

# APPENDIX REPORT

Project No.	SHT2210025201EW	Radio Specification	Bluetooth EDR
Test sample No.	YPHT2210025002	Model No.	G60 Pro
Start test date	2022-10-20	Finish date	2022-10-24
Temperature	25.9°C	Humidity	34%
Test Engineer	Xiaoxiao Li	Auditor	Xiaodong Zheo

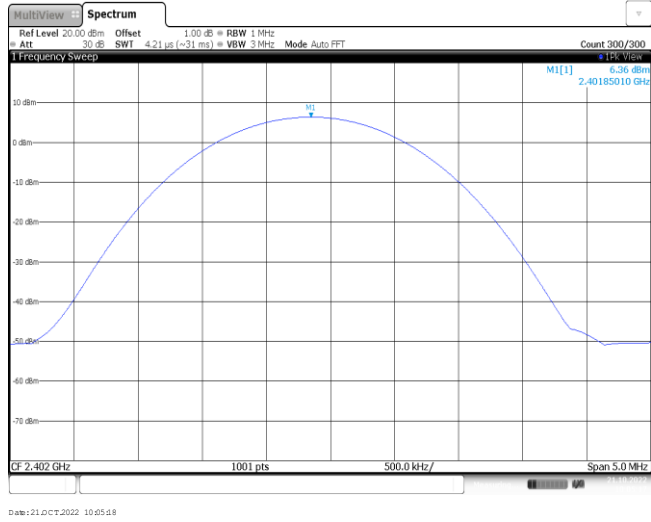
Appendix clause	Test item	Result
A	Peak Output Power	PASS
B	20 dB Bandwidth	PASS
C	99% Occupied Bandwidth	PASS
D	Carrier Frequencies Separation	PASS
E	Hopping Channel Number	PASS
F	Dwell Time	PASS
G	Duty Cycle Correction Factor (DCCF)	PASS
H	Band edge and Spurious Emissions(coducted)	PASS

**Appendix A: Peak Output Power**

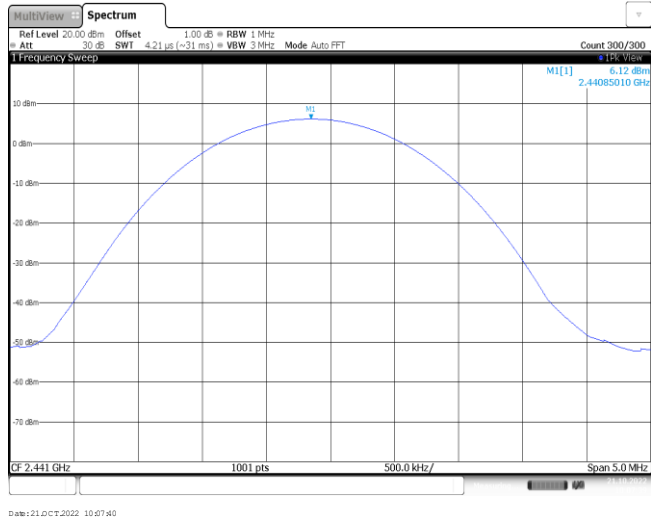
Modulation type	Channel	Peak Output power (dBm)	Average Output power (dBm)	Limit (dBm)	Result
GFSK	00	6.36	6.35	≤ 30.00	Pass
	39	6.12	6.08		
	78	5.81	5.76		
π/4DQPSK	00	5.14	4.88	≤ 21.00	Pass
	39	4.63	4.40		
	78	4.83	4.56		
8DPSK	00	4.71	4.12	≤ 21.00	Pass
	39	4.50	4.26		
	78	4.75	4.46		

**Modulation Type: GFSK**

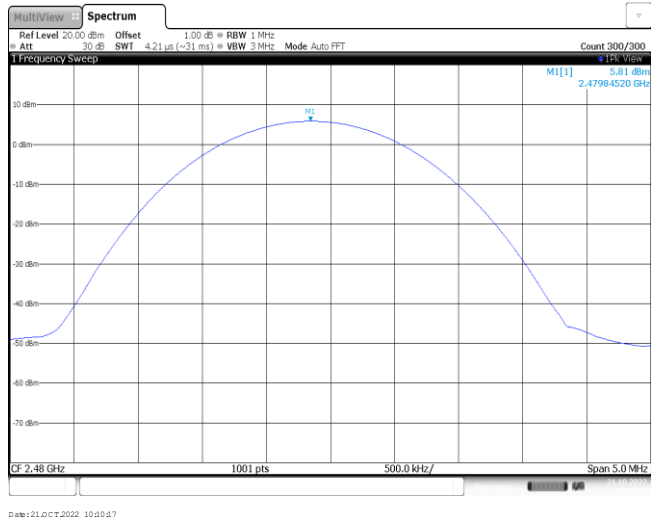
CH00



CH39

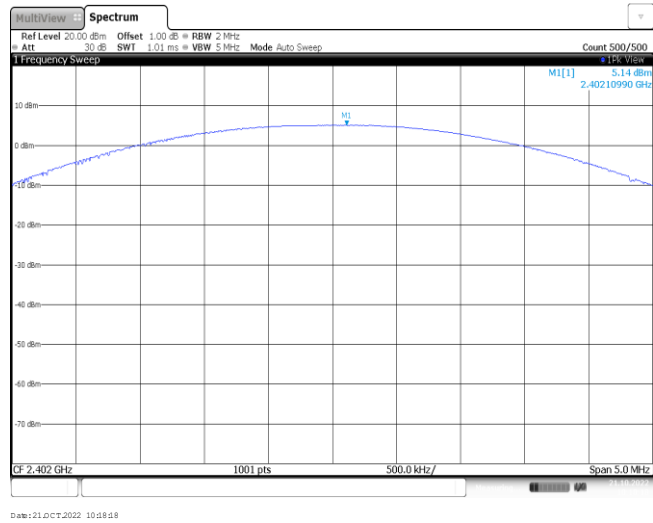


CH78

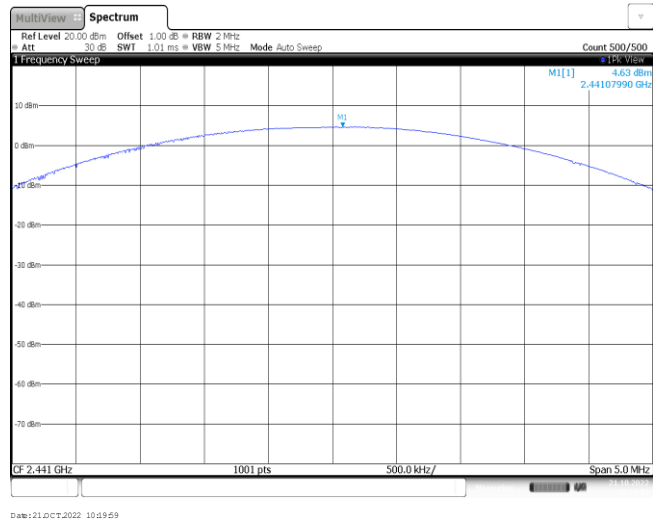


**Modulation Type:**  $\pi/4$ DQPSK

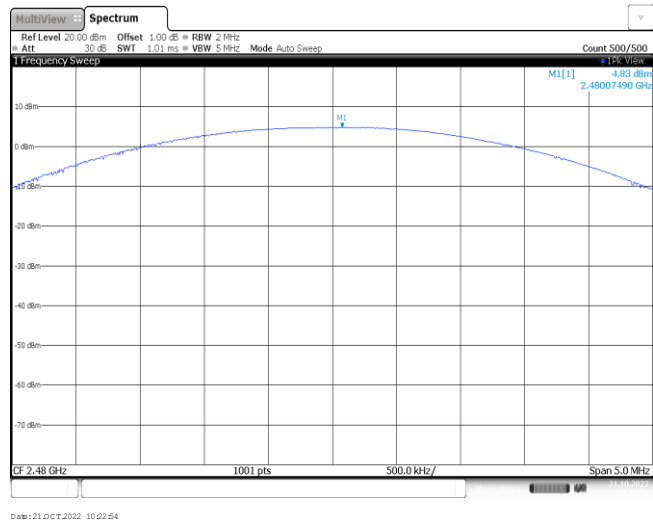
CH00



CH39



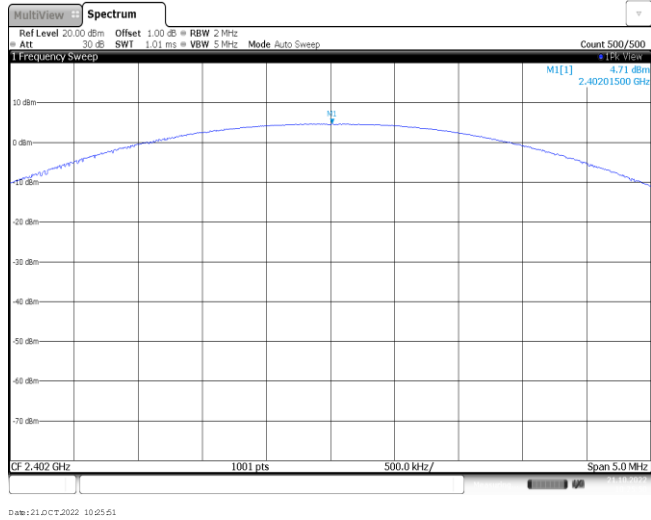
CH78



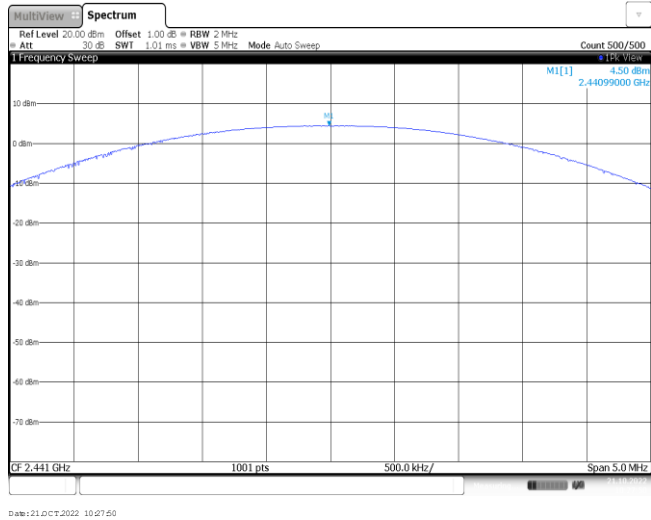
Modulation Type:

8DPSK

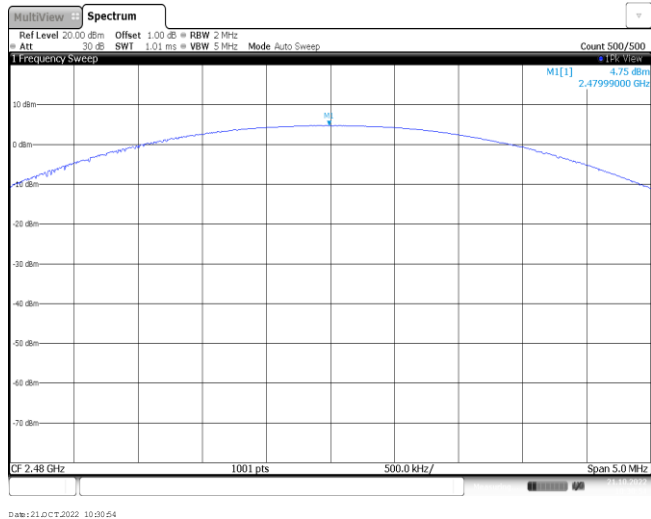
CH00



CH39



CH78

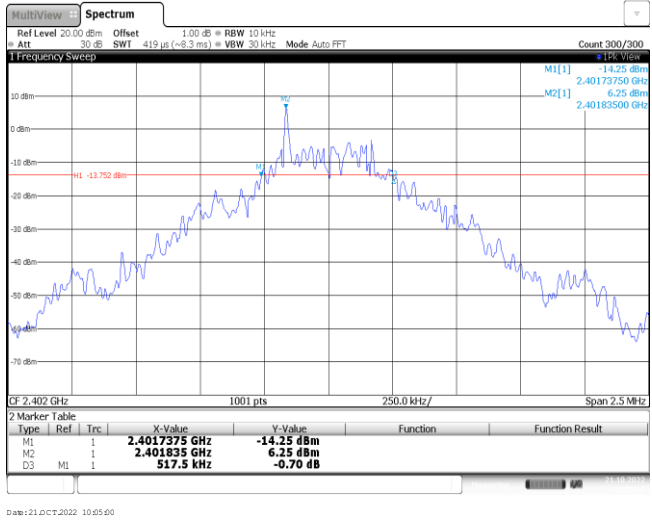


**Appendix B : 20 dB Bandwidth**

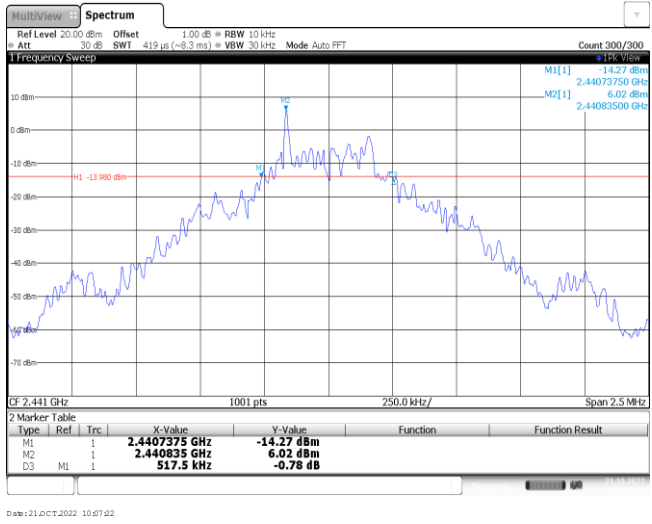
Modulation type	Channel	20 dB Bandwidth (kHz)	Limit (kHz)	Result
GFSK	00	517.50	-	Pass
	39	517.50		
	78	517.50		
$\pi/4$ DQPSK	00	1122.50	-	Pass
	39	1122.50		
	78	1125.00		
8DPSK	00	1120.00	-	Pass
	39	1115.00		
	78	1115.00		

