

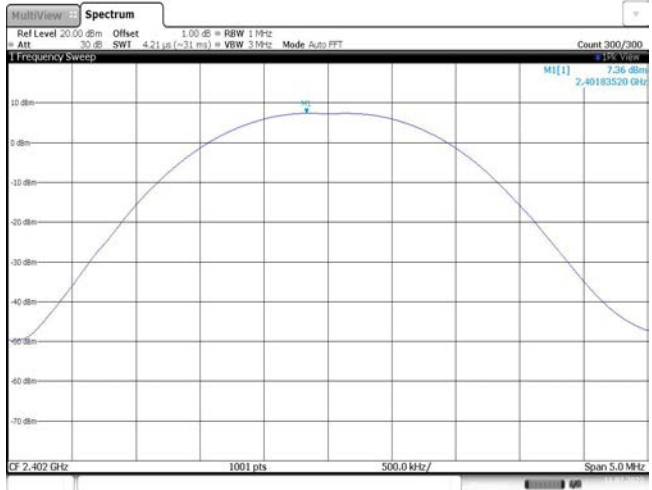
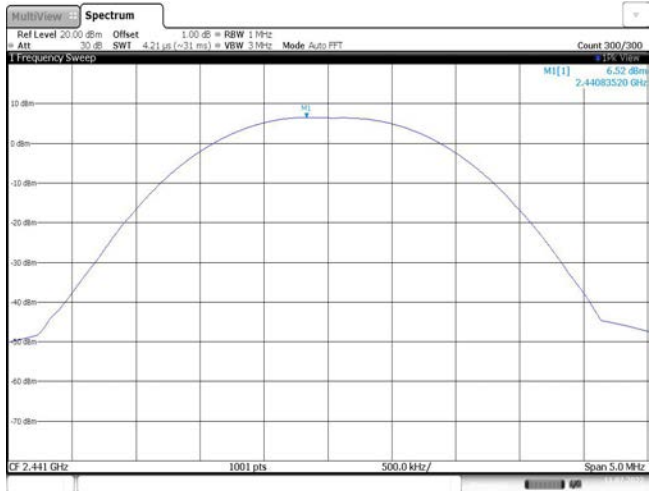
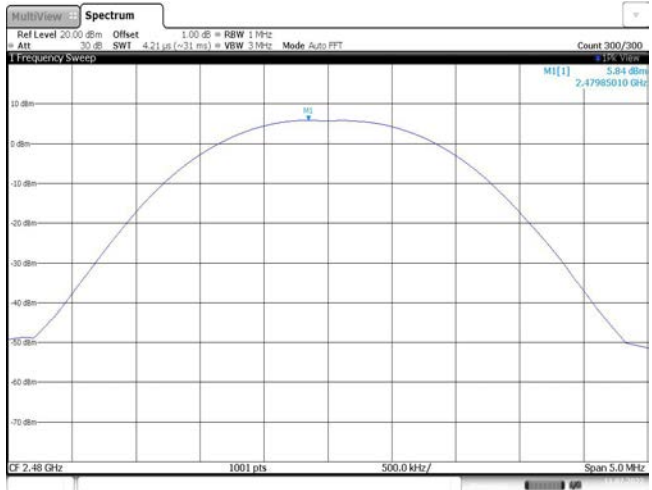
APPENDIX REPORT

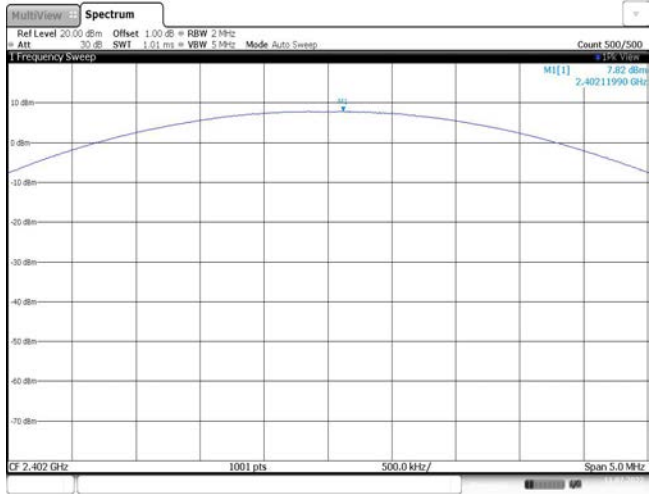
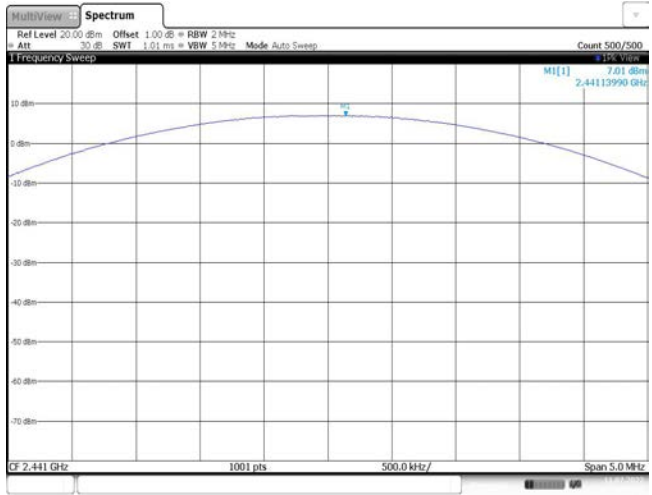
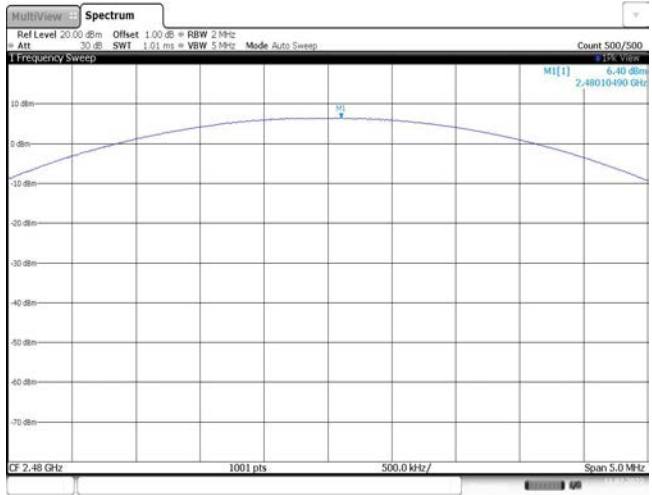
Project No.	SHT2206102301EW	Radio Specification	Bluetooth EDR
Test sample No.	YPHT22061023001	Model No.	Star10 3G
Start test date	2022-07-11	Finish date	2022-07-11
Temperature	24.8℃	Humidity	33%
Test Engineer	Xiaoqin Li	Auditor	Xiaodong Zhao

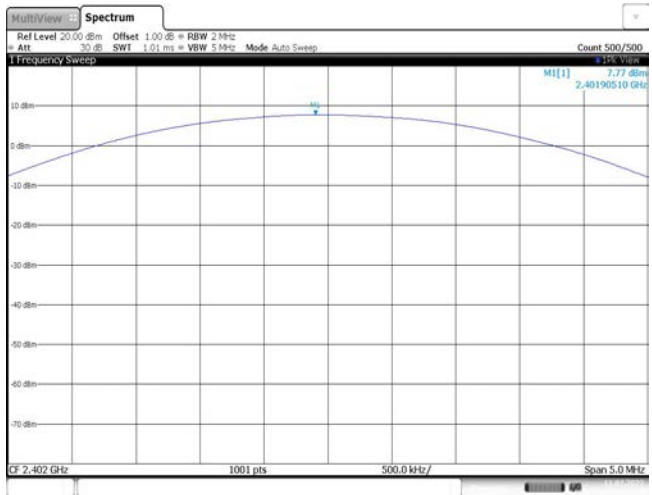
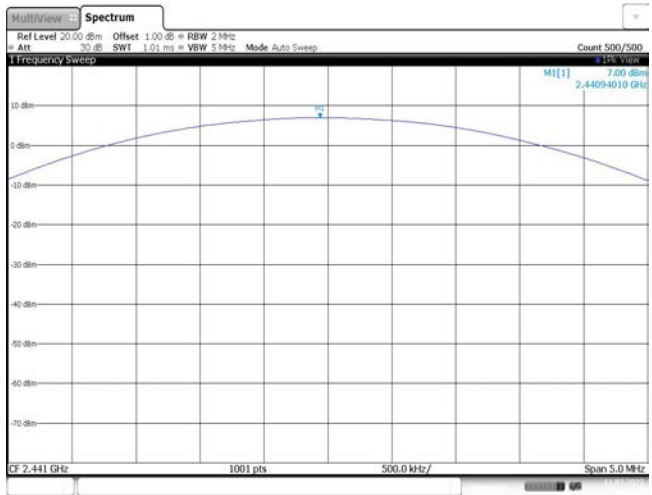
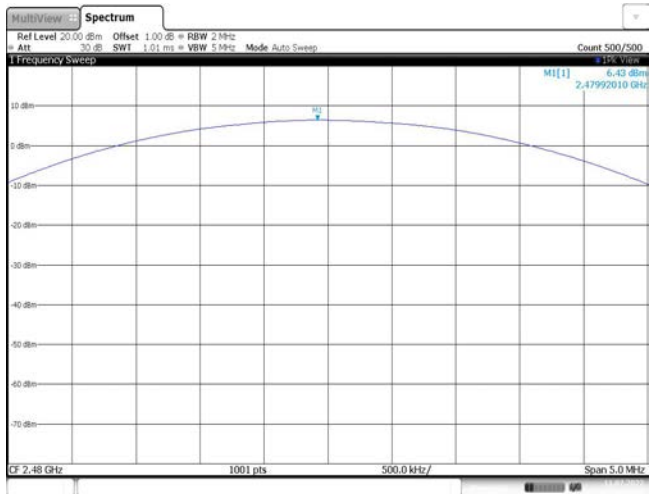
Appendix clause	Test item	Result
A	Peak Output Power	PASS
B	20 dB Bandwidth	PASS
C	99% Occupied Bandwidth	PASS
D	Carrier Frequencies Separation	PASS
E	Hopping Channel Number	PASS
F	Dwell Time	PASS
G	Duty Cycle Correction Factor (DCCF)	PASS
H	Band edge and Spurious Emissions(coducted)	PASS

Appendix A: Peak Output Power

Modulation type	Channel	Peak Output power (dBm)	Average Output power (dBm)	Limit (dBm)	Result
GFSK	00	7.36	7.34	≤ 30.00	Pass
	39	6.52	6.49		
	78	5.84	5.83		
$\pi/4$ DQPSK	00	7.82	7.29	≤ 21.00	Pass
	39	7.01	6.42		
	78	6.40	5.80		
8DPSK	00	7.77	7.20	≤ 21.00	Pass
	39	7.00	6.81		
	78	6.43	6.23		

Modulation Type:	GFSK
CH00	 11 JUL 2022 15:41:17
CH39	 11 JUL 2022 15:44:10
CH78	 11 JUL 2022 15:44:59

Modulation Type:	$\pi/4$ DQPSK
CH00	 Date: 11 JUL 2022 16:16:11
CH39	 Date: 11 JUL 2022 16:19:01
CH78	 Date: 11 JUL 2022 16:21:43

Modulation Type:	8DPSK
CH00	 MultiView Spectrum Ref Level 20.00 dBm Offset 1.00 dB RBW 2 MHz Att 30 dB SWI 1.01 ms VBW 5 MHz Mode Auto Sweep Count 500/500 1 Frequency Sweep M1[1] 7.77 dBm 2.40190519 GHz CF 2.402 GHz 1001 pts 500.0 kHz/ Span 5.0 MHz Date:11.JUL.2022 16:24:05
CH39	 MultiView Spectrum Ref Level 20.00 dBm Offset 1.00 dB RBW 2 MHz Att 30 dB SWI 1.01 ms VBW 5 MHz Mode Auto Sweep Count 500/500 1 Frequency Sweep M1[1] 7.00 dBm 2.44094010 GHz CF 2.441 GHz 1001 pts 500.0 kHz/ Span 5.0 MHz Date:11.JUL.2022 16:28:40
CH78	 MultiView Spectrum Ref Level 20.00 dBm Offset 1.00 dB RBW 2 MHz Att 30 dB SWI 1.01 ms VBW 5 MHz Mode Auto Sweep Count 500/500 1 Frequency Sweep M1[1] 6.43 dBm 2.47992010 GHz CF 2.48 GHz 1001 pts 500.0 kHz/ Span 5.0 MHz Date:11.JUL.2022 16:26:21

