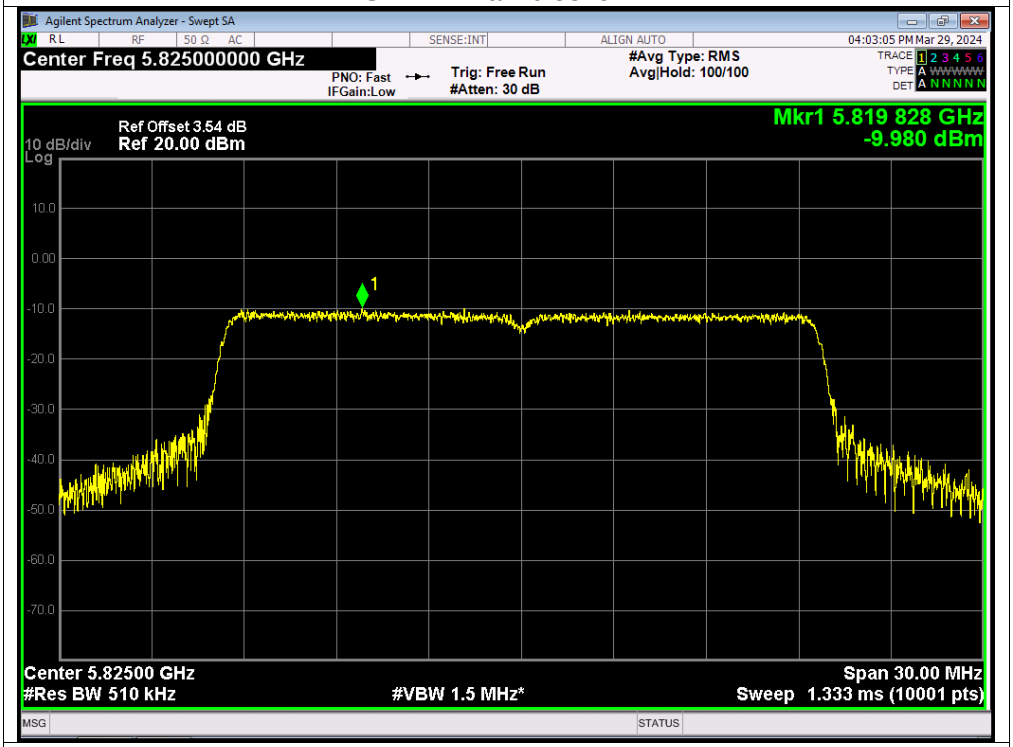
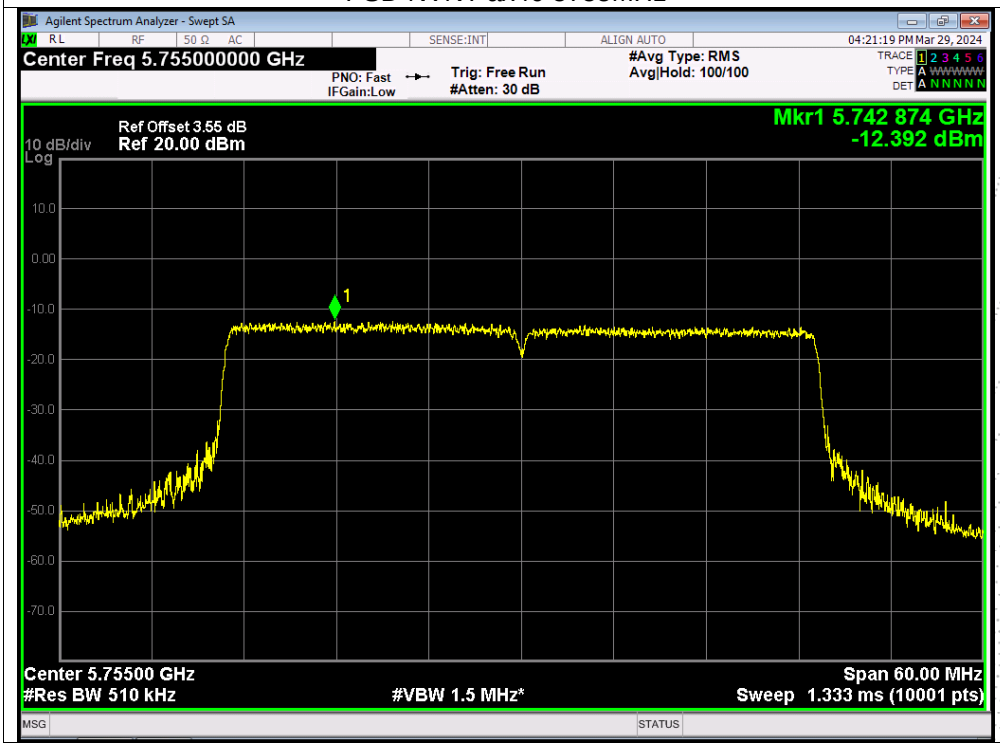
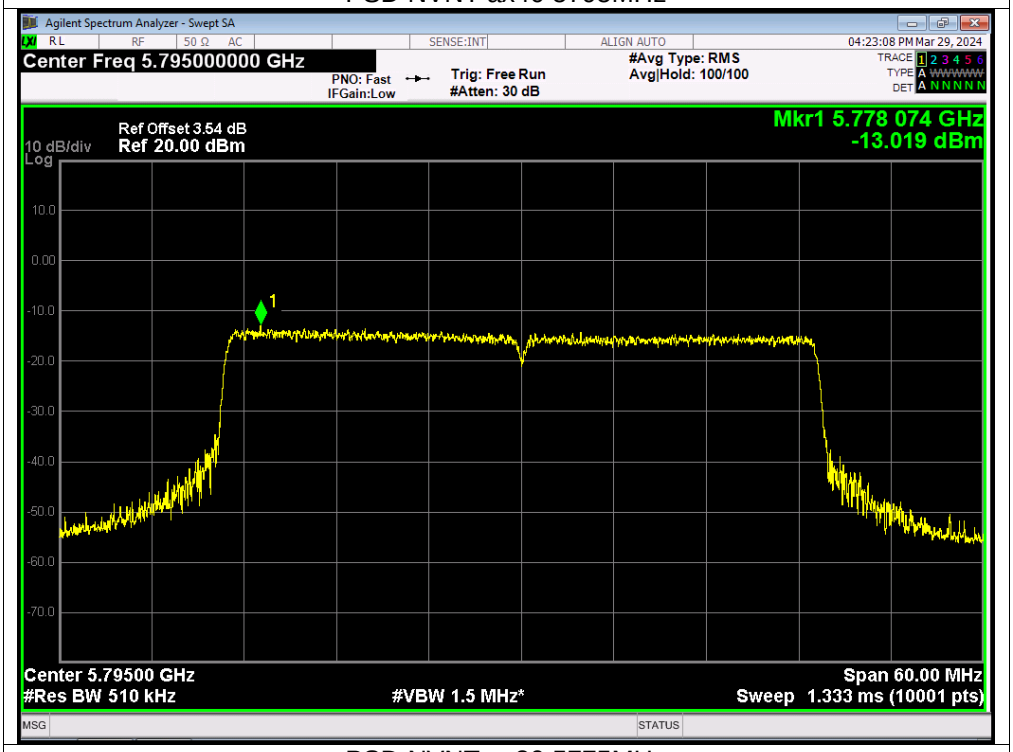
PSD NVNT ax20 5825MHz



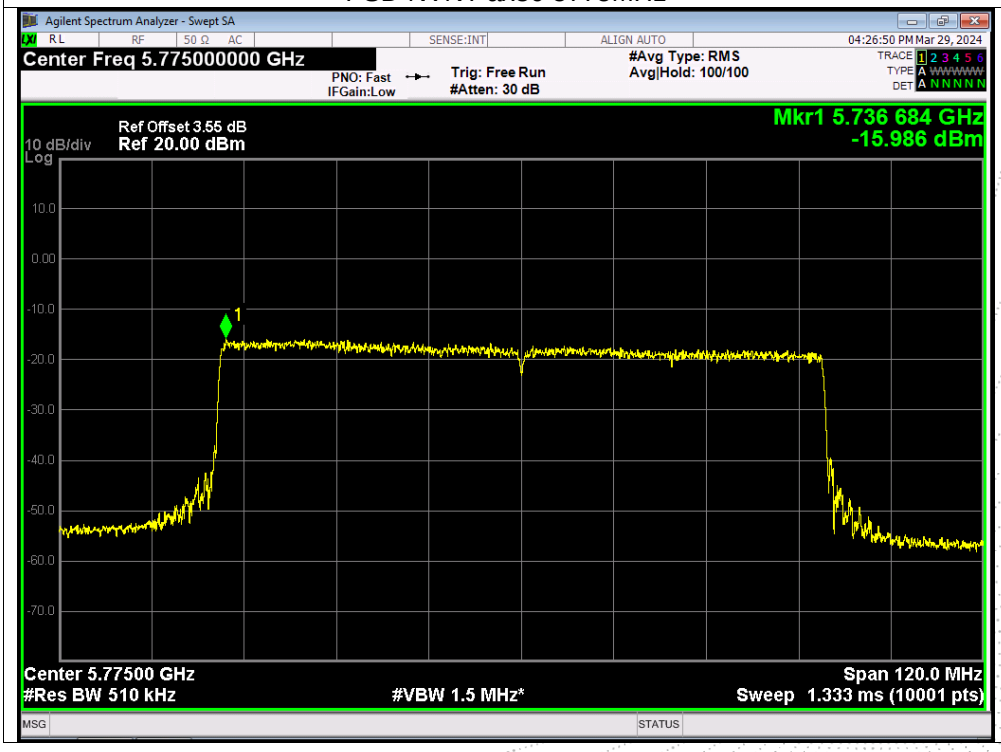
PSD NVNT ax40 5755MHz



PSD NVNT ax40 5795MHz

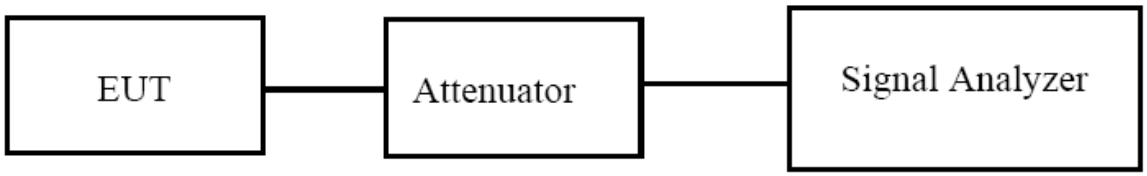


PSD NVNT ax80 5775MHz



9. 26dB & 6dB & 99% Emission Bandwidth

9.1 Block Diagram Of Test Setup



9.2 Limit

The maximum power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test. If the device cannot be connected directly, alternative techniques acceptable to the Commission may be used. Measurements in the 5.725-5.85 GHz band are made over a reference bandwidth of 500 kHz or the 26 dB emission bandwidth of the device, whichever is less. Measurements in the 5.15-5.25 GHz, 5.25-5.35 GHz, and the 5.47-5.725 GHz bands are made over a bandwidth of 1 MHz or the 26 dB emission bandwidth of the device, whichever is less. A narrower resolution bandwidth can be used, provided that the measured power
is integrated over the full reference bandwidth.

9.3 Test procedure

a) Set RBW = approximately 1% of the emission bandwidth.
b) Set the VBW > RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.
The following procedure shall be used for measuring (99 %) power bandwidth:
1. Set center frequency to the nominal EUT channel center frequency.
2. Set span = 1.5 times to 5.0 times the OBW.
3. Set RBW = 1 % to 5 % of the OBW
4. Set VBW ≥ 3 · RBW
5. Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
6. Use the 99 % power bandwidth function of the instrument (if available).
7. If the instrument does not have a 99 % power bandwidth function, the trace data points are recovered and directly summed in power units. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5 % of the total is reached; that frequency is recorded as the upper frequency. The 99% occupied bandwidth is the difference between these two frequencies.

9.4 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.

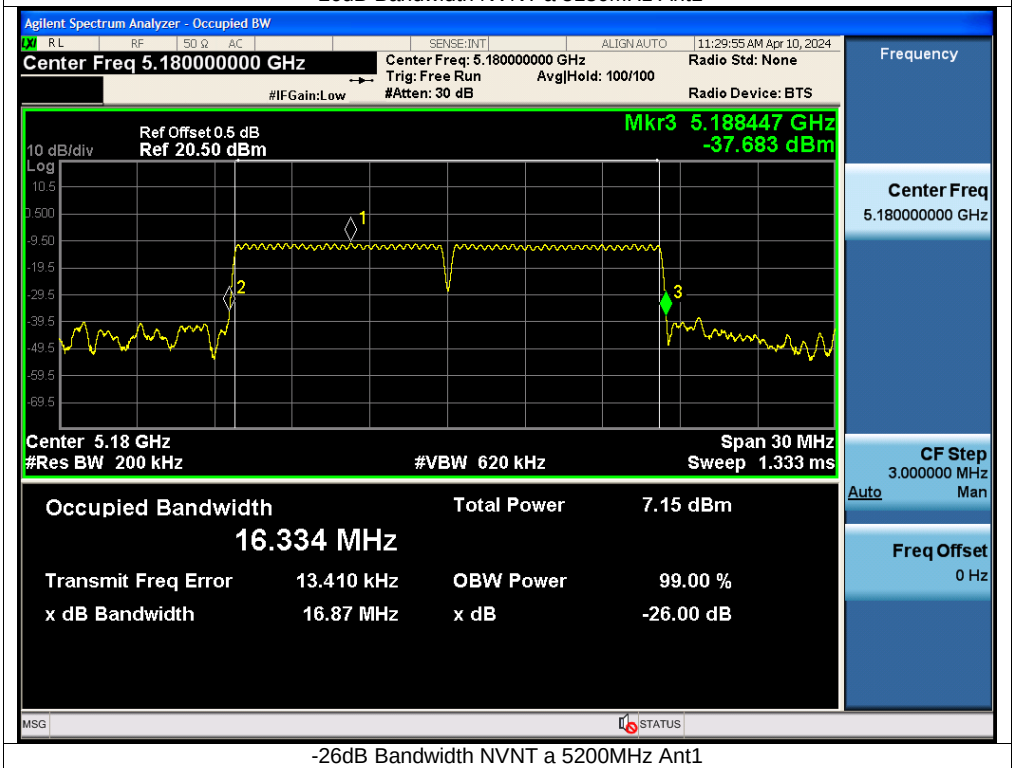
9.5 Test Result

Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101KPa	Test Voltage:	AC120V/60Hz
Test Mode:	(5180-5240MHz)		

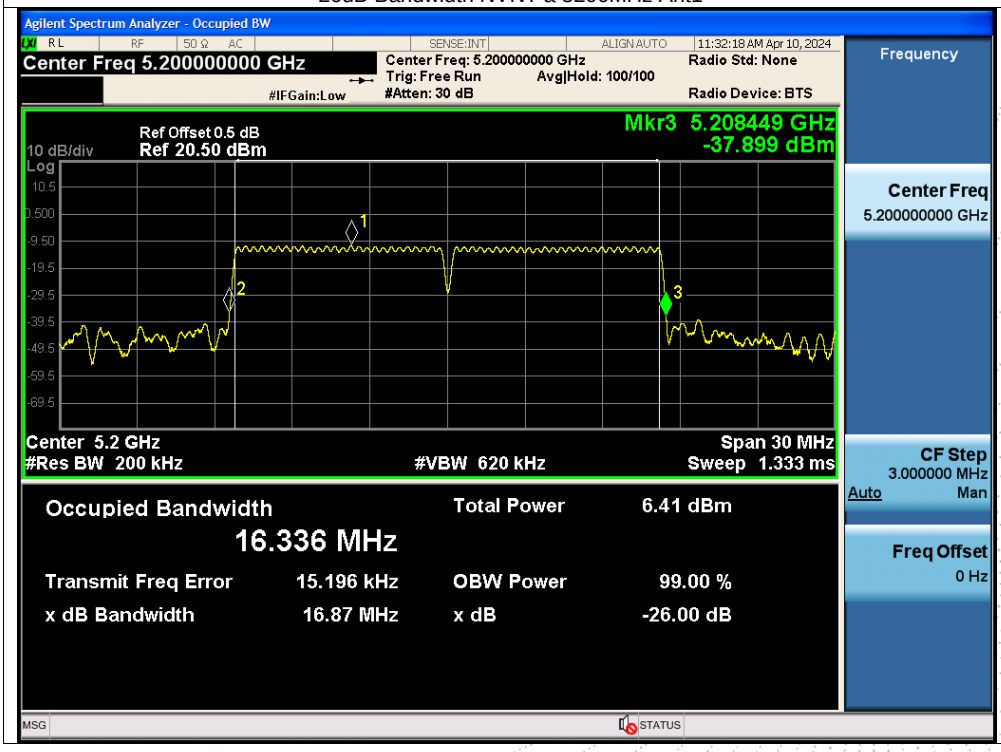
Condition	Mode	Frequency (MHz)	-26 dB Bandwidth (MHz)	99% OBW (MHz)
NVNT	a	5180	16.867	16.335
NVNT	a	5200	16.868	16.337
NVNT	a	5240	18.144	16.339
NVNT	n20	5180	18.153	17.589
NVNT	n20	5200	18.134	17.571
NVNT	n20	5240	18.151	17.579
NVNT	n40	5190	37.42	36.132
NVNT	n40	5230	37.421	36.119
NVNT	ac20	5180	18.132	17.577
NVNT	ac20	5200	18.138	17.571
NVNT	ac20	5240	18.153	17.574
NVNT	ac40	5190	37.388	36.114
NVNT	ac40	5230	37.429	36.122
NVNT	ac80	5210	94.086	75.755
NVNT	ax20	5180	19.569	18.948
NVNT	ax20	5200	19.573	18.948
NVNT	ax20	5240	19.594	18.949
NVNT	ax40	5190	39.094	37.753
NVNT	ax40	5230	39.119	37.754
NVNT	ax80	5210	86.161	77.325

