



Appendix A

RF Test Data for 2.4G WIFI (Conducted Measurement)

Product Name: Industrial 5G/4G/3G Router

Test Model: QUARTZ-ONYX

Environmental Conditions

Temperature:	23.8 ° C
Relative Humidity:	52.1%
ATM Pressure:	100.0 kPa
Test Engineer:	Ling Zhu
Supervised by:	Li Huan



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A.1 -6dB Bandwidth

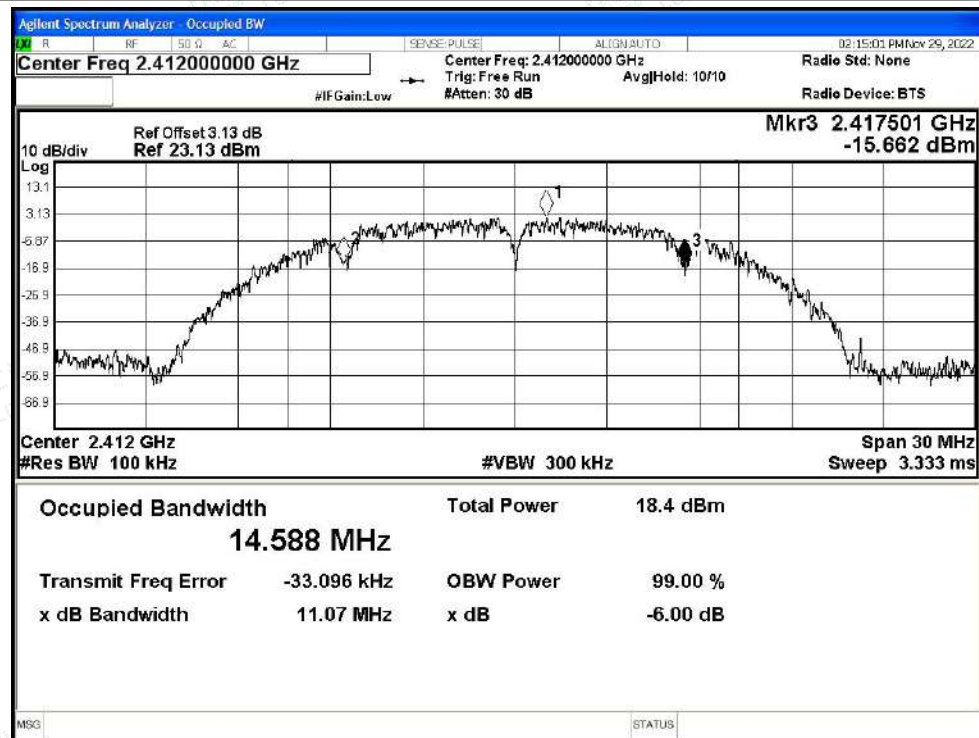
Condition	Mode	Frequency (MHz)	Antenna	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
NVNT	b	2412	Ant0	11.068	≥ 0.5	Pass
NVNT	b	2437	Ant0	9.891	≥ 0.5	Pass
NVNT	b	2462	Ant0	8.632	≥ 0.5	Pass
NVNT	g	2412	Ant0	16.348	≥ 0.5	Pass
NVNT	g	2437	Ant0	16.367	≥ 0.5	Pass
NVNT	g	2462	Ant0	16.312	≥ 0.5	Pass
NVNT	n20	2412	Ant0	16.251	≥ 0.5	Pass
NVNT	n20	2437	Ant0	15.509	≥ 0.5	Pass
NVNT	n20	2462	Ant0	16.335	≥ 0.5	Pass
NVNT	n40	2422	Ant0	35.066	≥ 0.5	Pass
NVNT	n40	2437	Ant0	35.39	≥ 0.5	Pass
NVNT	n40	2452	Ant0	34.971	≥ 0.5	Pass



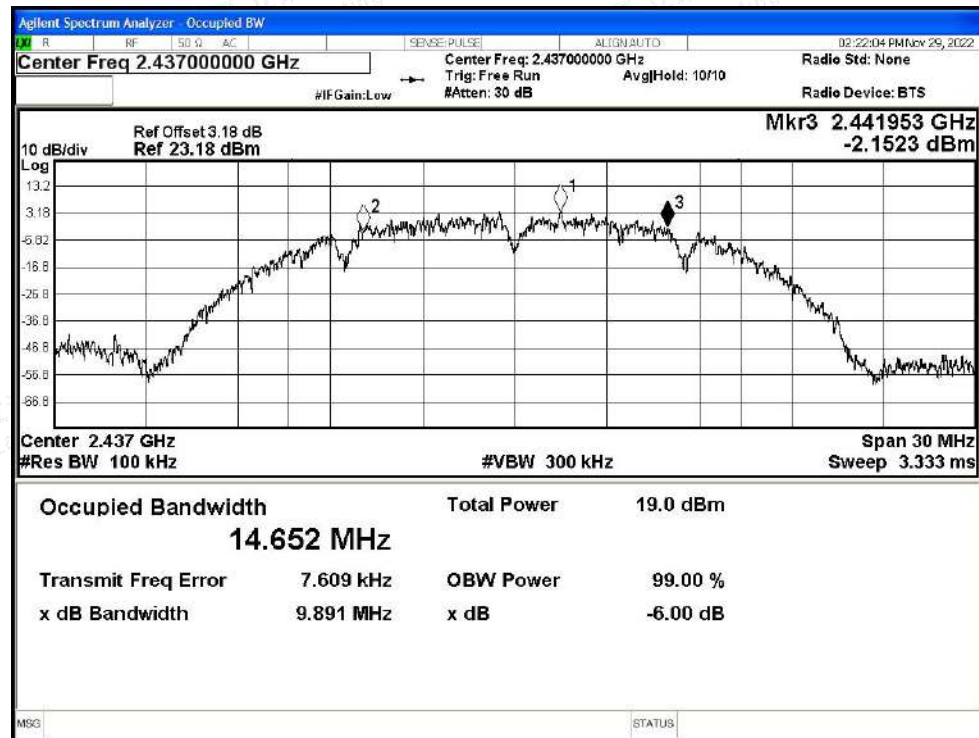


Test Graphs

-6dB Bandwidth NVNT b 2412MHz Ant0

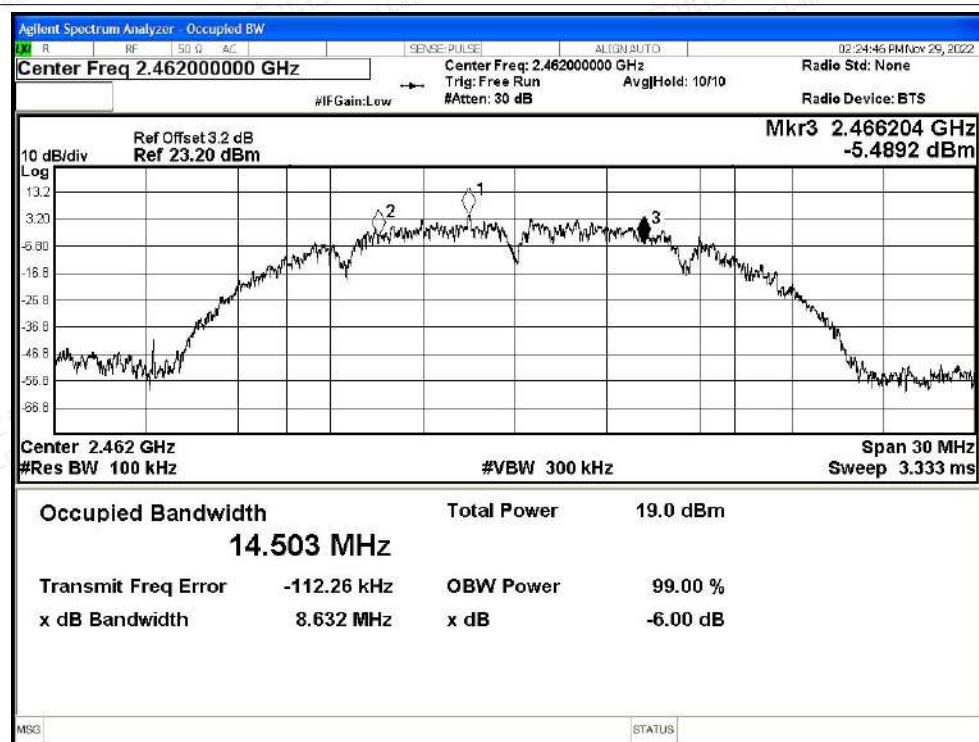


-6dB Bandwidth NVNT b 2437MHz Ant0

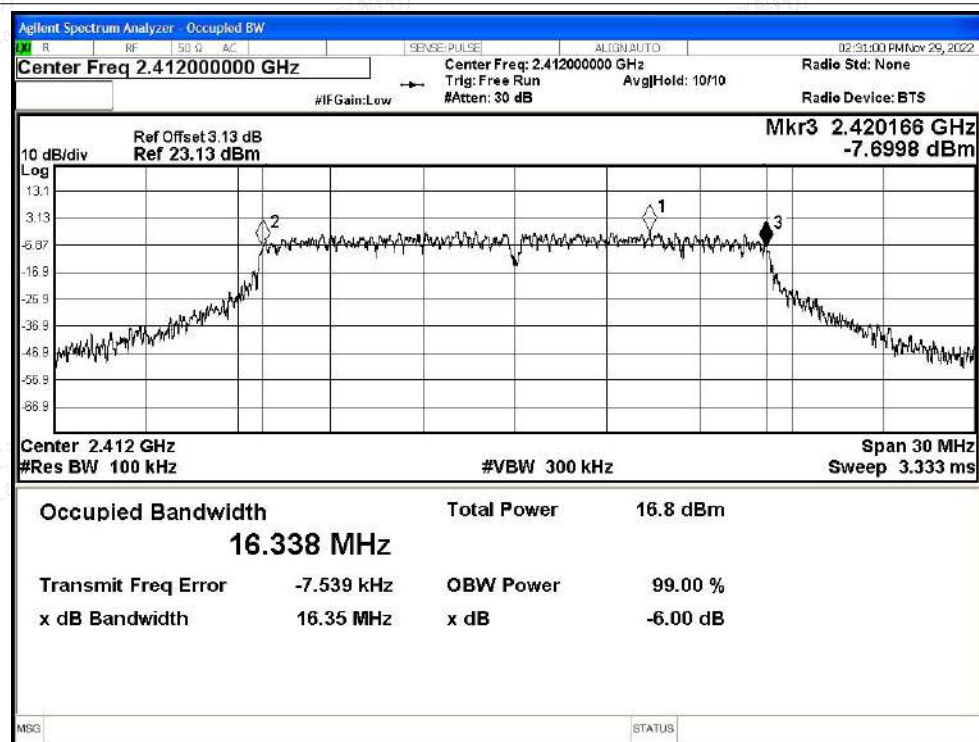




-6dB Bandwidth NVNT b 2462MHz Ant0

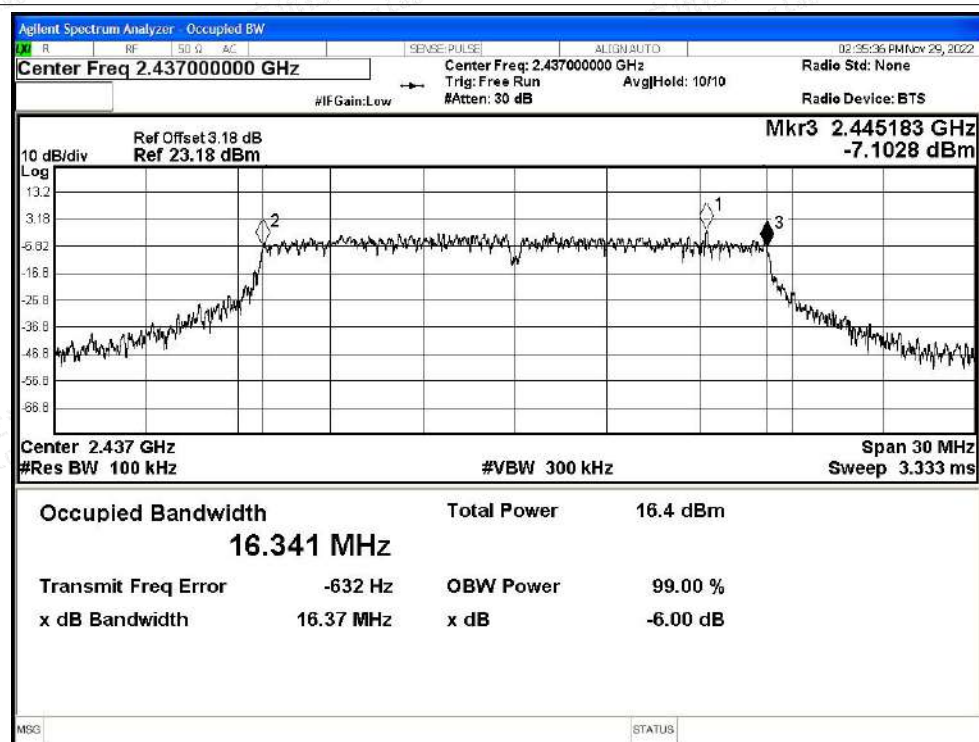


-6dB Bandwidth NVNT g 2412MHz Ant0

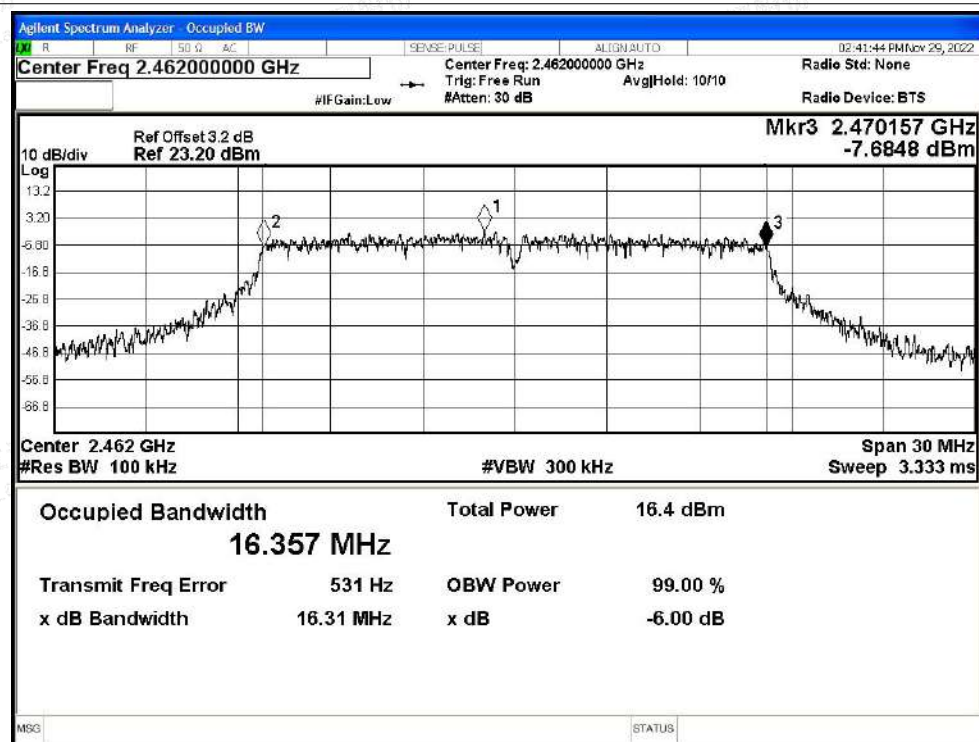




-6dB Bandwidth NVNT g 2437MHz Ant0

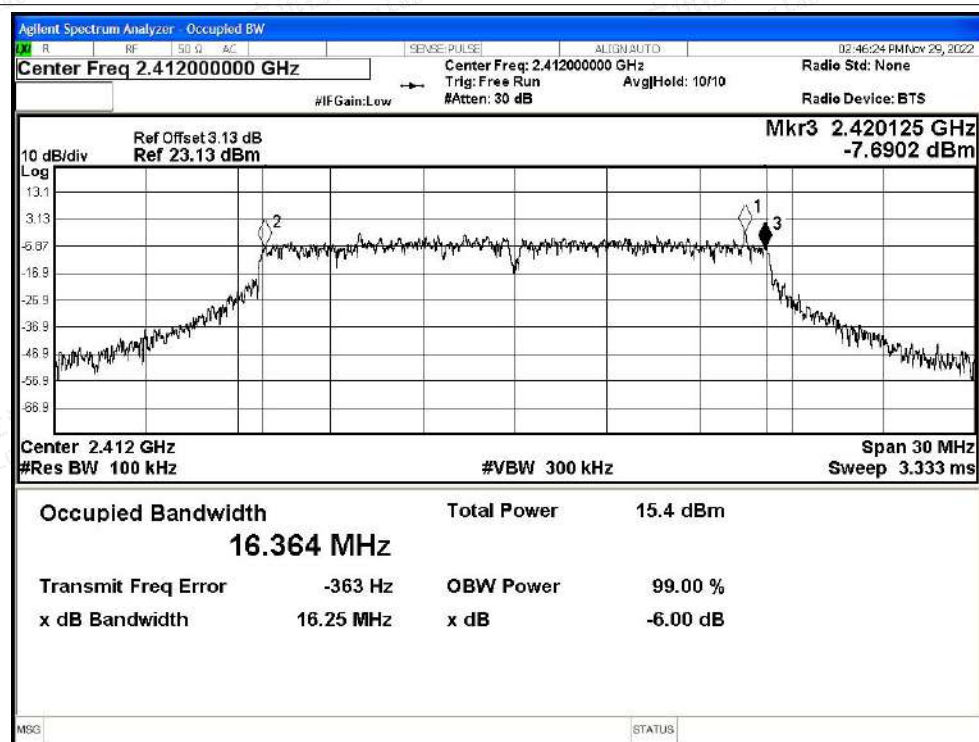


-6dB Bandwidth NVNT g 2462MHz Ant0

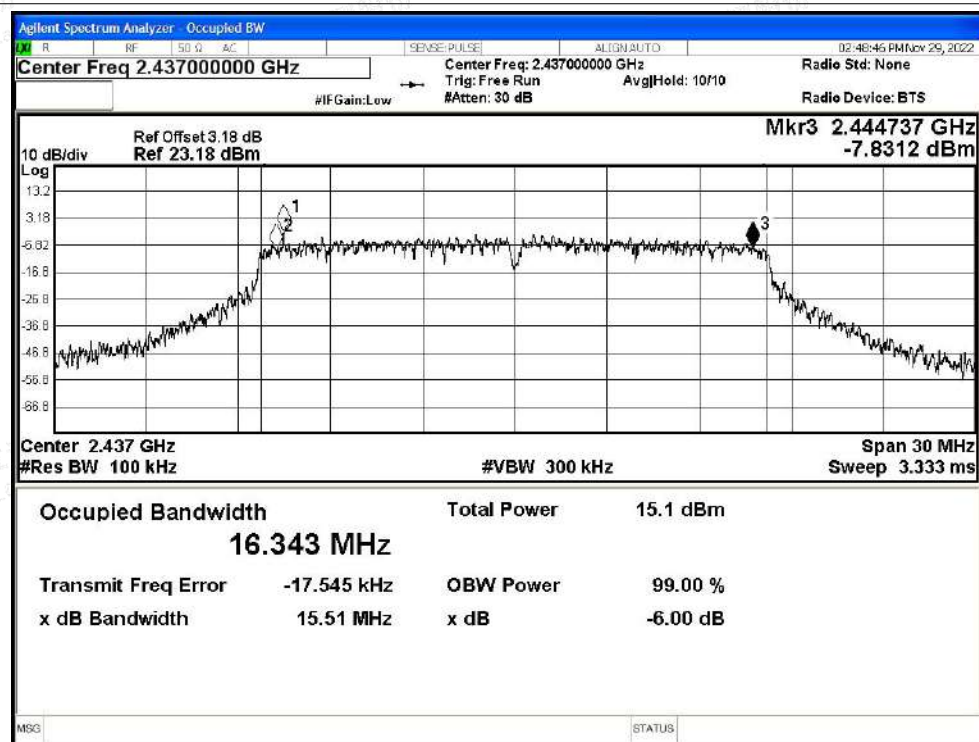




-6dB Bandwidth NVNT n20 2412MHz Ant0

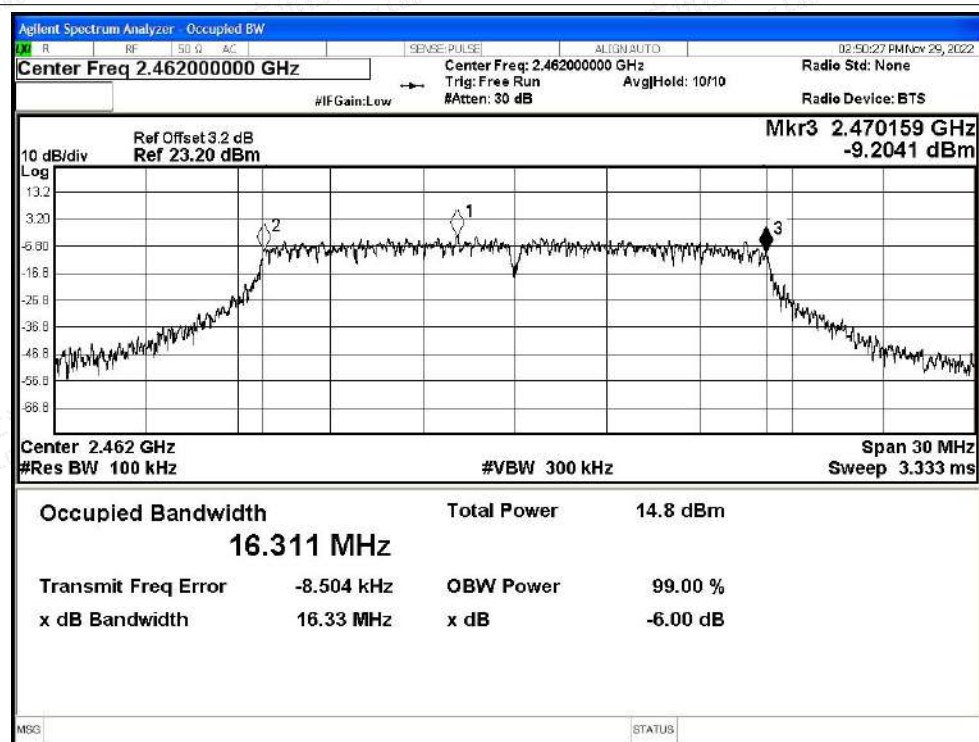


-6dB Bandwidth NVNT n20 2437MHz Ant0

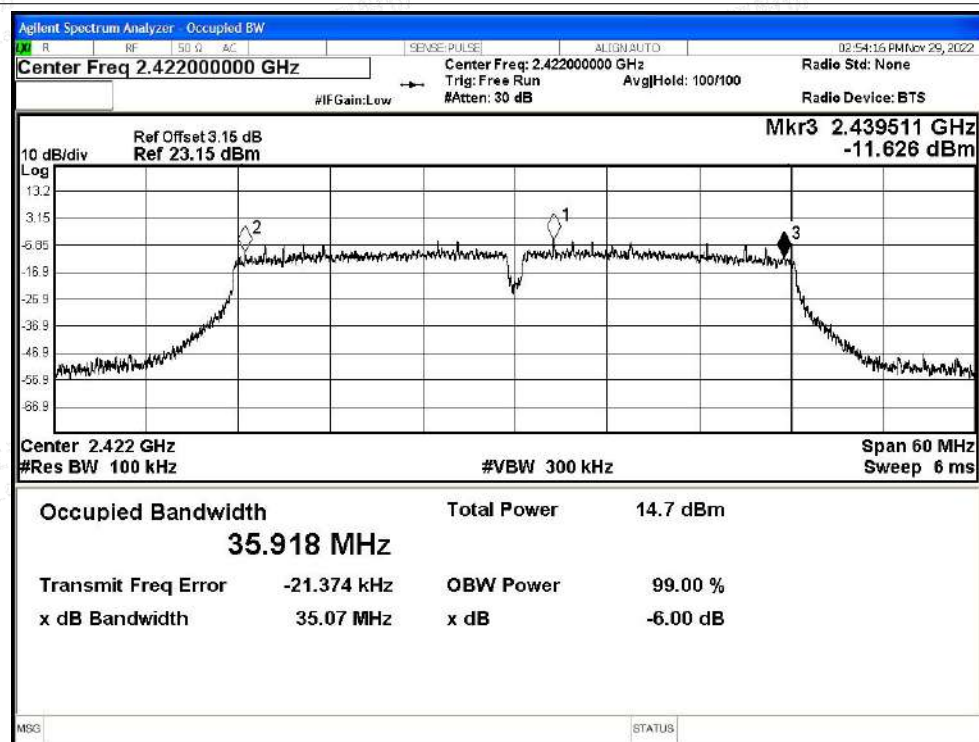




-6dB Bandwidth NVNT n20 2462MHz Ant0

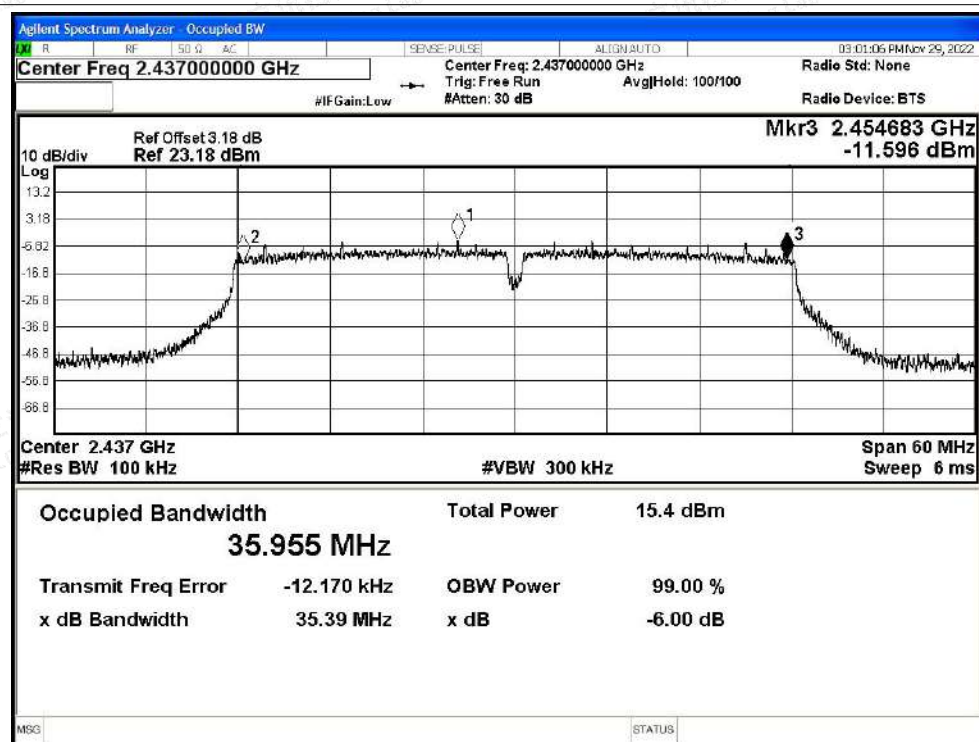


-6dB Bandwidth NVNT n40 2422MHz Ant0

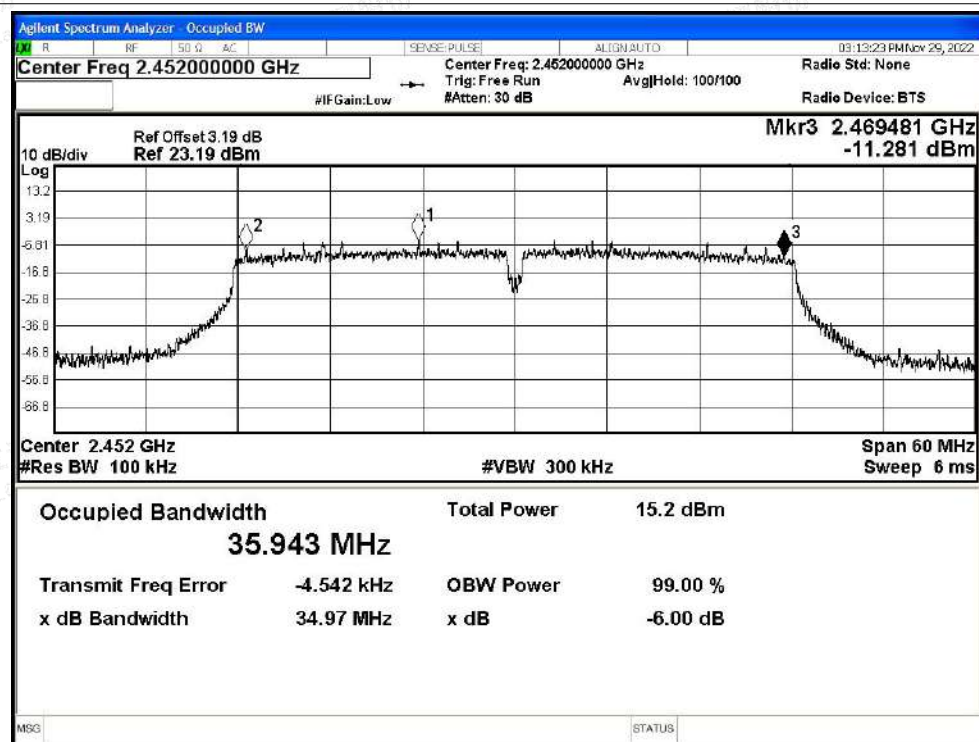




-6dB Bandwidth NVNT n40 2437MHz Ant0



-6dB Bandwidth NVNT n40 2452MHz Ant0





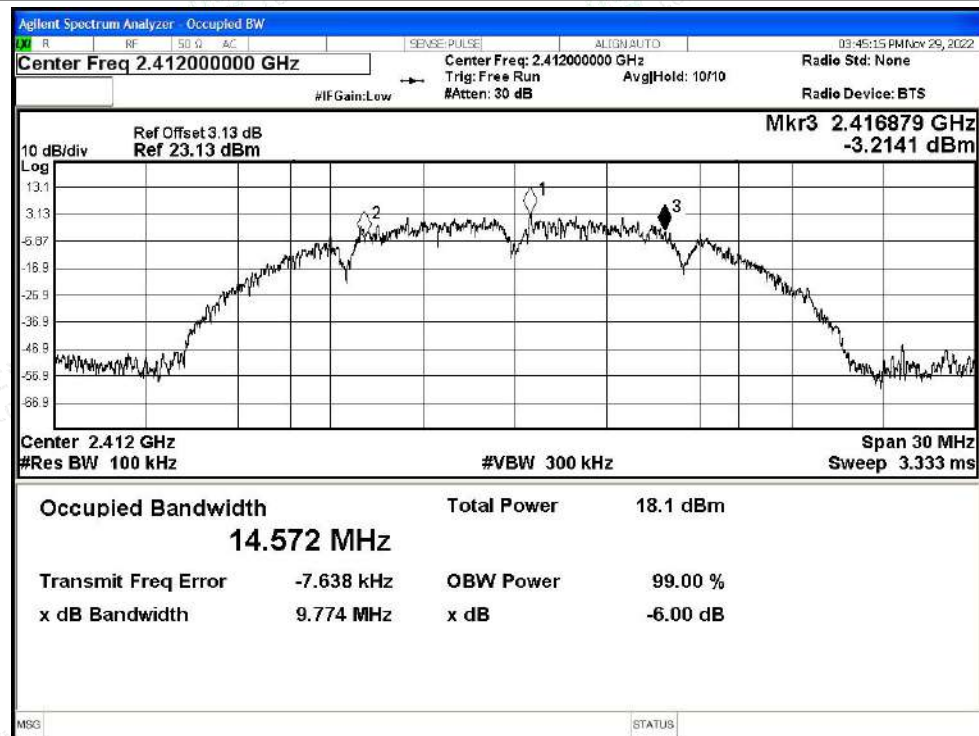
Condition	Mode	Frequency (MHz)	Antenna	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
NVNT	b	2412	Ant1	9.774	≥ 0.5	Pass
NVNT	b	2437	Ant1	10.02	≥ 0.5	Pass
NVNT	b	2462	Ant1	9.753	≥ 0.5	Pass
NVNT	g	2412	Ant1	16.398	≥ 0.5	Pass
NVNT	g	2437	Ant1	16.368	≥ 0.5	Pass
NVNT	g	2462	Ant1	16.383	≥ 0.5	Pass
NVNT	n20	2412	Ant1	16.918	≥ 0.5	Pass
NVNT	n20	2437	Ant1	17.597	≥ 0.5	Pass
NVNT	n20	2462	Ant1	16.097	≥ 0.5	Pass
NVNT	n40	2422	Ant1	35.016	≥ 0.5	Pass
NVNT	n40	2437	Ant1	34.962	≥ 0.5	Pass
NVNT	n40	2452	Ant1	33.844	≥ 0.5	Pass



