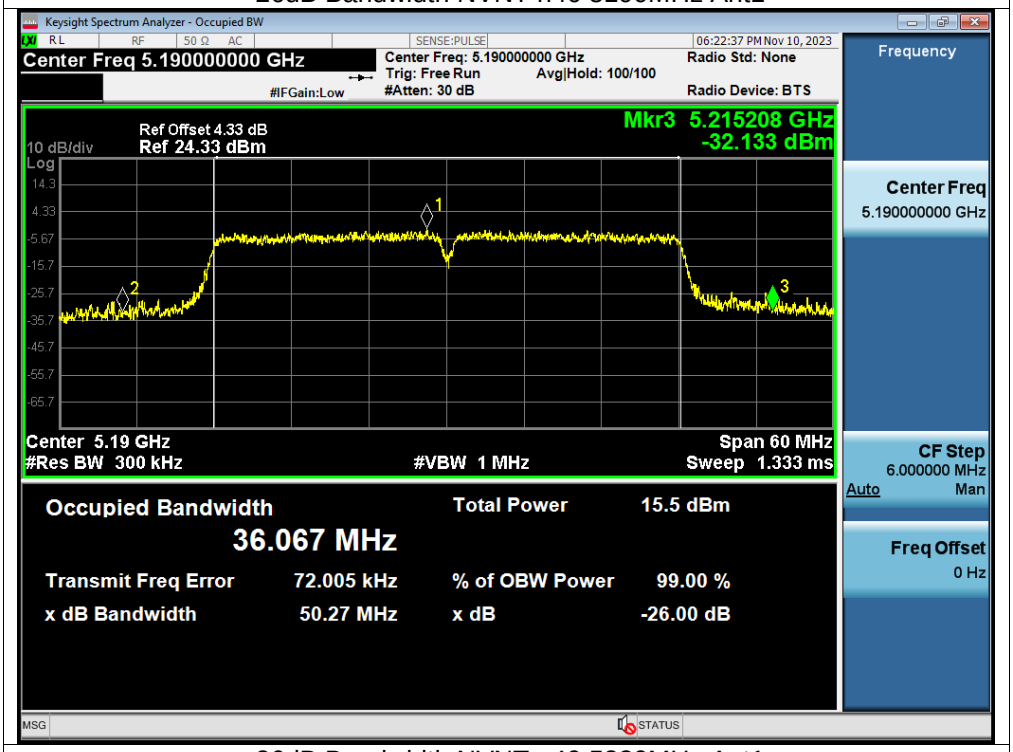
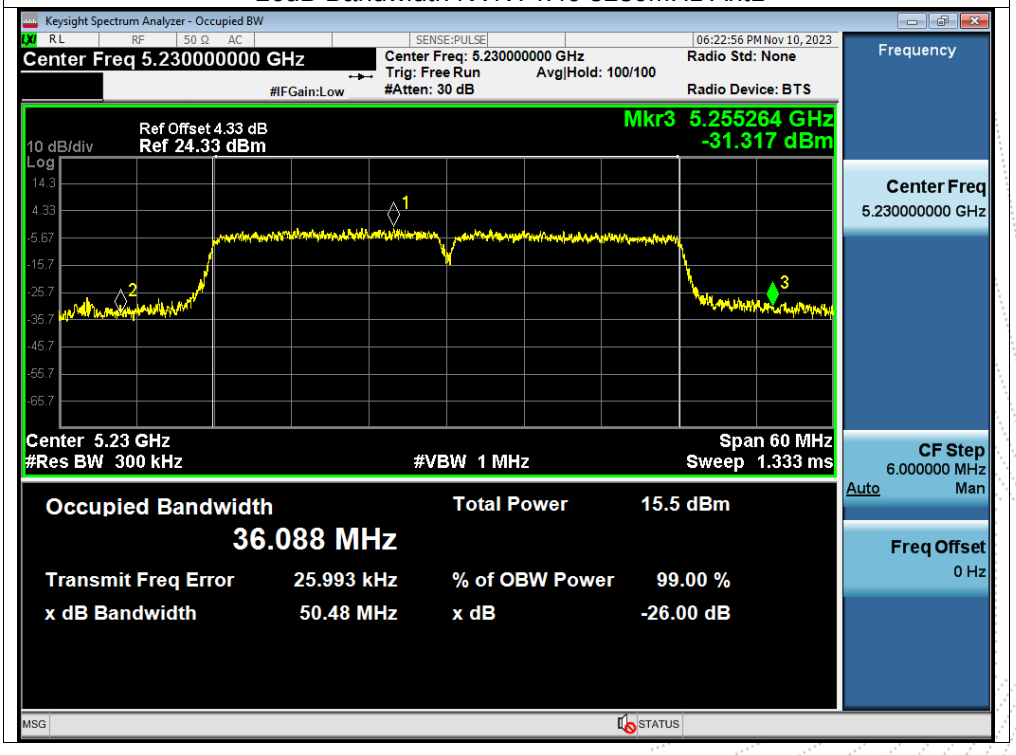
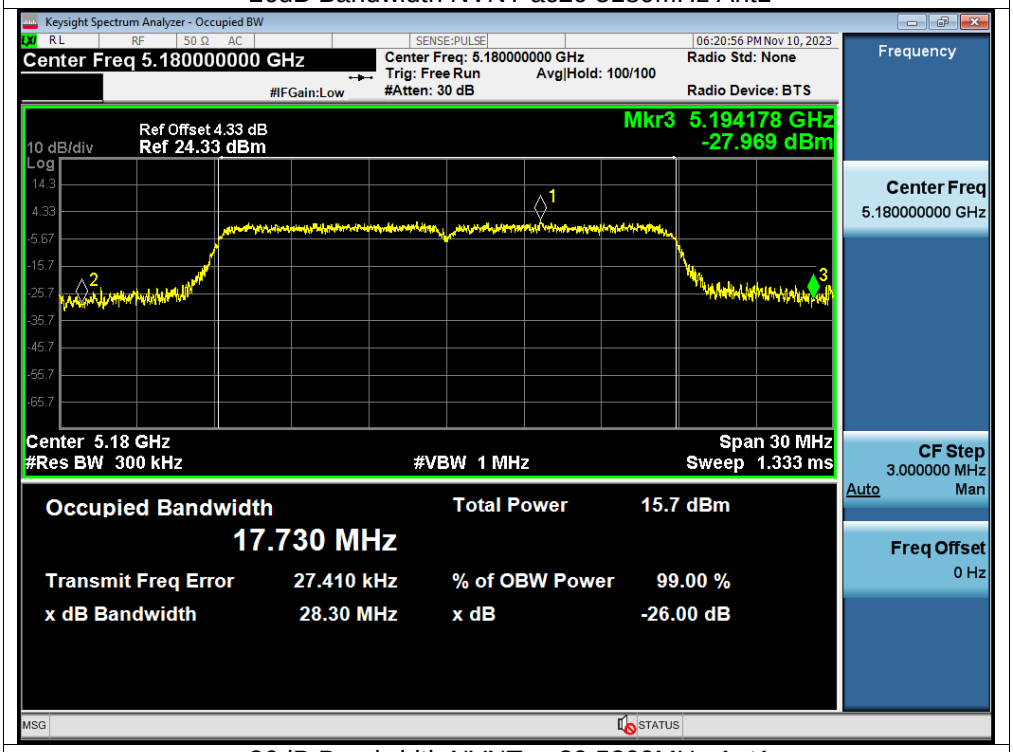
-26dB Bandwidth NVNT n40 5190MHz Ant1



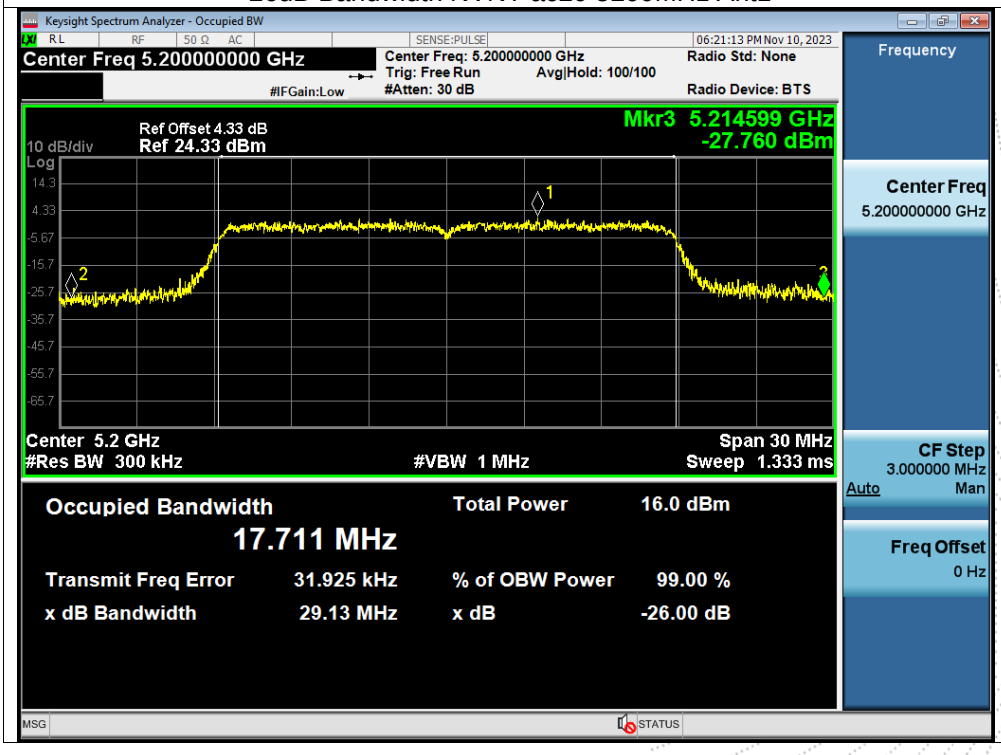
-26dB Bandwidth NVNT n40 5230MHz Ant1



-26dB Bandwidth NVNT ac20 5180MHz Ant1



-26dB Bandwidth NVNT ac20 5200MHz Ant1



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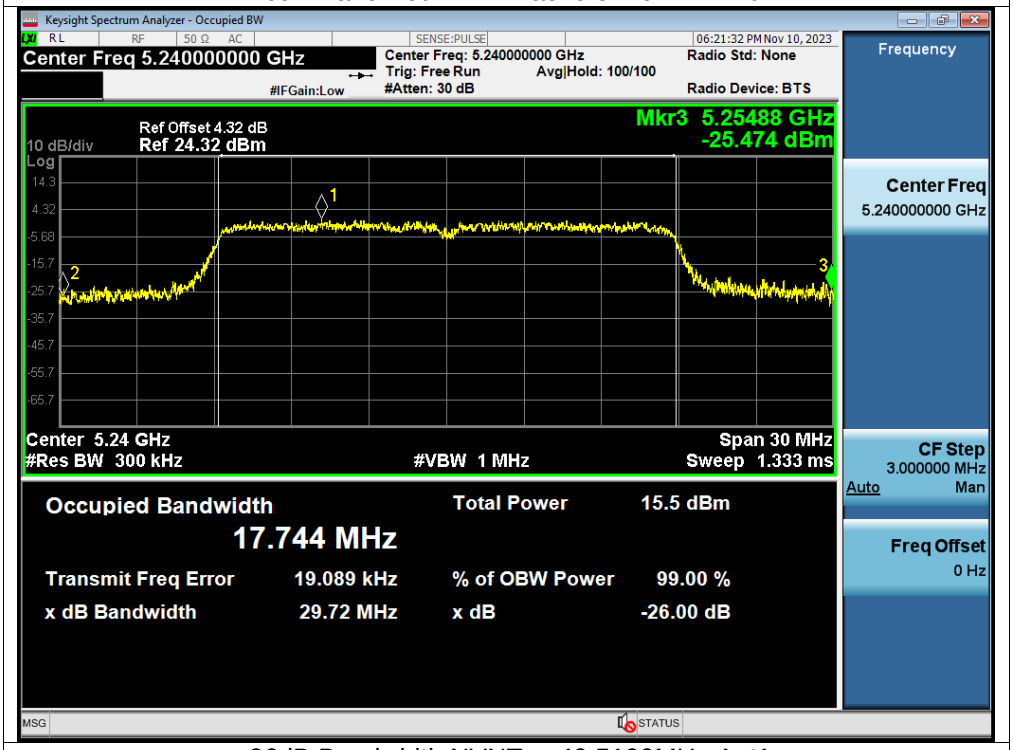
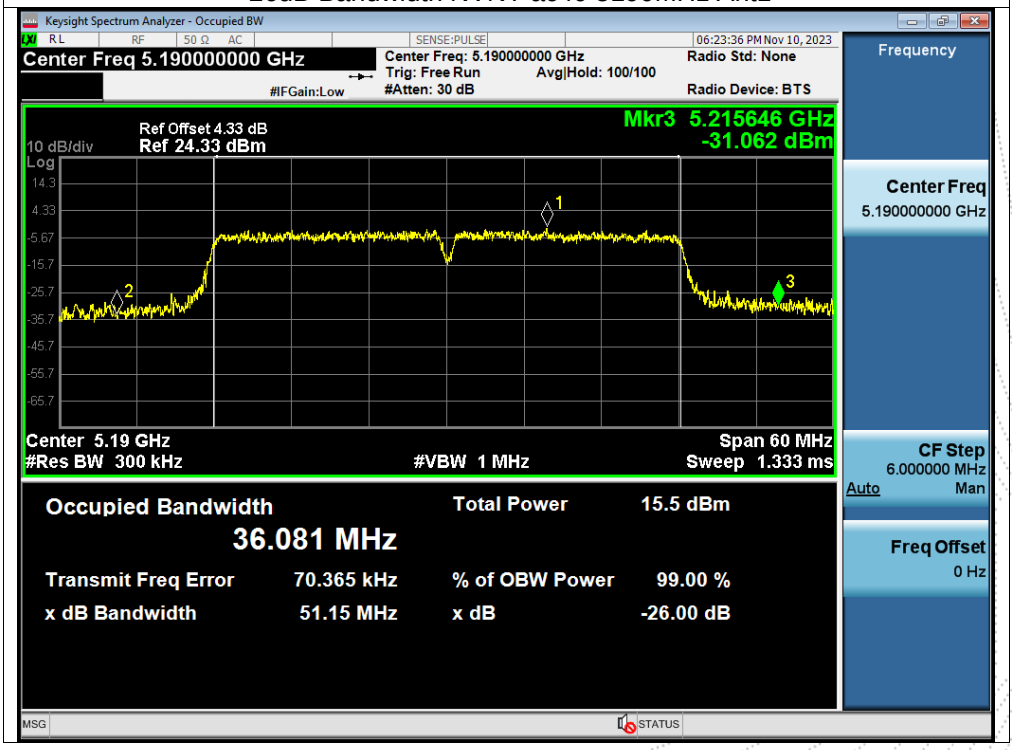
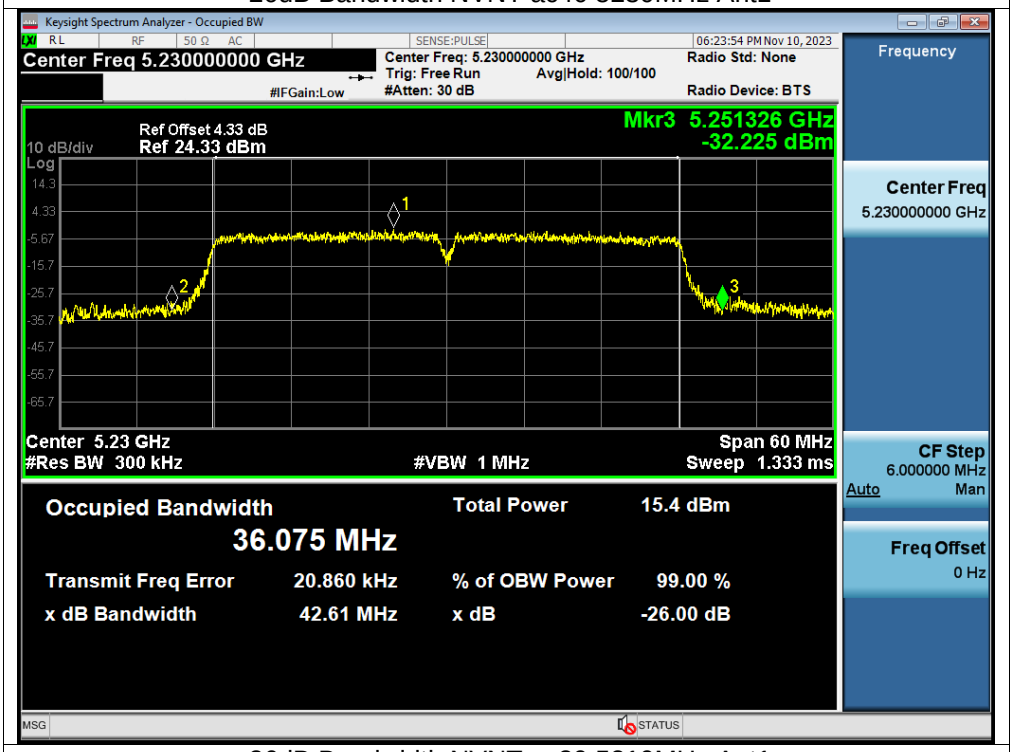


-26dB Bandwidth NVNT ac40 5190MHz Ant1



-26dB Bandwidth NVNT ac40 5230MHz Ant1

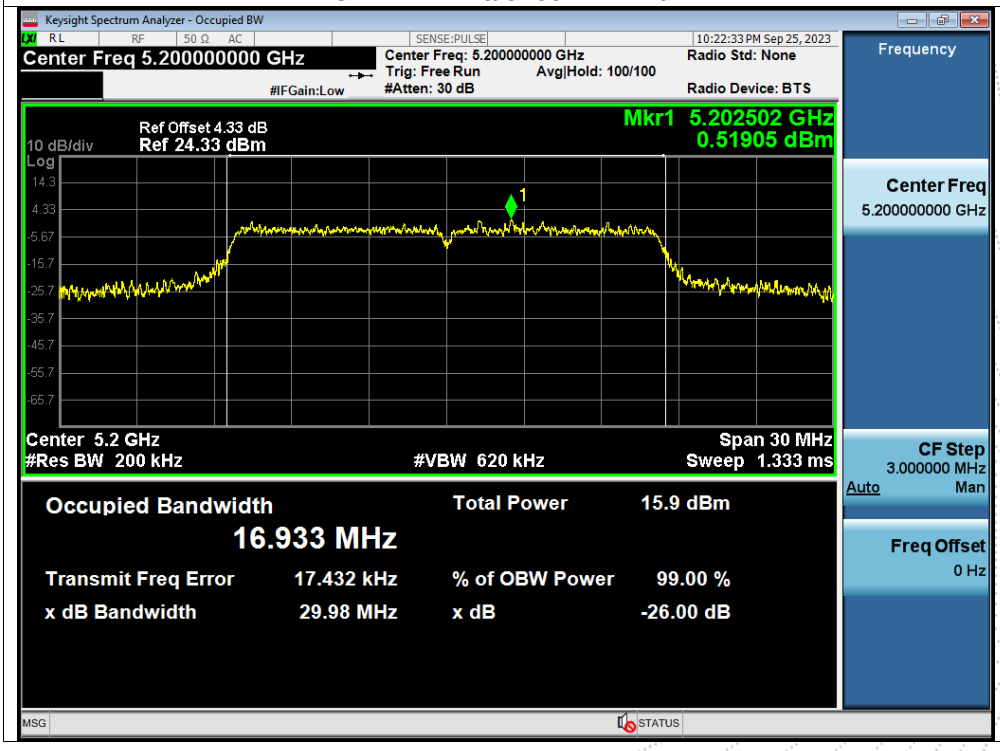


-26dB Bandwidth NVNT ac80 5210MHz Ant1

Test Graphs

OBW NVNT a 5180MHz Ant1

OBW NVNT a 5200MHz Ant1



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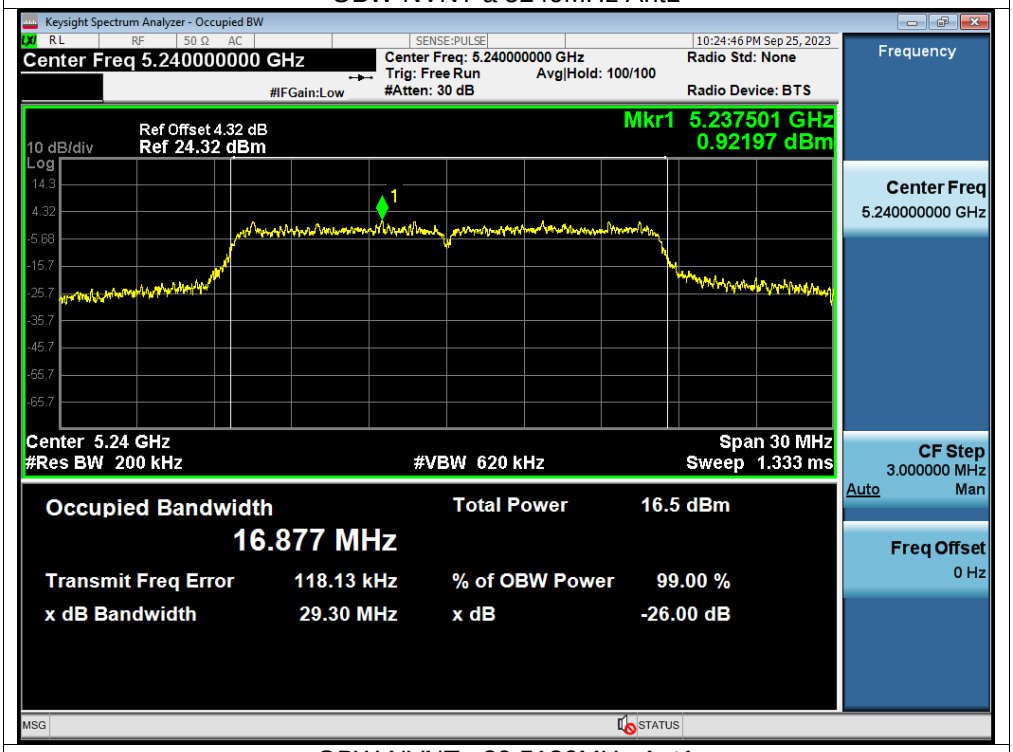

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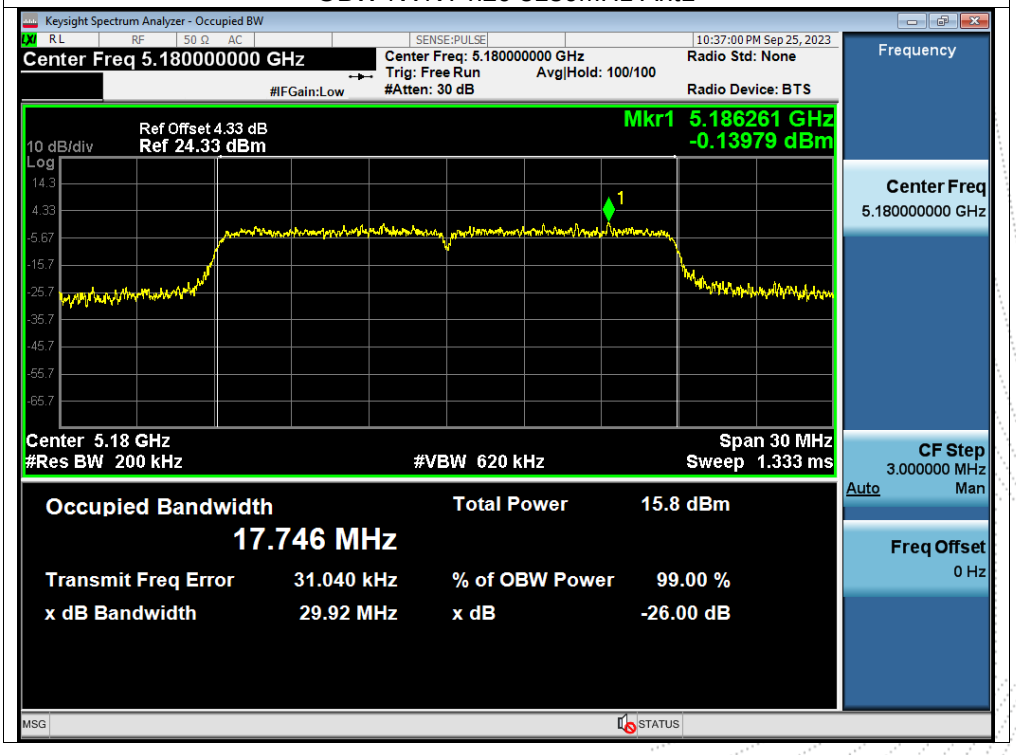

