



Appendix C

RF Test Data for 2.4GWIFI (Conducted Measurement)

Product Name: Freenove ESP-01 Module

Trade Mark: Freenove

Test Model: FN-ESP-01

Environmental Conditions

Temperature:	20.6° C
Relative Humidity:	51.0%
ATM Pressure:	100.0 kPa
Test Engineer:	Simba Huang
Supervised by:	Seal Chen



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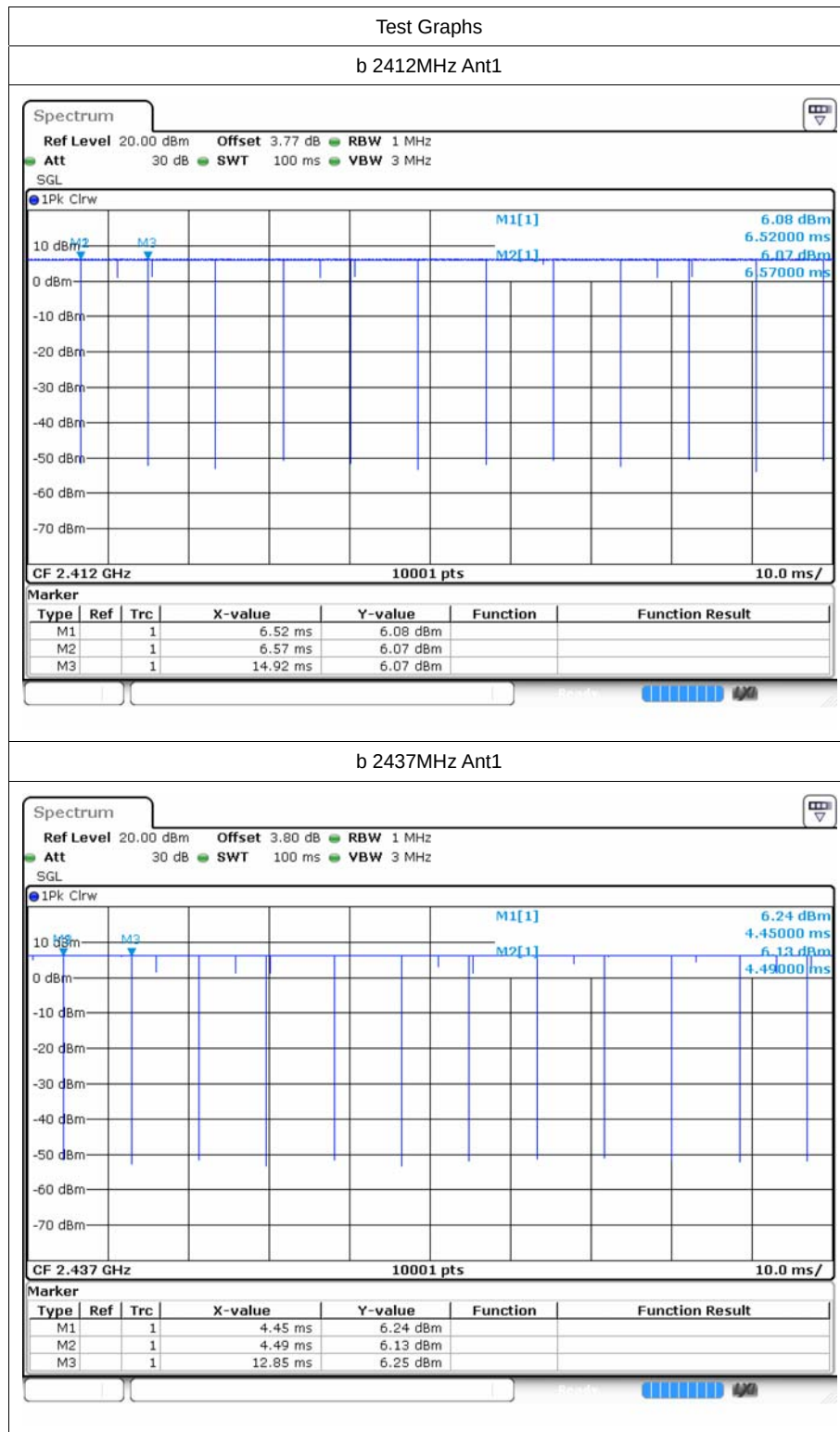


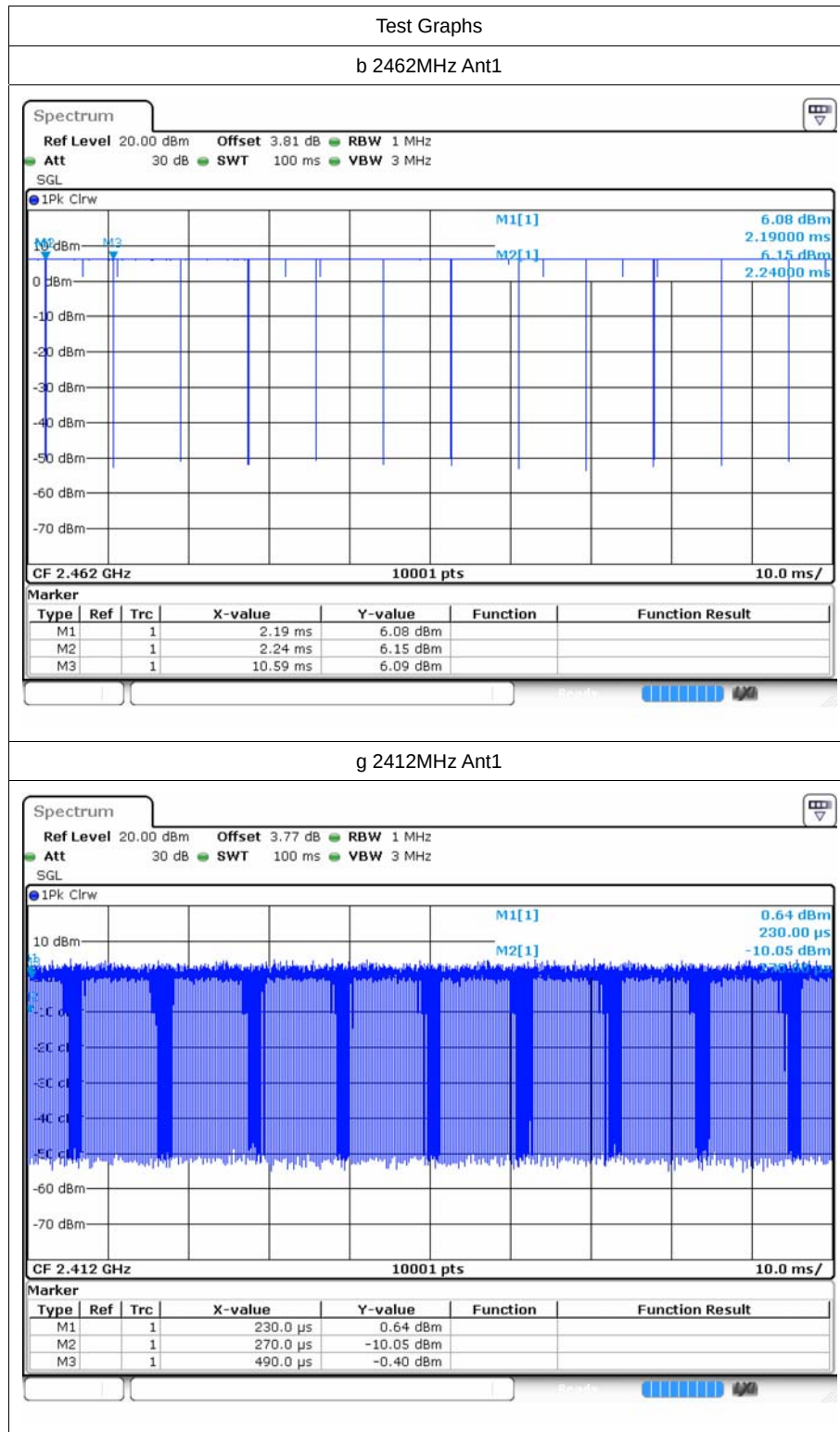
1 Duty Cycle

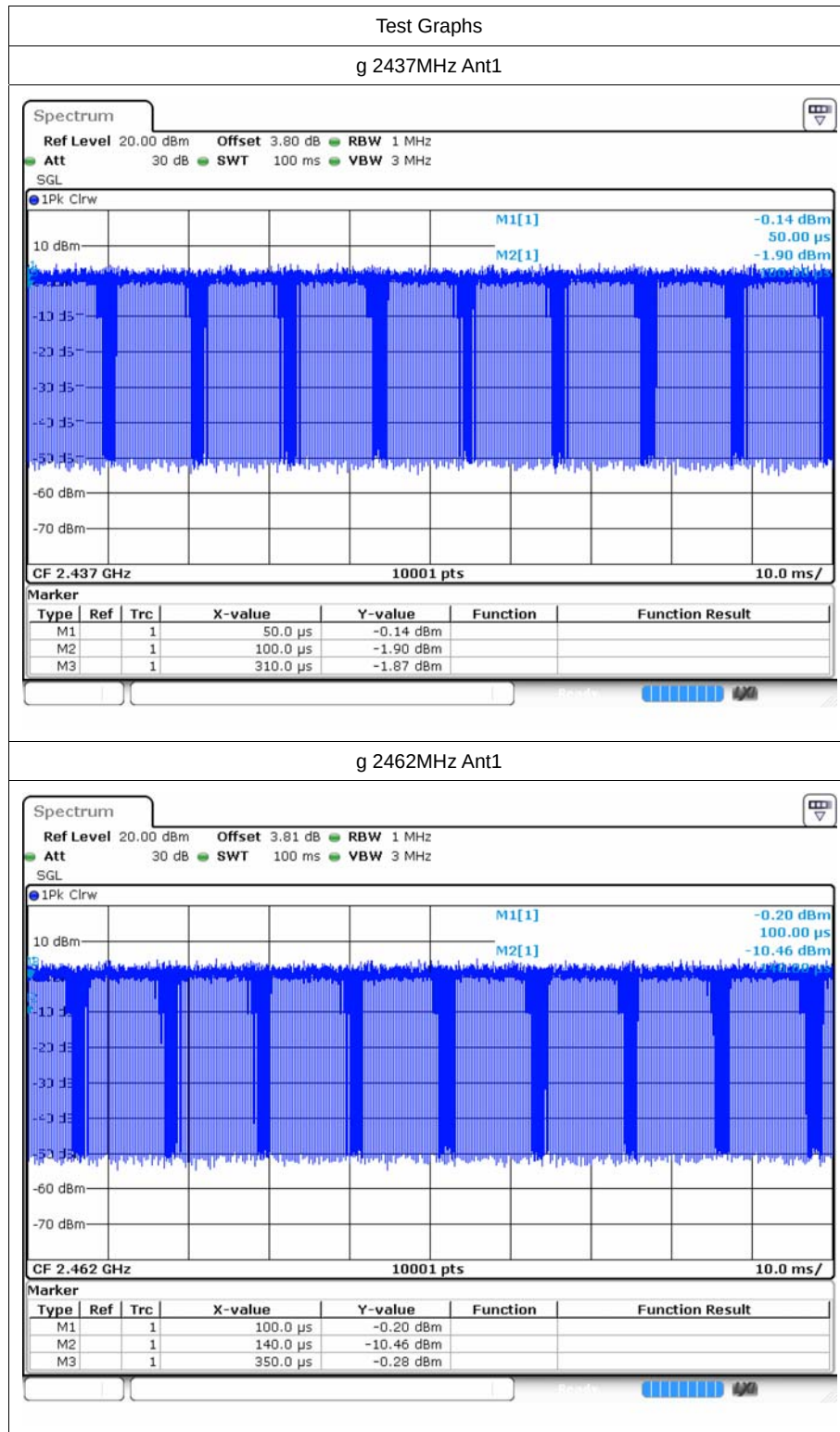
1.1 Test Result

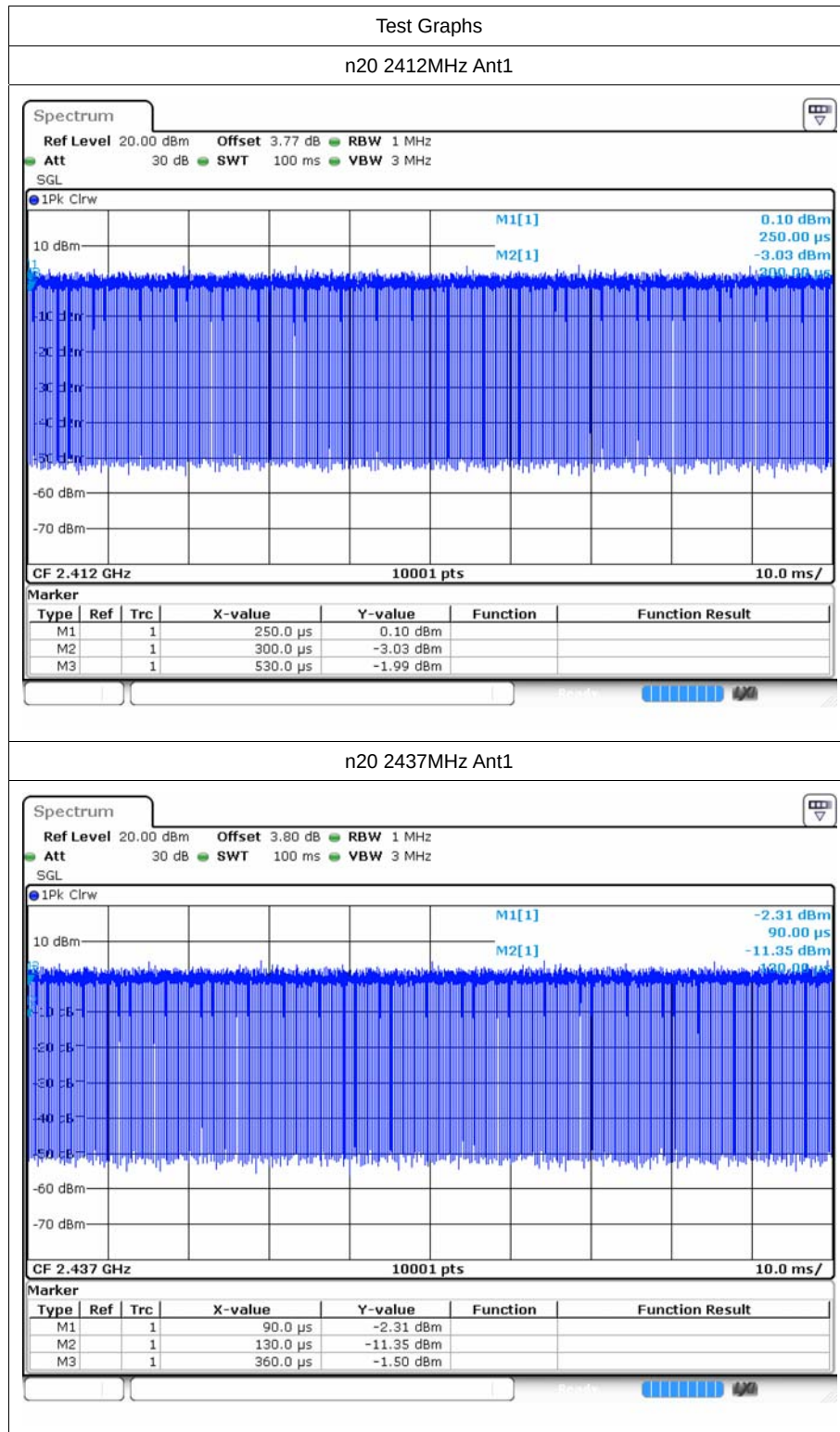
Mode	Frequency (MHz)	Antenna	Duty Cycle (%)	1/T (kHz)
b	2412	Ant1	99.59	0.12
b	2437	Ant1	99.61	0.12
b	2462	Ant1	99.61	0.12
g	2412	Ant1	86.95	4.55
g	2437	Ant1	86.95	4.76
g	2462	Ant1	87.03	4.76
n20	2412	Ant1	87.56	4.35
n20	2437	Ant1	87.59	4.35
n20	2462	Ant1	87.61	4.17

