



Appendix A

RF Test Data for LoRa 2.4G (Conducted Measurement)

Product Name: EMB-LR1280s

Test Model: EMB-LR1280s

Environmental Conditions

Temperature:	24.3°C
Relative Humidity:	53.6%
ATM Pressure:	100.0 kPa
Test Engineer:	Jerry Chu
Supervised by:	Can Kun



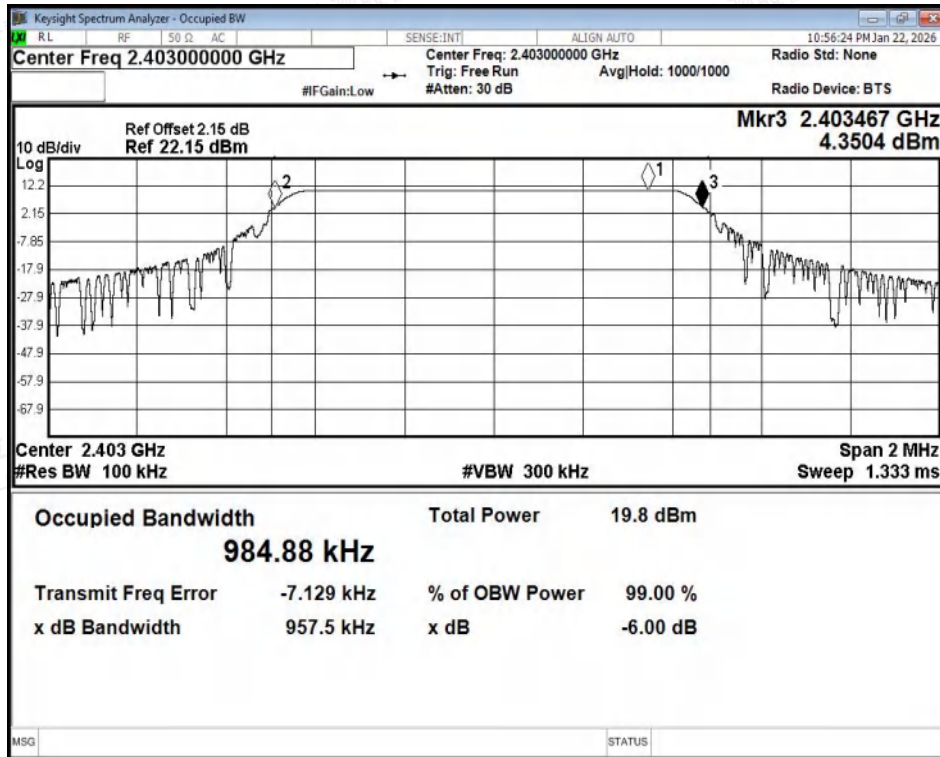
Shenzhen LCS Compliance Testing Laboratory Ltd.
Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China
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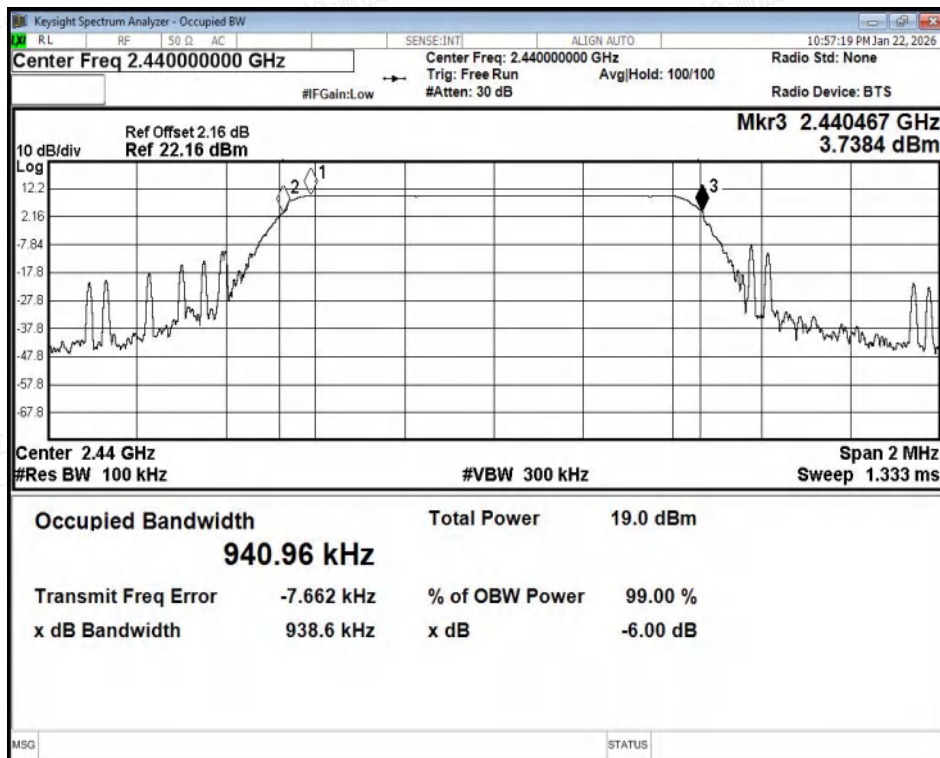
A.1 -6dB Bandwidth

Condition	Mode	Frequency (MHz)	Antenna	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
NVNT	LoRa 2.4G_800kHz	2403	Ant1	0.9575	0.5	Pass
NVNT	LoRa 2.4G_800kHz	2440	Ant1	0.9386	0.5	Pass
NVNT	LoRa 2.4G_800kHz	2480	Ant1	0.9579	0.5	Pass
NVNT	LoRa 2.4G_1600kHz	2403	Ant1	1.78	0.5	Pass
NVNT	LoRa 2.4G_1600kHz	2440	Ant1	1.783	0.5	Pass
NVNT	LoRa 2.4G_1600kHz	2480	Ant1	1.776	0.5	Pass



