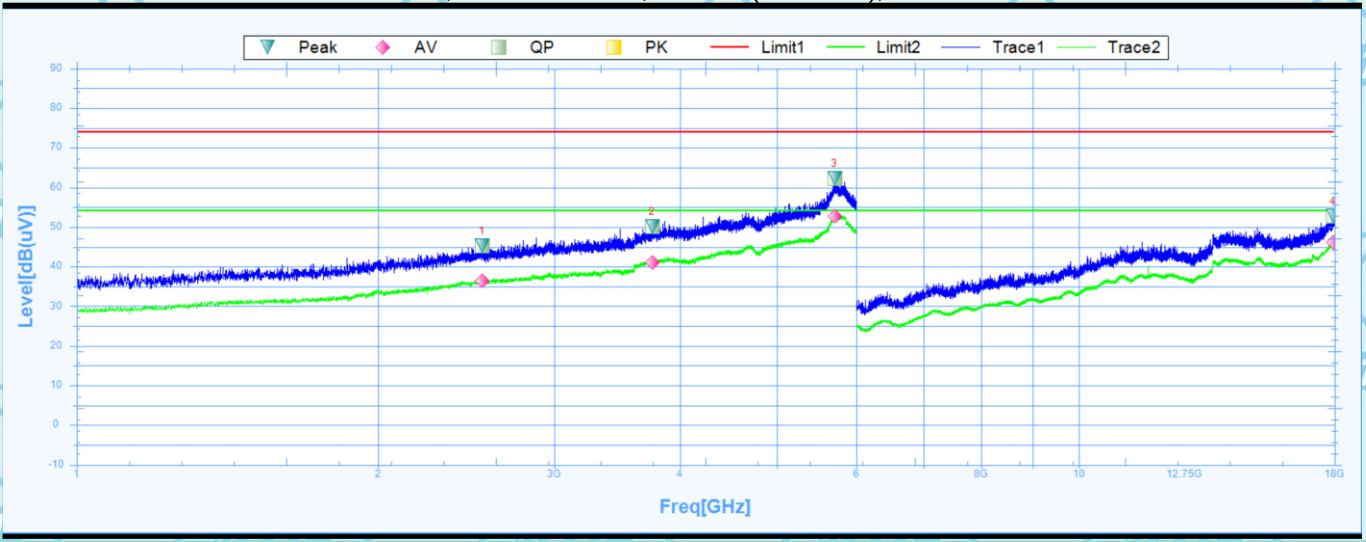
11a, 1 GHz to 18 GHz, Channel (5825 MHz), ANT V



Susputed Data List										
NO.	Freq. [MHz]	Reading [dB(uV)]	Factor [dB]	Level [dB(uV)]	Limit [dB]	Margin [dB]	Deg [°]	Polarity	Trace	Verdict
1	2538.7500	45.22	27.65	17.57	74	-28.78	305.4	Vertical	PK	Pass
1	2538.7500	36.42	27.65	8.77	54	-17.58	305.4	Vertical	AV	Pass
2	3752.5000	50.09	29.11	20.98	74	-23.91	98.6	Vertical	PK	Pass
2	3752.5000	40.98	29.11	11.87	54	-13.02	98.6	Vertical	AV	Pass
3	5706.8750	62.3	32.33	29.97	74	-11.7	357	Vertical	PK	Pass
3	5706.8750	52.83	32.33	20.5	54	-1.17	357	Vertical	AV	Pass
4	17941.5000	52.67	23.53	29.14	74	-21.33	0	Vertical	PK	Pass
4	17941.5000	46.03	23.53	22.5	54	-7.97	0	Vertical	AV	Pass

Note:
1. All emissions not reported were more than 20dB below the specified limit or in the noise floor.
2. Emission Level= Reading Level+ Probe Factor +Cable Loss.
3. Data of measurement within this frequency range shown “--” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
4. EUT has been tested in unfolded states, and the report only reflects data in the unfolded state (worst-case scenario)

7.3 ANTENNA REQUIREMENT

Standard requirement:	The EUT'S antenna is met the requirement of FCC part 15C section 15.203 and FCC part 15C section 15.407.
FCC part 15C section 15.203 and FCC part 15C section 15.407 requirements: Systems operating in the 5150~5850MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum peak output power of the intentional radiator is reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.	
E.U.T Antenna:	
The Wi-Fi antenna is a Integral Antenna. it meets the standards, and the best case gain of the antenna is "MAIN:2.94dBi ,AUX:2.75 dBi".	

<CDD Modes >
FCC KDB 662911 D01 Multiple Transmitter Output v02r01
For CDD transmissions, directional gain is calculated as
Directional gain = GANT + Array Gain, where Array Gain is as follows.
For power spectral density (PSD) measurements on all devices,
Array Gain = 10 log(NANT/NSS=1) dB.
For power measurements on IEEE 802.11 devices,
Array Gain = 0 dB (i.e., no array gain) for NANT ≤ 4.
Directional gain may be calculated by using the formulas applicable to equal gain antennas with
GANT set equal to the gain of the antenna having the highest gain;
The EUT supports CDD mode.
For power, the directional gain GANT is set equal to the antenna having the highest gain, i.e., F)2)f)i).
For PSD, the directional gain calculation is following F)2)f)ii) of KDB 662911 D01 v02r01.

The directional gain "DG" is calculated as following table.

<CDD Modes>	Ant1 (dBi)	Ant2 (dBi)	DG for power (dBi)	DG for PSD (dBi)
5180~5825MHz	2.94	2.75	2.94	5.86

Power limit reduction = Composite gain – 6dBi, (min = 0)
PSD limit reduction = Composite gain + PSD Array gain – 6dBi, (min = 0)

7.4 EMISSION BANDWIDTH

7.4.1 TEST EQUIPMENT

Please refer to Section 5 this report.

7.4.2 TEST PROCEDURE

-26dB Bandwidth and 99% Occupied Bandwidth:	
Test Method:	a)The transmitter was radiated to the spectrum analyzer in peak hold mode. b)Measure the maximum width of the emission that is 26 dB down from the peak 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%.
Test Equipment Setting – 26dB Bandwidth:	Test Equipment Setting – 99%% Bandwidth:
a)Attenuation: Auto b)Span Frequency: > 26dB Bandwidth c)RBW: Approximately 1% of the emission bandwidth d)VBW: VBW > RBW e)Detector: Peak f)Trace: Max Hold g)Sweep Time: Auto	a)Span: 1.5 times to 5.0 times the OBW b)RBW: 1 % to 5 % of the OBW c)VBW: ≥ 3 x RBW d)Detector: Peak e)Trace: Max Hold
6 dB Bandwidth:	
Test Method:	a)The transmitter was radiated to the spectrum analyzer in peak hold mode. b)Test was performed in accordance with KDB789033 D02 v01 for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - section (C) Emission Bandwidth. c)Multiple antenna system was performed in accordance with KDB662911 D01 v02r01 Emissions Testing of Transmitters with Multiple Outputs in the Same Band. d)Measured the spectrum width with power higher than 6dB below carrier.
Test Equipment Setting:	
a)Attenuation: Auto b)Span Frequency: > 6dB Bandwidth c)RBW: 100kHz d)VBW: ≥ 3 x RBW	e)Detector: Peak f)Trace: Max Hold g)Sweep Time: Auto
Maximum Conducted Output Power Measurement:	
Test Method:	a)The transmitter output (antenna port) was connected to the power meter. b)Test was performed in accordance with KDB789033 D02 v01 for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - section (E) Maximum conducted output power =>3. Measurement using a Power Meter (PM) =>b) Method PM-G (Measurement using a gated RF average power meter). c)Multiple antenna systems was performed in accordance with KDB662911 D01 v02r01 Emissions Testing of Transmitters with Multiple Outputs in the Same Band. d)When measuring maximum conducted output power with multiple antenna systems, add every result of the values by mathematic formula.
Test Equipment Setting: Detector - Average	
Power Spectral Density:	
Test Method:	a)The transmitter output (antenna port) was connected RF switch to the spectrum analyzer. b)Test was performed in accordance with KDB789033 D02 v01 for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - section (F) Maximum Power Spectral Density (PSD). c)Multiple antenna systems was performed in accordance KDB662911 D01 v02r01 in-Band Power Spectral Density (PSD) Measurements (a) Measure and sum the spectra across the outputs. d)When measuring first spectral bin of output 1 is summed with that in the first spectral bin of output 2 and that from the first spectral bin of output 3 and so on up to the Nth output to obtain the value for the first frequency bin of the summed spectrum. The summed spectrum value for each of the other frequency bins is computed in the same way. e)For 5.725~5.85 GHz, the measured result of PSD level must add 10log(500kHz/RBW)

	and the final result should ≤ 30 dBm.

Test Equipment Setting:

a)Attenuation: Auto b)Span Frequency: Encompass the entire emissions bandwidth (EBW) of the signal c)RBW: 1000 kHz d)VBW: 3000 kHz	e)Detector: RMS f)Trace: AVERAGE g)Sweep Time: Auto h)Trace Average: 100 times

Note: If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10log(500kHz/RBW) to the measured result, whereas RBW (< 500 kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.

Frequency Stability Measurement:

Test Method:	a)The transmitter output (antenna port) was connected to the spectrum analyzer. b)EUT have transmitted absence of modulation signal and fixed channelize. c)Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth. d)Set RBW = 10 kHz, VBW = 10 kHz with peak detector and maxhold settings. e)fc is declaring of channel frequency. Then the frequency error formula is (fc-f)/fc × 106 ppm and the limit is less than ±20ppm (IEEE 802.11nspecification). f)The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value g)Extreme temperature is 0°C~40°C

Test Equipment Setting:

a)Attenuation: Auto b)Span Frequency: Entire absence of modulation emissions bandwidth c)RBW: 10 kHz d)VBW: 10 kHz	e)Sweep Time: Auto

7.4.3 CONFIGURATION OF THE EUT

Same as section 3.4 of this report

7.4.4 EUT OPERATING CONDITION

Same as section 3.5 of this report.

7.4.5 LIMIT

-26dB Bandwidth and 99% Occupied Bandwidth:	
Limit:	No restriction limits.
-6 dB Bandwidth:	
Limit:	For digital modulation systems, the minimum 6dB bandwidth shall be at least 500 kHz.
Test Equipment Setting:	
a)Attenuation: Auto b)Span Frequency: > 6dB Bandwidth c)RBW: 100kHz d)VBW: ≥ 3 x RBW	e)Detector: Peak f)Trace: Max Hold g)Sweep Time: Auto
Maximum Conducted Output Power Measurement:	
☒5.15~5.25 GHz	
☐Limit of Outdoor access point:	☐Limit of Indoor access point:
The maximum conducted output power over the frequency band of operation shall not exceed 1 W (30dBm) provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).	The maximum conducted output power over the frequency band of operation shall not exceed 1 W (30dBm) provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
☐Limit of Fixed point-to-point access points:	☒Limit of Mobile and portable client devices:
The maximum conducted output power over the frequency band of operation shall not exceed 1 W (30dBm). Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi.	The maximum conducted output power over the frequency band of operation shall not exceed 250 mW (24dBm) provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
☒5.25-5.35 GHz & ☒5.470-5.725 GHz	
The maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW (24dBm) or 11 dBm 10 log B, where B is the 26 dB emission bandwidth in megahertz. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.	
☒5.725~5.85 GHz	
The maximum conducted output power over the frequency band of operation shall not exceed 1 W (30dBm). If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power.	
Power Spectral Density	
☒5.15~5.25 GHz	
☐Limit of Outdoor access point: 17 dBm/MHz	☐Limit of Indoor access point: 17 dBm/MHz
☐Limit of Fixed point-to-point access points: 17 dBm/MHz	☒Limit of Mobile and portable client devices: 11 dBm/MHz
☐5.25-5.35 GHz	11 dBm/MHz
☐5.470-5.725 GHz	11 dBm/MHz
☒5.725~5.85 GHz	30 dBm/500kHz
Frequency Stability Measurement:	
Limit:	In-band 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).

7.4.6 TEST RESULT

-26dB Bandwidth and 99% Occupied Bandwidth

Product	: EUT-Sample	Test Mode	: See section 3.4
Test Item	: -26dB Bandwidth/-6dB Bandwidth and 99% Occupied Bandwidth	Temperature	: 25 ℃
Test Voltage	: DC 11.55V	Humidity	: 56%RH
Test Result	: PASS		

-26dB Bandwidth

Mode	Frequency (MHz)	-26 dB Bandwidth (MHz)	Verdict
a	5180	19.62	Pass
a	5240	19.43	Pass
a	5260	19.08	Pass
a	5320	19.92	Pass
a	5500	19.52	Pass
a	5700	19.50	Pass
n20	5180	20.30	Pass
n20	5240	19.74	Pass
n20	5260	20.61	Pass
n20	5320	20.76	Pass
n20	5500	20.65	Pass
n20	5700	20.97	Pass
n40	5190	39.85	Pass
n40	5230	39.32	Pass
n40	5270	39.44	Pass
n40	5310	40.03	Pass
n40	5510	39.51	Pass
n40	5670	39.4	Pass
ac20	5180	20.31	Pass
ac20	5240	20.09	Pass
ac20	5260	20.32	Pass
ac20	5320	20.48	Pass
ac20	5500	20.34	Pass
ac20	5700	20.31	Pass
ac40	5190	39.25	Pass
ac40	5230	39.79	Pass
ac40	5270	39.13	Pass
ac40	5310	38.98	Pass
ac40	5510	39.01	Pass
ac40	5670	39.31	Pass
ac80	5210	79.14	Pass
ac80	5290	78.69	Pass
ac80	5530	78.80	Pass
ac80	5610	78.96	Pass
ax20	5180	22.86	Pass
ax20	5240	19.72	Pass
ax20	5260	20.94	Pass
ax20	5320	24.39	Pass
ax20	5500	22.51	Pass
ax20	5700	22.05	Pass
ax40	5190	47.89	Pass
ax40	5230	39.41	Pass
ax40	5270	39.38	Pass
ax40	5310	43.85	Pass
ax40	5510	44.13	Pass
ax40	5670	50.08	Pass
ax80	5210	81.85	Pass
ax80	5290	83.45	Pass
ax80	5530	92.83	Pass

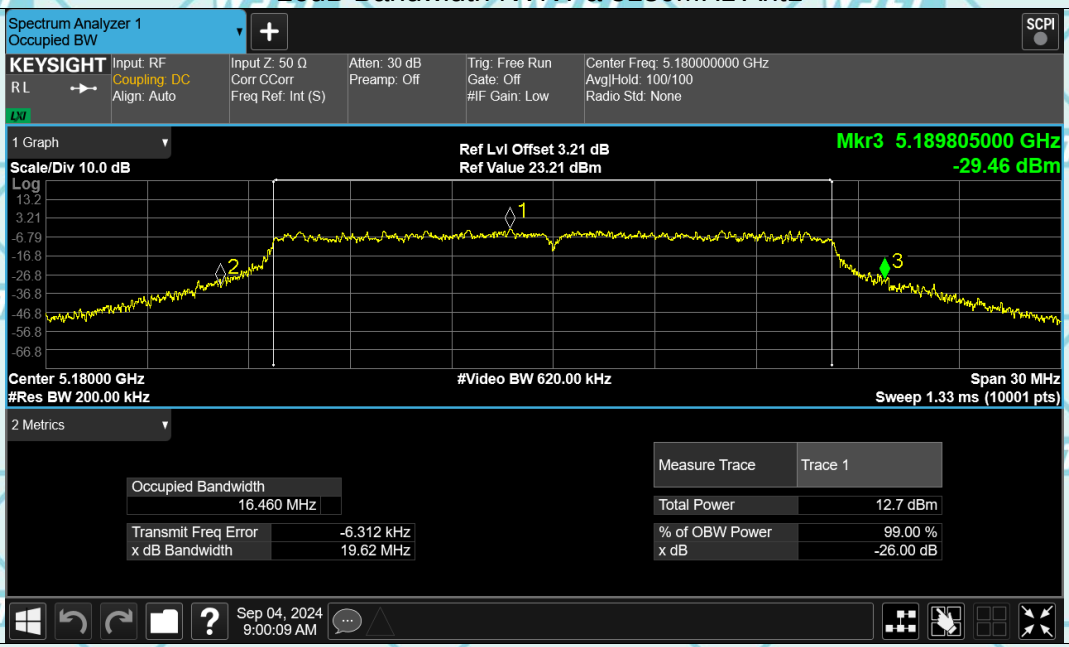
ax80	5610	79.52	Pass
ax160	5250	161.3	Pass
ax160	5570	164.5	Pass