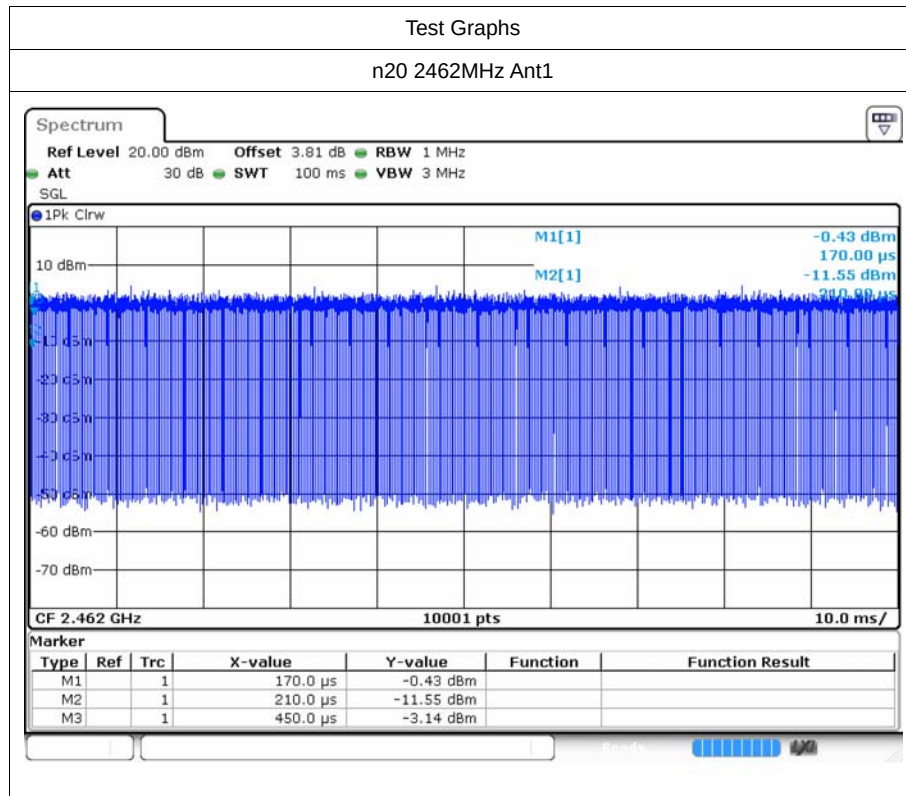
1.2 Test Graphs













2 Maximum Conducted Output Power

2.1 Test Result

Mode	Frequency (MHz)	Antenna	Conducted Power (dBm)	Limit (dBm)	Verdict
b	2412	Ant1	16.61	30	Pass
b	2437	Ant1	16.74	30	Pass
b	2462	Ant1	16.6	30	Pass
g	2412	Ant1	14.35	30	Pass
g	2437	Ant1	14.34	30	Pass
g	2462	Ant1	14.29	30	Pass
n20	2412	Ant1	13.35	30	Pass
n20	2437	Ant1	13.39	30	Pass
n20	2462	Ant1	13.24	30	Pass

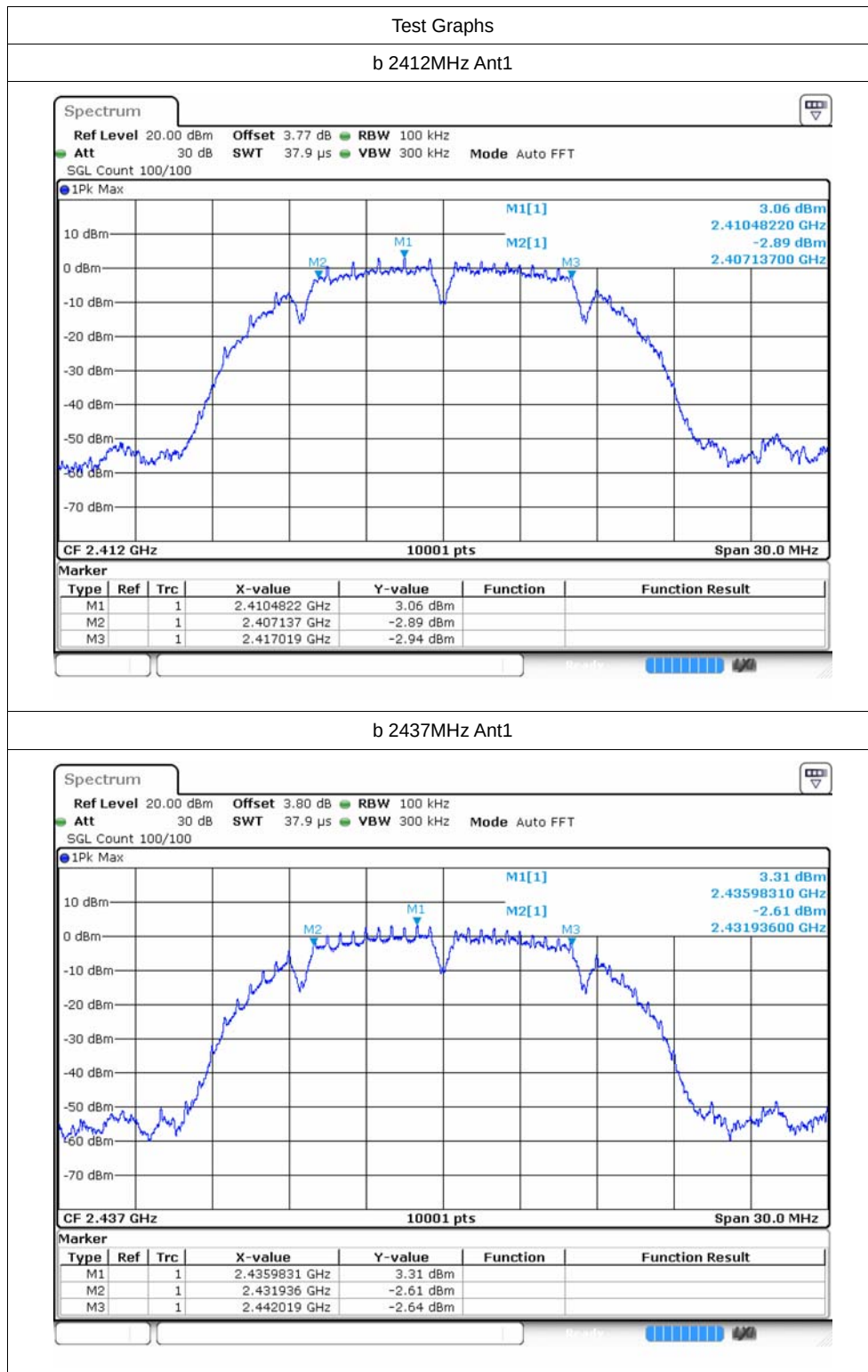


3 -6dB Bandwidth

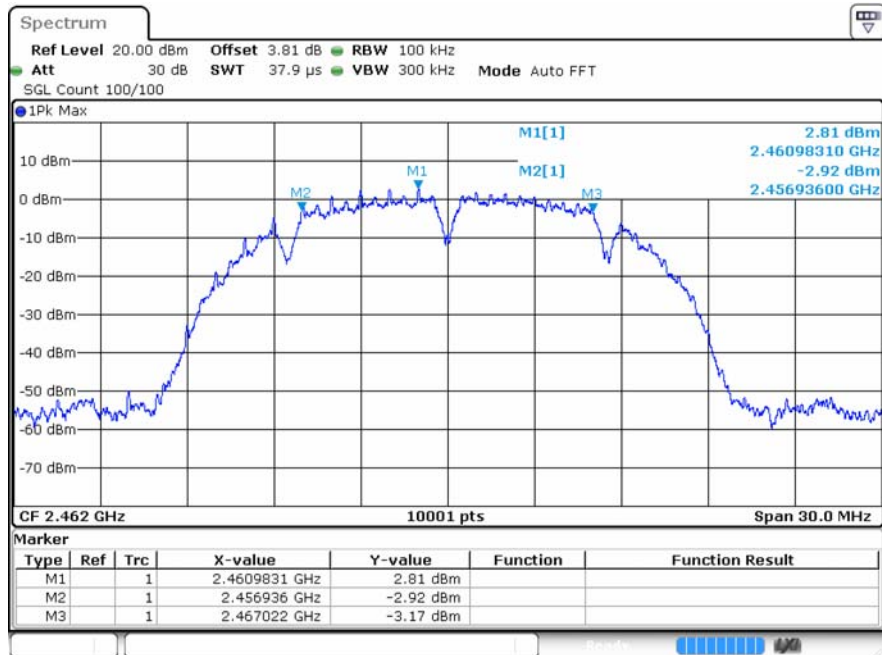
3.1 Test Result

Mode	Frequency (MHz)	Antenna	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
b	2412	Ant1	9.882	0.5	Pass
b	2437	Ant1	10.083	0.5	Pass
b	2462	Ant1	10.086	0.5	Pass
g	2412	Ant1	15.105	0.5	Pass
g	2437	Ant1	15.072	0.5	Pass
g	2462	Ant1	13.854	0.5	Pass
n20	2412	Ant1	15.123	0.5	Pass
n20	2437	Ant1	15.108	0.5	Pass
n20	2462	Ant1	15.105	0.5	Pass