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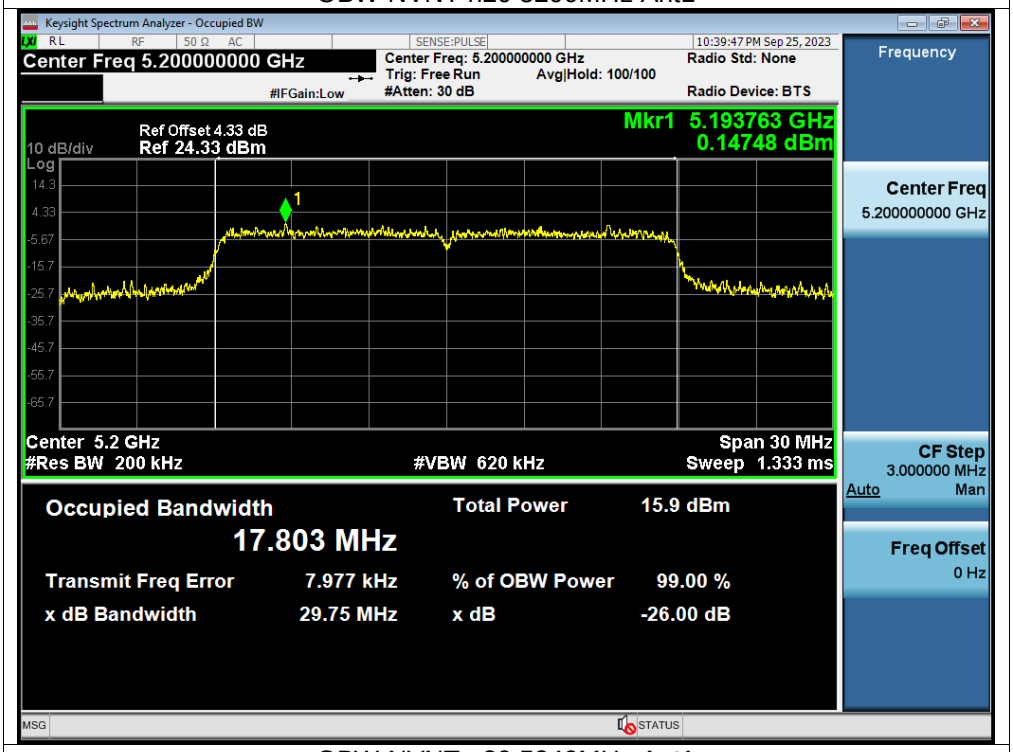

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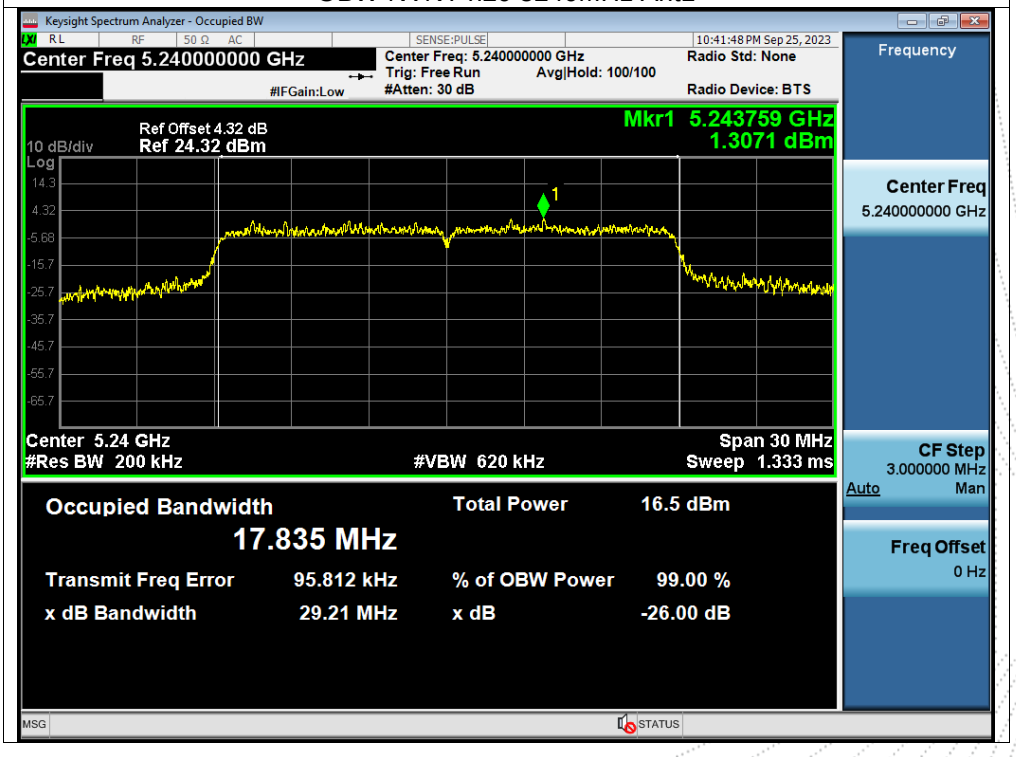
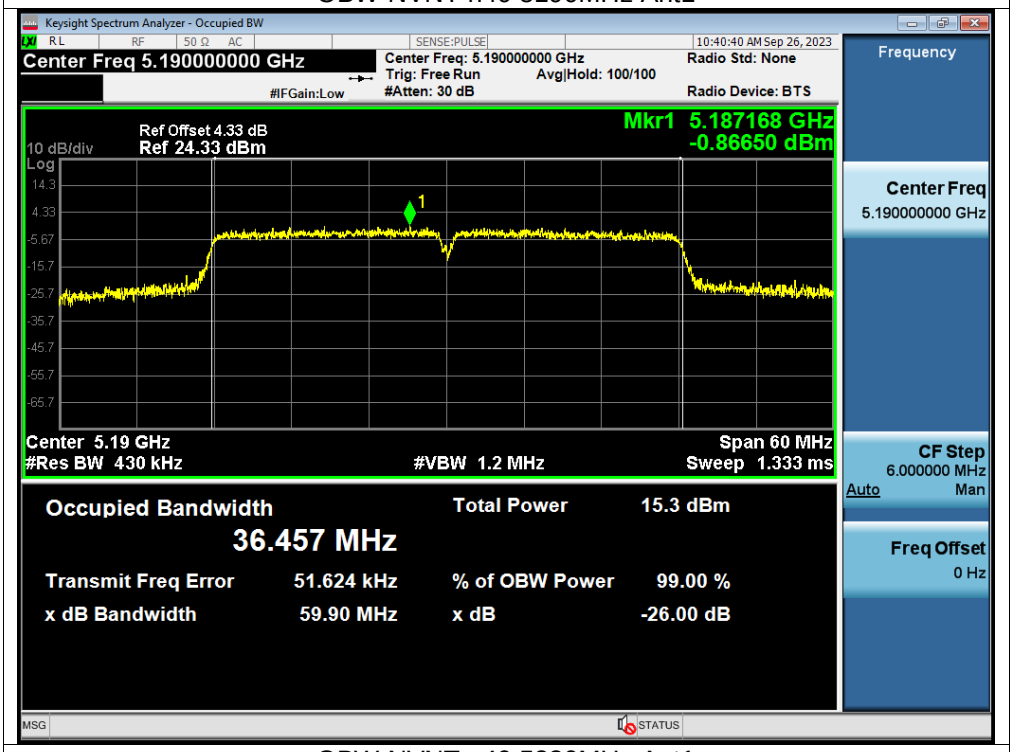
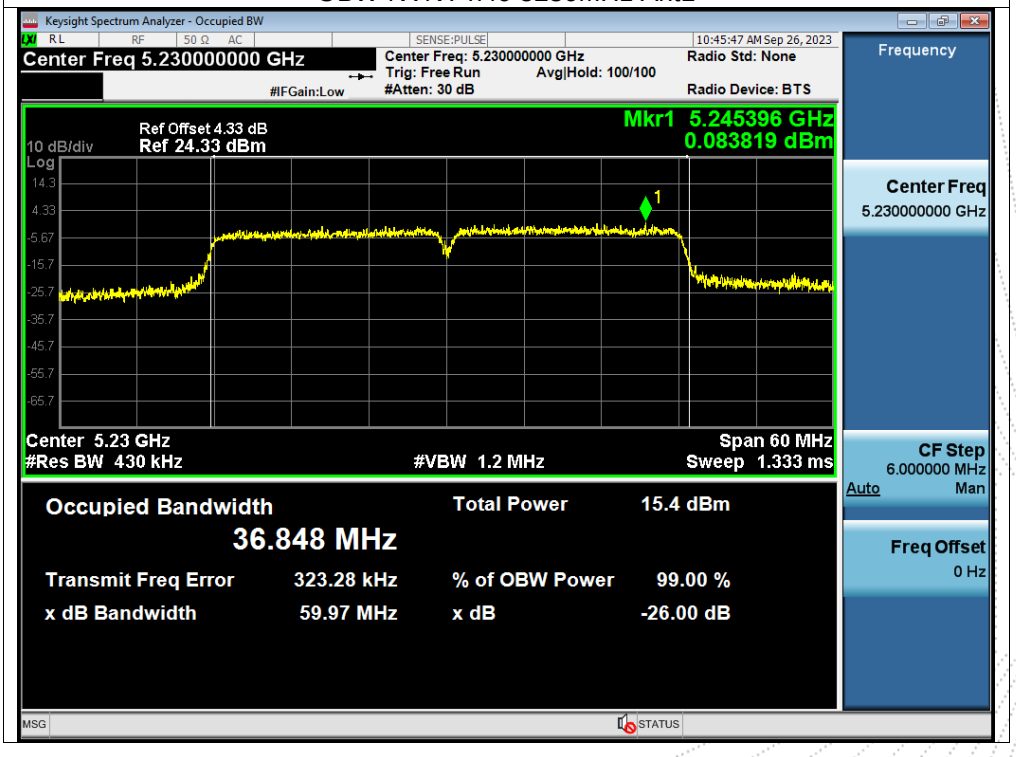


OBW NVNT n40 5190MHz Ant1



OBW NVNT n40 5230MHz Ant1



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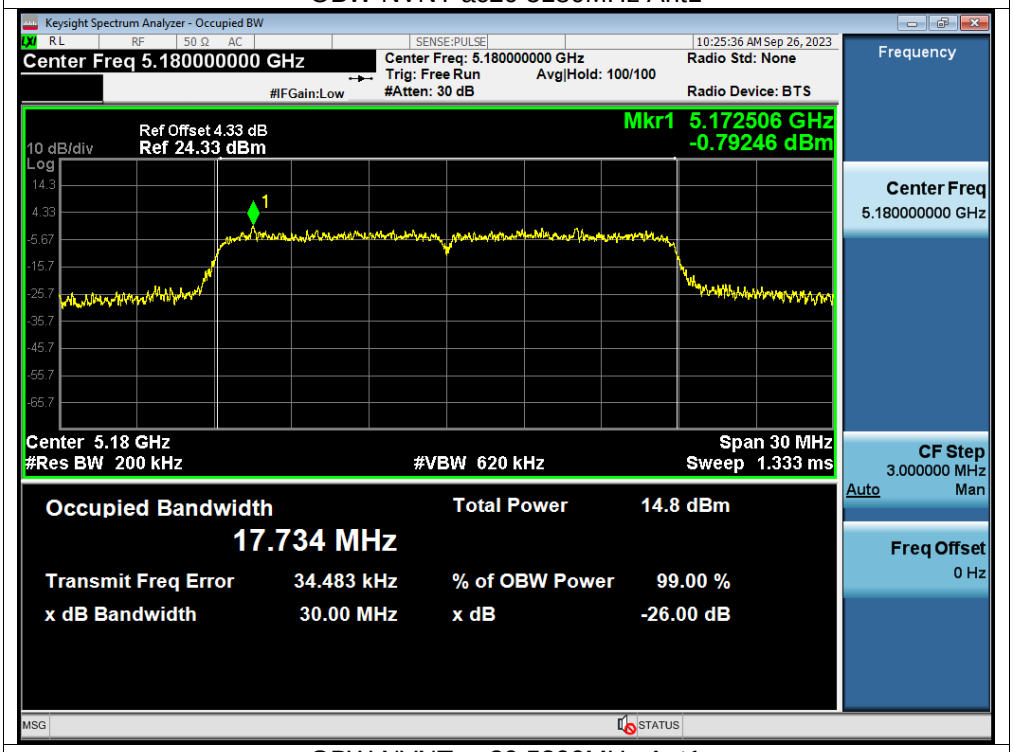

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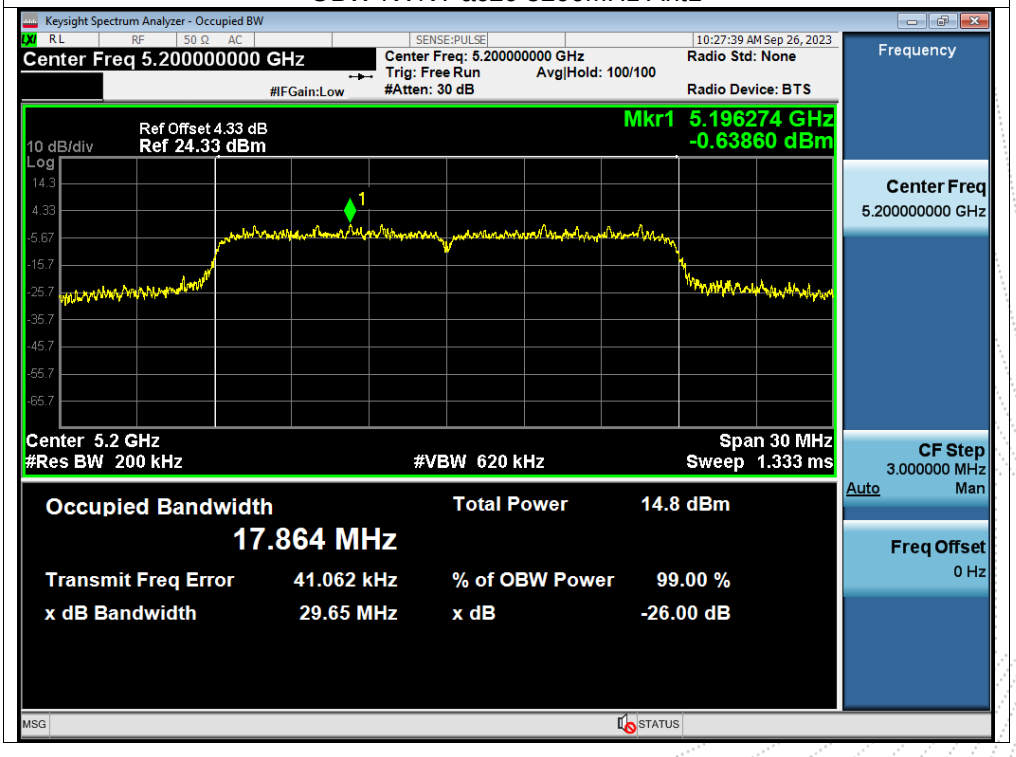

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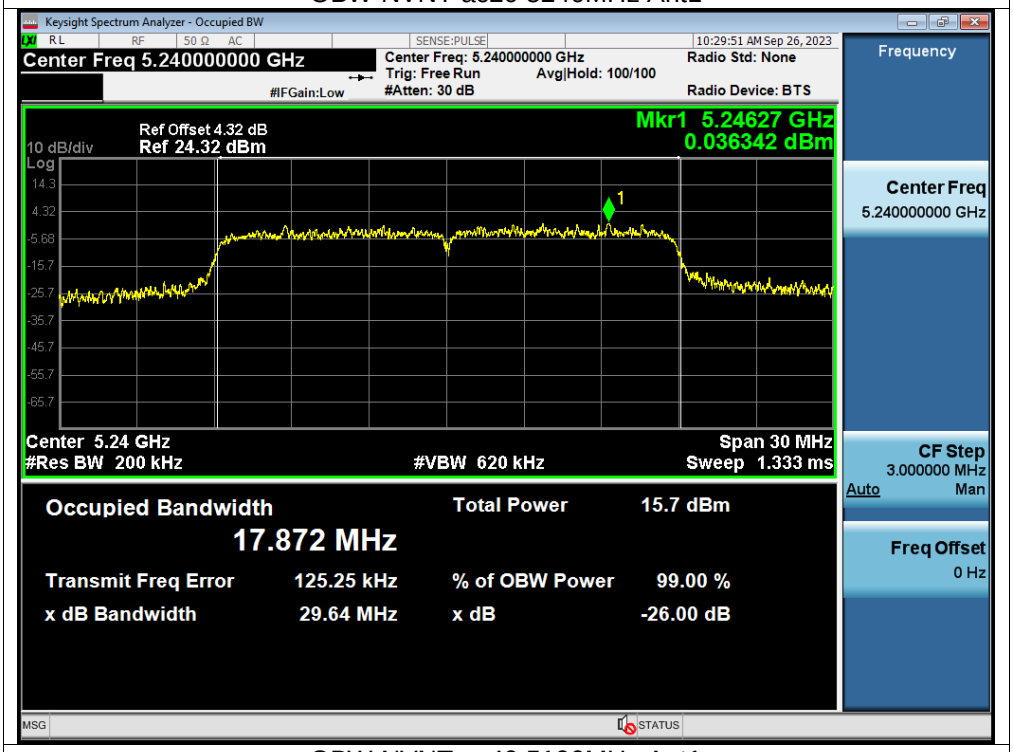
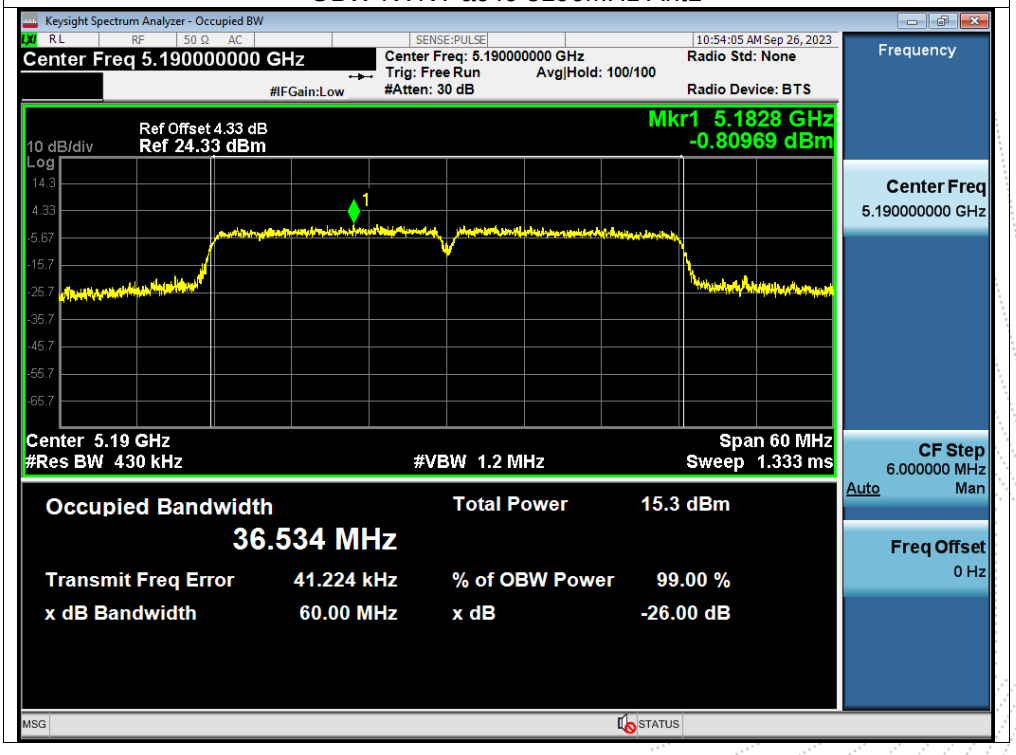
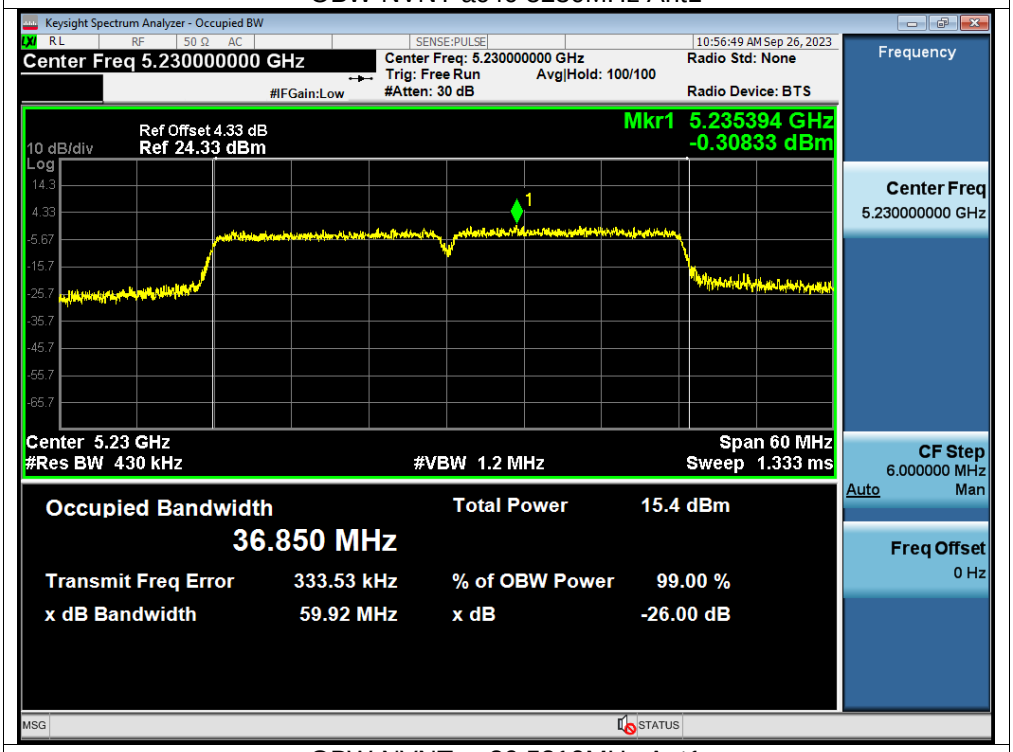