-6dB Bandwidth

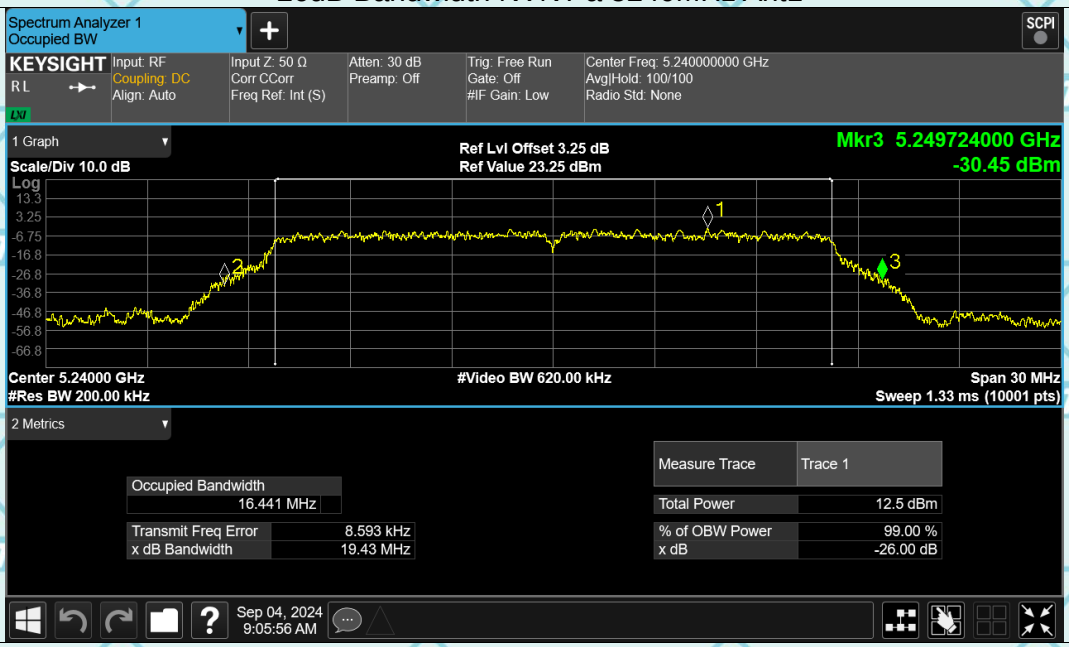
Mode	Frequency (MHz)	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
a	5745	16.38	0.5	Pass
a	5825	16.41	0.5	Pass
n20	5745	17.51	0.5	Pass
n20	5825	17.14	0.5	Pass
n40	5755	35.41	0.5	Pass
n40	5795	35.10	0.5	Pass
ac20	5745	16.93	0.5	Pass
ac20	5825	17.29	0.5	Pass
ac40	5755	35.02	0.5	Pass
ac40	5795	35.08	0.5	Pass
ac80	5775	75.11	0.5	Pass
ax20	5745	18.99	0.5	Pass
ax20	5825	18.79	0.5	Pass
ax40	5755	35.10	0.5	Pass
ax40	5795	36.04	0.5	Pass
ax80	5775	74.92	0.5	Pass

