

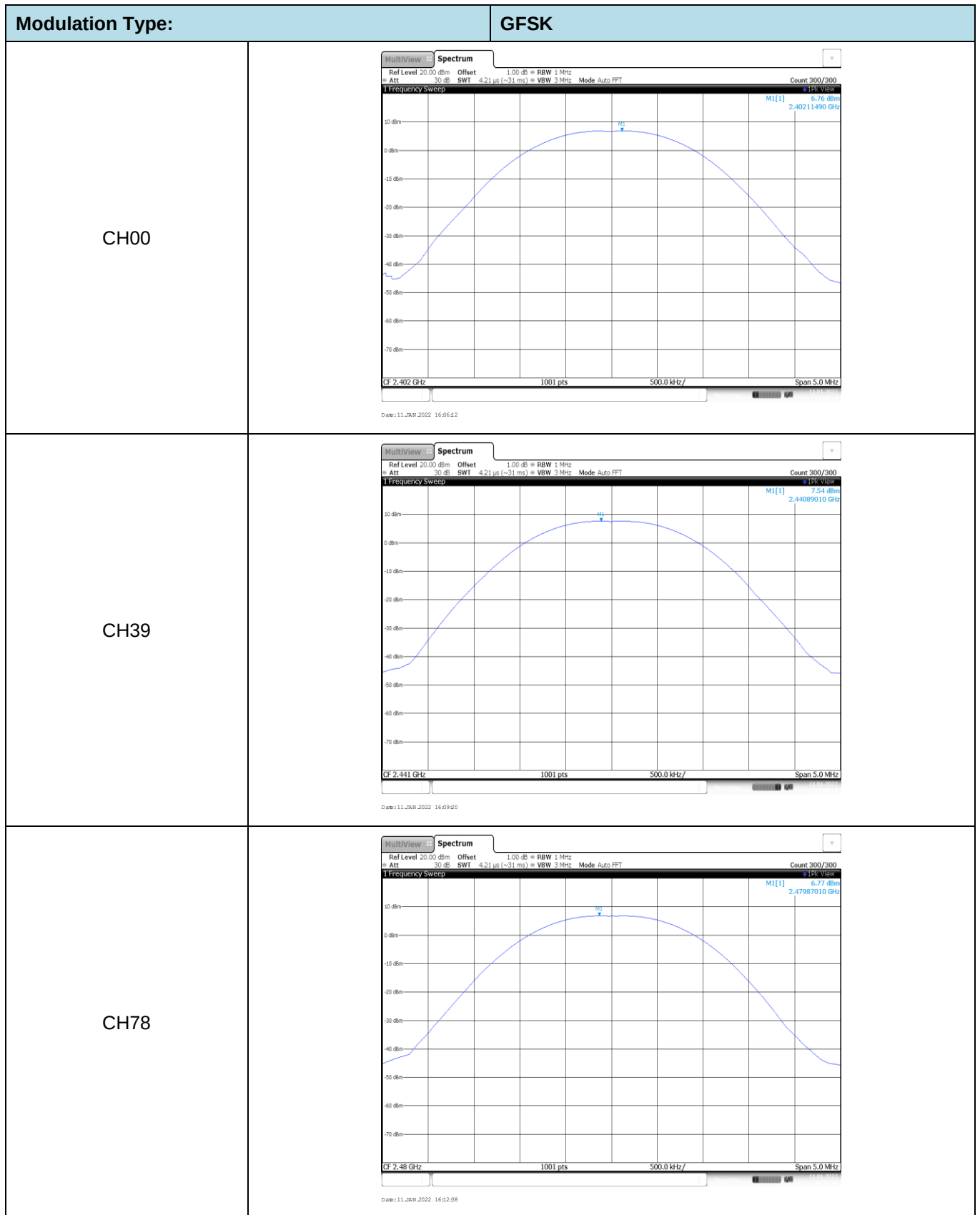
APPENDIX REPORT

Project No.	SHT2112116401EW	Radio Specification	Bluetooth EDR
Test sample No.	YPHT21121164004	Model No.	SH2-ADAA
Start test date	2022-01-11	Finish date	2022-01-12
Temperature	24.0℃	Humidity	35%
Test Engineer	Hailey Chen	Auditor	Xiaodong Zhao

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

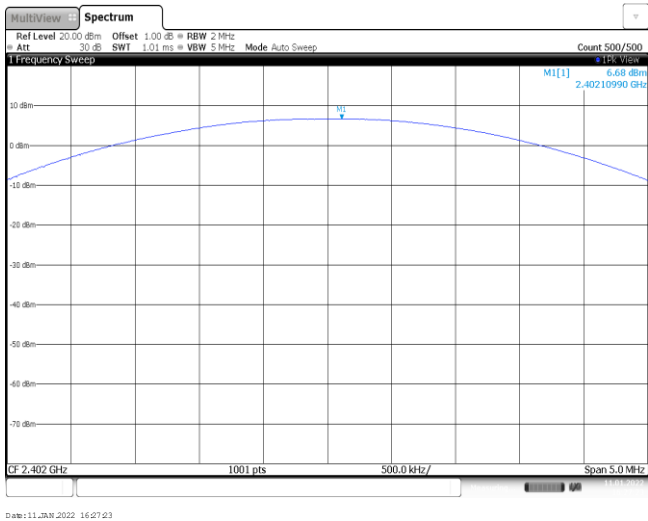
Modulation type	Channel	Peak Output power (dBm)	Average Output power (dBm)	Limit (dBm)	Result
GFSK	00	6.76	6.75	≤ 30.00	Pass
	39	7.54	7.51		
	78	6.77	6.71		
$\pi/4$ DQPSK	00	6.68	6.08	≤ 21.00	Pass
	39	7.41	6.78		
	78	5.73	5.07		
8DPSK	00	6.57	5.94	≤ 21.00	Pass
	39	6.59	5.96		
	78	6.87	6.22		



Modulation Type:

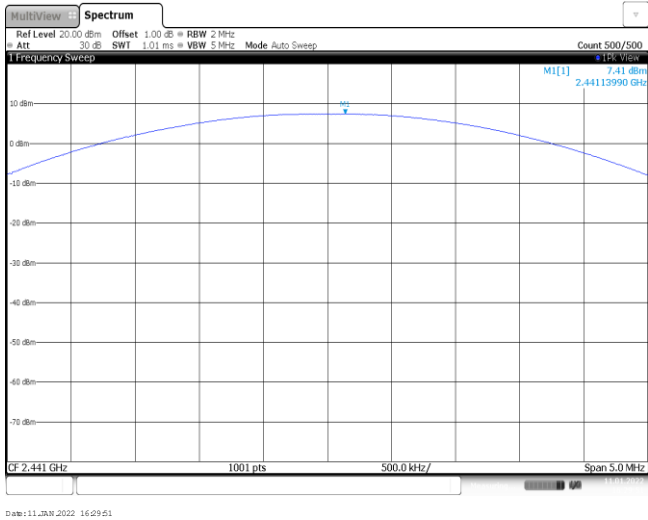
$\pi/4$ DQPSK

CH00



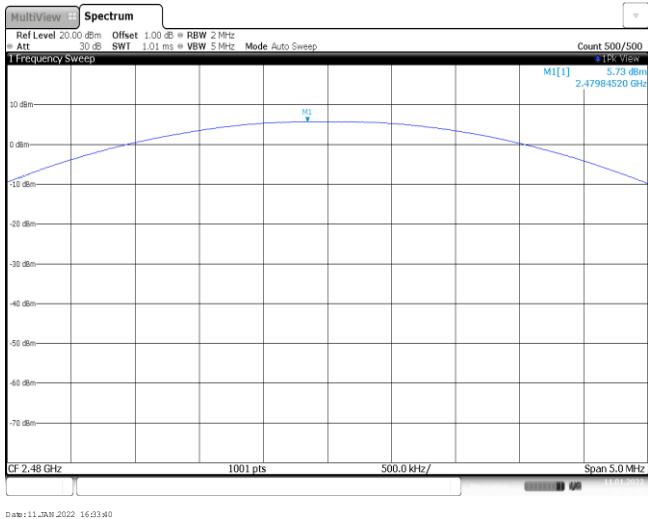
Date: 11 JAN 2022 16:27:23

CH39



Date: 11 JAN 2022 16:29:51

CH78

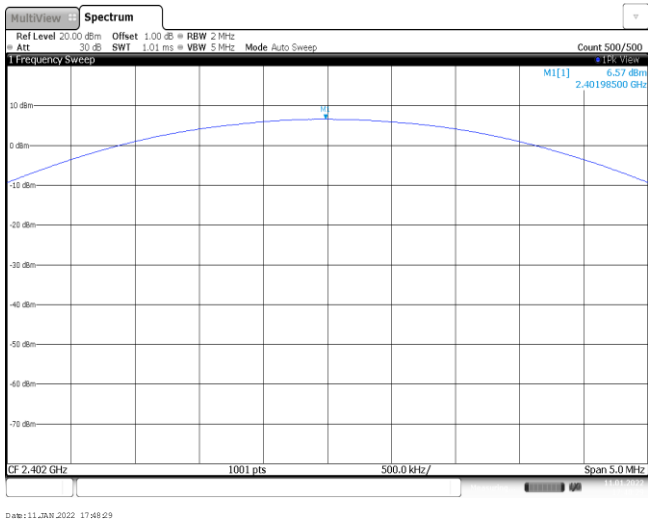


Date: 11 JAN 2022 16:31:40

Modulation Type:

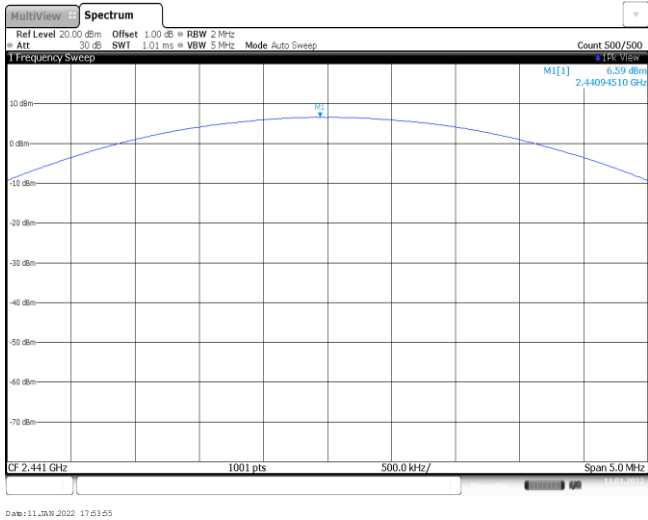
8DPSK

CH00



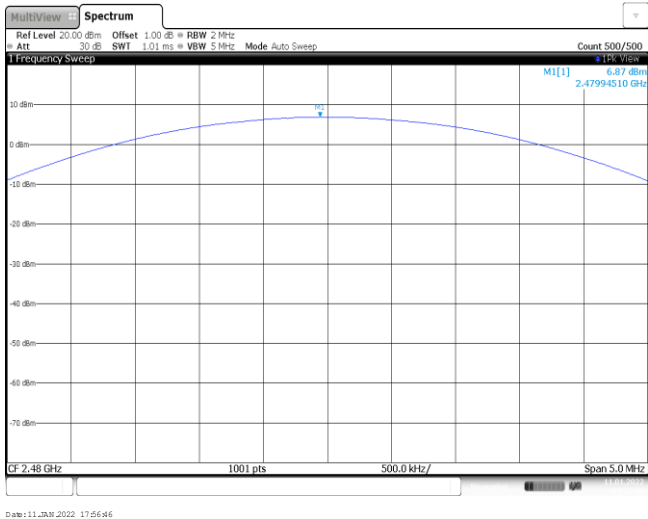
Date: 11 JAN 2022 17:48:29

CH39



Date: 11 JAN 2022 17:51:55

CH78



Date: 11 JAN 2022 17:56:46

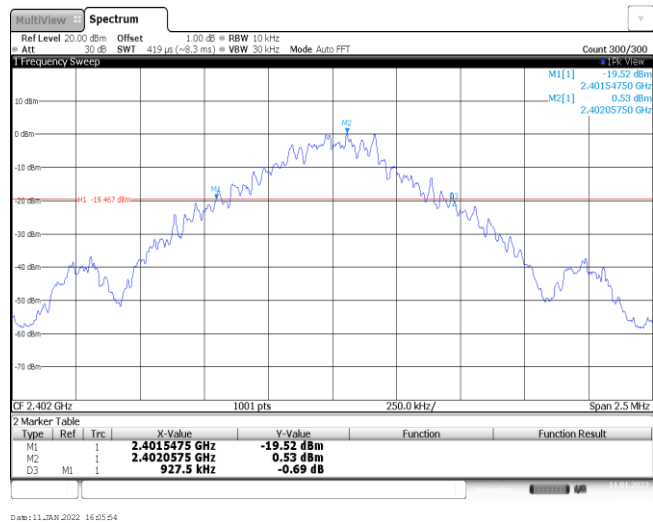
Appendix B : 20 dB Bandwidth

Modulation type	Channel	20 dB Bandwidth (kHz)	Limit (kHz)	Result
GFSK	00	927.50	-	Pass
	39	930.00		
	78	927.50		
$\pi/4$ DQPSK	00	1285.00	-	Pass
	39	1287.50		
	78	1290.00		
8DPSK	00	1302.50	-	Pass
	39	1302.50		
	78	1297.50		

