

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

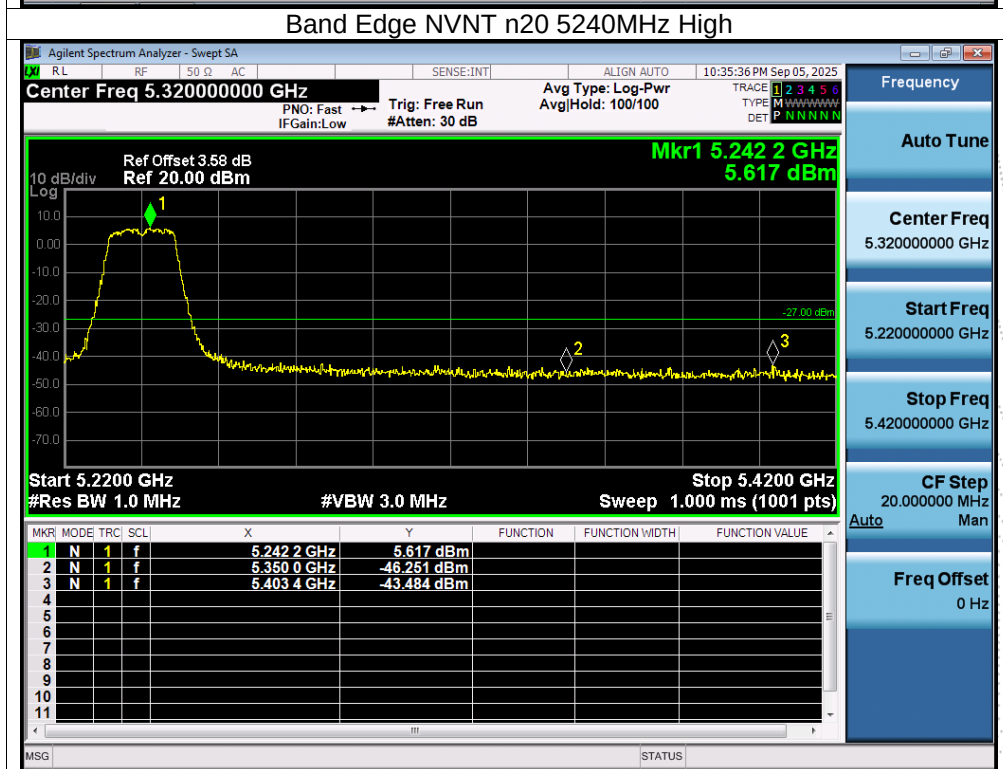
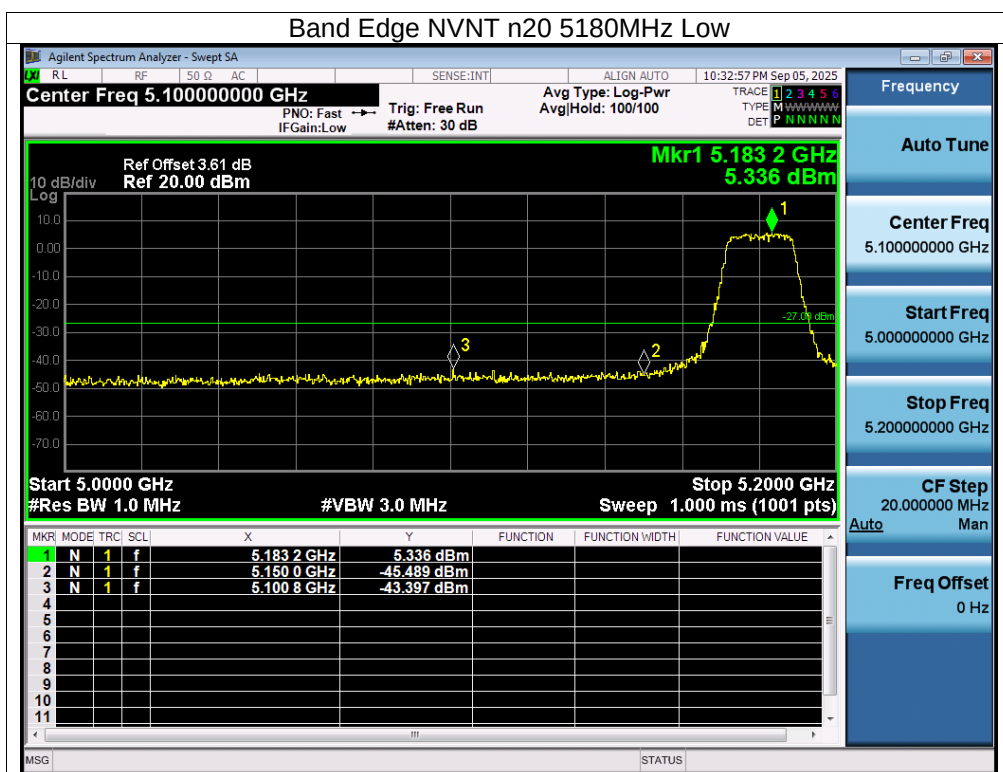
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then 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.

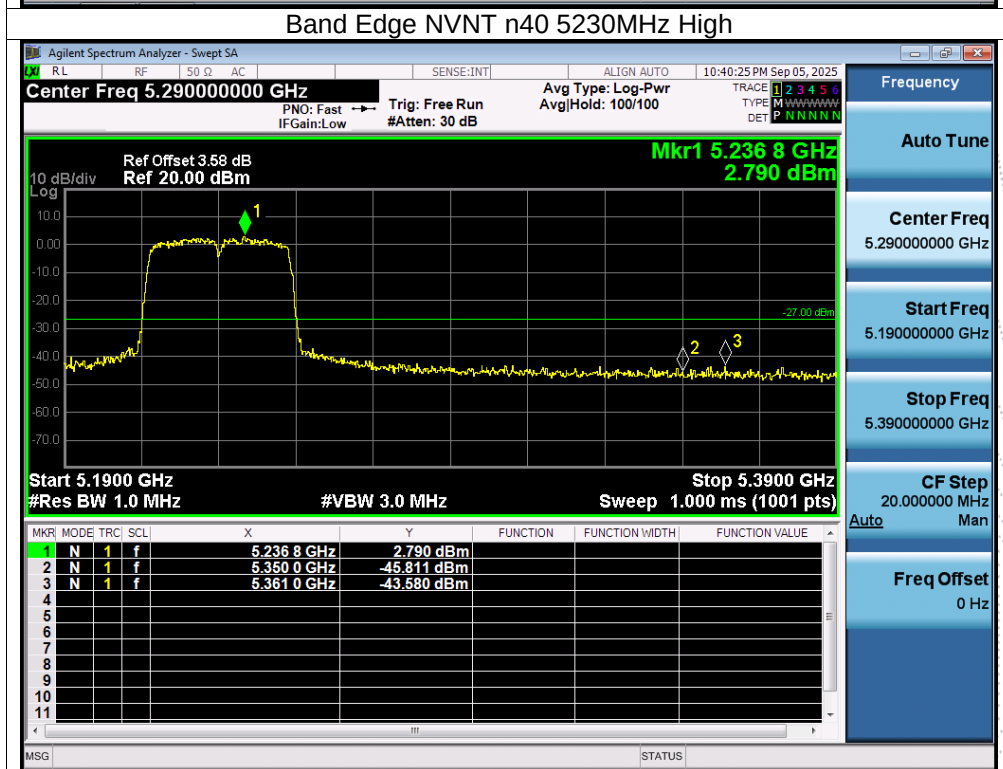
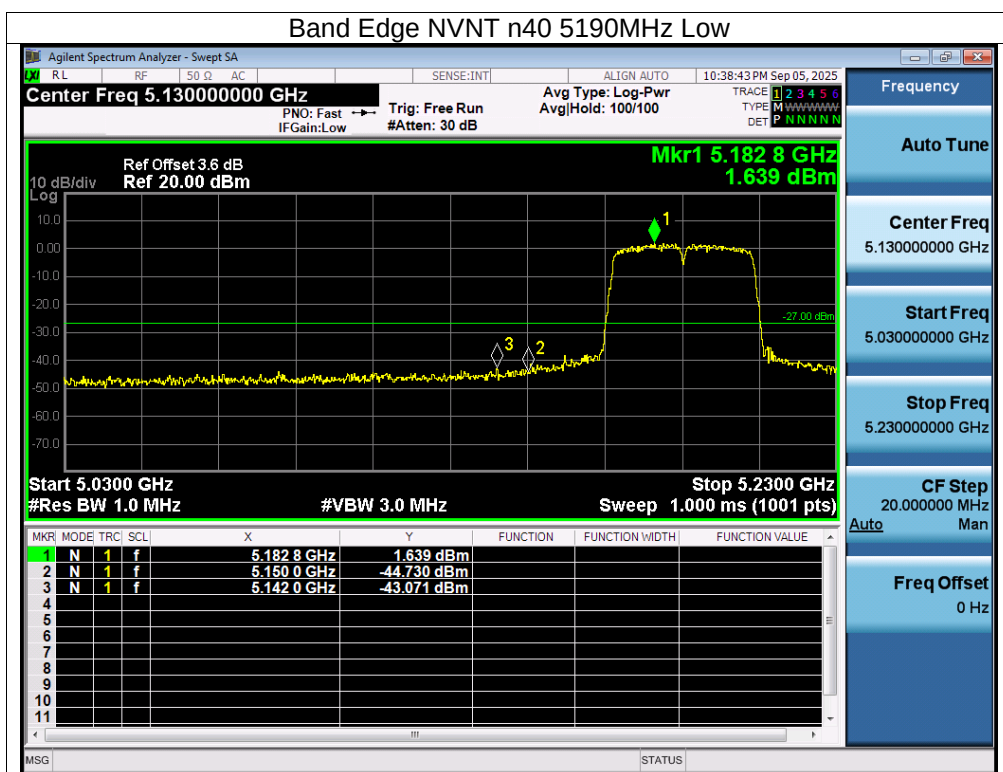
11.4 EUT Operating Conditions

