Appendix B

RF Test Data for BT (BLE) (Conducted Measurement)

Product Name: M5PaperS3

Trade Mark: M5STACK

Test Model: PaperS3

Environmental Conditions

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

Contents

Page

COVER PAGE

1 Duty Cycle 3
1.1 Test Result 3
1.2 Test Graphs 4
2 Maximum Conducted Output Power 7
2.1 Test Result 7
2.2 Test Graphs 8
3 -6dB Bandwidth 11
3.1 Test Result 11
3.2 Test Graphs 12
4 Maximum Power Spectral Density Level 15
4.1 Test Result 15
4.2 Test Graphs 16
5 Band Edge 19
5.1 Test Result 19
5.2 Test Graphs 20
6 Conducted RF Spurious Emission 24
6.1 Test Result 24
6.2 Test Graphs 25
7 Restrict Band 31
7.1 Test Result 31
7.2 Test Graphs 32

1 Duty Cycle

1.1 Test Result

Mode	Frequency (MHz)	Duty Cycle (%)	Correction Factor	1/T (kHz)
BLE 1M	2402	84.4	0.74	0.48
BLE 1M	2440	84.2	0.75	0.48
BLE 1M	2480	84.4	0.74	0.48
BLE 2M	2402	56.72	2.46	0.94
BLE 2M	2440	56.95	2.44	0.93
BLE 2M	2480	57.31	2.42	0.94

1.2 Test Graphs

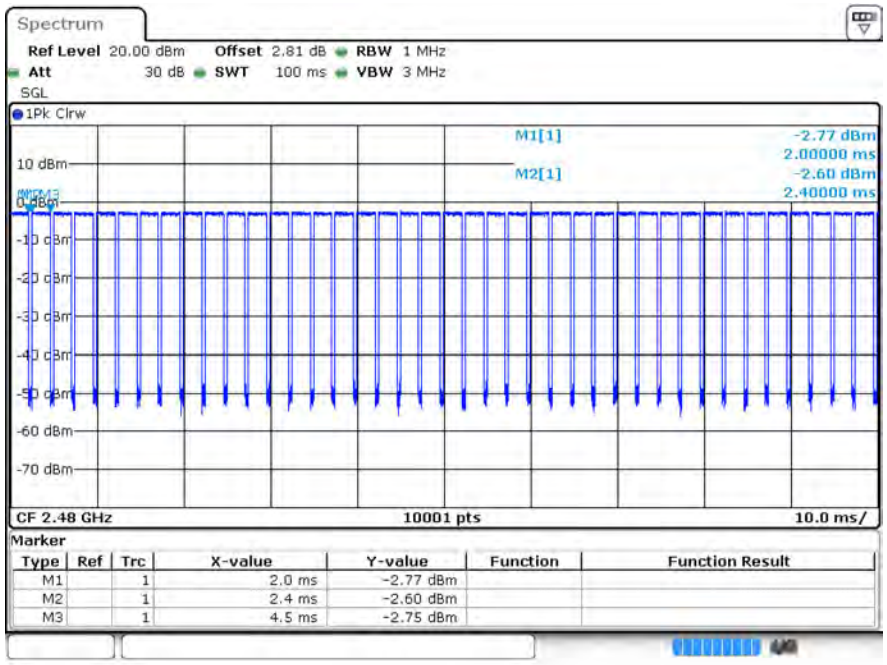
Test Graphs
BLE 1M 2402MHz



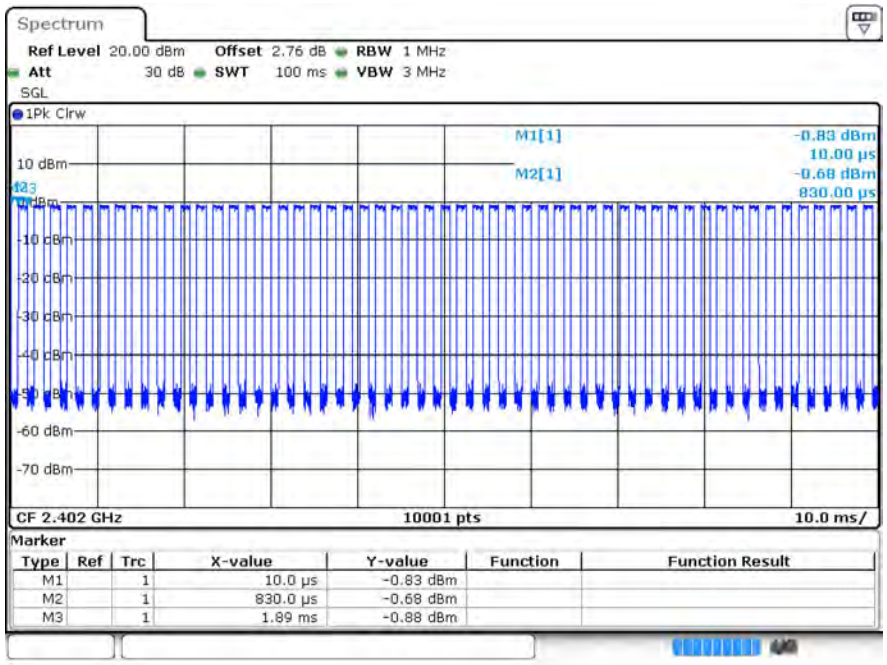
BLE 1M 2440MHz



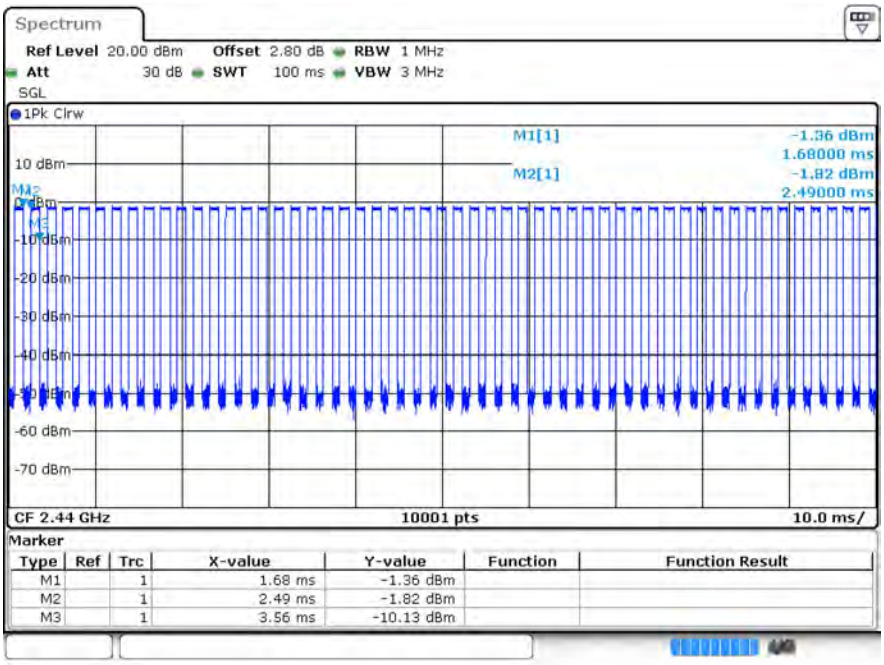
BLE 1M 2480MHz



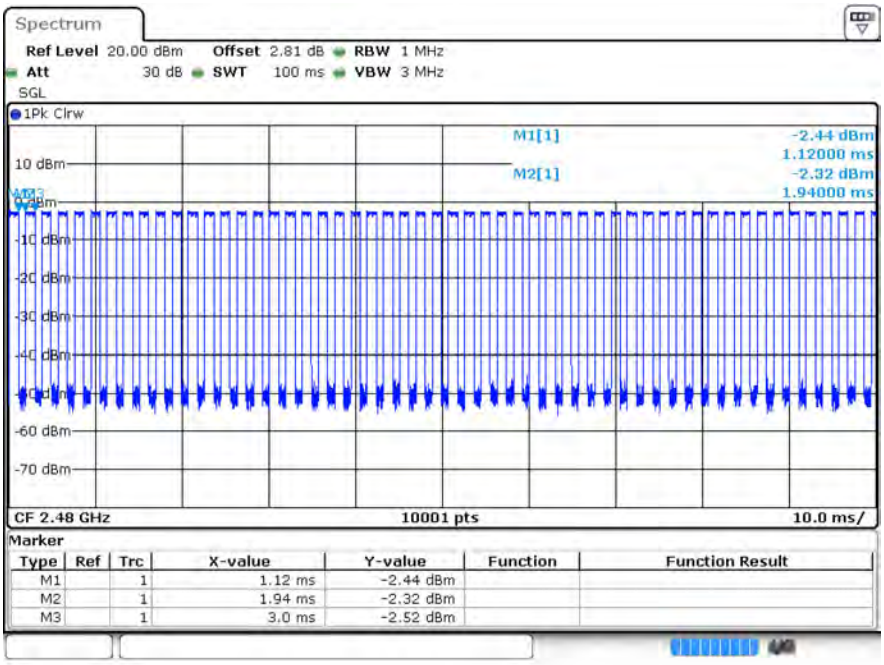
BLE 2M 2402MHz



BLE 2M 2440MHz



BLE 2M 2480MHz

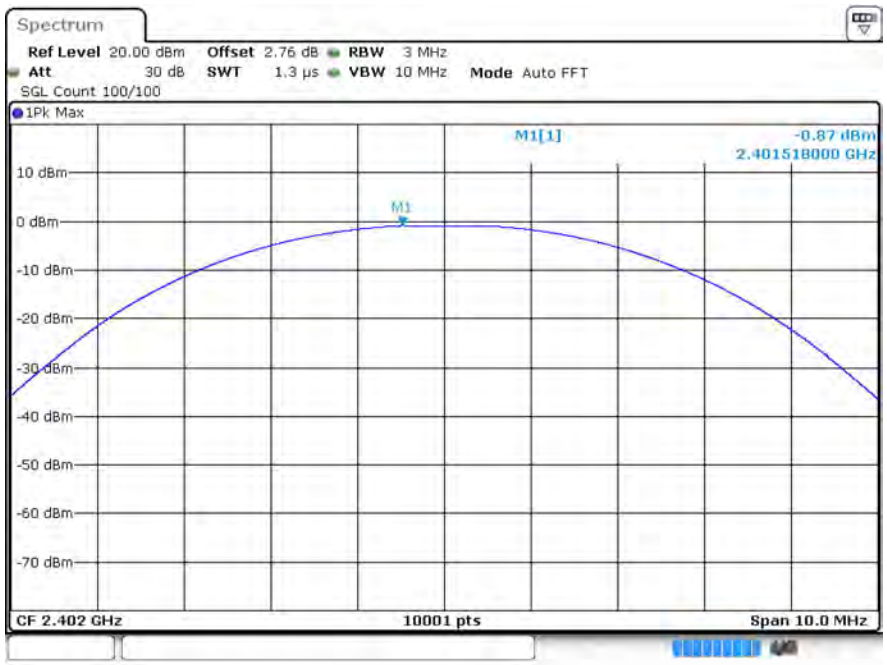
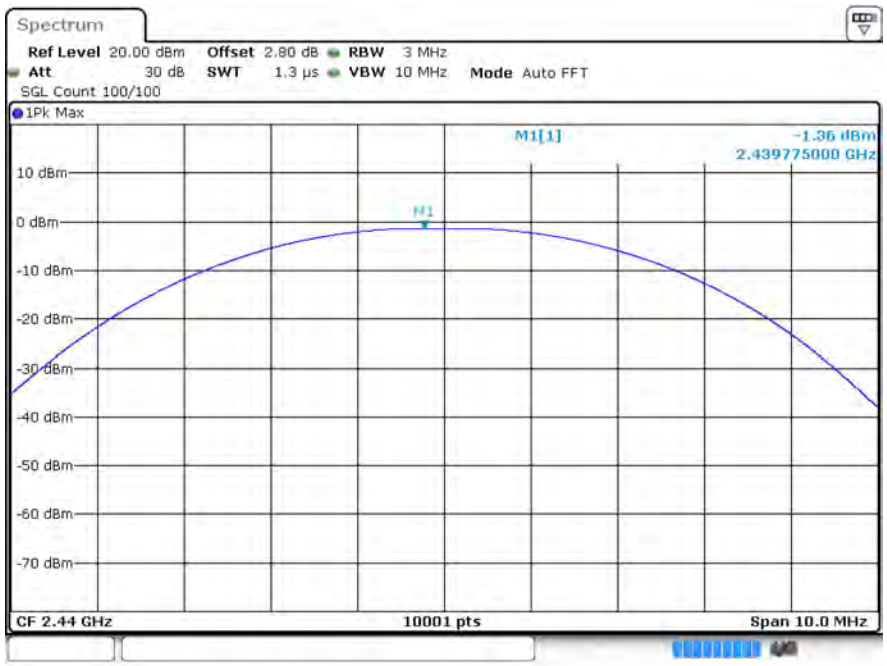