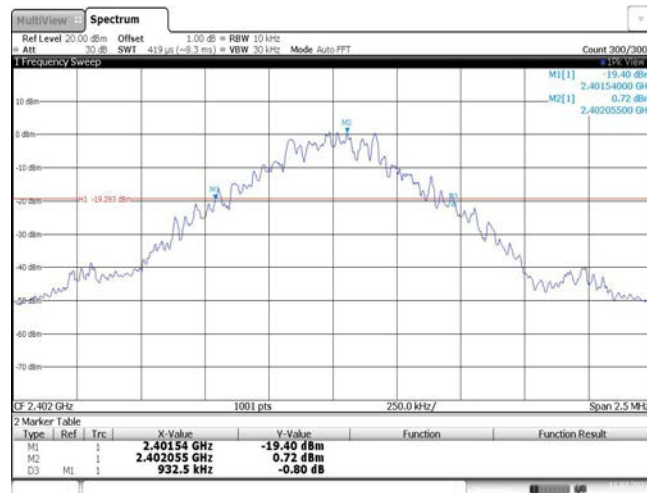
Appendix B : 20 dB Bandwidth

Modulation type	Channel	20 dB Bandwidth (kHz)	Limit (kHz)	Result
GFSK	00	932.50	-	Pass
	39	932.50		
	78	932.50		
$\pi/4$ DQPSK	00	1295.00	-	Pass
	39	1292.50		
	78	1292.50		
8DPSK	00	1302.50	-	Pass
	39	1297.50		
	78	1300.00		

Modulation Type:

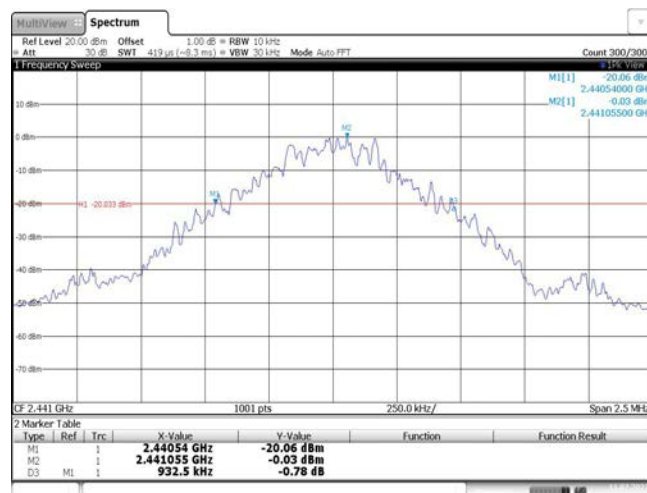
GFSK

CH00



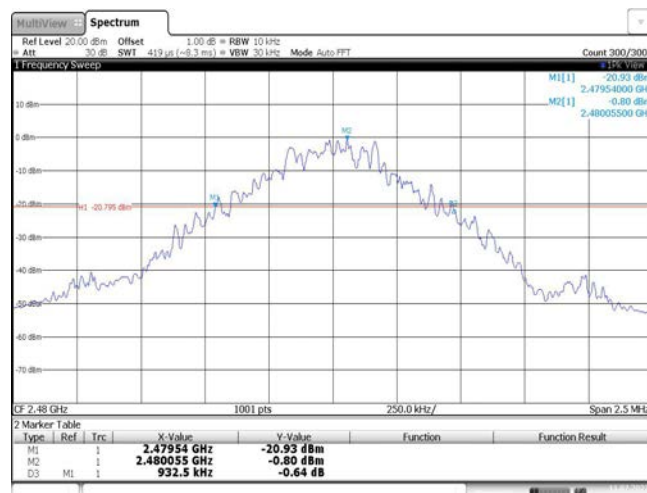
Date:11 JUL 2022 15:50:58

CH39



Date:11 JUL 2022 15:55:23

CH78



Date:11 JUL 2022 15:47:47

Modulation Type:

 $\pi/4$ DQPSK

CH00



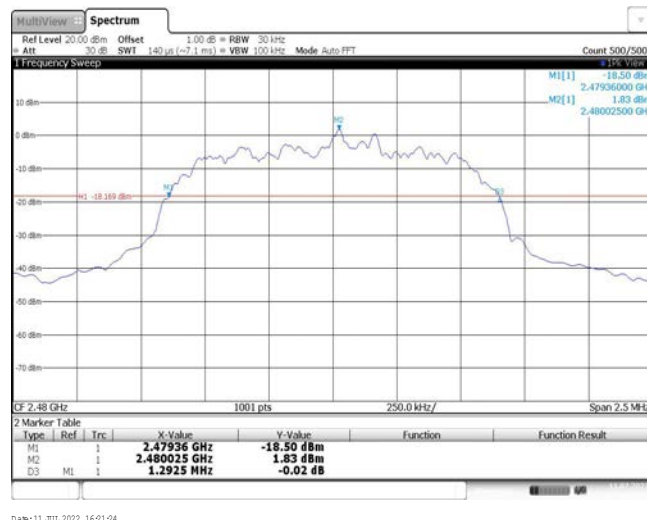
Date:11 JUL 2022 16:15:50

CH39



Date:11 JUL 2022 16:18:39

CH78



Date:11 JUL 2022 16:21:24

Modulation Type:

8DPSK

CH00



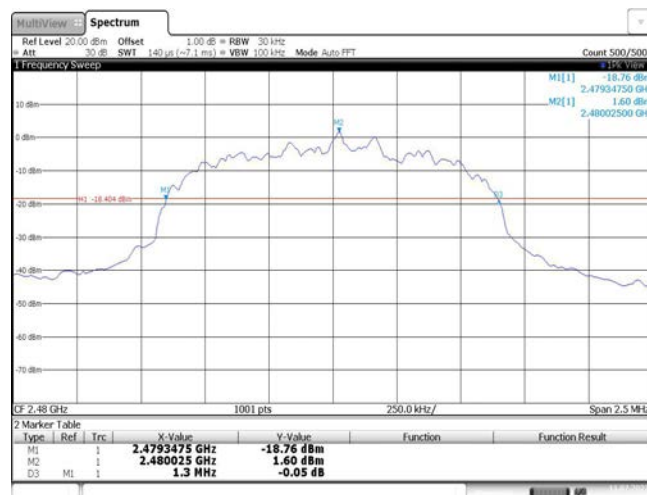
Date:11 JUL 2022 16:23:46

CH39



Date:11 JUL 2022 16:28:21

CH78



Date:11 JUL 2022 16:26:00

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	1.18	-	Pass
	39	1.19		
	78	1.18		
8DPSK	00	1.19	-	Pass
	39	1.19		
	78	1.19		

Modulation Type:

GFSK

CH00



Date:11.JUL.2022 15:51:07

CH39



Date:11.JUL.2022 15:55:33

CH78



Date:11.JUL.2022 15:47:25

Modulation Type:

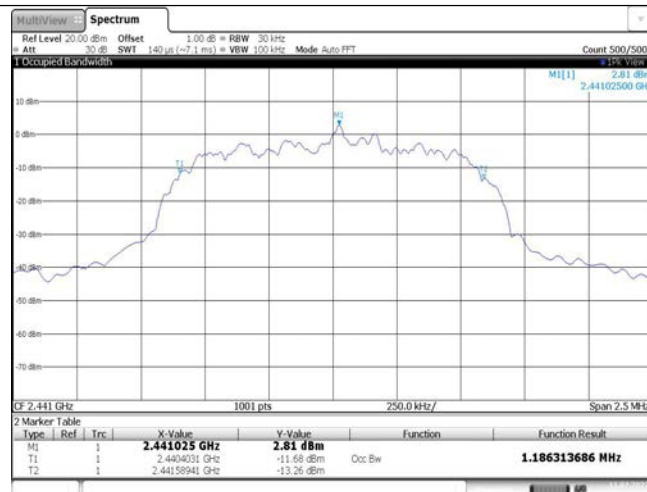
 $\pi/4$ DQPSK

CH00



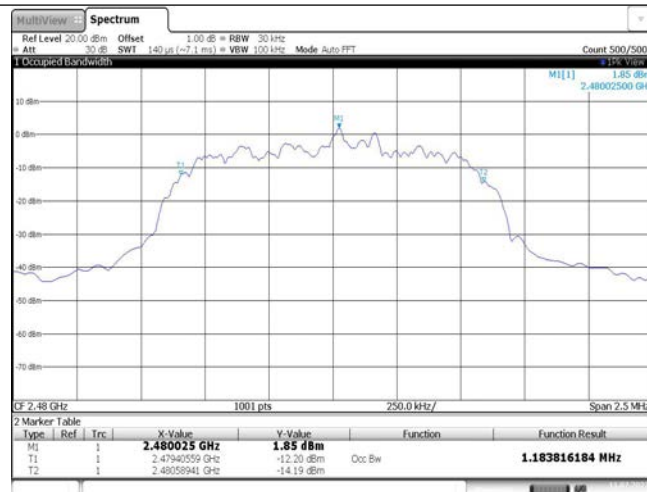
Date:11.JUL.2022 16:15:59

CH39



Date:11.JUL.2022 16:18:50

CH78



Date:11.JUL.2022 16:21:33

Modulation Type:

8DPSK

CH00



Date:11.JUL.2022 16:23:55

CH39



Date:11.JUL.2022 16:28:30

CH78



Date:11.JUL.2022 16:26:09

Appendix D: Carrier Frequencies Separation

Modulation type	Channel	Carrier Frequencies Separation (MHz)	Limit (kHz) *	Result
GFSK	39	1.00	≥932.50	Pass
π/4DQPSK	39	1.00	≥863.33	Pass
8DPSK	39	1.00	≥868.33	Pass

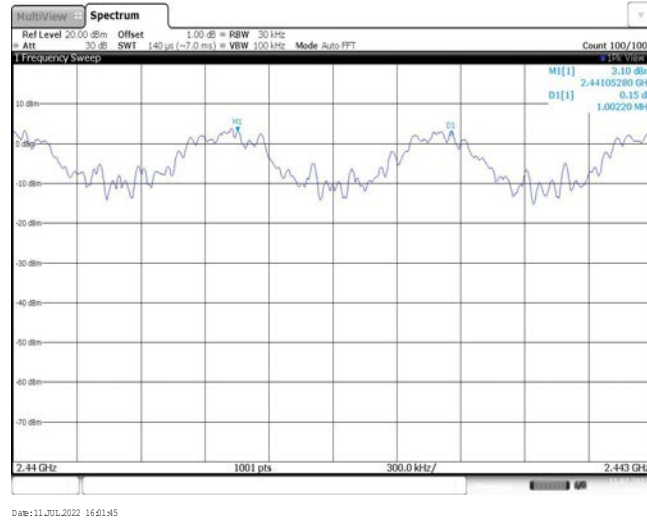
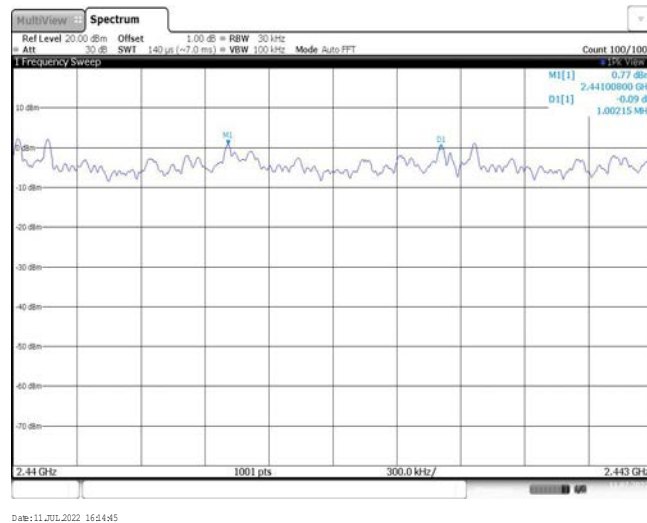
Note:

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

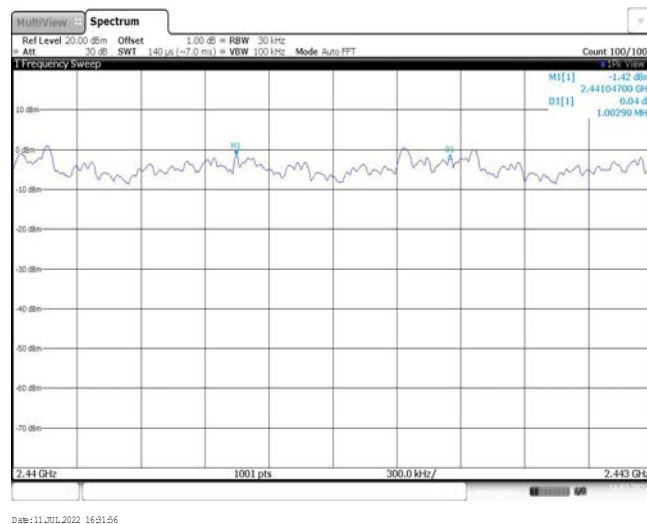
π/4DQPSK limit = $\frac{2}{3}$ * The maximum 20 dB Bandwidth for π/4DQPSK modulation on the appendix B.

