

APPENDIX REPORT

Project No.	SHT2109065202EW	Radio Specification	Bluetooth EDR
Test sample No.	YPHT21090652002	Model No.	AS8W
Start test date	2021-10-11	Finish date	2021-10-12
Temperature	25.8°C	Humidity	34%
Test Engineer	Xiaoqin Li	Auditor	Xiaodong Zheo

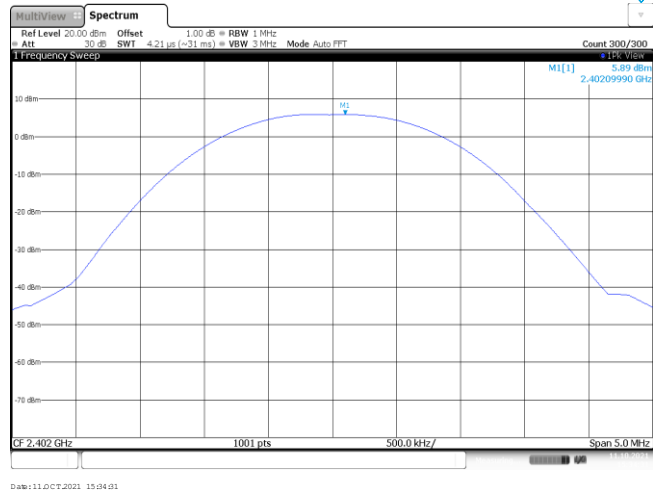
Appendix clause	Test item	Result
A	Peak Output Power	PASS
B	20 dB Bandwidth	PASS
C	99% Occupied Bandwidth	PASS
D	Carrier Frequencies Separation	PASS
E	Hopping Channel Number	PASS
F	Dwell Time	PASS
G	Duty Cycle Correction Factor (DCCF)	PASS
H	Band edge and Spurious Emissions(coducted)	PASS

Appendix A: Peak Output Power

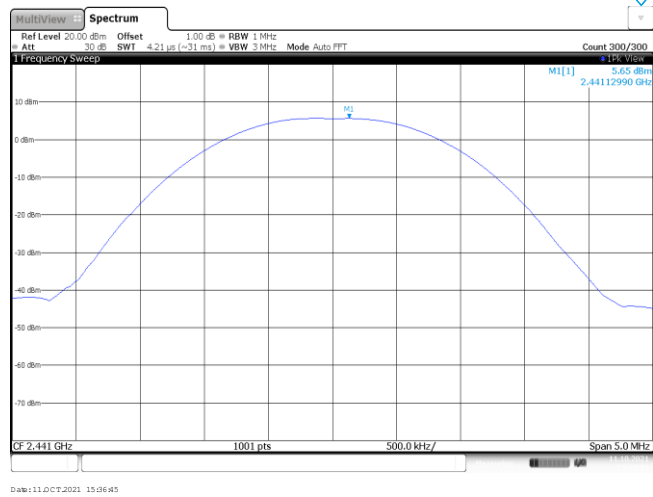
Modulation type	Channel	Peak Output power (dBm)	Average Output power (dBm)	Limit (dBm)	Result
GFSK	00	5.89	3.70	≤ 30.00	Pass
	39	5.65	3.00		
	78	5.16	2.96		
π/4DQPSK	00	7.84	4.80	≤ 21.00	Pass
	39	7.49	4.44		
	78	7.05	3.96		
8DPSK	00	8.04	4.94	≤ 21.00	Pass
	39	7.62	4.60		
	78	7.16	4.16		

Modulation Type: GFSK

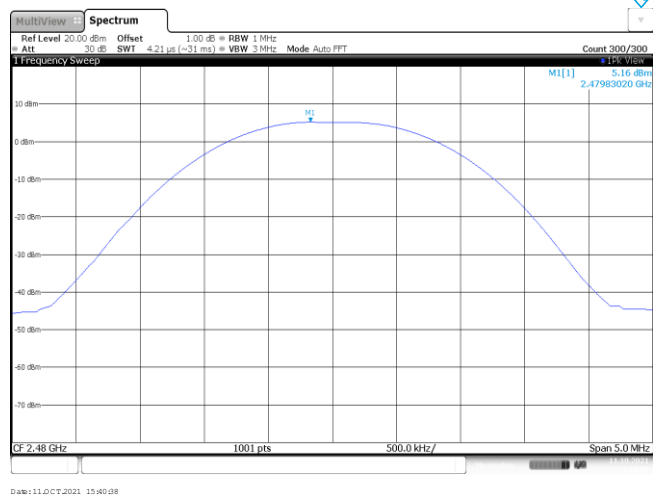
CH00



CH39

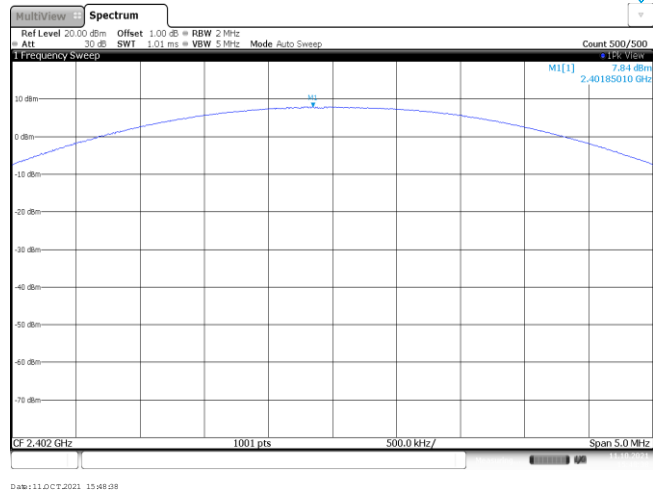


CH78

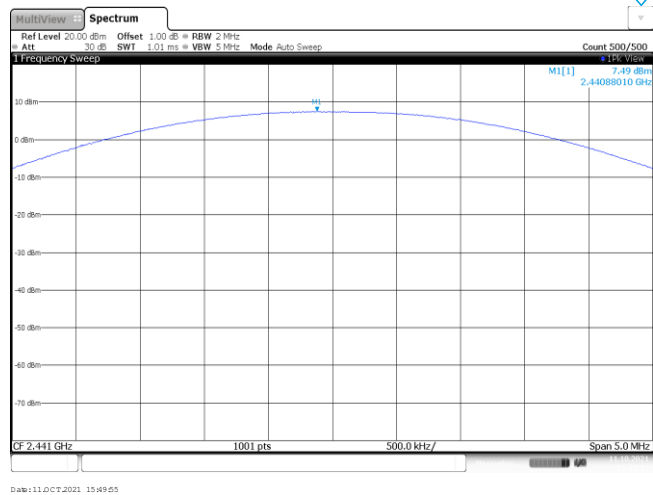


Modulation Type: $\pi/4$ DQPSK

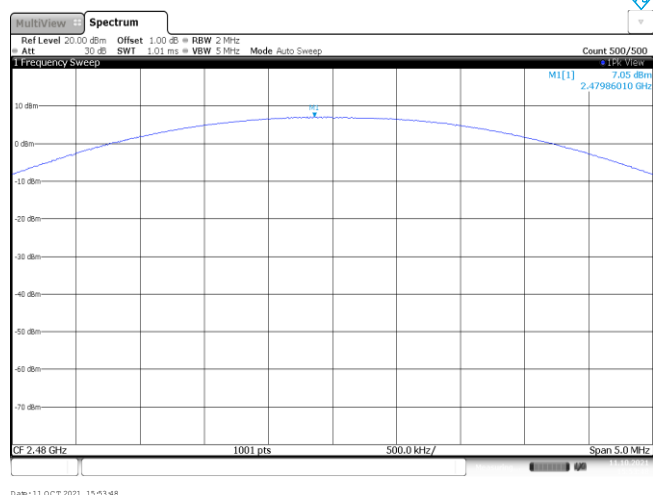
CH00



CH39



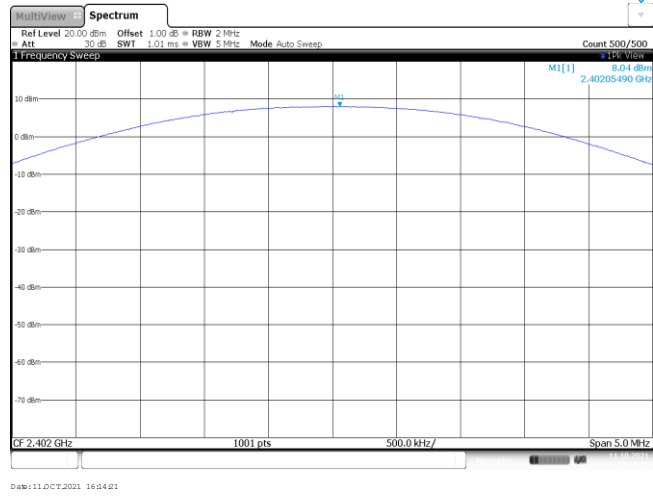
CH78



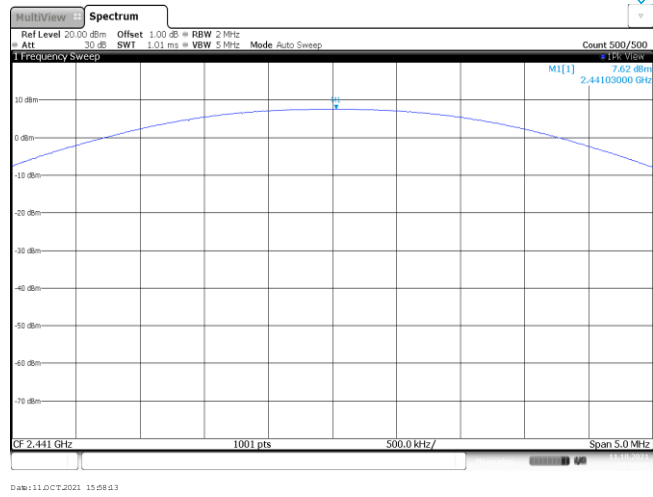
Modulation Type:

8DPSK

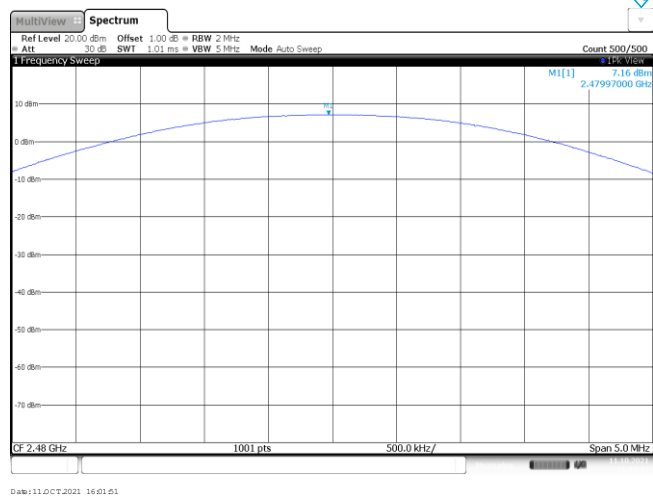
CH00



CH39



CH78

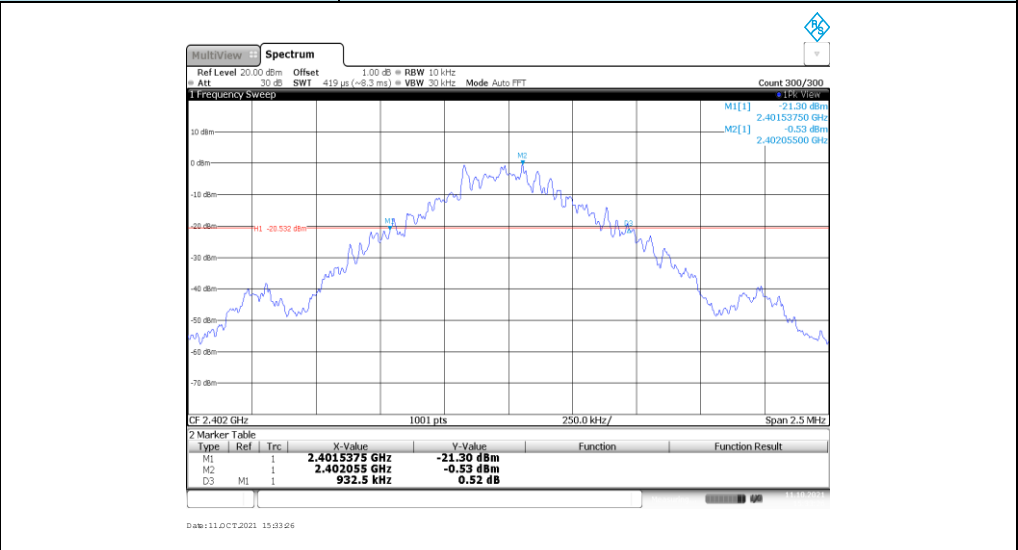


Appendix B : 20 dB Bandwidth

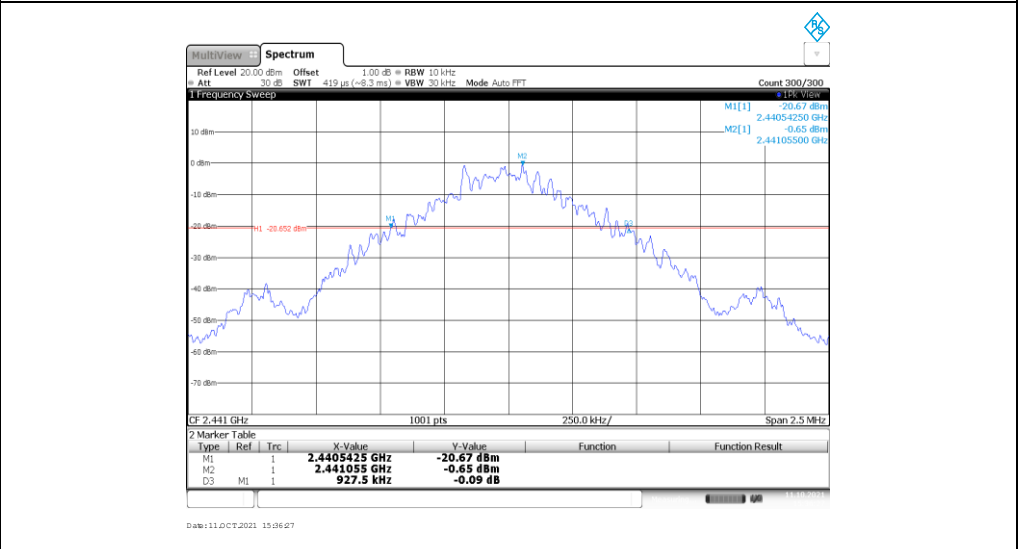
Modulation type	Channel	20 dB Bandwidth (kHz)	Limit (kHz)	Result
GFSK	00	932.50	-	Pass
	39	927.50		
	78	927.50		
$\pi/4$ DQPSK	00	1327.50	-	Pass
	39	1327.50		
	78	1327.50		
8DPSK	00	1302.50	-	Pass
	39	1307.50		
	78	1305.00		