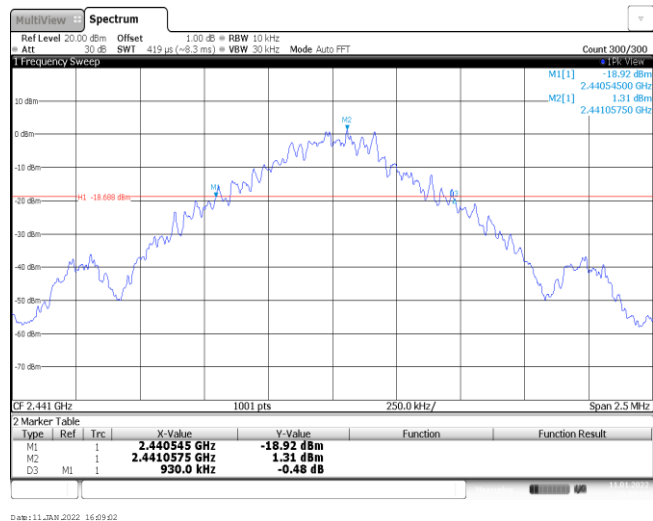
Modulation Type:

GFSK

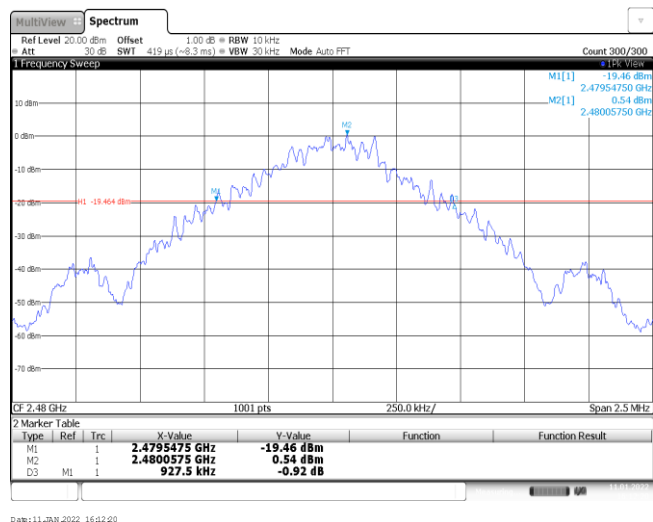
CH00



CH39



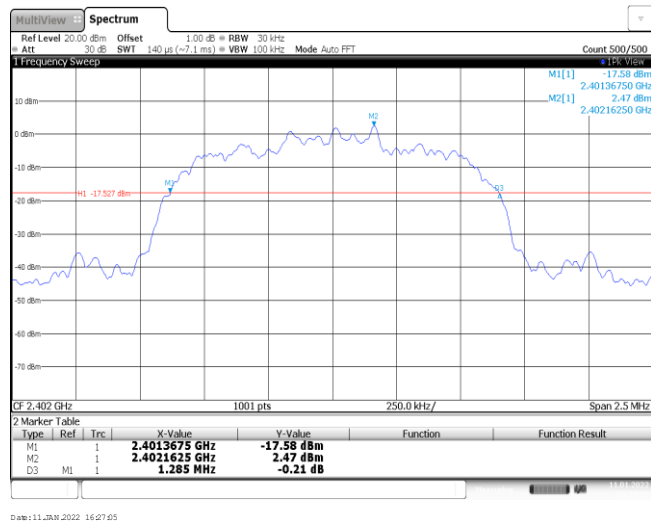
CH78



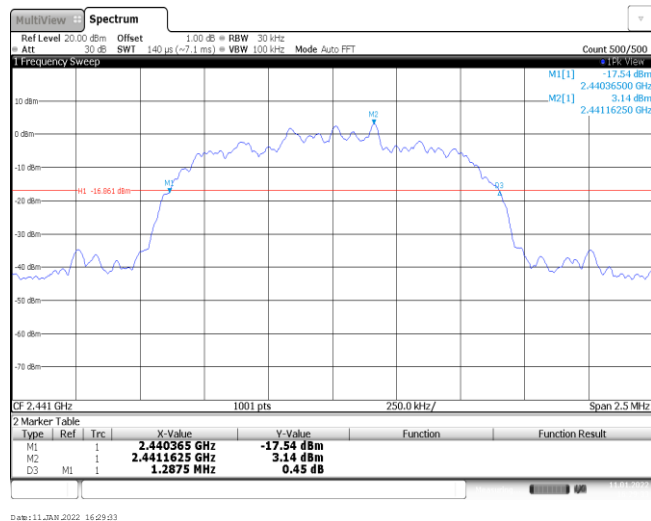
Modulation Type:

 $\pi/4$ DQPSK

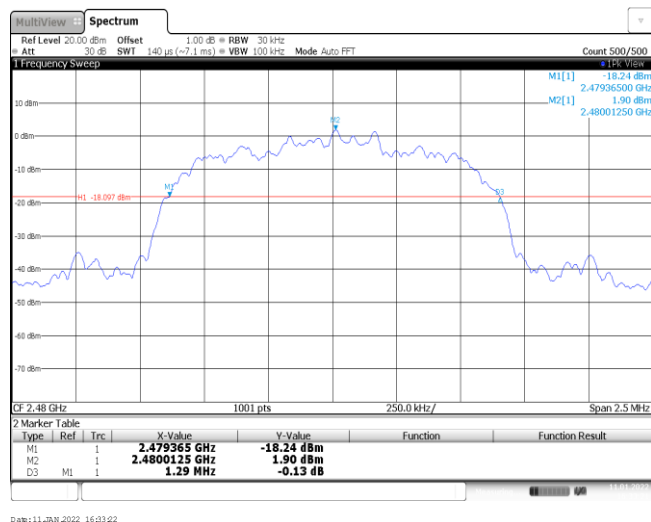
CH00



CH39



CH78



Modulation Type:		8DPSK
CH00	MultiView Spectrum Ref Level 20.00 dBm Offset 30 dB SWT 140 μs (≈7.1 ms) VBW 100 kHz Mode Auto FFT Count 500/500 1 Frequency Sweep </	

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	1.17	-	Pass
	39	1.16		
	78	1.17		
8DPSK	00	1.17	-	Pass
	39	1.17		
	78	1.17		

Modulation Type:

GFSK

CH00



Date: 11_JAN 2022 16:06:03

CH39

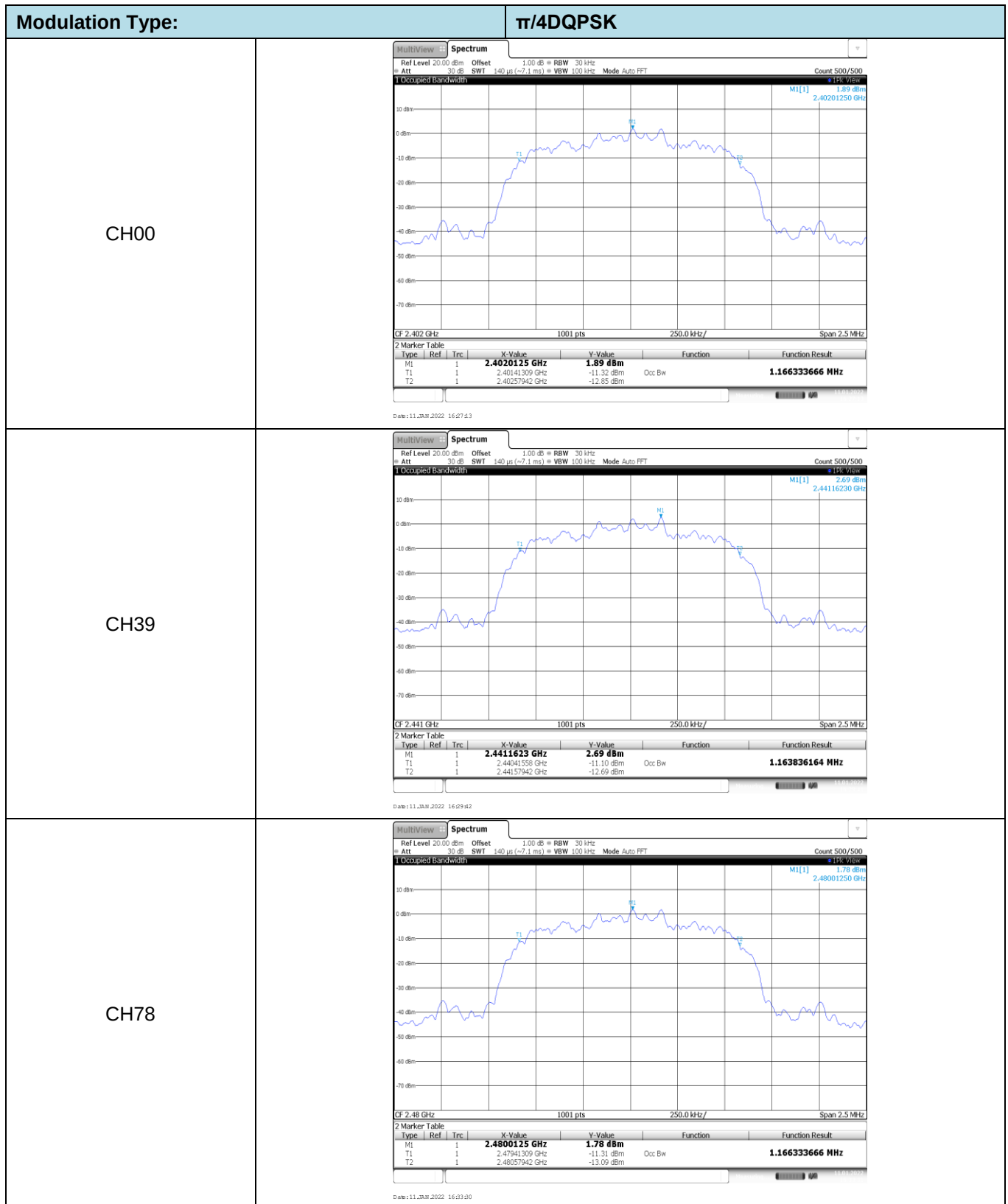


Date: 11_JAN 2022 16:09:10

CH78



Date: 11_JAN 2022 16:12:29



Modulation Type:

8DPSK

CH00



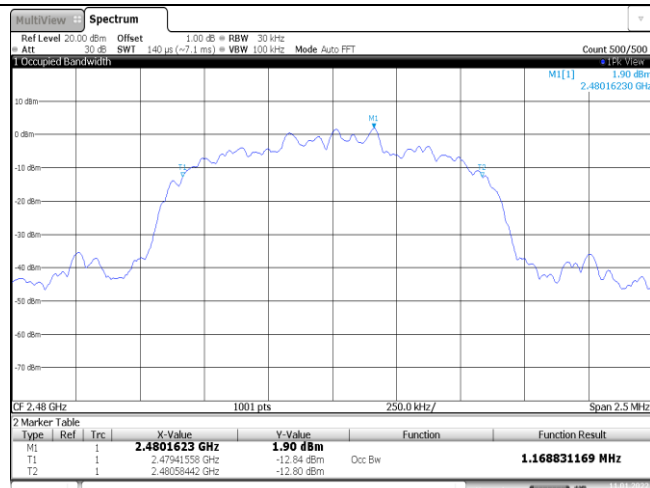
Date: 11_JAN 2022 17:48:9

CH39



Date: 11_JAN 2022 17:53:46

CH78



Date: 11_JAN 2022 17:56:97

Appendix D: Carrier Frequencies Separation

Modulation type	Channel	Carrier Frequencies Separation (MHz)	Limit (kHz) *	Result
GFSK	39	1.00	≥930.00	Pass
π/4DQPSK	39	1.00	≥860.00	Pass
8DPSK	39	1.00	≥868.33	Pass

