

APPENDIX REPORT

Project No.	SHT2012093501EW	Radio Specification	Bluetooth EDR
Test sample No.	YPHT20120935003	Model No.	NOBU A60 Pro
Start test date	2020/12/31	Finish date	2020/12/31
Temperature	23.4°C	Humidity	39%
Test Engineer	Hailey Chen	Auditor	Xiaodong Zheo

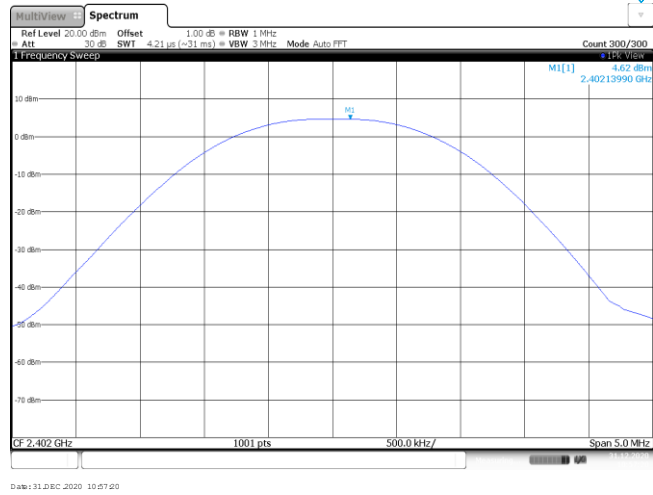
Appendix clause	Test item	Result
A	Peak Output Power	PASS
B	20 dB Bandwidth	PASS
C	99% Occupied Bandwidth	PASS
D	Carrier Frequencies Separation	PASS
E	Hopping Channel Number	PASS
F	Dwell Time	PASS
G	Duty Cycle Correction Factor (DCCF)	PASS
H	Band edge and Spurious Emissions(ducted)	PASS

Appendix A: Peak Output Power

Modulation type	Channel	Output power (dBm)	Average Output power (dBm)	Limit (dBm)	Result
GFSK	00	4.62	4.61	≤ 30.00	Pass
	39	4.62	4.60		
	78	3.77	3.75		
π/4DQPSK	00	4.65	3.95	≤ 21.00	Pass
	39	4.47	3.70		
	78	3.42	2.69		
8DPSK	00	4.71	4.06	≤ 21.00	Pass
	39	4.63	3.92		
	78	3.87	3.27		