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

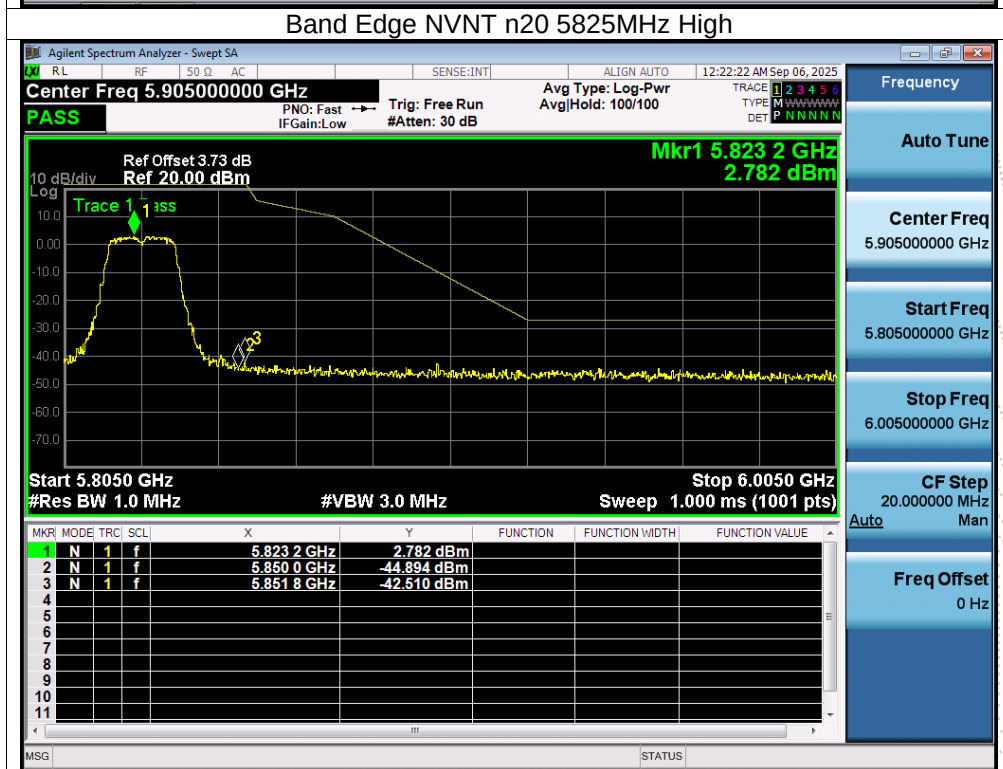
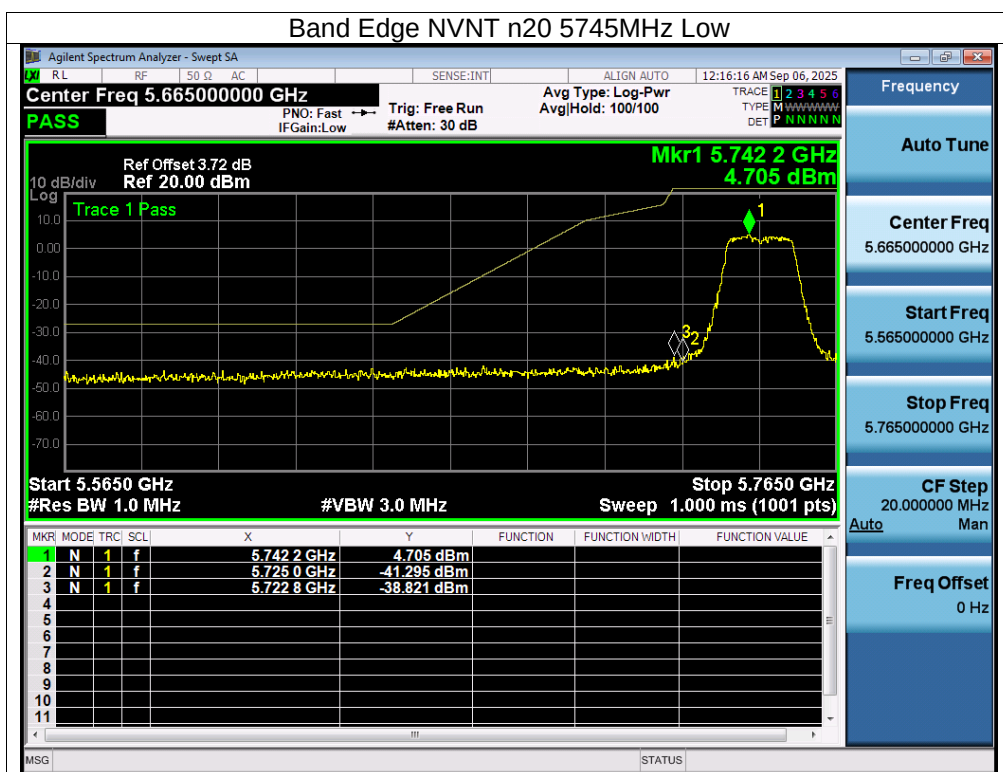
11.5 Test Result

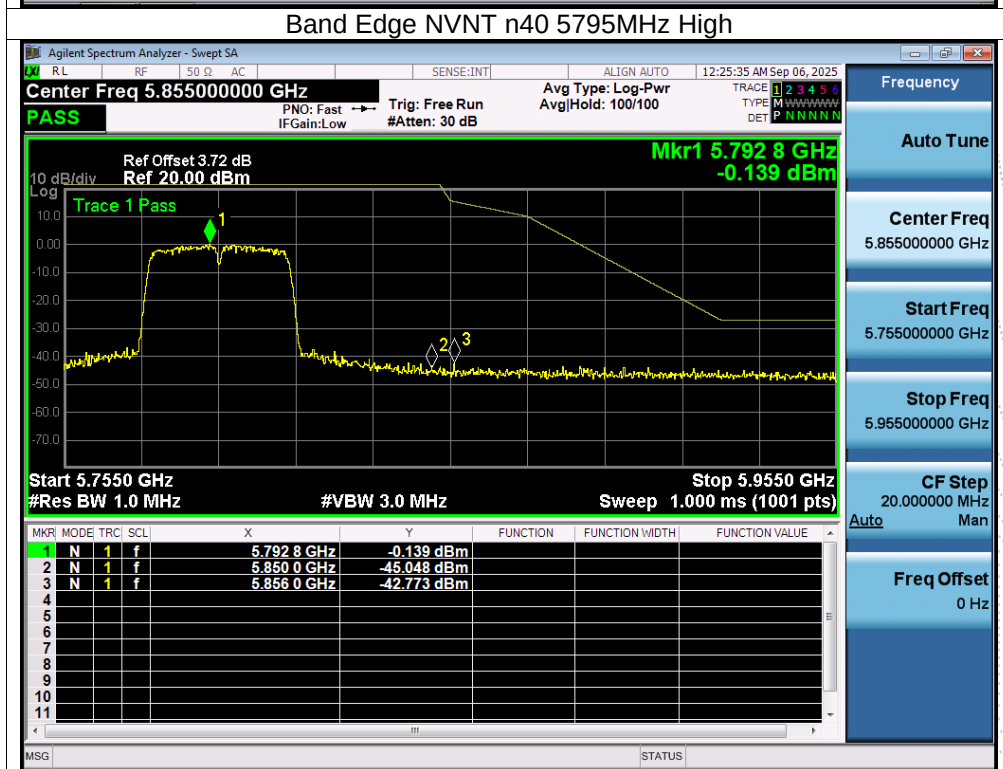
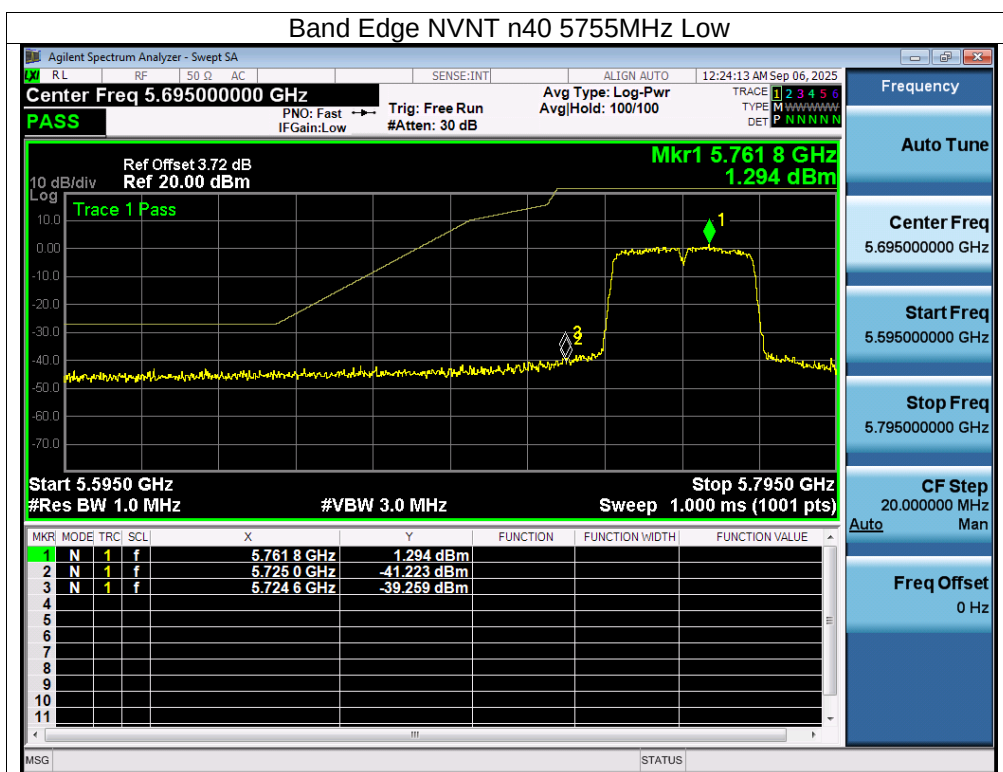












12. Spurious RF Conducted Emissions

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..

