

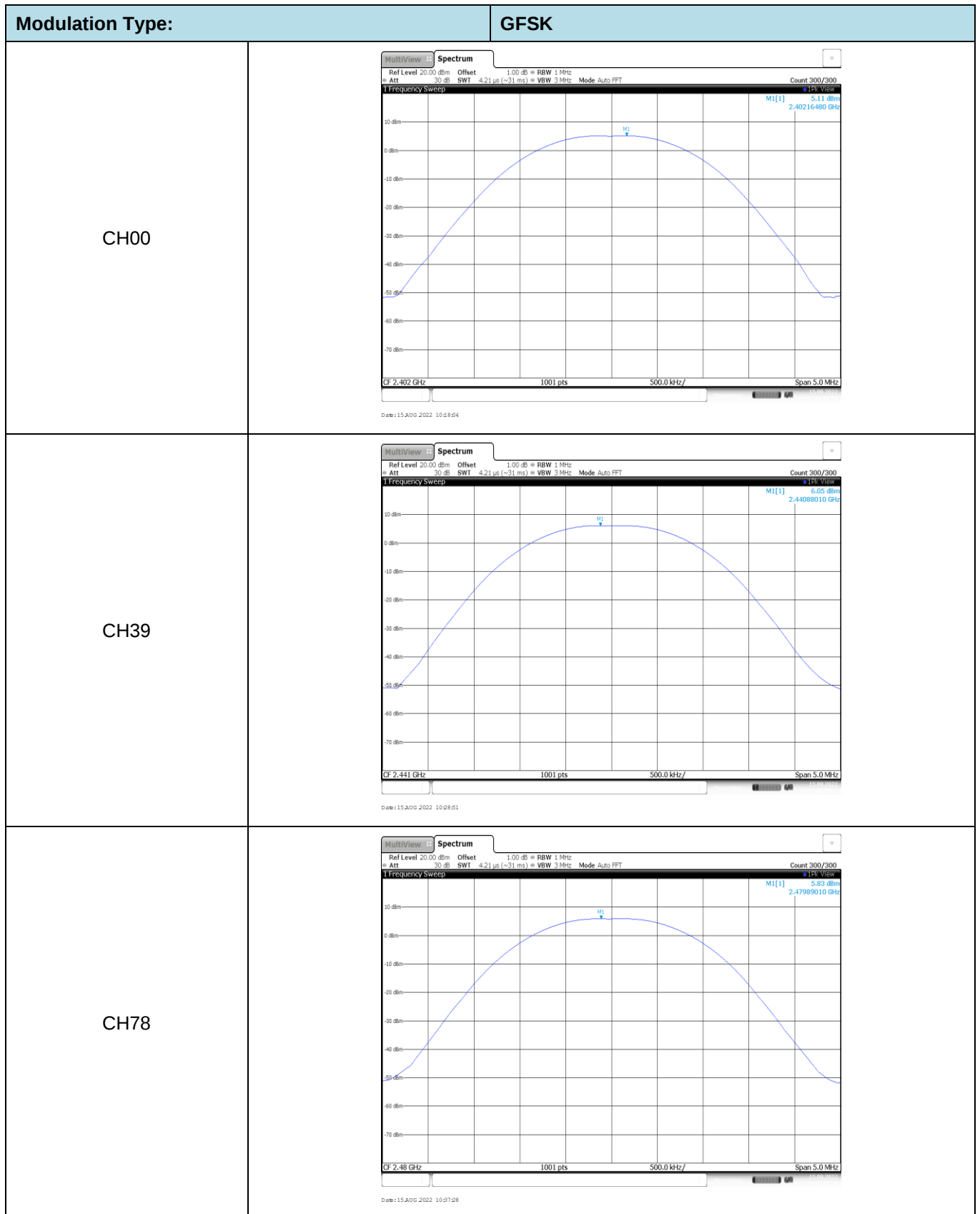
APPENDIX REPORT

Project No.	SHT2207115001EW	Radio Specification	Bluetooth EDR
Test sample No.	YPHT22071150003	Model No.	Star9 3G
Start test date	2022-08-15	Finish date	2022-08-15
Temperature	25.7℃	Humidity	31%
Test Engineer	Xiaoxiao Li	Auditor	Xiaodong Zhu

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	5.11	5.07	≤ 30.00	Pass
	39	6.05	6.02		
	78	5.83	5.81		
$\pi/4$ DQPSK	00	5.57	4.93	≤ 21.00	Pass
	39	6.81	6.12		
	78	6.78	6.10		
8DPSK	00	5.89	5.09	≤ 21.00	Pass
	39	7.16	6.38		
	78	7.20	6.37		

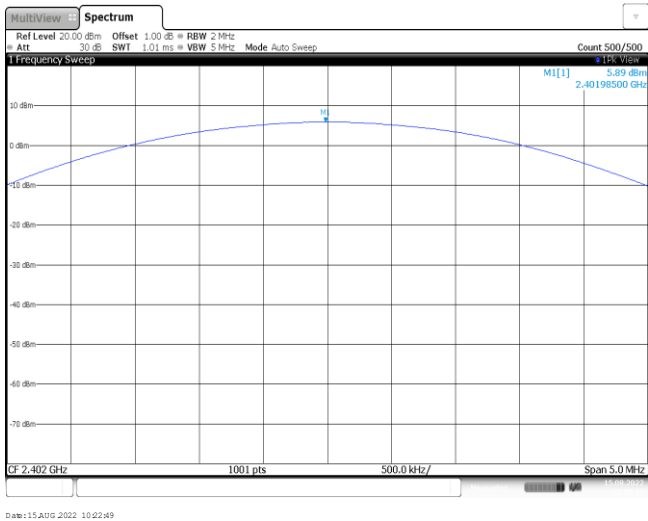


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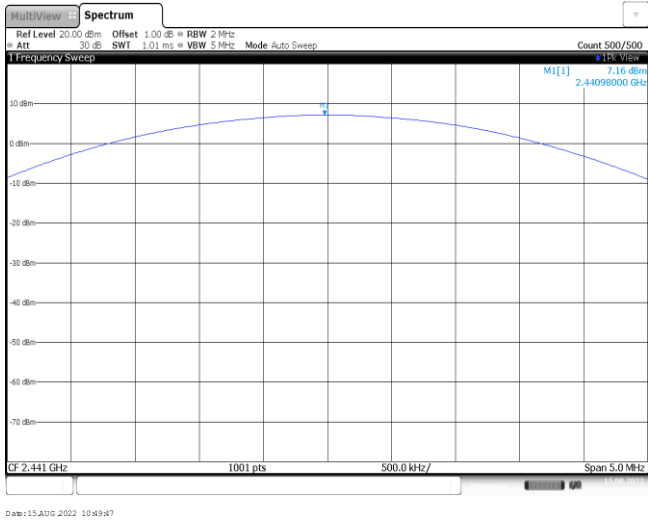
Modulation Type:

8DPSK

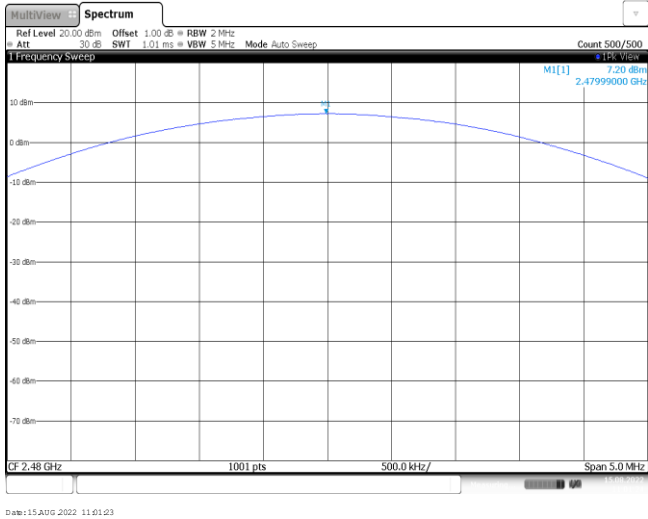
CH00



CH39



CH78



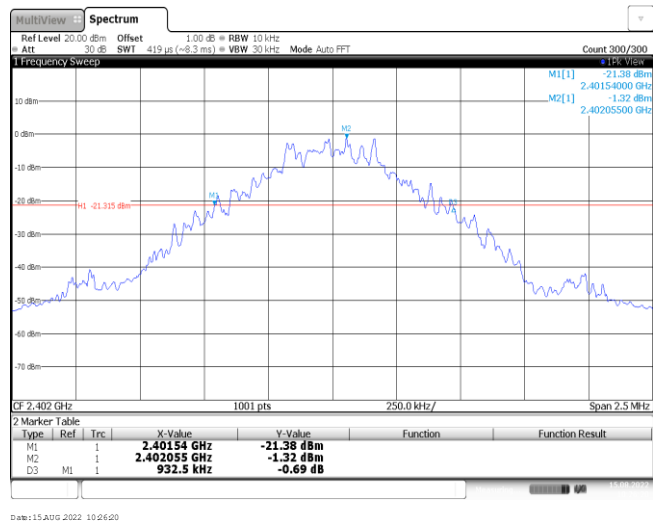
Appendix B : 20 dB Bandwidth

Modulation type	Channel	20 dB Bandwidth (kHz)	Limit (kHz)	Result
GFSK	00	932.50	-	Pass
	39	935.00		
	78	932.50		
$\pi/4$ DQPSK	00	1302.50	-	Pass
	39	1300.00		
	78	1317.50		
8DPSK	00	1300.00	-	Pass
	39	1307.50		
	78	1307.50		

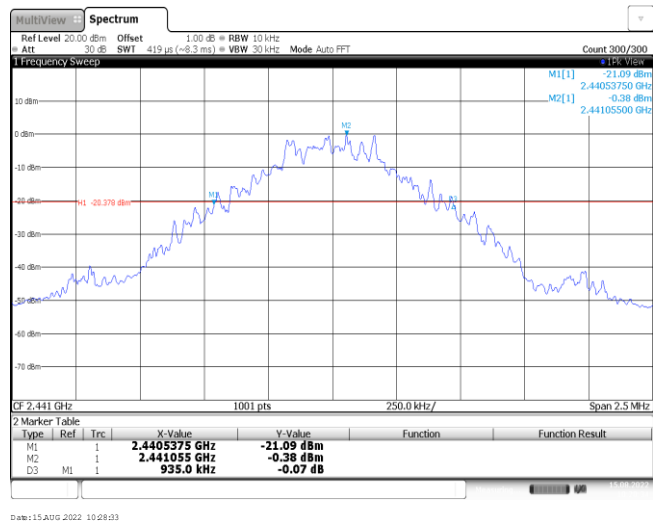
Modulation Type:

GFSK

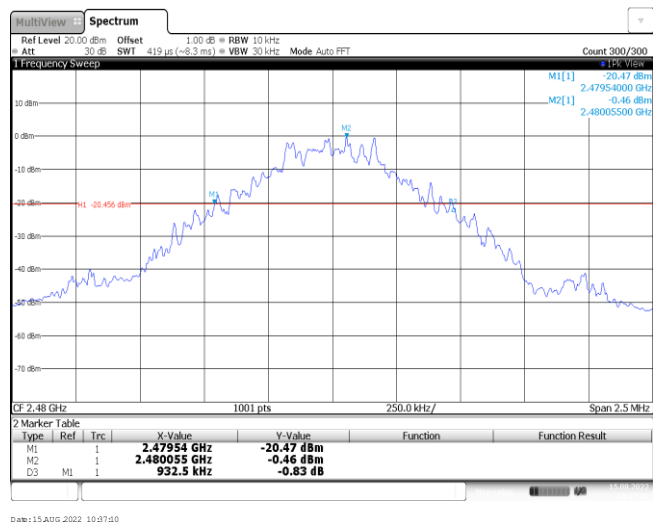
CH00



CH39



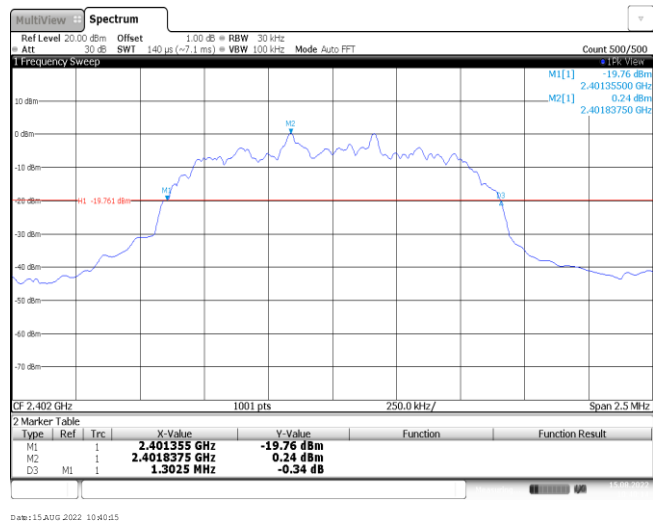
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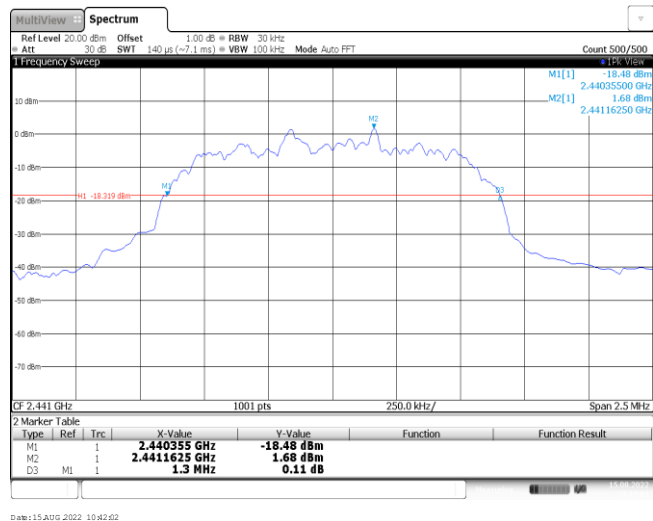
Modulation Type:

 $\pi/4$ DQPSK

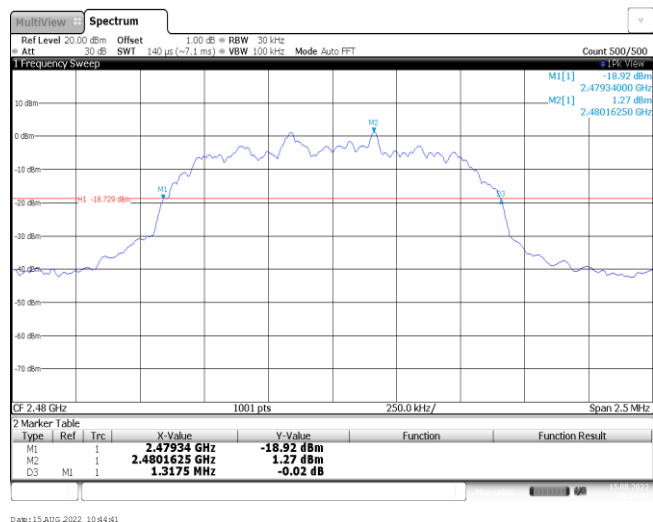
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CH39



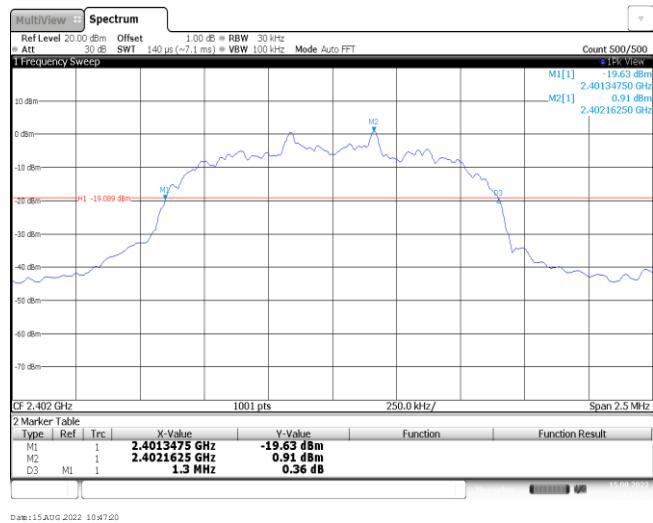
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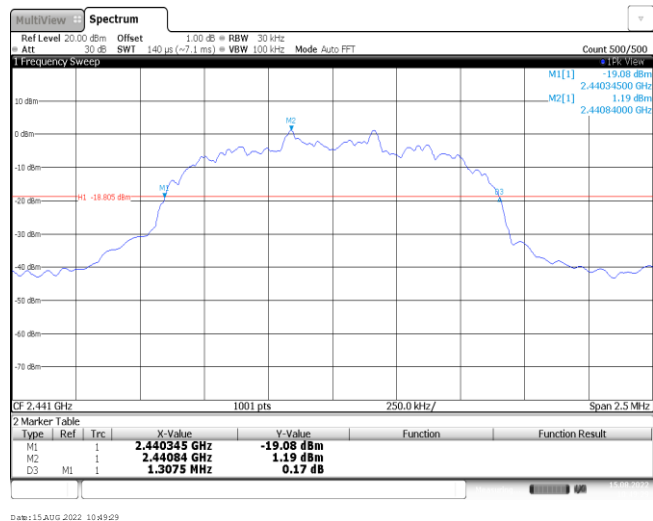
Modulation Type:

8DPSK

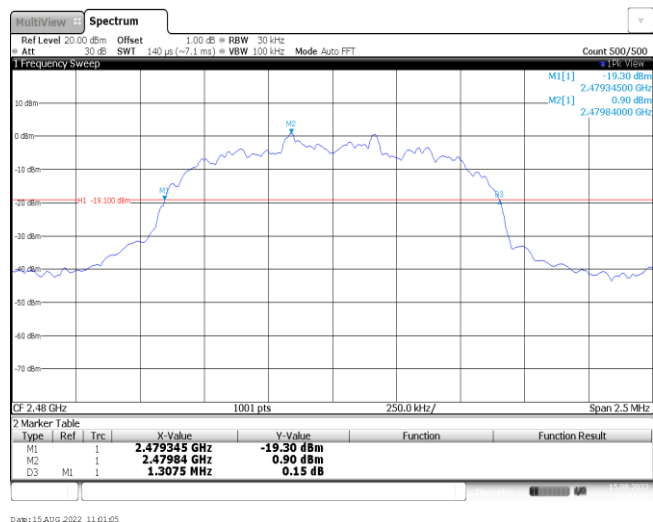
CH00



CH39



CH78



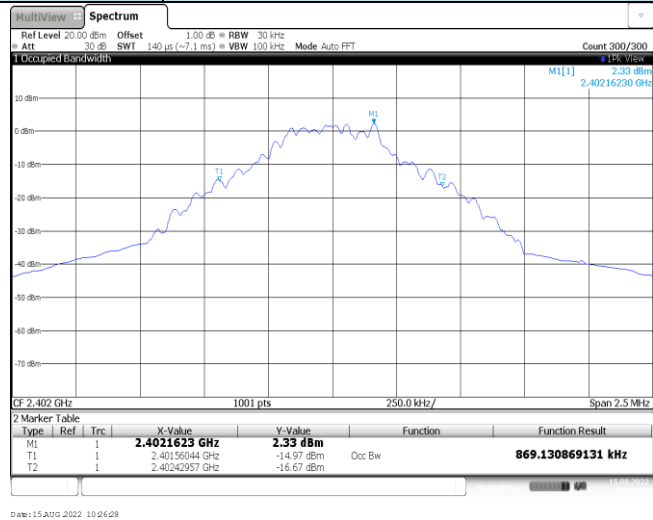
Appendix C: 99% Occupied Bandwidth

Modulation type	Channel	99% Occupied Bandwidth (MHz)	Limit (MHz)	Result
GFSK	00	0.87	-	Pass
	39	0.87		
	78	0.87		
$\pi/4$ DQPSK	00	1.19	-	Pass
	39	1.19		
	78	1.19		
8DPSK	00	1.19	-	Pass
	39	1.19		
	78	1.19		

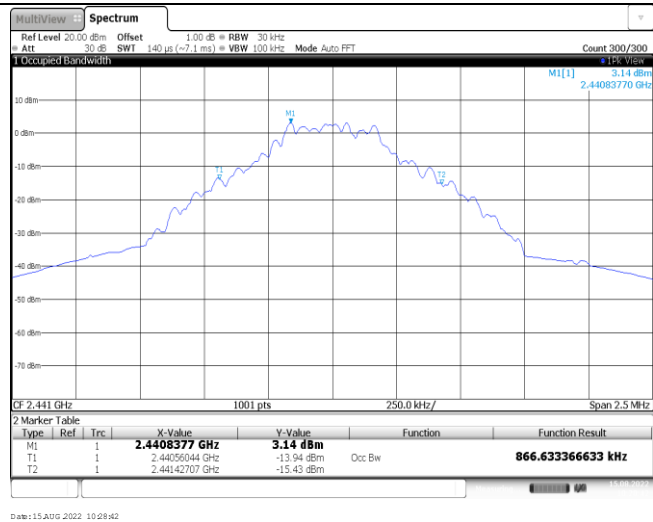
Modulation Type:

GFSK

CH00



CH39



CH78



Modulation Type:

 $\pi/4$ DQPSK

CH00



CH39



CH78



Modulation Type:

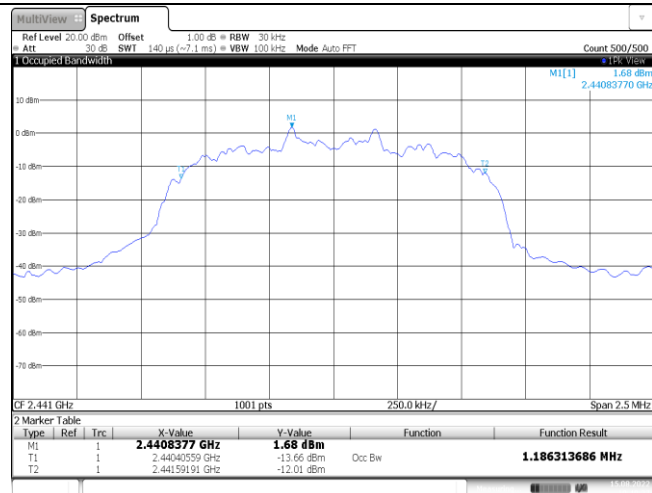
8DPSK

CH00



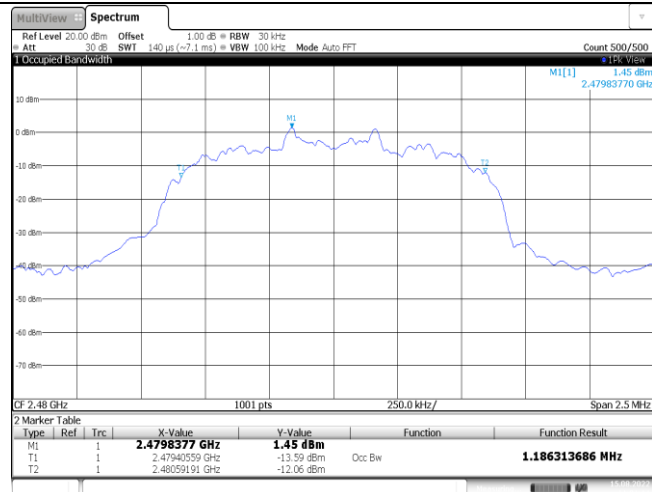
Date: 15.AUG.2022 10:47:29

CH39



Date: 15.AUG.2022 10:49:07

CH78



Date: 15.AUG.2022 11:01:14

Appendix D: Carrier Frequencies Separation

Modulation type	Channel	Carrier Frequencies Separation (MHz)	Limit (kHz) *	Result
GFSK	39	1.00	≥935.00	Pass
π/4DQPSK	39	1.00	≥878.33	Pass
8DPSK	39	1.00	≥871.67	Pass

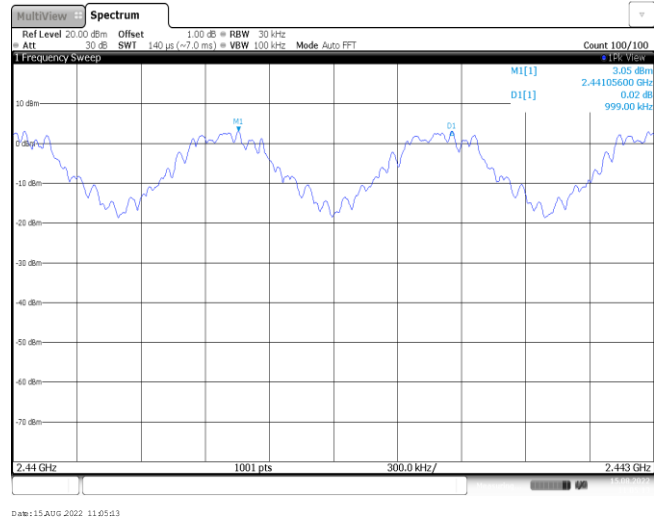
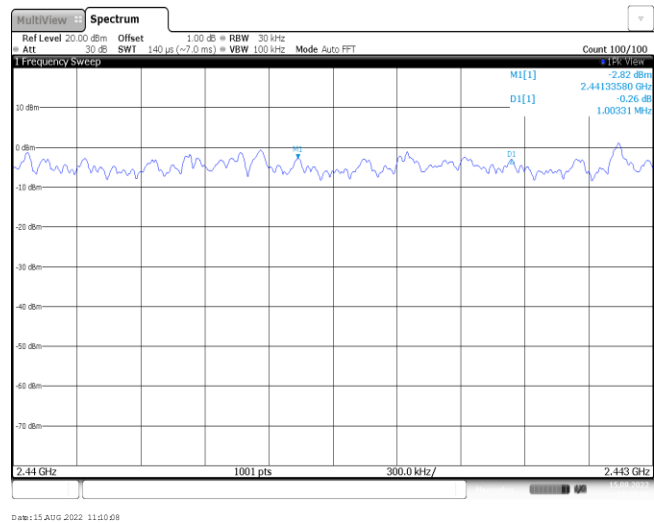
Note:

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

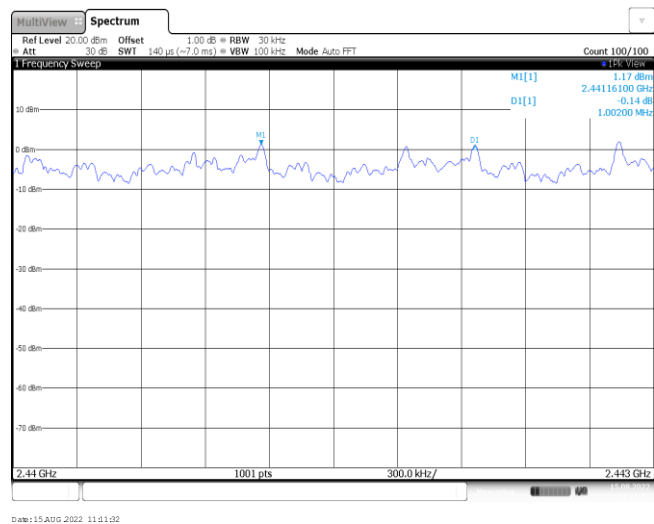
π/4DQPSK limit = $\frac{2}{3}$ * The maximum 20 dB Bandwidth for π/4DQPSK modulation on the appendix B.