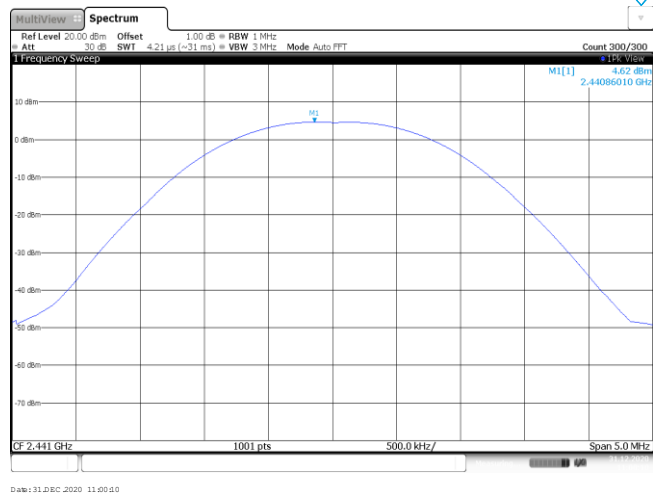
Modulation Type: GFSK

CH00



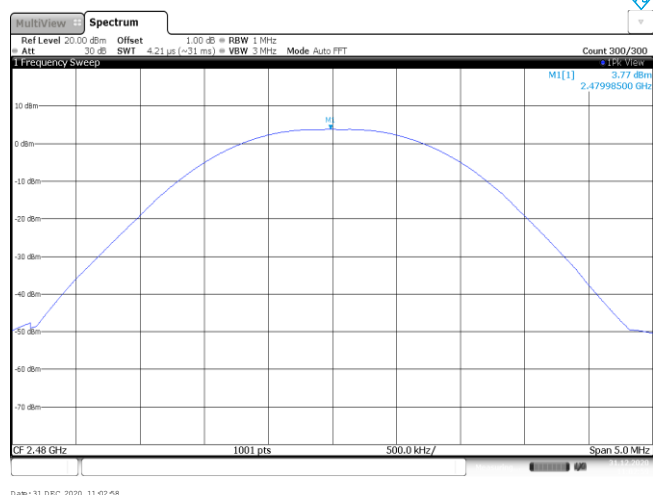
Date: 31.03.2020 10:57:20

CH39



Date: 31.03.2020 11:00:10

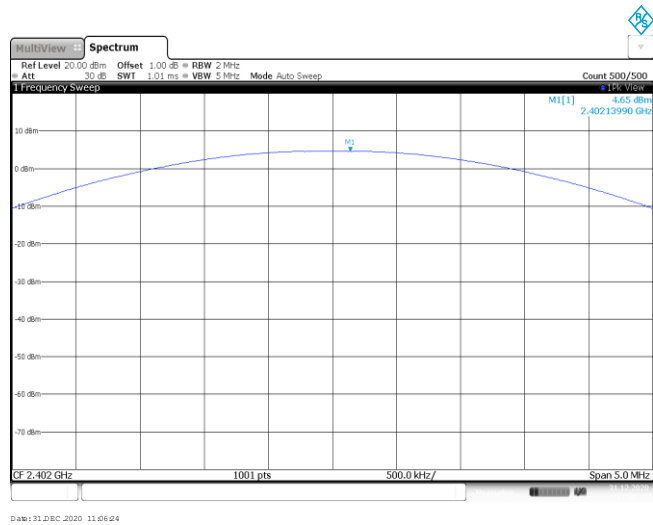
CH78



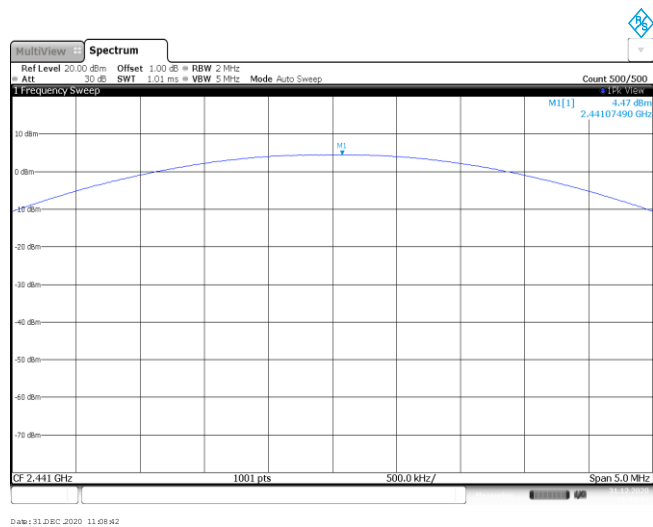
Date: 31.03.2020 11:02:28