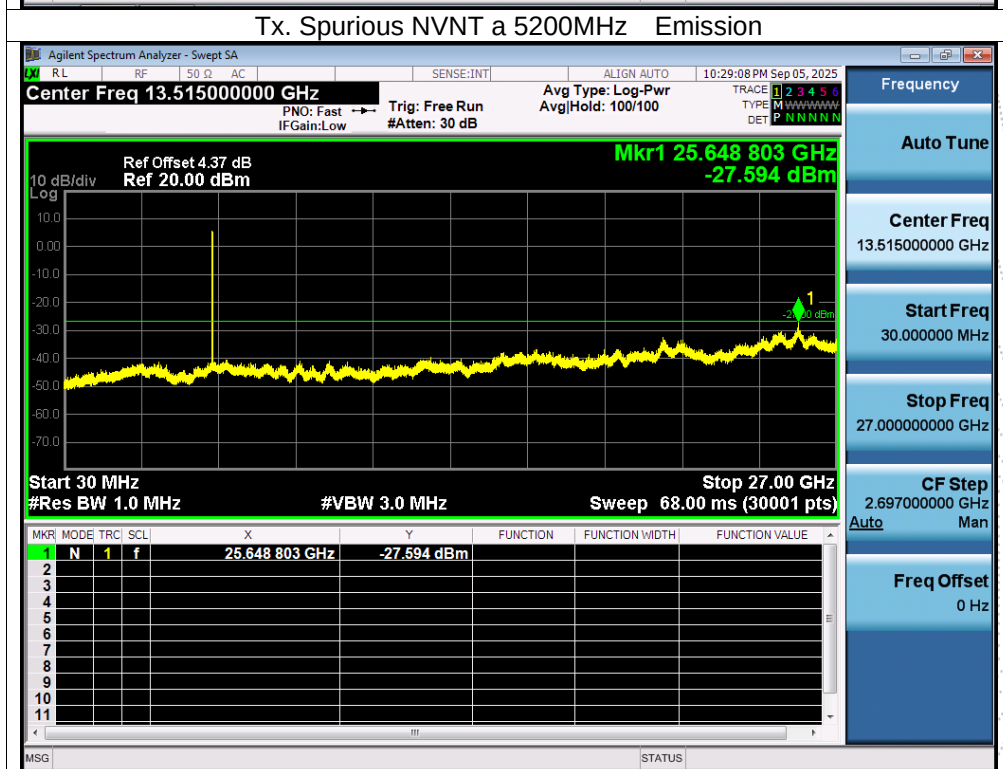
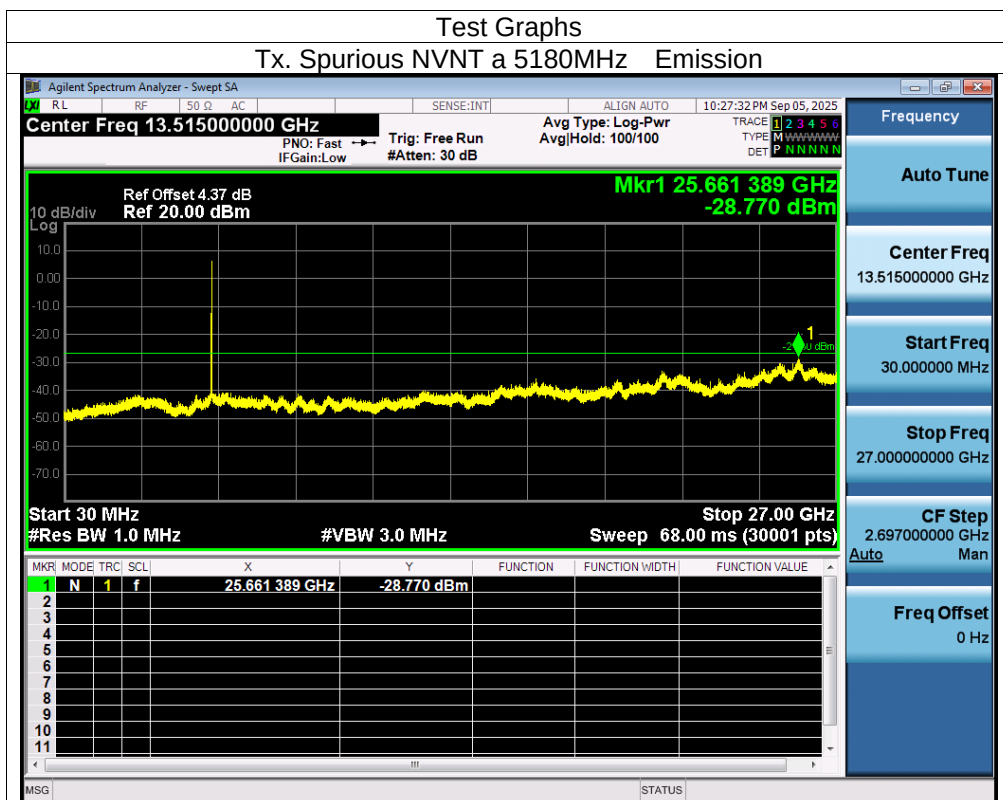
12.3 Test Procedure

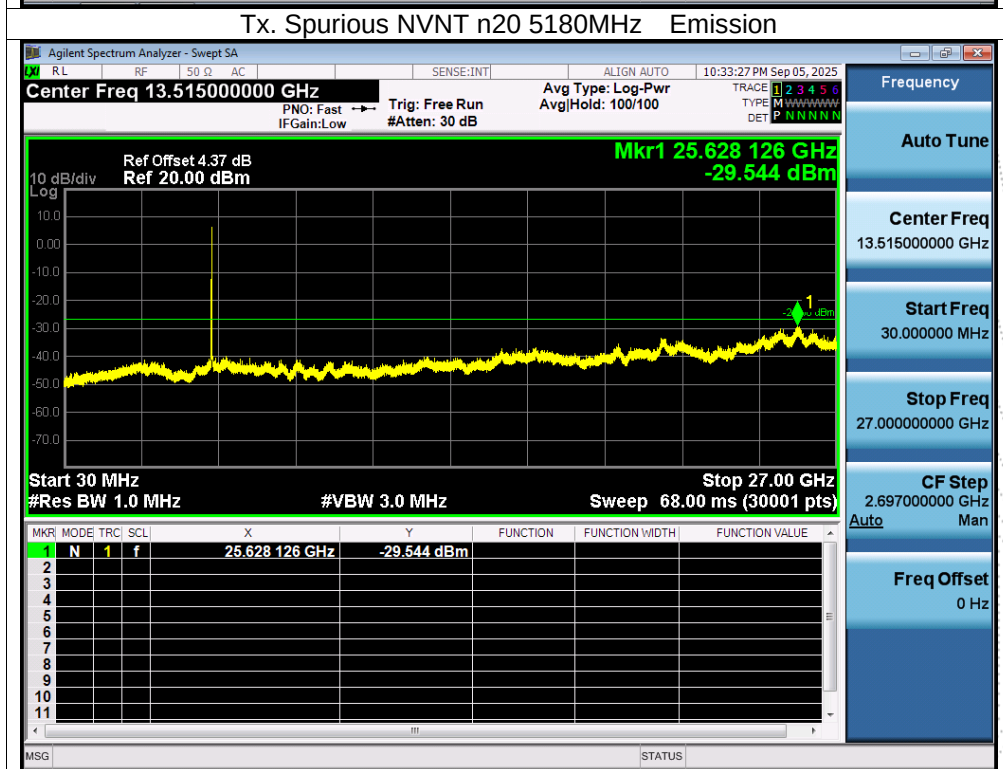
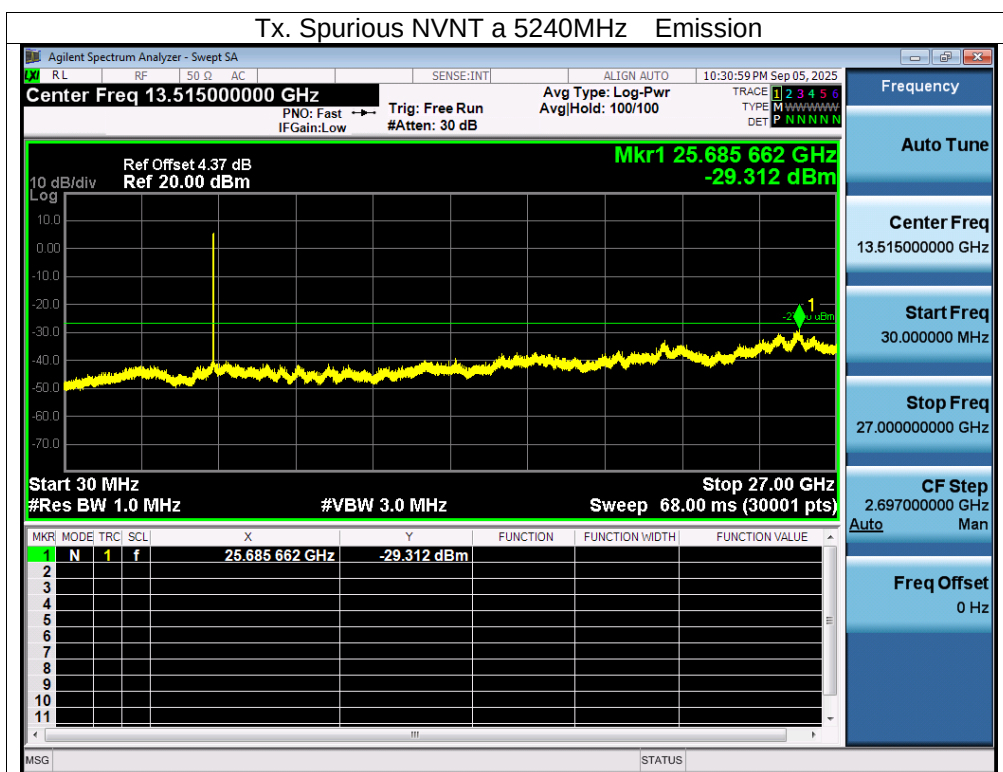
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then 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.