Test Graphs

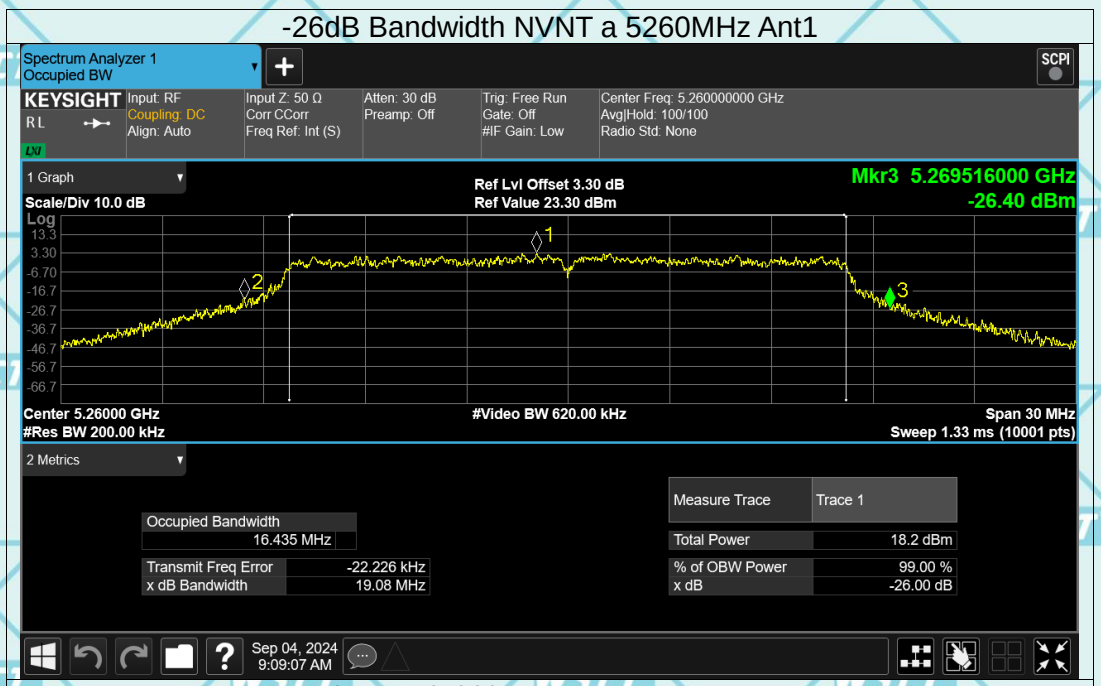
-26dB Bandwidth NVNT a 5180MHz Ant1



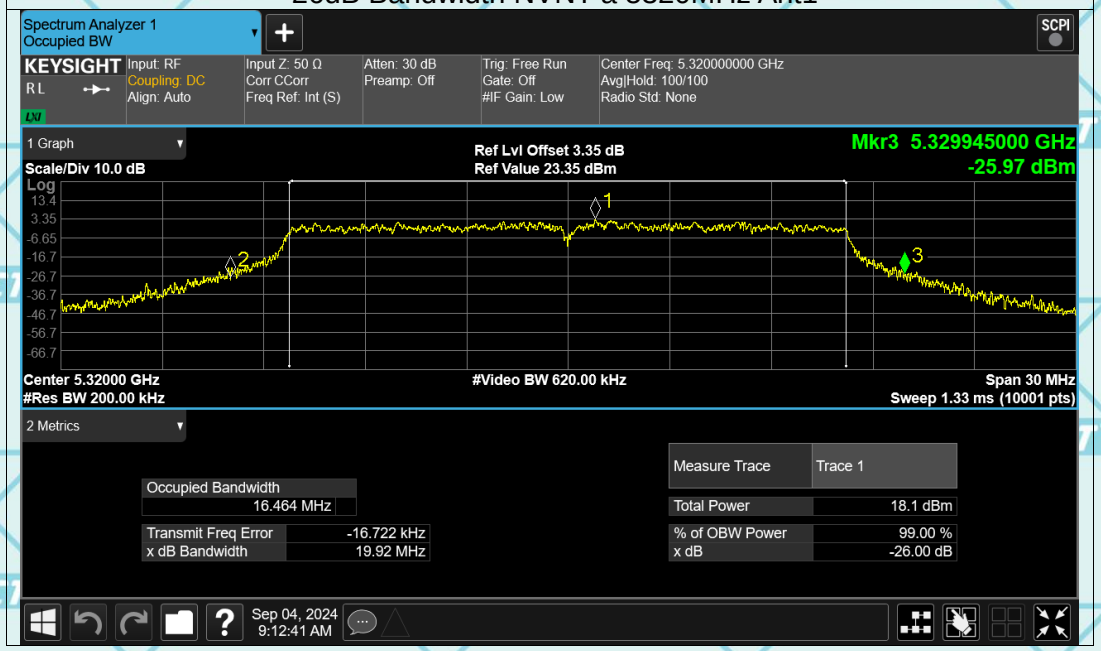
-26dB Bandwidth NVNT a 5240MHz Ant1



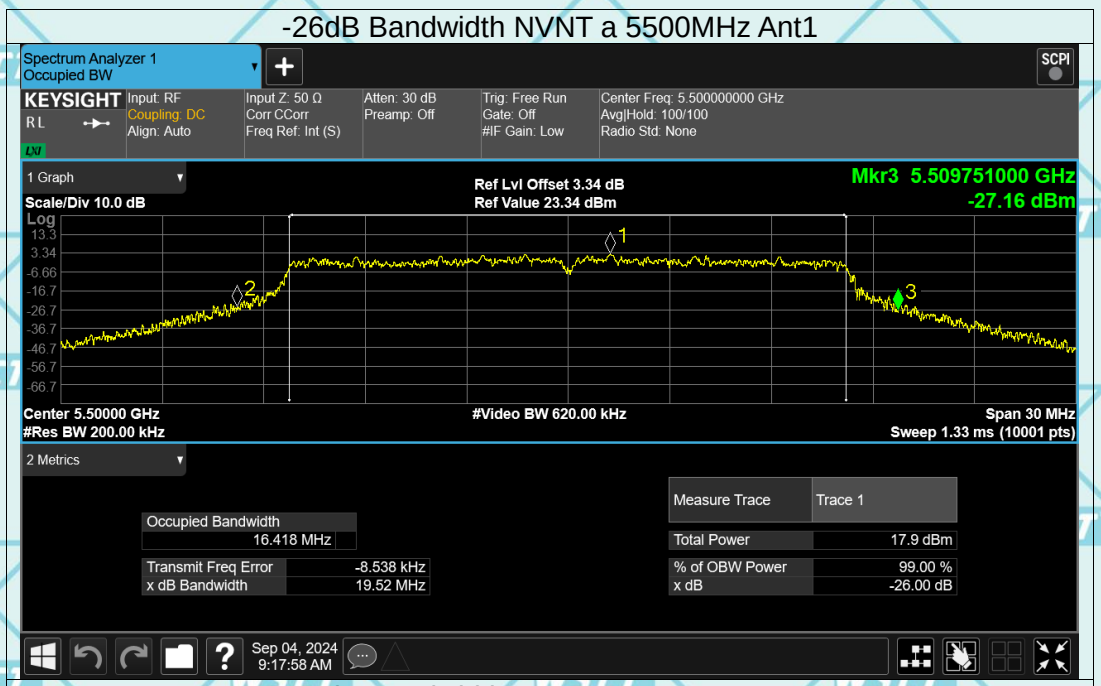
-26dB Bandwidth NVNT a 5260MHz Ant1



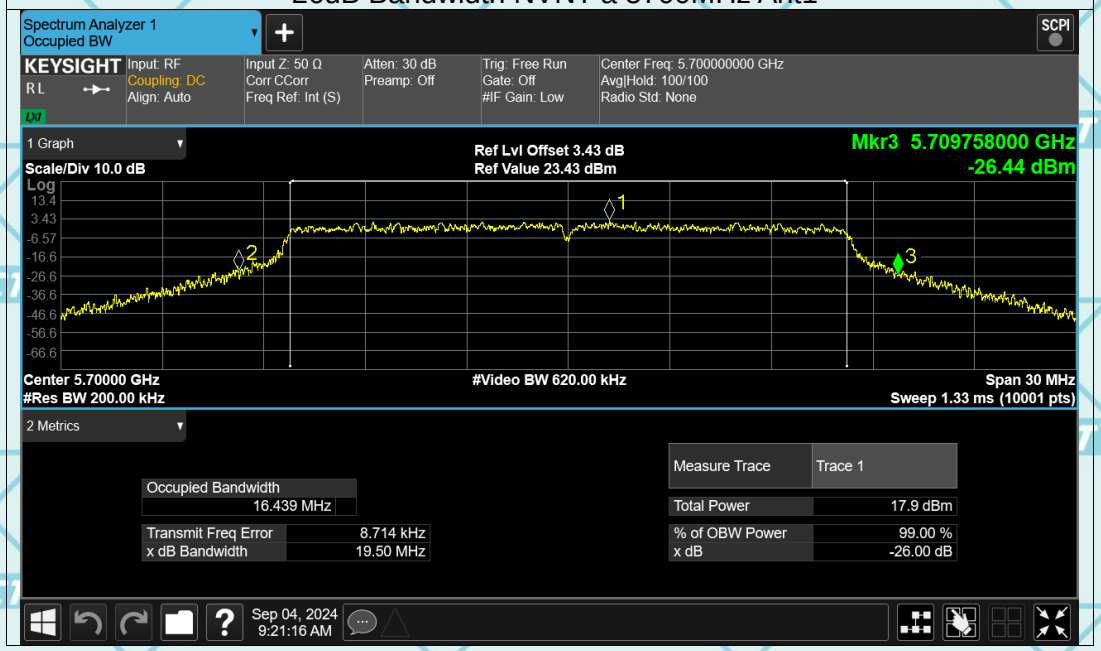
-26dB Bandwidth NVNT a 5320MHz Ant1



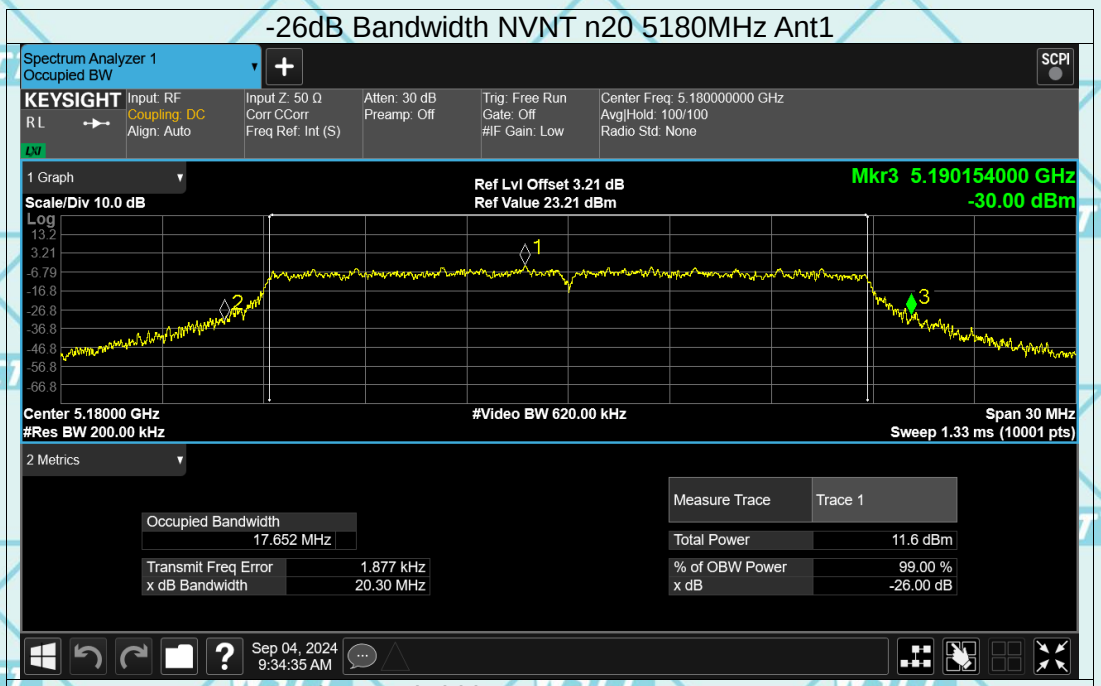
-26dB Bandwidth NVNT a 5500MHz Ant1



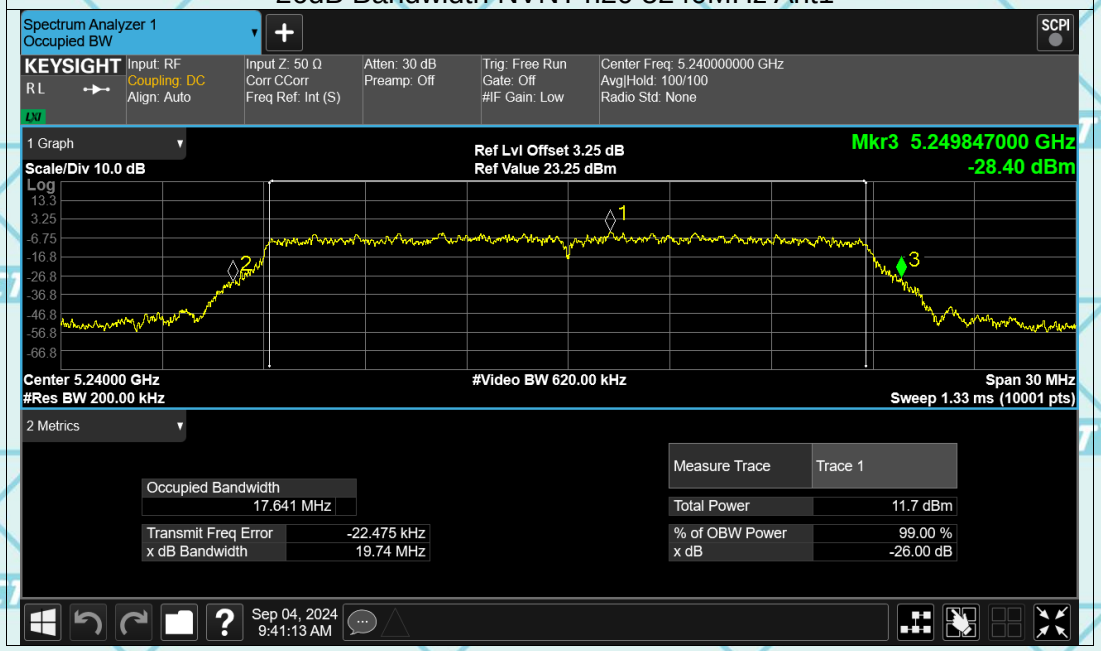
-26dB Bandwidth NVNT a 5700MHz Ant1



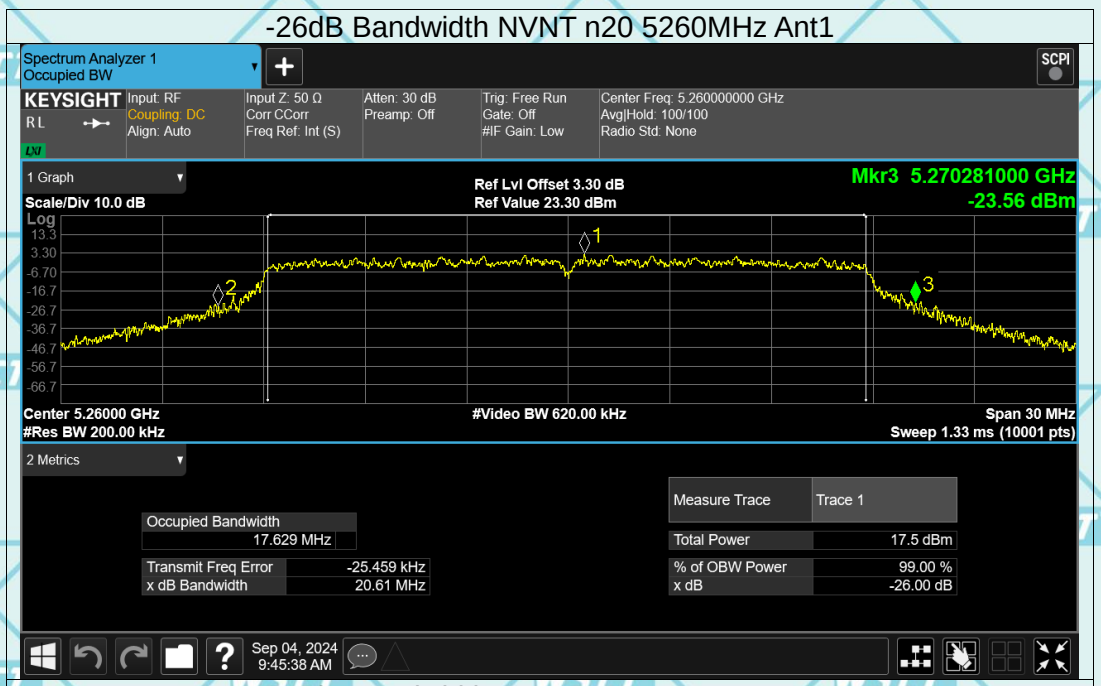
-26dB Bandwidth NVNT n20 5180MHz Ant1



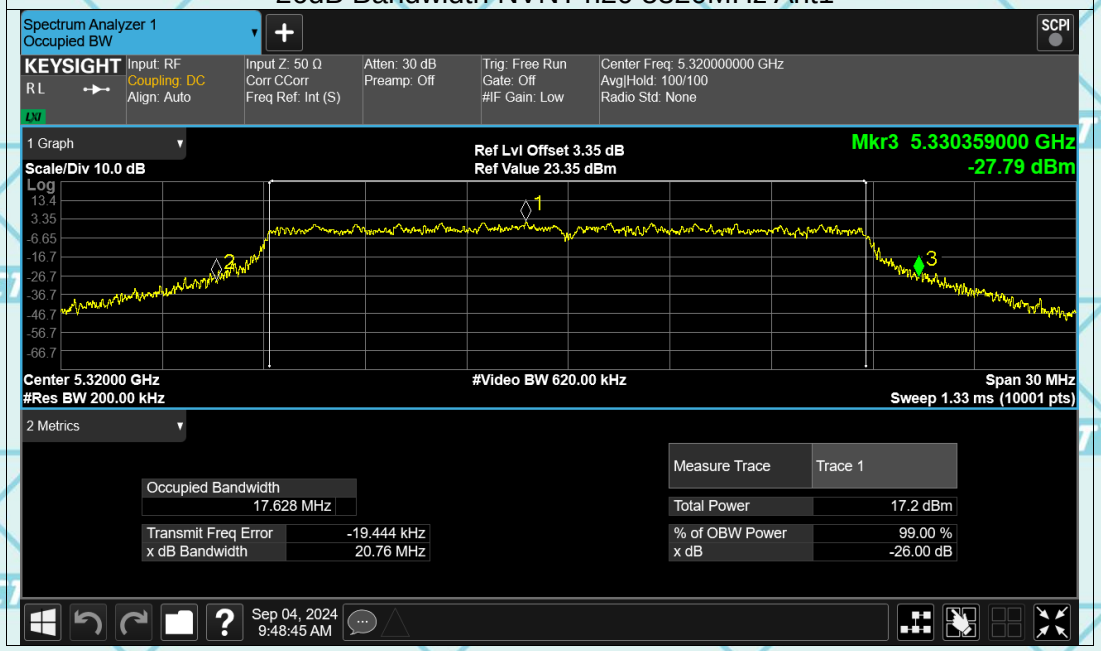
-26dB Bandwidth NVNT n20 5240MHz Ant1



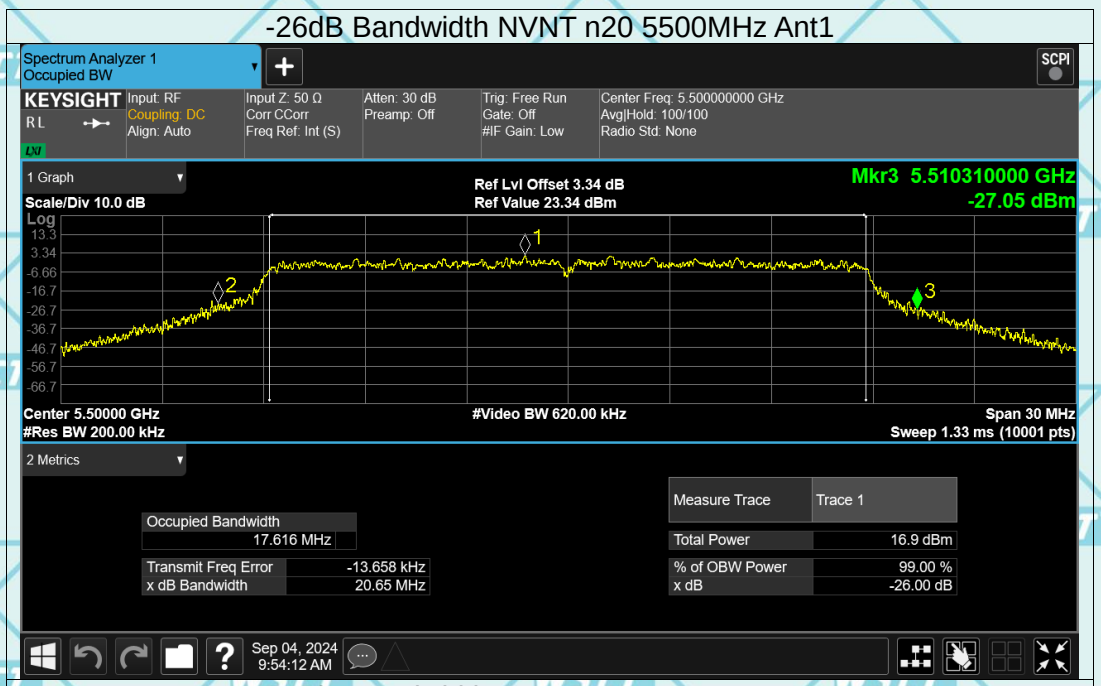
