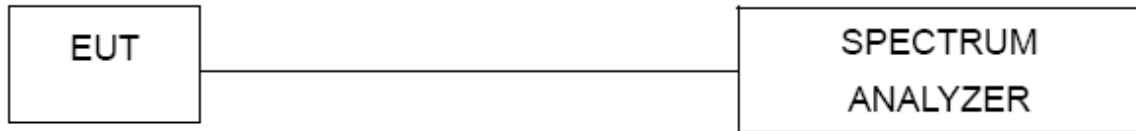


## 11. Out Of Band Emissions

### 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.

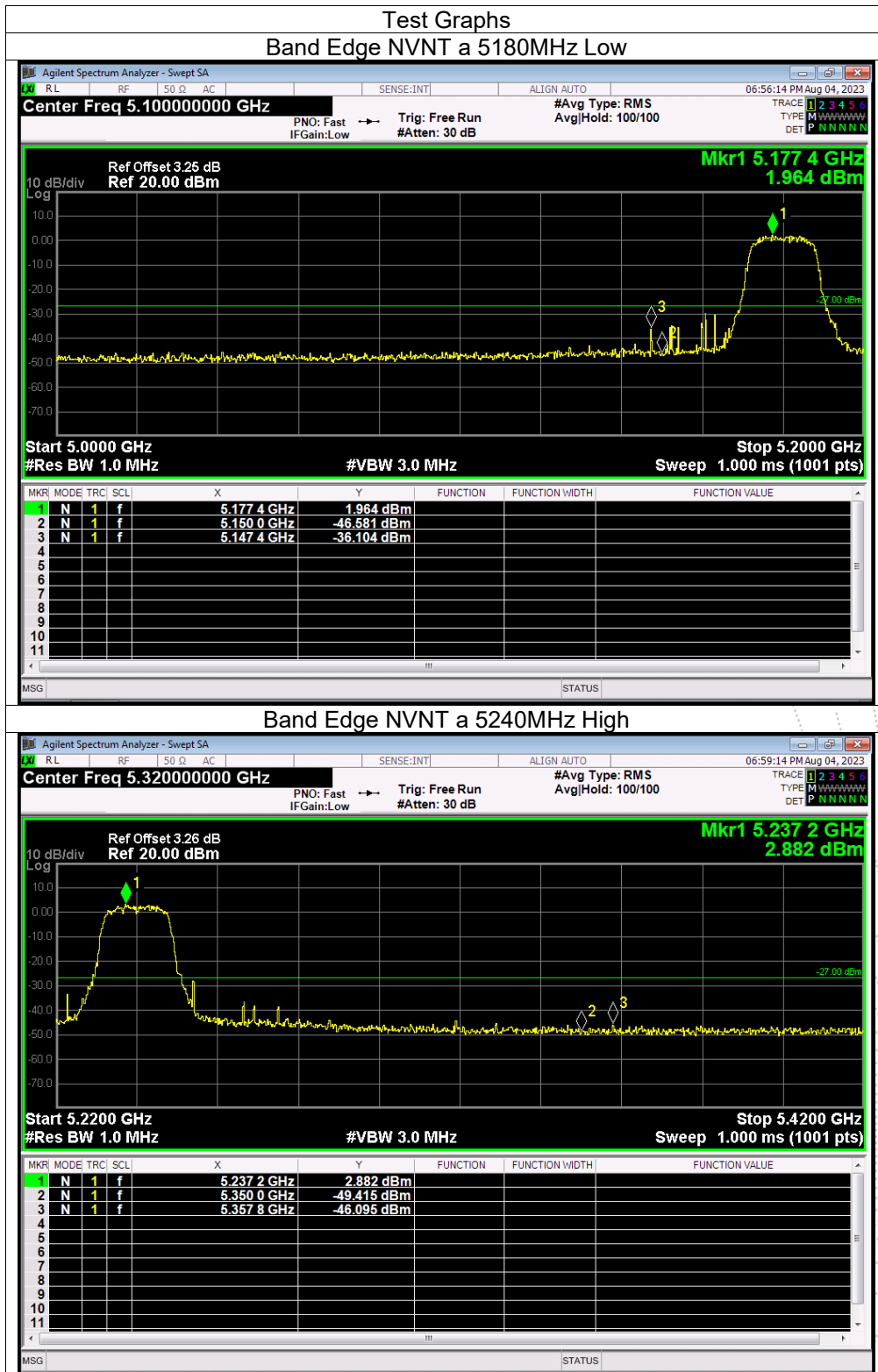
### 11.3 Test Procedure

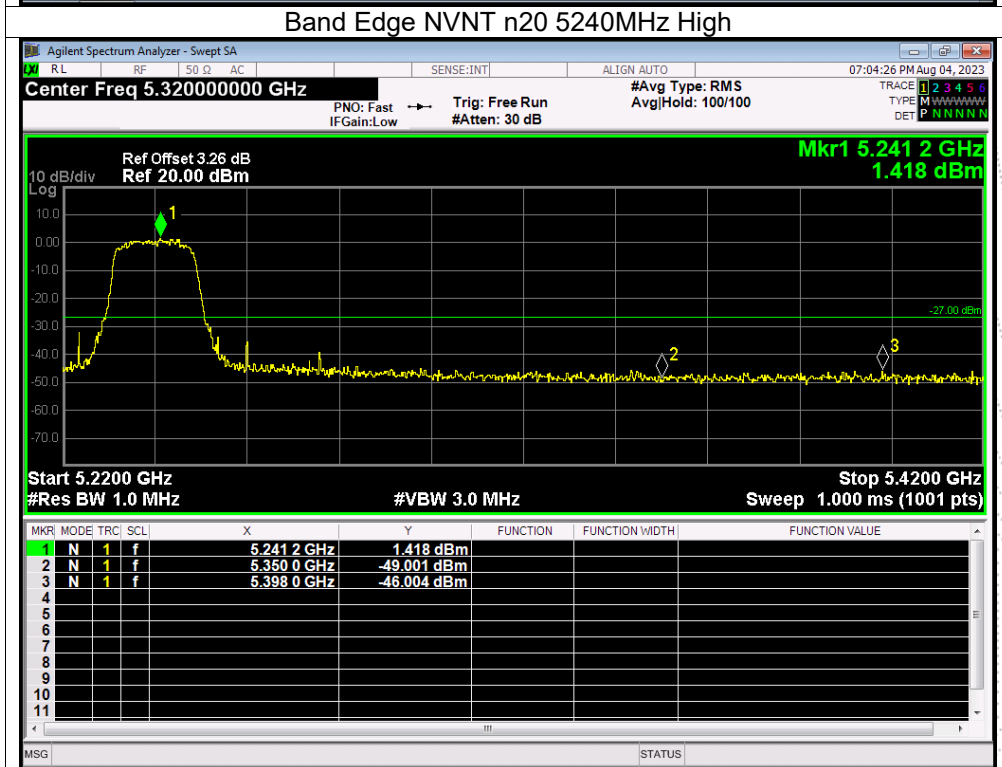
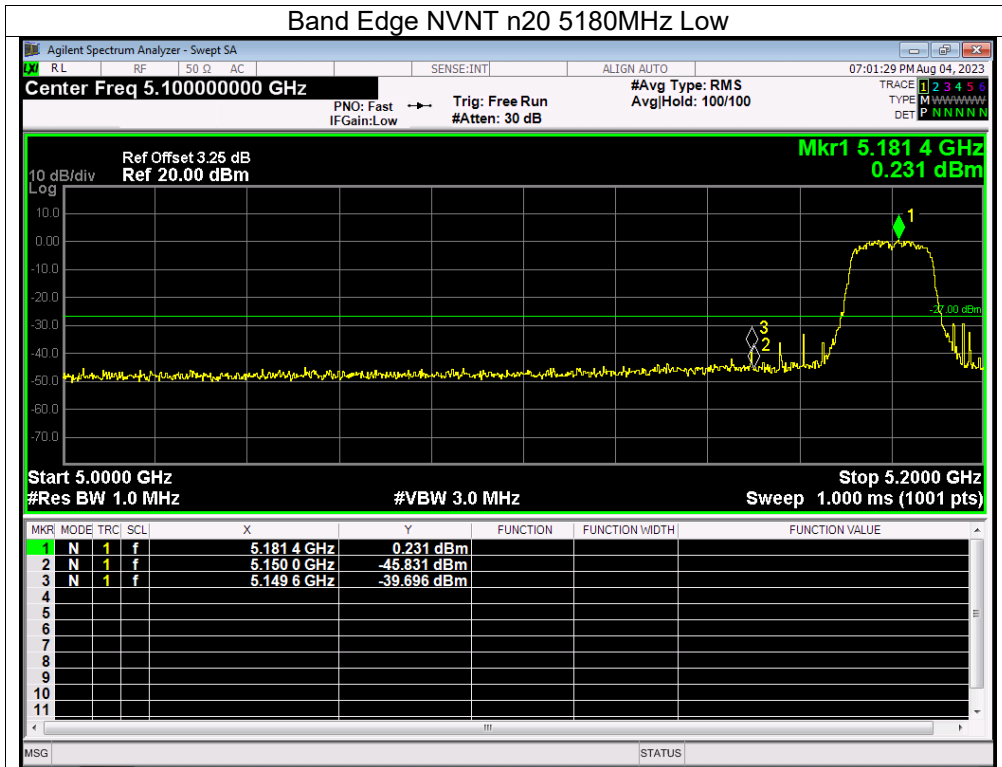
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then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

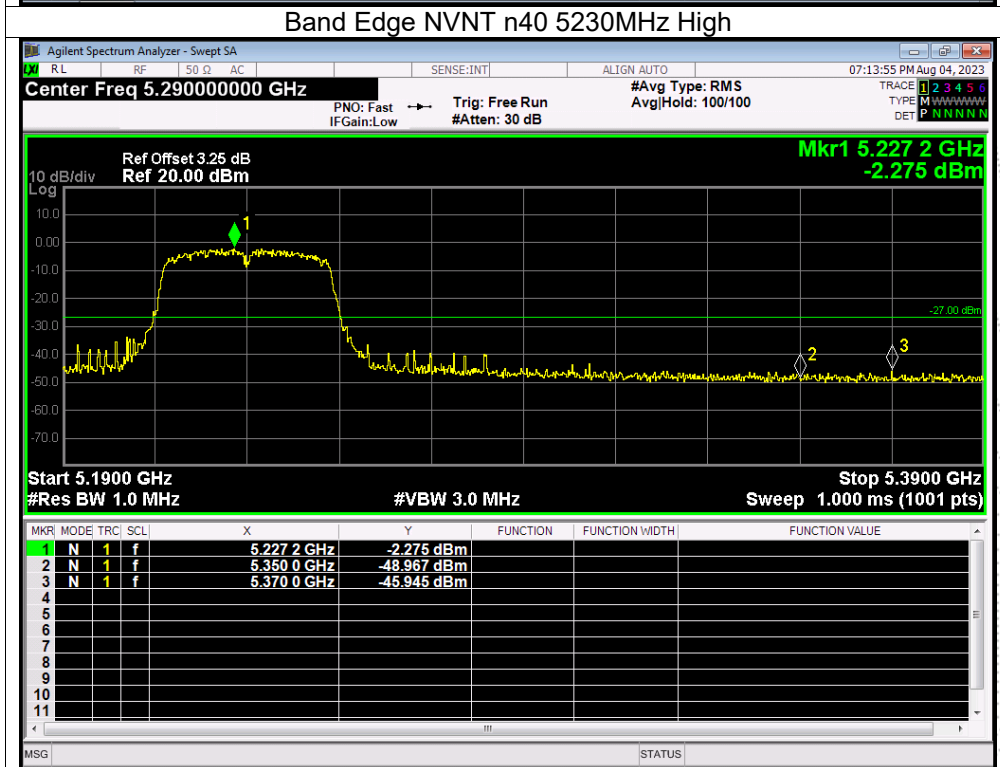
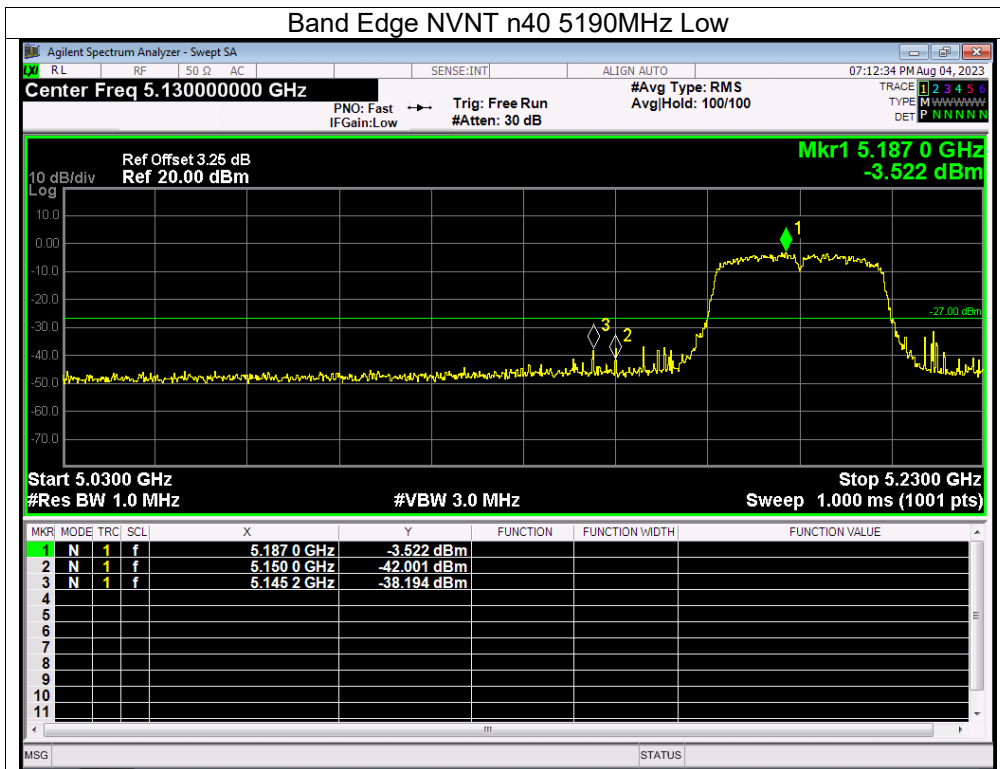
### 11.4 EUT Operating Conditions

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

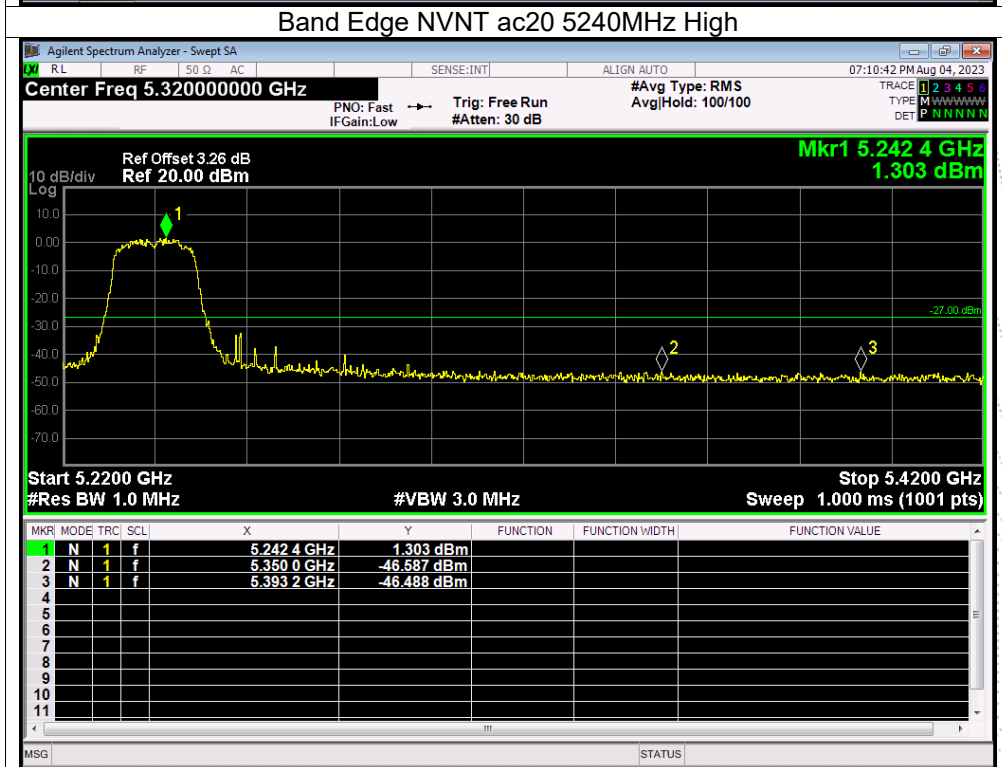
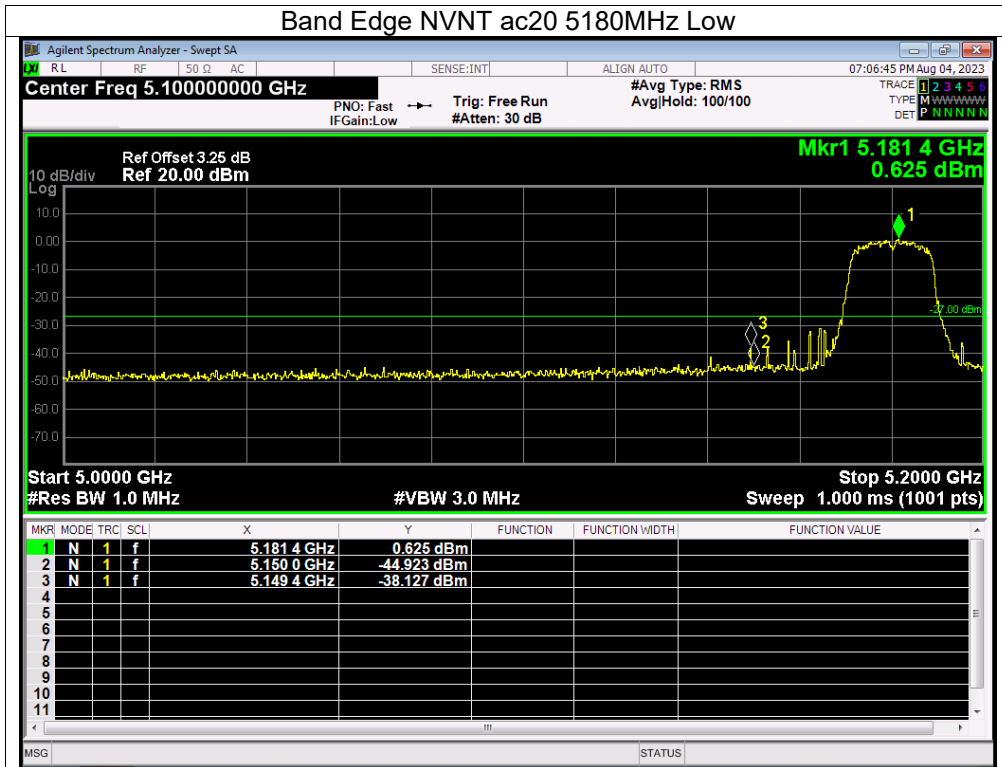
## 11.5 Test Result

