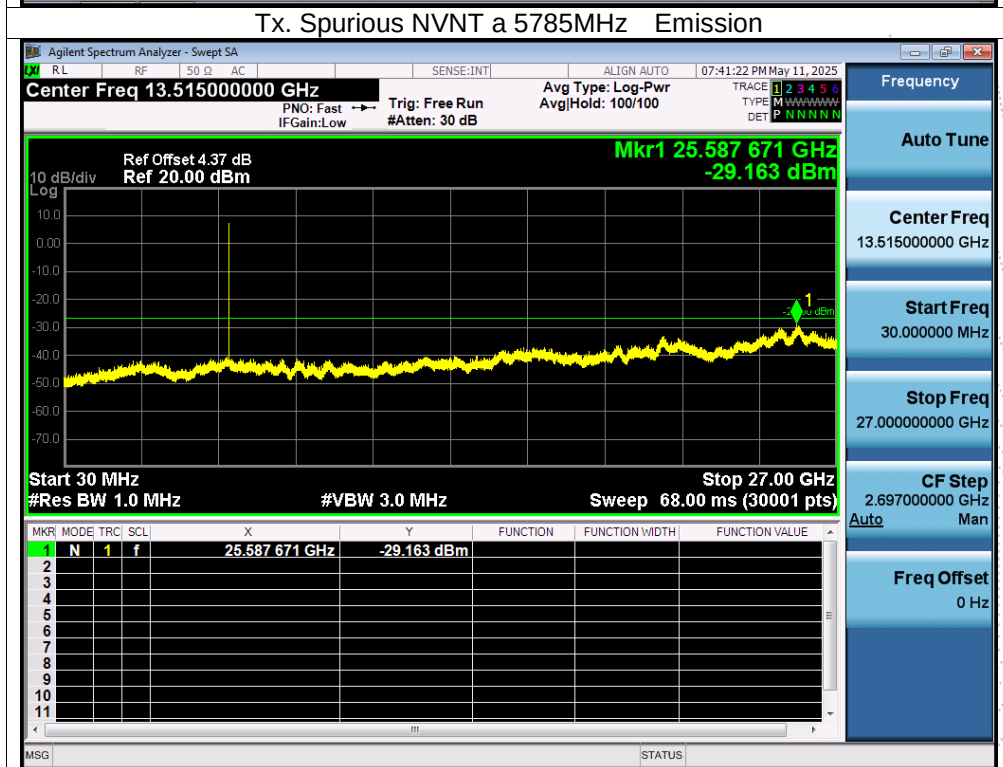
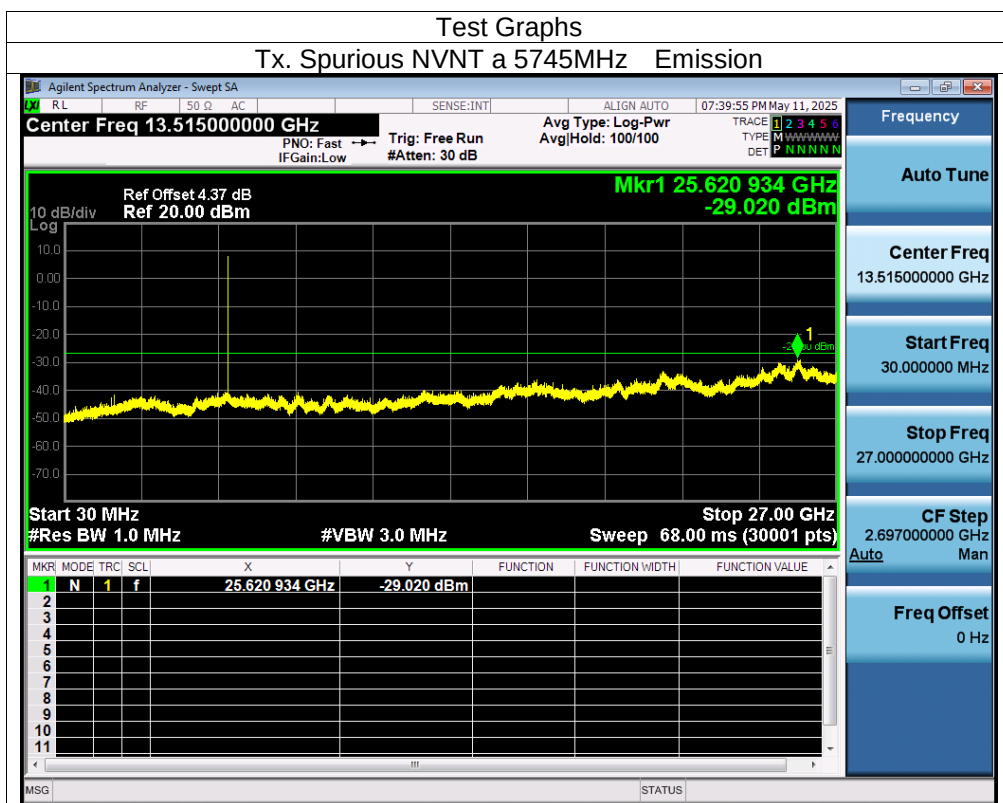
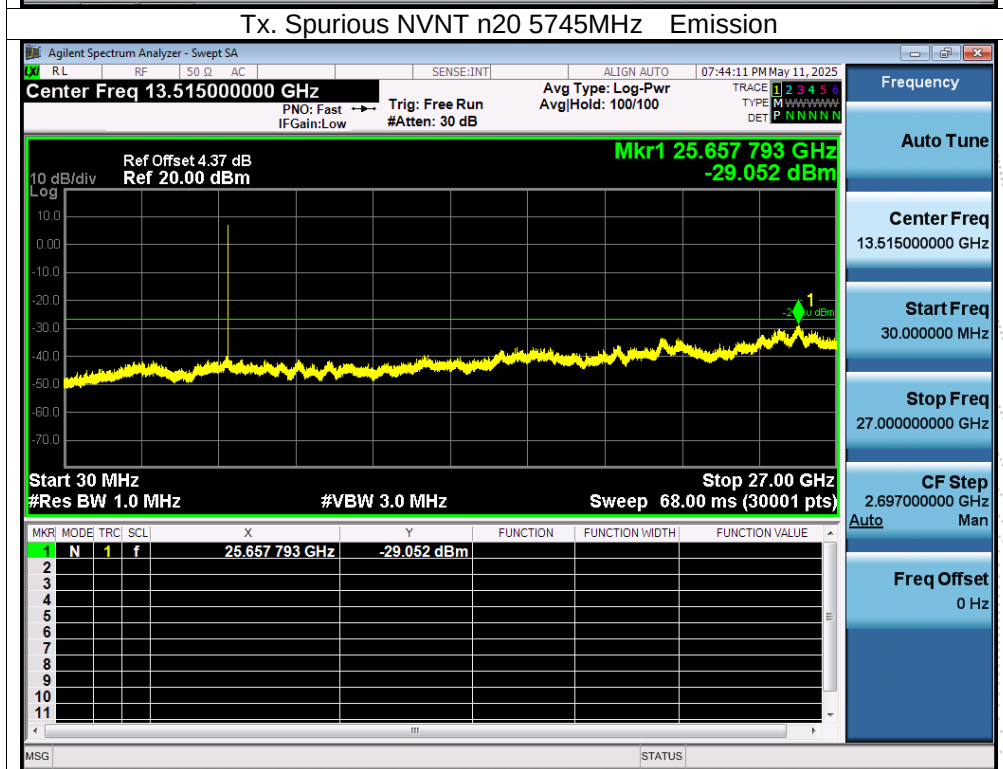
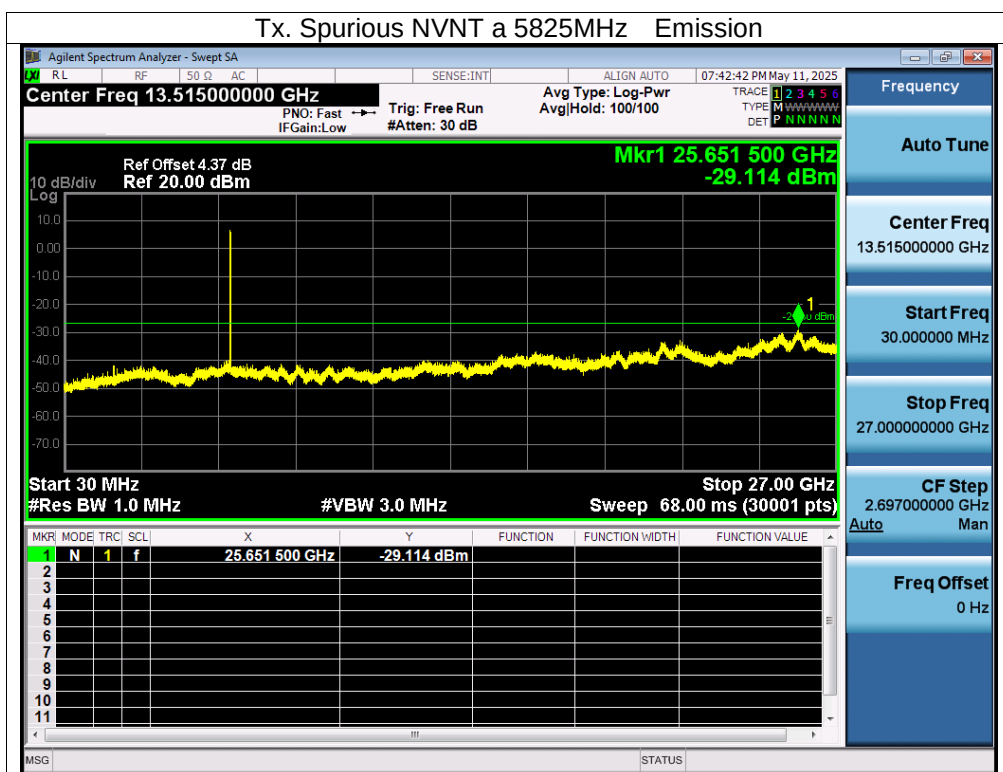
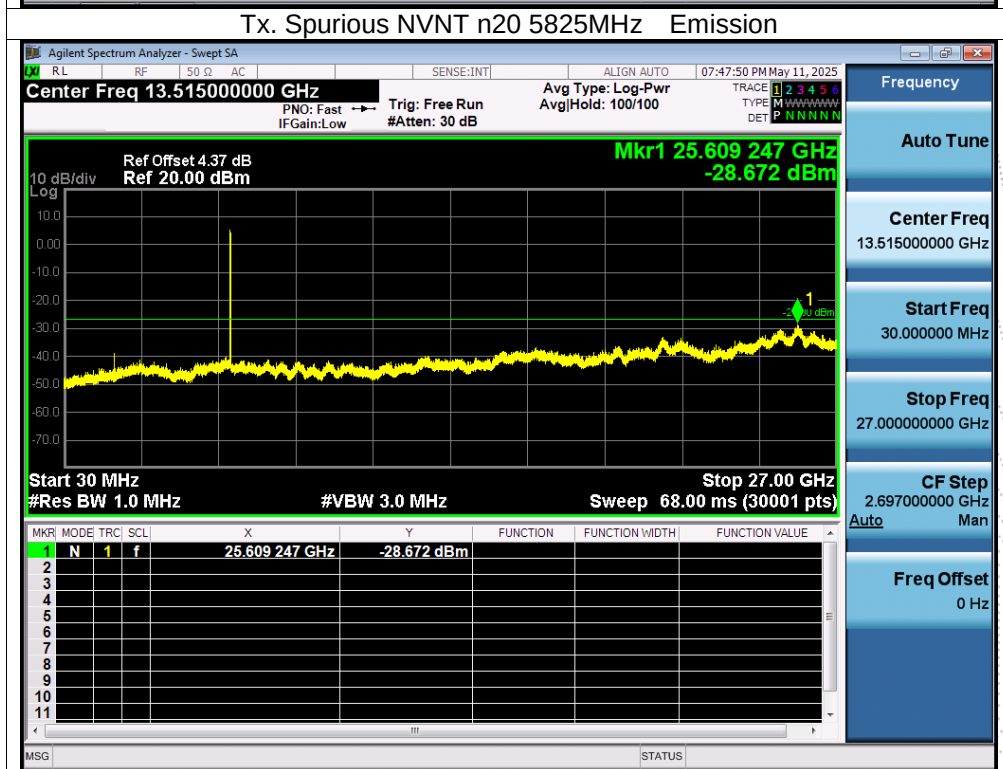
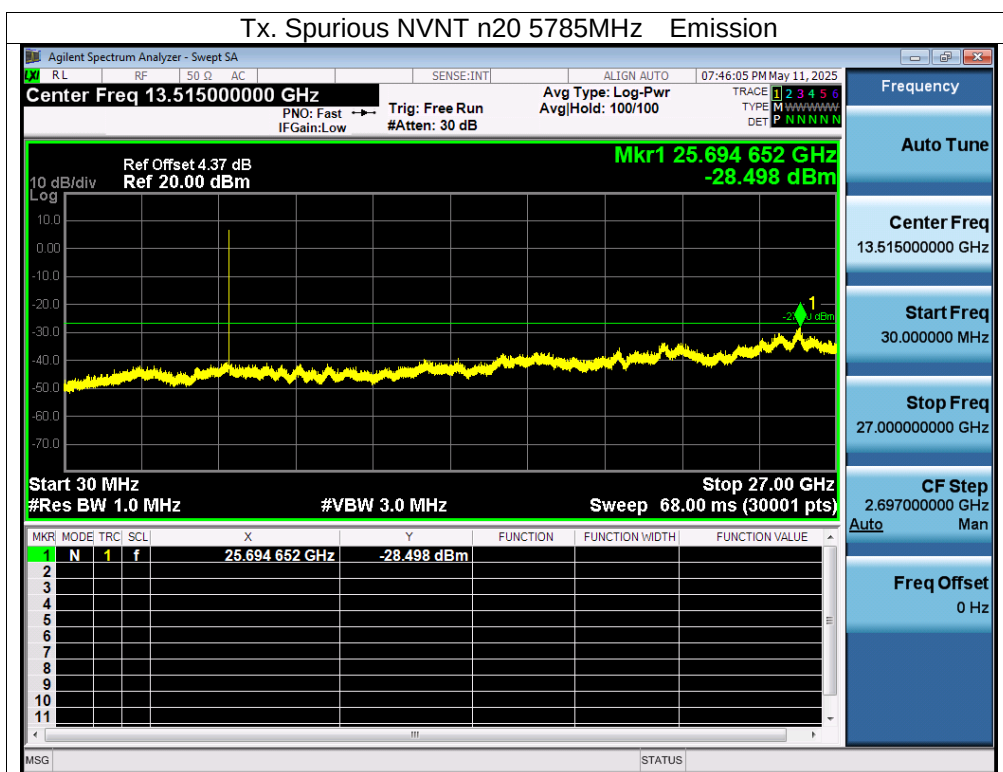
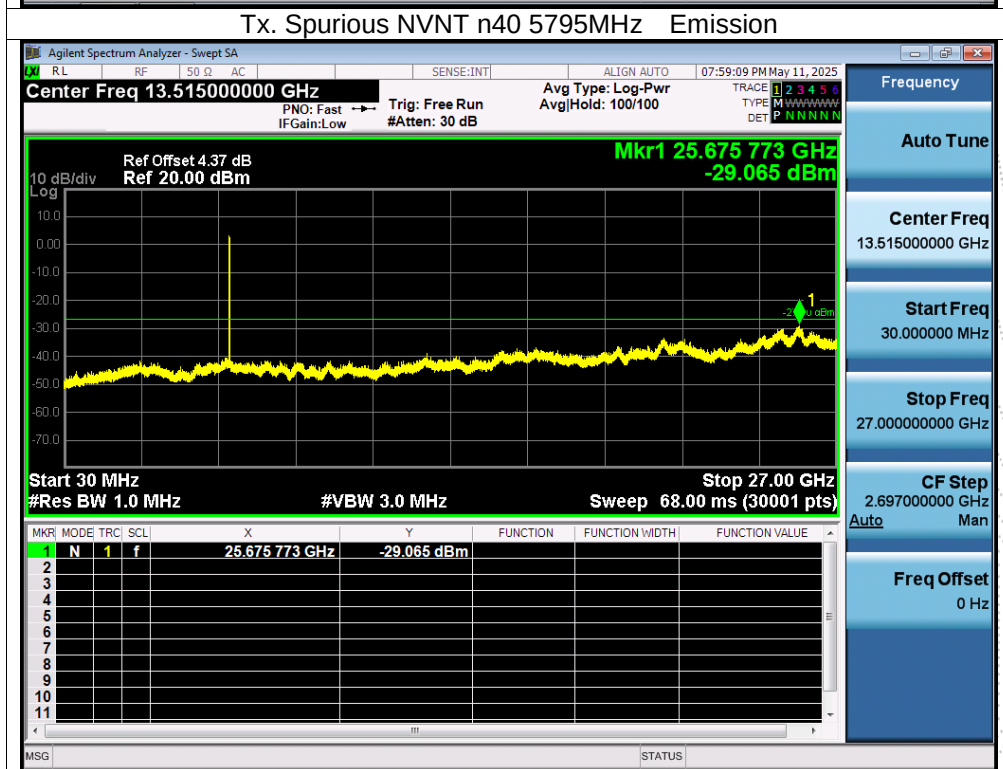
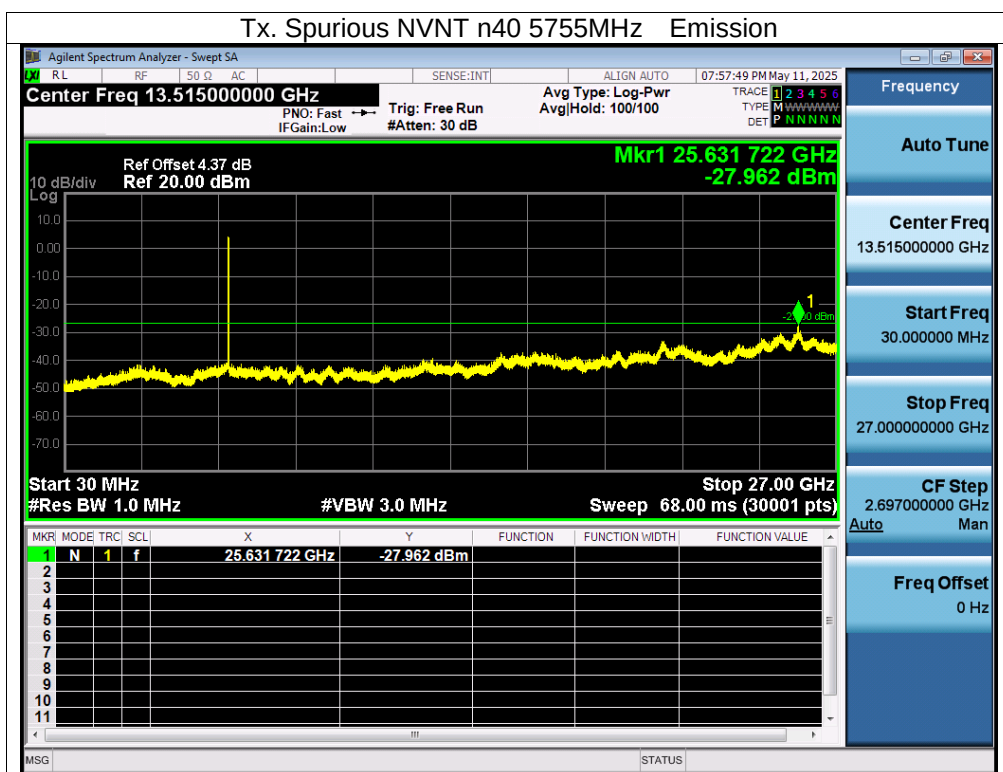
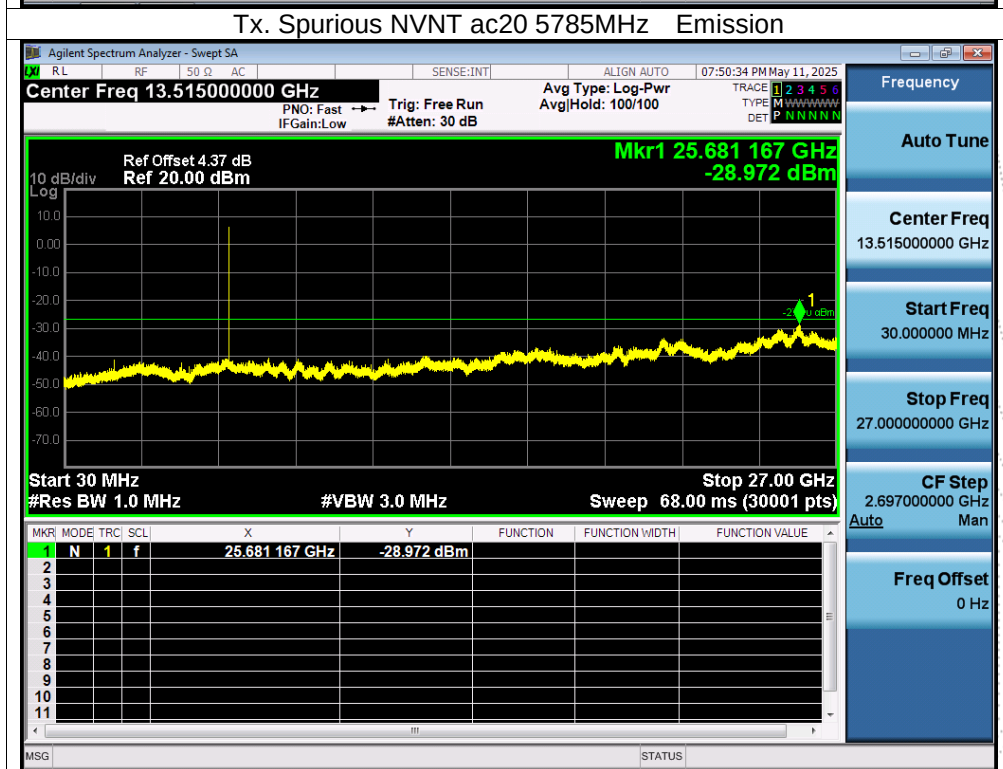
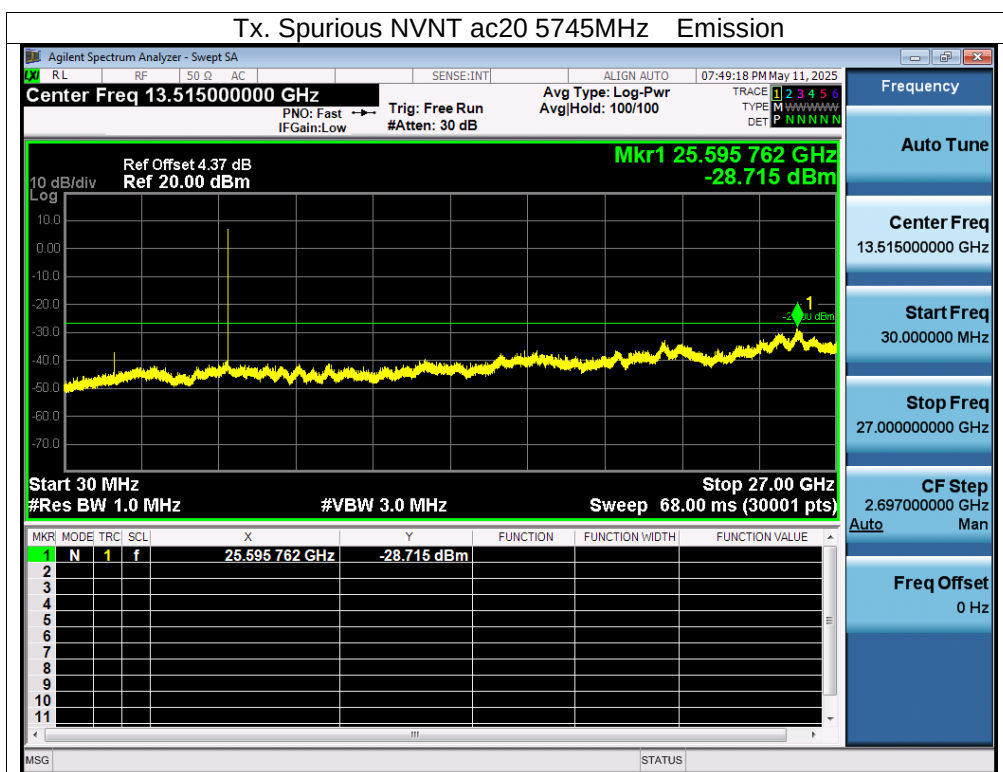