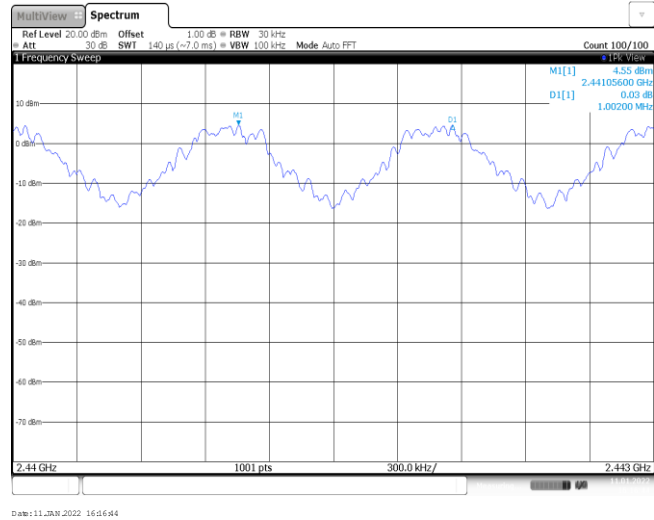
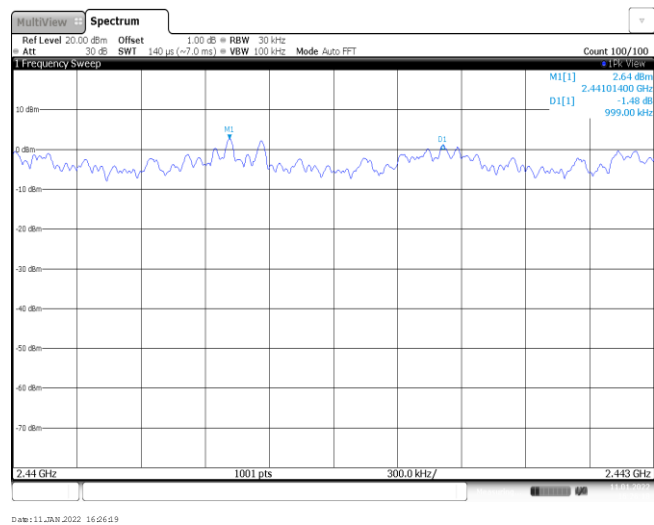
Note:

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

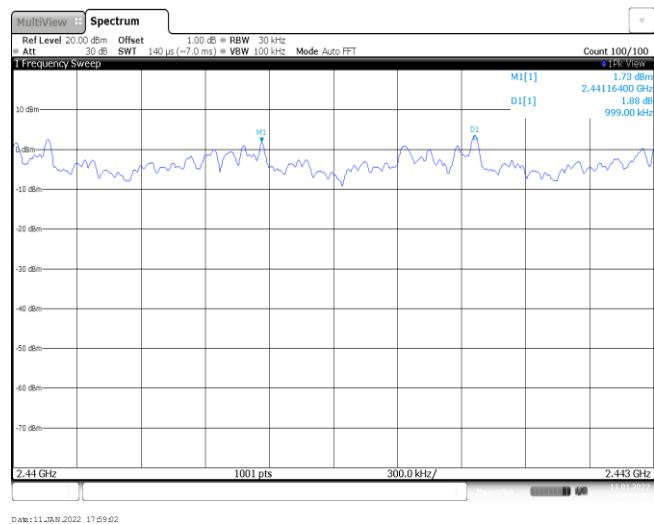
π/4DQPSK limit = $\frac{2}{3}$ * The maximum 20 dB Bandwidth for π/4DQPSK modulation on the appendix B.

8DPSK limit = $\frac{2}{3}$ * The maximum 20 dB Bandwidth for 8DPSK modulation on the appendix B

GFSK

 $\pi/4$ DQPSK

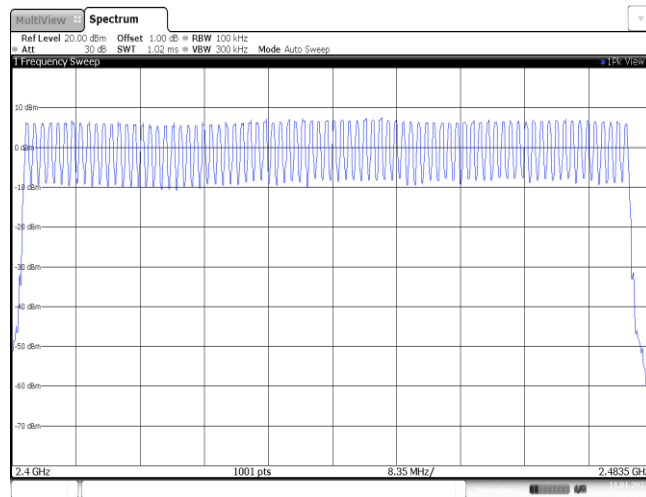
8DPSK



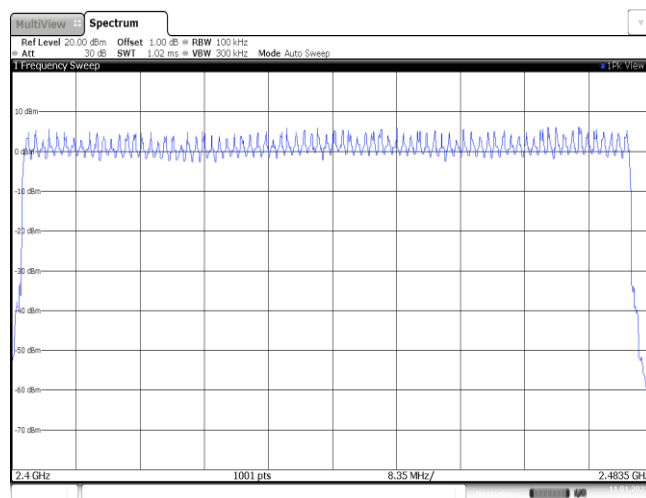
Appendix E: Hopping Channel Number

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

GFSK

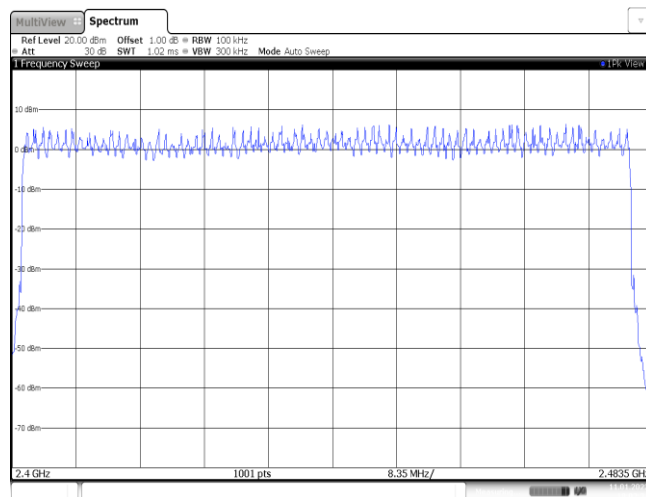


Date: 11 JAN 2022 16:18:01

 $\pi/4$ DQPSK

Date: 11 JAN 2022 16:24:09

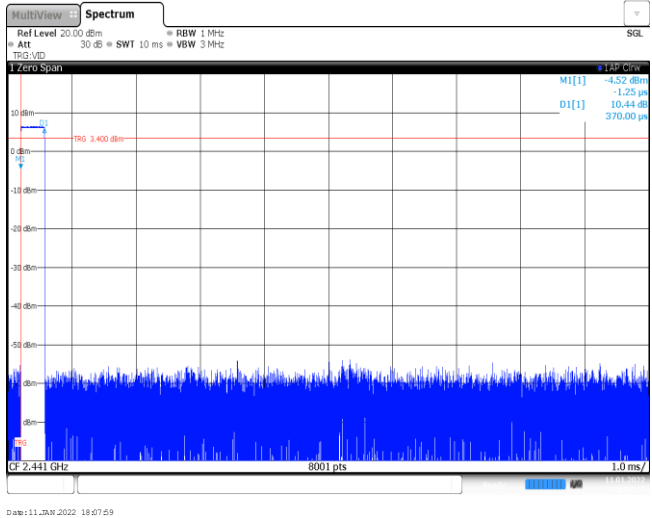
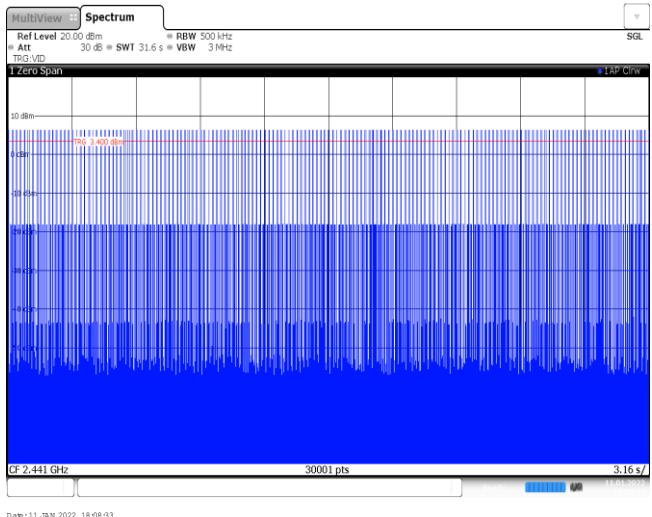
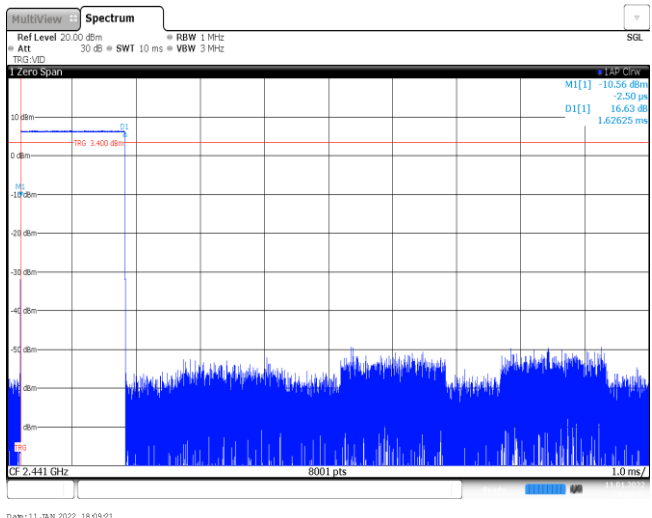
8DPSK

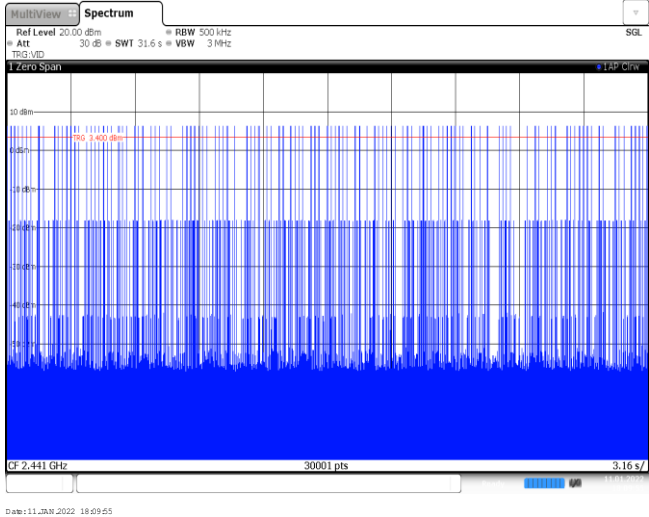
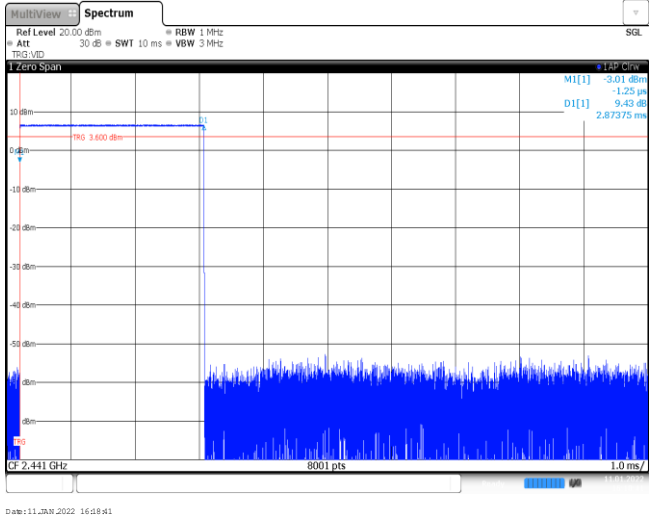
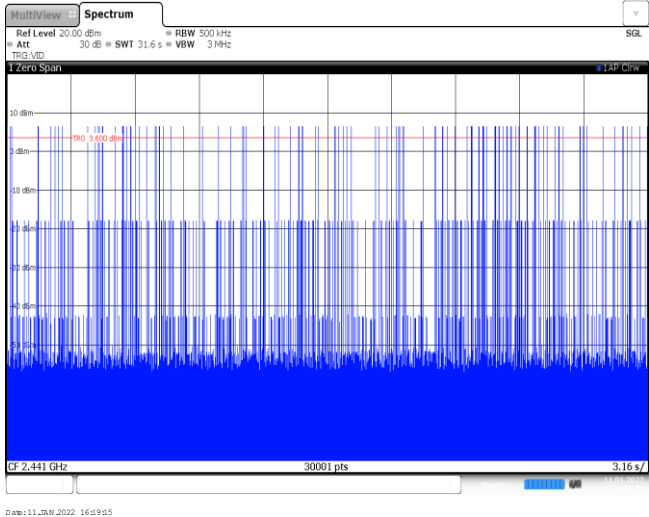