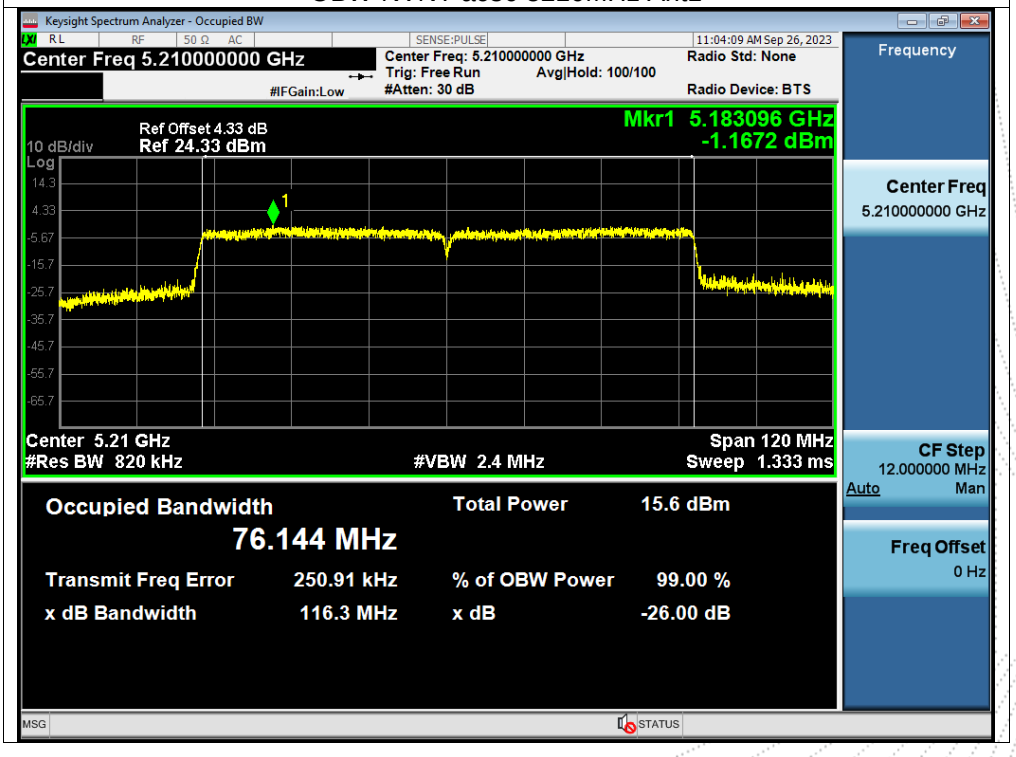
OBW NVNT ac40 5190MHz Ant1



OBW NVNT ac40 5230MHz Ant1



OBW NVNT ac80 5210MHz Ant1



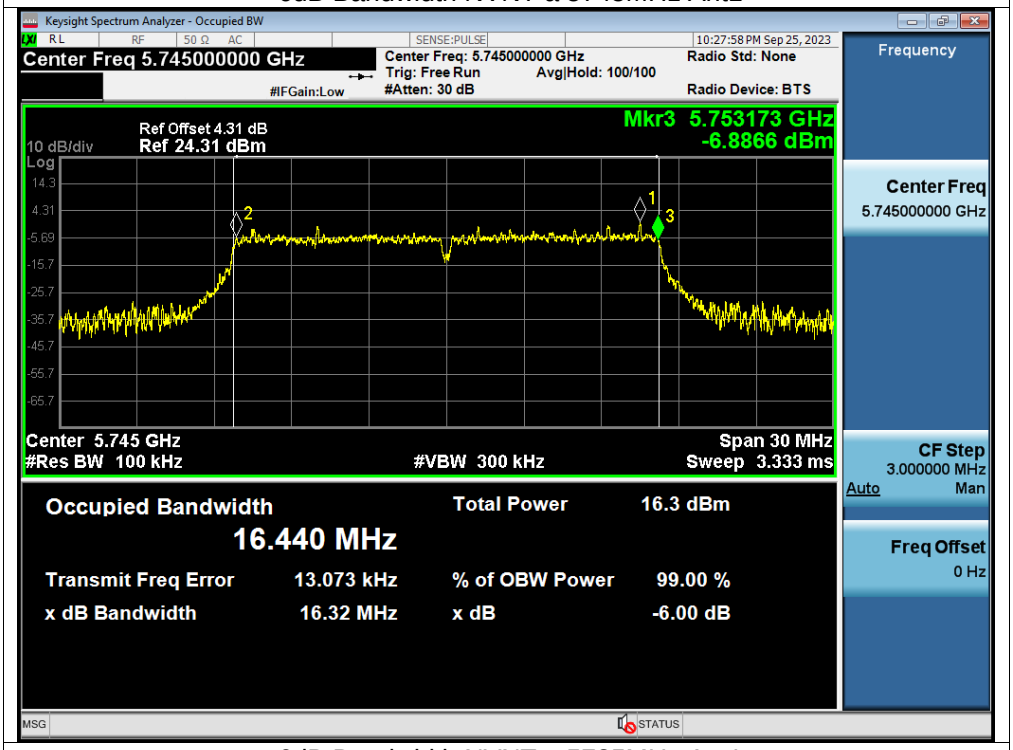
Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101KPa	Test Voltage:	DC 3.8V
Test Mode:	(5745-5825MHz)		

Condition	Mode	Frequency (MHz)	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
NVNT	a	5745	16.319	0.5	Pass
NVNT	a	5785	16.359	0.5	Pass
NVNT	a	5825	16.399	0.5	Pass
NVNT	n20	5745	16.689	0.5	Pass
NVNT	n20	5785	16.996	0.5	Pass
NVNT	n20	5825	17.277	0.5	Pass
NVNT	n40	5755	36.065	0.5	Pass
NVNT	n40	5795	35.901	0.5	Pass
NVNT	ac20	5745	17.051	0.5	Pass
NVNT	ac20	5785	17.282	0.5	Pass
NVNT	ac20	5825	17.554	0.5	Pass
NVNT	ac40	5755	36.07	0.5	Pass
NVNT	ac40	5795	35.925	0.5	Pass
NVNT	ac80	5775	75.507	0.5	Pass

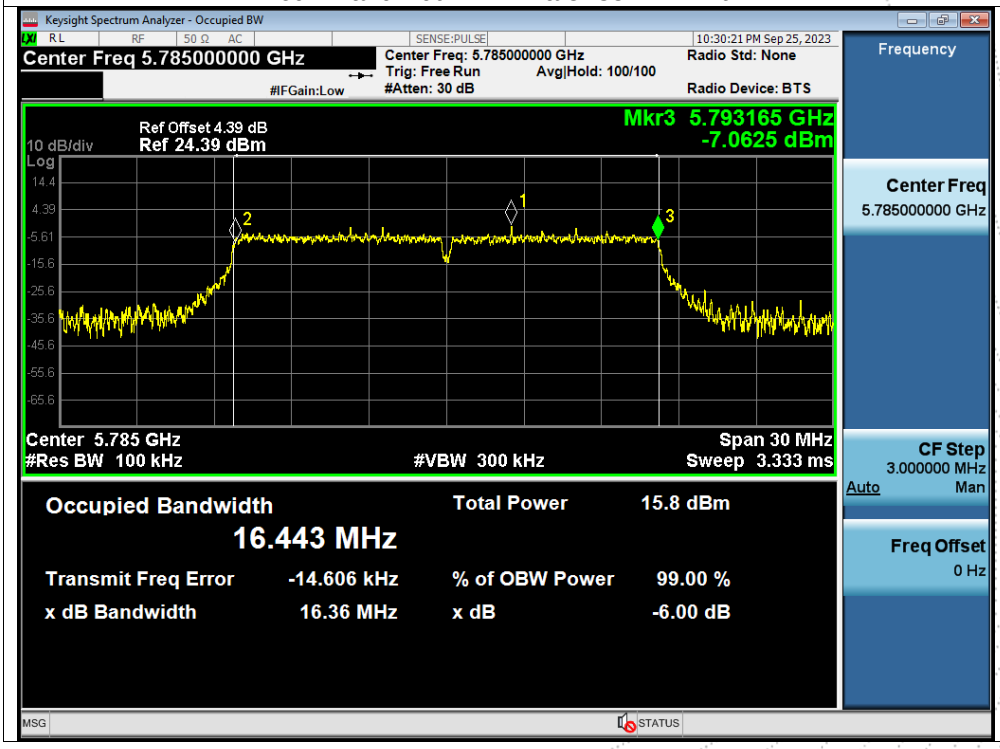
Condition	Mode	Frequency (MHz)	99% OBW (MHz)
NVNT	a	5745	16.57
NVNT	a	5785	16.588
NVNT	a	5825	16.569
NVNT	n20	5745	17.593
NVNT	n20	5785	17.613
NVNT	n20	5825	17.59
NVNT	n40	5755	36.237
NVNT	n40	5795	36.307
NVNT	ac20	5745	17.595
NVNT	ac20	5785	17.59
NVNT	ac20	5825	17.597
NVNT	ac40	5755	36.247
NVNT	ac40	5795	36.319
NVNT	ac80	5775	75.566

