

## 10. Maximum Conducted Output Power

### 10.1 Block Diagram Of Test Setup



### 10.2 Limit

#### According to FCC §15.407

The maximum conducted output power should not exceed:

Frequency Band(MHz)	Limit
5150~5250	250mW
5725~5850	1W

### 10.3 Test procedure

Maximum conducted output power may be measured using a spectrum analyzer/EMI receiver or an RF power meter.

#### 1. Device Configuration

If possible, configure or modify the operation of the EUT so that it transmits continuously at its maximum power control level (see section II.B.).

a) The intent is to test at 100 percent duty cycle; however a small reduction in duty cycle (to no lower than 98 percent) is permitted if required by the EUT for amplitude control purposes. Manufacturers are expected to provide software to the test lab to permit such continuous operation.

b) If continuous transmission (or at least 98 percent duty cycle) cannot be achieved due to hardware limitations (e.g., overheating), the EUT shall be operated at its maximum power control level with the transmit duration as long as possible and the duty cycle as high as possible.

#### 2. Measurement using a Spectrum Analyzer or EMI Receiver (SA)

Measurement of maximum conducted output power using a spectrum analyzer requires integrating the spectrum across a frequency span that encompasses, at a minimum, either the EBW or the 99-percent occupied bandwidth of the signal.<sup>1</sup> However, the EBW must be used to determine bandwidth dependent limits on maximum conducted output power in accordance with § 15.407(a).

a) The test method shall be selected as follows: (i) Method SA-1 or SA-1 Alternative (averaging with the EUT transmitting at full power throughout each sweep) shall be applied if either of the following conditions can be satisfied:

- The EUT transmits continuously (or with a duty cycle  $\geq 98$  percent).
- Sweep triggering or gating can be implemented in a way that the device transmits at the maximum power control level throughout the duration of each of the instrument sweeps to be averaged. This condition can generally be achieved by triggering the instrument's sweep if the duration of the sweep (with the analyzer configured as in Method SA-1, below) is equal to or shorter than the duration T of each transmission from the EUT and if those transmissions exhibit full power throughout their durations.

(ii) Method SA-2 or SA-2 Alternative (averaging across on and off times of the EUT transmissions, followed by duty cycle correction) shall be applied if the conditions of (i) cannot be achieved and the



transmissions exhibit a constant duty cycle during the measurement duration. Duty cycle will be considered to be constant if variations are less than  $\pm 2$  percent.

(iii) Method SA-3 (RMS detection with max hold) or SA-3 Alternative (reduced VBW with max hold) shall be applied if the conditions of (i) and (ii) cannot be achieved.

b) Method SA-1 (trace averaging with the EUT transmitting at full power throughout each sweep): (i) Set span to encompass the entire emission bandwidth (EBW) (or, alternatively, the entire 99% occupied bandwidth) of the signal.

(ii) Set RBW = 1 MHz.

(iii) Set VBW  $\geq 3$  MHz.

(iv) Number of points in sweep  $\geq 2$  Span / RBW. (This ensures that bin-to-bin spacing is  $\leq$  RBW/2, so that narrowband signals are not lost between frequency bins.)

(v) Sweep time = auto.

(vi) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.

(vii) If transmit duty cycle  $< 98$  percent, use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle  $\geq 98$  percent, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to "free run".

(viii) Trace average at least 100 traces in power averaging (i.e., RMS) mode.

(ix) Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument's band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum

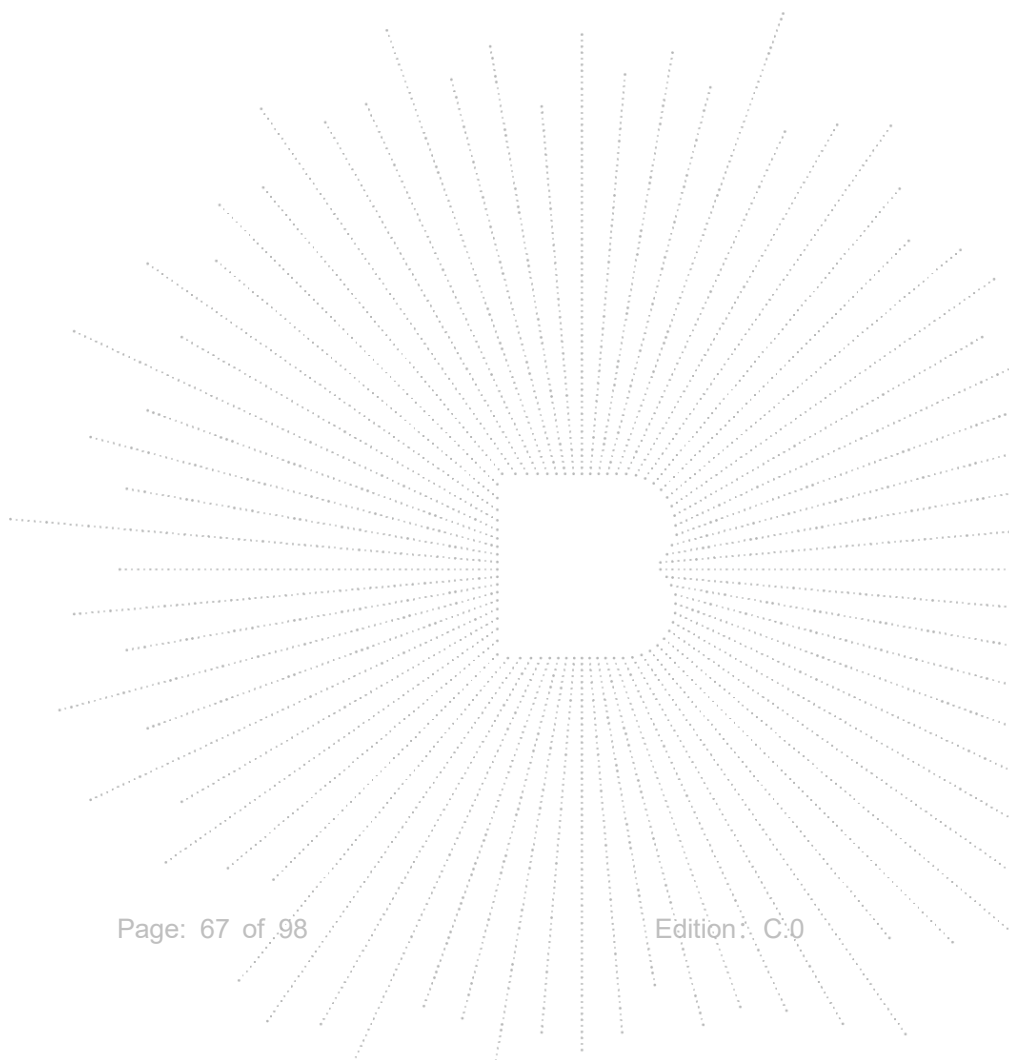
## 10.4 EUT operating Conditions

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.

## 10.5 Test Result

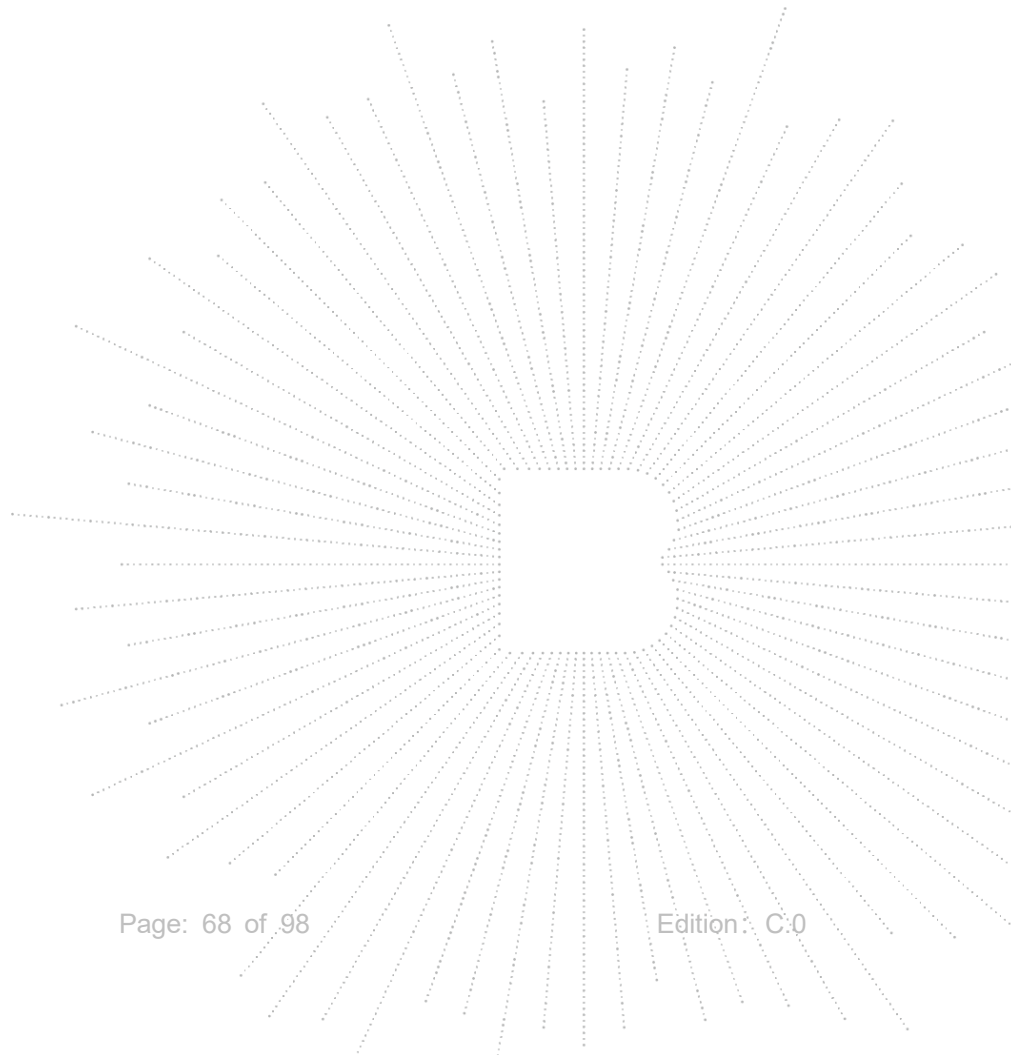
Temperature:	26 °C	Relative Humidity:	54%RH
Pressure:	101KPa	Test Voltage:	DC 5V
Test Mode:	(5180-5240MHz)		

Condition	Mode	Frequency (MHz)	Conducted Power (dBm)	Limit (dBm)	Verdict
NVNT	a	5180	12.19	24	Pass
NVNT	a	5200	11.26	24	Pass
NVNT	a	5240	10.59	24	Pass
NVNT	n20	5180	10.61	24	Pass
NVNT	n20	5200	10.02	24	Pass
NVNT	n20	5240	9.76	24	Pass
NVNT	ac20	5180	10.58	24	Pass
NVNT	ac20	5200	9.45	24	Pass
NVNT	ac20	5240	9.39	24	Pass



Temperature:	26 °C	Relative Humidity:	54%RH
Pressure:	101KPa	Test Voltage:	DC 5V
Test Mode:	(5745-5825MHz)		

Condition	Mode	Frequency (MHz)	Conducted Power (dBm)	Limit (dBm)	Verdict
NVNT	a	5745	11.97	30	Pass
NVNT	a	5785	11.05	30	Pass
NVNT	a	5825	10.08	30	Pass
NVNT	n20	5745	10.71	30	Pass
NVNT	n20	5785	9.70	30	Pass
NVNT	n20	5825	8.67	30	Pass
NVNT	ac20	5745	10.81	30	Pass
NVNT	ac20	5785	9.83	30	Pass
NVNT	ac20	5825	8.66	30	Pass



