# Appendix A

## RF Test Data for BT(BDR/EDR) (Conducted Measurement)

**Product Name: Bluetooth Speaker**

**Trade Mark: N/A**

**Test Model: Q21**

**Environmental Conditions**

| | |
|---|---|
| Temperature: | 24.9℃ |
| Relative Humidity: | 52.1% |
| ATM Pressure: | 101Kpa |
| 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 Peak Output Power ..... 9
2.1 Test Result ..... 9
2.2 Test Graphs ..... 10
3 20dB Bandwidth ..... 15
3.1 Test Result ..... 15
3.2 Test Graphs ..... 16
4 Carrier Frequency Separation ..... 21
4.1 Test Result ..... 21
4.2 Test Graphs ..... 22
5 Hopping Channel Number ..... 24
5.1 Test Result ..... 24
5.2 Test Graphs ..... 25
6 Dwell Time ..... 27
6.1 Test Result ..... 27
6.2 Test Graphs ..... 28
7 RF Conducted Spurious Emissions ..... 31
7.1 Test Result ..... 31
7.2 Test Graphs ..... 32
8 Band-edge for RF Conducted Emissions ..... 41
8.1 Test Result ..... 41
8.2 Test Graphs ..... 42
9 Restrict-band band-edge measurements ..... 54
9.1 Test Result ..... 54
9.2 Test Graphs ..... 56

# 1 Duty Cycle

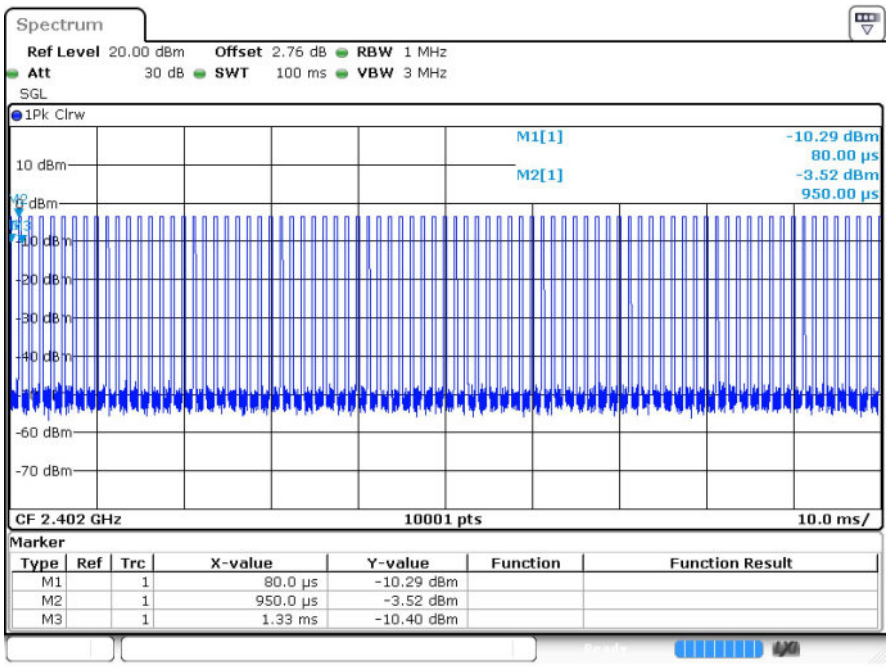
## 1.1 Test Result

| Mode | Frequency (MHz) | Duty Cycle (%) | Correction Factor | 1/T (kHz) |
|---|---|---|---|---|
| 1-DH1 | 2402 | 30.95 | 5.09 | 2.63 |
| 1-DH1 | 2441 | 31.2 | 5.06 | 2.63 |
| 1-DH1 | 2480 | 31.2 | 5.06 | 2.63 |
| 2-DH1 | 2402 | 31.2 | 5.06 | 2.63 |
| 2-DH1 | 2441 | 31.21 | 5.06 | 2.63 |
| 2-DH1 | 2480 | 31.2 | 5.06 | 2.63 |
| 3-DH1 | 2402 | 32.01 | 4.95 | 2.56 |
| 3-DH1 | 2441 | 31.68 | 4.99 | 2.63 |
| 3-DH1 | 2480 | 31.99 | 4.95 | 2.56 |

