

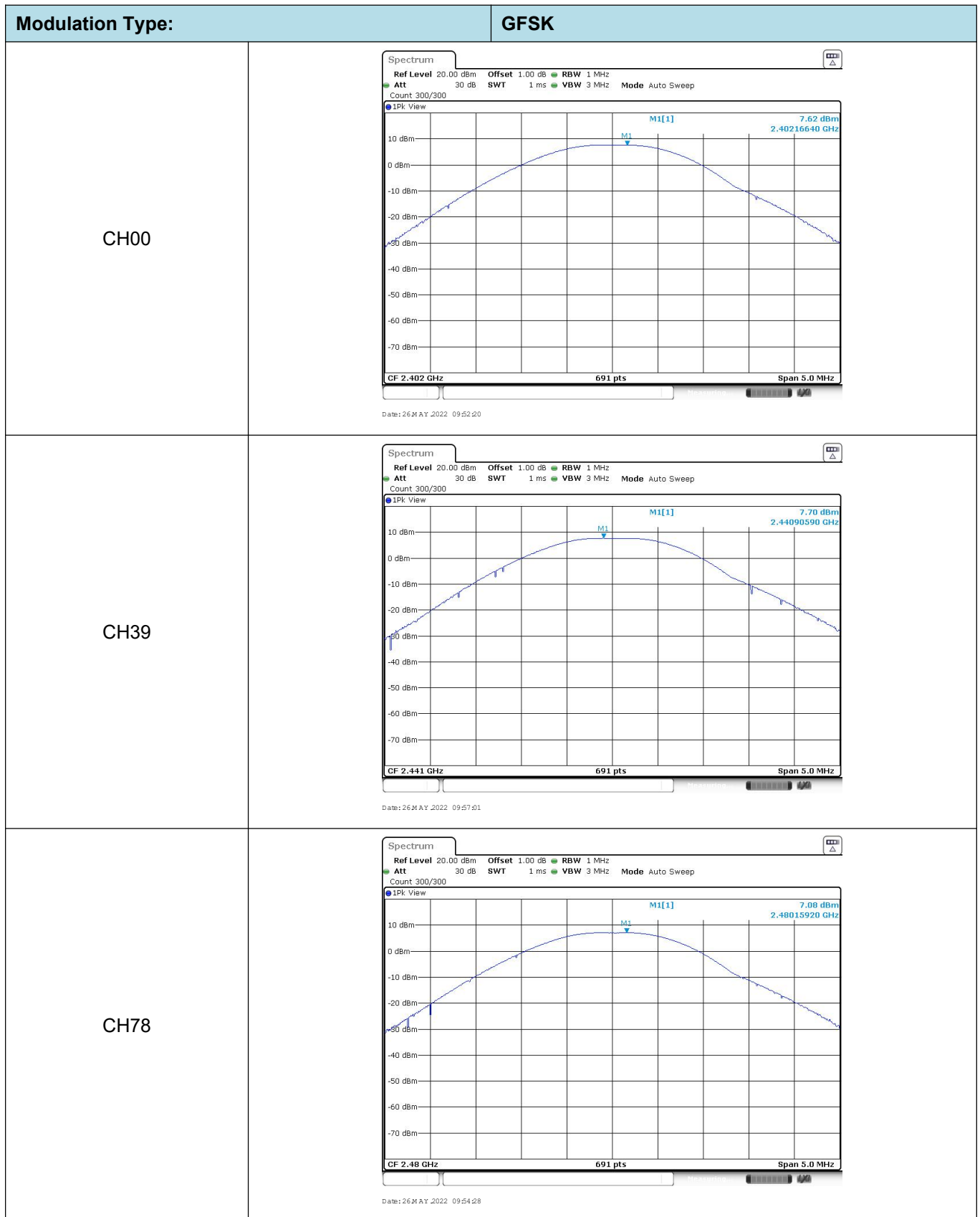
APPENDIX REPORT

Project No.	SHT2205032403EW	Radio Specification	Bluetooth EDR
Test sample No.	YPHT22050324006	Model No.	P60
Start test date	2022-05-26	Finish date	2022-05-27
Temperature	24.7℃	Humidity	37%
Test Engineer	Xiaoqin Li	Auditor	Xiaodong Zhuo

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

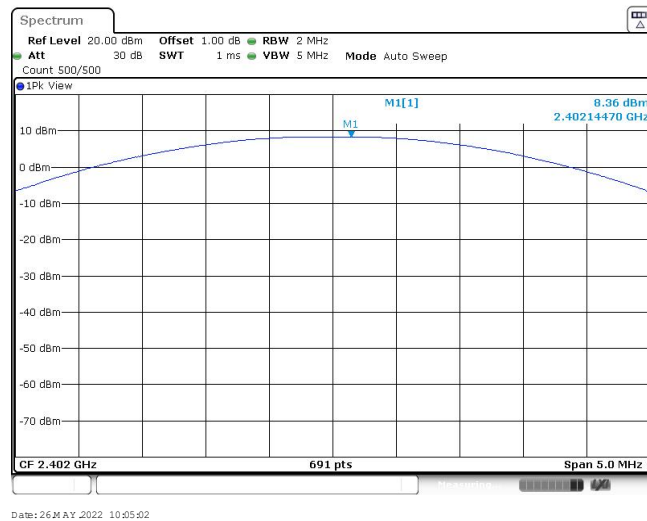
Modulation type	Channel	Peak Output power (dBm)	Average Output power (dBm)	Limit (dBm)	Result
GFSK	00	7.62	7.61	≤ 30.00	Pass
	39	7.70	7.65		
	78	7.08	7.01		
$\pi/4$ DQPSK	00	8.36	6.96	≤ 21.00	Pass
	39	8.94	7.28		
	78	8.43	7.07		
8DPSK	00	8.84	7.16	≤ 21.00	Pass
	39	9.37	7.30		
	78	8.88	7.20		



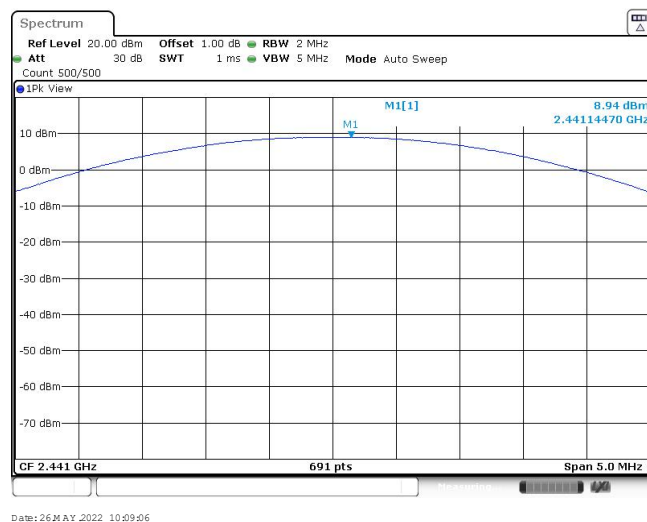
Modulation Type:

 $\pi/4$ DQPSK

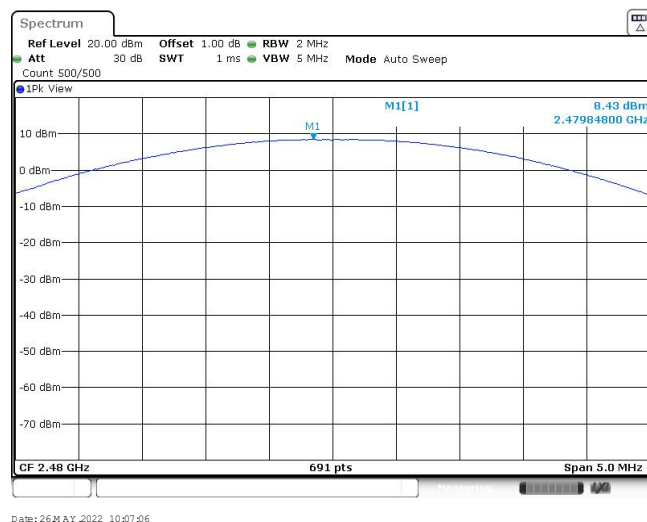
CH00



CH39



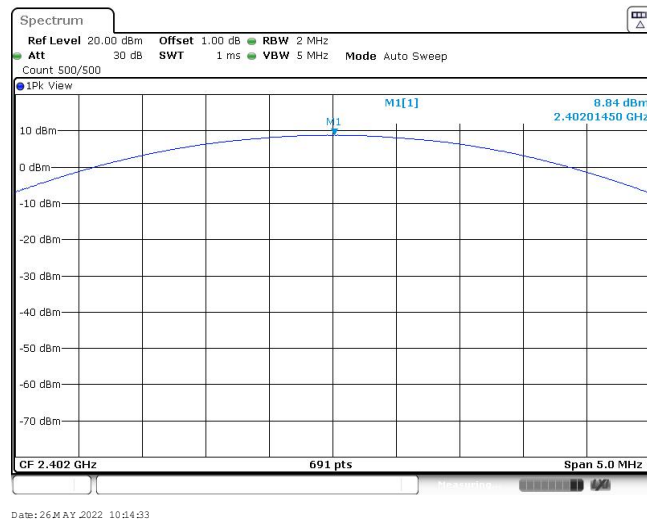
CH78



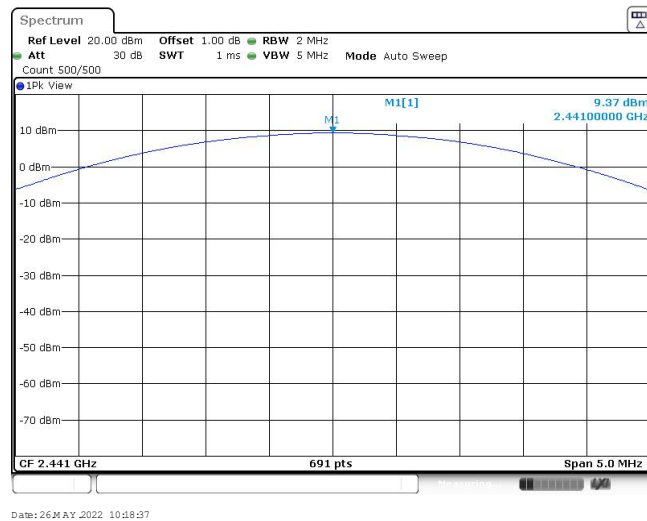
Modulation Type:

