

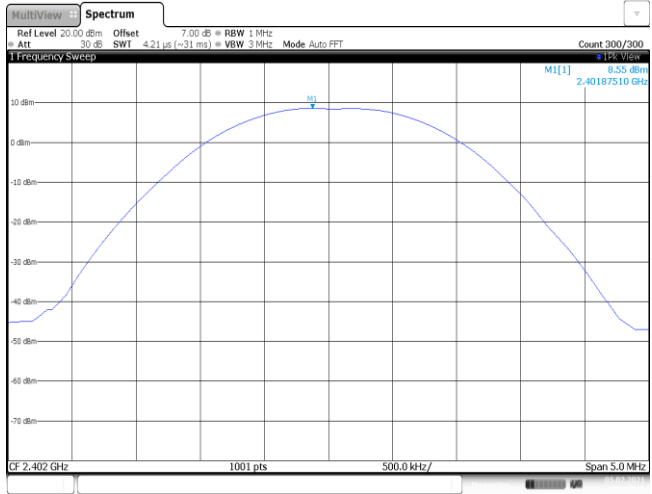
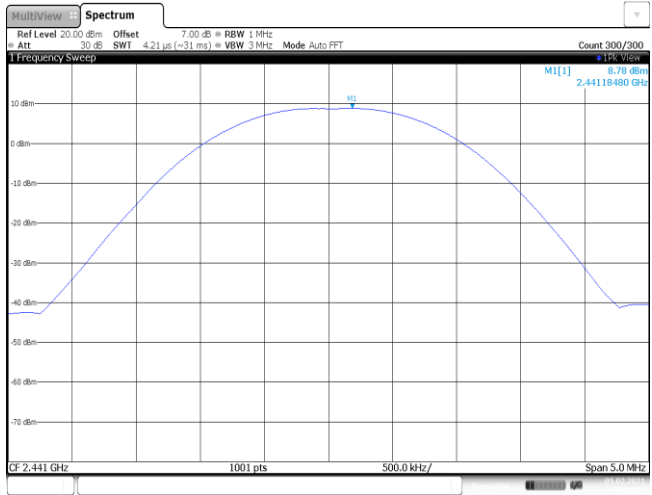
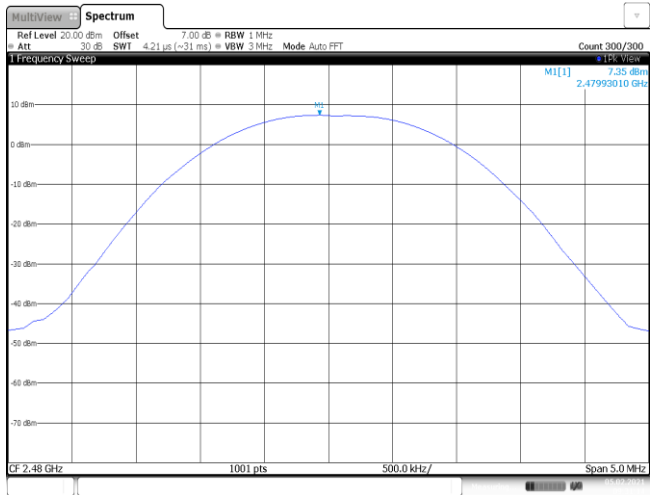
APPENDIX REPORT

Project No.	SHT2102000101EW	Radio Specification	Bluetooth EDR
Test sample No.	YPHT21020001010	Model No.	B2402
Start test date	2021-02-05	Finish date	2021-02-05
Temperature	24.8°C	Humidity	50%
Test Engineer	Hailey Chen	Auditor	Xiaodong Zheo

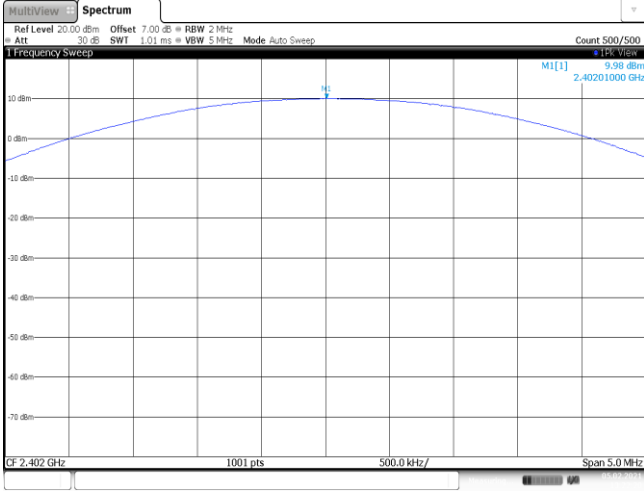
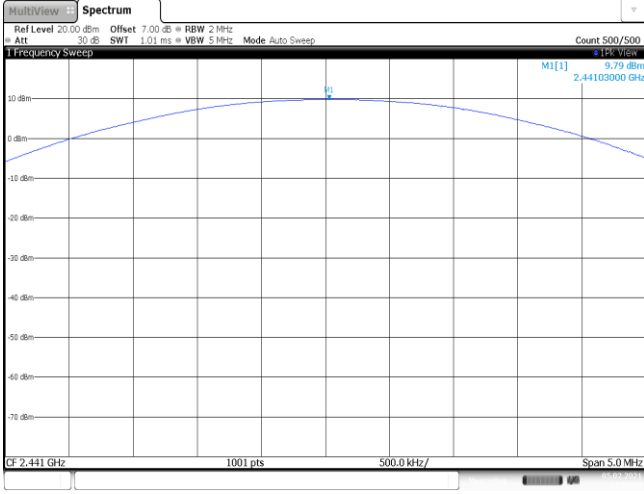
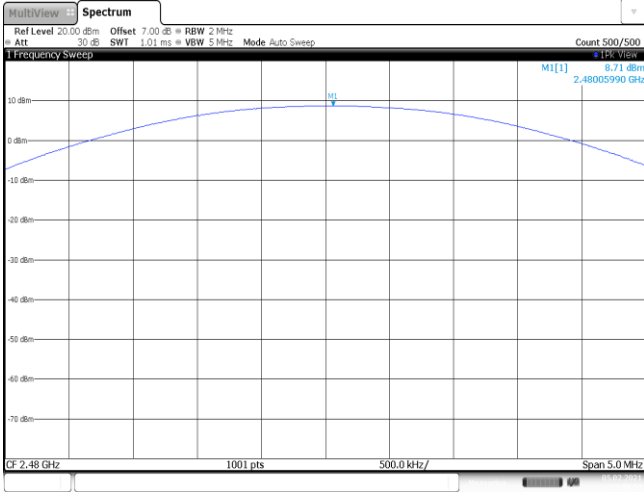
Appendix clause	Test item	Result
A	Peak Output Power	PASS
B	20 dB Bandwidth	PASS
C	99% Occupied Bandwidth	PASS
D	Carrier Frequencies Separation	PASS
E	Hopping Channel Number	PASS
F	Dwell Time	PASS
G	Duty Cycle Correction Factor (DCCF)	PASS
H	Band edge and Spurious Emissions(coducted)	PASS

Appendix A: Peak Output Power

Modulation type	Channel	Output power (dBm)	Average Output power (dBm)	Limit (dBm)	Result
GFSK	00	8.55	8.53	≤ 30.00	Pass
	39	8.78	8.74		
	78	7.35	7.31		
$\pi/4$ DQPSK	00	9.72	9.15	≤ 21.00	Pass
	39	9.37	8.90		
	78	7.39	6.92		
8DPSK	00	9.98	9.46	≤ 21.00	Pass
	39	9.79	9.27		
	78	8.71	8.04		

Modulation Type:	GFSK
CH00	 The spectrum plot for CH00 shows a GFSK signal centered at 2.402 GHz. The y-axis represents power in dBm, ranging from -70 to 10. The x-axis represents frequency in GHz, with a span of 5.0 MHz. The signal is a smooth, bell-shaped curve peaking at approximately 10 dBm. The plot includes a frequency sweep from 2.40187510 GHz to 2.40197510 GHz. The date is 5 FEB 2021 09:25:15.
CH39	 The spectrum plot for CH39 shows a GFSK signal centered at 2.441 GHz. The y-axis represents power in dBm, ranging from -70 to 10. The x-axis represents frequency in GHz, with a span of 5.0 MHz. The signal is a smooth, bell-shaped curve peaking at approximately 10 dBm. The plot includes a frequency sweep from 2.44118480 GHz to 2.44128480 GHz. The date is 5 FEB 2021 09:28:21.
CH78	 The spectrum plot for CH78 shows a GFSK signal centered at 2.48 GHz. The y-axis represents power in dBm, ranging from -70 to 10. The x-axis represents frequency in GHz, with a span of 5.0 MHz. The signal is a smooth, bell-shaped curve peaking at approximately 10 dBm. The plot includes a frequency sweep from 2.47993010 GHz to 2.47999010 GHz. The date is 5 FEB 2021 09:31:15.

Modulation Type: $\pi/4$ DQPSK	
CH00	MultiView Spectrum Ref Level 20.00 dBm Offset 7.00 dB RBW 2 MHz Att 30 dB SWI 1.01 ms VBW 5 MHz Mode Auto Sweep Count 500/500 1 Frequency Sweep M1 M1[1] 9.72 dBm 2.40196000 GHz CF 2.402 GHz 1001 pts 500.0 kHz/ Span 5.0 MHz Date: 5.FEB.2021 11:24:53
CH39	MultiView Spectrum Ref Level 20.00 dBm Offset 7.00 dB RBW 2 MHz Att 30 dB SWI 1.01 ms VBW 5 MHz Mode Auto Sweep Count 500/500 1 Frequency Sweep M1 M1[1] 9.37 dBm 2.44089510 GHz CF 2.441 GHz 1001 pts 500.0 kHz/ Span 5.0 MHz Date: 5.FEB.2021 11:27:11
CH78	MultiView Spectrum Ref Level 20.00 dBm Offset 7.00 dB RBW 2 MHz Att 30 dB SWI 1.01 ms VBW 5 MHz Mode Auto Sweep Count 500/500 1 Frequency Sweep M1 M1[1] 7.39 dBm 2.47992010 GHz CF 2.48 GHz 1001 pts 500.0 kHz/ Span 5.0 MHz Date: 5.FEB.2021 11:29:49

Modulation Type:	8DPSK
CH00	 Ref Level 20.00 dBm Offset 7.00 dB RBW 2 MHz Att 30 dB SWI 1.01 ms VBW 5 MHz Mode Auto Sweep Count 500/500 M1[1] 9.98 dBm 2.4021000 GHz CF 2.402 GHz 1001 pts 500.0 kHz/ Span 5.0 MHz Date: 5 FEB 2021 13:22:20
CH39	 Ref Level 20.00 dBm Offset 7.00 dB RBW 2 MHz Att 30 dB SWI 1.01 ms VBW 5 MHz Mode Auto Sweep Count 500/500 M1[1] 9.79 dBm 2.44103000 GHz CF 2.441 GHz 1001 pts 500.0 kHz/ Span 5.0 MHz Date: 5 FEB 2021 13:26:08
CH78	 Ref Level 20.00 dBm Offset 7.00 dB RBW 2 MHz Att 30 dB SWI 1.01 ms VBW 5 MHz Mode Auto Sweep Count 500/500 M1[1] 8.71 dBm 2.48005990 GHz CF 2.48 GHz 1001 pts 500.0 kHz/ Span 5.0 MHz Date: 5 FEB 2021 13:30:50

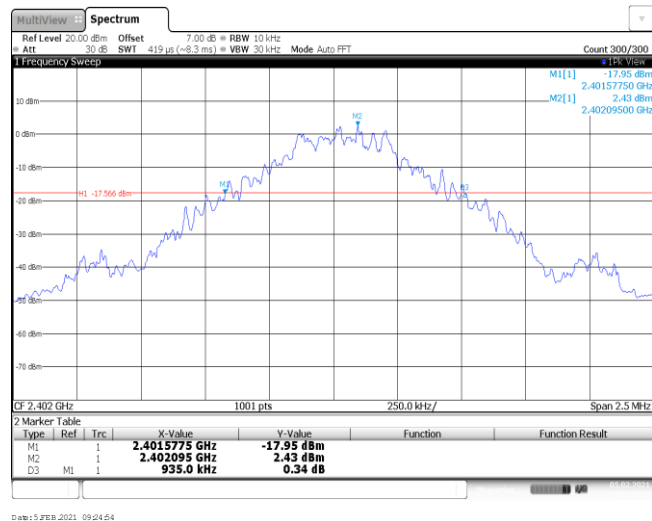
Appendix B : 20 dB Bandwidth

Modulation type	Channel	20 dB Bandwidth (kHz)	Limit (kHz)	Result
GFSK	00	935.00	-	Pass
	39	940.00		
	78	937.50		
$\pi/4$ DQPSK	00	1320.00	-	Pass
	39	1320.00		
	78	1315.00		
8DPSK	00	1305.00	-	Pass
	39	1302.50		
	78	1300.00		

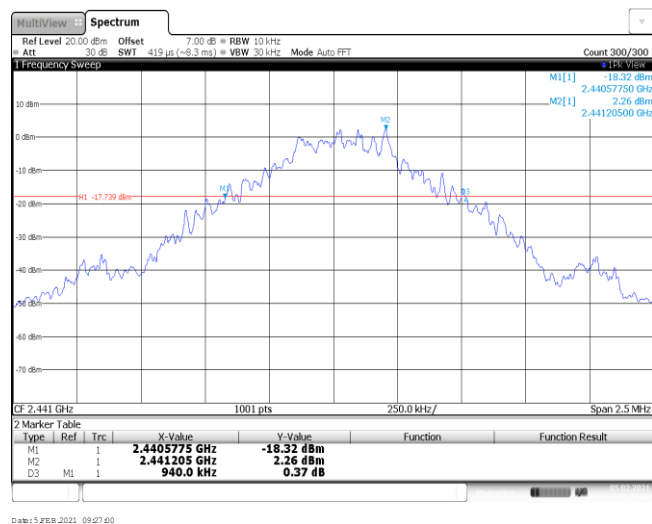
Modulation Type:

