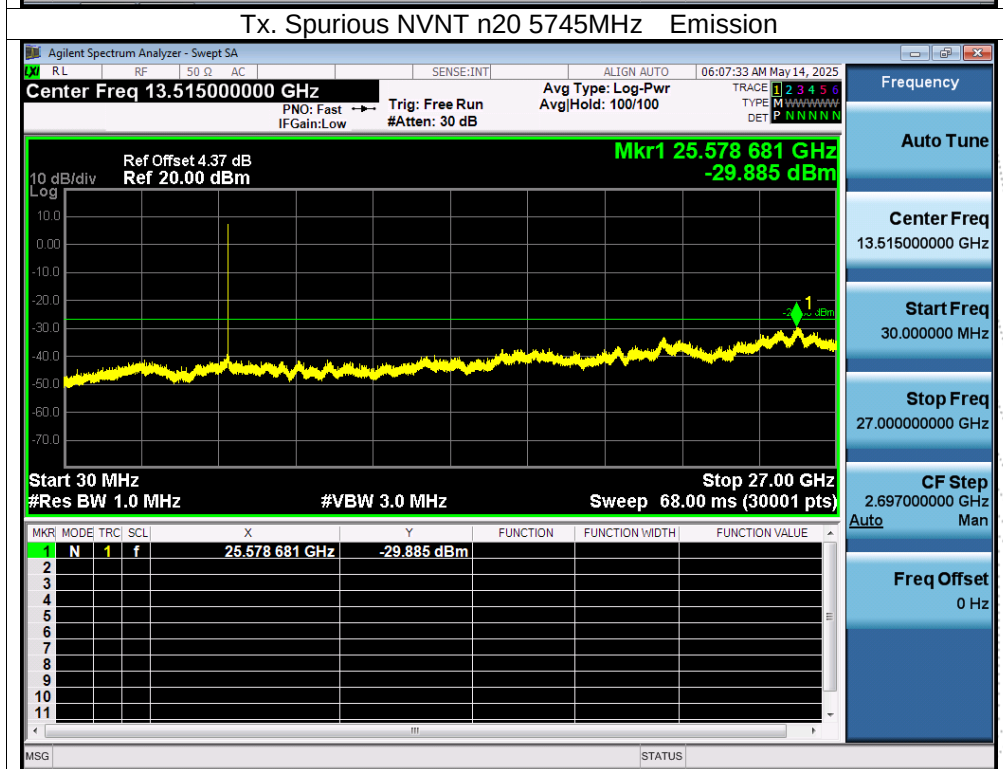
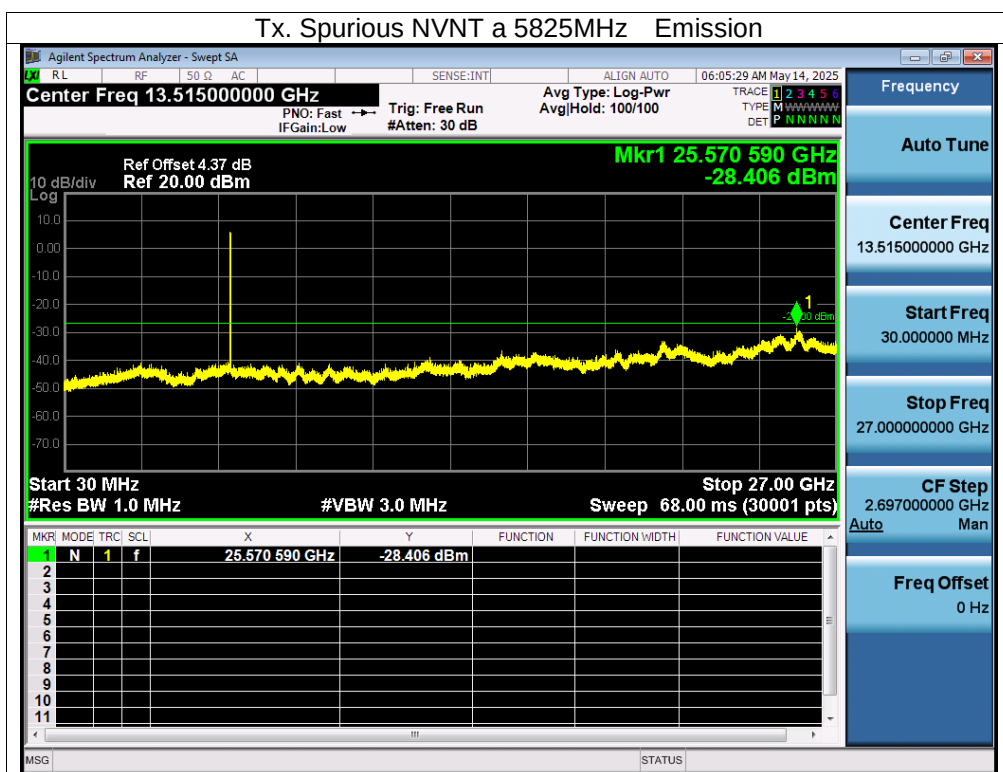
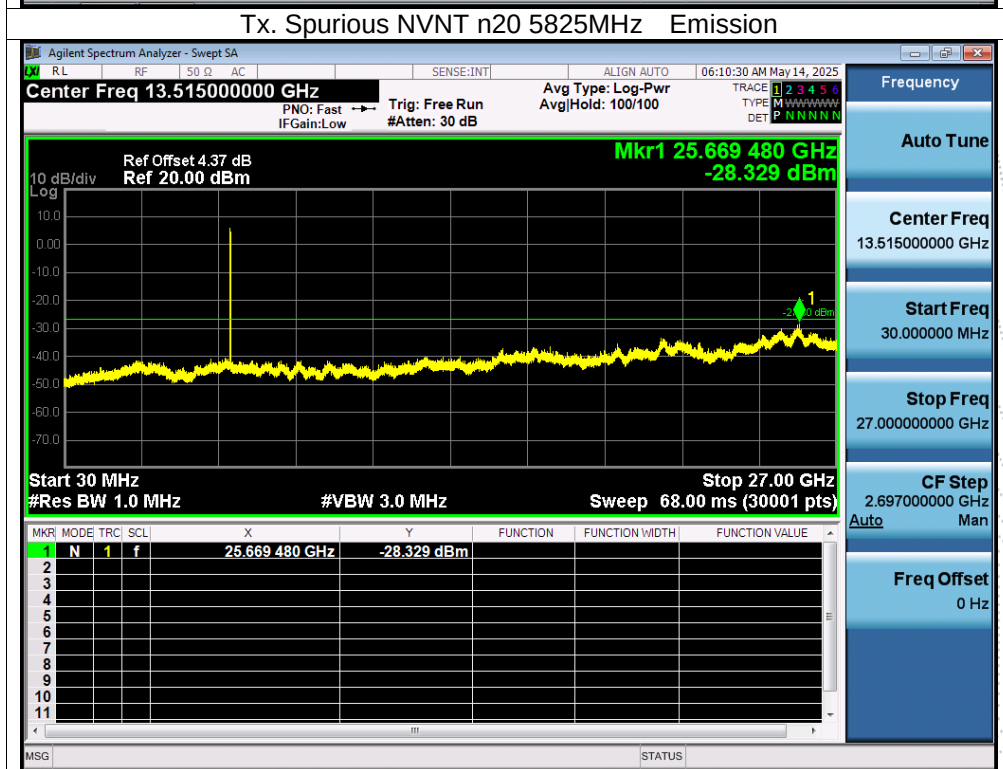
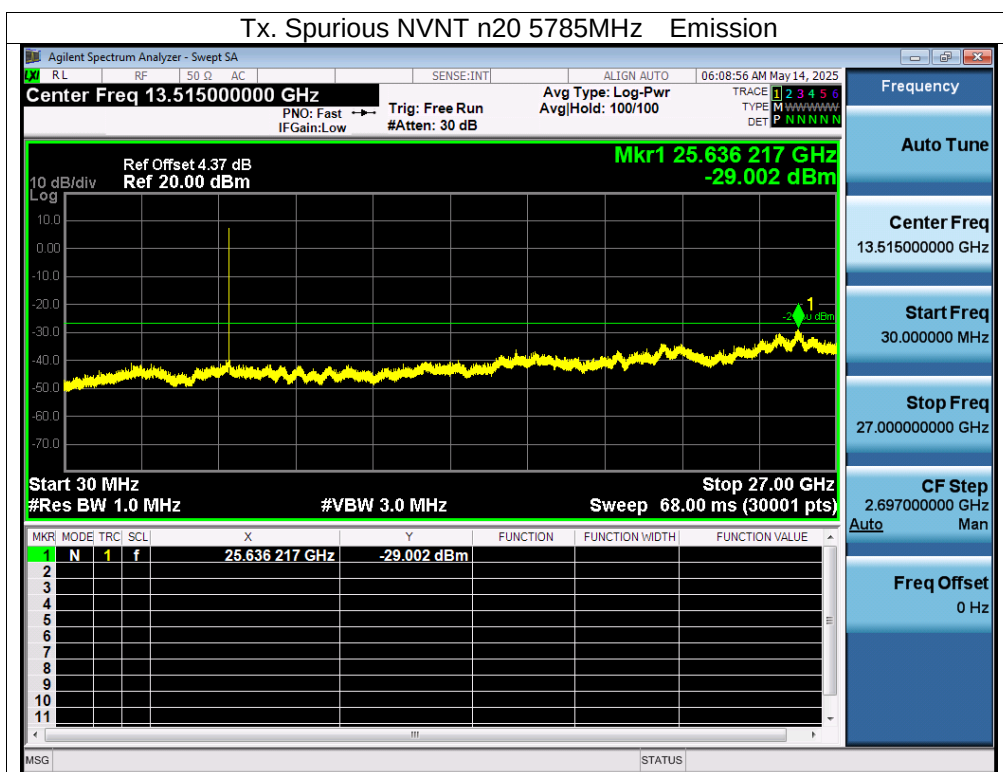
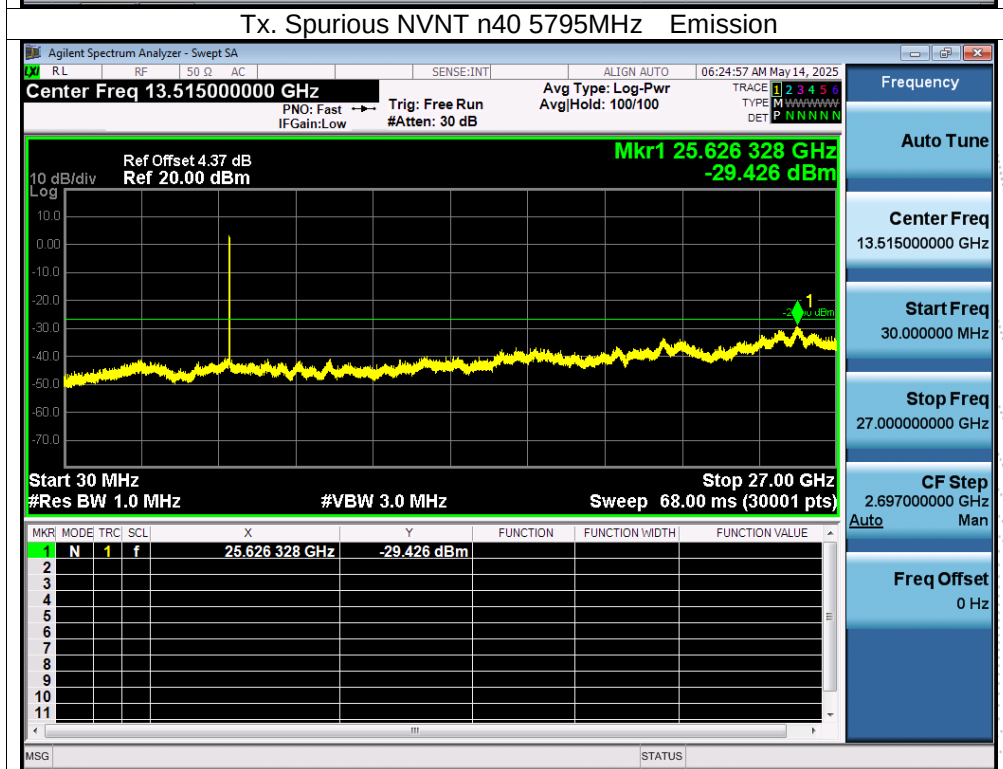
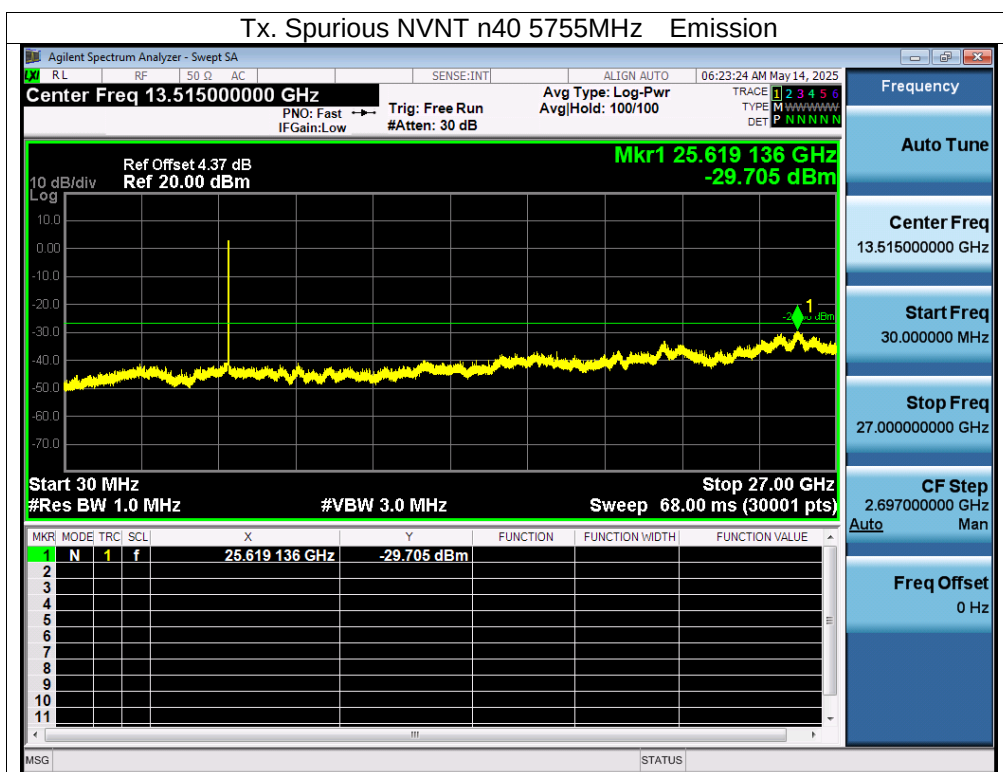
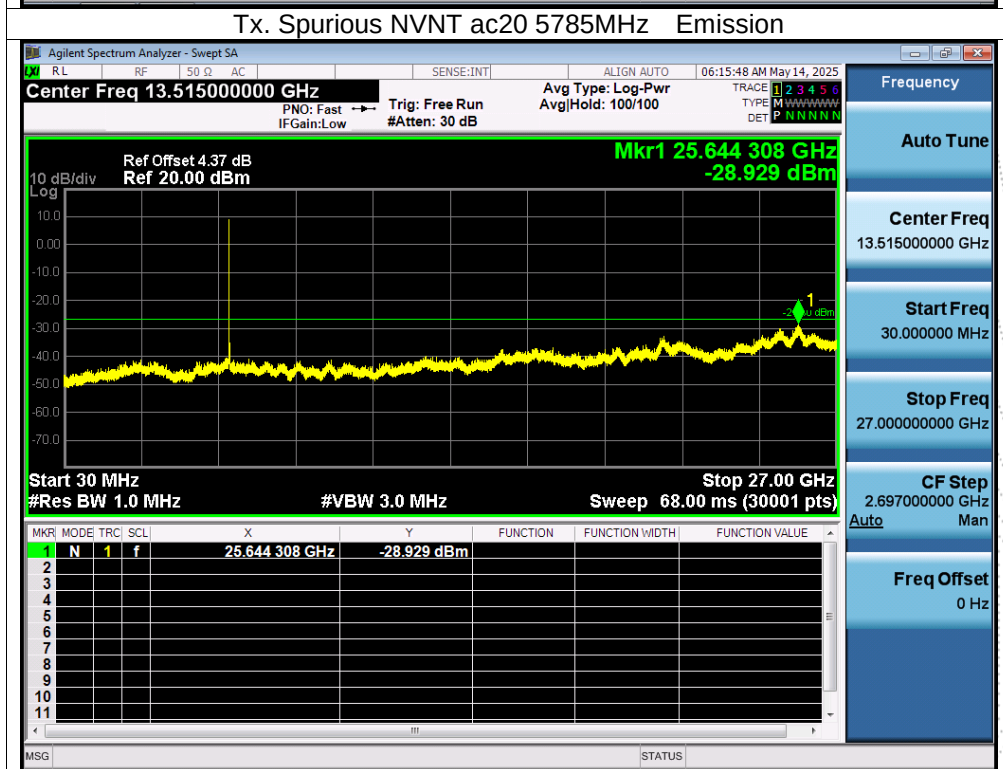
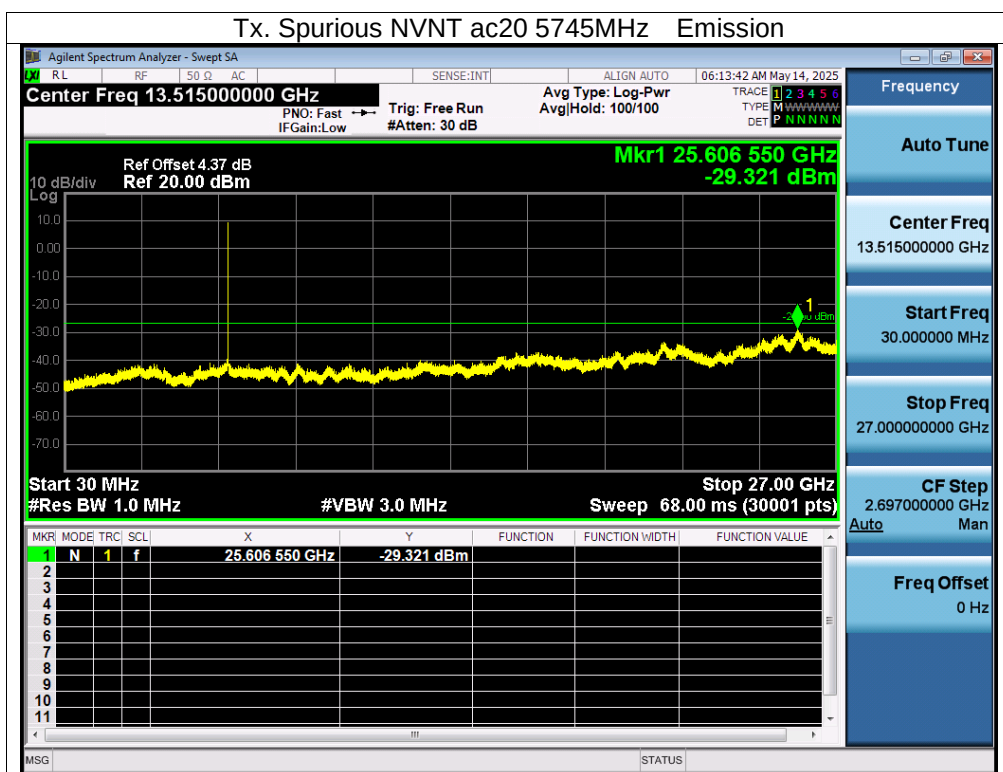
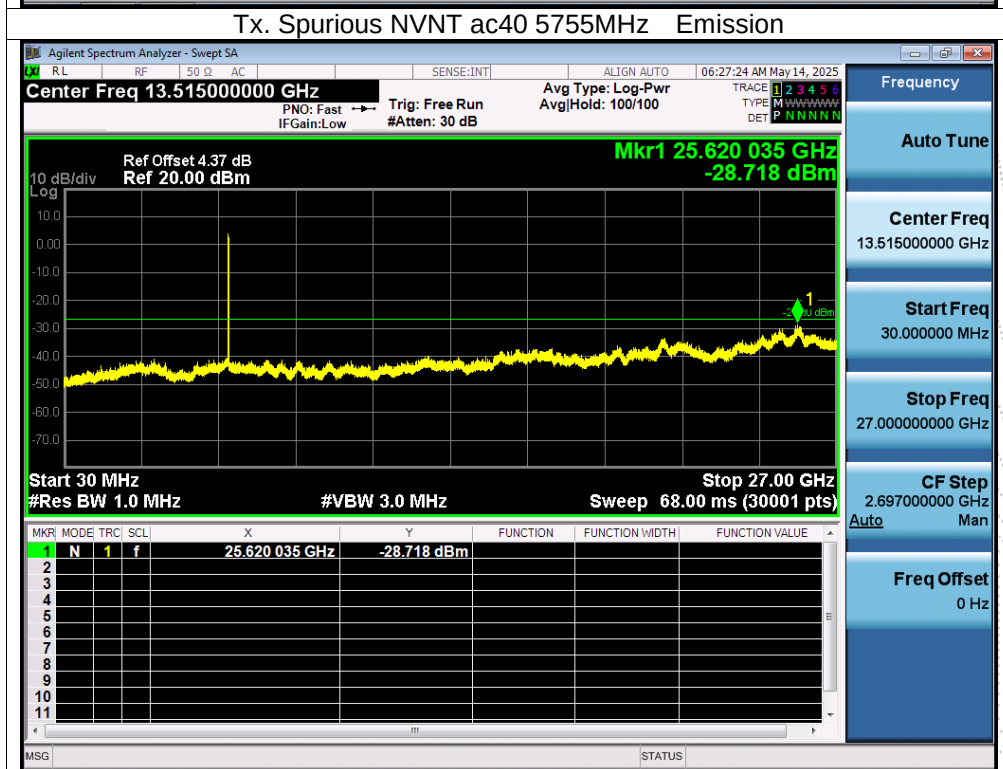
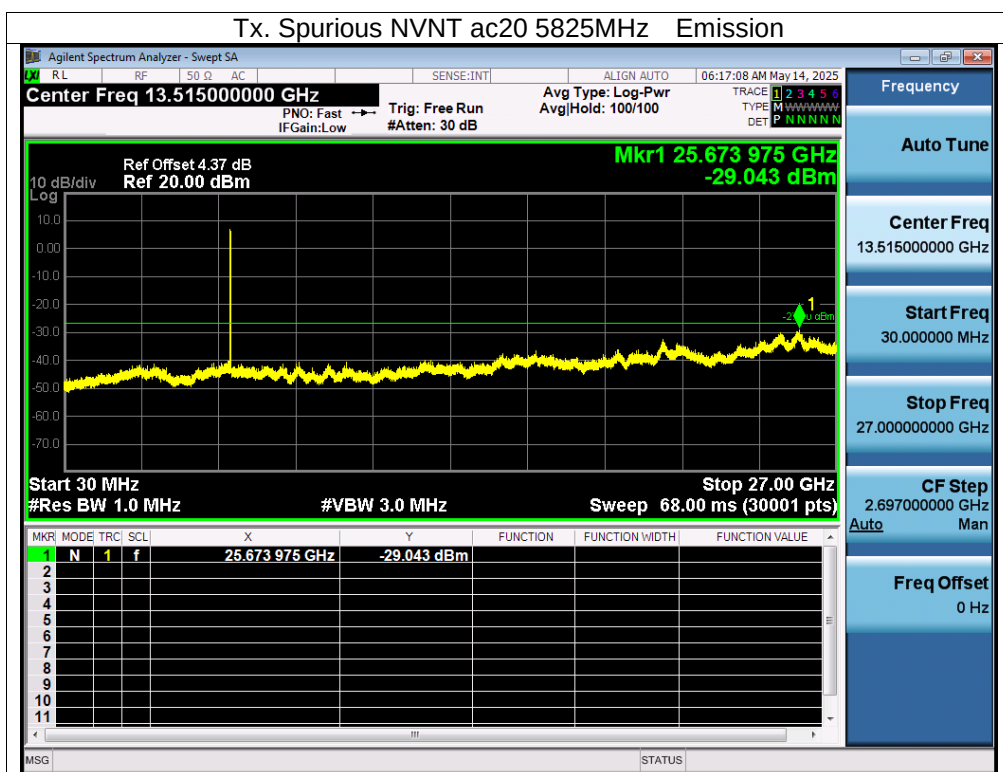