8DPSK

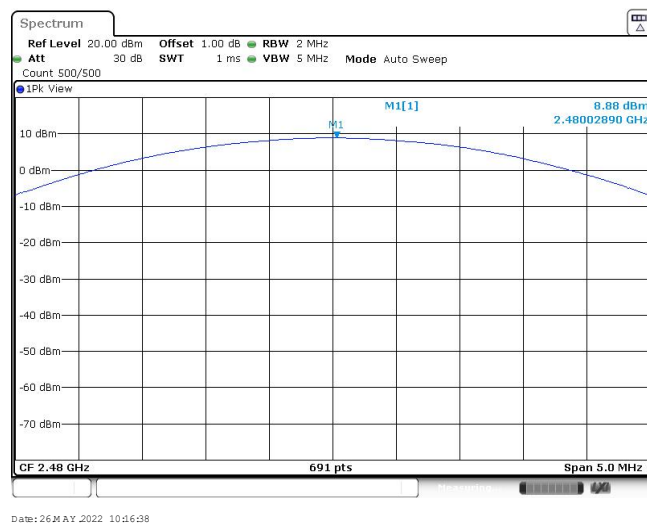
CH00



CH39



CH78



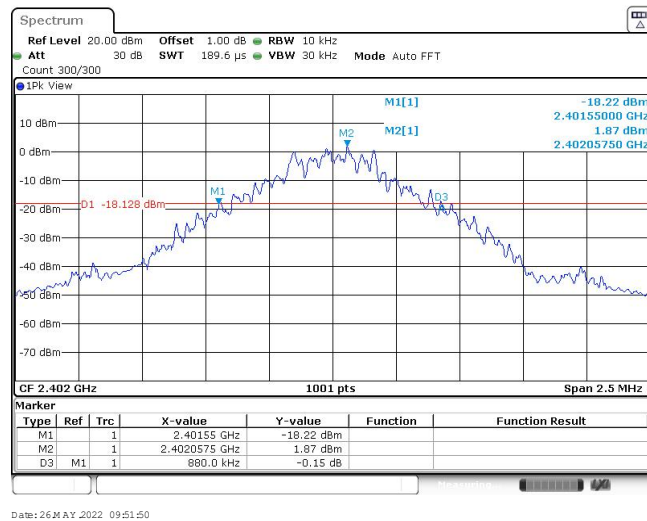
Appendix B : 20 dB Bandwidth

Modulation type	Channel	20 dB Bandwidth (kHz)	Limit (kHz)	Result
GFSK	00	880.00	-	Pass
	39	882.50		
	78	922.50		
$\pi/4$ DQPSK	00	1292.50	-	Pass
	39	1292.50		
	78	1292.50		
8DPSK	00	1297.50	-	Pass
	39	1297.50		
	78	1297.50		

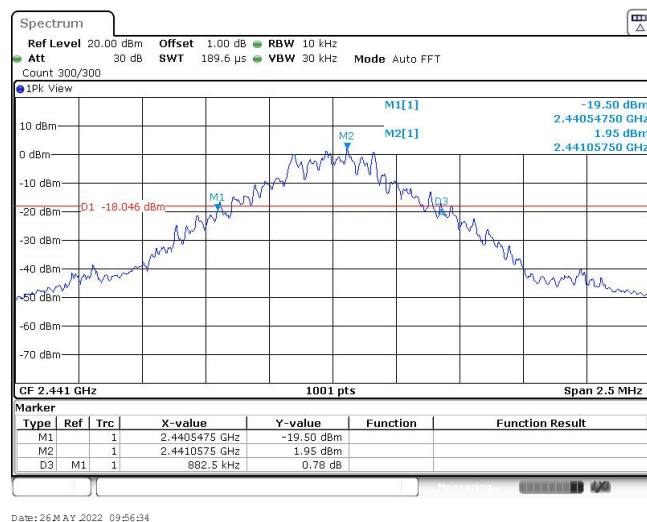
Modulation Type:

GFSK

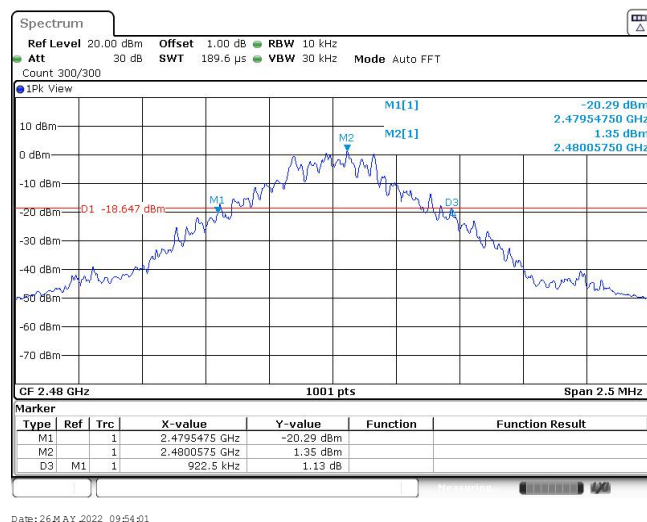
CH00



CH39



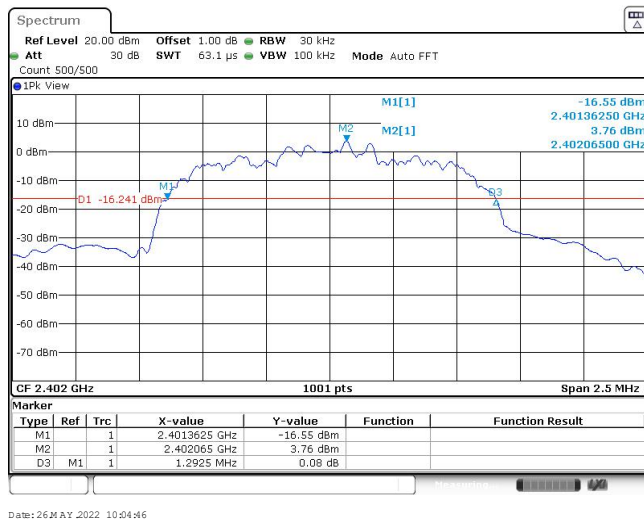
CH78



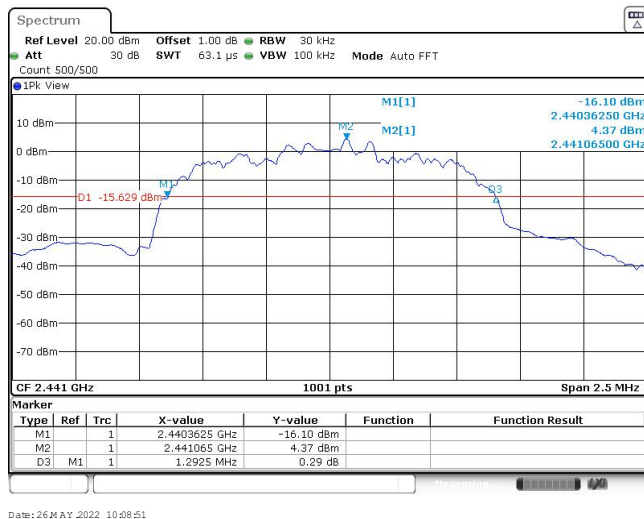
Modulation Type:

 $\pi/4$ DQPSK

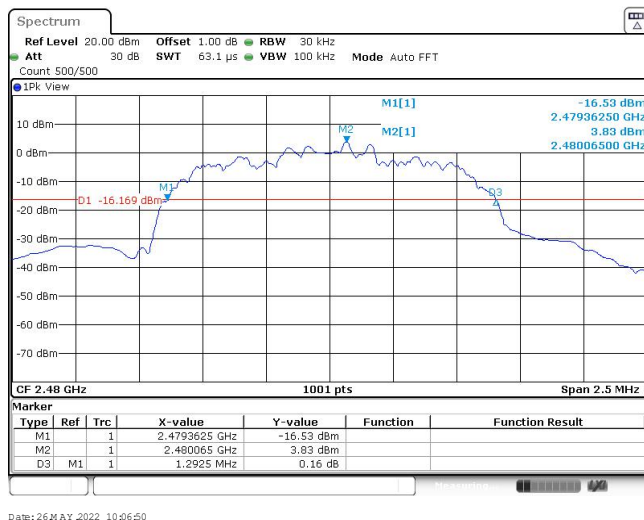
CH00



CH39



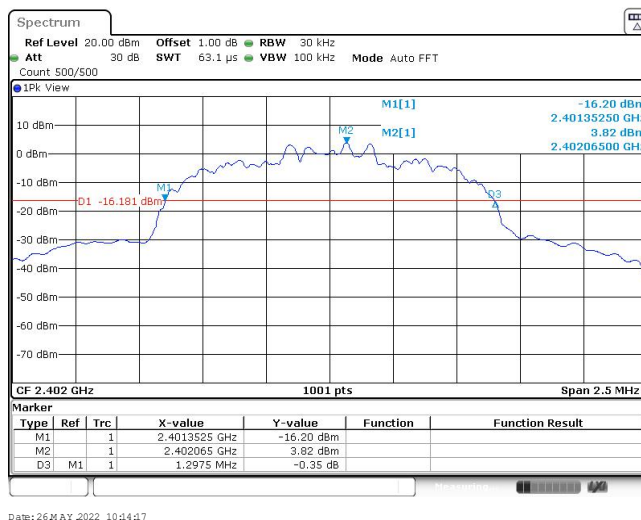
CH78



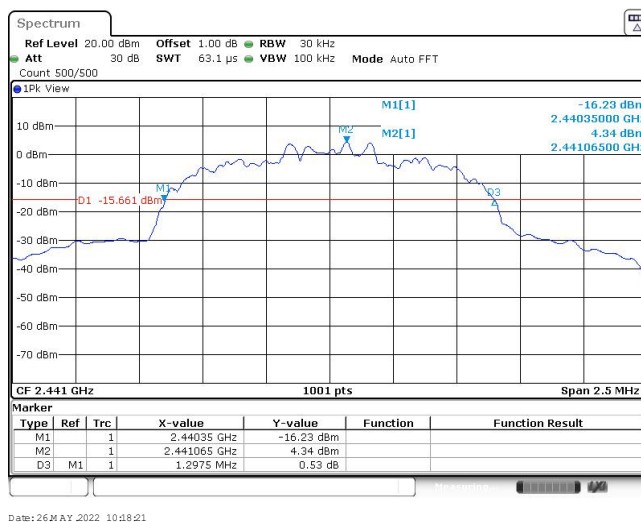
Modulation Type:

8DPSK

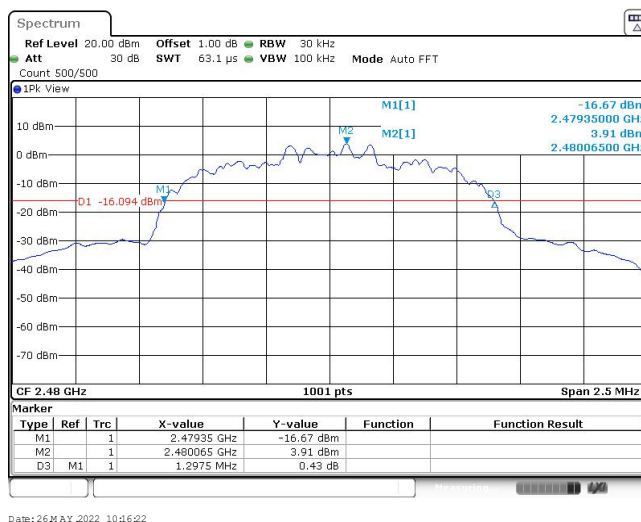
CH00



CH39

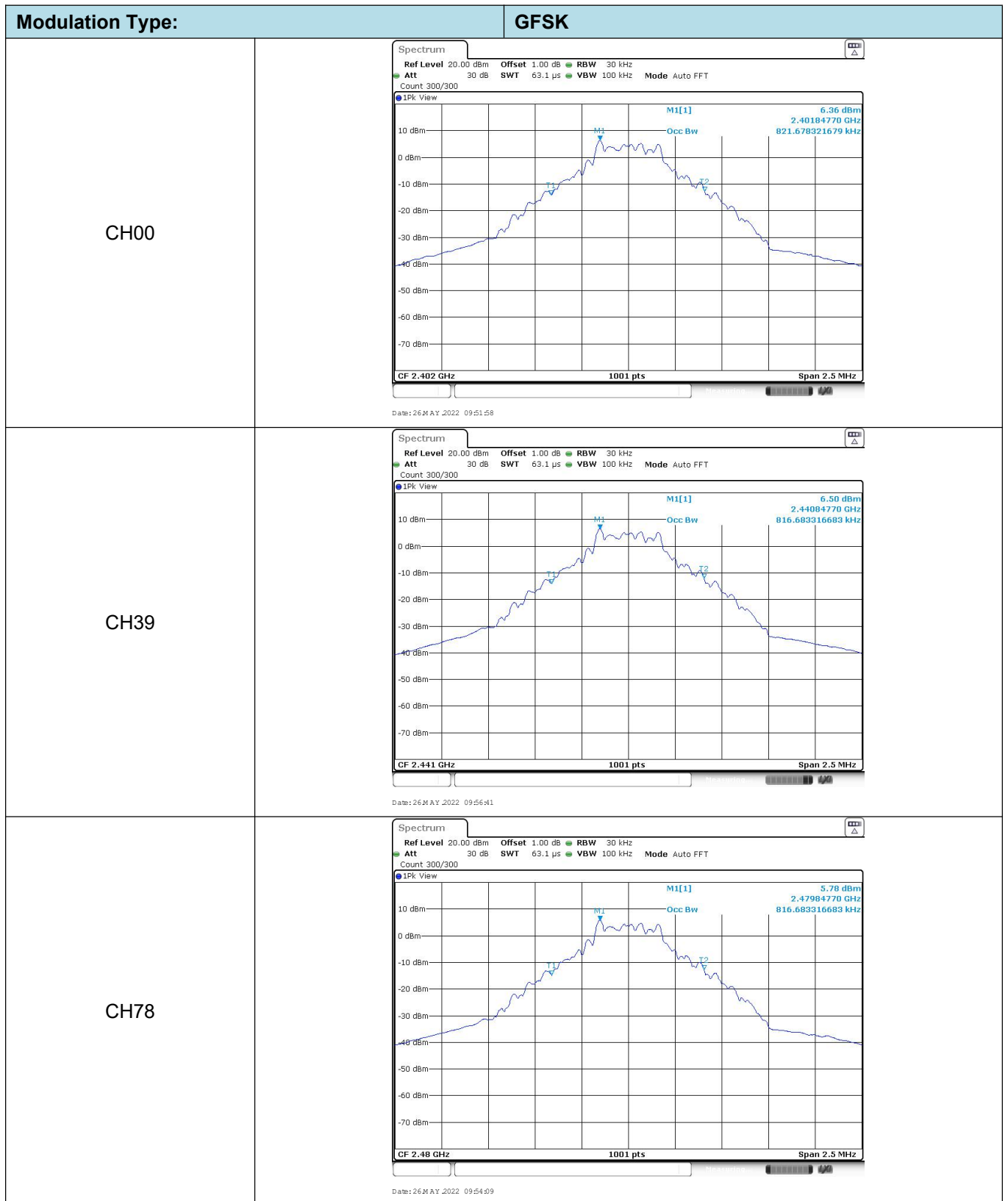


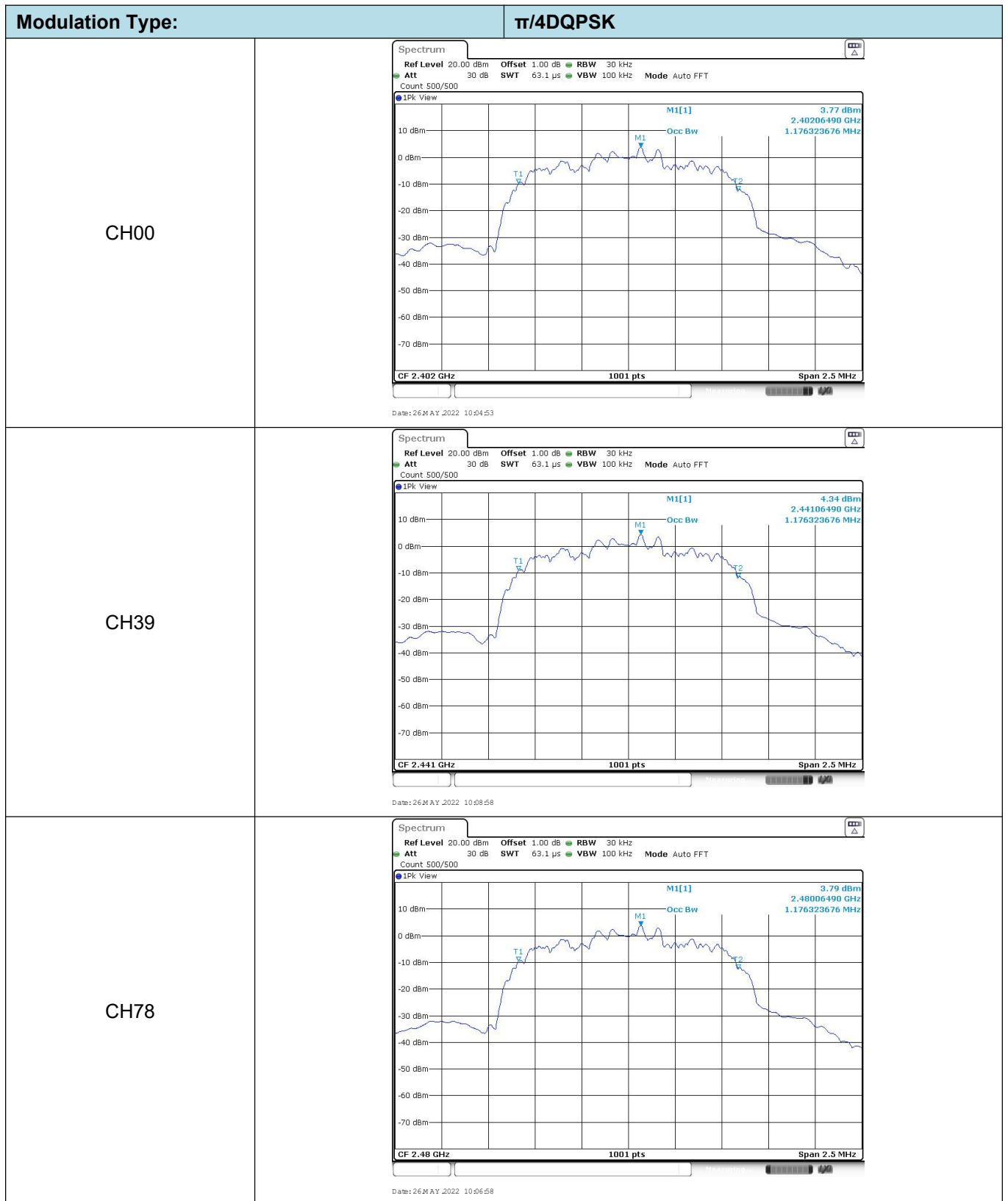
CH78

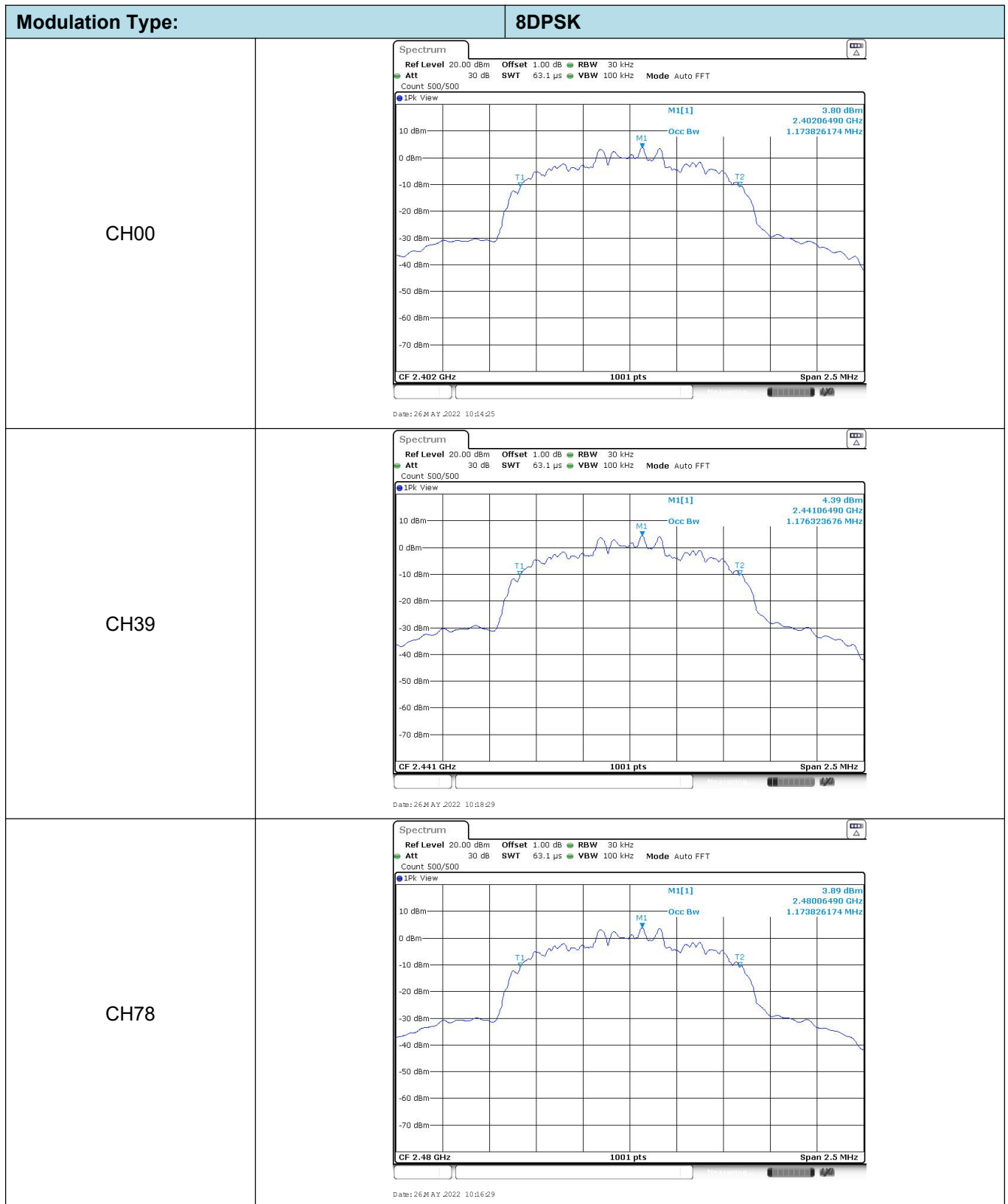


Appendix C: 99% Occupied Bandwidth

Modulation type	Channel	99% Occupied Bandwidth (MHz)	Limit (MHz)	Result
GFSK	00	0.82	-	Pass
	39	0.82		
	78	0.82		
$\pi/4$ DQPSK	00	1.18	-	Pass
	39	1.18		
	78	1.18		
8DPSK	00	1.17	-	Pass
	39	1.18		
	78	1.17		







Appendix D: Carrier Frequencies Separation

Modulation type	Channel	Carrier Frequencies Separation (MHz)	Limit (kHz) *	Result
GFSK	39	1.00	≥ 922.50	Pass
$\pi/4$ DQPSK	39	1.00	≥ 861.67	Pass
