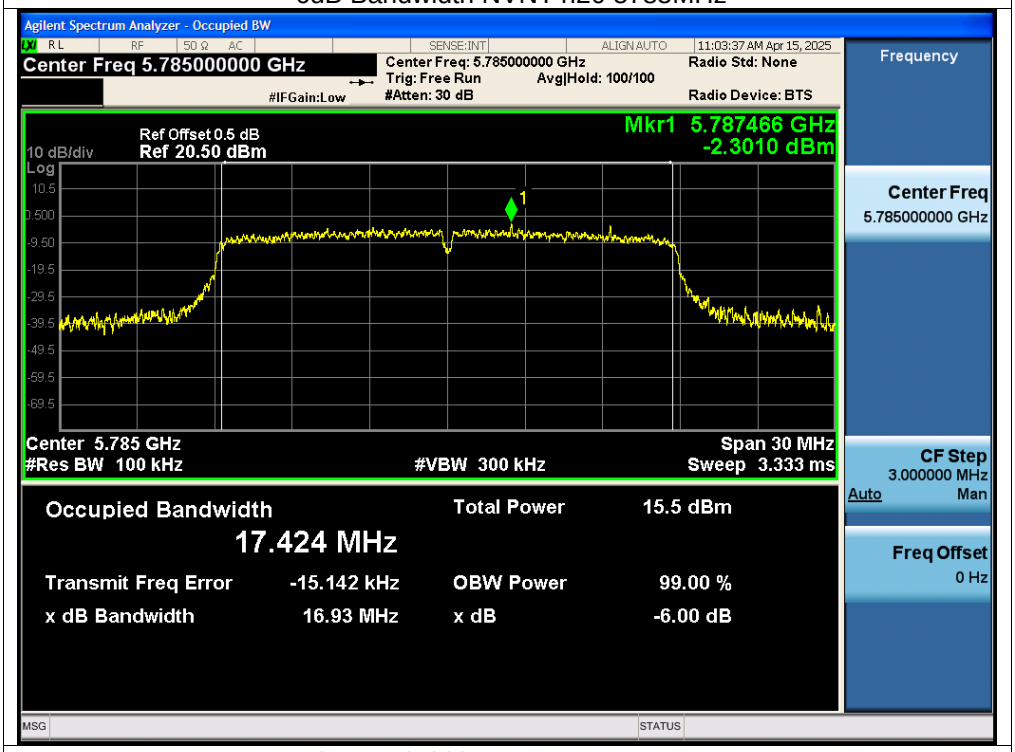
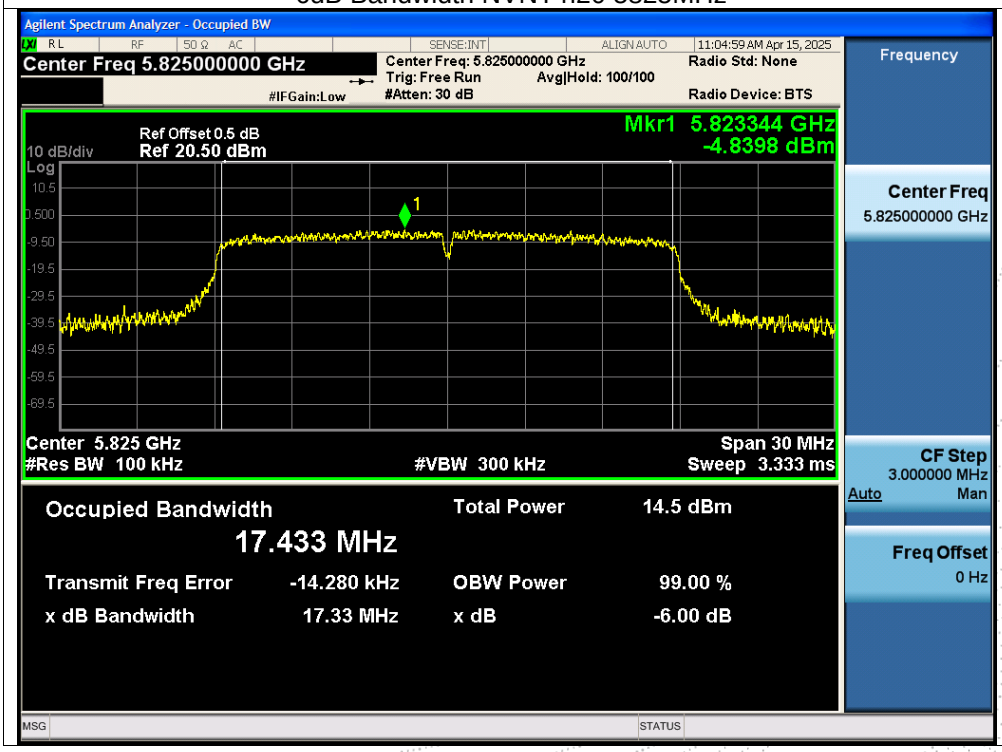
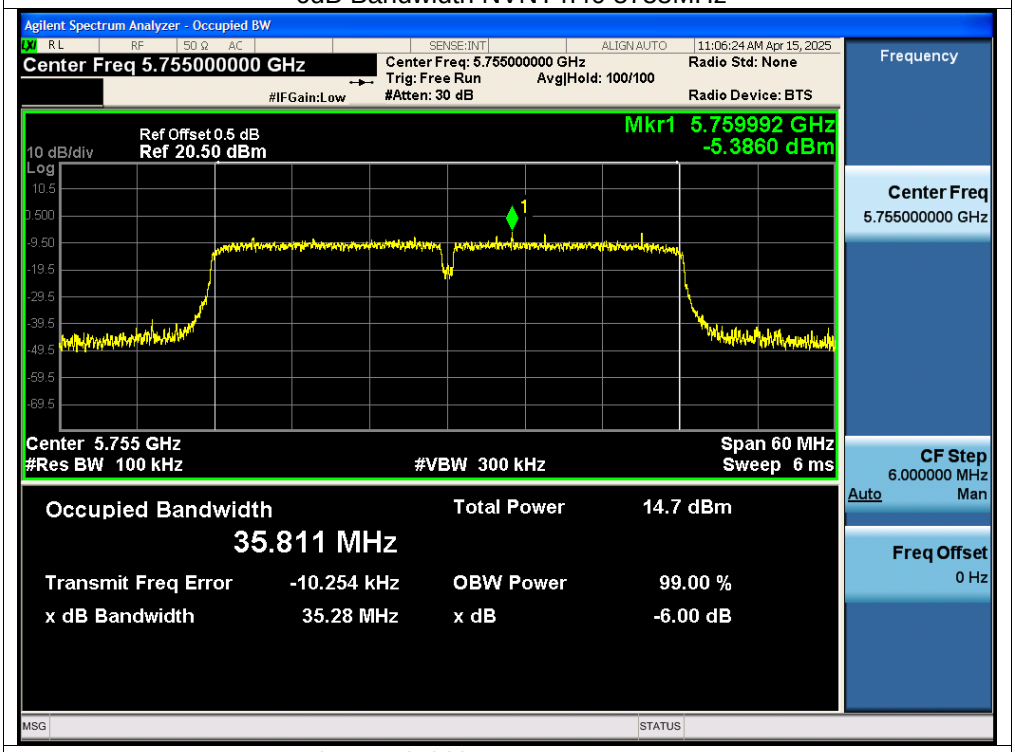
-6dB Bandwidth NVNT n20 5785MHz