Date: 11 JAN 2022 18:02:04

Appendix F: Dwell Time

Modulation type	Packet	Burst Width [ms]	Total Hops[hop*ch]	Dwell time (Second)	Limit (Second)	Result
GFSK	DH1	0.37	315	0.12	≤ 0.40	Pass
	DH3	1.63	161	0.26		
	DH5	2.87	104	0.30		
$\pi/4$ DQPSK	2DH1	0.38	314	0.12	≤ 0.40	Pass
	2DH3	1.63	159	0.26		
	2DH5	2.88	103	0.30		
8DPSK	3DH1	0.38	313	0.12	≤ 0.40	Pass
	3DH3	1.63	159	0.26		
	3DH5	2.88	98	0.28		

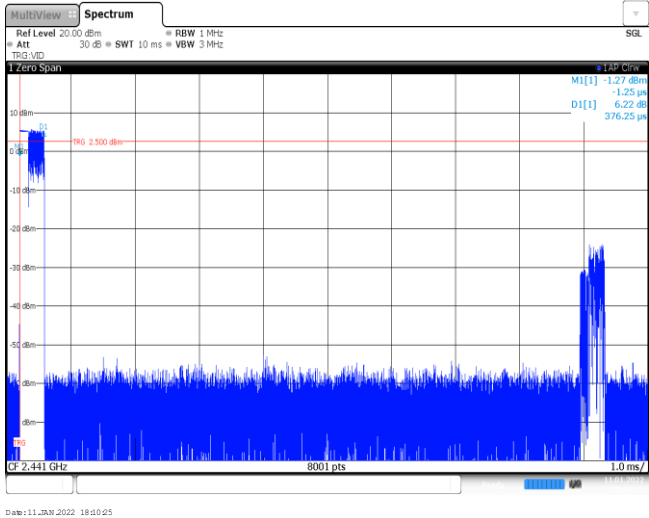
Modulation Type:	GFSK
DH1 Burst width	 The spectrum plot shows a signal at 2.441 GHz with a bandwidth of 3.400 dBm. The plot displays a narrowband signal with a peak level of 10.44 dBm and a noise floor of -10.56 dBm. The signal is characterized by a sharp peak and a wide bandwidth, indicating a burst of data. Ref Level 20.00 dBm Att 30 dB RBW 1 MHz SWT 10 ms VBW 3 MHz TSG V/D SGL 1 Zero Span M1[1] -10.56 dBm D1[1] 10.44 dBm CF 2.441 GHz 8001 pts 1.0 ms/ Date: 11 JAN 2022 18:07:59
DH1 Burst number	 The spectrum plot shows a signal at 2.441 GHz with a bandwidth of 3.16 s. The plot displays a narrowband signal with a peak level of 10.44 dBm and a noise floor of -10.56 dBm. The signal is characterized by a sharp peak and a wide bandwidth, indicating a burst of data. Ref Level 20.00 dBm Att 30 dB RBW 500 kHz SWT 31.6 s VBW 3 MHz TSG V/D SGL 1 Zero Span M1[1] -10.56 dBm D1[1] 10.44 dBm CF 2.441 GHz 30001 pts 3.16 s/ Date: 11 JAN 2022 18:08:03
DH3 Burst width	 The spectrum plot shows a signal at 2.441 GHz with a bandwidth of 3.400 dBm. The plot displays a narrowband signal with a peak level of 10.44 dBm and a noise floor of -10.56 dBm. The signal is characterized by a sharp peak and a wide bandwidth, indicating a burst of data. Ref Level 20.00 dBm Att 30 dB RBW 1 MHz SWT 10 ms VBW 3 MHz TSG V/D SGL 1 Zero Span M1[1] -10.56 dBm D1[1] 10.44 dBm CF 2.441 GHz 8001 pts 1.0 ms/ Date: 11 JAN 2022 18:09:01

DH3 Burst number	 The screenshot shows a spectrum analyzer interface with the title 'Spectrum'. The y-axis represents power in dBm, ranging from -50 to 10. The x-axis represents frequency in GHz, centered at 2.441 GHz. A red horizontal line is drawn at -10 dBm. The plot shows a dense, noisy signal across the entire frequency range. The status bar at the bottom indicates 'CF 2.441 GHz', '30001 pts', and '3.16 s'. The date and time are '11 JAN 2022 18:09:55'.
DH5 Burst width	 The screenshot shows a spectrum analyzer interface with the title 'Spectrum'. The y-axis represents power in dBm, ranging from -50 to 10. The x-axis represents frequency in GHz, centered at 2.441 GHz. A red horizontal line is drawn at -10 dBm. The plot shows a burst of signal that starts at approximately 2.441 GHz and extends to the right. The status bar at the bottom indicates 'CF 2.441 GHz', '8001 pts', and '1.0 ms'. The date and time are '11 JAN 2022 16:18:41'.
DH5 Burst number	 The screenshot shows a spectrum analyzer interface with the title 'Spectrum'. The y-axis represents power in dBm, ranging from -50 to 10. The x-axis represents frequency in GHz, centered at 2.441 GHz. A red horizontal line is drawn at -10 dBm. The plot shows a dense, noisy signal across the entire frequency range. The status bar at the bottom indicates 'CF 2.441 GHz', '30001 pts', and '3.16 s'. The date and time are '11 JAN 2022 16:19:45'.

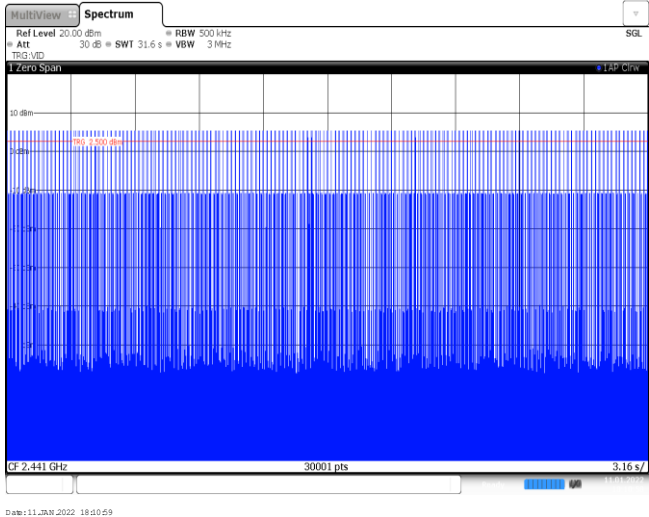
Modulation Type:

$\pi/4$ DQPSK

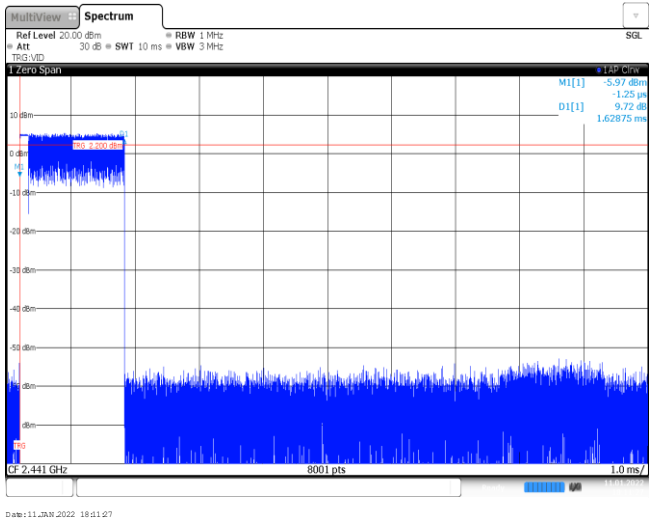
2DH1
Burst width

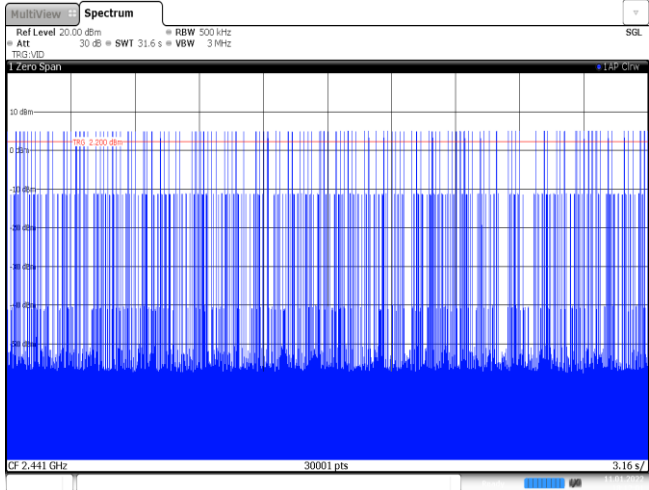
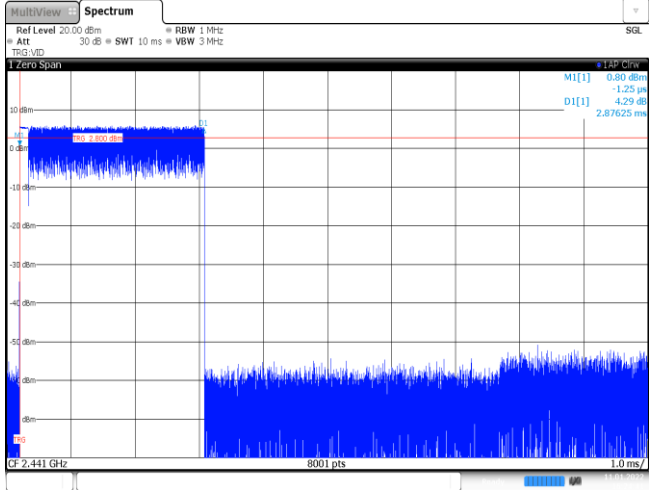
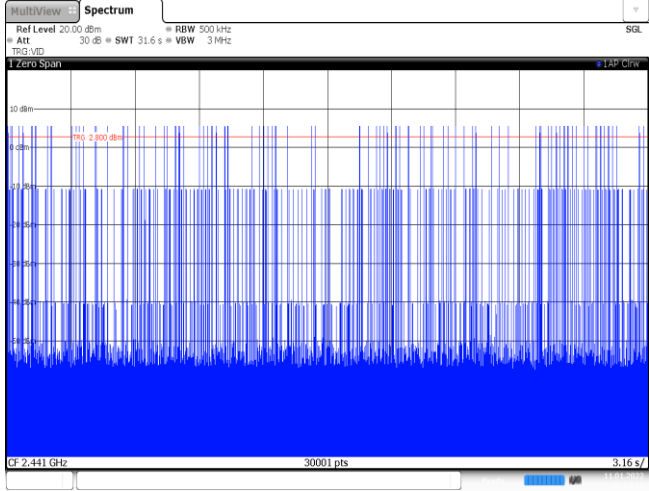


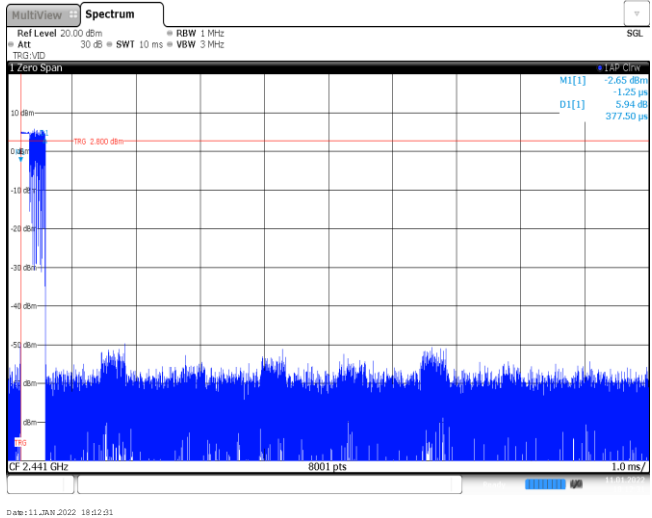
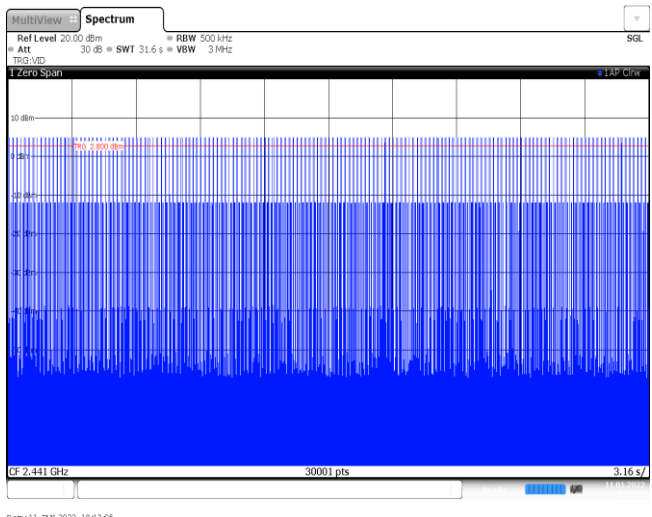
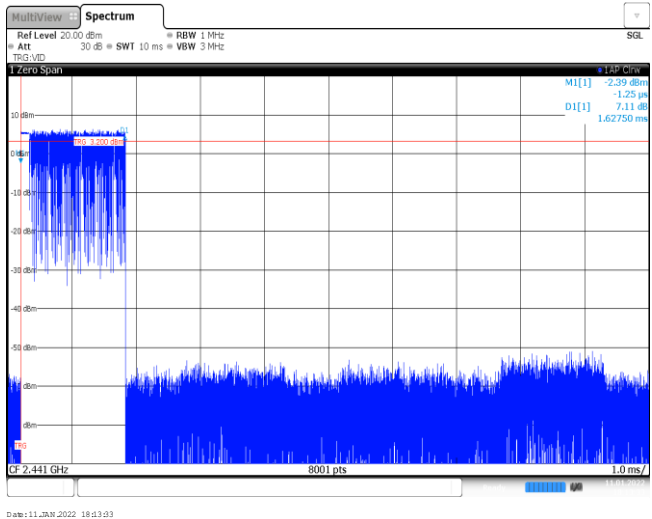
2DH1
Burst number

