

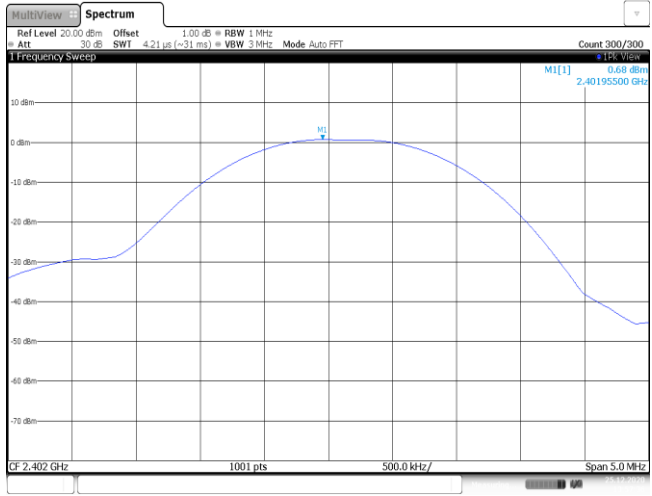
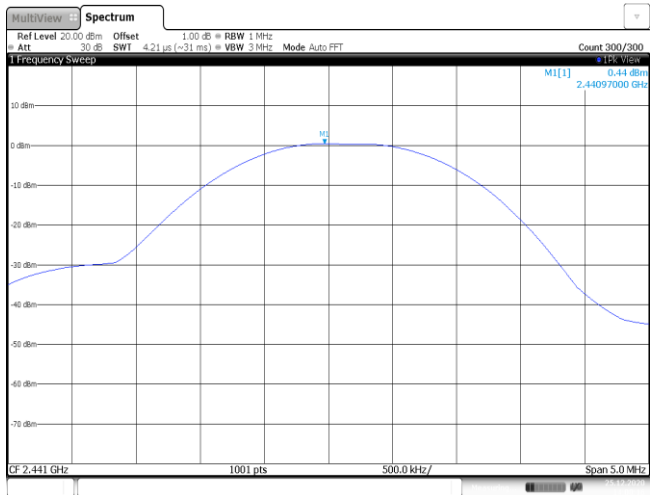
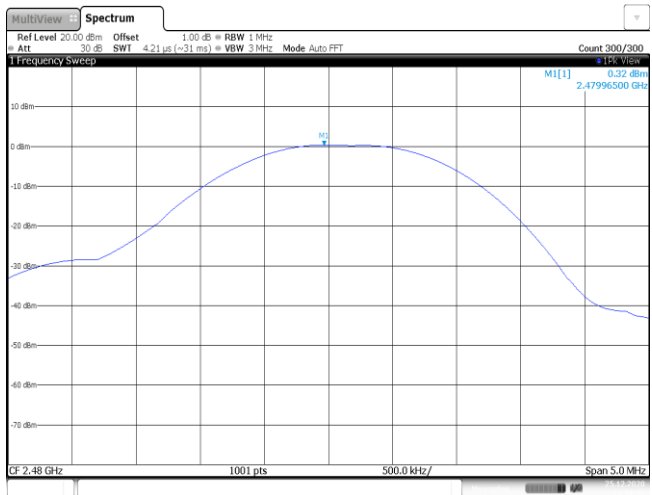
APPENDIX REPORT

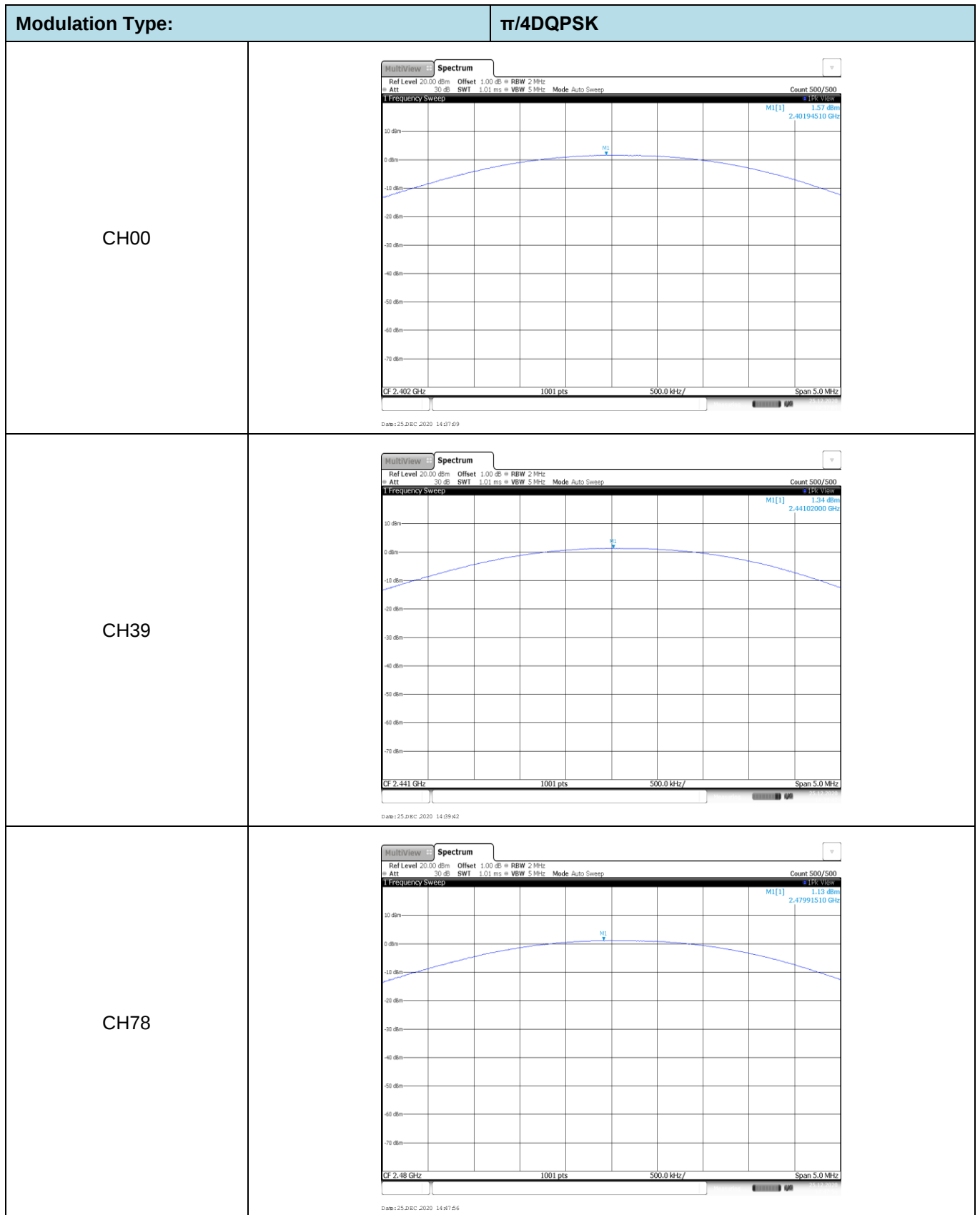
Project No.	SHT2012072601EW	Radio Specification	Bluetooth EDR
Test sample No.	SHT2012072602-1	Model No.	L7B
Start test date	2020/12/25	Finish date	2020/12/25
Temperature	22.1°C	Humidity	35%
Test Engineer	Qizhi Zhang	Auditor	Xiaodong Zheo

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	0.68	0.66	≤ 30.00	Pass
	39	0.44	0.42		
	78	0.32	0.31		
$\pi/4$ DQPSK	00	1.57	1.16	≤ 21.00	Pass
	39	1.34	0.92		
	78	1.13	0.72		

Modulation Type:	GFSK
CH00	 25 DEC 2020 13:57:37
CH39	 25 DEC 2020 14:08:16
CH78	 25 DEC 2020 14:31:50



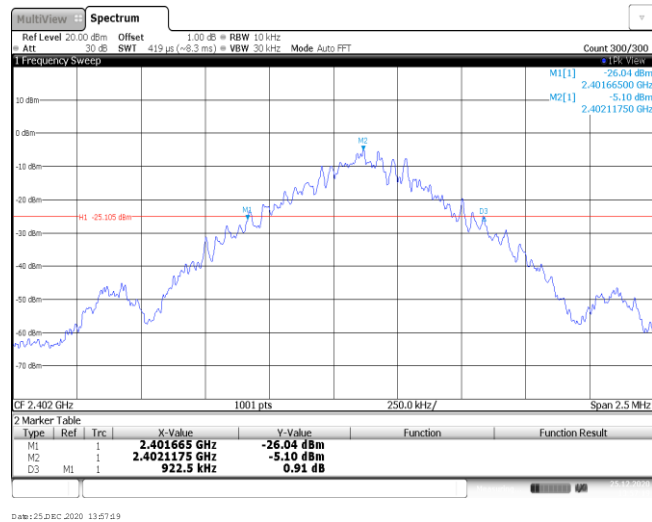
Appendix B : 20 dB Bandwidth

Modulation type	Channel	20 dB Bandwidth (kHz)	Limit (kHz)	Result
GFSK	00	922.50	-	Pass
	39	922.50		
	78	882.50		
$\pi/4$ DQPSK	00	1325.00	-	Pass
	39	1327.50		
	78	1327.50		

