

Appendix A for 5GWIFI Test Data

Product Name: ATOTO Car Navigation Multimedia Receiver

Test Model: F7G209WE

Environmental Conditions

Temperature:	23.8℃
Relative Humidity:	52%
ATM Pressure:	101.0 kPa
Test Engineer:	Kimi Lu
Supervised by:	Baret Wu



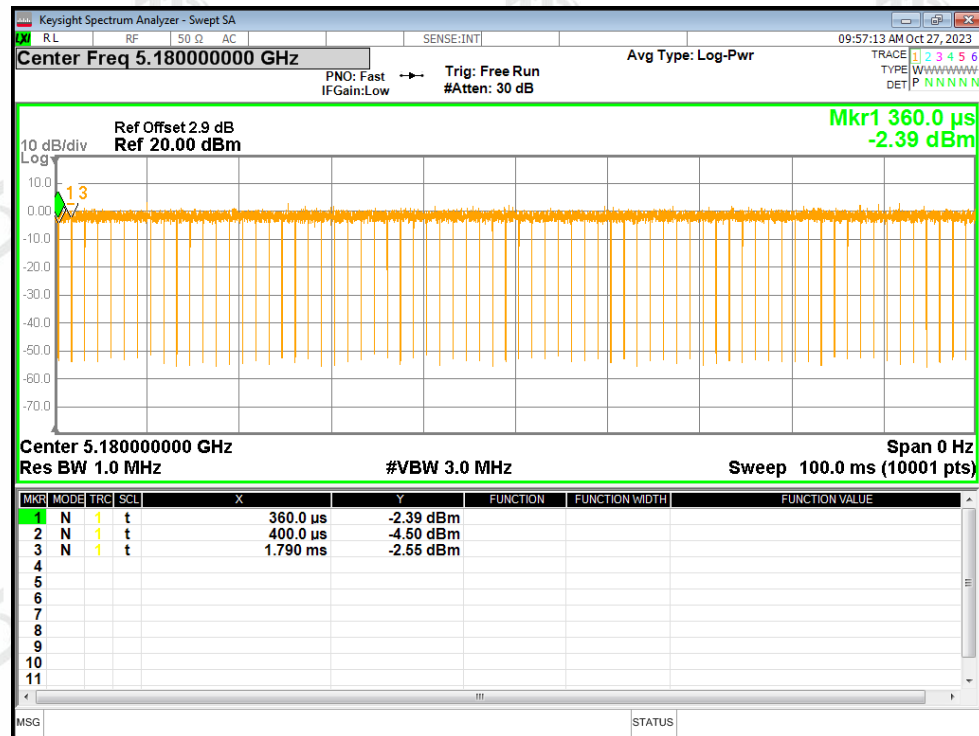
A1.Duty Cycle

Condition	Mode	Frequency (MHz)	Antenna	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	a	5180	Ant1	97.2	0.12	0.72
NVNT	a	5200	Ant1	97.2	0.12	0.72
NVNT	a	5240	Ant1	97.2	0.12	0.72
NVNT	n20	5180	Ant1	97.9	0.09	0.71
NVNT	n20	5200	Ant1	97.9	0.09	0.71
NVNT	n20	5240	Ant1	97.2	0.12	0.72
NVNT	n40	5190	Ant1	83.33	0.79	10
NVNT	n40	5230	Ant1	96.34	0.16	1.27
NVNT	ac20	5180	Ant1	97.01	0.13	0.77
NVNT	ac20	5200	Ant1	97.74	0.1	0.77
NVNT	ac20	5240	Ant1	97.74	0.1	0.77
NVNT	ac40	5190	Ant1	95.59	0.2	1.54
NVNT	ac40	5230	Ant1	95.59	0.2	1.54
NVNT	ac80	5210	Ant1	76.67	1.15	2.17

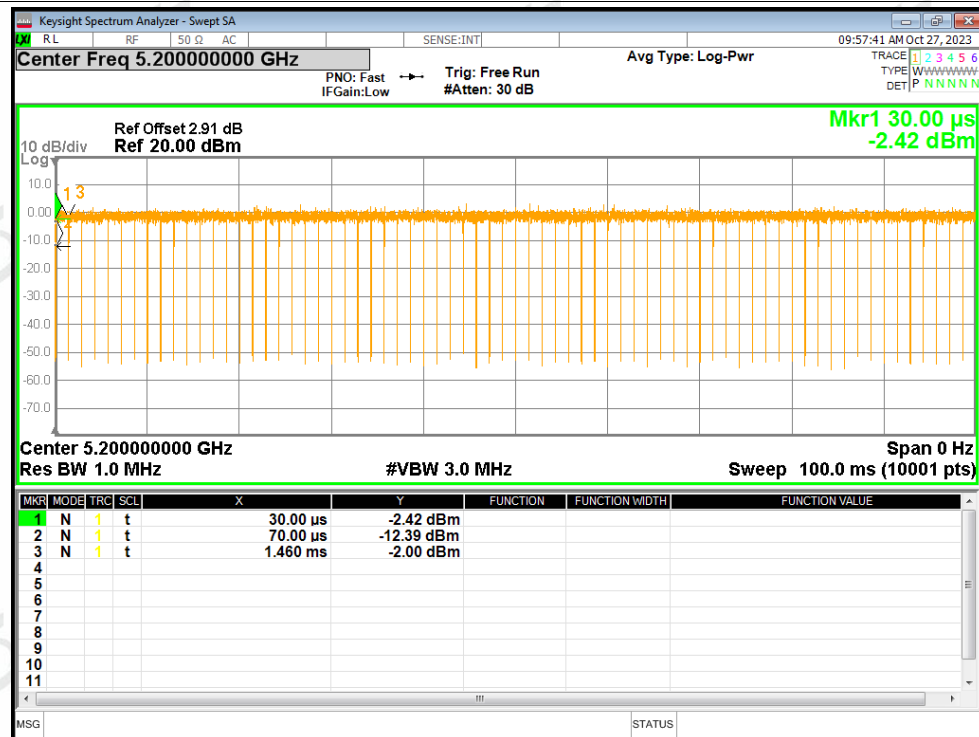


Test Graphs

Duty Cycle NVNT a 5180MHz Ant1

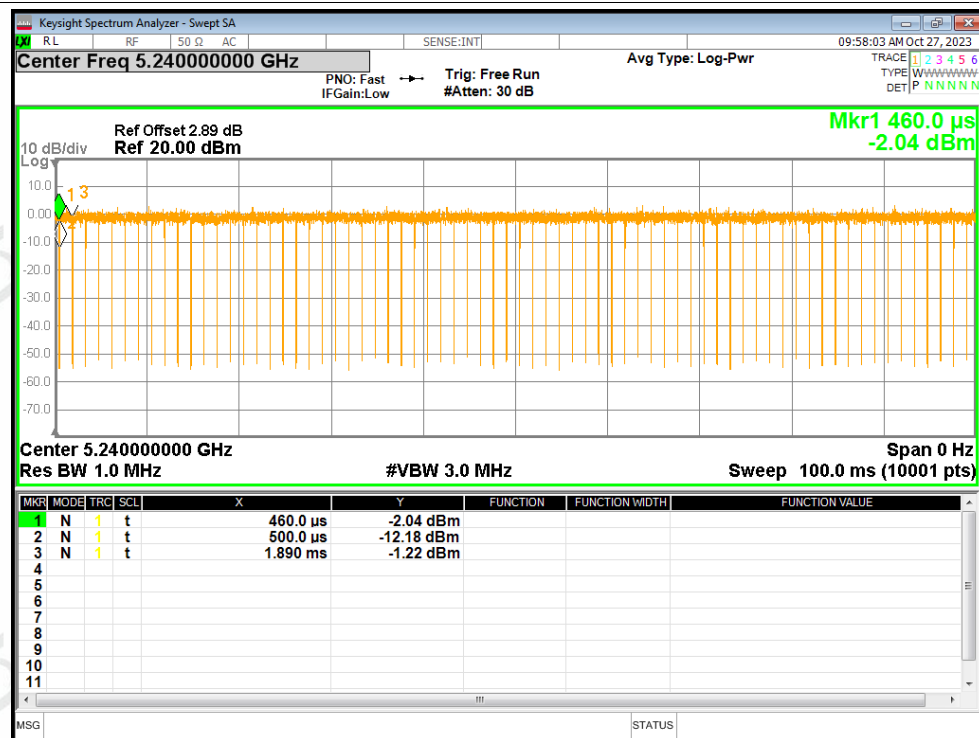


Duty Cycle NVNT a 5200MHz Ant1

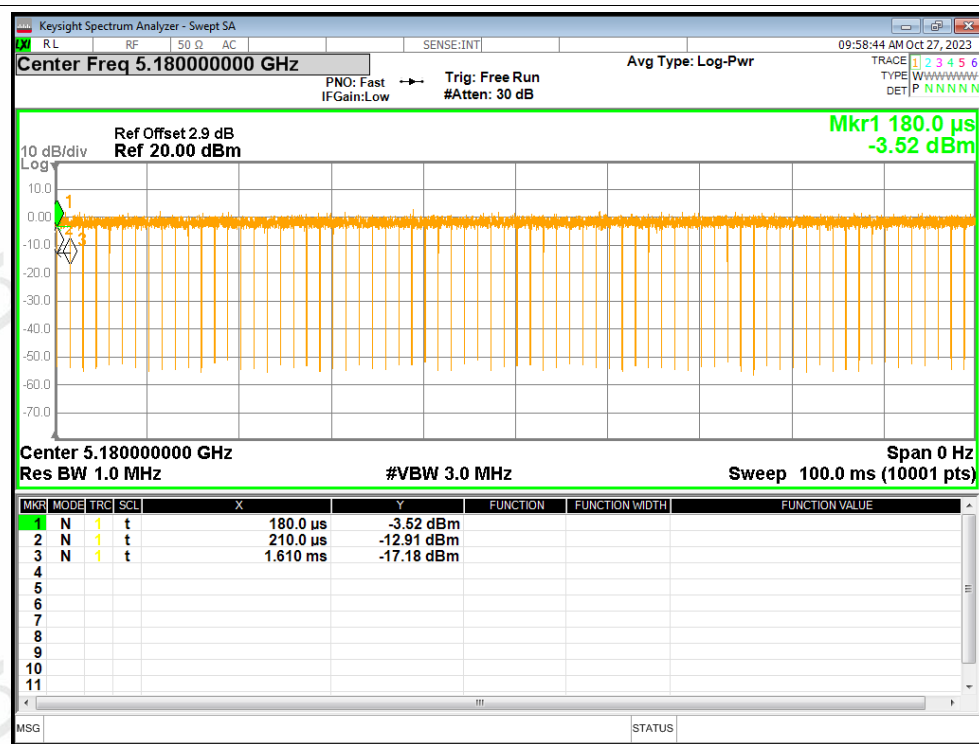




Duty Cycle NVNT a 5240MHz Ant1

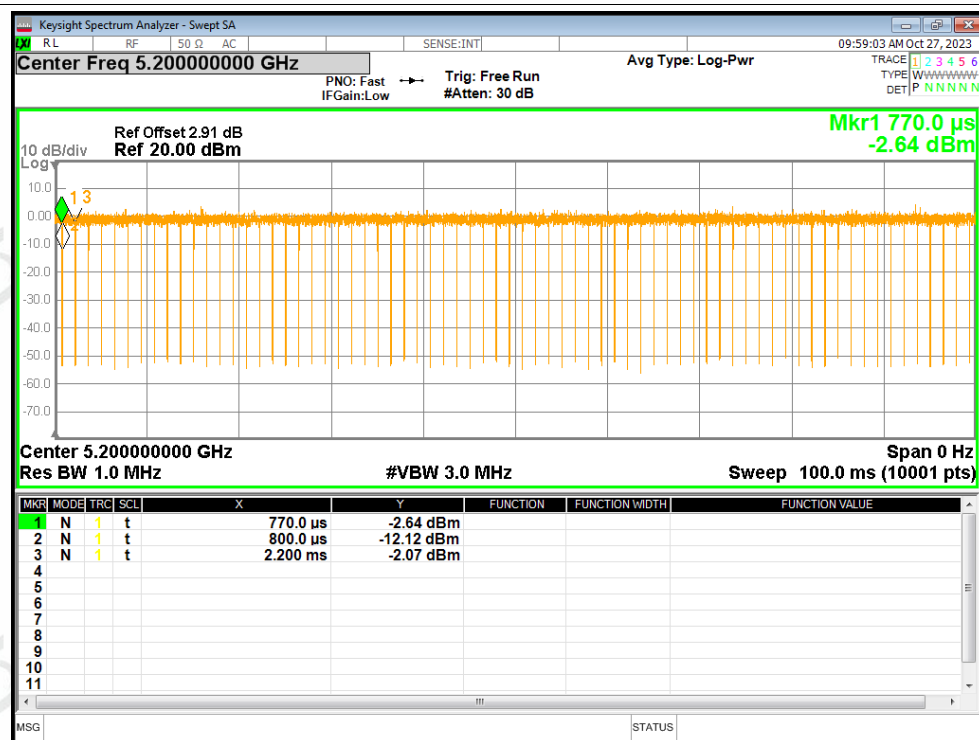


Duty Cycle NVNT n20 5180MHz Ant1

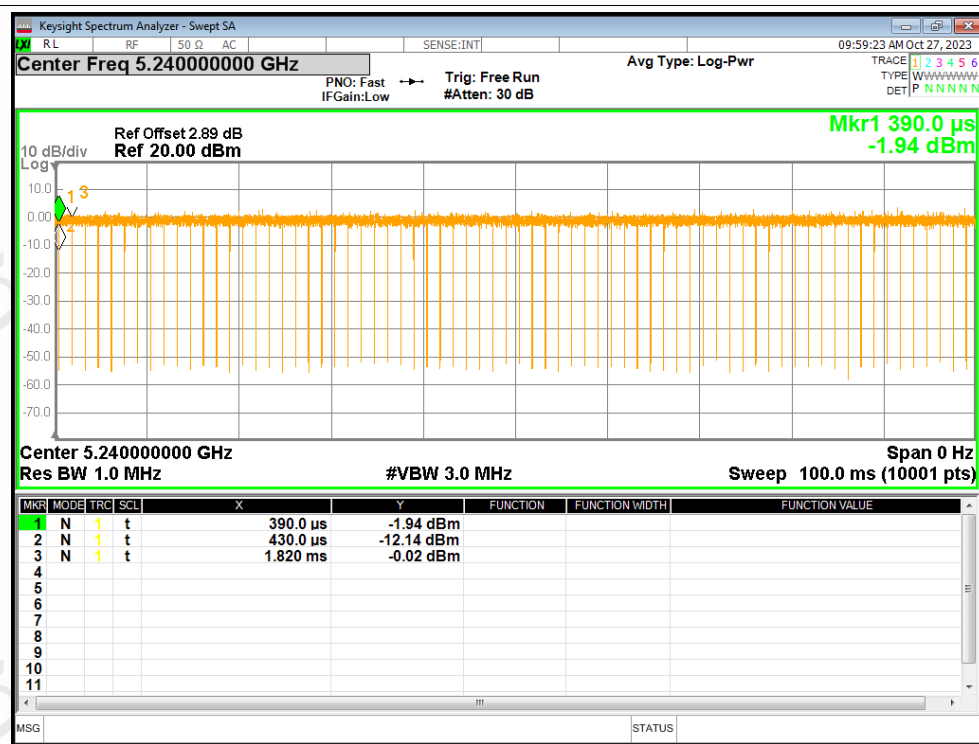




Duty Cycle NVNT n20 5200MHz Ant1

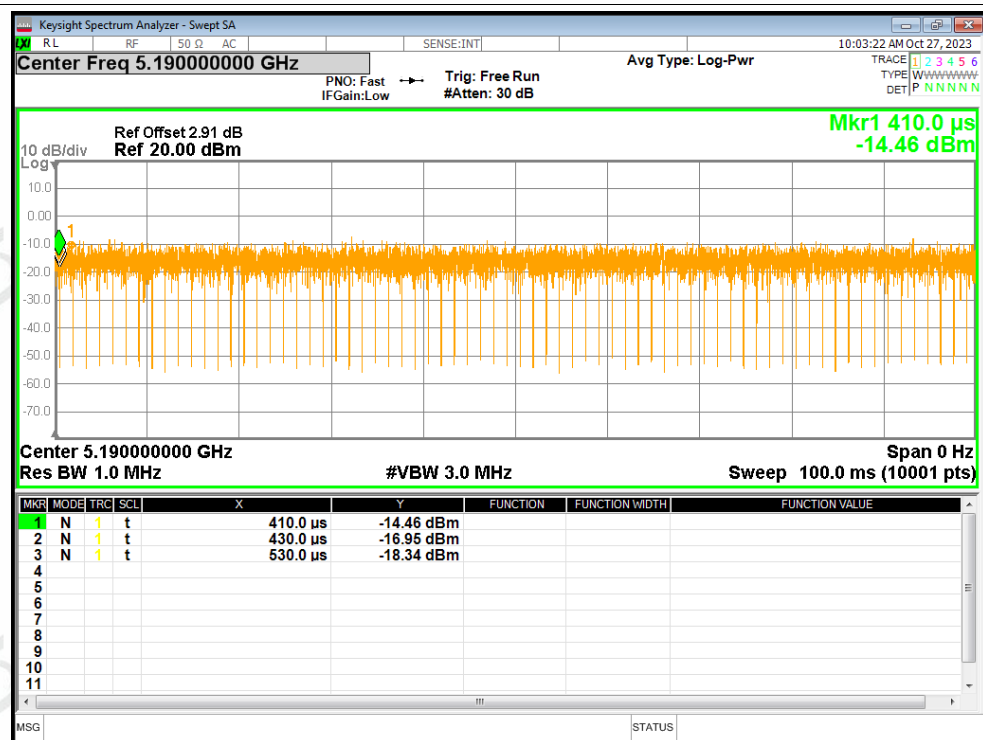


Duty Cycle NVNT n20 5240MHz Ant1

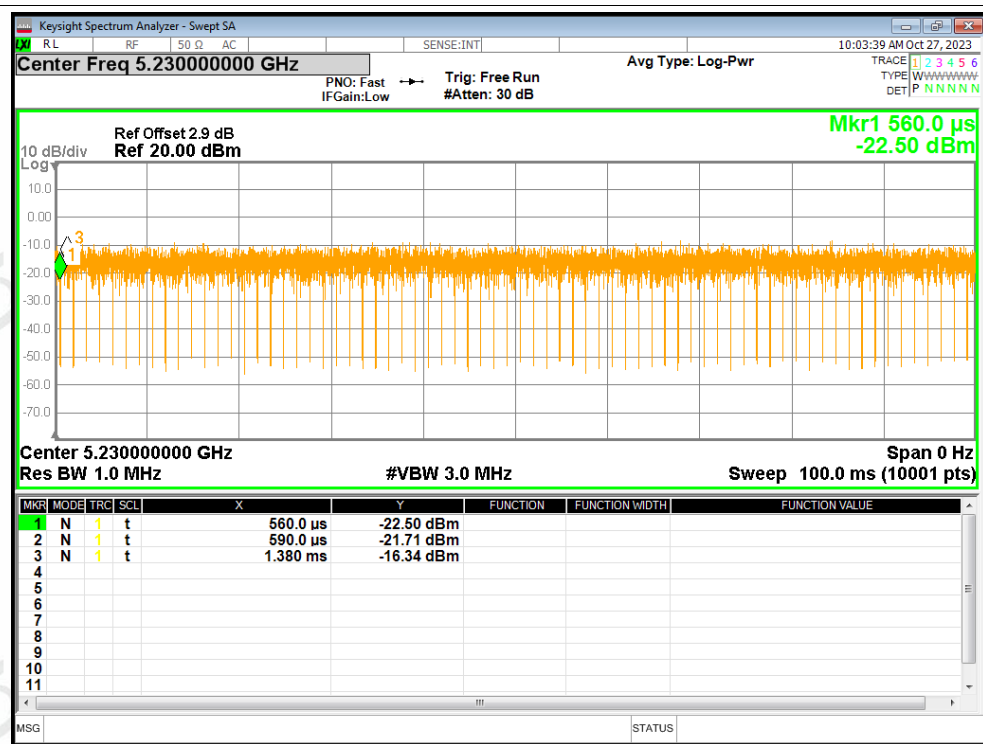




Duty Cycle NVNT n40 5190MHz Ant1

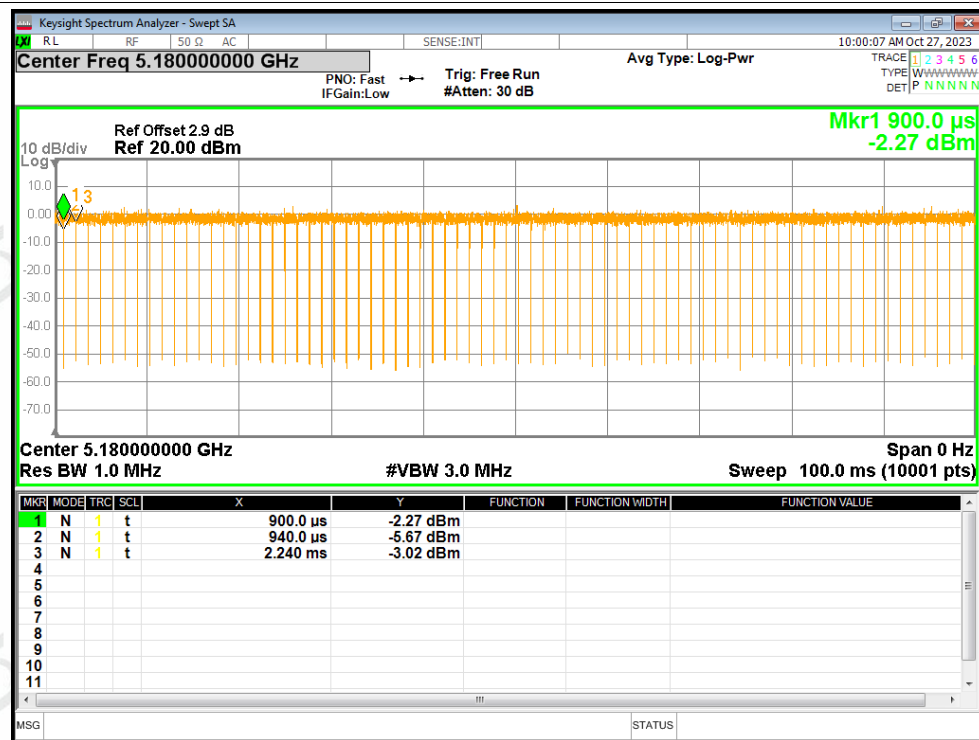


Duty Cycle NVNT n40 5230MHz Ant1

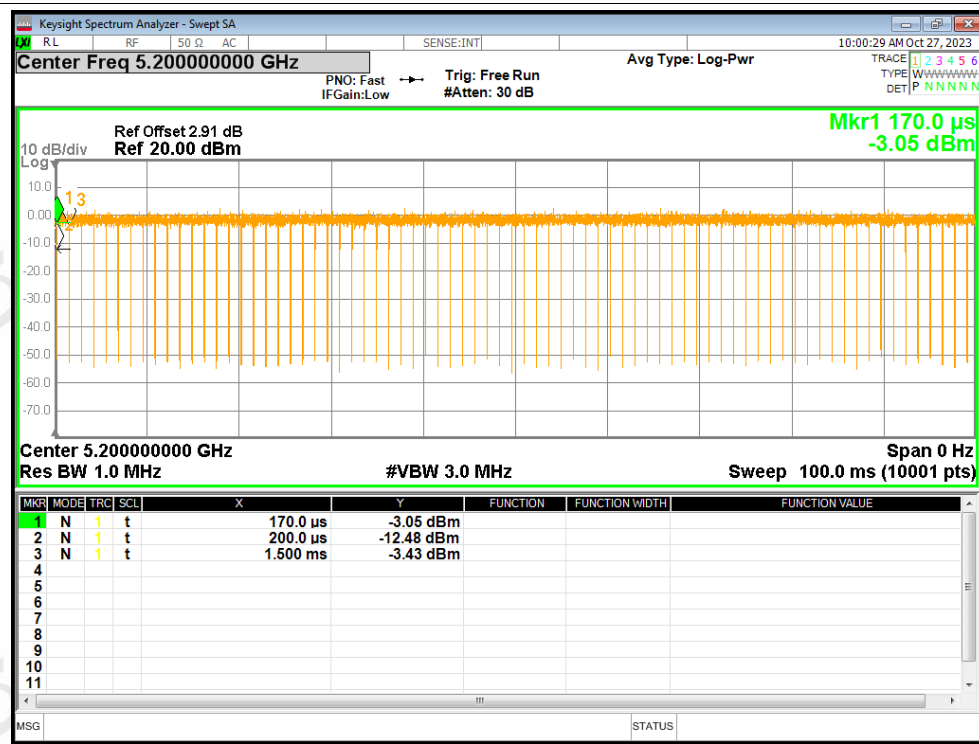




Duty Cycle NVNT ac20 5180MHz Ant1

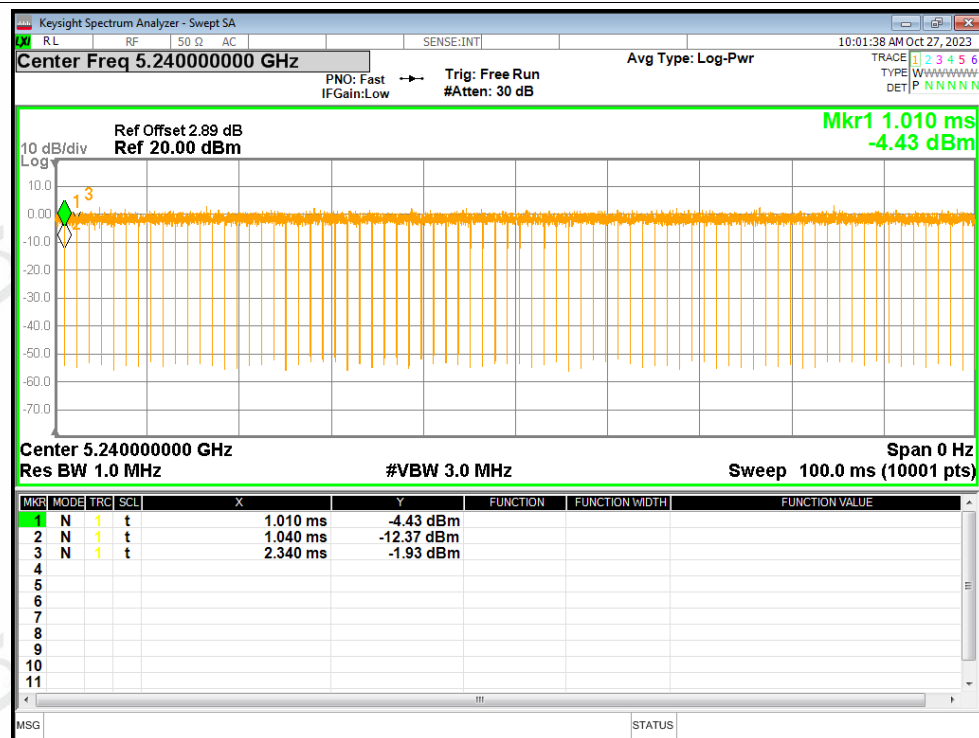


Duty Cycle NVNT ac20 5200MHz Ant1

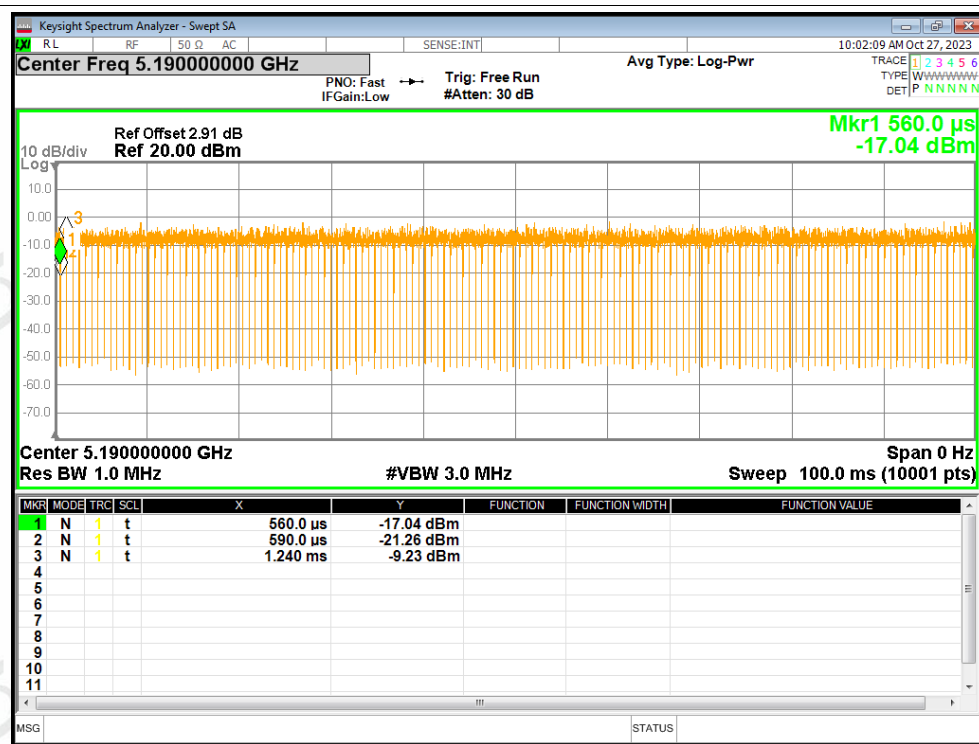




Duty Cycle NVNT ac20 5240MHz Ant1

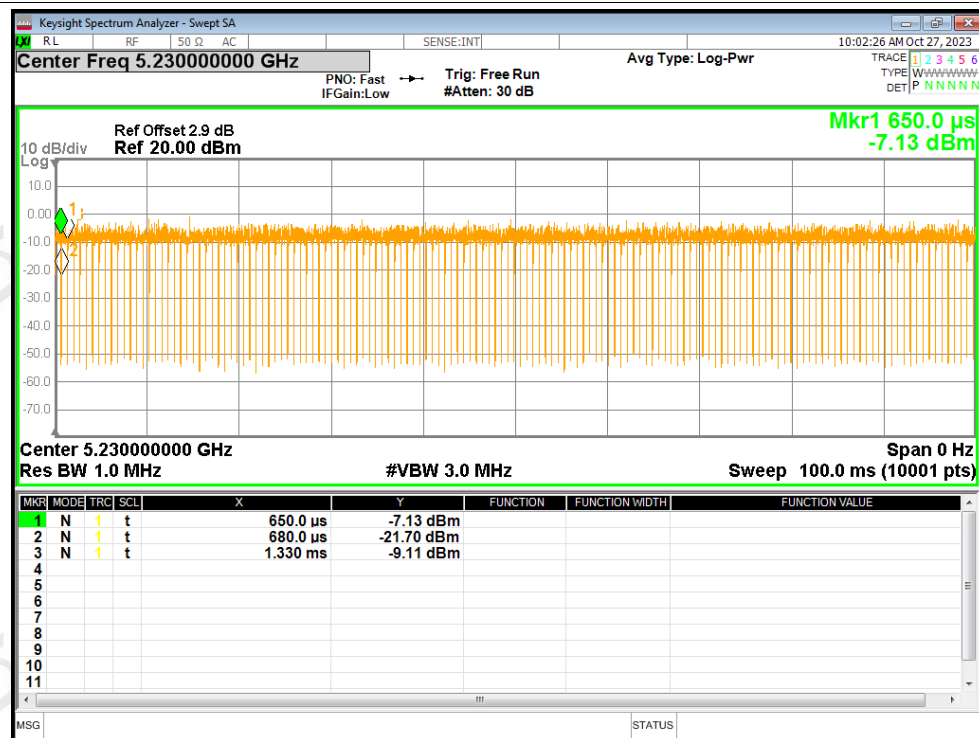


Duty Cycle NVNT ac40 5190MHz Ant1

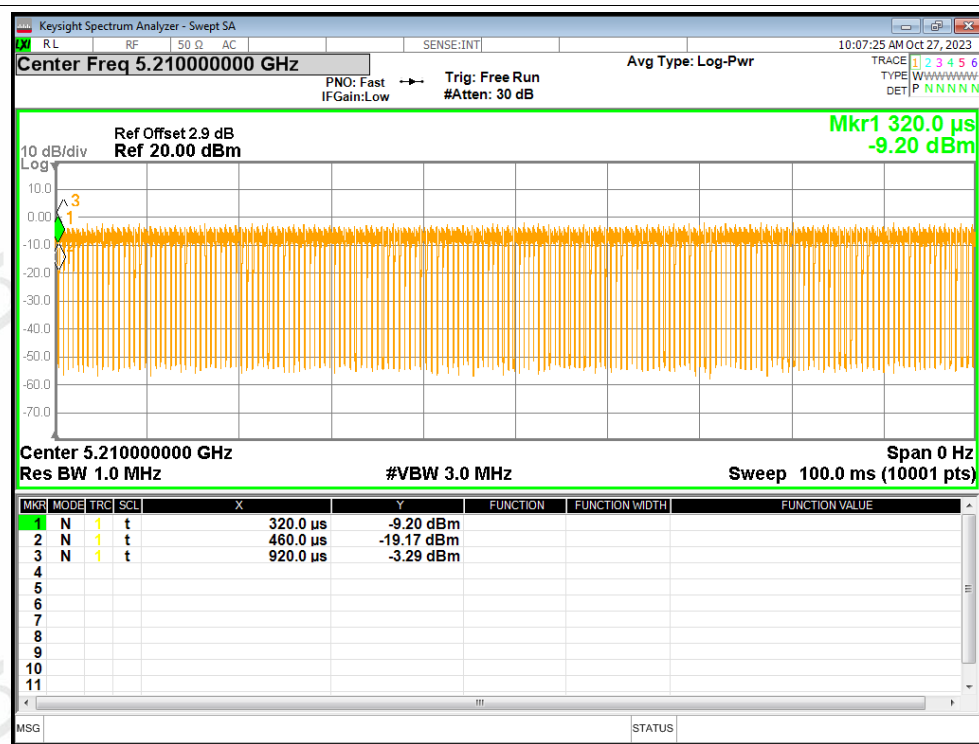




Duty Cycle NVNT ac40 5230MHz Ant1



Duty Cycle NVNT ac80 5210MHz Ant1





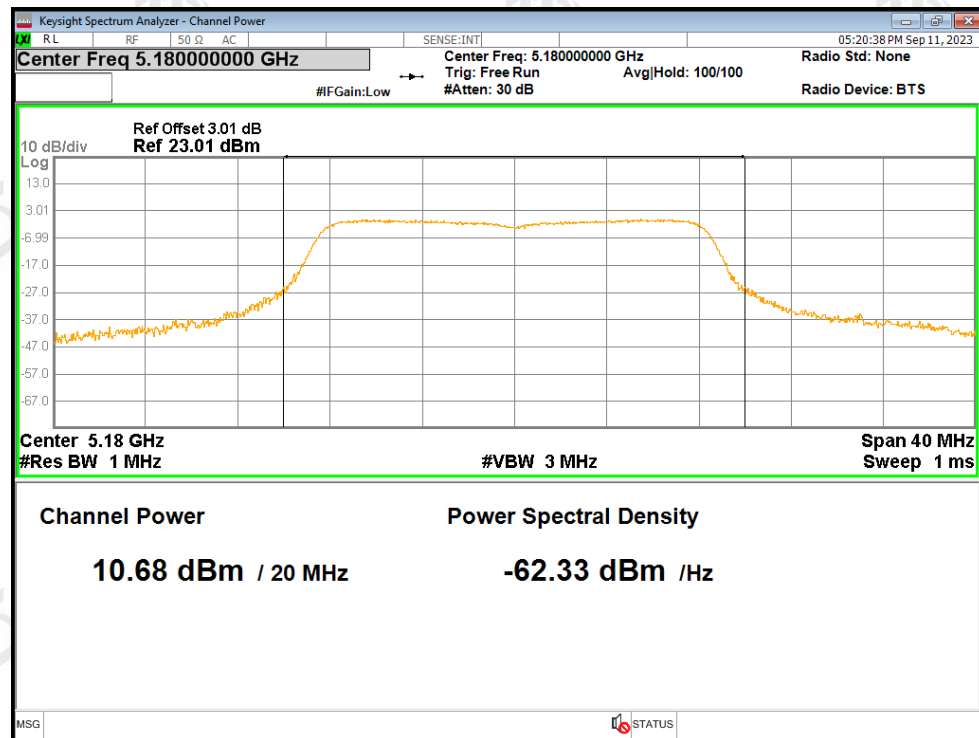
A2.Maximum Conducted Output Power

Condition	Mode	Frequency (MHz)	Antenna	Conducted Power (dBm)	Duty Factor (dB)	Total Power (dBm)	Limit (dBm)	Verdict
NVNT	a	5180	Ant1	10.68	0.12	10.8	24	Pass
NVNT	a	5200	Ant1	11.24	0.12	11.36	24	Pass
NVNT	a	5240	Ant1	11.35	0.12	11.47	24	Pass
NVNT	n20	5180	Ant1	10.95	0.09	11.04	24	Pass
NVNT	n20	5200	Ant1	11.34	0.09	11.43	24	Pass
NVNT	n20	5240	Ant1	10.66	0.12	10.78	24	Pass
NVNT	n40	5190	Ant1	11.26	0.79	12.05	24	Pass
NVNT	n40	5230	Ant1	10.87	0.16	11.03	24	Pass
NVNT	ac20	5180	Ant1	11.41	0.13	11.54	24	Pass
NVNT	ac20	5200	Ant1	11.44	0.1	11.54	24	Pass
NVNT	ac20	5240	Ant1	11.06	0.1	11.16	24	Pass
NVNT	ac40	5190	Ant1	11.19	0.2	11.39	24	Pass
NVNT	ac40	5230	Ant1	10.89	0.2	11.09	24	Pass
NVNT	ac80	5210	Ant1	6.41	1.15	7.56	24	Pass