Modulation Type: $\pi/4$ DQPSK

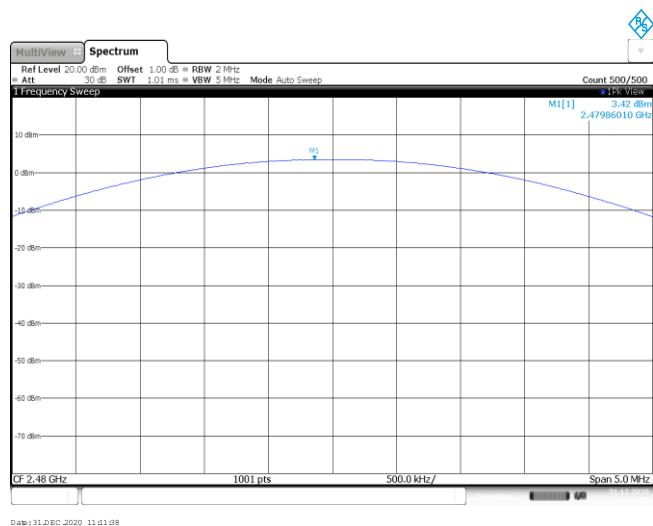
CH00



CH39

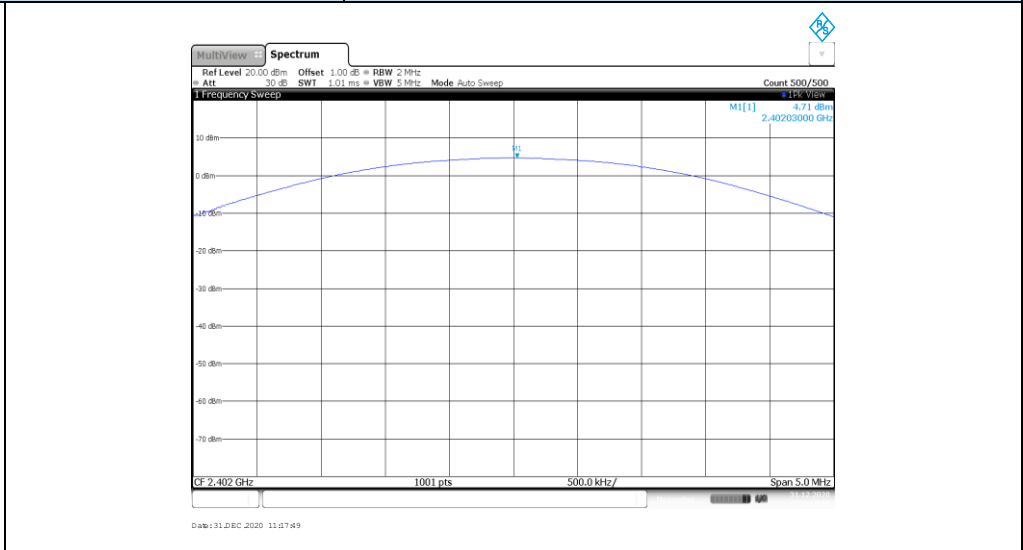


CH78

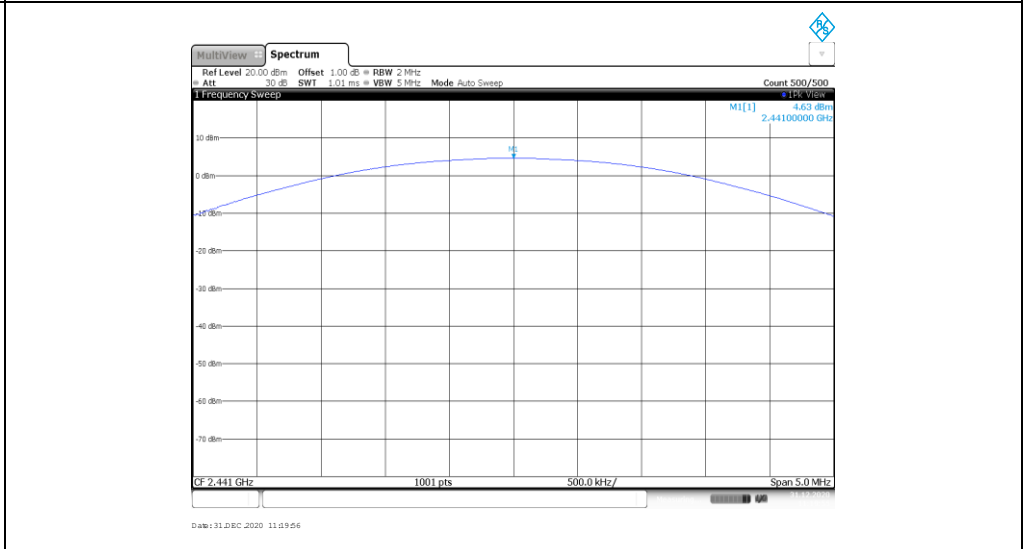


Modulation Type: 8DPSK

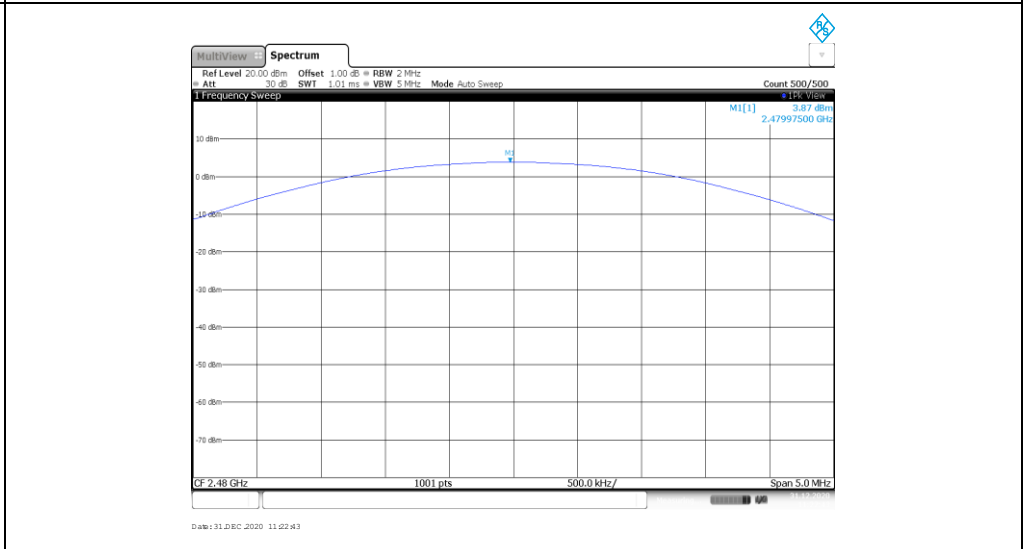
CH00



CH39



CH78

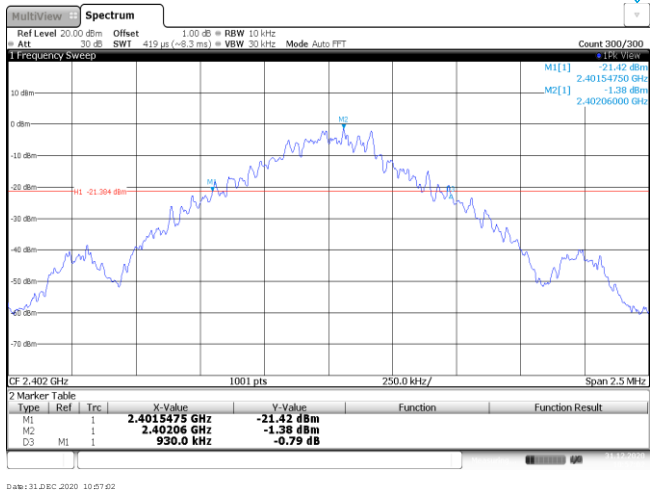