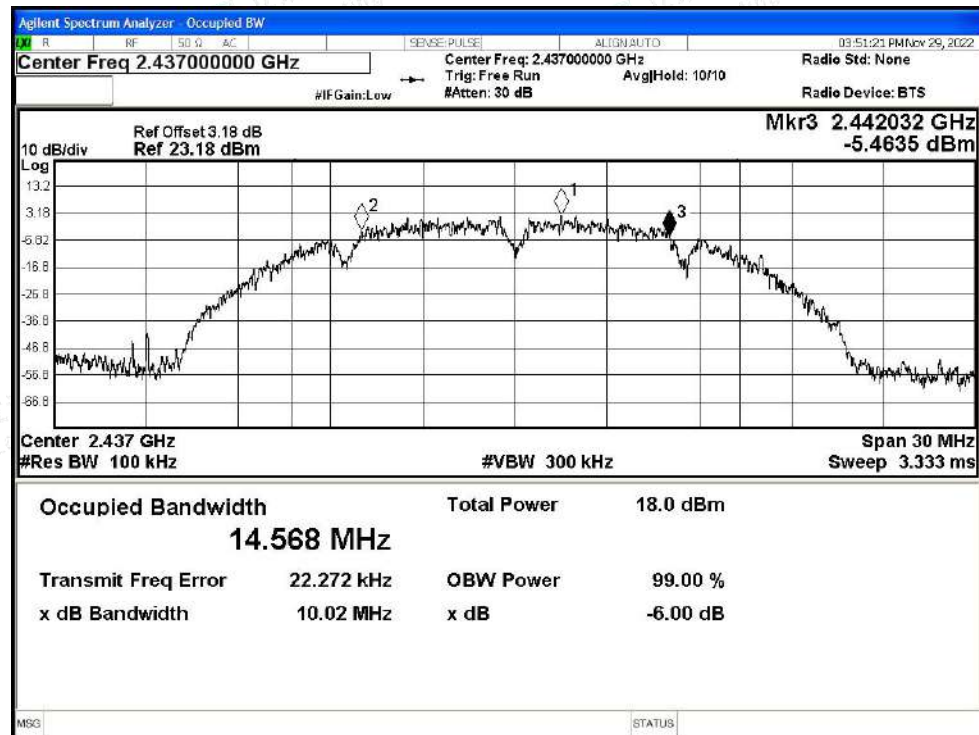


Test Graphs

-6dB Bandwidth NVNT b 2412MHz Ant1

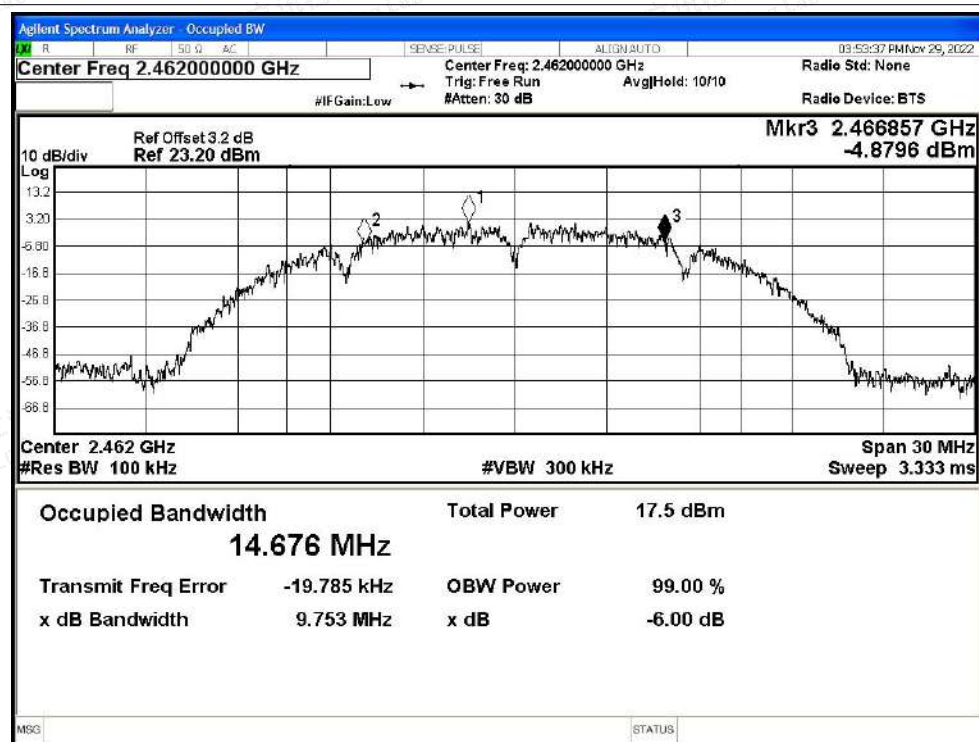


-6dB Bandwidth NVNT b 2437MHz Ant1

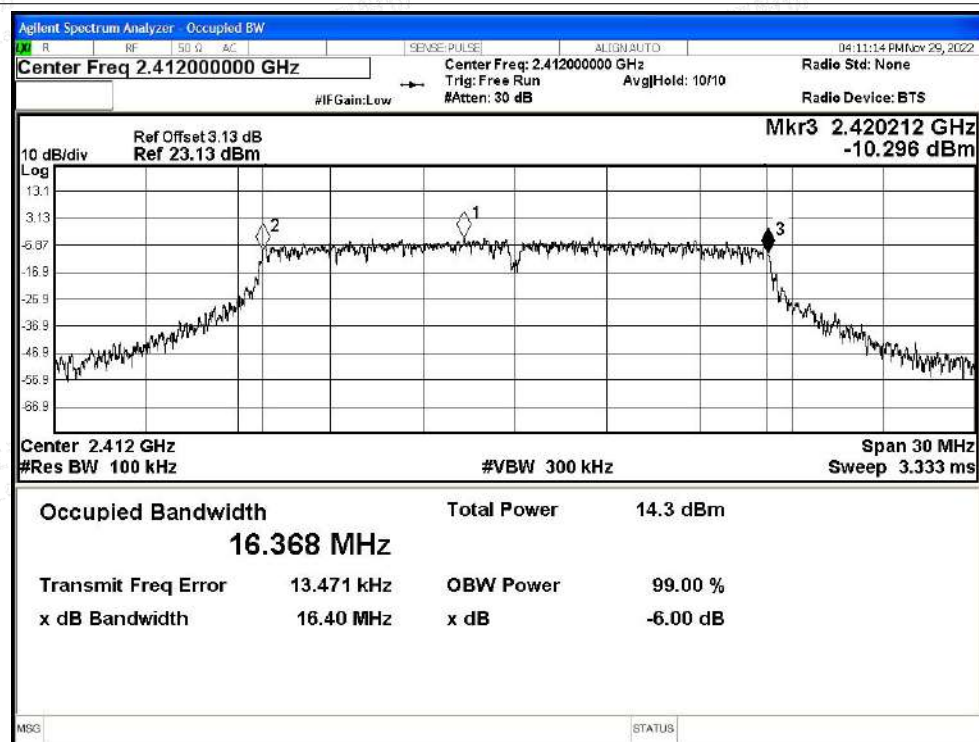




-6dB Bandwidth NVNT b 2462MHz Ant1

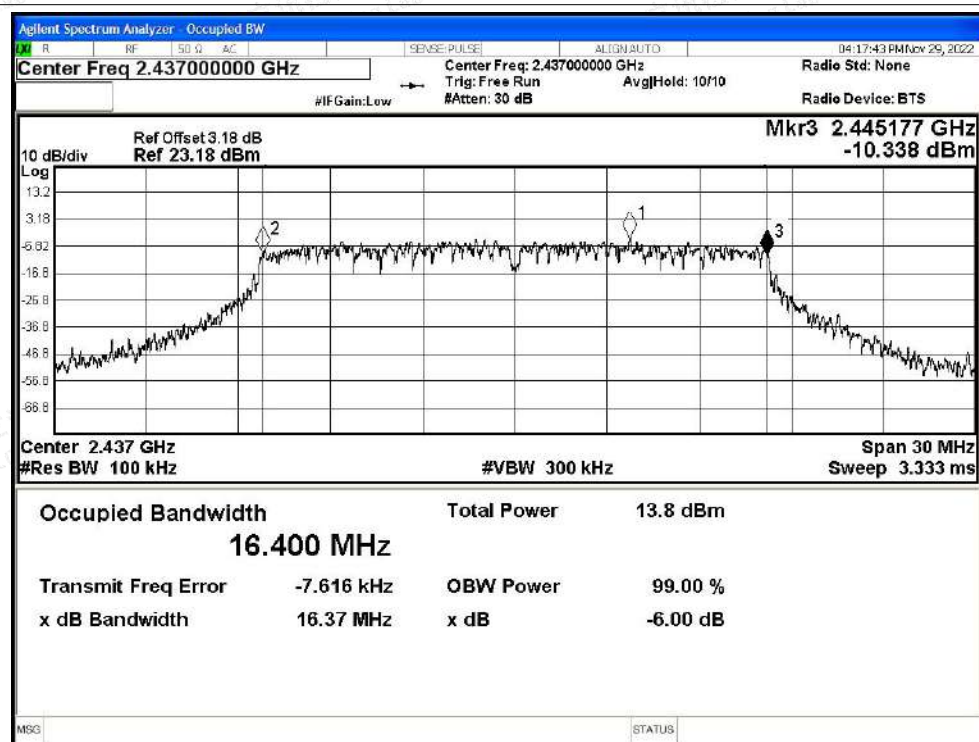


-6dB Bandwidth NVNT g 2412MHz Ant1

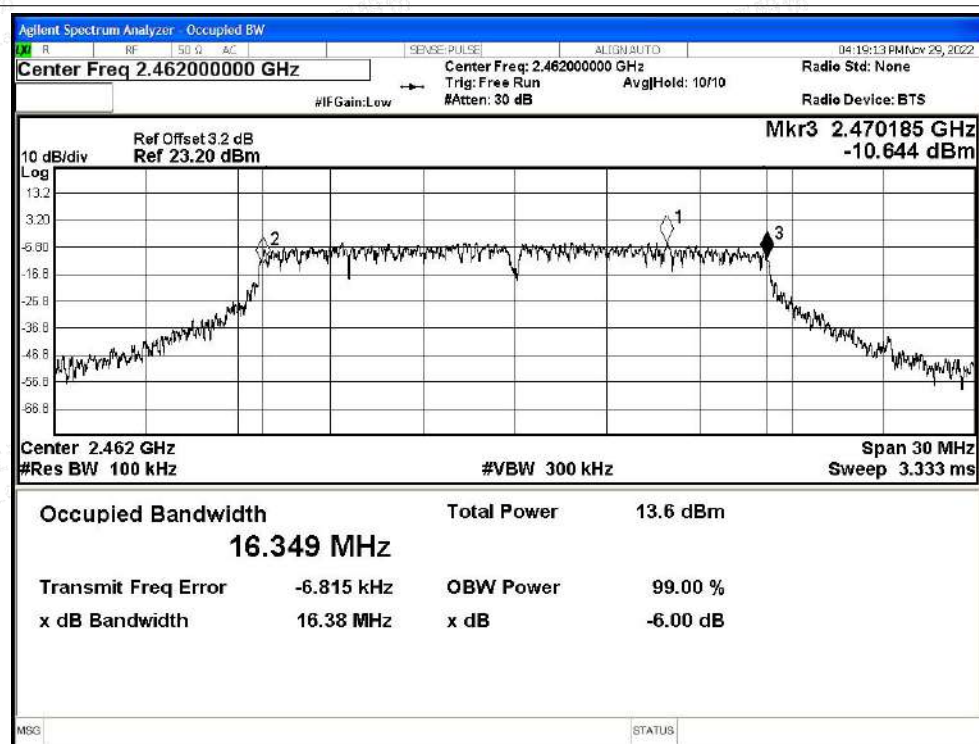




-6dB Bandwidth NVNT g 2437MHz Ant1

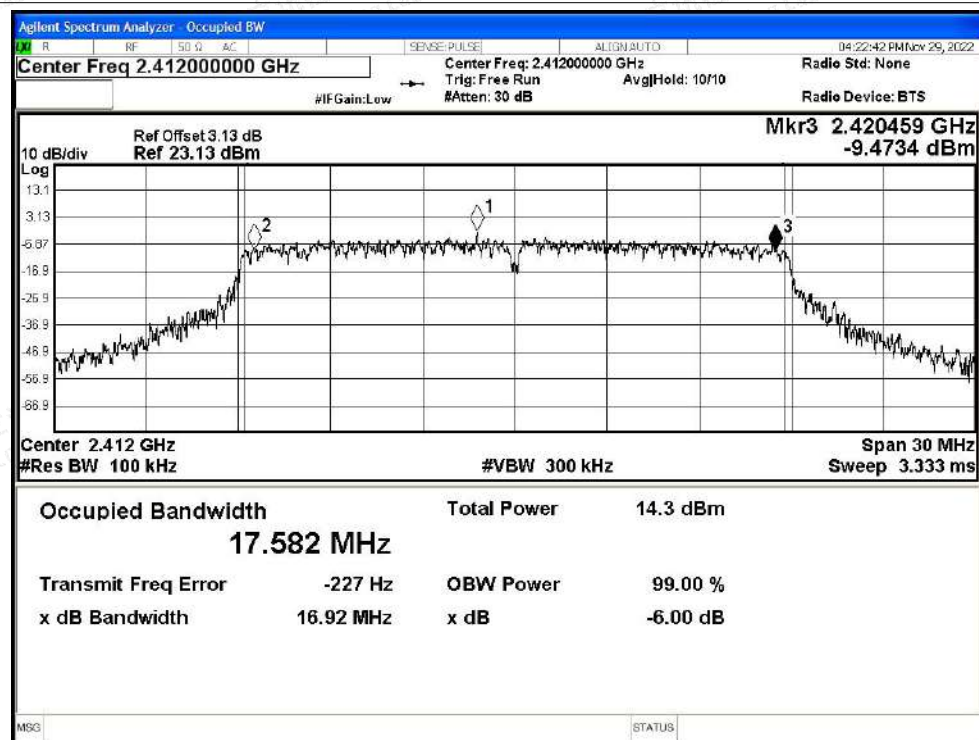


-6dB Bandwidth NVNT g 2462MHz Ant1

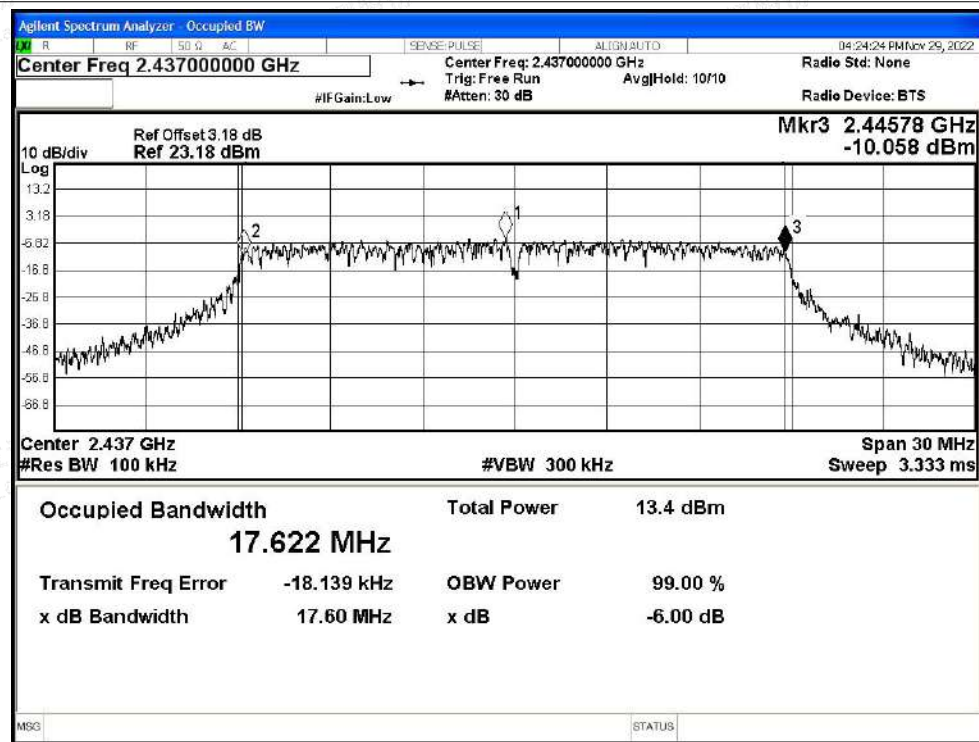




-6dB Bandwidth NVNT n20 2412MHz Ant1

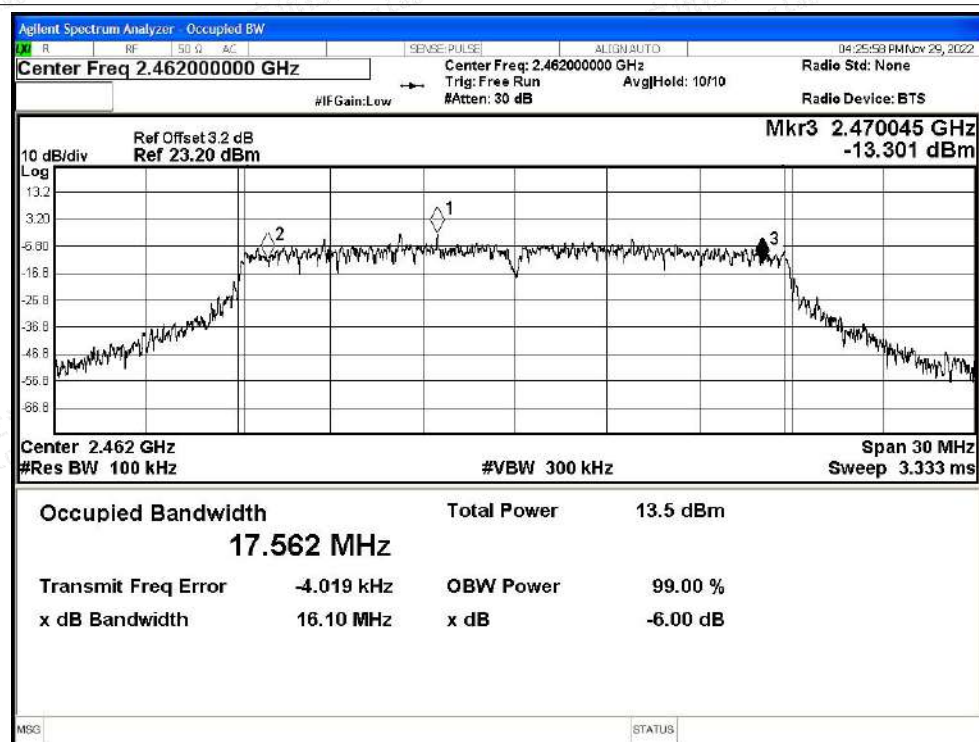


-6dB Bandwidth NVNT n20 2437MHz Ant1

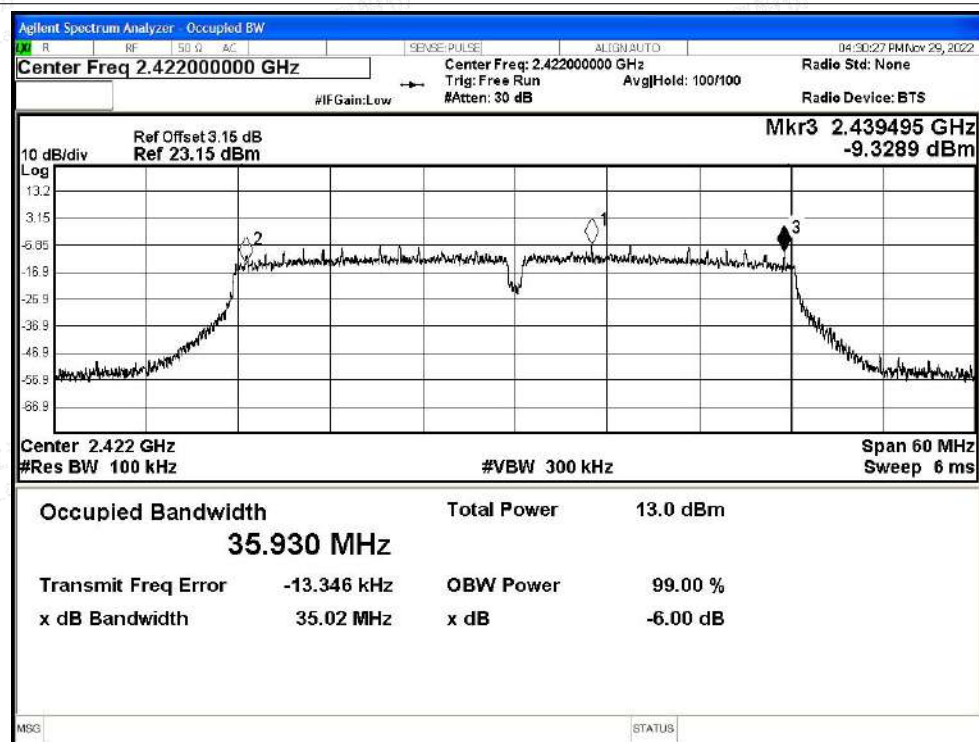




-6dB Bandwidth NVNT n20 2462MHz Ant1

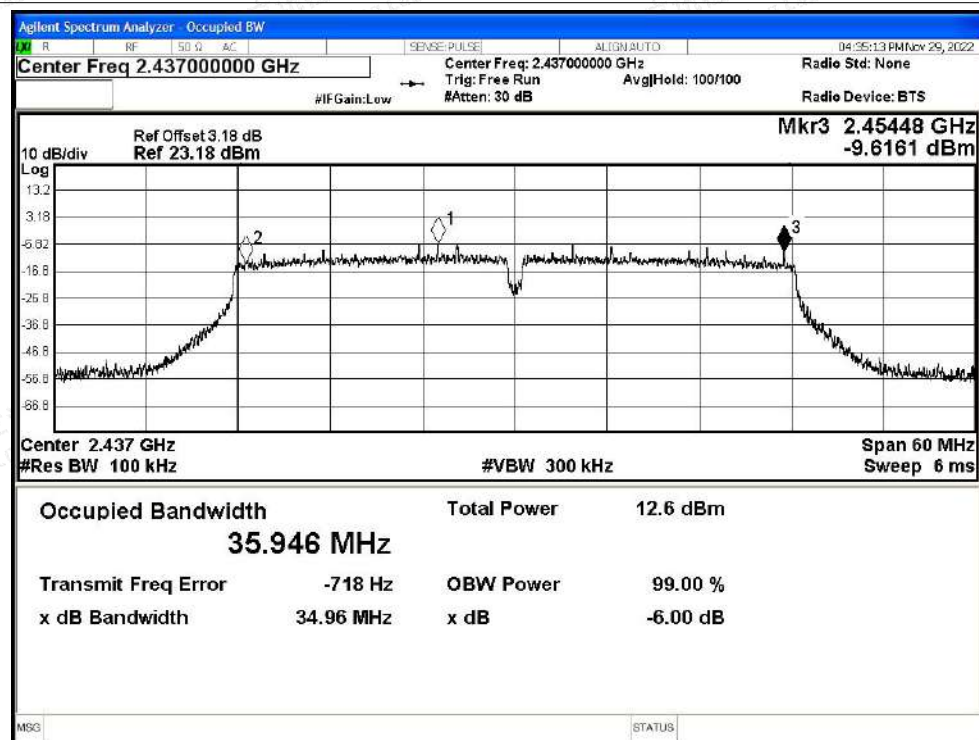


-6dB Bandwidth NVNT n40 2422MHz Ant1

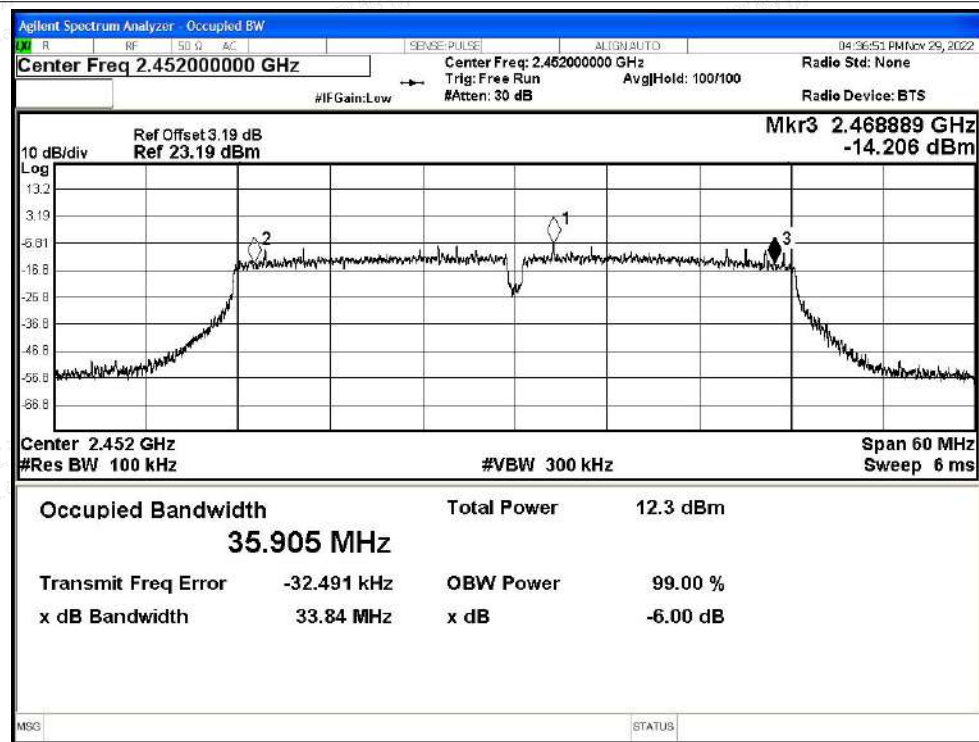




-6dB Bandwidth NVNT n40 2437MHz Ant1



-6dB Bandwidth NVNT n40 2452MHz Ant1





A.2 Maximum Conducted Output Power

Condition	Mode	Frequency (MHz)	Antenna	Total Power (dBm)	Limit (dBm)	Verdict
NVNT	b	2412	Ant0	14.84	30	Pass
NVNT	b	2437	Ant0	15.63	30	Pass
NVNT	b	2462	Ant0	15.5	30	Pass
NVNT	g	2412	Ant0	13.15	30	Pass
NVNT	g	2437	Ant0	12.8	30	Pass
NVNT	g	2462	Ant0	12.87	30	Pass
NVNT	n20	2412	Ant0	13.12	30	Pass
NVNT	n20	2437	Ant0	12.88	30	Pass
NVNT	n20	2462	Ant0	12.48	30	Pass
NVNT	n40	2422	Ant0	12.07	30	Pass
NVNT	n40	2437	Ant0	11.59	30	Pass
NVNT	n40	2452	Ant0	11.55	30	Pass

