

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 5V
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)	5.00	5180.0035	5180	0.0035	0.6672
		V max (V)	5.75	5180.0003	5180	0.0003	0.0522
		V min (V)	4.25	5180.0135	5180	0.0135	2.6001
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)	5	T (°C)	-20	5180.0050	5180	0.0050	0.9612
		T (°C)	-10	5180.0009	5180	0.0009	0.1787
		T (°C)	0	5180.0009	5180	0.0009	0.1700
		T (°C)	10	5180.0076	5180	0.0076	1.4679
		T (°C)	20	5180.0069	5180	0.0069	1.3408
		T (°C)	30	5180.0008	5180	0.0008	0.1613
		T (°C)	40	5180.0016	5180	0.0016	0.3070
		T (°C)	50	5180.0109	5180	0.0109	2.0973
		T (°C)	60	5180.0105	5180	0.0105	2.0226
		T (°C)	70	5180.0067	5180	0.0067	1.2891
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)	5.00	5200.0121	5200	0.0121	2.3309
		V max (V)	5.75	5200.0055	5200	0.0055	1.0536
		V min (V)	4.25	5200.0041	5200	0.0041	0.7976
Limits				5725-5850 MHz			
Result				Complies			

Temperature vs. Frequency Stability

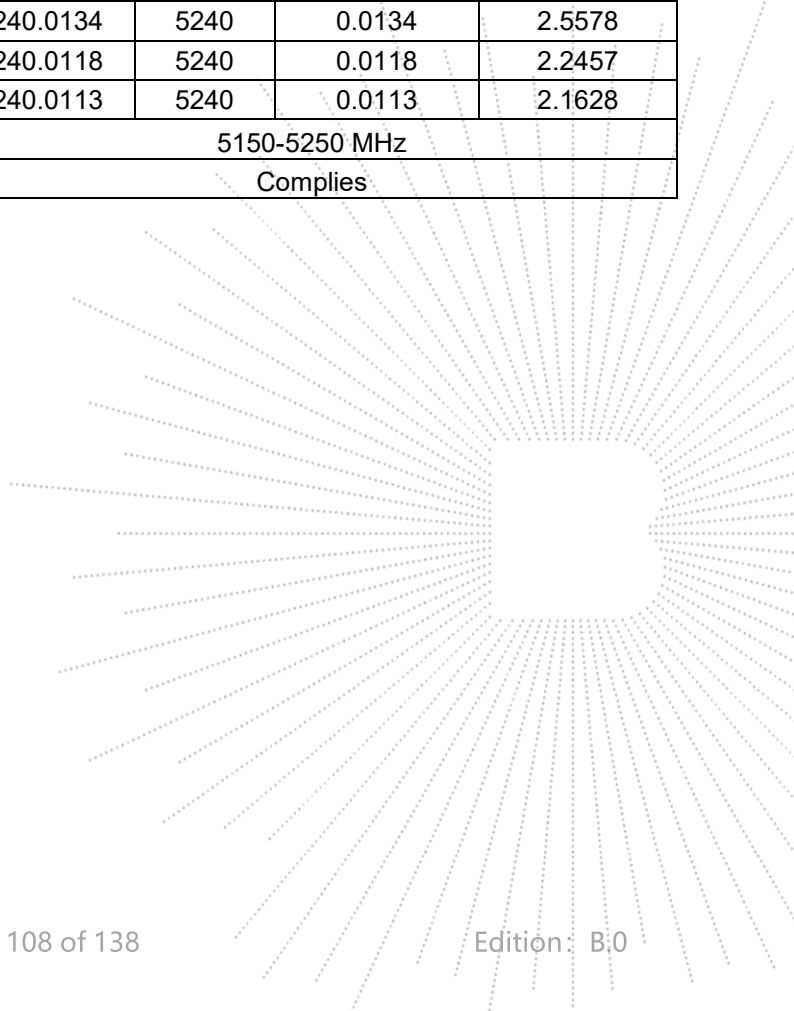
TEST CONDITIONS				Reference Frequency: 5200MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	5	T (°C)	-20	5200.01199	5200	0.01199	2.3059
		T (°C)	-10	5200.01193	5200	0.01193	2.2945
		T (°C)	0	5200.00354	5200	0.00354	0.6817
		T (°C)	10	5200.01048	5200	0.01048	2.0155
		T (°C)	20	5200.01242	5200	0.01242	2.3893
		T (°C)	30	5200.00843	5200	0.00843	1.6219
		T (°C)	40	5200.00131	5200	0.00131	0.2521
		T (°C)	50	5200.01323	5200	0.01323	2.5435
		T (°C)	60	5200.01067	5200	0.01067	2.0511
		T (°C)	70	5200.00146	5200	0.00146	0.2809
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)	5.00	5240.0088	5240	0.0088	1.6736
		V max (V)	5.75	5240.0034	5240	0.0034	0.6512
		V min (V)	4.25	5240.0117	5240	0.0117	2.2270
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)	5	T (°C)	-20	5240.0023	5240	0.0023	0.4432
		T (°C)	-10	5240.0116	5240	0.0116	2.2084
		T (°C)	0	5240.0047	5240	0.0047	0.9053
		T (°C)	10	5240.0120	5240	0.0120	2.2814
		T (°C)	20	5240.0091	5240	0.0091	1.7336
		T (°C)	30	5240.0048	5240	0.0048	0.9161
		T (°C)	40	5240.0129	5240	0.0129	2.4604
		T (°C)	50	5240.0134	5240	0.0134	2.5578
		T (°C)	60	5240.0118	5240	0.0118	2.2457
		T (°C)	70	5240.0113	5240	0.0113	2.1628
Limits				5150-5250 MHz			
Result				Complies			



Temperature:	26 °C	Relative Humidity:	54%
Pressure:	101KPa	Test Voltage:	DC 5V
Test Mode:	TX (5.3G) Mode Frequency U-NII-2A (5260-5320MHz)		

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5260MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	5.00	5260.0078	5260	0.0078	1.4842
		V max (V)	5.75	5260.0048	5260	0.0048	0.9190
		V min (V)	4.25	5260.0147	5260	0.0147	2.7963
Limits				5260-5320 MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5260MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	5	T (°C)	-20	5260.0034	5260	0.0034	0.6383
		T (°C)	-10	5260.0009	5260	0.0009	0.1720
		T (°C)	0	5260.0033	5260	0.0033	0.6344
		T (°C)	10	5260.0129	5260	0.0129	2.4497
		T (°C)	20	5260.0104	5260	0.0104	1.9789
		T (°C)	30	5260.0002	5260	0.0002	0.0340
		T (°C)	40	5260.0043	5260	0.0043	0.8081
		T (°C)	50	5260.0039	5260	0.0039	0.7506
		T (°C)	60	5260.0038	5260	0.0038	0.7310
		T (°C)	70	5260.0131	5260	0.0131	2.4930
Limits				5260-5320 MHz			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5280MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	5.00	5280.0107	5280	0.0107	2.0206
		V max (V)	5.75	5280.0032	5280	0.0032	0.6093
		V min (V)	4.25	5280.0128	5280	0.0128	2.4166
Limits				5260-5320 MHz			
Result				Complies			

Temperature vs. Frequency Stability

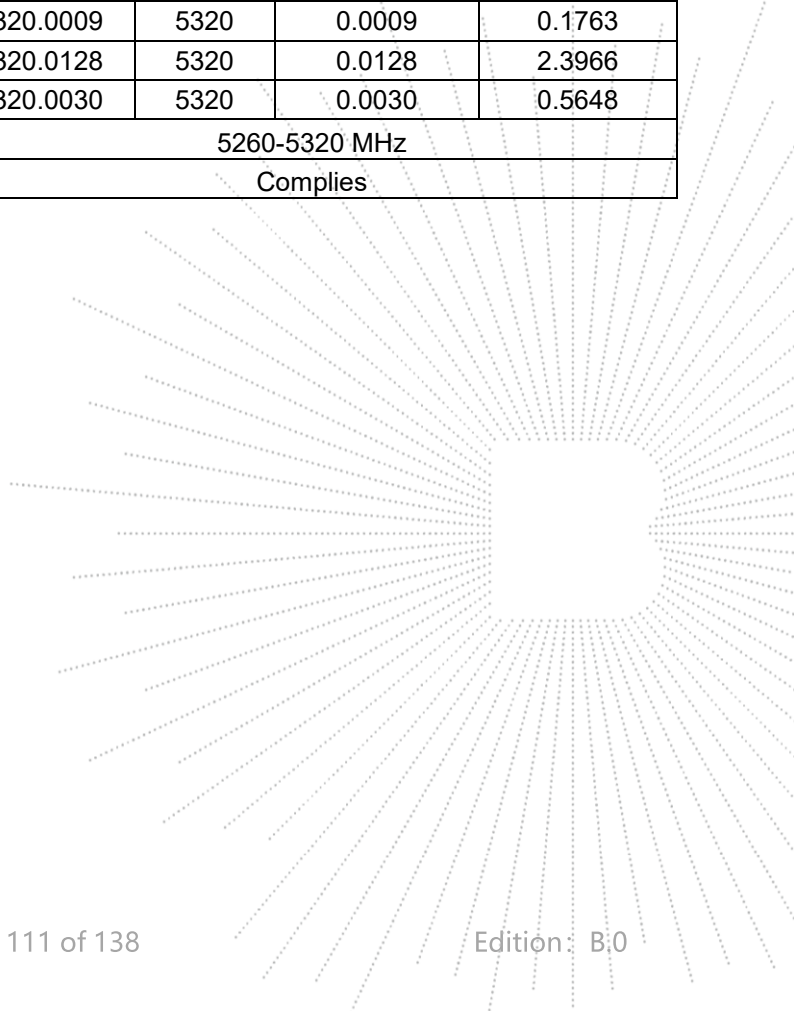
TEST CONDITIONS				Reference Frequency: 5280MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	5	T (°C)	-20	5280.00495	5280	0.00495	0.9369
		T (°C)	-10	5280.00844	5280	0.00844	1.5994
		T (°C)	0	5280.00966	5280	0.00966	1.8292
		T (°C)	10	5280.00354	5280	0.00354	0.6706
		T (°C)	20	5280.01218	5280	0.01218	2.3061
		T (°C)	30	5280.00157	5280	0.00157	0.2976
		T (°C)	40	5280.00473	5280	0.00473	0.8966
		T (°C)	50	5280.00865	5280	0.00865	1.6381
		T (°C)	60	5280.00890	5280	0.00890	1.6862
		T (°C)	70	5280.00676	5280	0.00676	1.2807
Limits				5260-5320 MHz			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5320MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	5.00	5320.0077	5320	0.0077	1.4432
		V max (V)	5.75	5320.0117	5320	0.0117	2.1938
		V min (V)	4.25	5320.0044	5320	0.0044	0.8319
Limits				5260-5320 MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5320MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	5	T (°C)	-20	5320.0118	5320	0.0118	2.2266
		T (°C)	-10	5320.0068	5320	0.0068	1.2862
		T (°C)	0	5320.0098	5320	0.0098	1.8414
		T (°C)	10	5320.0066	5320	0.0066	1.2487
		T (°C)	20	5320.0048	5320	0.0048	0.9029
		T (°C)	30	5320.0092	5320	0.0092	1.7377
		T (°C)	40	5320.0084	5320	0.0084	1.5853
		T (°C)	50	5320.0009	5320	0.0009	0.1763
		T (°C)	60	5320.0128	5320	0.0128	2.3966
		T (°C)	70	5320.0030	5320	0.0030	0.5648
Limits				5260-5320 MHz			
Result				Complies			



Temperature:	26 °C	Relative Humidity:	54%
Pressure:	101KPa	Test Voltage:	DC 5V
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)	5.00	5500.0167	5500	0.0167	3.0283
		V max (V)	5.75	5500.0143	5500	0.0143	2.5920
		V min (V)	4.25	5500.0070	5500	0.0070	1.2692
Limits				5500-5700 MHz			
Result				Complies			

