



Appendix RF test data for 5G WIFI

Product Name: carplay

Trade Mark: N/A

Test Model: D01

Environmental Conditions

Temperature:	24.6° C
Relative Humidity:	52.4%
ATM Pressure:	100.0 kPa
Test Engineer:	Emiya Lin
Supervised by:	Simba Huang



Contents

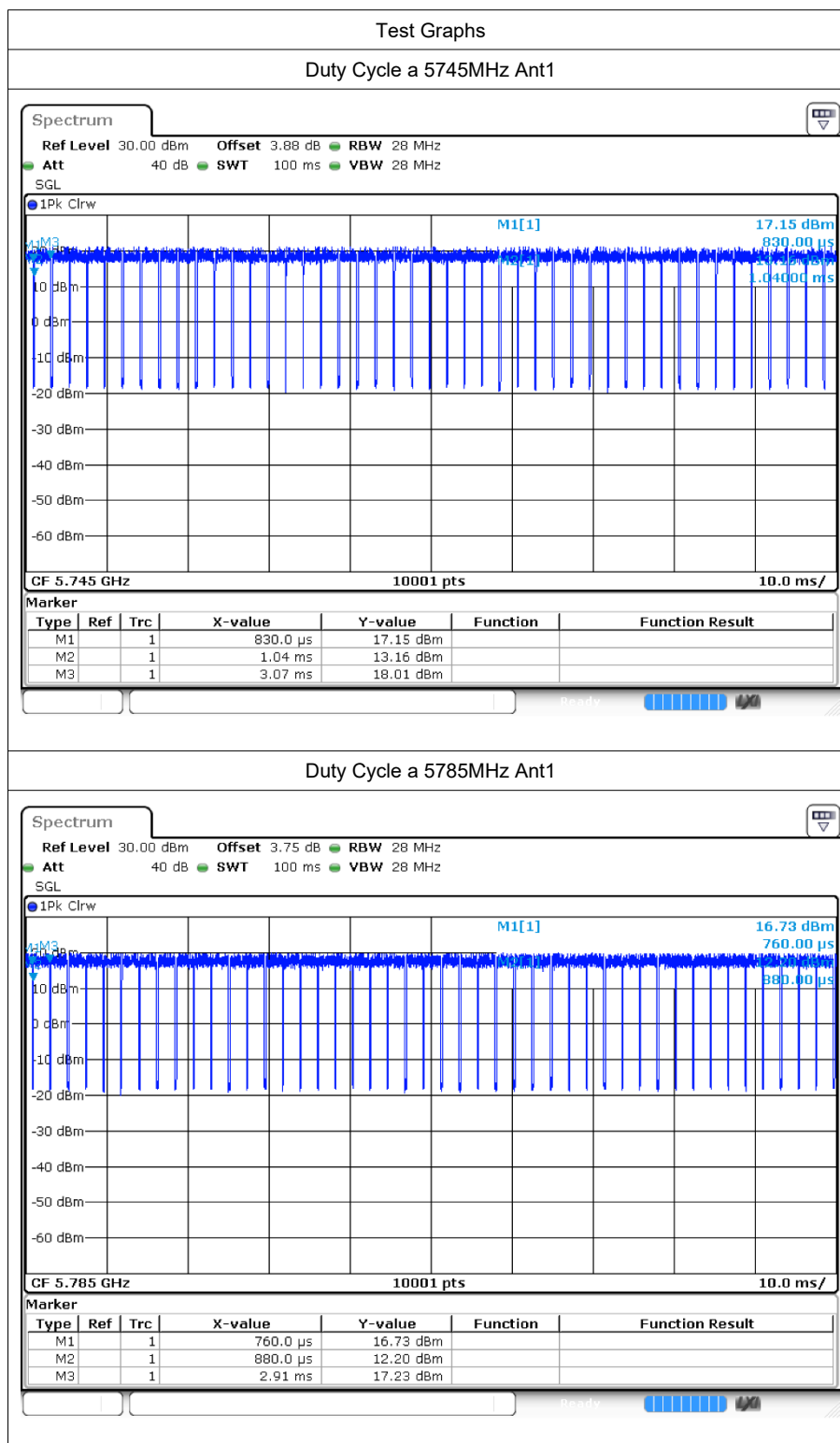
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1 Duty Cycle

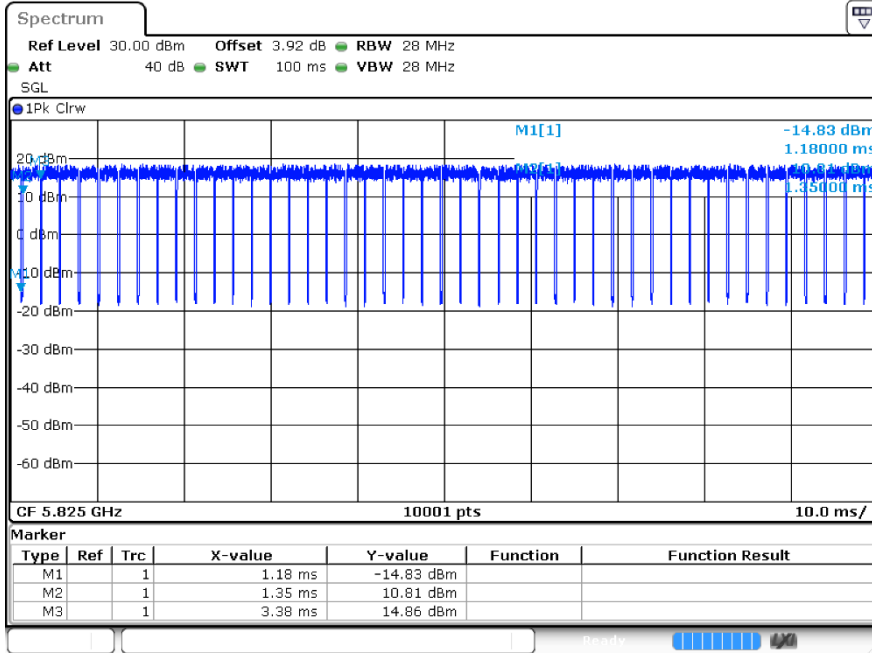
1.1 Test Result

Mode	Frequency (MHz)	Antenna	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
a	5745	Ant1	92.09	0.36	0.49
a	5785	Ant1	92.85	0.32	0.49
a	5825	Ant1	92.64	0.33	0.49
n20	5745	Ant1	92.62	0.33	0.53
n20	5785	Ant1	92.13	0.36	0.53
n20	5825	Ant1	91.81	0.37	0.53
n40	5755	Ant1	84.6	0.73	1.08
n40	5795	Ant1	90.21	0.45	1.08
ac20	5745	Ant1	92.36	0.35	0.53
ac20	5785	Ant1	92.7	0.33	0.53
ac20	5825	Ant1	93.16	0.31	0.53
ac40	5755	Ant1	90.22	0.45	1.06
ac40	5795	Ant1	90.39	0.44	1.08