8DPSK	39	1.00	≥ 865.00	Pass

Note:

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

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

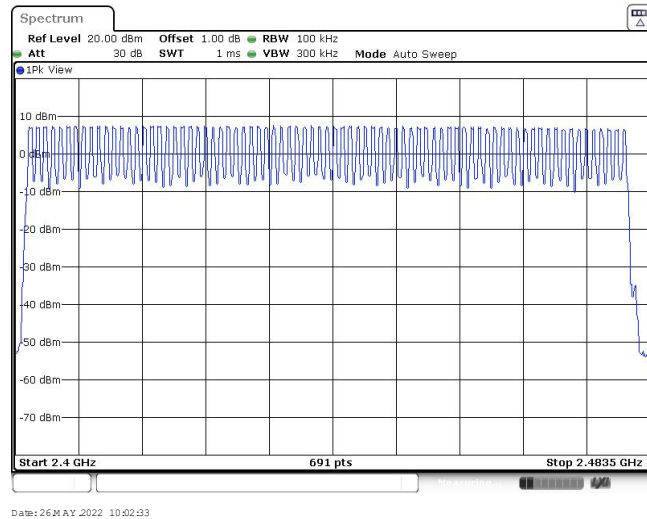
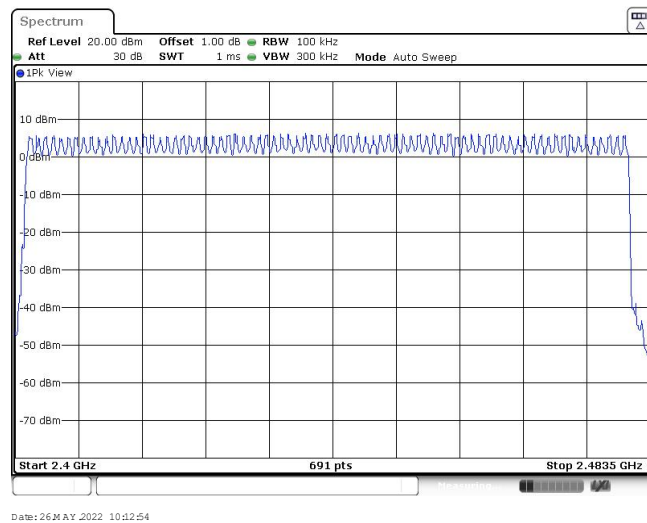
8DPSK limit = $2/3$ * The maximum 20 dB Bandwidth for 8DPSK modulation on the appendix B

Appendix report page: 15 of 41

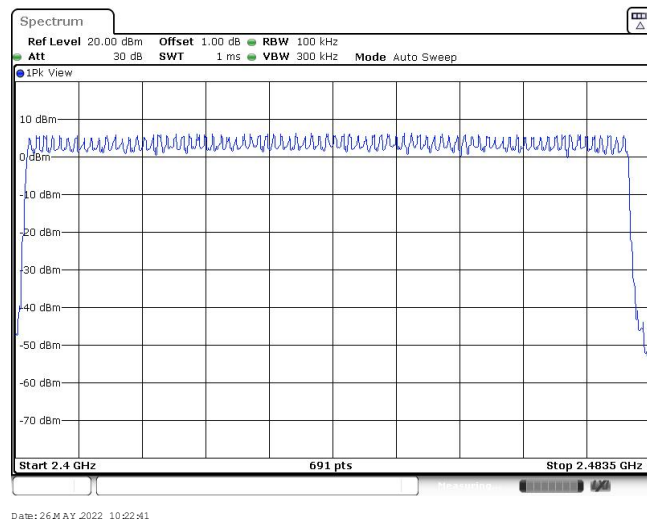
Appendix E: Hopping Channel Number

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

GFSK

 $\pi/4$ DQPSK

8DPSK

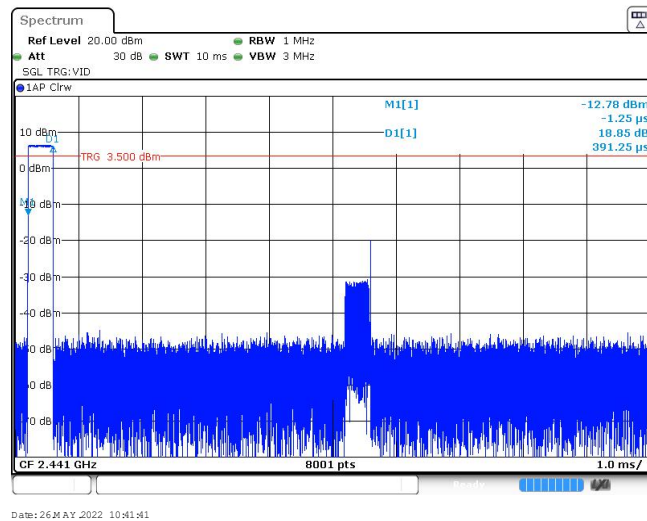
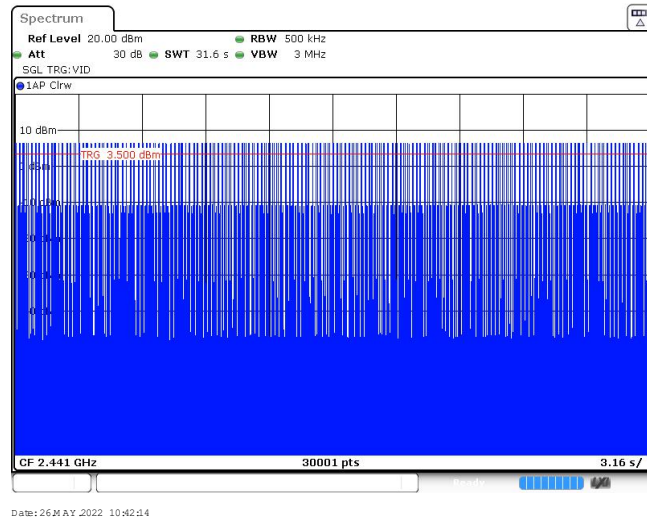
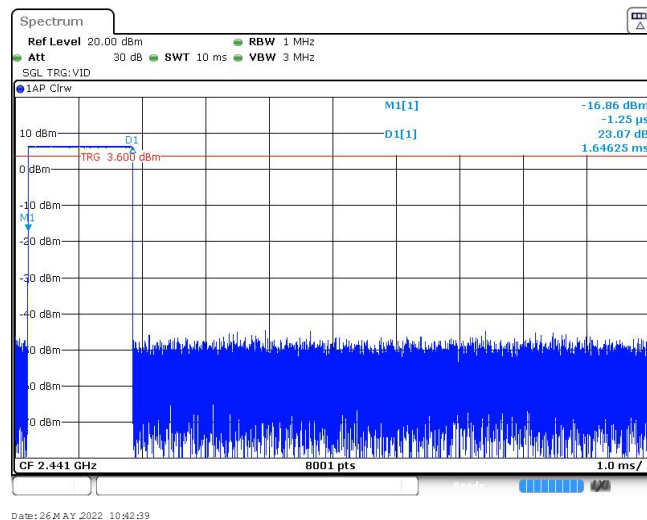