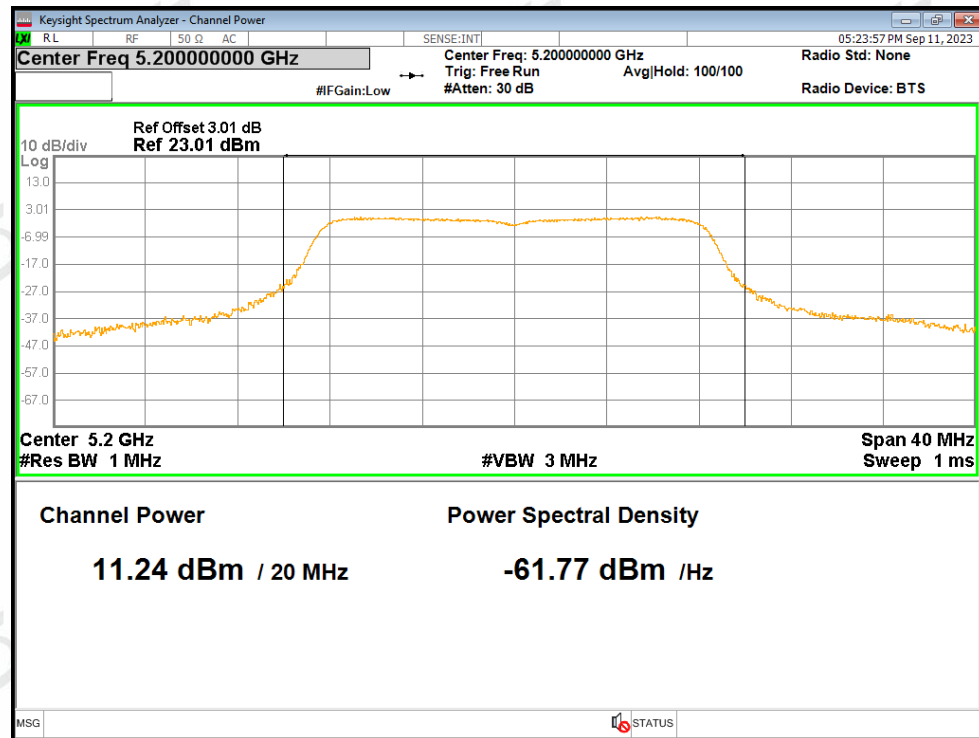


Test Graphs

Power NVNT a 5180MHz Ant1

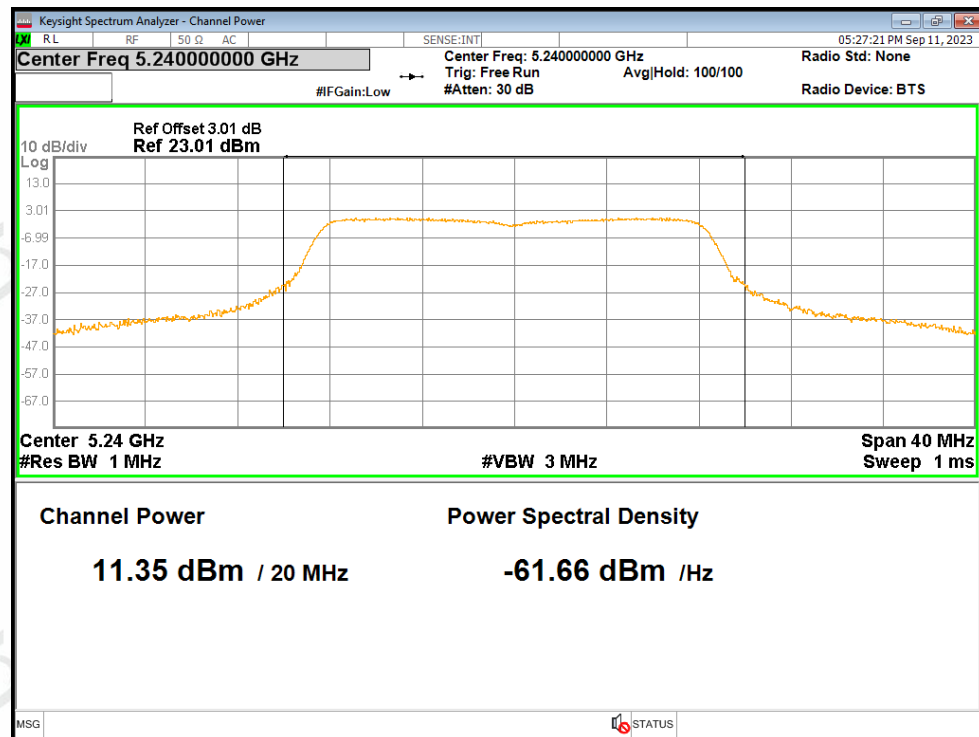


Power NVNT a 5200MHz Ant1

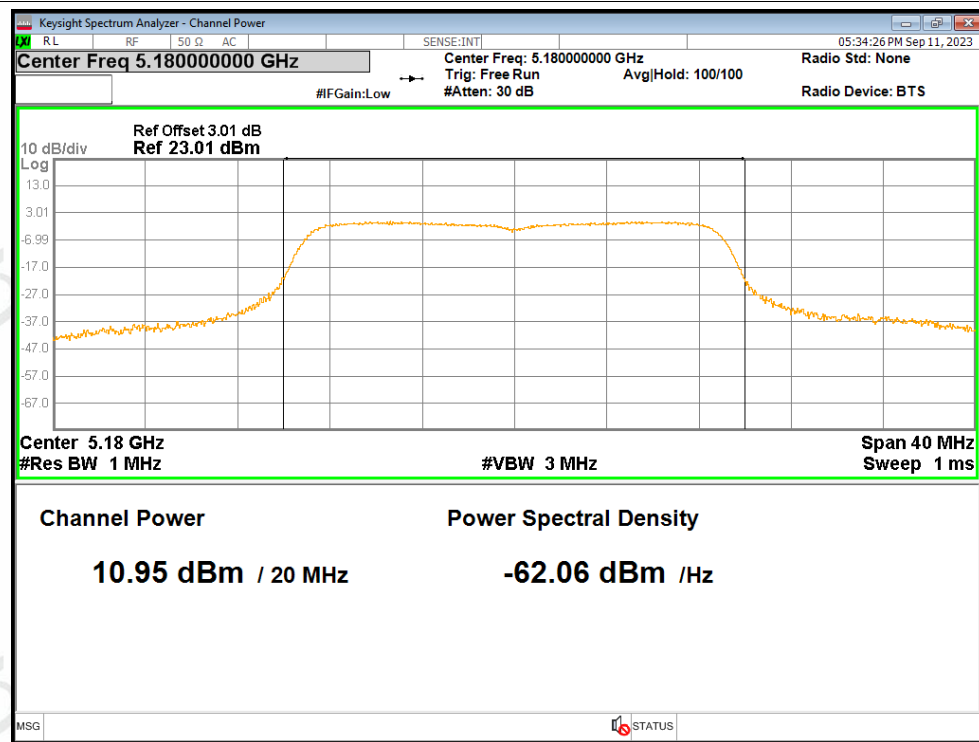




Power NVNT a 5240MHz Ant1

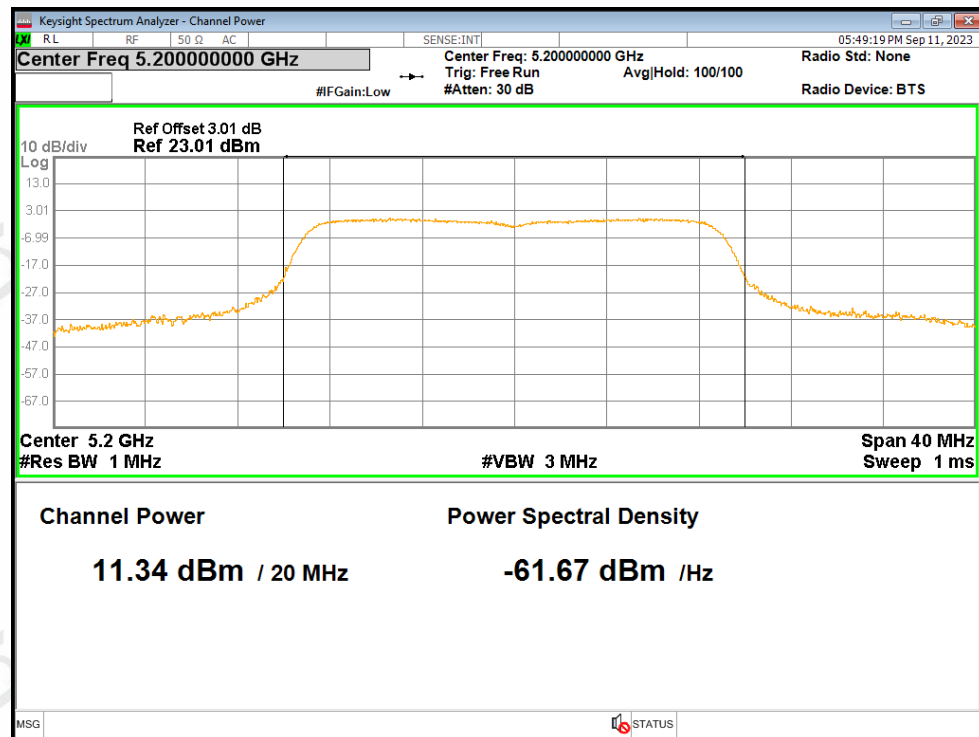


Power NVNT n20 5180MHz Ant1

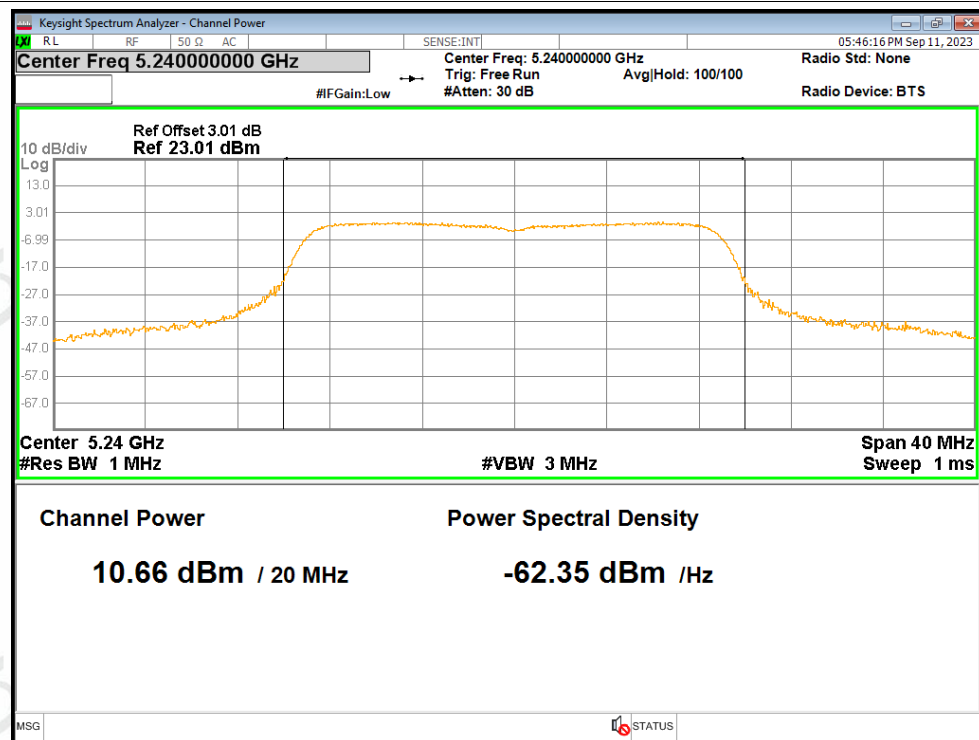




Power NVNT n20 5200MHz Ant1

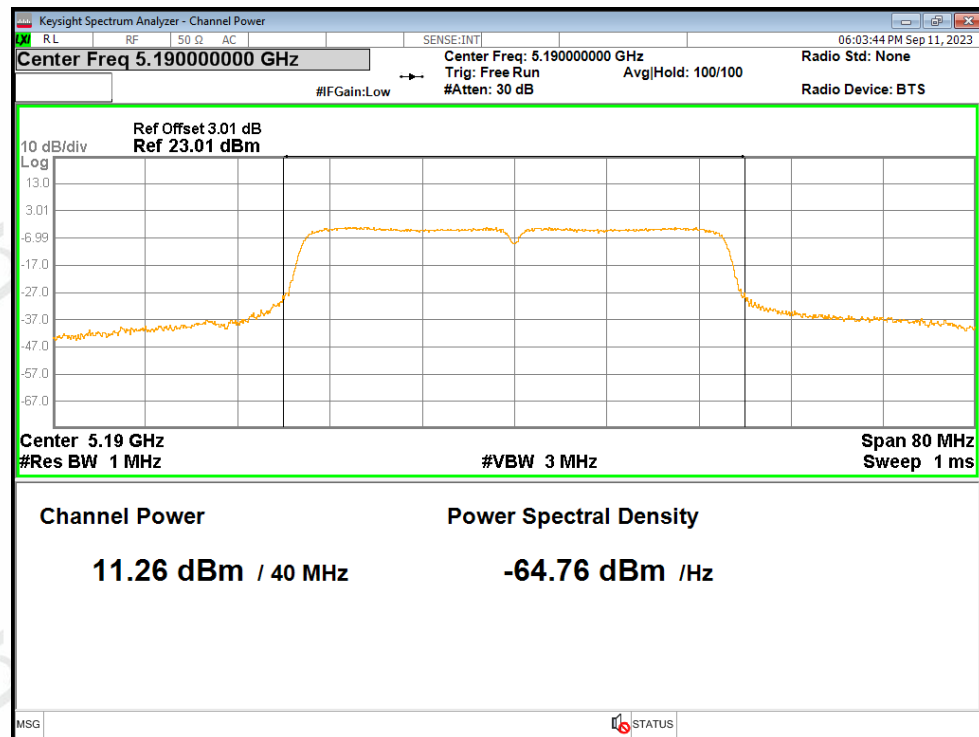


Power NVNT n20 5240MHz Ant1

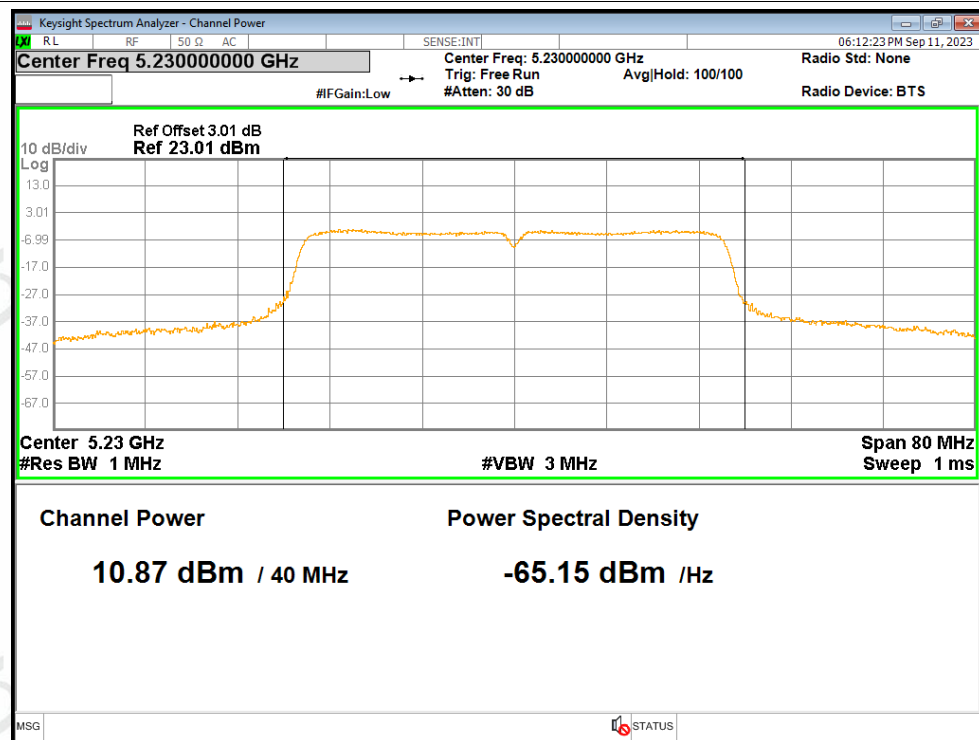




Power NVNT n40 5190MHz Ant1

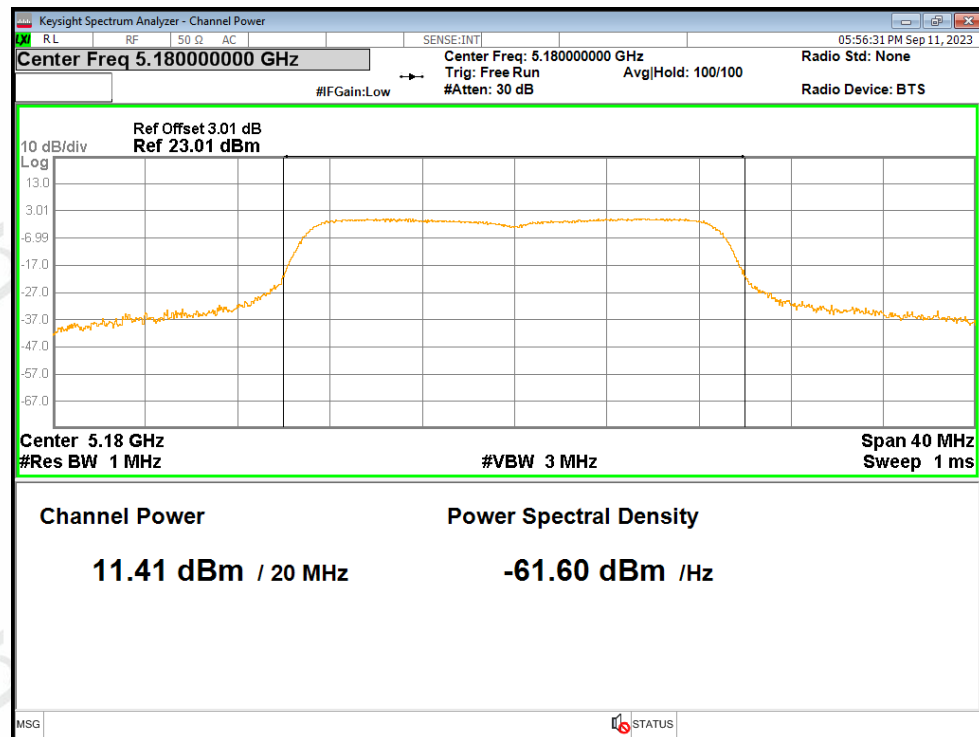


Power NVNT n40 5230MHz Ant1

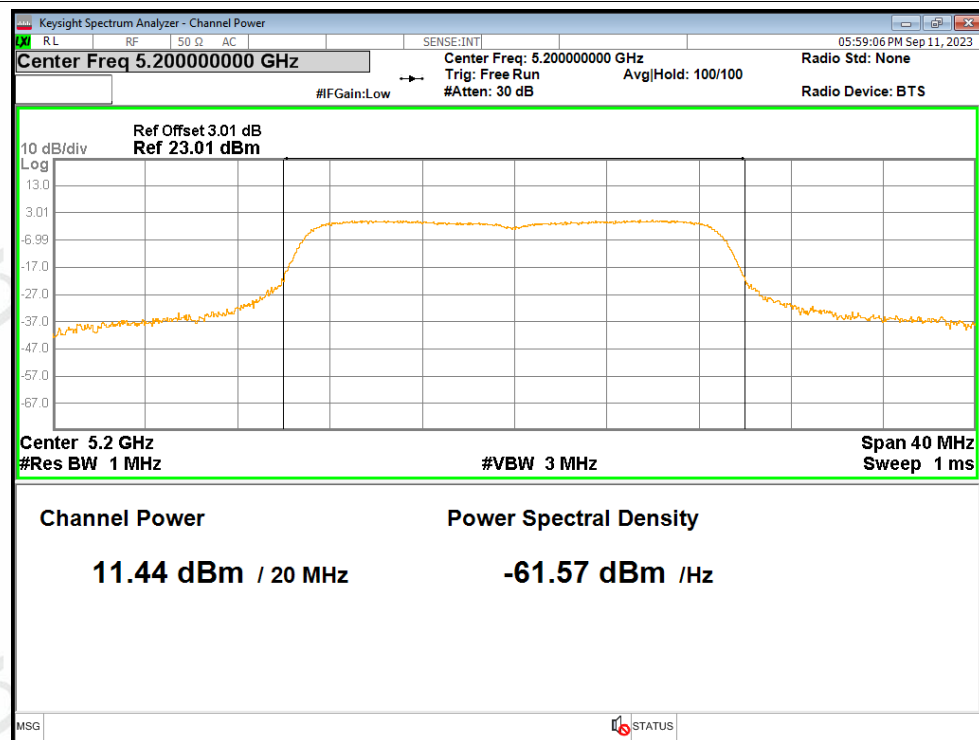




Power NVNT ac20 5180MHz Ant1

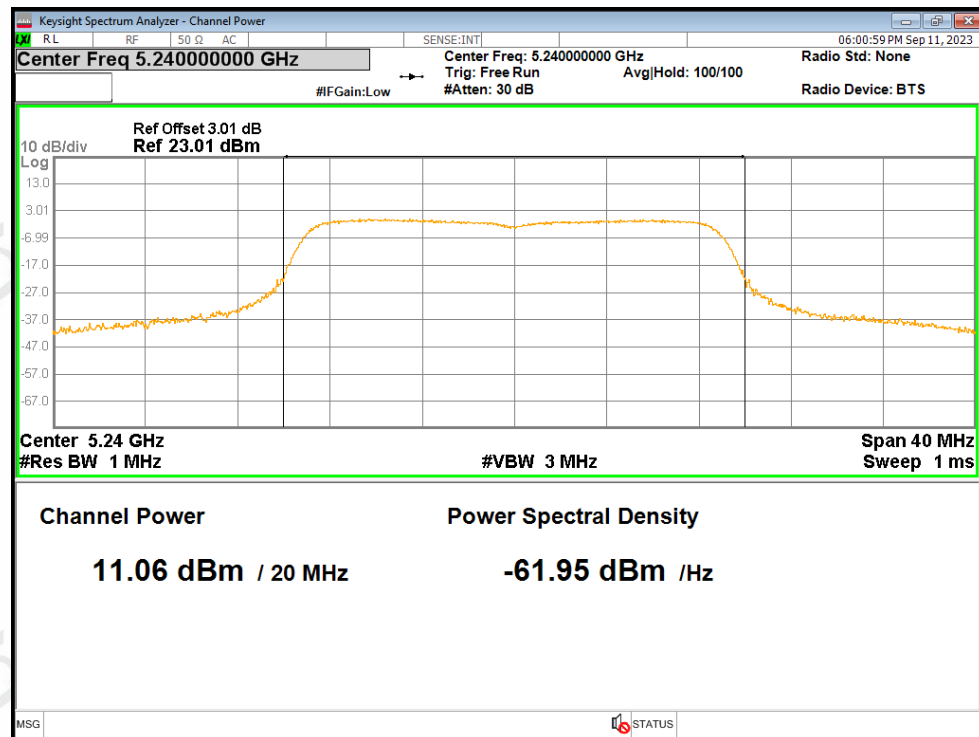


Power NVNT ac20 5200MHz Ant1

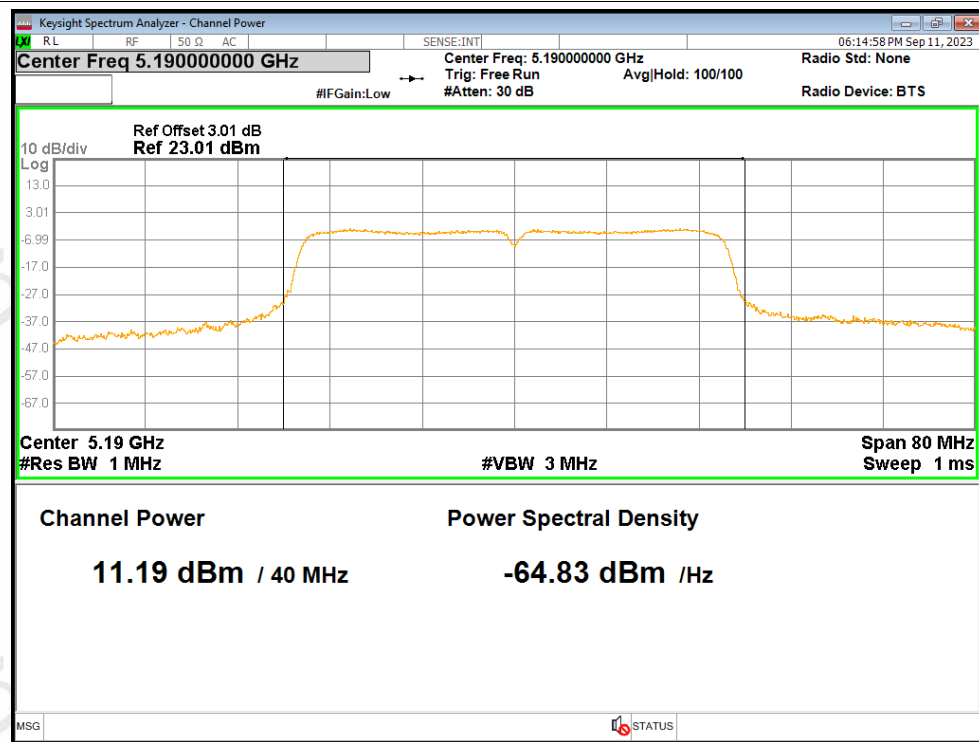




Power NVNT ac20 5240MHz Ant1

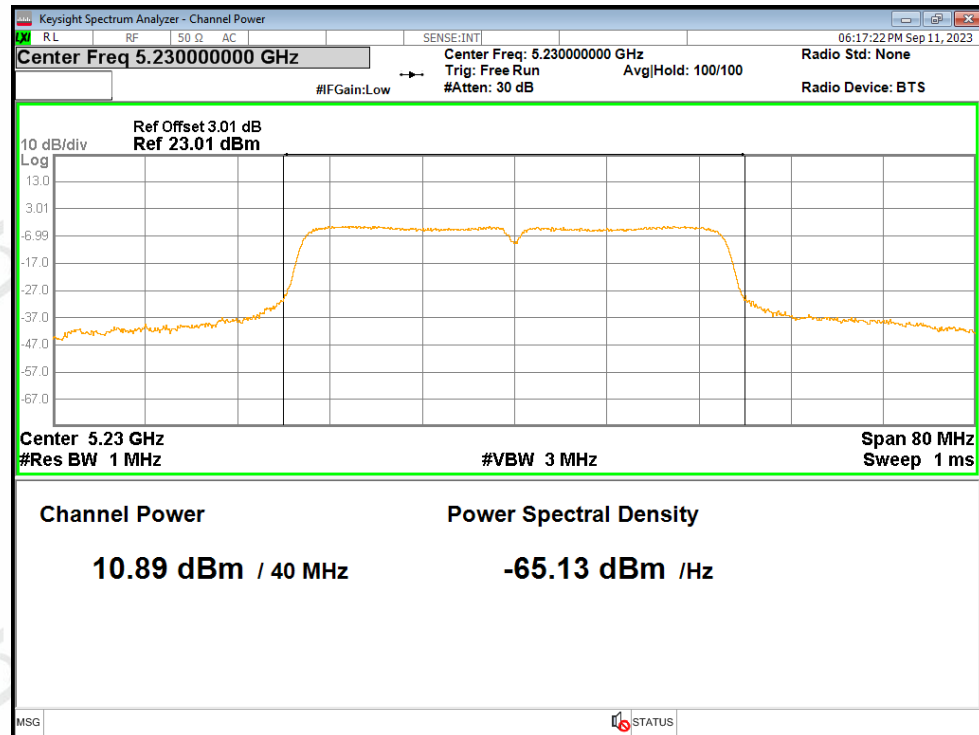


Power NVNT ac40 5190MHz Ant1

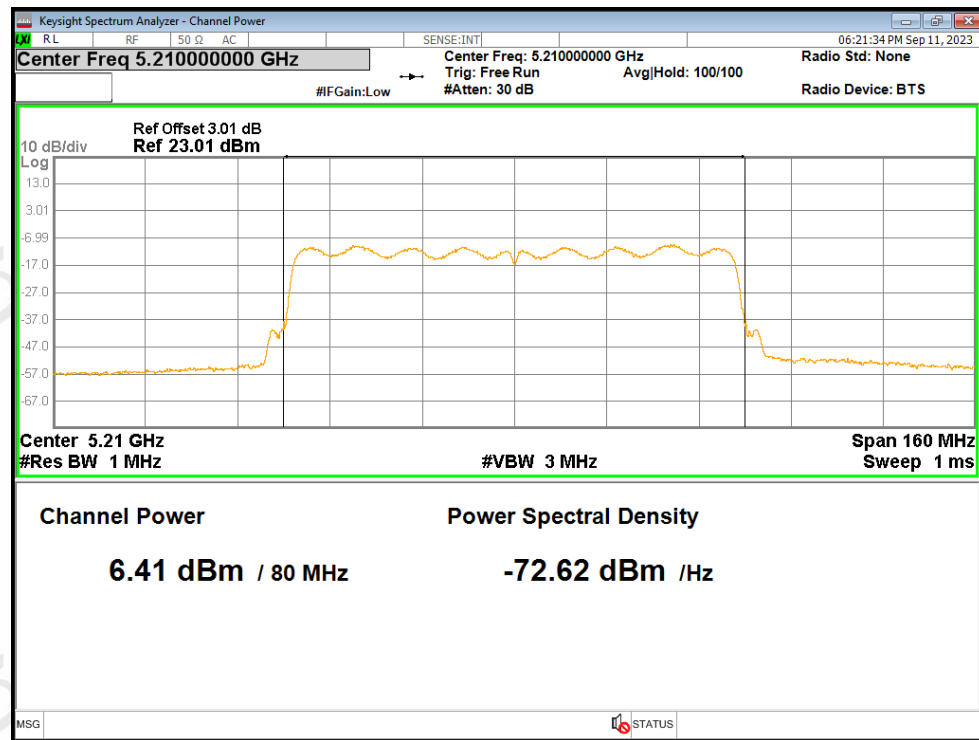




Power NVNT ac40 5230MHz Ant1



Power NVNT ac80 5210MHz Ant1



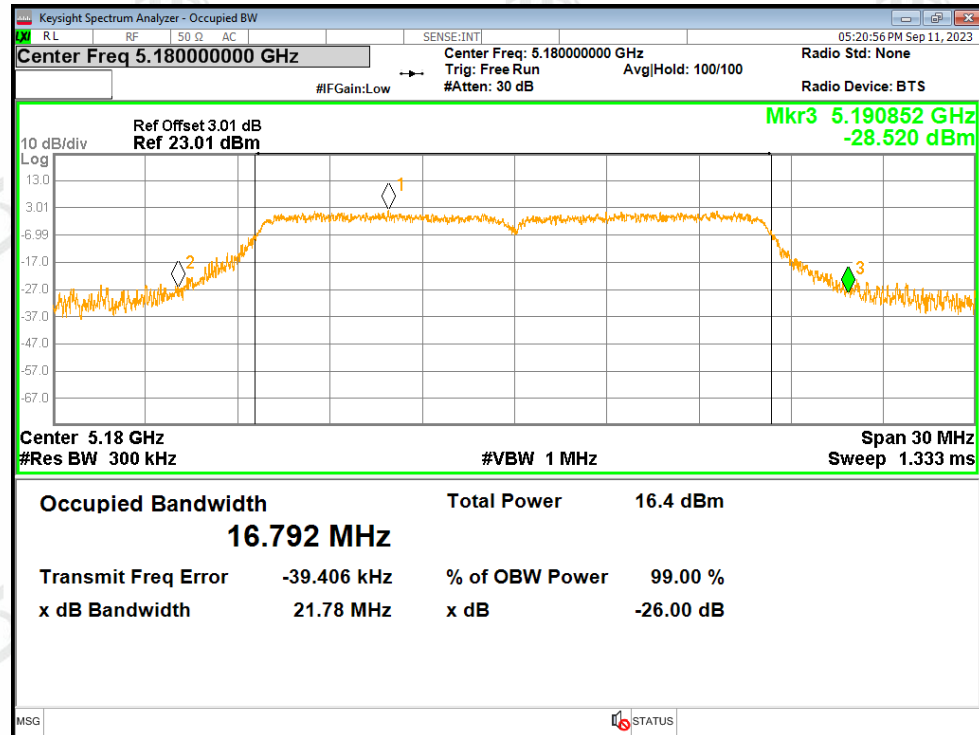
**A3.-26dB Bandwidth**

Condition	Mode	Frequency (MHz)	Antenna	-26 dB Bandwidth (MHz)	Verdict
NVNT	a	5180	Ant1	21.78	Pass
NVNT	a	5200	Ant1	22.21	Pass
NVNT	a	5240	Ant1	22.03	Pass
NVNT	n20	5180	Ant1	21.78	Pass
NVNT	n20	5200	Ant1	22.17	Pass
NVNT	n20	5240	Ant1	21.65	Pass
NVNT	n40	5190	Ant1	43.82	Pass
NVNT	n40	5230	Ant1	41.31	Pass
NVNT	ac20	5180	Ant1	26.40	Pass
NVNT	ac20	5200	Ant1	21.86	Pass
NVNT	ac20	5240	Ant1	21.46	Pass
NVNT	ac40	5190	Ant1	41.38	Pass
NVNT	ac40	5230	Ant1	41.50	Pass
NVNT	ac80	5210	Ant1	80.04	Pass