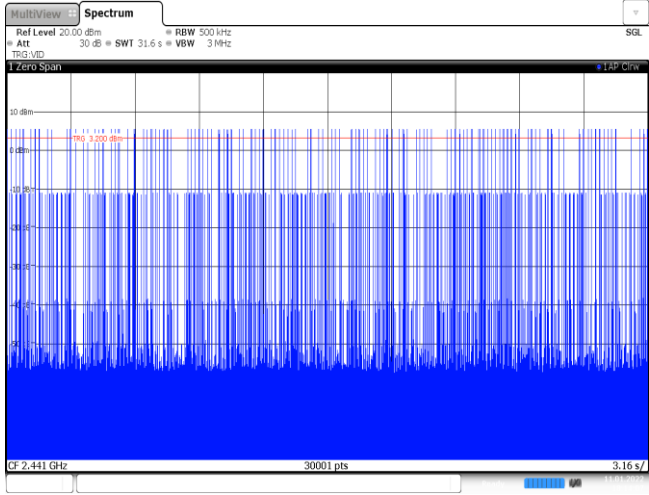
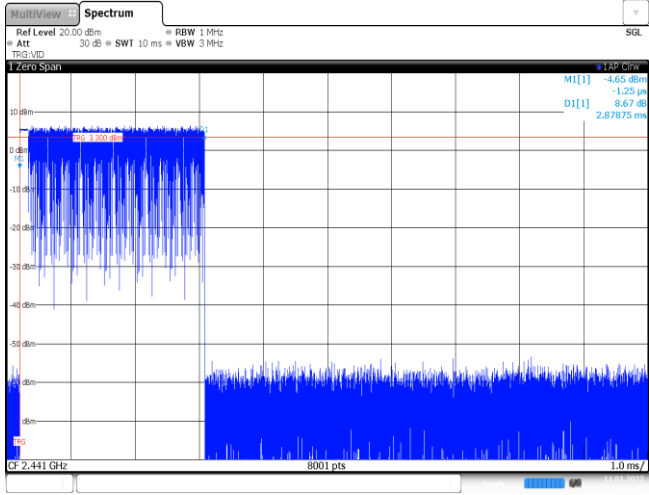
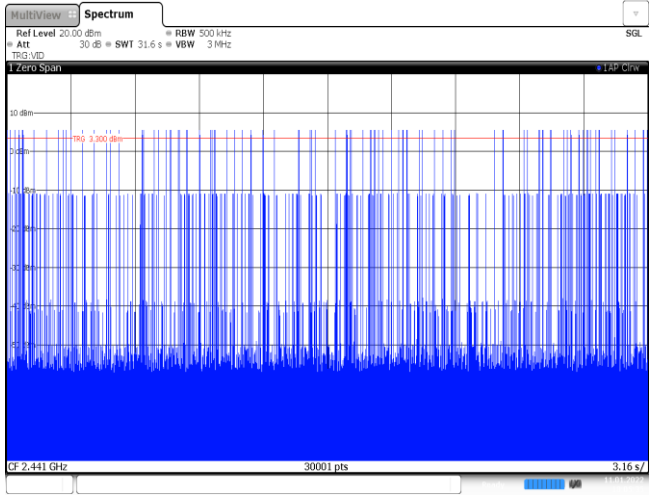


2DH3
Burst width



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

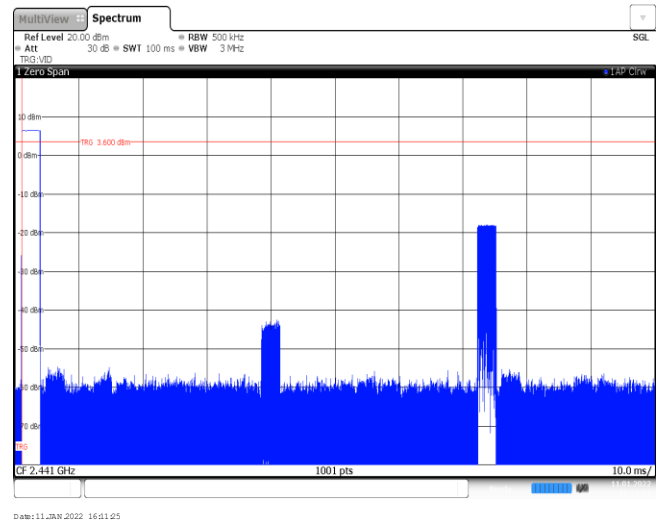
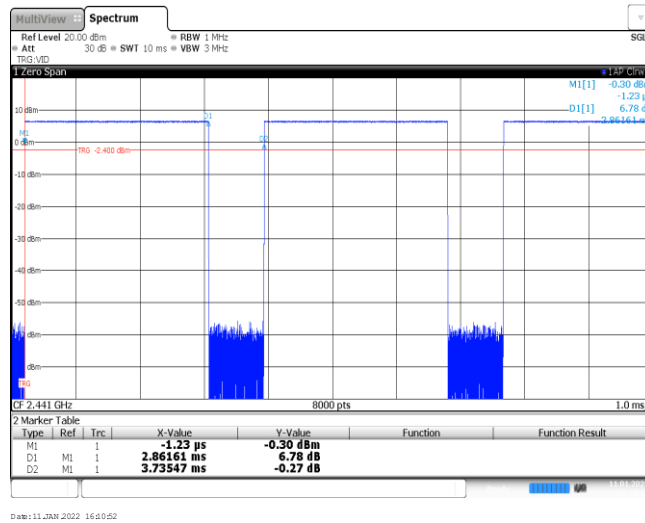
Modulation Type:	8DPSK
3DH1 Burst width	 The spectrum plot shows a single burst of signal at 2.441 GHz. The y-axis represents power in dBm, ranging from -60 to 10. The x-axis represents frequency in MHz, ranging from 2.435 to 2.447. A red horizontal line indicates the reference level at -20.00 dBm. The plot shows a sharp peak at the center frequency, with a bandwidth of approximately 1 MHz. The signal is labeled with 'M[1]' at -2.65 dBm, 'D[1]' at -1.25 dBm, and 'D[1]' at -5.94 dBm. The plot also shows a noise floor at approximately -60 dBm.
3DH1 Burst number	 The spectrum plot shows a continuous signal at 2.441 GHz. The y-axis represents power in dBm, ranging from -60 to 10. The x-axis represents frequency in MHz, ranging from 2.435 to 2.447. A red horizontal line indicates the reference level at -20.00 dBm. The plot shows a continuous signal with a bandwidth of approximately 1 MHz. The signal is labeled with 'M[1]' at -2.65 dBm, 'D[1]' at -1.25 dBm, and 'D[1]' at -5.94 dBm. The plot also shows a noise floor at approximately -60 dBm.
3DH3 Burst width	 The spectrum plot shows a single burst of signal at 2.441 GHz. The y-axis represents power in dBm, ranging from -60 to 10. The x-axis represents frequency in MHz, ranging from 2.435 to 2.447. A red horizontal line indicates the reference level at -20.00 dBm. The plot shows a sharp peak at the center frequency, with a bandwidth of approximately 1 MHz. The signal is labeled with 'M[1]' at -2.39 dBm, 'D[1]' at -1.25 dBm, and 'D[1]' at -7.11 dBm. The plot also shows a noise floor at approximately -60 dBm.

3DH3 Burst number	 The spectrum plot shows a dense signal across the frequency range from 2.441 GHz to 3.165 GHz. The y-axis represents power in dBm, ranging from -60 to 10. The x-axis represents frequency in GHz. The plot is titled 'Spectrum' and includes parameters: Ref Level 20.00 dBm, Att 30 dB, RBW 500 kHz, SWT 31.6 s, VSW 3 MHz. The date is 11 JAN 2022 18:14:08.
3DH5 Burst width	 The spectrum plot shows a signal burst between 2.441 GHz and 2.5 GHz. The y-axis represents power in dBm, ranging from -60 to 10. The x-axis represents frequency in GHz. The plot is titled 'Spectrum' and includes parameters: Ref Level 20.00 dBm, Att 30 dB, RBW 1 MHz, SWT 10 ms, VSW 3 MHz. The date is 11 JAN 2022 18:05:01. Additional parameters shown are: M1[1] -4.65 dBm, D1[1] -1.25 ps, 8.67 dB, 2.87875 ms.
3DH5 Burst number	 The spectrum plot shows a dense signal across the frequency range from 2.441 GHz to 3.165 GHz. The y-axis represents power in dBm, ranging from -60 to 10. The x-axis represents frequency in GHz. The plot is titled 'Spectrum' and includes parameters: Ref Level 20.00 dBm, Att 30 dB, RBW 500 kHz, SWT 31.6 s, VSW 3 MHz. The date is 11 JAN 2022 18:05:05.

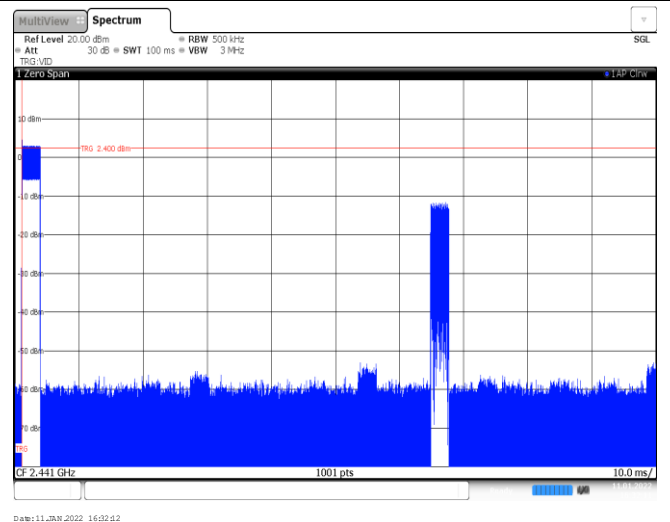
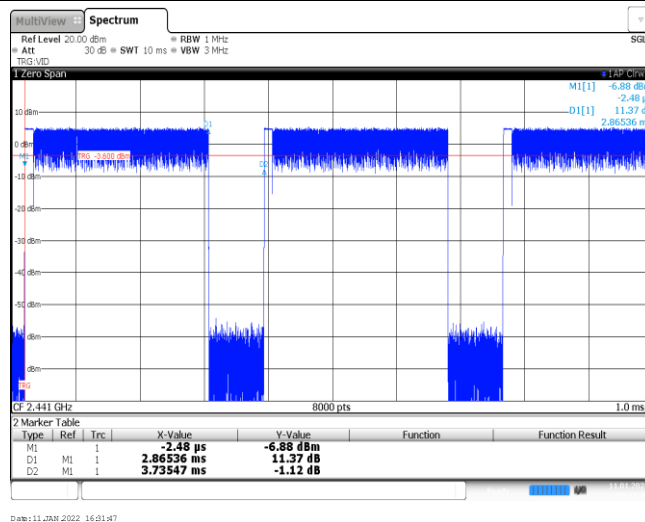
Appendix G: Duty Cycle Correction Factor (DCCF)

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	2.86	100	2	-24.85
$\pi/4$ DQPSK	2441	2.87	100	2	-24.82
8DPSK	2441	2.87	100	3	-21.30