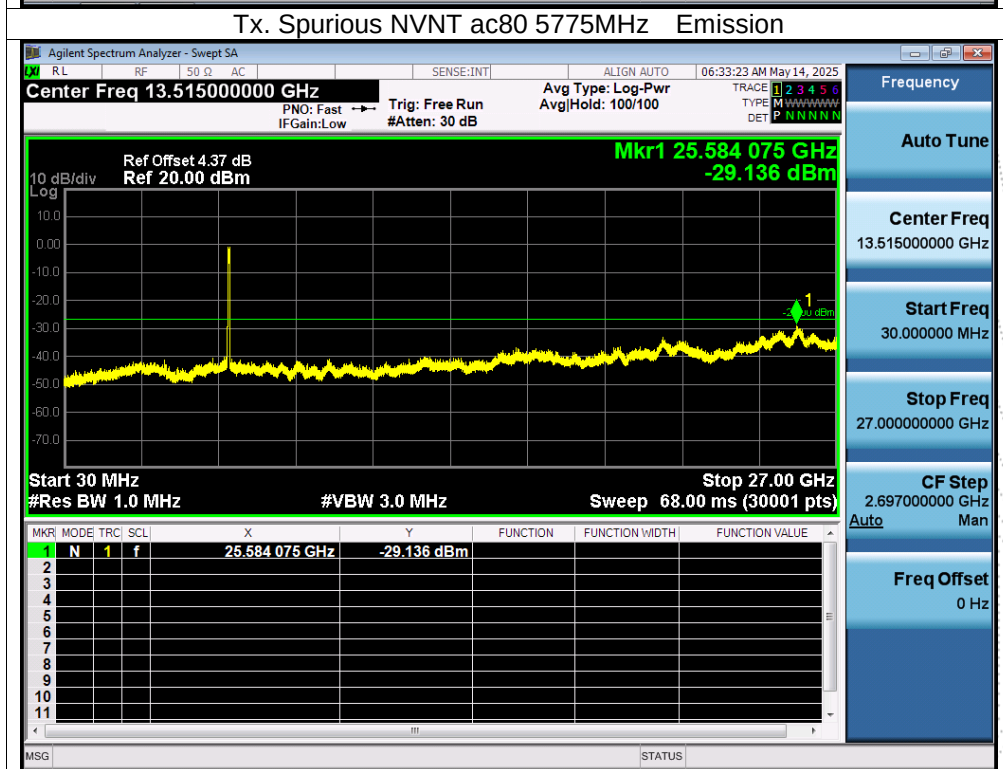
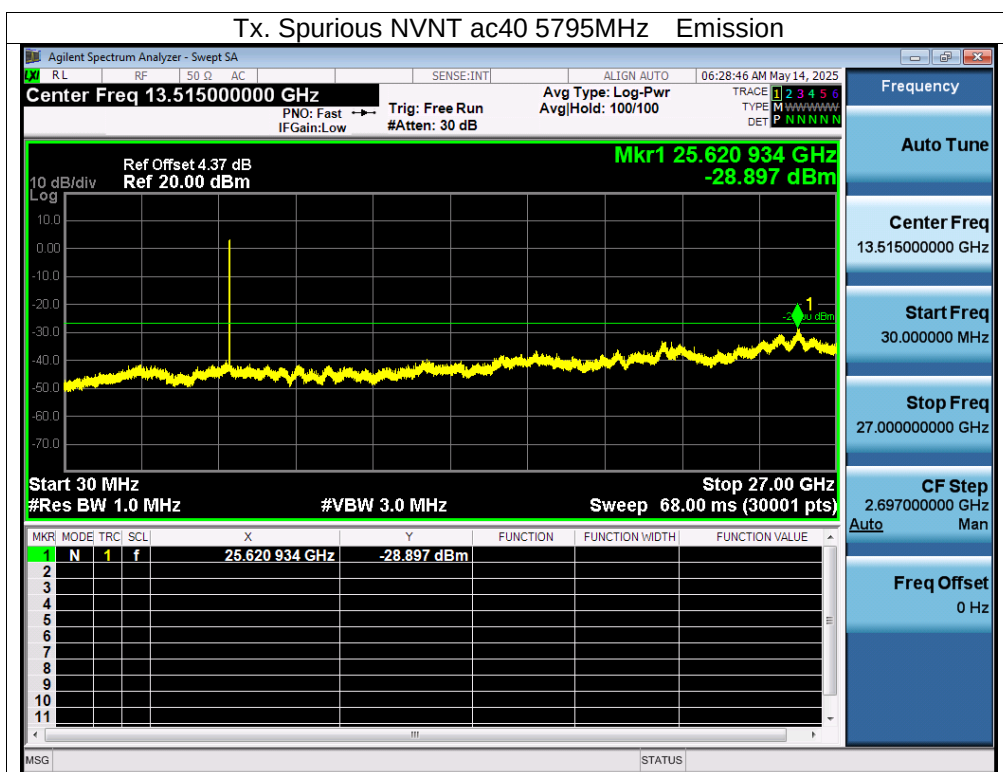


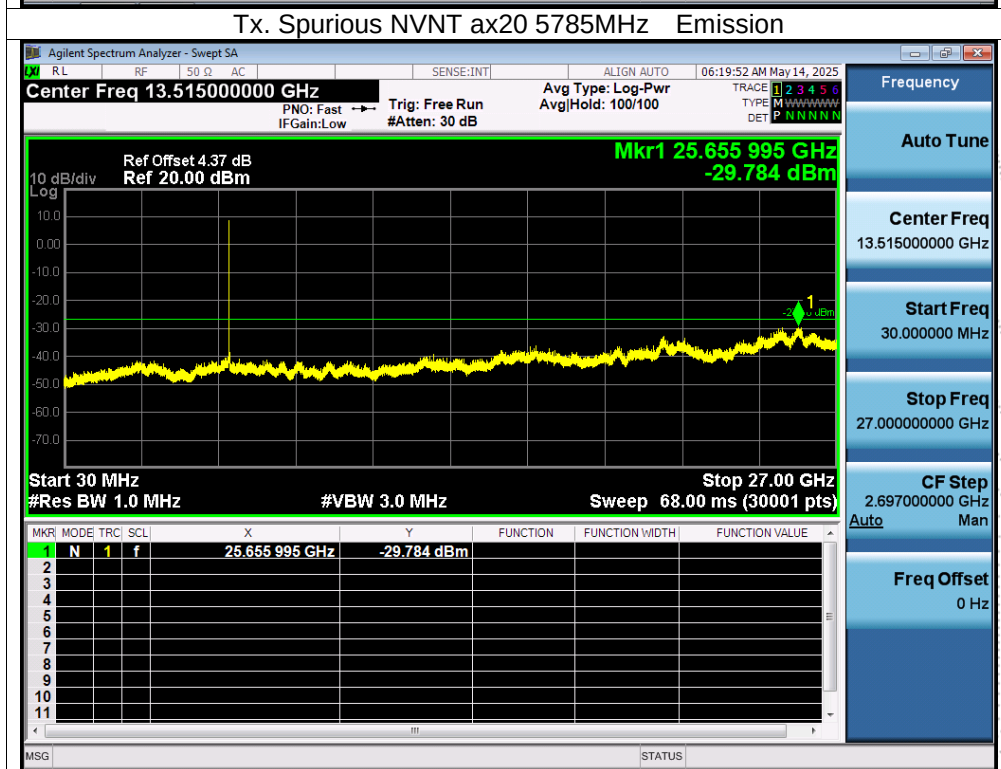
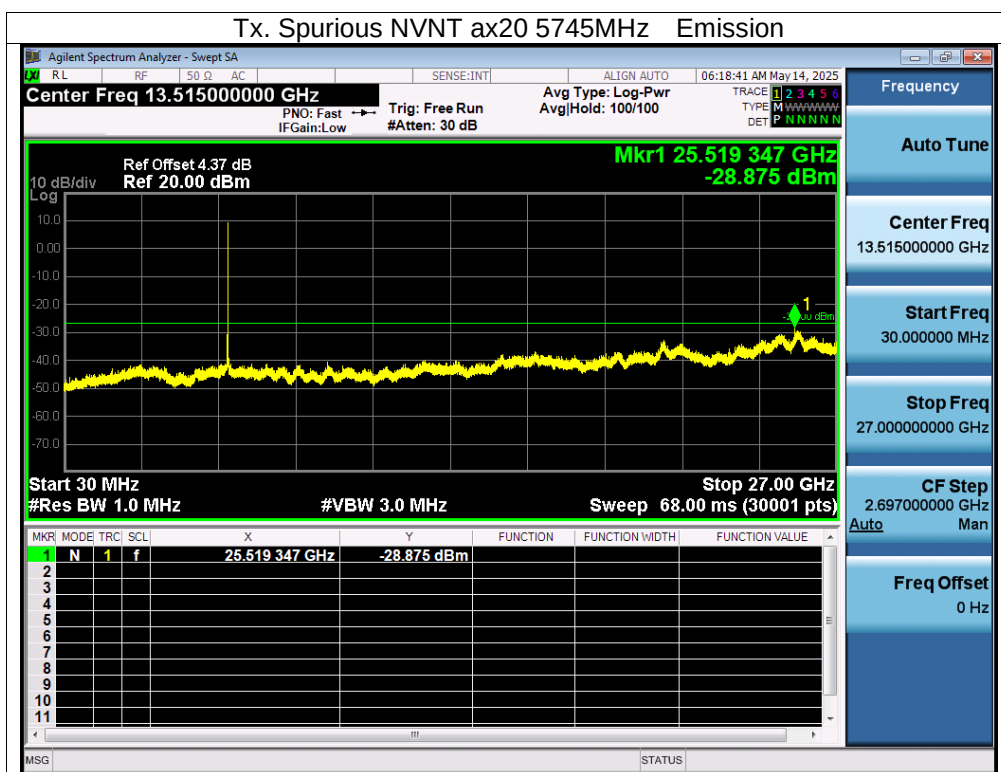


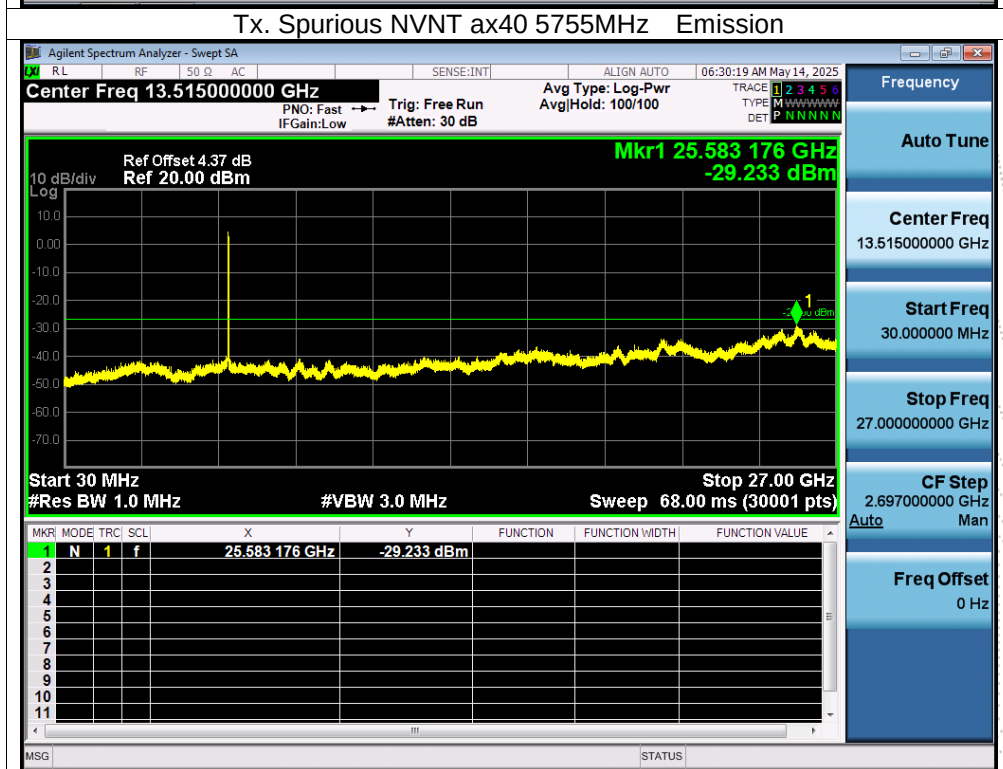
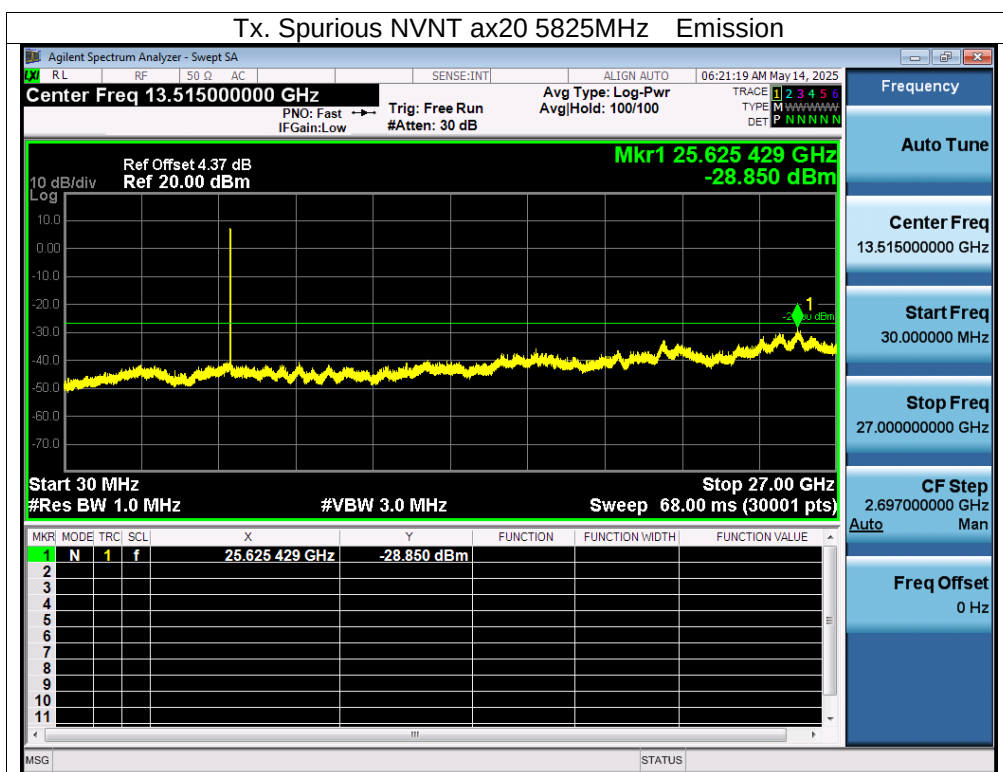