Appendix B : 20 dB Bandwidth

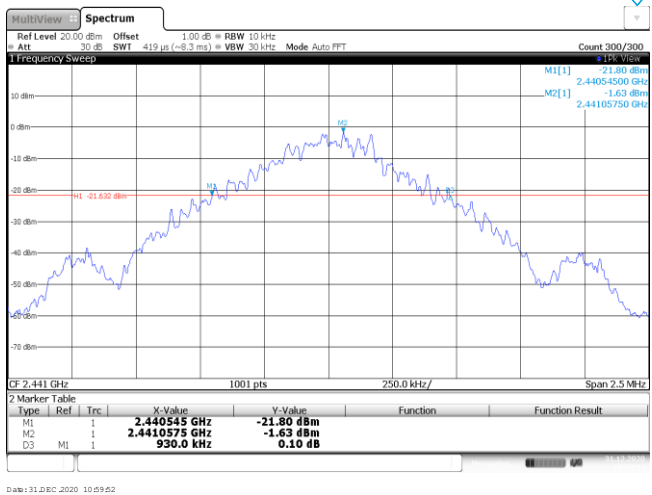
Modulation type	Channel	20 dB Bandwidth (kHz)	Limit (kHz)	Result
GFSK	00	930.00	-	Pass
	39	930.00		
	78	930.00		
$\pi/4$ DQPSK	00	1287.50	-	Pass
	39	1302.50		
	78	1312.50		
8DPSK	00	1280.00	-	Pass
	39	1280.00		
	78	1282.50		