## 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.

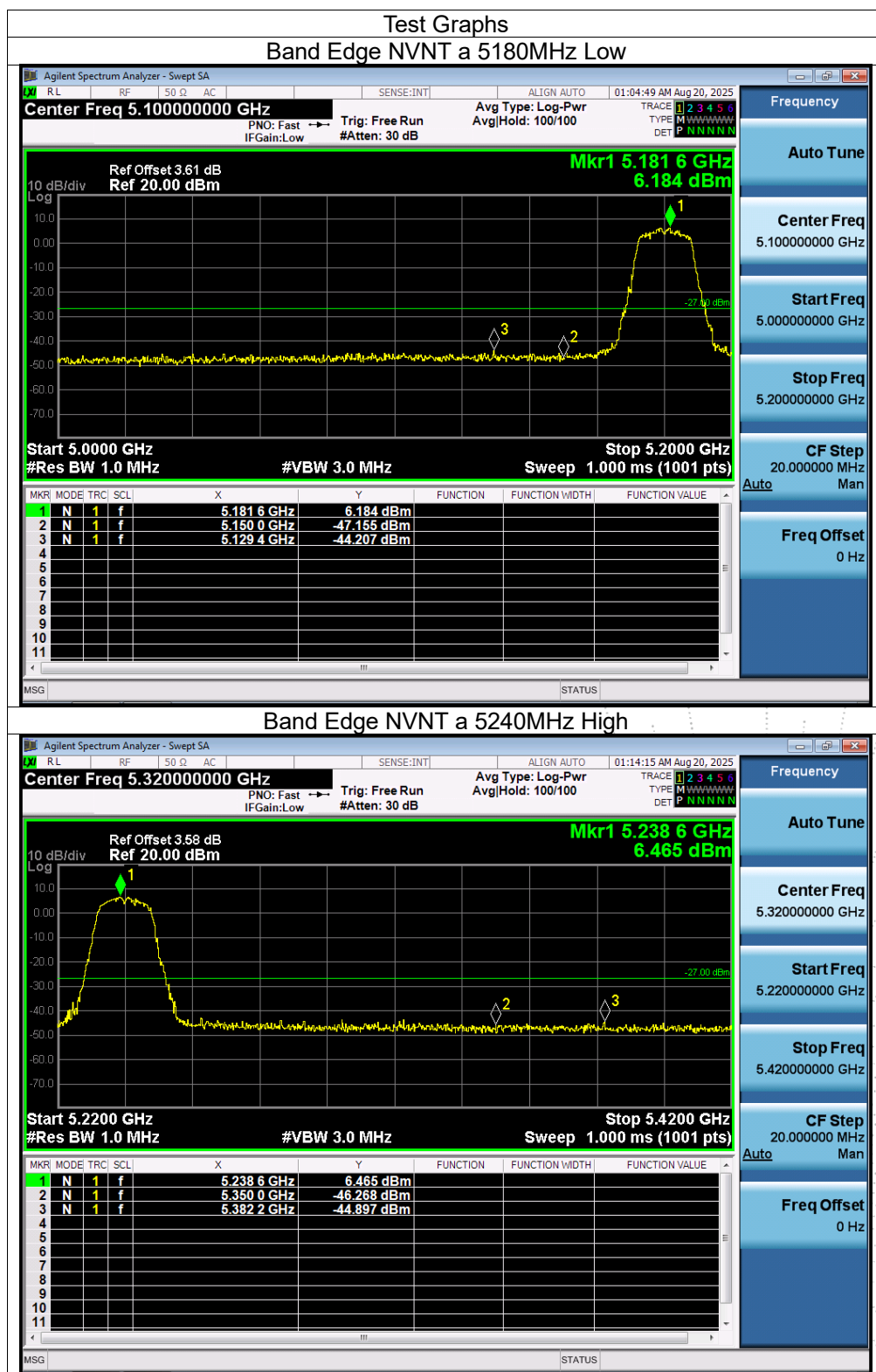
### 11.3 Test procedure

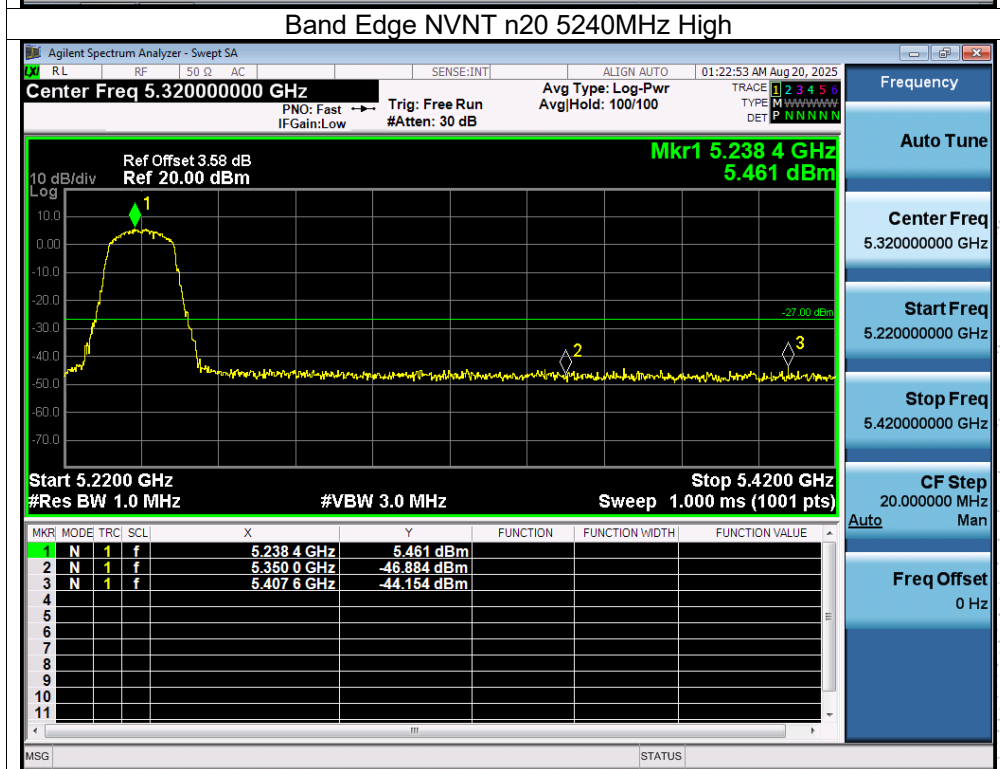
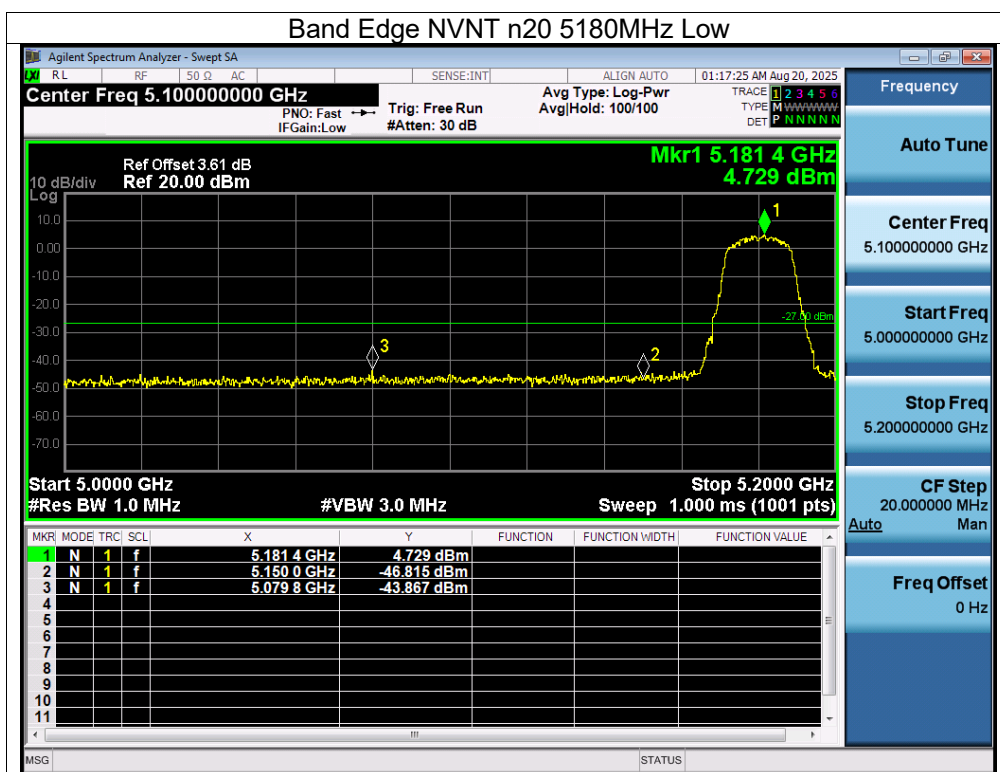
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then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

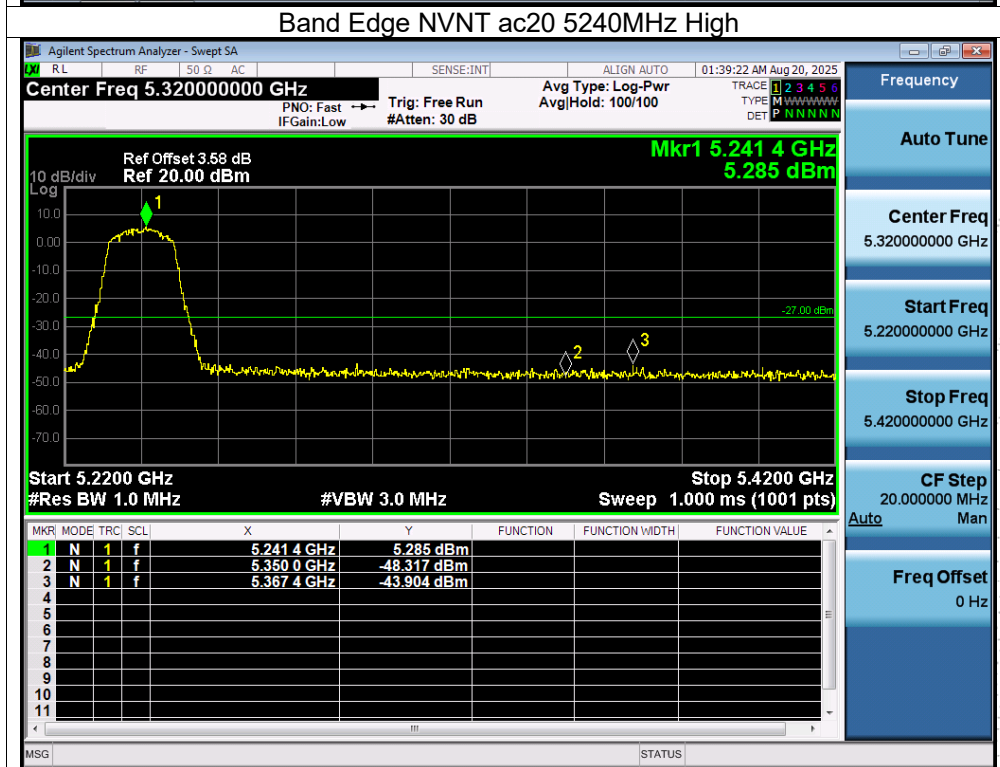
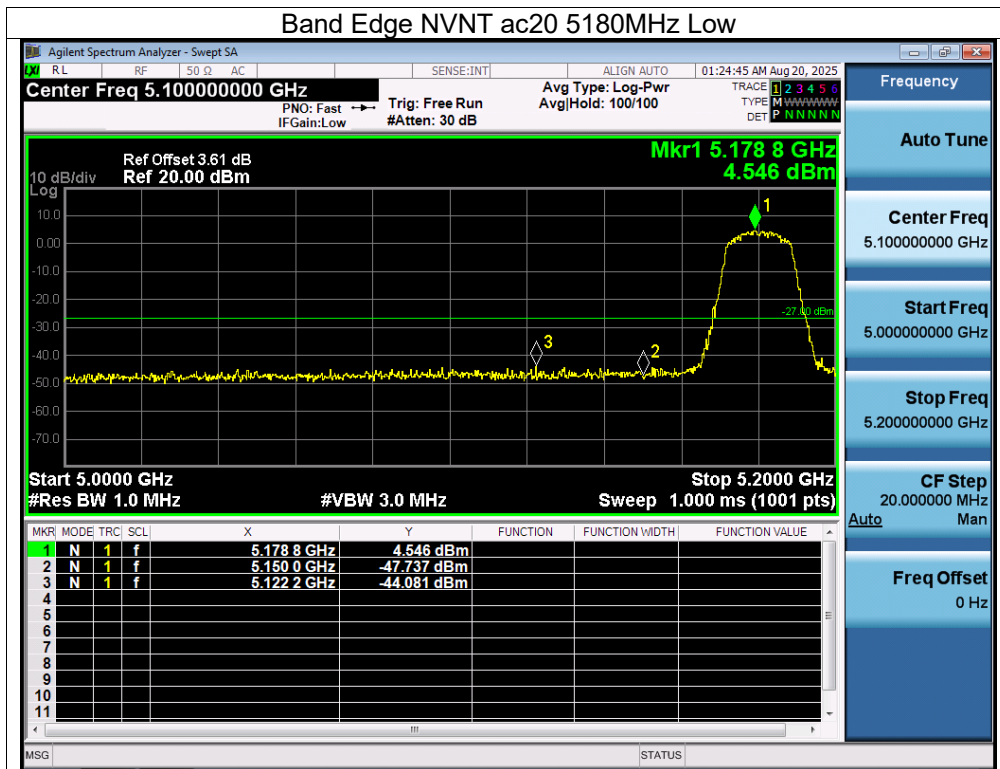
The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data

