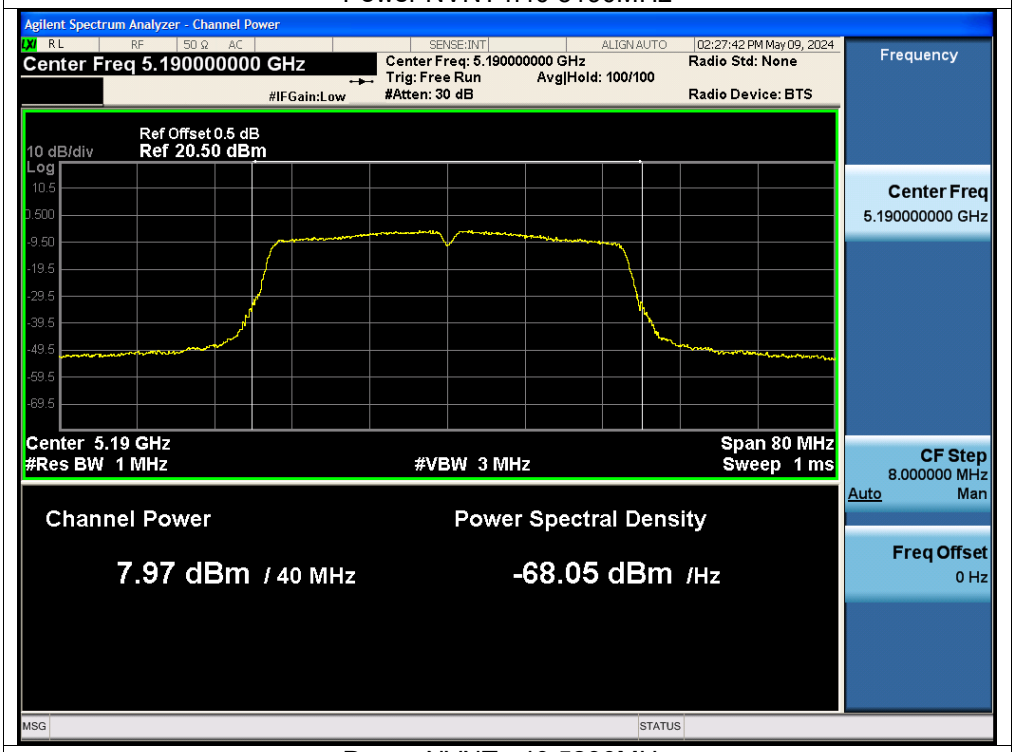
Power NVNT n20 5200MHz



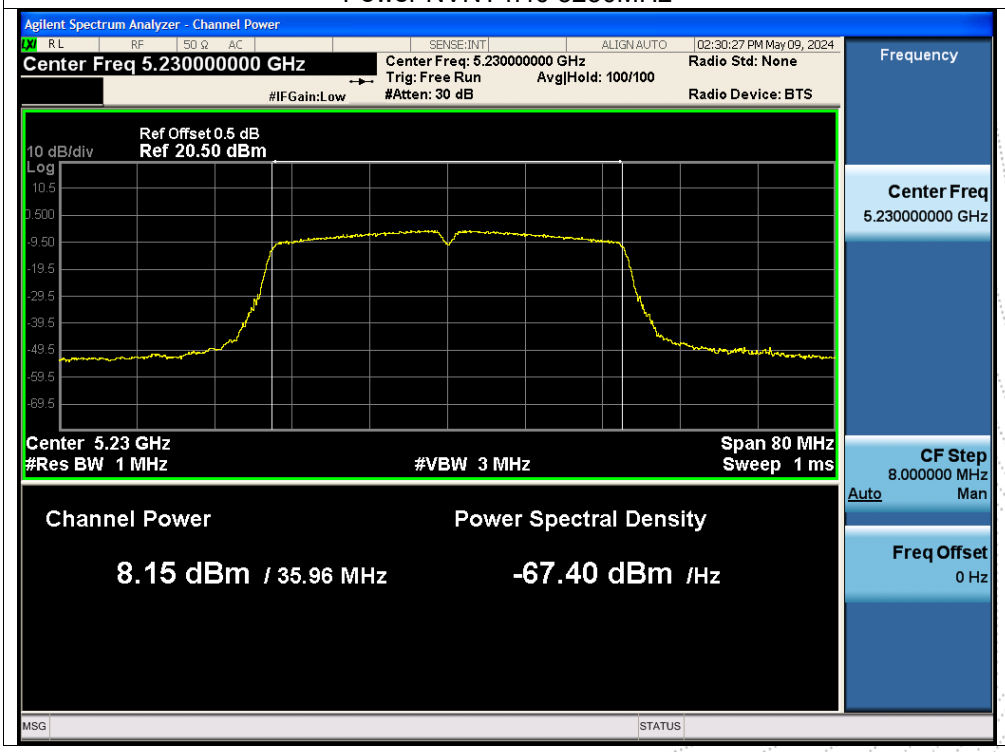
Power NVNT n20 5240MHz



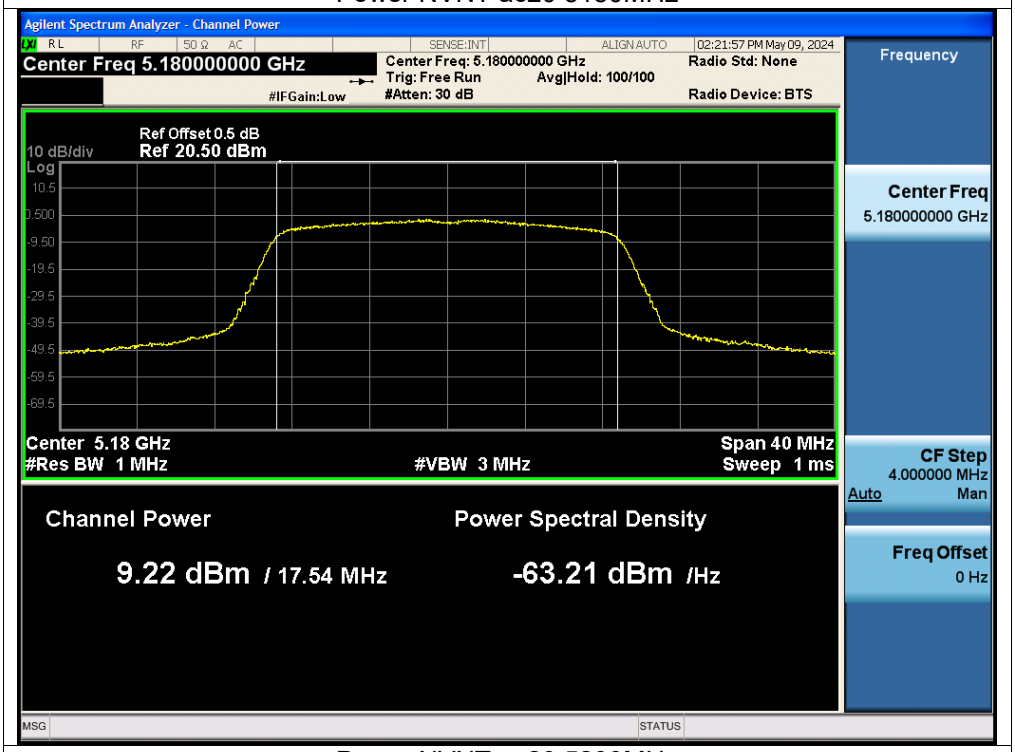
Power NVNT n40 5190MHz



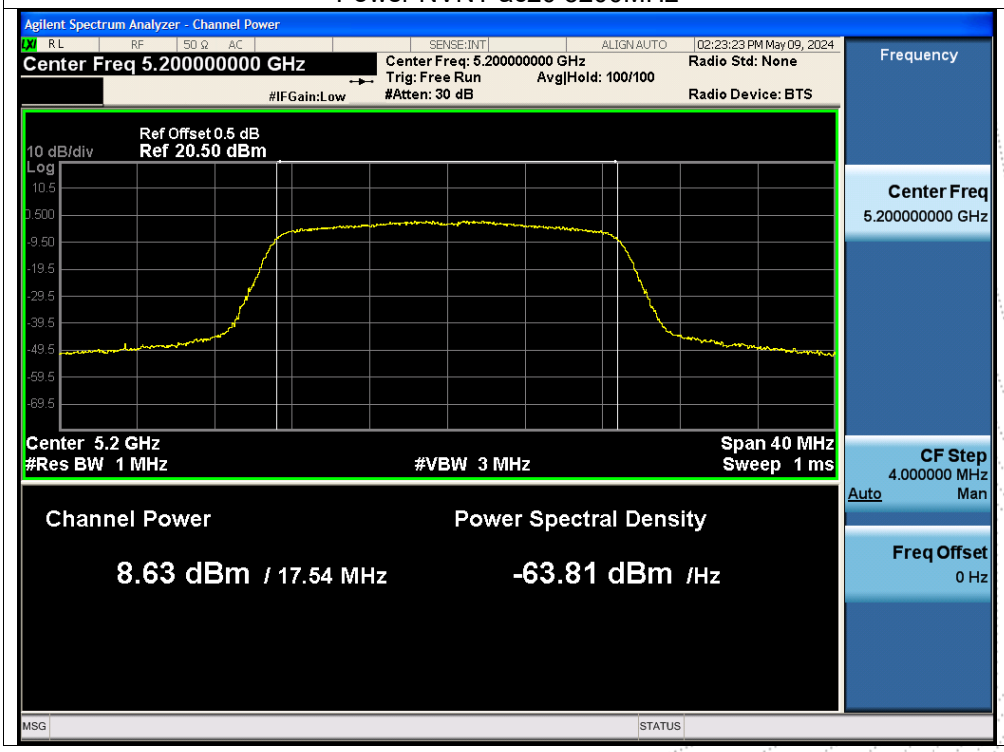
Power NVNT n40 5230MHz



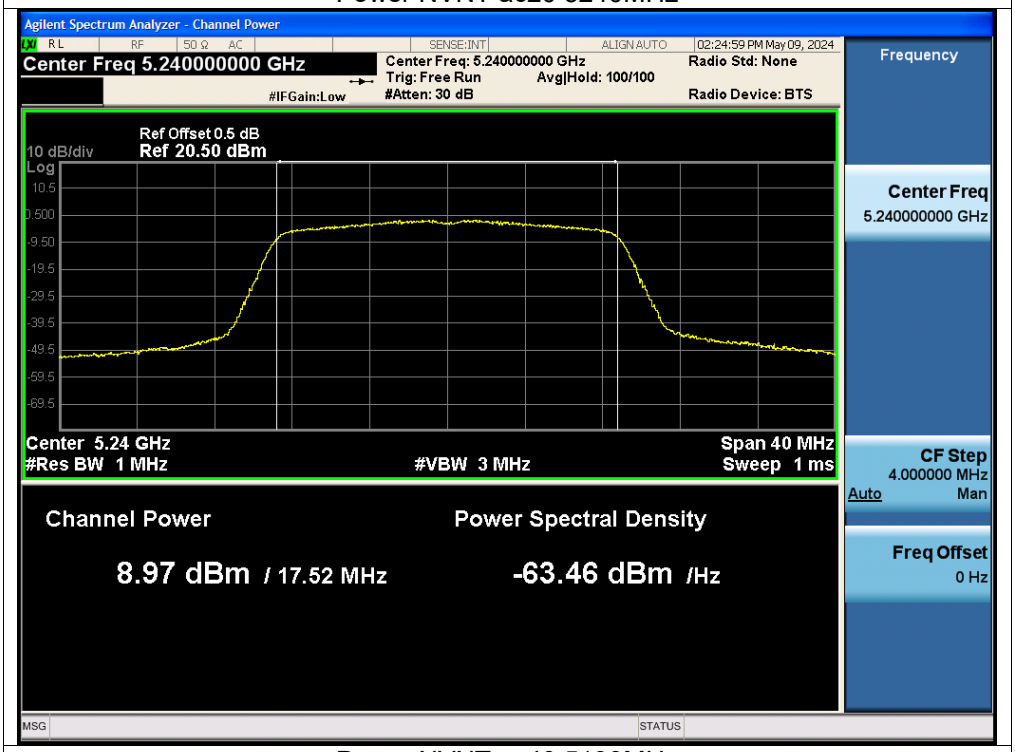
Power NVNT ac20 5180MHz



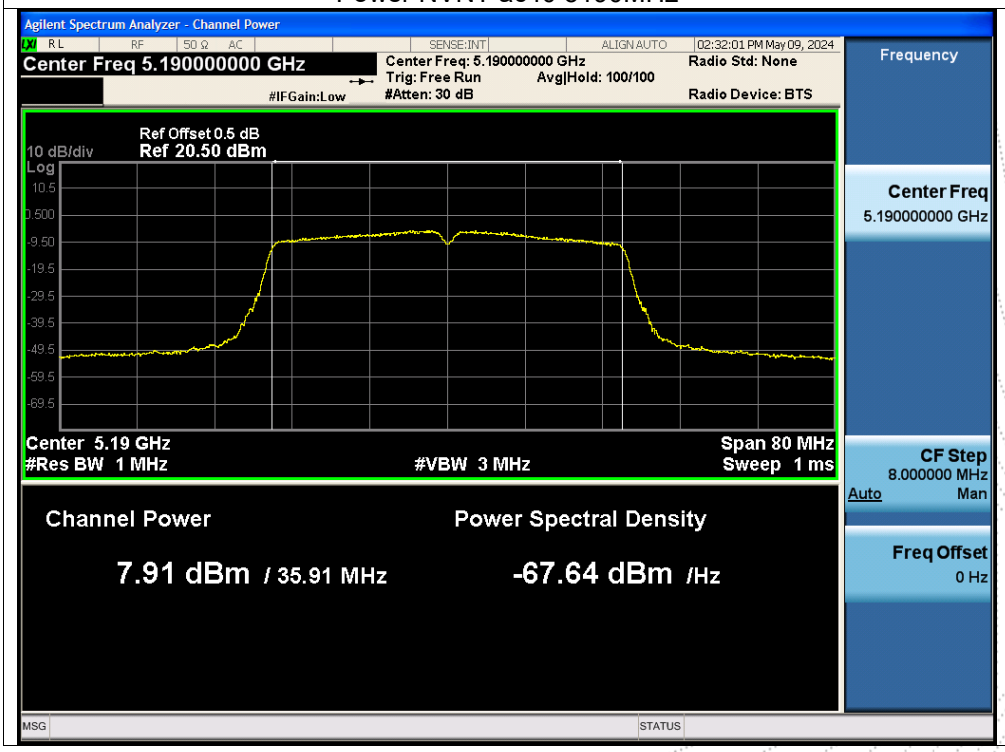
Power NVNT ac20 5200MHz



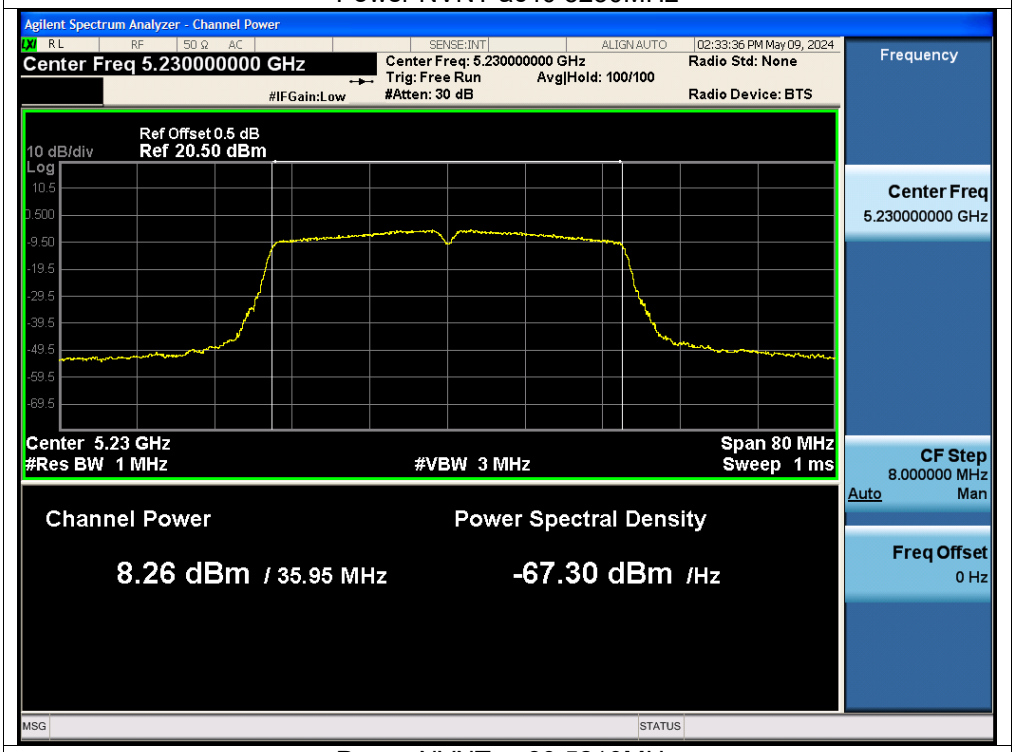
Power NVNT ac20 5240MHz



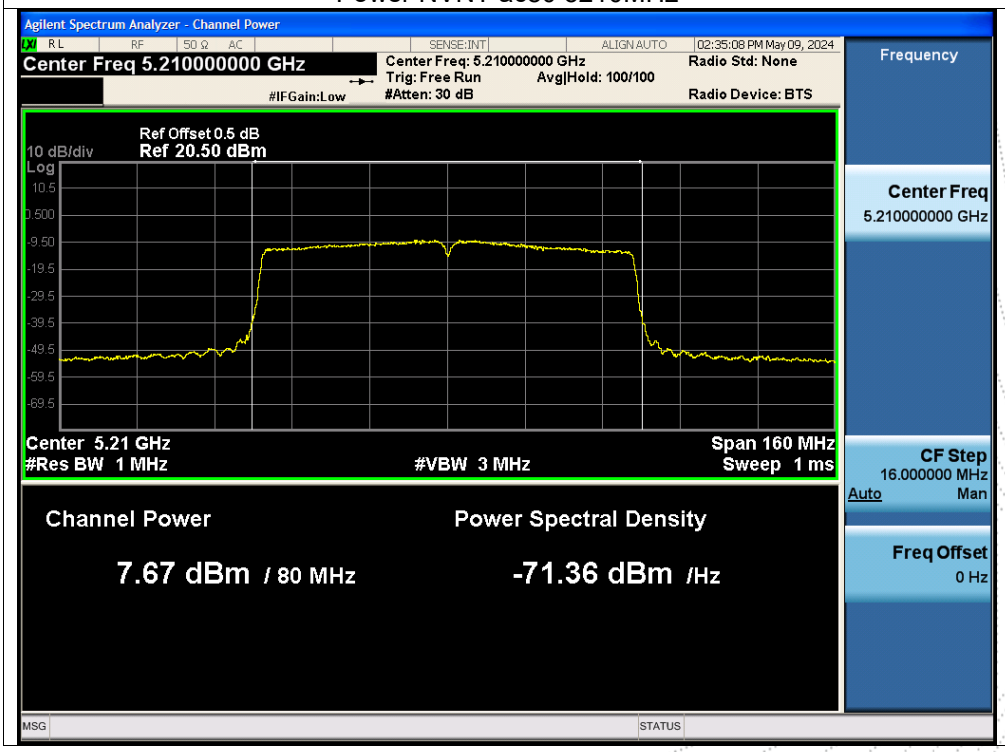
Power NVNT ac40 5190MHz



Power NVNT ac40 5230MHz

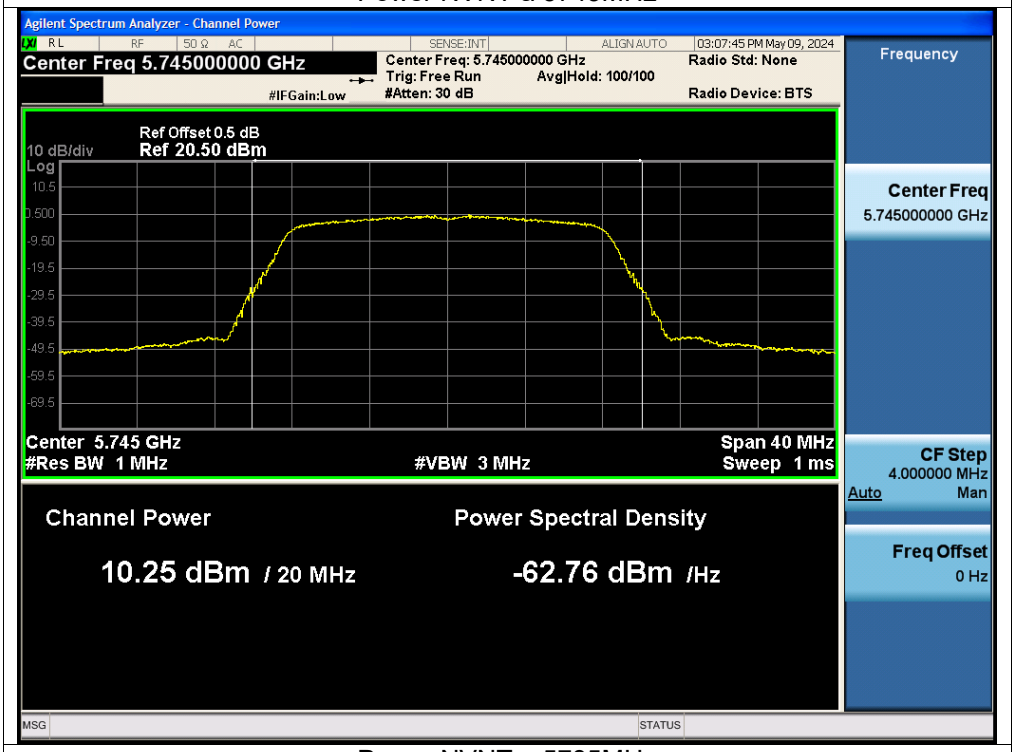