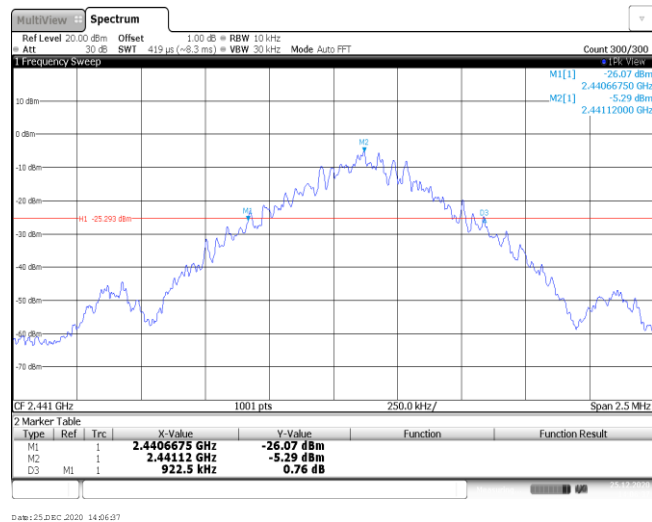
Modulation Type:

GFSK

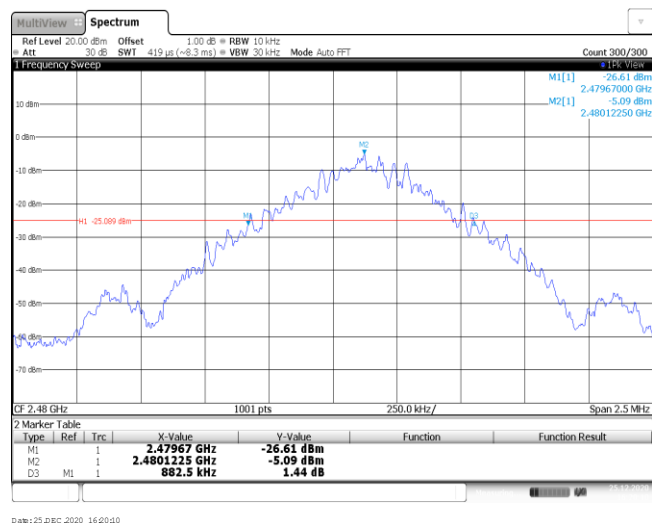
CH00



CH39



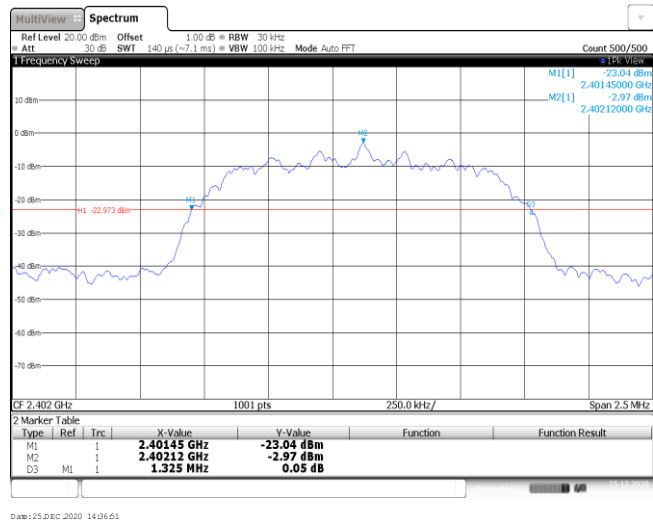
CH78



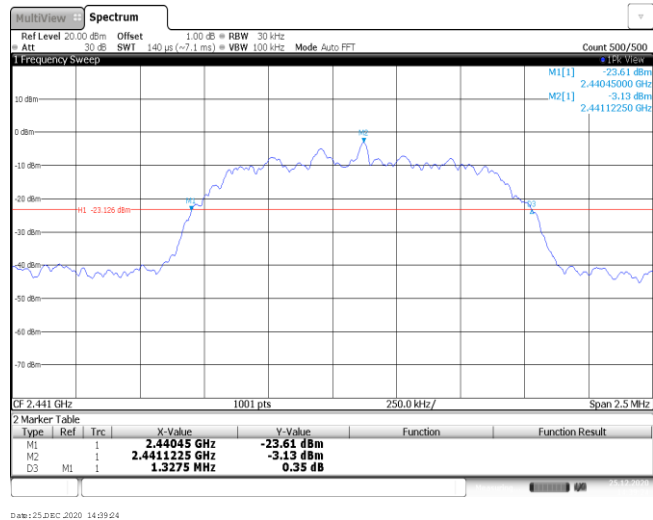
Modulation Type:

 $\pi/4$ DQPSK

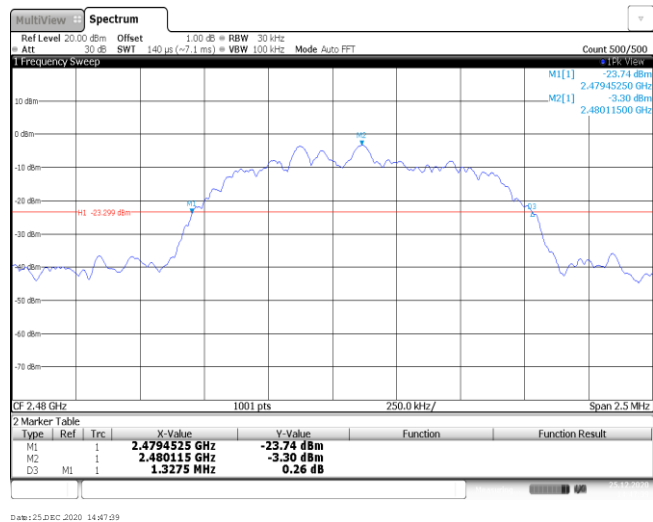
CH00



CH39



CH78



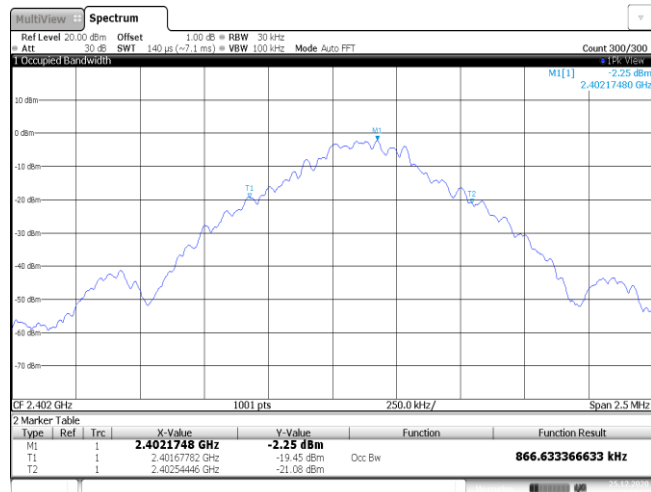
Appendix C: 99% Occupied Bandwidth

Modulation type	Channel	99% Occupied Bandwidth (MHz)	Limit (MHz)	Result
GFSK	00	0.87	-	Pass
	39	0.87		
	78	0.86		
$\pi/4$ DQPSK	00	1.19	-	Pass
	39	1.19		
	78	1.17		

Modulation Type:

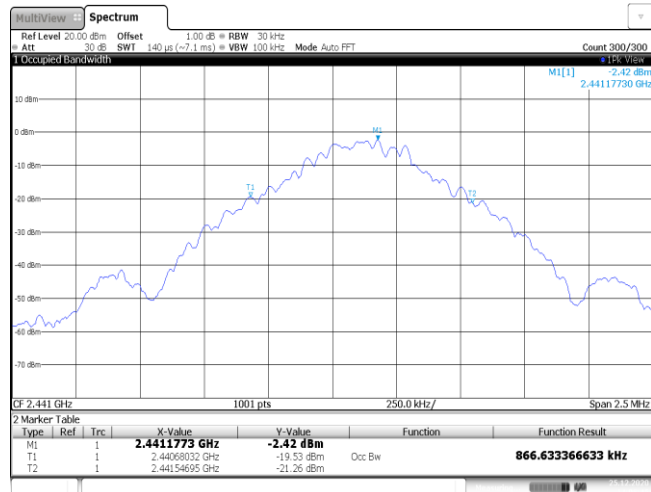
GFSK

CH00



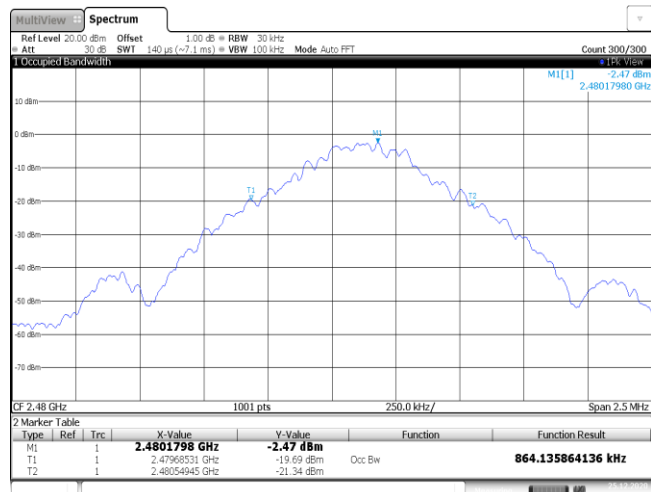
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CH39