Test Graphs

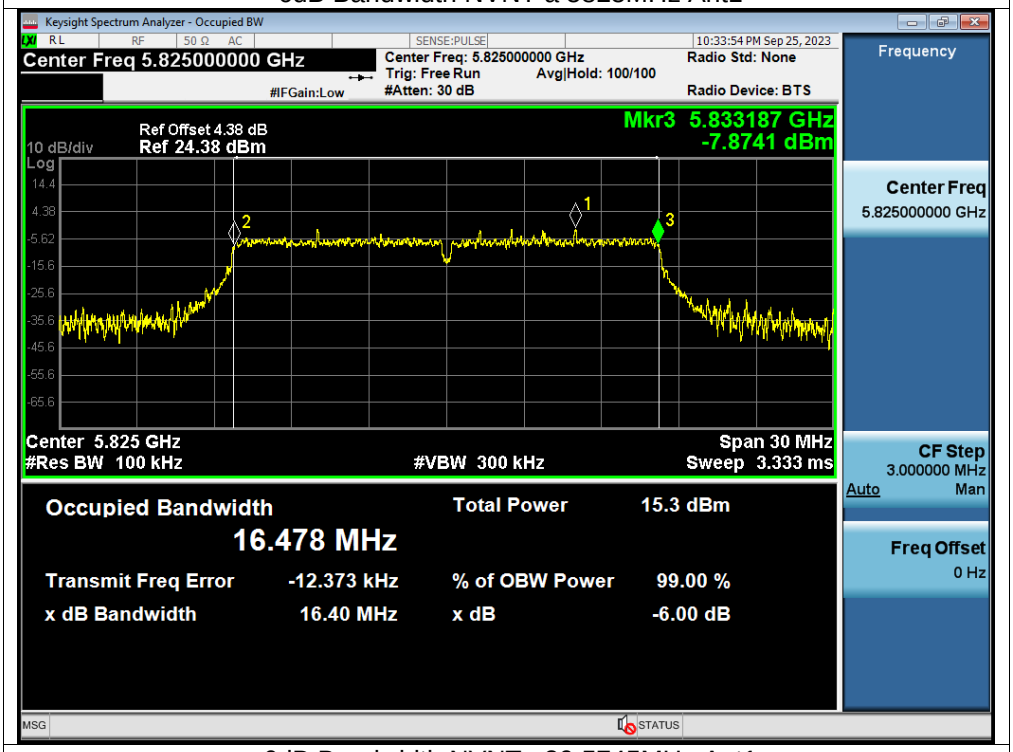
-6dB Bandwidth NVNT a 5745MHz Ant1



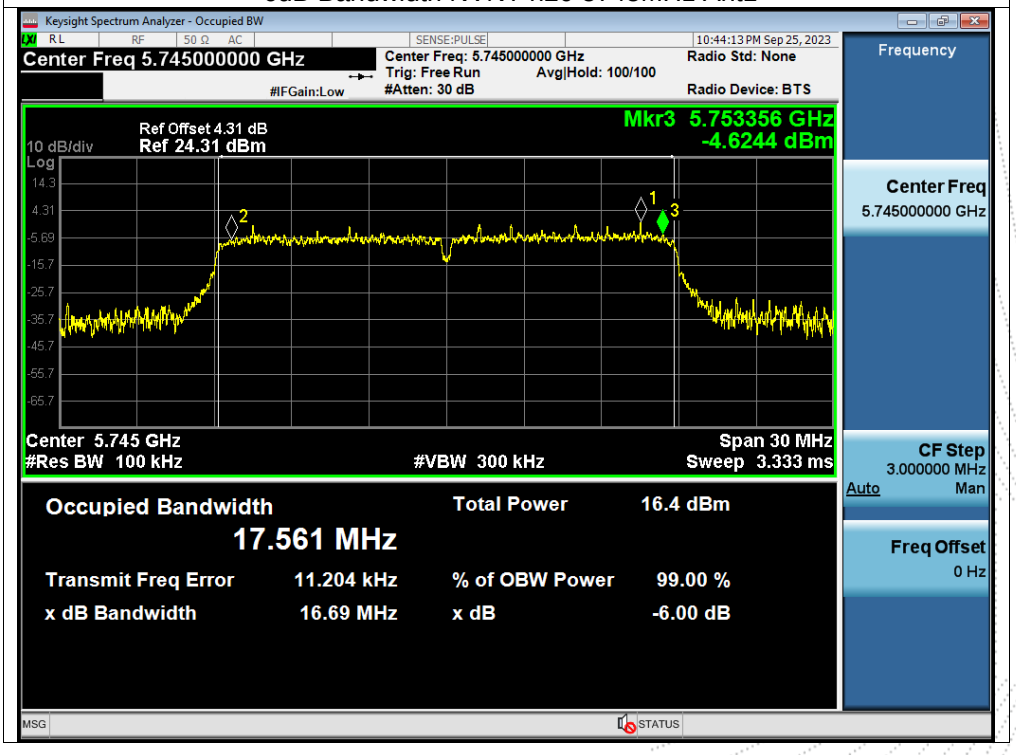
-6dB Bandwidth NVNT a 5785MHz Ant1



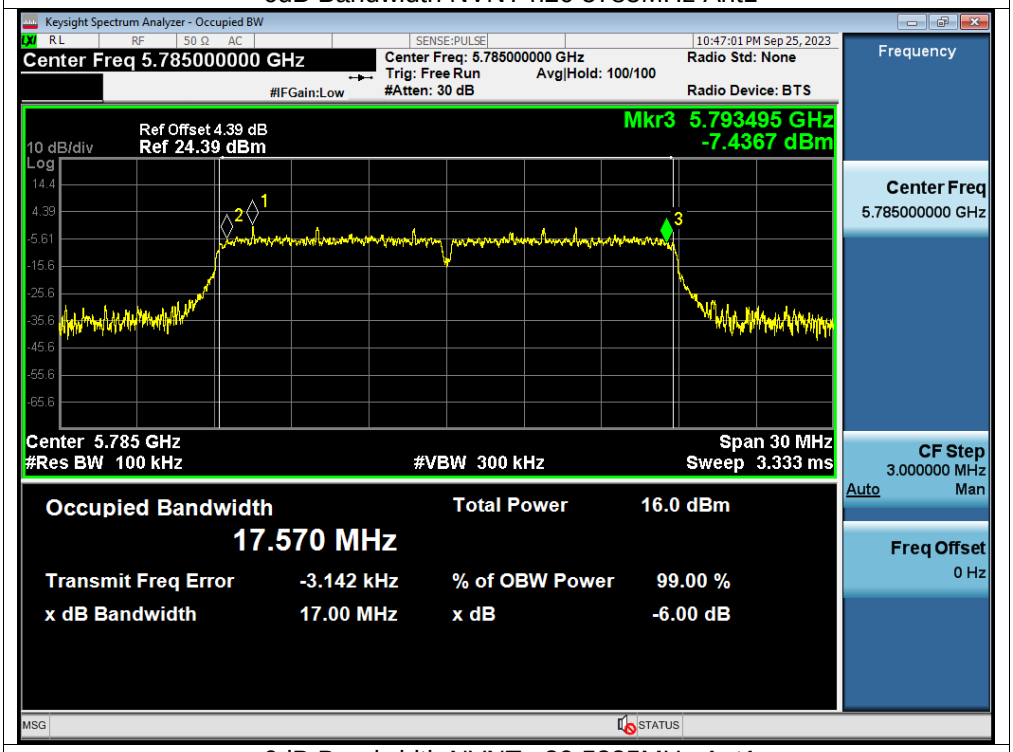
-6dB Bandwidth NVNT a 5825MHz Ant1



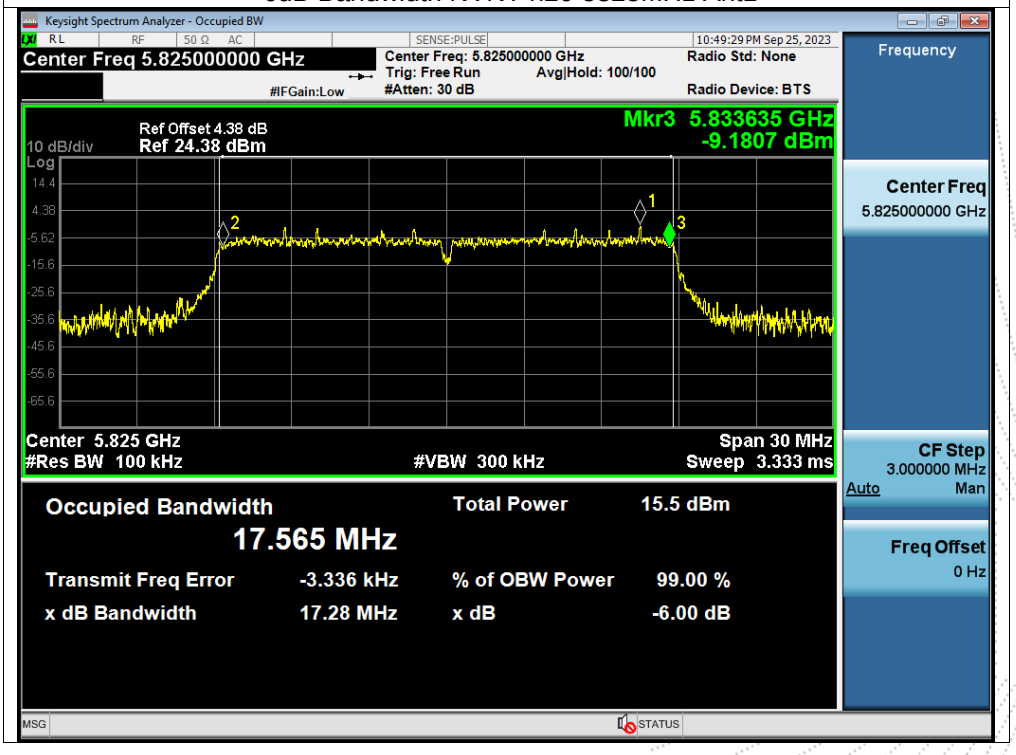
-6dB Bandwidth NVNT n20 5745MHz Ant1



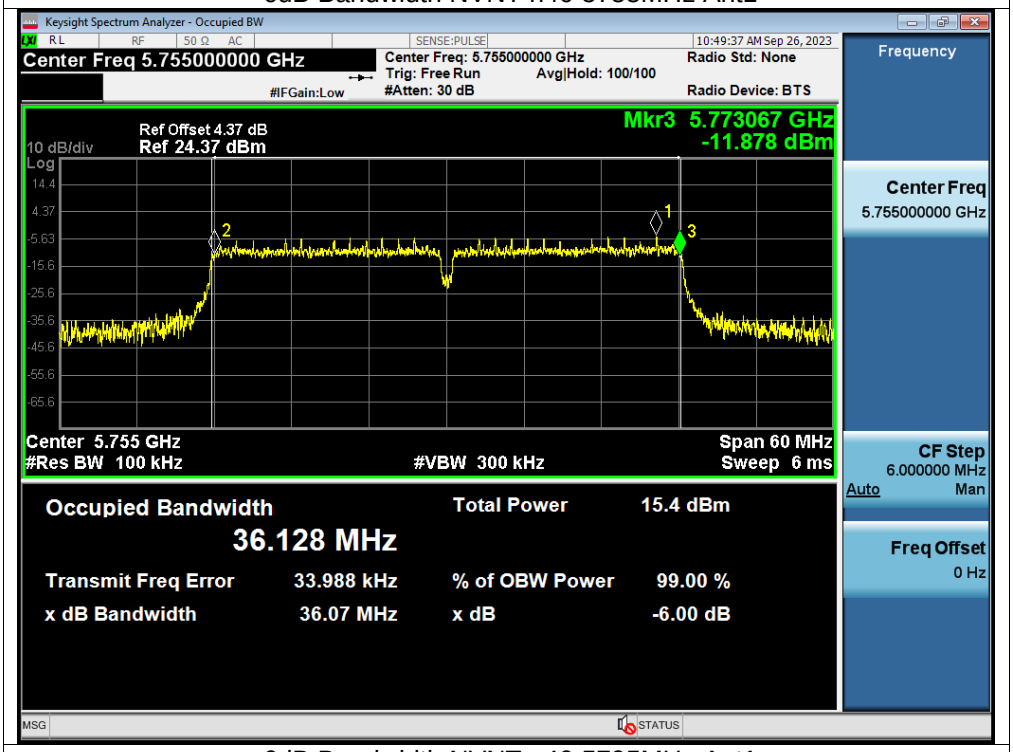
-6dB Bandwidth NVNT n20 5785MHz Ant1



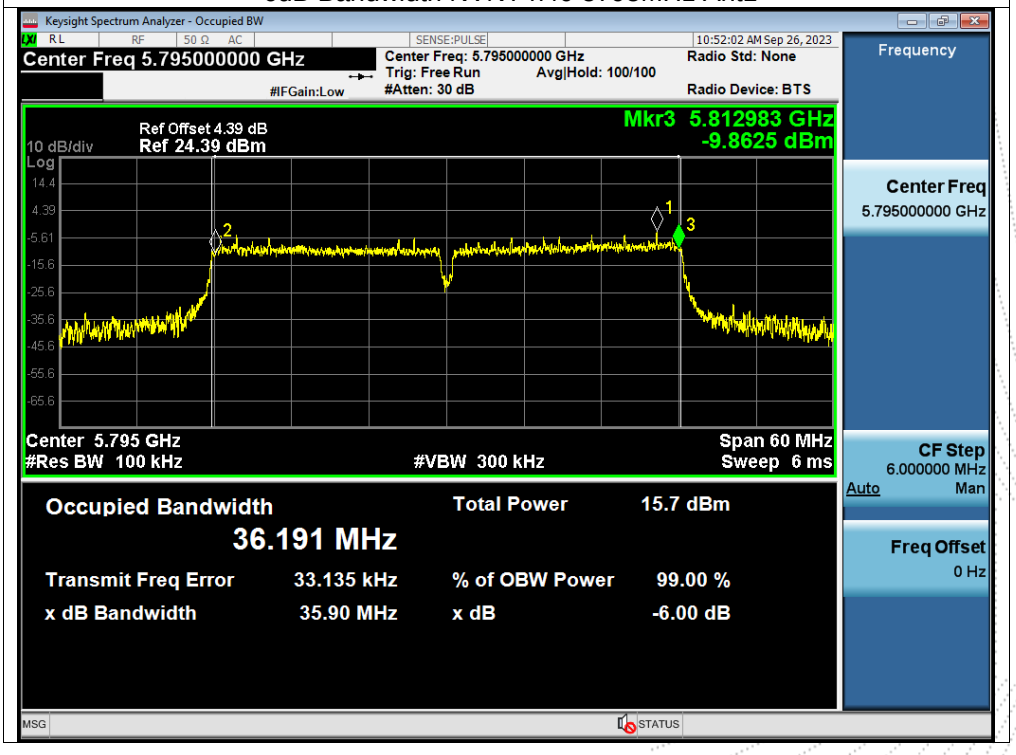
-6dB Bandwidth NVNT n20 5825MHz Ant1



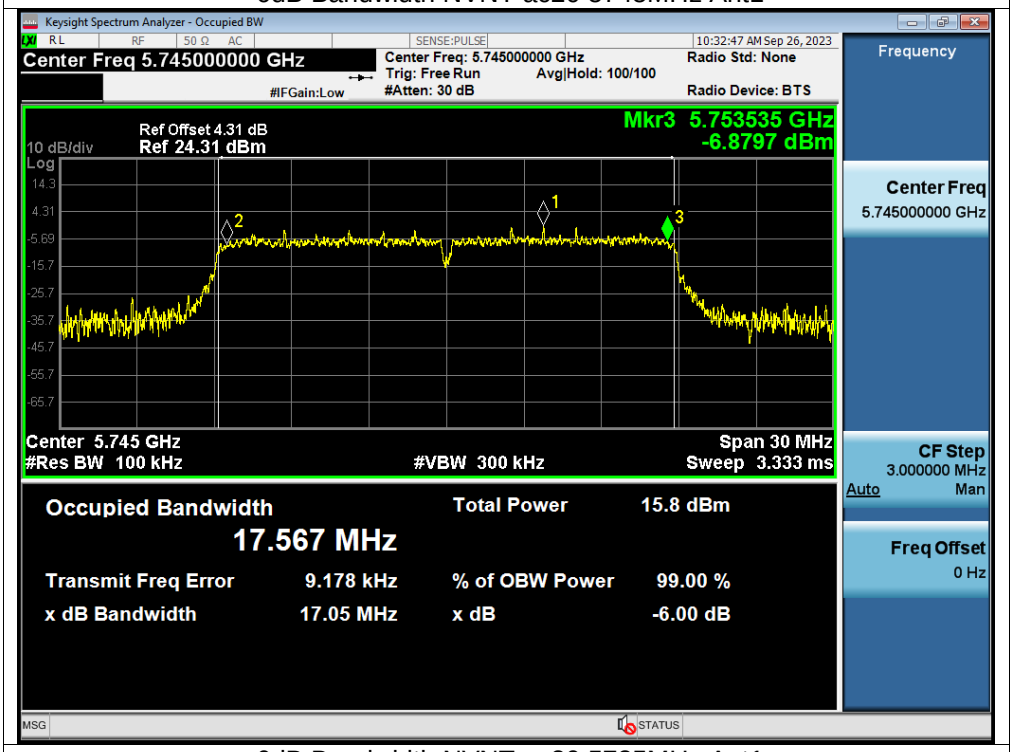
-6dB Bandwidth NVNT n40 5755MHz Ant1



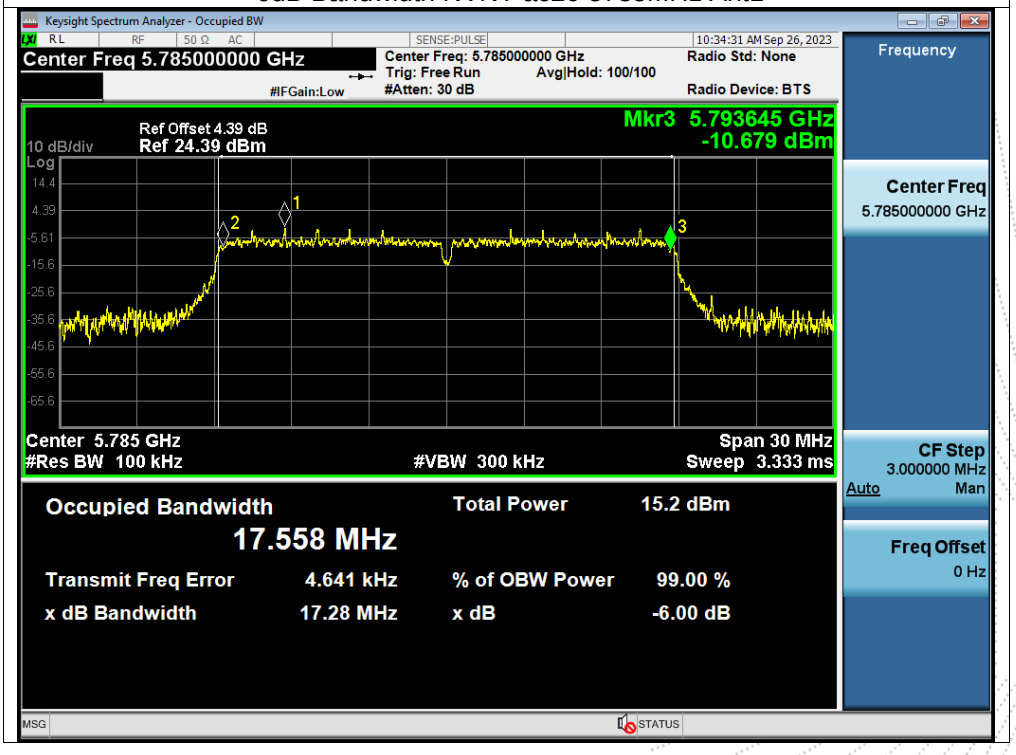
-6dB Bandwidth NVNT n40 5795MHz Ant1



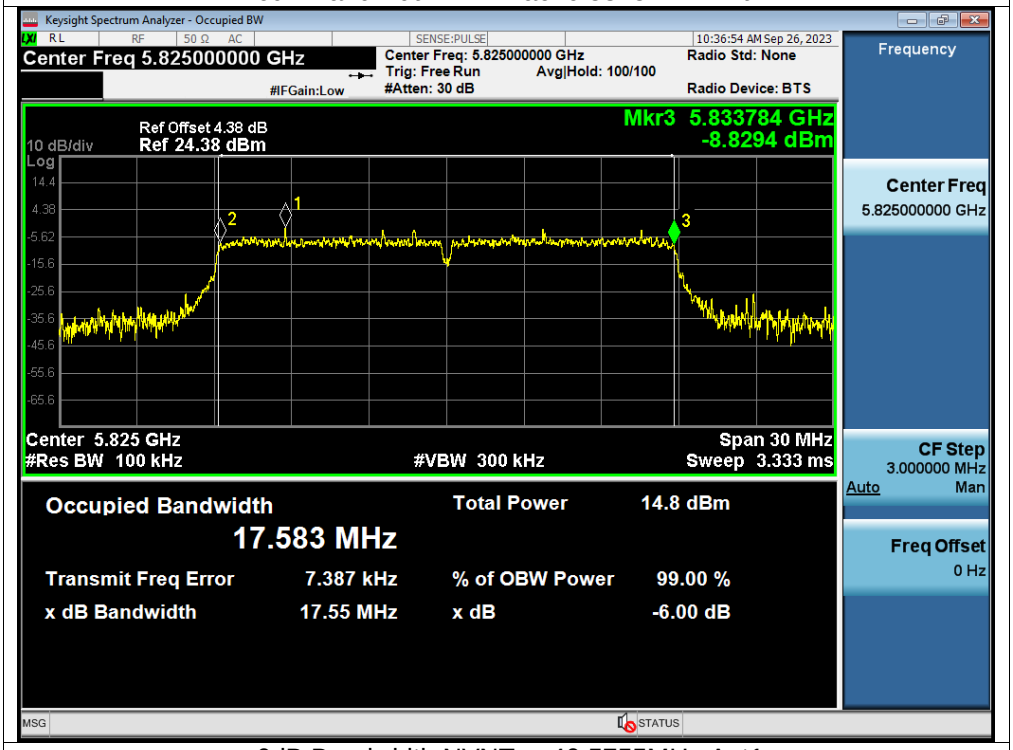
-6dB Bandwidth NVNT ac20 5745MHz Ant1



-6dB Bandwidth NVNT ac20 5785MHz Ant1



-6dB Bandwidth NVNT ac20 5825MHz Ant1



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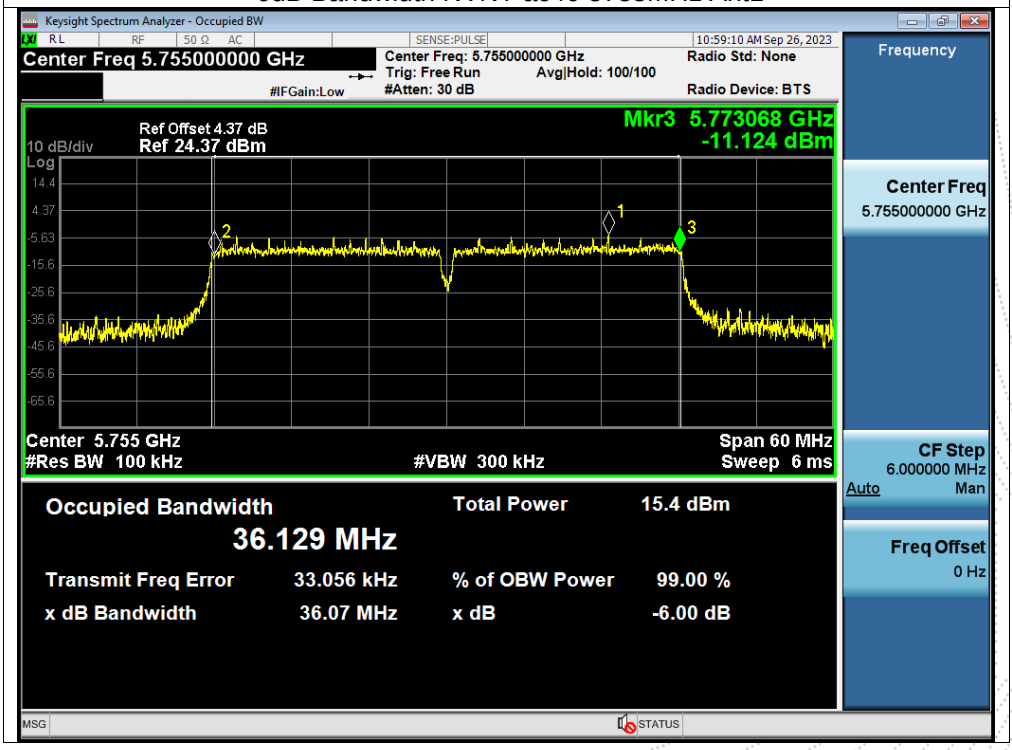
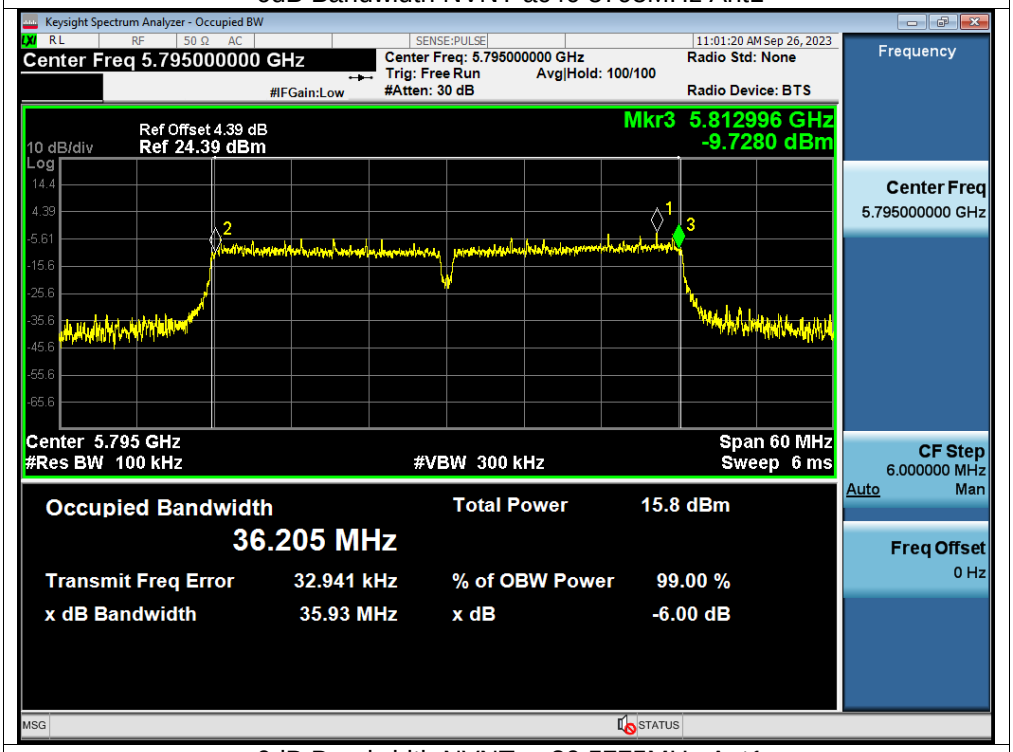
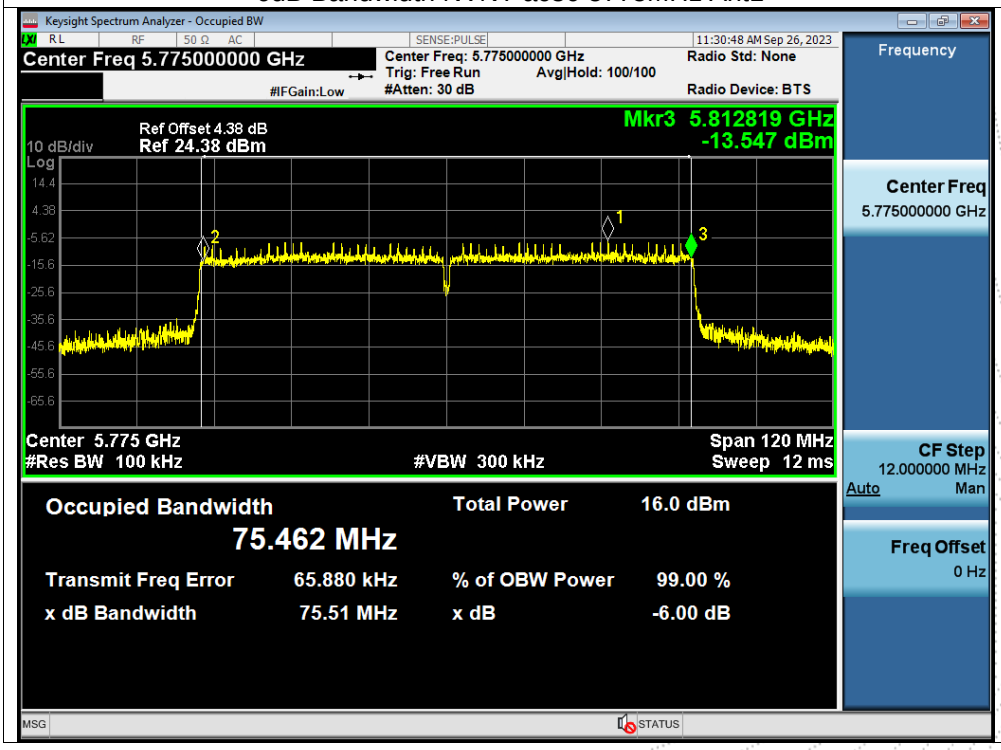