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

GFSK

 $\pi/4$ DQPSK

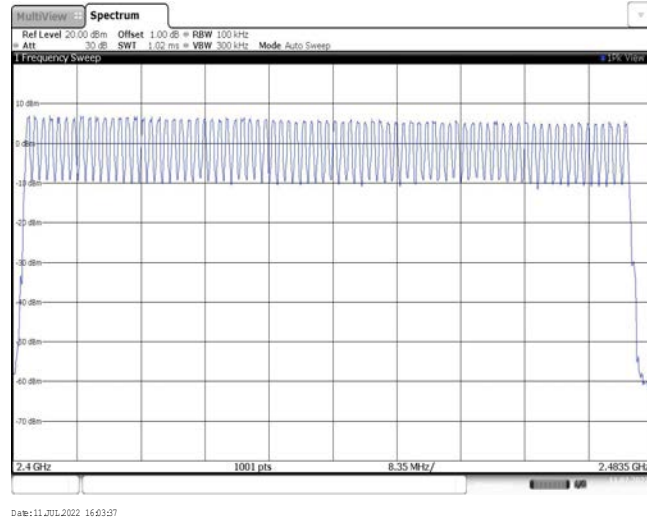
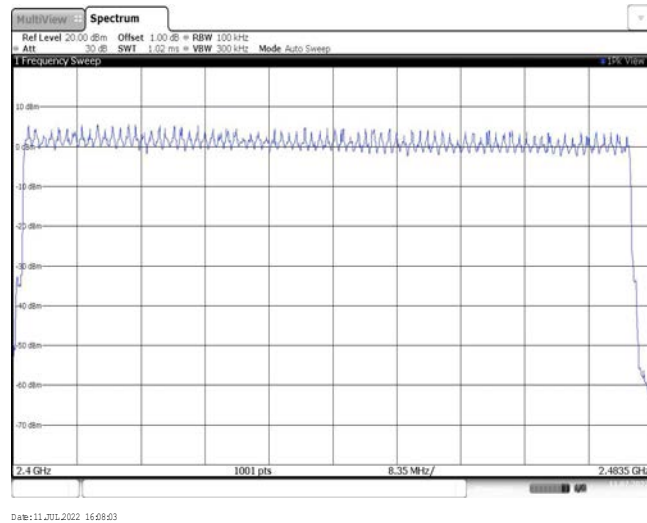
8DPSK



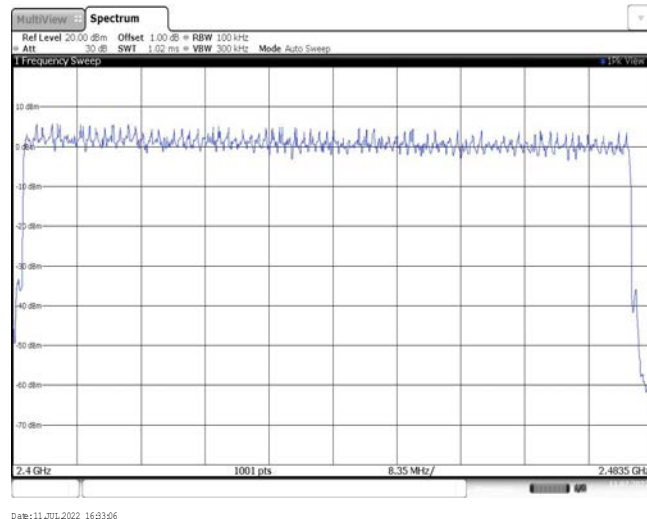
Appendix E: Hopping Channel Number

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

GFSK

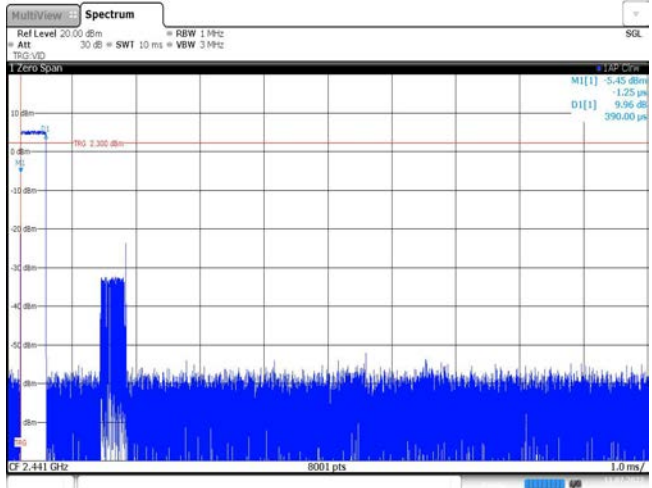
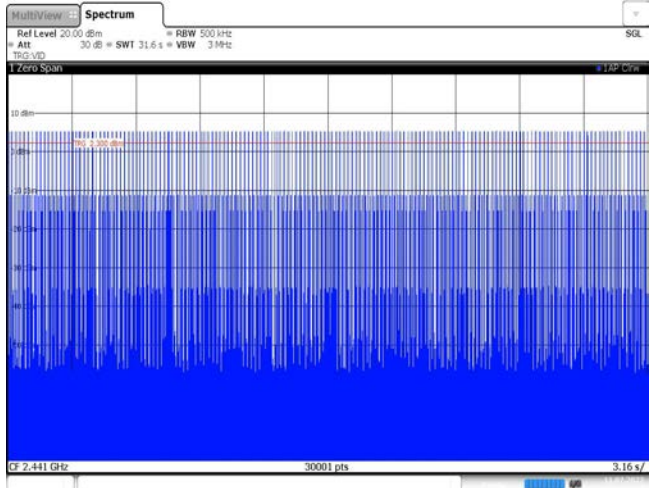
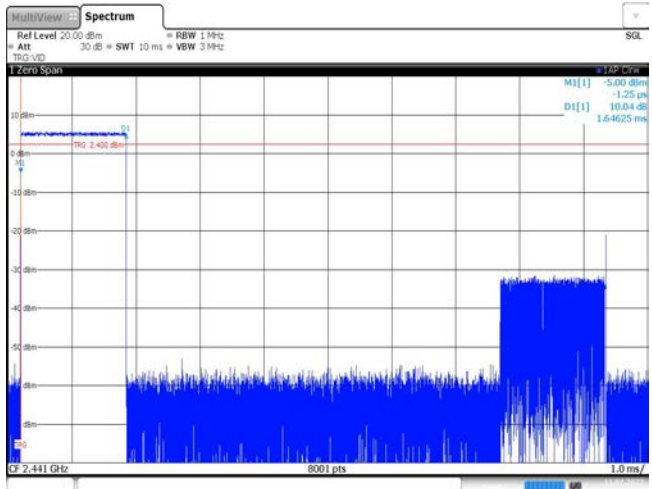
 $\pi/4$ DQPSK

8DPSK

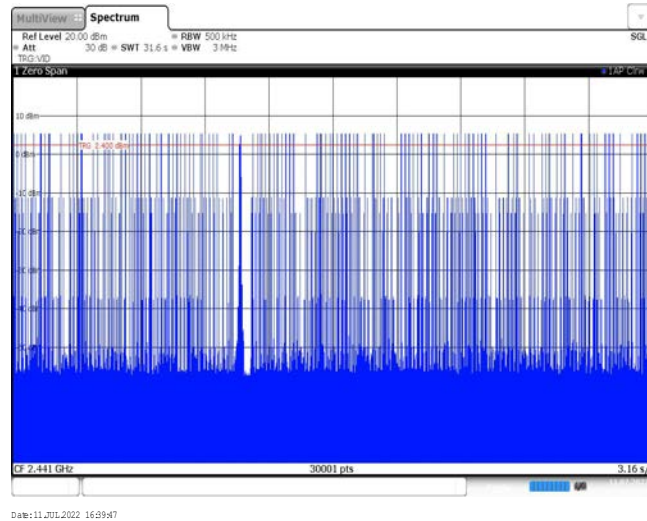


Appendix F: Dwell Time

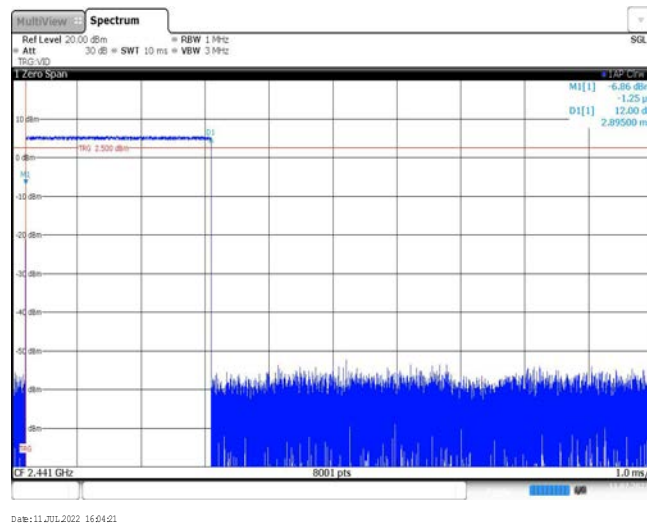
Modulation type	Packet	Burst Width [ms]	Total Hops[hop*ch]	Dwell time (Second)	Limit (Second)	Result
GFSK	DH1	0.39	317	0.12	≤ 0.40	Pass
	DH3	1.65	162	0.27		
	DH5	2.90	112	0.32		
$\pi/4$ DQPSK	2DH1	0.38	317	0.12	≤ 0.40	Pass
	2DH3	1.63	168	0.27		
	2DH5	2.88	94	0.27		
8DPSK	3DH1	0.38	316	0.12	≤ 0.40	Pass
	3DH3	1.63	159	0.26		
	3DH5	2.88	116	0.33		

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 -80 to 10. The x-axis represents time in milliseconds, ranging from 0 to 1.0 ms. A red horizontal line indicates the noise floor at -120 dBm. The burst reaches a peak power of approximately -30 dBm. The plot is titled 'Spectrum' and includes parameters: Ref Level 20.00 dBm, Att 30 dB, SWT 10 ms, VBW 3 kHz. The date and time are 11 JUL 2022 16:38:10.
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 -80 to 10. The x-axis represents time in seconds, ranging from 0 to 3.16 s. A red horizontal line indicates the noise floor at -120 dBm. The burst reaches a peak power of approximately -30 dBm. The plot is titled 'Spectrum' and includes parameters: Ref Level 20.00 dBm, Att 30 dB, SWT 31.6 s, VBW 3 kHz. The date and time are 11 JUL 2022 16:38:45.
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 -80 to 10. The x-axis represents time in milliseconds, ranging from 0 to 1.0 ms. A red horizontal line indicates the noise floor at -120 dBm. The burst reaches a peak power of approximately -30 dBm. The plot is titled 'Spectrum' and includes parameters: Ref Level 20.00 dBm, Att 30 dB, SWT 10 ms, VBW 3 kHz. The date and time are 11 JUL 2022 16:39:12.

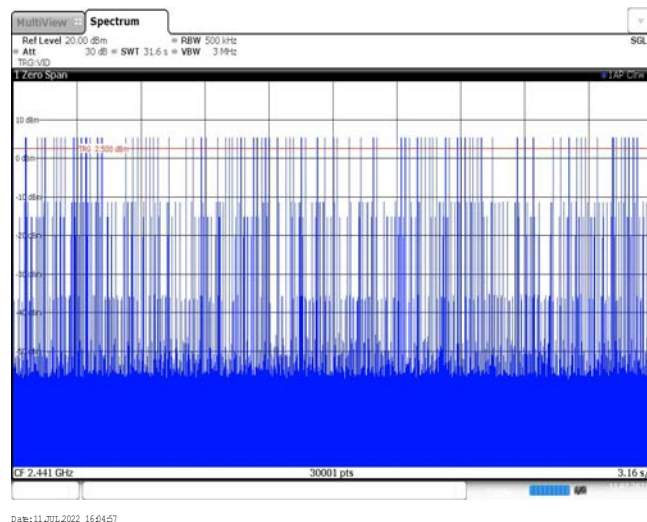
DH3
Burst number

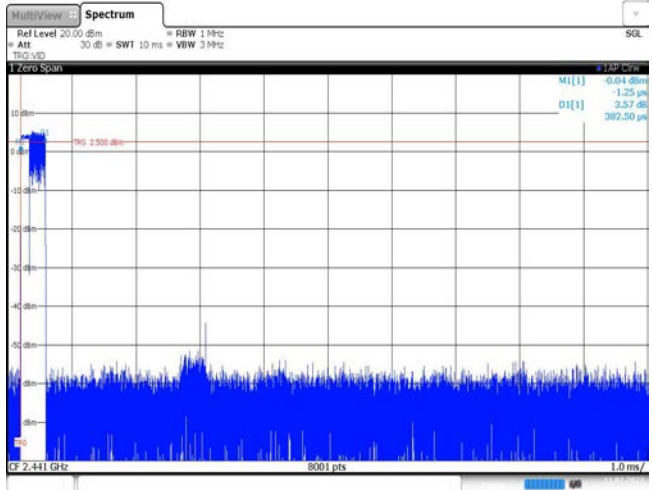
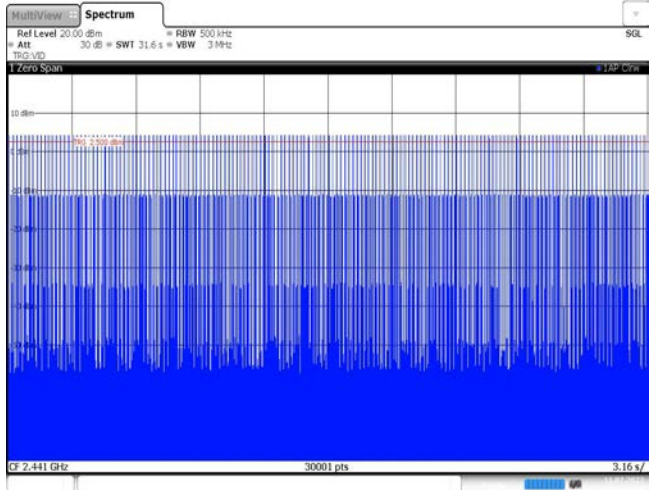
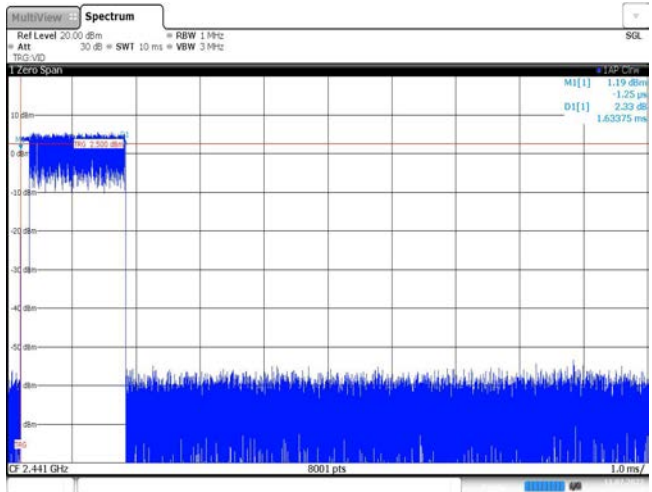