Temperature vs. Frequency Stability

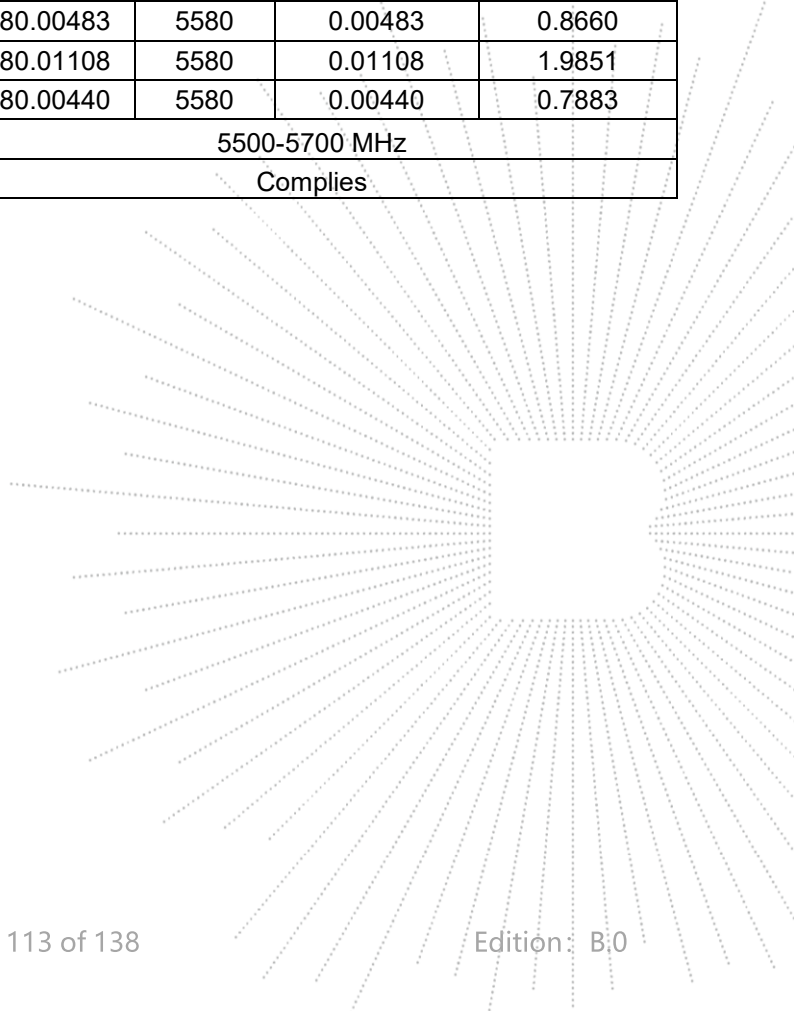
TEST CONDITIONS				Reference Frequency: 5500MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	5	T (°C)	-20	5500.0069	5500	0.0069	1.2632
		T (°C)	-10	5500.0066	5500	0.0066	1.1919
		T (°C)	0	5500.0089	5500	0.0089	1.6117
		T (°C)	10	5500.0064	5500	0.0064	1.1701
		T (°C)	20	5500.0010	5500	0.0010	0.1864
		T (°C)	30	5500.0077	5500	0.0077	1.4033
		T (°C)	40	5500.0043	5500	0.0043	0.7884
		T (°C)	50	5500.0113	5500	0.0113	2.0481
		T (°C)	60	5500.0042	5500	0.0042	0.7615
		T (°C)	70	5500.0032	5500	0.0032	0.5842
Limits				5500-5700 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)	5.00	5580.0049	5580	0.0049	0.8796
		V max (V)	5.75	5580.0017	5580	0.0017	0.3026
		V min (V)	4.25	5580.0124	5580	0.0124	2.2253
Limits				5500-5700 MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5580MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	5	T (°C)	-20	5580.00148	5580	0.00148	0.2648
		T (°C)	-10	5580.00402	5580	0.00402	0.7212
		T (°C)	0	5580.00675	5580	0.00675	1.2092
		T (°C)	10	5580.00855	5580	0.00855	1.5327
		T (°C)	20	5580.00445	5580	0.00445	0.7968
		T (°C)	30	5580.00958	5580	0.00958	1.7163
		T (°C)	40	5580.00787	5580	0.00787	1.4110
		T (°C)	50	5580.00483	5580	0.00483	0.8660
		T (°C)	60	5580.01108	5580	0.01108	1.9851
		T (°C)	70	5580.00440	5580	0.00440	0.7883
Limits				5500-5700 MHz			
Result				Complies			

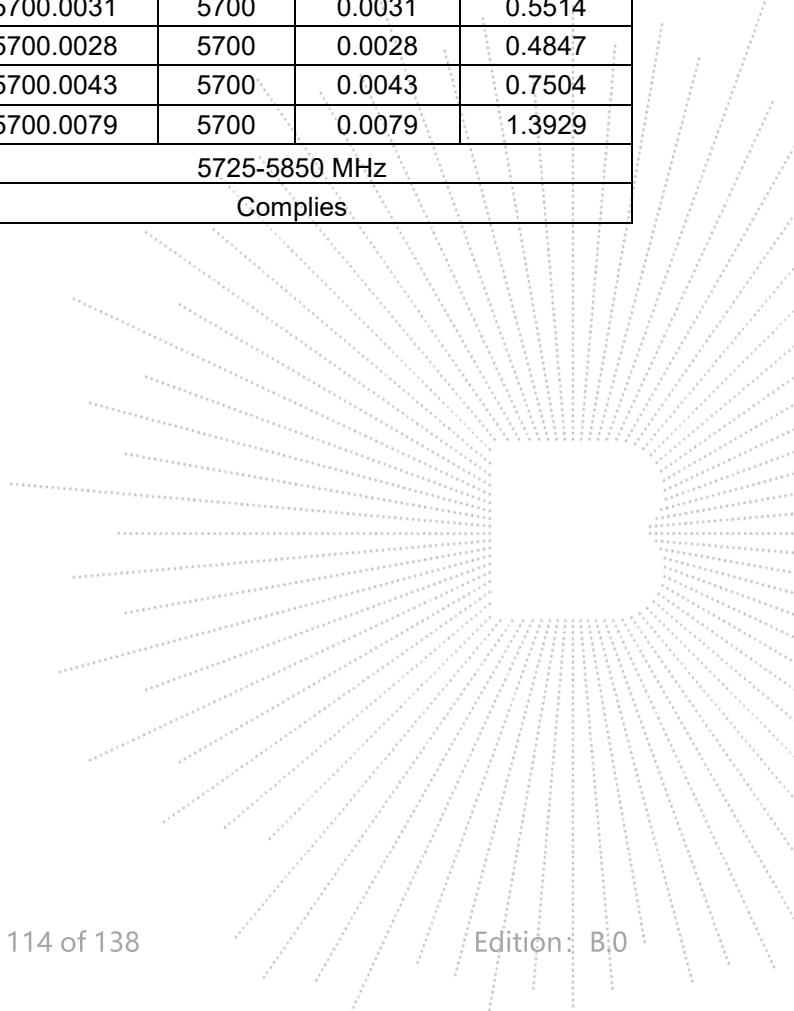


Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5700MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	5.00	5700.0003	5700	0.0003	0.0588
		V max (V)	5.75	5700.0046	5700	0.0046	0.8155
		V min (V)	4.25	5700.0085	5700	0.0085	1.4838
Limits				5725-5850 MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5700MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	5	T (°C)	-20	5700.0089	5700	0.0089	1.5561
		T (°C)	-10	5700.0072	5700	0.0072	1.2636
		T (°C)	0	5700.0043	5700	0.0043	0.7473
		T (°C)	10	5700.0022	5700	0.0022	0.3795
		T (°C)	20	5700.0112	5700	0.0112	1.9564
		T (°C)	30	5700.0050	5700	0.0050	0.8687
		T (°C)	40	5700.0031	5700	0.0031	0.5514
		T (°C)	50	5700.0028	5700	0.0028	0.4847
		T (°C)	60	5700.0043	5700	0.0043	0.7504
		T (°C)	70	5700.0079	5700	0.0079	1.3929
Limits				5725-5850 MHz			
Result				Complies			



Temperature:	26 °C	Relative Humidity:	54%
Pressure:	101KPa	Test Voltage:	DC 5V
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)	5.00	5745.00182	5745	0.00182	0.3173
		V max (V)	5.75	5745.00630	5745	0.00630	1.0962
		V min (V)	4.25	5745.00146	5745	0.00146	0.2542
Limits				5725-5850 MHz			
Result				Complies			

Temperature vs. Frequency Stability

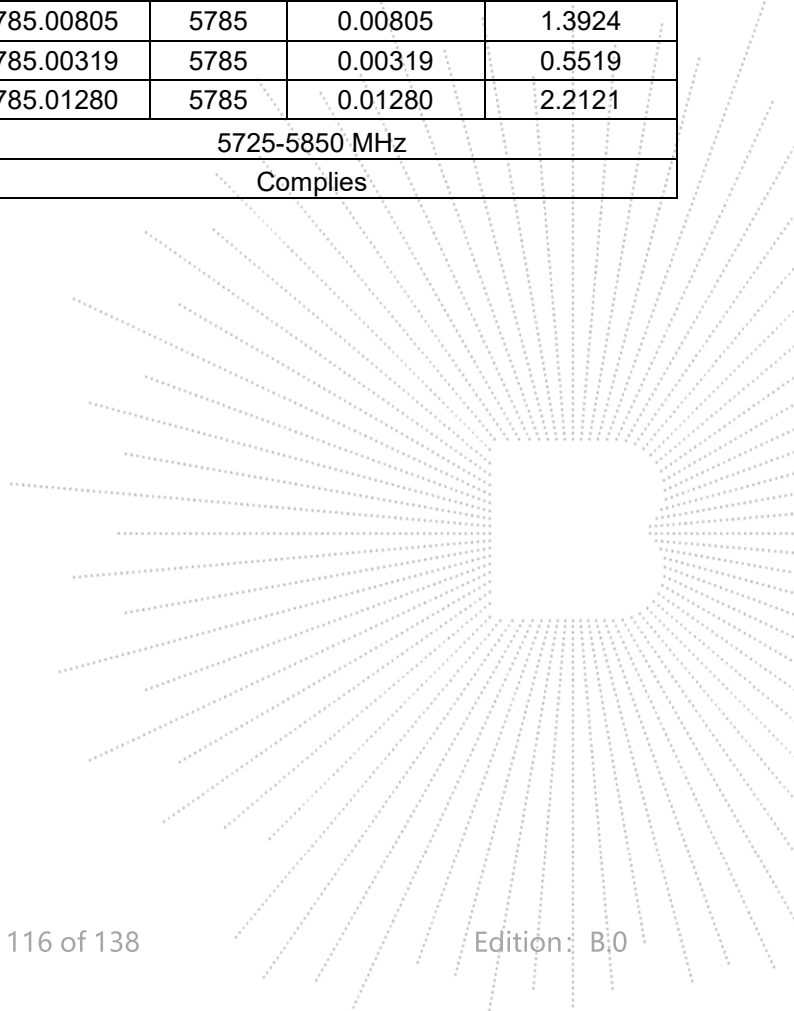
TEST CONDITIONS				Reference Frequency: 5745MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	5	T (°C)	-20	5745.00659	5745	0.00659	1.1477
		T (°C)	-10	5745.00519	5745	0.00519	0.9041
		T (°C)	0	5745.01265	5745	0.01265	2.2019
		T (°C)	10	5745.00126	5745	0.00126	0.2190
		T (°C)	20	5745.00515	5745	0.00515	0.8963
		T (°C)	30	5745.00870	5745	0.00870	1.5137
		T (°C)	40	5745.00037	5745	0.00037	0.0647
		T (°C)	50	5745.00111	5745	0.00111	0.1924
		T (°C)	60	5745.00287	5745	0.00287	0.4995
		T (°C)	70	5745.01191	5745	0.01191	2.0731
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)	5.00	5785.01272	5785	0.01272	2.1984
		V max (V)	5.75	5785.01054	5785	0.01054	1.8221
		V min (V)	4.25	5785.00856	5785	0.00856	1.4799
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)	5	T (°C)	-20	5785.00876	5785	0.00876	1.5142
		T (°C)	-10	5785.00528	5785	0.00528	0.9124
		T (°C)	0	5785.00106	5785	0.00106	0.1834
		T (°C)	10	5785.01017	5785	0.01017	1.7586
		T (°C)	20	5785.00738	5785	0.00738	1.2761
		T (°C)	30	5785.00225	5785	0.00225	0.3886
		T (°C)	40	5785.00431	5785	0.00431	0.7455
		T (°C)	50	5785.00805	5785	0.00805	1.3924
		T (°C)	60	5785.00319	5785	0.00319	0.5519
		T (°C)	70	5785.01280	5785	0.01280	2.2121
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)	5.00	5825.00803	5825	0.00803	1.3782
		V max (V)	5.75	5825.00149	5825	0.00149	0.2563
		V min (V)	4.25	5825.00148	5825	0.00148	0.2534
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)	5	T (°C)	-20	5825.00792	5825	0.00792	1.3600
		T (°C)	-10	5825.00655	5825	0.00655	1.1239
		T (°C)	0	5825.01222	5825	0.01222	2.0971
		T (°C)	10	5825.00922	5825	0.00922	1.5833
		T (°C)	20	5825.01291	5825	0.01291	2.2167
		T (°C)	30	5825.00727	5825	0.00727	1.2472
		T (°C)	40	5825.00265	5825	0.00265	0.4551
		T (°C)	50	5825.01193	5825	0.01193	2.0487
		T (°C)	60	5825.01156	5825	0.01156	1.9840
		T (°C)	70	5825.00153	5825	0.00153	0.2625
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