2 Maximum Conducted Output Power

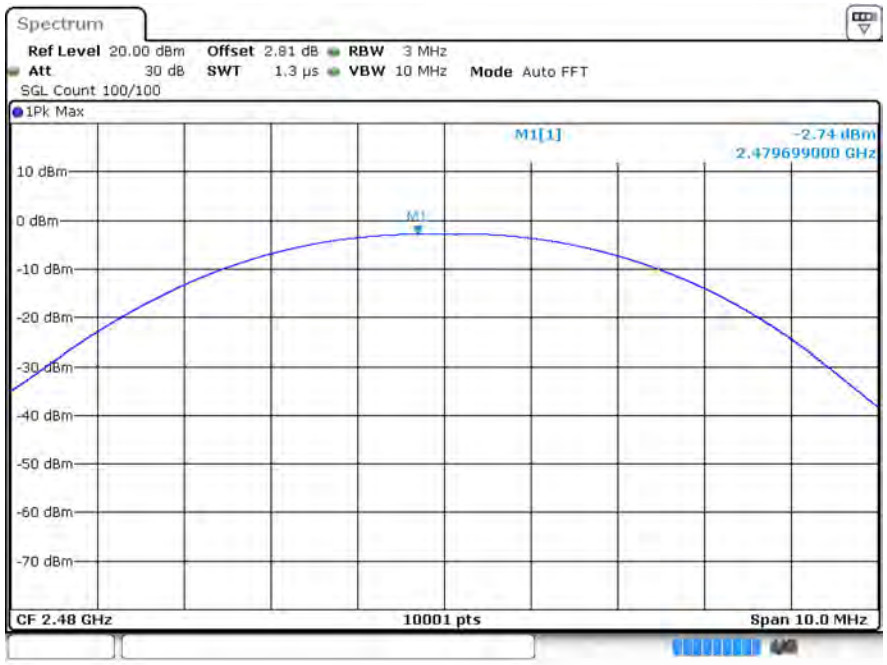
2.1 Test Result

Mode	Frequency (MHz)	Conducted Power (dBm)	Limit (dBm)	Verdict
BLE 1M	2402	-0.87	30	Pass
BLE 1M	2440	-1.36	30	Pass
BLE 1M	2480	-2.74	30	Pass
BLE 2M	2402	-0.74	30	Pass
BLE 2M	2440	-1.1	30	Pass
BLE 2M	2480	-2.43	30	Pass