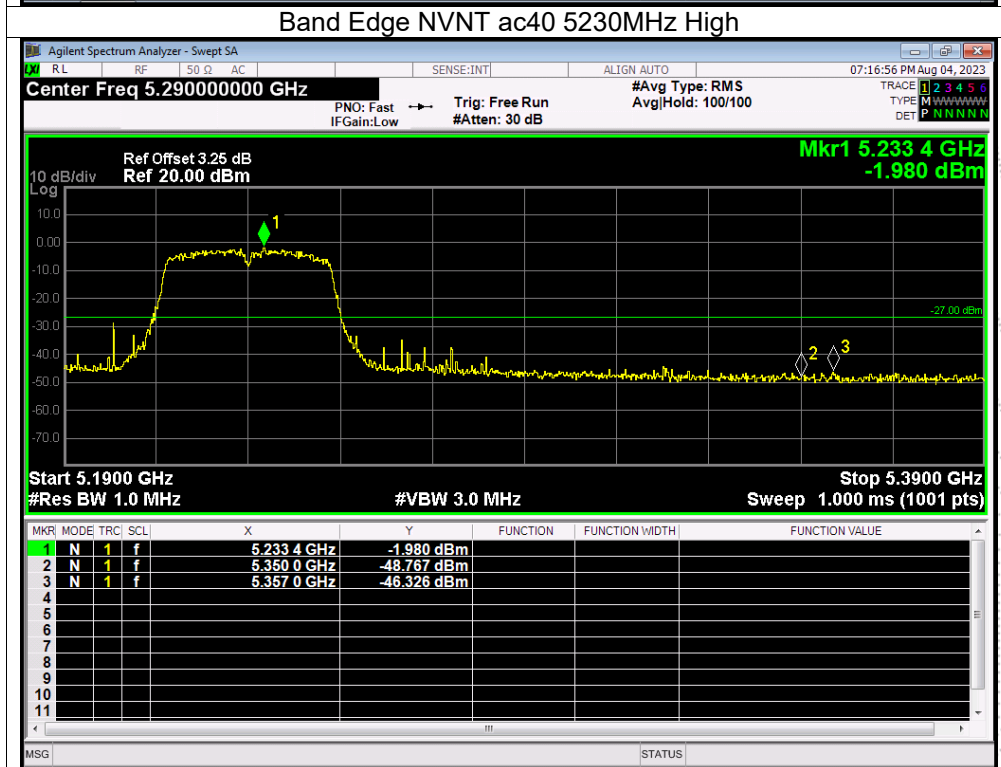
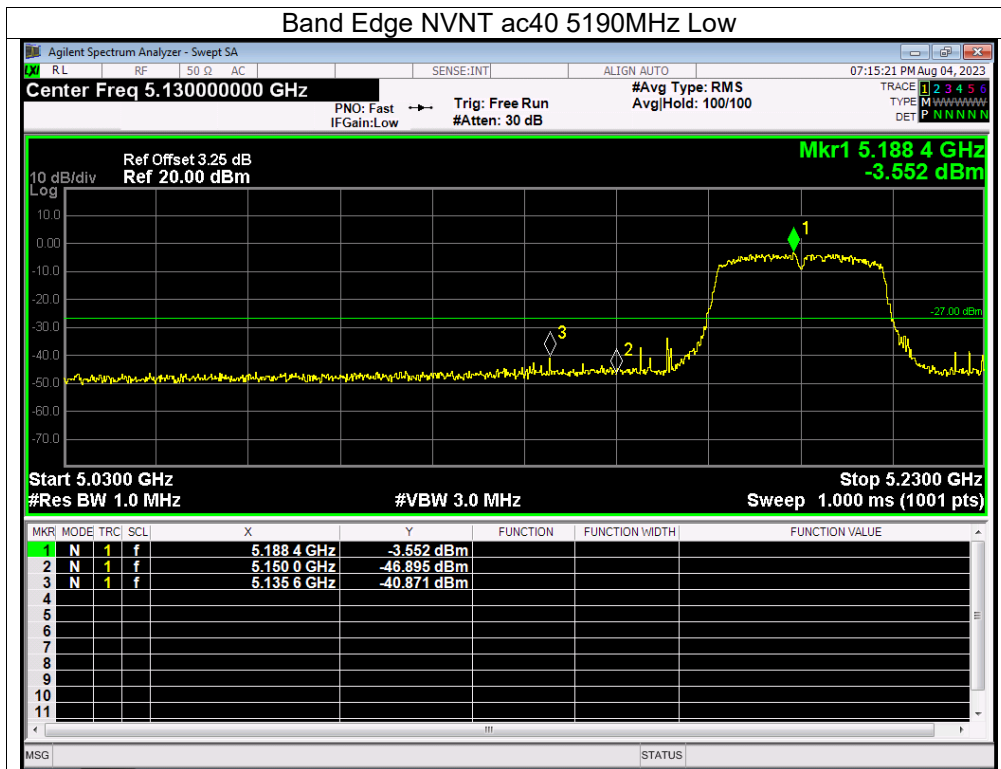


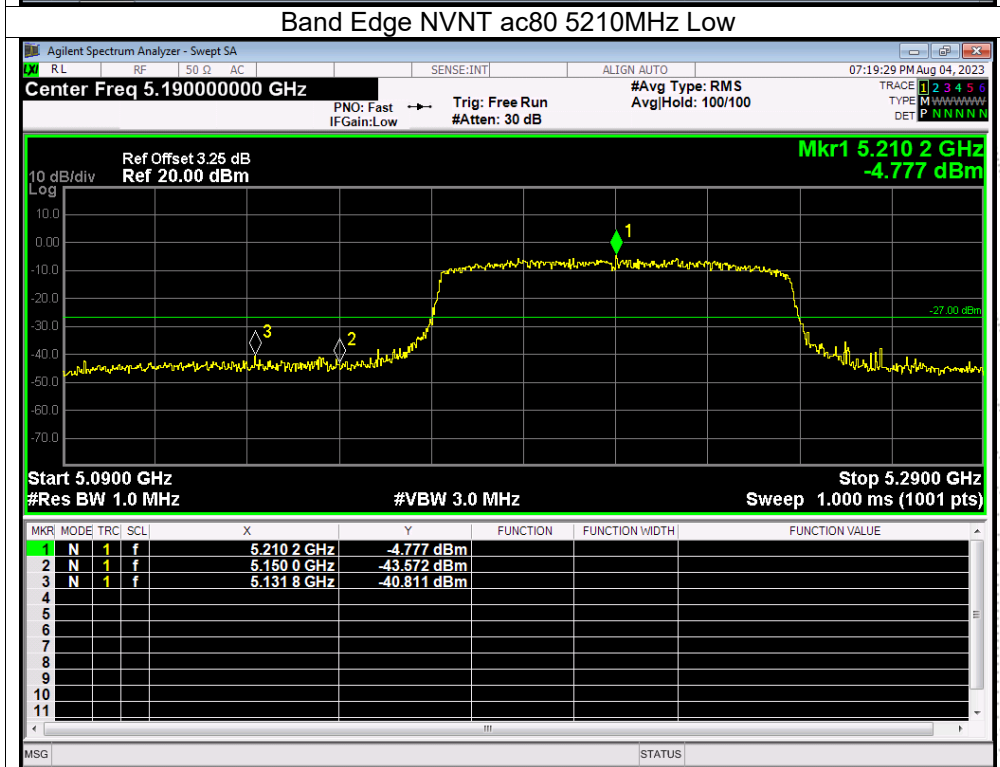
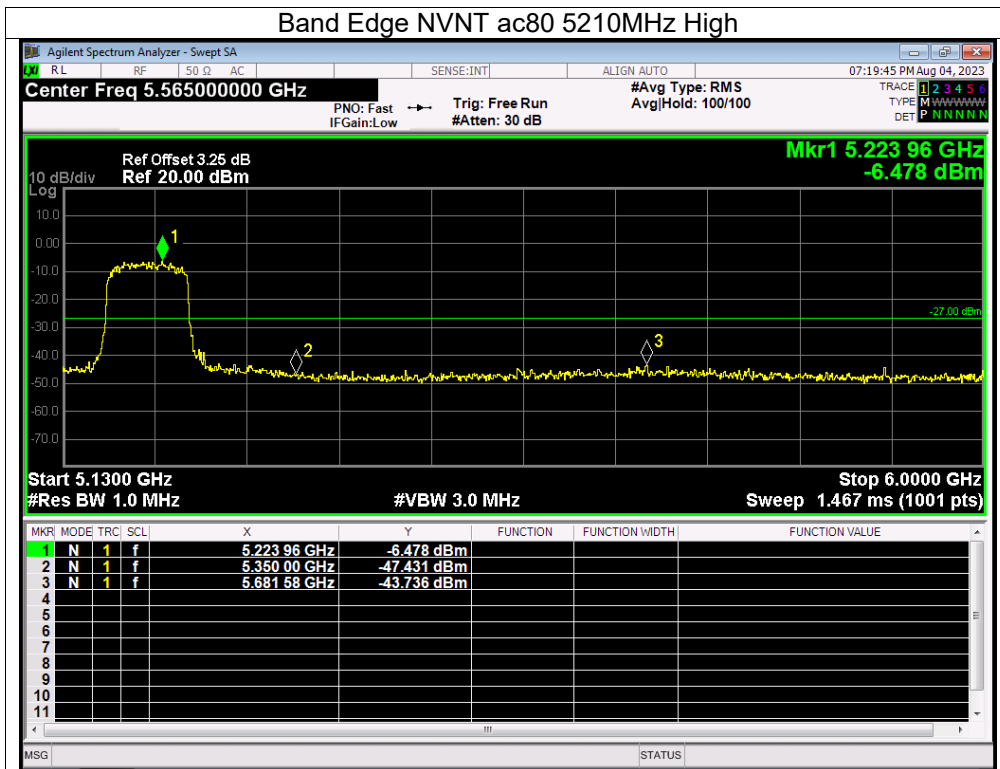


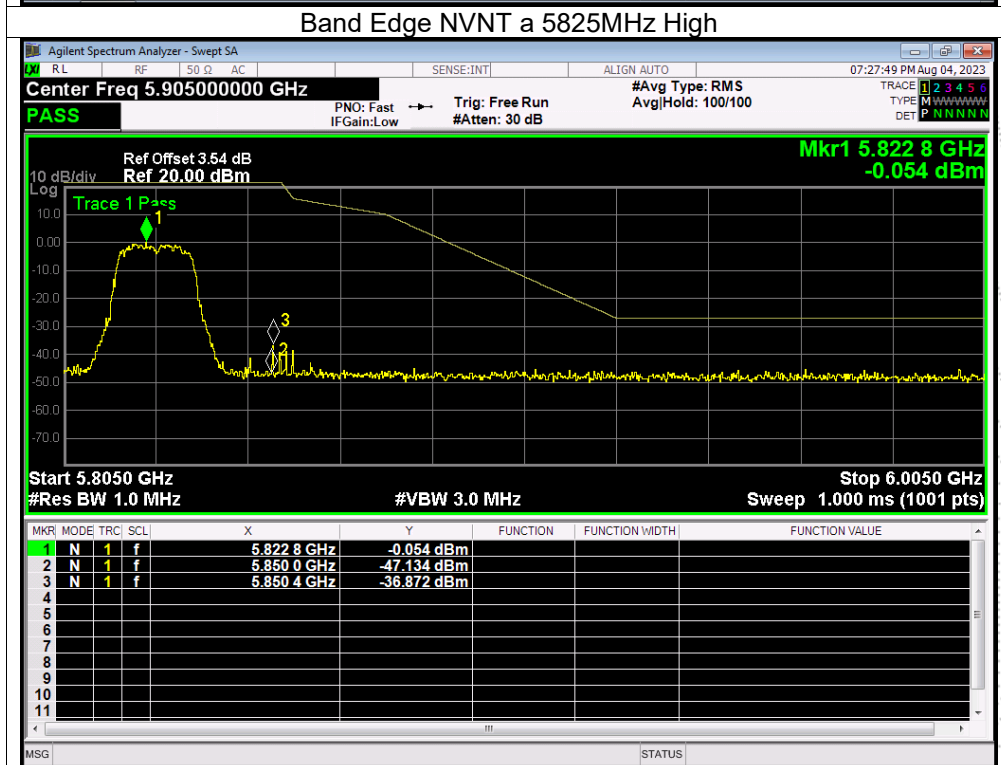
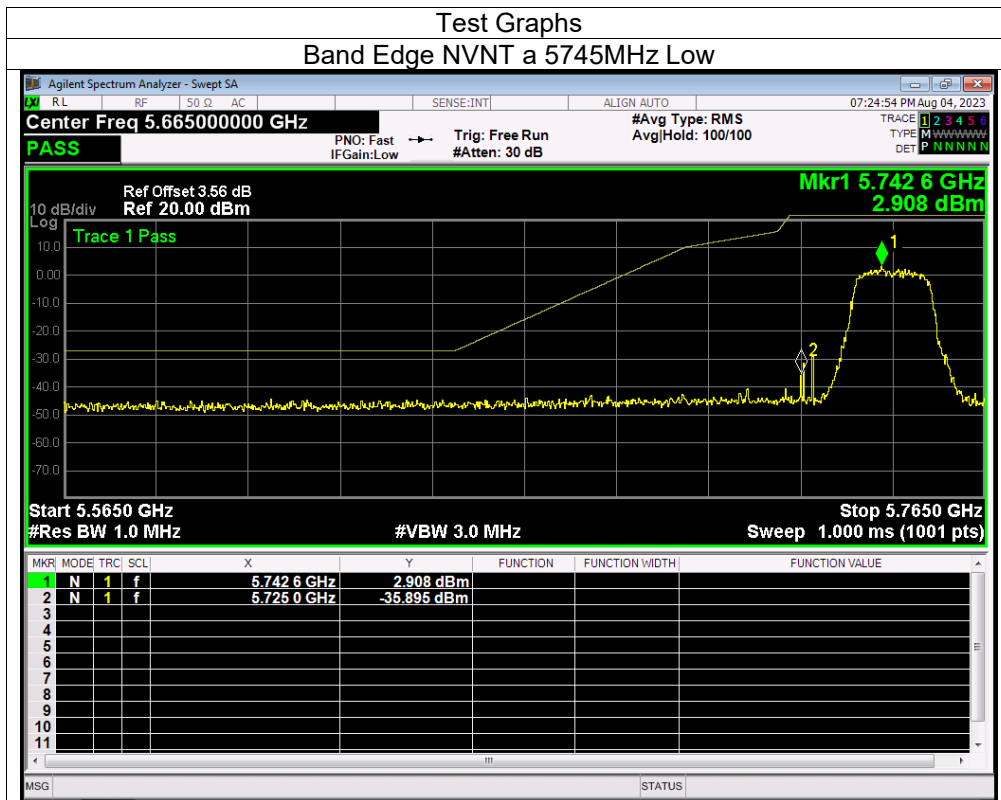


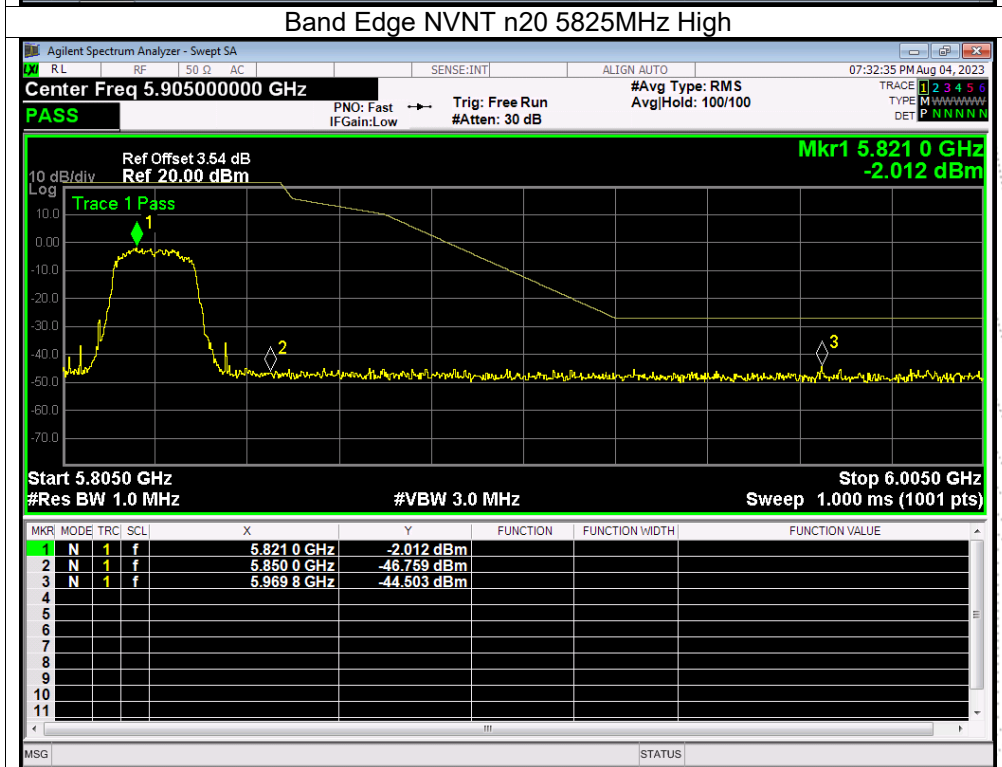
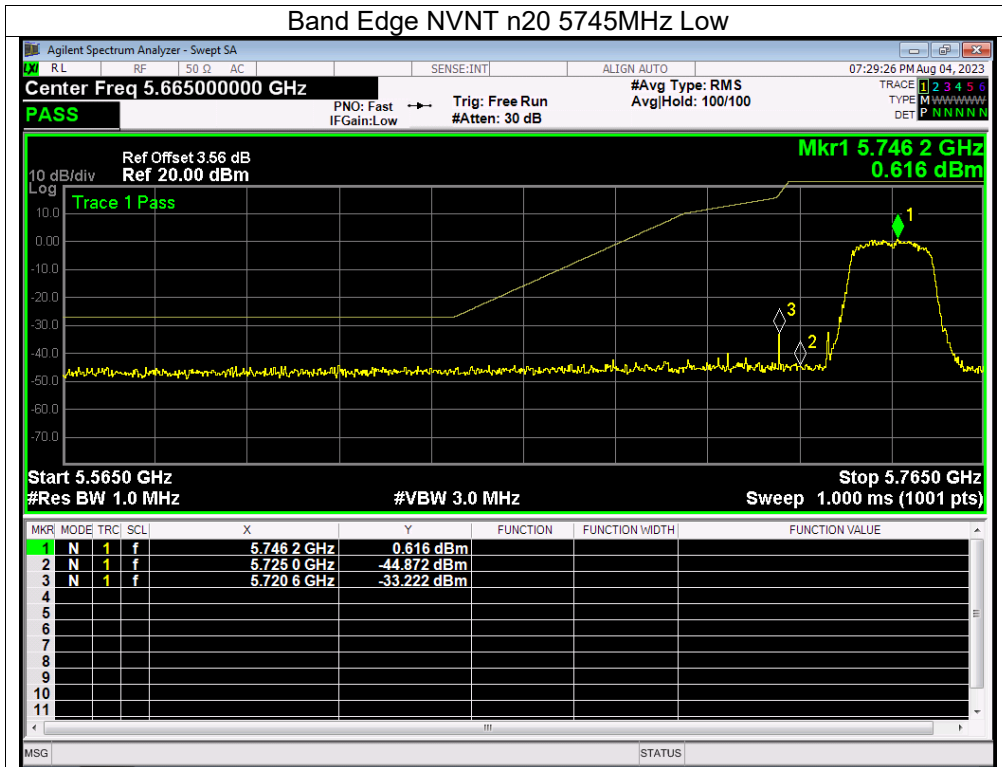