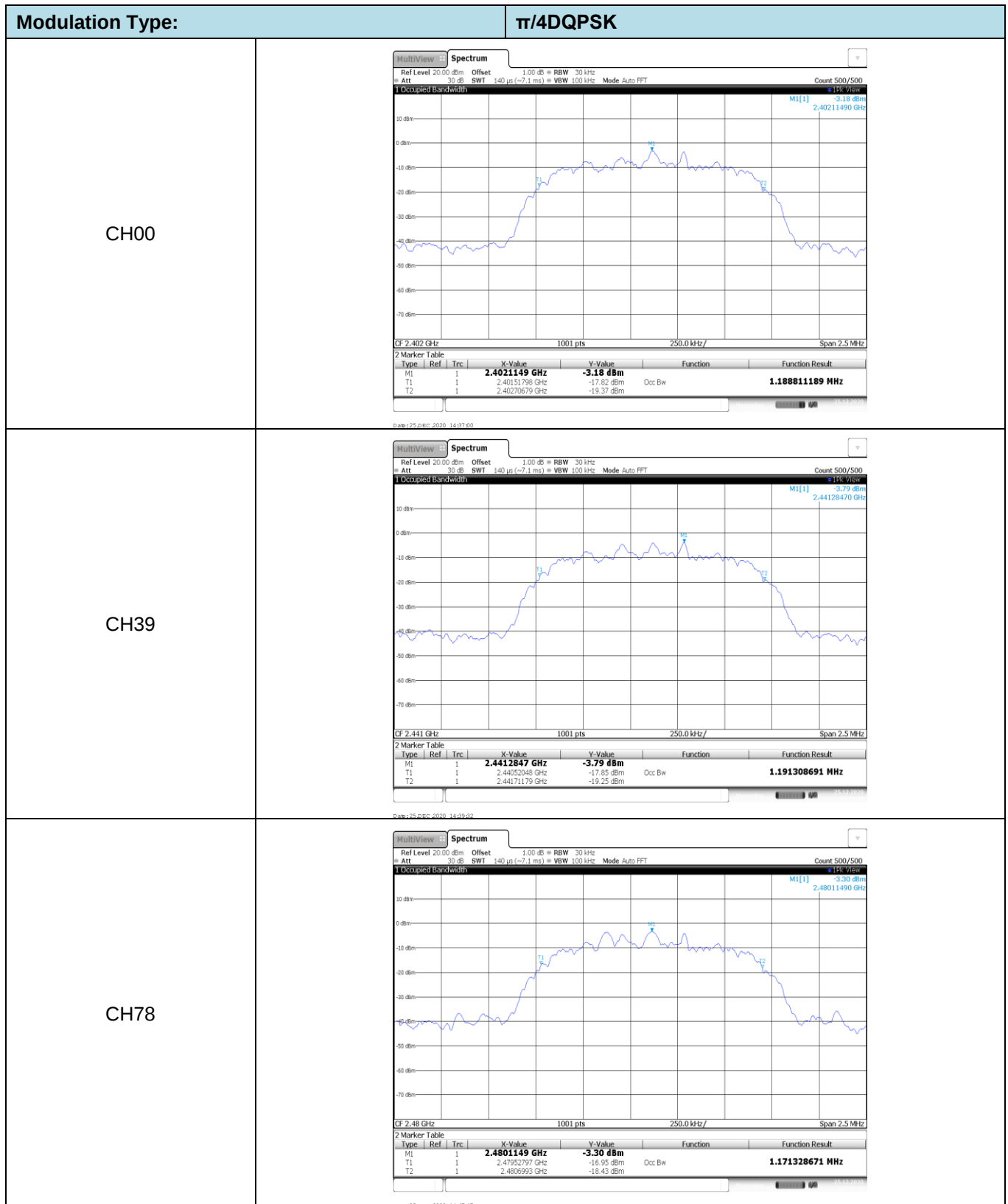


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CH78



Date: 25 Dec 2020 16:23:08



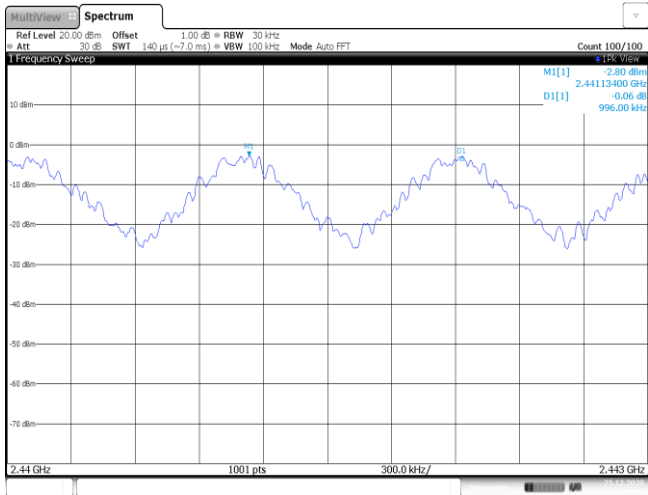
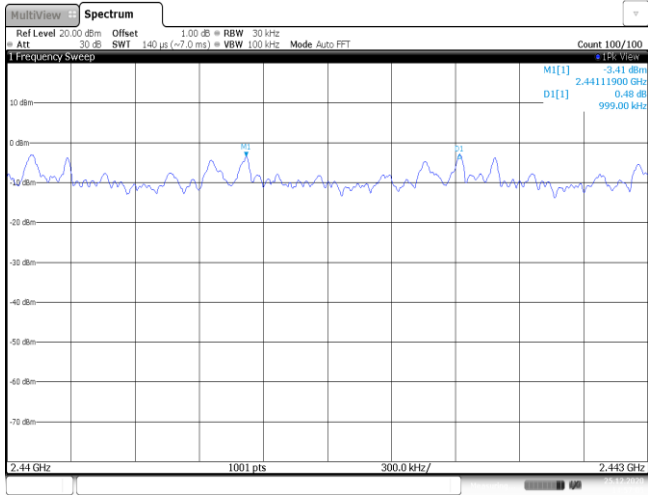
Appendix D: Carrier Frequencies Separation

Modulation type	Channel	Carrier Frequencies Separation (MHz)	Limit (kHz) *	Result
GFSK	39	1.00	≥922.50	Pass
π/4DQPSK	39	1.00	≥885.00	Pass

Note:

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

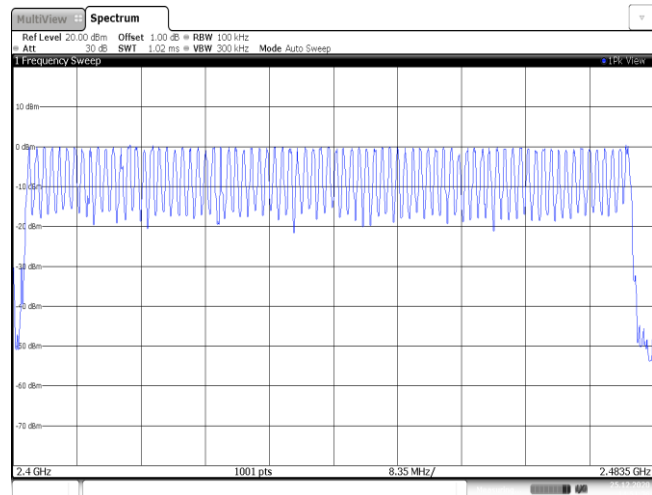
π/4DQPSK limit = 2/3 * The maximum 20 dB Bandwidth for π/4DQPSK modulation on the appendix B.

GFSK	 Ref Level 20.00 dBm Offset 1.00 dB RBW 30 kHz Att 30 dB SWI 140 μs (~7.0 ms) VSW 100 kHz Mode Auto FFT Count 100/100 M1[1] 2.44113400 GHz -2.80 dBm D1[1] 2.44113400 GHz -0.06 dBm 999.00 kHz 2.44 GHz 1001 pts 300.0 kHz/ 2.443 GHz Date: 25 DEC 2020 14:35:04
π /4DQPSK	 Ref Level 20.00 dBm Offset 1.00 dB RBW 30 kHz Att 30 dB SWI 140 μs (~7.0 ms) VSW 100 kHz Mode Auto FFT Count 100/100 M1[1] 2.44111900 GHz -2.41 dBm D1[1] 2.44111900 GHz 0.48 dBm 999.00 kHz 2.44 GHz 1001 pts 300.0 kHz/ 2.443 GHz Date: 25 DEC 2020 14:57:05