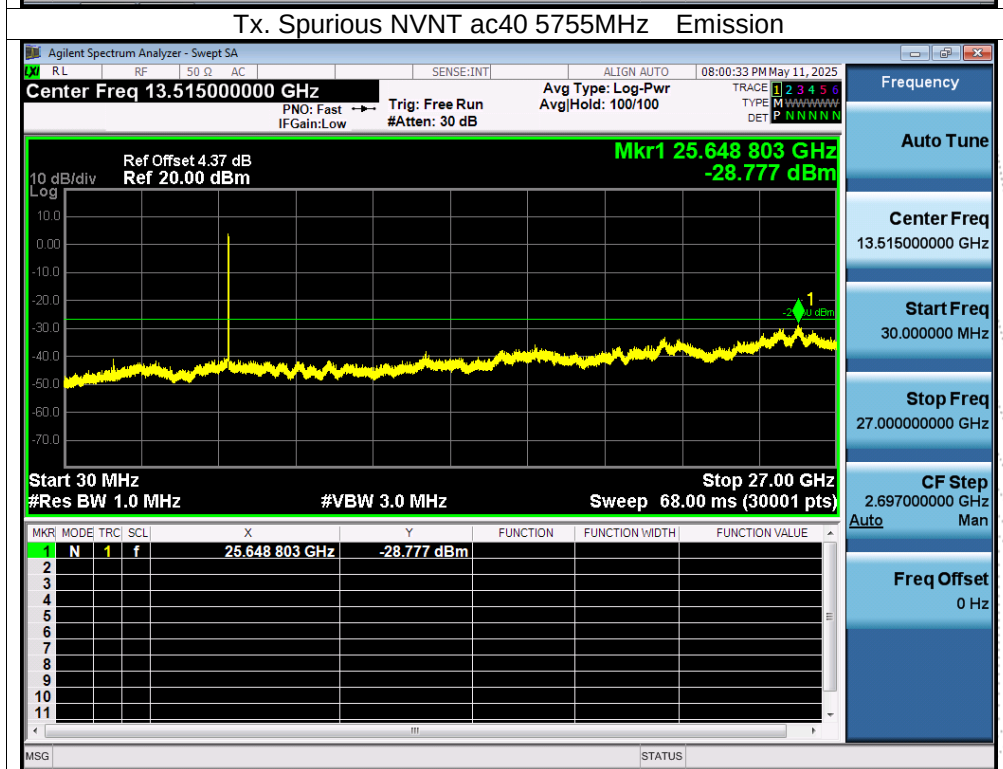
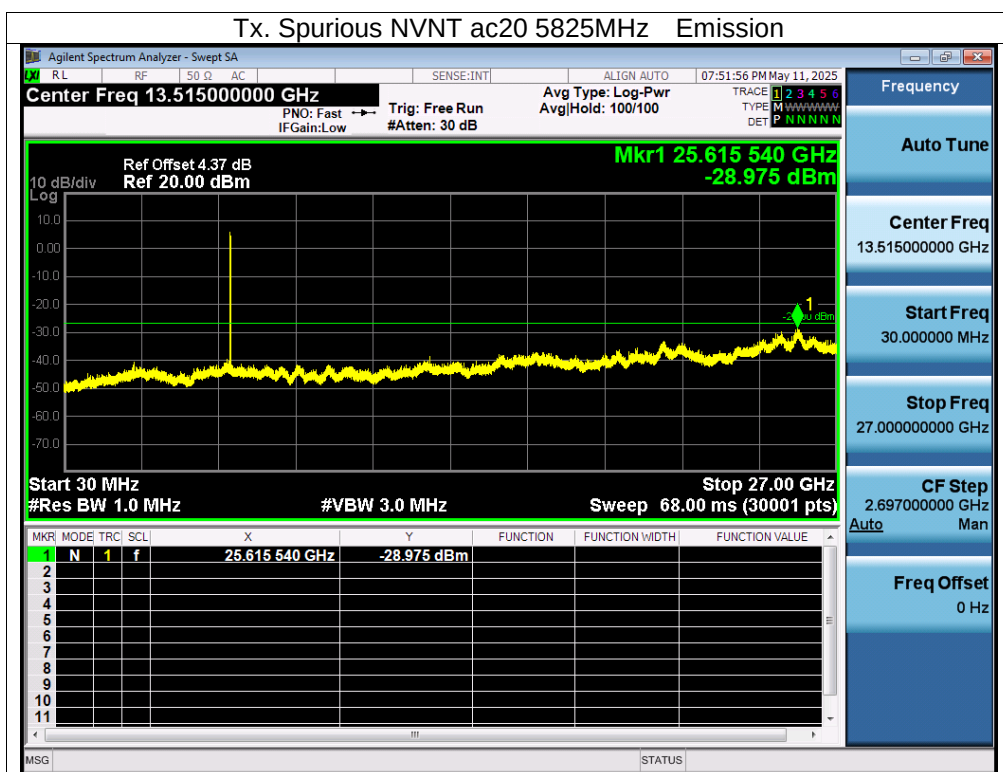


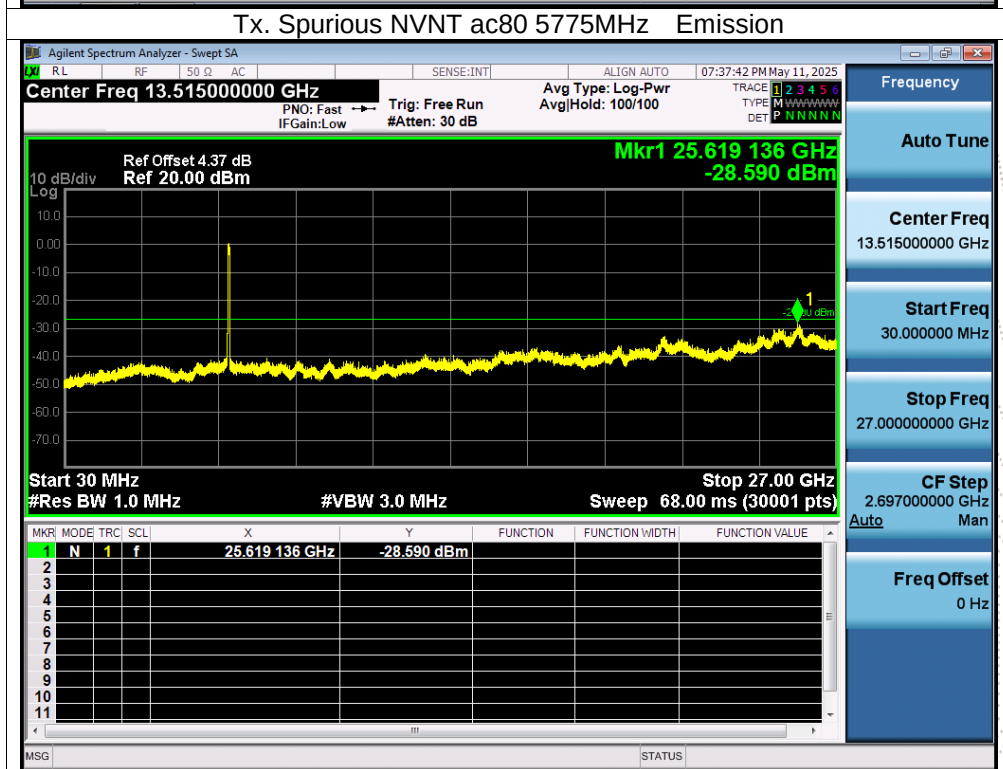
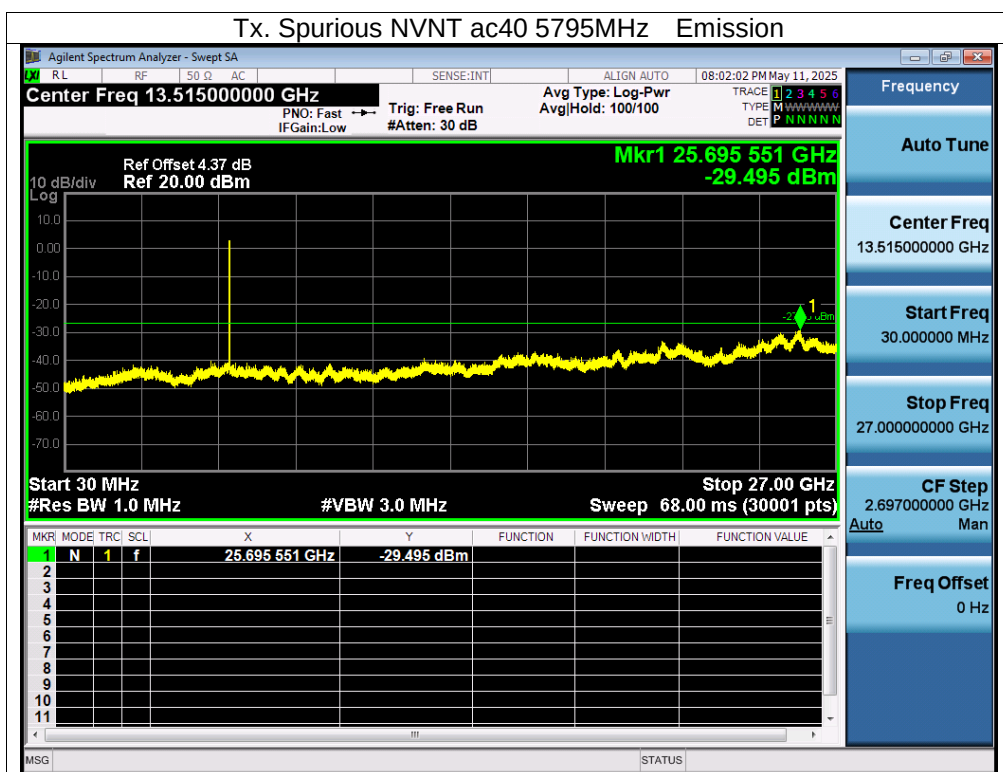


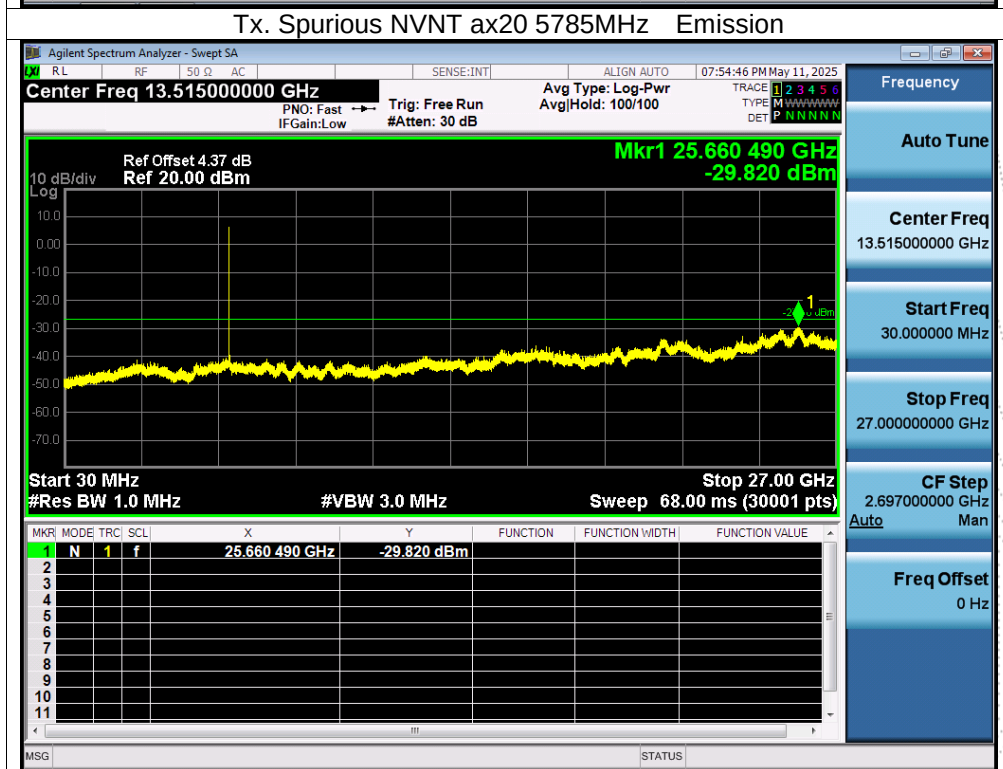
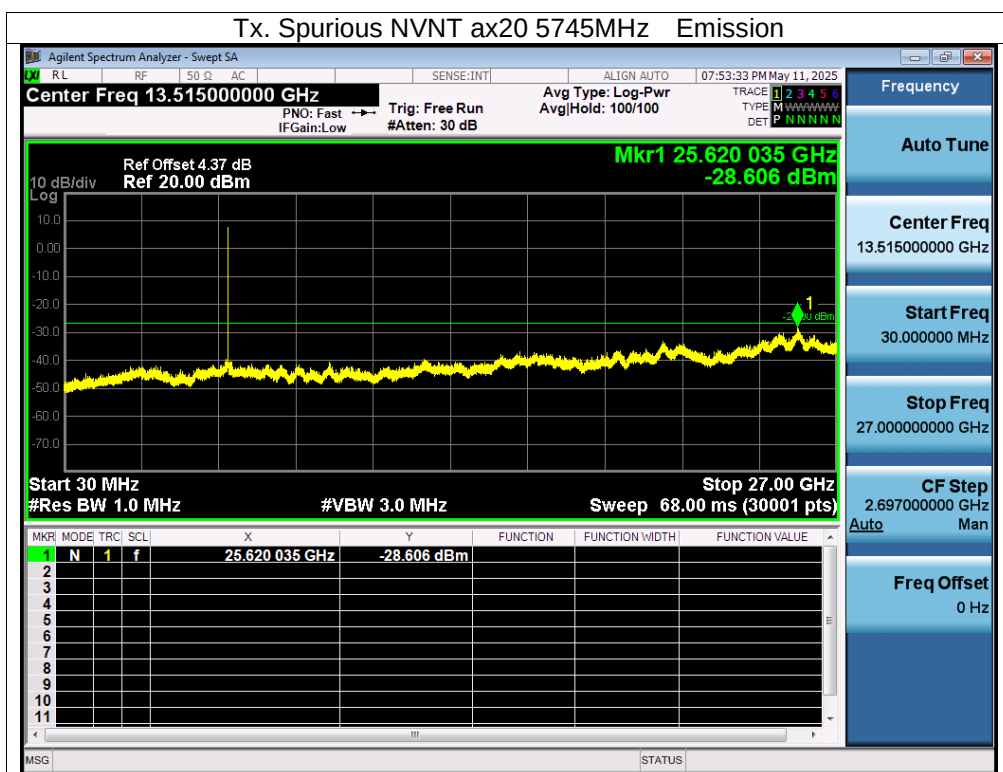