Power NVNT ac80 5210MHz

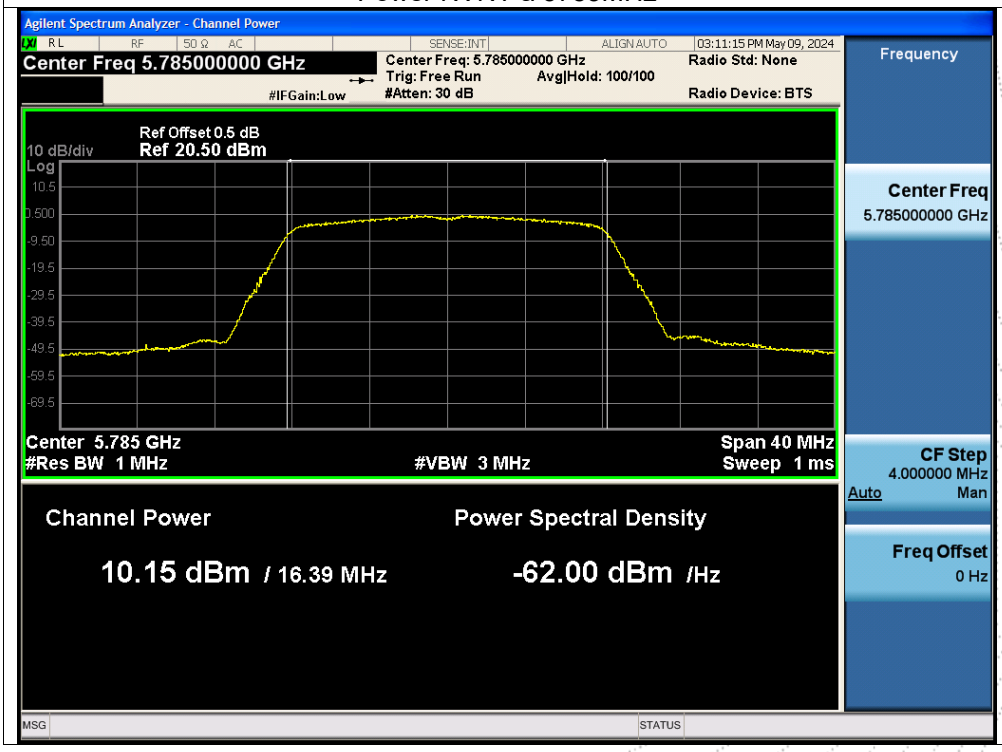


Test Graphs

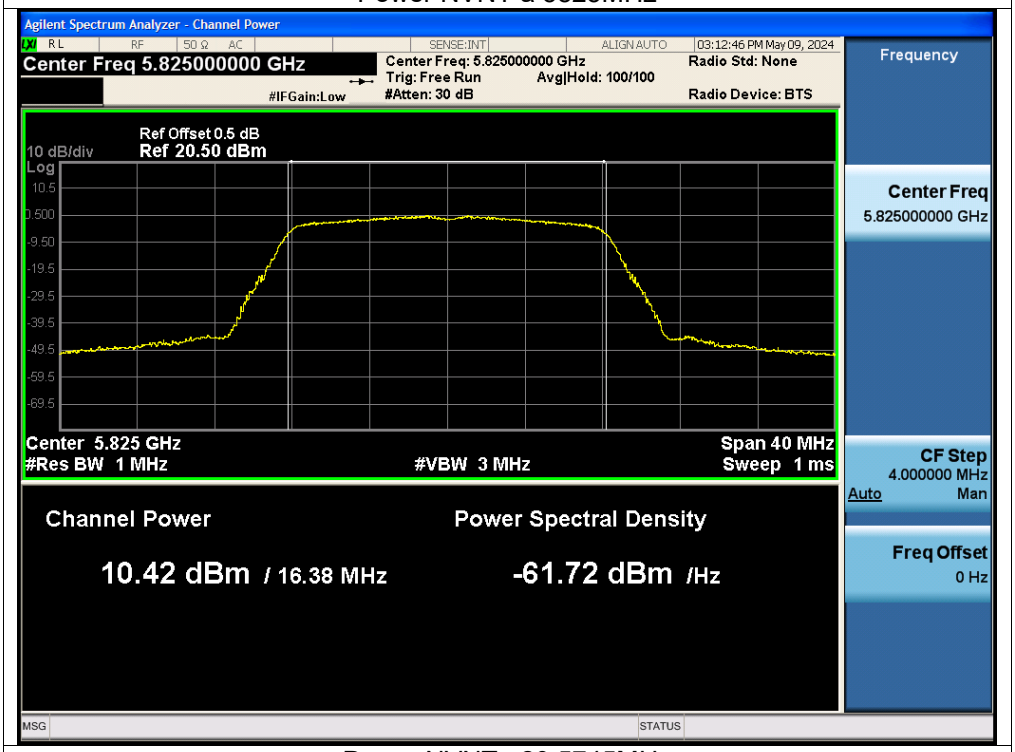
Power NVNT a 5745MHz



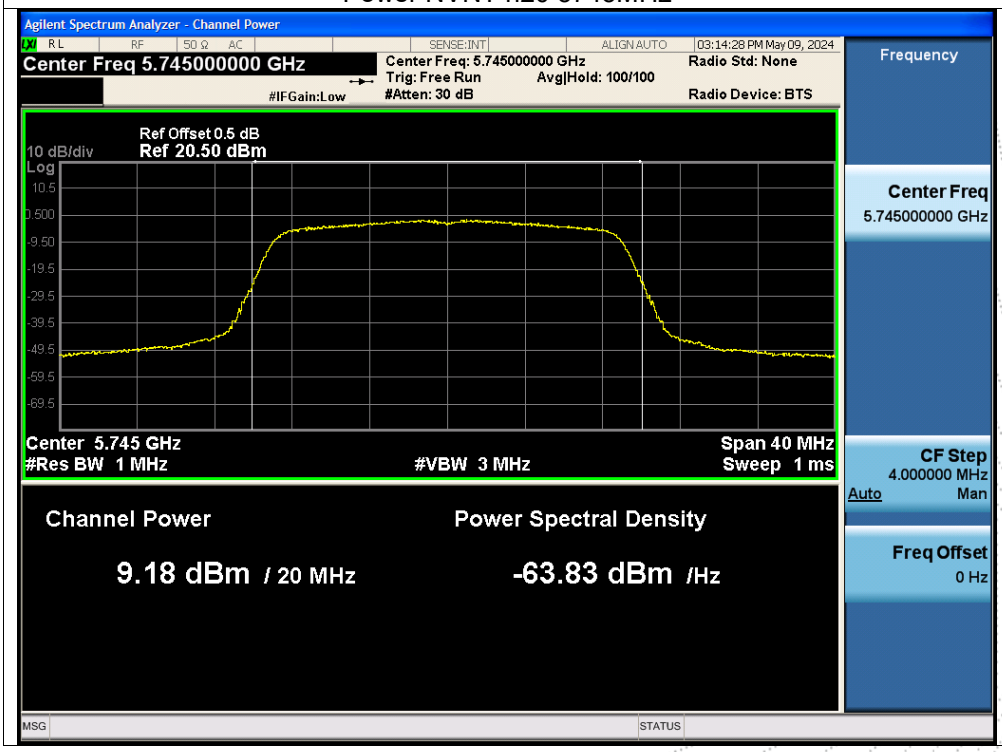
Power NVNT a 5785MHz



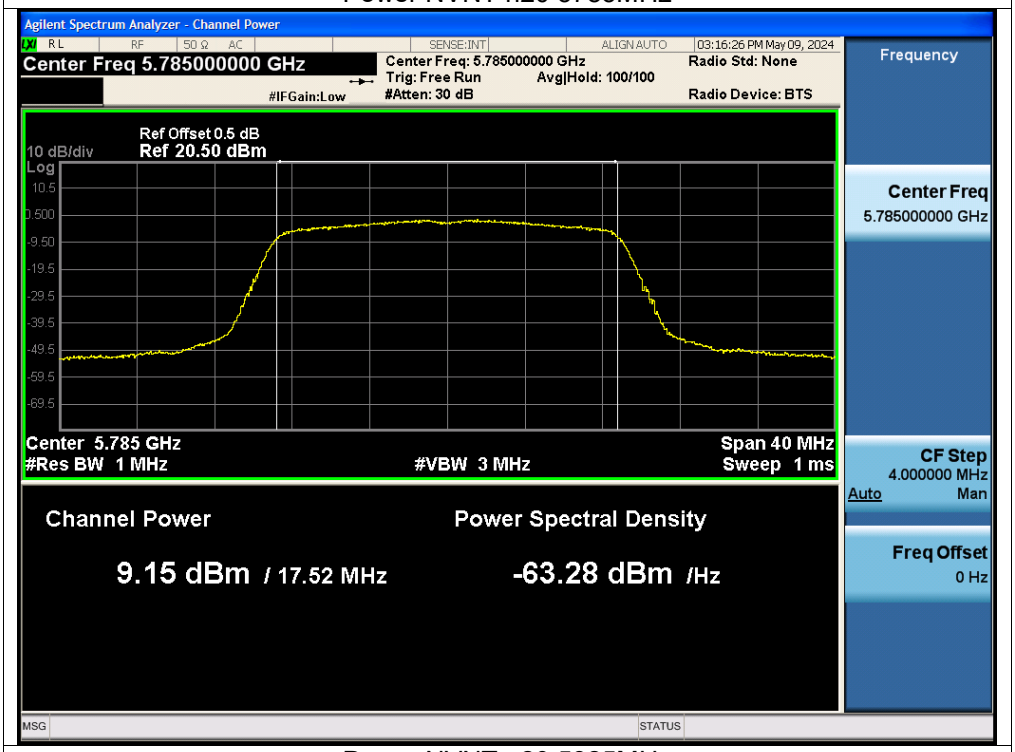
Power NVNT a 5825MHz



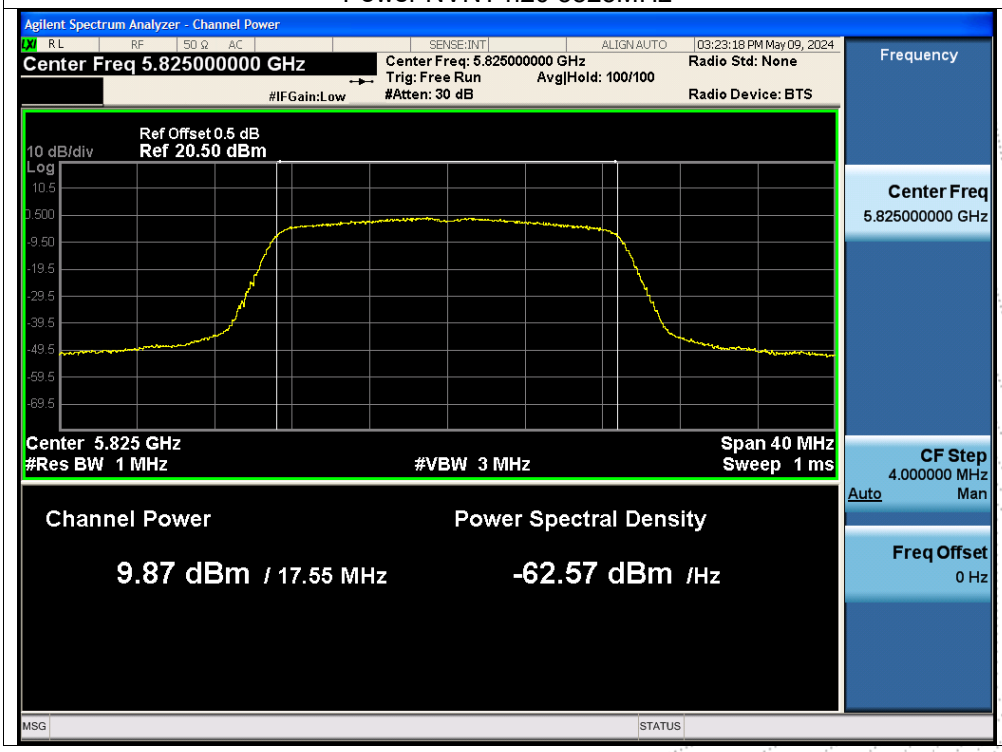
Power NVNT n20 5745MHz



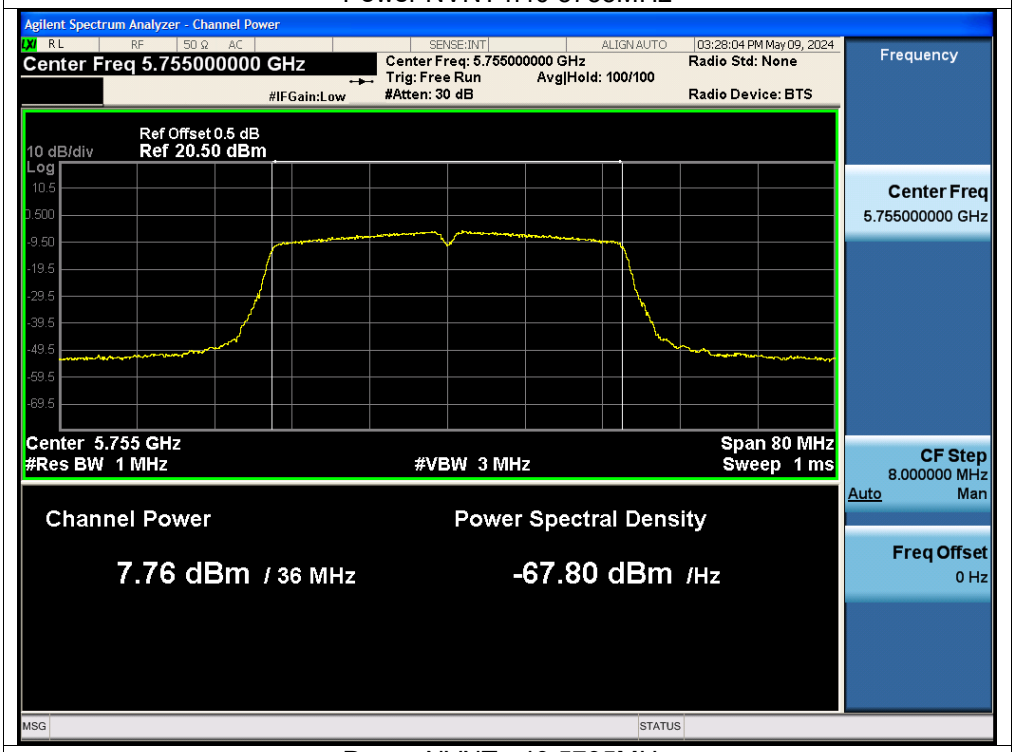
Power NVNT n20 5785MHz



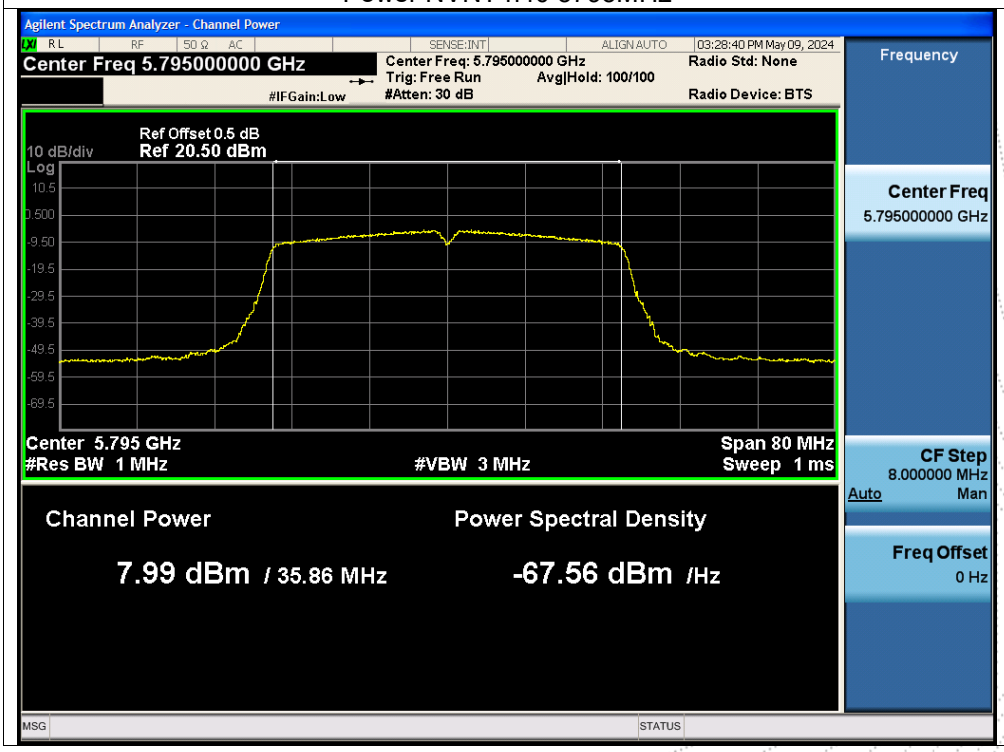
Power NVNT n20 5825MHz



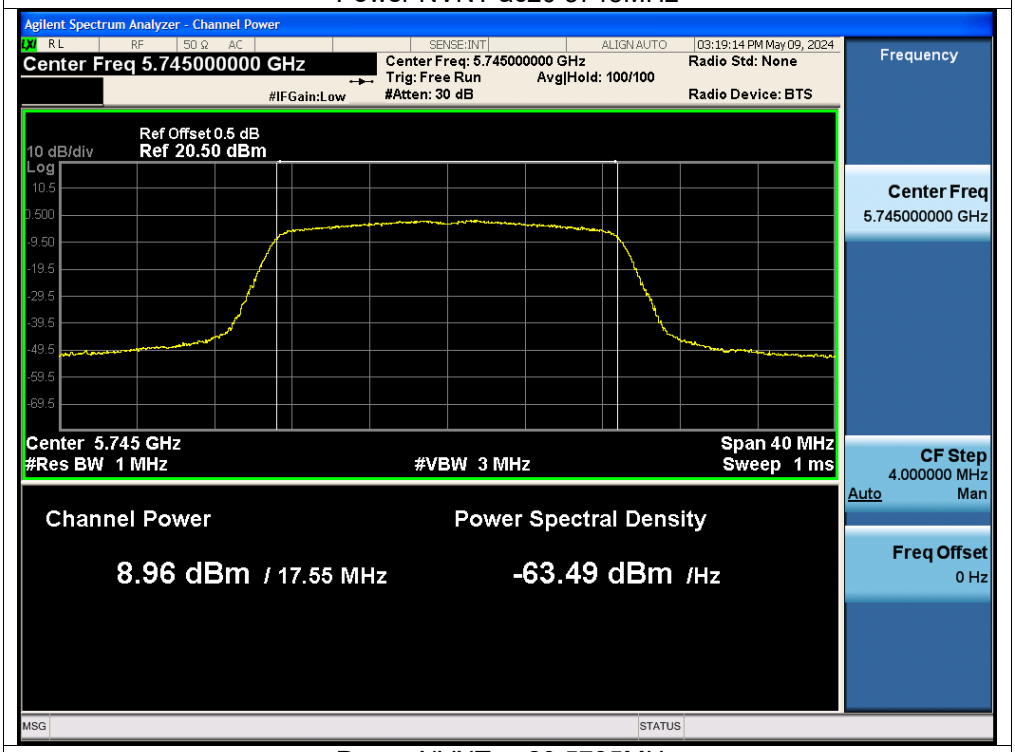
Power NVNT n40 5755MHz



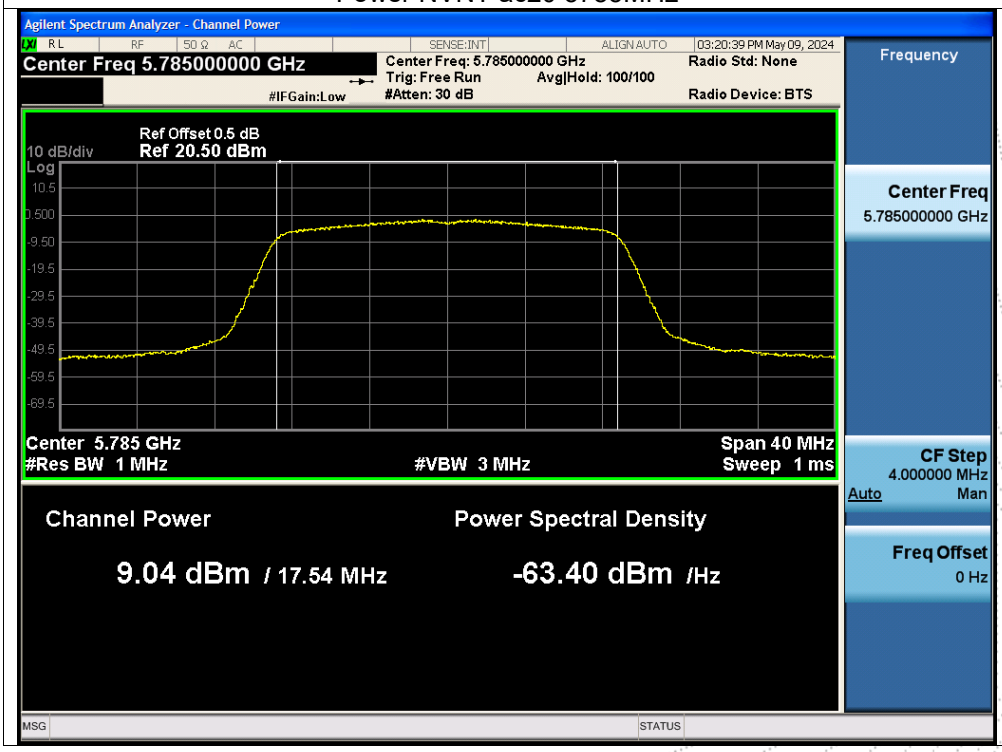
Power NVNT n40 5795MHz



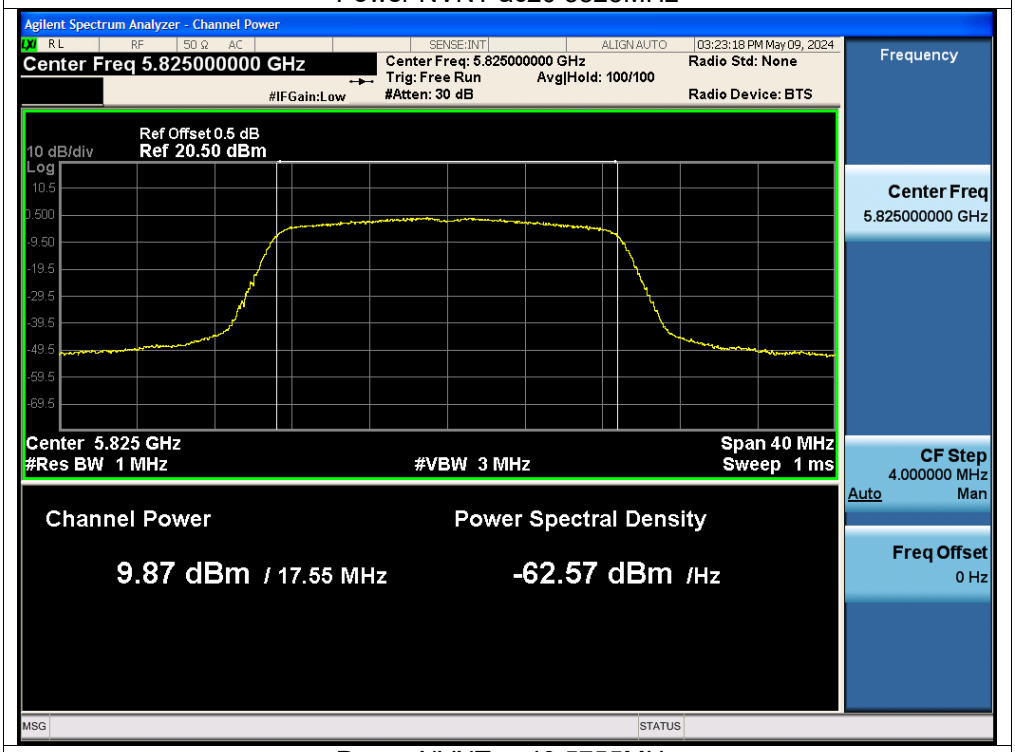