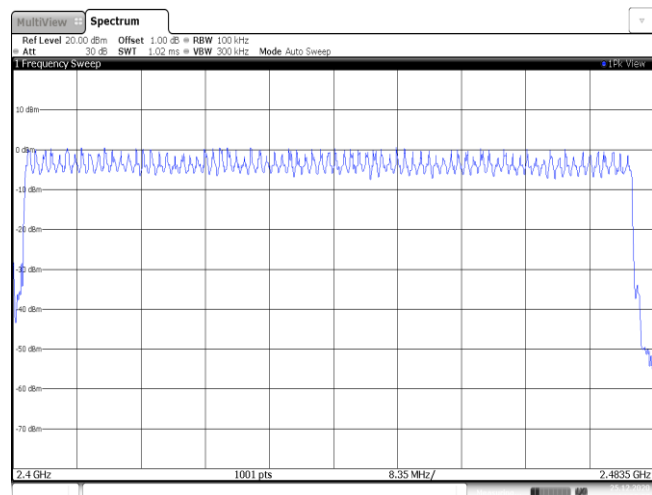
Appendix E: Hopping Channel Number

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

GFSK



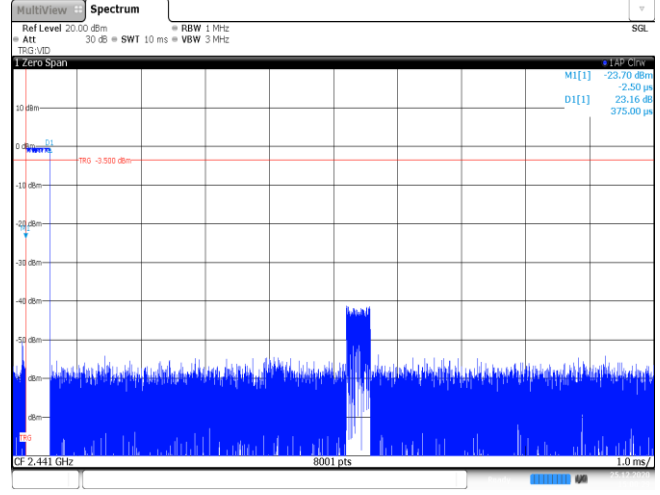
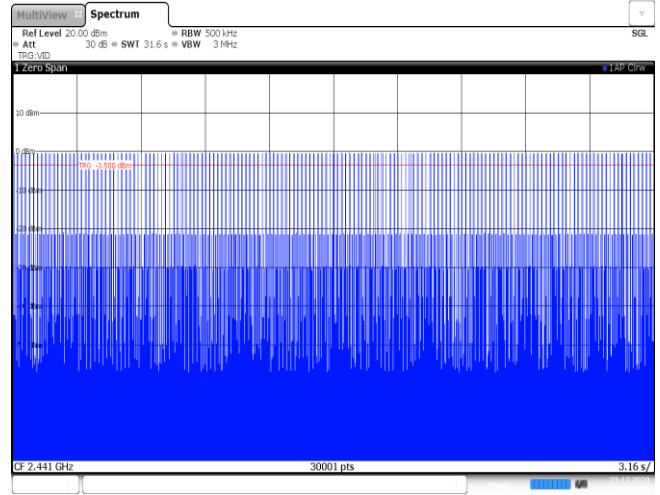
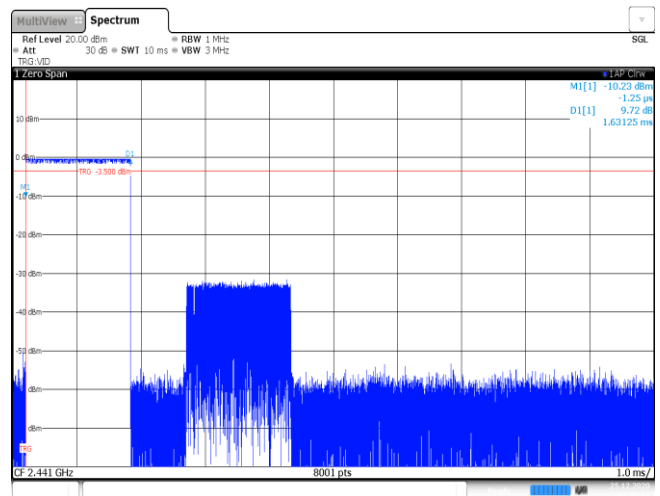
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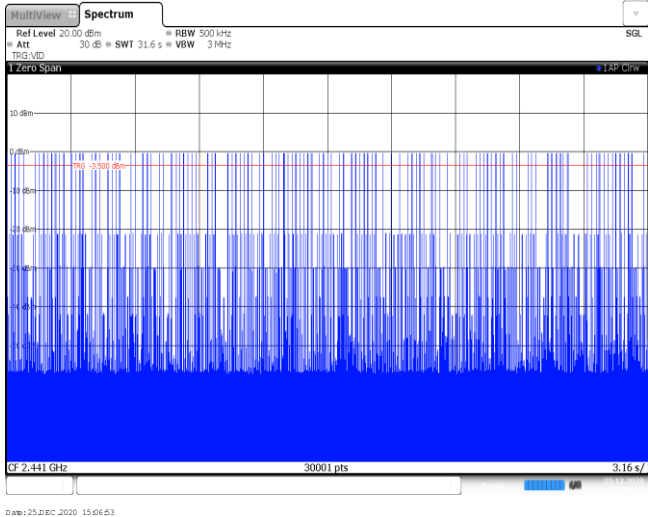
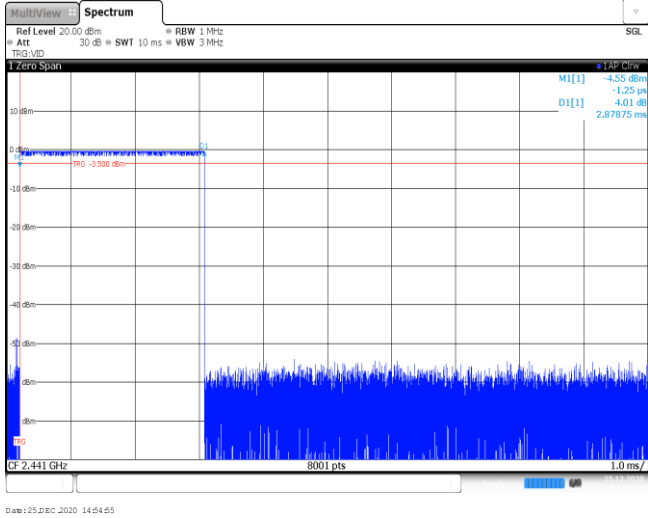
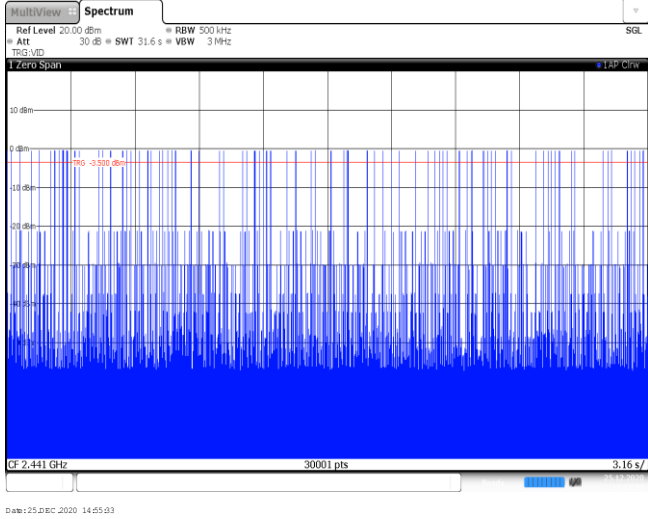
 $\pi/4$ DQPSK

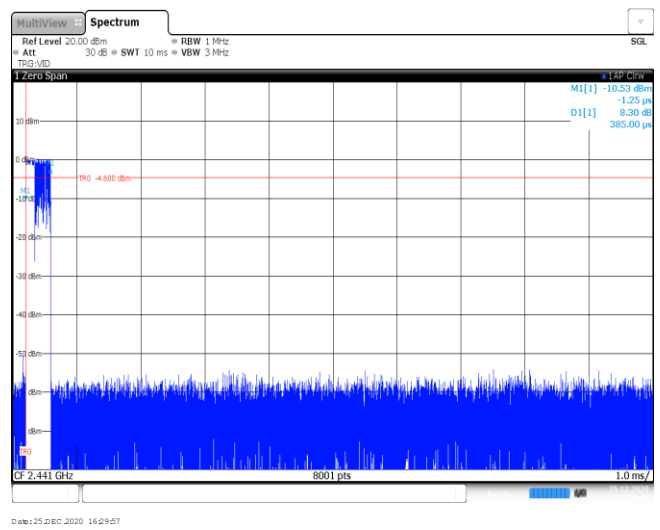
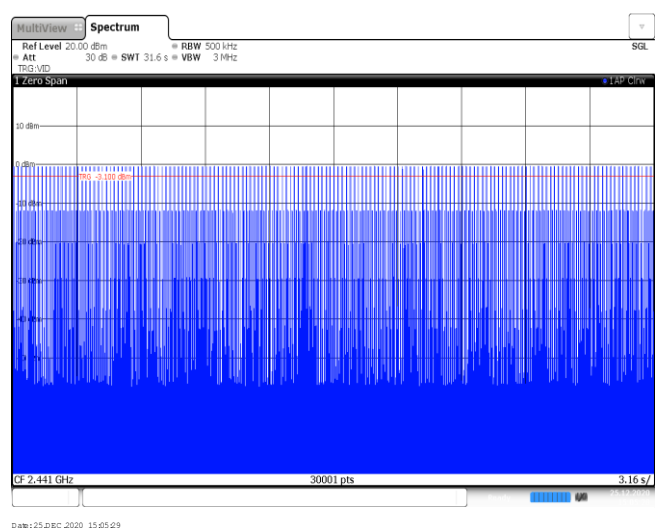
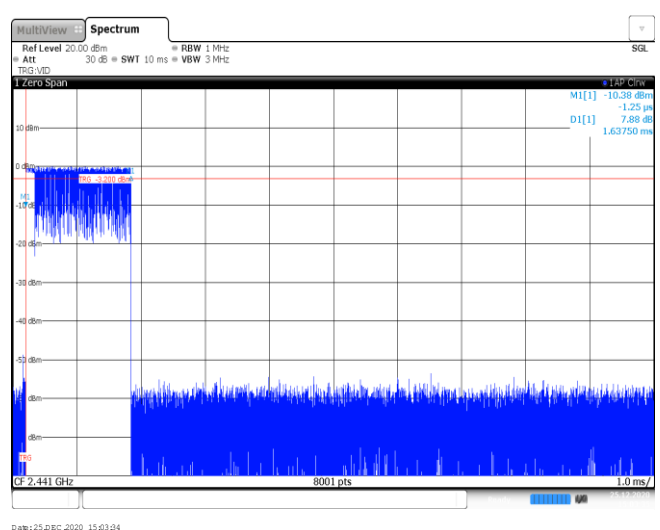
Date: 25 DEC 2020 14:58:28