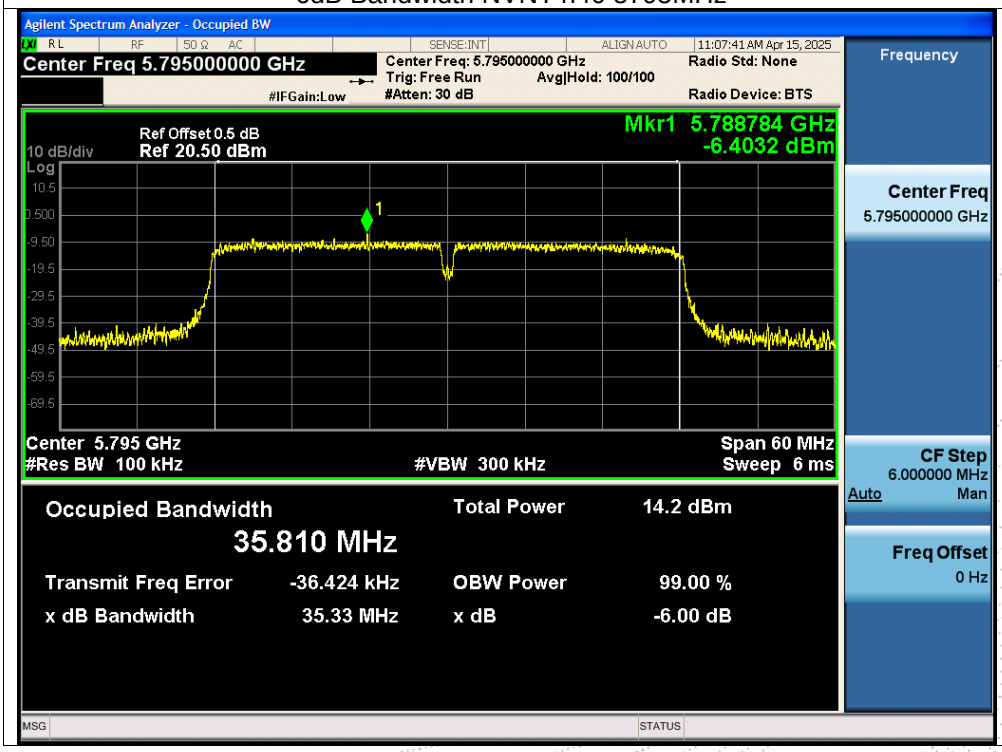
-6dB Bandwidth NVNT n20 5825MHz



-6dB Bandwidth NVNT n40 5755MHz

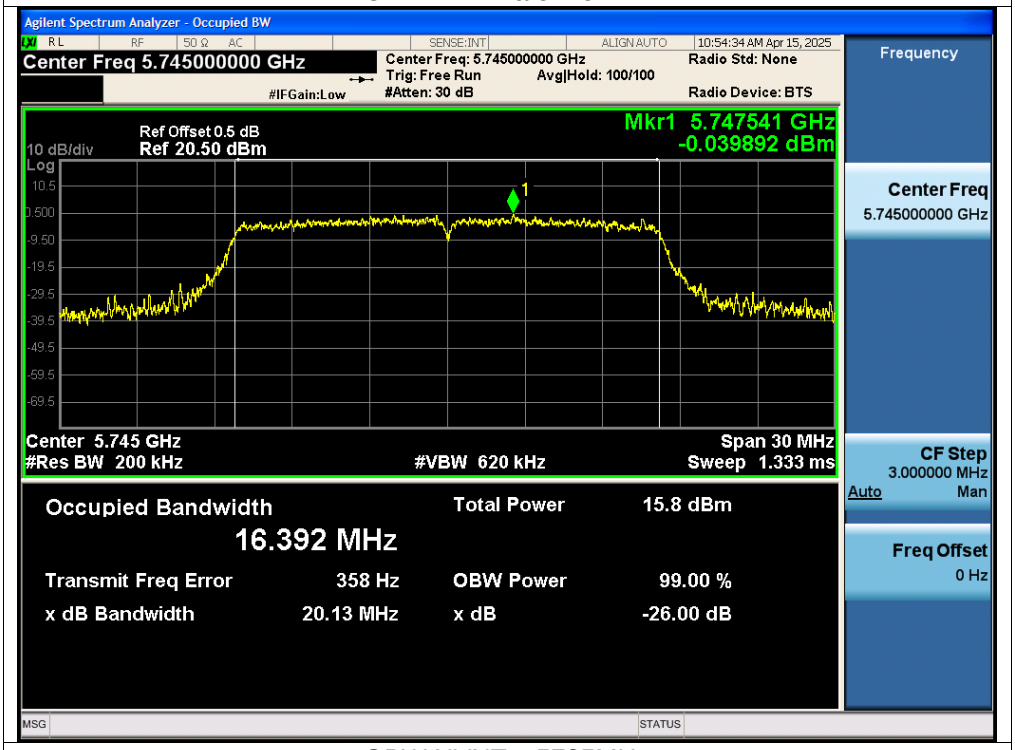


-6dB Bandwidth NVNT n40 5795MHz

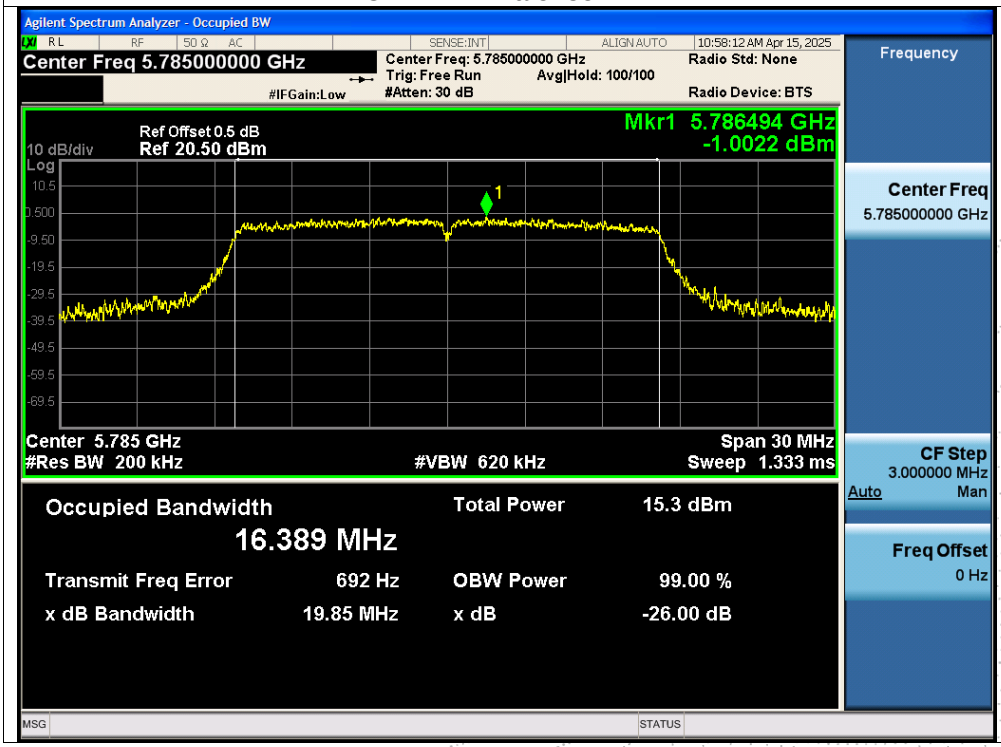


Test Graphs

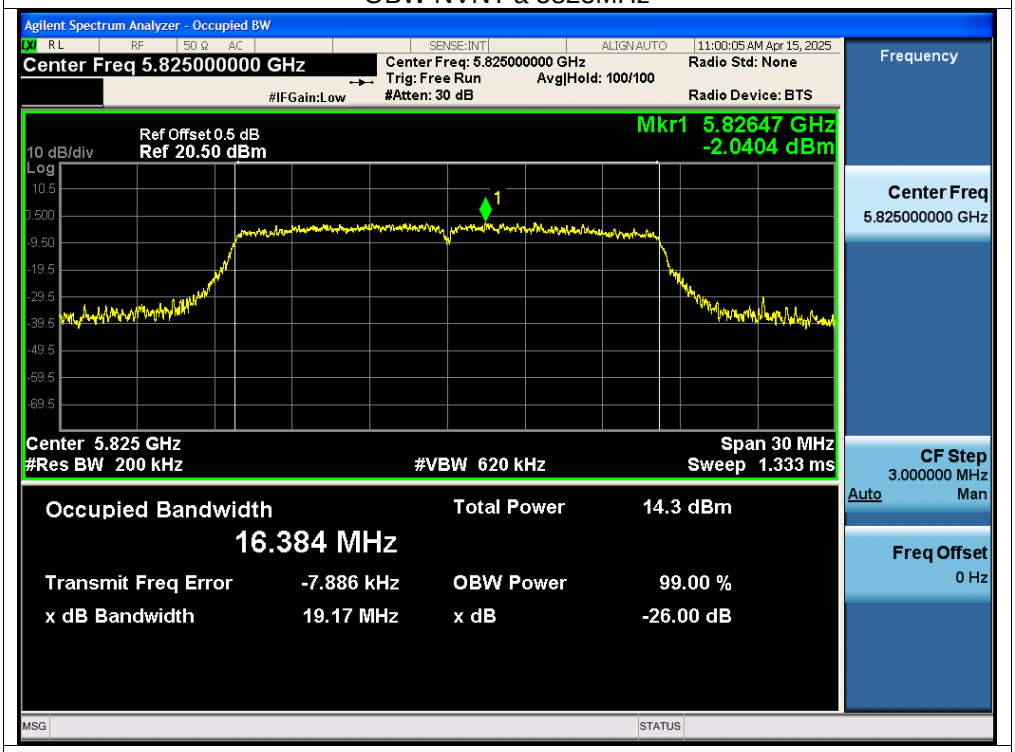
OBW NVNT a 5745MHz



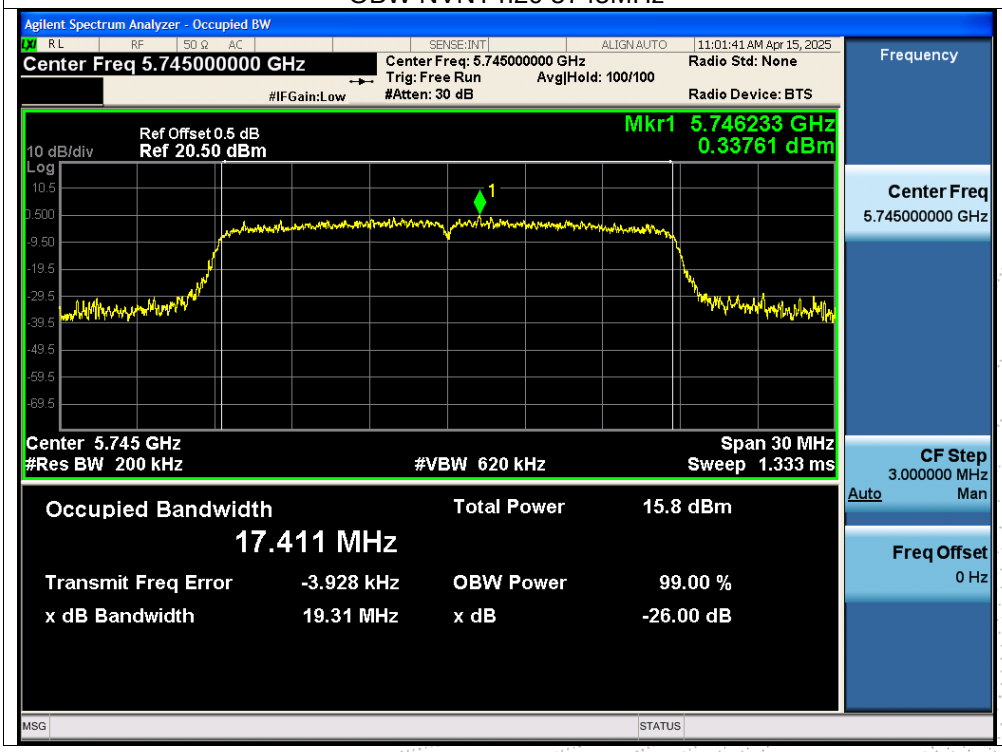
OBW NVNT a 5785MHz



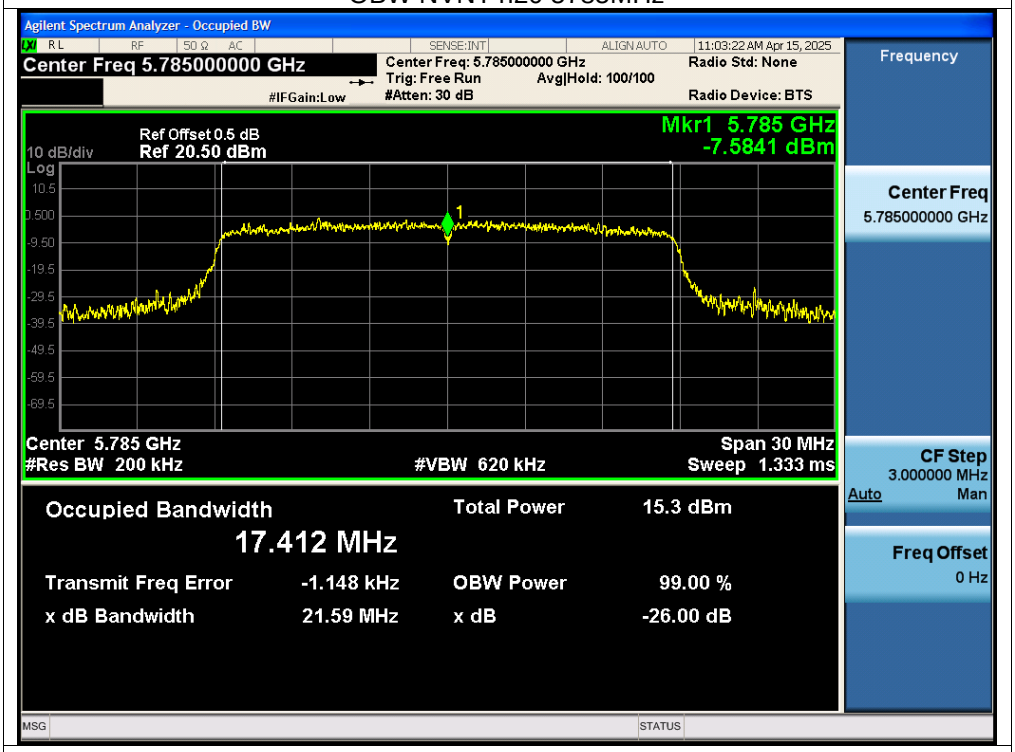
OBW NVNT a 5825MHz



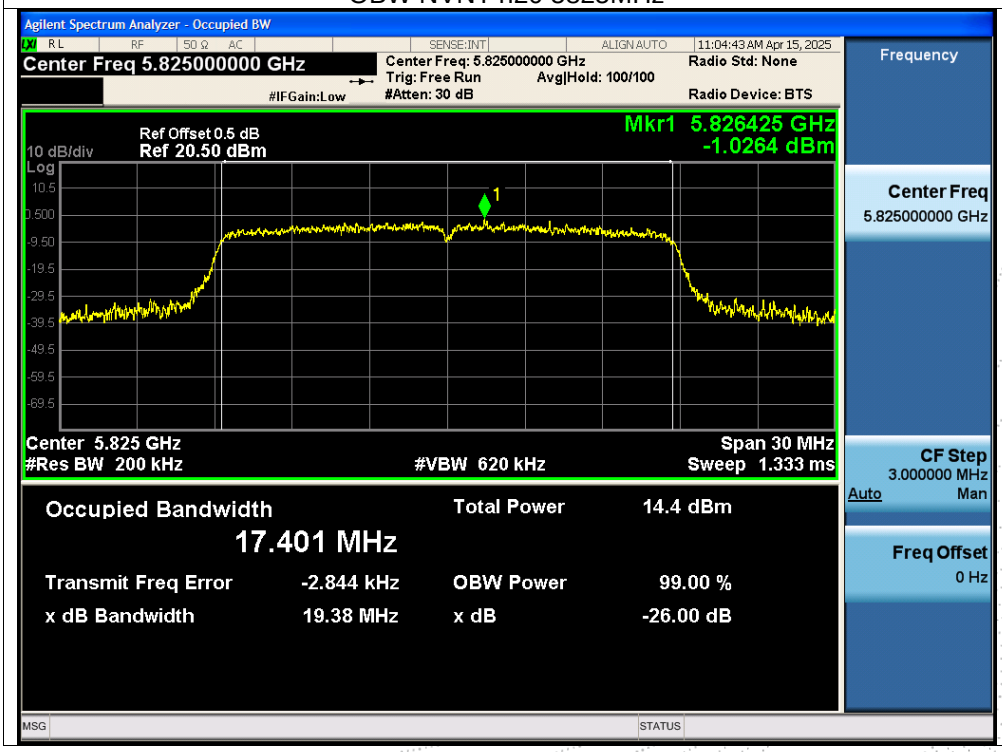
OBW NVNT n20 5745MHz



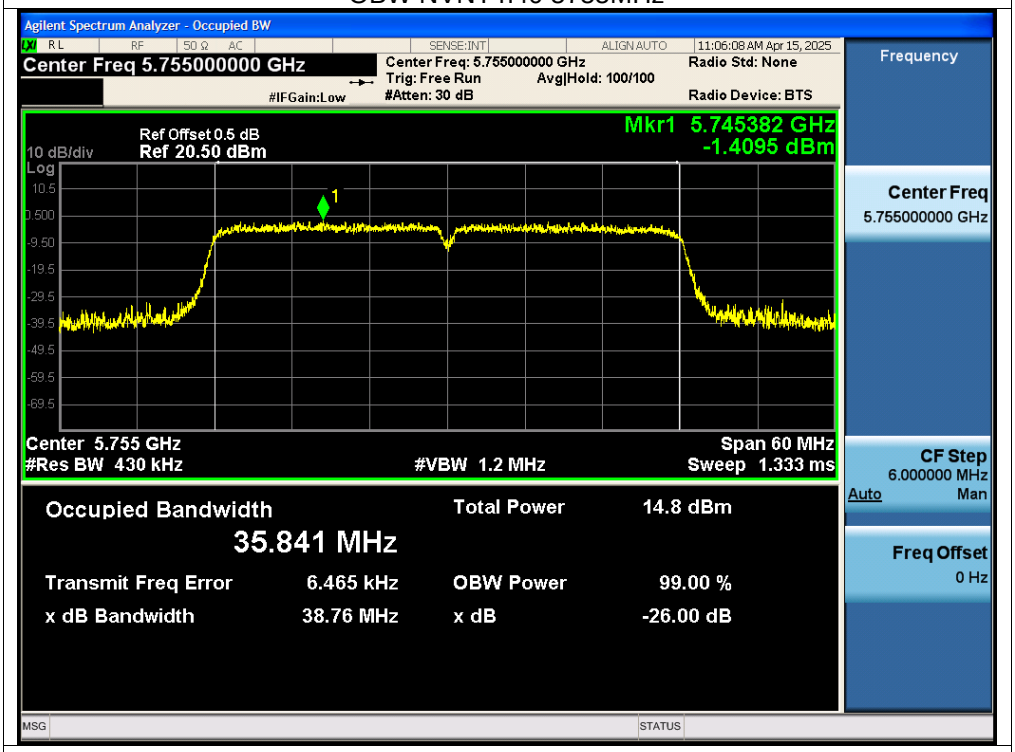
OBW NVNT n20 5785MHz



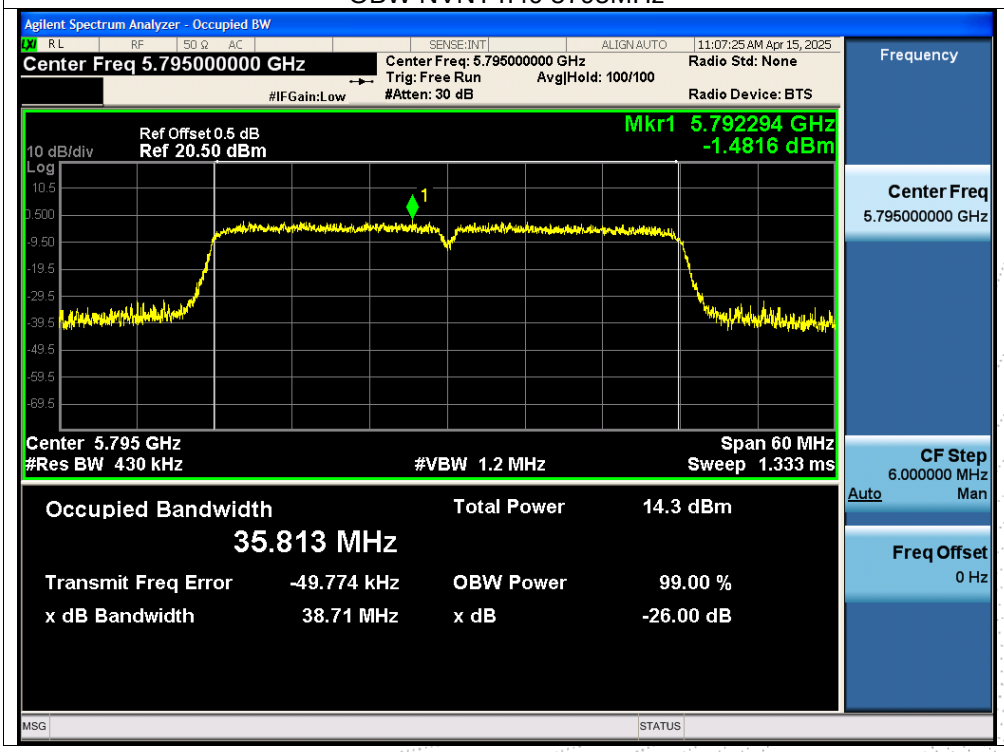
OBW NVNT n20 5825MHz



OBW NVNT n40 5755MHz

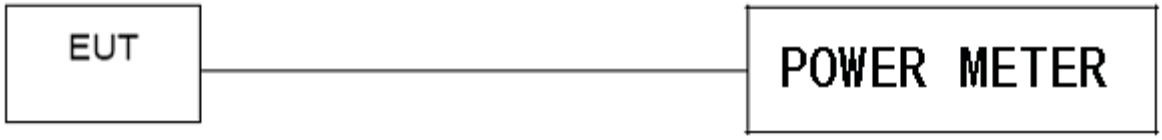


OBW NVNT n40 5795MHz



10. Maximum Conducted Output Power

10.1 Block Diagram Of Test Setup



10.2 Limit

According to FCC §15.407

The maximum conduced 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.1 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 ≥ 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 ± 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 ≥ 3 MHz.