Test Graphs

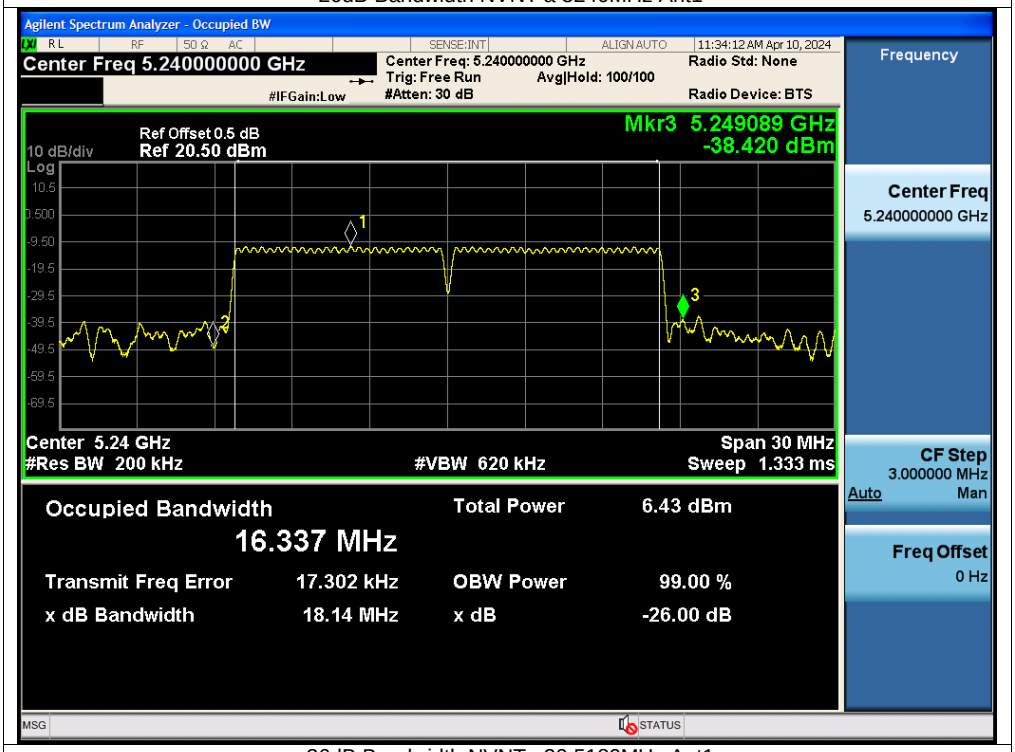
-26dB Bandwidth NVNT a 5180MHz Ant1



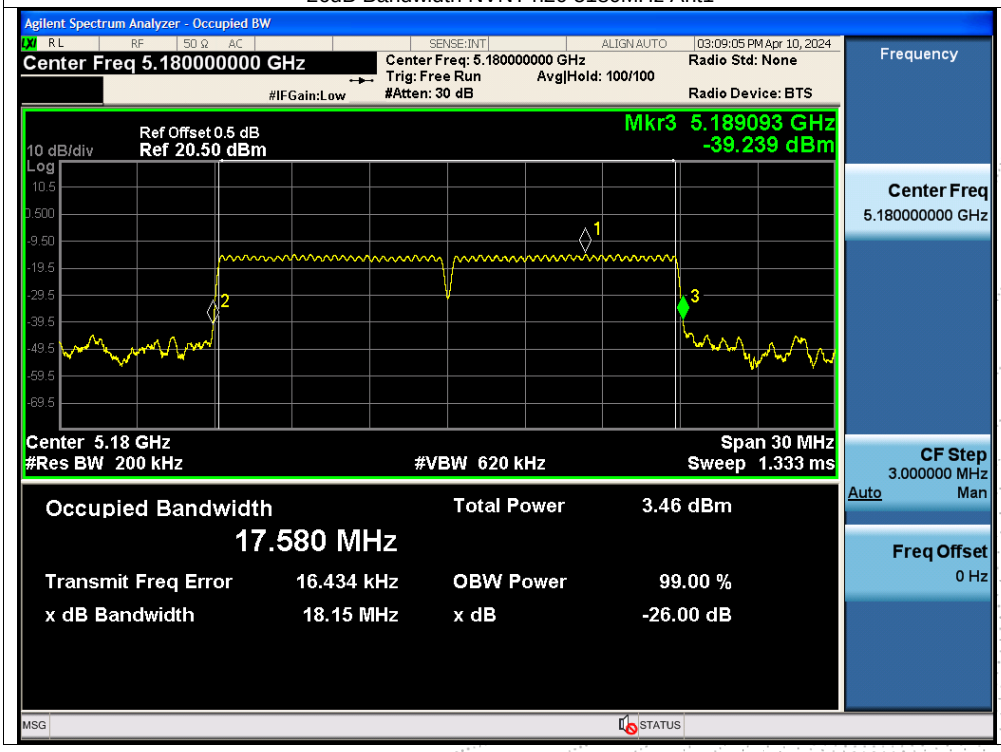
-26dB Bandwidth NVNT a 5200MHz Ant1



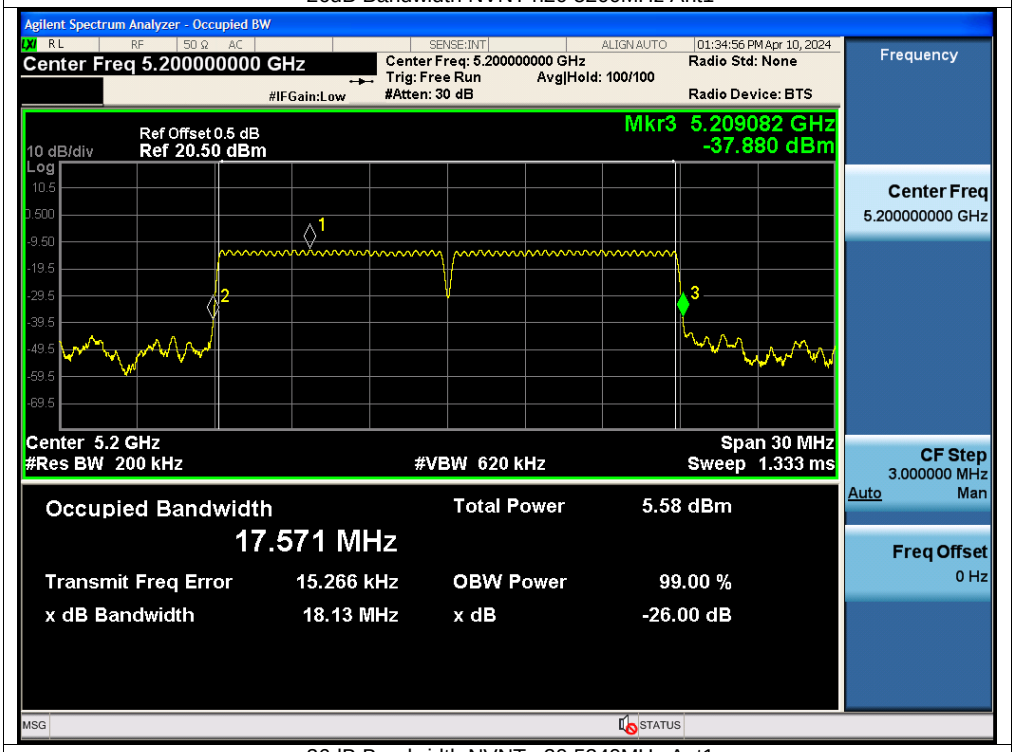
-26dB Bandwidth NVNT a 5240MHz Ant1



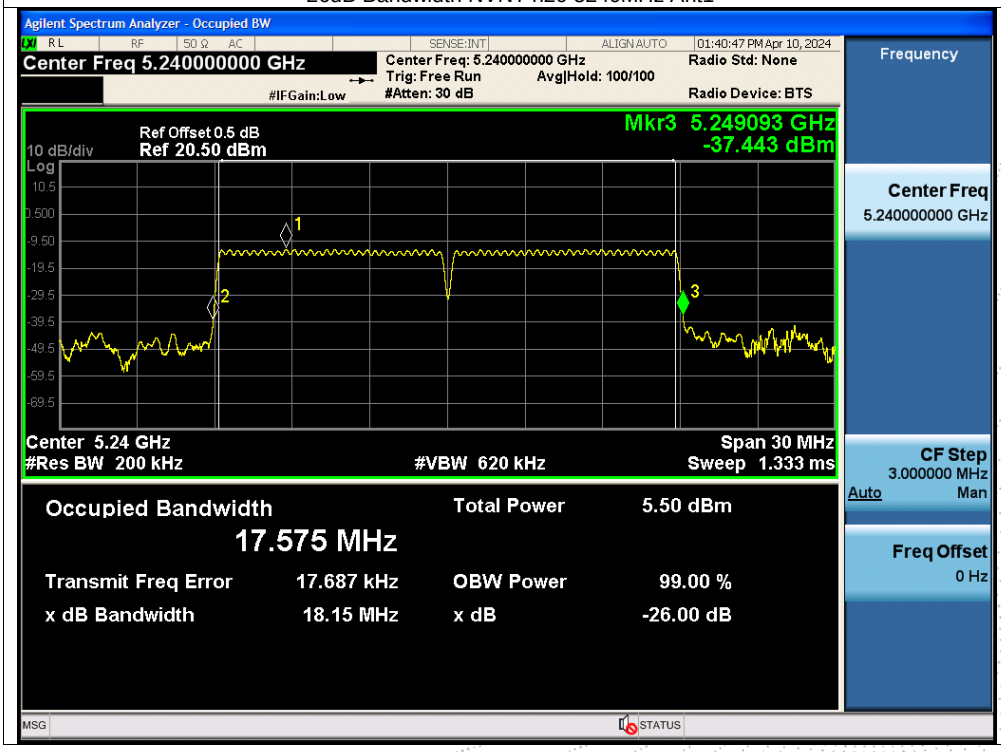
-26dB Bandwidth NVNT n20 5180MHz Ant1



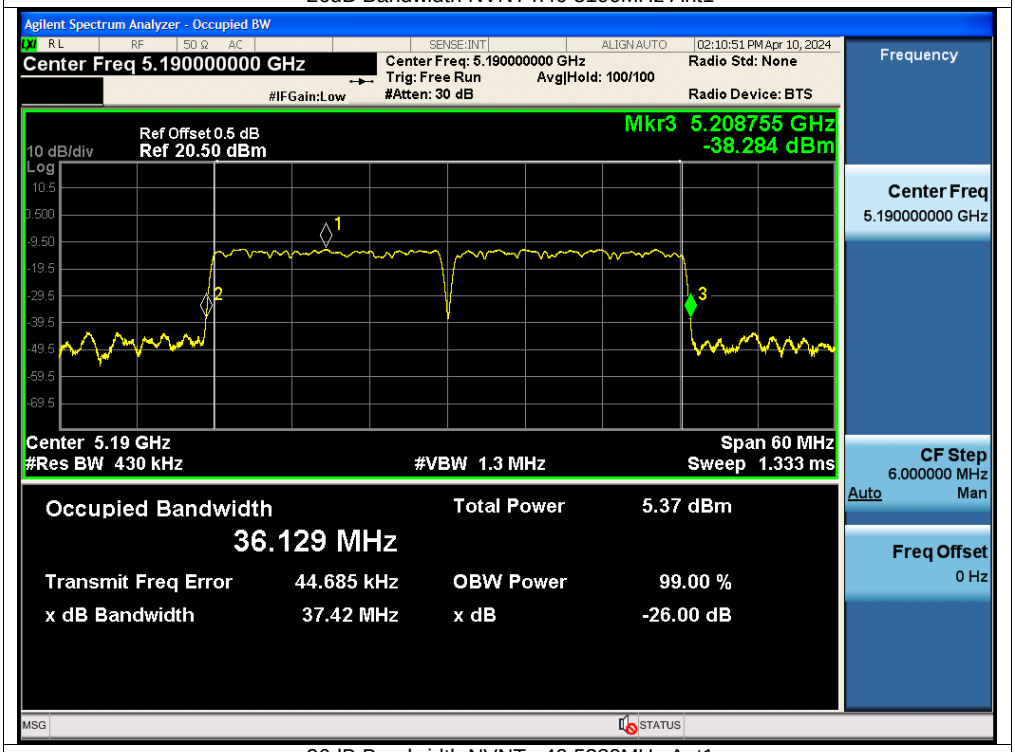
-26dB Bandwidth NVNT n20 5200MHz Ant1



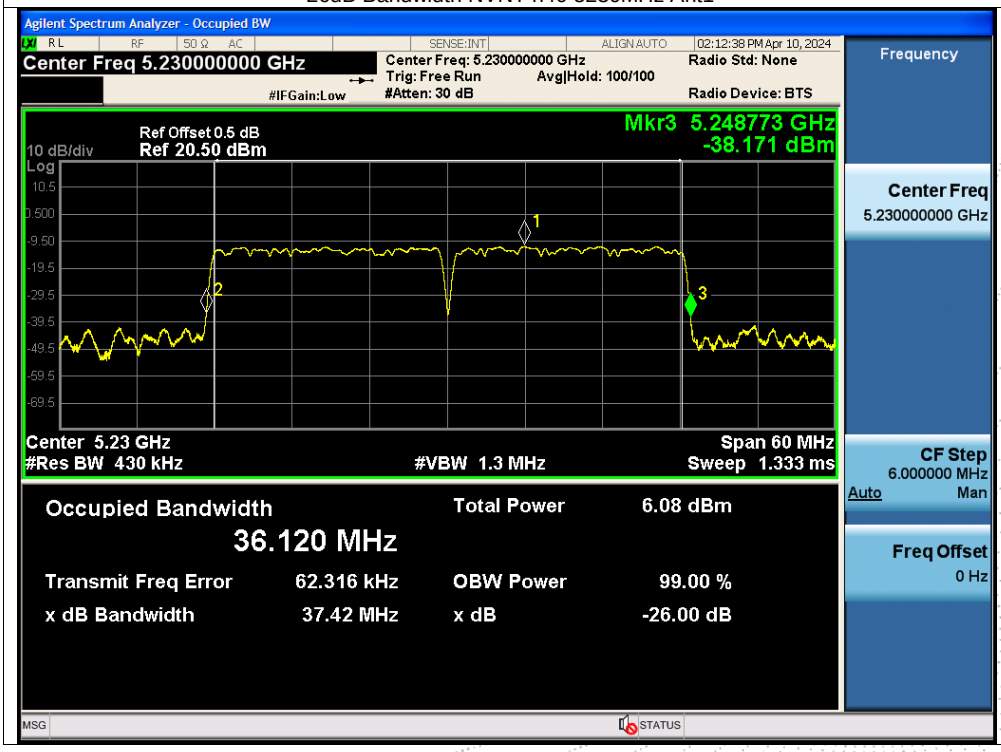
-26dB Bandwidth NVNT n20 5240MHz Ant1



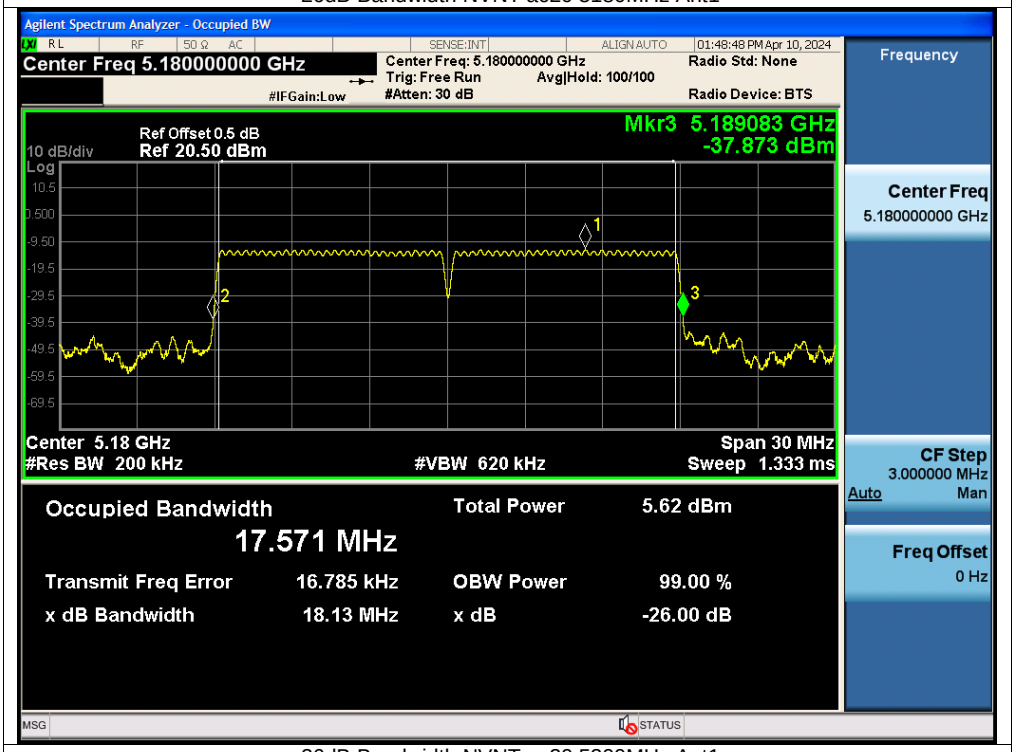
-26dB Bandwidth NVNT n40 5190MHz Ant1



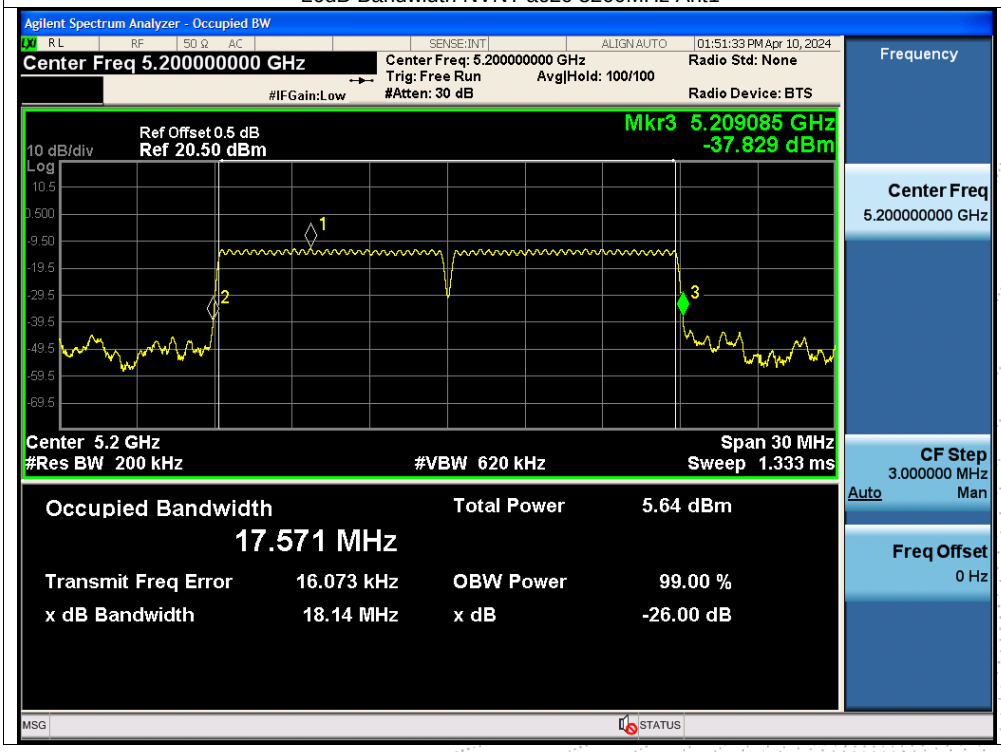
-26dB Bandwidth NVNT n40 5230MHz Ant1



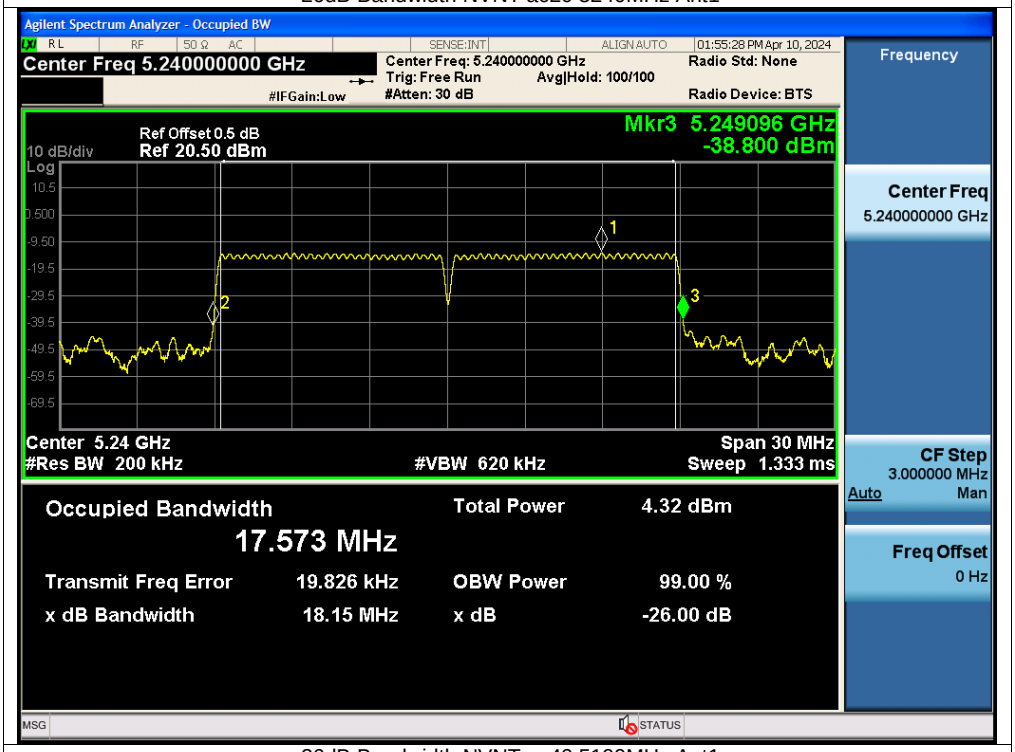
-26dB Bandwidth NVNT ac20 5180MHz Ant1



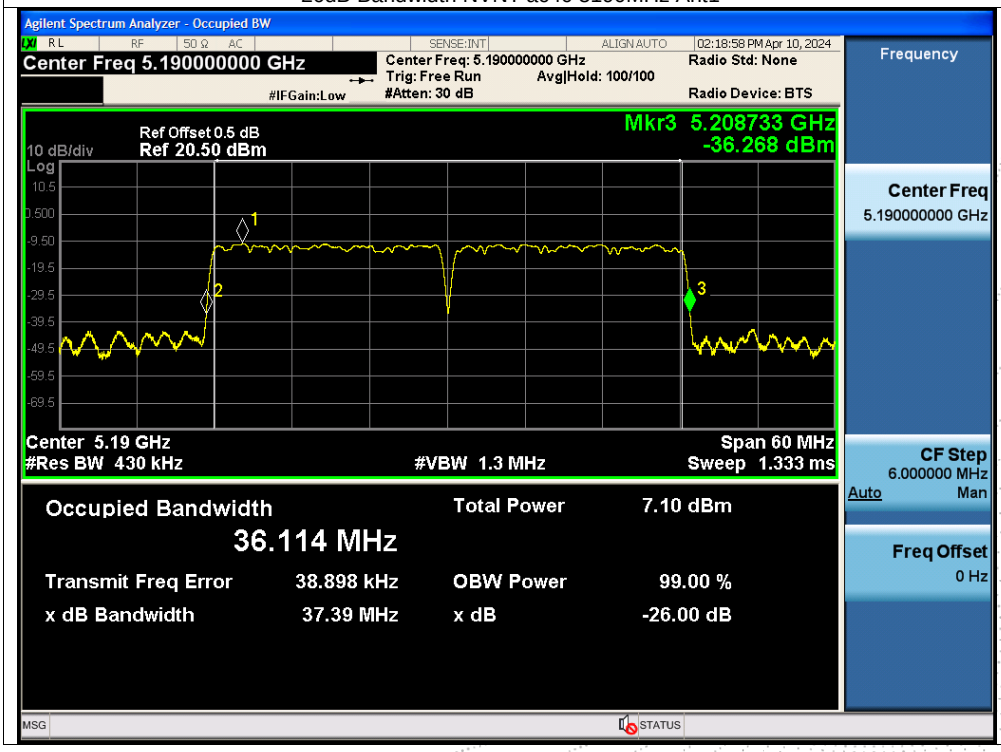