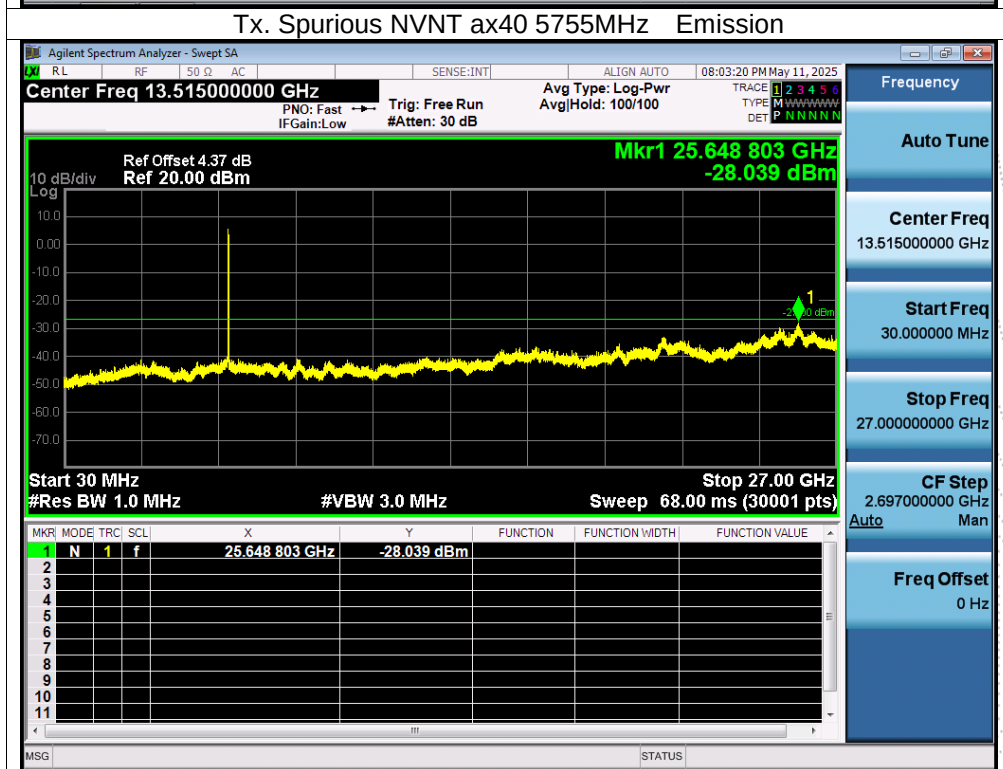
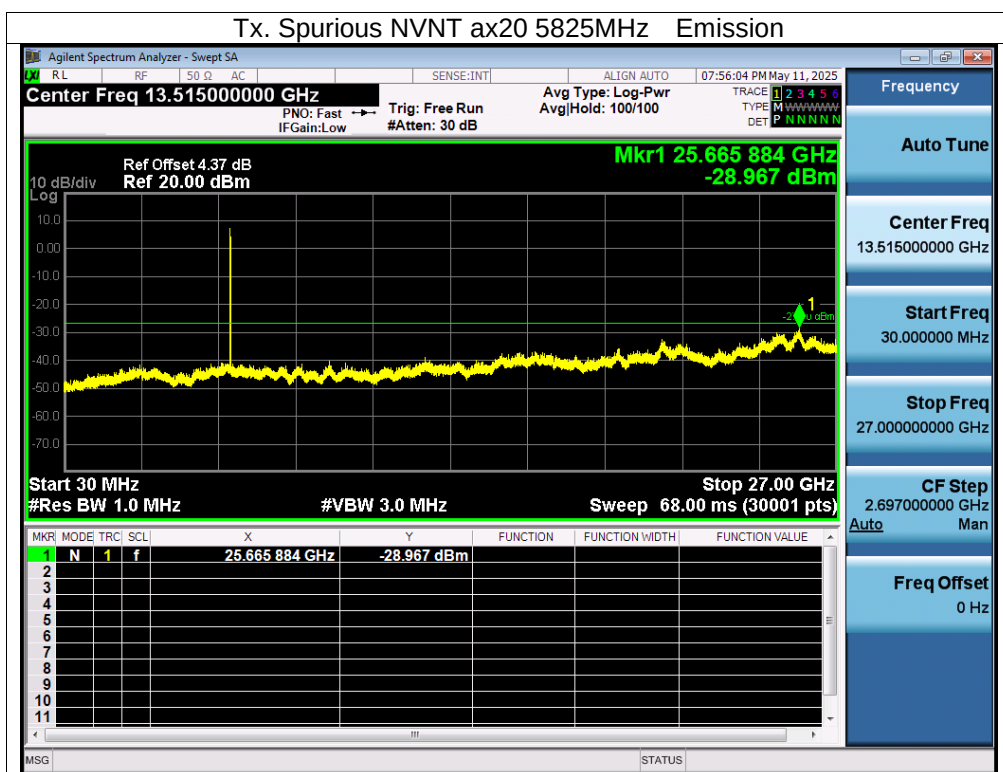


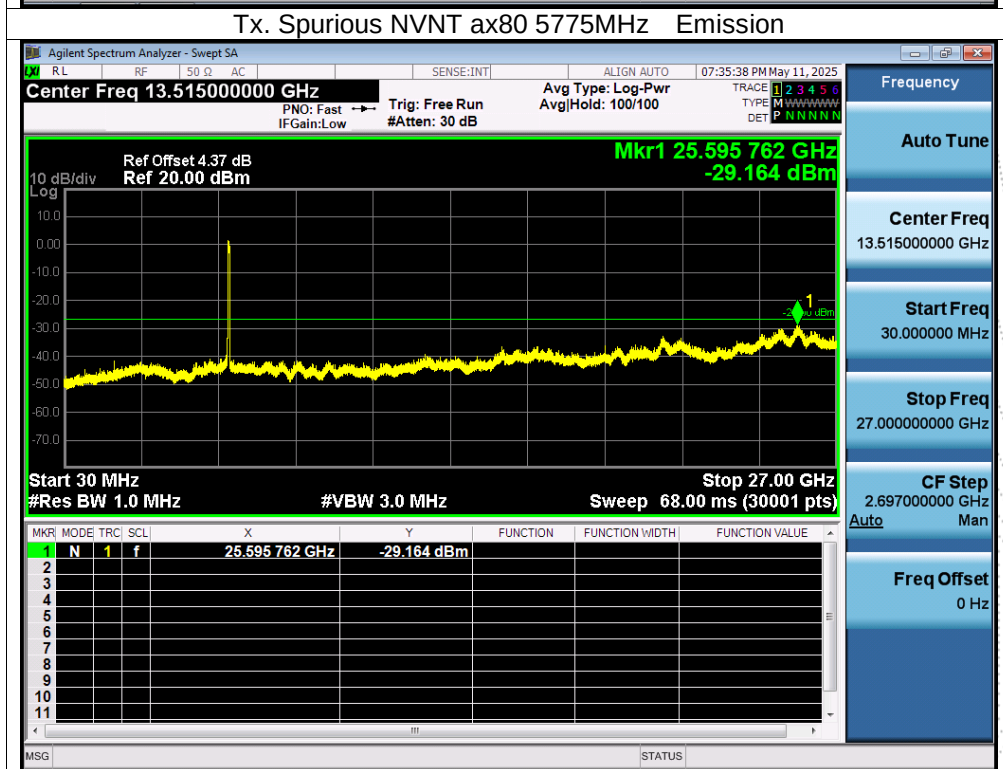
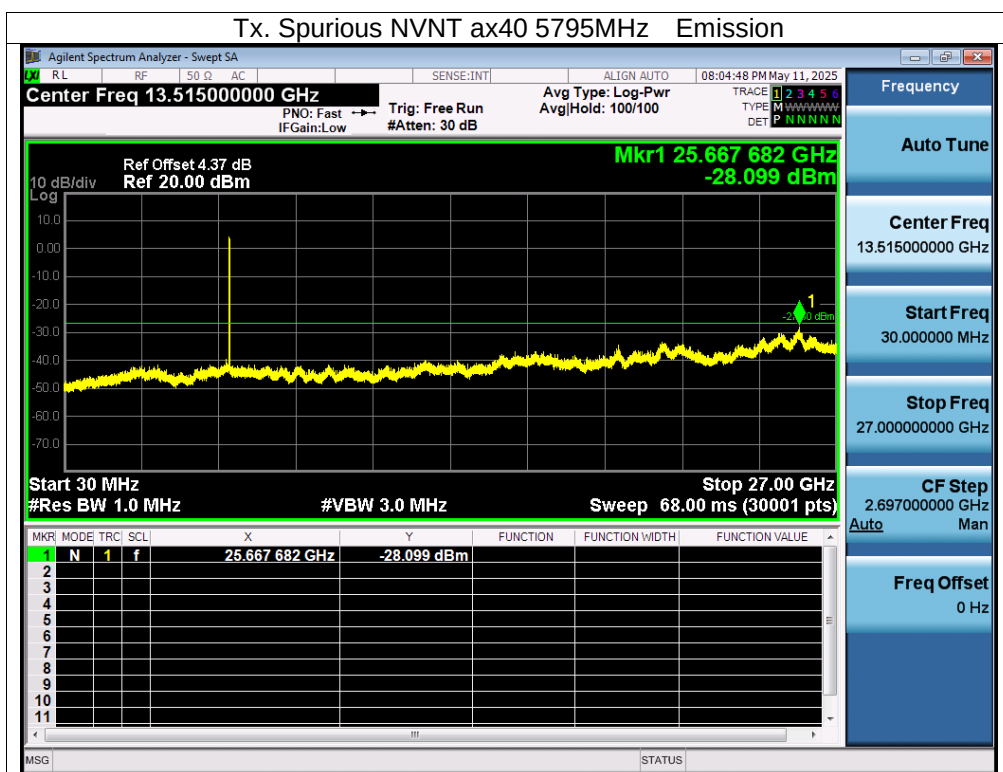












13. Frequency Stability Measurement

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. f_c is declaring of channel frequency. Then the frequency error formula is $(f_c - f)/f_c \times 10^6$ ppm and he limit is less than ± 20 ppm (IEEE 802.11n specification).
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 $-20^\circ\text{C} \sim 70^\circ\text{C}$.

13.4 Test Result

Temperature:	26 °C	Relative Humidity:	54%
Pressure:	101KPa	Test Voltage:	DC 3.3V
Test Mode:	TX (5.1G) Mode 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)	3.30	5180.0094	5180	0.0094	1.8147
		V max (V)	3.80	5180.0110	5180	0.0110	2.1236
		V min (V)	2.81	5180.0099	5180	0.0099	1.9112
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)	3.3	T (°C)	-20	5180.0090	5180	0.0090	1.7375
		T (°C)	-10	5180.0076	5180	0.0076	1.4672
		T (°C)	0	5180.0070	5180	0.0070	1.3514
		T (°C)	10	5180.0118	5180	0.0118	2.2780
		T (°C)	20	5180.0068	5180	0.0068	1.3127
		T (°C)	30	5180.0118	5180	0.0118	2.2780
		T (°C)	40	5180.0084	5180	0.0084	1.6216
		T (°C)	50	5180.0129	5180	0.0129	2.4903
		T (°C)	60	5180.0093	5180	0.0093	1.7954
		T (°C)	70	5180.0069	5180	0.0069	1.3320
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)	3.30	5200.0050	5200	0.0050	0.9615
		V max (V)	3.80	5200.0084	5200	0.0084	1.6154
		V min (V)	2.81	5200.0065	5200	0.0065	1.2500
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)	3.3	T (°C)	-20	5200.00040	5200	0.00040	0.0769
		T (°C)	-10	5200.00110	5200	0.00110	0.2115
		T (°C)	0	5200.00660	5200	0.00660	1.2692
		T (°C)	10	5200.01190	5200	0.01190	2.2885
		T (°C)	20	5200.01020	5200	0.01020	1.9615
		T (°C)	30	5200.00710	5200	0.00710	1.3654
		T (°C)	40	5200.00140	5200	0.00140	0.2692
		T (°C)	50	5200.00080	5200	0.00080	0.1538
		T (°C)	60	5200.00680	5200	0.00680	1.3077
		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)	3.30	5240.0097	5240	0.0097	1.8511
		V max (V)	3.80	5240.0066	5240	0.0066	1.2595
		V min (V)	2.81	5240.0068	5240	0.0068	1.2977
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)	3.3	T (°C)	-20	5240.0039	5240	0.0039	0.7443
		T (°C)	-10	5240.0014	5240	0.0014	0.2672
		T (°C)	0	5240.0044	5240	0.0044	0.8397
		T (°C)	10	5240.0091	5240	0.0091	1.7366
		T (°C)	20	5240.0098	5240	0.0098	1.8702
		T (°C)	30	5240.0030	5240	0.0030	0.5725
		T (°C)	40	5240.0121	5240	0.0121	2.3092
		T (°C)	50	5240.0058	5240	0.0058	1.1069
		T (°C)	60	5240.0092	5240	0.0092	1.7557
		T (°C)	70	5240.0100	5240	0.0100	1.9084
Limits				5150-5250 MHz			
Result				Complies			

Temperature:	26 °C	Relative Humidity:	54%
Pressure:	101KPa	Test Voltage:	DC 3.3V
Test Mode:	TX (5.3G) Mode Frequency U-NII-2A (5260-5320MHz)		

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5180MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	3.30	5260.0060	5260	0.0060	1.1407
		V max (V)	3.80	5260.0041	5260	0.0041	0.7795
		V min (V)	2.81	5260.0024	5260	0.0024	0.4563
Limits				5250-5350 MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5180MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	3.3	T (°C)	-20	5260.0030	5260	0.0030	0.5703
		T (°C)	-10	5260.0132	5260	0.0132	2.5095
		T (°C)	0	5260.0052	5260	0.0052	0.9886
		T (°C)	10	5260.0105	5260	0.0105	1.9962
		T (°C)	20	5260.0116	5260	0.0116	2.2053
		T (°C)	30	5260.0073	5260	0.0073	1.3878
		T (°C)	40	5260.0058	5260	0.0058	1.1027
		T (°C)	50	5260.0131	5260	0.0131	2.4905
		T (°C)	60	5260.0131	5260	0.0131	2.4905
		T (°C)	70	5260.0072	5260	0.0072	1.3688
Limits				5250-5350 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)	3.30	5280.0104	5280	0.0104	1.9697
		V max (V)	3.80	5280.0052	5280	0.0052	0.9848
		V min (V)	2.81	5280.0021	5280	0.0021	0.3977
Limits				5250-5350 MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5200MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	3.3	T (°C)	-20	5280.00800	5280	0.00800	1.5152
		T (°C)	-10	5280.00110	5280	0.00110	0.2083
		T (°C)	0	5280.00390	5280	0.00390	0.7386
		T (°C)	10	5280.01270	5280	0.01270	2.4053
		T (°C)	20	5280.00780	5280	0.00780	1.4773
		T (°C)	30	5280.00890	5280	0.00890	1.6856
		T (°C)	40	5280.00300	5280	0.00300	0.5682
		T (°C)	50	5280.00350	5280	0.00350	0.6629
		T (°C)	60	5280.01100	5280	0.01100	2.0833
		T (°C)	70	5280.01300	5280	0.01300	2.4621
Limits				5250-5350 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)	3.30	5320.0065	5320	0.0065	1.2218
		V max (V)	3.80	5320.0028	5320	0.0028	0.5263
		V min (V)	2.81	5320.0031	5320	0.0031	0.5827
Limits				5250-5350 MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency : 5240MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	3.3	T (°C)	-20	5320.0063	5320	0.0063	1.1842
		T (°C)	-10	5320.0105	5320	0.0105	1.9737
		T (°C)	0	5320.0094	5320	0.0094	1.7669
		T (°C)	10	5320.0060	5320	0.0060	1.1278
		T (°C)	20	5320.0055	5320	0.0055	1.0338
		T (°C)	30	5320.0019	5320	0.0019	0.3571
		T (°C)	40	5320.0055	5320	0.0055	1.0338
		T (°C)	50	5320.0032	5320	0.0032	0.6015
		T (°C)	60	5320.0033	5320	0.0033	0.6203
		T (°C)	70	5320.0012	5320	0.0012	0.2256
Limits				5250-5350 MHz			
Result				Complies			

Temperature:	26 °C	Relative Humidity:	54%
Pressure:	101KPa	Test Voltage:	DC 3.3V
Test Mode:	TX (5.6G) Mode Frequency U-NII-2C (5500-5700MHz)		

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5500MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	3.30	5500.0103	5500	0.0103	1.8727
		V max (V)	3.80	5500.0026	5500	0.0026	0.4727
		V min (V)	2.81	5500.0080	5500	0.0080	1.4545
Limits				5470-5725 MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5500MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	3.3	T (°C)	-20	5500.0059	5500	0.0059	1.0727
		T (°C)	-10	5500.0037	5500	0.0037	0.6727
		T (°C)	0	5500.0117	5500	0.0117	2.1273
		T (°C)	10	5500.0077	5500	0.0077	1.4000
		T (°C)	20	5500.0119	5500	0.0119	2.1636
		T (°C)	30	5500.0009	5500	0.0009	0.1636
		T (°C)	40	5500.0016	5500	0.0016	0.2909
		T (°C)	50	5500.0056	5500	0.0056	1.0182
		T (°C)	60	5500.0022	5500	0.0022	0.4000
		T (°C)	70	5500.0040	5500	0.0040	0.7273
Limits				5470-5725 MHz			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5580MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	3.30	5580.0092	5580	0.0092	1.6487
		V max (V)	3.80	5580.0038	5580	0.0038	0.6810
		V min (V)	2.81	5580.0081	5580	0.0081	1.4516
Limits				5470-5725 MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5580MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	3.3	T (°C)	-20	5580.00220	5580	0.00220	0.3943
		T (°C)	-10	5580.01320	5580	0.01320	2.3656
		T (°C)	0	5580.00670	5580	0.00670	1.2007
		T (°C)	10	5580.00970	5580	0.00970	1.7384
		T (°C)	20	5580.00840	5580	0.00840	1.5054
		T (°C)	30	5580.01290	5580	0.01290	2.3118
		T (°C)	40	5580.00920	5580	0.00920	1.6487
		T (°C)	50	5580.01060	5580	0.01060	1.8996
		T (°C)	60	5580.00340	5580	0.00340	0.6093
		T (°C)	70	5580.00240	5580	0.00240	0.4301
Limits				5470-5725 MHz			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5700MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	3.30	5700.0126	5700	0.0126	2.2105
		V max (V)	3.80	5700.0040	5700	0.0040	0.7018
		V min (V)	2.81	5700.0054	5700	0.0054	0.9474
Limits				5470-5725 MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5700MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	3.3	T (°C)	-20	5700.0018	5700	0.0018	0.3158
		T (°C)	-10	5700.0048	5700	0.0048	0.8421
		T (°C)	0	5700.0008	5700	0.0008	0.1404
		T (°C)	10	5700.0003	5700	0.0003	0.0526
		T (°C)	20	5700.0109	5700	0.0109	1.9123
		T (°C)	30	5700.0108	5700	0.0108	1.8947
		T (°C)	40	5700.0123	5700	0.0123	2.1579
		T (°C)	50	5700.0114	5700	0.0114	2.0000
		T (°C)	60	5700.0039	5700	0.0039	0.6842
		T (°C)	70	5700.0108	5700	0.0108	1.8947
Limits				5470-5725 MHz			
Result				Complies			