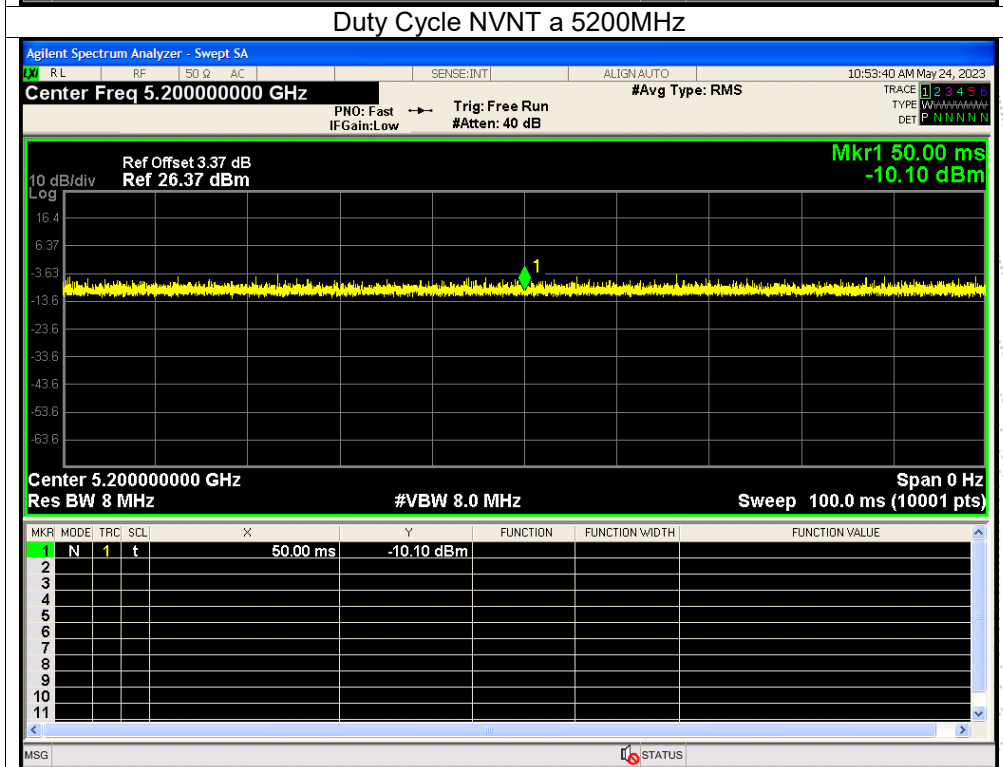
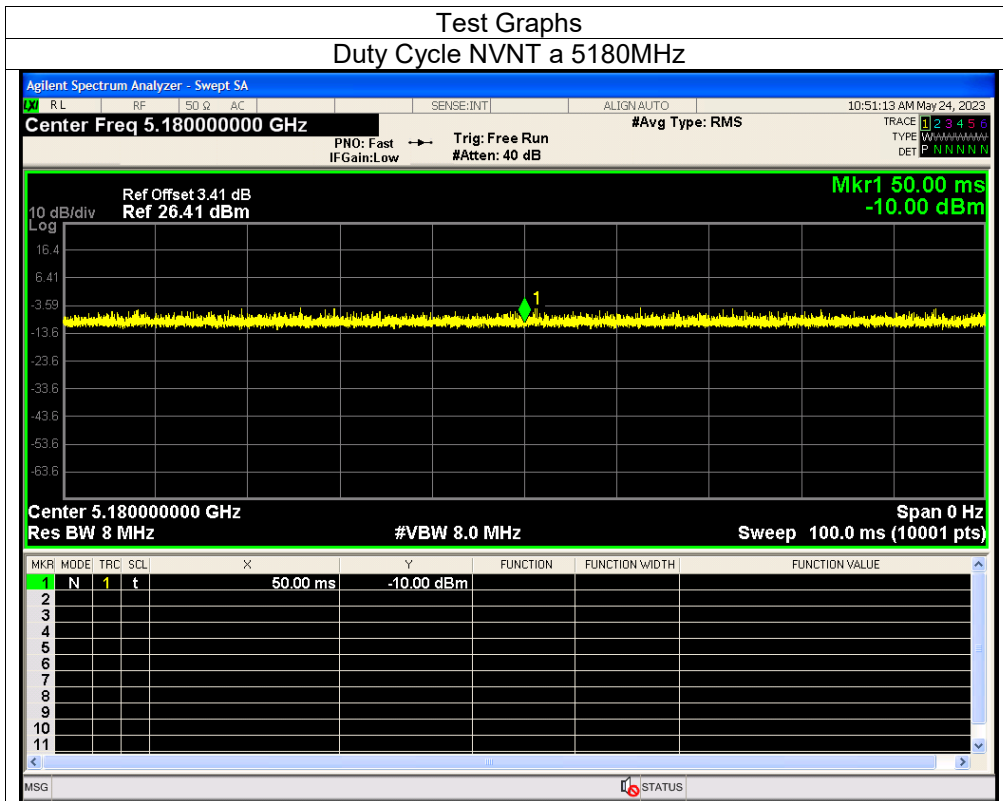
Duty Cycle = $T_{on} / (T_{on} + T_{off})$

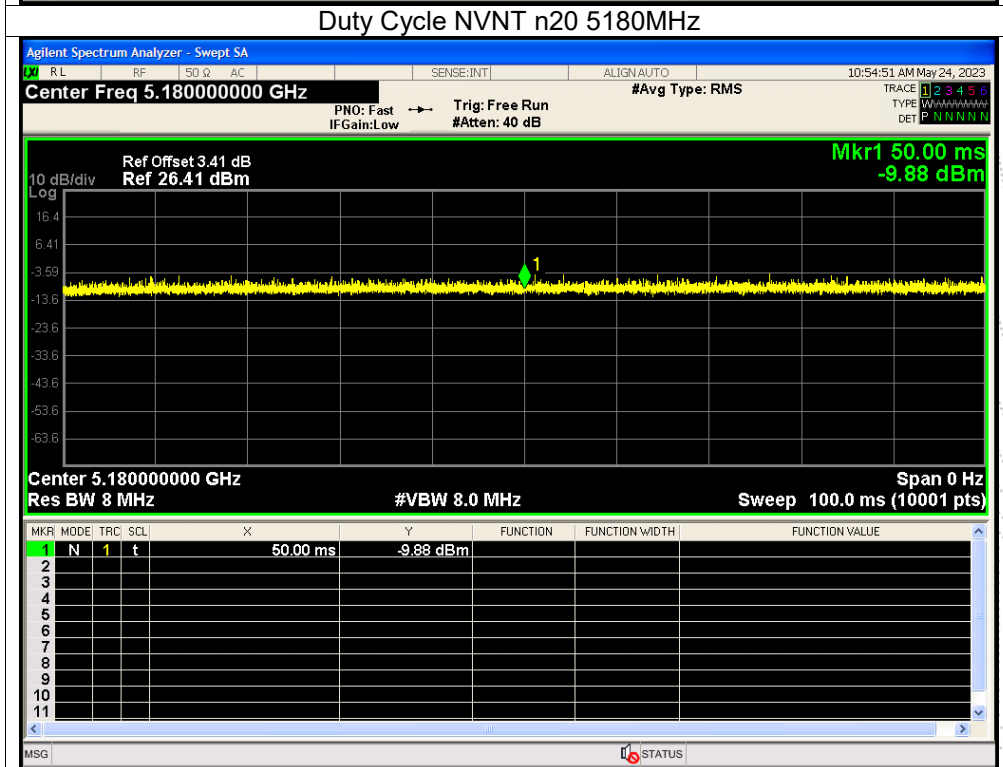
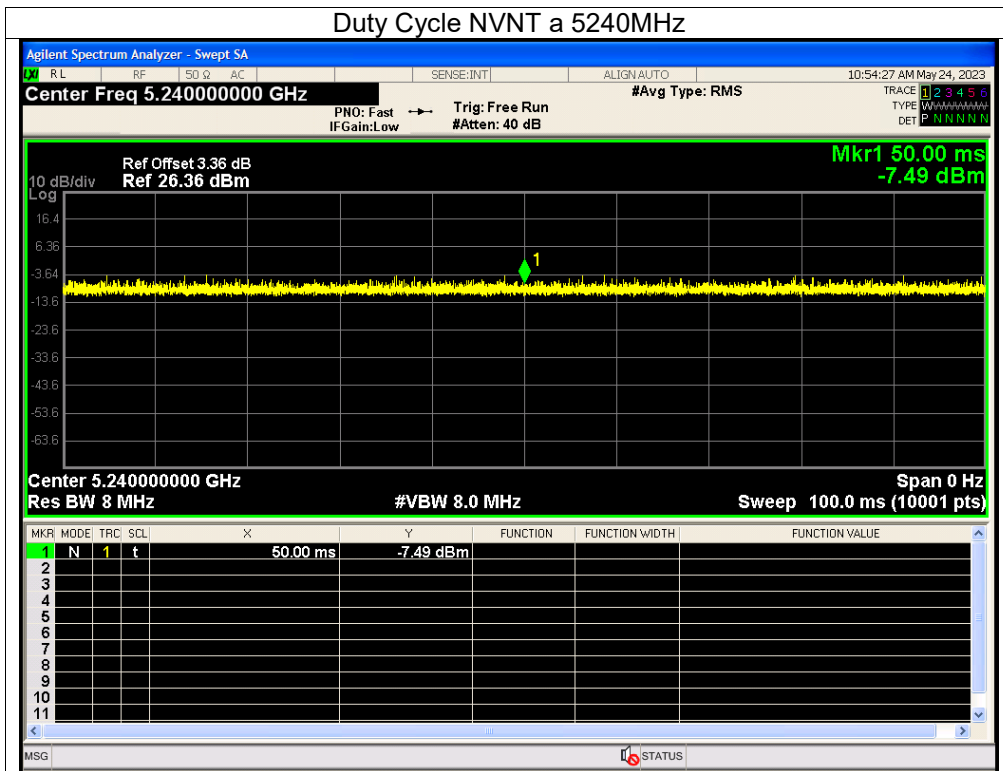
14.3 Test Procedure

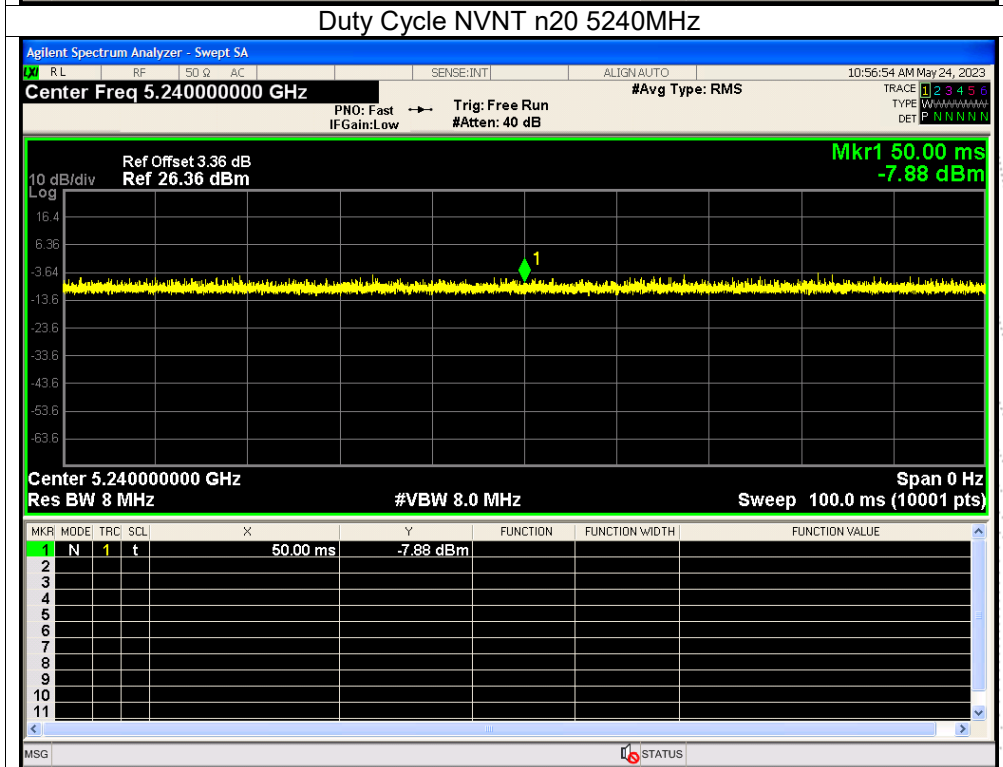
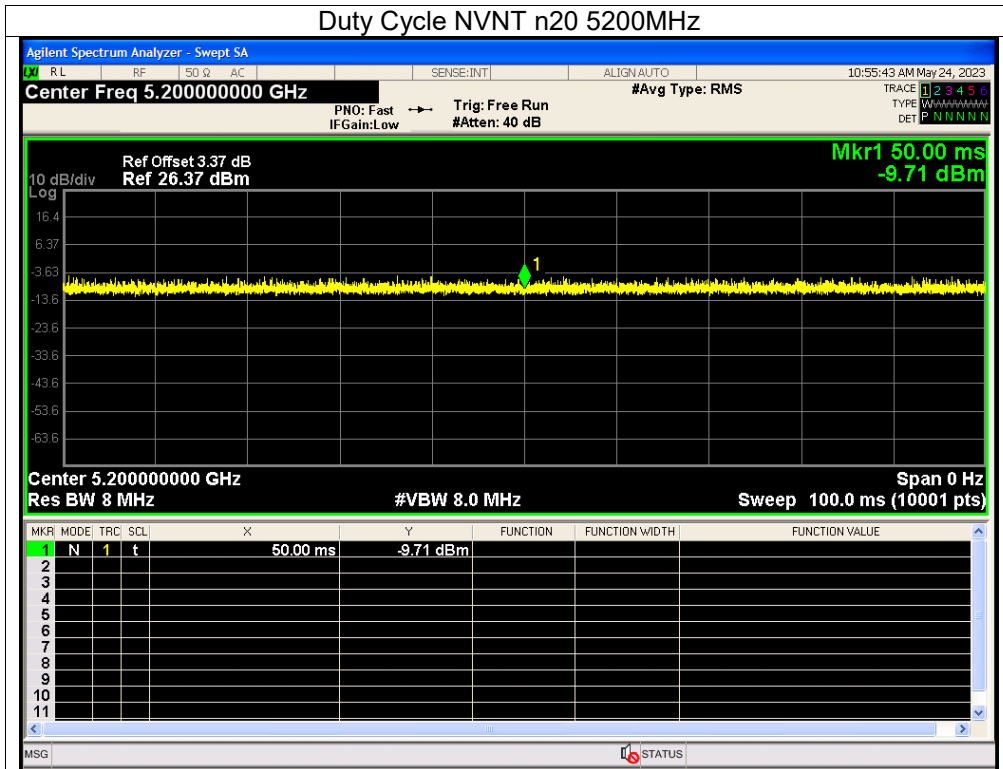
1. Set span = Zero
2. RBW = 8MHz
3. VBW = 8MHz,
4. Detector = Peak