Power NVNT ac20 5745MHz



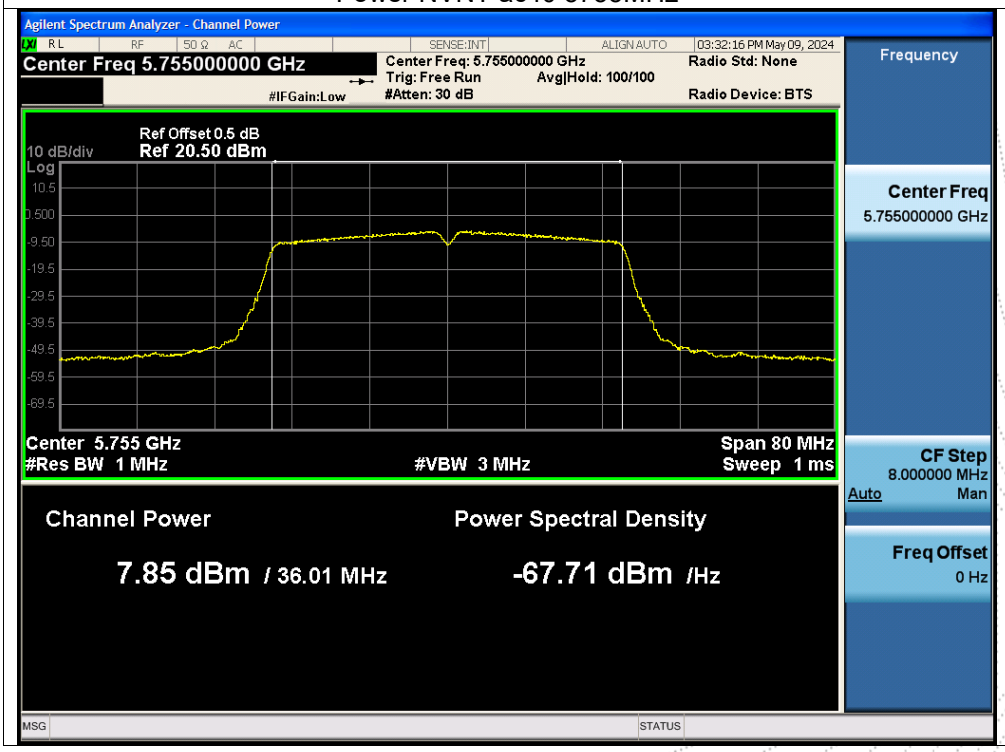
Power NVNT ac20 5785MHz



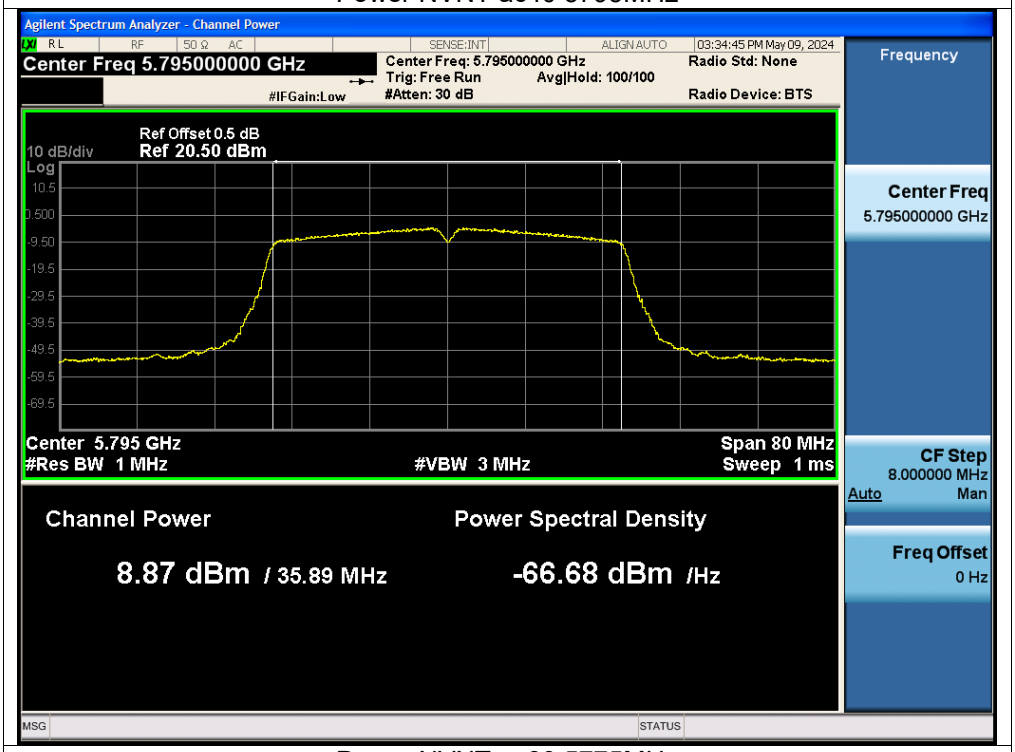
Power NVNT ac20 5825MHz



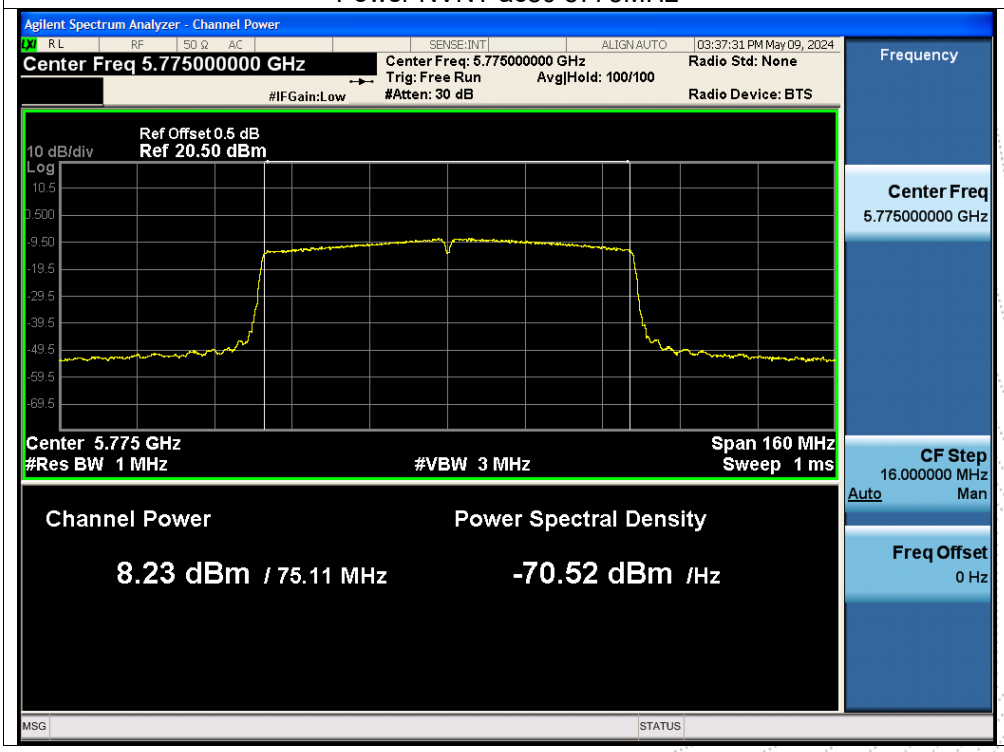
Power NVNT ac40 5755MHz



Power NVNT ac40 5795MHz

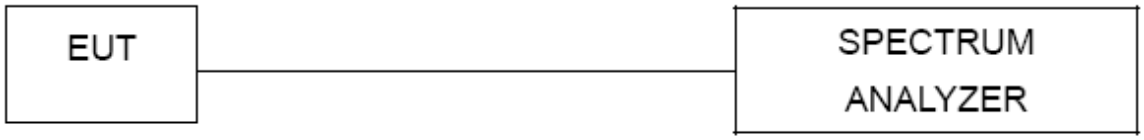


Power NVNT ac80 5775MHz



11. Out Of Band Emissions

11.1 Block Diagram Of Test Setup



11.2 Limit

According to FCC §15.407(b)
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) 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.

11.3 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.