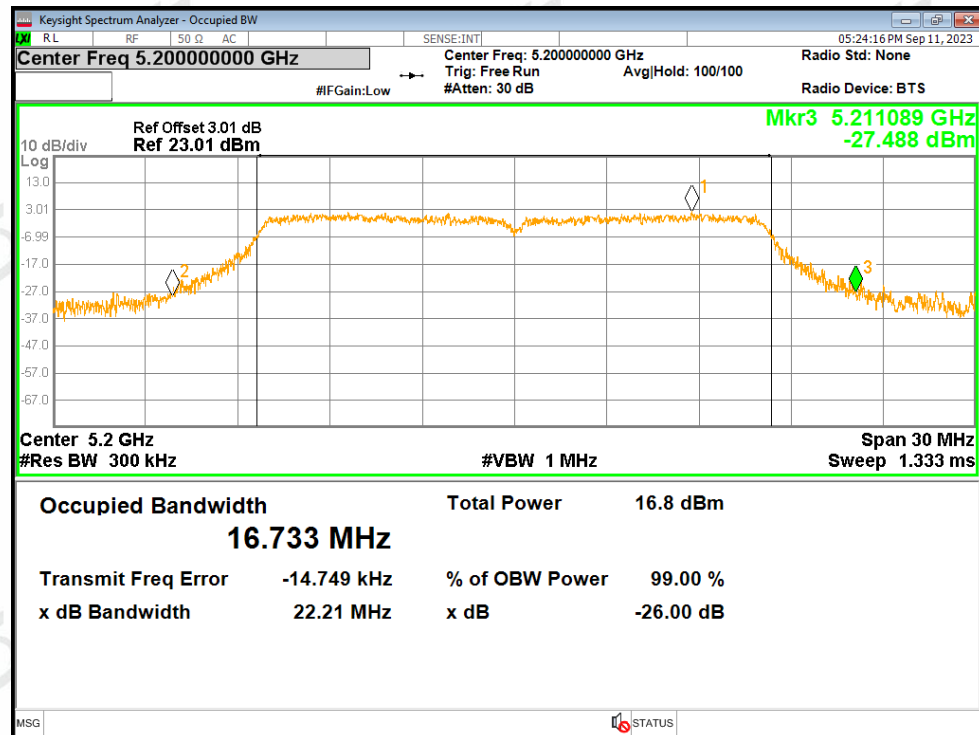


Test Graphs

-26dB Bandwidth NVNT a 5180MHz Ant1

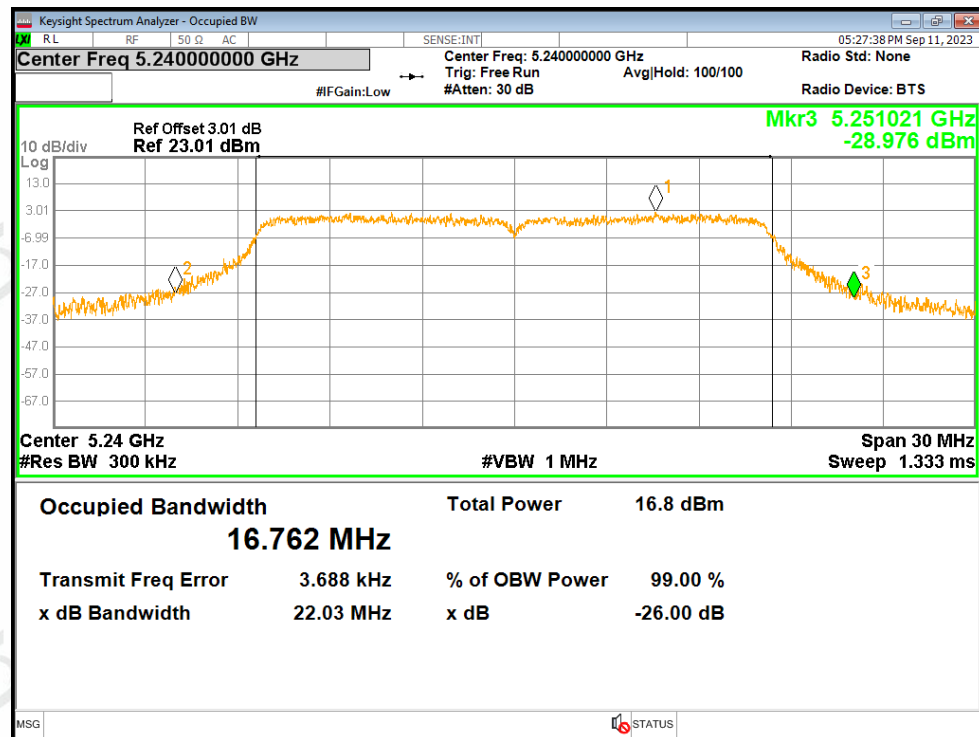


-26dB Bandwidth NVNT a 5200MHz Ant1

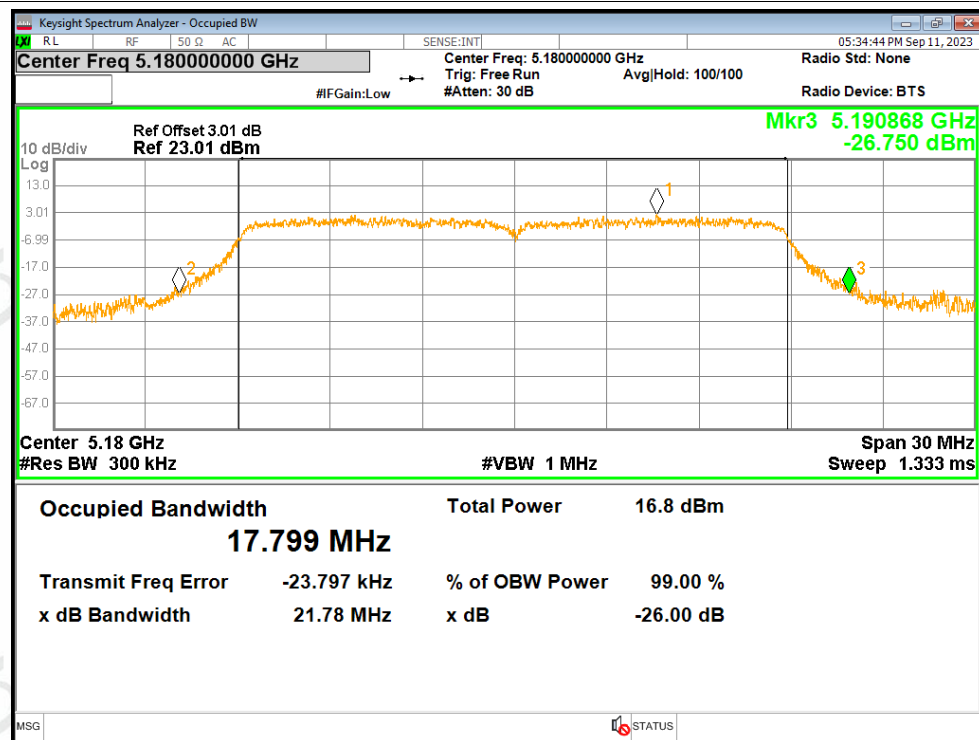




-26dB Bandwidth NVNT a 5240MHz Ant1

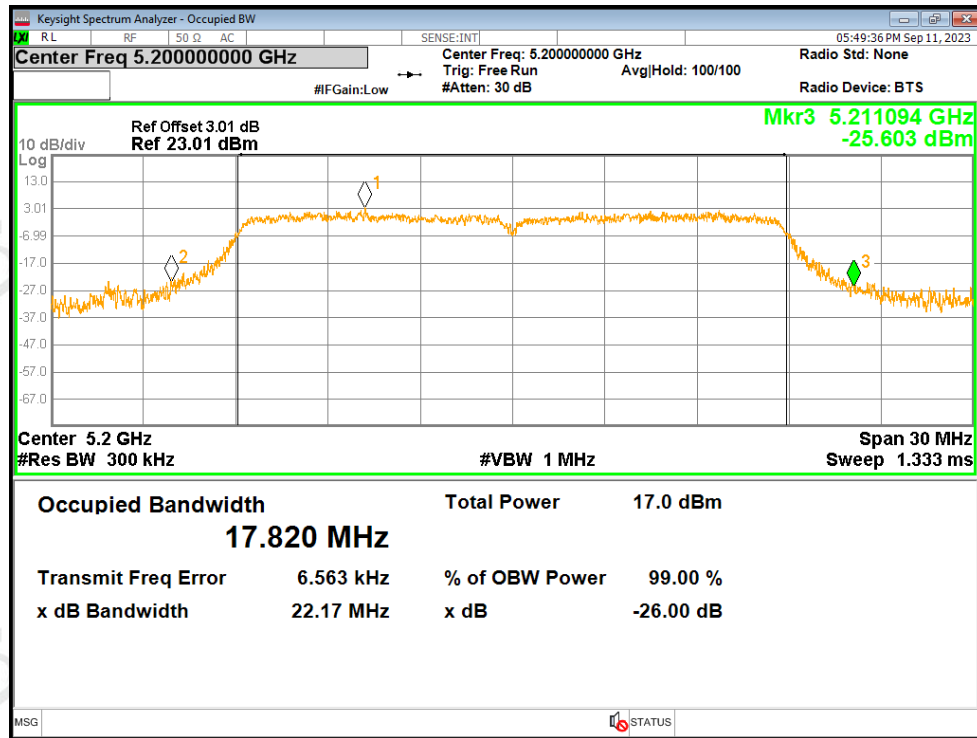


-26dB Bandwidth NVNT n20 5180MHz Ant1

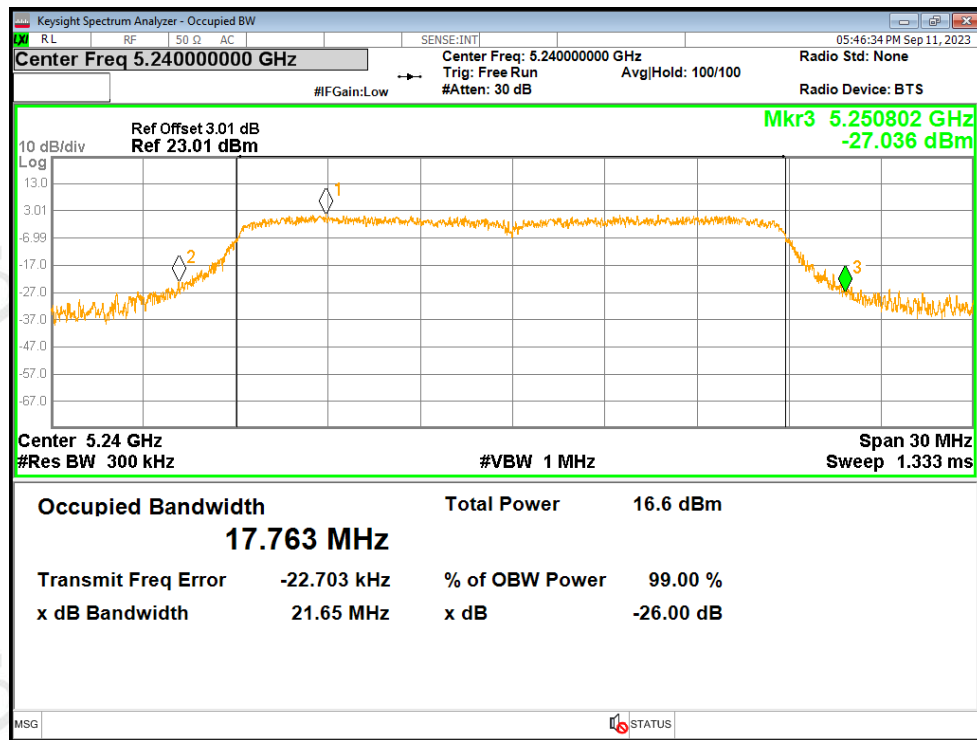




-26dB Bandwidth NVNT n20 5200MHz Ant1

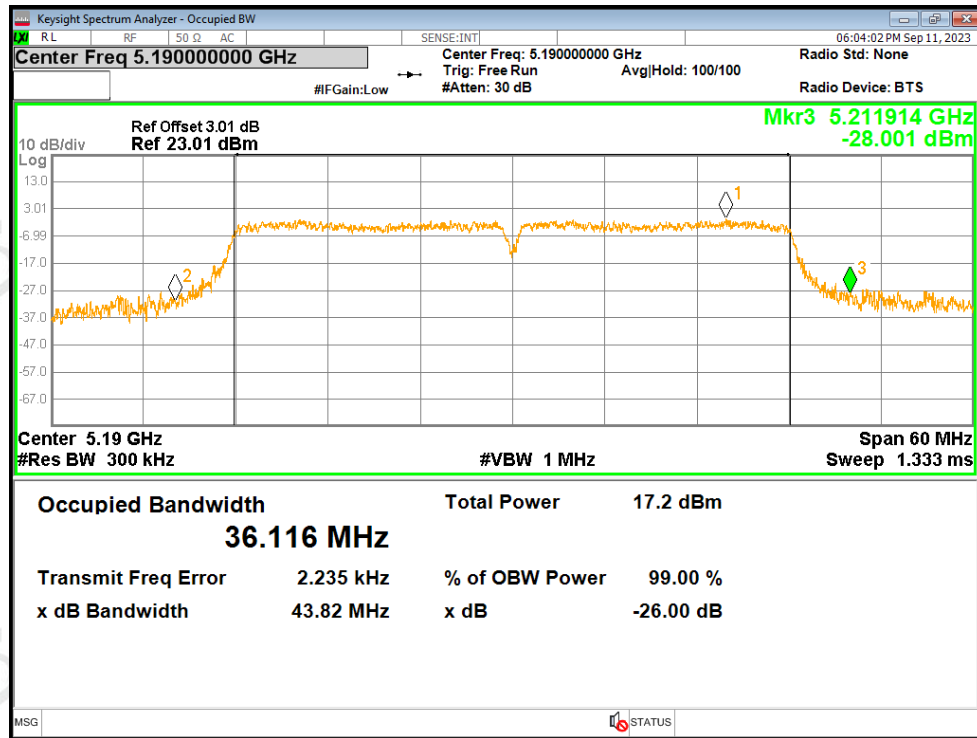


-26dB Bandwidth NVNT n20 5240MHz Ant1

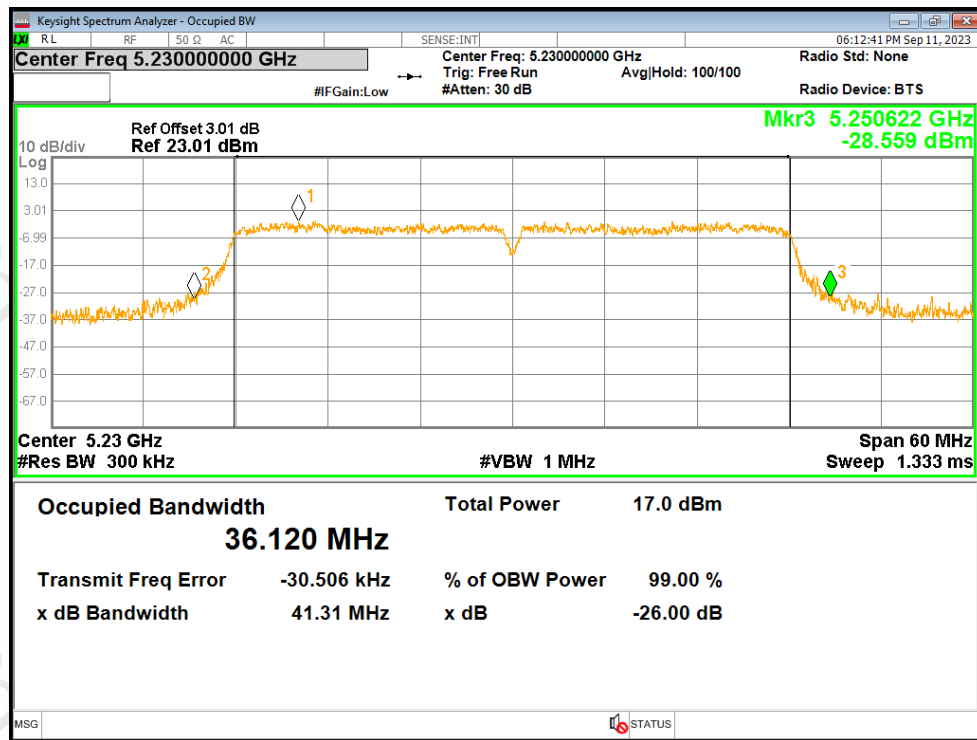




-26dB Bandwidth NVNT n40 5190MHz Ant1

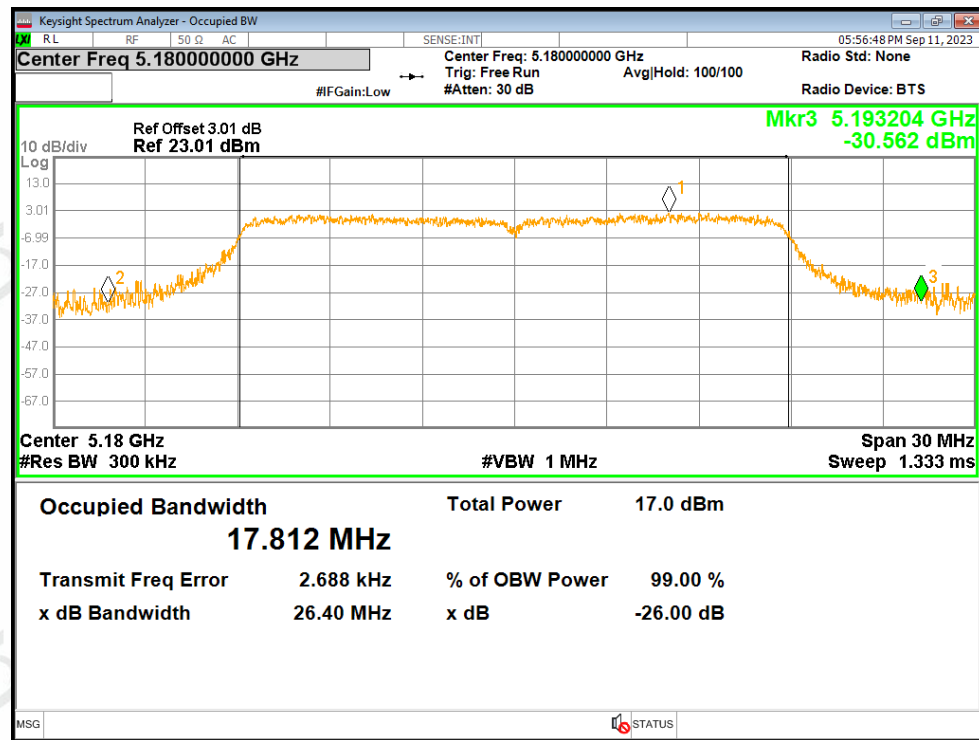


-26dB Bandwidth NVNT n40 5230MHz Ant1

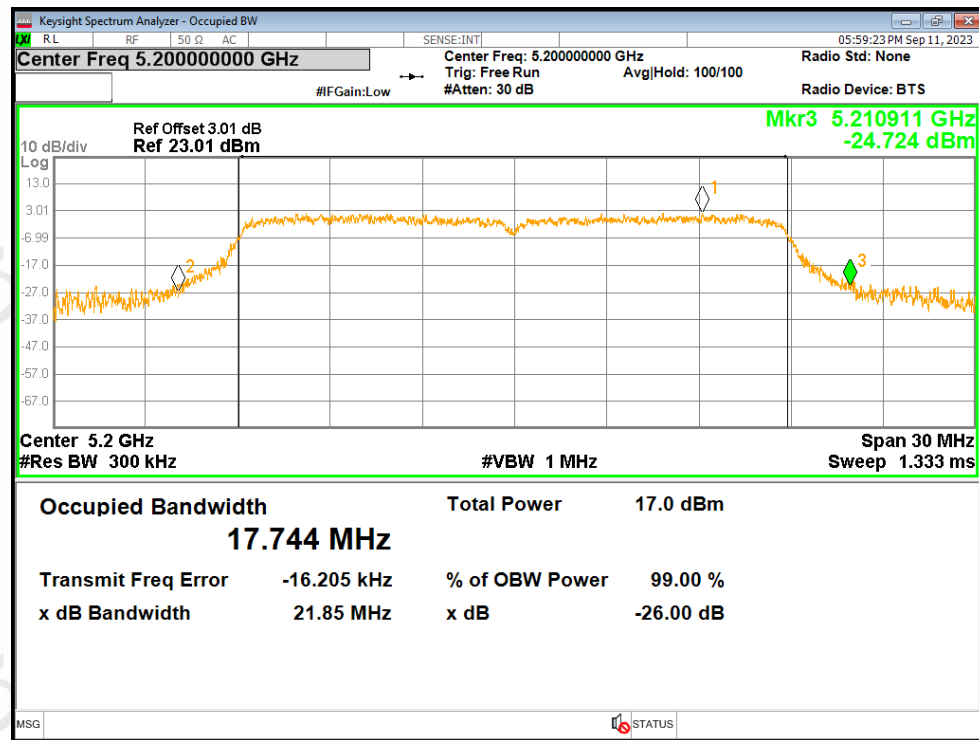




-26dB Bandwidth NVNT ac20 5180MHz Ant1

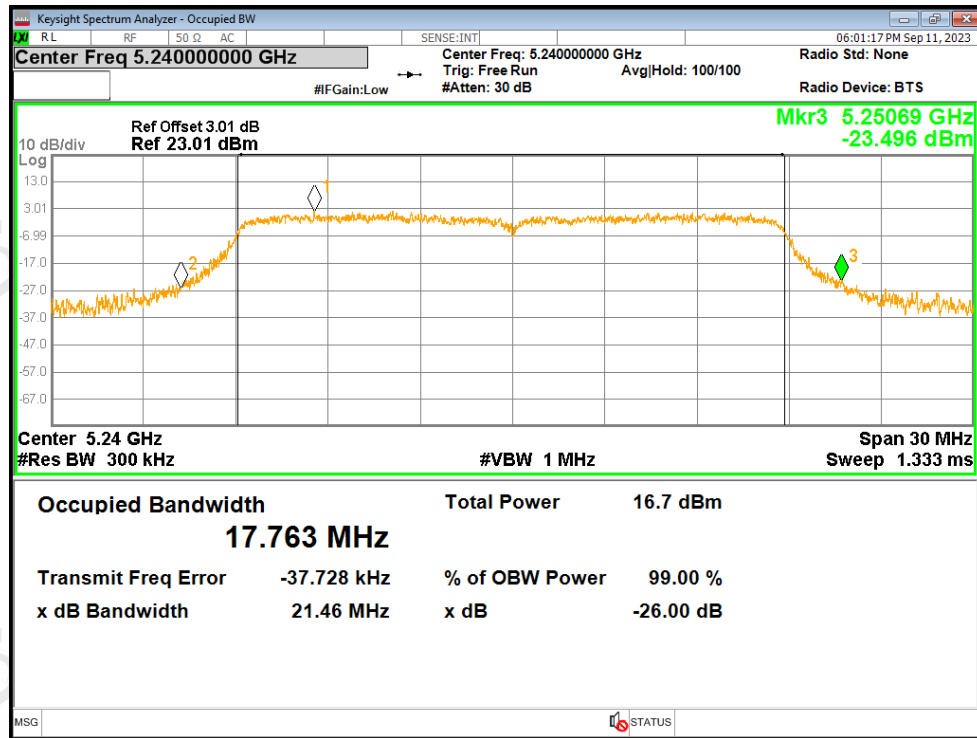


-26dB Bandwidth NVNT ac20 5200MHz Ant1

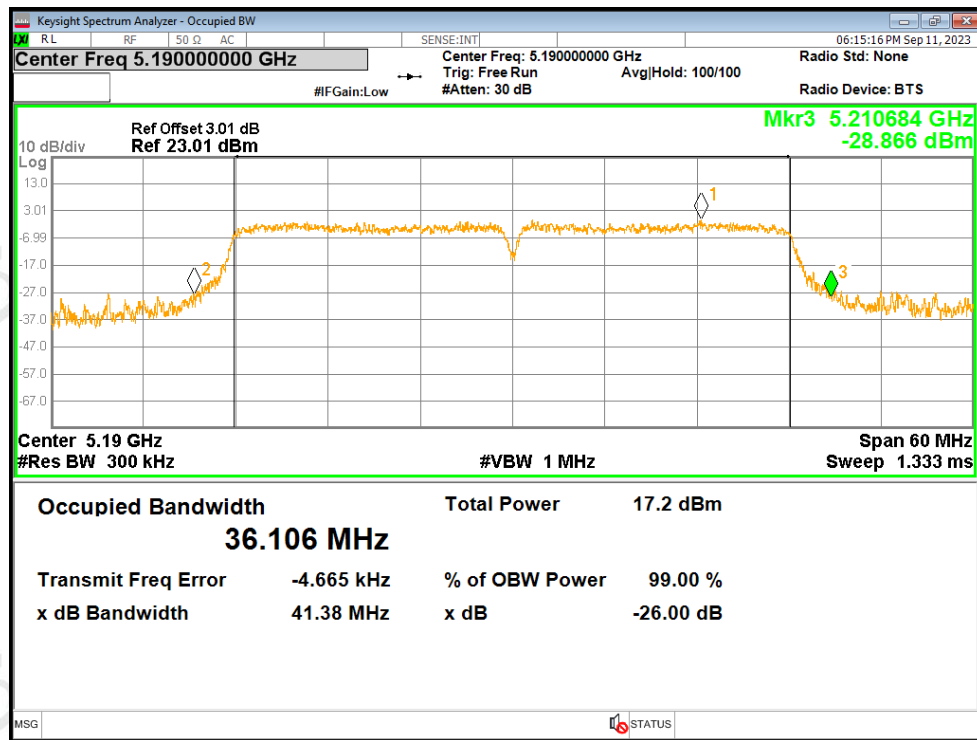




-26dB Bandwidth NVNT ac20 5240MHz Ant1

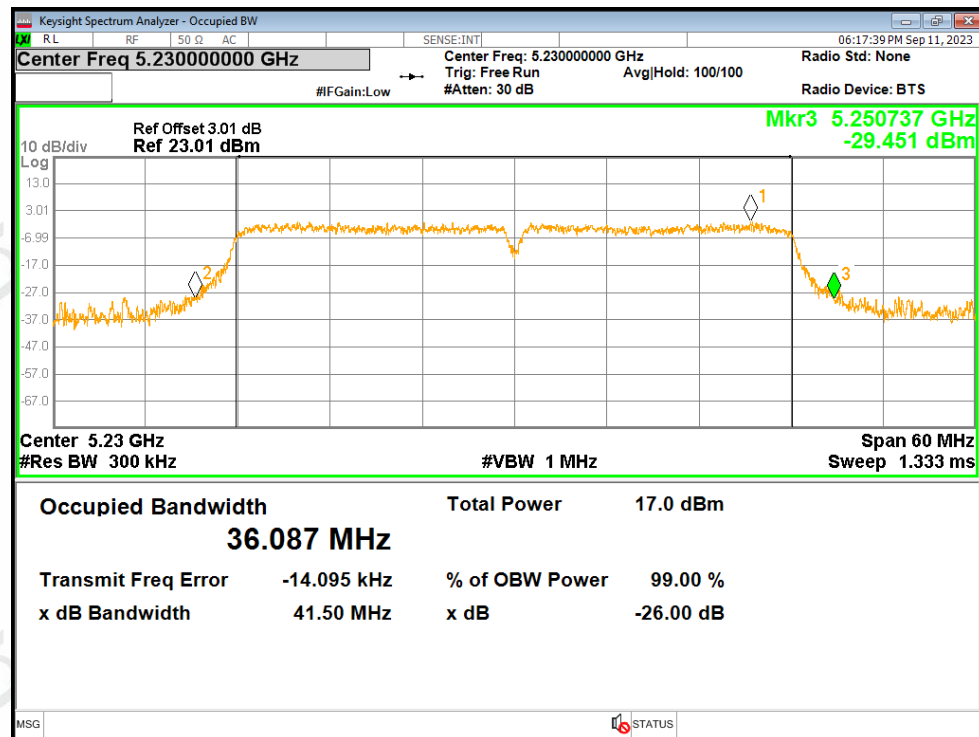


-26dB Bandwidth NVNT ac40 5190MHz Ant1

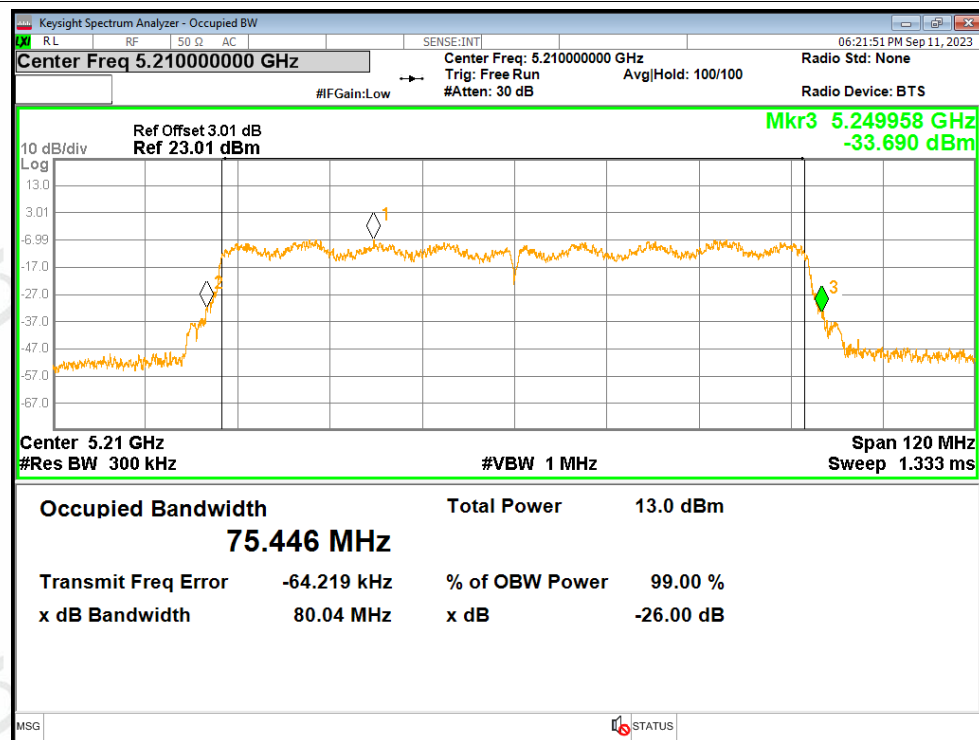




-26dB Bandwidth NVNT ac40 5230MHz Ant1



-26dB Bandwidth NVNT ac80 5210MHz Ant1





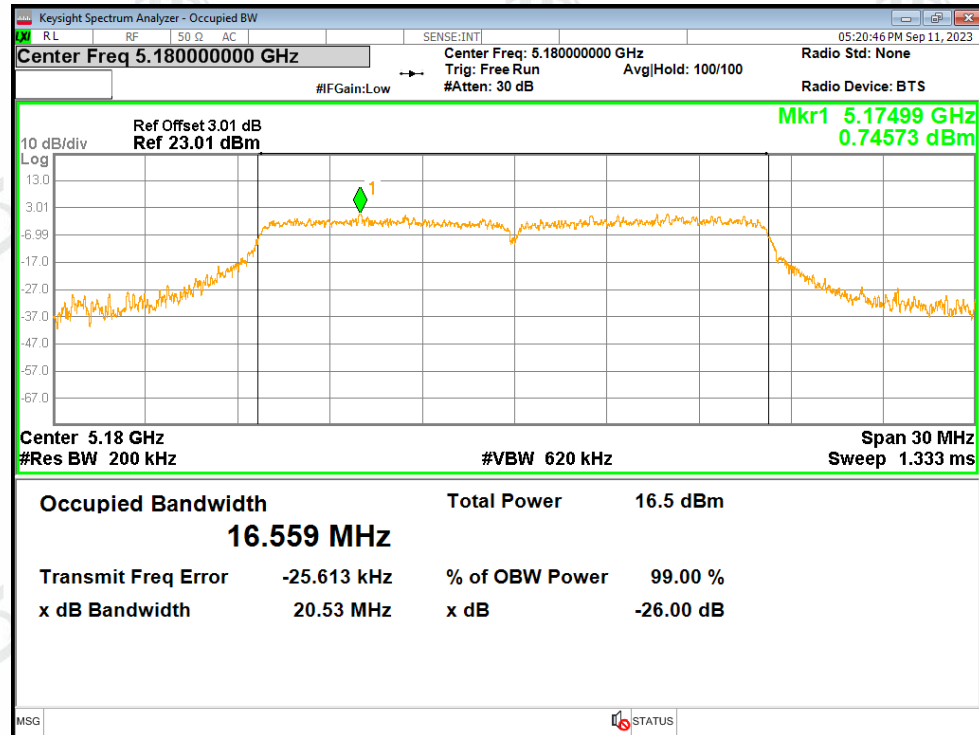
A4.Occupied Channel Bandwidth

Condition	Mode	Frequency (MHz)	Antenna	99% OBW (MHz)
NVNT	a	5180	Ant1	16.559
NVNT	a	5200	Ant1	16.587
NVNT	a	5240	Ant1	16.594
NVNT	n20	5180	Ant1	17.661
NVNT	n20	5200	Ant1	17.682
NVNT	n20	5240	Ant1	17.645
NVNT	n40	5190	Ant1	36.268
NVNT	n40	5230	Ant1	36.193
NVNT	ac20	5180	Ant1	17.714
NVNT	ac20	5200	Ant1	17.664
NVNT	ac20	5240	Ant1	17.627
NVNT	ac40	5190	Ant1	36.203
NVNT	ac40	5230	Ant1	36.215
NVNT	ac80	5210	Ant1	75.519