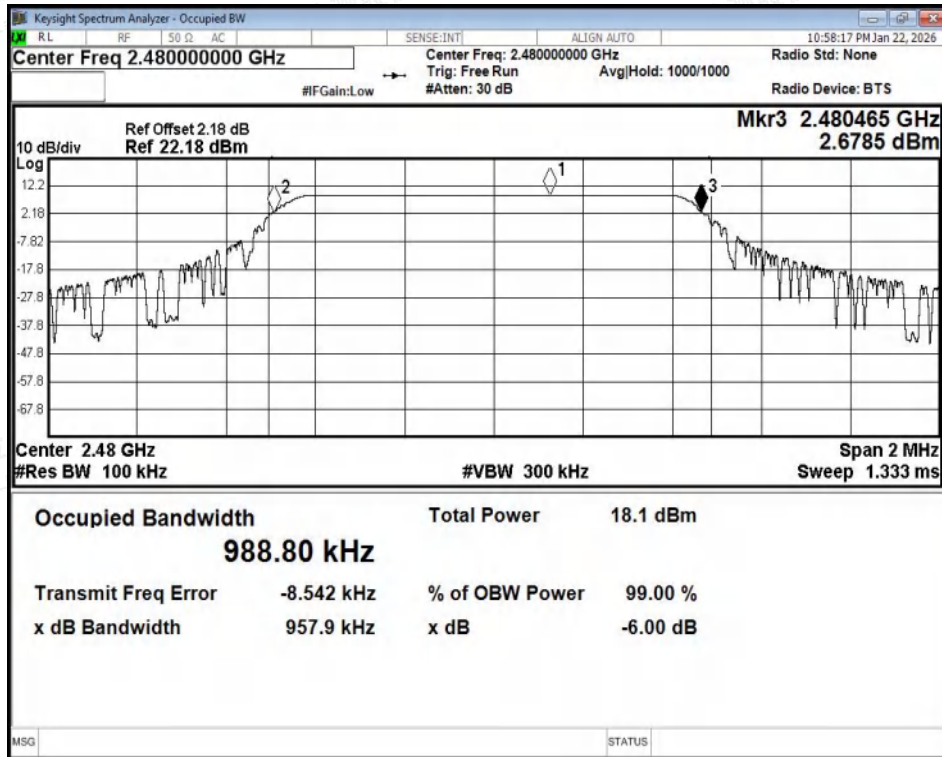


-6dB Bandwidth NVNT LoRa 2.4G_800kHz 2403MHz Ant1

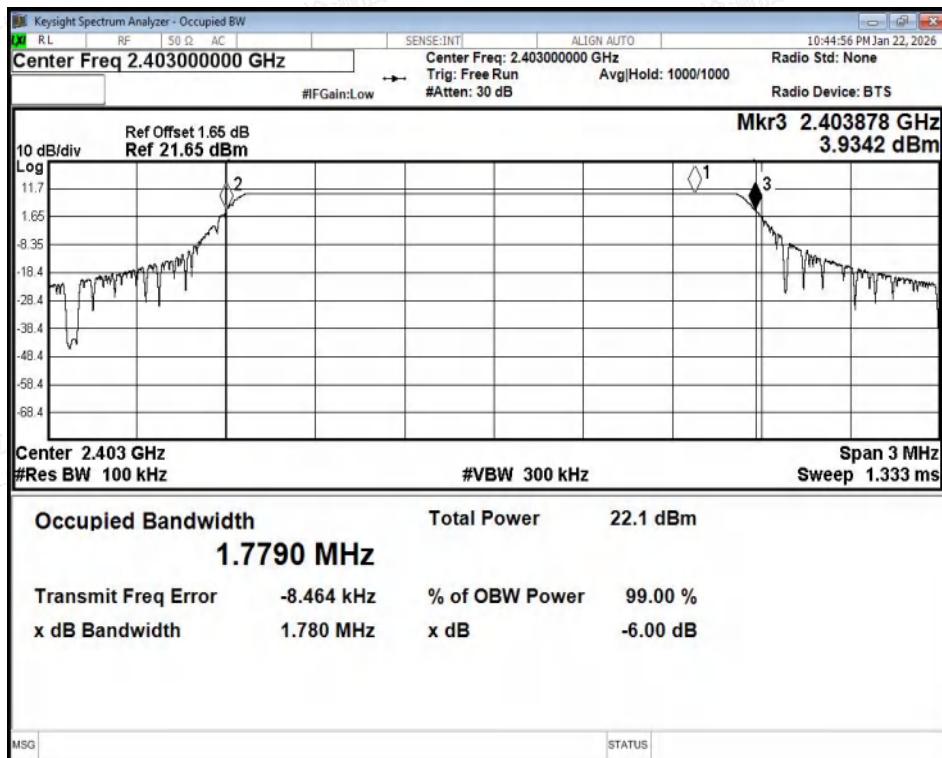


-6dB Bandwidth NVNT LoRa 2.4G_800kHz 2440MHz Ant1



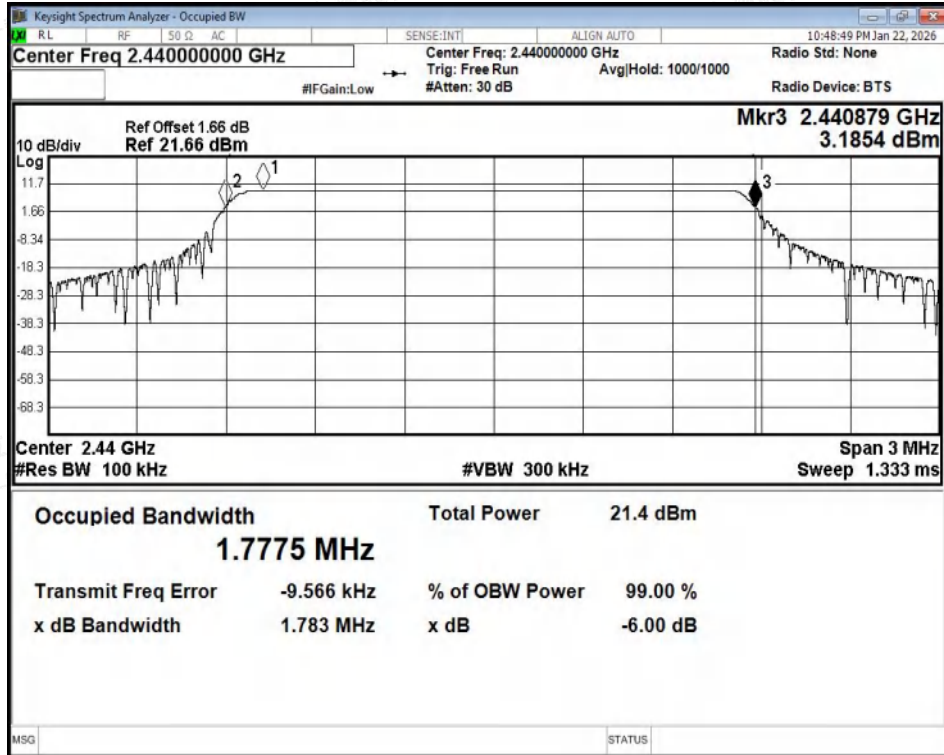


-6dB Bandwidth NVNT LoRa 2.4G_800kHz 2480MHz Ant1

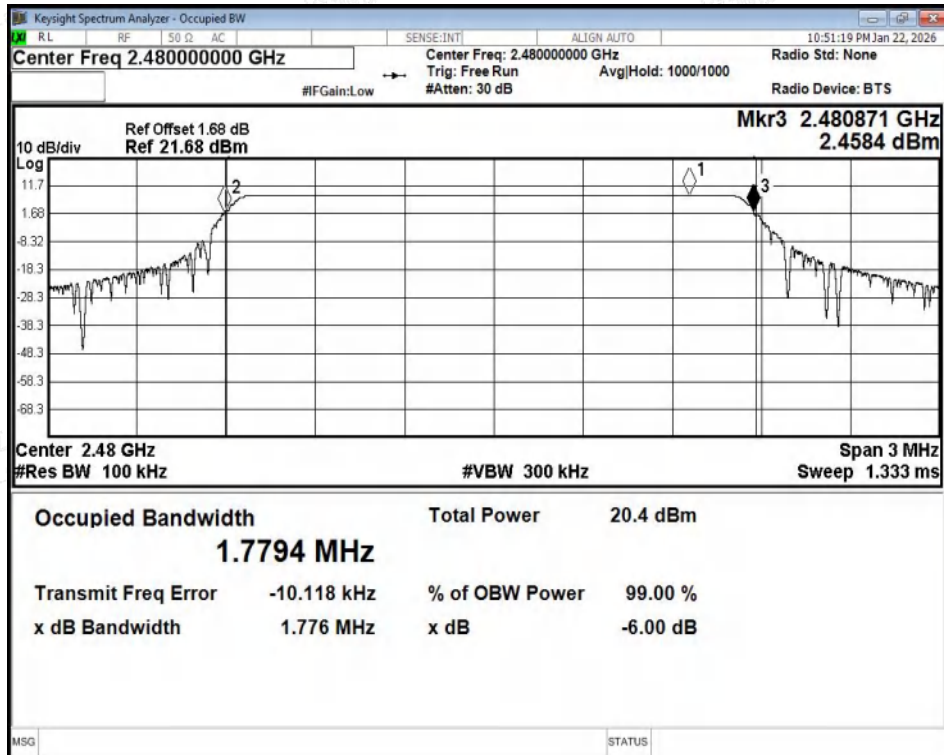


-6dB Bandwidth NVNT LoRa 2.4G_1600kHz 2403MHz Ant1





-6dB Bandwidth NVNT LoRa 2.4G_1600kHz 2440MHz Ant1



-6dB Bandwidth NVNT LoRa 2.4G_1600kHz 2480MHz Ant1

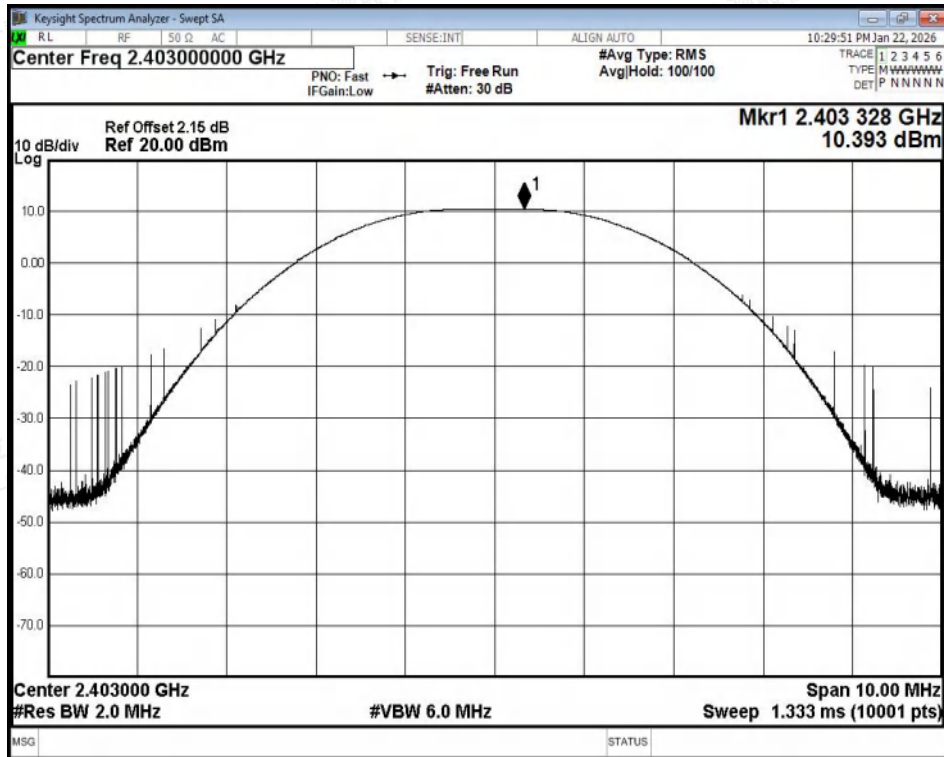




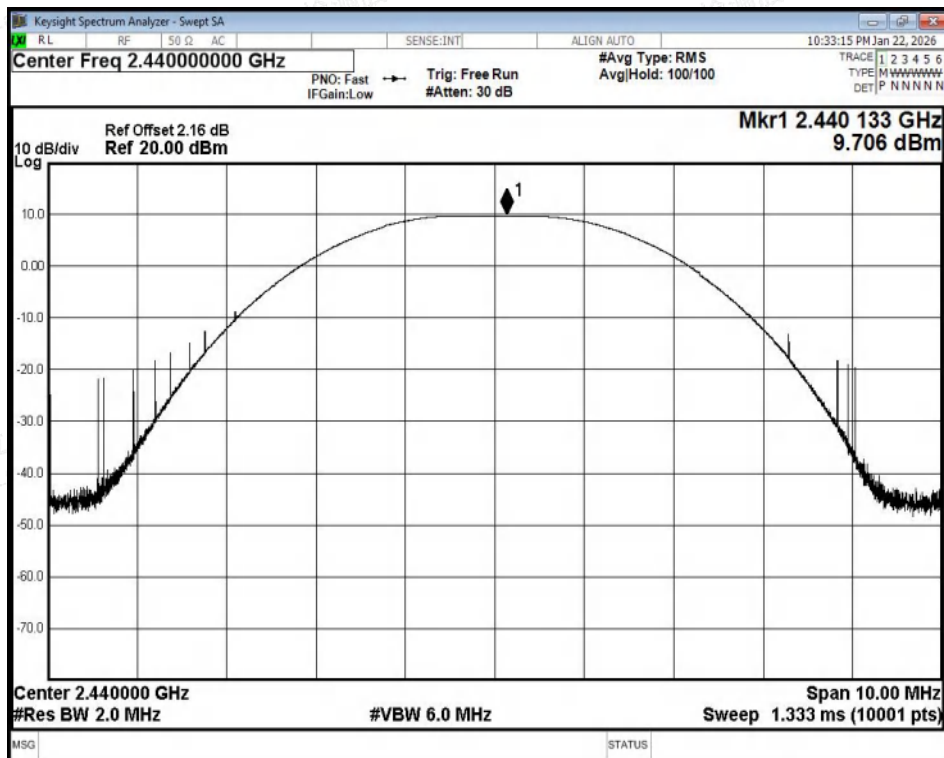
A.2 Maximum Peak Conducted Output Power

Condition	Mode	Frequency (MHz)	Antenna	Conducted Power (dBm)	Total Conducted Power (W)	Limit Conducted(dBm)	Verdict
NVNT	LoRa 2.4G_800kHz	2403	Ant1	10.39	0.01094	30	Pass
NVNT	LoRa 2.4G_800kHz	2440	Ant1	9.71	0.00935	30	Pass
NVNT	LoRa 2.4G_800kHz	2480	Ant1	8.71	0.00743	30	Pass
NVNT	LoRa 2.4G_1600kHz	2403	Ant1	9.91	0.00979	30	Pass
NVNT	LoRa 2.4G_1600kHz	2440	Ant1	9.20	0.00832	30	Pass
NVNT	LoRa 2.4G_1600kHz	2480	Ant1	8.18	0.00658	30	Pass