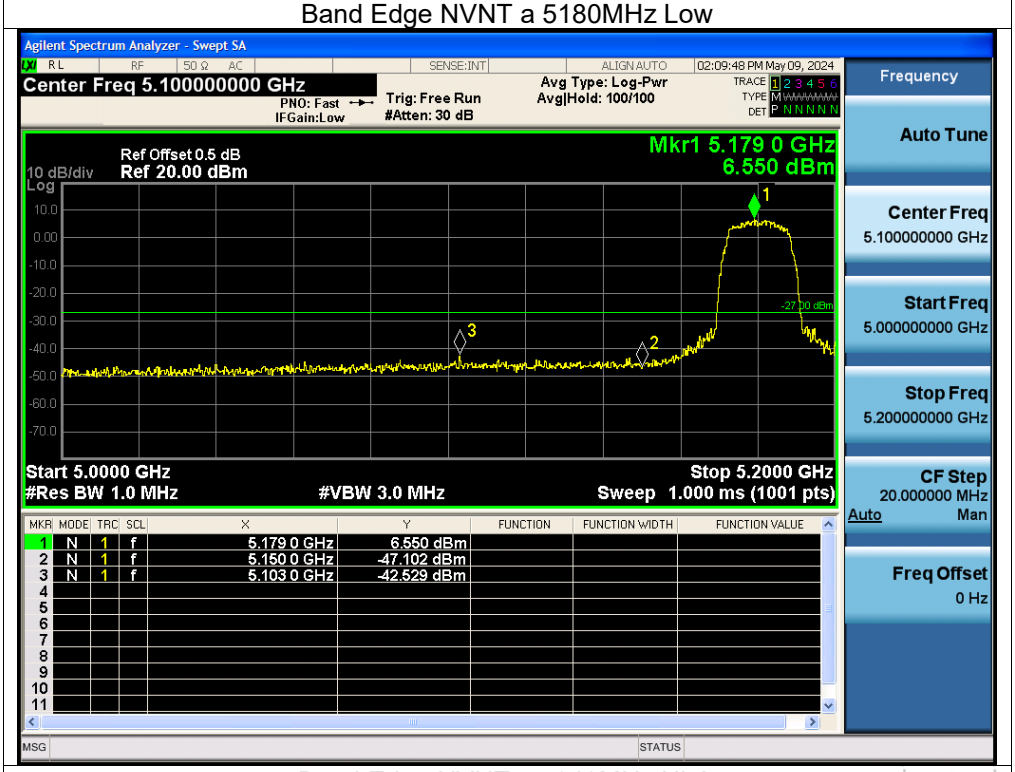
11.4 EUT Operating Conditions

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data

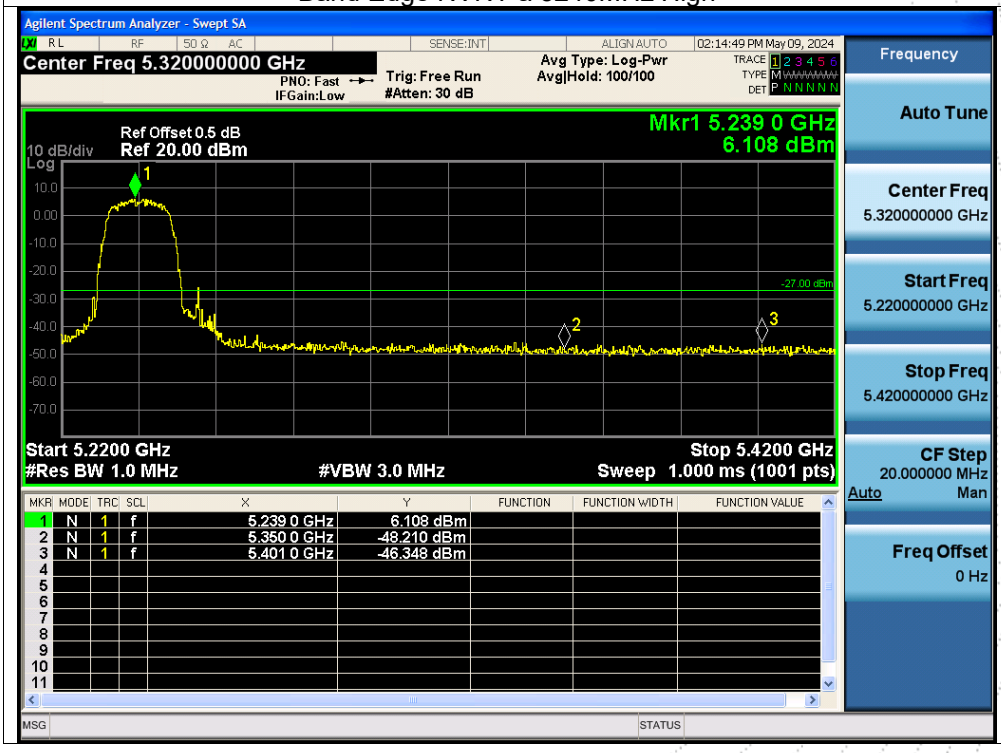
11.5 Test Result

Test Graphs

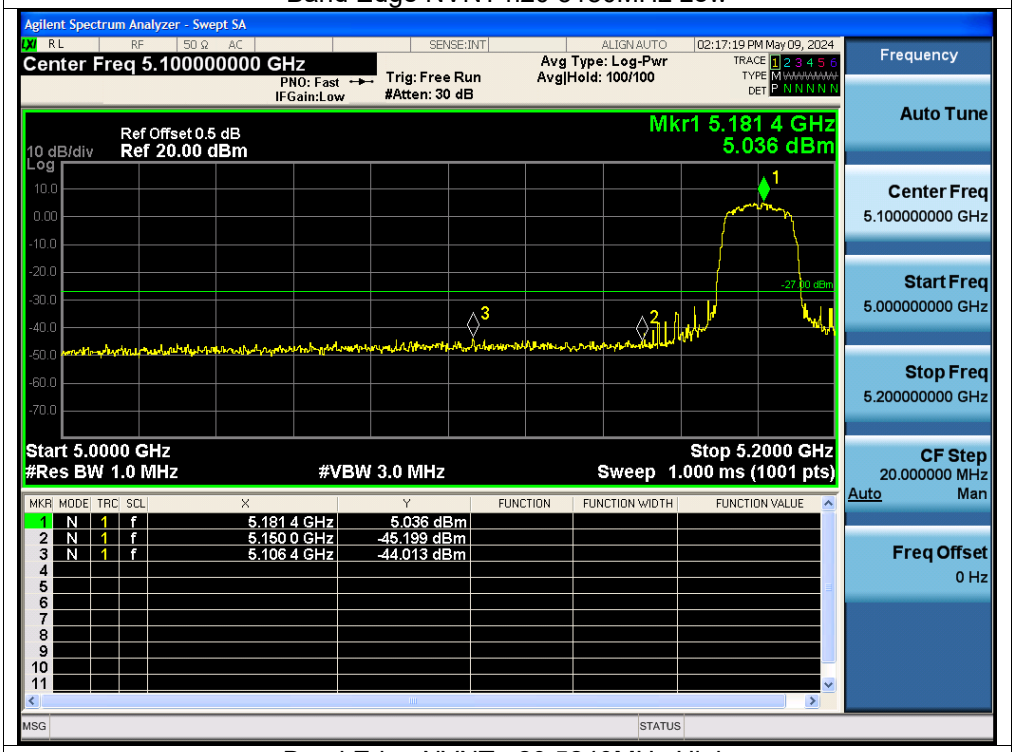
Band Edge NVNT a 5180MHz Low



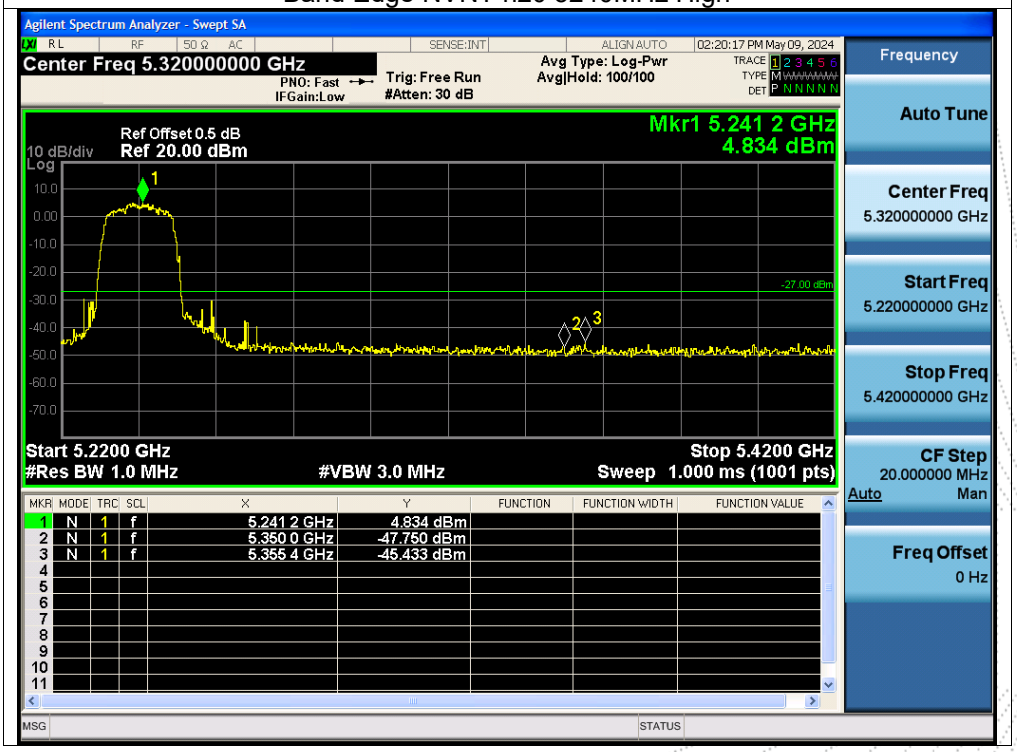
Band Edge NVNT a 5240MHz High



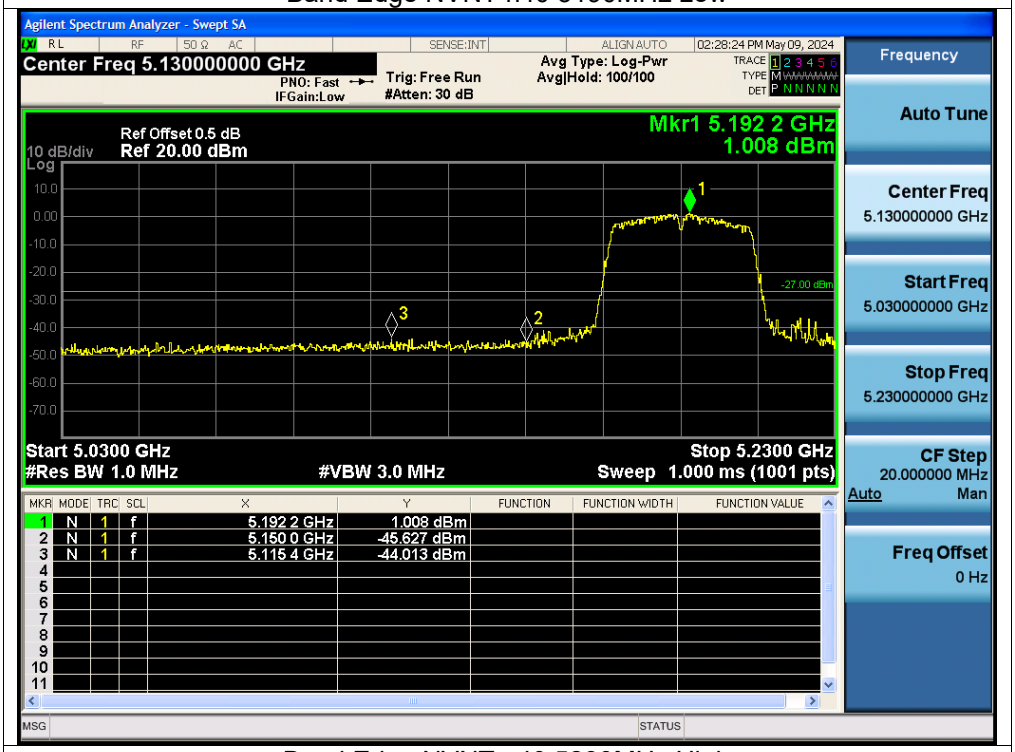
Band Edge NVNT n20 5180MHz Low



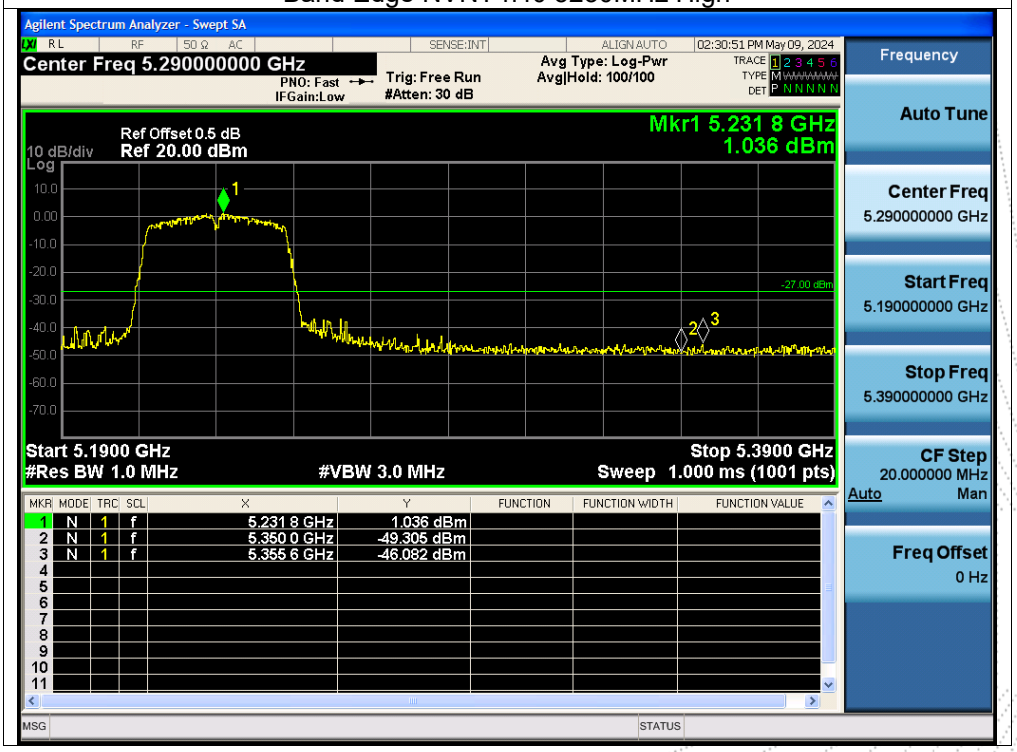
Band Edge NVNT n20 5240MHz High



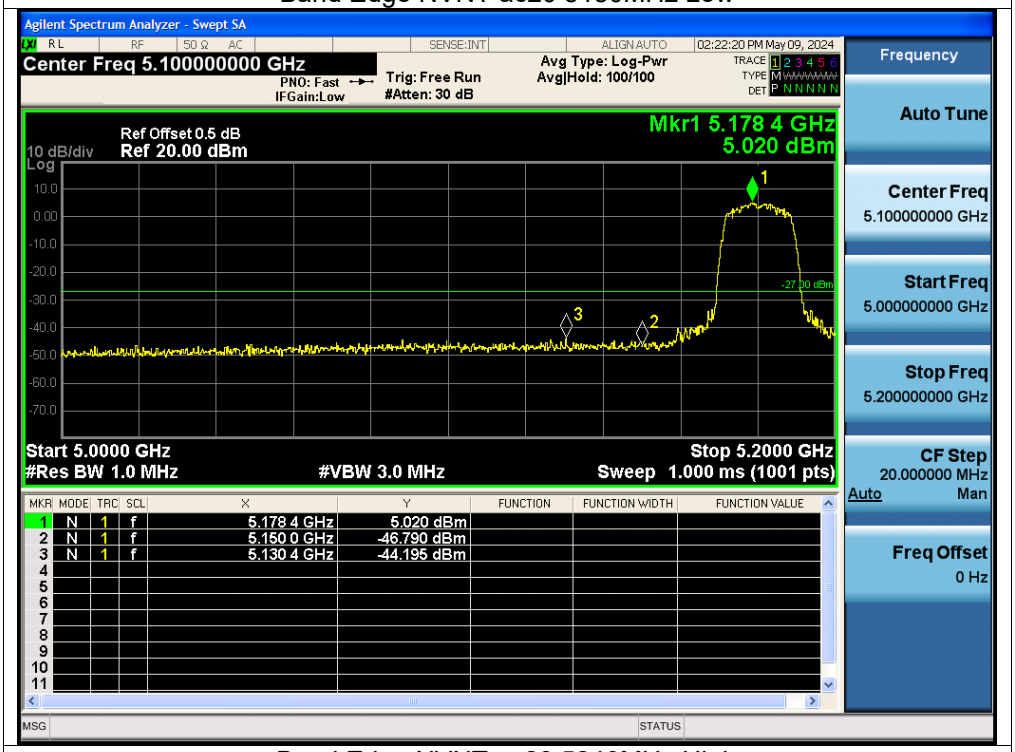
Band Edge NVNT n40 5190MHz Low



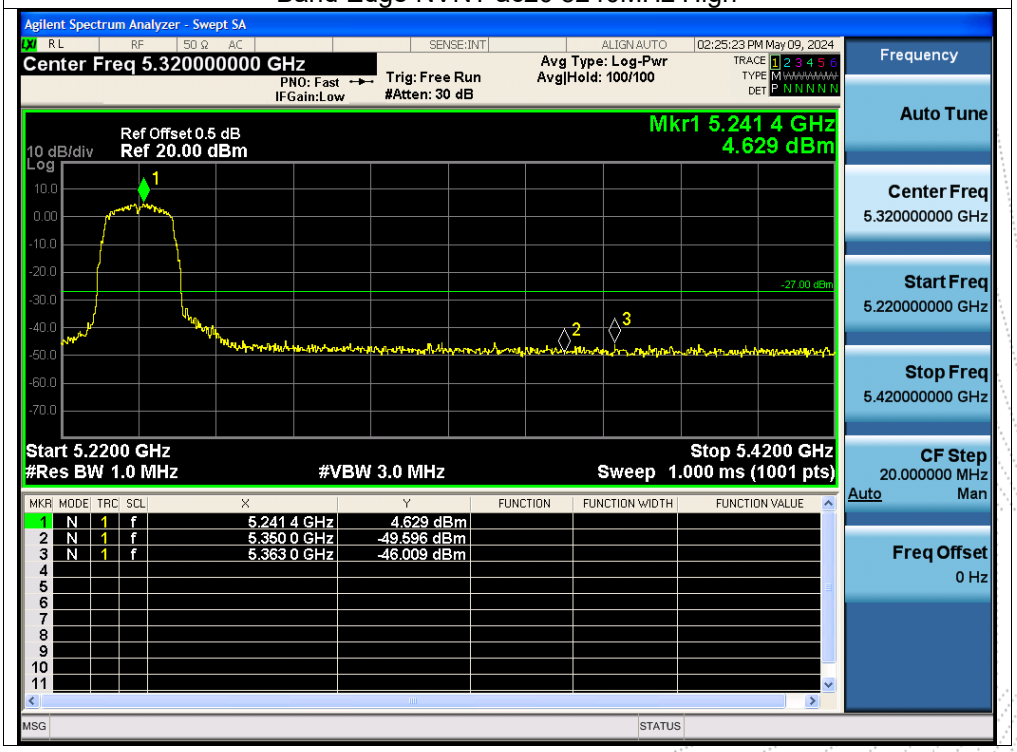
Band Edge NVNT n40 5230MHz High



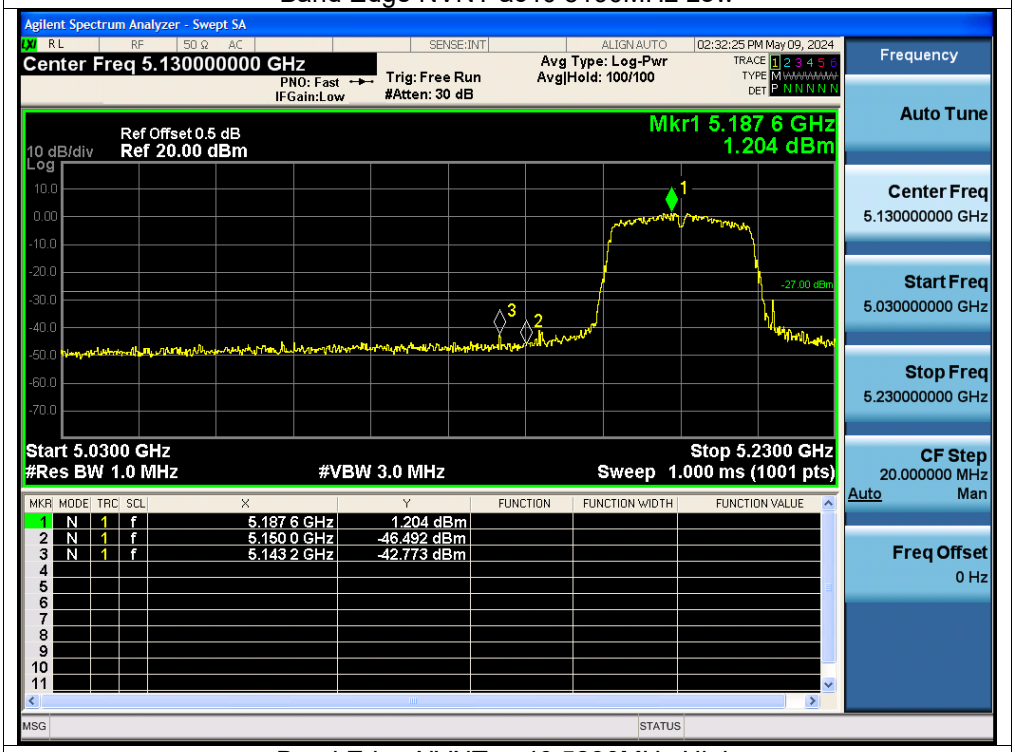
Band Edge NVNT ac20 5180MHz Low



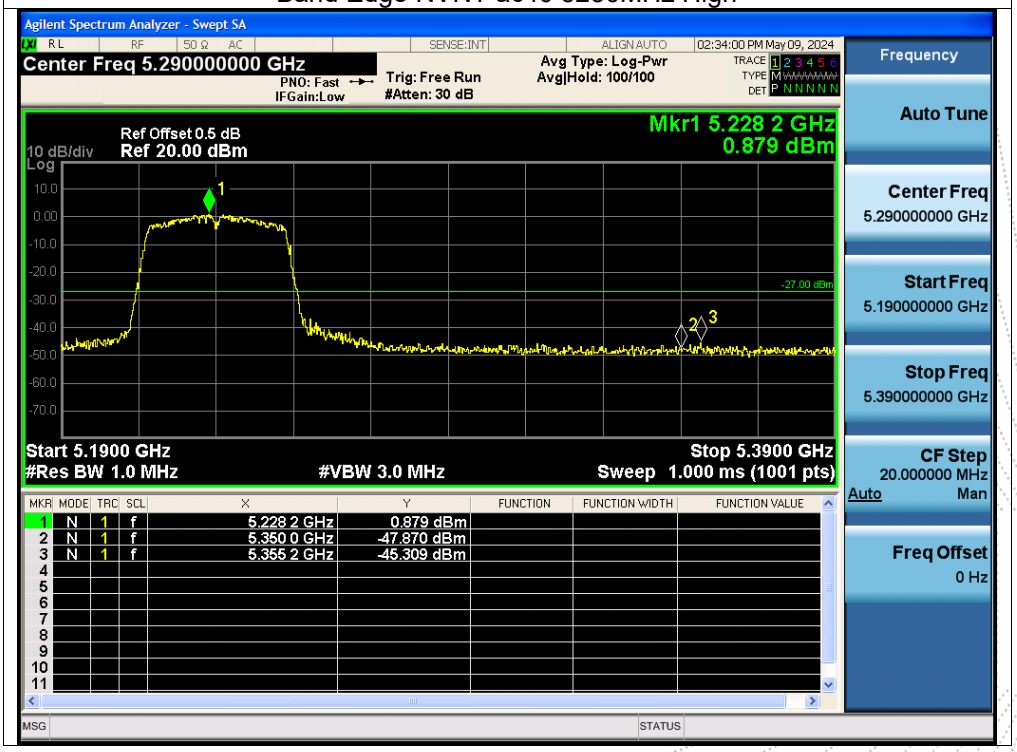