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

GFSK

 $\pi/4$ DQPSK

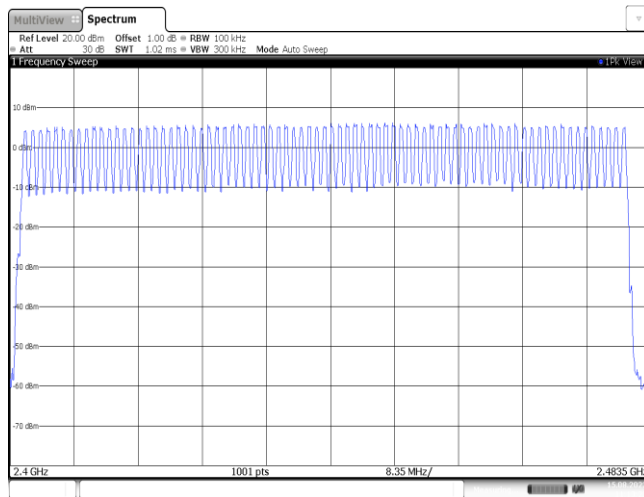
8DPSK



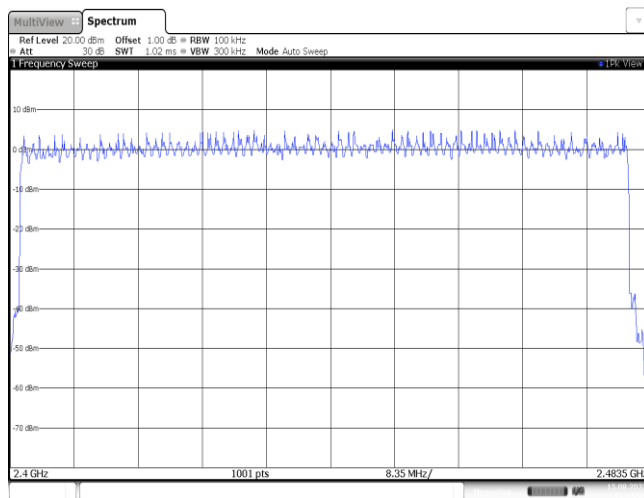
Appendix E: Hopping Channel Number

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

GFSK

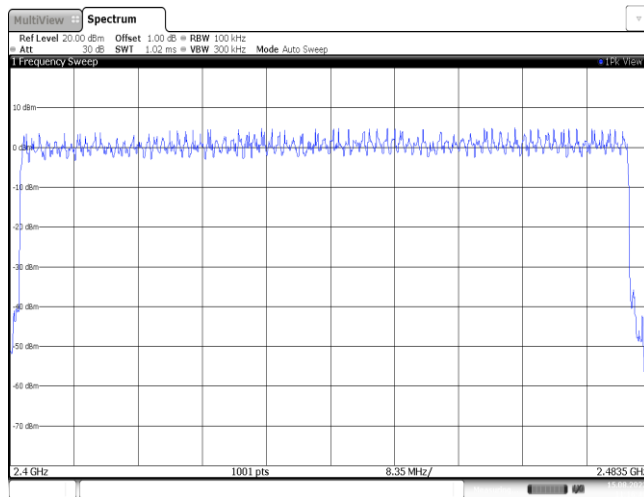


Date:15.AUG.2022 11:13:22

 $\pi/4$ DQPSK

Date:15.AUG.2022 11:15:09

8DPSK



Date:15.AUG.2022 11:16:40

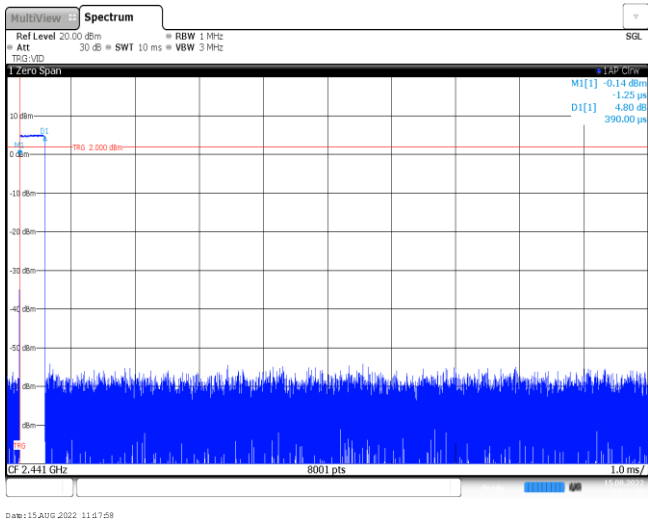
Appendix F: Dwell Time

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	155	0.26		
	DH5	2.89	100	0.29		
$\pi/4$ DQPSK	2DH1	0.38	320	0.12	≤ 0.40	Pass
	2DH3	1.64	169	0.28		
	2DH5	2.88	107	0.31		
8DPSK	3DH1	0.38	319	0.12	≤ 0.40	Pass
	3DH3	1.63	173	0.28		
	3DH5	2.88	106	0.31		

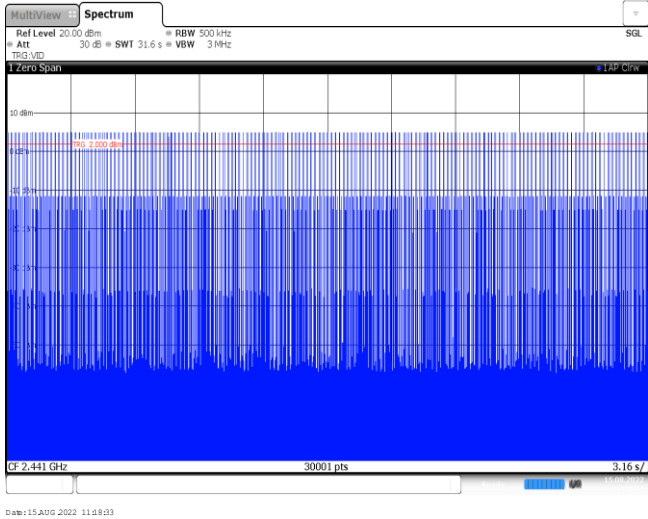
Modulation Type:

GFSK

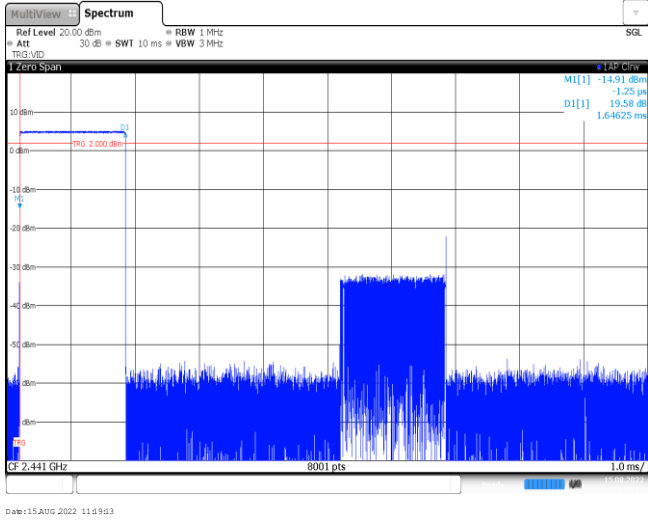
DH1
Burst width

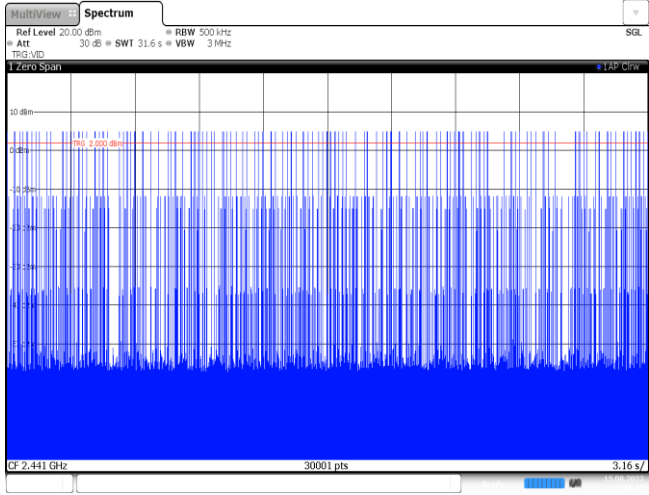
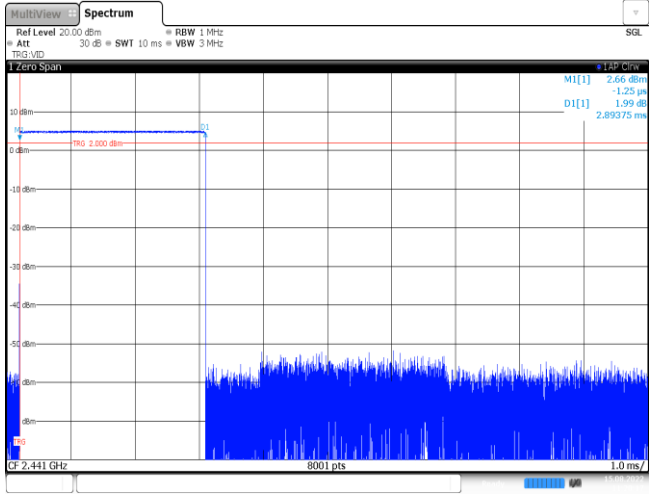
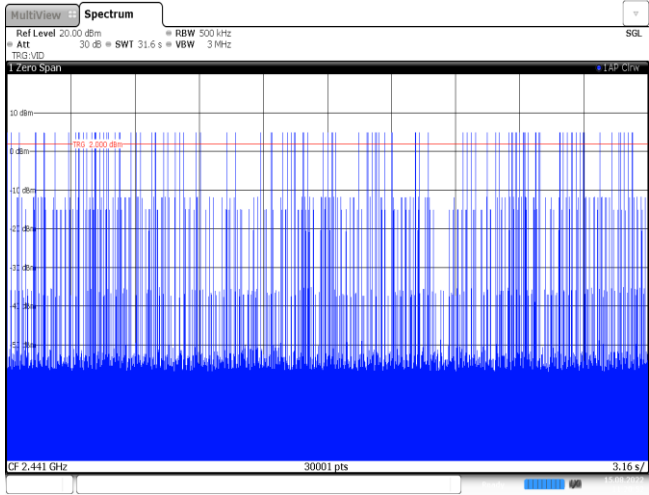