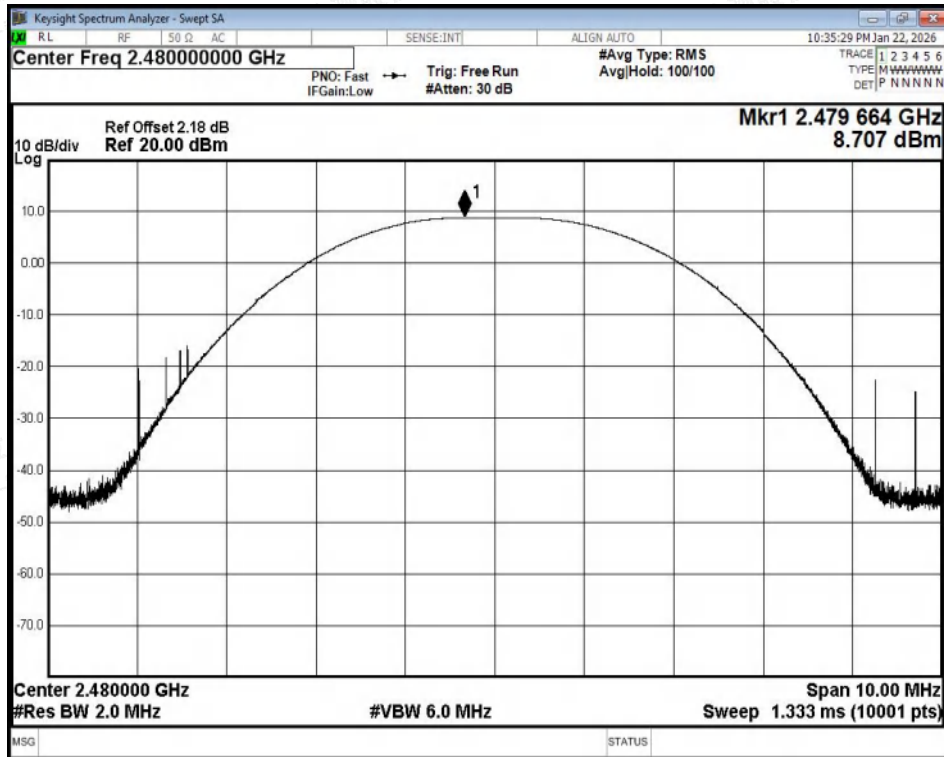


Peak Power NVNT LoRa 2.4G_800kHz 2403MHz Ant1

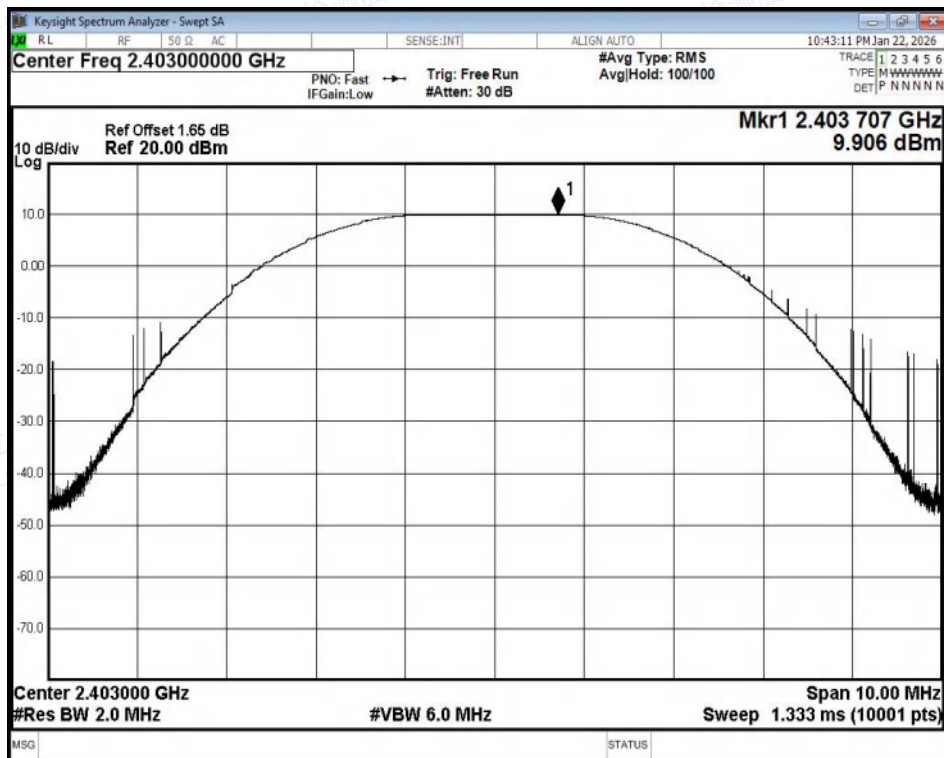


Peak Power NVNT LoRa 2.4G_800kHz 2440MHz Ant1



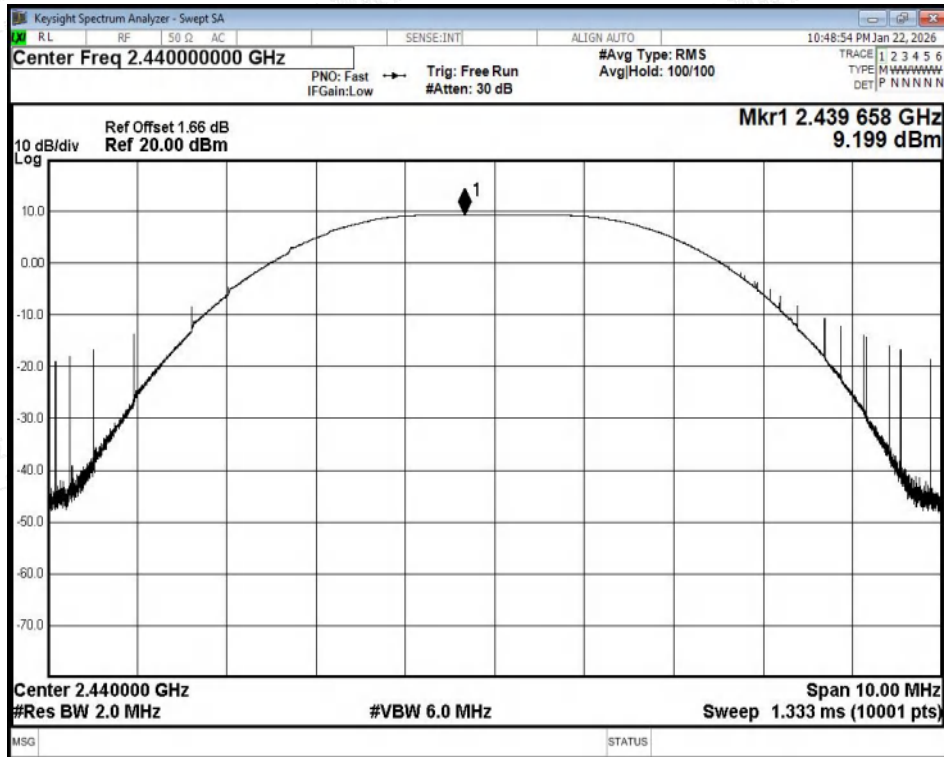


Peak Power NVNT LoRa 2.4G_800kHz 2480MHz Ant1

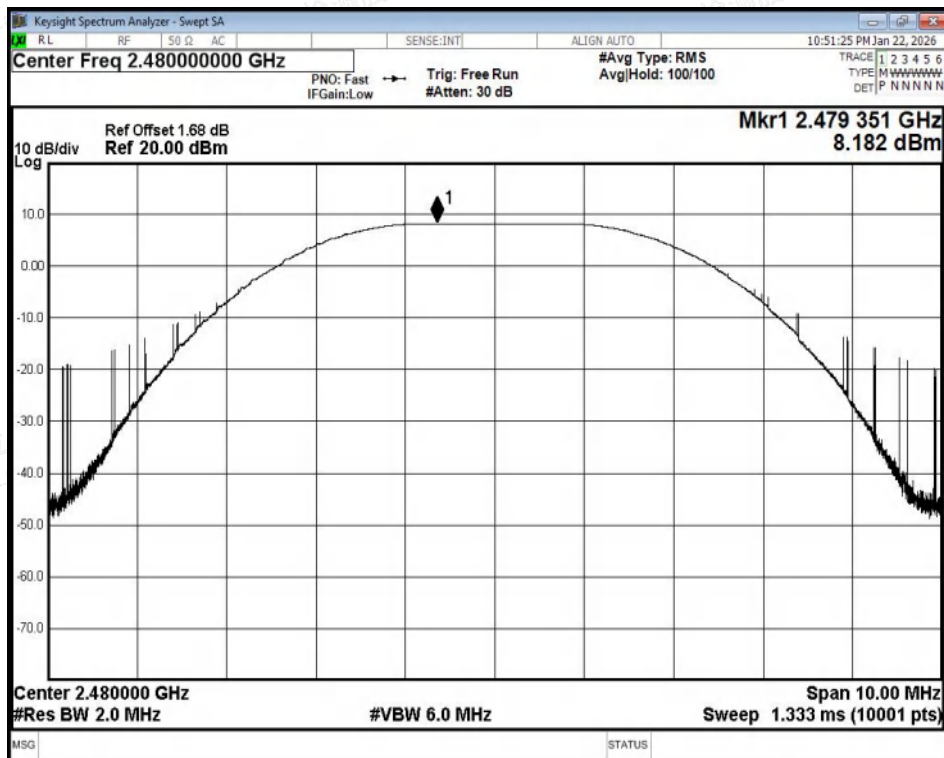


Peak Power NVNT LoRa 2.4G_1600kHz 2403MHz Ant1





Peak Power NVNT LoRa 2.4G_1600kHz 2440MHz Ant1



Peak Power NVNT LoRa 2.4G_1600kHz 2480MHz Ant1

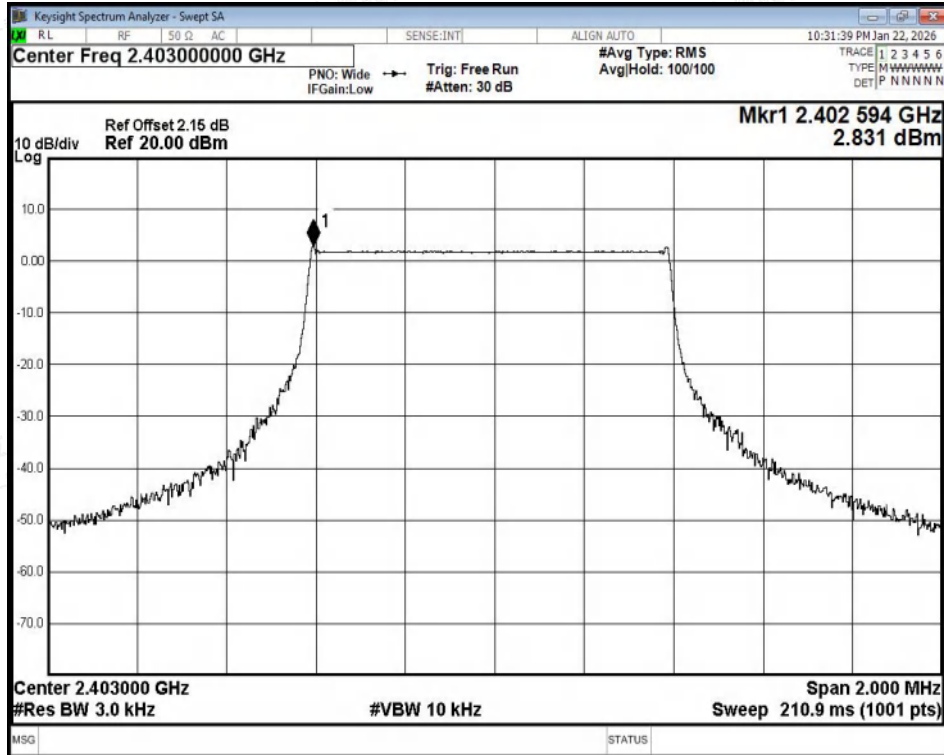




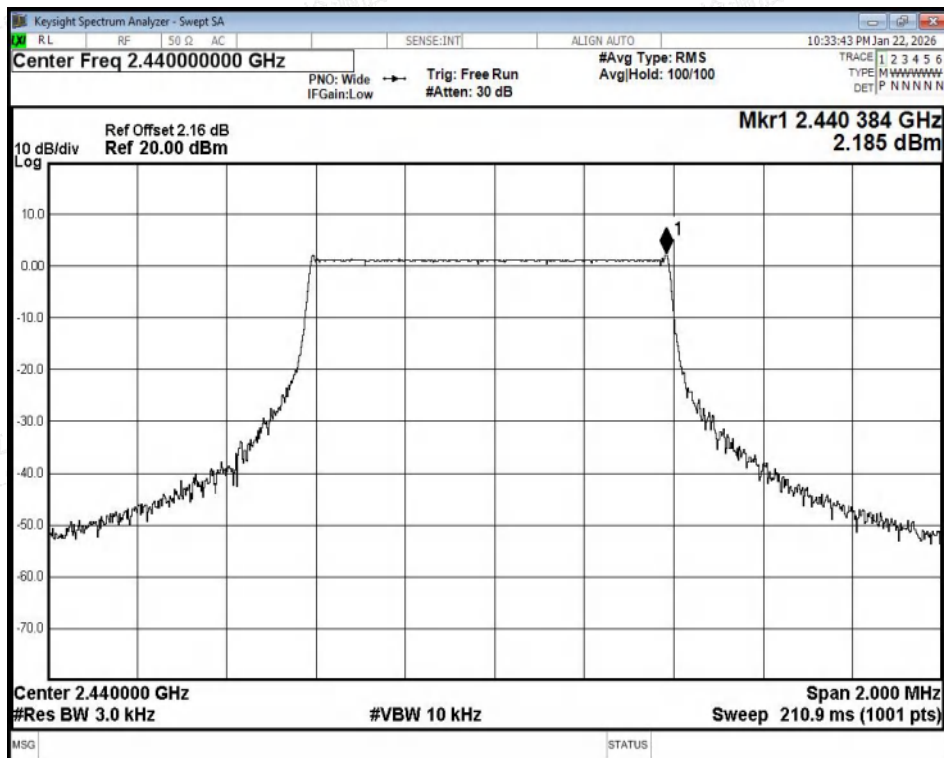
A.3 Maximum Power Spectral Density Level

Condition	Mode	Frequency (MHz)	Antenna	Conducted PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
NVNT	LoRa 2.4G_800kHz	2403	Ant1	2.83	8	Pass
NVNT	LoRa 2.4G_800kHz	2440	Ant1	2.19	8	Pass
NVNT	LoRa 2.4G_800kHz	2480	Ant1	1.25	8	Pass
NVNT	LoRa 2.4G_1600kHz	2403	Ant1	-3.55	8	Pass
NVNT	LoRa 2.4G_1600kHz	2440	Ant1	-4.18	8	Pass
NVNT	LoRa 2.4G_1600kHz	2480	Ant1	-5.22	8	Pass



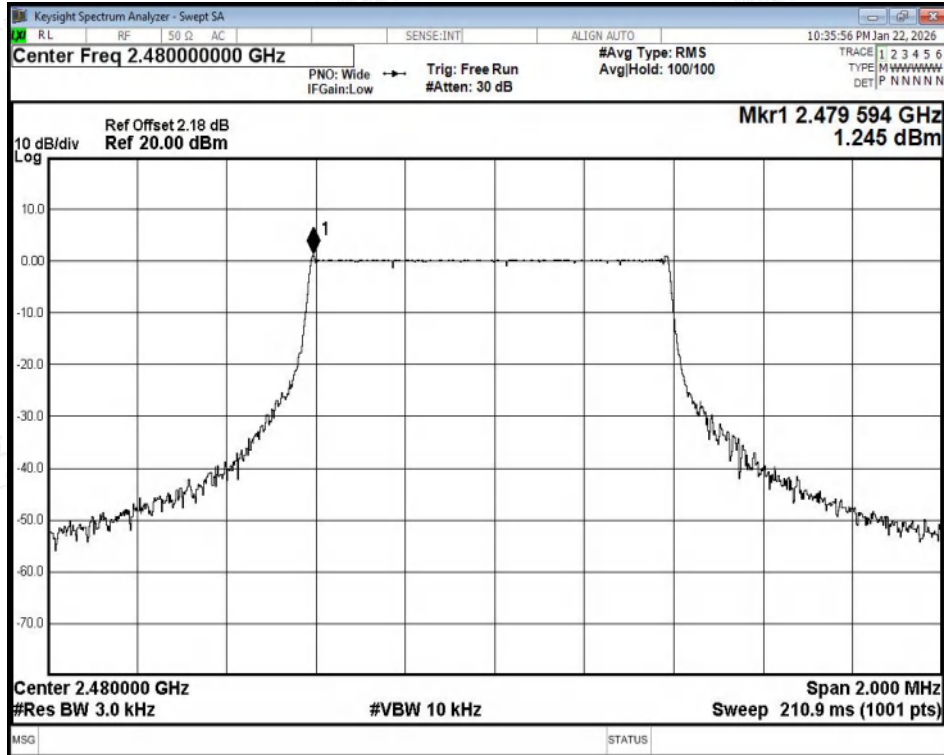


PSD NVNT LoRa 2.4G_800kHz 2403MHz Ant1

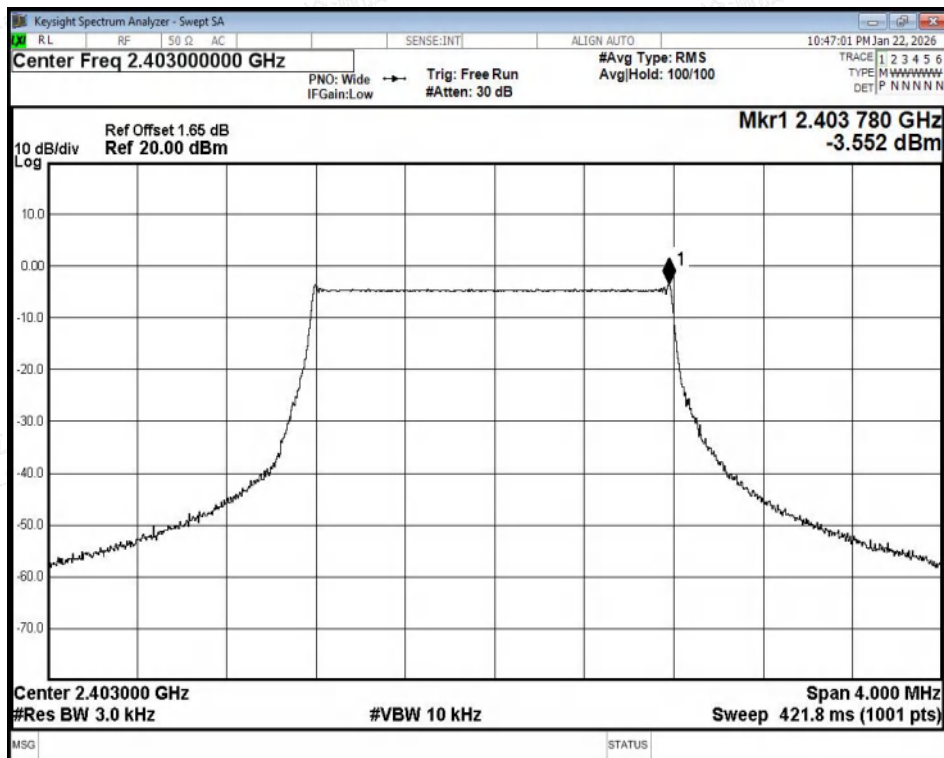


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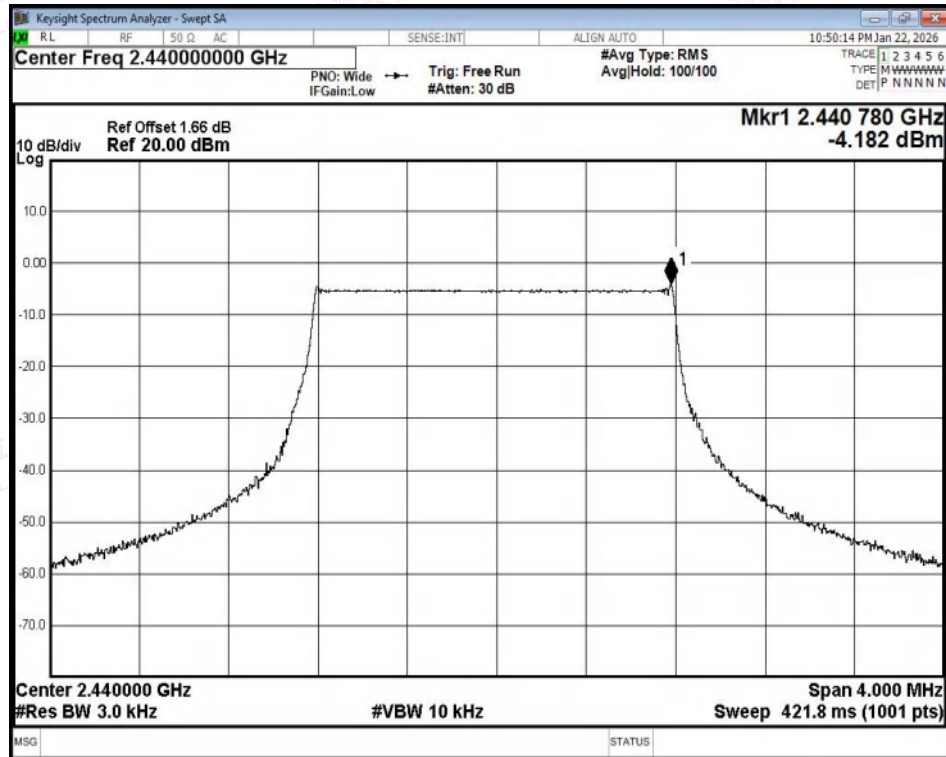


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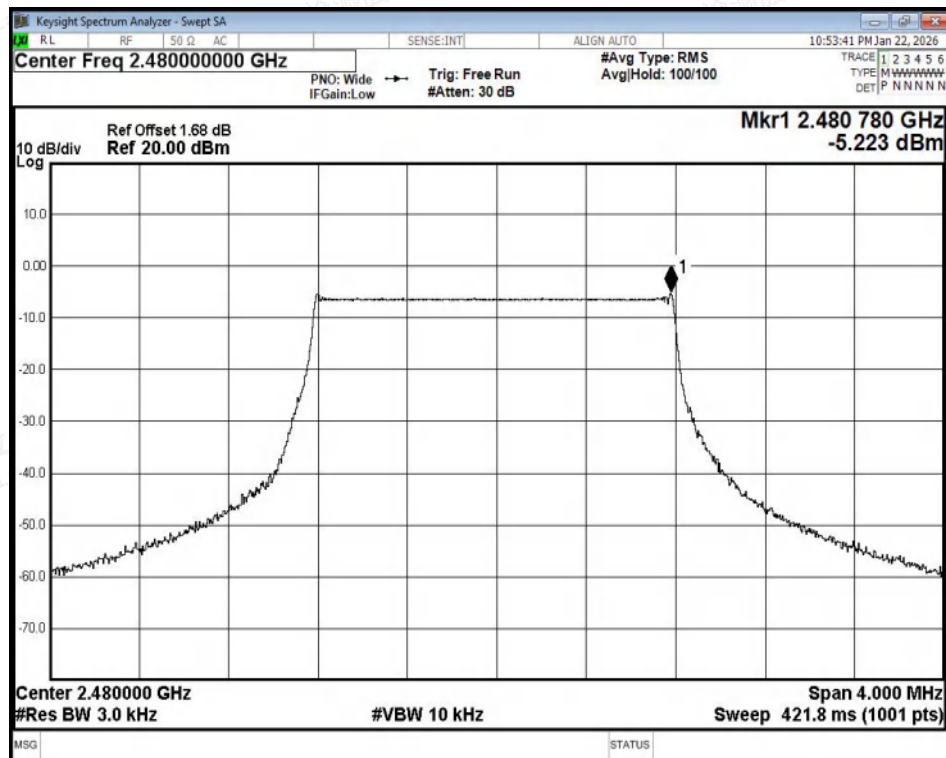