Band Edge NVNT ac20 5240MHz High



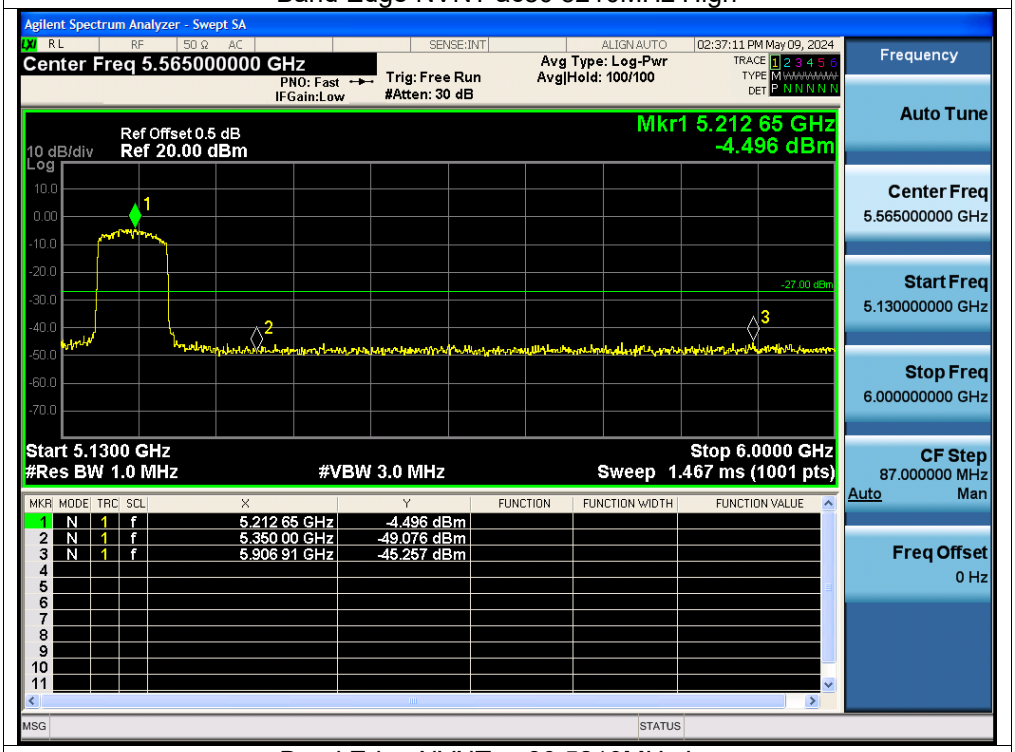
Band Edge NVNT ac40 5190MHz Low



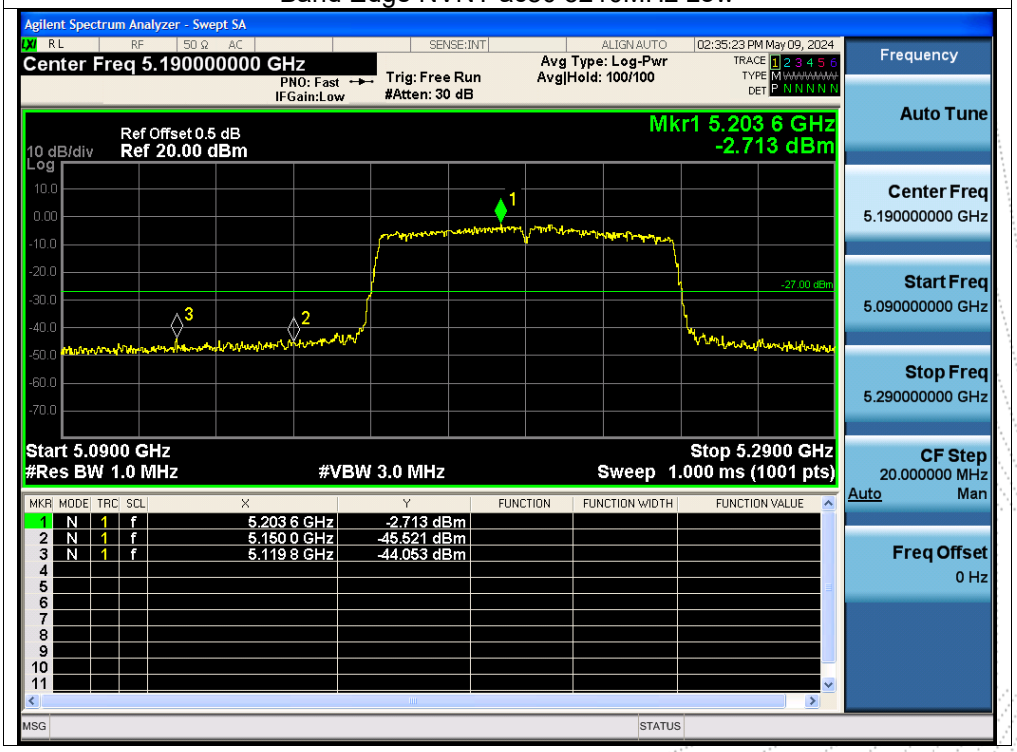
Band Edge NVNT ac40 5230MHz High



Band Edge NVNT ac80 5210MHz High

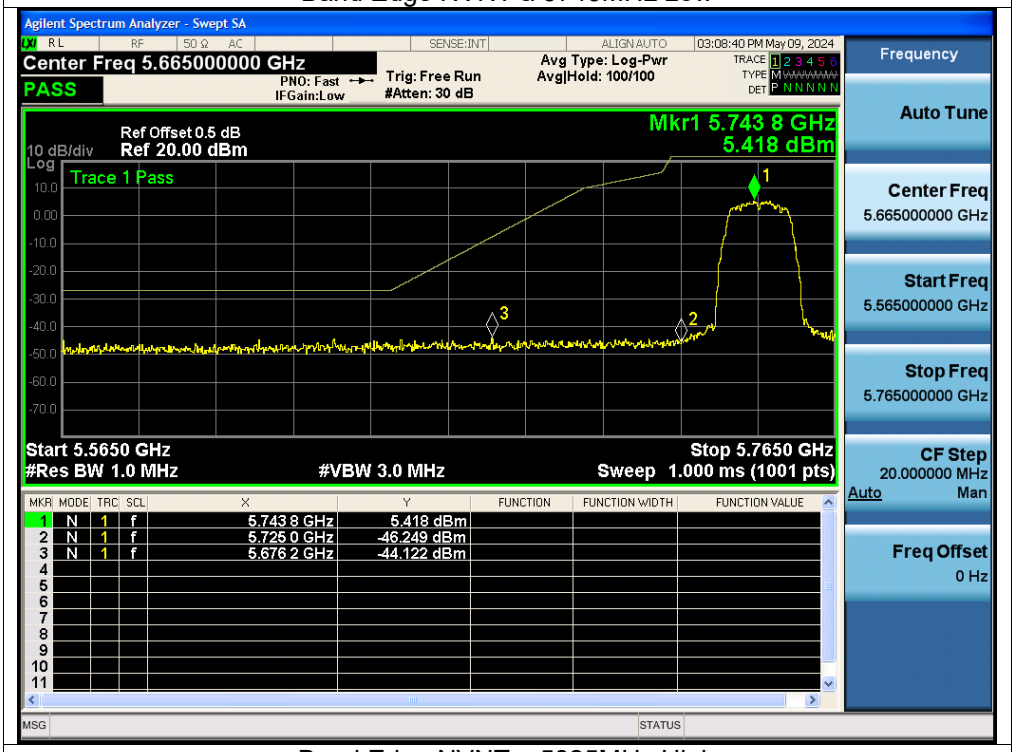


Band Edge NVNT ac80 5210MHz Low

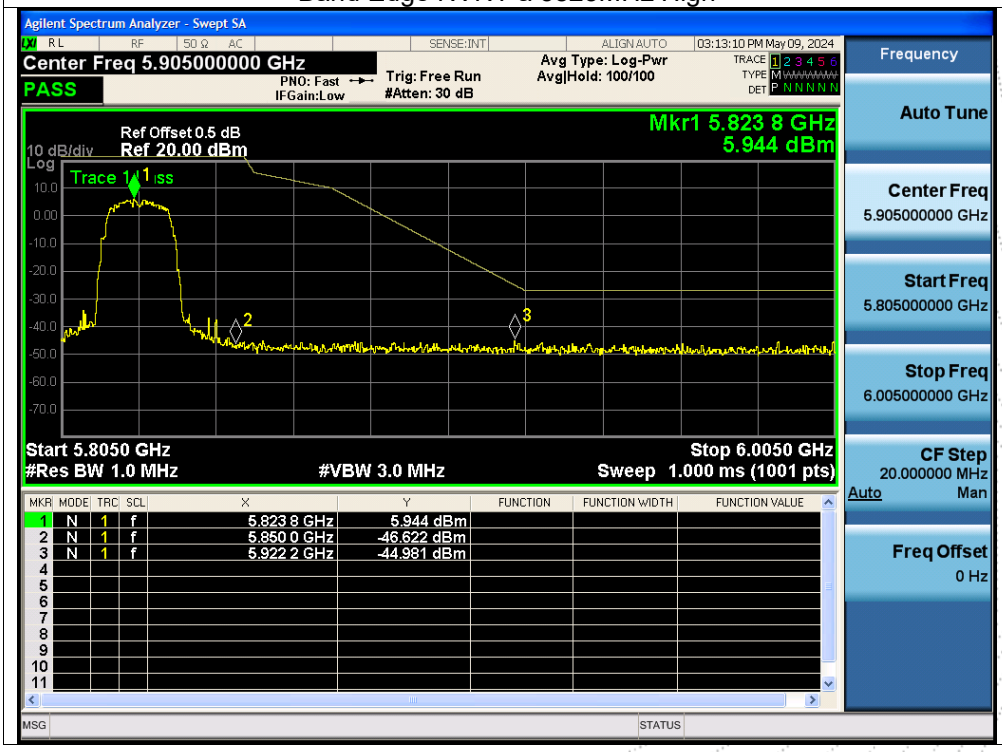


Test Graphs

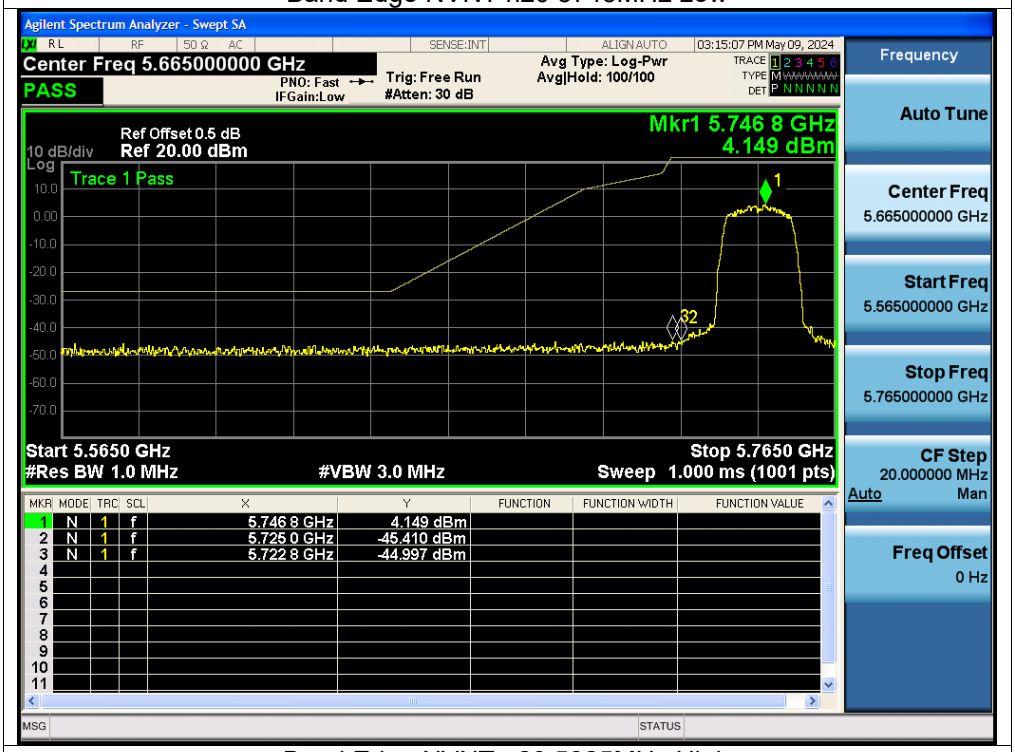
Band Edge NVNT a 5745MHz Low



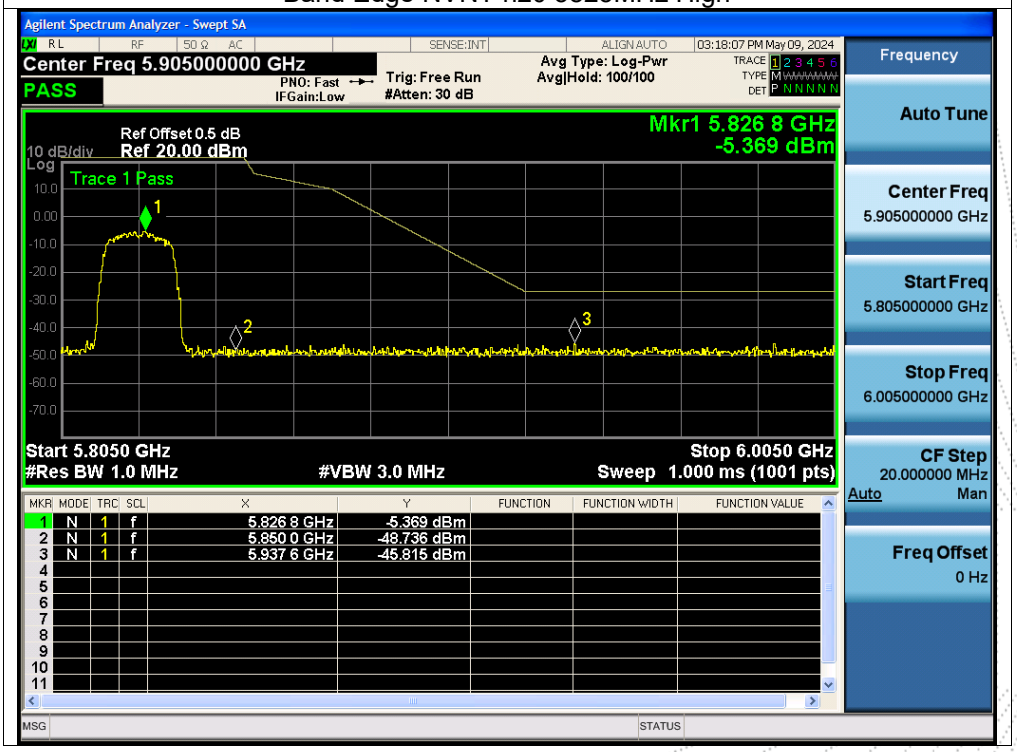
Band Edge NVNT a 5825MHz High



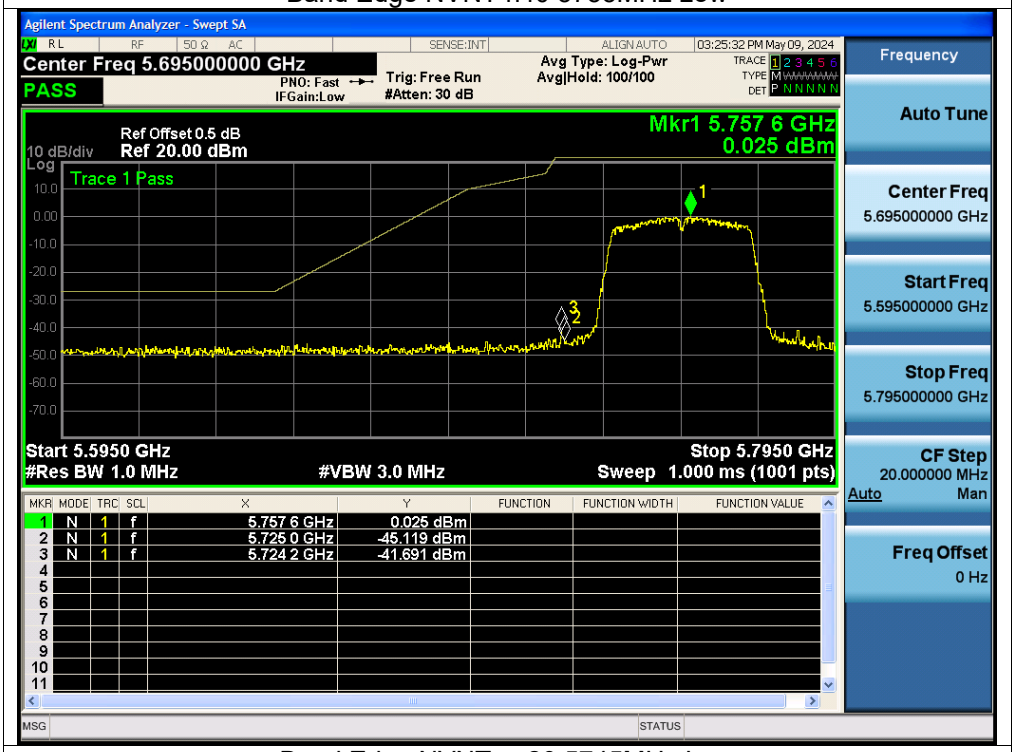
Band Edge NVNT n20 5745MHz Low



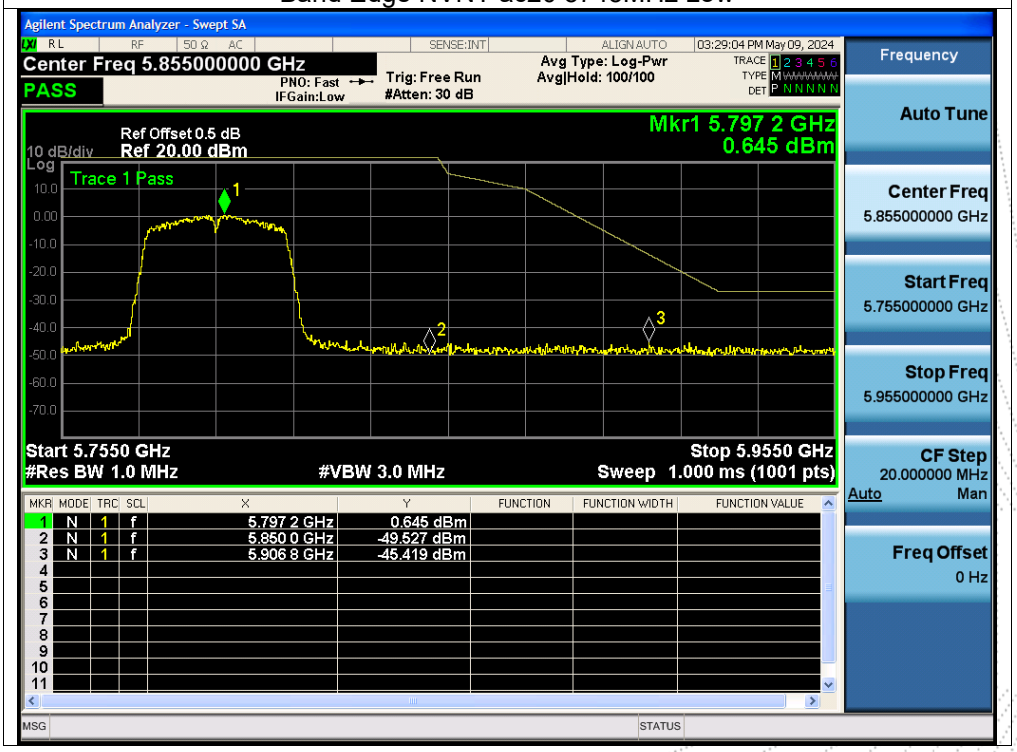
Band Edge NVNT n20 5825MHz High



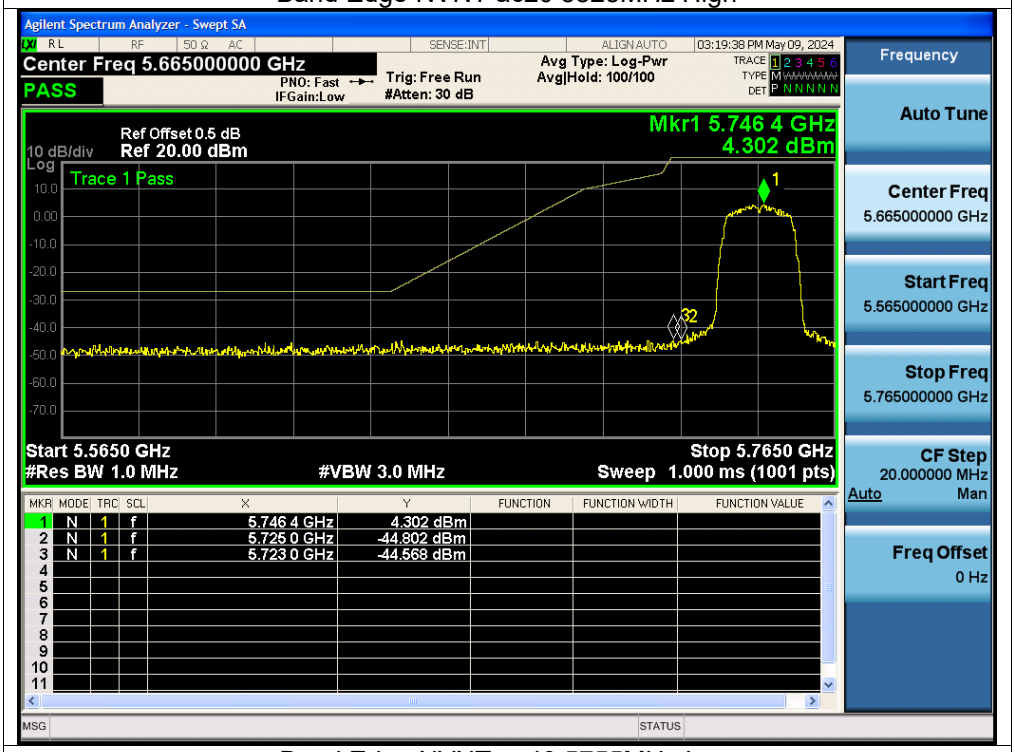
Band Edge NVNT n40 5755MHz Low



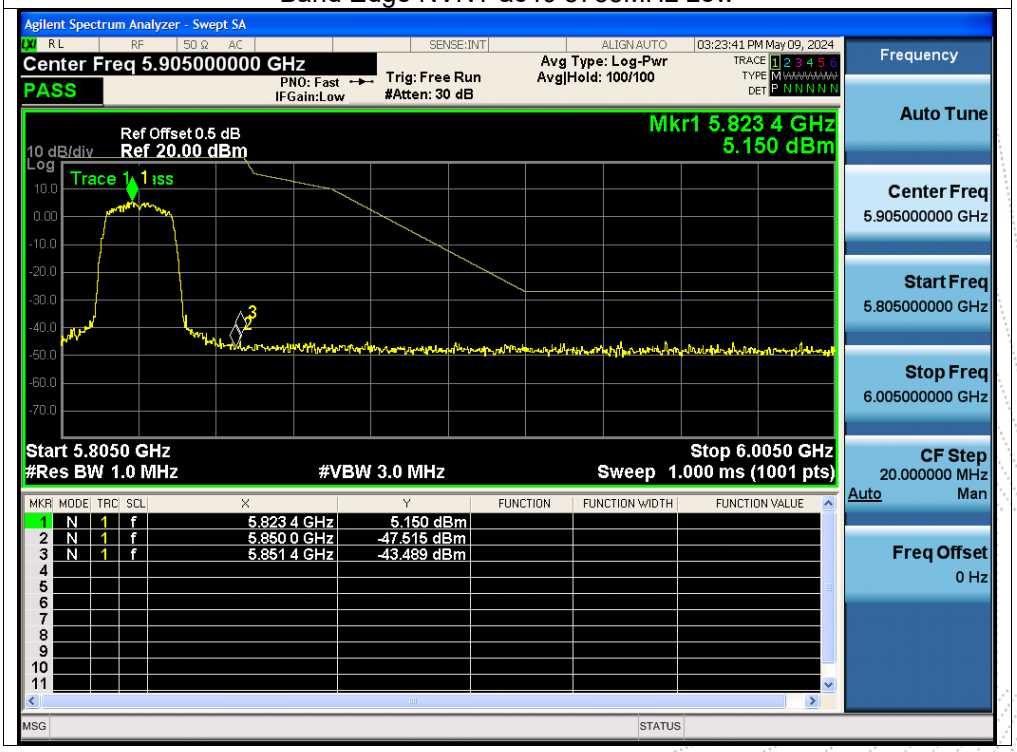