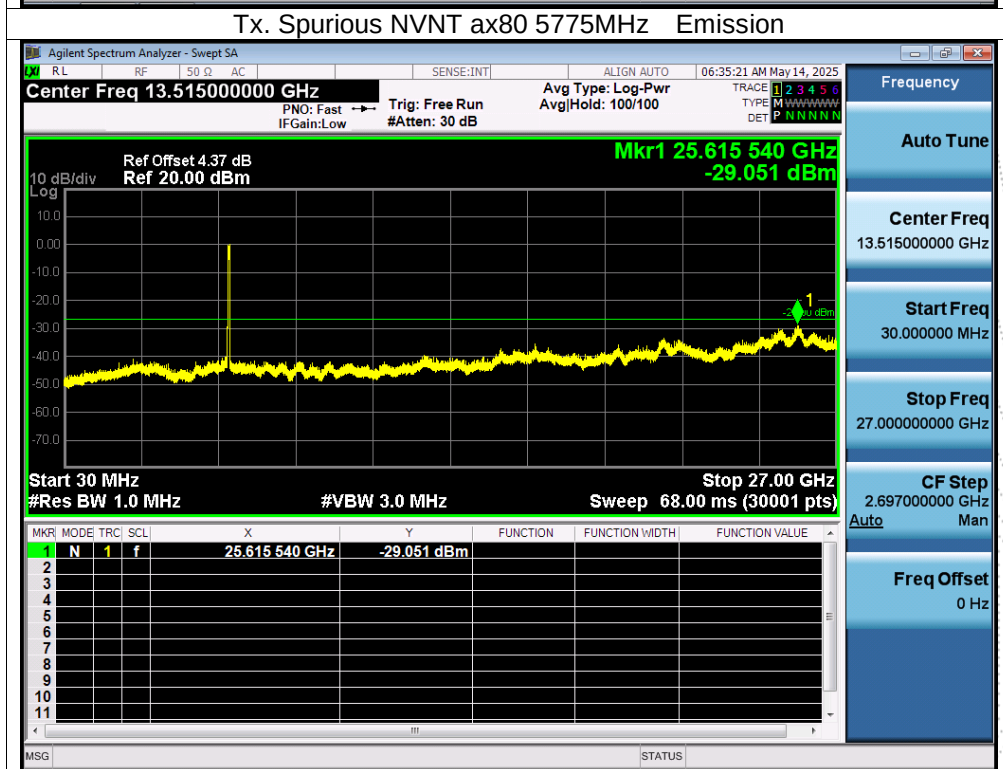
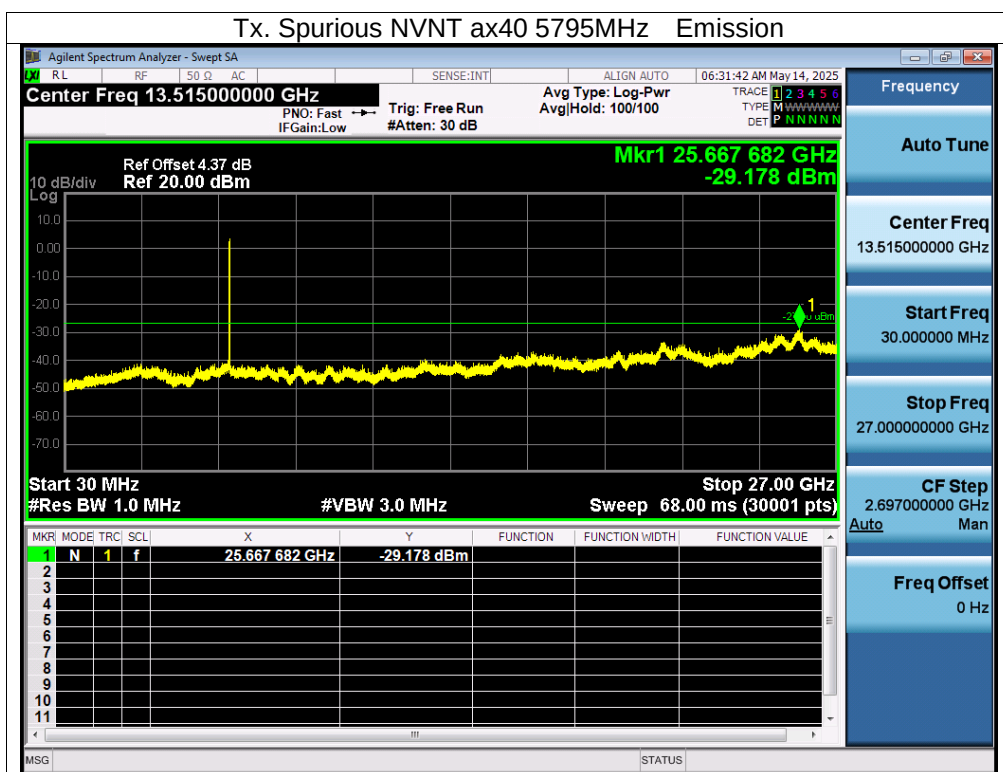












13. Frequency Stability Measurement

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	5180.0085	5180	0.0085	1.6409
		V max (V)	3.80	5180.0098	5180	0.0098	1.8919
		V min (V)	2.81	5180.0021	5180	0.0021	0.4054
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	5180.0072	5180	0.0072	1.3900
		T (°C)	-10	5180.0006	5180	0.0006	0.1158
		T (°C)	0	5180.0020	5180	0.0020	0.3861
		T (°C)	10	5180.0086	5180	0.0086	1.6602
		T (°C)	20	5180.0080	5180	0.0080	1.5444
		T (°C)	30	5180.0124	5180	0.0124	2.3938
		T (°C)	40	5180.0113	5180	0.0113	2.1815
		T (°C)	50	5180.0027	5180	0.0027	0.5212
		T (°C)	60	5180.0017	5180	0.0017	0.3282
		T (°C)	70	5180.0034	5180	0.0034	0.6564
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	5200.0013	5200	0.0013	0.2500
		V max (V)	3.80	5200.0105	5200	0.0105	2.0192
		V min (V)	2.81	5200.0037	5200	0.0037	0.7115
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	5200.01050	5200	0.01050	2.0192
		T (°C)	-10	5200.00380	5200	0.00380	0.7308
		T (°C)	0	5200.01300	5200	0.01300	2.5000
		T (°C)	10	5200.00720	5200	0.00720	1.3846
		T (°C)	20	5200.00540	5200	0.00540	1.0385
		T (°C)	30	5200.01180	5200	0.01180	2.2692
		T (°C)	40	5200.00250	5200	0.00250	0.4808
		T (°C)	50	5200.00140	5200	0.00140	0.2692
		T (°C)	60	5200.01090	5200	0.01090	2.0962
		T (°C)	70	5200.00920	5200	0.00920	1.7692
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	5240.0095	5240	0.0095	1.8130
		V max (V)	3.80	5240.0096	5240	0.0096	1.8321
		V min (V)	2.81	5240.0040	5240	0.0040	0.7634
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	5240.0113	5240	0.0113	2.1565
		T (°C)	-10	5240.0111	5240	0.0111	2.1183
		T (°C)	0	5240.0068	5240	0.0068	1.2977
		T (°C)	10	5240.0047	5240	0.0047	0.8969
		T (°C)	20	5240.0123	5240	0.0123	2.3473
		T (°C)	30	5240.0002	5240	0.0002	0.0382
		T (°C)	40	5240.0135	5240	0.0135	2.5763
		T (°C)	50	5240.0082	5240	0.0082	1.5649
		T (°C)	60	5240.0106	5240	0.0106	2.0229
		T (°C)	70	5240.0113	5240	0.0113	2.1565
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	5260.0103	5260	0.0103	1.9582
		V max (V)	3.80	5260.0073	5260	0.0073	1.3878
		V min (V)	2.81	5260.0116	5260	0.0116	2.2053
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	5260.0074	5260	0.0074	1.4068
		T (°C)	-10	5260.0001	5260	0.0001	0.0190
		T (°C)	0	5260.0052	5260	0.0052	0.9886
		T (°C)	10	5260.0028	5260	0.0028	0.5323
		T (°C)	20	5260.0065	5260	0.0065	1.2357
		T (°C)	30	5260.0086	5260	0.0086	1.6350
		T (°C)	40	5260.0056	5260	0.0056	1.0646
		T (°C)	50	5260.0004	5260	0.0004	0.0760
		T (°C)	60	5260.0022	5260	0.0022	0.4183
		T (°C)	70	5260.0135	5260	0.0135	2.5665
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	5280.0044	5280	0.0044	0.8333
		V max (V)	3.80	5280.0074	5280	0.0074	1.4015
		V min (V)	2.81	5280.0022	5280	0.0022	0.4167
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	5280.00650	5280	0.00650	1.2311
		T (°C)	-10	5280.00470	5280	0.00470	0.8902
		T (°C)	0	5280.00250	5280	0.00250	0.4735
		T (°C)	10	5280.00220	5280	0.00220	0.4167
		T (°C)	20	5280.01330	5280	0.01330	2.5189
		T (°C)	30	5280.00800	5280	0.00800	1.5152
		T (°C)	40	5280.00550	5280	0.00550	1.0417
		T (°C)	50	5280.00890	5280	0.00890	1.6856
		T (°C)	60	5280.00900	5280	0.00900	1.7045
		T (°C)	70	5280.01060	5280	0.01060	2.0076
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	5320.0084	5320	0.0084	1.5789
		V max (V)	3.80	5320.0083	5320	0.0083	1.5602
		V min (V)	2.81	5320.0086	5320	0.0086	1.6165
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	5320.0095	5320	0.0095	1.7857
		T (°C)	-10	5320.0116	5320	0.0116	2.1805
		T (°C)	0	5320.0084	5320	0.0084	1.5789
		T (°C)	10	5320.0030	5320	0.0030	0.5639
		T (°C)	20	5320.0129	5320	0.0129	2.4248
		T (°C)	30	5320.0133	5320	0.0133	2.5000
		T (°C)	40	5320.0126	5320	0.0126	2.3684
		T (°C)	50	5320.0022	5320	0.0022	0.4135
		T (°C)	60	5320.0118	5320	0.0118	2.2180
		T (°C)	70	5320.0070	5320	0.0070	1.3158
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	5500.0102	5500	0.0102	1.8545
		V max (V)	3.80	5500.0130	5500	0.0130	2.3636
		V min (V)	2.81	5500.0062	5500	0.0062	1.1273
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	5500.0010	5500	0.0010	0.1818
		T (°C)	-10	5500.0047	5500	0.0047	0.8545
		T (°C)	0	5500.0090	5500	0.0090	1.6364
		T (°C)	10	5500.0100	5500	0.0100	1.8182
		T (°C)	20	5500.0047	5500	0.0047	0.8545
		T (°C)	30	5500.0097	5500	0.0097	1.7636
		T (°C)	40	5500.0036	5500	0.0036	0.6545
		T (°C)	50	5500.0126	5500	0.0126	2.2909
		T (°C)	60	5500.0036	5500	0.0036	0.6545
		T (°C)	70	5500.0002	5500	0.0002	0.0364
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	5580.0088	5580	0.0088	1.5771
		V max (V)	3.80	5580.0063	5580	0.0063	1.1290
		V min (V)	2.81	5580.0134	5580	0.0134	2.4014
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	5580.00310	5580	0.00310	0.5556
		T (°C)	-10	5580.00960	5580	0.00960	1.7204
		T (°C)	0	5580.00390	5580	0.00390	0.6989
		T (°C)	10	5580.01110	5580	0.01110	1.9892
		T (°C)	20	5580.01330	5580	0.01330	2.3835
		T (°C)	30	5580.01040	5580	0.01040	1.8638
		T (°C)	40	5580.00670	5580	0.00670	1.2007
		T (°C)	50	5580.00500	5580	0.00500	0.8961
		T (°C)	60	5580.00100	5580	0.00100	0.1792
		T (°C)	70	5580.00790	5580	0.00790	1.4158
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	5700.0090	5700	0.0090	1.5789
		V max (V)	3.80	5700.0008	5700	0.0008	0.1404
		V min (V)	2.81	5700.0014	5700	0.0014	0.2456
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	5700.0081	5700	0.0081	1.4211
		T (°C)	-10	5700.0045	5700	0.0045	0.7895
		T (°C)	0	5700.0067	5700	0.0067	1.1754
		T (°C)	10	5700.0043	5700	0.0043	0.7544
		T (°C)	20	5700.0102	5700	0.0102	1.7895
		T (°C)	30	5700.0049	5700	0.0049	0.8596
		T (°C)	40	5700.0108	5700	0.0108	1.8947
		T (°C)	50	5700.0131	5700	0.0131	2.2982
		T (°C)	60	5700.0038	5700	0.0038	0.6667
		T (°C)	70	5700.0036	5700	0.0036	0.6316
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	5745.00860	5745	0.00860	1.4970
		V max (V)	3.80	5745.00950	5745	0.00950	1.6536
		V min (V)	2.81	5745.01260	5745	0.01260	2.1932
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	5745.00850	5745	0.00850	1.4795
		T (°C)	-10	5745.00000	5745	0.00000	0.0000
		T (°C)	0	5745.00330	5745	0.00330	0.5744
		T (°C)	10	5745.00260	5745	0.00260	0.4526
		T (°C)	20	5745.00940	5745	0.00940	1.6362
		T (°C)	30	5745.00300	5745	0.00300	0.5222
		T (°C)	40	5745.00980	5745	0.00980	1.7058
		T (°C)	50	5745.00910	5745	0.00910	1.5840
		T (°C)	60	5745.00310	5745	0.00310	0.5396
		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)	3.30	5785.00210	5785	0.00210	0.3630
		V max (V)	3.80	5785.01180	5785	0.01180	2.0398
		V min (V)	2.81	5785.00730	5785	0.00730	1.2619
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	5785.00620	5785	0.00620	1.0717
		T (°C)	-10	5785.01000	5785	0.01000	1.7286
		T (°C)	0	5785.00860	5785	0.00860	1.4866
		T (°C)	10	5785.01150	5785	0.01150	1.9879
		T (°C)	20	5785.00640	5785	0.00640	1.1063
		T (°C)	30	5785.01020	5785	0.01020	1.7632
		T (°C)	40	5785.00090	5785	0.00090	0.1556
		T (°C)	50	5785.01190	5785	0.01190	2.0570
		T (°C)	60	5785.00730	5785	0.00730	1.2619
		T (°C)	70	5785.00020	5785	0.00020	0.0346
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	5825.01120	5825	0.01120	1.9227
		V max (V)	3.80	5825.00310	5825	0.00310	0.5322
		V min (V)	2.81	5825.01190	5825	0.01190	2.0429
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	5825.00570	5825	0.00570	0.9785
		T (°C)	-10	5825.01350	5825	0.01350	2.3176
		T (°C)	0	5825.00960	5825	0.00960	1.6481
		T (°C)	10	5825.00600	5825	0.00600	1.0300
		T (°C)	20	5825.00450	5825	0.00450	0.7725
		T (°C)	30	5825.00940	5825	0.00940	1.6137
		T (°C)	40	5825.00800	5825	0.00800	1.3734
		T (°C)	50	5825.00470	5825	0.00470	0.8069
		T (°C)	60	5825.00110	5825	0.00110	0.1888
		T (°C)	70	5825.01160	5825	0.01160	1.9914
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 = $T_{on} / (T_{on} + T_{off})$