DH5
Burst width

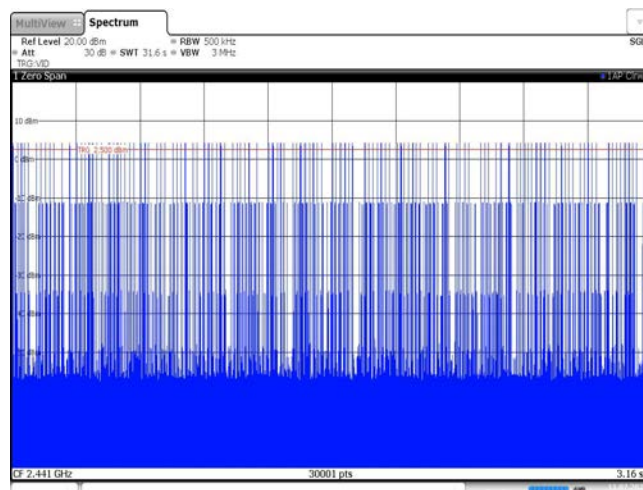


DH5
Burst number



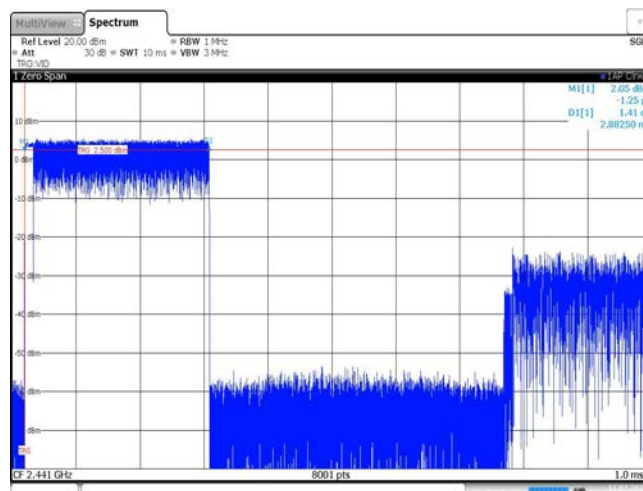
Modulation Type:	$\pi/4$ DQPSK
2DH1 Burst width	 The spectrum plot shows a signal centered at 2.441 GHz. The y-axis represents power in dBm, ranging from -80 to 10. The x-axis represents frequency in MHz, ranging from 2.435 to 2.447. A red horizontal line is drawn at -25.00 dBm. The signal is a narrowband burst. The plot includes a 'Spectrum' tab and a 'MultView' button. The 'Spectrum' tab shows the following parameters: Ref Level 20.00 dBm, Att 30 dB, RBW 1 MHz, SWT 10 ms, VBW 3 MHz. The 'MultView' button is labeled 'Zero Span'. The plot also shows a 'TAP Ctrl' button and a 'SGL' button. The plot includes a 'Date: 11 JUL 2022 16:40:13' timestamp.
2DH1 Burst number	 The spectrum plot shows a signal centered at 2.441 GHz. The y-axis represents power in dBm, ranging from -80 to 10. The x-axis represents frequency in MHz, ranging from 2.435 to 2.447. A red horizontal line is drawn at -25.00 dBm. The signal is a narrowband burst. The plot includes a 'Spectrum' tab and a 'MultView' button. The 'Spectrum' tab shows the following parameters: Ref Level 20.00 dBm, Att 30 dB, RBW 500 kHz, SWT 31.6 s, VBW 3 MHz. The 'MultView' button is labeled 'Zero Span'. The plot also shows a 'TAP Ctrl' button and a 'SGL' button. The plot includes a 'Date: 11 JUL 2022 16:40:49' timestamp.
2DH3 Burst width	 The spectrum plot shows a signal centered at 2.441 GHz. The y-axis represents power in dBm, ranging from -80 to 10. The x-axis represents frequency in MHz, ranging from 2.435 to 2.447. A red horizontal line is drawn at -25.00 dBm. The signal is a narrowband burst. The plot includes a 'Spectrum' tab and a 'MultView' button. The 'Spectrum' tab shows the following parameters: Ref Level 20.00 dBm, Att 30 dB, RBW 1 MHz, SWT 10 ms, VBW 3 MHz. The 'MultView' button is labeled 'Zero Span'. The plot also shows a 'TAP Ctrl' button and a 'SGL' button. The plot includes a 'Date: 11 JUL 2022 16:41:45' timestamp.

2DH3
Burst number



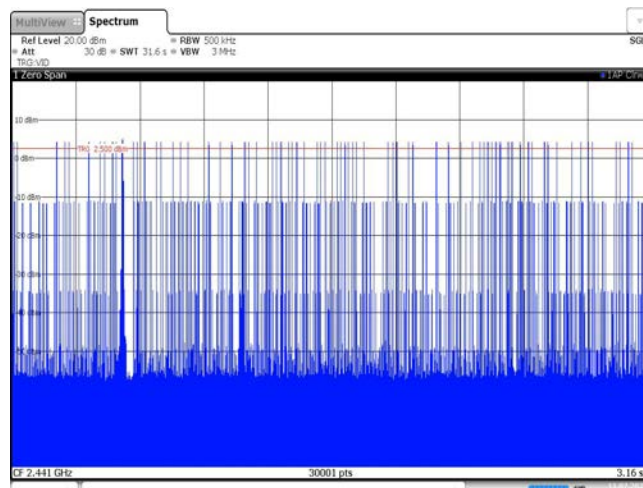
Date: 11 JUL 2022 16:41:51

2DH5
Burst width

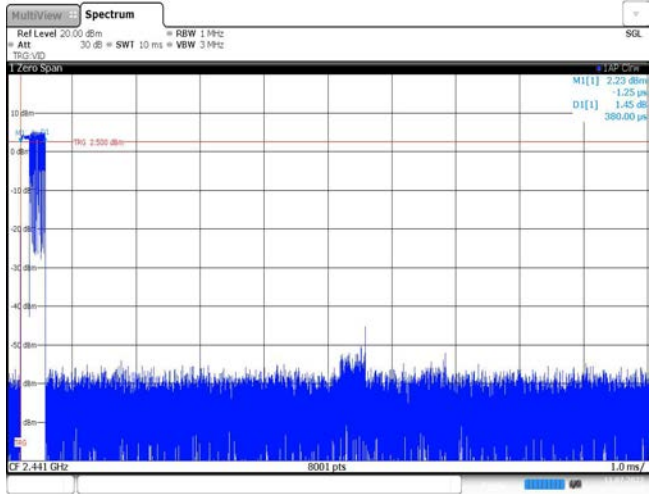
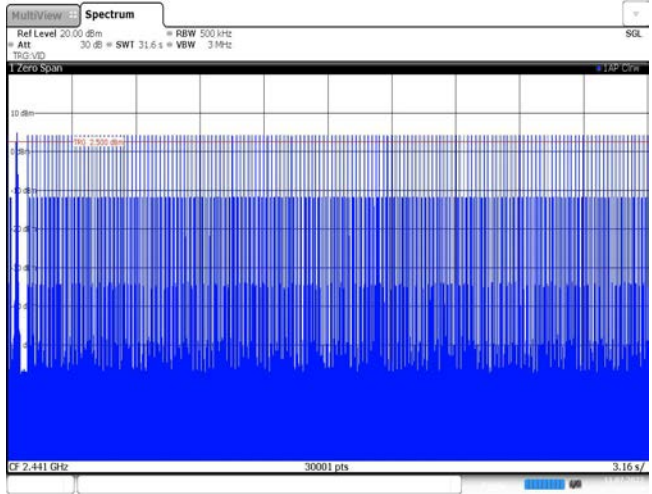
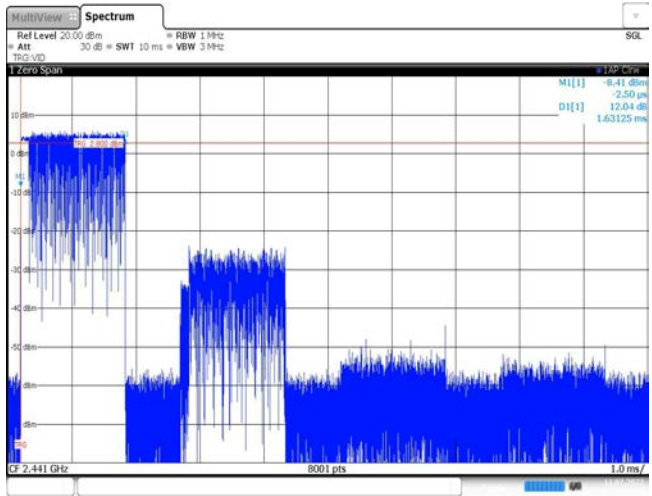


Date: 11 JUL 2022 16:08:53

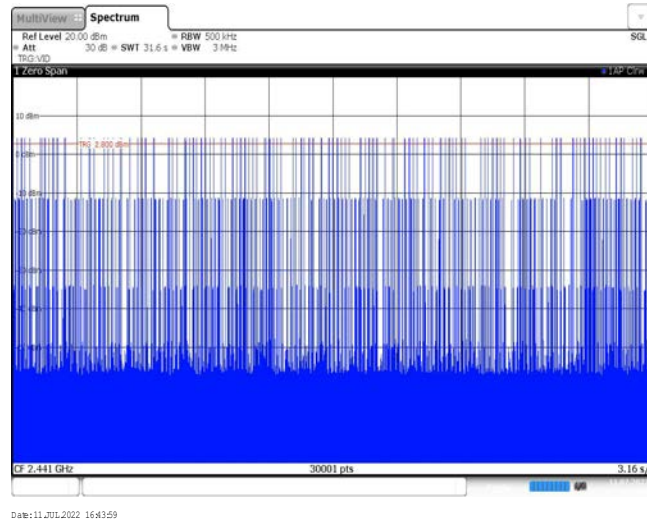
2DH5
Burst number



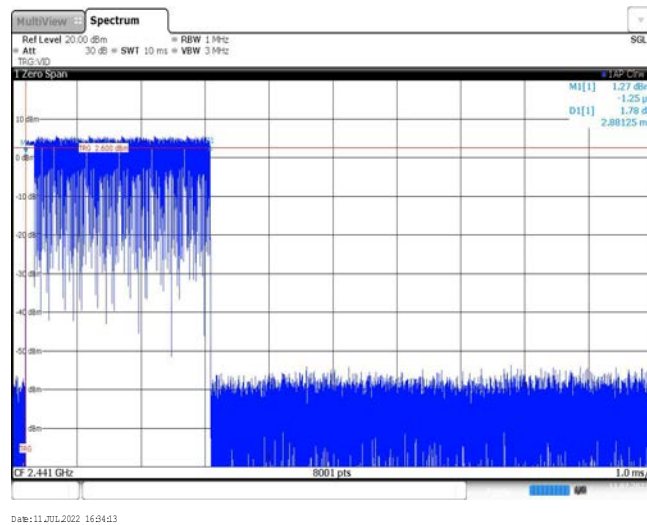
Date: 11 JUL 2022 16:09:28

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 -80 to 10. The x-axis represents frequency in MHz, ranging from 2.440 to 2.442. The burst is centered at 2.441 GHz and has a width of approximately 1.0 MHz. The plot includes a reference level of 20.00 dBm, an attenuation of 30 dB, a resolution bandwidth of 1 MHz, a sweep time of 10 ms, and a video bandwidth of 3 MHz. The date and time are 11 JUL 2022 16:42:19.
3DH1 Burst number	 The spectrum plot shows multiple bursts of signal at 2.441 GHz. The y-axis represents power in dBm, ranging from -80 to 10. The x-axis represents frequency in MHz, ranging from 2.440 to 2.442. The plot includes a reference level of 20.00 dBm, an attenuation of 30 dB, a resolution bandwidth of 500 kHz, a sweep time of 31.6 s, and a video bandwidth of 3 MHz. The date and time are 11 JUL 2022 16:42:58.
3DH3 Burst width	 The spectrum plot shows multiple bursts of signal at 2.441 GHz. The y-axis represents power in dBm, ranging from -80 to 10. The x-axis represents frequency in MHz, ranging from 2.440 to 2.442. The plot includes a reference level of 20.00 dBm, an attenuation of 30 dB, a resolution bandwidth of 1 MHz, a sweep time of 10 ms, and a video bandwidth of 3 MHz. The date and time are 11 JUL 2022 16:43:24.