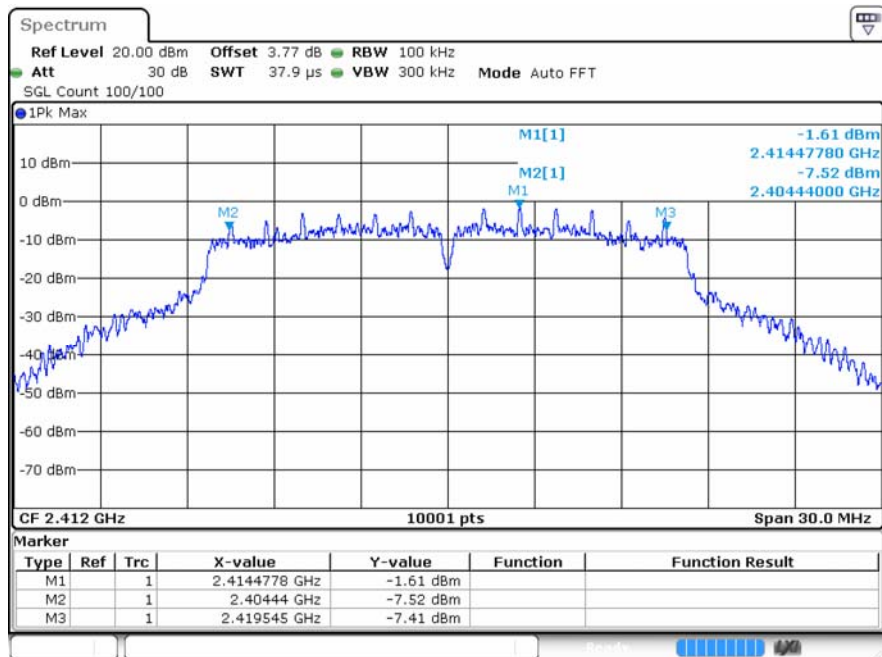
3.2 Test Graphs



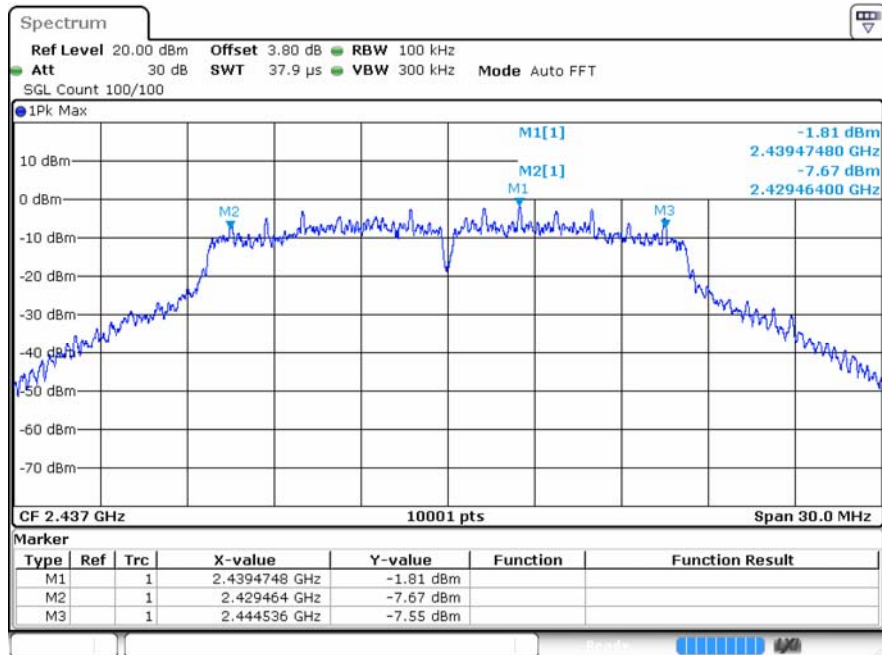
b 2462MHz Ant1



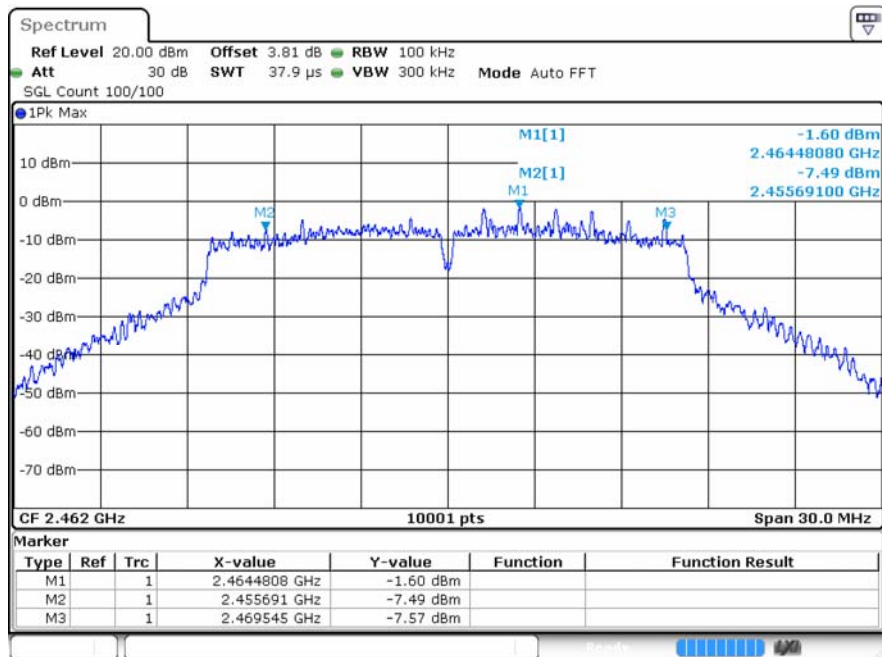
g 2412MHz Ant1



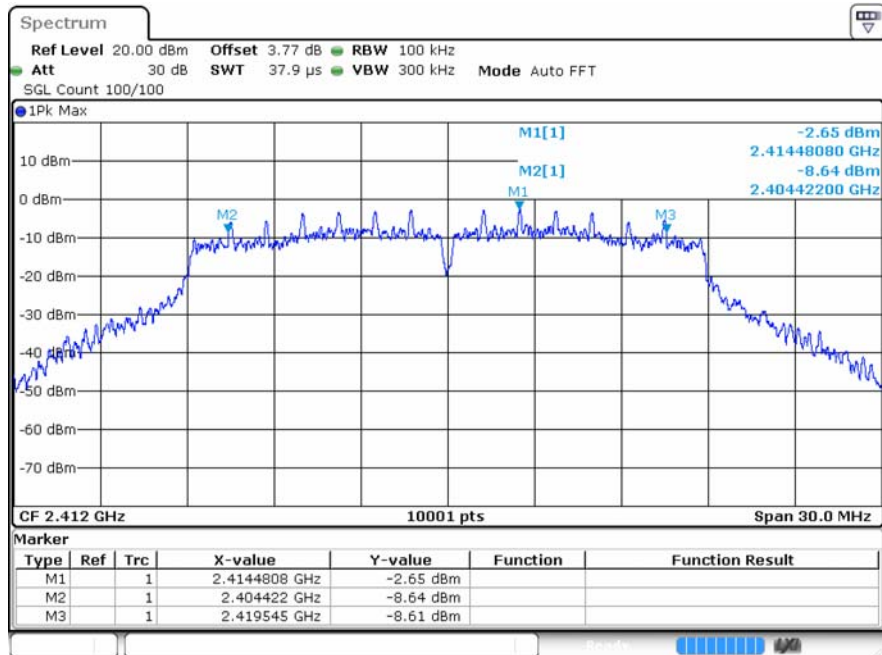
g 2437MHz Ant1



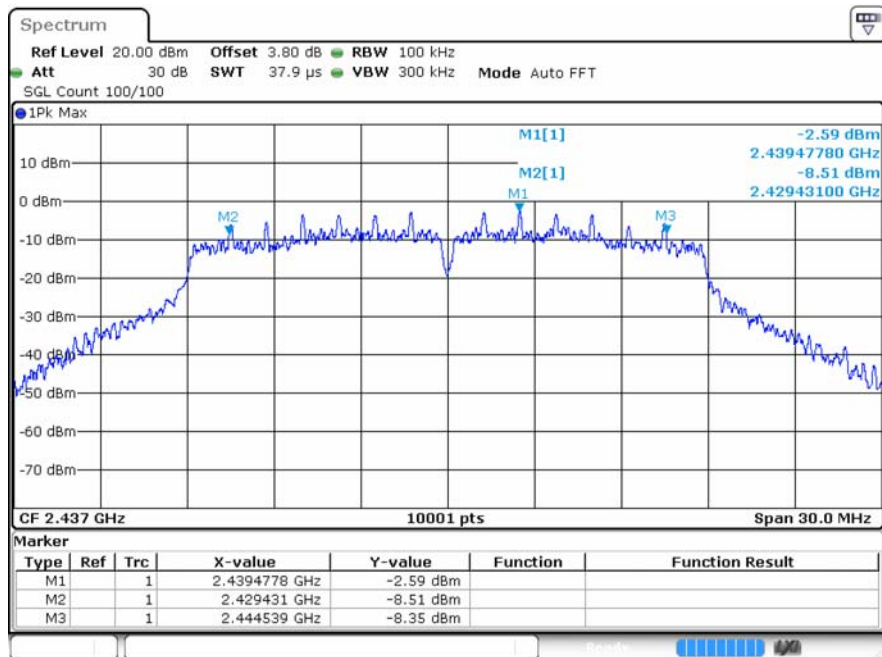
g 2462MHz Ant1

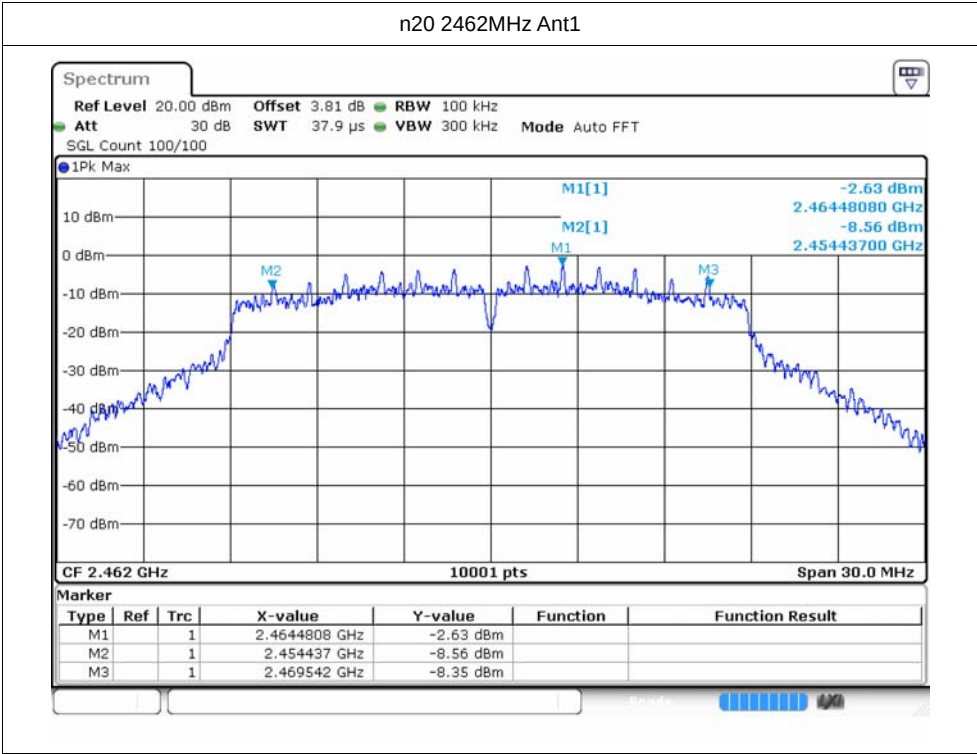


n20 2412MHz Ant1



n20 2437MHz Ant1



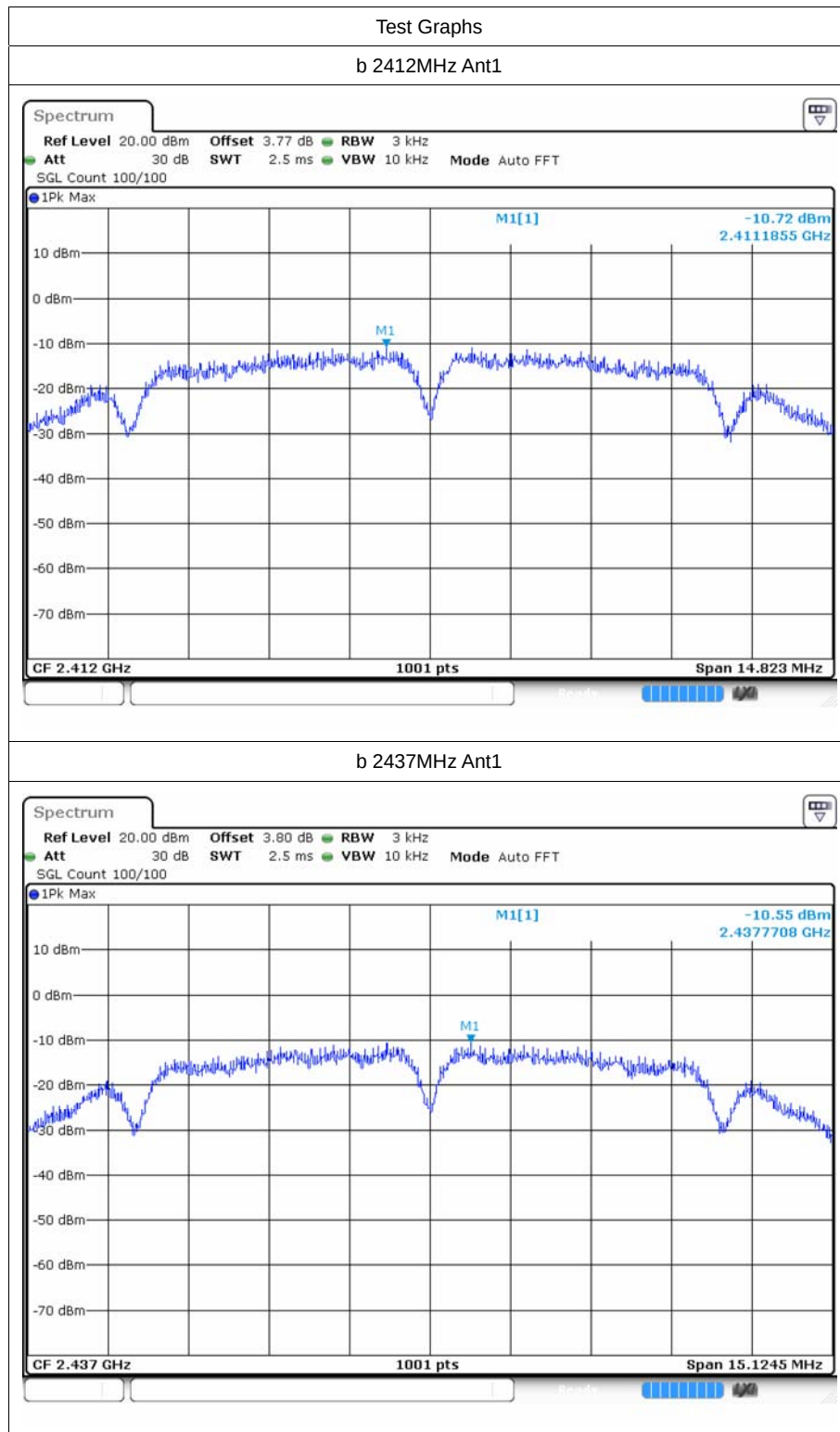


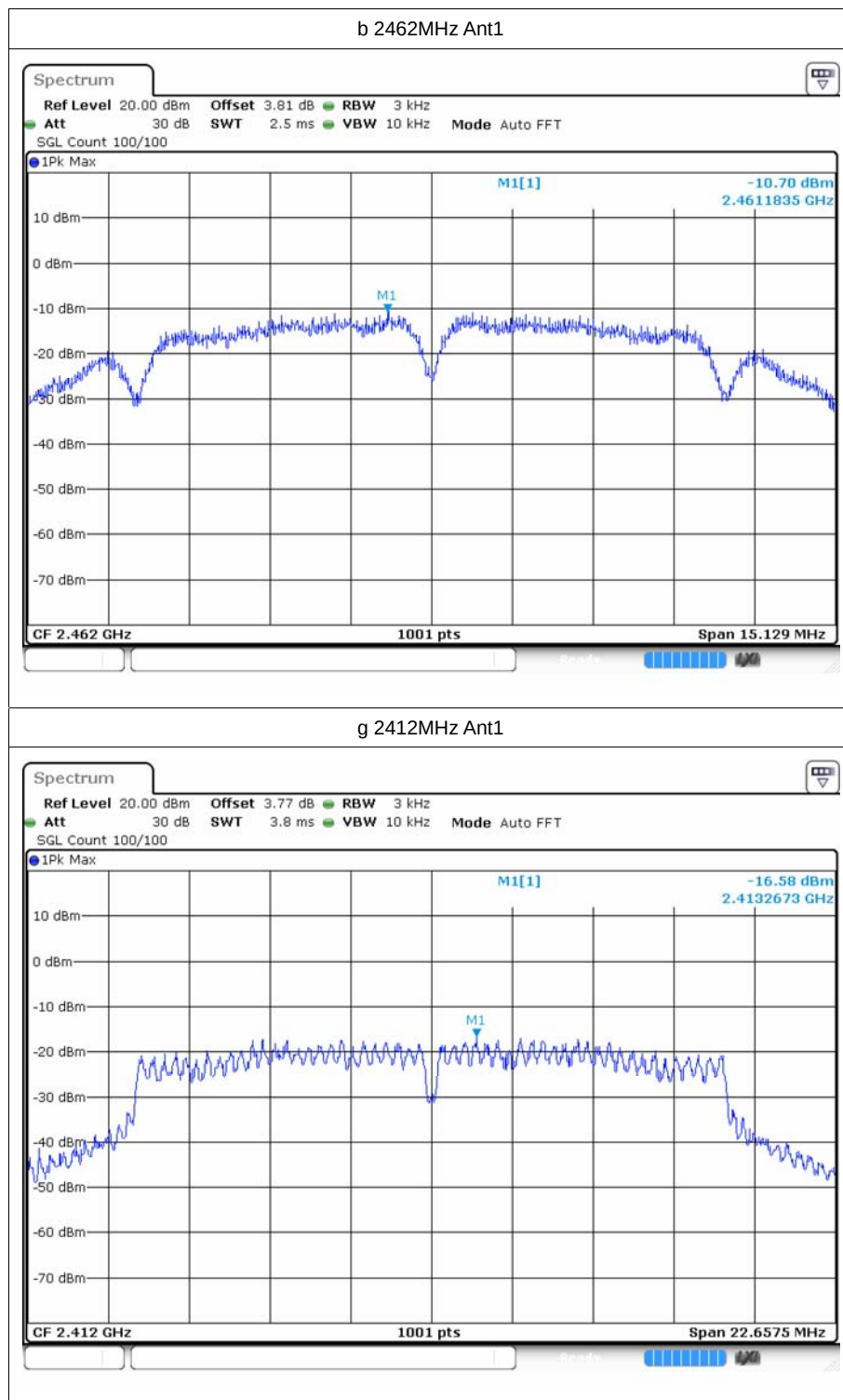
4 Maximum Power Spectral Density Level

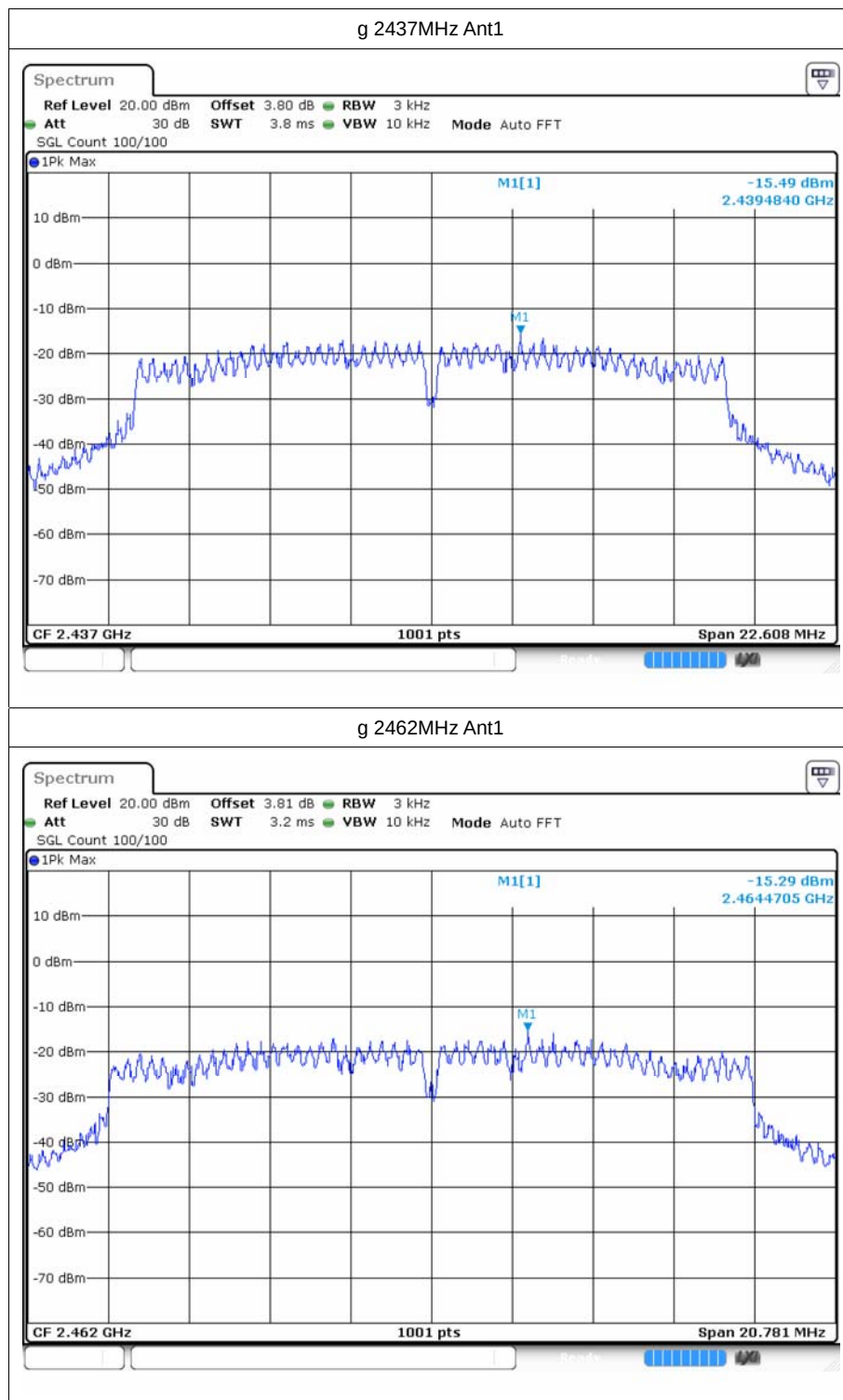
4.1 Test Result

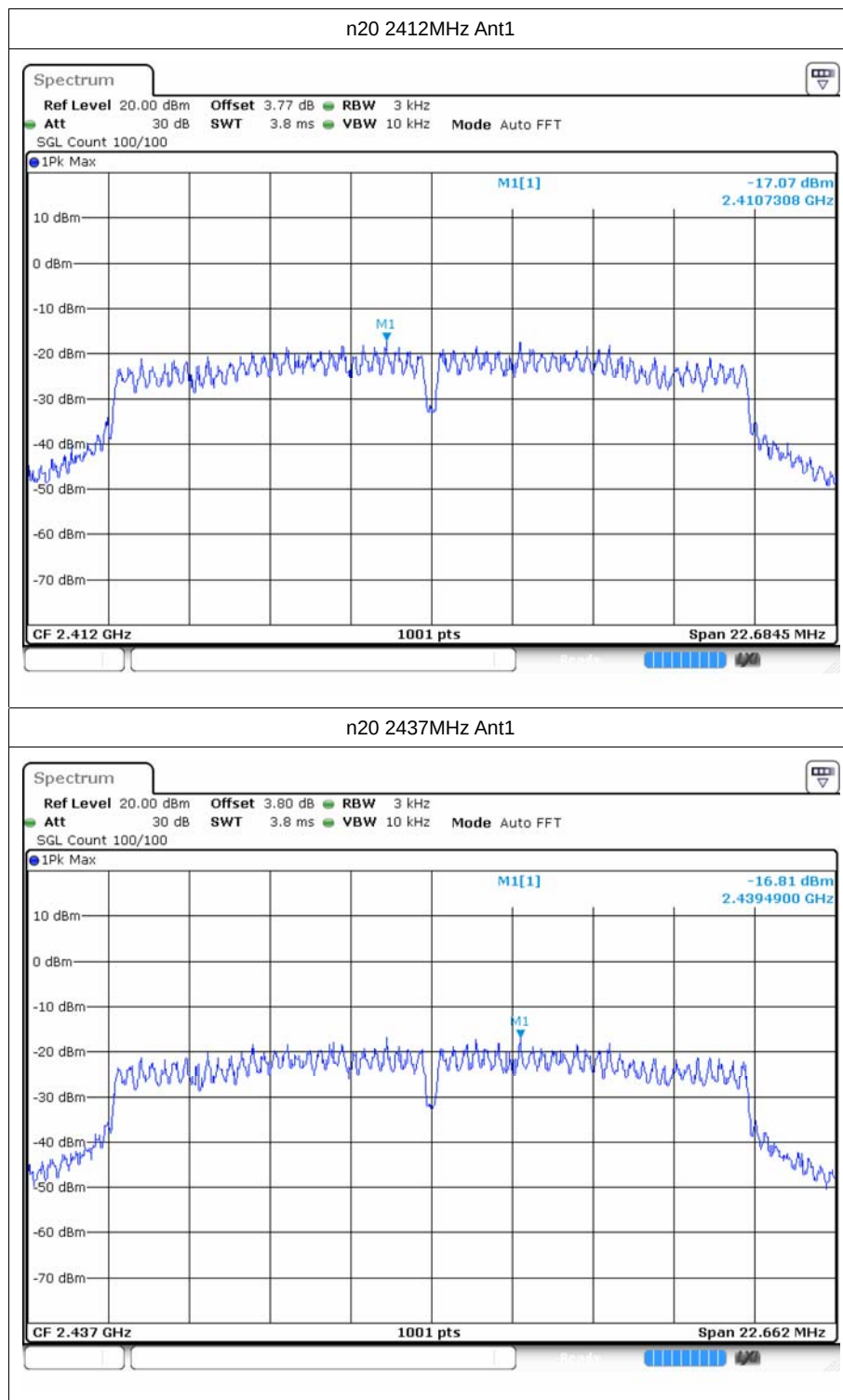
Mode	Frequency (MHz)	Antenna	Conducted PSD (dBm/3-100kHz)	Limit (dBm/3kHz)	Verdict
b	2412	Ant1	-10.72	≤ 8	Pass
b	2437	Ant1	-10.55	≤ 8	Pass
b	2462	Ant1	-10.7	≤ 8	Pass
g	2412	Ant1	-16.58	≤ 8	Pass
g	2437	Ant1	-15.49	≤ 8	Pass
g	2462	Ant1	-15.29	≤ 8	Pass
n20	2412	Ant1	-17.07	≤ 8	Pass
n20	2437	Ant1	-16.81	≤ 8	Pass
n20	2462	Ant1	-17.78	≤ 8	Pass