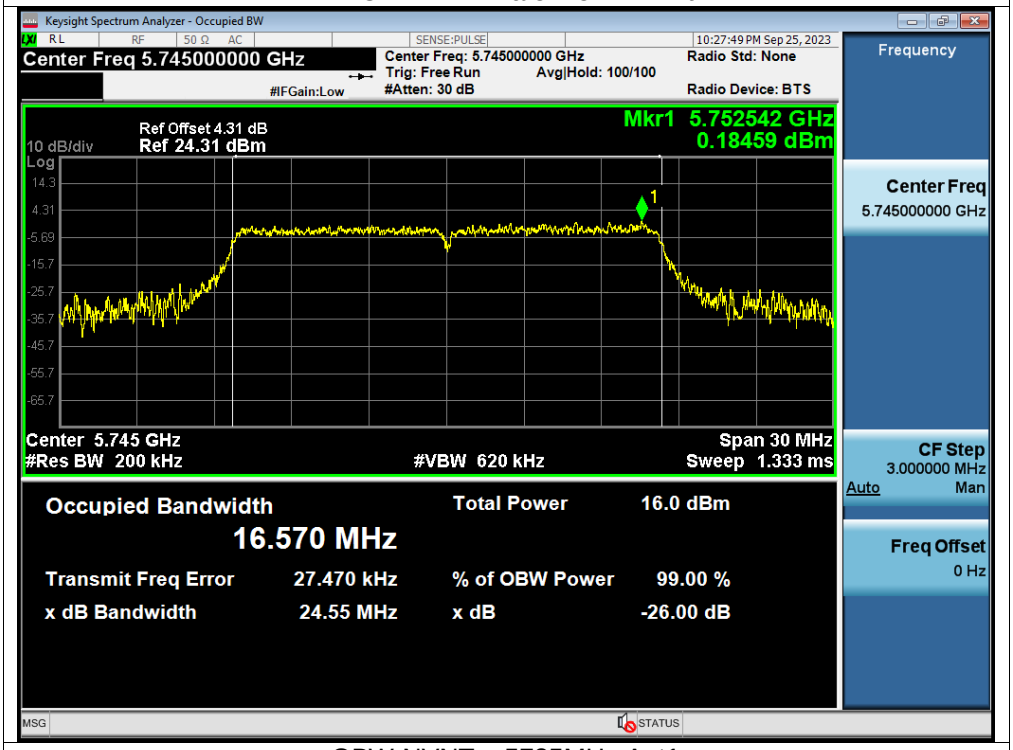
-6dB Bandwidth NVNT ac40 5795MHz Ant1



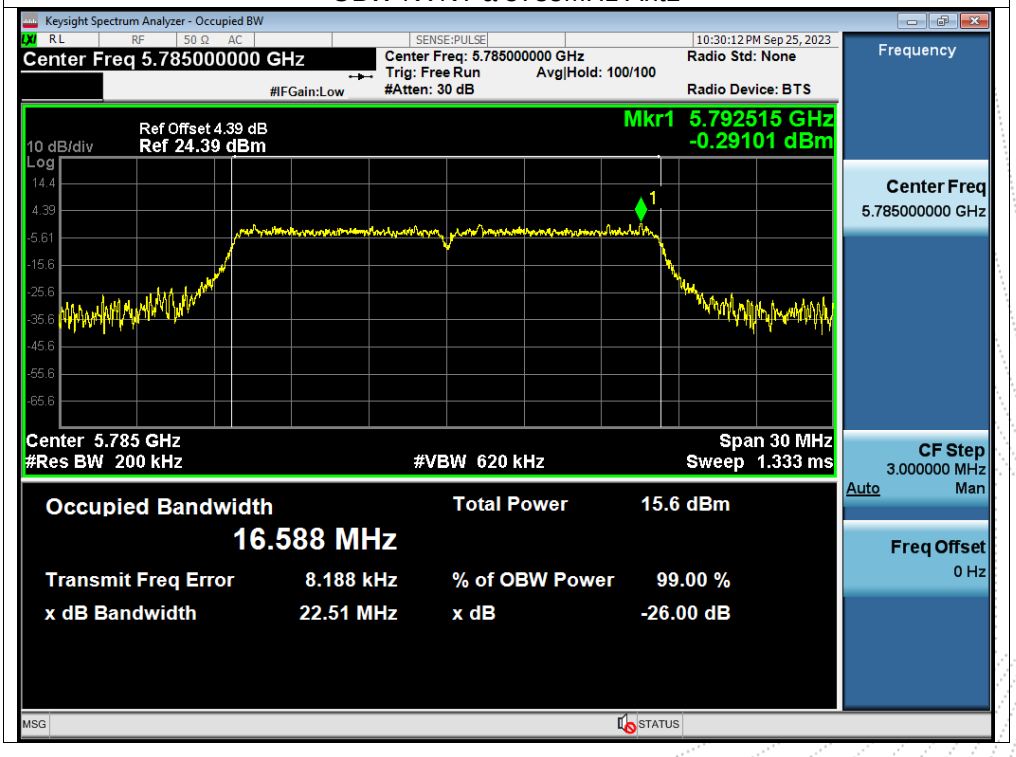
-6dB Bandwidth NVNT ac80 5775MHz Ant1



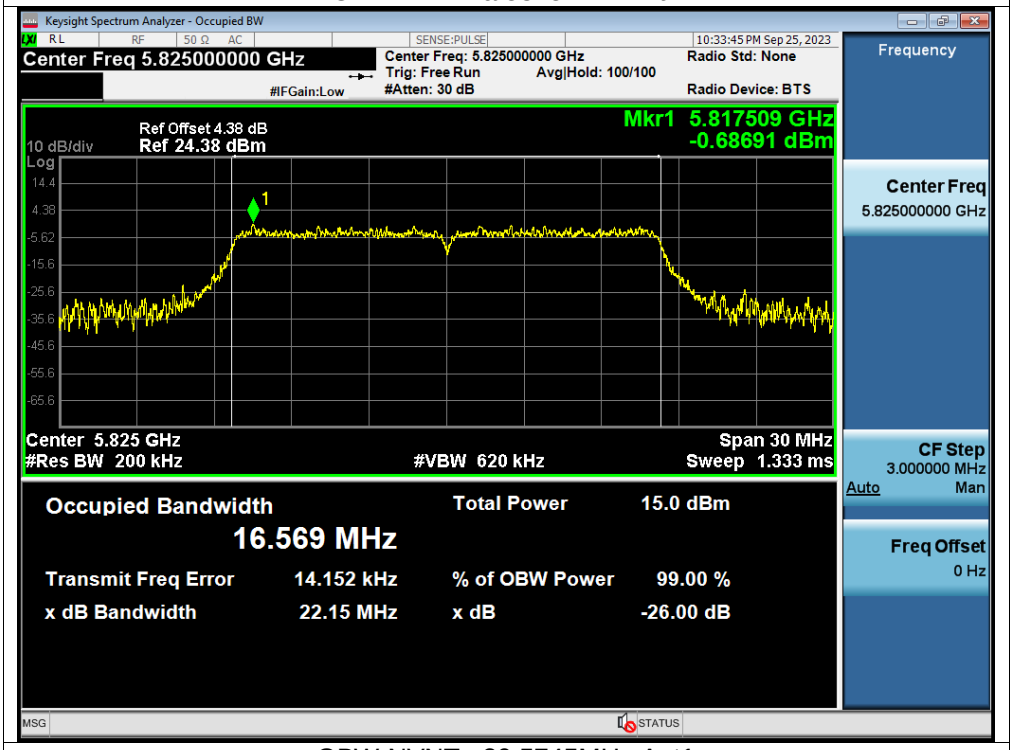
OBW NVNT a 5745MHz Ant1



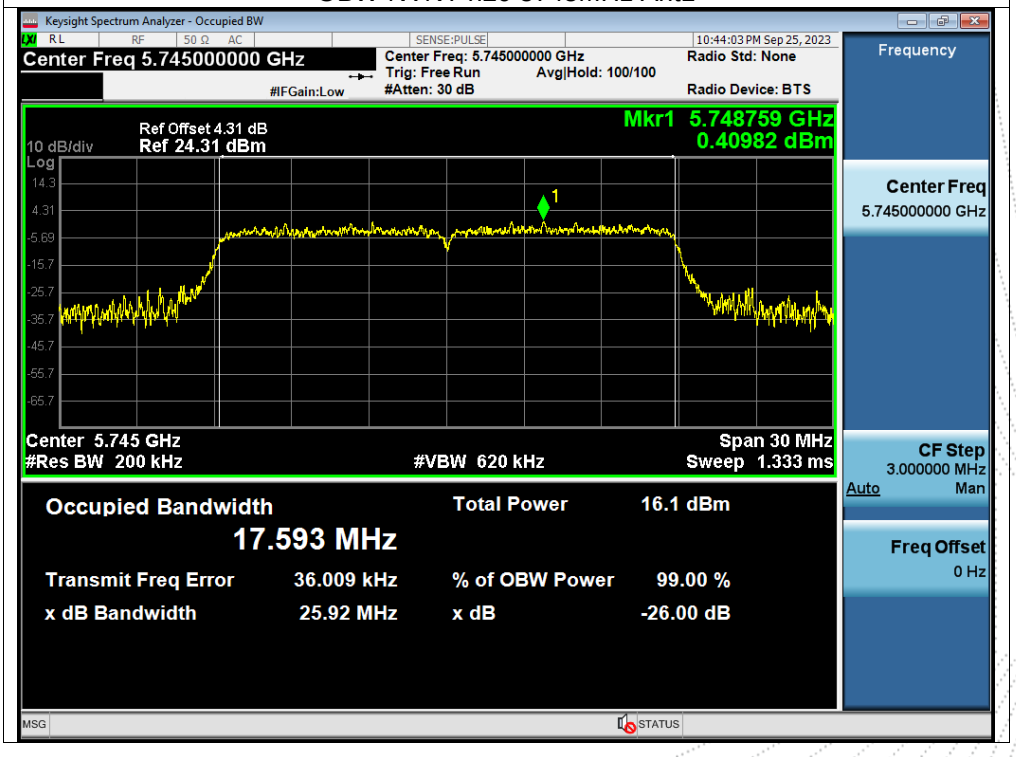
OBW NVNT a 5785MHz Ant1



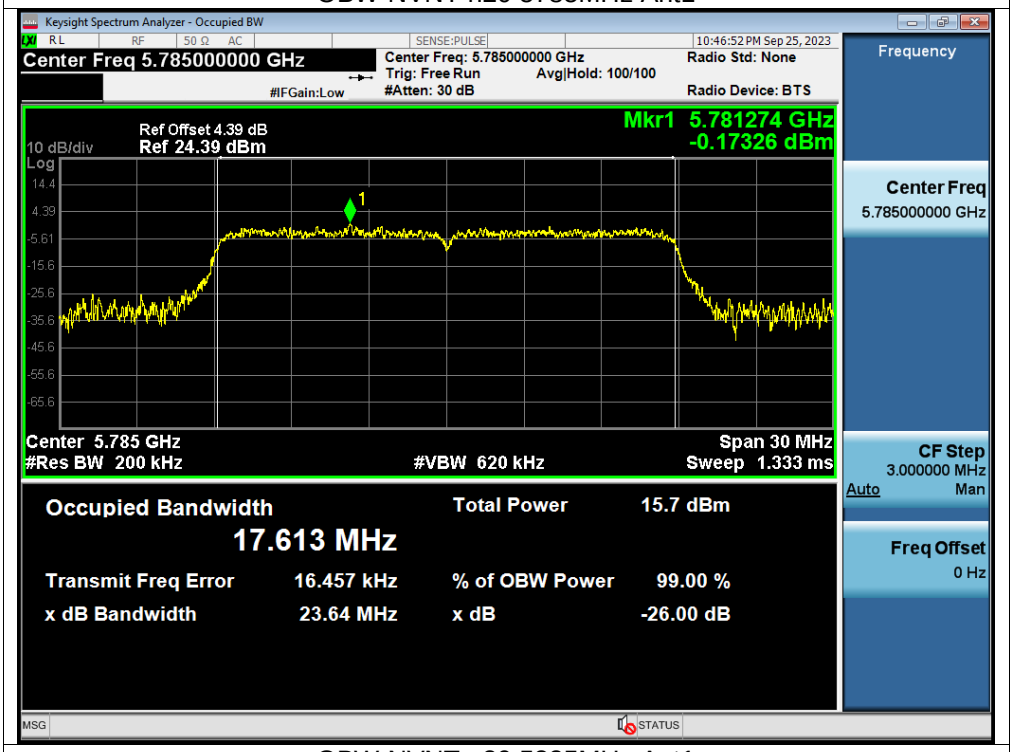
OBW NVNT a 5825MHz Ant1



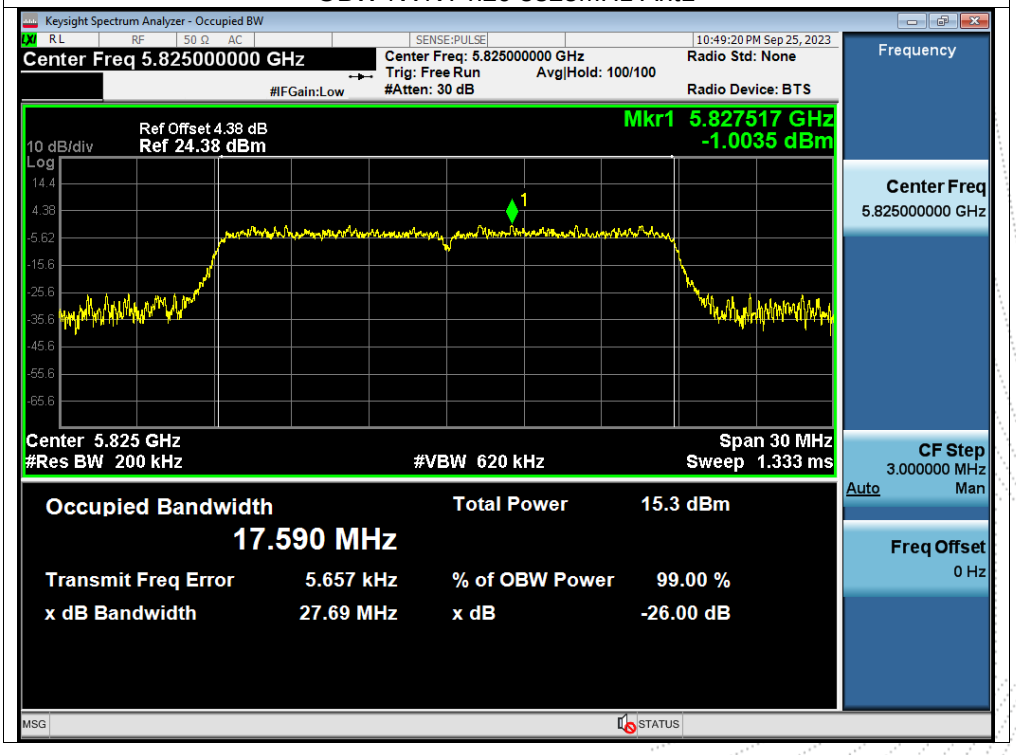
OBW NVNT n20 5745MHz Ant1



OBW NVNT n20 5785MHz Ant1



OBW NVNT n20 5825MHz Ant1



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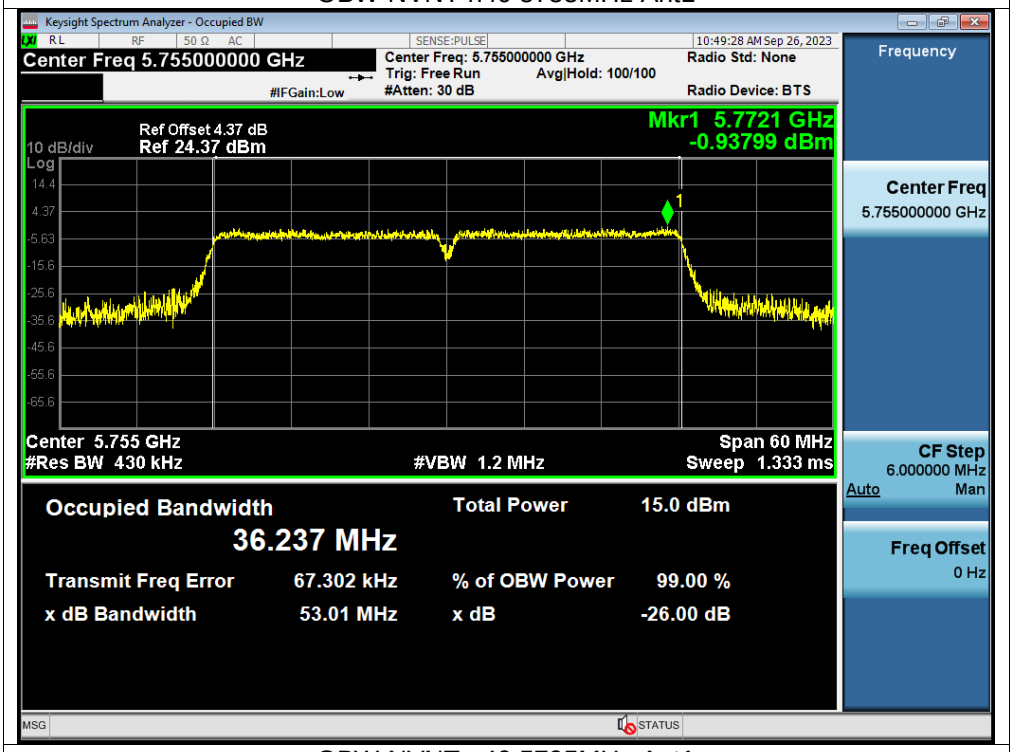
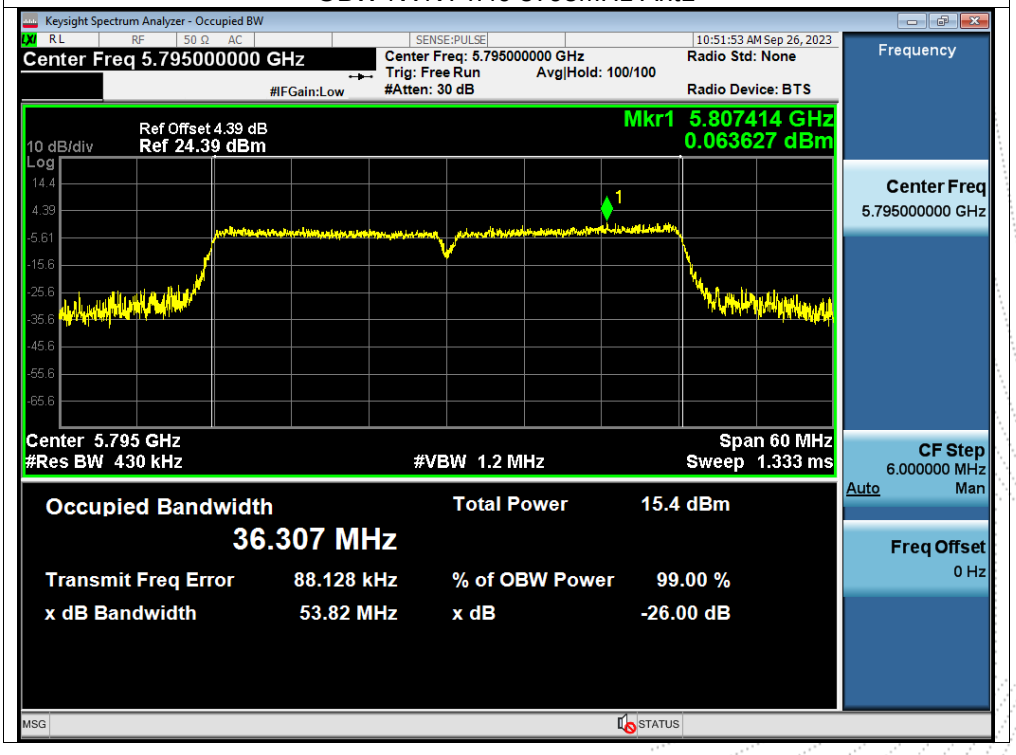
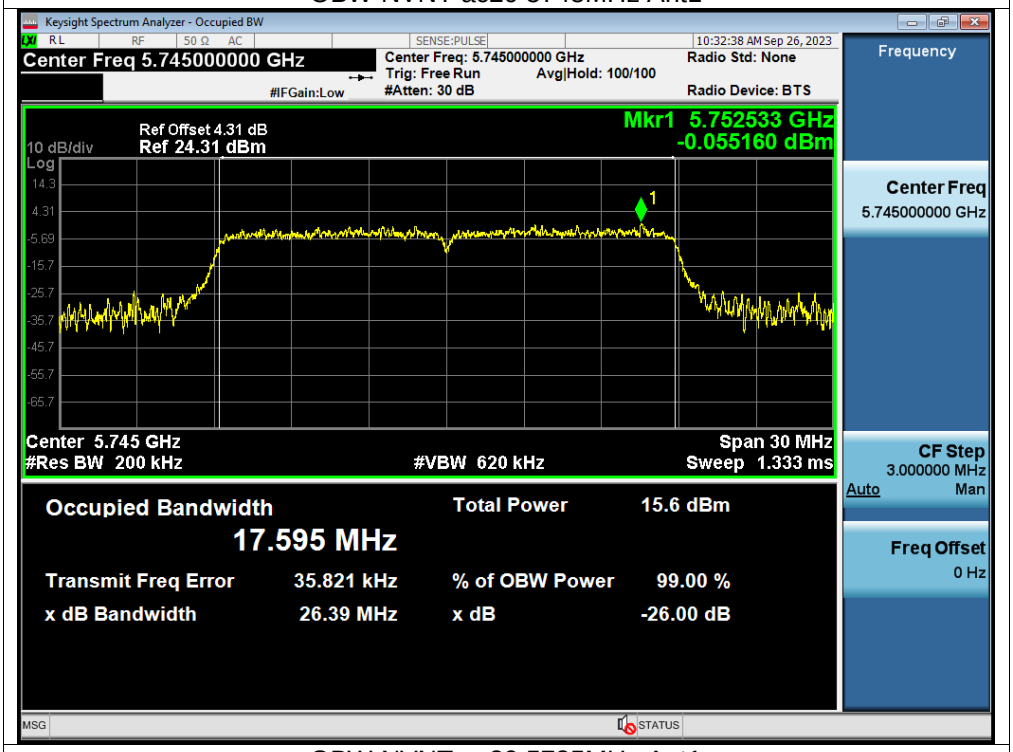


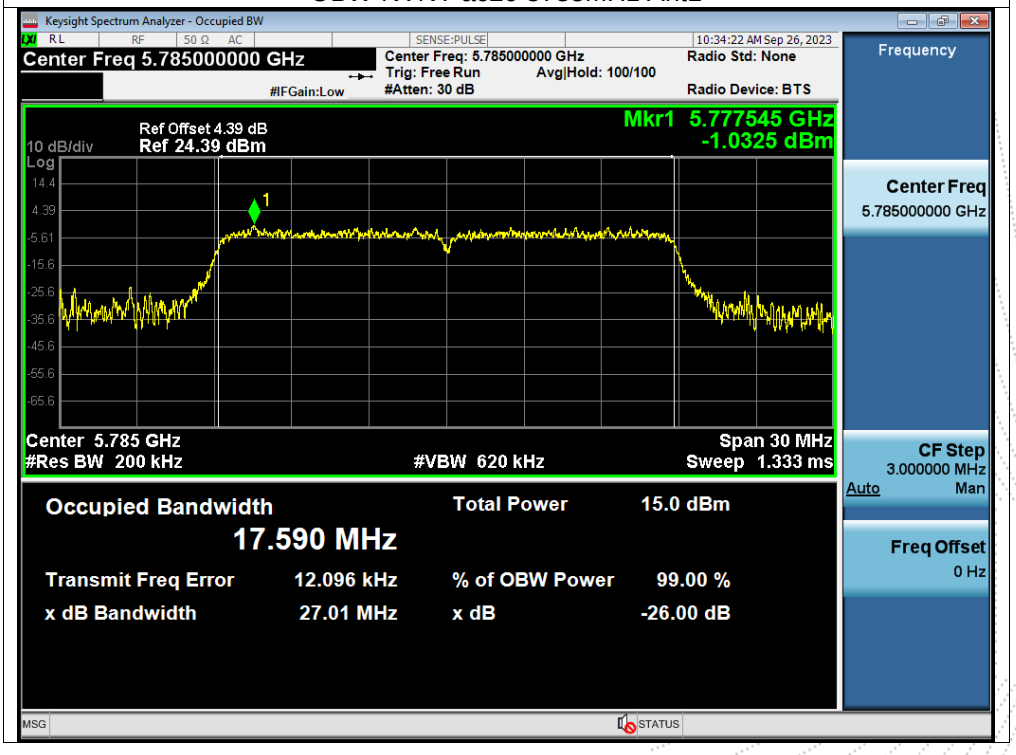
OBW NVNT n40 5795MHz Ant1



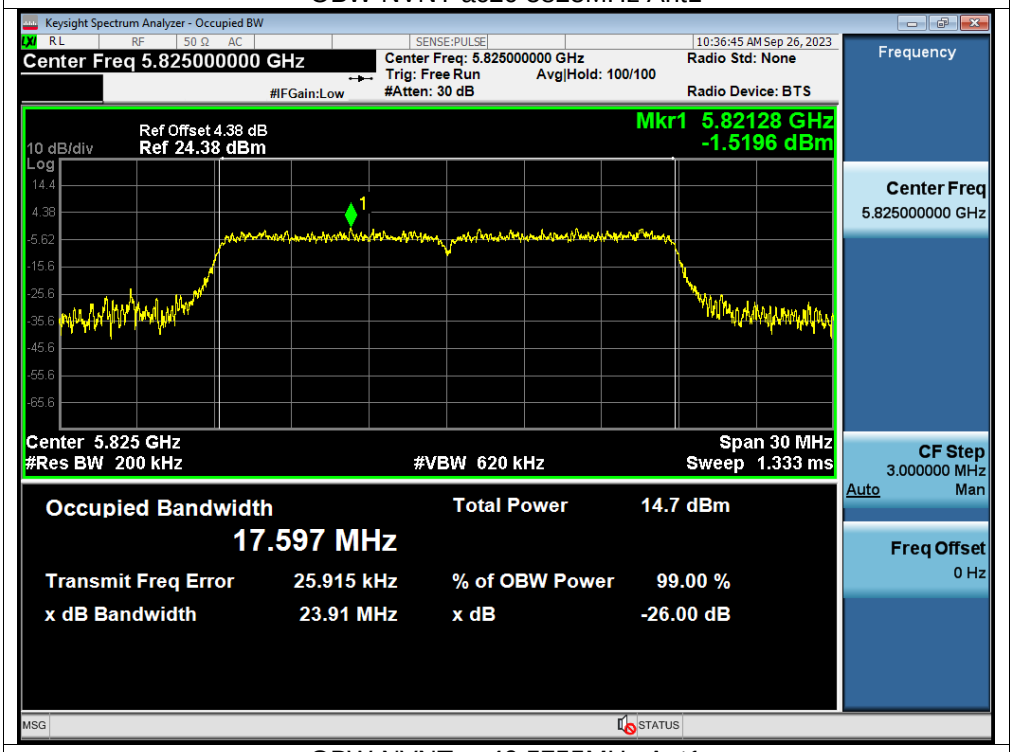
OBW NVNT ac20 5745MHz Ant1



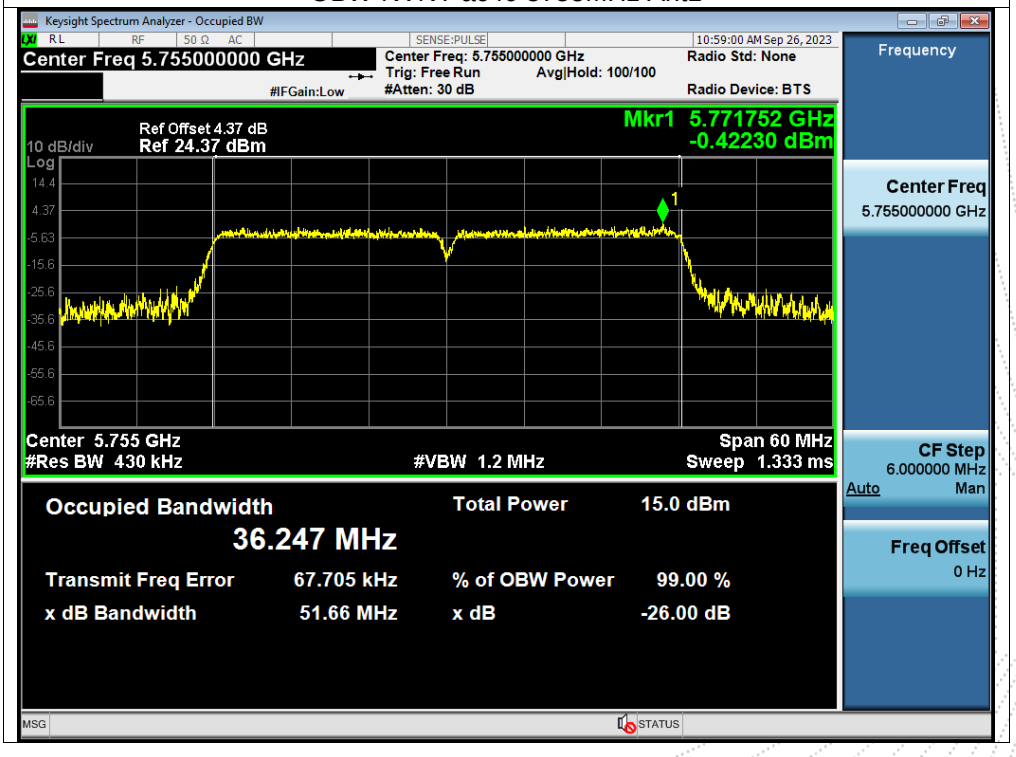
OBW NVNT ac20 5785MHz Ant1



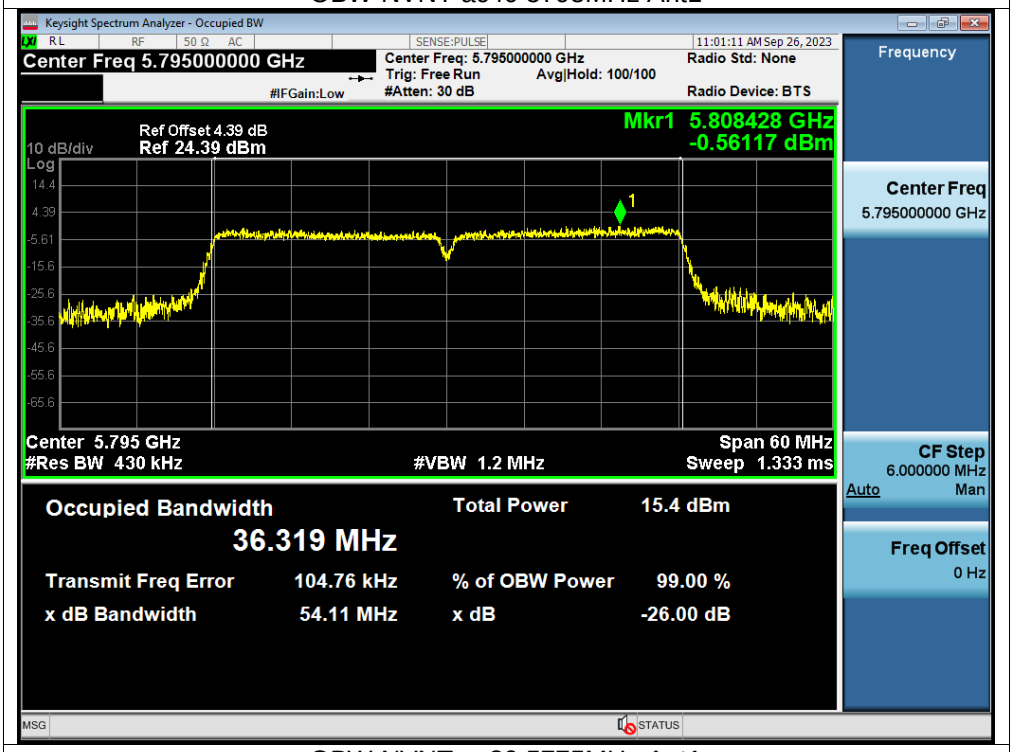
OBW NVNT ac20 5825MHz Ant1



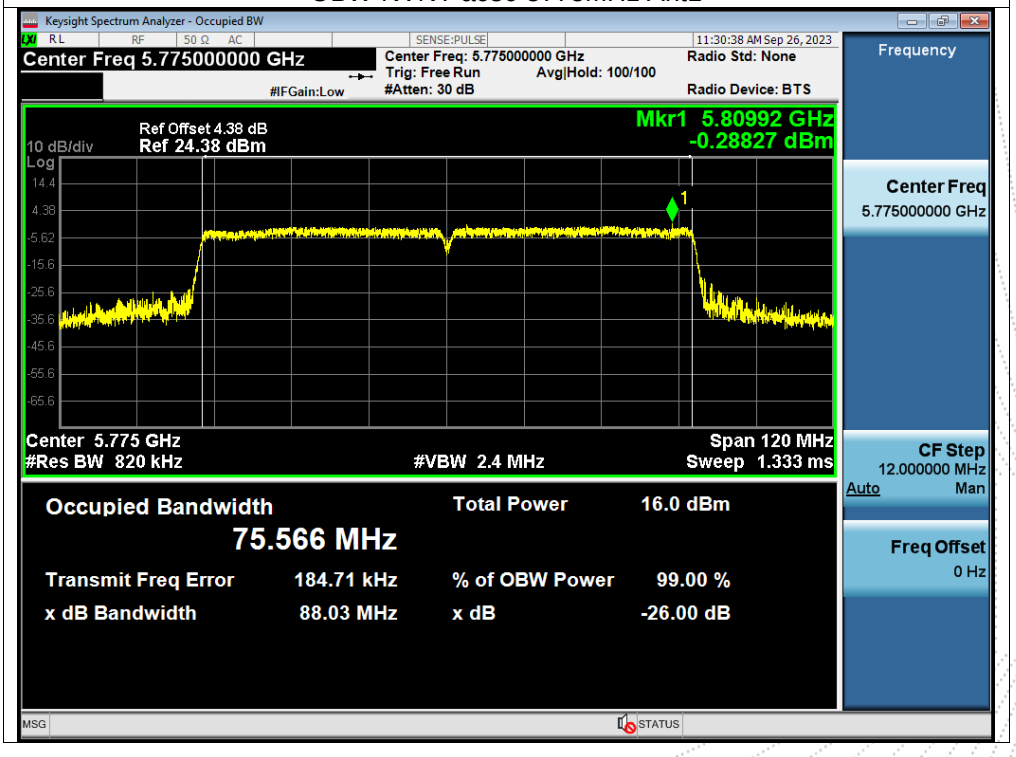
OBW NVNT ac40 5755MHz Ant1



OBW NVNT ac40 5795MHz Ant1

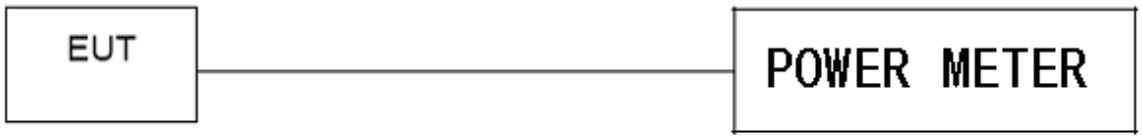


OBW NVNT ac80 5775MHz Ant1



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	0.25W
5250~5350	0.25W
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%
Pressure:	101KPa	Test Voltage:	DC 3.8V
Test Mode:	5180-5240MHz		