(iv) Number of points in sweep ≥ 2 Span / RBW. (This ensures that bin-to-bin spacing is ≤ 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 ≥ 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

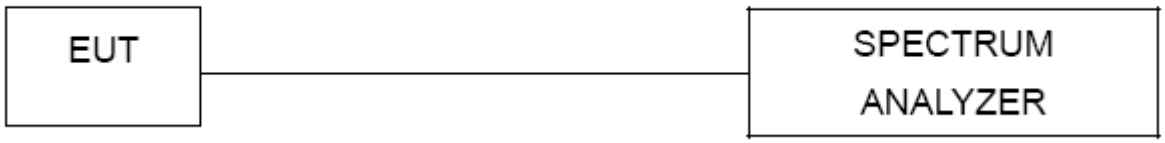
Temperature:	26 ℃	Relative Humidity:	54%RH
Pressure:	101KPa	Test Voltage:	AC 120V/60Hz
Test Mode:	(5180-5240MHz); (5745-5825MHz)		

Condition	Mode	Frequency (MHz)	Conducted Power (dBm)	Limit (dBm)	Verdict
NVNT	a	5180	10.81	24	Pass
NVNT	a	5200	10.06	24	Pass
NVNT	a	5240	9.74	24	Pass
NVNT	n20	5180	9.83	24	Pass
NVNT	n20	5200	9.80	24	Pass
NVNT	n20	5240	9.59	24	Pass
NVNT	n40	5190	8.91	24	Pass
NVNT	n40	5230	8.54	24	Pass

Condition	Mode	Frequency (MHz)	Conducted Power (dBm)	Limit (dBm)	Verdict
NVNT	a	5745	13.41	30	Pass
NVNT	a	5785	12.76	30	Pass
NVNT	a	5825	11.54	30	Pass
NVNT	n20	5745	13.22	30	Pass
NVNT	n20	5785	12.51	30	Pass
NVNT	n20	5825	11.61	30	Pass
NVNT	n40	5755	12.14	30	Pass
NVNT	n40	5795	11.64	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

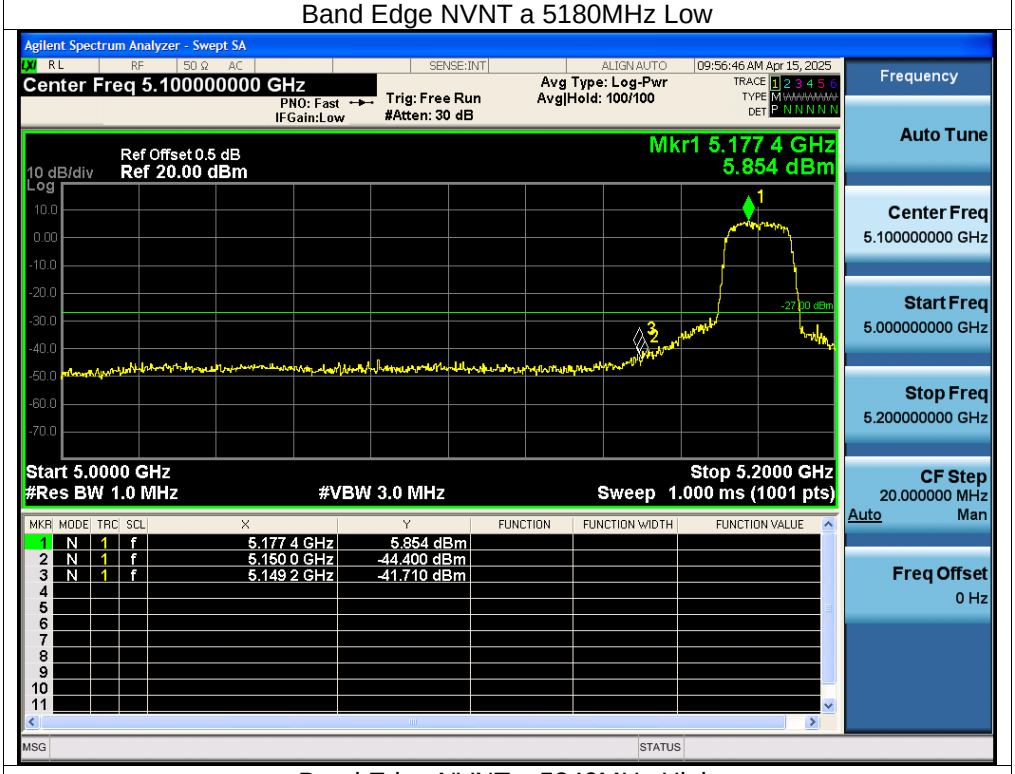
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then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