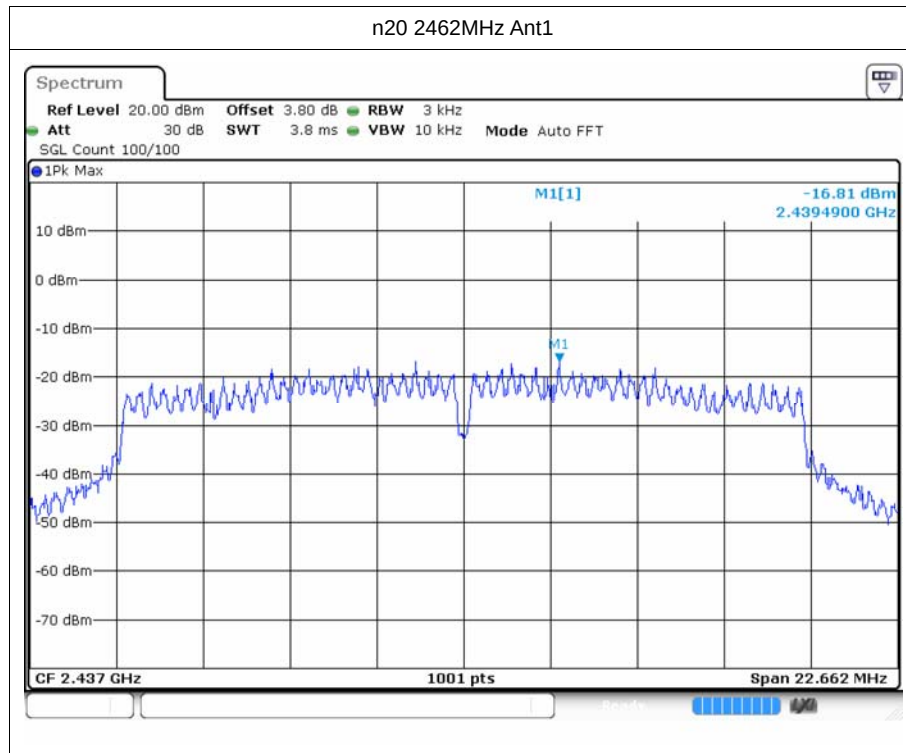
4.2 Test Graphs











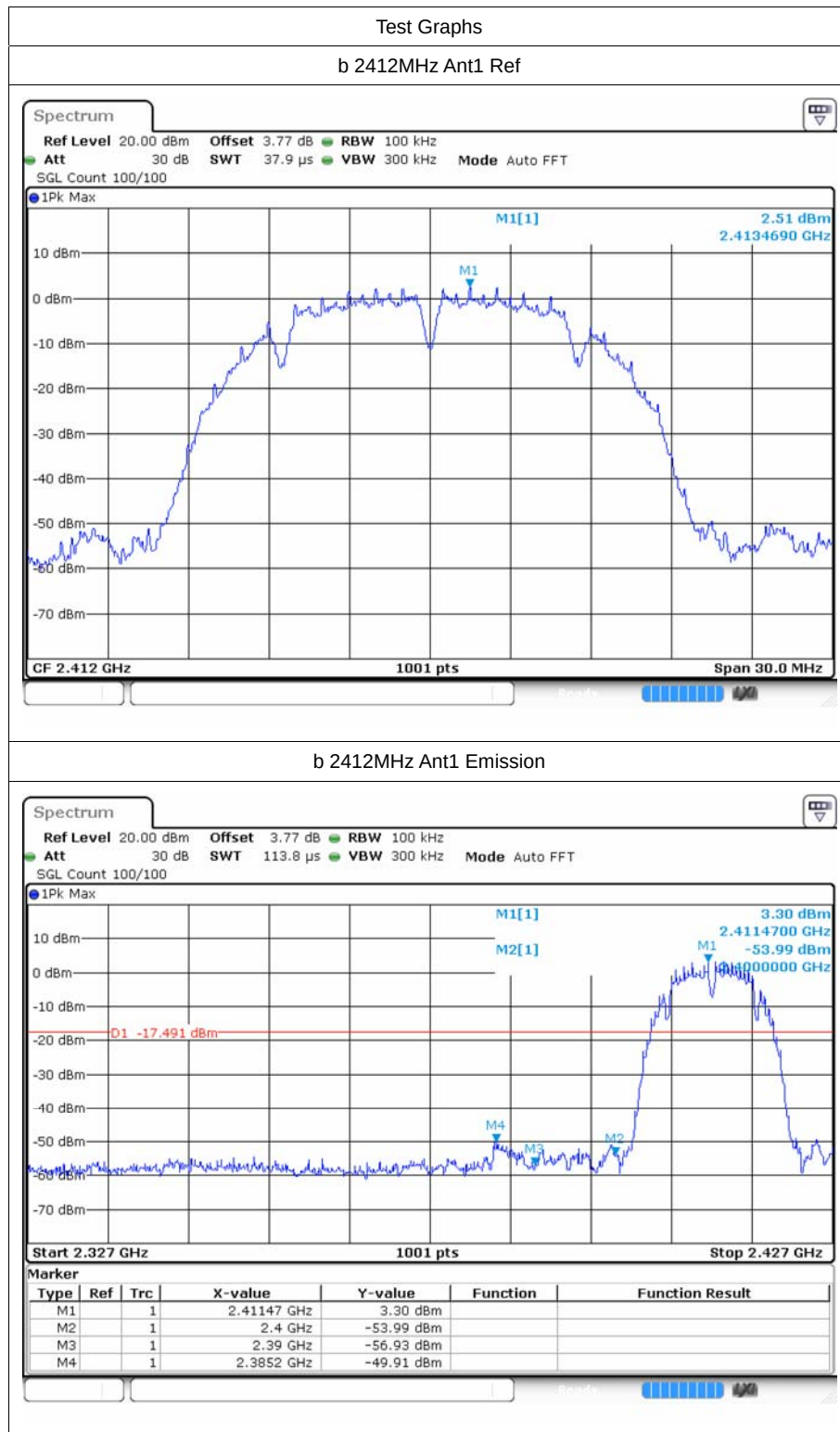


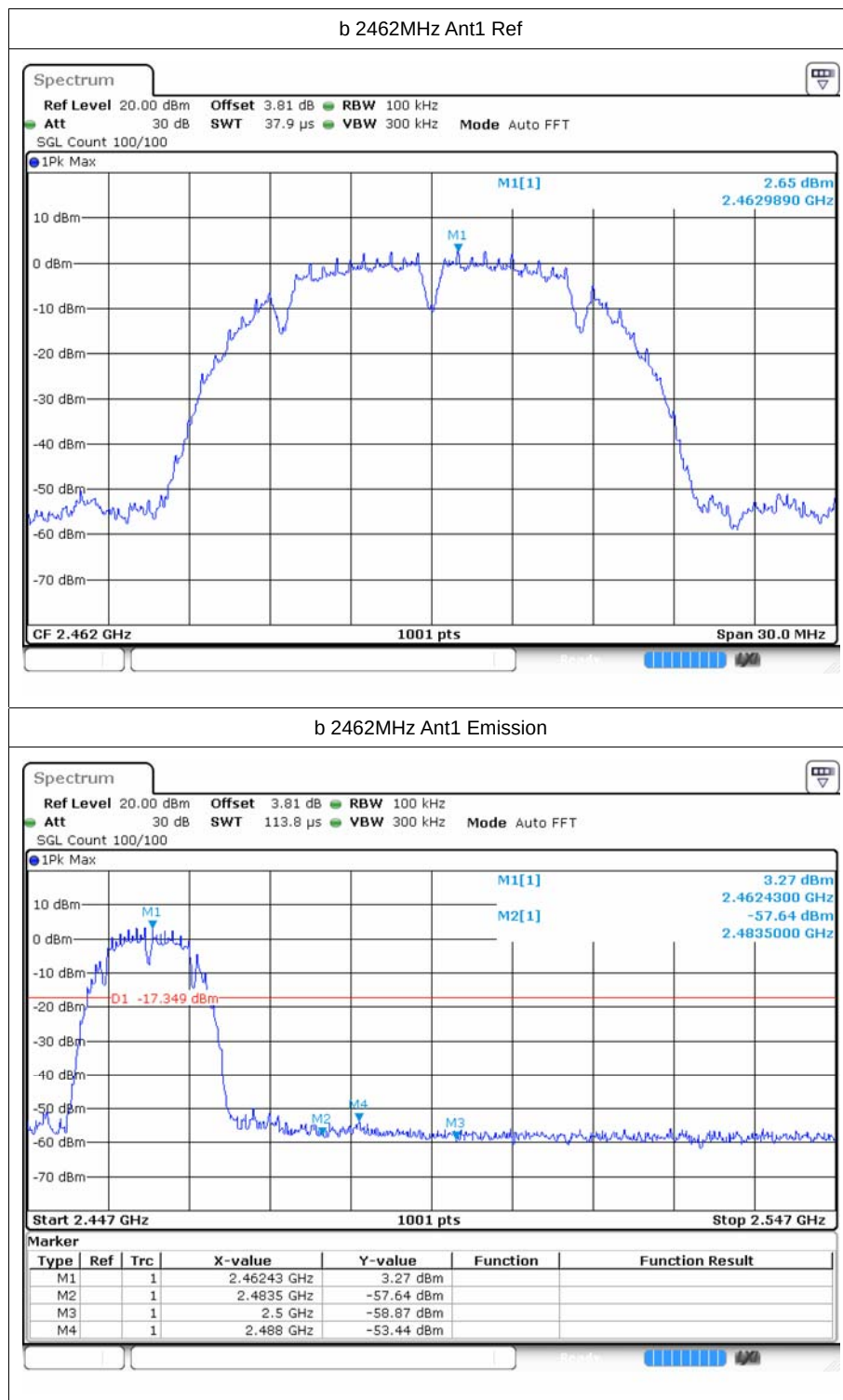
5 Band Edge

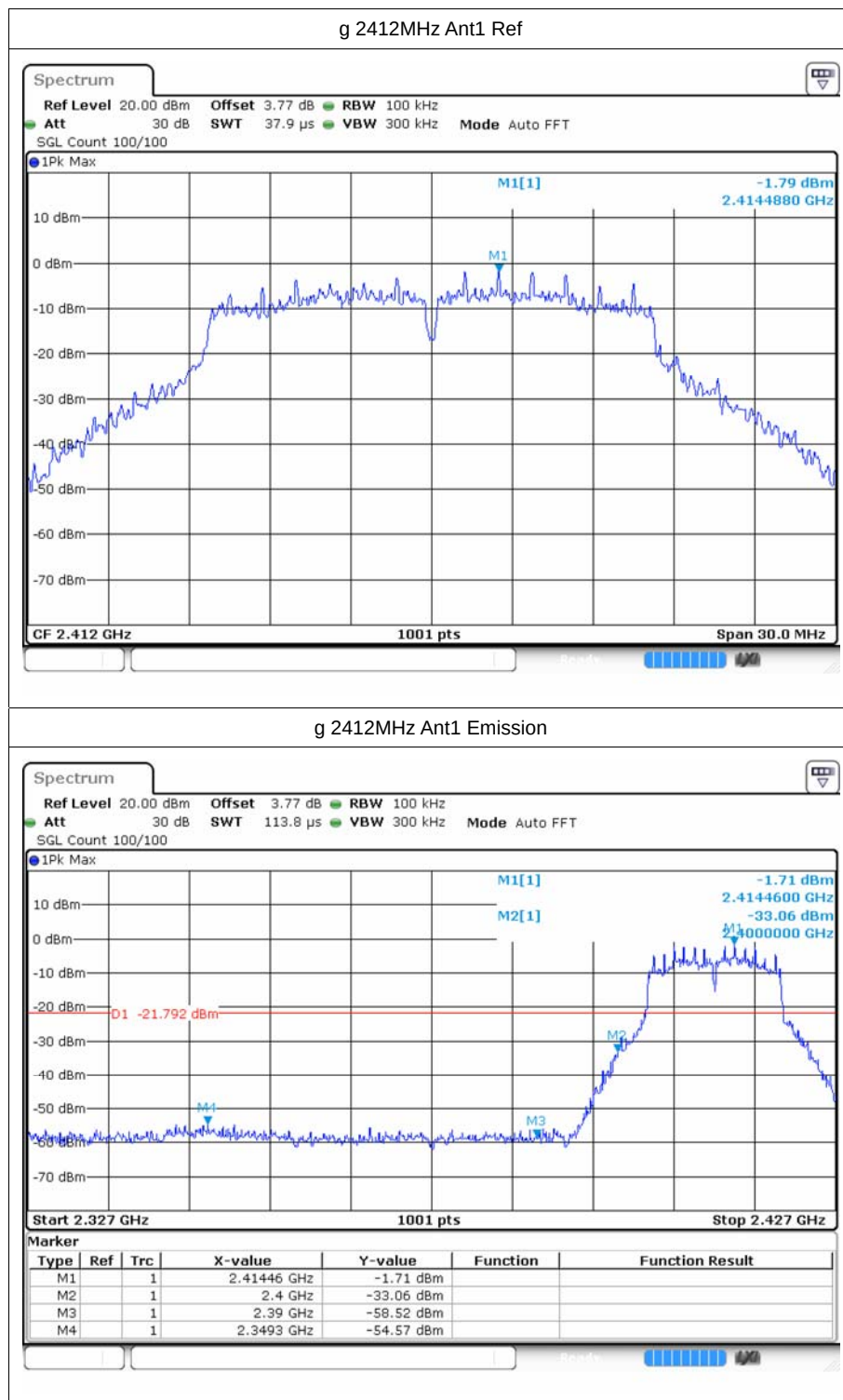
5.1 Test Result

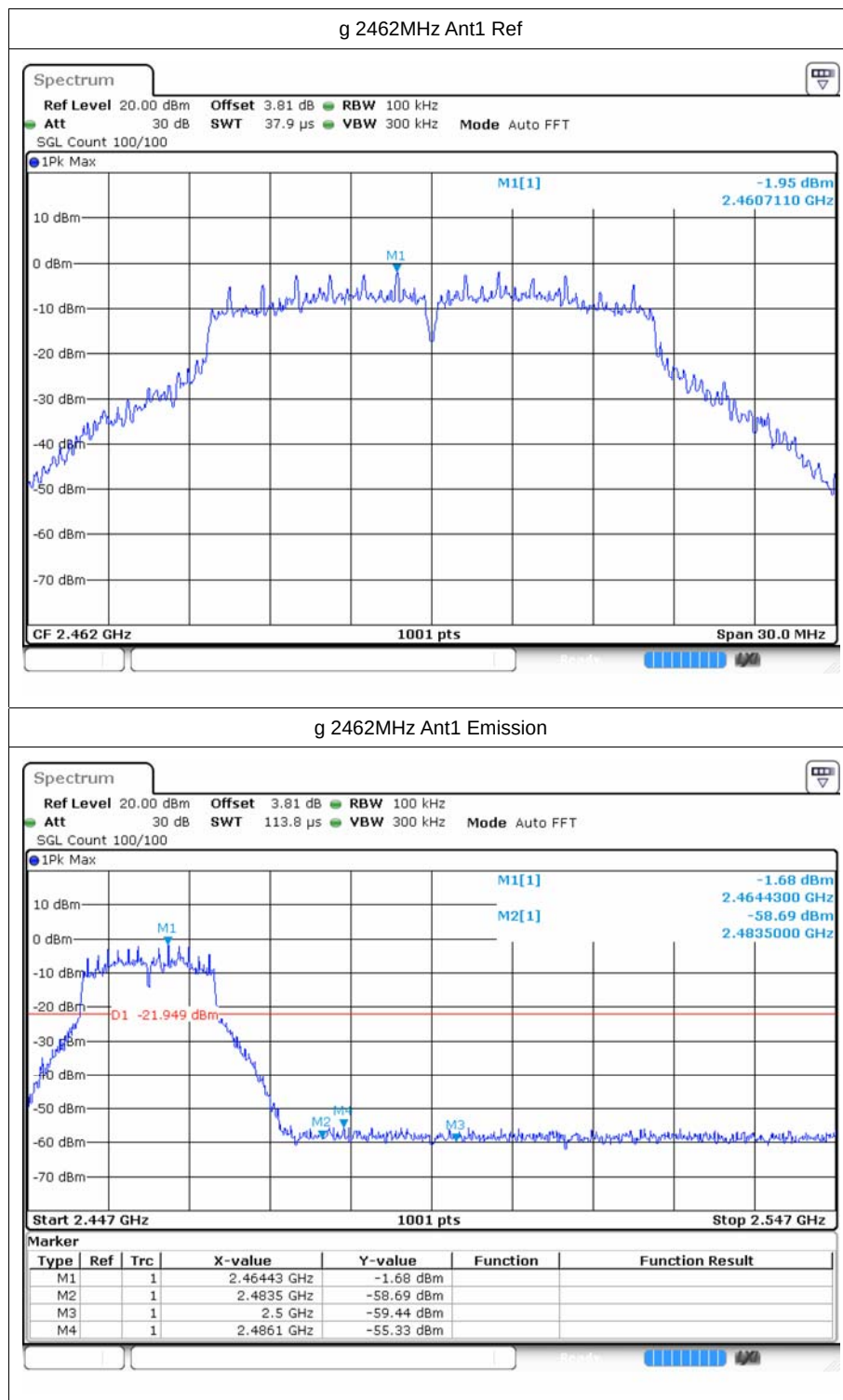
Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
b	2412	Ant1	-52.41	-20	-52.41
b	2462	Ant1	-56.09	-20	Pass
g	2412	Ant1	-52.78	-20	Pass
g	2462	Ant1	-53.38	-20	Pass
n20	2412	Ant1	-52.11	-20	Pass
n20	2462	Ant1	-52.7	-20	Pass