Temperature:	26 °C	Relative Humidity:	54%
Pressure:	101KPa	Test Voltage:	DC 3.3V
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)	3.30	5745.01030	5745	0.01030	1.7929
		V max (V)	3.80	5745.00060	5745	0.00060	0.1044
		V min (V)	2.81	5745.00470	5745	0.00470	0.8181
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)	3.3	T (°C)	-20	5745.01250	5745	0.01250	2.1758
		T (°C)	-10	5745.00250	5745	0.00250	0.4352
		T (°C)	0	5745.01290	5745	0.01290	2.2454
		T (°C)	10	5745.00320	5745	0.00320	0.5570
		T (°C)	20	5745.00290	5745	0.00290	0.5048
		T (°C)	30	5745.00240	5745	0.00240	0.4178
		T (°C)	40	5745.01250	5745	0.01250	2.1758
		T (°C)	50	5745.00850	5745	0.00850	1.4795
		T (°C)	60	5745.01200	5745	0.01200	2.0888
		T (°C)	70	5745.00150	5745	0.00150	0.2611
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)	3.30	5785.00410	5785	0.00410	0.7087
		V max (V)	3.80	5785.00740	5785	0.00740	1.2792
		V min (V)	2.81	5785.00400	5785	0.00400	0.6914
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)	3.3	T (°C)	-20	5785.01150	5785	0.01150	1.9879
		T (°C)	-10	5785.00060	5785	0.00060	0.1037
		T (°C)	0	5785.00610	5785	0.00610	1.0545
		T (°C)	10	5785.00210	5785	0.00210	0.3630
		T (°C)	20	5785.01180	5785	0.01180	2.0398
		T (°C)	30	5785.00270	5785	0.00270	0.4667
		T (°C)	40	5785.01140	5785	0.01140	1.9706
		T (°C)	50	5785.01250	5785	0.01250	2.1608
		T (°C)	60	5785.00640	5785	0.00640	1.1063
		T (°C)	70	5785.00800	5785	0.00800	1.3829
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)	3.30	5825.00420	5825	0.00420	0.7210
		V max (V)	3.80	5825.01110	5825	0.01110	1.9056
		V min (V)	2.81	5825.01060	5825	0.01060	1.8197
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)	3.3	T (°C)	-20	5825.00910	5825	0.00910	1.5622
		T (°C)	-10	5825.00550	5825	0.00550	0.9442
		T (°C)	0	5825.00820	5825	0.00820	1.4077
		T (°C)	10	5825.00640	5825	0.00640	1.0987
		T (°C)	20	5825.00680	5825	0.00680	1.1674
		T (°C)	30	5825.00310	5825	0.00310	0.5322
		T (°C)	40	5825.00550	5825	0.00550	0.9442
		T (°C)	50	5825.00400	5825	0.00400	0.6867
		T (°C)	60	5825.01030	5825	0.01030	1.7682
		T (°C)	70	5825.01000	5825	0.01000	1.7167
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 = $T_{on} / (T_{on} + T_{off})$

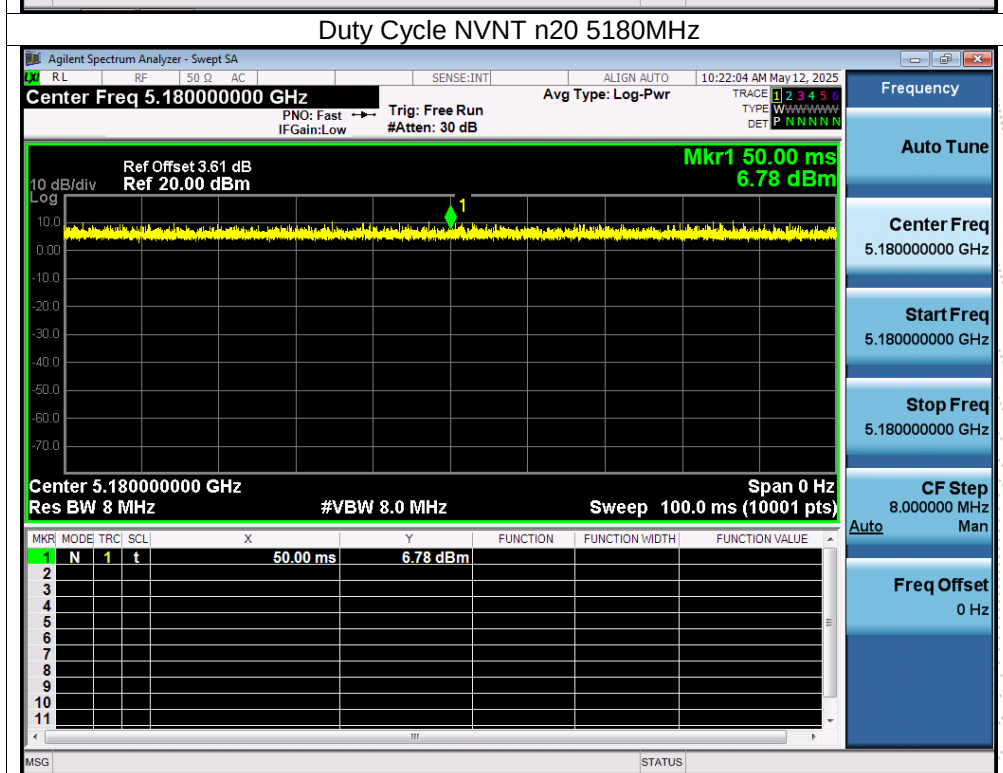
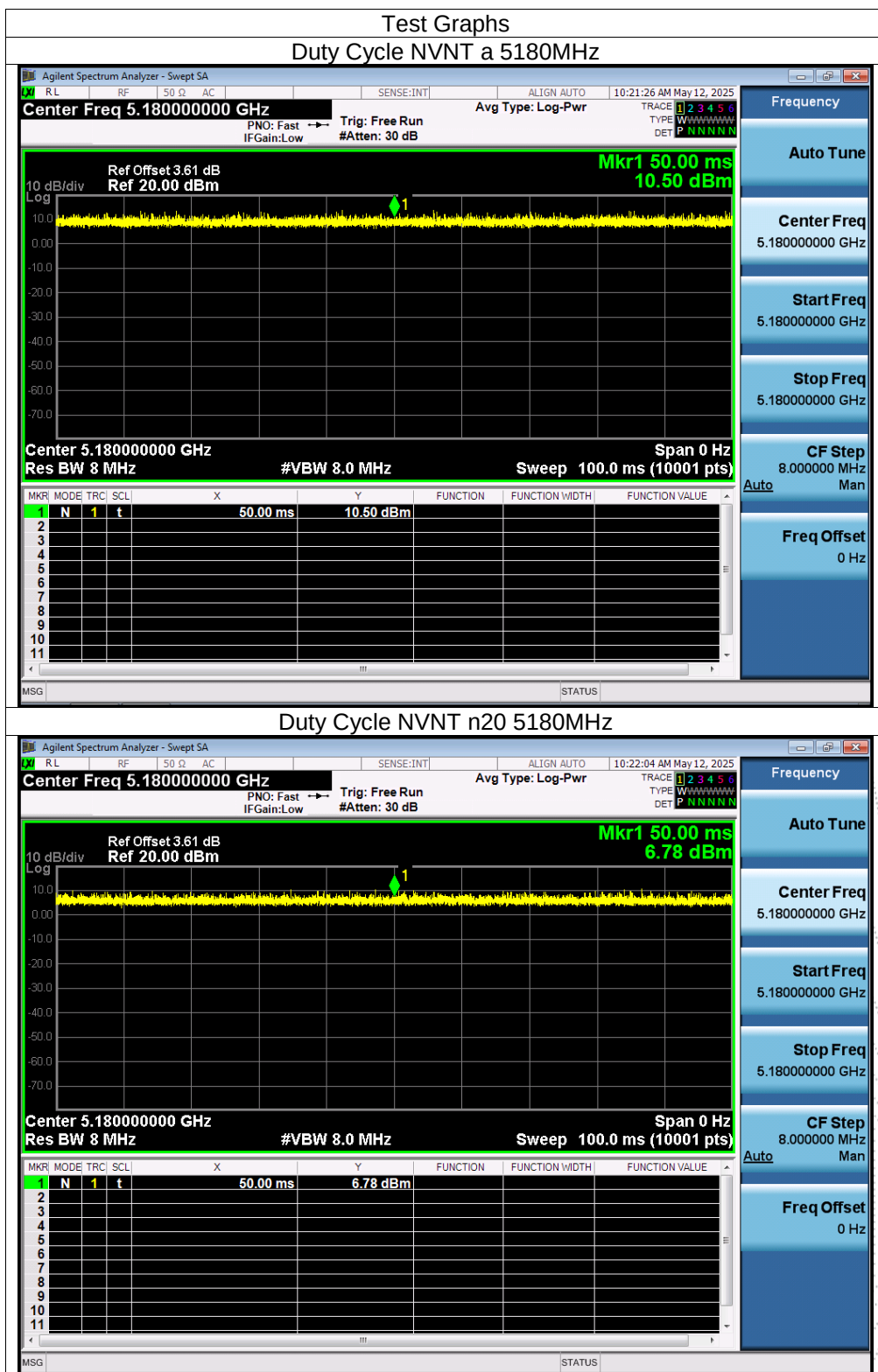
14.3 Test Procedure

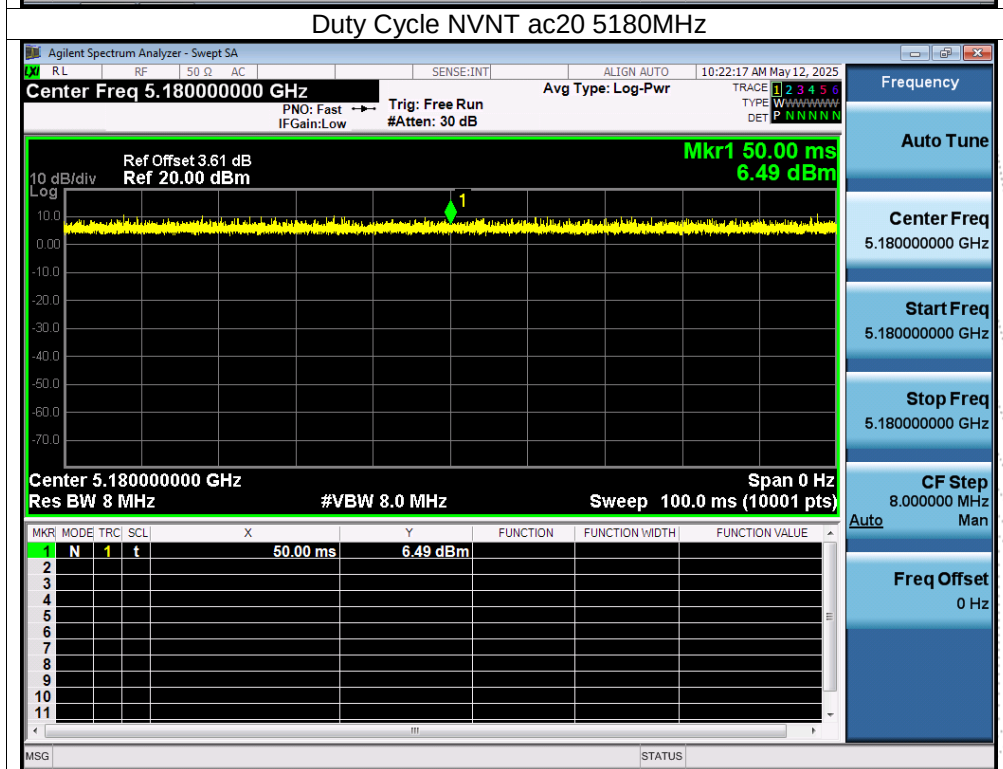
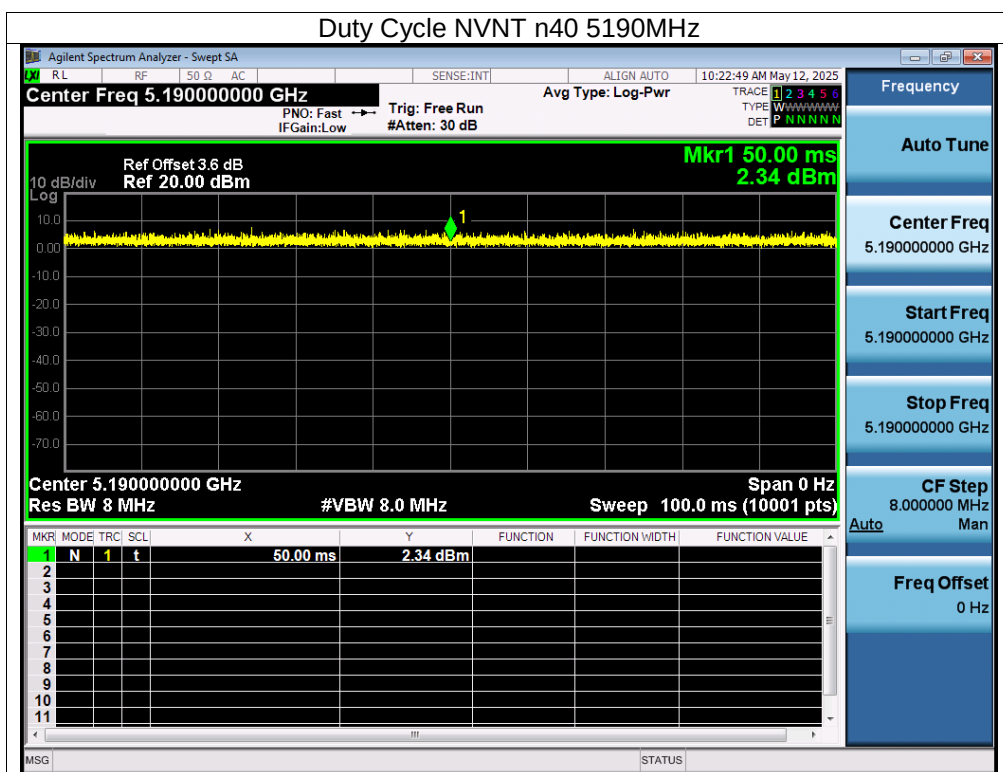
1. Set span = Zero
2. RBW = 8MHz
3. VBW = 8MHz,
4. Detector = Peak

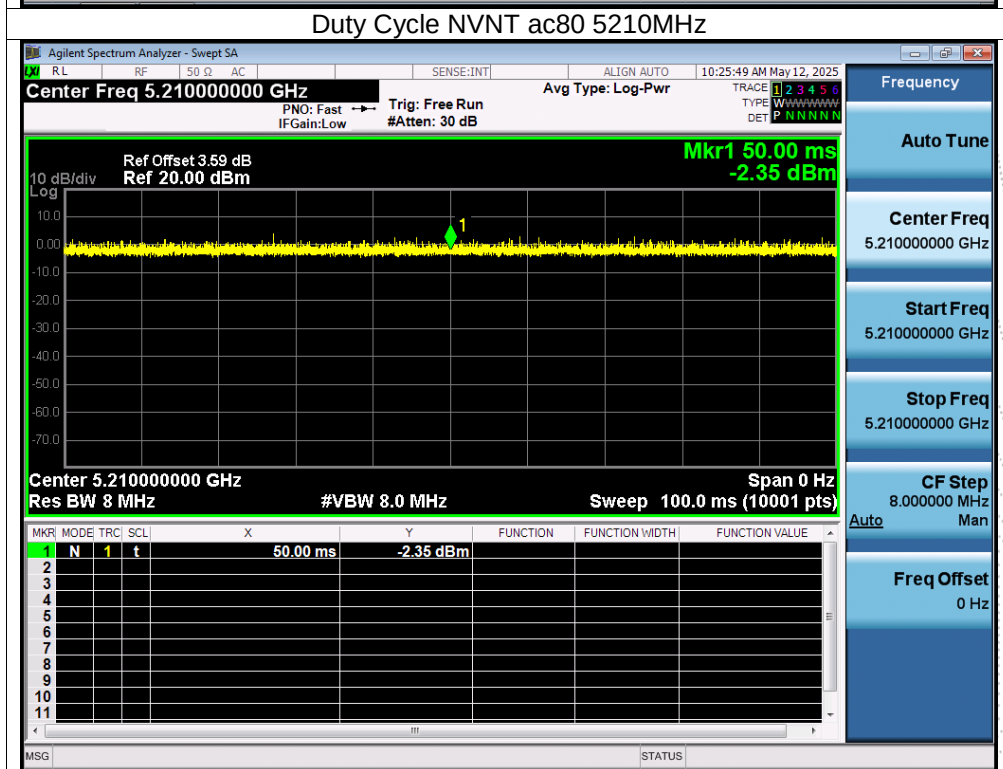
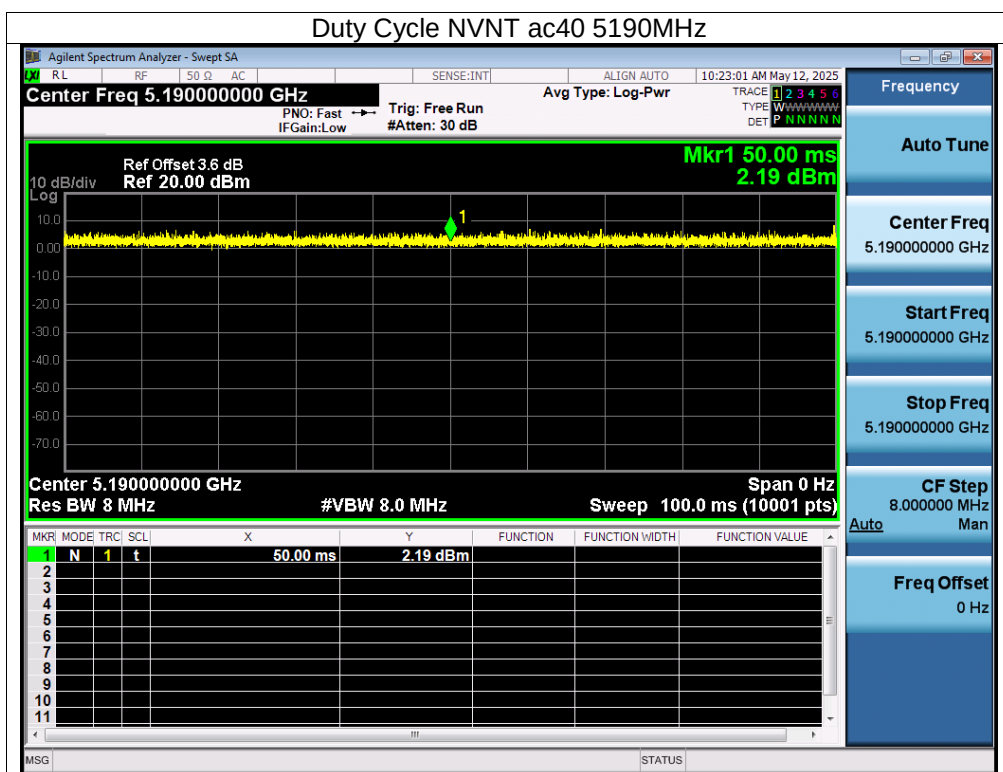
14.4 Test Result