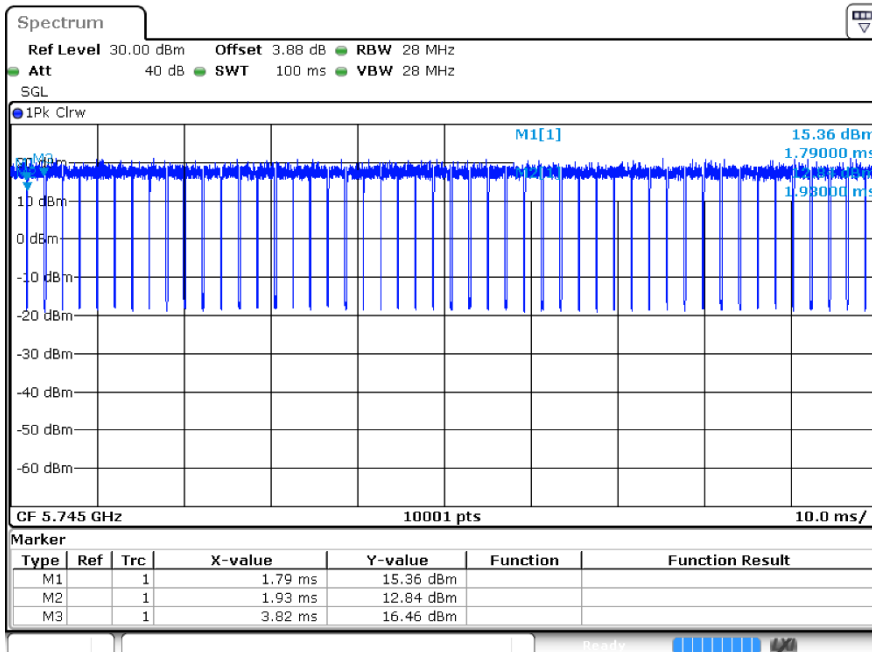
1.2 Test Graphs



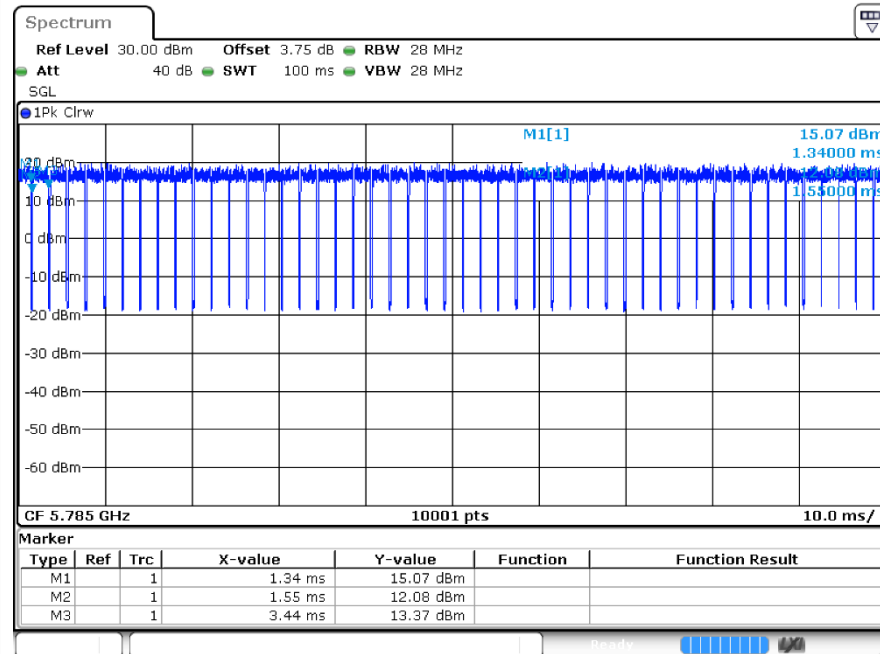
Duty Cycle a 5825MHz Ant1



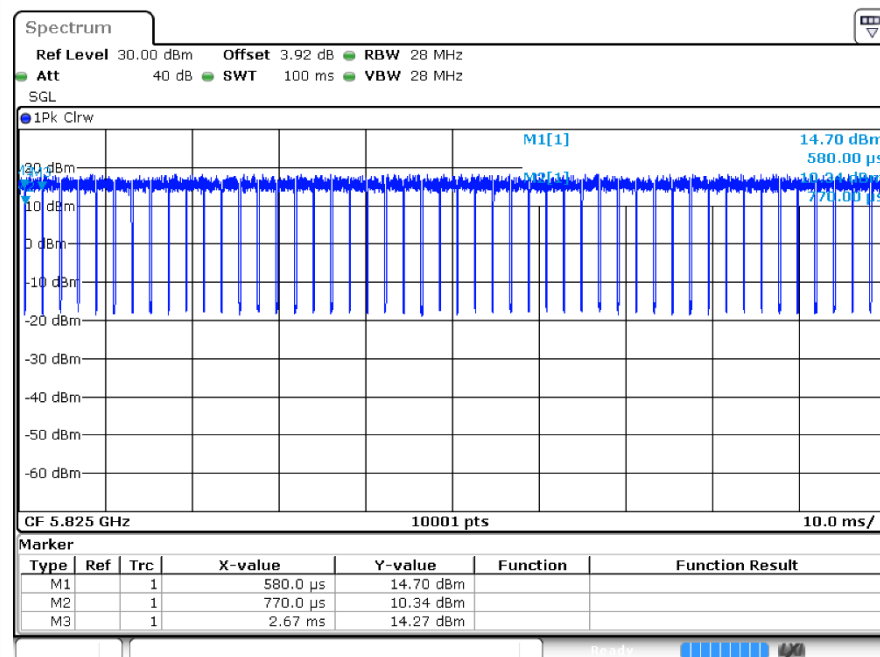
Duty Cycle n20 5745MHz Ant1



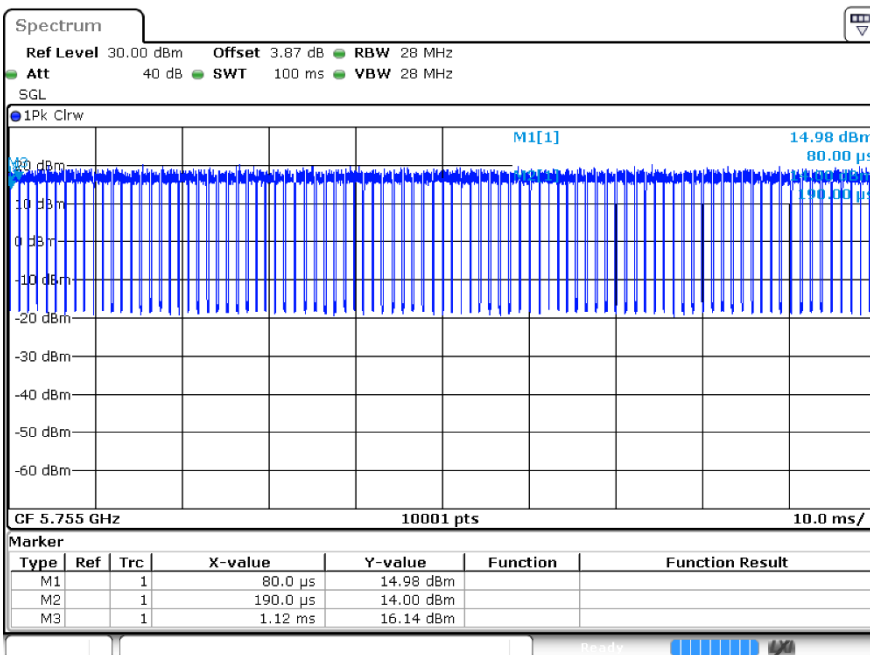
Duty Cycle n20 5785MHz Ant1



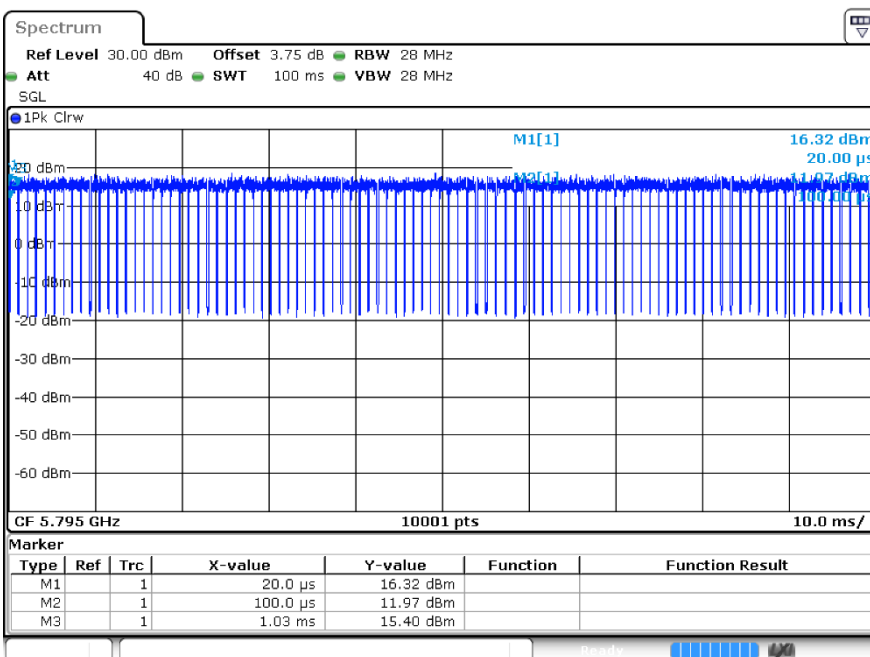
Duty Cycle n20 5825MHz Ant1



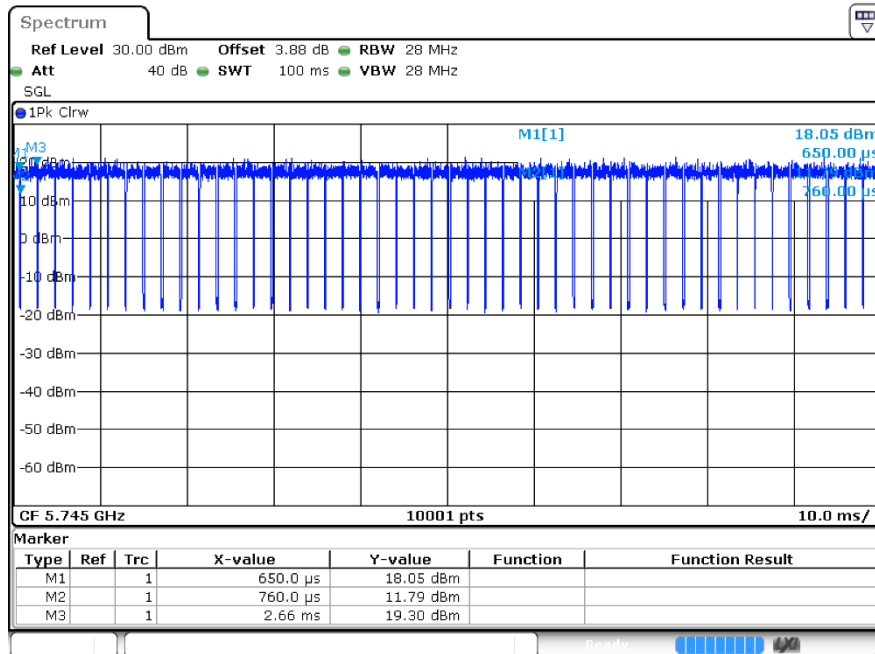
Duty Cycle n40 5755MHz Ant1



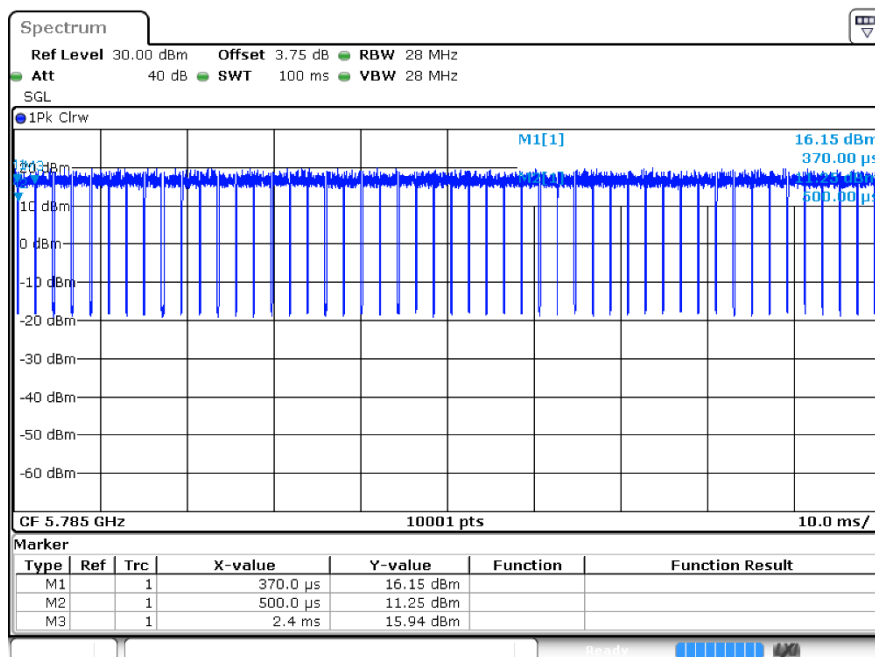
Duty Cycle n40 5795MHz Ant1



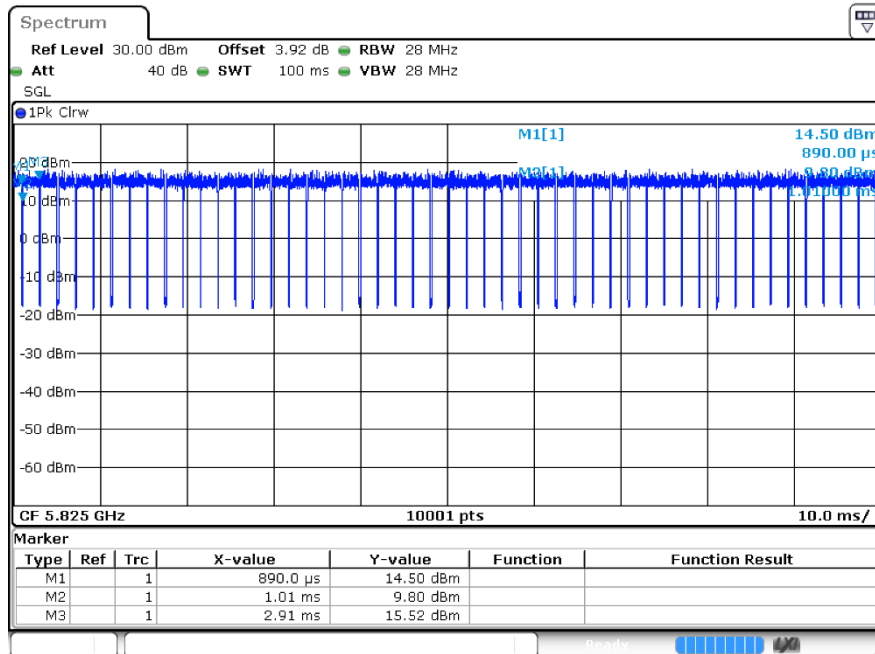
Duty Cycle ac20 5745MHz Ant1



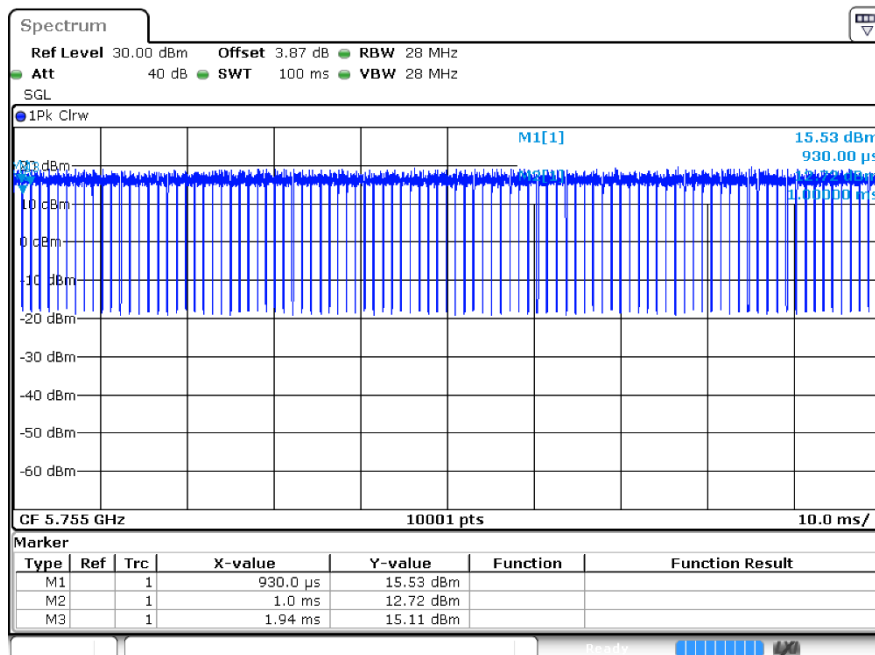
Duty Cycle ac20 5785MHz Ant1

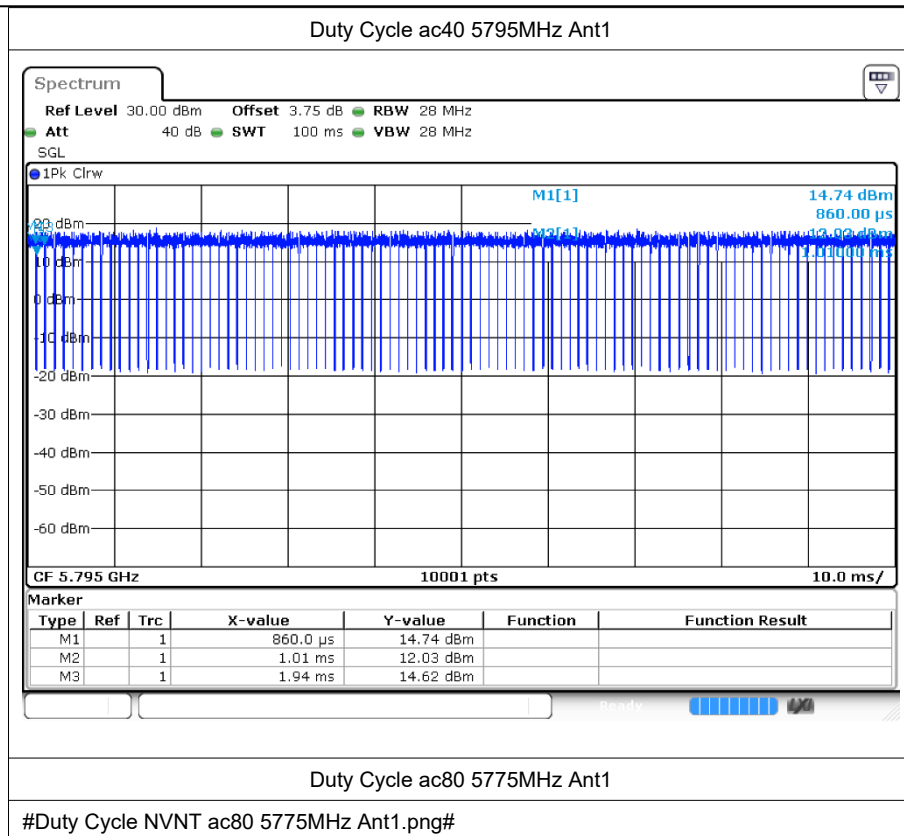


Duty Cycle ac20 5825MHz Ant1



Duty Cycle ac40 5755MHz Ant1





2 Maximum Conducted Output Power

2.1 Test Result

Mode	Frequency (MHz)	Antenna	Conducted Power (dBm)	Limit (dBm)	Verdict
a	5745	Ant1	14.38	30	Pass
a	5785	Ant1	13.34	30	Pass
a	5825	Ant1	11.8	30	Pass