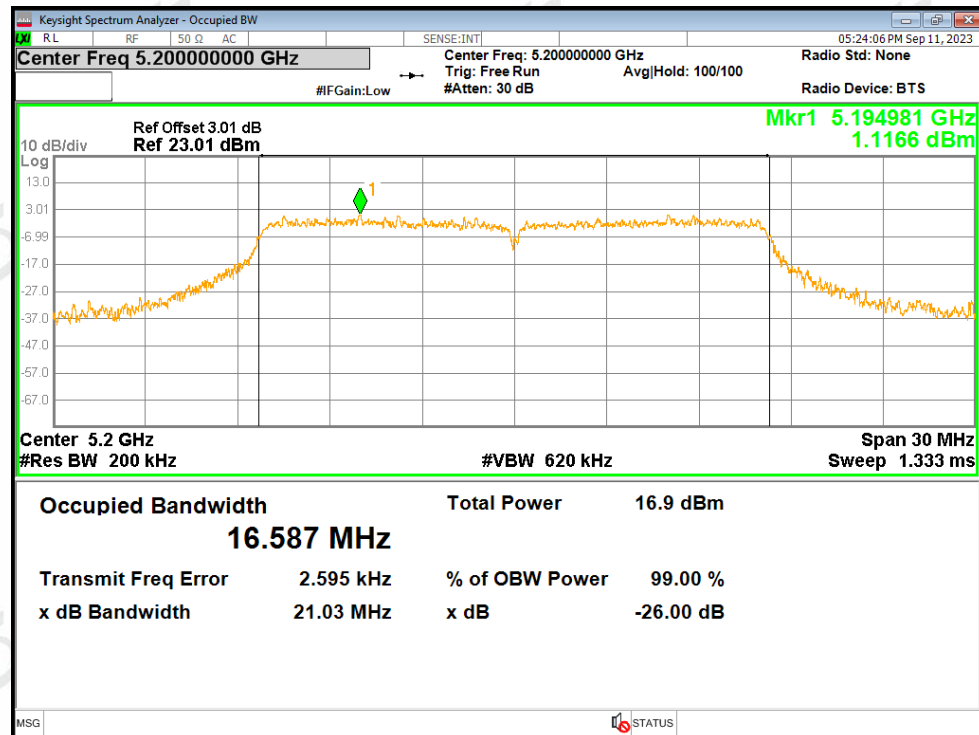


Test Graphs

OBW NVNT a 5180MHz Ant1

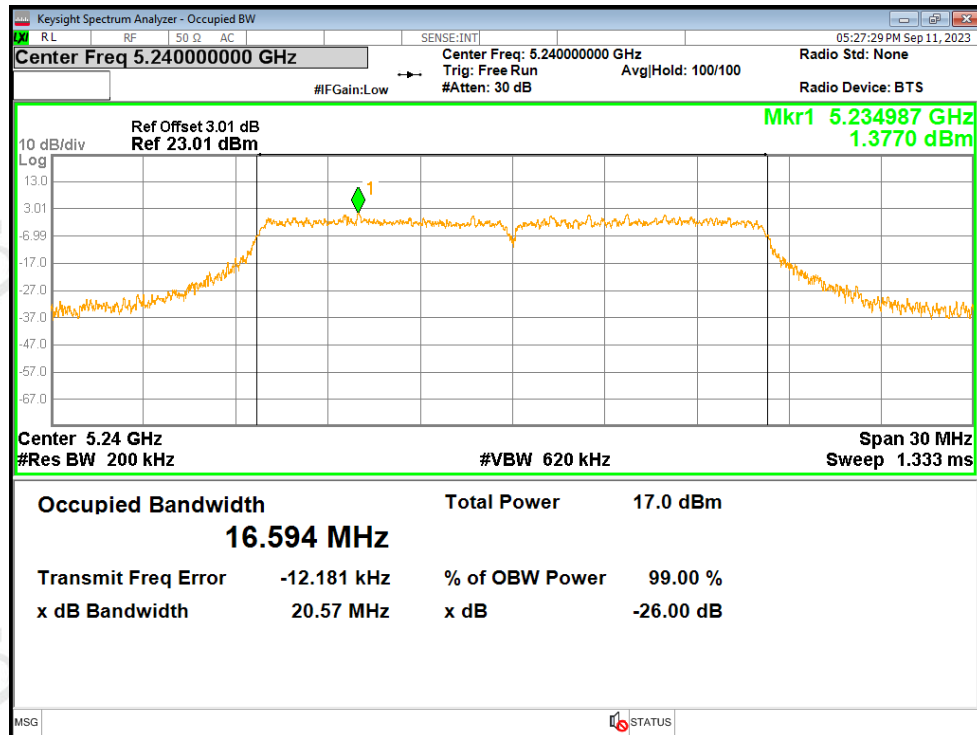


OBW NVNT a 5200MHz Ant1

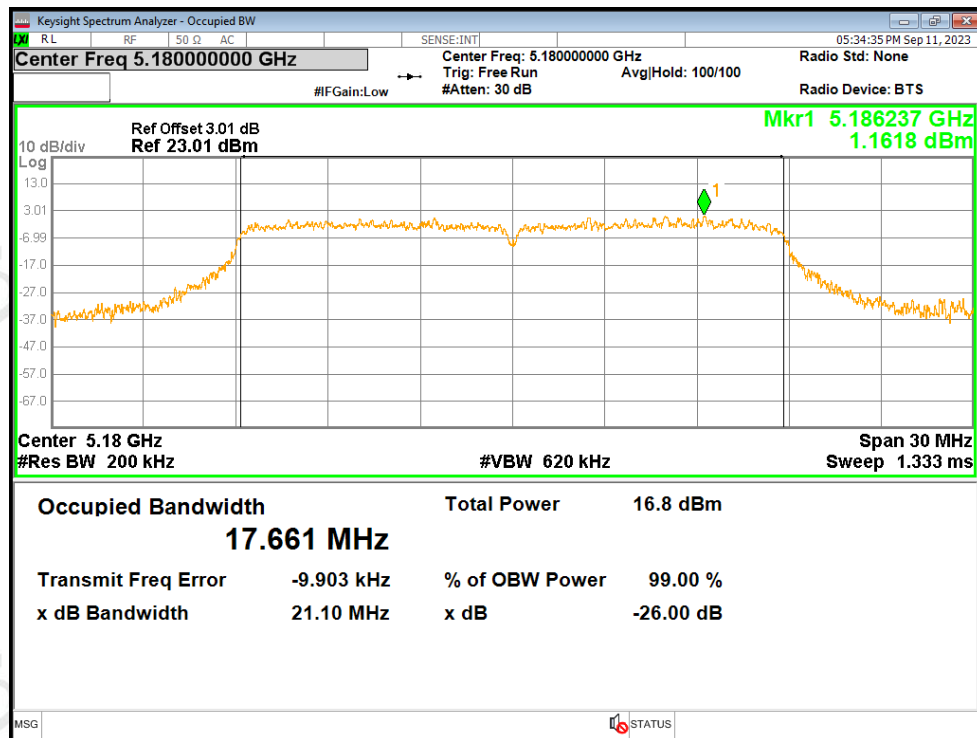




OBW NVNT a 5240MHz Ant1

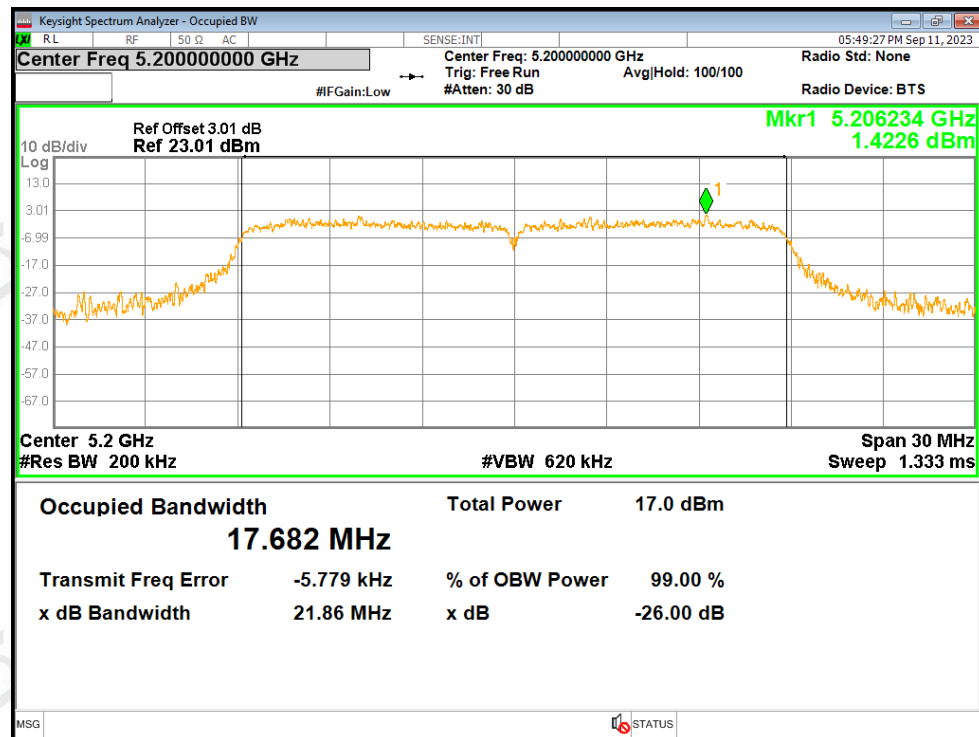


OBW NVNT n20 5180MHz Ant1

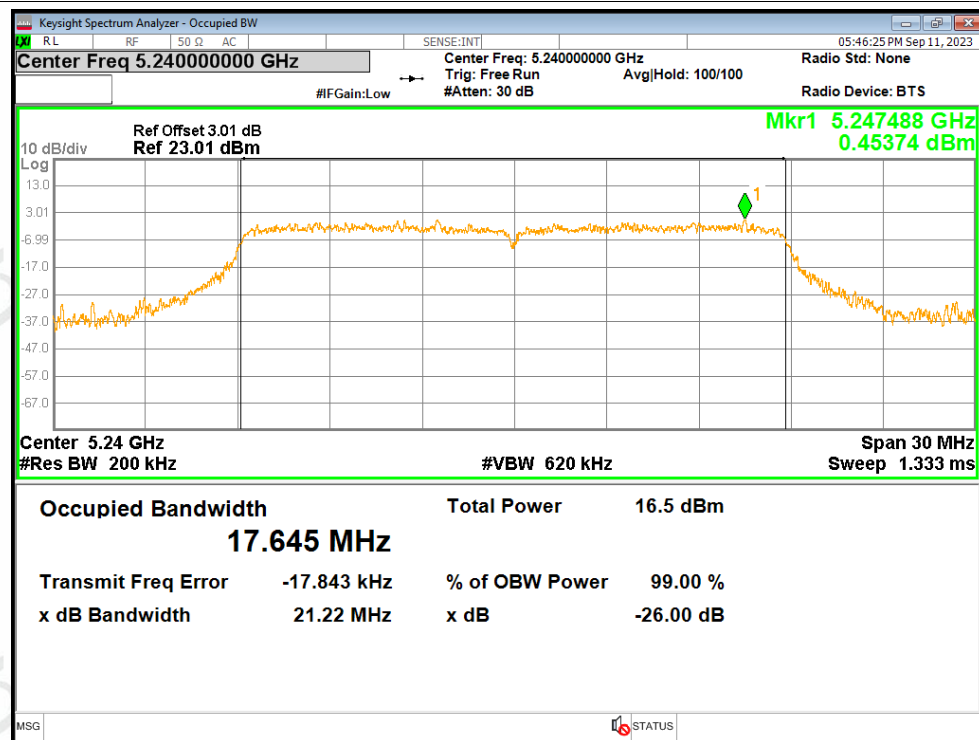




OBW NVNT n20 5200MHz Ant1

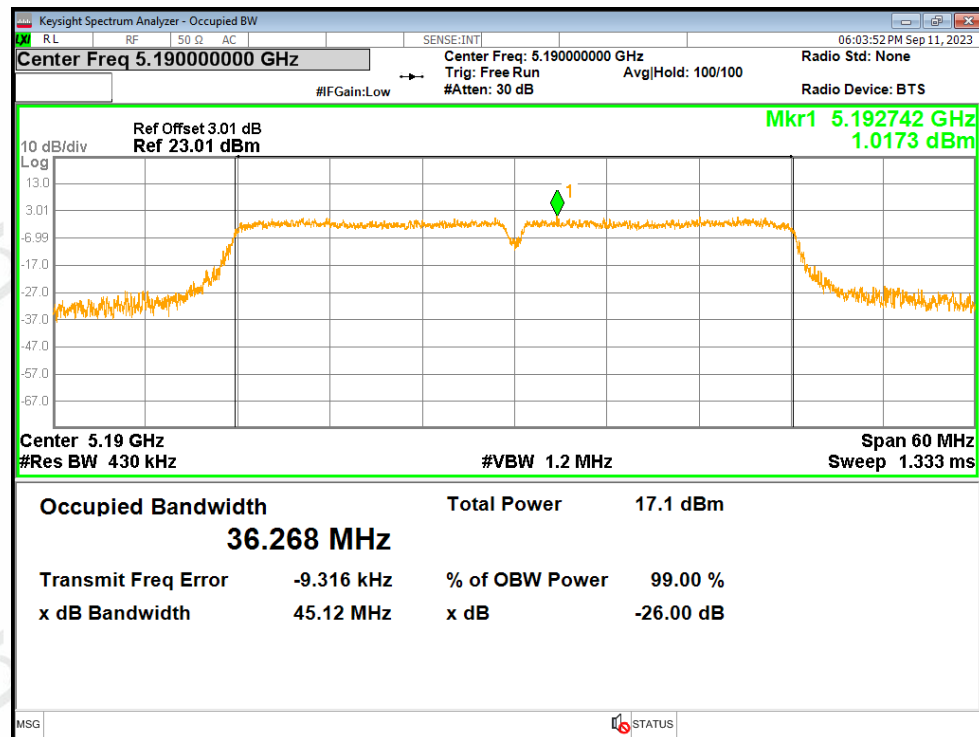


OBW NVNT n20 5240MHz Ant1

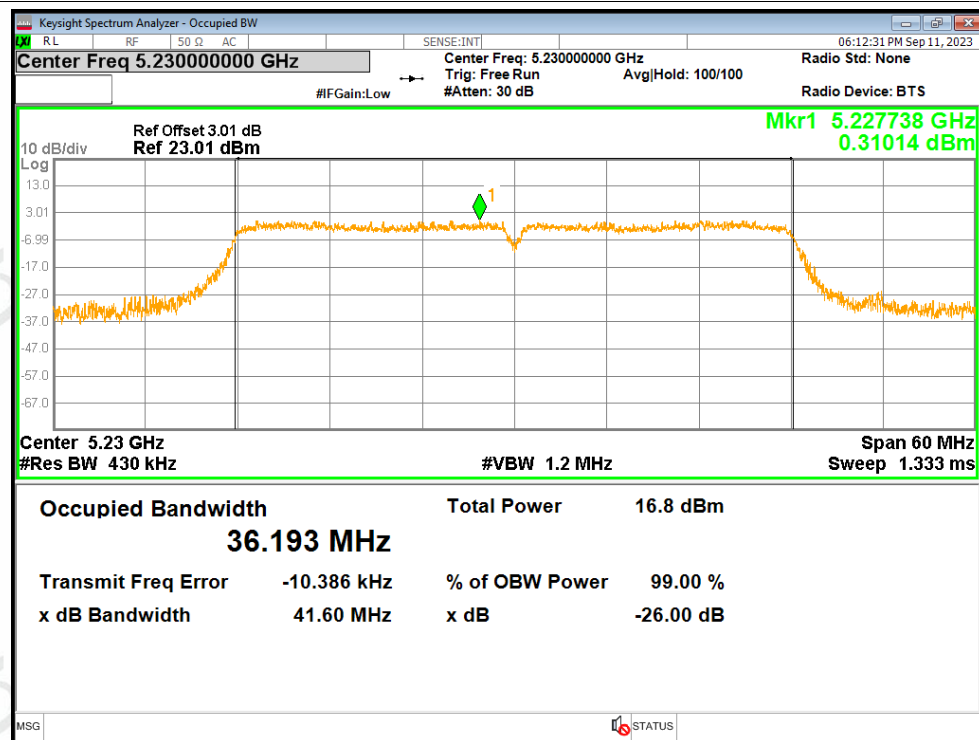




OBW NVNT n40 5190MHz Ant1

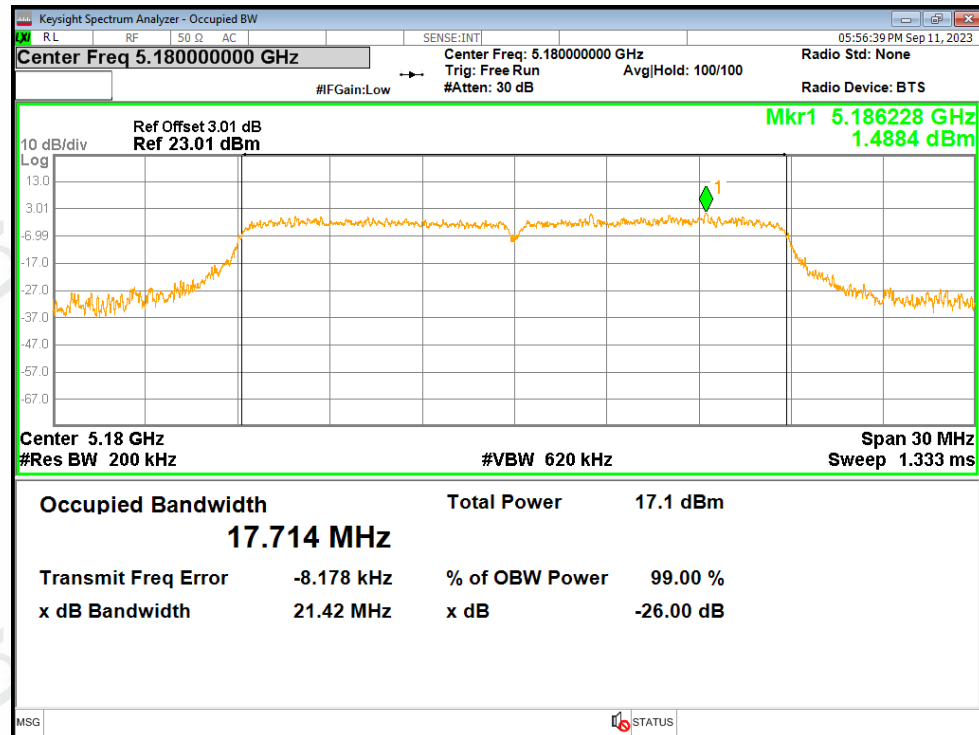


OBW NVNT n40 5230MHz Ant1

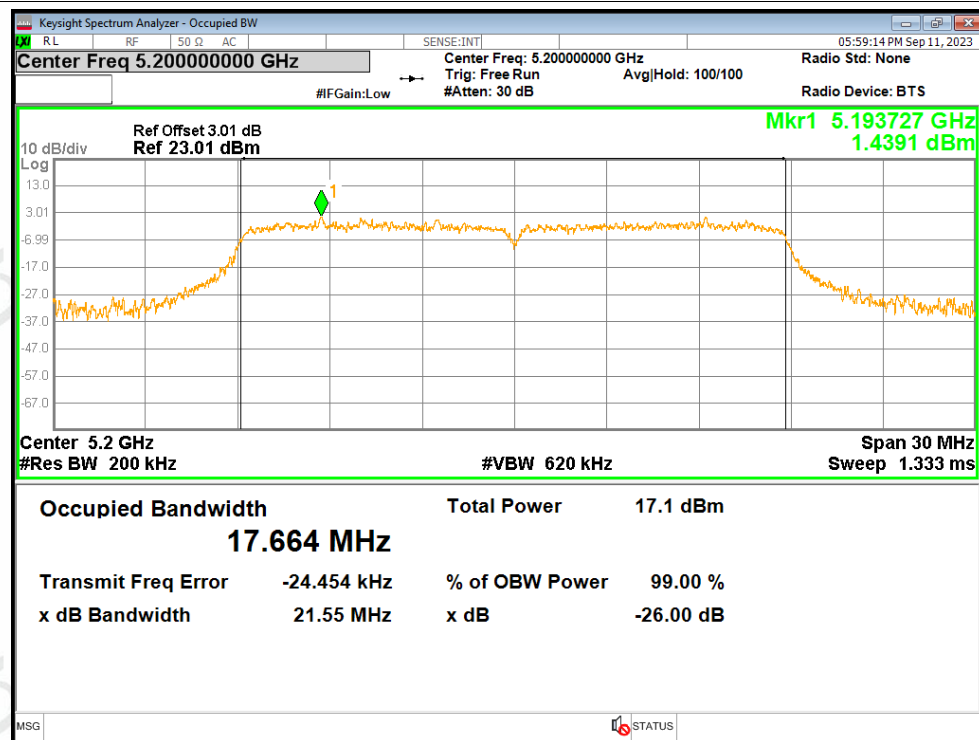




OBW NVNT ac20 5180MHz Ant1

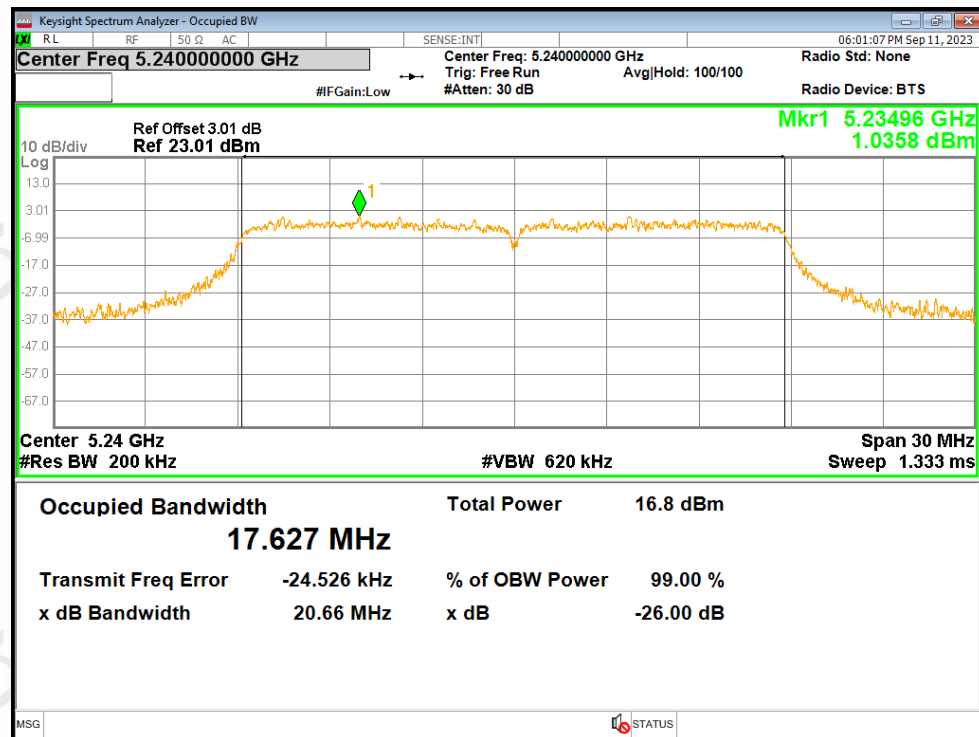


OBW NVNT ac20 5200MHz Ant1

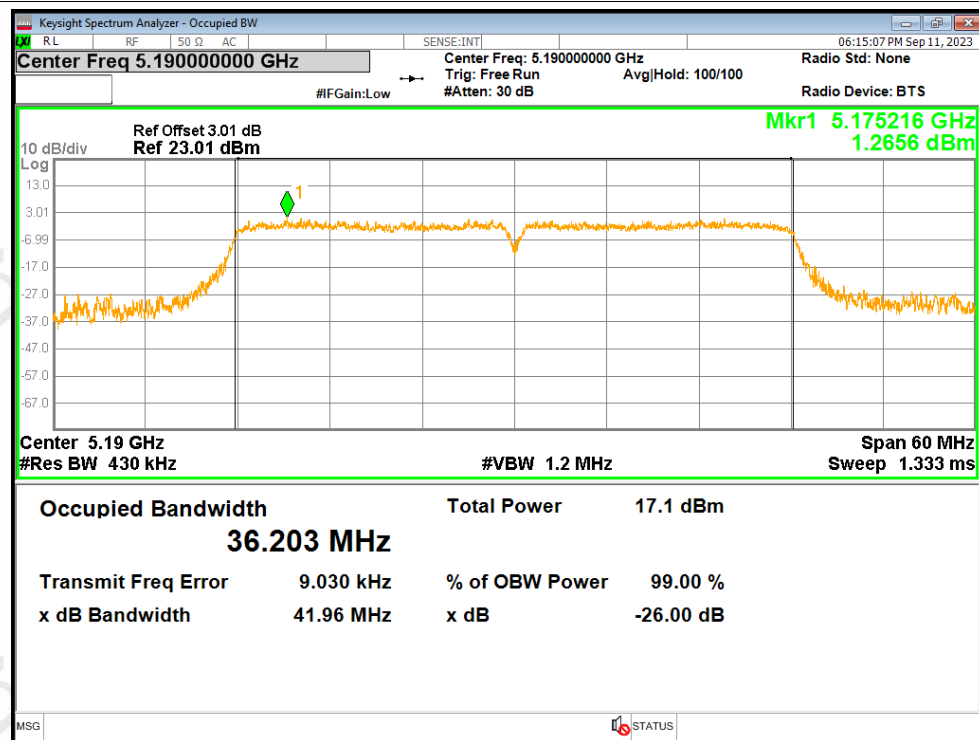




OBW NVNT ac20 5240MHz Ant1

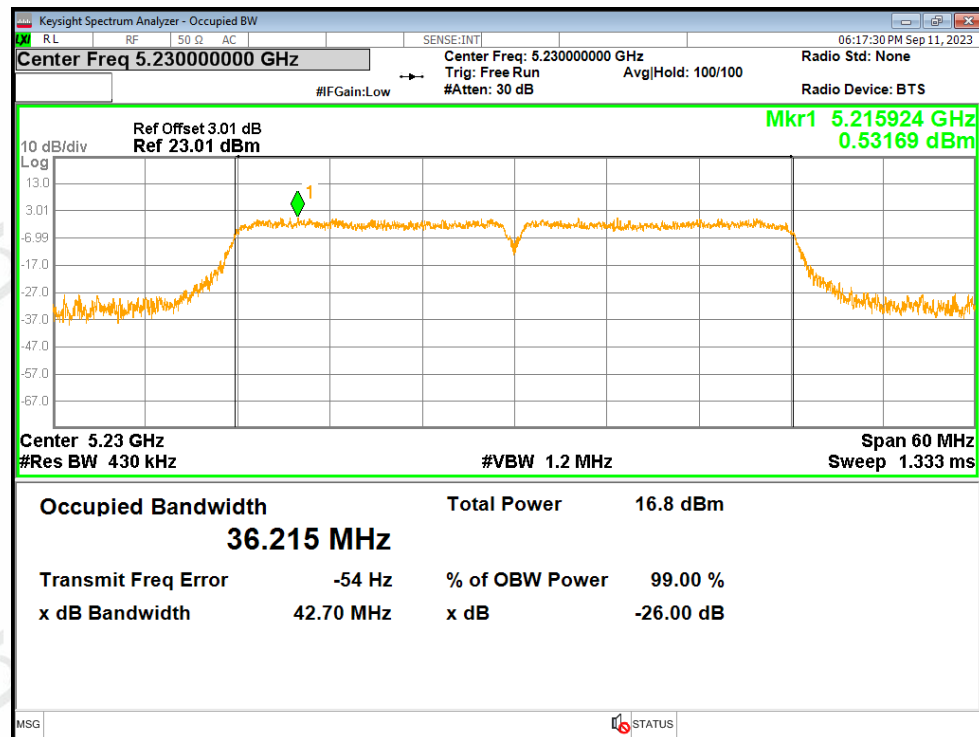


OBW NVNT ac40 5190MHz Ant1

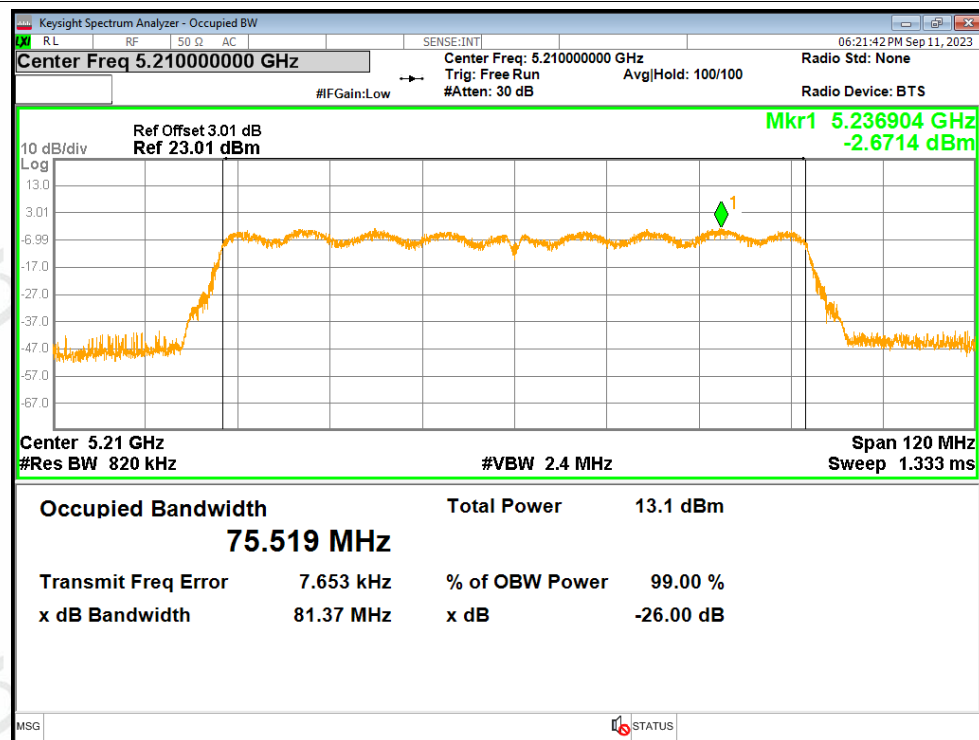




OBW NVNT ac40 5230MHz Ant1



OBW NVNT ac80 5210MHz Ant1



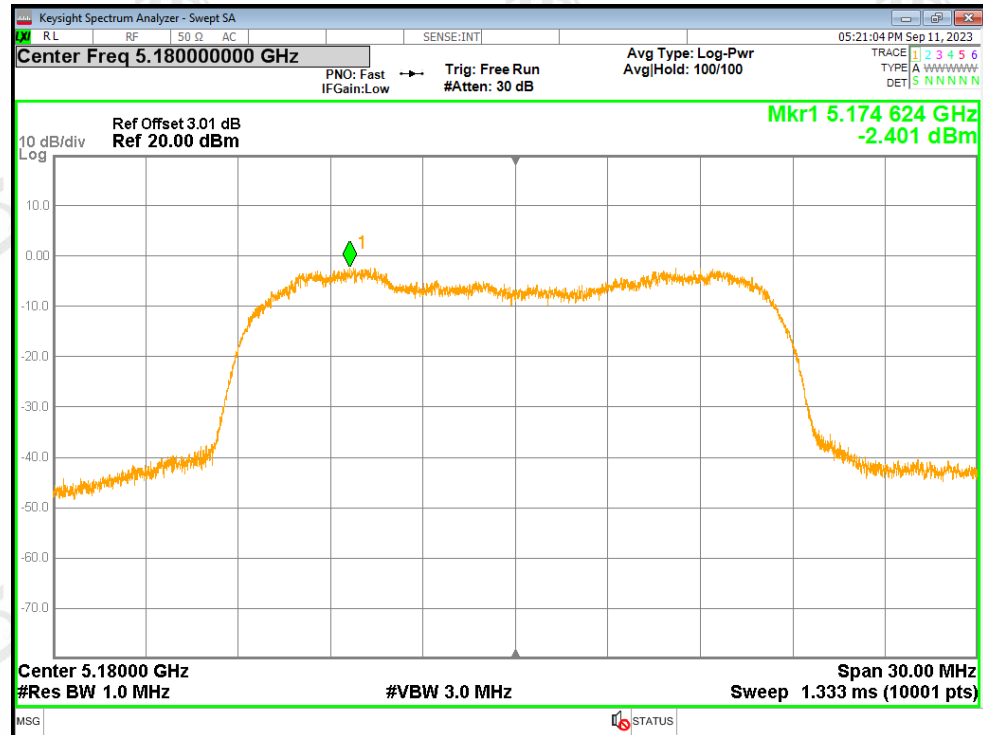
A5.Maximum Power Spectral Density Level