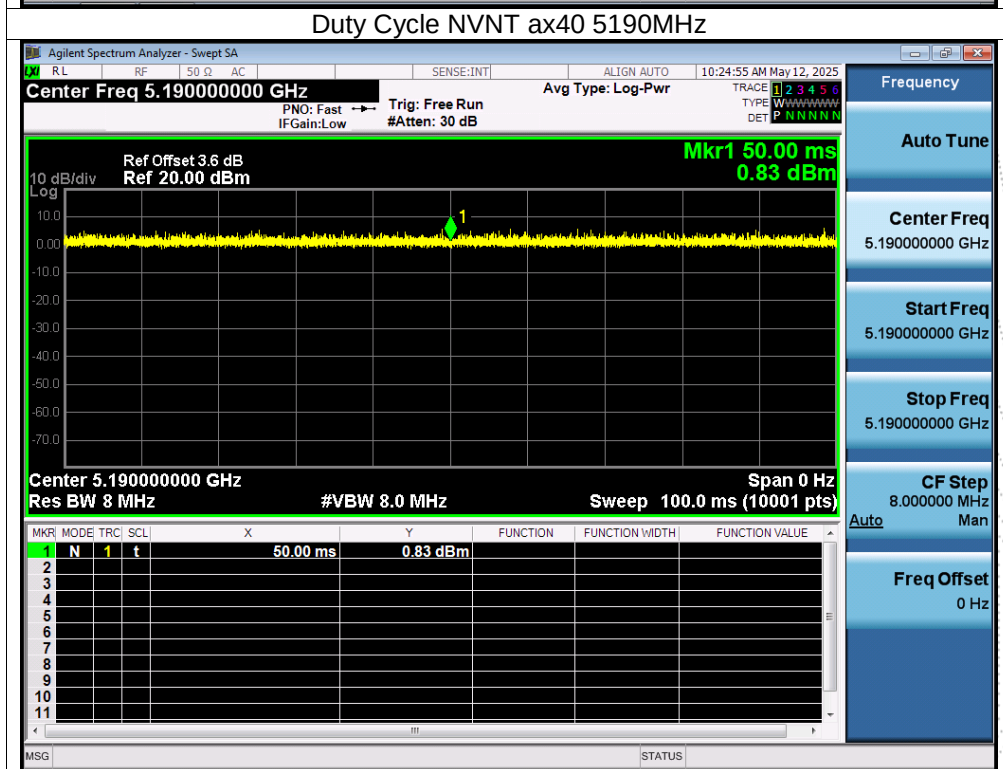
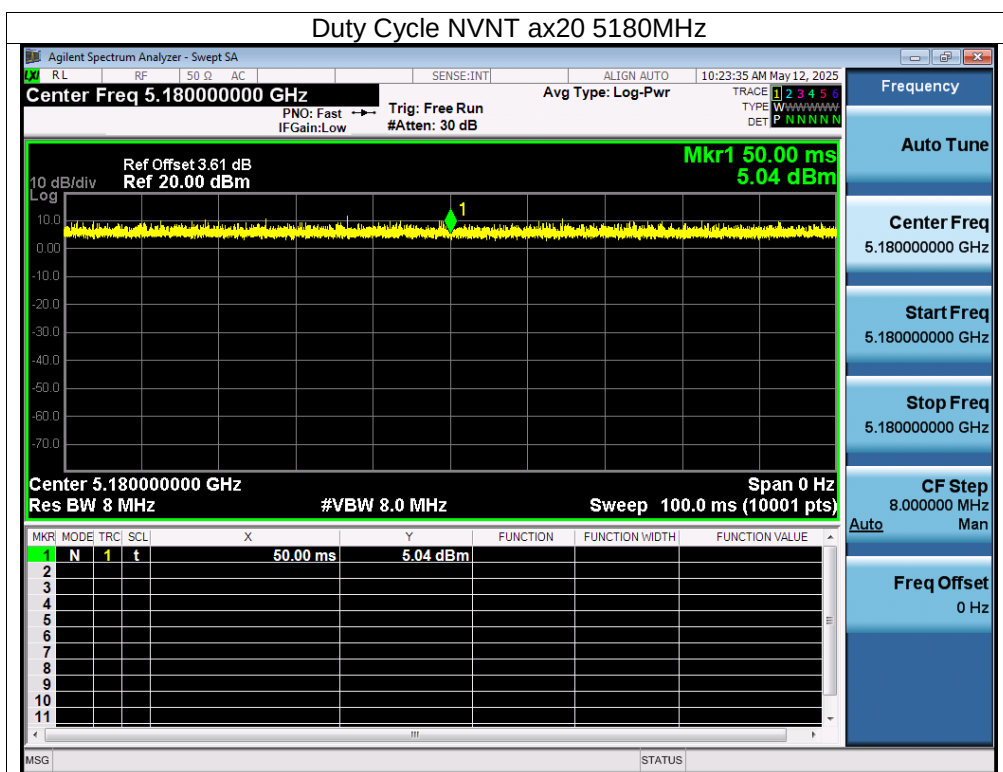
ANT A

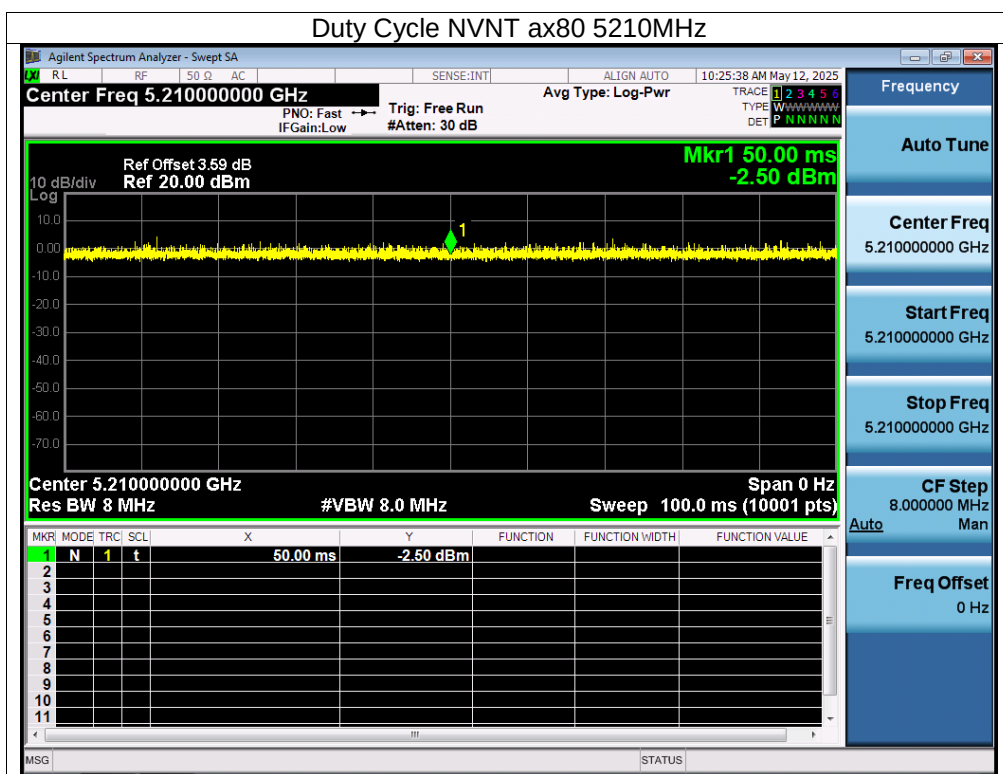
Condition	Mode	Frequency (MHz)	Duty Cycle (%)	Correction Factor (dB)
NVNT	a	5180	100	0
NVNT	n20	5180	100	0
NVNT	n40	5190	100	0
NVNT	ac20	5180	100	0
NVNT	ac40	5190	100	0
NVNT	ac80	5210	100	0
NVNT	ax20	5180	100	0
NVNT	ax40	5190	100	0
NVNT	ax80	5210	100	0





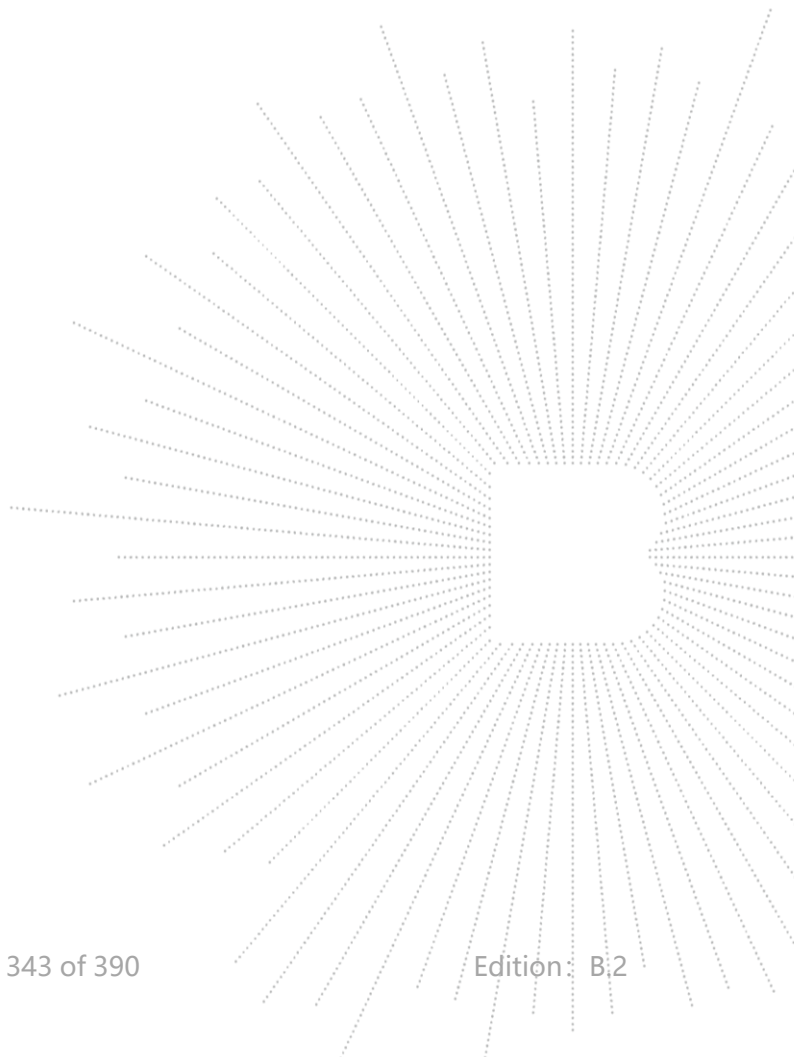


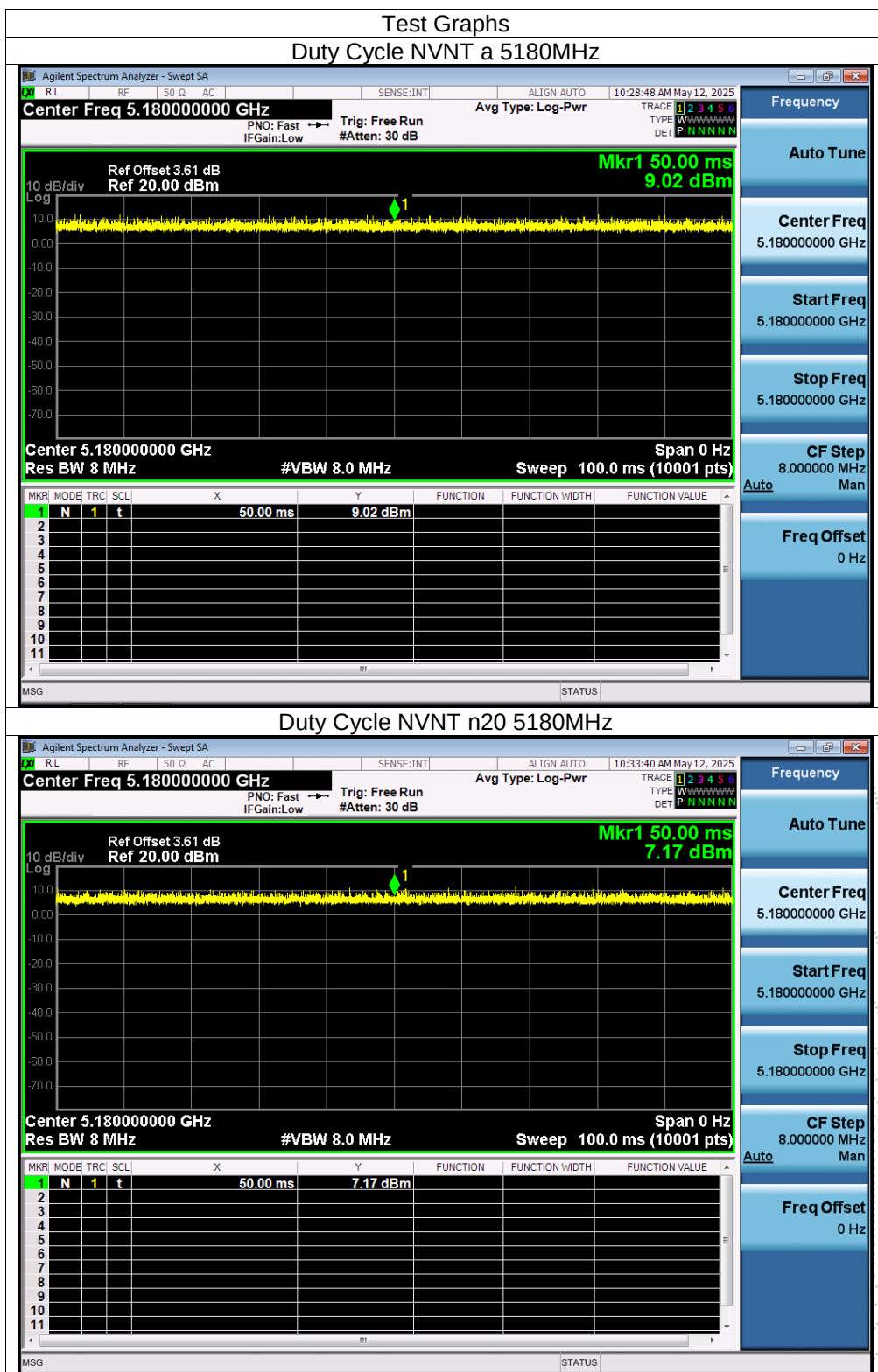


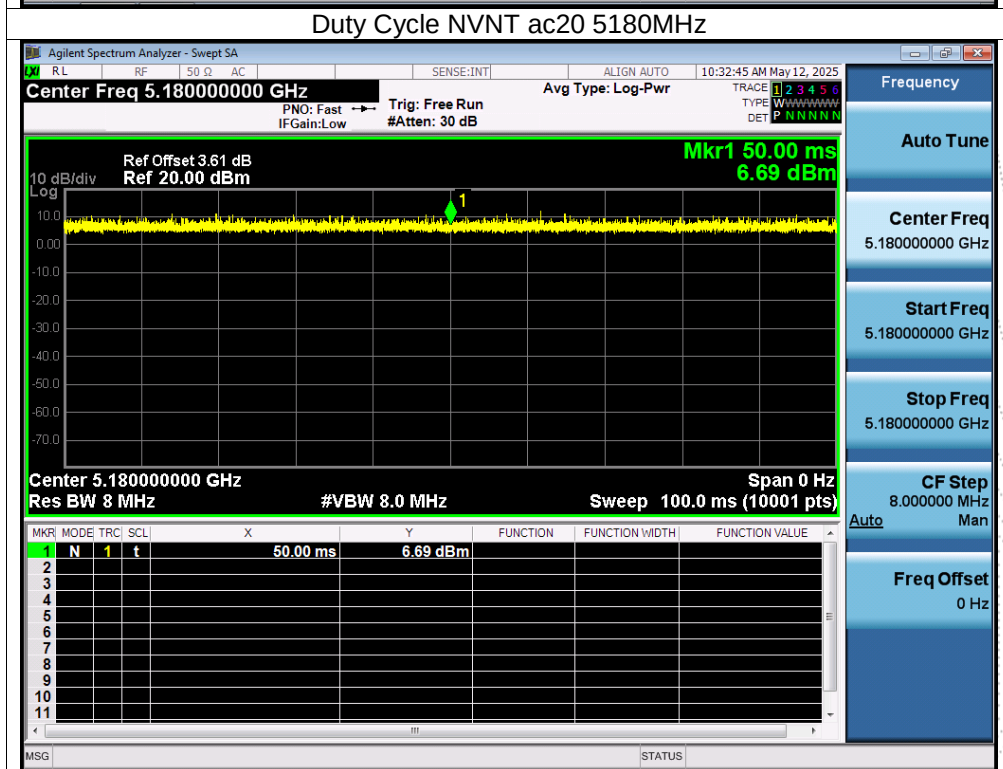
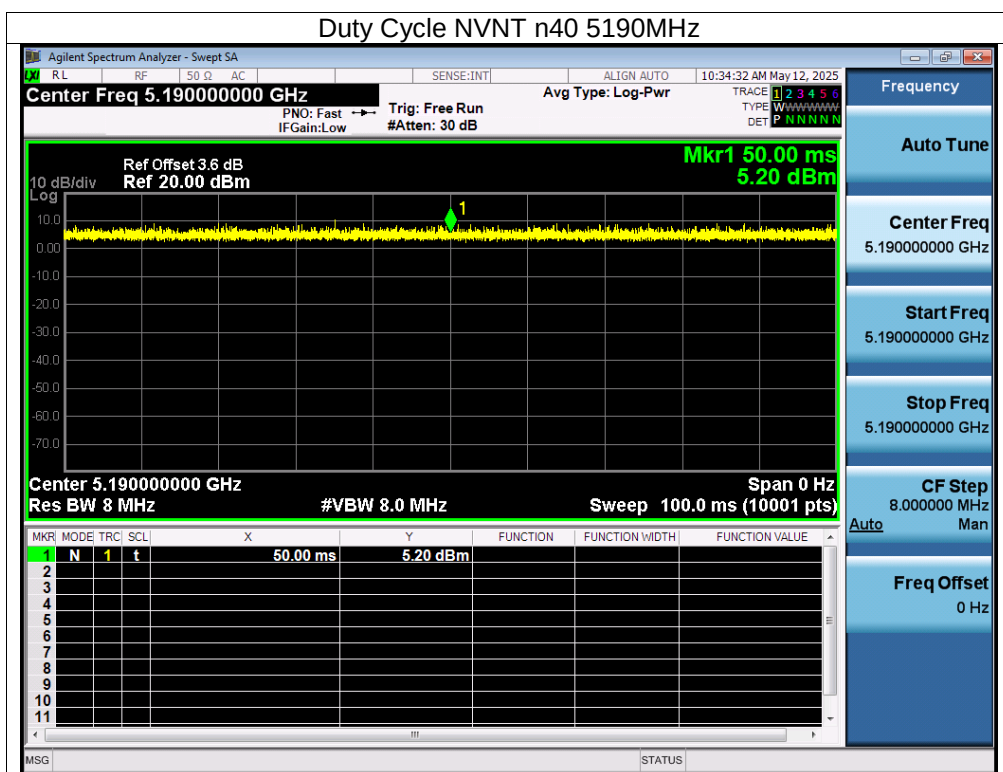


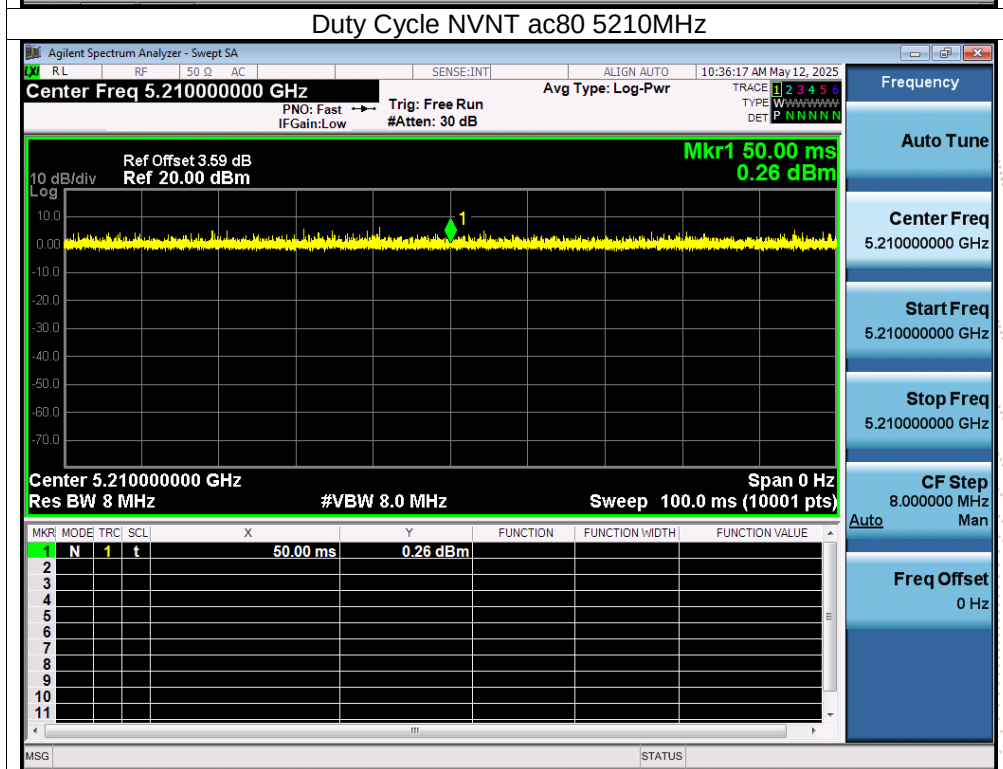
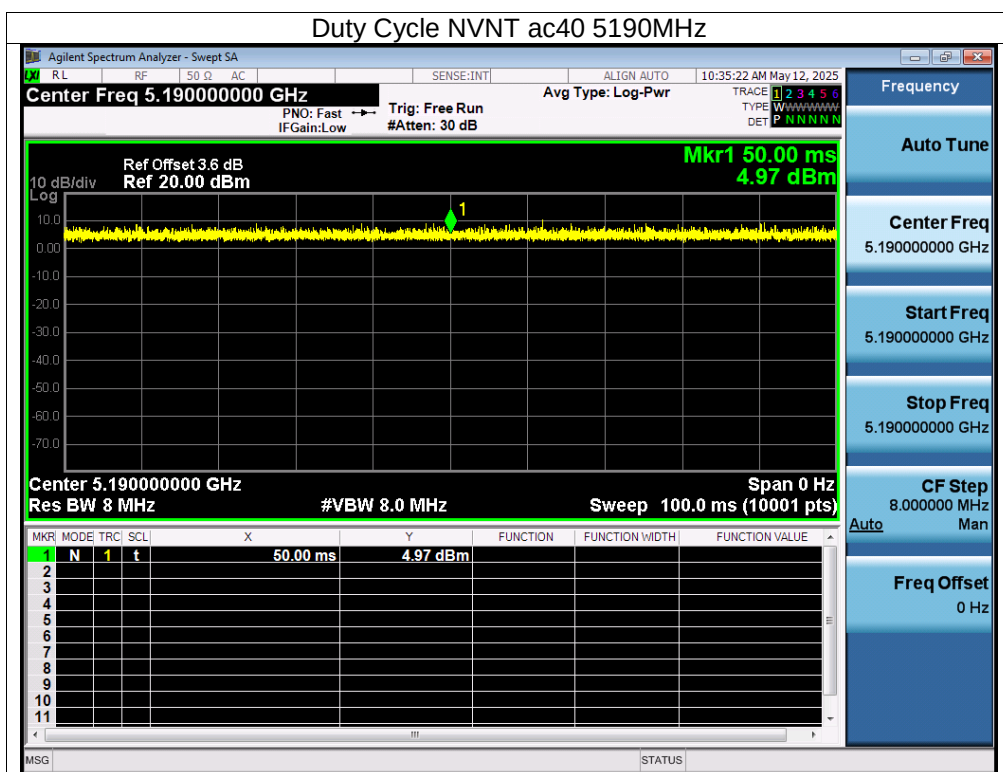
ANT B