PSD NVNT LoRa 2.4G_1600kHz 2403MHz Ant1





PSD NVNT LoRa 2.4G_1600kHz 2440MHz Ant1



PSD NVNT LoRa 2.4G_1600kHz 2480MHz Ant1

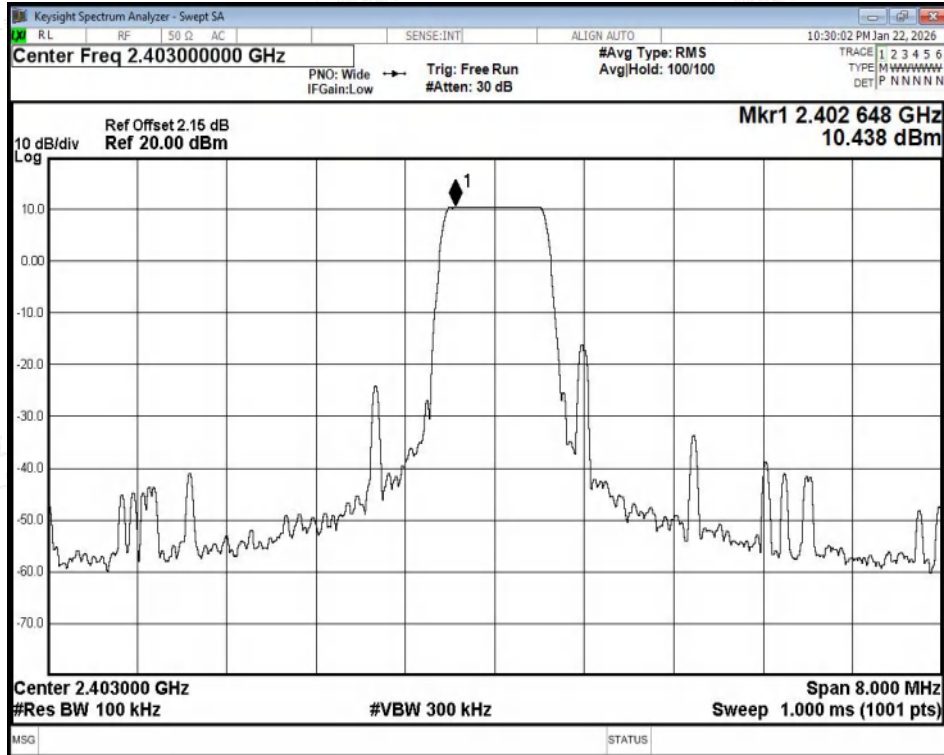




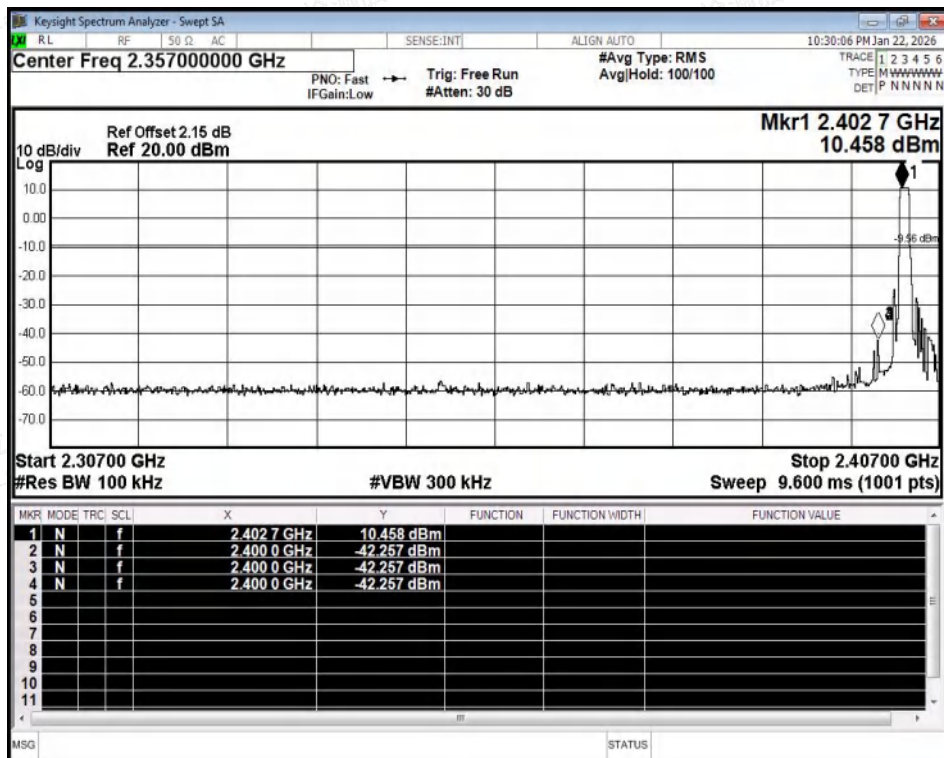
A.4 Band Edge

Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	LoRa 2.4G_800kHz	2403	Ant1	-52.69	-20	Pass
NVNT	LoRa 2.4G_800kHz	2480	Ant1	-56.78	-20	Pass
NVNT	LoRa 2.4G_1600kHz	2403	Ant1	-47.4	-20	Pass
NVNT	LoRa 2.4G_1600kHz	2480	Ant1	-50.43	-20	Pass





Band Edge NVNT LoRa 2.4G_800kHz 2403MHz Ant1 Ref



Band Edge NVNT LoRa 2.4G_800kHz 2403MHz Ant1 Emission

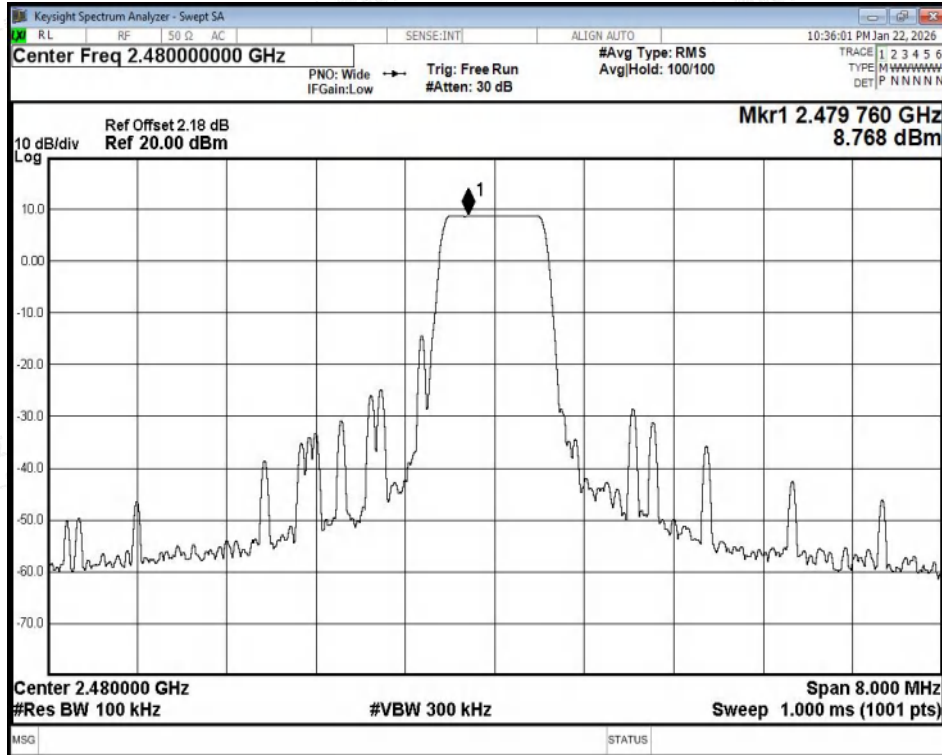


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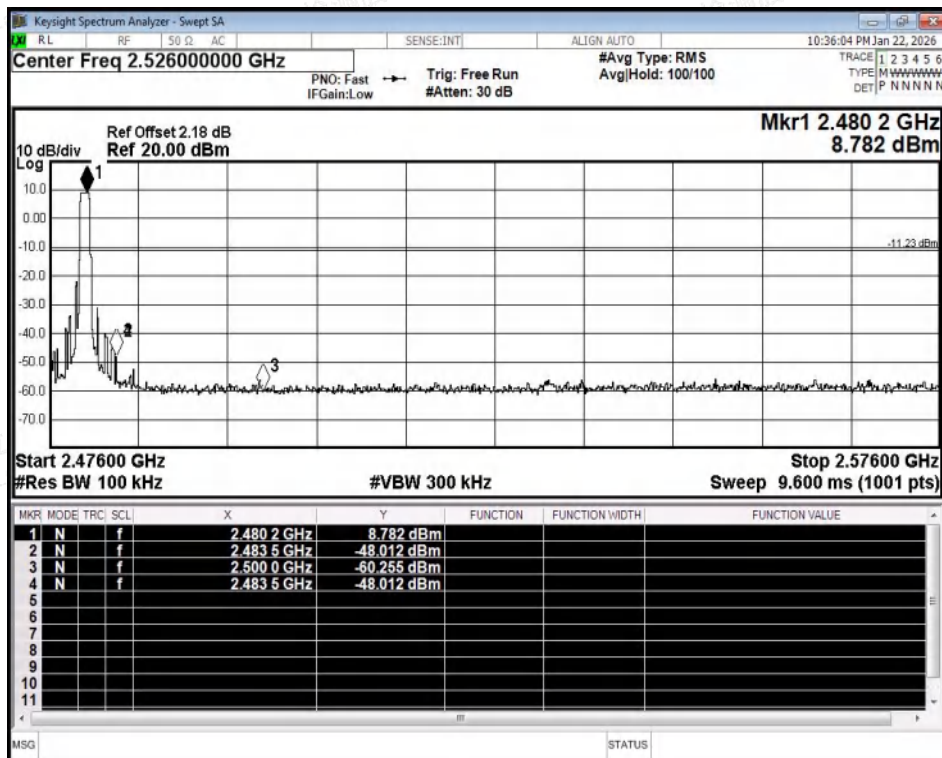
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Band Edge NVNT LoRa 2.4G_800kHz 2480MHz Ant1 Ref



Band Edge NVNT LoRa 2.4G_800kHz 2480MHz Ant1 Emission

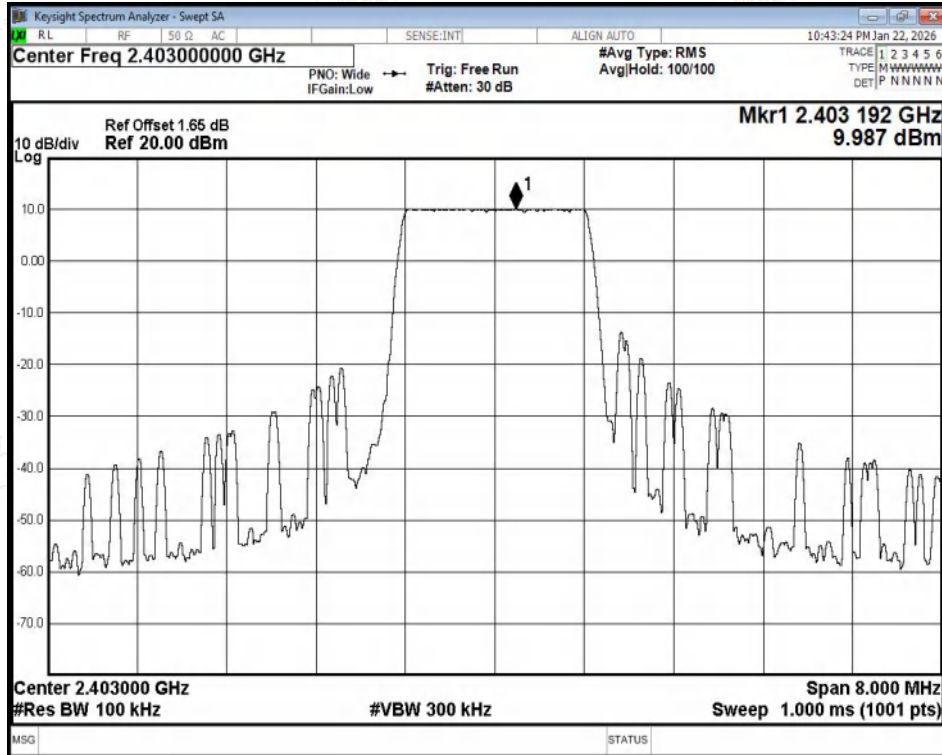


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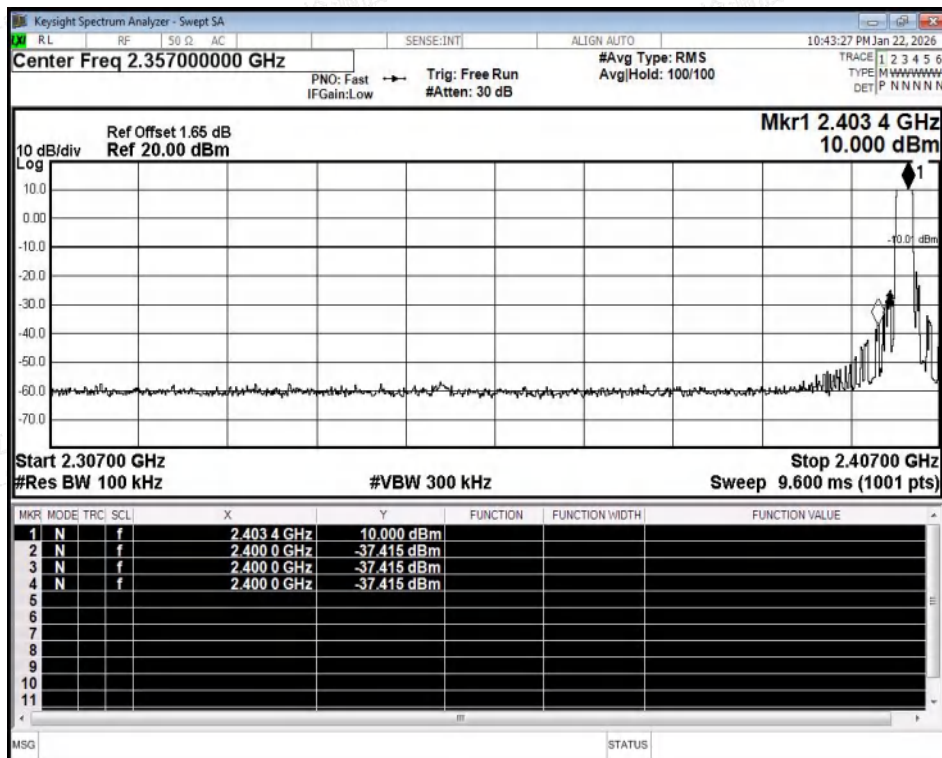
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Band Edge NVNT LoRa 2.4G_1600kHz 2403MHz Ant1 Emission

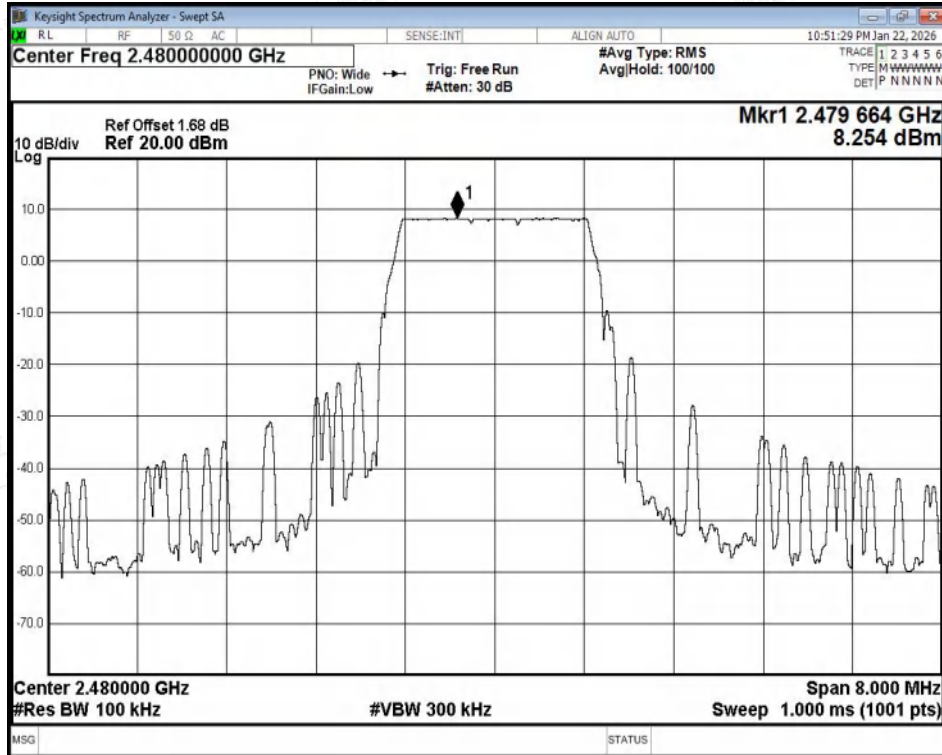


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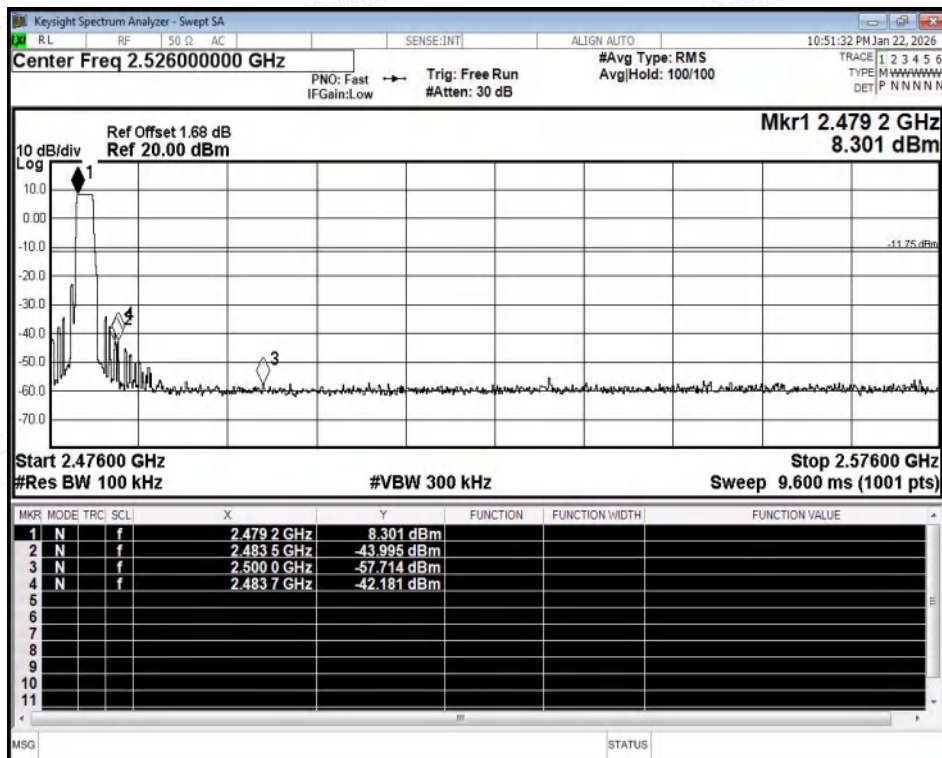
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Band Edge NVNT LoRa 2.4G_1600kHz 2480MHz Ant1 Emission