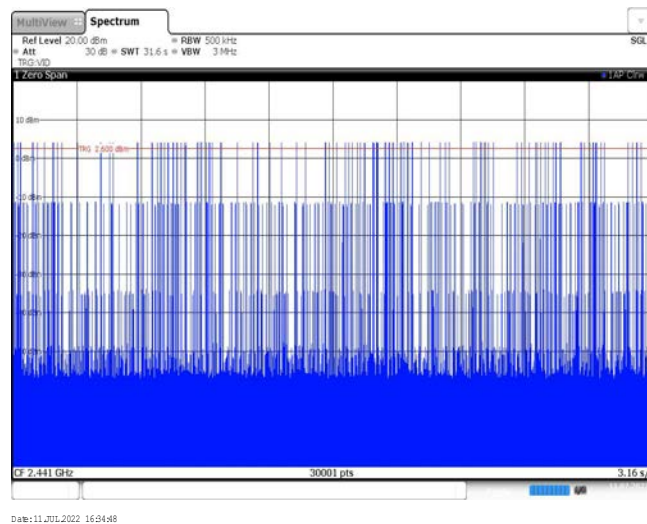
3DH3
Burst number



3DH5
Burst width



3DH5
Burst number

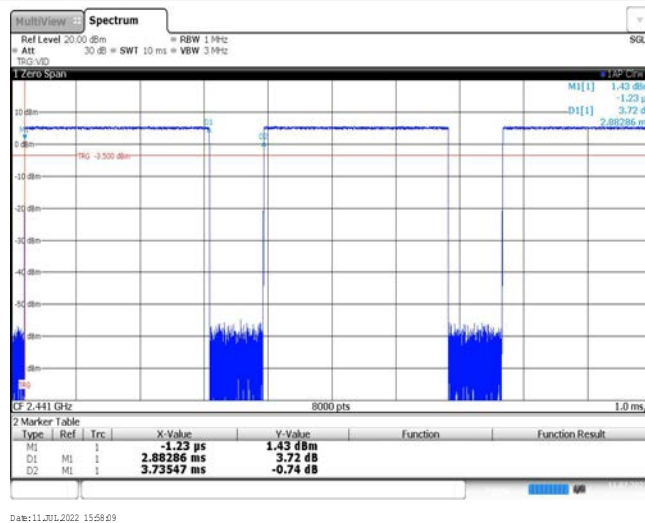


Appendix G: Duty Cycle Correction Factor (DCCF)**DCCF Calculate Formula**

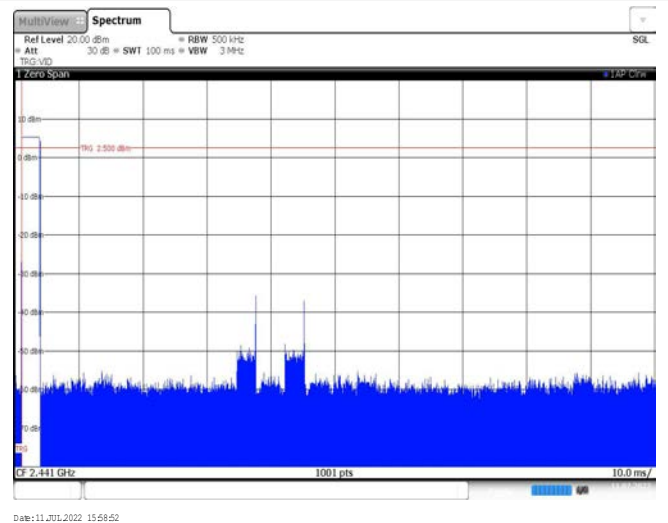
$$\text{DCCF} = 20 * \text{Log}(\text{duty cycle}) = 20 * \text{Log}(T_{\text{on time}} / T_{\text{period}})$$

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	2.87	100	2	-24.82

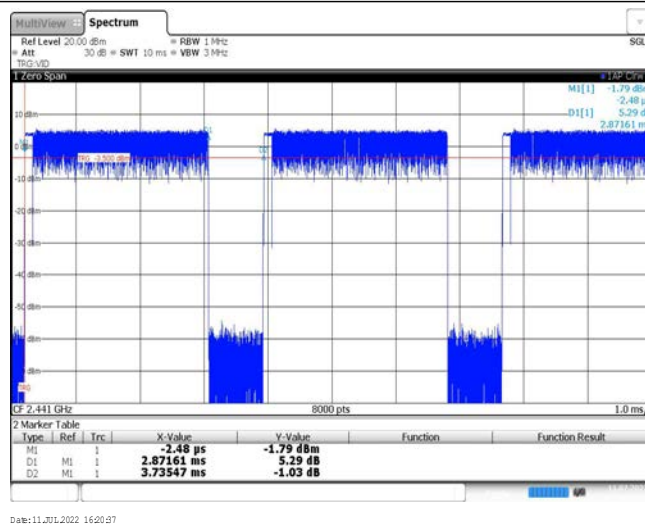
GFSK



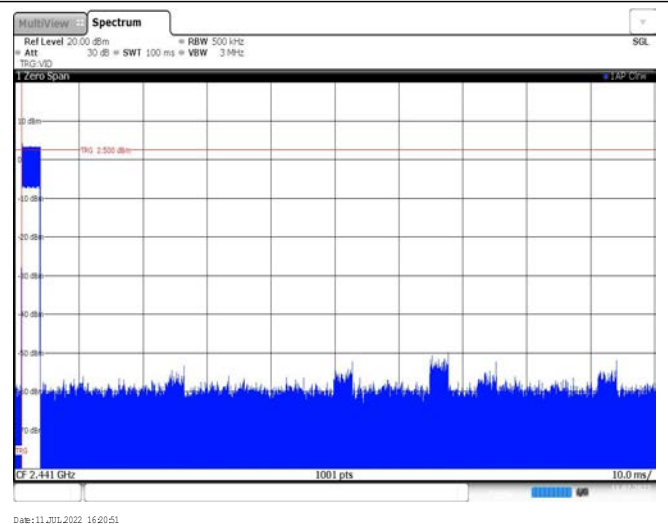
Ton time for single burst



Burst Quantity

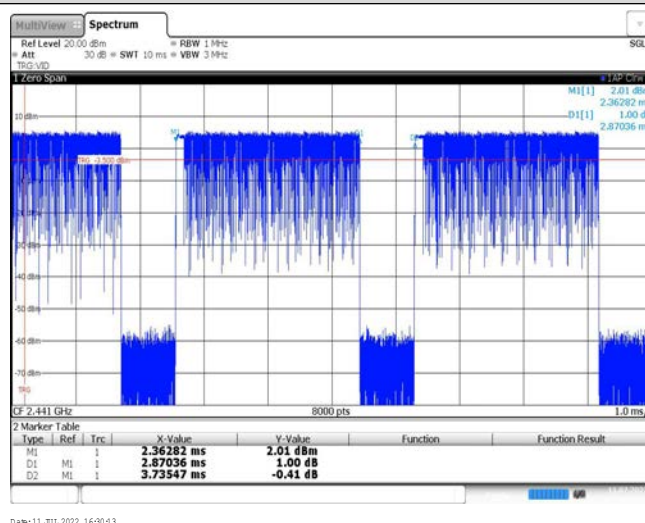
 $\pi/4$ DQPSK

Ton time for single burst

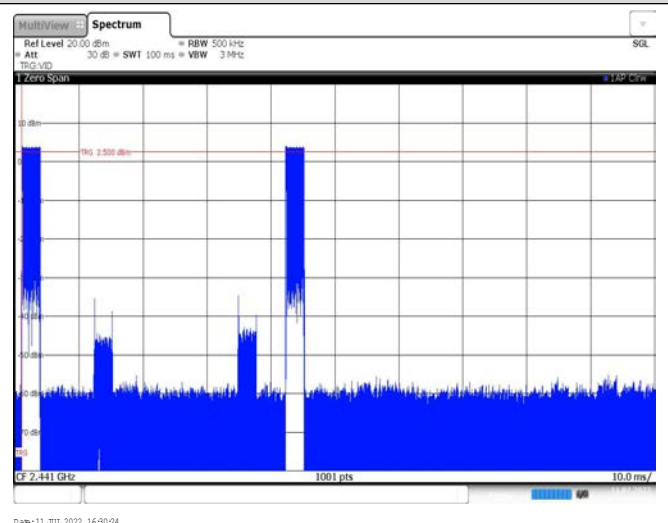


Burst Quantity

8DPSK

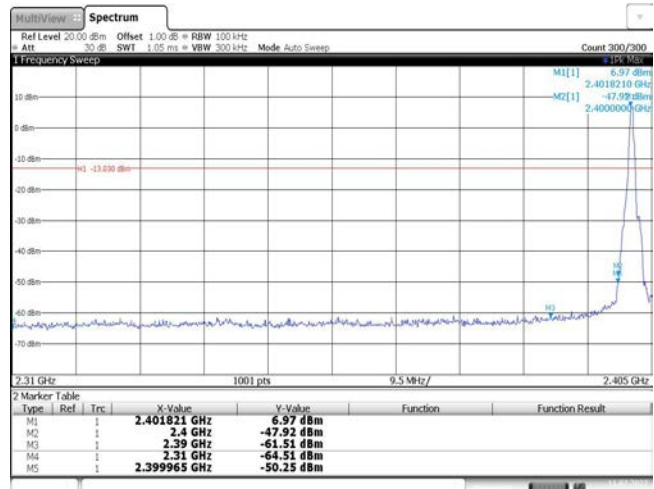
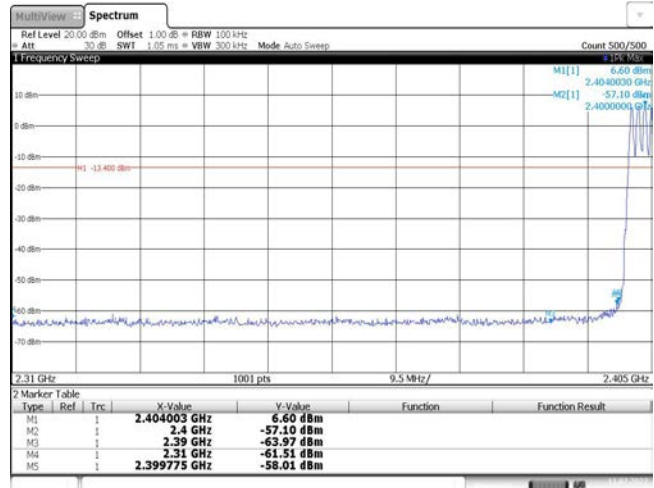
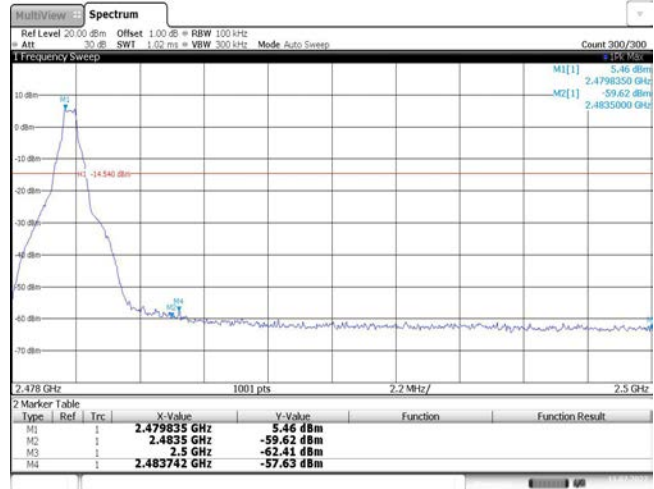