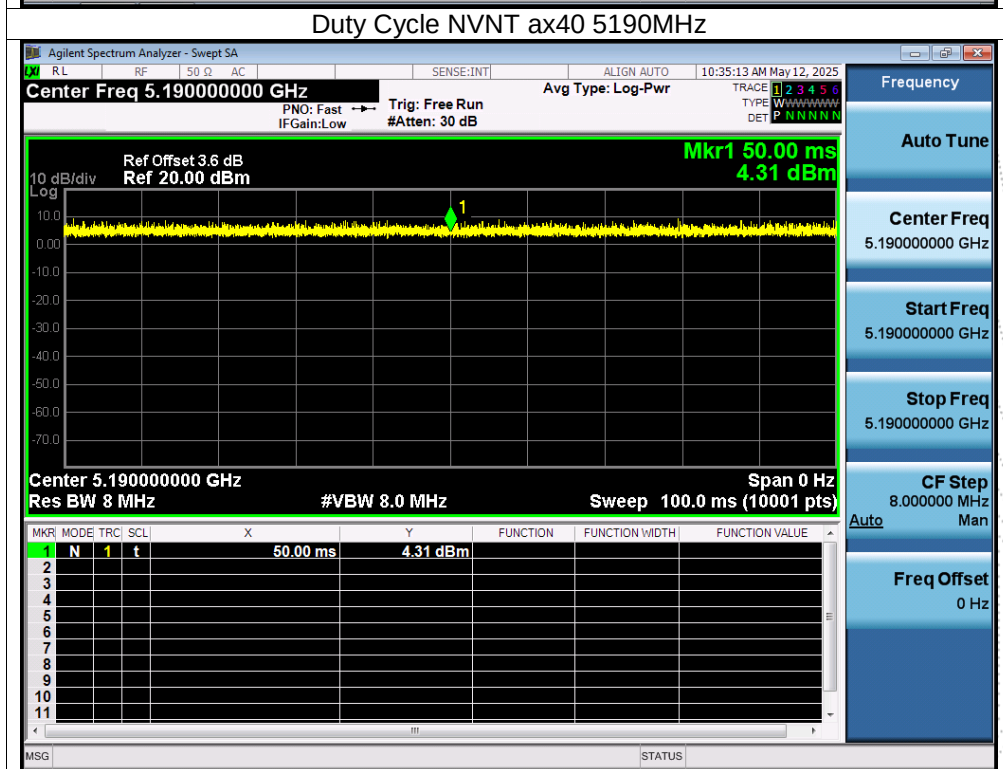
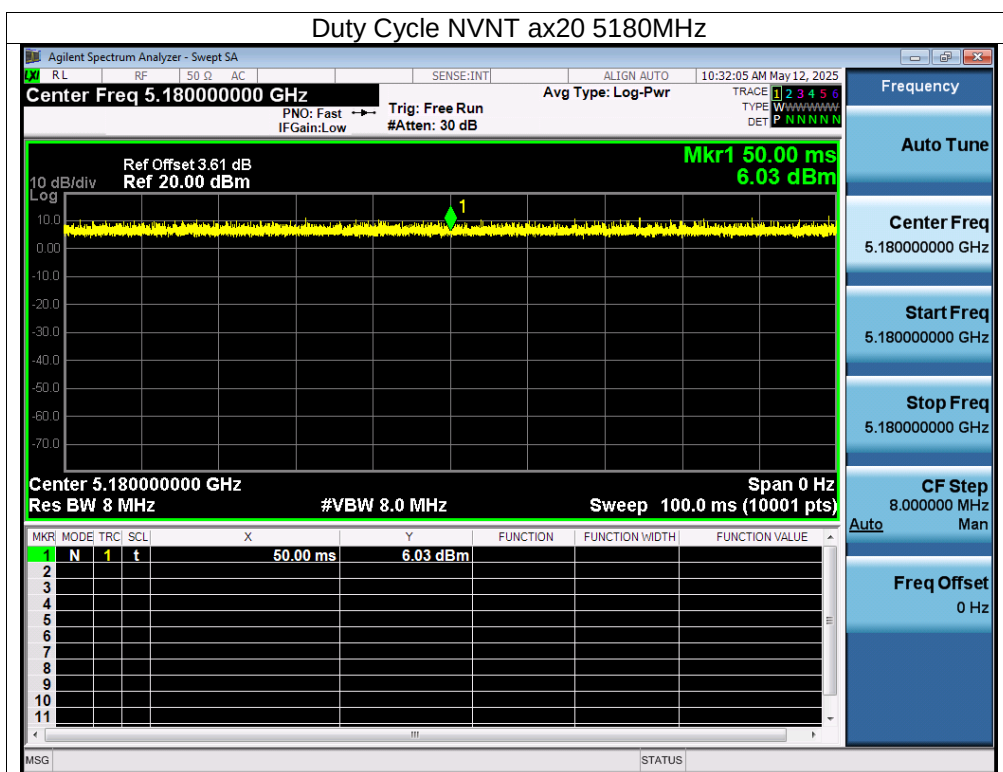
Condition	Mode	Frequency (MHz)	Duty Cycle (%)	Correction Factor (dB)
NVNT	a	5180	100	0
NVNT	n20	5180	100	0
NVNT	n40	5190	100	0
NVNT	ac20	5180	100	0
NVNT	ac40	5190	100	0
NVNT	ac80	5210	100	0
NVNT	ax20	5180	100	0
NVNT	ax40	5190	100	0
NVNT	ax80	5210	100	0

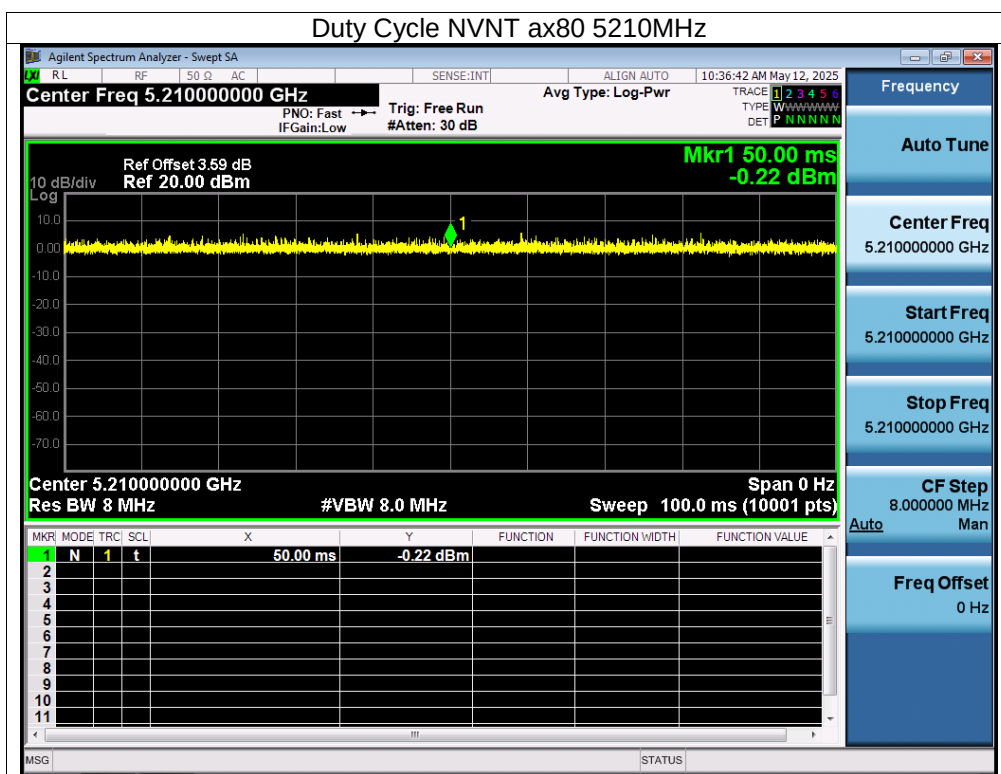






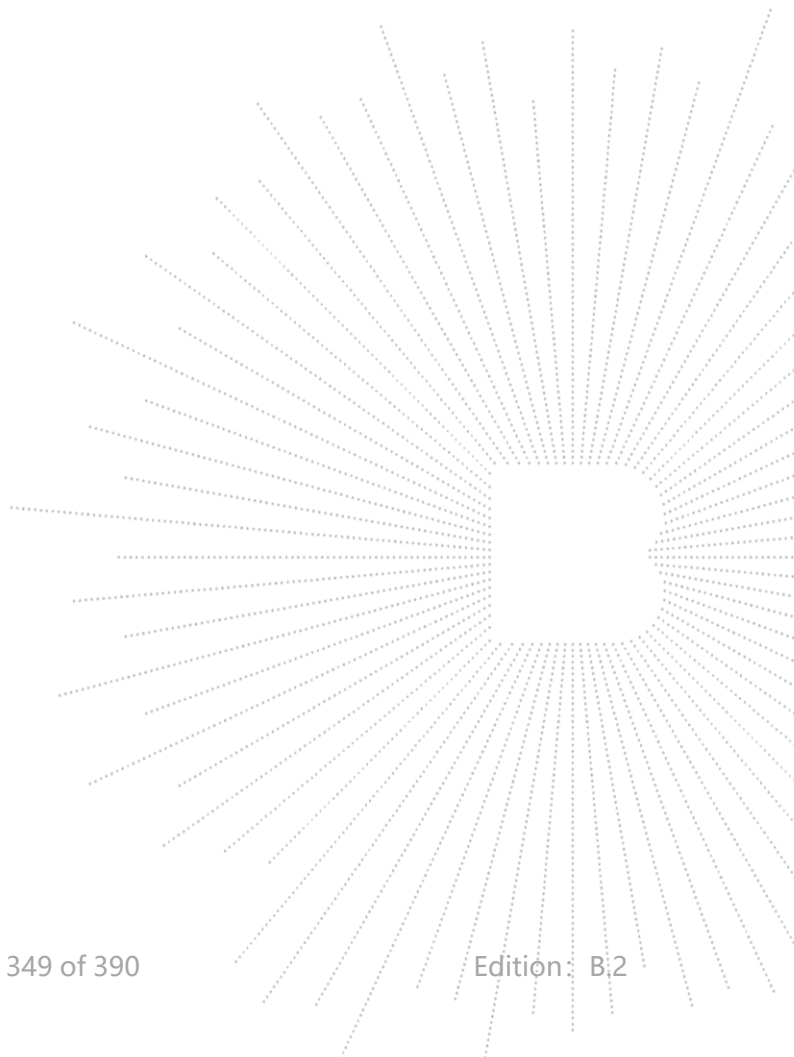


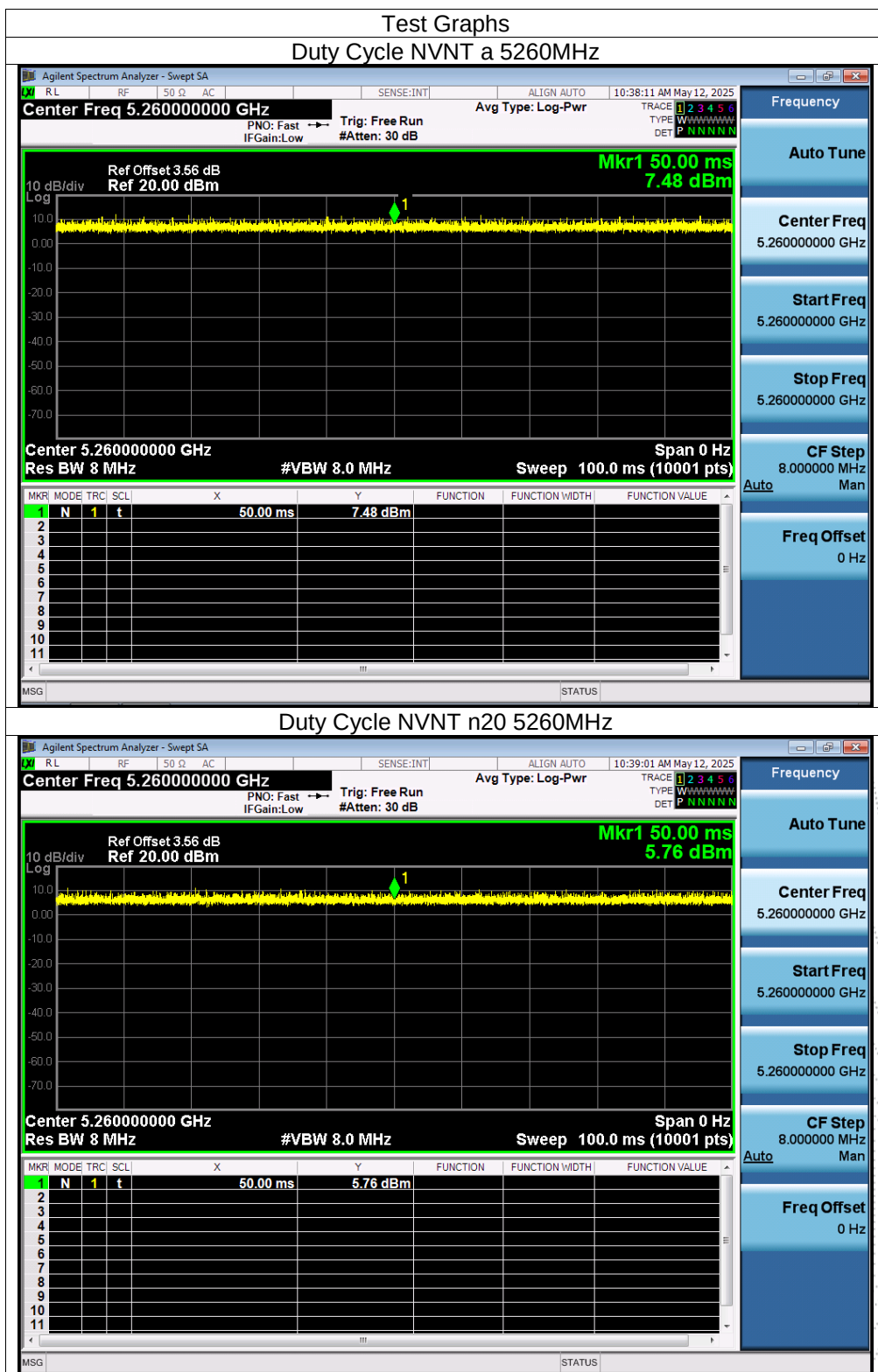


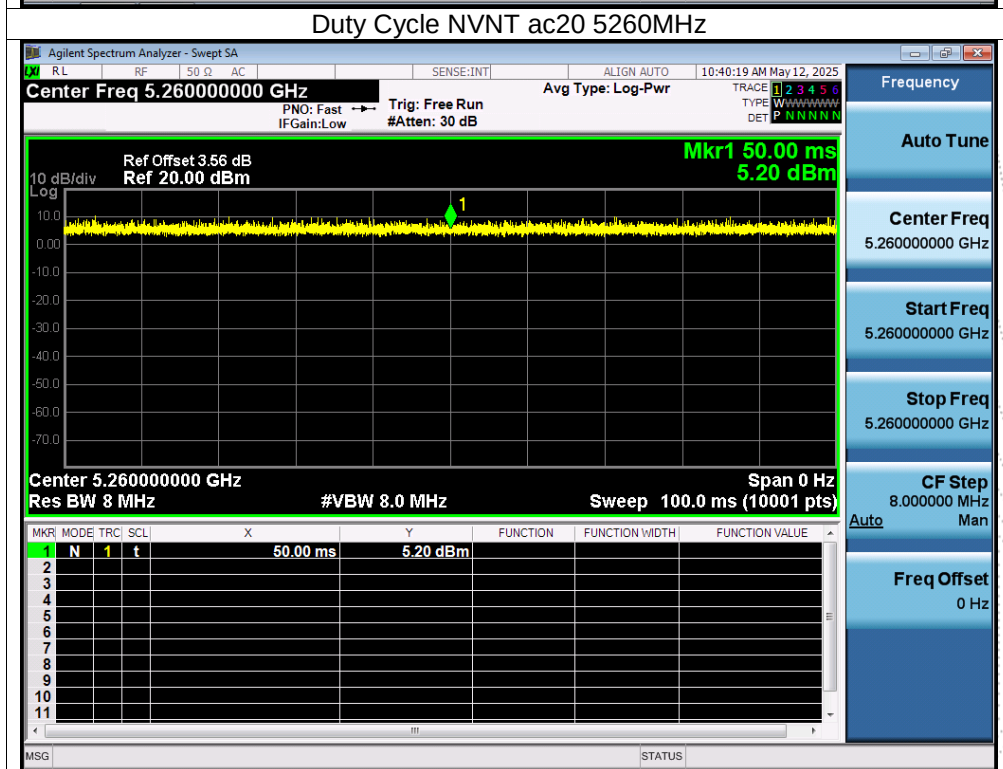
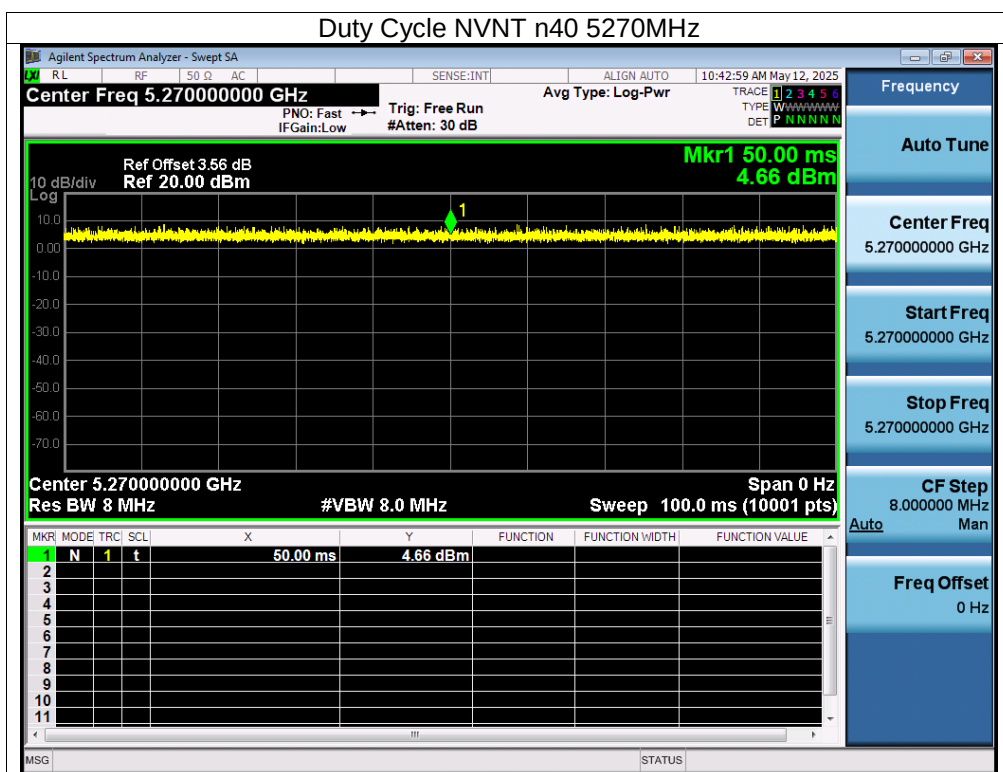