Appendix F: Dwell Time

Modulation type	Packet	Burst Width [ms]	Total Hops[hop*ch]	Dwell time (Second)	Limit (Second)	Result
GFSK	DH1	0.38	318.00	0.12	≤ 0.40	Pass
	DH3	1.63	163.00	0.27		
	DH5	2.88	95.00	0.27		
$\pi/4$ DQPSK	2DH1	0.39	318.00	0.12	≤ 0.40	Pass
	2DH3	1.64	155.00	0.25		
	2DH5	2.89	103.00	0.30		

Modulation Type:	GFSK
DH1 Burst width	 The spectrum plot shows a single burst of energy 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 noise floor at -30.00 dBm. The burst reaches a peak power of approximately -23.70 dBm. The plot is titled 'Spectrum' and includes parameters: Ref Level 20.00 dBm, Att 30 dB, SWT 10 ms, VBW 3 MHz. The date is 25 DEC 2020 15:00:28.
DH1 Burst number	 The spectrum plot shows a continuous burst of energy 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 noise floor at -30.00 dBm. The burst reaches a peak power of approximately -23.70 dBm. The plot is titled 'Spectrum' and includes parameters: Ref Level 20.00 dBm, Att 30 dB, SWT 31.6 s, VBW 3 MHz. The date is 25 DEC 2020 15:01:05.
DH3 Burst width	 The spectrum plot shows a single burst of energy 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 noise floor at -30.00 dBm. The burst reaches a peak power of approximately -10.23 dBm. The plot is titled 'Spectrum' and includes parameters: Ref Level 20.00 dBm, Att 30 dB, SWT 10 ms, VBW 3 MHz. The date is 25 DEC 2020 15:06:17.

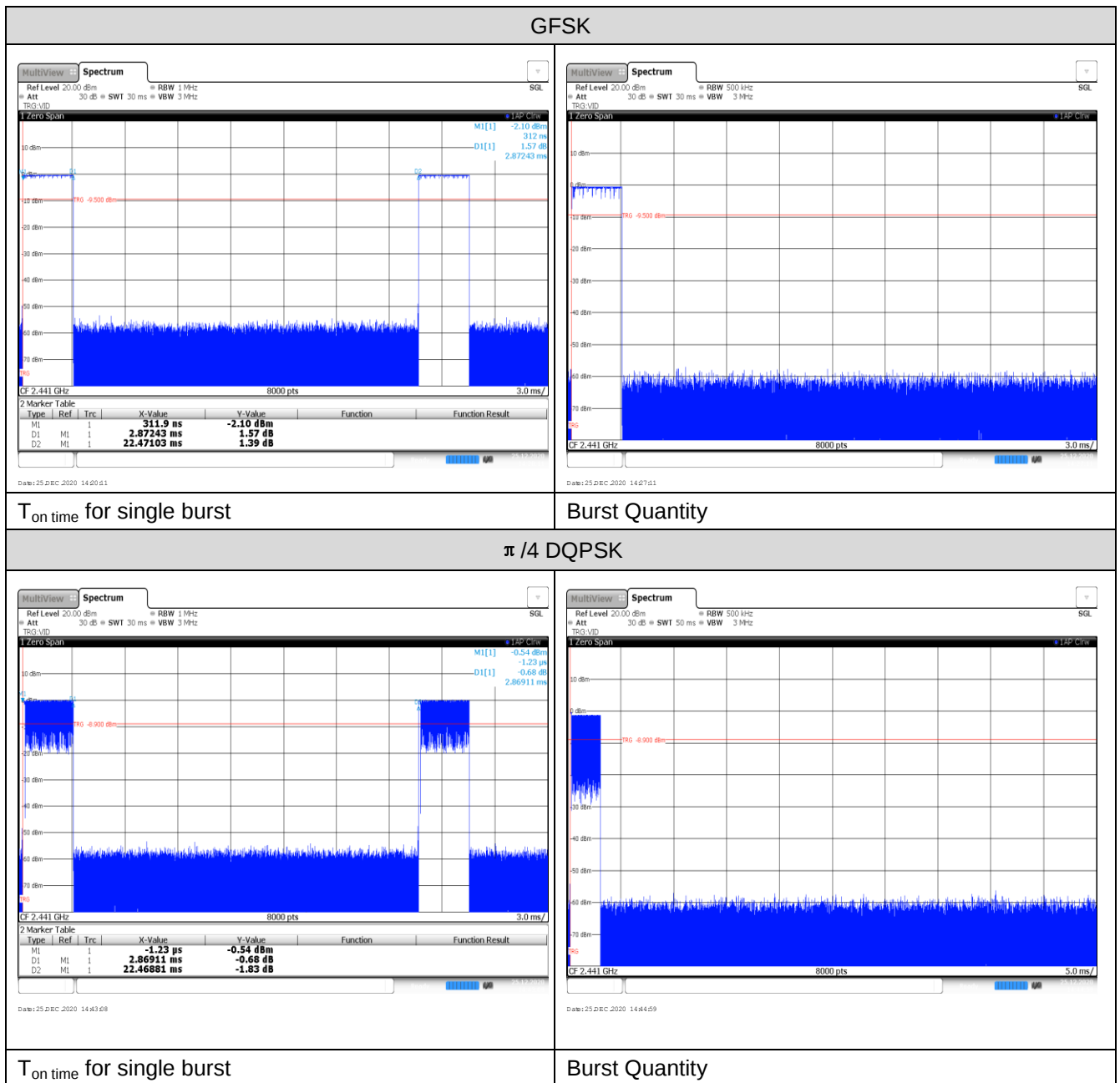
DH3 Burst number	
DH5 Burst width	
DH5 Burst number	

Modulation Type:	$\pi/4$ DQPSK
2DH1 Burst width	 The spectrum plot shows a signal centered at 2.441 GHz. The y-axis represents power in dBm, ranging from -60 to 10. The x-axis represents frequency in GHz, ranging from 2.440 to 2.442. A red trace is visible at approximately -10.53 dBm. The plot is labeled 'Spectrum' and '1 Zero Span'. The date is 25 DEC 2020 16:29:57.
2DH1 Burst number	 The spectrum plot shows a signal centered at 2.441 GHz. The y-axis represents power in dBm, ranging from -60 to 10. The x-axis represents frequency in GHz, ranging from 2.440 to 2.442. A red trace is visible at approximately -10.53 dBm. The plot is labeled 'Spectrum' and '1 Zero Span'. The date is 25 DEC 2020 15:05:29.
2DH3 Burst width	 The spectrum plot shows a signal centered at 2.441 GHz. The y-axis represents power in dBm, ranging from -60 to 10. The x-axis represents frequency in GHz, ranging from 2.440 to 2.442. A red trace is visible at approximately -10.53 dBm. The plot is labeled 'Spectrum' and '1 Zero Span'. The date is 25 DEC 2020 15:03:24.

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Appendix G: Duty Cycle Correction Factor (DCCF)

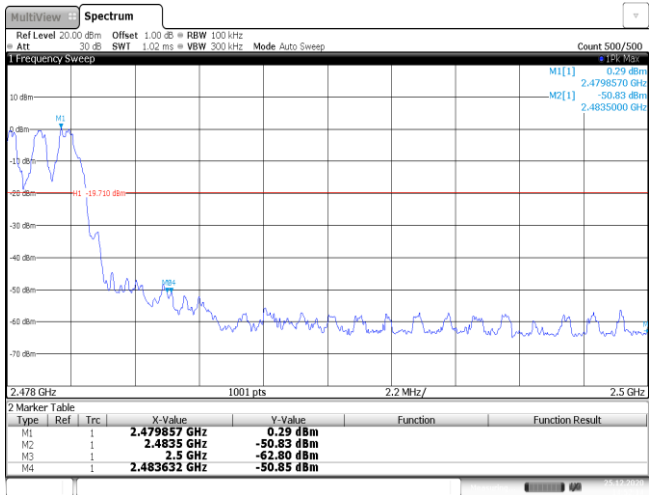
DCCF Calculate Formula					
$DCCF = 20 * \text{Log}(\text{duty cycle}) = 20 * \text{Log}(T_{\text{on time}} / T_{\text{period}})$					
Modulation type	Test Frequency (MHz)	$T_{\text{on time}}$ for single burst [ms]	T_{period} [ms]	Burst Quantity	DCCF [dB]
GFSK	2441	2.87	100	1	-30.84
$\pi/4$ DQPSK	2441	2.87	100	1	-30.84



Appendix H: Band edge and Spurious Emissions (conducted)