n20	5745	Ant1	13.33	30	Pass
n20	5785	Ant1	12.37	30	Pass
n20	5825	Ant1	11.43	30	Pass
n40	5755	Ant1	13.22	30	Pass
n40	5795	Ant1	11.57	30	Pass
ac20	5745	Ant1	13.33	30	Pass
ac20	5785	Ant1	12.47	30	Pass
ac20	5825	Ant1	10.84	30	Pass
ac40	5755	Ant1	12.67	30	Pass
ac40	5795	Ant1	11.62	30	Pass

Note:

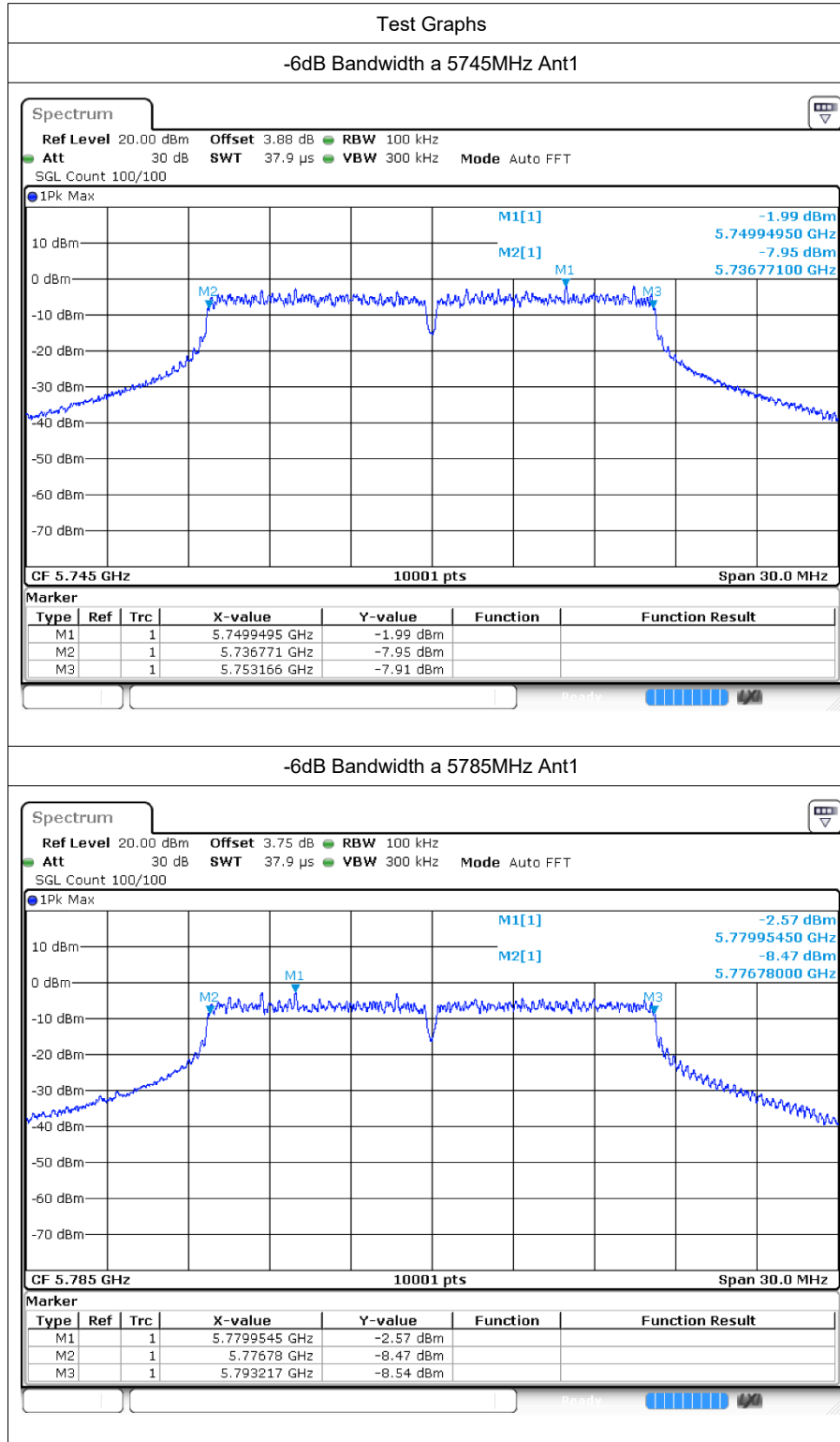
The duty factor has been compensated into the result.

3 -6dB Bandwidth

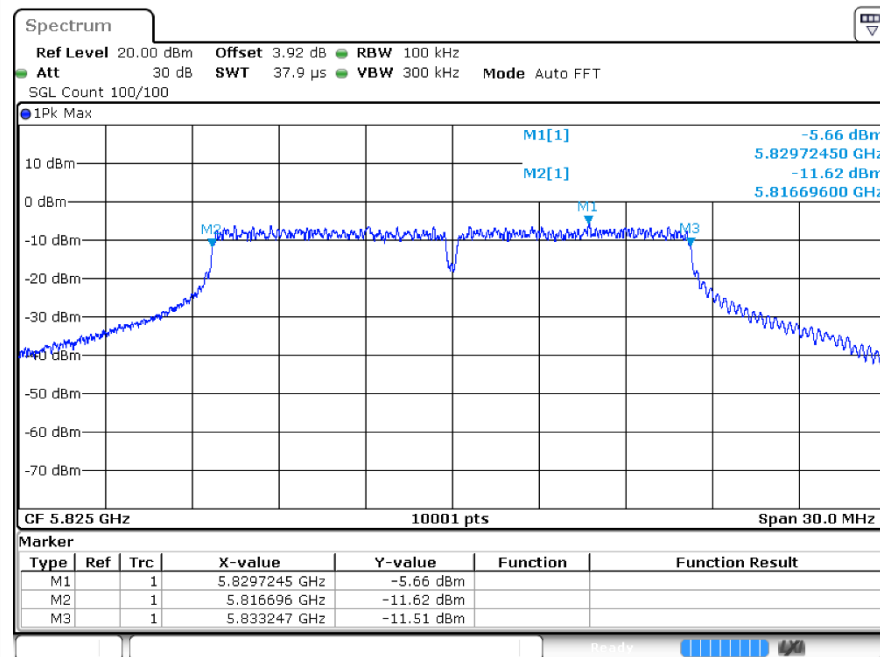
3.1 Test Result

Mode	Frequency (MHz)	Antenna	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
a	5745	Ant1	16.395	0.5	Pass
a	5785	Ant1	16.437	0.5	Pass
a	5825	Ant1	16.551	0.5	Pass
n20	5745	Ant1	17.607	0.5	Pass
n20	5785	Ant1	17.592	0.5	Pass
n20	5825	Ant1	17.712	0.5	Pass
n40	5755	Ant1	36.312	0.5	Pass
n40	5795	Ant1	36.33	0.5	Pass
ac20	5745	Ant1	17.577	0.5	Pass
ac20	5785	Ant1	17.601	0.5	Pass
ac20	5825	Ant1	17.724	0.5	Pass
ac40	5755	Ant1	36.318	0.5	Pass
ac40	5795	Ant1	36.318	0.5	Pass