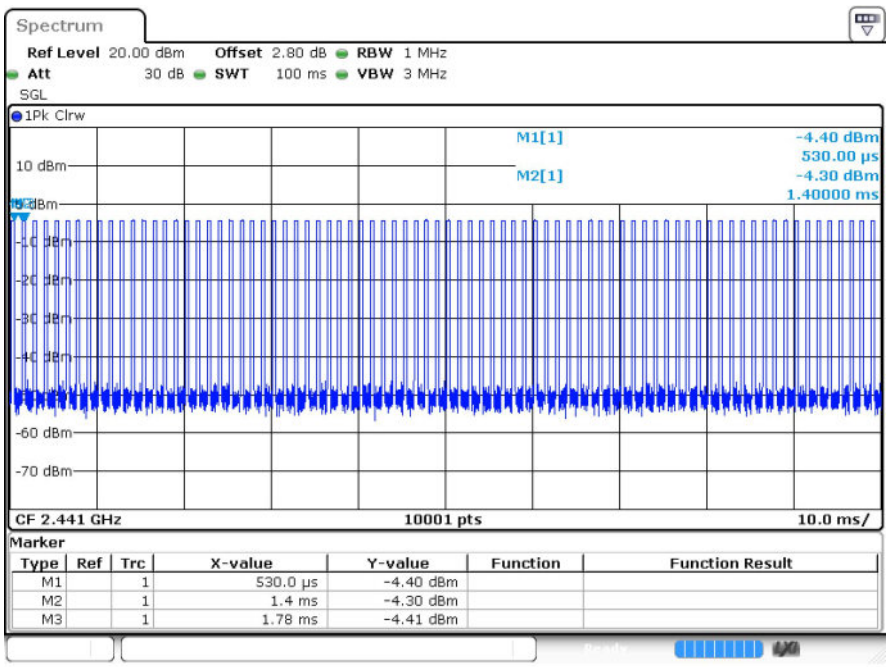
## 1.2 Test Graphs

Test Graphs

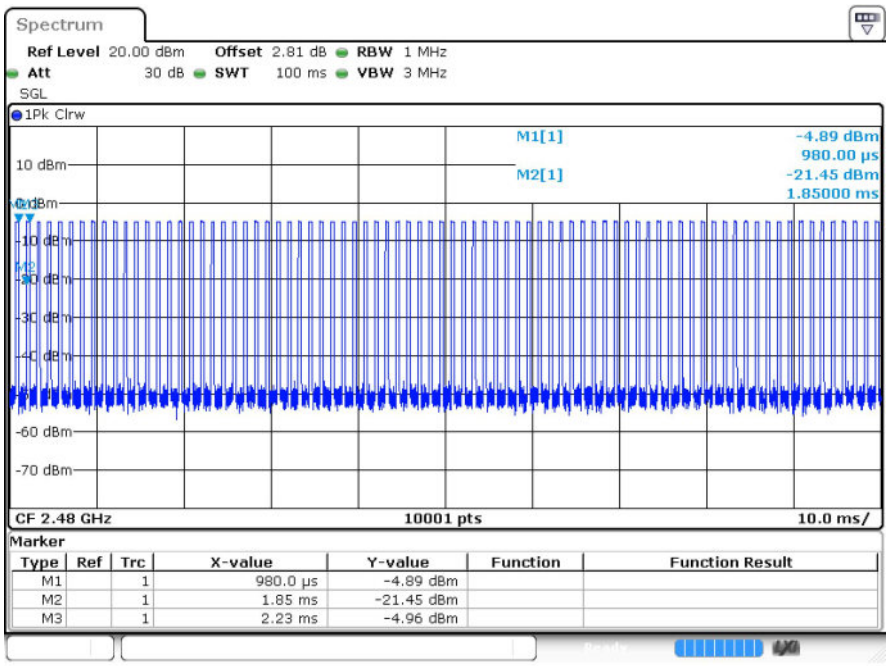
1-DH1 2402MHz



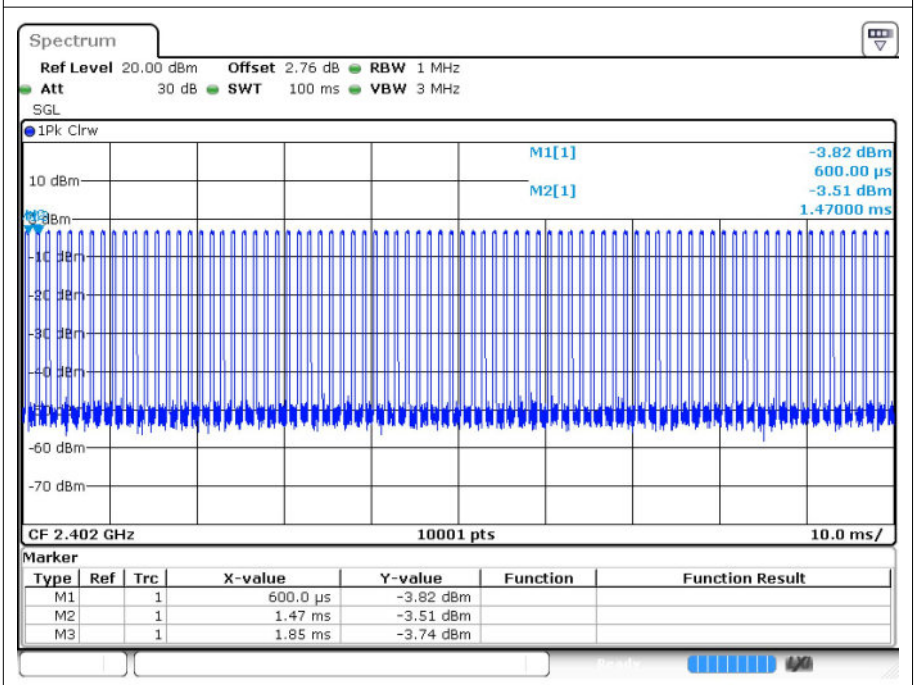

1-DH1 2441MHz



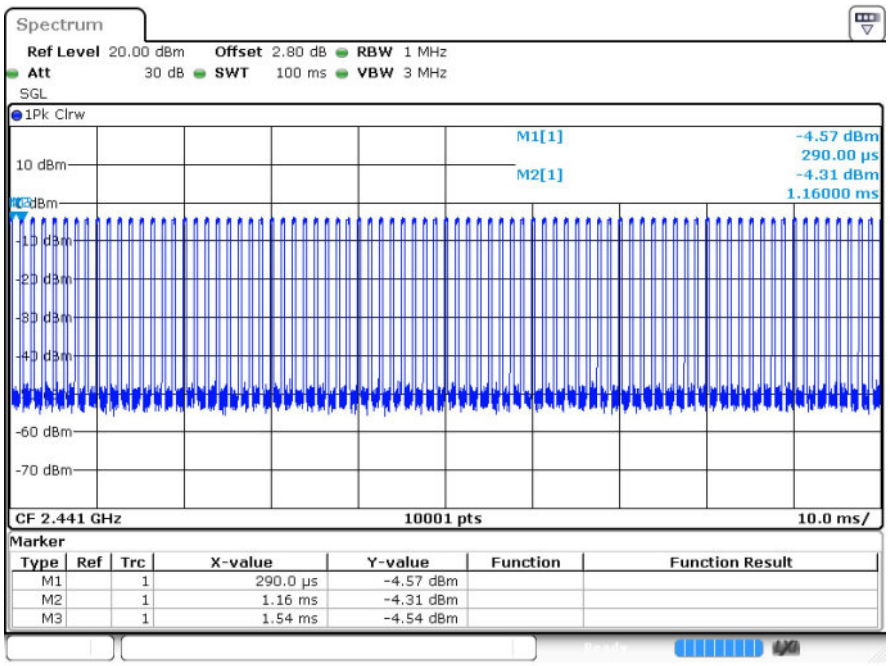
1-DH1 2480MHz



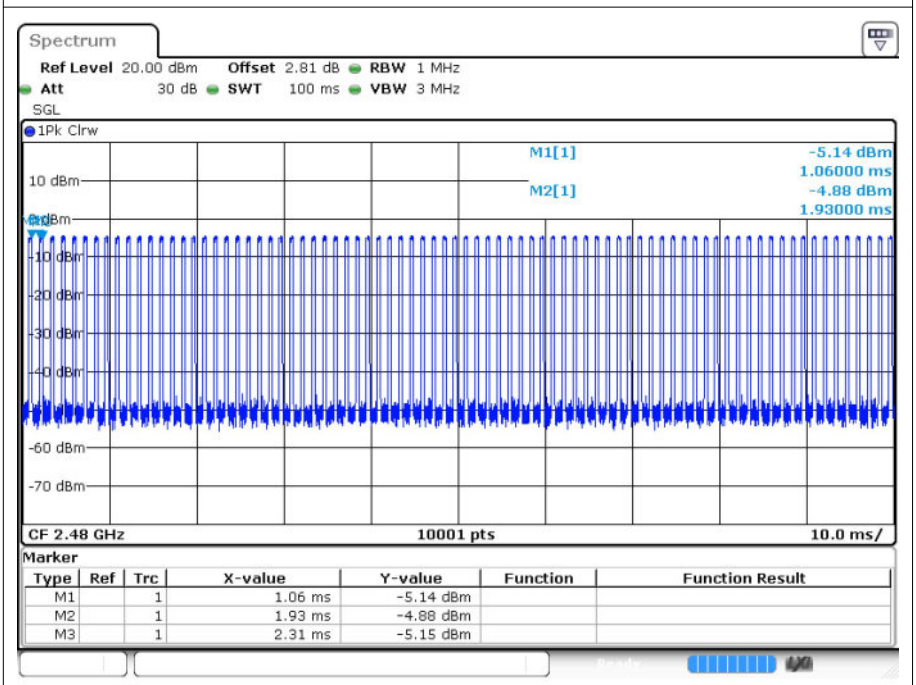

2-DH1 2402MHz



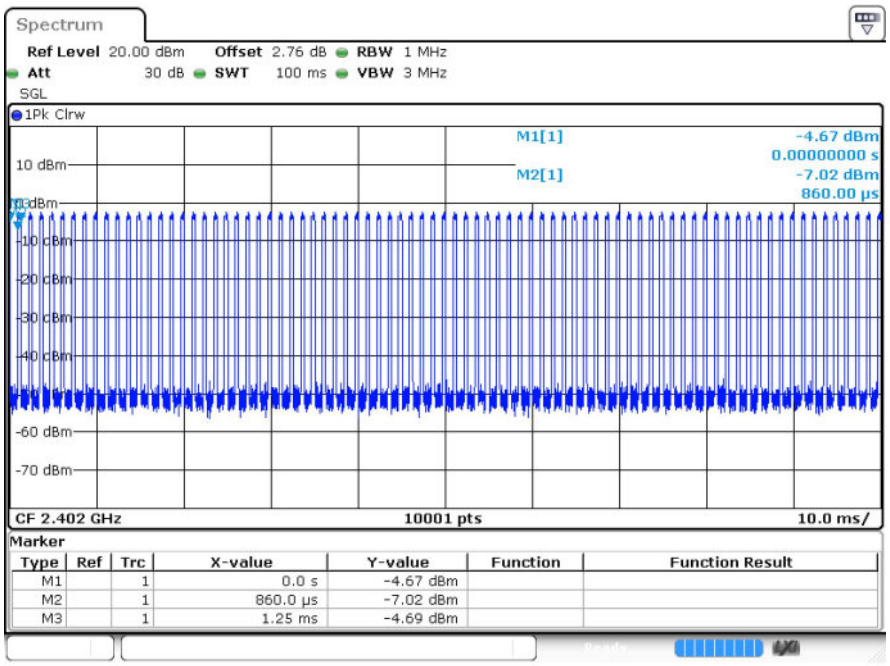
2-DH1 2441MHz



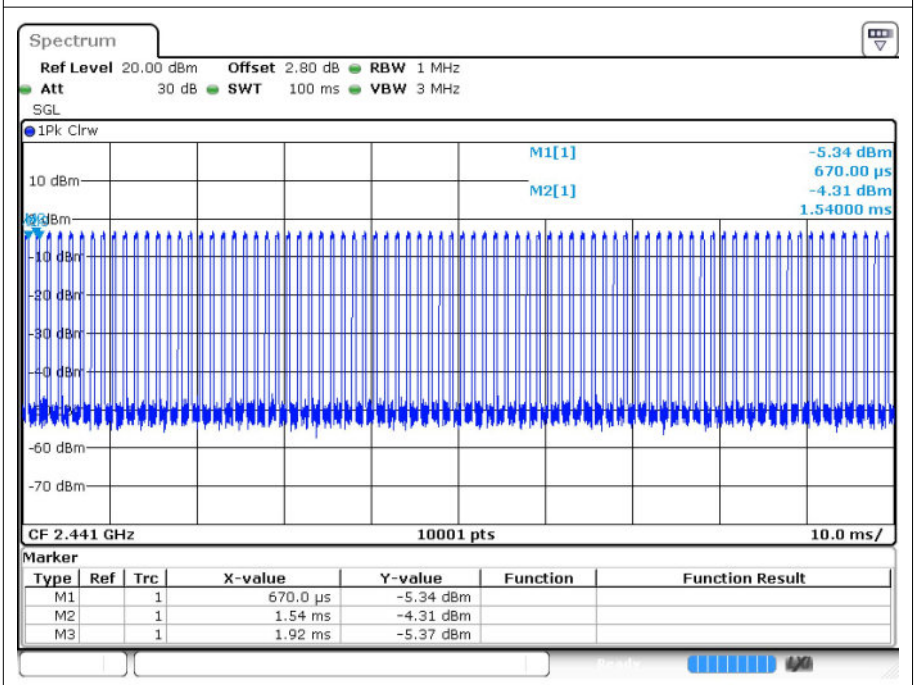

2-DH1 2480MHz



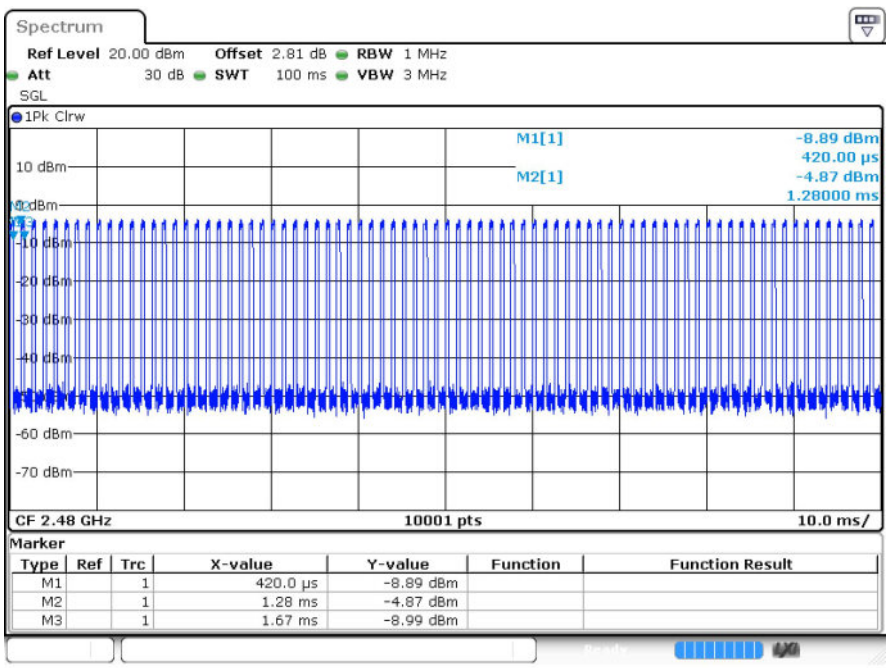
3-DH1 2402MHz




3-DH1 2441MHz



3-DH1 2480MHz

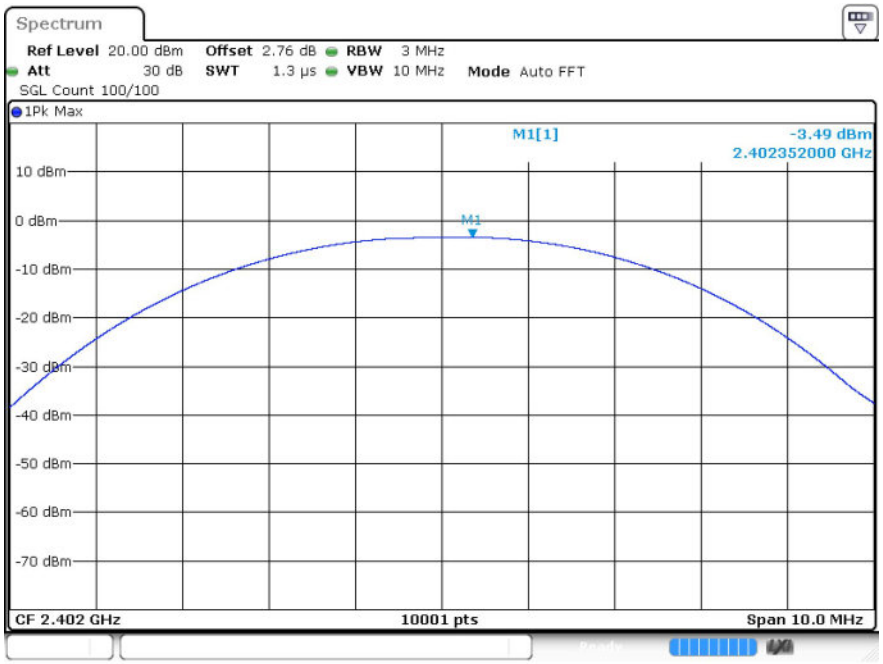
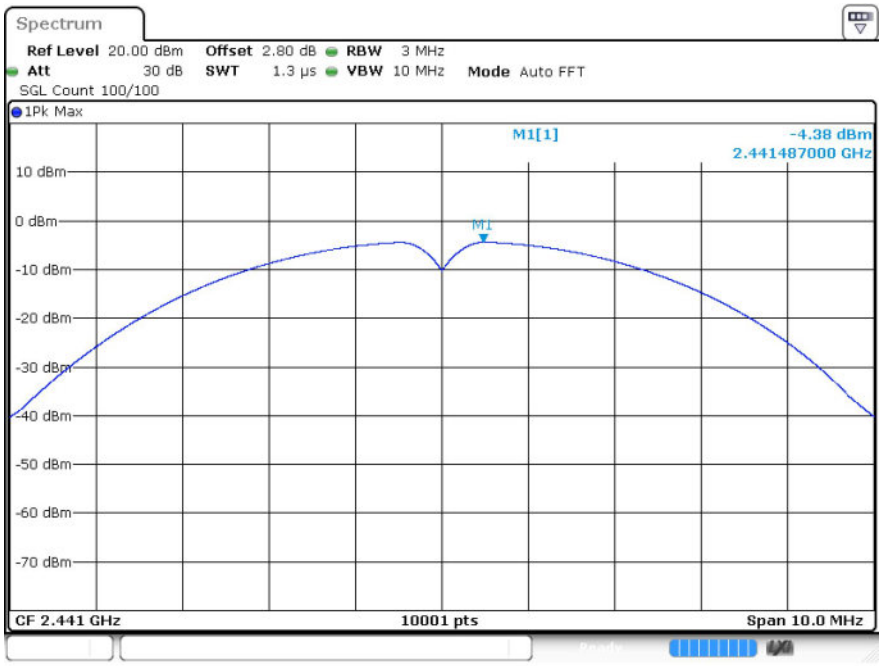