-26dB Bandwidth NVNT ac20 5200MHz Ant1



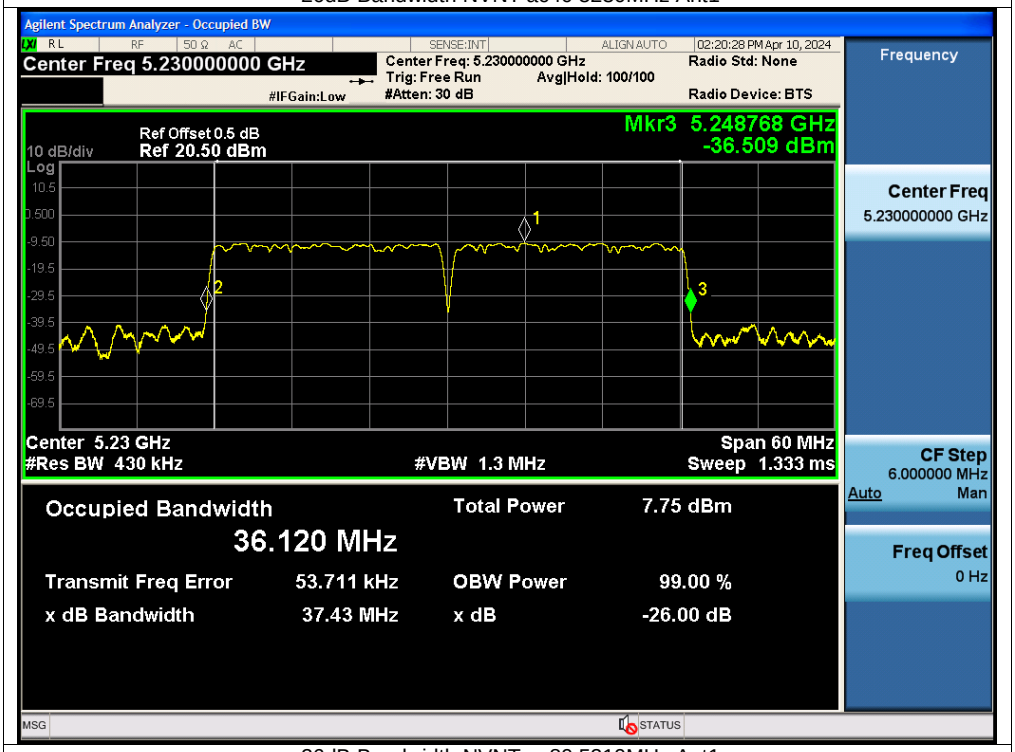
-26dB Bandwidth NVNT ac20 5240MHz Ant1



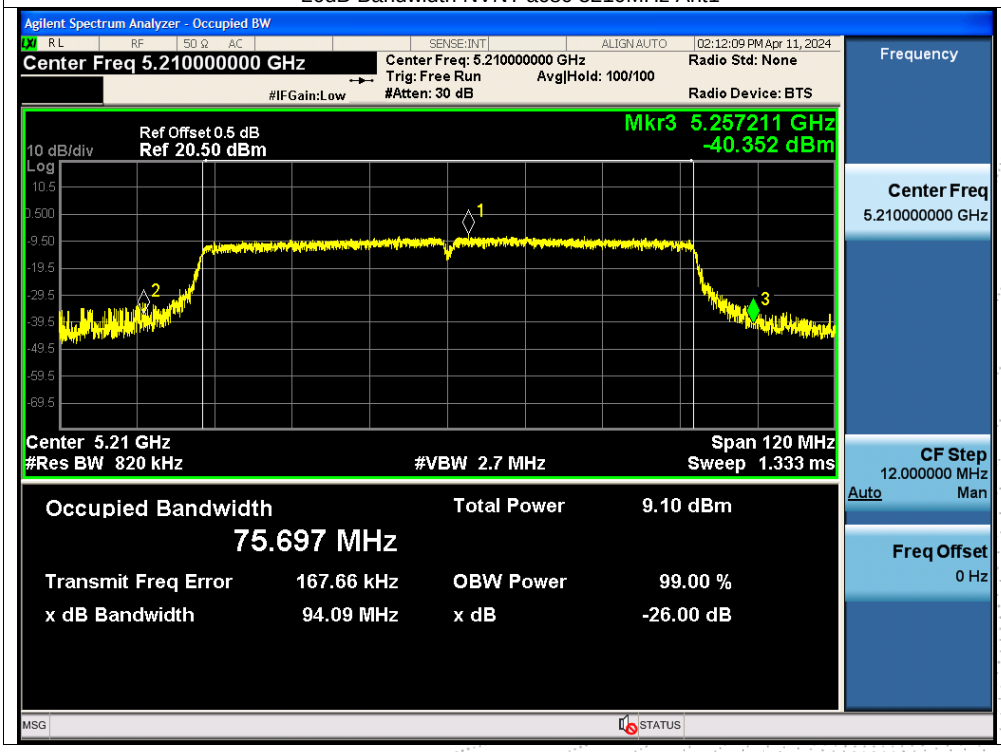
-26dB Bandwidth NVNT ac40 5190MHz Ant1



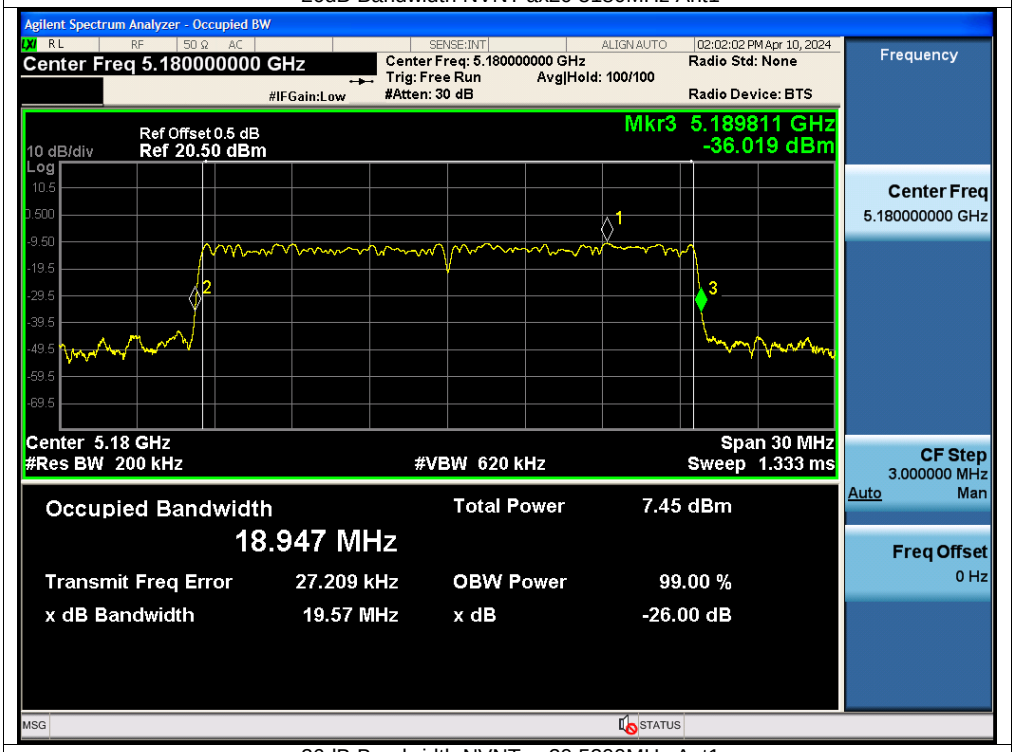
-26dB Bandwidth NVNT ac40 5230MHz Ant1



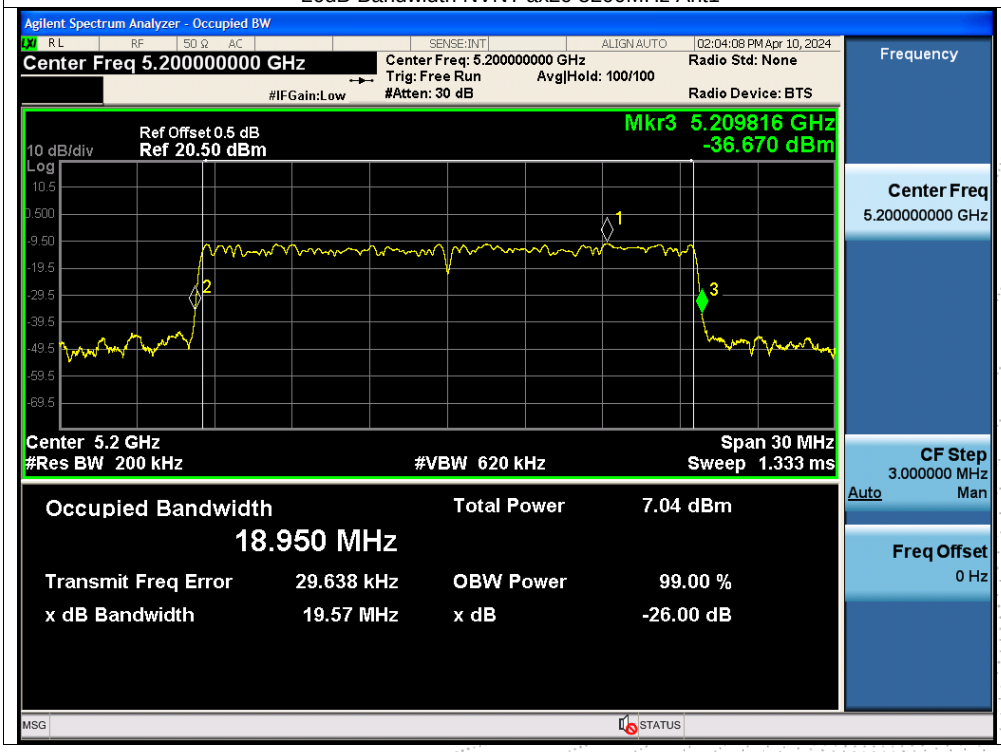
-26dB Bandwidth NVNT ac80 5210MHz Ant1



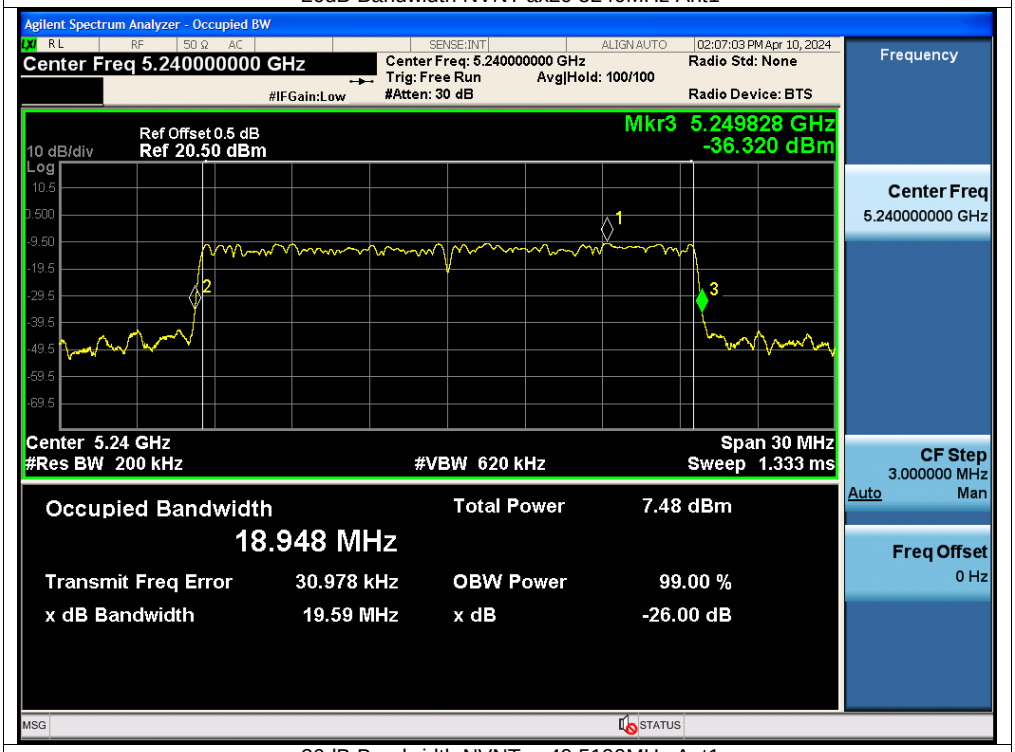
-26dB Bandwidth NVNT ax20 5180MHz Ant1



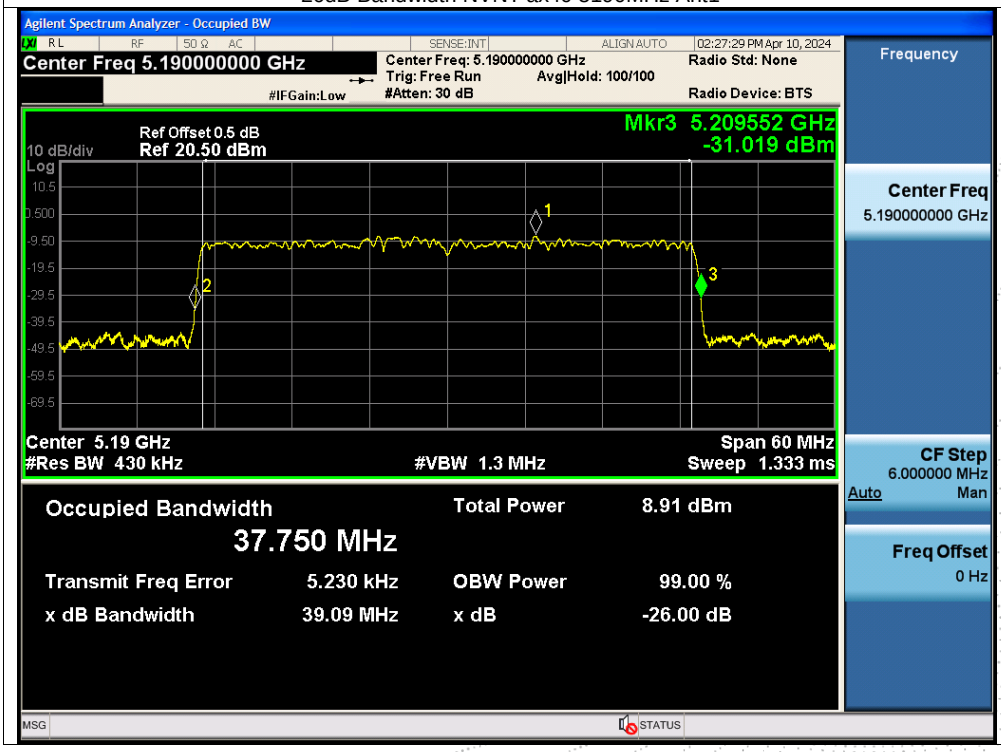
-26dB Bandwidth NVNT ax20 5200MHz Ant1



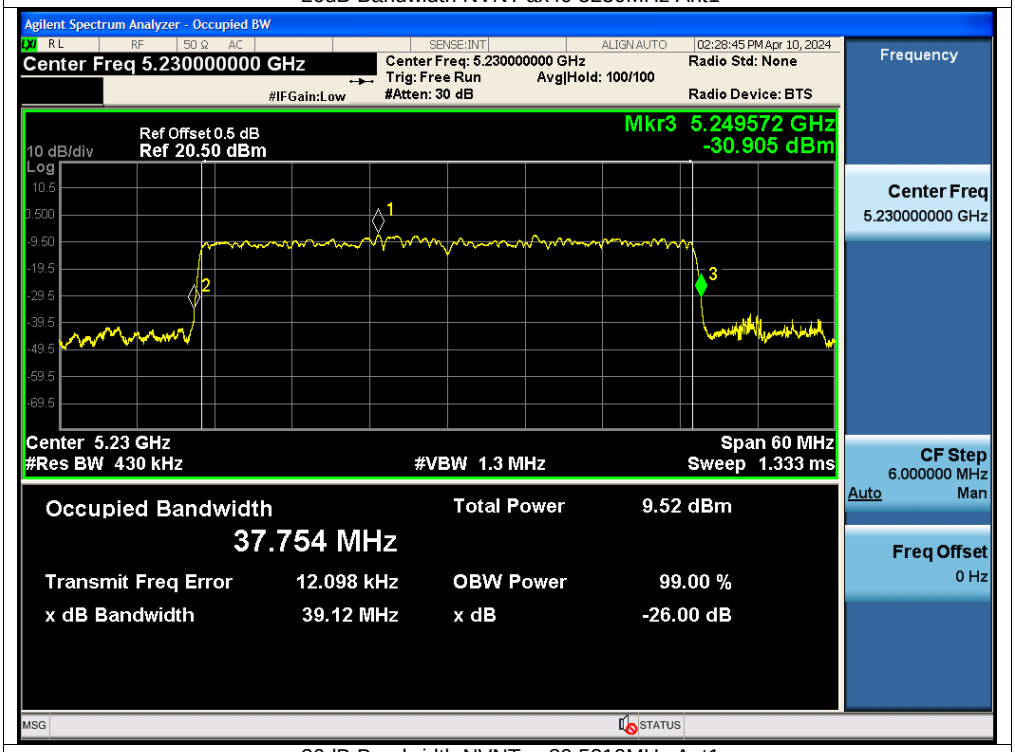
-26dB Bandwidth NVNT ax20 5240MHz Ant1



-26dB Bandwidth NVNT ax40 5190MHz Ant1



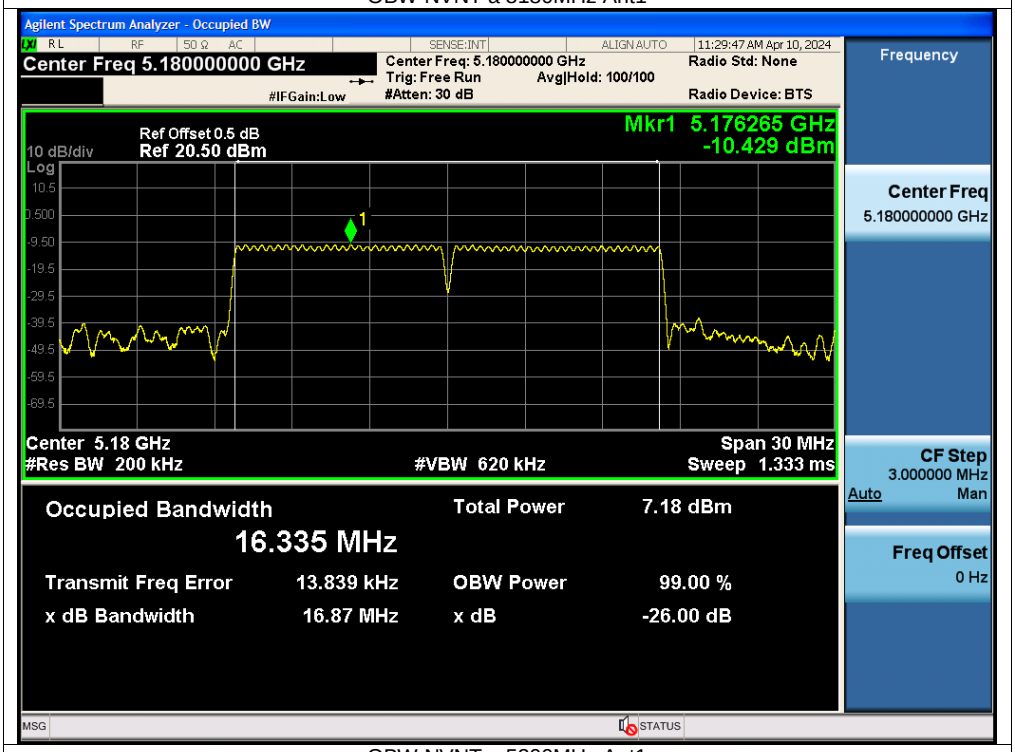
-26dB Bandwidth NVNT ax40 5230MHz Ant1



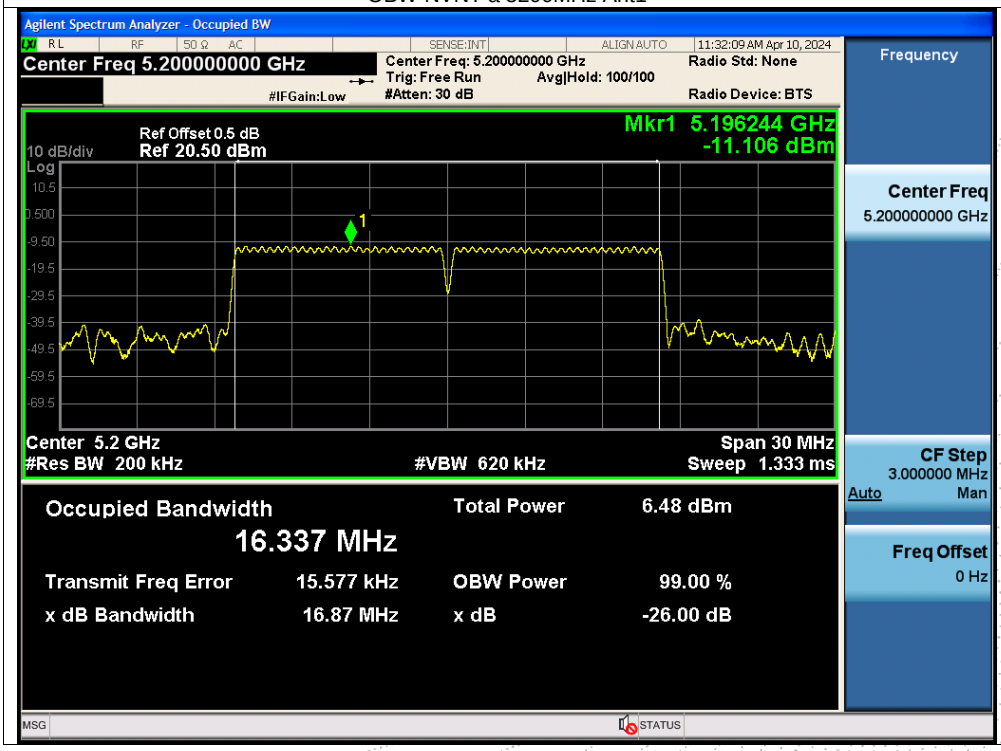
-26dB Bandwidth NVNT ax80 5210MHz Ant1