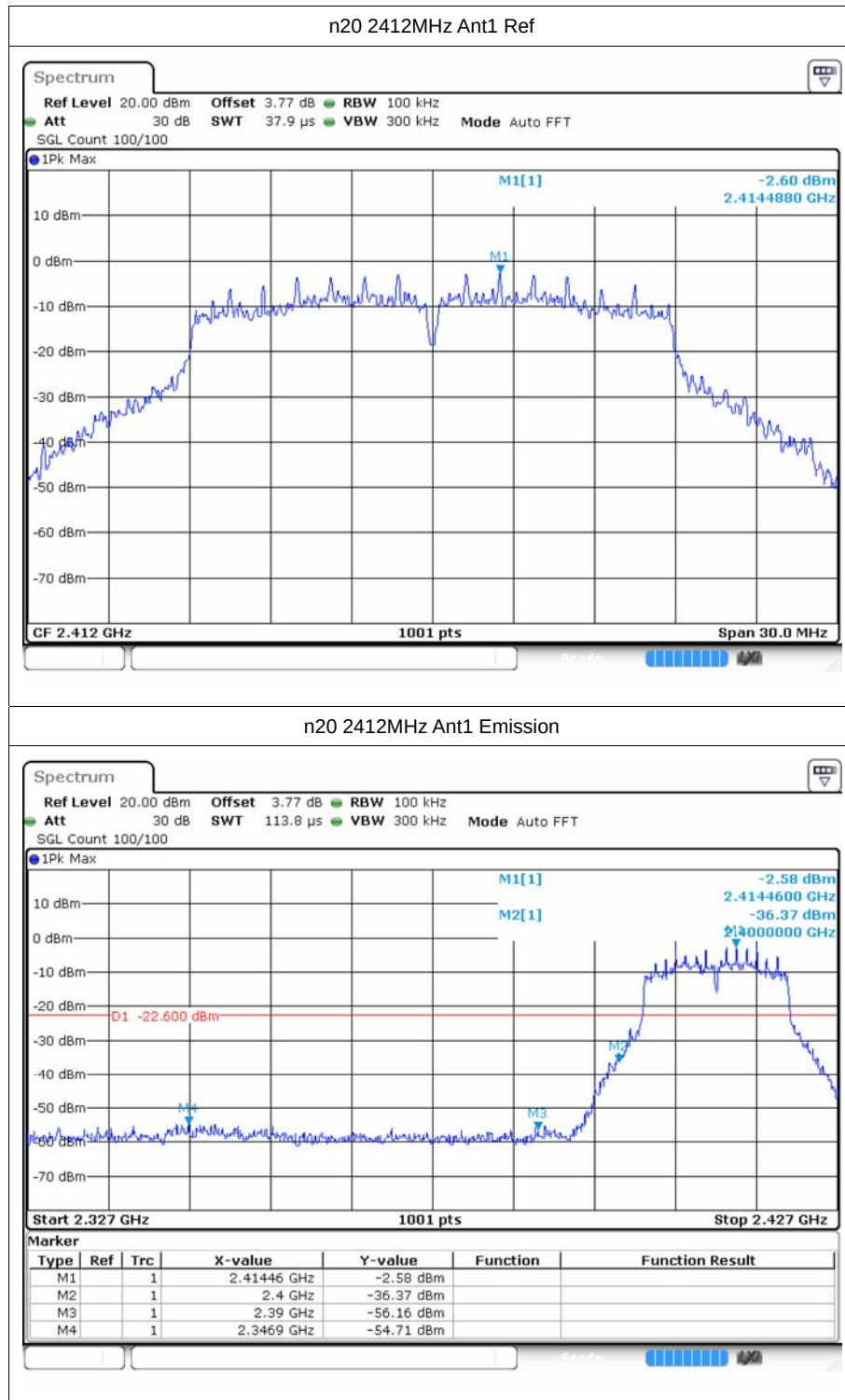
5.2 Test Graphs

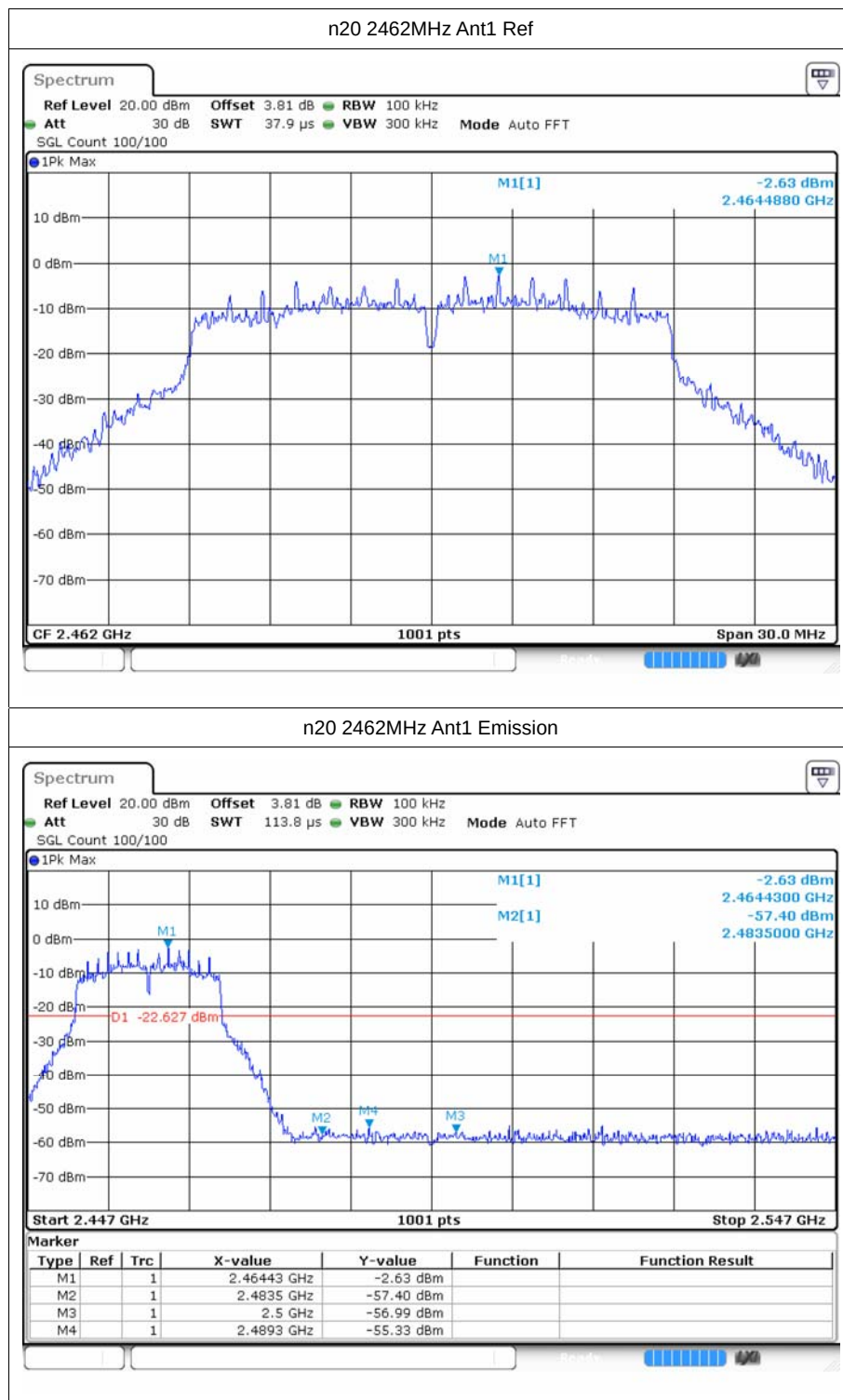












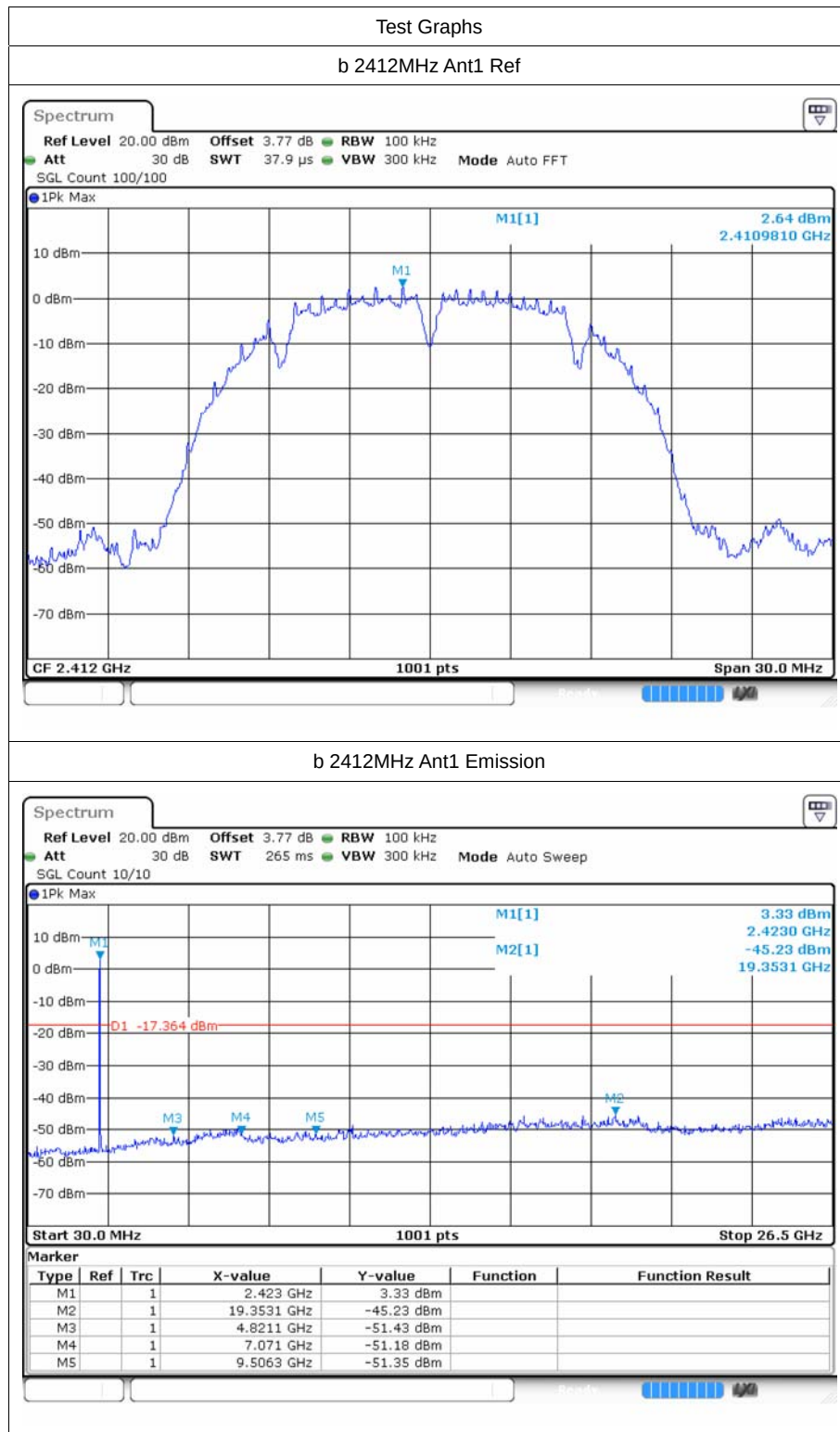


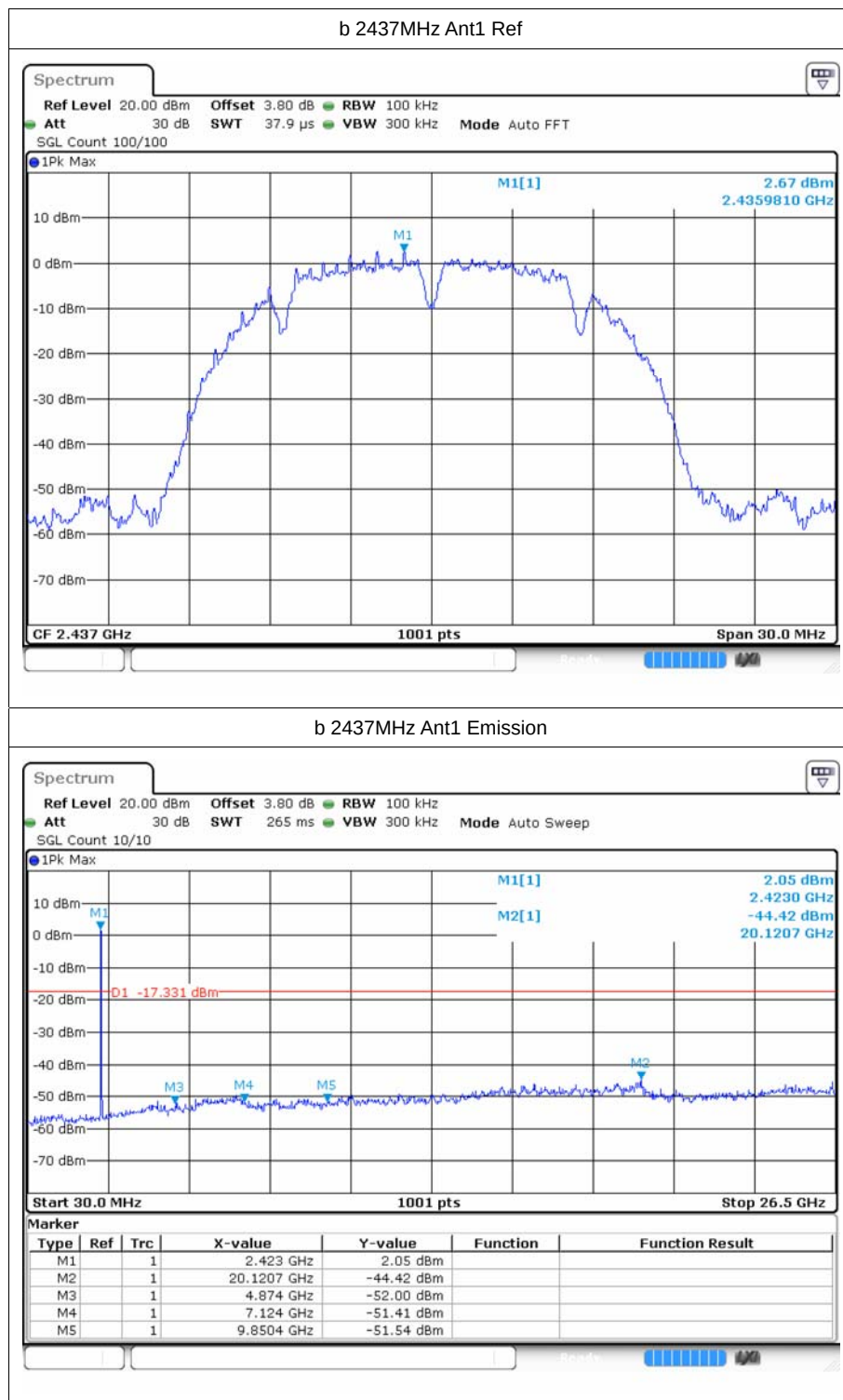
6 Conducted RF Spurious Emission

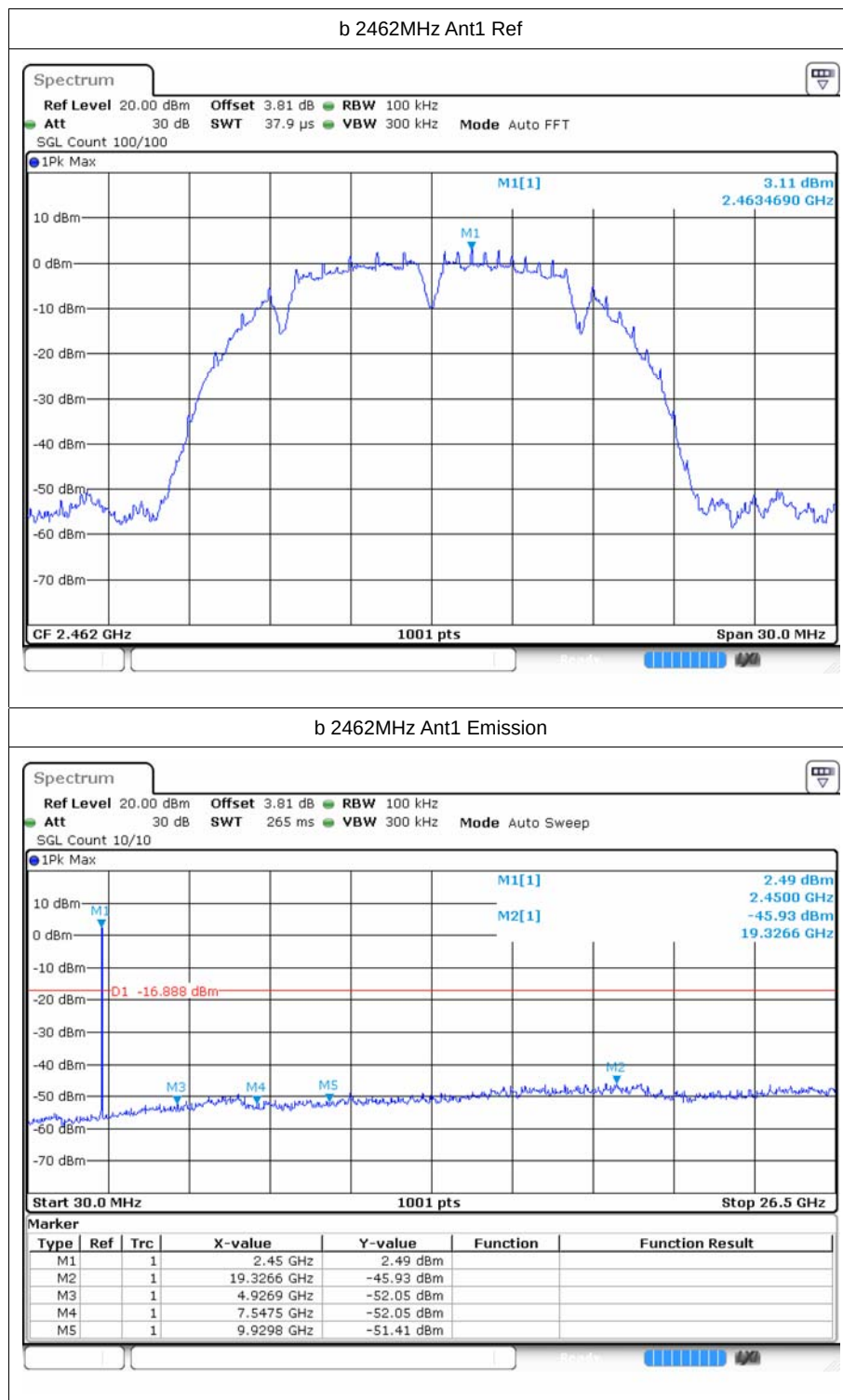
6.1 Test Result

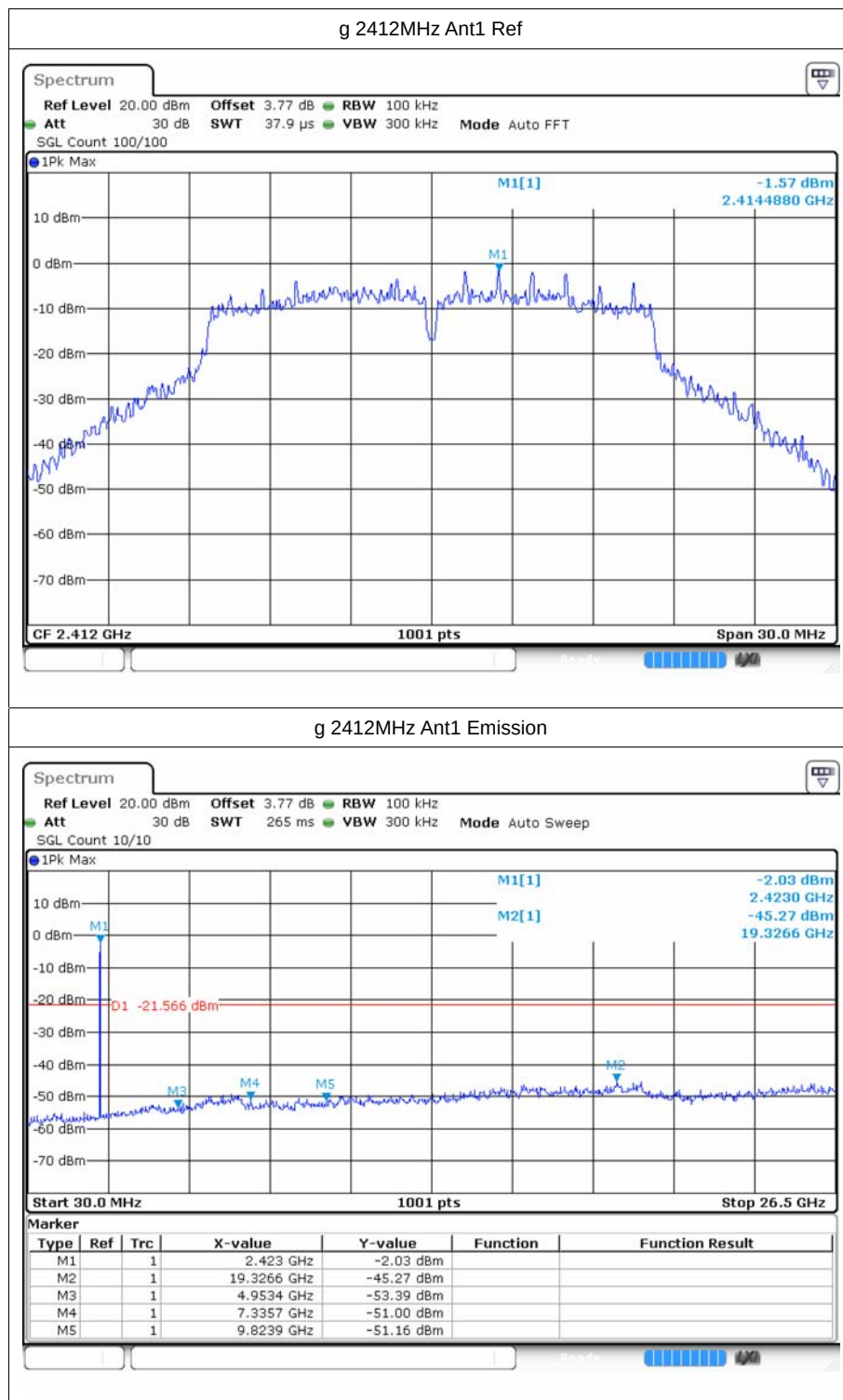
Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
b	2412	Ant1	-47.87	-20	Pass
b	2437	Ant1	-47.09	-20	Pass
b	2462	Ant1	-49.04	-20	Pass
g	2412	Ant1	-43.7	-20	Pass
g	2437	Ant1	-43.72	-20	Pass
g	2462	Ant1	-43.34	-20	Pass
n20	2412	Ant1	-42.56	-20	Pass
n20	2437	Ant1	-41.87	-20	Pass
n20	2462	Ant1	-42.19	-20	Pass