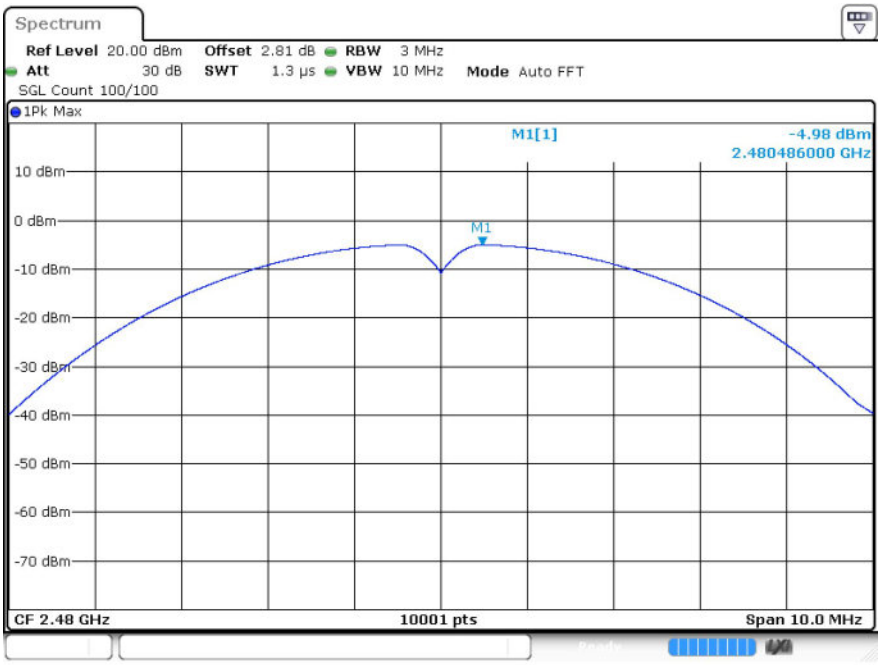
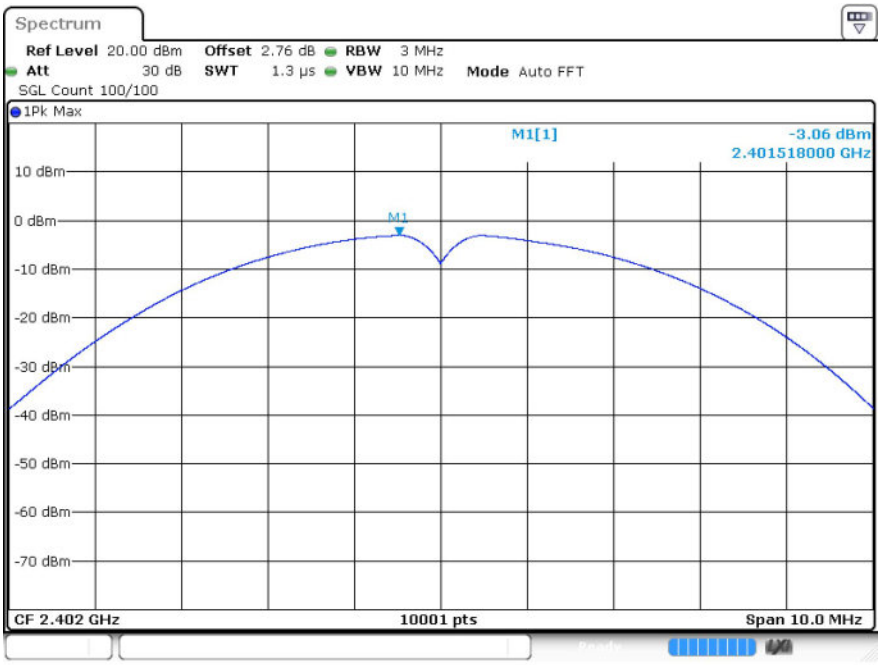
# 2 Maximum Conducted Peak Output Power

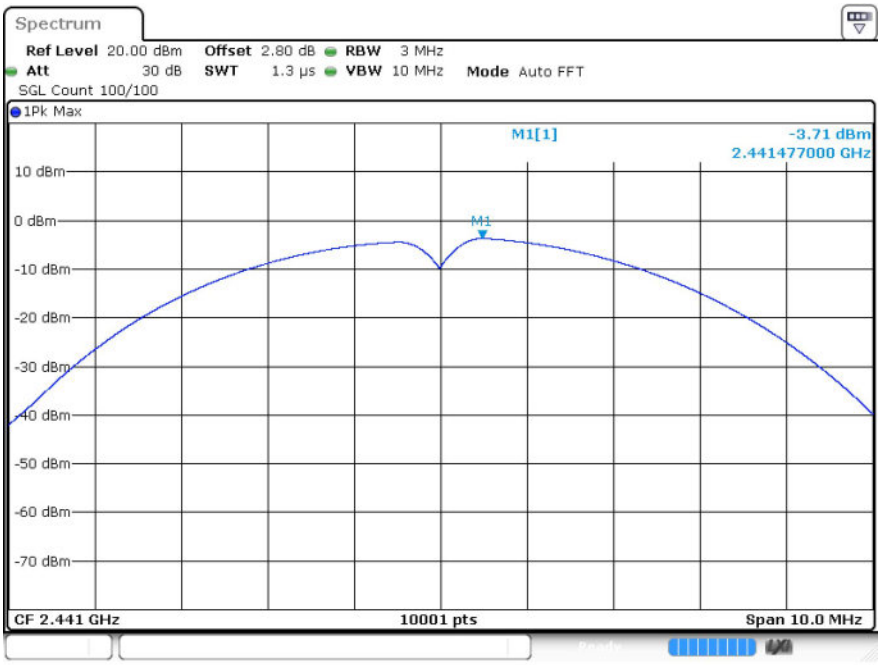
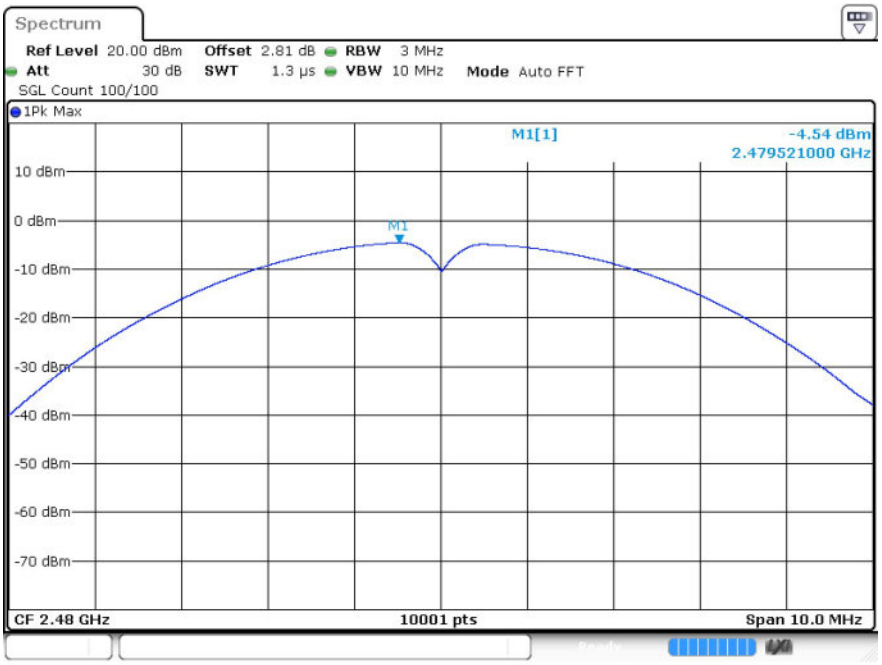
## 2.1 Test Result

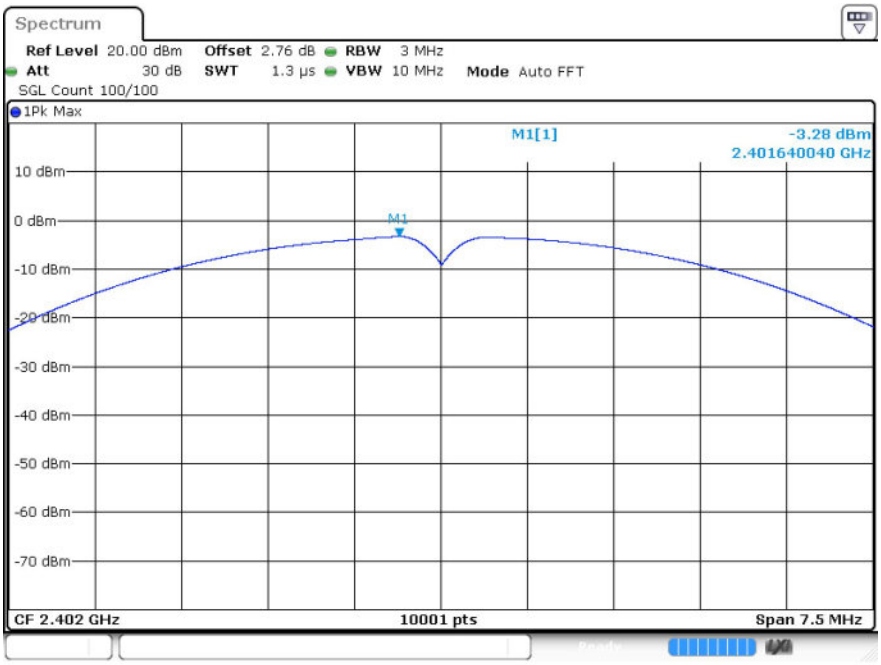
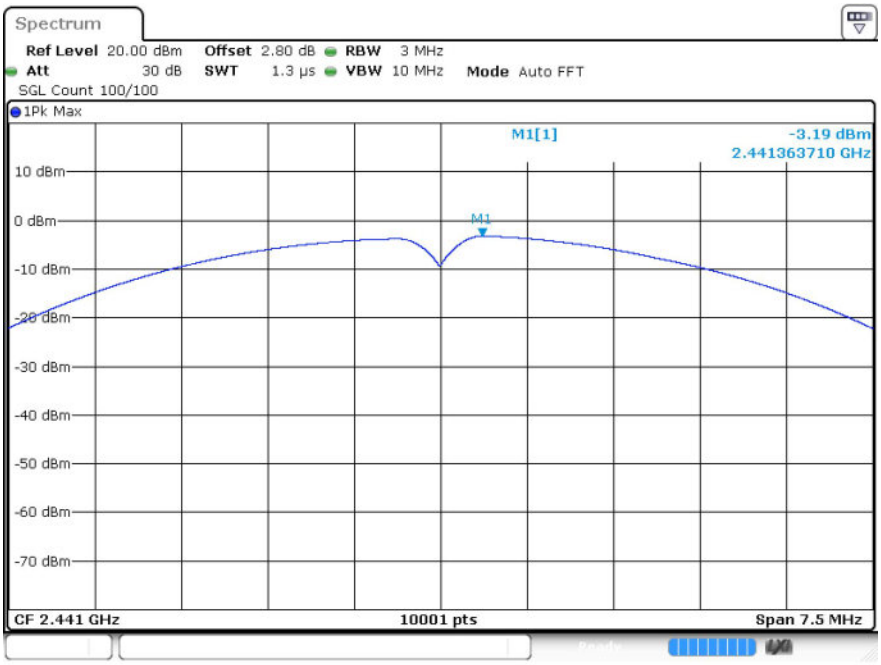
| Mode | Channel. | Maximum Peak Output Power [dBm] | Limit [dBm] | Verdict |
|---|---|---|---|---|
| GFSK | LCH | -3.49 | 21 | Pass |
| | MCH | -4.38 | 21 | Pass |
| | HCH | -4.98 | 21 | Pass |
| π/4DQPSK | LCH | -3.06 | 21 | Pass |
| | MCH | -3.71 | 21 | Pass |
| | HCH | -4.54 | 21 | Pass |
| 8DPSK | LCH | -3.28 | 21 | Pass |
| | MCH | -3.19 | 21 | Pass |
| | HCH | -4.23 | 21 | Pass |