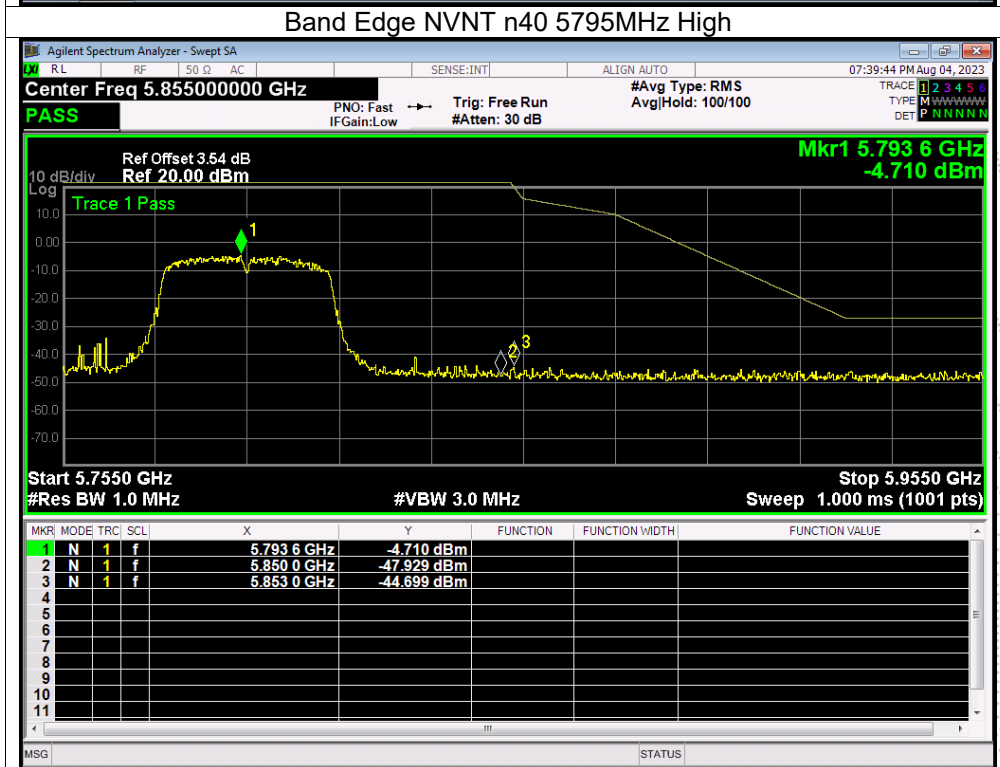
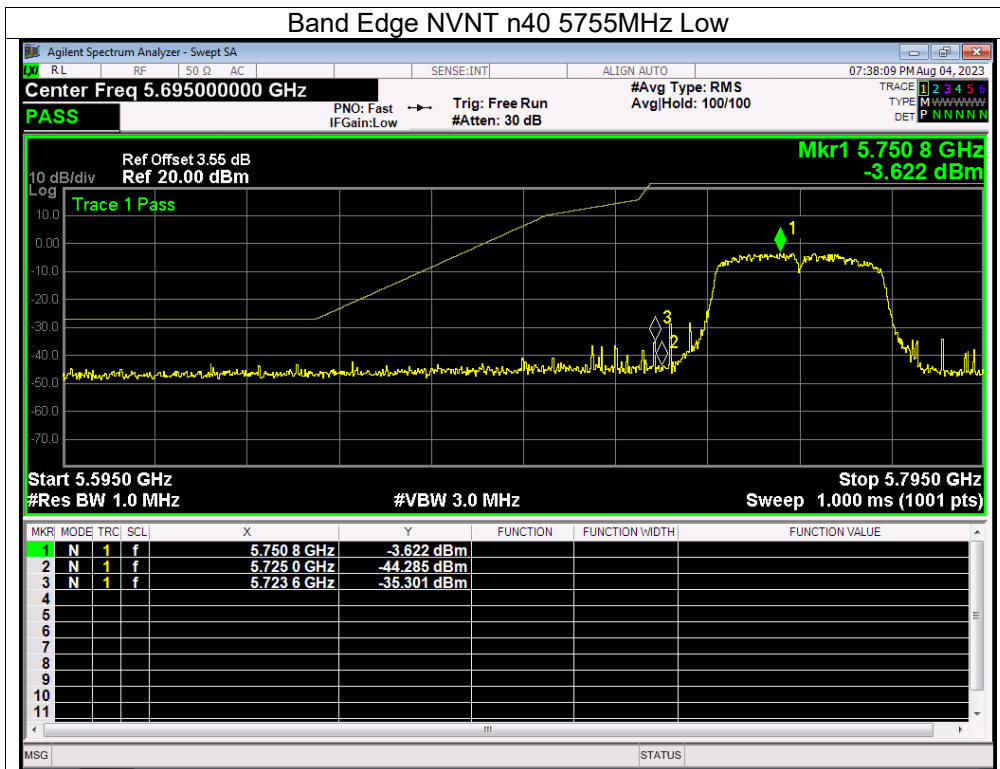


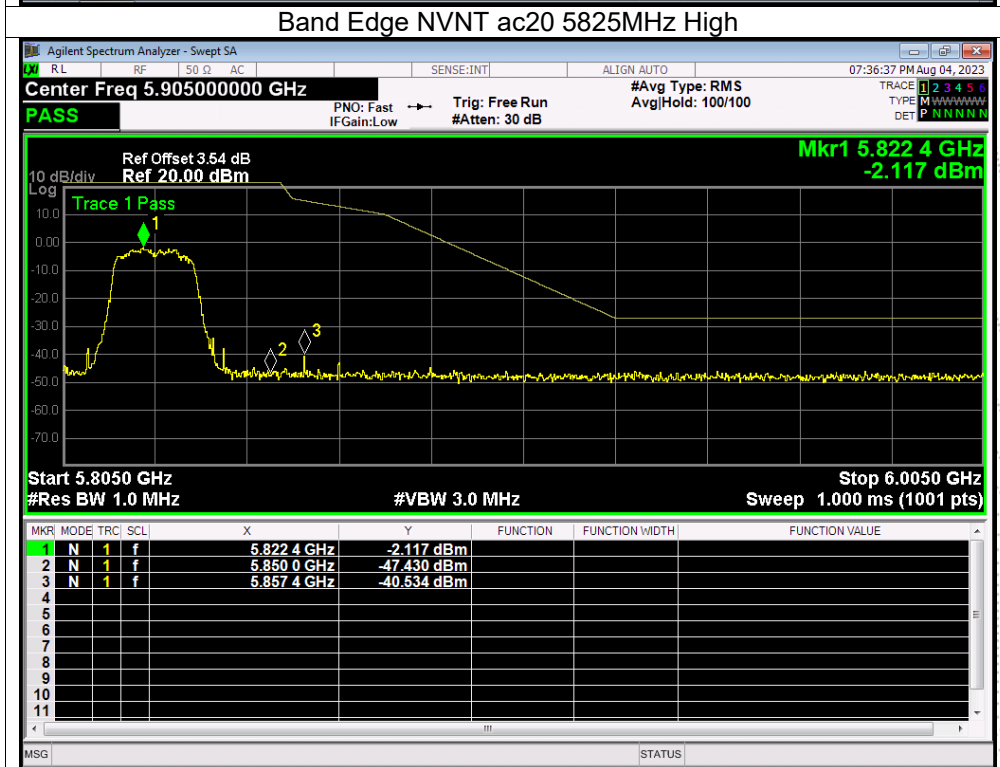
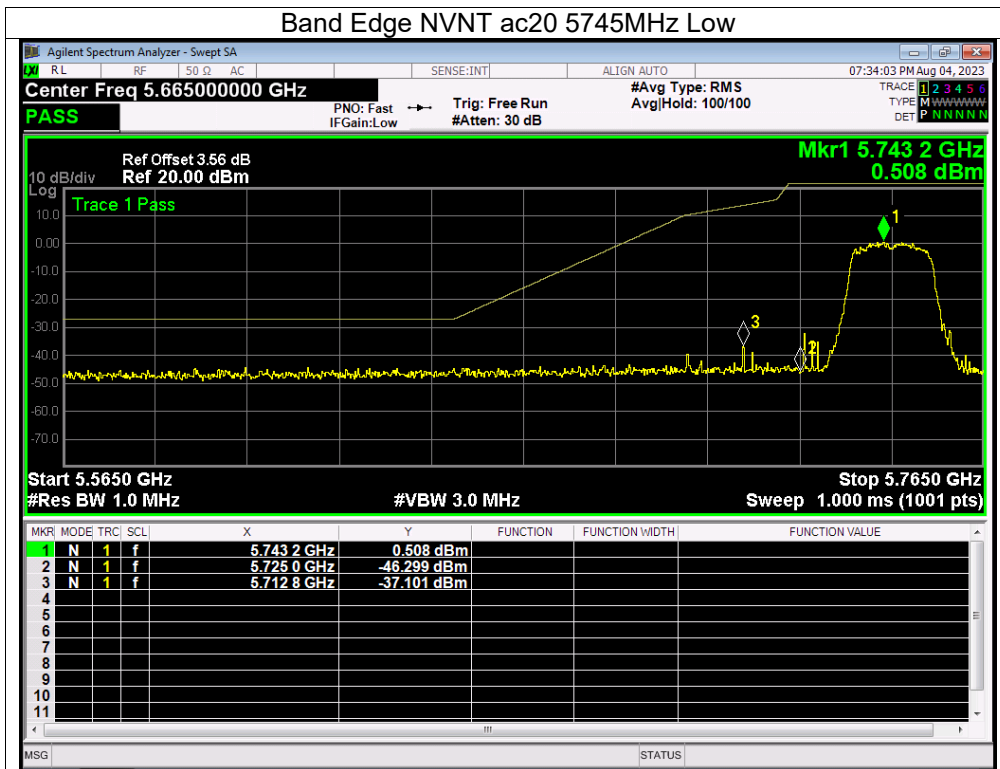


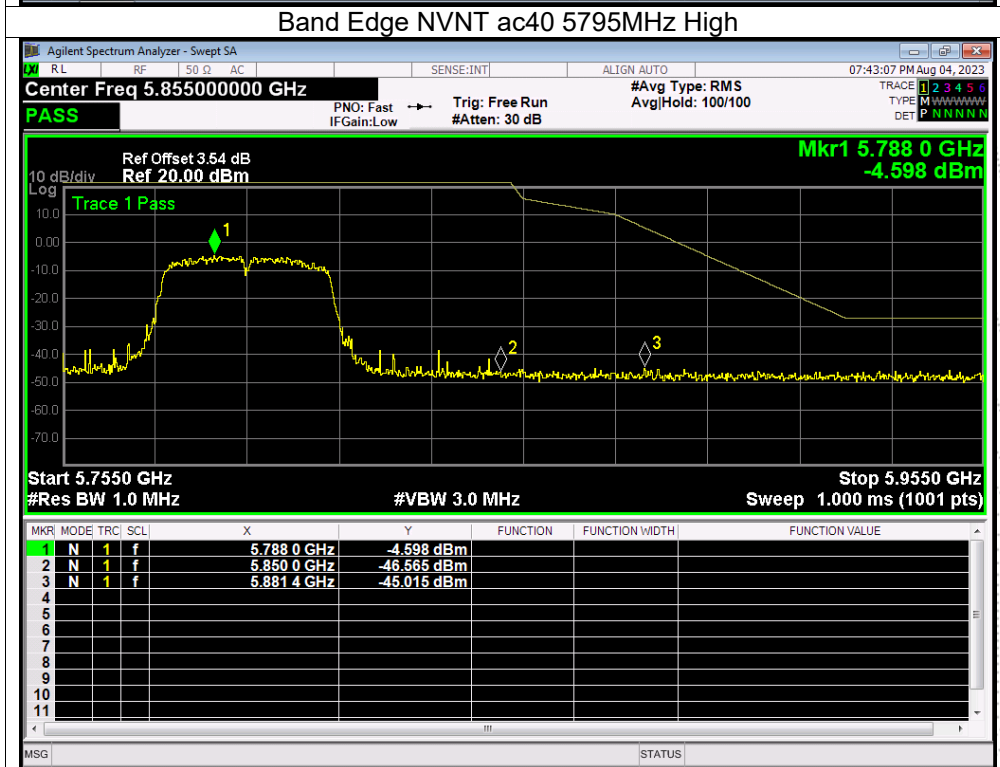
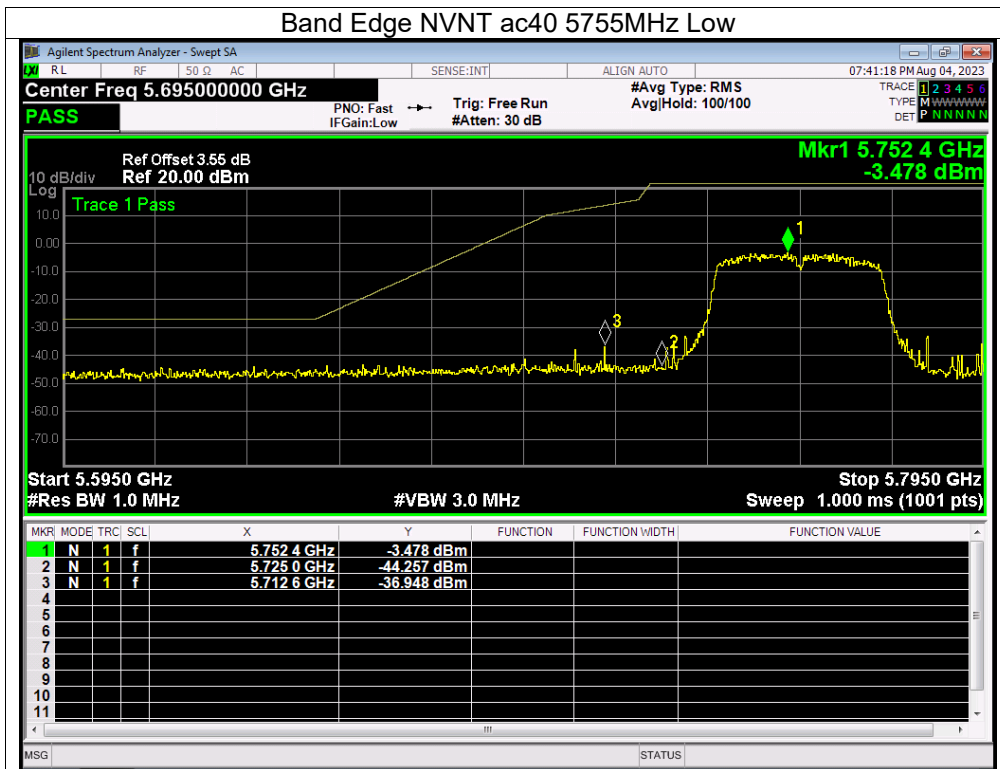




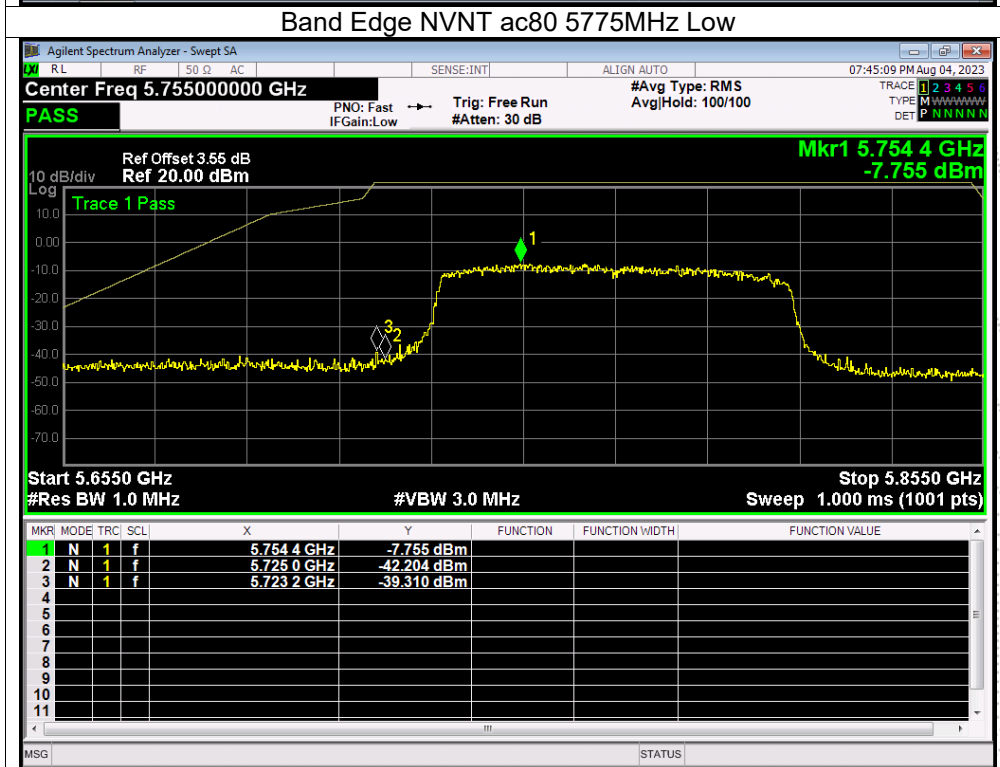
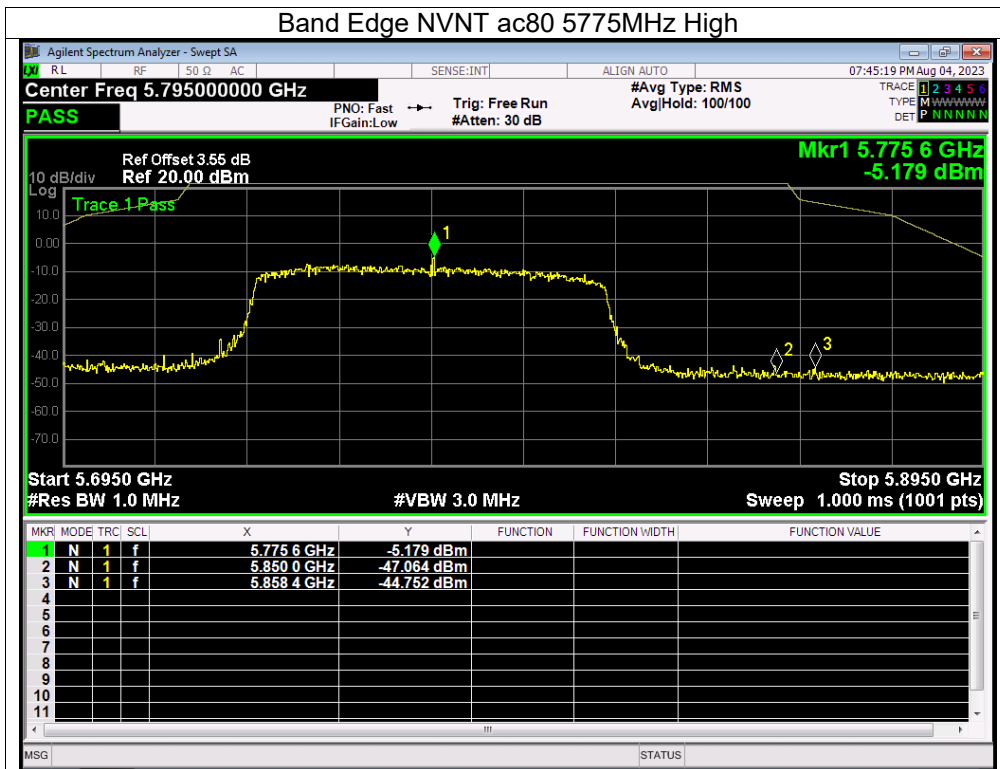