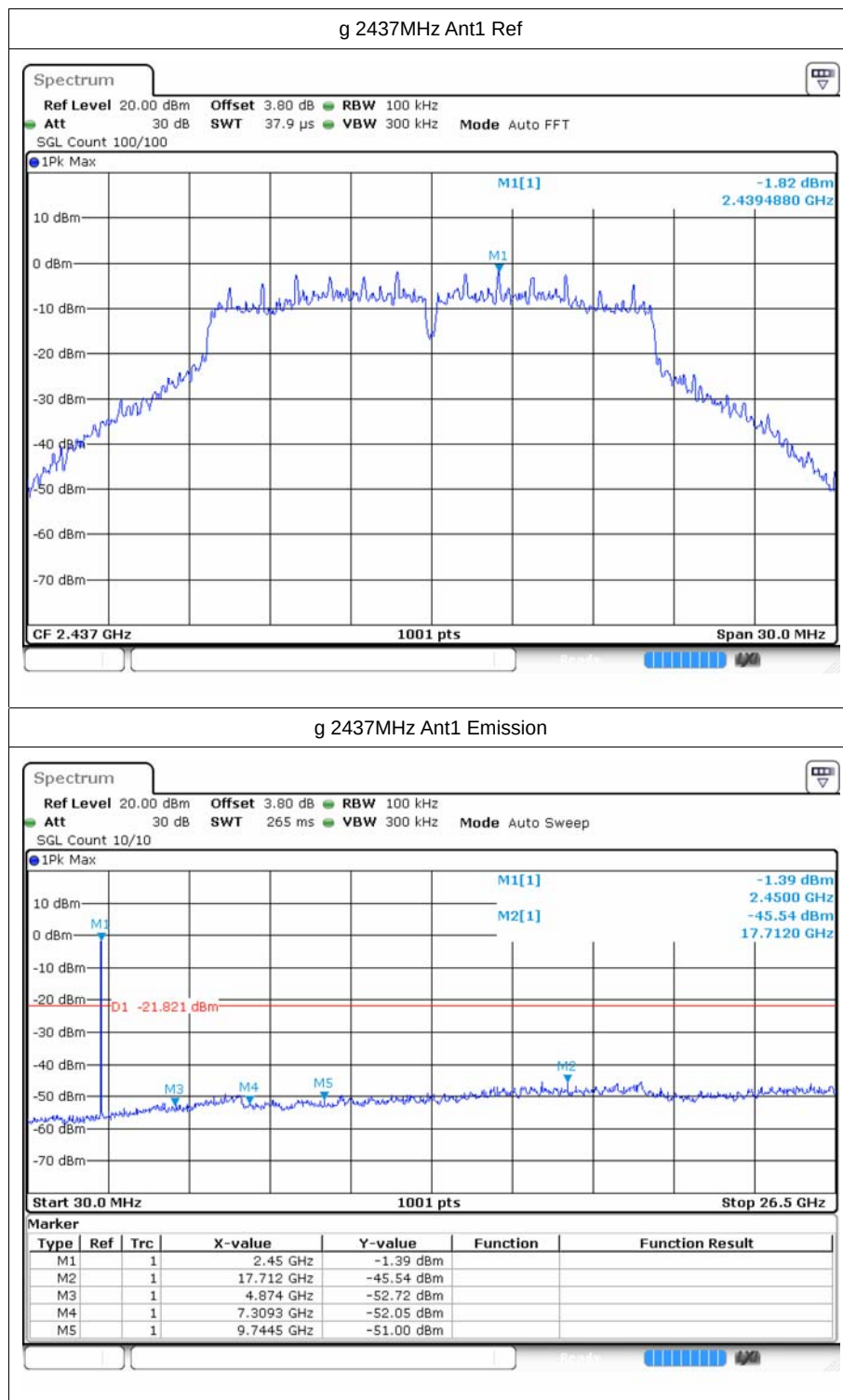
6.2 Test Graphs

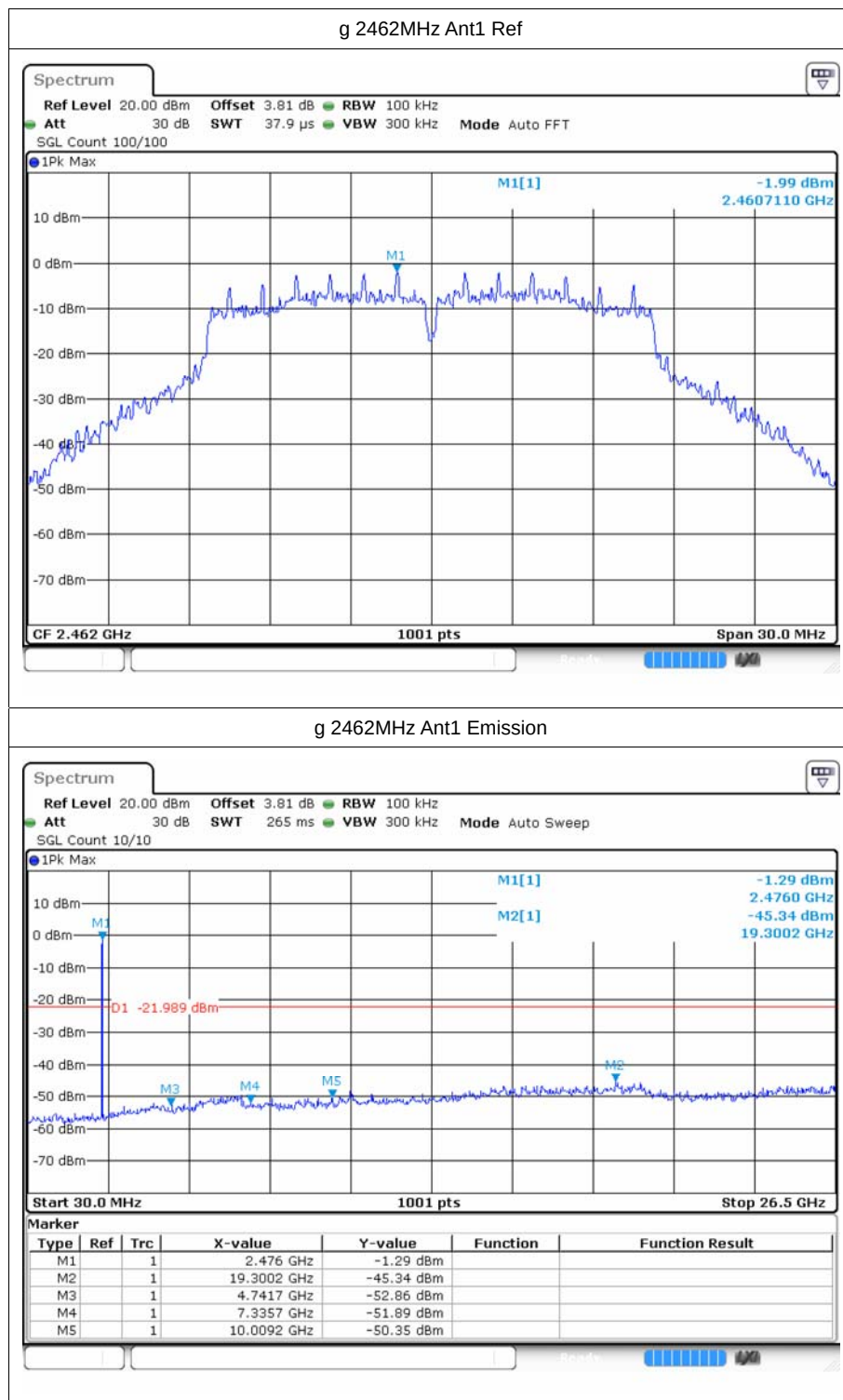


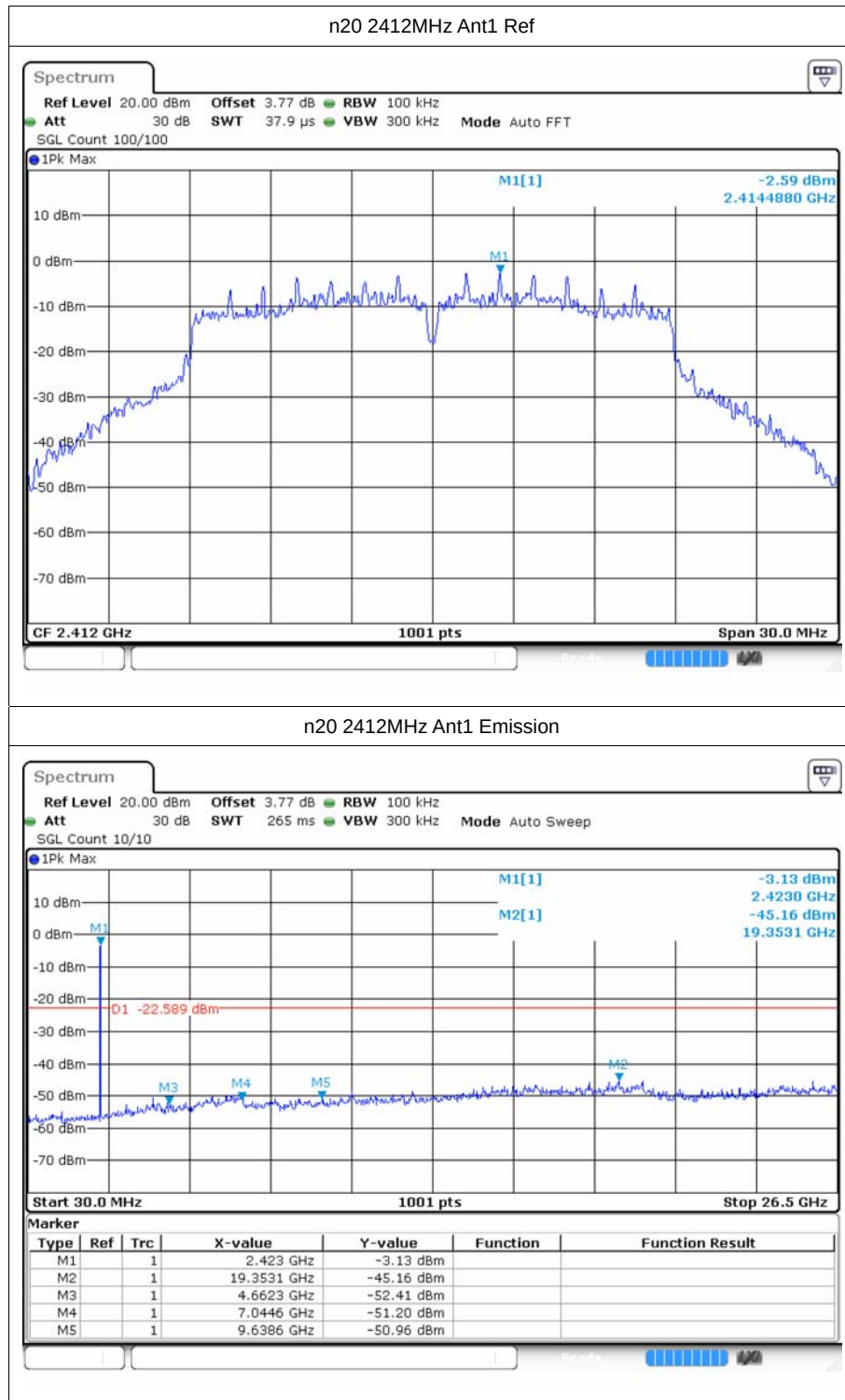


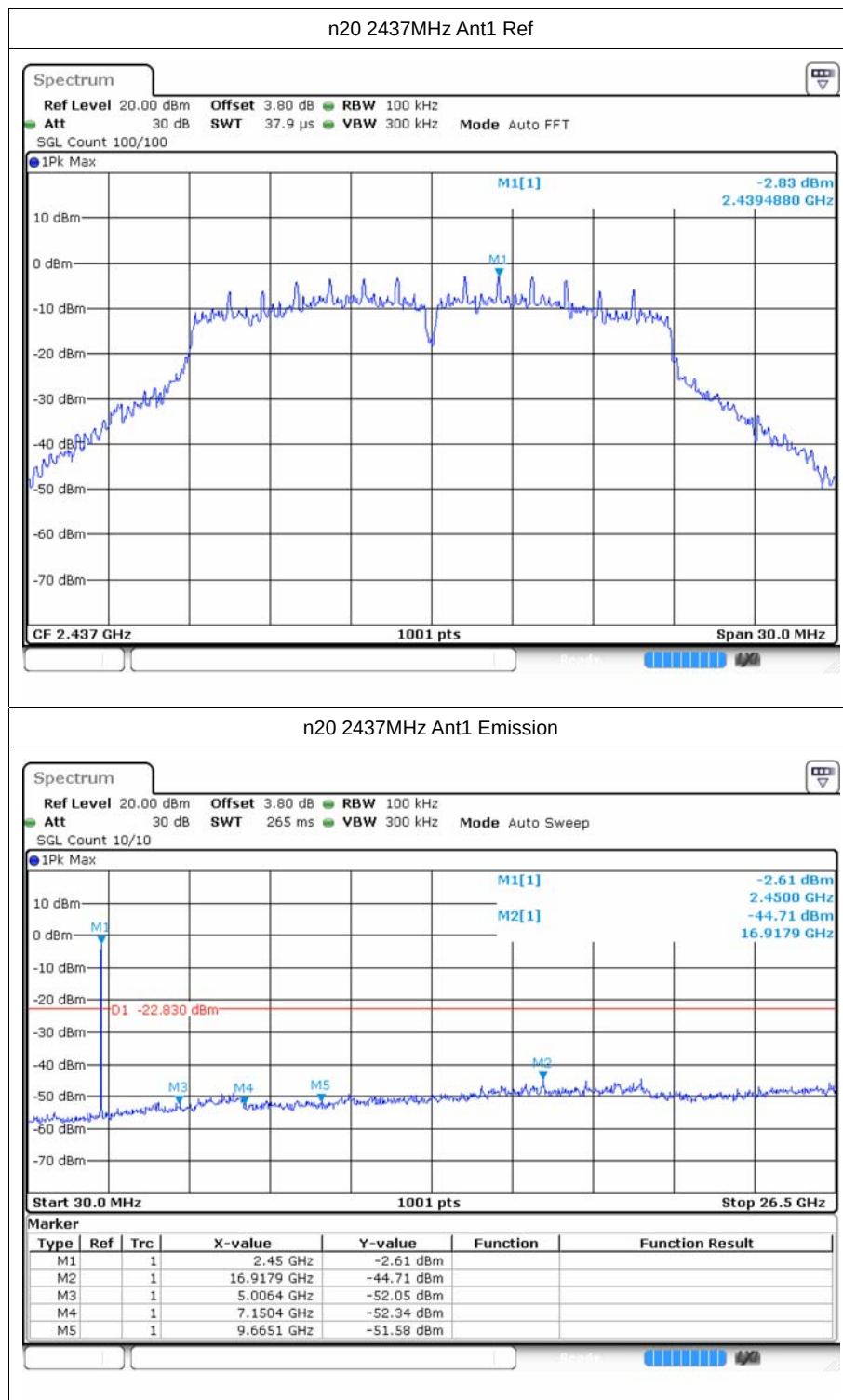


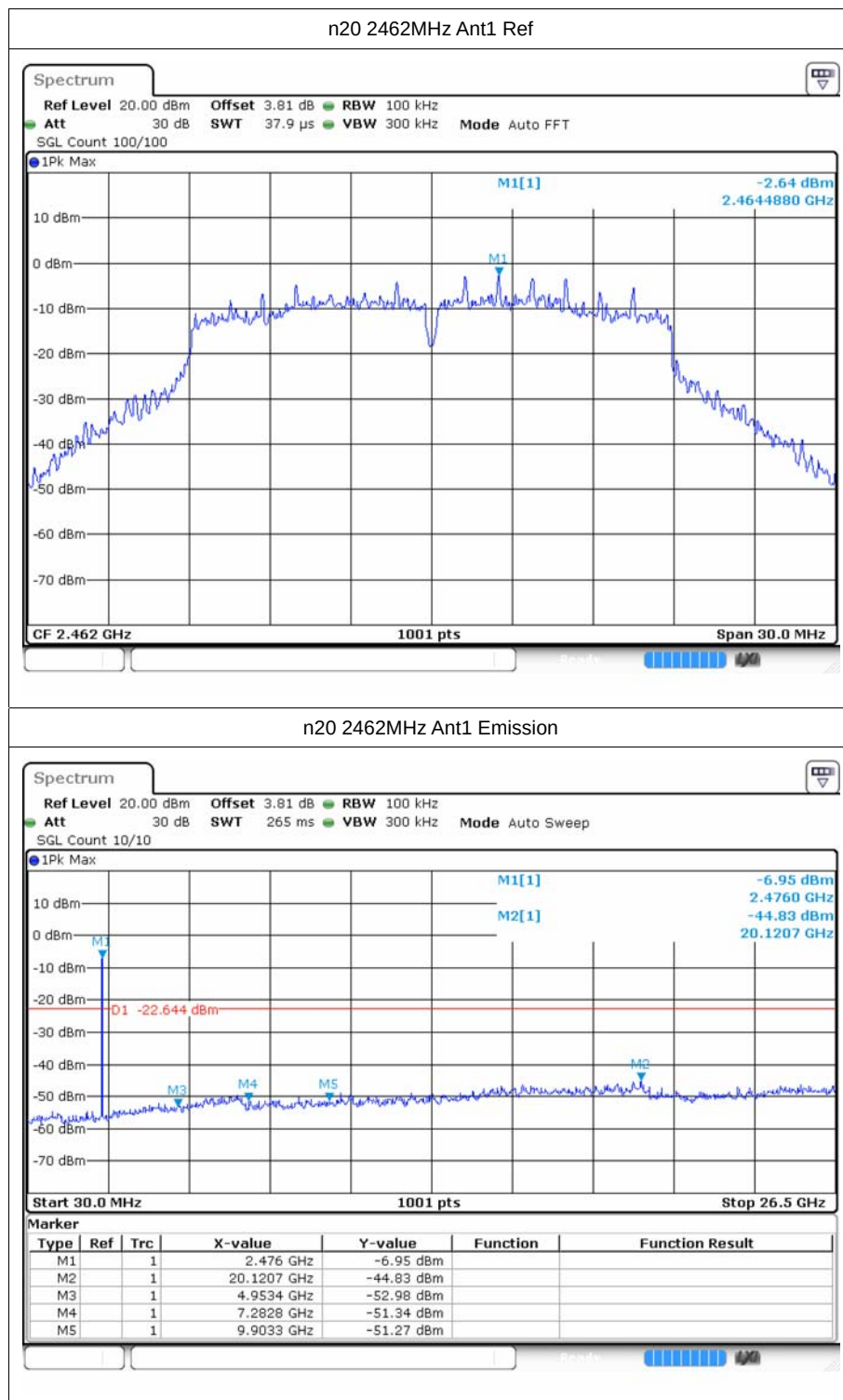














7 Restrict Band

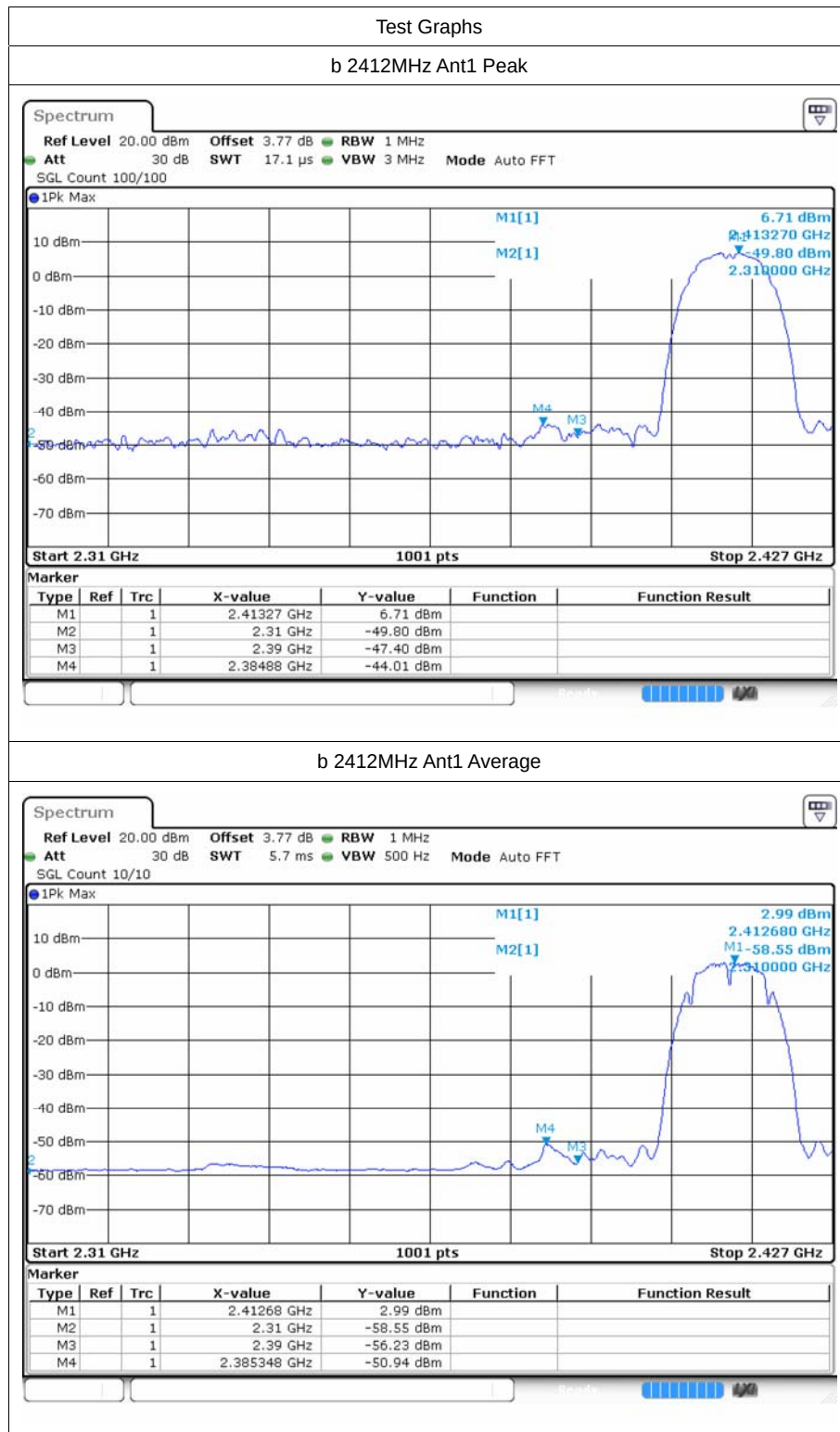
7.1 Test Result

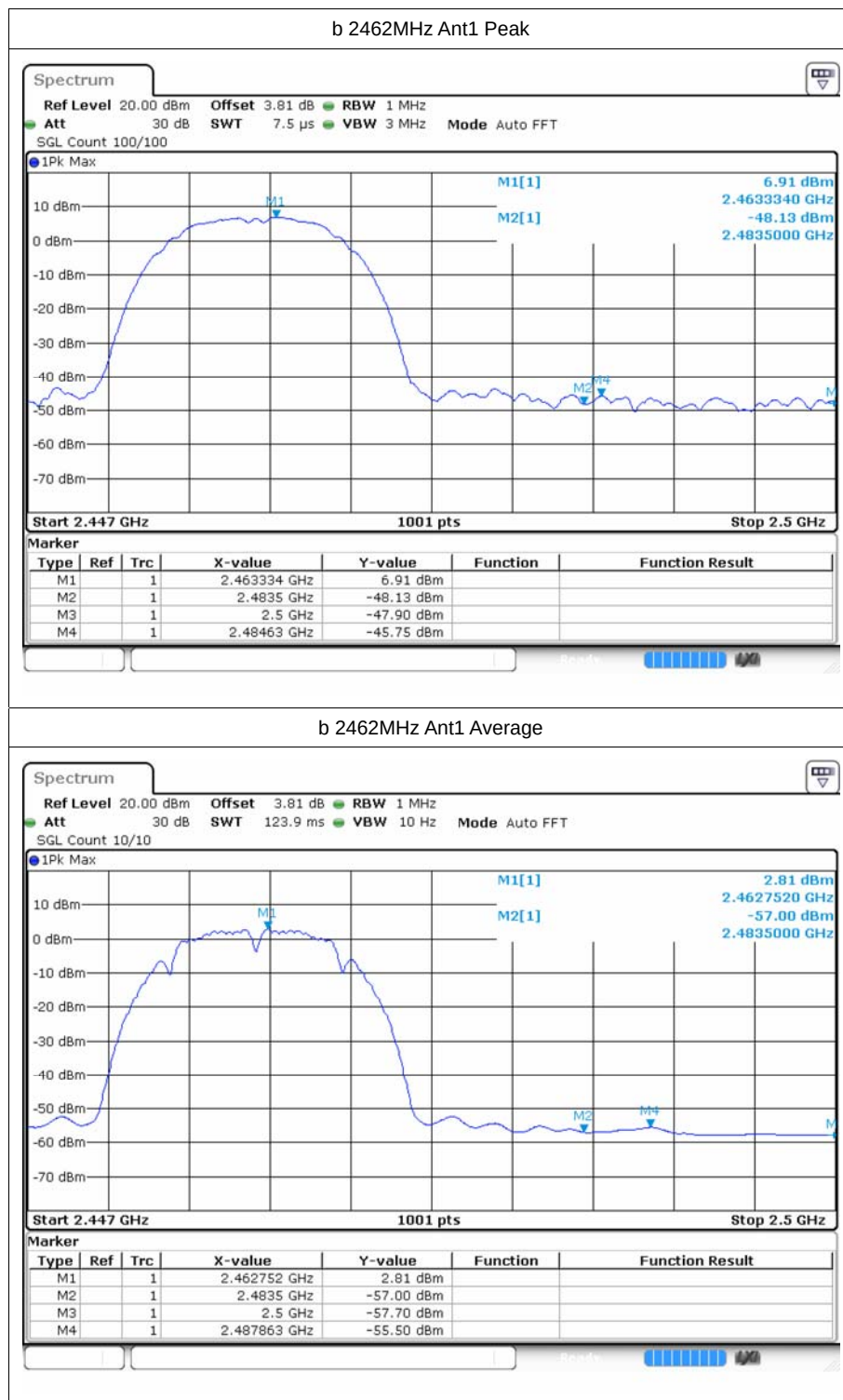
Mod e	Frequency (MHz)	Antenn a	Spur Freq (MHz)	Power (dBm)	Gain (dBi)	E (dBuV/m)	Detecto r	Limit (dBuV/m)	Verdic t
b	2412	Ant1	2310	-49.79	2	47.47	Peak	74	Pass
b	2412	Ant1	2310	-58.55	2	38.71	Average	54	Pass
b	2412	Ant1	2384.88	-44.01	2	53.25	Peak	74	Pass
b	2412	Ant1	2385.348	-50.93	2	46.33	Average	54	Pass
b	2412	Ant1	2390	-47.39	2	49.87	Peak	74	Pass
b	2412	Ant1	2390	-56.22	2	41.04	Average	54	Pass
b	2462	Ant1	2483.5	-48.12	2	49.14	Peak	74	49.14
b	2462	Ant1	2483.5	-57	2	40.26	Average	54	Pass
b	2462	Ant1	2484.63	-45.75	2	51.51	Peak	74	Pass
b	2462	Ant1	2487.863	-55.5	2	41.76	Average	54	Pass
b	2462	Ant1	2500	-47.89	2	49.37	Peak	74	Pass
b	2462	Ant1	2500	-57.7	2	39.56	Average	54	Pass