## 11.5 Test Result

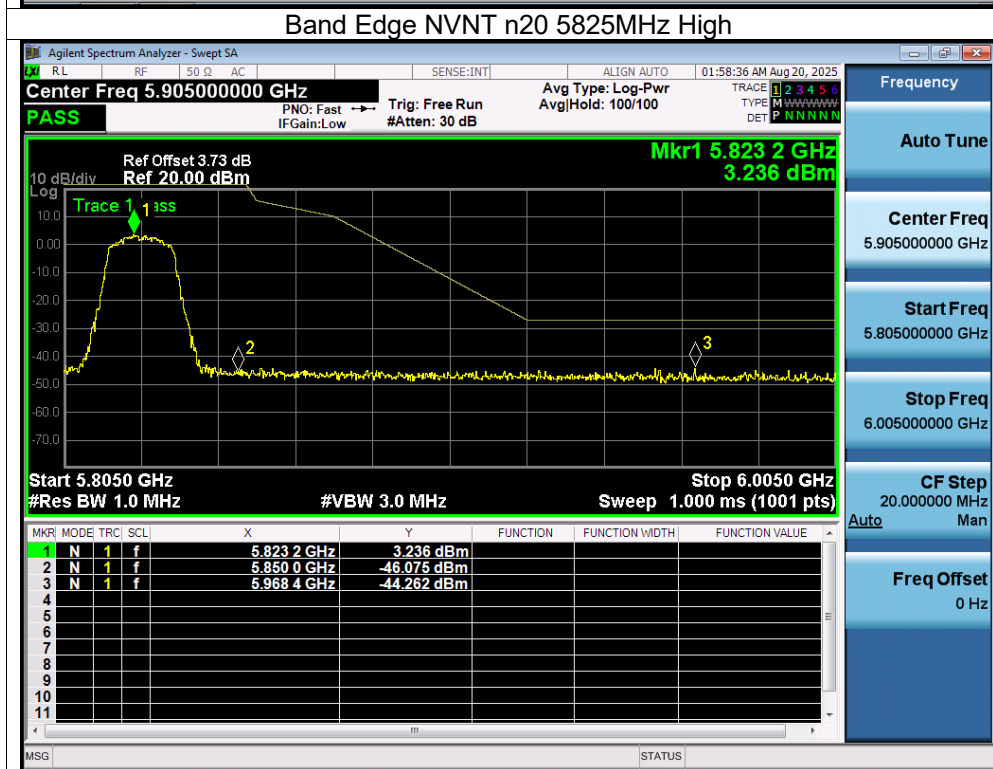
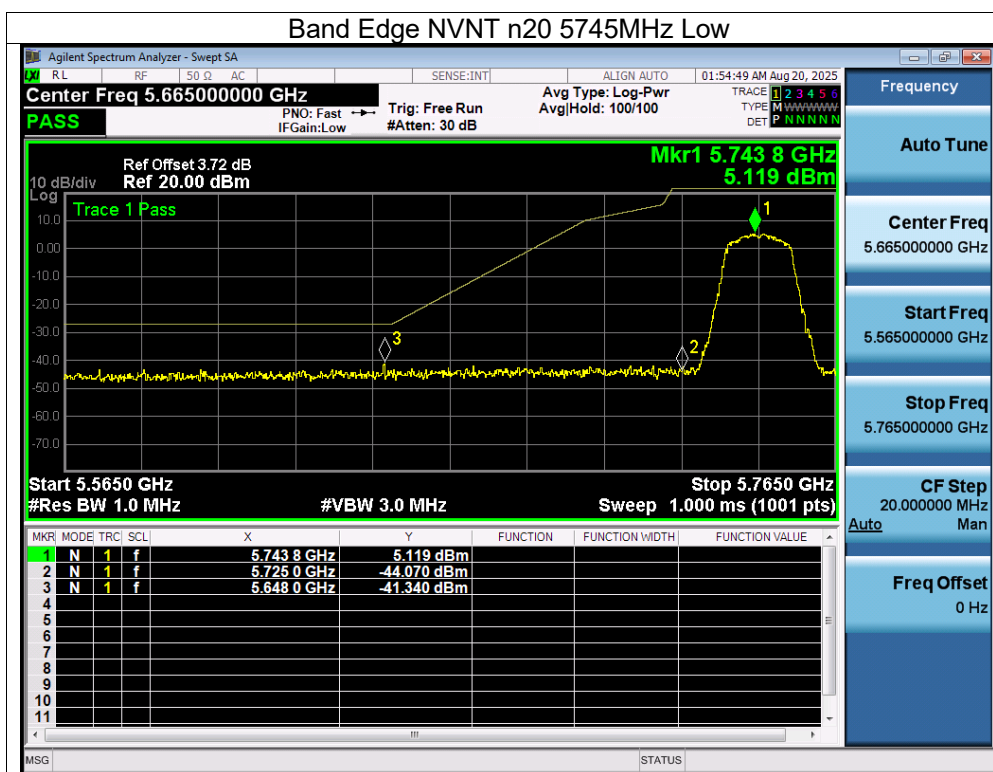


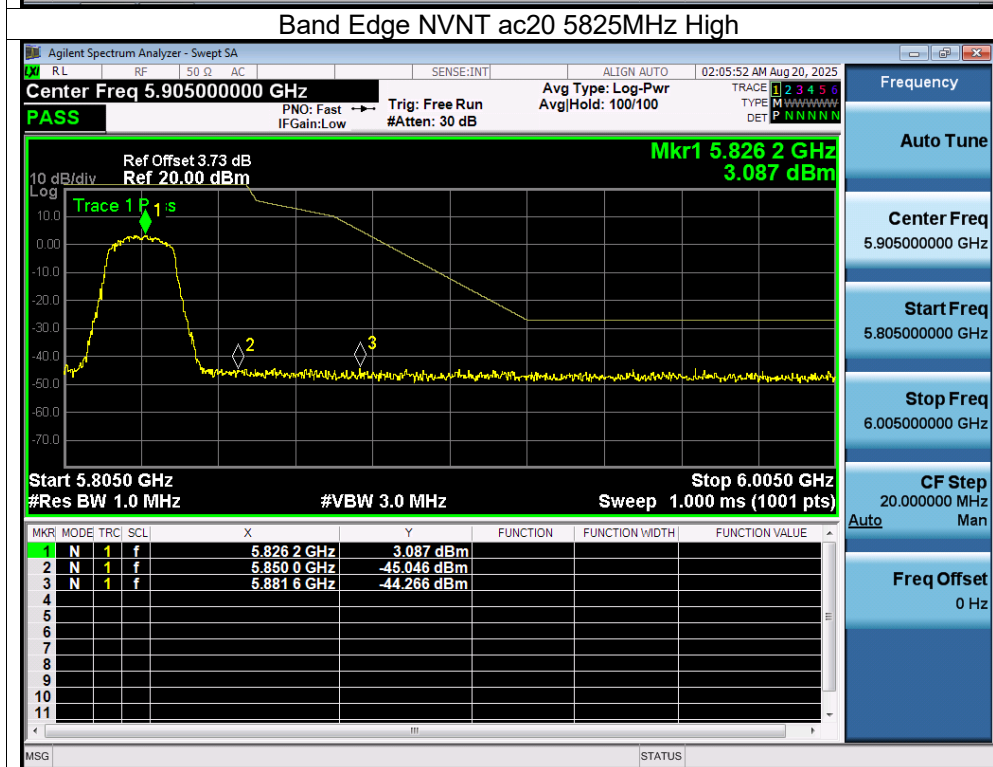
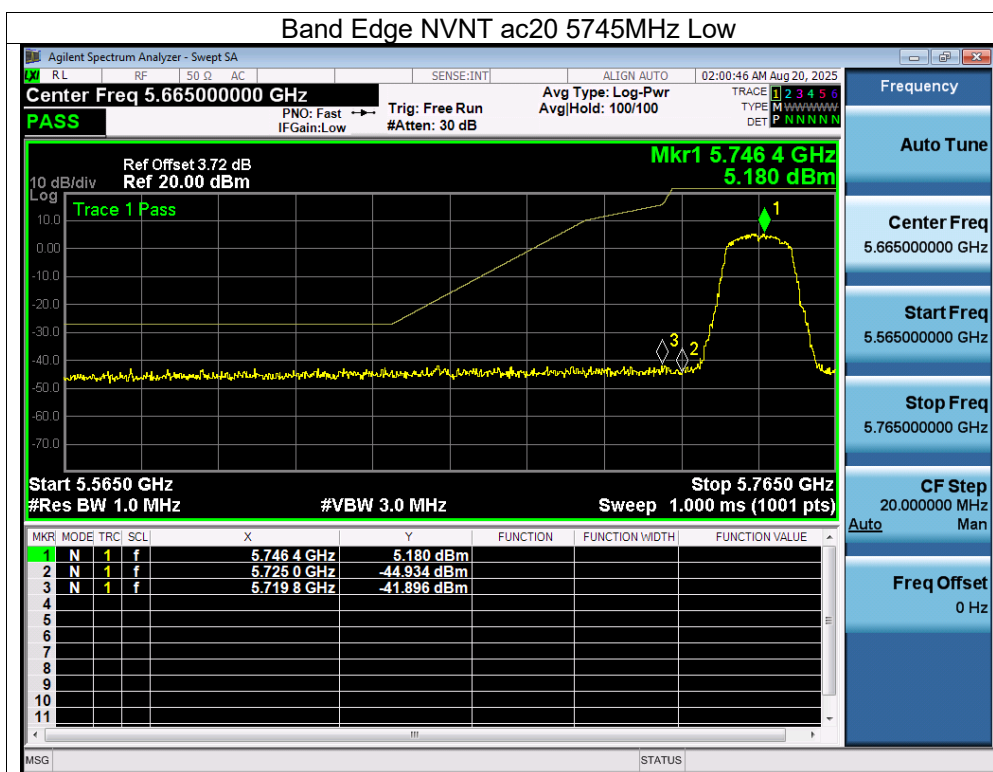












## 12. Spurious RF Conducted Emissions

### 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.

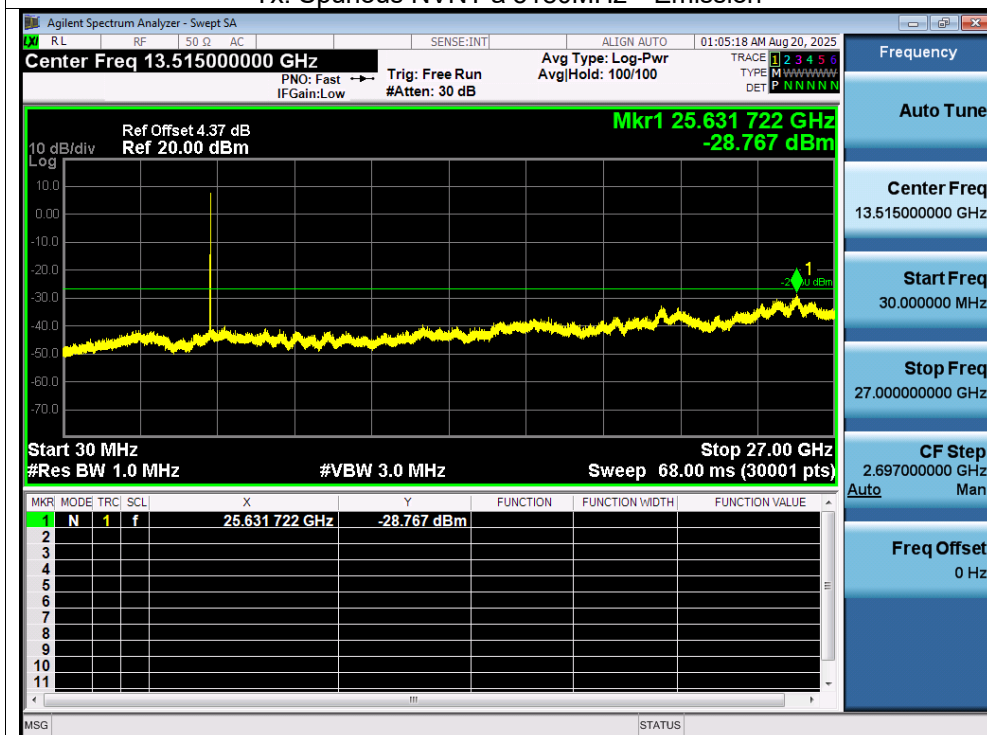
### 12.4 Test Result

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.

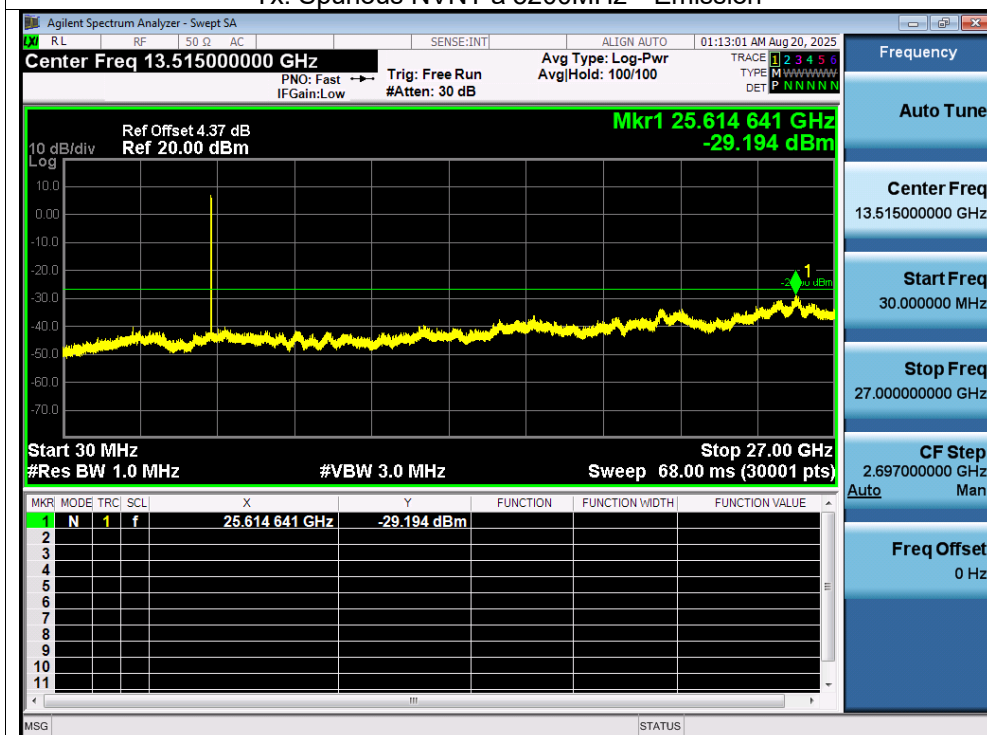
About: 26.5GHz-40GHz, The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