Ton time for single burst

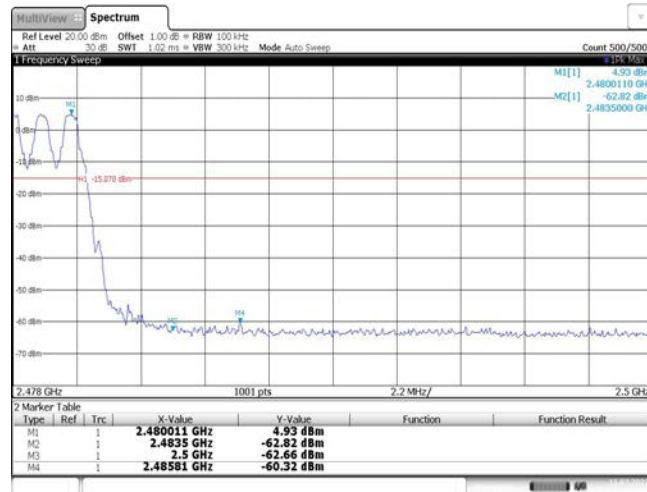


Burst Quantity

Appendix H: Band edge and Spurious Emissions (conducted)

Test Item:	Band edge	Modulation type:	GFSK																																										
CH00 No hopping mode	 <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>2.401821 GHz</td><td>6.97 dBm</td><td></td><td></td></tr><tr><td>M2</td><td>1</td><td></td><td>2.4 GHz</td><td>-47.92 dBm</td><td></td><td></td></tr><tr><td>M3</td><td>1</td><td></td><td>2.39 GHz</td><td>-61.51 dBm</td><td></td><td></td></tr><tr><td>M4</td><td>1</td><td></td><td>2.31 GHz</td><td>-64.51 dBm</td><td></td><td></td></tr><tr><td>M5</td><td>1</td><td></td><td>2.399965 GHz</td><td>-50.25 dBm</td><td></td><td></td></tr></table> Date: 11 JUL 2022 15:53:08	Type	Ref	Trc	X-Value	Y-Value	Function	Function Result	M1	1		2.401821 GHz	6.97 dBm			M2	1		2.4 GHz	-47.92 dBm			M3	1		2.39 GHz	-61.51 dBm			M4	1		2.31 GHz	-64.51 dBm			M5	1		2.399965 GHz	-50.25 dBm				
Type	Ref	Trc	X-Value	Y-Value	Function	Function Result																																							
M1	1		2.401821 GHz	6.97 dBm																																									
M2	1		2.4 GHz	-47.92 dBm																																									
M3	1		2.39 GHz	-61.51 dBm																																									
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CH00 Hopping mode	 <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>6.60 dBm</td><td></td><td></td></tr><tr><td>M2</td><td>1</td><td></td><td>2.4 GHz</td><td>-57.10 dBm</td><td></td><td></td></tr><tr><td>M3</td><td>1</td><td></td><td>2.39 GHz</td><td>-63.97 dBm</td><td></td><td></td></tr><tr><td>M4</td><td>1</td><td></td><td>2.31 GHz</td><td>-61.51 dBm</td><td></td><td></td></tr><tr><td>M5</td><td>1</td><td></td><td>2.399775 GHz</td><td>-58.01 dBm</td><td></td><td></td></tr></table> Date: 11 JUL 2022 16:03:53	Type	Ref	Trc	X-Value	Y-Value	Function	Function Result	M1	1		2.404003 GHz	6.60 dBm			M2	1		2.4 GHz	-57.10 dBm			M3	1		2.39 GHz	-63.97 dBm			M4	1		2.31 GHz	-61.51 dBm			M5	1		2.399775 GHz	-58.01 dBm				
Type	Ref	Trc	X-Value	Y-Value	Function	Function Result																																							
M1	1		2.404003 GHz	6.60 dBm																																									
M2	1		2.4 GHz	-57.10 dBm																																									
M3	1		2.39 GHz	-63.97 dBm																																									
M4	1		2.31 GHz	-61.51 dBm																																									
M5	1		2.399775 GHz	-58.01 dBm																																									
CH78 No hopping mode	 <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>2.479835 GHz</td><td>5.46 dBm</td><td></td><td></td></tr><tr><td>M2</td><td>1</td><td></td><td>2.4835 GHz</td><td>-59.62 dBm</td><td></td><td></td></tr><tr><td>M3</td><td>1</td><td></td><td>2.5 GHz</td><td>-62.41 dBm</td><td></td><td></td></tr><tr><td>M4</td><td>1</td><td></td><td>2.483742 GHz</td><td>-57.63 dBm</td><td></td><td></td></tr></table> Date: 11 JUL 2022 15:47:41	Type	Ref	Trc	X-Value	Y-Value	Function	Function Result	M1	1		2.479835 GHz	5.46 dBm			M2	1		2.4835 GHz	-59.62 dBm			M3	1		2.5 GHz	-62.41 dBm			M4	1		2.483742 GHz	-57.63 dBm											
Type	Ref	Trc	X-Value	Y-Value	Function	Function Result																																							
M1	1		2.479835 GHz	5.46 dBm																																									
M2	1		2.4835 GHz	-59.62 dBm																																									
M3	1		2.5 GHz	-62.41 dBm																																									
M4	1		2.483742 GHz	-57.63 dBm																																									

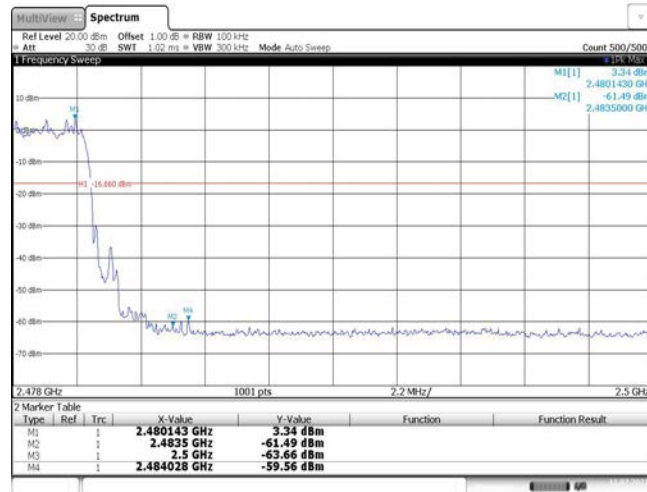
CH78
Hopping mode



Date: 11 JUL 2022 16:04:07

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

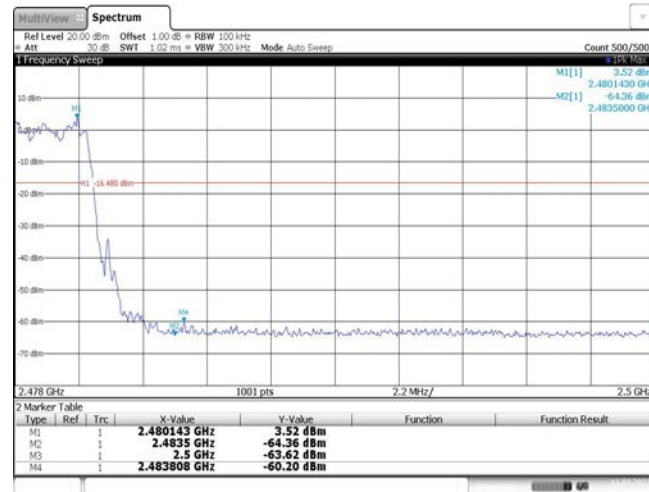
CH78
Hopping mode



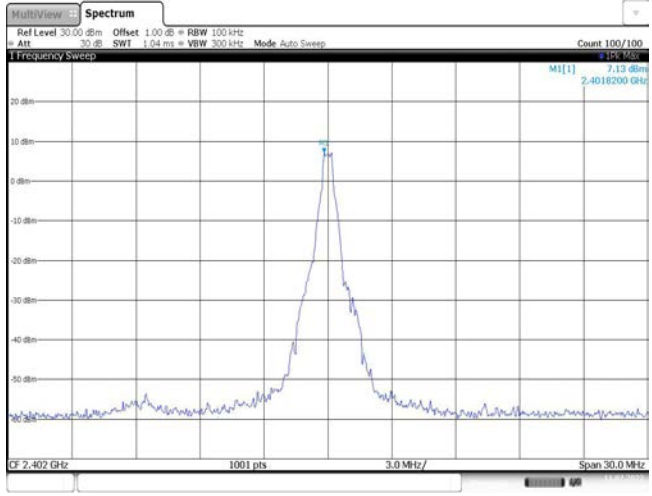
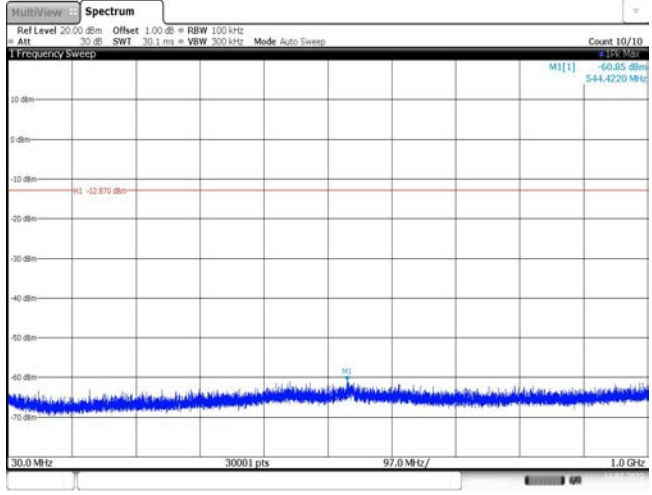
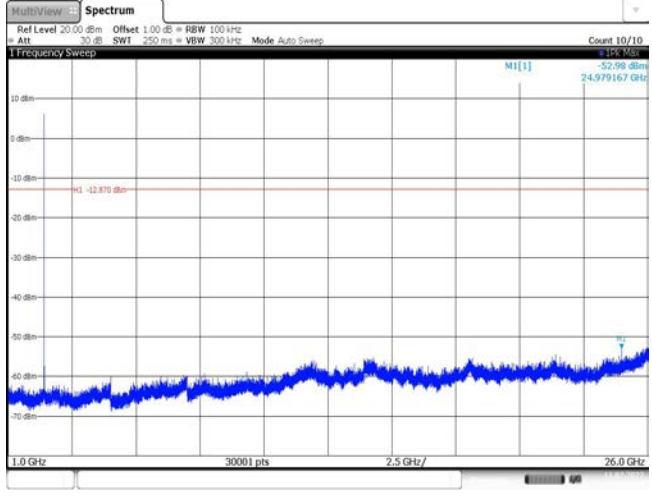
Date: 11 JUL 2022 16:08:40

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

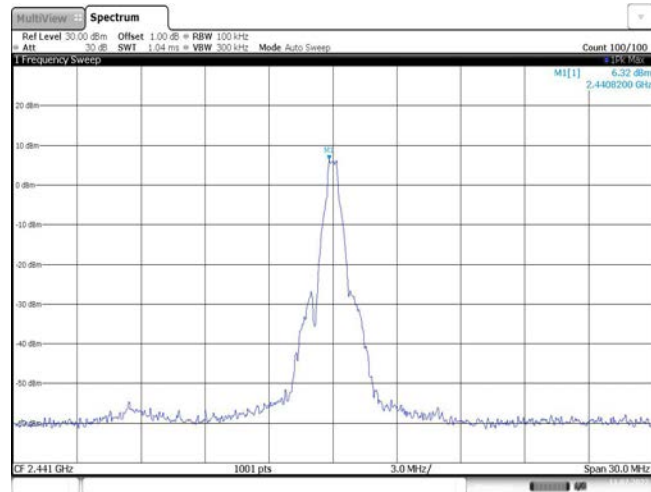
CH78
Hoppig mode



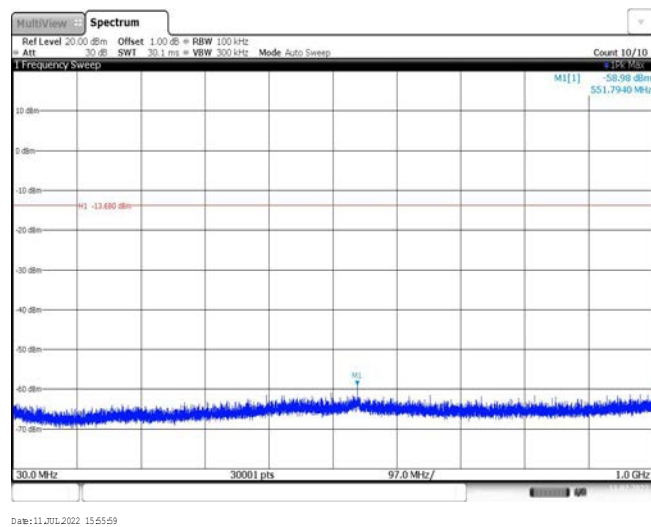
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Test Item:	Spurious Emission	Modulation type:	GFSK
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CH00 30MHz~1000MHz			
CH00 1GHz~26GHz			