GFSK

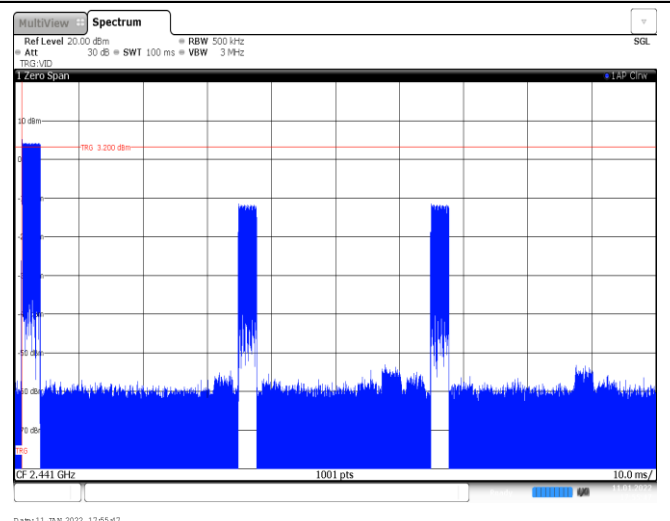
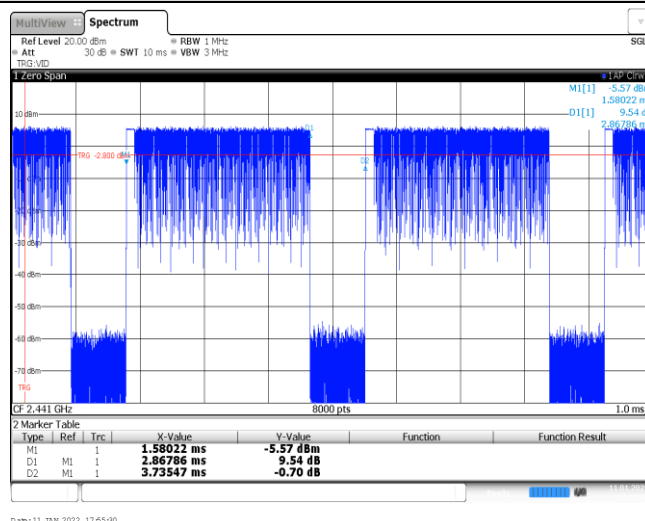
T_{on} time for single burst

Burst Quantity

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

Burst Quantity

8DPSK

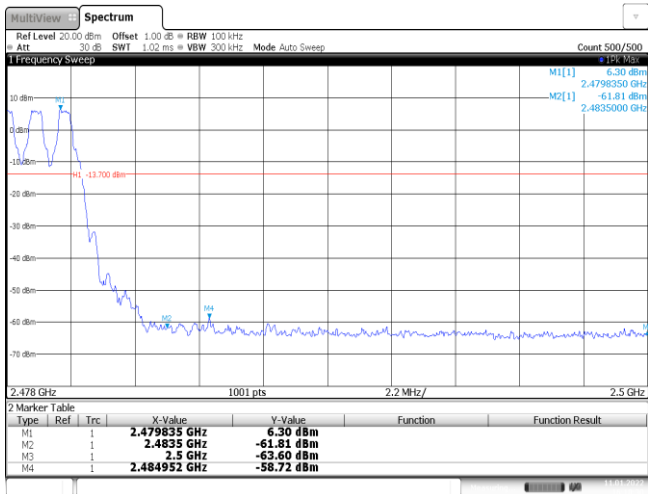
T_{on} time for single burst

Burst Quantity

Appendix H: Band edge and Spurious Emissions (conducted)

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

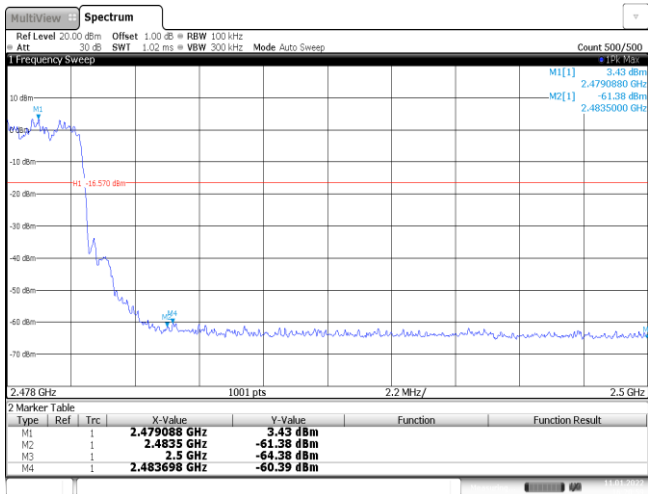
CH78
Hopping mode



Date: 11 JAN 2022 16:18:00

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

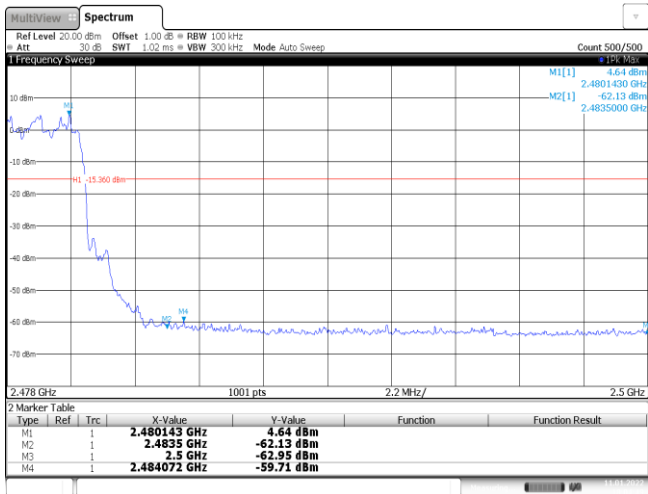
CH78
Hopping mode

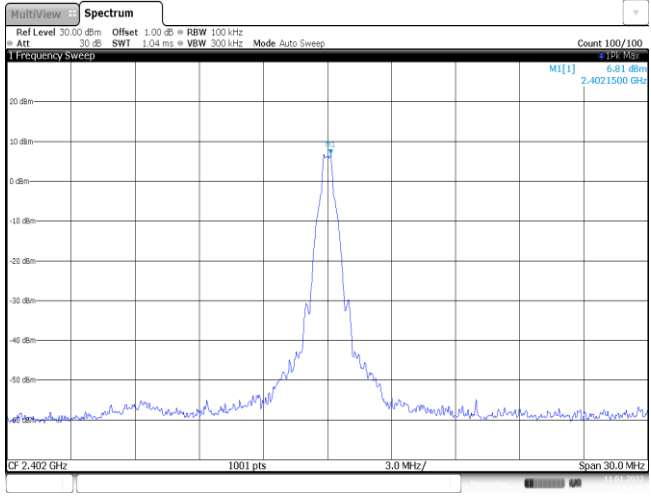
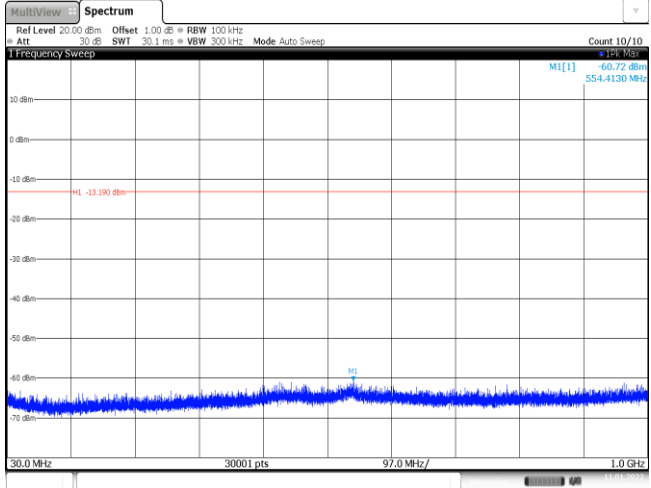
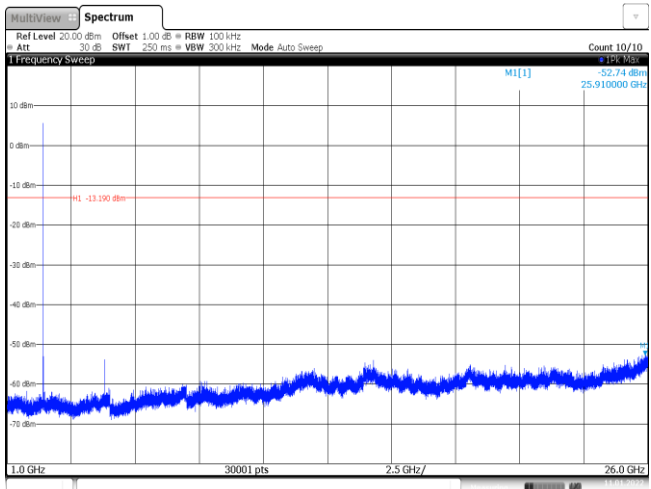


Date: 11 JAN 2022 16:20:59

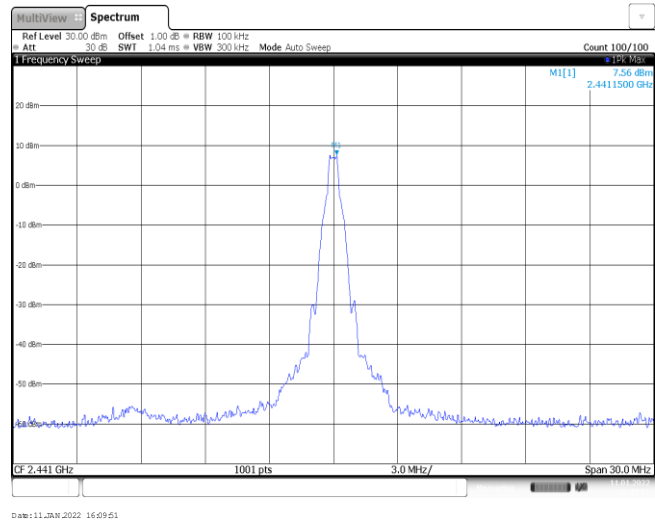
Test Item:	Band edge	Modulation type:	8DPSK																																										
CH00 No hopping mode	MultiView Spectrum Ref Level 20.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SWT 1.05 ms VBW 300 kHz Mode Auto Sweep Count 500/500 1 Frequency Sweep 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] 5.35 dBm 2.4021050 GHz M2[1] -50.17 dBm 2.4000000 GHz 2.31 GHz 1001 pts 9.5 MHz/ 2.405 GHz 2 Marker Table <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>2.402105 GHz</td><td>5.55 dBm</td><td></td><td></td></tr><tr><td>M2</td><td>1</td><td></td><td>2.4 GHz</td><td>-50.17 dBm</td><td></td><td></td></tr><tr><td>M3</td><td>1</td><td></td><td>2.39 GHz</td><td>-62.59 dBm</td><td></td><td></td></tr><tr><td>M4</td><td>1</td><td></td><td>2.31 GHz</td><td>-63.59 dBm</td><td></td><td></td></tr><tr><td>M5</td><td>1</td><td></td><td>2.399965 GHz</td><td>-50.08 dBm</td><td></td><td></td></tr></table> Date: 11_JAN 2022 17:51:29			Type	Ref	Trc	X-Value	Y-Value	Function	Function Result	M1	1		2.402105 GHz	5.55 dBm			M2	1		2.4 GHz	-50.17 dBm			M3	1		2.39 GHz	-62.59 dBm			M4	1		2.31 GHz	-63.59 dBm			M5	1		2.399965 GHz	-50.08 dBm		
Type	Ref	Trc	X-Value	Y-Value	Function	Function Result																																							
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M3	1		2.39 GHz	-62.59 dBm																																									
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CH00 Hopping mode	MultiView Spectrum 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 1 Frequency Sweep 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] 5.68 dBm 2.4040980 GHz M2[1] -49.90 dBm 2.4000000 GHz 2.31 GHz 1001 pts 9.5 MHz/ 2.405 GHz 2 Marker Table <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>2.404098 GHz</td><td>5.68 dBm</td><td></td><td></td></tr><tr><td>M2</td><td>1</td><td></td><td>2.4 GHz</td><td>-49.90 dBm</td><td></td><td></td></tr><tr><td>M3</td><td>1</td><td></td><td>2.39 GHz</td><td>-61.81 dBm</td><td></td><td></td></tr><tr><td>M4</td><td>1</td><td></td><td>2.31 GHz</td><td>-63.80 dBm</td><td></td><td></td></tr><tr><td>M5</td><td>1</td><td></td><td>2.399965 GHz</td><td>-50.03 dBm</td><td></td><td></td></tr></table> Date: 11_JAN 2022 18:03:46			Type	Ref	Trc	X-Value	Y-Value	Function	Function Result	M1	1		2.404098 GHz	5.68 dBm			M2	1		2.4 GHz	-49.90 dBm			M3	1		2.39 GHz	-61.81 dBm			M4	1		2.31 GHz	-63.80 dBm			M5	1		2.399965 GHz	-50.03 dBm		
Type	Ref	Trc	X-Value	Y-Value	Function	Function Result																																							
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M2	1		2.4 GHz	-49.90 dBm																																									
M3	1		2.39 GHz	-61.81 dBm																																									
M4	1		2.31 GHz	-63.80 dBm																																									
M5	1		2.399965 GHz	-50.03 dBm																																									
CH78 No hopping mode	MultiView Spectrum 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 500/500 1 Frequency Sweep 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] 5.44 dBm 2.4801430 GHz M2[1] -57.48 dBm 2.4835000 GHz 2.478 GHz 1001 pts 2.2 MHz/ 2.5 GHz 2 Marker Table <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>2.480143 GHz</td><td>5.44 dBm</td><td></td><td></td></tr><tr><td>M2</td><td>1</td><td></td><td>2.4835 GHz</td><td>-57.48 dBm</td><td></td><td></td></tr><tr><td>M3</td><td>1</td><td></td><td>2.5 GHz</td><td>-62.75 dBm</td><td></td><td></td></tr><tr><td>M4</td><td>1</td><td></td><td>2.48383 GHz</td><td>-57.95 dBm</td><td></td><td></td></tr></table> Date: 11_JAN 2022 17:57:22			Type	Ref	Trc	X-Value	Y-Value	Function	Function Result	M1	1		2.480143 GHz	5.44 dBm			M2	1		2.4835 GHz	-57.48 dBm			M3	1		2.5 GHz	-62.75 dBm			M4	1		2.48383 GHz	-57.95 dBm									
Type	Ref	Trc	X-Value	Y-Value	Function	Function Result																																							
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M3	1		2.5 GHz	-62.75 dBm																																									
M4	1		2.48383 GHz	-57.95 dBm																																									