### Test Graphs

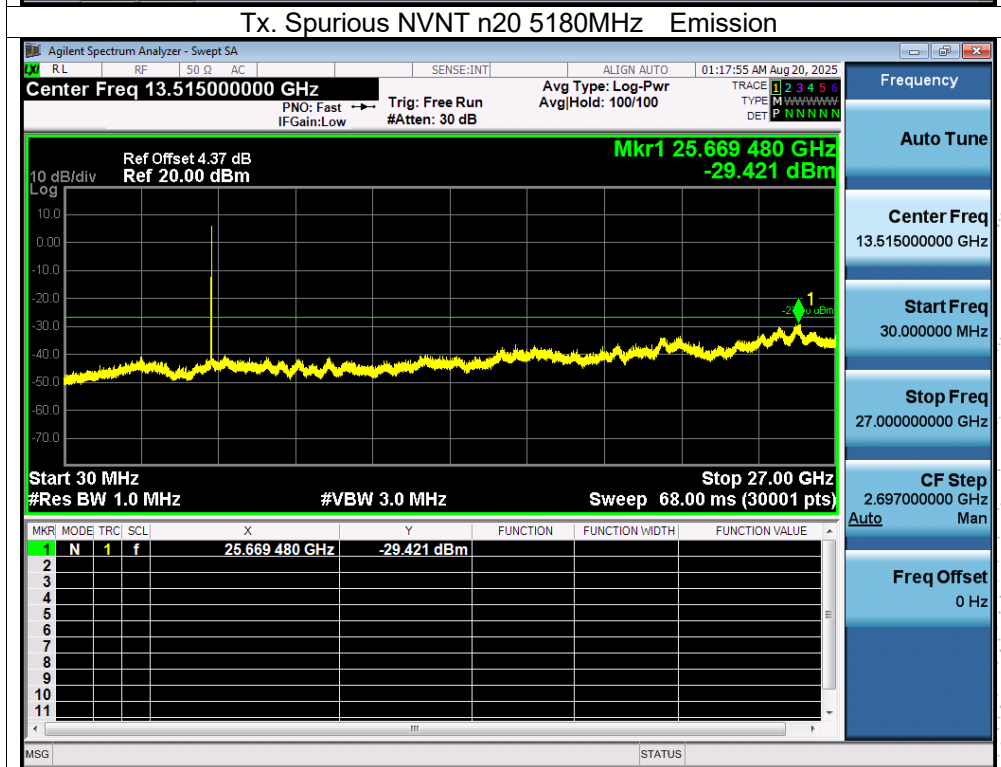
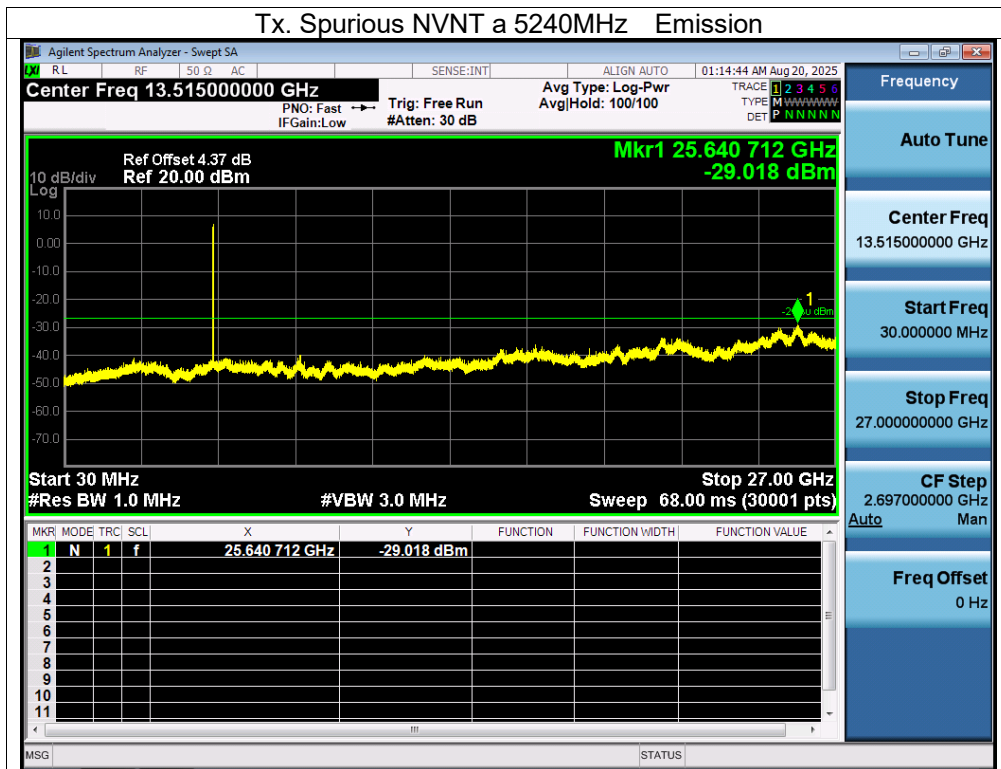
#### Tx. Spurious NVNT a 5180MHz Emission

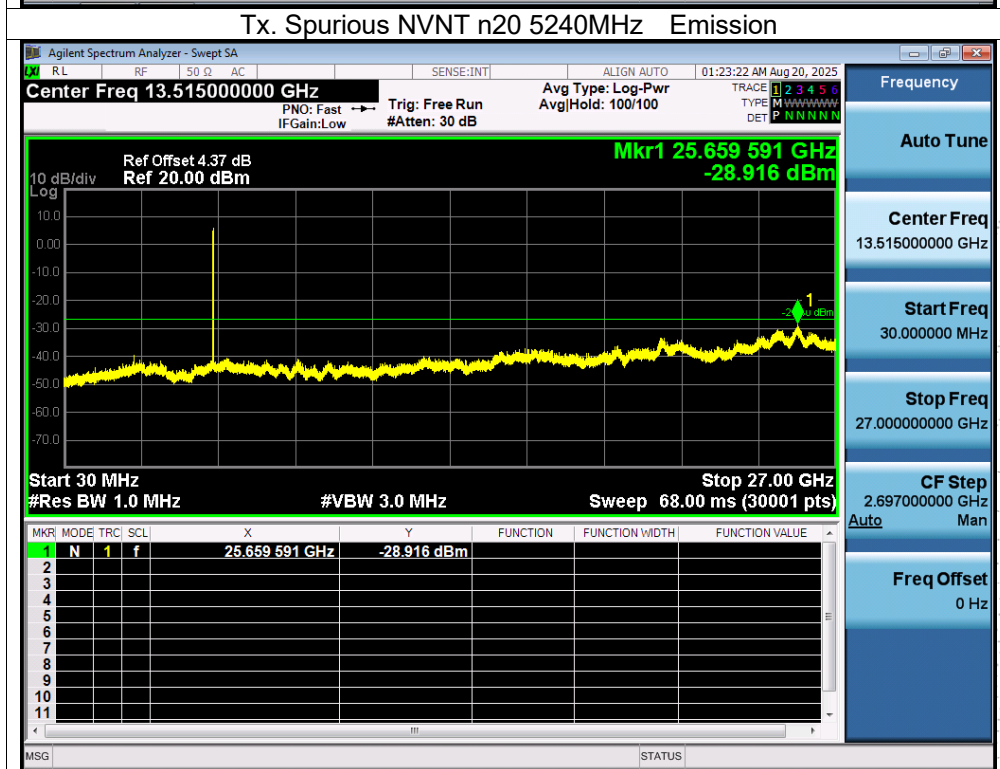
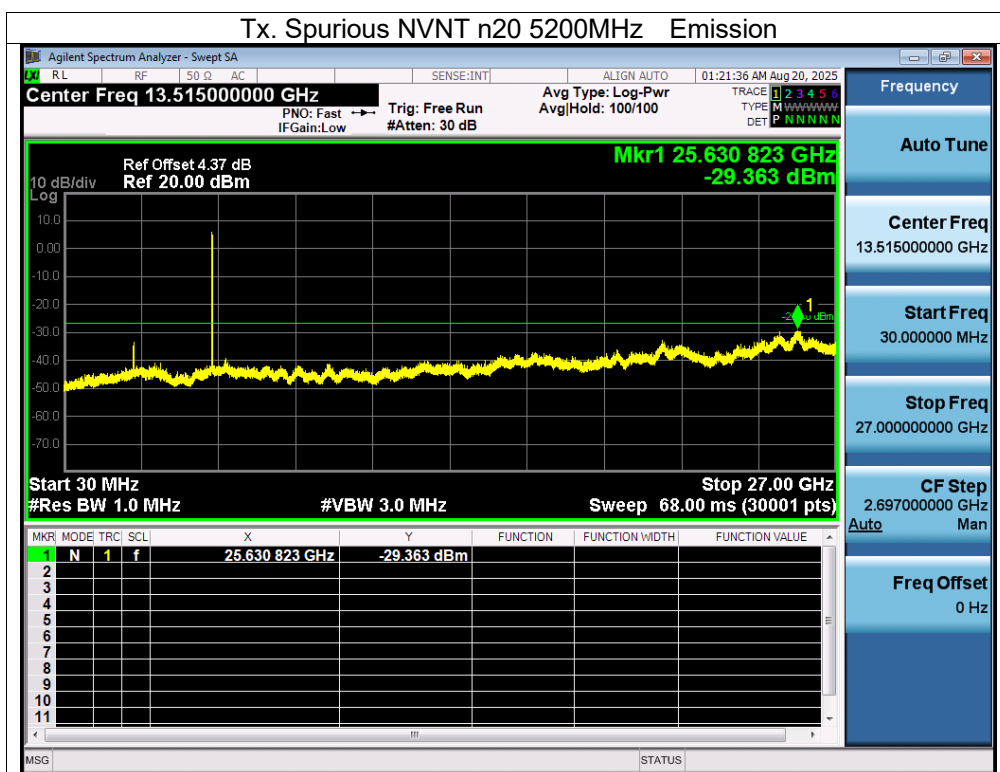


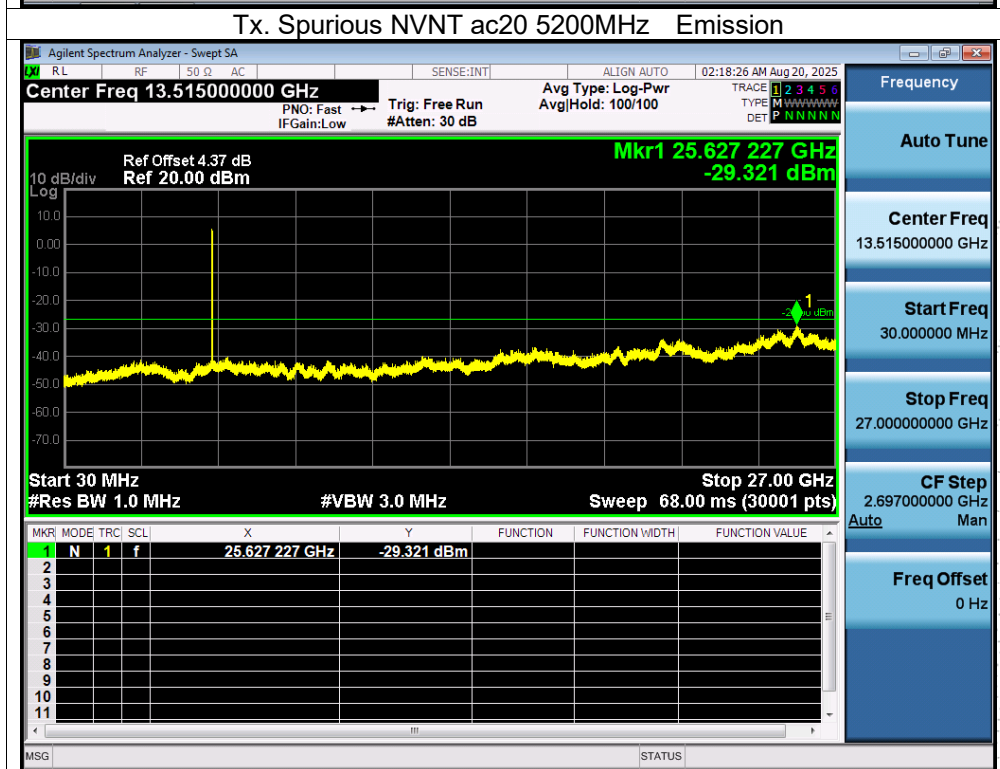
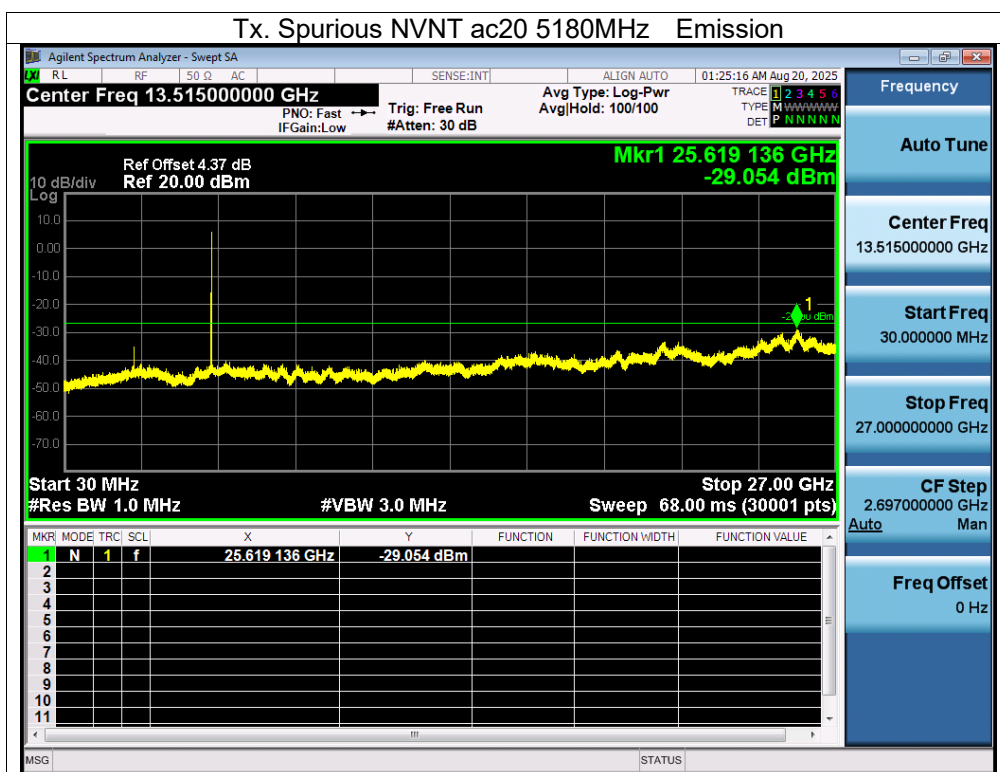
#### Tx. Spurious NVNT a 5200MHz Emission