## 12. Spurious RF Conducted Emissions

### 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..

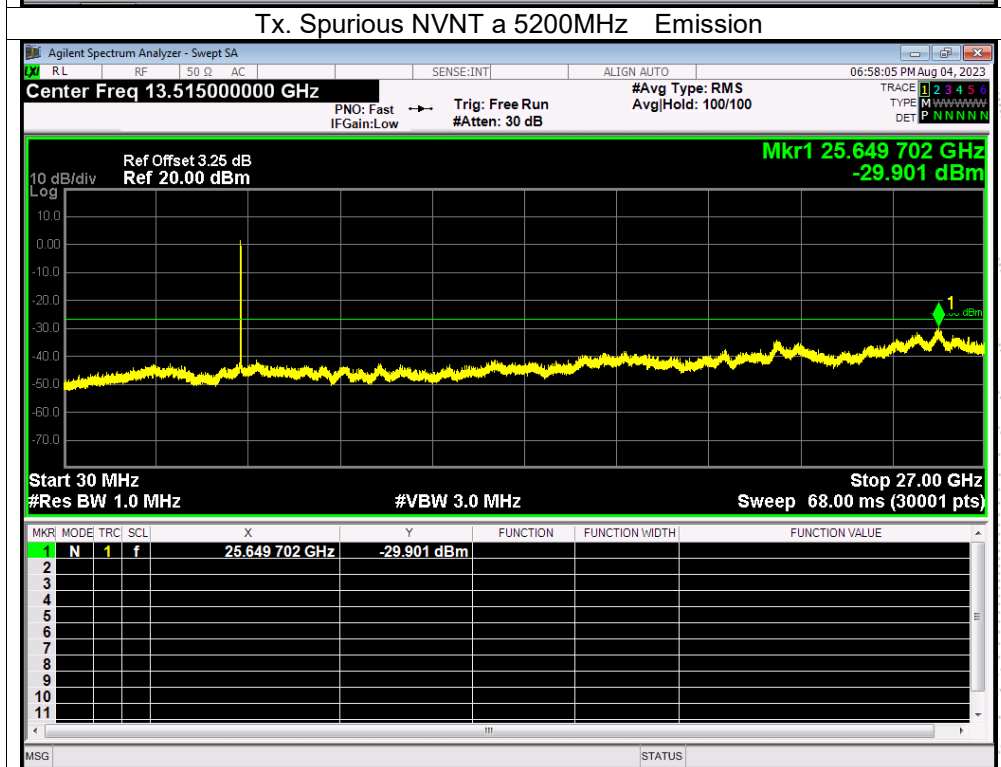
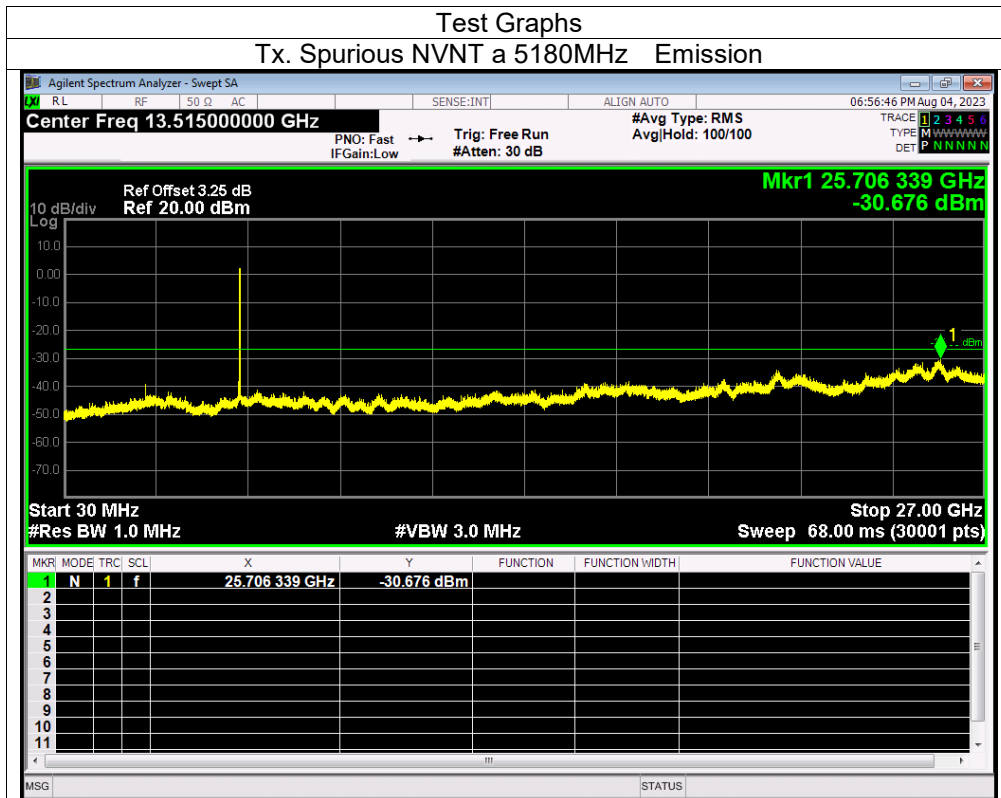
### 12.3 Test Procedure

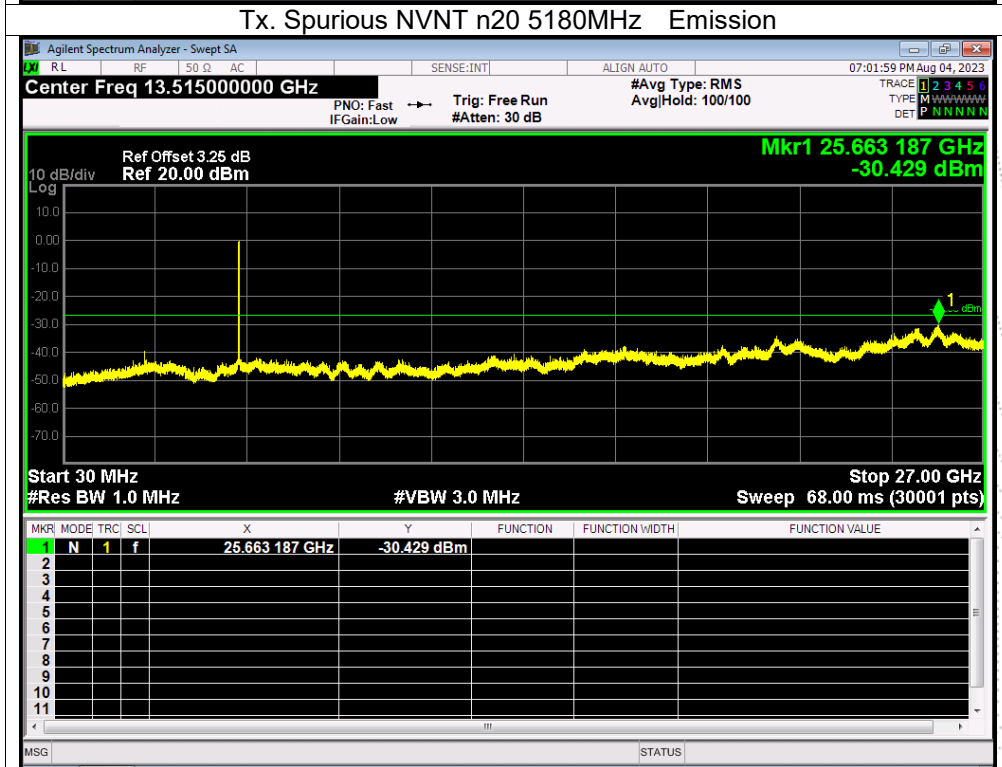
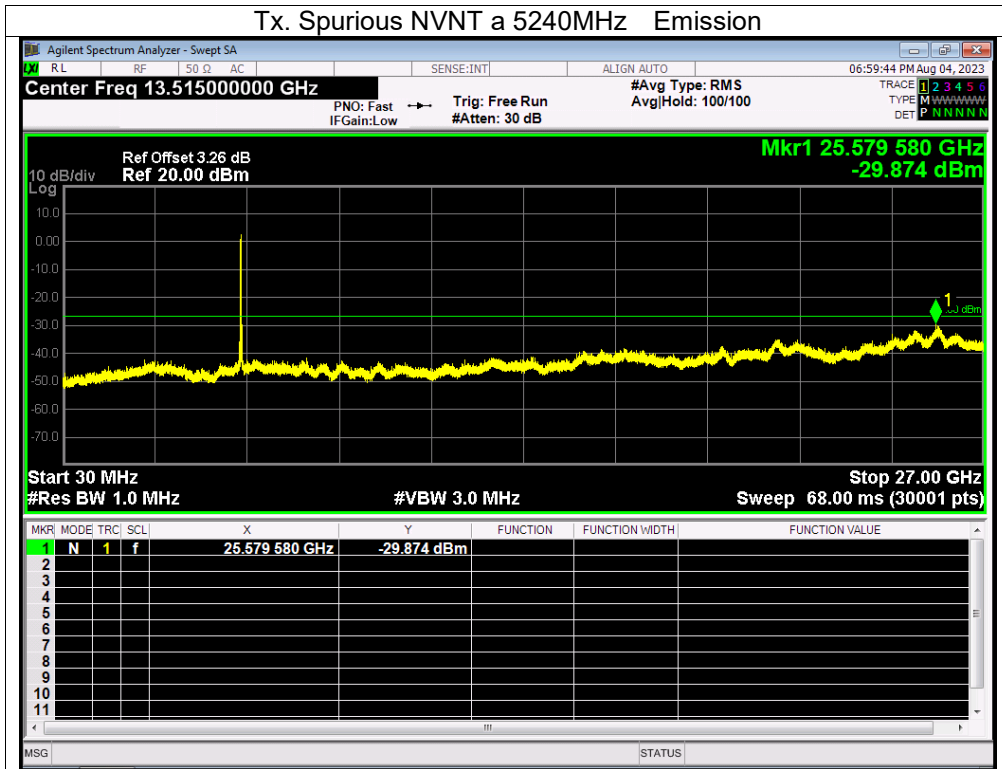
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then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

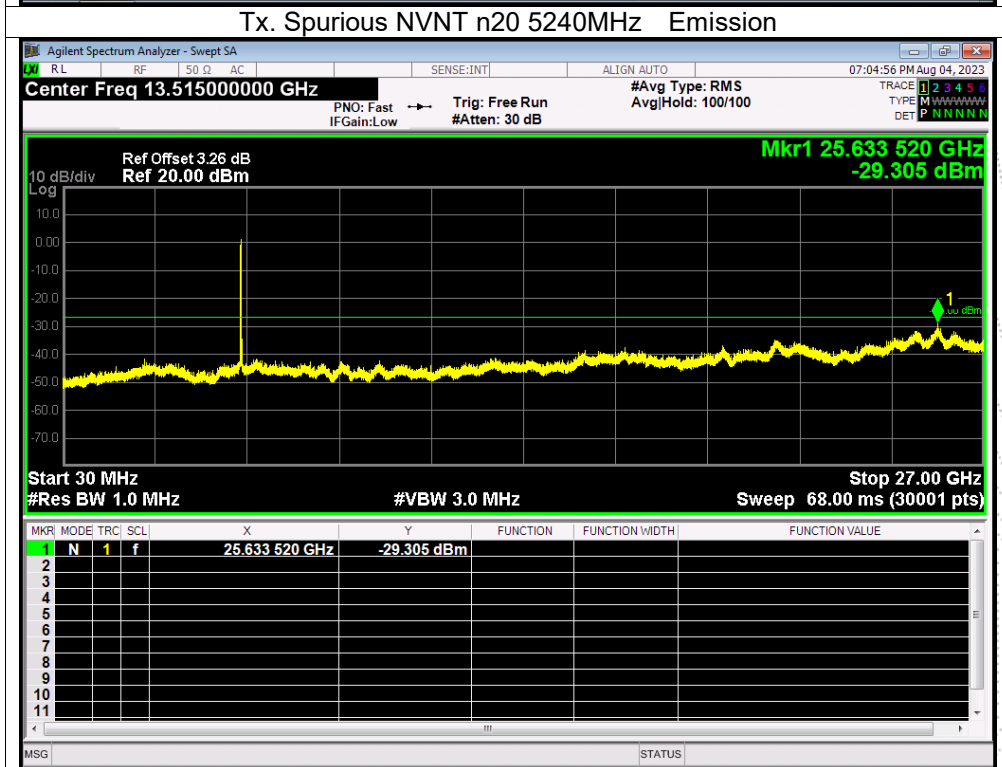
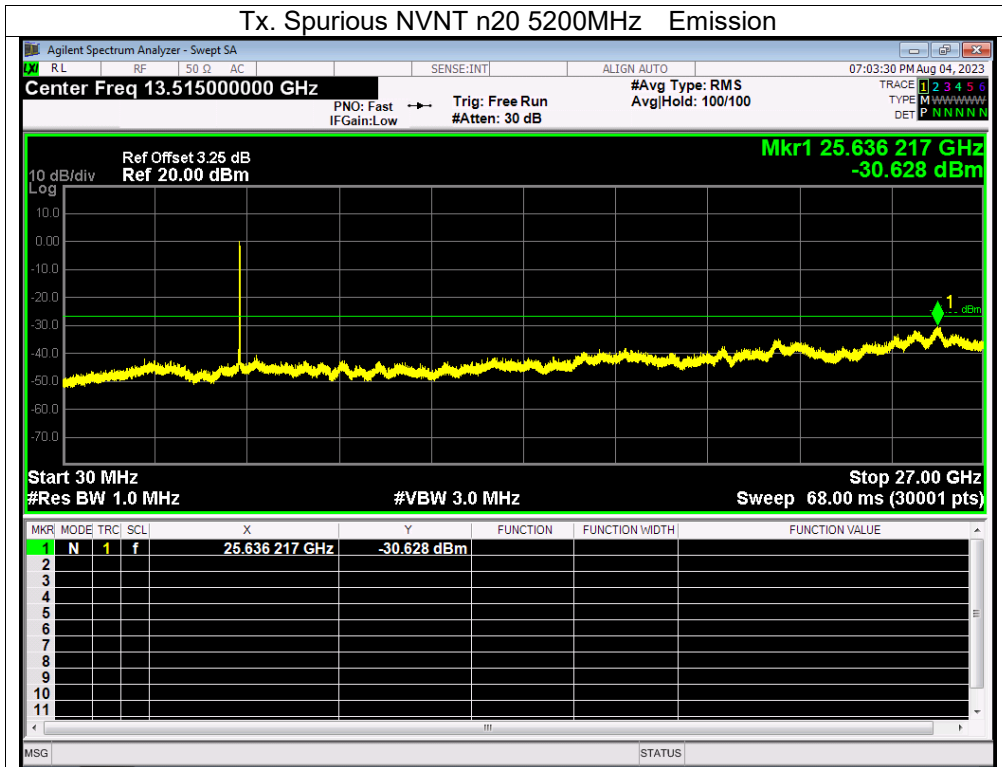
### 12.4 Test Result

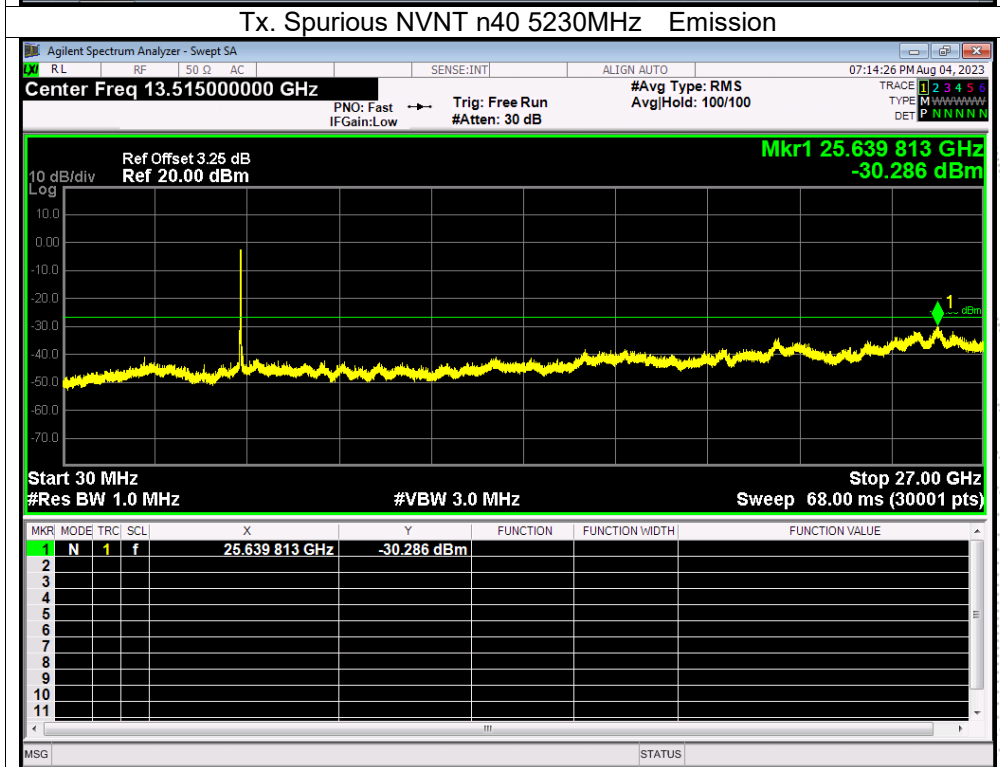
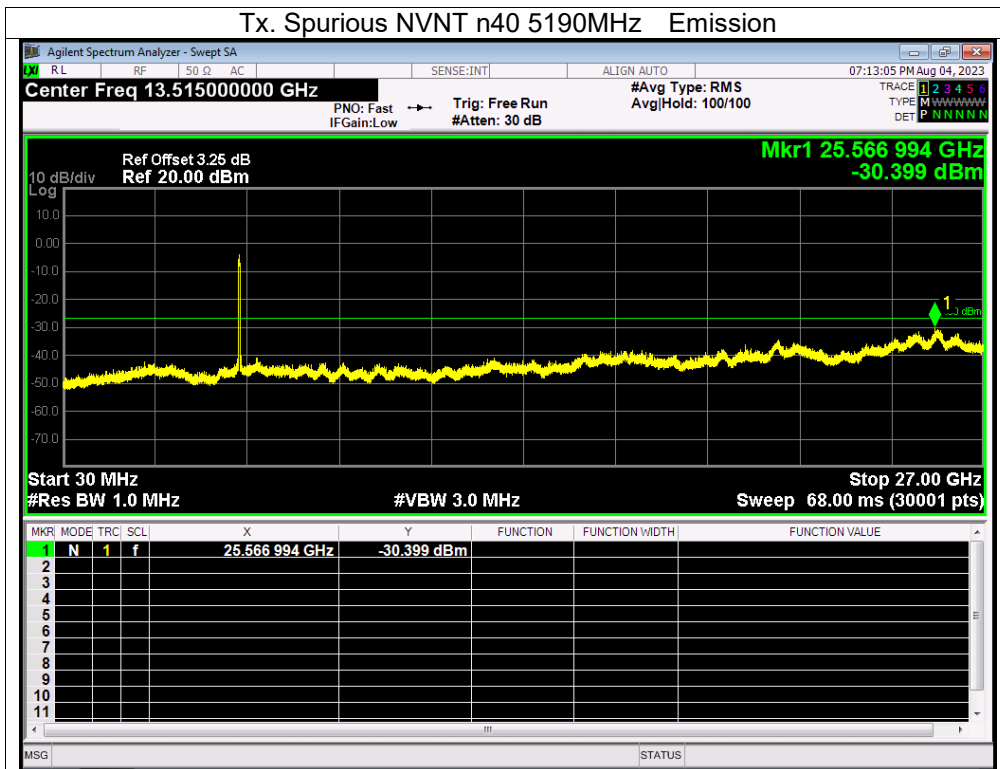
Remark: The measurement frequency range is from 9KHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions and band edge measurement data.