**Modulation Type: GFSK**

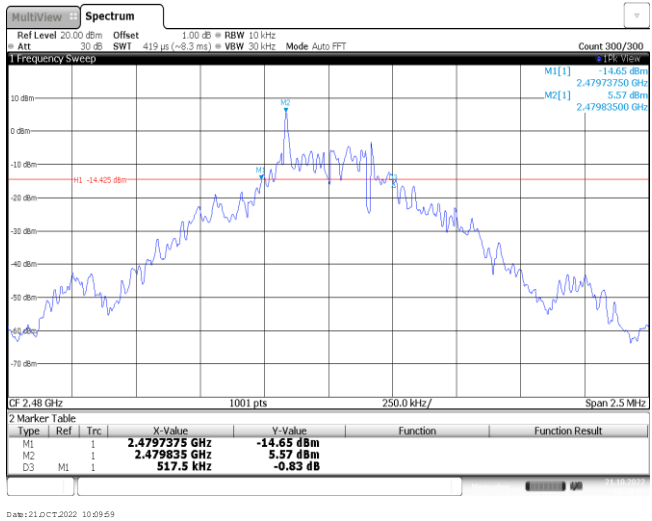
CH00



CH39

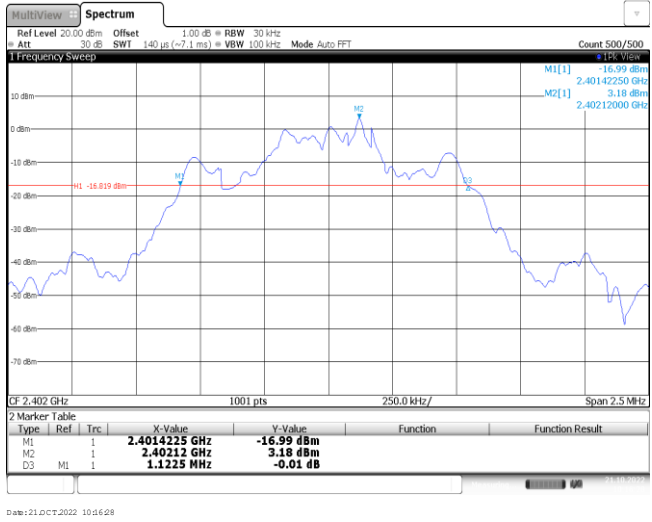


CH78

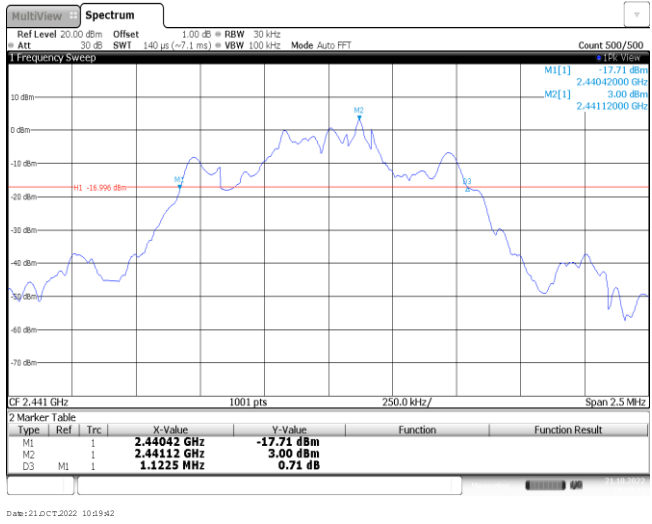


**Modulation Type:**  **$\pi/4$ DQPSK**

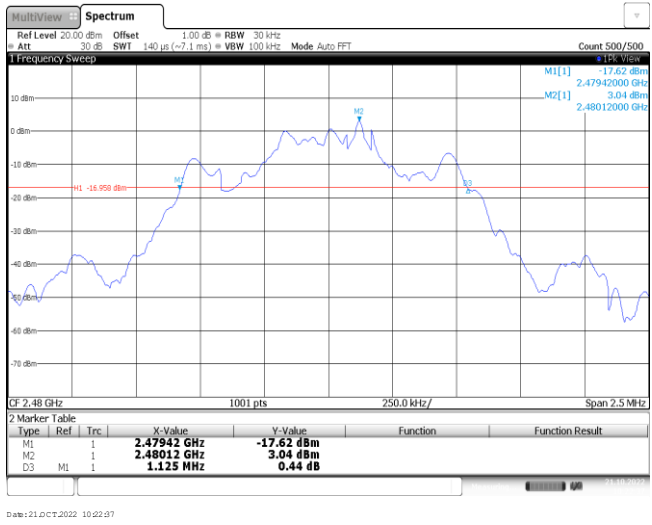
CH00



CH39



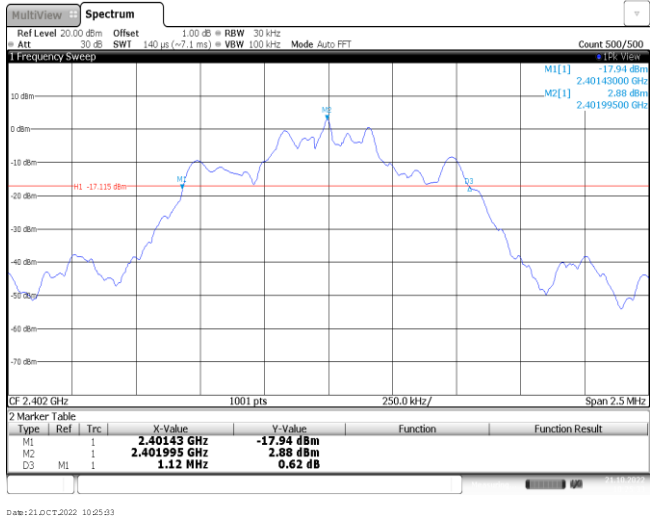
CH78





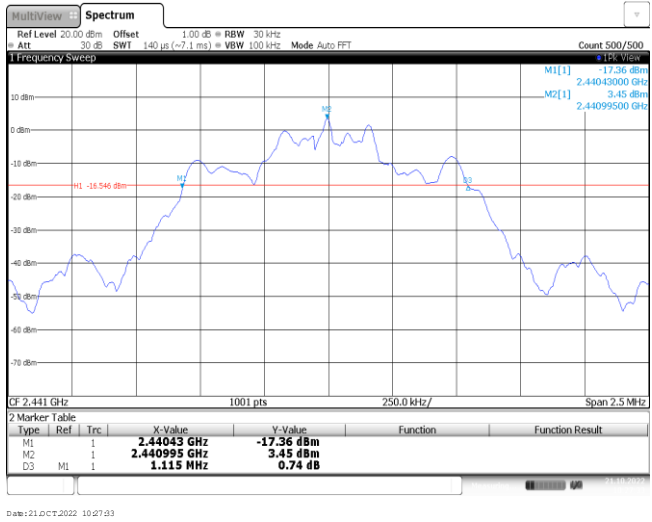
**Modulation Type: 8DPSK**

CH00



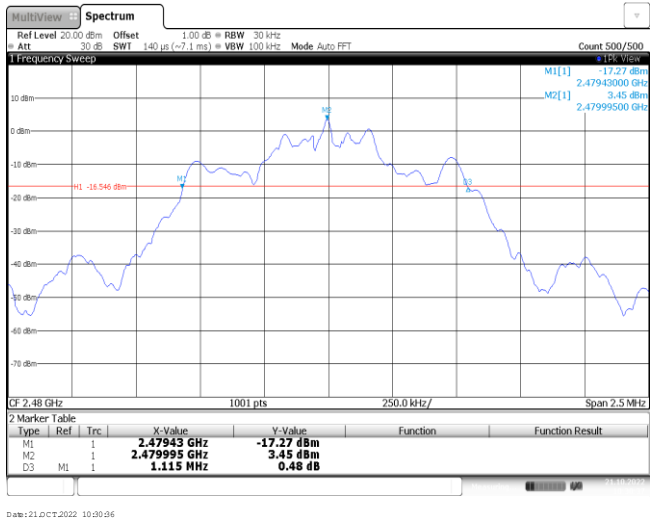
Date: 21.OCT.2022 10:25:33

CH39



Date: 21.OCT.2022 10:27:33

CH78



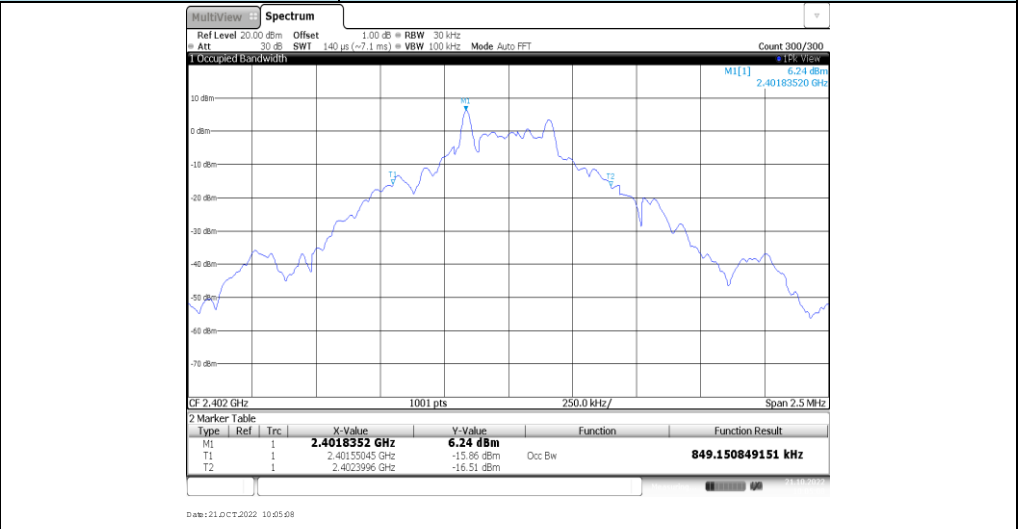
Date: 21.OCT.2022 10:30:36

**Appendix C: 99% Occupied Bandwidth**

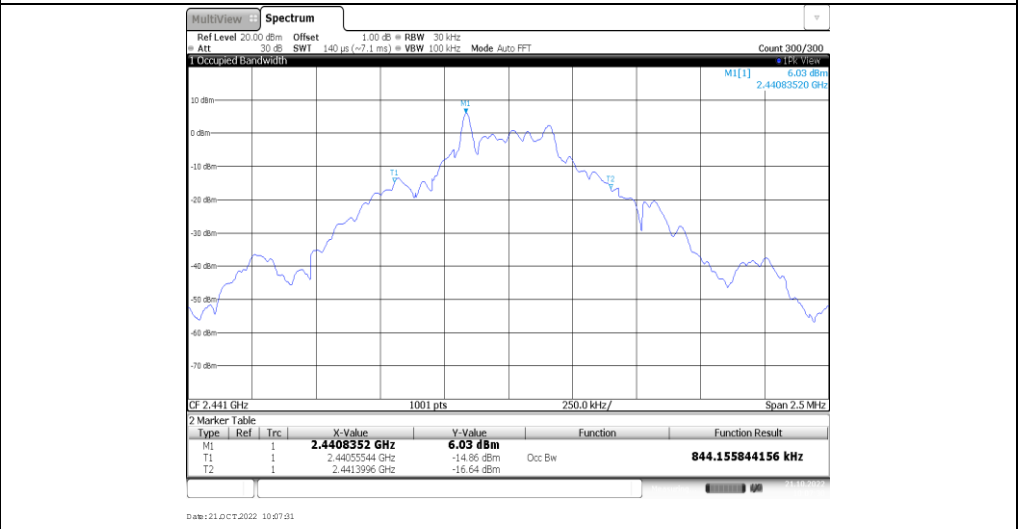
Modulation type	Channel	99% Occupied Bandwidth (MHz)	Limit (MHz)	Result
GFSK	00	0.85	-	Pass
	39	0.84		
	78	0.84		
$\pi/4$ DQPSK	00	1.08	-	Pass
	39	1.09		
	78	1.08		
8DPSK	00	1.07	-	Pass
	39	1.07		
	78	1.07		