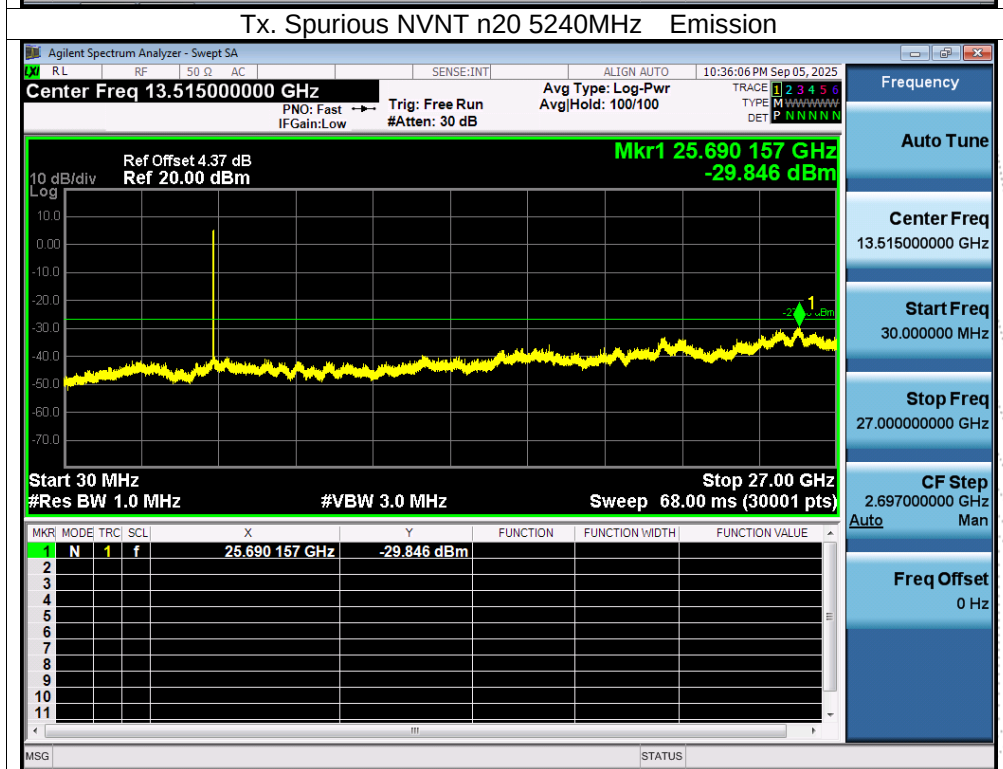
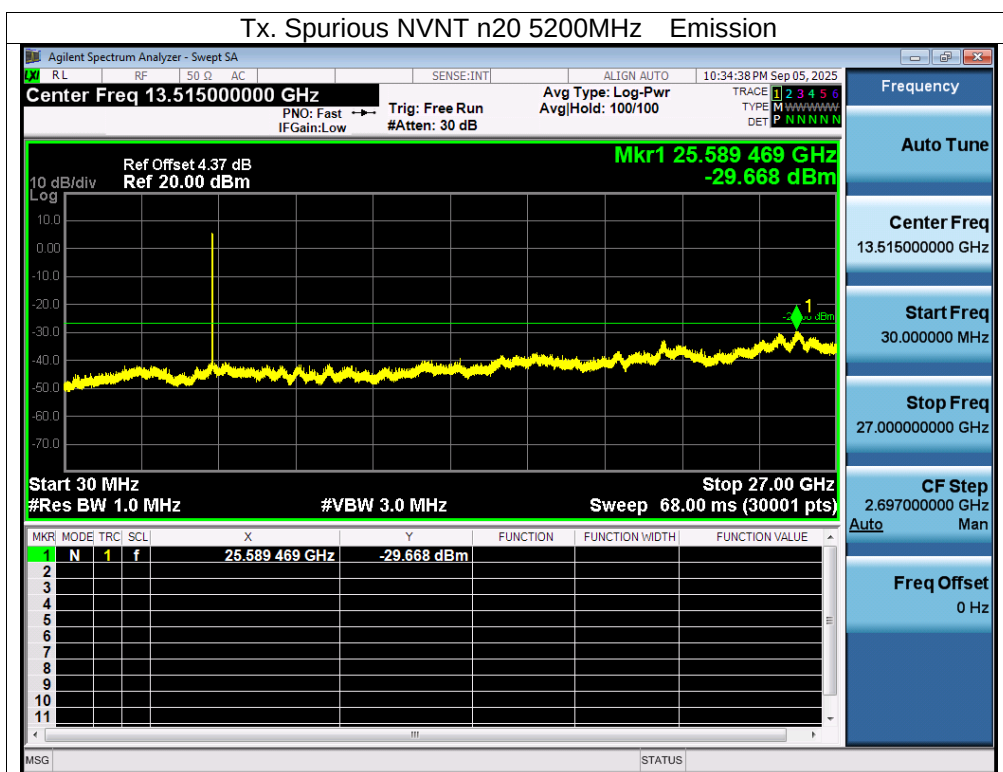
12.4 Test Result

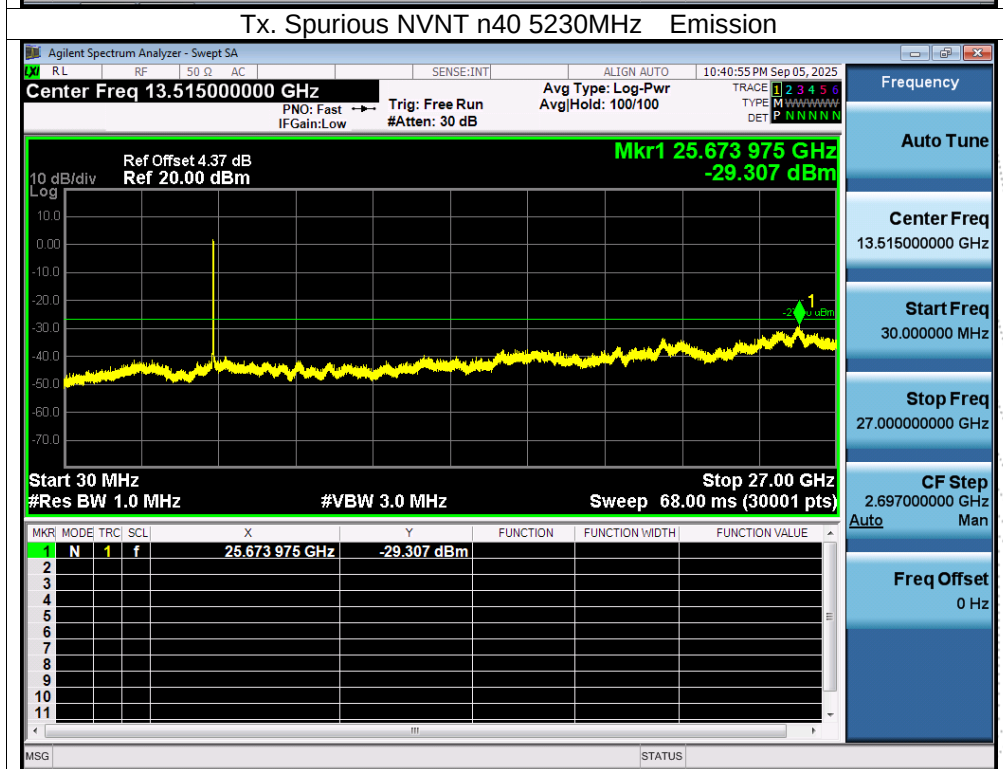
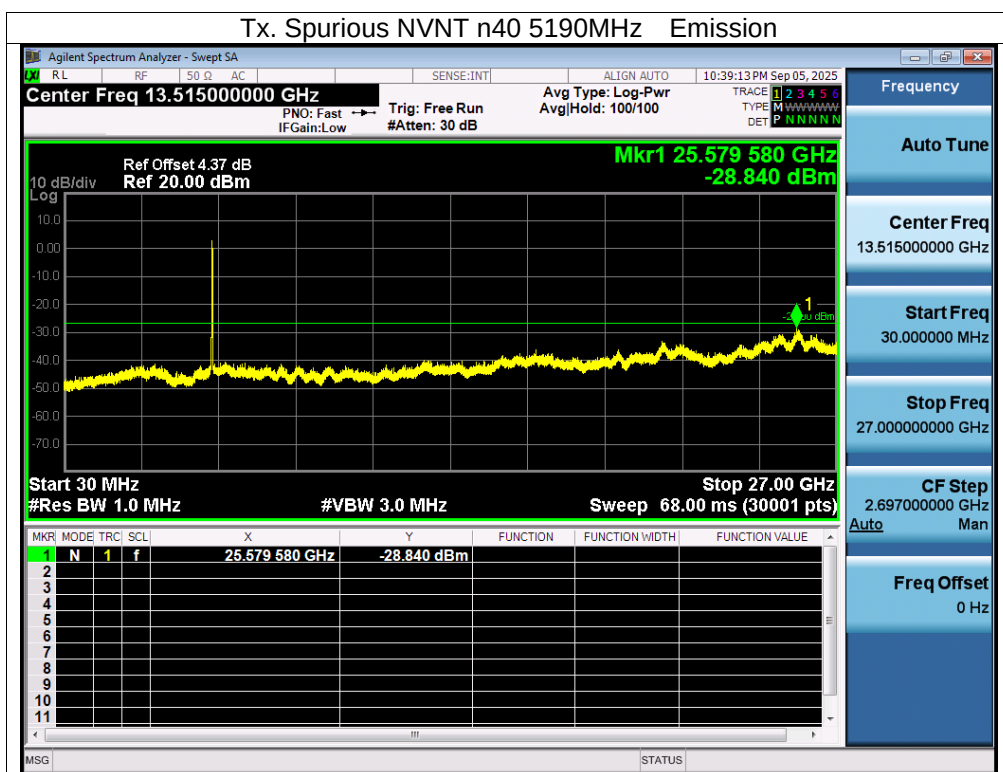
Remark: The measurement frequency range is from 9KHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions and bandedge measurement data.

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.