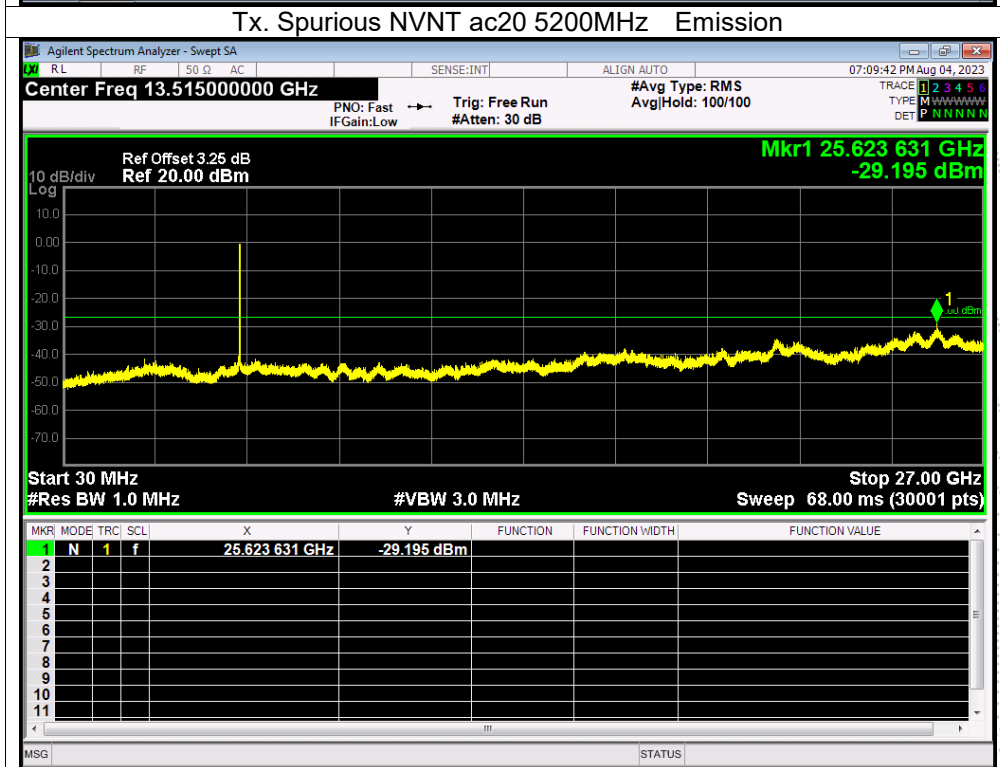
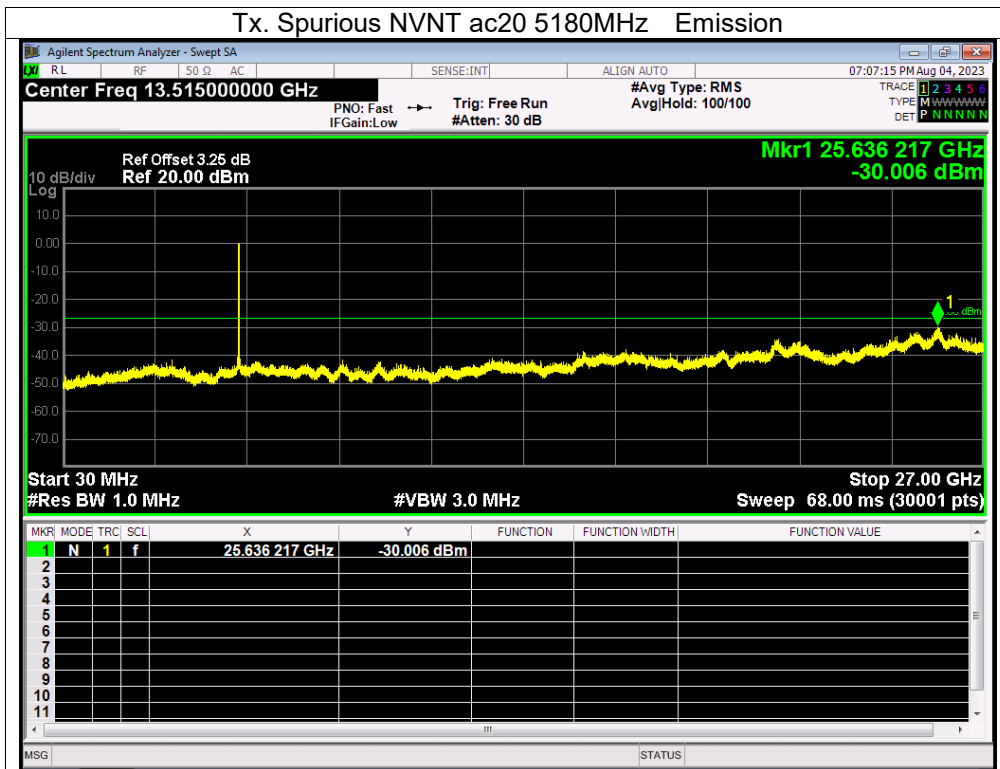
About: 26.5GHz-40GHz, The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

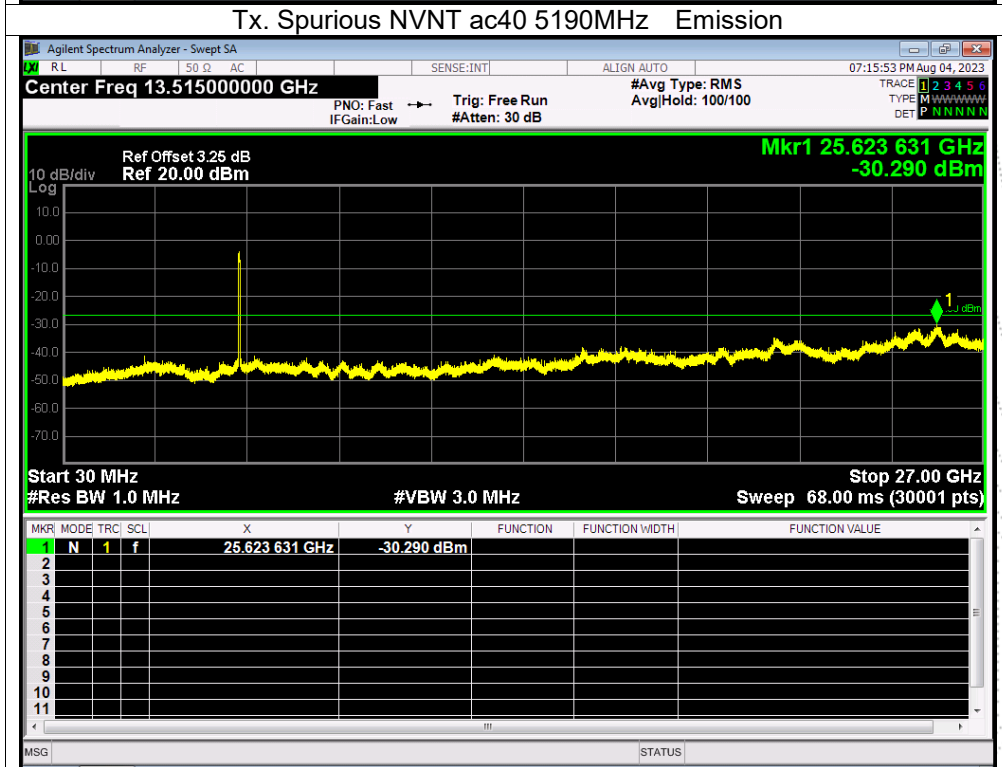
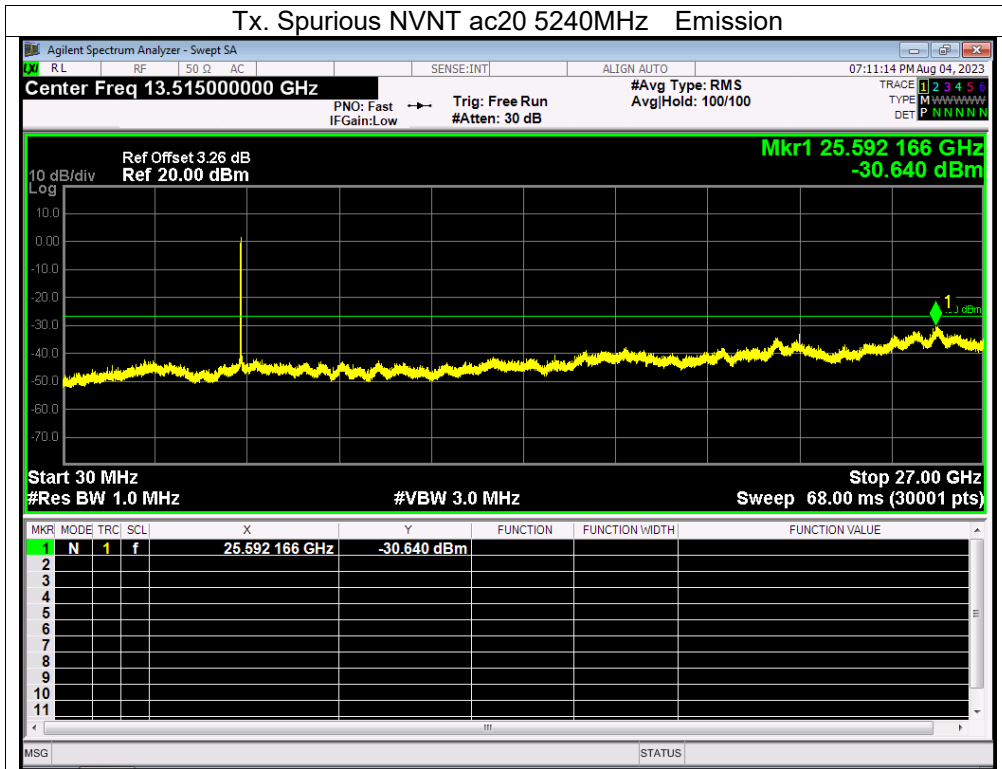




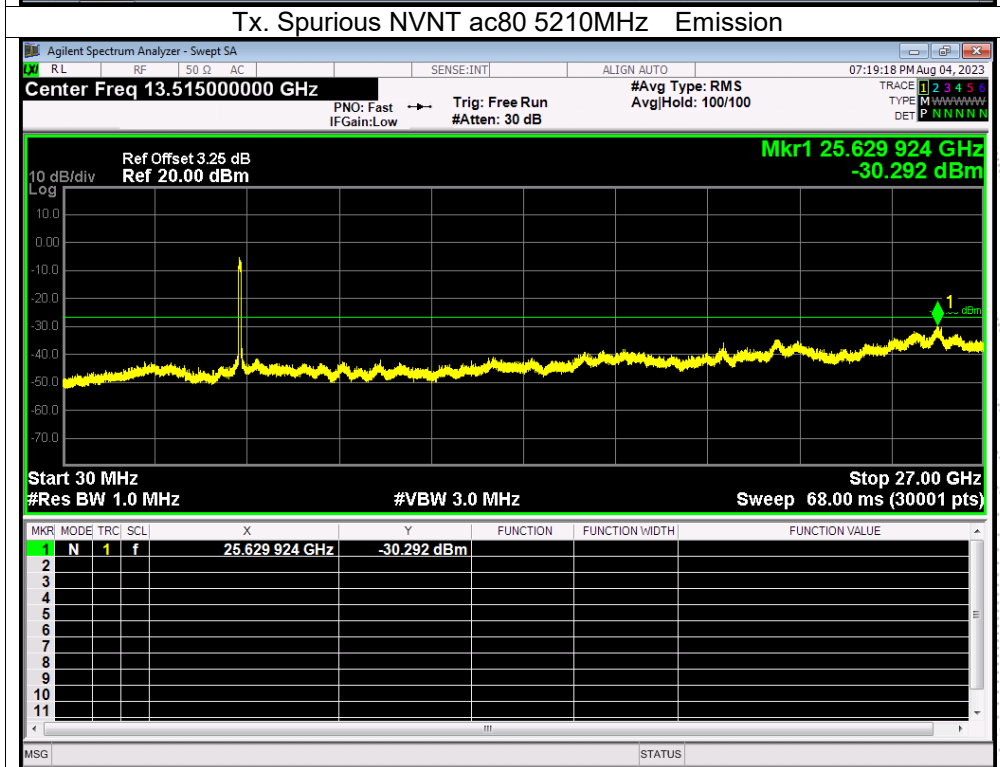
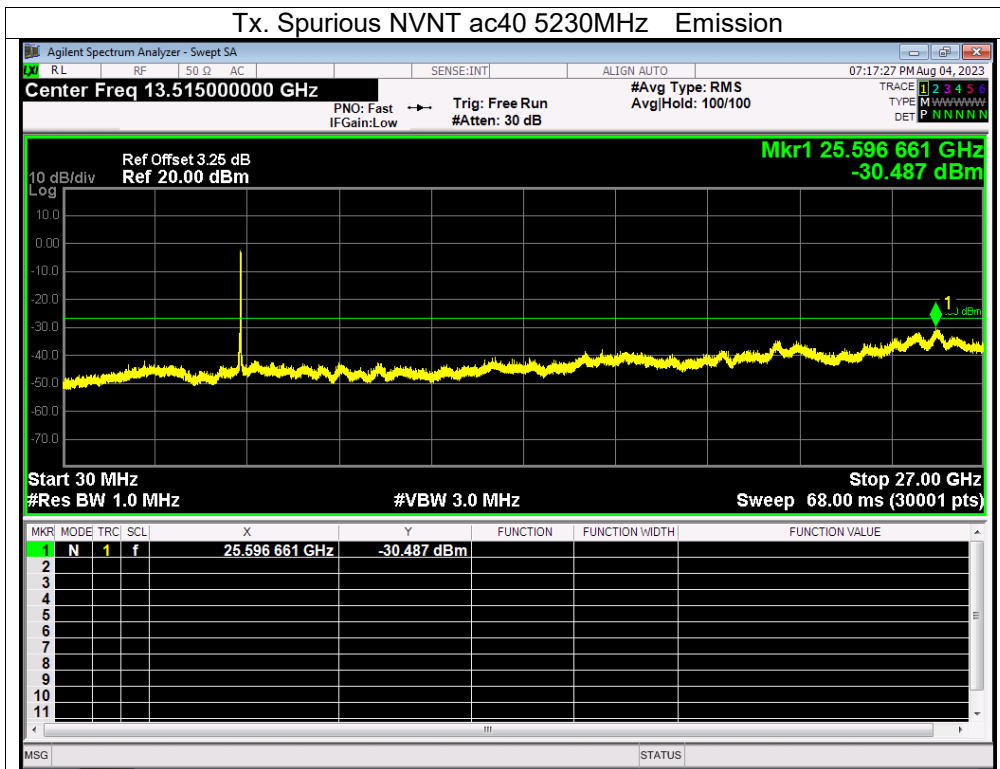


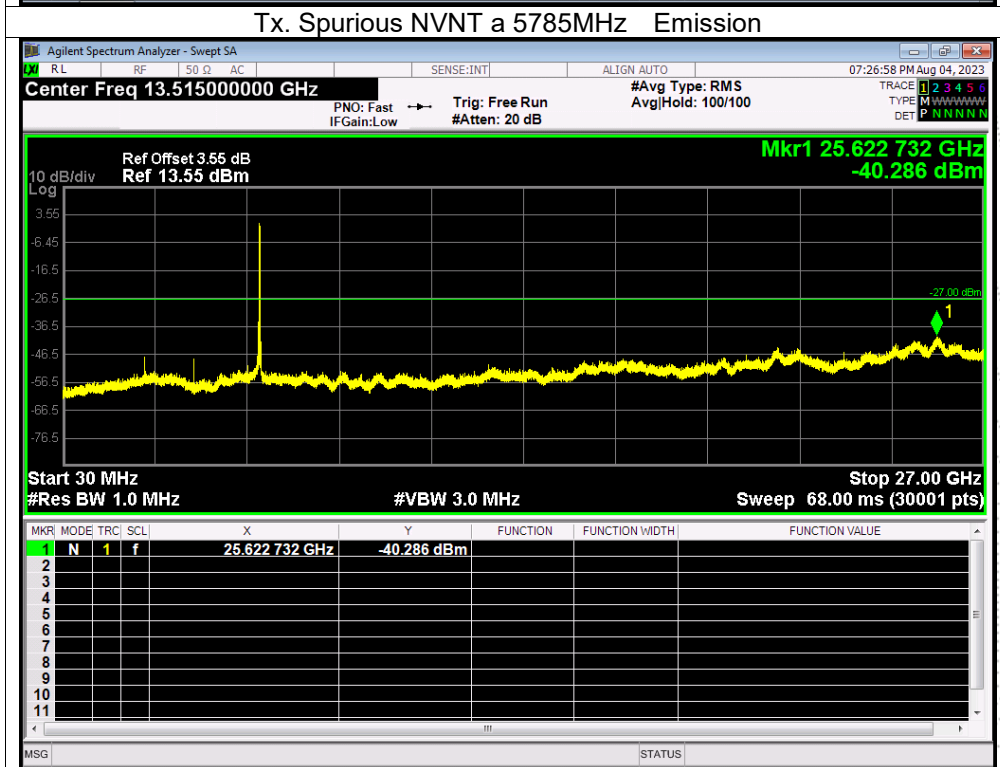
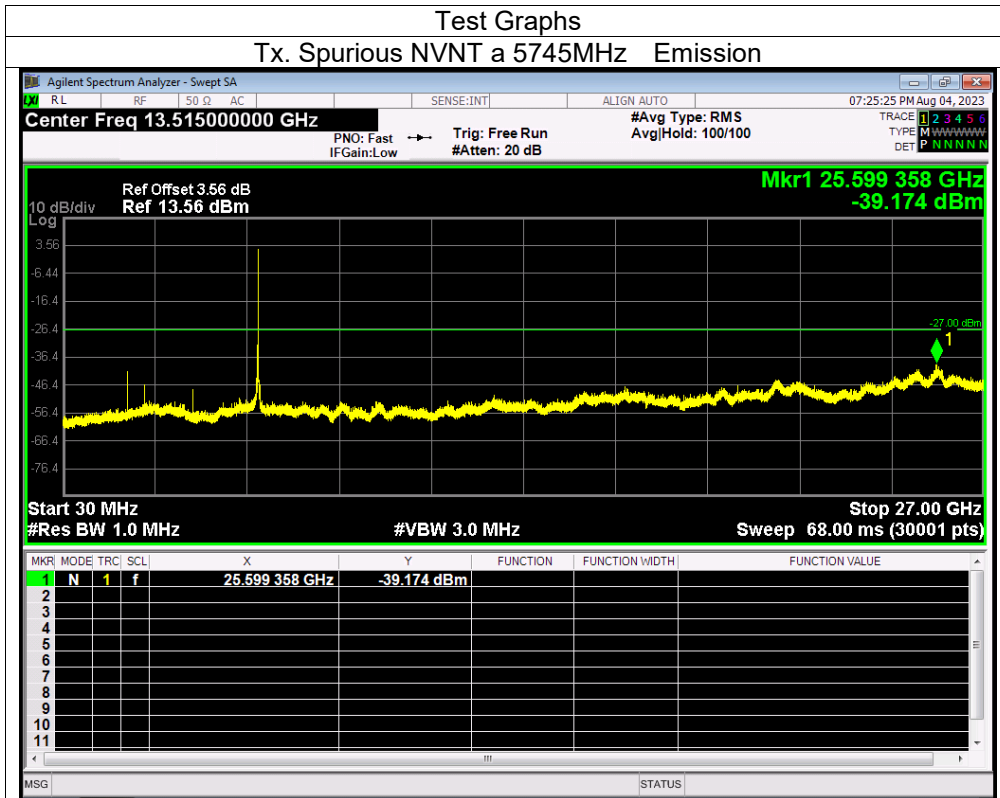