Condition	Mode	Frequency (MHz)	Antenna	Conducted PSD (dBm)	Duty Factor (dB)	Total PSD (dBm)	Limit (dBm)	Verdict
NVNT	a	5180	Ant1	-2.4	0.12	-2.28	11	Pass
NVNT	a	5200	Ant1	-2.73	0.12	-2.61	11	Pass
NVNT	a	5240	Ant1	-2.57	0.12	-2.45	11	Pass
NVNT	n20	5180	Ant1	-2.98	0.09	-2.89	11	Pass
NVNT	n20	5200	Ant1	-3.22	0.09	-3.13	11	Pass
NVNT	n20	5240	Ant1	-2.78	0.12	-2.66	11	Pass
NVNT	n40	5190	Ant1	-6.93	0.79	-6.14	11	Pass
NVNT	n40	5230	Ant1	-7.48	0.16	-7.32	11	Pass
NVNT	ac20	5180	Ant1	-1.46	0.13	-1.33	11	Pass
NVNT	ac20	5200	Ant1	-2.8	0.1	-2.7	11	Pass
NVNT	ac20	5240	Ant1	-4.41	0.1	-4.31	11	Pass
NVNT	ac40	5190	Ant1	-7.08	0.2	-6.88	11	Pass
NVNT	ac40	5230	Ant1	-8.56	0.2	-8.36	11	Pass
NVNT	ac80	5210	Ant1	-17.02	1.15	-15.87	11	Pass

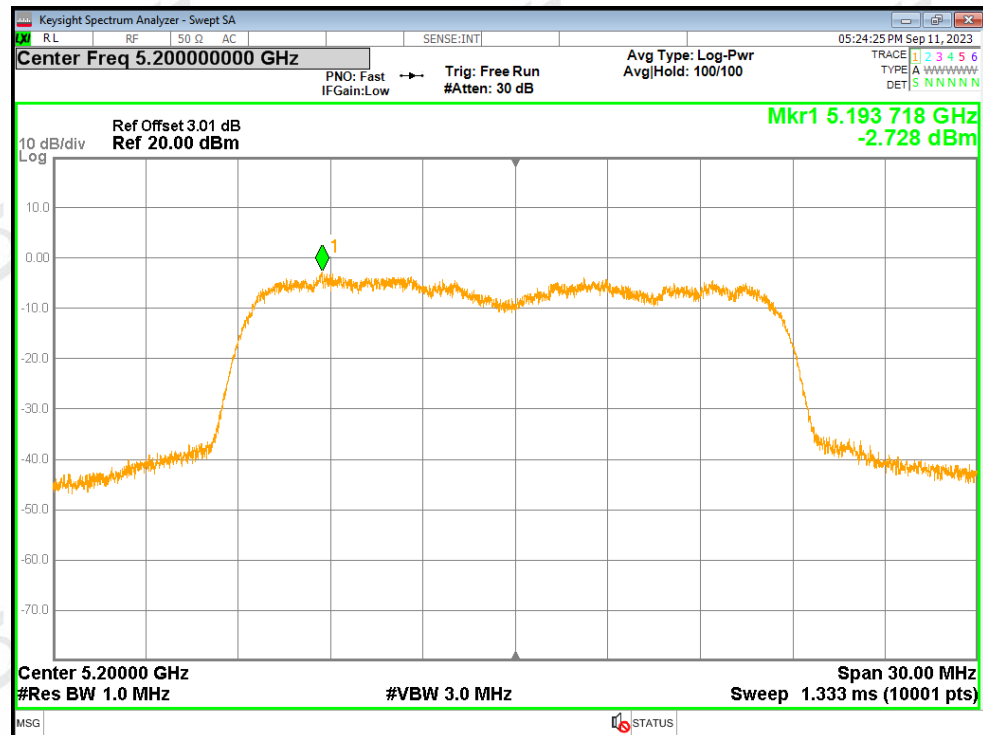


Test Graphs

PSD NVNT a 5180MHz Ant1

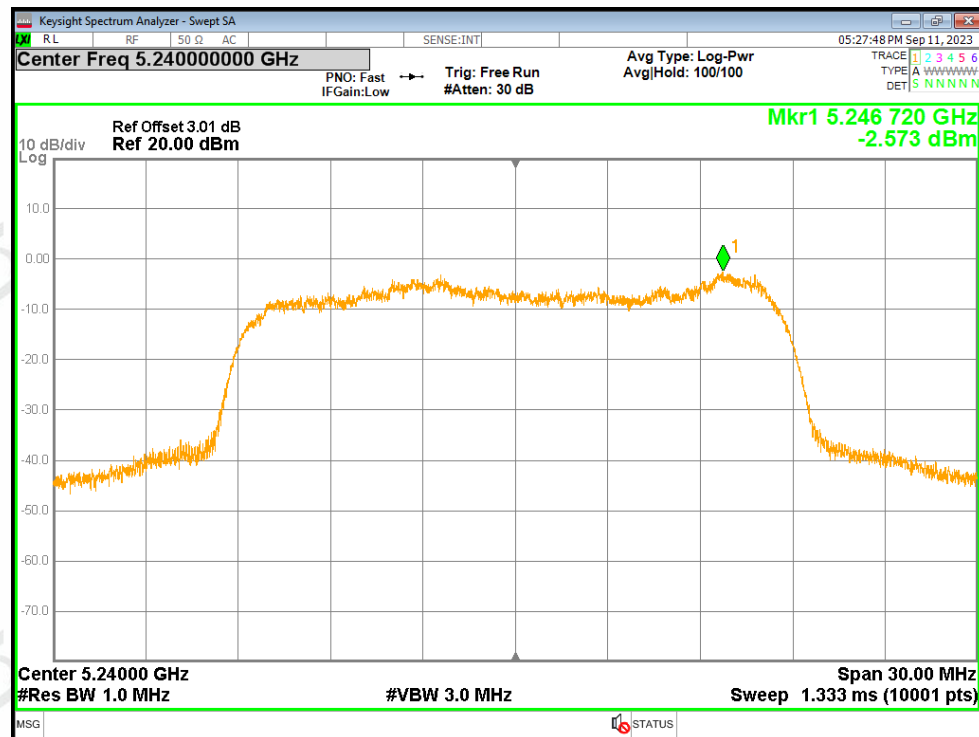


PSD NVNT a 5200MHz Ant1

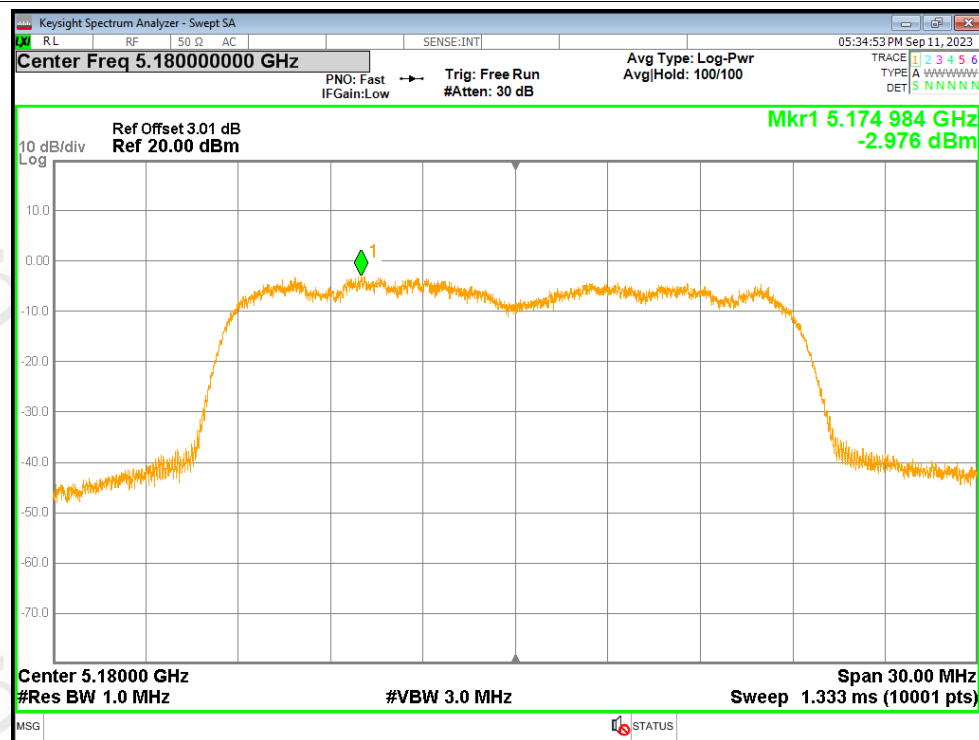


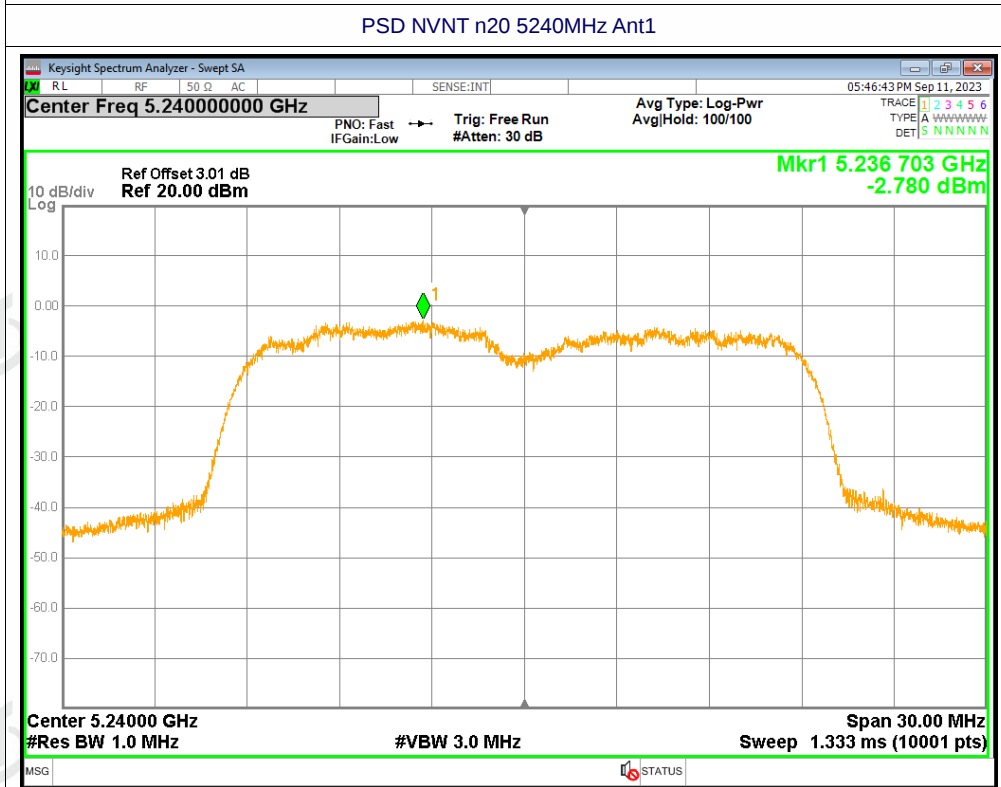
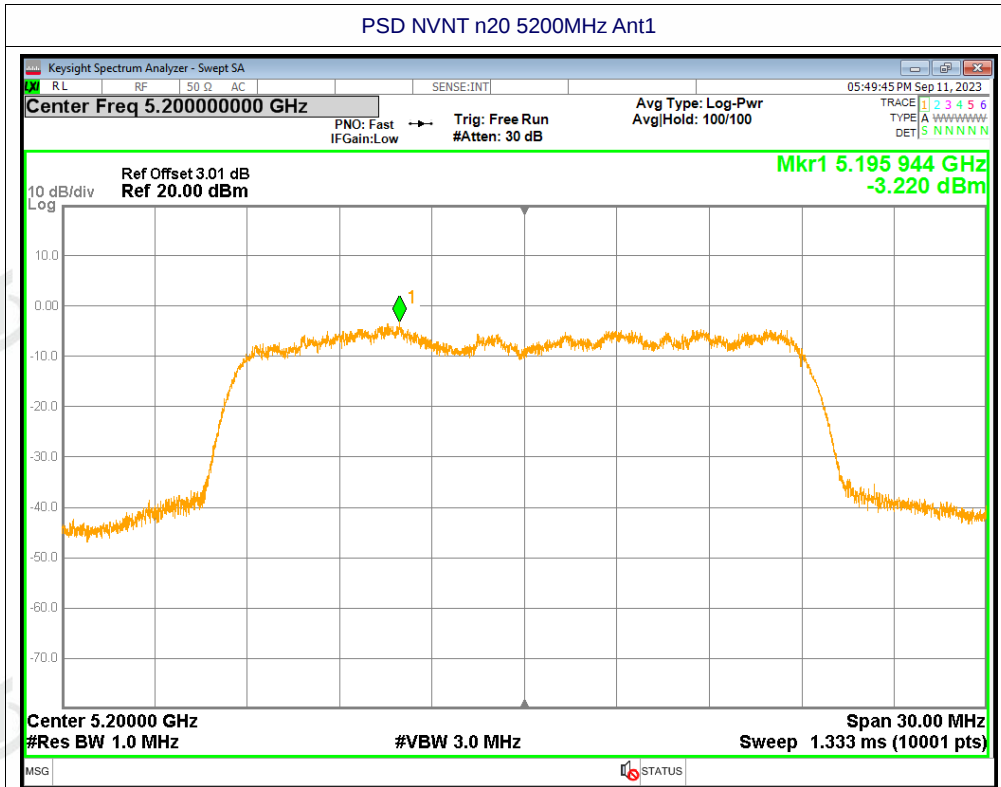


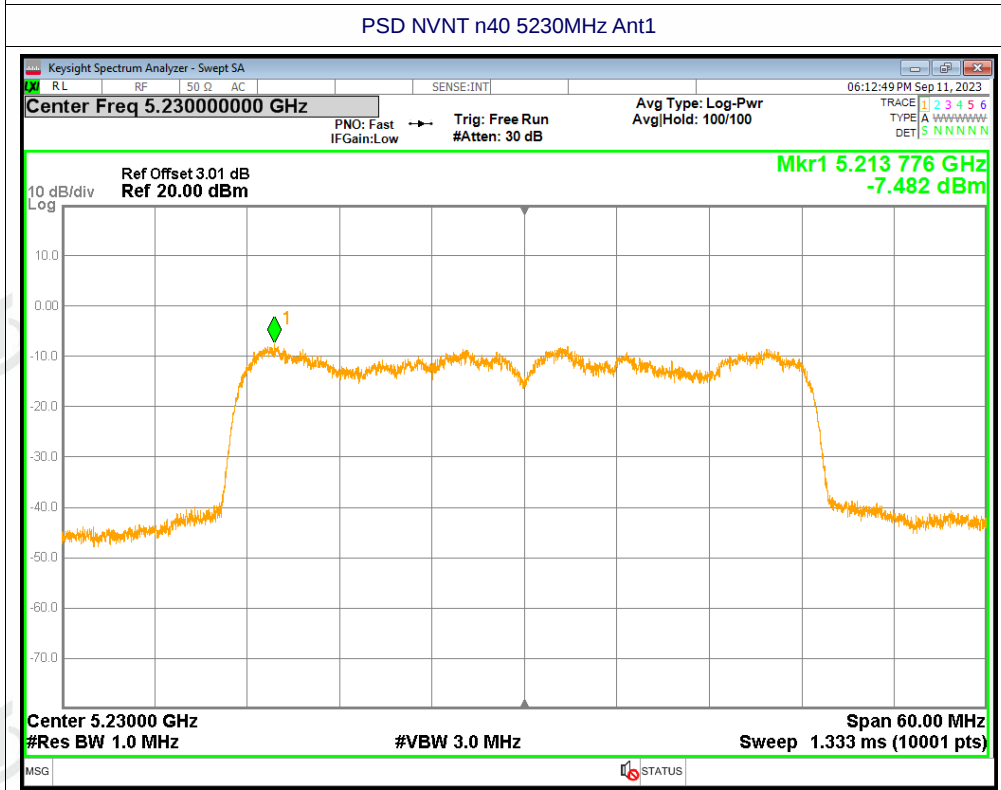
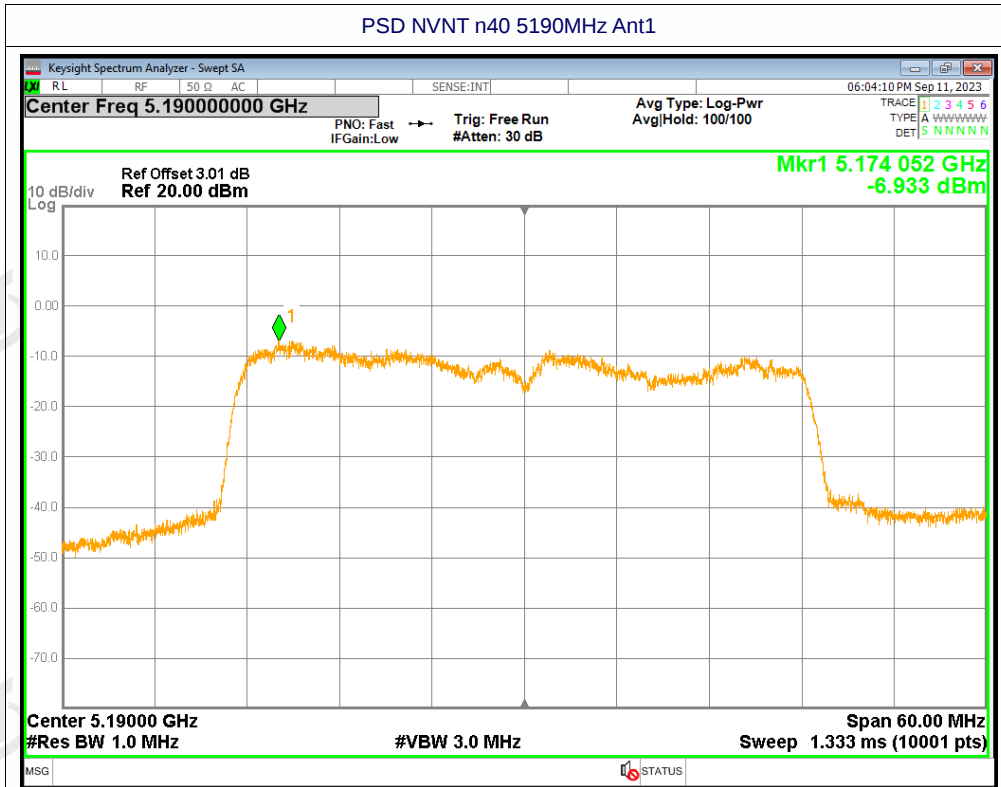
PSD NVNT a 5240MHz Ant1