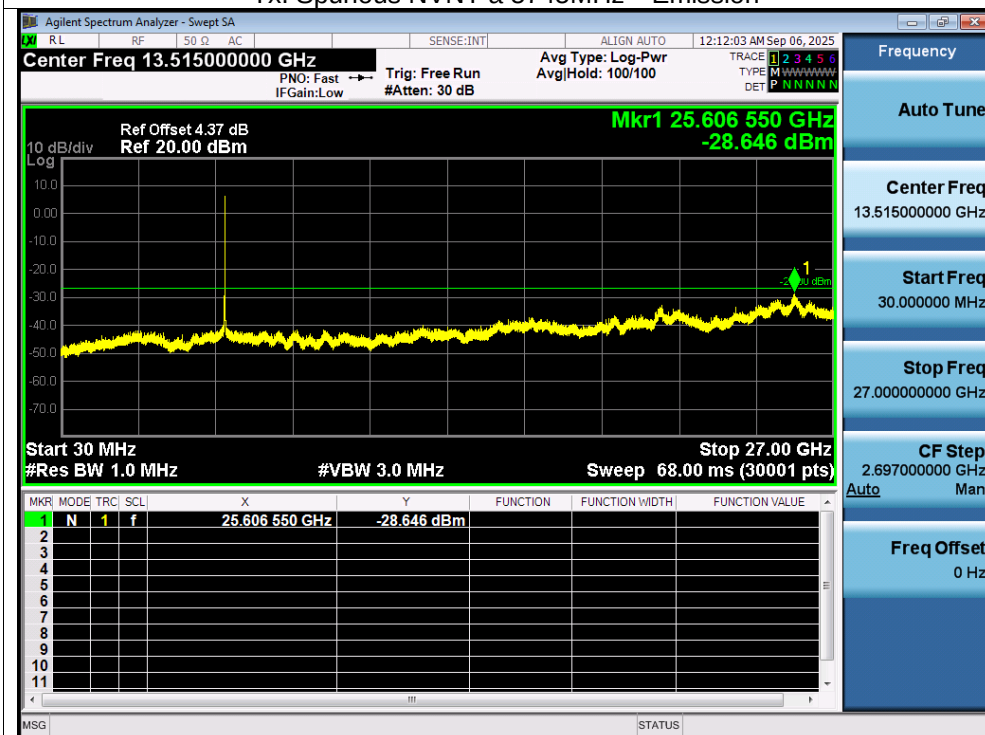




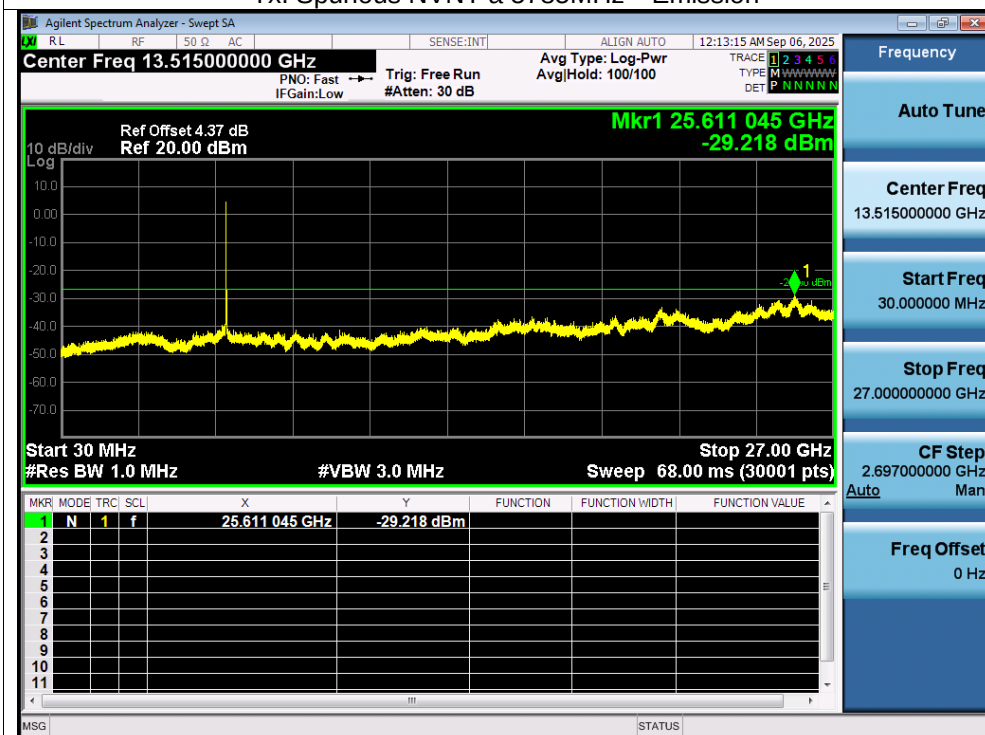


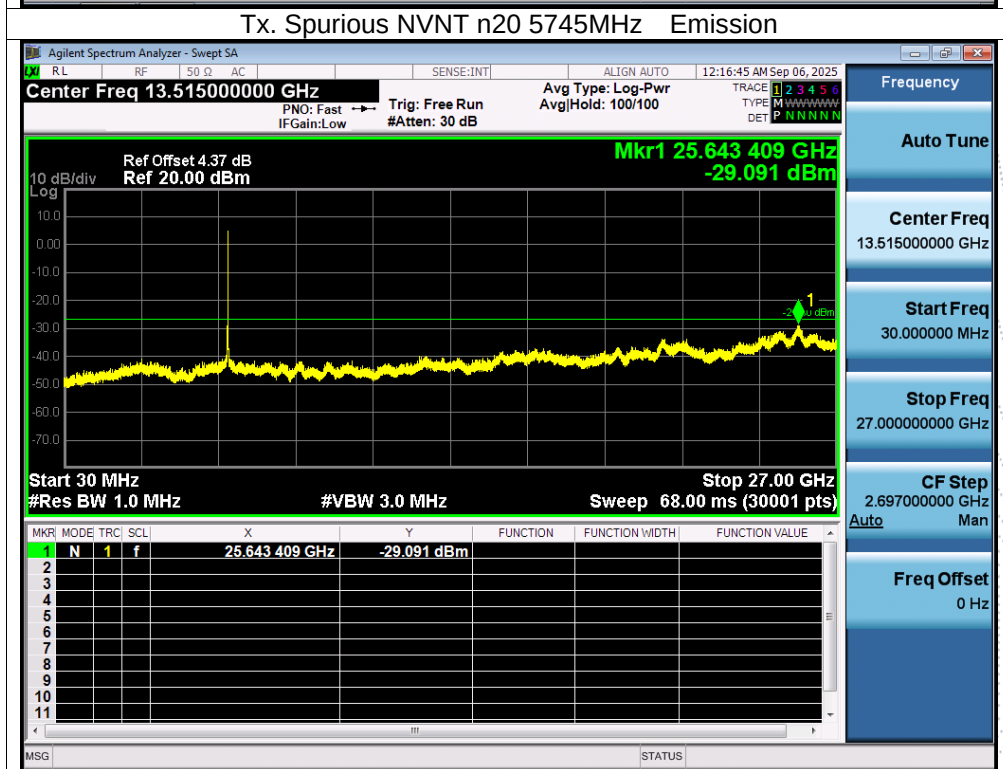
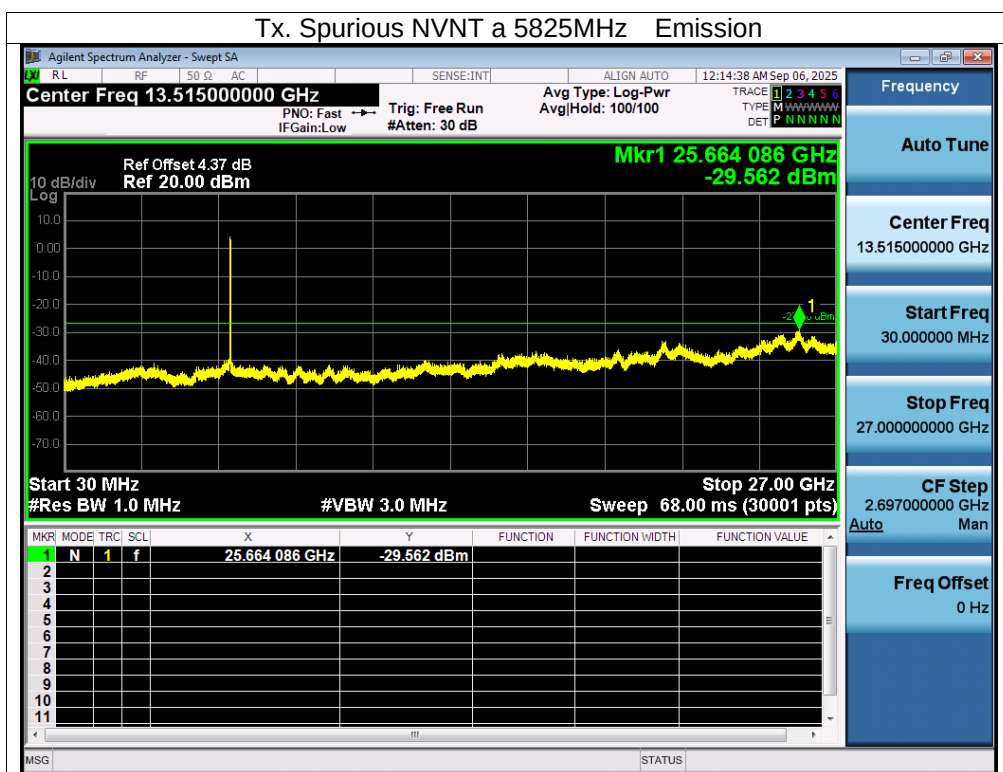
Test Graphs

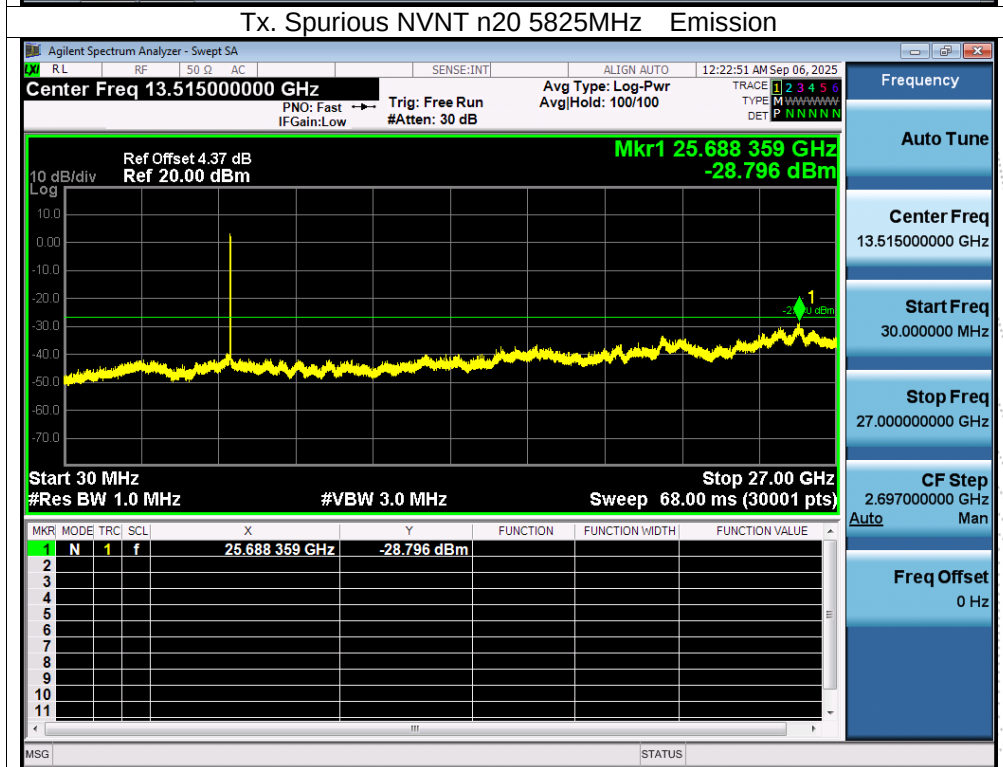
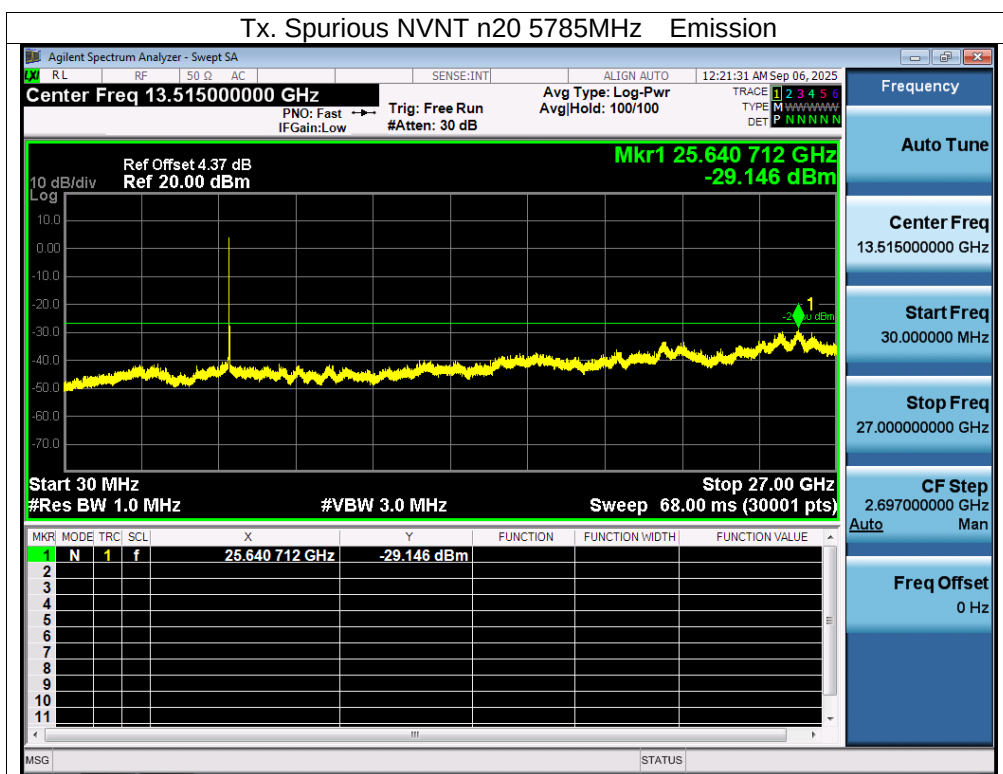
Tx. Spurious NVNT a 5745MHz Emission