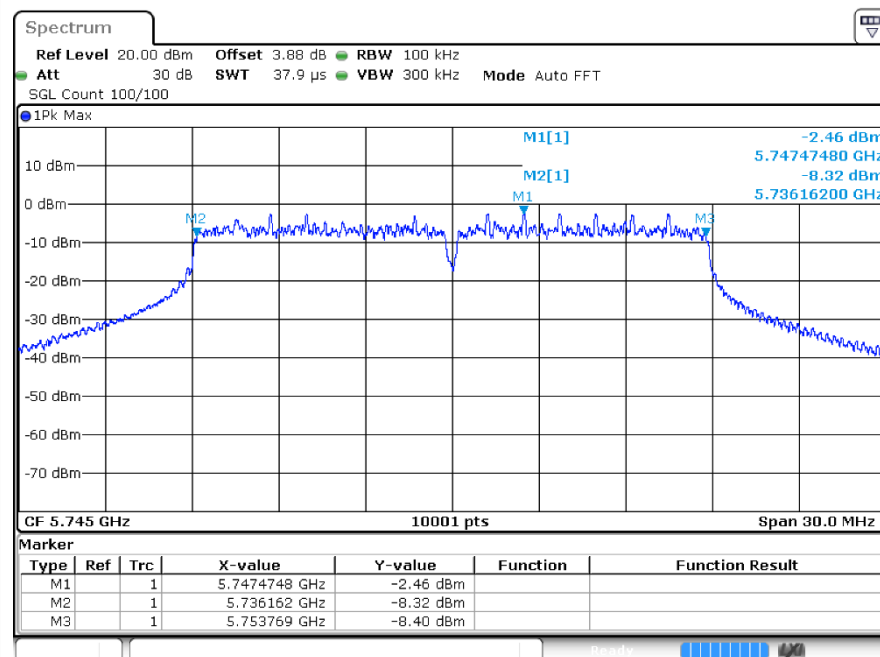
3.2 Test Graphs



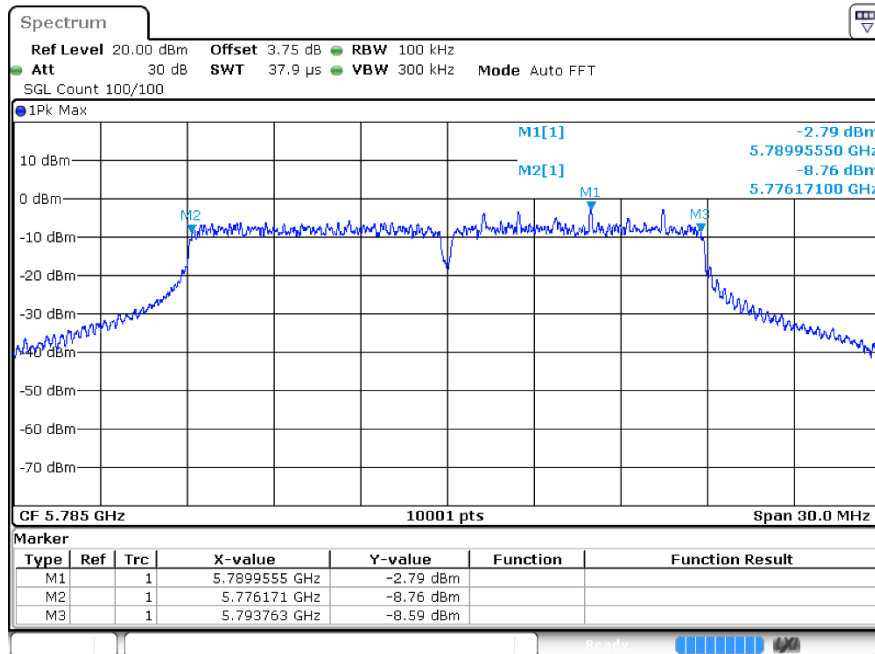
-6dB Bandwidth a 5825MHz Ant1



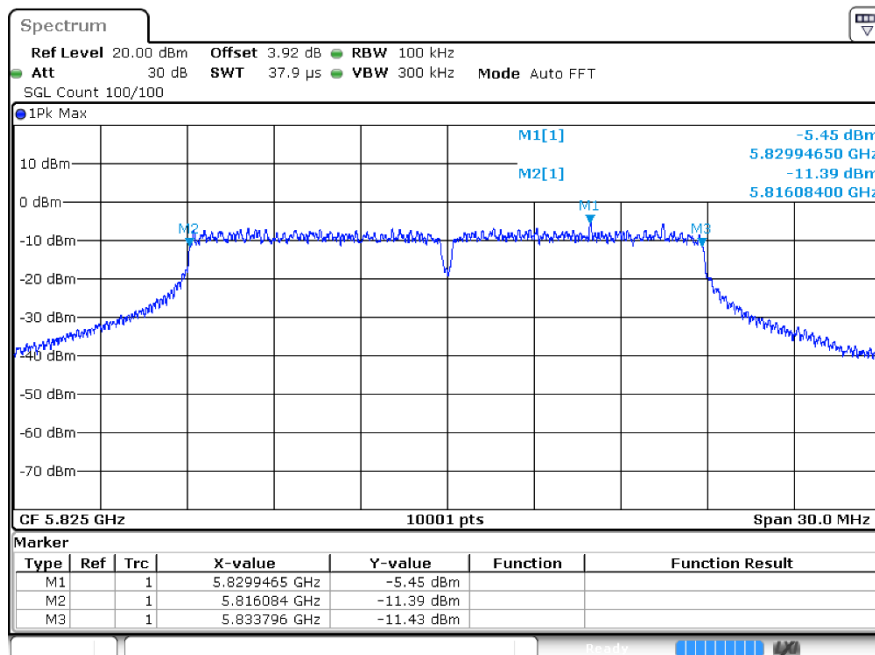
-6dB Bandwidth n20 5745MHz Ant1



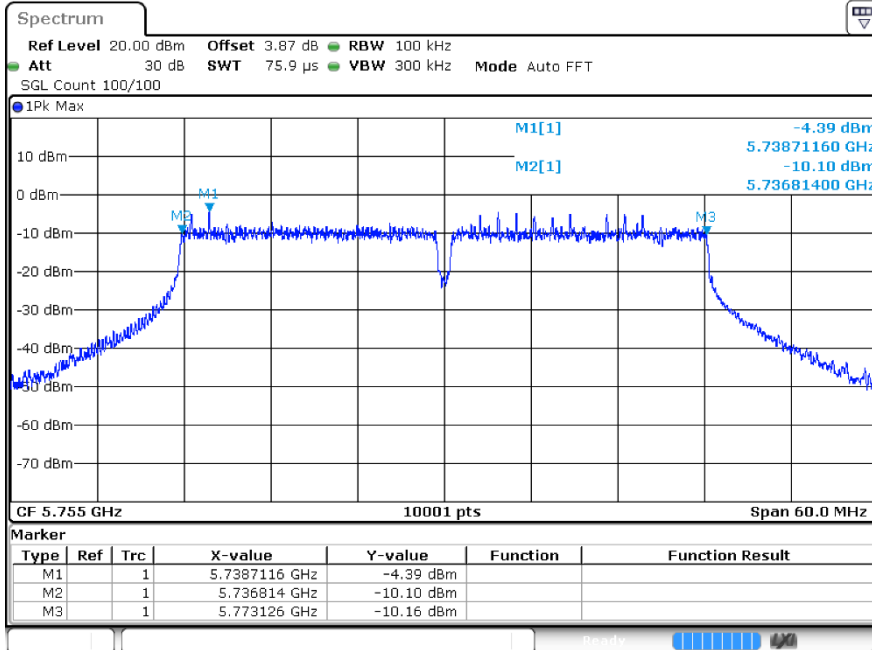
-6dB Bandwidth n20 5785MHz Ant1



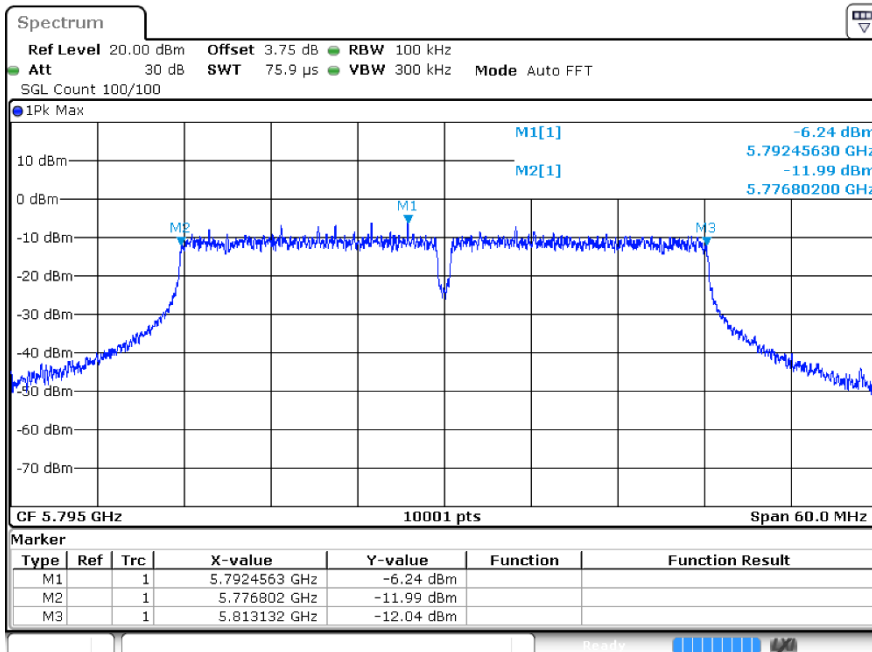
-6dB Bandwidth n20 5825MHz Ant1



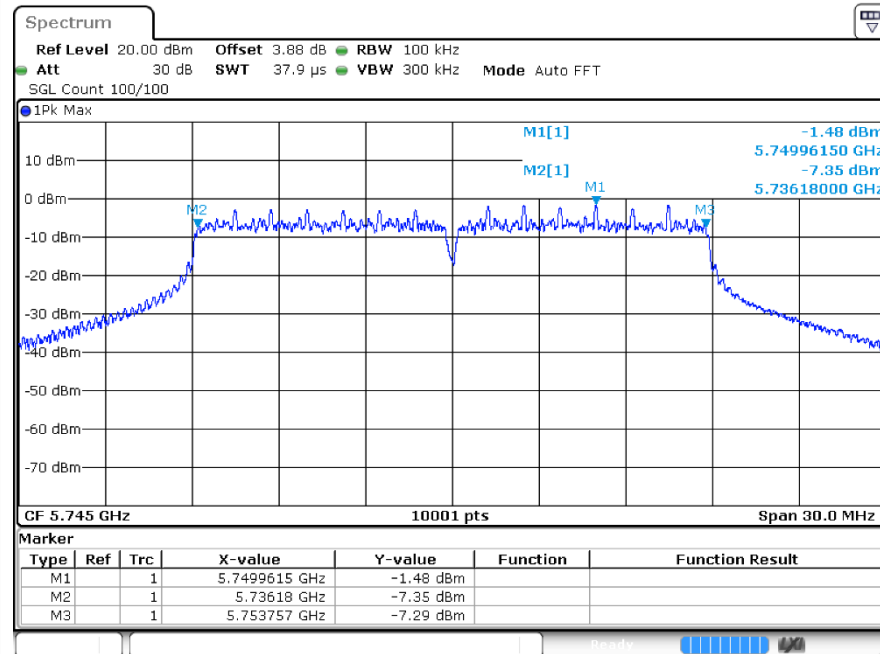
-6dB Bandwidth n40 5755MHz Ant1



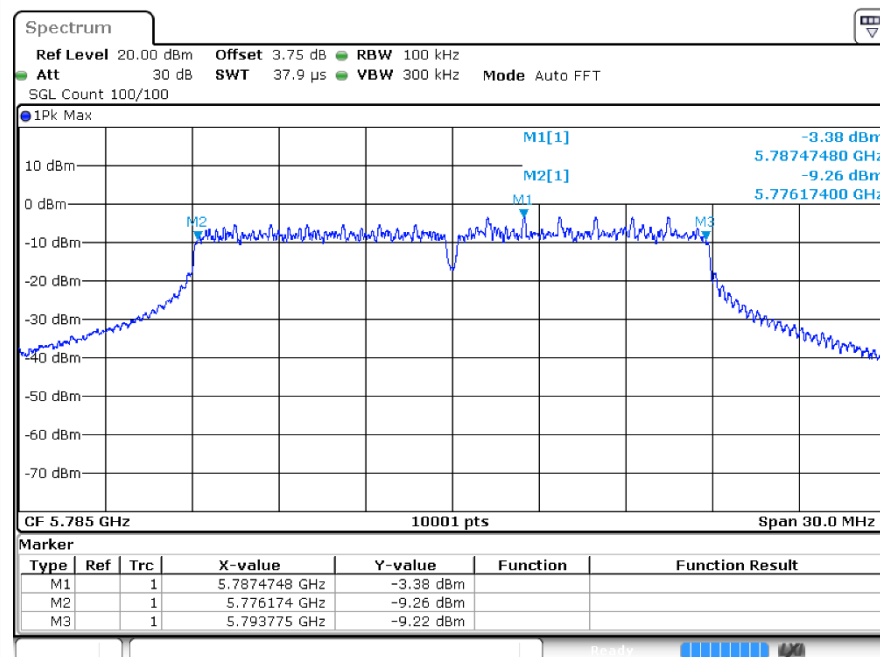
-6dB Bandwidth n40 5795MHz Ant1



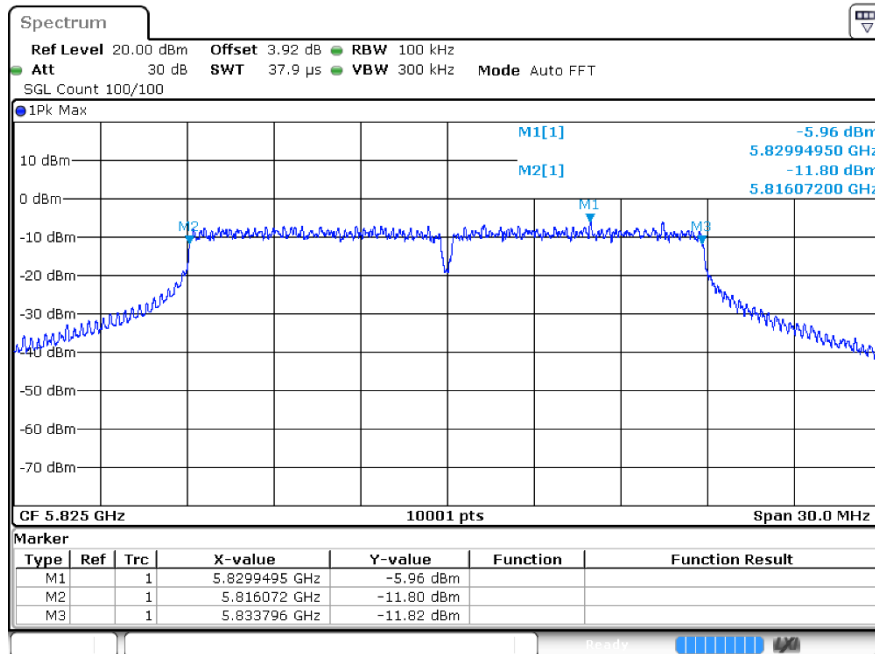
-6dB Bandwidth ac20 5745MHz Ant1



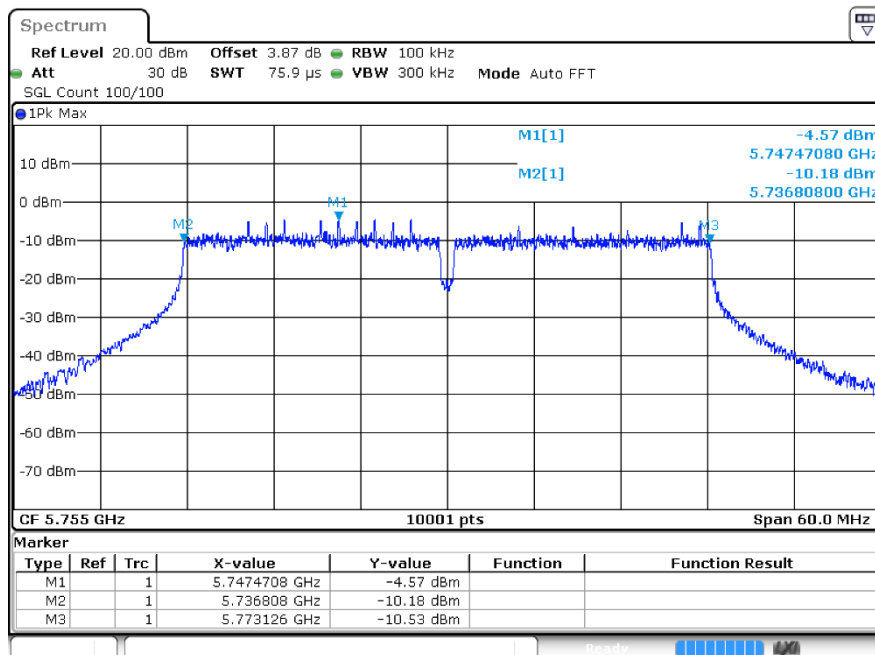
-6dB Bandwidth ac20 5785MHz Ant1

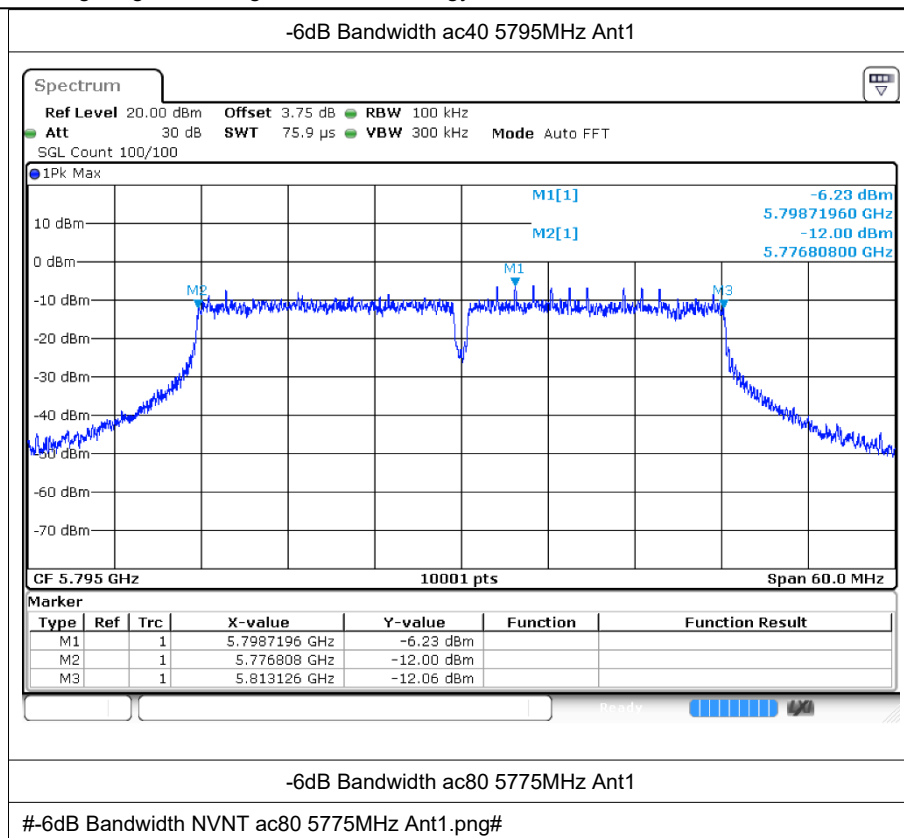


-6dB Bandwidth ac20 5825MHz Ant1



-6dB Bandwidth ac40 5755MHz Ant1



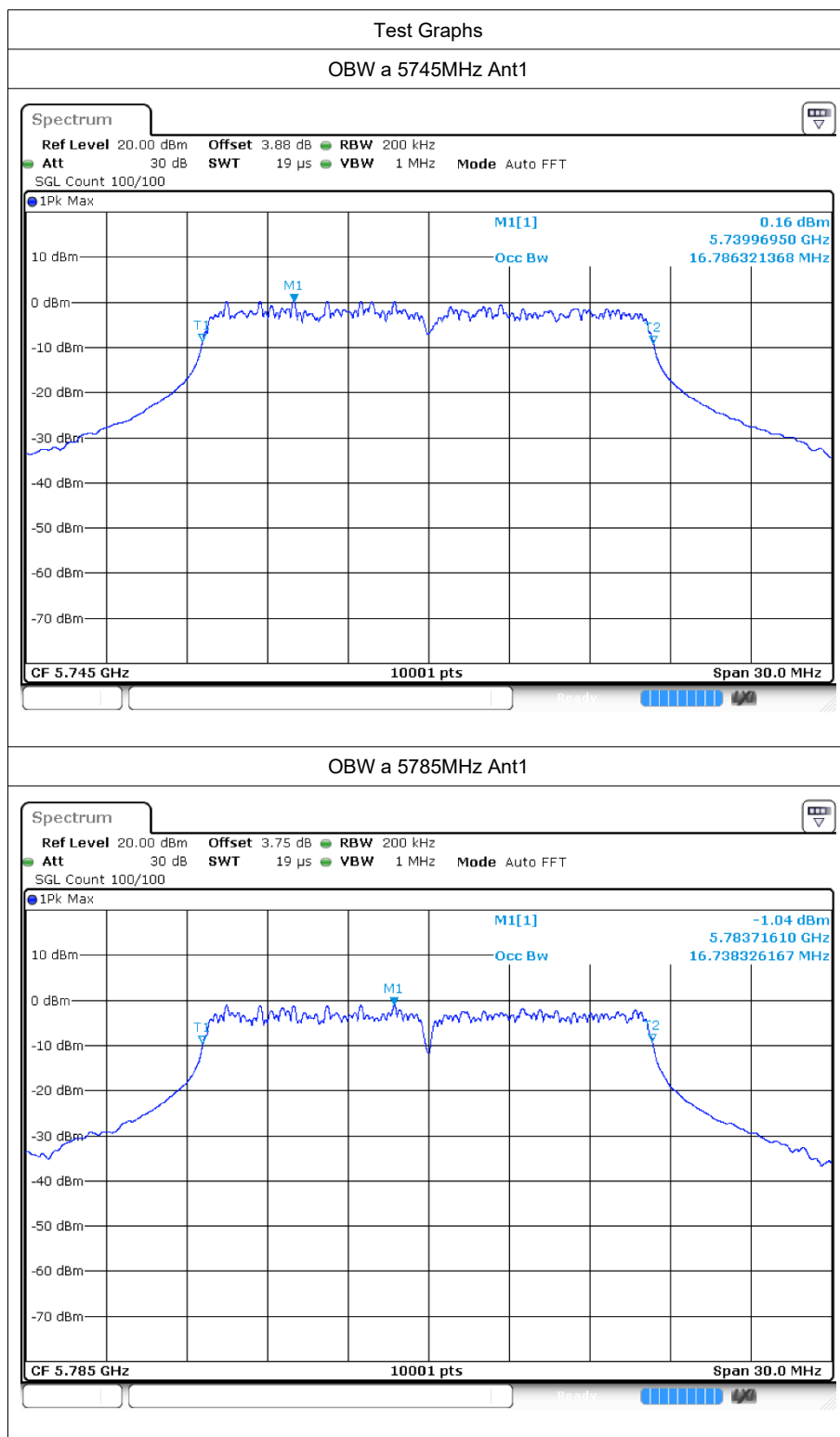


4 Occupied Channel Bandwidth

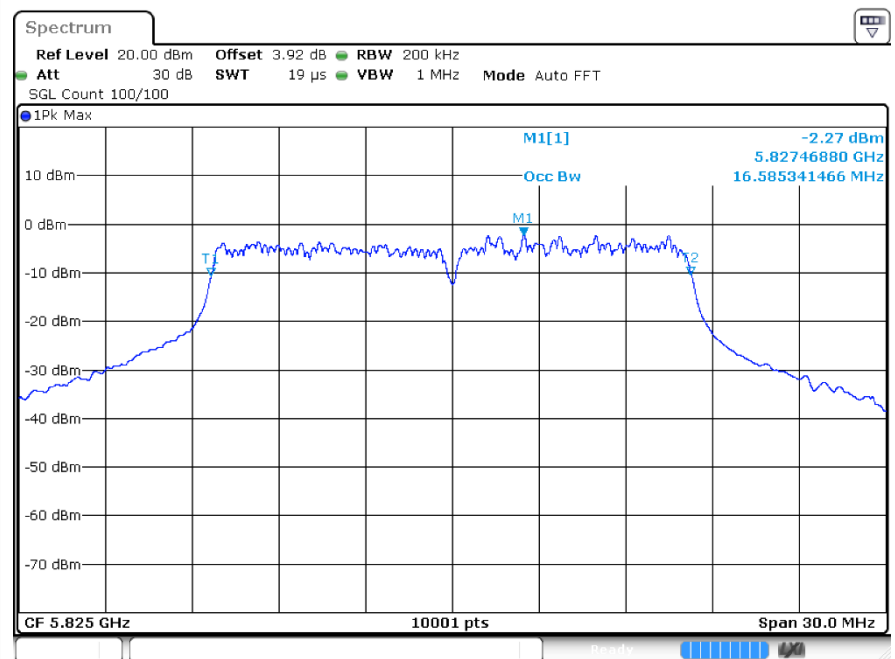
4.1 Test Result

Mode	Frequency (MHz)	Antenna	99% OBW (MHz)
a	5745	Ant1	16.786
a	5785	Ant1	16.738
a	5825	Ant1	16.585
n20	5745	Ant1	17.98
n20	5785	Ant1	17.809
n20	5825	Ant1	17.914
n40	5755	Ant1	36.764
n40	5795	Ant1	36.506
ac20	5745	Ant1	18.004
ac20	5785	Ant1	17.989
ac20	5825	Ant1	17.941
ac40	5755	Ant1	36.548
ac40	5795	Ant1	36.512