14.4 Test Result

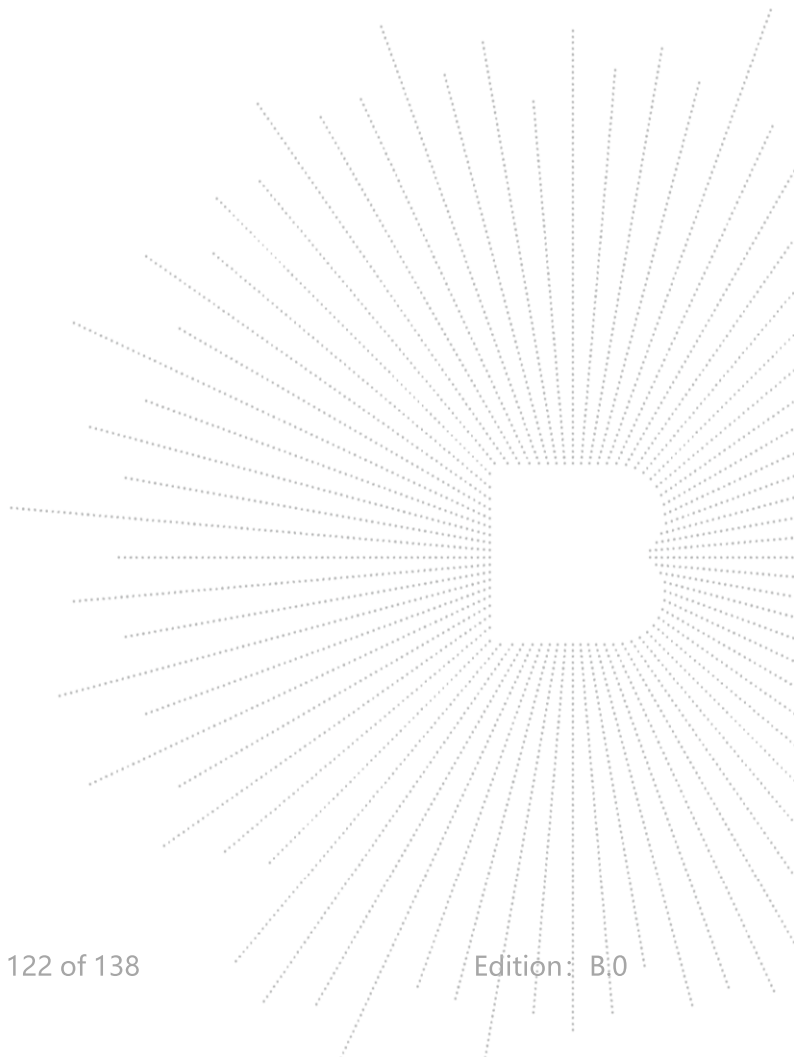
Condition	Mode	Frequency (MHz)	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	a	5180	100	0	0
NVNT	a	5200	100	0	0
NVNT	a	5240	100	0	0
NVNT	n20	5180	100	0	0
NVNT	n20	5200	100	0	0
NVNT	n20	5240	100	0	0

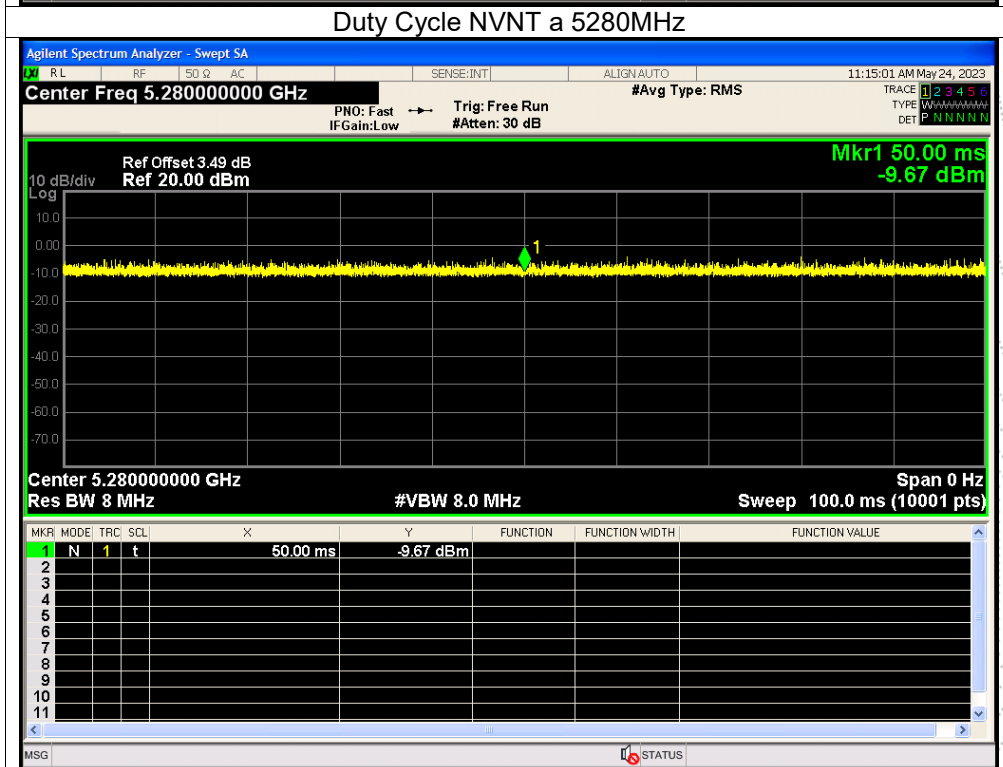
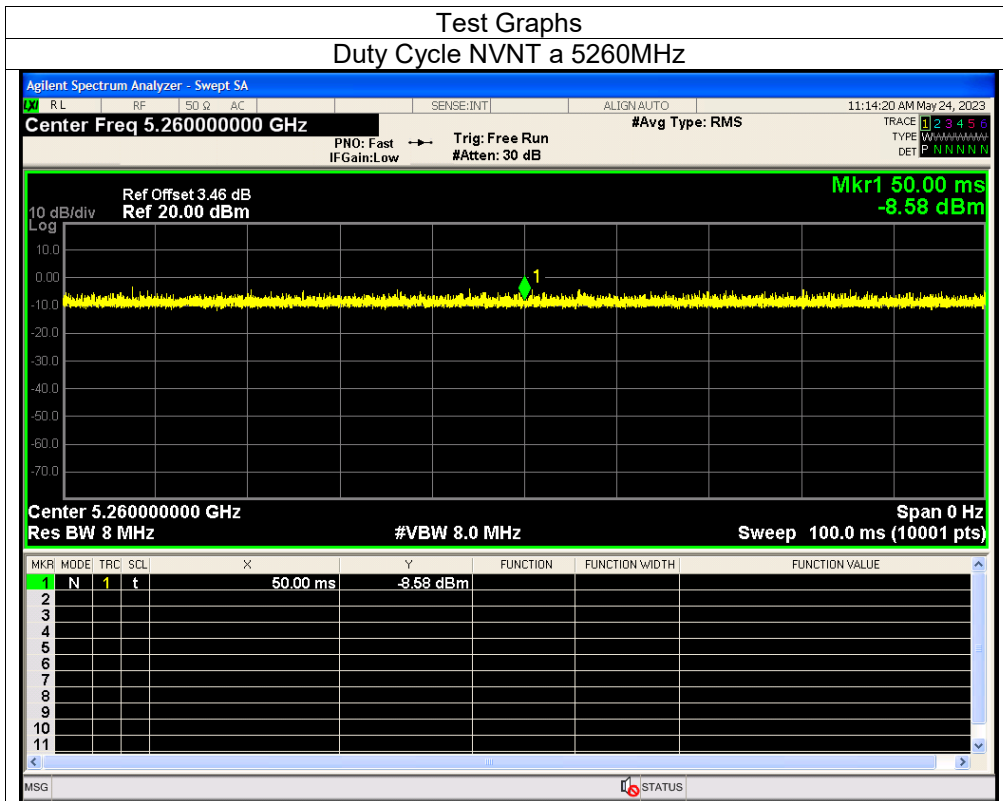