GFSK

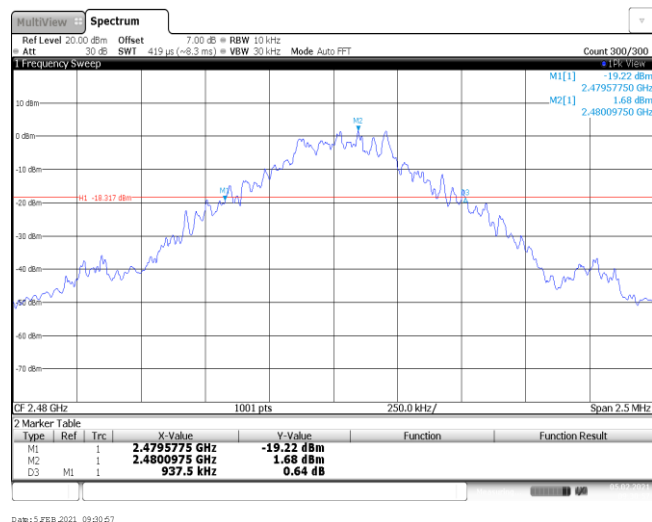
CH00



CH39



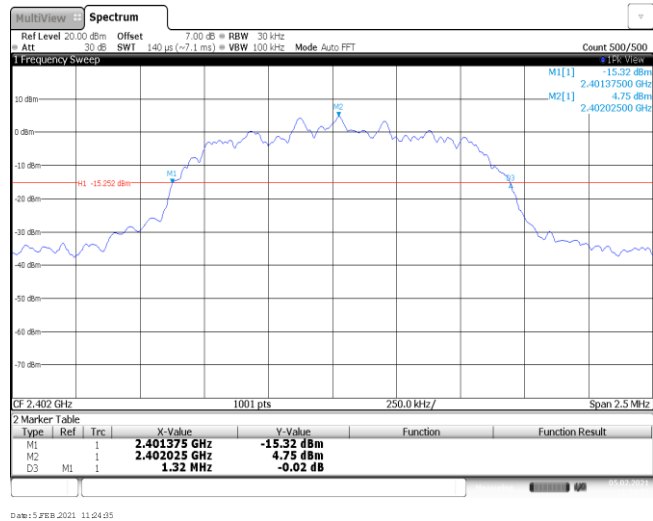
CH78



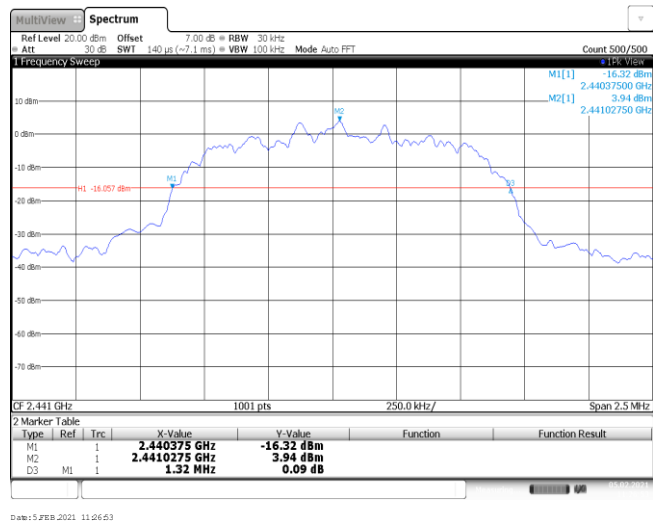
Modulation Type:

 $\pi/4$ DQPSK

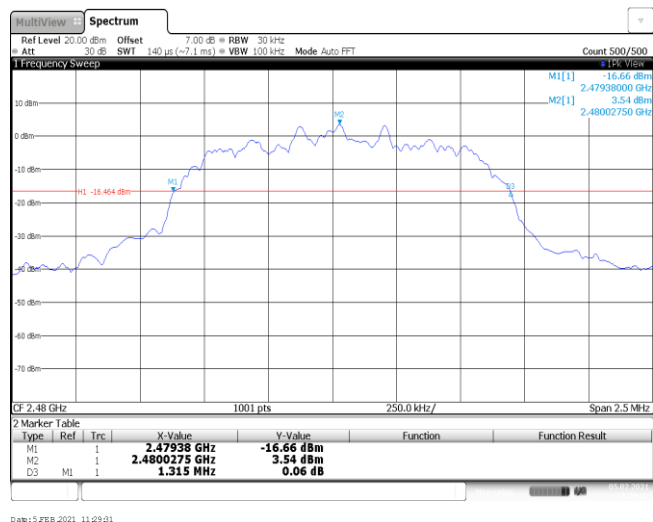
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CH39



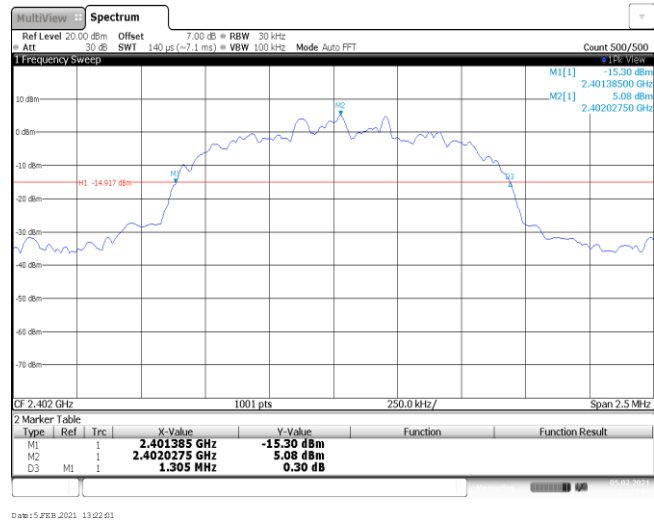
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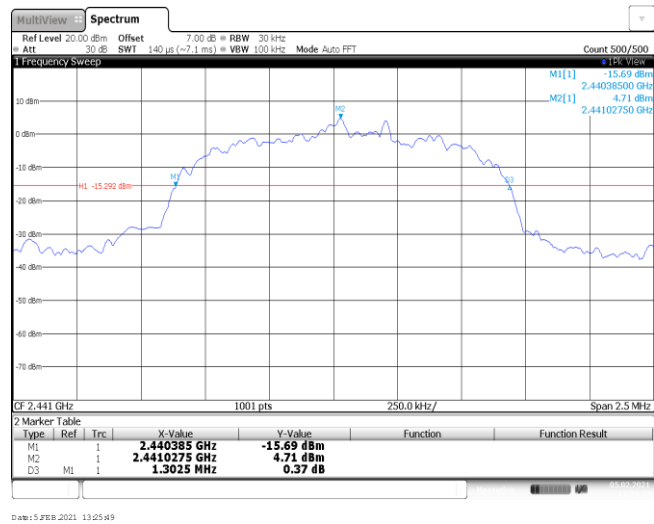
Modulation Type:

8DPSK

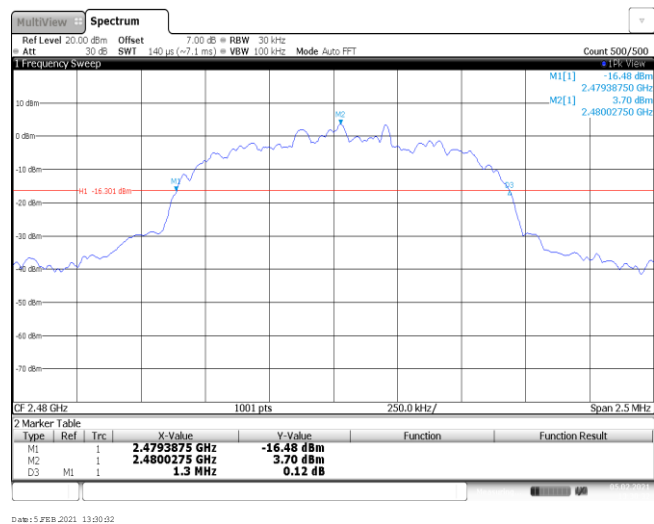
CH00



CH39

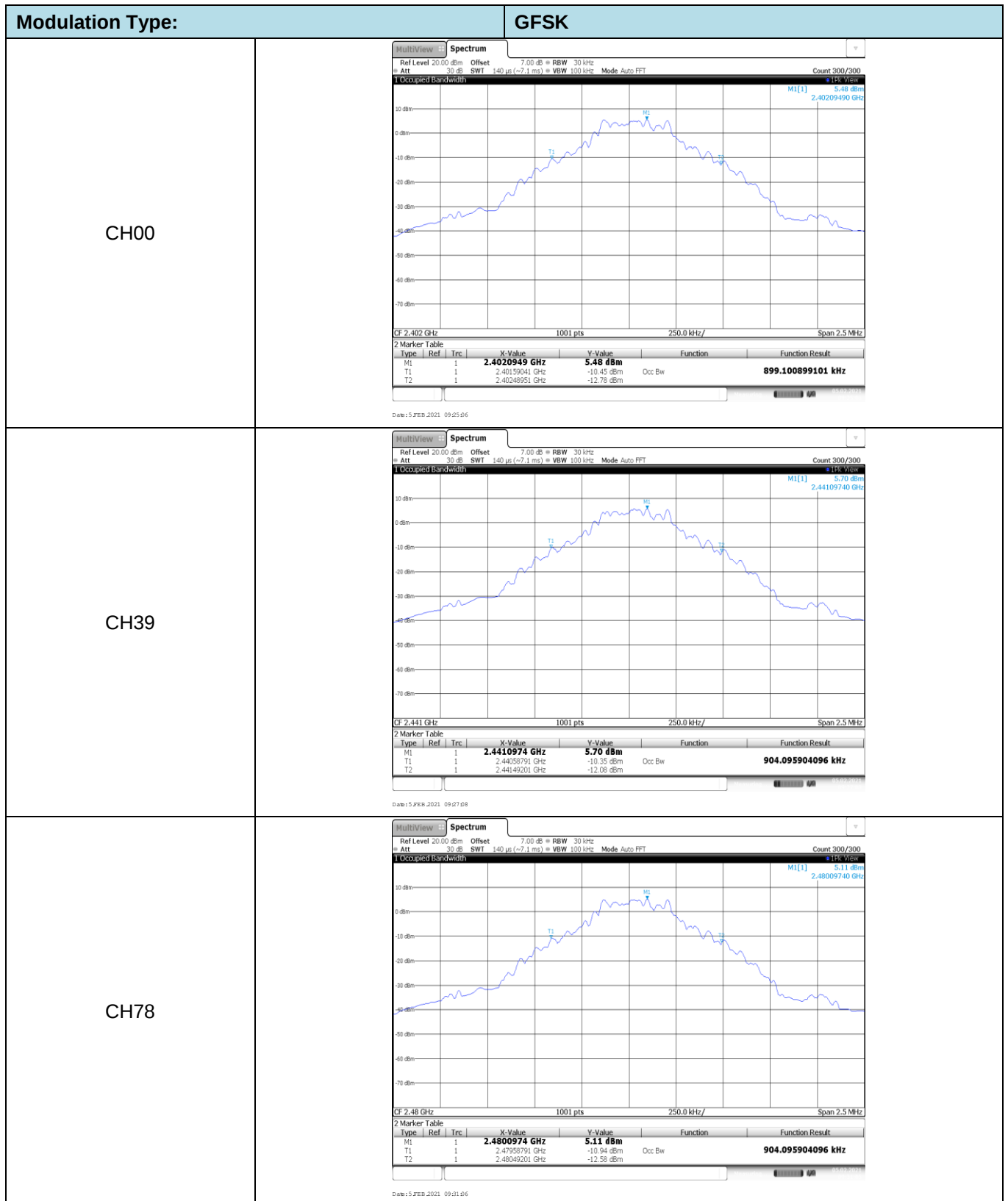


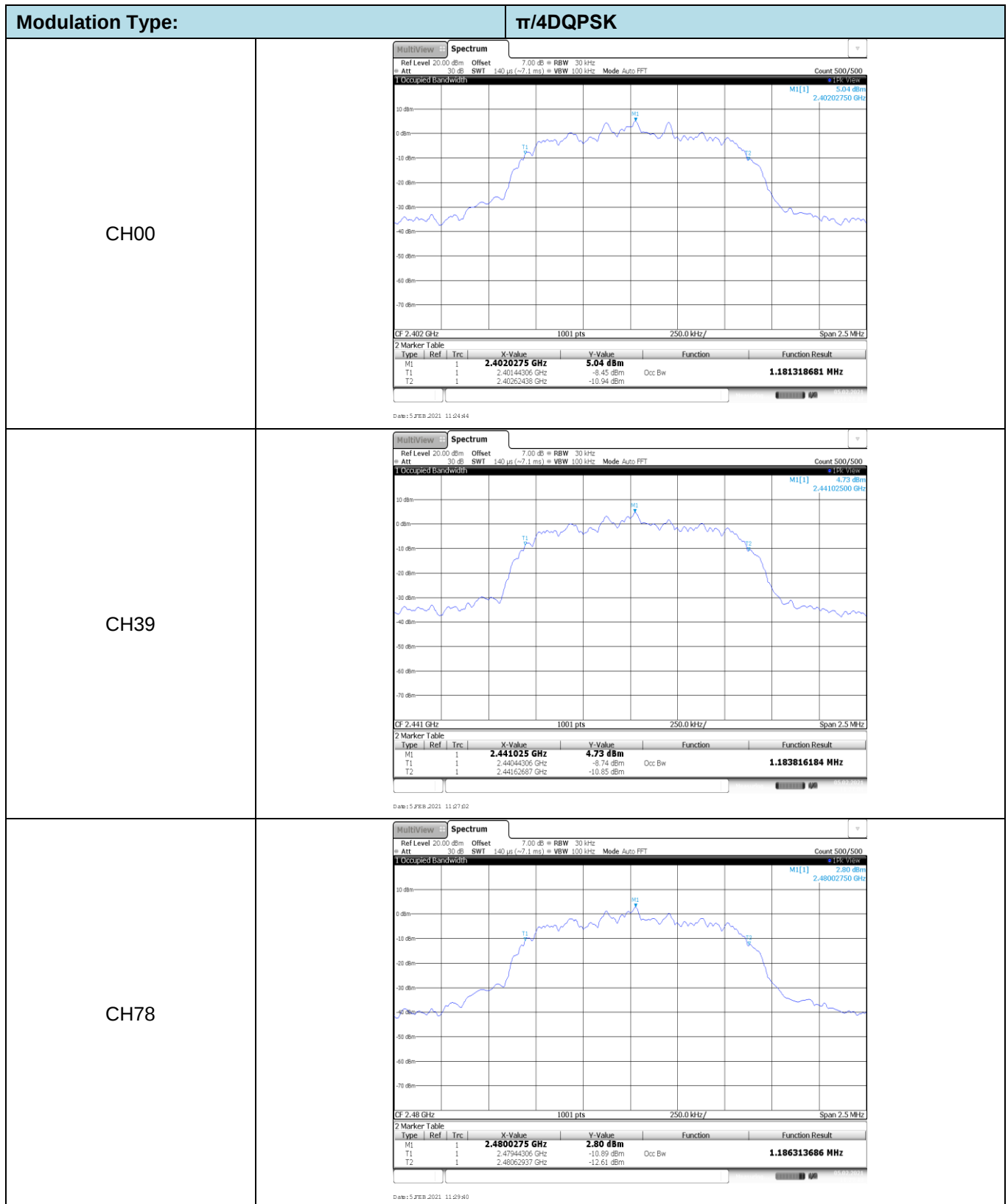
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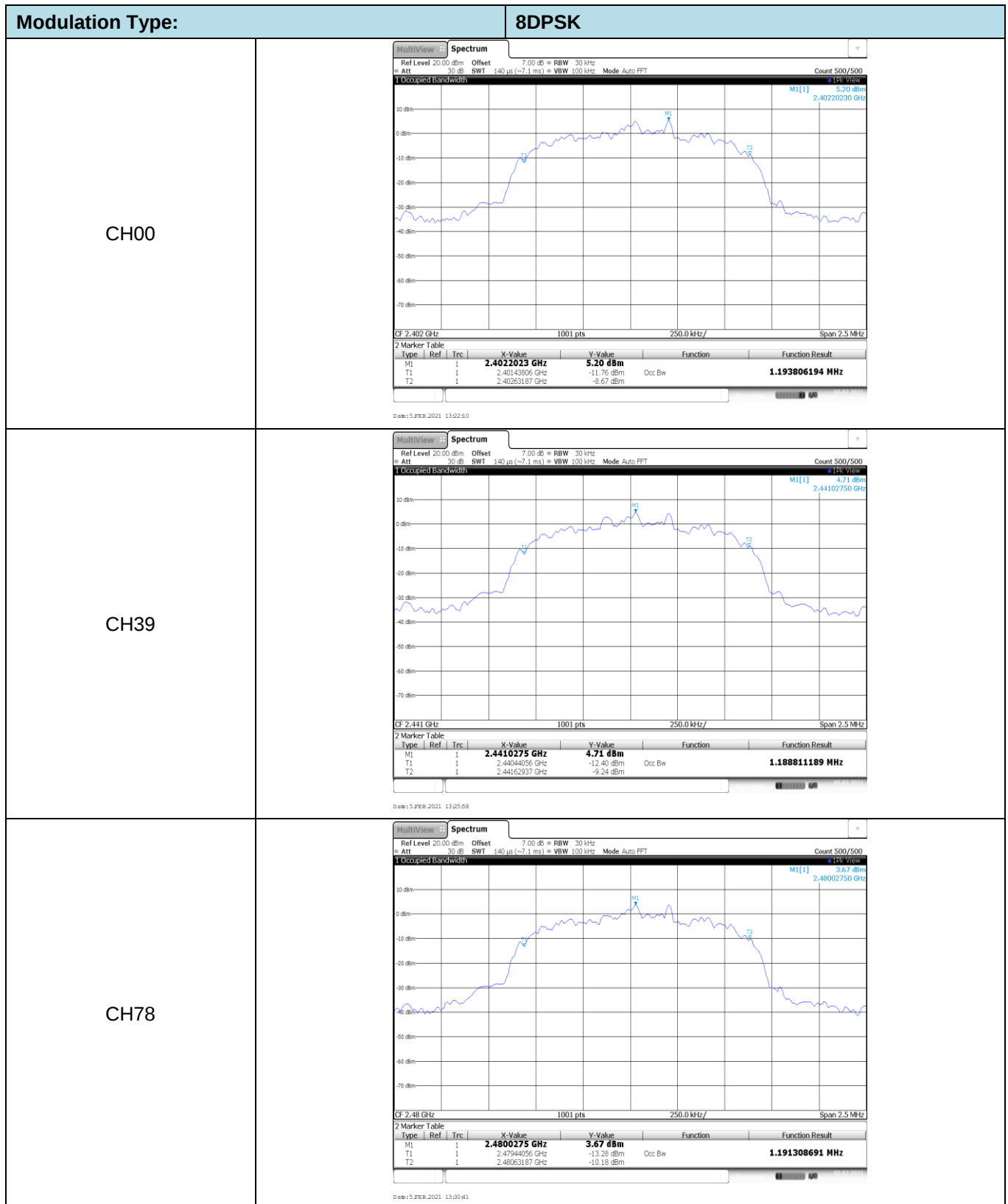


Appendix C: 99% Occupied Bandwidth

Modulation type	Channel	99% Occupied Bandwidth (MHz)	Limit (MHz)	Result
GFSK	00	0.90	-	Pass
	39	0.90		
	78	0.90		
$\pi/4$ DQPSK	00	1.18	-	Pass
	39	1.18		
	78	1.19		
8DPSK	00	1.19	-	Pass
	39	1.19		
	78	1.19		







Appendix D: Carrier Frequencies Separation

Modulation type	Channel	Carrier Frequencies Separation (MHz)	Limit (kHz) *	Result
GFSK	39	1.00	≥940.00	Pass
π/4DQPSK	39	1.00	≥880.00	Pass
8DPSK	39	1.01	≥870.00	Pass

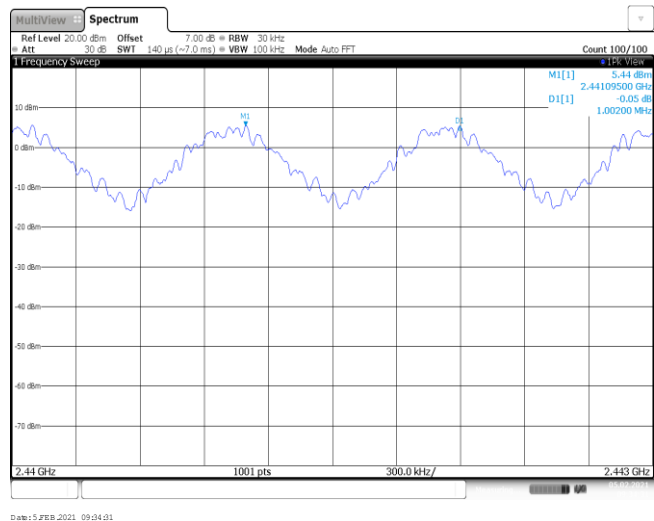
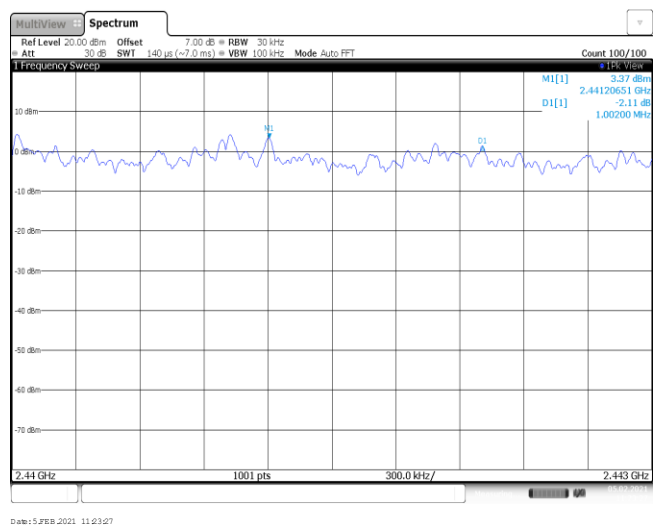
Note:

*: GFSK limit = The maximum 20 dB Bandwidth for GFSK modulation on the appendix B.

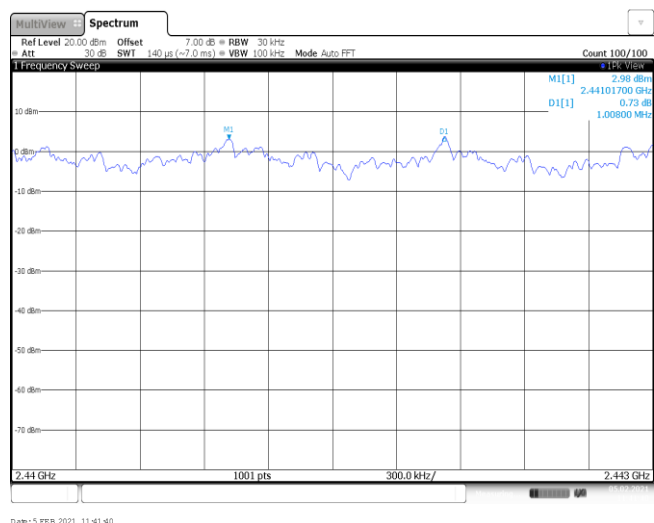
π/4DQPSK limit = 2/3 * The maximum 20 dB Bandwidth for π/4DQPSK modulation on the appendix B.

8DPSK limit = 2/3 * The maximum 20 dB Bandwidth for 8DPSK modulation on the appendix B

GFSK

 $\pi/4$ DQPSK

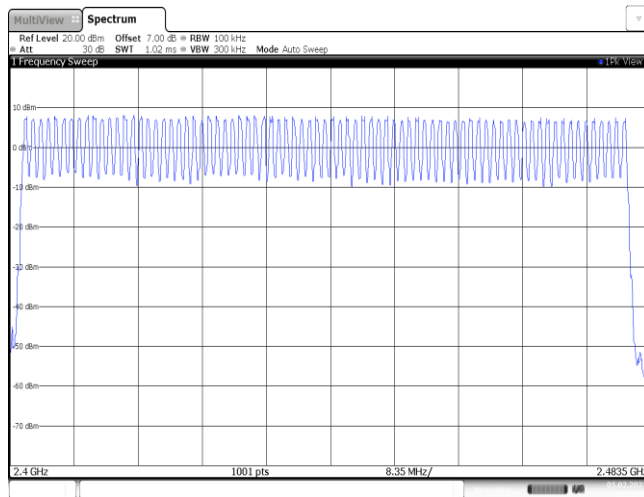
8DPSK



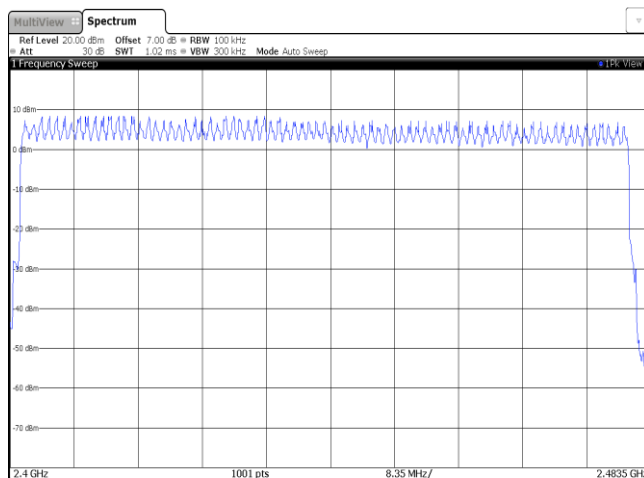
Appendix E: Hopping Channel Number

Modulation type	Channel number	Limit	Result
GFSK	79	≥15.00	Pass
π/4DQPSK	79		
8DPSK	79		

GFSK

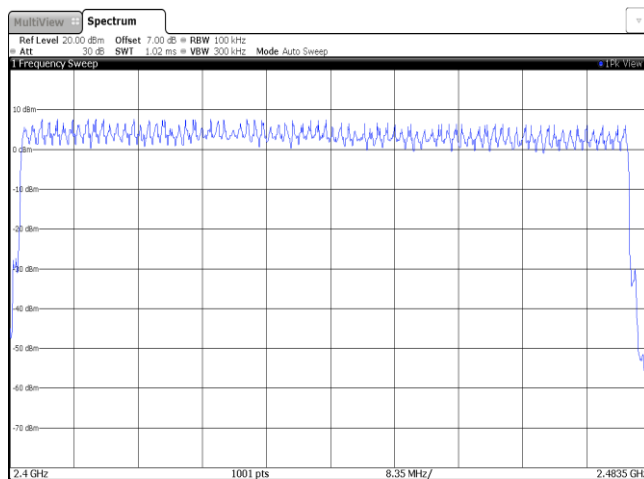


Date: 5.FEB.2021 09:55:10

 $\pi/4$ DQPSK

Date: 5.FEB.2021 09:48:55

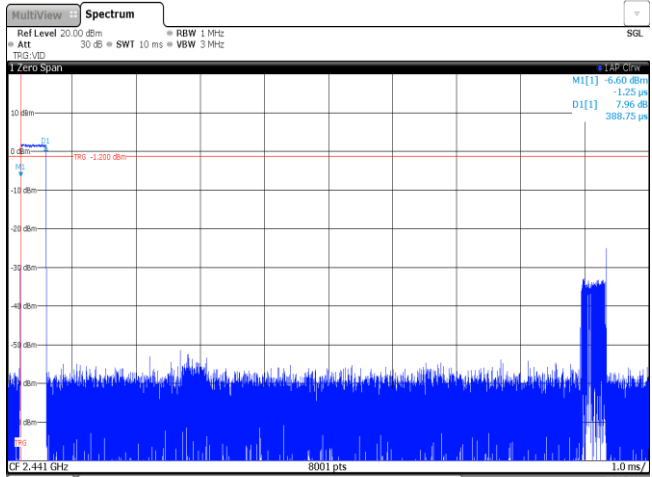
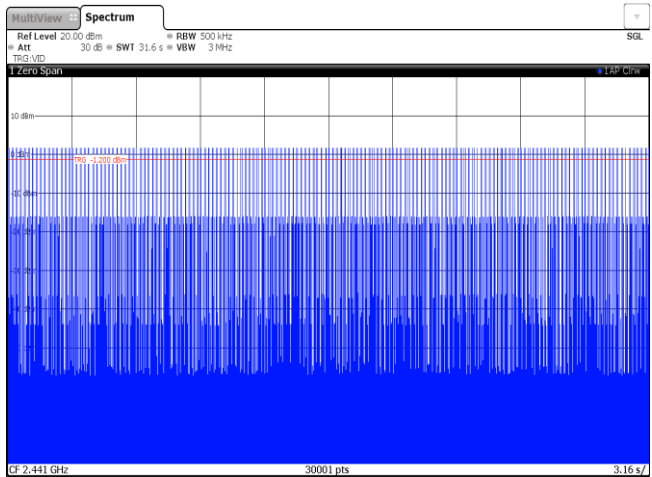
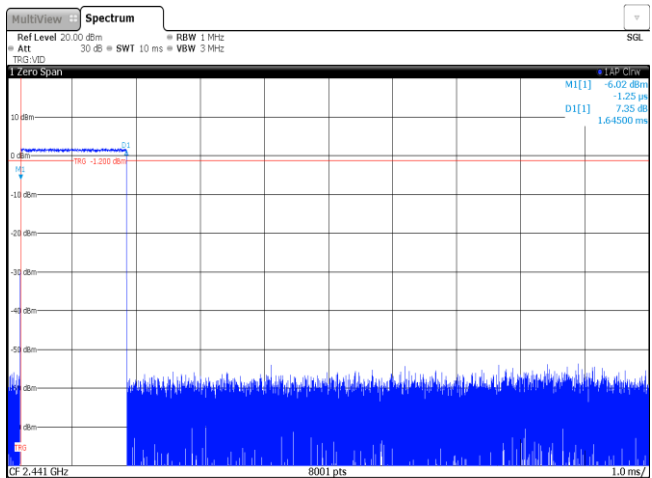
8DPSK