Test Item:	Band edge	Modulation type:	GFSK																																										
CH00 No hopping mode	MultiViewSpectrum Ref Level 20.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SWT 1.05 ms VBW 300 kHz Mode Auto Sweep Count 300/300 Frequency Sweep M1[1] 0.20 dBm 2.4019160 GHz M2[1] -28.97 dBm 2.4000000 GHz 2.31 GHz 1001 pts 9.5 MHz/ 2.405 GHz <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>2.401916 GHz</td><td>0.20 dBm</td><td></td><td></td></tr><tr><td>M2</td><td>1</td><td></td><td>2.4 GHz</td><td>-28.97 dBm</td><td></td><td></td></tr><tr><td>M3</td><td>1</td><td></td><td>2.39 GHz</td><td>-63.90 dBm</td><td></td><td></td></tr><tr><td>M4</td><td>1</td><td></td><td>2.31 GHz</td><td>-63.47 dBm</td><td></td><td></td></tr><tr><td>M5</td><td>1</td><td></td><td>2.39797 GHz</td><td>-38.02 dBm</td><td></td><td></td></tr></table> Date: 25 DEC 2020 13:59:29			Type	Ref	Trc	X-Value	Y-Value	Function	Function Result	M1	1		2.401916 GHz	0.20 dBm			M2	1		2.4 GHz	-28.97 dBm			M3	1		2.39 GHz	-63.90 dBm			M4	1		2.31 GHz	-63.47 dBm			M5	1		2.39797 GHz	-38.02 dBm		
Type	Ref	Trc	X-Value	Y-Value	Function	Function Result																																							
M1	1		2.401916 GHz	0.20 dBm																																									
M2	1		2.4 GHz	-28.97 dBm																																									
M3	1		2.39 GHz	-63.90 dBm																																									
M4	1		2.31 GHz	-63.47 dBm																																									
M5	1		2.39797 GHz	-38.02 dBm																																									
CH00 Hopping mode	MultiViewSpectrum Ref Level 20.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SWT 1.05 ms VBW 300 kHz Mode Auto Sweep Count 500/500 Frequency Sweep M1[1] -0.23 dBm 2.4040030 GHz M2[1] -31.32 dBm 2.4000000 GHz 2.31 GHz 1001 pts 9.5 MHz/ 2.405 GHz <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>2.404003 GHz</td><td>-0.23 dBm</td><td></td><td></td></tr><tr><td>M2</td><td>1</td><td></td><td>2.4 GHz</td><td>-31.32 dBm</td><td></td><td></td></tr><tr><td>M3</td><td>1</td><td></td><td>2.39 GHz</td><td>-63.74 dBm</td><td></td><td></td></tr><tr><td>M4</td><td>1</td><td></td><td>2.31 GHz</td><td>-63.81 dBm</td><td></td><td></td></tr><tr><td>M5</td><td>1</td><td></td><td>2.399015 GHz</td><td>-38.65 dBm</td><td></td><td></td></tr></table> Date: 25 DEC 2020 14:51:50			Type	Ref	Trc	X-Value	Y-Value	Function	Function Result	M1	1		2.404003 GHz	-0.23 dBm			M2	1		2.4 GHz	-31.32 dBm			M3	1		2.39 GHz	-63.74 dBm			M4	1		2.31 GHz	-63.81 dBm			M5	1		2.399015 GHz	-38.65 dBm		
Type	Ref	Trc	X-Value	Y-Value	Function	Function Result																																							
M1	1		2.404003 GHz	-0.23 dBm																																									
M2	1		2.4 GHz	-31.32 dBm																																									
M3	1		2.39 GHz	-63.74 dBm																																									
M4	1		2.31 GHz	-63.81 dBm																																									
M5	1		2.399015 GHz	-38.65 dBm																																									
CH78 No hopping mode	MultiViewSpectrum Ref Level 20.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SWT 1.02 ms VBW 300 kHz Mode Auto Sweep Count 300/300 Frequency Sweep M1[1] 0.24 dBm 2.4798570 GHz M2[1] -51.29 dBm 2.4835000 GHz 2.478 GHz 1001 pts 2.2 MHz/ 2.5 GHz <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>2.479857 GHz</td><td>0.24 dBm</td><td></td><td></td></tr><tr><td>M2</td><td>1</td><td></td><td>2.4835 GHz</td><td>-51.29 dBm</td><td></td><td></td></tr><tr><td>M3</td><td>1</td><td></td><td>2.5 GHz</td><td>-63.31 dBm</td><td></td><td></td></tr><tr><td>M4</td><td>1</td><td></td><td>2.483632 GHz</td><td>-49.41 dBm</td><td></td><td></td></tr></table> Date: 25 DEC 2020 14:02:53			Type	Ref	Trc	X-Value	Y-Value	Function	Function Result	M1	1		2.479857 GHz	0.24 dBm			M2	1		2.4835 GHz	-51.29 dBm			M3	1		2.5 GHz	-63.31 dBm			M4	1		2.483632 GHz	-49.41 dBm									
Type	Ref	Trc	X-Value	Y-Value	Function	Function Result																																							
M1	1		2.479857 GHz	0.24 dBm																																									
M2	1		2.4835 GHz	-51.29 dBm																																									
M3	1		2.5 GHz	-63.31 dBm																																									
M4	1		2.483632 GHz	-49.41 dBm																																									

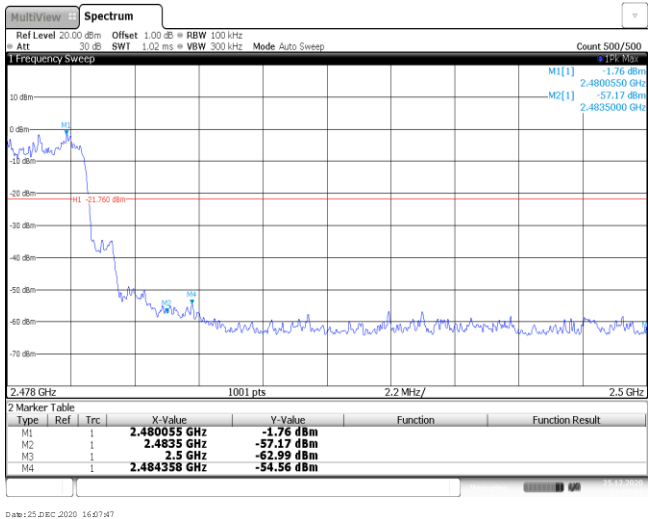
CH78
Hopping mode

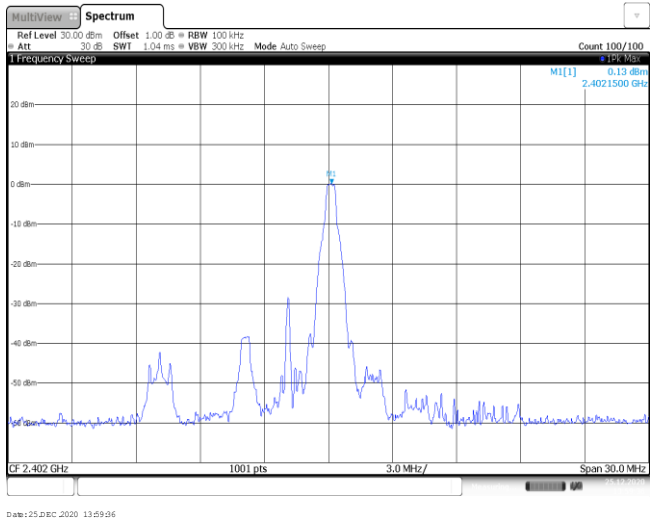
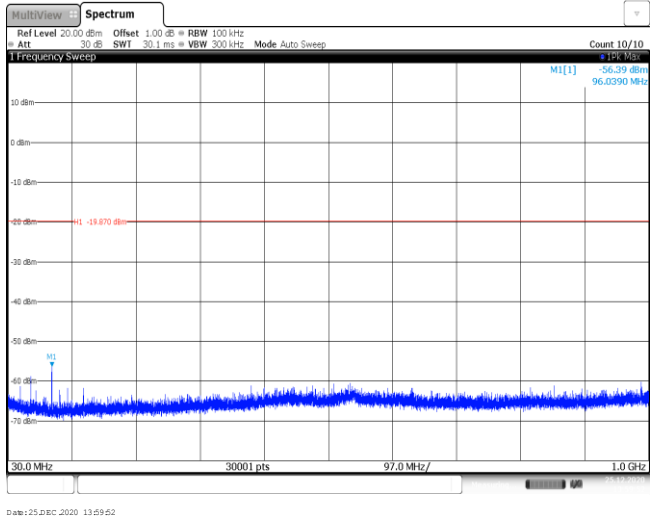
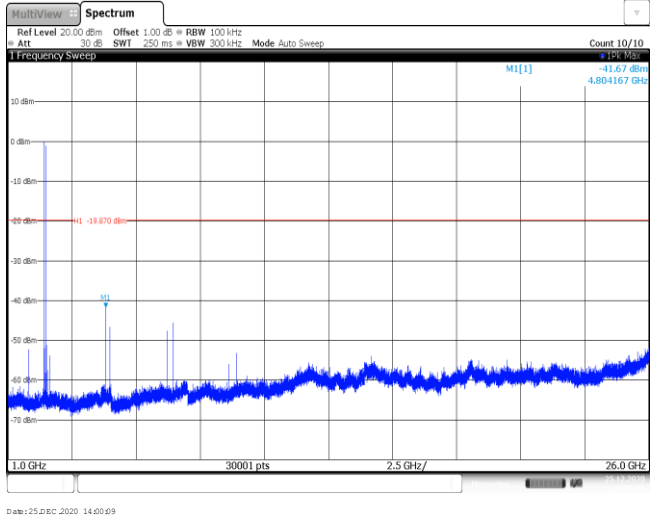