Test Graphs

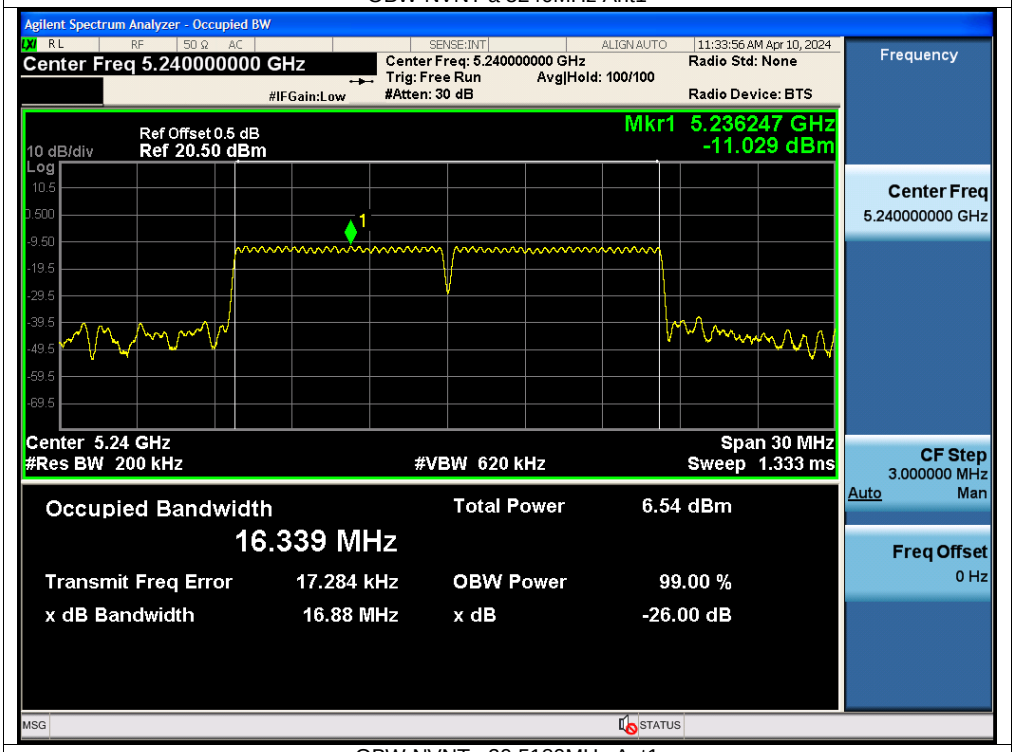
OBW NVNT a 5180MHz Ant1



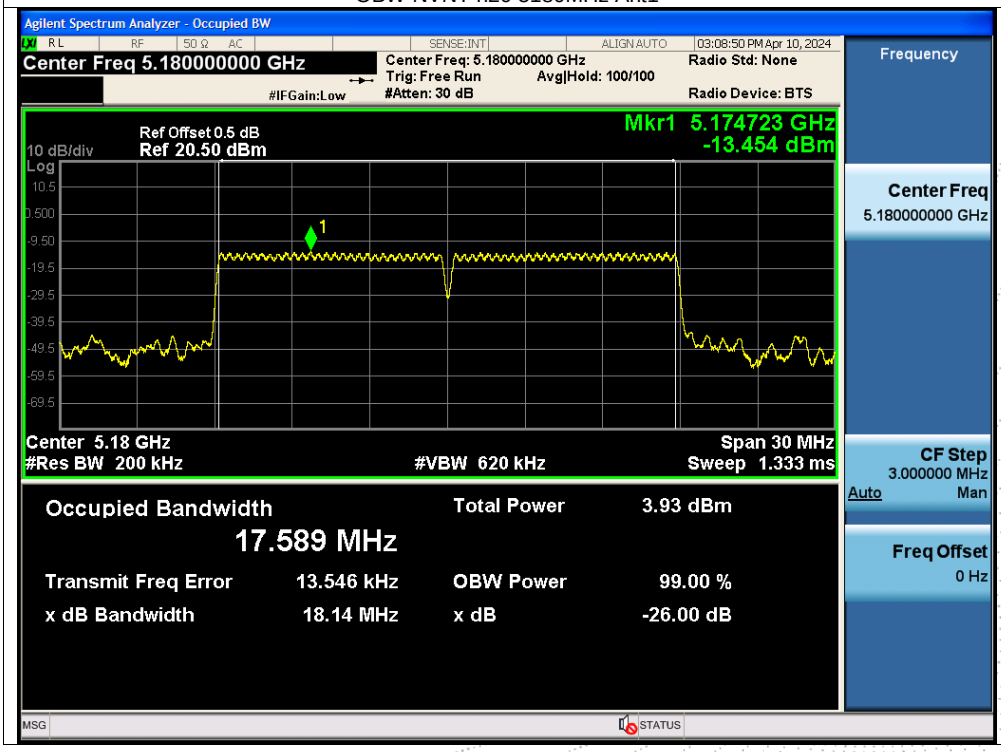
OBW NVNT a 5200MHz Ant1



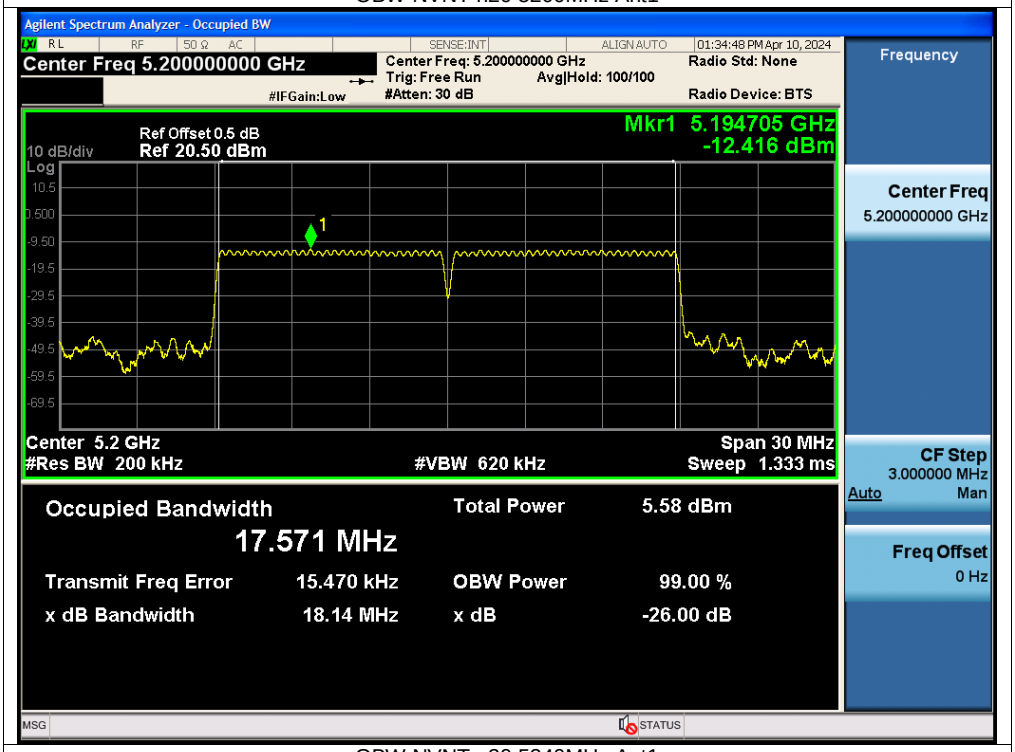
OBW NVNT a 5240MHz Ant1



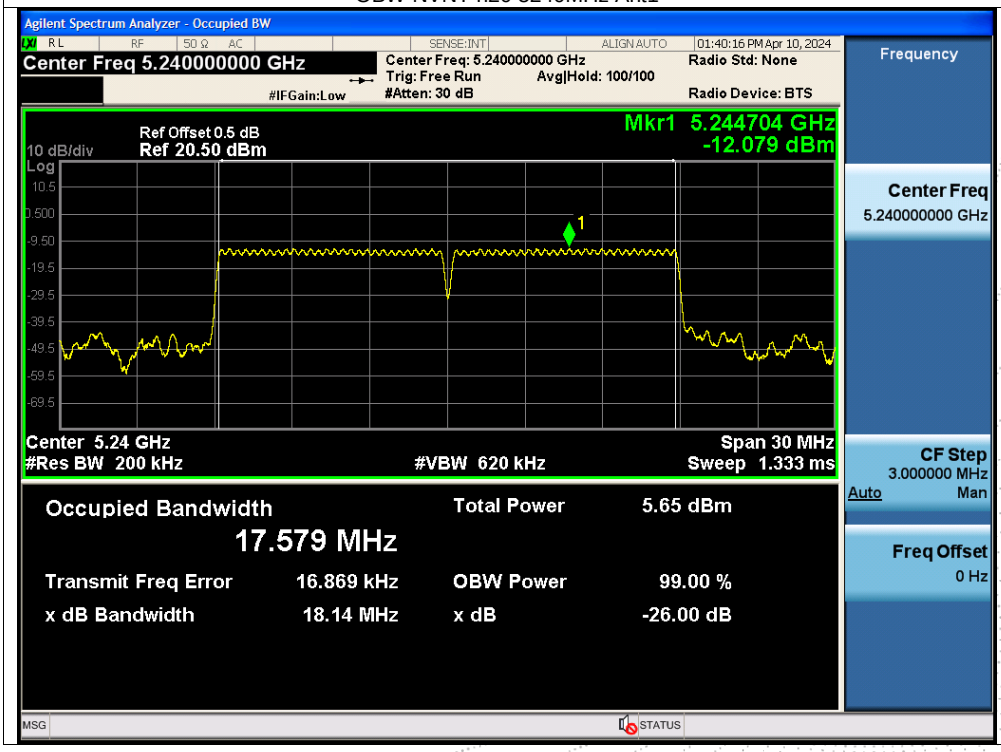
OBW NVNT n20 5180MHz Ant1



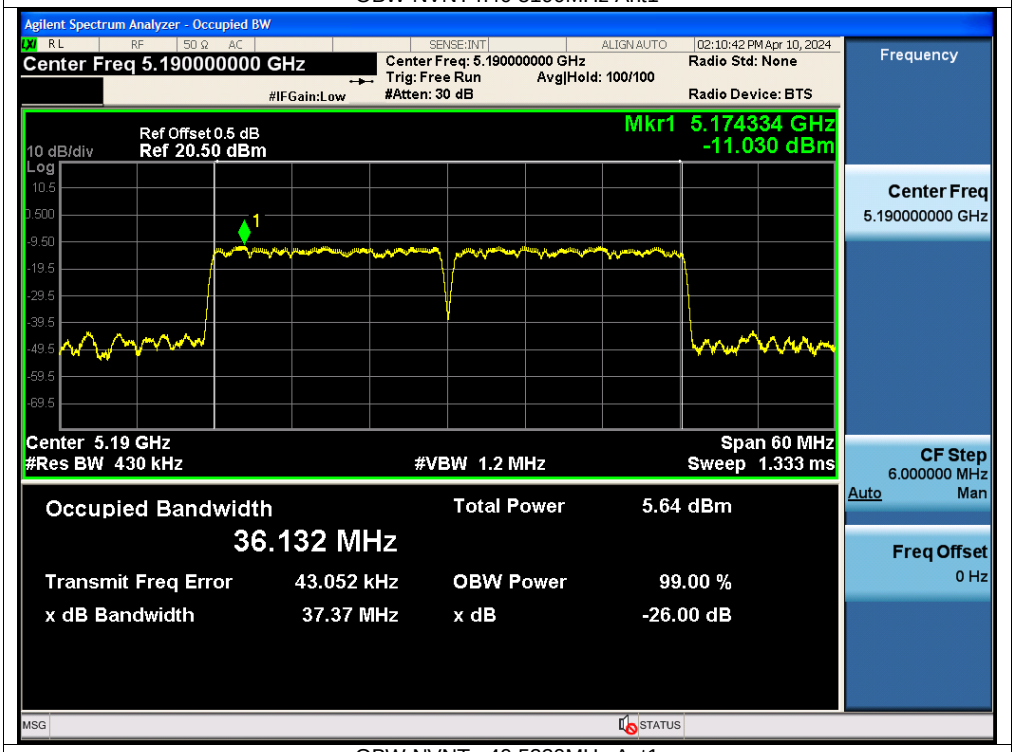
OBW NVNT n20 5200MHz Ant1



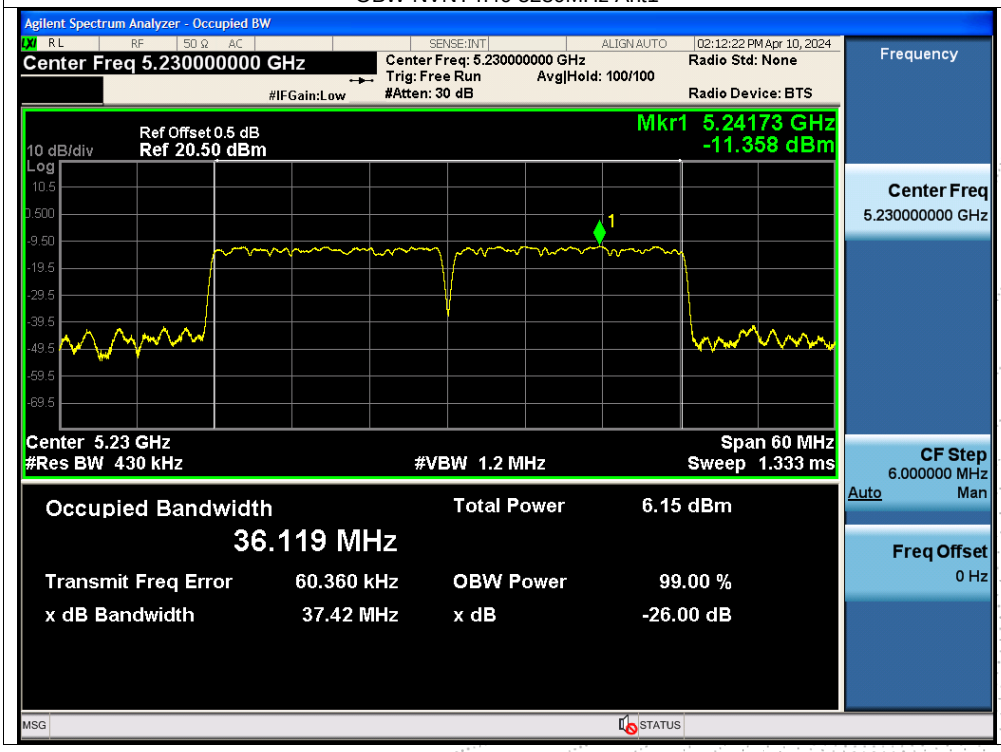
OBW NVNT n20 5240MHz Ant1



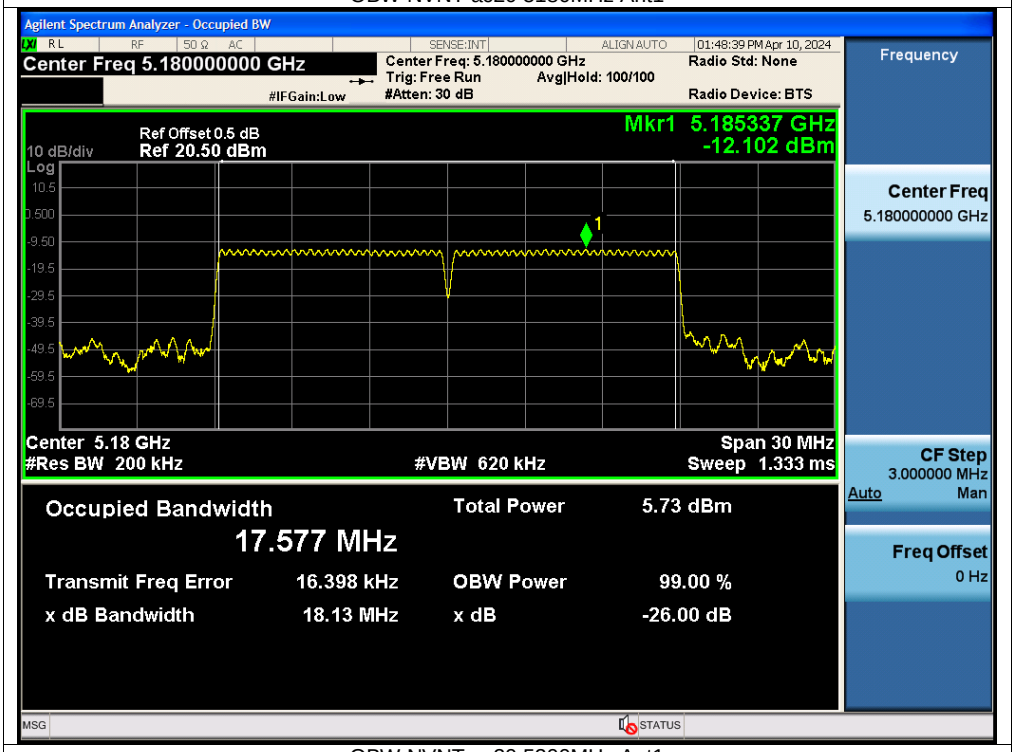
OBW NVNT n40 5190MHz Ant1



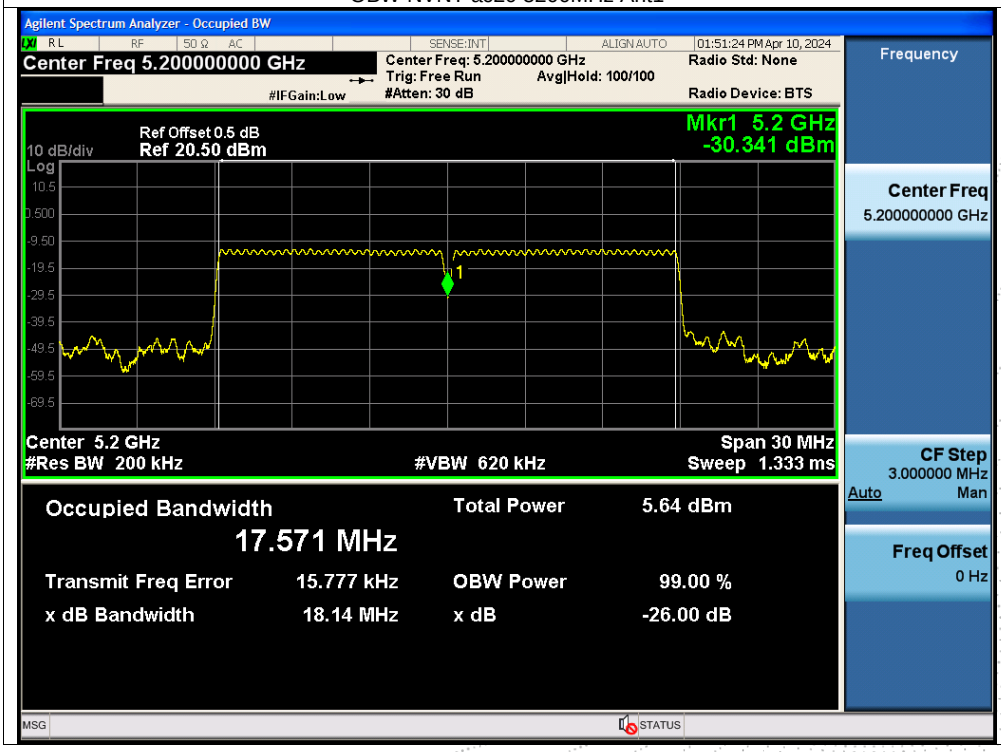
OBW NVNT n40 5230MHz Ant1



OBW NVNT ac20 5180MHz Ant1



OBW NVNT ac20 5200MHz Ant1



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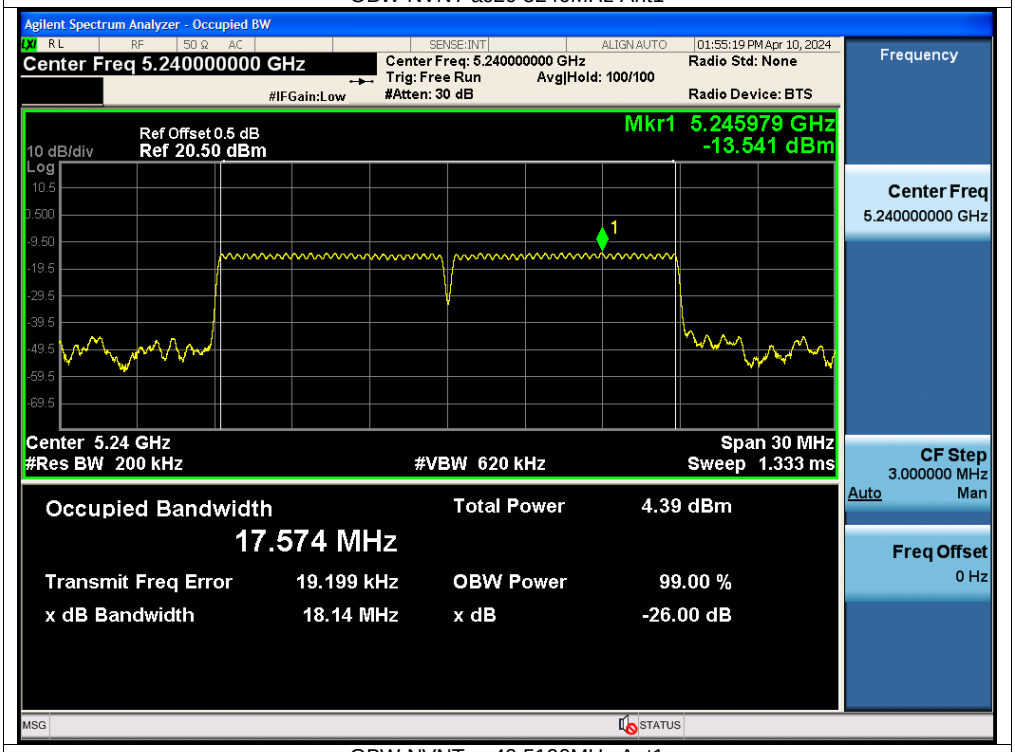
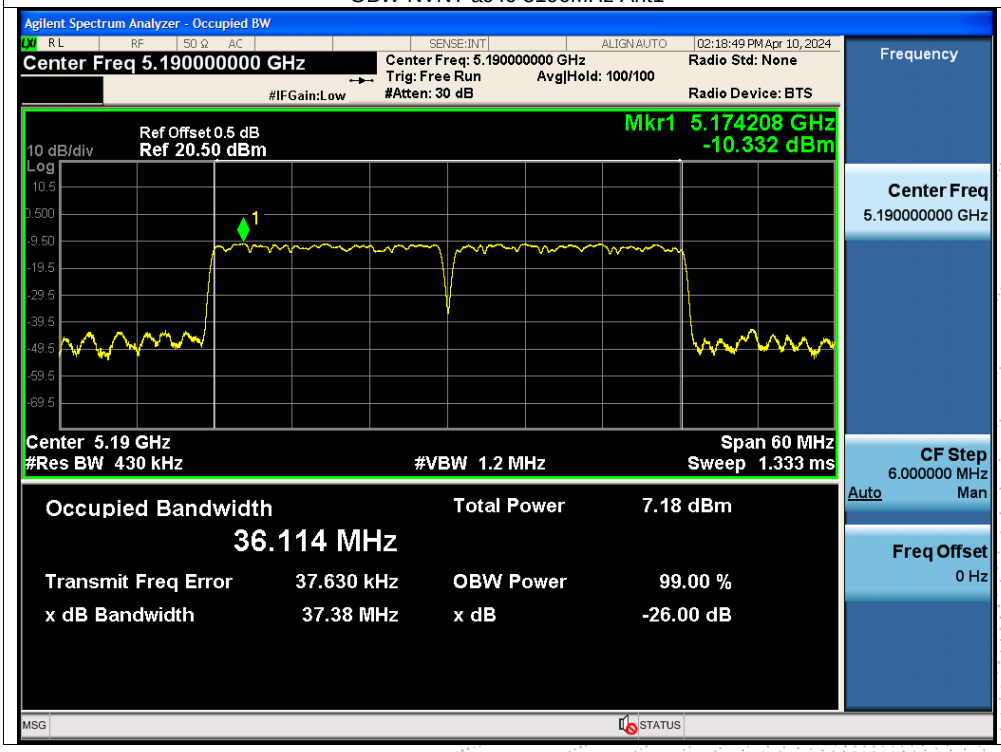
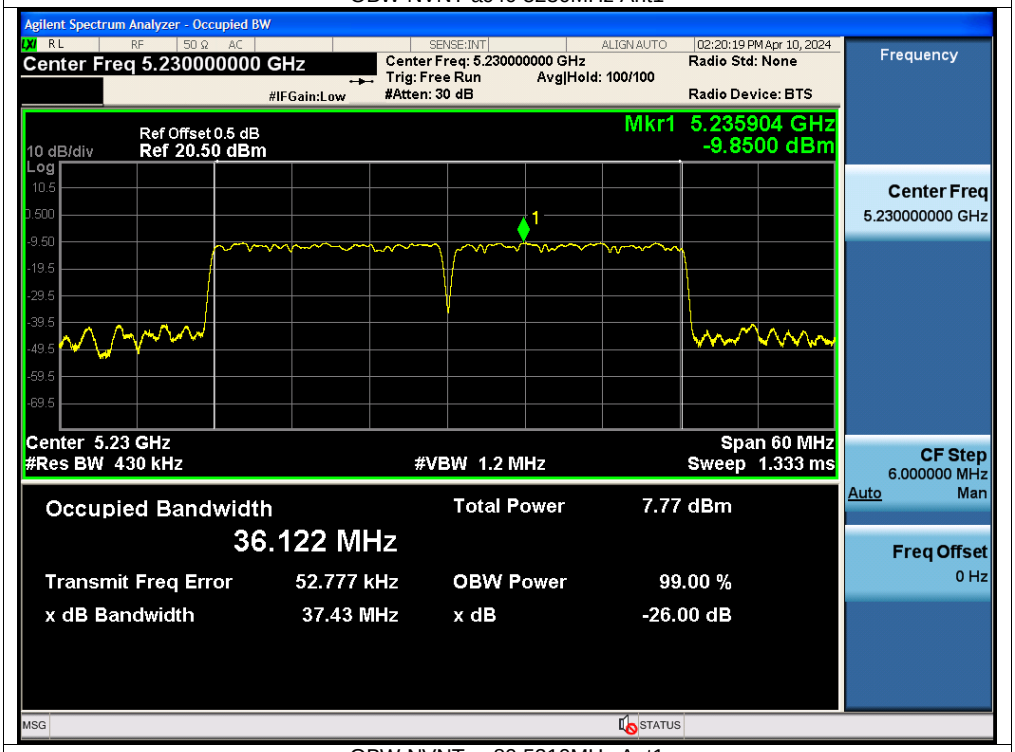