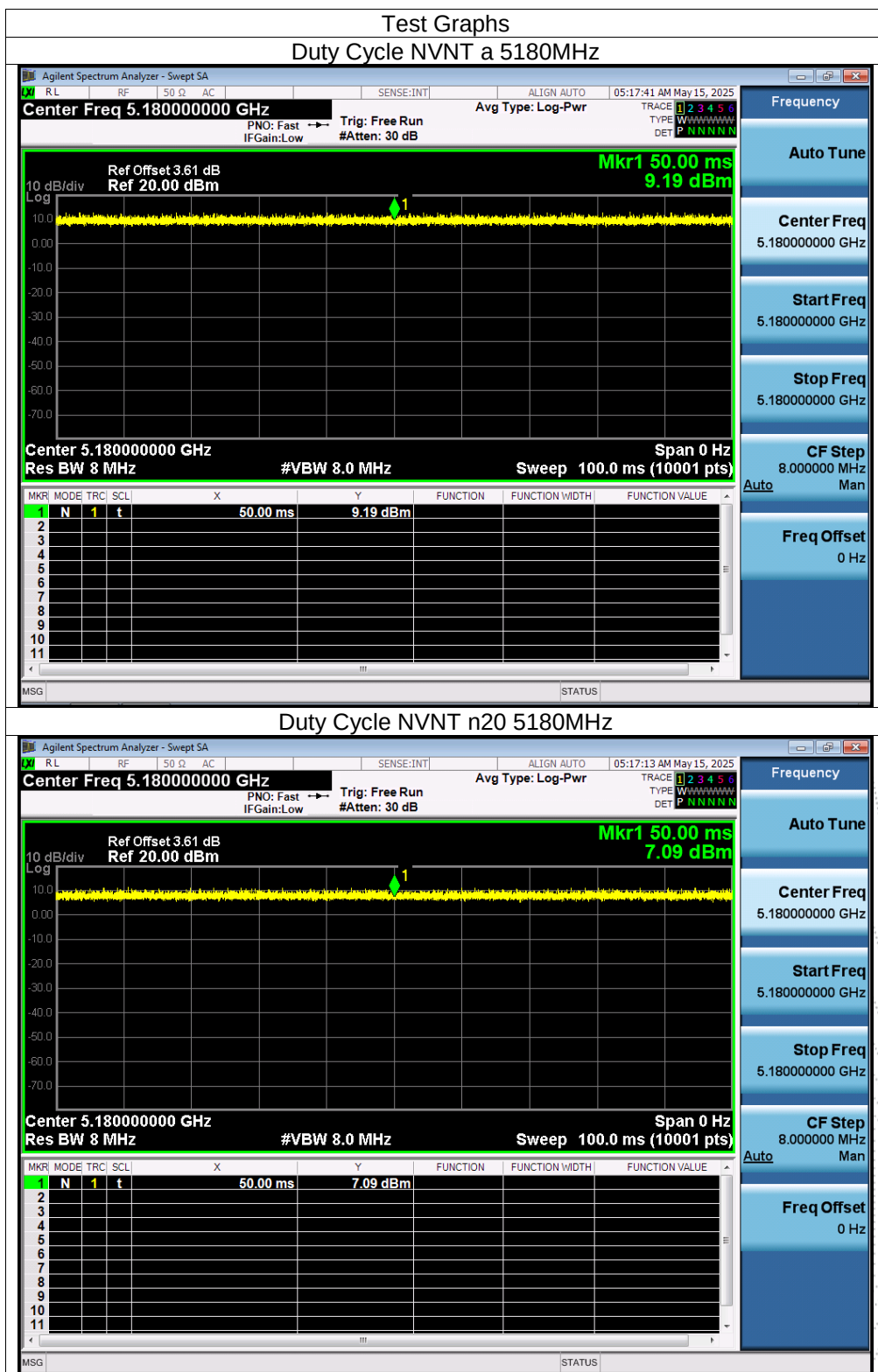
14.3 Test Procedure

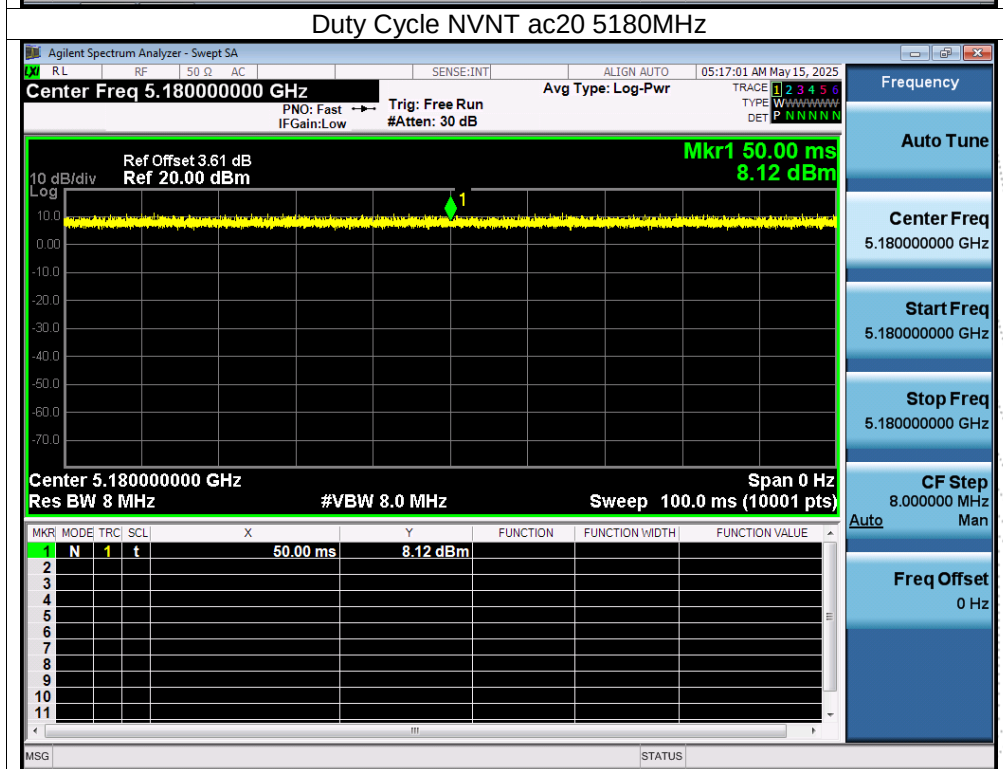
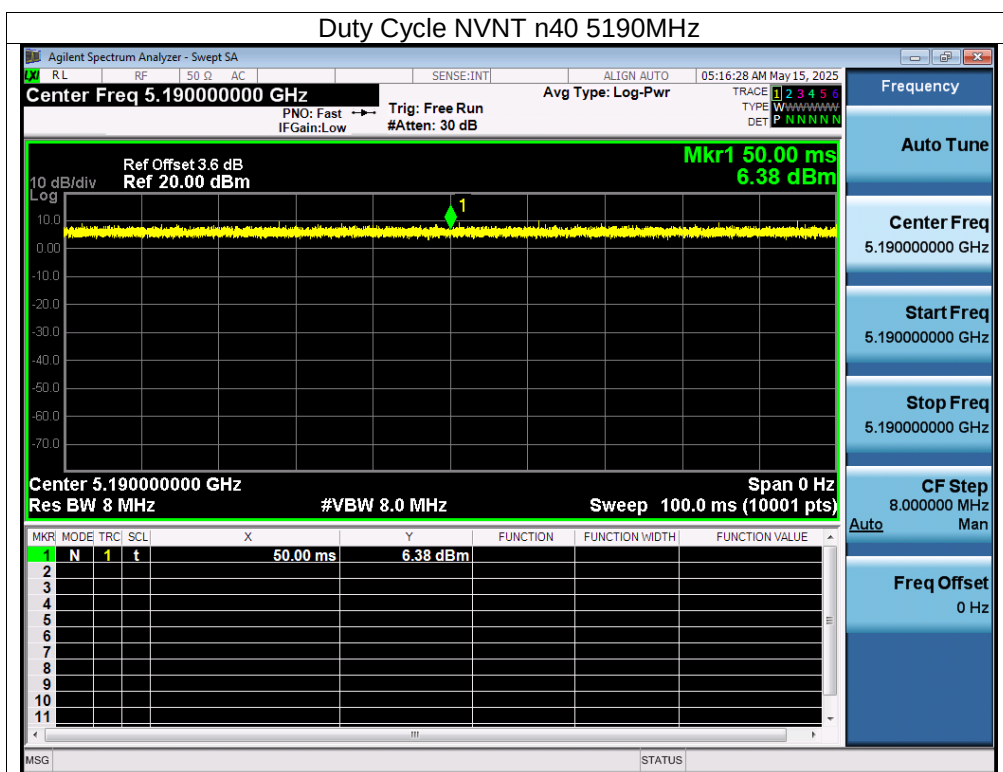
1. Set span = Zero
2. RBW = 8MHz
3. VBW = 8MHz,
4. Detector = Peak

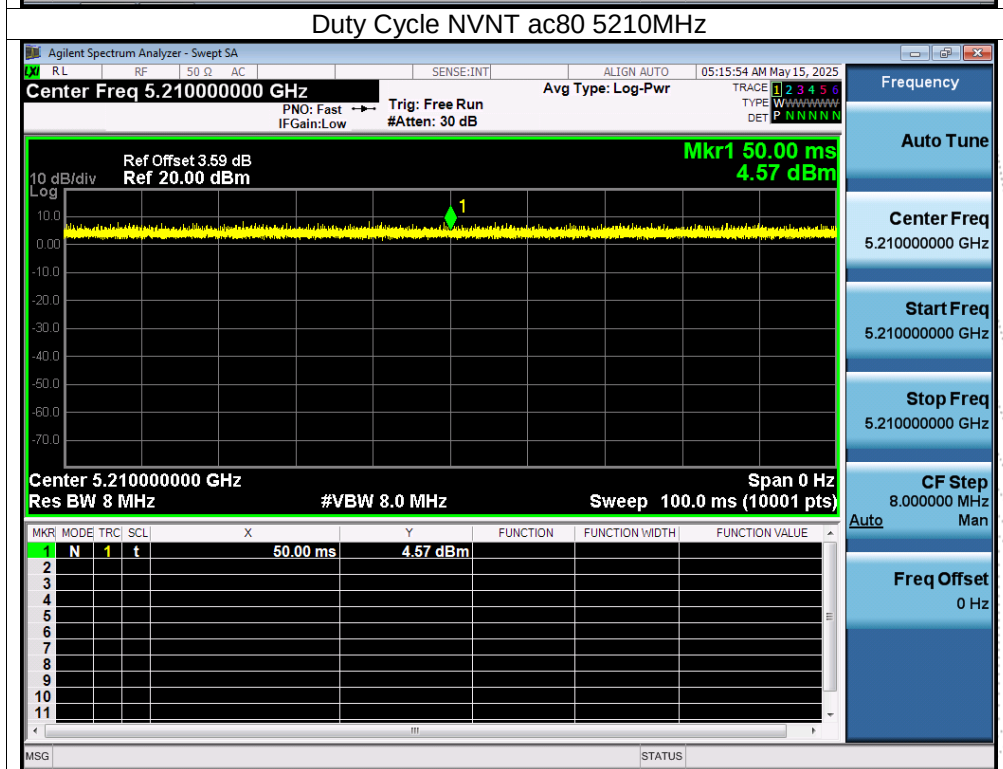
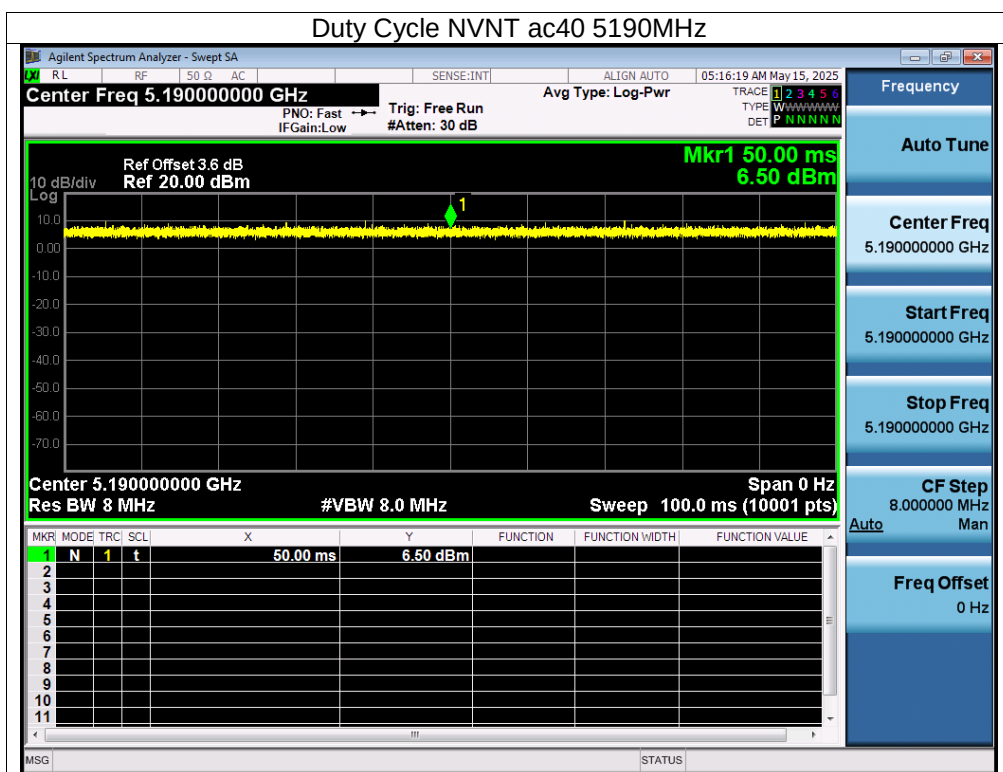
14.4 Test Result

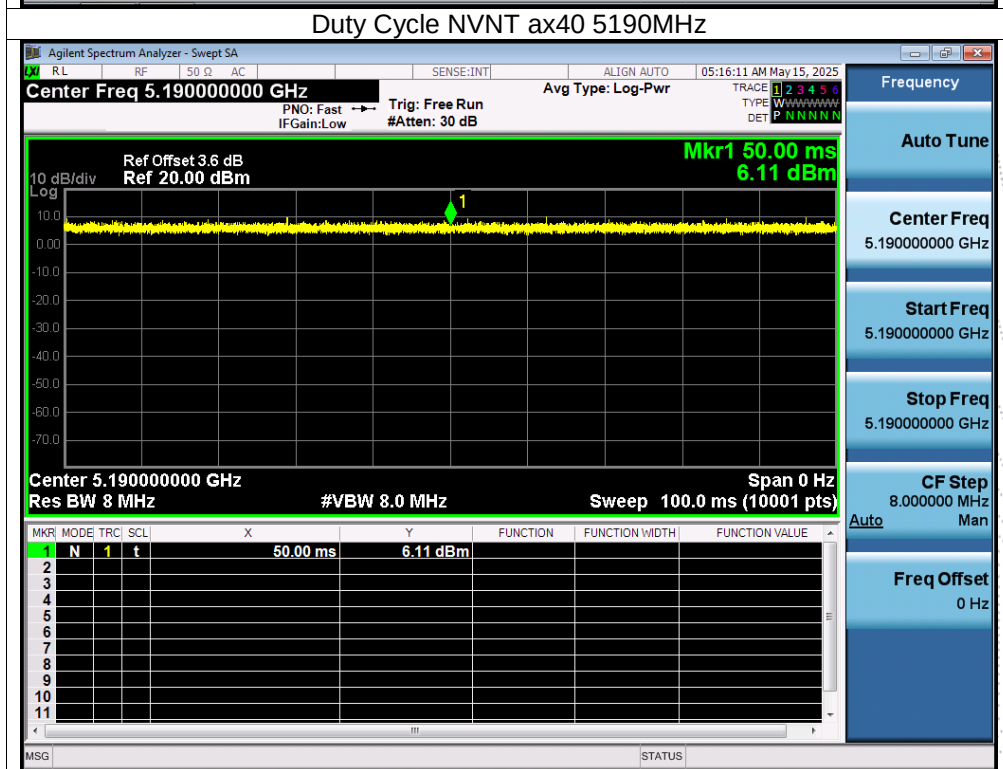
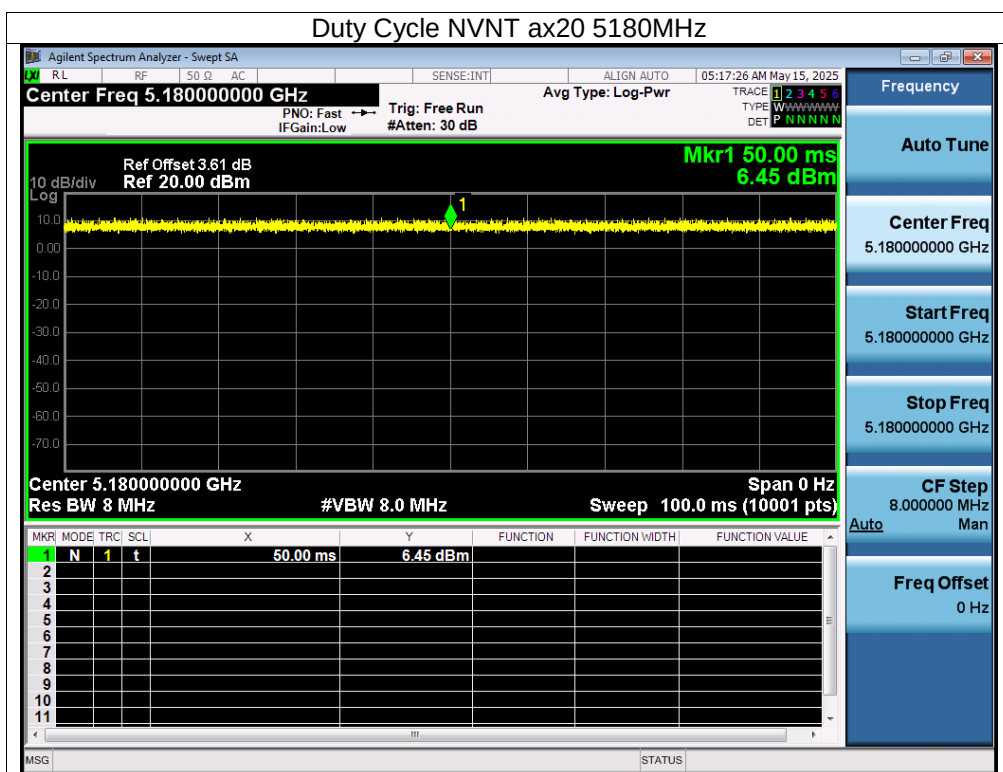
ANT A

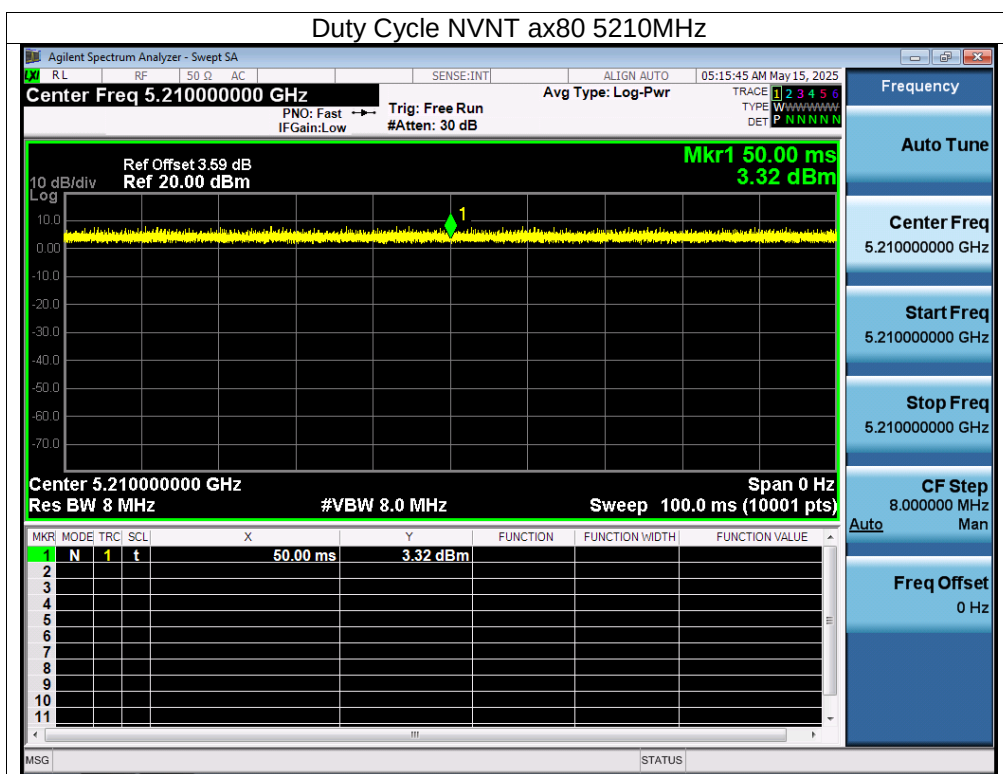
Condition	Mode	Frequency (MHz)	Duty Cycle (%)	Correction Factor (dB)
NVNT	a	5180	100	0
NVNT	n20	5180	100	0
NVNT	n40	5190	100	0
NVNT	ac20	5180	100	0
NVNT	ac40	5190	100	0
NVNT	ac80	5210	100	0
NVNT	ax20	5180	100	0
NVNT	ax40	5190	100	0
NVNT	ax80	5210	100	0