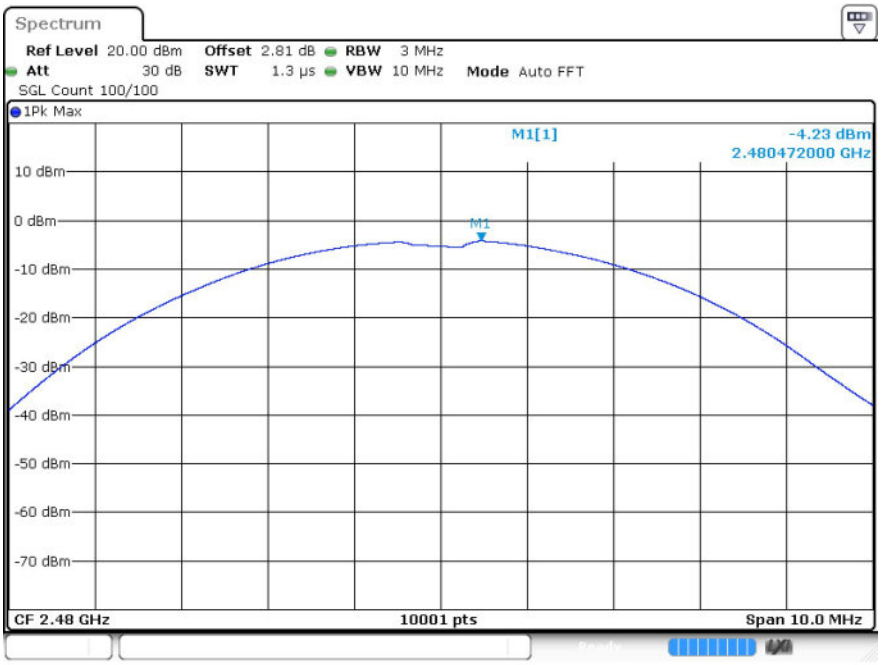
## 2.2 Test Graphs

| Test Graphs | |
|---|---|
| GFSK/LCH |  |
| GFSK/MCH |  |

| | |
|---|---|
| GFSK/HCH |  |
| π/4DQPSK/LCH |  |

| | |
|---|---|
| π/4DQPSK/MCH |  |
| π/4DQPSK/HCH |  |

| | |
|---|---|
| 8DPSK/LCH |  |
| 8DPSK/MCH |  |

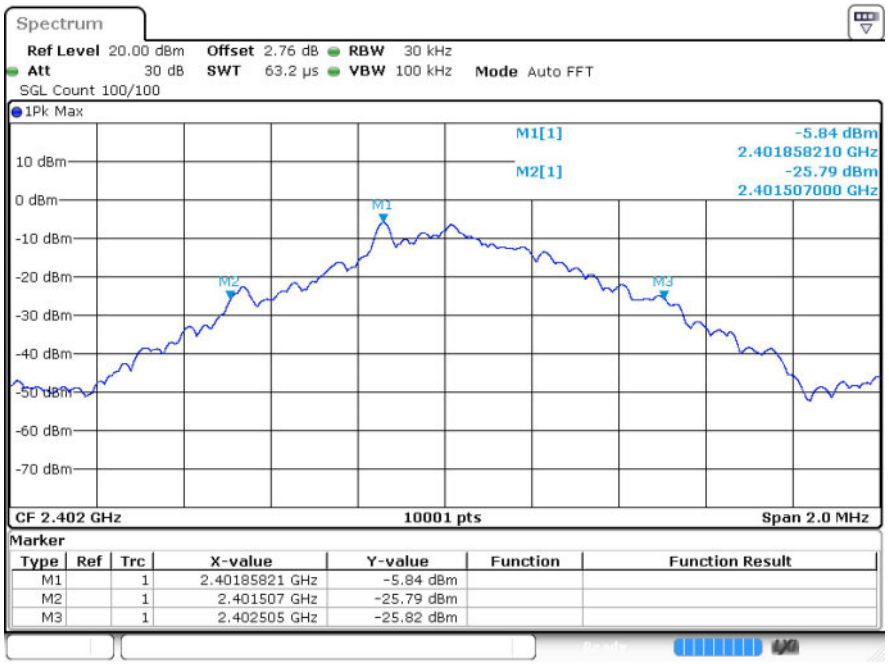
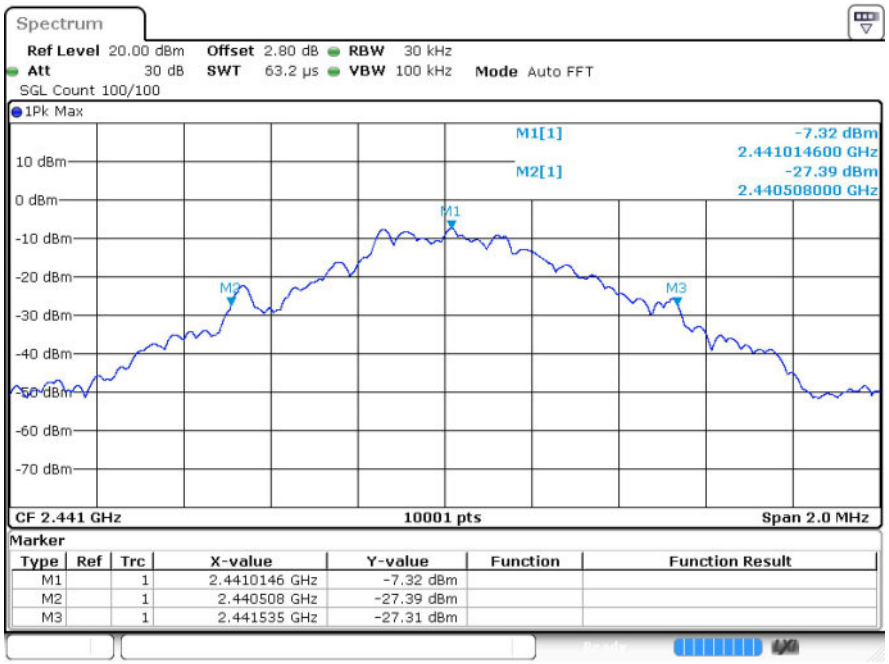
| | |
|---|---|
| 8DPSK/HCH |  Spectrum<br>Ref Level 20.00 dBm Offset 2.81 dB RBW 3 MHz<br>Att 30 dB SWT 1.3 µs VBW 10 MHz Mode Auto FFT<br>SGL Count 100/100<br>1Pk Max<br>M1[1] -4.23 dBm<br>2.480472000 GHz<br>M1<br>10 dBm<br>0 dBm<br>-10 dBm<br>-20 dBm<br>-30 dBm<br>-40 dBm<br>-50 dBm<br>-60 dBm<br>-70 dBm<br>CF 2.48 GHz<br>10001 pts<br>Span 10.0 MHz |

# 3 20dB Bandwidth

## 3.1 Test Result

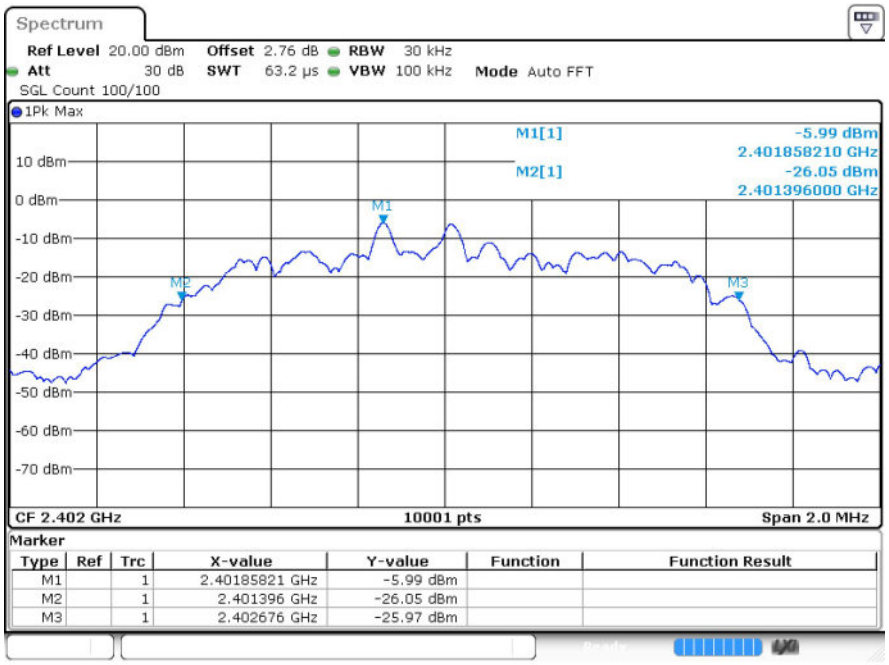
| Mode | Channel. | 20dB Bandwidth [MHz] | Limit [MHz] | Verdict |
|---|---|---|---|---|
| GFSK | LCH | 0.998 | Not Specified | Pass |
| | MCH | 1.027 | Not Specified | Pass |
| | HCH | 1.024 | Not Specified | Pass |
| π/4DQPSK | LCH | 1.28 | Not Specified | Pass |
| | MCH | 1.293 | Not Specified | Pass |
| | HCH | 1.219 | Not Specified | Pass |
| 8DPSK | LCH | 1.222 | Not Specified | Pass |
| | MCH | 1.225 | Not Specified | Pass |
| | HCH | 1.213 | Not Specified | Pass |

## 3.2 Test Graphs

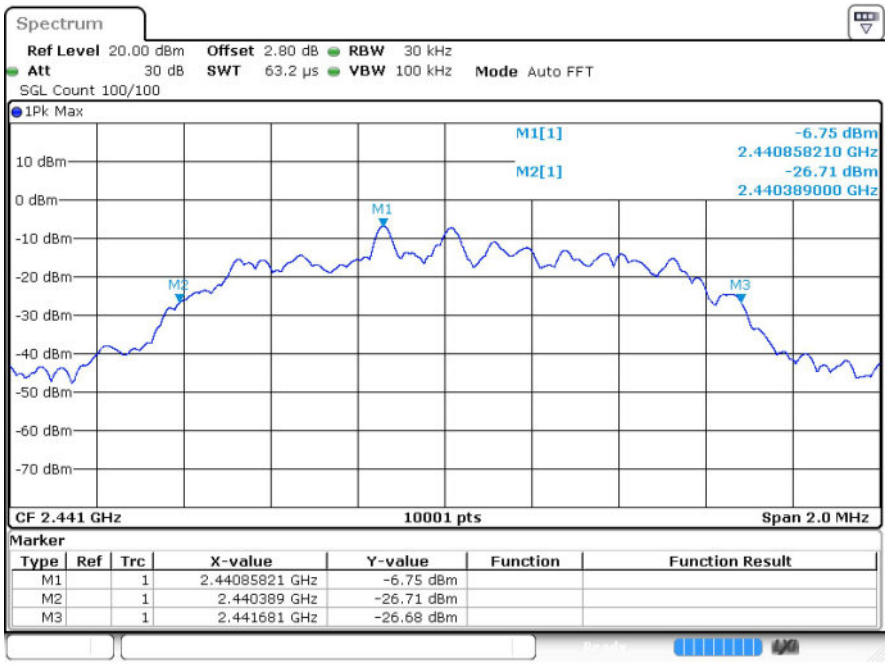
| Test Graphs | |
|---|---|
| GFSK/LCH |  |
| GFSK/MCH |  |