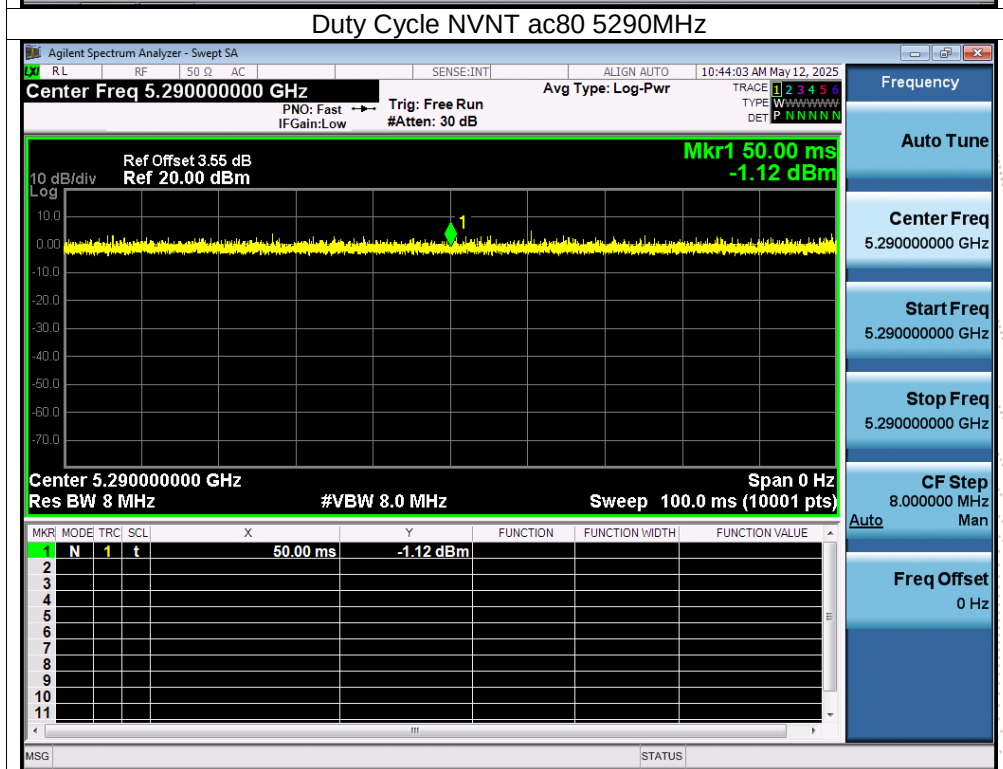
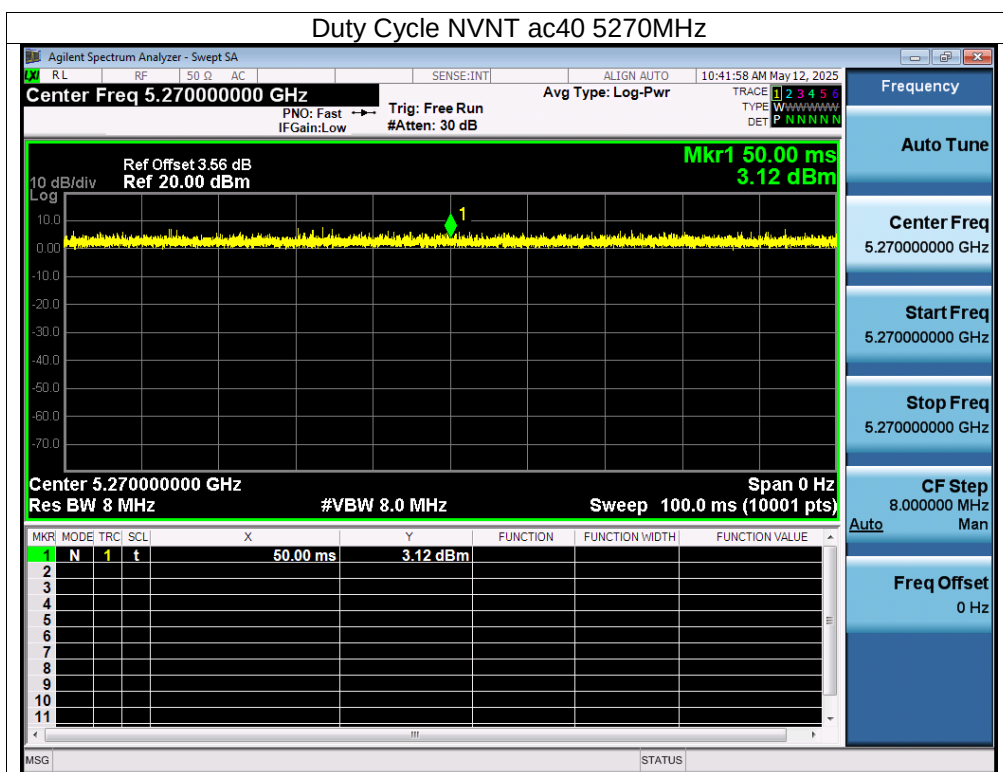
ANT A

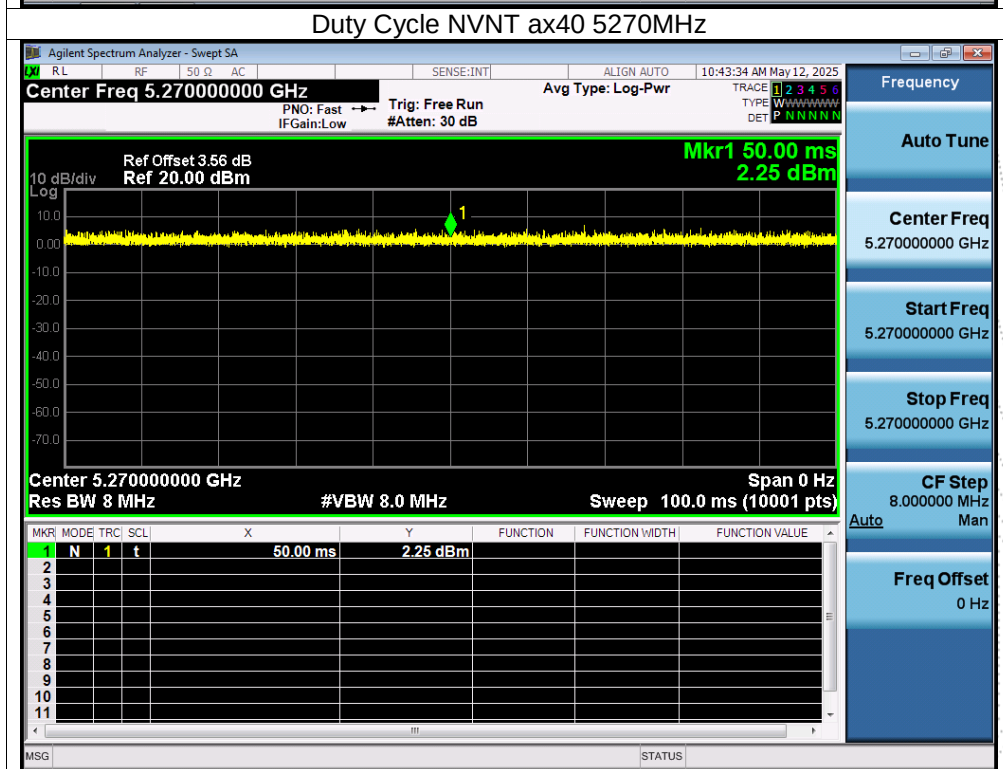
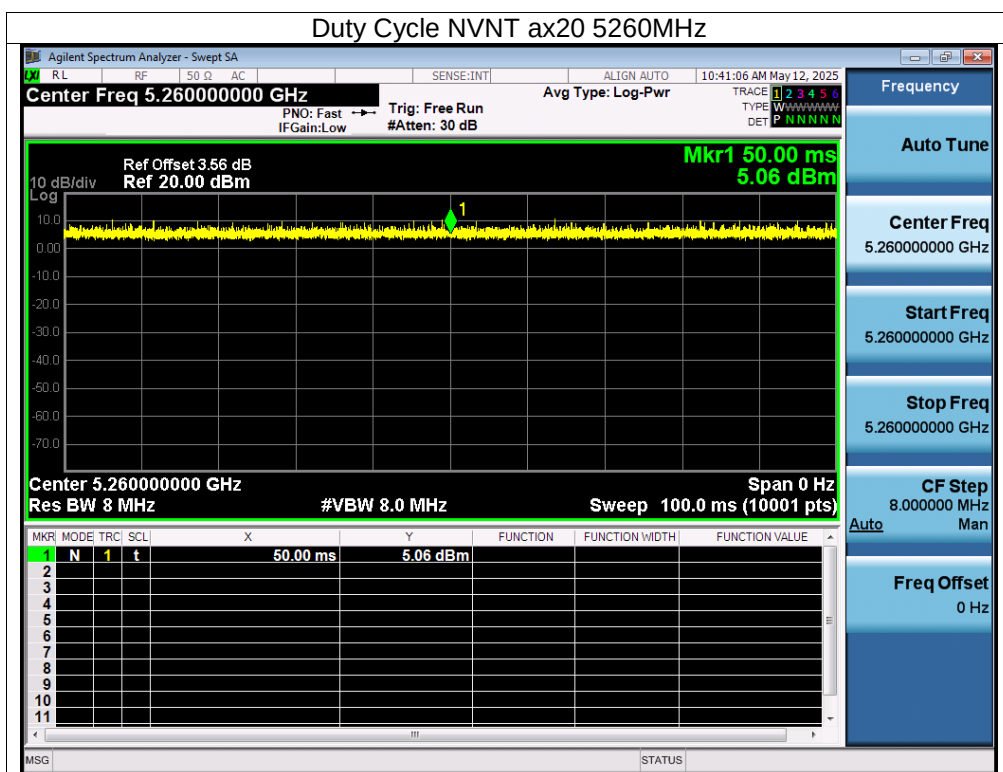
Condition	Mode	Frequency (MHz)	Duty Cycle (%)	Correction Factor (dB)
NVNT	a	5260	100	0
NVNT	n20	5260	100	0
NVNT	n40	5270	100	0
NVNT	ac20	5260	100	0
NVNT	ac40	5270	100	0
NVNT	ac80	5290	100	0
NVNT	ax20	5260	100	0
NVNT	ax40	5270	100	0
NVNT	ax80	5290	100	0

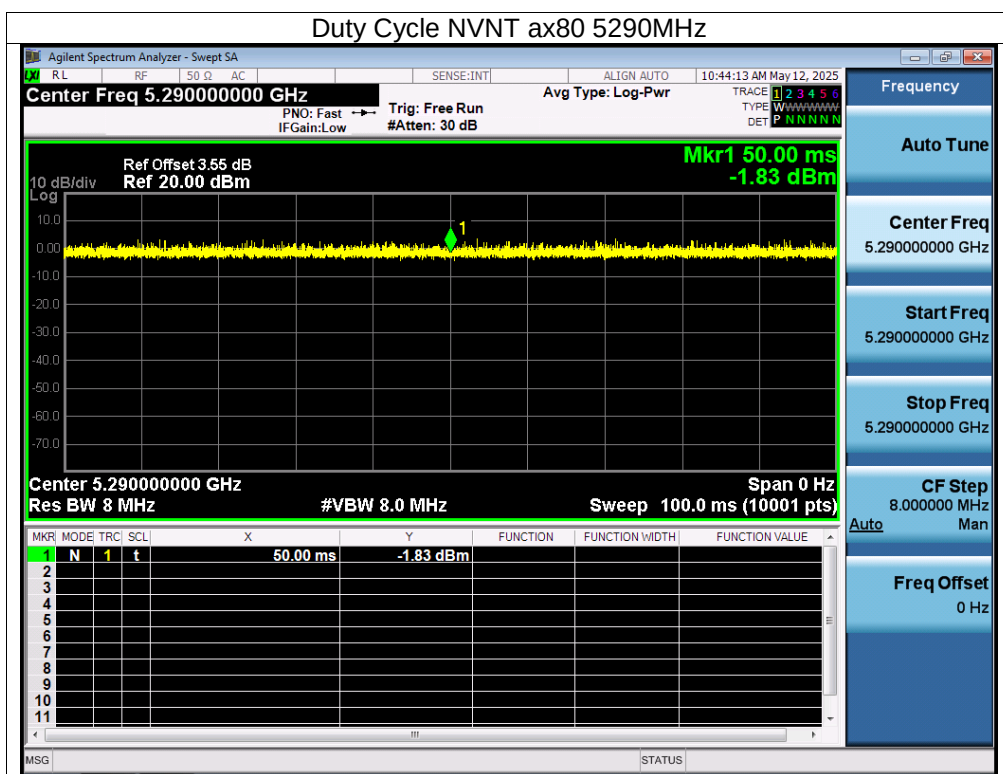






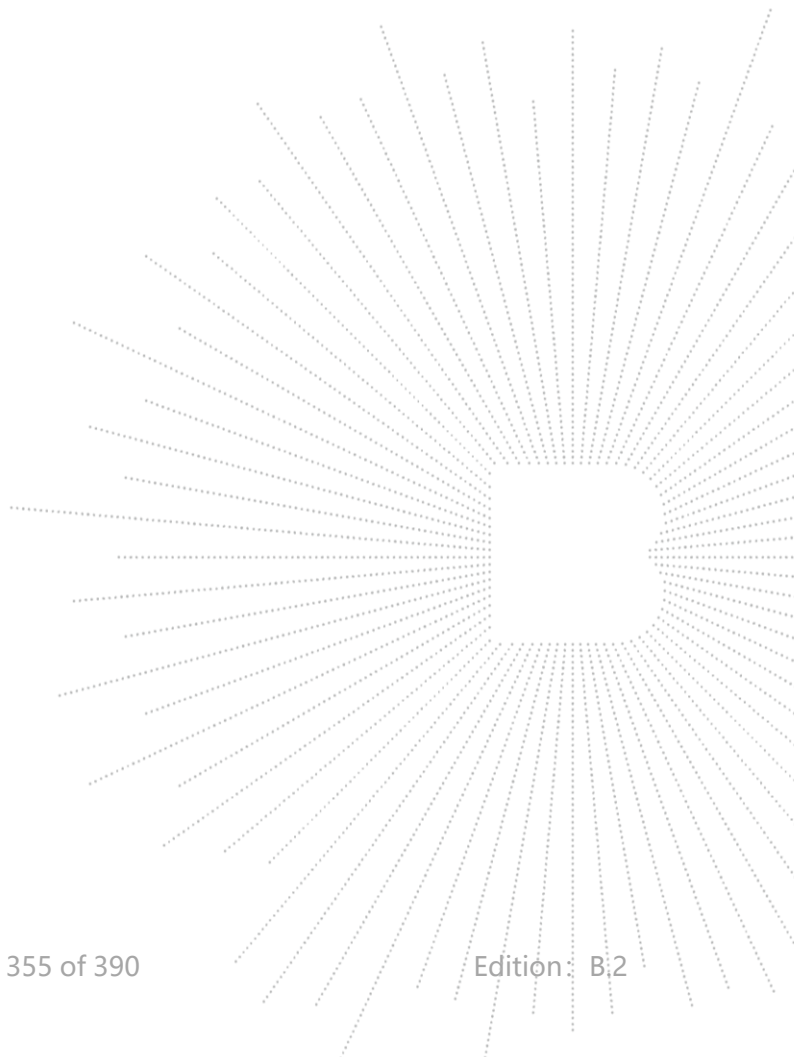






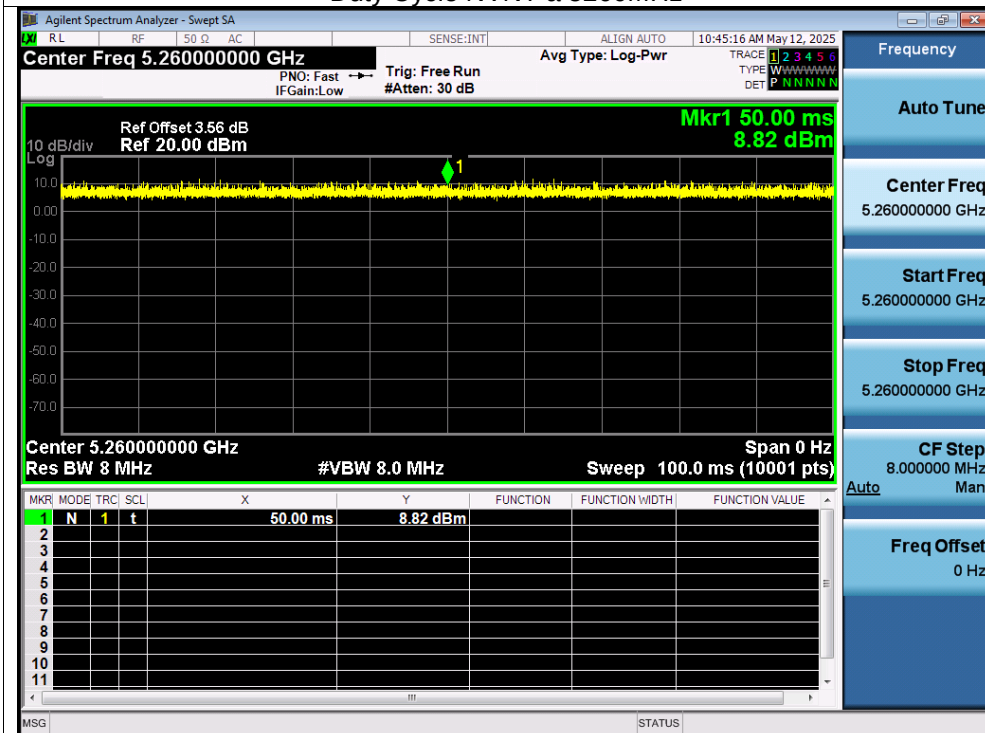
ANT B

Condition	Mode	Frequency (MHz)	Duty Cycle (%)	Correction Factor (dB)
NVNT	a	5260	100	0
NVNT	n20	5260	100	0
NVNT	n40	5270	100	0
NVNT	ac20	5260	100	0
NVNT	ac40	5270	100	0
NVNT	ac80	5290	100	0
NVNT	ax20	5260	100	0
NVNT	ax40	5270	100	0
NVNT	ax80	5290	100	0