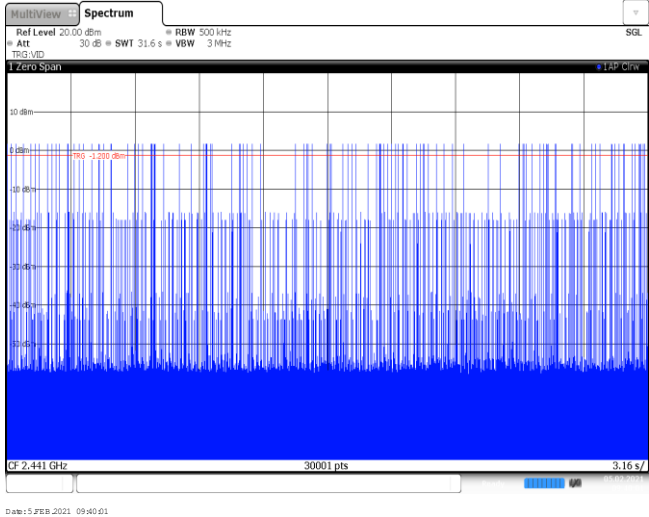
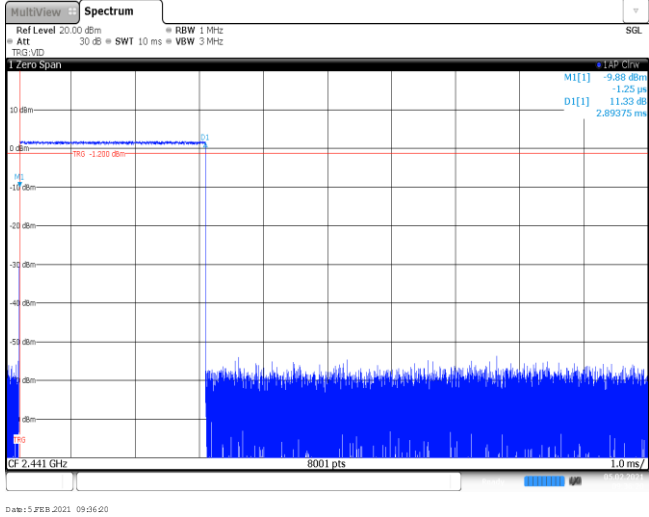
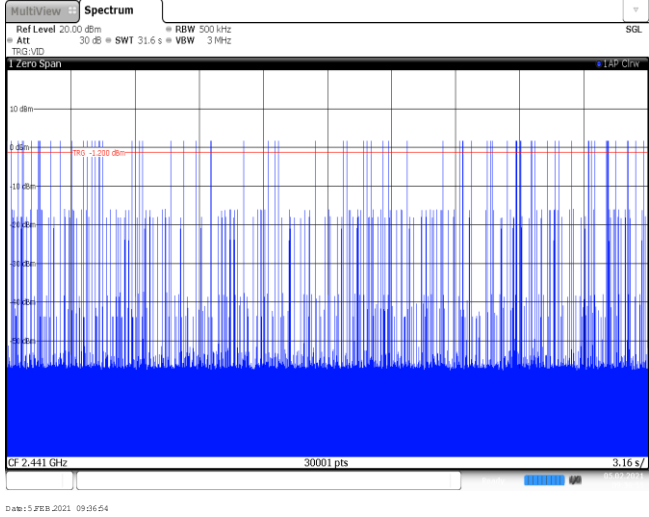


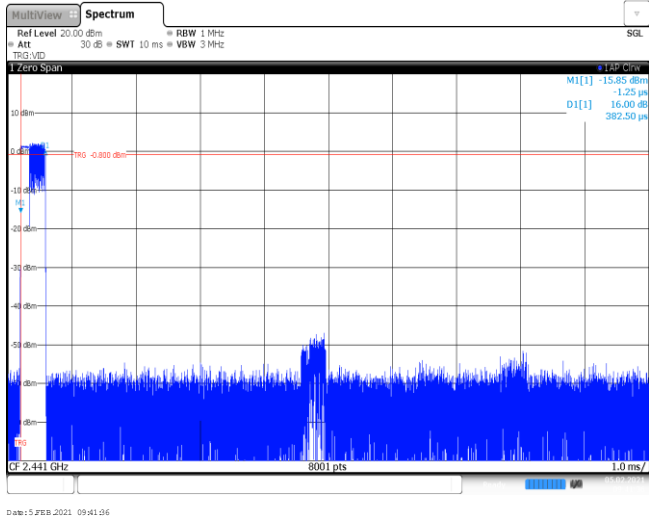
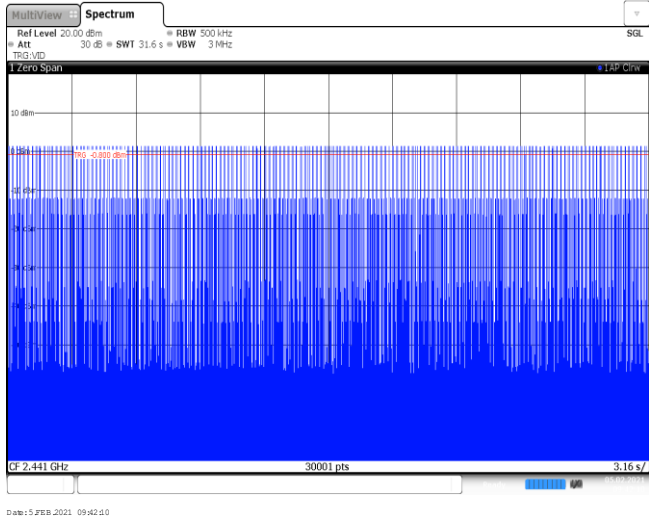
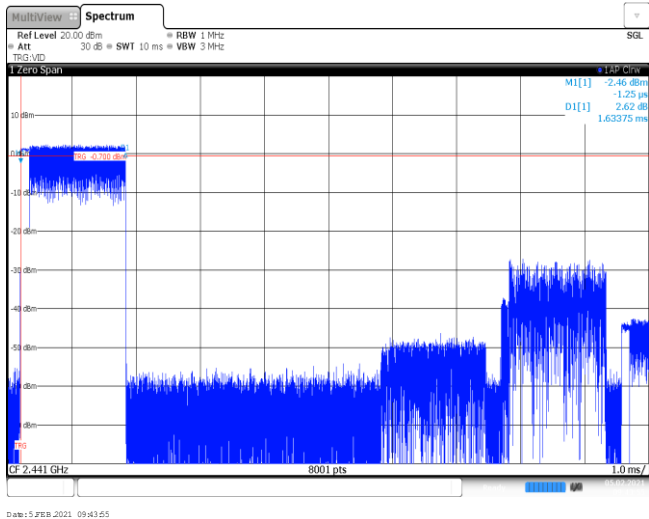
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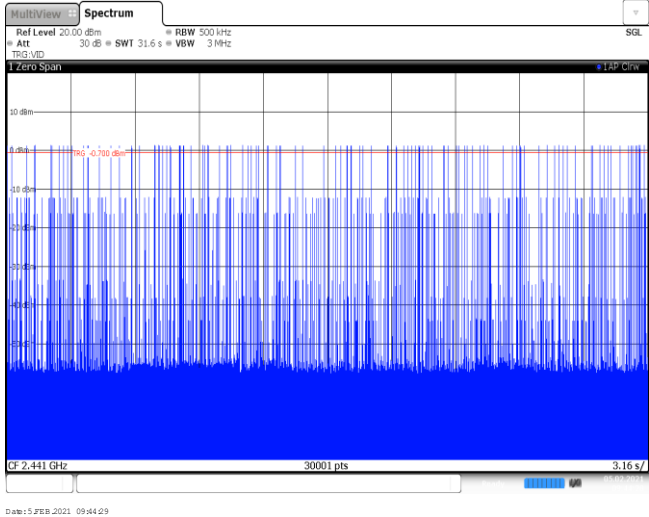
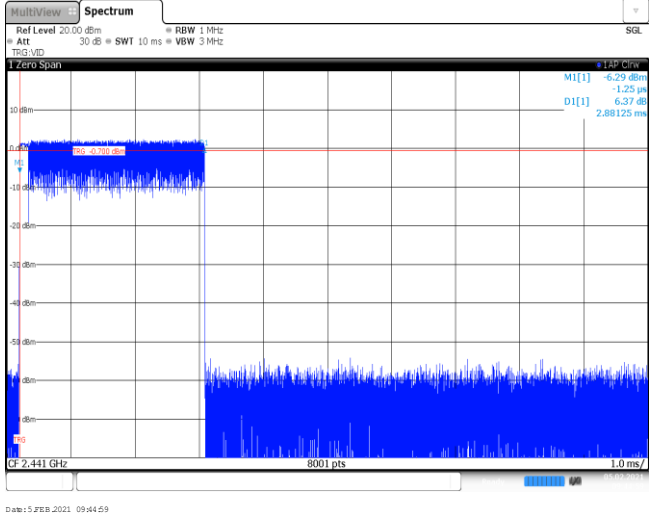
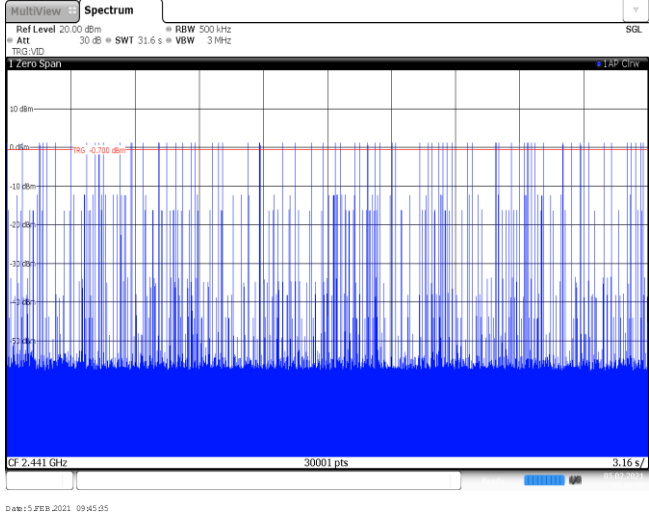
Appendix F: Dwell Time

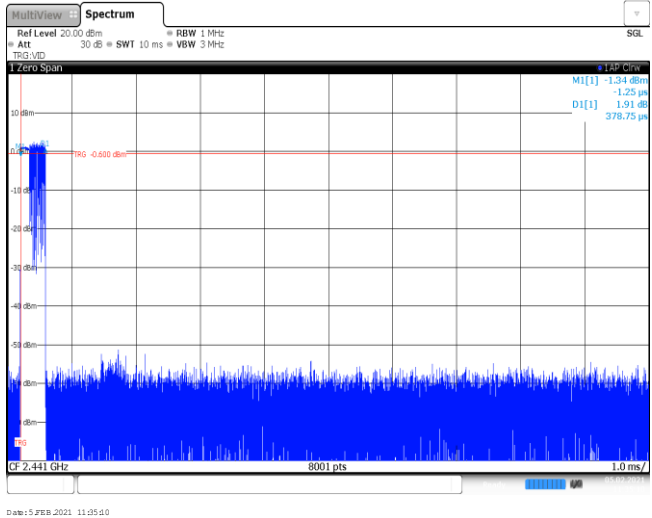
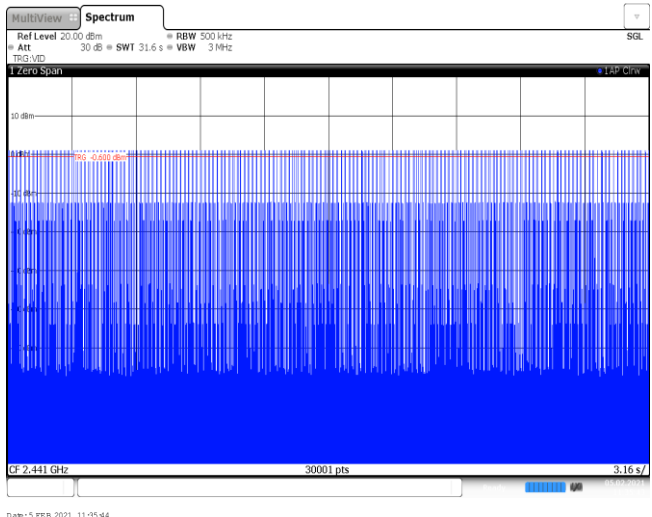
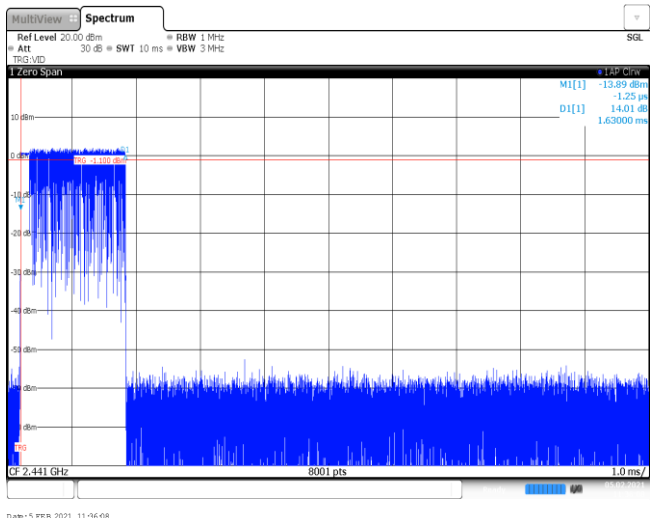
Modulation type	Packet	Burst Width [ms]	Total Hops[hop*ch]	Dwell time (Second)	Limit (Second)	Result
GFSK	DH1	0.39	319	0.12	≤ 0.40	Pass
	DH3	1.65	107	0.18		
	DH5	2.89	66	0.19		
$\pi/4$ DQPSK	2DH1	0.38	320	0.12	≤ 0.40	Pass
	2DH3	1.63	112	0.18		
	2DH5	2.88	73	0.21		
8DPSK	3DH1	0.38	320	0.12	≤ 0.40	Pass
	3DH3	1.63	114	0.19		
	3DH5	2.88	55	0.16		