**Modulation Type: GFSK**

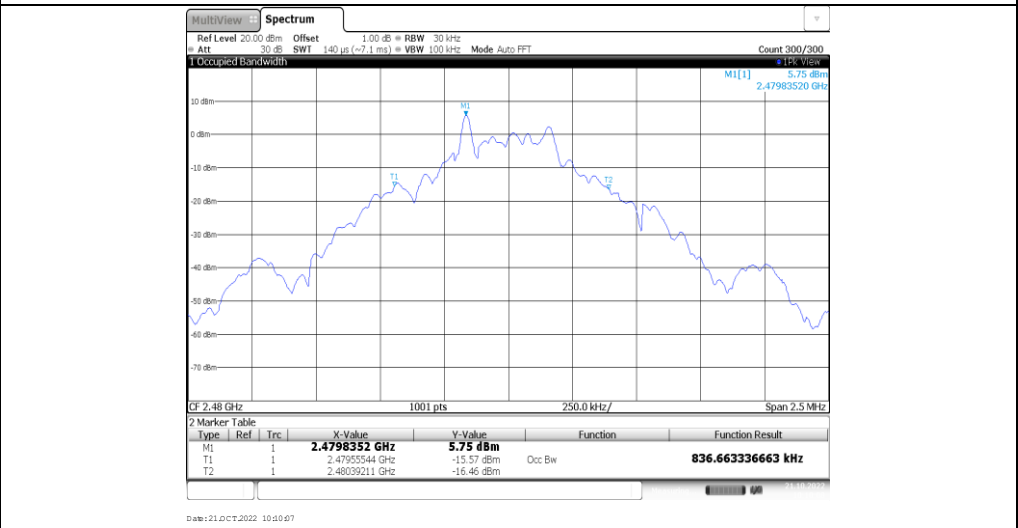
CH00



CH39

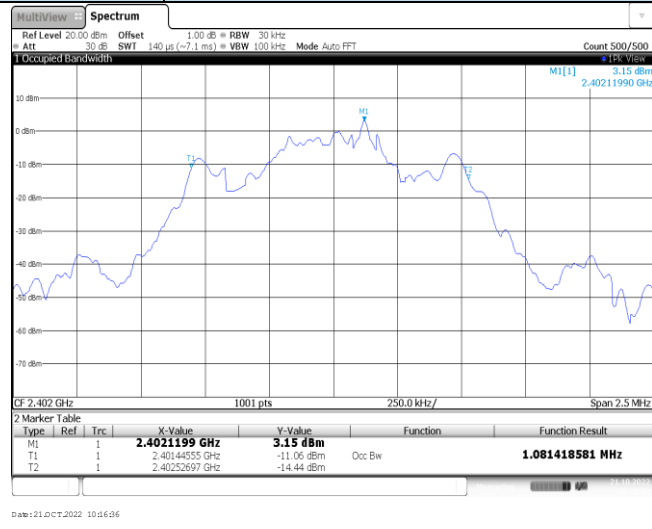


CH78

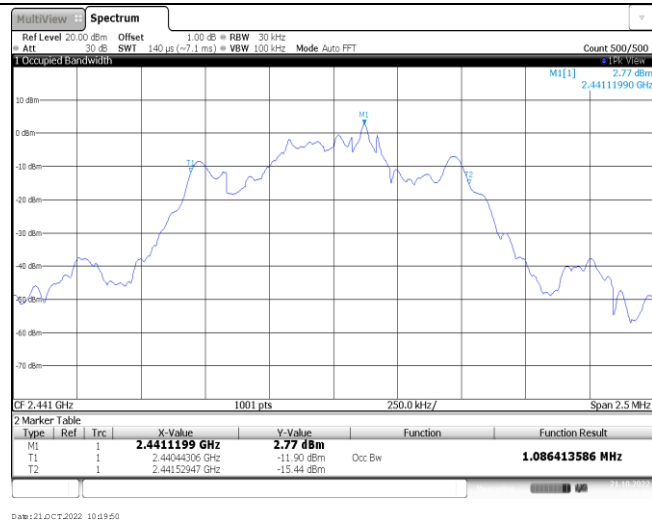


**Modulation Type:**  **$\pi$ /4DQPSK**

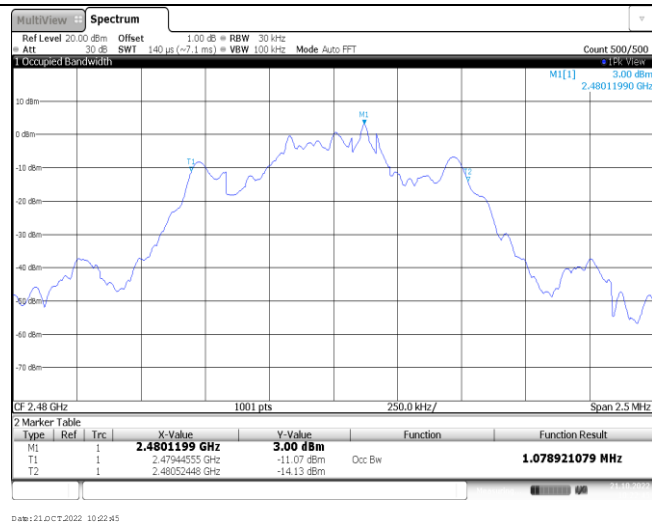
CH00



CH39



CH78



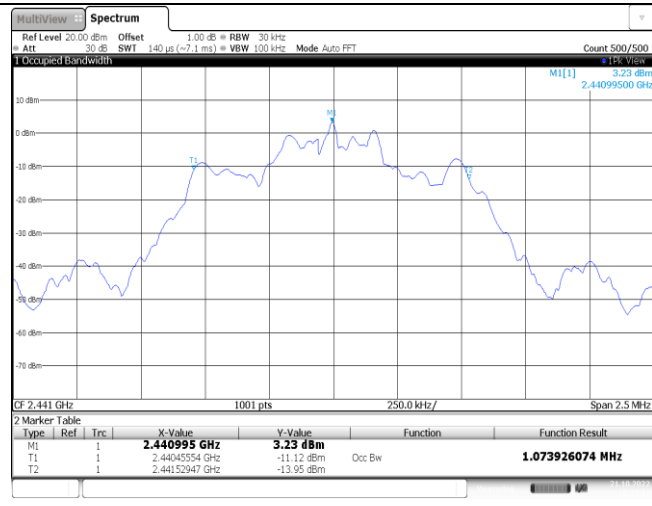
**Modulation Type: 8DPSK**

CH00



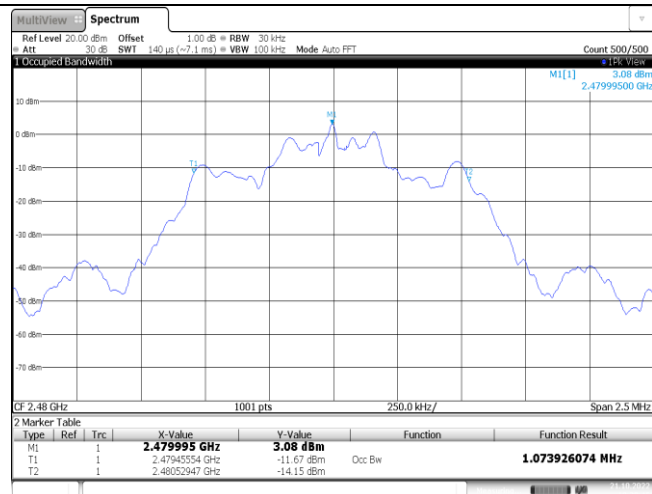
Date: 21 OCT 2022 10:25:42

CH39



Date: 21 OCT 2022 10:27:41

CH78



Date: 21 OCT 2022 10:30:45

**Appendix D: Carrier Frequencies Separation**

Modulation type	Channel	Carrier Frequencies Separation (MHz)	Limit (kHz) *	Result
GFSK	39	1.00	≥517.50	Pass
$\pi/4$ DQPSK	39	1.00	≥748.33	Pass
8DPSK	39	1.00	≥746.67	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

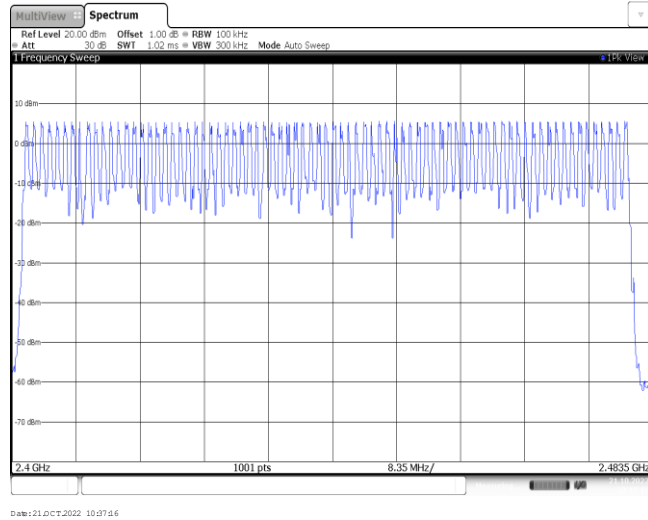
<p style="text-align: center;">GFSK</p>	
<p style="text-align: center;"><math>\pi/4</math>DQPSK</p>	
<p style="text-align: center;">8DPSK</p>	

**Appendix E: Hopping Channel Number**

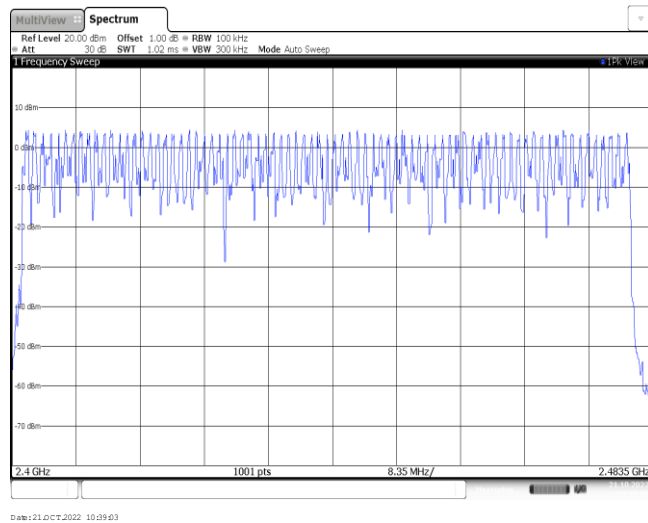
Modulation type	Channel number	Limit	Result
GFSK	79	≥15.00	Pass
π/4DQPSK	79		
8DPSK	79		