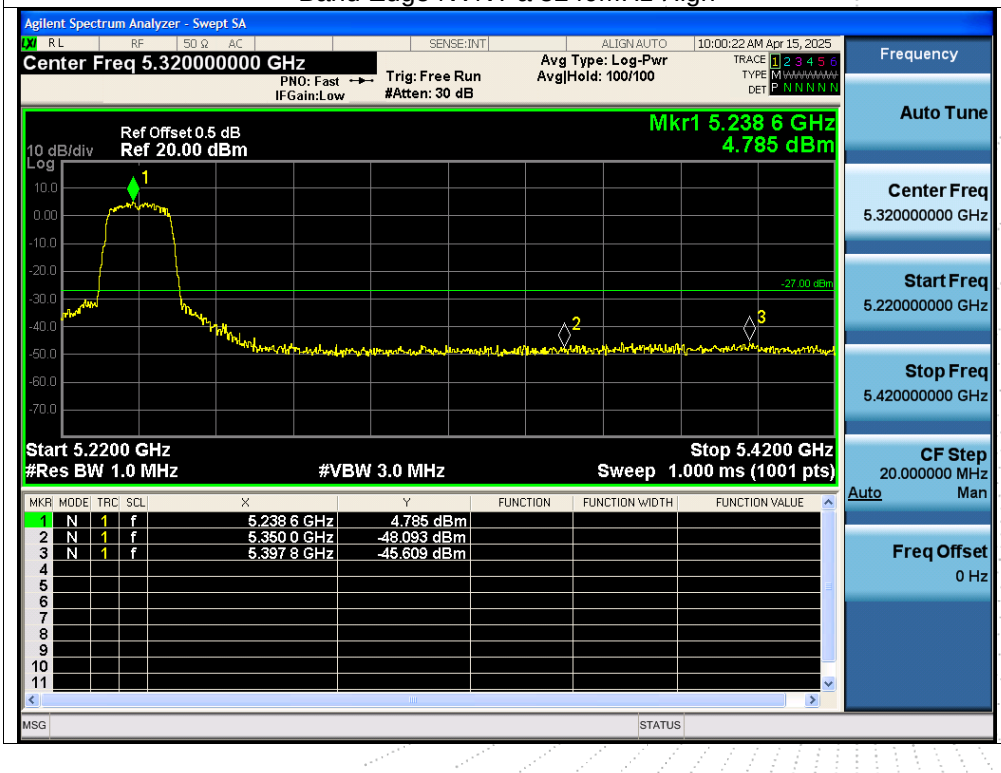
The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data

11.5 Test Result

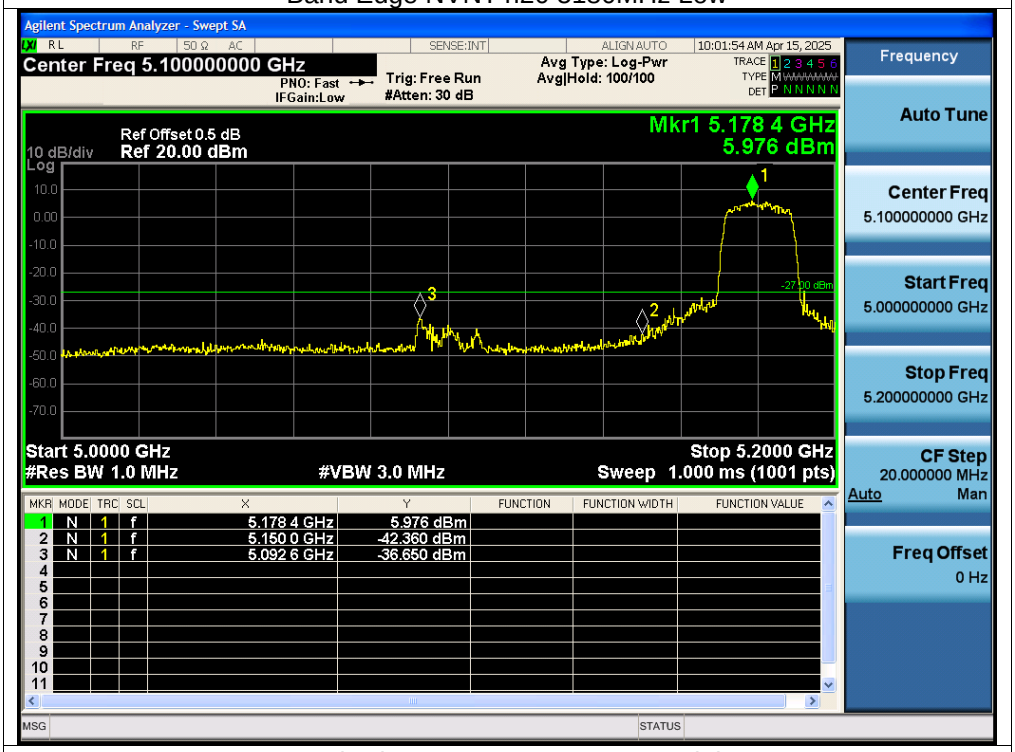
Test Graphs
Band Edge NVNT a 5180MHz Low