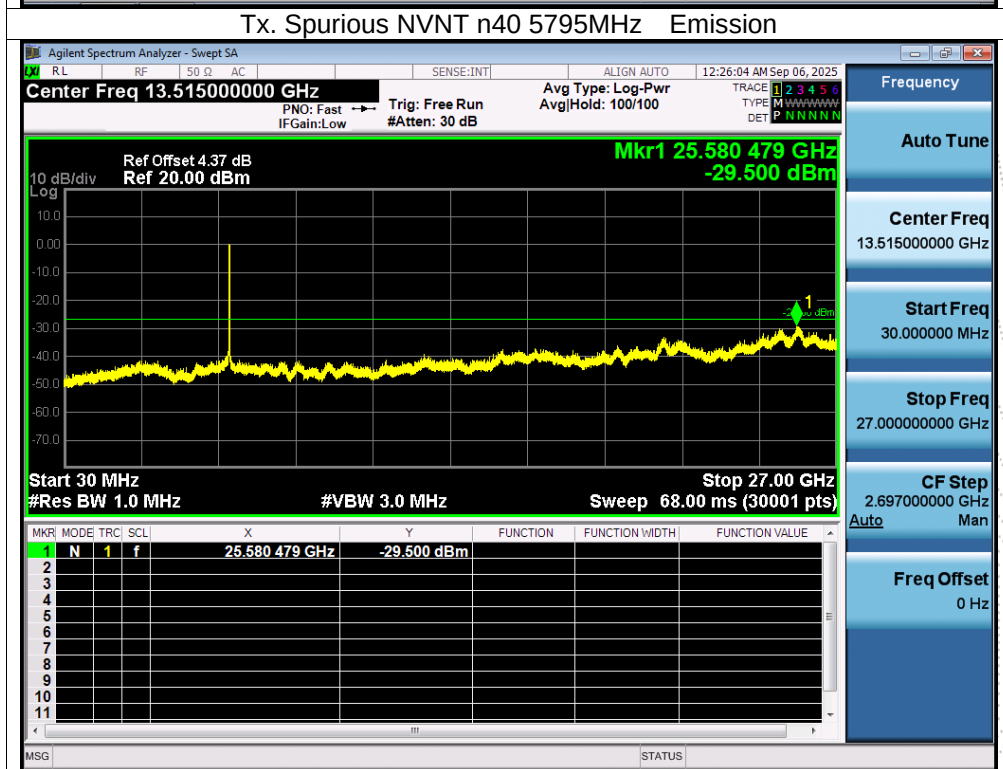
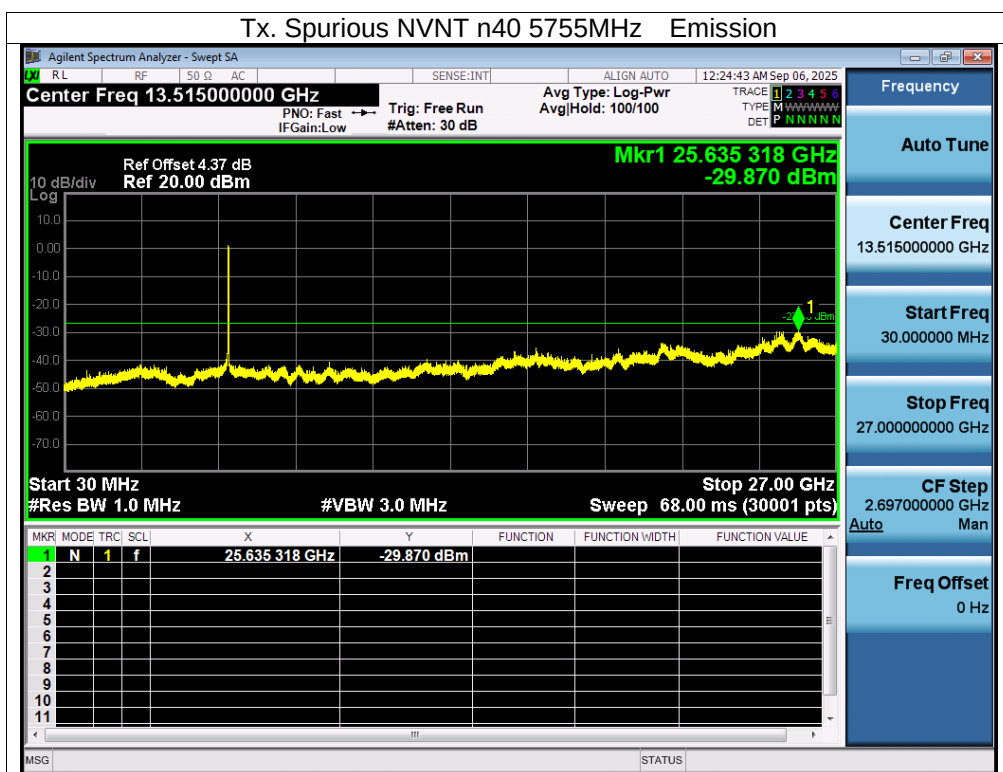


Tx. Spurious NVNT a 5785MHz Emission



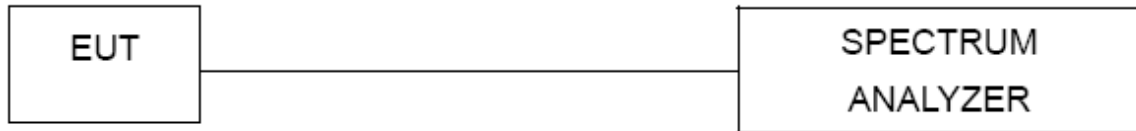






13. Frequency Stability Measurement

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. 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 6V
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)	6.00	5180.0018	5180	0.0018	0.3475
		V max (V)	6.90	5180.0037	5180	0.0037	0.7143
		V min (V)	5.10	5180.0112	5180	0.0112	2.1622
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)	6	T (°C)	-20	5180.0120	5180	0.0120	2.3166
		T (°C)	-10	5180.0046	5180	0.0046	0.8880
		T (°C)	0	5180.0126	5180	0.0126	2.4324
		T (°C)	10	5180.0042	5180	0.0042	0.8108
		T (°C)	20	5180.0079	5180	0.0079	1.5251
		T (°C)	30	5180.0103	5180	0.0103	1.9884
		T (°C)	40	5180.0124	5180	0.0124	2.3938
		T (°C)	50	5180.0081	5180	0.0081	1.5637
		T (°C)	60	5180.0034	5180	0.0034	0.6564
		T (°C)	70	5180.0046	5180	0.0046	0.8880
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)	6.00	5200.0041	5200	0.0041	0.7885
		V max (V)	6.90	5200.0091	5200	0.0091	1.7500
		V min (V)	5.10	5200.0116	5200	0.0116	2.2308
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)	6	T (°C)	-20	5200.01140	5200	0.01140	2.1923
		T (°C)	-10	5200.00870	5200	0.00870	1.6731
		T (°C)	0	5200.00280	5200	0.00280	0.5385
		T (°C)	10	5200.00940	5200	0.00940	1.8077
		T (°C)	20	5200.01340	5200	0.01340	2.5769
		T (°C)	30	5200.00040	5200	0.00040	0.0769
		T (°C)	40	5200.01130	5200	0.01130	2.1731
		T (°C)	50	5200.00910	5200	0.00910	1.7500
		T (°C)	60	5200.00320	5200	0.00320	0.6154
		T (°C)	70	5200.00520	5200	0.00520	1.0000
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)	6.00	5240.0103	5240	0.0103	1.9656
		V max (V)	6.90	5240.0126	5240	0.0126	2.4046
		V min (V)	5.10	5240.0065	5240	0.0065	1.2405
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)	6	T (°C)	-20	5240.0132	5240	0.0132	2.5191
		T (°C)	-10	5240.0124	5240	0.0124	2.3664
		T (°C)	0	5240.0002	5240	0.0002	0.0382
		T (°C)	10	5240.0118	5240	0.0118	2.2519
		T (°C)	20	5240.0005	5240	0.0005	0.0954
		T (°C)	30	5240.0114	5240	0.0114	2.1756
		T (°C)	40	5240.0122	5240	0.0122	2.3282
		T (°C)	50	5240.0002	5240	0.0002	0.0382
		T (°C)	60	5240.0057	5240	0.0057	1.0878
		T (°C)	70	5240.0044	5240	0.0044	0.8397
Limits				5150-5250 MHz			
Result				Complies			