Condition	Mode	Frequency (MHz)	Antenna	Total Power (dBm)	Limit (dBm)	Verdict
NVNT	b	2412	Ant1	14.68	30	Pass
NVNT	b	2437	Ant1	14.47	30	Pass
NVNT	b	2462	Ant1	14.17	30	Pass
NVNT	g	2412	Ant1	12.88	30	Pass
NVNT	g	2437	Ant1	12.65	30	Pass
NVNT	g	2462	Ant1	12.46	30	Pass
NVNT	n20	2412	Ant1	13.06	30	Pass
NVNT	n20	2437	Ant1	12.64	30	Pass
NVNT	n20	2462	Ant1	12.31	30	Pass
NVNT	n40	2422	Ant1	11.6	30	Pass
NVNT	n40	2437	Ant1	11.2	30	Pass
NVNT	n40	2452	Ant1	10.97	30	Pass

MIMO

Condition	Mode	Frequency (MHz)	Total Power (dBm)			Limit (dBm)	Verdict
			Ant0	Ant1	Ant0+Ant1		
NVNT	n20	2412	13.12	13.06	16.10	30	Pass
NVNT	n20	2437	12.88	12.64	15.77	30	Pass
NVNT	n20	2462	12.48	12.31	15.41	30	Pass
NVNT	n40	2422	12.07	11.6	14.85	30	Pass
NVNT	n40	2437	11.59	11.2	14.41	30	Pass
NVNT	n40	2452	11.55	10.97	14.28	30	Pass



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A.3 Maximum Power Spectral Density Level

Condition	Mode	Frequency (MHz)	Antenna	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
NVNT	b	2412	Ant0	-9.06	8	Pass
NVNT	b	2437	Ant0	-9.39	8	Pass
NVNT	b	2462	Ant0	-8.43	8	Pass
NVNT	g	2412	Ant0	-14.86	8	Pass
NVNT	g	2437	Ant0	-16.13	8	Pass
NVNT	g	2462	Ant0	-14.87	8	Pass
NVNT	n20	2412	Ant0	-15.18	8	Pass
NVNT	n20	2437	Ant0	-15.13	8	Pass
NVNT	n20	2462	Ant0	-16.79	8	Pass
NVNT	n40	2422	Ant0	-20.13	8	Pass
NVNT	n40	2437	Ant0	-21.29	8	Pass
NVNT	n40	2452	Ant0	-21.23	8	Pass

Condition	Mode	Frequency (MHz)	Antenna	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
NVNT	b	2412	Ant1	-9.76	8	Pass
NVNT	b	2437	Ant1	-10.76	8	Pass
NVNT	b	2462	Ant1	-10.42	8	Pass
NVNT	g	2412	Ant1	-15.64	8	Pass
NVNT	g	2437	Ant1	-15.36	8	Pass
NVNT	g	2462	Ant1	-15.53	8	Pass
NVNT	n20	2412	Ant1	-14.44	8	Pass
NVNT	n20	2437	Ant1	-15.2	8	Pass
NVNT	n20	2462	Ant1	-15.76	8	Pass
NVNT	n40	2422	Ant1	-20.03	8	Pass
NVNT	n40	2437	Ant1	-20.96	8	Pass
NVNT	n40	2452	Ant1	-22.3	8	Pass

MIMO

Condition	Mode	Frequency (MHz)	Total PSD (dBm/3kHz)			Limit (dBm/3kHz)	Verdict
			Ant0	Ant1	Ant0+Ant1		
NVNT	n20	2412	-15.18	-14.44	-11.78	7.99	Pass
NVNT	n20	2437	-15.13	-15.2	-12.15	7.99	Pass
NVNT	n20	2462	-16.79	-15.76	-13.23	7.99	Pass
NVNT	n40	2422	-20.13	-20.03	-17.07	7.99	Pass
NVNT	n40	2437	-21.29	-20.96	-18.11	7.99	Pass
NVNT	n40	2452	-21.23	-22.3	-18.72	7.99	Pass

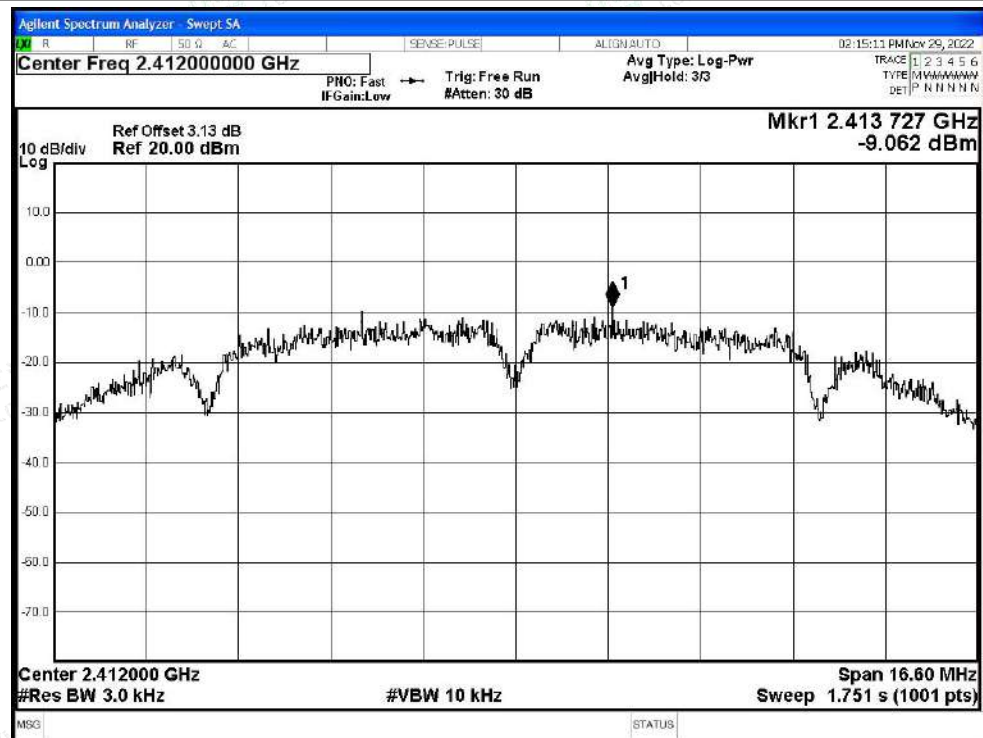


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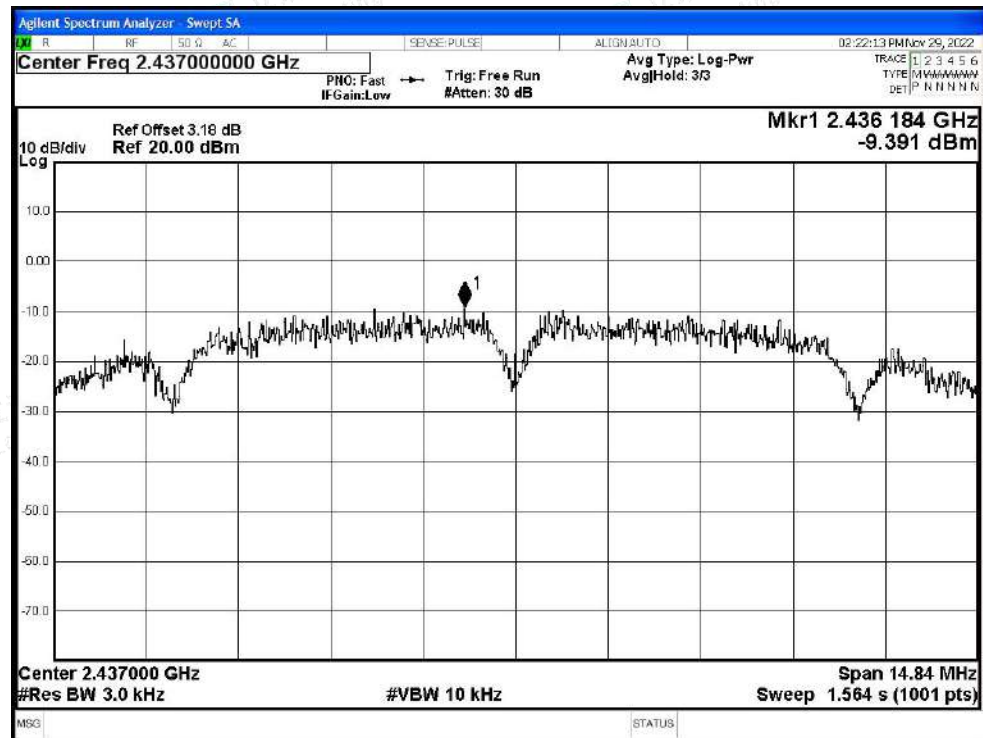


Test Graphs

PSD NVNT b 2412MHz Ant0

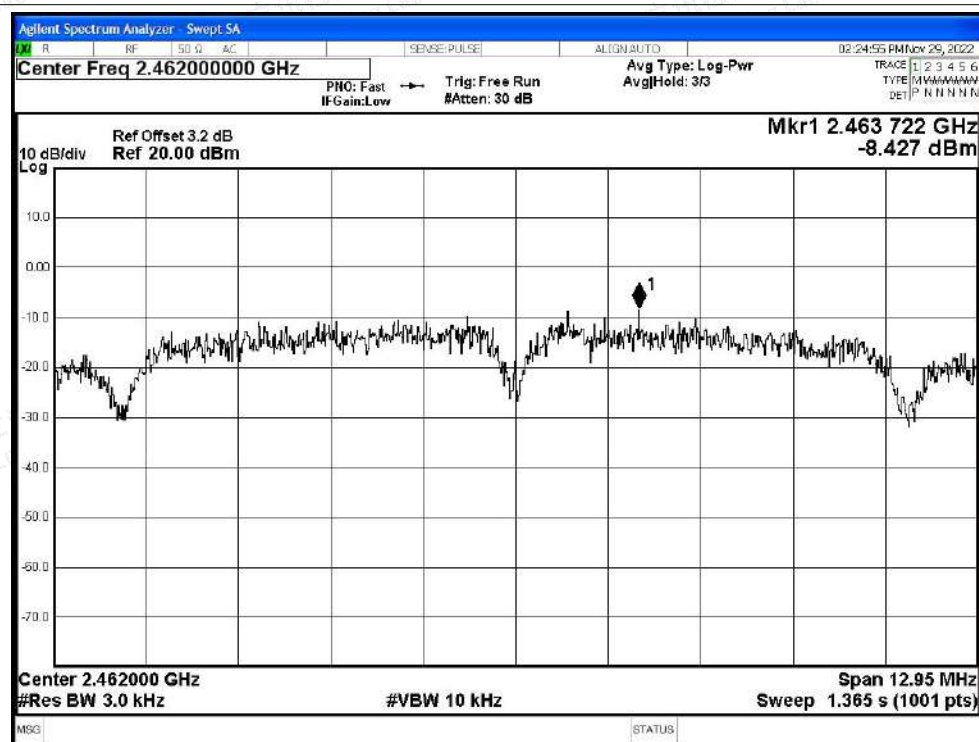


PSD NVNT b 2437MHz Ant0

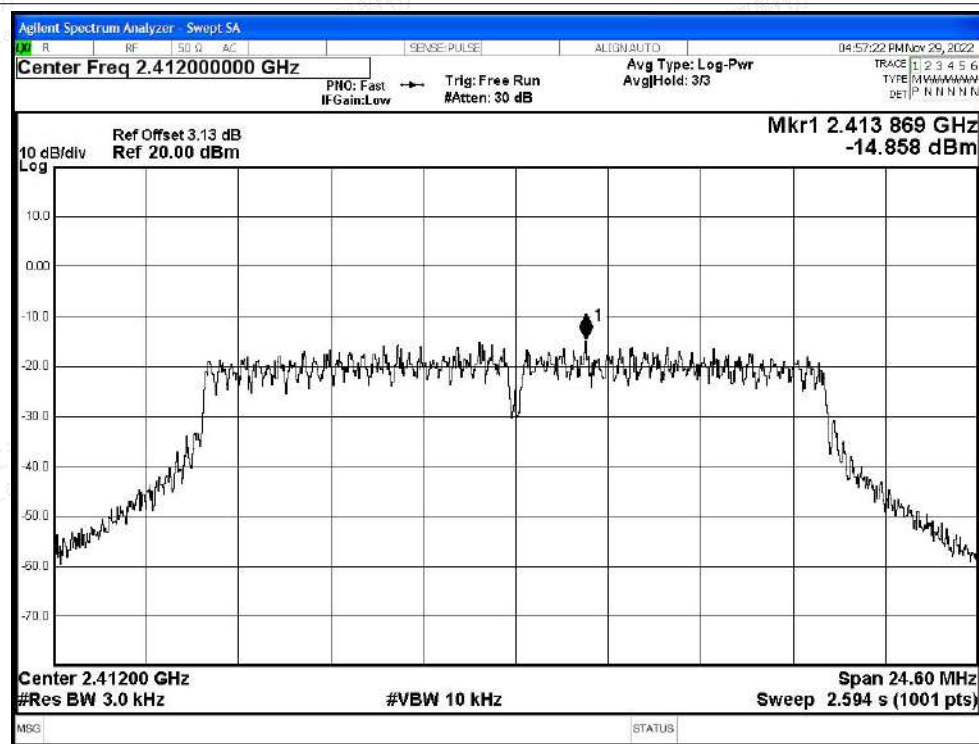




PSD NVNT b 2462MHz Ant0

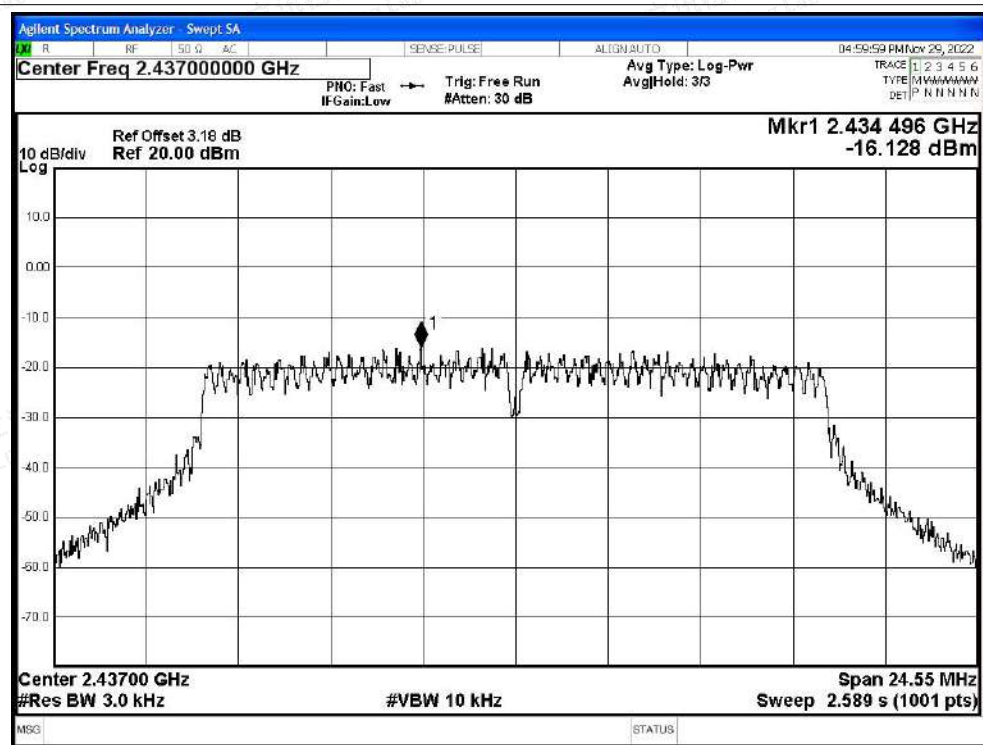


PSD NVNT g 2412MHz Ant0

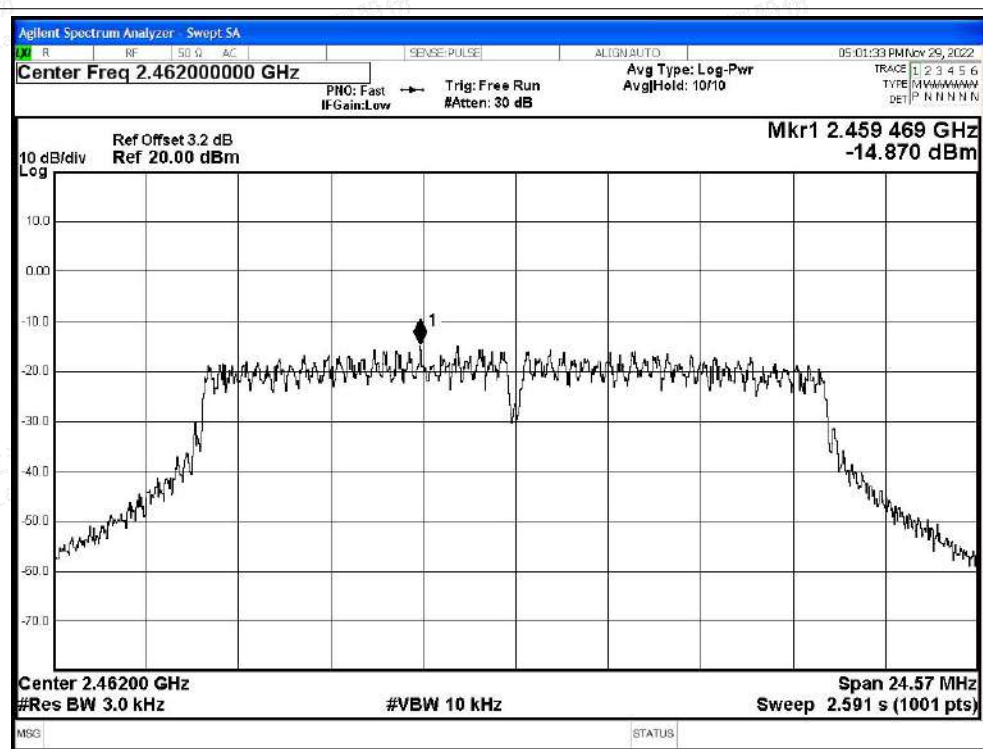


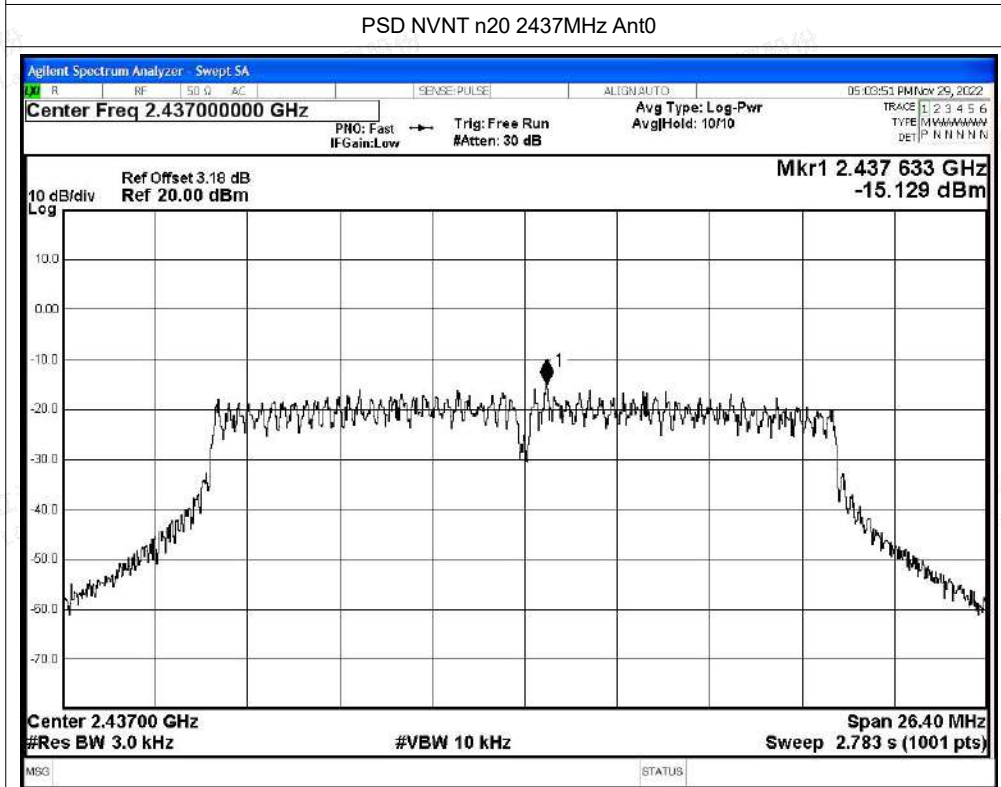
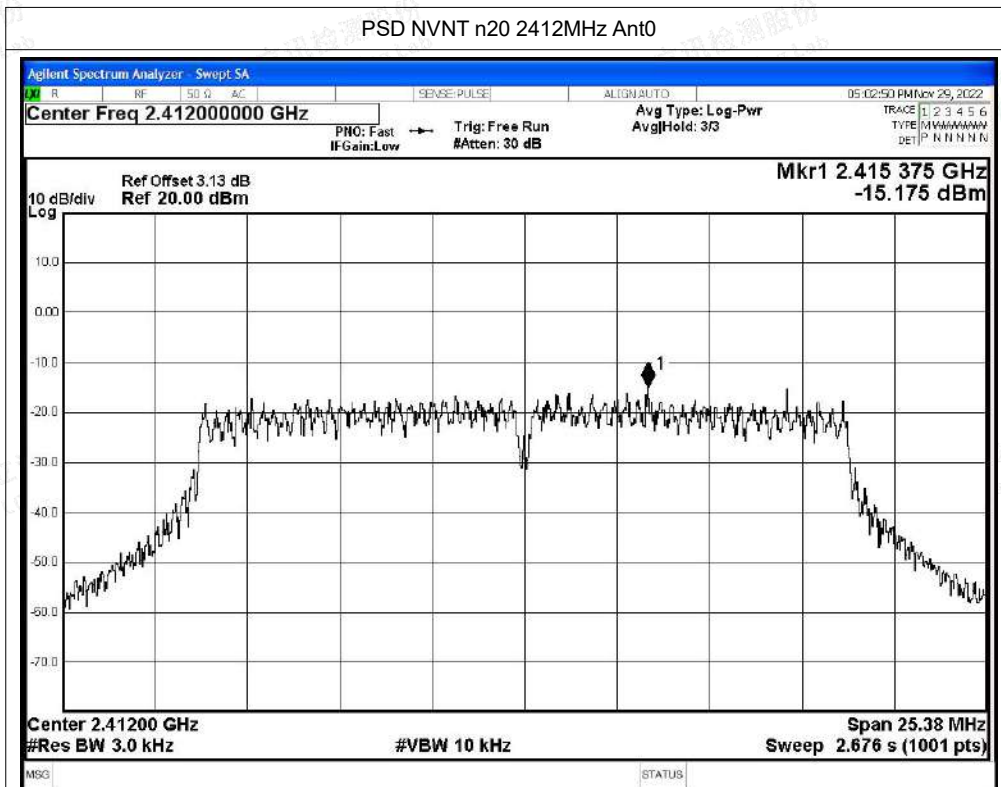


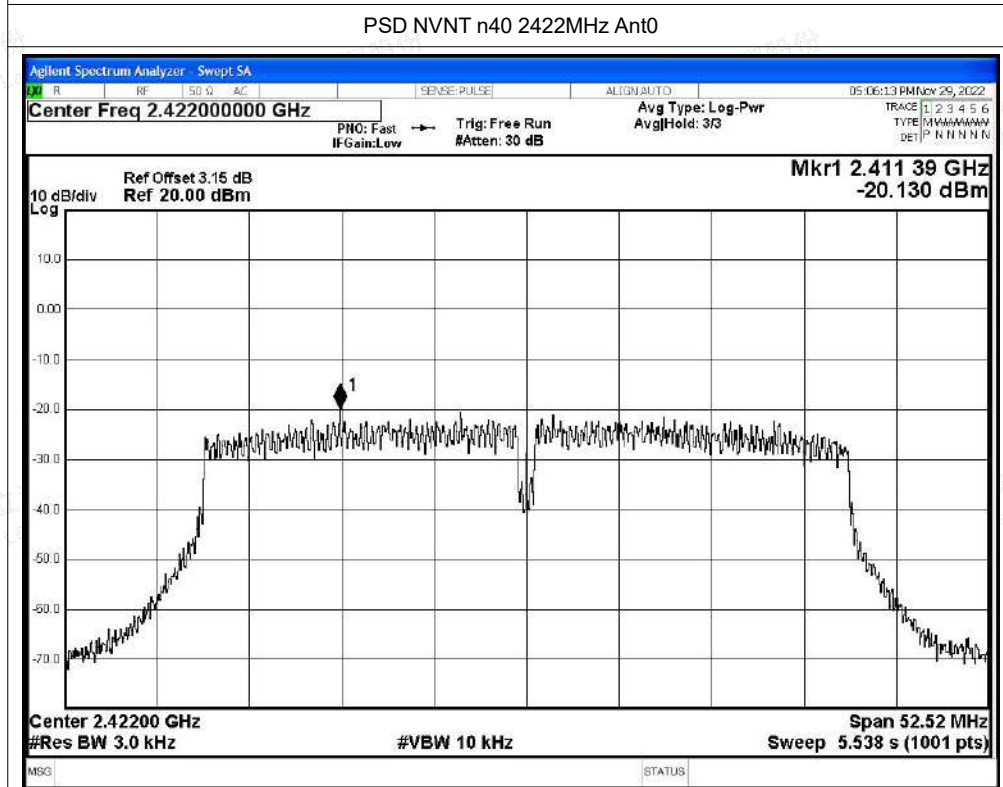
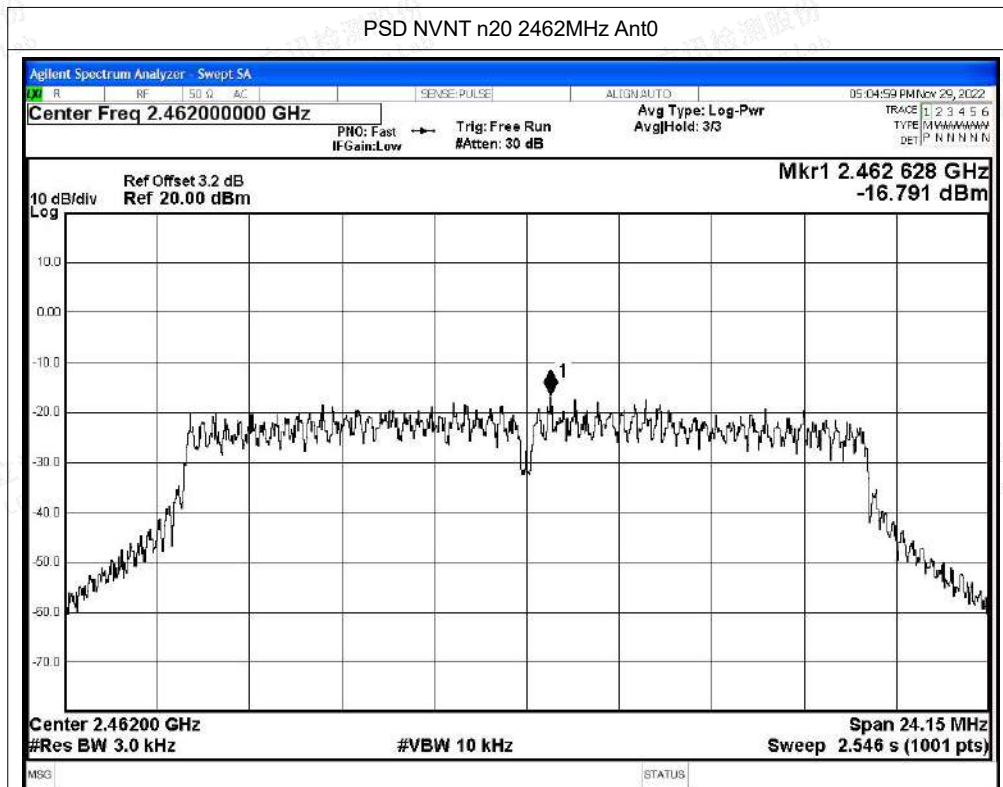
PSD NVNT g 2437MHz Ant0