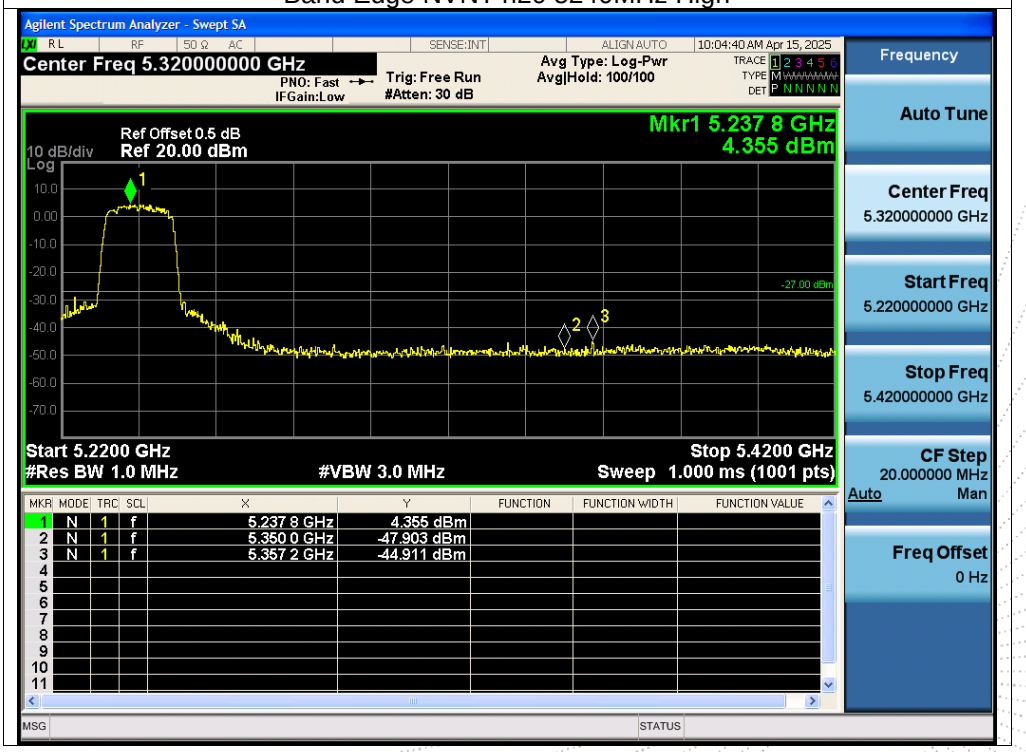
Band Edge NVNT a 5240MHz High



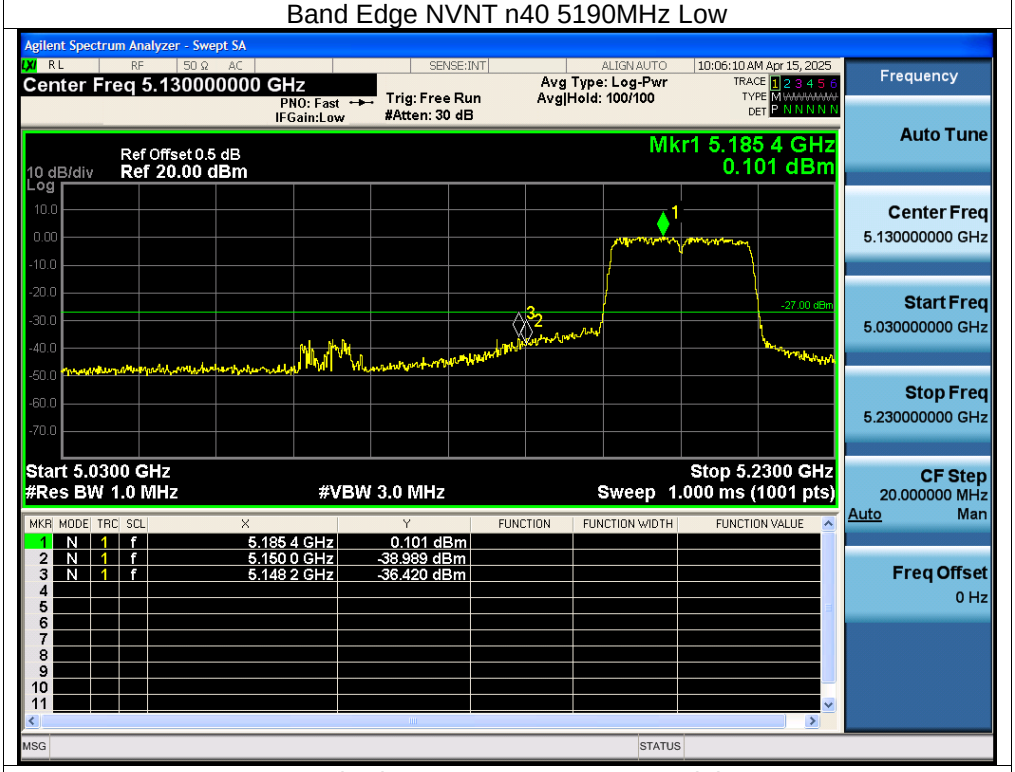
Band Edge NVNT n20 5180MHz Low



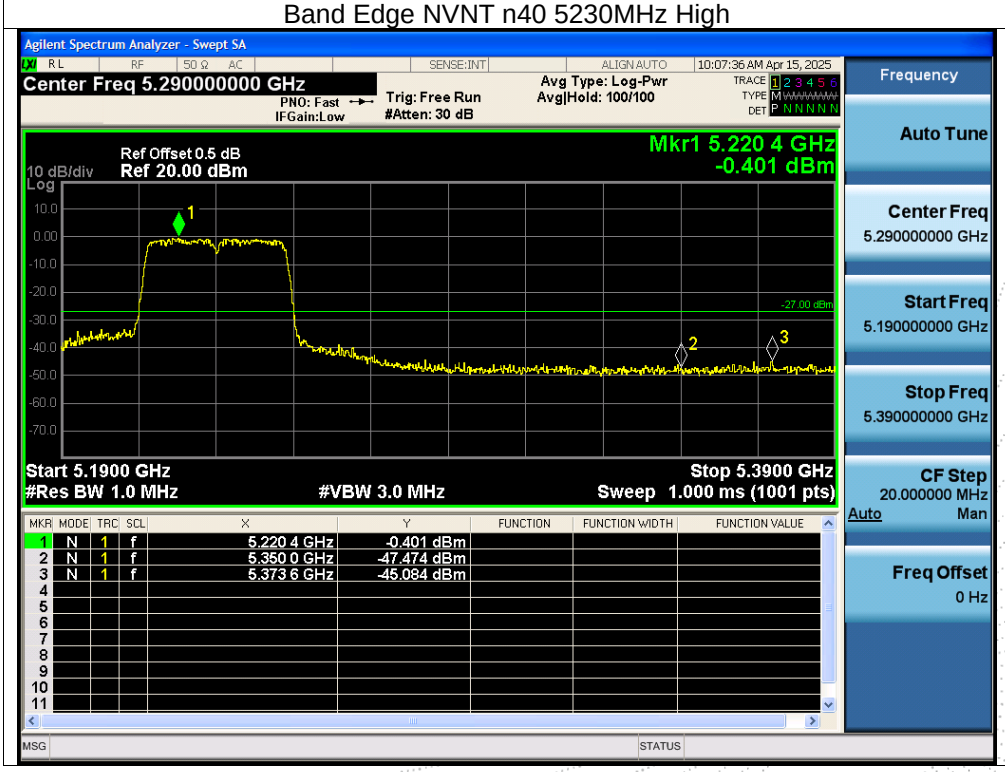
Band Edge NVNT n20 5240MHz High



Band Edge NVNT n40 5190MHz Low



Band Edge NVNT n40 5230MHz High



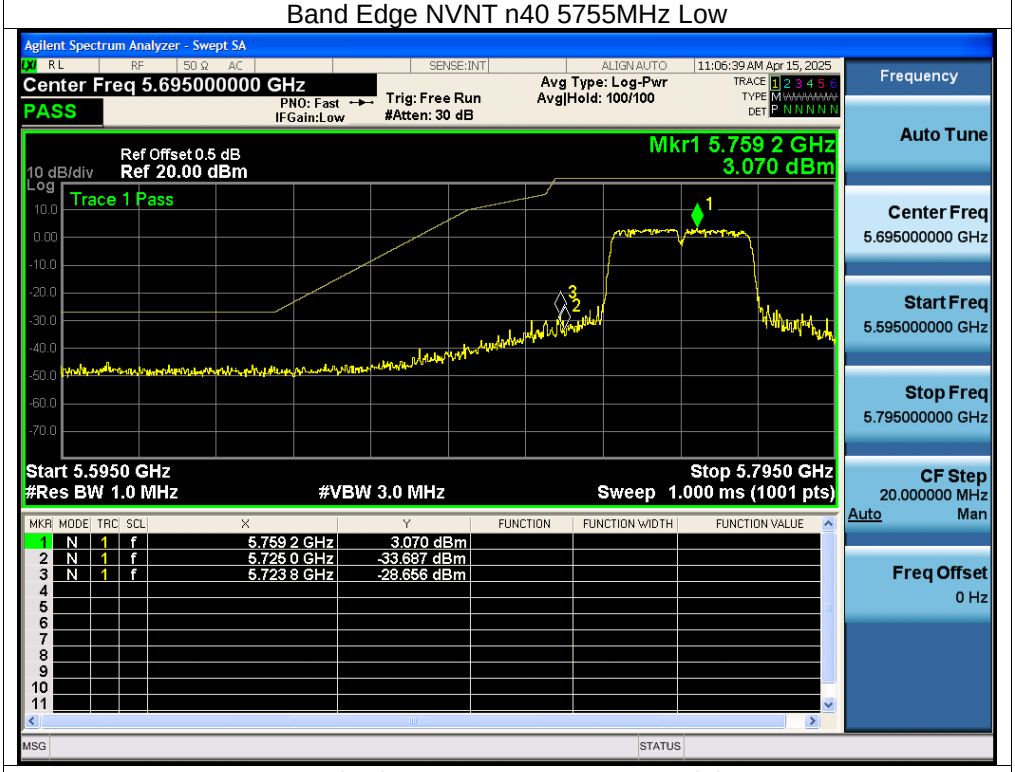
Test Graphs
Band Edge NVNT a 5745MHz Low

Band Edge NVNT a 5825MHz High

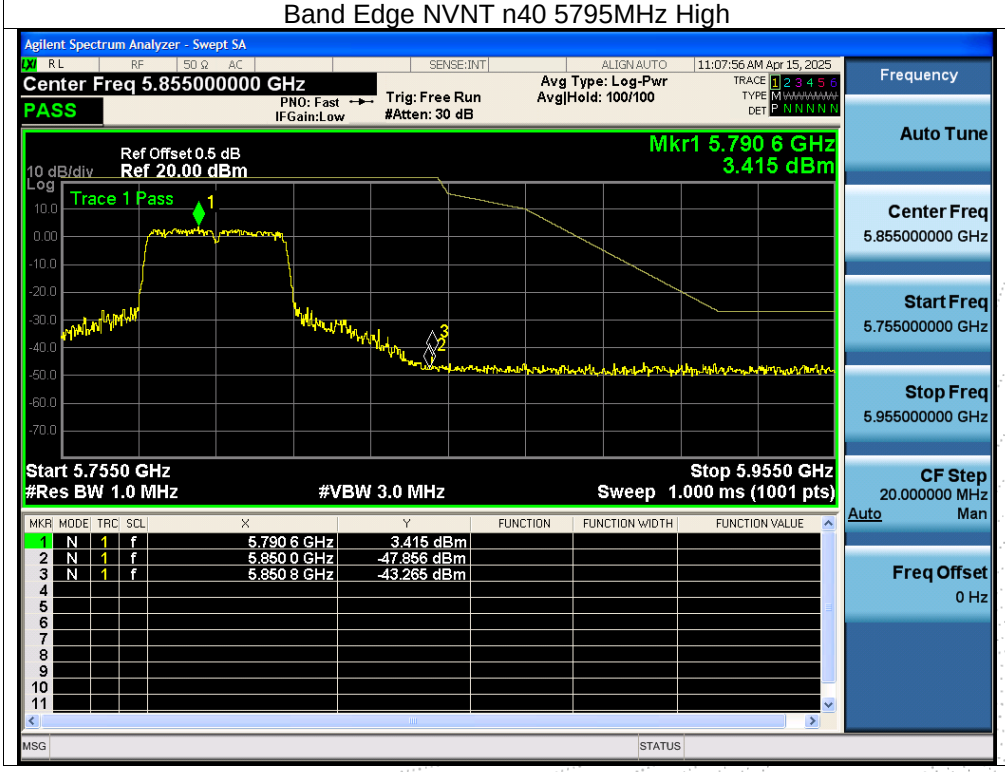
Band Edge NVNT n20 5745MHz Low

Band Edge NVNT n20 5825MHz High

Band Edge NVNT n40 5755MHz Low

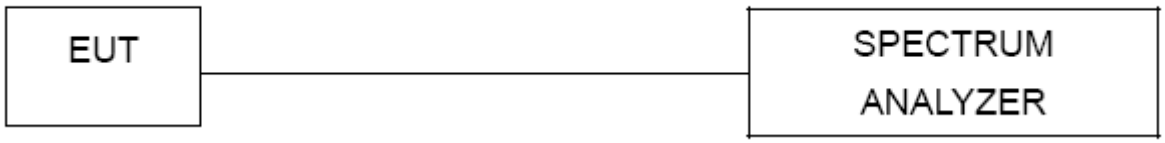


Band Edge NVNT n40 5795MHz High



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.

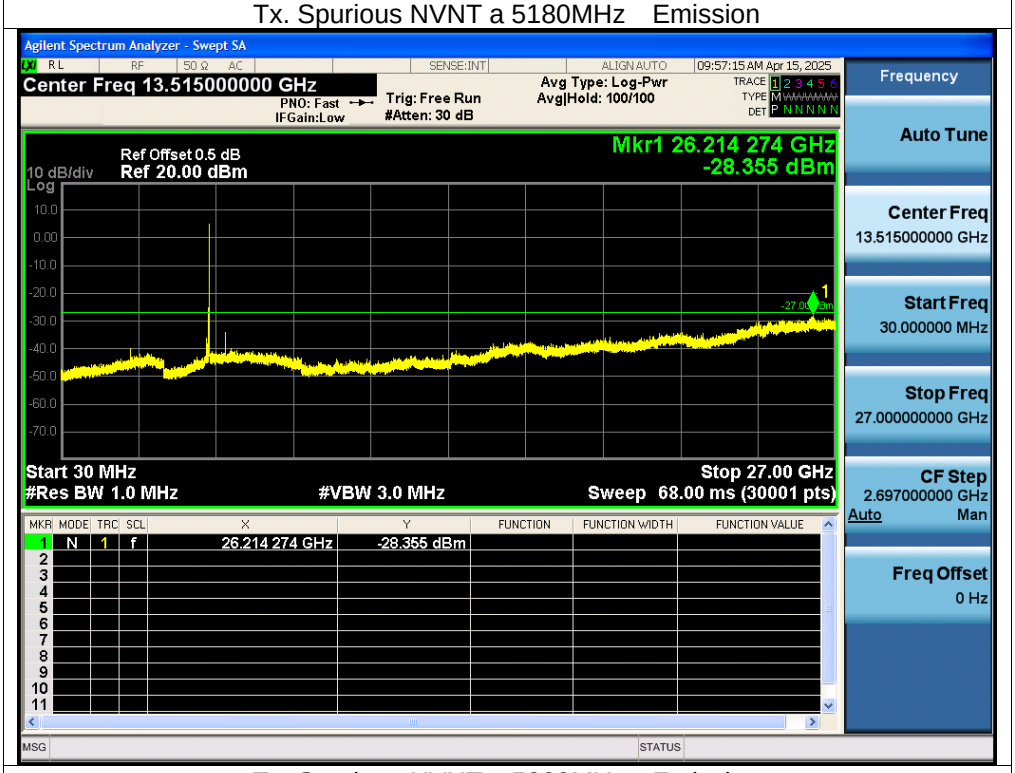
12.4 Test Result

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 bandege measurement data.

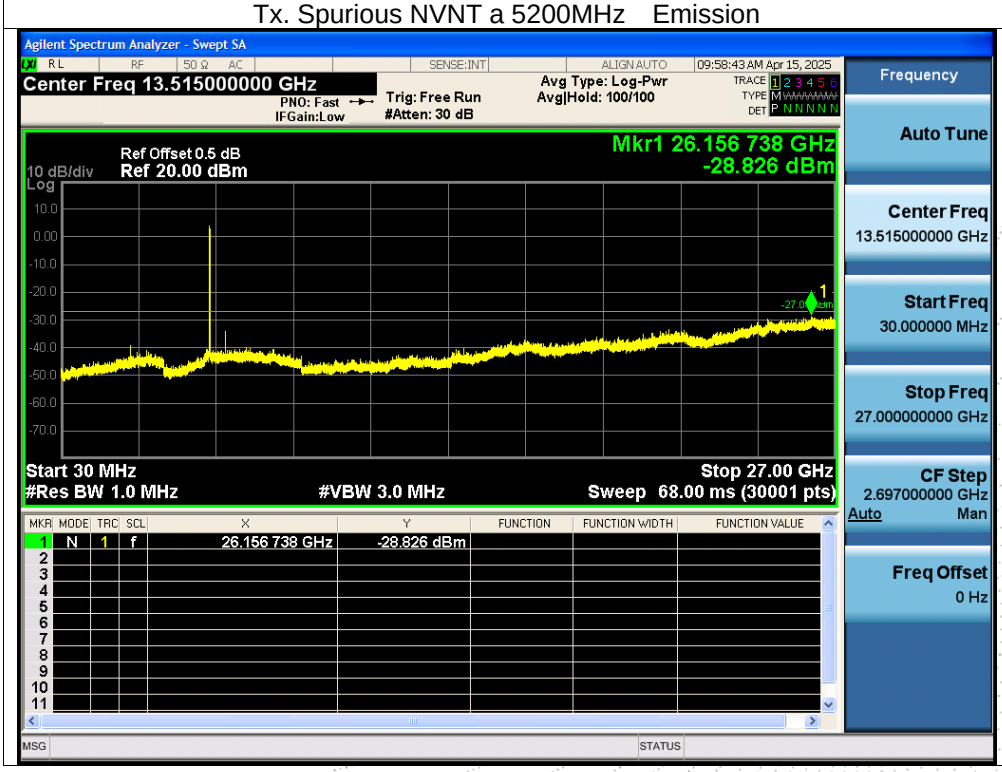
About:26.5GHz-40GHz, The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Test Graphs