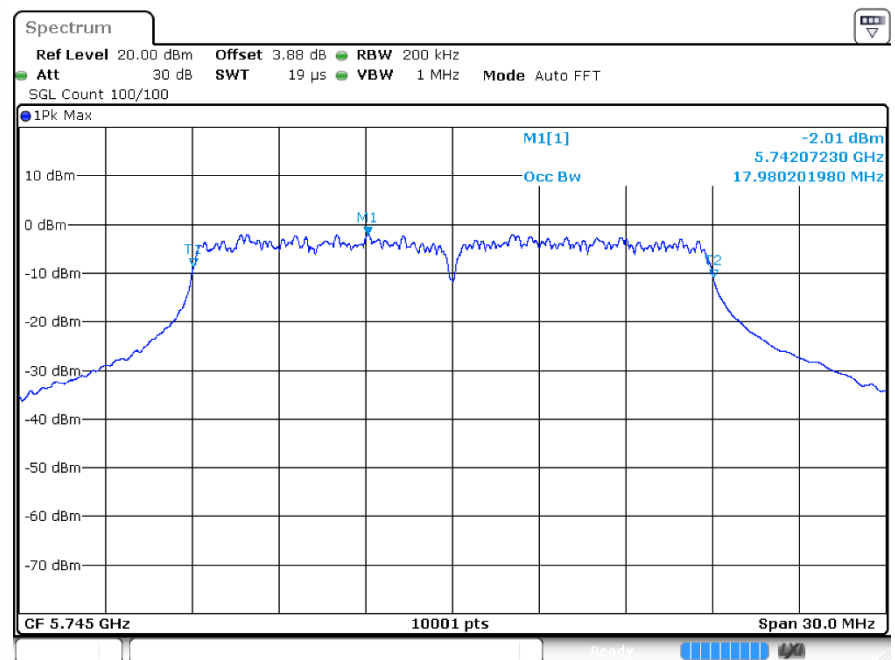
4.2 Test Graphs



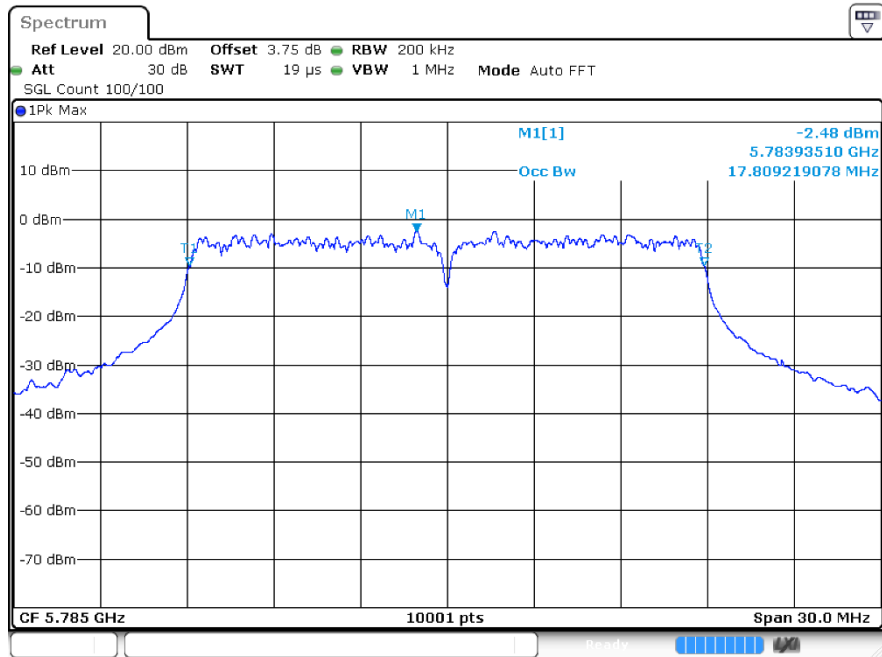
OBW a 5825MHz Ant1



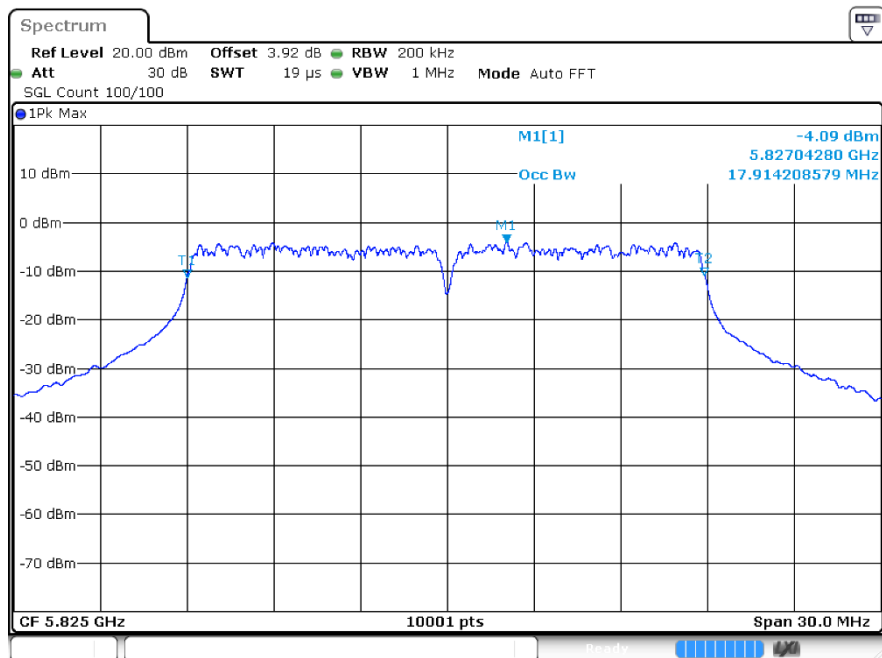
OBW n20 5745MHz Ant1



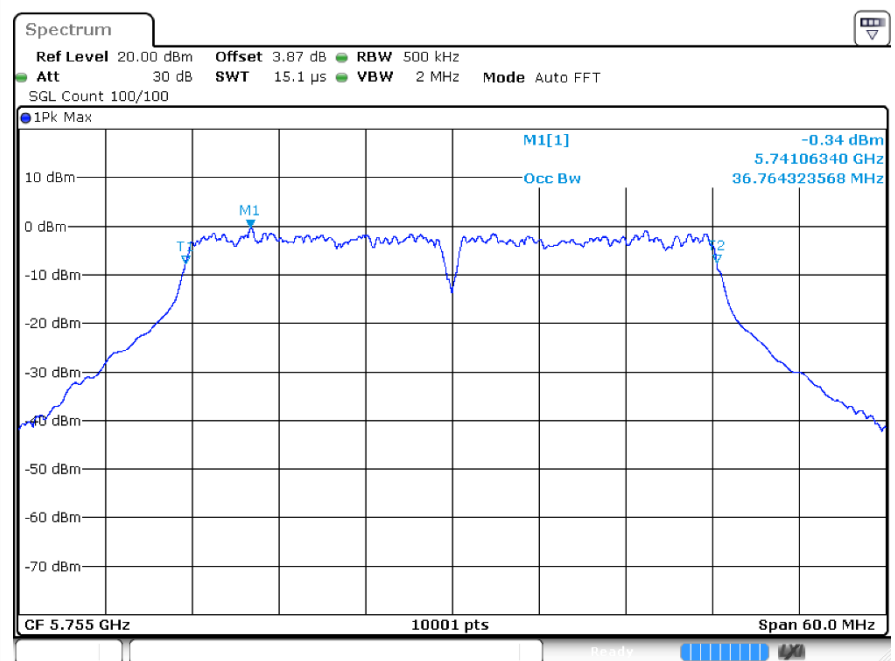
OBW n20 5785MHz Ant1



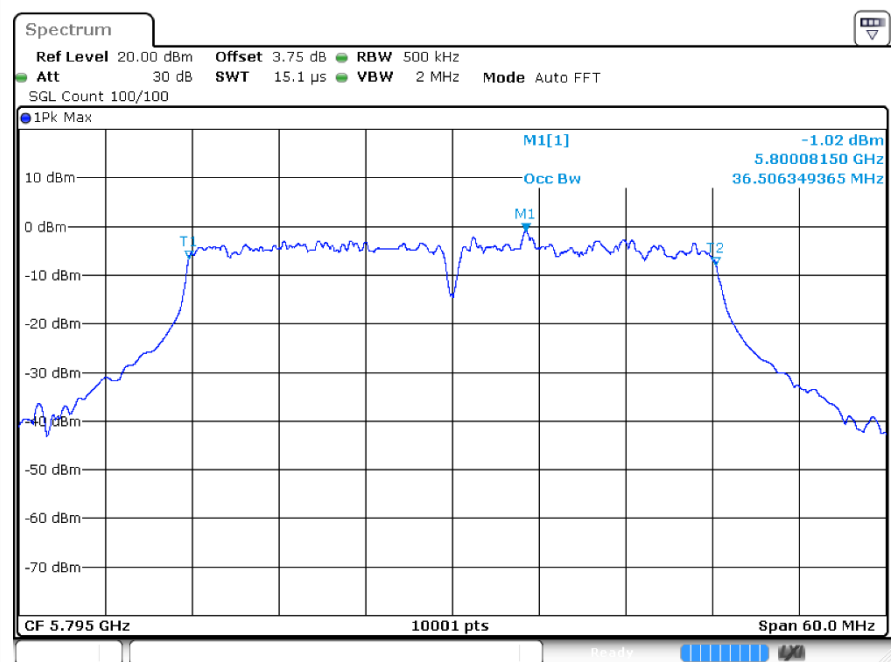
OBW n20 5825MHz Ant1



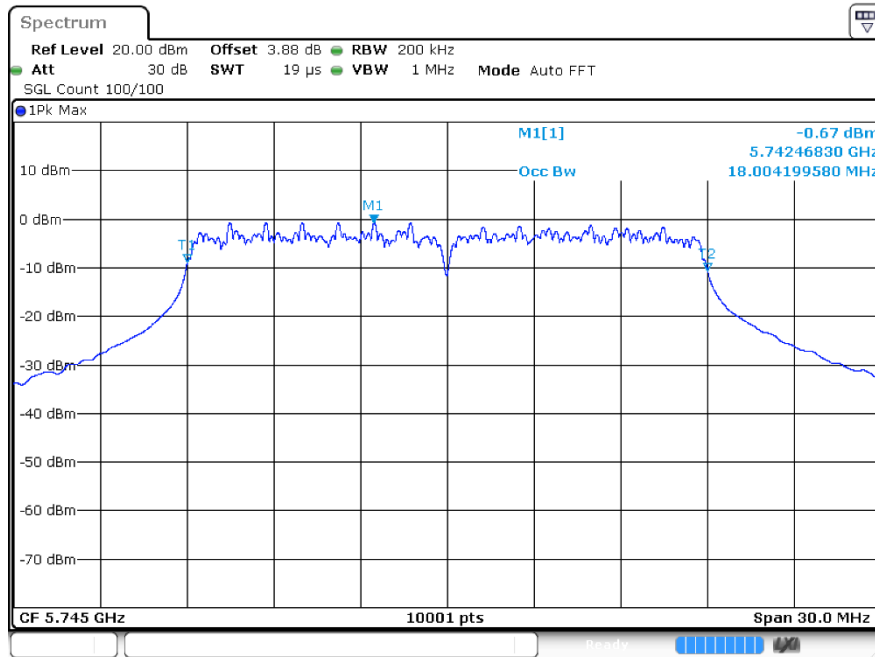
OBW n40 5755MHz Ant1



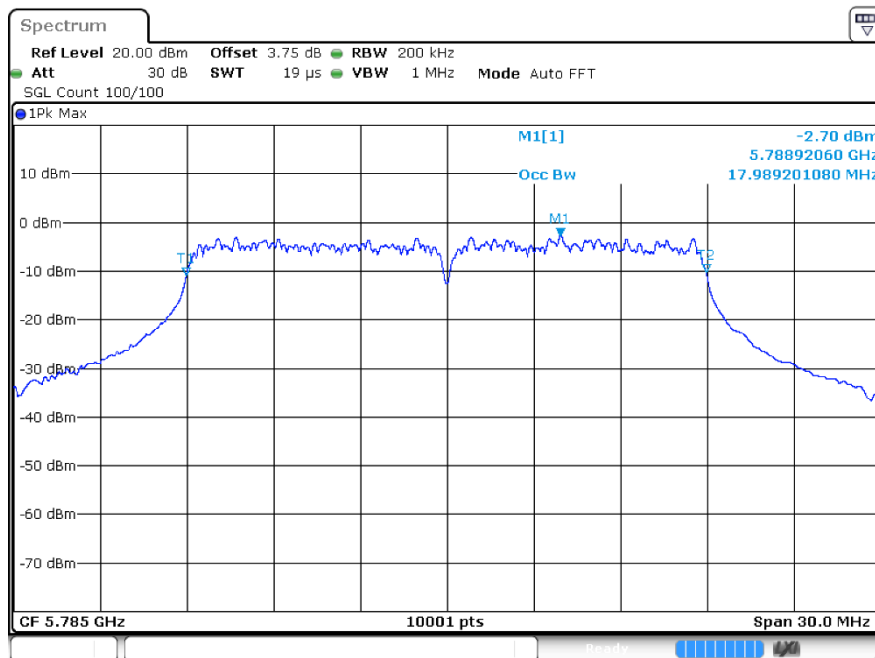
OBW n40 5795MHz Ant1



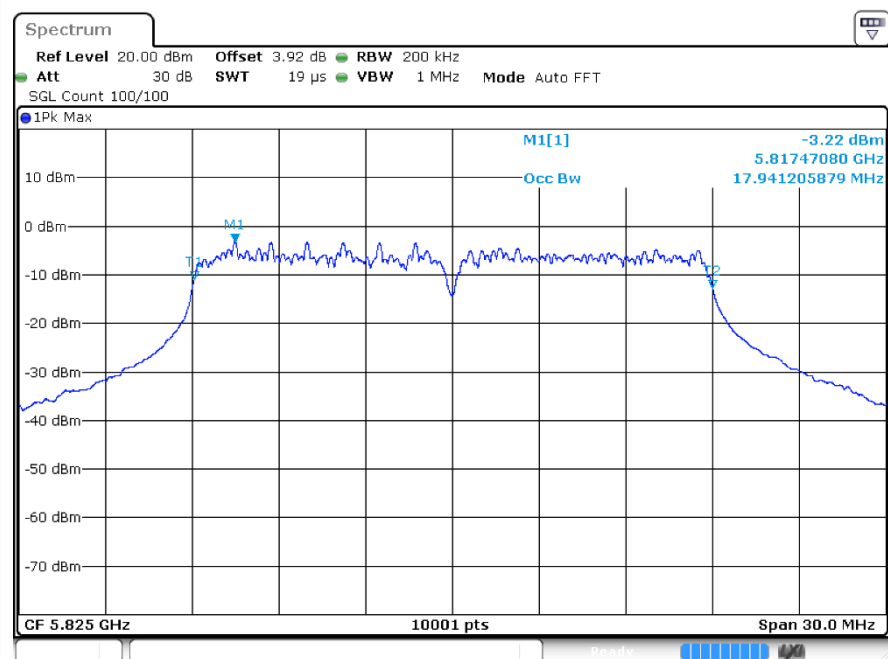
OBW ac20 5745MHz Ant1



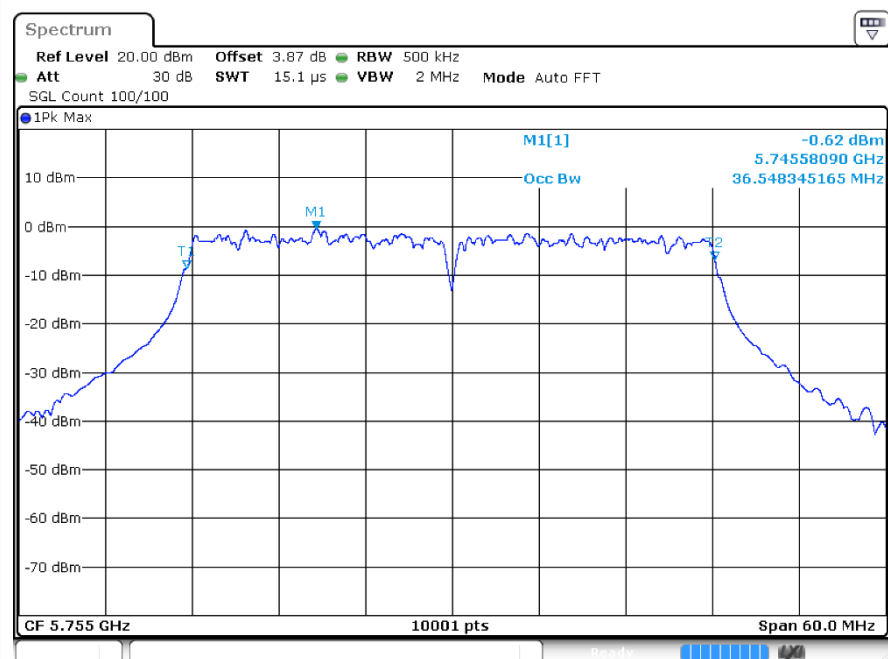
OBW ac20 5785MHz Ant1

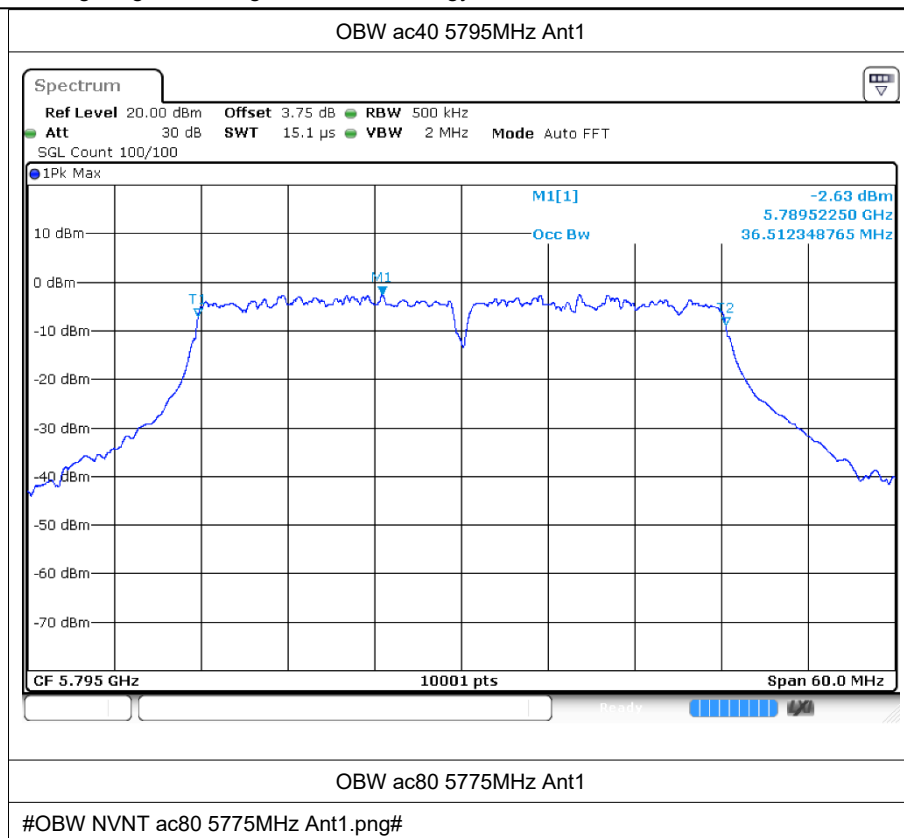


OBW ac20 5825MHz Ant1



OBW ac40 5755MHz Ant1



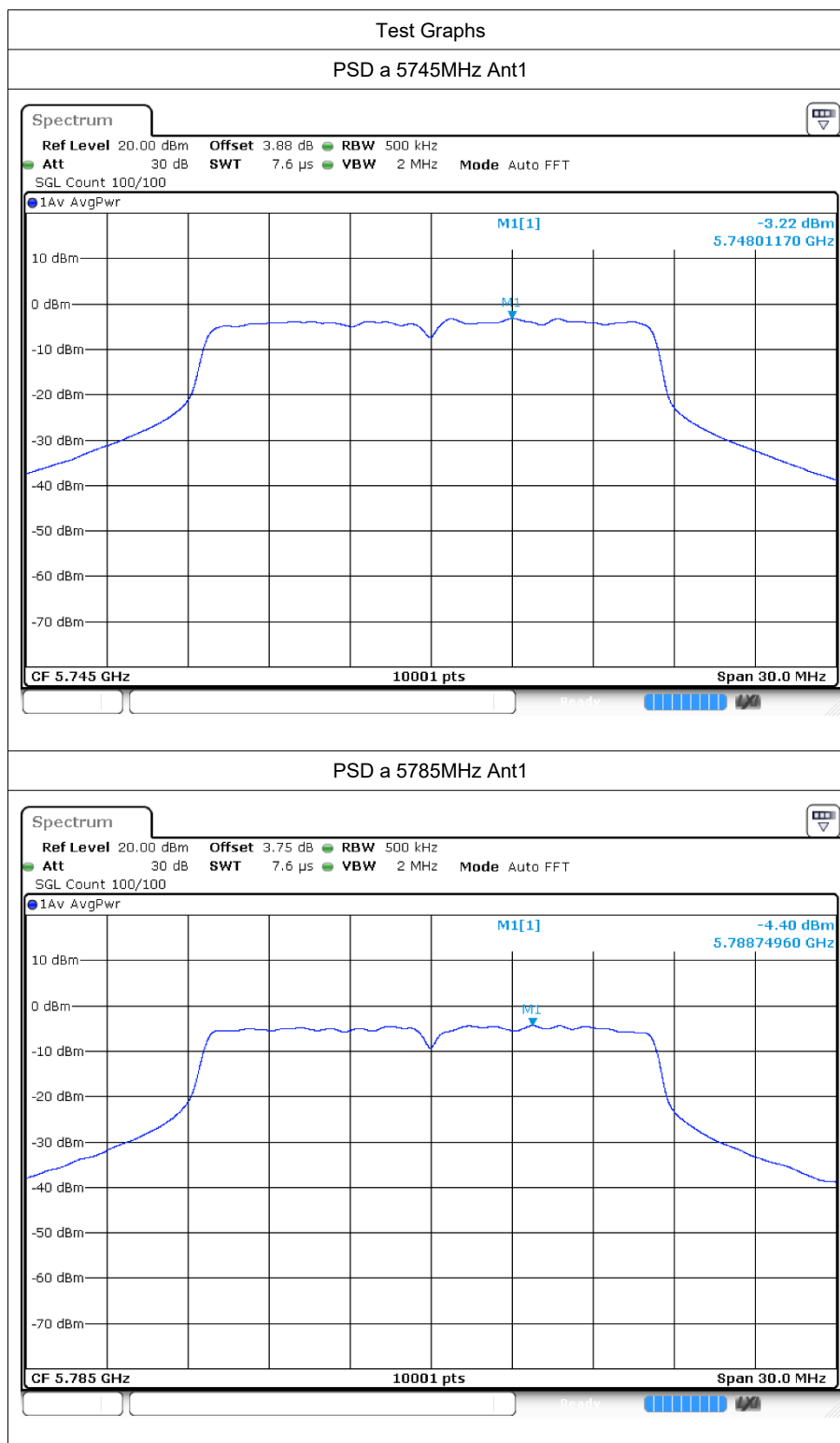


5 Maximum Power Spectral Density Level

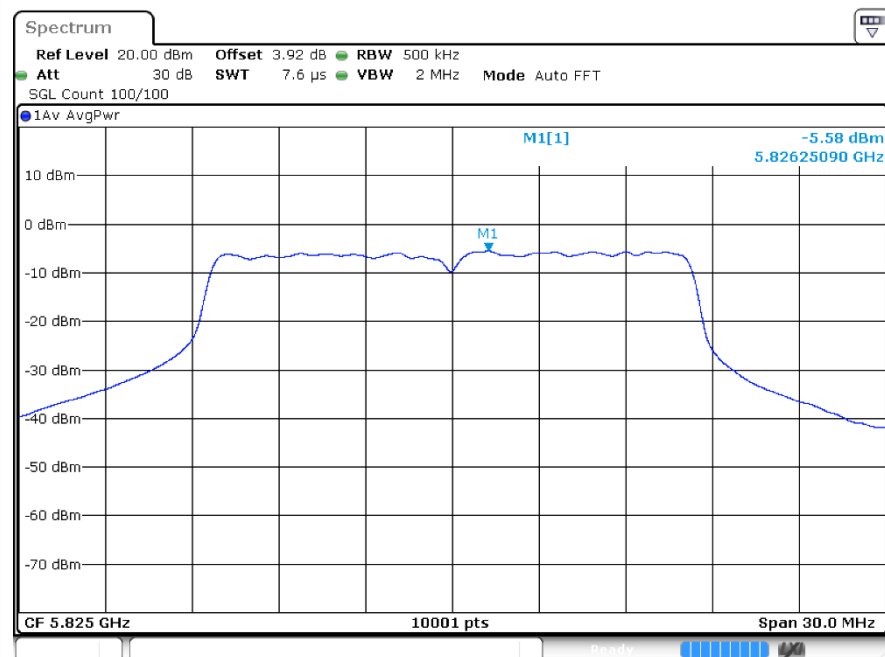
5.1 Test Result

Mode	Frequency (MHz)	Antenna	Conducted PSD (dBm)	Duty Factor (dB)	Total PSD (dBm)	Limit (dBm)	Verdict
a	5745	Ant1	-3.22	0.36	-2.86	30	Pass
a	5785	Ant1	-4.4	0.32	-4.08	30	Pass
a	5825	Ant1	-5.58	0.33	-5.25	30	Pass
n20	5745	Ant1	-4.62	0.33	-4.29	30	Pass
n20	5785	Ant1	-5.68	0.36	-5.32	30	Pass
n20	5825	Ant1	-6.89	0.37	-6.52	30	Pass
n40	5755	Ant1	-7.91	0.73	-7.18	30	Pass
n40	5795	Ant1	-8.6	0.45	-8.15	30	Pass
ac20	5745	Ant1	-4.93	0.35	-4.58	30	Pass
ac20	5785	Ant1	-5.59	0.33	-5.26	30	Pass
ac20	5825	Ant1	-6.62	0.31	-6.31	30	Pass
ac40	5755	Ant1	-7.93	0.45	-7.48	30	Pass
ac40	5795	Ant1	-9.75	0.44	-9.31	30	Pass