GFSK/HCH

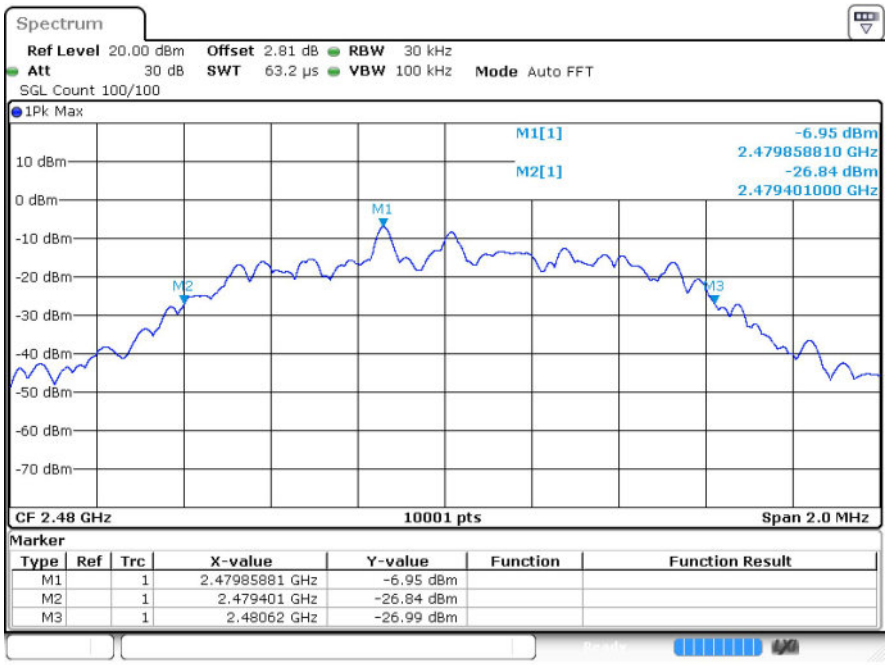
π/4DQPSK/LCH



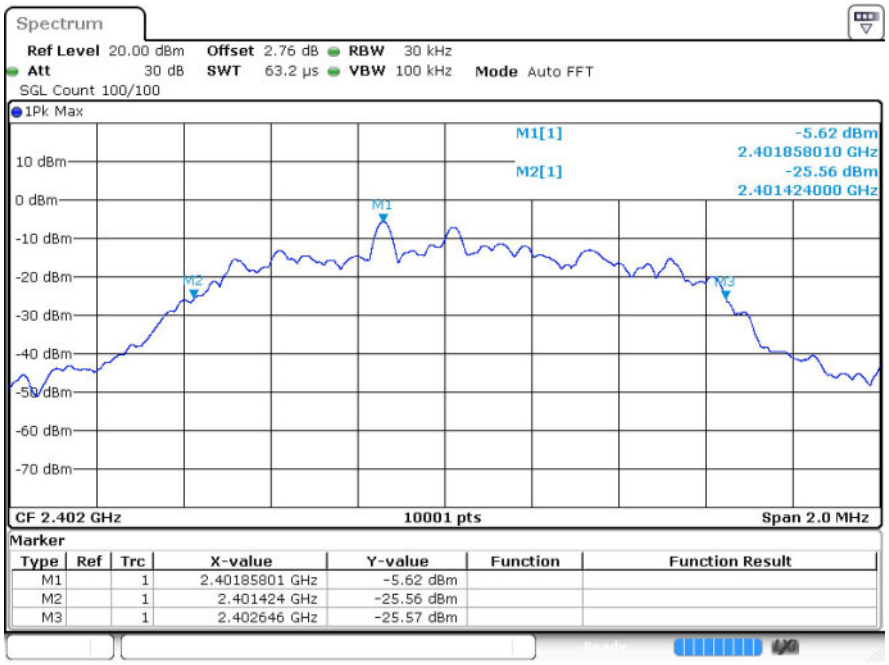
π/4DQPSK/MCH



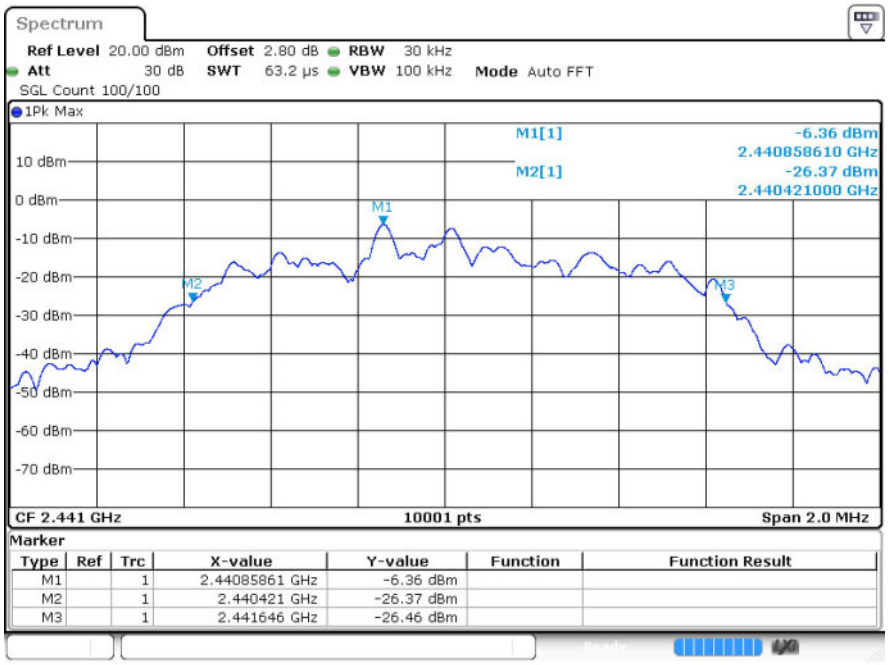

π/4DQPSK/HCH



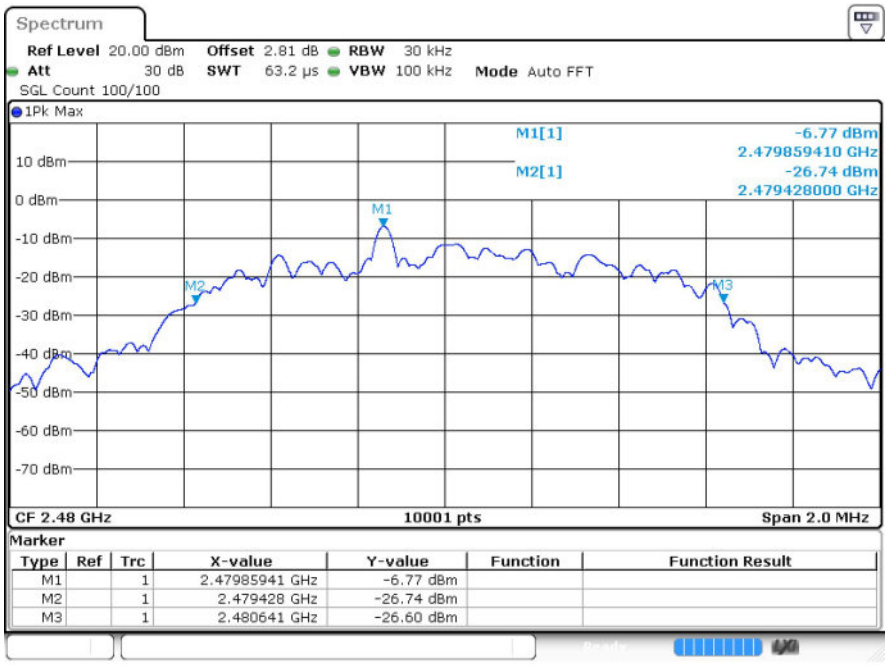
8DPSK/LCH




8DPSK/MCH



8DPSK/HCH

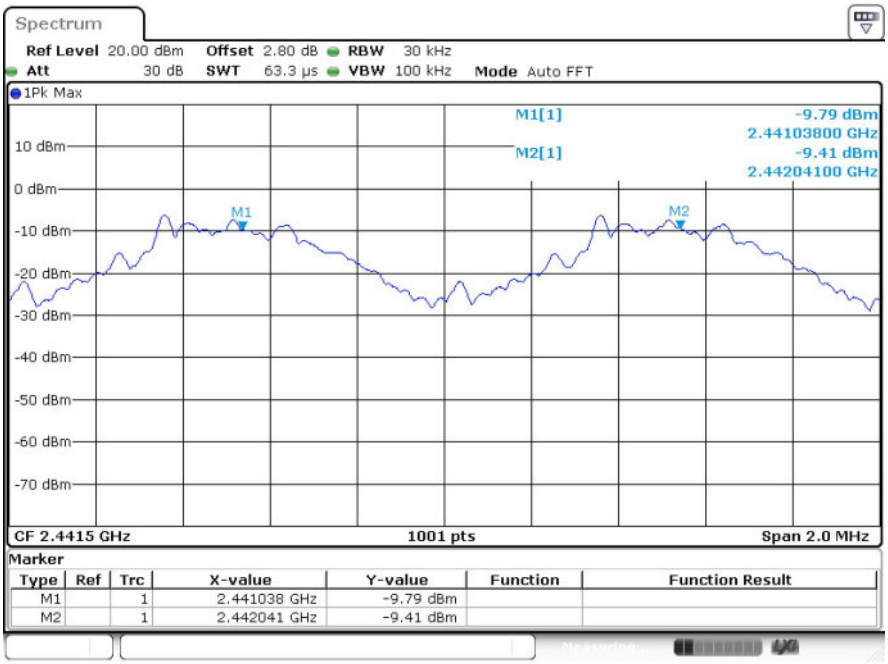
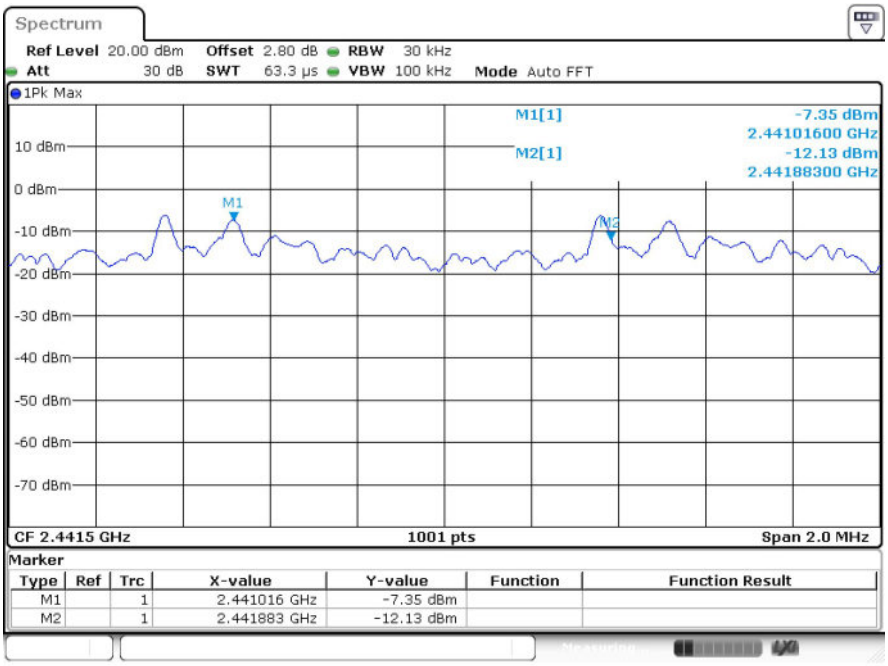