g	2412	Ant1	2310	-49.99	2	47.27	Peak	74	Pass
g	2412	Ant1	2310	-57.23	2	40.03	Average	54	Pass
g	2412	Ant1	2336.676	-45.99	2	51.27	Peak	74	Pass
g	2412	Ant1	2337.846	-54.9	2	42.36	Average	54	Pass
g	2412	Ant1	2390	-48.99	2	49.87	Peak	74	Pass
g	2412	Ant1	2390	-57.07	2	40.19	Average	54	Pass
g	2462	Ant1	2483.5	-47.96	2	49.3	Peak	74	Pass
g	2462	Ant1	2483.5	-56.89	2	40.37	Average	54	Pass
g	2462	Ant1	2484.63	-45.81	2	51.45	Peak	74	Pass
g	2462	Ant1	2488.499	-55.74	2	41.52	Average	54	Pass
g	2462	Ant1	2500	-48.89	2	49.37	Peak	74	Pass
g	2462	Ant1	2500	-56.43	2	40.83	Average	54	Pass
n20	2412	Ant1	2310	-49.03	2	48.23	Peak	74	Pass
n20	2412	Ant1	2310	-57.07	2	40.19	Average	54	Pass
n20	2412	Ant1	2339.835	-45.61	2	51.65	Peak	74	Pass
n20	2412	Ant1	2336.676	-55.09	2	42.17	Average	54	Pass
n20	2412	Ant1	2390	-47.94	2	49.32	Peak	74	Pass
n20	2412	Ant1	2390	-56.85	2	40.41	Average	54	Pass
n20	2462	Ant1	2483.5	-48.88	2	48.38	Peak	74	Pass
n20	2462	Ant1	2483.5	-56.74	2	40.52	Average	54	Pass
n20	2462	Ant1	2486.273	-46.68	2	50.58	Peak	74	Pass
n20	2462	Ant1	2492.792	-55.89	2	41.37	Average	54	Pass