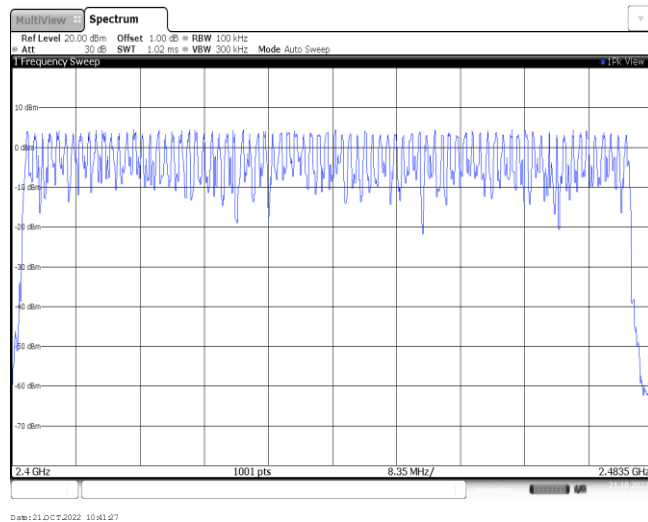
GFSK



$\pi/4$ DQPSK



8DPSK

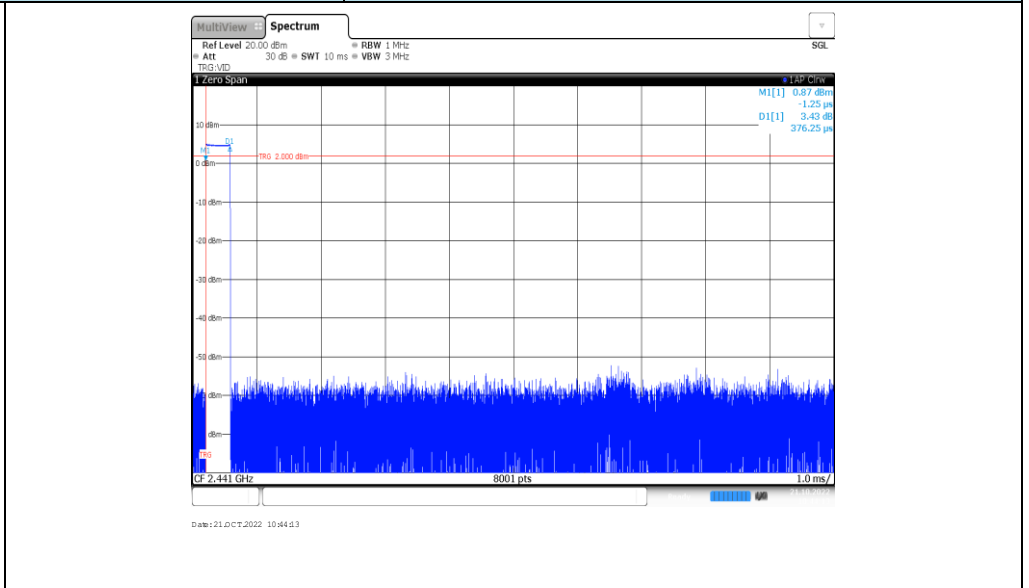


**Appendix F: Dwell Time**

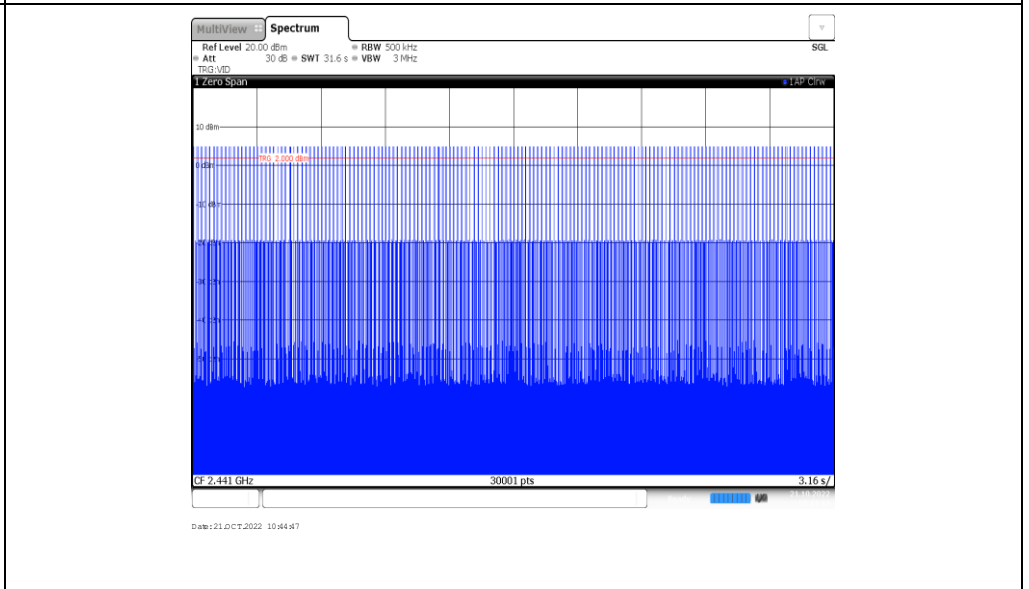
Modulation type	Packet	Burst Width [ms]	Total Hops[hop*ch]	Dwell time (Second)	Limit (Second)	Result
GFSK	DH1	0.38	313	0.12	≤ 0.40	Pass
	DH3	1.63	160	0.26		
	DH5	2.88	93	0.27		
π/4DQPSK	2DH1	0.38	315	0.12	≤ 0.40	Pass
	2DH3	1.64	152	0.25		
	2DH5	2.88	101	0.29		
8DPSK	3DH1	0.39	314	0.12	≤ 0.40	Pass
	3DH3	1.64	162	0.27		
	3DH5	2.89	106	0.31		

**Modulation Type: GFSK**

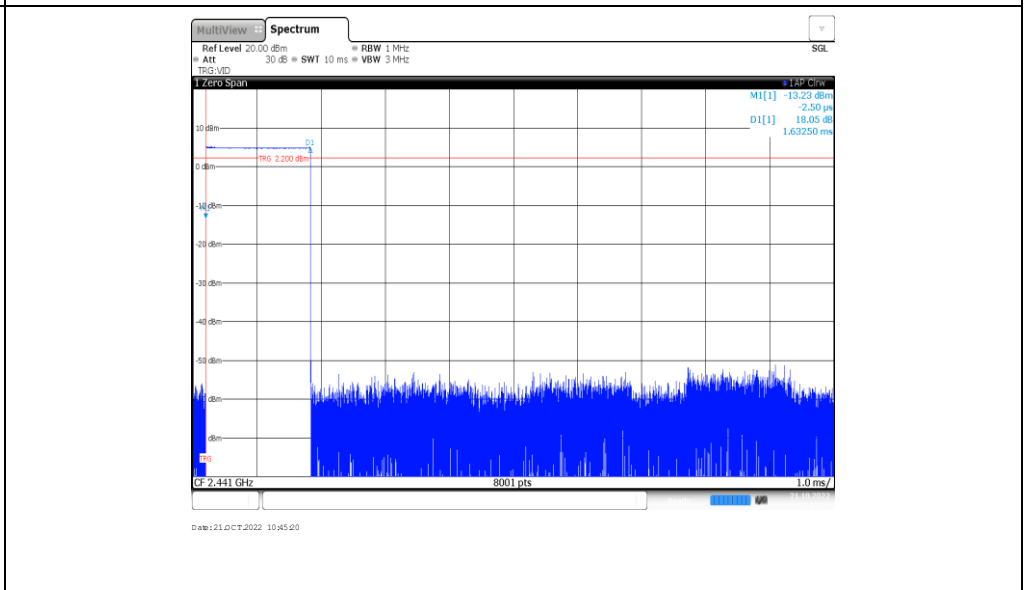
DH1  
Burst width



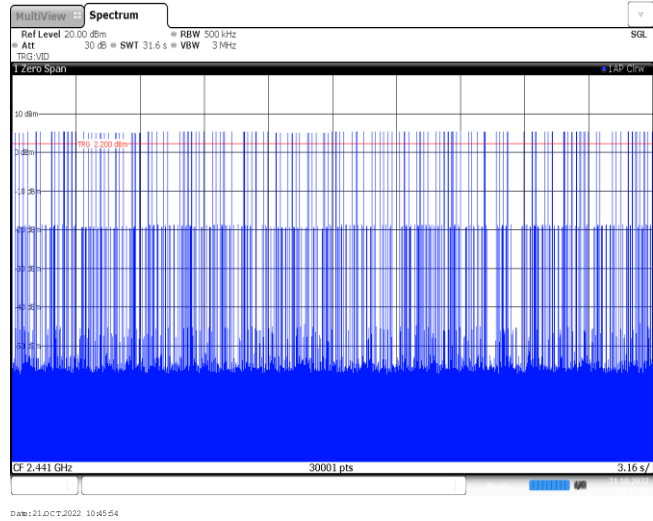
DH1  
Burst number



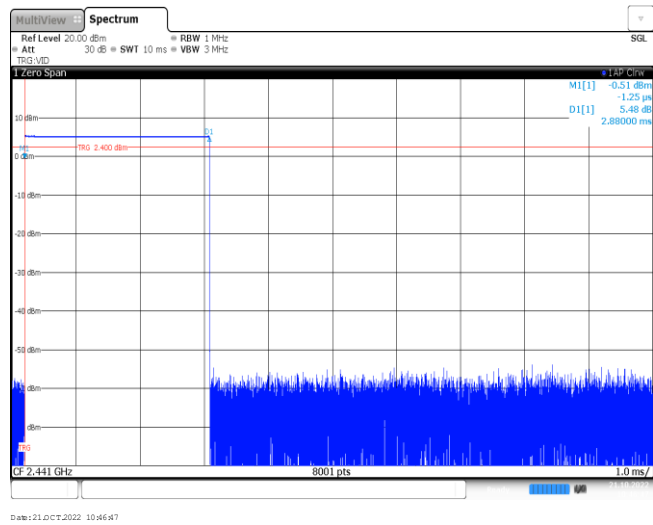
DH3  
Burst width



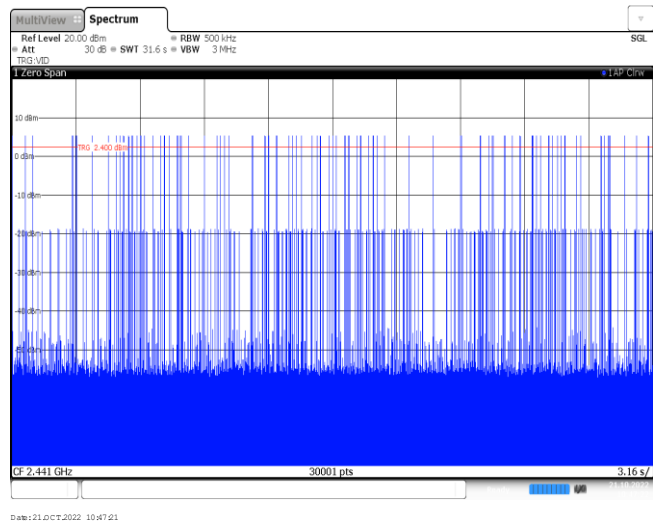
DH3  
Burst number



DH5  
Burst width

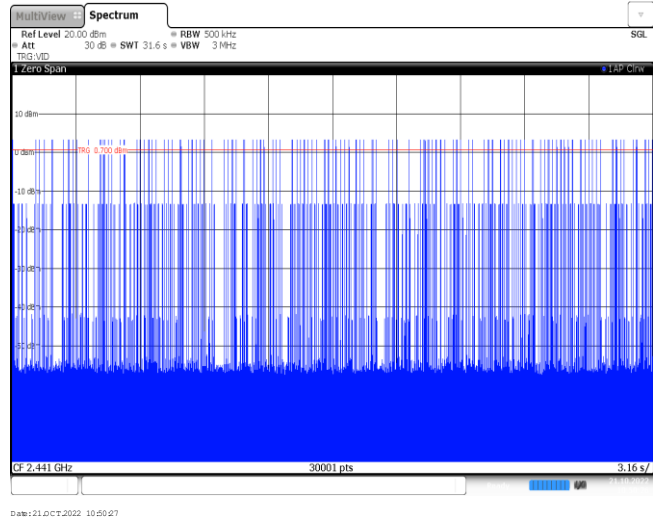


DH5  
Burst number

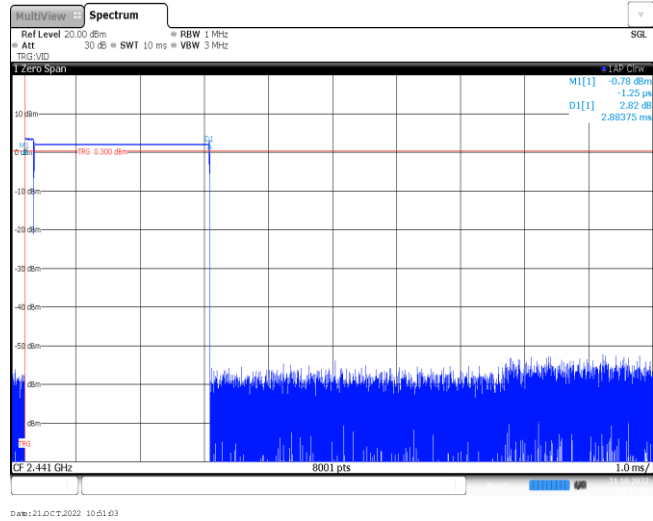


Modulation Type:	$\pi/4$ DQPSK
<p>2DH1 Burst width</p>	<p>Ref Level 20.00 dBm Att 30 dB RBW 1 MHz SWT 10 ms VBW 3 MHz</p> <p>M[1] -3.49 dBm D1[1] 5.12 dB 383.75 μs</p> <p>CF 2.441 GHz 8001 pts 1.0 ms/</p> <p>Date: 21.OCT.2022 10:47:58</p>
<p>2DH1 Burst number</p>	<p>Ref Level 20.00 dBm Att 30 dB RBW 500 kHz SWT 31.6 s VBW 3 MHz</p> <p>CF 2.441 GHz 30001 pts 3.16 s/</p> <p>Date: 21.OCT.2022 10:48:22</p>
<p>2DH3 Burst width</p>	<p>Ref Level 20.00 dBm Att 30 dB RBW 1 MHz SWT 10 ms VBW 3 MHz</p> <p>M[1] -9.72 dBm D1[1] 11.28 dB 1.63625 ms</p> <p>CF 2.441 GHz 8001 pts 1.0 ms/</p> <p>Date: 21.OCT.2022 10:49:53</p>