-26dB Bandwidth NVNT n20 5260MHz Ant1



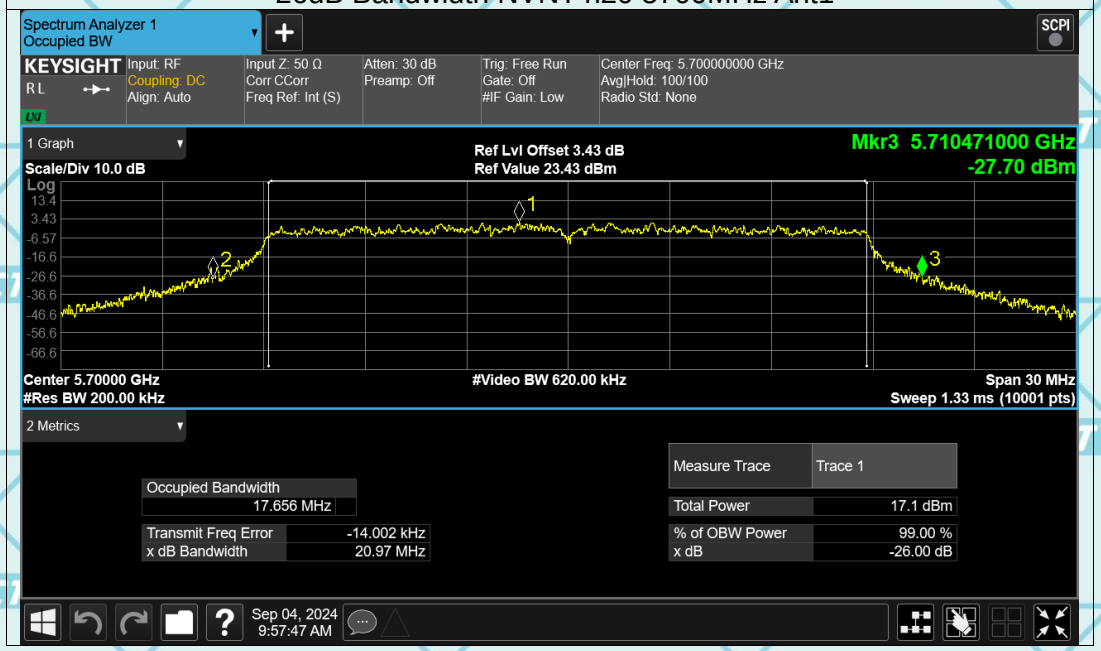
-26dB Bandwidth NVNT n20 5320MHz Ant1



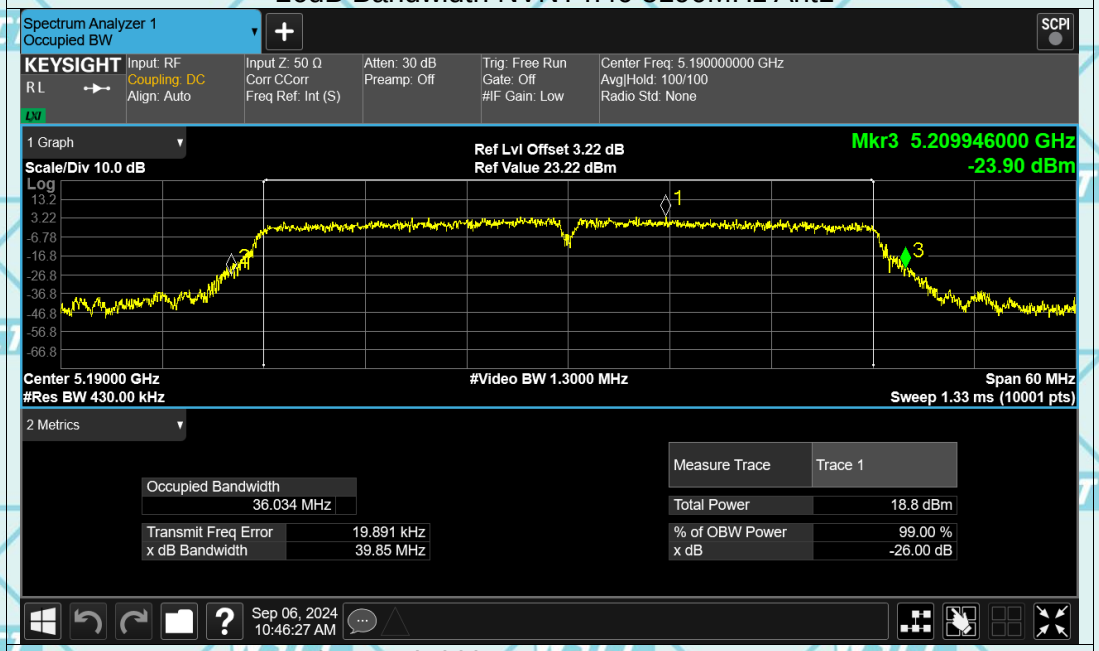
-26dB Bandwidth NVNT n20 5500MHz Ant1



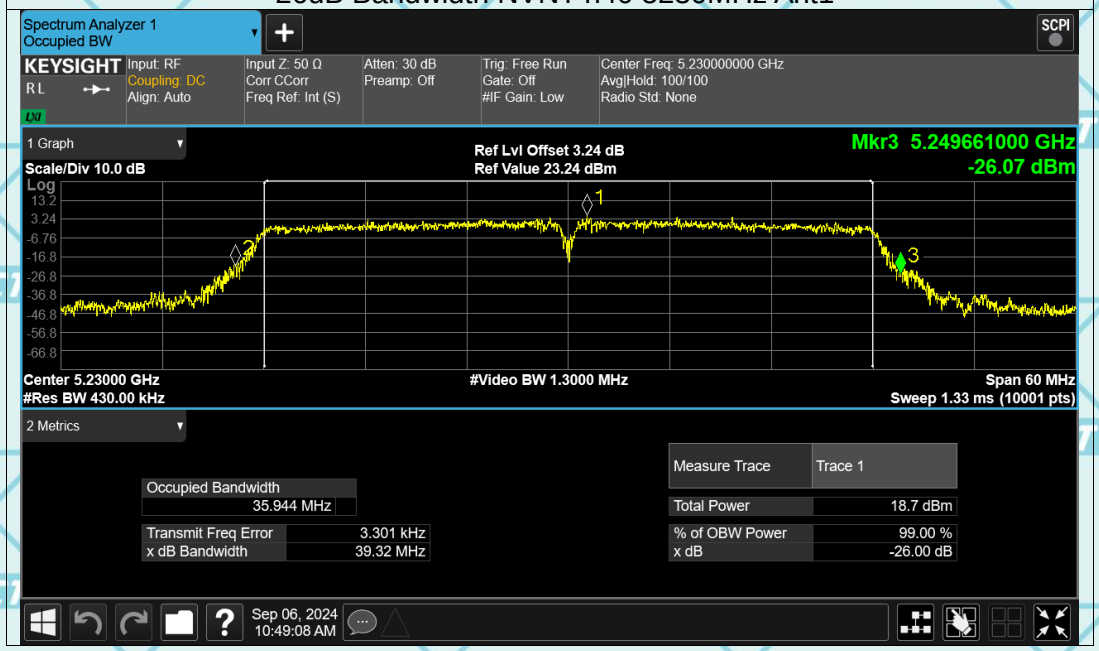
-26dB Bandwidth NVNT n20 5700MHz Ant1



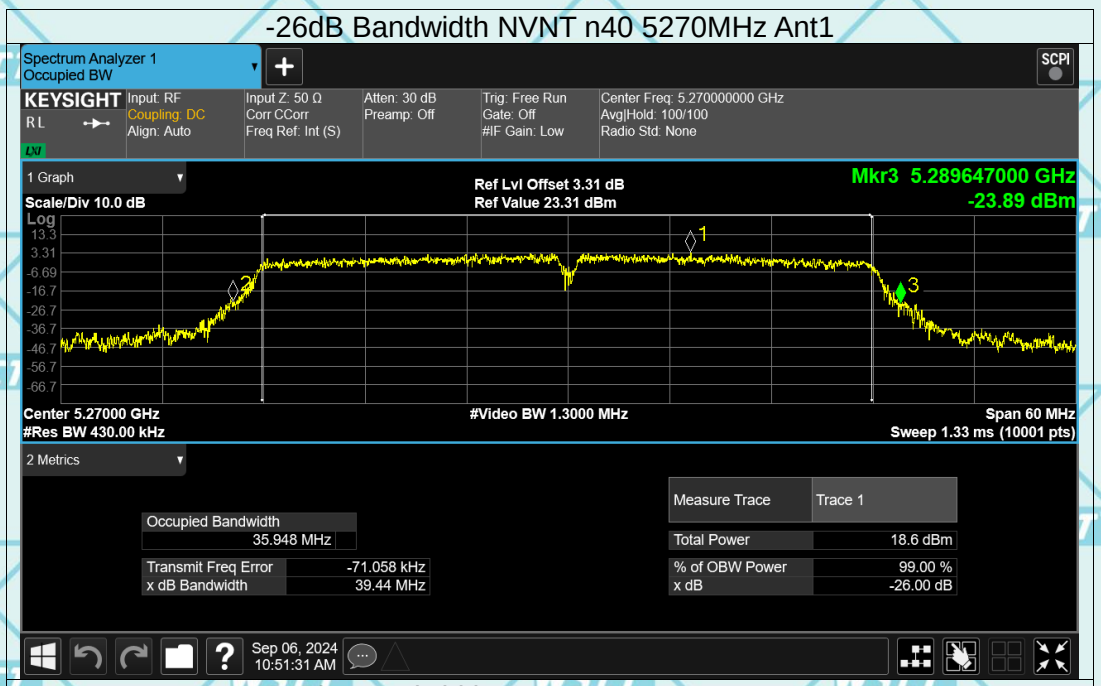
-26dB Bandwidth NVNT n40 5190MHz Ant1



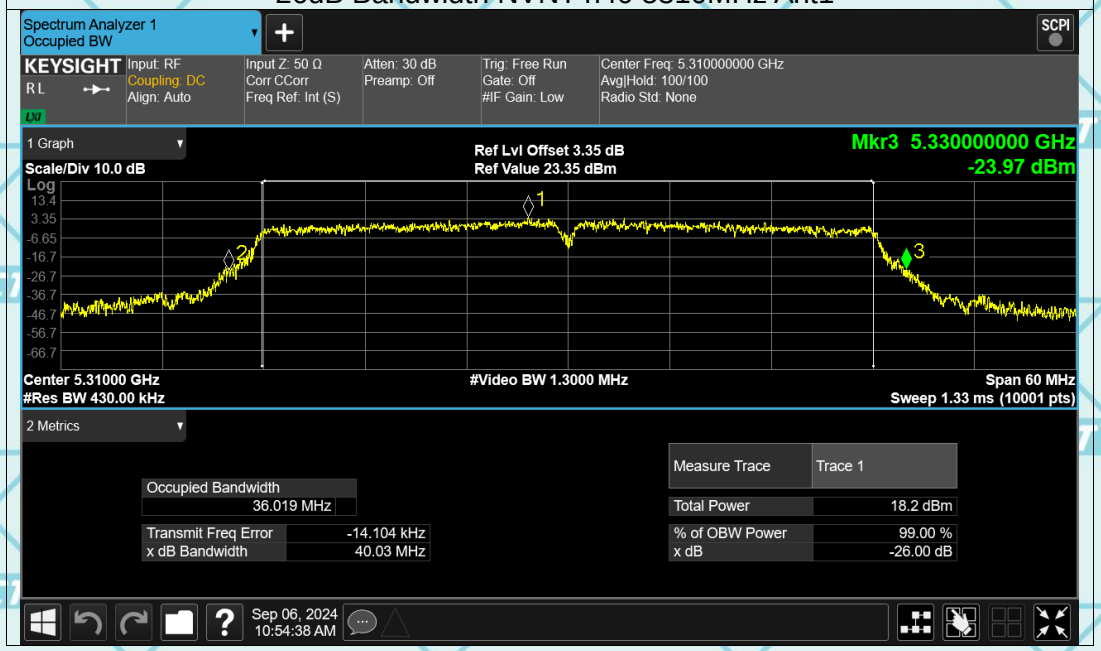
-26dB Bandwidth NVNT n40 5230MHz Ant1



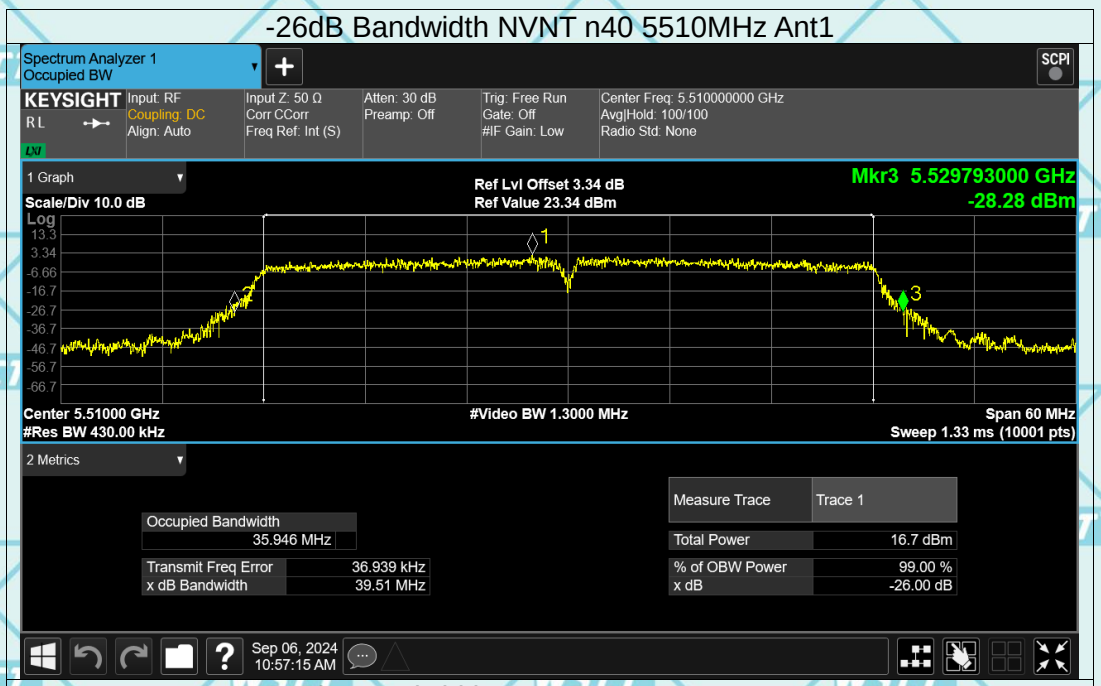
-26dB Bandwidth NVNT n40 5270MHz Ant1



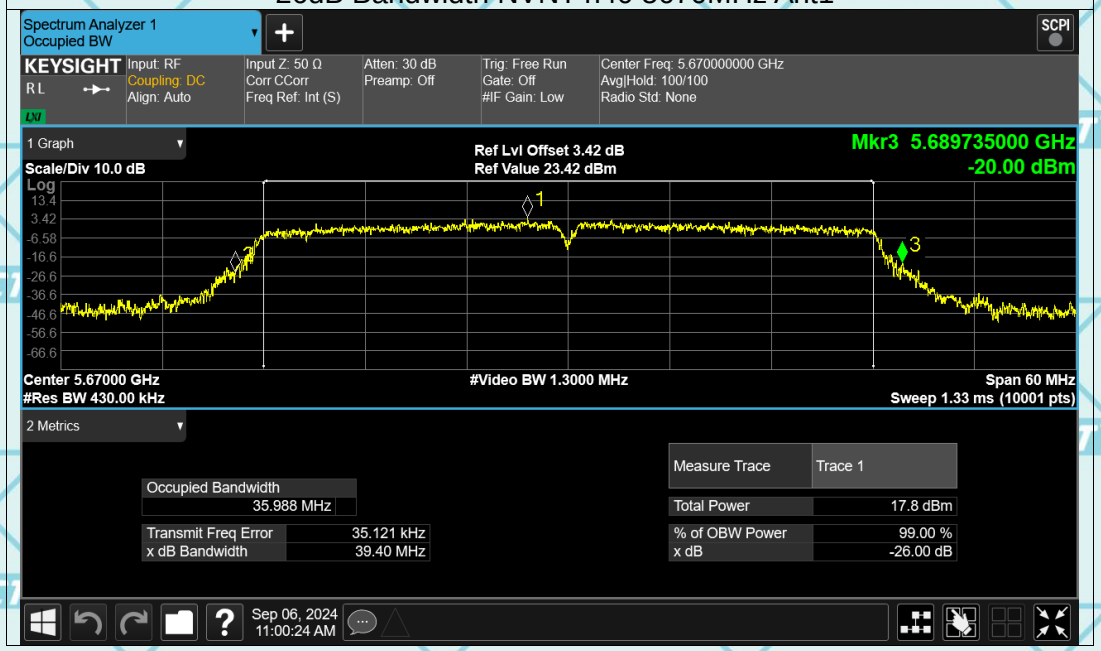
-26dB Bandwidth NVNT n40 5310MHz Ant1



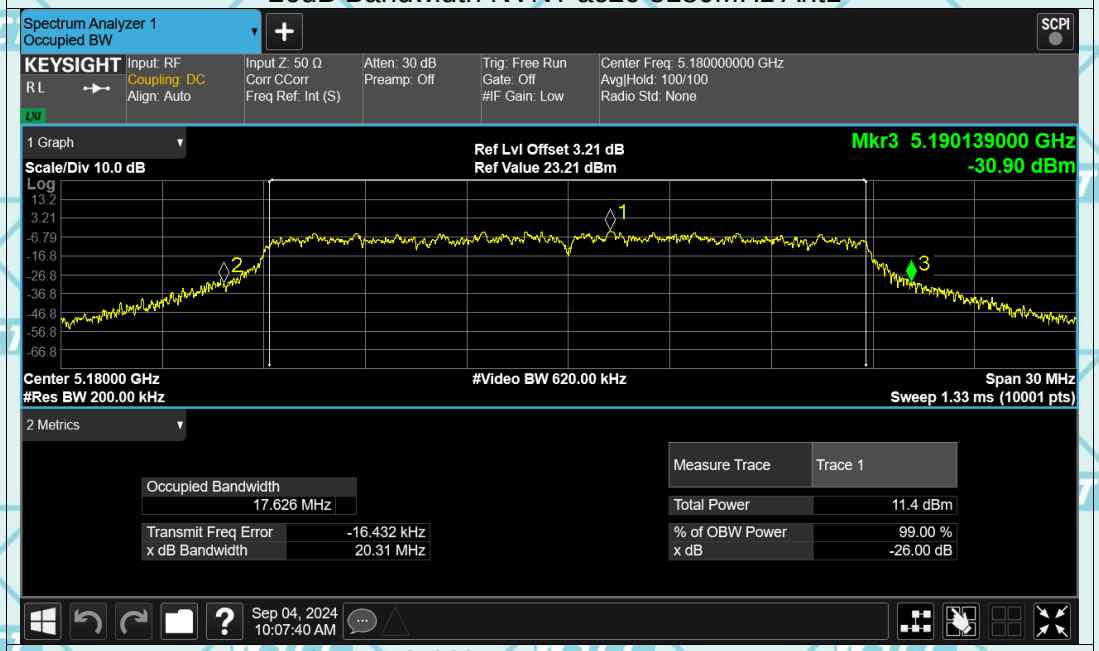
-26dB Bandwidth NVNT n40 5510MHz Ant1