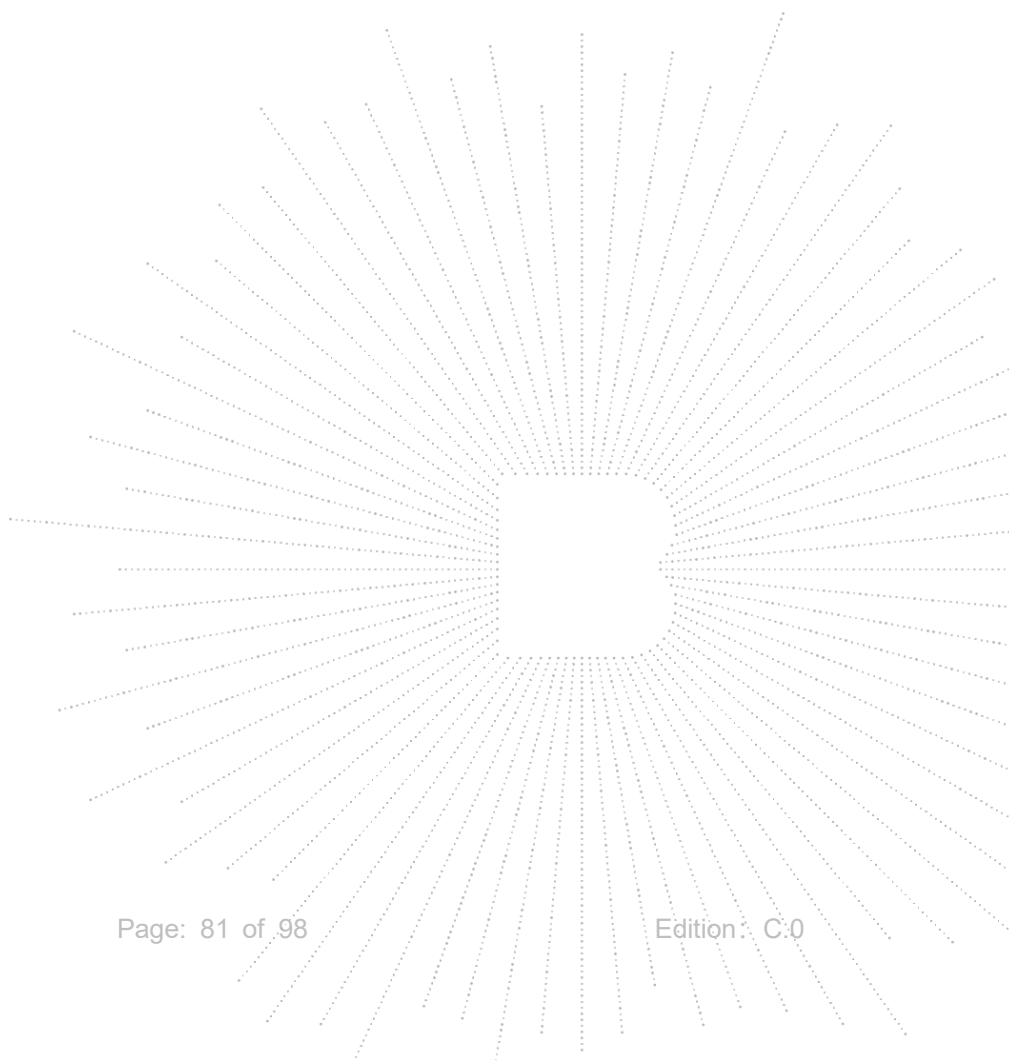
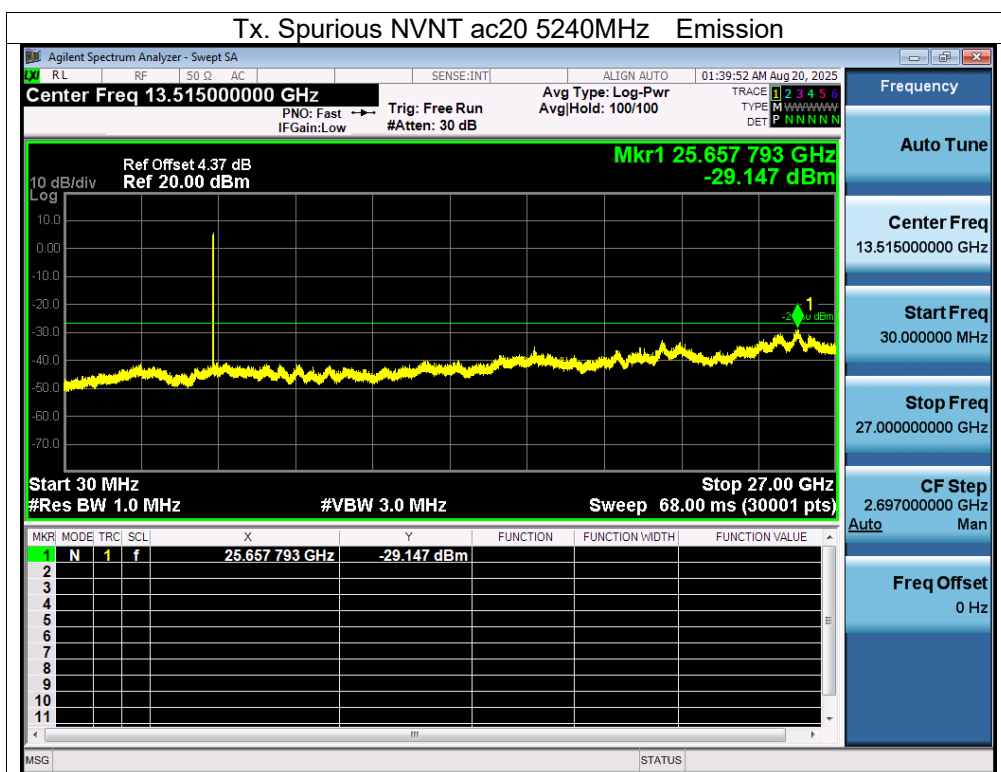






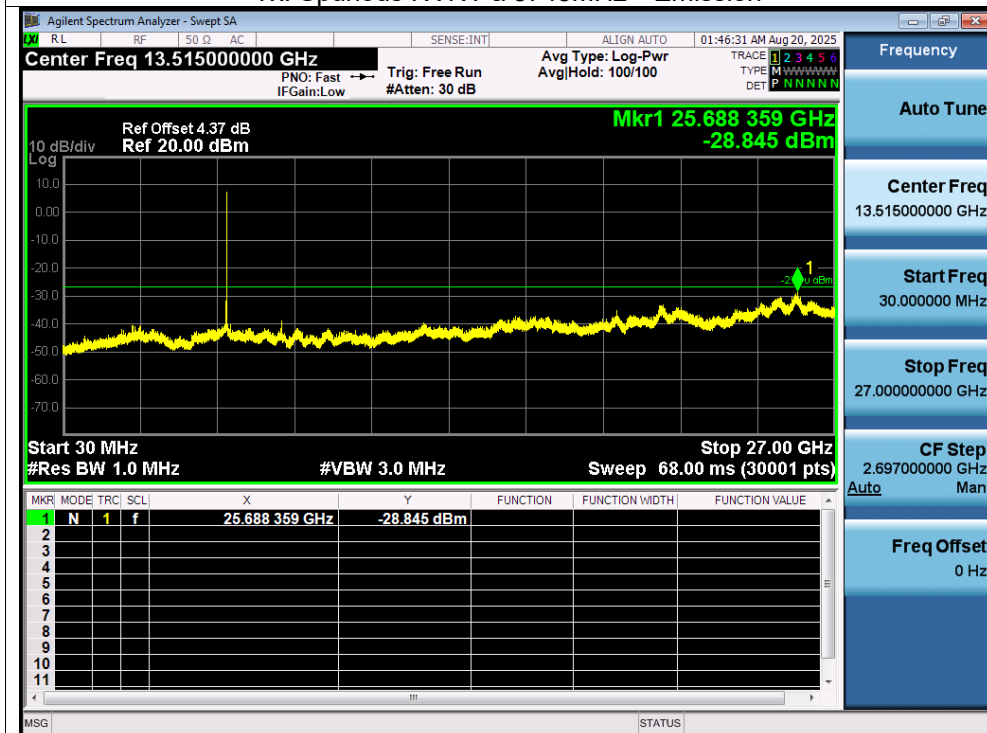




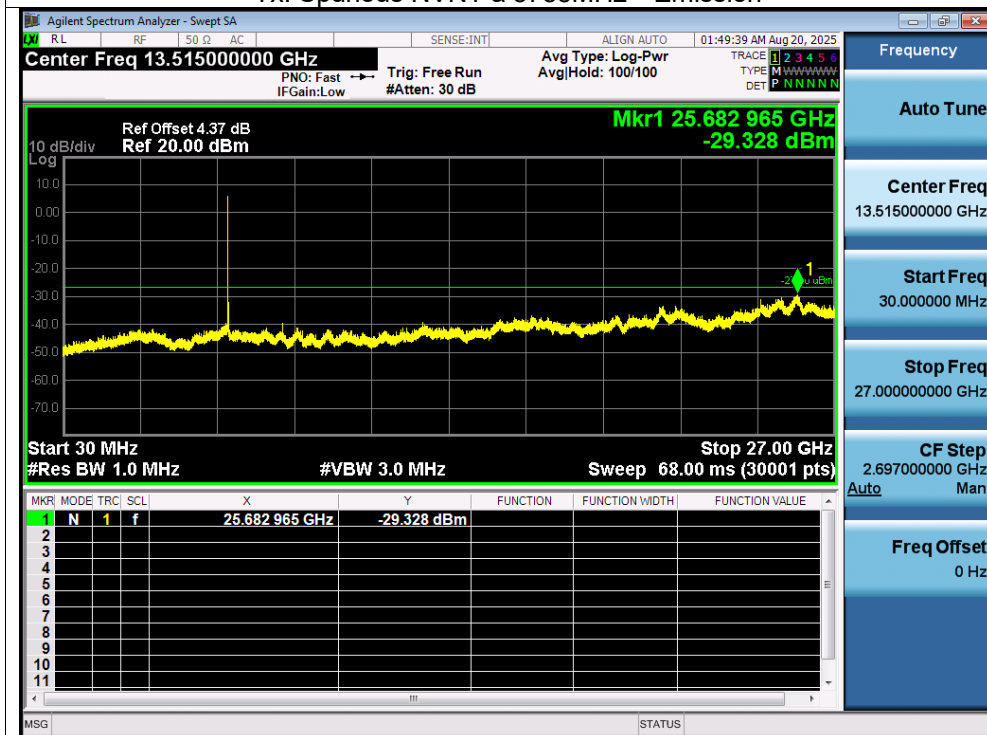


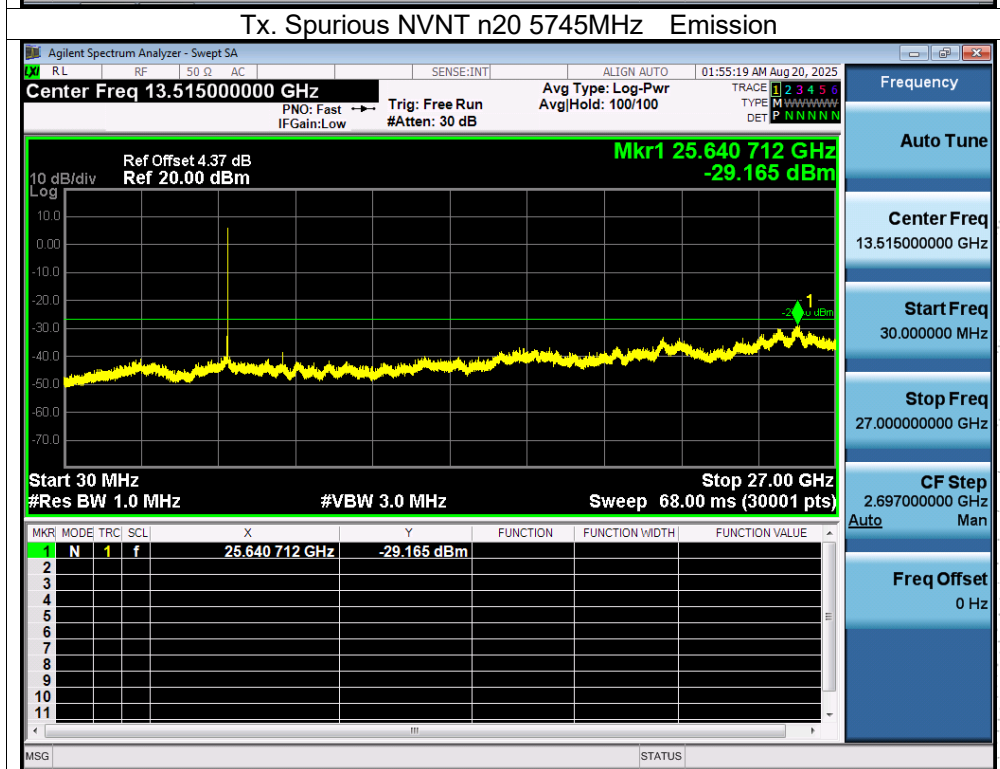
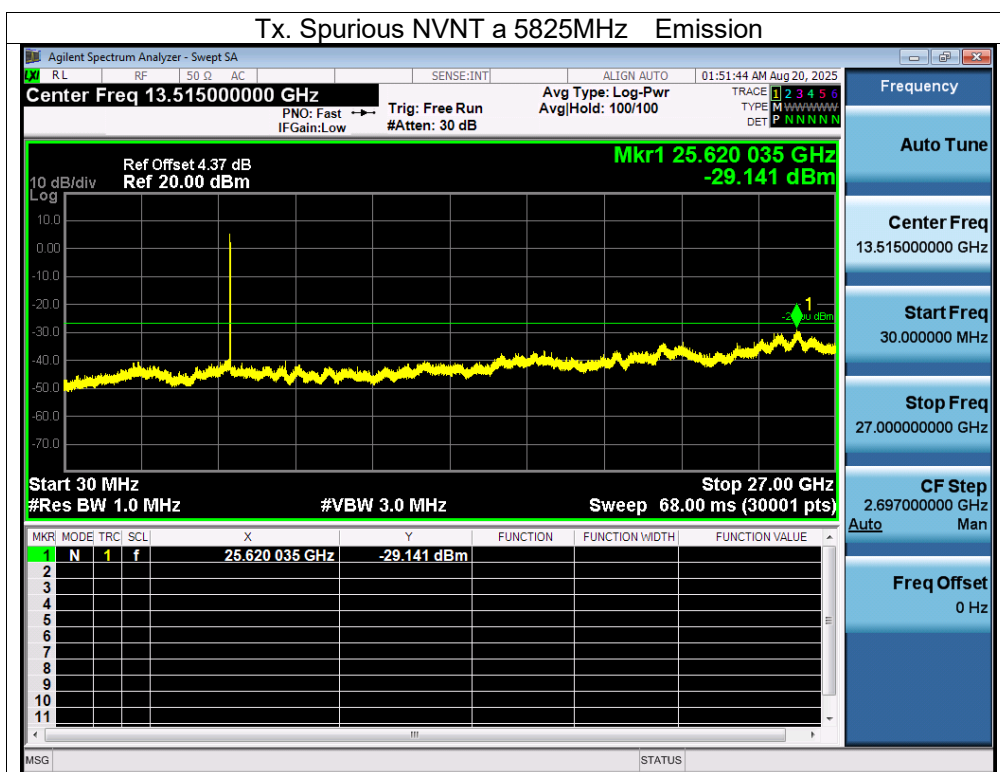
### Test Graphs