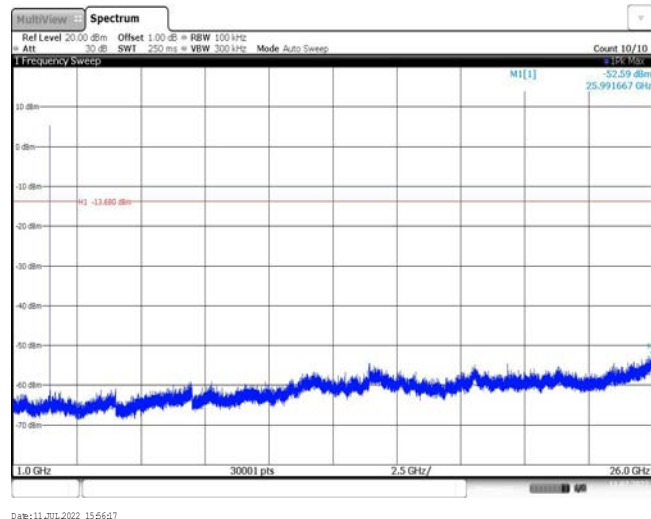
CH39
Reference level



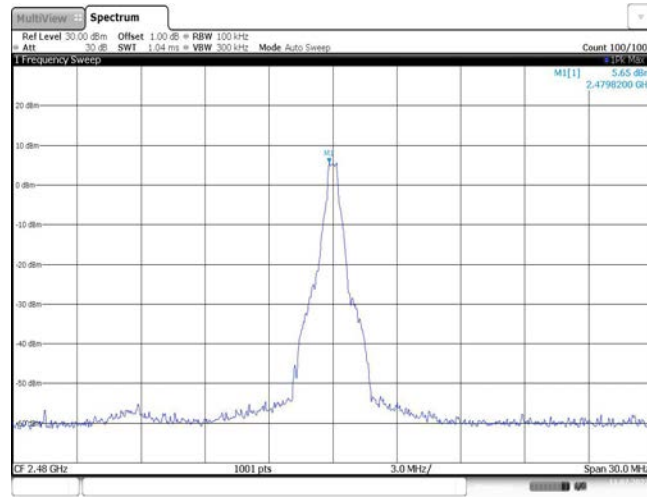
CH39
30MHz~1000MHz



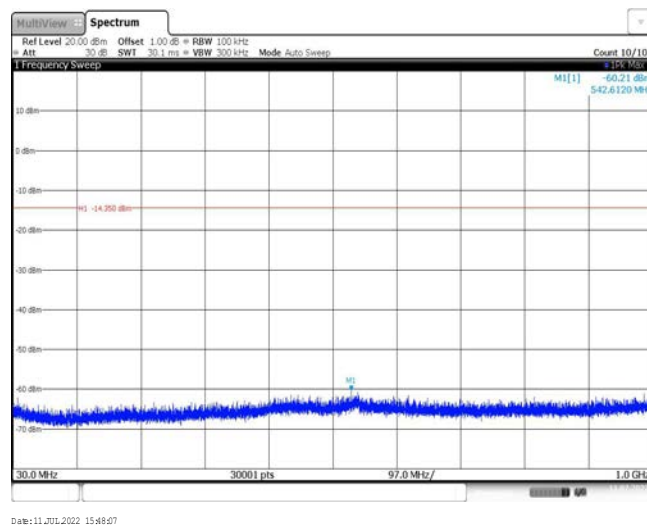
CH39
1GHz~26GHz



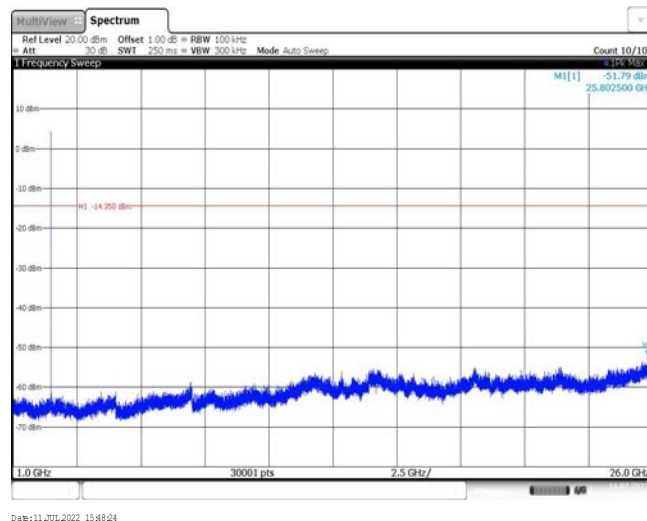
CH78
Reference level

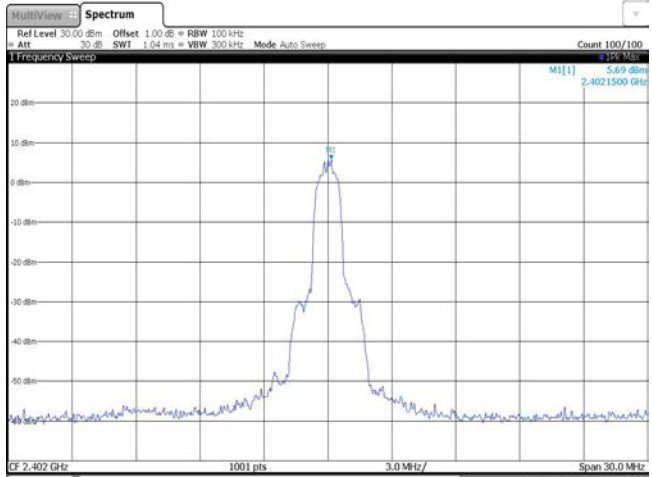
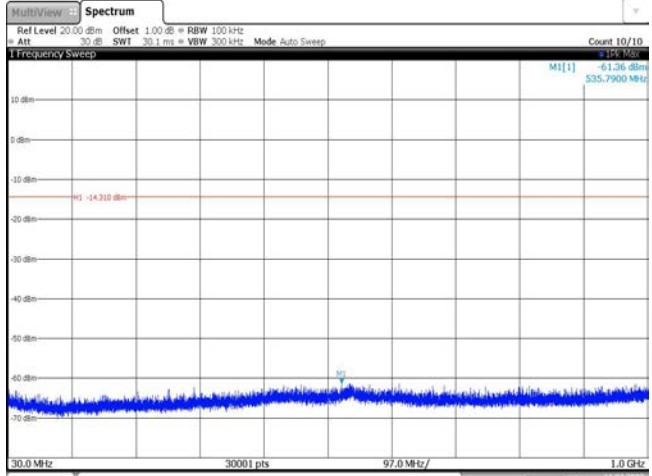
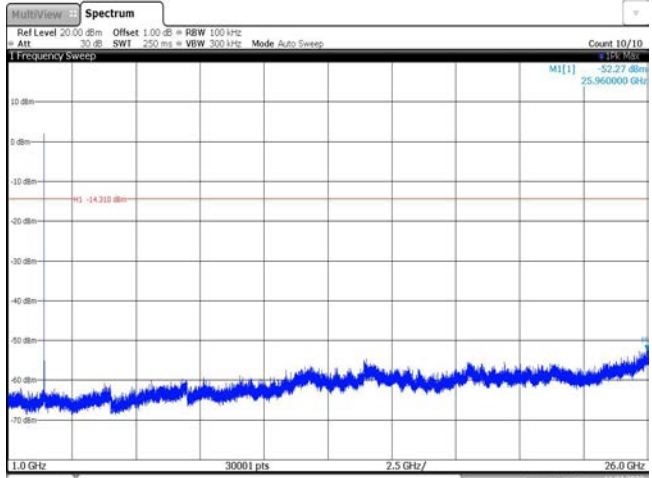


CH78
30MHz~1000MHz

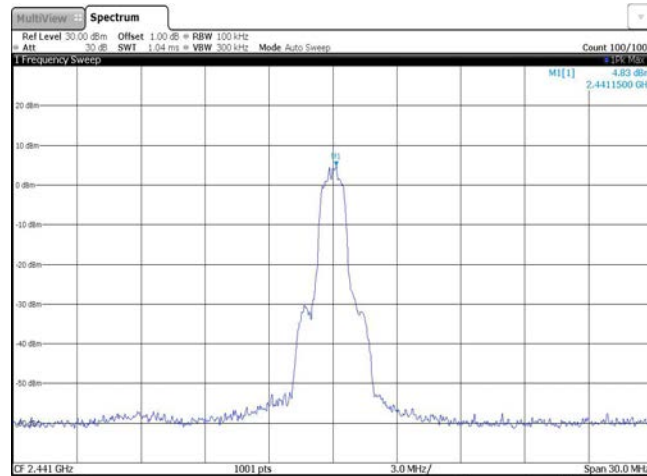


CH78
1GHz~26GHz



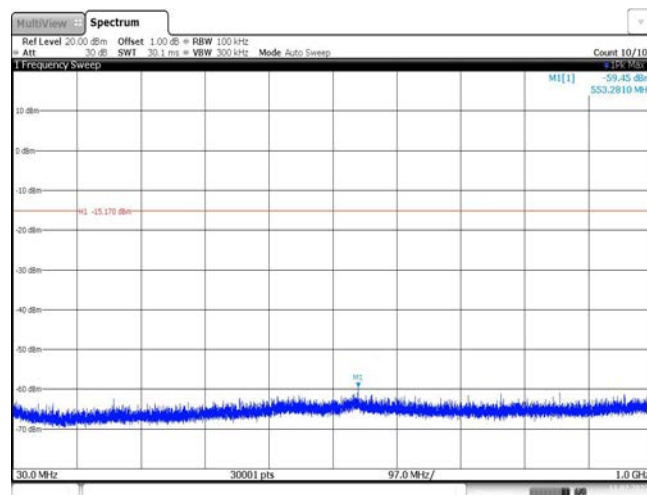
Test Item:	Spurious Emission	Modulation type:	$\pi/4$ DQPSK
CH00 Reference level	 Ref Level 30.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SWI 1.04 ms VBW 300 kHz Mode Auto Sweep Count 100/100 M1[1] 2.4021500 GHz M1[1] -5.69 dBm CF 2.402 GHz 1001 pts 3.0 MHz/ Span 30.0 MHz Date:11 JUL 2022 16:17:23		
CH00 30MHz~1000MHz	 Ref Level 20.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SWI 30.1 ms VBW 300 kHz Mode Auto Sweep Count 10/10 M1[1] -61.38 dBm M1[1] 535.7900 MHz M1 -43.10 dBm 30.0 MHz 30001 pts 97.0 MHz/ 1.0 GHz Date:11 JUL 2022 16:17:40		
CH00 1GHz~26GHz	 Ref Level 20.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SWI 250 ms VBW 300 kHz Mode Auto Sweep Count 10/10 M1[1] -52.27 dBm M1[1] 25.960000 GHz M1 -43.10 dBm 1.0 GHz 30001 pts 2.5 GHz/ 26.0 GHz Date:11 JUL 2022 16:17:57		