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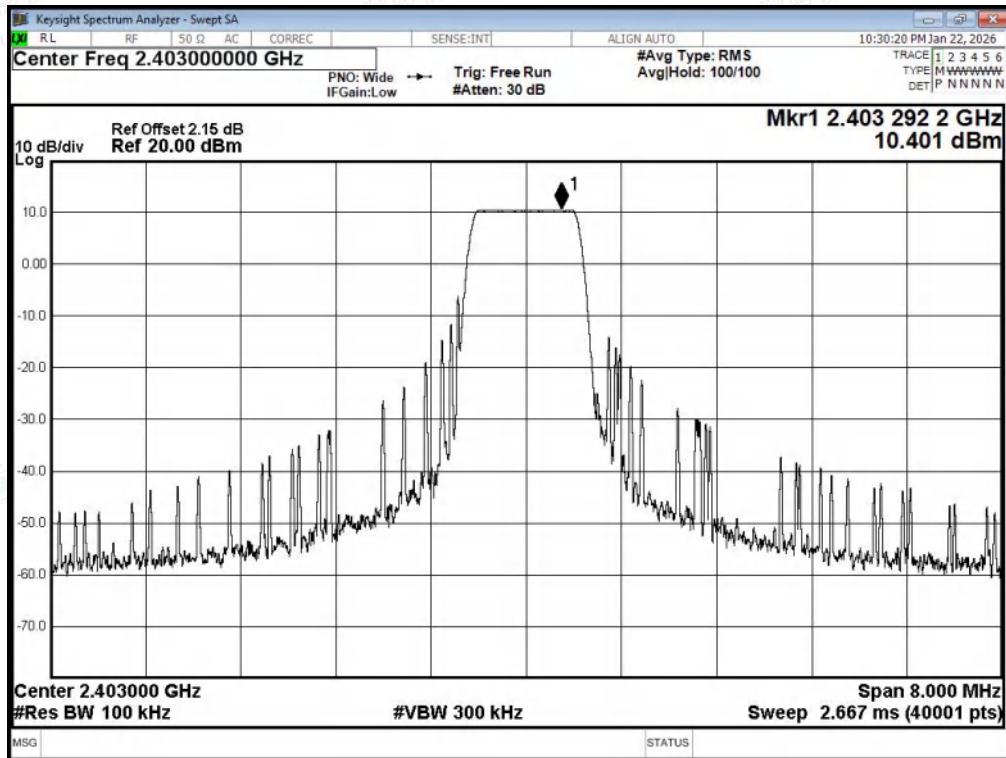
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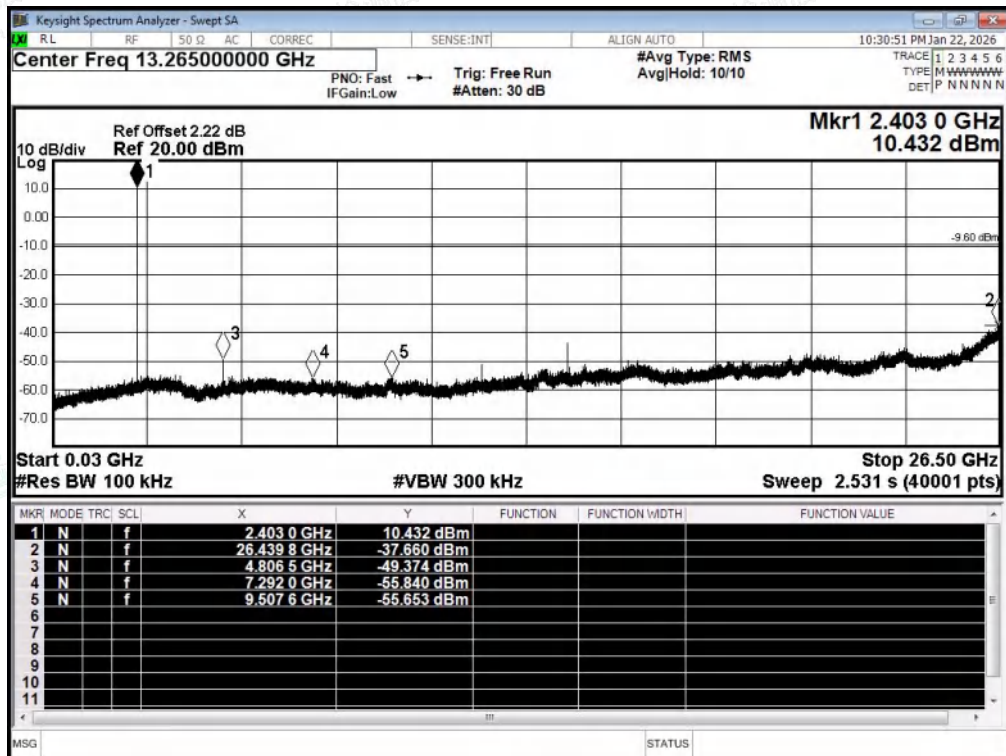
A.5 Conducted RF Spurious Emission

Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	LoRa 2.4G_800kHz	2403	Ant1	-48.06	-20	Pass
NVNT	LoRa 2.4G_800kHz	2440	Ant1	-48.26	-20	Pass
NVNT	LoRa 2.4G_800kHz	2480	Ant1	-46.88	-20	Pass
NVNT	LoRa 2.4G_1600kHz	2403	Ant1	-49.08	-20	Pass
NVNT	LoRa 2.4G_1600kHz	2440	Ant1	-47.83	-20	Pass
NVNT	LoRa 2.4G_1600kHz	2480	Ant1	-47.52	-20	Pass





Tx. Spurious NVNT LoRa 2.4G_800kHz 2403MHz Ant1 Ref



Tx. Spurious NVNT LoRa 2.4G_800kHz 2403MHz Ant1 Emission

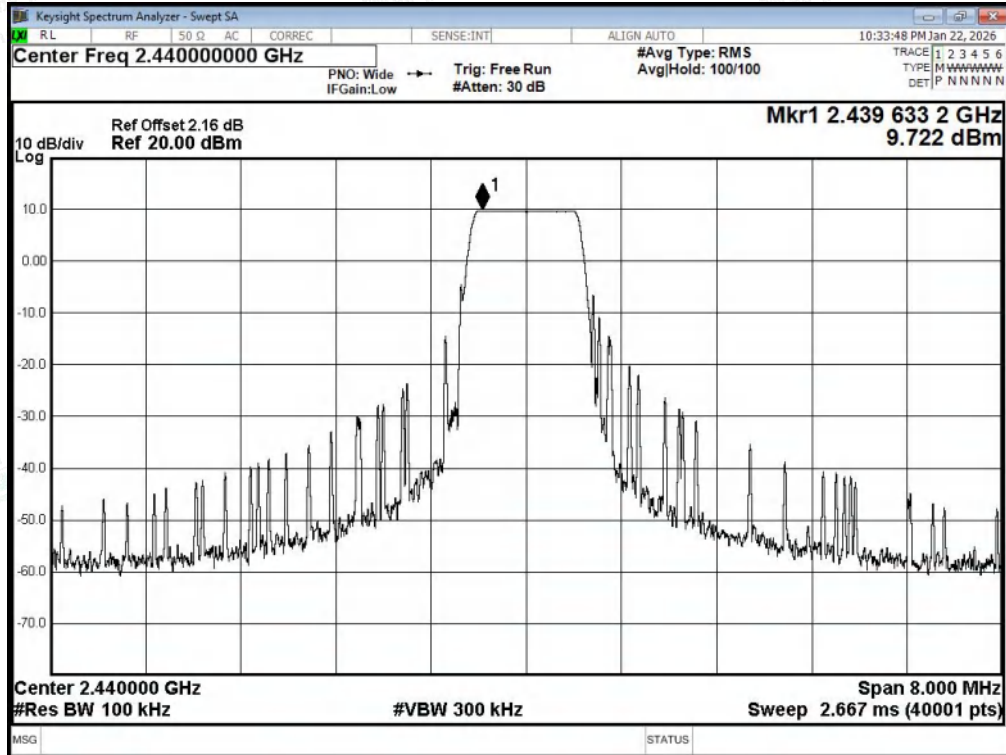


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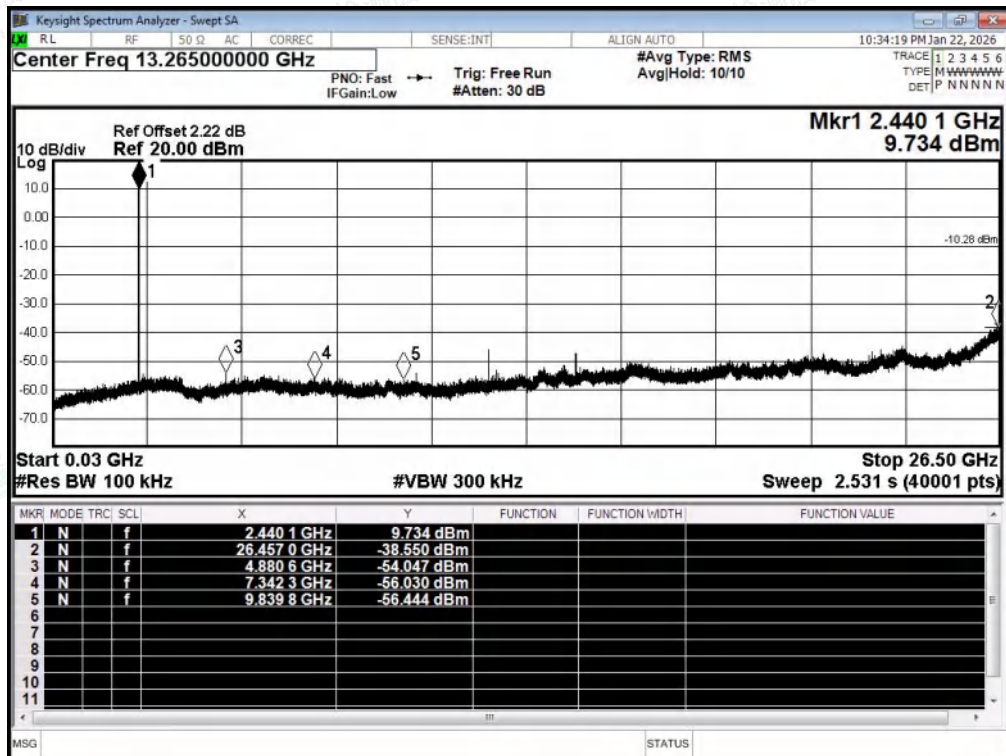
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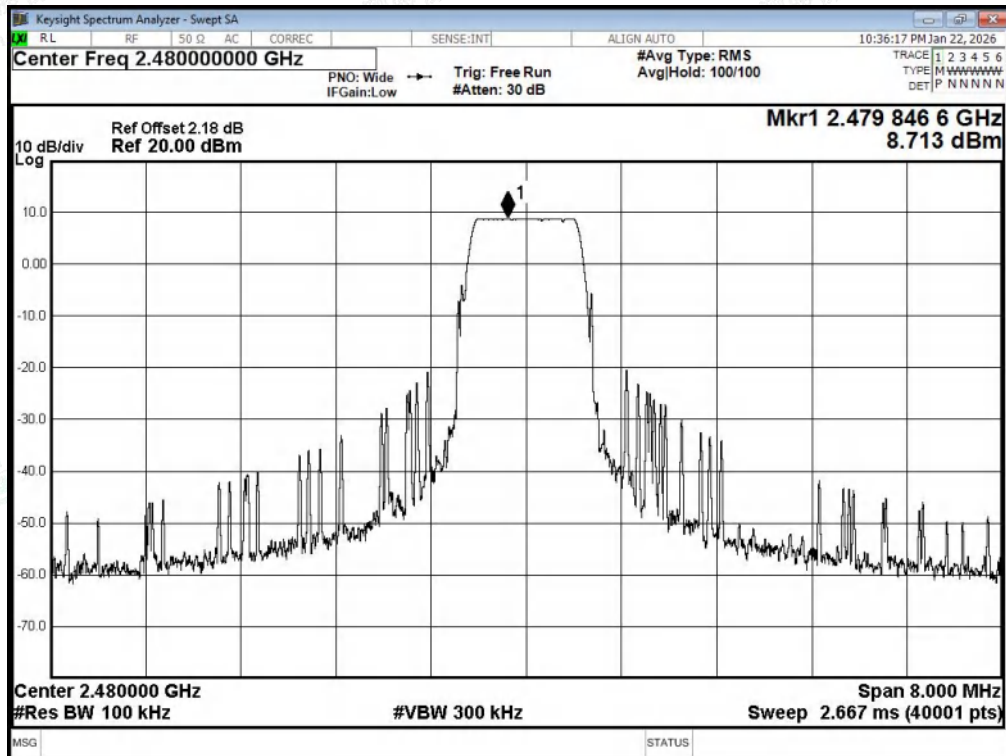