Modulation Type: GFSK

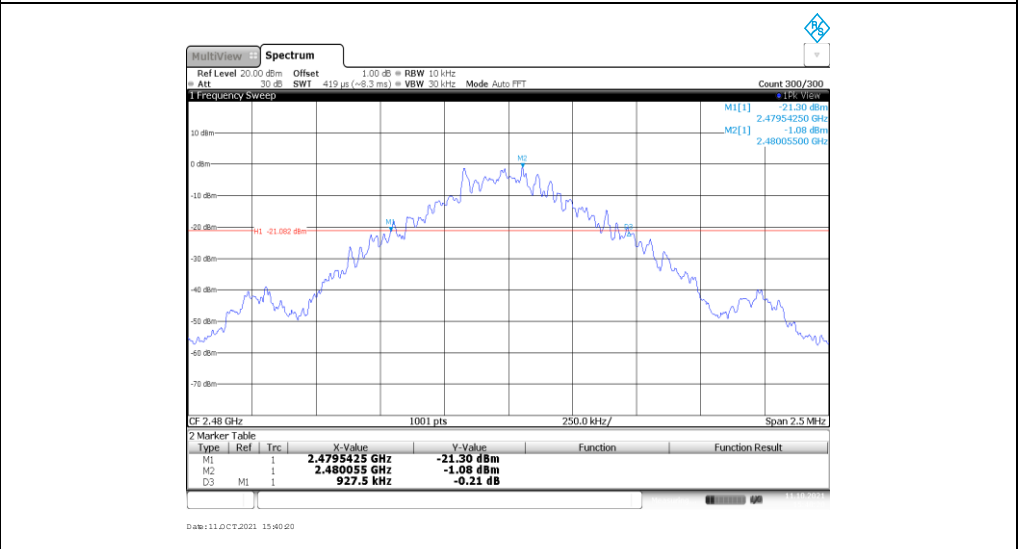
CH00



CH39



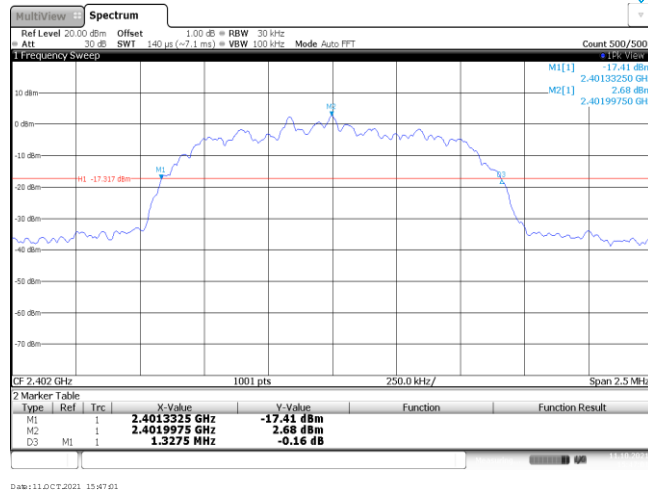
CH78



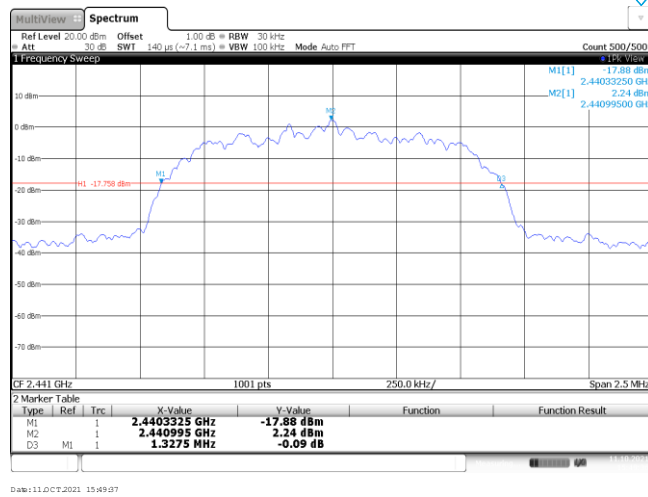
Modulation Type:

$\pi/4$ DQPSK

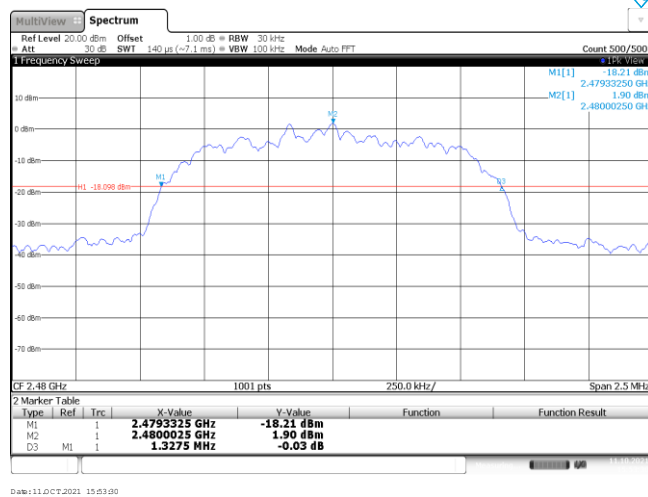
CH00



CH39

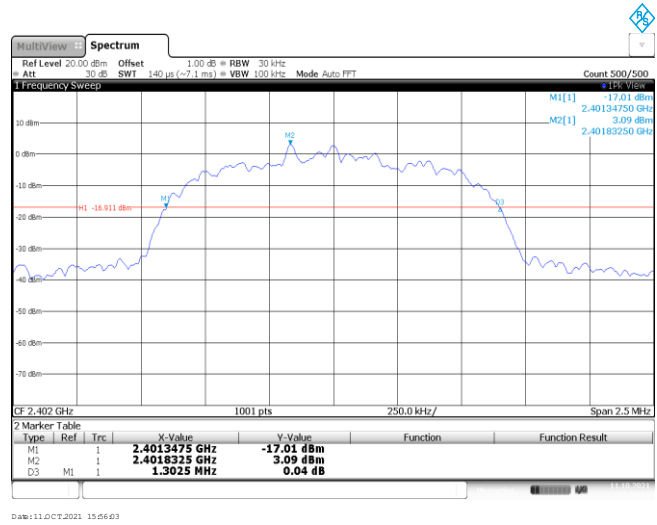


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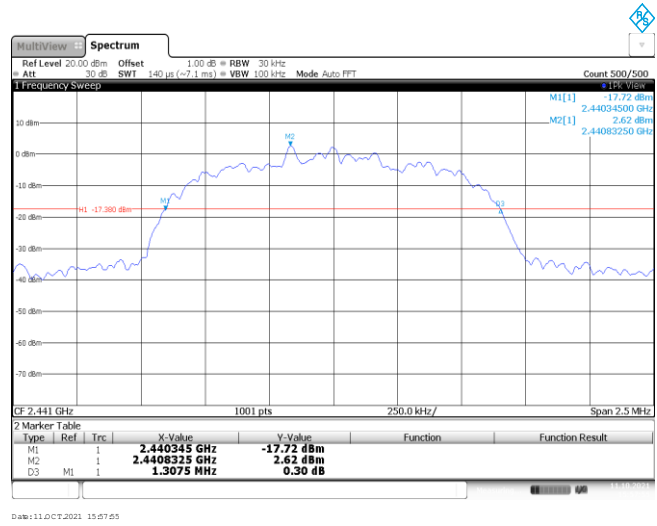


Modulation Type: 8DPSK

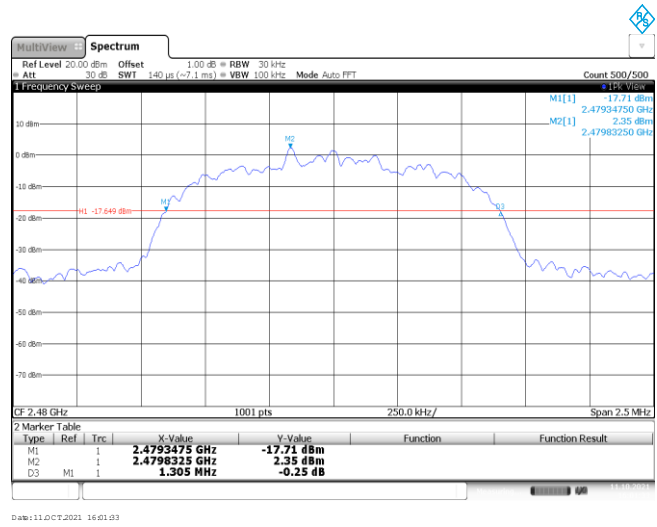
CH00



CH39



CH78

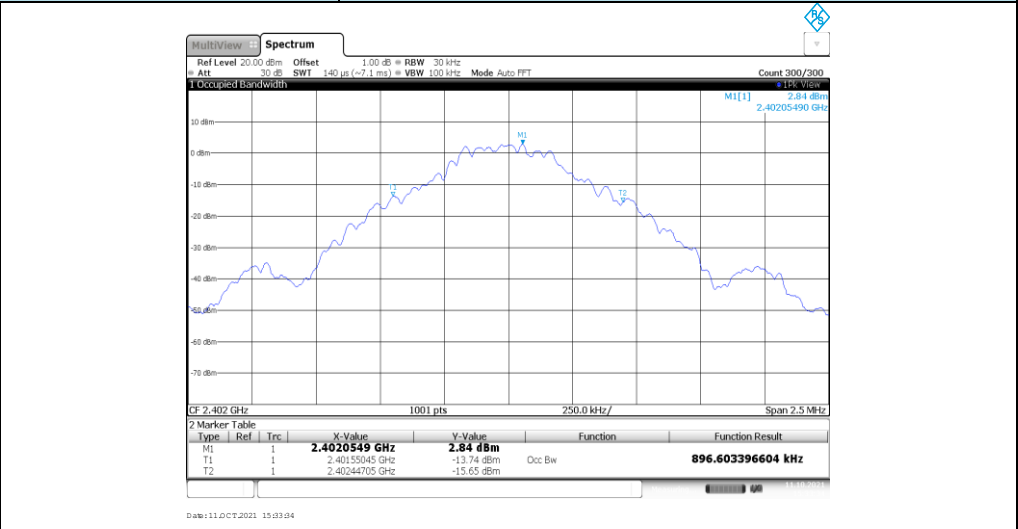


Appendix C: 99% Occupied Bandwidth

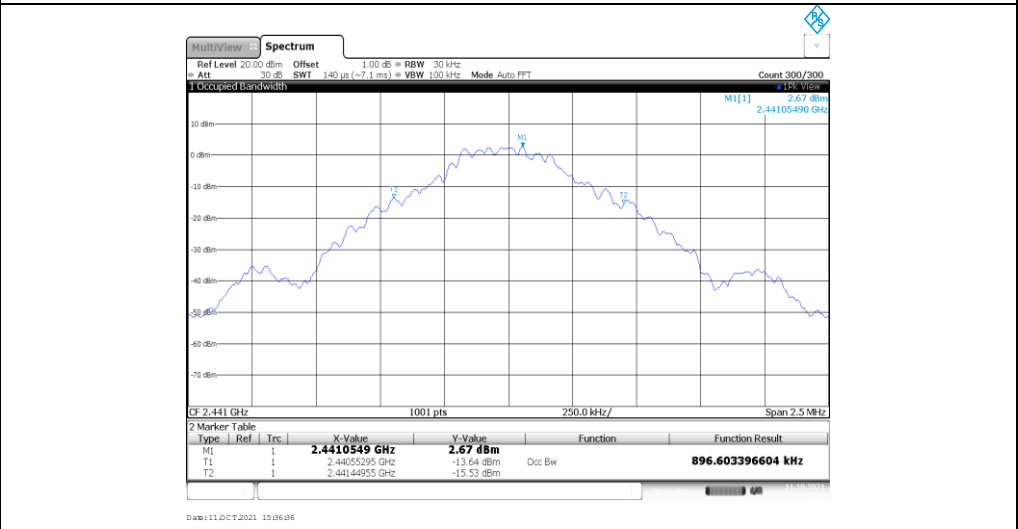
Modulation type	Channel	99% Occupied Bandwidth (MHz)	Limit (MHz)	Result
GFSK	00	0.90	-	Pass
	39	0.90		
	78	0.90		
$\pi/4$ DQPSK	00	1.19	-	Pass
	39	1.19		
	78	1.19		
8DPSK	00	1.19	-	Pass
	39	1.19		
	78	1.19		

Modulation Type: GFSK

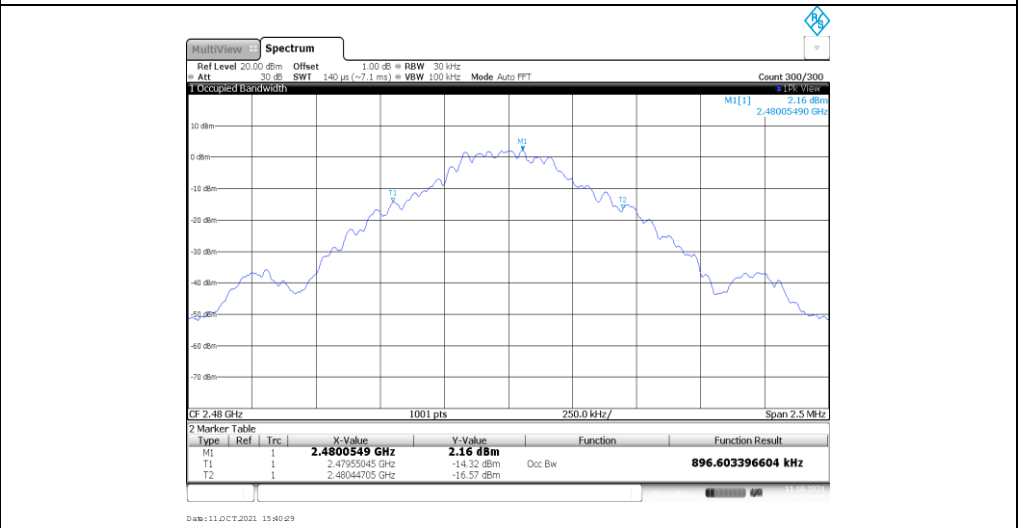
CH00



CH39

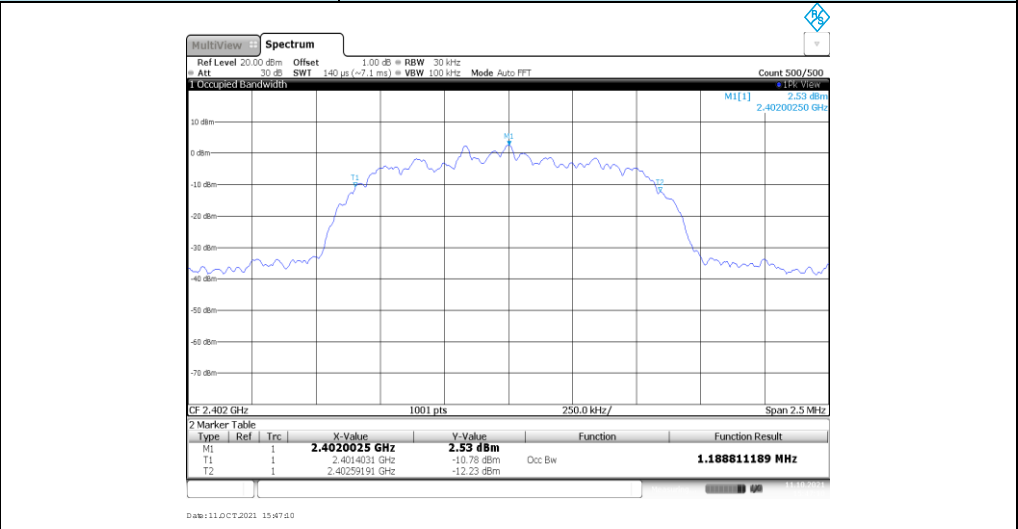


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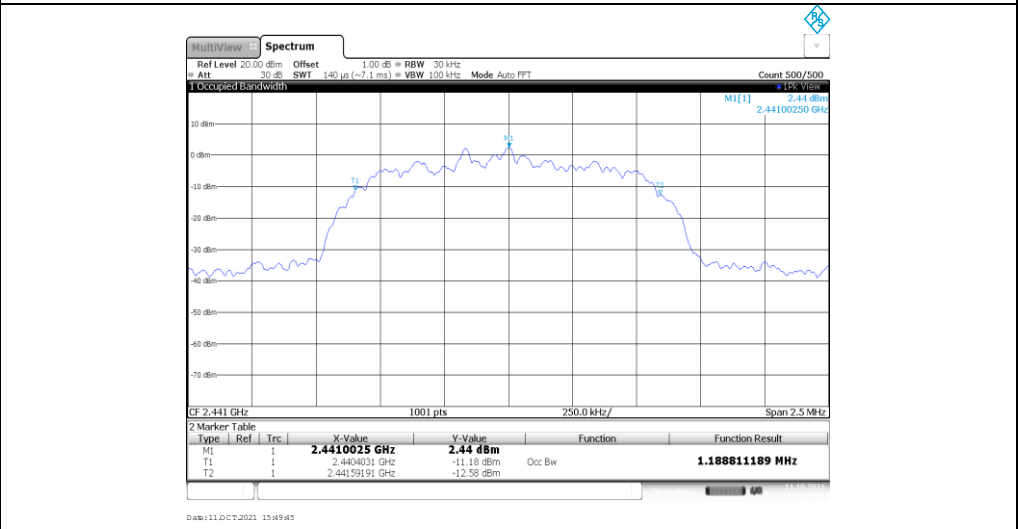