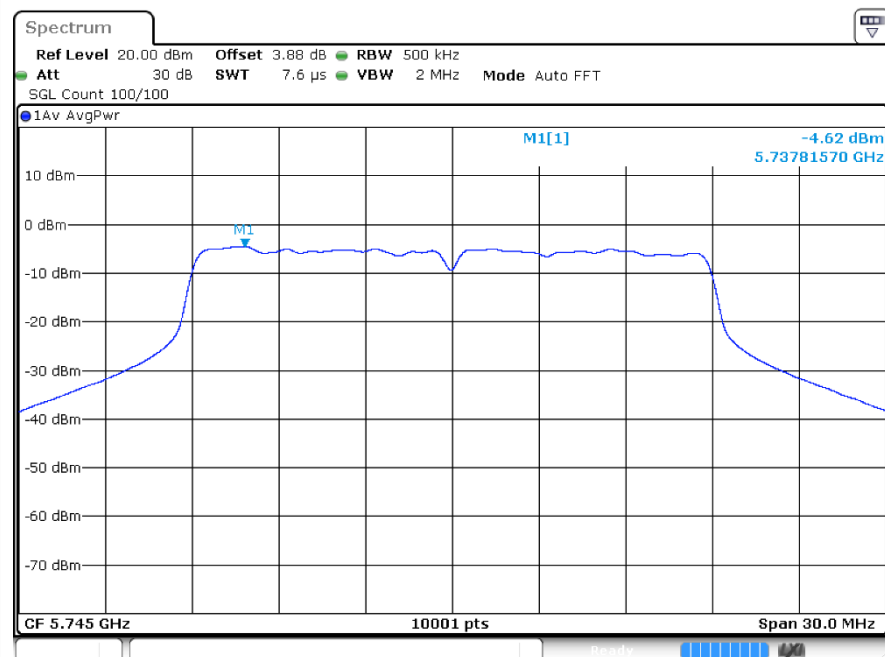
5.2 Test Graphs



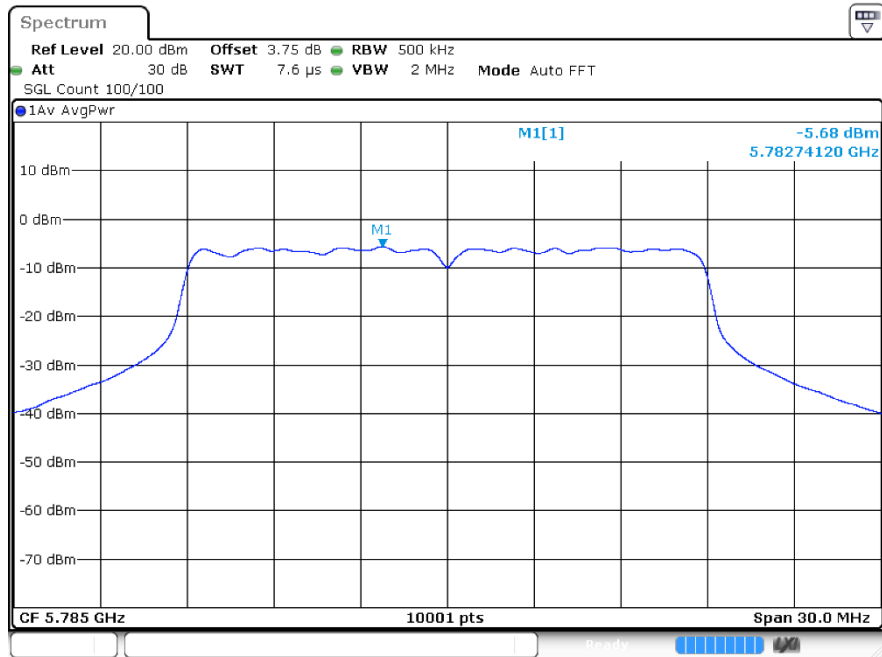
PSD a 5825MHz Ant1



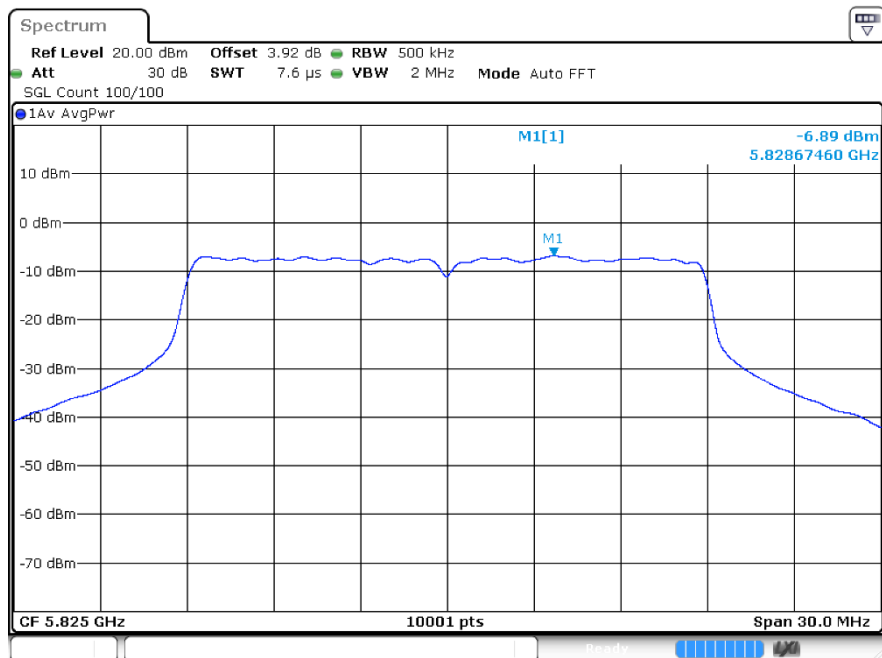
PSD n20 5745MHz Ant1



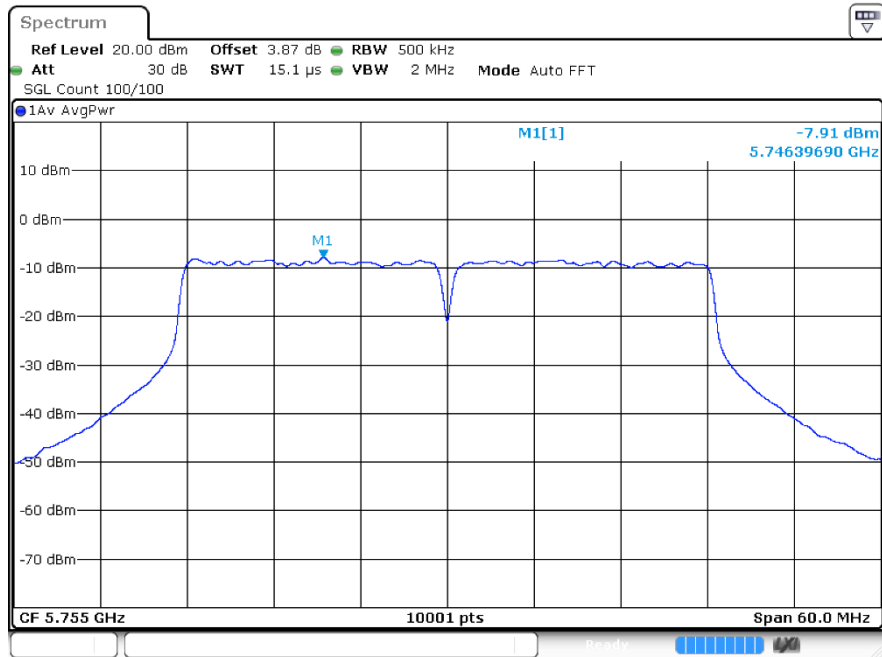
PSD n20 5785MHz Ant1



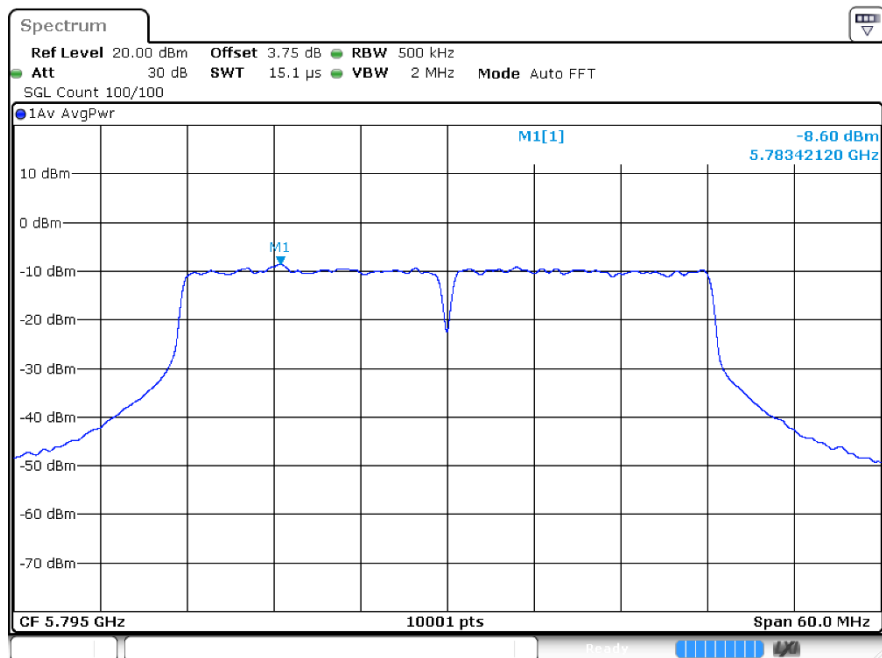
PSD n20 5825MHz Ant1



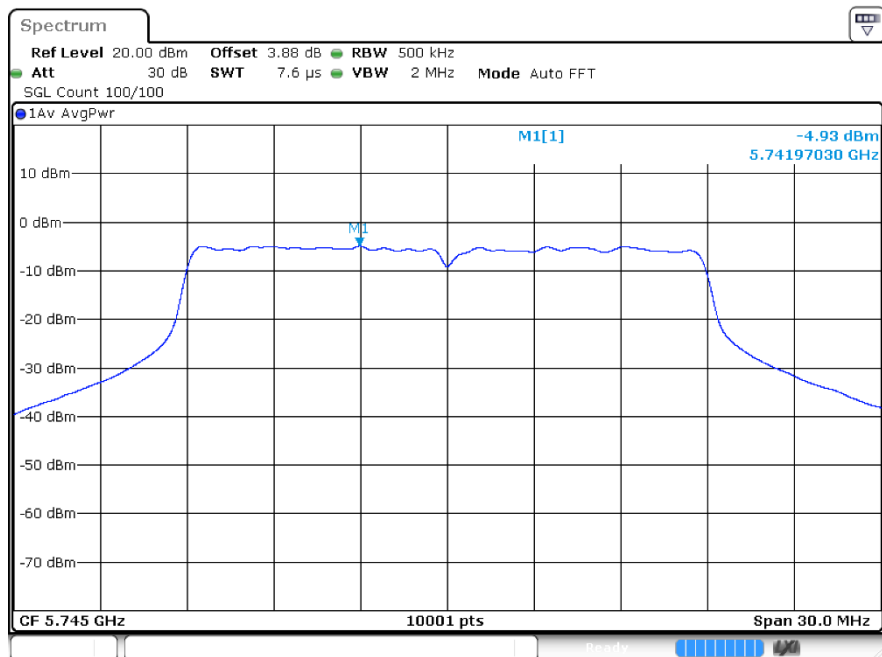
PSD n40 5755MHz Ant1



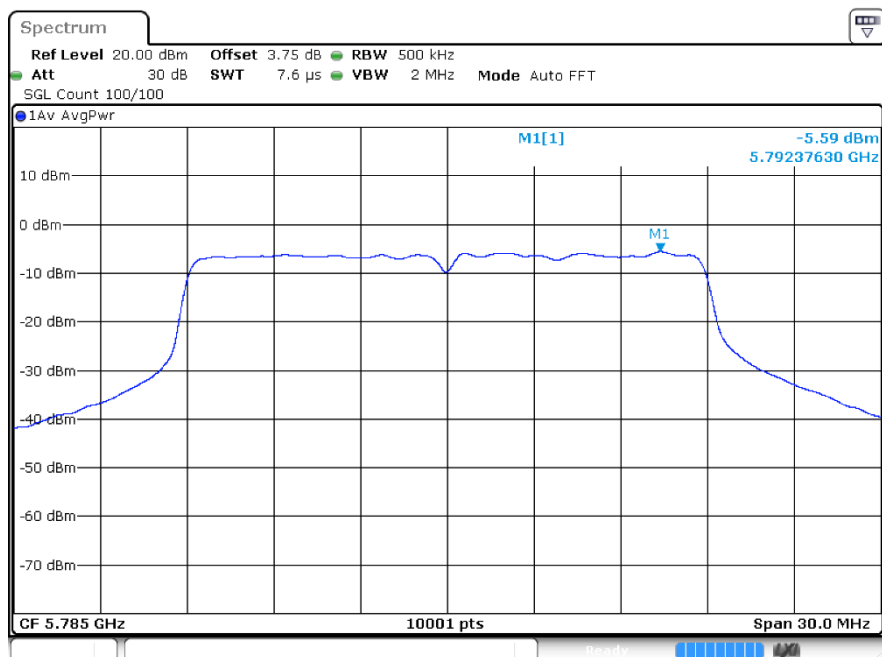
PSD n40 5795MHz Ant1



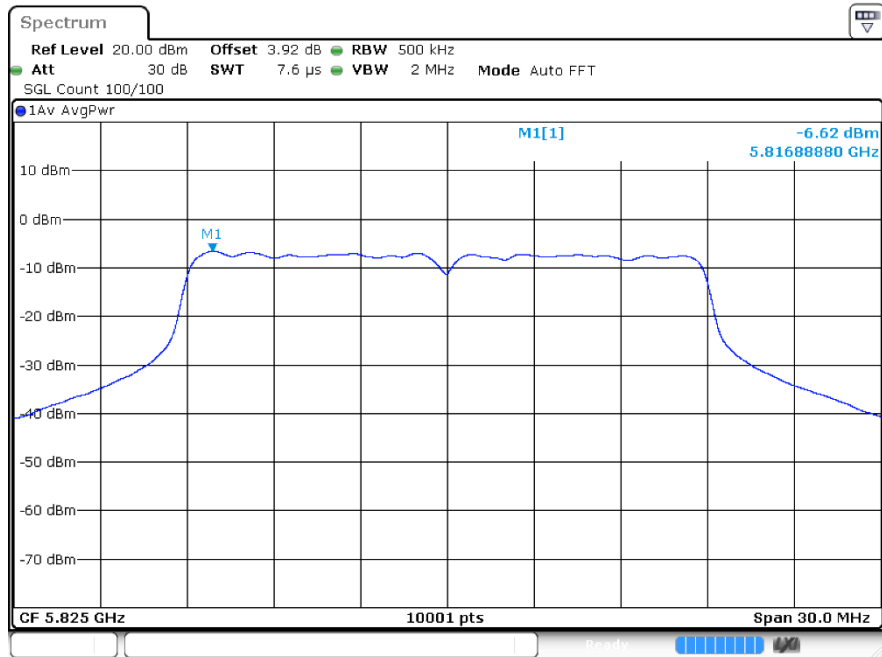
PSD ac20 5745MHz Ant1



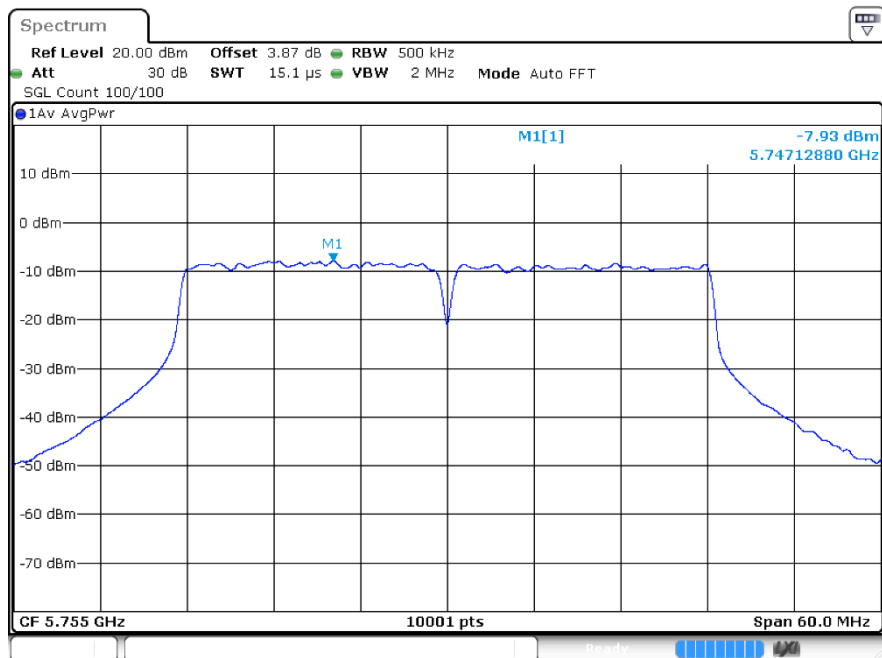
PSD ac20 5785MHz Ant1

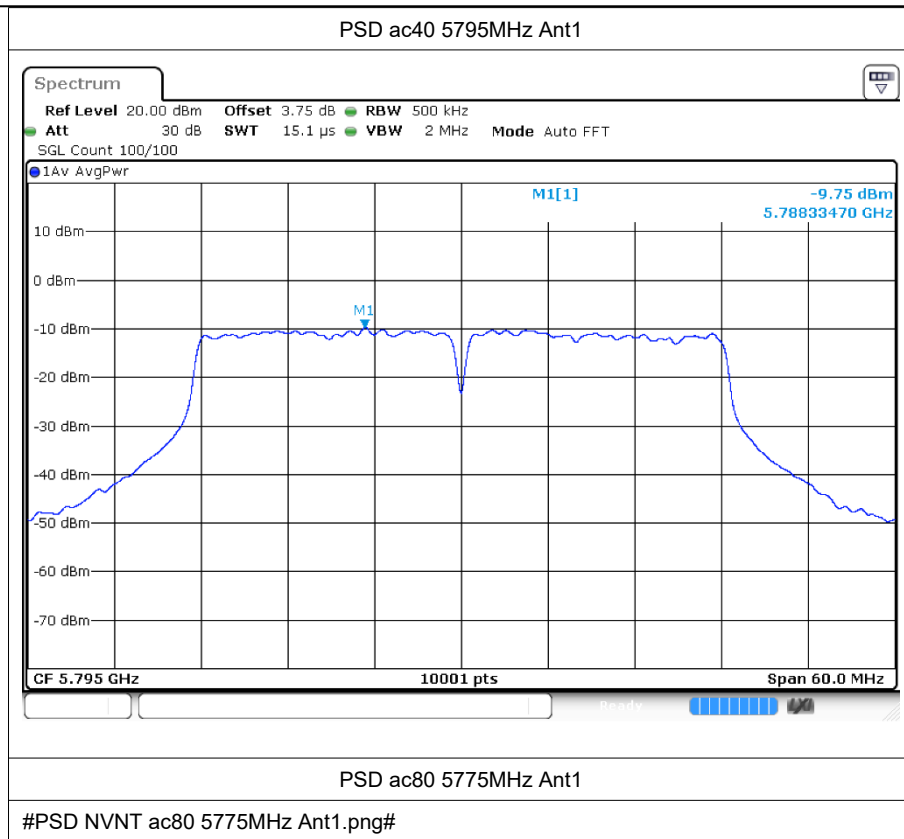


PSD ac20 5825MHz Ant1



PSD ac40 5755MHz Ant1





6 Frequency Stability

6.1 Test Result

Condition	Mode	Frequency (MHz)	Antenna	Measured Frequency (MHz)	Frequency Error (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
20C 102V	a	5745	Ant1	5744.96	-40000	-6.96	25	Pass
20C 120V	a	5745	Ant1	5744.96	-40000	-6.96	25	Pass
20C 138V	a	5745	Ant1	5744.98	-20000	-3.48	25	Pass
-20C 120V	a	5745	Ant1	5744.98	-20000	-3.48	25	Pass
-10C 120V	a	5745	Ant1	5744.96	-40000	-6.96	25	Pass
0C 120V	a	5745	Ant1	5744.98	-20000	-3.48	25	Pass
10C 120V	a	5745	Ant1	5744.96	-40000	-6.96	25	Pass
30C 120V	a	5745	Ant1	5744.98	-20000	-3.48	25	Pass
40C 120V	a	5745	Ant1	5744.98	-20000	-3.48	25	Pass
50C 120V	a	5745	Ant1	5744.96	-40000	-6.96	25	Pass
20C 102V	a	5785	Ant1	5784.96	-40000	-6.91	25	Pass
20C 120V	a	5785	Ant1	5784.98	-20000	-3.46	25	Pass
20C 138V	a	5785	Ant1	5784.98	-20000	-3.46	25	Pass
-20C 120V	a	5785	Ant1	5784.98	-20000	-3.46	25	Pass
-10C 120V	a	5785	Ant1	5784.98	-20000	-3.46	25	Pass
0C 120V	a	5785	Ant1	5784.96	-40000	-6.91	25	Pass
10C 120V	a	5785	Ant1	5784.96	-40000	-6.91	25	Pass
30C 120V	a	5785	Ant1	5784.98	-20000	-3.46	25	Pass
40C 120V	a	5785	Ant1	5784.98	-20000	-3.46	25	Pass
50C 120V	a	5785	Ant1	5784.96	-40000	-6.91	25	Pass
20C 102V	a	5825	Ant1	5824.98	-20000	-3.43	25	Pass
20C 120V	a	5825	Ant1	5824.96	-40000	-6.87	25	Pass
20C 138V	a	5825	Ant1	5824.96	-40000	-6.87	25	Pass
-20C 120V	a	5825	Ant1	5824.98	-20000	-3.43	25	Pass
-10C 120V	a	5825	Ant1	5824.96	-40000	-6.87	25	Pass
0C 120V	a	5825	Ant1	5824.98	-20000	-3.43	25	Pass
10C 120V	a	5825	Ant1	5824.98	-20000	-3.43	25	Pass
30C 120V	a	5825	Ant1	5824.96	-40000	-6.87	25	Pass
40C 120V	a	5825	Ant1	5824.96	-40000	-6.87	25	Pass