Tx. Spurious NVNT a 5180MHz Emission



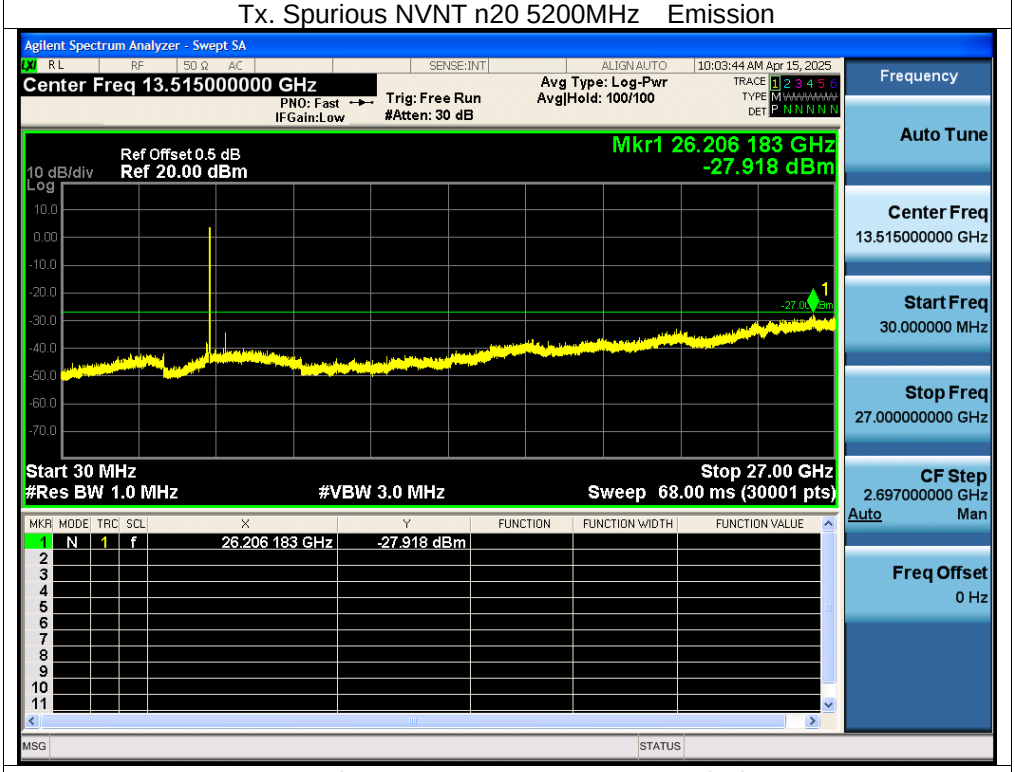
Tx. Spurious NVNT a 5200MHz Emission



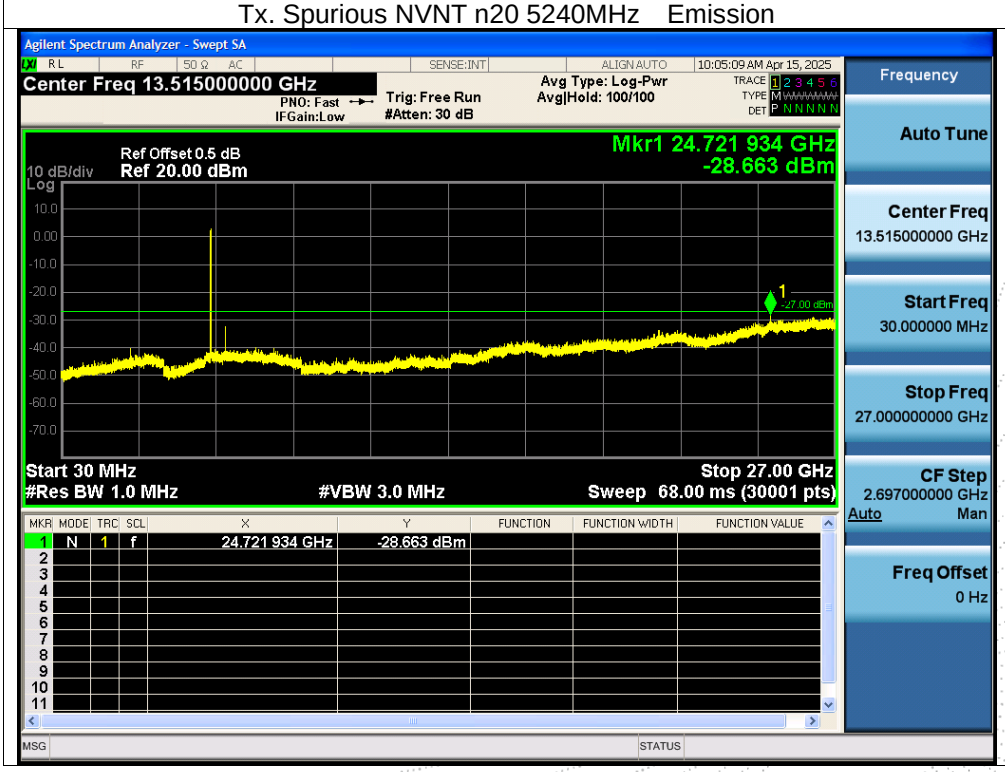
Tx. Spurious NVNT a 5240MHz Emission

Tx. Spurious NVNT n20 5180MHz Emission

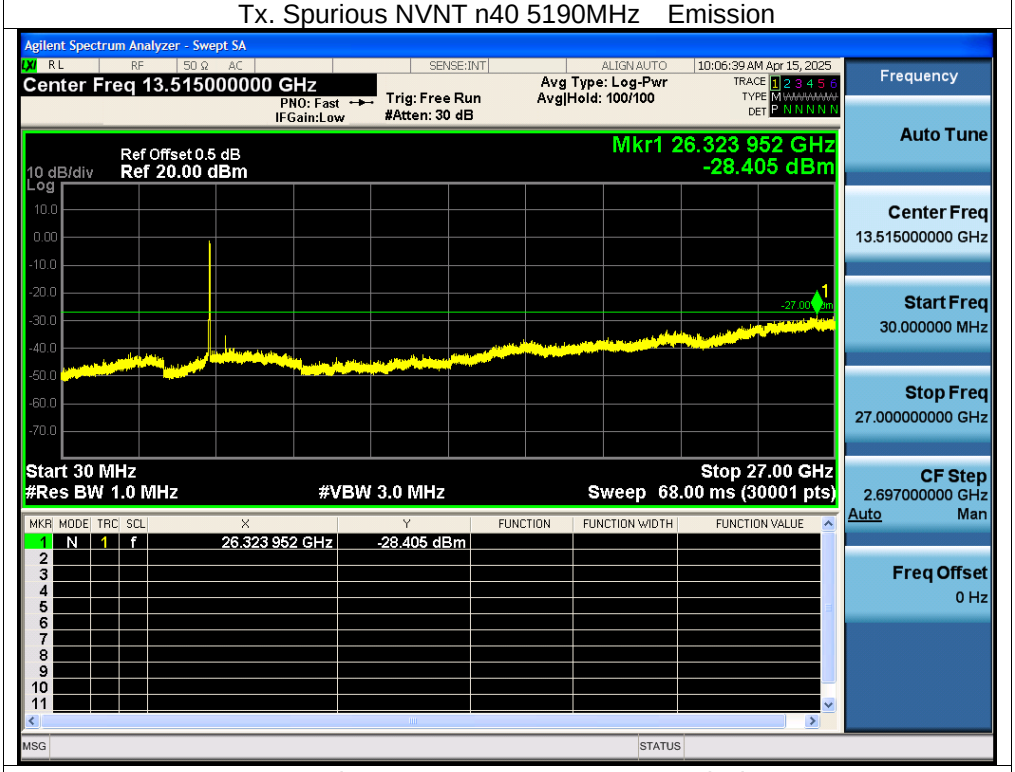
Tx. Spurious NVNT n20 5200MHz Emission



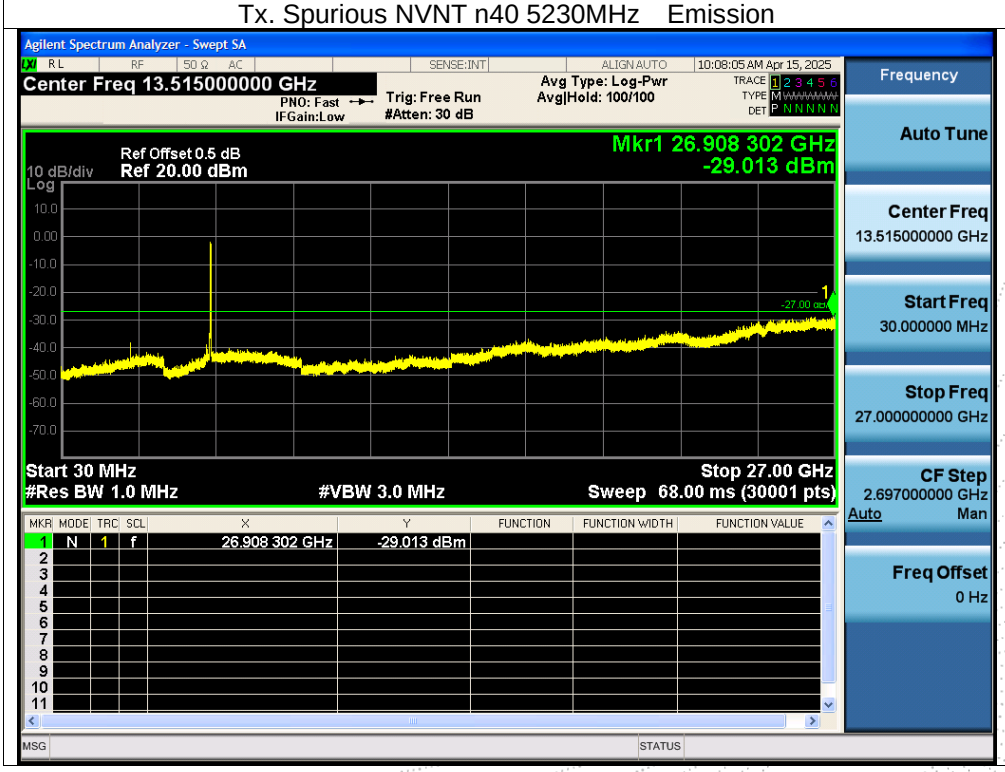
Tx. Spurious NVNT n20 5240MHz Emission



Tx. Spurious NVNT n40 5190MHz Emission



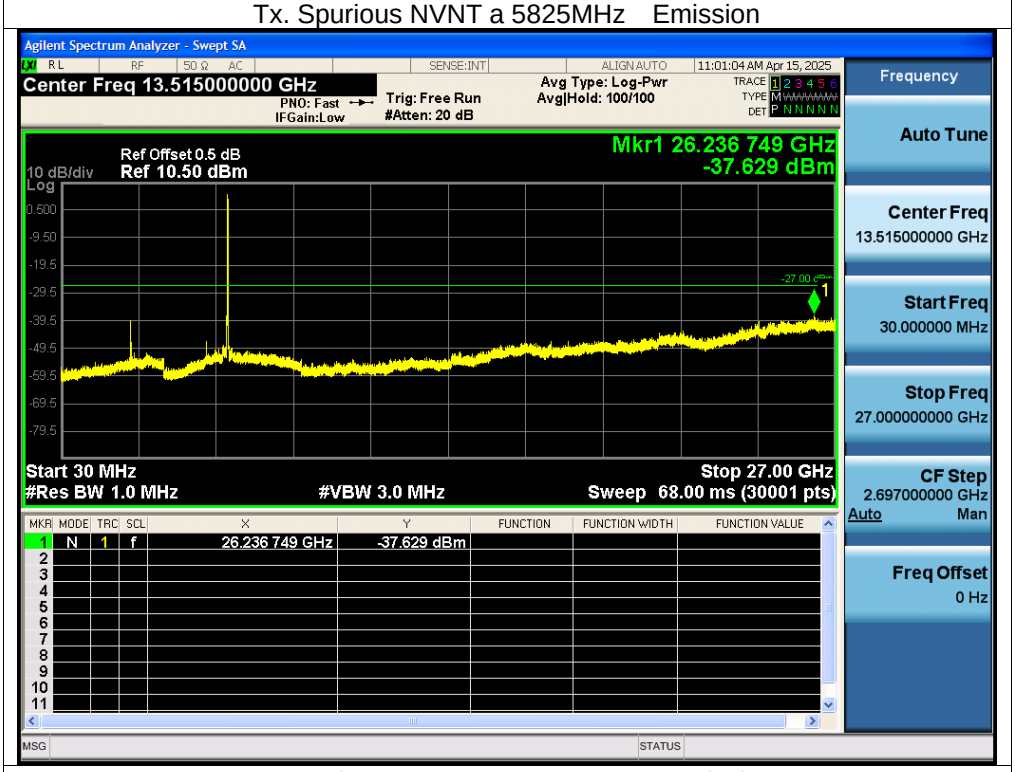
Tx. Spurious NVNT n40 5230MHz Emission



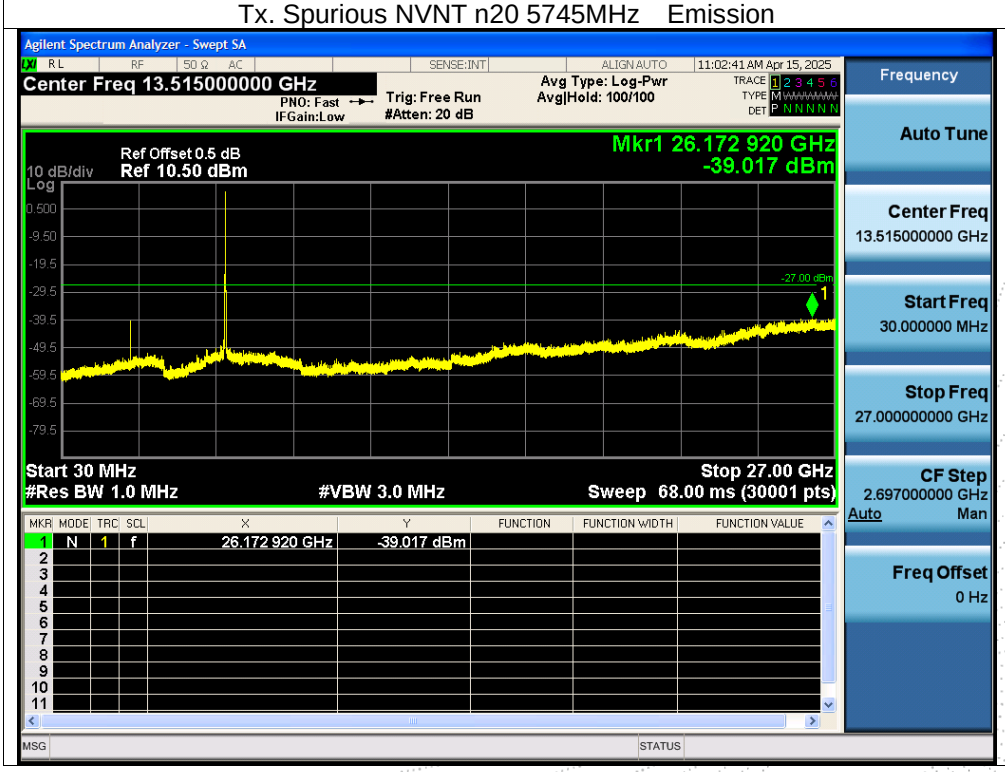
Test Graphs
Tx. Spurious NVNT a 5745MHz Emission