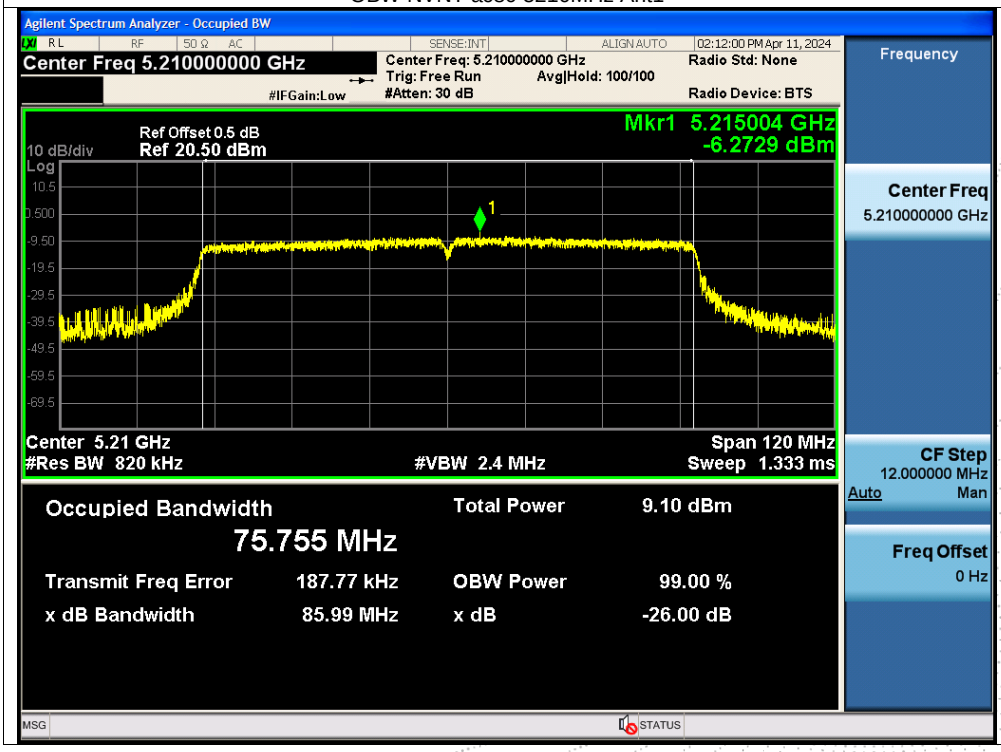
OBW NVNT ac40 5190MHz Ant1



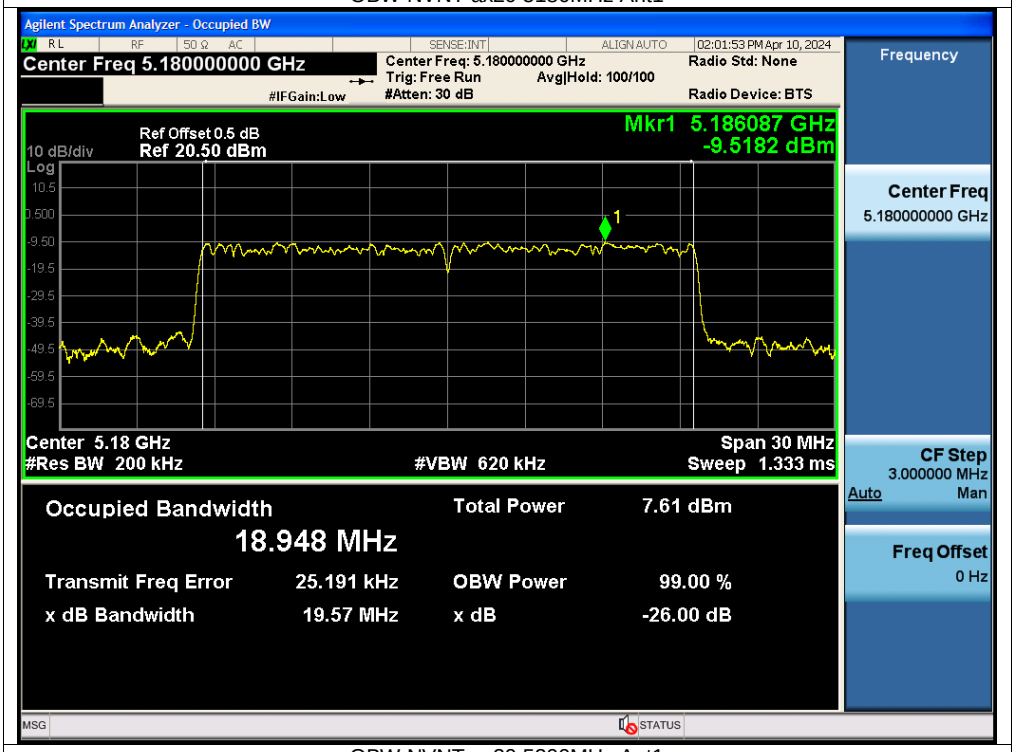
OBW NVNT ac40 5230MHz Ant1



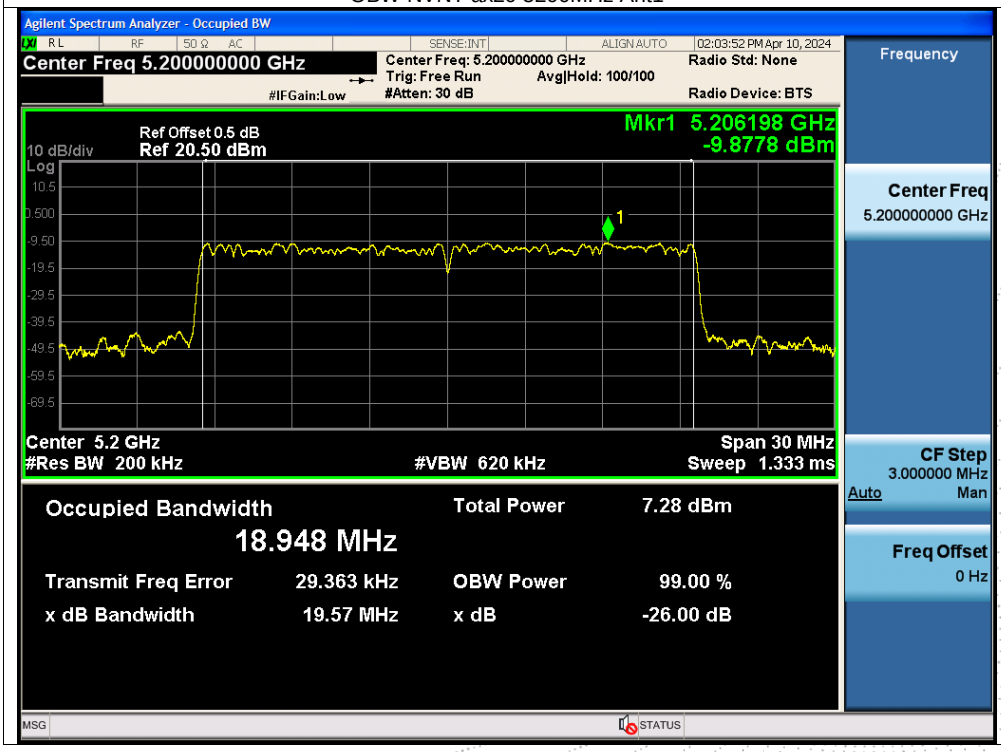
OBW NVNT ac80 5210MHz Ant1



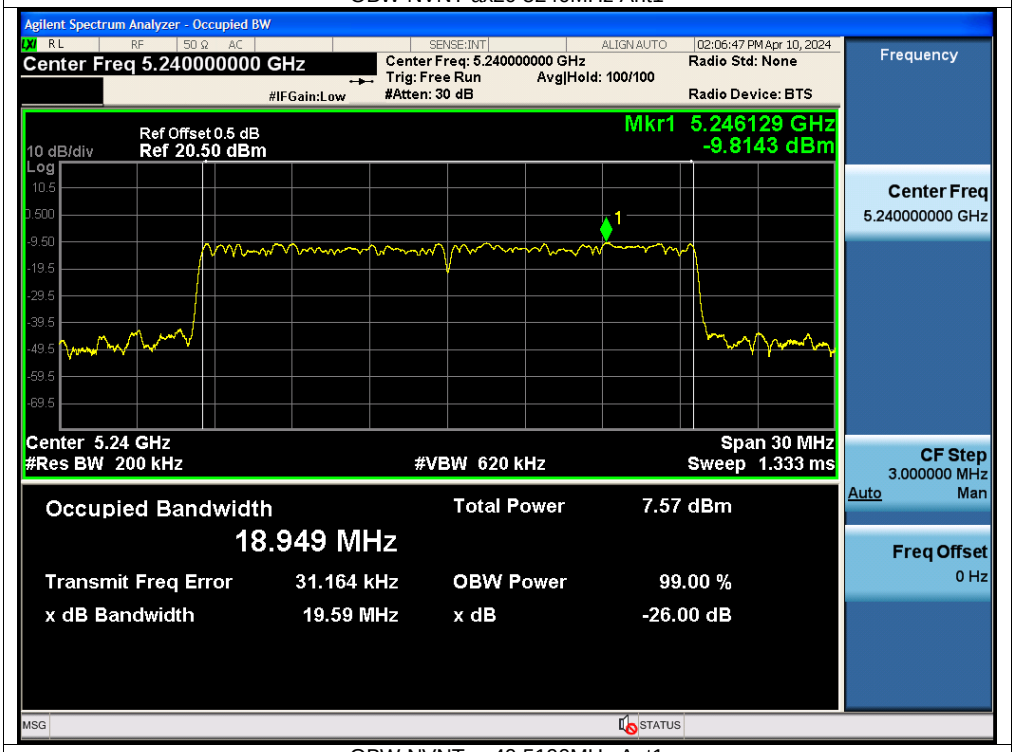
OBW NVNT ax20 5180MHz Ant1



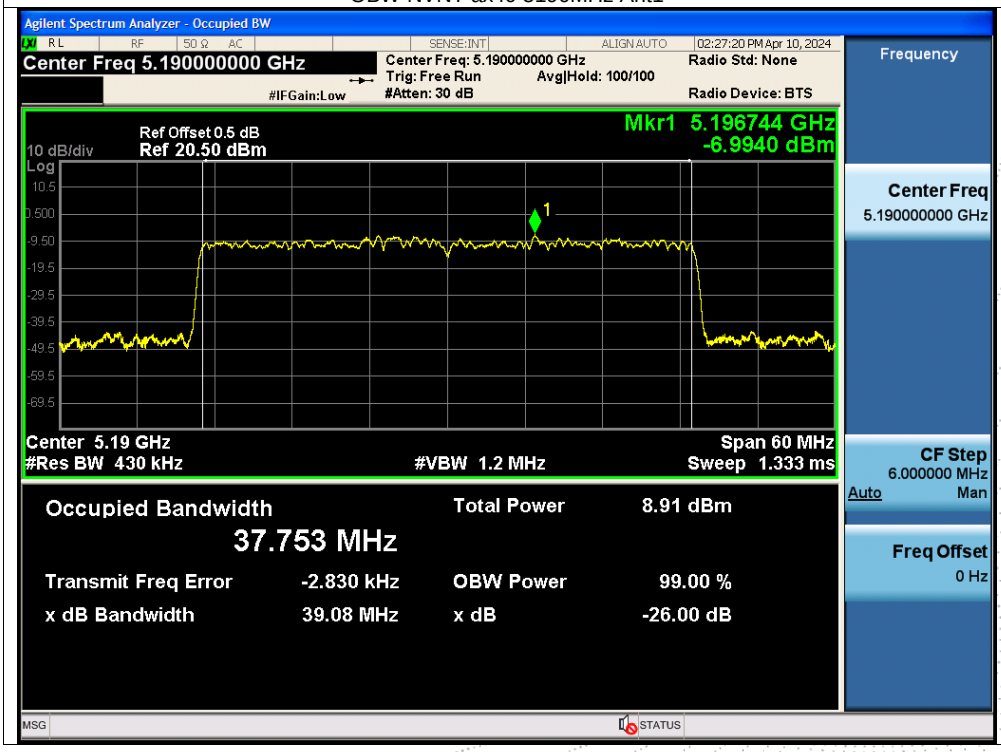
OBW NVNT ax20 5200MHz Ant1



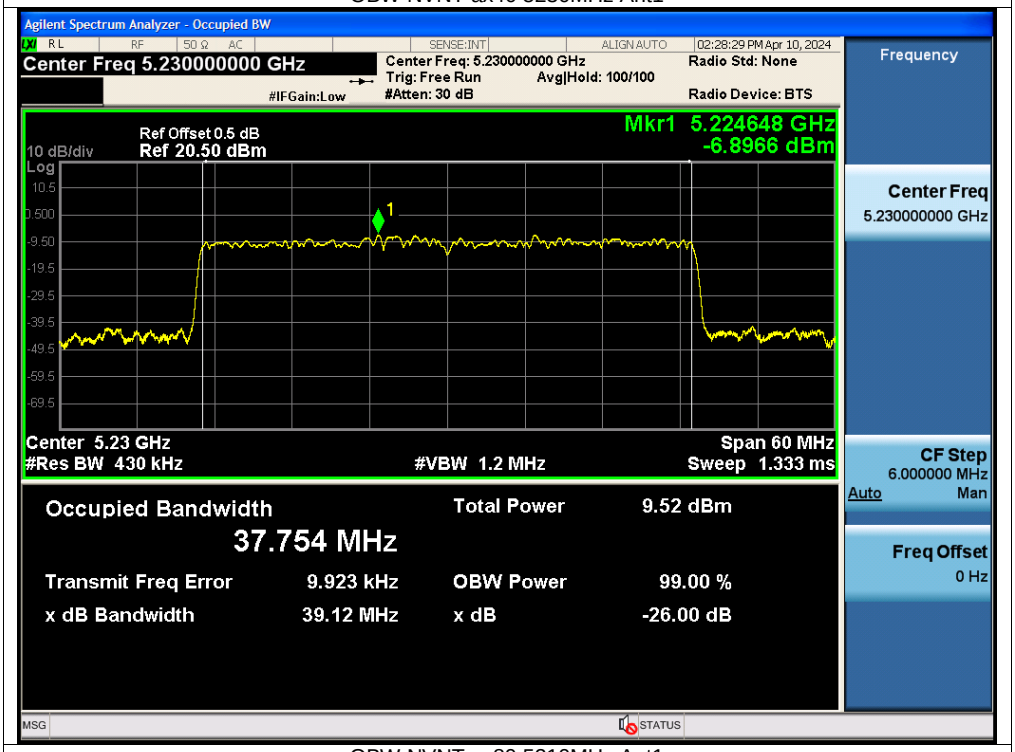
OBW NVNT ax20 5240MHz Ant1



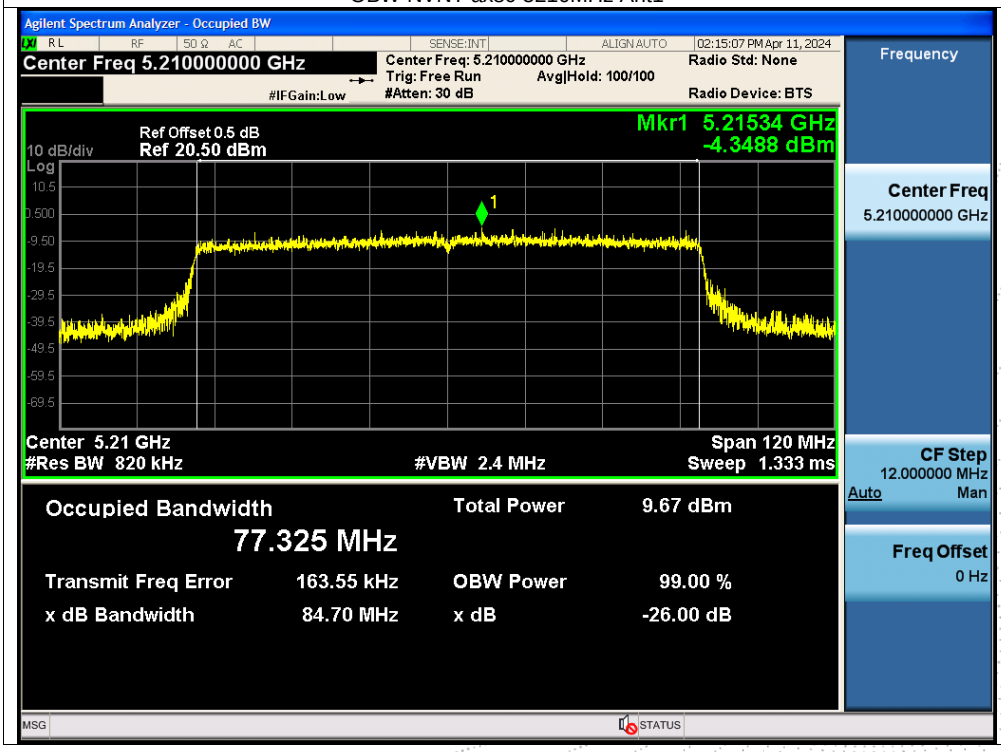
OBW NVNT ax40 5190MHz Ant1



OBW NVNT ax40 5230MHz Ant1



OBW NVNT ax80 5210MHz Ant1

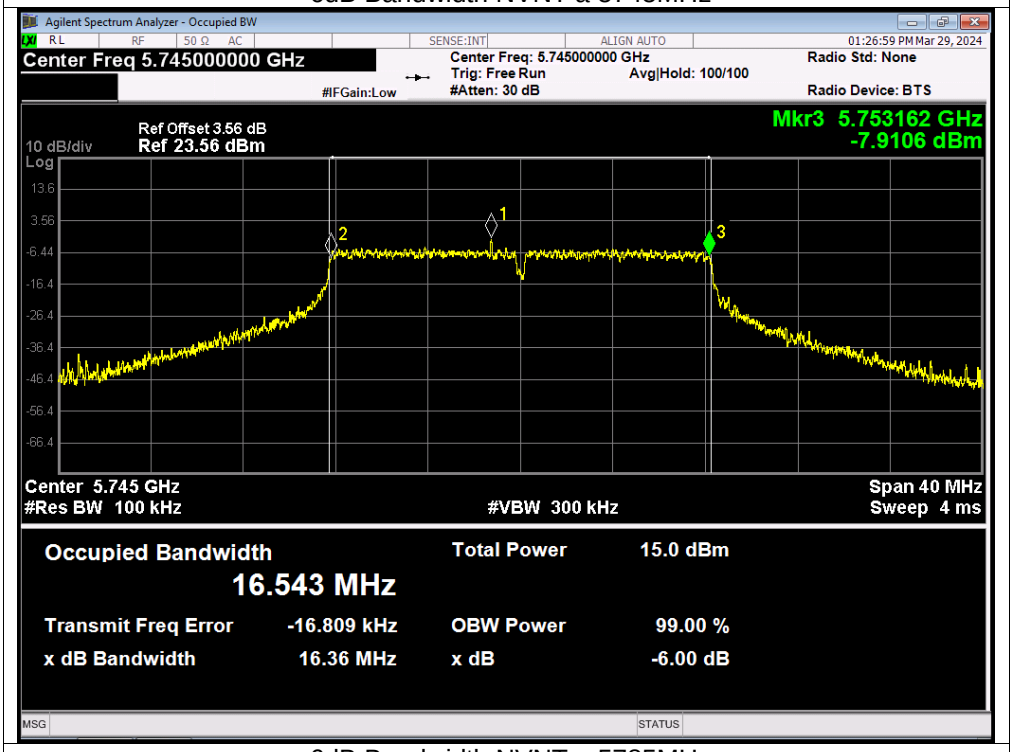


Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101KPa	Test Voltage:	AC120V/60Hz
Test Mode:	(5745-5825MHz)		

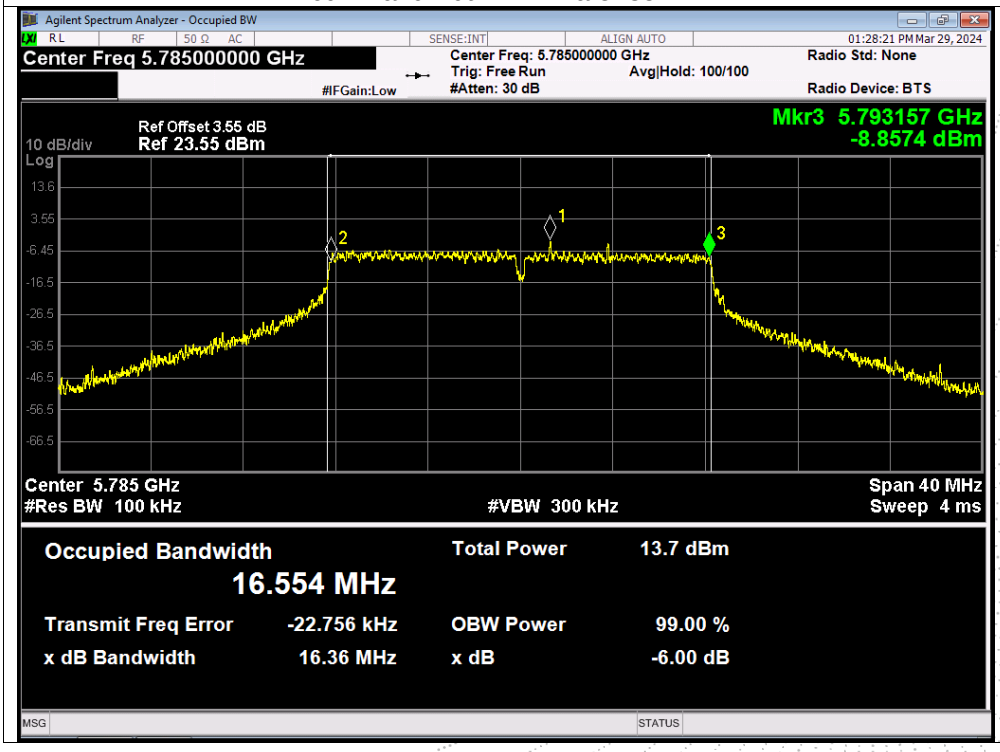
Condition	Mode	Frequency (MHz)	99% OBW (MHz)	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
NVNT	a	5745	16.794	16.357	0.5	Pass
NVNT	a	5785	16.736	16.360	0.5	Pass
NVNT	a	5825	16.803	16.403	0.5	Pass
NVNT	n20	5745	17.967	17.653	0.5	Pass
NVNT	n20	5785	17.954	17.601	0.5	Pass
NVNT	n20	5825	17.958	17.616	0.5	Pass
NVNT	n40	5755	36.569	36.344	0.5	Pass
NVNT	n40	5795	36.418	36.367	0.5	Pass
NVNT	ac20	5745	17.938	17.625	0.5	Pass
NVNT	ac20	5785	17.966	17.615	0.5	Pass
NVNT	ac20	5825	18.012	17.587	0.5	Pass
NVNT	ac40	5755	36.589	36.349	0.5	Pass
NVNT	ac40	5795	36.664	36.323	0.5	Pass
NVNT	ac80	5775	76.042	75.755	0.5	Pass
NVNT	ax20	5745	19.130	18.955	0.5	Pass
NVNT	ax20	5785	19.133	19.126	0.5	Pass
NVNT	ax20	5825	19.107	19.087	0.5	Pass
NVNT	ax40	5755	38.083	37.779	0.5	Pass
NVNT	ax40	5795	38.008	37.986	0.5	Pass
NVNT	ax80	5775	77.590	76.584	0.5	Pass

Test Graphs

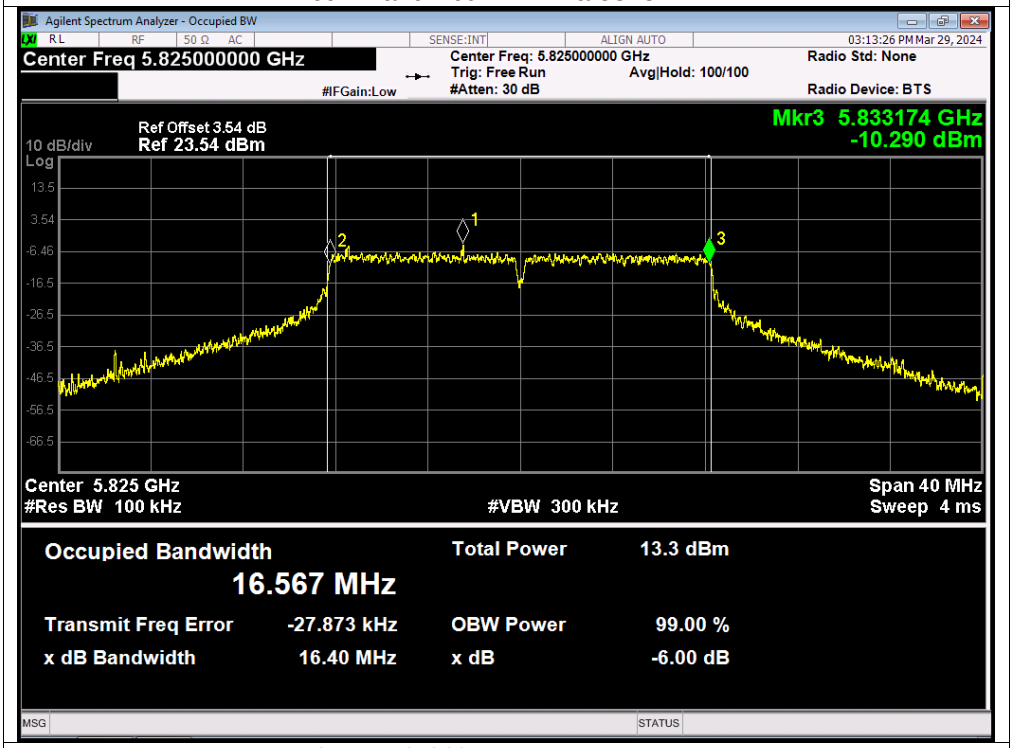
-6dB Bandwidth NVNT a 5745MHz



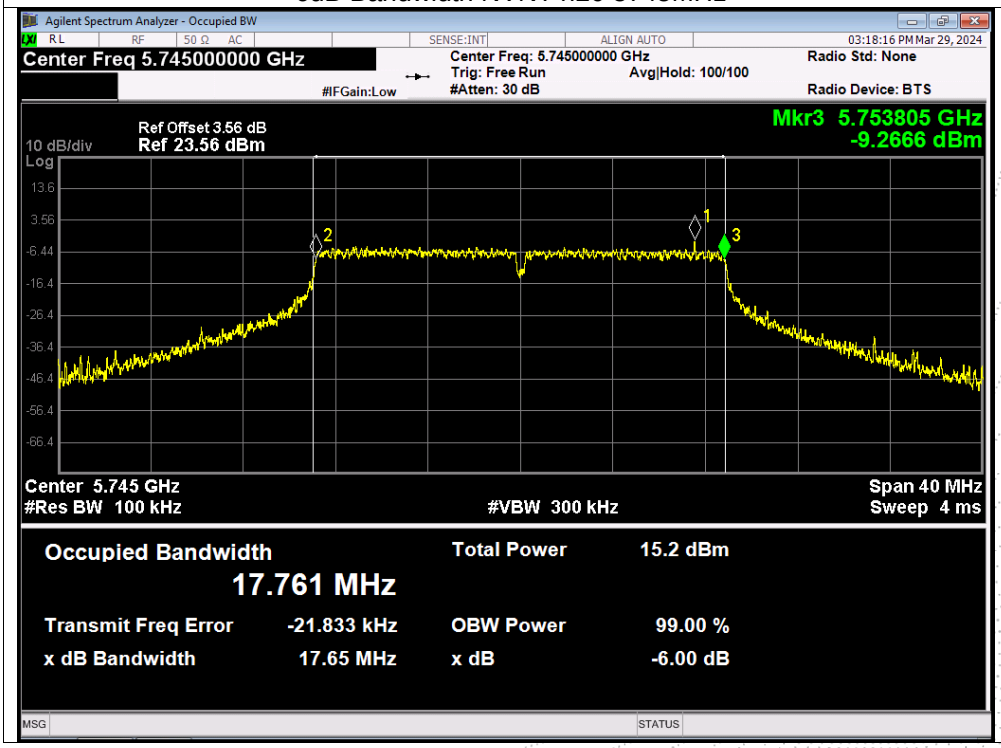
-6dB Bandwidth NVNT a 5785MHz



-6dB Bandwidth NVNT a 5825MHz



-6dB Bandwidth NVNT n20 5745MHz



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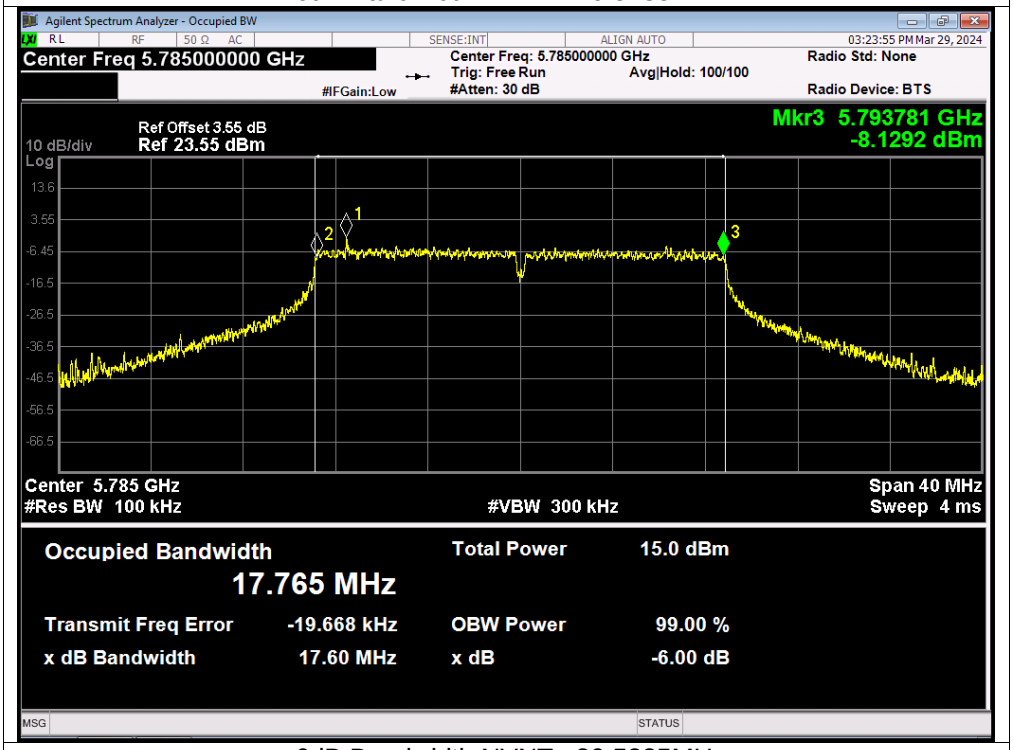

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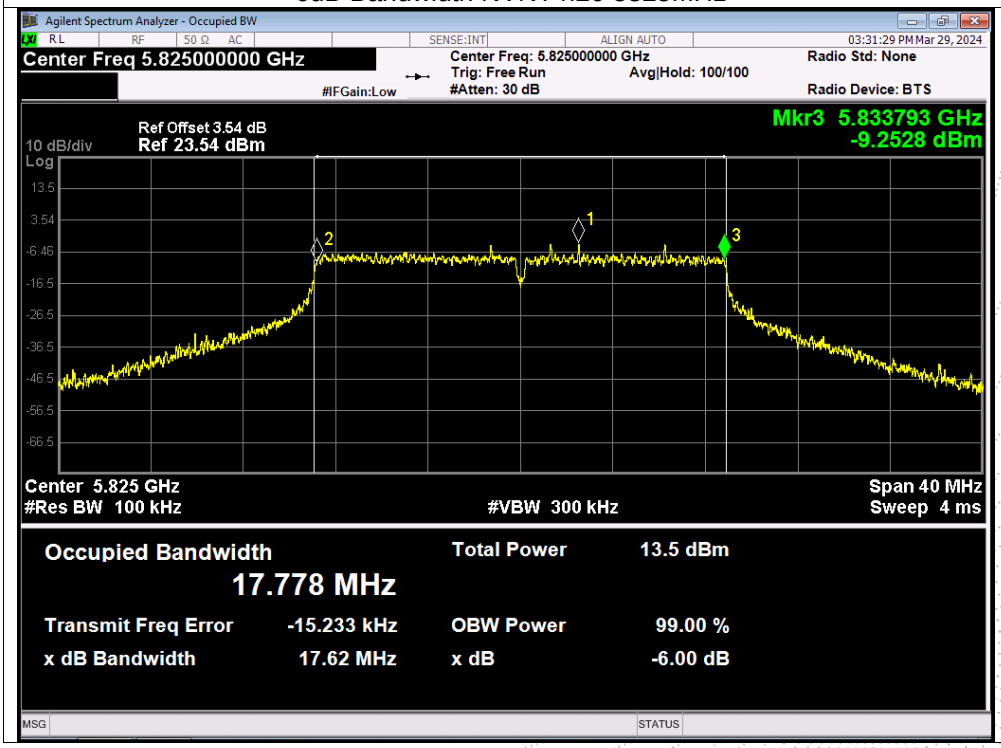
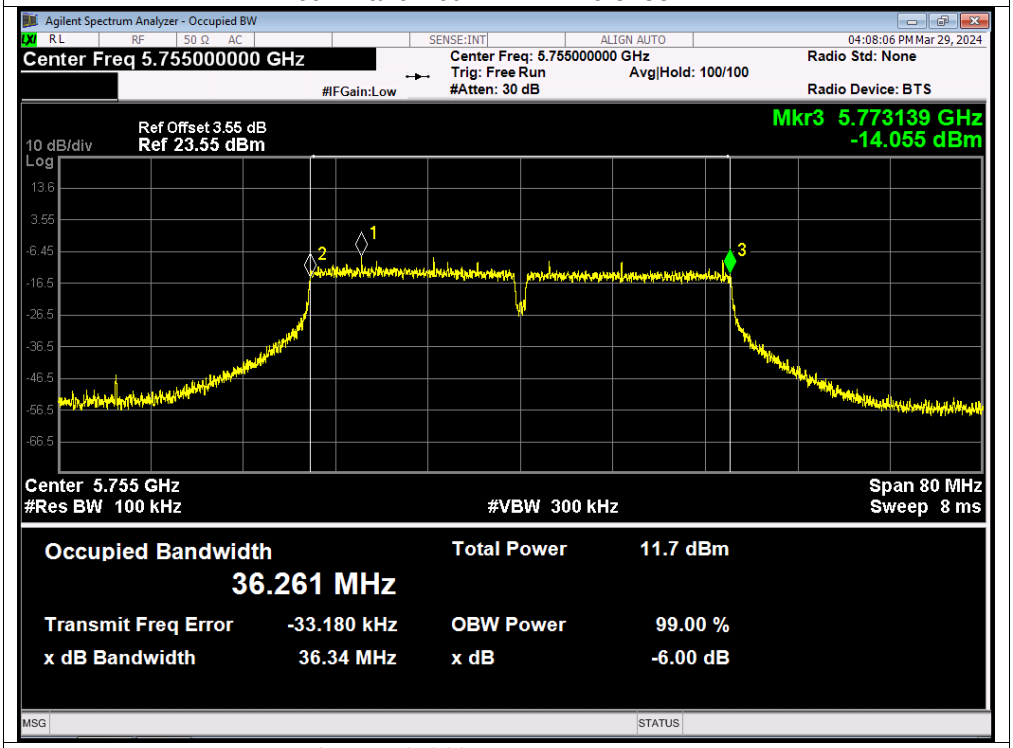


-6dB Bandwidth NVNT n40 5755MHz



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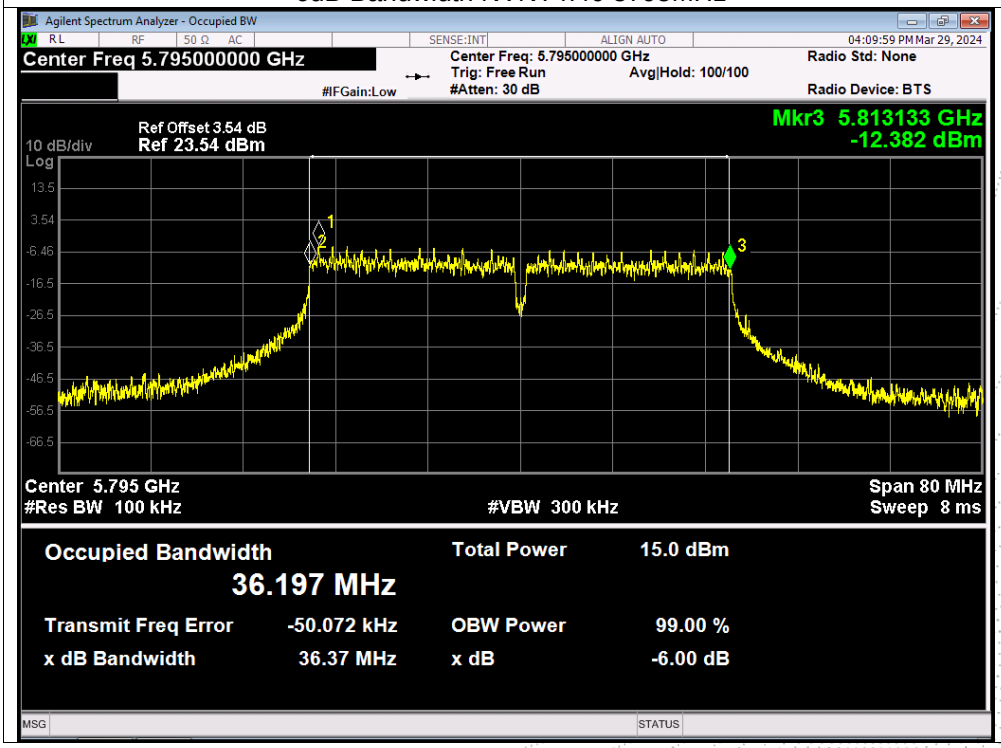
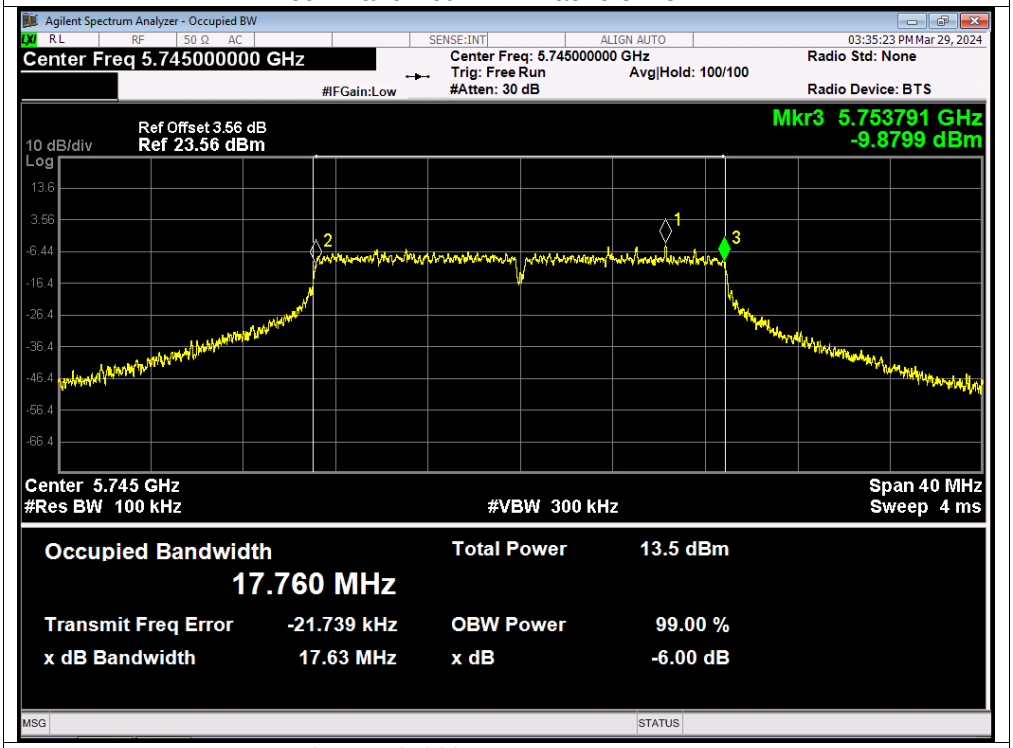