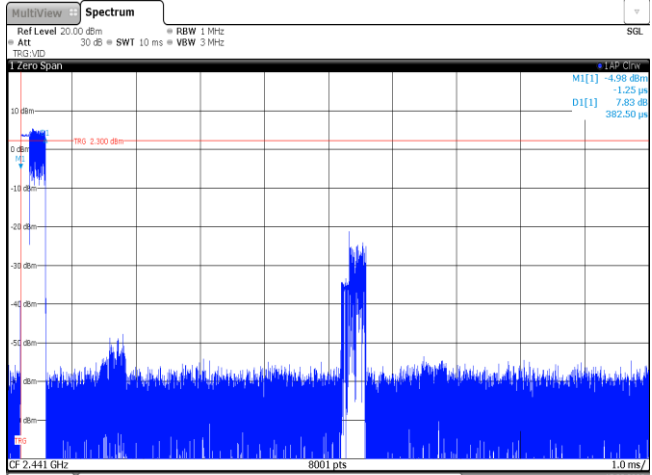
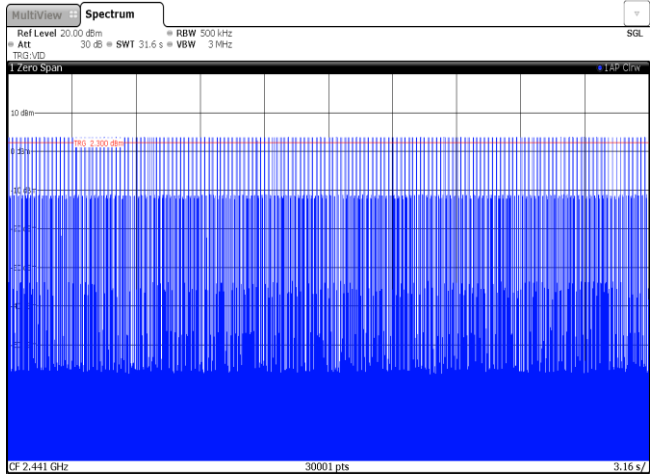
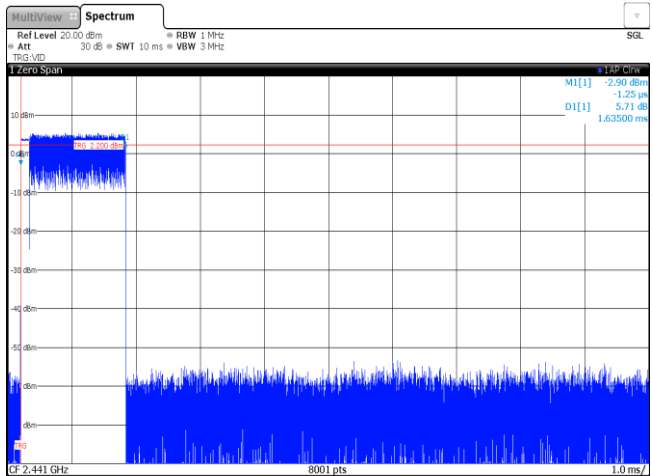
DH1
Burst number



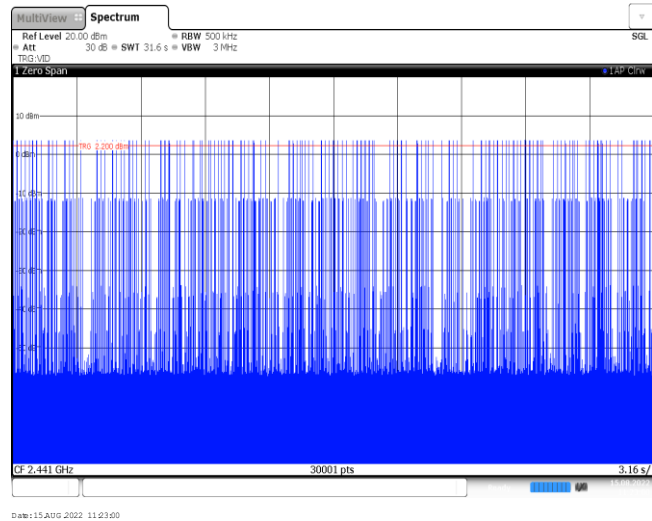
DH3
Burst width



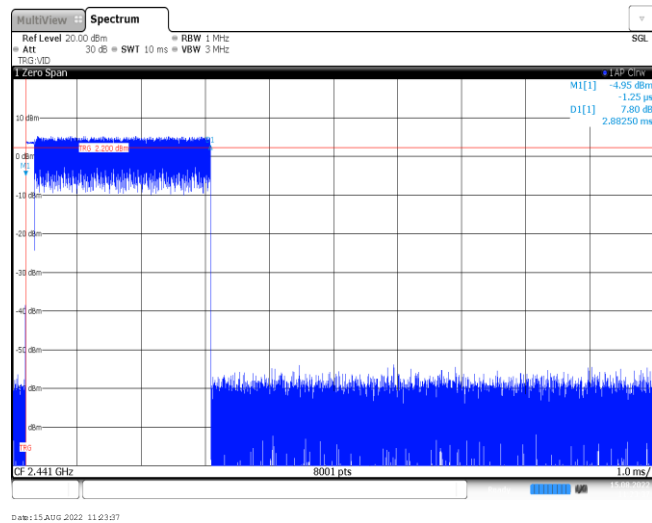
DH3 Burst number	 The screenshot shows a spectrum plot titled 'Spectrum' with a 'Zero Span' view. The y-axis represents power in dBm, ranging from -50 to 10. The x-axis represents frequency in GHz, centered at 2.441 GHz. A red horizontal line is drawn at approximately -10 dBm. The plot shows a dense, 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 '15.AUG.2022 11:19:47' is displayed at the bottom left.
DH5 Burst width	 The screenshot shows a spectrum plot titled 'Spectrum' with a 'Zero Span' view. 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 approximately -10 dBm. The plot shows a burst of signal that is wider than the previous one. The status bar at the bottom indicates 'CF 2.441 GHz', '8001 pts', and '1.0 ms'. The date '15.AUG.2022 11:20:17' is displayed at the bottom left.
DH5 Burst number	 The screenshot shows a spectrum plot titled 'Spectrum' with a 'Zero Span' view. 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 approximately -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 '15.AUG.2022 11:20:52' is displayed at the bottom left.

Modulation Type:	$\pi/4$ DQPSK
2DH1 Burst width	 The spectrum plot shows a signal burst at 2.441 GHz. 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. A red horizontal line indicates a reference level at -20.00 dBm. The signal burst is visible as a sharp peak at approximately 0.5 ms. The plot includes parameters: Ref Level 20.00 dBm, Att 30 dB, SWT 10 ms, RBW 1 MHz, VBW 3 MHz. The date is 15.AUG.2022 11:21:23.
2DH1 Burst number	 The spectrum plot shows a signal burst at 2.441 GHz. The y-axis represents power in dBm, ranging from -60 to 10. The x-axis represents time in ms, ranging from 0 to 3.16. A red horizontal line indicates a reference level at -20.00 dBm. The signal burst is visible as a sharp peak at approximately 0.5 ms. The plot includes parameters: Ref Level 20.00 dBm, Att 30 dB, SWT 31.6 s, RBW 500 kHz, VBW 3 MHz. The date is 15.AUG.2022 11:21:57.
2DH3 Burst width	 The spectrum plot shows a signal burst at 2.441 GHz. 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. A red horizontal line indicates a reference level at -20.00 dBm. The signal burst is visible as a sharp peak at approximately 0.5 ms. The plot includes parameters: Ref Level 20.00 dBm, Att 30 dB, SWT 10 ms, RBW 1 MHz, VBW 3 MHz. The date is 15.AUG.2022 11:22:26.

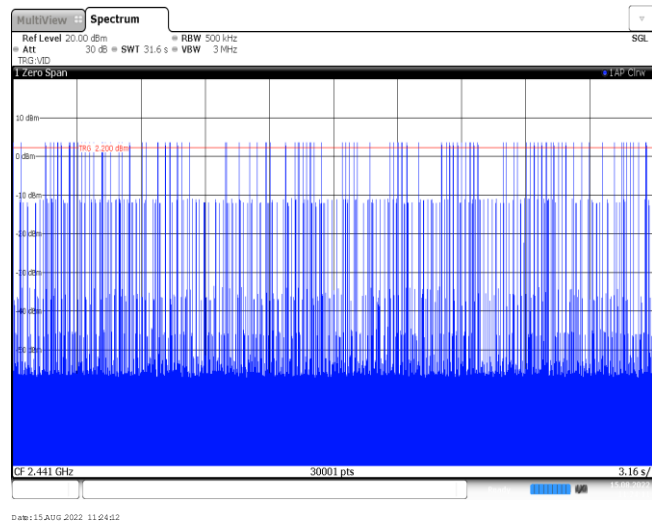
2DH3
Burst number

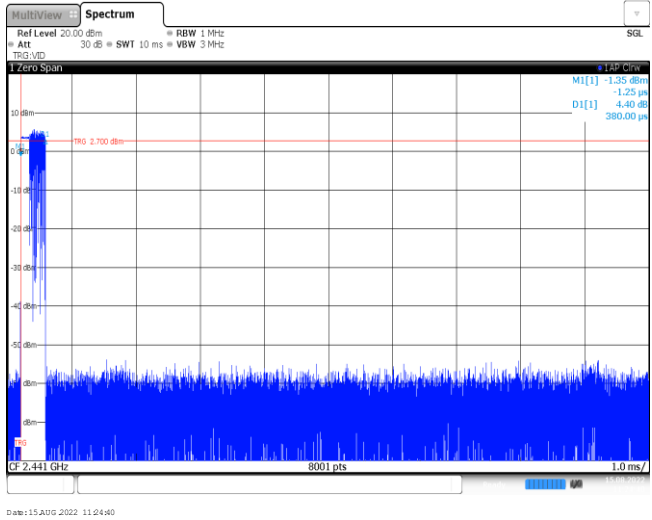
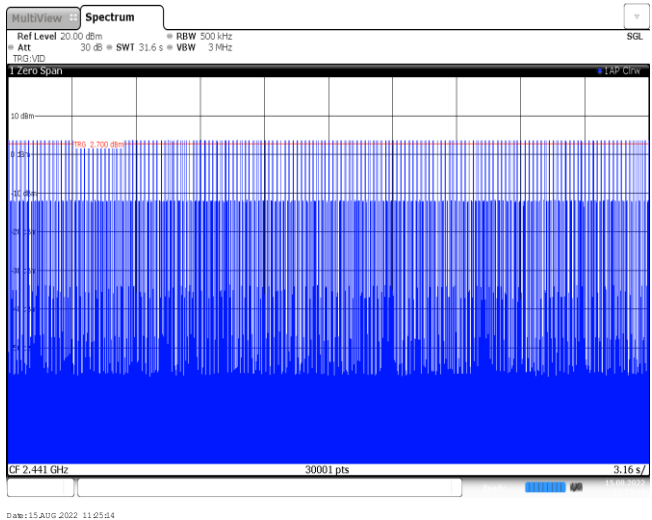
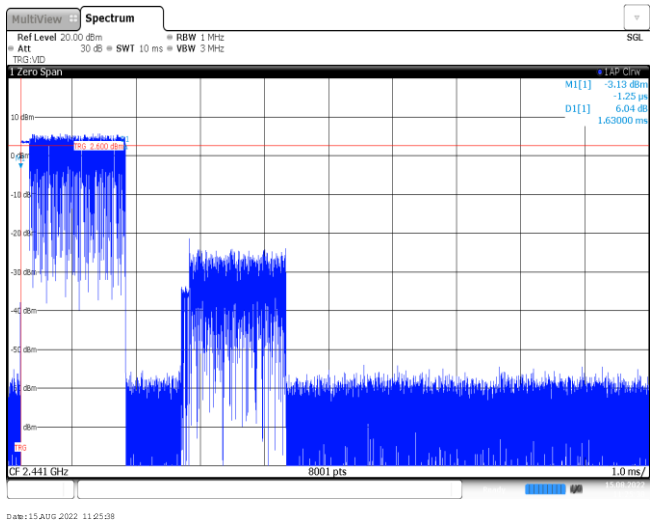