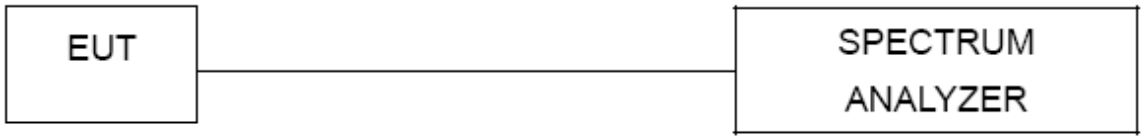
Condition	Mode	Frequency (MHz)	Conducted Power (dBm)	Limit (dBm)	Verdict
NVNT	a	5180	10.15	24	Pass
NVNT	a	5200	9.78	24	Pass
NVNT	a	5240	10.29	24	Pass
NVNT	n20	5180	9.70	24	Pass
NVNT	n20	5200	9.80	24	Pass
NVNT	n20	5240	9.40	24	Pass
NVNT	n40	5190	8.58	24	Pass
NVNT	n40	5230	8.98	24	Pass
NVNT	ac20	5180	8.87	24	Pass
NVNT	ac20	5200	8.65	24	Pass
NVNT	ac20	5240	9.45	24	Pass
NVNT	ac40	5190	8.76	24	Pass
NVNT	ac40	5230	8.81	24	Pass
NVNT	ac80	5210	7.59	24	Pass

Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101KPa	Test Voltage:	DC 3.8V
Test Mode:	5745-5825MHz		

Condition	Mode	Frequency (MHz)	Conducted Power (dBm)	Limit (dBm)	Verdict
NVNT	a	5745	10.01	30	Pass
NVNT	a	5785	9.64	30	Pass
NVNT	a	5825	9.05	30	Pass
NVNT	n20	5745	10.02	30	Pass
NVNT	n20	5785	9.76	30	Pass
NVNT	n20	5825	9.18	30	Pass
NVNT	n40	5755	8.43	30	Pass
NVNT	n40	5795	8.76	30	Pass
NVNT	ac20	5745	9.58	30	Pass
NVNT	ac20	5785	8.98	30	Pass
NVNT	ac20	5825	8.59	30	Pass
NVNT	ac40	5755	8.32	30	Pass
NVNT	ac40	5795	8.88	30	Pass
NVNT	ac80	5775	8.11	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

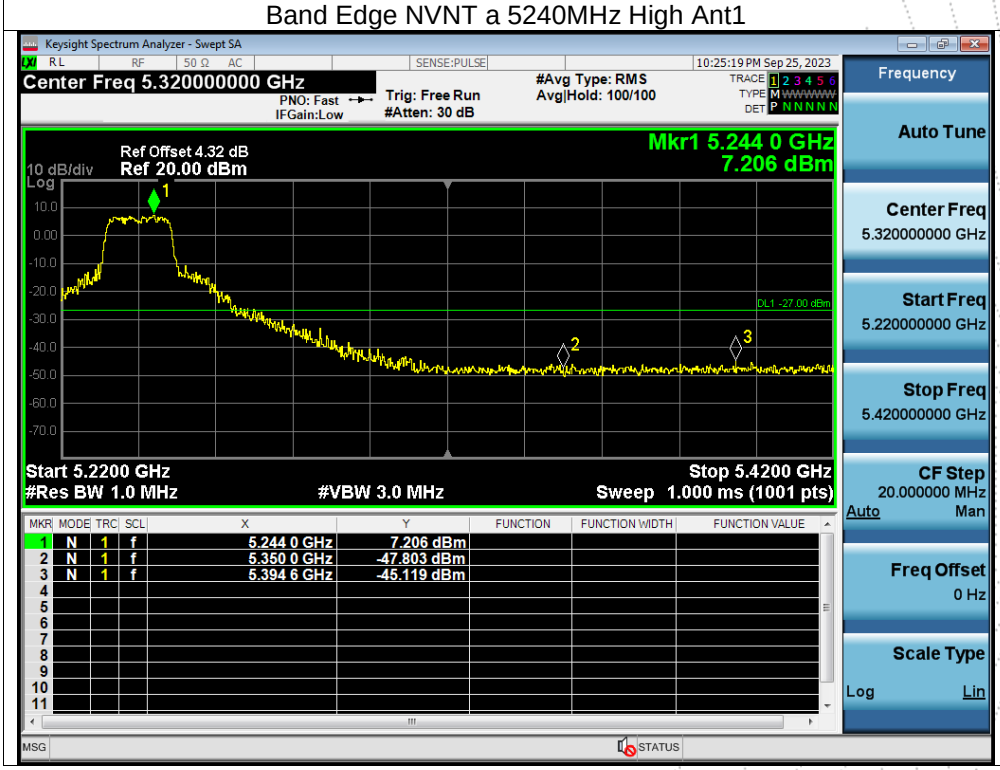
Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101kPa	Test Voltage:	DC 3.8V