PSD NVNT n20 5180MHz Ant1

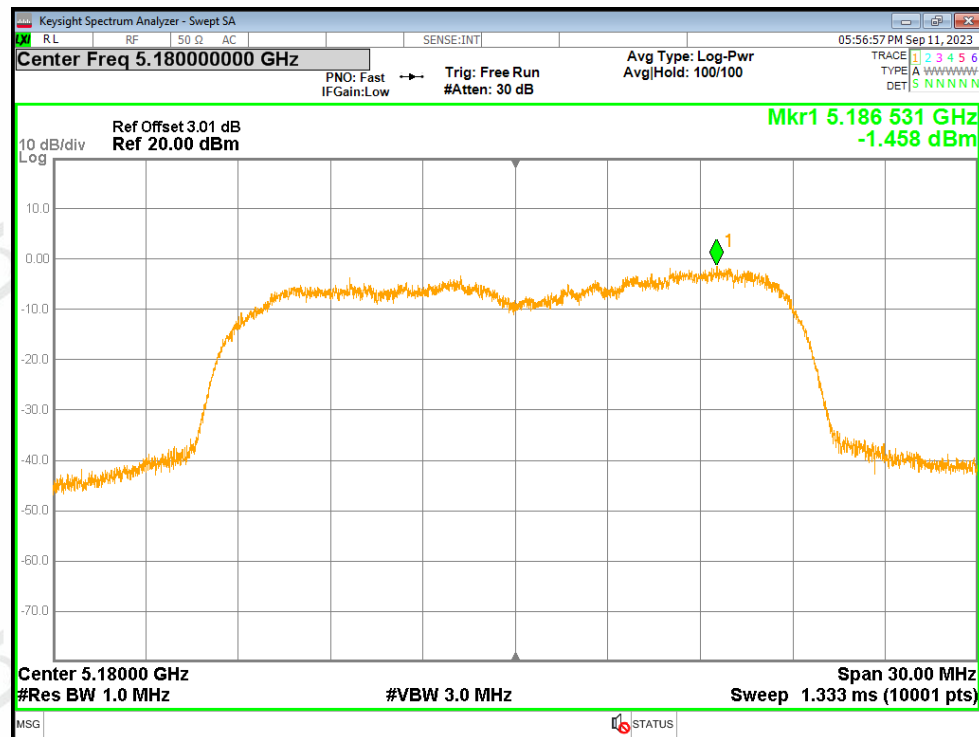




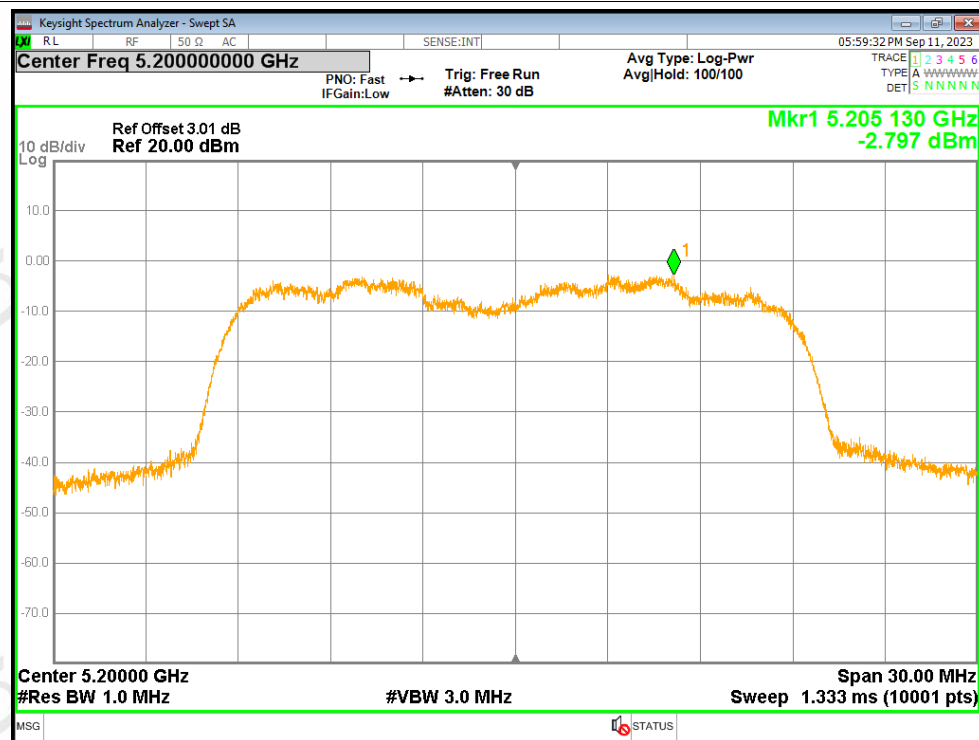




PSD NVNT ac20 5180MHz Ant1

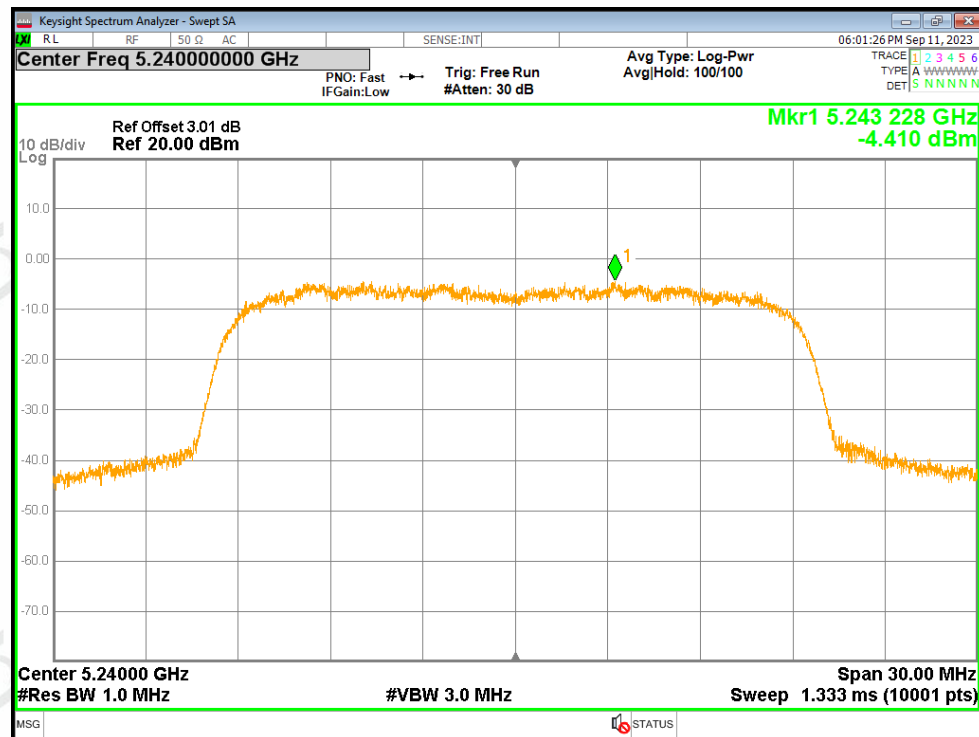


PSD NVNT ac20 5200MHz Ant1

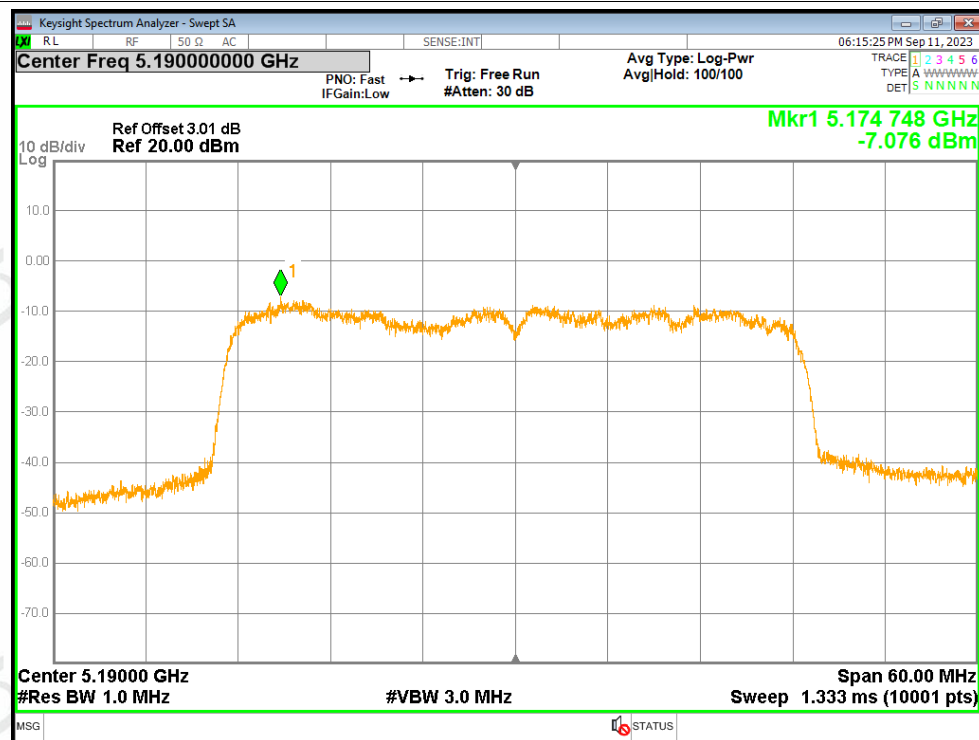




PSD NVNT ac20 5240MHz Ant1

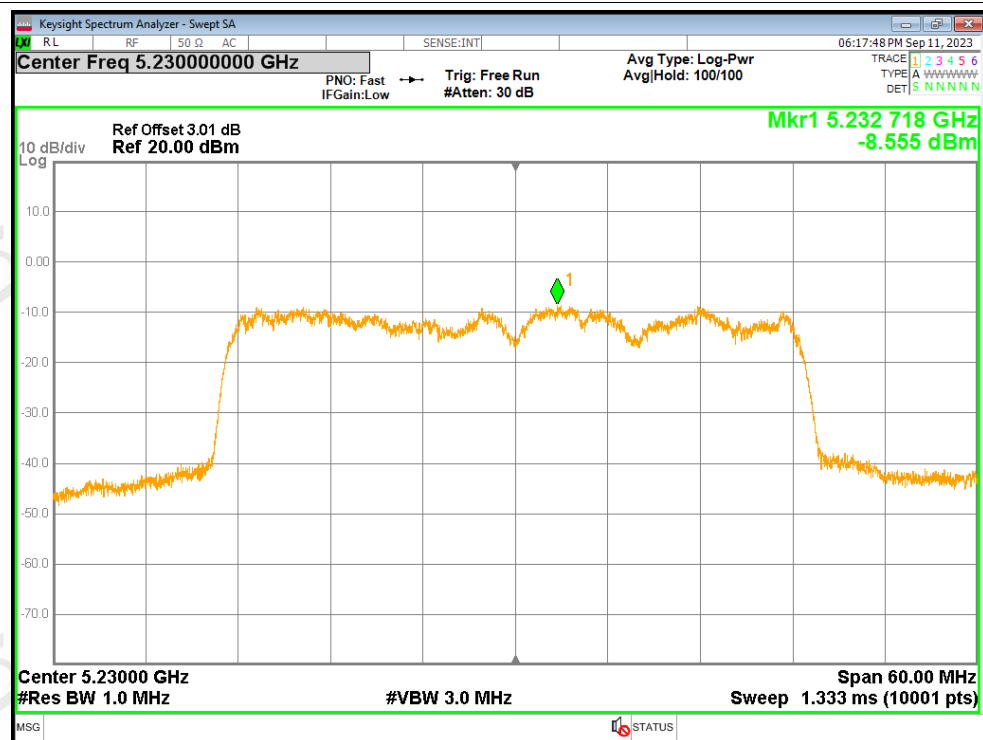


PSD NVNT ac40 5190MHz Ant1

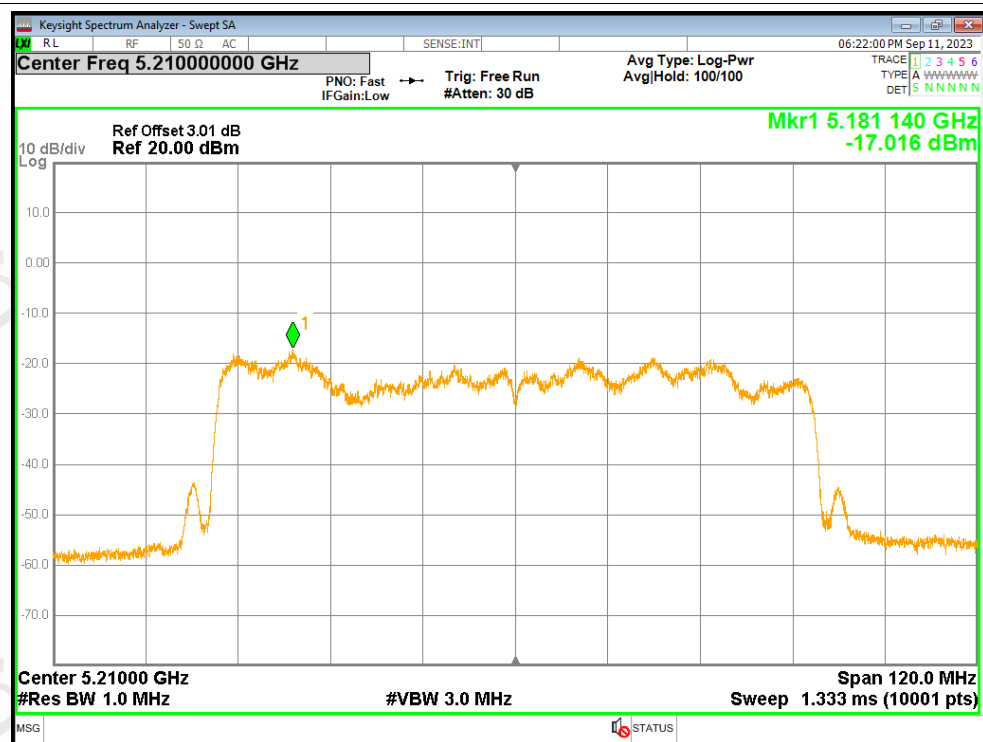




PSD NVNT ac40 5230MHz Ant1



PSD NVNT ac80 5210MHz Ant1





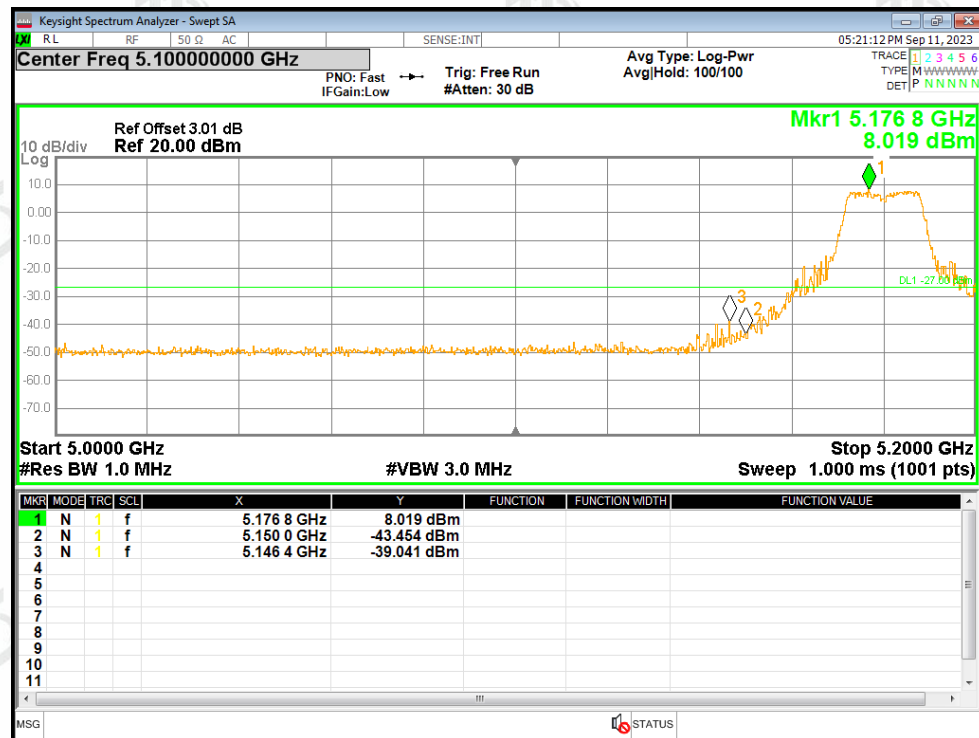
A6.Band Edge

Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	a	5180	Ant1	-39.04	-27	Pass
NVNT	a	5240	Ant1	-46.12	-27	Pass
NVNT	n20	5180	Ant1	-40.7	-27	Pass
NVNT	n20	5240	Ant1	-46.32	-27	Pass
NVNT	n40	5190	Ant1	-29.6	-27	Pass
NVNT	n40	5230	Ant1	-45.95	-27	Pass
NVNT	ac20	5180	Ant1	-34.25	-27	Pass
NVNT	ac20	5240	Ant1	-46.32	-27	Pass
NVNT	ac40	5190	Ant1	-30.61	-27	Pass
NVNT	ac40	5230	Ant1	-46.28	-27	Pass
NVNT	ac80	5210	Ant1	-43.23	-27	Pass

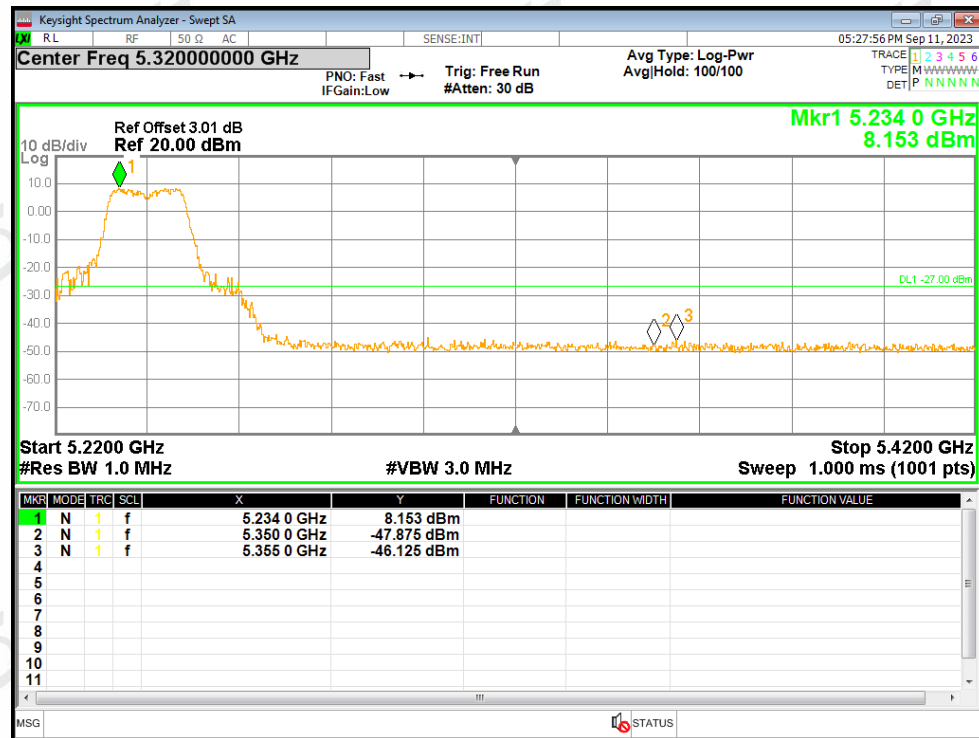


Test Graphs

Band Edge NVNT a 5180MHz Low Ant1

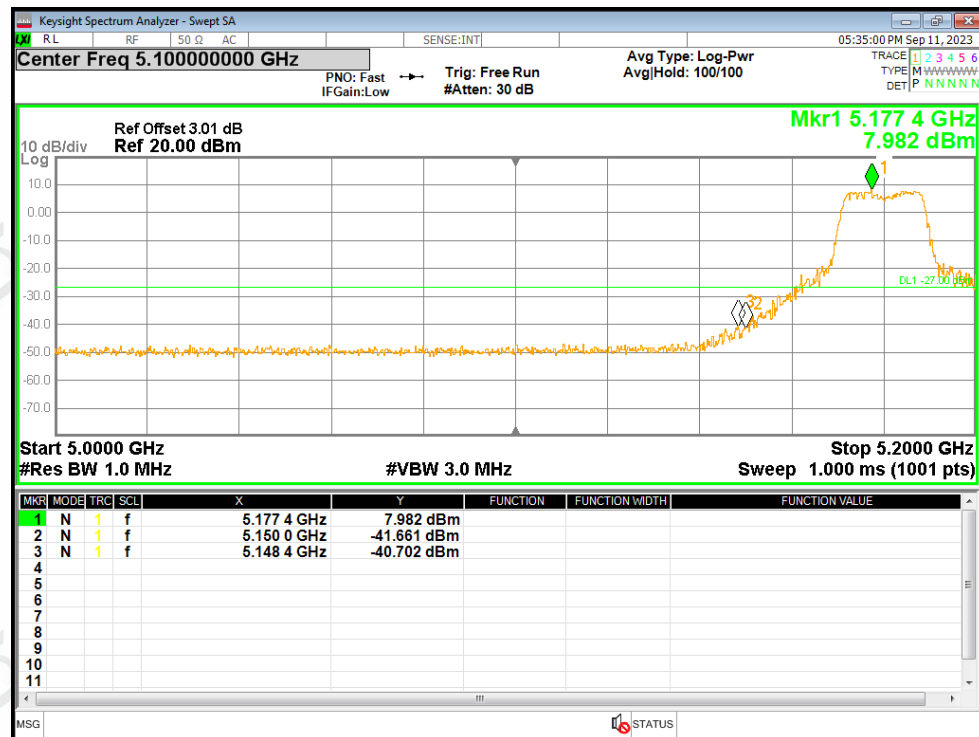


Band Edge NVNT a 5240MHz High Ant1

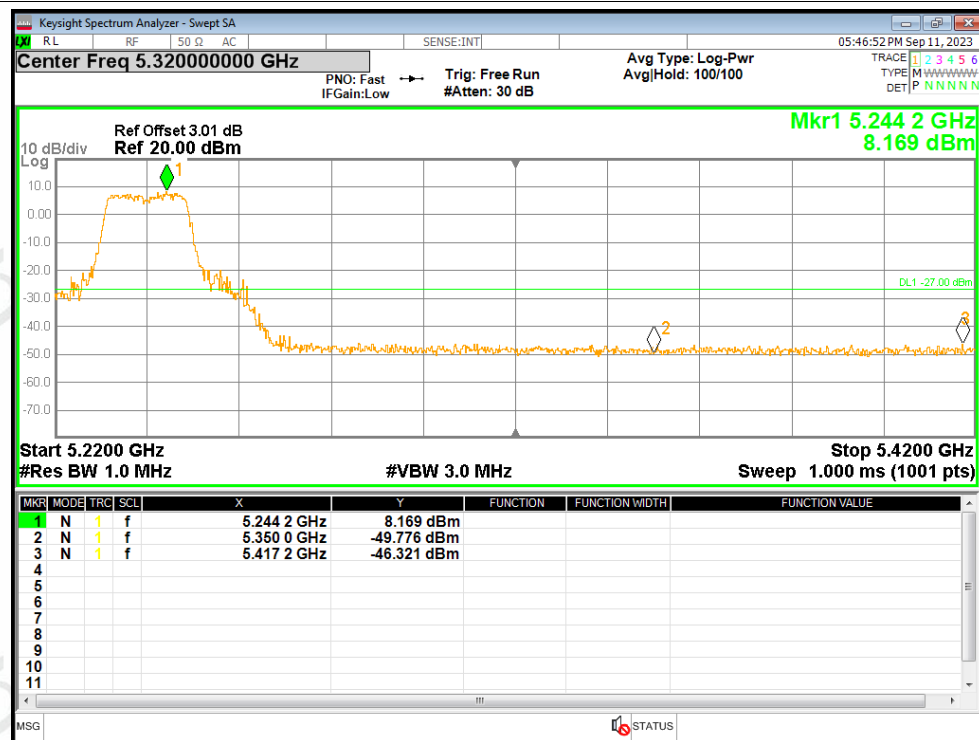




Band Edge NVNT n20 5180MHz Low Ant1

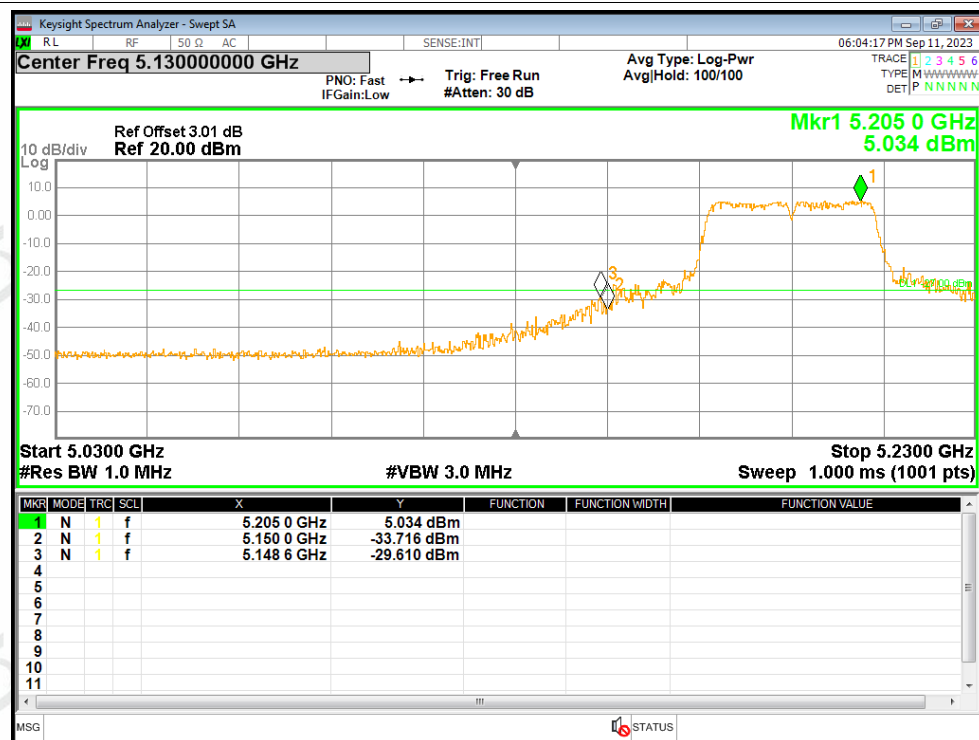


Band Edge NVNT n20 5240MHz High Ant1

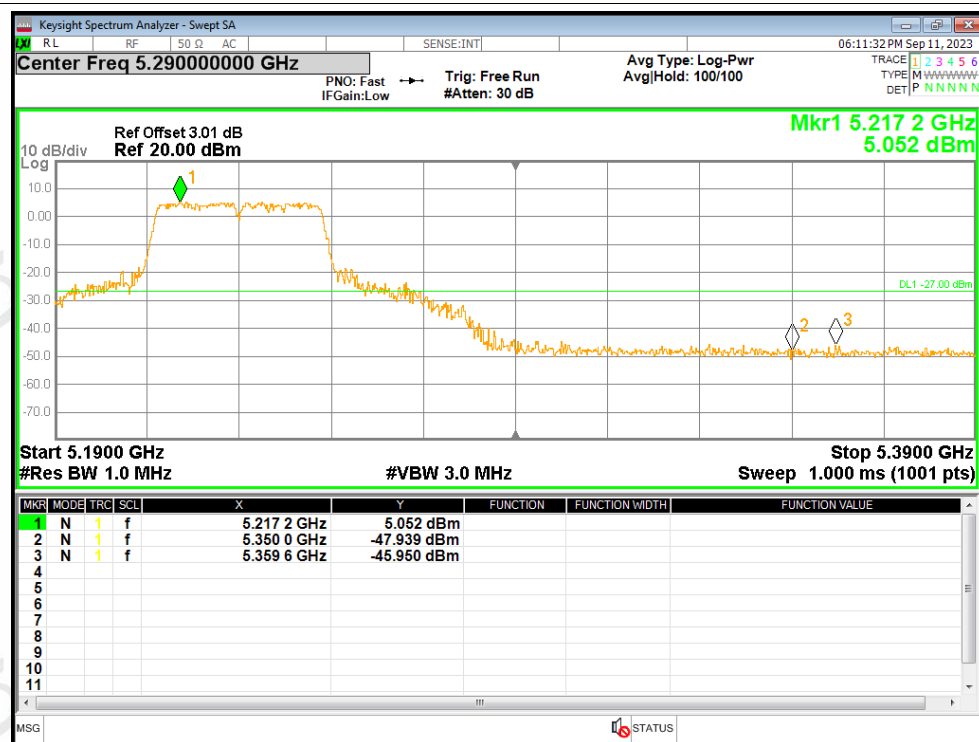




Band Edge NVNT n40 5190MHz Low Ant1

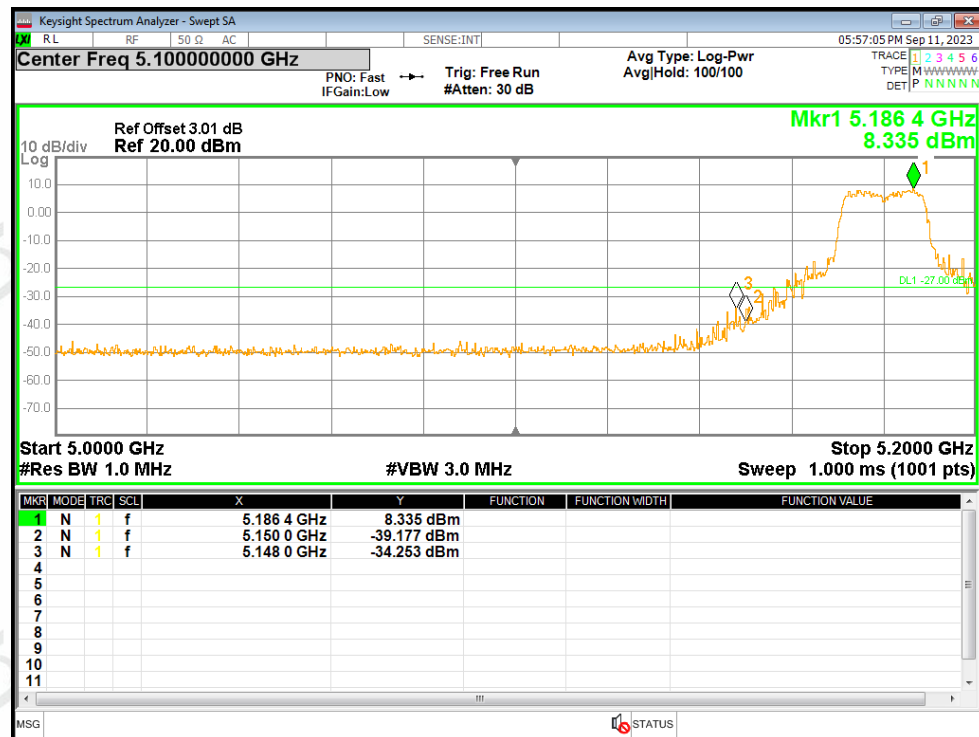


Band Edge NVNT n40 5230MHz High Ant1

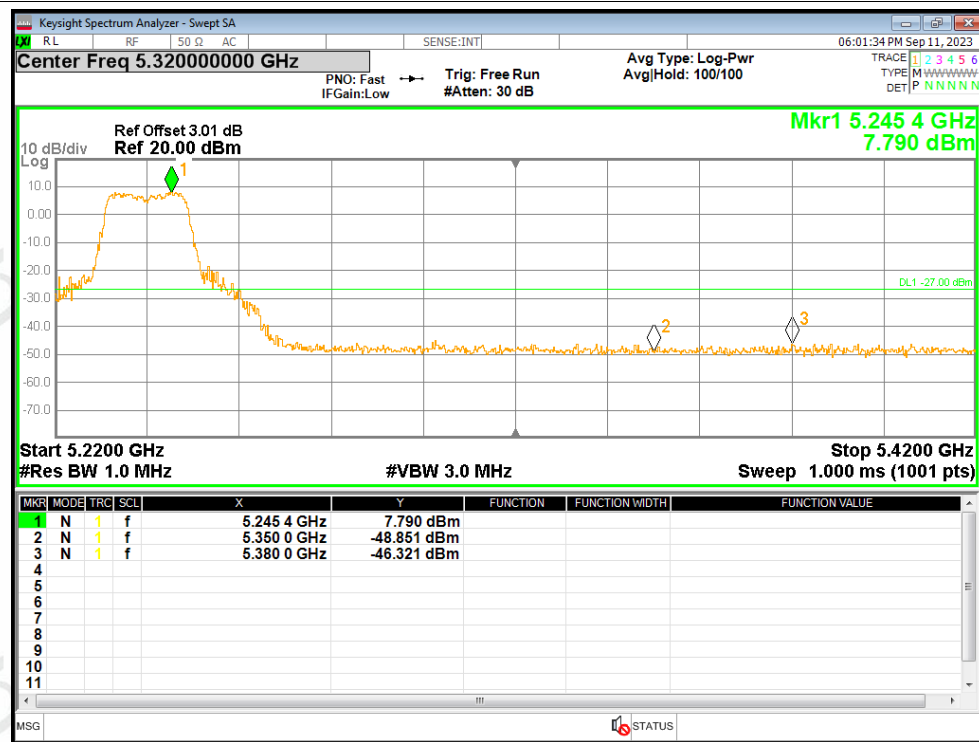




Band Edge NVNT ac20 5180MHz Low Ant1

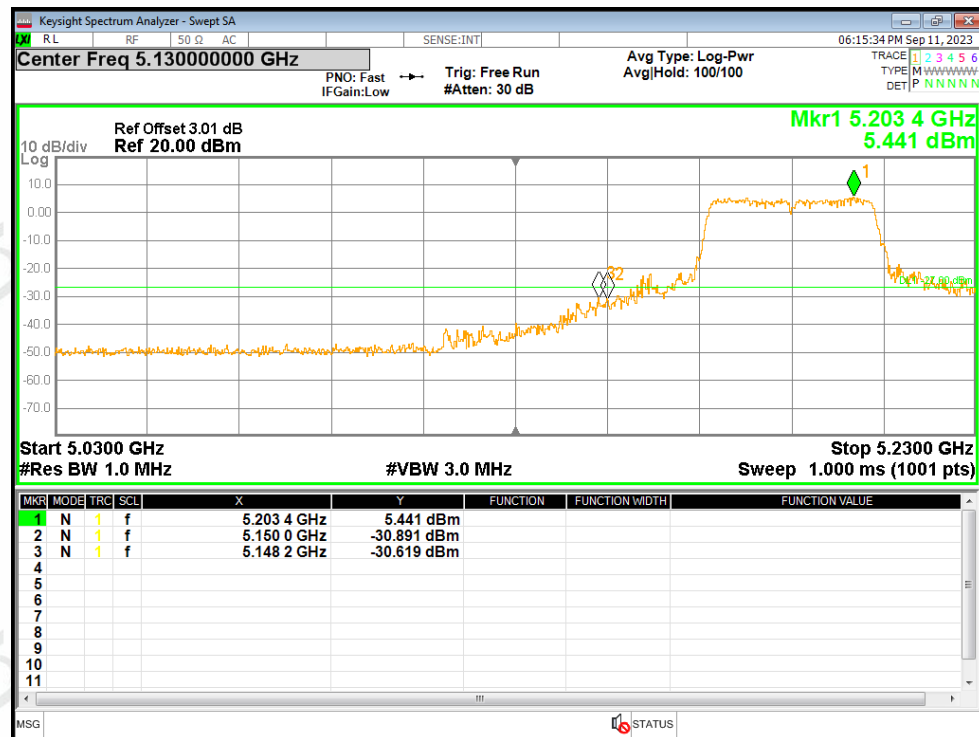


Band Edge NVNT ac20 5240MHz High Ant1

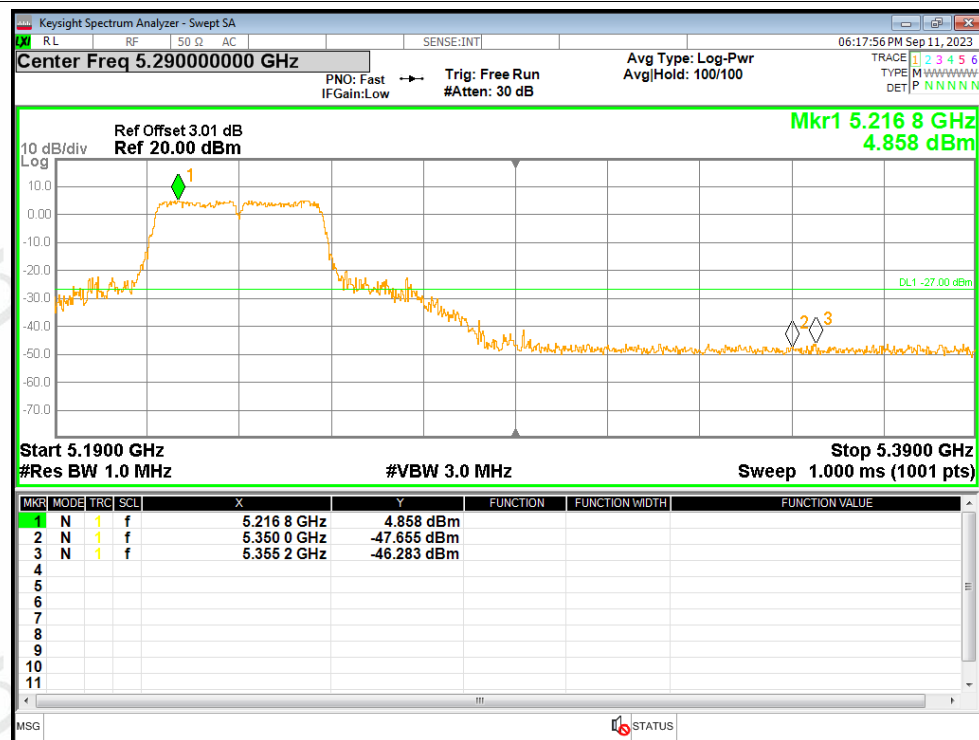


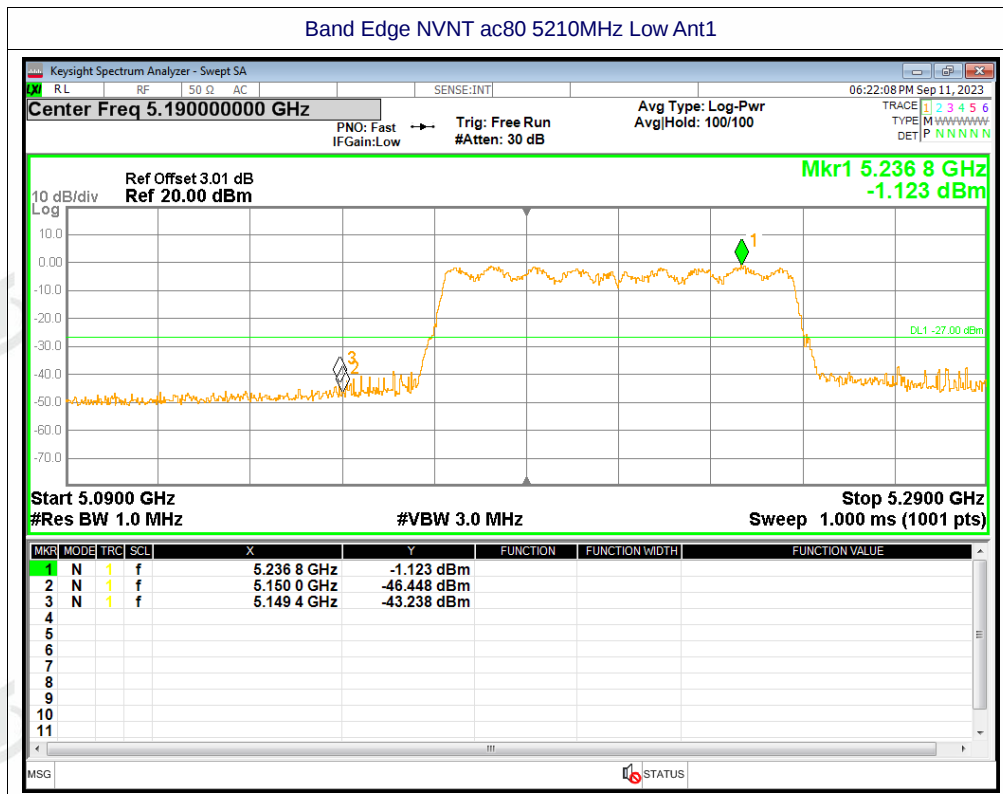


Band Edge NVNT ac40 5190MHz Low Ant1



Band Edge NVNT ac40 5230MHz High Ant1







A7.Frequency Stability

Test Mode	Channel	Voltage				Limit (ppm)	Verdict
		Voltage [Vdc]	Temperature (°C)	Frequency Error (Hz)	Deviation (ppm)		
a	5180	NV	NT	0	0	Within 5150-5250MH z	Pass
		LV	NT	0	0		
		HV	NT	0	0		
	5200	NV	NT	-20000	-3.85		
		LV	NT	-20000	-3.85		
		HV	NT	-20000	-3.85		
	5240	NV	NT	-20000	-3.82		
		LV	NT	-20000	-3.82		
		HV	NT	-20000	-3.82		
n20	5180	NV	NT	0	0		
		LV	NT	0	0		
		HV	NT	0	0		
	5200	NV	NT	0	0		
		LV	NT	0	0		
		HV	NT	0	0		
	5240	NV	NT	-20000	-3.82		
		LV	NT	-20000	-3.82		
		HV	NT	-20000	-3.82		
ac20	5180	NV	NT	0	0		
		LV	NT	0	0		
		HV	NT	0	0		
	5200	NV	NT	-20000	-3.85		
		LV	NT	-20000	-3.85		
		HV	NT	-20000	-3.85		
	5240	NV	NT	0	0		
		LV	NT	0	0		
		HV	NT	0	0		



n40	5200	NV	NT	0	0	Within 5150-5250MHz	Pass
		LV	NT	0	0		
		HV	NT	0	0		
	5240	NV	NT	-40000	-7.65		
		LV	NT	-40000	-7.65		
		HV	NT	-40000	-7.65		
ac40	5200	NV	NT	0	0		
		LV	NT	0	0		
		HV	NT	0	0		
	5240	NV	NT	0	0		
		LV	NT	0	0		
		HV	NT	0	0		
ac80	5210	NV	NT	-80000	-15.36		
		LV	NT	-80000	-15.36		
		HV	NT	-80000	-15.36		



Temperature							
TestMod e	Channel	Voltage [Vdc]	Temperature (°C)	Frequency Error (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
a	5180	NV	-20	0	0	Within 5150-5250MHz	Pass
		NV	-10	0	0		
		NV	0	0	0		
		NV	20	0	0		
		NV	30	0	0		
		NV	50	0	0		
		NV	60	0	0		
	5200	NV	-20	-20000	-3.85		
		NV	-10	-20000	-3.85		
		NV	0	-20000	-3.85		
		NV	20	-20000	-3.85		
		NV	30	-20000	-3.85		
		NV	50	-20000	-3.85		
		NV	60	-20000	-3.85		
	5240	NV	-20	-20000	-3.82		
		NV	-10	-20000	-3.82		
		NV	0	-20000	-3.82		
		NV	20	-20000	-3.82		
		NV	30	-20000	-3.82		
		NV	50	-20000	-3.82		
		NV	60	-20000	-3.82		
N20	5180	NV	-20	0	0		
		NV	-10	0	0		
		NV	0	0	0		
		NV	20	0	0		
		NV	30	0	0		
		NV	50	0	0		
		NV	60	0	0		
	5200	NV	-20	0	0		
		NV	-10	0	0		
		NV	0	0	0		
		NV	20	0	0		
		NV	30	0	0		



	5240	NV	50	0	0	Within 5150-5250MHz	Pass
		NV	60	0	0		
		NV	-20	0	0		
		NV	-10	0	0		
		NV	0	0	0		
		NV	20	0	0		
		NV	30	0	0		
		NV	50	0	0		
		NV	60	0	0		
		NV	-20	0	0		
ac20	5180	NV	-20	0	0		
		NV	-10	0	0		
		NV	0	0	0		
		NV	20	0	0		
		NV	30	0	0		
		NV	50	0	0		
		NV	60	0	0		
	5200	NV	-20	-20000	-3.85		
		NV	-10	-20000	-3.85		
		NV	0	-20000	-3.85		
		NV	20	-20000	-3.85		
		NV	30	-20000	-3.85		
		NV	50	-20000	-3.85		
		NV	60	-20000	-3.85		
	5240	NV	-20	0	0		
		NV	-10	0	0		
		NV	0	0	0		
		NV	20	0	0		
		NV	30	0	0		
		NV	50	0	0		
		NV	60	0	0		
N40	5190	NV	-20	0	0		
		NV	-10	0	0		
		NV	0	0	0		
		NV	20	0	0		
		NV	30	0	0		
		NV	50	0	0		
		NV	60	0	0		



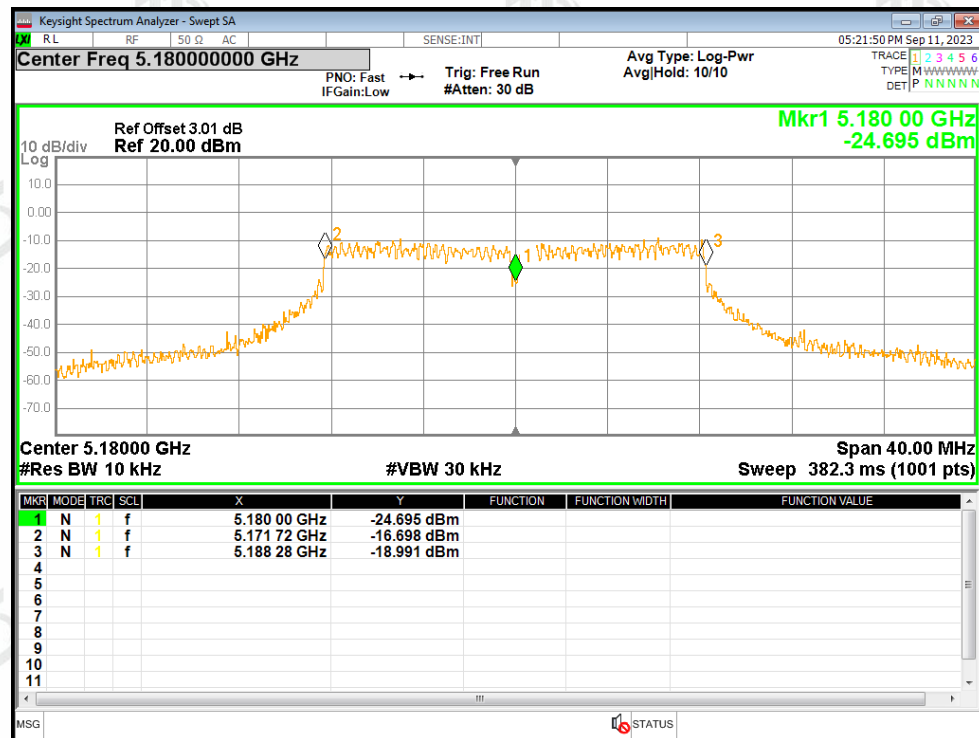
N40	5230	NV	-20	-40000	-7.65	Within 5150-5250MHz	Pass
		NV	-10	-40000	-7.65		
		NV	0	-40000	-7.65		
		NV	20	-40000	-7.65		
		NV	30	-40000	-7.65		
		NV	50	-40000	-7.65		
		NV	60	-40000	-7.65		
ac40	5190	NV	-20	0	0		
		NV	-10	0	0		
		NV	0	0	0		
		NV	20	0	0		
		NV	30	0	0		
		NV	50	0	0		
		NV	60	0	0		
	5230	NV	-20	0	0		
		NV	-10	0	0		
		NV	0	0	0		
		NV	20	0	0		
		NV	30	0	0		
		NV	50	0	0		
		NV	60	0	0		
ac80	5210	NV	-20	-80000	-15.36		
		NV	-10	-80000	-15.36		
		NV	0	-80000	-15.36		
		NV	20	-80000	-15.36		
		NV	30	-80000	-15.36		
		NV	50	-80000	-15.36		
		NV	60	-80000	-15.36		

Note: Test temperature: -20° to $+60^{\circ}$, At room temperature, the test results are the worst, only reflecting the test results at room temperature.