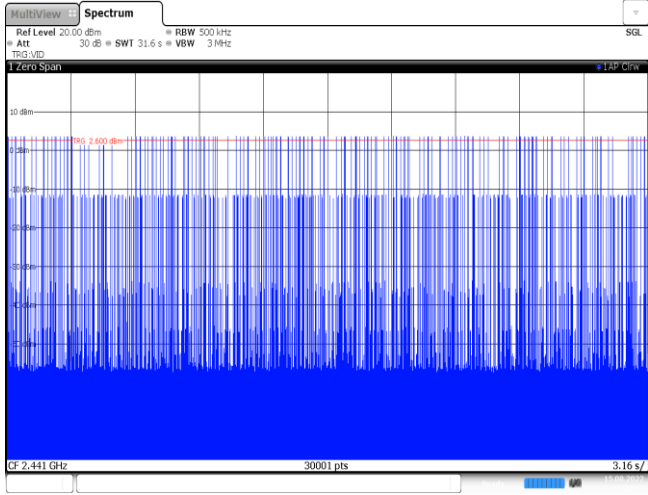
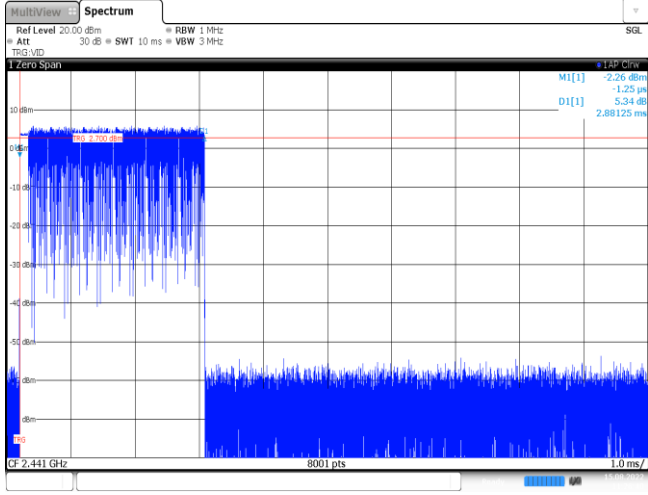
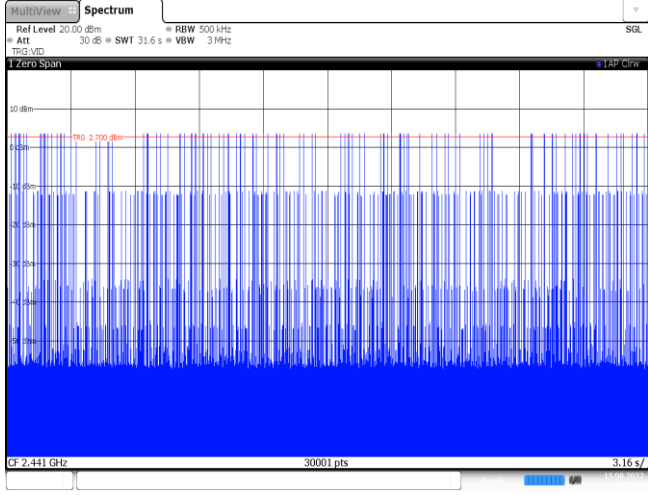
2DH5
Burst width



2DH5
Burst number



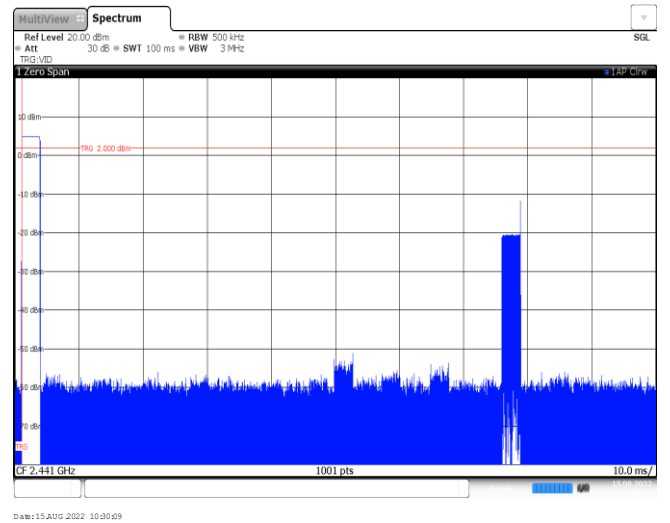
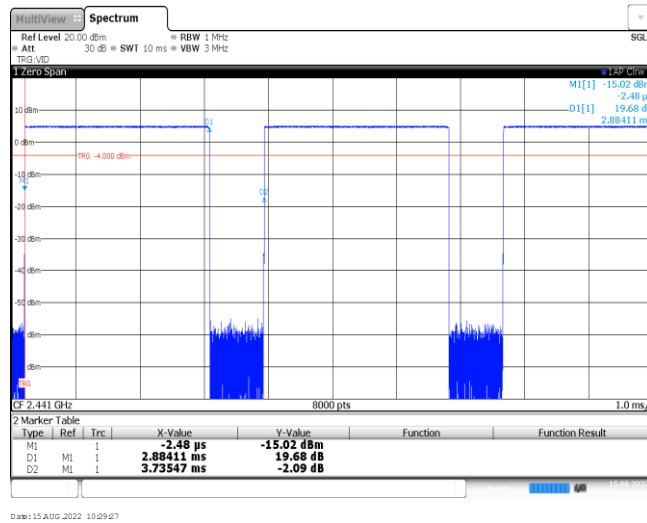
Modulation Type:	8DPSK
3DH1 Burst width	 The spectrum plot shows a single burst of signal at 2.441 GHz. The y-axis represents power in dBm, ranging from -60 to 10. The x-axis represents time in ms, ranging from 0 to 1.0. A red horizontal line indicates a reference level at -20.00 dBm. The plot shows a sharp peak at the start of the burst, followed by a rapid decay. The signal is centered around 2.441 GHz. Ref Level 20.00 dBm Att 30 dB RBW 1 MHz SWT 10 ms VBW 3 MHz 1 Zero Span CF 2.441 GHz 8001 pts 1.0 ms/ Date: 15 AUG 2022 11:24:40
3DH1 Burst number	 The spectrum plot shows a continuous burst of signal at 2.441 GHz. 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. A red horizontal line indicates a reference level at -20.00 dBm. The plot shows a dense, continuous signal across the entire time range. Ref Level 20.00 dBm Att 30 dB RBW 500 kHz SWT 31.6 s VBW 3 MHz 1 Zero Span CF 2.441 GHz 30001 pts 3.16 s/ Date: 15 AUG 2022 11:25:14
3DH3 Burst width	 The spectrum plot shows a burst of signal at 2.441 GHz. 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. A red horizontal line indicates a reference level at -20.00 dBm. The plot shows a sharp peak at the start of the burst, followed by a rapid decay. The signal is centered around 2.441 GHz. Ref Level 20.00 dBm Att 30 dB RBW 1 MHz SWT 10 ms VBW 3 MHz 1 Zero Span CF 2.441 GHz 8001 pts 1.0 ms/ Date: 15 AUG 2022 11:25:28

3DH3 Burst number	 MultiView Spectrum Ref Level 20.00 dBm Att 30 dB RBW 500 kHz SWT 31.6 s VBW 3 MHz 1 Zero Span CF 2.441 GHz 30001 pts 3.165 GHz Date: 15.AUG.2022 11:26:12
3DH5 Burst width	 MultiView Spectrum Ref Level 20.00 dBm Att 30 dB RBW 1 MHz SWT 10 ms VBW 3 MHz 1 Zero Span CF 2.441 GHz 8001 pts 3.165 GHz Date: 15.AUG.2022 11:26:40
3DH5 Burst number	 MultiView Spectrum Ref Level 20.00 dBm Att 30 dB RBW 500 kHz SWT 31.6 s VBW 3 MHz 1 Zero Span CF 2.441 GHz 30001 pts 3.165 GHz Date: 15.AUG.2022 11:27:14

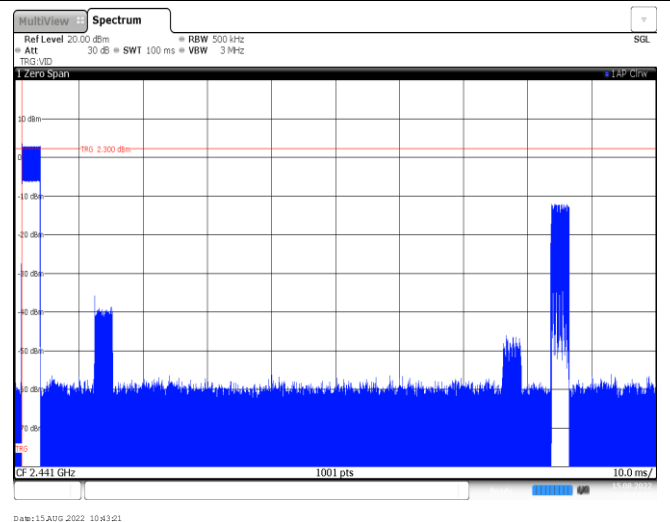
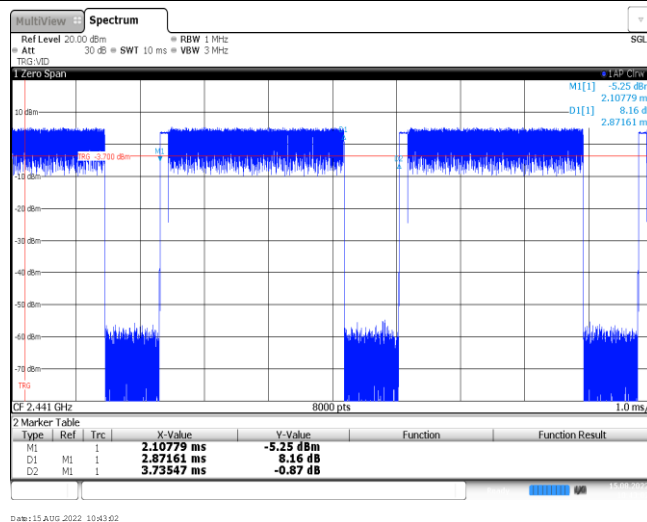
Appendix G: Duty Cycle Correction Factor (DCCF)

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	2	-24.79
$\pi/4$ DQPSK	2441	2.87	100	2	-24.82
8DPSK	2441	2.87	100	1	-30.84

GFSK

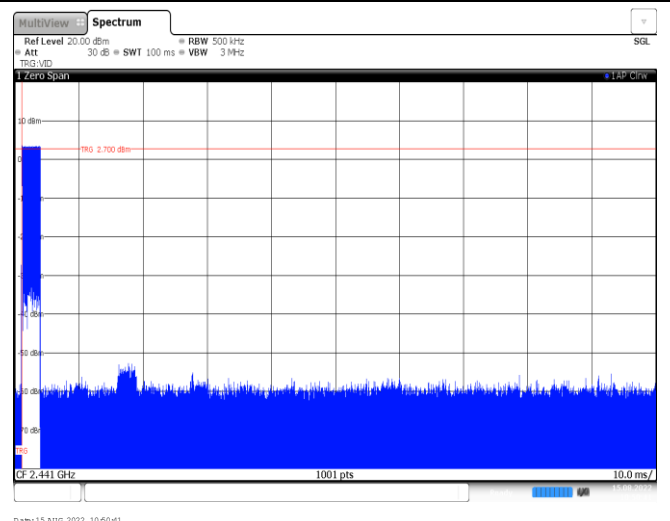
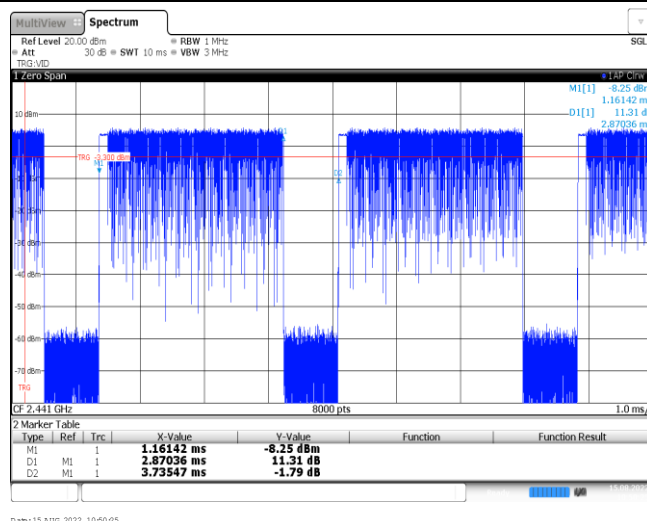
T_{on} time for single burst

Burst Quantity

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

Burst Quantity

8DPSK

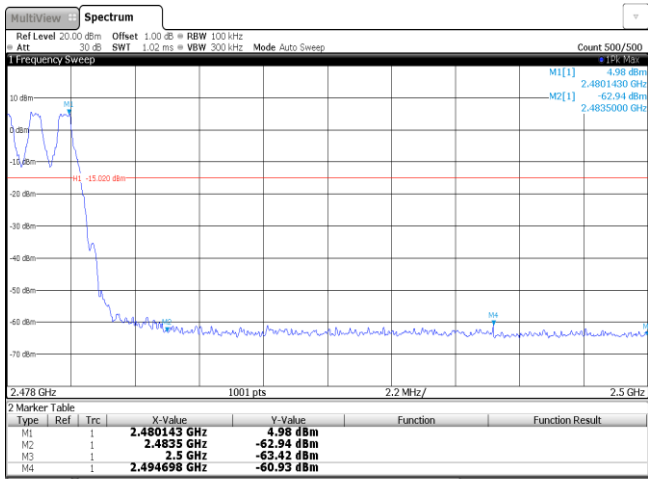
T_{on} time for single burst

Burst Quantity

Appendix H: Band edge and Spurious Emissions (conducted)