50C 120V	a	5825	Ant1	5824.96	-40000	-6.87	25	Pass
20C 102V	n20	5745	Ant1	5744.98	-20000	-3.48	25	Pass
20C 120V	n20	5745	Ant1	5744.98	-20000	-3.48	25	Pass
20C 138V	n20	5745	Ant1	5744.98	-20000	-3.48	25	Pass
-20C 120V	n20	5745	Ant1	5744.98	-20000	-3.48	25	Pass
-10C 120V	n20	5745	Ant1	5744.96	-40000	-6.96	25	Pass
0C 120V	n20	5745	Ant1	5744.96	-40000	-6.96	25	Pass
10C 120V	n20	5745	Ant1	5744.98	-20000	-3.48	25	Pass
30C 120V	n20	5745	Ant1	5744.96	-40000	-6.96	25	Pass
40C 120V	n20	5745	Ant1	5745	0	0	25	Pass
50C 120V	n20	5745	Ant1	5744.94	-60000	-10.44	25	Pass
20C 102V	n20	5785	Ant1	5784.98	-20000	-3.46	25	Pass
20C 120V	n20	5785	Ant1	5784.98	-20000	-3.46	25	Pass
20C 138V	n20	5785	Ant1	5784.98	-20000	-3.46	25	Pass
-20C 120V	n20	5785	Ant1	5784.96	-40000	-6.91	25	Pass
-10C 120V	n20	5785	Ant1	5784.96	-40000	-6.91	25	Pass
0C 120V	n20	5785	Ant1	5784.96	-40000	-6.91	25	Pass
10C 120V	n20	5785	Ant1	5784.98	-20000	-3.46	25	Pass
30C 120V	n20	5785	Ant1	5784.96	-40000	-6.91	25	Pass
40C 120V	n20	5785	Ant1	5784.96	-40000	-6.91	25	Pass
50C 120V	n20	5785	Ant1	5784.96	-40000	-6.91	25	Pass
20C 102V	n20	5825	Ant1	5824.96	-40000	-6.87	25	Pass
20C 120V	n20	5825	Ant1	5824.98	-20000	-3.43	25	Pass
20C 138V	n20	5825	Ant1	5824.96	-40000	-6.87	25	Pass
-20C 120V	n20	5825	Ant1	5824.98	-20000	-3.43	25	Pass
-10C 120V	n20	5825	Ant1	5824.98	-20000	-3.43	25	Pass
0C 120V	n20	5825	Ant1	5824.96	-40000	-6.87	25	Pass
10C 120V	n20	5825	Ant1	5824.98	-20000	-3.43	25	Pass
30C 120V	n20	5825	Ant1	5824.98	-20000	-3.43	25	Pass
40C 120V	n20	5825	Ant1	5824.98	-20000	-3.43	25	Pass
50C 120V	n20	5825	Ant1	5824.96	-40000	-6.87	25	Pass
20C 102V	n40	5755	Ant1	5754.96	-40000	-6.95	25	Pass
20C 120V	n40	5755	Ant1	5754.96	-40000	-6.95	25	Pass
20C 138V	n40	5755	Ant1	5754.96	-40000	-6.95	25	Pass
-20C 120V	n40	5755	Ant1	5754.96	-40000	-6.95	25	Pass
-10C	n40	5755	Ant1	5754.96	-40000	-6.95	25	Pass



120V								
0C 120V	n40	5755	Ant1	5754.96	-40000	-6.95	25	Pass
10C 120V	n40	5755	Ant1	5754.96	-40000	-6.95	25	Pass
30C 120V	n40	5755	Ant1	5754.96	-40000	-6.95	25	Pass
40C 120V	n40	5755	Ant1	5755	0	0	25	Pass
50C 120V	n40	5755	Ant1	5754.96	-40000	-6.95	25	Pass
20C 102V	n40	5795	Ant1	5794.96	-40000	-6.9	25	Pass
20C 120V	n40	5795	Ant1	5794.96	-40000	-6.9	25	Pass
20C 138V	n40	5795	Ant1	5794.96	-40000	-6.9	25	Pass
-20C 120V	n40	5795	Ant1	5794.96	-40000	-6.9	25	Pass
-10C 120V	n40	5795	Ant1	5794.96	-40000	-6.9	25	Pass
0C 120V	n40	5795	Ant1	5794.96	-40000	-6.9	25	Pass
10C 120V	n40	5795	Ant1	5794.96	-40000	-6.9	25	Pass
30C 120V	n40	5795	Ant1	5794.96	-40000	-6.9	25	Pass
40C 120V	n40	5795	Ant1	5794.96	-40000	-6.9	25	Pass
50C 120V	n40	5795	Ant1	5794.96	-40000	-6.9	25	Pass
20C 102V	ac20	5745	Ant1	5744.96	-40000	-6.96	25	Pass
20C 120V	ac20	5745	Ant1	5744.96	-40000	-6.96	25	Pass
20C 138V	ac20	5745	Ant1	5744.98	-20000	-3.48	25	Pass
-20C 120V	ac20	5745	Ant1	5744.96	-40000	-6.96	25	Pass
-10C 120V	ac20	5745	Ant1	5744.94	-60000	-10.44	25	Pass
0C 120V	ac20	5745	Ant1	5744.98	-20000	-3.48	25	Pass
10C 120V	ac20	5745	Ant1	5744.96	-40000	-6.96	25	Pass
30C 120V	ac20	5745	Ant1	5744.98	-20000	-3.48	25	Pass
40C 120V	ac20	5745	Ant1	5744.96	-40000	-6.96	25	Pass
50C 120V	ac20	5745	Ant1	5744.98	-20000	-3.48	25	Pass
20C 102V	ac20	5785	Ant1	5784.96	-40000	-6.91	25	Pass
20C 120V	ac20	5785	Ant1	5784.98	-20000	-3.46	25	Pass
20C 138V	ac20	5785	Ant1	5784.98	-20000	-3.46	25	Pass
-20C 120V	ac20	5785	Ant1	5784.96	-40000	-6.91	25	Pass
-10C 120V	ac20	5785	Ant1	5784.94	-60000	-10.37	25	Pass
0C 120V	ac20	5785	Ant1	5784.98	-20000	-3.46	25	Pass
10C 120V	ac20	5785	Ant1	5784.94	-60000	-10.37	25	Pass
30C 120V	ac20	5785	Ant1	5784.98	-20000	-3.46	25	Pass
40C 120V	ac20	5785	Ant1	5784.98	-20000	-3.46	25	Pass
50C 120V	ac20	5785	Ant1	5784.96	-40000	-6.91	25	Pass
20C 102V	ac20	5825	Ant1	5824.96	-40000	-6.87	25	Pass



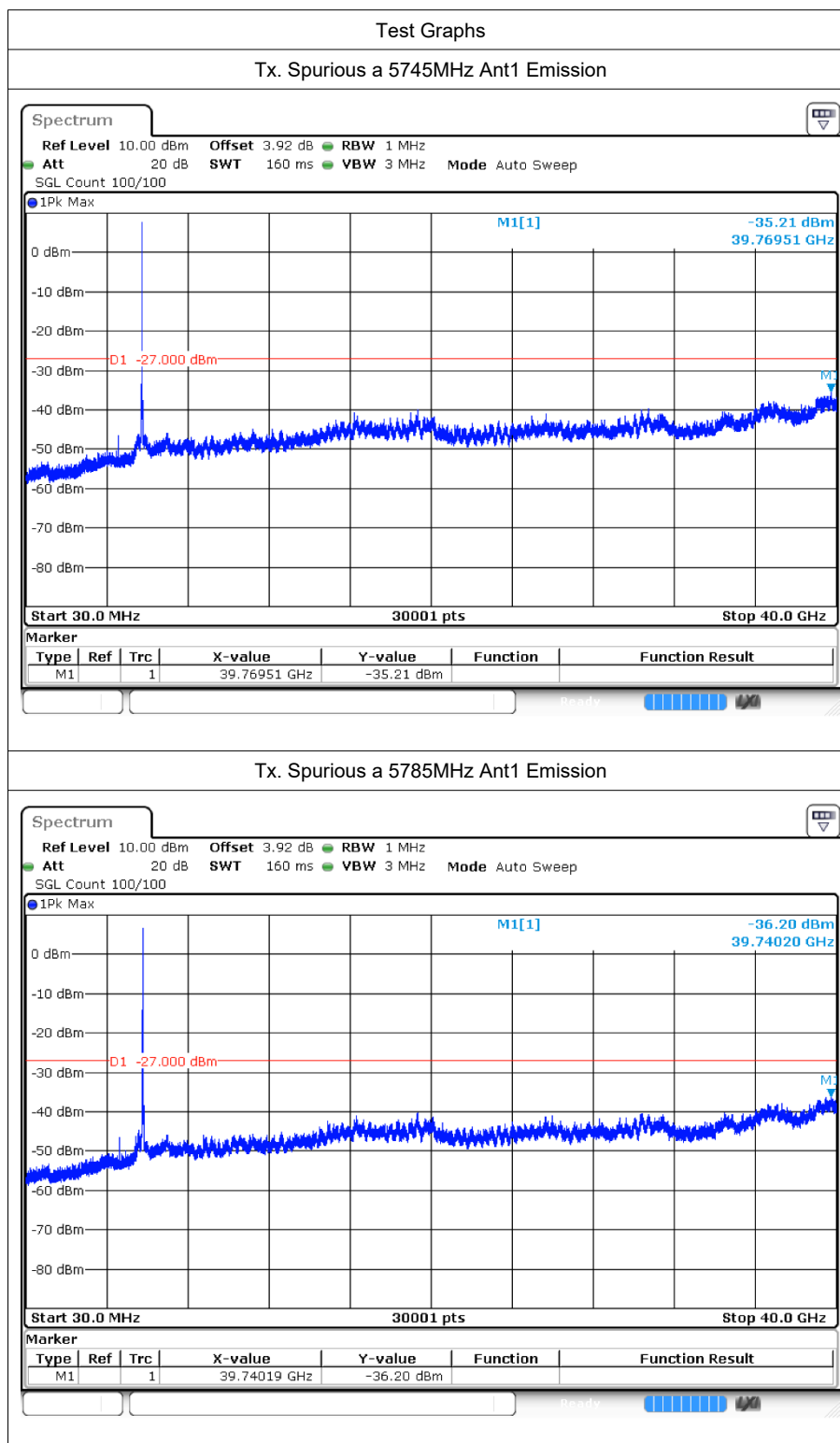
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-20C 120V	ac20	5825	Ant1	5824.96	-40000	-6.87	25	Pass
-10C 120V	ac20	5825	Ant1	5824.94	-60000	-10.3	25	Pass
0C 120V	ac20	5825	Ant1	5824.96	-40000	-6.87	25	Pass
10C 120V	ac20	5825	Ant1	5824.98	-20000	-3.43	25	Pass
30C 120V	ac20	5825	Ant1	5824.96	-40000	-6.87	25	Pass
40C 120V	ac20	5825	Ant1	5824.96	-40000	-6.87	25	Pass
50C 120V	ac20	5825	Ant1	5824.98	-20000	-3.43	25	Pass
20C 102V	ac40	5755	Ant1	5754.96	-40000	-6.95	25	Pass
20C 120V	ac40	5755	Ant1	5754.96	-40000	-6.95	25	Pass
20C 138V	ac40	5755	Ant1	5754.96	-40000	-6.95	25	Pass
-20C 120V	ac40	5755	Ant1	5754.96	-40000	-6.95	25	Pass
-10C 120V	ac40	5755	Ant1	5754.96	-40000	-6.95	25	Pass
0C 120V	ac40	5755	Ant1	5754.96	-40000	-6.95	25	Pass
10C 120V	ac40	5755	Ant1	5754.96	-40000	-6.95	25	Pass
30C 120V	ac40	5755	Ant1	5754.96	-40000	-6.95	25	Pass
40C 120V	ac40	5755	Ant1	5754.96	-40000	-6.95	25	Pass
50C 120V	ac40	5755	Ant1	5754.96	-40000	-6.95	25	Pass
20C 102V	ac40	5795	Ant1	5794.96	-40000	-6.9	25	Pass
20C 120V	ac40	5795	Ant1	5795	0	0	25	Pass
20C 138V	ac40	5795	Ant1	5794.96	-40000	-6.9	25	Pass
-20C 120V	ac40	5795	Ant1	5794.96	-40000	-6.9	25	Pass
-10C 120V	ac40	5795	Ant1	5794.96	-40000	-6.9	25	Pass
0C 120V	ac40	5795	Ant1	5794.96	-40000	-6.9	25	Pass
10C 120V	ac40	5795	Ant1	5794.96	-40000	-6.9	25	Pass
30C 120V	ac40	5795	Ant1	5794.96	-40000	-6.9	25	Pass
40C 120V	ac40	5795	Ant1	5794.96	-40000	-6.9	25	Pass
50C 120V	ac40	5795	Ant1	5794.96	-40000	-6.9	25	Pass

7 Conducted RF Spurious Emission

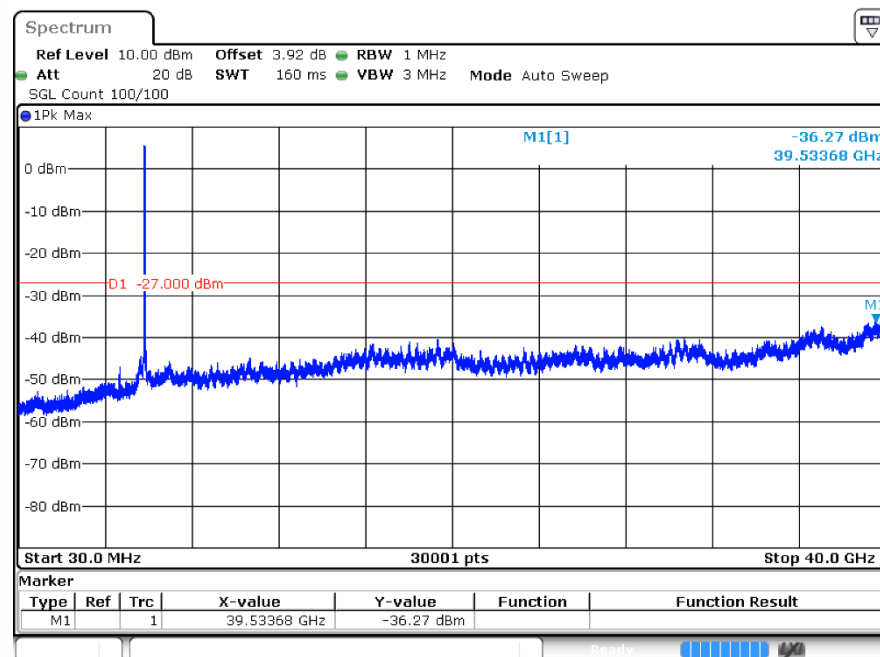
7.1 Test Result

Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
a	5745	Ant1	-35.2	-27	Pass
a	5785	Ant1	-36.19	-27	Pass
a	5825	Ant1	-36.27	-27	Pass
n20	5745	Ant1	-35.75	-27	Pass
n20	5785	Ant1	-35.97	-27	Pass
n20	5825	Ant1	-36.16	-27	Pass
n40	5755	Ant1	-35.49	-27	Pass
n40	5795	Ant1	-35.64	-27	Pass
ac20	5745	Ant1	-35.66	-27	Pass
ac20	5785	Ant1	-36.08	-27	Pass
ac20	5825	Ant1	-36.15	-27	Pass
ac40	5755	Ant1	-35.76	-27	Pass
ac40	5795	Ant1	-36.1	-27	Pass