Modulation Type: GFSK

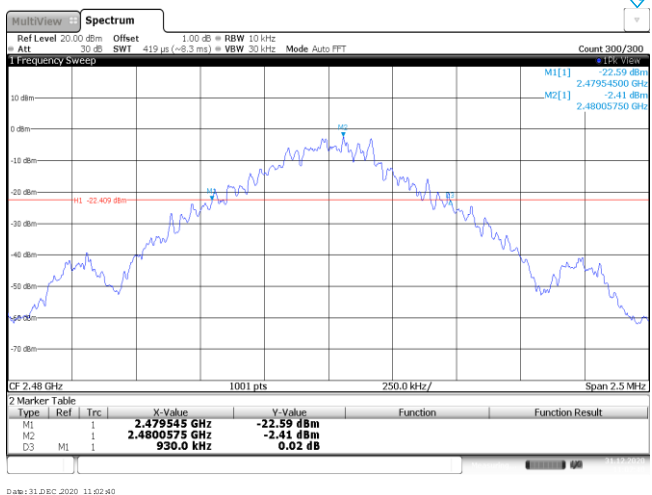
CH00



CH39

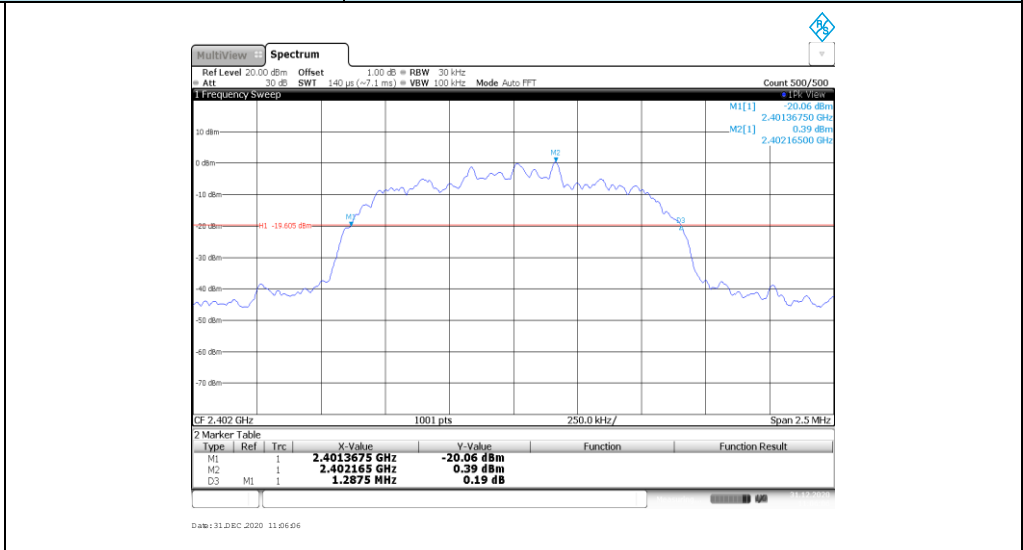


CH78

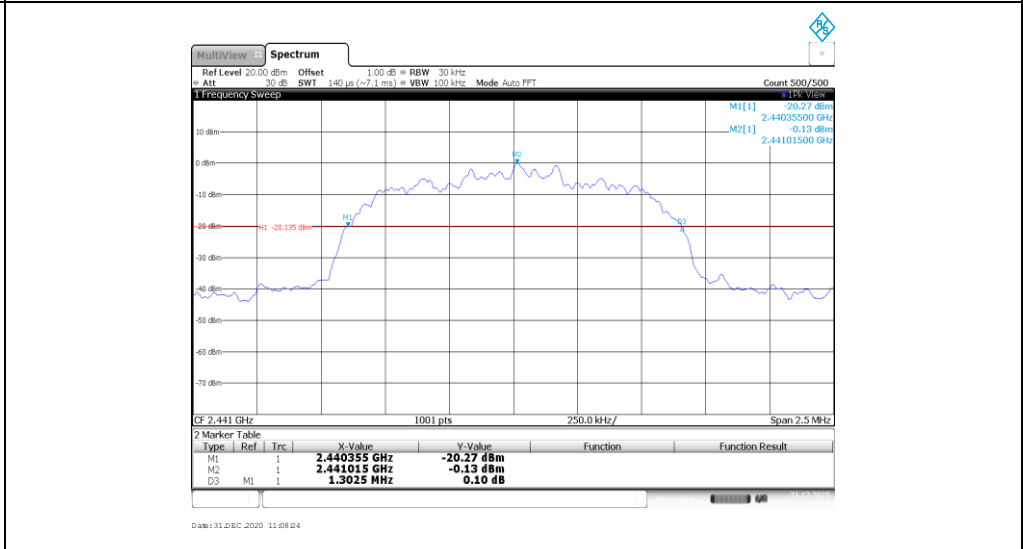


Modulation Type: $\pi/4$ DQPSK

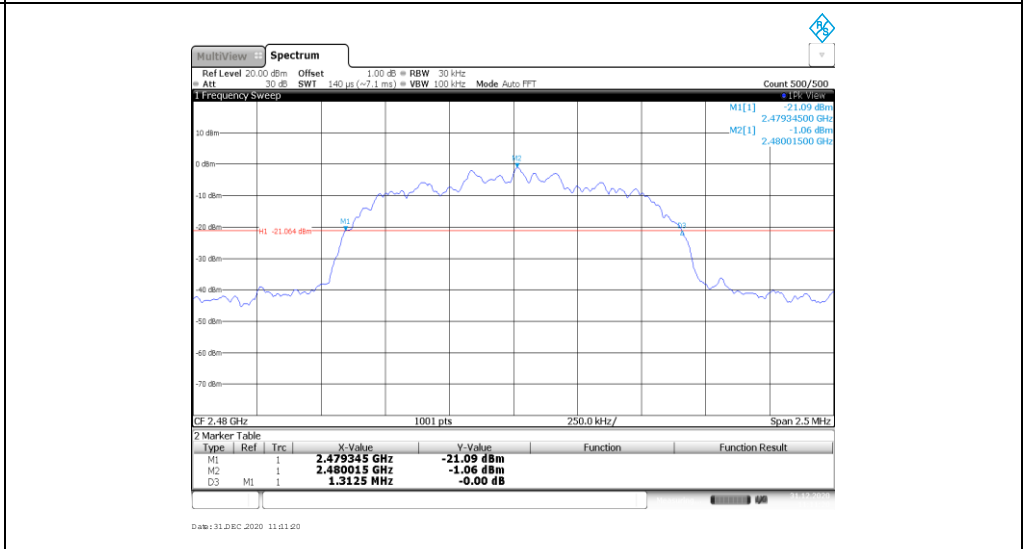