-6dB Bandwidth NVNT ac20 5745MHz



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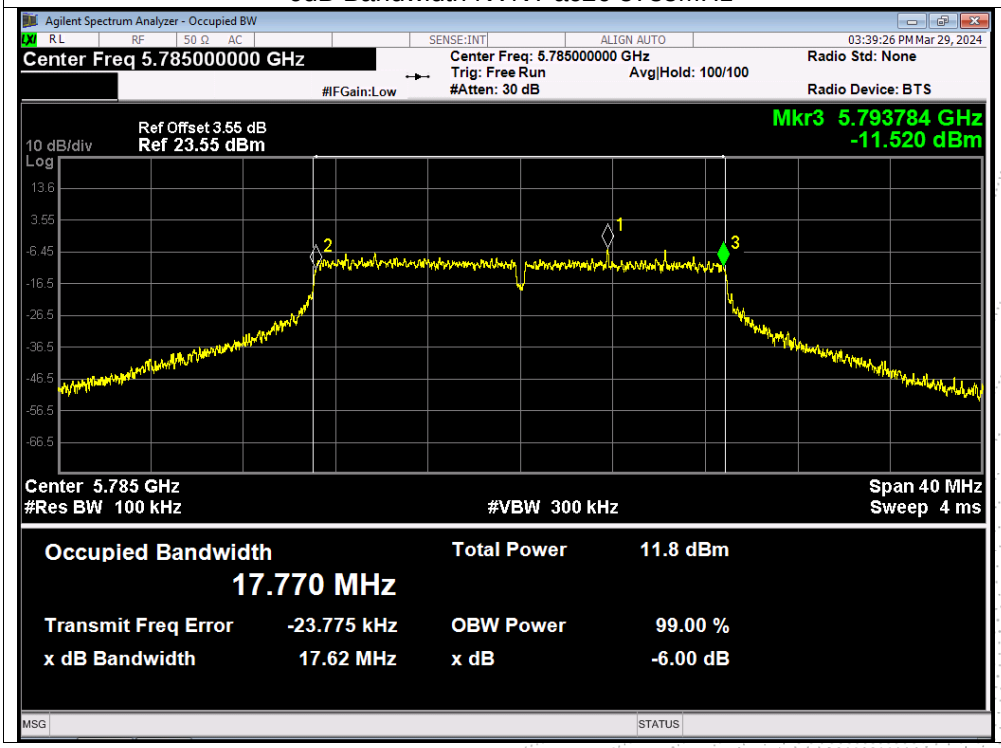
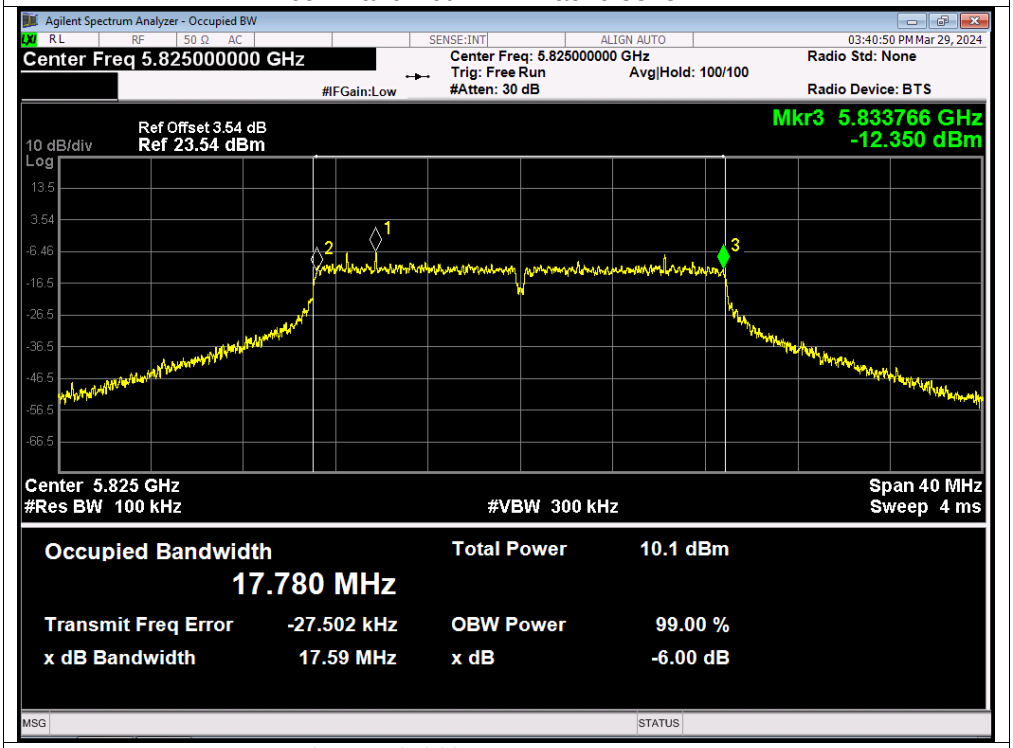
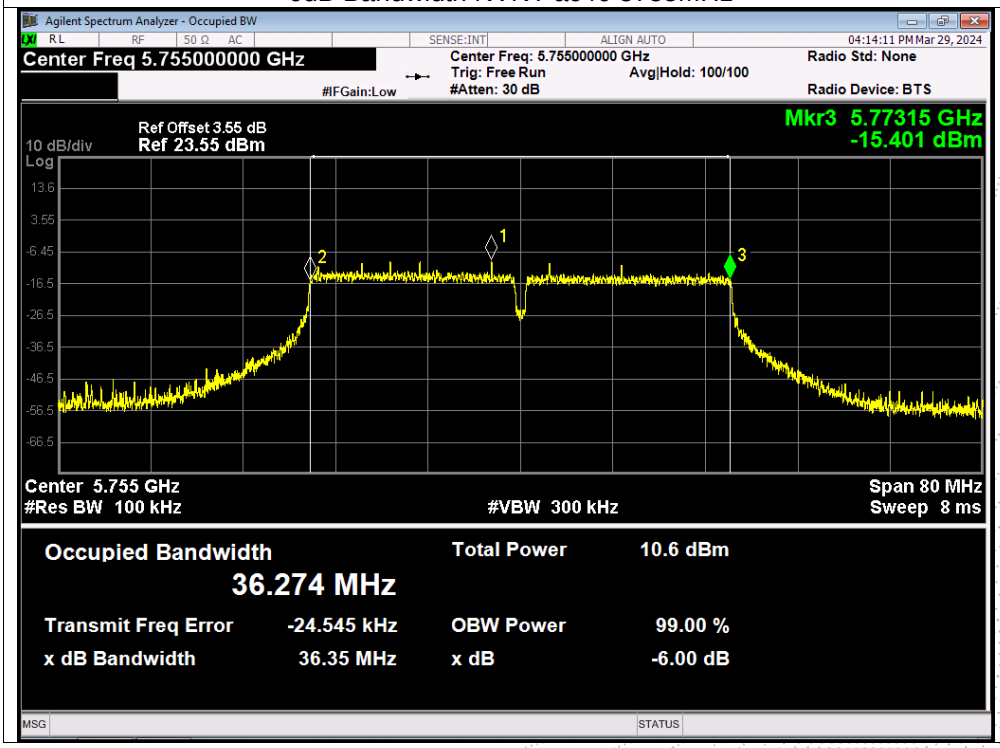


-6dB Bandwidth NVNT ac20 5825MHz



-6dB Bandwidth NVNT ac40 5755MHz



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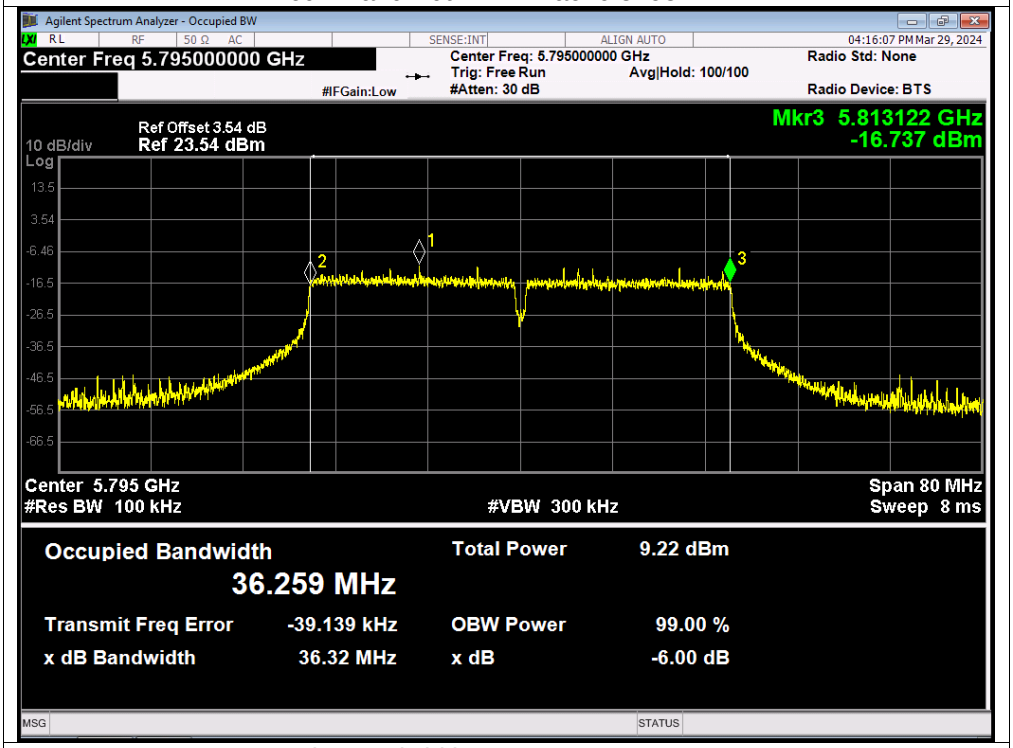
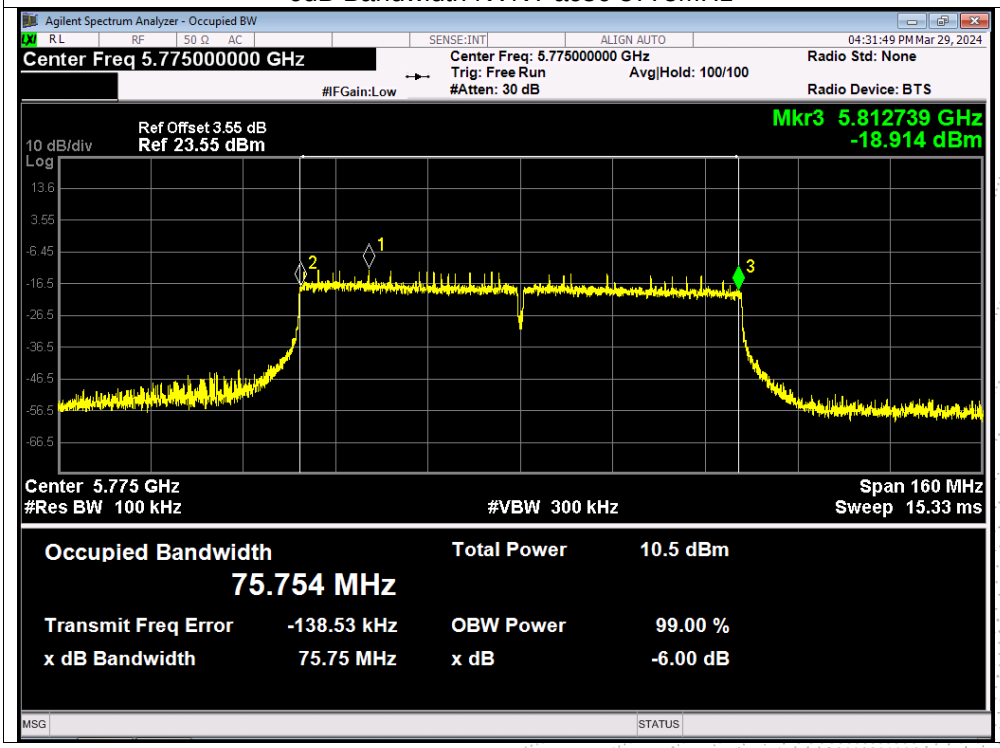


-6dB Bandwidth NVNT ac80 5775MHz



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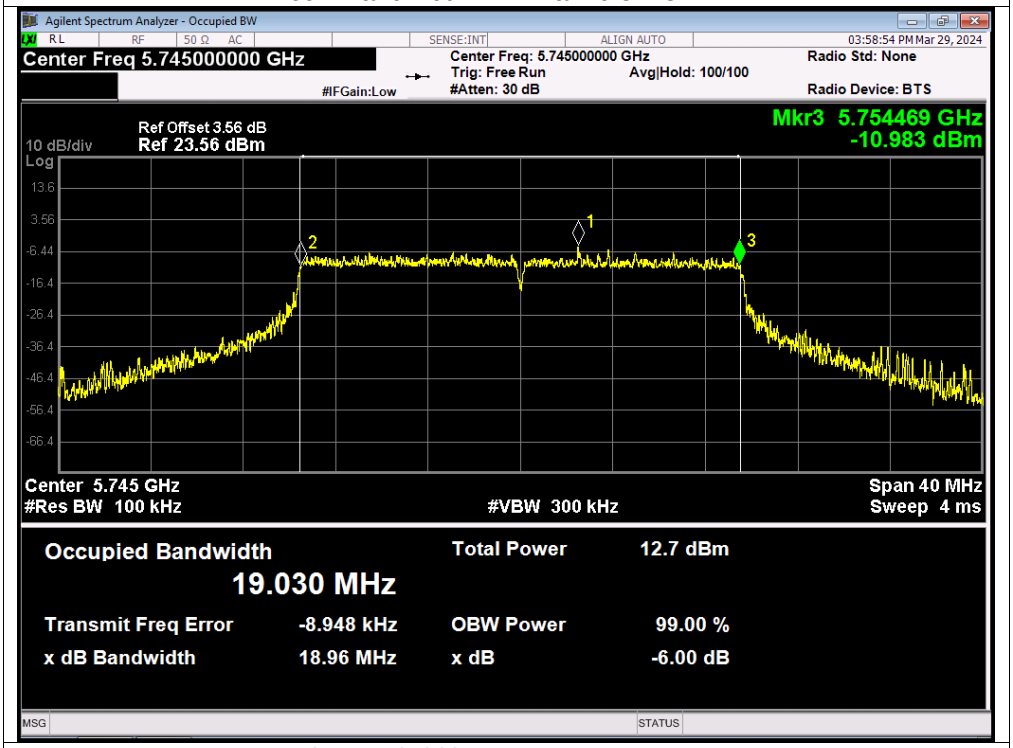

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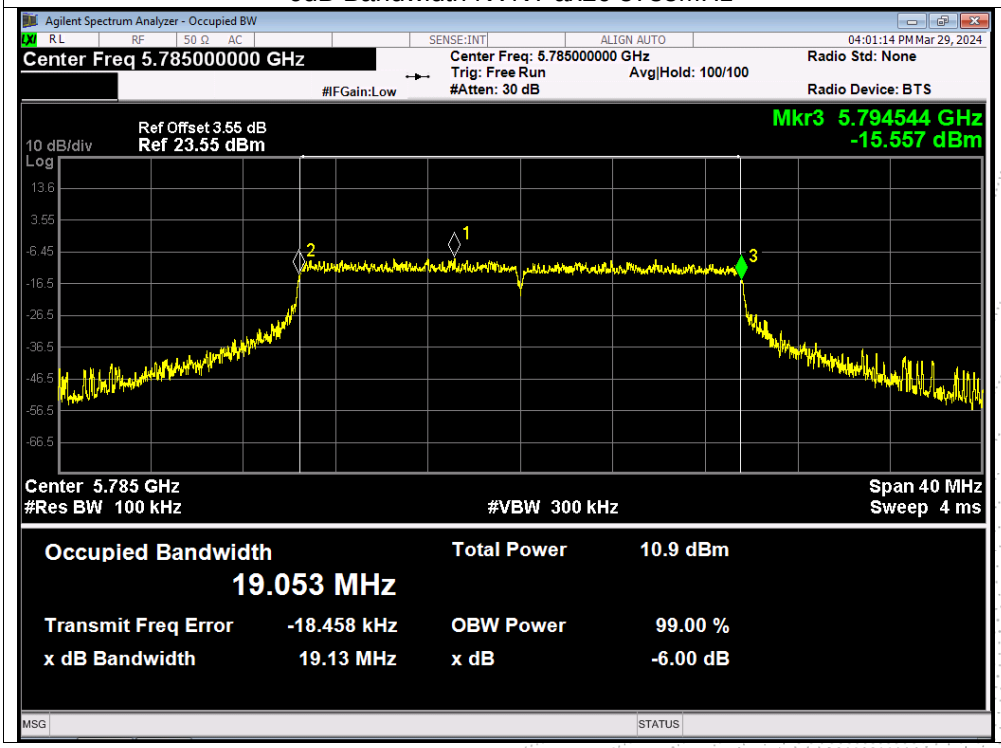

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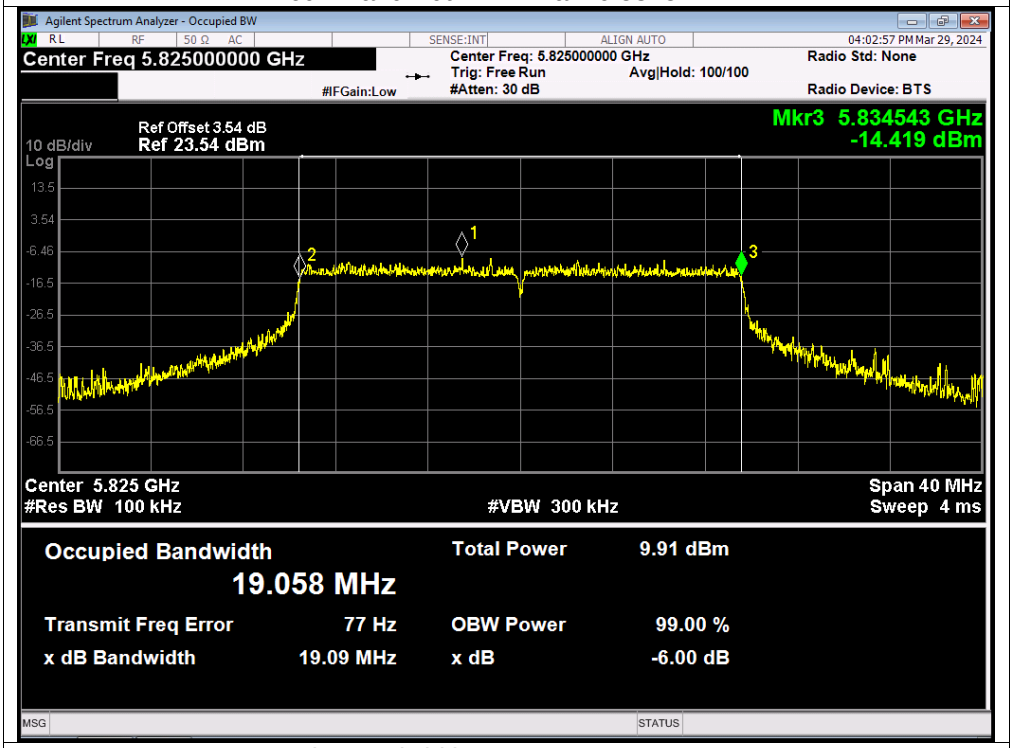
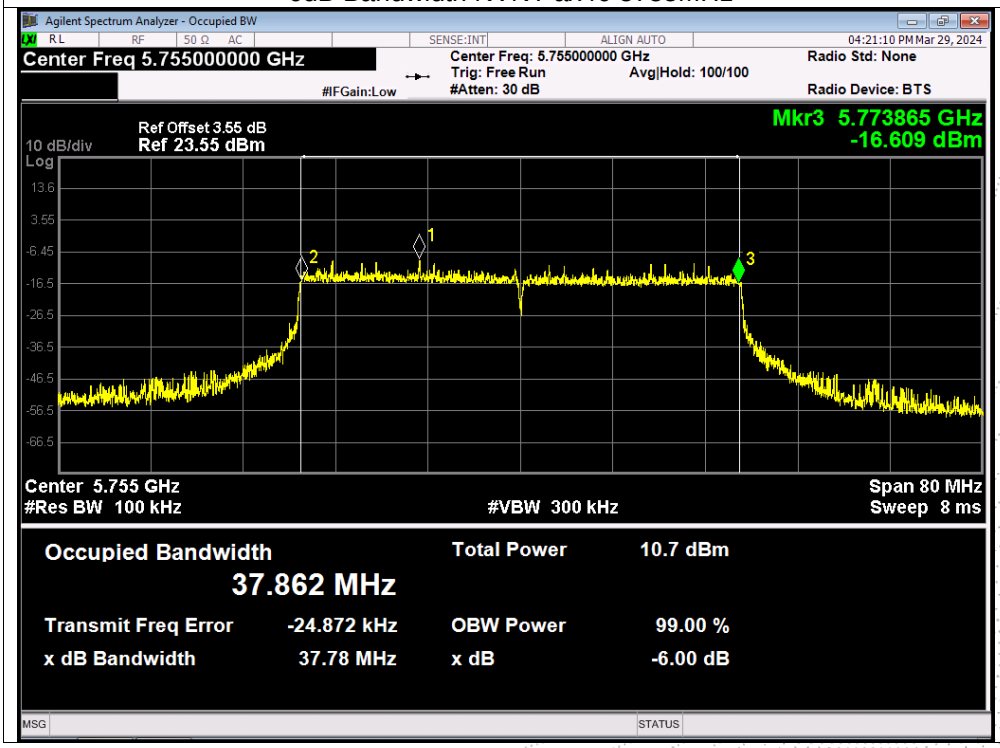
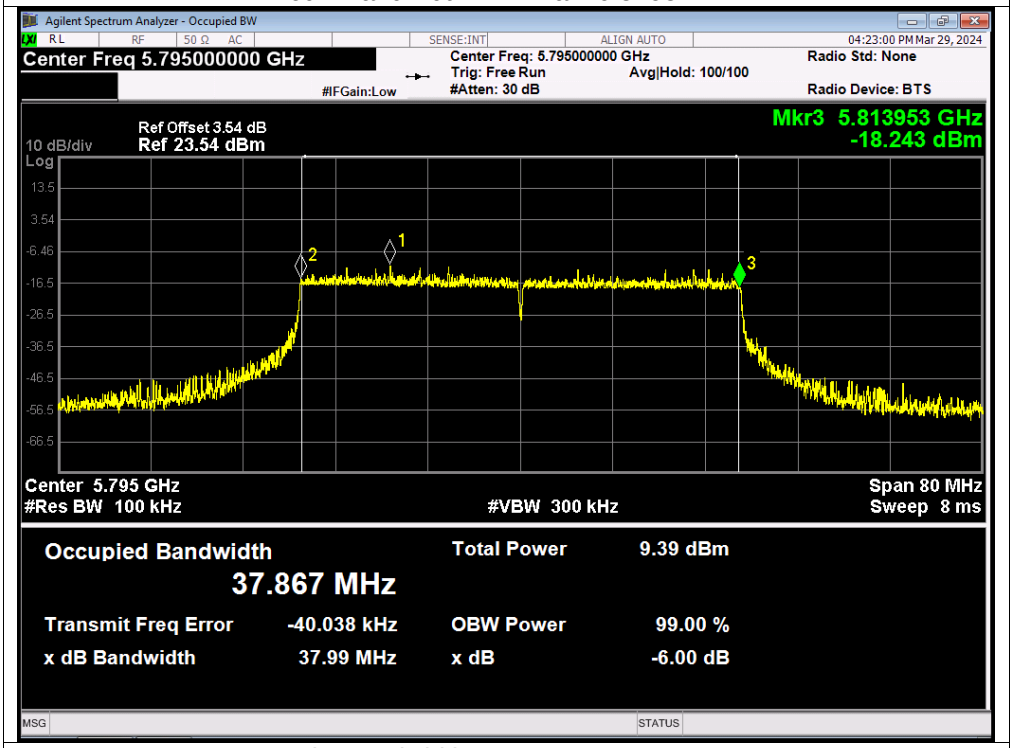