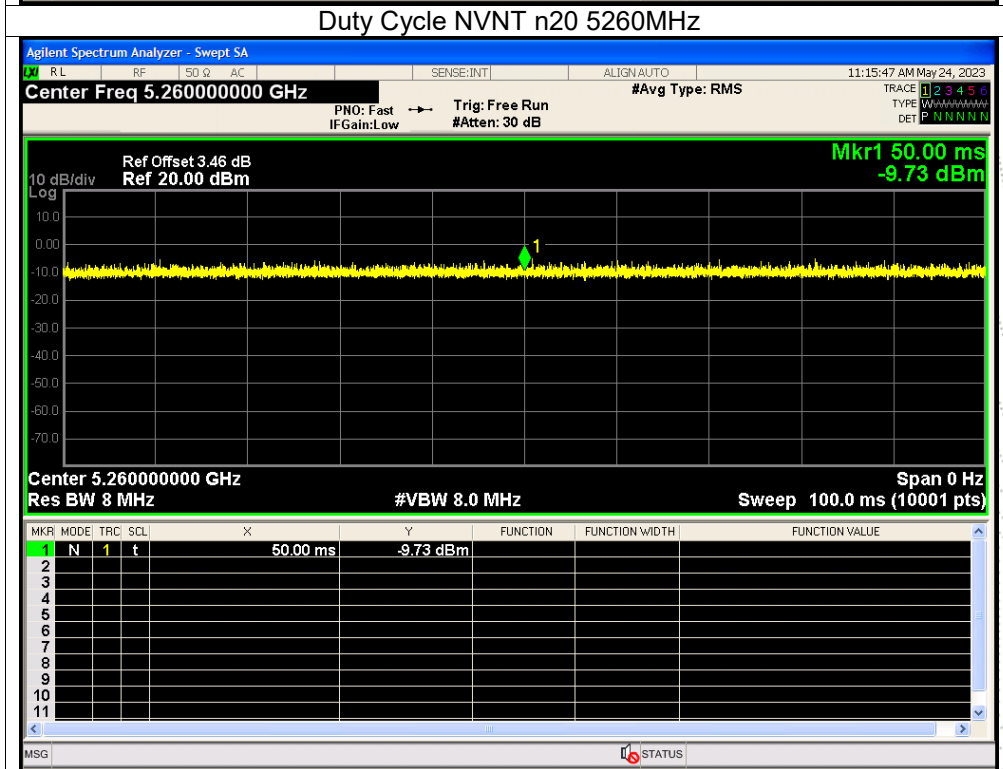
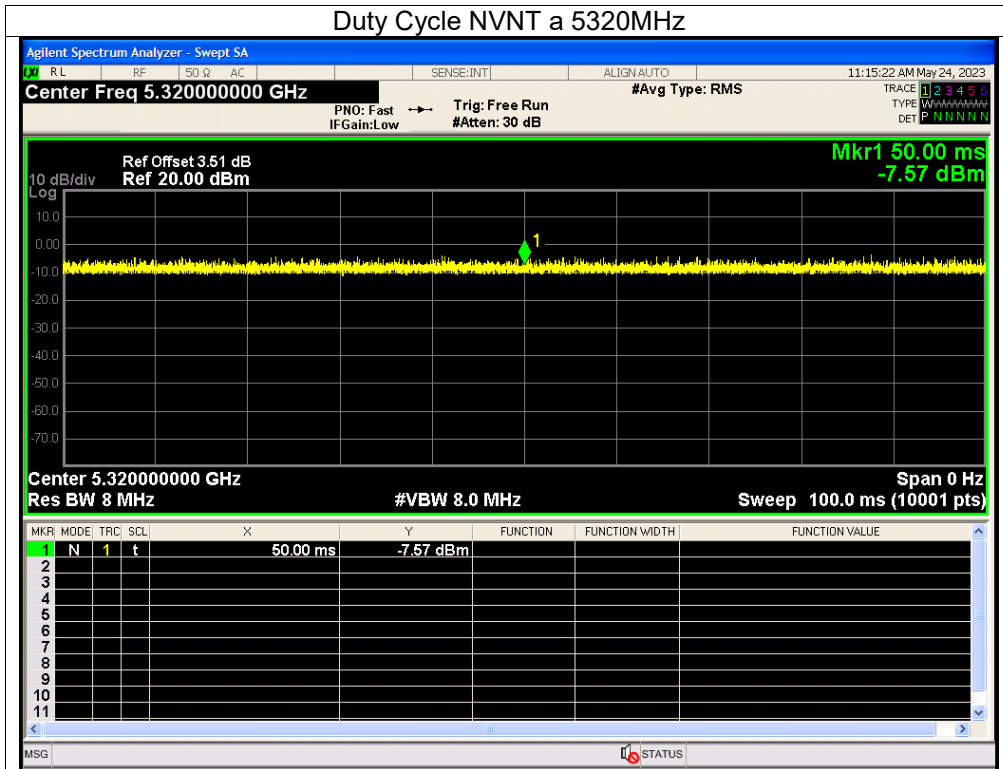


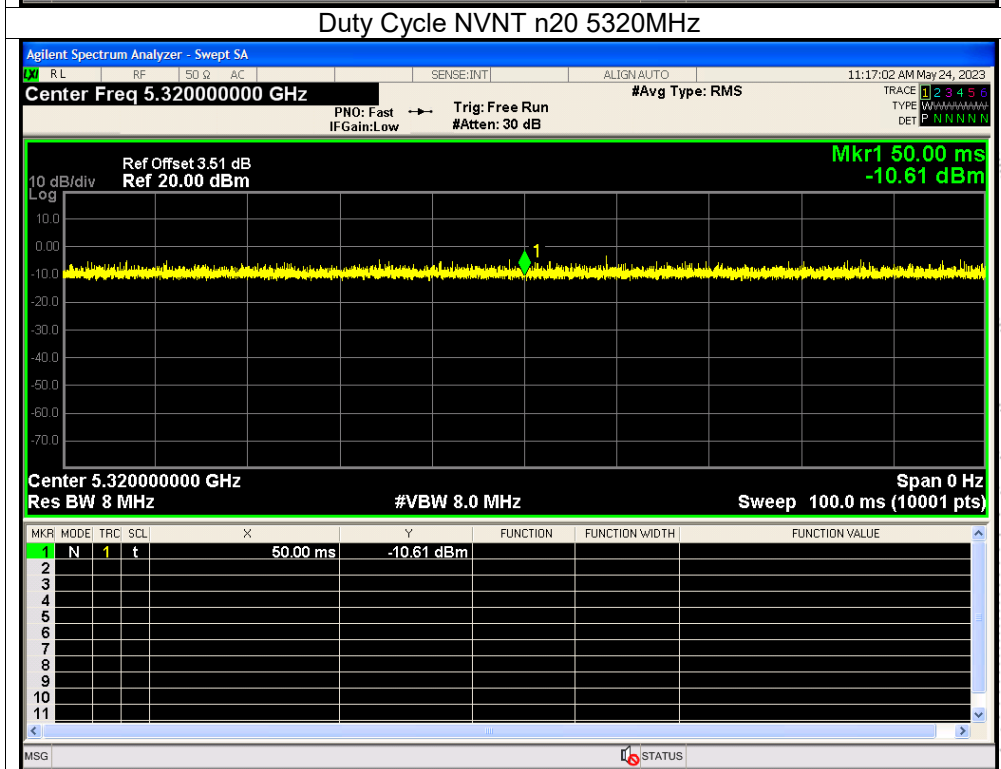
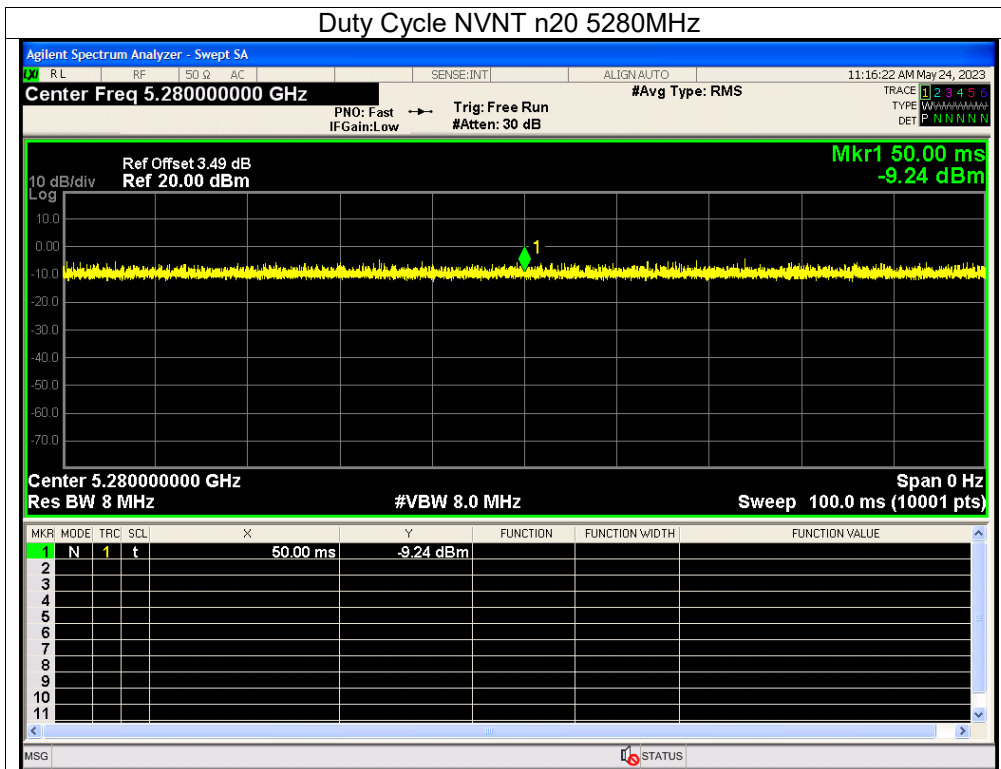


Condition	Mode	Frequency (MHz)	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	a	5260	100	0	0
NVNT	a	5280	100	0	0
NVNT	a	5320	100	0	0
NVNT	n20	5260	100	0	0
NVNT	n20	5280	100	0	0
NVNT	n20	5320	100	0	0