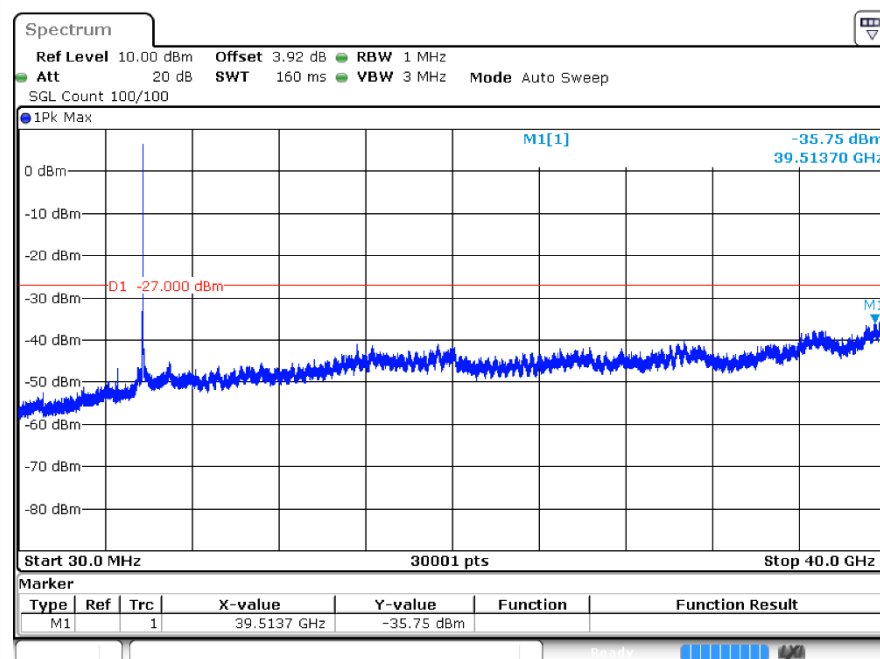
7.2 Test Graphs



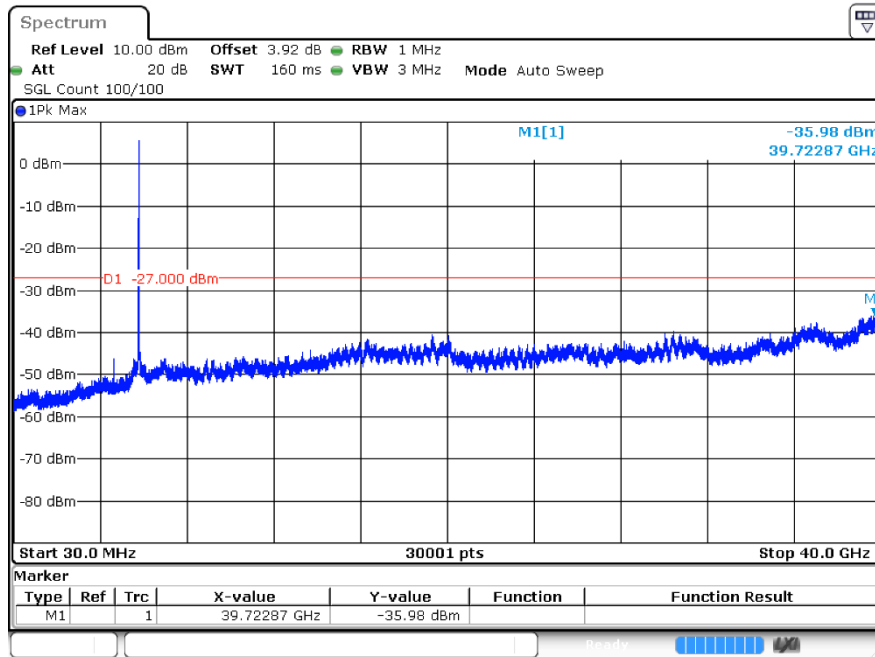
Tx. Spurious a 5825MHz Ant1 Emission



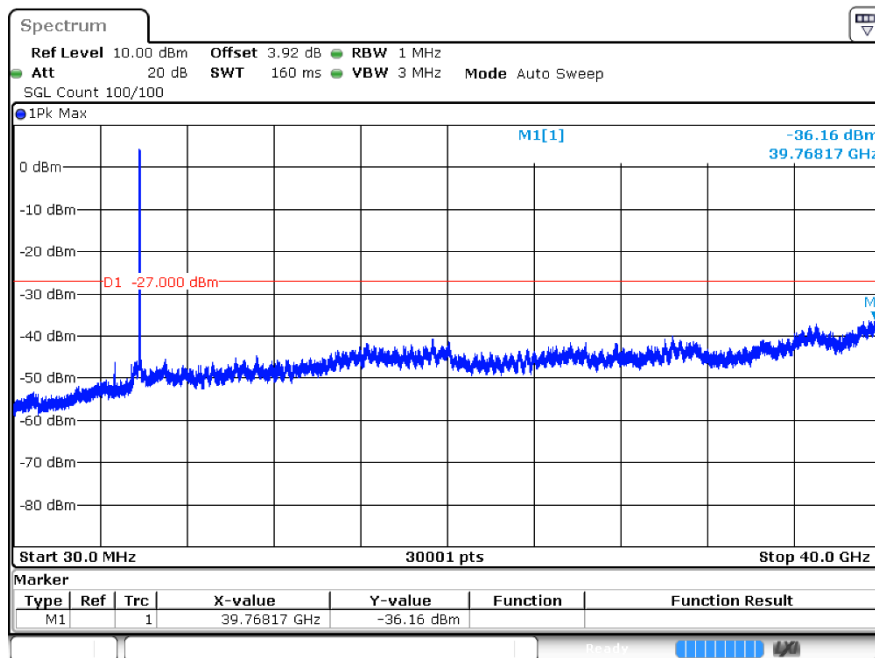
Tx. Spurious n20 5745MHz Ant1 Emission



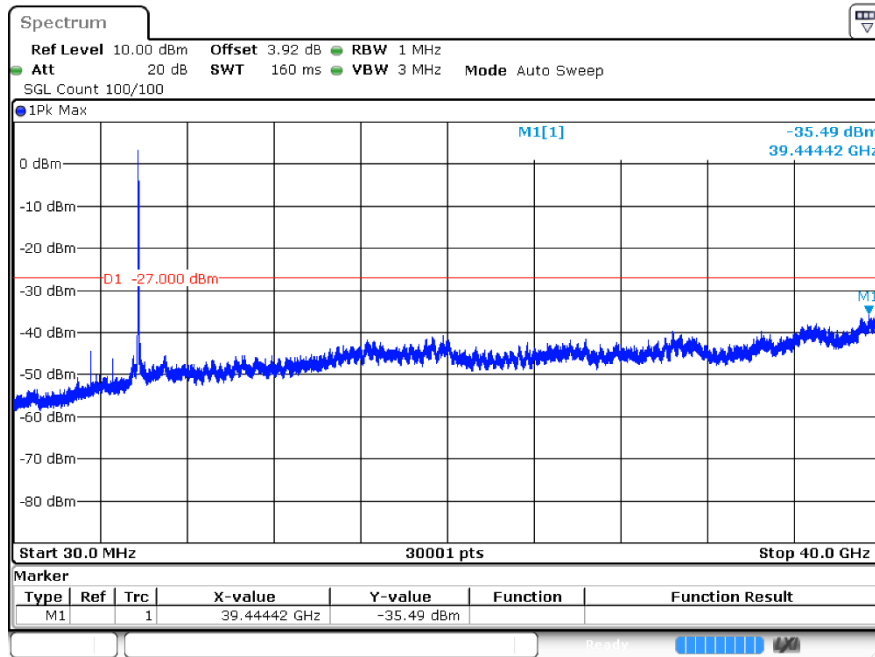
Tx. Spurious n20 5785MHz Ant1 Emission



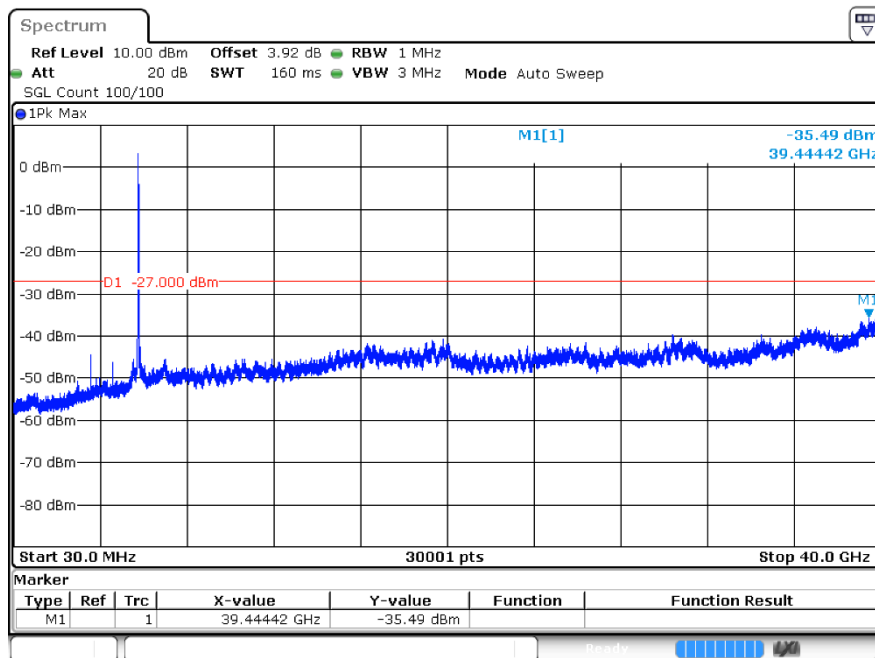
Tx. Spurious n20 5825MHz Ant1 Emission



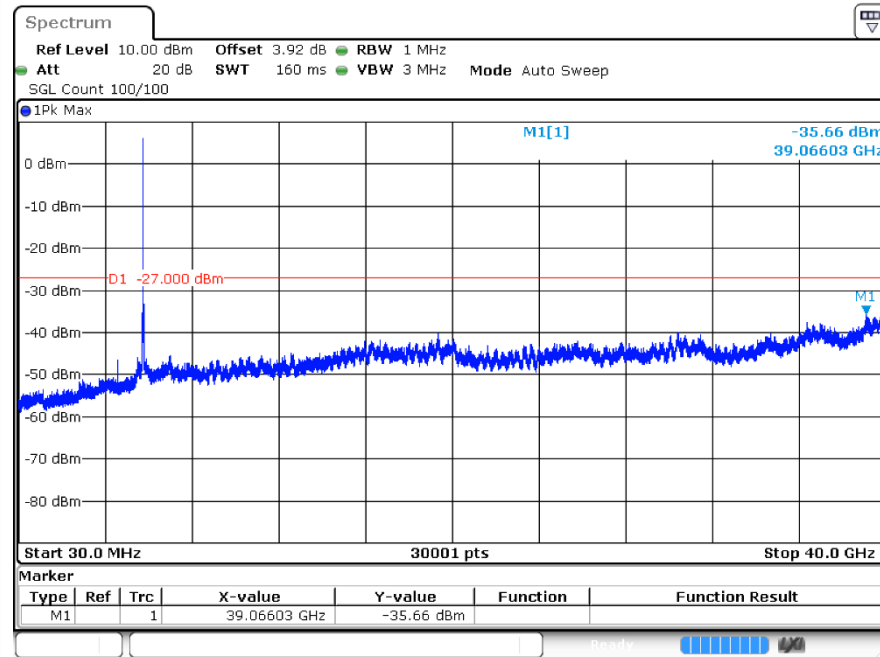
Tx. Spurious n40 5755MHz Ant1 Emission



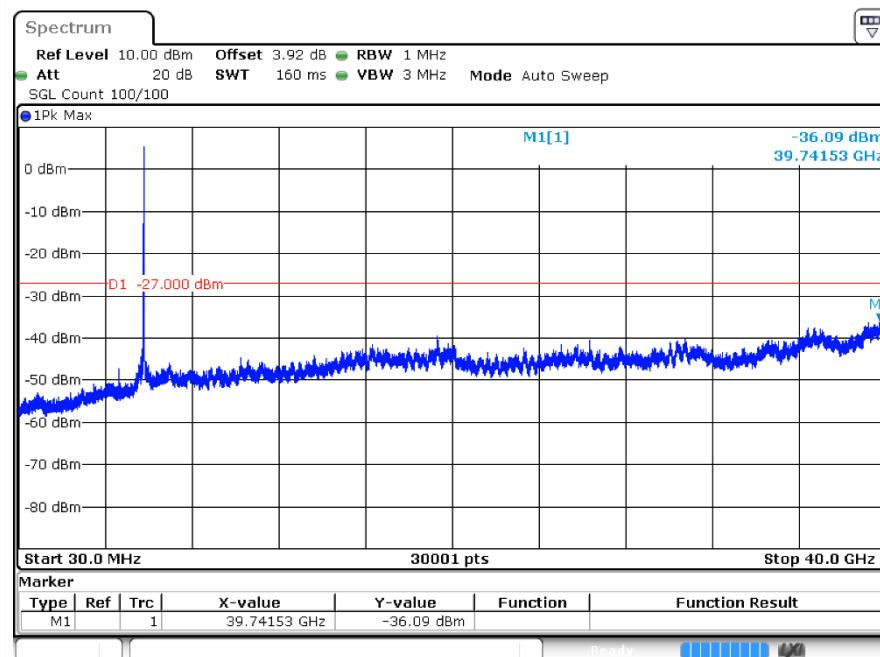
Tx. Spurious n40 5795MHz Ant1 Emission



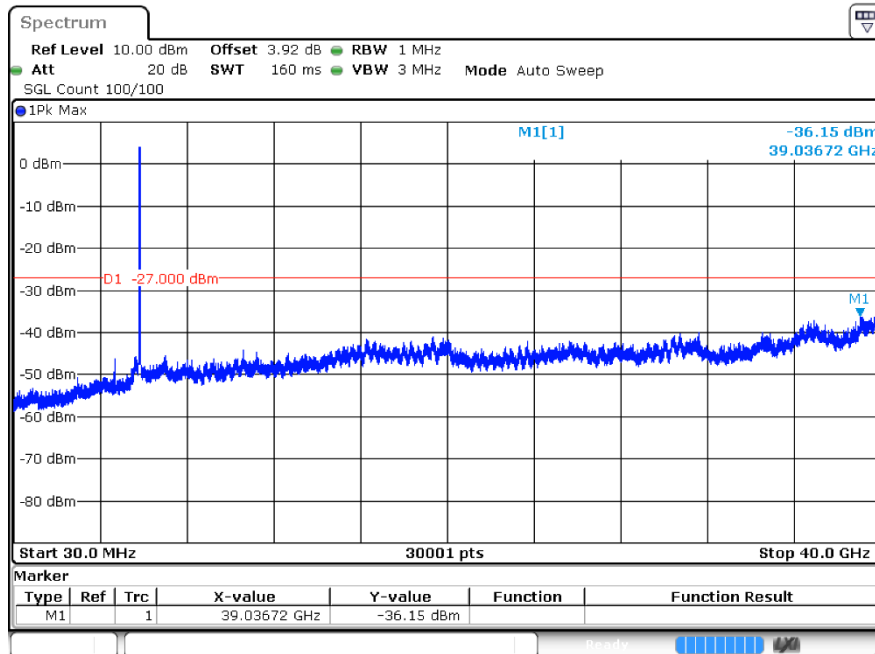
Tx. Spurious ac20 5745MHz Ant1 Emission



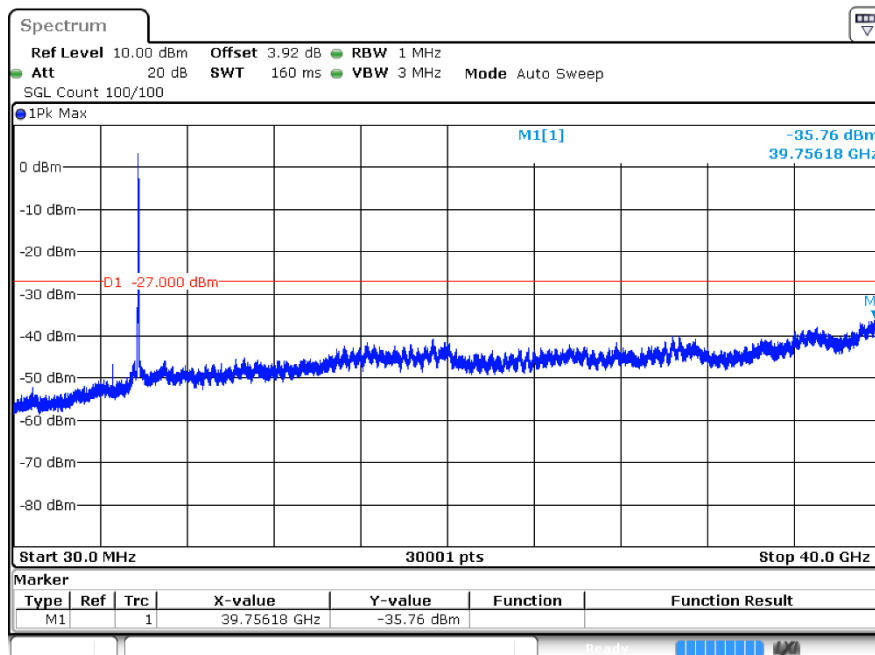
Tx. Spurious ac20 5785MHz Ant1 Emission

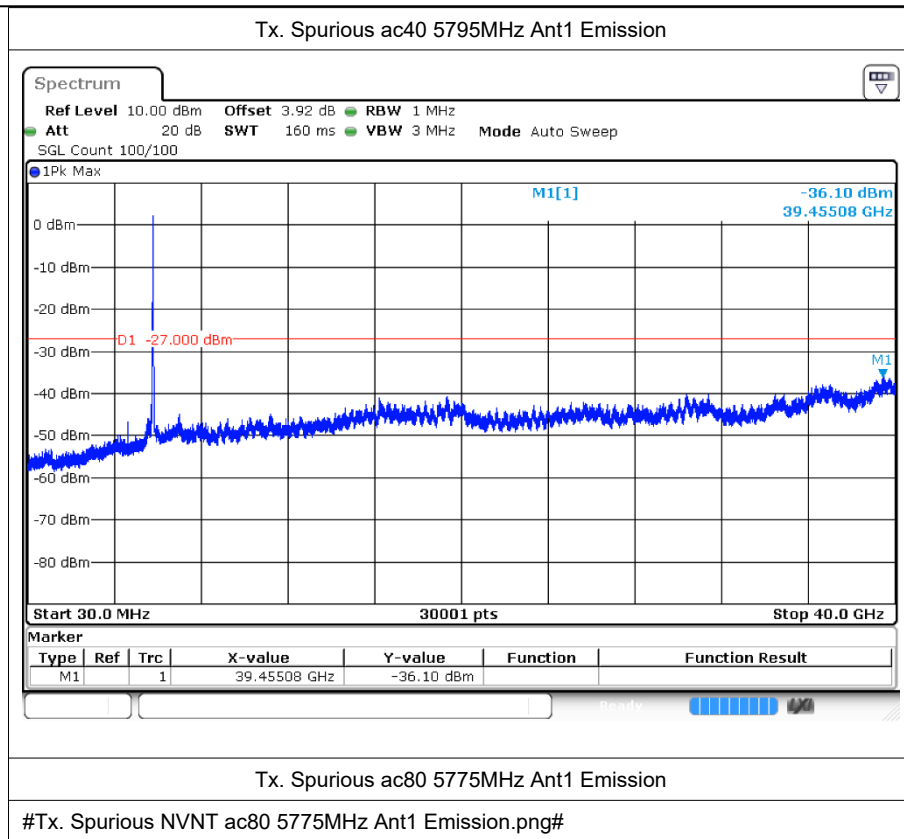


Tx. Spurious ac20 5825MHz Ant1 Emission



Tx. Spurious ac40 5755MHz Ant1 Emission





---The End---