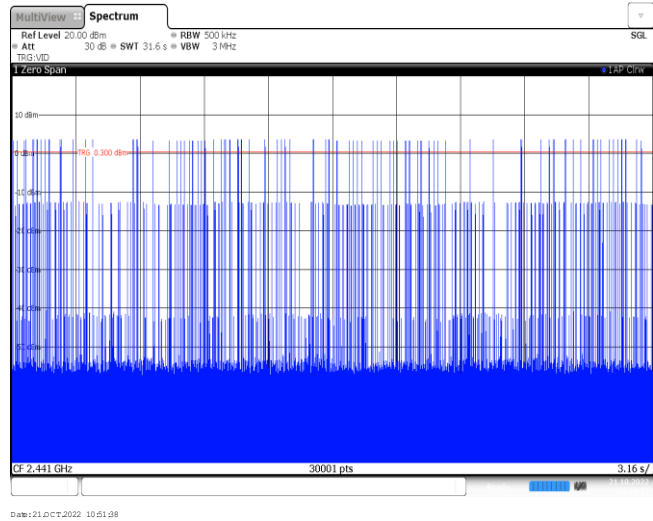
2DH3  
Burst number



2DH5  
Burst width

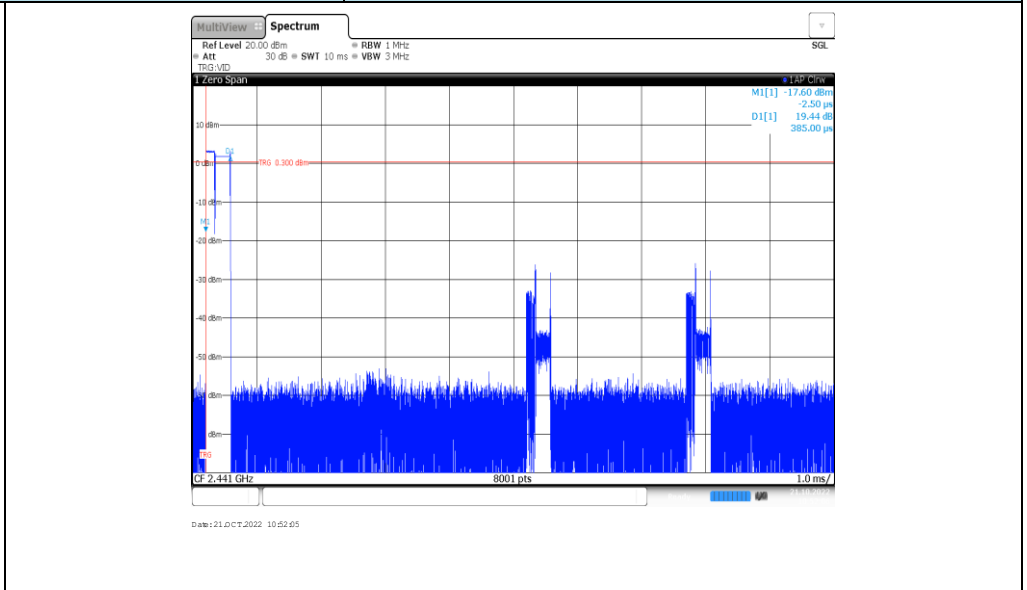


2DH5  
Burst number

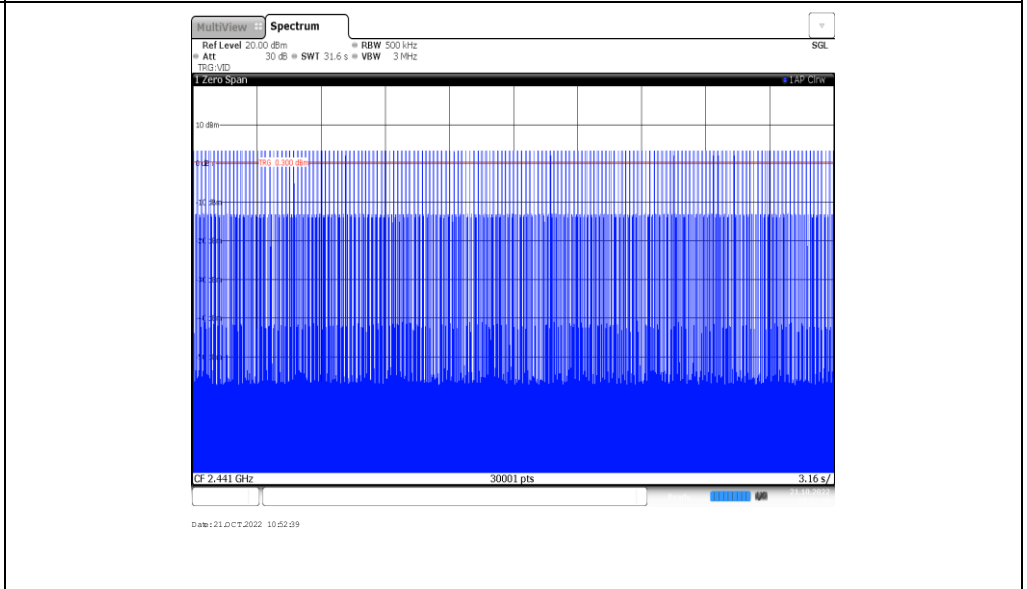


**Modulation Type: 8DPSK**

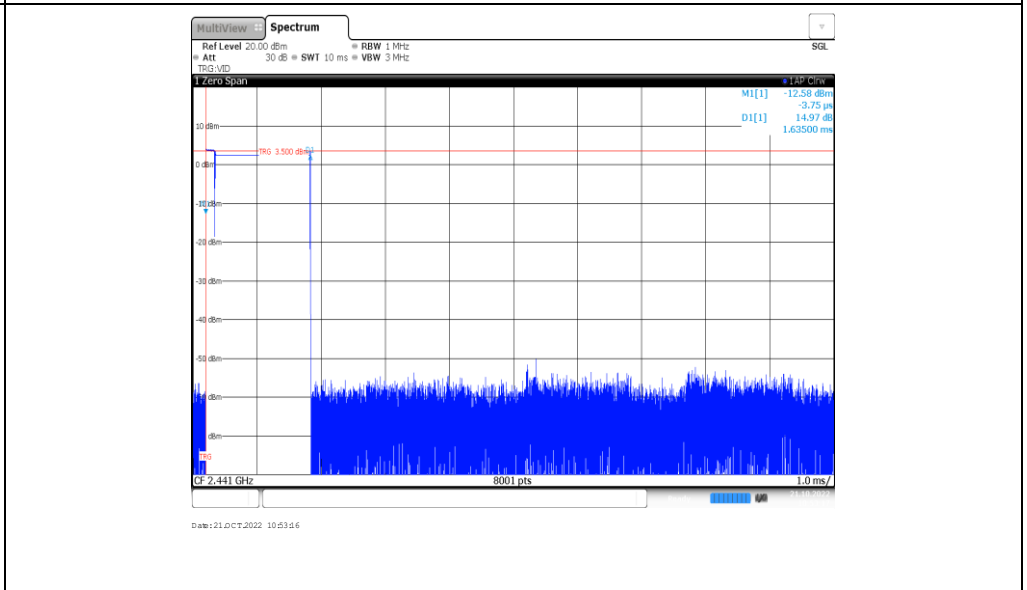
3DH1  
Burst width



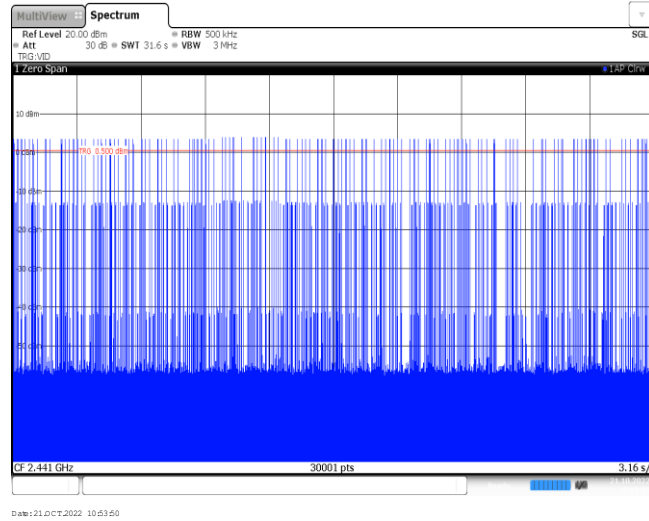
3DH1  
Burst number



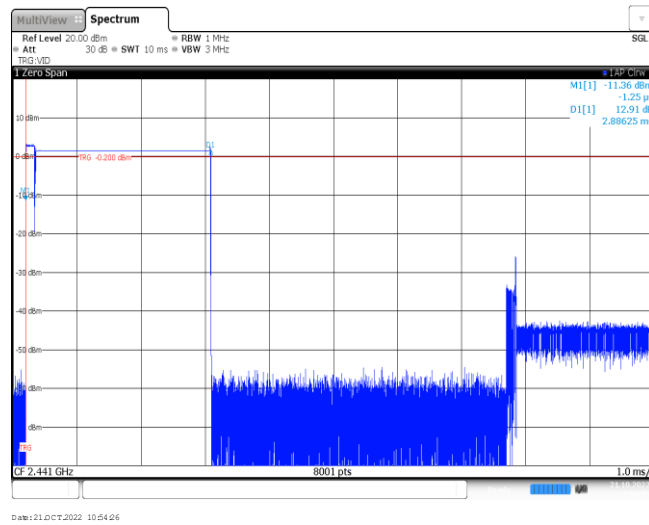
3DH3  
Burst width



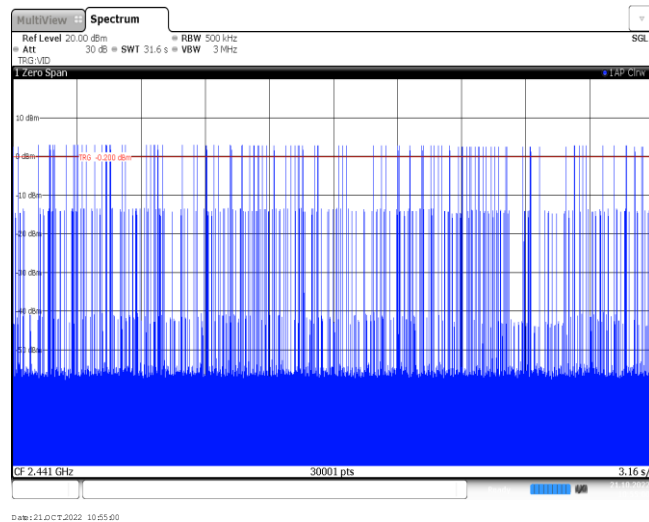
3DH3  
Burst number



3DH5  
Burst width



3DH5  
Burst number

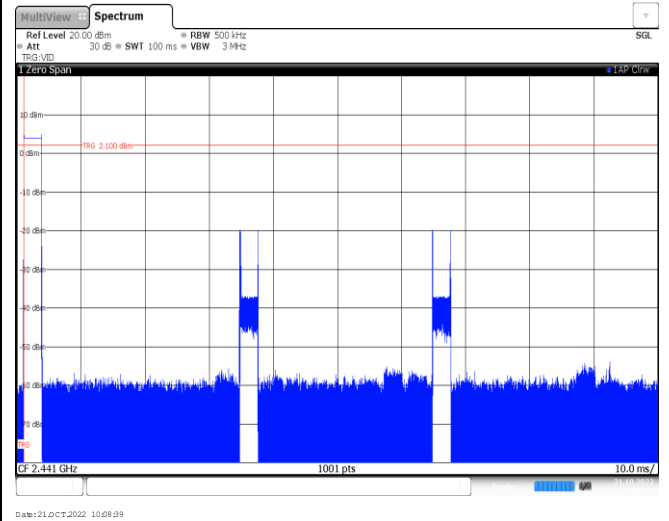
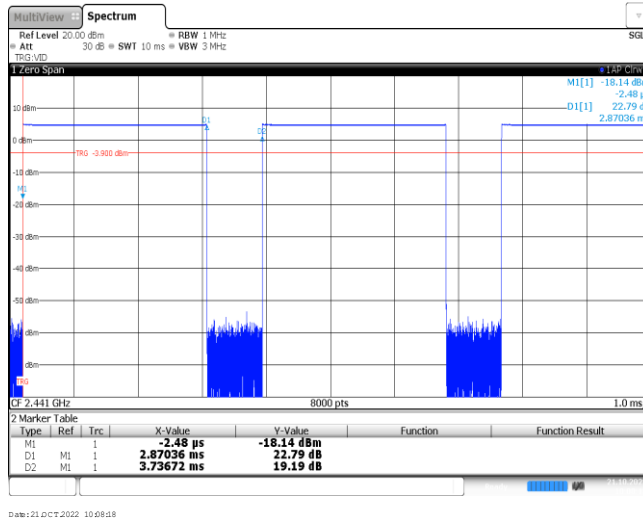




**Appendix G: Duty Cycle Correction Factor (DCCF)**

DCCF Calculate Formula					
DCCF=20 * Log(duty cycle) = 20 * Log( $T_{\text{on time}} / T_{\text{period}}$ )					
Modulation type	Test Frequency (MHz)	$T_{\text{on time}}$ for single burst [ms]	$T_{\text{period}}$ [ms]	Burst Quantity	DCCF [dB]
GFSK	2441	2.87	100	1	-30.84
$\pi/4$ DQPSK	2441	2.87	100	2	-24.82
8DPSK	2441	2.88	100	2	-24.79

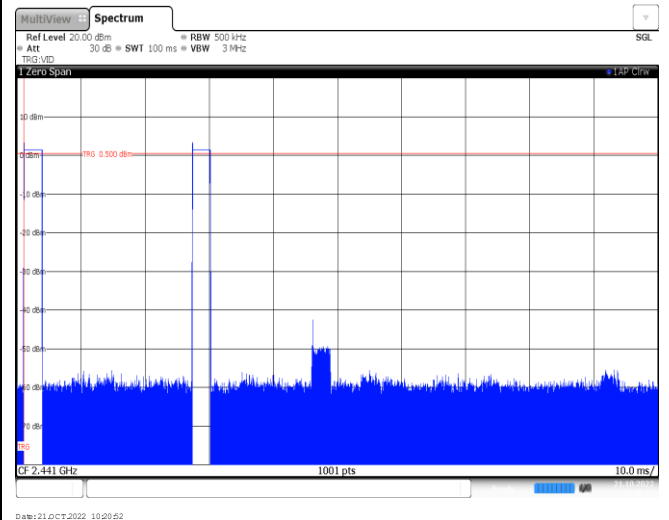
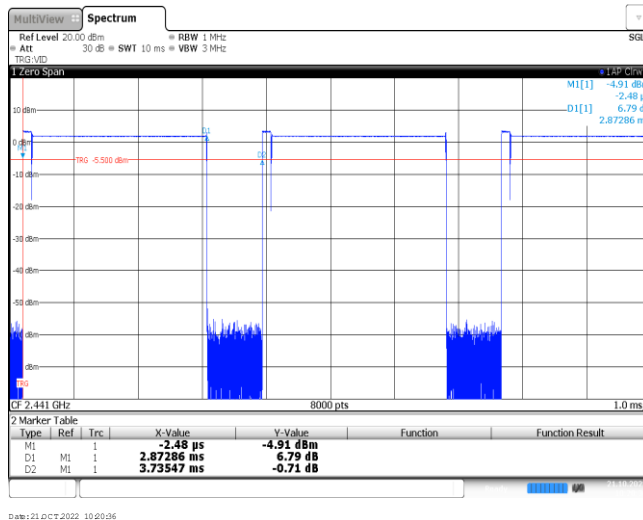
### GFSK