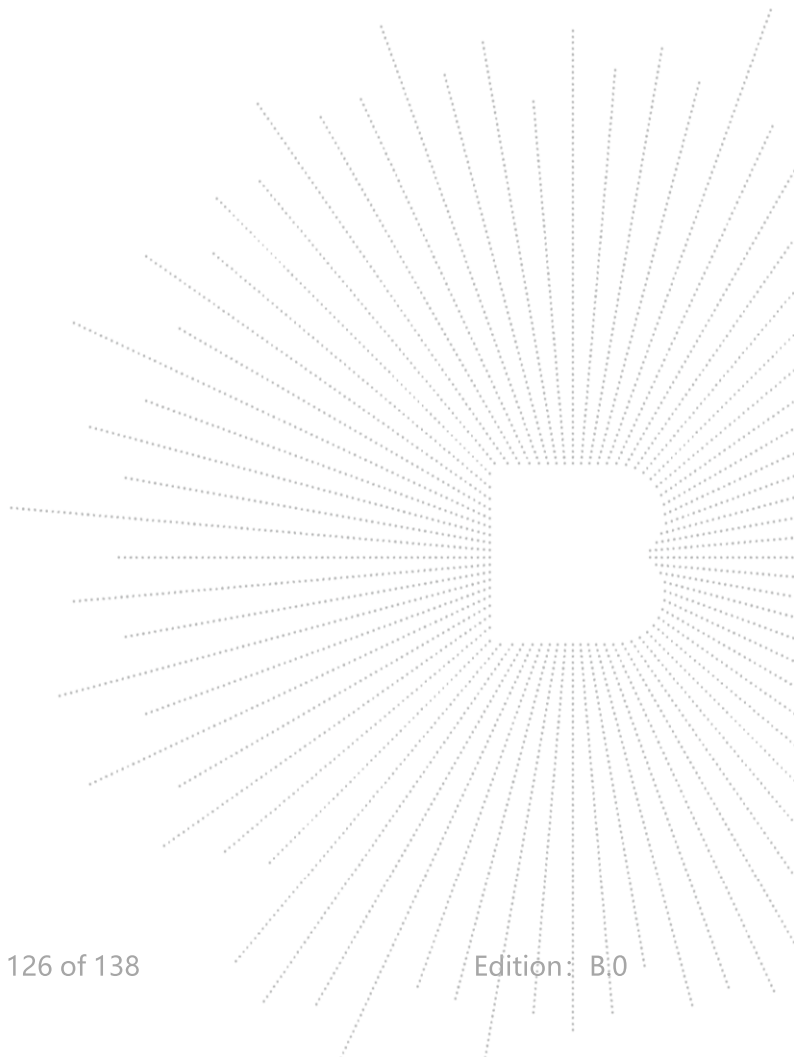


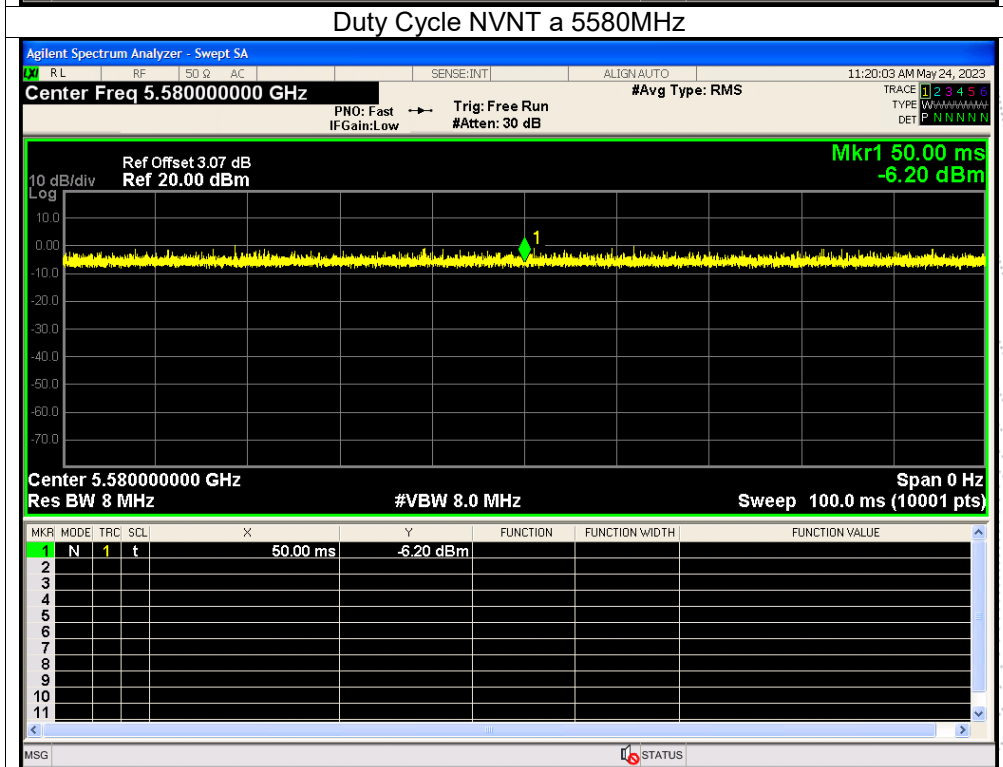
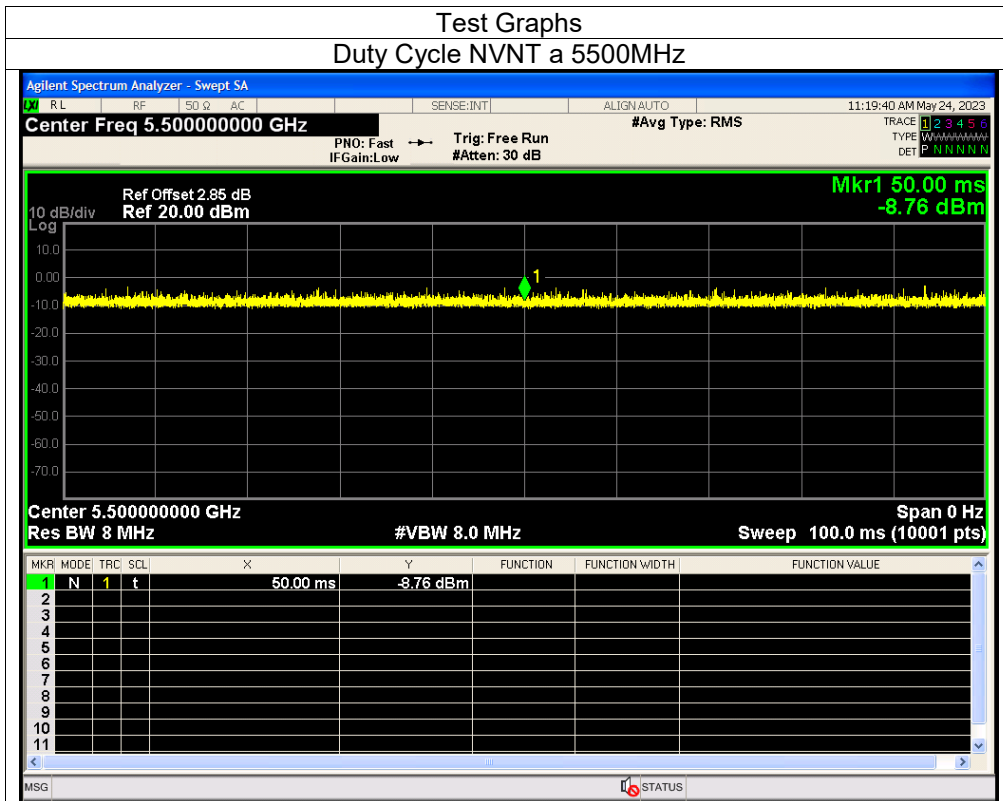


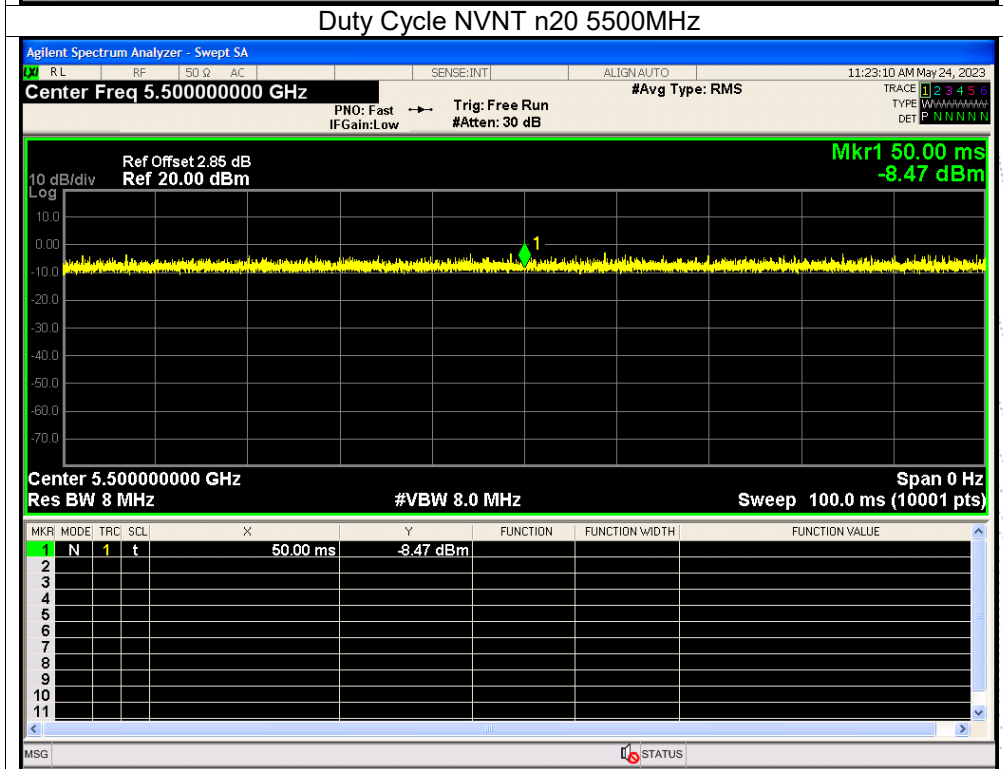
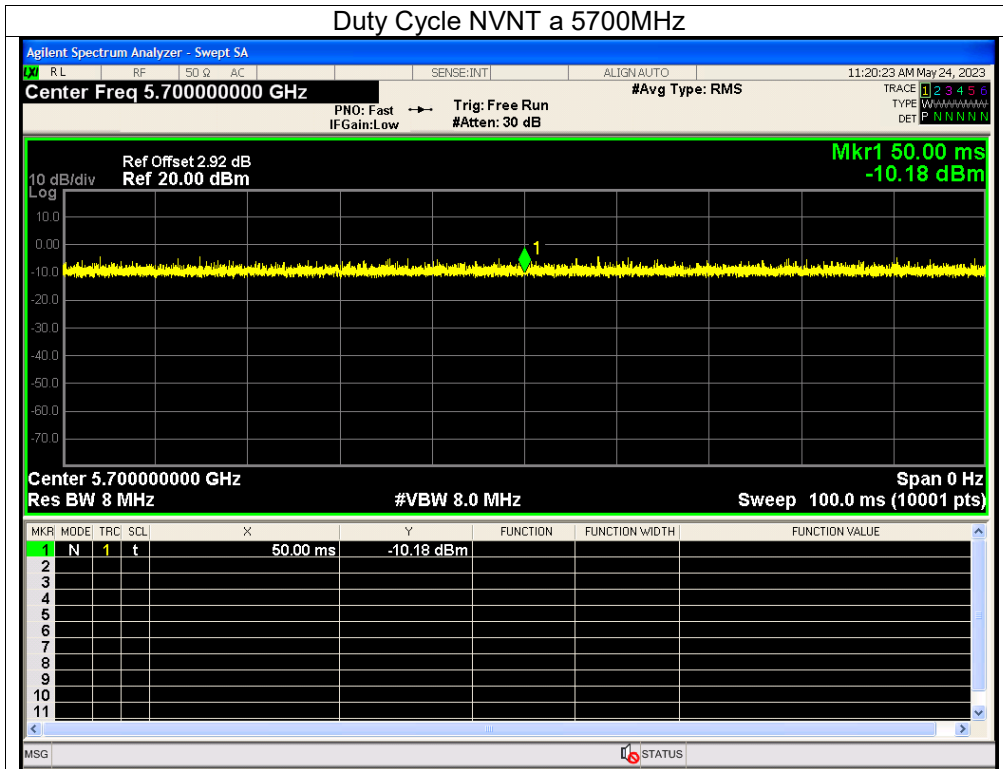


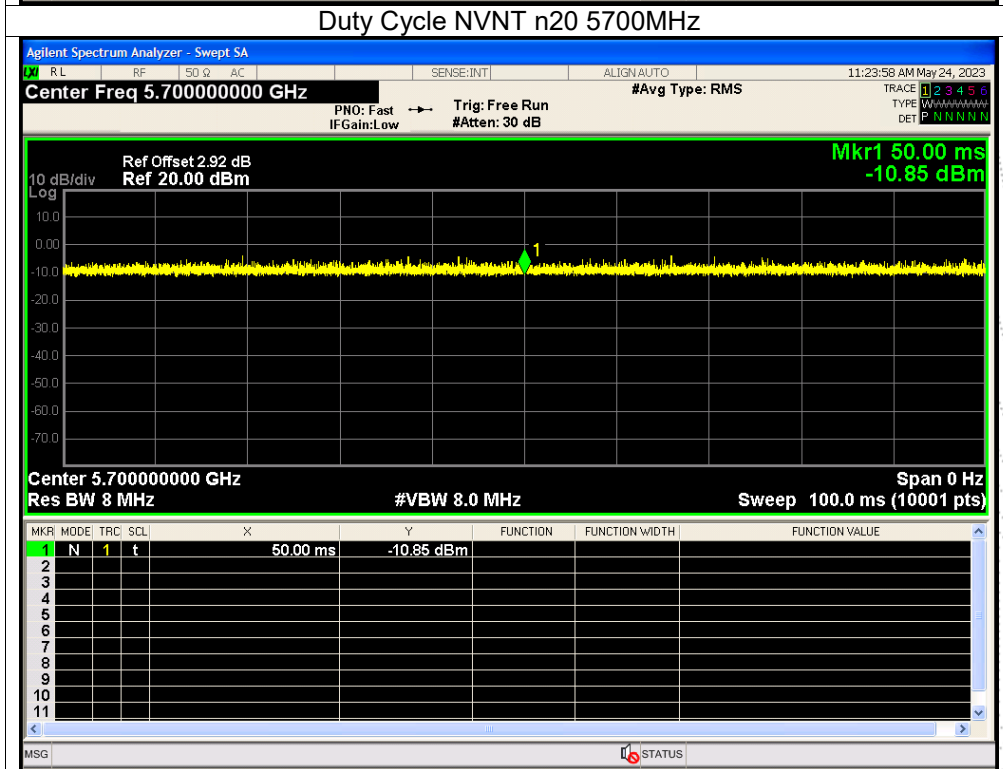
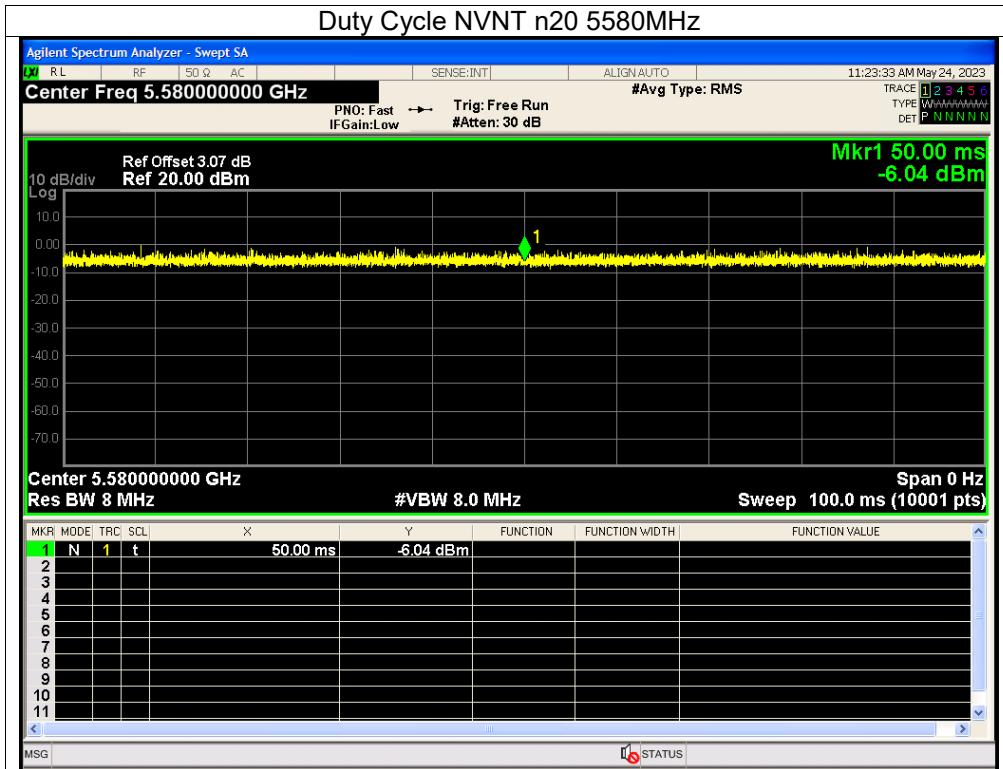