Spectrum
Ref Level 20.00 dBm Offset 2.81 dB RBW 30 kHz
Att 30 dB SWT 63.2 µs VBW 100 kHz Mode Auto FFT
SGL Count 100/100
1Pk Max
M1[1] -6.77 dBm
2.479859410 GHz
M2[1] -26.74 dBm
2.479428000 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
M2
M3
CF 2.48 GHz
10001 pts
Span 2.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.47985941 GHz -6.77 dBm
M2 1 2.479428 GHz -26.74 dBm
M3 1 2.480641 GHz -26.60 dBm

# 4 Carrier Frequency Separation

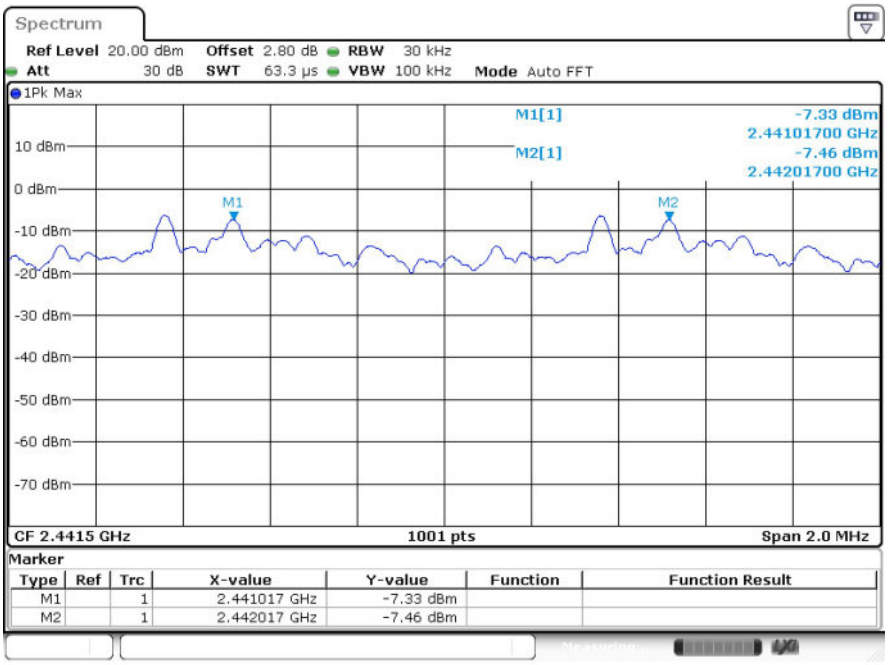
## 4.1 Test Result

| Mode | Channel. | Carrier Frequency Separation [MHz] | Limit [MHz] | Verdict |
|---|---|---|---|---|
| GFSK | MCH | 1.003 | 0.685 | Pass |
| π/4DQPSK | MCH | 0.867 | 0.862 | Pass |
| 8DPSK | MCH | 1 | 0.817 | Pass |

## 4.2 Test Graphs

| Test Graphs | |
|---|---|
| GFSK/MCH |  |
| π/4DQPSK/MCH |  |

8DPSK/MCH

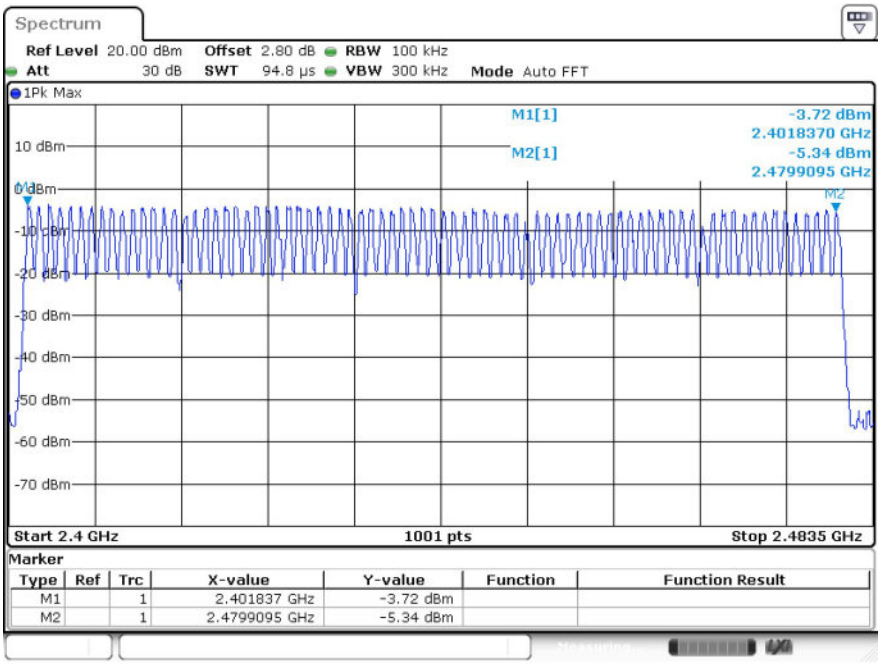
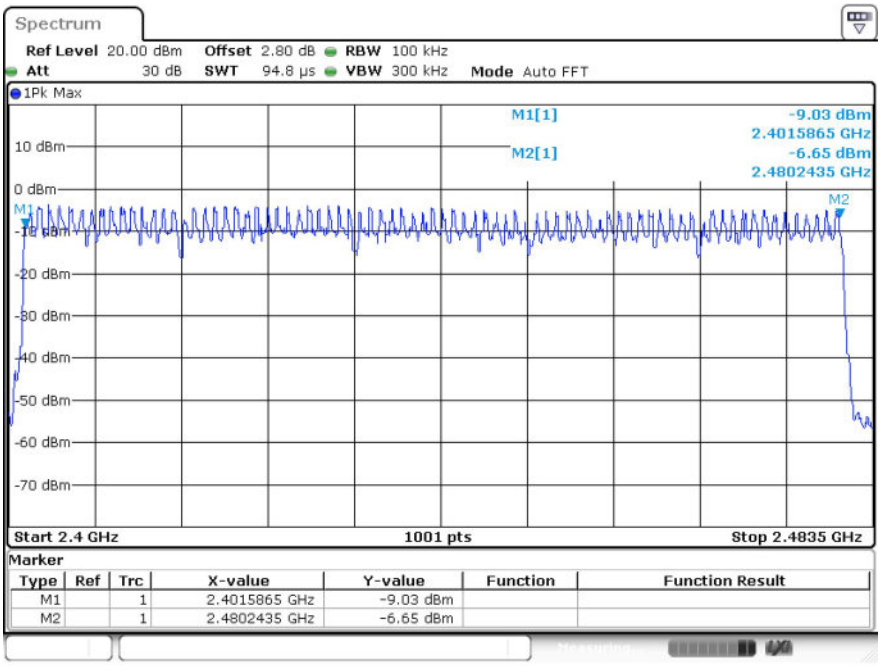

Spectrum
Ref Level 20.00 dBm Offset 2.80 dB RBW 30 kHz
Att 30 dB SWT 63.3 µs VBW 100 kHz Mode Auto FFT
1Pk Max
M1[1] -7.33 dBm
2.44101700 GHz
M2[1] -7.46 dBm
2.44201700 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
M2
CF 2.4415 GHz
1001 pts
Span 2.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.441017 GHz -7.33 dBm
M2 1 2.442017 GHz -7.46 dBm

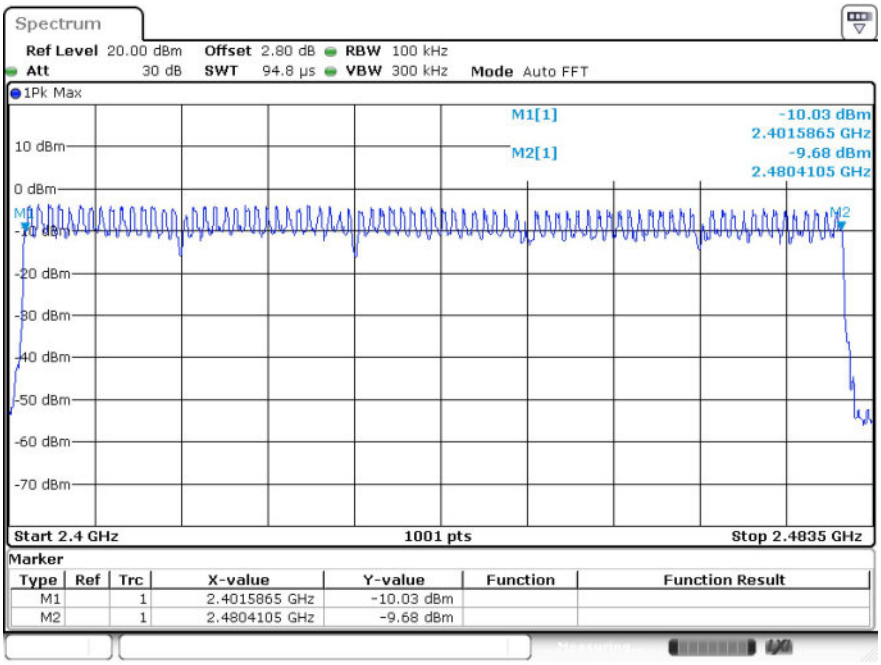
# 5 Hopping Channel Number

## 5.1 Test Result

| Mode | Channel. | Number of Hopping Channel [N] | Limit [N] | Verdict |
|---|---|---|---|---|
| GFSK | Hop | 79 | >=15 | PASS |
| π/4DQPSK | Hop | 79 | >=15 | PASS |
| 8DPSK | Hop | 79 | >=15 | PASS |