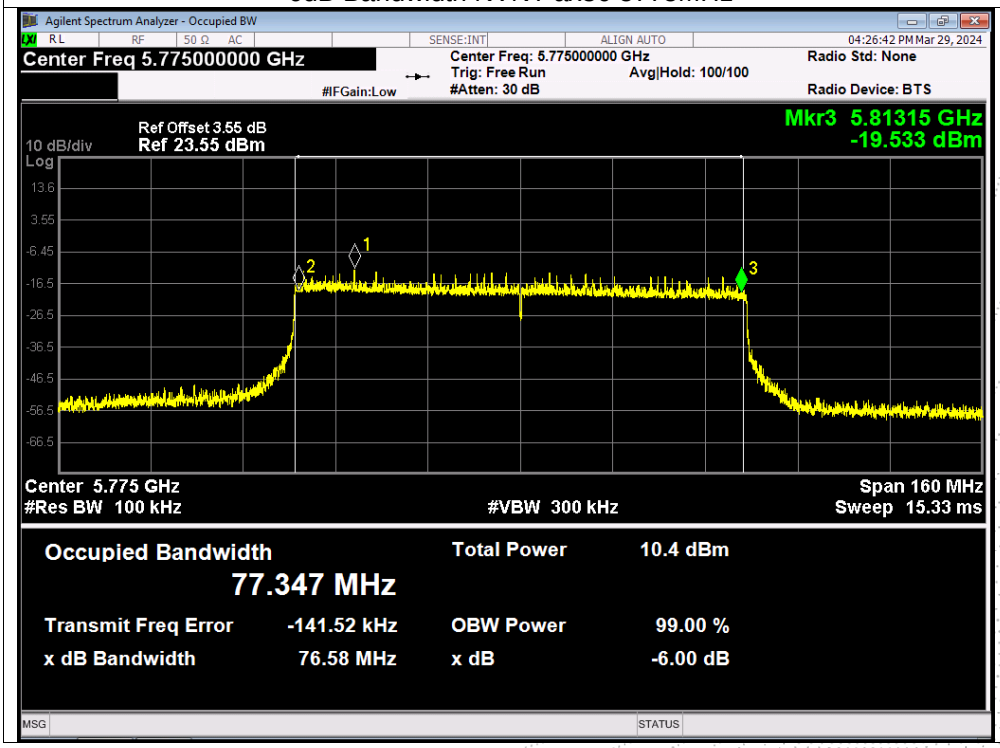
-6dB Bandwidth NVNT ax40 5755MHz



-6dB Bandwidth NVNT ax40 5795MHz

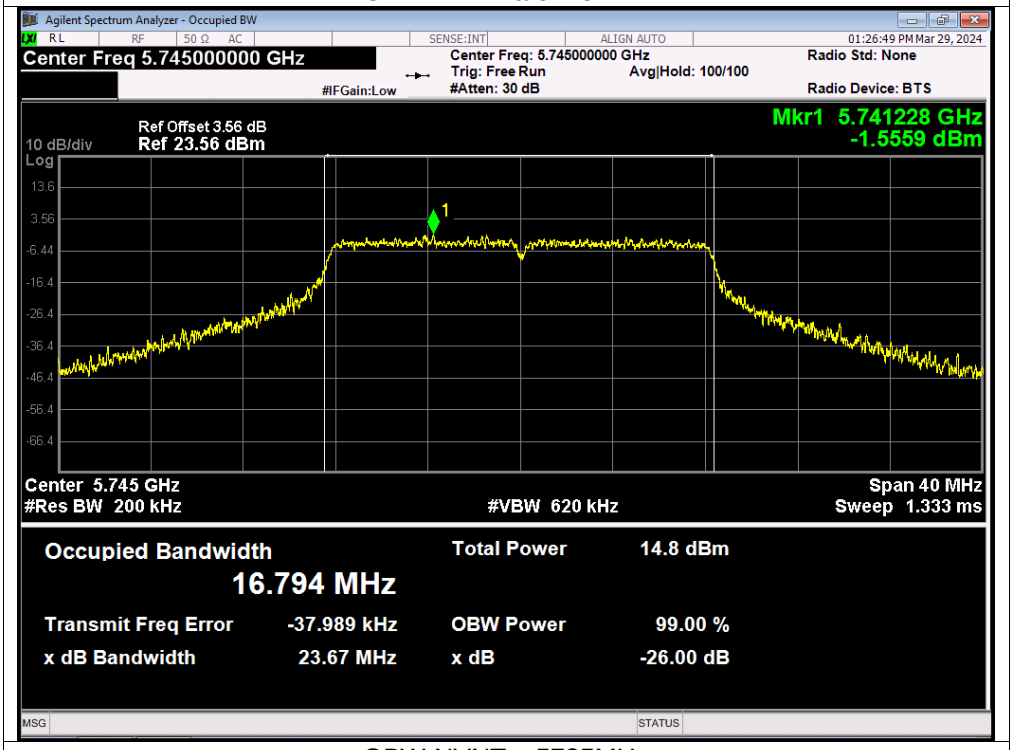


-6dB Bandwidth NVNT ax80 5775MHz

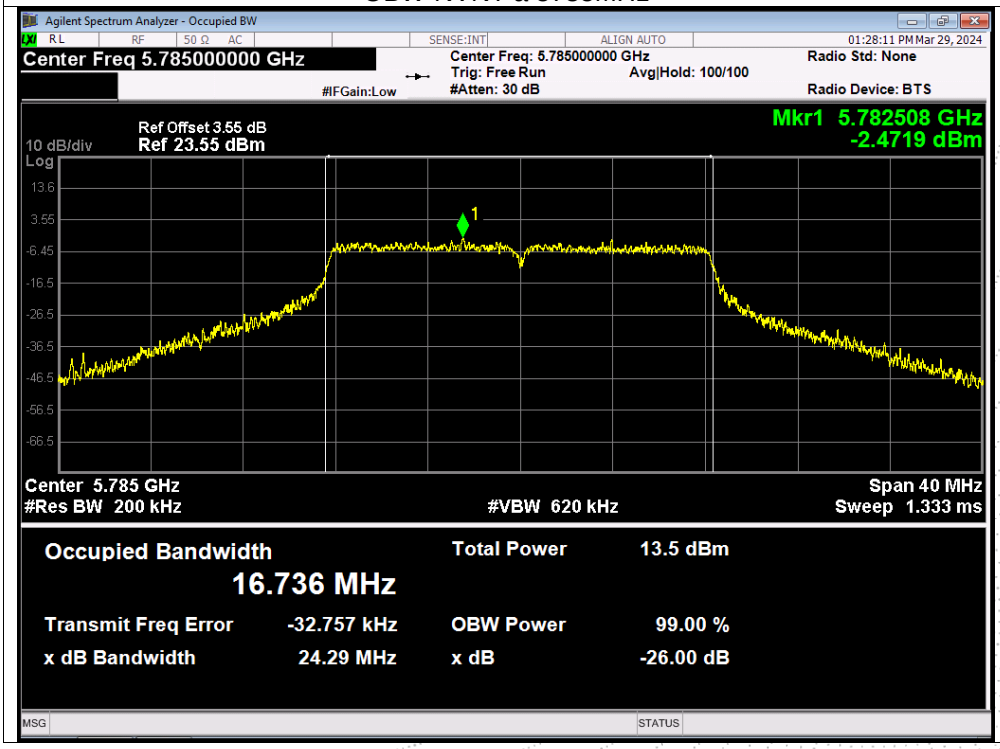


Test Graphs

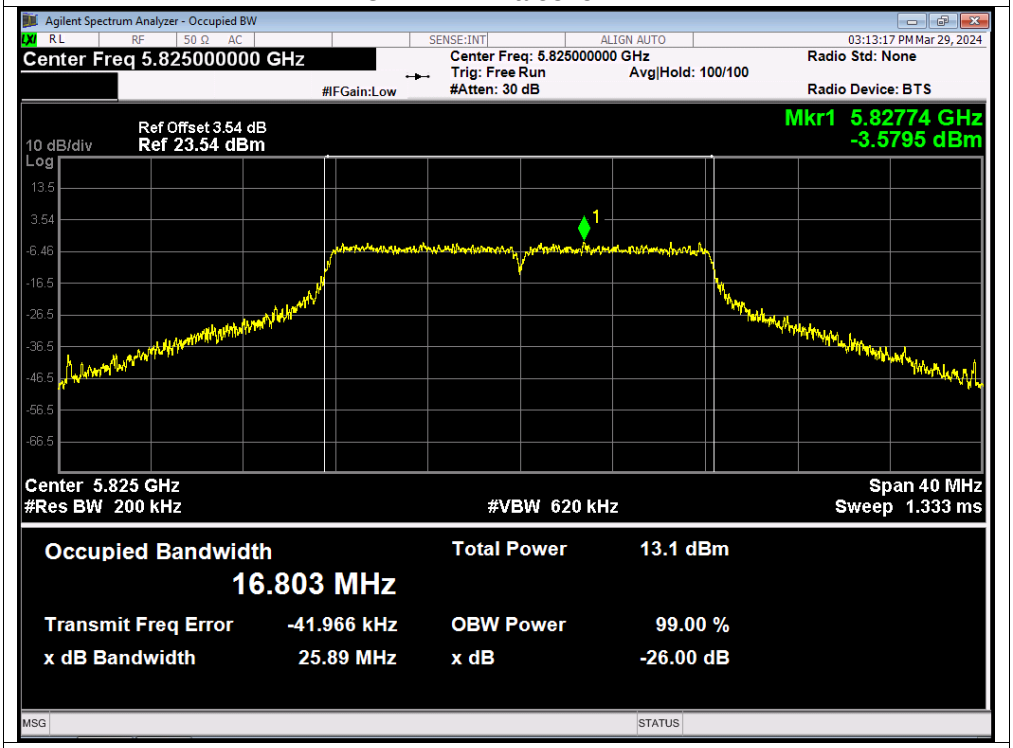
OBW NVNT a 5745MHz



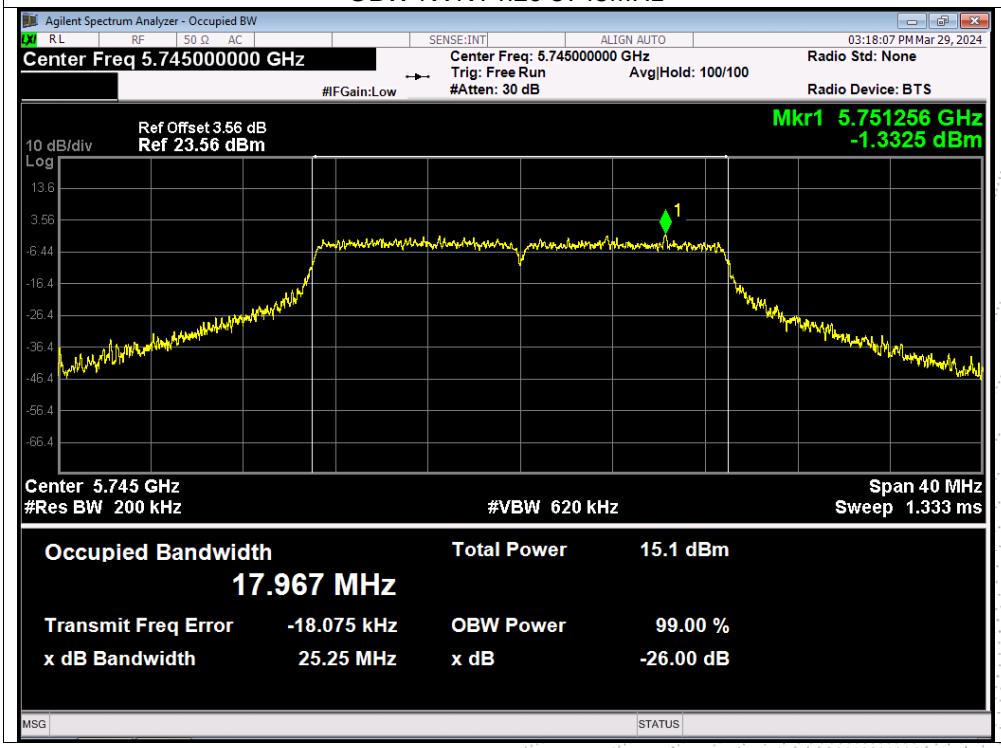
OBW NVNT a 5785MHz



OBW NVNT a 5825MHz



OBW NVNT n20 5745MHz



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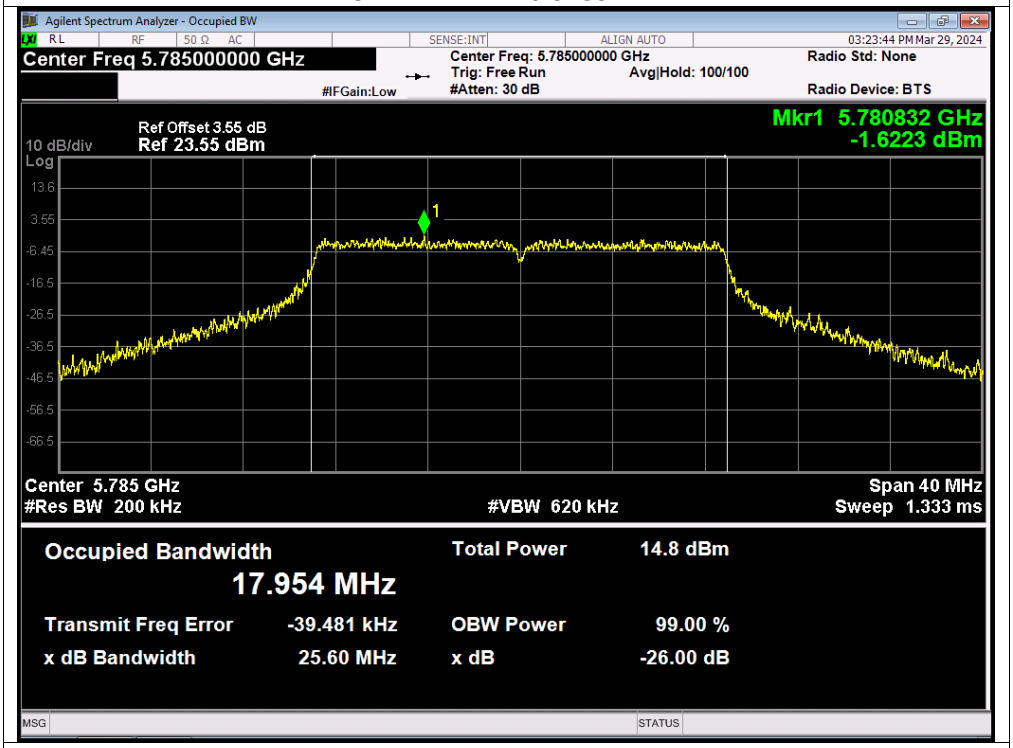
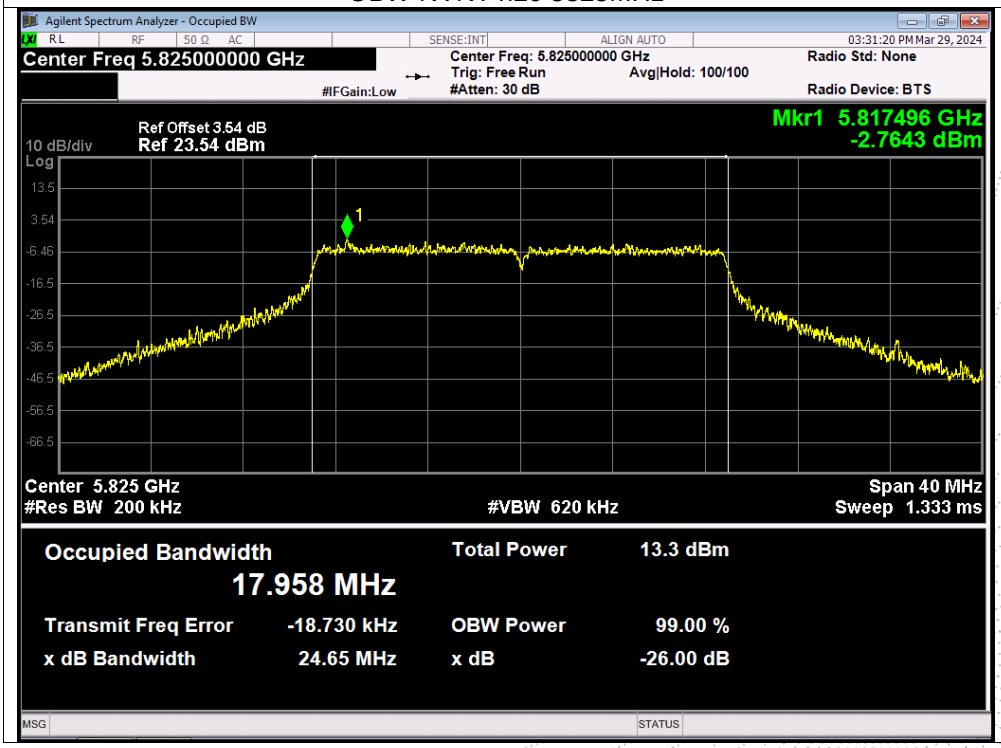
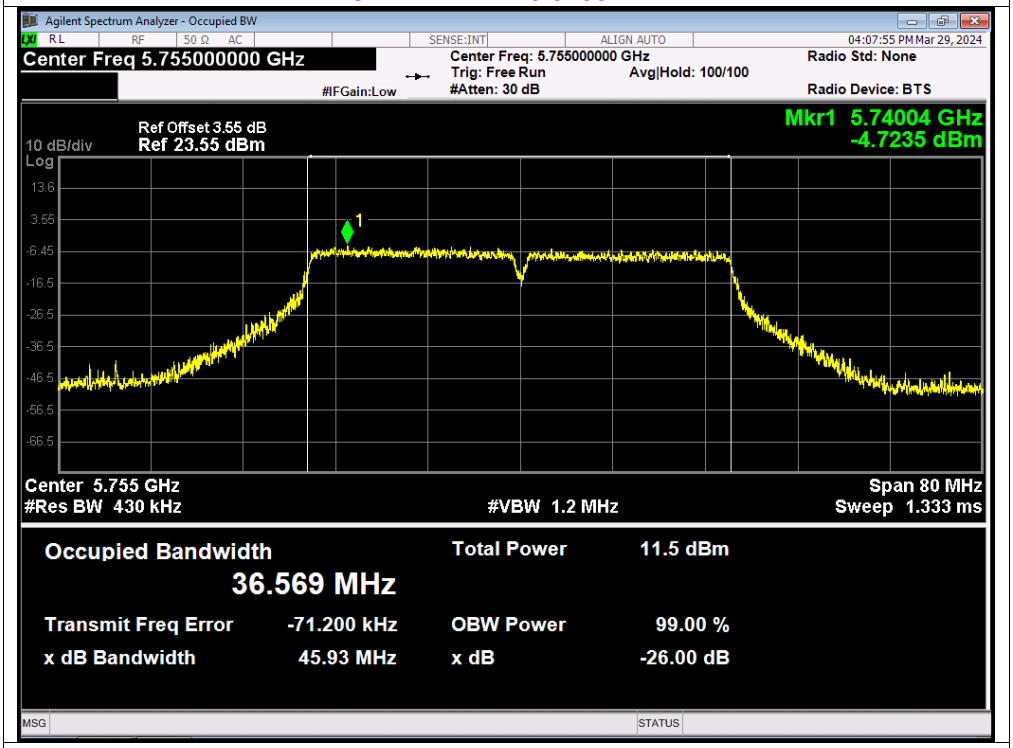


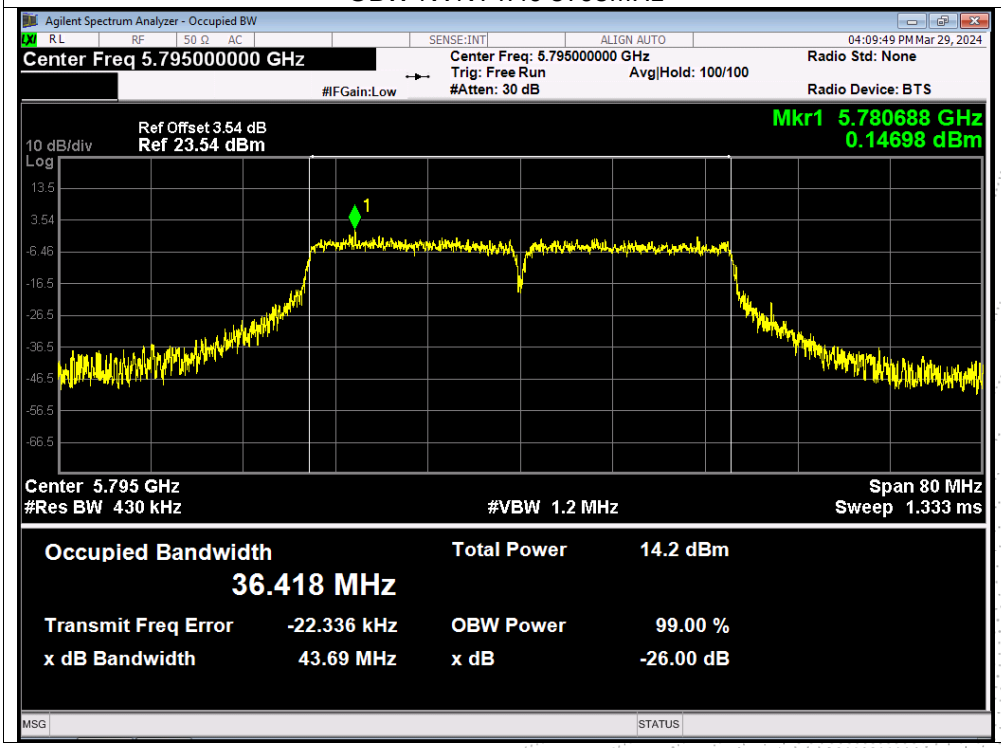
OBW NVNT n20 5825MHz



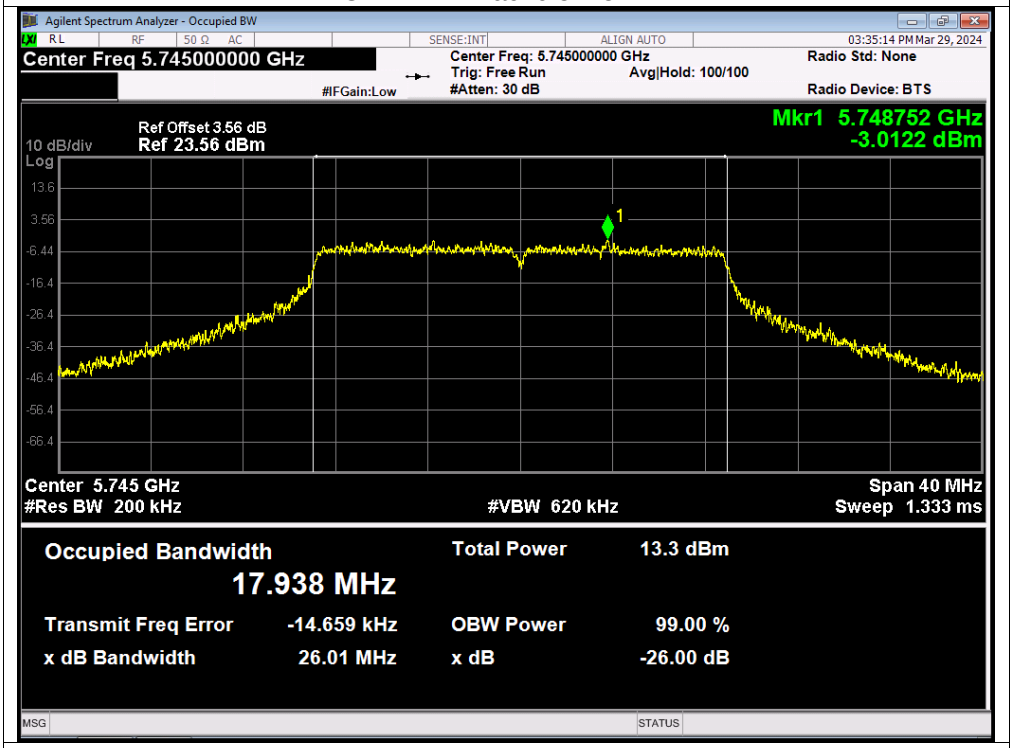
OBW NVNT n40 5755MHz



OBW NVNT n40 5795MHz



OBW NVNT ac20 5745MHz



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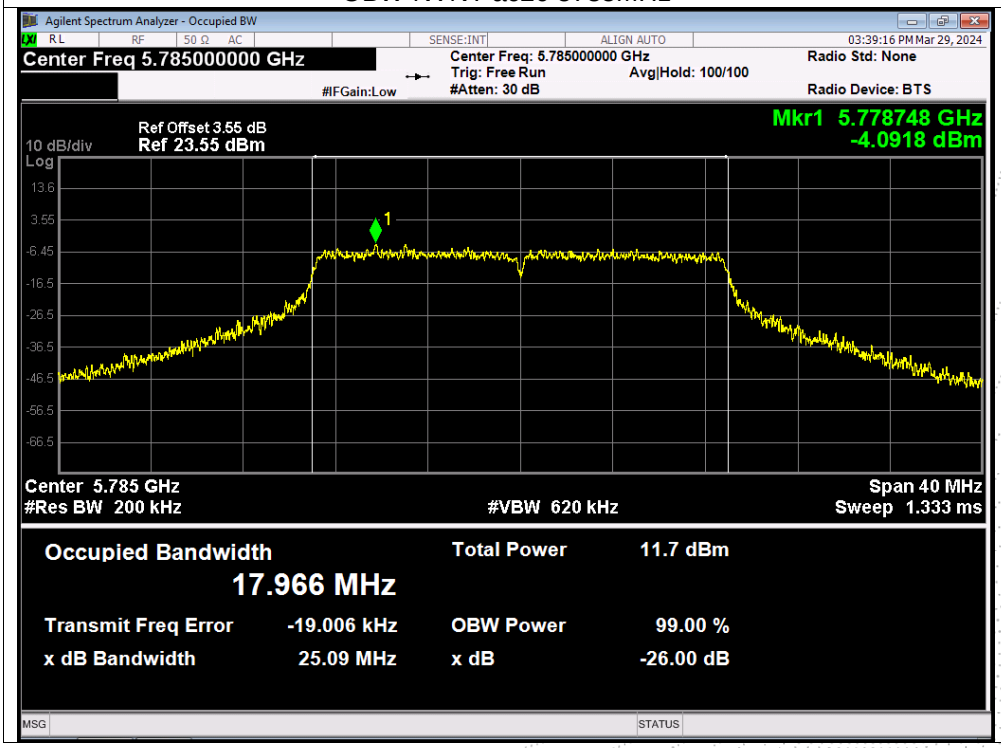