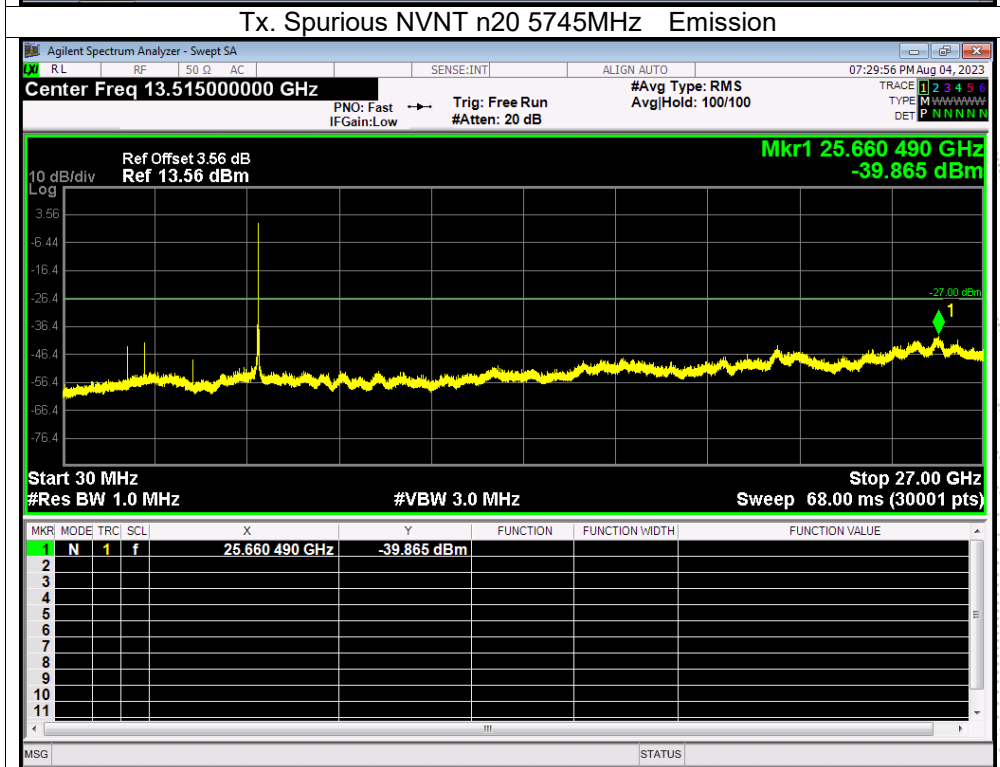
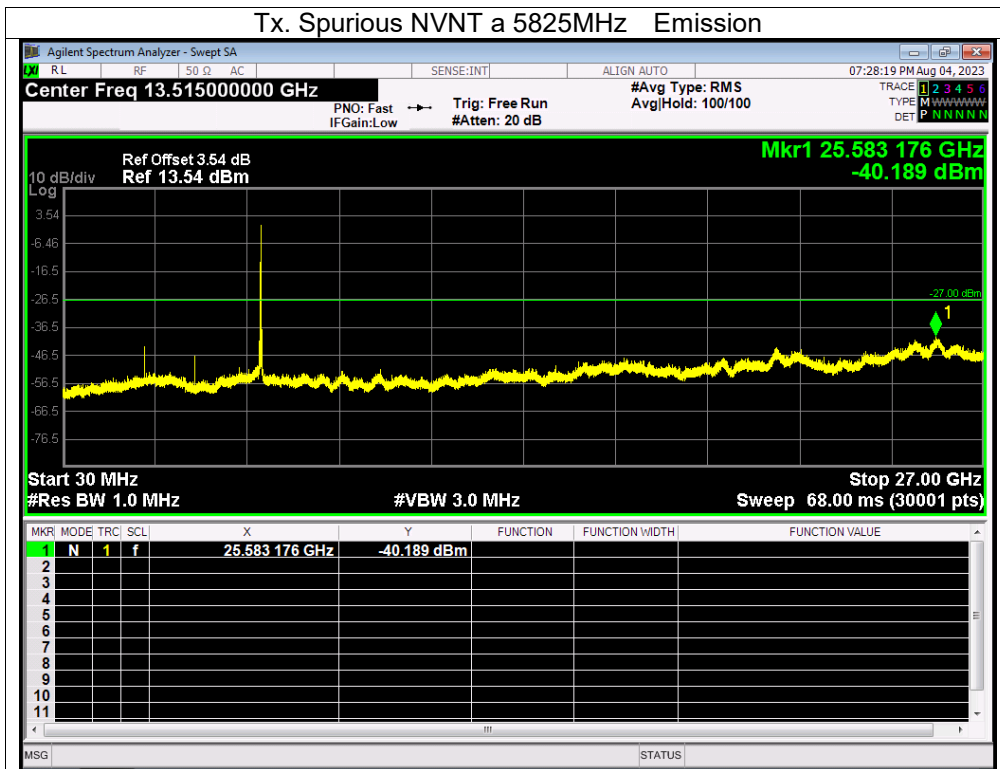


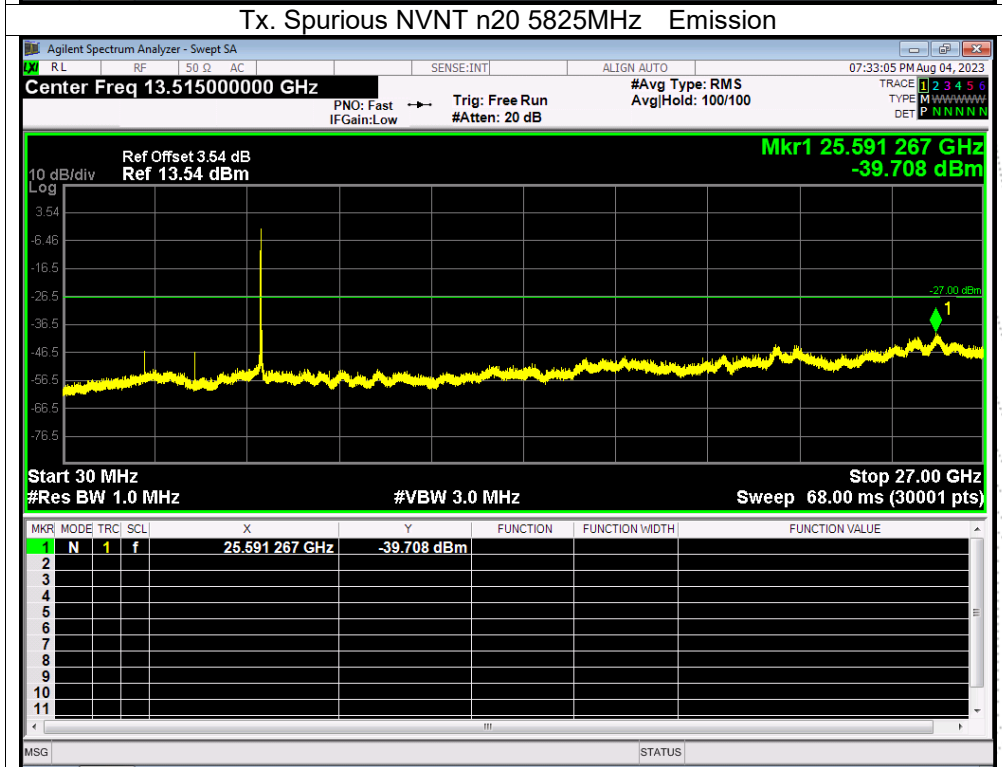
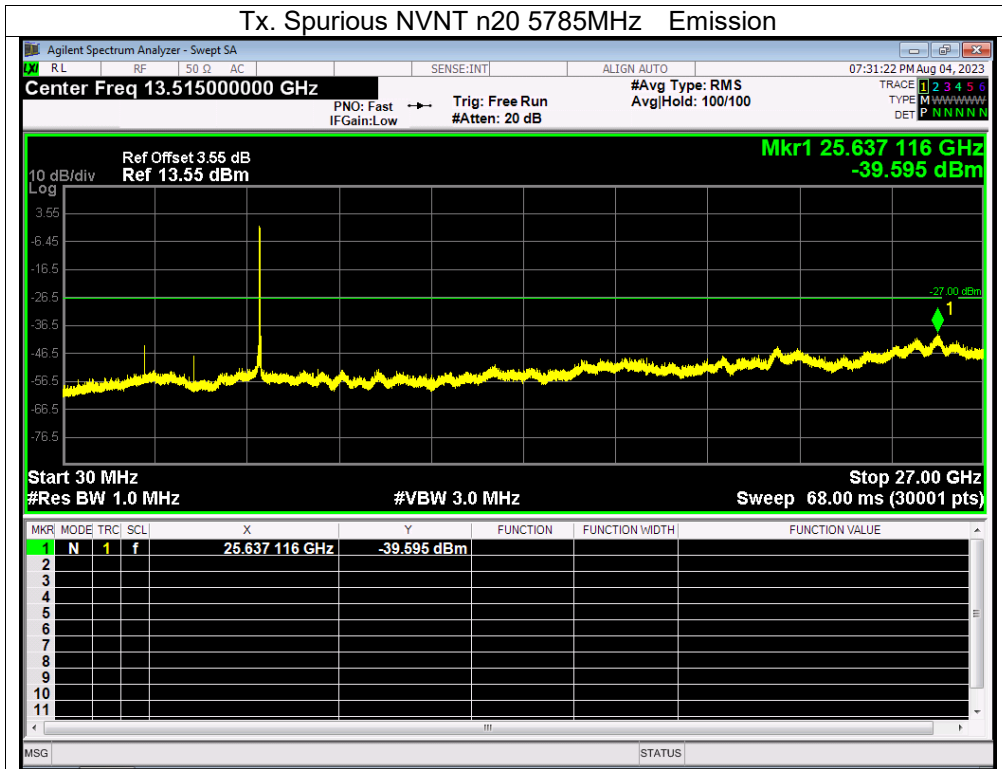


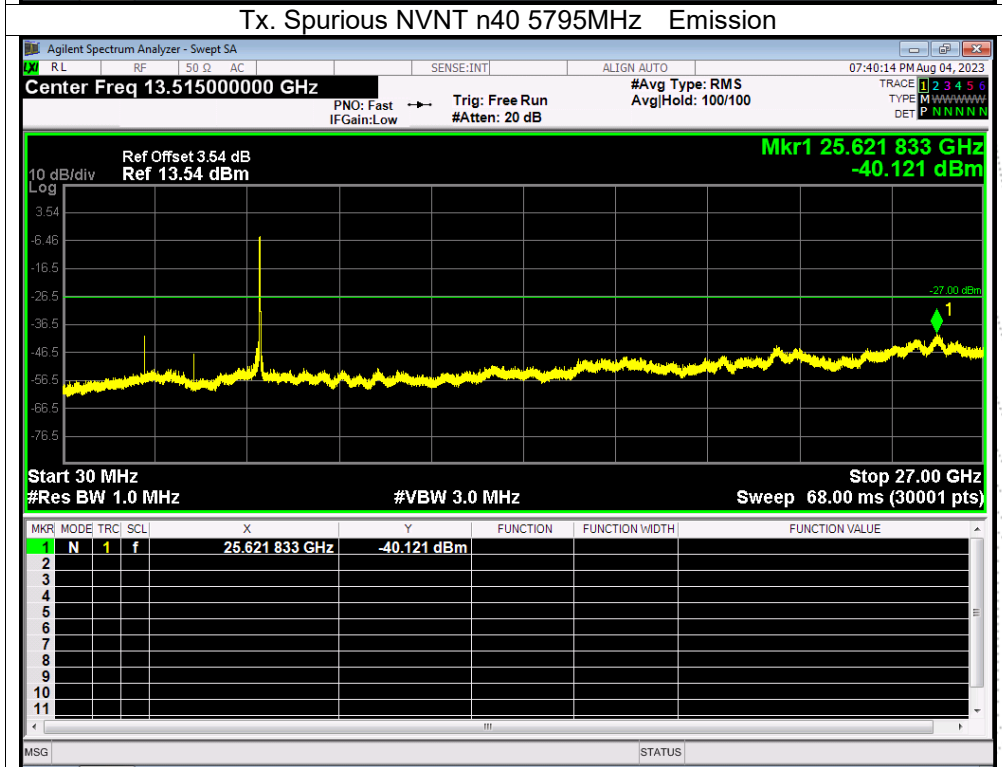
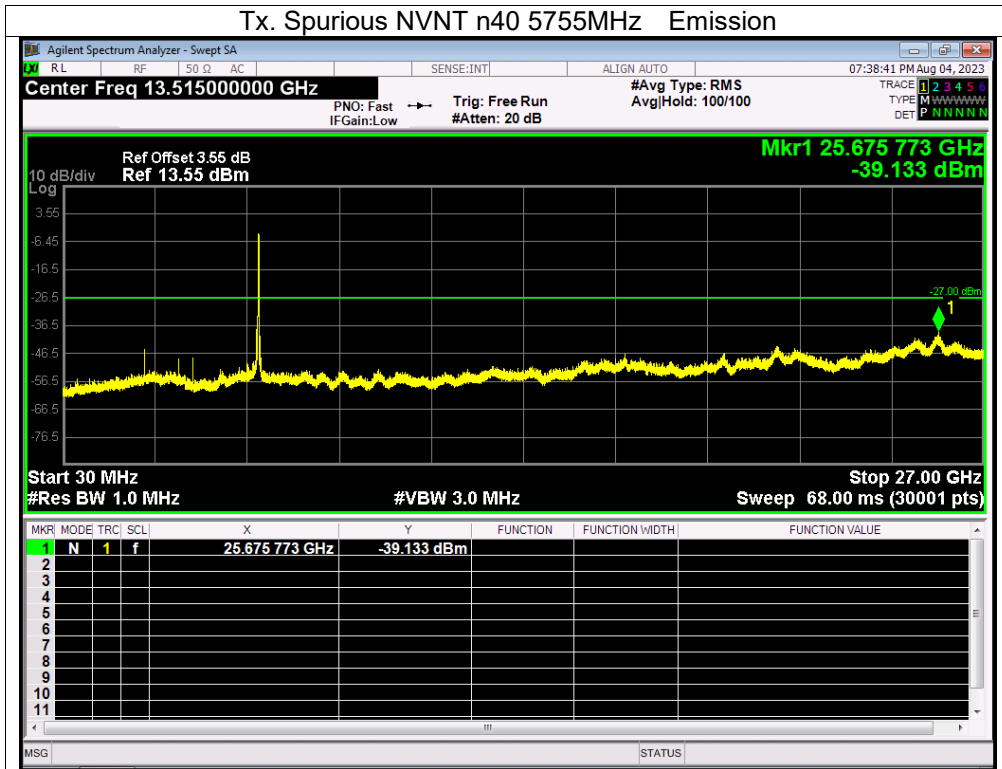


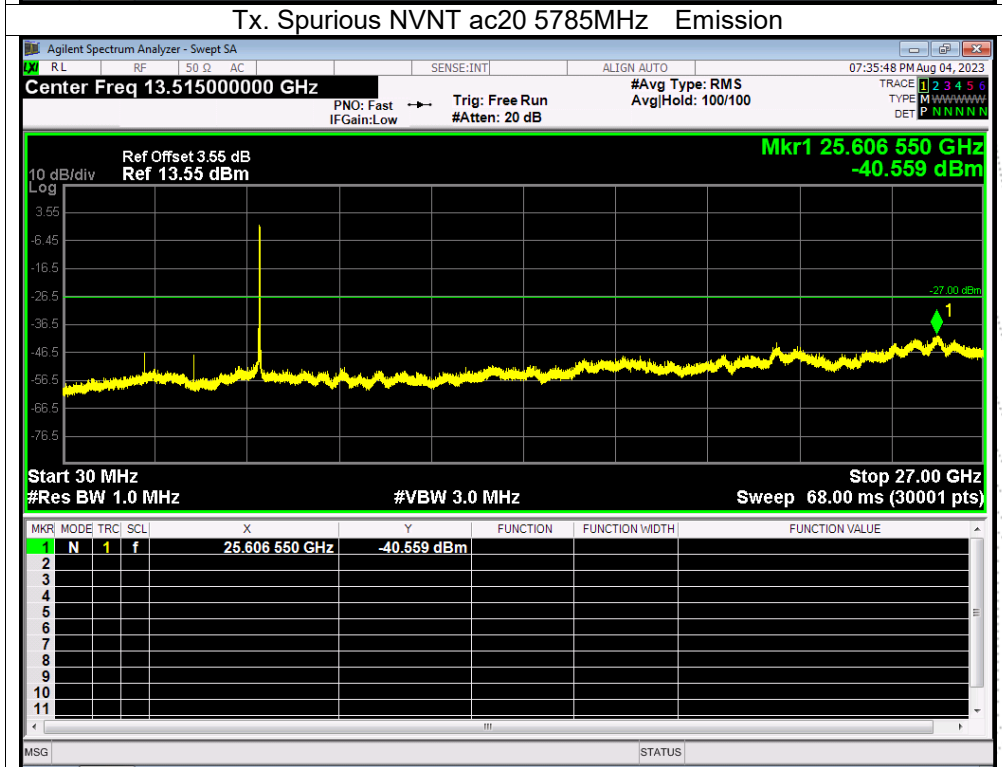
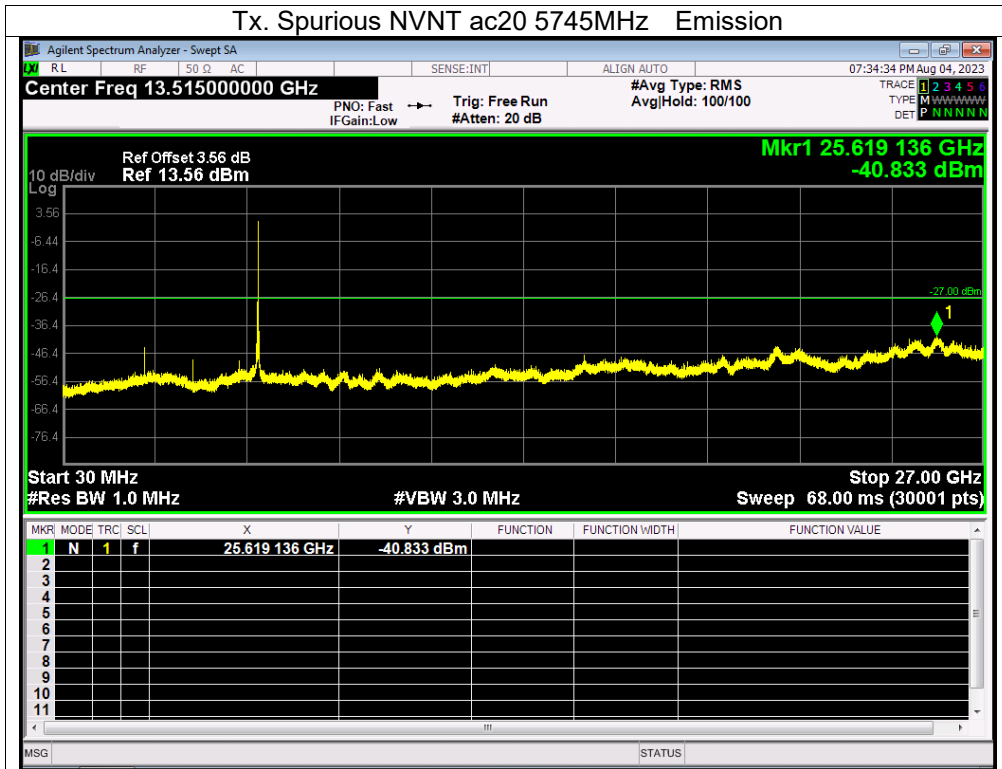