Ton time for single burst

Burst Quantity

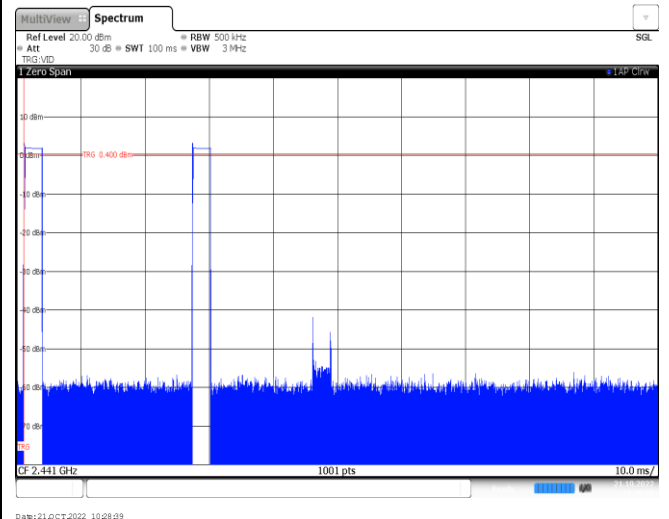
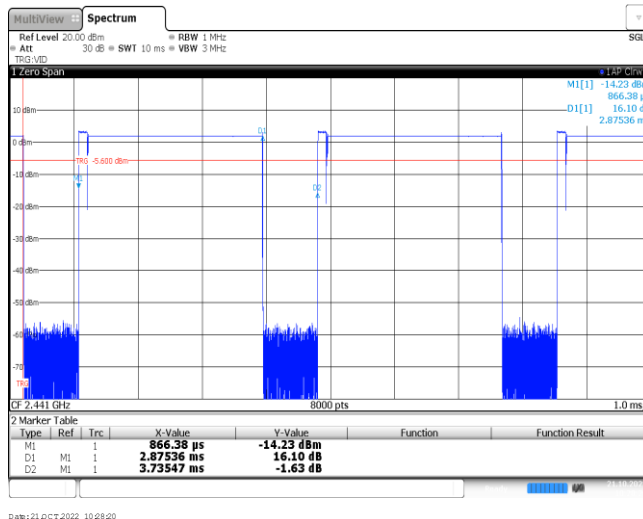
### $\pi/4$ DQPSK



Ton time for single burst

Burst Quantity

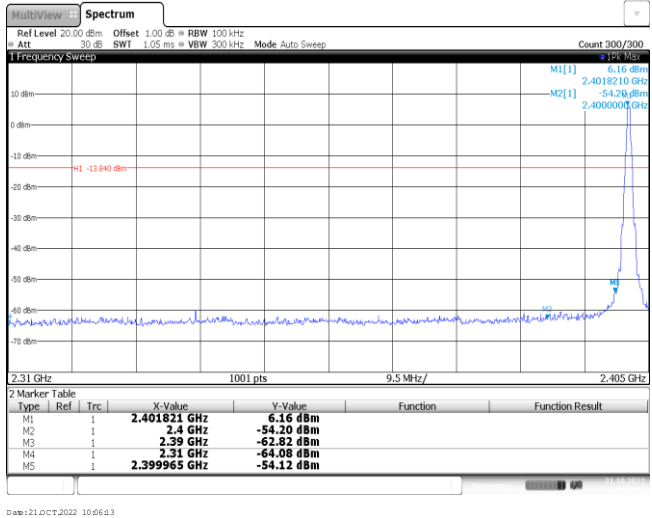
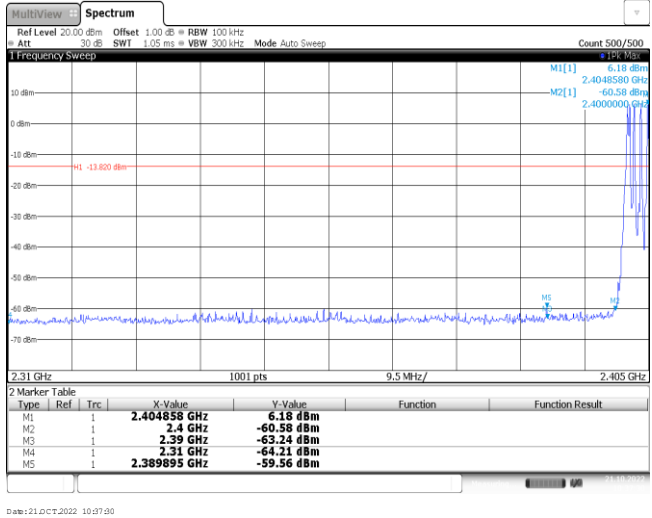
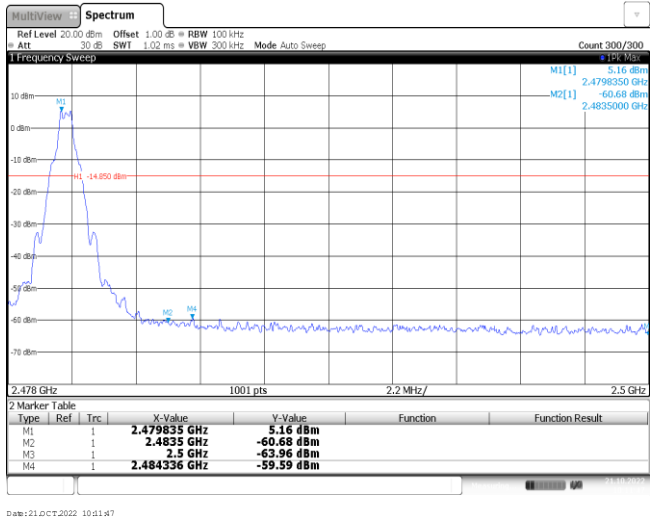
### 8DPSK



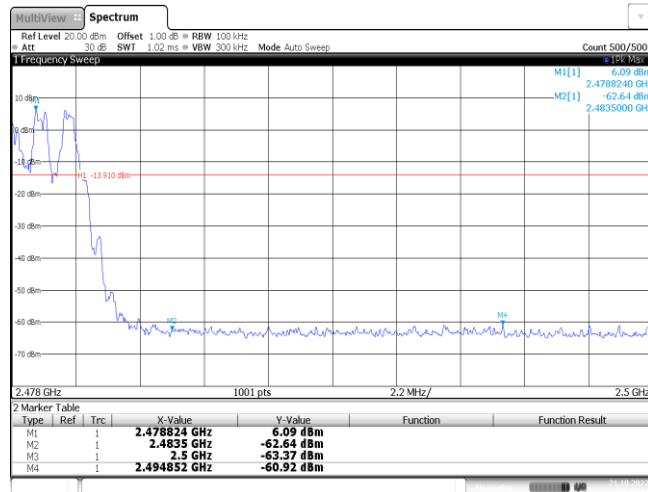
Ton time for single burst

Burst Quantity

**Appendix H: Band edge and Spurious Emissions (conducted)**

Test Item:	Band edge	Modulation type:	GFSK
<p>CH00 No hopping mode</p>			
<p>CH00 Hopping mode</p>			
<p>CH78 No hopping mode</p>			

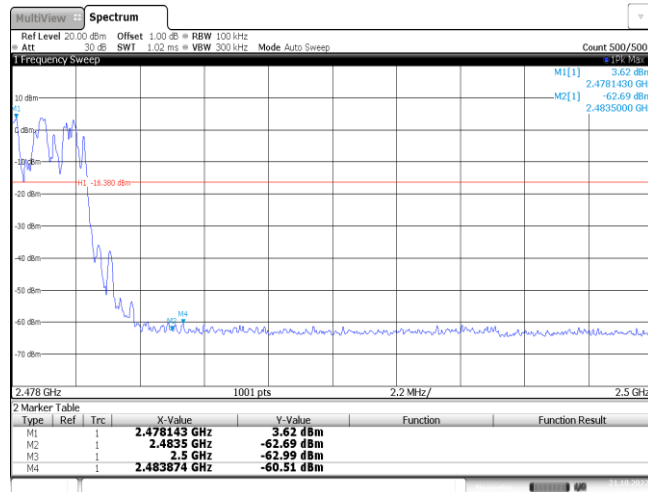
CH78  
Hopping mode



Date: 21 OCT 2022 10:07:44

Test Item:	Band edge	Modulation type:	π/4DQPSK																																										
<p>CH00 No hopping mode</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>4.36 dBm</td> <td></td> <td></td> </tr> <tr> <td>M2</td> <td>1</td> <td></td> <td>2.4 GHz</td> <td>-53.70 dBm</td> <td></td> <td></td> </tr> <tr> <td>M3</td> <td>1</td> <td></td> <td>2.39 GHz</td> <td>-63.00 dBm</td> <td></td> <td></td> </tr> <tr> <td>M4</td> <td>1</td> <td></td> <td>2.31 GHz</td> <td>-64.42 dBm</td> <td></td> <td></td> </tr> <tr> <td>M5</td> <td>1</td> <td></td> <td>2.399965 GHz</td> <td>-55.00 dBm</td> <td></td> <td></td> </tr> </tbody> </table> <p>Date: 21.OCT.2022 10:17:06</p>			Type	Ref	Trc	X-Value	Y-Value	Function	Function Result	M1	1		2.401821 GHz	4.36 dBm			M2	1		2.4 GHz	-53.70 dBm			M3	1		2.39 GHz	-63.00 dBm			M4	1		2.31 GHz	-64.42 dBm			M5	1		2.399965 GHz	-55.00 dBm		
Type	Ref	Trc	X-Value	Y-Value	Function	Function Result																																							
M1	1		2.401821 GHz	4.36 dBm																																									
M2	1		2.4 GHz	-53.70 dBm																																									
M3	1		2.39 GHz	-63.00 dBm																																									
M4	1		2.31 GHz	-64.42 dBm																																									
M5	1		2.399965 GHz	-55.00 dBm																																									
<p>CH00 Hopping mode</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>2.403149 GHz</td> <td>4.32 dBm</td> <td></td> <td></td> </tr> <tr> <td>M2</td> <td>1</td> <td></td> <td>2.4 GHz</td> <td>-54.57 dBm</td> <td></td> <td></td> </tr> <tr> <td>M3</td> <td>1</td> <td></td> <td>2.39 GHz</td> <td>-63.31 dBm</td> <td></td> <td></td> </tr> <tr> <td>M4</td> <td>1</td> <td></td> <td>2.31 GHz</td> <td>-63.30 dBm</td> <td></td> <td></td> </tr> <tr> <td>M5</td> <td>1</td> <td></td> <td>2.39968 GHz</td> <td>-55.49 dBm</td> <td></td> <td></td> </tr> </tbody> </table> <p>Date: 21.OCT.2022 10:19:27</p>			Type	Ref	Trc	X-Value	Y-Value	Function	Function Result	M1	1		2.403149 GHz	4.32 dBm			M2	1		2.4 GHz	-54.57 dBm			M3	1		2.39 GHz	-63.31 dBm			M4	1		2.31 GHz	-63.30 dBm			M5	1		2.39968 GHz	-55.49 dBm		
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<p>CH78 No hopping mode</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>2.479835 GHz</td> <td>3.83 dBm</td> <td></td> <td></td> </tr> <tr> <td>M2</td> <td>1</td> <td></td> <td>2.4835 GHz</td> <td>-61.16 dBm</td> <td></td> <td></td> </tr> <tr> <td>M3</td> <td>1</td> <td></td> <td>2.5 GHz</td> <td>-63.14 dBm</td> <td></td> <td></td> </tr> <tr> <td>M4</td> <td>1</td> <td></td> <td>2.483984 GHz</td> <td>-59.45 dBm</td> <td></td> <td></td> </tr> </tbody> </table> <p>Date: 21.OCT.2022 10:23:17</p>			Type	Ref	Trc	X-Value	Y-Value	Function	Function Result	M1	1		2.479835 GHz	3.83 dBm			M2	1		2.4835 GHz	-61.16 dBm			M3	1		2.5 GHz	-63.14 dBm			M4	1		2.483984 GHz	-59.45 dBm									
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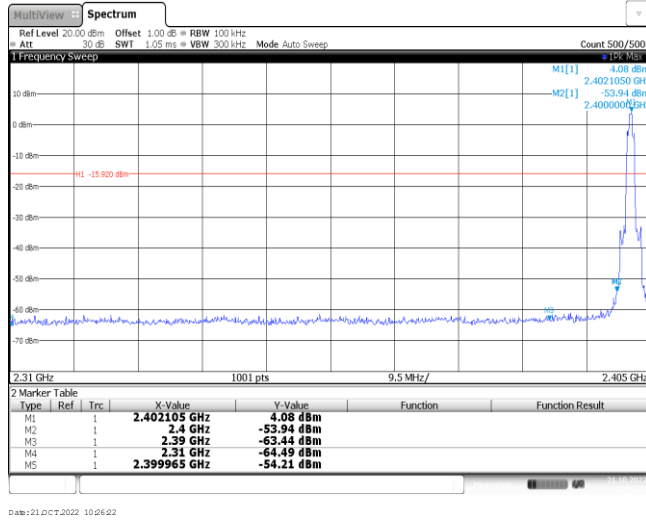
CH78  
Hopping mode