Modulation Type: $\pi/4$ DQPSK

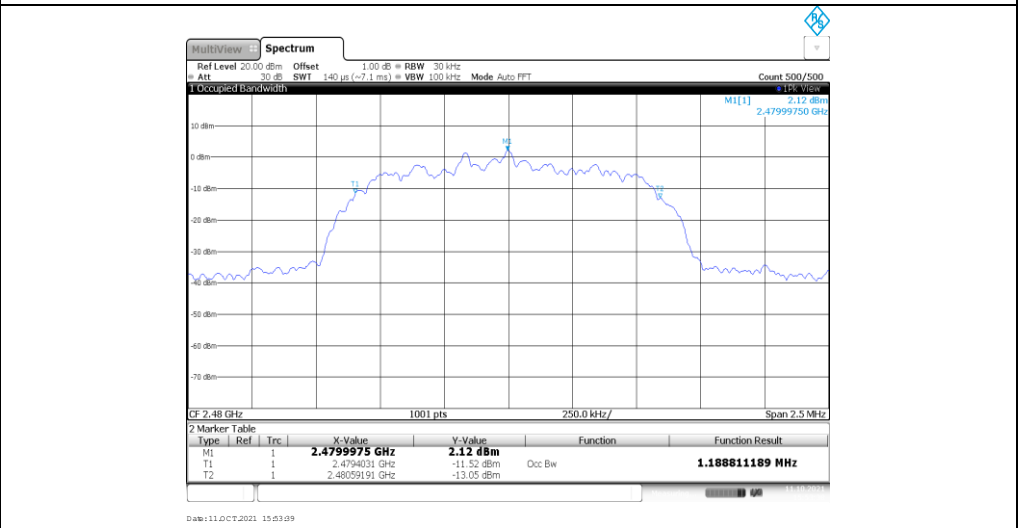
CH00



CH39

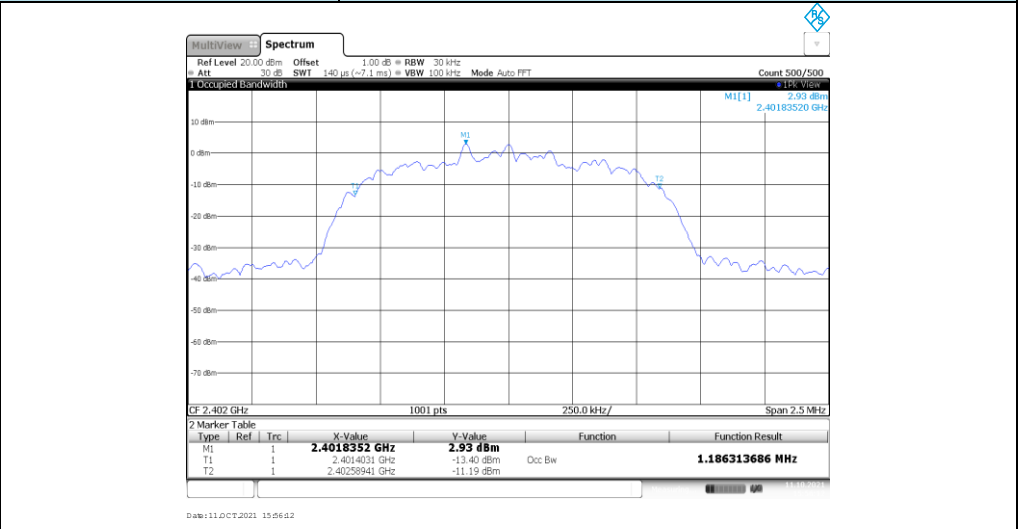


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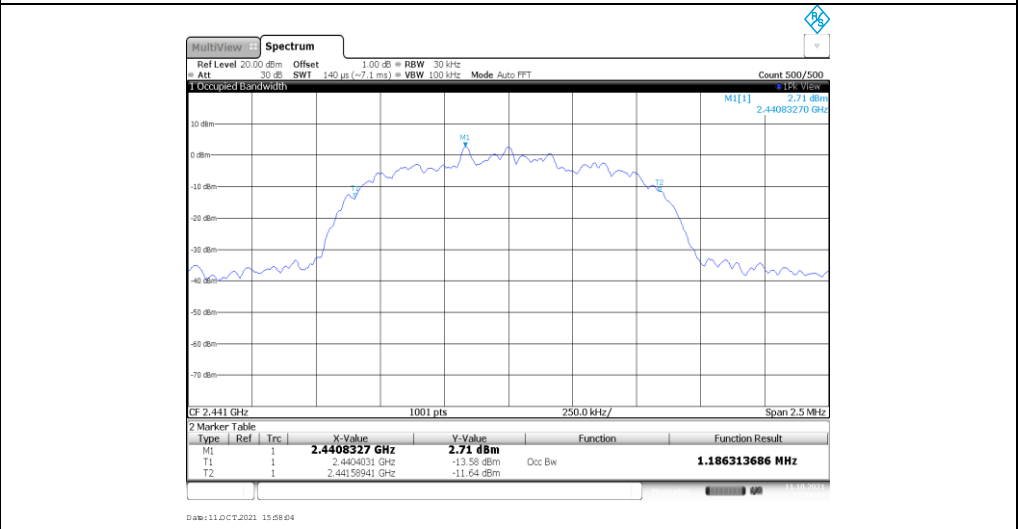


Modulation Type: 8DPSK

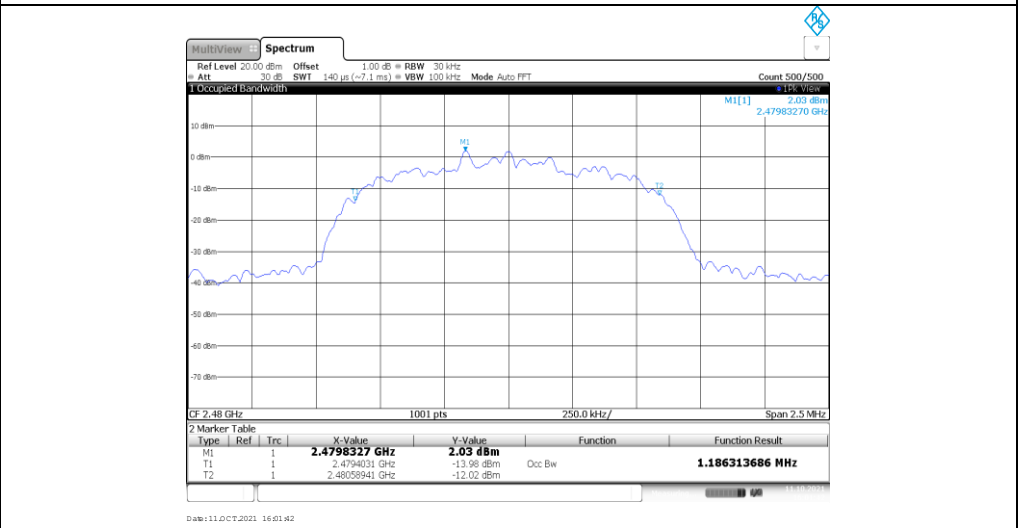
CH00



CH39



CH78



Appendix D: Carrier Frequencies Separation

Modulation type	Channel	Carrier Frequencies Separation (MHz)	Limit (kHz) *	Result
GFSK	39	1.00	≥932.50	Pass
$\pi/4$ DQPSK	39	1.00	≥885.00	Pass
8DPSK	39	1.00	≥871.67	Pass

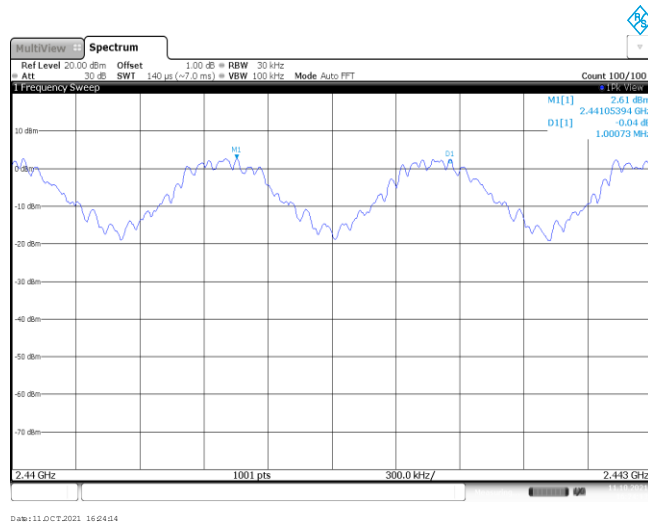
Note:

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

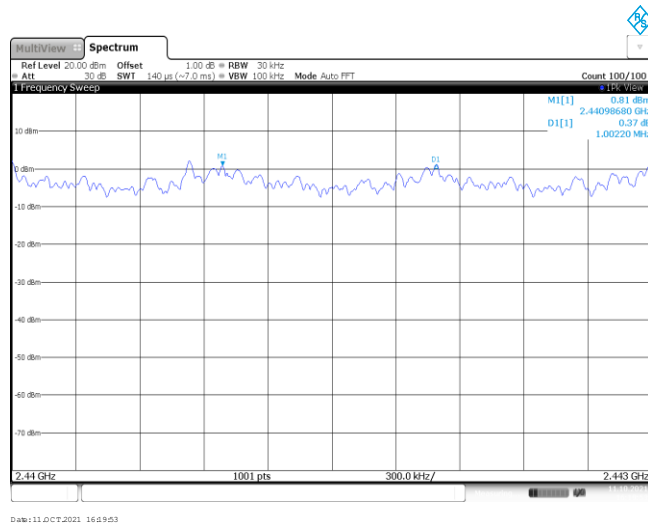
$\pi/4$ DQPSK limit = $2/3$ * The maximum 20 dB Bandwidth for $\pi/4$ DQPSK modulation on the appendix B.