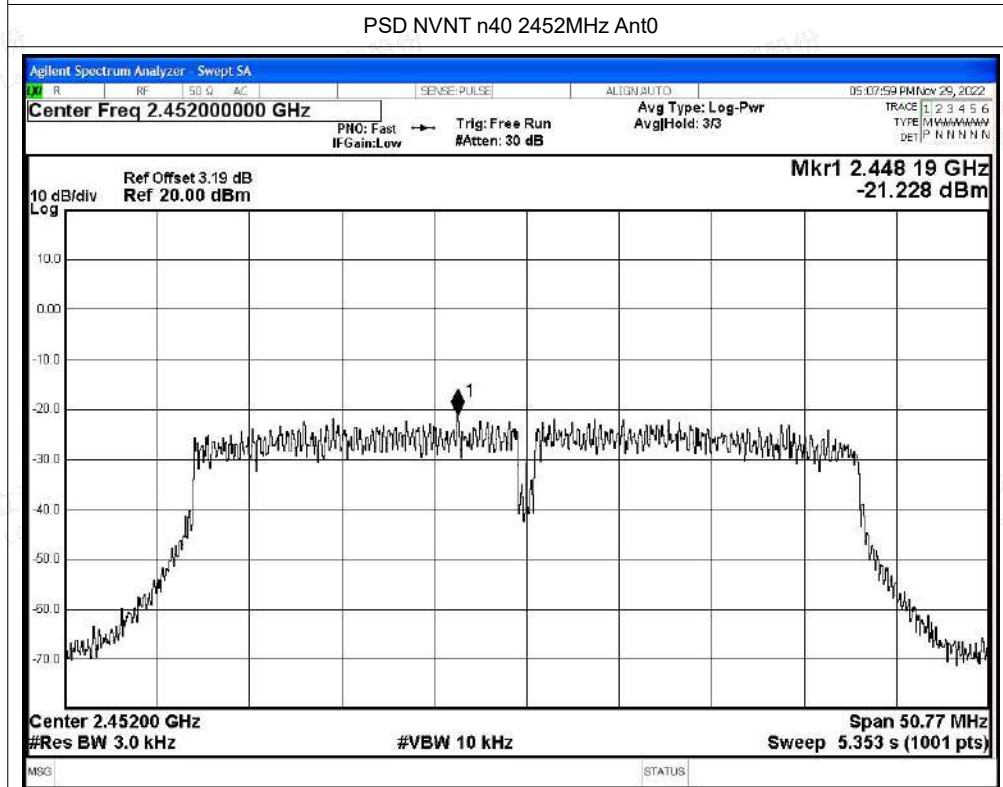
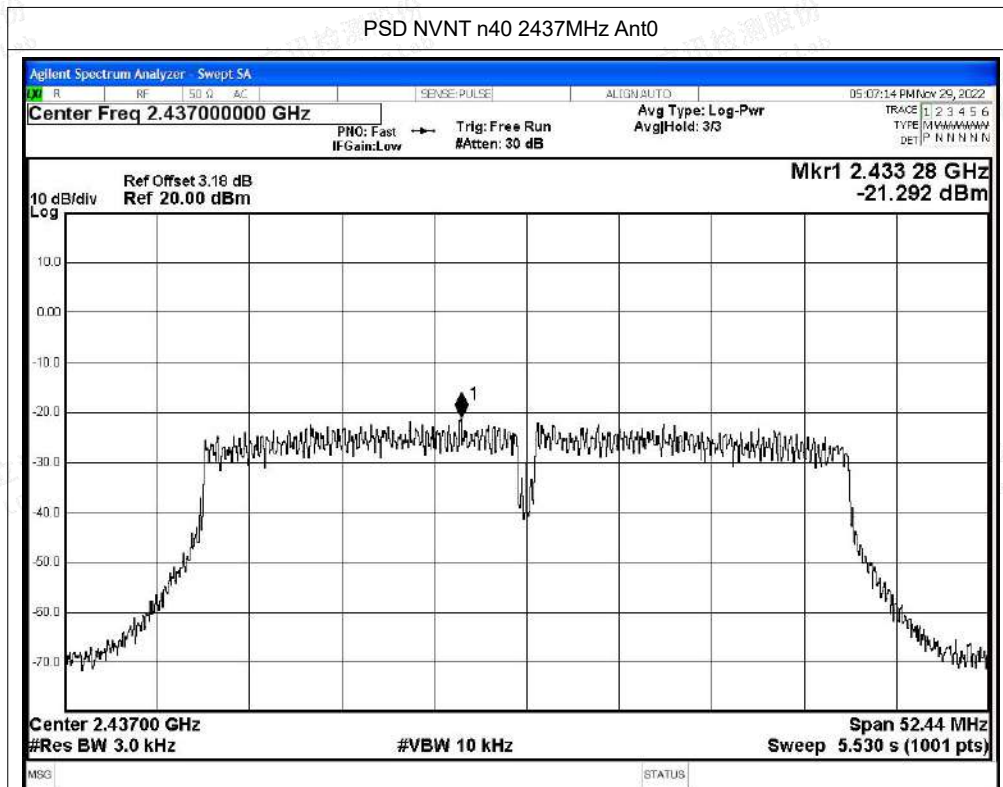


PSD NVNT g 2462MHz Ant0





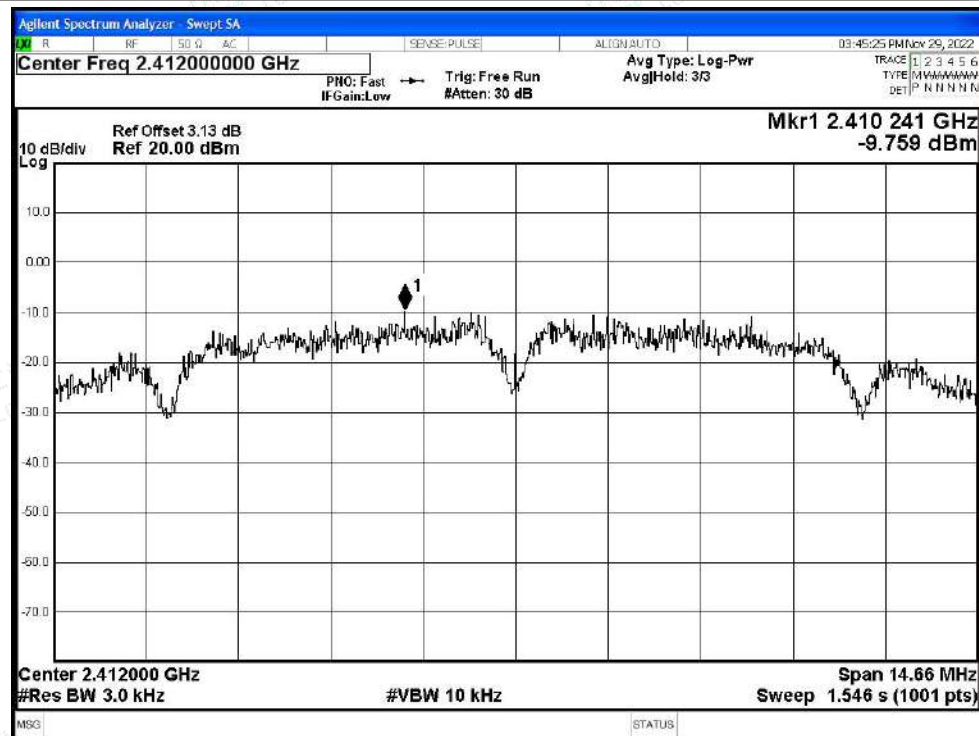




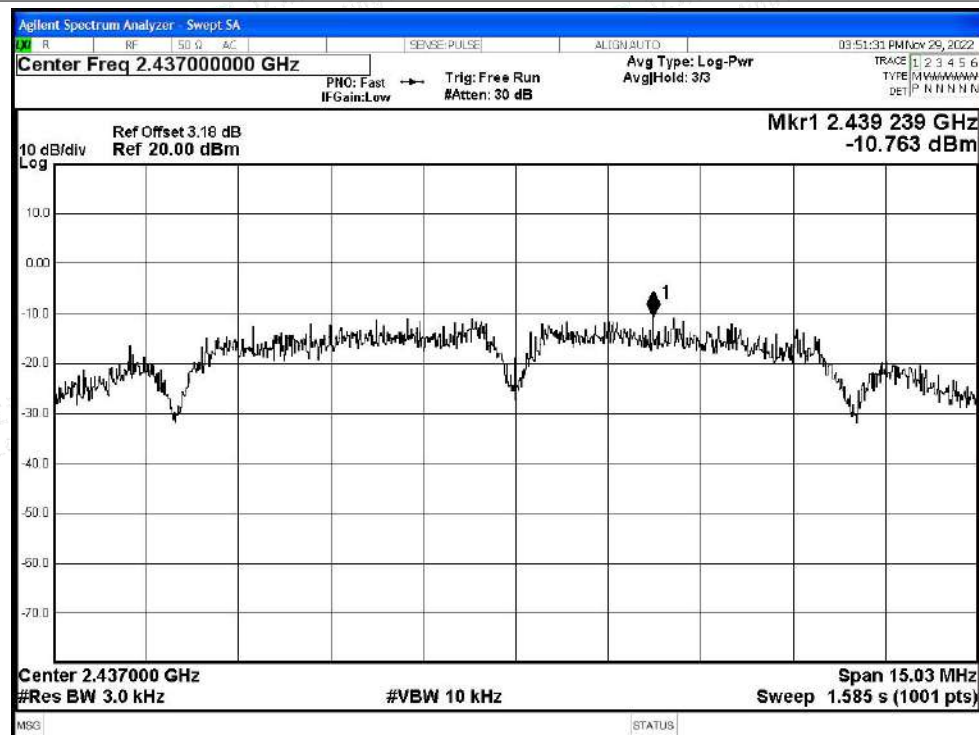


Test Graphs

PSD NVNT b 2412MHz Ant1

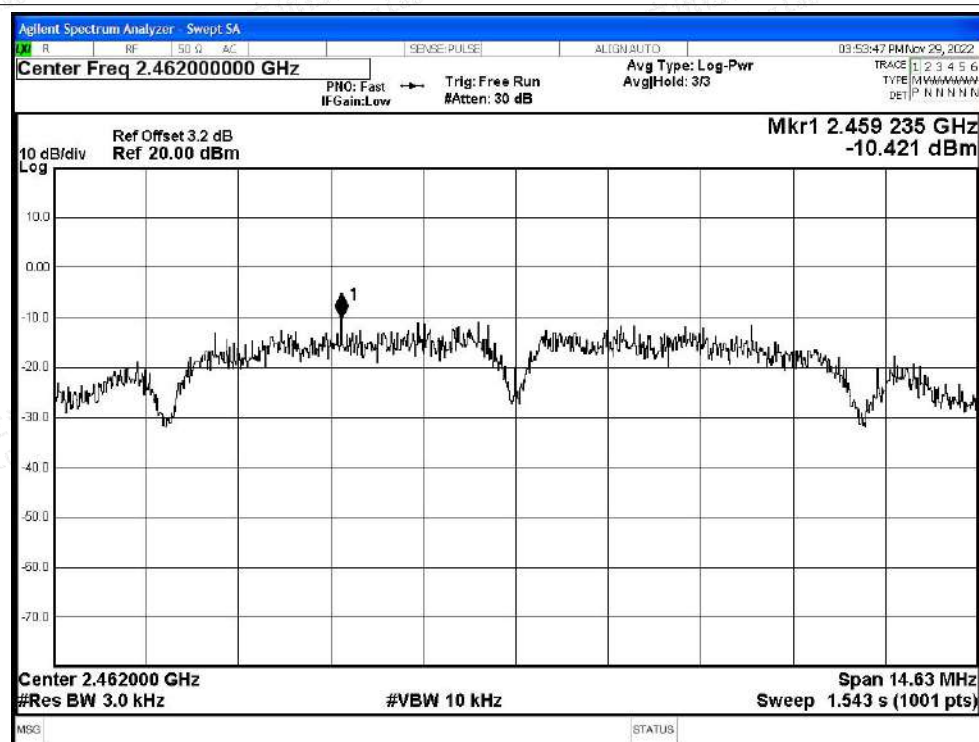


PSD NVNT b 2437MHz Ant1

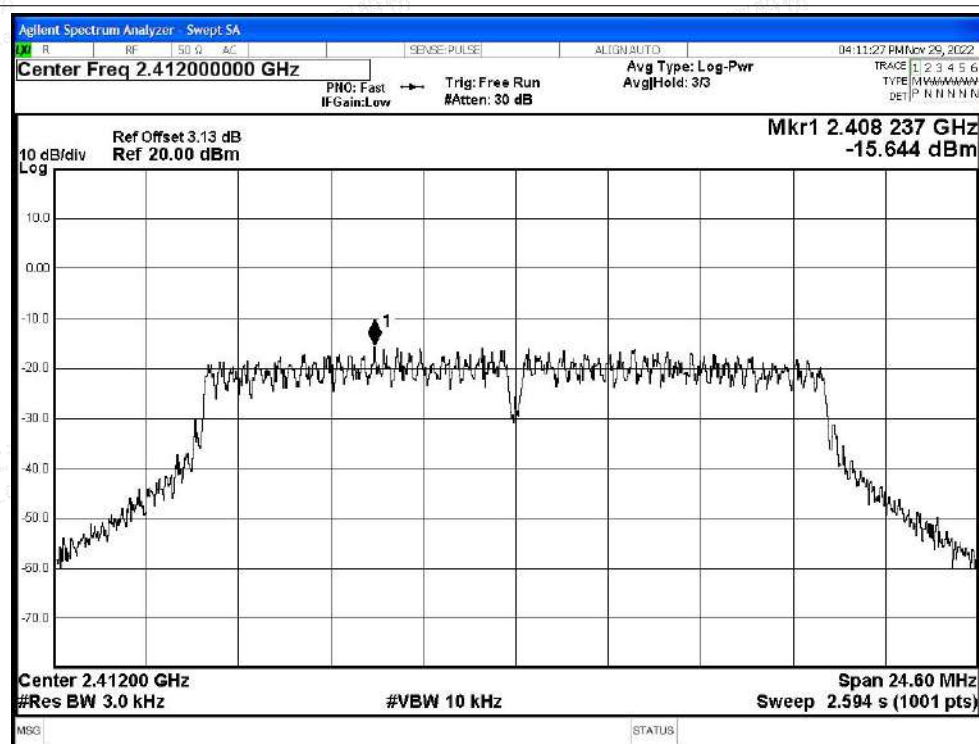




PSD NVNT b 2462MHz Ant1

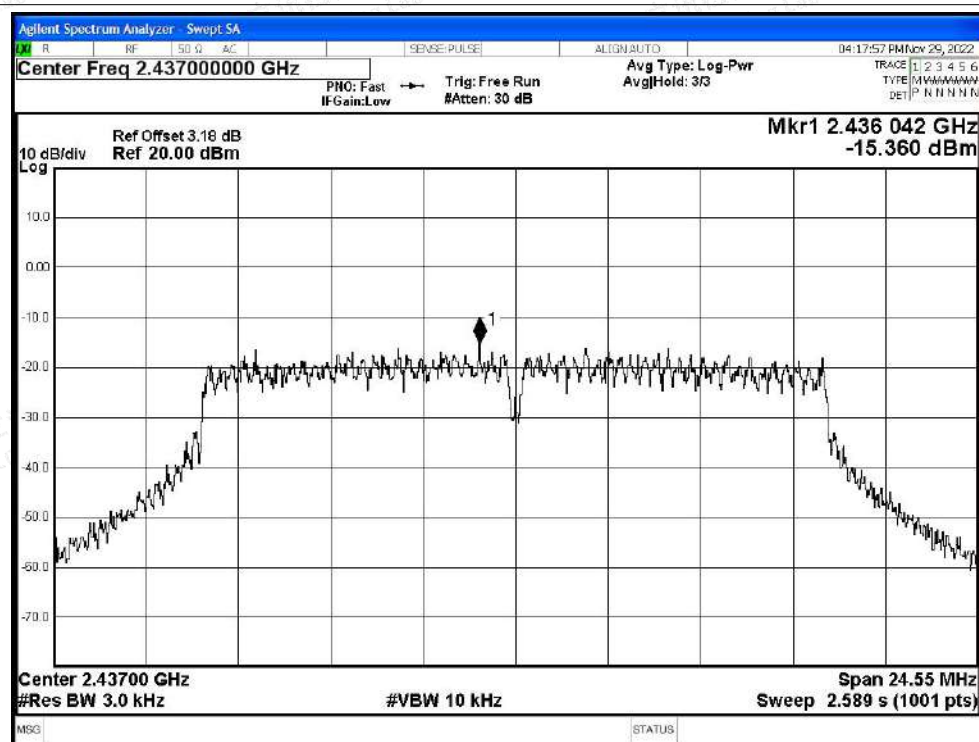


PSD NVNT g 2412MHz Ant1

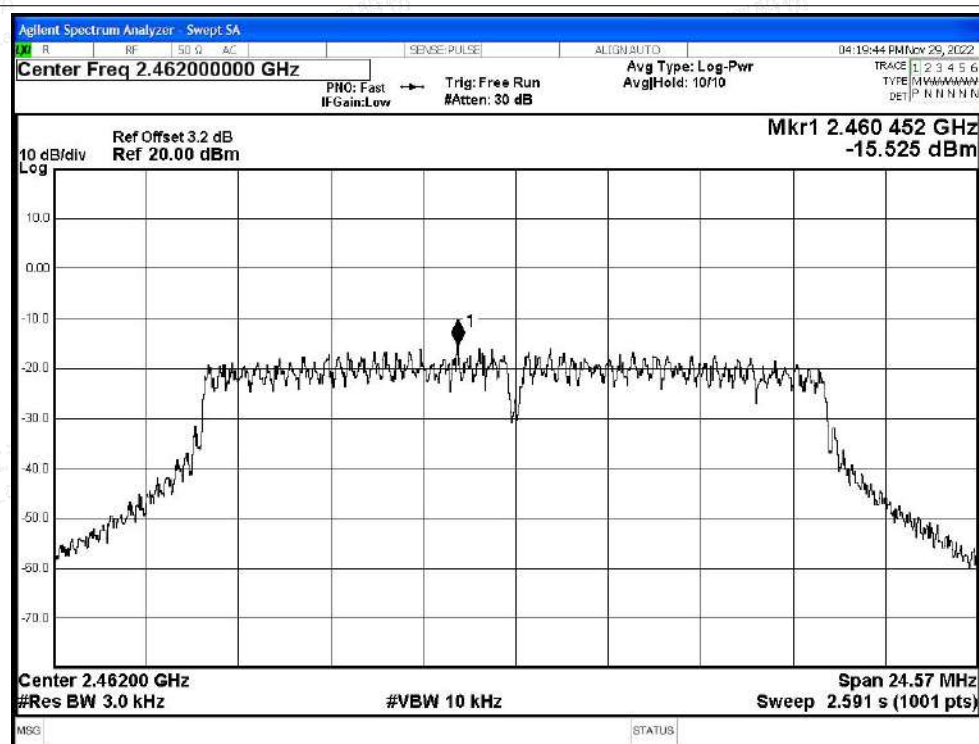


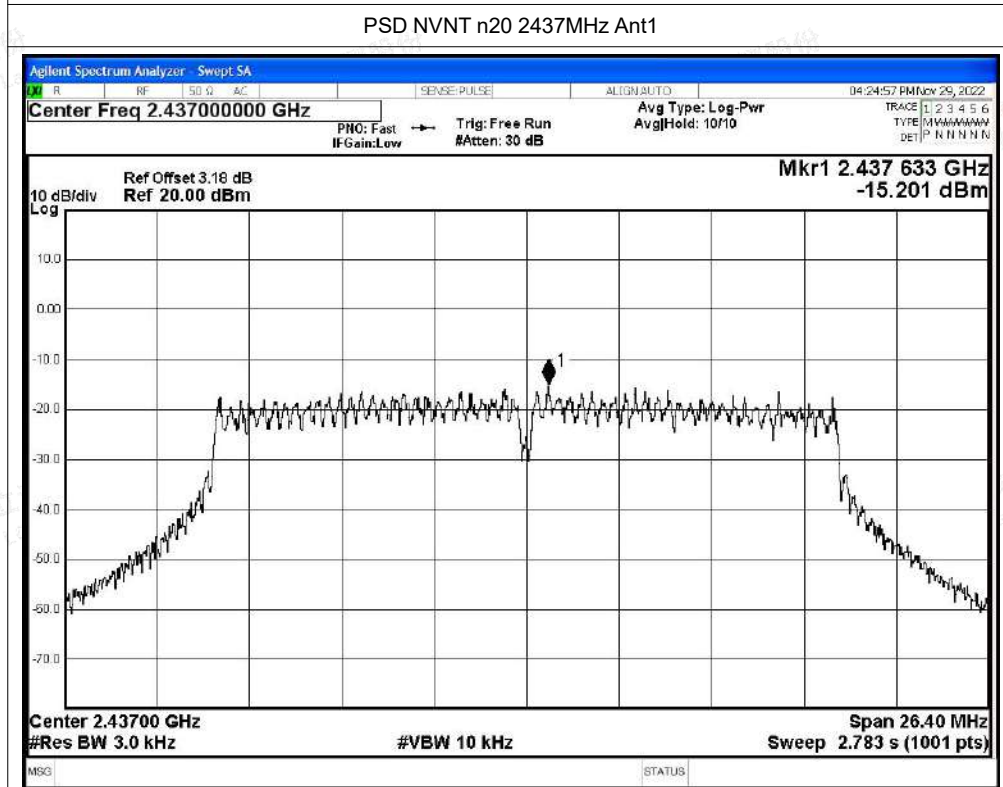
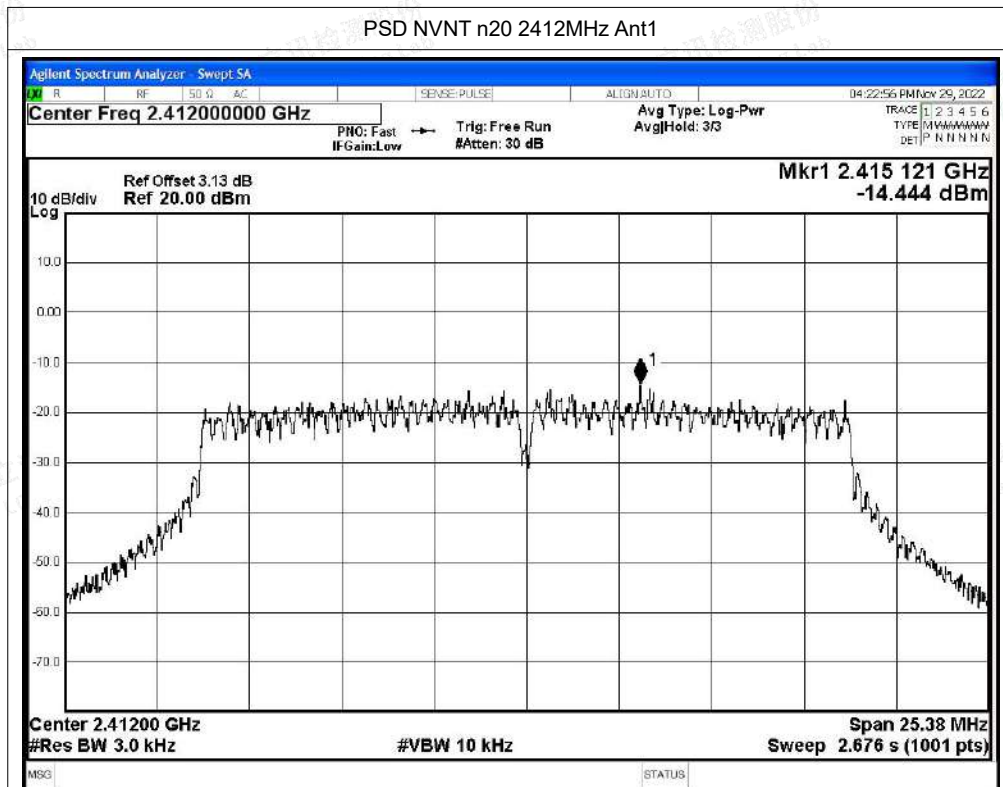


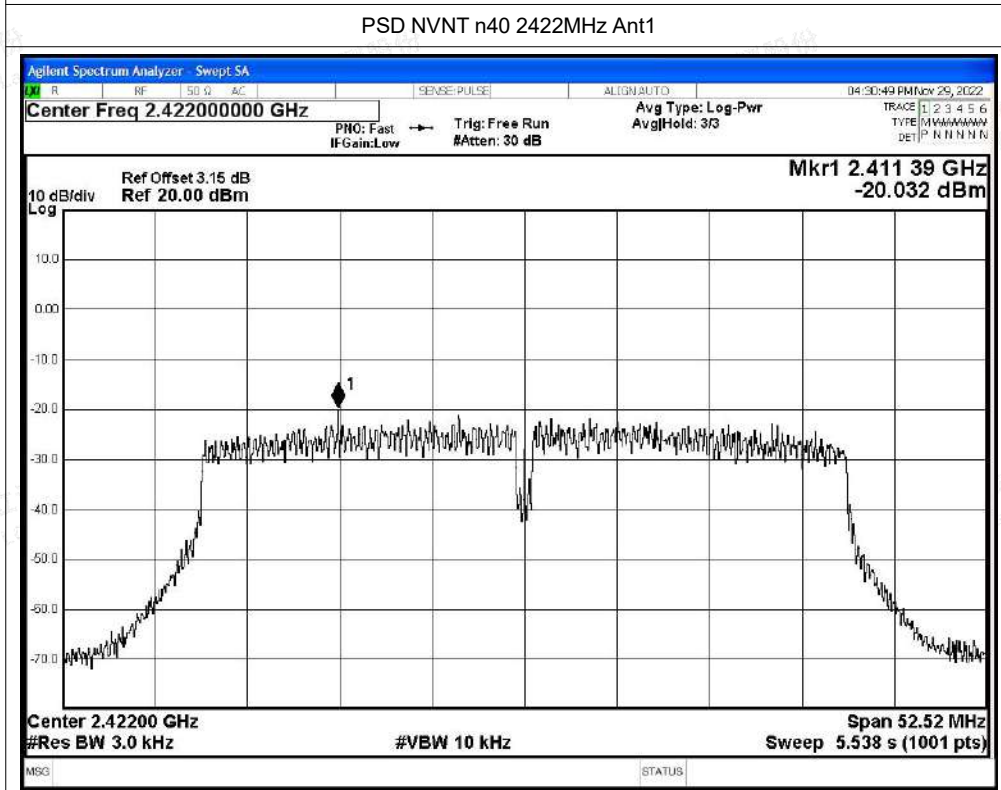
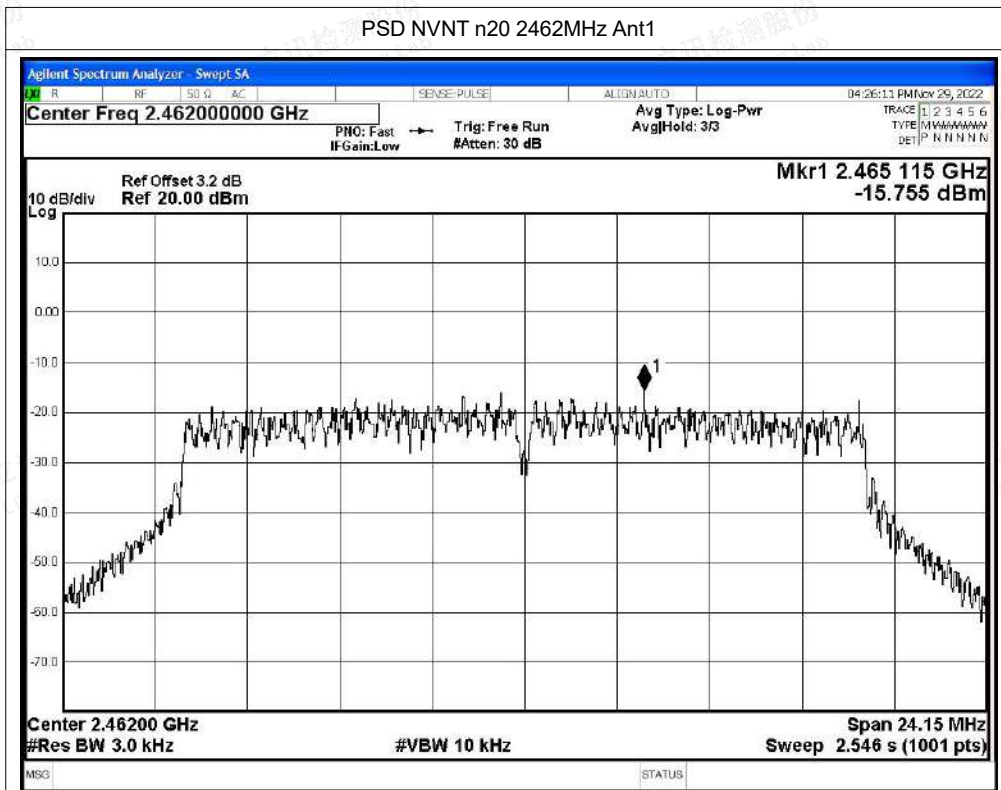
PSD NVNT g 2437MHz Ant1