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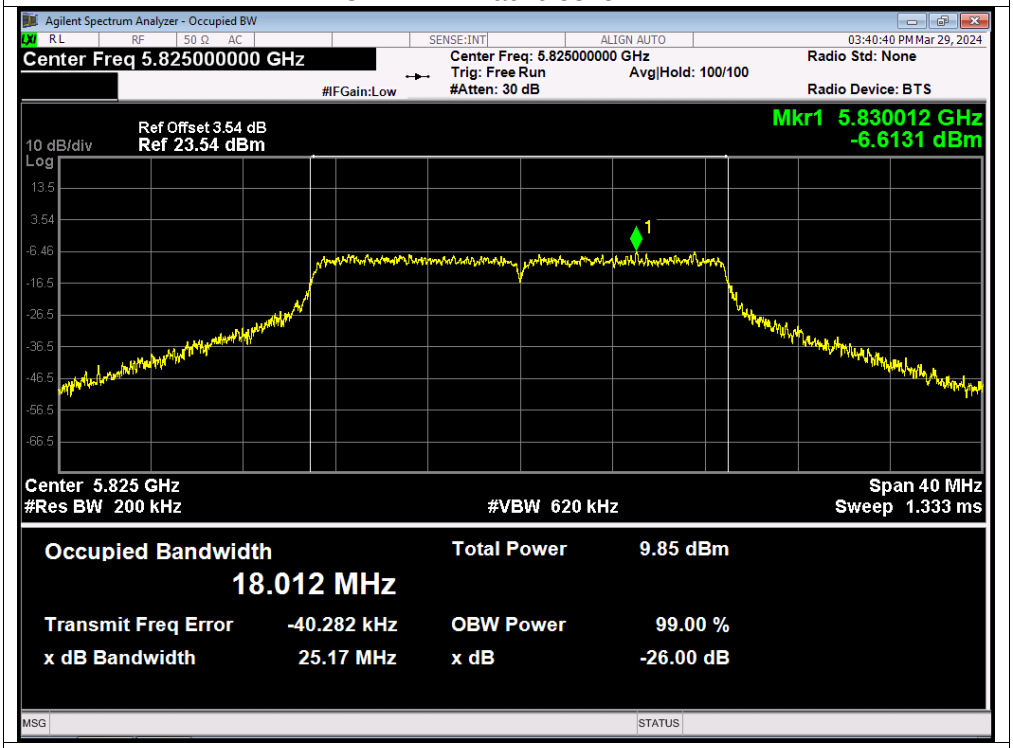
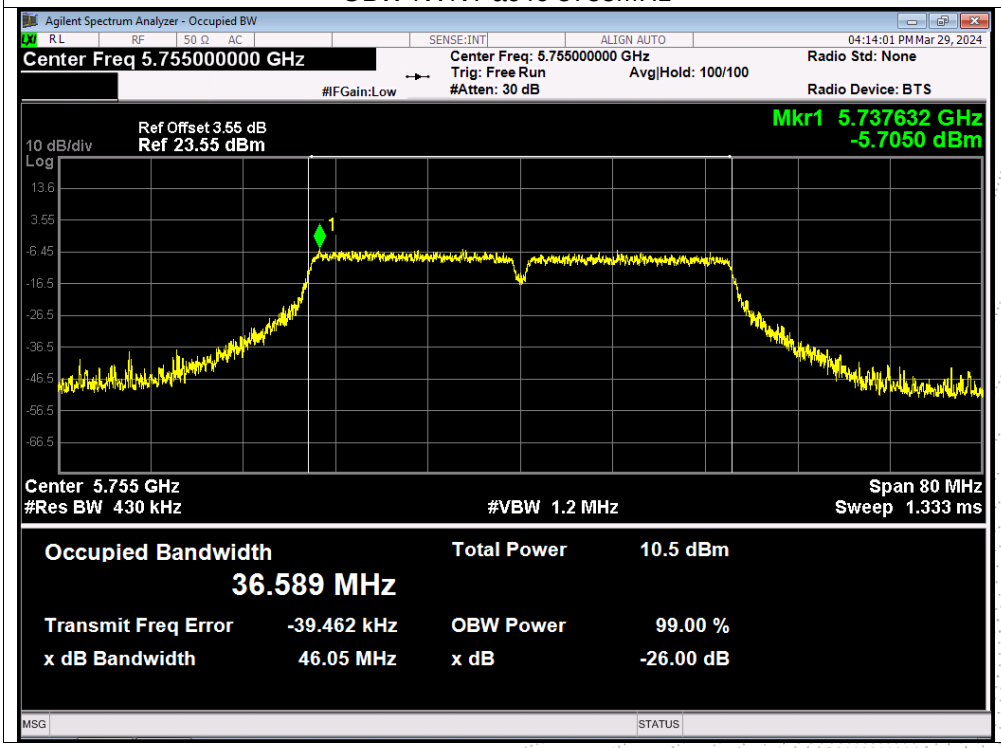
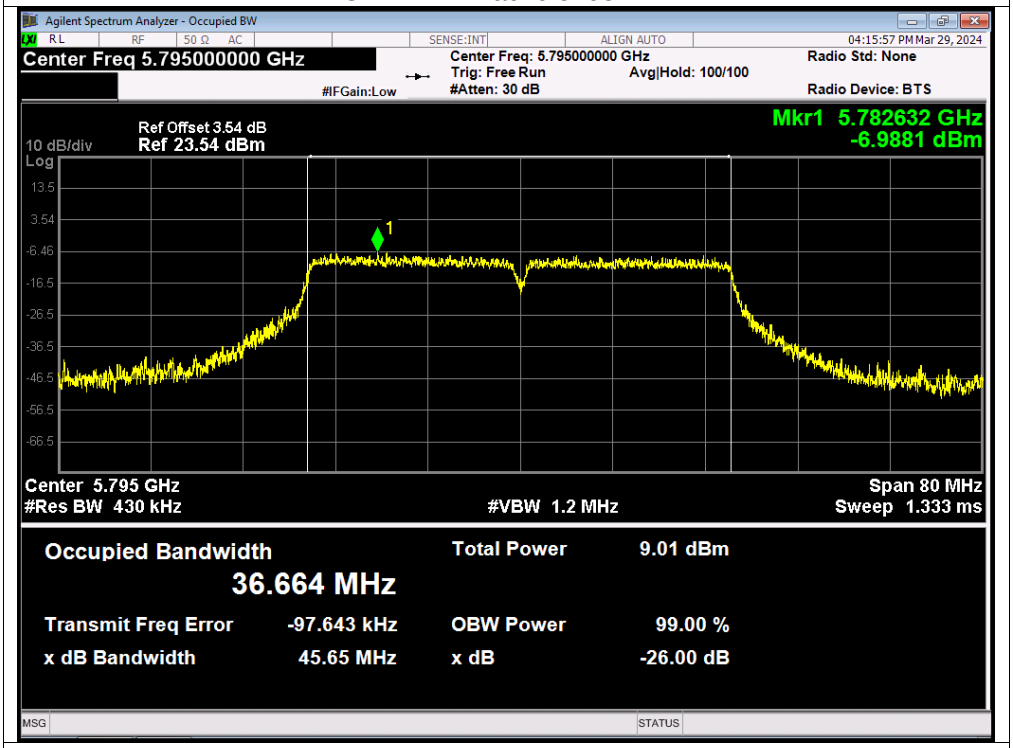


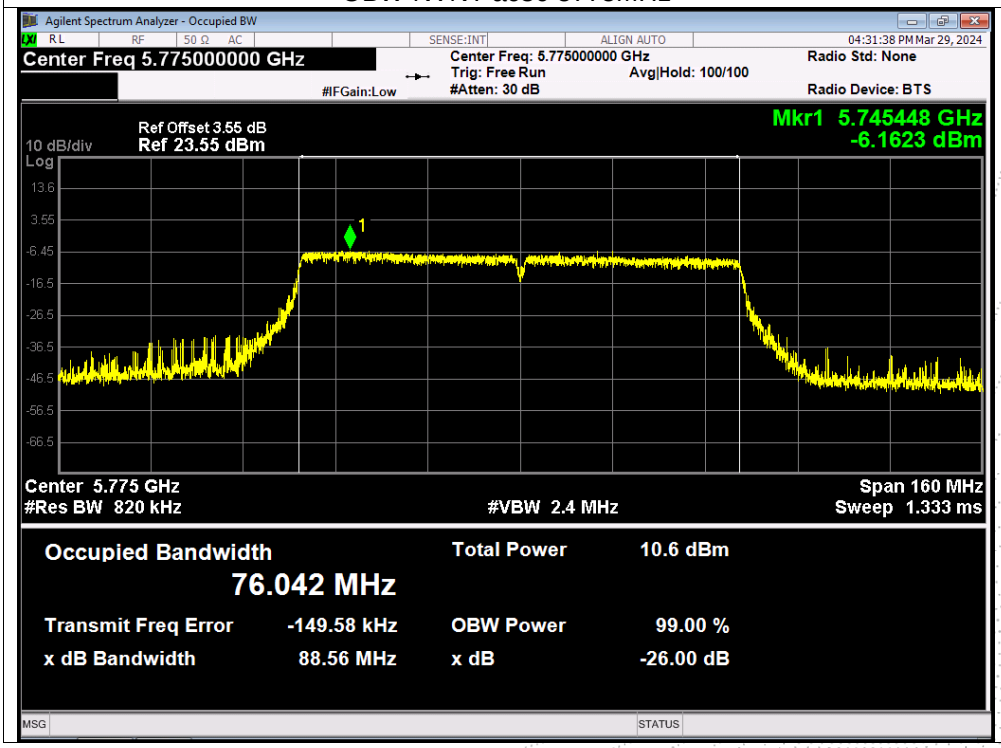
OBW NVNT ac40 5755MHz



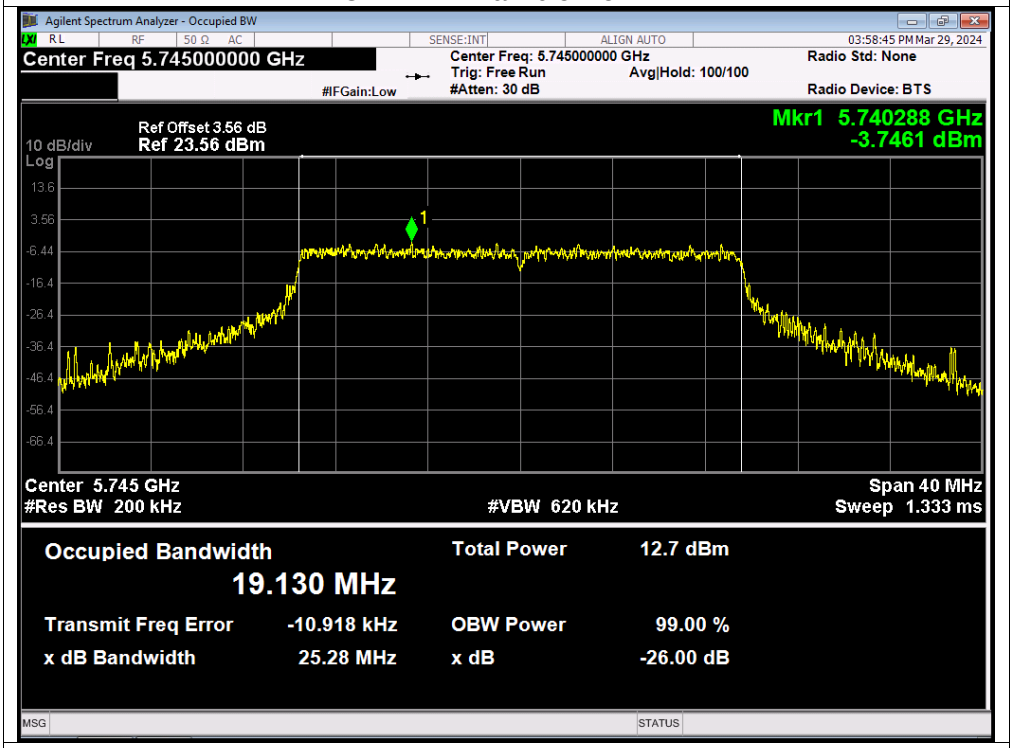
OBW NVNT ac40 5795MHz



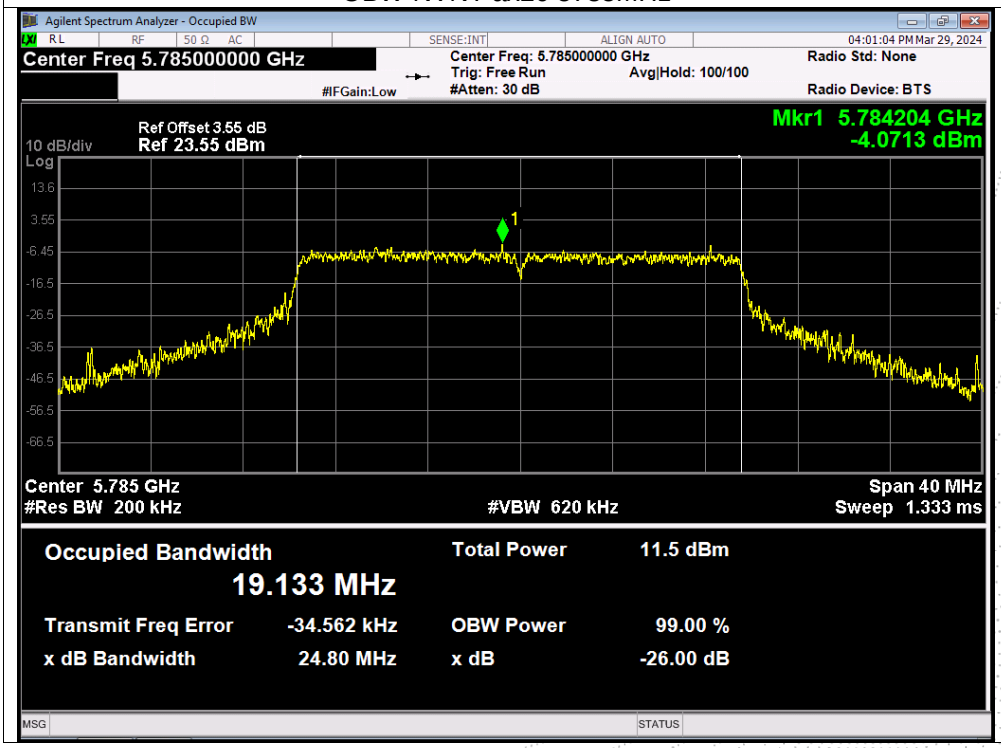
OBW NVNT ac80 5775MHz



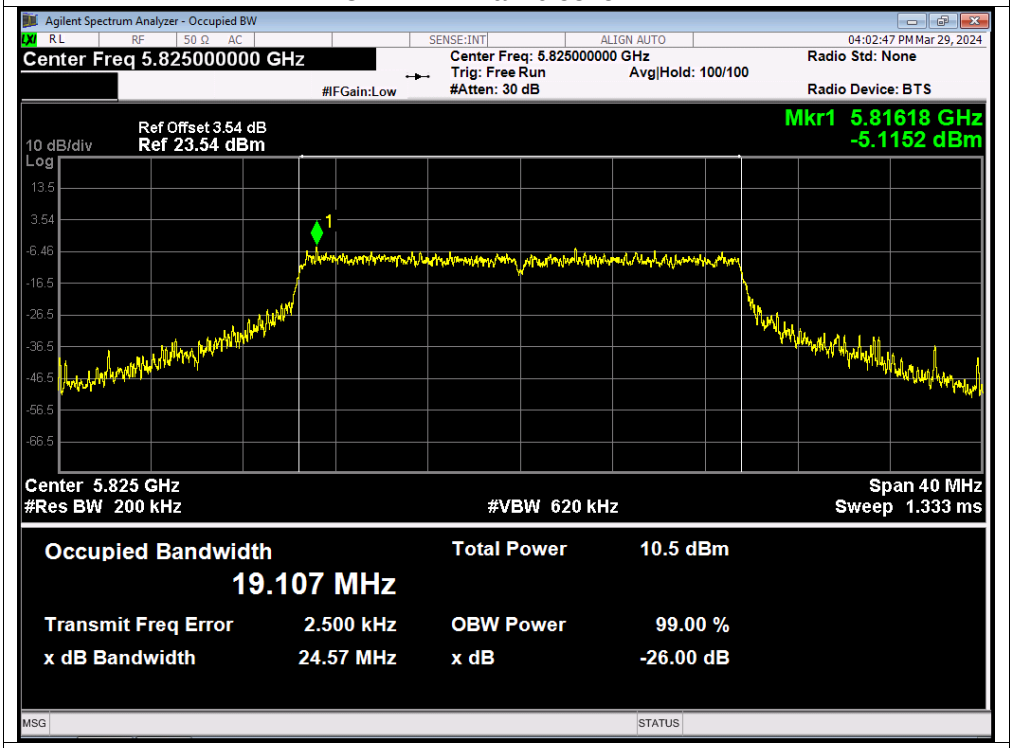
OBW NVNT ax20 5745MHz



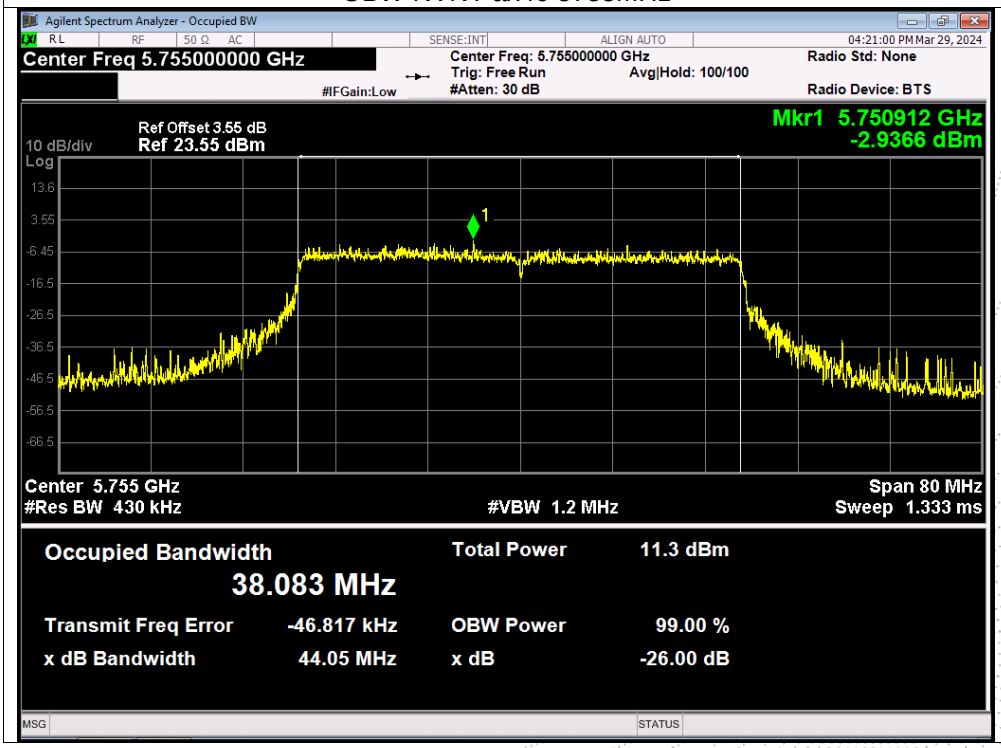
OBW NVNT ax20 5785MHz



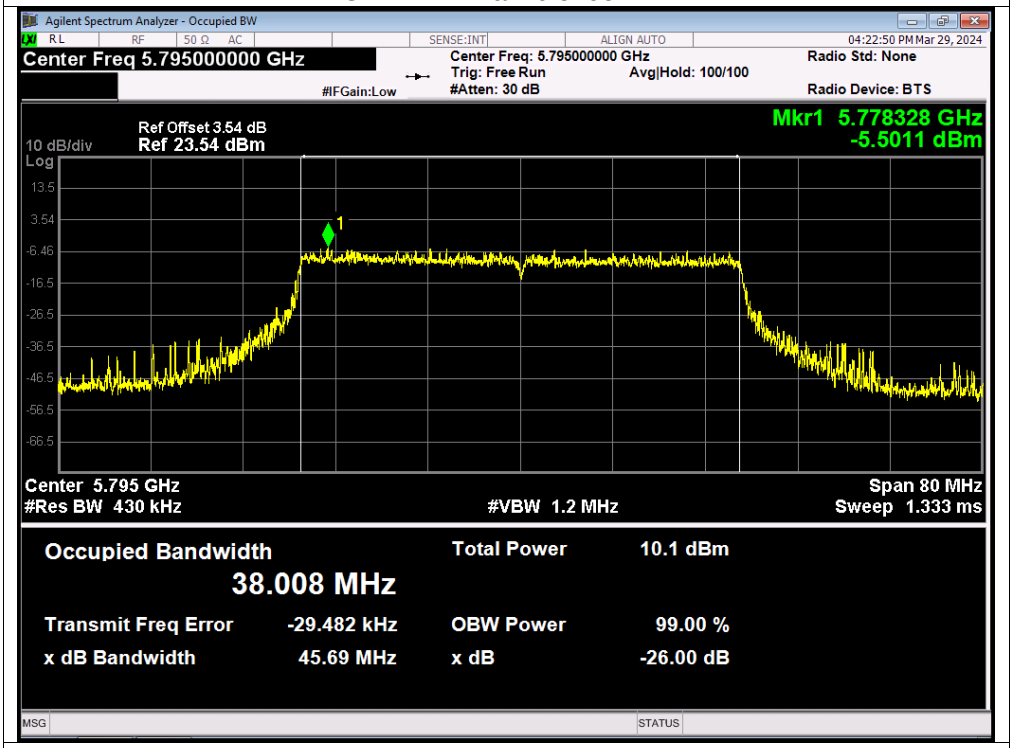
OBW NVNT ax20 5825MHz



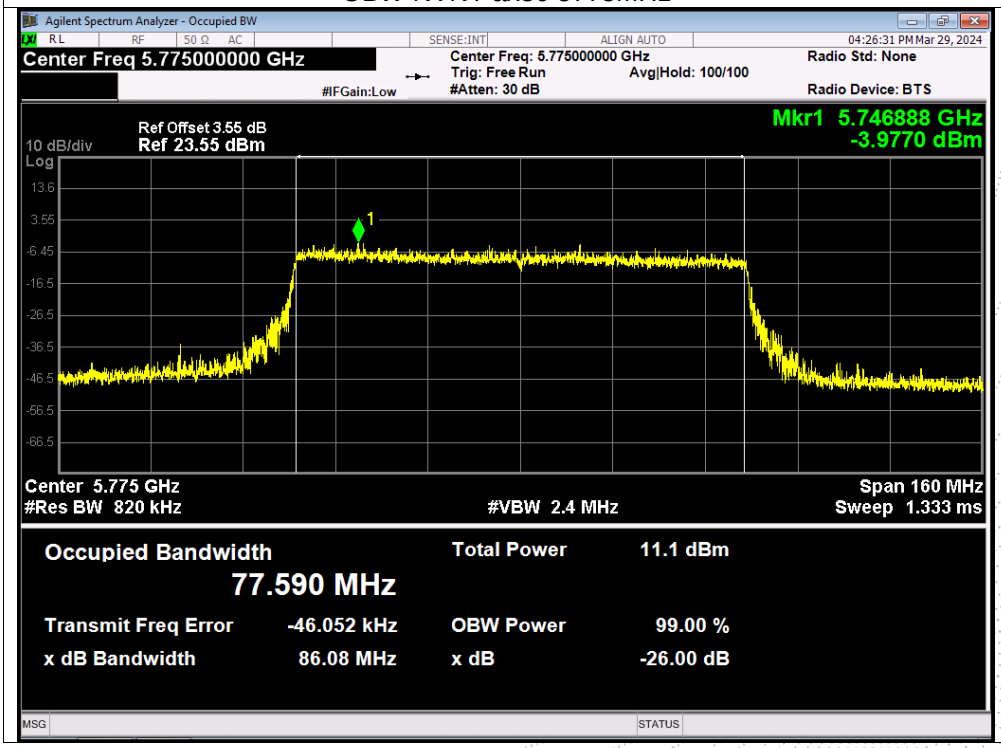
OBW NVNT ax40 5755MHz



OBW NVNT ax40 5795MHz

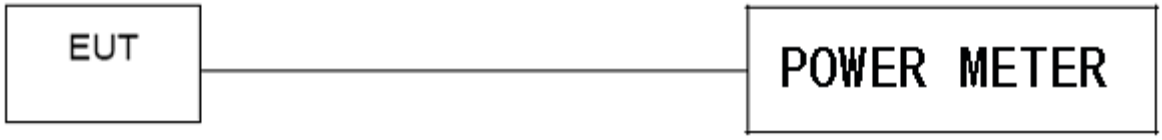


OBW NVNT ax80 5775MHz



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%
Pressure:	101KPa	Test Voltage:	AC120V/60Hz
Test Mode:	(5180-5240MHz)		

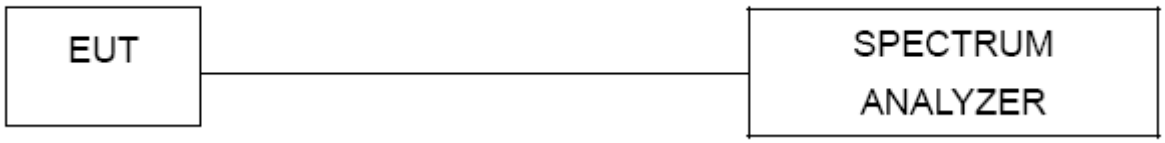
Condition	Mode	Frequency (MHz)	Conducted Power (dBm)	Limit (dBm)	Verdict
NVNT	a	5180	8.23	24	Pass
NVNT	a	5200	7.83	24	Pass
NVNT	a	5240	7.7	24	Pass
NVNT	n20	5180	7.27	24	Pass
NVNT	n20	5200	7.2	24	Pass
NVNT	n20	5240	7.04	24	Pass
NVNT	n40	5190	5.35	24	Pass
NVNT	n40	5230	5.92	24	Pass
NVNT	ac20	5180	7.3	24	Pass
NVNT	ac20	5200	7.18	24	Pass
NVNT	ac20	5240	5.96	24	Pass
NVNT	ac40	5190	6.85	24	Pass
NVNT	ac40	5230	7.38	24	Pass
NVNT	ac80	5210	4.7	24	Pass
NVNT	ax20	5180	5.74	24	Pass
NVNT	ax20	5200	5.19	24	Pass
NVNT	ax20	5240	5.66	24	Pass
NVNT	ax40	5190	7.16	24	Pass
NVNT	ax40	5230	7.18	24	Pass
NVNT	ax80	5210	4.51	24	Pass

Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101KPa	Test Voltage:	AC120V/60Hz
Test Mode:	(5745-5825MHz)		

Condition	Mode	Frequency (MHz)	Conducted Power (dBm)	Limit (dBm)	Verdict
NVNT	a	5745	10.34	30	Pass
NVNT	a	5785	7.47	30	Pass
NVNT	a	5825	7.90	30	Pass
NVNT	n20	5745	8.77	30	Pass
NVNT	n20	5785	8.40	30	Pass
NVNT	n20	5825	7.80	30	Pass
NVNT	n40	5755	5.28	30	Pass
NVNT	n40	5795	5.12	30	Pass
NVNT	ac20	5745	7.56	30	Pass
NVNT	ac20	5785	6.47	30	Pass
NVNT	ac20	5825	4.94	30	Pass
NVNT	ac40	5755	4.38	30	Pass
NVNT	ac40	5795	3.08	30	Pass
NVNT	ac80	5775	4.48	30	Pass
NVNT	ax20	5745	6.68	30	Pass
NVNT	ax20	5785	5.46	30	Pass
NVNT	ax20	5825	3.94	30	Pass
NVNT	ax40	5755	4.27	30	Pass
NVNT	ax40	5795	3.11	30	Pass
NVNT	ax80	5775	3.02	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