Temperature:	26 °C	Relative Humidity:	54%
Pressure:	101KPa	Test Voltage:	DC 6V
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)	6.00	5745.00360	5745	0.00360	0.6266
		V max (V)	6.90	5745.01320	5745	0.01320	2.2977
		V min (V)	5.10	5745.00310	5745	0.00310	0.5396
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)	6	T (°C)	-20	5745.00420	5745	0.00420	0.7311
		T (°C)	-10	5745.00430	5745	0.00430	0.7485
		T (°C)	0	5745.00770	5745	0.00770	1.3403
		T (°C)	10	5745.00580	5745	0.00580	1.0096
		T (°C)	20	5745.00530	5745	0.00530	0.9225
		T (°C)	30	5745.00750	5745	0.00750	1.3055
		T (°C)	40	5745.00360	5745	0.00360	0.6266
		T (°C)	50	5745.00210	5745	0.00210	0.3655
		T (°C)	60	5745.00980	5745	0.00980	1.7058
		T (°C)	70	5745.00530	5745	0.00530	0.9225
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)	6.00	5785.01010	5785	0.01010	1.7459
		V max (V)	6.90	5785.00770	5785	0.00770	1.3310
		V min (V)	5.10	5785.01140	5785	0.01140	1.9706
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)	6	T (°C)	-20	5785.00480	5785	0.00480	0.8297
		T (°C)	-10	5785.01180	5785	0.01180	2.0398
		T (°C)	0	5785.00660	5785	0.00660	1.1409
		T (°C)	10	5785.01080	5785	0.01080	1.8669
		T (°C)	20	5785.00380	5785	0.00380	0.6569
		T (°C)	30	5785.00170	5785	0.00170	0.2939
		T (°C)	40	5785.00980	5785	0.00980	1.6940
		T (°C)	50	5785.00800	5785	0.00800	1.3829
		T (°C)	60	5785.00440	5785	0.00440	0.7606
		T (°C)	70	5785.01220	5785	0.01220	2.1089
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)	6.00	5825.01300	5825	0.01300	2.2318
		V max (V)	6.90	5825.00450	5825	0.00450	0.7725
		V min (V)	5.10	5825.00570	5825	0.00570	0.9785
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)	6	T (°C)	-20	5825.00090	5825	0.00090	0.1545
		T (°C)	-10	5825.00880	5825	0.00880	1.5107
		T (°C)	0	5825.01080	5825	0.01080	1.8541
		T (°C)	10	5825.00140	5825	0.00140	0.2403
		T (°C)	20	5825.00720	5825	0.00720	1.2361
		T (°C)	30	5825.01180	5825	0.01180	2.0258
		T (°C)	40	5825.00950	5825	0.00950	1.6309
		T (°C)	50	5825.00450	5825	0.00450	0.7725
		T (°C)	60	5825.00100	5825	0.00100	0.1717
		T (°C)	70	5825.00470	5825	0.00470	0.8069
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 = $T_{on} / (T_{on} + T_{off})$

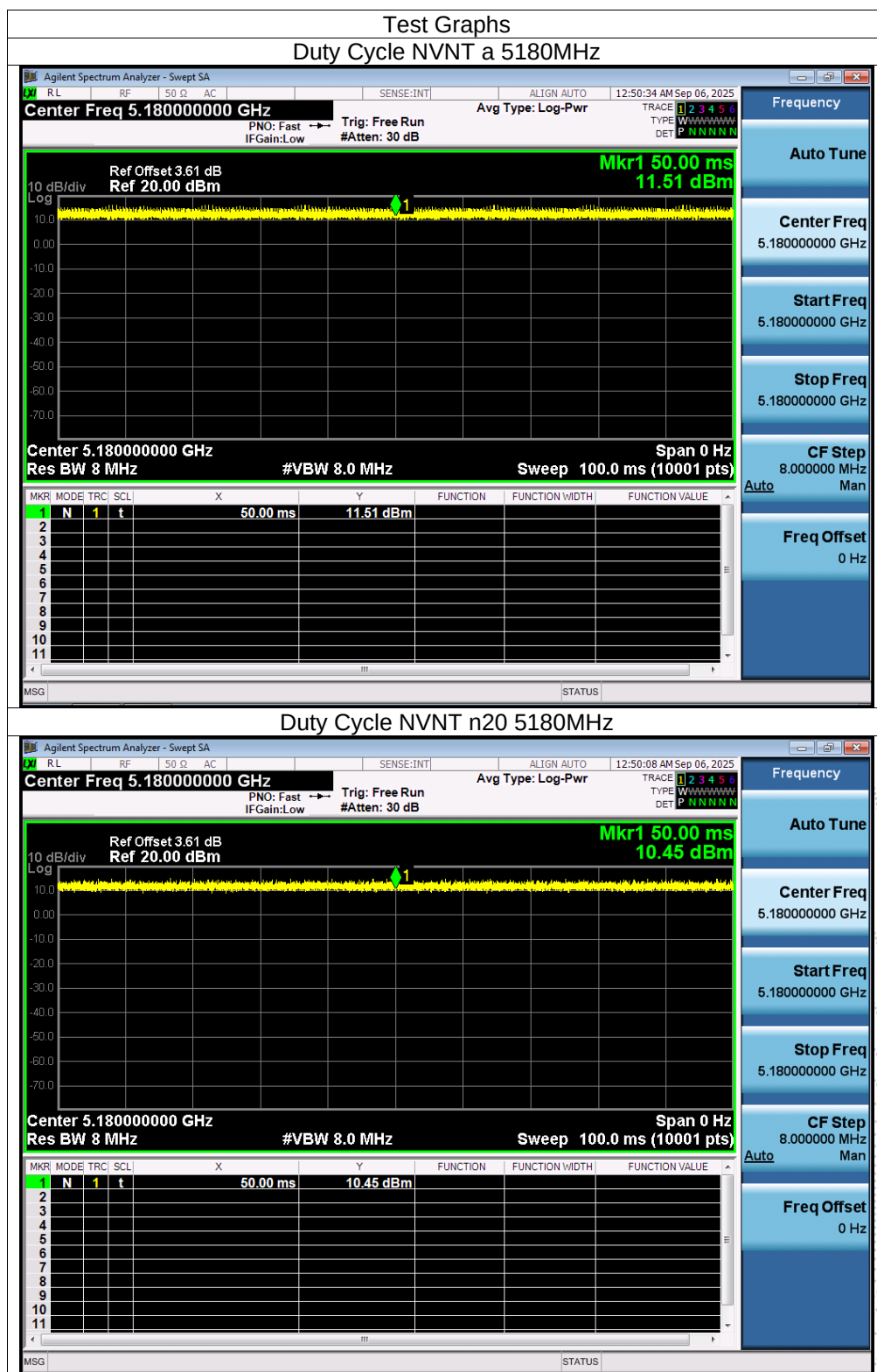
14.3 Test Procedure

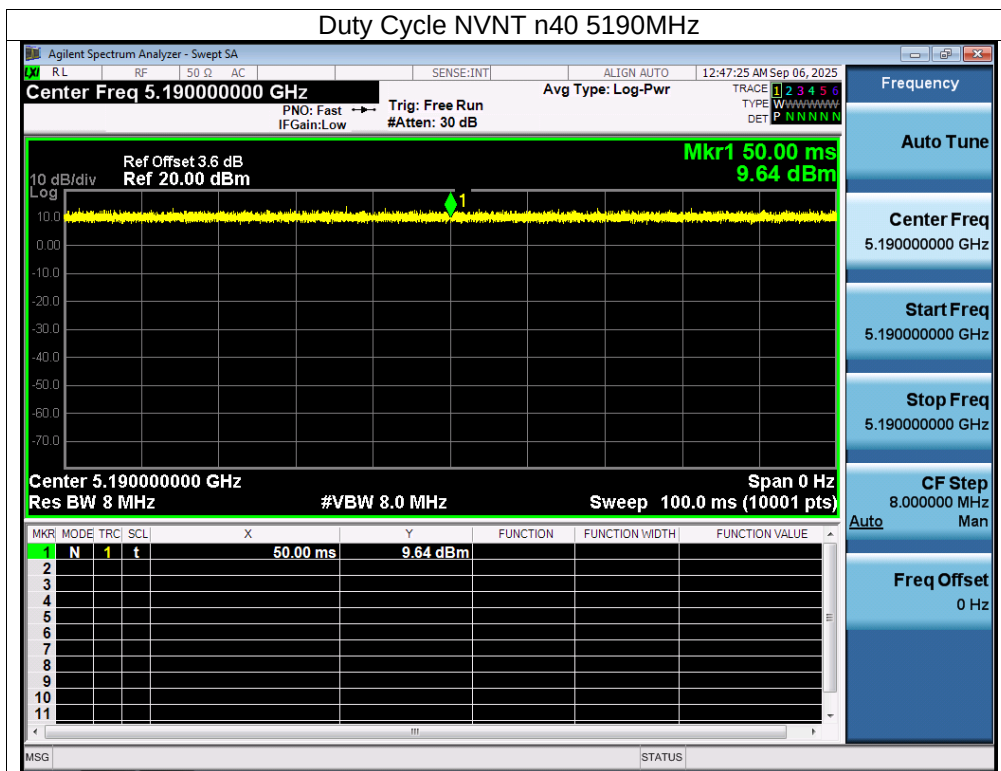
1. Set span = Zero
2. RBW = 8MHz
3. VBW = 8MHz,
4. Detector = Peak