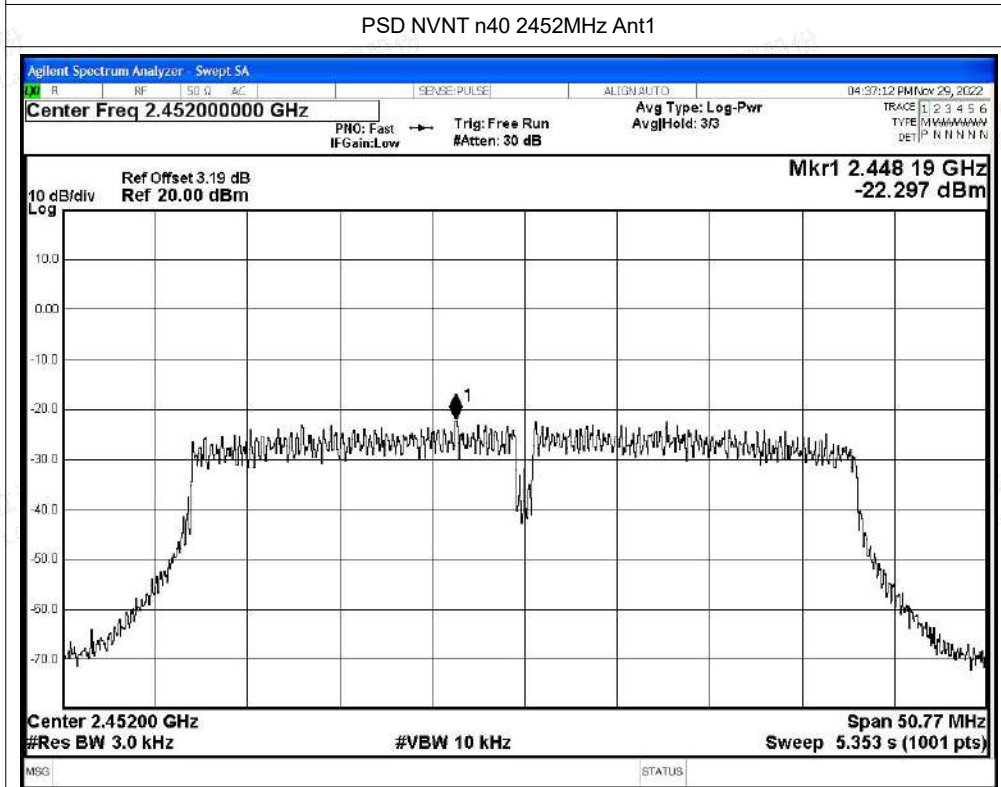
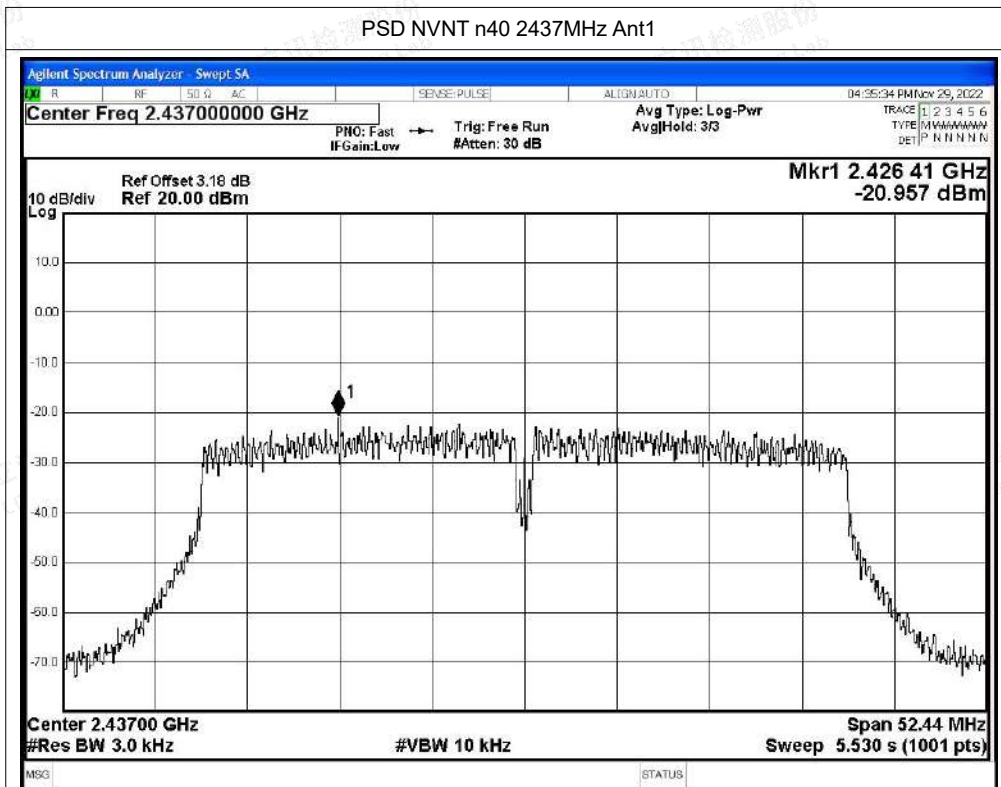


PSD NVNT g 2462MHz Ant1











A.4 Band Edge

Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	b	2412	Ant0	-50.1	-20	Pass
NVNT	b	2462	Ant0	-58.1	-20	Pass
NVNT	g	2412	Ant0	-37.99	-20	Pass
NVNT	g	2462	Ant0	-50.36	-20	Pass
NVNT	n20	2412	Ant0	-37.35	-20	Pass
NVNT	n20	2462	Ant0	-52.82	-20	Pass
NVNT	n40	2422	Ant0	-37.95	-20	Pass
NVNT	n40	2452	Ant0	-42.6	-20	Pass

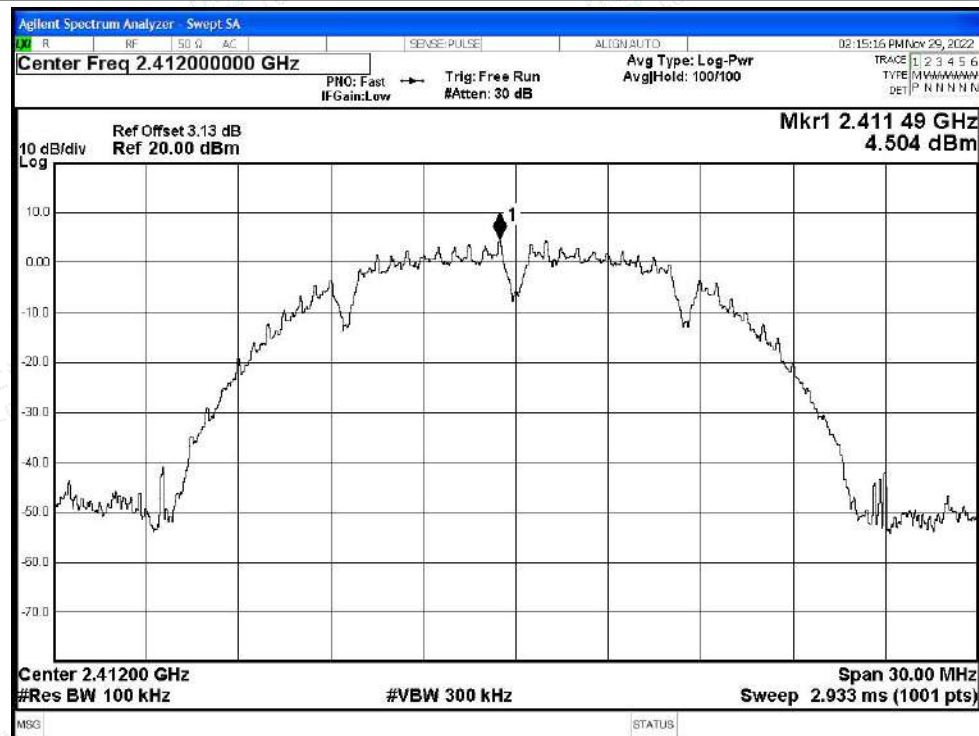


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Scan code to check authenticity

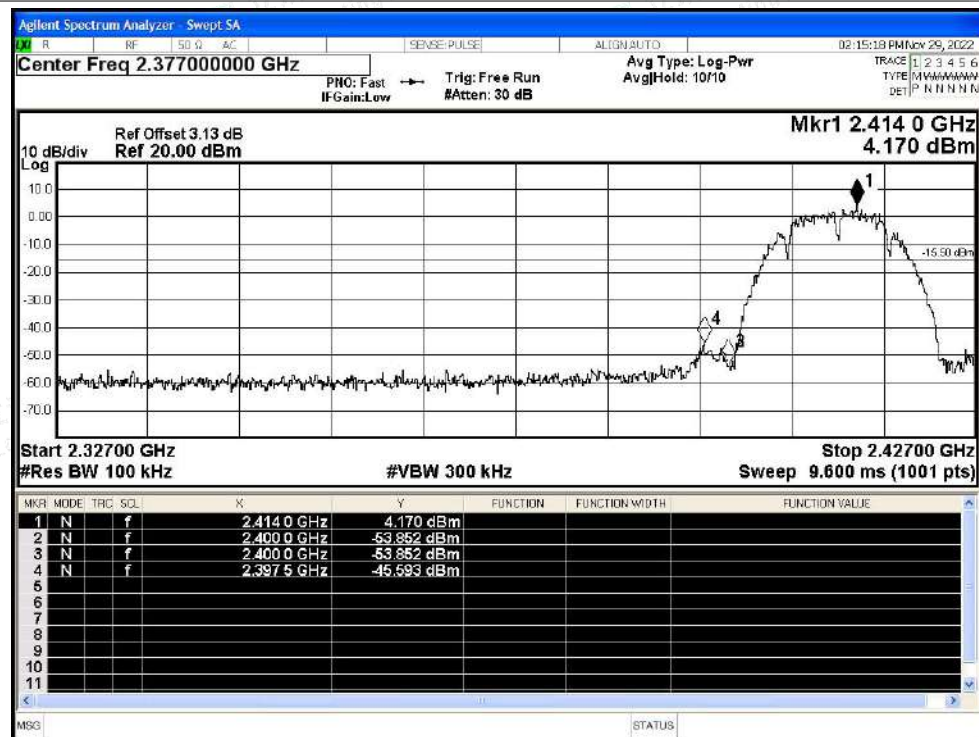


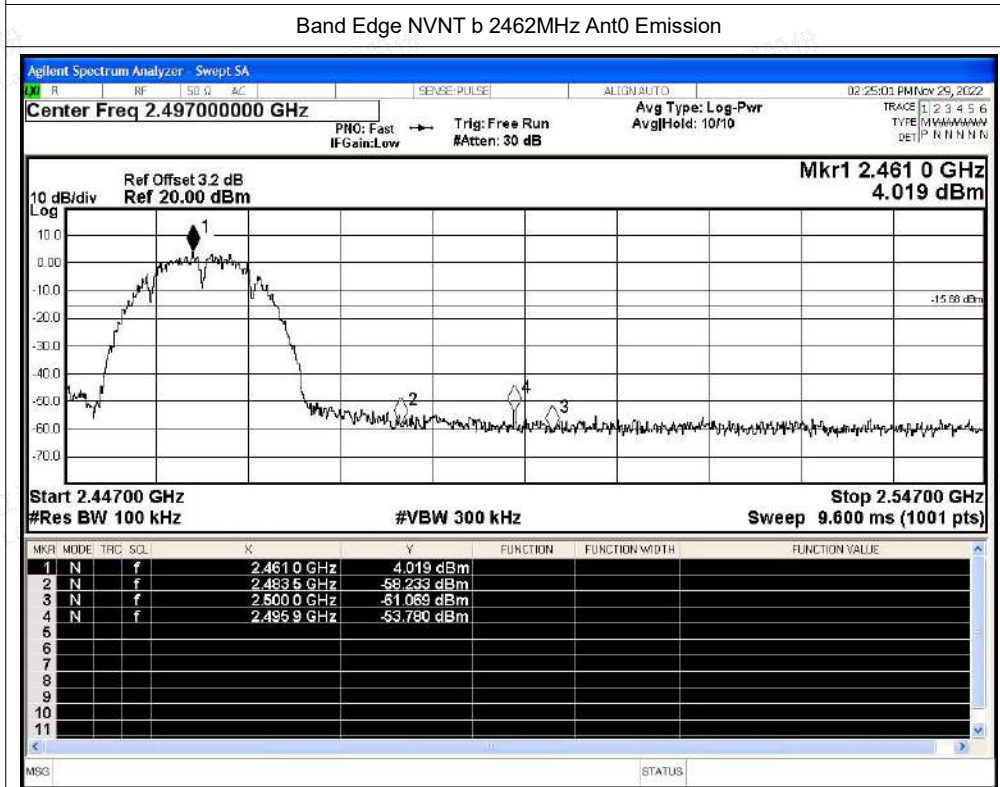
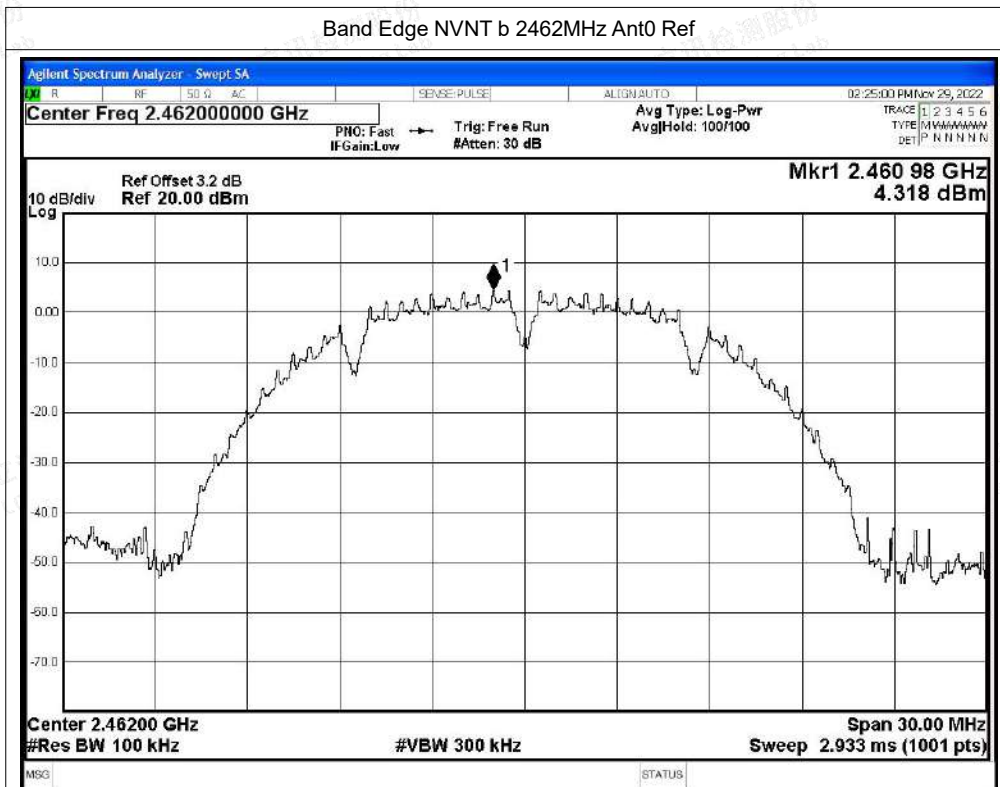
Test Graphs

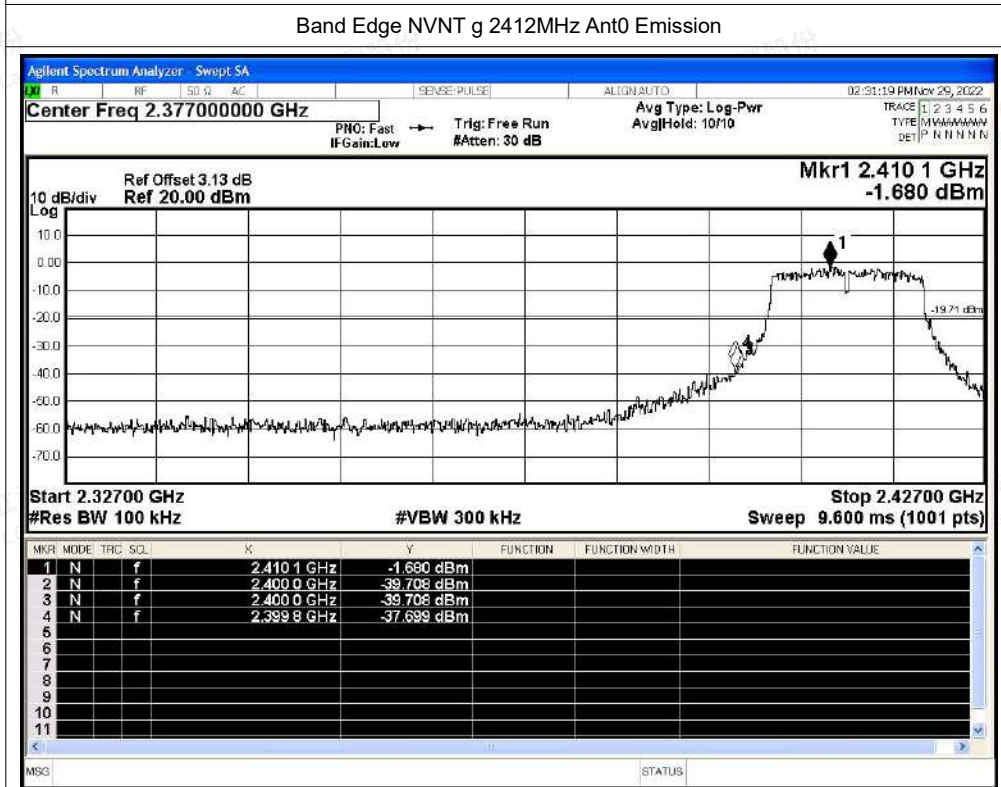
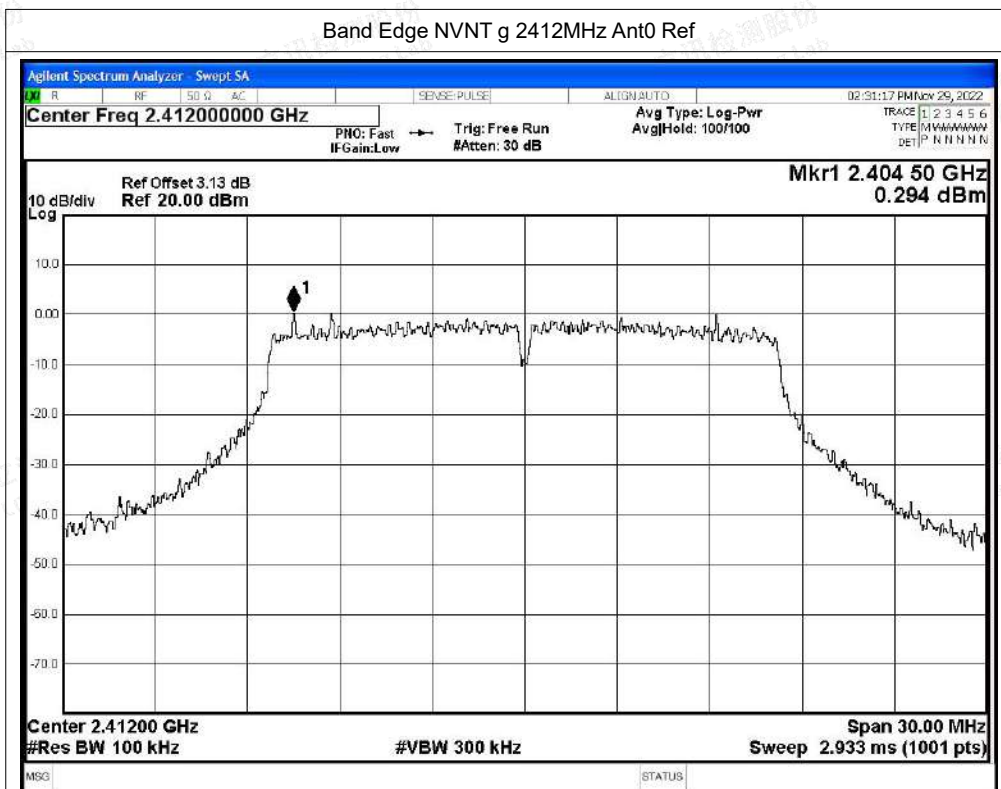
Band Edge NVNT b 2412MHz Ant0 Ref

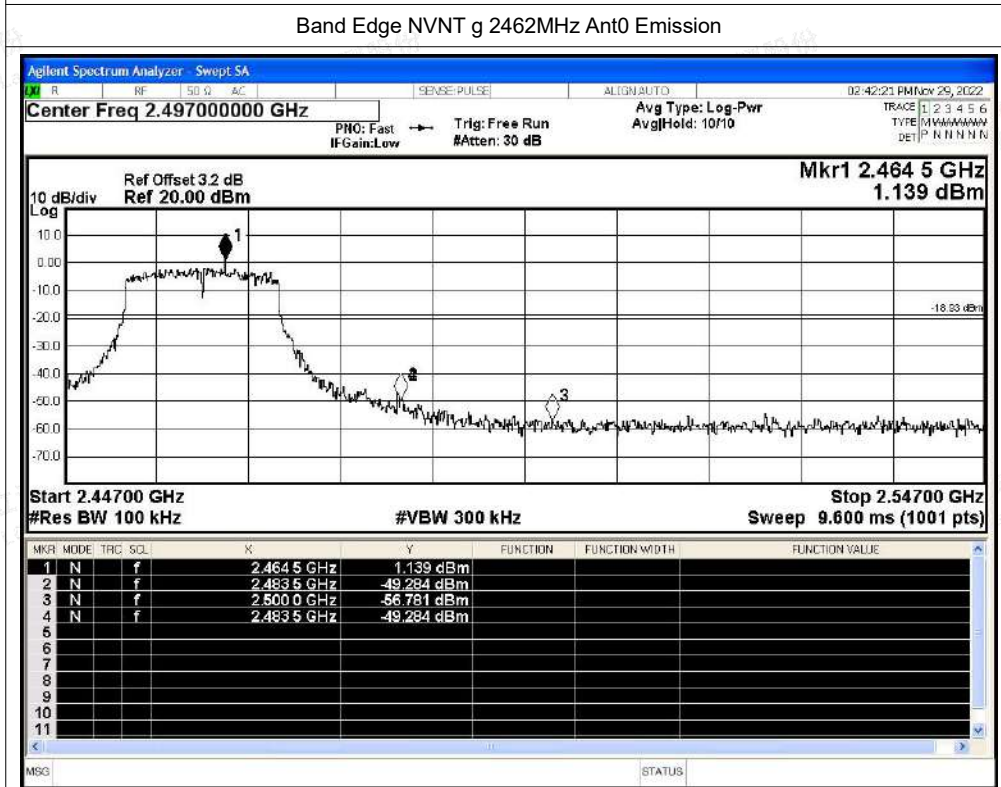
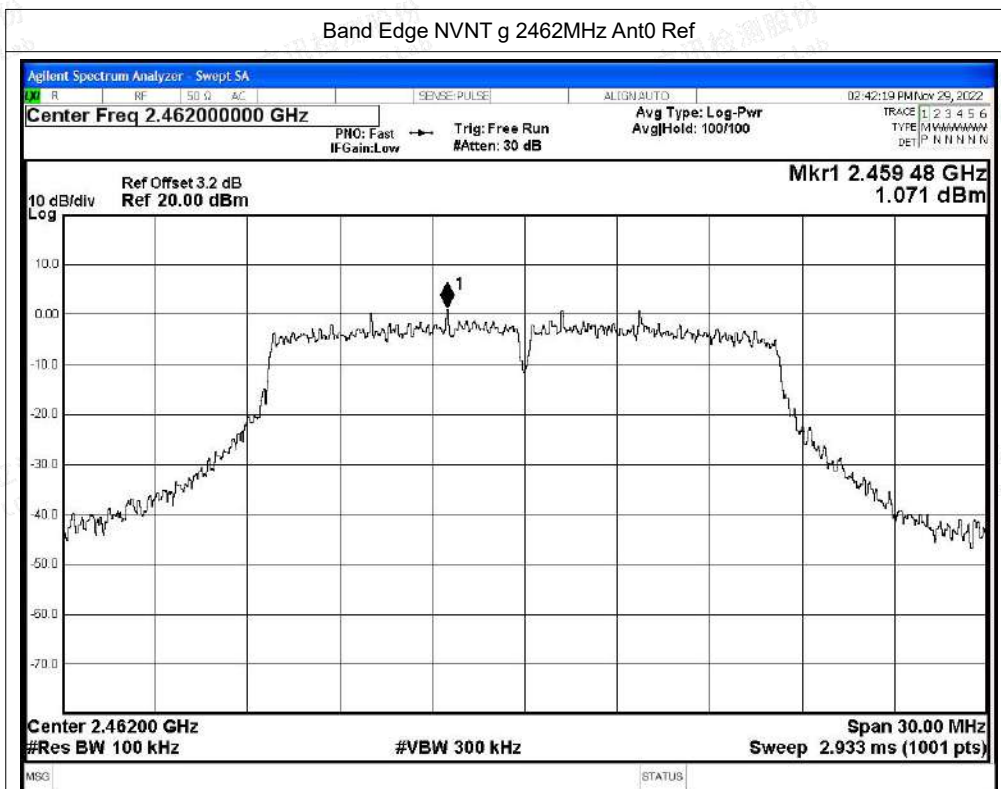


Band Edge NVNT b 2412MHz Ant0 Emission



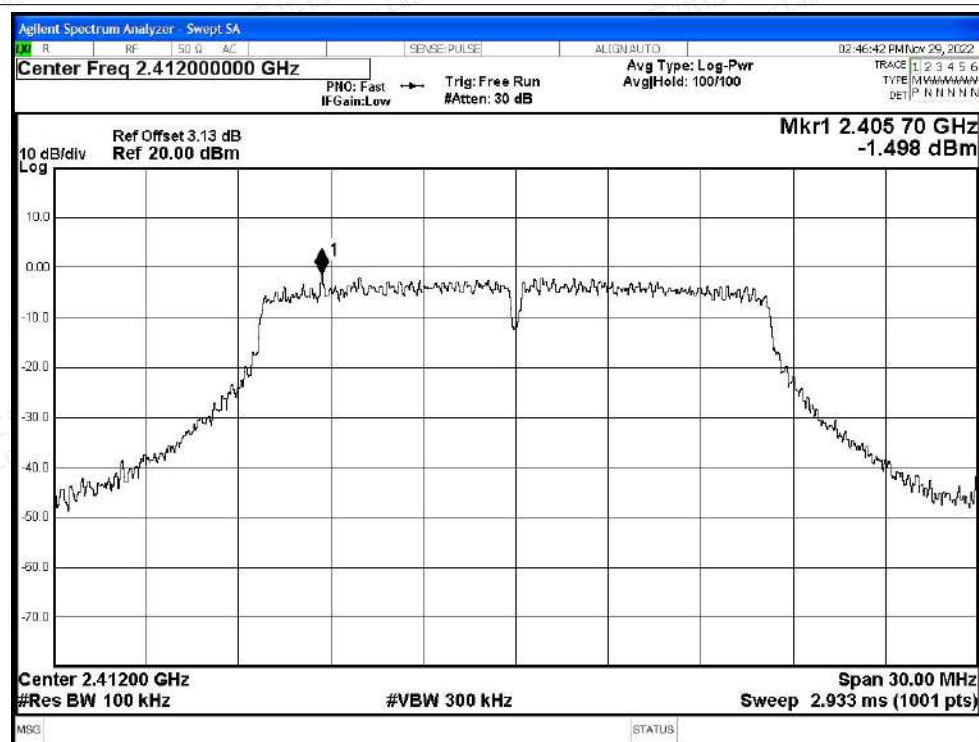








Band Edge NVNT n20 2412MHz Ant0 Ref



Band Edge NVNT n20 2412MHz Ant0 Emission



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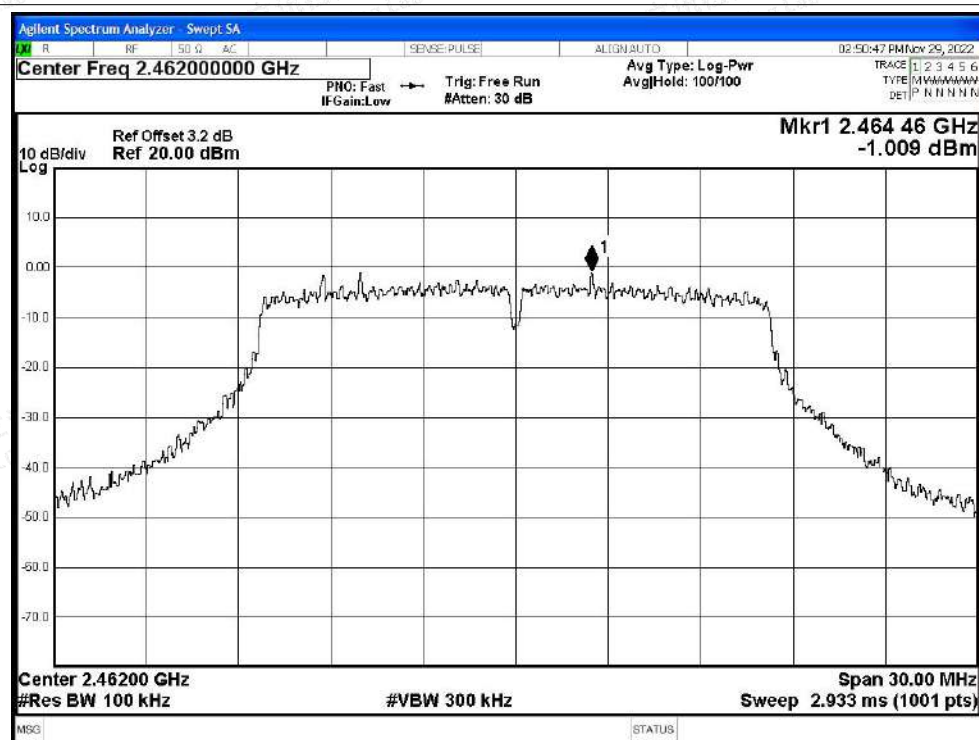
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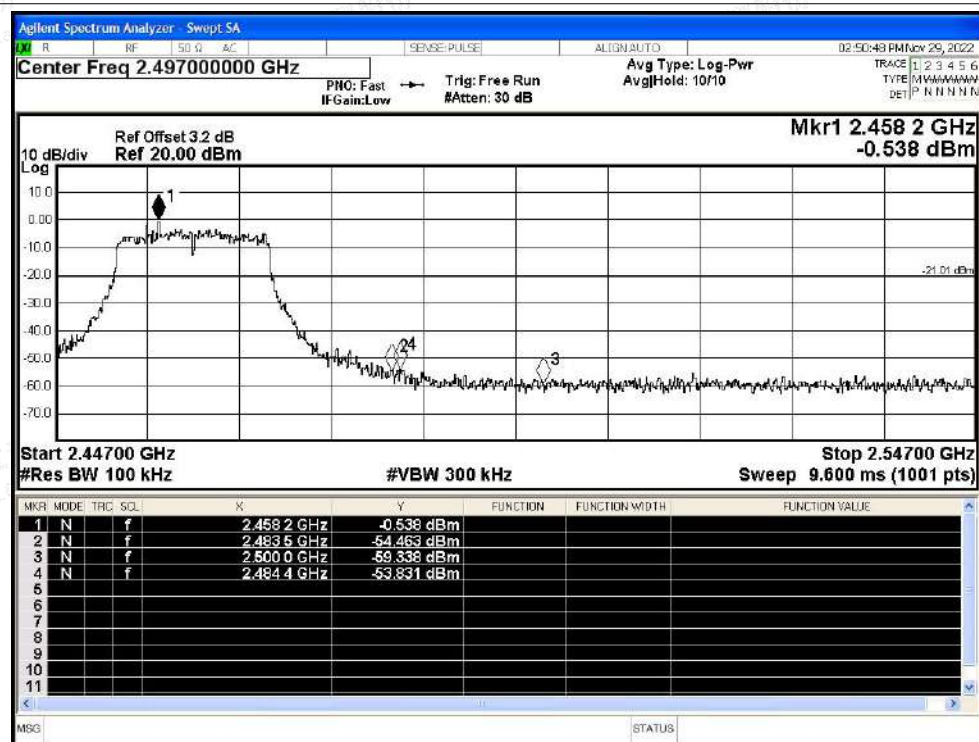
Scan code to check authenticity