Tx. Spurious NVNT LoRa 2.4G_800kHz 2440MHz Ant1 Ref

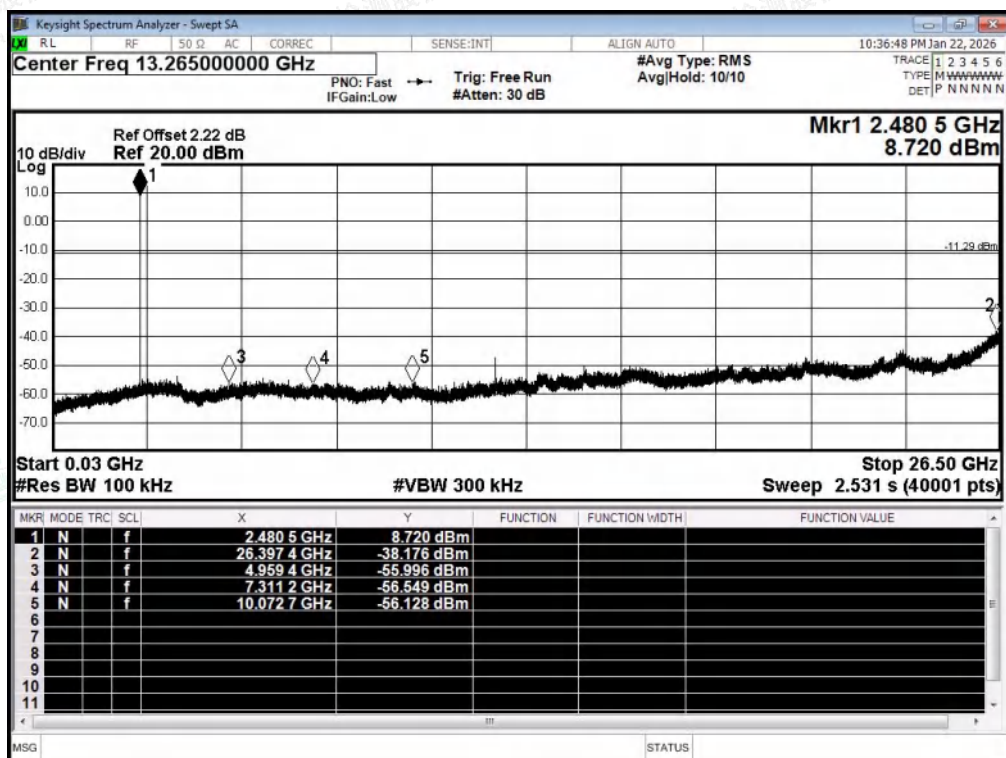


Tx. Spurious NVNT LoRa 2.4G_800kHz 2440MHz Ant1 Emission





Tx. Spurious NVNT LoRa 2.4G_800kHz 2480MHz Ant1 Ref



Tx. Spurious NVNT LoRa 2.4G_800kHz 2480MHz Ant1 Emission

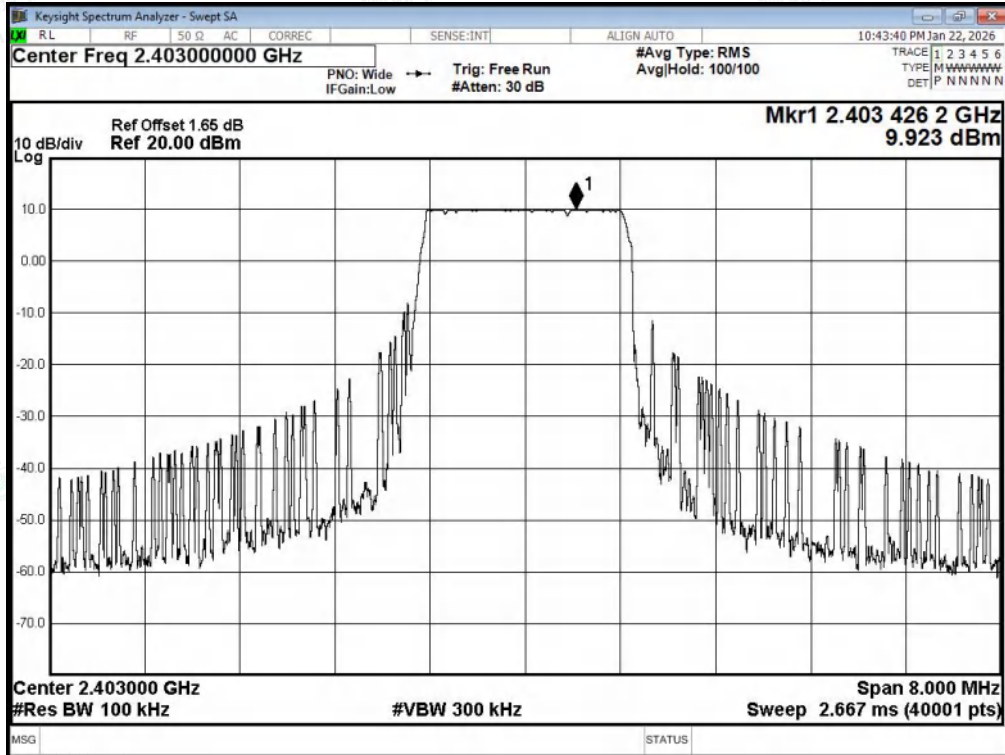


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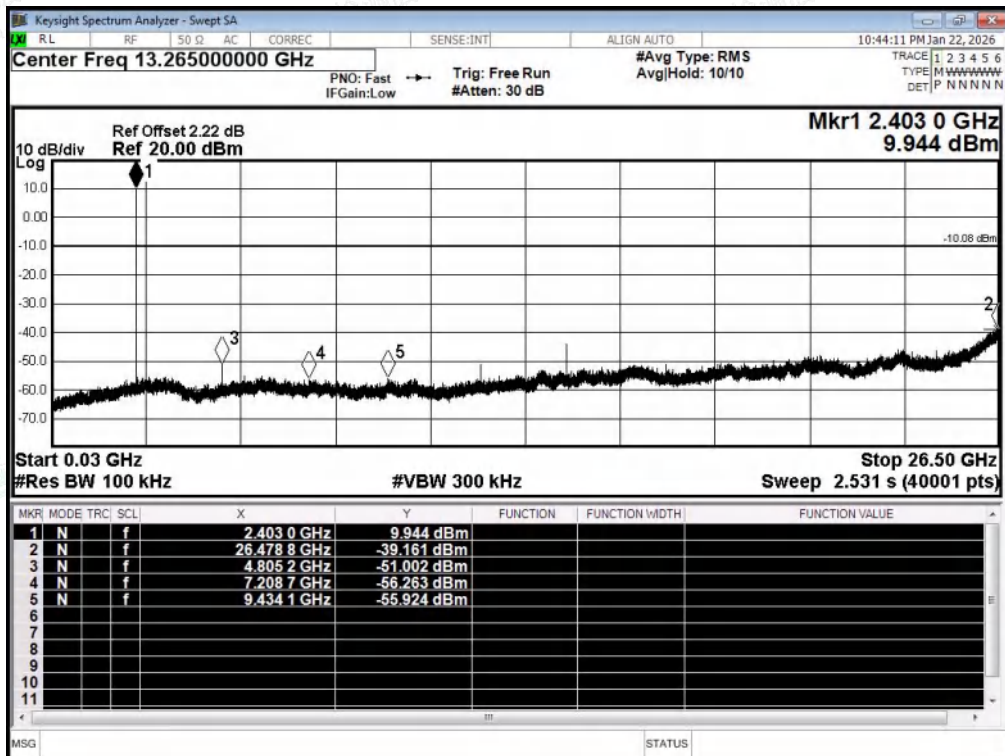
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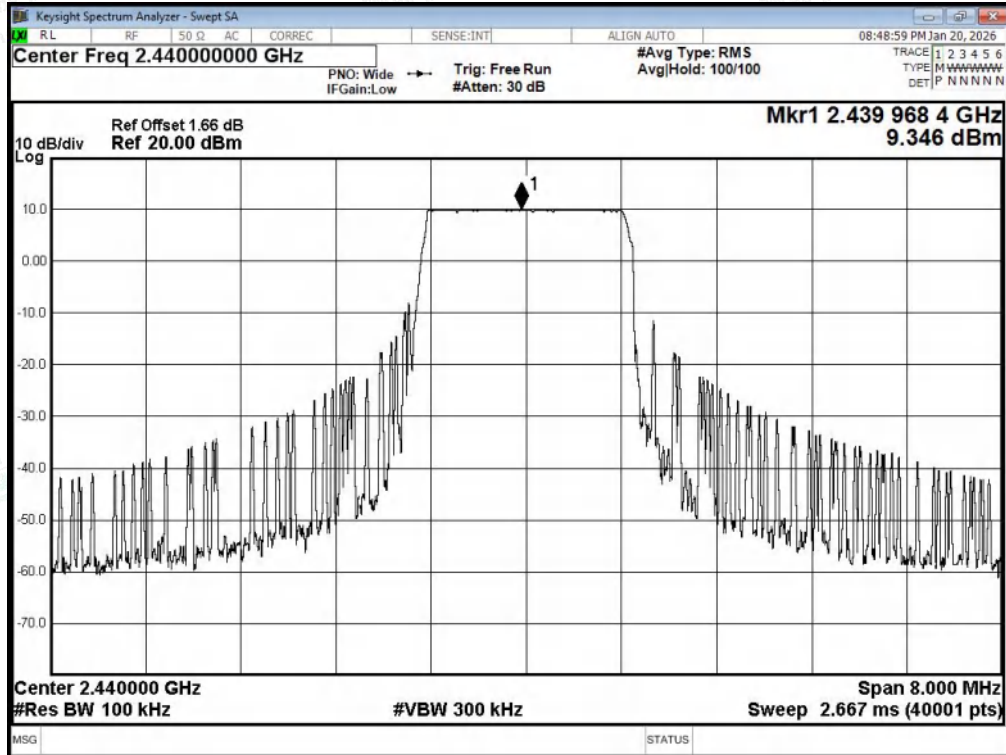


Tx. Spurious NVNT LoRa 2.4G_1600kHz 2403MHz Ant1 Ref

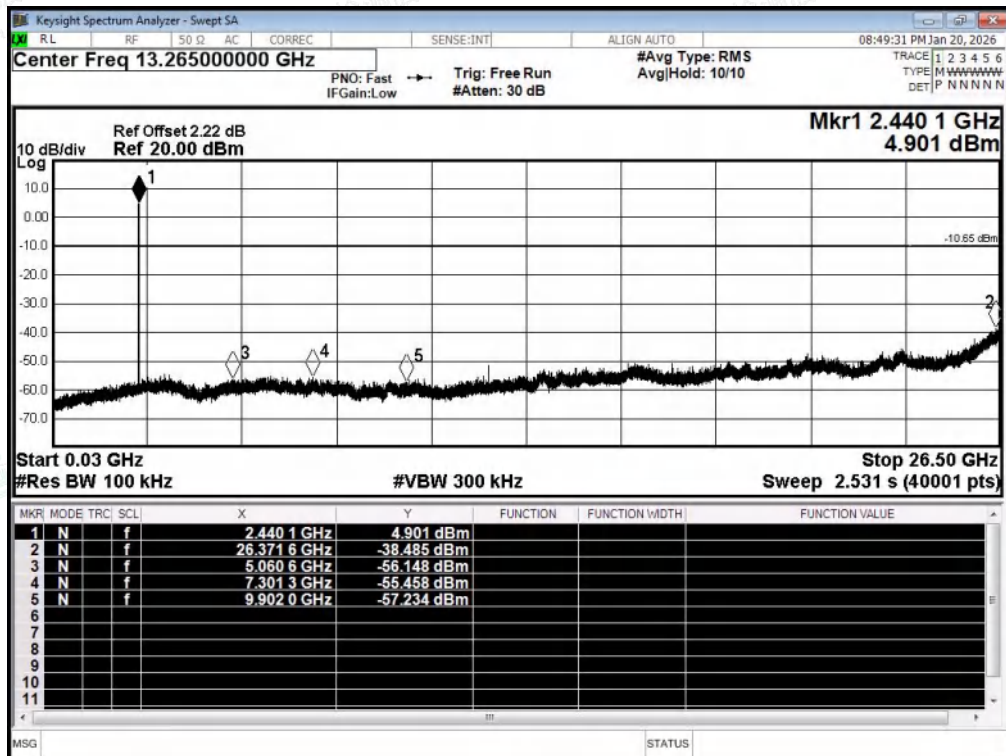


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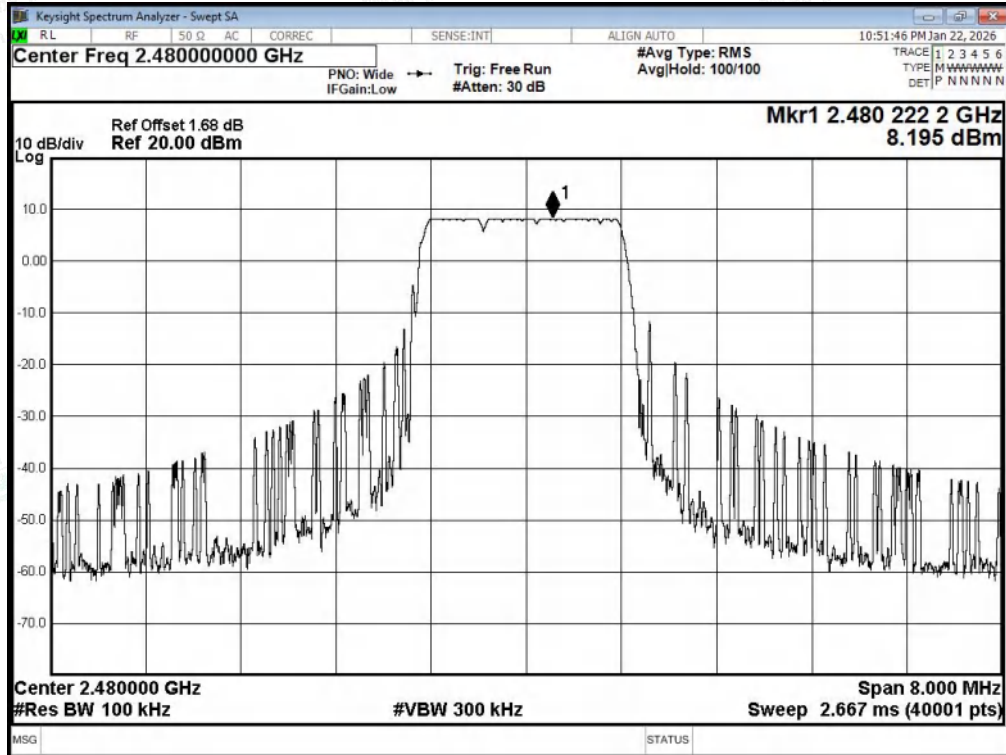


Tx. Spurious NVNT LoRa 2.4G_1600kHz 2440MHz Ant1 Ref

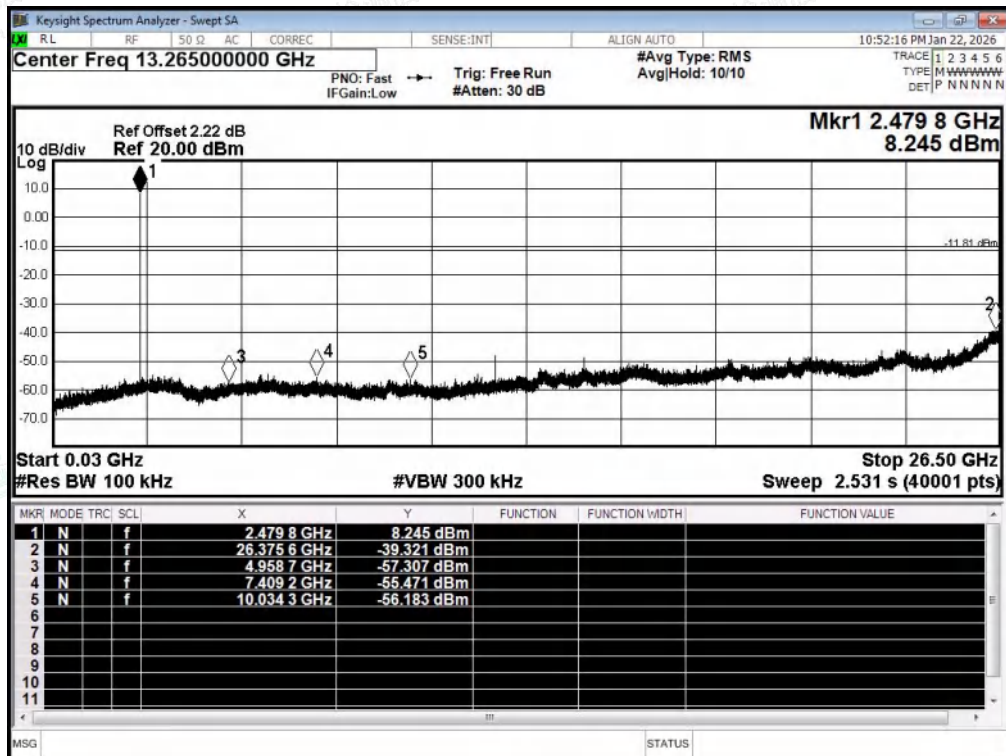


Tx. Spurious NVNT LoRa 2.4G_1600kHz 2440MHz Ant1 Emission





Tx. Spurious NVNT LoRa 2.4G_1600kHz 2480MHz Ant1 Ref



Tx. Spurious NVNT LoRa 2.4G_1600kHz 2480MHz Ant1 Emission





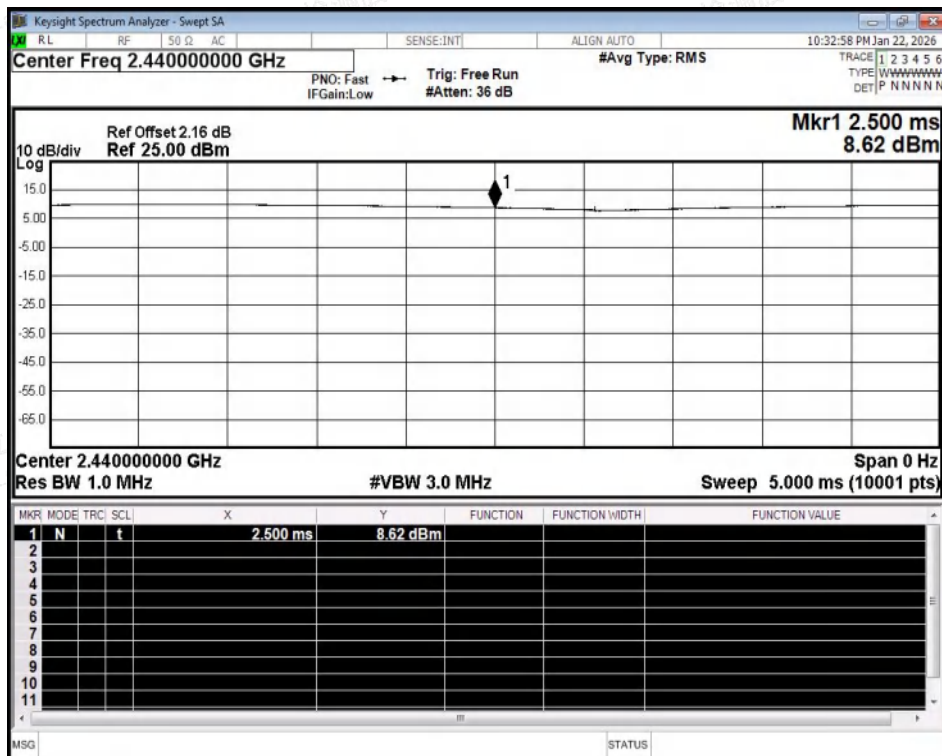
A.6 Duty Cycle

Condition	Mode	Frequency (MHz)	Antenna	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	LoRa 2.4G_800kHz	2403	Ant1	100	0	0
NVNT	LoRa 2.4G_800kHz	2440	Ant1	100	0	0
NVNT	LoRa 2.4G_800kHz	2480	Ant1	100	0	0
NVNT	LoRa 2.4G_1600kHz	2403	Ant1	100	0	0
NVNT	LoRa 2.4G_1600kHz	2440	Ant1	100	0	0
NVNT	LoRa 2.4G_1600kHz	2480	Ant1	100	0	0