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

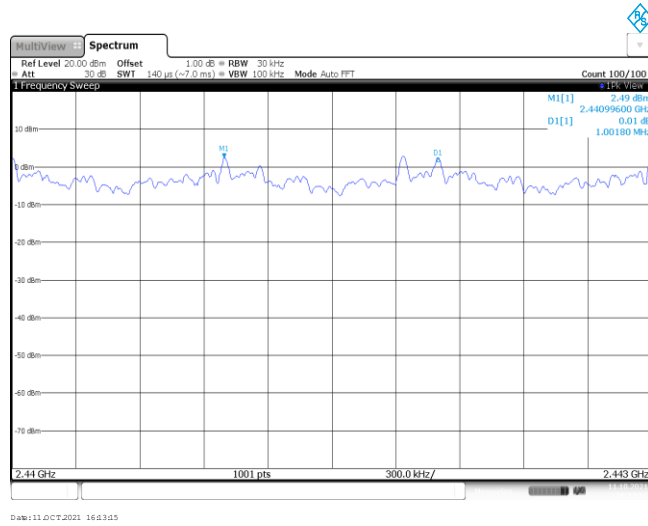
GFSK



$\pi/4$ DQPSK



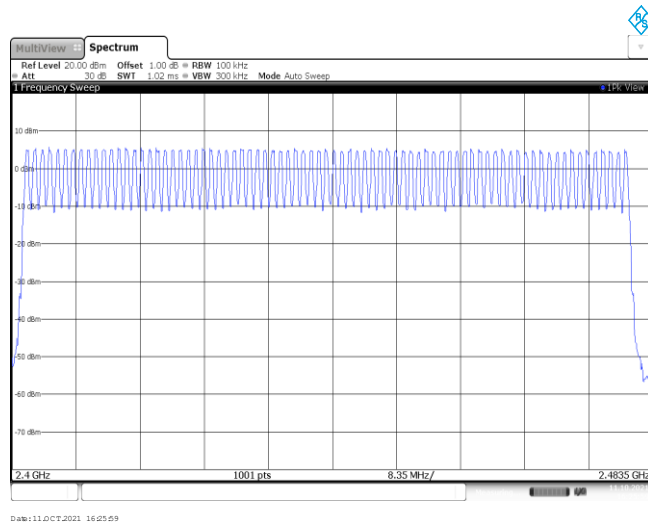
8DPSK



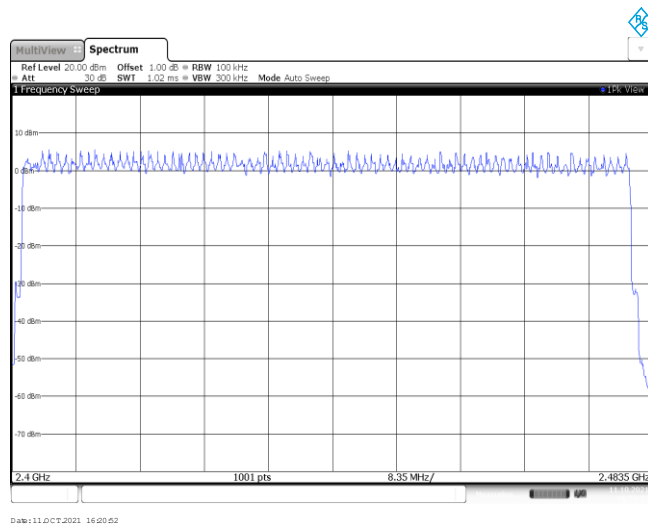
Appendix E: Hopping Channel Number

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

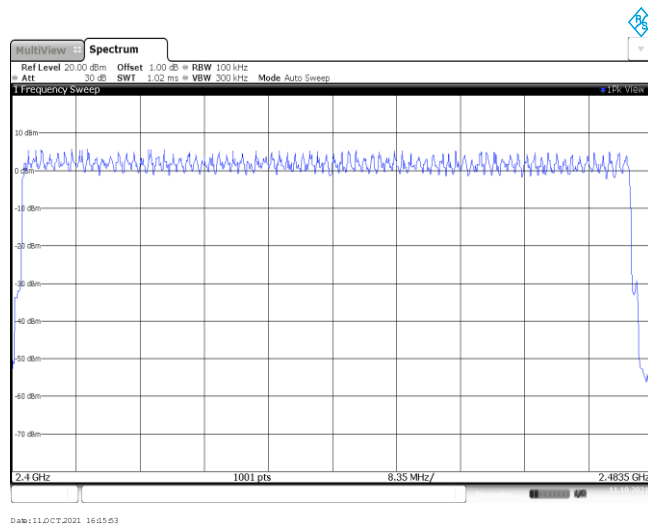
GFSK



$\pi/4$ DQPSK



8DPSK

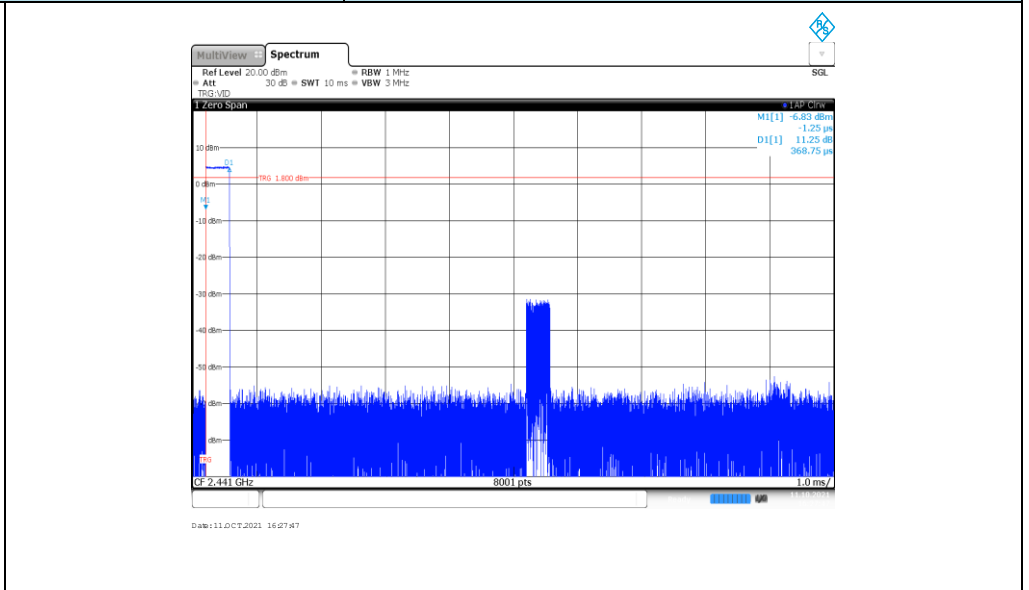


Appendix F: Dwell Time

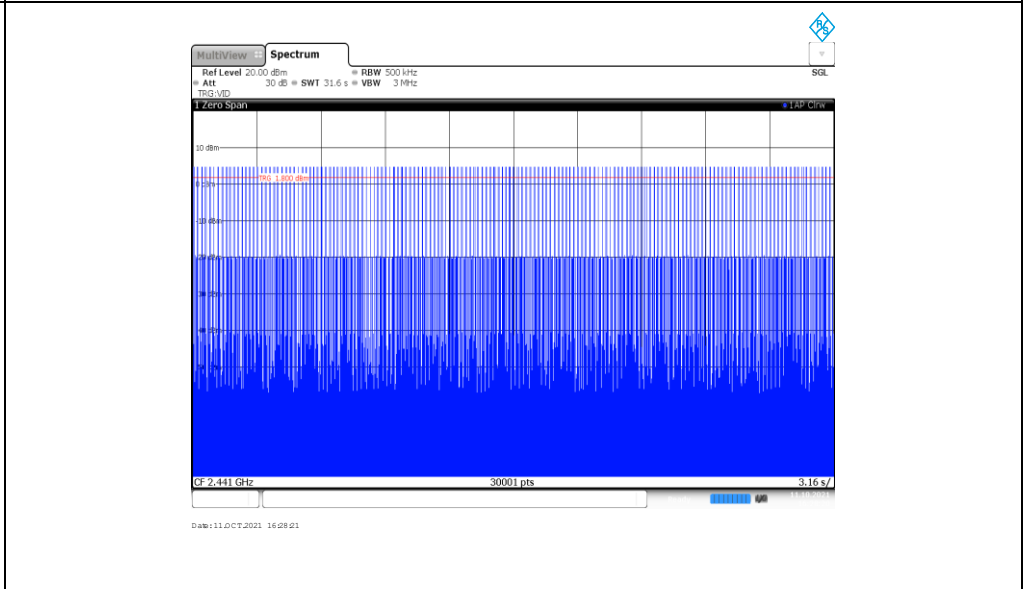
Modulation type	Packet	Burst Width [ms]	Total Hops[hop*ch]	Dwell time (Second)	Limit (Second)	Result
GFSK	DH1	0.37	320	0.12	≤ 0.40	Pass
	DH3	1.62	160	0.26		
	DH5	2.87	105	0.30		
π/4DQPSK	2DH1	0.38	320	0.12	≤ 0.40	Pass
	2DH3	1.63	157	0.26		
	2DH5	2.88	119	0.34		
8DPSK	3DH1	0.38	320	0.12	≤ 0.40	Pass
	3DH3	1.63	157	0.26		
	3DH5	2.88	111	0.32		