14.4 Test Result

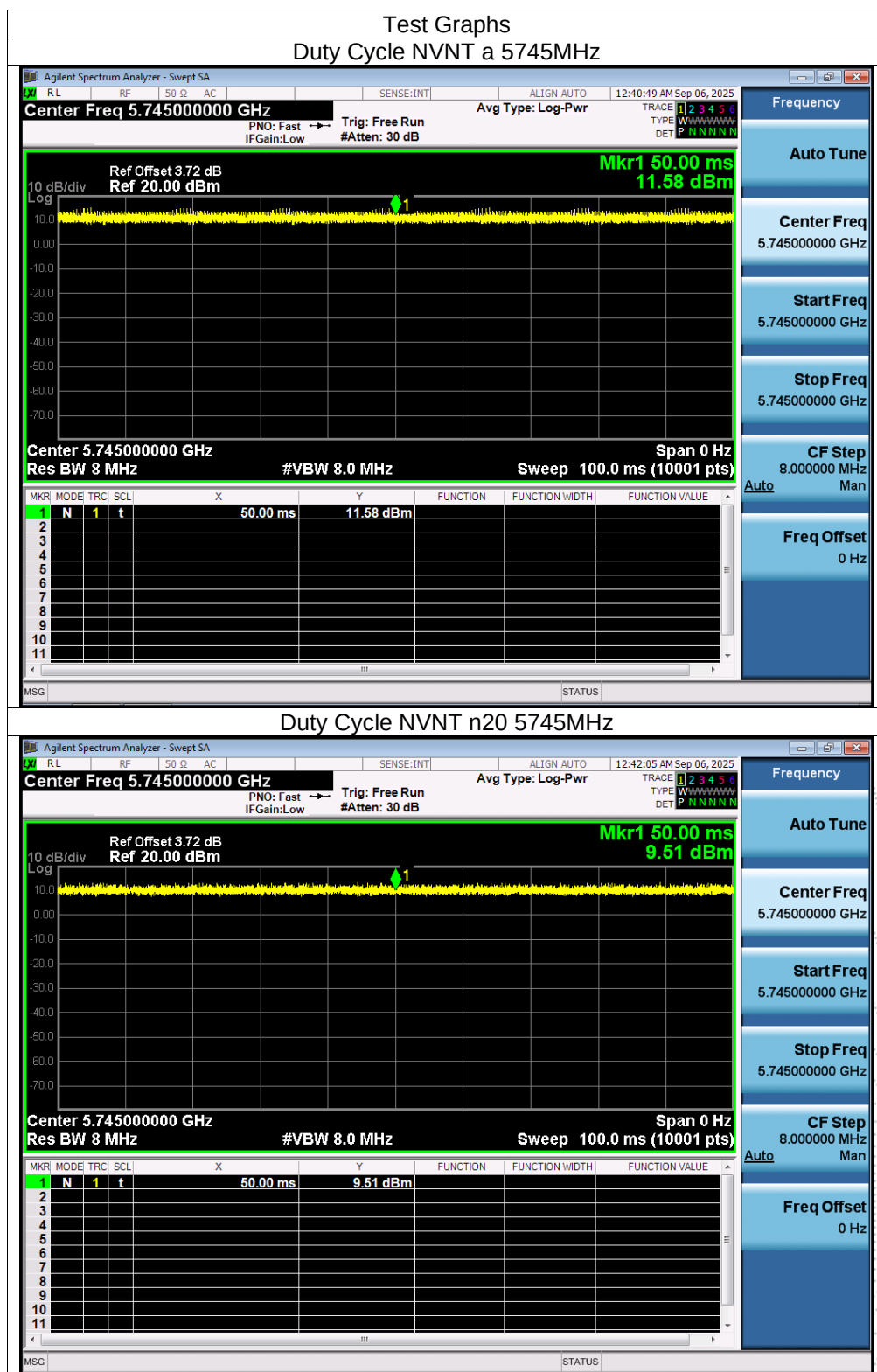
5.1G

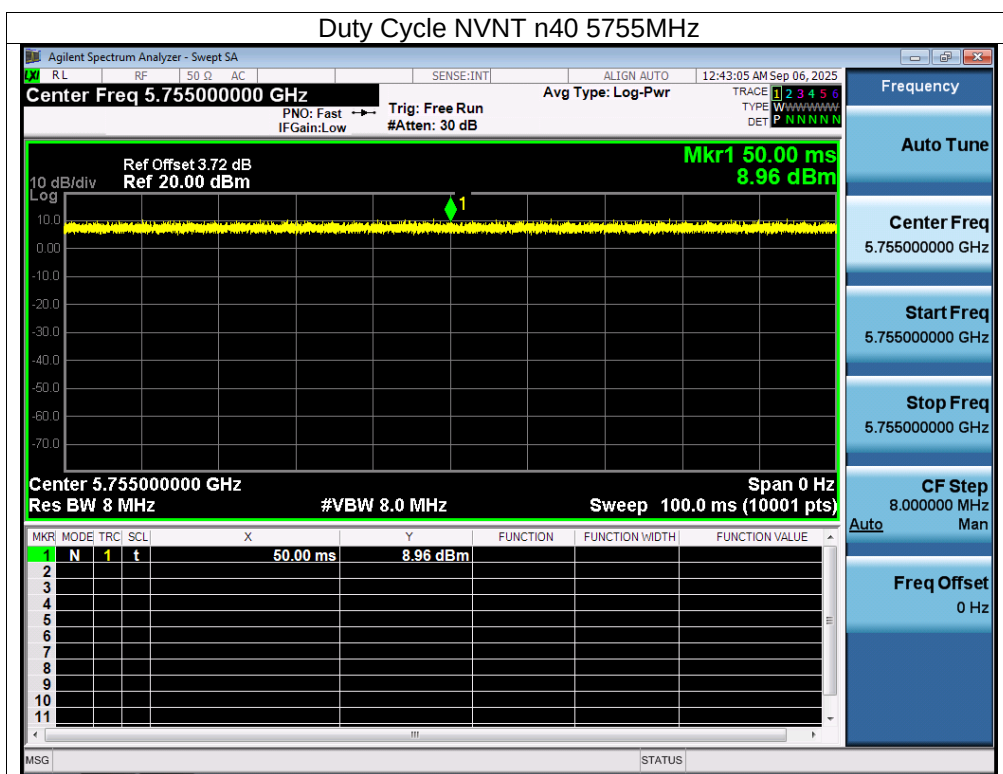
Condition	Mode	Frequency (MHz)	Duty Cycle (%)
NVNT	a	5180	100
NVNT	n20	5180	100
NVNT	n40	5190	100





Condition	Mode	Frequency (MHz)	Duty Cycle (%)
NVNT	a	5745	100
NVNT	n20	5745	100
NVNT	n40	5755	100





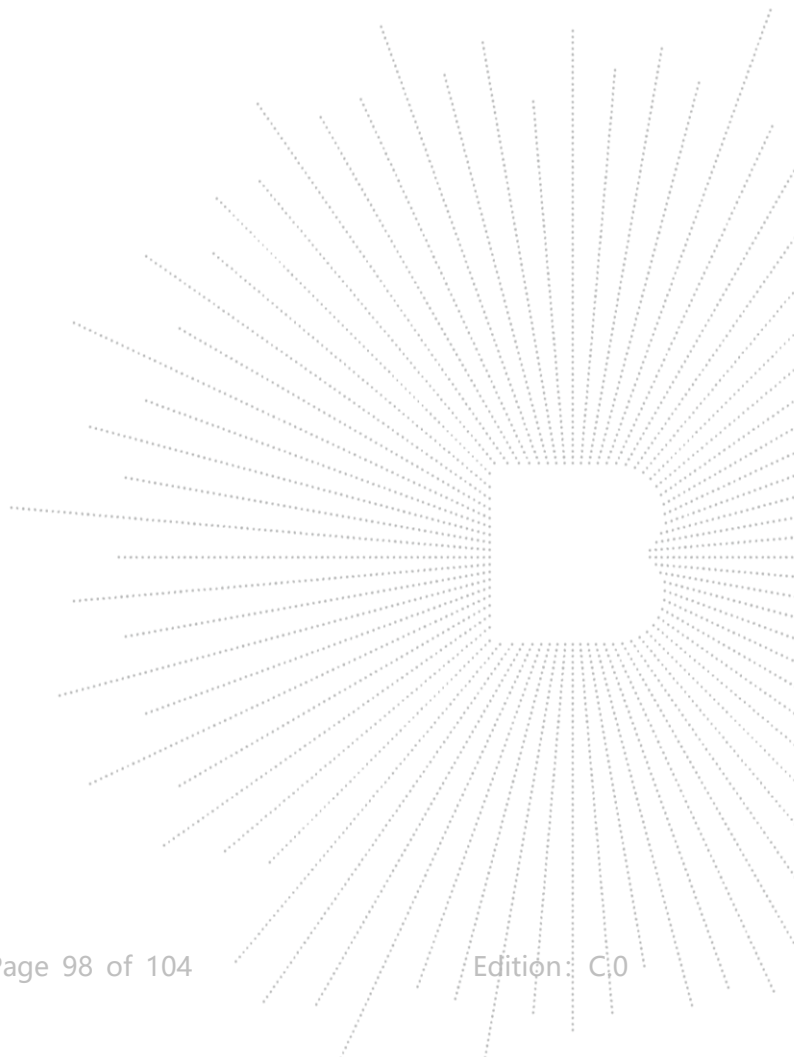
15. Antenna Requirement

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 PCB antenna, fulfill the requirement of this section.



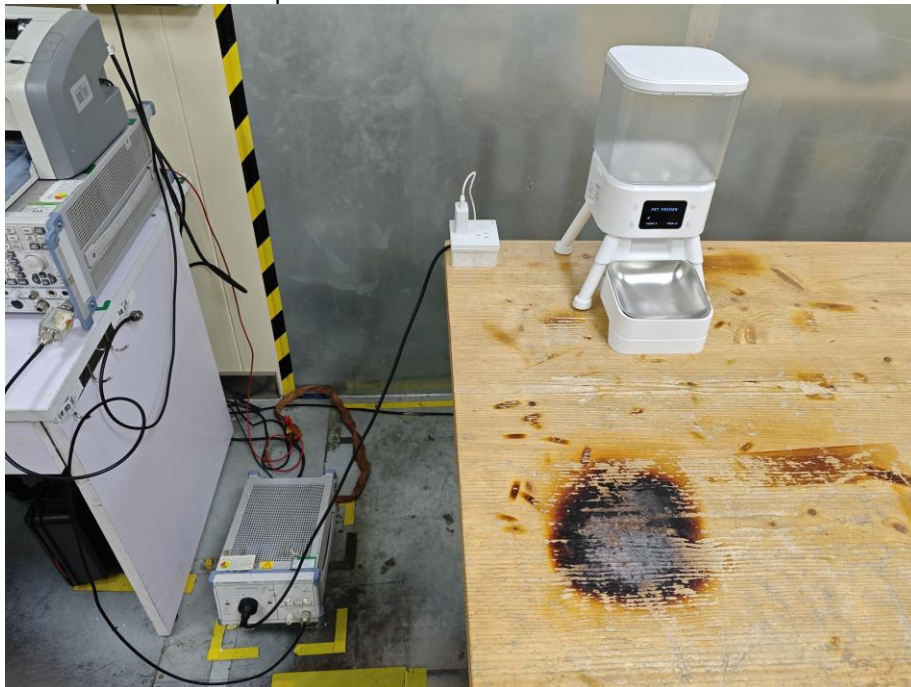
16. EUT Photographs**EUT Photo 1****EUT Photo 2**

NOTE: Appendix-Photographs Of EUT Constructional Details.

17. EUT Test Setup Photographs

Conducted Emissions Photo

Adapter Model: TPA-418G050100UU01



Adapter Model: YMK-10W050100



Adapter Model: QL010-0501000UU



Radiated Measurement Photos

Adapter Model: TPA-418G050100UU01



Adapter Model: YMK-10W050100



Adapter Model: QL010-0501000UU





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.

Address:

1-2/F., Building B, Pengzhou Industrial Park, No.158, Fuyuan 1st Road, Zhancheng, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China

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FAX: 0755-33229357

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Complaint/Advice E-mail: advice@bctc-lab.com.cn

***** END *****