Band Edge NVNT n20 2462MHz Ant0 Ref

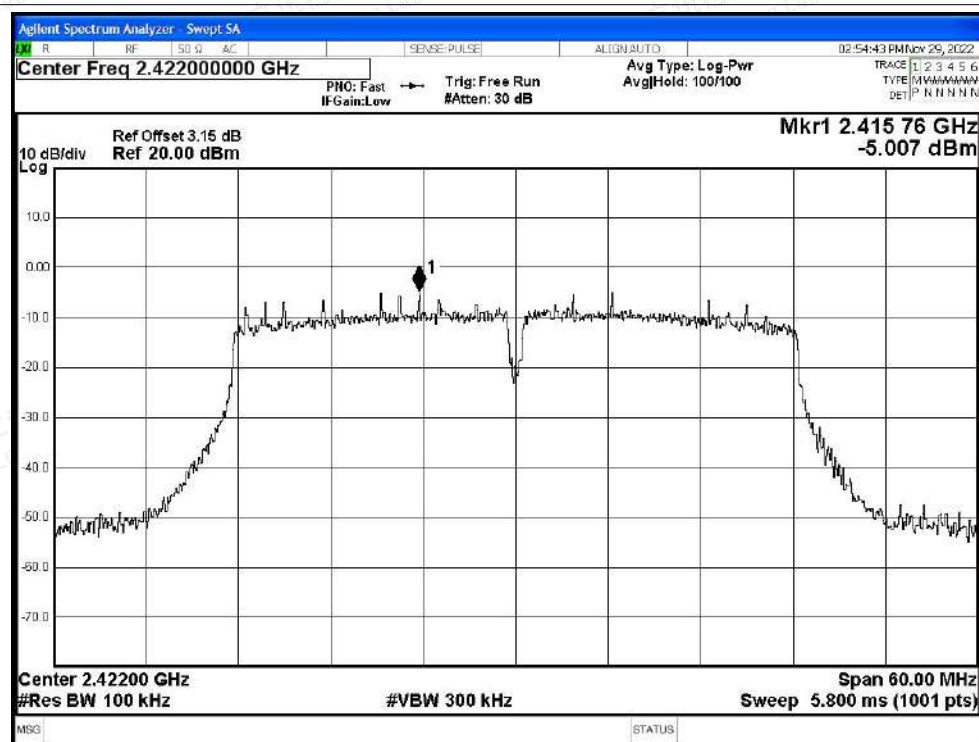


Band Edge NVNT n20 2462MHz Ant0 Emission

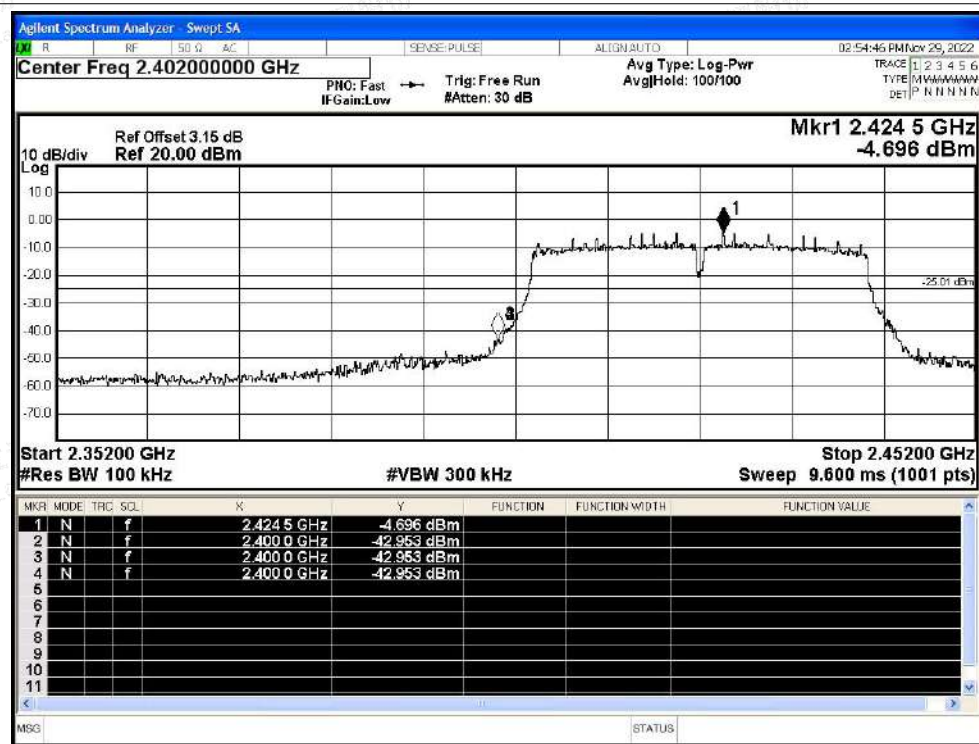




Band Edge NVNT n40 2422MHz Ant0 Ref

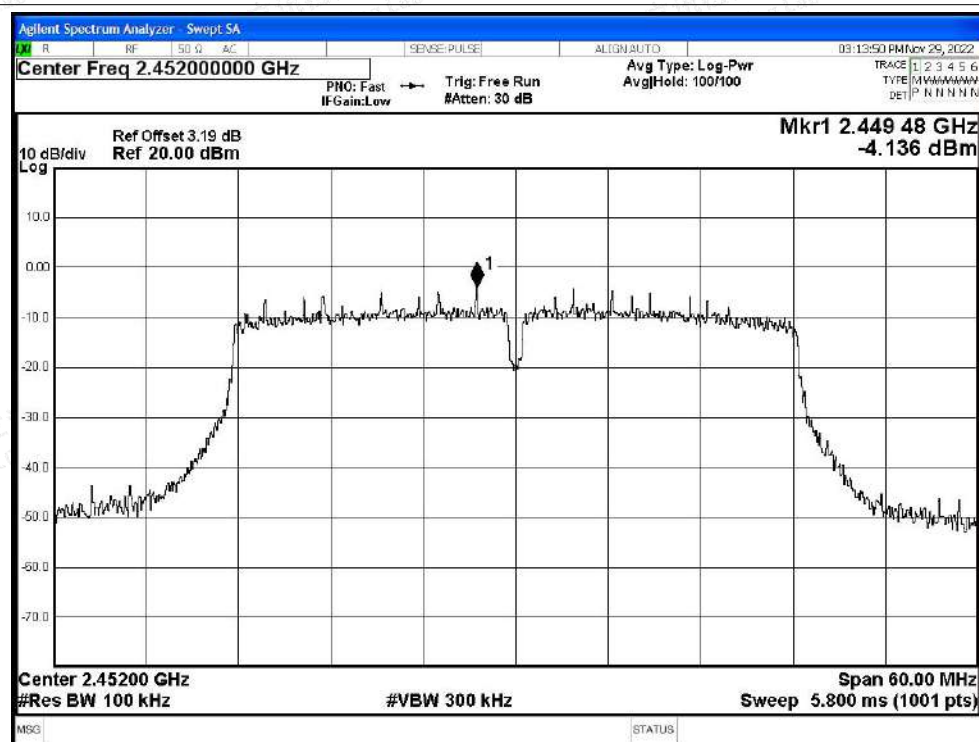


Band Edge NVNT n40 2422MHz Ant0 Emission

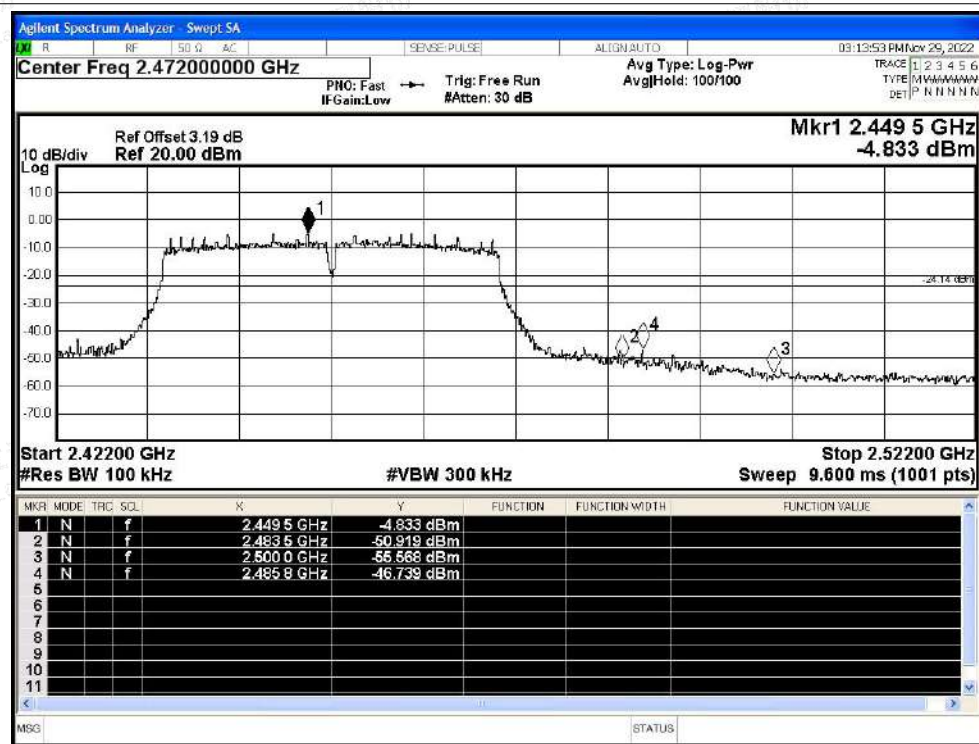




Band Edge NVNT n40 2452MHz Ant0 Ref



Band Edge NVNT n40 2452MHz Ant0 Emission





Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	b	2412	Ant1	-51.79	-20	Pass
NVNT	b	2462	Ant1	-57.57	-20	Pass
NVNT	g	2412	Ant1	-41.59	-20	Pass
NVNT	g	2462	Ant1	-53.7	-20	Pass
NVNT	n20	2412	Ant1	-37.89	-20	Pass
NVNT	n20	2462	Ant1	-53.29	-20	Pass
NVNT	n40	2422	Ant1	-39.79	-20	Pass
NVNT	n40	2452	Ant1	-45.15	-20	Pass

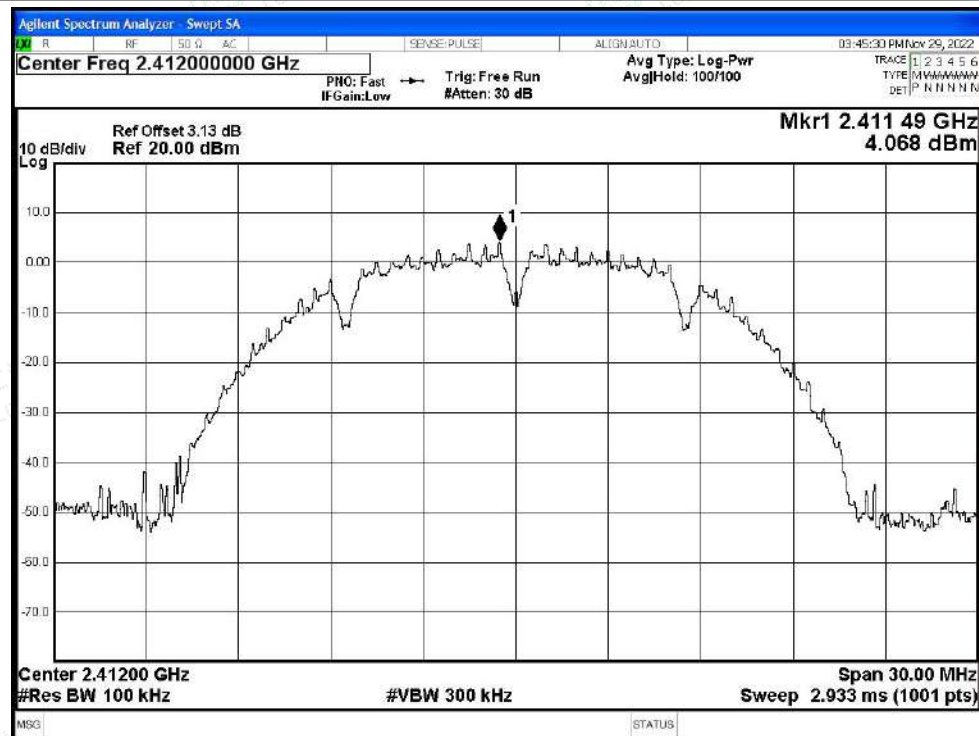


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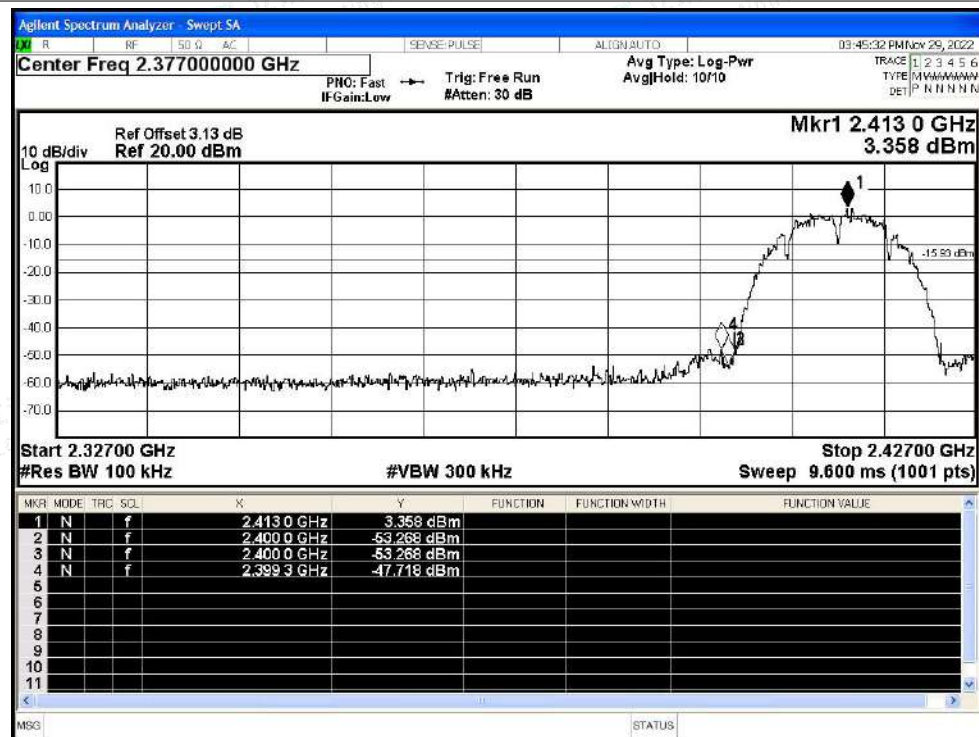