Condition	Mode	Frequency (MHz)	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	a	5500	100	0	0
NVNT	a	5580	100	0	0
NVNT	a	5700	100	0	0
NVNT	n20	5500	100	0	0
NVNT	n20	5580	100	0	0
NVNT	n20	5700	100	0	0

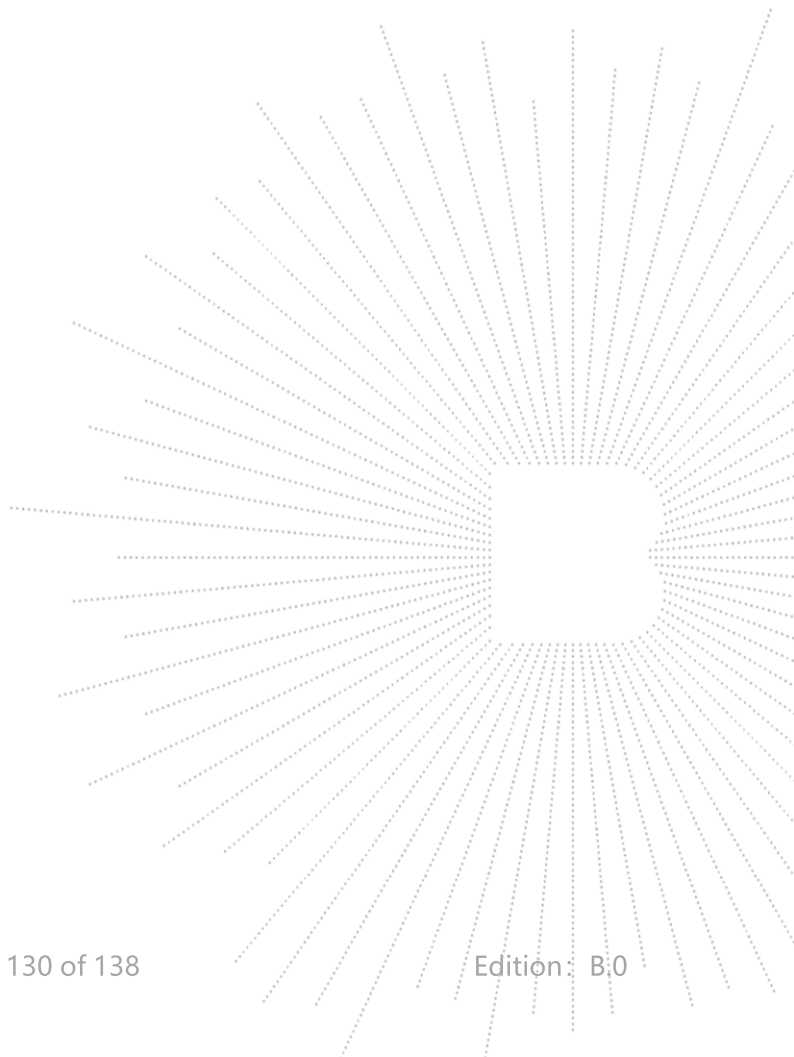


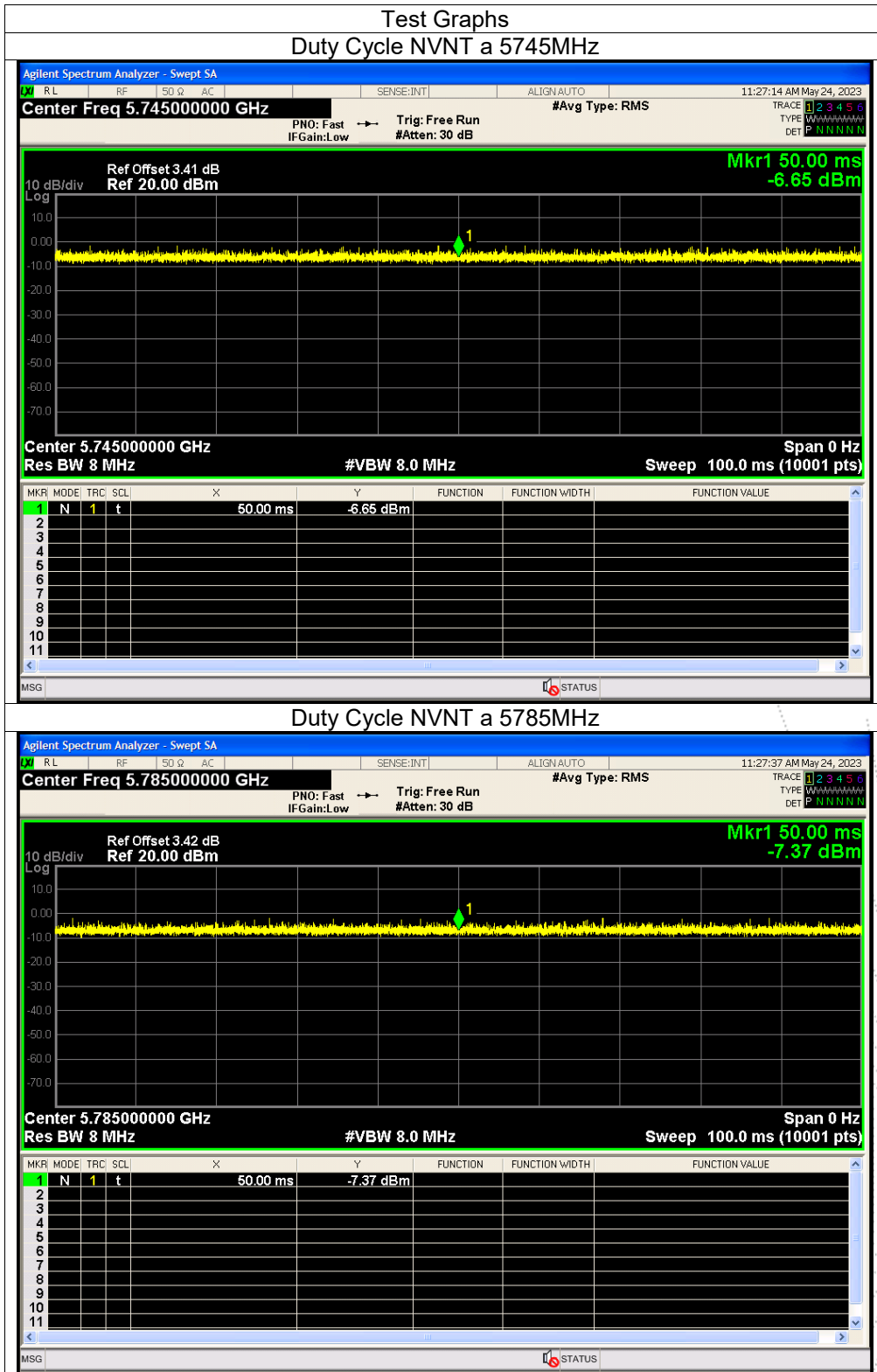


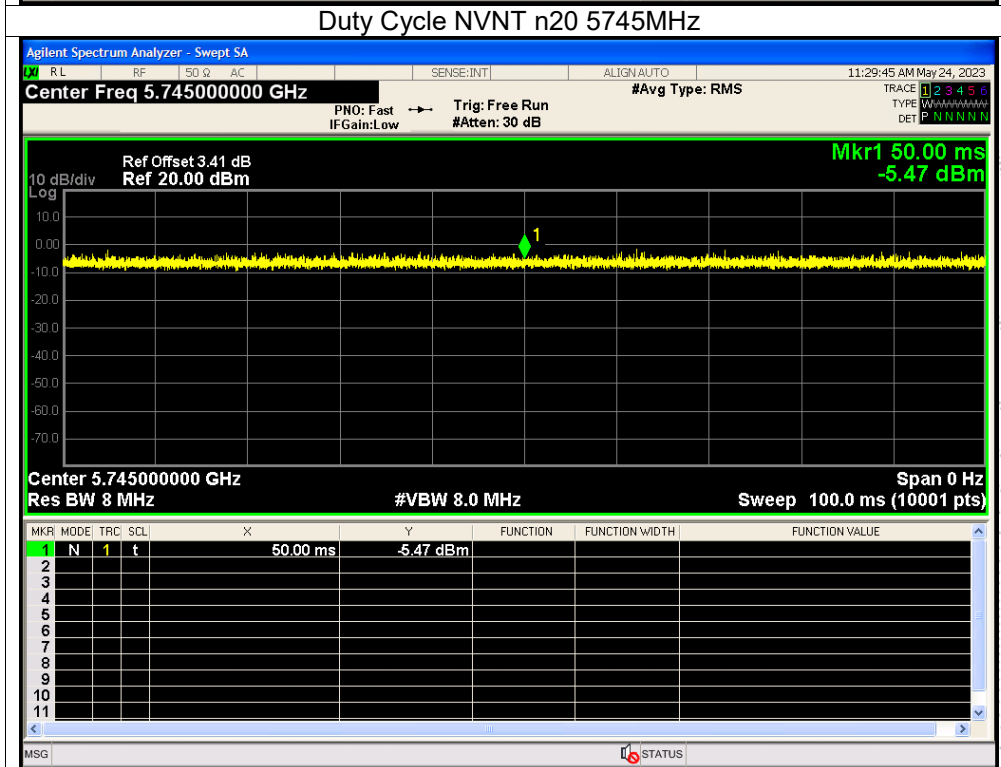
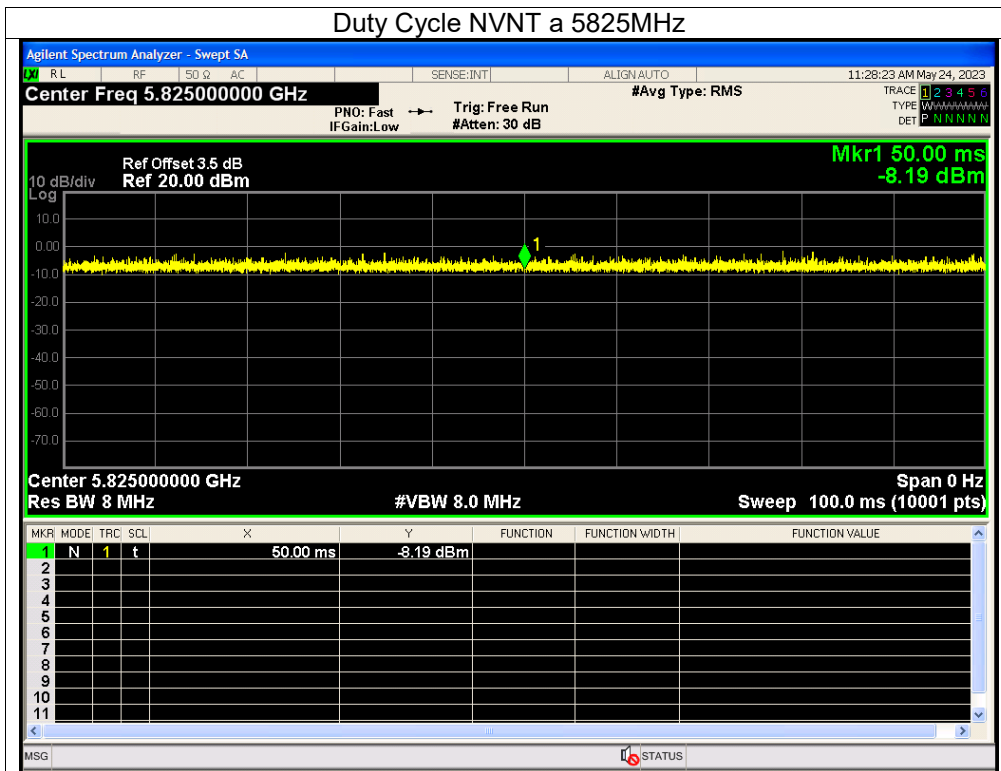