Duty Cycle NVNT LoRa 2.4G_800kHz 2403MHz Ant1

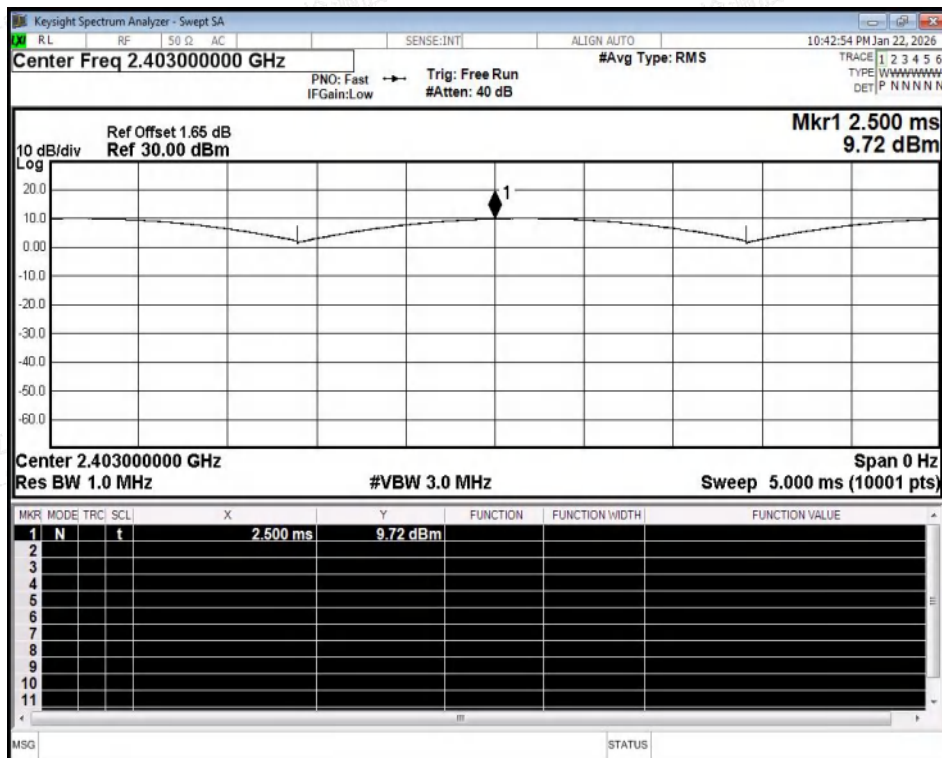


Duty Cycle NVNT LoRa 2.4G_800kHz 2440MHz Ant1





Duty Cycle NVNT LoRa 2.4G_800kHz 2480MHz Ant1



Duty Cycle NVNT LoRa 2.4G_1600kHz 2403MHz Ant1

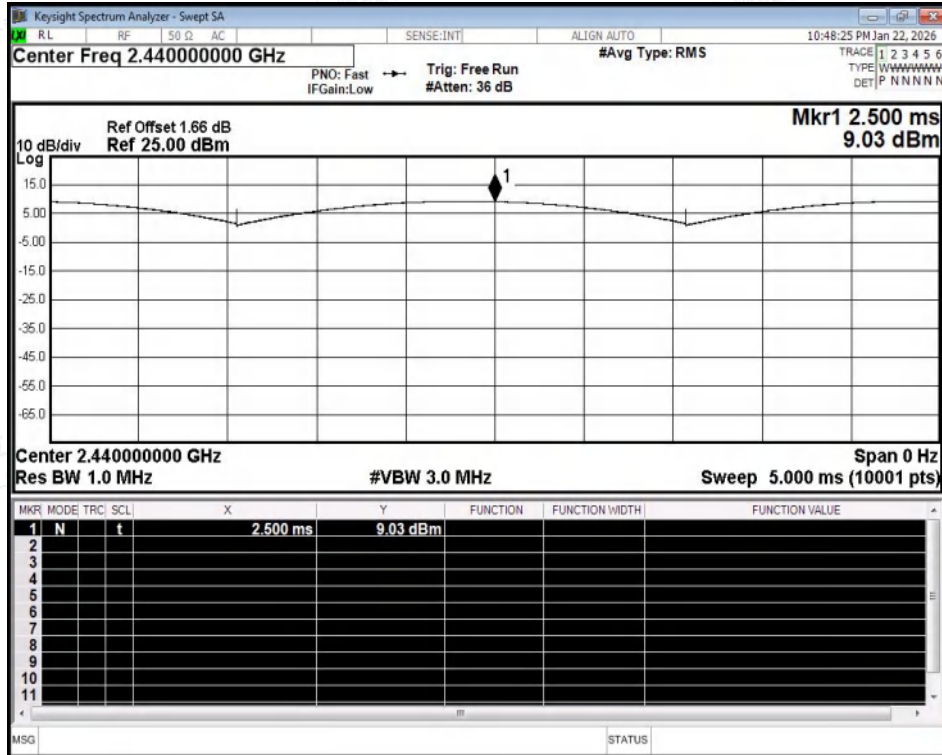


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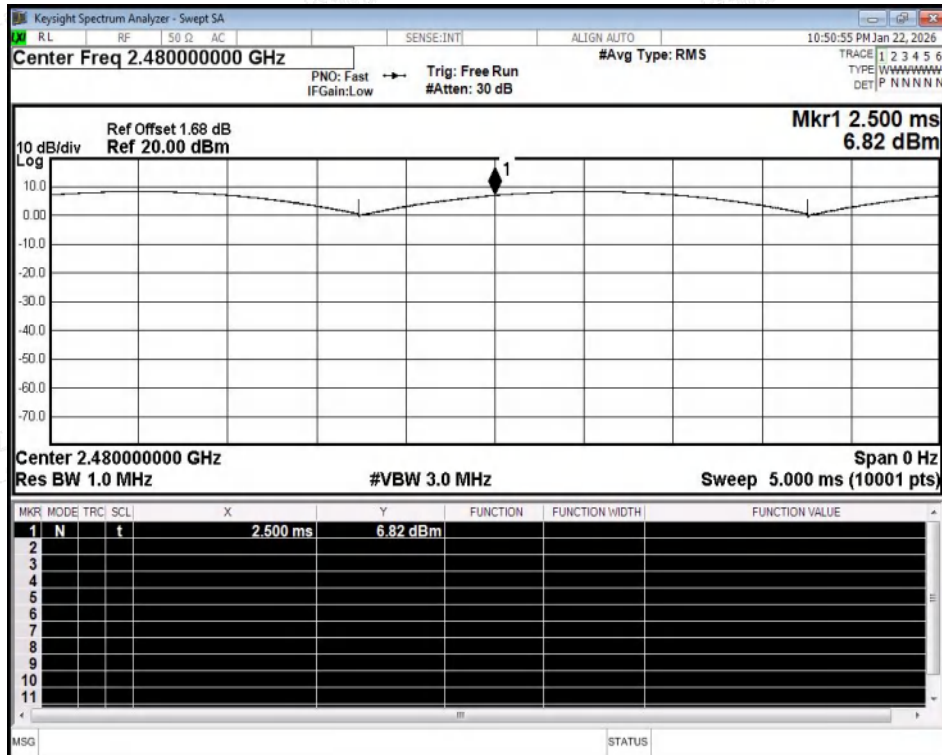
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Duty Cycle NVNT LoRa 2.4G_1600kHz 2440MHz Ant1



Duty Cycle NVNT LoRa 2.4G_1600kHz 2480MHz Ant1



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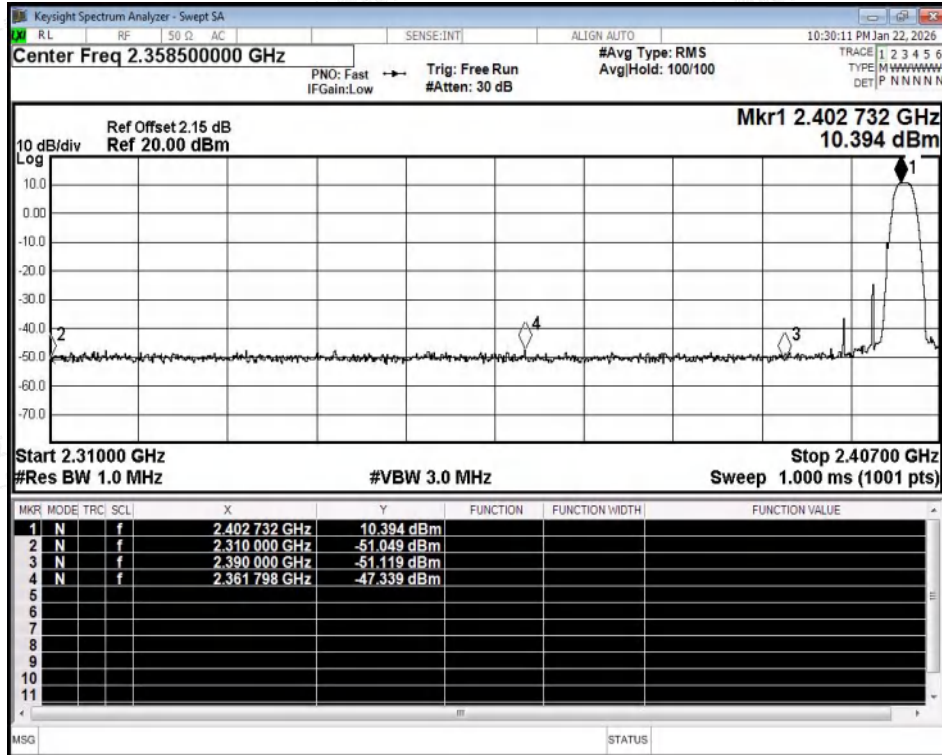
A.7 Restrict Band

Condition	Mode	Frequency (MHz)	Antenna	Spur Freq (MHz)	Power (dBm)	Gain (dBi)	E (dBuV/m)	Detector	Limit (dBuV/m)	Verdict
NVNT	LoRa 2.4G_800kHz	2403	Ant1	2310	-51.04	2.15	46.37	Peak	74	Pass
NVNT	LoRa 2.4G_800kHz	2403	Ant1	2310	-57.5	2.15	39.91	Average	54	Pass
NVNT	LoRa 2.4G_800kHz	2403	Ant1	2361.798	-47.33	2.15	50.08	Peak	74	Pass
NVNT	LoRa 2.4G_800kHz	2403	Ant1	2351.128	-55.88	2.15	41.53	Average	54	Pass
NVNT	LoRa 2.4G_800kHz	2403	Ant1	2390	-51.11	2.15	46.3	Peak	74	Pass
NVNT	LoRa 2.4G_800kHz	2403	Ant1	2390	-57.19	2.15	40.22	Average	54	Pass
NVNT	LoRa 2.4G_800kHz	2480	Ant1	2483.5	-48.07	2.15	49.34	Peak	74	Pass
NVNT	LoRa 2.4G_800kHz	2480	Ant1	2483.5	-47.73	2.15	49.68	Average	54	Pass
NVNT	LoRa 2.4G_800kHz	2480	Ant1	2484.568	-31.93	2.15	65.48	Peak	74	Pass
NVNT	LoRa 2.4G_800kHz	2480	Ant1	2483.512	-47.73	2.15	49.68	Average	54	Pass
NVNT	LoRa 2.4G_800kHz	2480	Ant1	2500	-47.84	2.15	49.57	Peak	74	Pass
NVNT	LoRa 2.4G_800kHz	2480	Ant1	2500	-56.74	2.15	40.67	Average	54	Pass
NVNT	LoRa 2.4G_1600kHz	2403	Ant1	2310	-49.26	2.15	48.15	Peak	74	Pass
NVNT	LoRa 2.4G_1600kHz	2403	Ant1	2310	-57.93	2.15	39.48	Average	54	Pass
NVNT	LoRa 2.4G_1600kHz	2403	Ant1	2389.443	-42.74	2.15	54.67	Peak	74	Pass
NVNT	LoRa 2.4G_1600kHz	2403	Ant1	2351.225	-56.39	2.15	41.02	Average	54	Pass
NVNT	LoRa 2.4G_1600kHz	2403	Ant1	2390	-47.35	2.15	50.06	Peak	74	Pass
NVNT	LoRa 2.4G_1600kHz	2403	Ant1	2390	-57.51	2.15	39.9	Average	54	Pass
NVNT	LoRa 2.4G_1600kHz	2480	Ant1	2483.5	-48.73	2.15	48.68	Peak	74	Pass
NVNT	LoRa 2.4G_1600kHz	2480	Ant1	2483.5	-43.92	2.15	53.49	Average	54	Pass
NVNT	LoRa 2.4G_1600kHz	2480	Ant1	2484.472	-28.19	2.15	69.22	Peak	74	Pass
NVNT	LoRa 2.4G_1600kHz	2480	Ant1	2483.512	-43.92	2.15	53.49	Average	54	Pass
NVNT	LoRa 2.4G_1600kHz	2480	Ant1	2500	-49.81	2.15	47.6	Peak	74	Pass
NVNT	LoRa 2.4G_1600kHz	2480	Ant1	2500	-57.52	2.15	39.89	Average	54	Pass