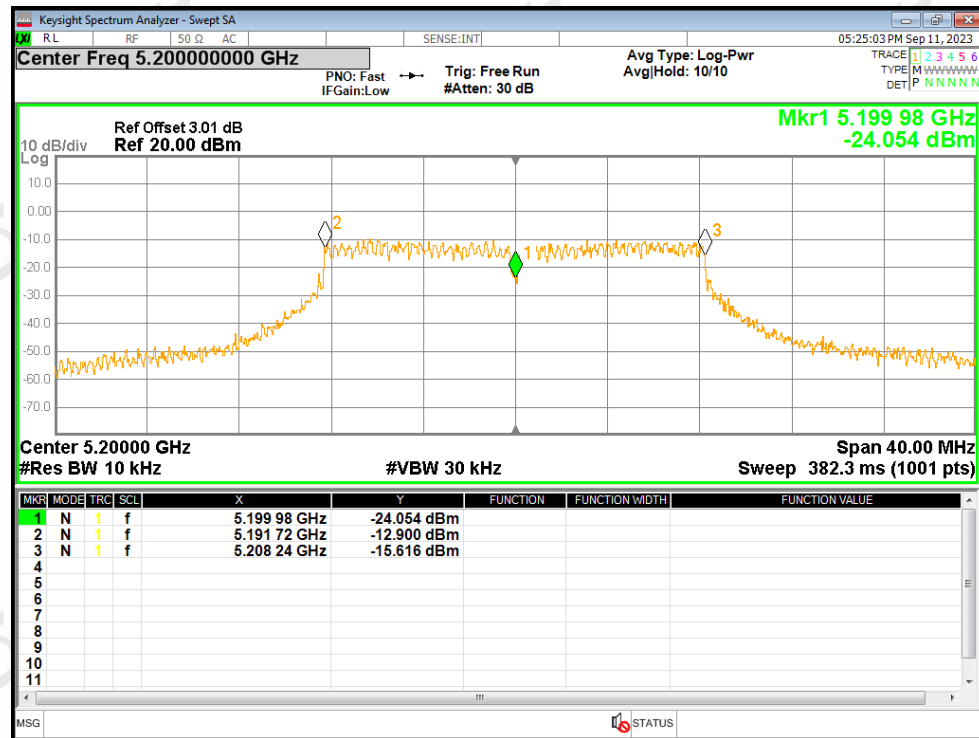


Test Graphs

Freq. Stability NVNT a 5180MHz Ant1

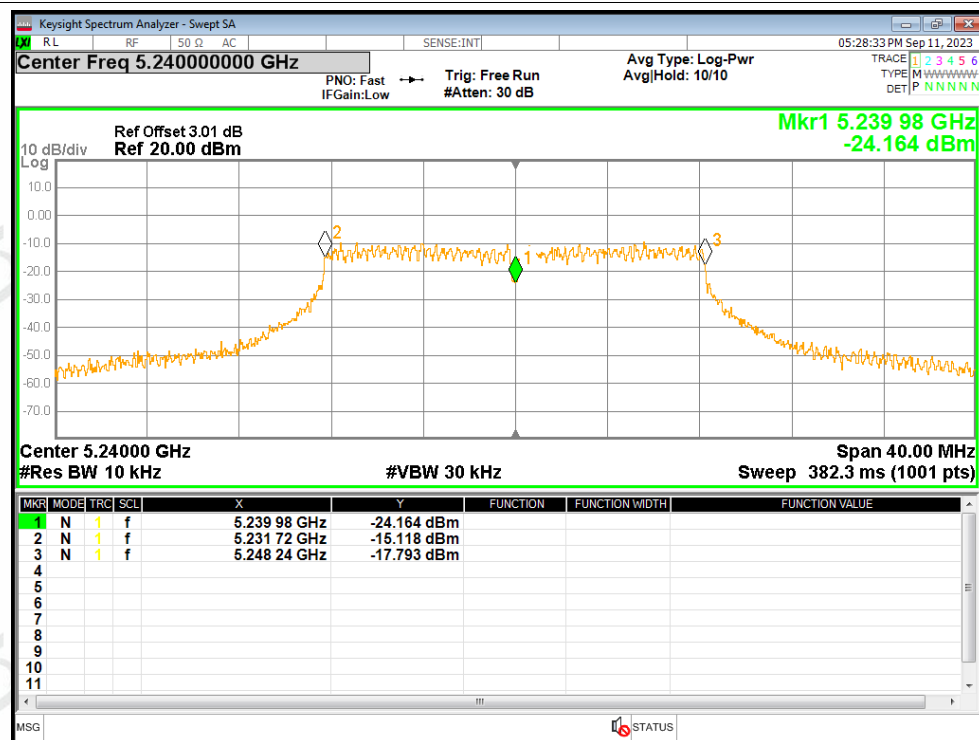


Freq. Stability NVNT a 5200MHz Ant1

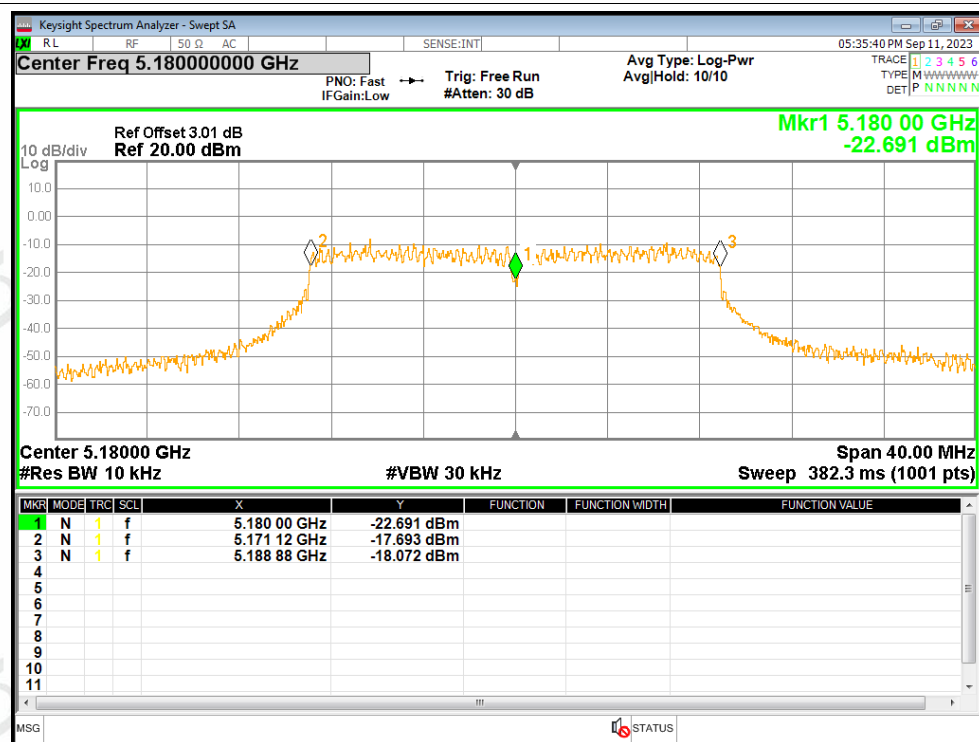




Freq. Stability NVNT a 5240MHz Ant1

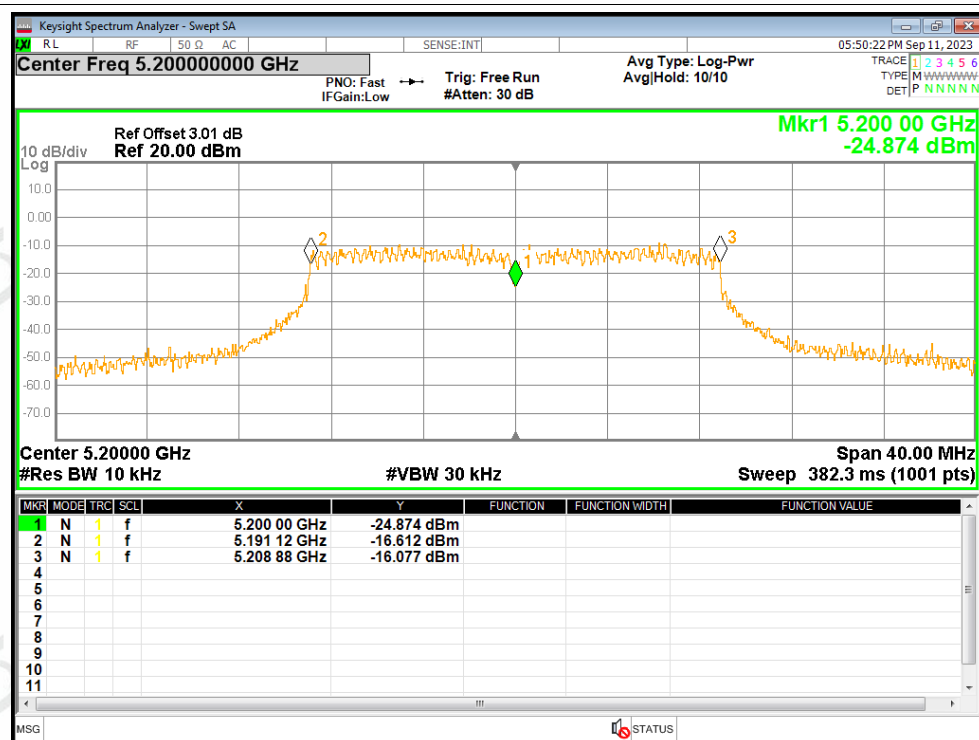


Freq. Stability NVNT n20 5180MHz Ant1

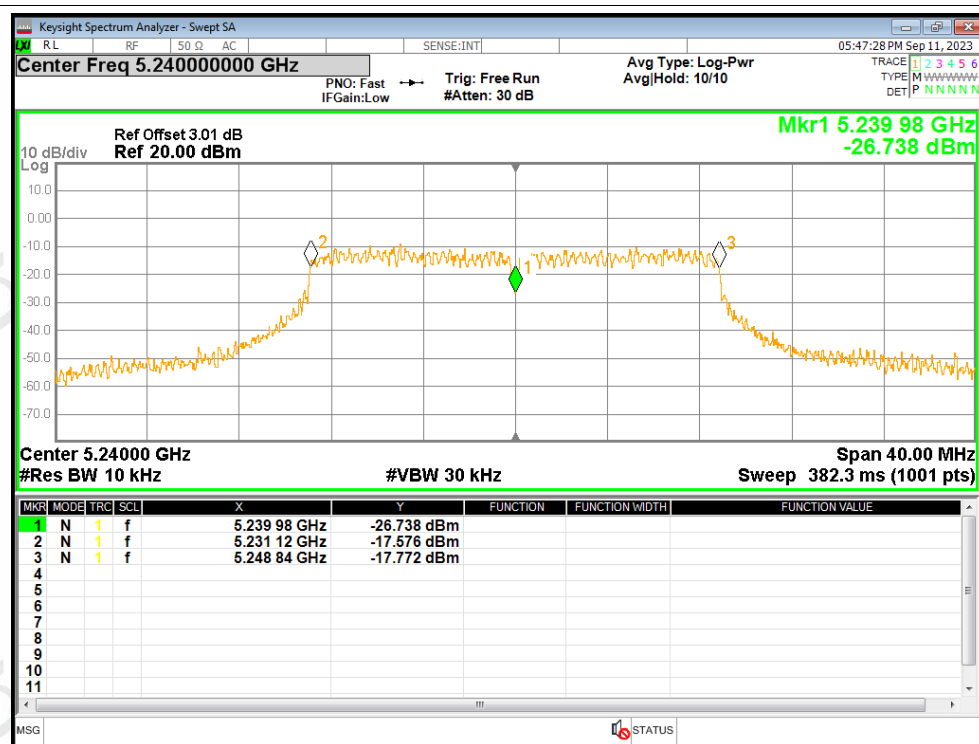




Freq. Stability NVNT n20 5200MHz Ant1

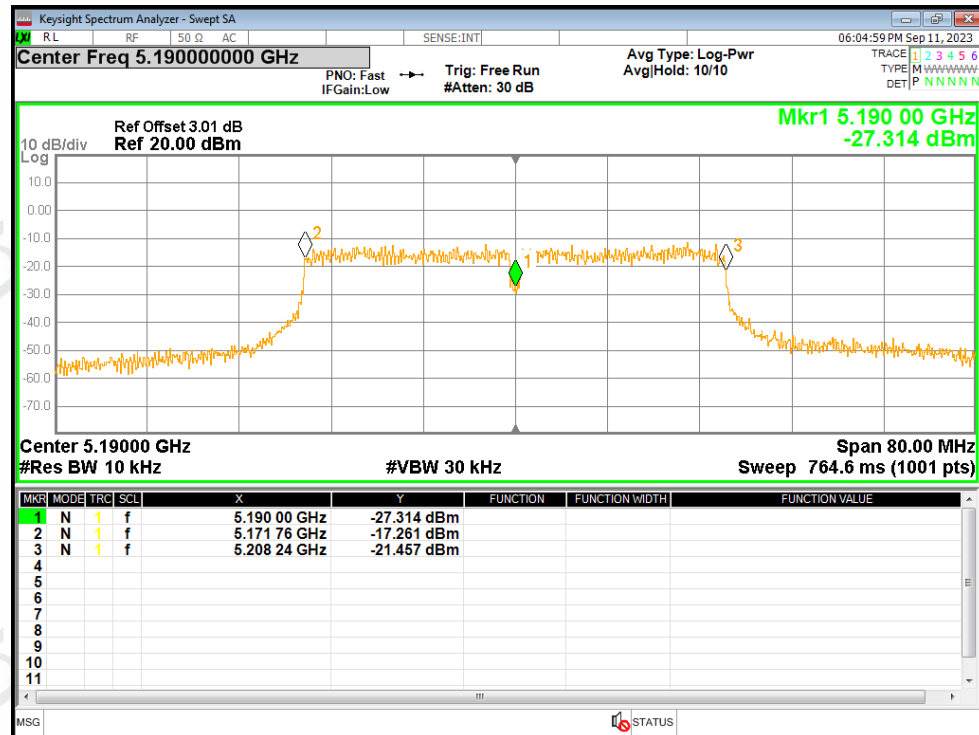


Freq. Stability NVNT n20 5240MHz Ant1

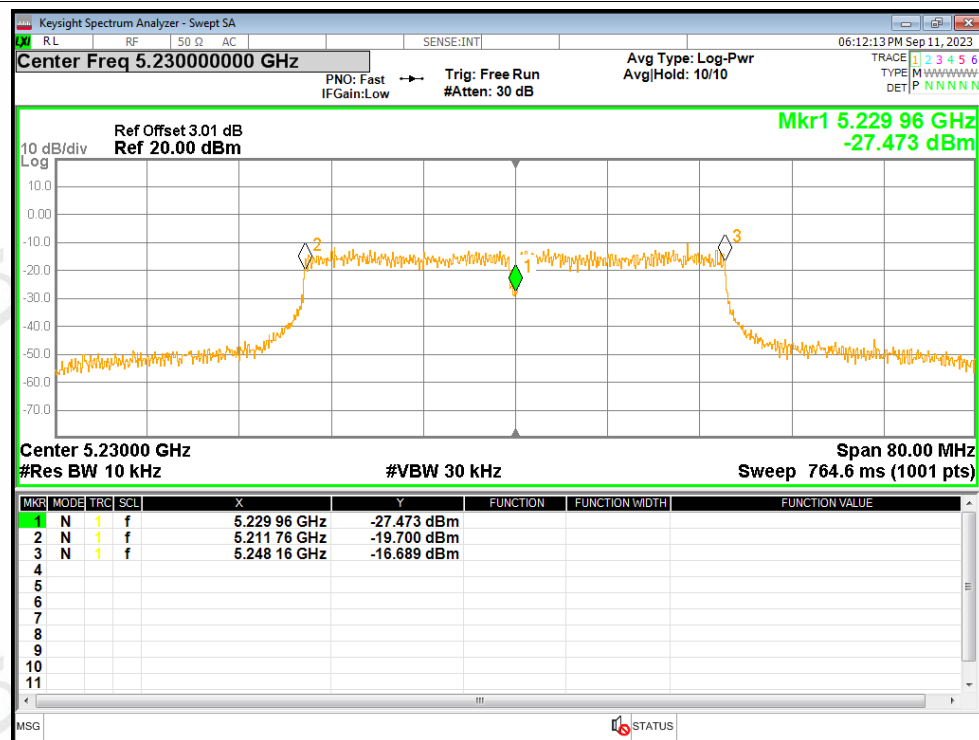




Freq. Stability NVNT n40 5190MHz Ant1

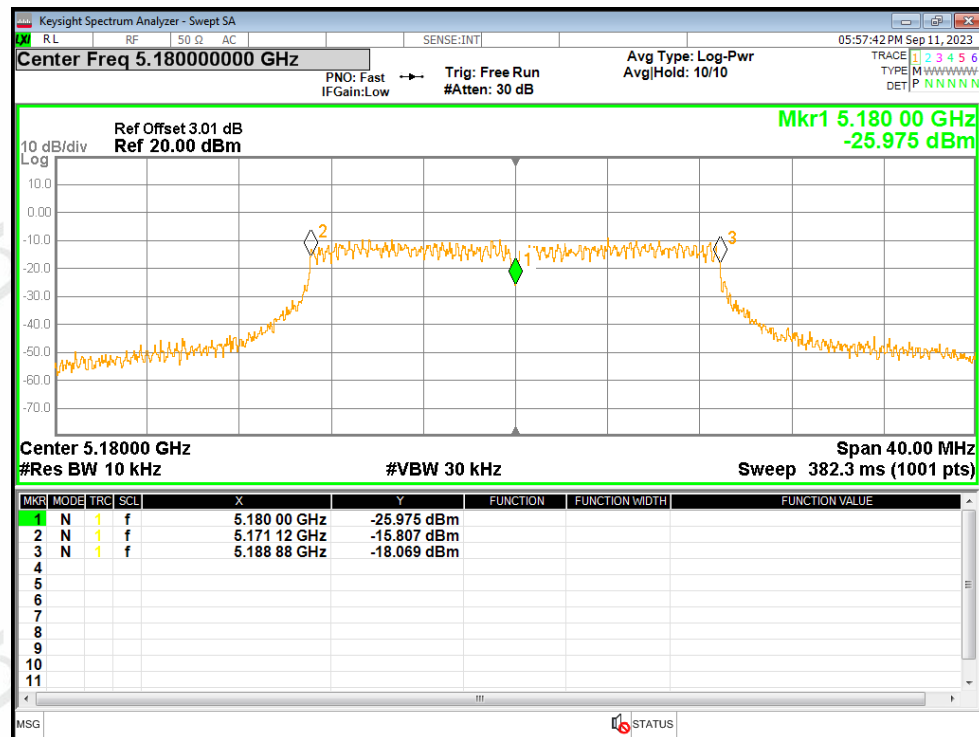


Freq. Stability NVNT n40 5230MHz Ant1

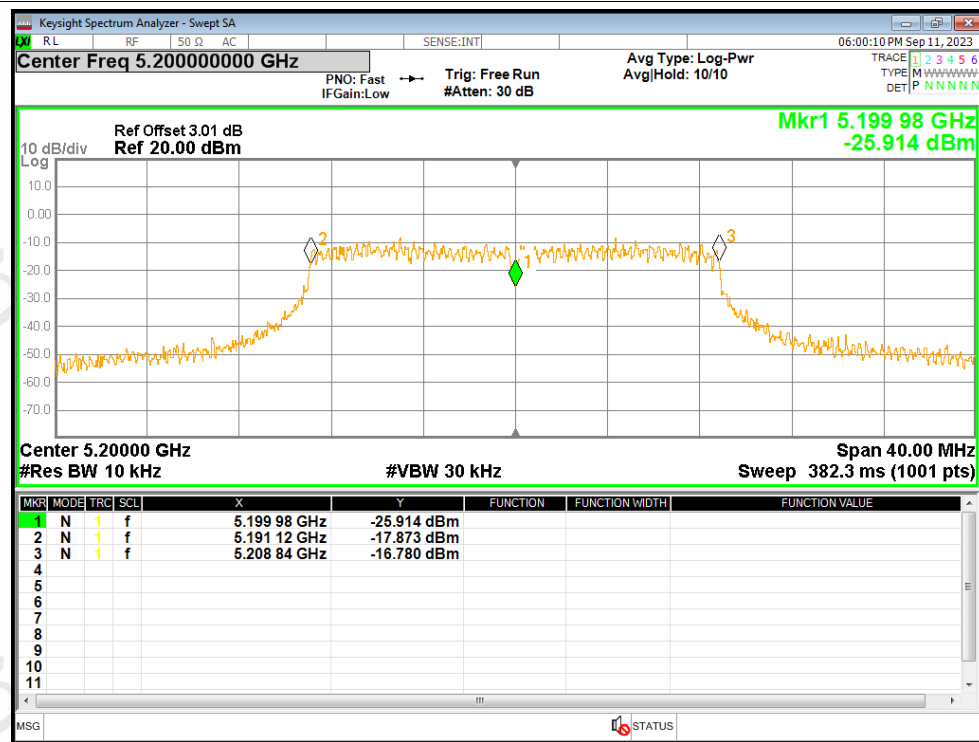




Freq. Stability NVNT ac20 5180MHz Ant1

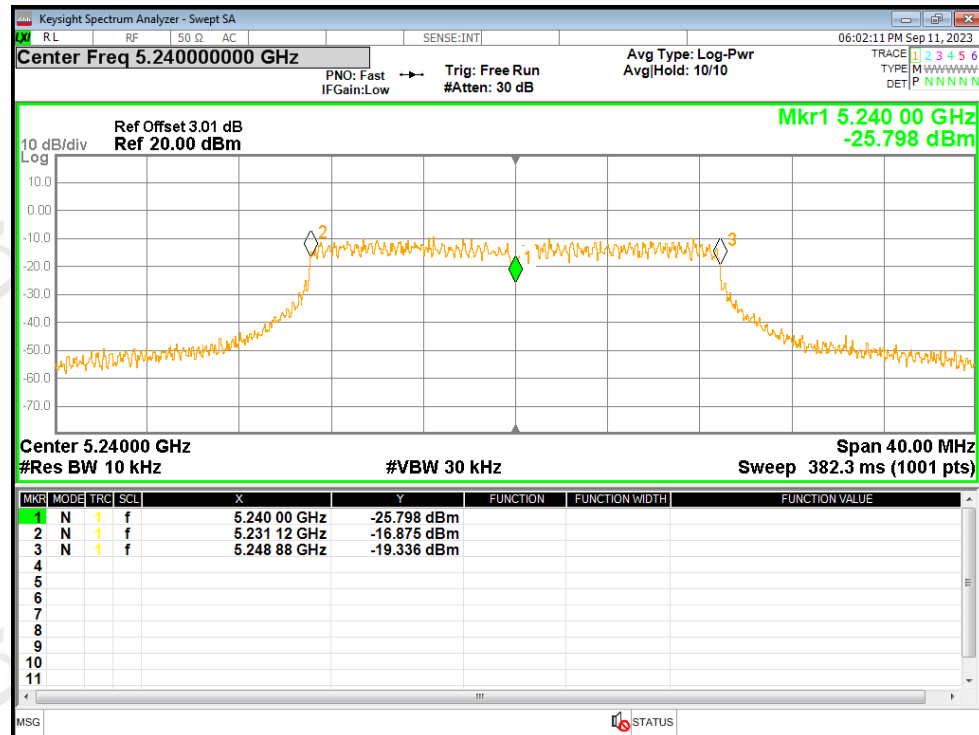


Freq. Stability NVNT ac20 5200MHz Ant1

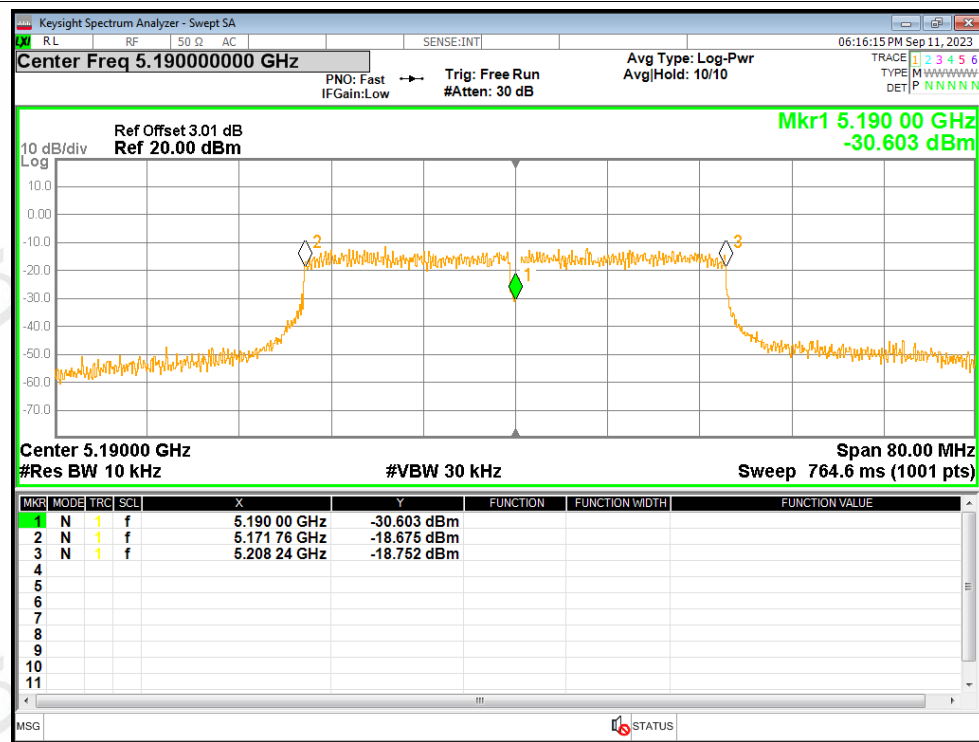




Freq. Stability NVNT ac20 5240MHz Ant1

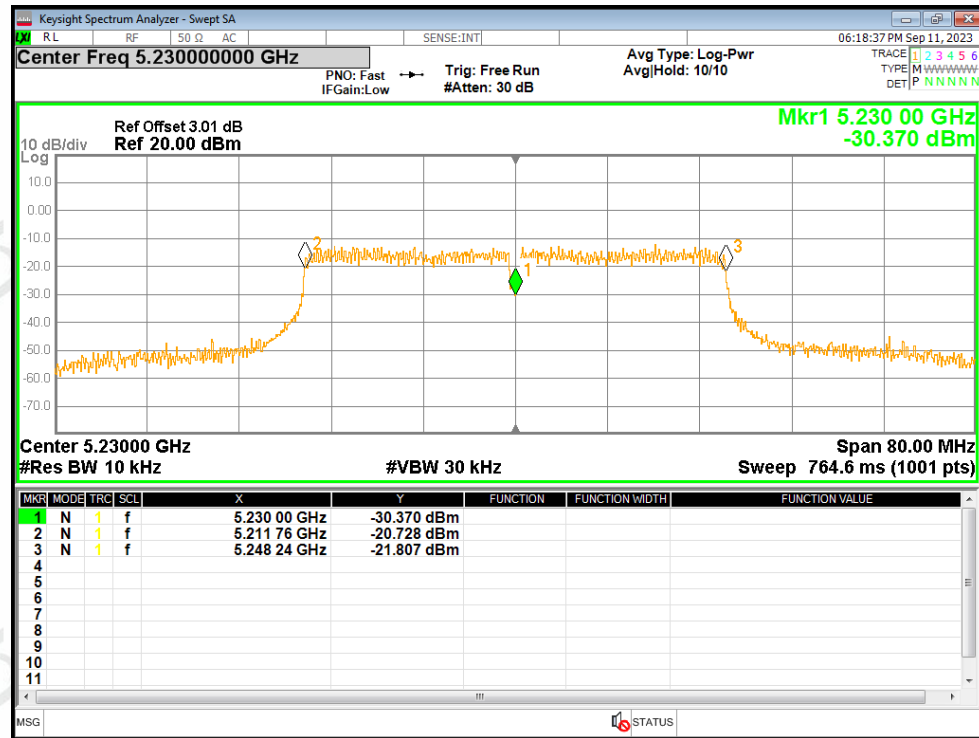


Freq. Stability NVNT ac40 5190MHz Ant1

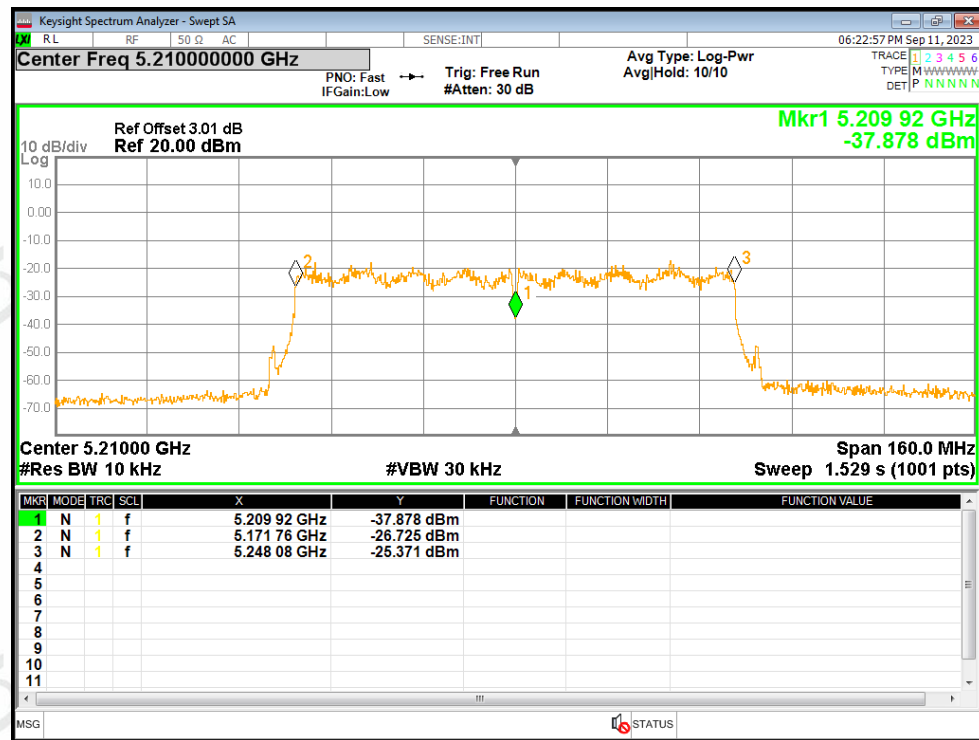




Freq. Stability NVNT ac40 5230MHz Ant1



Freq. Stability NVNT ac80 5210MHz Ant1



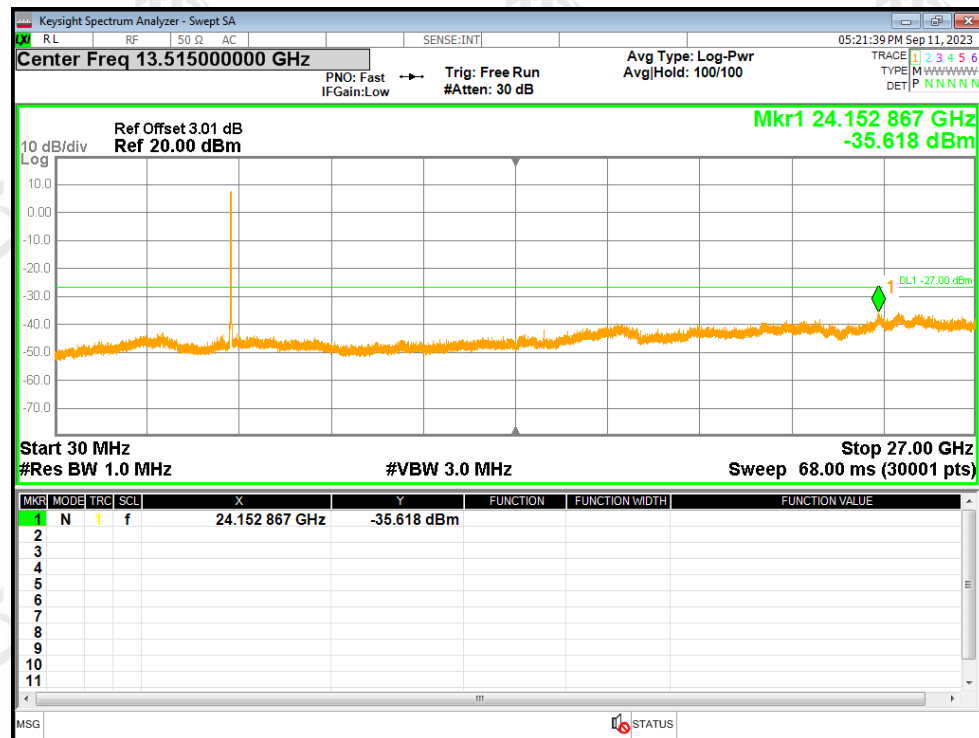
A8.Conducted RF Spurious Emission

Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	a	5180	Ant1	-35.61	-27	Pass
NVNT	a	5200	Ant1	-35.12	-27	Pass
NVNT	a	5240	Ant1	-36.16	-27	Pass
NVNT	n20	5180	Ant1	-36.31	-27	Pass
NVNT	n20	5200	Ant1	-34.66	-27	Pass
NVNT	n20	5240	Ant1	-35.79	-27	Pass