Appendix F: Dwell Time

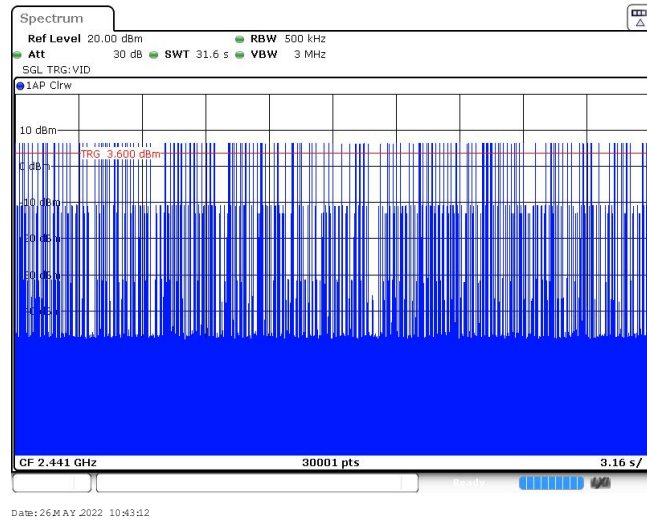
Modulation type	Packet	Burst Width [ms]	Total Hops[hop*ch]	Dwell time (Second)	Limit (Second)	Result
GFSK	DH1	0.39	321	0.13	≤ 0.40	Pass
	DH3	1.65	171	0.28		
	DH5	2.89	100	0.29		
$\pi/4$ DQPSK	2DH1	0.38	321	0.12	≤ 0.40	Pass
	2DH3	1.64	165	0.27		
	2DH5	2.88	111	0.32		
8DPSK	3DH1	0.38	320	0.12	≤ 0.40	Pass
	3DH3	1.63	159	0.26		
	3DH5	2.88	93	0.27		

Modulation Type:

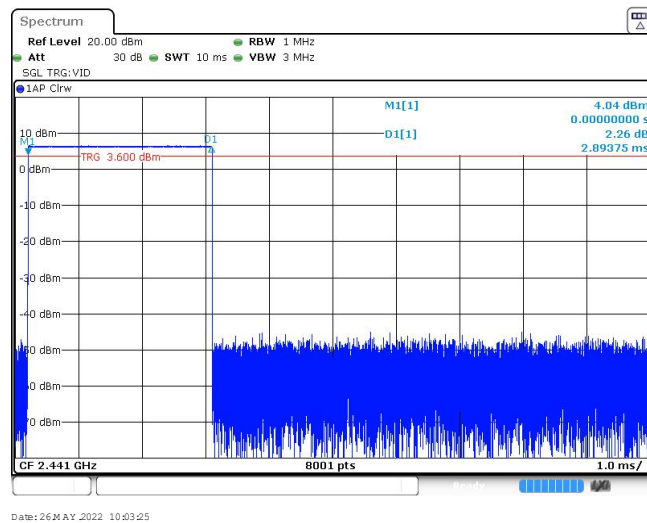
GFSK

DH1
Burst widthDH1
Burst numberDH3
Burst width

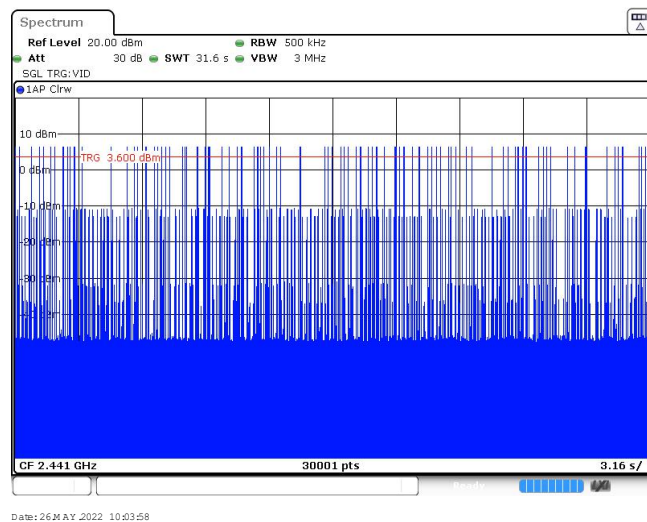
DH3
Burst number



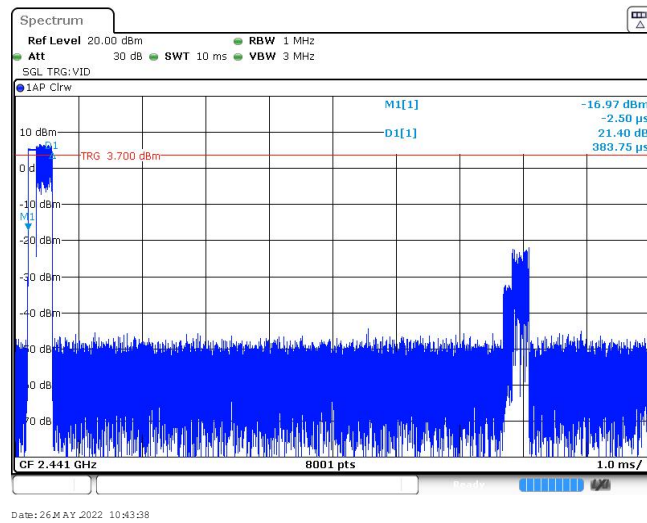
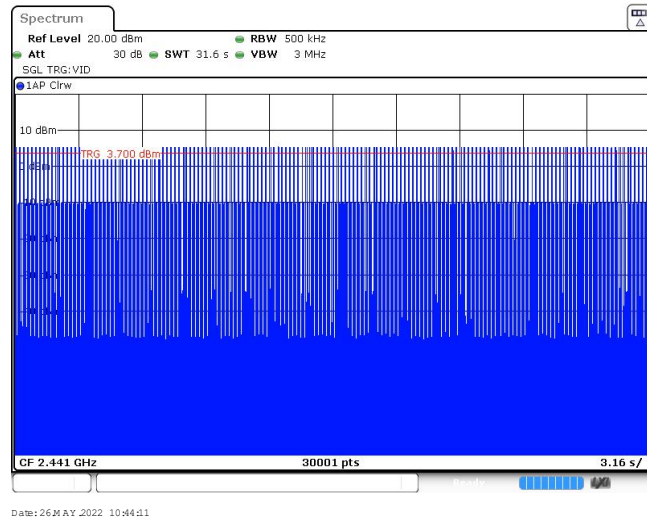
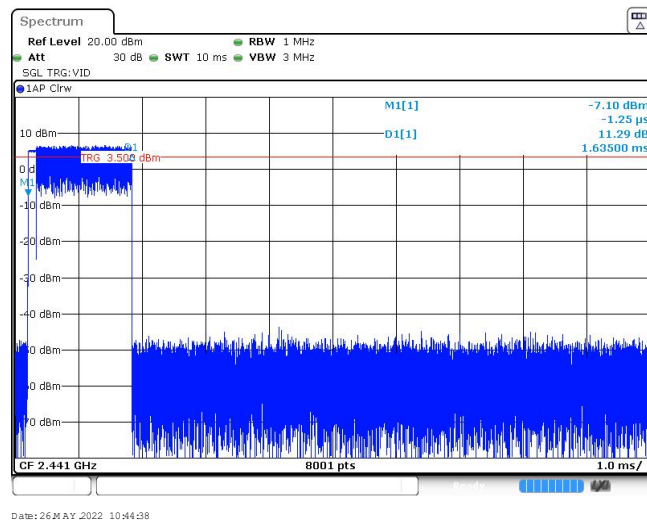
DH5
Burst width

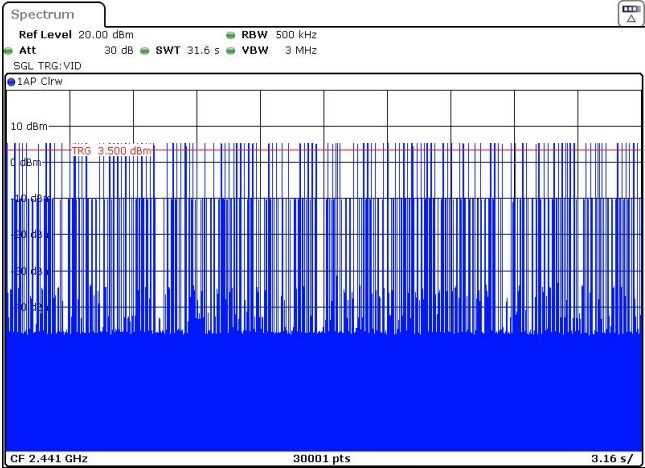
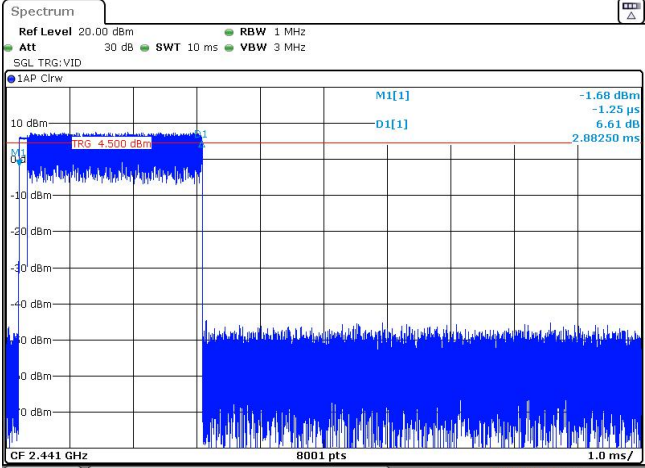
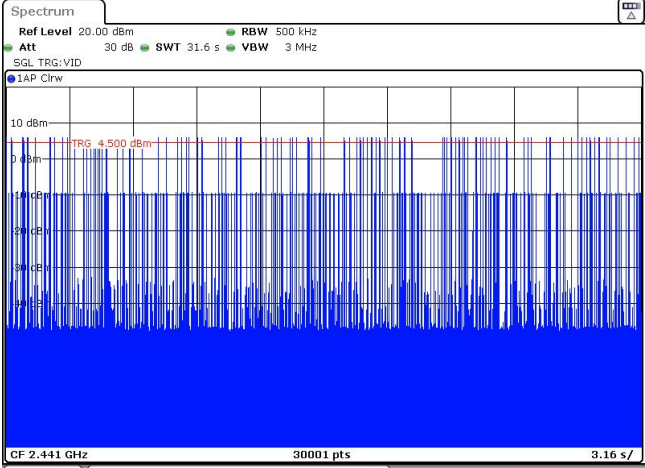