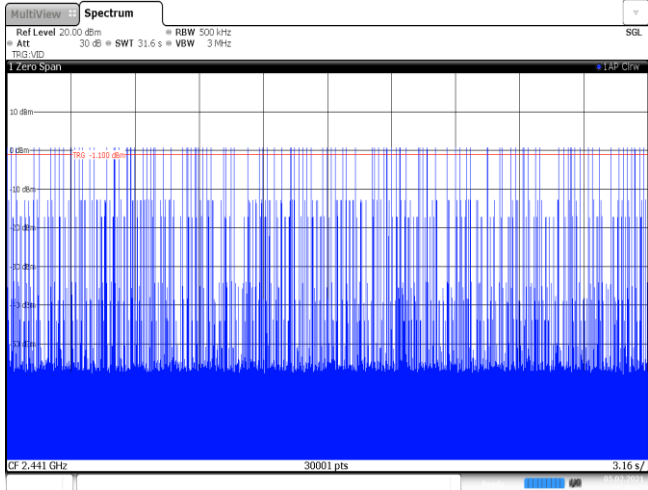
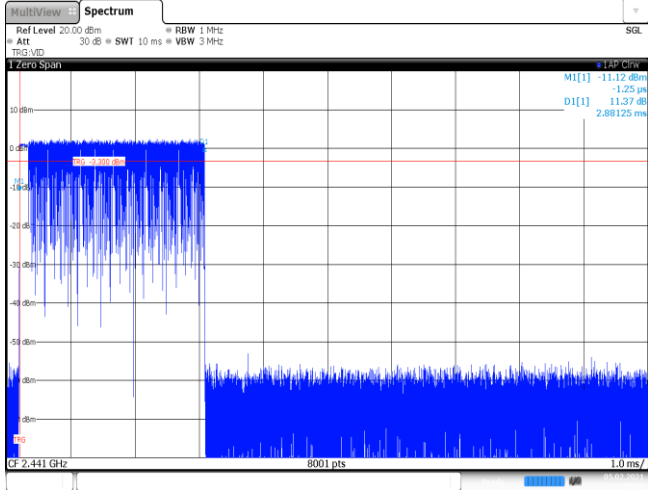
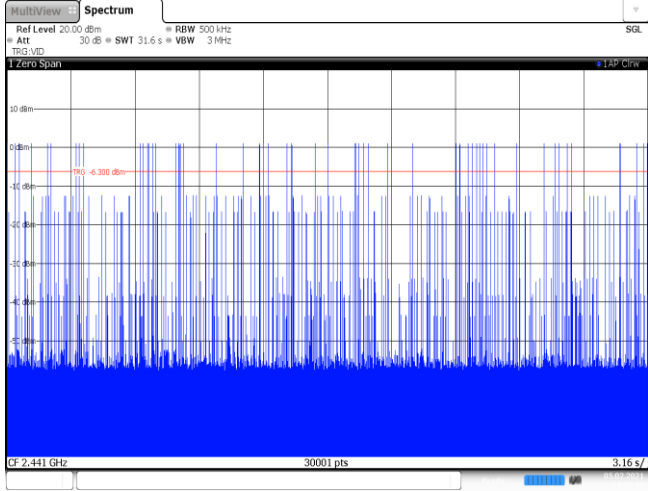
Modulation Type:	GFSK
DH1 Burst width	 The spectrum plot shows a signal at 2.441 GHz. The y-axis represents power in dBm, ranging from -50 to 10. The x-axis represents frequency in MHz, ranging from 2.440 to 2.442. A red line indicates the signal level at approximately -1.25 dBm. The plot shows a burst of signal at the specified frequency. Ref Level 20.00 dBm Att 30 dB SWT 10 ms VBW 3 MHz RBW 1 MHz SGL 1 Zero Span M1[1] -6.60 dBm D1[1] -1.25 dBm D1[1] 7.96 dBm 388.75 ps CF 2.441 GHz 8001 pts 1.0 ms/ Date: 5.FEB.2021 09:28:33
DH1 Burst number	 The spectrum plot shows a signal at 2.441 GHz. The y-axis represents power in dBm, ranging from -50 to 10. The x-axis represents frequency in MHz, ranging from 2.440 to 2.442. A red line indicates the signal level at approximately -1.25 dBm. The plot shows a burst of signal at the specified frequency. Ref Level 20.00 dBm Att 30 dB SWT 31.6 s VBW 3 MHz RBW 500 kHz SGL 1 Zero Span M1[1] -6.60 dBm D1[1] -1.25 dBm D1[1] 7.96 dBm 388.75 ps CF 2.441 GHz 30001 pts 3.16 s/ Date: 5.FEB.2021 09:29:27
DH3 Burst width	 The spectrum plot shows a signal at 2.441 GHz. The y-axis represents power in dBm, ranging from -50 to 10. The x-axis represents frequency in MHz, ranging from 2.440 to 2.442. A red line indicates the signal level at approximately -1.25 dBm. The plot shows a burst of signal at the specified frequency. Ref Level 20.00 dBm Att 30 dB SWT 10 ms VBW 3 MHz RBW 1 MHz SGL 1 Zero Span M1[1] -6.02 dBm D1[1] -1.25 dBm D1[1] 7.35 dBm 1.64500 ms CF 2.441 GHz 8001 pts 1.0 ms/ Date: 5.FEB.2021 09:29:27

DH3 Burst number	 A spectrum plot titled 'Spectrum' showing a dense signal across a frequency range. The y-axis represents power in dBm, ranging from -10 to -90. The x-axis represents frequency in GHz, centered at 2.441 GHz. The plot shows a wideband signal with many narrow peaks. A red horizontal line is drawn at -120 dBm. The bottom status bar indicates 'CF 2.441 GHz', '30001 pts', and '3.16 s'.
DH5 Burst width	 A spectrum plot titled 'Spectrum' showing a signal burst. The y-axis represents power in dBm, ranging from -10 to -90. The x-axis represents frequency in GHz, centered at 2.441 GHz. The plot shows a narrowband signal burst. A red horizontal line is drawn at -120 dBm. The bottom status bar indicates 'CF 2.441 GHz', '8001 pts', and '1.0 ms'. On the right side, there are measurement statistics: 'M1[1] -9.88 dBm', 'D1[1] -1.25 ps', '11.33 dB', and '2.89375 ms'.
DH5 Burst number	 A spectrum plot titled 'Spectrum' showing a dense signal across a frequency range. The y-axis represents power in dBm, ranging from -10 to -90. The x-axis represents frequency in GHz, centered at 2.441 GHz. The plot shows a wideband signal with many narrow peaks. A red horizontal line is drawn at -120 dBm. The bottom status bar indicates 'CF 2.441 GHz', '30001 pts', and '3.16 s'.

Modulation Type: $\pi/4$ DQPSK	
2DH1 Burst width	
2DH1 Burst number	
2DH3 Burst width	

2DH3 Burst number	
2DH5 Burst width	
2DH5 Burst number	

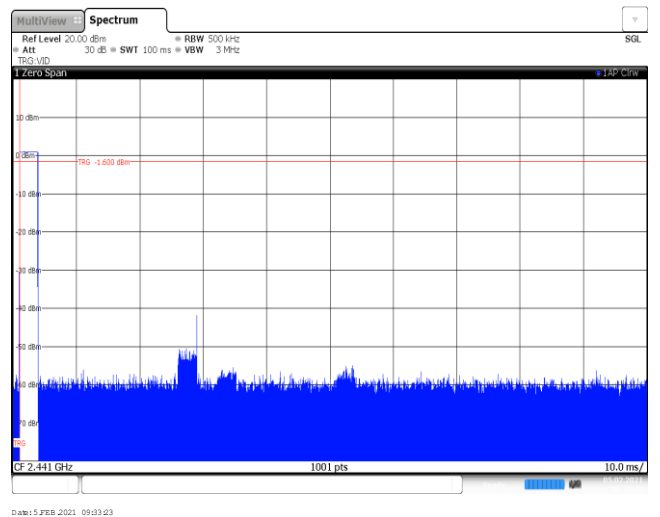
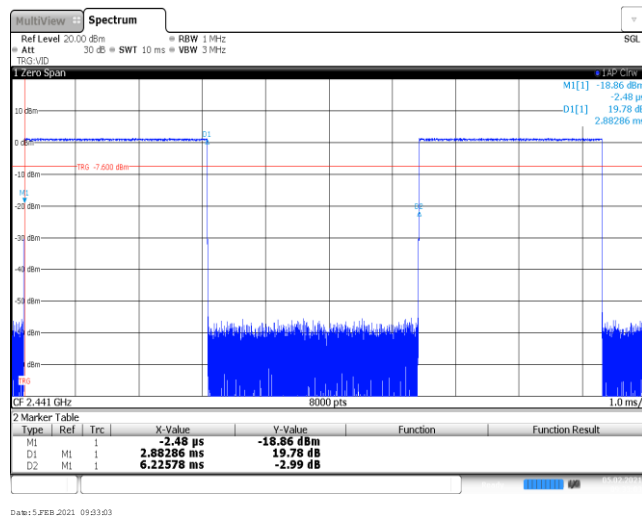
Modulation Type:	8DPSK
3DH1 Burst width	 The spectrum plot shows a signal at 2.441 GHz with a bandwidth of 8001 pts. The y-axis represents power in dBm, ranging from -60 to 10. The x-axis represents time in ms, ranging from 0 to 1.0. The signal is a burst of energy, with a peak power of approximately -10 dBm. The plot includes a reference level of 20.00 dBm, an attenuation of 30 dB, a sweep time of 10 ms, and a video bandwidth of 3 MHz. The plot also shows a trace of the signal's envelope, with a peak value of 1.34 dBm, a minimum value of -1.25 dBm, and a difference of 1.91 dB. The plot is dated 5 FEB 2021 11:25:10.
3DH1 Burst number	 The spectrum plot shows a signal at 2.441 GHz with a bandwidth of 30001 pts. The y-axis represents power in dBm, ranging from -60 to 10. The x-axis represents time in s, ranging from 0 to 3.16. The signal is a burst of energy, with a peak power of approximately -10 dBm. The plot includes a reference level of 20.00 dBm, an attenuation of 30 dB, a sweep time of 31.6 s, and a video bandwidth of 3 MHz. The plot also shows a trace of the signal's envelope, with a peak value of 1.34 dBm, a minimum value of -1.25 dBm, and a difference of 1.91 dB. The plot is dated 5 FEB 2021 11:25:14.
3DH3 Burst width	 The spectrum plot shows a signal at 2.441 GHz with a bandwidth of 8001 pts. The y-axis represents power in dBm, ranging from -60 to 10. The x-axis represents time in ms, ranging from 0 to 1.0. The signal is a burst of energy, with a peak power of approximately -10 dBm. The plot includes a reference level of 20.00 dBm, an attenuation of 30 dB, a sweep time of 10 ms, and a video bandwidth of 3 MHz. The plot also shows a trace of the signal's envelope, with a peak value of 1.34 dBm, a minimum value of -1.25 dBm, and a difference of 1.91 dB. The plot is dated 5 FEB 2021 11:26:08.