#### Tx. Spurious NVNT a 5745MHz Emission

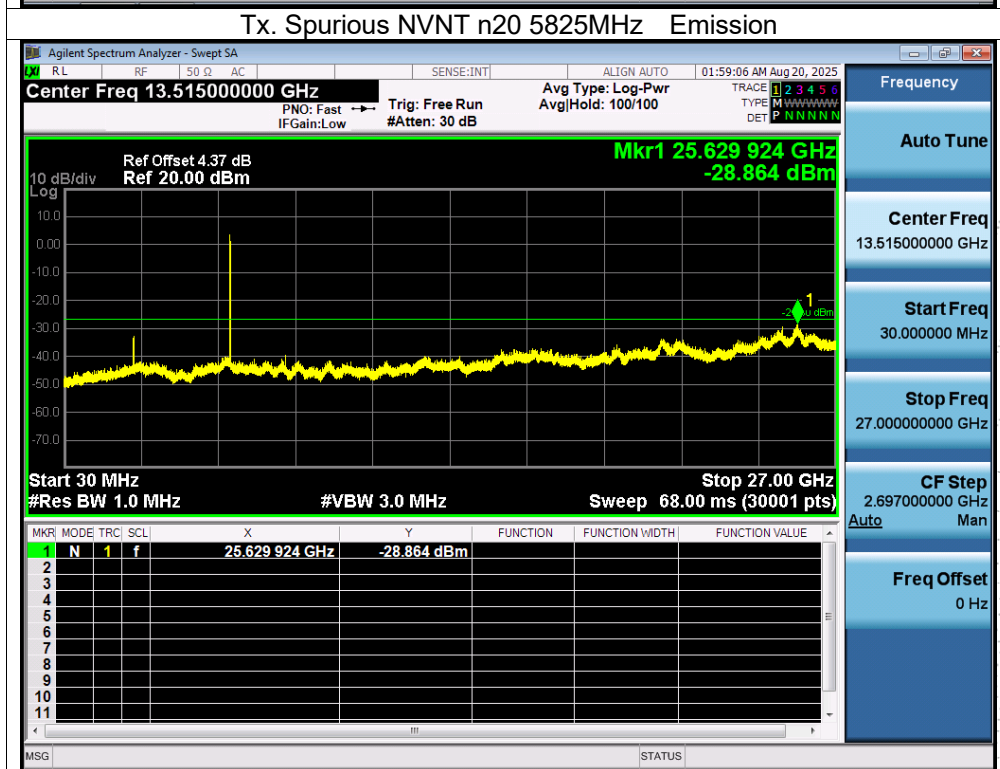
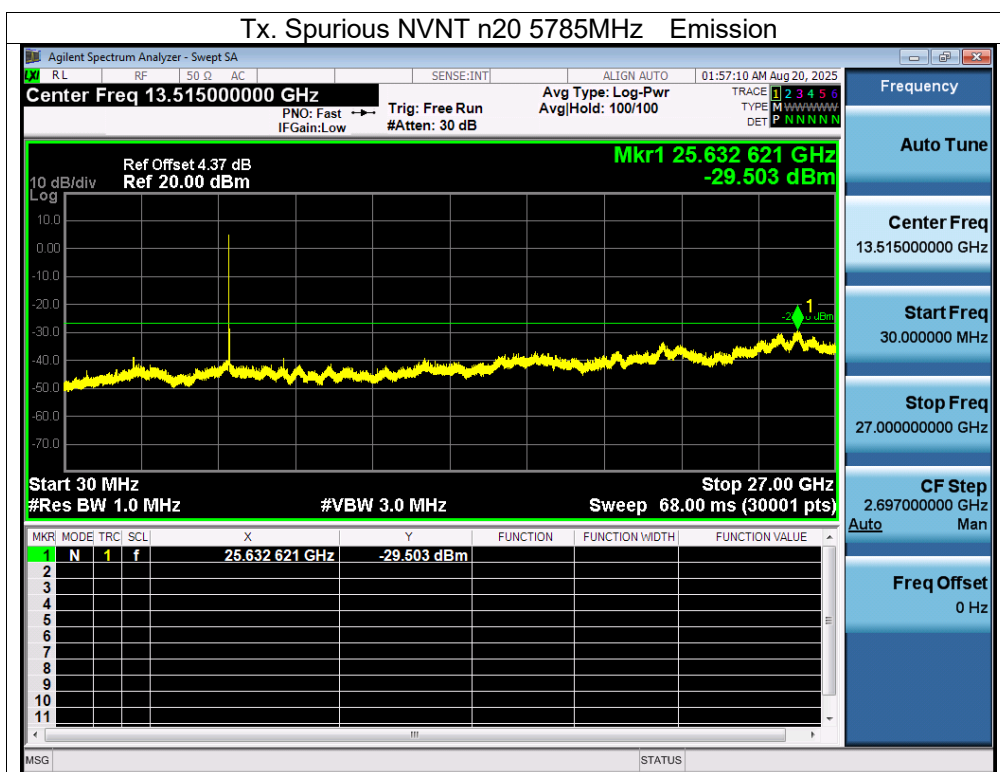


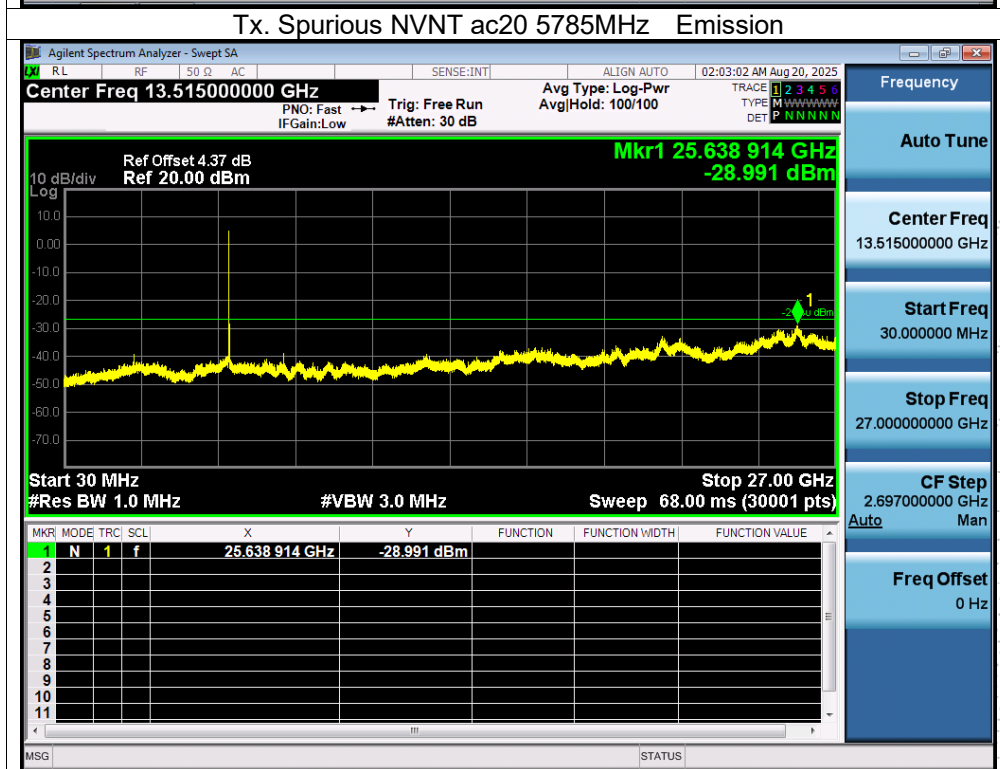
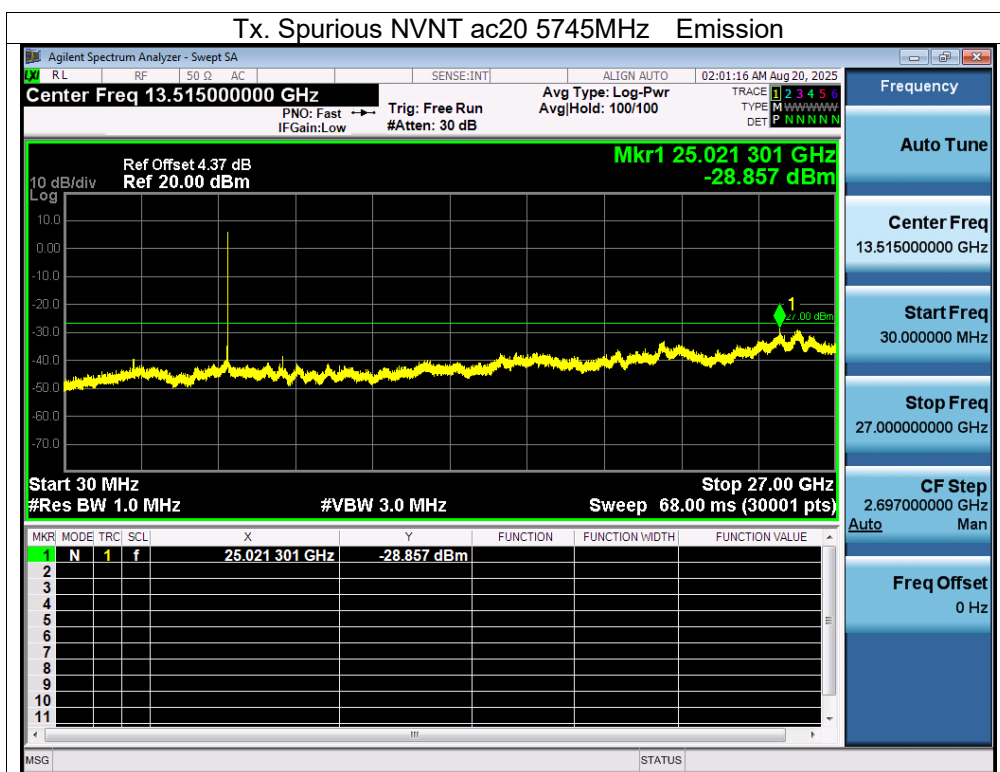
#### Tx. Spurious NVNT a 5785MHz Emission