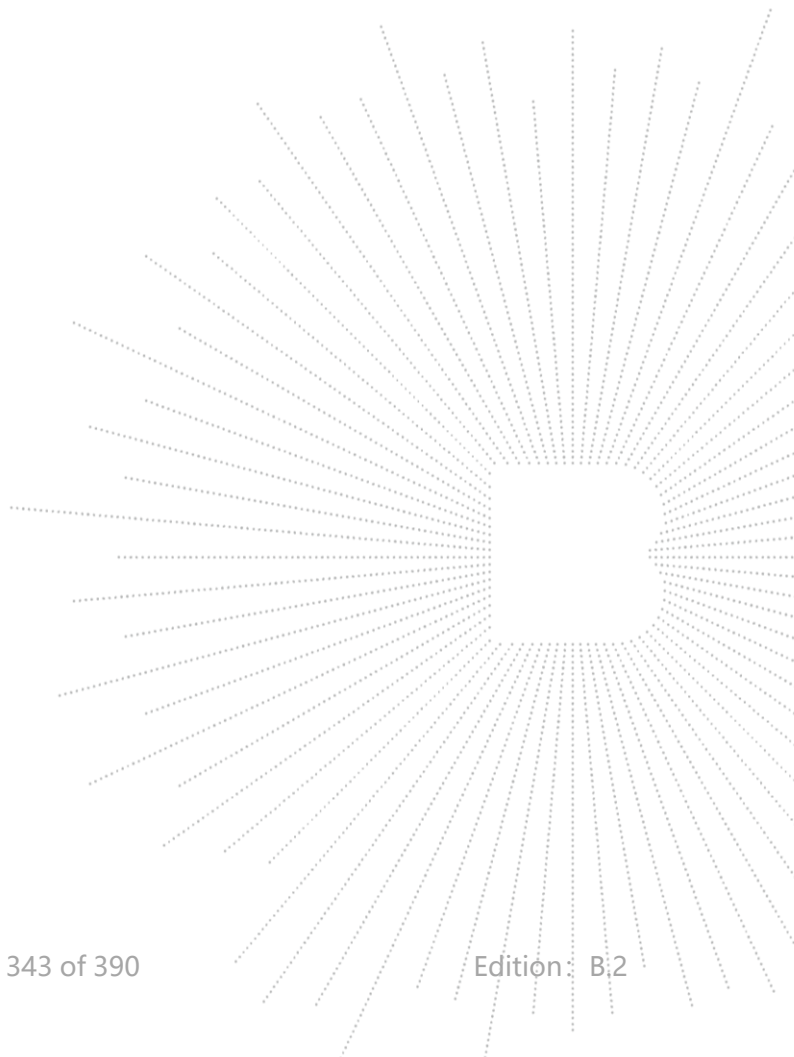


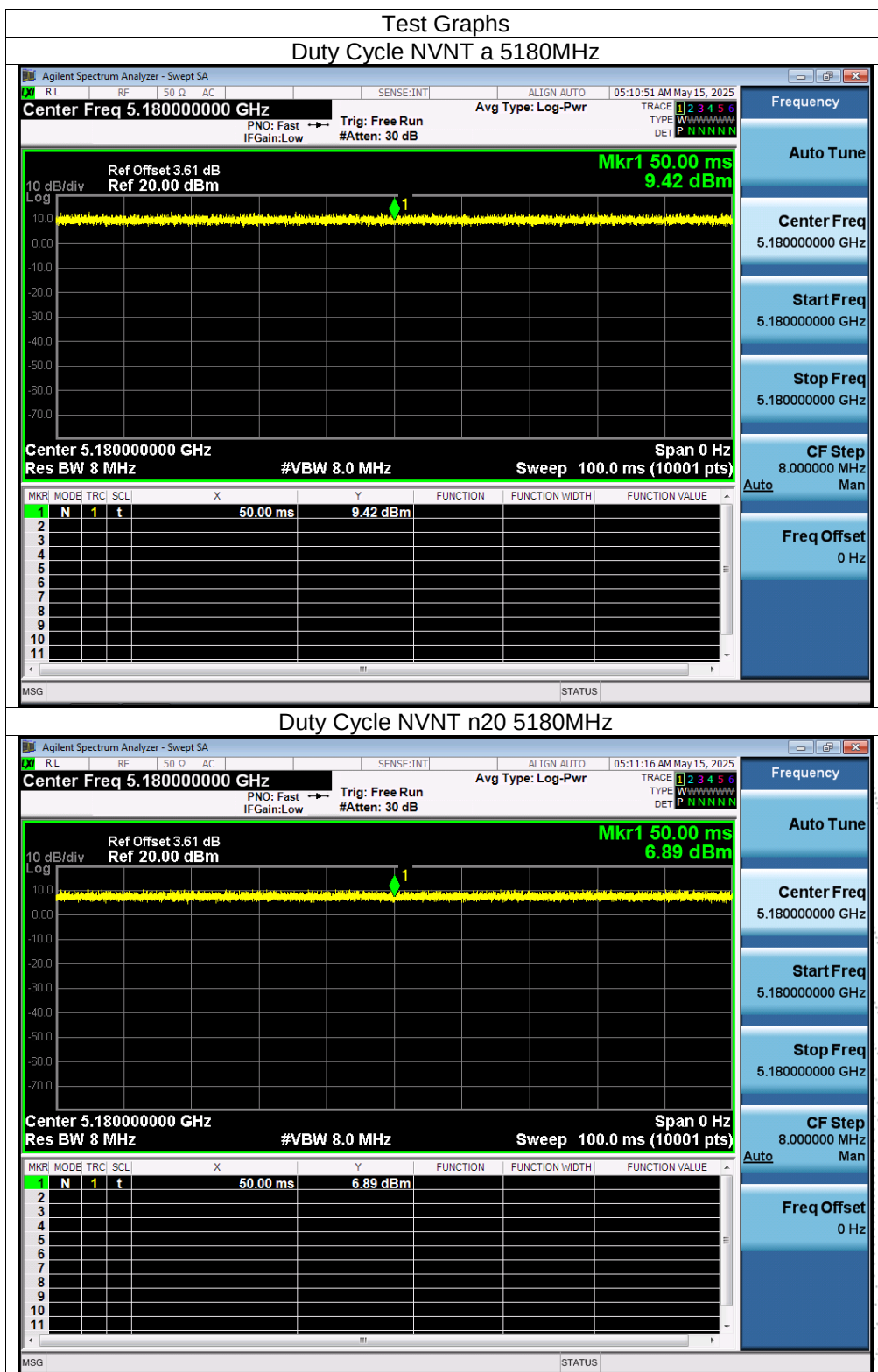


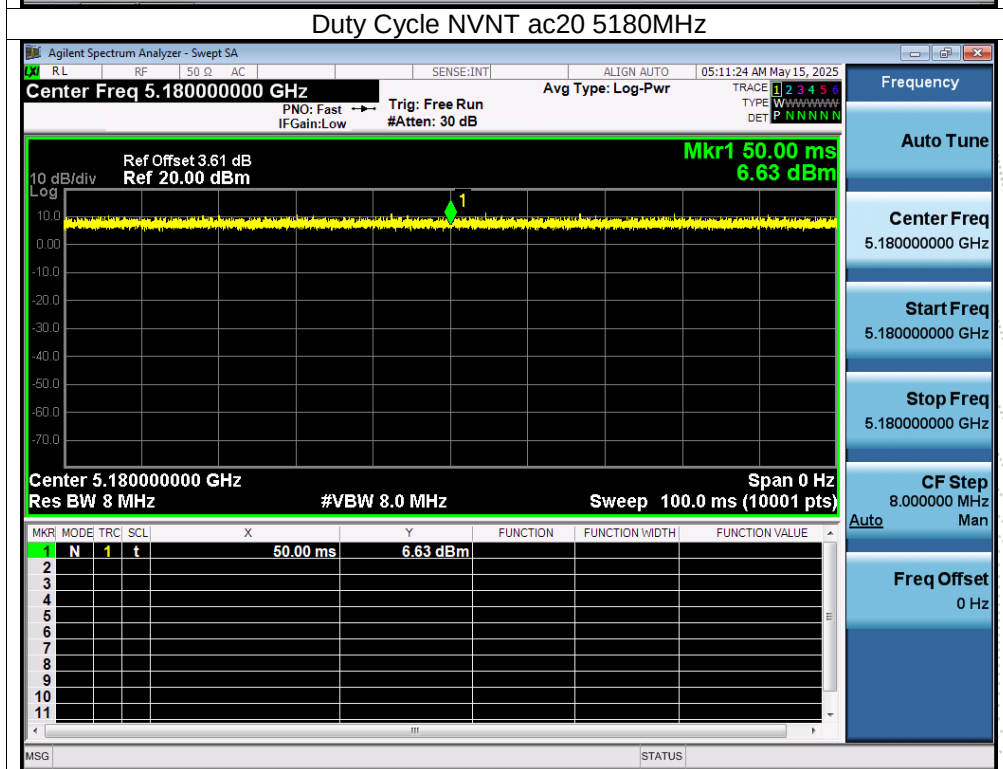
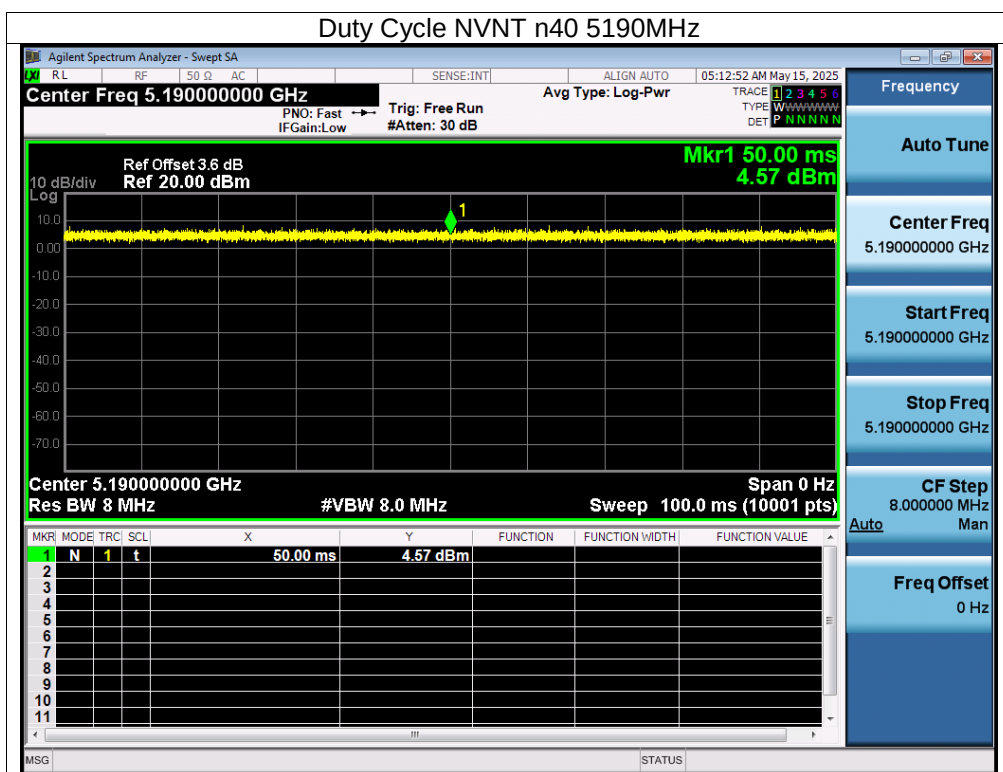


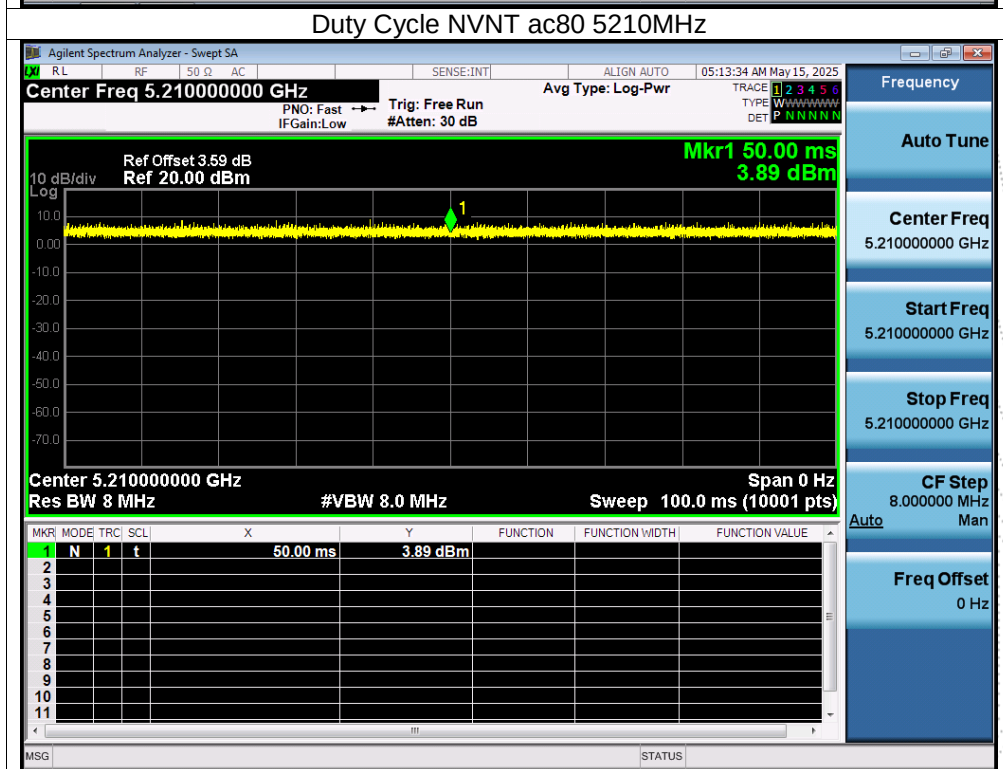
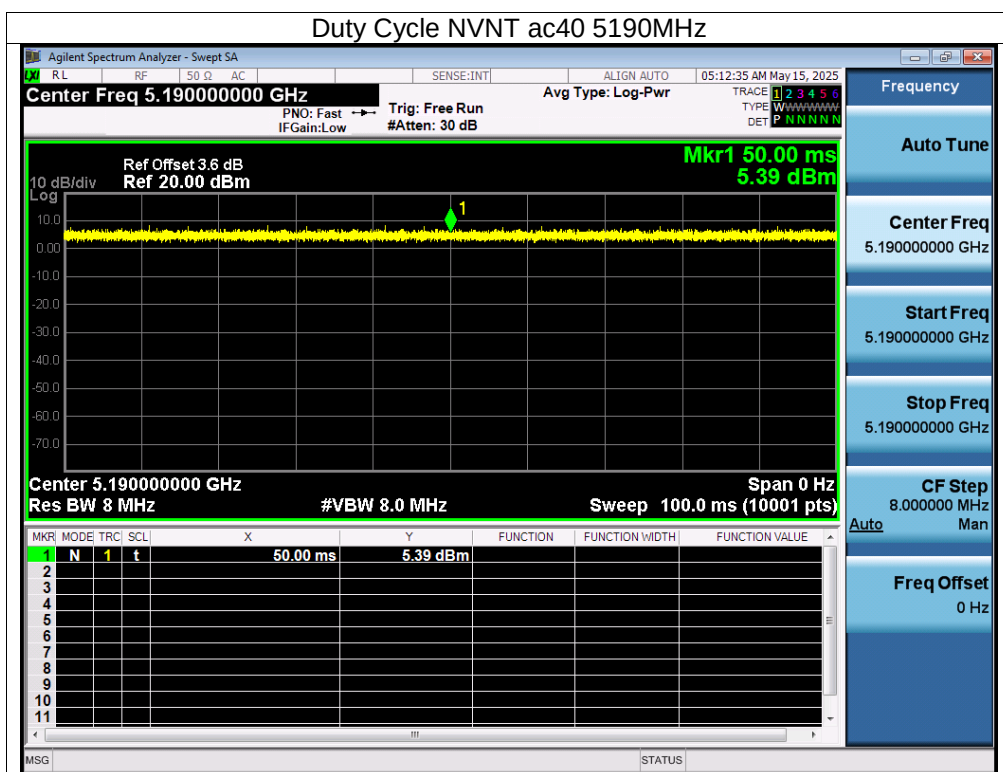
ANT B