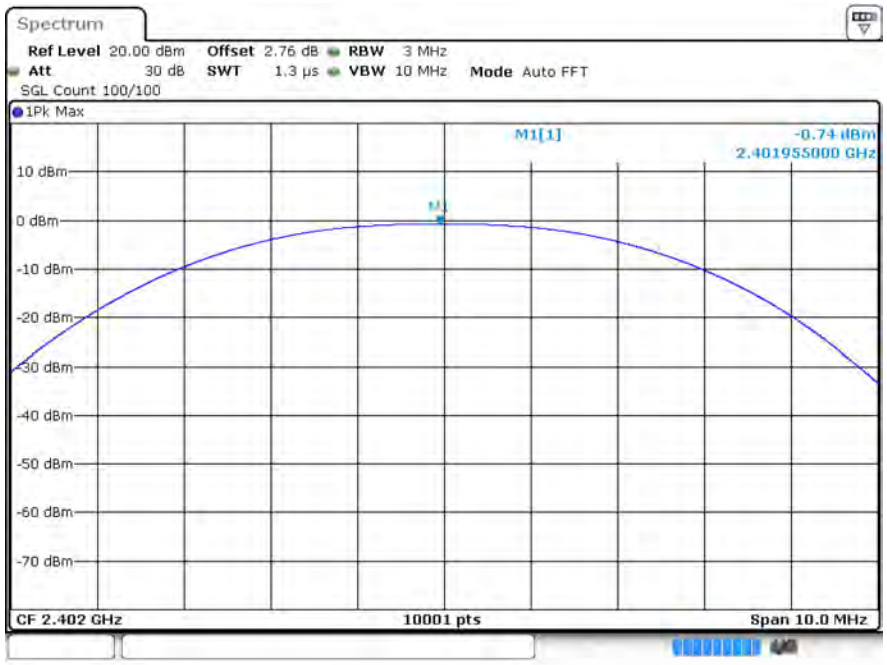
2.2 Test Graphs

Test Graphs
BLE 1M 2402MHz

BLE 1M 2440MHz


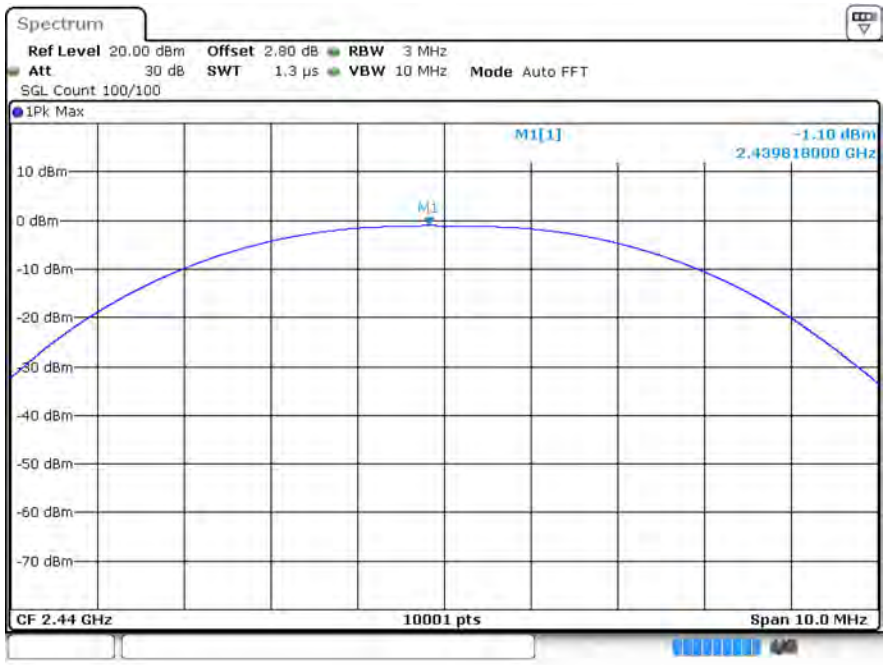
BLE 1M 2480MHz



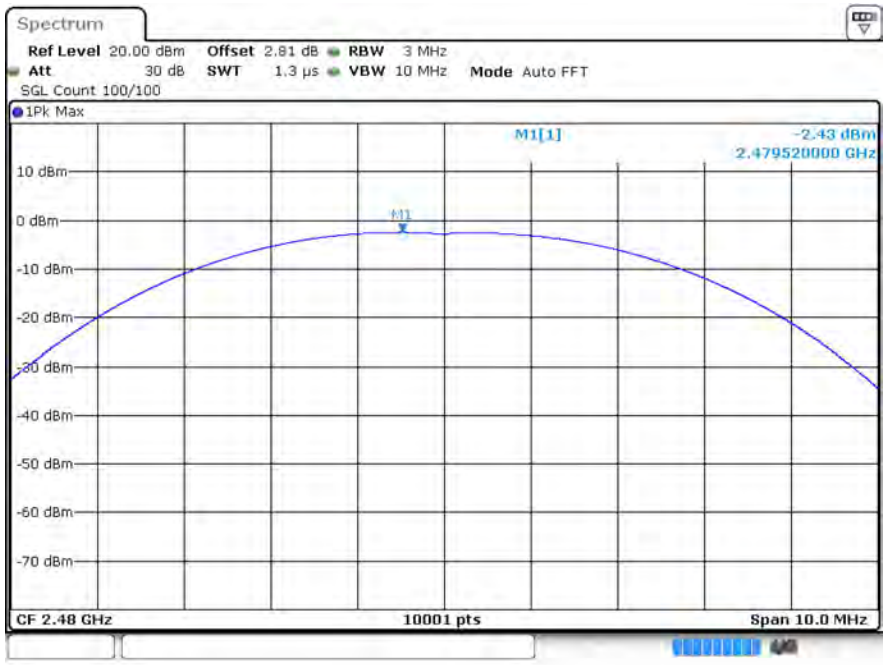
BLE 2M 2402MHz



BLE 2M 2440MHz



BLE 2M 2480MHz



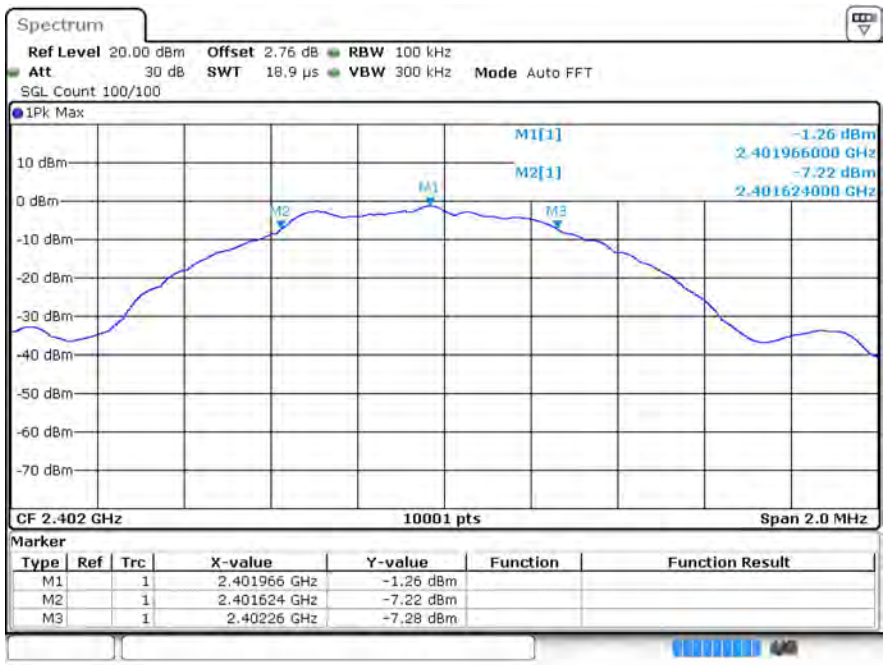
3 -6dB Bandwidth

3.1 Test Result

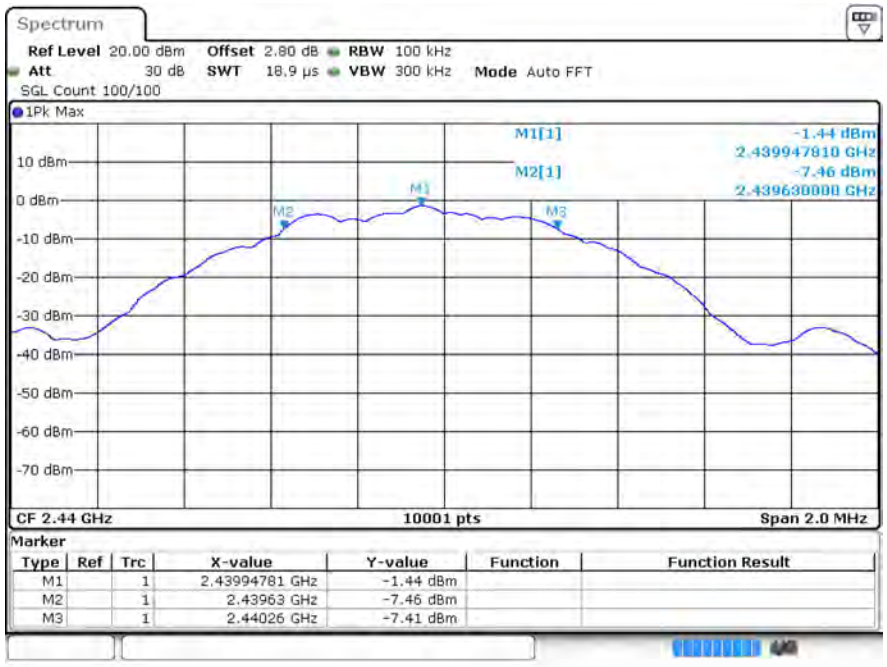
Mode	Frequency (MHz)	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
BLE 1M	2402	0.636	0.5	Pass
BLE 1M	2440	0.63	0.5	Pass
BLE 1M	2480	0.625	0.5	Pass
BLE 2M	2402	1.085	0.5	Pass
BLE 2M	2440	1.229	0.5	Pass
BLE 2M	2480	1.068	0.5	Pass