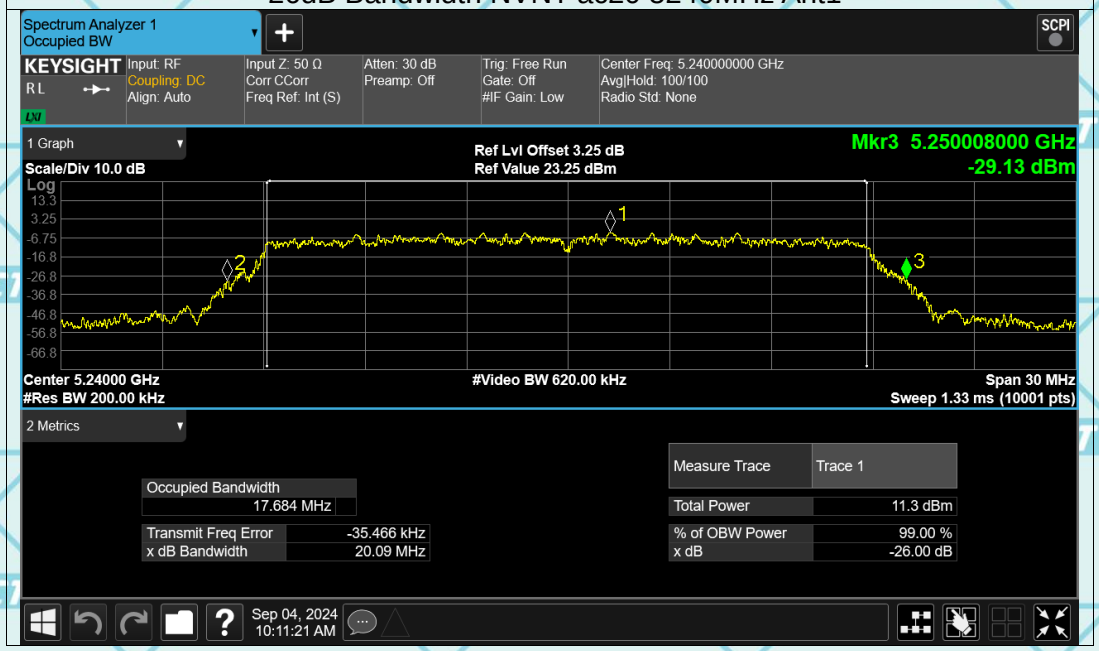
-26dB Bandwidth NVNT n40 5670MHz Ant1



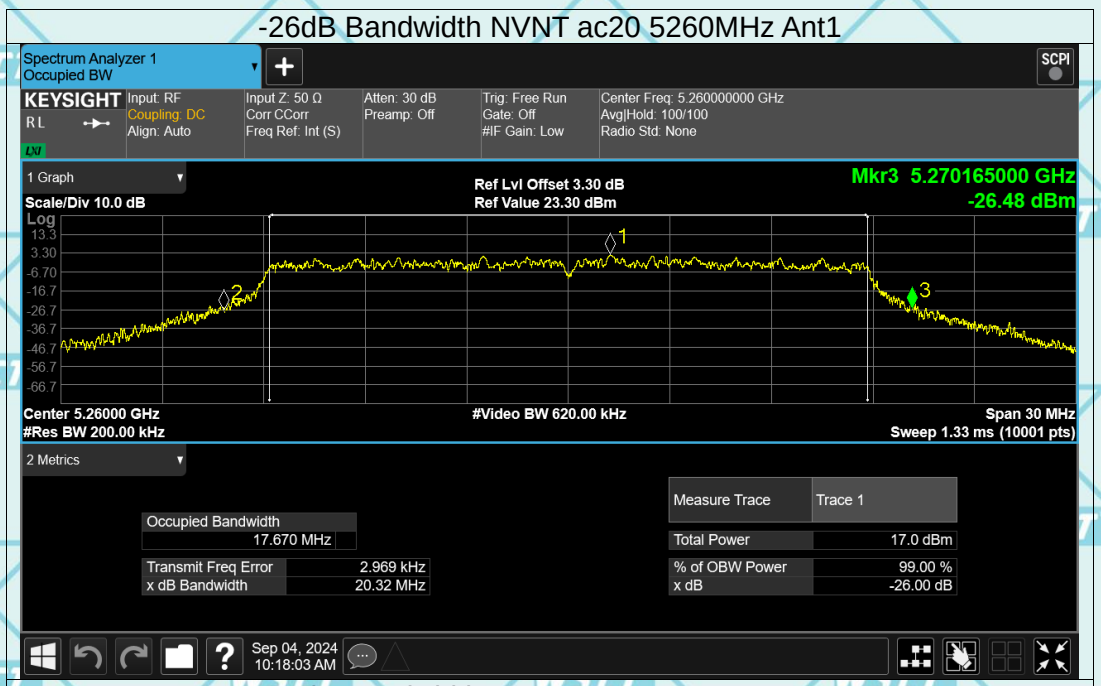
-26dB Bandwidth NVNT ac20 5180MHz Ant1



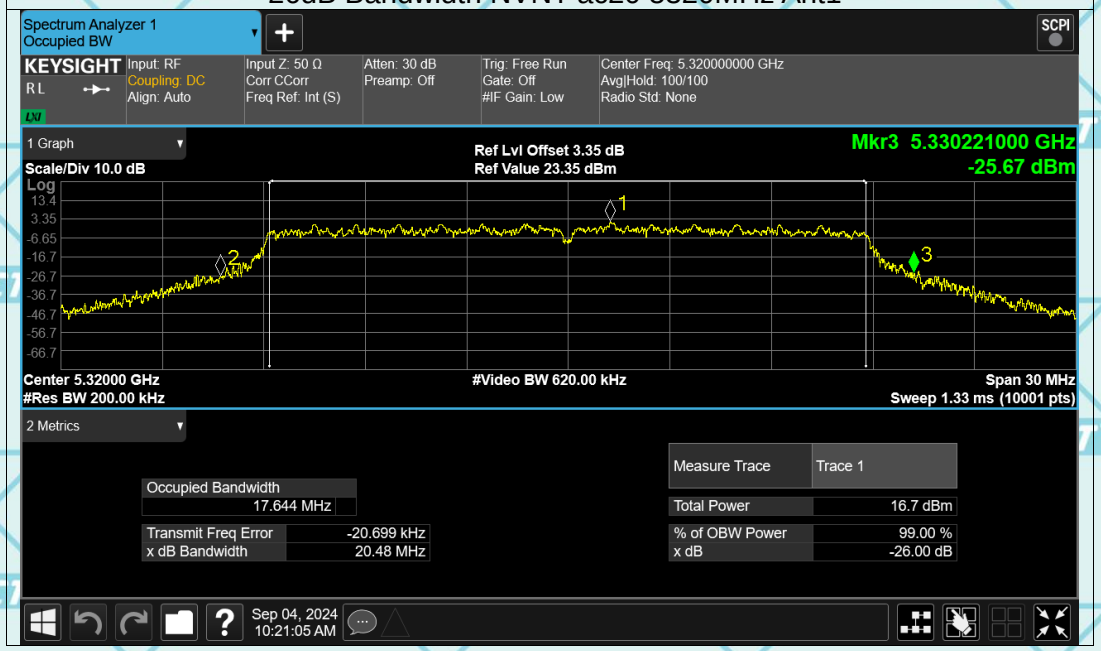
-26dB Bandwidth NVNT ac20 5240MHz Ant1



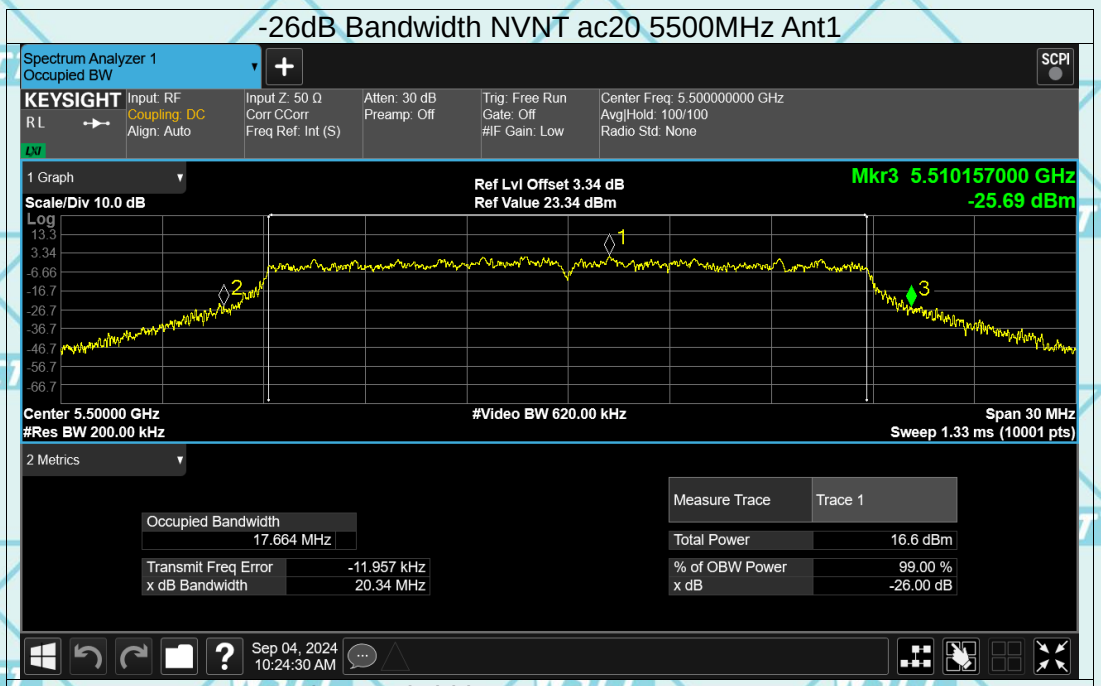
-26dB Bandwidth NVNT ac20 5260MHz Ant1



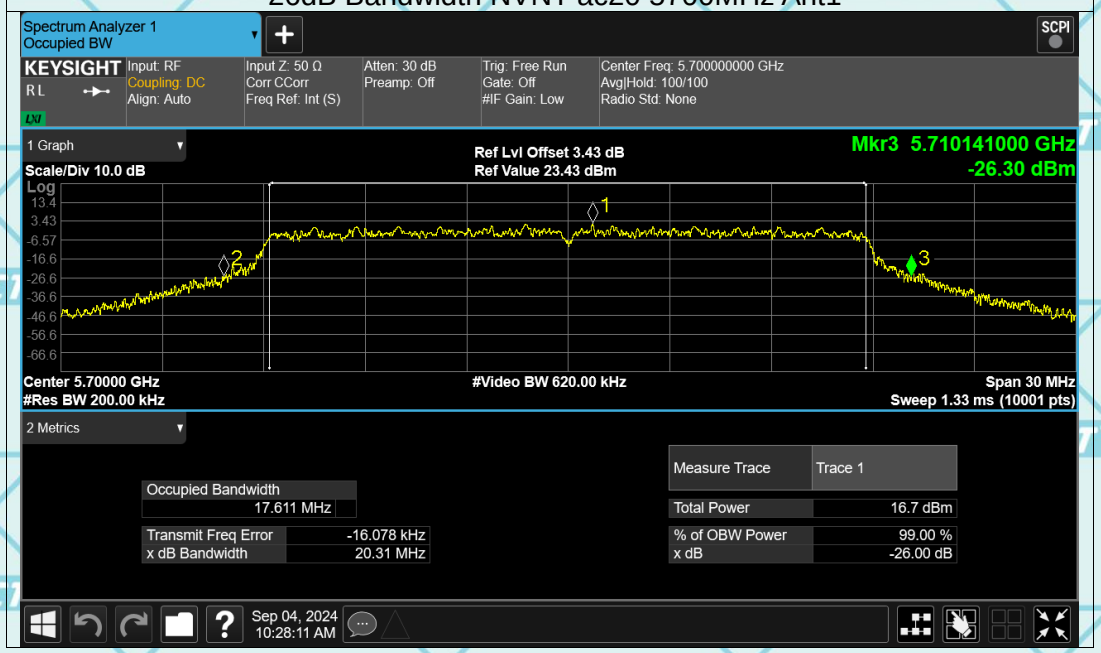
-26dB Bandwidth NVNT ac20 5320MHz Ant1



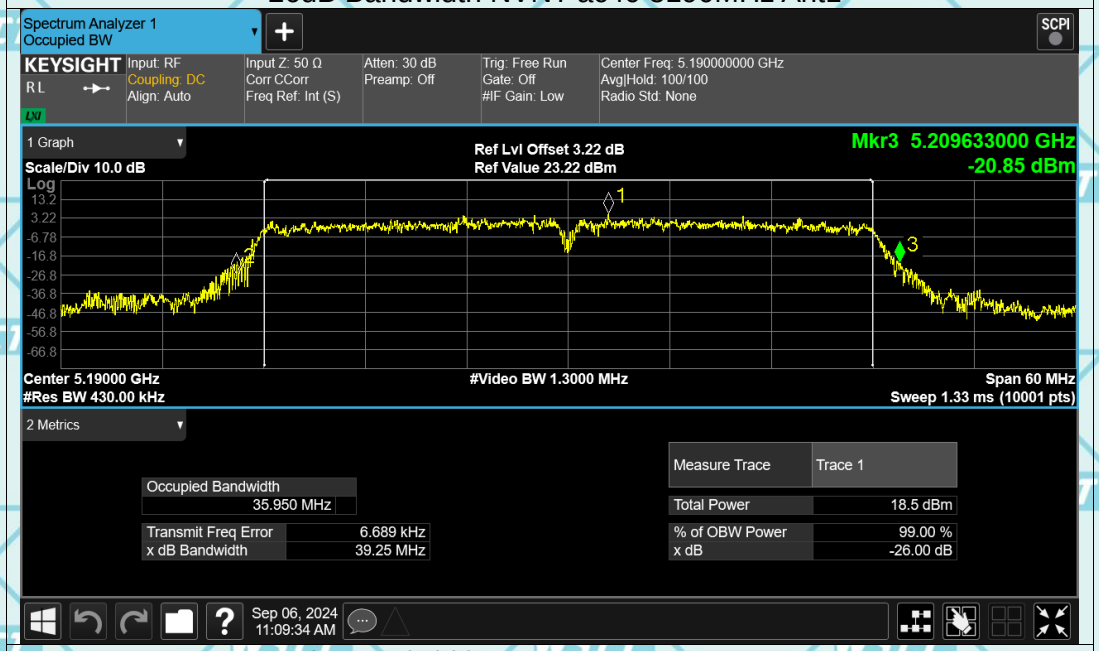
-26dB Bandwidth NVNT ac20 5500MHz Ant1



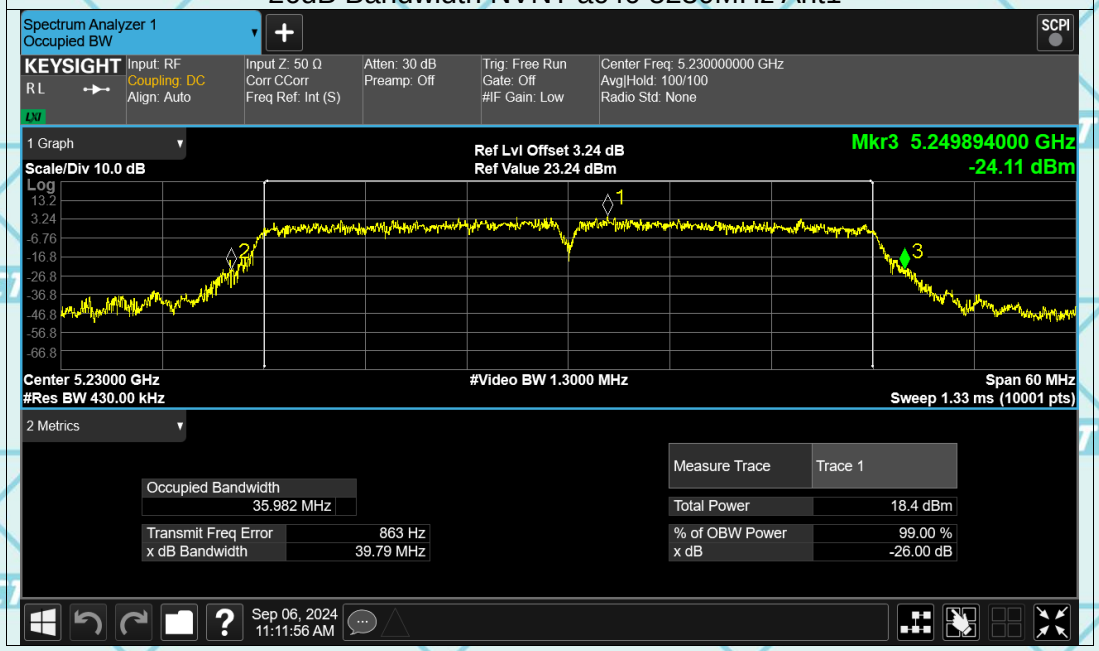
-26dB Bandwidth NVNT ac20 5700MHz Ant1



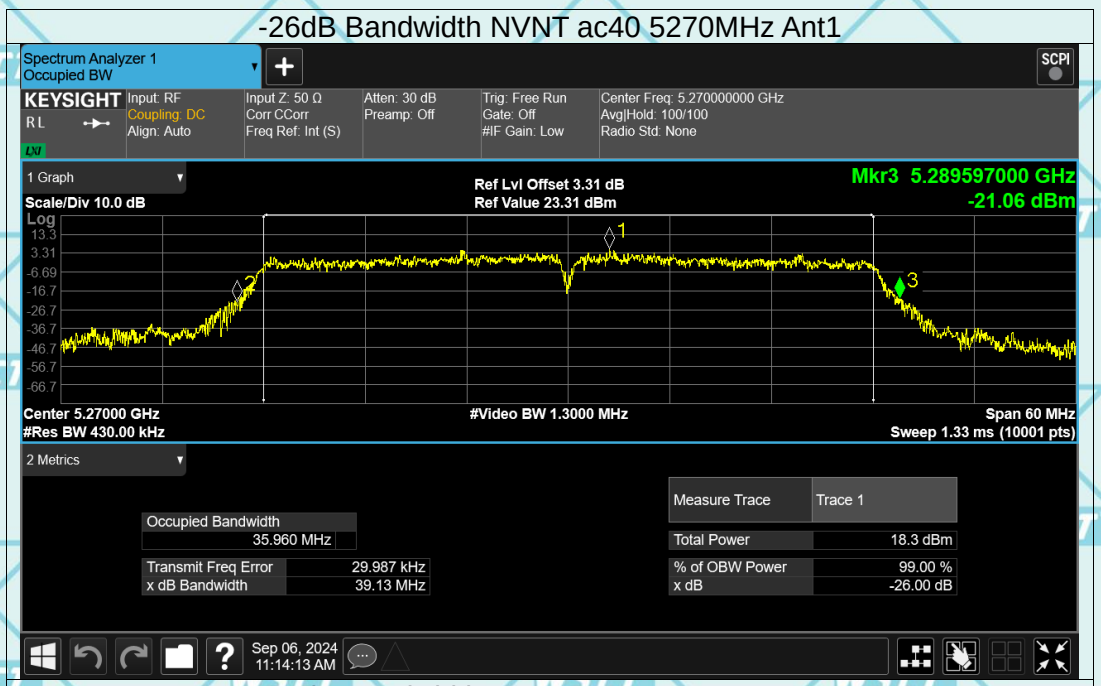
-26dB Bandwidth NVNT ac40 5190MHz Ant1