CH78
Hoppig mode

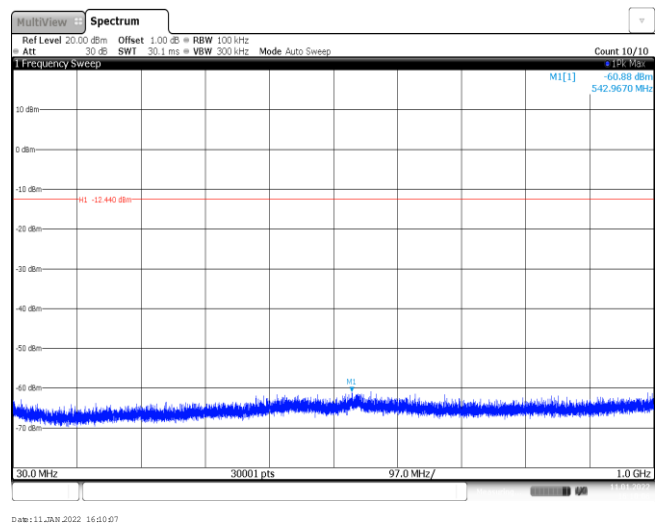


Test Item:	Spurious Emission	Modulation type:	GFSK
CH00 Reference level			
CH00 30MHz~1000MHz			
CH00 1GHz~26GHz			

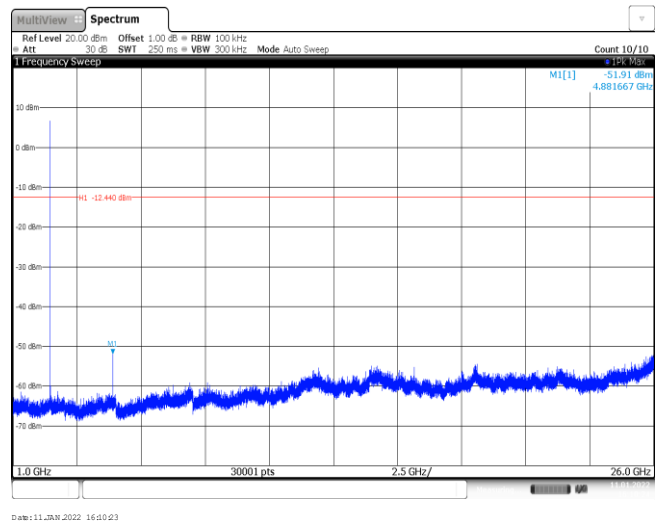
CH39
Reference level



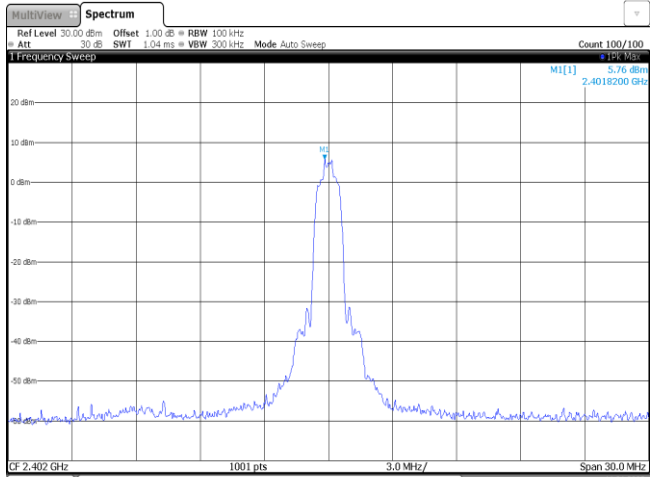
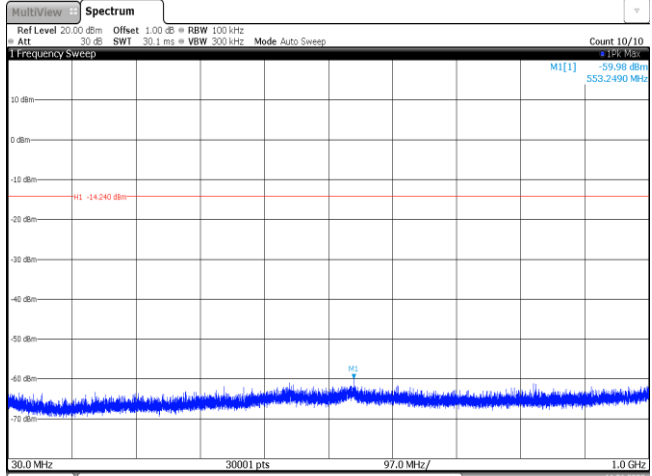
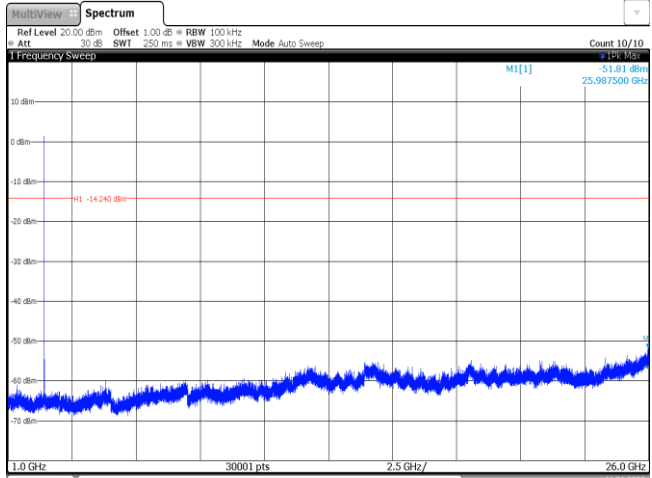
CH39
30MHz~1000MHz



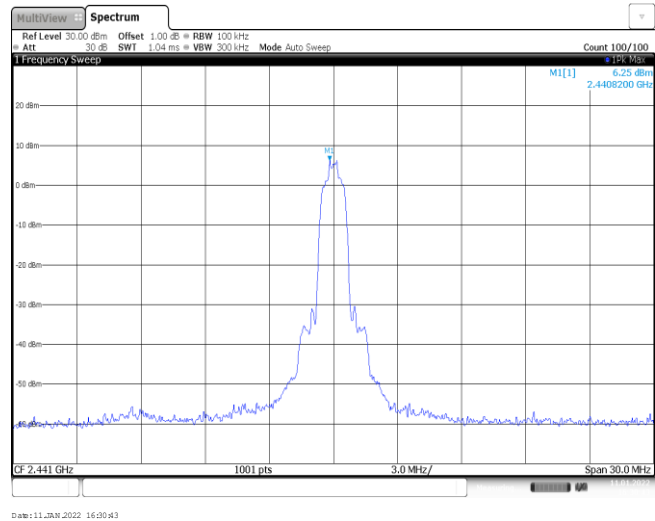
CH39
1GHz~26GHz



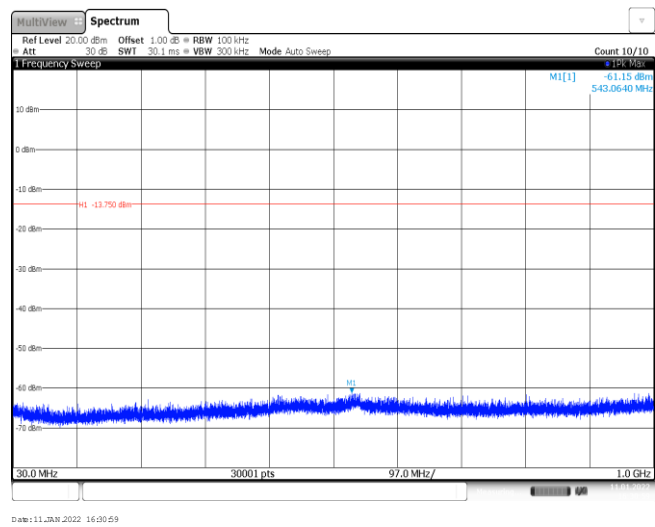
CH78 Reference level	A spectrum plot titled 'Spectrum' showing a single sharp peak at 2.48 GHz. The y-axis represents power in dBm, ranging from -70 to 20. The x-axis represents frequency in MHz, with a span of 30.0 MHz. The peak is labeled with a count of 100/100 and a value of 6.73 dBm. The plot includes a frequency sweep and a count of 100/100. The date is 11 JAN 2022 16:14:09.
CH78 30MHz~1000MHz	A spectrum plot titled 'Spectrum' showing 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, with a span of 1.0 GHz. The plot includes a frequency sweep and a count of 10/10. The date is 11 JAN 2022 16:14:25.
CH78 1GHz~26GHz	A spectrum plot titled 'Spectrum' showing 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, with a span of 2.5 GHz. The plot includes a frequency sweep and a count of 10/10. The date is 11 JAN 2022 16:14:41.