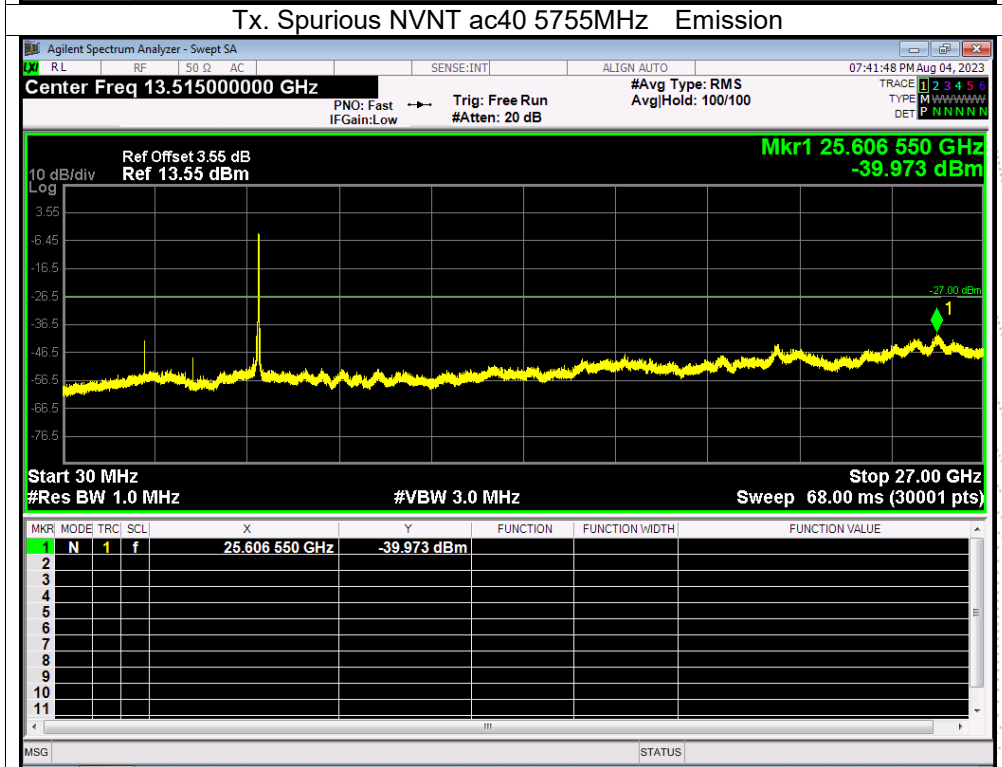
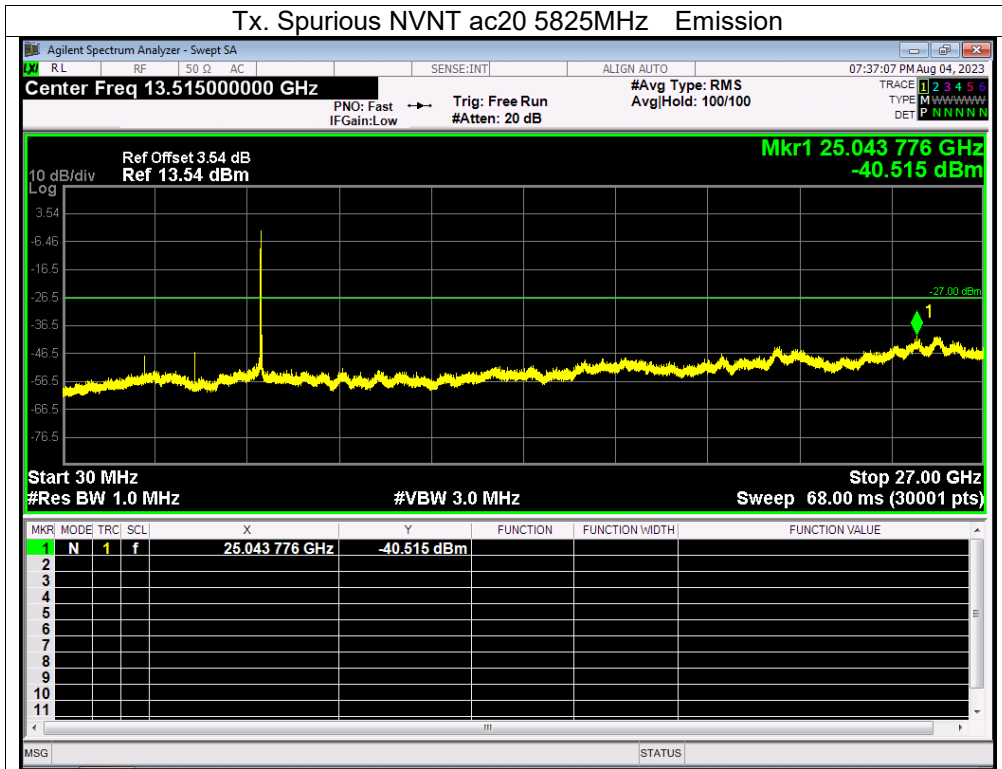


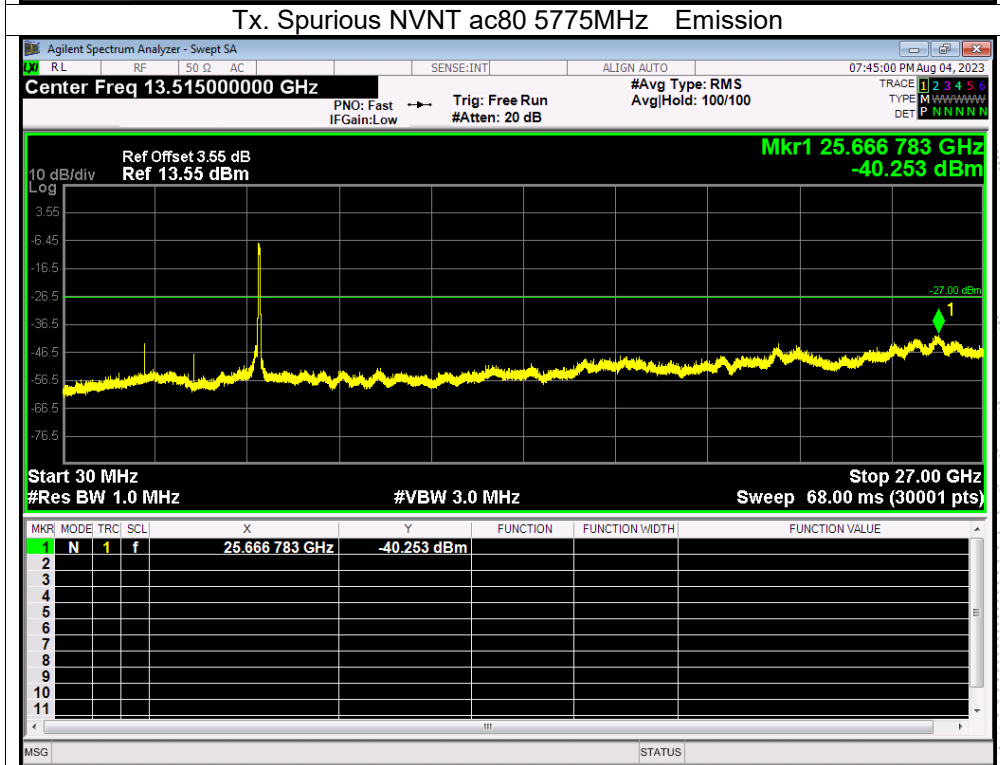
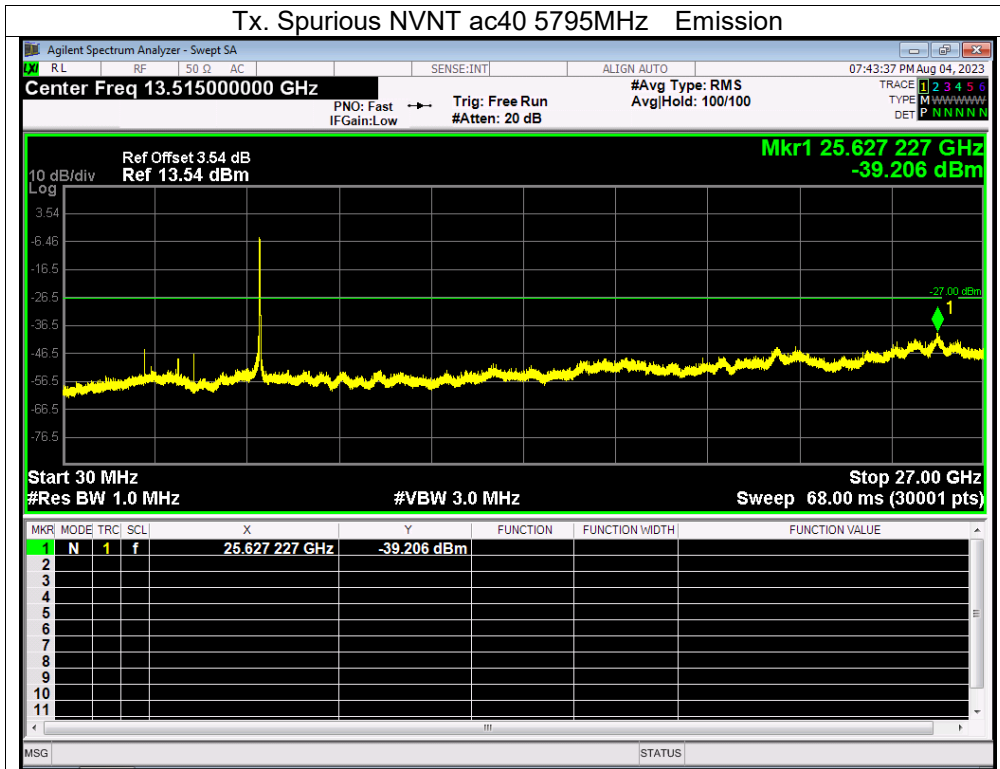














## 13. Frequency Stability Measurement

### 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  $\pm 20$  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  $\pm 20$  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 12V
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)	12.00	5180.0051	5180	0.0051	0.9939
		V max (V)	13.80	5180.0014	5180	0.0014	0.2737
		V min (V)	10.20	5180.0102	5180	0.0102	1.9731
Limits				5150-5250 MHz			
Result				Complies			

## Temperature vs. Frequency Stability

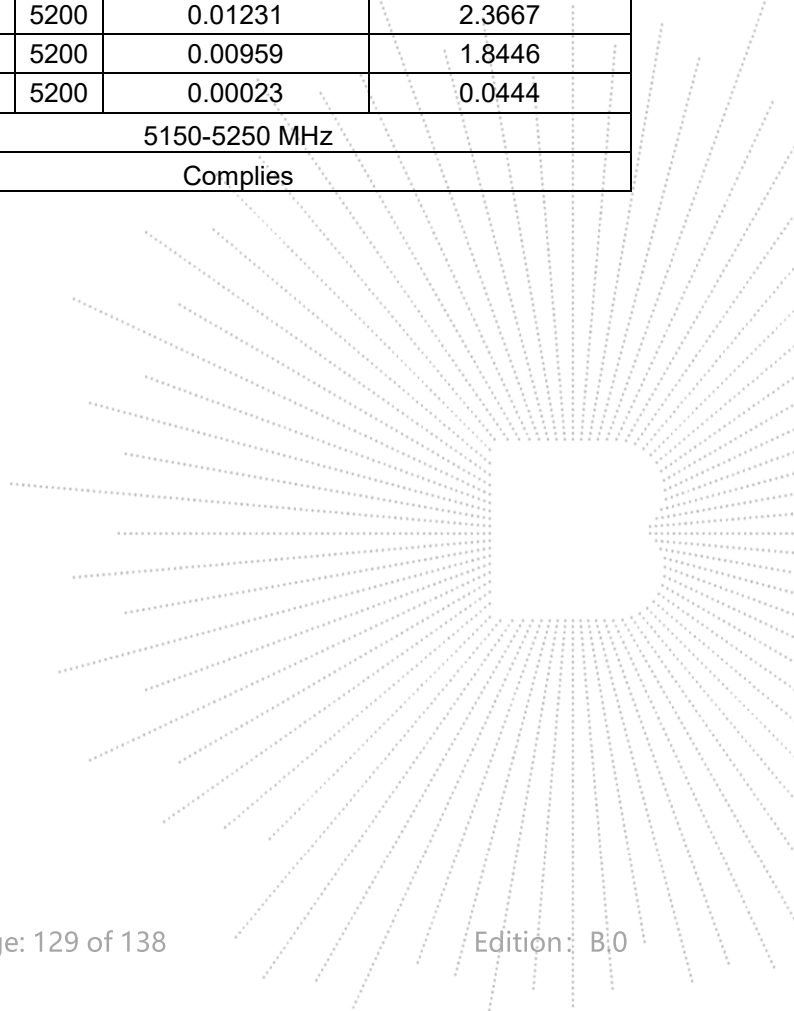
TEST CONDITIONS				Reference Frequency: 5180MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	12	T (°C)	-20	5180.0104	5180	0.0104	1.9983
		T (°C)	-10	5180.0023	5180	0.0023	0.4383
		T (°C)	0	5180.0025	5180	0.0025	0.4753
		T (°C)	10	5180.0116	5180	0.0116	2.2319
		T (°C)	20	5180.0098	5180	0.0098	1.8865
		T (°C)	30	5180.0062	5180	0.0062	1.2052
		T (°C)	40	5180.0126	5180	0.0126	2.4319
		T (°C)	50	5180.0047	5180	0.0047	0.8990
		T (°C)	60	5180.0103	5180	0.0103	1.9812
		T (°C)	70	5180.0064	5180	0.0064	1.2346
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)	12.00	5200.0070	5200	0.0070	1.3531
		V max (V)	13.80	5200.0014	5200	0.0014	0.2742
		V min (V)	10.20	5200.0059	5200	0.0059	1.1297
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)	12	T (°C)	-20	5200.01156	5200	0.01156	2.2234
		T (°C)	-10	5200.00483	5200	0.00483	0.9289
		T (°C)	0	5200.01128	5200	0.01128	2.1690
		T (°C)	10	5200.00030	5200	0.00030	0.0579
		T (°C)	20	5200.00764	5200	0.00764	1.4696
		T (°C)	30	5200.00332	5200	0.00332	0.6381
		T (°C)	40	5200.01250	5200	0.01250	2.4041
		T (°C)	50	5200.01231	5200	0.01231	2.3667
		T (°C)	60	5200.00959	5200	0.00959	1.8446
		T (°C)	70	5200.00023	5200	0.00023	0.0444
Limits				5150-5250 MHz			
Result				Complies			

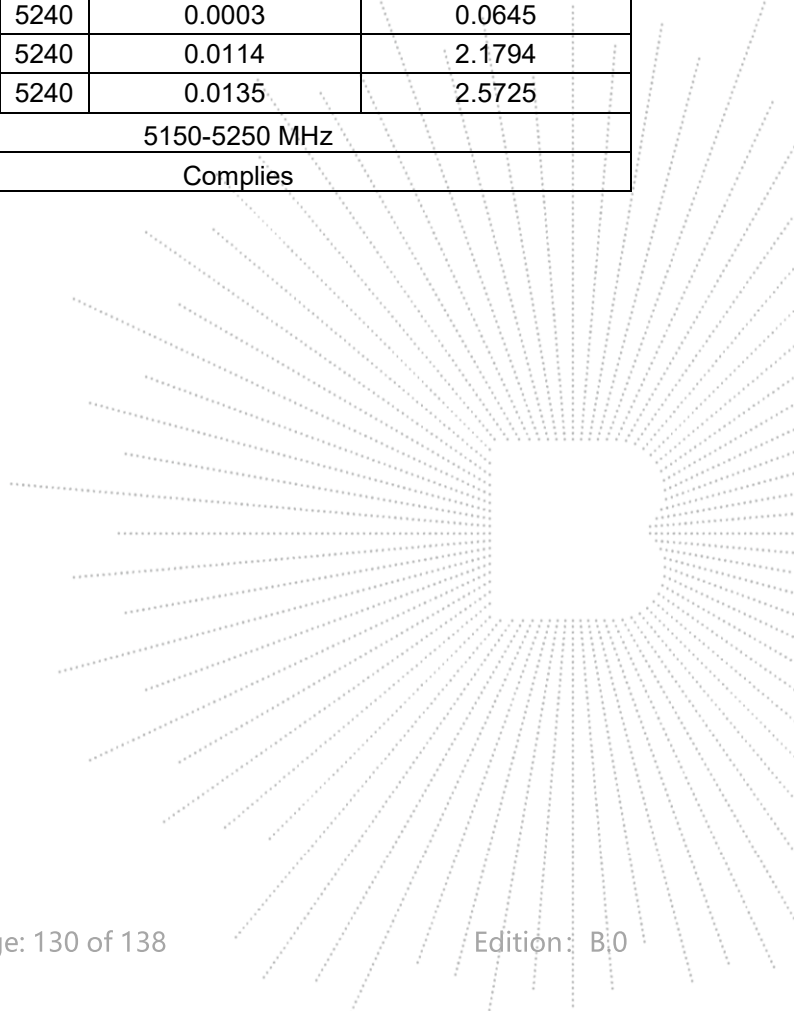


**Voltage vs. Frequency Stability**

TEST CONDITIONS				Reference Frequency: 5240MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	12.00	5240.0024	5240	0.0024	0.4635
		V max (V)	13.80	5240.0028	5240	0.0028	0.5403
		V min (V)	10.20	5240.0065	5240	0.0065	1.2412
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)	12	T (°C)	-20	5240.0115	5240	0.0115	2.1965
		T (°C)	-10	5240.0088	5240	0.0088	1.6754
		T (°C)	0	5240.0097	5240	0.0097	1.8564
		T (°C)	10	5240.0108	5240	0.0108	2.0575
		T (°C)	20	5240.0018	5240	0.0018	0.3459
		T (°C)	30	5240.0100	5240	0.0100	1.9171
		T (°C)	40	5240.0084	5240	0.0084	1.6093
		T (°C)	50	5240.0003	5240	0.0003	0.0645
		T (°C)	60	5240.0114	5240	0.0114	2.1794
		T (°C)	70	5240.0135	5240	0.0135	2.5725
Limits				5150-5250 MHz			
Result				Complies			