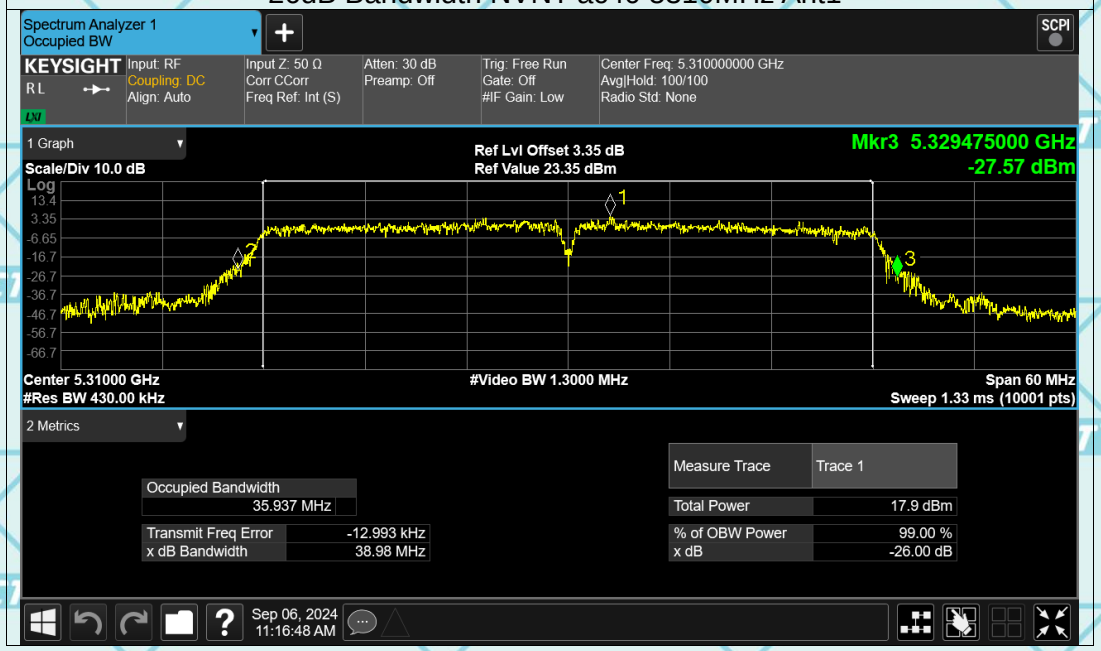
-26dB Bandwidth NVNT ac40 5230MHz Ant1



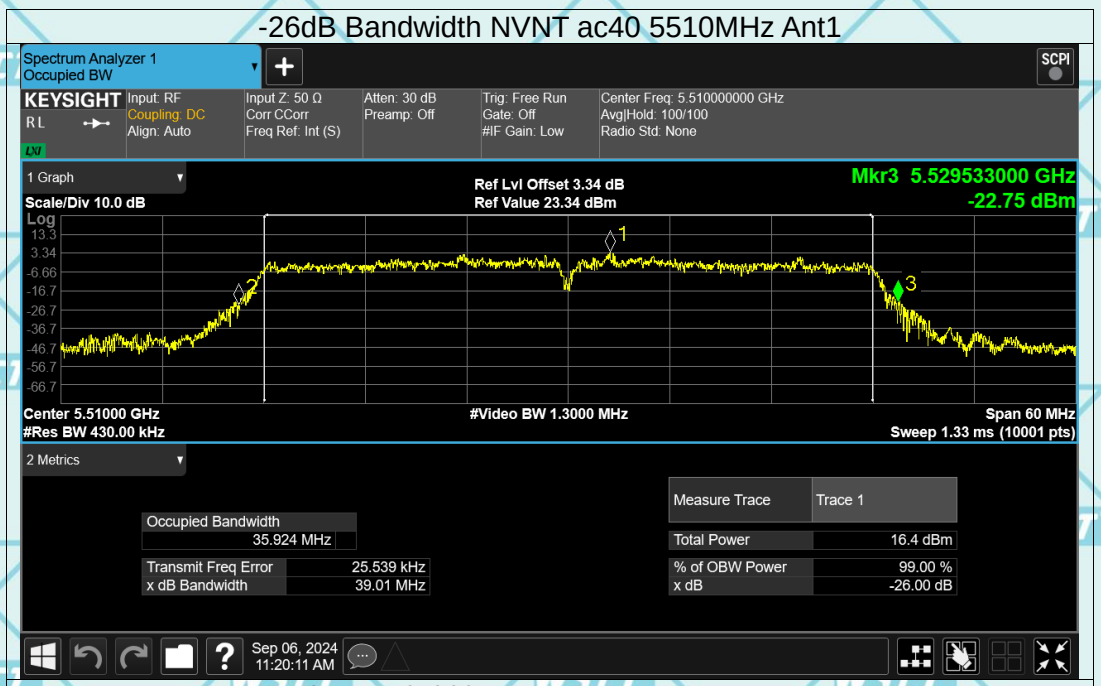
-26dB Bandwidth NVNT ac40 5270MHz Ant1



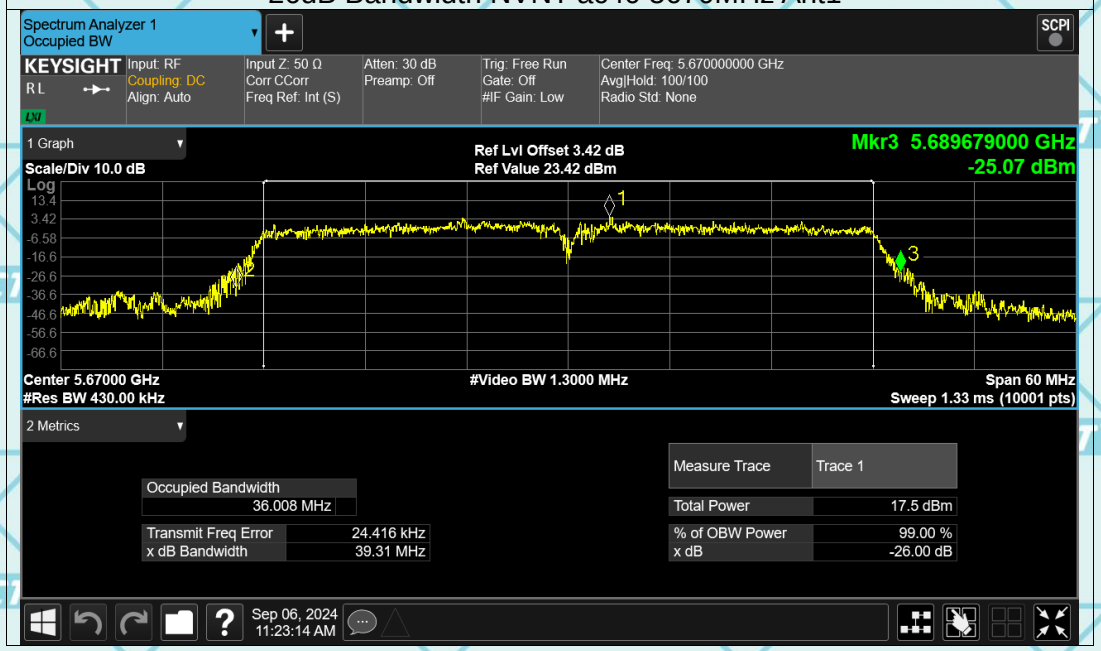
-26dB Bandwidth NVNT ac40 5310MHz Ant1



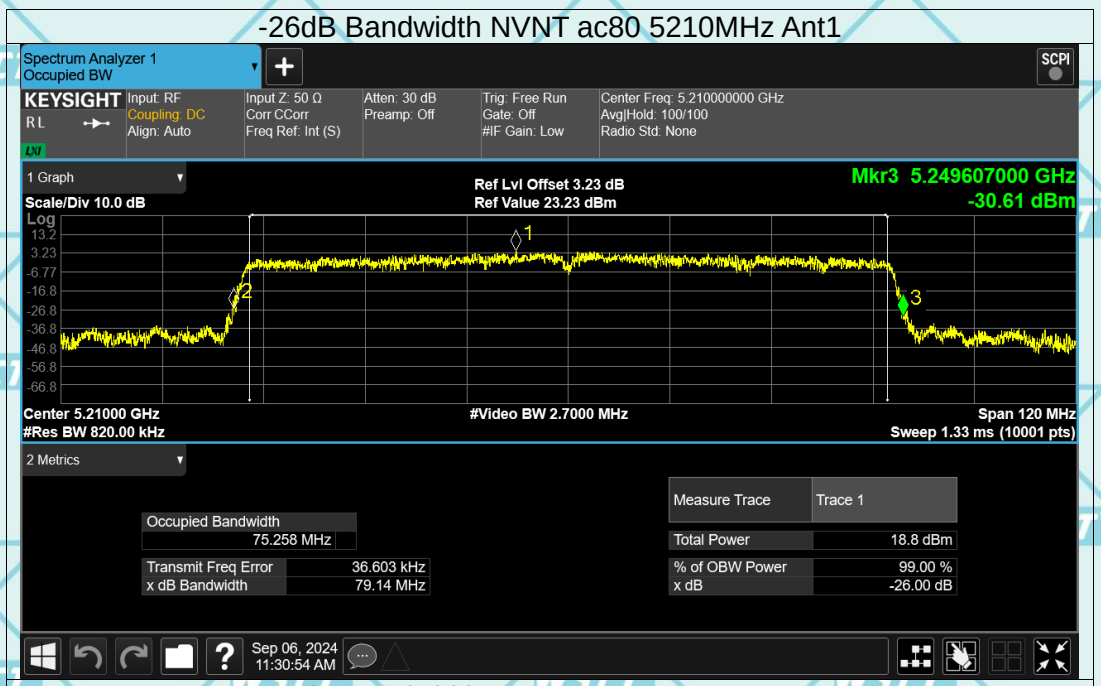
-26dB Bandwidth NVNT ac40 5510MHz Ant1



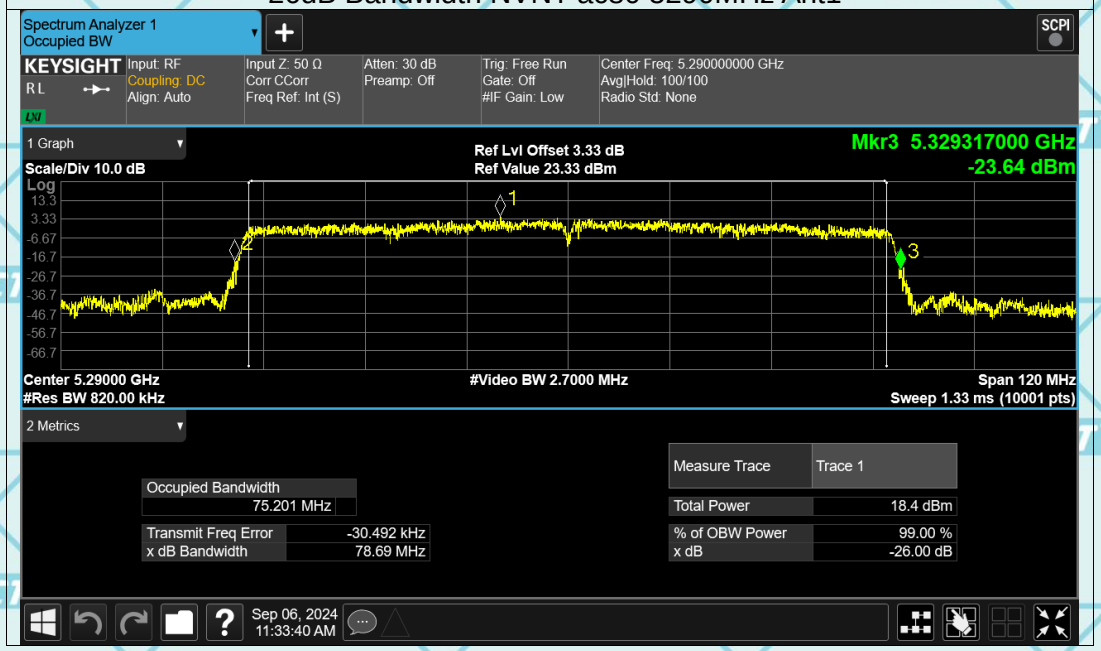
-26dB Bandwidth NVNT ac40 5670MHz Ant1



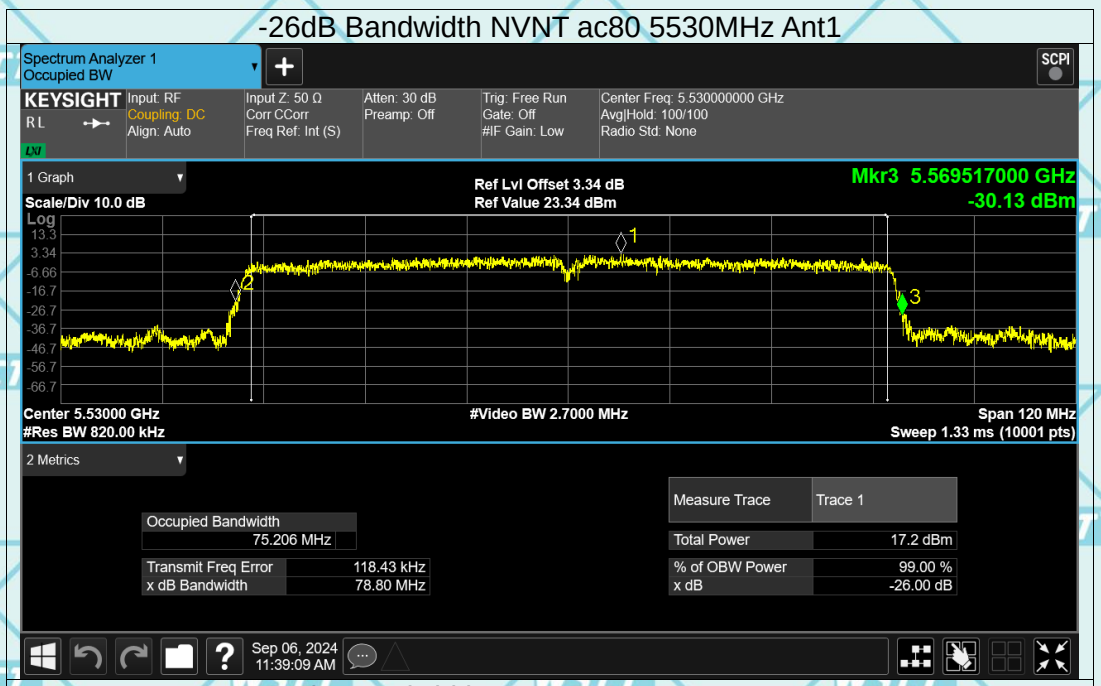
-26dB Bandwidth NVNT ac80 5210MHz Ant1



-26dB Bandwidth NVNT ac80 5290MHz Ant1

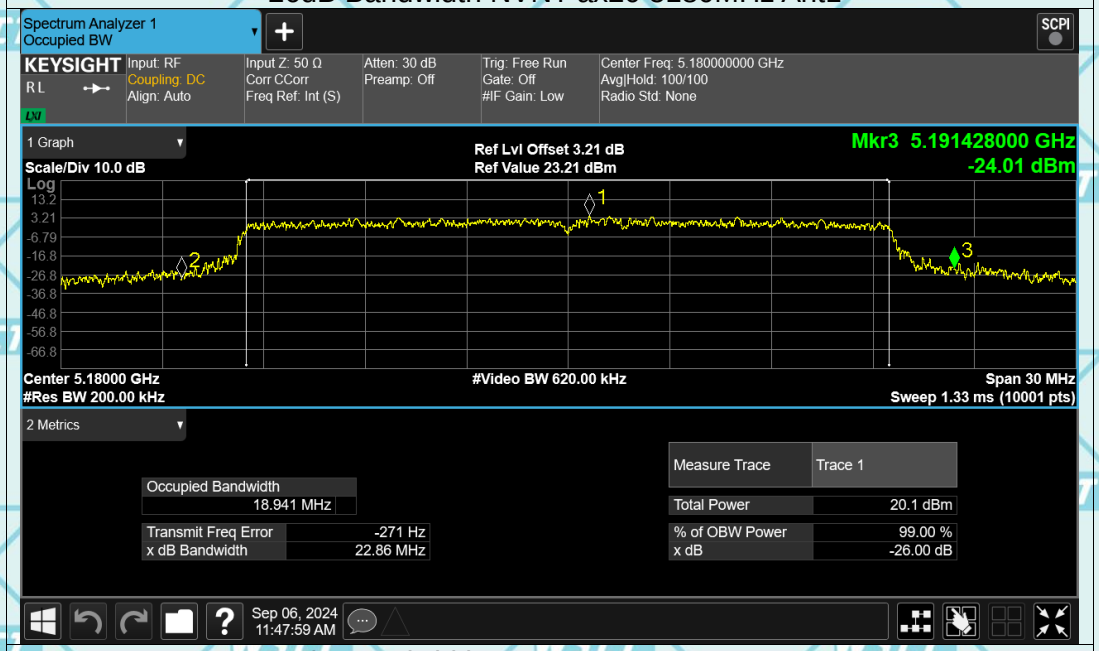


-26dB Bandwidth NVNT ac80 5530MHz Ant1

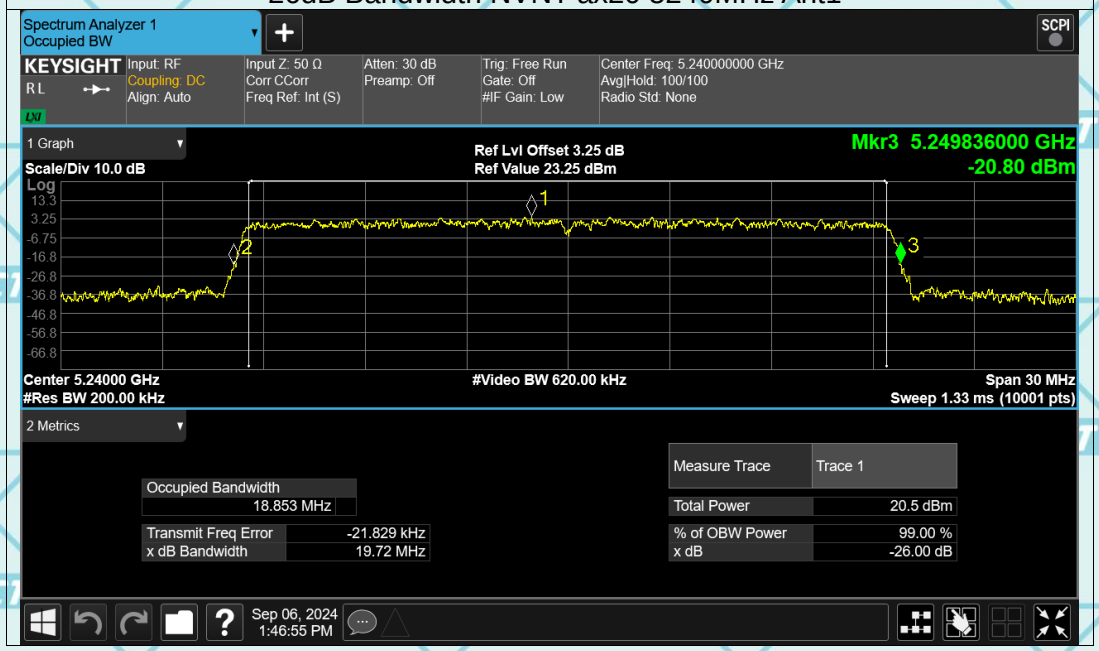


-26dB Bandwidth NVNT ac80 5610MHz Ant1