Test Graphs

Band Edge NVNT b 2412MHz Ant1 Ref

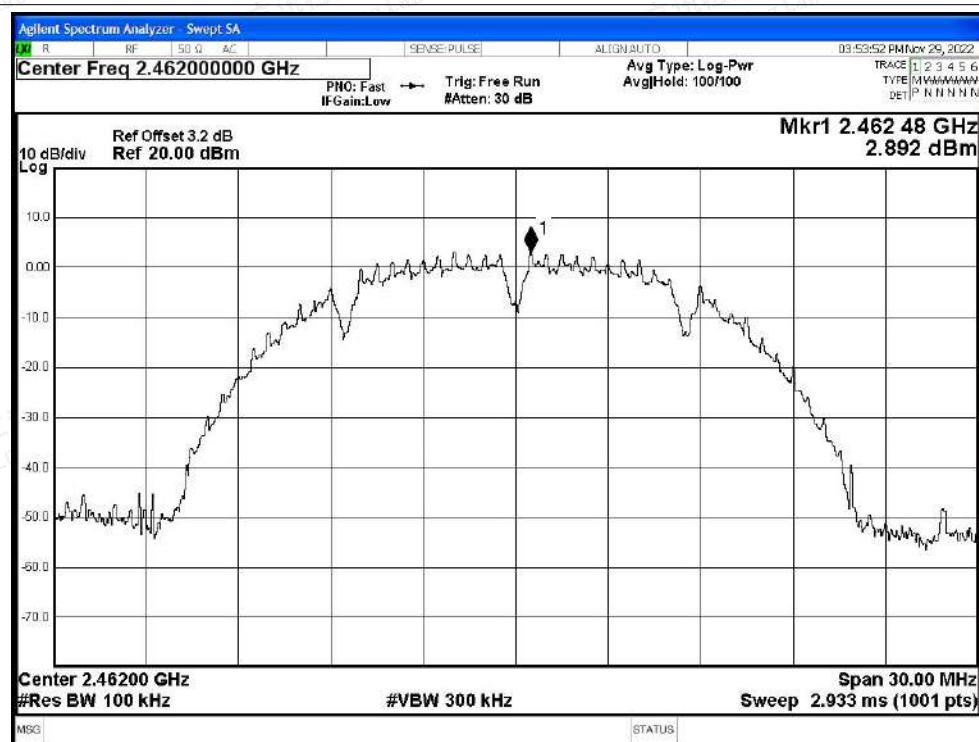


Band Edge NVNT b 2412MHz Ant1 Emission

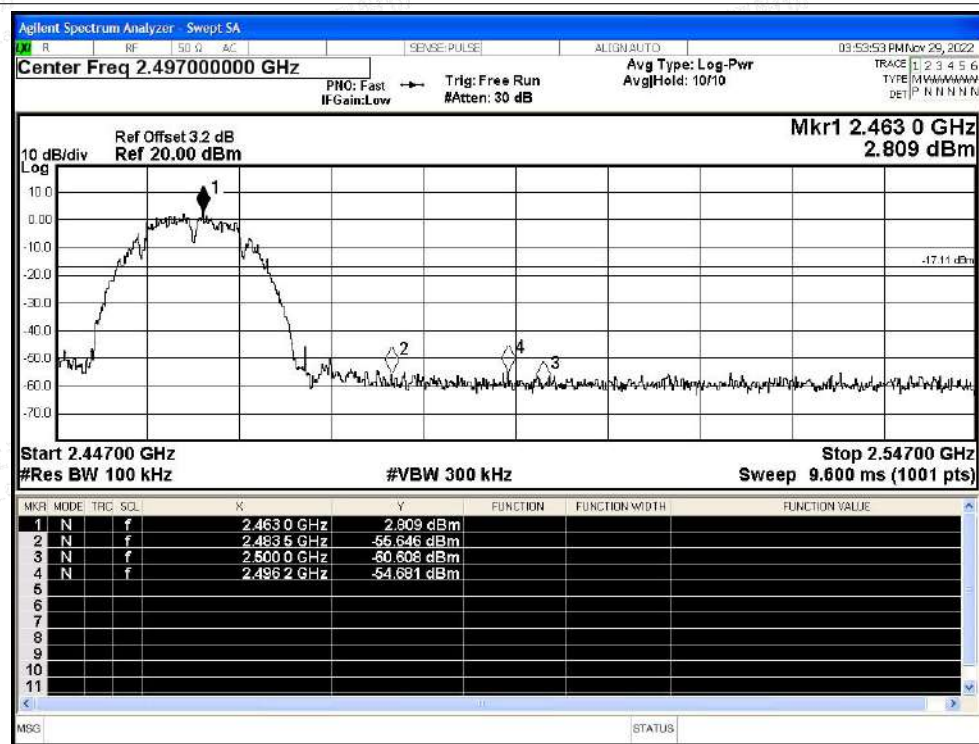




Band Edge NVNT b 2462MHz Ant1 Ref

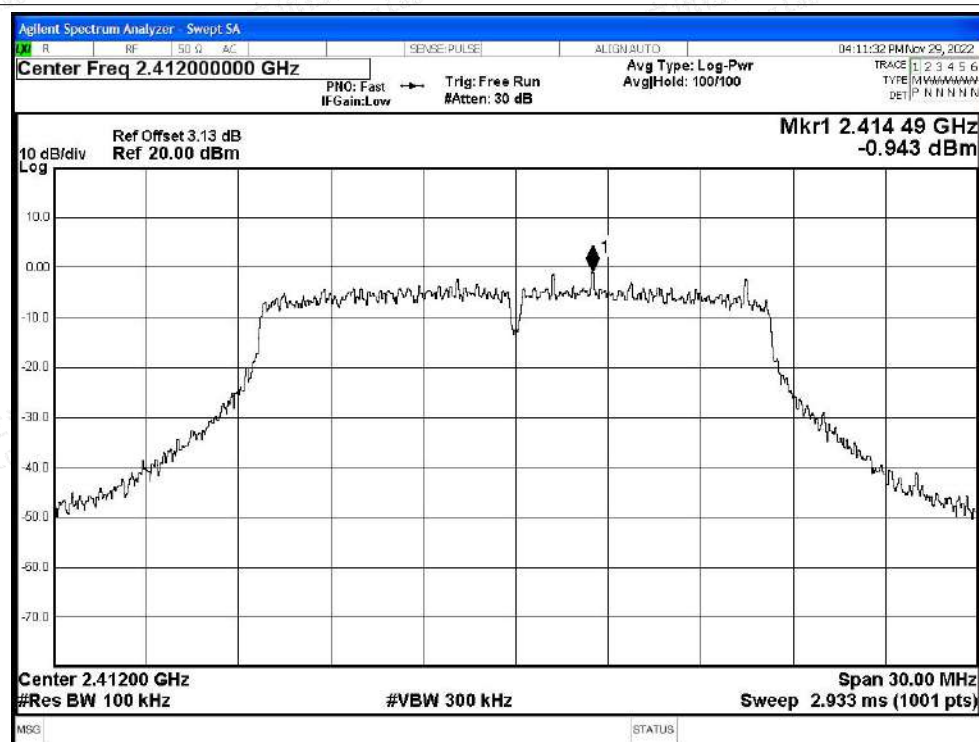


Band Edge NVNT b 2462MHz Ant1 Emission

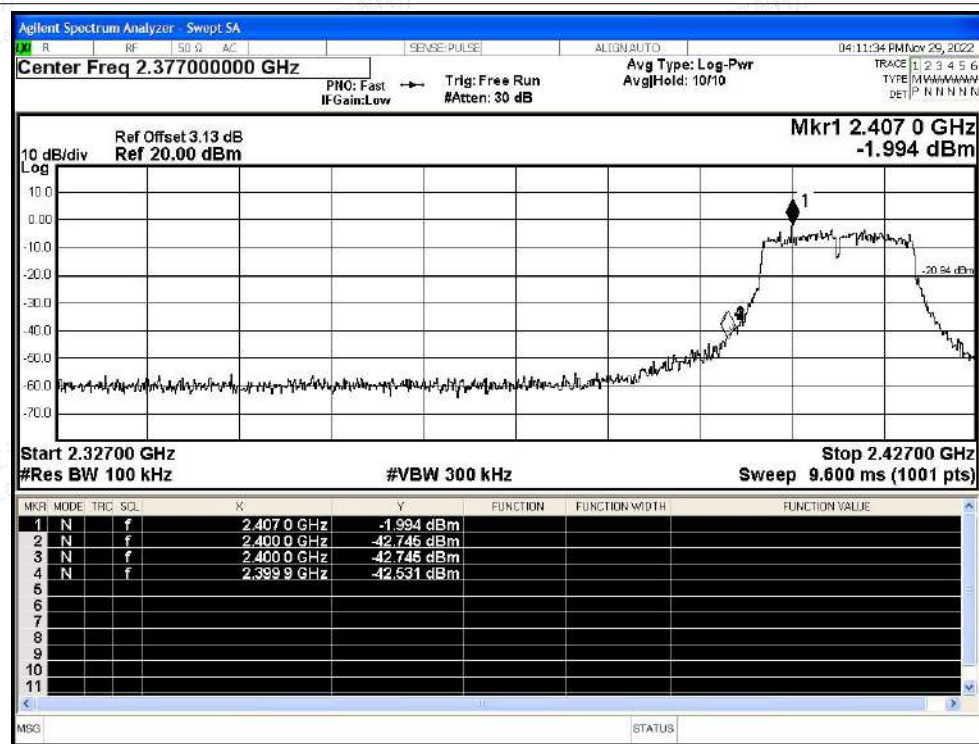




Band Edge NVNT g 2412MHz Ant1 Ref

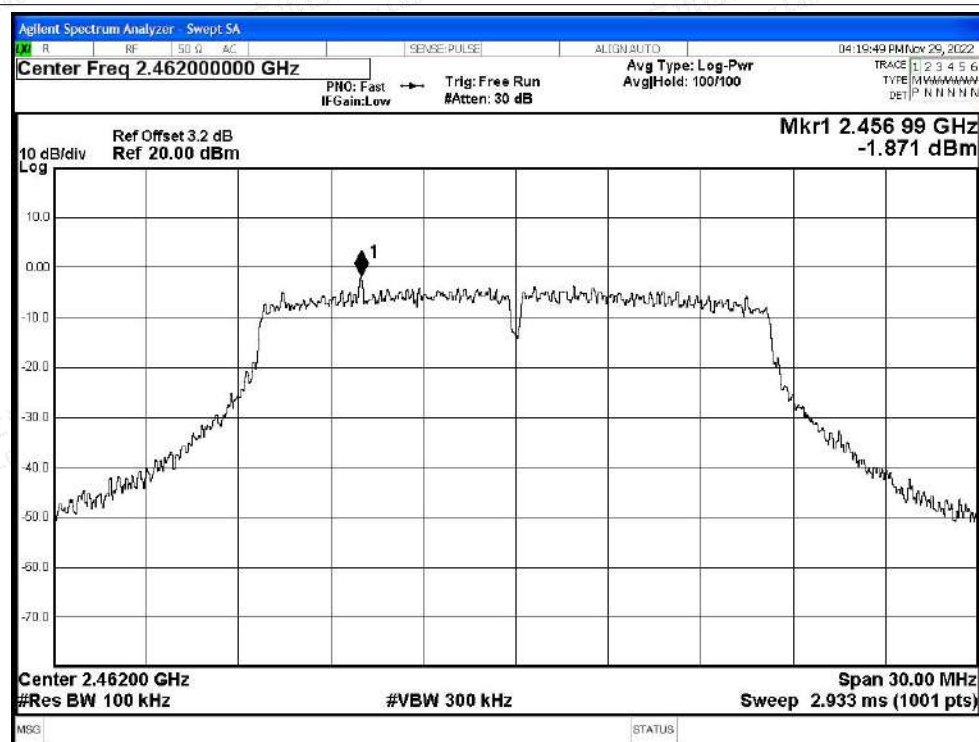


Band Edge NVNT g 2412MHz Ant1 Emission

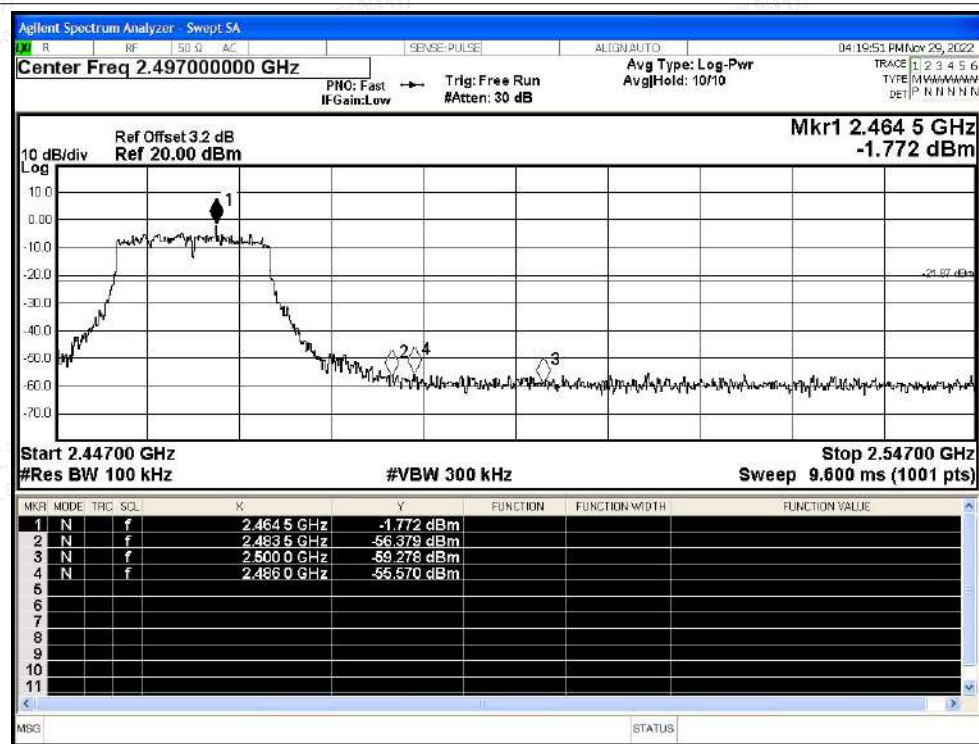




Band Edge NVNT g 2462MHz Ant1 Ref

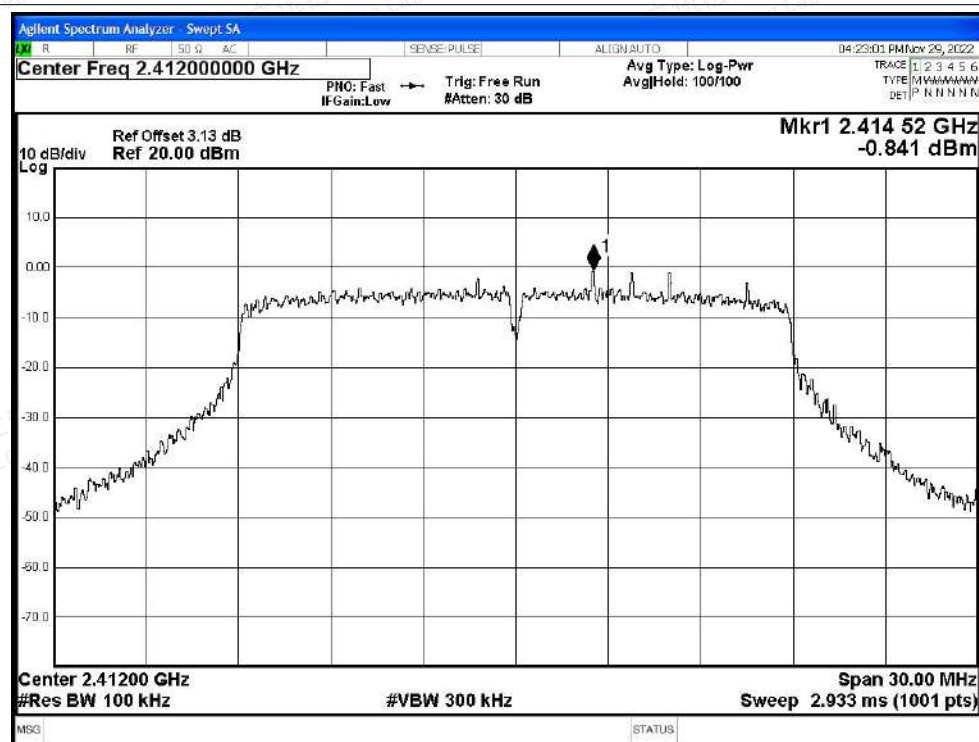


Band Edge NVNT g 2462MHz Ant1 Emission

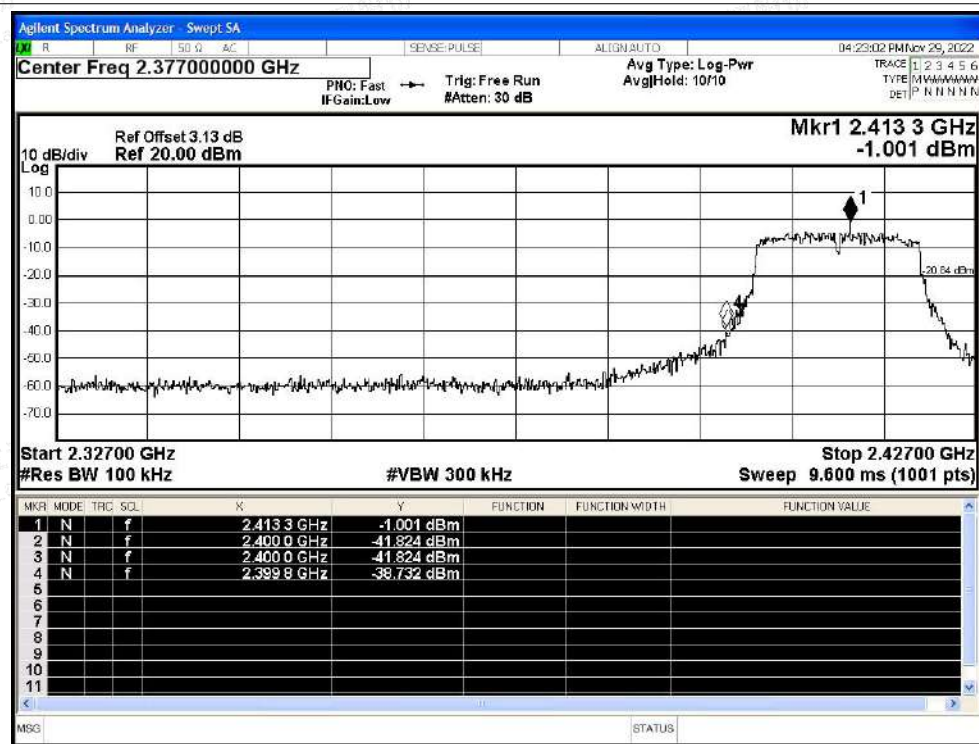




Band Edge NVNT n20 2412MHz Ant1 Ref

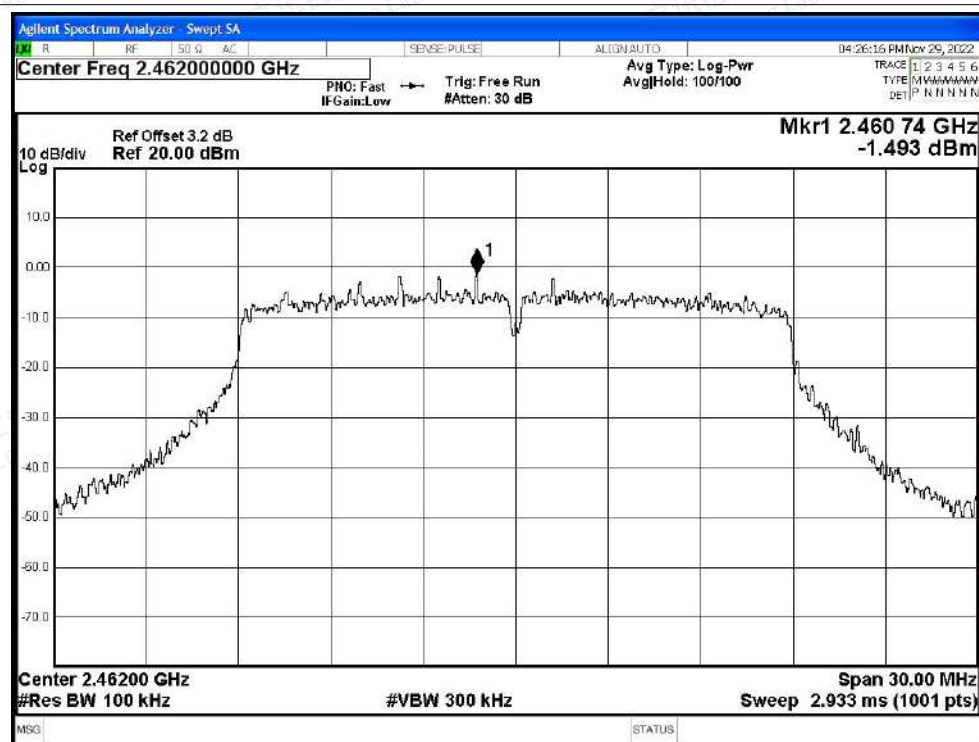


Band Edge NVNT n20 2412MHz Ant1 Emission

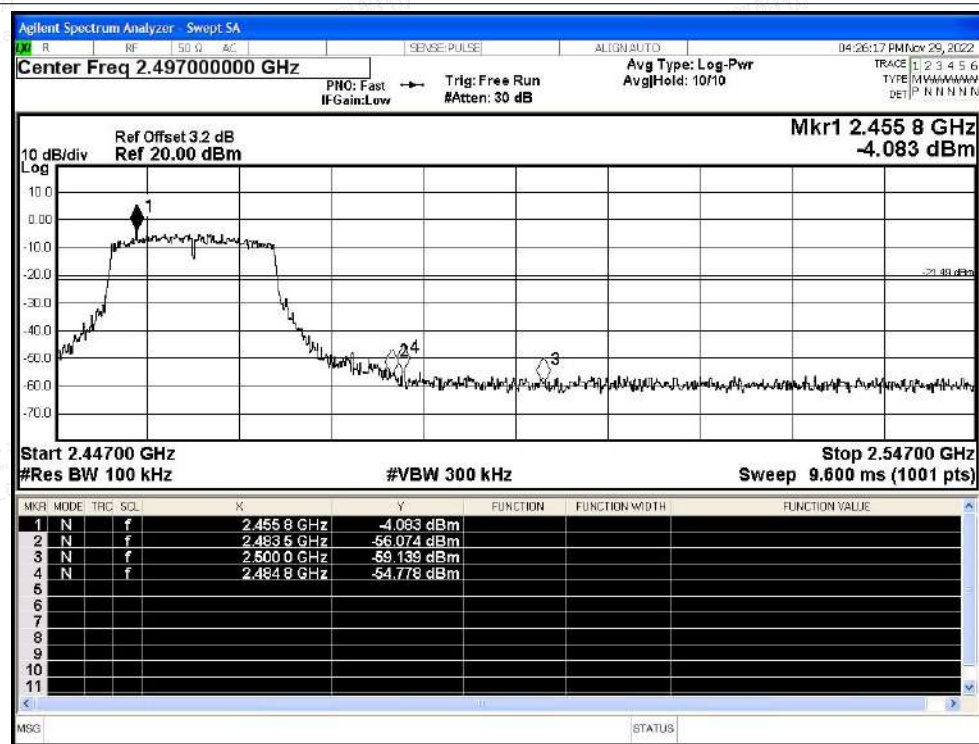




Band Edge NVNT n20 2462MHz Ant1 Ref

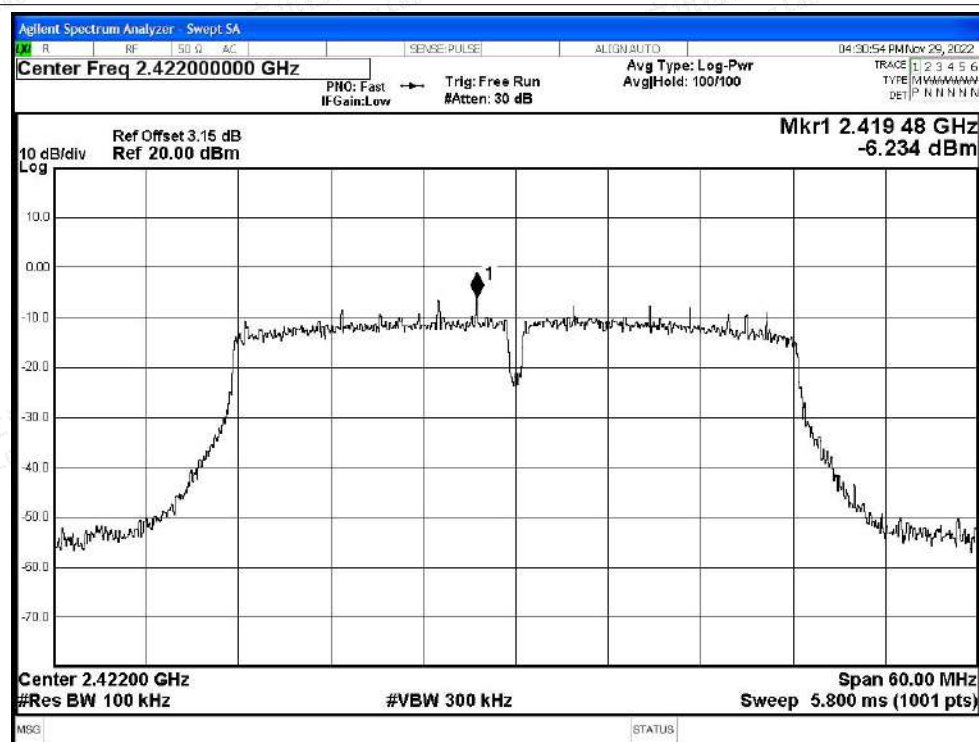


Band Edge NVNT n20 2462MHz Ant1 Emission

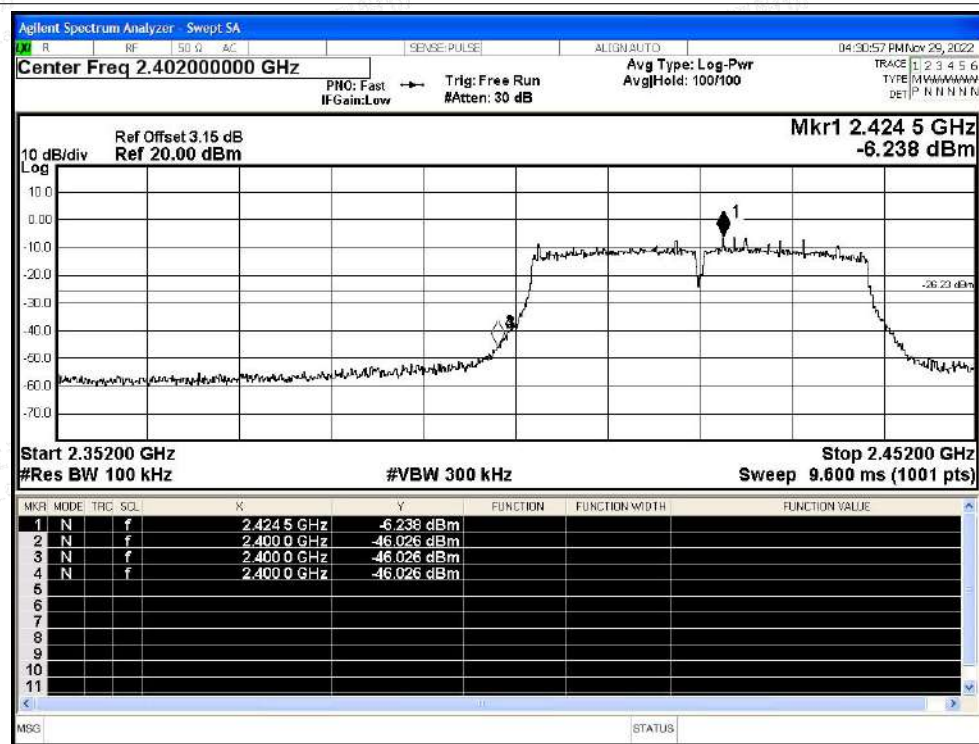




Band Edge NVNT n40 2422MHz Ant1 Ref

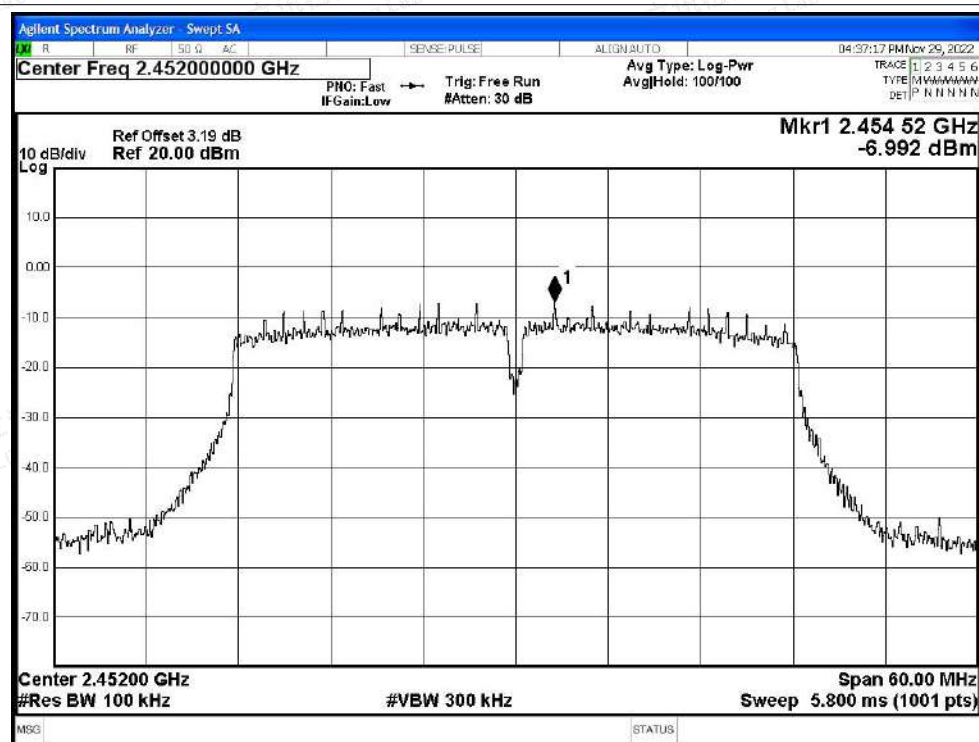


Band Edge NVNT n40 2422MHz Ant1 Emission

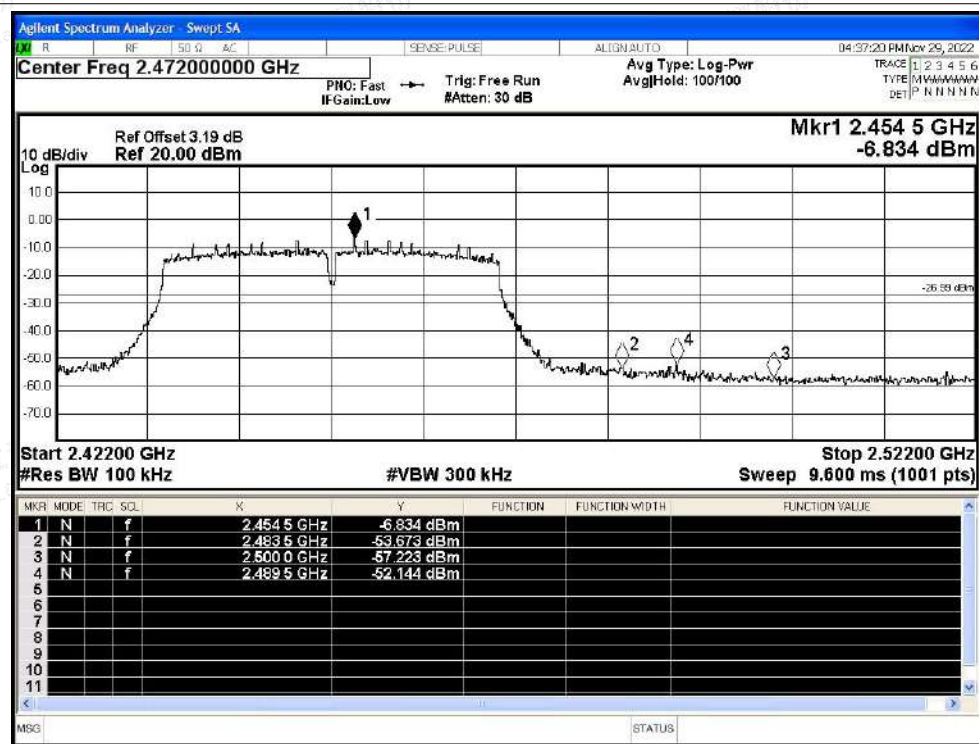




Band Edge NVNT n40 2452MHz Ant1 Ref



Band Edge NVNT n40 2452MHz Ant1 Emission





A.5 Conducted RF Spurious Emission

Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	b	2412	Ant0	-42.88	-20	Pass
NVNT	b	2437	Ant0	-49.58	-20	Pass
NVNT	b	2462	Ant0	-49.17	-20	Pass
NVNT	g	2412	Ant0	-44.95	-20	Pass
NVNT	g	2437	Ant0	-45.94	-20	Pass
NVNT	g	2462	Ant0	-44.35	-20	Pass
NVNT	n20	2412	Ant0	-45.93	-20	Pass
NVNT	n20	2437	Ant0	-45.39	-20	Pass
NVNT	n20	2462	Ant0	-43.2	-20	Pass
NVNT	n40	2422	Ant0	-39.8	-20	Pass
NVNT	n40	2437	Ant0	-40.55	-20	Pass
NVNT	n40	2452	Ant0	-40.28	-20	Pass

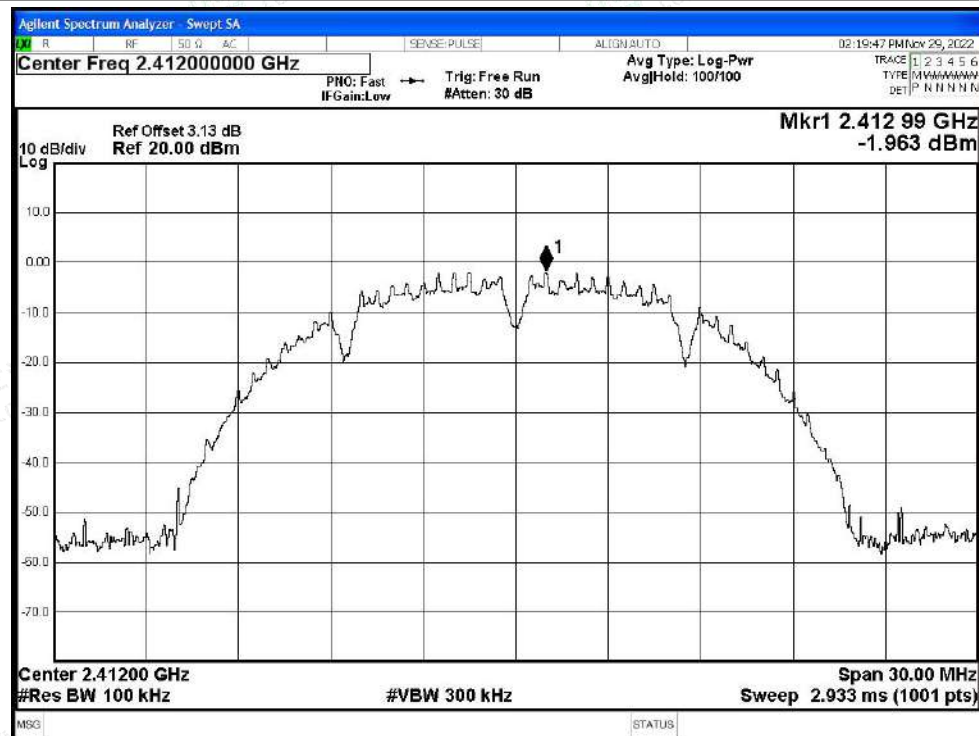


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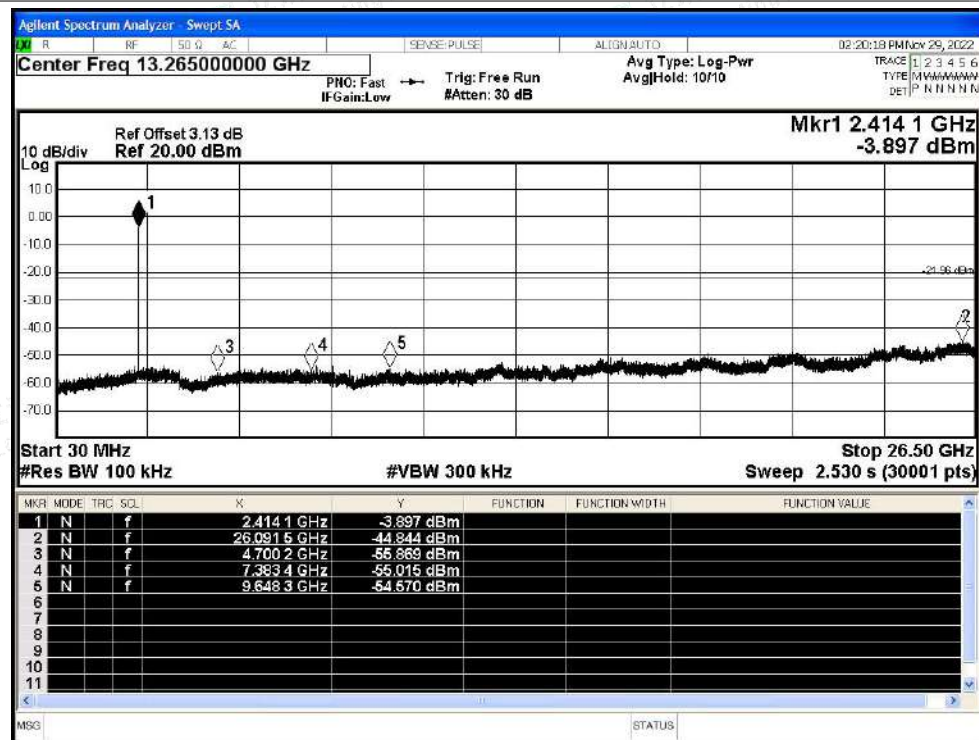


Test Graphs

Tx. Spurious NVNT b 2412MHz Ant0 Ref

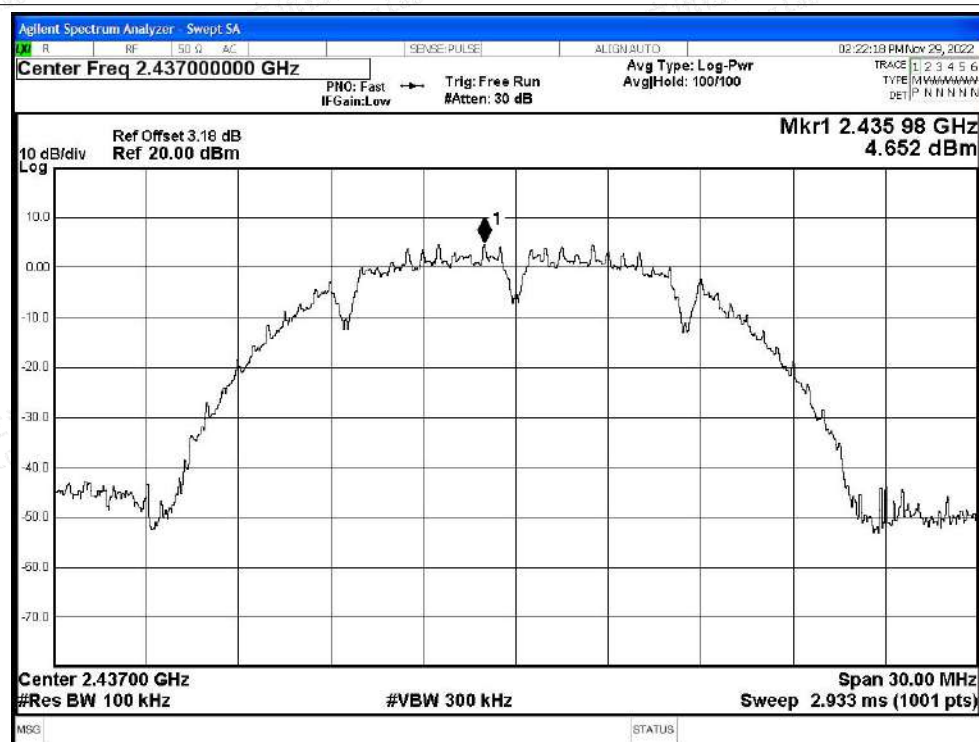


Tx. Spurious NVNT b 2412MHz Ant0 Emission

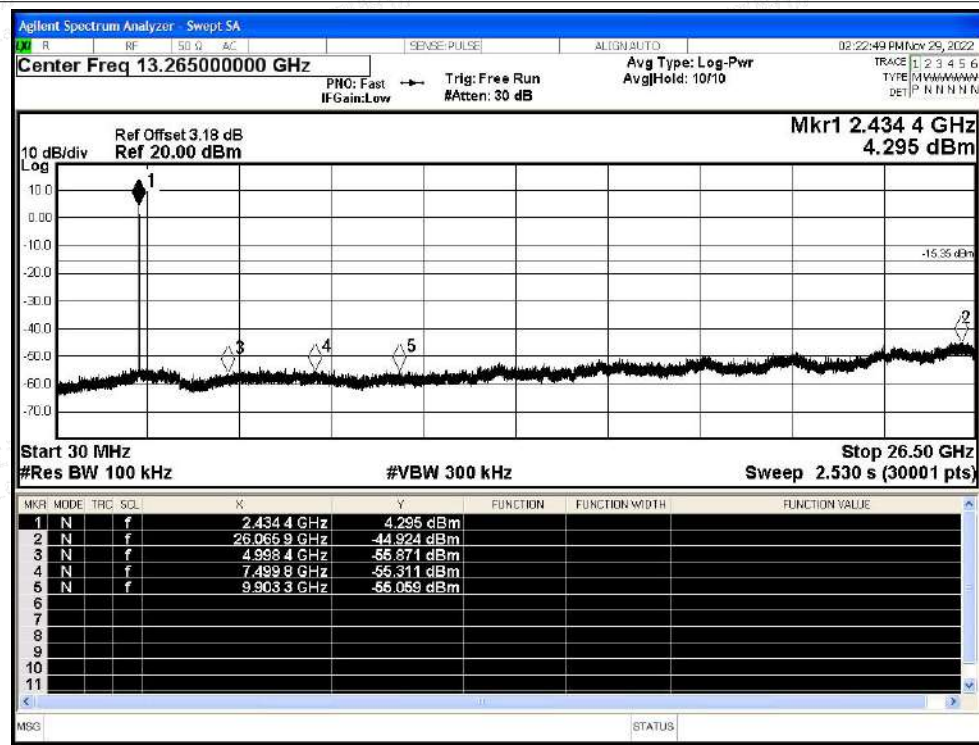




Tx. Spurious NVNT b 2437MHz Ant0 Ref



Tx. Spurious NVNT b 2437MHz Ant0 Emission



Shenzhen LCS Compliance Testing Laboratory Ltd.