CH39
Reference level



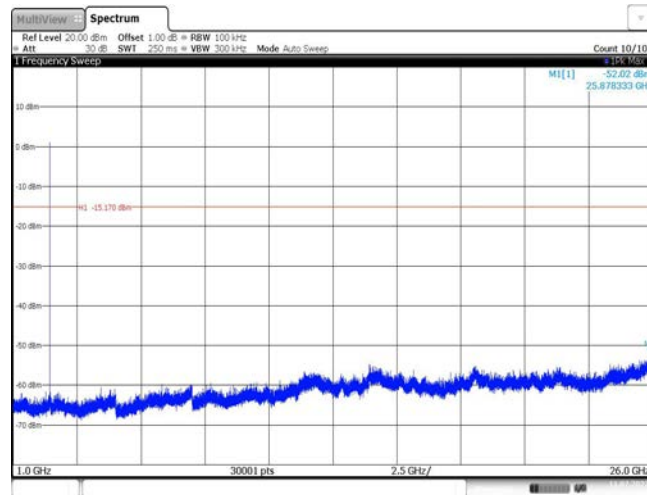
Date: 11 JUL 2022 16:19:27

CH39
30MHz~1000MHz



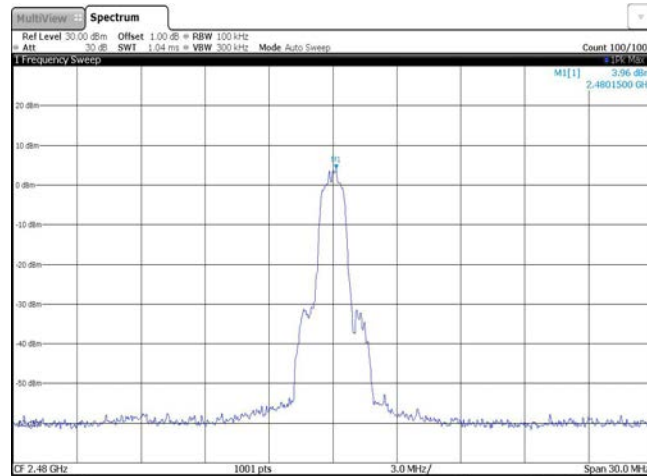
Date: 11 JUL 2022 16:19:45

CH39
1GHz~26GHz

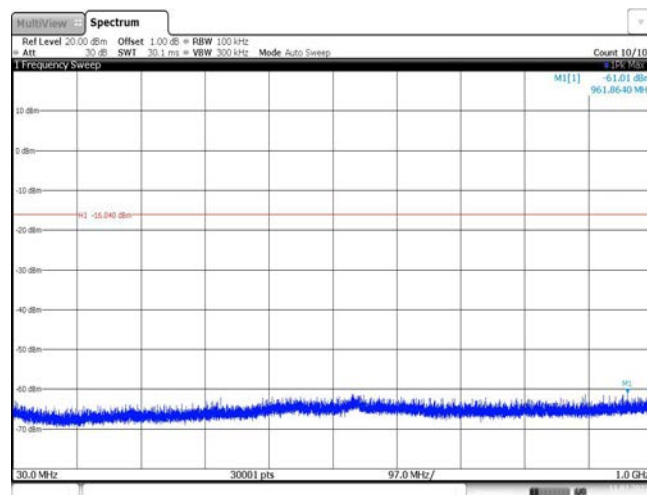


Date: 11 JUL 2022 16:20:04

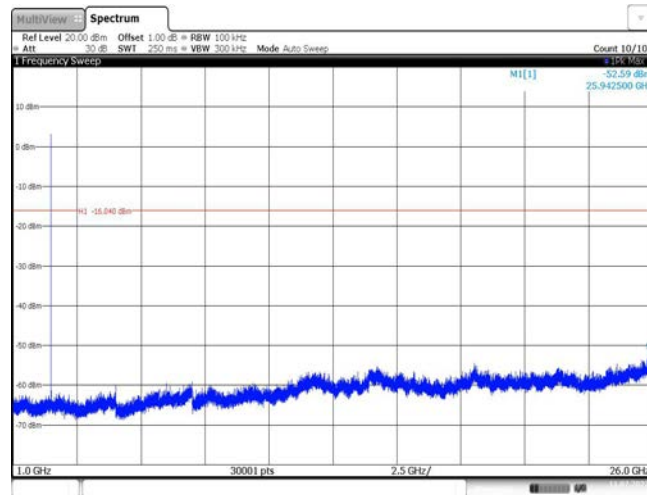
CH78
Reference level

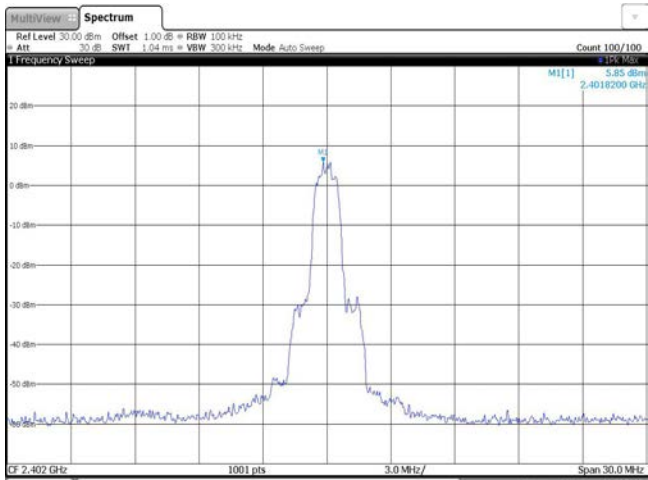
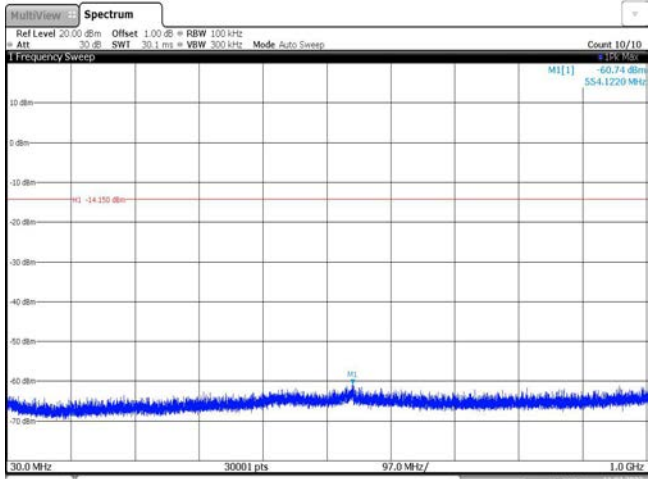
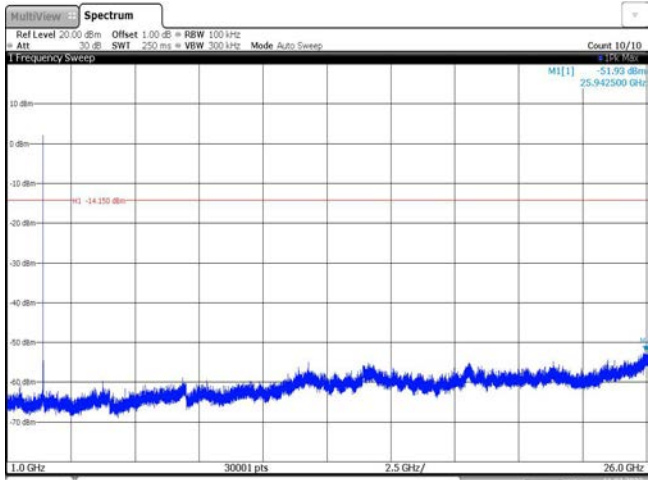


CH78
30MHz~1000MHz

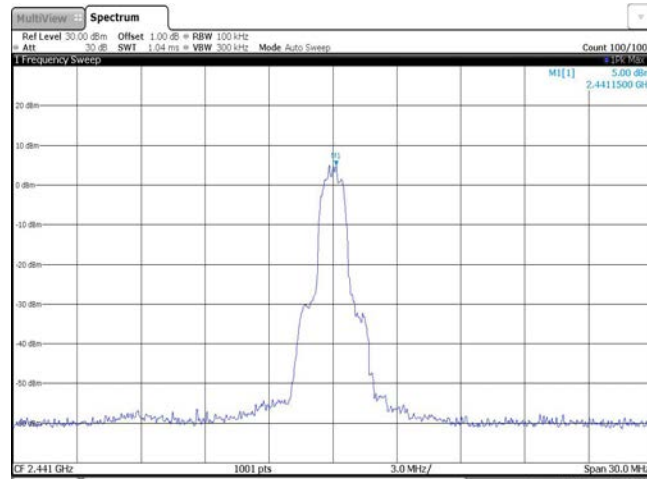


CH78
1GHz~26GHz



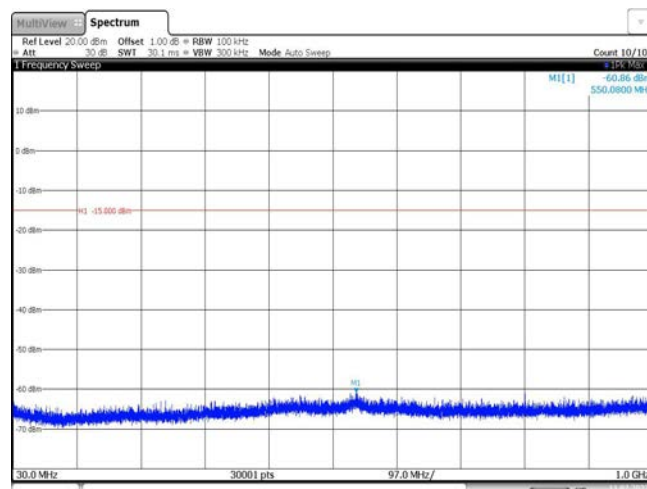
Test Item:	Spurious Emission	Modulation type:	8DPSK
CH00 Reference level	 Date: 11 JUL 2022 16:24:47		
CH00 30MHz~1000MHz	 Date: 11 JUL 2022 16:25:03		
CH00 1GHz~26GHz	 Date: 11 JUL 2022 16:25:22		

CH39
Reference level



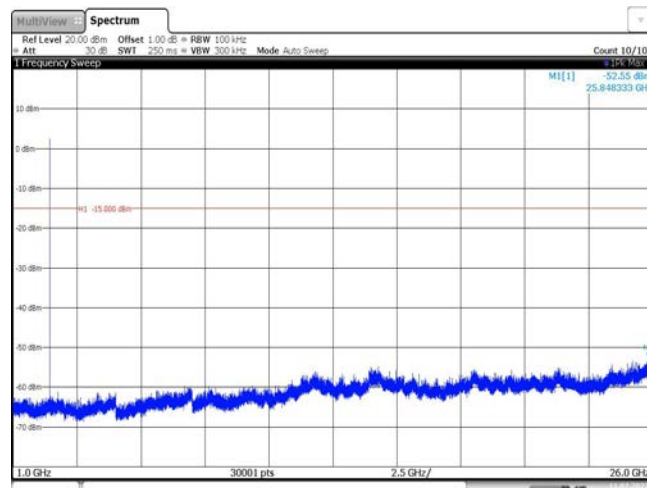
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CH39
30MHz~1000MHz

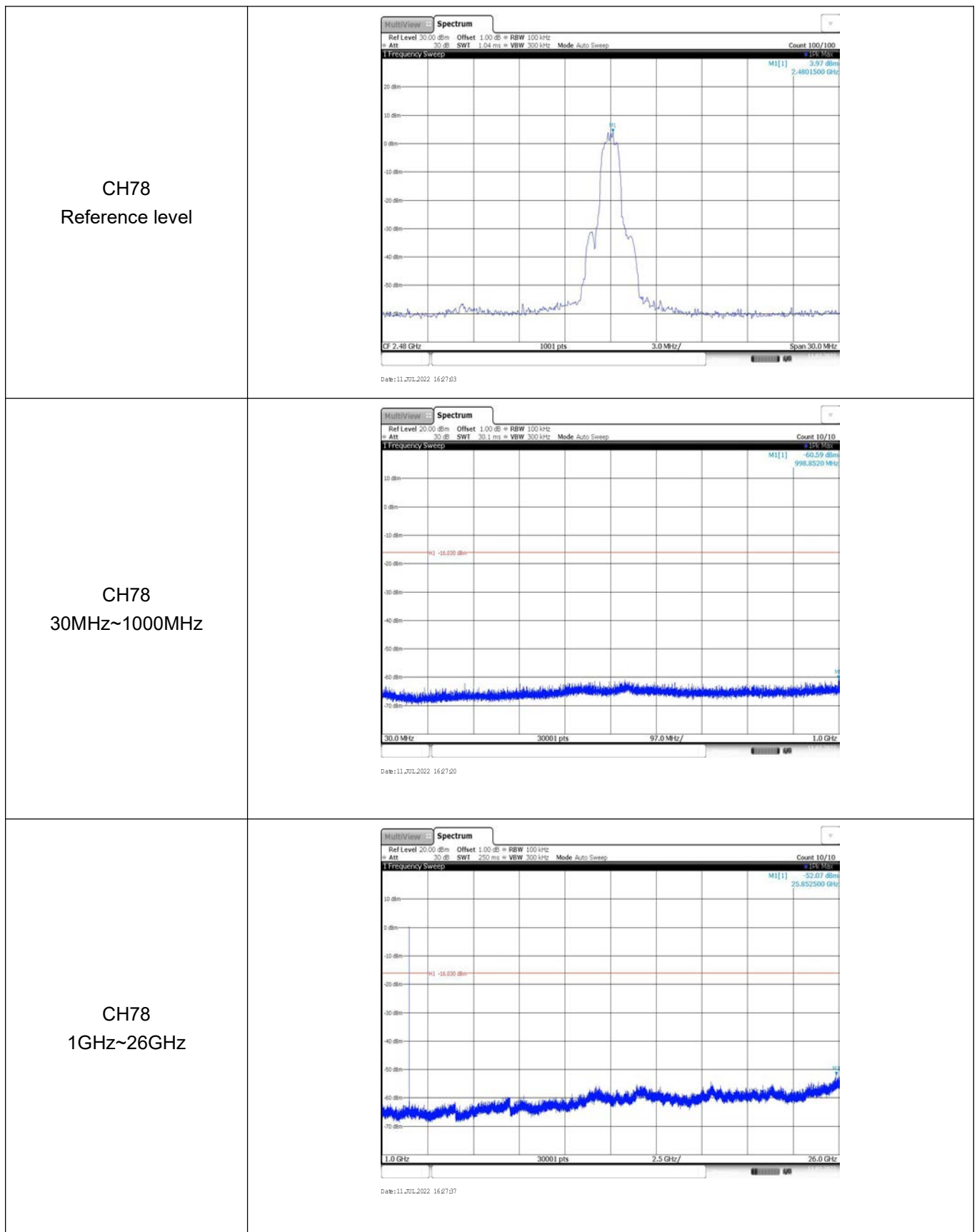


Date:11 JUL 2022 16:29:26

CH39
1GHz~26GHz



Date:11 JUL 2022 16:29:43



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