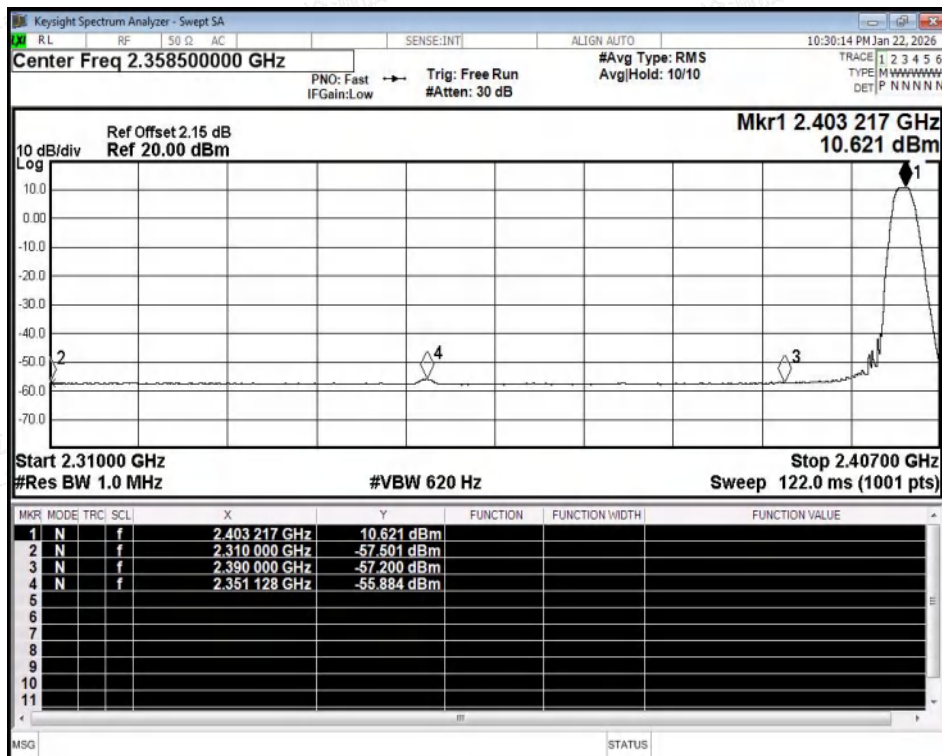
Note: For restrict band, only maximum antenna gain recorded in this report



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Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China
Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com
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Restrict Band NVNT LoRa 2.4G_800kHz 2403MHz Ant1 Peak



Restrict Band NVNT LoRa 2.4G_800kHz 2403MHz Ant1 Average

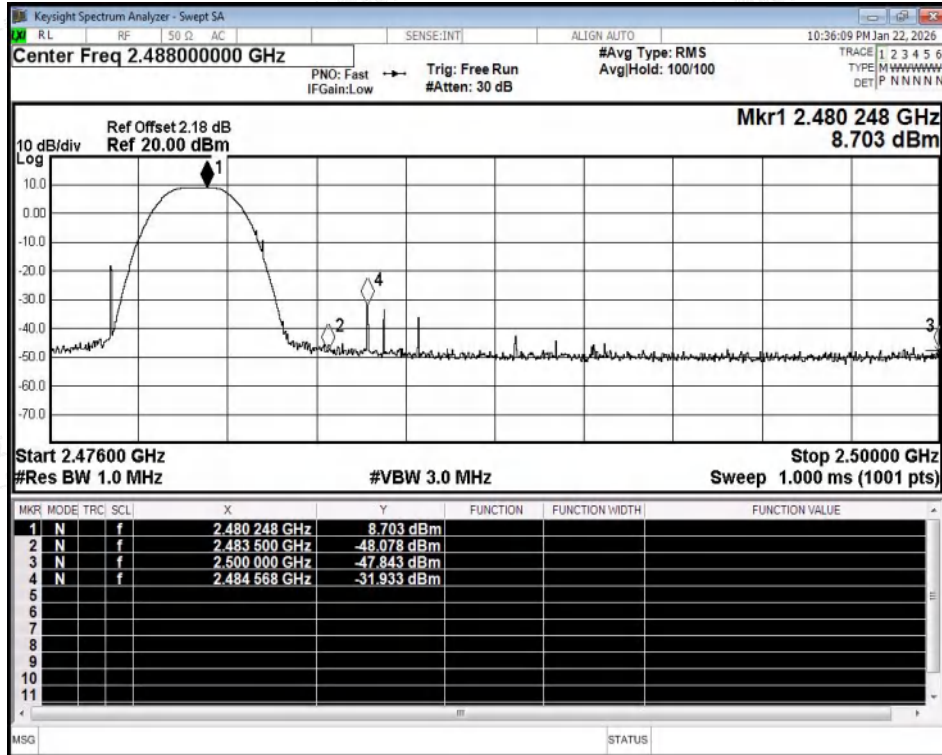


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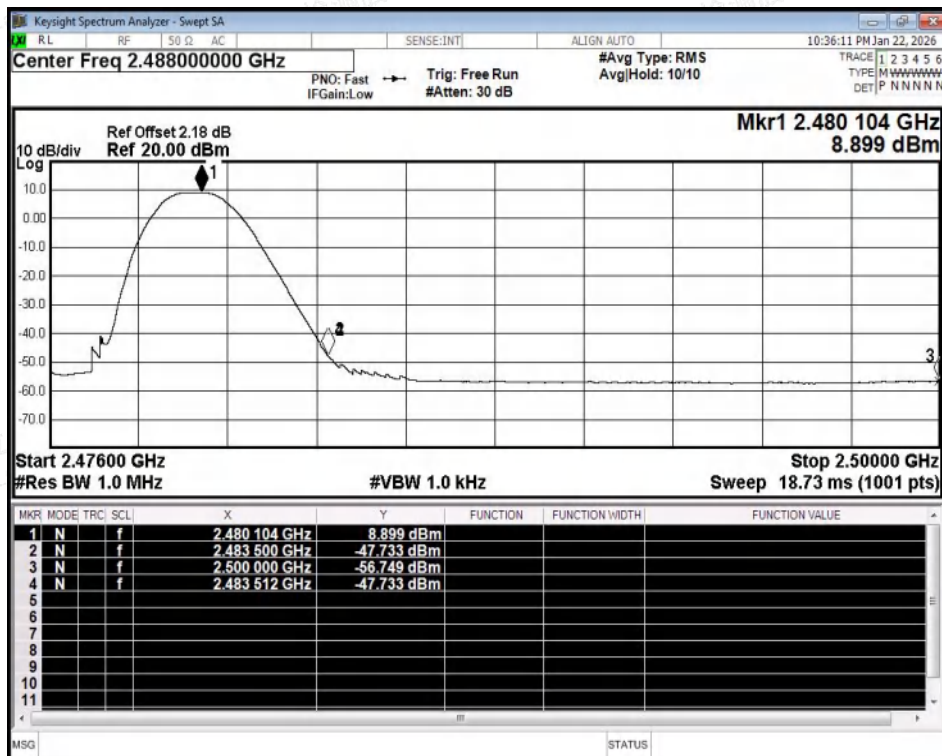
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Restrict Band NVNT LoRa 2.4G_800kHz 2480MHz Ant1 Peak



Restrict Band NVNT LoRa 2.4G_800kHz 2480MHz Ant1 Average

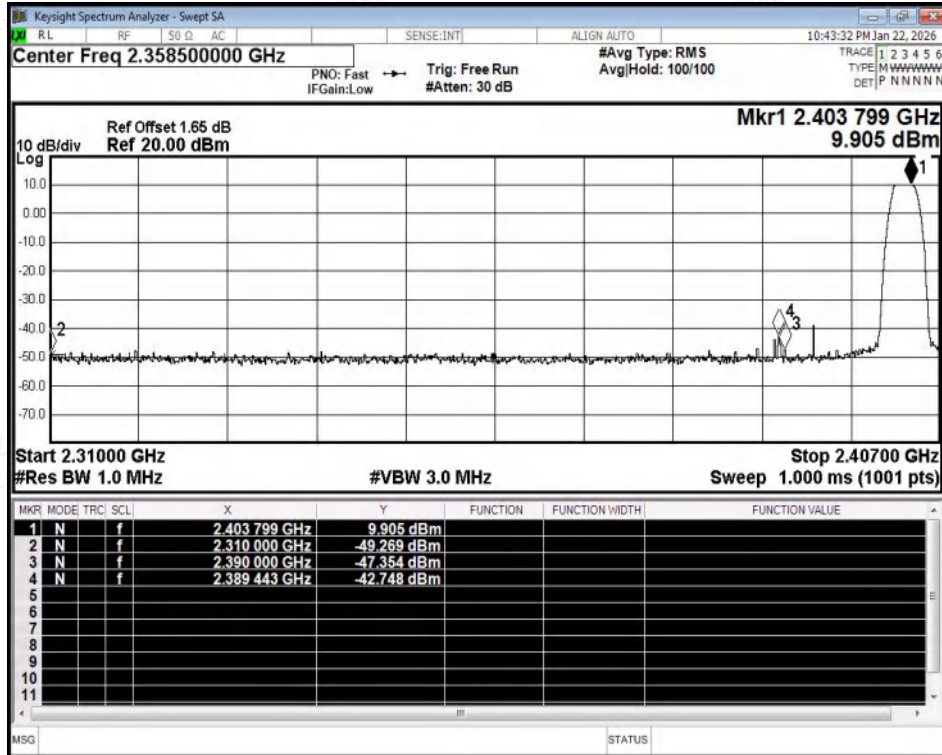


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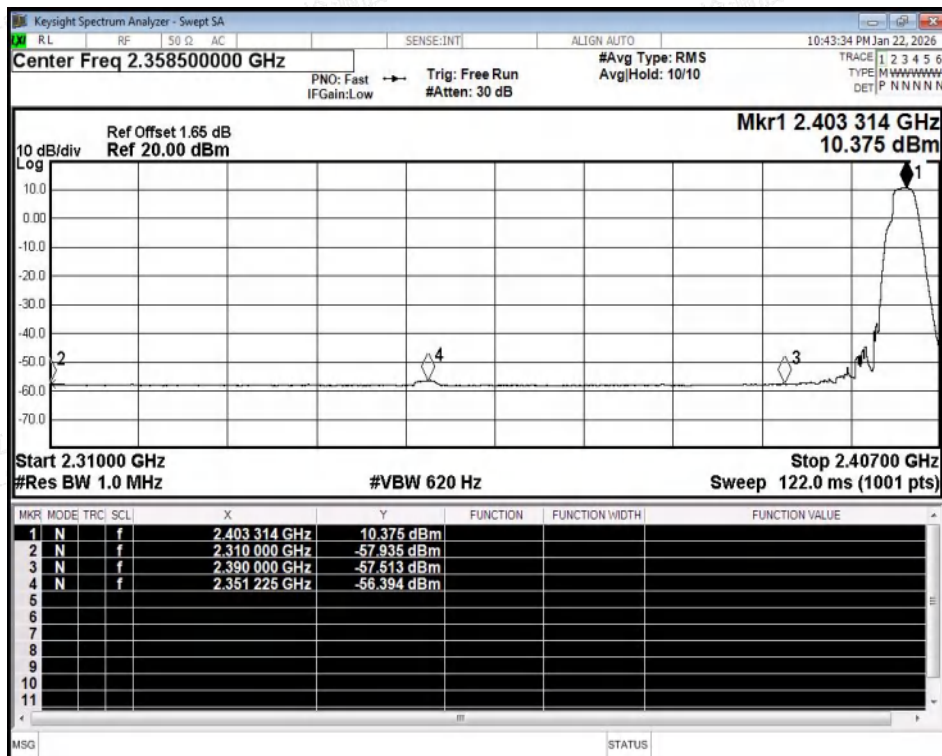
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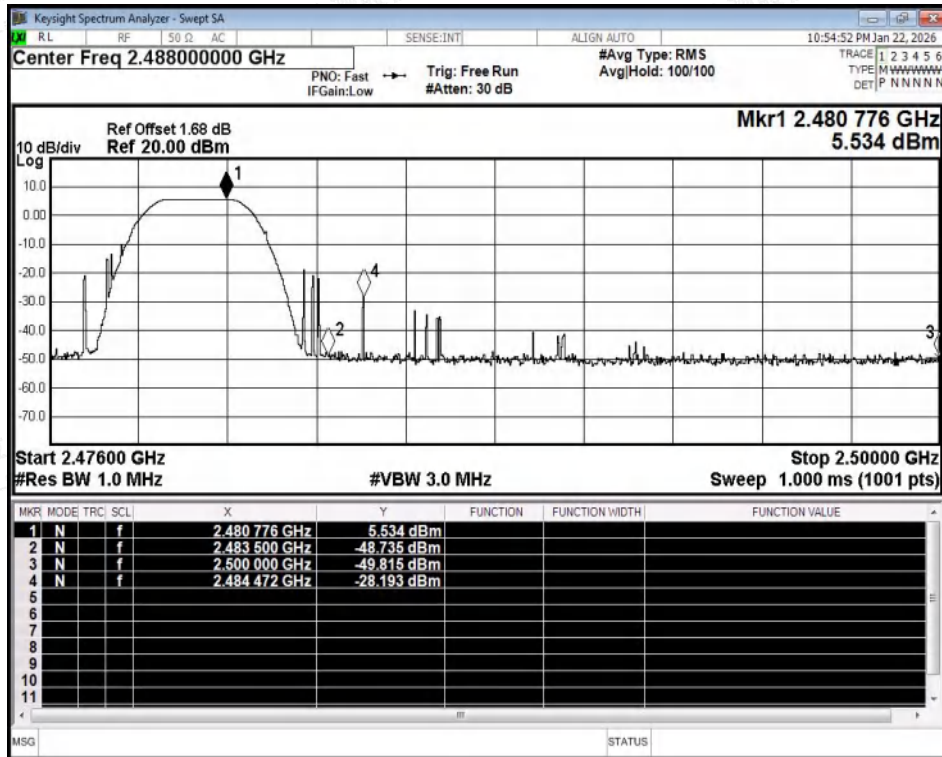


Restrict Band NVNT LoRa 2.4G_1600kHz 2403MHz Ant1 Peak

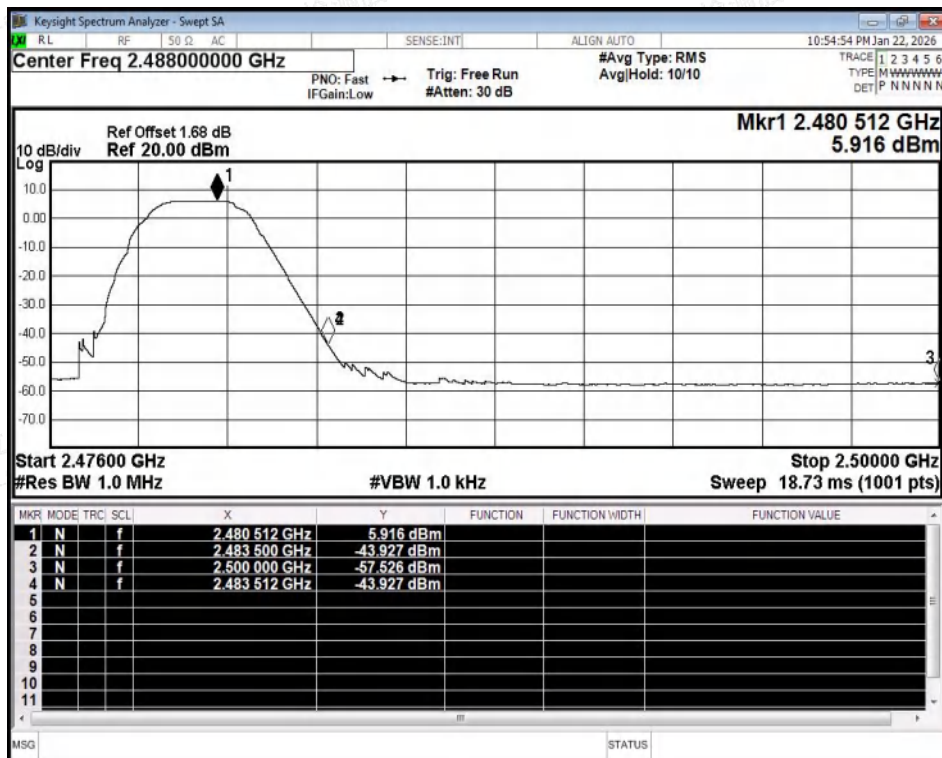


Restrict Band NVNT LoRa 2.4G_1600kHz 2403MHz Ant1 Average





Restrict Band NVNT LoRa 2.4G_1600kHz 2480MHz Ant1 Peak



Restrict Band NVNT LoRa 2.4G_1600kHz 2480MHz Ant1 Average



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