3.2 Test Graphs

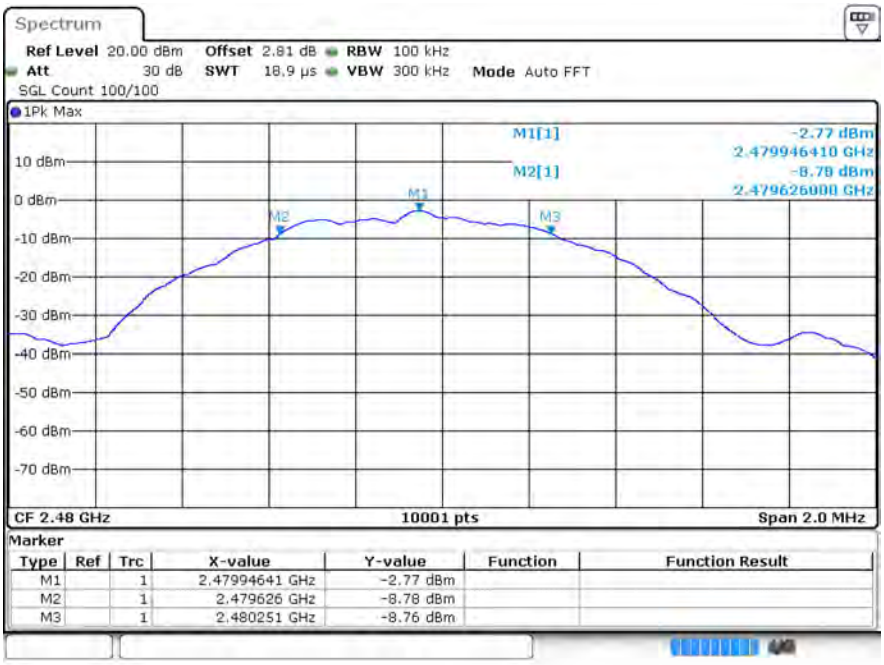
Test Graphs
BLE 1M 2402MHz



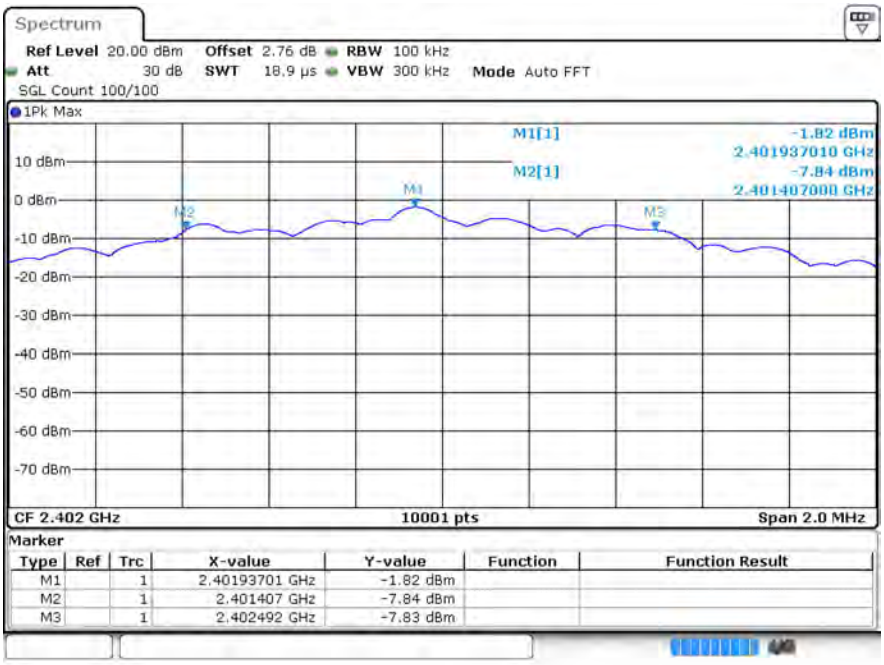
BLE 1M 2440MHz



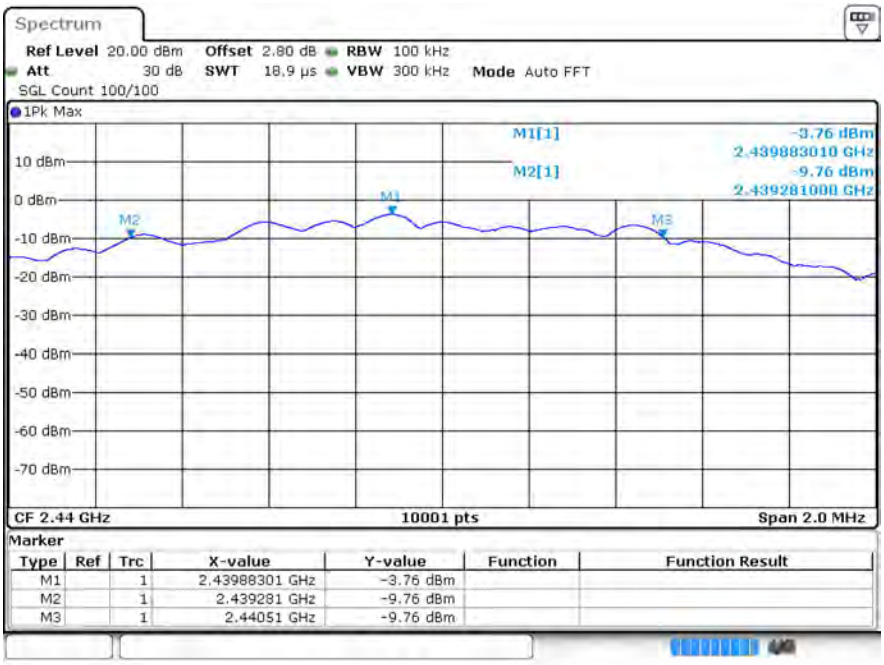
BLE 1M 2480MHz



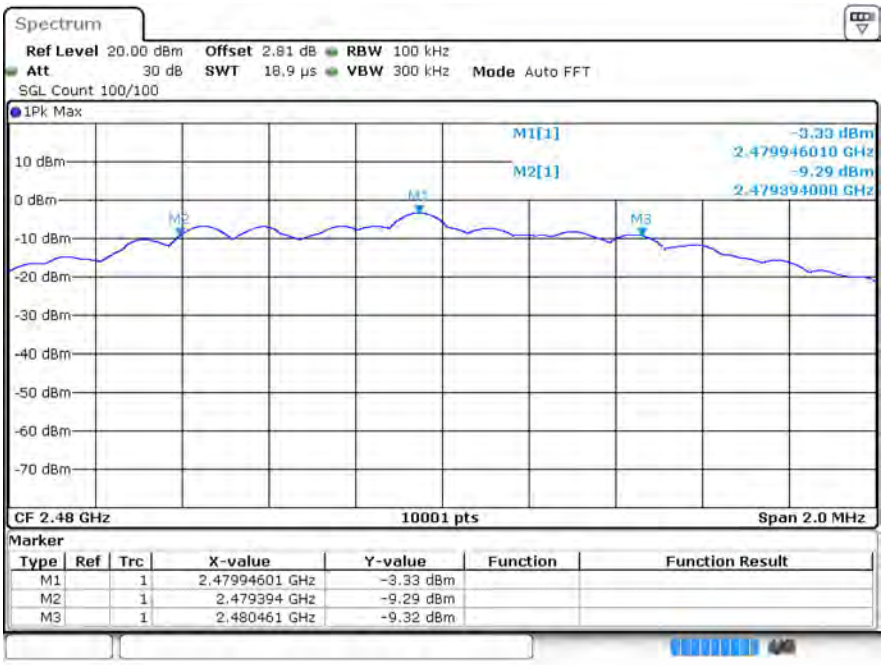
BLE 2M 2402MHz



BLE 2M 2440MHz



BLE 2M 2480MHz

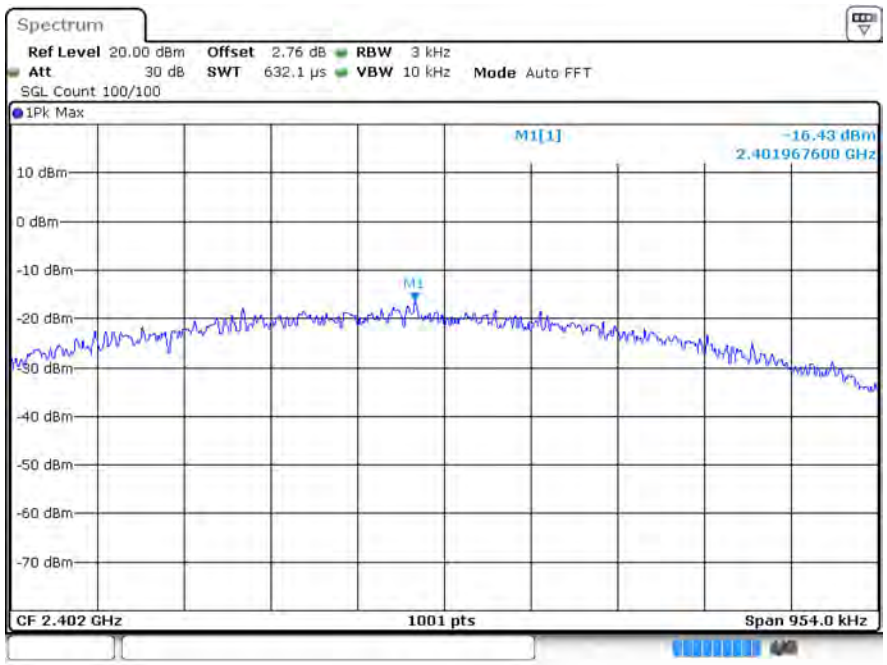
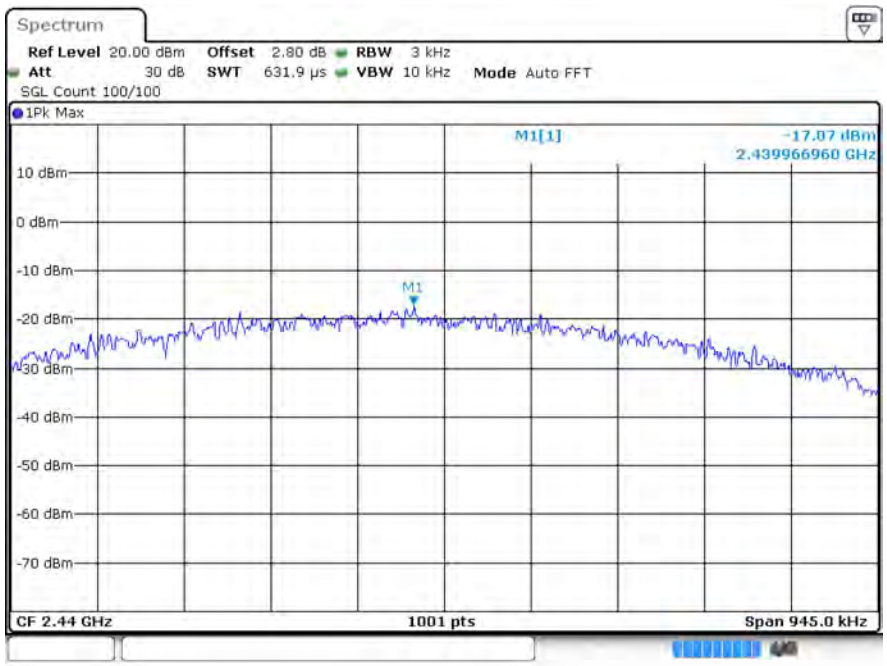


4 Maximum Power Spectral Density Level

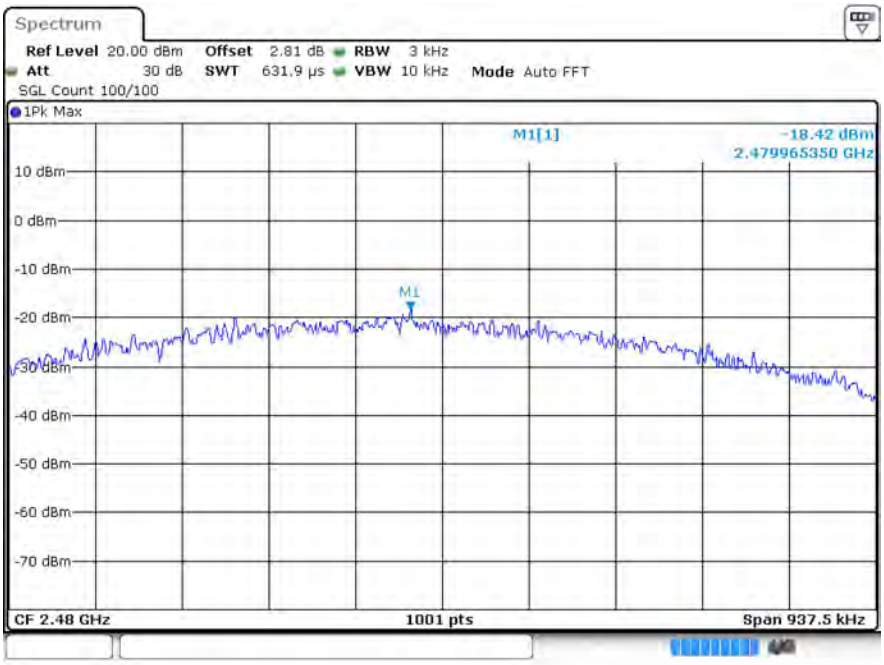
4.1 Test Result

Mode	Frequency (MHz)	Conducted PSD (dBm/3-100kHz)	Limit (dBm/3kHz)	Verdict
BLE 1M	2402	-16.43	≤8	Pass
BLE 1M	2440	-17.07	≤8	Pass
BLE 1M	2480	-18.42	≤8	Pass
BLE 2M	2402	-18.27	≤8	Pass
BLE 2M	2440	-18.72	≤8	Pass
BLE 2M	2480	-20.09	≤8	Pass