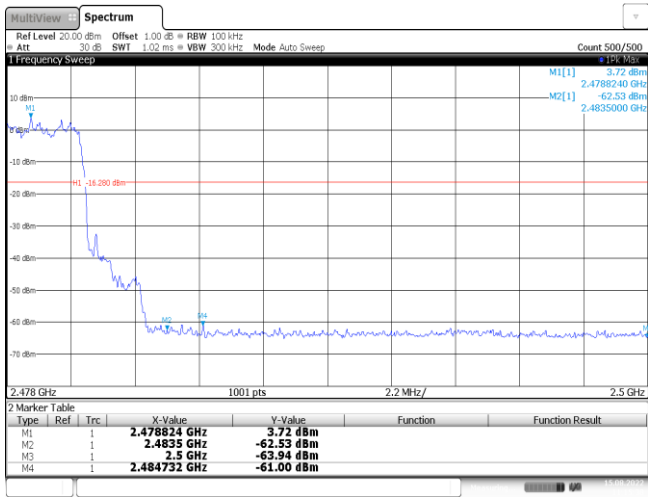
Test Item:	Band edge	Modulation type:	GFSK
CH00 No hopping mode	</		

CH78
Hopping mode



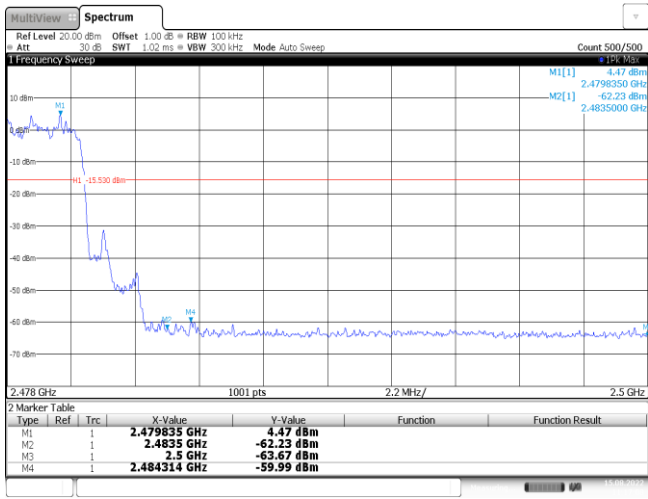
Test Item:	Band edge	Modulation type:	$\pi/4$ DQPSK																																										
CH00 No hopping mode	MultiViewSpectrum Ref Level 20.00 dBm Offset 1.00 dB BW 100 kHz Att 30 dB SW 1.05 ms VBW 300 kHz Mode Auto Sweep Count 500/500 Frequency Sweep M1[1] -3.43 dBm 2.4018210 GHz M2[1] -48.15 dBm 2.4000000 GHz M1 -16.570 dBm 2.31 GHz 1001 pts 9.5 MHz/ 2.405 GHz 2 Marker Table <table><thead><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></thead><tbody><tr><td>M1</td><td>1</td><td></td><td>2.401821 GHz</td><td>3.43 dBm</td><td></td><td></td></tr><tr><td>M2</td><td>1</td><td></td><td>2.4 GHz</td><td>-48.15 dBm</td><td></td><td></td></tr><tr><td>M3</td><td>1</td><td></td><td>2.39 GHz</td><td>-63.40 dBm</td><td></td><td></td></tr><tr><td>M4</td><td>1</td><td></td><td>2.31 GHz</td><td>-64.01 dBm</td><td></td><td></td></tr><tr><td>M5</td><td>1</td><td></td><td>2.399585 GHz</td><td>-48.27 dBm</td><td></td><td></td></tr></tbody></table> Date: 15.AUG 2022 10:40:42			Type	Ref	Trc	X-Value	Y-Value	Function	Function Result	M1	1		2.401821 GHz	3.43 dBm			M2	1		2.4 GHz	-48.15 dBm			M3	1		2.39 GHz	-63.40 dBm			M4	1		2.31 GHz	-64.01 dBm			M5	1		2.399585 GHz	-48.27 dBm		
Type	Ref	Trc	X-Value	Y-Value	Function	Function Result																																							
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M2	1		2.4 GHz	-48.15 dBm																																									
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M5	1		2.399585 GHz	-48.27 dBm																																									
CH00 Hopping mode	MultiViewSpectrum Ref Level 20.00 dBm Offset 1.00 dB BW 100 kHz Att 30 dB SW 1.05 ms VBW 300 kHz Mode Auto Sweep Count 500/500 Frequency Sweep M1[1] -2.67 dBm 2.4018210 GHz M2[1] -51.27 dBm 2.4000000 GHz M1 -17.330 dBm 2.31 GHz 1001 pts 9.5 MHz/ 2.405 GHz 2 Marker Table <table><thead><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></thead><tbody><tr><td>M1</td><td>1</td><td></td><td>2.401821 GHz</td><td>2.67 dBm</td><td></td><td></td></tr><tr><td>M2</td><td>1</td><td></td><td>2.4 GHz</td><td>-51.27 dBm</td><td></td><td></td></tr><tr><td>M3</td><td>1</td><td></td><td>2.39 GHz</td><td>-63.49 dBm</td><td></td><td></td></tr><tr><td>M4</td><td>1</td><td></td><td>2.31 GHz</td><td>-64.87 dBm</td><td></td><td></td></tr><tr><td>M5</td><td>1</td><td></td><td>2.399585 GHz</td><td>-50.75 dBm</td><td></td><td></td></tr></tbody></table> Date: 15.AUG 2022 11:45:23			Type	Ref	Trc	X-Value	Y-Value	Function	Function Result	M1	1		2.401821 GHz	2.67 dBm			M2	1		2.4 GHz	-51.27 dBm			M3	1		2.39 GHz	-63.49 dBm			M4	1		2.31 GHz	-64.87 dBm			M5	1		2.399585 GHz	-50.75 dBm		
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M5	1		2.399585 GHz	-50.75 dBm																																									
CH78 No hopping mode	MultiViewSpectrum Ref Level 20.00 dBm Offset 1.00 dB BW 100 kHz Att 30 dB SW 1.02 ms VBW 300 kHz Mode Auto Sweep Count 500/500 Frequency Sweep M1[1] -4.55 dBm 2.4798350 GHz M2[1] -58.79 dBm 2.4835000 GHz M1 -15.450 dBm 2.478 GHz 1001 pts 2.2 MHz/ 2.5 GHz 2 Marker Table <table><thead><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></thead><tbody><tr><td>M1</td><td>1</td><td></td><td>2.479835 GHz</td><td>4.55 dBm</td><td></td><td></td></tr><tr><td>M2</td><td>1</td><td></td><td>2.4835 GHz</td><td>-58.79 dBm</td><td></td><td></td></tr><tr><td>M3</td><td>1</td><td></td><td>2.5 GHz</td><td>-63.33 dBm</td><td></td><td></td></tr><tr><td>M4</td><td>1</td><td></td><td>2.483588 GHz</td><td>-57.99 dBm</td><td></td><td></td></tr></tbody></table> Date: 15.AUG 2022 10:45:28			Type	Ref	Trc	X-Value	Y-Value	Function	Function Result	M1	1		2.479835 GHz	4.55 dBm			M2	1		2.4835 GHz	-58.79 dBm			M3	1		2.5 GHz	-63.33 dBm			M4	1		2.483588 GHz	-57.99 dBm									
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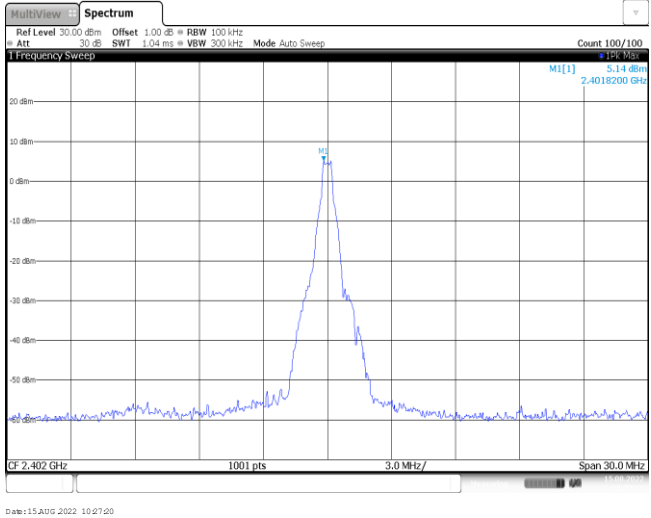
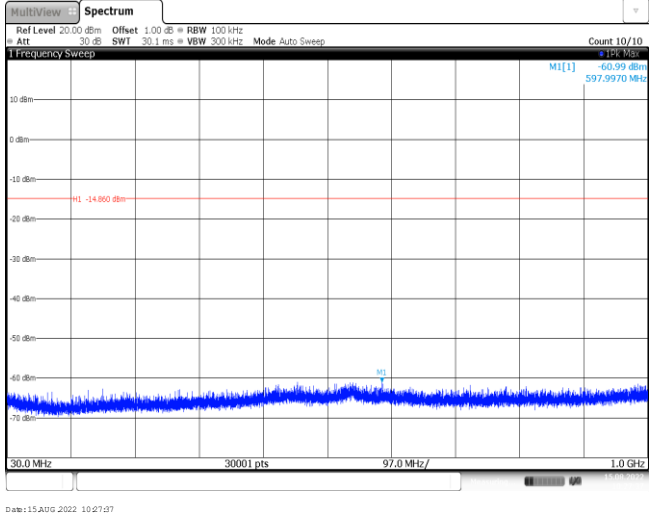
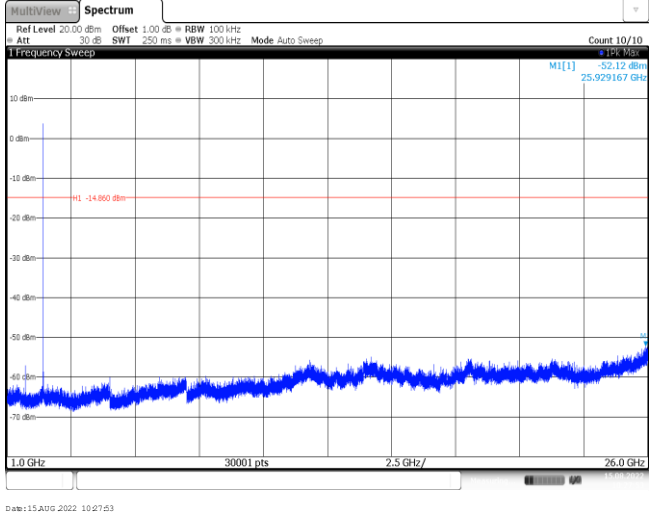
CH78
Hopping mode



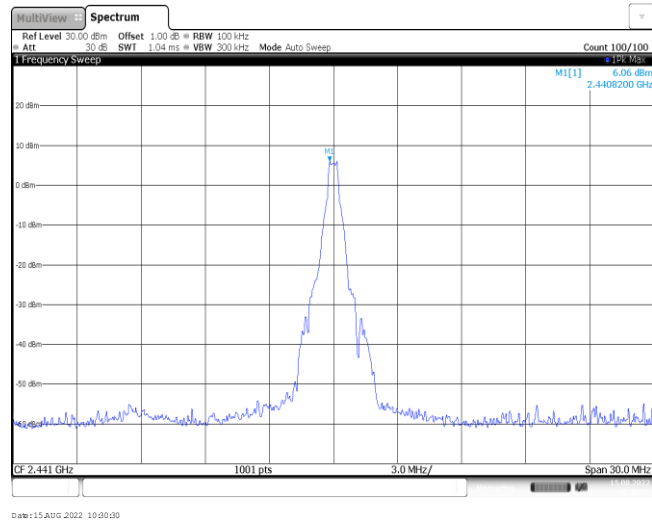
Test Item:	Band edge	Modulation type:	8DPSK
CH00 No hopping mode	MultiView Spectrum Ref Level 20.00 dBm Offset 1.00 dB BW 100 kHz Att 30 dB SW 1.05 ms VBW 300 kHz Mode Auto Sweep Count 500/500 Frequency Sweep <		

CH78
Hoppig mode

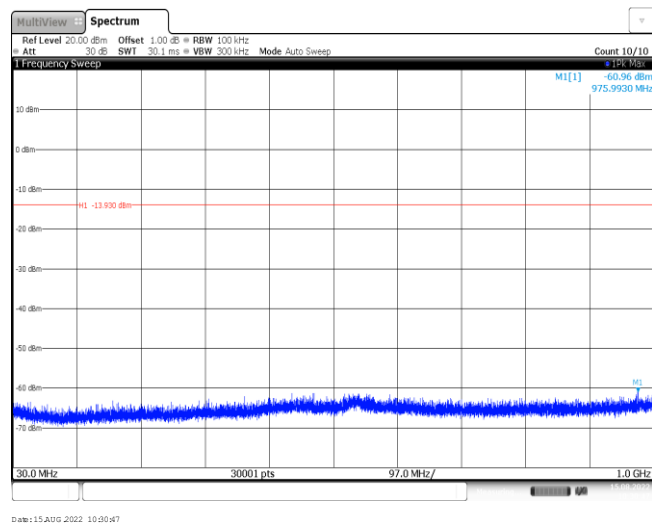


Test Item:	Spurious Emission	Modulation type:	GFSK
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CH00 30MHz~1000MHz			
CH00 1GHz~26GHz			