CH00



CH39

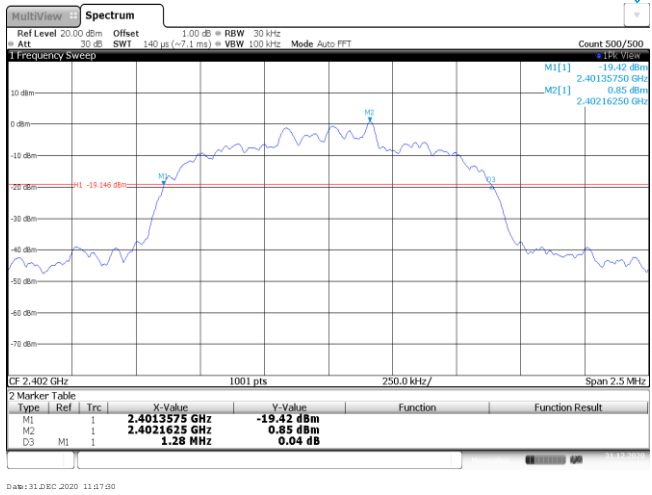


CH78

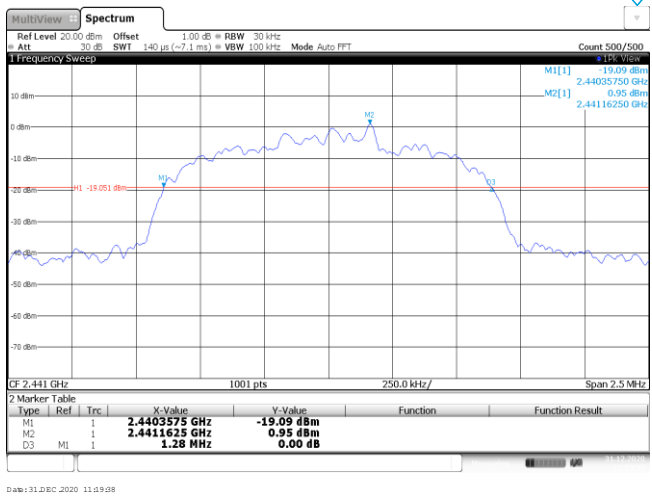


Modulation Type: 8DPSK

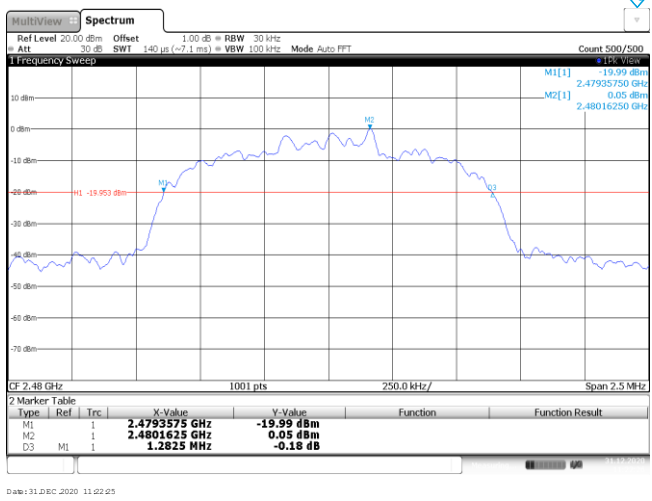
CH00



CH39



CH78

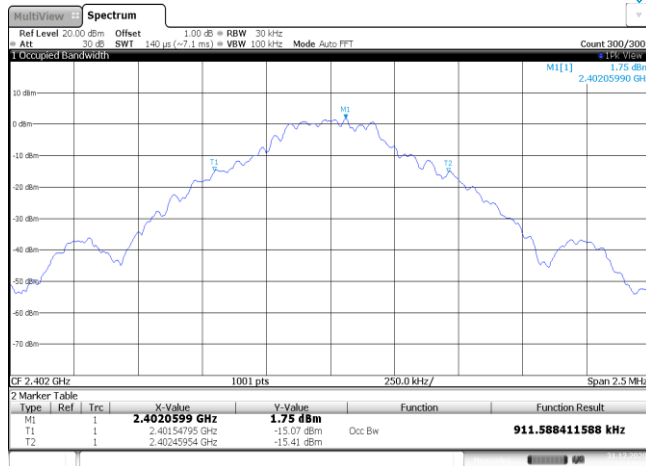


Appendix C: 99% Occupied Bandwidth

Modulation type	Channel	99% Occupied Bandwidth (MHz)	Limit (MHz)	Result
GFSK	00	0.91	-	Pass
	39	0.91		
	78	0.90		
$\pi/4$ DQPSK	00	1.17	-	Pass
	39	1.17		
	78	1.17		
8DPSK	00	1.16	-	Pass
	39	1.16		
	78	1.17		