Modulation Type: GFSK

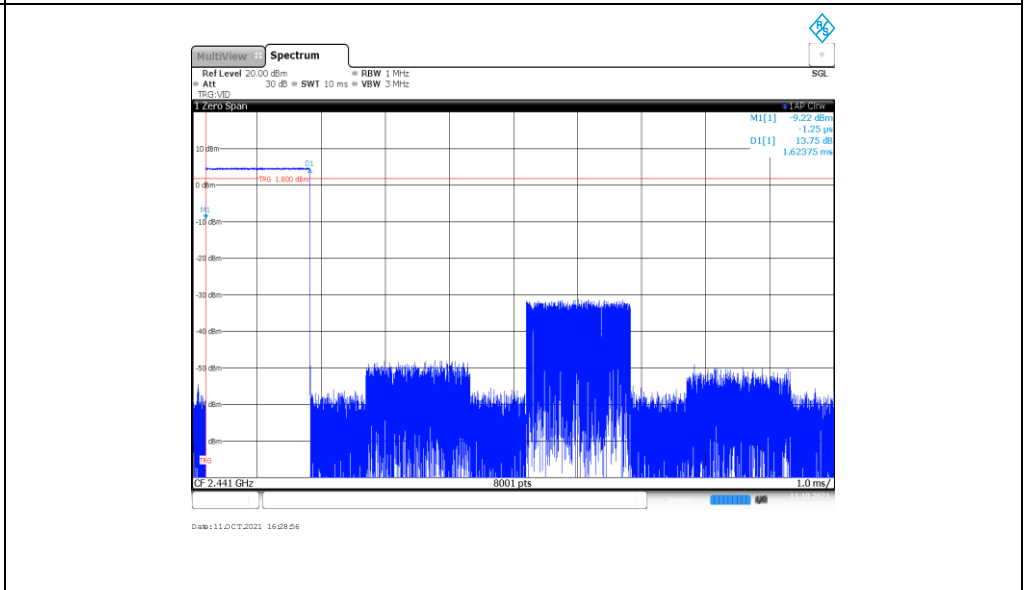
DH1
Burst width



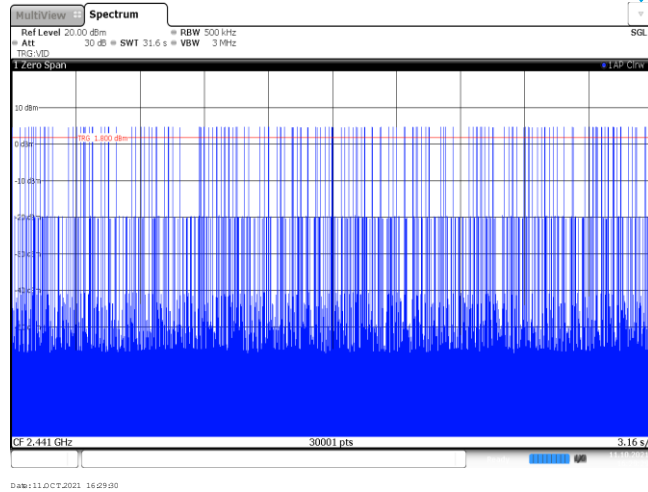
DH1
Burst number



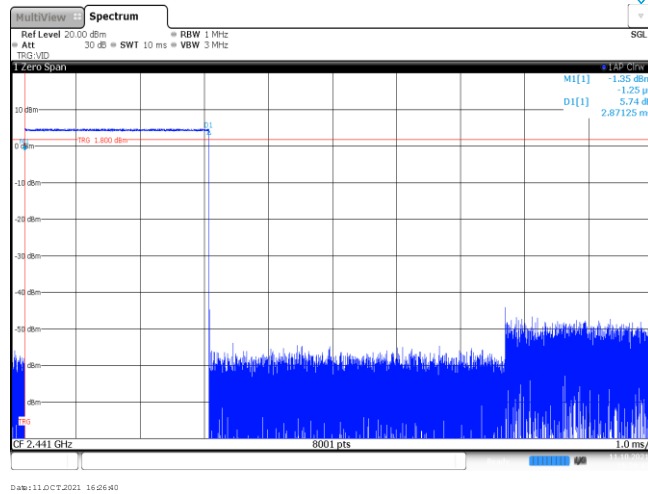
DH3
Burst width



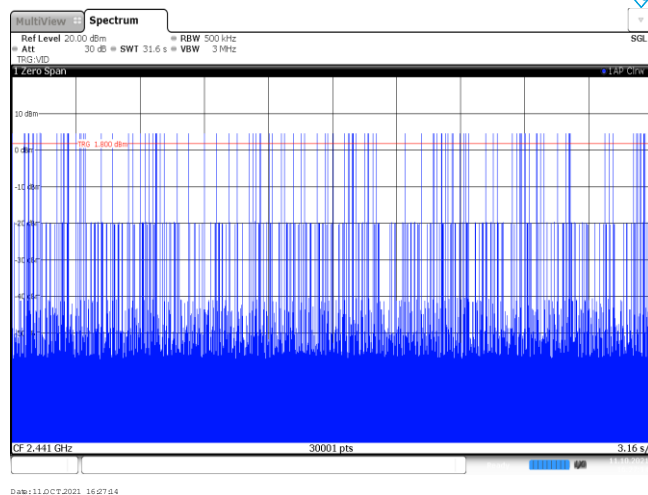
DH3
Burst number



DH5
Burst width

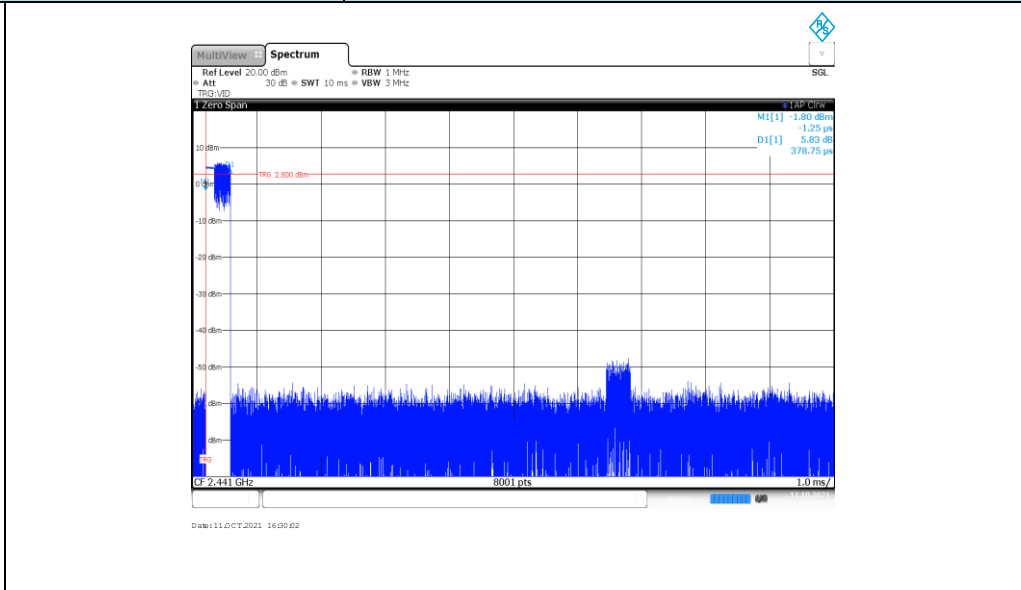


DH5
Burst number

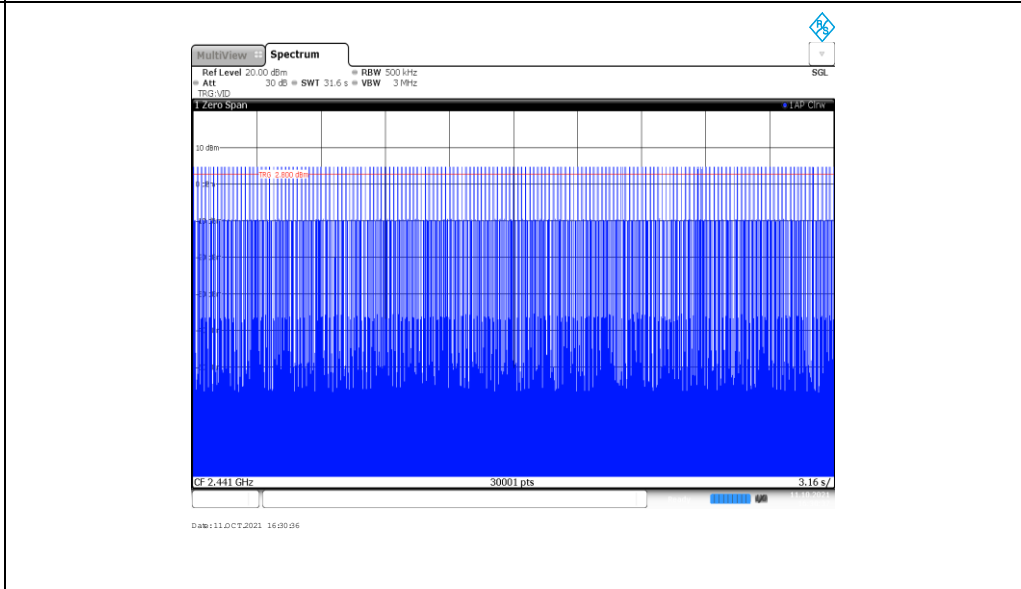


Modulation Type: $\pi/4$ DQPSK

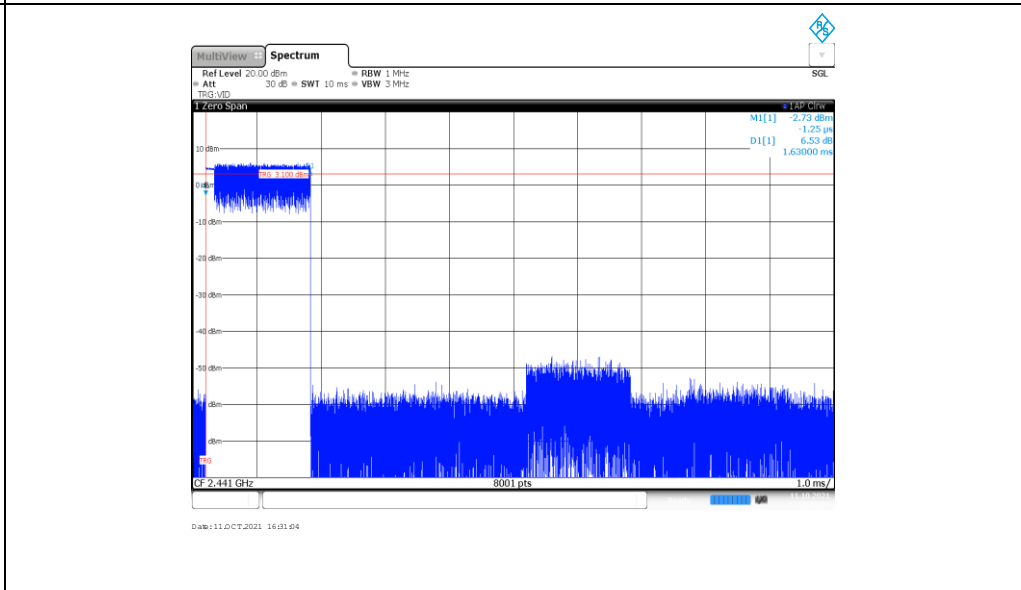
2DH1
Burst width



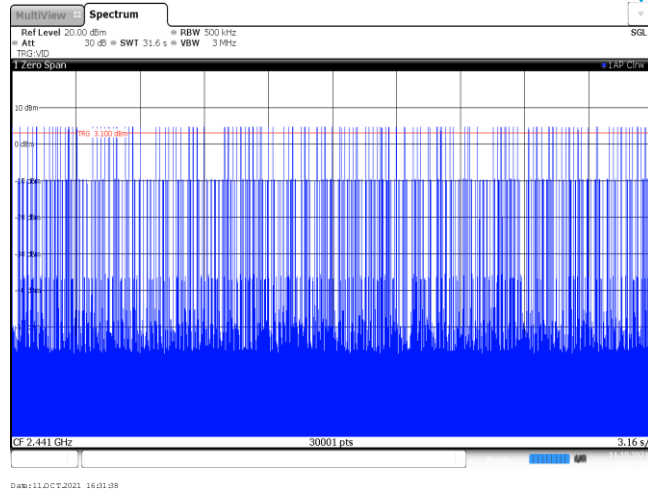
2DH1
Burst number



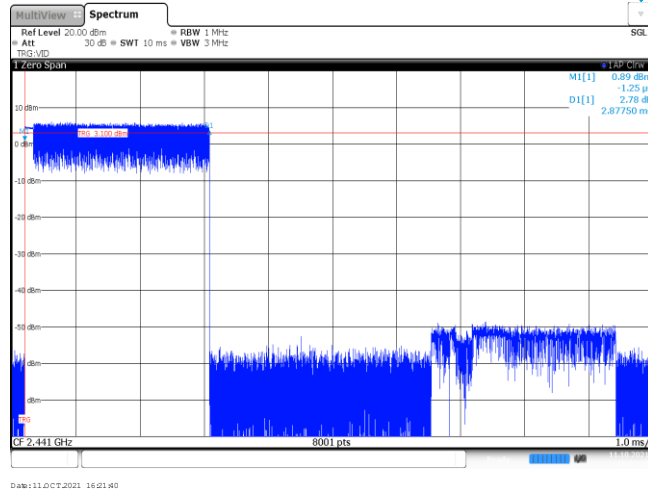
2DH3
Burst width



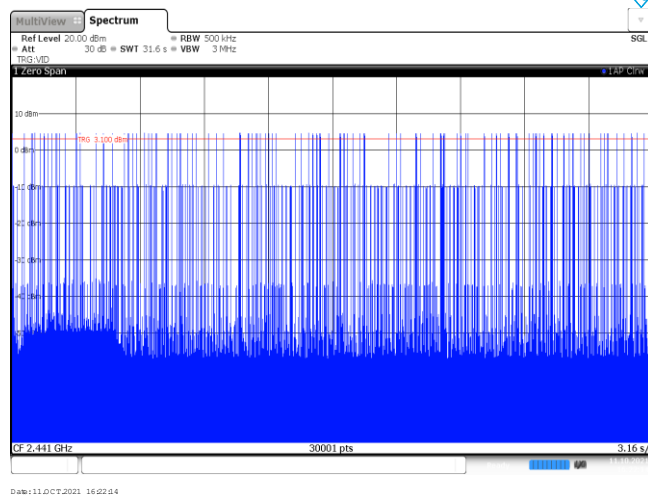
2DH3
Burst number



2DH5
Burst width

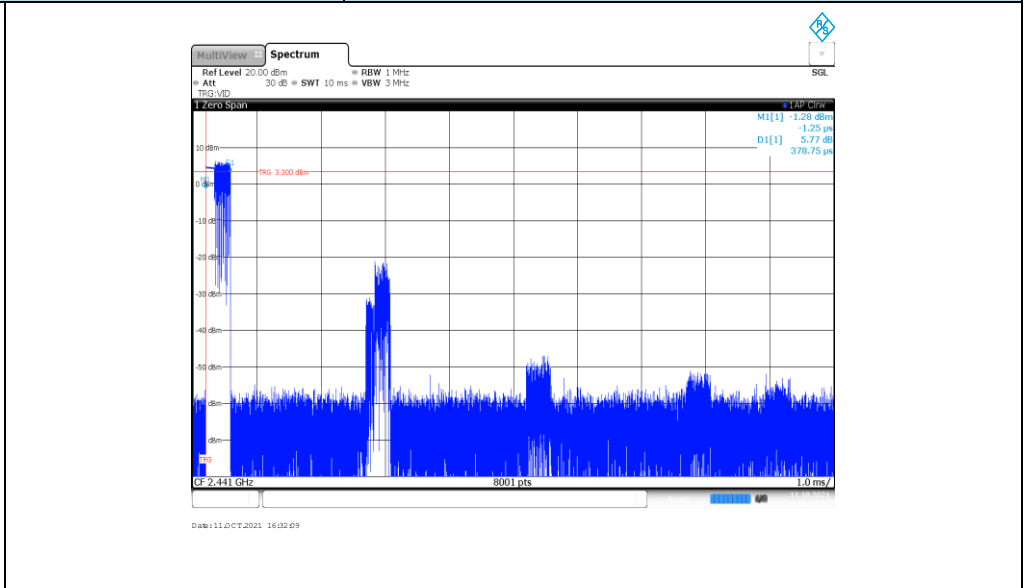


2DH5
Burst number

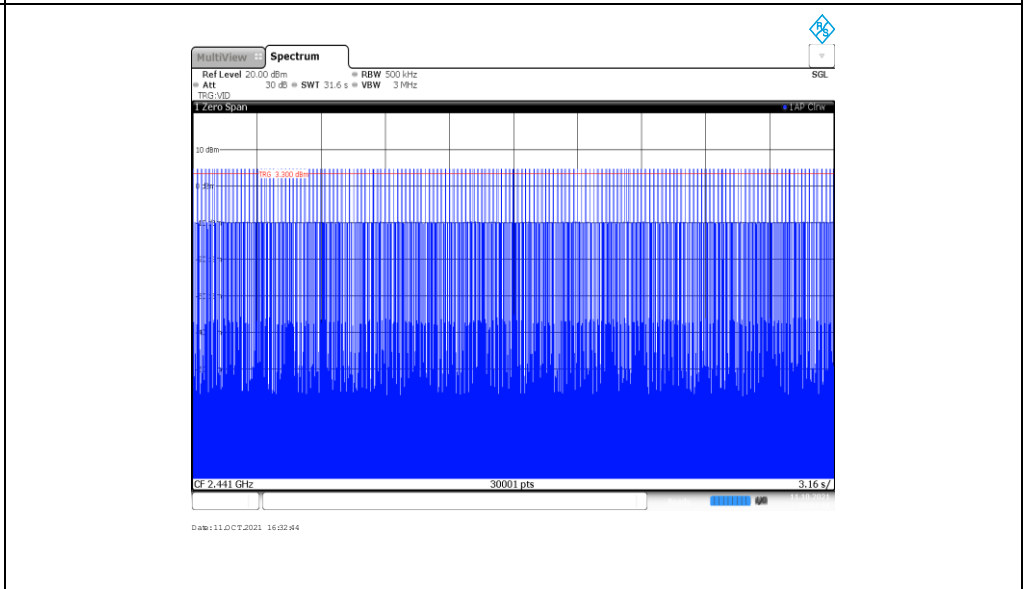


Modulation Type: 8DPSK

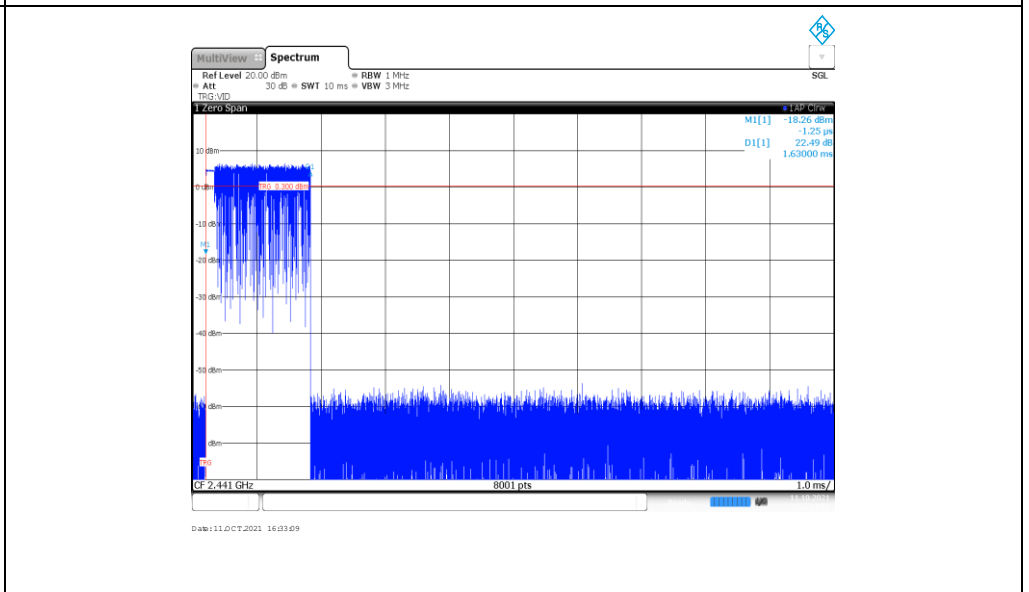
3DH1
Burst width



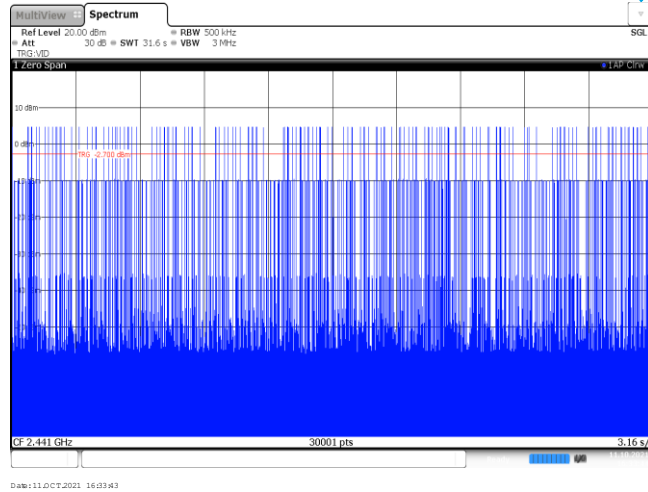
3DH1
Burst number



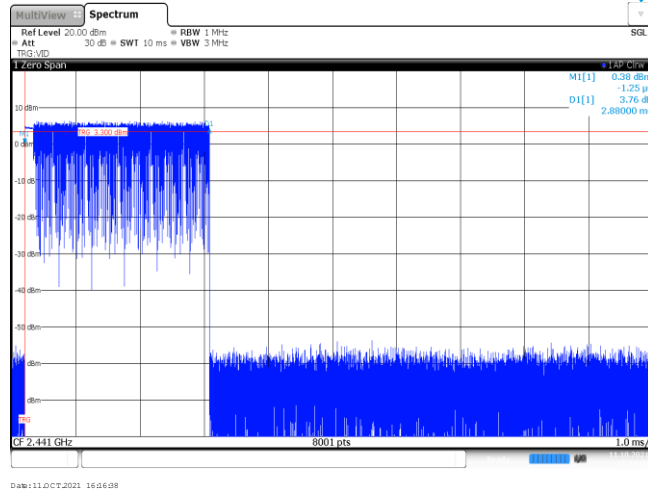
3DH3
Burst width



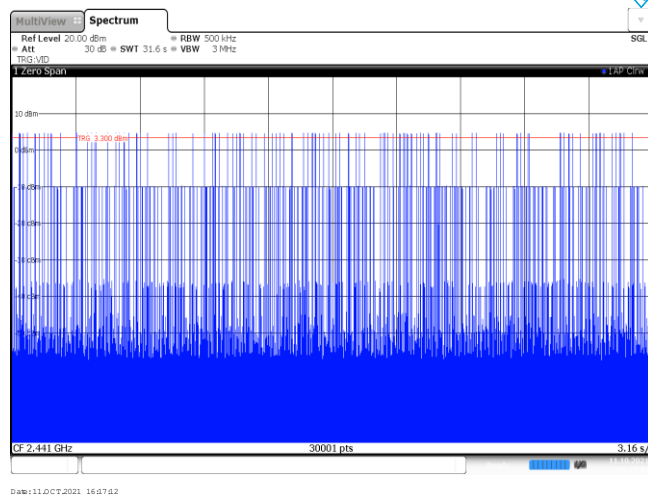
3DH3
Burst number



3DH5
Burst width



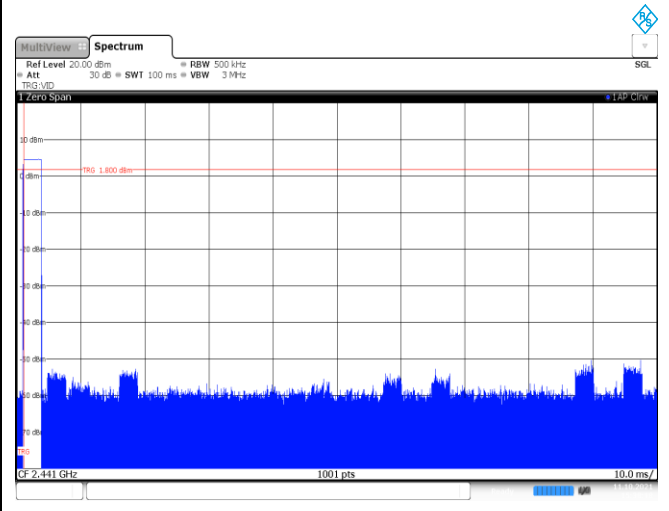
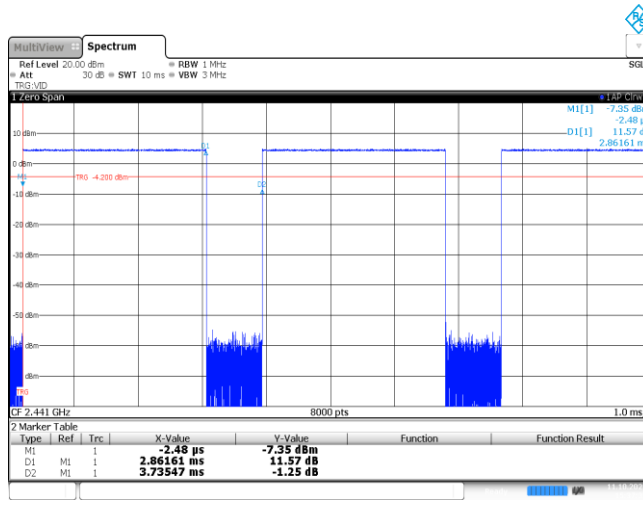
3DH5
Burst number



Appendix G: Duty Cycle Correction Factor (DCCF)

DCCF Calculate Formula					
DCCF=20 * Log(duty cycle) = 20 * Log($T_{on\ time} / T_{period}$)					
Modulation type	Test Frequency (MHz)	$T_{on\ time}$ for single burst [ms]	T_{period} [ms]	Burst Quantity	DCCF [dB]
GFSK	2441	2.86	100	1	-30.87
$\pi/4$ DQPSK	2441	2.87	100	1	-30.84
8DPSK	2441	2.87	100	1	-30.84

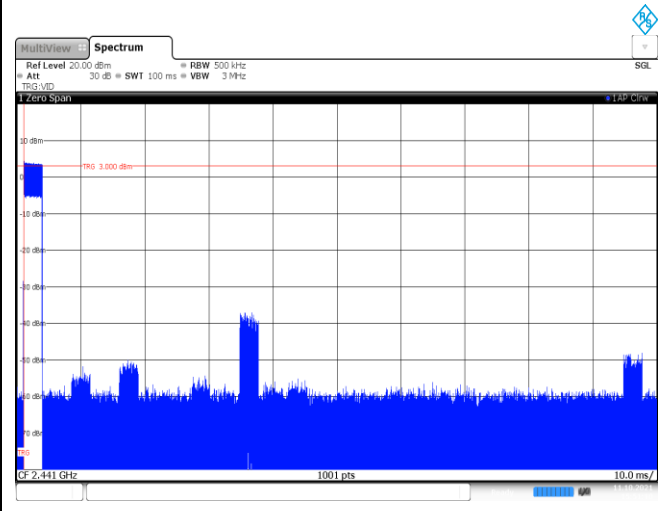
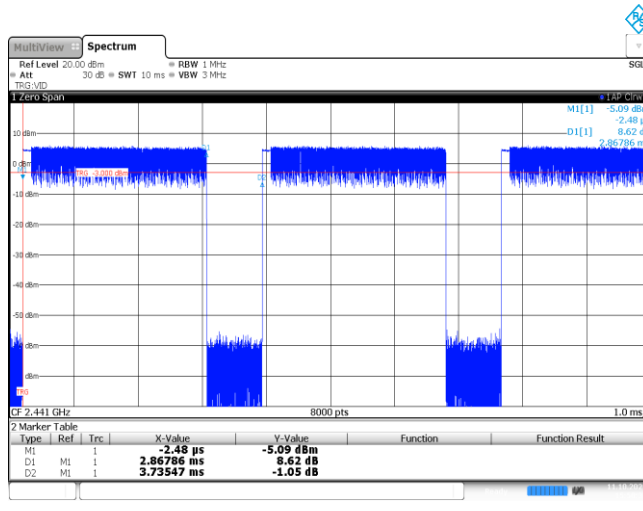
GFSK