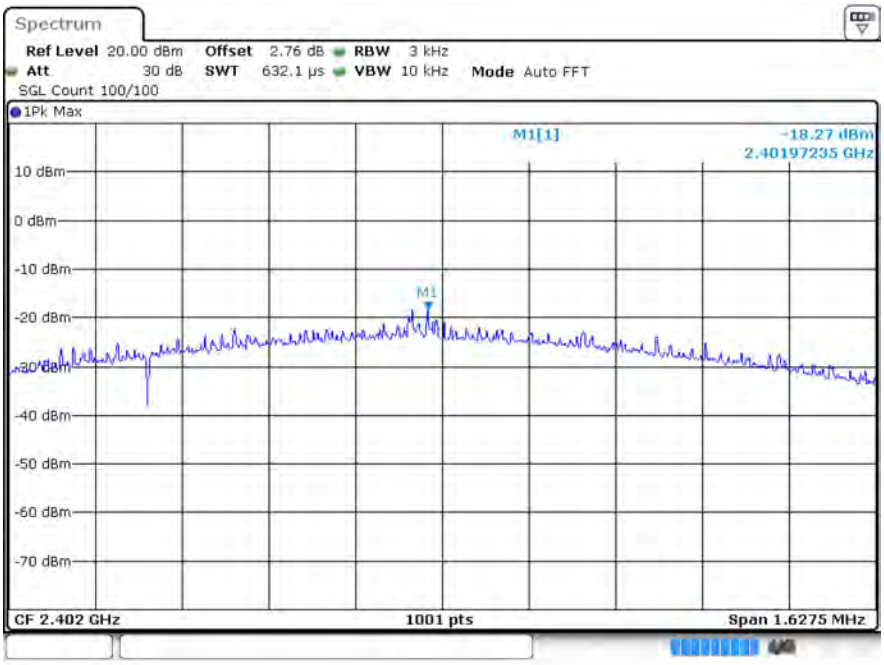
4.2 Test Graphs

Test Graphs
BLE 1M 2402MHz

BLE 1M 2440MHz


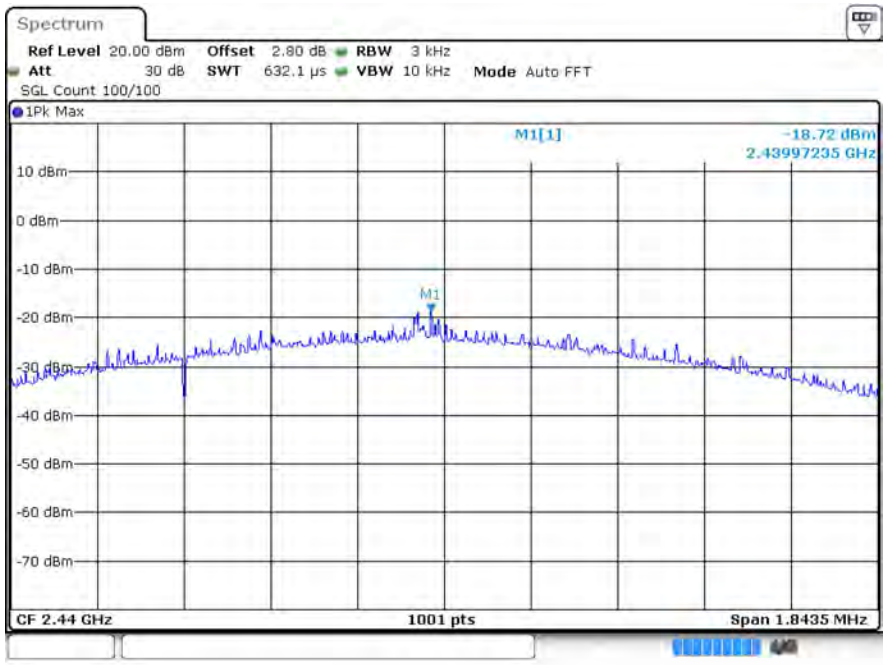
BLE 1M 2480MHz



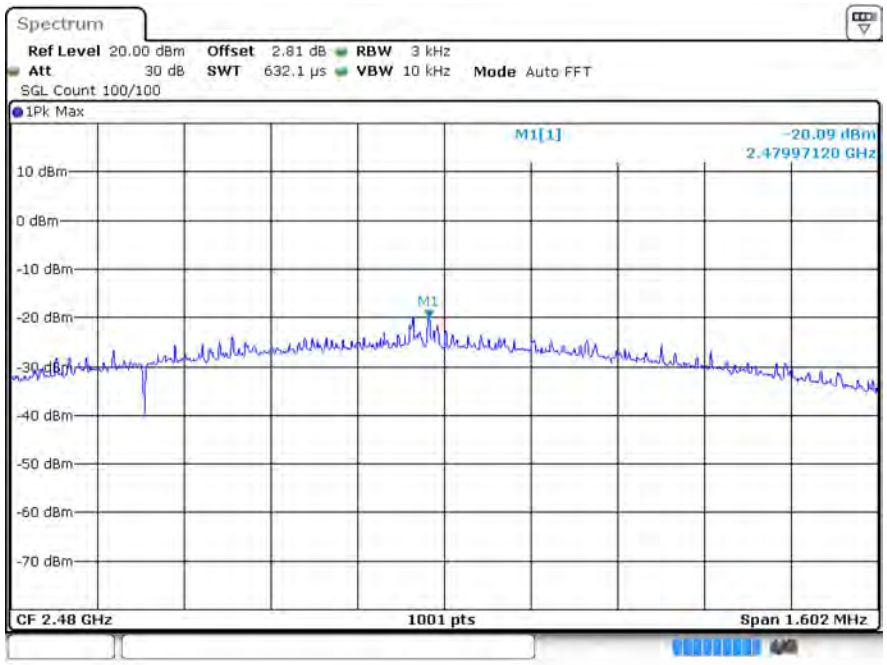
BLE 2M 2402MHz



BLE 2M 2440MHz



BLE 2M 2480MHz



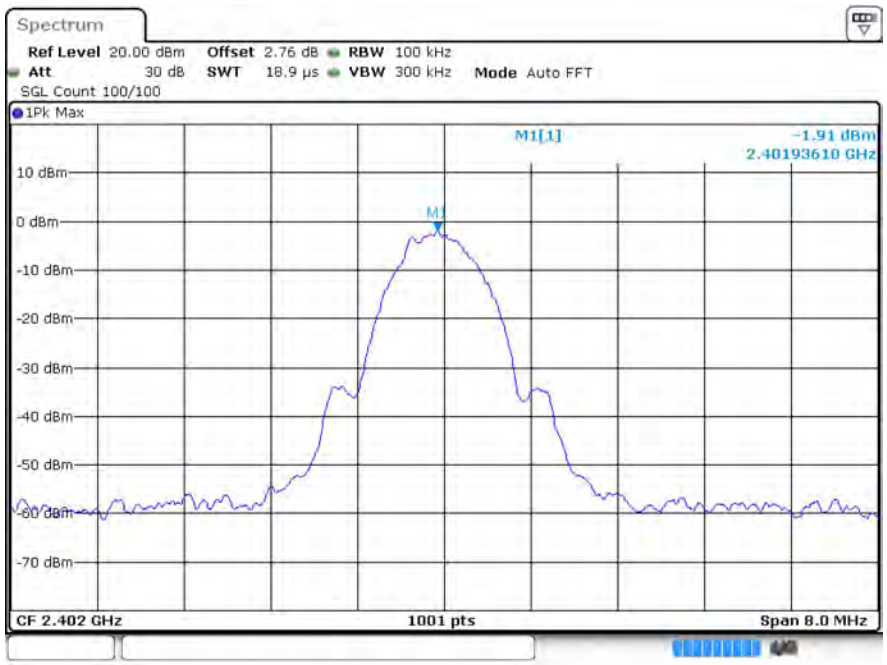
5 Band Edge

5.1 Test Result

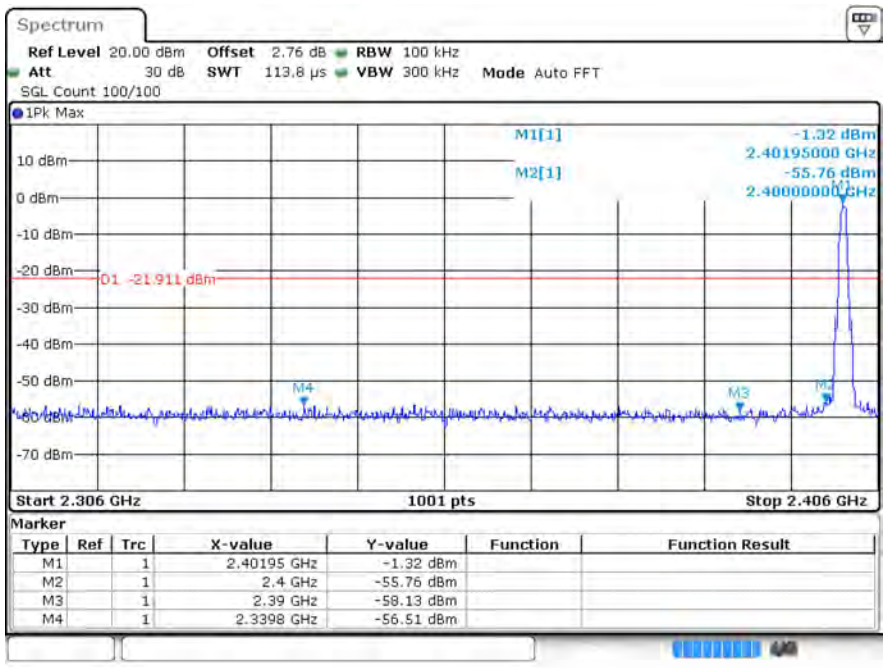
Mode	Frequency (MHz)	Max Value (dBc)	Limit (dBc)	Verdict
BLE 1M	2402	-54.59	-20	Pass
BLE 1M	2480	-52.39	-20	Pass
BLE 2M	2402	-54.5	-20	Pass
BLE 2M	2480	-50.39	-20	Pass