Band Edge NVNT ac20 5745MHz Low



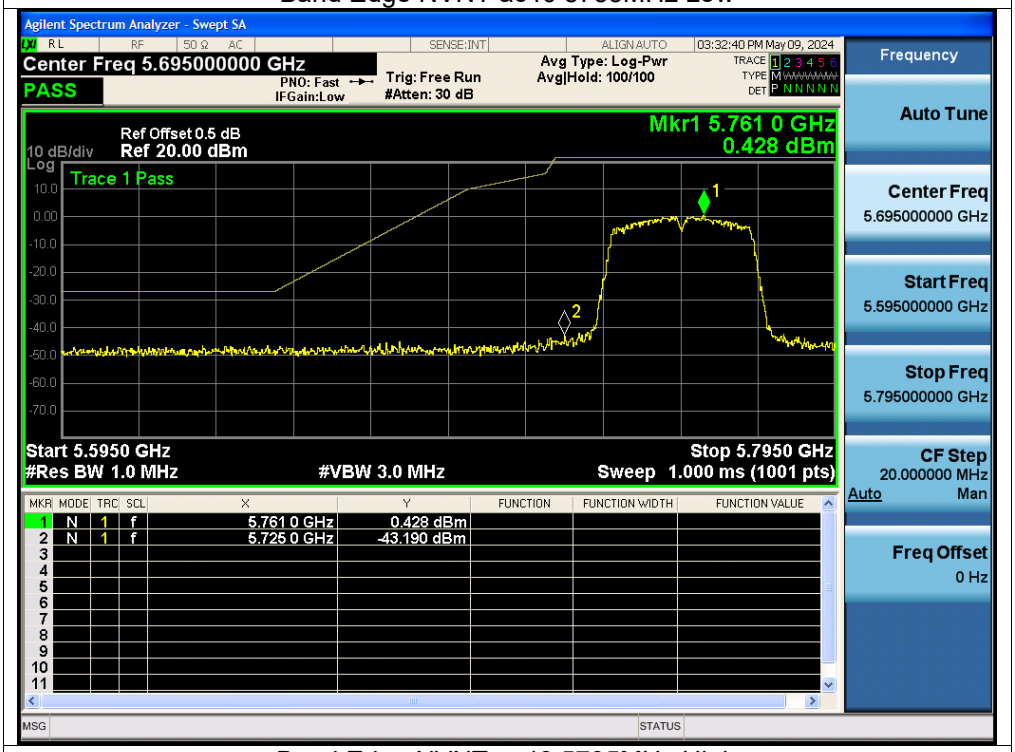
Band Edge NVNT ac20 5825MHz High



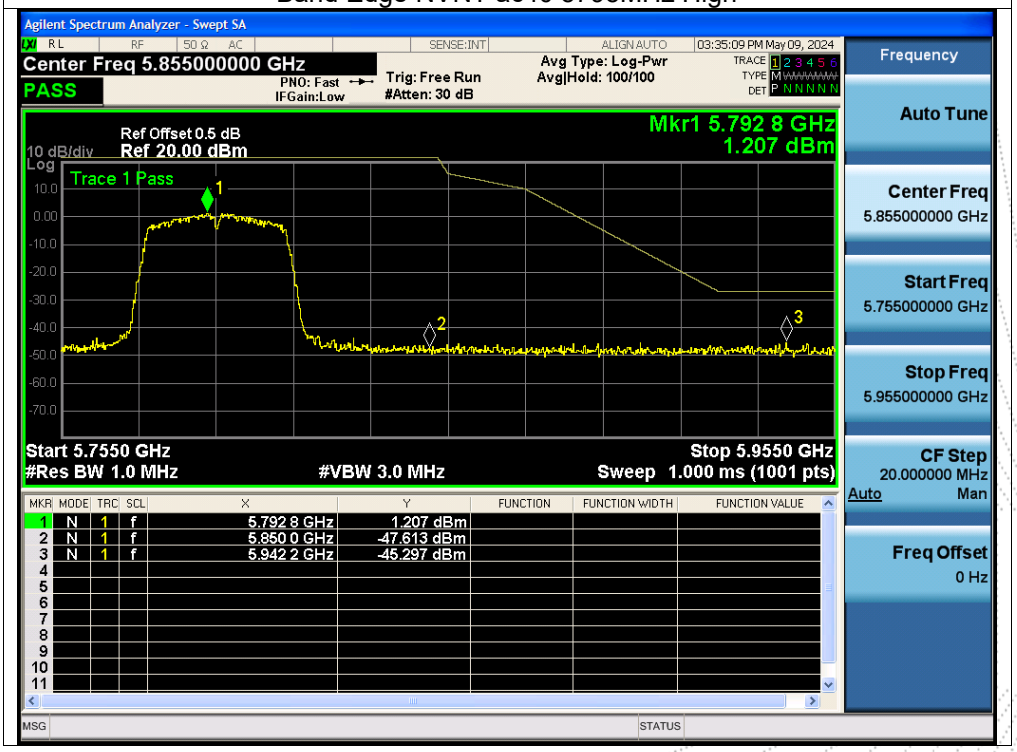
Band Edge NVNT ac40 5755MHz Low



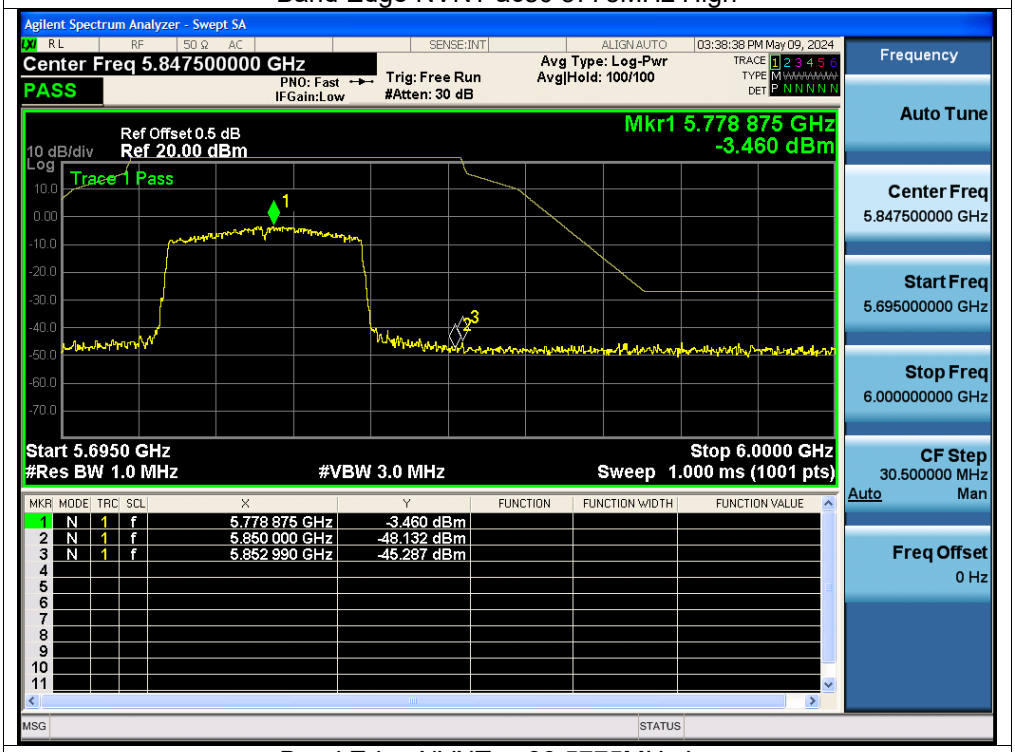
Band Edge NVNT ac40 5755MHz Low



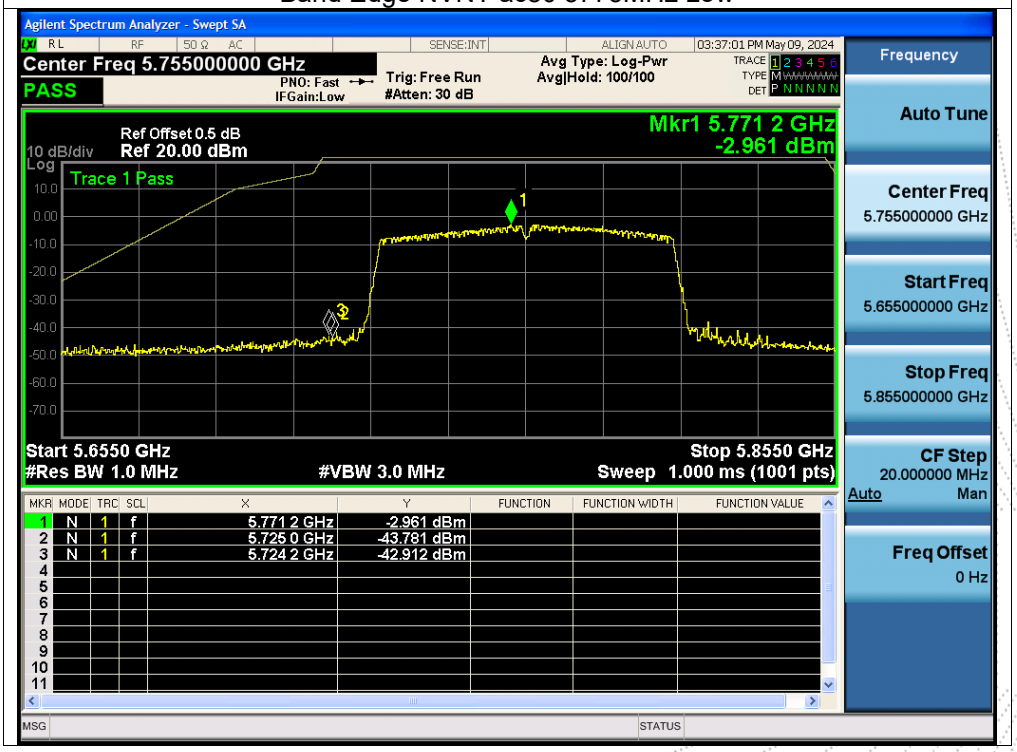
Band Edge NVNT ac40 5795MHz High



Band Edge NVNT ac80 5775MHz High

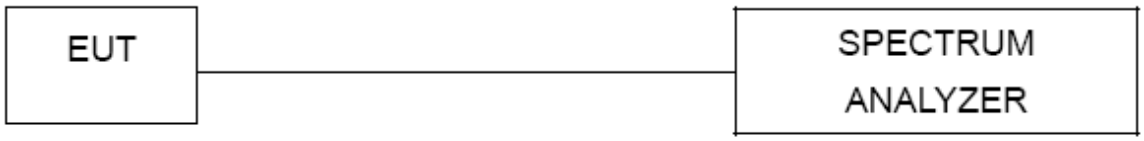


Band Edge NVNT ac80 5775MHz Low



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

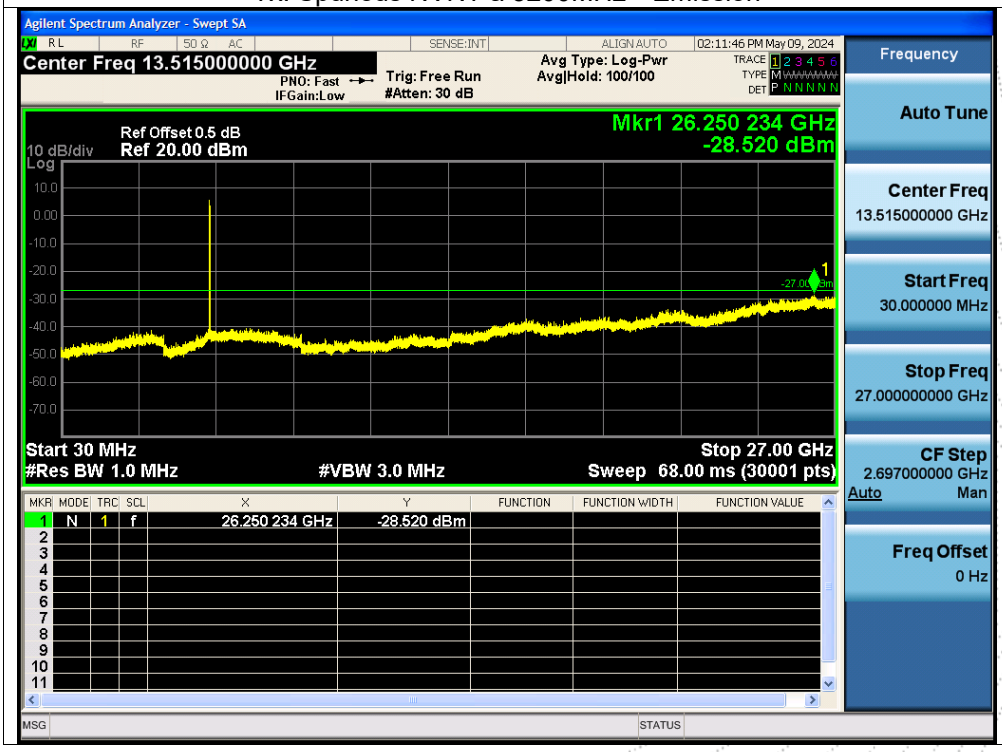
Remark: The measurement frequency range is from 9KHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions and bandege measurement data.

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.