5180-5240MHz

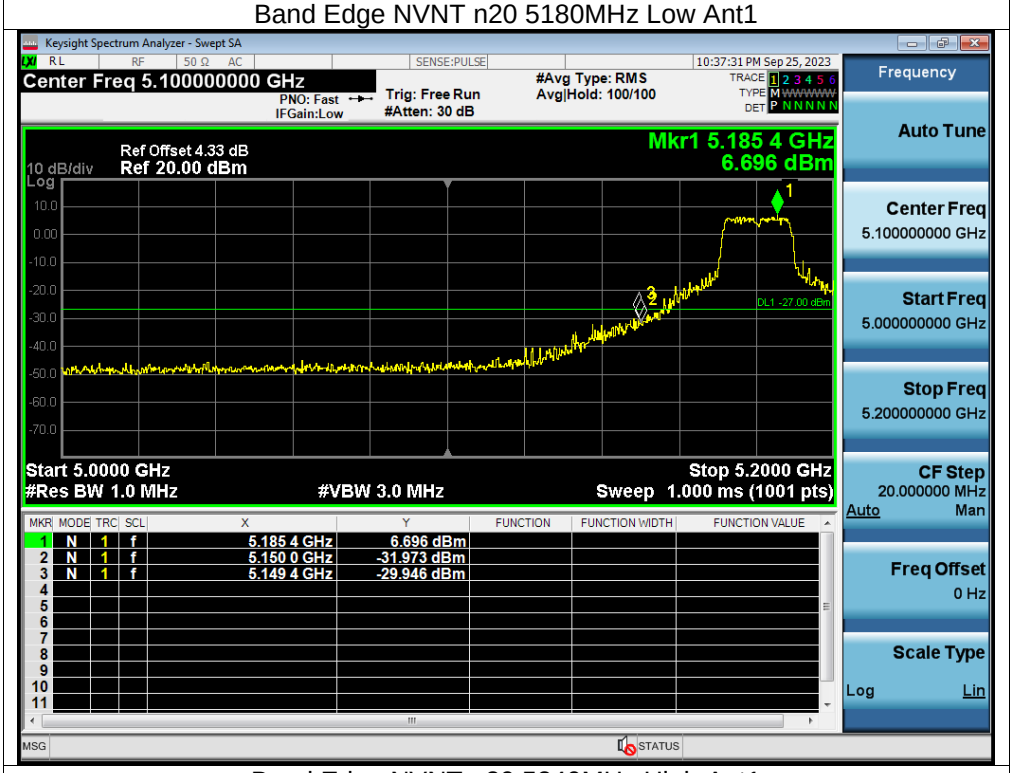
Test Graphs

Band Edge NVNT a 5180MHz Low Ant1

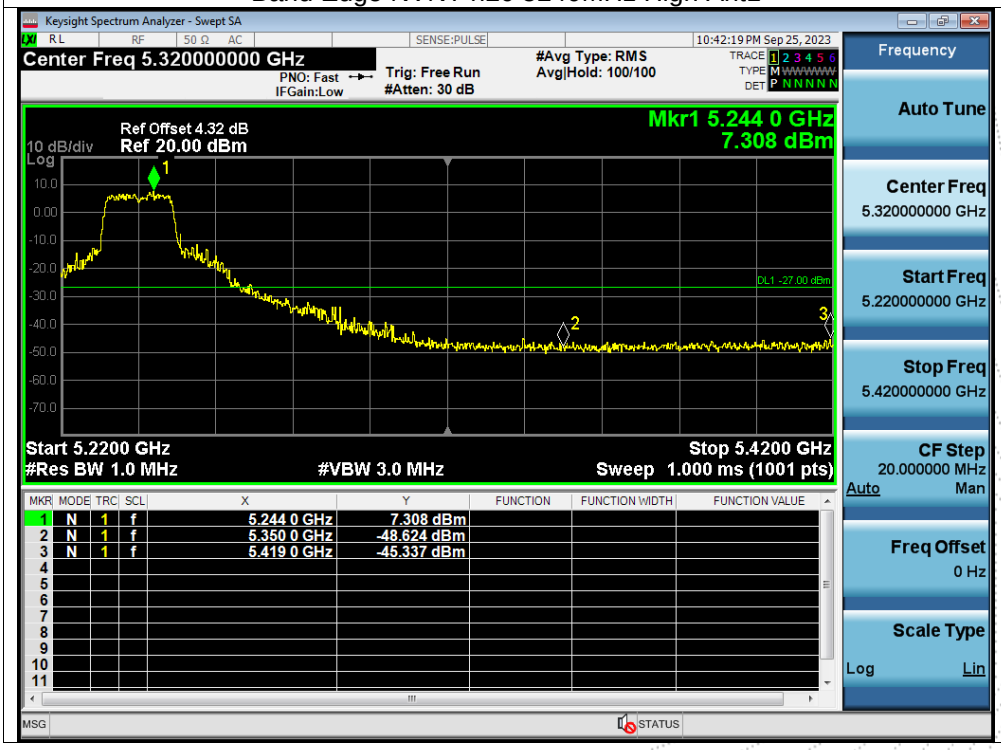
Band Edge NVNT a 5240MHz High Ant1



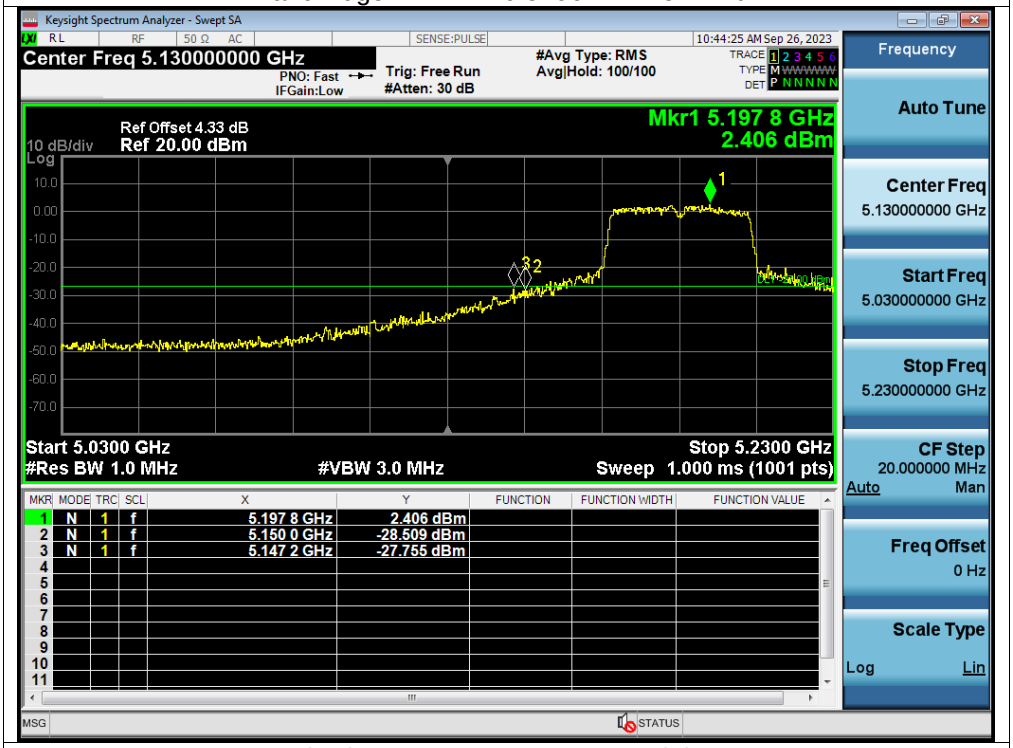
Band Edge NVNT n20 5180MHz Low Ant1



Band Edge NVNT n20 5240MHz High Ant1

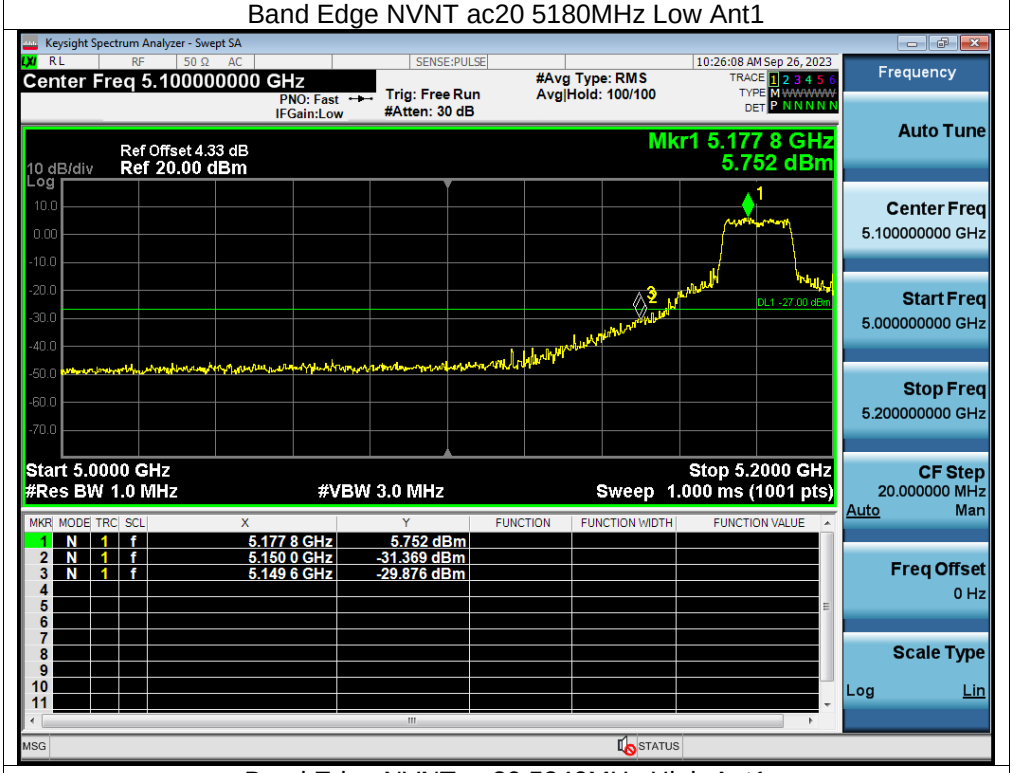


Band Edge NVNT n40 5190MHz Low Ant1



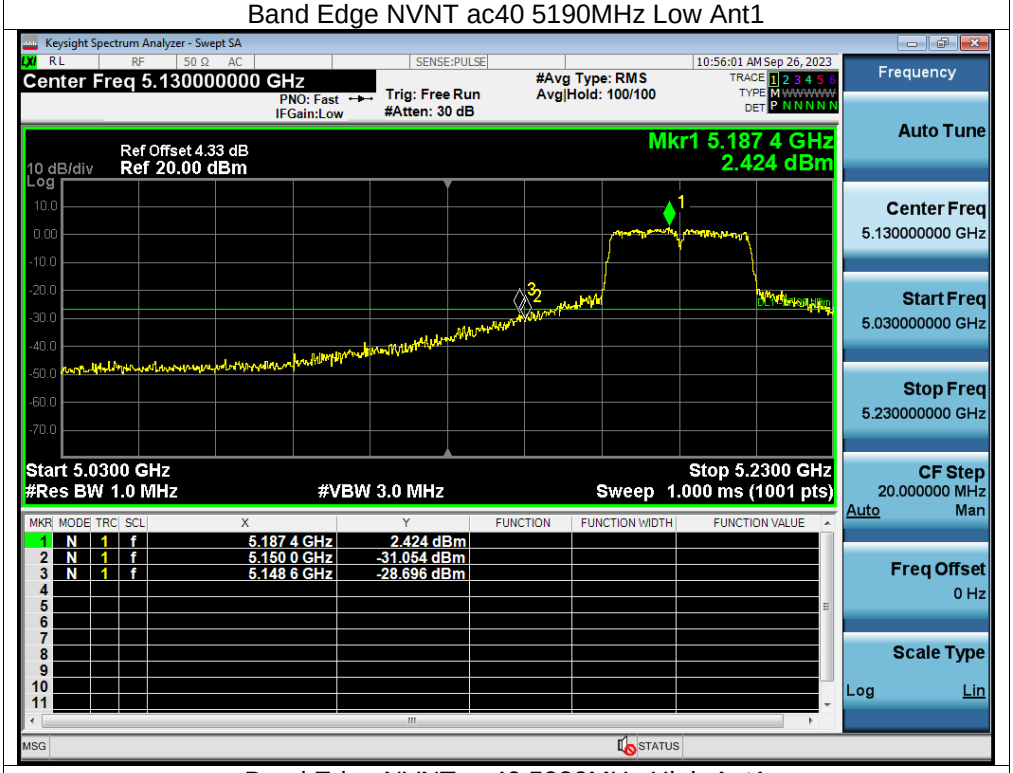
Band Edge NVNT n40 5230MHz High Ant1

Band Edge NVNT ac20 5180MHz Low Ant1



Band Edge NVNT ac20 5240MHz High Ant1

Band Edge NVNT ac40 5190MHz Low Ant1



Band Edge NVNT ac40 5230MHz High Ant1

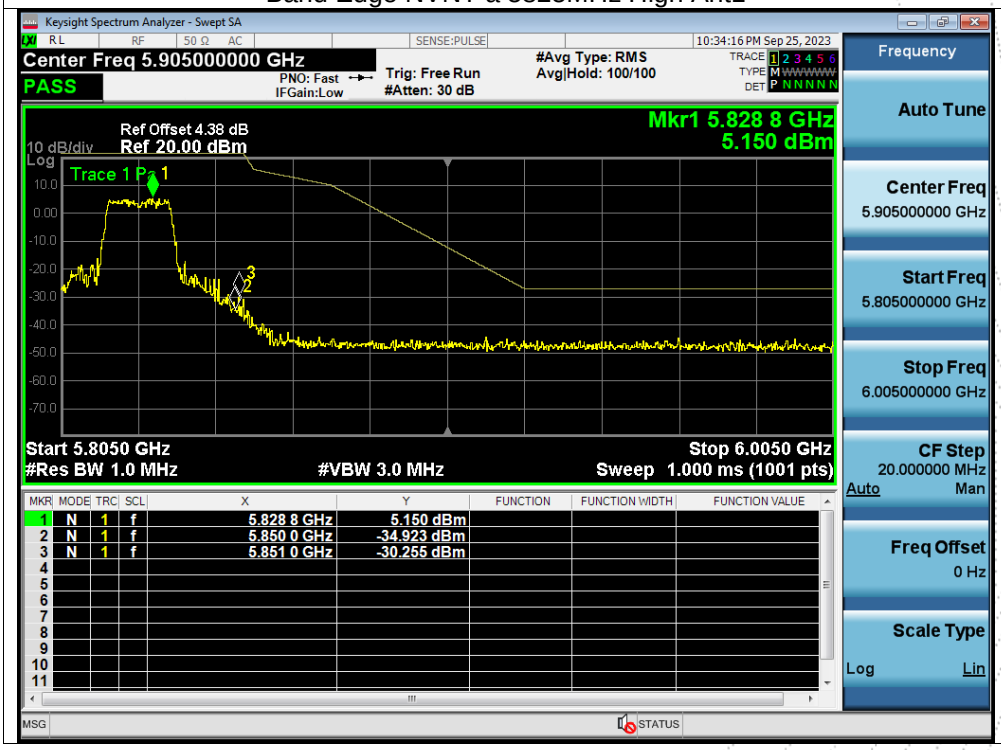
Band Edge NVNT ac80 5210MHz High Ant1

5745-5825MHz

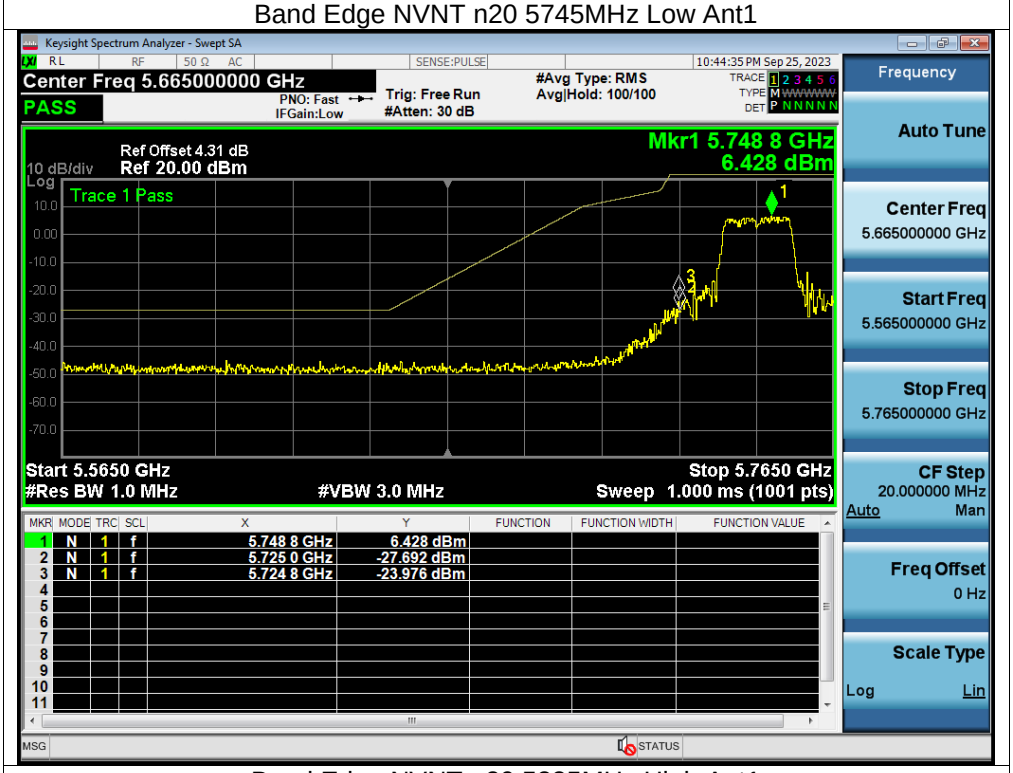
Test Graphs

Band Edge NVNT a 5745MHz Low Ant1

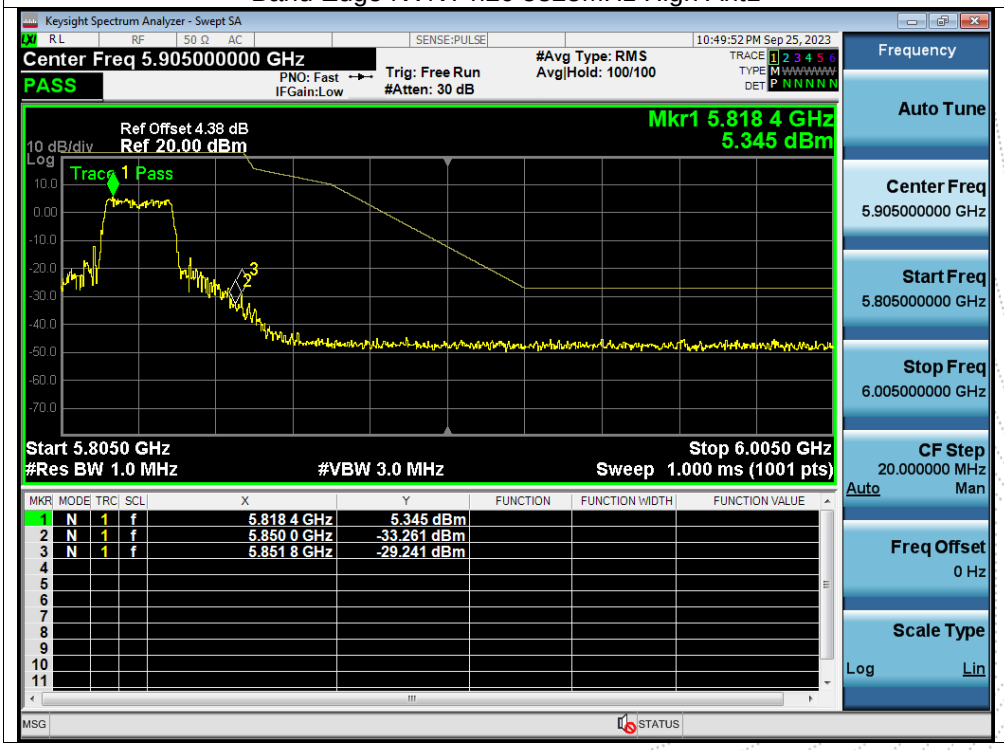
Band Edge NVNT a 5825MHz High Ant1



Band Edge NVNT n20 5745MHz Low Ant1



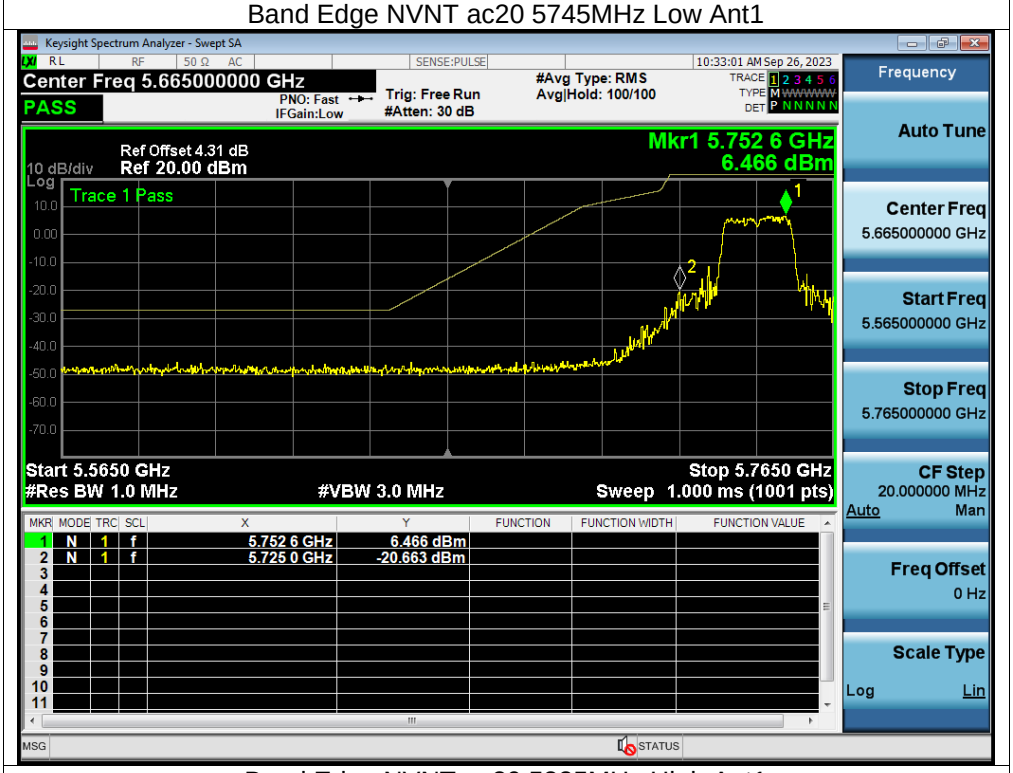
Band Edge NVNT n20 5825MHz High Ant1



Band Edge NVNT n40 5755MHz Low Ant1

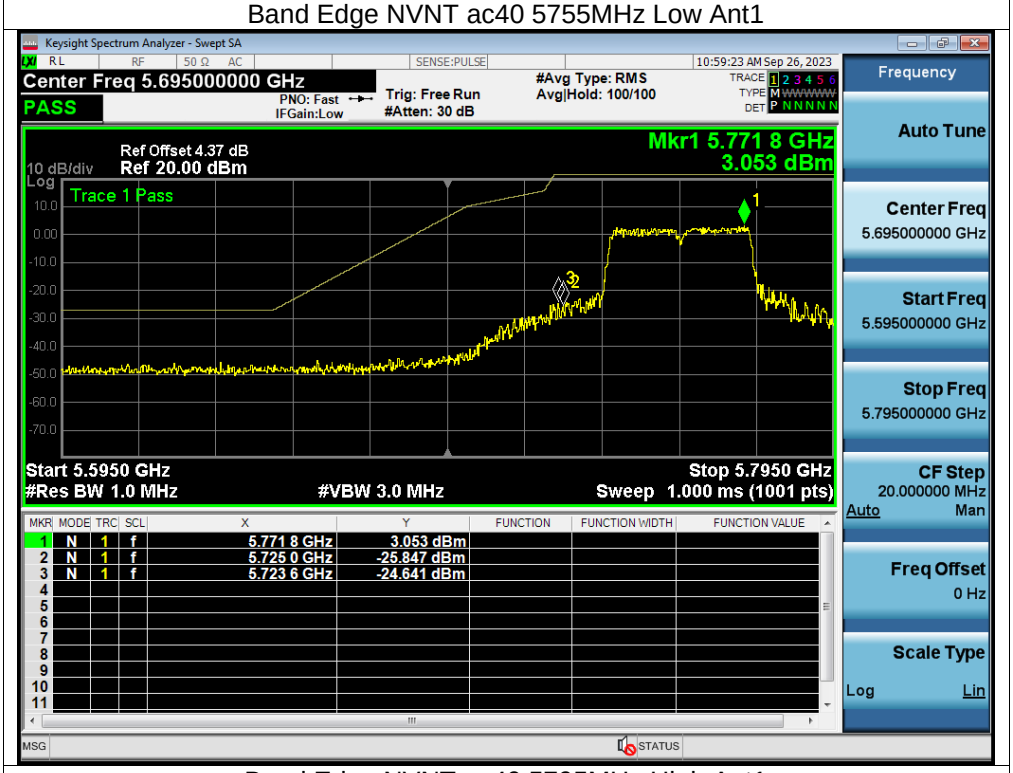
Band Edge NVNT n40 5795MHz High Ant1

Band Edge NVNT ac20 5745MHz Low Ant1

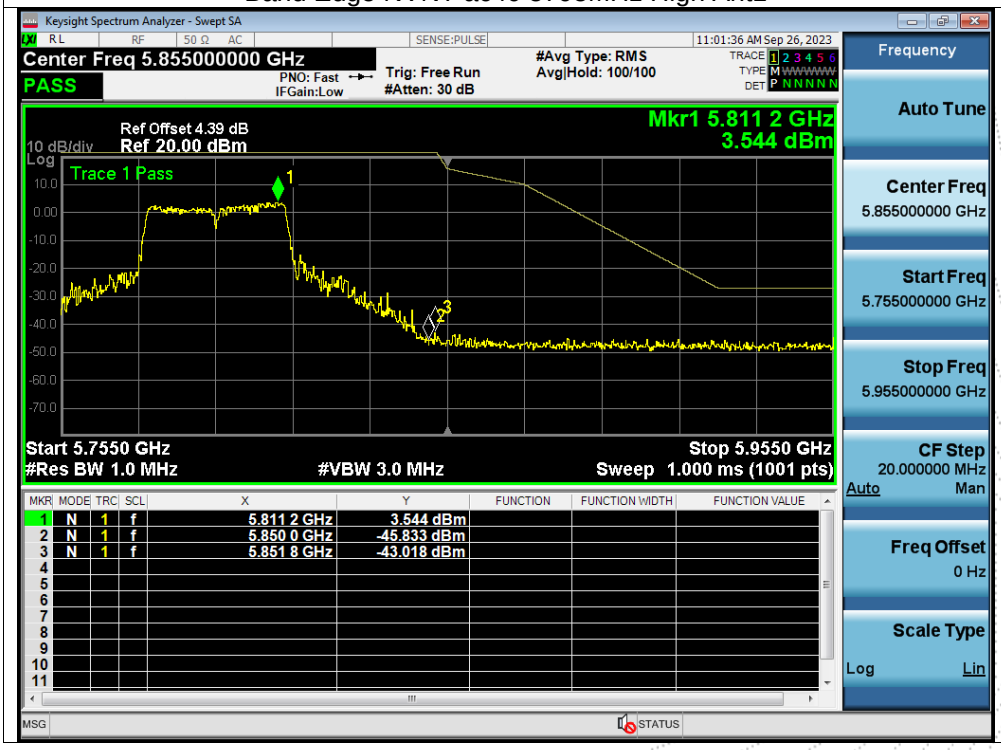


Band Edge NVNT ac20 5825MHz High Ant1

Band Edge NVNT ac40 5755MHz Low Ant1



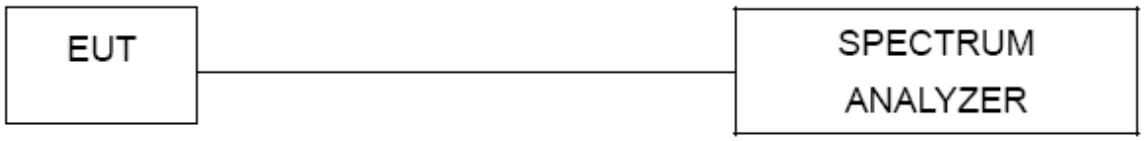
Band Edge NVNT ac40 5795MHz High Ant1



Band Edge NVNT ac80 5775MHz High Ant1

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.

5180-5240MHz

Test Graphs
Tx. Spurious NVNT a 5180MHz Ant1 Emission

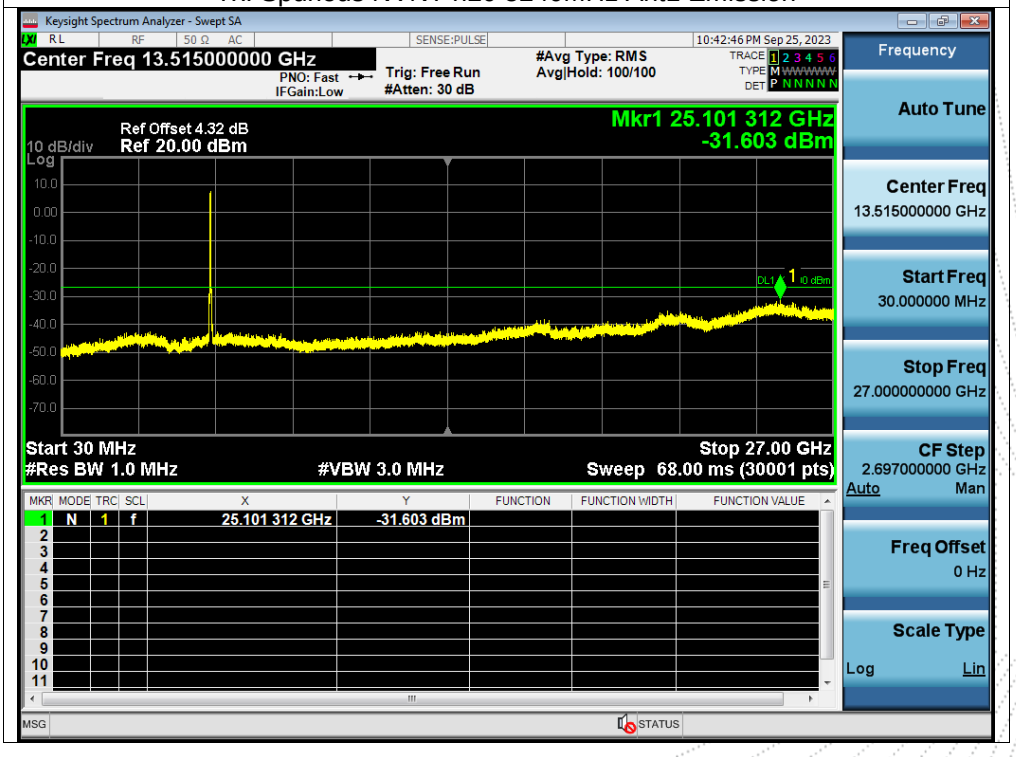
Tx. Spurious NVNT a 5200MHz Ant1 Emission

Tx. Spurious NVNT a 5240MHz Ant1 Emission

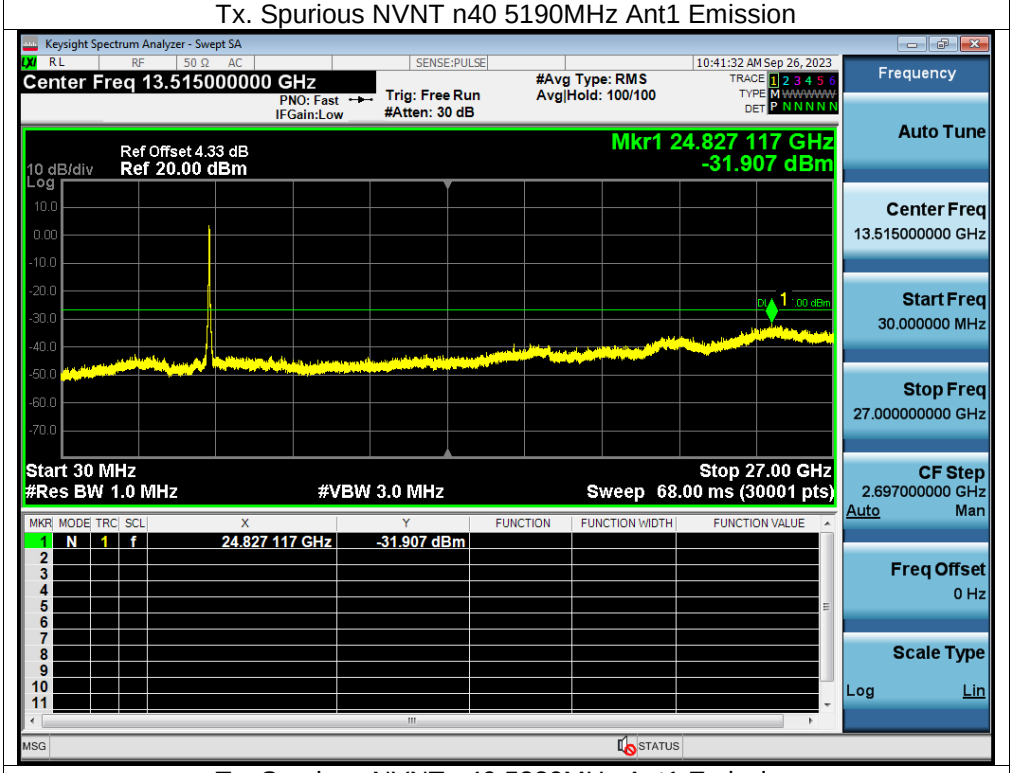
Tx. Spurious NVNT n20 5180MHz Ant1 Emission

Tx. Spurious NVNT n20 5200MHz Ant1 Emission

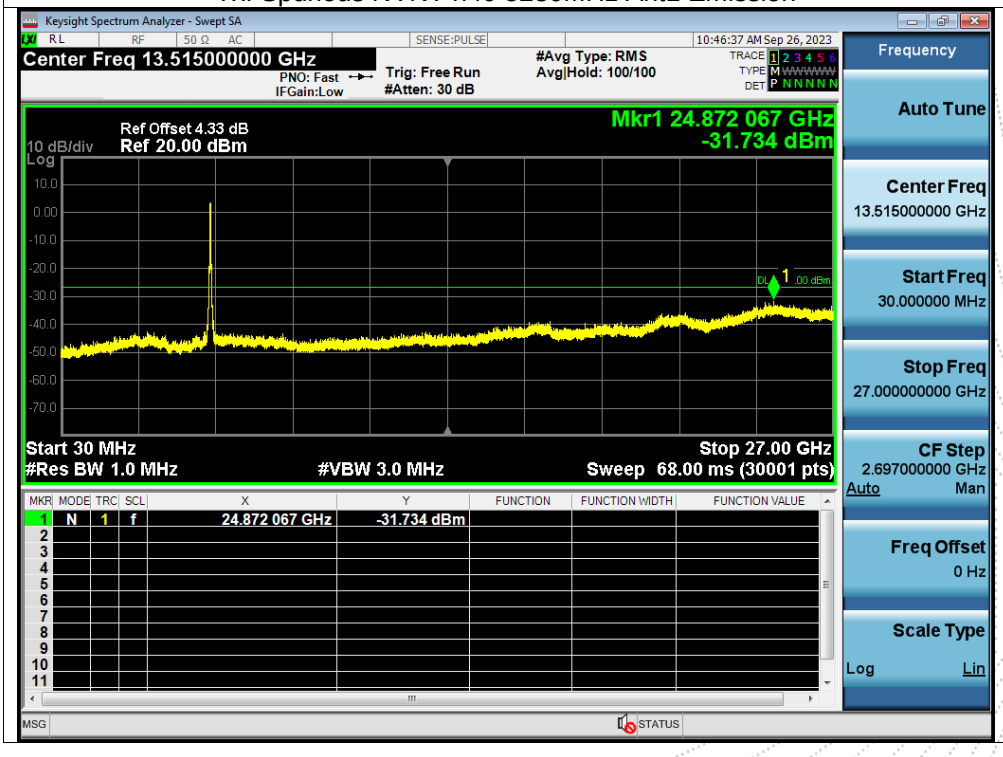
Tx. Spurious NVNT n20 5240MHz Ant1 Emission



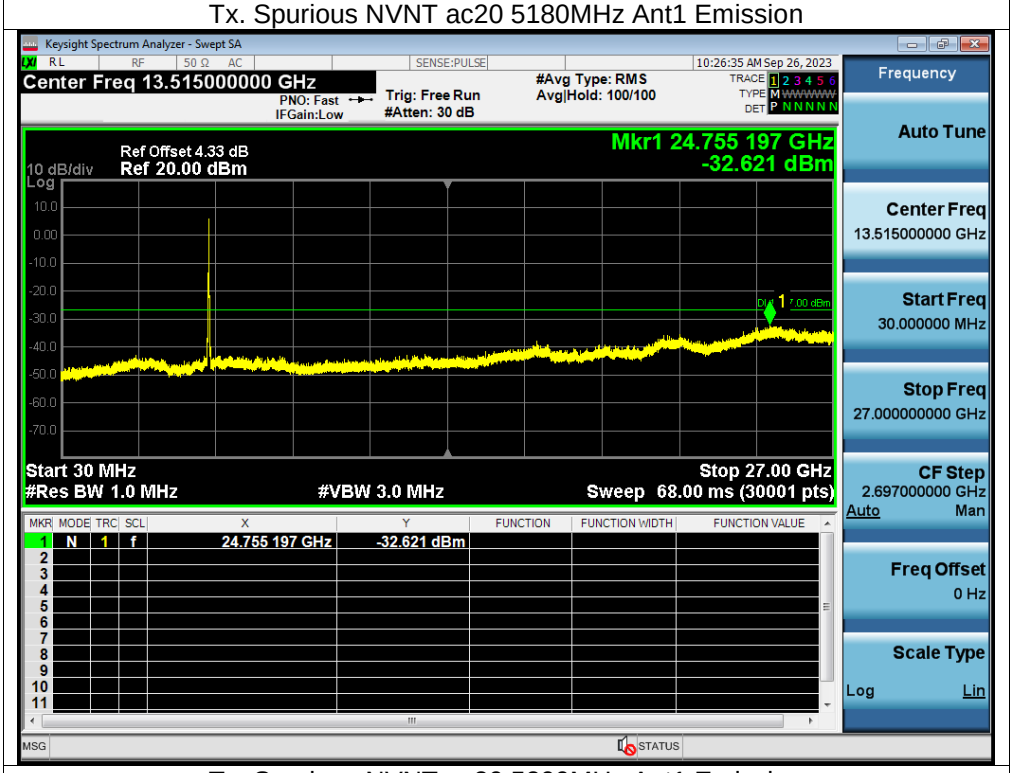
Tx. Spurious NVNT n40 5190MHz Ant1 Emission



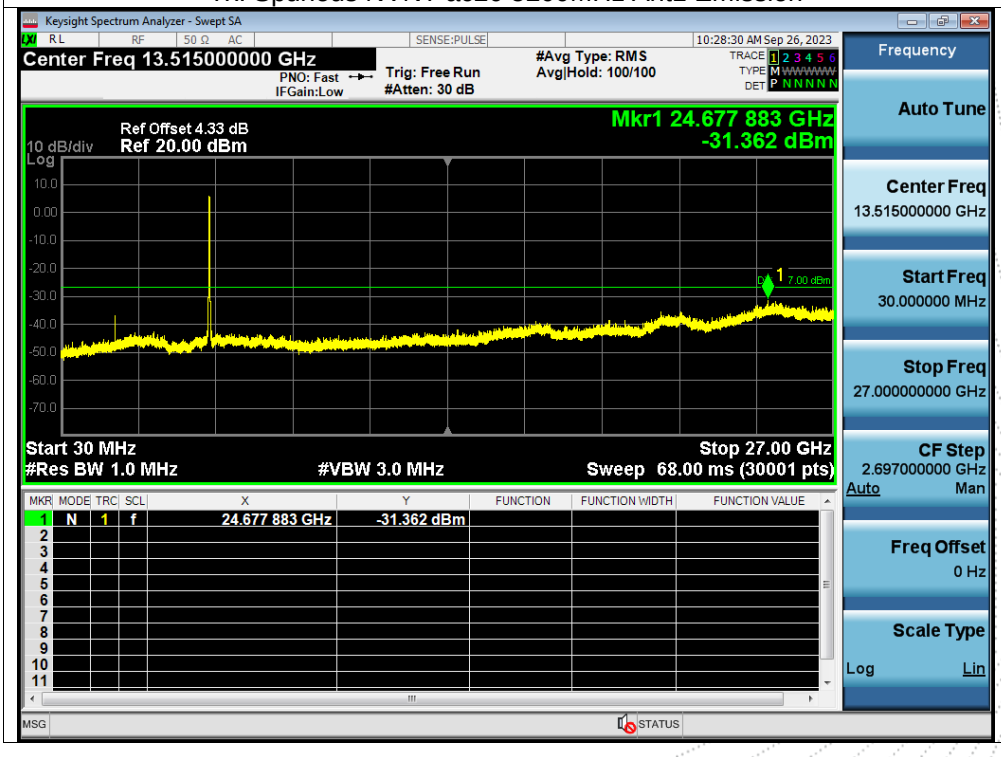
Tx. Spurious NVNT n40 5230MHz Ant1 Emission