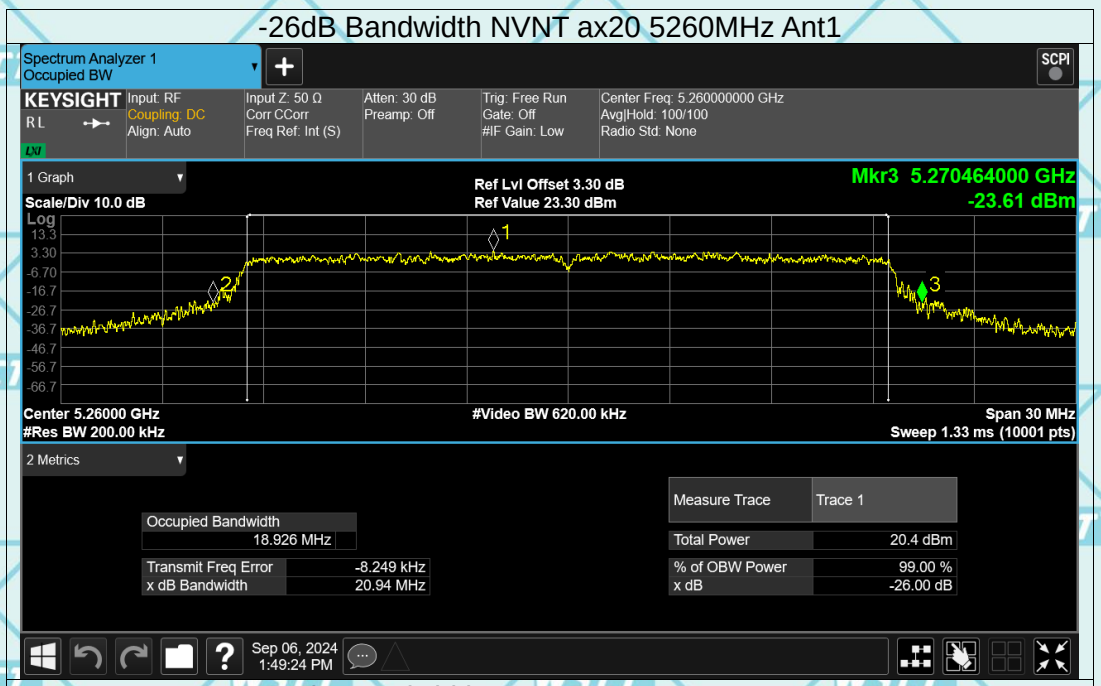
-26dB Bandwidth NVNT ax20 5180MHz Ant1



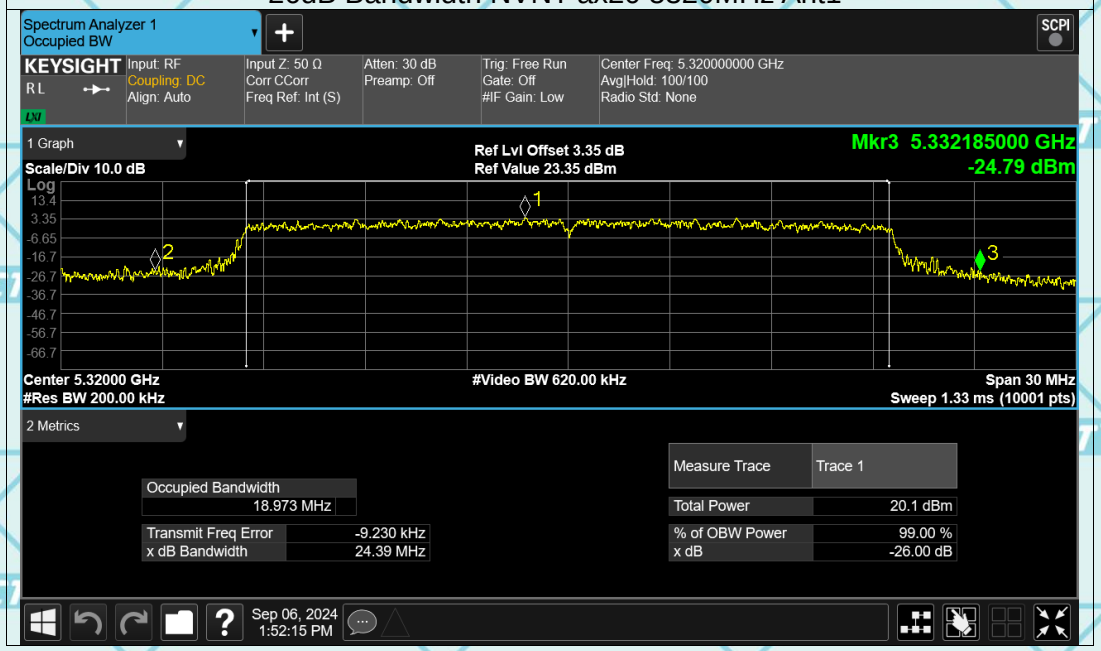
-26dB Bandwidth NVNT ax20 5240MHz Ant1



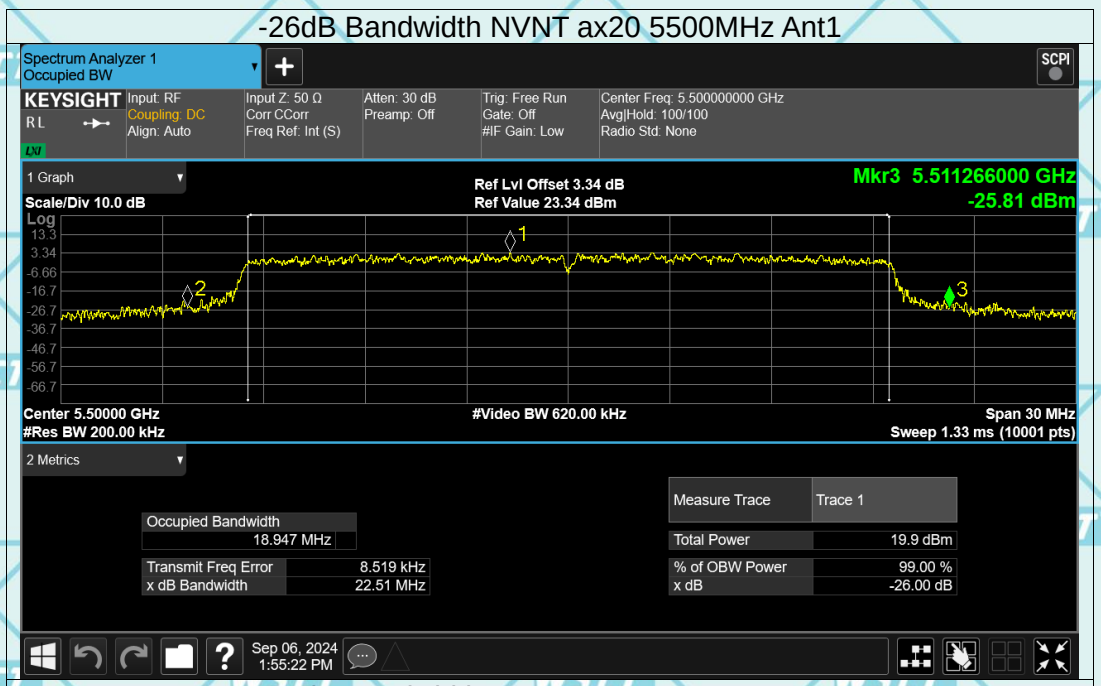
-26dB Bandwidth NVNT ax20 5260MHz Ant1



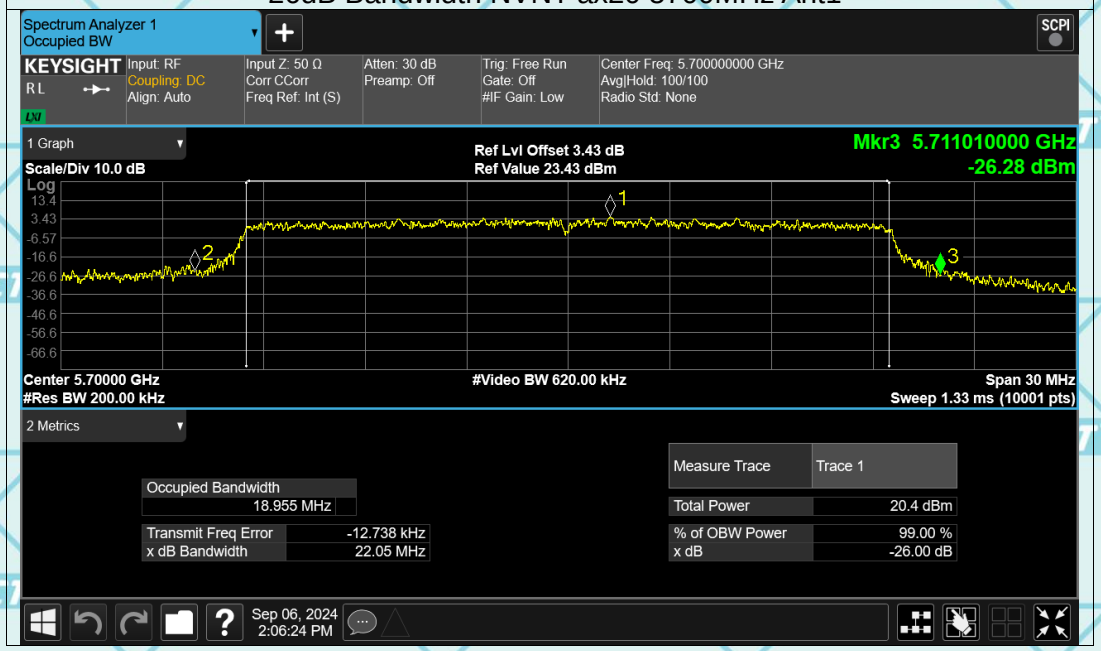
-26dB Bandwidth NVNT ax20 5320MHz Ant1



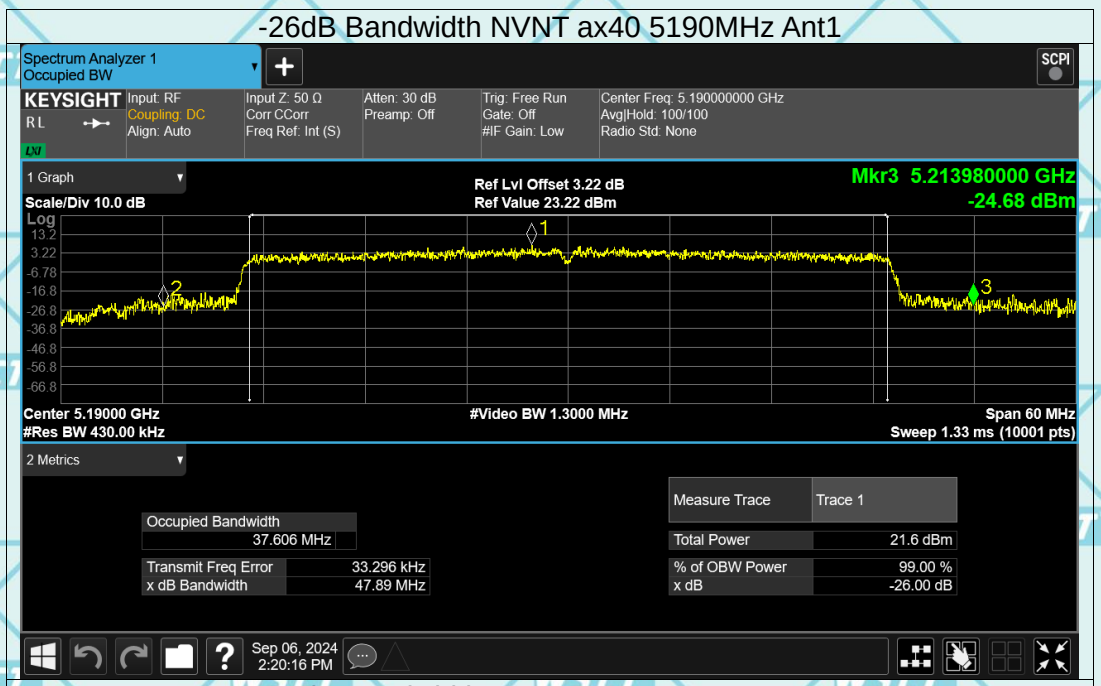
-26dB Bandwidth NVNT ax20 5500MHz Ant1



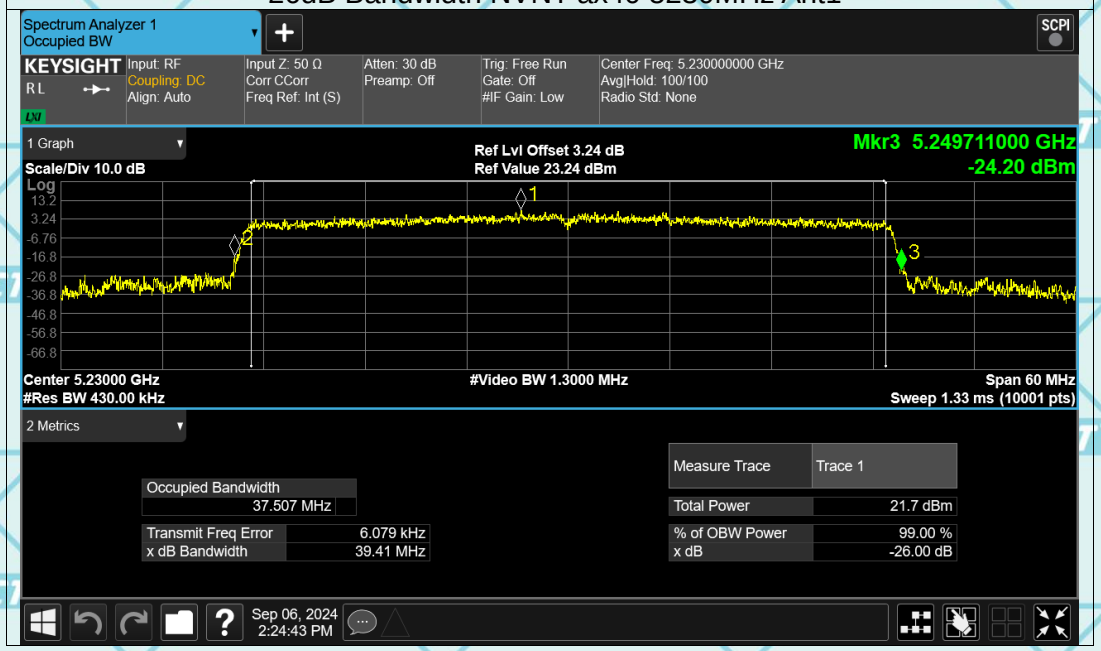
-26dB Bandwidth NVNT ax20 5700MHz Ant1



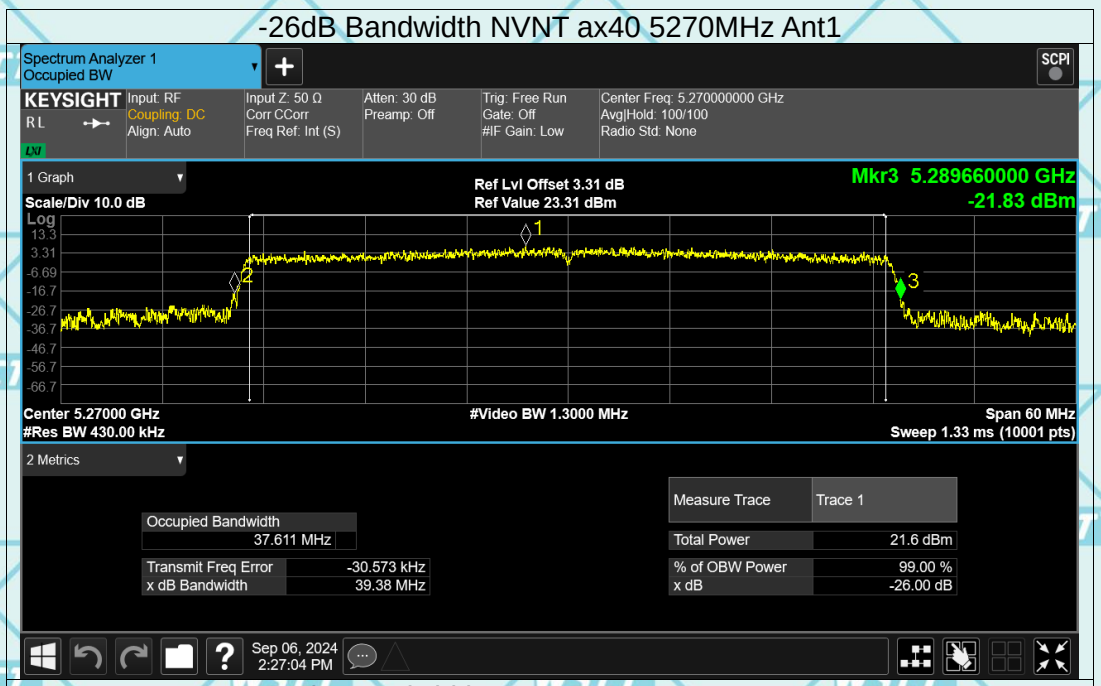
-26dB Bandwidth NVNT ax40 5190MHz Ant1



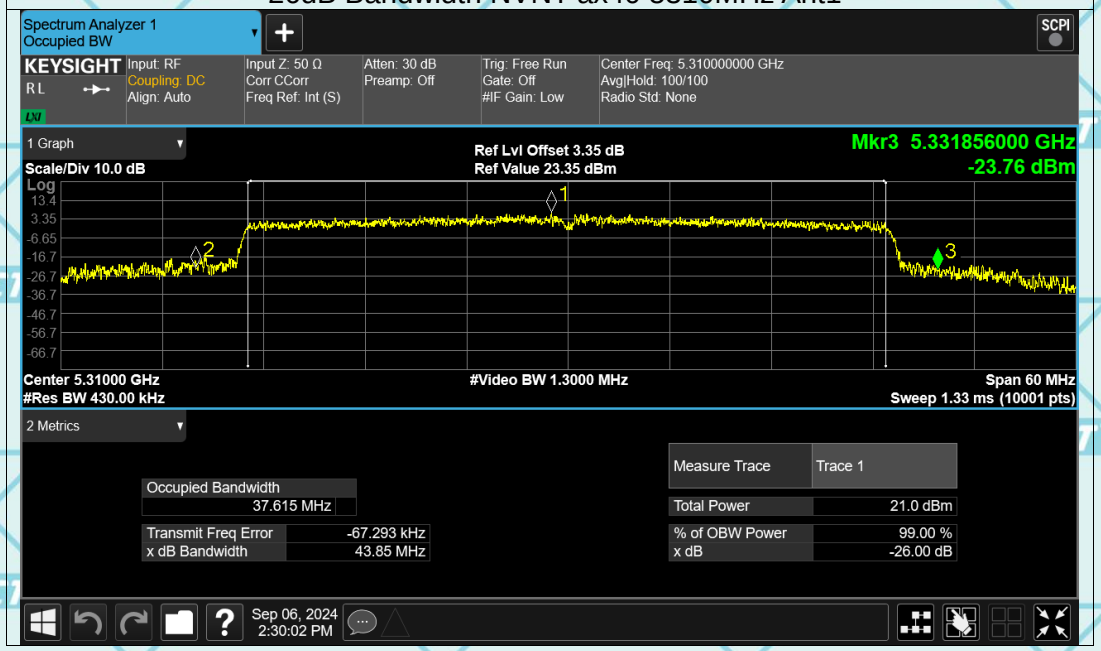
-26dB Bandwidth NVNT ax40 5230MHz Ant1