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

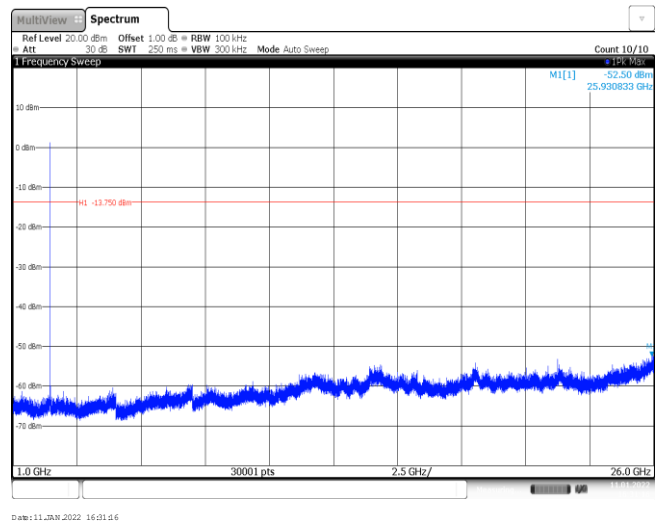
CH39
Reference level



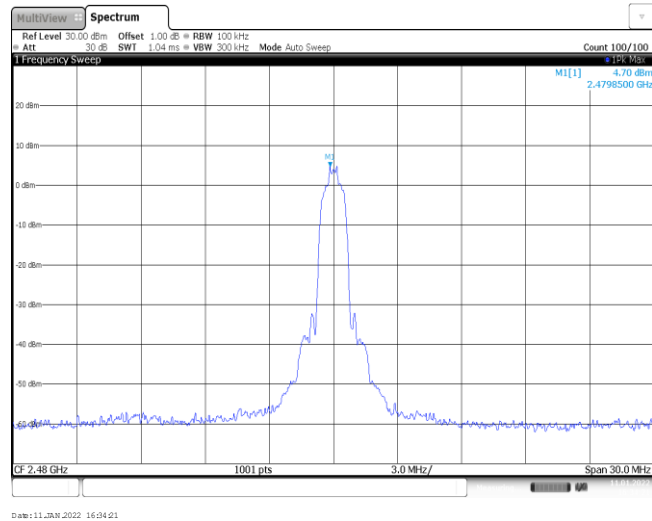
CH39
30MHz~1000MHz



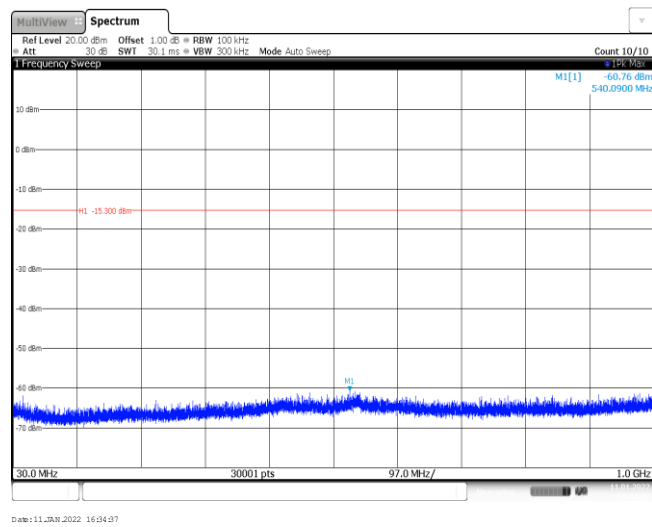
CH39
1GHz~26GHz



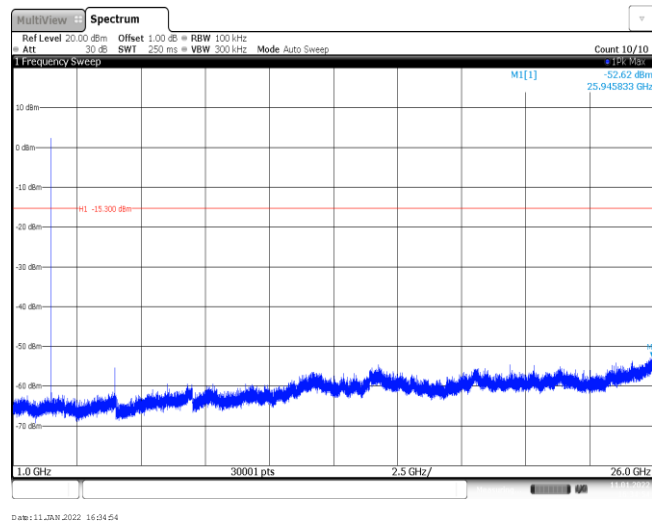
CH78
Reference level

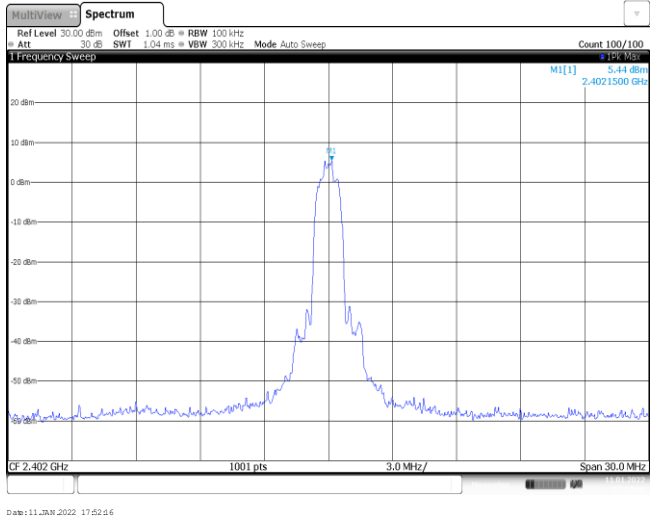
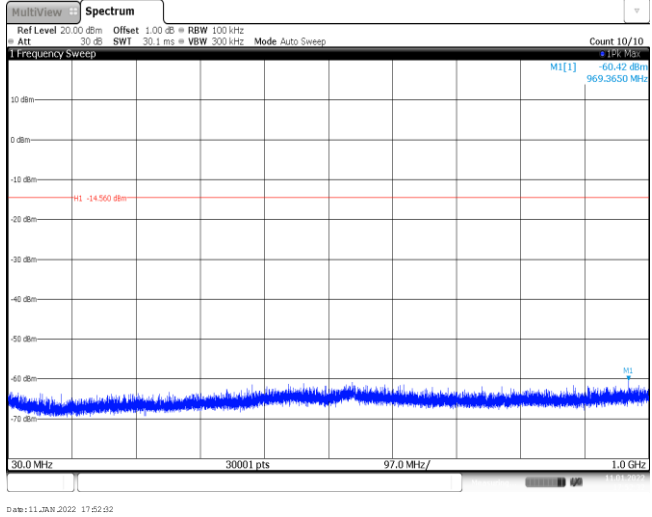
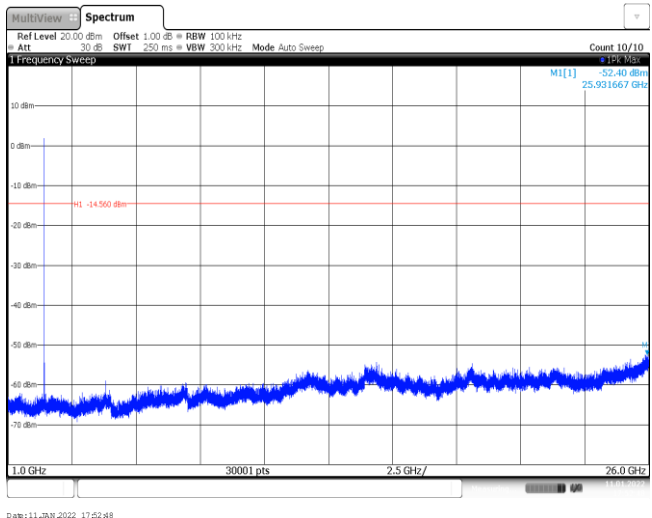


CH78
30MHz~1000MHz

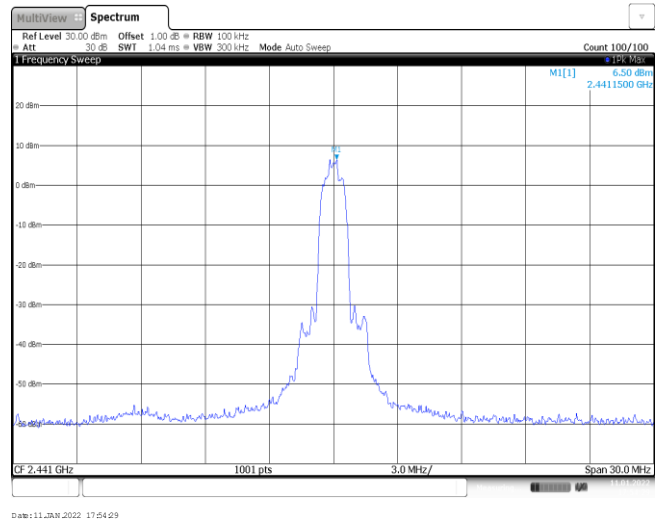


CH78
1GHz~26GHz

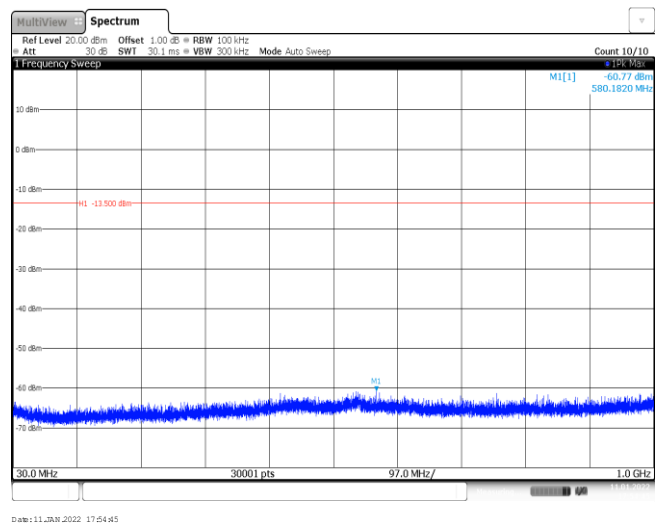


Test Item:	Spurious Emission	Modulation type:	8DPSK
CH00 Reference level	 CH00 Reference level		
CH00 30MHz~1000MHz	 CH00 30MHz~1000MHz		
CH00 1GHz~26GHz	 CH00 1GHz~26GHz		

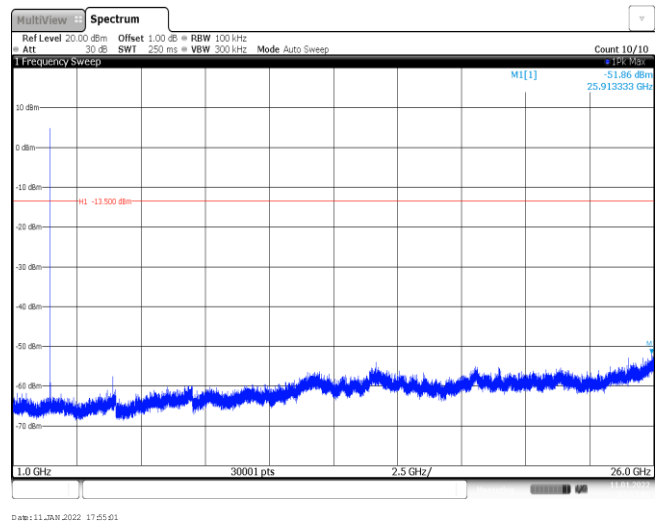
CH39
Reference level



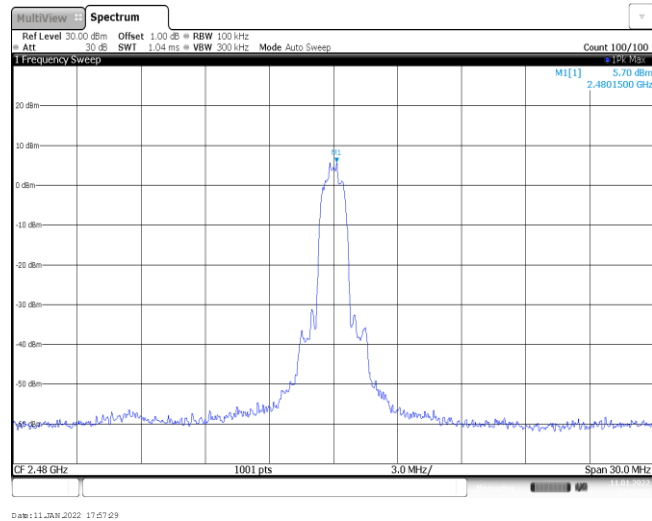
CH39
30MHz~1000MHz



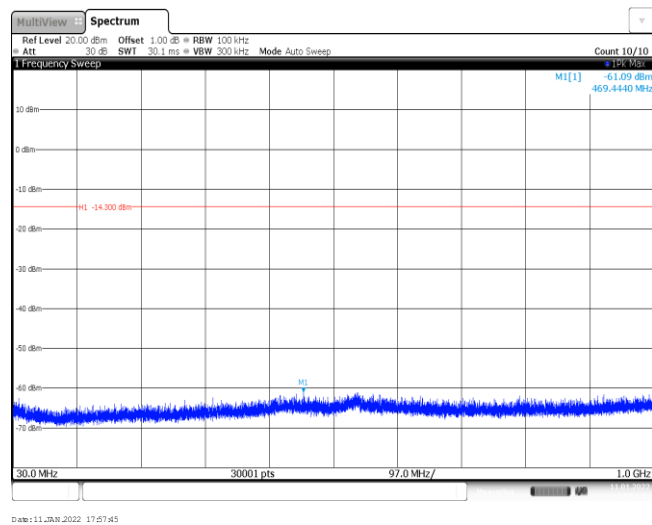
CH39
1GHz~26GHz



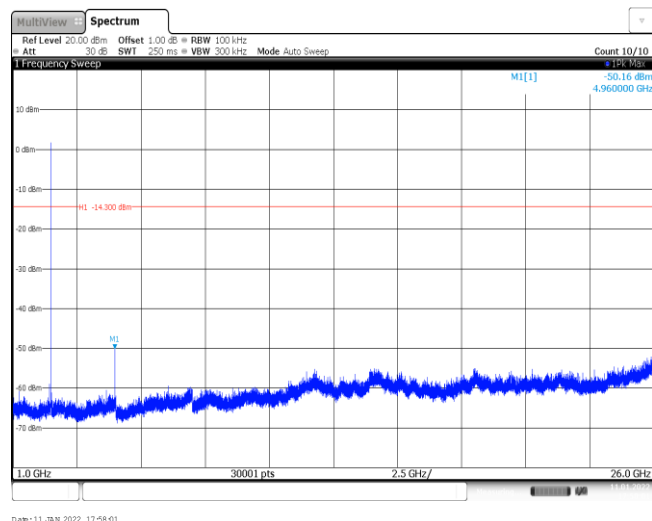
CH78
Reference level



CH78
30MHz~1000MHz



CH78
1GHz~26GHz



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