Tx. Spurious NVNT a 5785MHz Emission

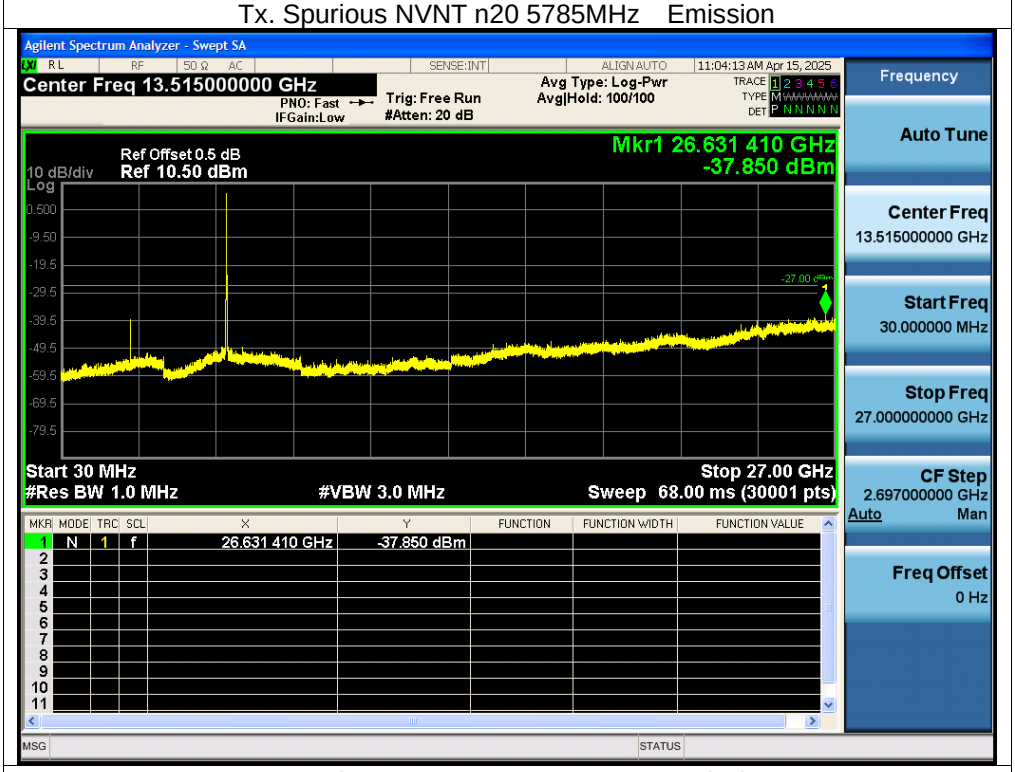
Tx. Spurious NVNT a 5825MHz Emission



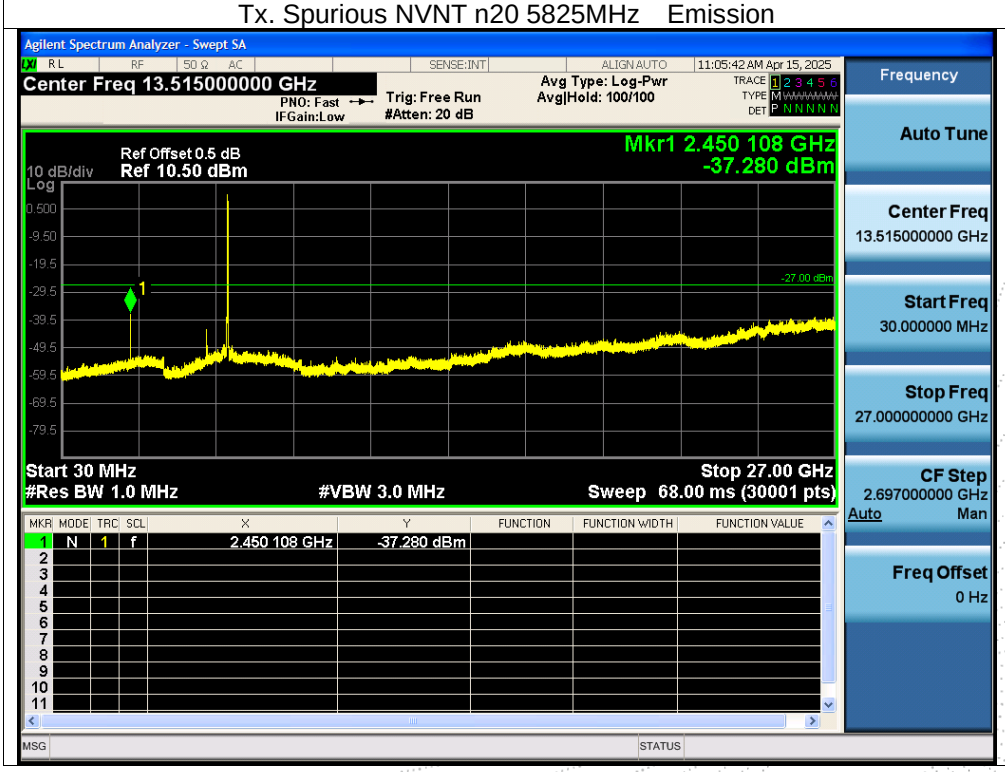
Tx. Spurious NVNT n20 5745MHz Emission



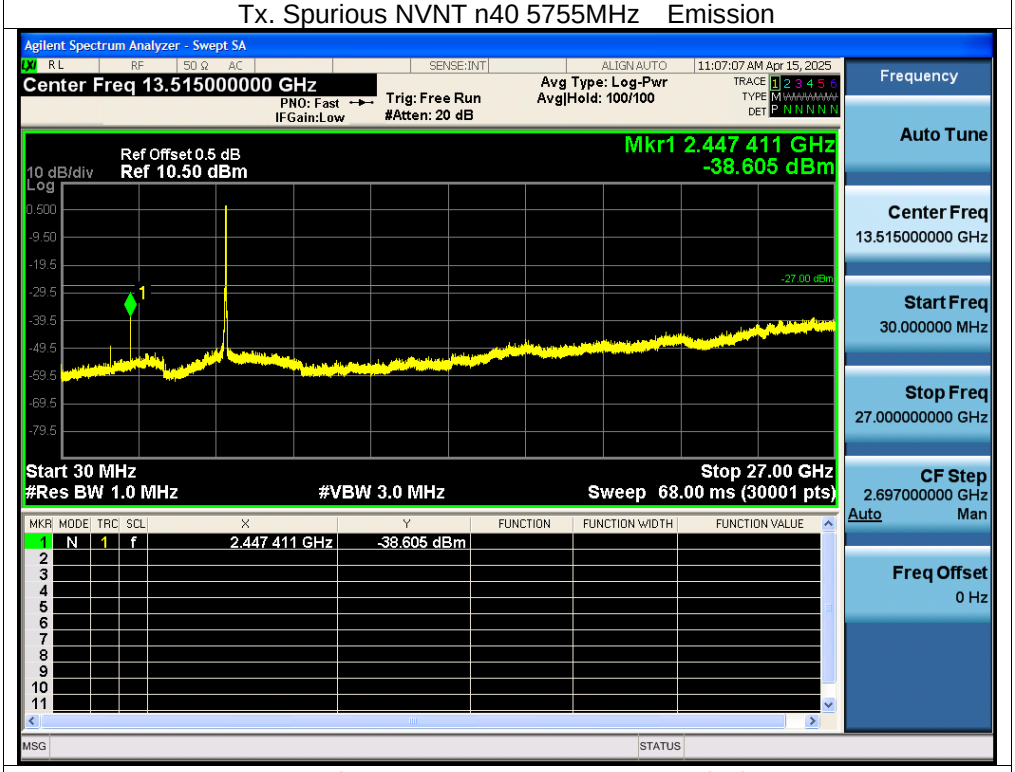
Tx. Spurious NVNT n20 5785MHz Emission



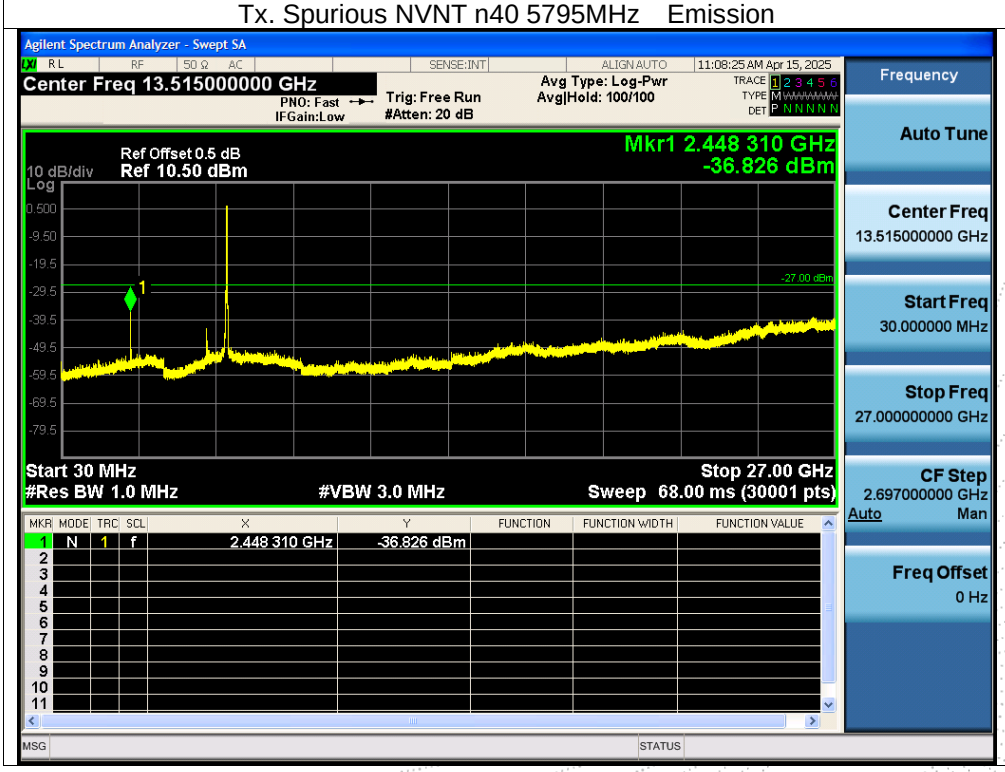
Tx. Spurious NVNT n20 5825MHz Emission



Tx. Spurious NVNT n40 5755MHz Emission

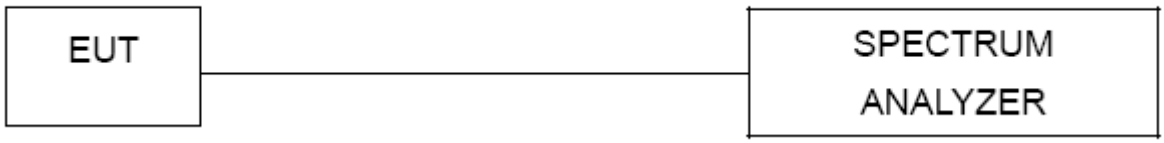


Tx. Spurious NVNT n40 5795MHz Emission



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. fc is declaring of channel frequency. Then the frequency error formula is (fc-f)/fc × 106 ppm and he limit is less than ±20ppm (IEEE 802.11nspecification).
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°C~70°C.

13.4 Test Result

Temperature:	26 ℃	Relative Humidity:	54%RH
Pressure:	101KPa	Test Voltage:	AC 120V/60Hz
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	5180.0088	5180	0.0088	1.6988
		V max (V)	138	5180.0132	5180	0.0132	2.5483
		V min (V)	102	5180.0024	5180	0.0024	0.4633
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	5180.0125	5180	0.0125	2.4131
		T (°C)	-10	5180.0097	5180	0.0097	1.8726
		T (°C)	0	5180.0008	5180	0.0008	0.1544
		T (°C)	10	5180.0041	5180	0.0041	0.7915
		T (°C)	20	5180.0133	5180	0.0133	2.5676
		T (°C)	30	5180.0035	5180	0.0035	0.6757
		T (°C)	40	5180.0103	5180	0.0103	1.9884
		T (°C)	50	5180.0131	5180	0.0131	2.5290
		T (°C)	60	5180.0054	5180	0.0054	1.0425
		T (°C)	70	5180.0019	5180	0.0019	0.3668
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	5200.0078	5200	0.0078	1.5000
		V max (V)	138	5200.0049	5200	0.0049	0.9423
		V min (V)	102	5200.0065	5200	0.0065	1.2500
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	5200.0063	5200	0.0063	1.2115
		T (°C)	-10	5200.0082	5200	0.0082	1.5769
		T (°C)	0	5200.0015	5200	0.0015	0.2885
		T (°C)	10	5200.0014	5200	0.0014	0.2692
		T (°C)	20	5200.0067	5200	0.0067	1.2885
		T (°C)	30	5200.0073	5200	0.0073	1.4038
		T (°C)	40	5200.0038	5200	0.0038	0.7308
		T (°C)	50	5200.0027	5200	0.0027	0.5192
		T (°C)	60	5200.0073	5200	0.0073	1.4038
		T (°C)	70	5200.0000	5200	0.0000	0.0000
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)	120	5240.0117	5240	0.0117	2.2328
		V max (V)	138	5240.0046	5240	0.0046	0.8779
		V min (V)	102	5240.0069	5240	0.0069	1.3168
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	5240.0065	5240	0.0065	1.2405
		T (°C)	-10	5240.0060	5240	0.0060	1.1450
		T (°C)	0	5240.0067	5240	0.0067	1.2786
		T (°C)	10	5240.0079	5240	0.0079	1.5076
		T (°C)	20	5240.0015	5240	0.0015	0.2863
		T (°C)	30	5240.0090	5240	0.0090	1.7176