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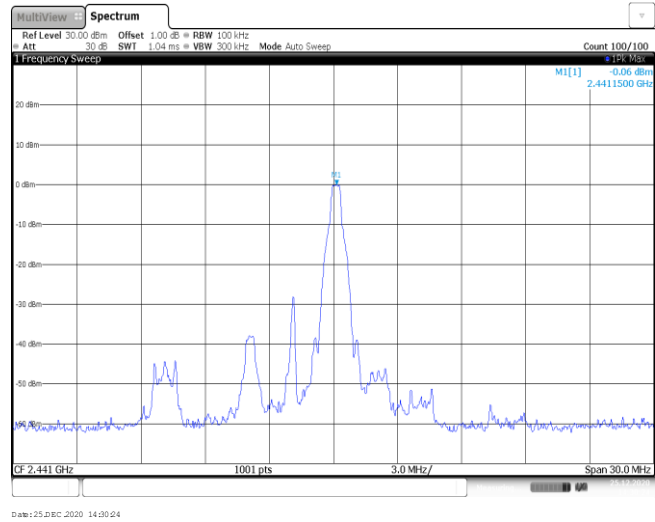
Test Item:	Band edge	Modulation type:	$\pi/4$ DQPSK
CH00 No hopping mode	<		

CH78
Hopping mode

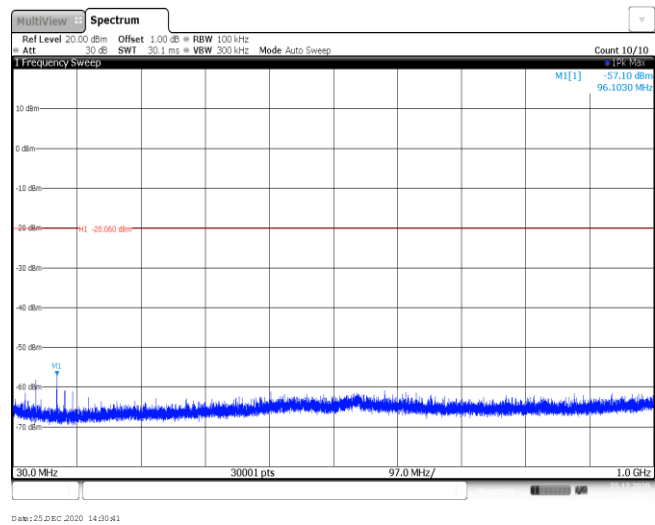


Test Item:	Spurious Emission	Modulation type:	GFSK
CH00 Reference level			
CH00 30MHz~1000MHz			
CH00 1GHz~26GHz			