5.2 Test Graphs

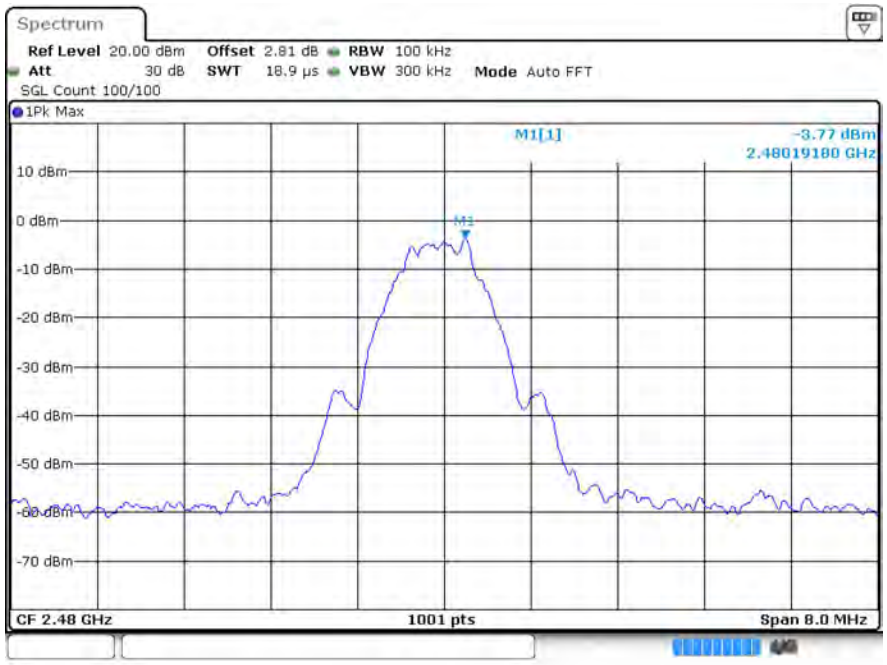
Test Graphs
BLE 1M 2402MHz Ref



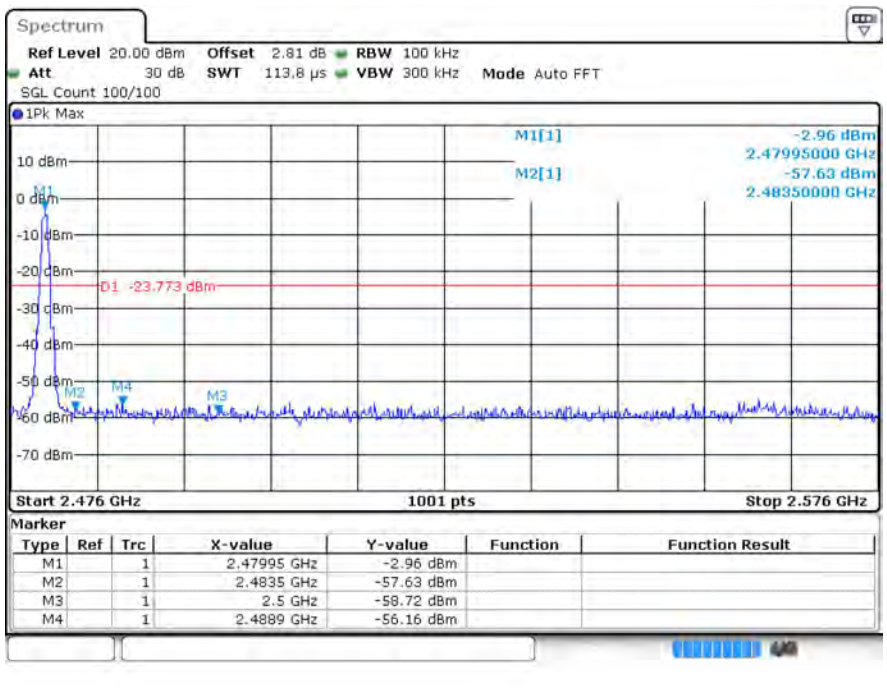
BLE 1M 2402MHz Emission



BLE 1M 2480MHz Ref



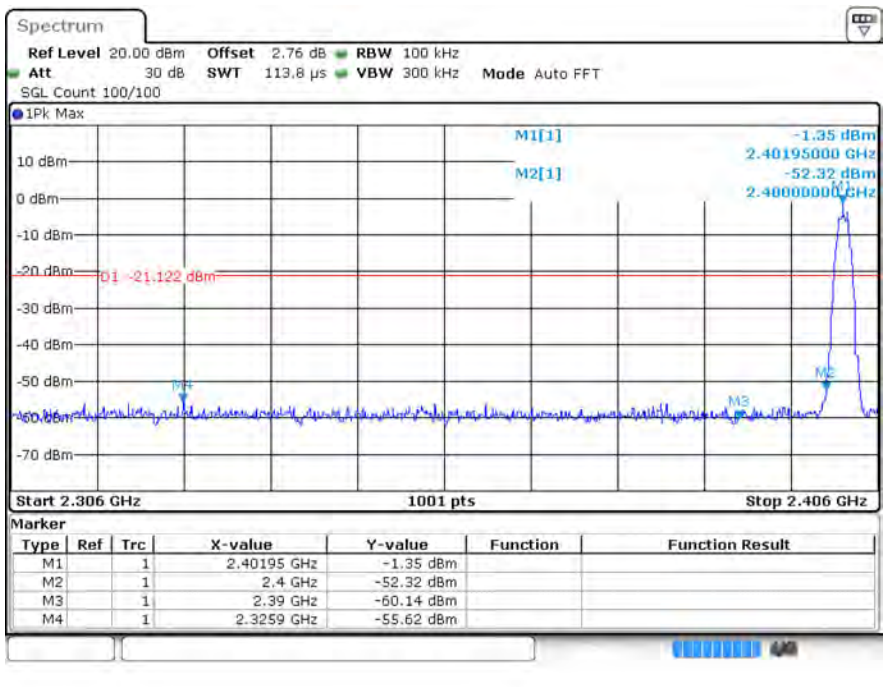
BLE 1M 2480MHz Emission



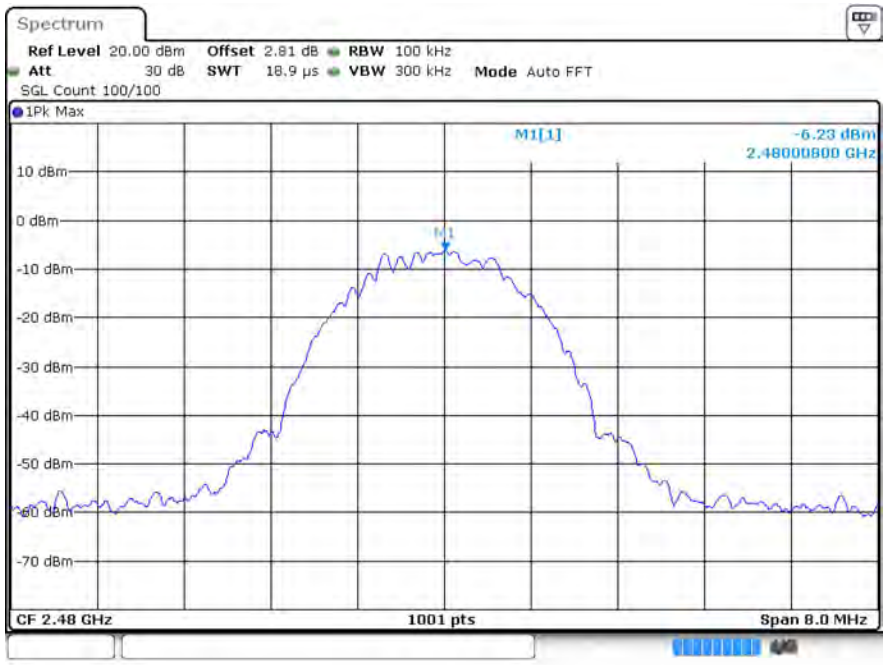
BLE 2M 2402MHz Ref



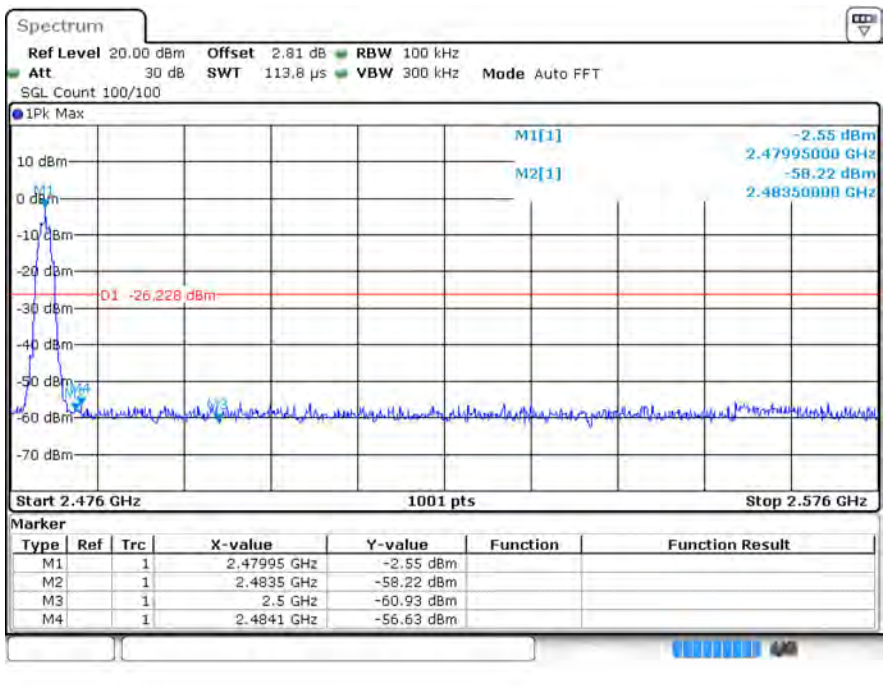
BLE 2M 2402MHz Emission



BLE 2M 2480MHz Ref



BLE 2M 2480MHz Emission



6 Conducted RF Spurious Emission

6.1 Test Result

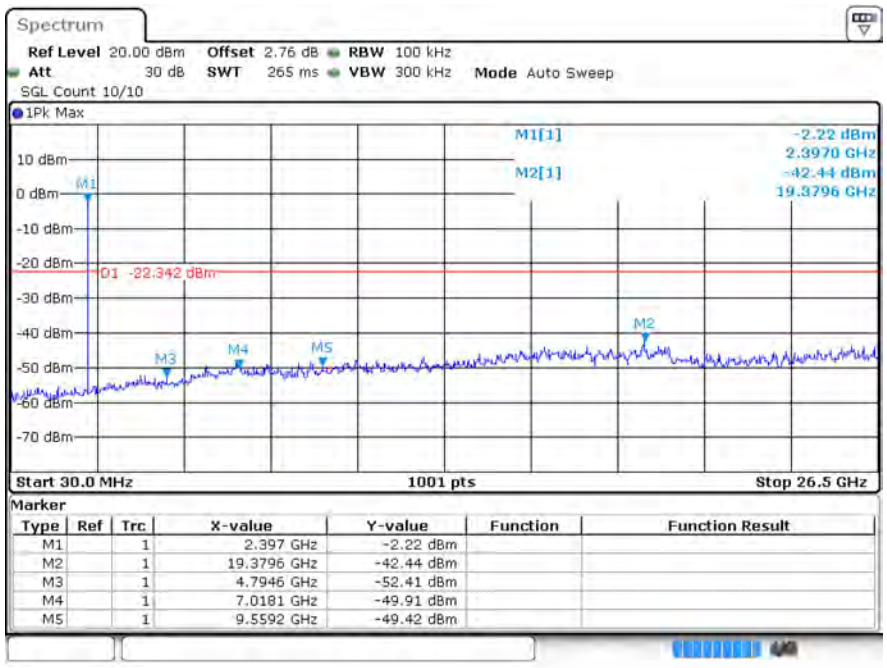
Mode	Frequency (MHz)	Max Value (dBc)	Limit (dBc)	Verdict
BLE 1M	2402	-40.09	-20	Pass
BLE 1M	2440	-40.15	-20	Pass
BLE 1M	2480	-39.24	-20	Pass
BLE 2M	2402	-41.98	-20	Pass
BLE 2M	2440	-41.95	-20	Pass
BLE 2M	2480	-41.56	-20	Pass