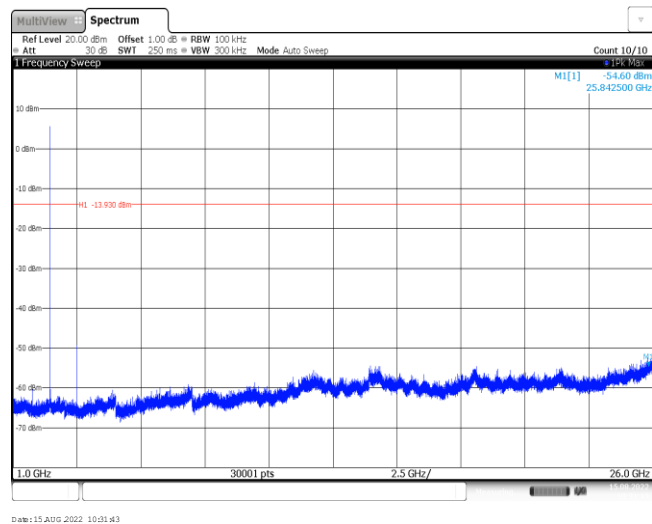
CH39
Reference level



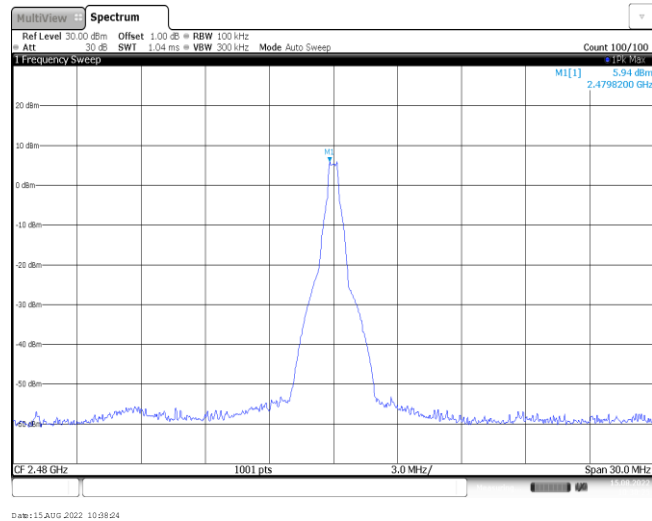
CH39
30MHz~1000MHz



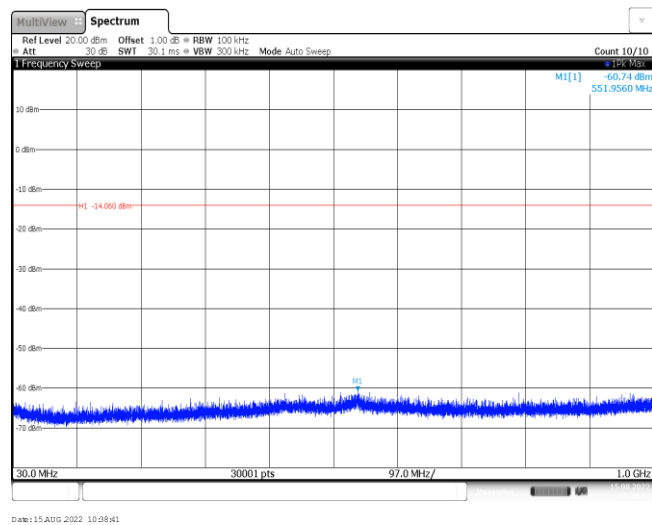
CH39
1GHz~26GHz



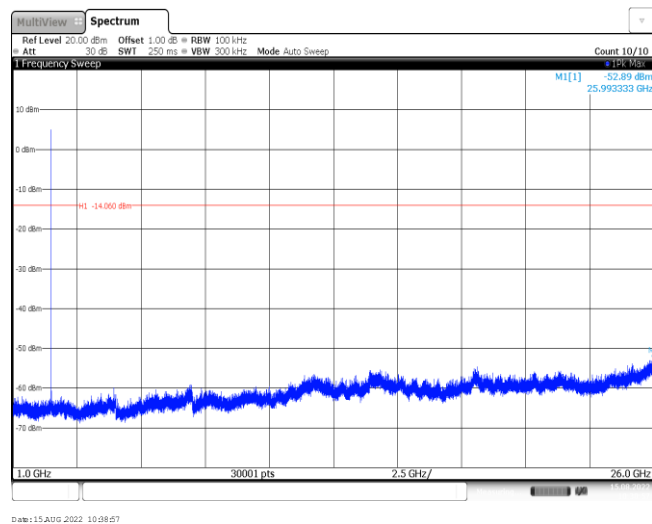
CH78
Reference level

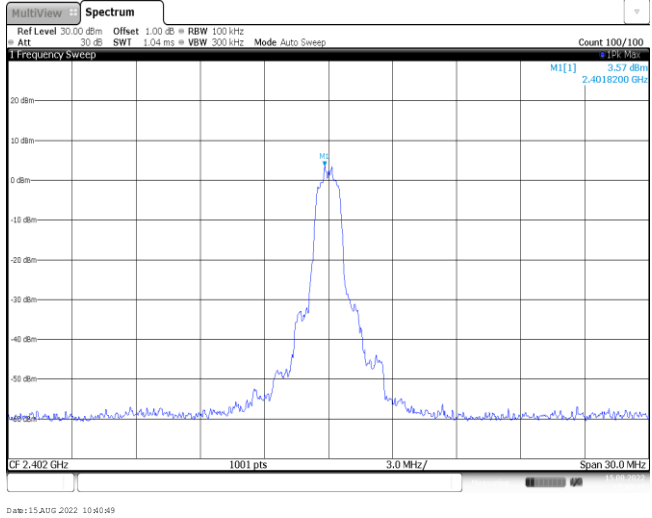
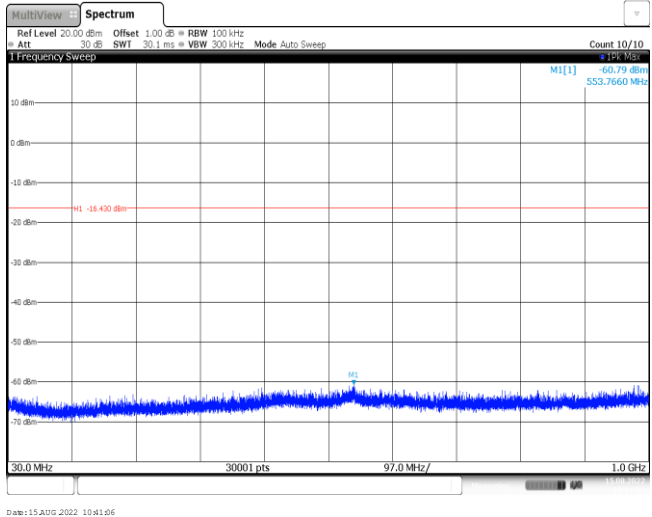
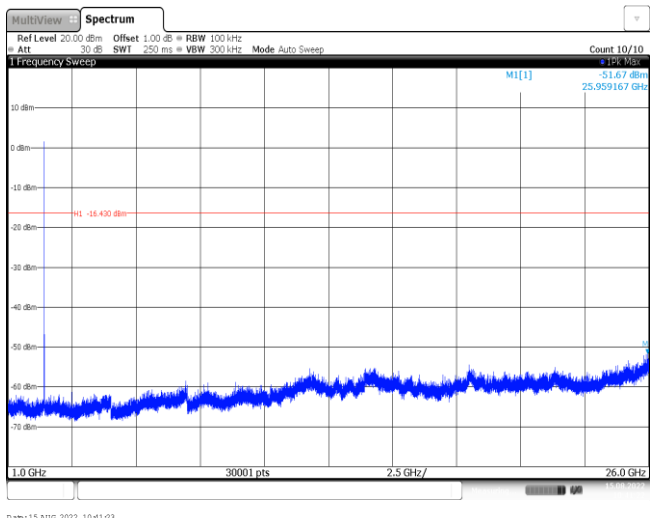


CH78
30MHz~1000MHz

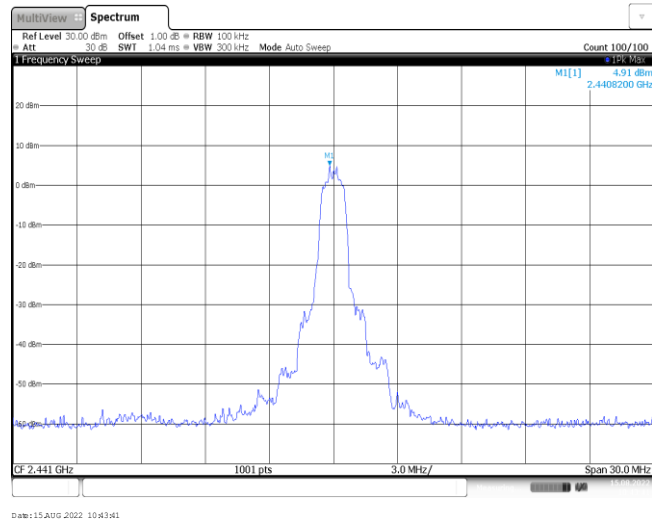


CH78
1GHz~26GHz

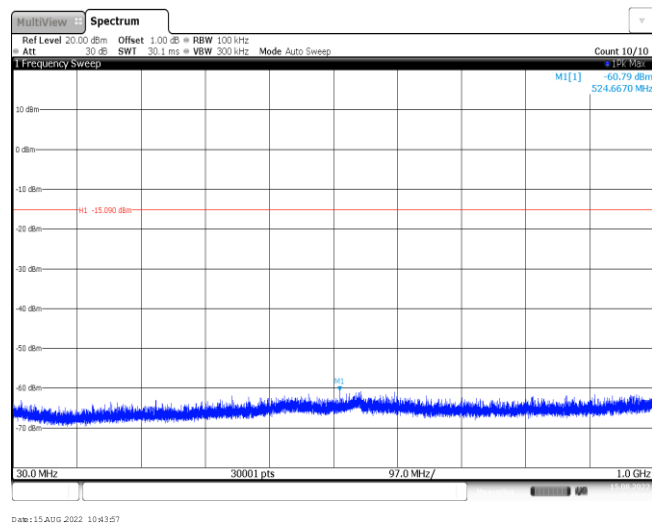


Test Item:	Spurious Emission	Modulation type:	$\pi/4$ DQPSK
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CH00 30MHz~1000MHz			
CH00 1GHz~26GHz			