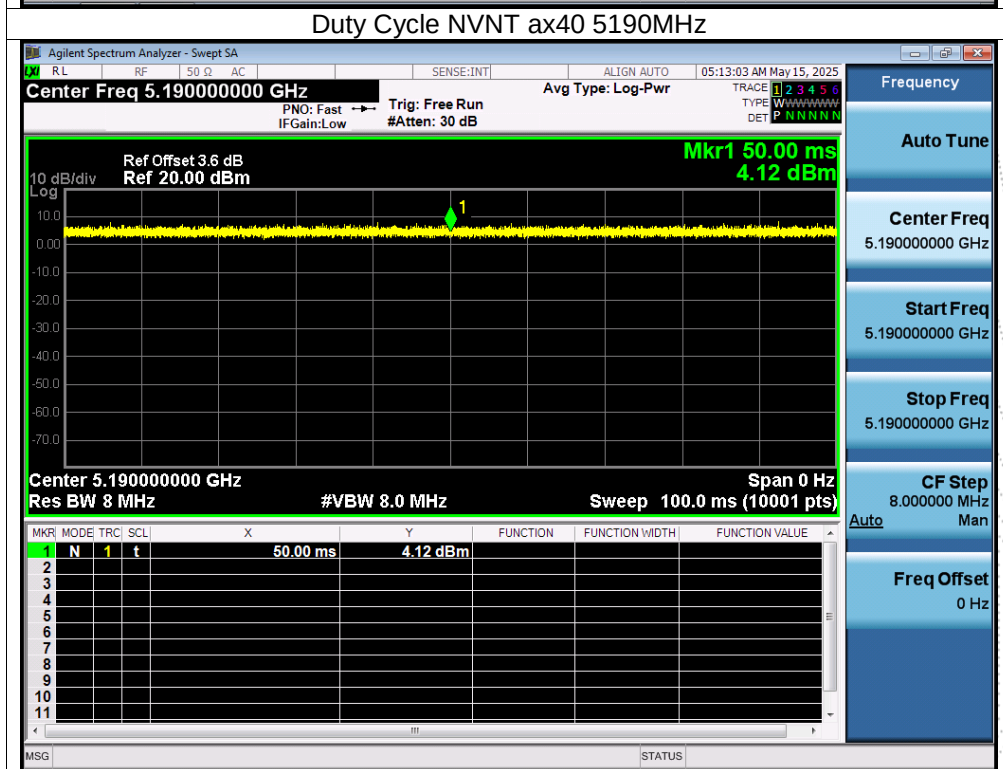
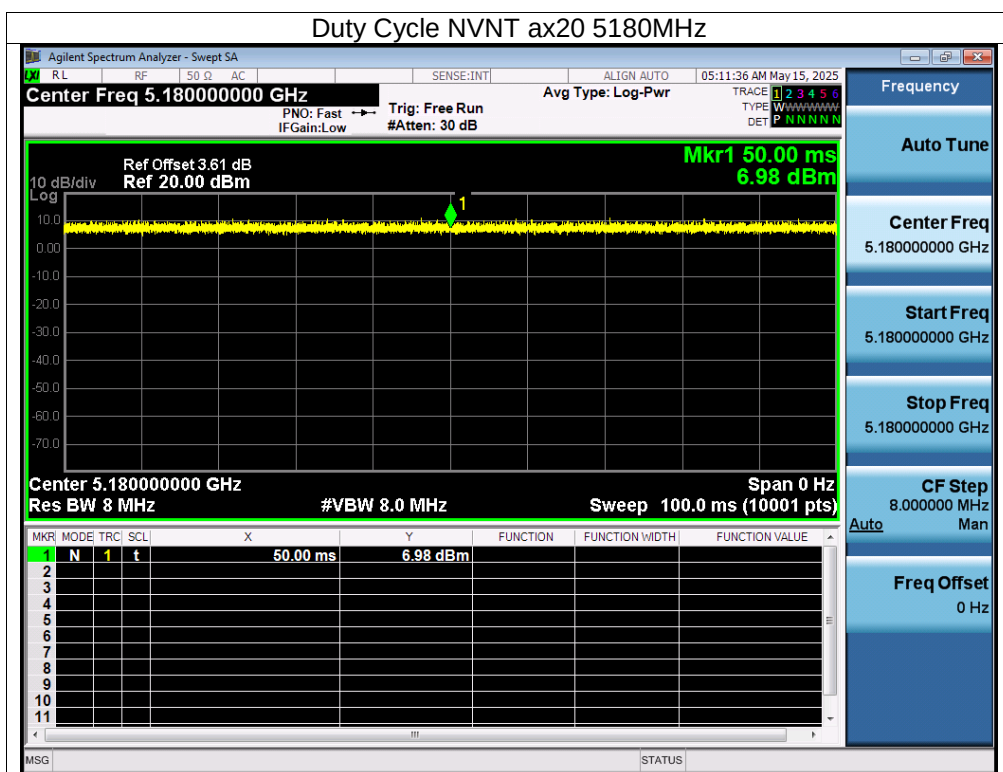
Condition	Mode	Frequency (MHz)	Duty Cycle (%)	Correction Factor (dB)
NVNT	a	5180	100	0
NVNT	n20	5180	100	0
NVNT	n40	5190	100	0
NVNT	ac20	5180	100	0
NVNT	ac40	5190	100	0
NVNT	ac80	5210	100	0
NVNT	ax20	5180	100	0
NVNT	ax40	5190	100	0
NVNT	ax80	5210	100	0

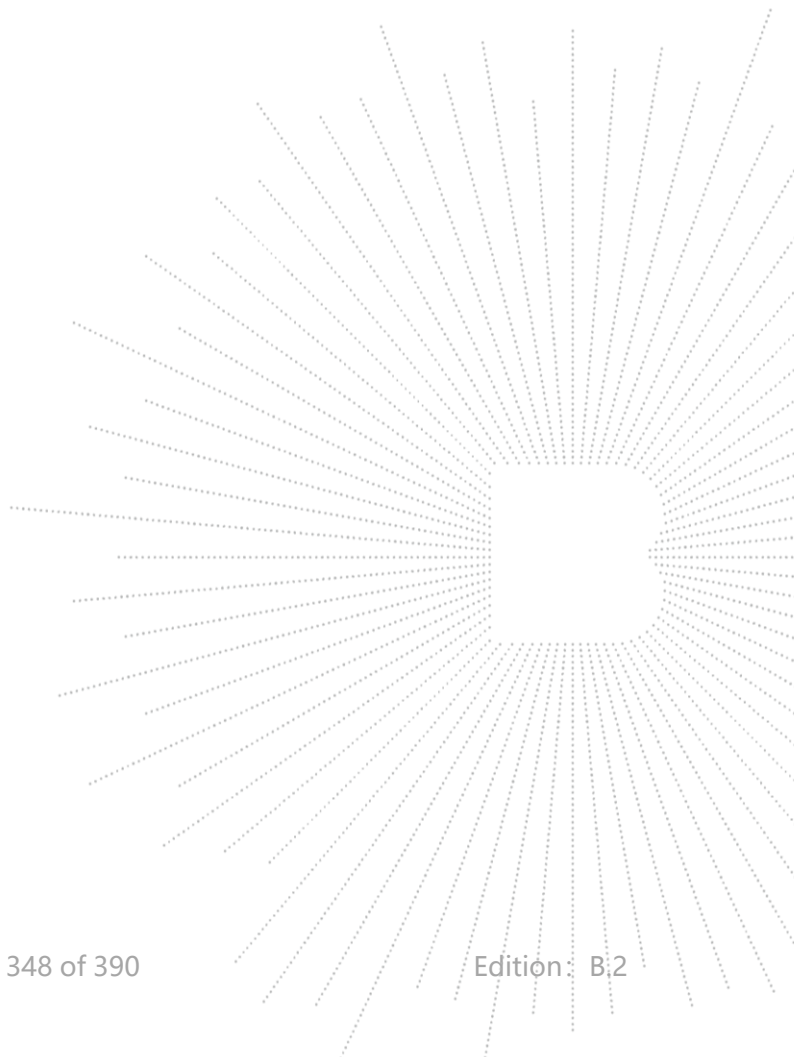
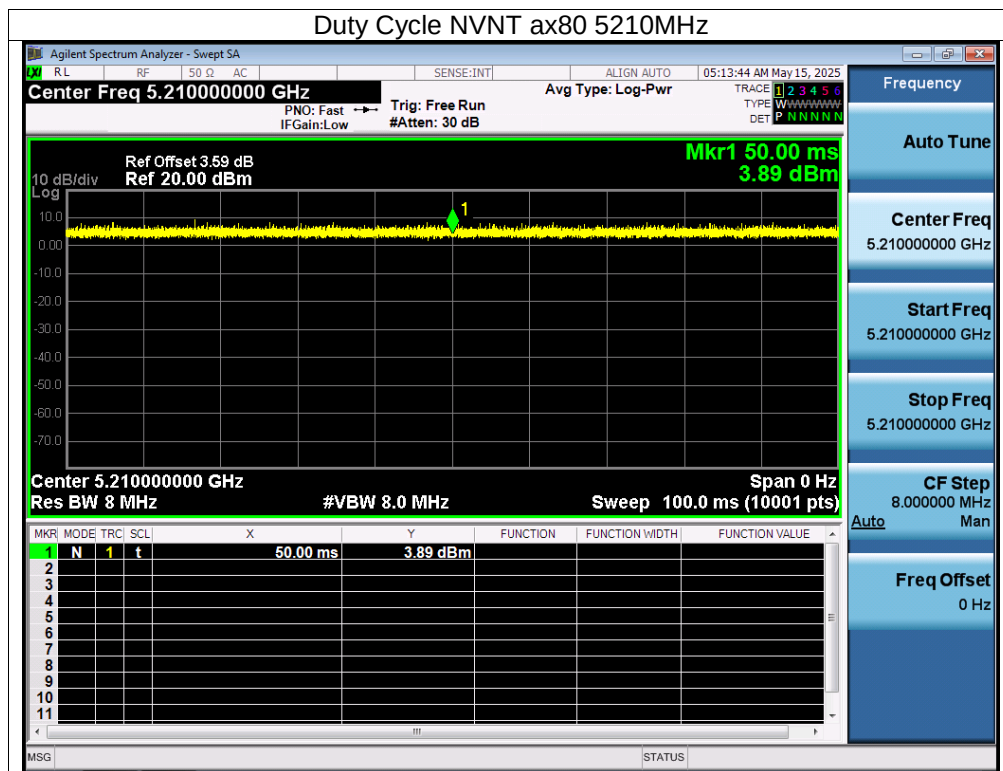






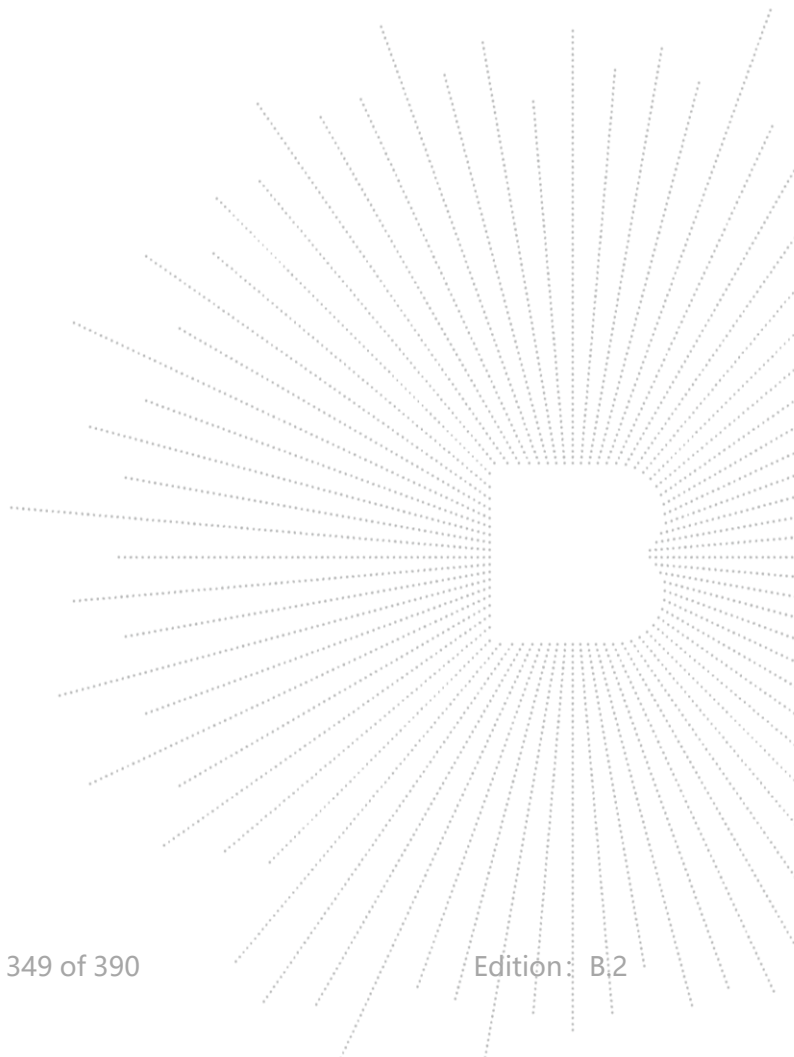


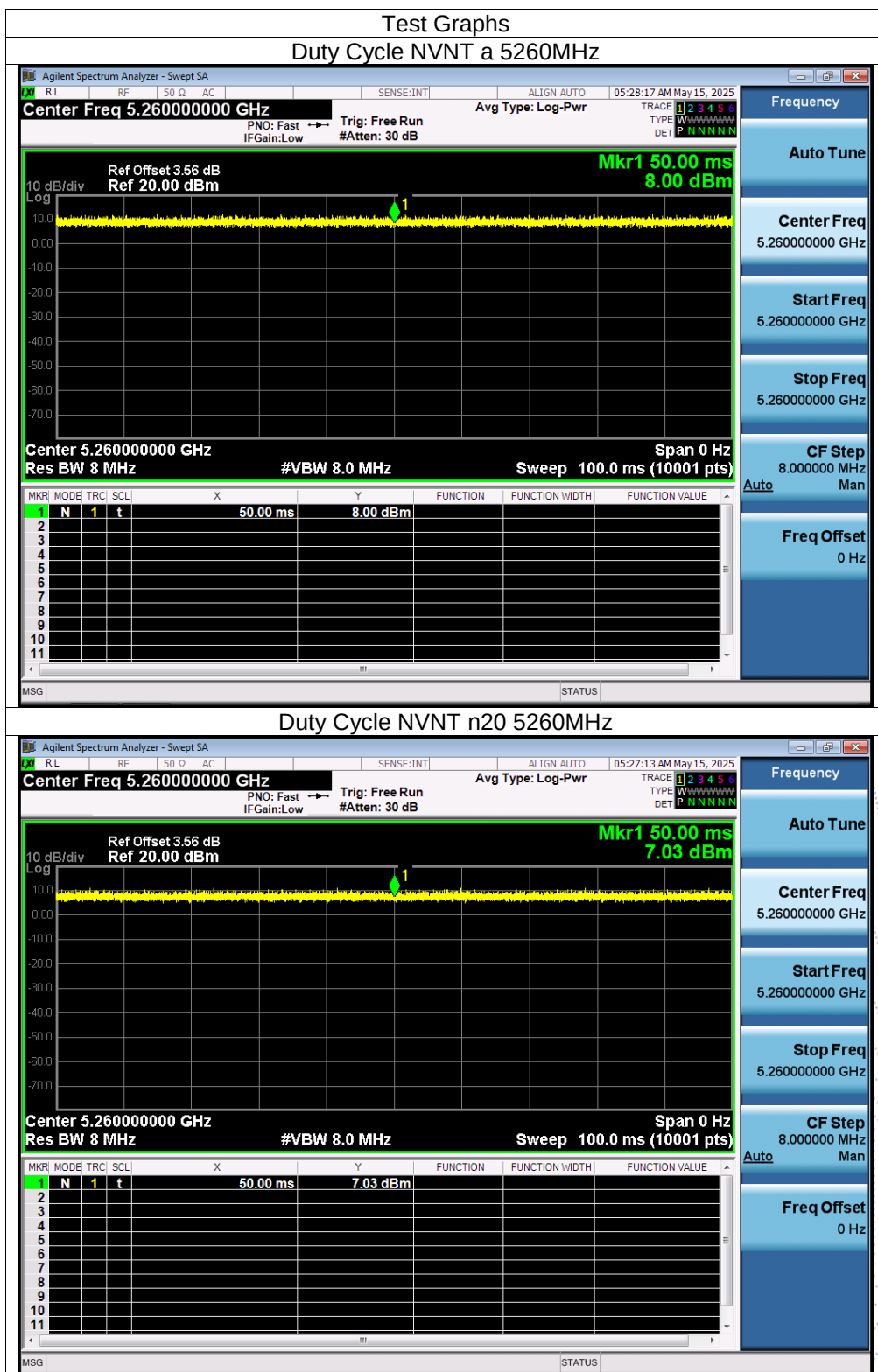


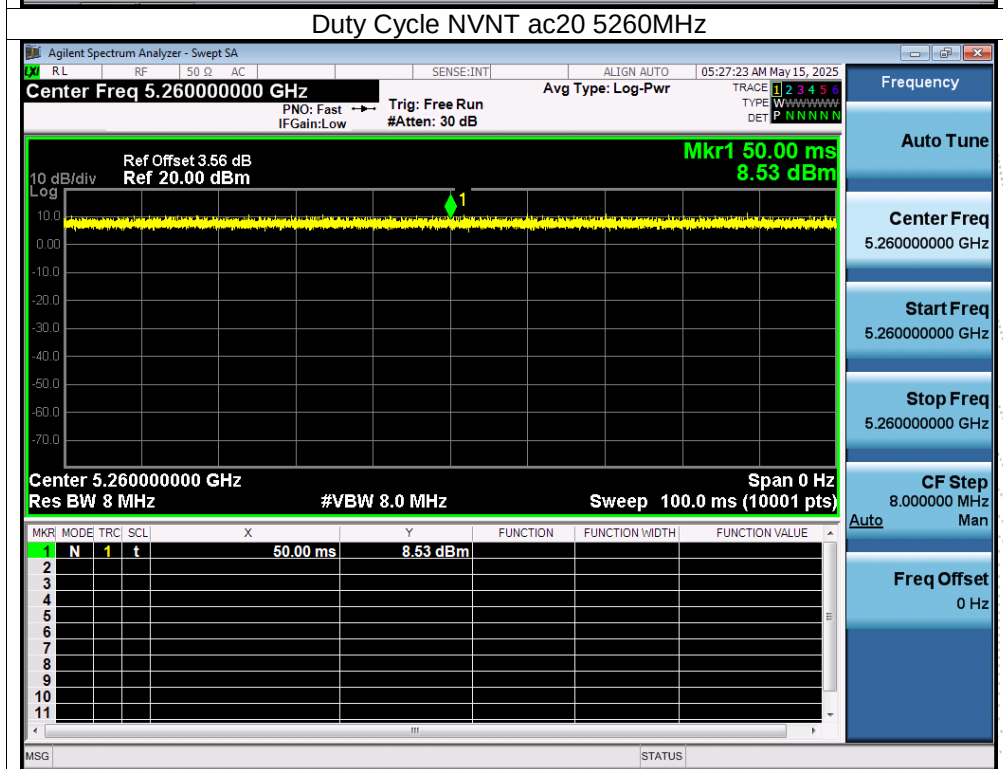
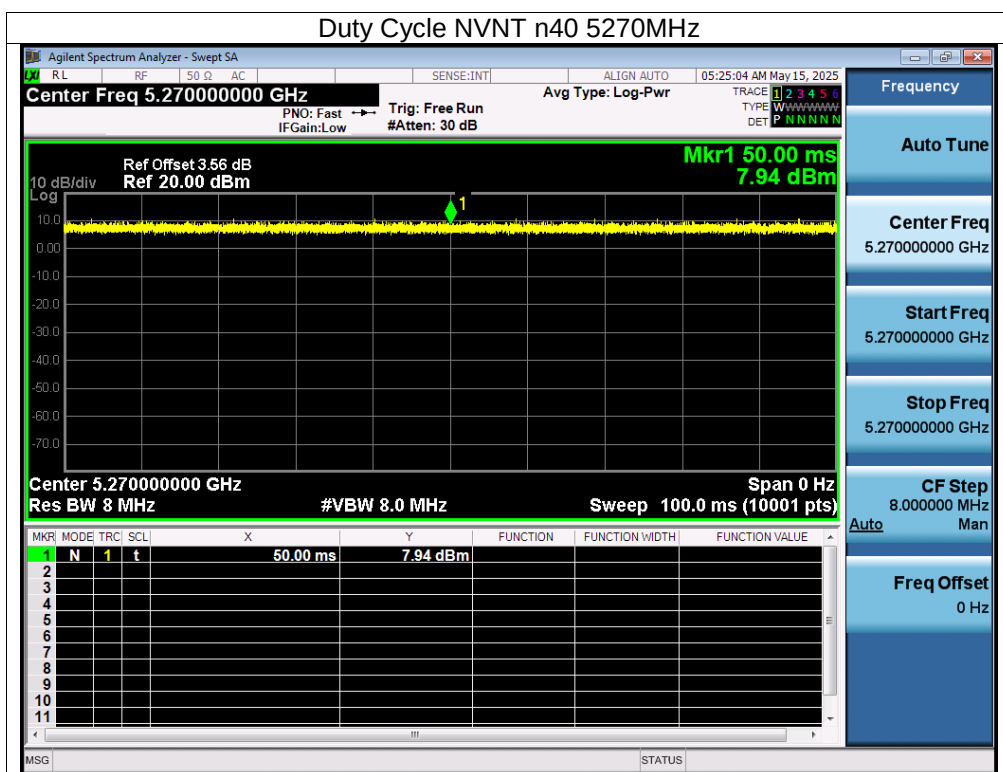