Temperature :	26 °C	Relative Humidity :	54%
Pressure :	101kPa	Test Voltage :	DC 12V
Test Mode :	TX Frequency(5745-5825MHz)		

**Voltage vs. Frequency Stability**

TEST CONDITIONS				Reference Frequency: 5745MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	12.00	5745.00244	5745	0.00244	0.4243
		V max (V)	13.80	5745.00734	5745	0.00734	1.2783
		V min (V)	10.20	5745.00703	5745	0.00703	1.2240
Limits				5725-5850 MHz			
Result				Complies			

**Temperature vs. Frequency Stability**

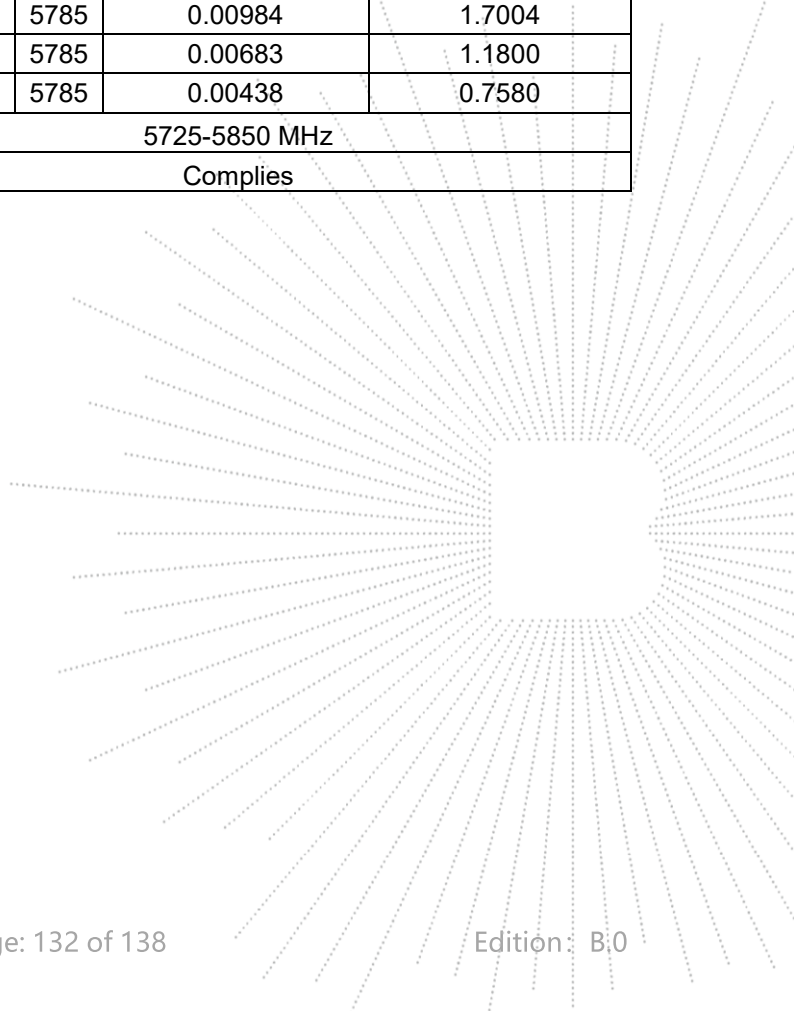
TEST CONDITIONS				Reference Frequency: 5745MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	12	T (°C)	-20	5745.00725	5745	0.00725	1.2614
		T (°C)	-10	5745.00871	5745	0.00871	1.5170
		T (°C)	0	5745.00450	5745	0.00450	0.7835
		T (°C)	10	5745.00098	5745	0.00098	0.1706
		T (°C)	20	5745.01102	5745	0.01102	1.9177
		T (°C)	30	5745.01183	5745	0.01183	2.0583
		T (°C)	40	5745.00473	5745	0.00473	0.8235
		T (°C)	50	5745.01290	5745	0.01290	2.2455
		T (°C)	60	5745.01086	5745	0.01086	1.8909
		T (°C)	70	5745.00721	5745	0.00721	1.2556
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)	12.00	5785.00978	5785	0.00978	1.6903
		V max (V)	13.80	5785.00540	5785	0.00540	0.9339
		V min (V)	10.20	5785.00689	5785	0.00689	1.1916
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)	12	T (°C)	-20	5785.00263	5785	0.00263	0.4538
		T (°C)	-10	5785.00854	5785	0.00854	1.4768
		T (°C)	0	5785.00668	5785	0.00668	1.1543
		T (°C)	10	5785.01321	5785	0.01321	2.2836
		T (°C)	20	5785.00519	5785	0.00519	0.8980
		T (°C)	30	5785.00621	5785	0.00621	1.0728
		T (°C)	40	5785.01244	5785	0.01244	2.1503
		T (°C)	50	5785.00984	5785	0.00984	1.7004
		T (°C)	60	5785.00683	5785	0.00683	1.1800
		T (°C)	70	5785.00438	5785	0.00438	0.7580
Limits				5725-5850 MHz			
Result				Complies			

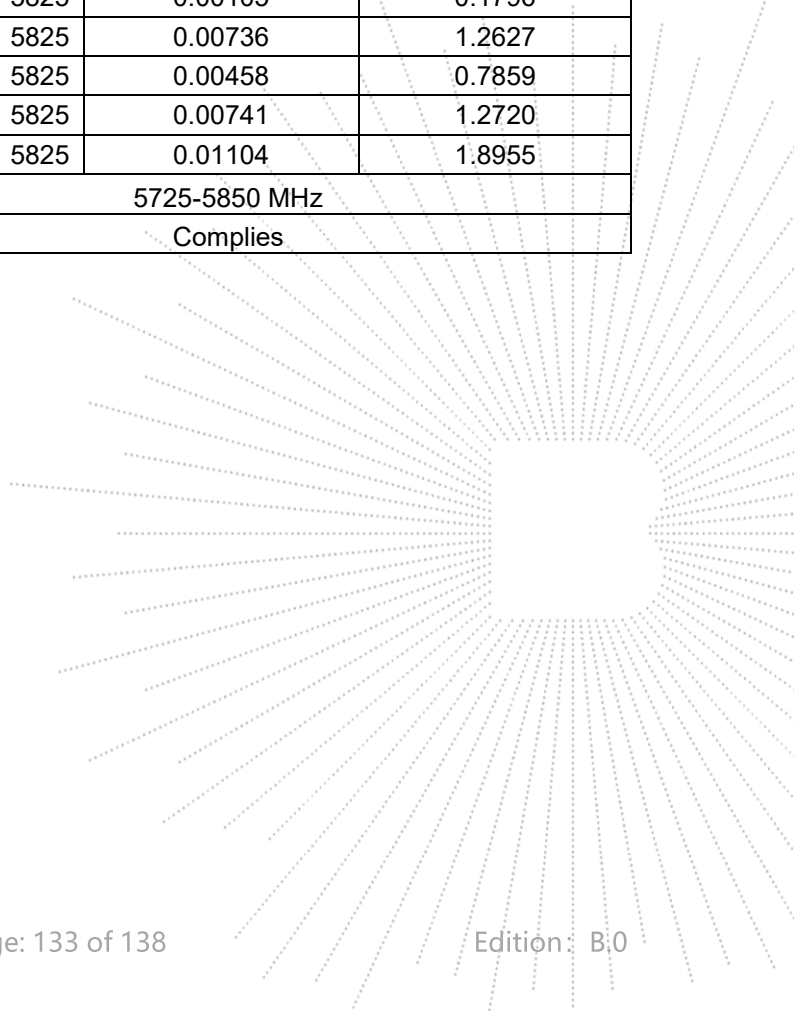


## Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5825MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	12.00	5825.00279	5825	0.00279	0.4786
		V max (V)	13.80	5825.00821	5825	0.00821	1.4096
		V min (V)	10.20	5825.00914	5825	0.00914	1.5683
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)	12	T (°C)	-20	5825.00885	5825	0.00885	1.5191
		T (°C)	-10	5825.00483	5825	0.00483	0.8291
		T (°C)	0	5825.00687	5825	0.00687	1.1795
		T (°C)	10	5825.00664	5825	0.00664	1.1395
		T (°C)	20	5825.01306	5825	0.01306	2.2427
		T (°C)	30	5825.00105	5825	0.00105	0.1796
		T (°C)	40	5825.00736	5825	0.00736	1.2627
		T (°C)	50	5825.00458	5825	0.00458	0.7859
		T (°C)	60	5825.00741	5825	0.00741	1.2720
		T (°C)	70	5825.01104	5825	0.01104	1.8955
Limits				5725-5850 MHz			
Result				Complies			



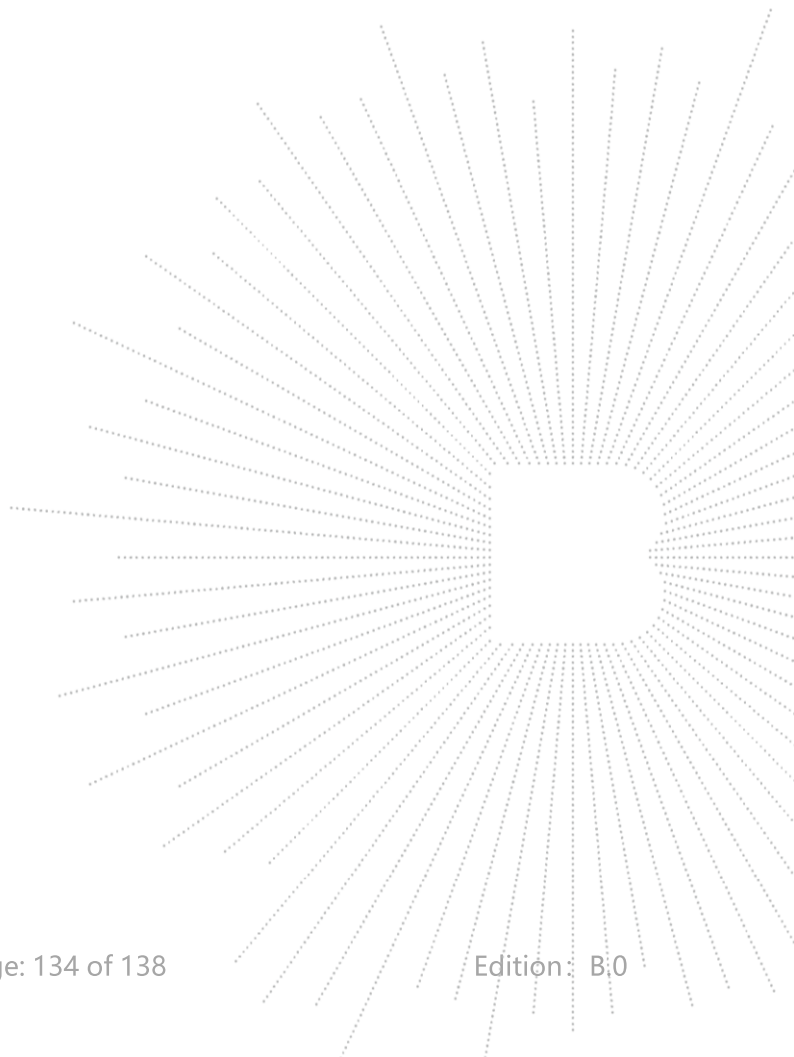
## 14. Antenna Requirement

### 14.1 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.

### 14.2 Test Result

The EUT antenna is Internal antenna (antenna gain: 2.5 dBi ). It comply with the standard requirement.





### 15. EUT Photographs

EUT Photo 1



EUT Photo 2

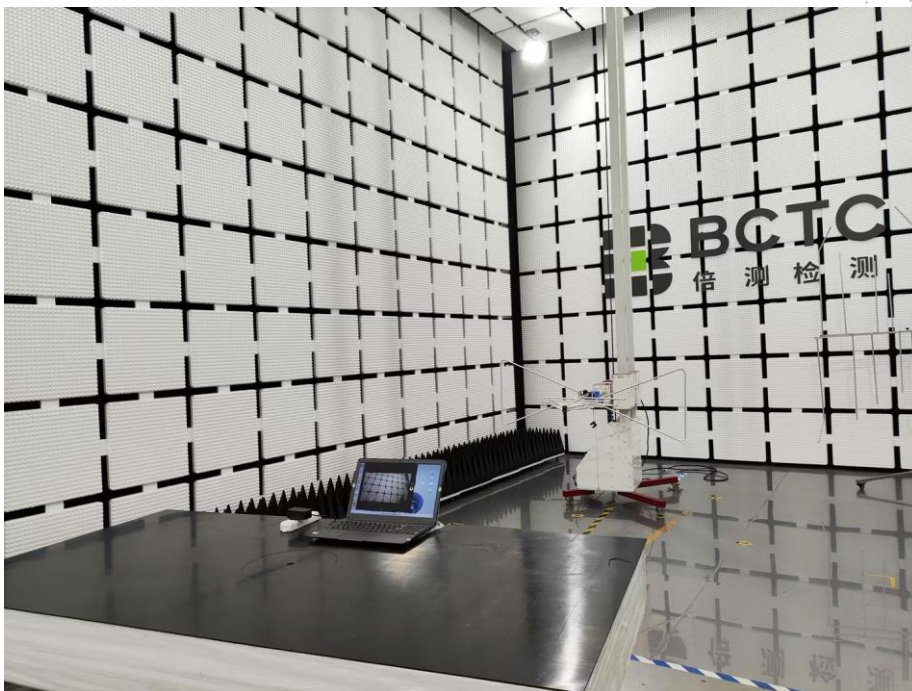


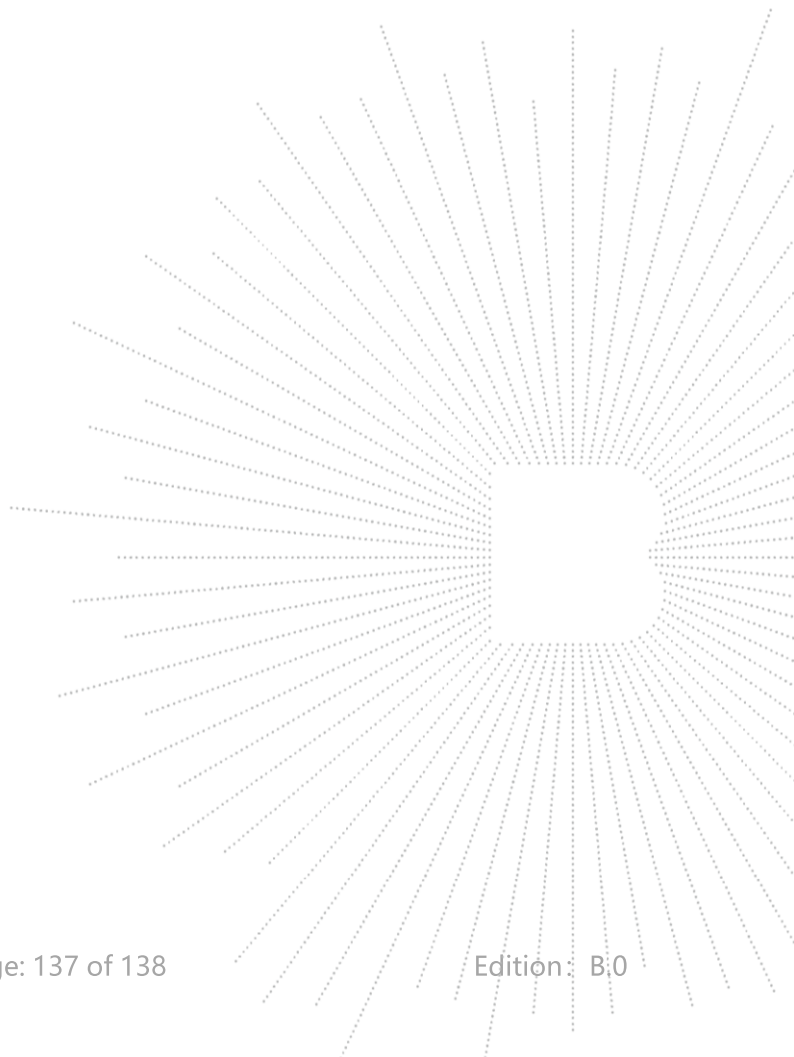
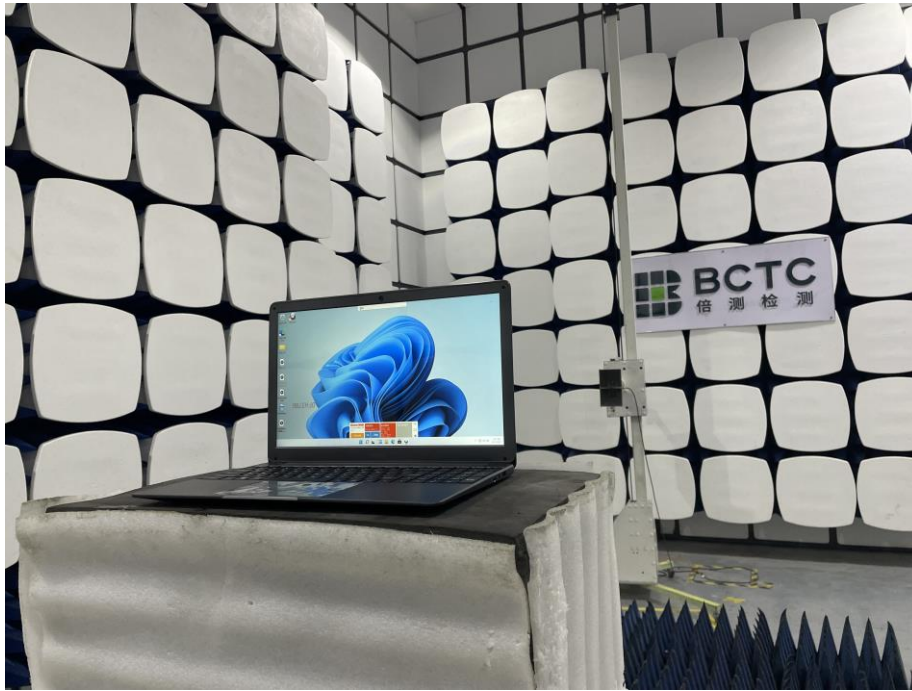
### 16. EUT Test Setup Photographs

#### Conducted Measurement 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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\*\*\*\*\* END \*\*\*\*\*