T_{on} time for single burst

Burst Quantity

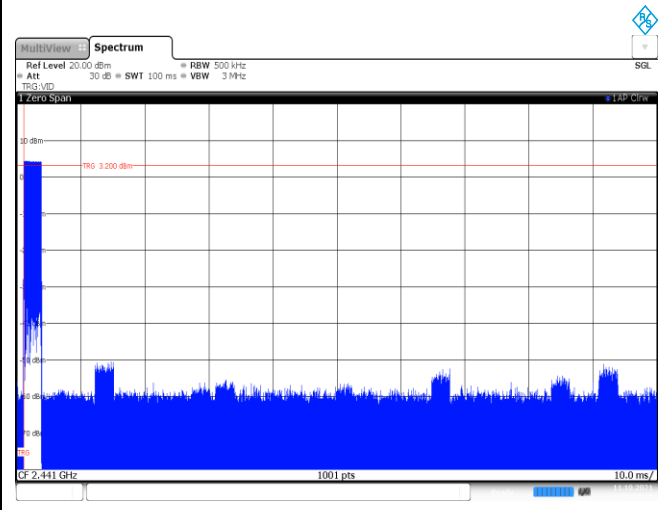
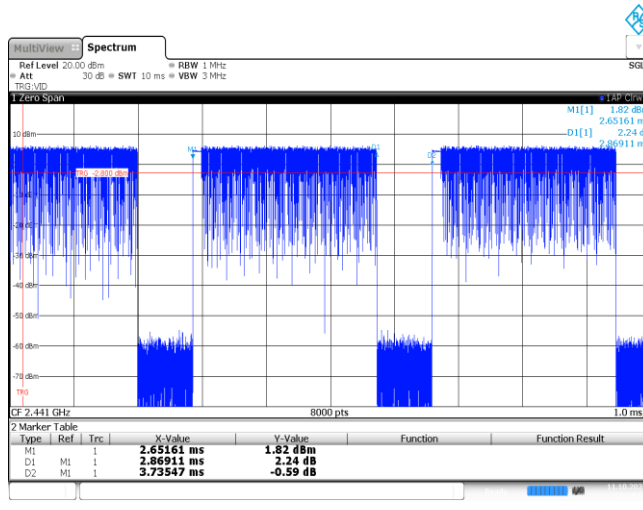
$\pi/4$ DQPSK



T_{on} time for single burst

Burst Quantity

8DPSK



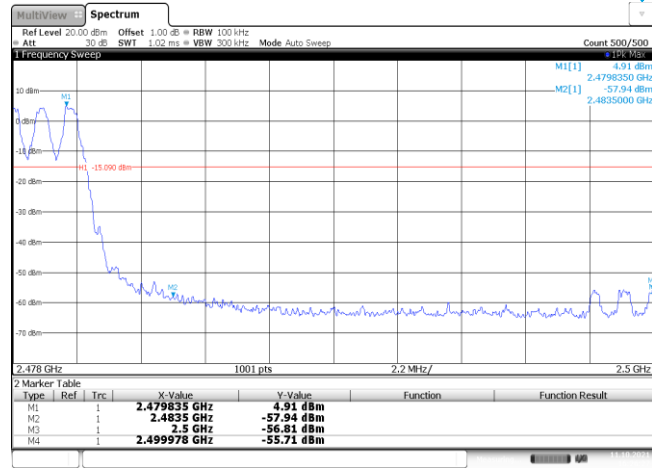
T_{on} time for single burst

Burst Quantity

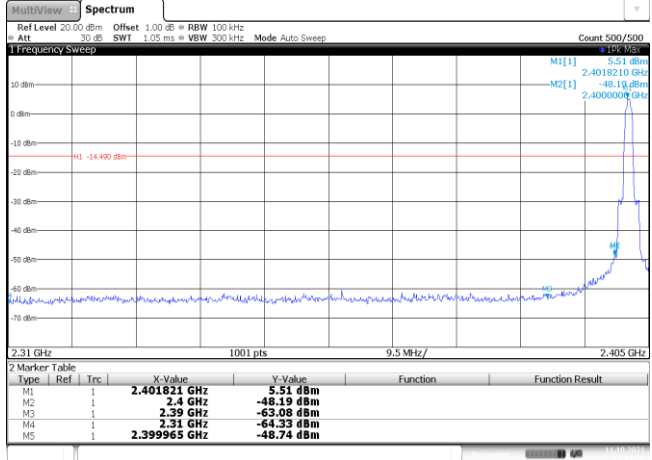
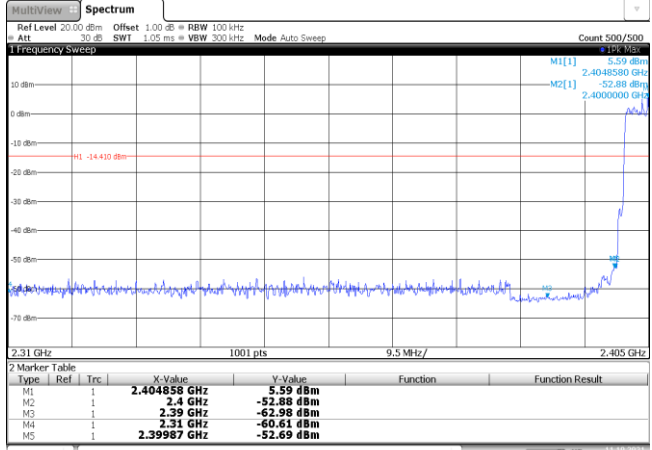
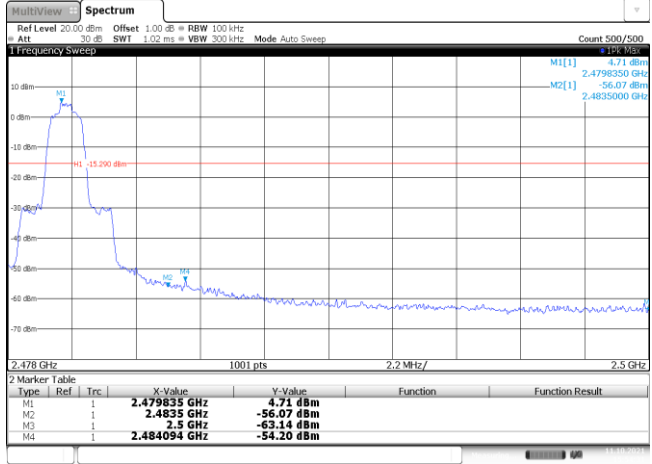
Appendix H: Band edge and Spurious Emissions (conducted)

Test Item:	Band edge	Modulation type:	GFSK																																										
<p>CH00 No hopping mode</p>	<table border="1"> <caption>2 Marker Table</caption> <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>5.70 dBm</td> <td></td> <td></td> </tr> <tr> <td>M2</td> <td>1</td> <td></td> <td>2.4 GHz</td> <td>-48.44 dBm</td> <td></td> <td></td> </tr> <tr> <td>M3</td> <td>1</td> <td></td> <td>2.39 GHz</td> <td>-62.87 dBm</td> <td></td> <td></td> </tr> <tr> <td>M4</td> <td>1</td> <td></td> <td>2.31 GHz</td> <td>-63.66 dBm</td> <td></td> <td></td> </tr> <tr> <td>M5</td> <td>1</td> <td></td> <td>2.39987 GHz</td> <td>-50.12 dBm</td> <td></td> <td></td> </tr> </tbody> </table> <p>Date: 11.OCT.2021 15:03:58</p>			Type	Ref	Trc	X-Value	Y-Value	Function	Function Result	M1	1		2.401821 GHz	5.70 dBm			M2	1		2.4 GHz	-48.44 dBm			M3	1		2.39 GHz	-62.87 dBm			M4	1		2.31 GHz	-63.66 dBm			M5	1		2.39987 GHz	-50.12 dBm		
Type	Ref	Trc	X-Value	Y-Value	Function	Function Result																																							
M1	1		2.401821 GHz	5.70 dBm																																									
M2	1		2.4 GHz	-48.44 dBm																																									
M3	1		2.39 GHz	-62.87 dBm																																									
M4	1		2.31 GHz	-63.66 dBm																																									
M5	1		2.39987 GHz	-50.12 dBm																																									
<p>CH00 Hopping mode</p>	<table border="1"> <caption>2 Marker Table</caption> <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>2.404953 GHz</td> <td>5.31 dBm</td> <td></td> <td></td> </tr> <tr> <td>M2</td> <td>1</td> <td></td> <td>2.4 GHz</td> <td>-53.69 dBm</td> <td></td> <td></td> </tr> <tr> <td>M3</td> <td>1</td> <td></td> <td>2.39 GHz</td> <td>-61.87 dBm</td> <td></td> <td></td> </tr> <tr> <td>M4</td> <td>1</td> <td></td> <td>2.31 GHz</td> <td>-56.14 dBm</td> <td></td> <td></td> </tr> <tr> <td>M5</td> <td>1</td> <td></td> <td>2.39987 GHz</td> <td>-51.68 dBm</td> <td></td> <td></td> </tr> </tbody> </table> <p>Date: 11.OCT.2021 16:26:13</p>			Type	Ref	Trc	X-Value	Y-Value	Function	Function Result	M1	1		2.404953 GHz	5.31 dBm			M2	1		2.4 GHz	-53.69 dBm			M3	1		2.39 GHz	-61.87 dBm			M4	1		2.31 GHz	-56.14 dBm			M5	1		2.39987 GHz	-51.68 dBm		
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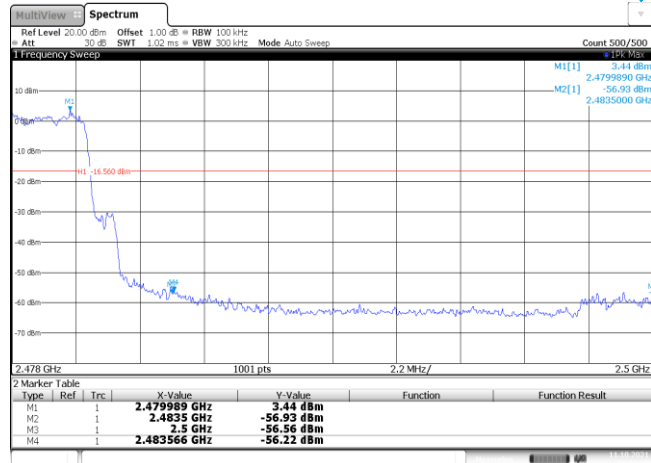
CH78
Hopping mode



Date: 11.OCT.2021 16:26:28

Test Item:	Band edge	Modulation type:	$\pi/4$ DQPSK																																										
<p>CH00 No hopping mode</p>	 <p>2 Marker Table</p> <table border="1"> <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>5.51 dBm</td> <td></td> <td></td> </tr> <tr> <td>M2</td> <td>1</td> <td></td> <td>2.4 GHz</td> <td>-48.19 dBm</td> <td></td> <td></td> </tr> <tr> <td>M3</td> <td>1</td> <td></td> <td>2.39 GHz</td> <td>-63.08 dBm</td> <td></td> <td></td> </tr> <tr> <td>M4</td> <td>1</td> <td></td> <td>2.31 GHz</td> <td>-64.33 dBm</td> <td></td> <td></td> </tr> <tr> <td>M5</td> <td>1</td> <td></td> <td>2.399965 GHz</td> <td>-48.74 dBm</td> <td></td> <td></td> </tr> </tbody> </table> <p>Date: 11/OCT/2021 15:47:33</p>			Type	Ref	Trc	X-Value	Y-Value	Function	Function Result	M1	1		2.401821 GHz	5.51 dBm			M2	1		2.4 GHz	-48.19 dBm			M3	1		2.39 GHz	-63.08 dBm			M4	1		2.31 GHz	-64.33 dBm			M5	1		2.399965 GHz	-48.74 dBm		
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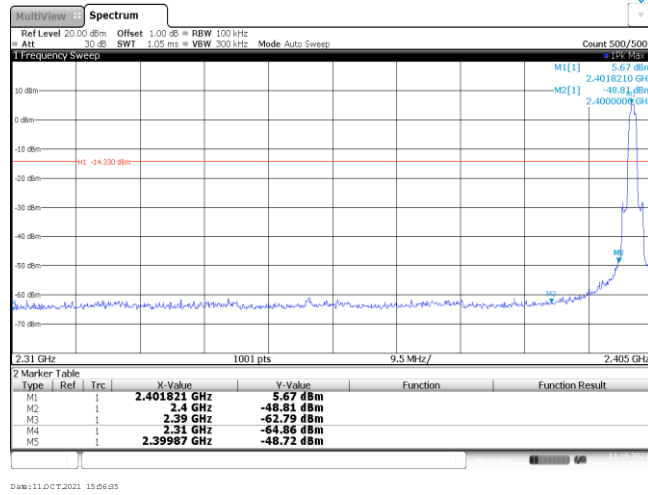
CH78
Hopping mode



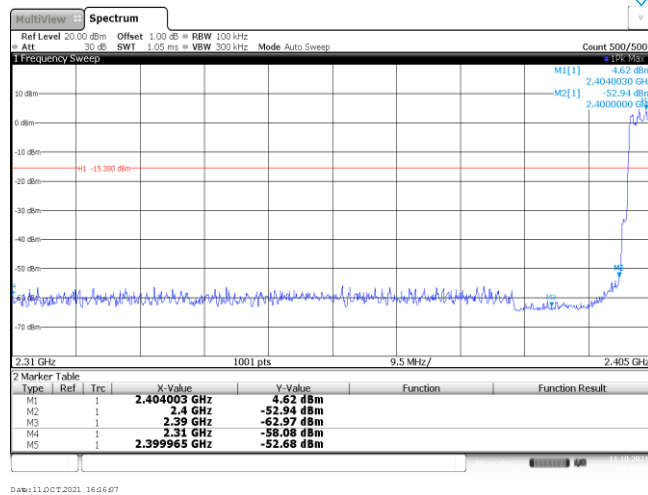
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Test Item:	Band edge	Modulation type:	8DPSK
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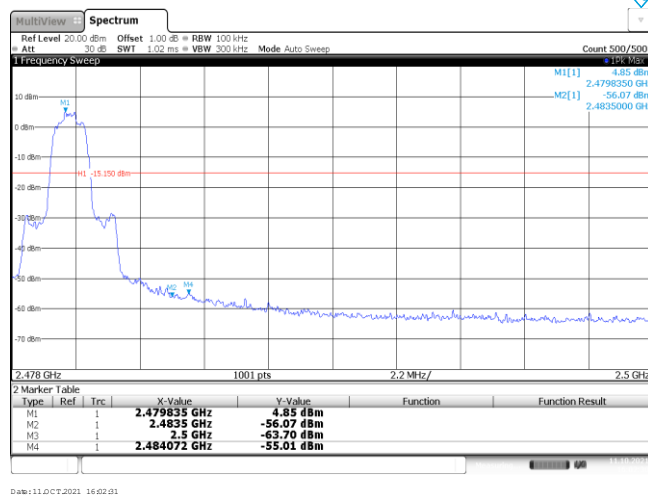
CH00
No hopping mode