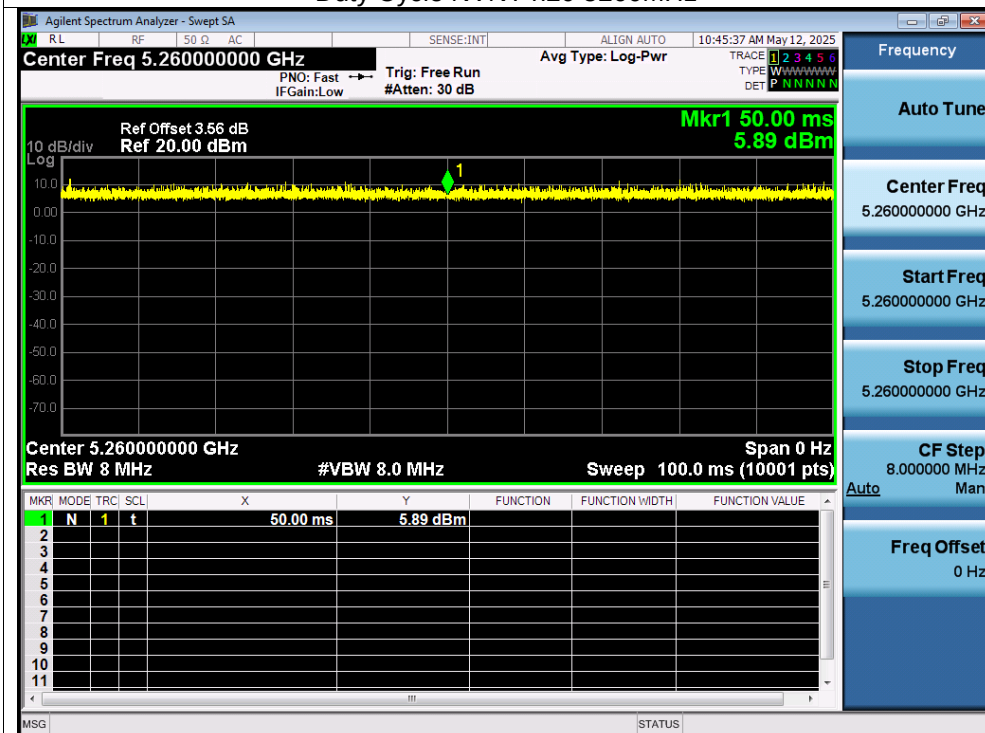


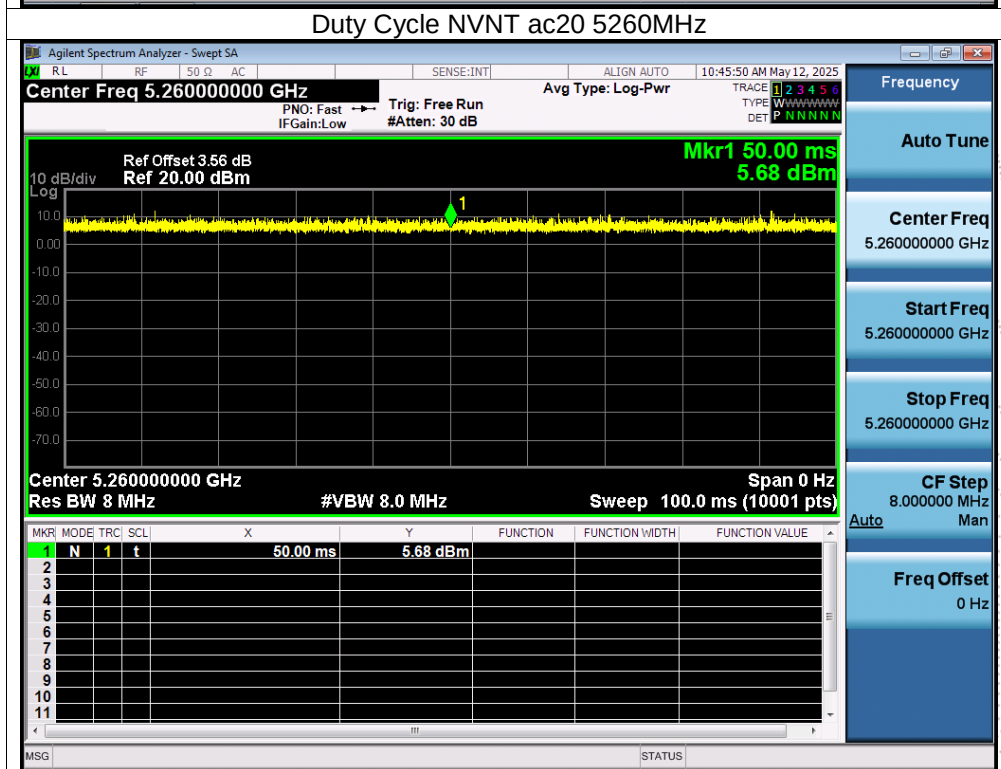
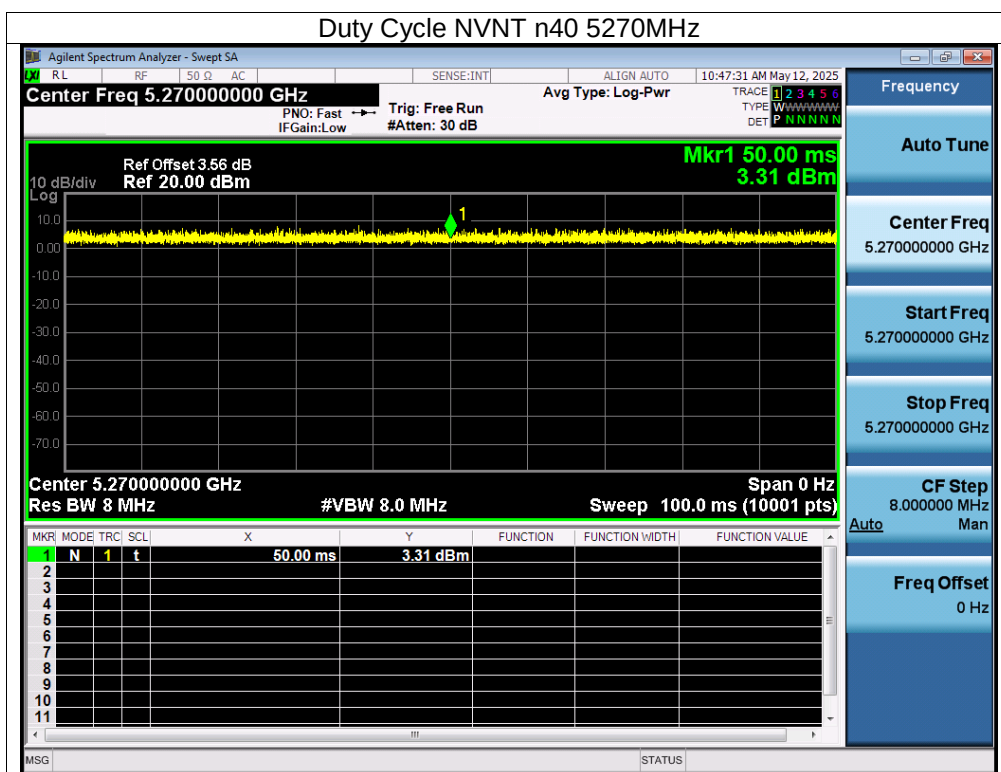
Test Graphs

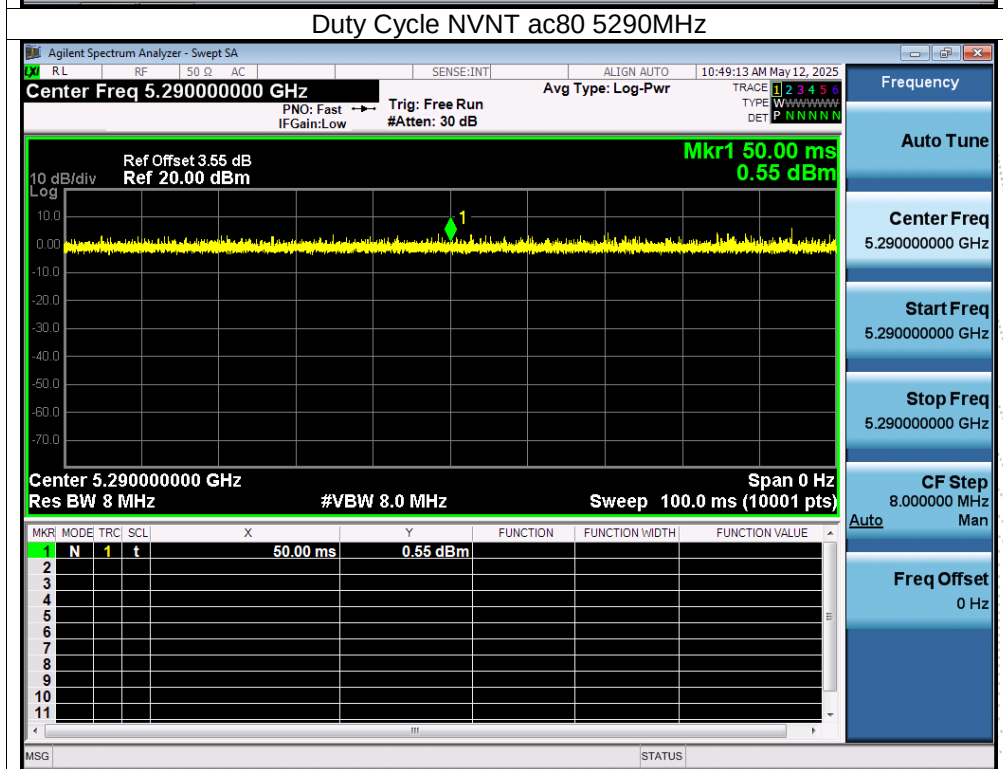
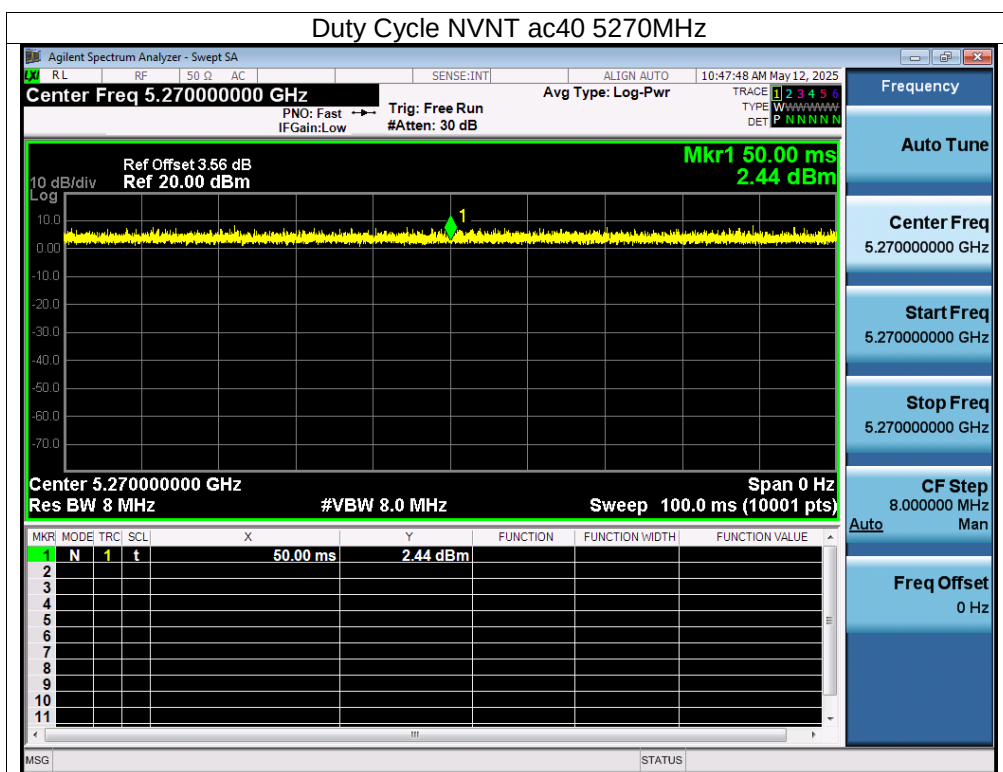
Duty Cycle NVNT a 5260MHz

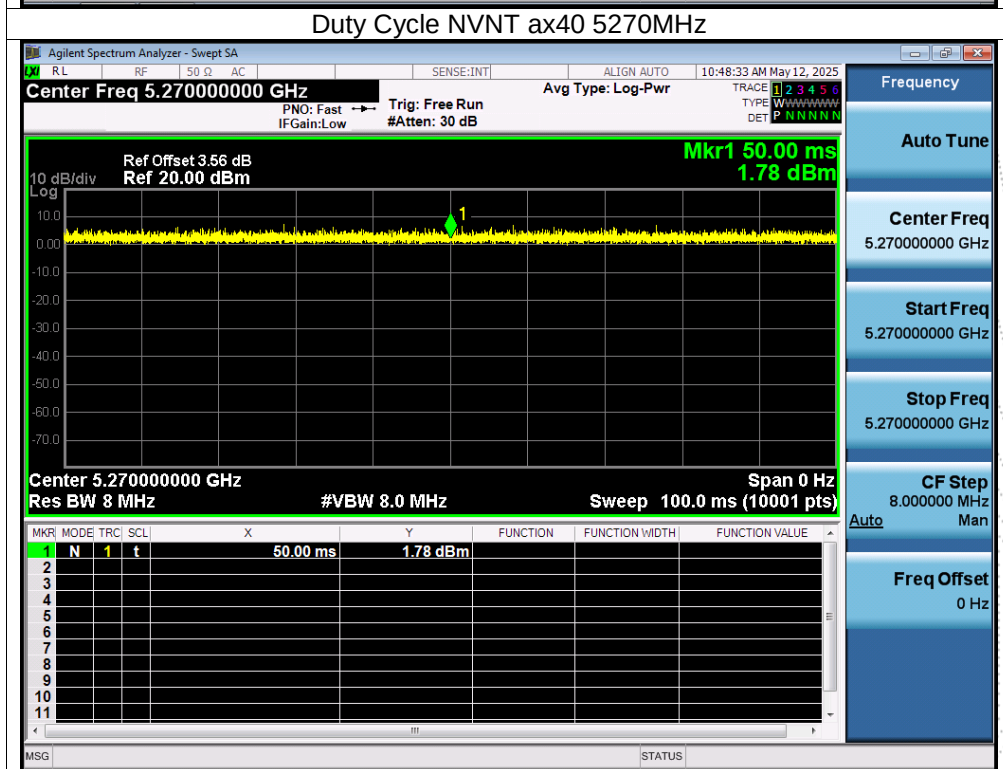
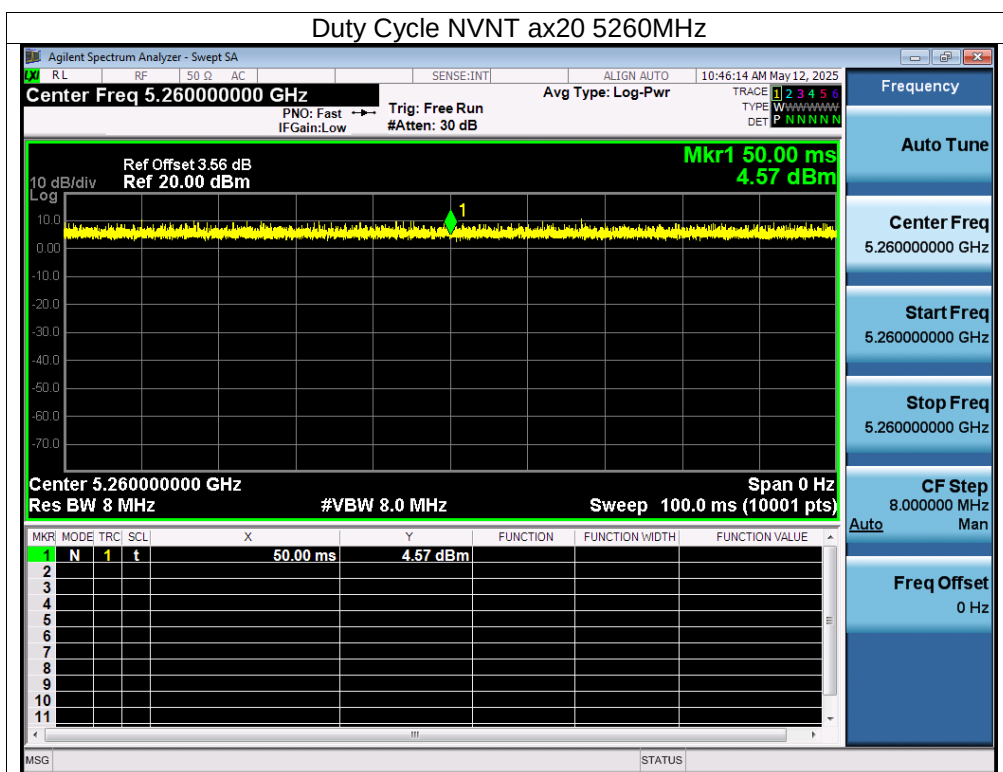


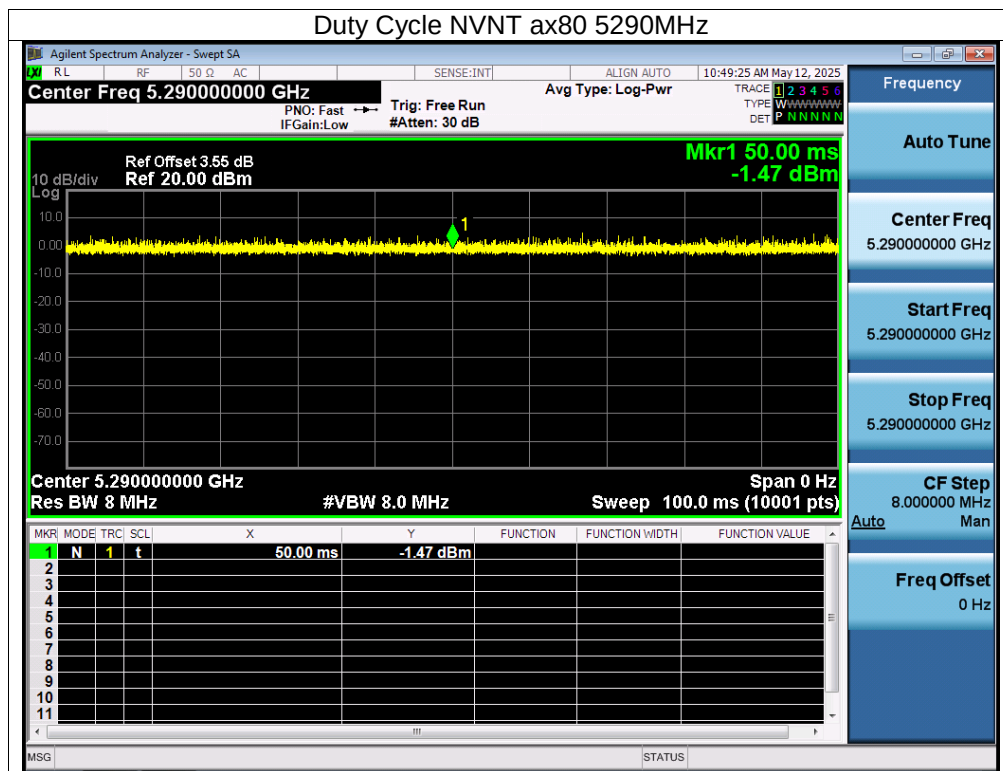
Duty Cycle NVNT n20 5260MHz











ANT A

Condition	Mode	Frequency (MHz)	Duty Cycle (%)	Correction Factor (dB)
NVNT	a	5500	100	0
NVNT	n20	5500	100	0
NVNT	n40	5510	100	0
NVNT	ac20	5500	100	0
NVNT	ac40	5510	100	0
NVNT	ac80	5530	100	0
NVNT	ax20	5500	100	0
NVNT	ax40	5510	100	0
NVNT	ax80	5530	100	0