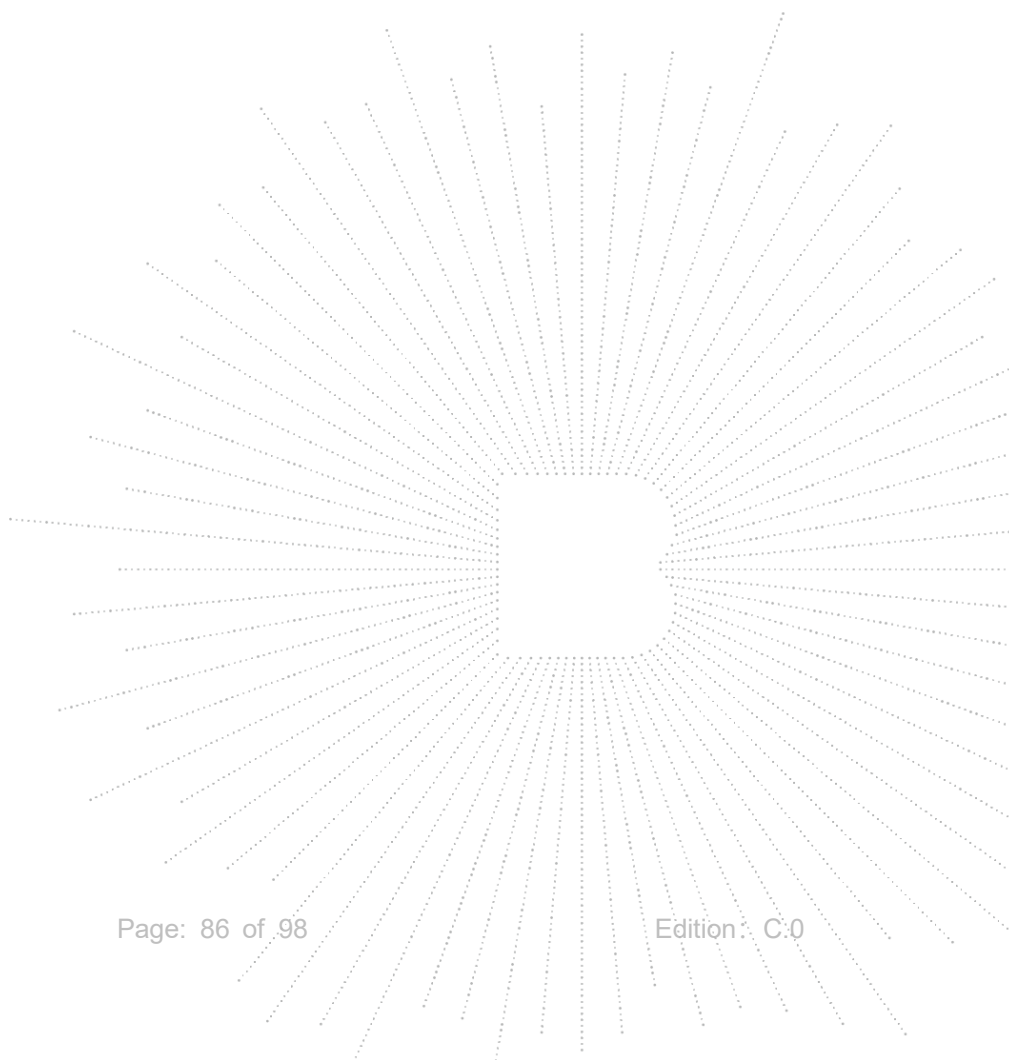
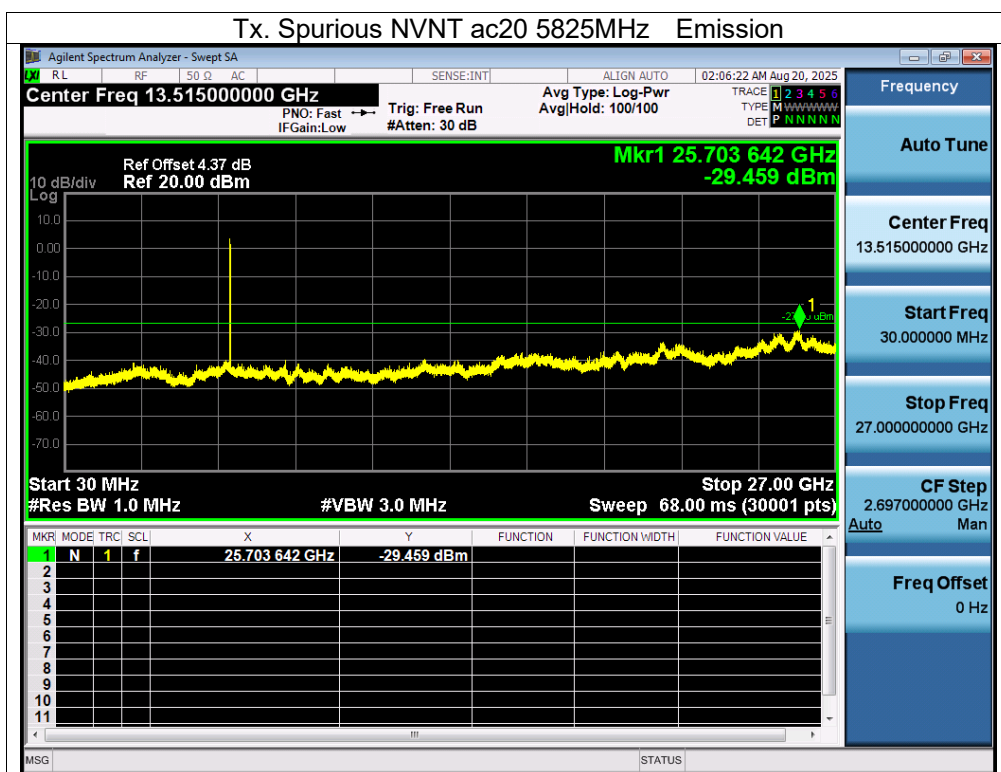






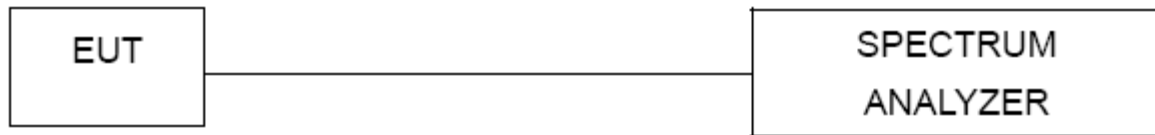






### 13. Frequency Stability Measurement

#### 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  $\pm 20$  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%RH
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)	120.00	5180.0080	5180	0.0080	1.5444
		V max (V)	138.00	5180.0019	5180	0.0019	0.3668
		V min (V)	102.00	5180.0084	5180	0.0084	1.6216
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)	120	T (°C)	-20	5180.0135	5180	0.0135	2.6062
		T (°C)	-10	5180.0060	5180	0.0060	1.1583
		T (°C)	0	5180.0126	5180	0.0126	2.4324
		T (°C)	10	5180.0122	5180	0.0122	2.3552
		T (°C)	20	5180.0067	5180	0.0067	1.2934
		T (°C)	30	5180.0069	5180	0.0069	1.3320
		T (°C)	40	5180.0081	5180	0.0081	1.5637
		T (°C)	50	5180.0128	5180	0.0128	2.4710
		T (°C)	60	5180.0128	5180	0.0128	2.4710
		T (°C)	70	5180.0002	5180	0.0002	0.0386
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)	120.00	5200.0047	5200	0.0047	0.9038
		V max (V)	138.00	5200.0048	5200	0.0048	0.9231
		V min (V)	102.00	5200.0014	5200	0.0014	0.2692
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)	120	T (°C)	-20	5200.0107	5200	0.0107	2.0577
		T (°C)	-10	5200.0019	5200	0.0019	0.3654
		T (°C)	0	5200.0086	5200	0.0086	1.6538
		T (°C)	10	5200.0039	5200	0.0039	0.7500
		T (°C)	20	5200.0050	5200	0.0050	0.9615
		T (°C)	30	5200.0045	5200	0.0045	0.8654
		T (°C)	40	5200.0026	5200	0.0026	0.5000
		T (°C)	50	5200.0096	5200	0.0096	1.8462
		T (°C)	60	5200.0092	5200	0.0092	1.7692
		T (°C)	70	5200.0080	5200	0.0080	1.5385
Limits				5150-5250 MHz			
Result				Complies			

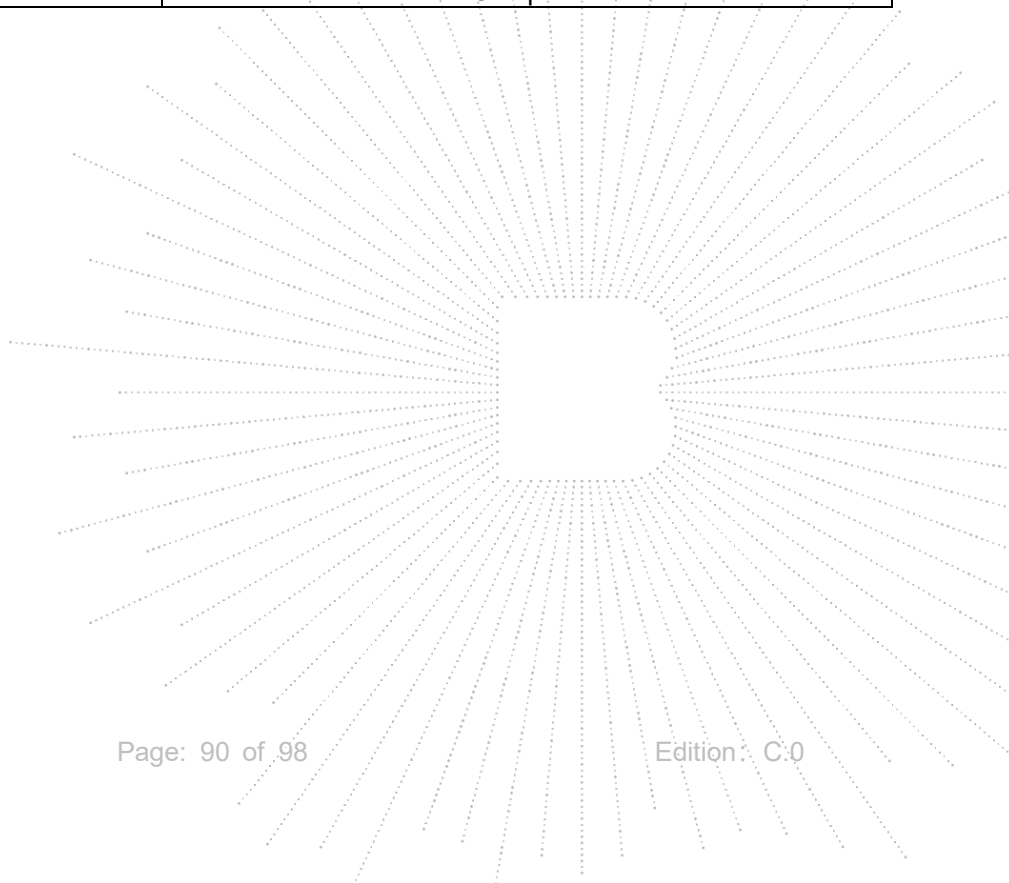


## Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency : 5240MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	120.00	5240.0018	5240	0.0018	0.3435
		V max (V)	138.00	5240.0025	5240	0.0025	0.4771
		V min (V)	102.00	5240.0058	5240	0.0058	1.1069
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)	120	T (°C)	-20	5240.0052	5240	0.0052	0.9924
		T (°C)	-10	5240.0054	5240	0.0054	1.0305
		T (°C)	0	5240.0106	5240	0.0106	2.0229
		T (°C)	10	5240.0133	5240	0.0133	2.5382
		T (°C)	20	5240.0047	5240	0.0047	0.8969
		T (°C)	30	5240.0101	5240	0.0101	1.9275
		T (°C)	40	5240.0114	5240	0.0114	2.1756
		T (°C)	50	5240.0074	5240	0.0074	1.4122
		T (°C)	60	5240.0076	5240	0.0076	1.4504
		T (°C)	70	5240.0092	5240	0.0092	1.7557
Limits				5150-5250 MHz			
Result				Complies			



Temperature:	26 °C	Relative Humidity:	54%RH
Pressure:	101KPa	Test Voltage:	DC 5V
Test Mode:	TX (5.8G) Mode Frequency U-NII-3 (5745-5825MHz)		

#### Voltage vs. Frequency Stabilit

TEST CONDITIONS				Reference Frequency : 5745MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	120.00	5745.0121	5745	0.0121	2.1062
		V max (V)	138.00	5745.0003	5745	0.0003	0.0522
		V min (V)	102.00	5745.0050	5745	0.0050	0.8703
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)	120	T (°C)	-20	5745.0058	5745	0.0058	1.0096
		T (°C)	-10	5745.0018	5745	0.0018	0.3133
		T (°C)	0	5745.0112	5745	0.0112	1.9495
		T (°C)	10	5745.0125	5745	0.0125	2.1758
		T (°C)	20	5745.0053	5745	0.0053	0.9225
		T (°C)	30	5745.0070	5745	0.0070	1.2185
		T (°C)	40	5745.0008	5745	0.0008	0.1393
		T (°C)	50	5745.0009	5745	0.0009	0.1567
		T (°C)	60	5745.0112	5745	0.0112	1.9495
		T (°C)	70	5745.0061	5745	0.0061	1.0618
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)	120.00	5785.0024	5785	0.0024	0.4149
		V max (V)	138.00	5785.0063	5785	0.0063	1.0890
		V min (V)	102.00	5785.0002	5785	0.0002	0.0346
Limits				5725-5850 MHz			
Result				Complies			