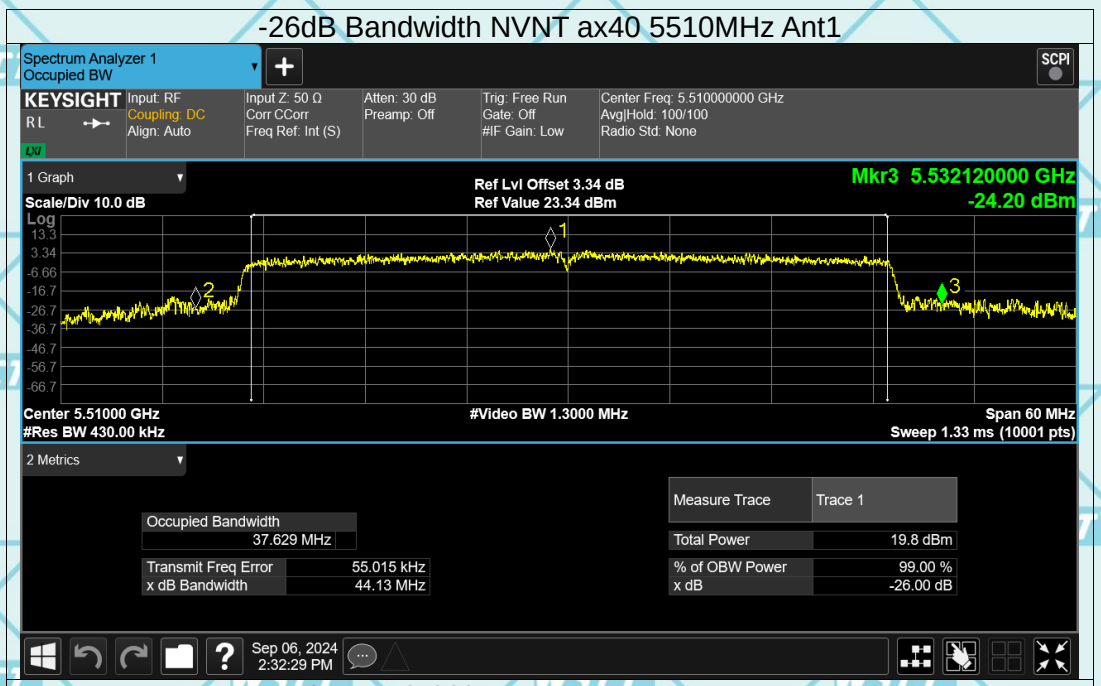
-26dB Bandwidth NVNT ax40 5270MHz Ant1



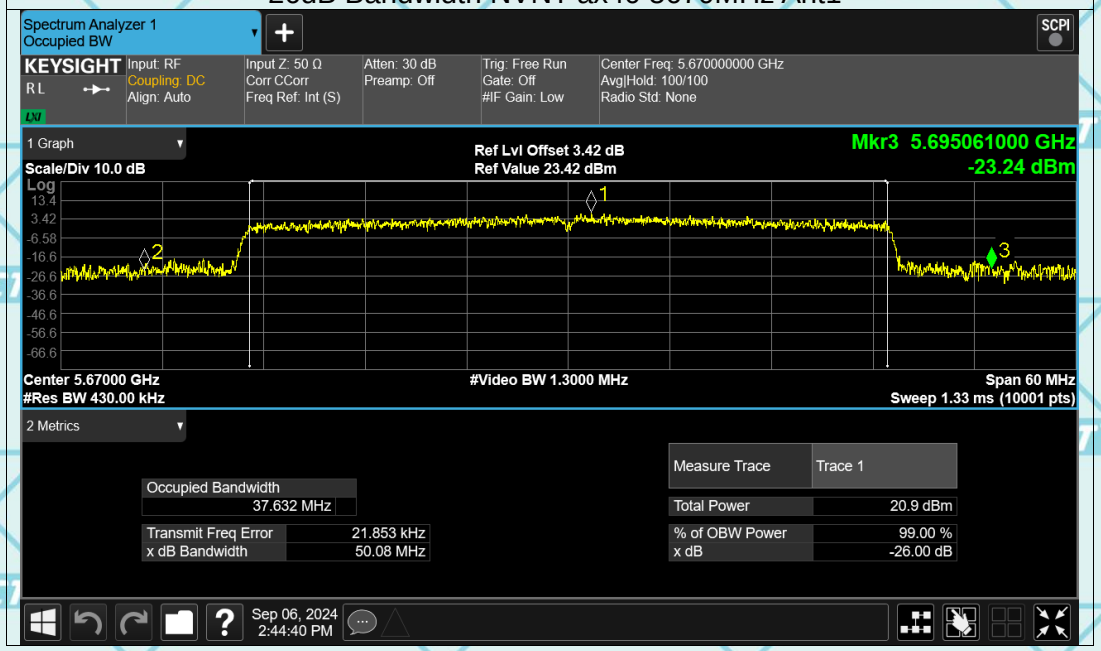
-26dB Bandwidth NVNT ax40 5310MHz Ant1



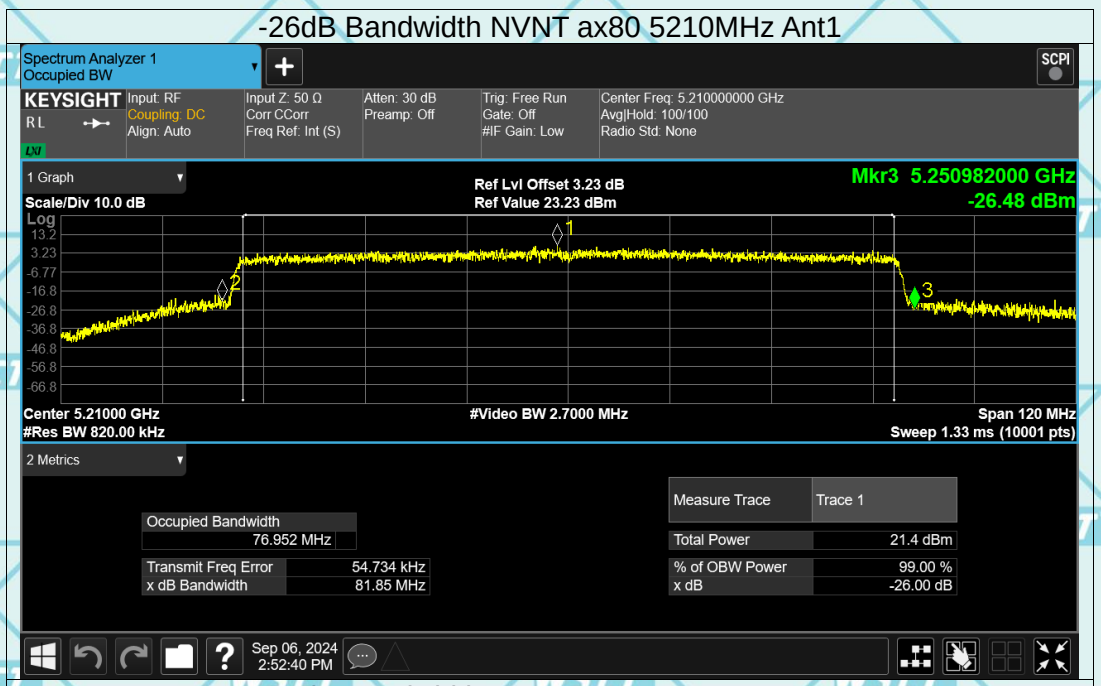
-26dB Bandwidth NVNT ax40 5510MHz Ant1



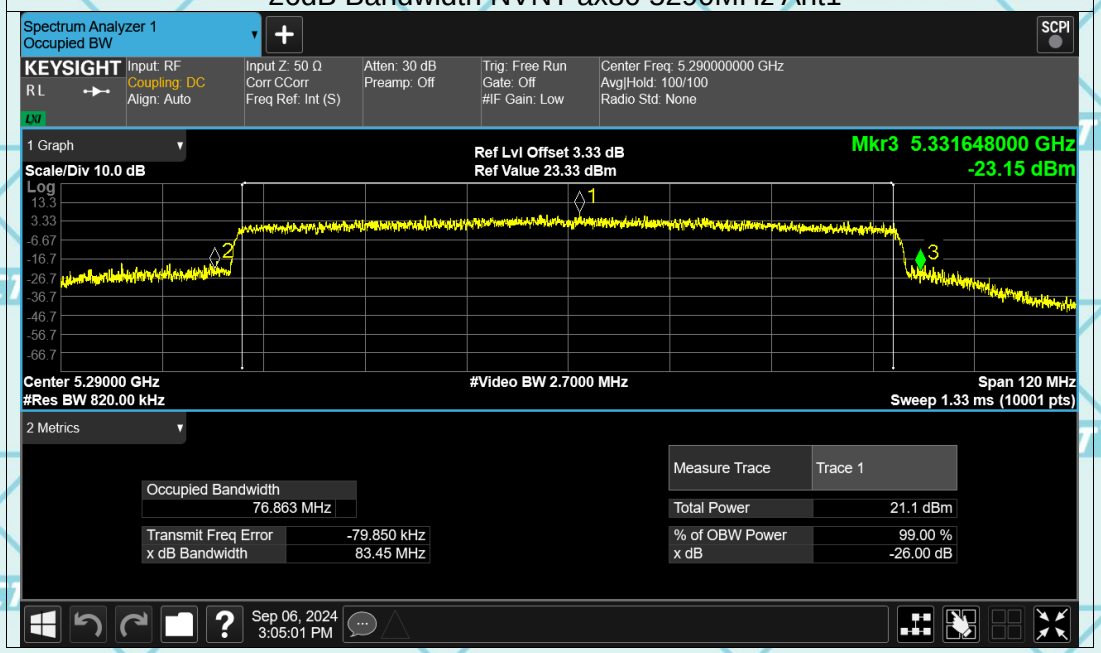
-26dB Bandwidth NVNT ax40 5670MHz Ant1



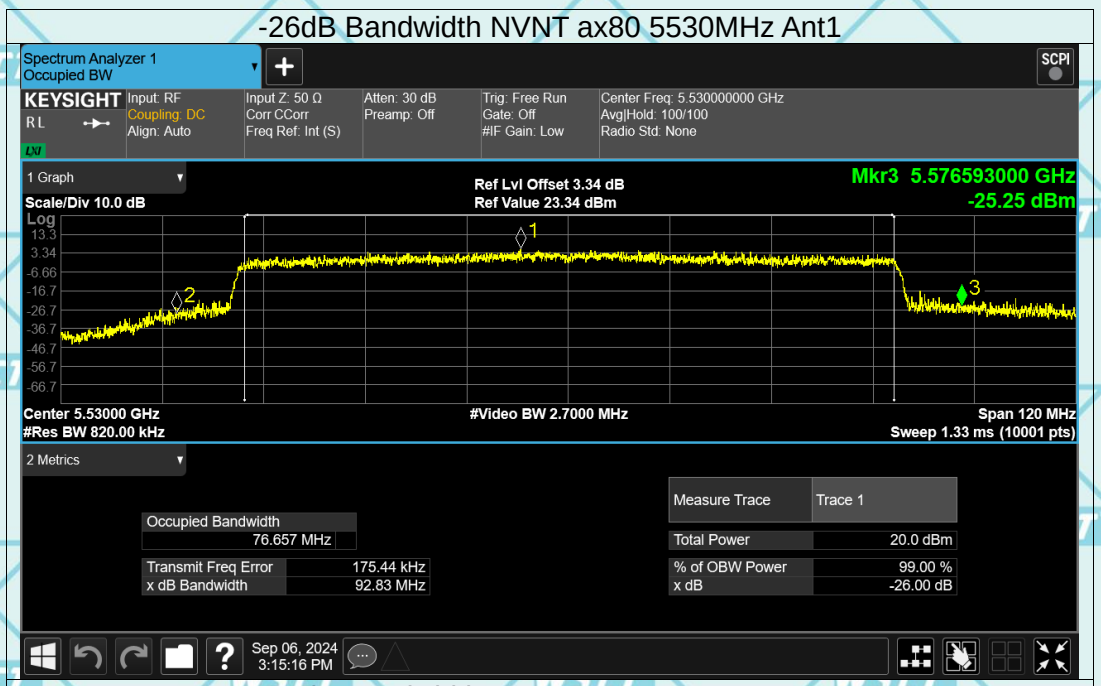
-26dB Bandwidth NVNT ax80 5210MHz Ant1



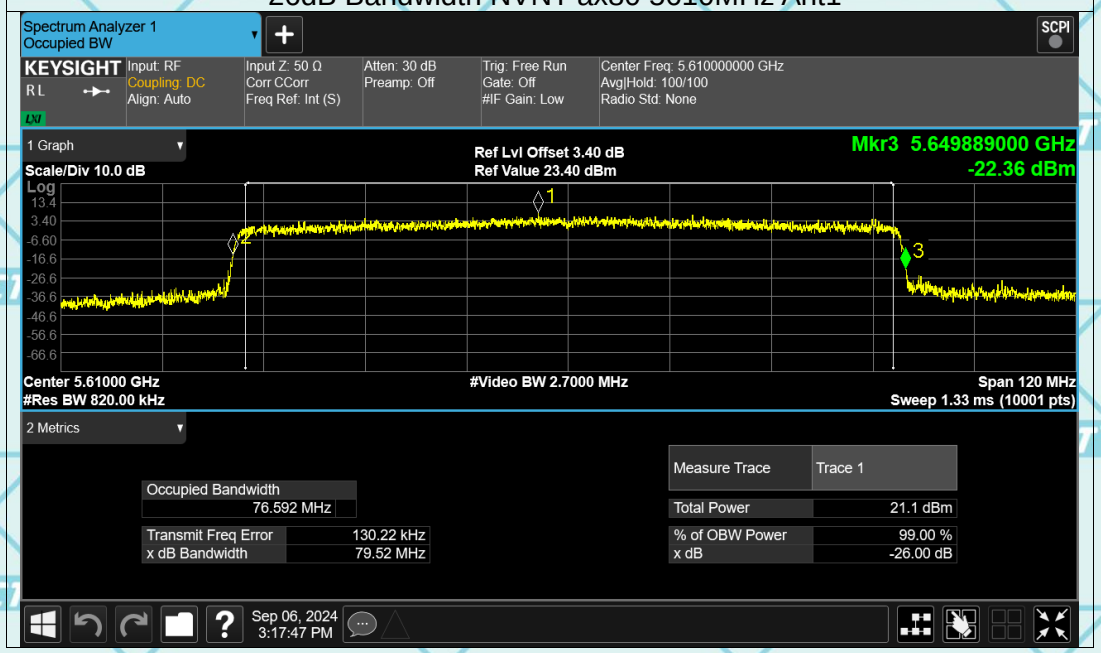
-26dB Bandwidth NVNT ax80 5290MHz Ant1



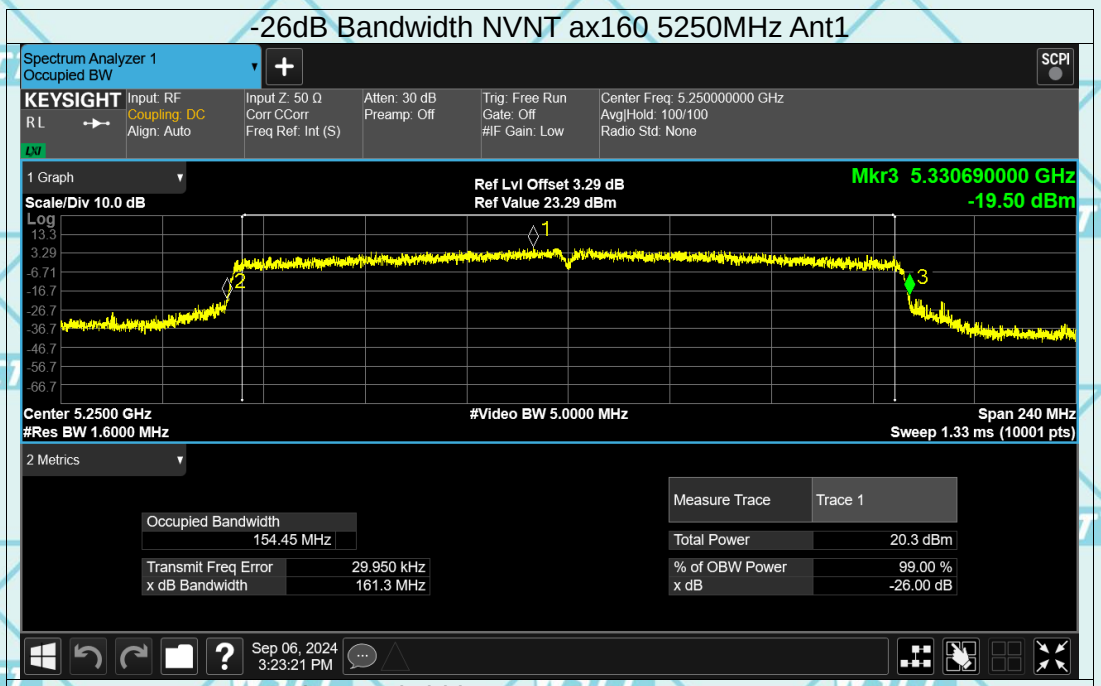
-26dB Bandwidth NVNT ax80 5530MHz Ant1



-26dB Bandwidth NVNT ax80 5610MHz Ant1



-26dB Bandwidth NVNT ax160 5250MHz Ant1



-26dB Bandwidth NVNT ax160 5570MHz Ant1