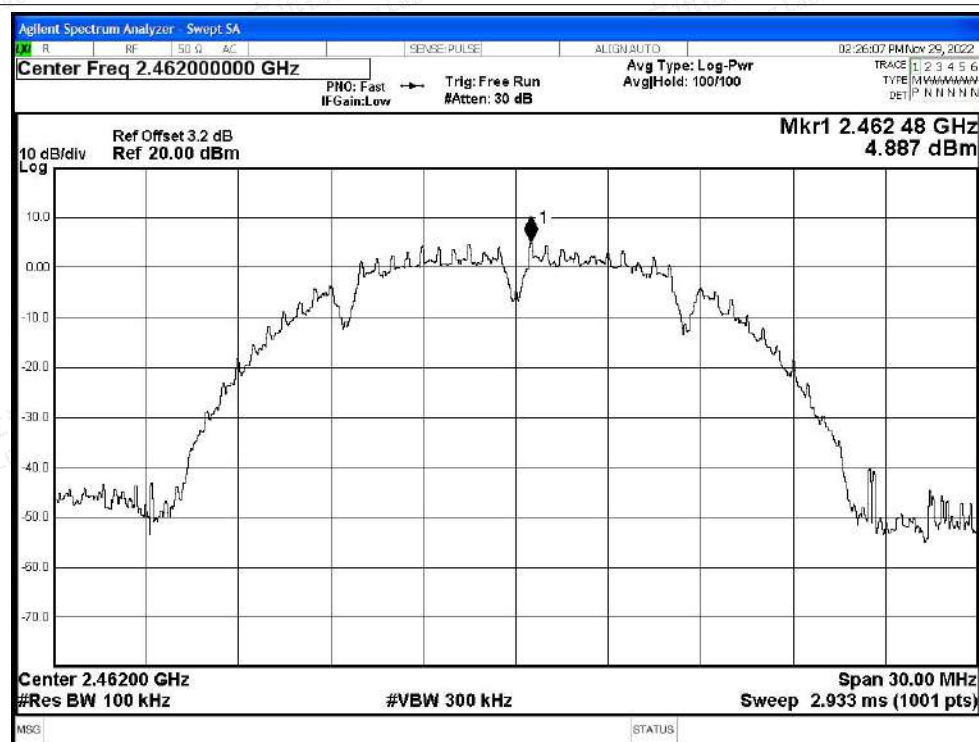
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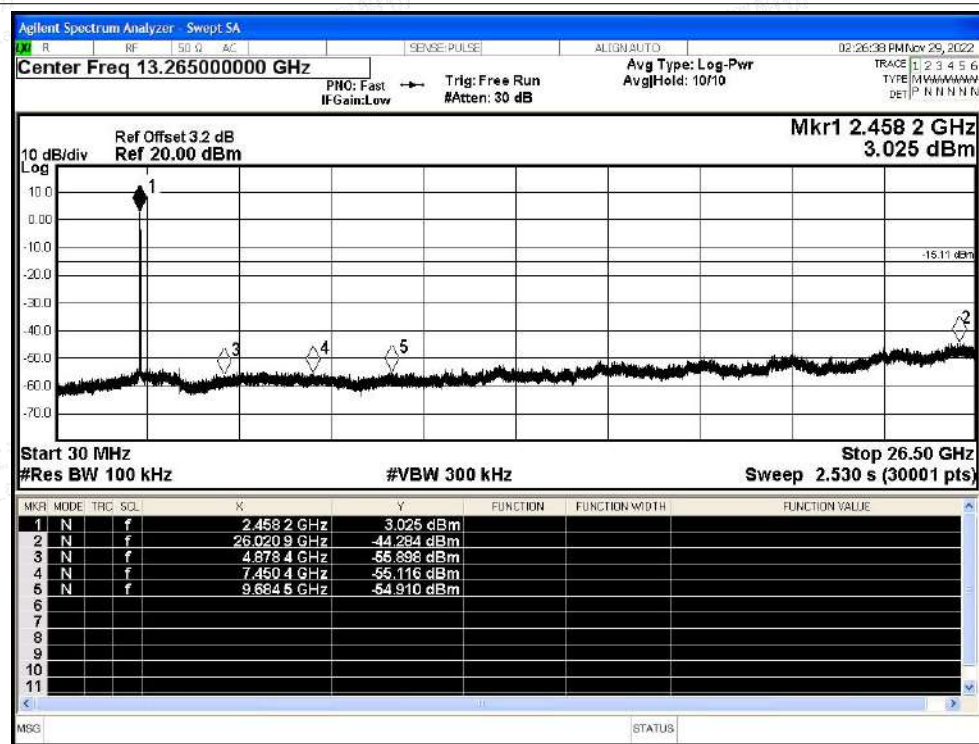
Scan code to check authenticity



Tx. Spurious NVNT b 2462MHz Ant0 Ref



Tx. Spurious NVNT b 2462MHz Ant0 Emission



Shenzhen LCS Compliance Testing Laboratory Ltd.

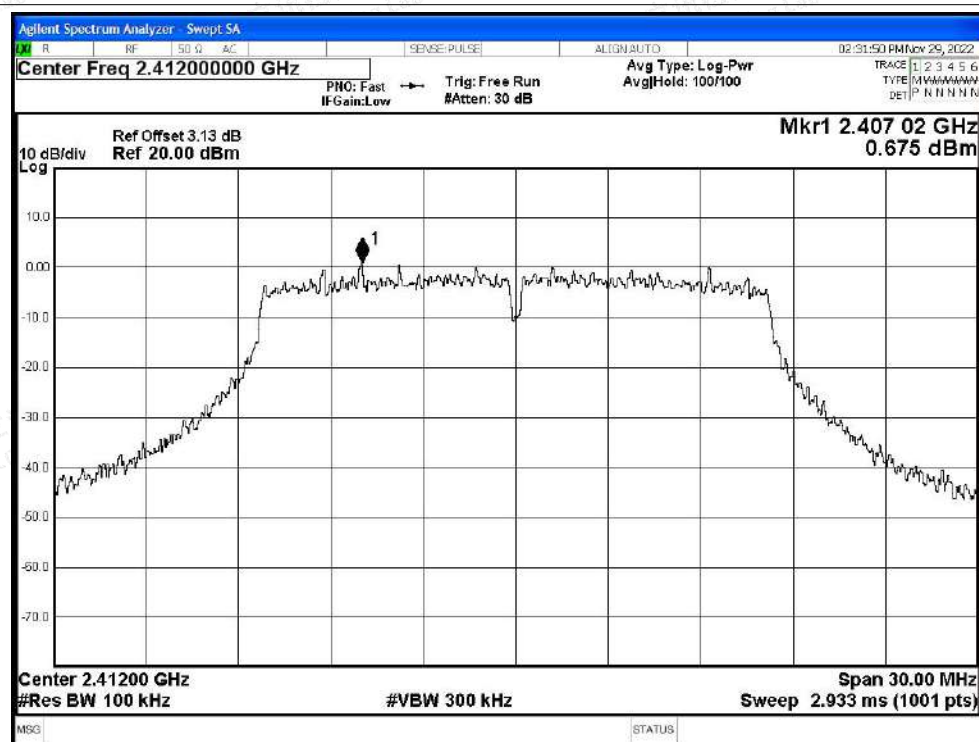
Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

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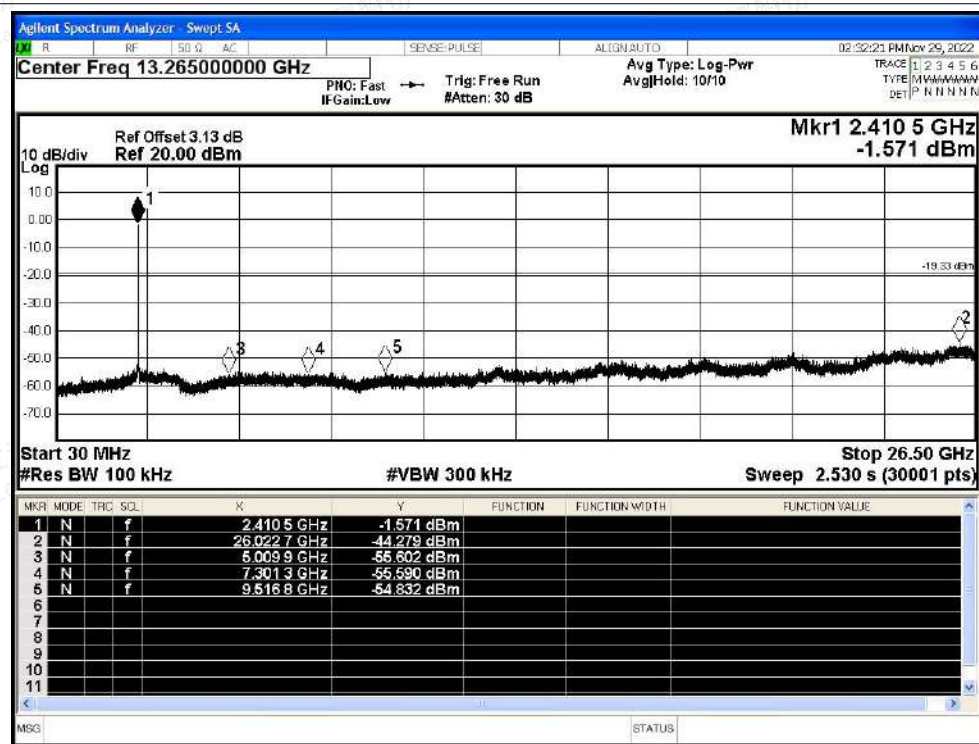
Scan code to check authenticity



Tx. Spurious NVNT g 2412MHz Ant0 Ref

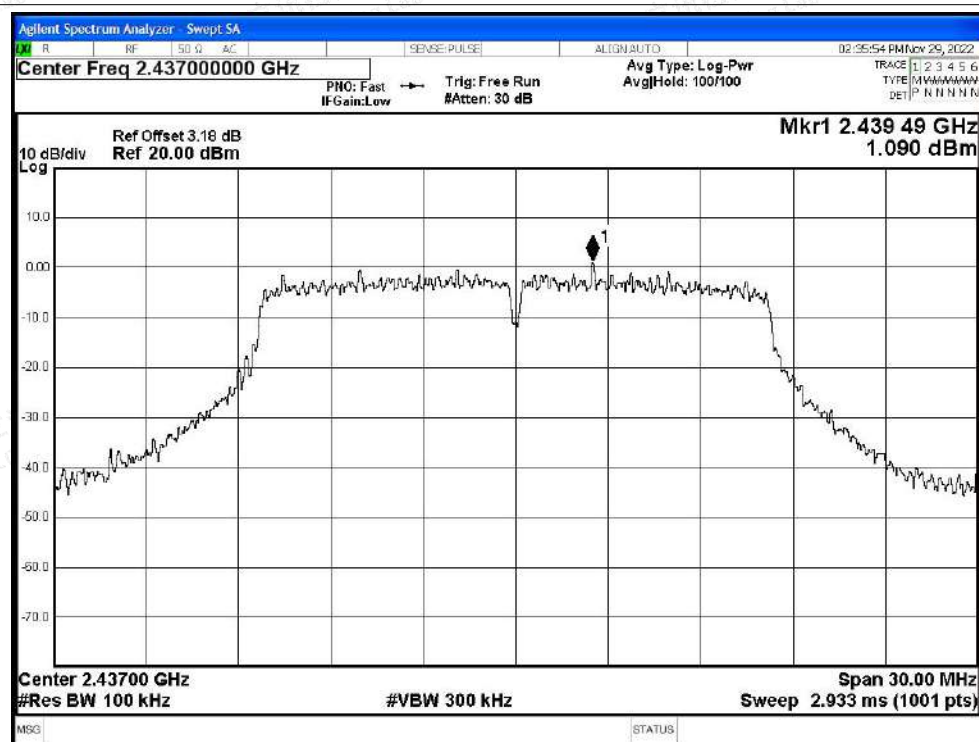


Tx. Spurious NVNT g 2412MHz Ant0 Emission

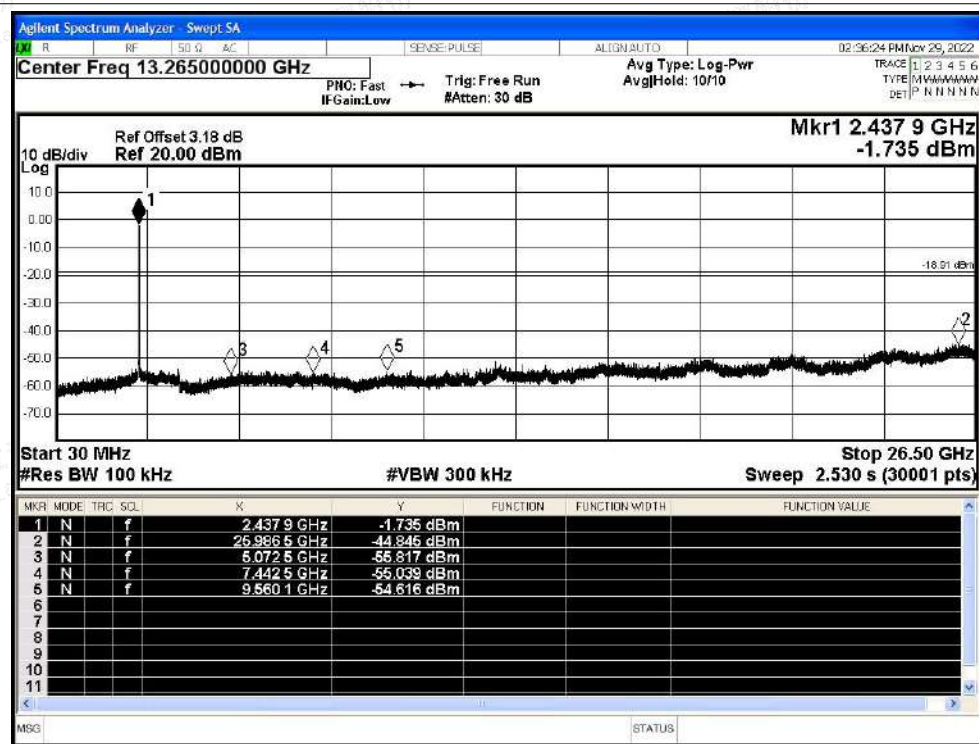




Tx. Spurious NVNT g 2437MHz Ant0 Ref

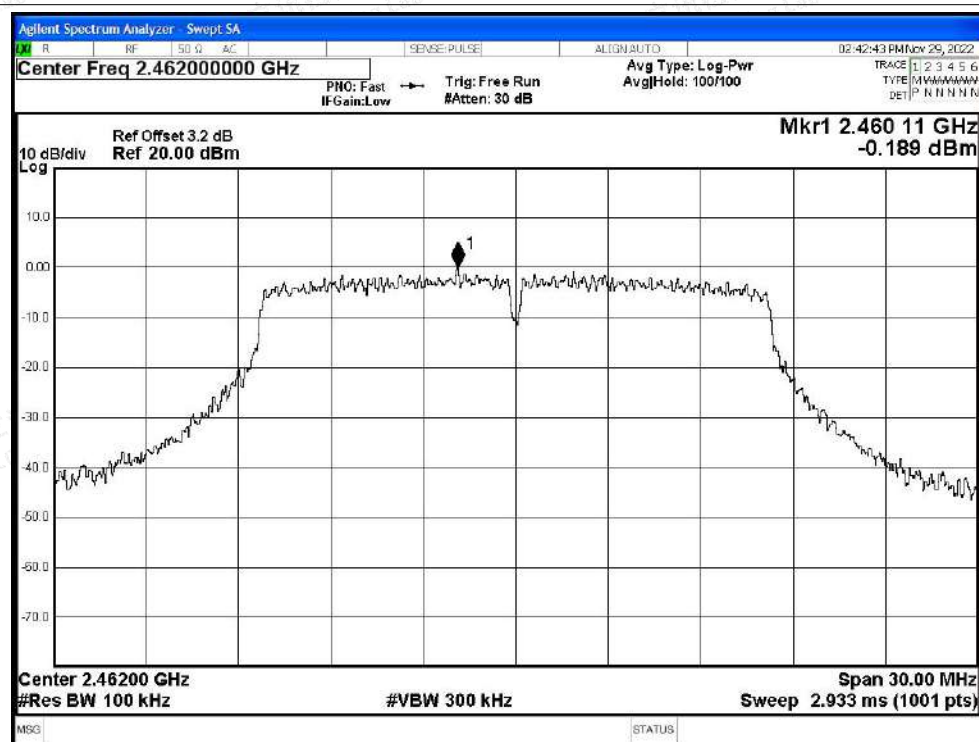


Tx. Spurious NVNT g 2437MHz Ant0 Emission

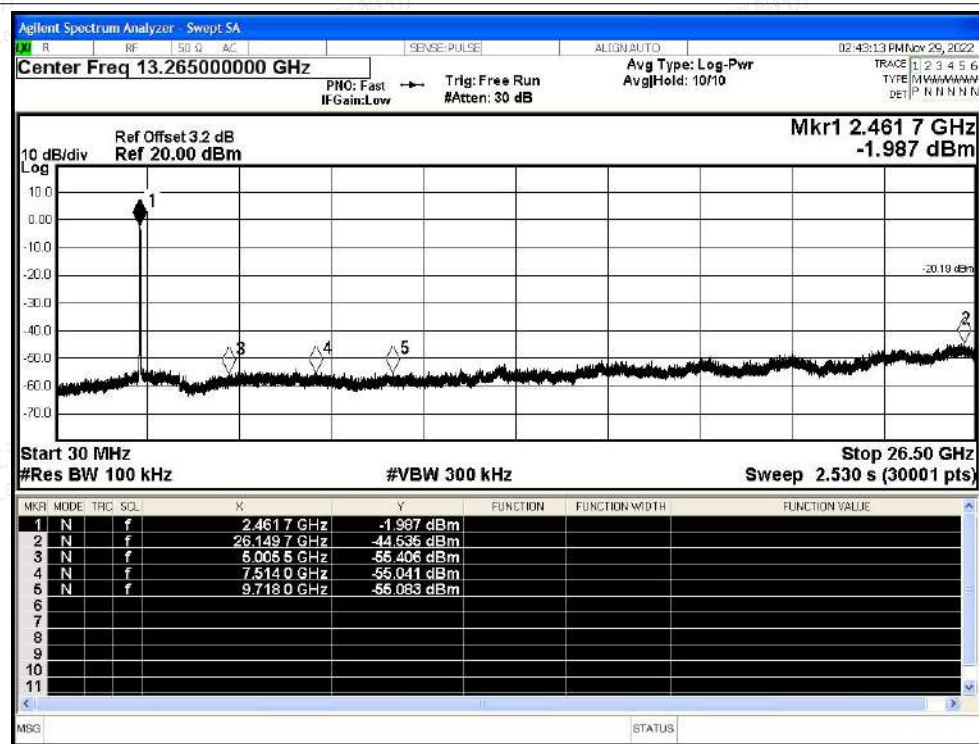




Tx. Spurious NVNT g 2462MHz Ant0 Ref

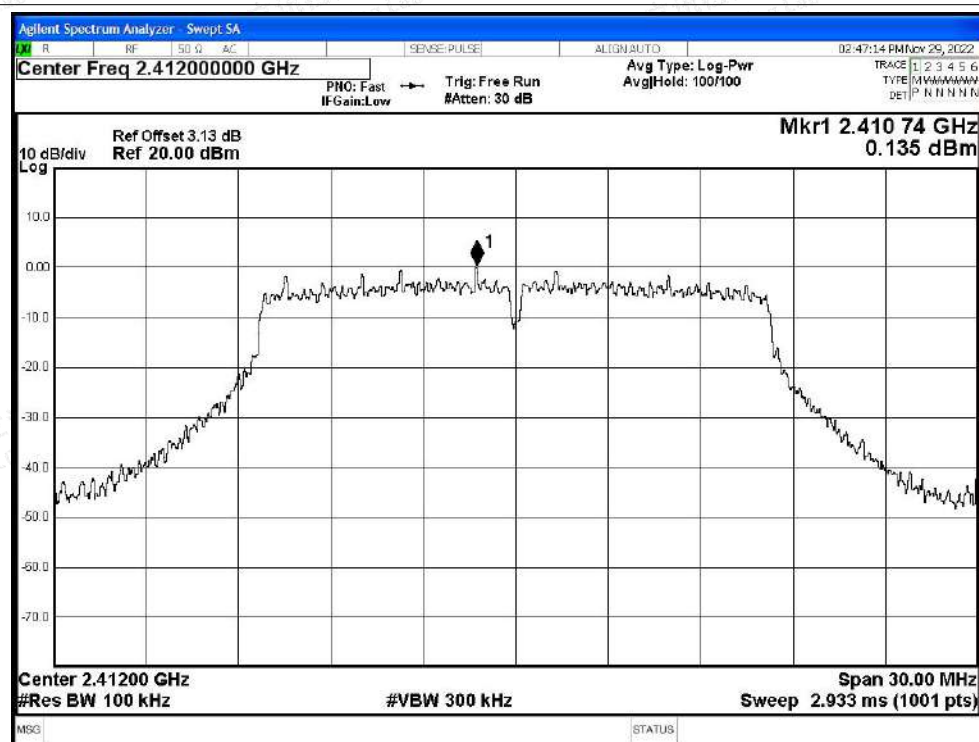


Tx. Spurious NVNT g 2462MHz Ant0 Emission

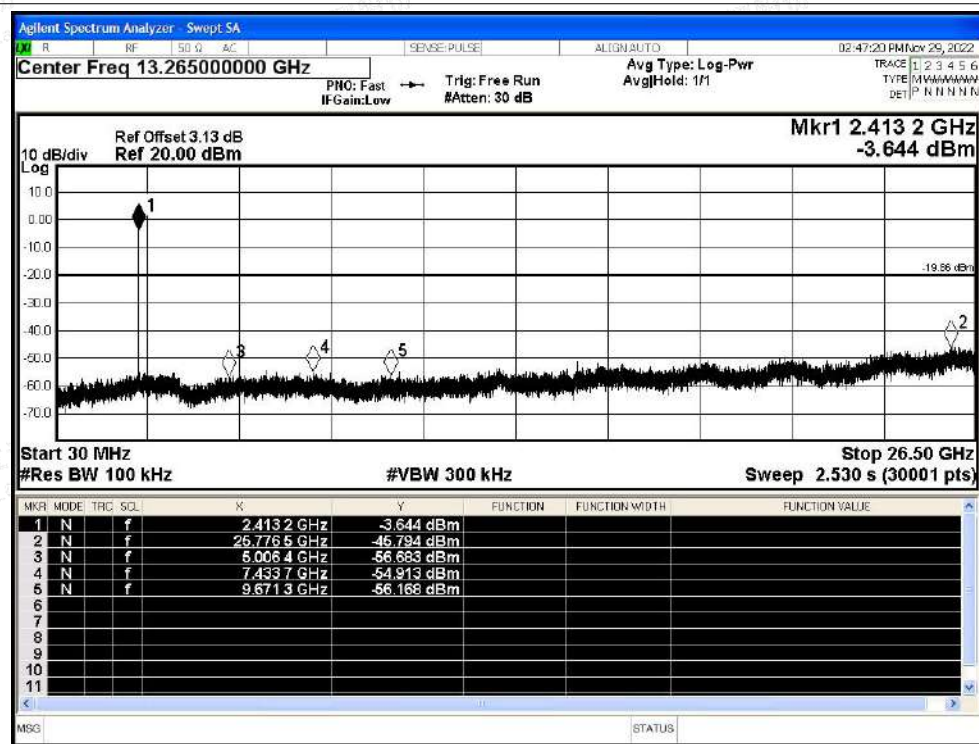




Tx. Spurious NVNT n20 2412MHz Ant0 Ref

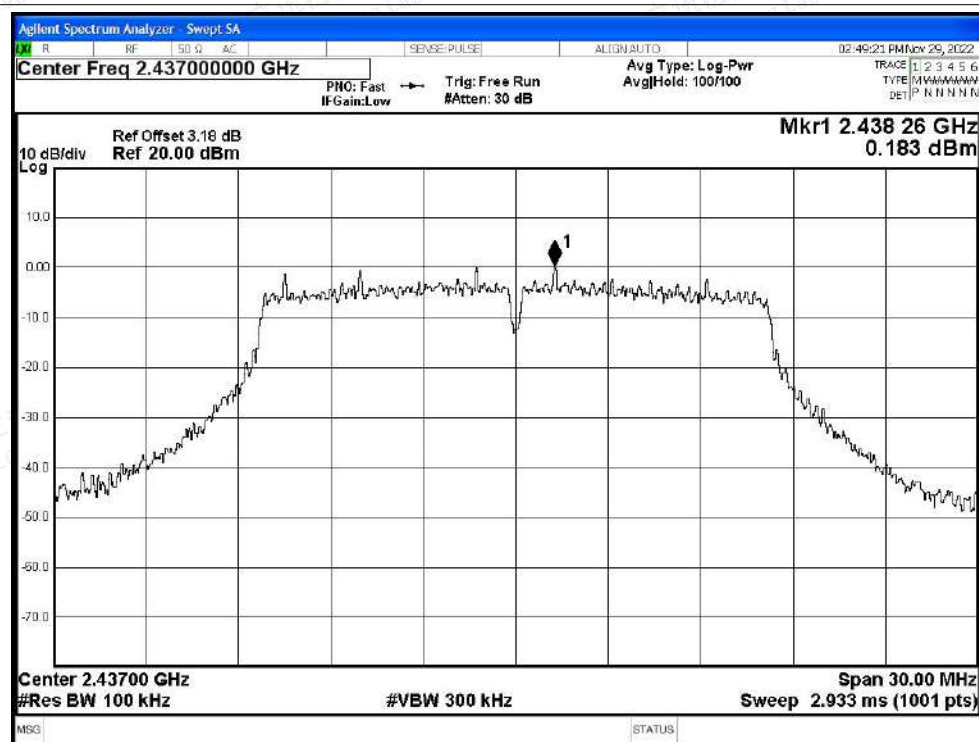


Tx. Spurious NVNT n20 2412MHz Ant0 Emission





Tx. Spurious NVNT n20 2437MHz Ant0 Ref



Tx. Spurious NVNT n20 2437MHz Ant0 Emission