Date: 21 OCT 2022 10:09:58

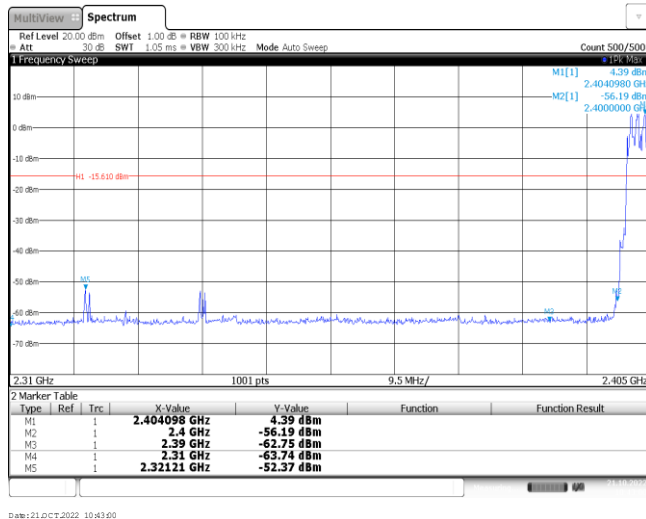
<b>Test Item:</b>	<b>Band edge</b>	<b>Modulation type:</b>	<b>8DPSK</b>
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CH00  
No hopping mode



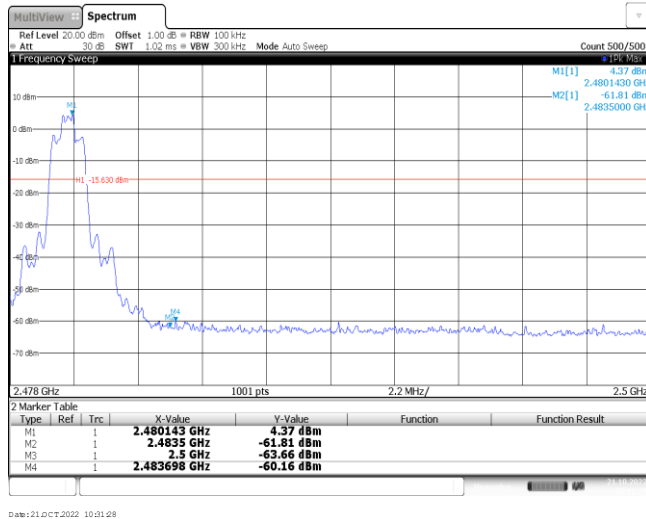
Date: 21.OCT.2022 10:26:22

CH00  
Hopping mode



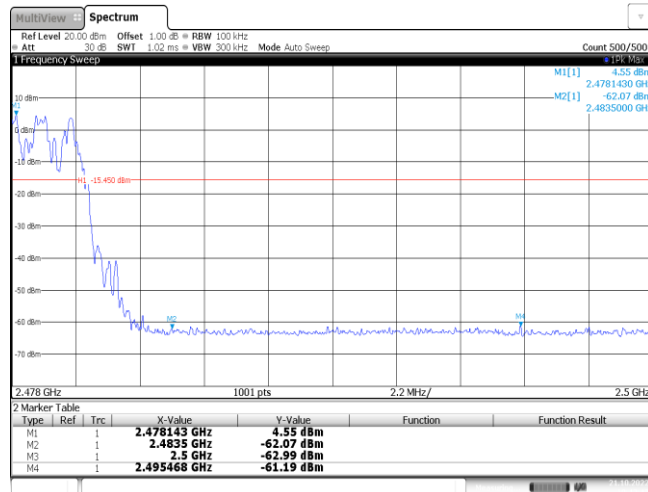
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CH78  
No hopping mode



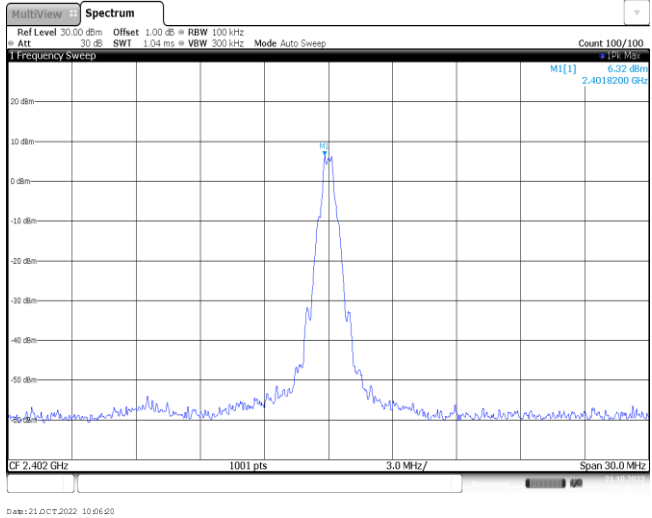
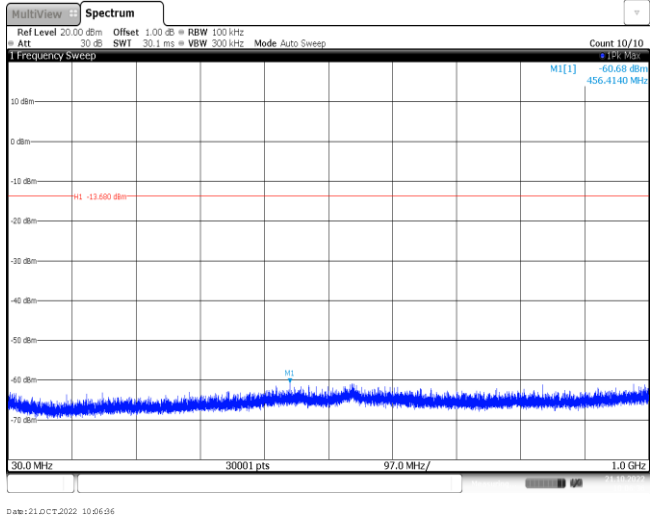
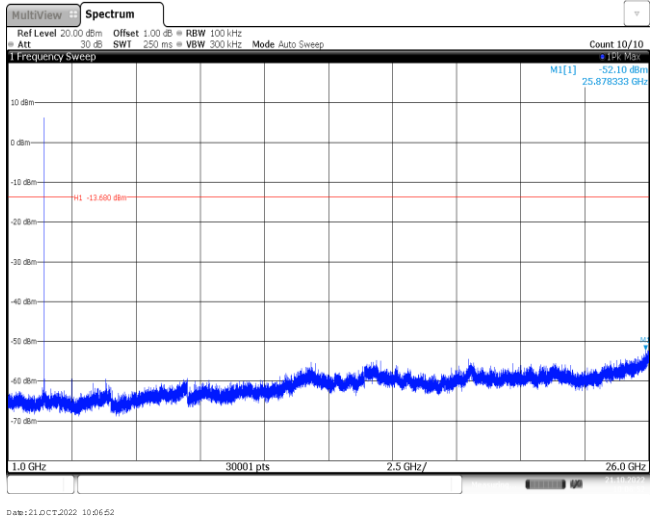
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CH78  
Hoppig mode



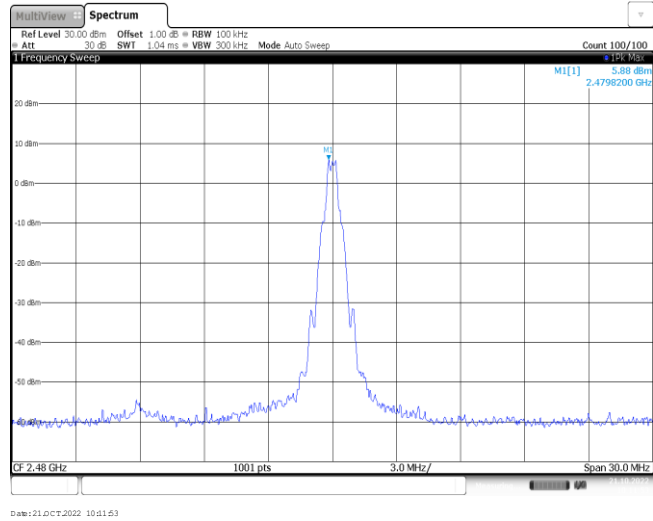
Date: 21 OCT 2022 10:43:42



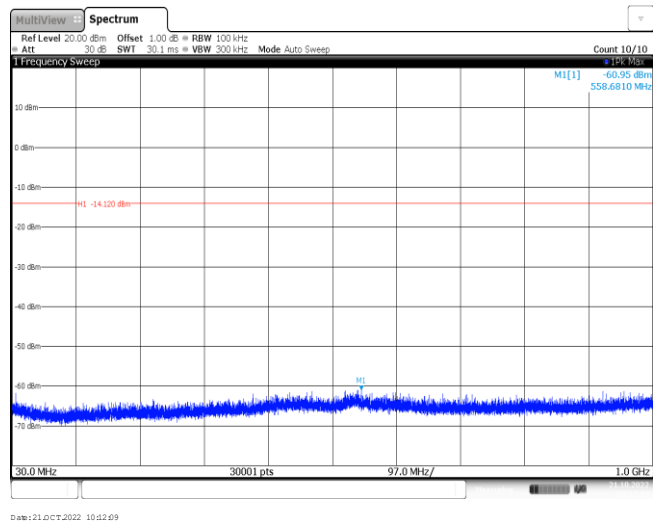
Test Item:	Spurious Emission	Modulation type:	GFSK
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<p>CH00 30MHz~1000MHz</p>			
<p>CH00 1GHz~26GHz</p>			

<p>CH39 Reference level</p>	<p>Date: 21.OCT.2022 10:09:58</p>
<p>CH39 30MHz~1000MHz</p>	<p>Date: 21.OCT.2022 10:09:14</p>
<p>CH39 1GHz~26GHz</p>	<p>Date: 21.OCT.2022 10:09:20</p>

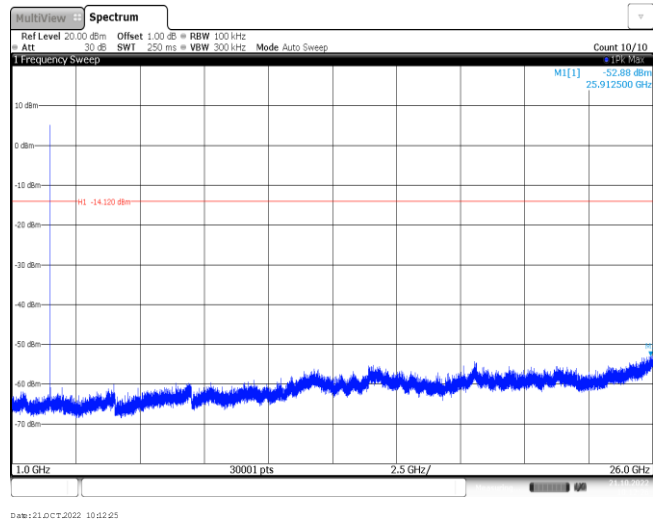
CH78  
Reference level

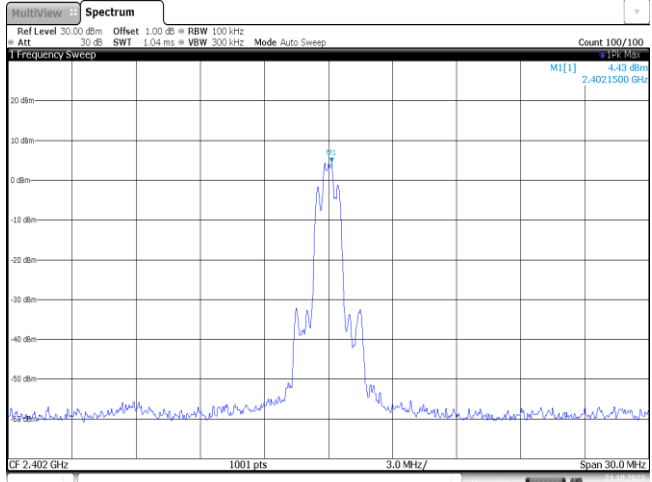
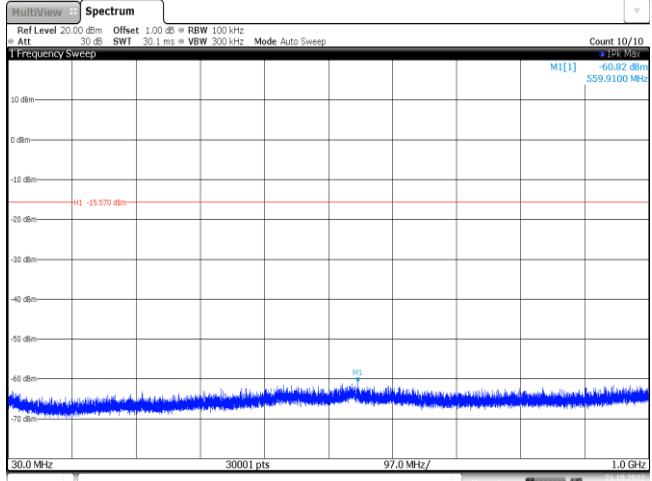
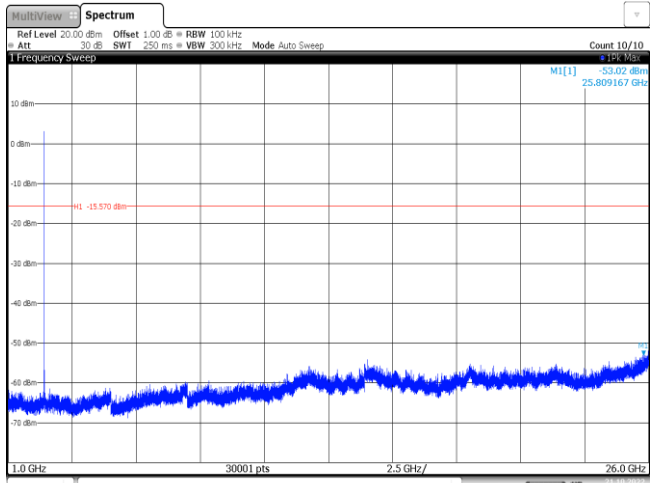