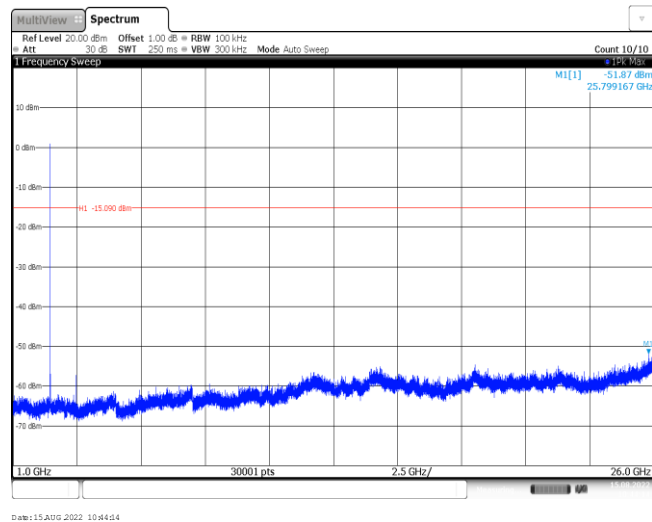
CH39
Reference level



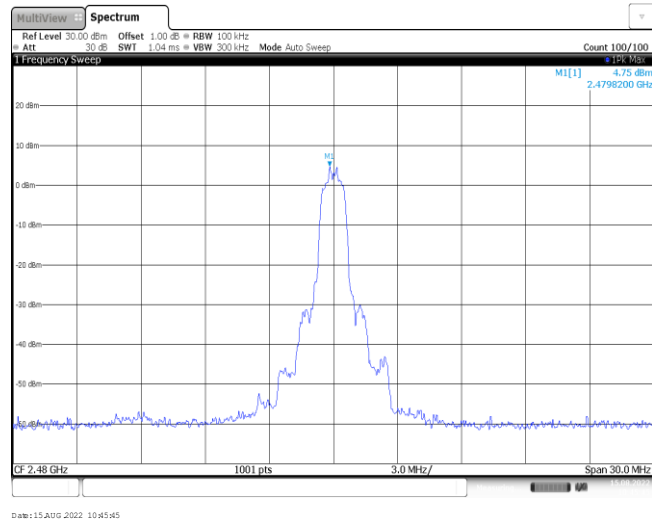
CH39
30MHz~1000MHz



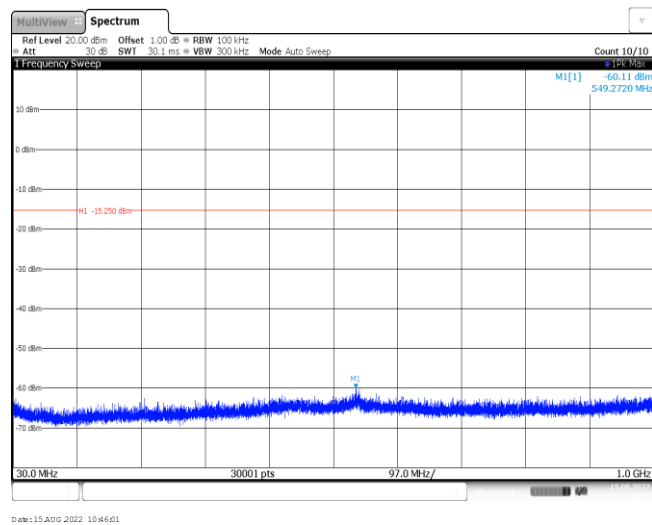
CH39
1GHz~26GHz



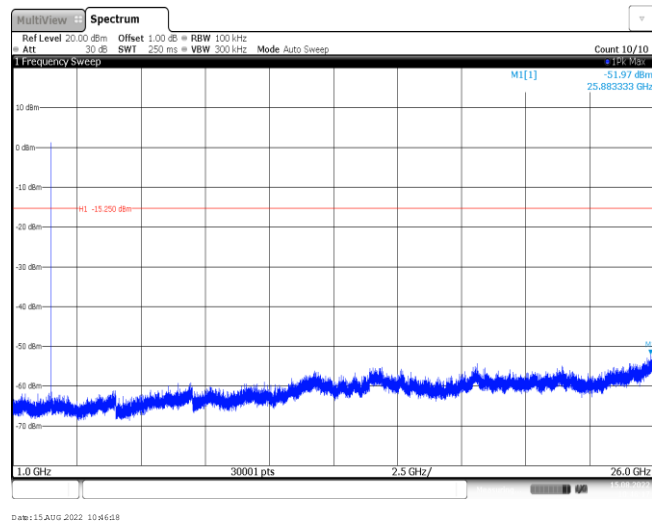
CH78
Reference level

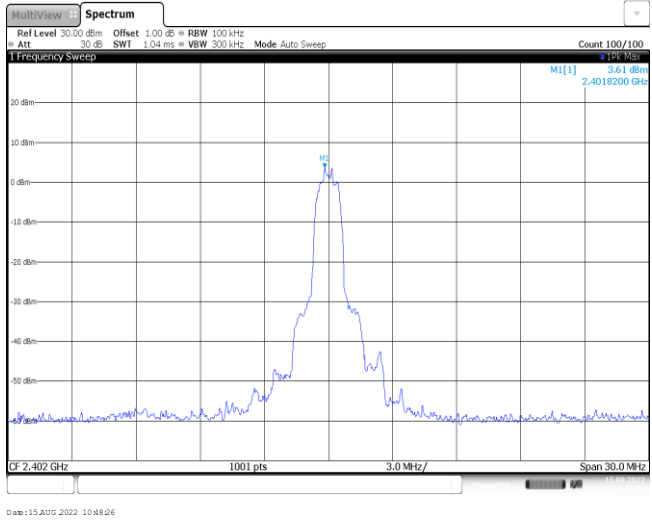
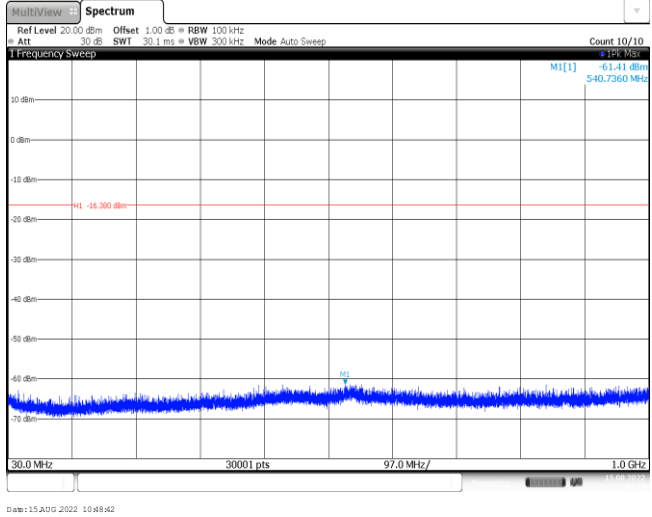
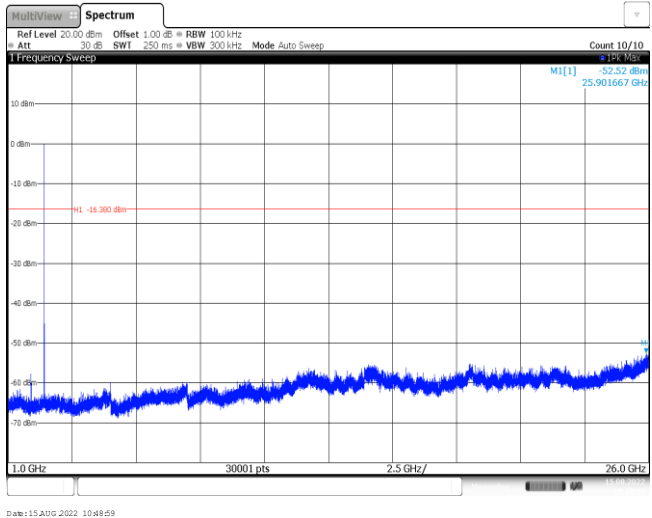


CH78
30MHz~1000MHz

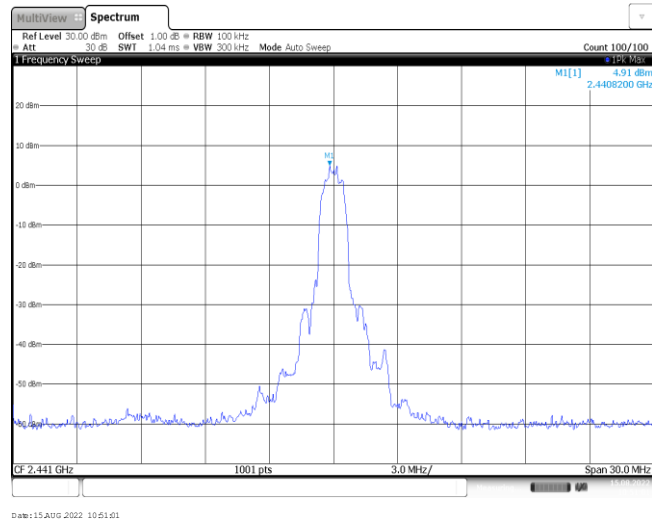


CH78
1GHz~26GHz

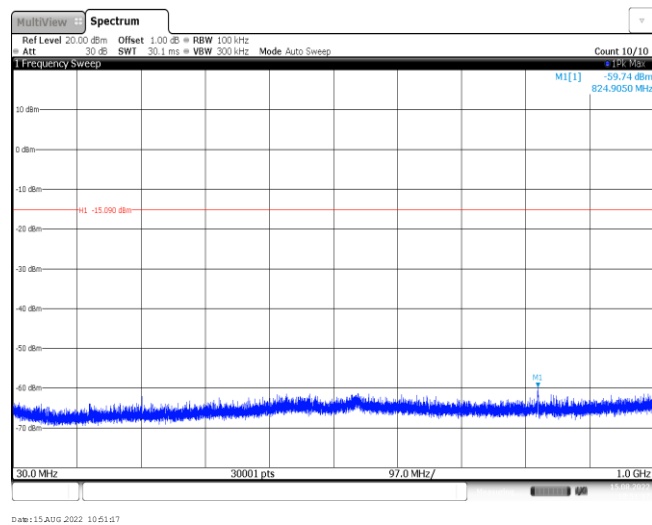


Test Item:	Spurious Emission	Modulation type:	8DPSK
CH00 Reference level			
CH00 30MHz~1000MHz			
CH00 1GHz~26GHz			

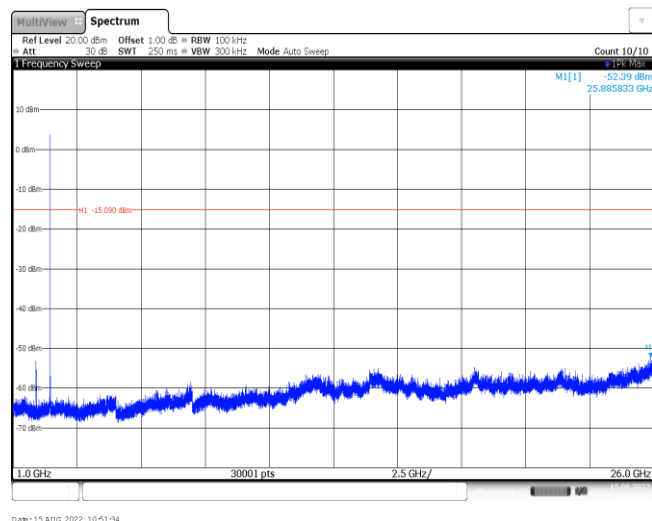
CH39
Reference level



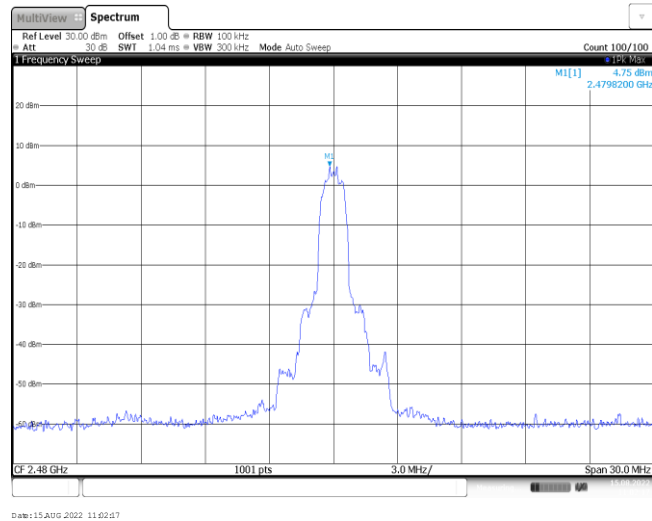
CH39
30MHz~1000MHz



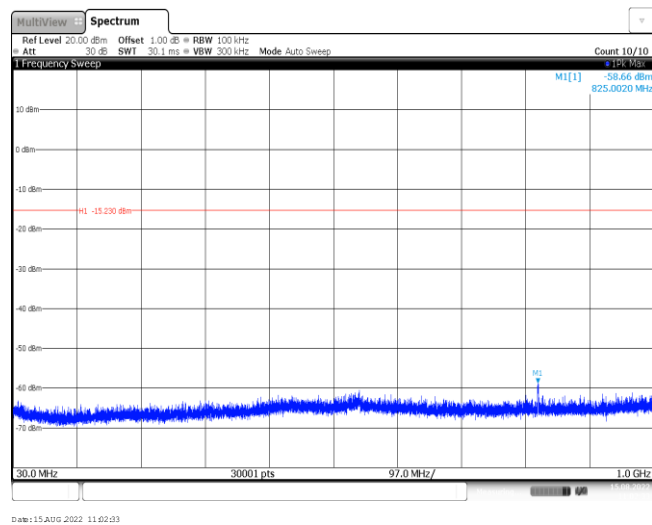
CH39
1GHz~26GHz



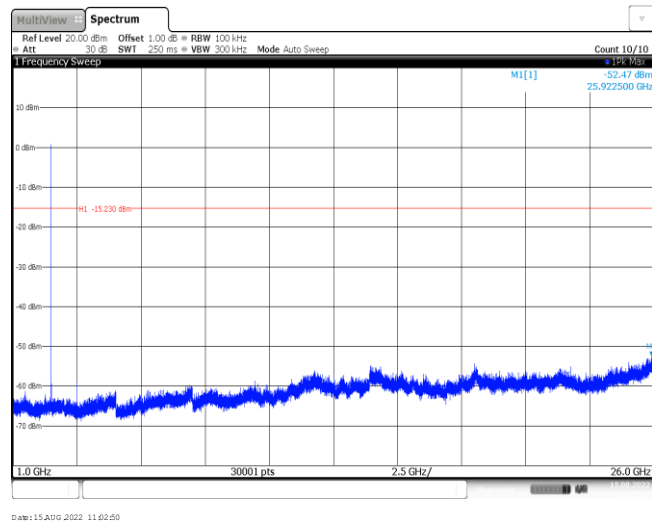
CH78
Reference level



CH78
30MHz~1000MHz



CH78
1GHz~26GHz



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