Tx. Spurious NVNT ac20 5180MHz Ant1 Emission

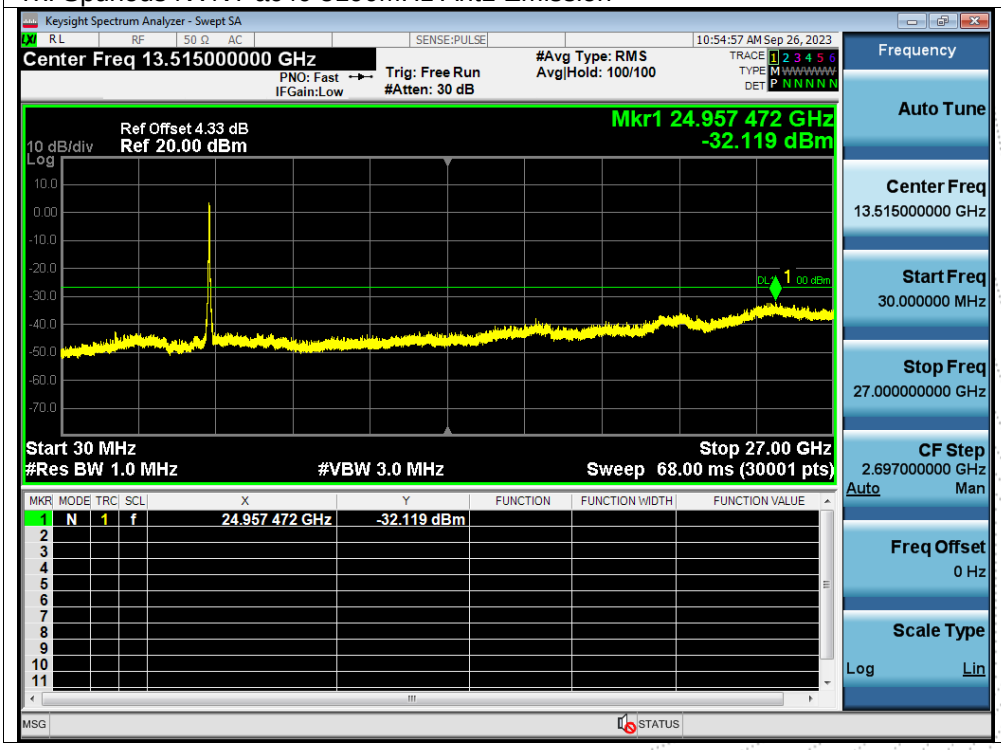


Tx. Spurious NVNT ac20 5200MHz Ant1 Emission

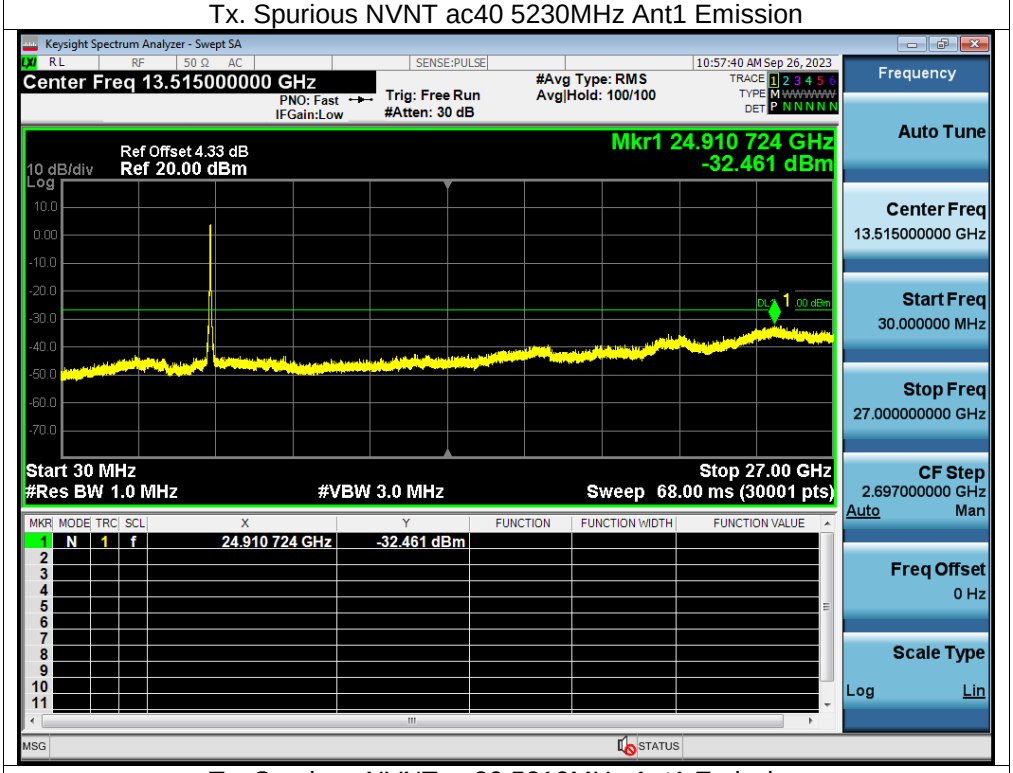


Tx. Spurious NVNT ac20 5240MHz Ant1 Emission

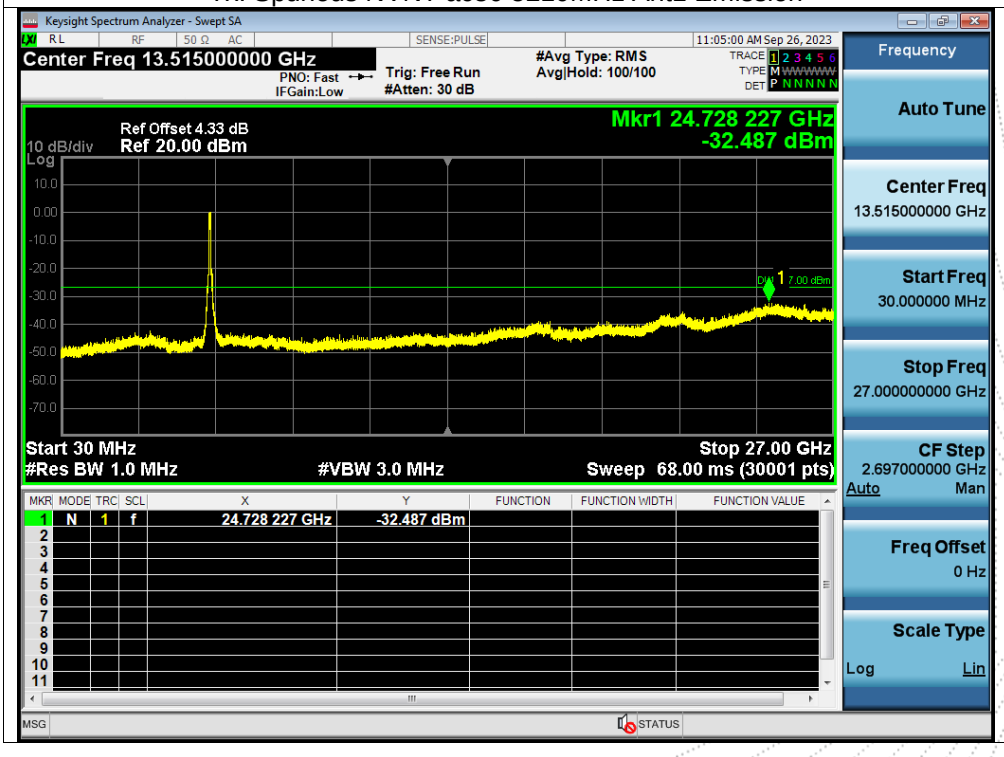
Tx. Spurious NVNT ac40 5190MHz Ant1 Emission



Tx. Spurious NVNT ac40 5230MHz Ant1 Emission

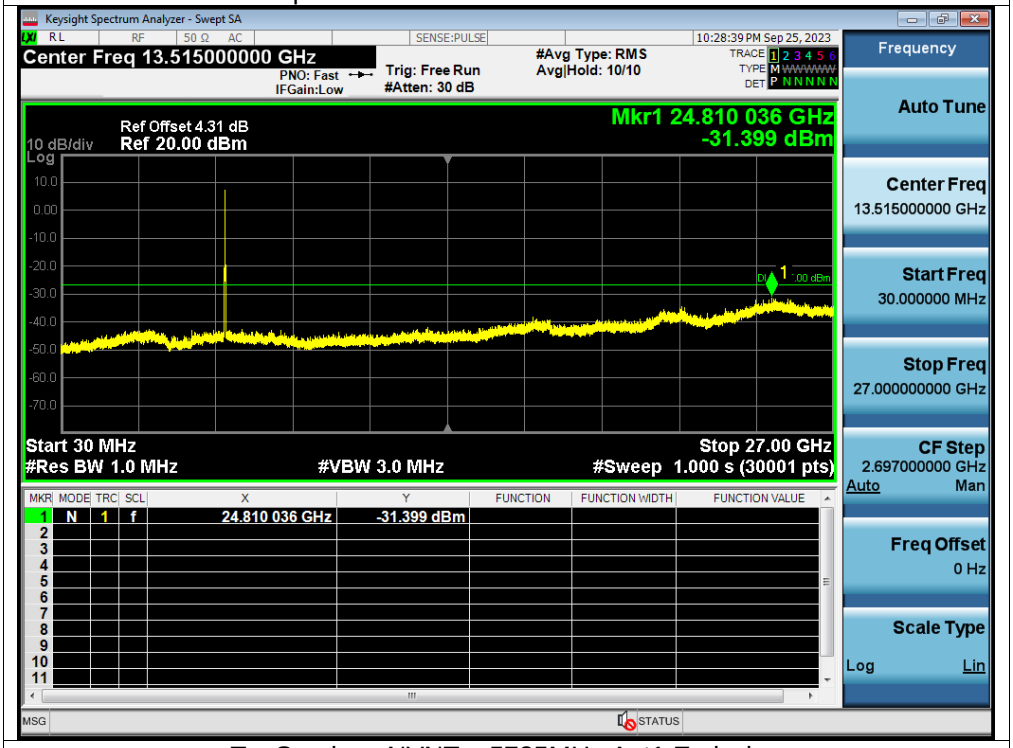


Tx. Spurious NVNT ac80 5210MHz Ant1 Emission



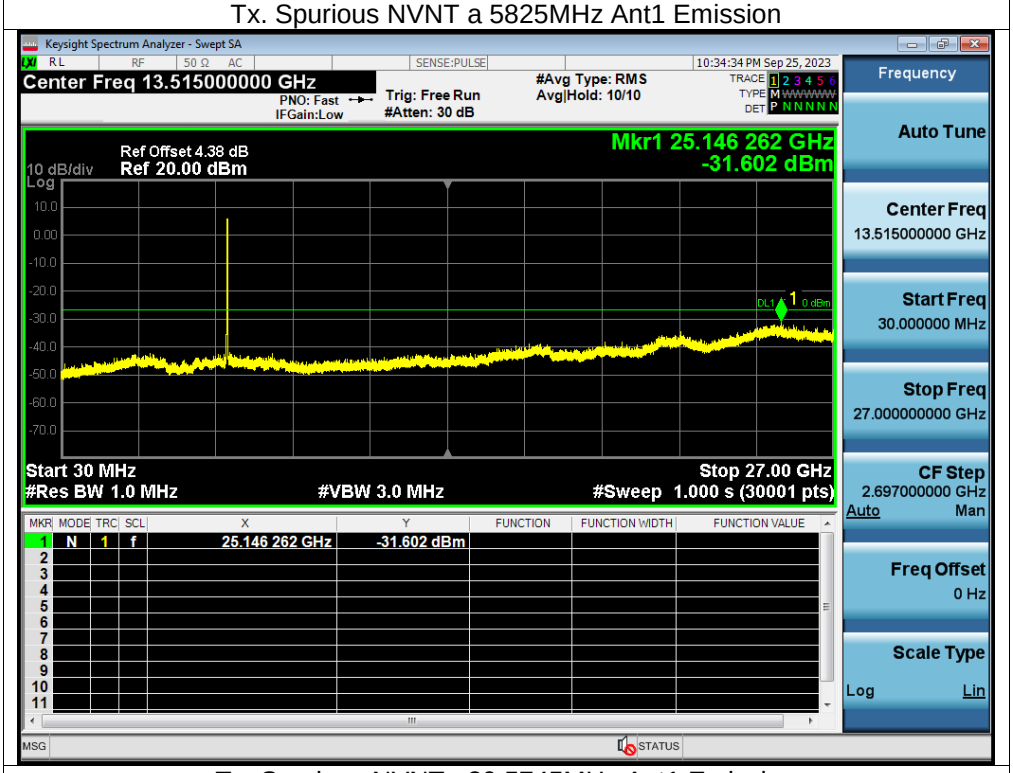
5745-58250MHz

Tx. Spurious NVNT a 5745MHz Ant1 Emission



Tx. Spurious NVNT a 5785MHz Ant1 Emission

Tx. Spurious NVNT a 5825MHz Ant1 Emission



Tx. Spurious NVNT n20 5745MHz Ant1 Emission

Tx. Spurious NVNT n20 5785MHz Ant1 Emission

Tx. Spurious NVNT n20 5825MHz Ant1 Emission

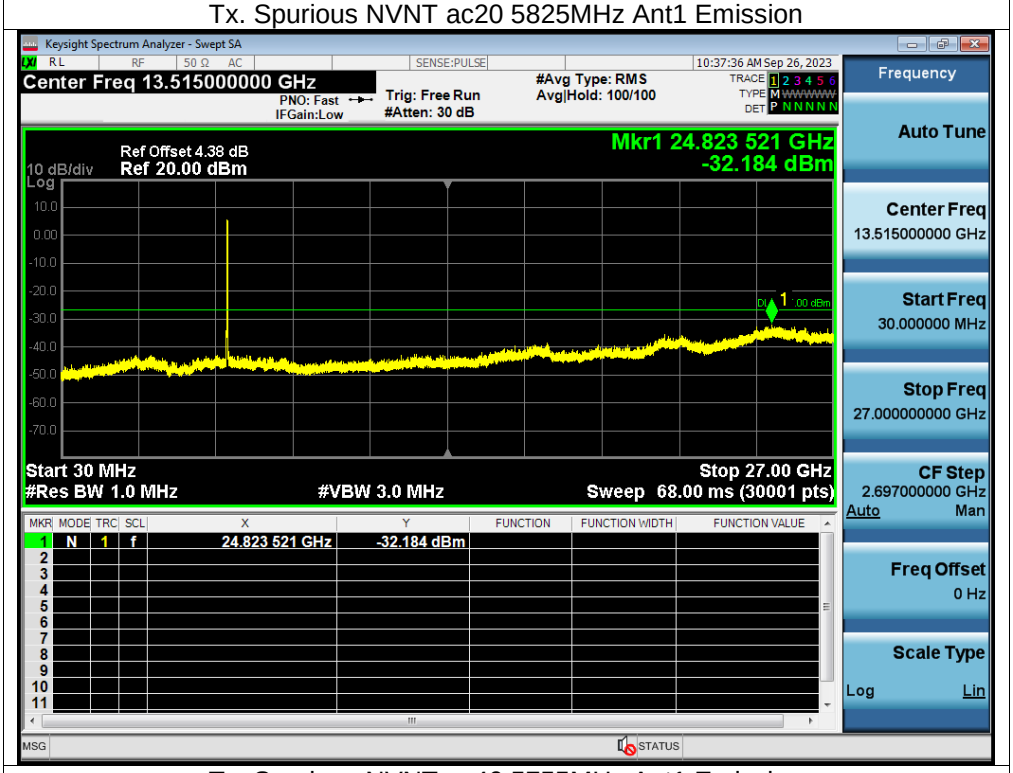
Tx. Spurious NVNT n40 5755MHz Ant1 Emission

Tx. Spurious NVNT n40 5795MHz Ant1 Emission

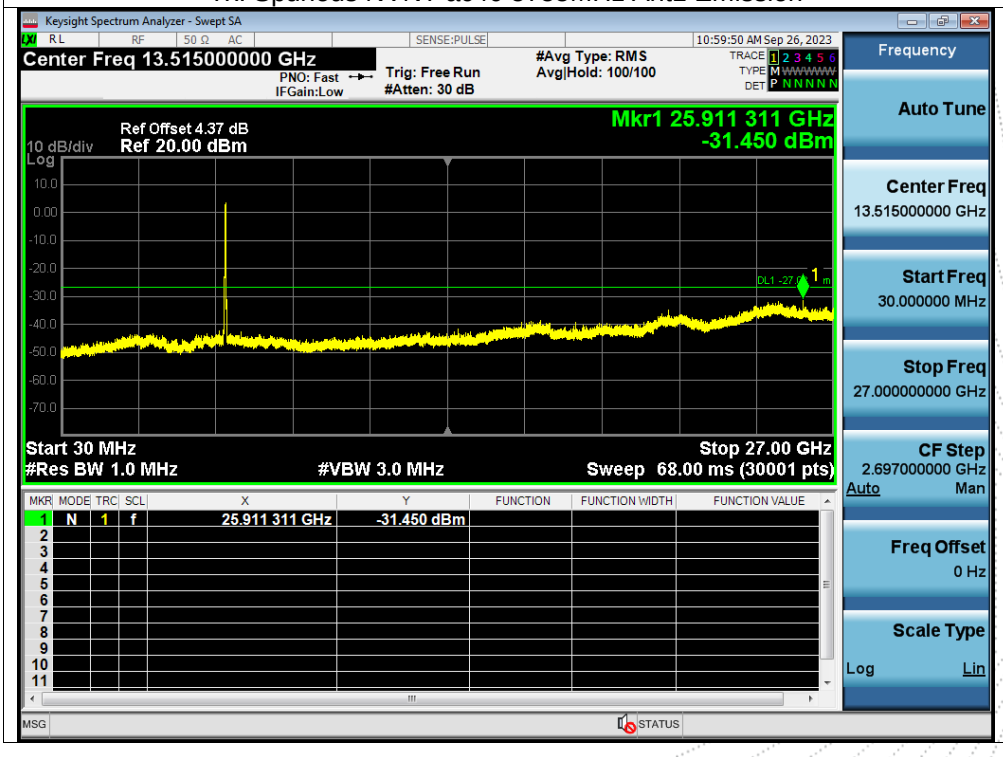
Tx. Spurious NVNT ac20 5745MHz Ant1 Emission

Tx. Spurious NVNT ac20 5785MHz Ant1 Emission

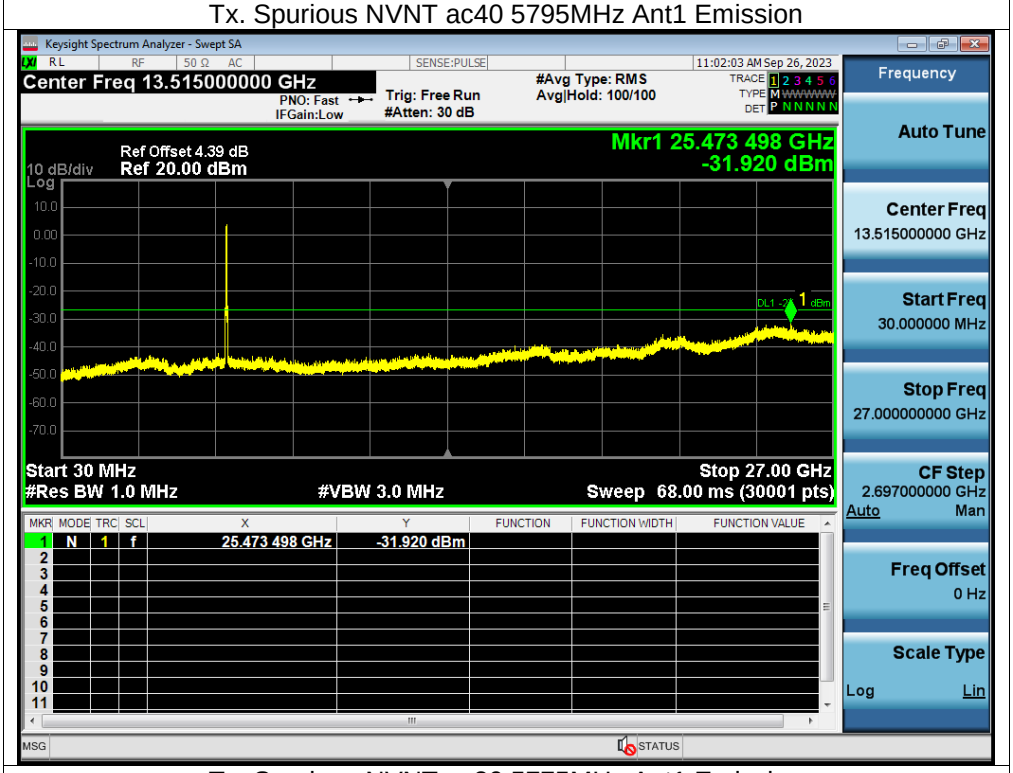
Tx. Spurious NVNT ac20 5825MHz Ant1 Emission



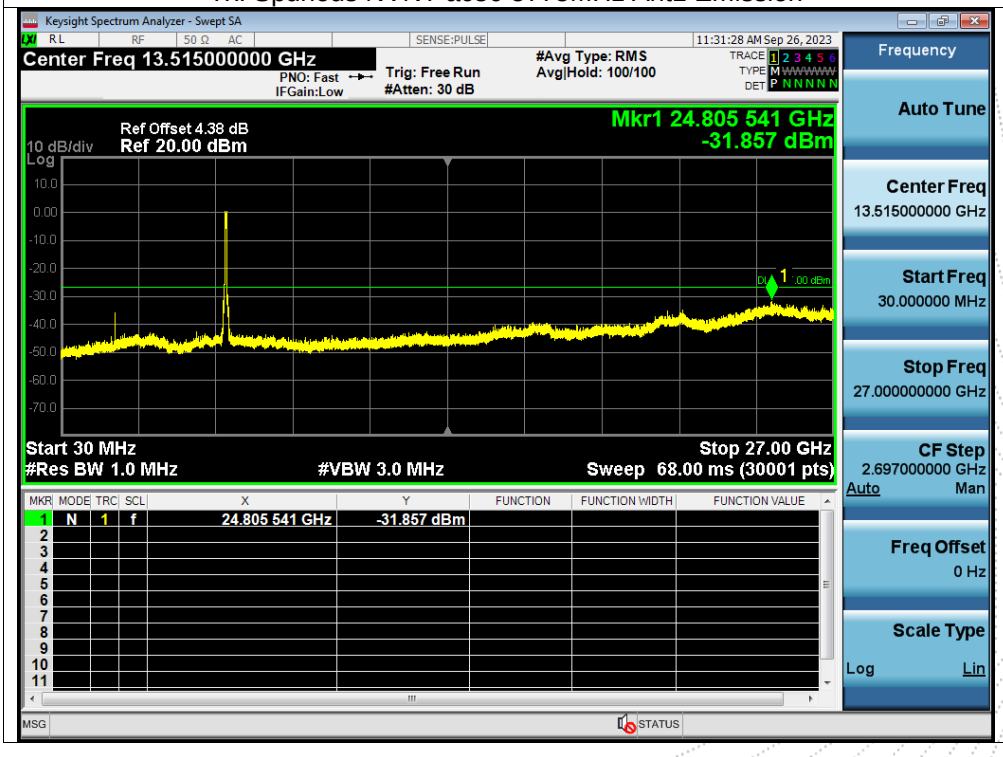
Tx. Spurious NVNT ac40 5755MHz Ant1 Emission



Tx. Spurious NVNT ac40 5795MHz Ant1 Emission

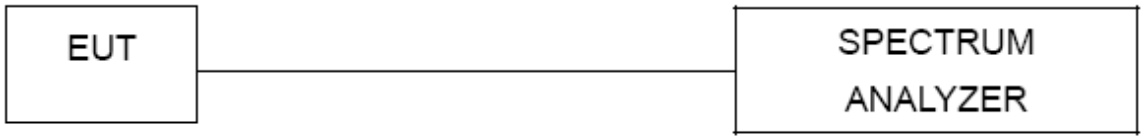


Tx. Spurious NVNT ac80 5775MHz Ant1 Emission



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%
Pressure:	101KPa	Test Voltage:	DC 3.8V
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)	3.8	5179.9871	5180	-0.0129	-2.49
		V max (V)	4.2	5179.9817	5180	-0.0183	-3.53
		V min (V)	3.3	5179.9823	5180	-0.0177	-3.42
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)	3.8	T (°C)	-20	5179.9803	5180	-0.0197	-3.80
		T (°C)	-10	5179.9884	5180	-0.0116	-2.24
		T (°C)	0	5179.9864	5180	-0.0136	-2.63
		T (°C)	10	5179.9875	5180	-0.0125	-2.41
		T (°C)	20	5179.9806	5180	-0.0194	-3.75
		T (°C)	30	5179.9852	5180	-0.0148	-2.86
		T (°C)	40	5179.9848	5180	-0.0152	-2.93
		T (°C)	50	5179.9885	5180	-0.0115	-2.22
		T (°C)	60	5179.9836	5180	-0.0164	-3.17
		T (°C)	70	5179.9837	5180	-0.0163	-3.15
Limits				5150-5250 MHz			
Result				Complies			