3DH3 Burst number	 Date: 5.FEB.2021 11:06:42
3DH5 Burst width	 Date: 5.FEB.2021 11:07:05
3DH5 Burst number	 Date: 5.FEB.2021 11:07:41

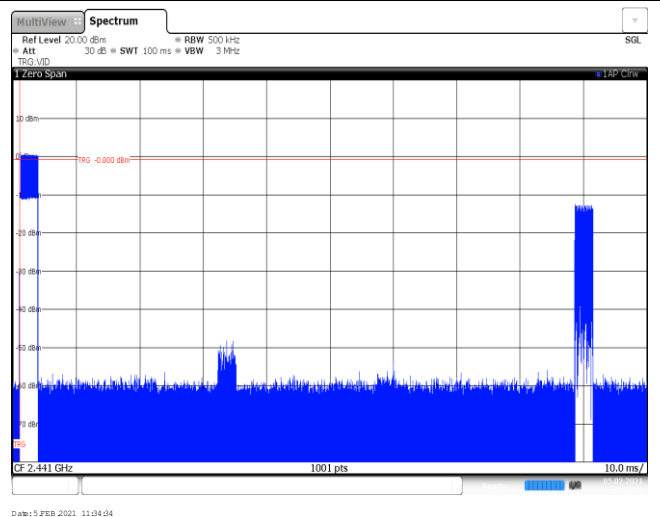
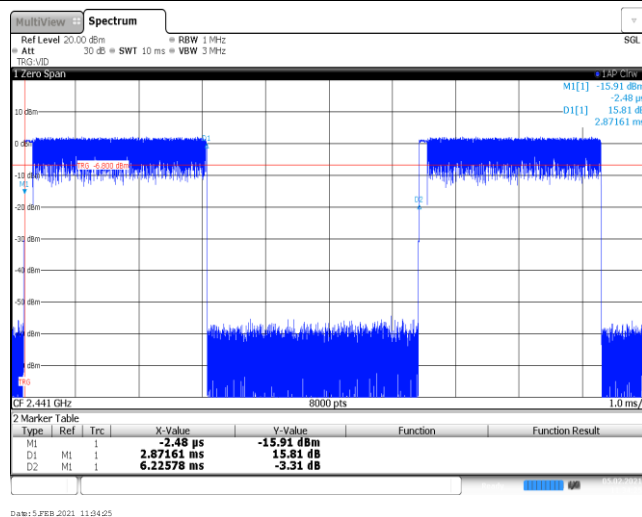
Appendix G: Duty Cycle Correction Factor (DCCF)

DCCF Calculate Formula					
DCCF=20 * Log(duty cycle) = 20 * Log($T_{\text{on time}} / T_{\text{period}}$)					
Modulation type	Test Frequency (MHz)	$T_{\text{on time}}$ for single burst [ms]	T_{period} [ms]	Burst Quantity	DCCF [dB]
GFSK	2441	2.88	100	1	-30.81
$\pi/4$ DQPSK	2441	2.87	100	2	-24.82
8DPSK	2441	2.87	100	2	-24.82

GFSK

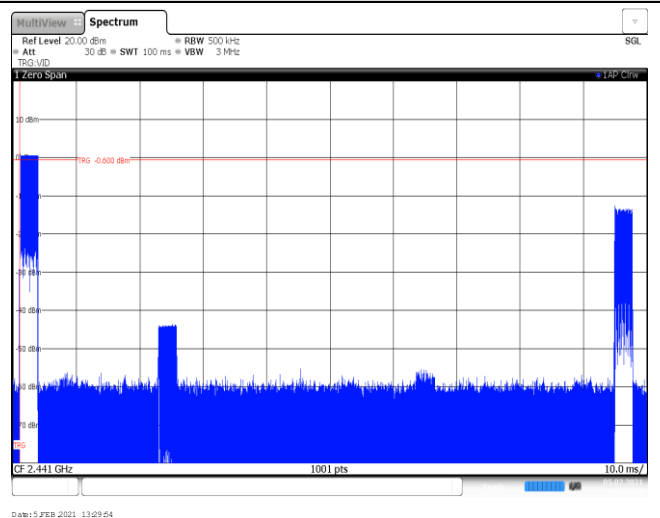
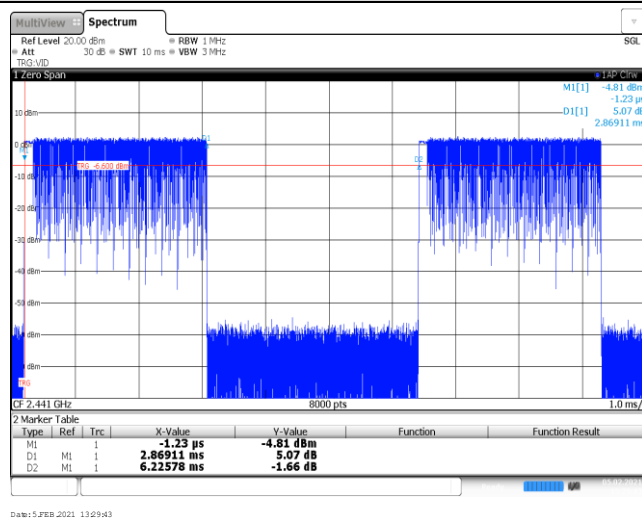
T_{on} time for single burst

Burst Quantity

 $\pi/4$ DQPSKT_{on} time for single burst

Burst Quantity

8DPSK

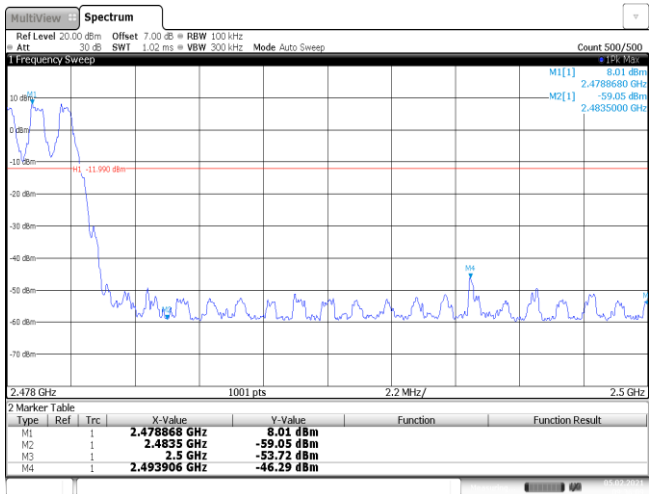
T_{on} time for single burst

Burst Quantity

Appendix H: Band edge and Spurious Emissions (conducted)

Test Item:	Band edge	Modulation type:	GFSK
CH00 No hopping mode	</		

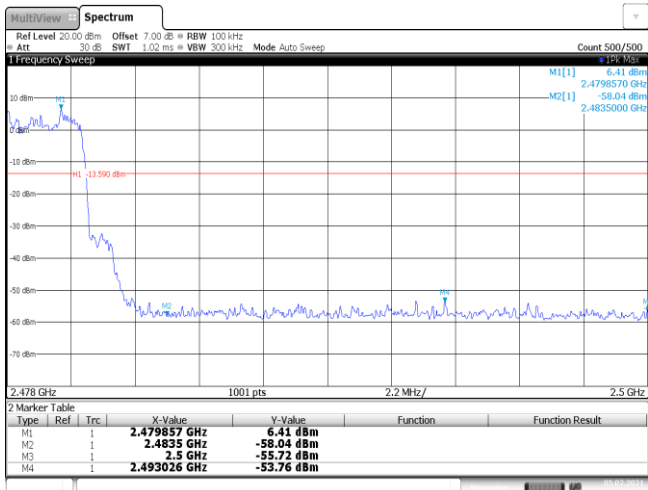
CH78
Hopping mode



Date: 5 FEB 2021 09:06:09

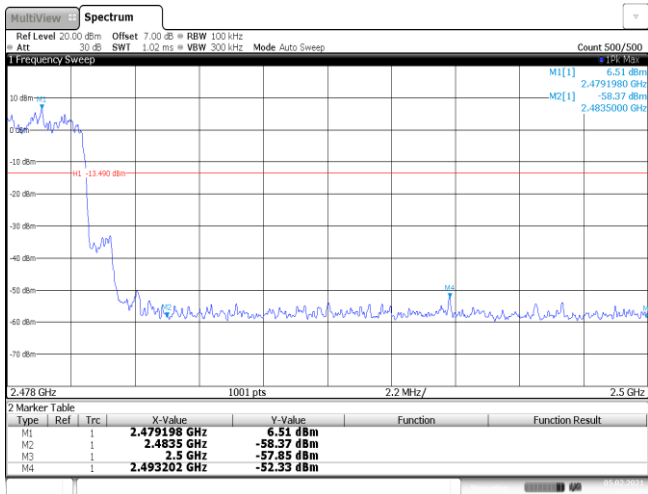
Test Item:	Band edge	Modulation type:	$\pi/4$ DQPSK
CH00 No hopping mode			

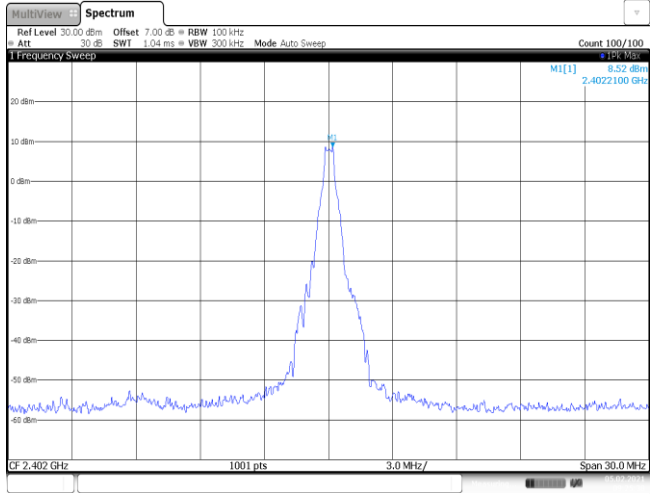
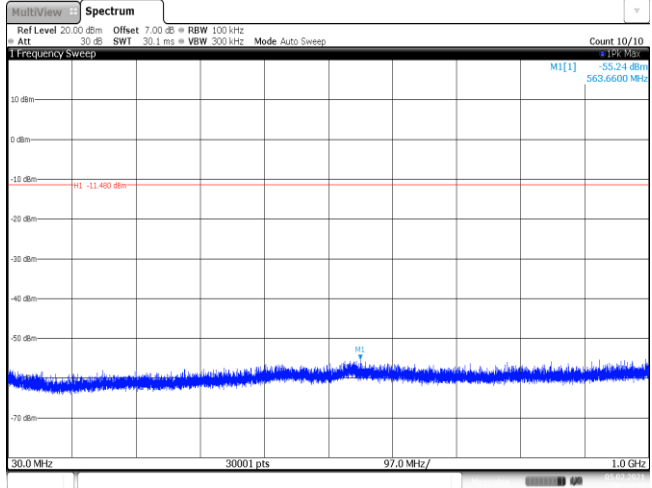
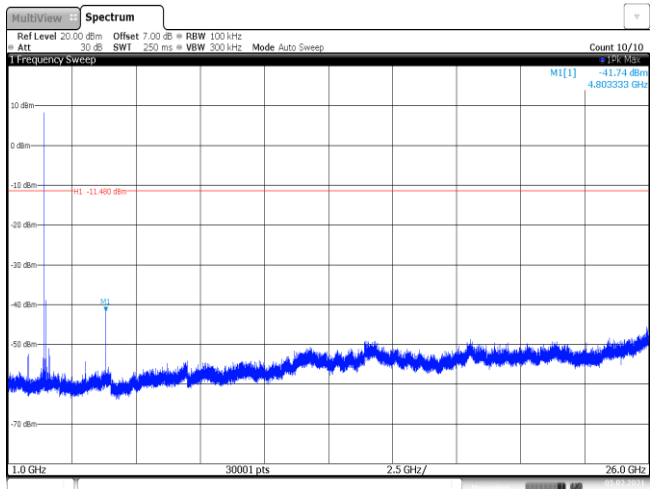
CH78
Hopping mode