## 5.2 Test Graphs

| Test Graphs | |
|---|---|
| GFSK/Hop |  |
| π/4DQPSK/Hop |  |

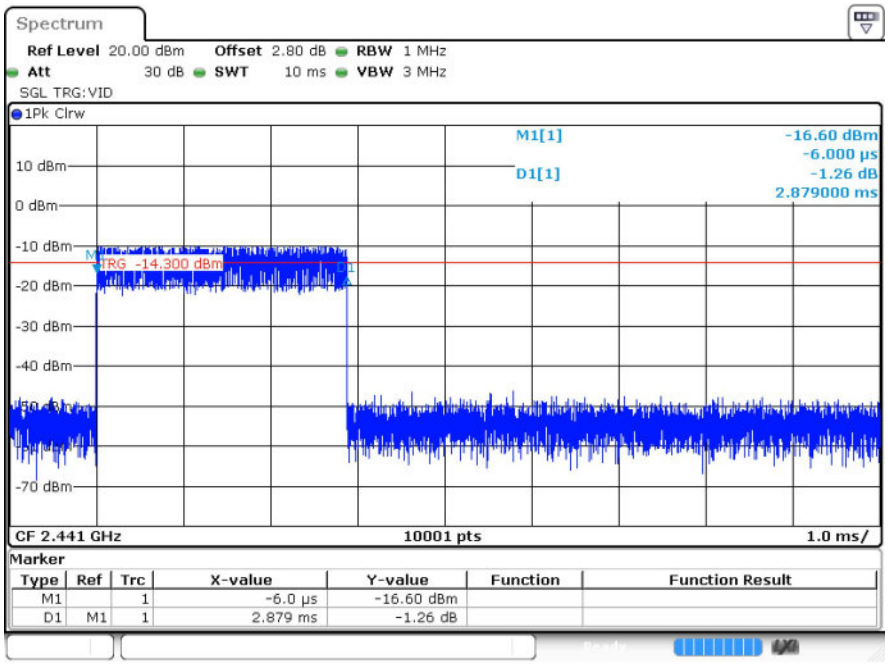
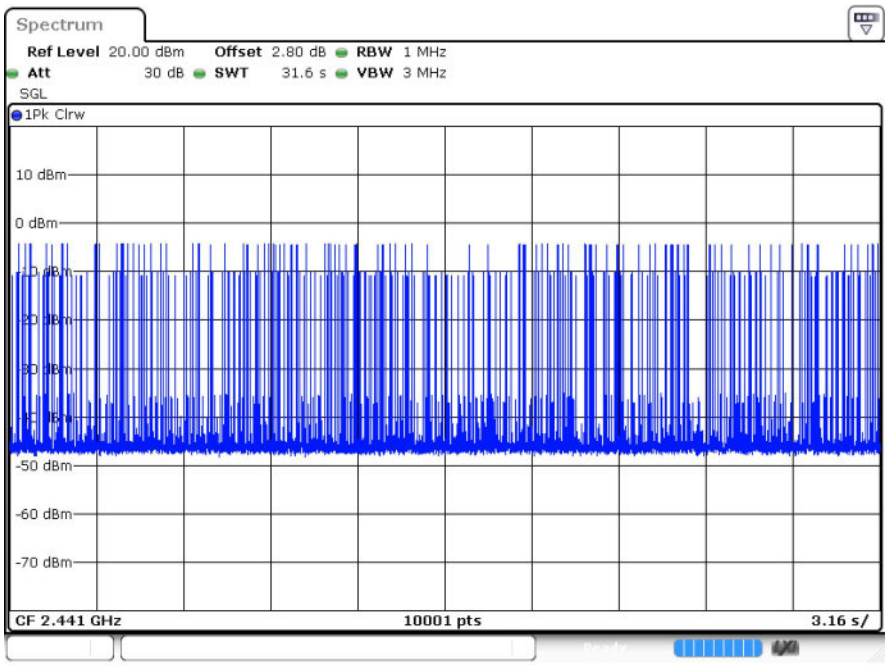
| | |
|---|---|
| 8DPSK/Hop |  Spectrum<br>Ref Level 20.00 dBm Offset 2.80 dB RBW 100 kHz<br>Att 30 dB SWT 94.8 µs VBW 300 kHz Mode Auto FFT<br>1Pk Max<br>M1[1] -10.03 dBm 2.4015865 GHz<br>M2[1] -9.68 dBm 2.4804105 GHz<br>10 dBm<br>0 dBm<br>-10 dBm<br>-20 dBm<br>-30 dBm<br>-40 dBm<br>-50 dBm<br>-60 dBm<br>-70 dBm<br>Start 2.4 GHz 1001 pts Stop 2.4835 GHz<br>Marker<br>Type Ref Trc X-value Y-value Function Function Result<br>M1 1 2.4015865 GHz -10.03 dBm<br>M2 1 2.4804105 GHz -9.68 dBm |

# 6 Dwell Time

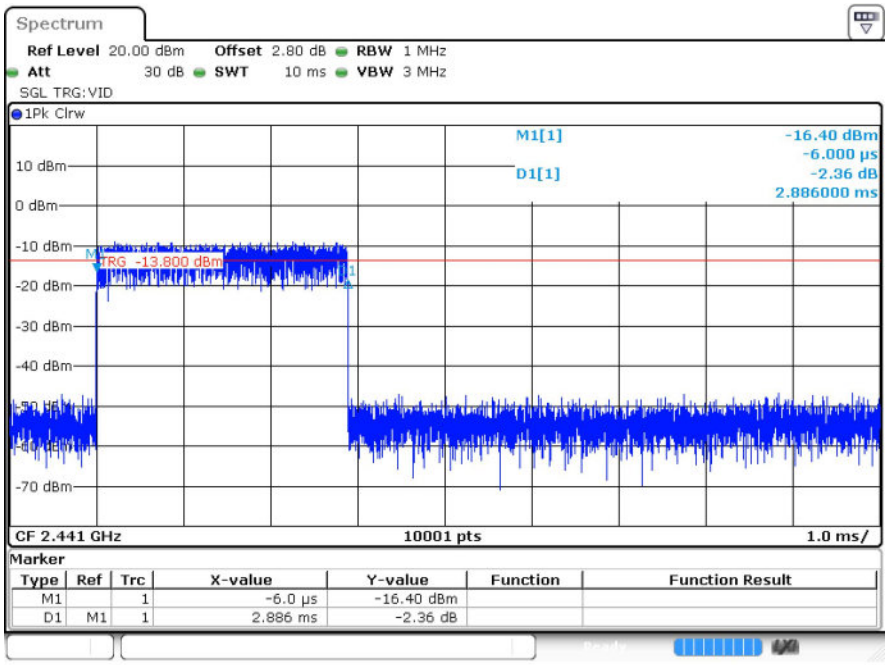
## 6.1 Test Result

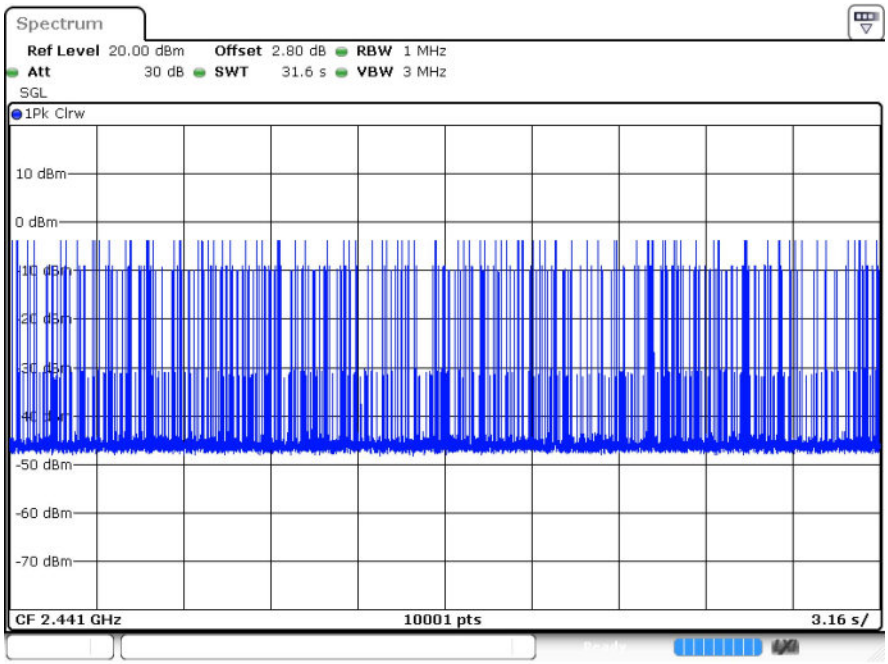
| Mode | Packet | Channel | Burst Width [ms/hop/ch] | Total Hops[hop*ch] | Dwell Time[ms] | Limit [s] | Verdict |
|---|---|---|---|---|---|---|---|
| GFSK | DH5 | MCH | 2.879 | 112 | 322.448 | 0.4 | Pass |
| π/4DQPSK | 2DH5 | MCH | 2.886 | 95 | 274.17 | 0.4 | Pass |
| 8DPSK | 3DH5 | MCH | 2.887 | 99 | 285.813 | 0.4 | Pass |

## 6.2 Test Graphs

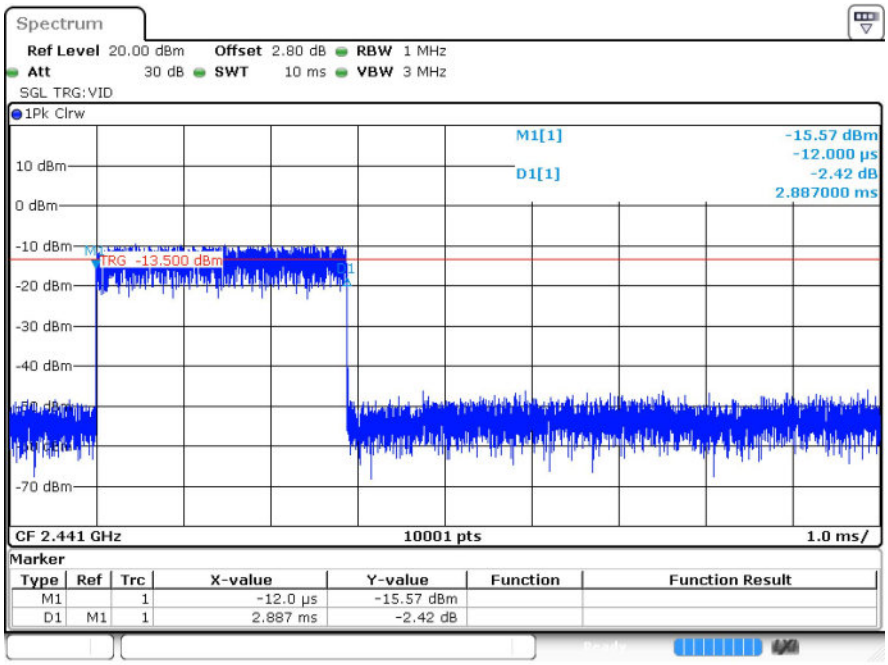
| Test Graphs | |
|---|---|
| GFSK_DH5/MCH |  <br>  |