Test Graphs

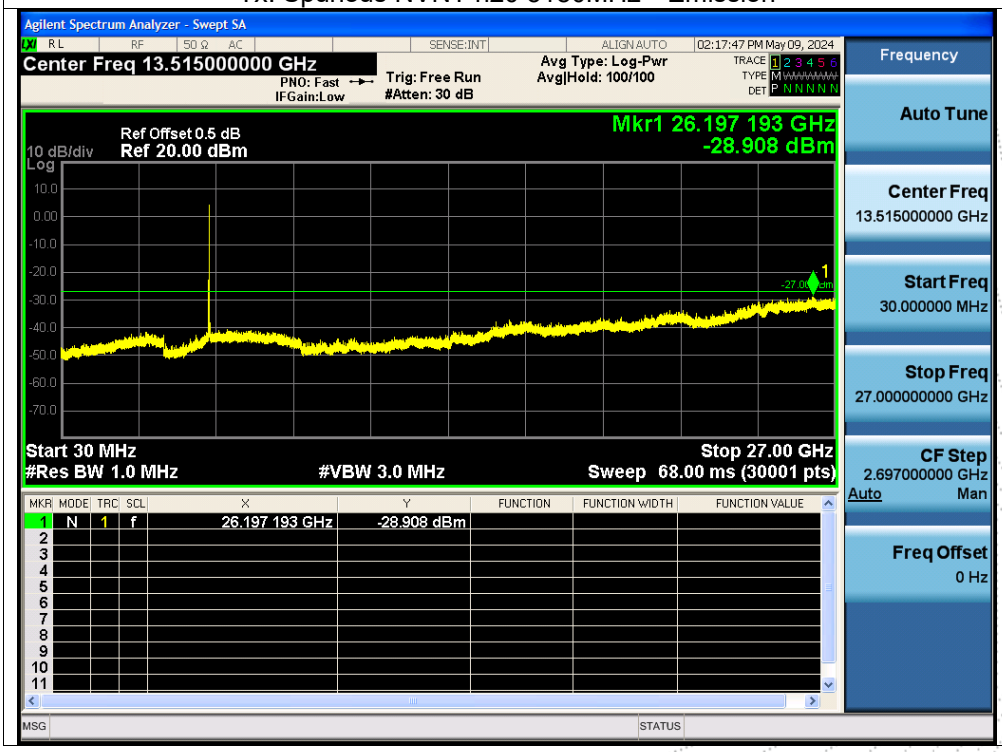
Tx. Spurious NVNT a 5180MHz Emission

Tx. Spurious NVNT a 5200MHz Emission



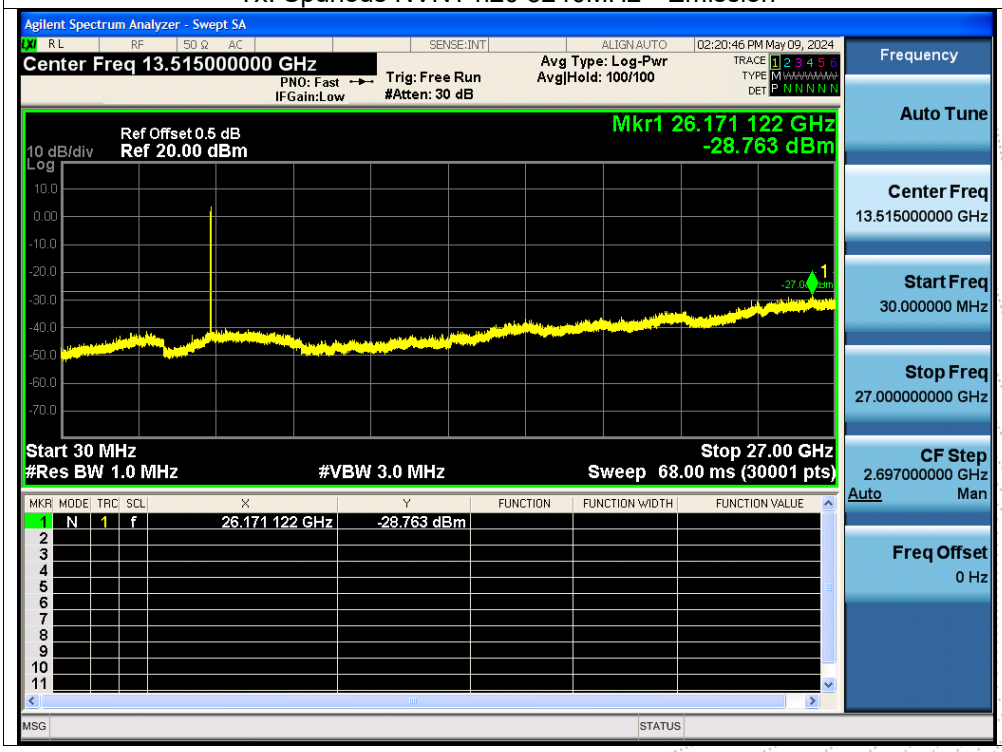
Tx. Spurious NVNT a 5240MHz Emission

Tx. Spurious NVNT n20 5180MHz Emission



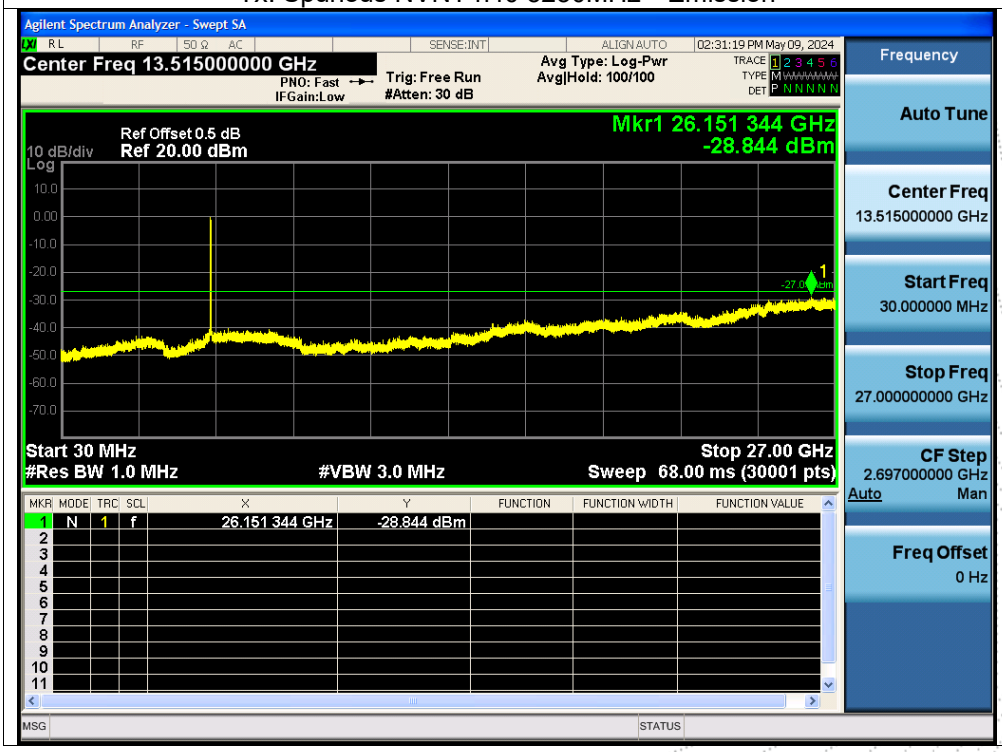
Tx. Spurious NVNT n20 5200MHz Emission

Tx. Spurious NVNT n20 5240MHz Emission



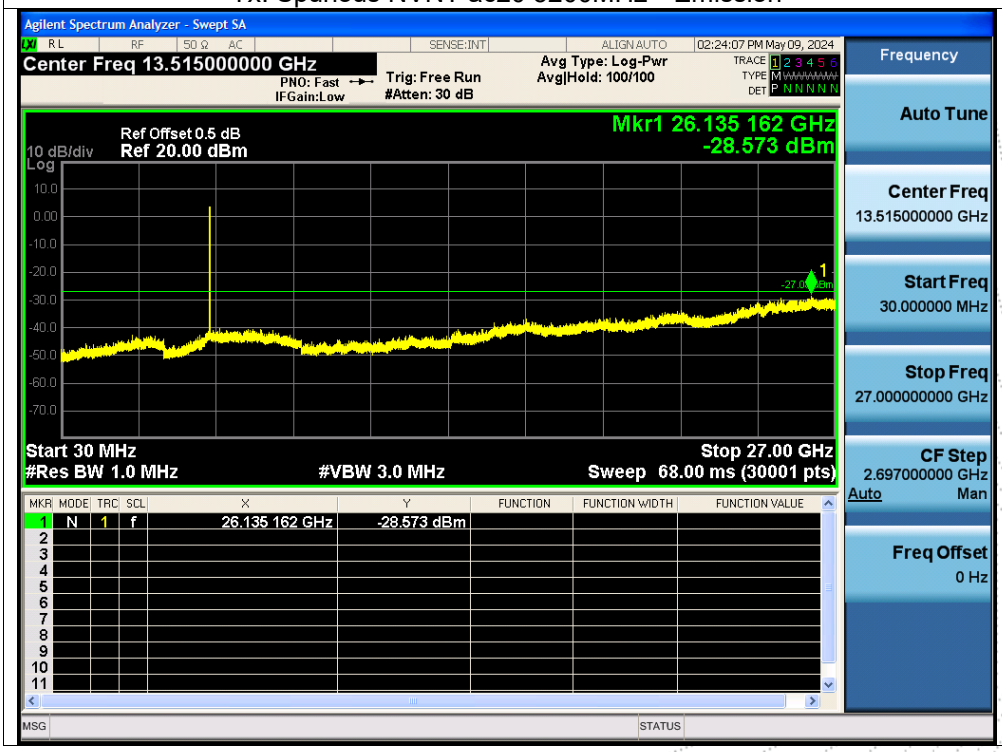
Tx. Spurious NVNT n40 5190MHz Emission

Tx. Spurious NVNT n40 5230MHz Emission

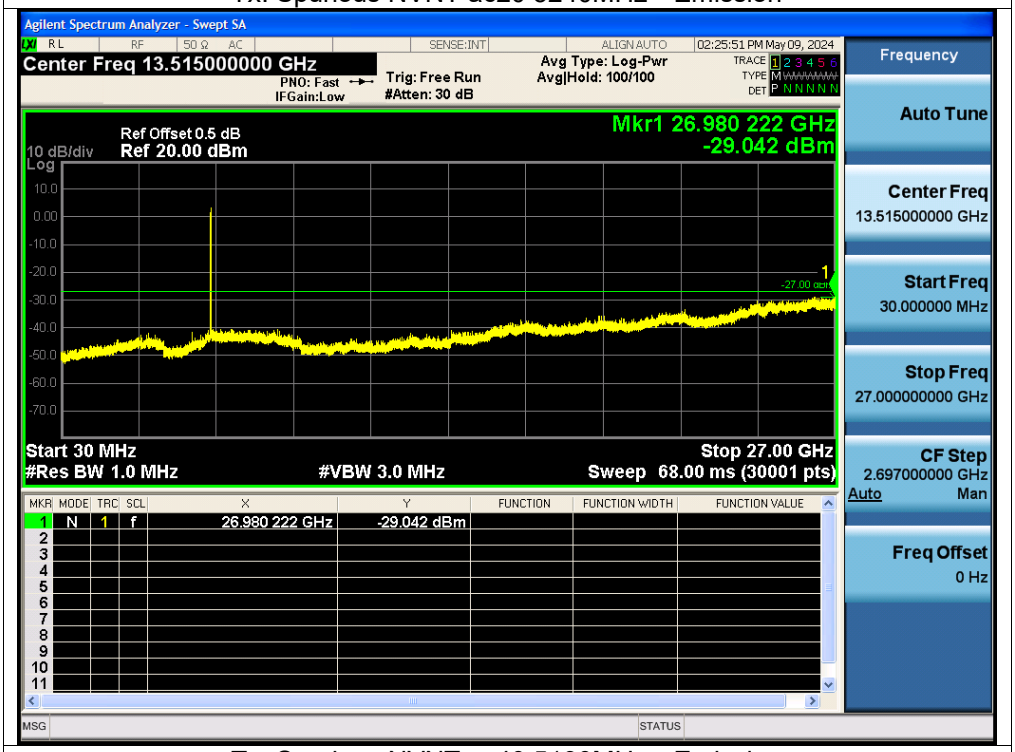


Tx. Spurious NVNT ac20 5180MHz Emission

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

Test Graphs

Tx. Spurious NVNT a 5745MHz Emission

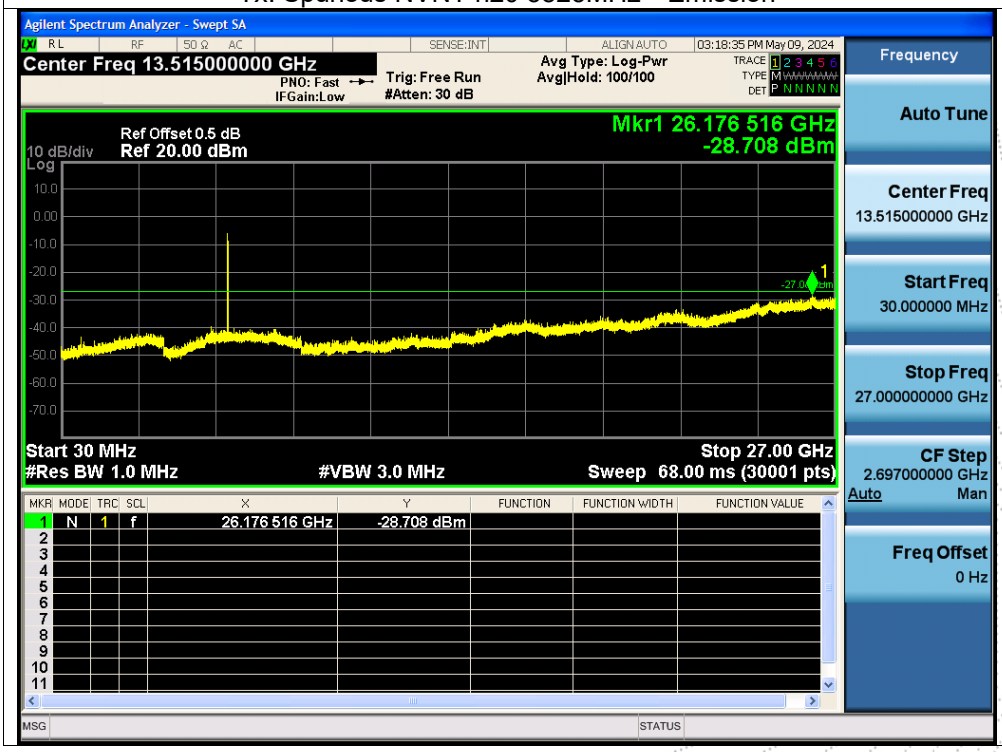
Tx. Spurious NVNT a 5785MHz Emission

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

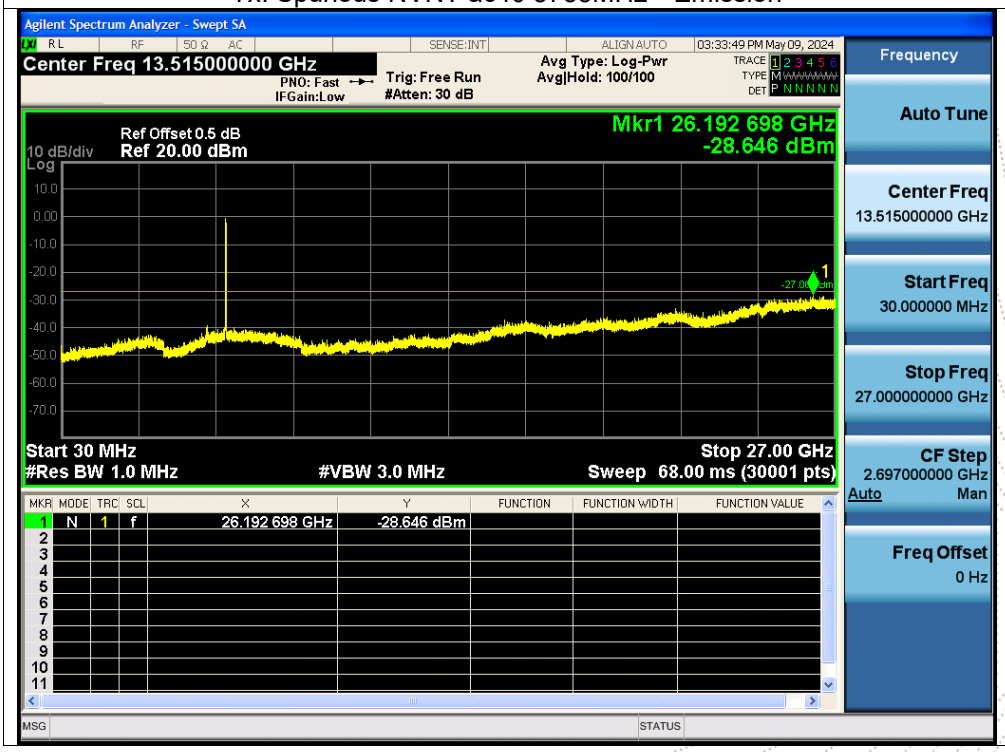
Tx. Spurious NVNT n40 5795MHz Emission

Tx. Spurious NVNT ac20 5745MHz Emission

Tx. Spurious NVNT ac20 5785MHz Emission

Tx. Spurious NVNT ac20 5825MHz Emission

Tx. Spurious NVNT ac40 5755MHz Emission

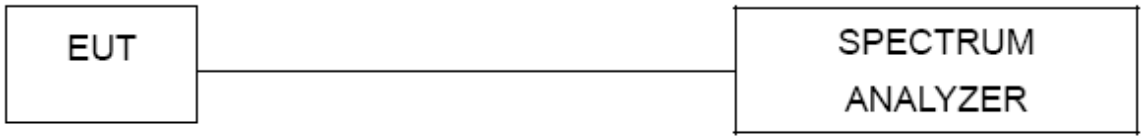


Tx. Spurious NVNT ac40 5795MHz Emission

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 3.87V
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)	3.87	5180.0020	5180	0.0020	0.3861
		V max (V)	4.45	5180.0077	5180	0.0077	1.4865
		V min (V)	3.29	5180.0064	5180	0.0064	1.2355
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)	3.87	T (°C)	-20	5180.0029	5180	0.0029	0.5598
		T (°C)	-10	5180.0083	5180	0.0083	1.6023
		T (°C)	0	5180.0031	5180	0.0031	0.5985
		T (°C)	10	5180.0031	5180	0.0031	0.5985
		T (°C)	20	5180.0036	5180	0.0036	0.6950
		T (°C)	30	5180.0004	5180	0.0004	0.0772
		T (°C)	40	5180.0043	5180	0.0043	0.8301
		T (°C)	50	5180.0132	5180	0.0132	2.5483
		T (°C)	60	5180.0080	5180	0.0080	1.5444
		T (°C)	70	5180.0115	5180	0.0115	2.2201
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)	3.87	5200.0077	5200	0.0077	1.4808
		V max (V)	4.45	5200.0081	5200	0.0081	1.5577
		V min (V)	3.29	5200.0009	5200	0.0009	0.1731
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)	3.87	T (°C)	-20	5200.01030	5200	0.01030	1.9808
		T (°C)	-10	5200.00910	5200	0.00910	1.7500
		T (°C)	0	5200.00460	5200	0.00460	0.8846
		T (°C)	10	5200.00460	5200	0.00460	0.8846
		T (°C)	20	5200.00520	5200	0.00520	1.0000
		T (°C)	30	5200.00420	5200	0.00420	0.8077
		T (°C)	40	5200.00160	5200	0.00160	0.3077
		T (°C)	50	5200.00210	5200	0.00210	0.4038
		T (°C)	60	5200.00970	5200	0.00970	1.8654
		T (°C)	70	5200.01200	5200	0.01200	2.3077
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)	3.87	5240.0098	5240	0.0098	1.8702
		V max (V)	4.45	5240.0080	5240	0.0080	1.5267
		V min (V)	3.29	5240.0009	5240	0.0009	0.1718
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)	3.87	T (°C)	-20	5240.0043	5240	0.0043	0.8206
		T (°C)	-10	5240.0135	5240	0.0135	2.5763
		T (°C)	0	5240.0036	5240	0.0036	0.6870
		T (°C)	10	5240.0087	5240	0.0087	1.6603
		T (°C)	20	5240.0118	5240	0.0118	2.2519
		T (°C)	30	5240.0096	5240	0.0096	1.8321
		T (°C)	40	5240.0052	5240	0.0052	0.9924
		T (°C)	50	5240.0089	5240	0.0089	1.6985
		T (°C)	60	5240.0104	5240	0.0104	1.9847
		T (°C)	70	5240.0004	5240	0.0004	0.0763
Limits				5150-5250 MHz			
Result				Complies			

Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101kPa	Test Voltage:	DC 3.87V
Test Mode:	TX Frequency(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)	3.87	5745.00270	5745	0.00270	0.4700
		V max (V)	4.45	5745.01140	5745	0.01140	1.9843
		V min (V)	3.29	5745.00240	5745	0.00240	0.4178
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)	3.87	T (°C)	-20	5745.00230	5745	0.00230	0.4003
		T (°C)	-10	5745.01150	5745	0.01150	2.0017
		T (°C)	0	5745.00000	5745	0.00000	0.0000
		T (°C)	10	5745.01150	5745	0.01150	2.0017
		T (°C)	20	5745.01110	5745	0.01110	1.9321
		T (°C)	30	5745.00790	5745	0.00790	1.3751
		T (°C)	40	5745.00610	5745	0.00610	1.0618
		T (°C)	50	5745.00140	5745	0.00140	0.2437
		T (°C)	60	5745.01170	5745	0.01170	2.0366
		T (°C)	70	5745.01020	5745	0.01020	1.7755
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)	3.87	5785.00030	5785	0.00030	0.0519
		V max (V)	4.45	5785.00160	5785	0.00160	0.2766
		V min (V)	3.29	5785.00370	5785	0.00370	0.6396
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)	3.87	T (°C)	-20	5785.00140	5785	0.00140	0.2420
		T (°C)	-10	5785.00240	5785	0.00240	0.4149
		T (°C)	0	5785.01250	5785	0.01250	2.1608
		T (°C)	10	5785.00670	5785	0.00670	1.1582
		T (°C)	20	5785.00070	5785	0.00070	0.1210
		T (°C)	30	5785.01300	5785	0.01300	2.2472
		T (°C)	40	5785.00540	5785	0.00540	0.9334
		T (°C)	50	5785.00450	5785	0.00450	0.7779
		T (°C)	60	5785.01040	5785	0.01040	1.7978
		T (°C)	70	5785.00190	5785	0.00190	0.3284
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)	3.87	5825.00660	5825	0.00660	1.1330
		V max (V)	4.45	5825.00960	5825	0.00960	1.6481
		V min (V)	3.29	5825.00500	5825	0.00500	0.8584
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)	3.87	T (°C)	-20	5825.00790	5825	0.00790	1.3562
		T (°C)	-10	5825.01140	5825	0.01140	1.9571
		T (°C)	0	5825.00350	5825	0.00350	0.6009
		T (°C)	10	5825.00820	5825	0.00820	1.4077
		T (°C)	20	5825.01050	5825	0.01050	1.8026
		T (°C)	30	5825.00600	5825	0.00600	1.0300
		T (°C)	40	5825.00050	5825	0.00050	0.0858
		T (°C)	50	5825.00070	5825	0.00070	0.1202
		T (°C)	60	5825.00900	5825	0.00900	1.5451
		T (°C)	70	5825.00710	5825	0.00710	1.2189
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

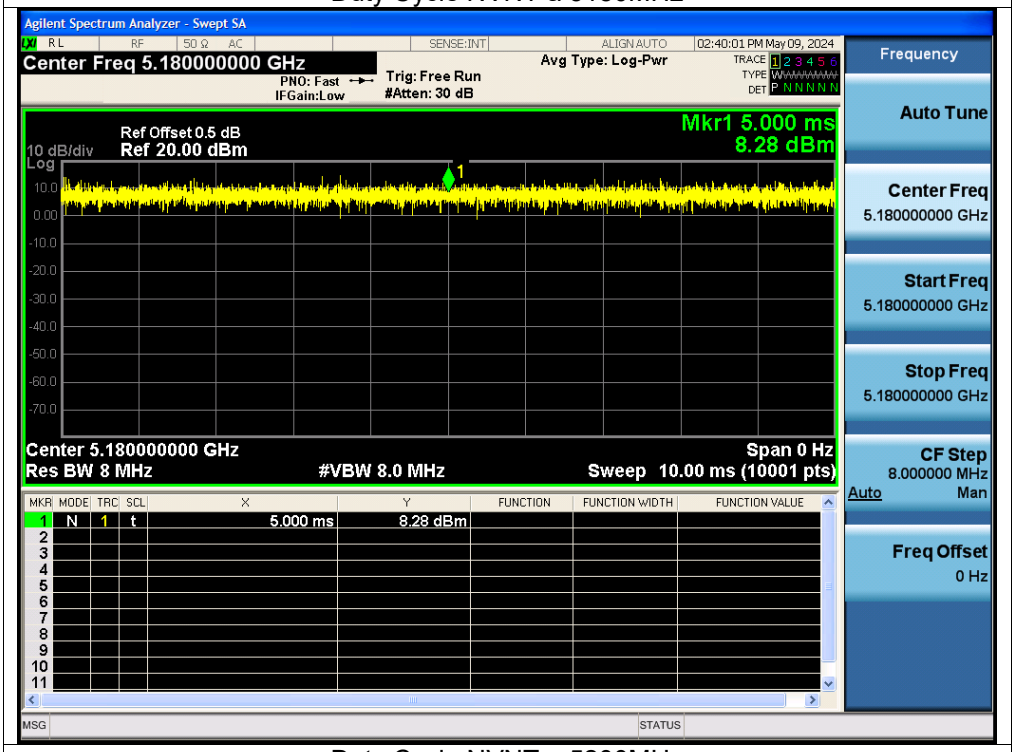
14.4 Test Result

5.1G

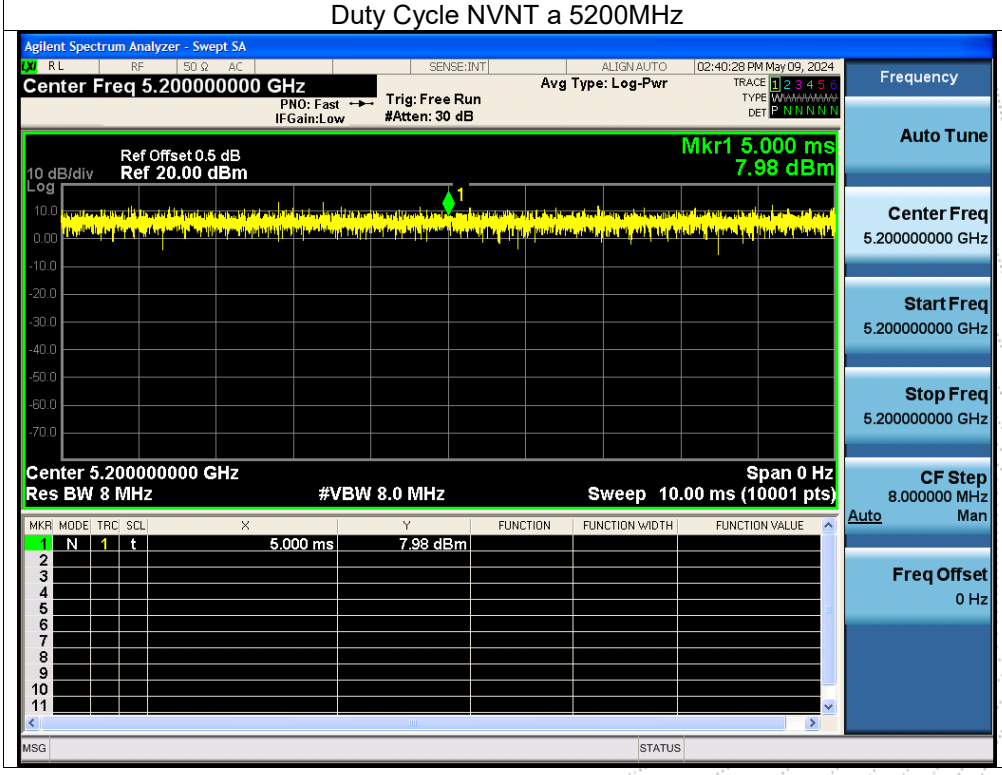
Condition	Mode	Frequency (MHz)	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	a	5180	100	0	0
NVNT	a	5200	100	0	0
NVNT	a	5240	100	0	0
NVNT	n20	5180	100	0	0
NVNT	n20	5200	100	0	0
NVNT	n20	5240	100	0	0
NVNT	n40	5190	100	0	0
NVNT	n40	5230	100	0	0
NVNT	ac20	5180	100	0	0
NVNT	ac20	5200	100	0	0
NVNT	ac20	5240	100	0	0
NVNT	ac40	5190	100	0	0
NVNT	ac40	5230	100	0	0
NVNT	ac80	5210	100	0	0