NVNT	n40	5190	Ant1	-36.2	-27	Pass
NVNT	n40	5230	Ant1	-36.08	-27	Pass
NVNT	ac20	5180	Ant1	-36.29	-27	Pass
NVNT	ac20	5200	Ant1	-36.3	-27	Pass
NVNT	ac20	5240	Ant1	-36.12	-27	Pass
NVNT	ac40	5190	Ant1	-35.14	-27	Pass
NVNT	ac40	5230	Ant1	-35.68	-27	Pass
NVNT	ac80	5210	Ant1	-36.1	-27	Pass

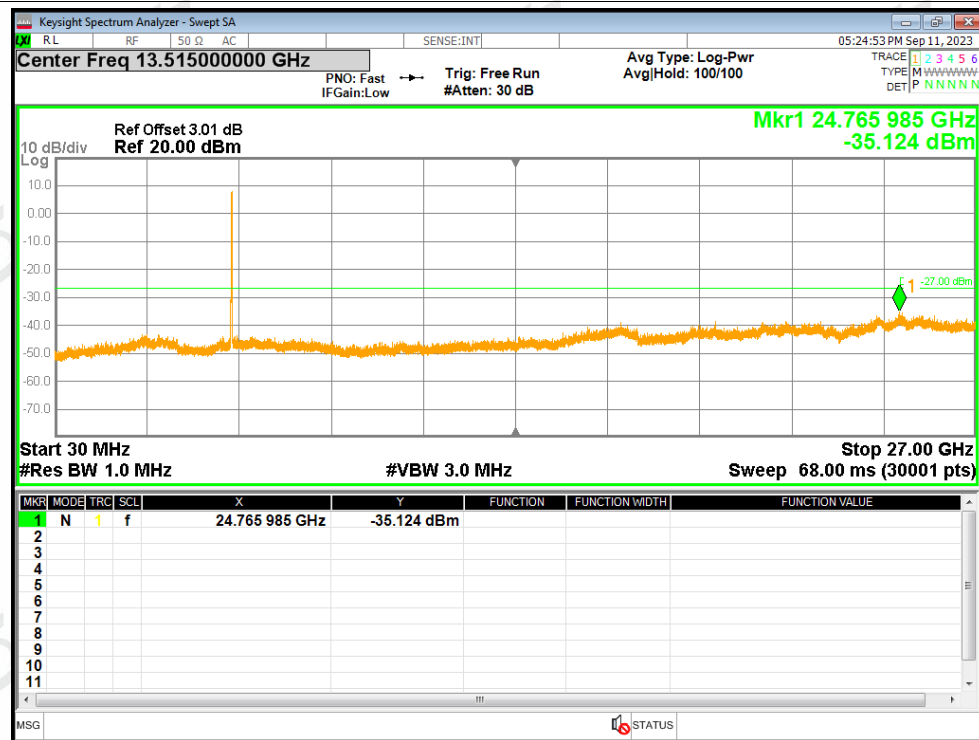


Test Graphs

Tx. Spurious NVNT a 5180MHz Ant1 Emission

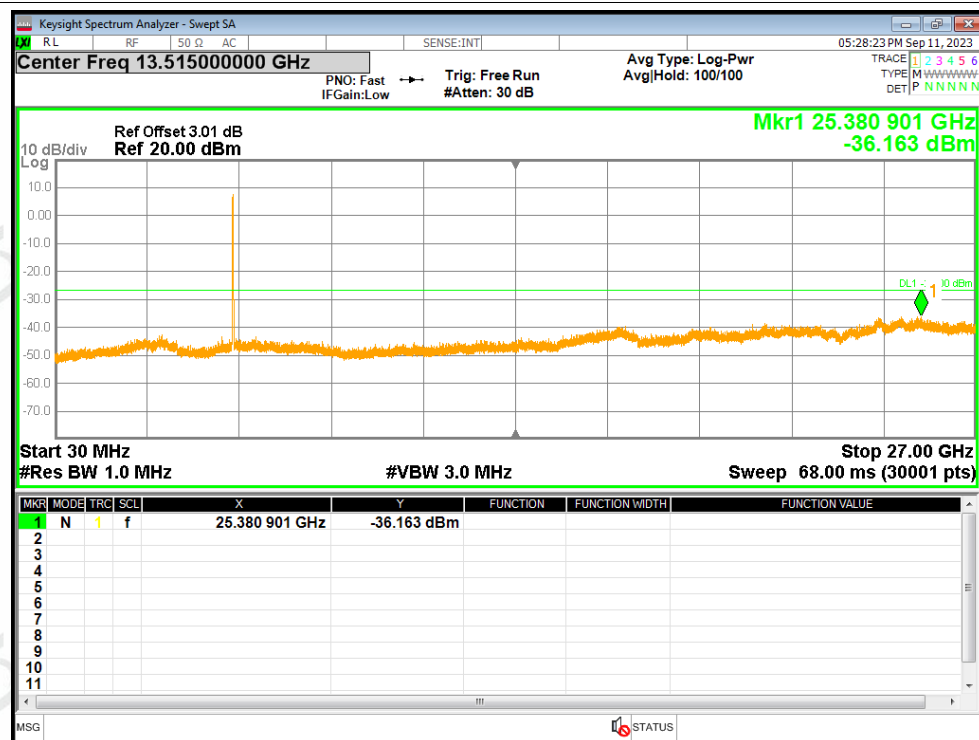


Tx. Spurious NVNT a 5200MHz Ant1 Emission

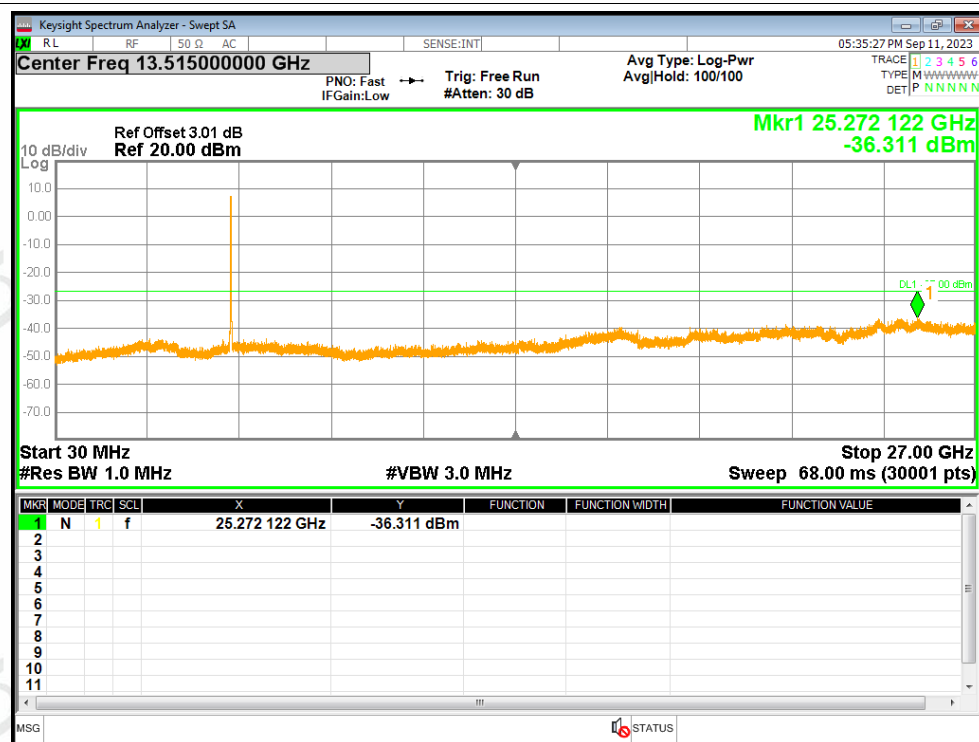




Tx. Spurious NVNT a 5240MHz Ant1 Emission

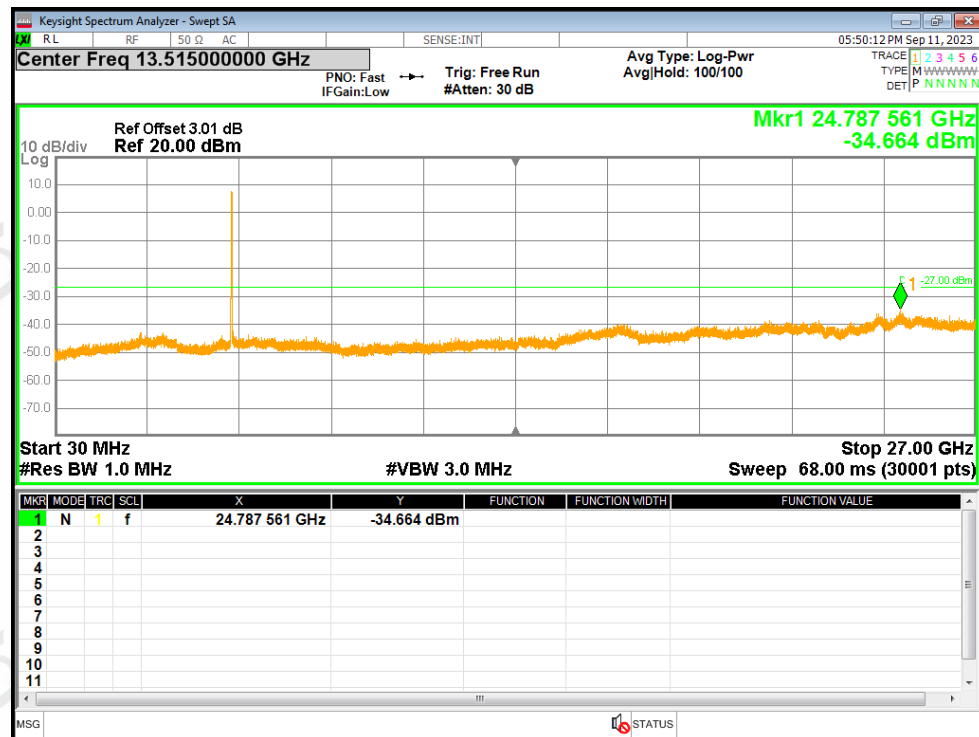


Tx. Spurious NVNT n20 5180MHz Ant1 Emission

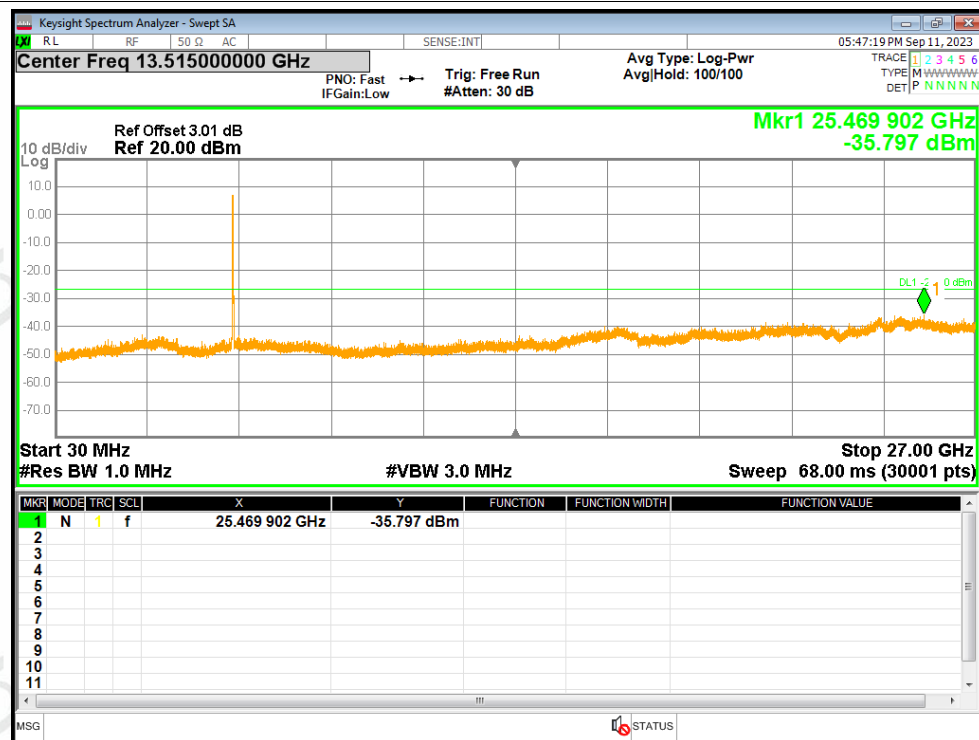




Tx. Spurious NVNT n20 5200MHz Ant1 Emission

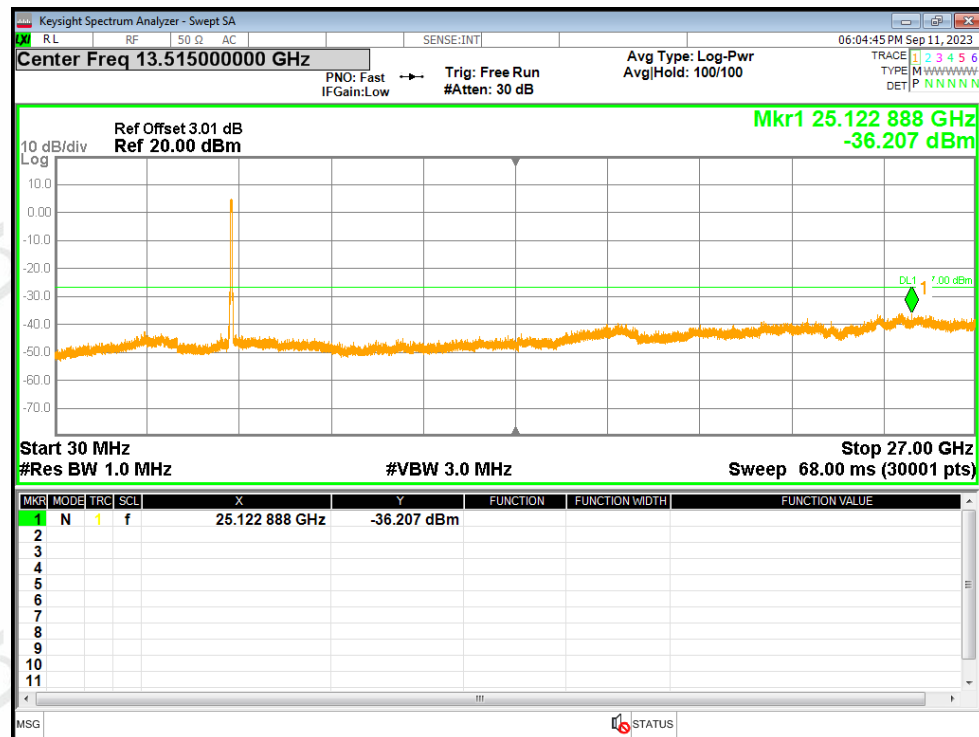


Tx. Spurious NVNT n20 5240MHz Ant1 Emission

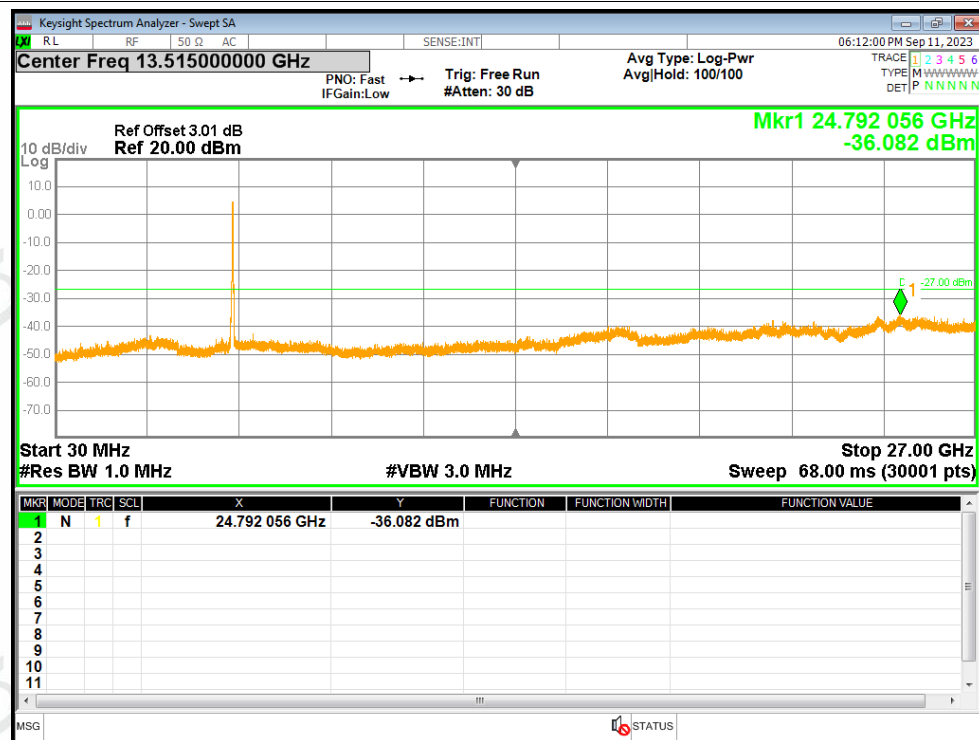




Tx. Spurious NVNT n40 5190MHz Ant1 Emission

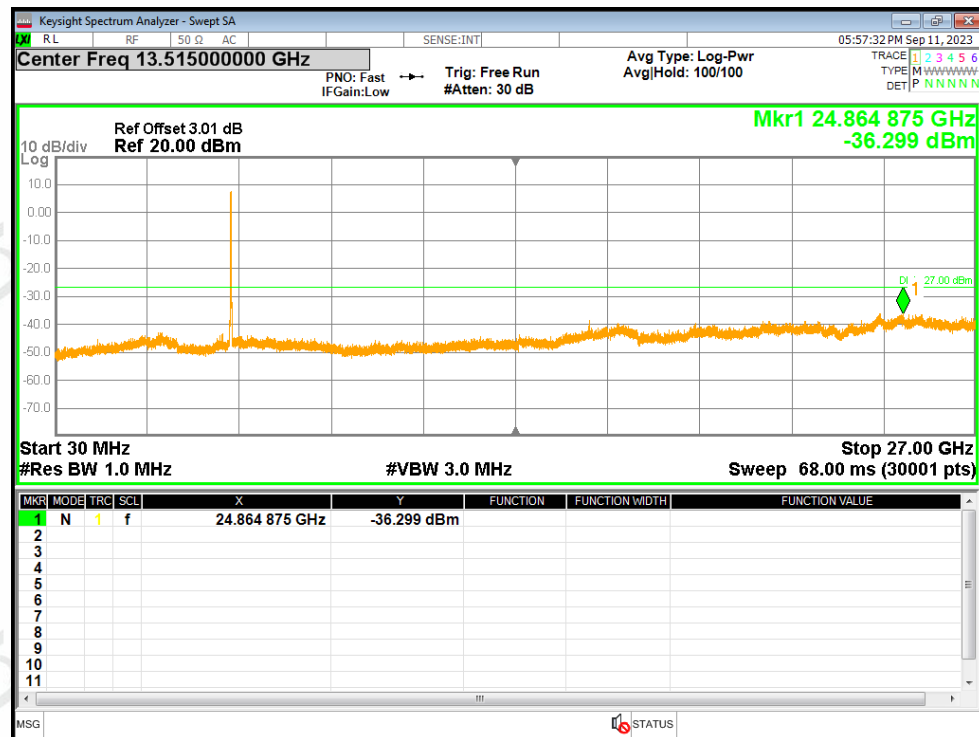


Tx. Spurious NVNT n40 5230MHz Ant1 Emission

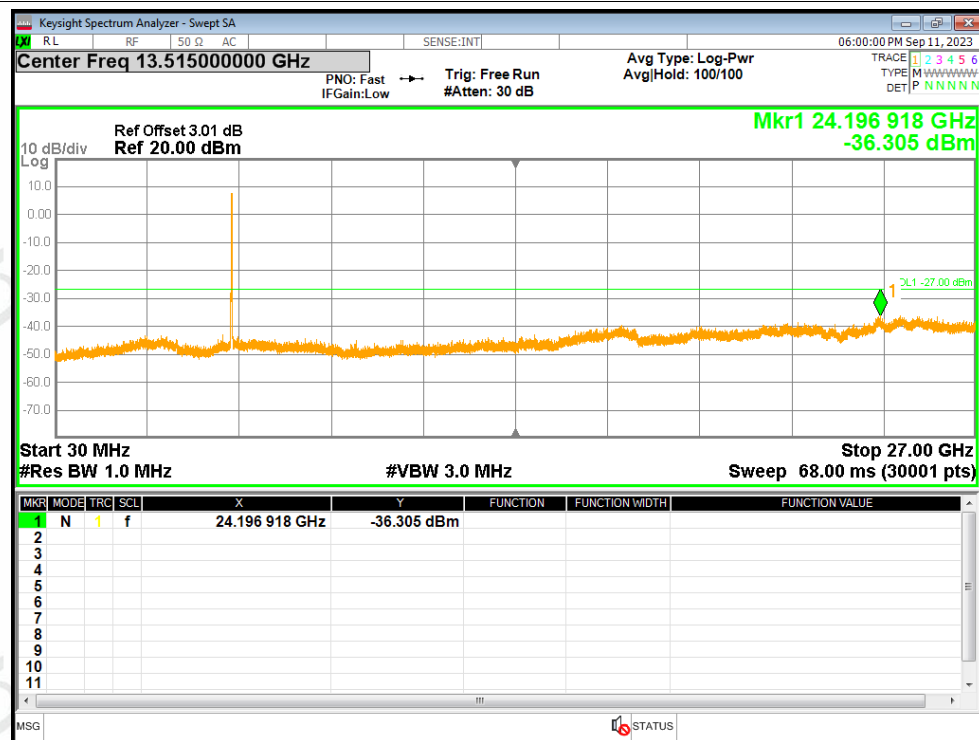




Tx. Spurious NVNT ac20 5180MHz Ant1 Emission

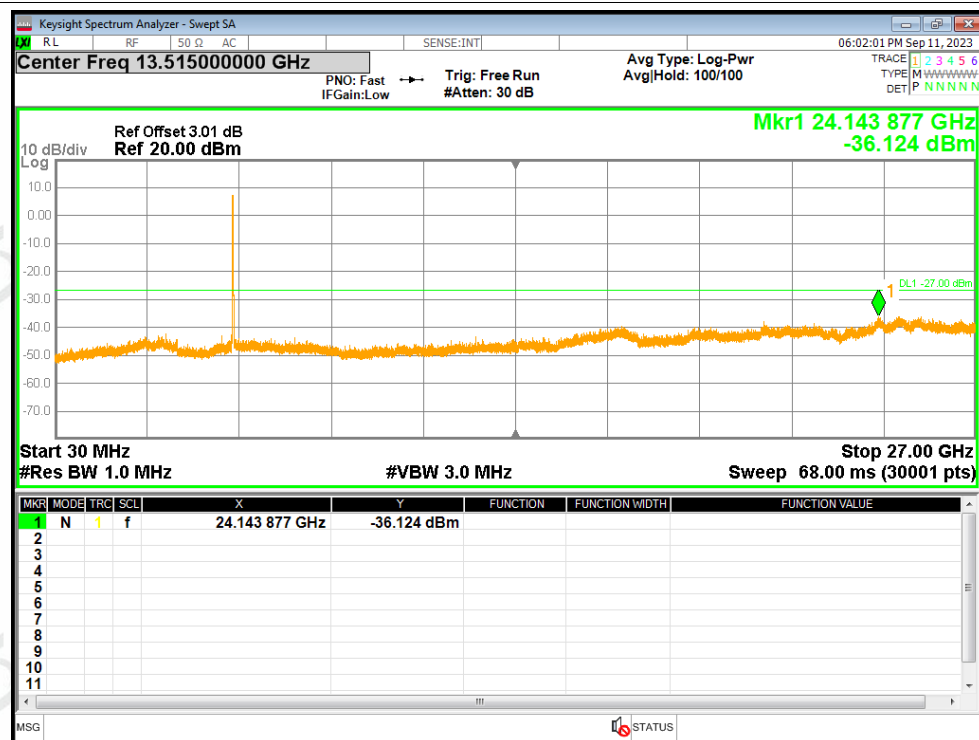


Tx. Spurious NVNT ac20 5200MHz Ant1 Emission

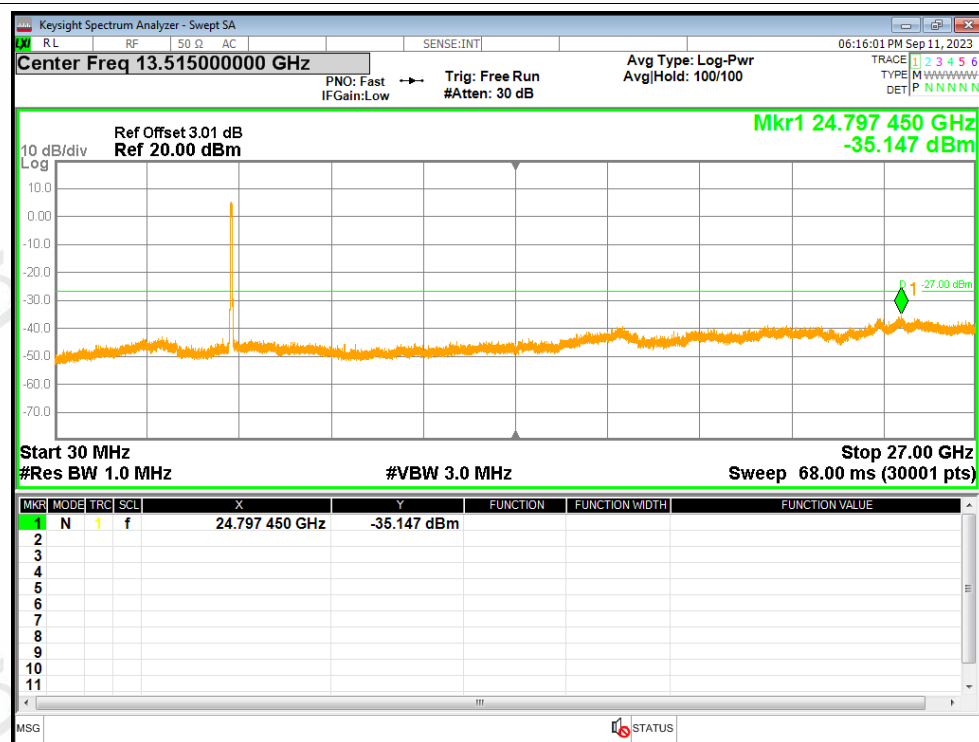




Tx. Spurious NVNT ac20 5240MHz Ant1 Emission

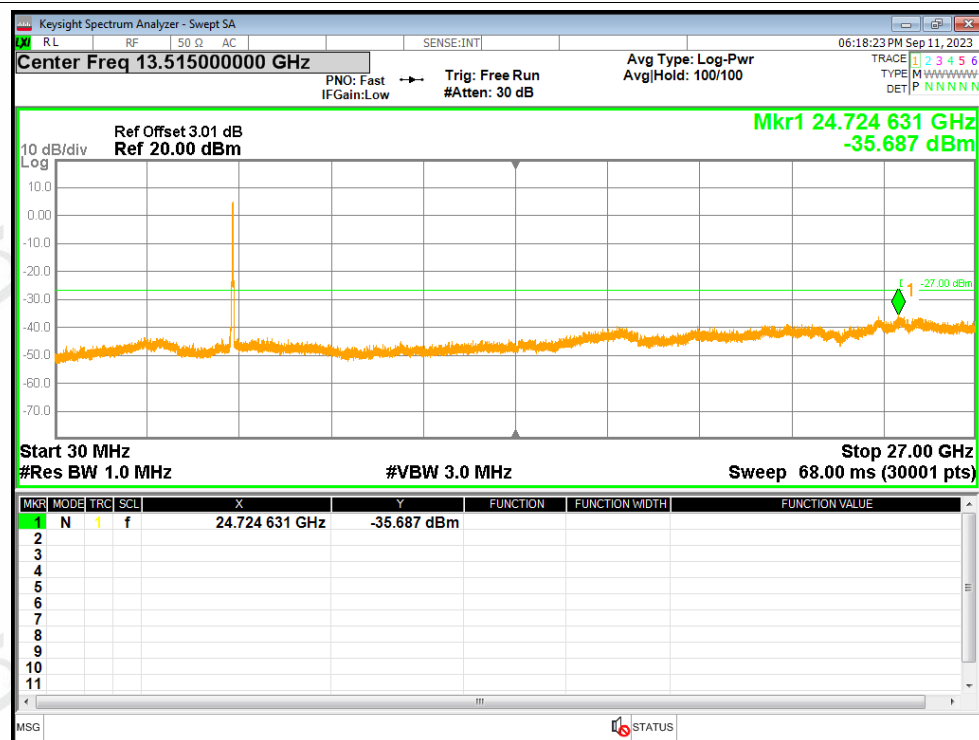


Tx. Spurious NVNT ac40 5190MHz Ant1 Emission





Tx. Spurious NVNT ac40 5230MHz Ant1 Emission



Tx. Spurious NVNT ac80 5210MHz Ant1 Emission