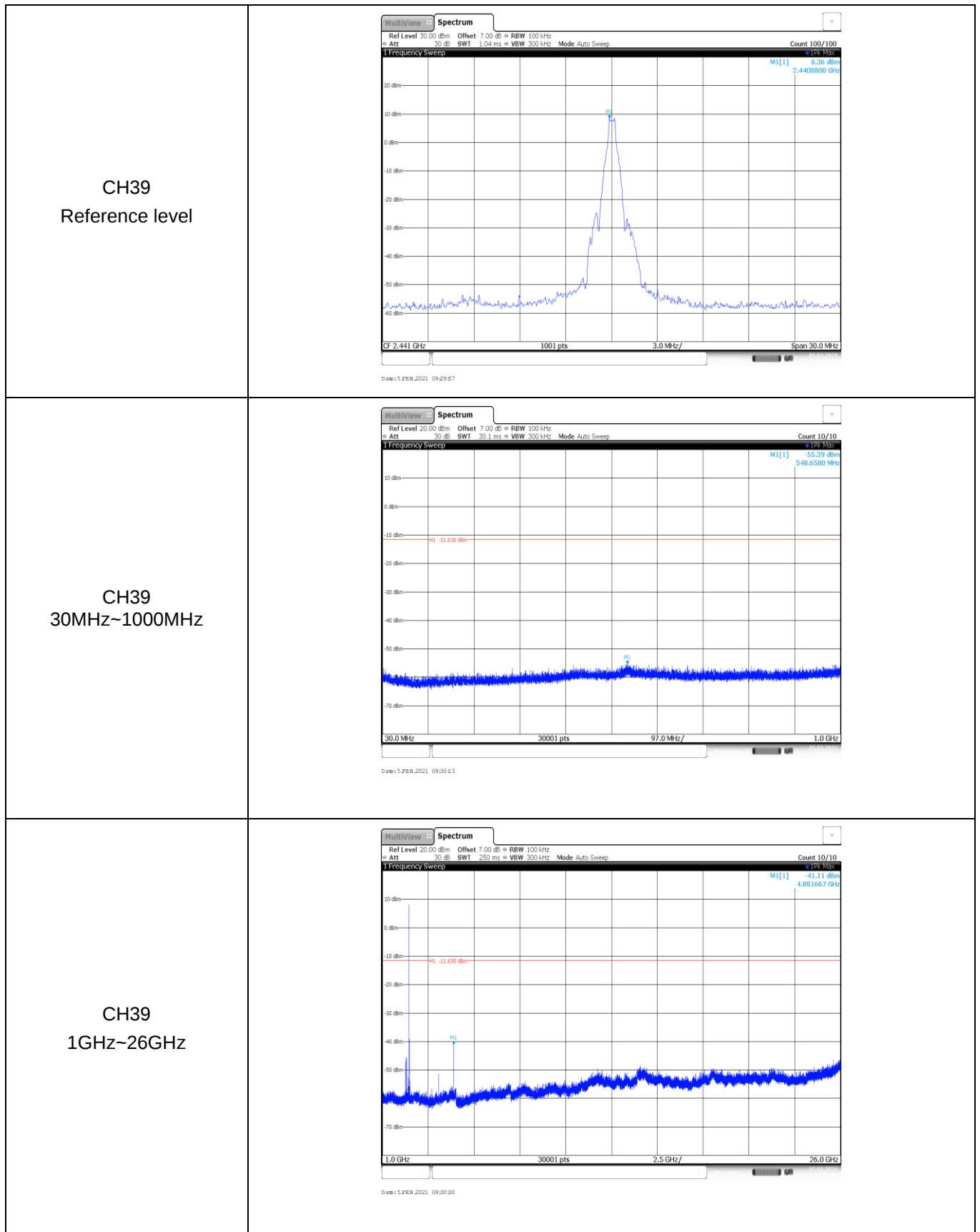


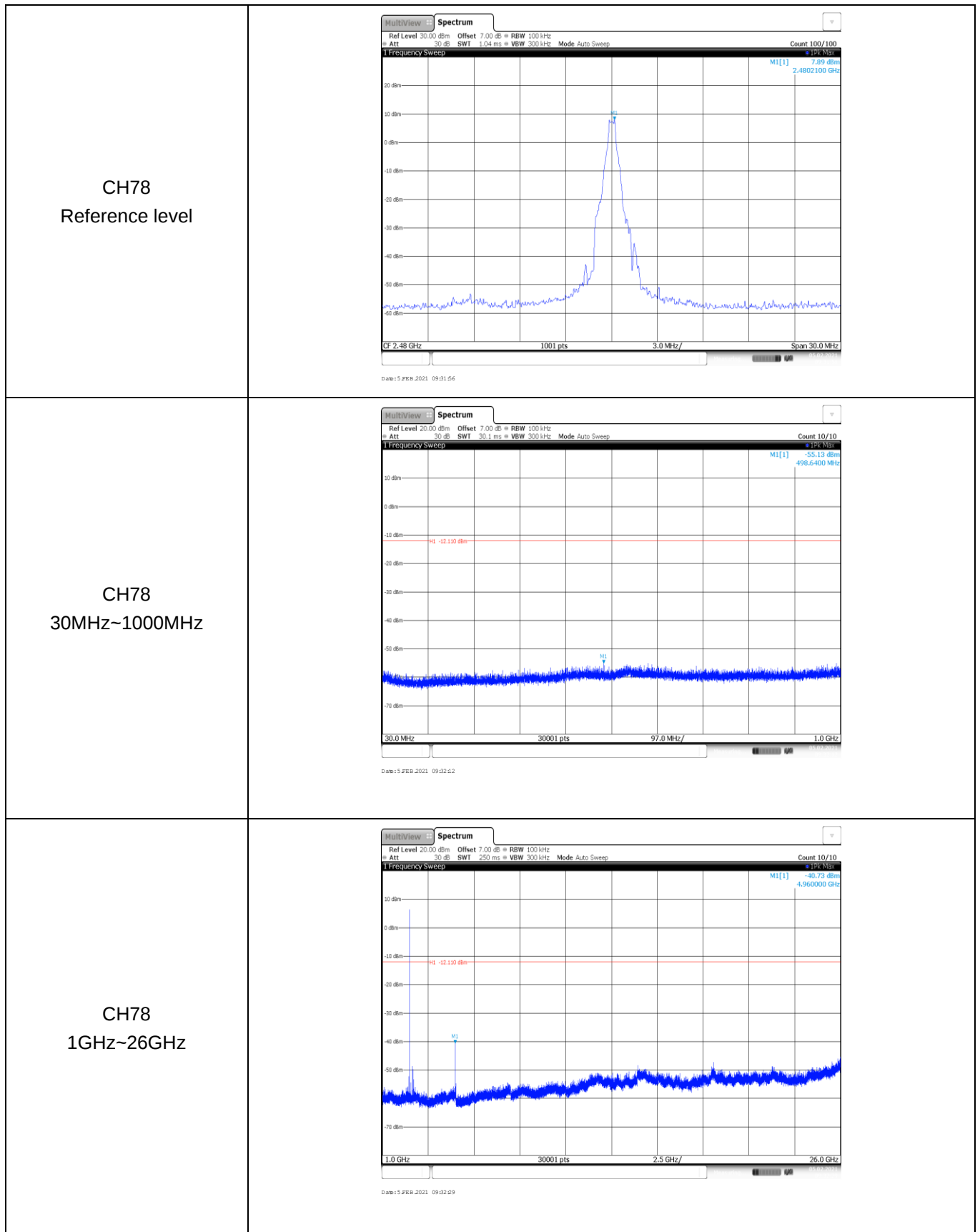
Test Item:	Band edge	Modulation type:	8DPSK
CH00 No hopping mode	<		

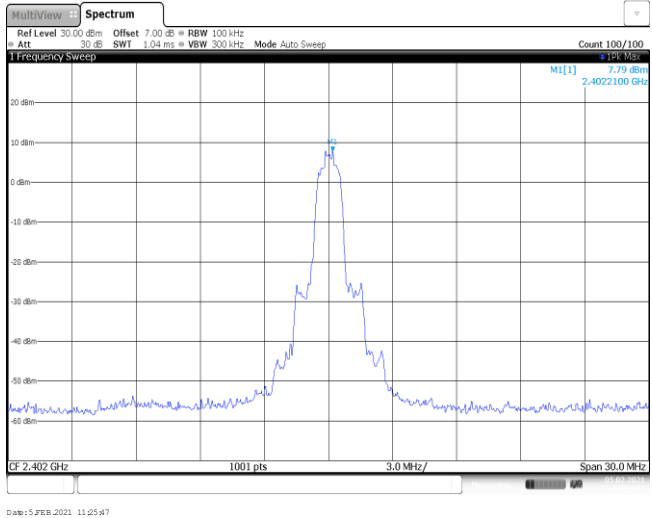
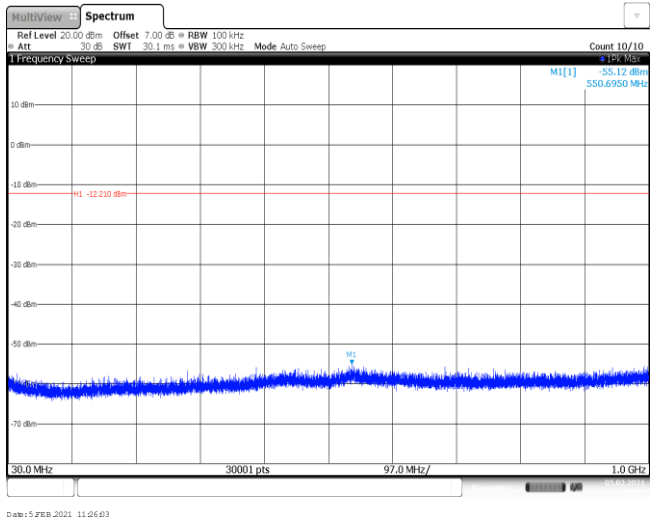
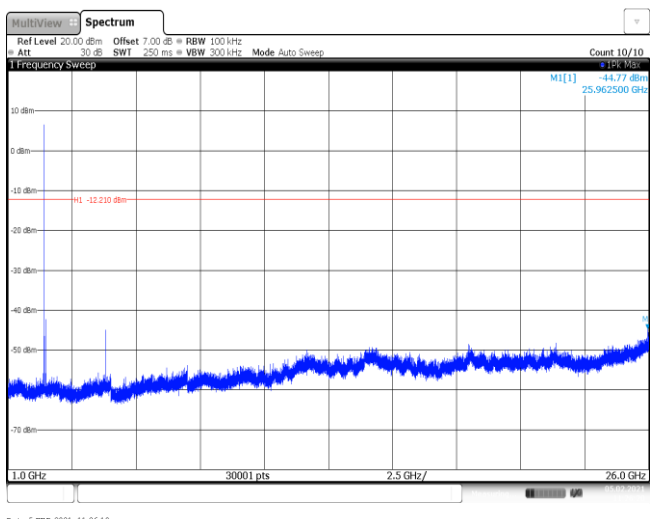
CH78
Hoppig mode

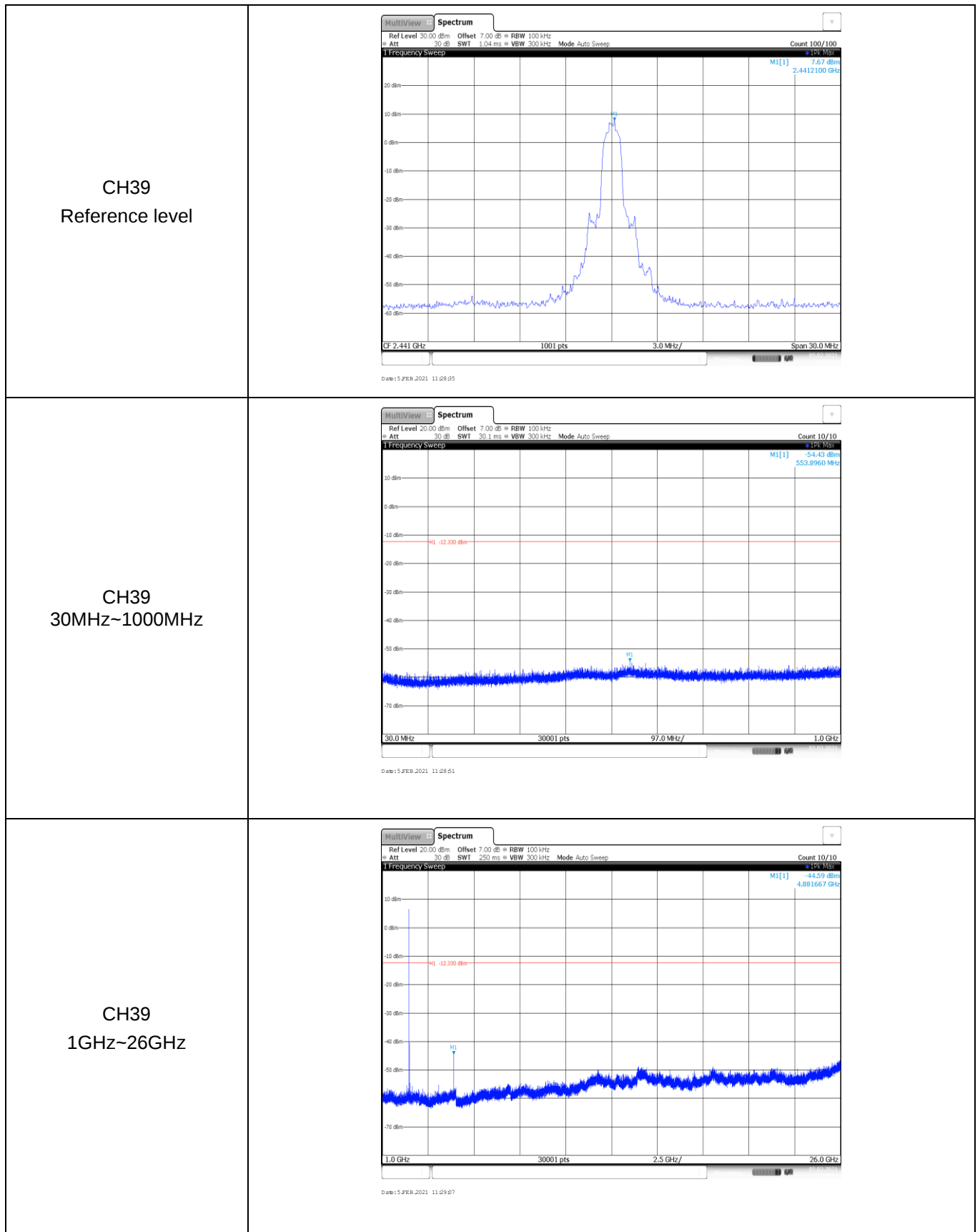


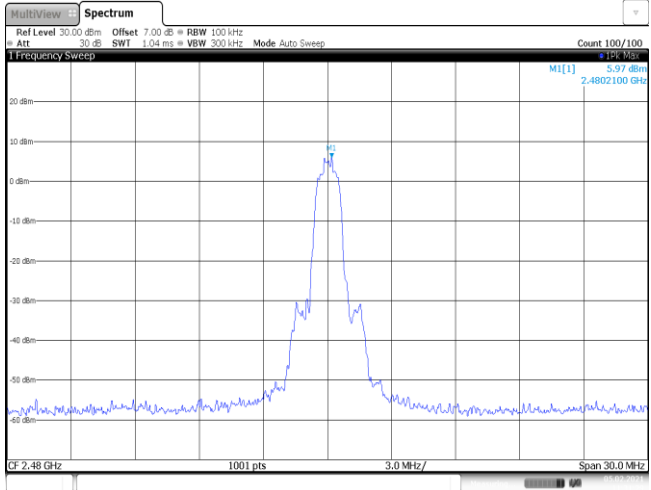
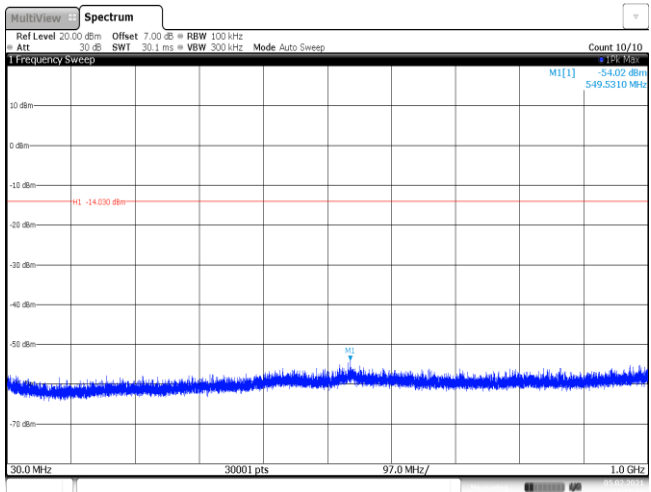
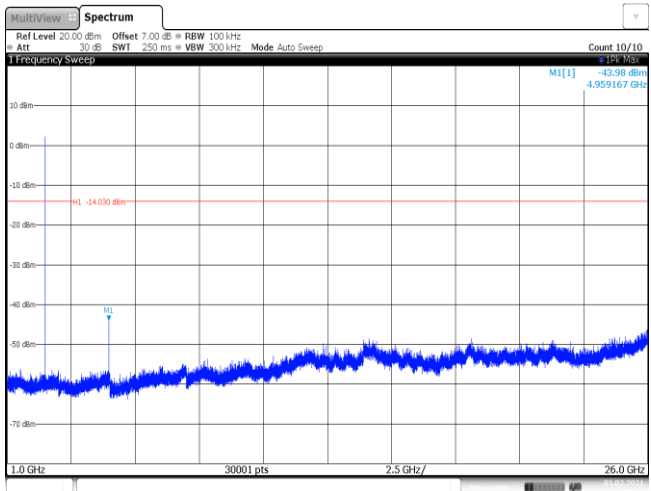
Test Item:	Spurious Emission	Modulation type:	GFSK
CH00 Reference level	 The spectrum plot shows a single sharp peak at 2.4022100 GHz. The y-axis represents power in dBm, ranging from -60 to 20. The x-axis represents frequency in MHz, ranging from 2.400 to 2.404. The peak is labeled with a value of 19.52 dBm. The plot is titled 'Spectrum' and includes parameters: Ref Level 30.00 dBm, Offset 7.00 dB, RBW 100 kHz, Att 30 dB, SWI 1.04 ms, VBW 300 kHz, Mode Auto Sweep, Count 100/100. The date is 5.FEB.2021 09:25:08.		
CH00 30MHz~1000MHz	 The spectrum plot shows a flat noise floor across the 30 MHz to 1000 MHz range. The y-axis represents power in dBm, ranging from -70 to 10. The x-axis represents frequency in MHz, ranging from 30.0 to 1000.0. A red line is drawn at -11.40 dBm. The plot is titled 'Spectrum' and includes parameters: Ref Level 20.00 dBm, Offset 7.00 dB, RBW 100 kHz, Att 30 dB, SWI 30.1 ms, VBW 300 kHz, Mode Auto Sweep, Count 10/10. The date is 5.FEB.2021 09:25:55.		
CH00 1GHz~26GHz	 The spectrum plot shows a flat noise floor across the 1 GHz to 26 GHz range. The y-axis represents power in dBm, ranging from -70 to 10. The x-axis represents frequency in GHz, ranging from 1.0 to 26.0. A red line is drawn at -11.40 dBm. The plot is titled 'Spectrum' and includes parameters: Ref Level 20.00 dBm, Offset 7.00 dB, RBW 100 kHz, Att 30 dB, SWI 250 ms, VBW 300 kHz, Mode Auto Sweep, Count 10/10. The date is 5.FEB.2021 09:26:11.		