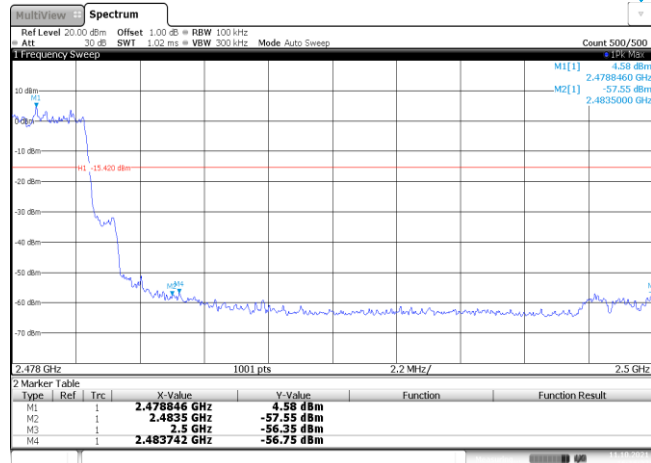
CH00
Hopping mode

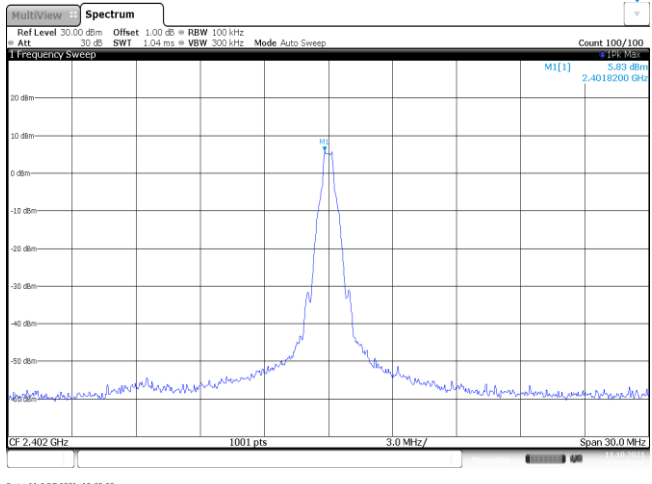
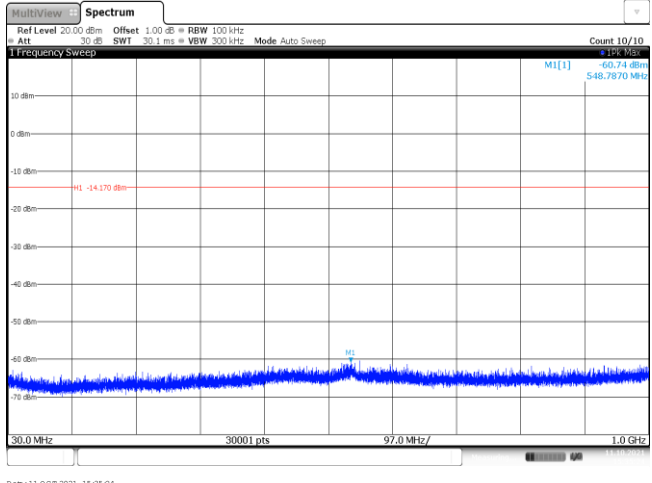
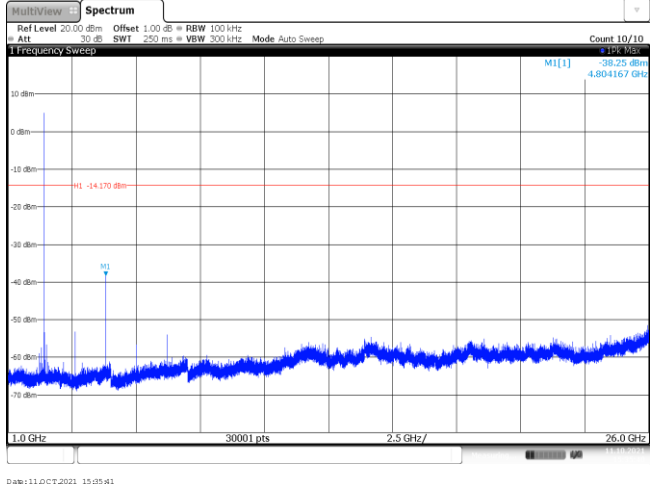


CH78
No hopping mode

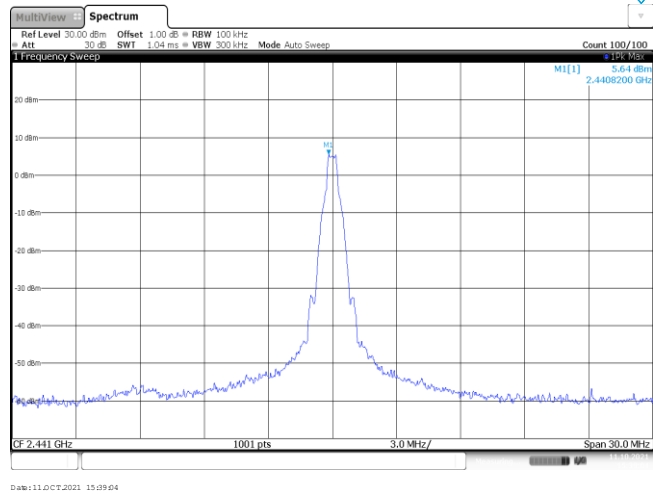


CH78
Hoppig mode

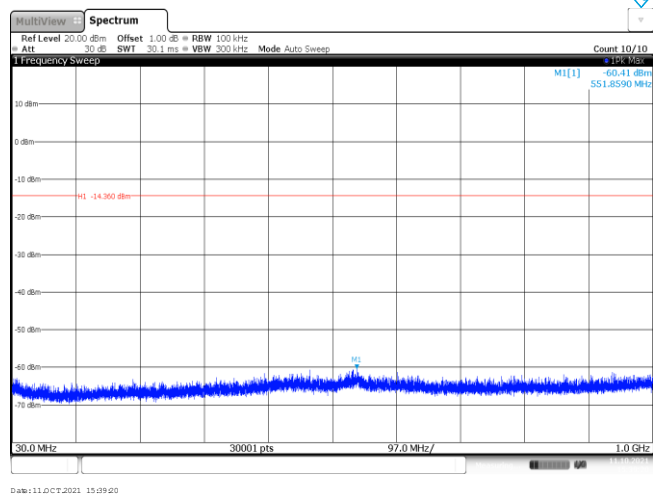


Test Item:	Spurious Emission	Modulation type:	GFSK
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<p>CH00 30MHz~1000MHz</p>			
<p>CH00 1GHz~26GHz</p>			

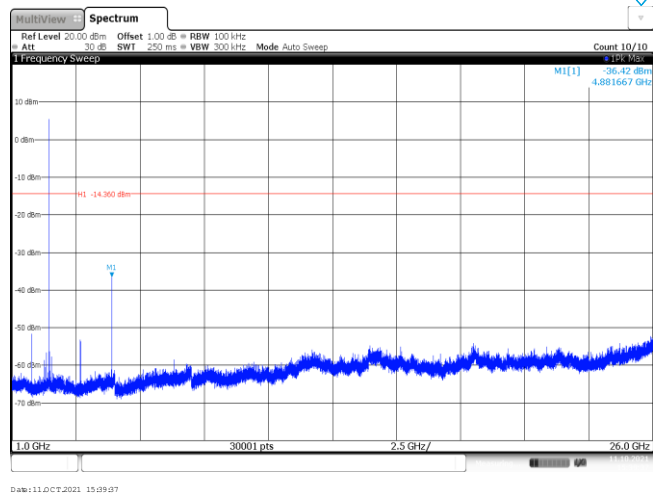
CH39
Reference level



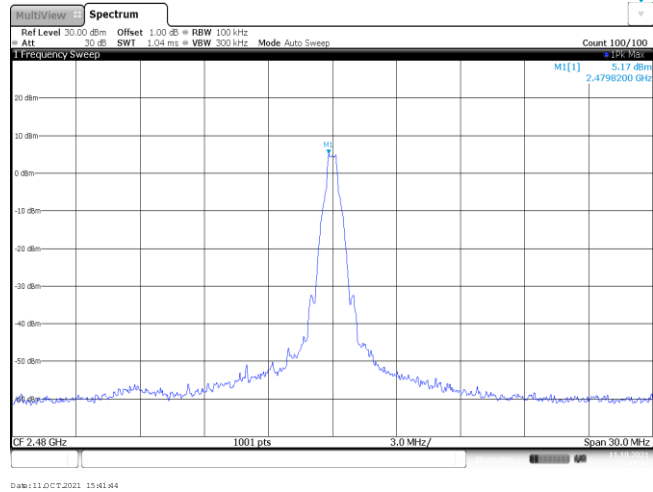
CH39
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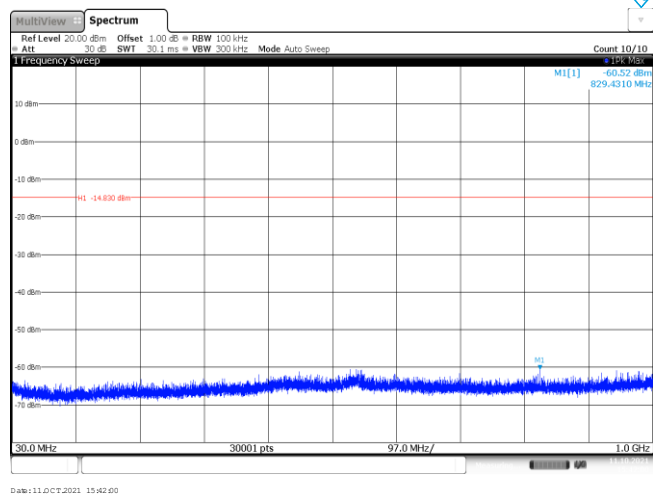
CH39
1GHz~26GHz



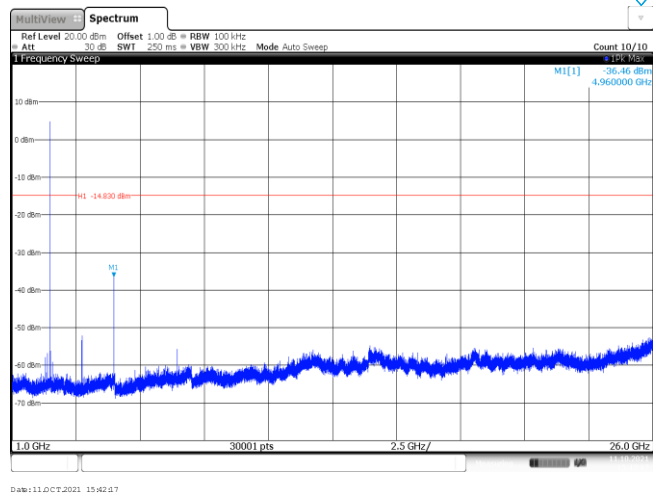
CH78
Reference level

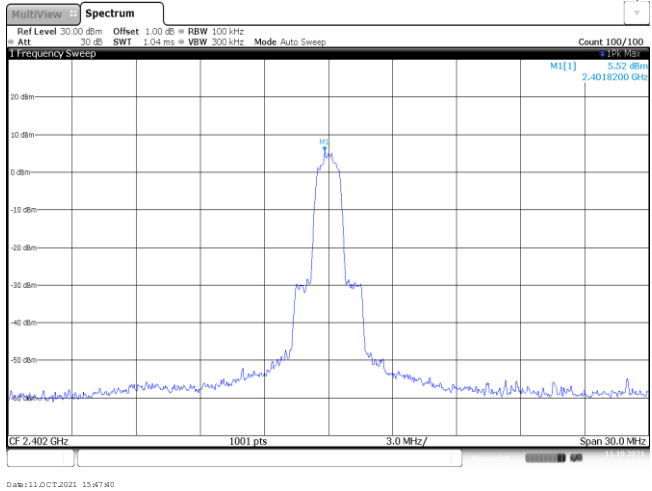
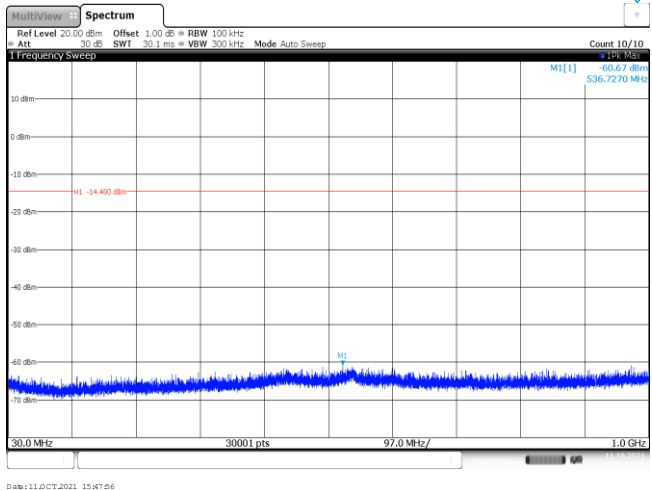
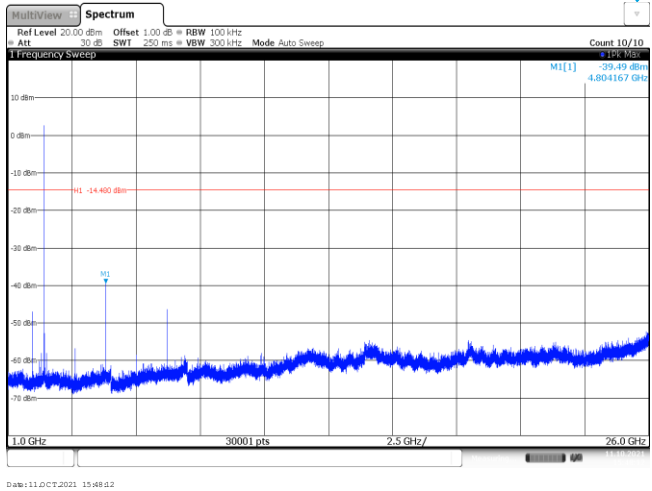


CH78
30MHz~1000MHz

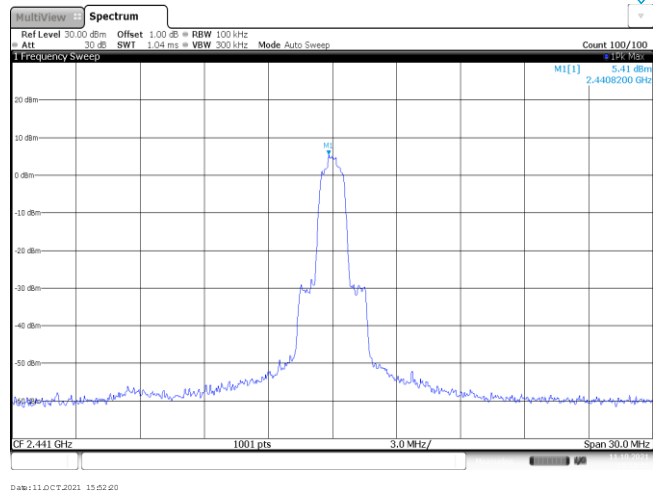


CH78
1GHz~26GHz

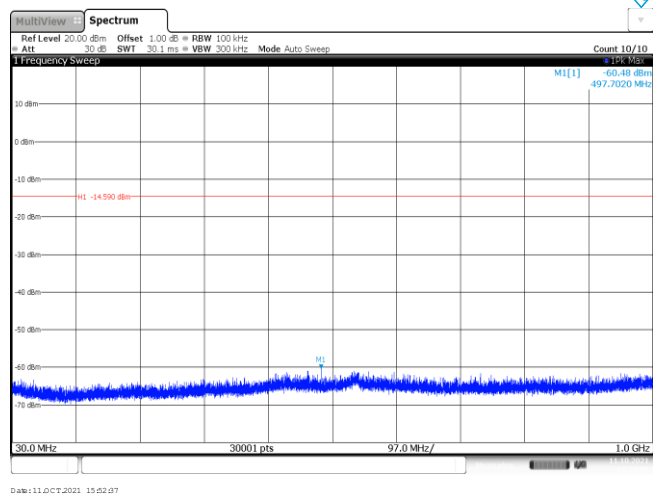


Test Item:	Spurious Emission	Modulation type:	π/4DQPSK
<p>CH00 Reference level</p>	 <p>MultiView Spectrum Ref Level 30.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SWI 1.04 ms VBW 300 kHz Mode Auto Sweep Count 100/100 1 Frequency Sweep M1[1] 5.52 dBm 2.4018200 GHz CF 2.402 GHz 1001 pts 3.0 MHz/ Span 30.0 MHz Date: 11.OCT.2021 15:47:40</p>		
<p>CH00 30MHz~1000MHz</p>	 <p>MultiView Spectrum 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 1 Frequency Sweep M1[1] -60.67 dBm 536.7270 MHz M1 -14.400 dBm 30.0 MHz 30001 pts 97.0 MHz/ 1.0 GHz Date: 11.OCT.2021 15:47:56</p>		
<p>CH00 1GHz~26GHz</p>	 <p>MultiView Spectrum 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 1 Frequency Sweep M1[1] -52.49 dBm 4.804167 GHz M1 -14.400 dBm 1.0 GHz 30001 pts 2.5 GHz/ 26.0 GHz Date: 11.OCT.2021 15:48:12</p>		