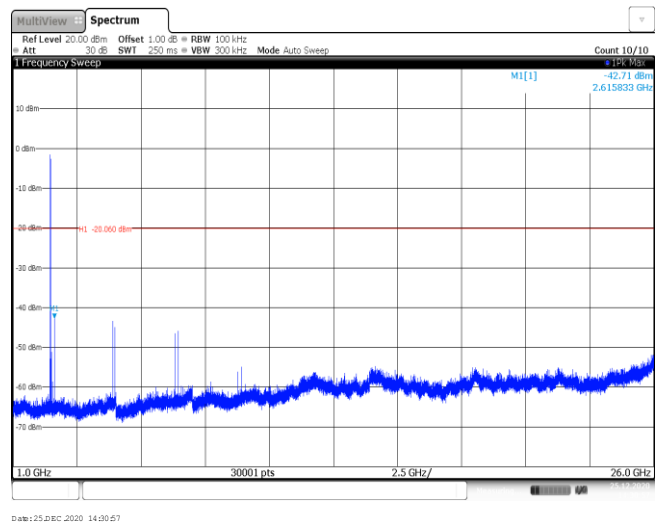
CH39
Reference level



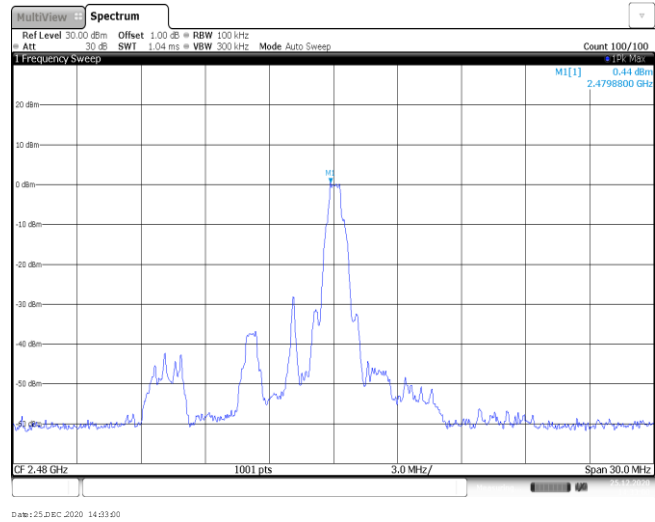
CH39
30MHz~1000MHz



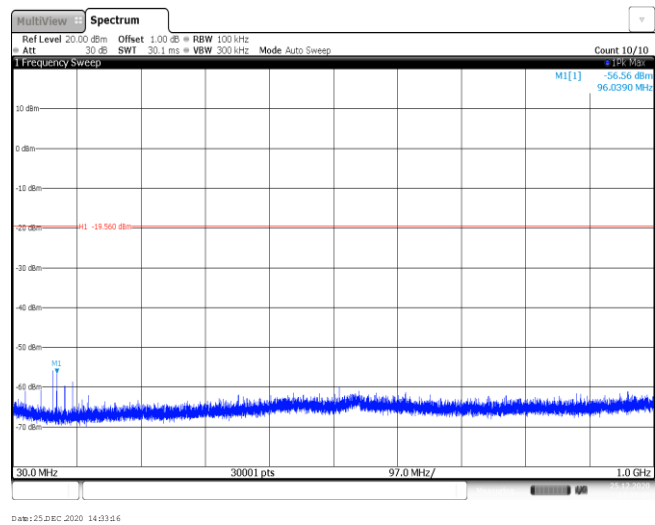
CH39
1GHz~26GHz



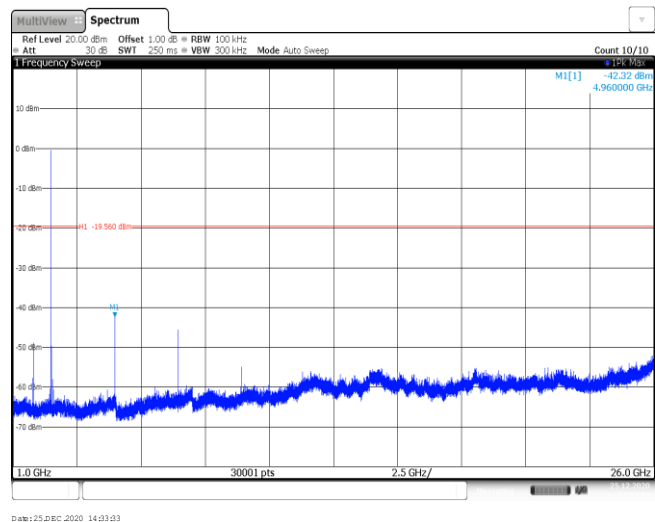
CH78
Reference level

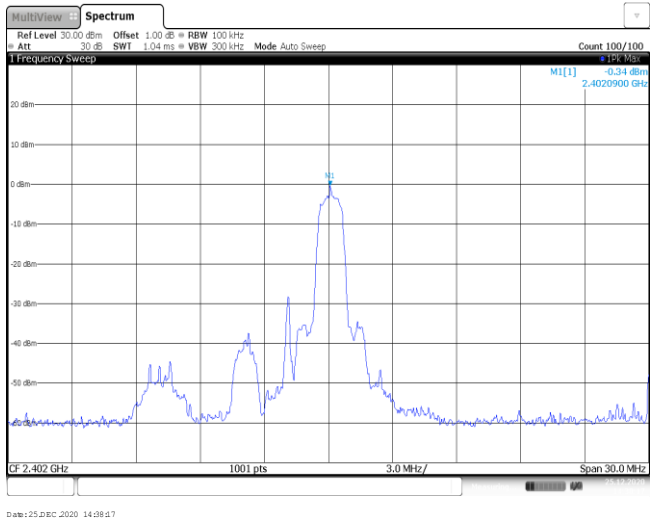
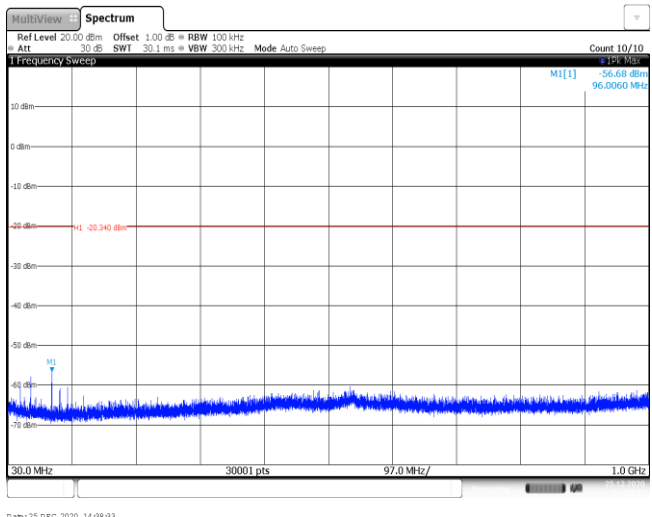
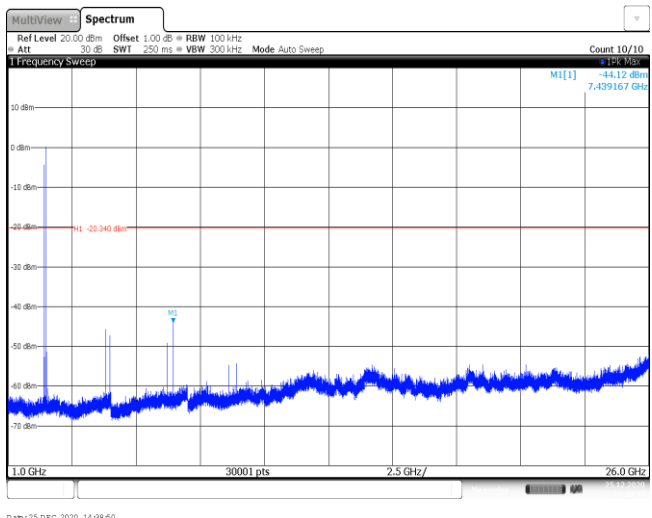


CH78
30MHz~1000MHz

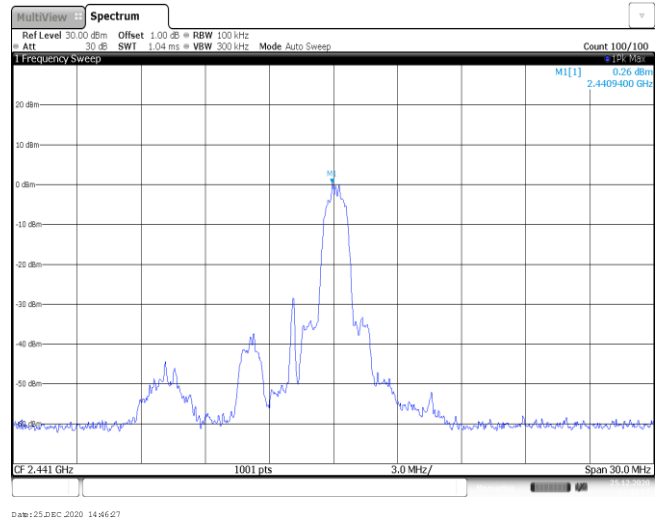


CH78
1GHz~26GHz

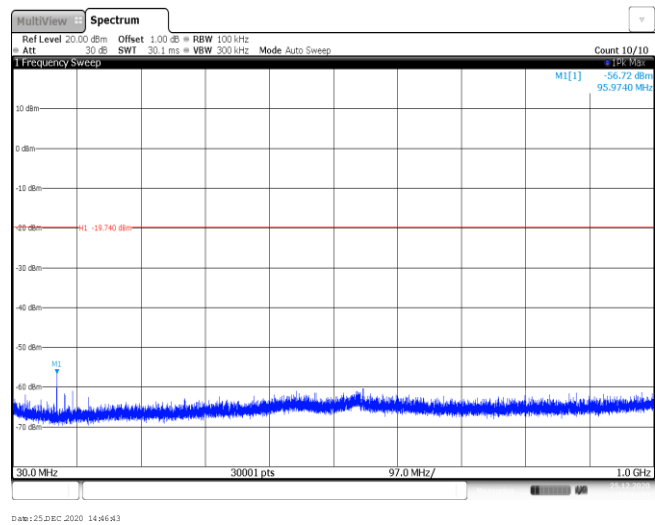


Test Item:	Spurious Emission	Modulation type:	$\pi/4$ DQPSK
CH00 Reference level	 CH00 Reference level		
CH00 30MHz~1000MHz	 CH00 30MHz~1000MHz		
CH00 1GHz~26GHz	 CH00 1GHz~26GHz		

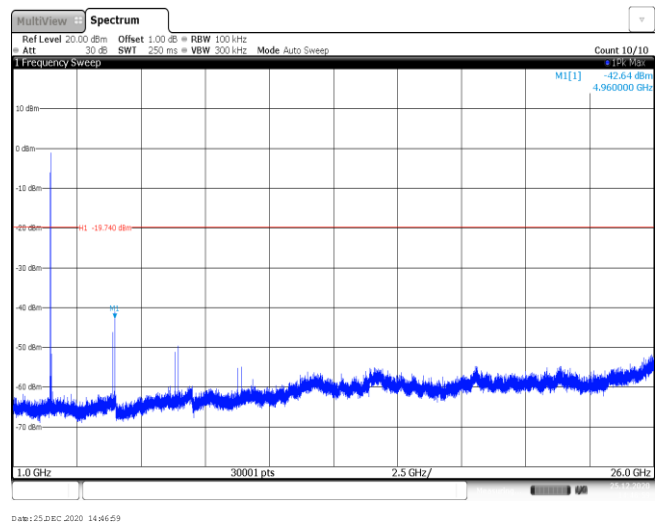
CH39
Reference level

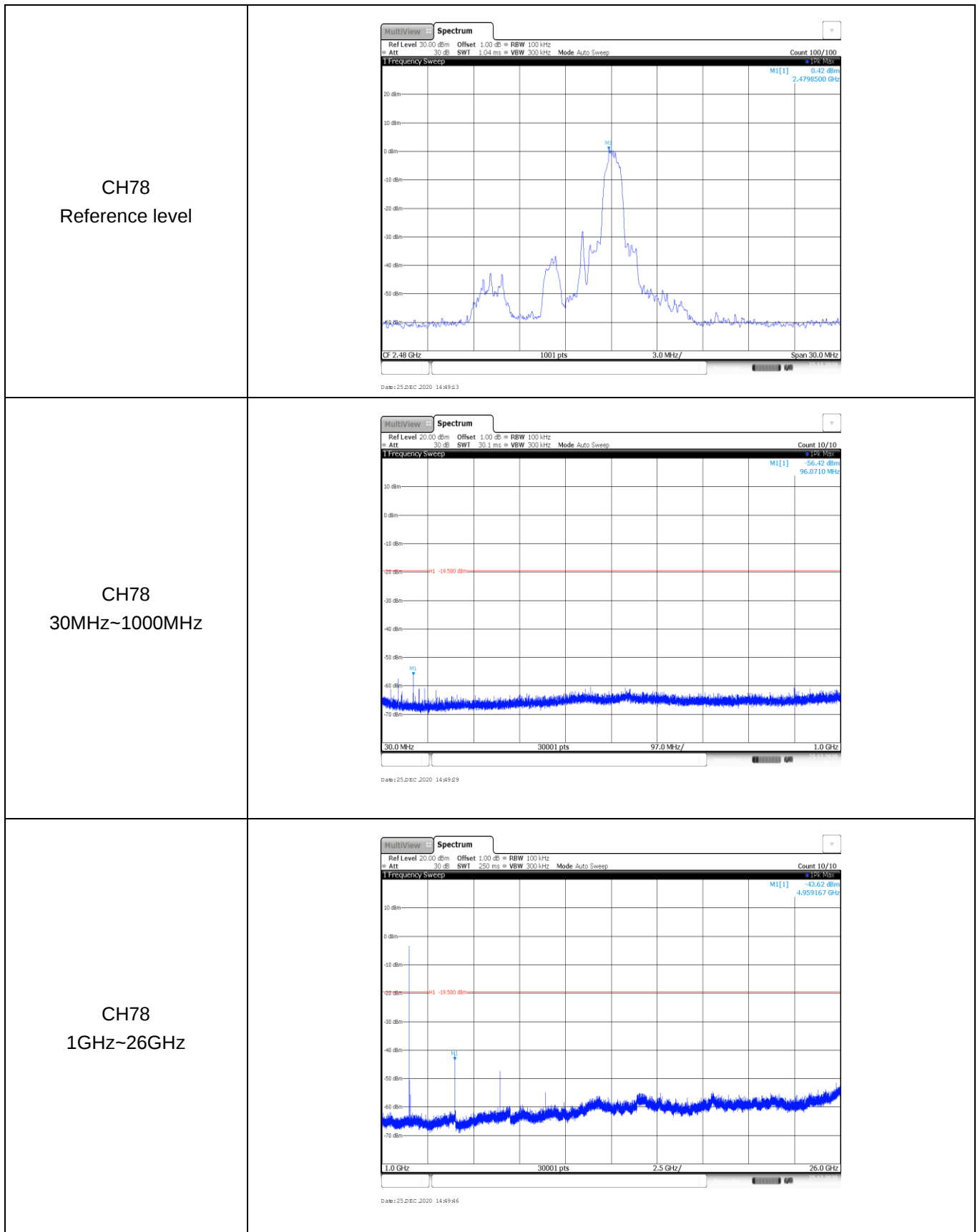


CH39
30MHz~1000MHz



CH39
1GHz~26GHz





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