		T (°C)	40	5240.0118	5240	0.0118	2.2519
		T (°C)	50	5240.0103	5240	0.0103	1.9656
		T (°C)	60	5240.0073	5240	0.0073	1.3931
		T (°C)	70	5240.0077	5240	0.0077	1.4695
Limits				5150-5250 MHz			
Result				Complies			

Temperature:	26 ℃	Relative Humidity:	54%RH
Pressure:	101KPa	Test Voltage:	AC 120V/50Hz
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	5745.0002	5745	0.0002	0.0348
		V max (V)	138	5745.0118	5745	0.0118	2.0540
		V min (V)	102	5745.0060	5745	0.0060	1.0444
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	5745.0017	5745	0.0017	0.2959
		T (°C)	-10	5745.0034	5745	0.0034	0.5918
		T (°C)	0	5745.0012	5745	0.0012	0.2089
		T (°C)	10	5745.0115	5745	0.0115	2.0017
		T (°C)	20	5745.0018	5745	0.0018	0.3133
		T (°C)	30	5745.0041	5745	0.0041	0.7137
		T (°C)	40	5745.0049	5745	0.0049	0.8529
		T (°C)	50	5745.0039	5745	0.0039	0.6789
		T (°C)	60	5745.0086	5745	0.0086	1.4970
		T (°C)	70	5745.0036	5745	0.0036	0.6266
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	5785.0003	5785	0.0003	0.0519
		V max (V)	138	5785.0113	5785	0.0113	1.9533
		V min (V)	102	5785.0100	5785	0.0100	1.7286
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	5785.0082	5785	0.0082	1.4175
		T (°C)	-10	5785.0080	5785	0.0080	1.3829
		T (°C)	0	5785.0051	5785	0.0051	0.8816
		T (°C)	10	5785.0018	5785	0.0018	0.3111
		T (°C)	20	5785.0053	5785	0.0053	0.9162
		T (°C)	30	5785.0065	5785	0.0065	1.1236
		T (°C)	40	5785.0111	5785	0.0111	1.9188
		T (°C)	50	5785.0003	5785	0.0003	0.0519
		T (°C)	60	5785.0077	5785	0.0077	1.3310
		T (°C)	70	5785.0020	5785	0.0020	0.3457
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	5825.0135	5825	0.0135	2.3176
		V max (V)	138	5825.0132	5825	0.0132	2.2661
		V min (V)	102	5825.0074	5825	0.0074	1.2704
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	5825.0030	5825	0.0030	0.5150
		T (°C)	-10	5825.0022	5825	0.0022	0.3777
		T (°C)	0	5825.0062	5825	0.0062	1.0644
		T (°C)	10	5825.0077	5825	0.0077	1.3219
		T (°C)	20	5825.0112	5825	0.0112	1.9227
		T (°C)	30	5825.0035	5825	0.0035	0.6009
		T (°C)	40	5825.0130	5825	0.0130	2.2318
		T (°C)	50	5825.0050	5825	0.0050	0.8584
		T (°C)	60	5825.0026	5825	0.0026	0.4464
		T (°C)	70	5825.0131	5825	0.0131	2.2489
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 External antenna, Adopt the IPEX interface, fulfill the requirement of this section.

15. EUT Photographs

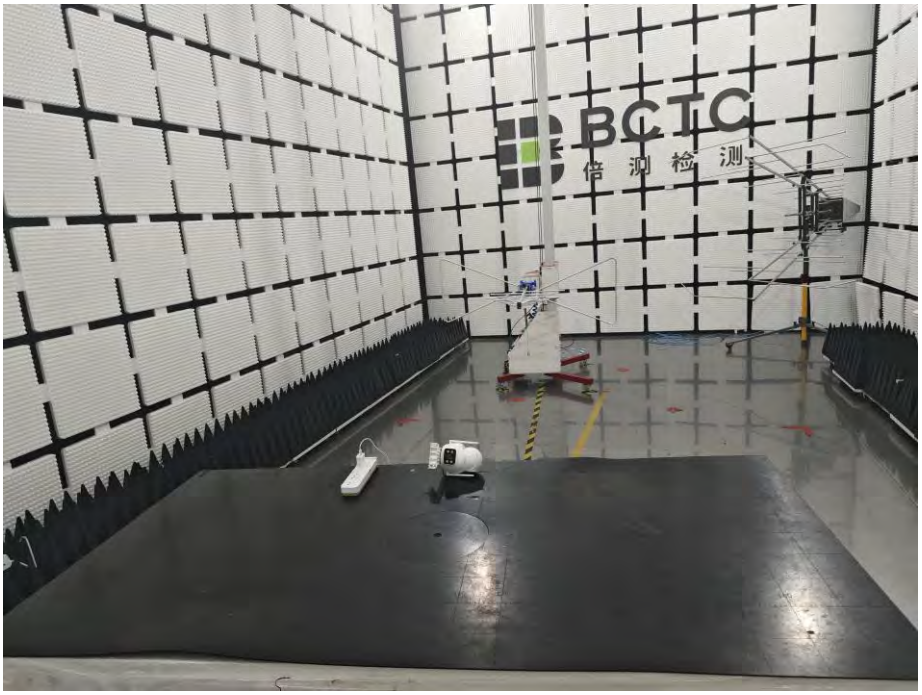
EUT Photo

NOTE: Appendix-Photographs Of EUT Constructional Details

16. EUT Test Setup Photographs

Conducted emissions

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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