DH5
Burst number



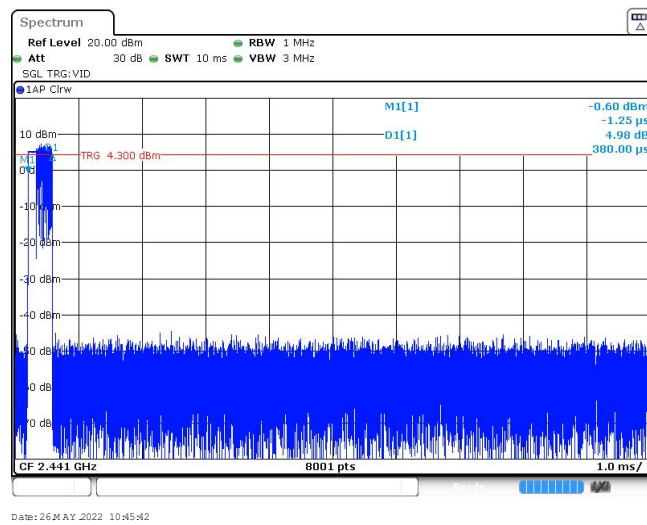
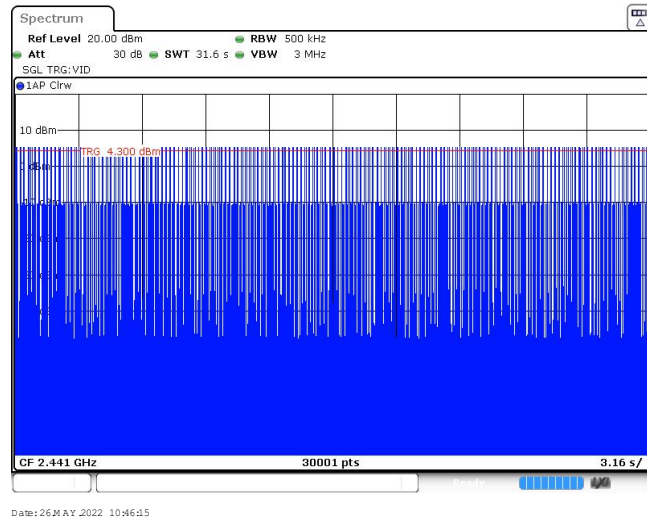
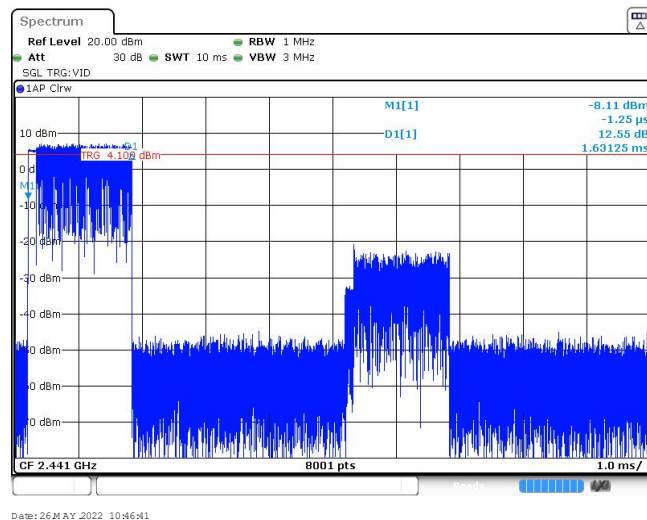
Modulation Type:

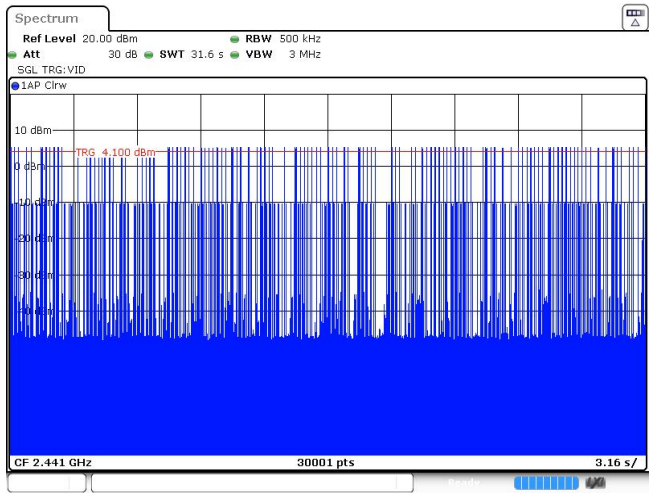
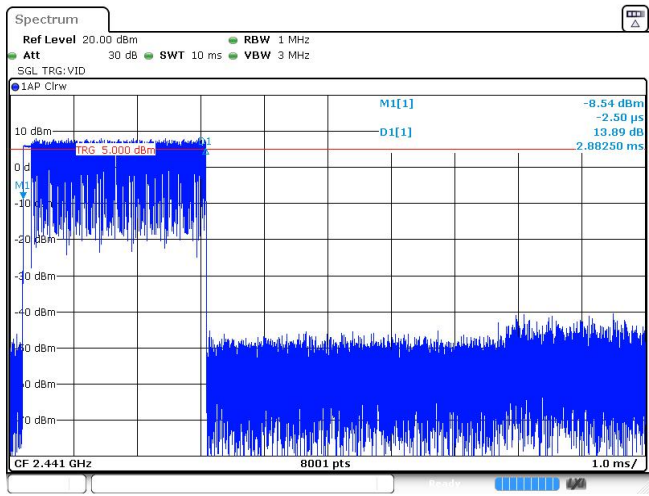
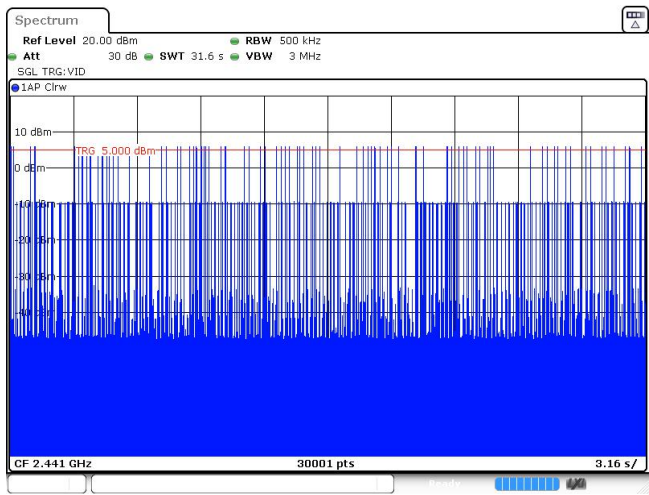
 $\pi/4$ DQPSK2DH1
Burst width2DH1
Burst number2DH3
Burst width

2DH3 Burst number	 Spectrum Ref Level 20.00 dBm Att 30 dB SWT 31.6 s RBW 500 kHz VBW 3 MHz SGL TRG:VID 1AP Clrw 10 dBm 0 dBm TRG 3.500 dBm CF 2.441 GHz 30001 pts 3.16 s/ Date: 26 MAY 2022 10:45:11
2DH5 Burst width	 Spectrum Ref Level 20.00 dBm Att 30 dB SWT 10 ms RBW 1 MHz VBW 3 MHz SGL TRG:VID 1AP Clrw 10 dBm 0 dBm TRG 4.500 dBm CF 2.441 GHz 8001 pts 1.0 ms/ Date: 27 MAY 2022 09:01:00 M1[1] -1.68 dBm D1[1] -1.25 μs 6.61 dB 2.88250 ms
2DH5 Burst number	 Spectrum Ref Level 20.00 dBm Att 30 dB SWT 31.6 s RBW 500 kHz VBW 3 MHz SGL TRG:VID 1AP Clrw 10 dBm 0 dBm TRG 4.500 dBm CF 2.441 GHz 30001 pts 3.16 s/ Date: 27 MAY 2022 09:01:33

Modulation Type:

8DPSK

3DH1
Burst width3DH1
Burst number3DH3
Burst width

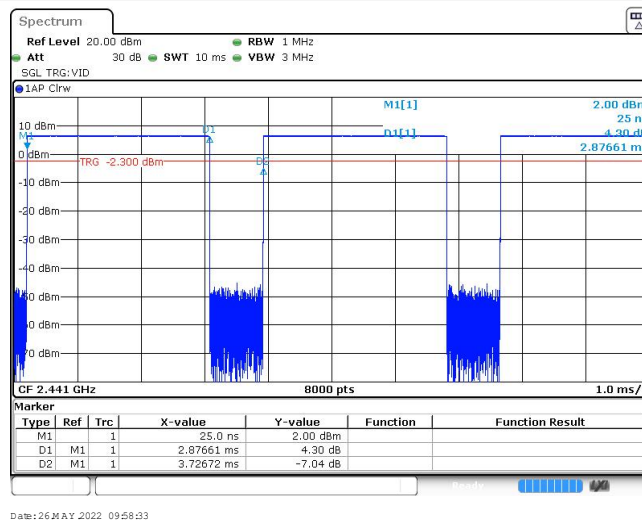
3DH3 Burst number	 The spectrum plot shows a signal at 2.441 GHz with a bandwidth of 30001 pts. The y-axis represents power in dBm, ranging from -40 to 10. A red trigger line is set at 4.100 dBm. The signal is a burst of noise. The date is 26 MAY 2022 10:47:14.
3DH5 Burst width	 The spectrum plot shows a signal at 2.441 GHz with a bandwidth of 8001 pts. The y-axis represents power in dBm, ranging from -40 to 10. A red trigger line is set at 5.000 dBm. The signal is a burst of noise. The date is 27 MAY 2022 09:02:03.
3DH5 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 -40 to 10. A red trigger line is set at 5.000 dBm. The signal is a burst of noise. The date is 27 MAY 2022 09:02:06.