6.2 Test Graphs

Test Graphs
BLE 1M 2402MHz Ref



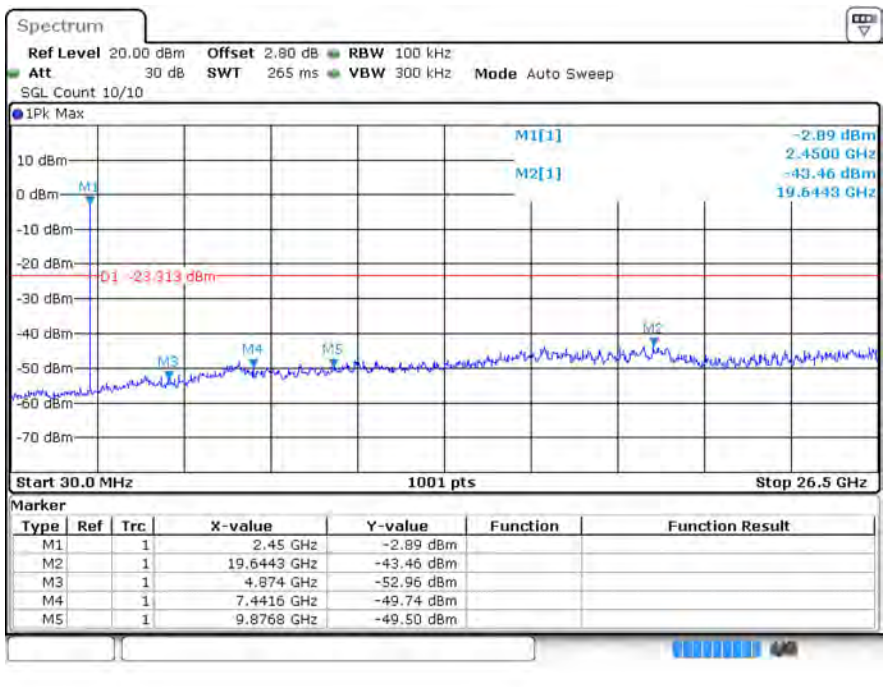
BLE 1M 2402MHz Emission



BLE 1M 2440MHz Ref



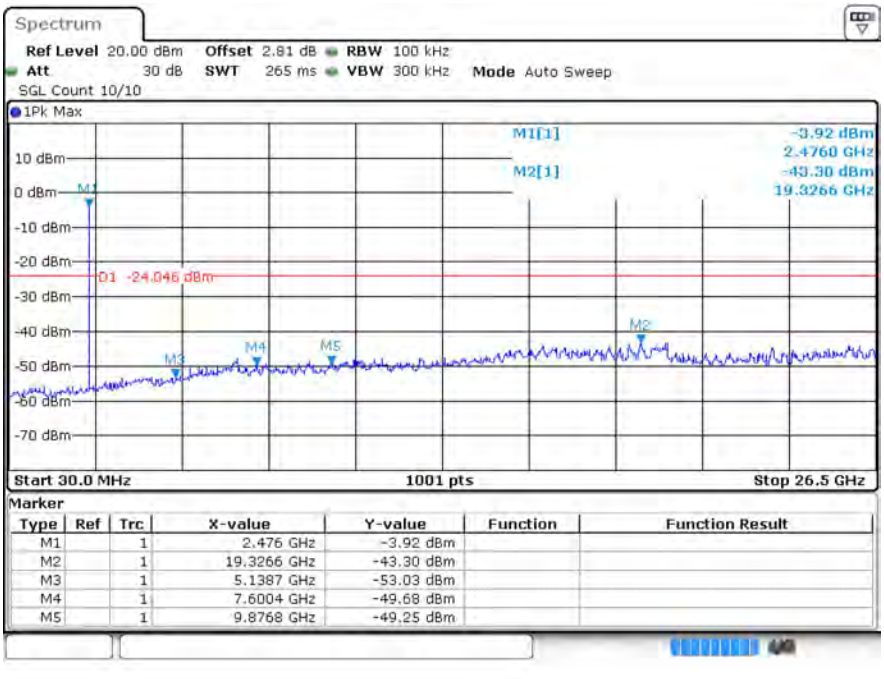
BLE 1M 2440MHz Emission



BLE 1M 2480MHz Ref



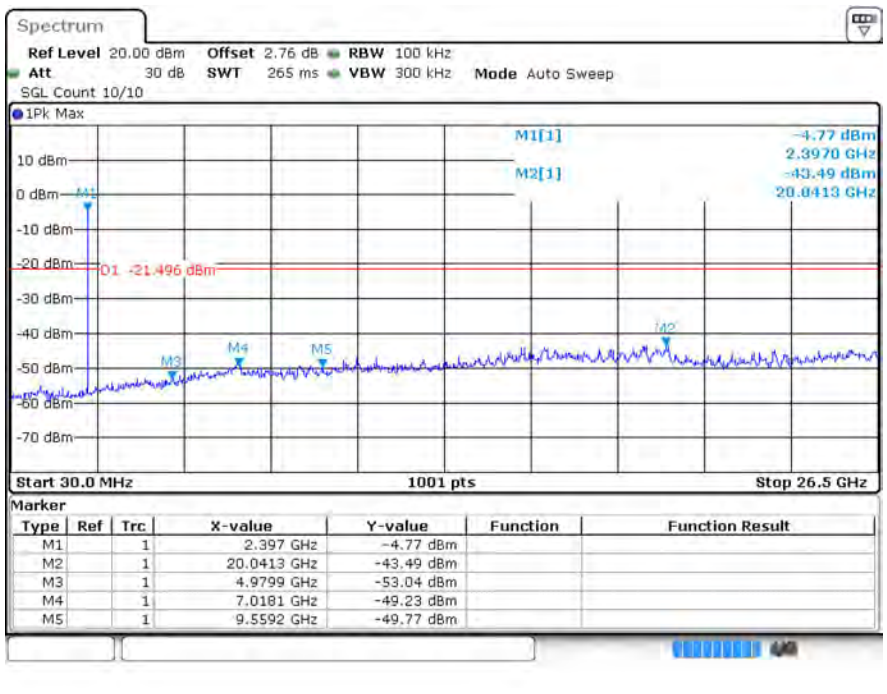
BLE 1M 2480MHz Emission



BLE 2M 2402MHz Ref



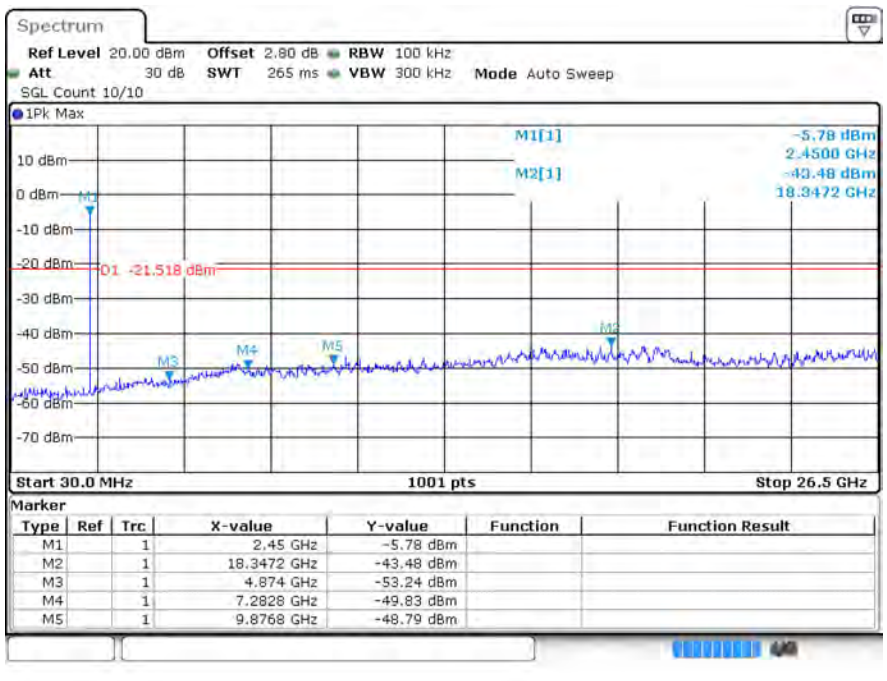
BLE 2M 2402MHz Emission



BLE 2M 2440MHz Ref



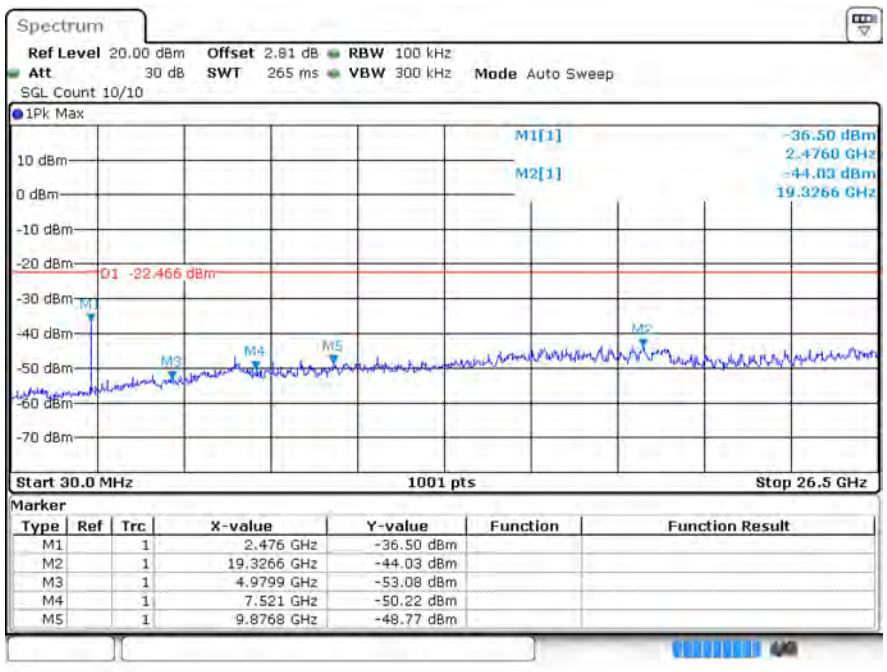
BLE 2M 2440MHz Emission



BLE 2M 2480MHz Ref



BLE 2M 2480MHz Emission



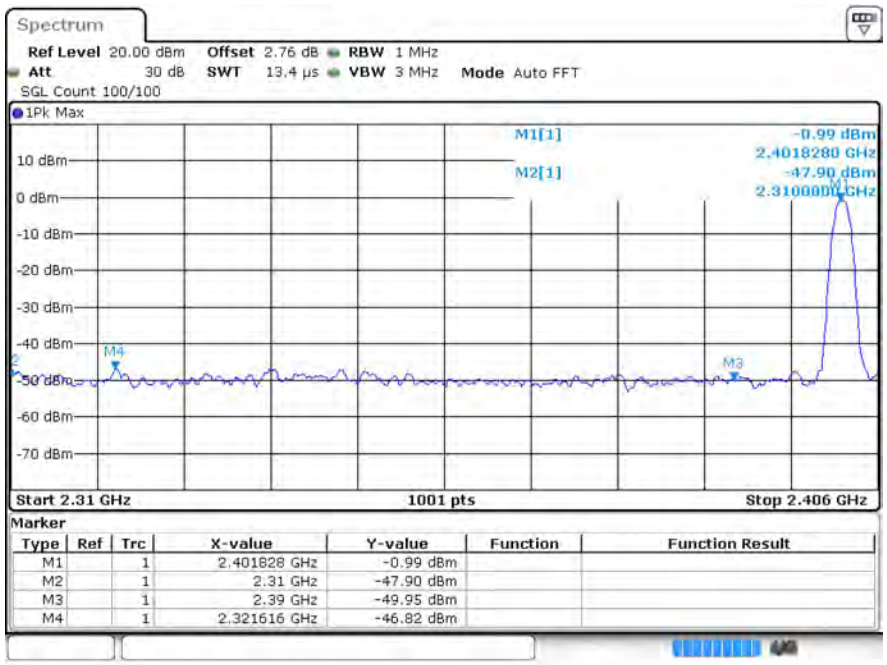
7 Restrict Band

7.1 Test Result

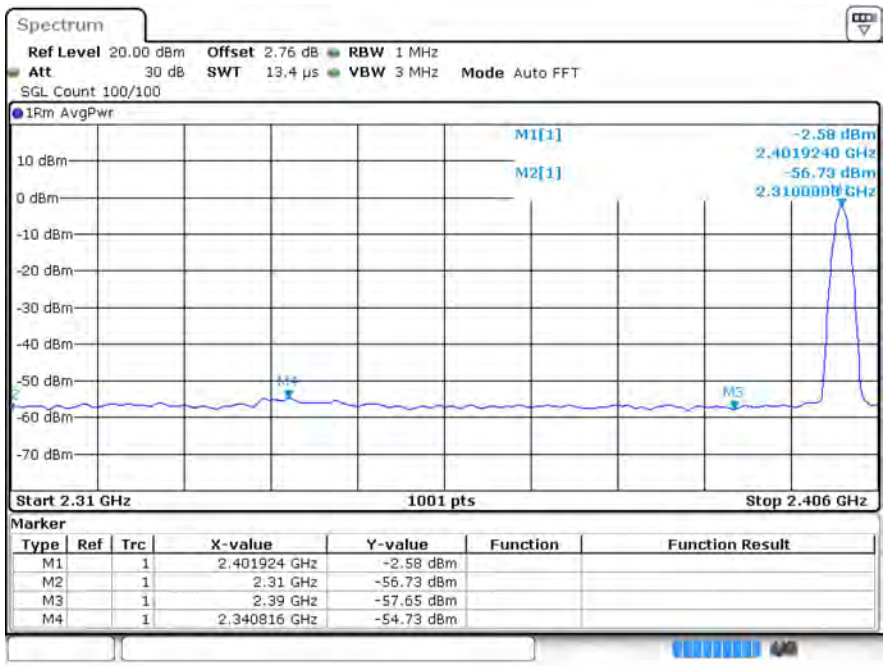
Mode	Frequency (MHz)	Spur Freq (MHz)	Power (dBm)	Gain (dBi)	Duty Factor	E (dBuV/m)	Detector	Limit (dBuV/m)	Verdict
BLE 1M	2402	2310	-47.9	4.23	-	51.59	Peak	74	Pass
BLE 1M	2402	2310	-56.73	4.23	0.74	43.5	Average	54	Pass
BLE 1M	2402	2321.616	-46.81	4.23	-	52.68	Peak	74	Pass
BLE 1M	2402	2340.816	-54.72	4.23	0.74	45.51	Average	54	Pass
BLE 1M	2402	2390	-49.95	4.23	-	49.54	Peak	74	Pass
BLE 1M	2402	2390	-57.65	4.23	0.74	42.58	Average	54	Pass
BLE 1M	2480	2483.5	-47.98	4.23	-	51.51	Peak	74	Pass
BLE 1M	2480	2483.5	-56.44	4.23	0.74	43.79	Average	54	Pass
BLE 1M	2480	2497.072	-47.37	4.23	-	52.12	Peak	74	Pass
BLE 1M	2480	2484.4	-55.44	4.23	0.74	44.79	Average	54	Pass
BLE 1M	2480	2500	-49.53	4.23	-	49.96	Peak	74	Pass
BLE 1M	2480	2500	-56.61	4.23	0.74	43.62	Average	54	Pass
BLE 2M	2402	2310	-48.59	4.23	-	50.9	Peak	74	Pass
BLE 2M	2402	2310	-55.85	4.23	2.46	46.1	Average	54	Pass
BLE 2M	2402	2339.664	-46.49	4.23	-	53	Peak	74	Pass
BLE 2M	2402	2338.224	-54.44	4.23	2.46	47.51	Average	54	Pass
BLE 2M	2402	2390	-50.59	4.23	-	48.9	Peak	74	Pass
BLE 2M	2402	2390	-57.64	4.23	2.46	44.31	Average	54	Pass
BLE 2M	2480	2483.5	-47.55	4.23	-	51.94	Peak	74	Pass
BLE 2M	2480	2483.5	-55.78	4.23	2.42	46.13	Average	54	Pass
BLE 2M	2480	2487.376	-47.51	4.23	-	51.98	Peak	74	Pass
BLE 2M	2480	2484.208	-55.49	4.23	2.42	46.42	Average	54	Pass
BLE 2M	2480	2500	-48.35	4.23	-	51.14	Peak	74	Pass
BLE 2M	2480	2500	-56.99	4.23	2.42	44.92	Average	54	Pass