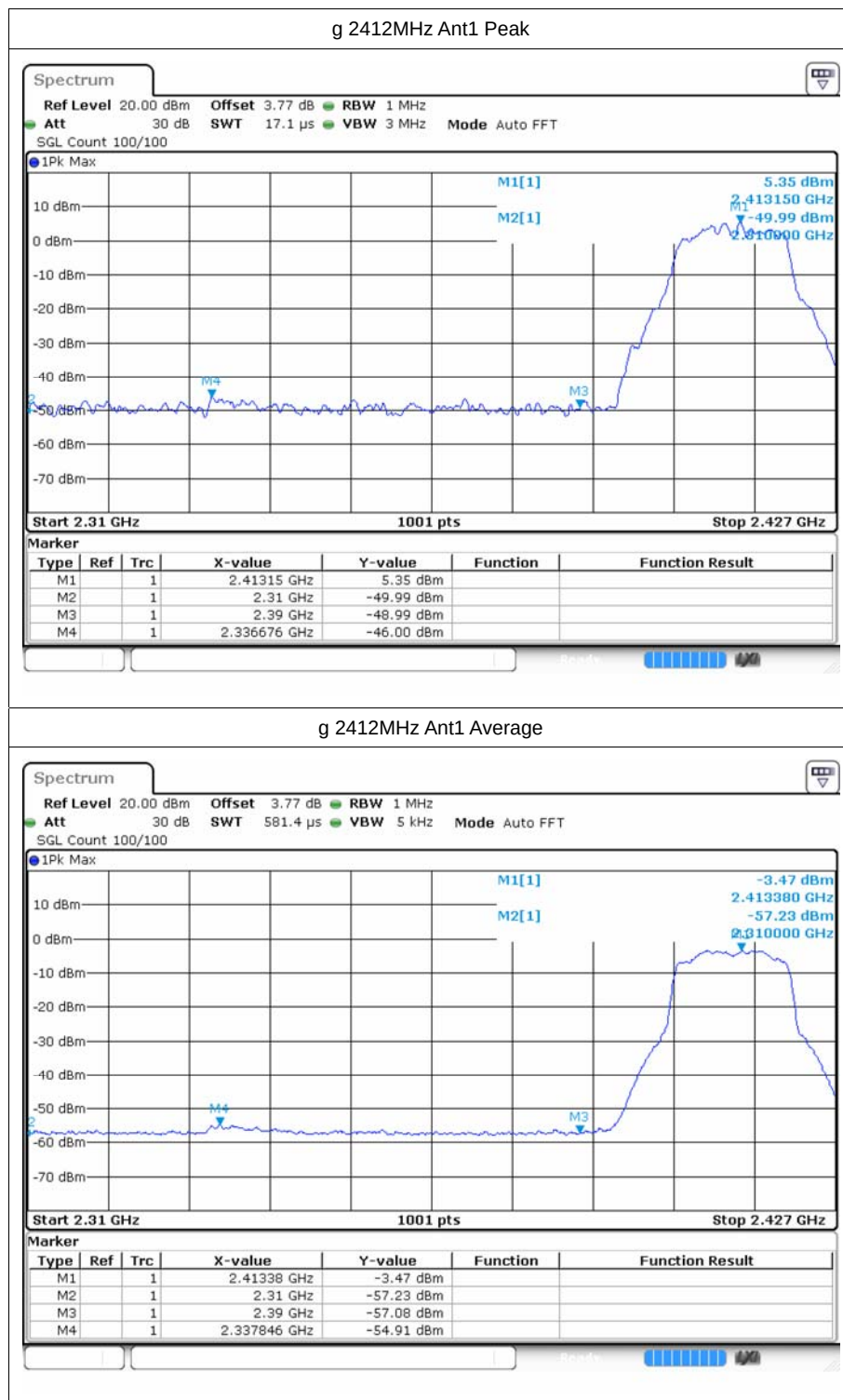


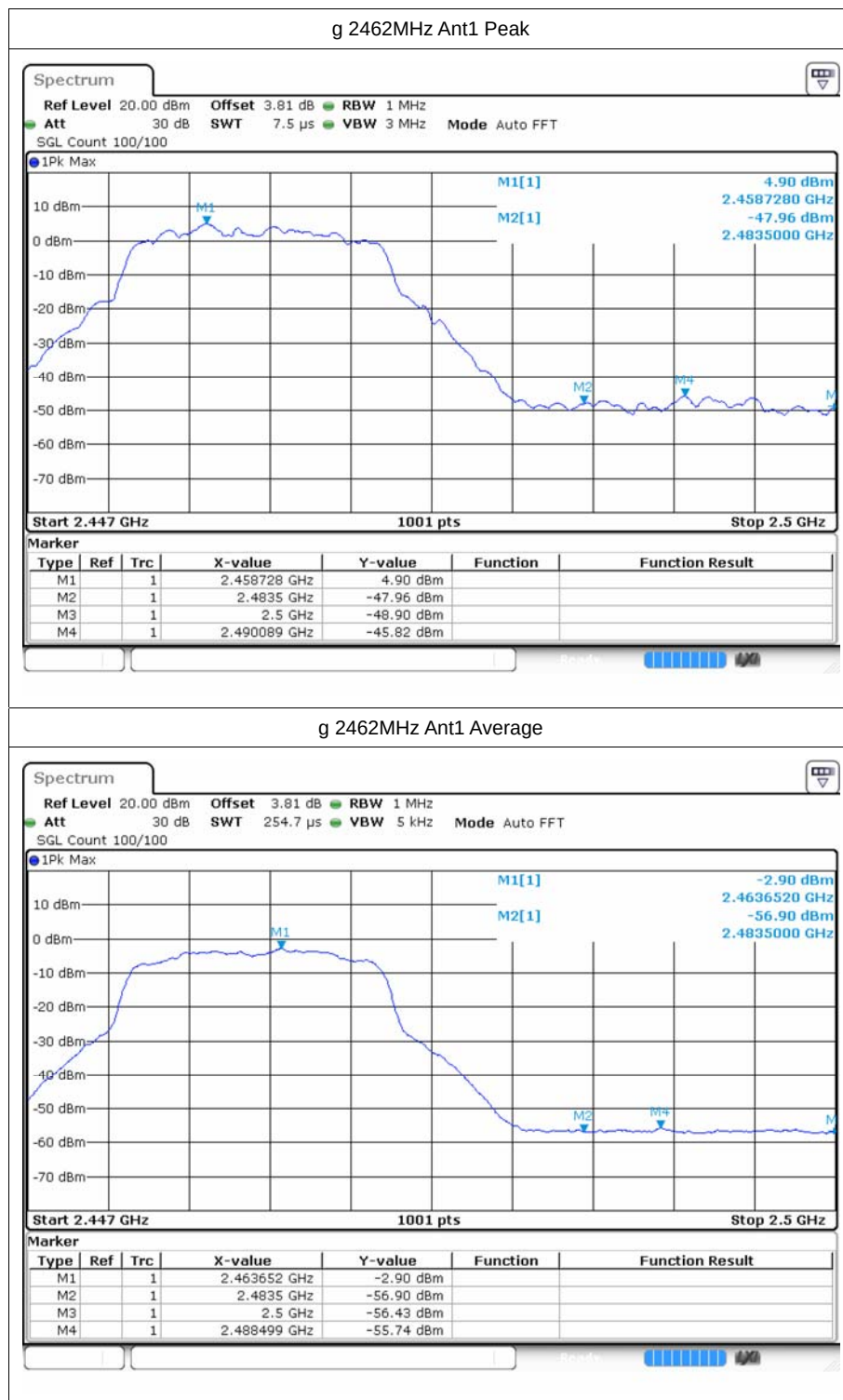
n20	2462	Ant1	2500	-48.48	2	48.78	Peak	74	Pass
n20	2462	Ant1	2500	-56.51	2	40.75	Average	54	Pass

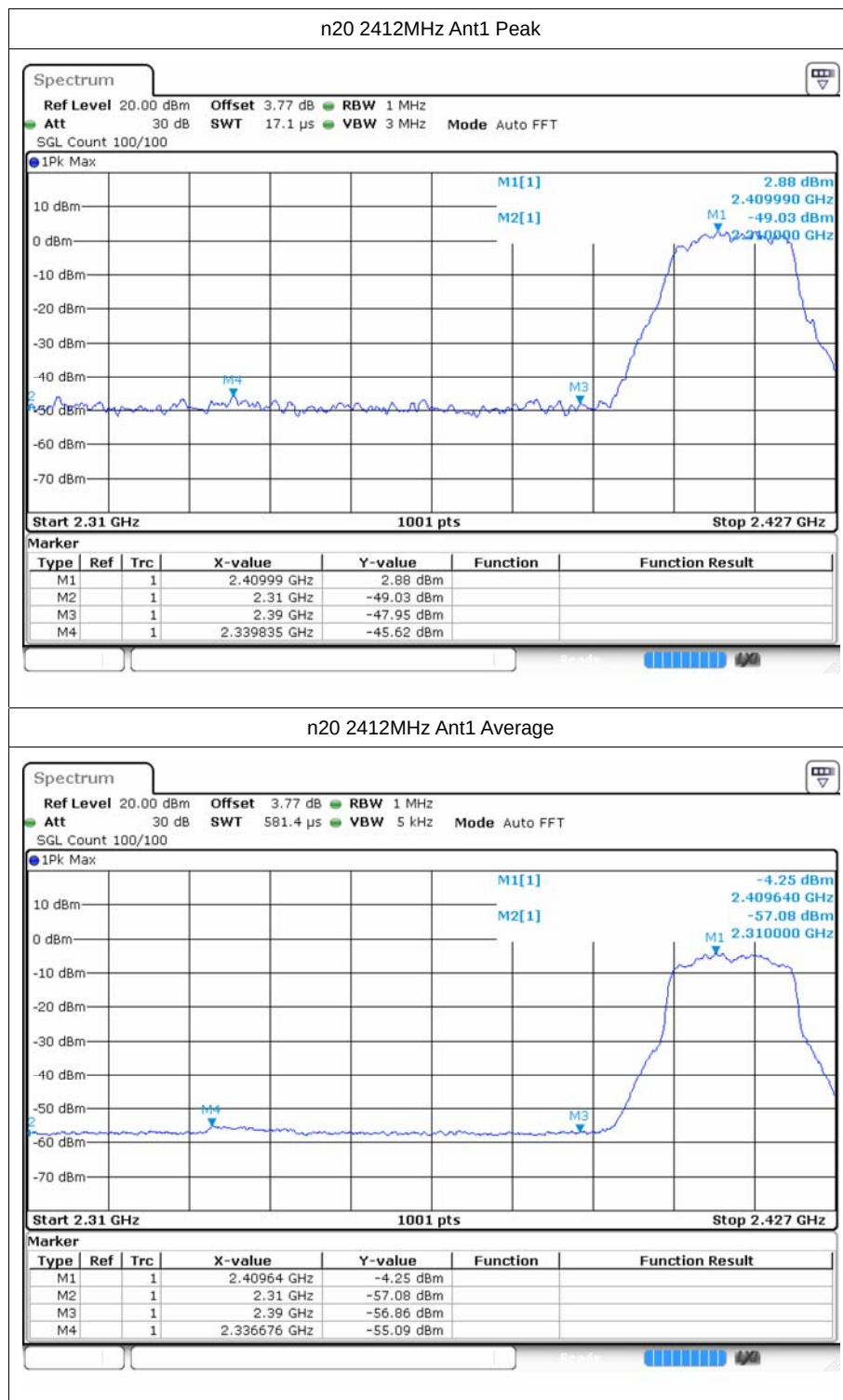
7.2 Test Graphs

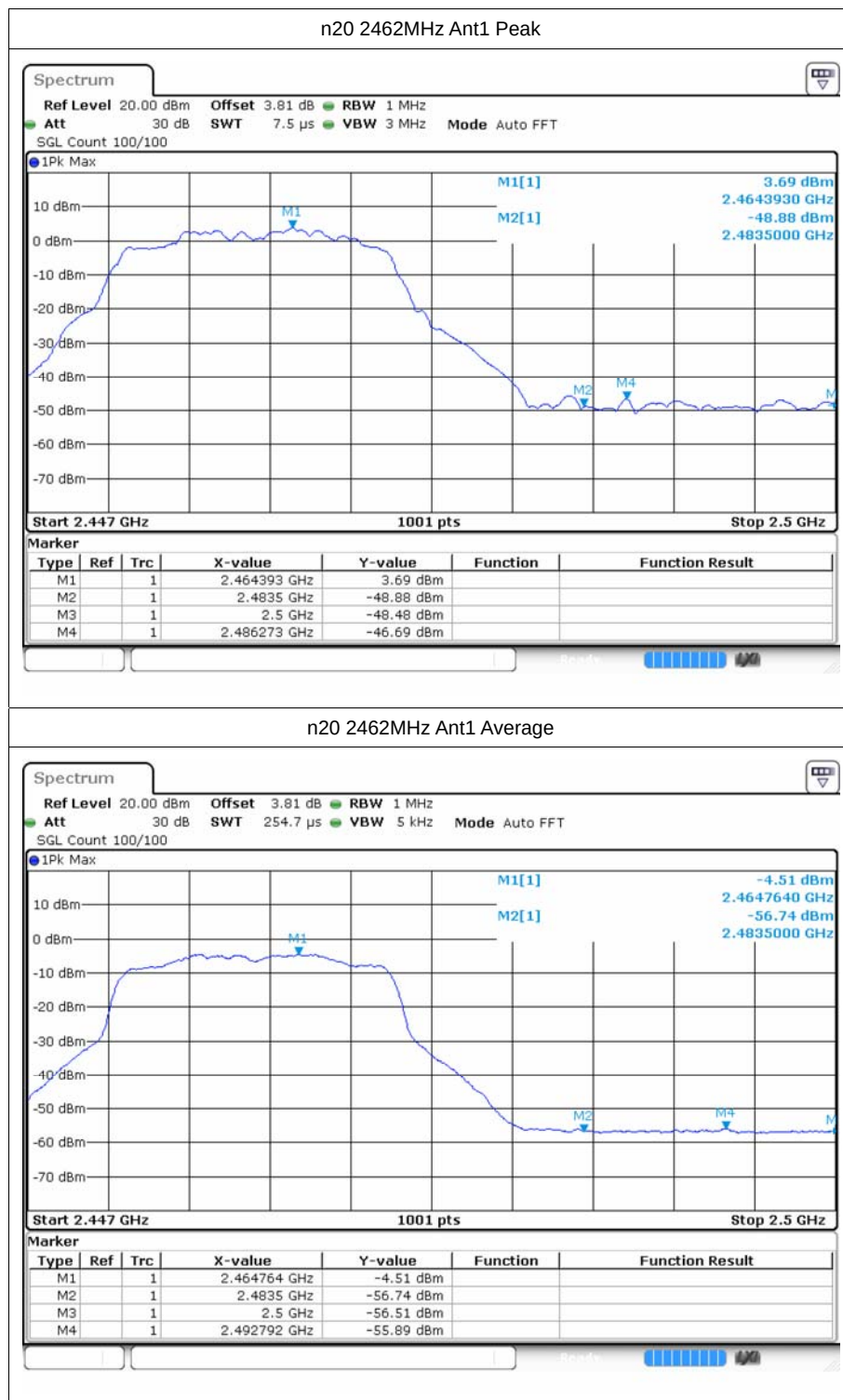












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