Appendix G: Duty Cycle Correction Factor (DCCF)**DCCF Calculate Formula**

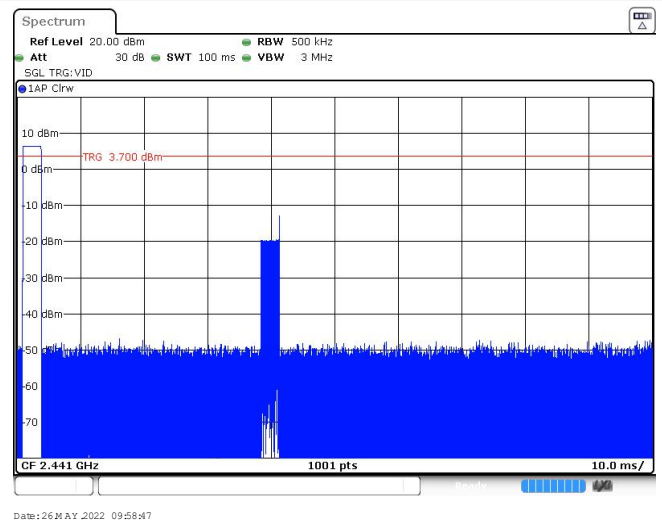
$$\text{DCCF} = 20 * \text{Log}(\text{duty cycle}) = 20 * \text{Log}(T_{\text{on time}} / T_{\text{period}})$$

Modulation type	Test Frequency (MHz)	T _{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	1	-30.84
8DPSK	2441	2.86	100	1	-30.87

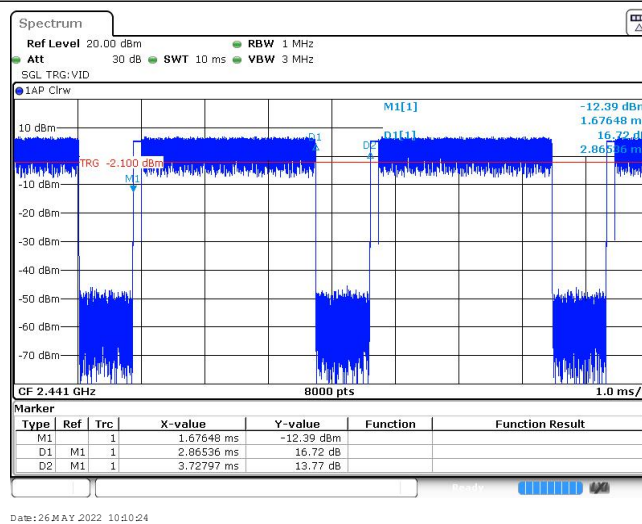
GFSK



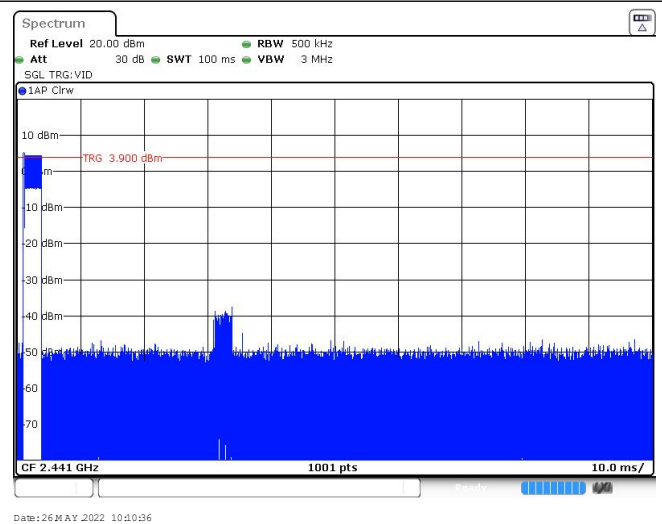
Ton time for single burst



Burst Quantity

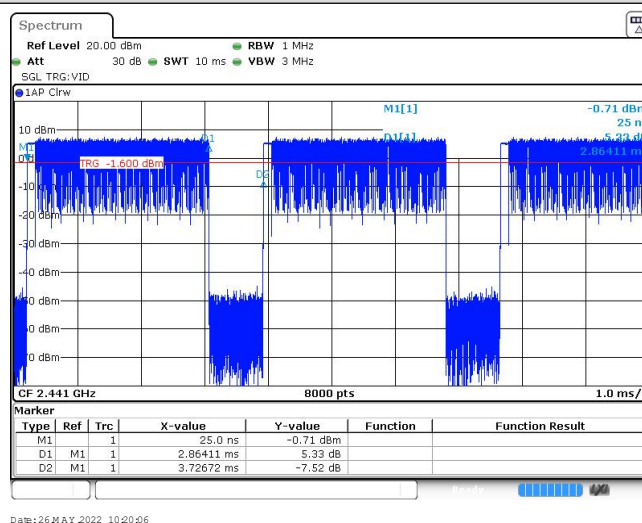
 $\pi/4$ DQPSK

Ton time for single burst

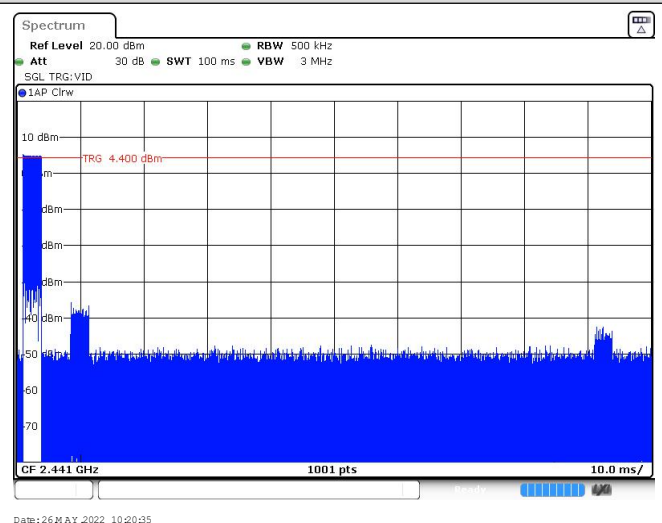


Burst Quantity

8DPSK



Ton time for single burst

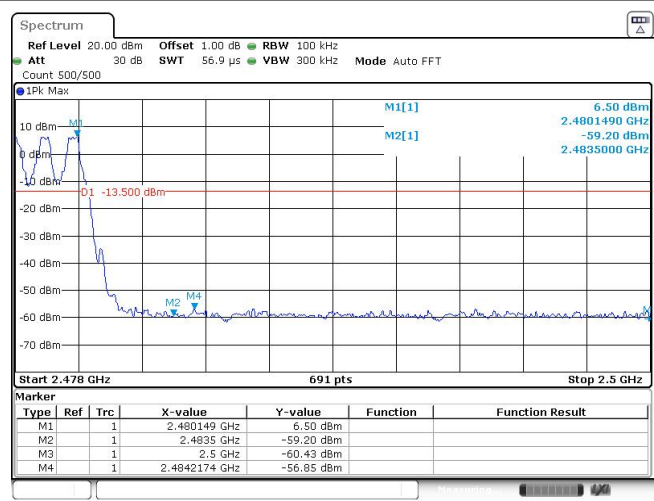


Burst Quantity

Appendix H: Band edge and Spurious Emissions (conducted)