Test Graphs

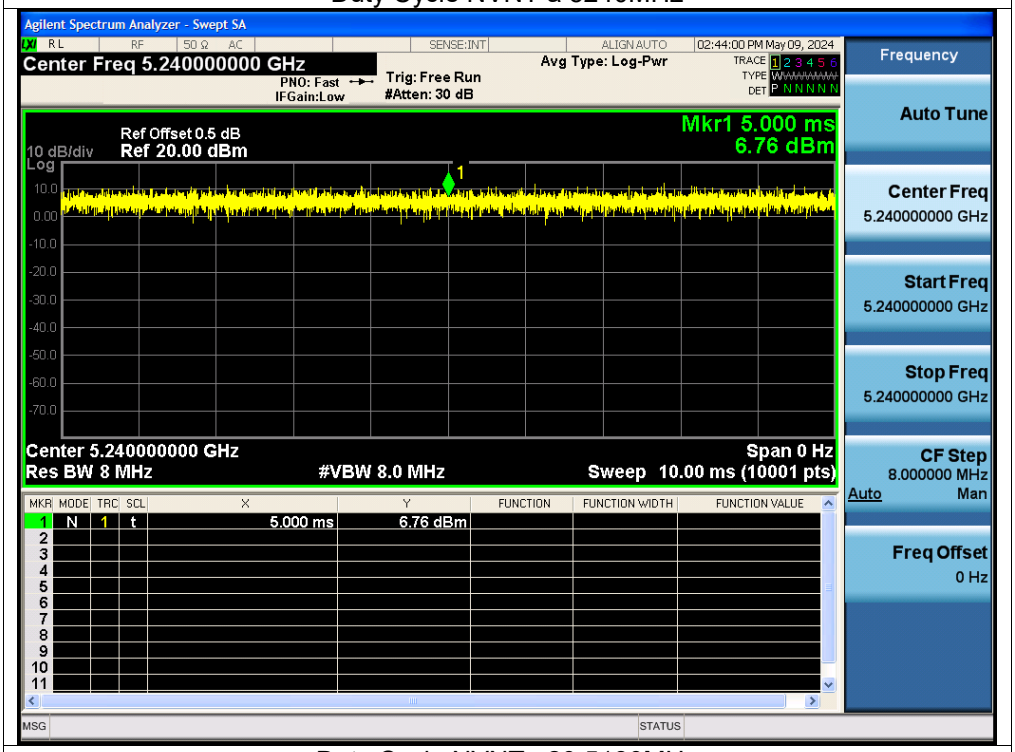
Duty Cycle NVNT a 5180MHz



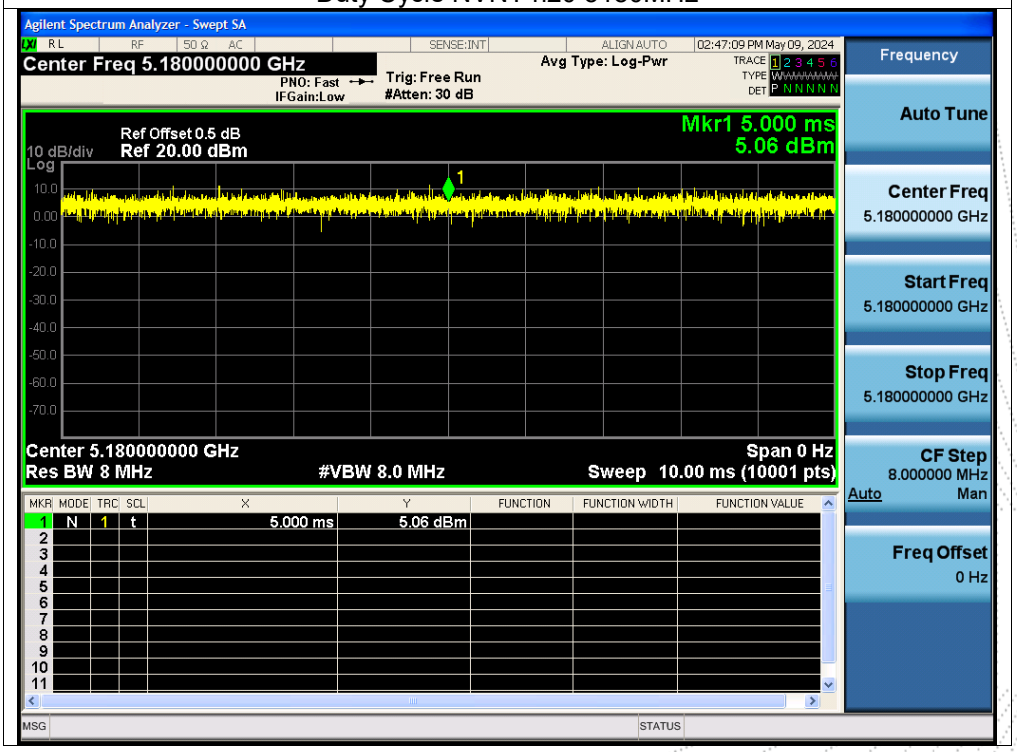
Duty Cycle NVNT a 5200MHz



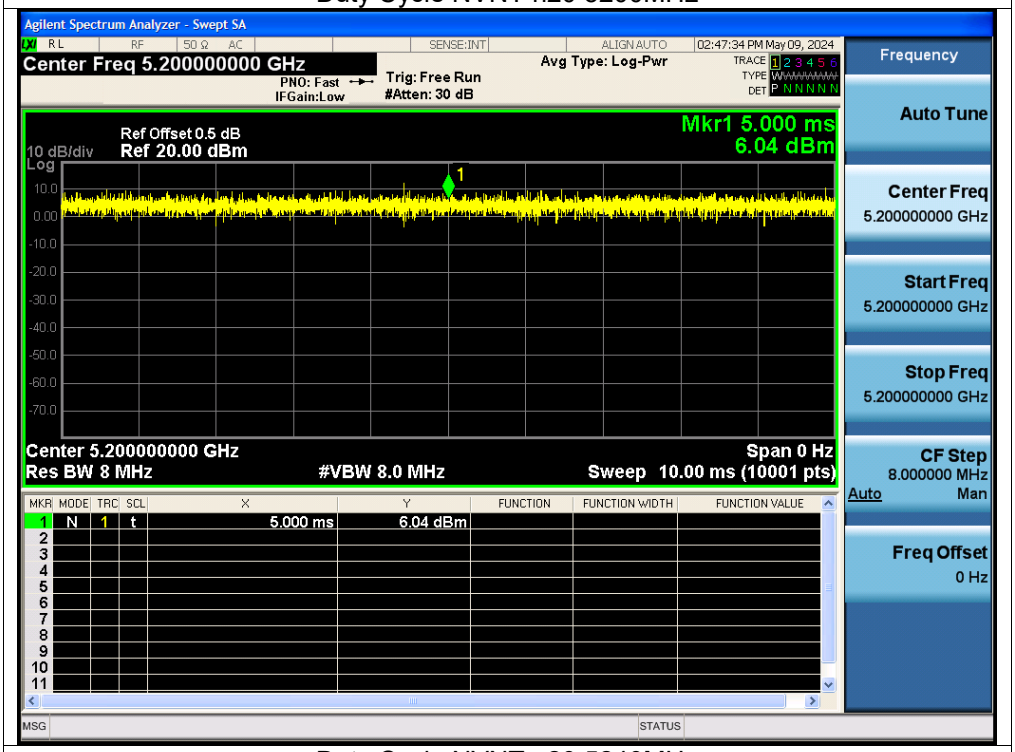
Duty Cycle NVNT a 5240MHz



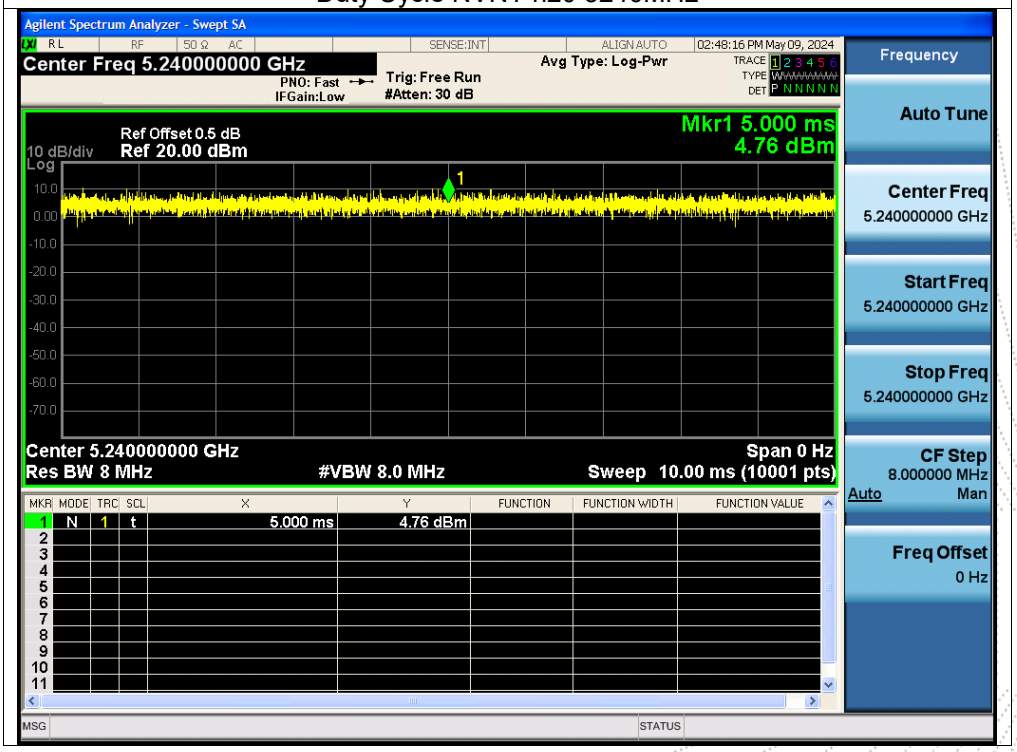
Duty Cycle NVNT n20 5180MHz



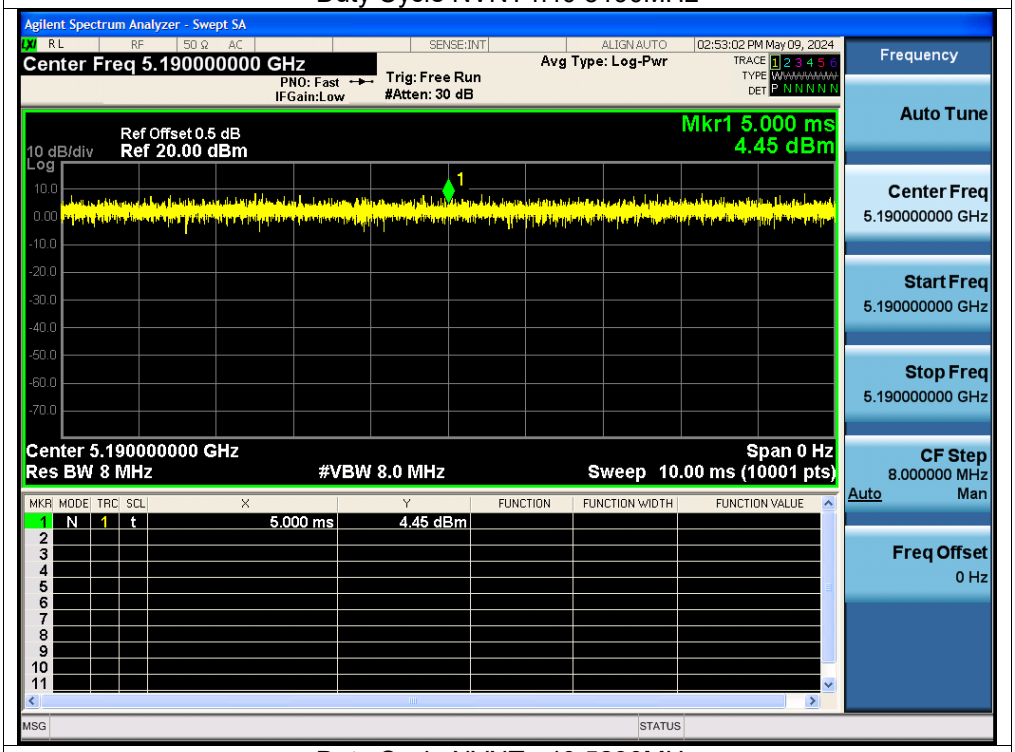
Duty Cycle NVNT n20 5200MHz



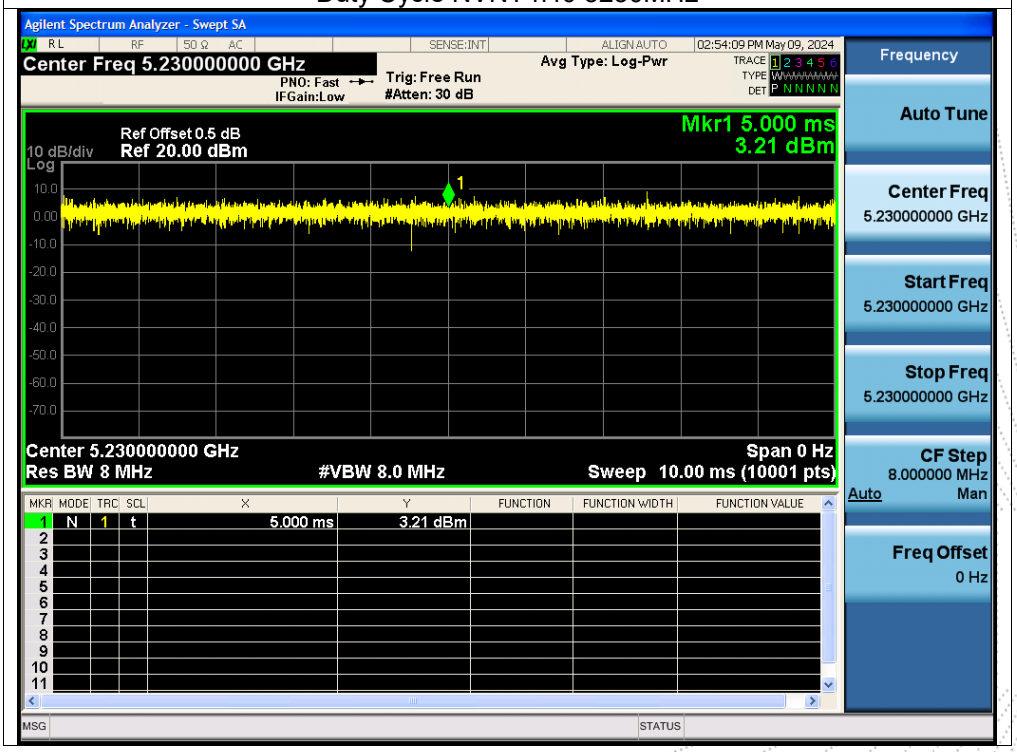
Duty Cycle NVNT n20 5240MHz



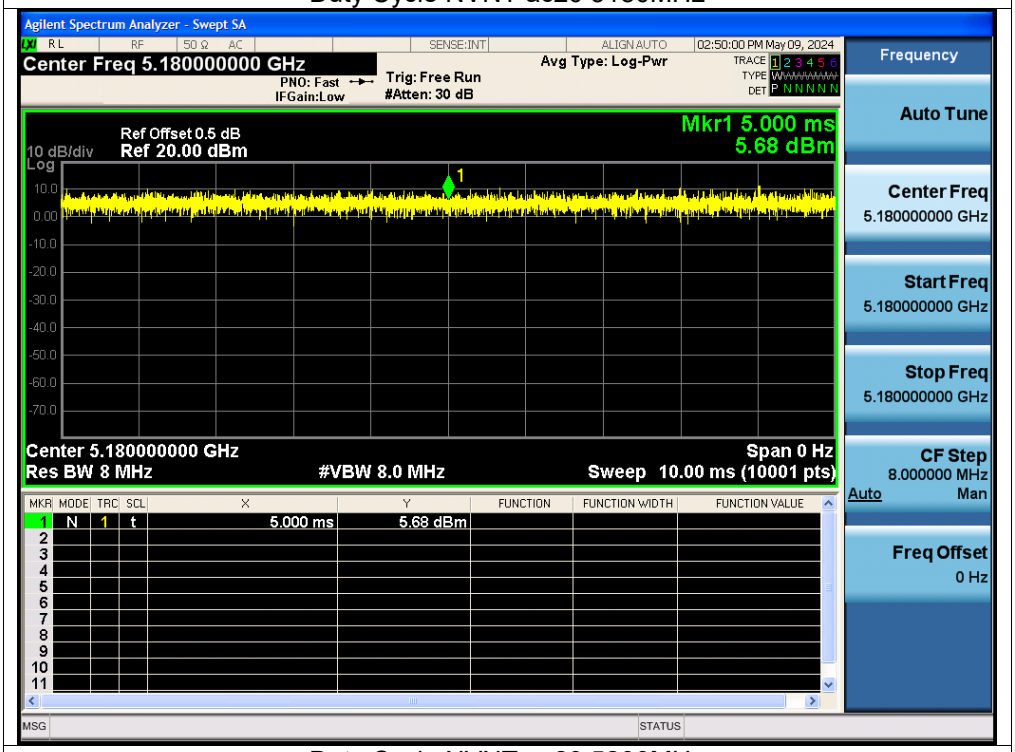
Duty Cycle NVNT n40 5190MHz



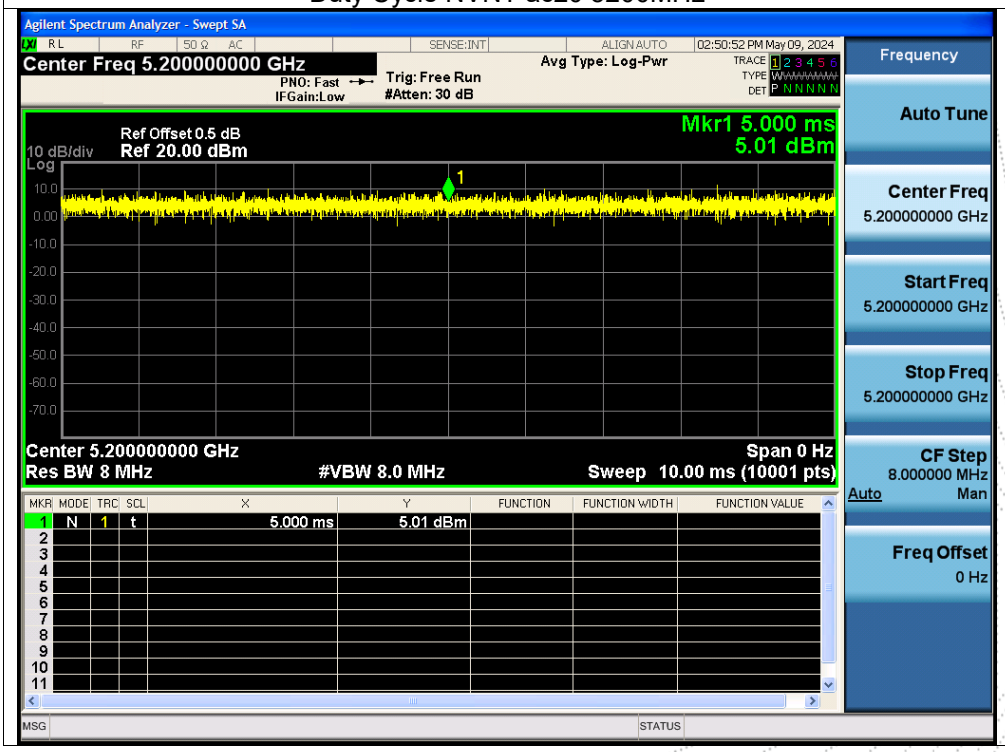
Duty Cycle NVNT n40 5230MHz



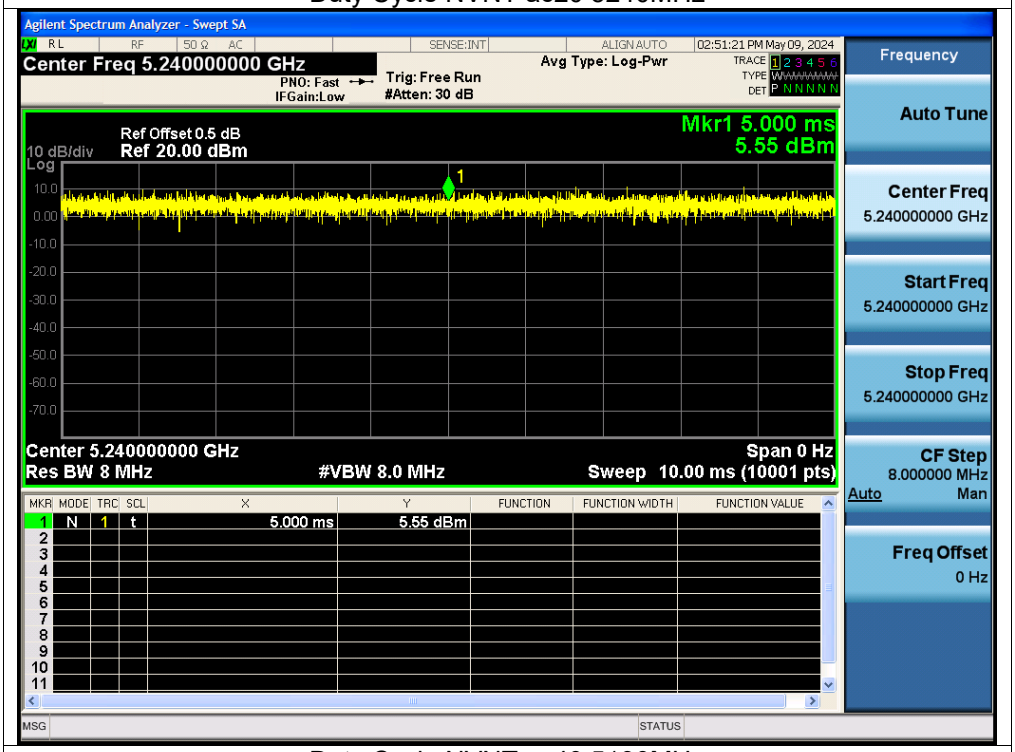
Duty Cycle NVNT ac20 5180MHz



Duty Cycle NVNT ac20 5200MHz



Duty Cycle NVNT ac20 5240MHz



Duty Cycle NVNT ac40 5190MHz