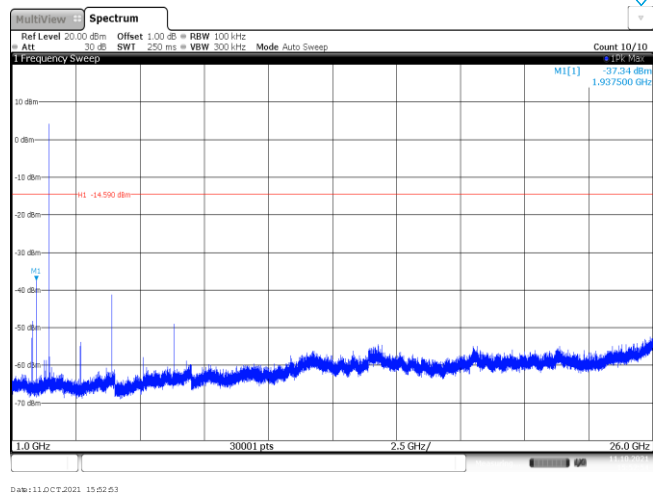
CH39
Reference level



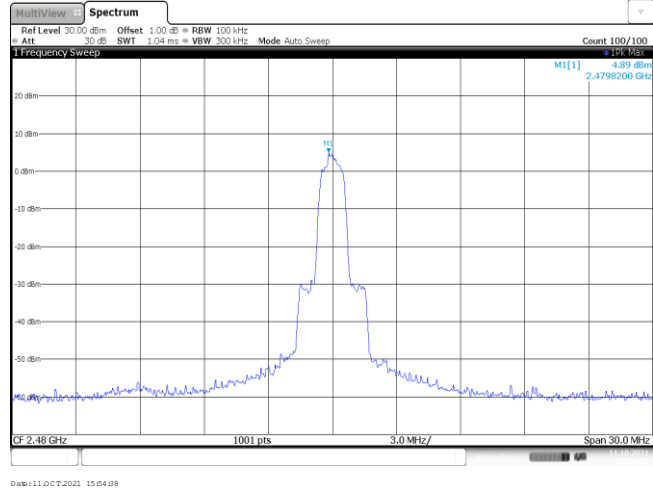
CH39
30MHz~1000MHz



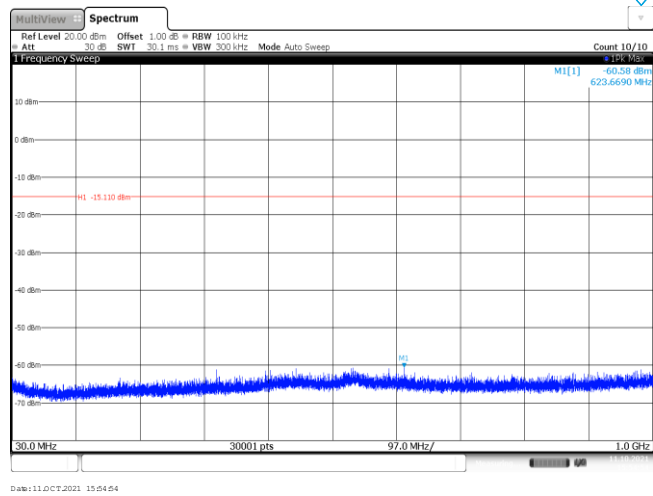
CH39
1GHz~26GHz



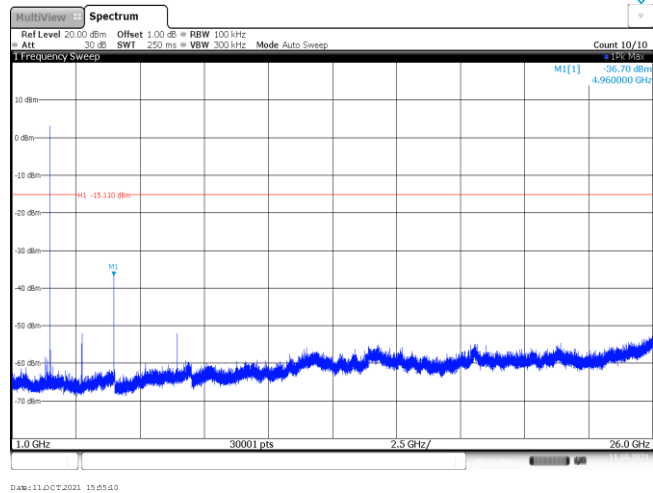
CH78
Reference level

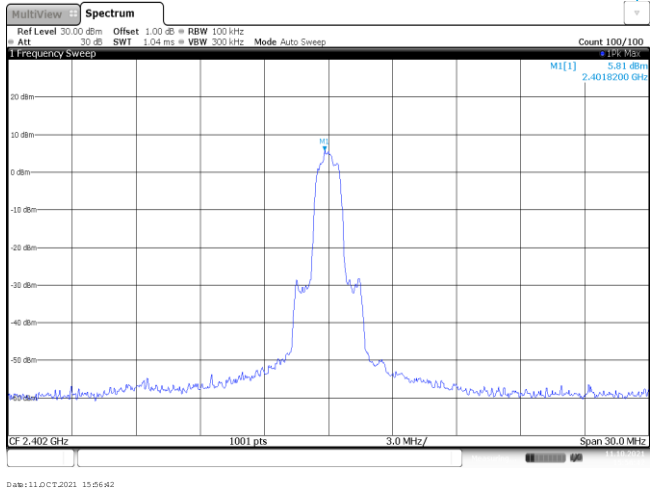
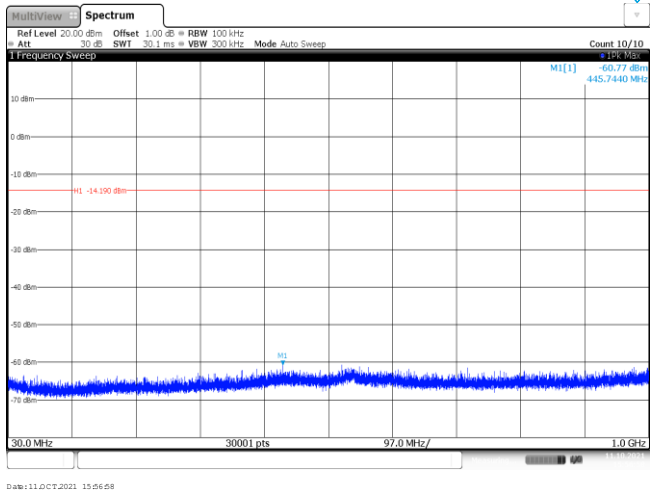
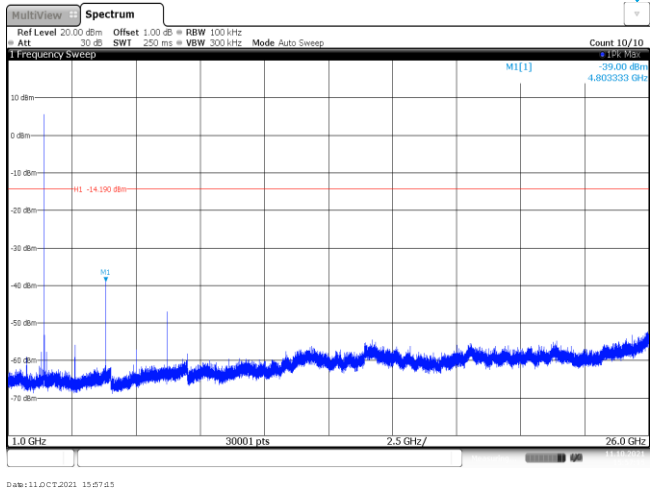


CH78
30MHz~1000MHz

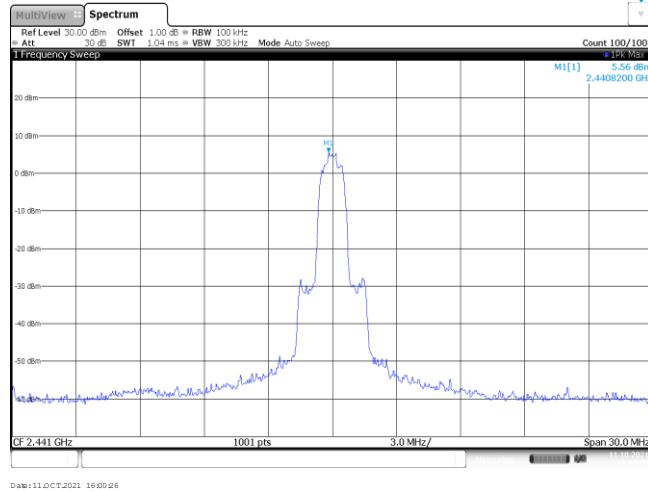


CH78
1GHz~26GHz

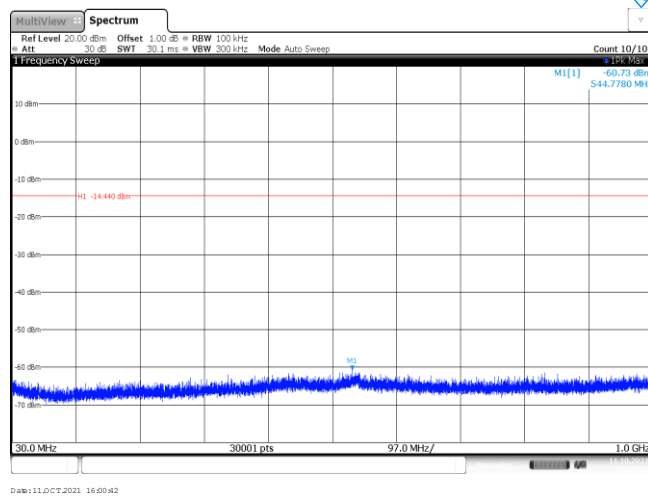


Test Item:	Spurious Emission	Modulation type:	8DPSK
<p>CH00 Reference level</p>	 <p>MultiView Spectrum Ref Level 30.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SWI 1.04 ms VBW 300 kHz Mode Auto Sweep Count 100/100 1 Frequency Sweep M1[1] -5.81 dBm 2.4018200 GHz CF 2.402 GHz 1001 pts 3.0 MHz/ Span 30.0 MHz Date: 11.OCT.2021 15:56:42</p>		
<p>CH00 30MHz~1000MHz</p>	 <p>MultiView Spectrum 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 1 Frequency Sweep M1[1] -60.77 dBm 445.7440 MHz M1 -14.190 dBm 30.0 MHz 30001 pts 97.0 MHz/ 1.0 GHz Date: 11.OCT.2021 15:56:58</p>		
<p>CH00 1GHz~26GHz</p>	 <p>MultiView Spectrum 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 1 Frequency Sweep M1[1] -33.00 dBm 4.803333 GHz M1 -14.190 dBm 1.0 GHz 30001 pts 2.5 GHz/ 26.0 GHz Date: 11.OCT.2021 15:57:15</p>		

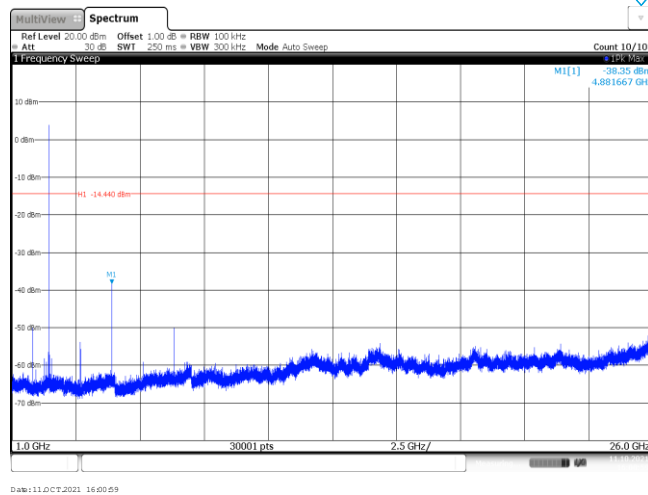
CH39
Reference level



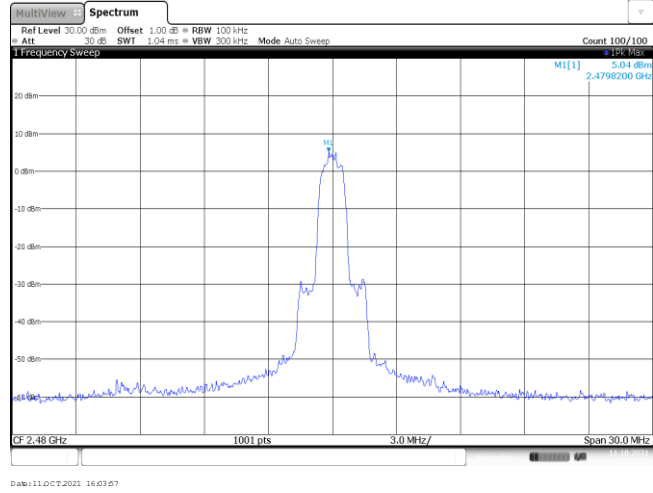
CH39
30MHz~1000MHz



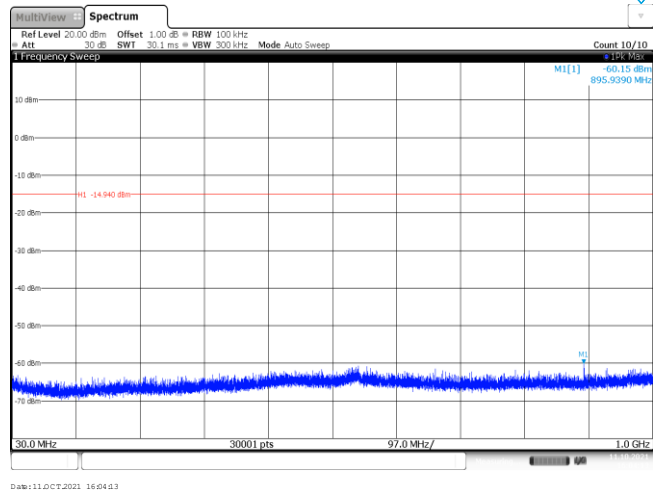
CH39
1GHz~26GHz



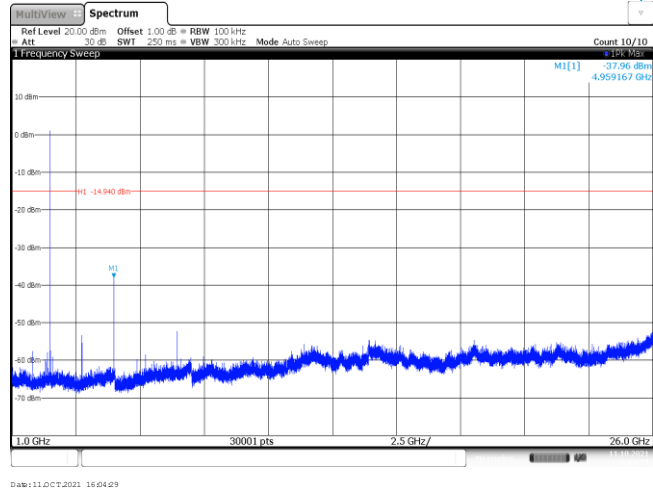
CH78
Reference level



CH78
30MHz~1000MHz



CH78
1GHz~26GHz



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