Test Item:	Band edge	Modulation type:	GFSK																																										
CH00 No hopping mode	Spectrum Ref Level 20.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SWT 1.1 ms VBW 300 kHz Mode Auto Sweep Count 300/300 1Pk Max 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] M2[1] M3 M4 M5 7.23 dBm 2.401910 GHz -52.61 dBm 2.400000 GHz D1 -12.770 dBm Start 2.31 GHz 691 pts Stop 2.405 GHz Marker <table><tr><th>Type</th><th>Ref</th><th>Trc</th><th>X-value</th><th>Y-value</th><th>Function</th><th>Function Result</th></tr><tr><td>M1</td><td>1</td><td></td><td>2.40191 GHz</td><td>7.23 dBm</td><td></td><td></td></tr><tr><td>M2</td><td>1</td><td></td><td>2.4 GHz</td><td>-52.61 dBm</td><td></td><td></td></tr><tr><td>M3</td><td>1</td><td></td><td>2.39 GHz</td><td>-54.74 dBm</td><td></td><td></td></tr><tr><td>M4</td><td>1</td><td></td><td>2.31 GHz</td><td>-53.98 dBm</td><td></td><td></td></tr><tr><td>M5</td><td>1</td><td></td><td>2.399906 GHz</td><td>-52.14 dBm</td><td></td><td></td></tr></table> Date: 26 MAY 2022 09:52:49			Type	Ref	Trc	X-value	Y-value	Function	Function Result	M1	1		2.40191 GHz	7.23 dBm			M2	1		2.4 GHz	-52.61 dBm			M3	1		2.39 GHz	-54.74 dBm			M4	1		2.31 GHz	-53.98 dBm			M5	1		2.399906 GHz	-52.14 dBm		
Type	Ref	Trc	X-value	Y-value	Function	Function Result																																							
M1	1		2.40191 GHz	7.23 dBm																																									
M2	1		2.4 GHz	-52.61 dBm																																									
M3	1		2.39 GHz	-54.74 dBm																																									
M4	1		2.31 GHz	-53.98 dBm																																									
M5	1		2.399906 GHz	-52.14 dBm																																									
CH00 Hopping mode	Spectrum Ref Level 20.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SWT 1.1 ms VBW 300 kHz Mode Auto Sweep Count 500/500 1Pk Max 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] M2[1] M3 M4 M5 7.25 dBm 2.404240 GHz -53.73 dBm 2.400000 GHz D1 -12.750 dBm Start 2.31 GHz 691 pts Stop 2.405 GHz Marker <table><tr><th>Type</th><th>Ref</th><th>Trc</th><th>X-value</th><th>Y-value</th><th>Function</th><th>Function Result</th></tr><tr><td>M1</td><td>1</td><td></td><td>2.40424 GHz</td><td>7.25 dBm</td><td></td><td></td></tr><tr><td>M2</td><td>1</td><td></td><td>2.4 GHz</td><td>-53.73 dBm</td><td></td><td></td></tr><tr><td>M3</td><td>1</td><td></td><td>2.39 GHz</td><td>-54.88 dBm</td><td></td><td></td></tr><tr><td>M4</td><td>1</td><td></td><td>2.31 GHz</td><td>-54.73 dBm</td><td></td><td></td></tr><tr><td>M5</td><td>1</td><td></td><td>2.374986 GHz</td><td>-52.22 dBm</td><td></td><td></td></tr></table> Date: 26 MAY 2022 10:02:46			Type	Ref	Trc	X-value	Y-value	Function	Function Result	M1	1		2.40424 GHz	7.25 dBm			M2	1		2.4 GHz	-53.73 dBm			M3	1		2.39 GHz	-54.88 dBm			M4	1		2.31 GHz	-54.73 dBm			M5	1		2.374986 GHz	-52.22 dBm		
Type	Ref	Trc	X-value	Y-value	Function	Function Result																																							
M1	1		2.40424 GHz	7.25 dBm																																									
M2	1		2.4 GHz	-53.73 dBm																																									
M3	1		2.39 GHz	-54.88 dBm																																									
M4	1		2.31 GHz	-54.73 dBm																																									
M5	1		2.374986 GHz	-52.22 dBm																																									
CH78 No hopping mode	Spectrum Ref Level 20.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SWT 56.9 µs VBW 300 kHz Mode Auto FFT Count 300/300 1Pk Max 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] M2[1] M3 M4 7.13 dBm 2.4798310 GHz -56.91 dBm 2.4835000 GHz D1 -12.870 dBm Start 2.478 GHz 691 pts Stop 2.5 GHz Marker <table><tr><th>Type</th><th>Ref</th><th>Trc</th><th>X-value</th><th>Y-value</th><th>Function</th><th>Function Result</th></tr><tr><td>M1</td><td>1</td><td></td><td>2.479831 GHz</td><td>7.13 dBm</td><td></td><td></td></tr><tr><td>M2</td><td>1</td><td></td><td>2.4835 GHz</td><td>-56.91 dBm</td><td></td><td></td></tr><tr><td>M3</td><td>1</td><td></td><td>2.5 GHz</td><td>-59.39 dBm</td><td></td><td></td></tr><tr><td>M4</td><td>1</td><td></td><td>2.4836435 GHz</td><td>-56.68 dBm</td><td></td><td></td></tr></table> Date: 26 MAY 2022 09:55:25			Type	Ref	Trc	X-value	Y-value	Function	Function Result	M1	1		2.479831 GHz	7.13 dBm			M2	1		2.4835 GHz	-56.91 dBm			M3	1		2.5 GHz	-59.39 dBm			M4	1		2.4836435 GHz	-56.68 dBm									
Type	Ref	Trc	X-value	Y-value	Function	Function Result																																							
M1	1		2.479831 GHz	7.13 dBm																																									
M2	1		2.4835 GHz	-56.91 dBm																																									
M3	1		2.5 GHz	-59.39 dBm																																									
M4	1		2.4836435 GHz	-56.68 dBm																																									

CH78
Hopping mode



Test Item:	Band edge	Modulation type:	$\pi/4$ DQPSK																																										
CH00 No hopping mode	Spectrum Ref Level 20.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SWT 1.1 ms VBW 300 kHz Mode Auto Sweep Count 500/500 1Pk Max 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] M2[1] M3 5.25 dBm 2.402180 GHz -46.35 dBm 2.400000 GHz D1 -14.750 dBm Start 2.31 GHz 691 pts Stop 2.405 GHz Marker <table><tr><th>Type</th><th>Ref</th><th>Trc</th><th>X-value</th><th>Y-value</th><th>Function</th><th>Function Result</th></tr><tr><td>M1</td><td>1</td><td>1</td><td>2.40218 GHz</td><td>5.25 dBm</td><td></td><td></td></tr><tr><td>M2</td><td>1</td><td>1</td><td>2.4 GHz</td><td>-46.35 dBm</td><td></td><td></td></tr><tr><td>M3</td><td>1</td><td>1</td><td>2.39 GHz</td><td>-53.48 dBm</td><td></td><td></td></tr><tr><td>M4</td><td>1</td><td>1</td><td>2.31 GHz</td><td>-52.51 dBm</td><td></td><td></td></tr><tr><td>M5</td><td>1</td><td>1</td><td>2.39963 GHz</td><td>-45.39 dBm</td><td></td><td></td></tr></table> Date: 26 MAY 2022 10:05:34			Type	Ref	Trc	X-value	Y-value	Function	Function Result	M1	1	1	2.40218 GHz	5.25 dBm			M2	1	1	2.4 GHz	-46.35 dBm			M3	1	1	2.39 GHz	-53.48 dBm			M4	1	1	2.31 GHz	-52.51 dBm			M5	1	1	2.39963 GHz	-45.39 dBm		
Type	Ref	Trc	X-value	Y-value	Function	Function Result																																							
M1	1	1	2.40218 GHz	5.25 dBm																																									
M2	1	1	2.4 GHz	-46.35 dBm																																									
M3	1	1	2.39 GHz	-53.48 dBm																																									
M4	1	1	2.31 GHz	-52.51 dBm																																									
M5	1	1	2.39963 GHz	-45.39 dBm																																									
CH00 Hopping mode	Spectrum Ref Level 20.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SWT 1.1 ms VBW 300 kHz Mode Auto Sweep Count 500/500 1Pk Max 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] M2[1] M3 5.53 dBm 2.401910 GHz -49.01 dBm 2.400000 GHz D1 -14.470 dBm Start 2.31 GHz 691 pts Stop 2.405 GHz Marker <table><tr><th>Type</th><th>Ref</th><th>Trc</th><th>X-value</th><th>Y-value</th><th>Function</th><th>Function Result</th></tr><tr><td>M1</td><td>1</td><td>1</td><td>2.40191 GHz</td><td>5.53 dBm</td><td></td><td></td></tr><tr><td>M2</td><td>1</td><td>1</td><td>2.4 GHz</td><td>-49.01 dBm</td><td></td><td></td></tr><tr><td>M3</td><td>1</td><td>1</td><td>2.39 GHz</td><td>-55.08 dBm</td><td></td><td></td></tr><tr><td>M4</td><td>1</td><td>1</td><td>2.31 GHz</td><td>-53.64 dBm</td><td></td><td></td></tr><tr><td>M5</td><td>1</td><td>1</td><td>2.399768 GHz</td><td>-46.08 dBm</td><td></td><td></td></tr></table> Date: 26 MAY 2022 10:13:07			Type	Ref	Trc	X-value	Y-value	Function	Function Result	M1	1	1	2.40191 GHz	5.53 dBm			M2	1	1	2.4 GHz	-49.01 dBm			M3	1	1	2.39 GHz	-55.08 dBm			M4	1	1	2.31 GHz	-53.64 dBm			M5	1	1	2.399768 GHz	-46.08 dBm		
Type	Ref	Trc	X-value	Y-value	Function	Function Result																																							
M1	1	1	2.40191 GHz	5.53 dBm																																									
M2	1	1	2.4 GHz	-49.01 dBm																																									
M3	1	1	2.39 GHz	-55.08 dBm																																									
M4	1	1	2.31 GHz	-53.64 dBm																																									
M5	1	1	2.399768 GHz	-46.08 dBm																																									
CH78 No hopping mode	Spectrum Ref Level 20.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SWT 56.9 μs VBW 300 kHz Mode Auto FFT Count 500/500 1Pk Max 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] M2[1] M3 6.13 dBm 2.4798310 GHz -52.39 dBm 2.4835000 GHz D1 -13.870 dBm Start 2.478 GHz 691 pts Stop 2.5 GHz Marker <table><tr><th>Type</th><th>Ref</th><th>Trc</th><th>X-value</th><th>Y-value</th><th>Function</th><th>Function Result</th></tr><tr><td>M1</td><td>1</td><td>1</td><td>2.479831 GHz</td><td>6.13 dBm</td><td></td><td></td></tr><tr><td>M2</td><td>1</td><td>1</td><td>2.4835 GHz</td><td>-52.39 dBm</td><td></td><td></td></tr><tr><td>M3</td><td>1</td><td>1</td><td>2.5 GHz</td><td>-60.22 dBm</td><td></td><td></td></tr><tr><td>M4</td><td>1</td><td>1</td><td>2.4835159 GHz</td><td>-53.80 dBm</td><td></td><td></td></tr></table> Date: 26 MAY 2022 10:07:40			Type	Ref	Trc	X-value	Y-value	Function	Function Result	M1	1	1	2.479831 GHz	6.13 dBm			M2	1	1	2.4835 GHz	-52.39 dBm			M3	1	1	2.5 GHz	-60.22 dBm			M4	1	1	2.4835159 GHz	-53.80 dBm									
Type	Ref	Trc	X-value	Y-value	Function	Function Result																																							
M1	1	1	2.479831 GHz	6.13 dBm																																									
M2	1	1	2.4835 GHz	-52.39 dBm																																									
M3	1	1	2.5 GHz	-60.22 dBm																																									
M4	1	1	2.4835159 GHz	-53.80 dBm																																									