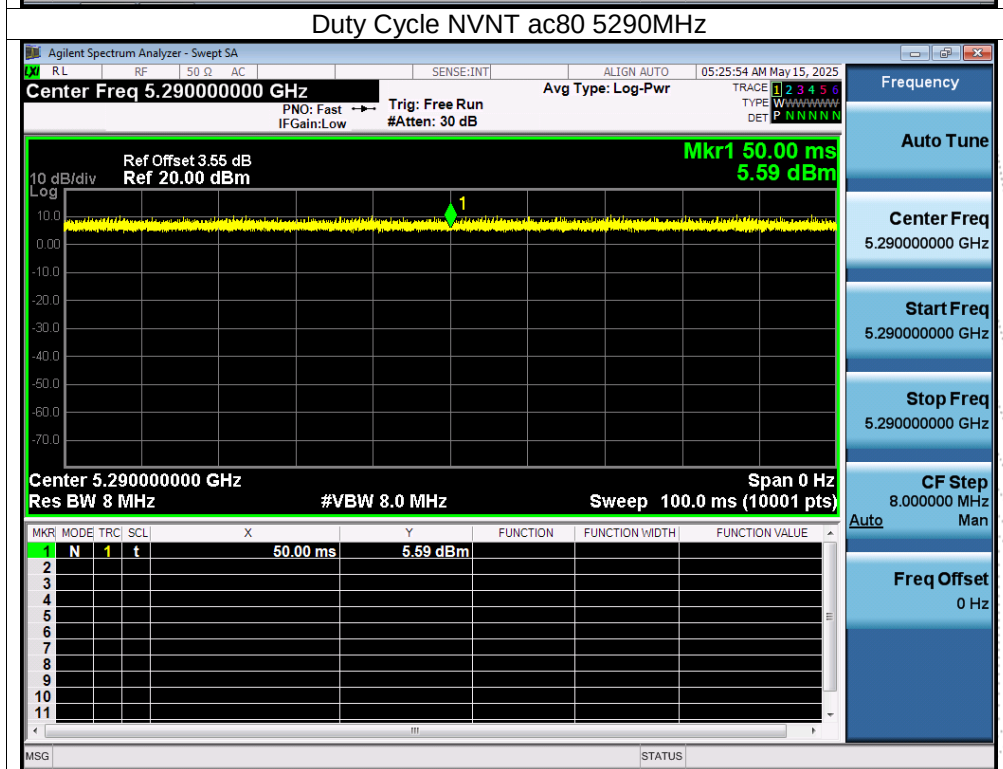
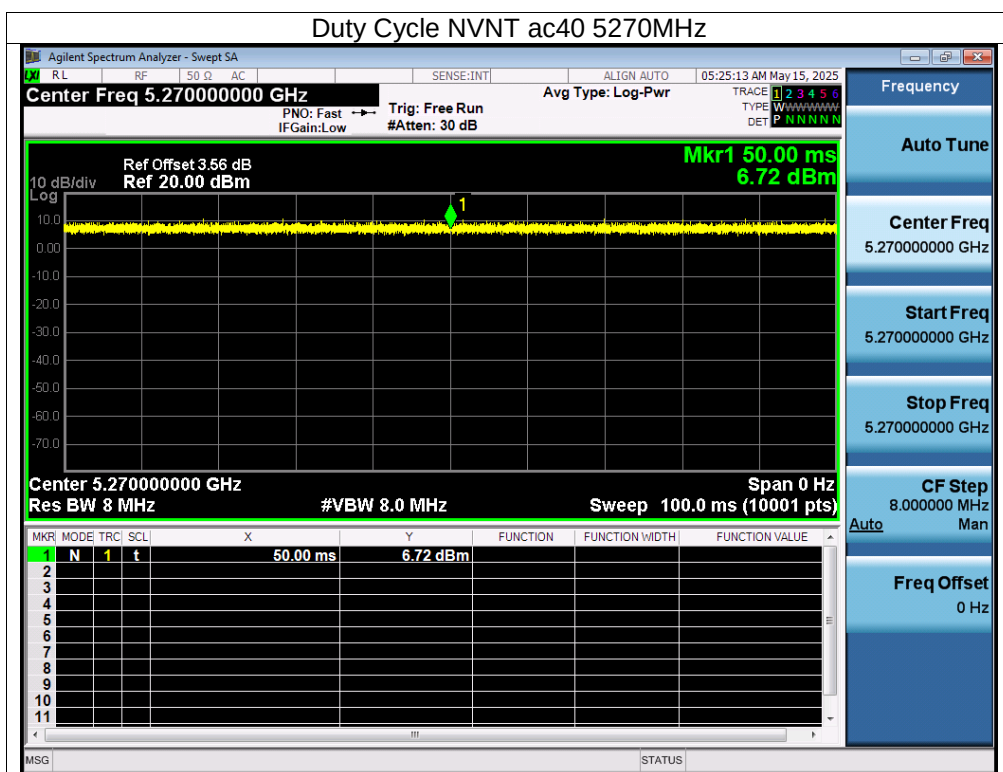
ANT A

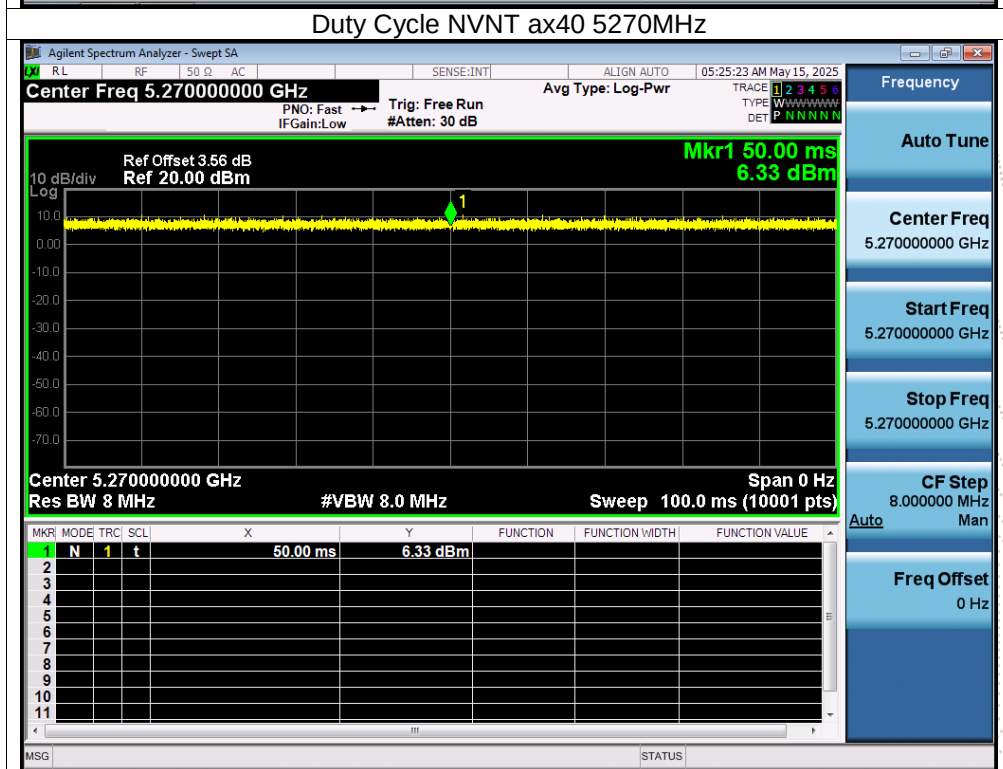
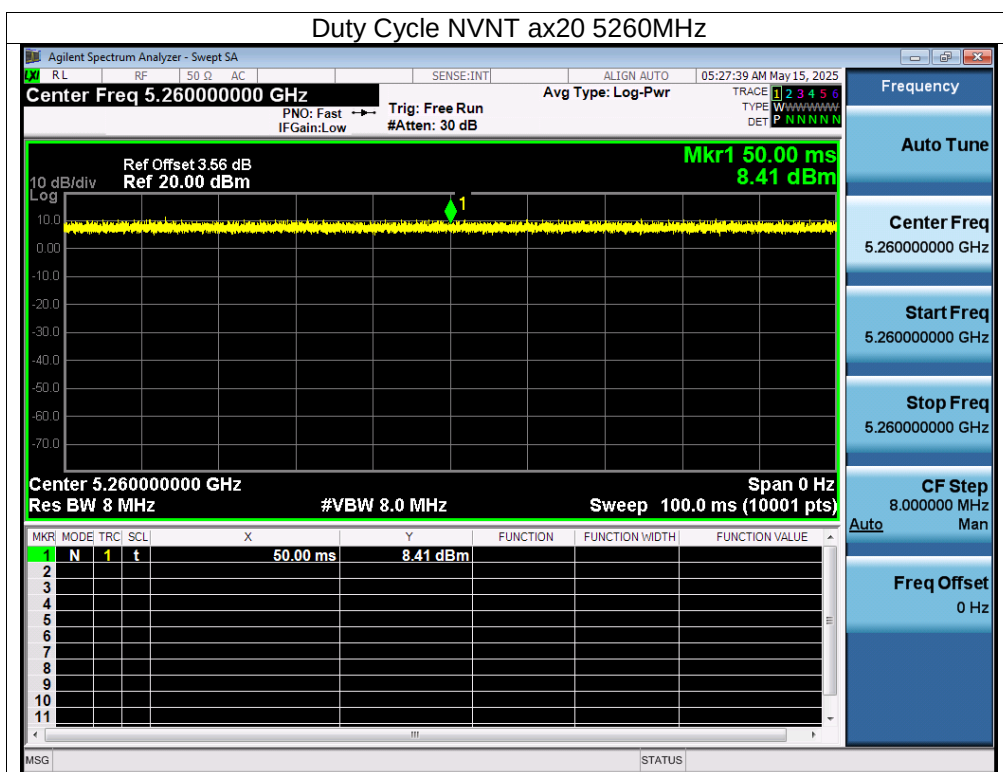
Condition	Mode	Frequency (MHz)	Duty Cycle (%)	Correction Factor (dB)
NVNT	a	5260	100	0
NVNT	n20	5260	100	0
NVNT	n40	5270	100	0
NVNT	ac20	5260	100	0
NVNT	ac40	5270	100	0
NVNT	ac80	5290	100	0
NVNT	ax20	5260	100	0
NVNT	ax40	5270	100	0
NVNT	ax80	5290	100	0