CH78  
30MHz~1000MHz



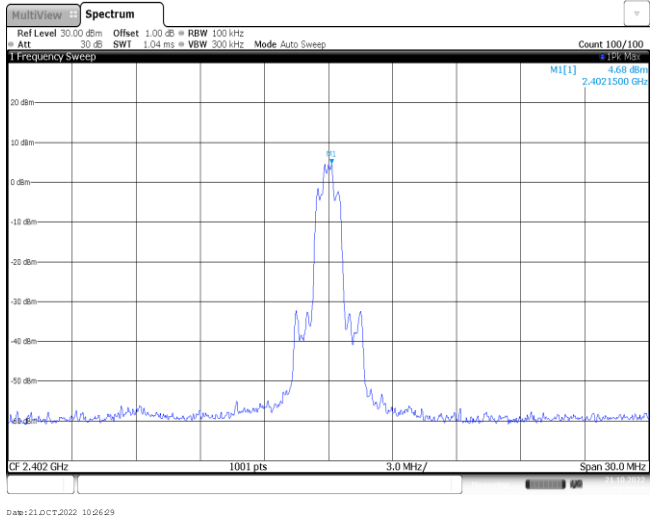
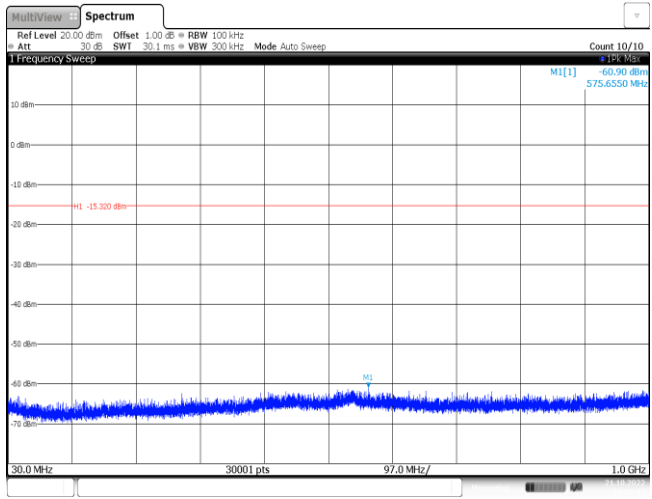
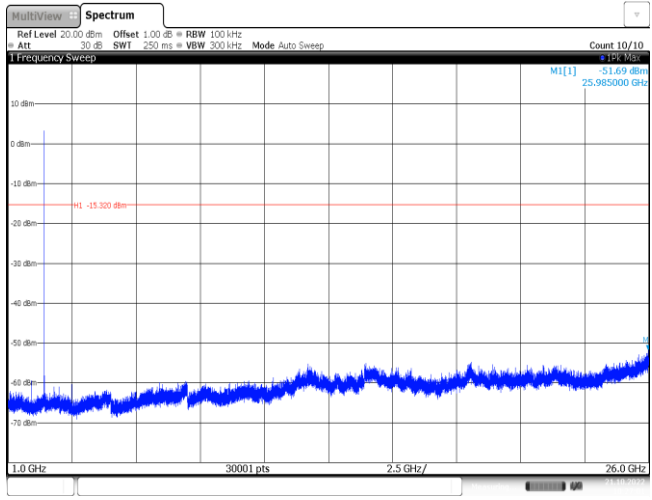
CH78  
1GHz~26GHz



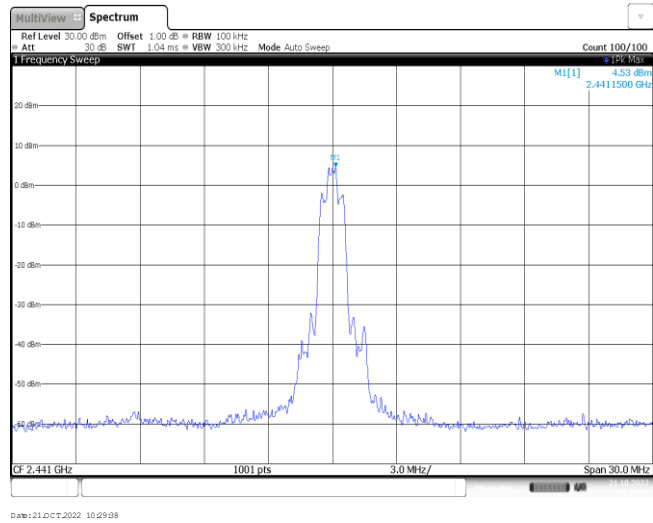
Test Item:	Spurious Emission	Modulation type:	π/4DQPSK
<p>CH00 Reference level</p>	 <p>Date: 21.OCT.2022 10:17:42</p>		
<p>CH00 30MHz~1000MHz</p>	 <p>Date: 21.OCT.2022 10:17:29</p>		
<p>CH00 1GHz~26GHz</p>	 <p>Date: 21.OCT.2022 10:17:44</p>		

<p>CH39 Reference level</p>	<p>Ref Level 30.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SWF 1.04 ms VBW 300 kHz Mode Auto Sweep Count 100/100 MI[1] 4.45 dBm 2.4408200 GHz</p> <p>CF 2.441 GHz 1001 pts 3.0 MHz/ Span 30.0 MHz</p> <p>Date: 21.OCT.2022 10:21:44</p>
<p>CH39 30MHz~1000MHz</p>	<p>Ref Level 20.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SWF 30.1 ms VBW 300 kHz Mode Auto Sweep Count 10/10 MI[1] -59.06 dBm 554.5100 MHz</p> <p>MI -15.550 dBm</p> <p>30.0 MHz 30001 pts 97.0 MHz/ 1.0 GHz</p> <p>Date: 21.OCT.2022 10:21:29</p>
<p>CH39 1GHz~26GHz</p>	<p>Ref Level 20.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SWF 250 ms VBW 300 kHz Mode Auto Sweep Count 10/10 MI[1] -52.20 dBm 25.982500 GHz</p> <p>MI -15.550 dBm</p> <p>1.0 GHz 30001 pts 2.5 GHz/ 26.0 GHz</p> <p>Date: 21.OCT.2022 10:21:46</p>

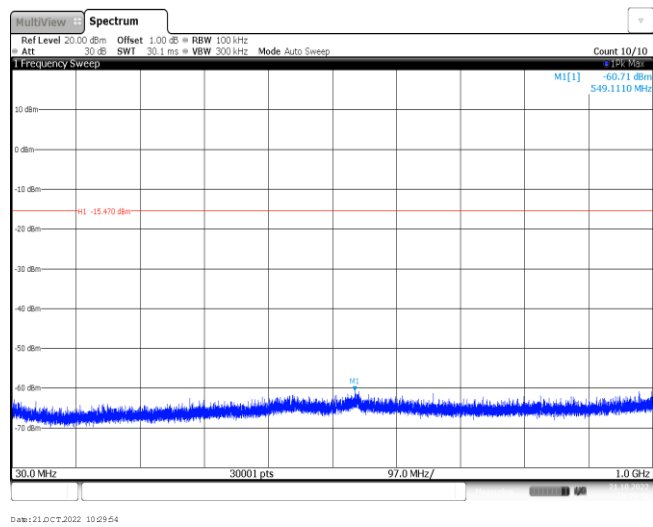
<p>CH78 Reference level</p>	<p>Ref Level 30.00 dBm Offset 1.00 dB RBW 100 kHz Att -30 dB SWF 1.04 ms VBW 300 kHz Mode Auto Sweep Count 100/100 M1[1] 4.16 dBm 2.4801500 GHz CF 2.48 GHz 1001 pts 3.0 MHz/ Span 30.0 MHz Date: 21.OCT.2022 10:24:07</p>
<p>CH78 30MHz~1000MHz</p>	<p>Ref Level 20.00 dBm Offset 1.00 dB RBW 100 kHz Att -30 dB SWF 30.1 ms VBW 300 kHz Mode Auto Sweep Count 10/10 M1[1] -60.67 dBm 465.6290 MHz M1 -15.940 dBm 30.0 MHz 30001 pts 97.0 MHz/ 1.0 GHz Date: 21.OCT.2022 10:24:23</p>
<p>CH78 1GHz~26GHz</p>	<p>Ref Level 20.00 dBm Offset 1.00 dB RBW 100 kHz Att -30 dB SWF 250 ms VBW 300 kHz Mode Auto Sweep Count 10/10 M1[1] -52.51 dBm 25.984167 GHz M1 -15.940 dBm 1.0 GHz 30001 pts 25 GHz/ 26.0 GHz Date: 21.OCT.2022 10:24:39</p>

Test Item:	Spurious Emission	Modulation type:	8DPSK
<p>CH00 Reference level</p>	 <p>Date: 21.OCT.2022 10:26:29</p>		
<p>CH00 30MHz~1000MHz</p>	 <p>Date: 21.OCT.2022 10:26:45</p>		
<p>CH00 1GHz~26GHz</p>	 <p>Date: 21.OCT.2022 10:27:01</p>		

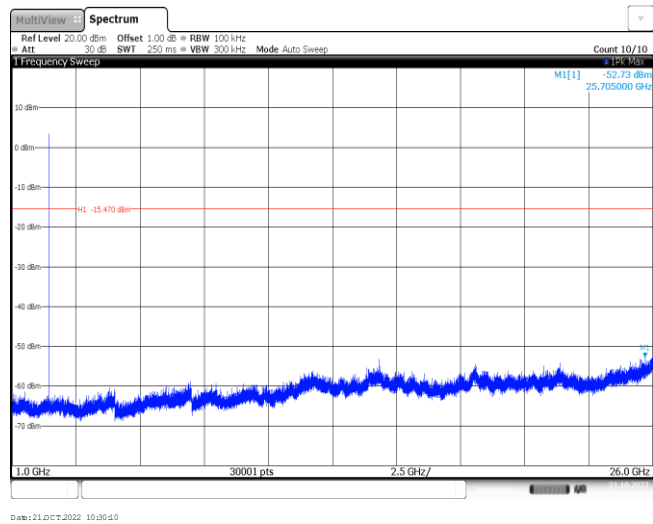
CH39  
Reference level



CH39  
30MHz~1000MHz

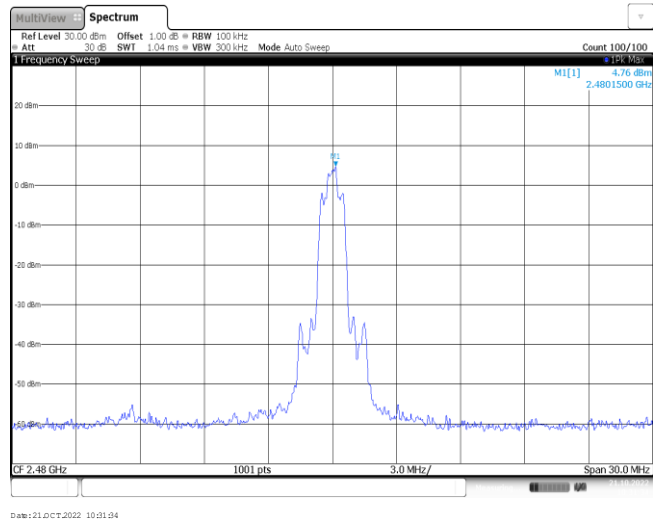


CH39  
1GHz~26GHz

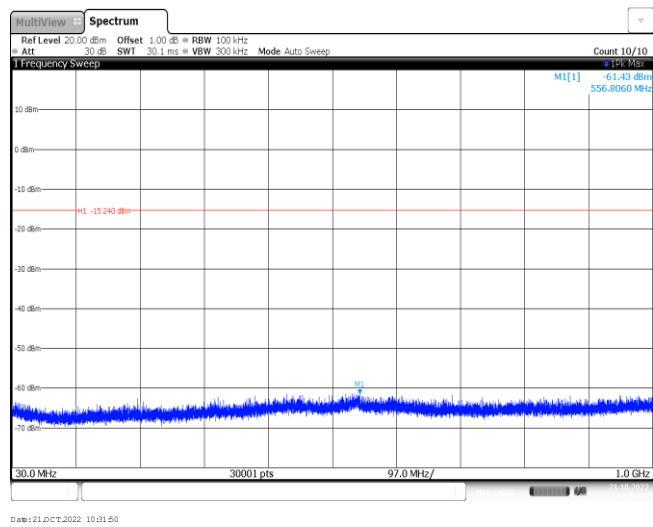




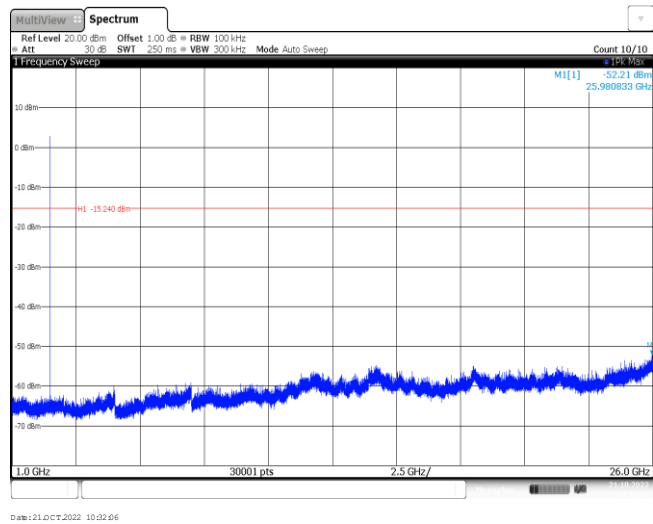
CH78  
Reference level



CH78  
30MHz~1000MHz



CH78  
1GHz~26GHz



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