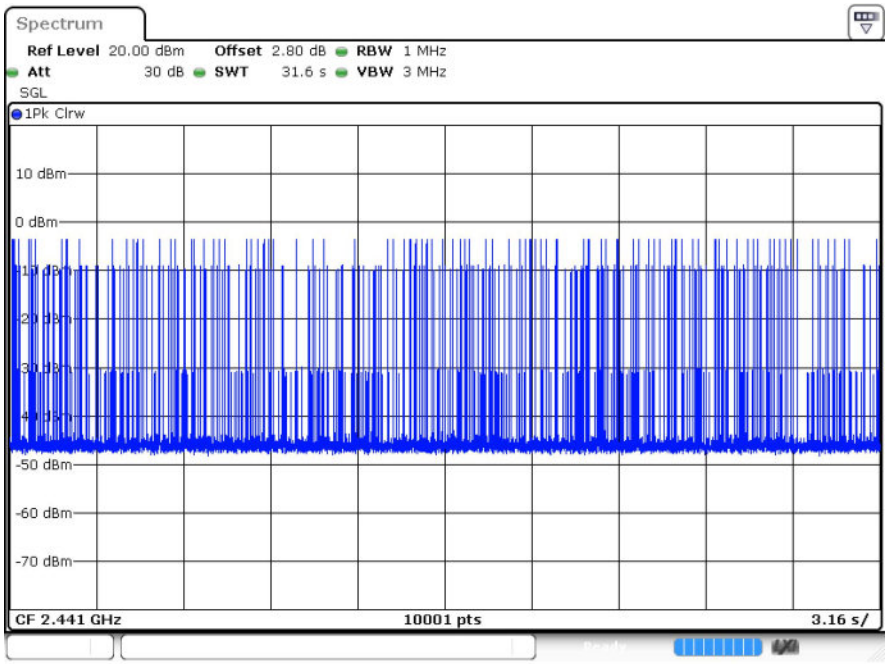
π/4DQPSK
_2DH5/MCH



8DPSK _3DH5/MCH



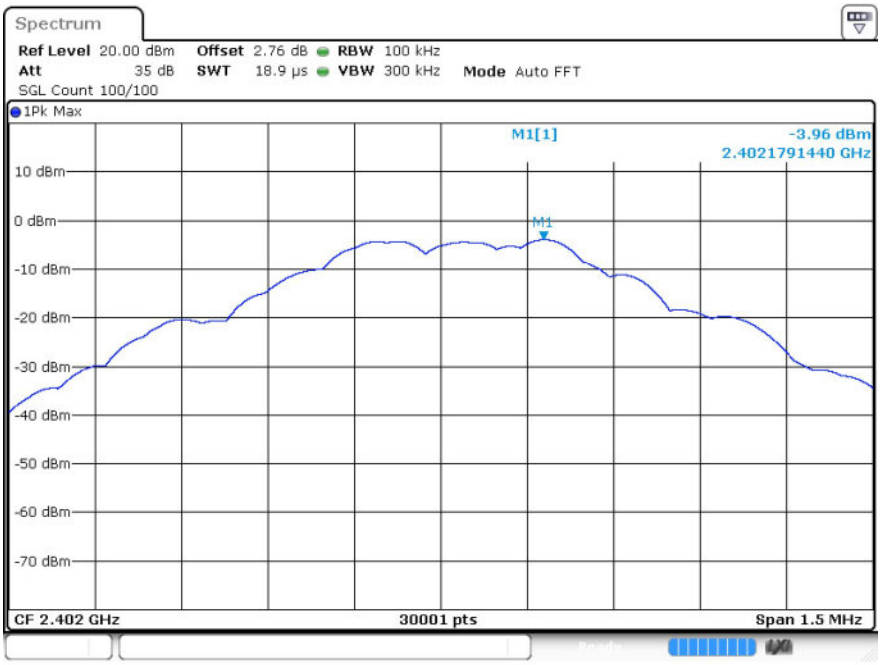
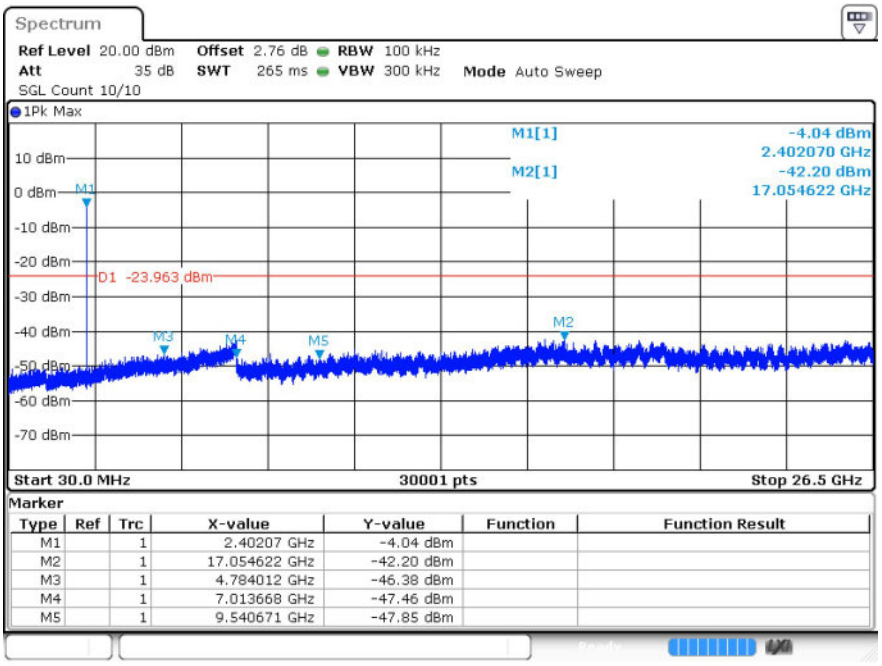



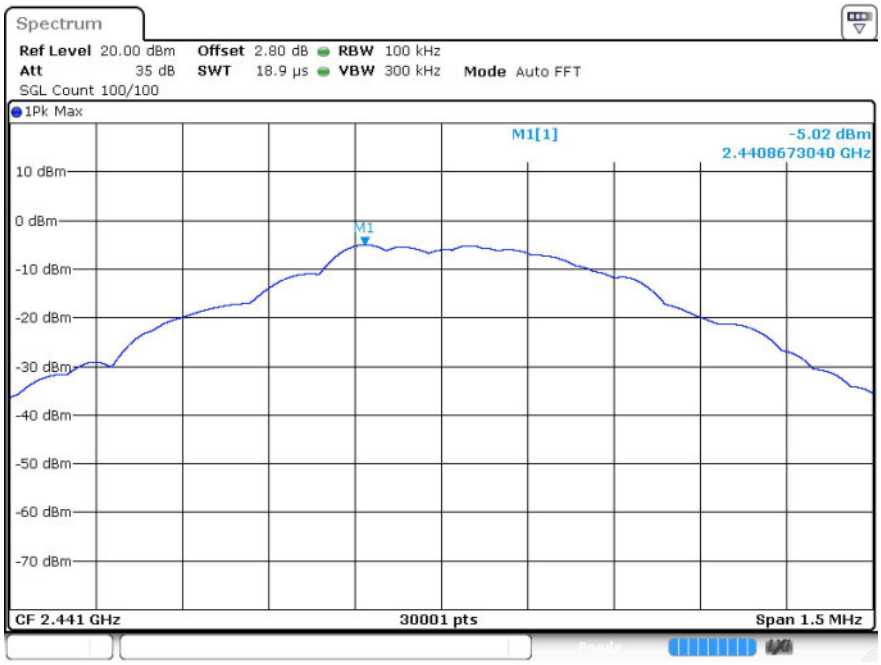
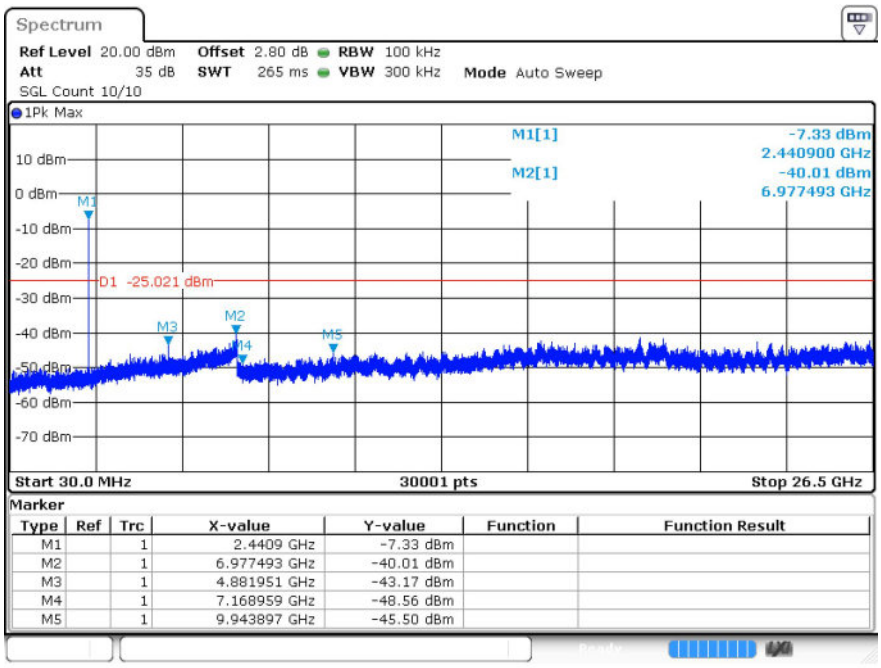
# 7 RF Conducted Spurious Emissions

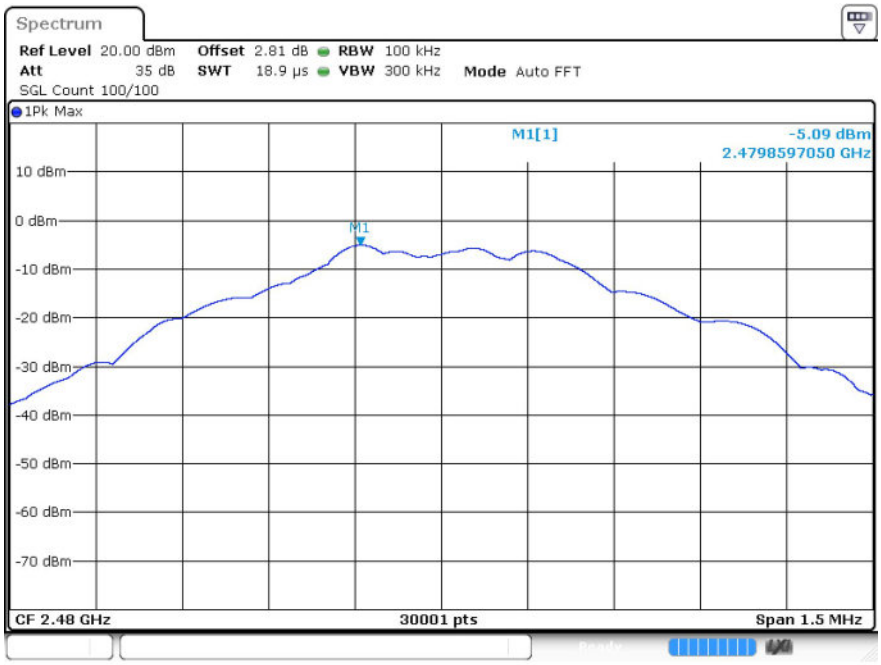
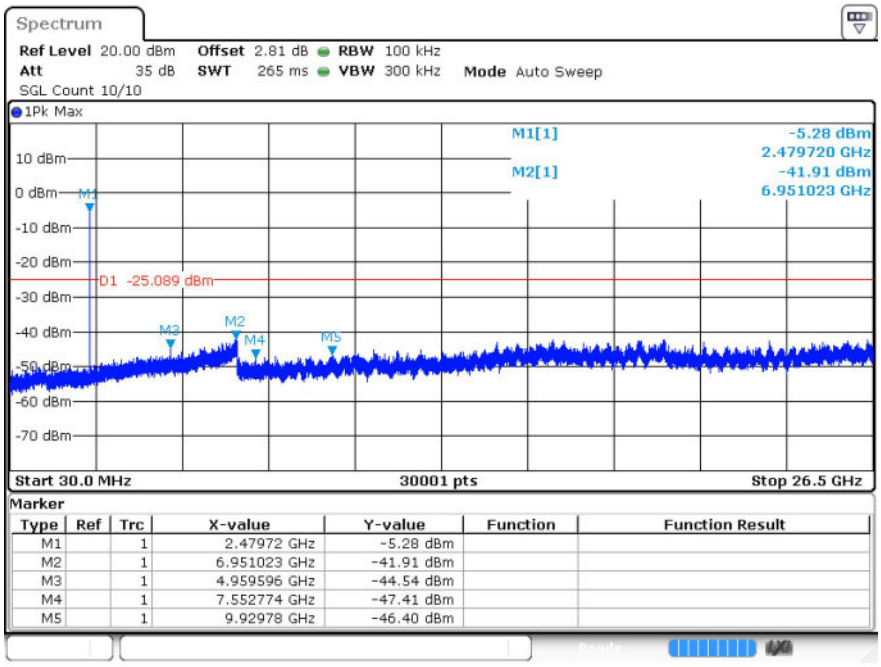
## 7.1 Test Result

| Mode | Channel | Max. Level [dBc] | Limit [dBc] | Verdict |
|---|---|---|---|---|
| GFSK | LCH | -38.23 | -20 | Pass |
| | MCH | -34.98 | -20 | Pass |
| | HCH | -36.82 | -20 | Pass |
| π/4DQPSK | LCH | -36.11 | -20 | Pass |
| | MCH | -36.69 | -20 | Pass |
| | HCH | -36.24 | -20 | Pass |
| 8DPSK | LCH | -37.77 | -20 | Pass |
| | MCH | -36.79 | -20 | Pass |
| | HCH | -35.62 | -20 | Pass |

## 7.2 Test Graphs

| GFSK_LCH_Graphs | |
|---|---|
| Pref |  |
| Puw |  |

| GFSK_MCH_Graphs | |
|---|---|
| Pref |  |
| Puw |  |

| GFSK_HCH_Graphs | |
|---|---|
| Pref |  |
| Puw |  |