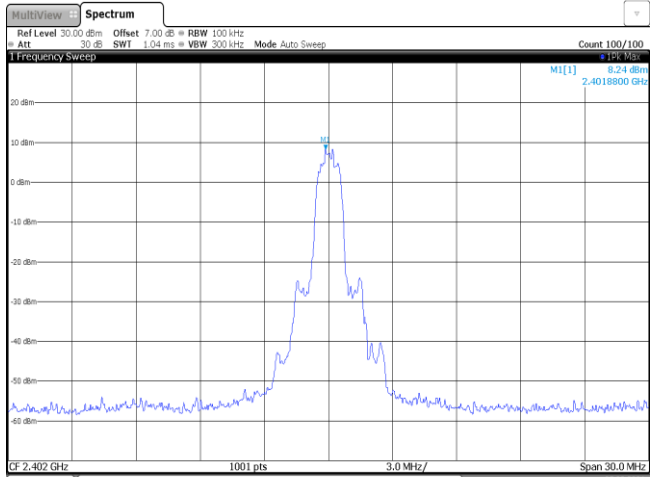
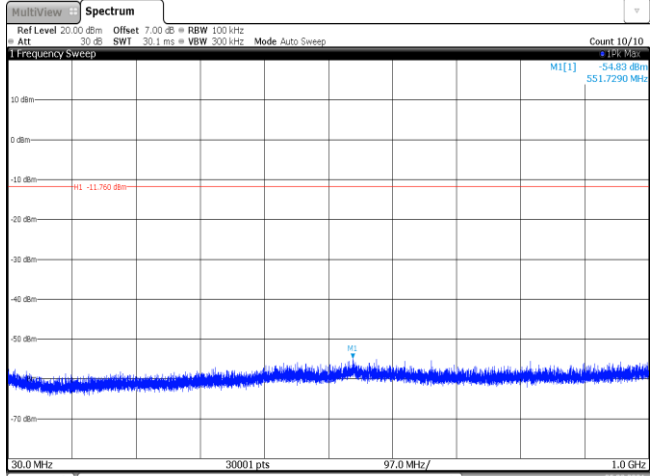
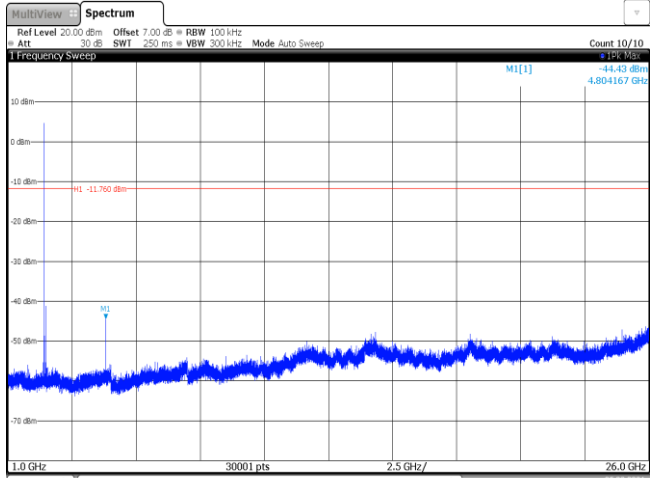


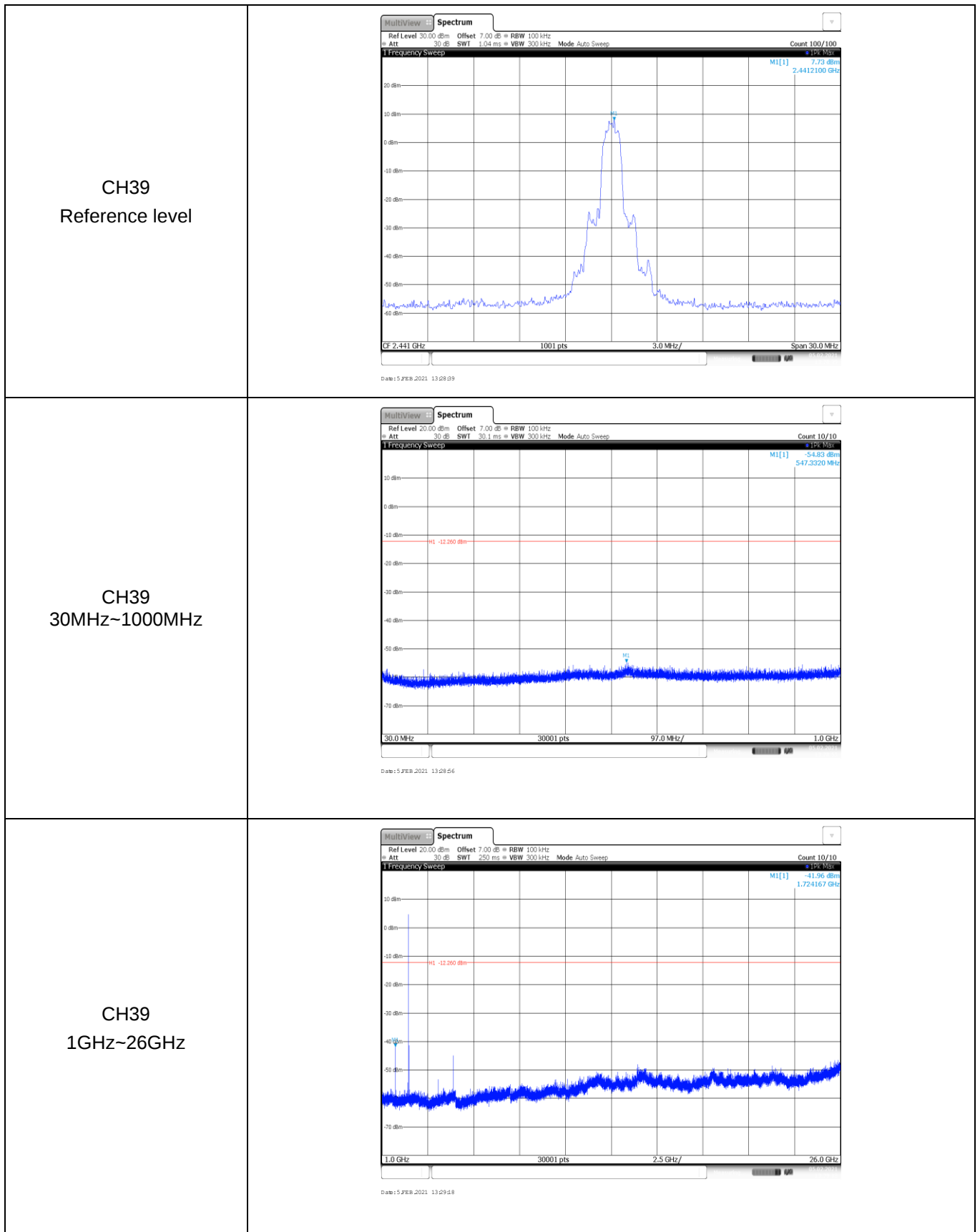


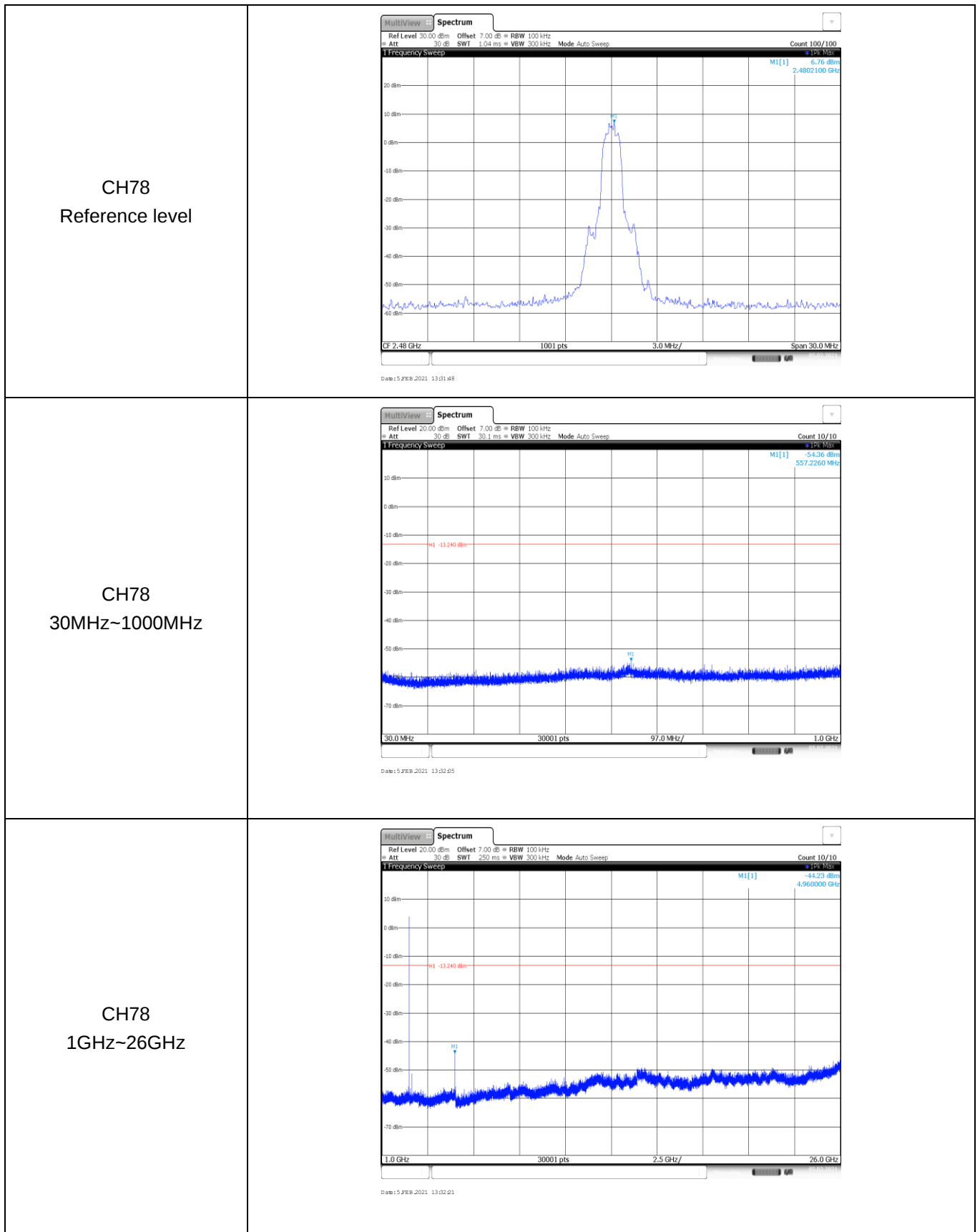
Test Item:	Spurious Emission	Modulation type:	$\pi/4$ DQPSK
CH00 Reference level			
CH00 30MHz~1000MHz			
CH00 1GHz~26GHz			



CH78 Reference level	 The spectrum plot shows a single sharp peak at 2.48 GHz. The y-axis represents power in dBm, ranging from -60 to 20. The x-axis represents frequency in MHz, with a span of 30.0 MHz. The peak is labeled with a count of 100/100. The plot is titled 'Spectrum' and includes parameters: Ref Level 30.00 dBm, Offset 7.00 dB, RBW 100 kHz, Att 30 dB, SWF 1.04 ms, VBW 300 kHz, Mode Auto Sweep. The date is 5 FEB 2021 11:01:29.
CH78 30MHz~1000MHz	 The spectrum plot shows a wide range of frequencies from 30.0 MHz to 1.0 GHz. The y-axis represents power in dBm, ranging from -70 to 10. The x-axis represents frequency in MHz, with a span of 97.0 MHz. The plot is titled 'Spectrum' and includes parameters: Ref Level 20.00 dBm, Offset 7.00 dB, RBW 100 kHz, Att 30 dB, SWF 30.1 ms, VBW 300 kHz, Mode Auto Sweep. The date is 5 FEB 2021 11:01:45.
CH78 1GHz~26GHz	 The spectrum plot shows a wide range of frequencies from 1.0 GHz to 26.0 GHz. The y-axis represents power in dBm, ranging from -70 to 10. The x-axis represents frequency in GHz, with a span of 2.5 GHz. The plot is titled 'Spectrum' and includes parameters: Ref Level 20.00 dBm, Offset 7.00 dB, RBW 100 kHz, Att 30 dB, SWF 250 ms, VBW 300 kHz, Mode Auto Sweep. The date is 5 FEB 2021 11:02:02.

Test Item:	Spurious Emission	Modulation type:	8DPSK
CH00 Reference level	 CH00 Reference level		
CH00 30MHz~1000MHz	 CH00 30MHz~1000MHz		
CH00 1GHz~26GHz	 CH00 1GHz~26GHz		





-----End of Report-----