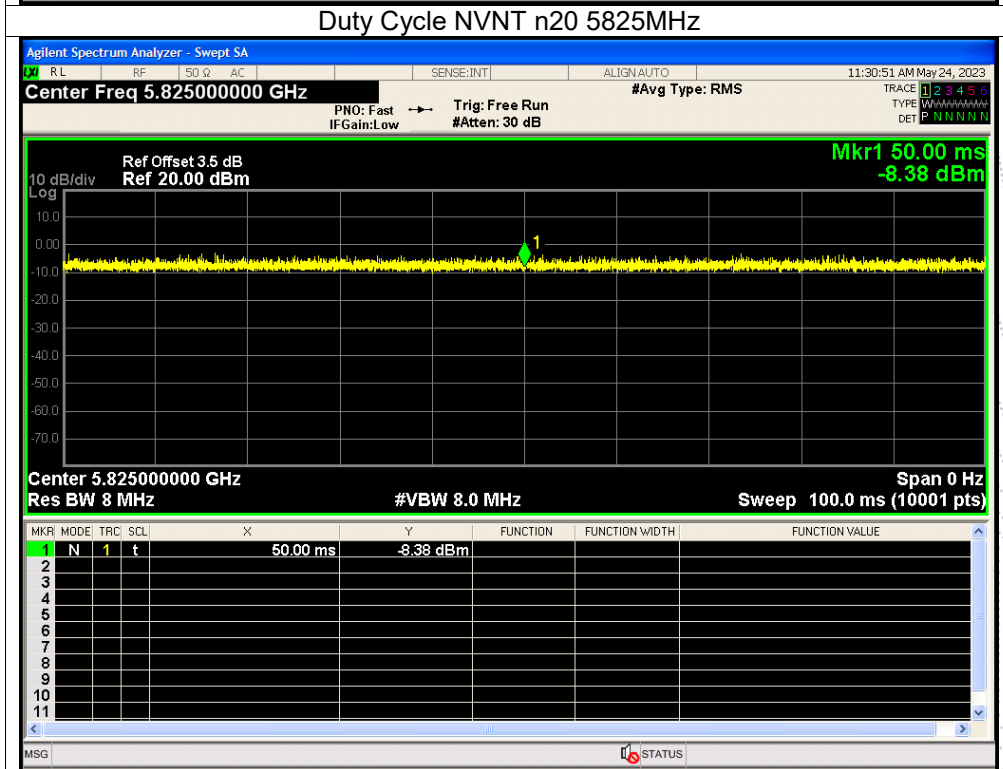
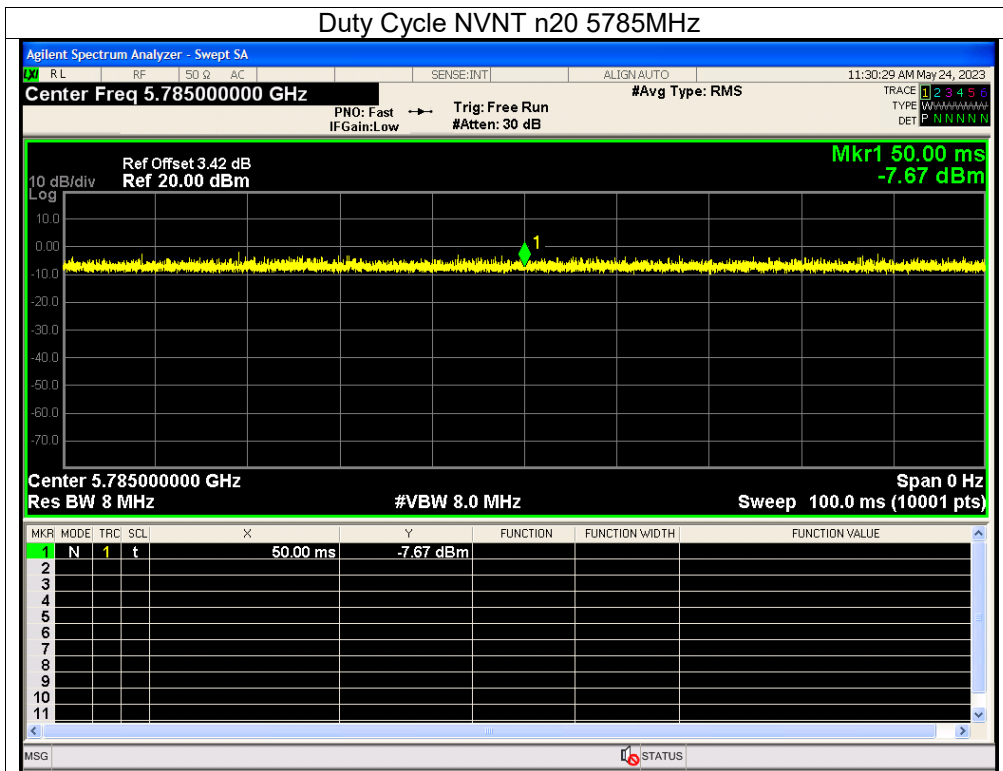


Condition	Mode	Frequency (MHz)	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	a	5745	100	0	0
NVNT	a	5785	100	0	0
NVNT	a	5825	100	0	0
NVNT	n20	5745	100	0	0
NVNT	n20	5785	100	0	0
NVNT	n20	5825	100	0	0









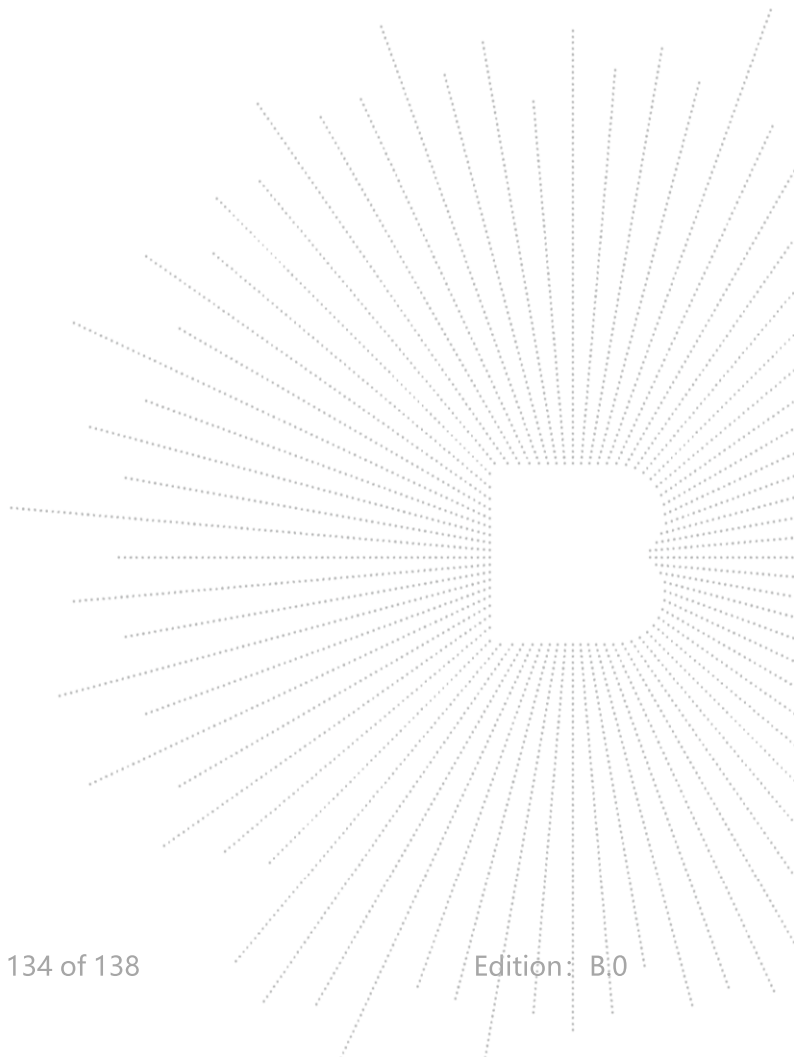
15. Antenna Requirement

15.1 Limit

15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

15.2 Test Result

The EUT antenna is Internal antenna (antenna gain: 4.35dBi). It comply with the standard requirement.



16. EUT Photographs

EUT Photo 1



EUT Photo 2



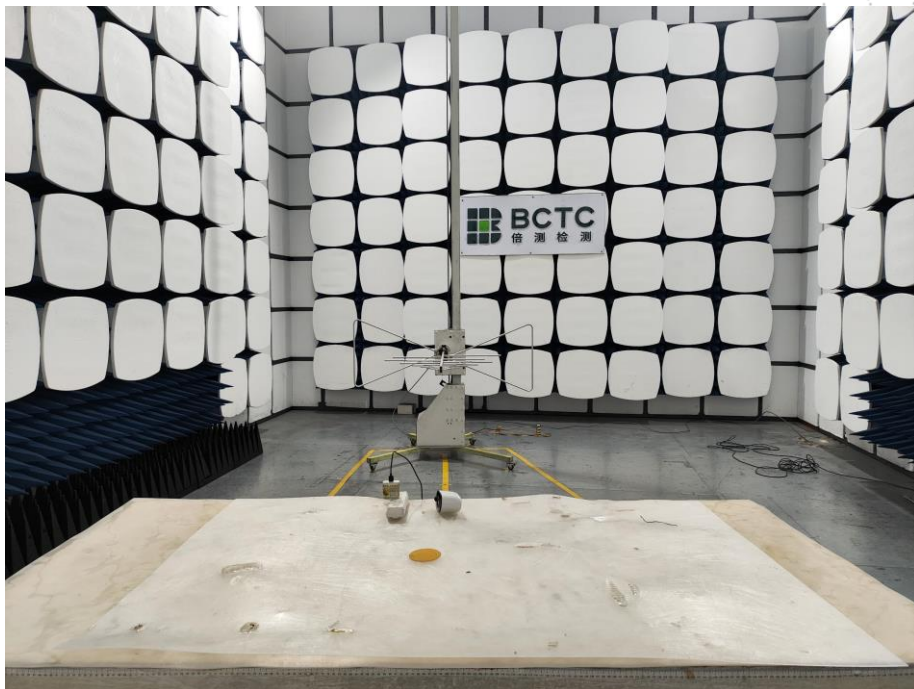
NOTE: Appendix-Photographs Of EUT Constructional Details

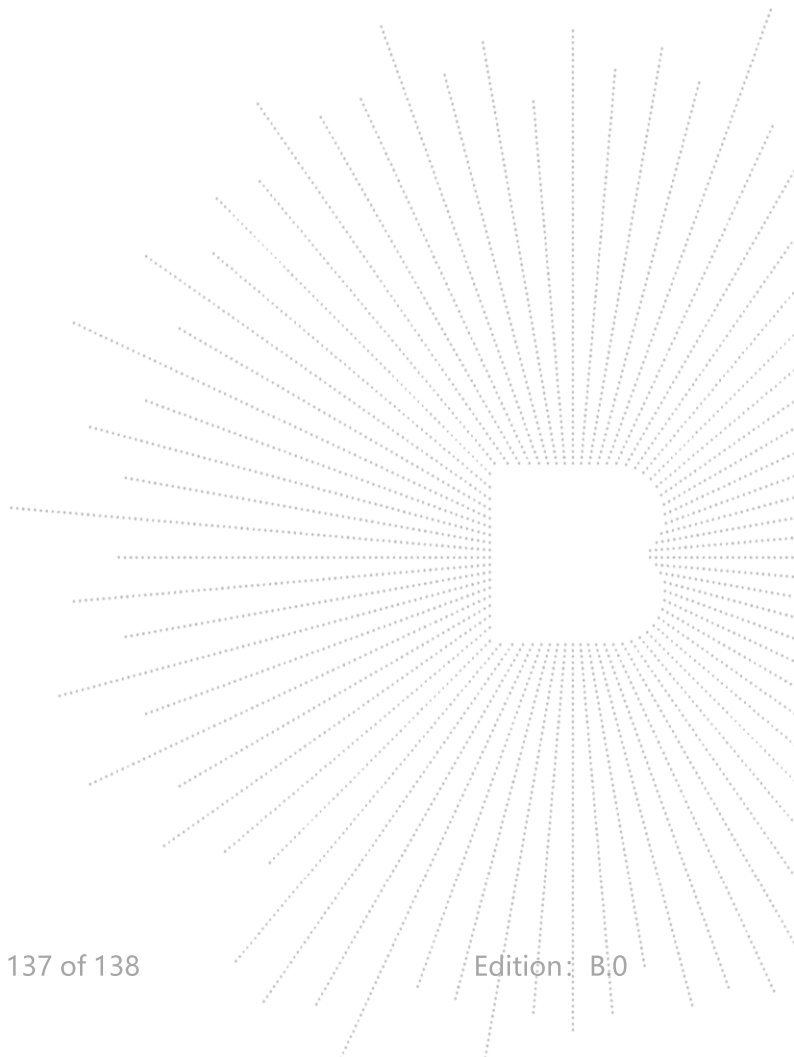
17. EUT Test Setup Photographs

Conducted Emissions Photo



Radiated Measurement Photos





STATEMENT

1. The equipment lists are traceable to the national reference standards.
2. The test report can not be partially copied unless prior written approval is issued from our lab.
3. The test report is invalid without the "special seal for inspection and testing".
4. The test report is invalid without the signature of the approver.
5. The test process and test result is only related to the Unit Under Test.
6. Sample information is provided by the client and the laboratory is not responsible for its authenticity.
7. The quality system of our laboratory is in accordance with ISO/IEC17025.
8. If there is any objection to this test report, the client should inform issuing laboratory within 15 days from the date of receiving test report.

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TEL: 400-788-9558

P.C.: 518103

FAX: 0755-33229357

Website: <http://www.chnbctc.com>

E-Mail: bctc@bctc-lab.com.cn

******* END *******