7.2 Test Graphs

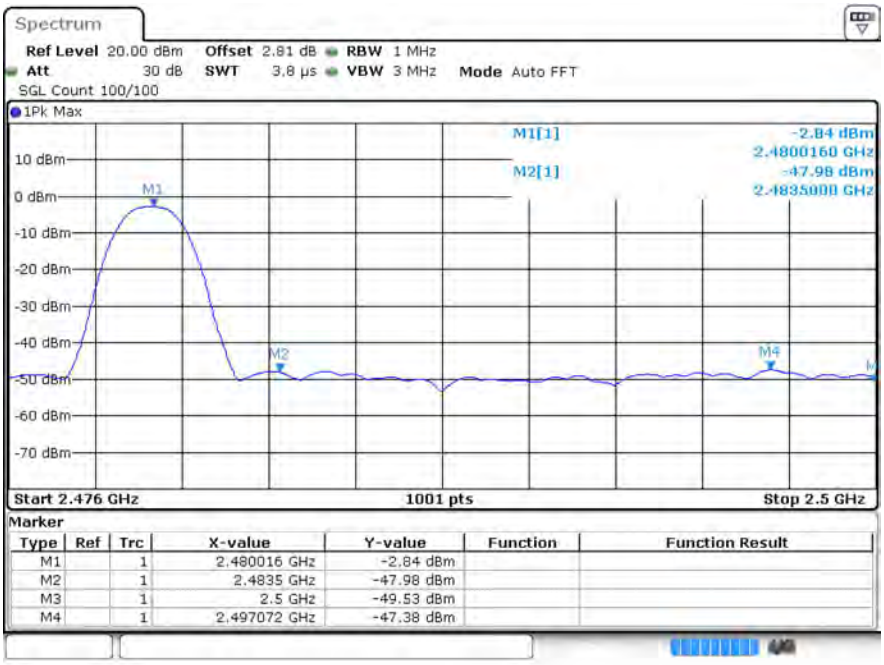
Test Graphs
BLE 1M 2402MHz Peak



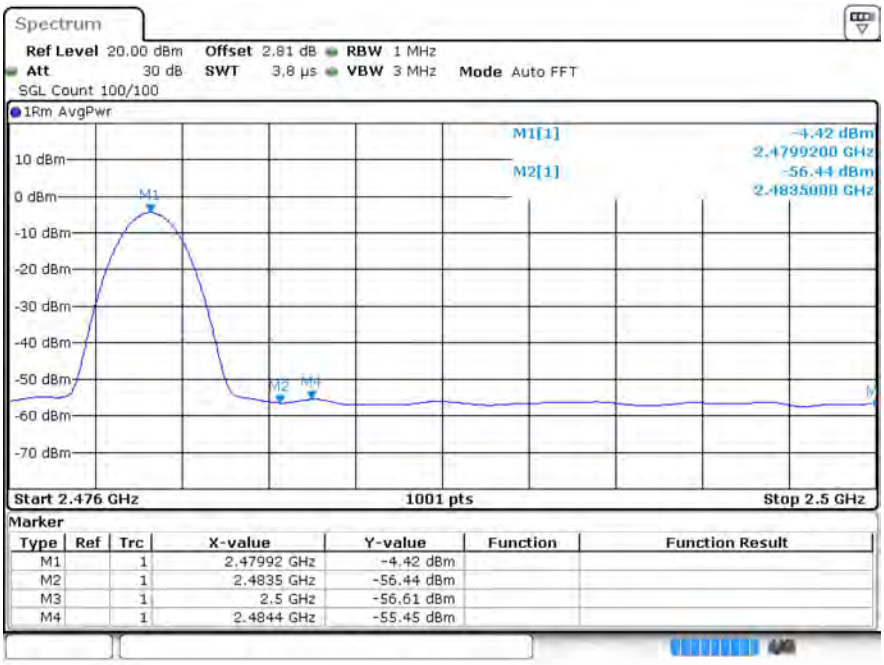
BLE 1M 2402MHz Average



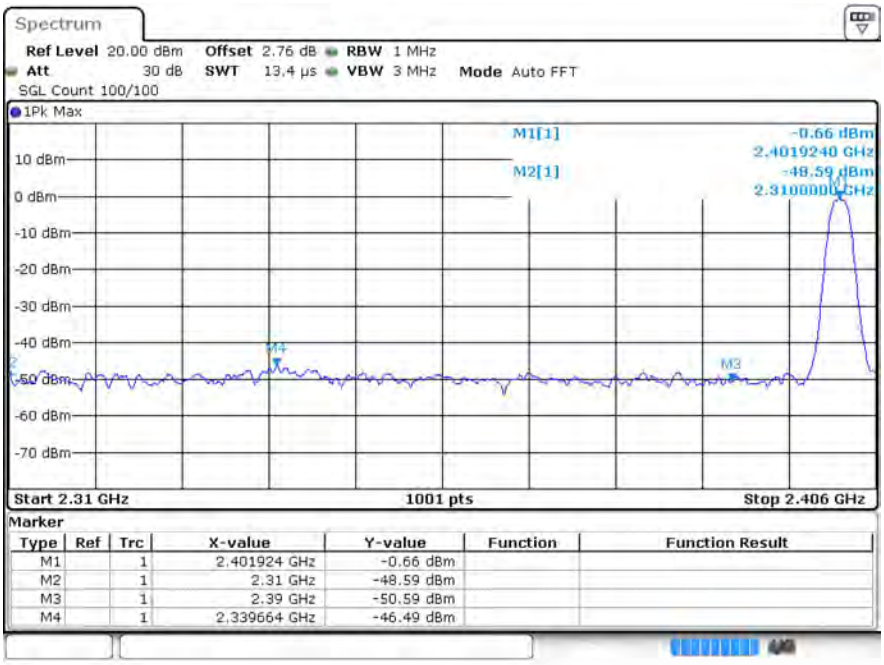
BLE 1M 2480MHz Peak



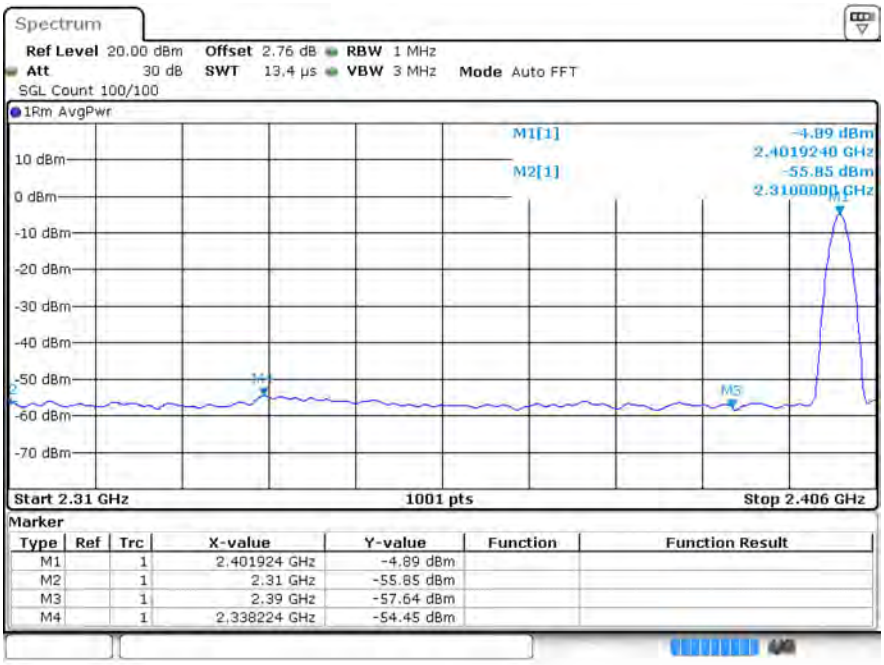
BLE 1M 2480MHz Average



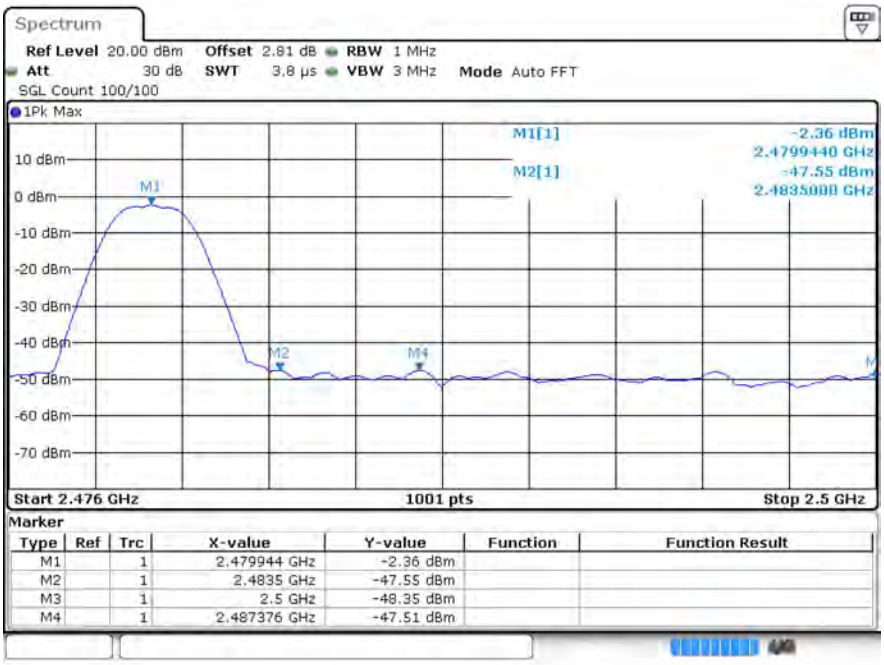
BLE 2M 2402MHz Peak



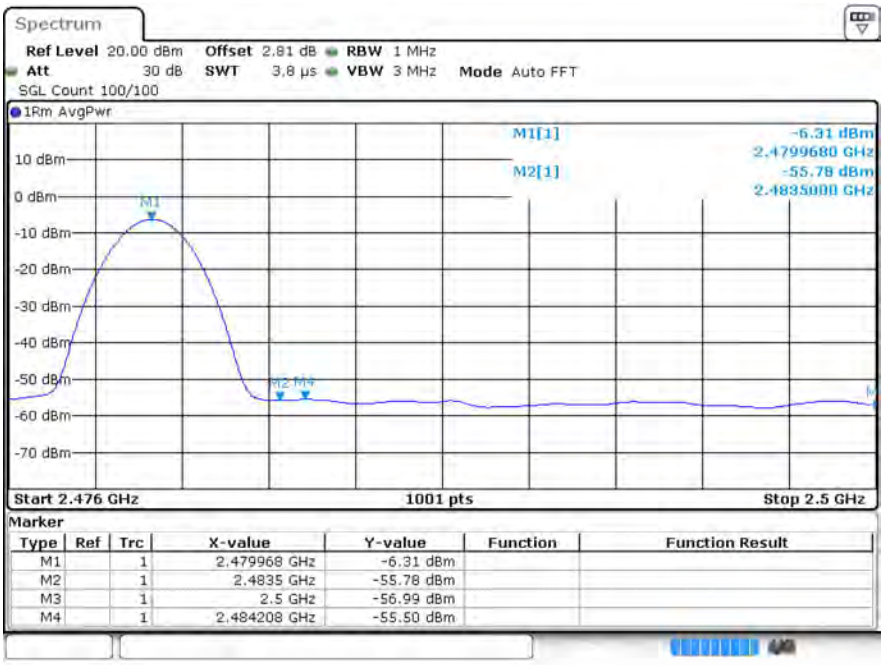
BLE 2M 2402MHz Average



BLE 2M 2480MHz Peak



BLE 2M 2480MHz Average



---The End---