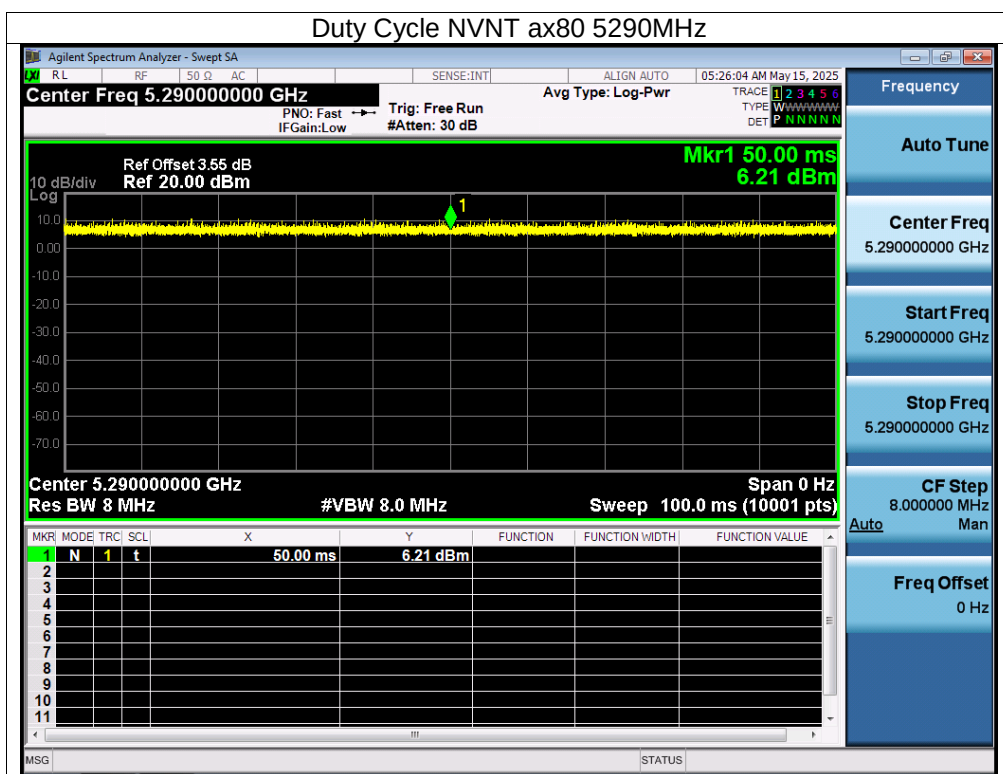






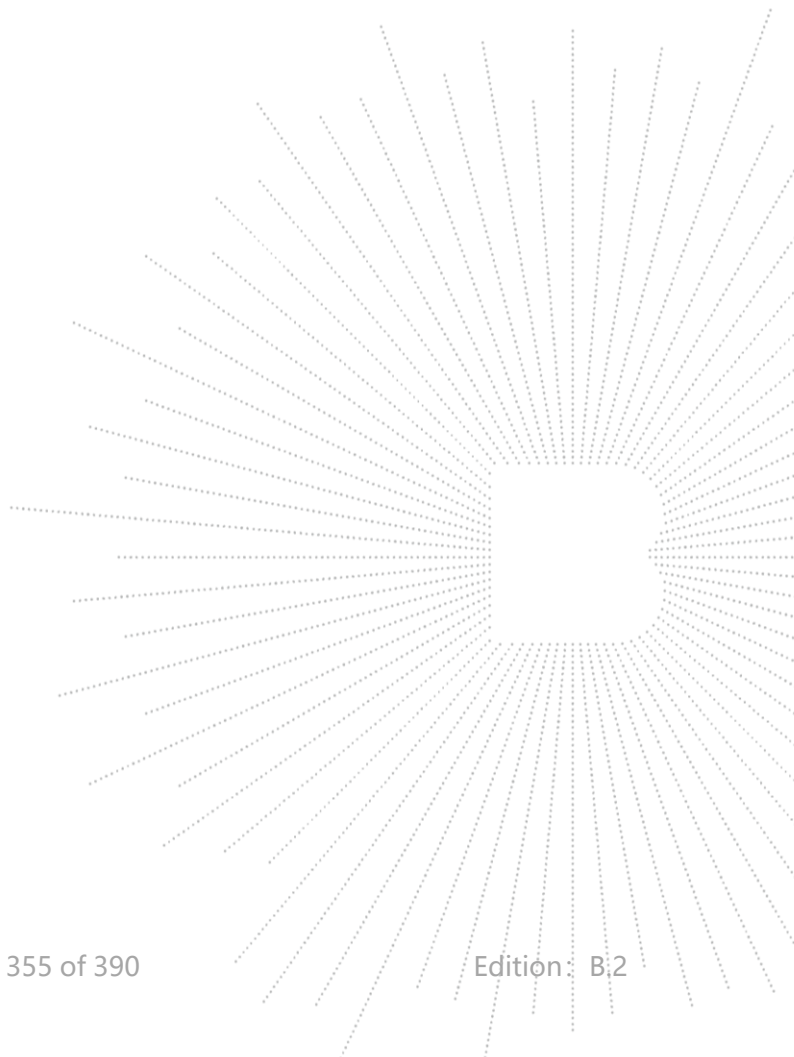


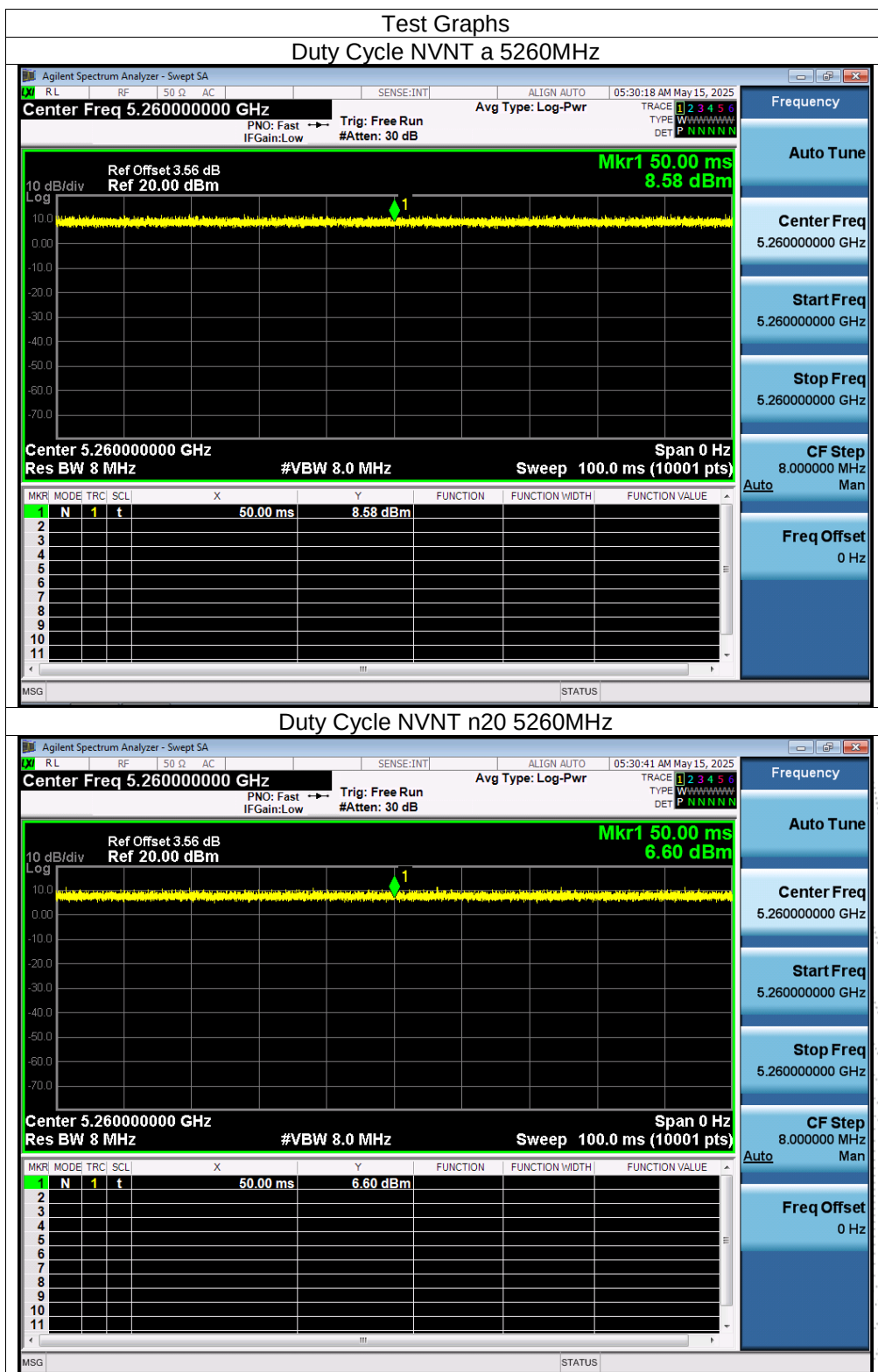


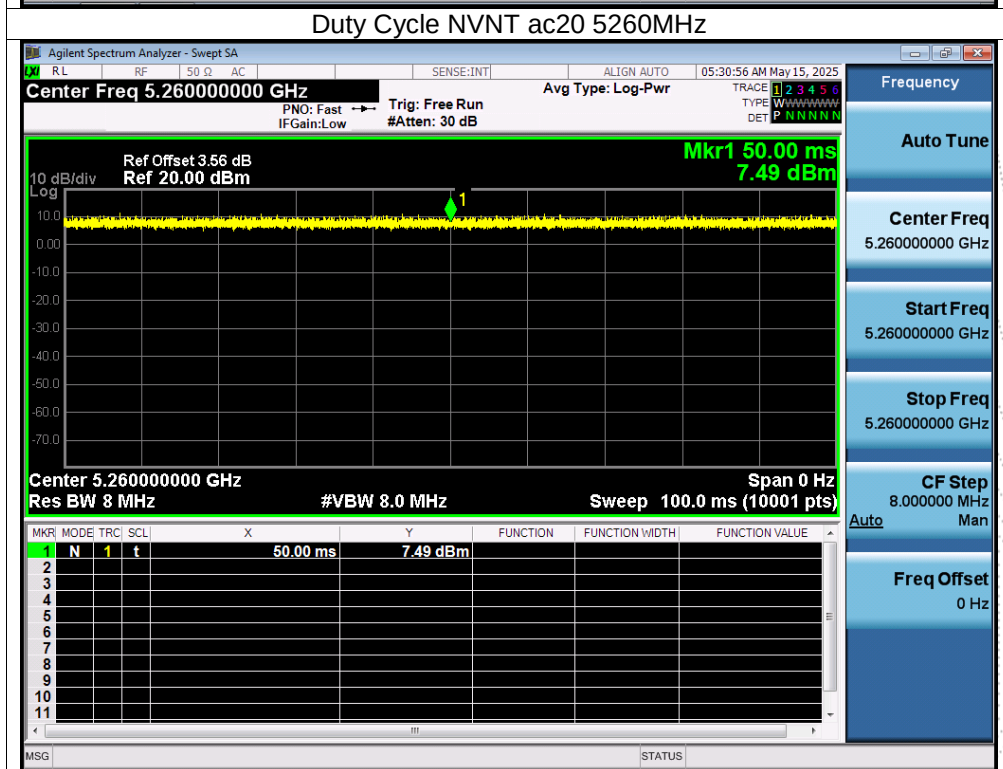
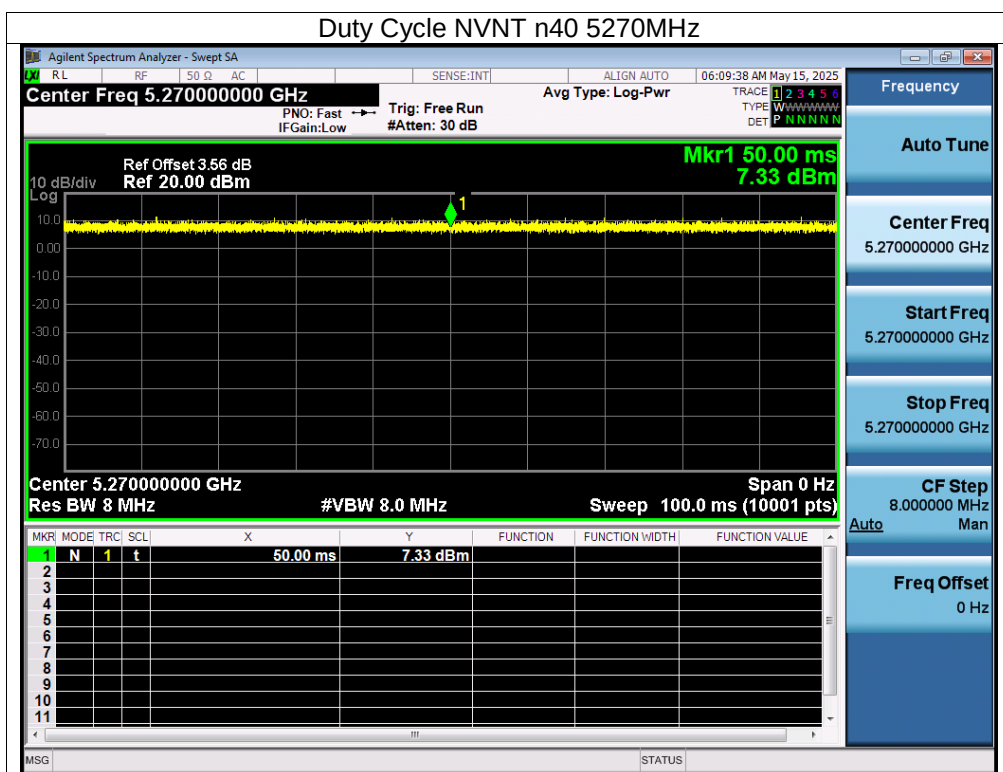


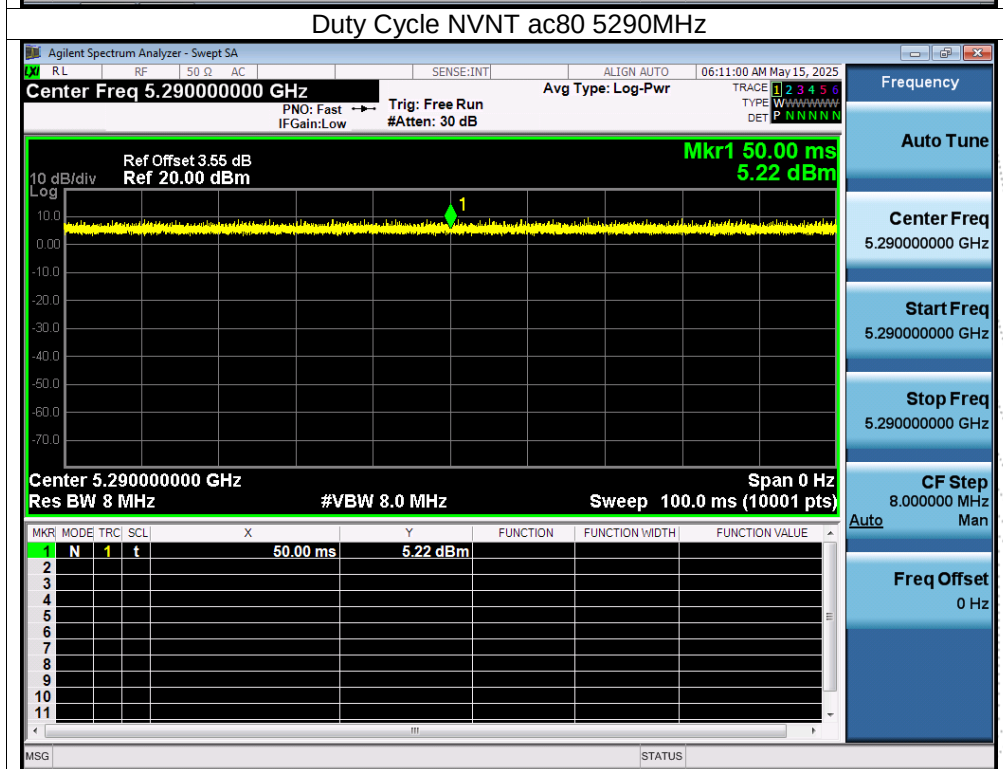
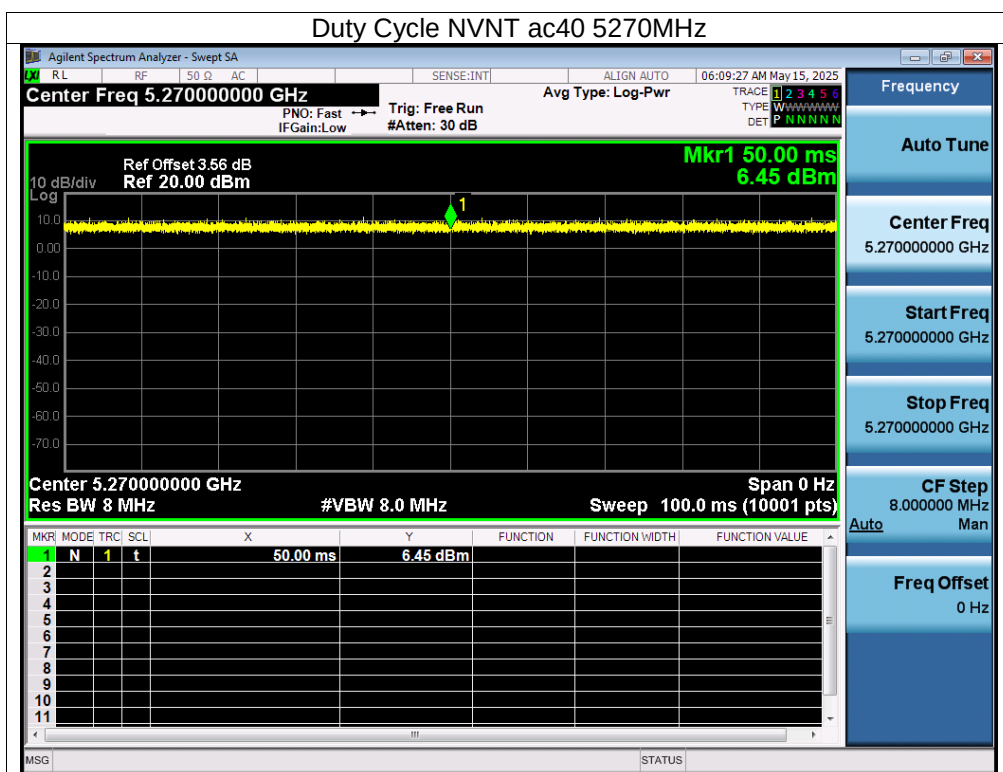
ANT B

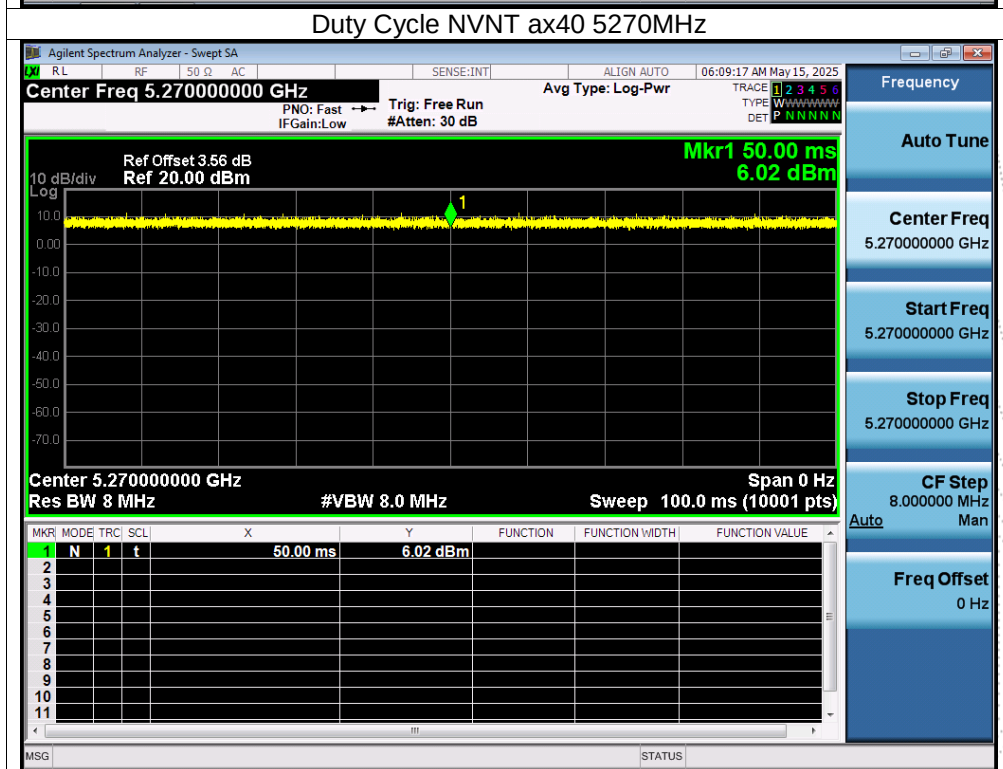
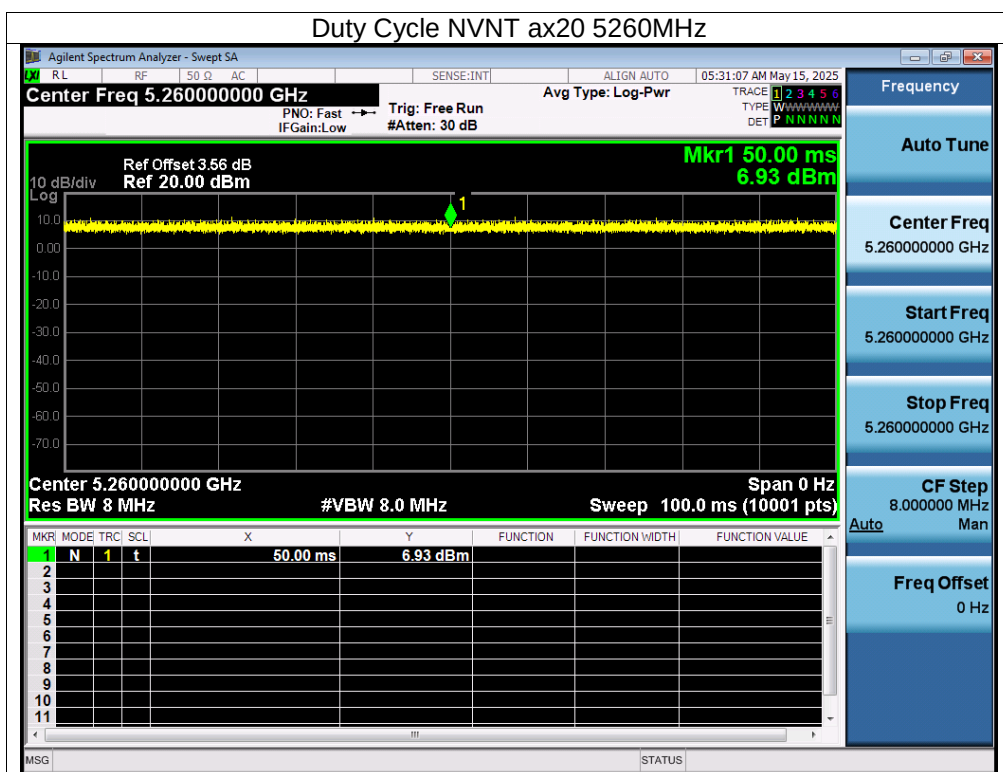
Condition	Mode	Frequency (MHz)	Duty Cycle (%)	Correction Factor (dB)
NVNT	a	5260	100	0
NVNT	n20	5260	100	0
NVNT	n40	5270	100	0
NVNT	ac20	5260	100	0
NVNT	ac40	5270	100	0
NVNT	ac80	5290	100	0
NVNT	ax20	5260	100	0
NVNT	ax40	5270	100	0
NVNT	ax80	5290	100	0

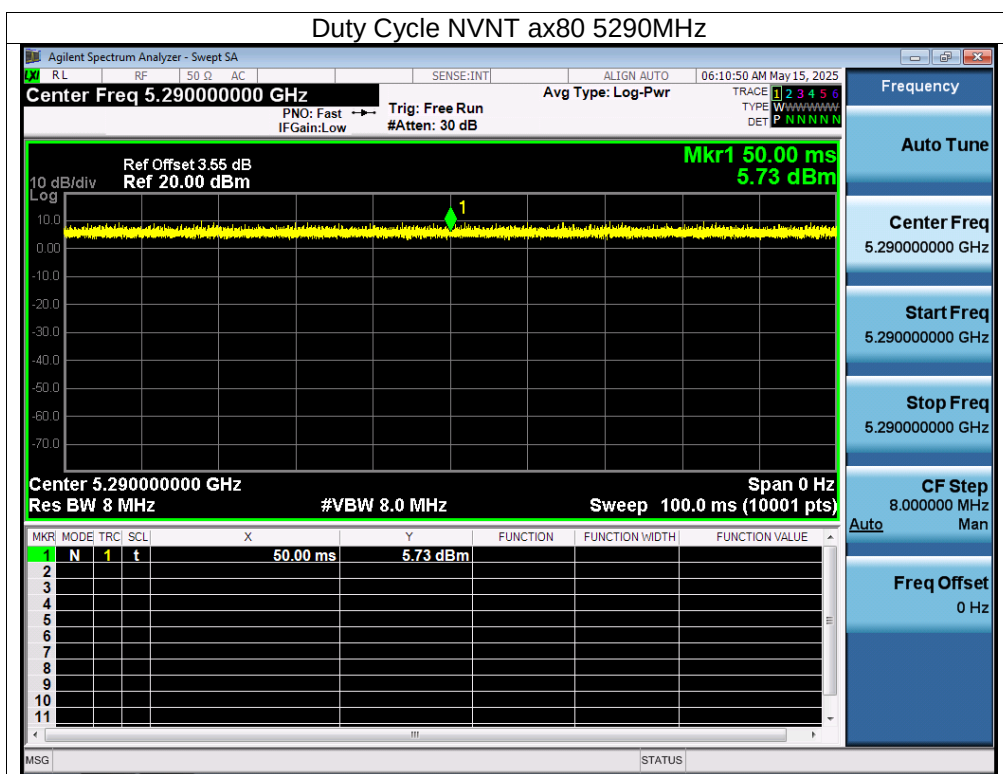












ANT A

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