## Temperature vs. Frequency Stability

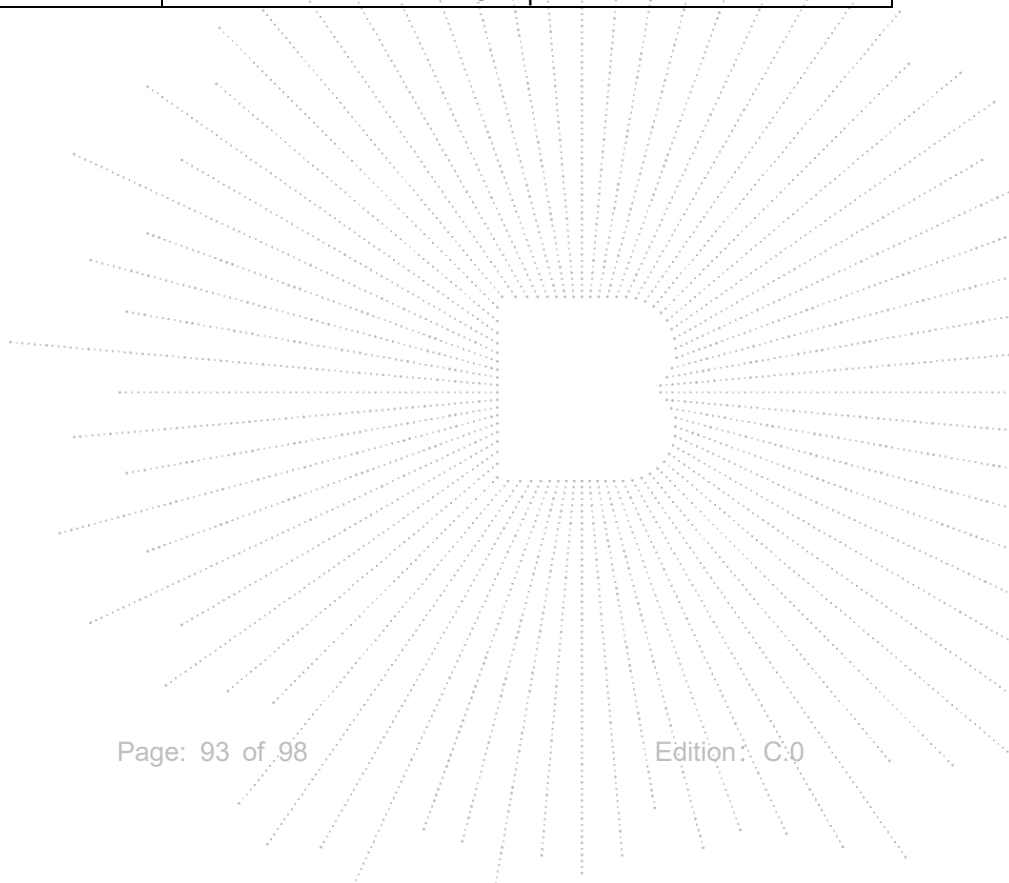
TEST CONDITIONS				Reference Frequency : 5785MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	120	T (°C)	-20	5785.0061	5785	0.0061	1.0545
		T (°C)	-10	5785.0103	5785	0.0103	1.7805
		T (°C)	0	5785.0018	5785	0.0018	0.3111
		T (°C)	10	5785.0081	5785	0.0081	1.4002
		T (°C)	20	5785.0055	5785	0.0055	0.9507
		T (°C)	30	5785.0058	5785	0.0058	1.0026
		T (°C)	40	5785.0103	5785	0.0103	1.7805
		T (°C)	50	5785.0098	5785	0.0098	1.6940
		T (°C)	60	5785.0019	5785	0.0019	0.3284
		T (°C)	70	5785.0112	5785	0.0112	1.9360
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)	120.00	5825.0098	5825	0.0098	1.6824
		V max (V)	138.00	5825.0023	5825	0.0023	0.3948
		V min (V)	102.00	5825.0087	5825	0.0087	1.4936
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)	120	T (°C)	-20	5825.0076	5825	0.0076	1.3047
		T (°C)	-10	5825.0024	5825	0.0024	0.4120
		T (°C)	0	5825.0066	5825	0.0066	1.1330
		T (°C)	10	5825.0064	5825	0.0064	1.0987
		T (°C)	20	5825.0087	5825	0.0087	1.4936
		T (°C)	30	5825.0030	5825	0.0030	0.5150
		T (°C)	40	5825.0095	5825	0.0095	1.6309
		T (°C)	50	5825.0100	5825	0.0100	1.7167
		T (°C)	60	5825.0001	5825	0.0001	0.0172
		T (°C)	70	5825.0029	5825	0.0029	0.4979
Limits				5725-5850 MHz			
Result				Complies			



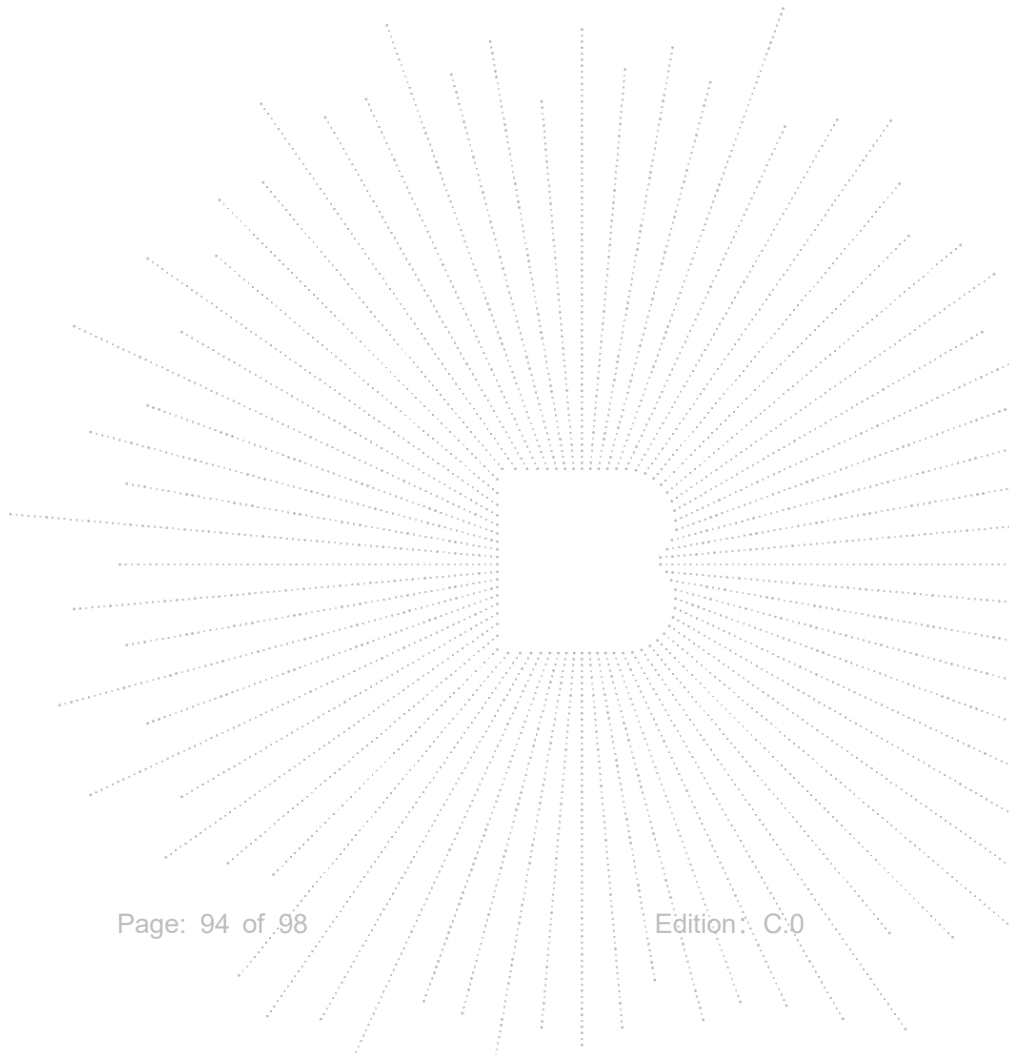
## 14. Antenna Requirement

### 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 Antenna

The EUT antenna is Internal antenna. It comply with the standard requirement.

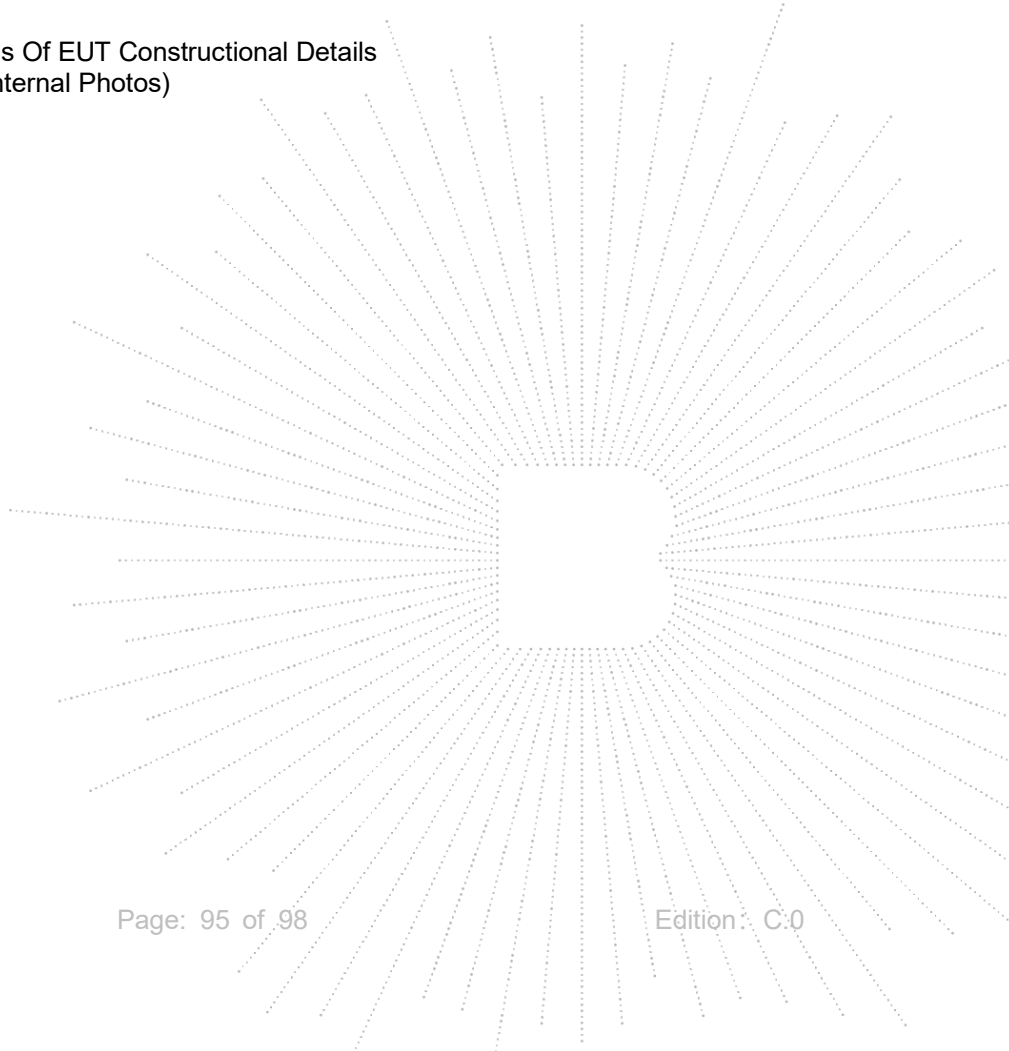


## 15. EUT Photographs

EUT Photo



NOTE: Appendix-Photographs Of EUT Constructional Details  
(CM737(RX) \_External & Internal Photos)





## 16. EUT Test Setup Photographs

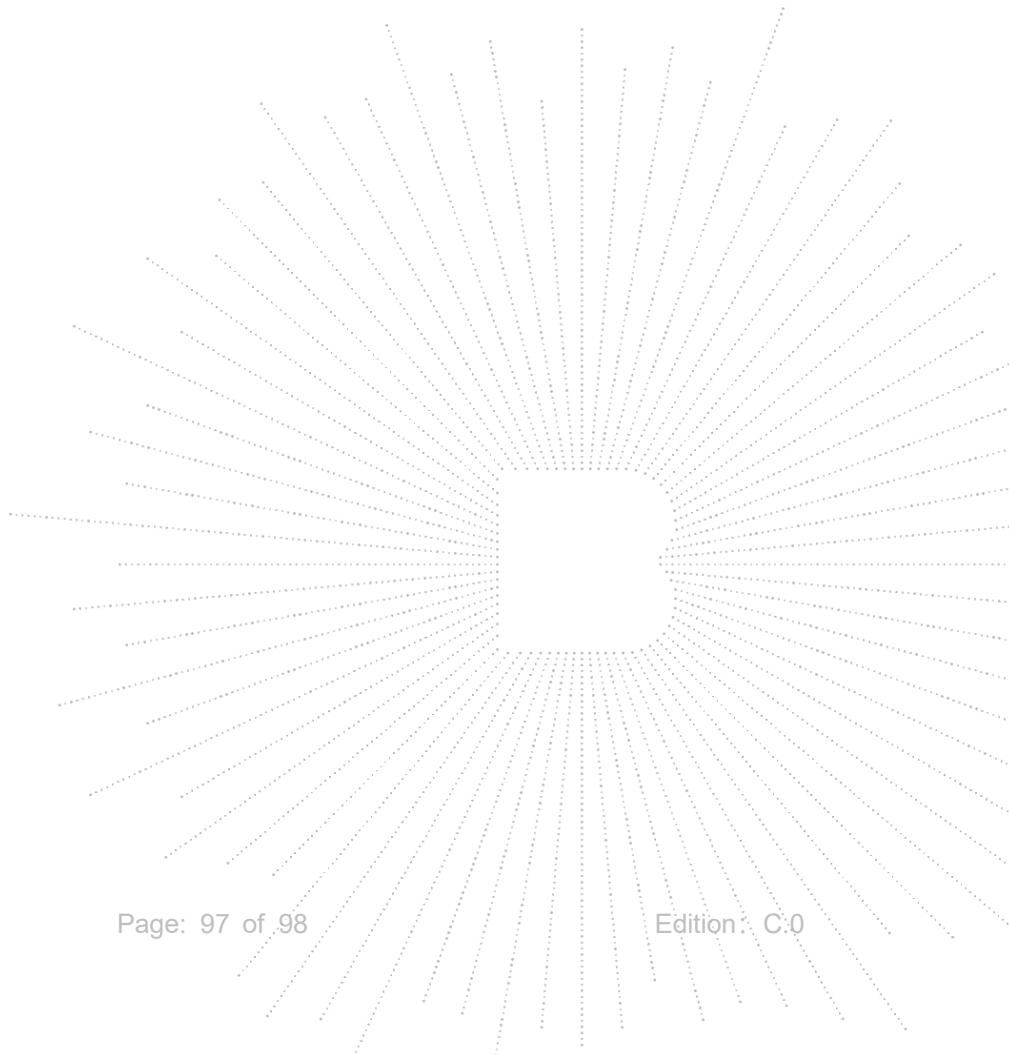
Conducted Measurement Photo



Radiated Measurement Photos



Spurious emissions



**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 \*\*\*\*\*