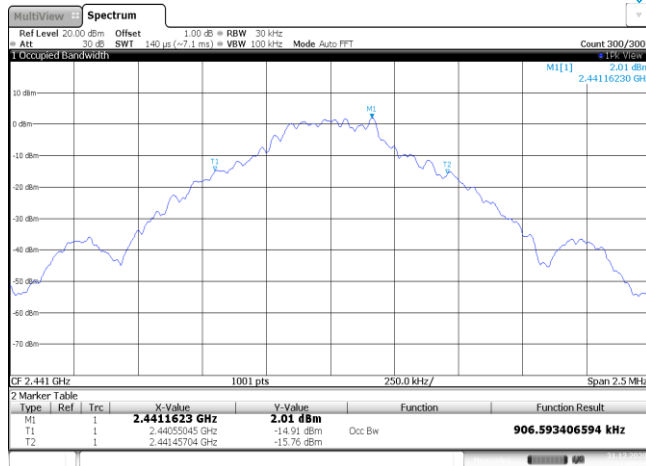
Modulation Type: GFSK

CH00



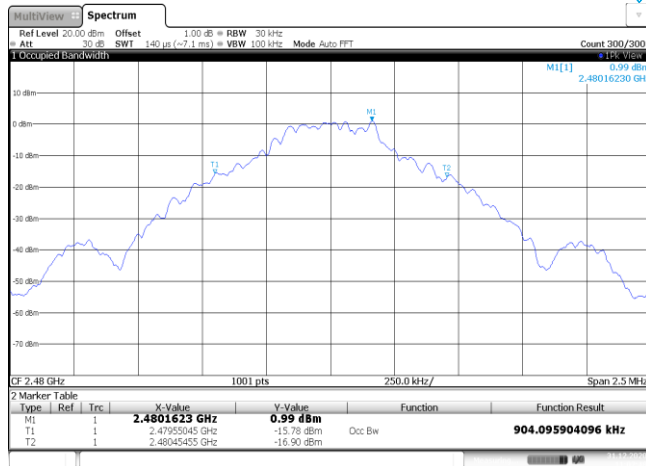
Date: 31.03.2020 10:57:10

CH39



Date: 31.03.2020 11:00:01

CH78



Date: 31.03.2020 11:02:49

Modulation Type: $\pi/4$ DQPSK

CH00



Date: 31.08.2020 11:06:15

CH39



Date: 31.08.2020 11:08:02

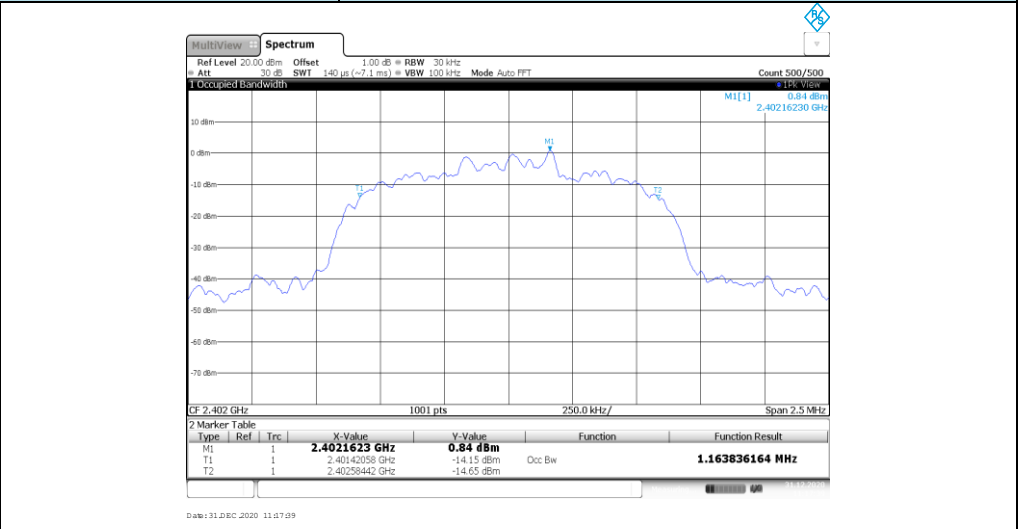
CH78



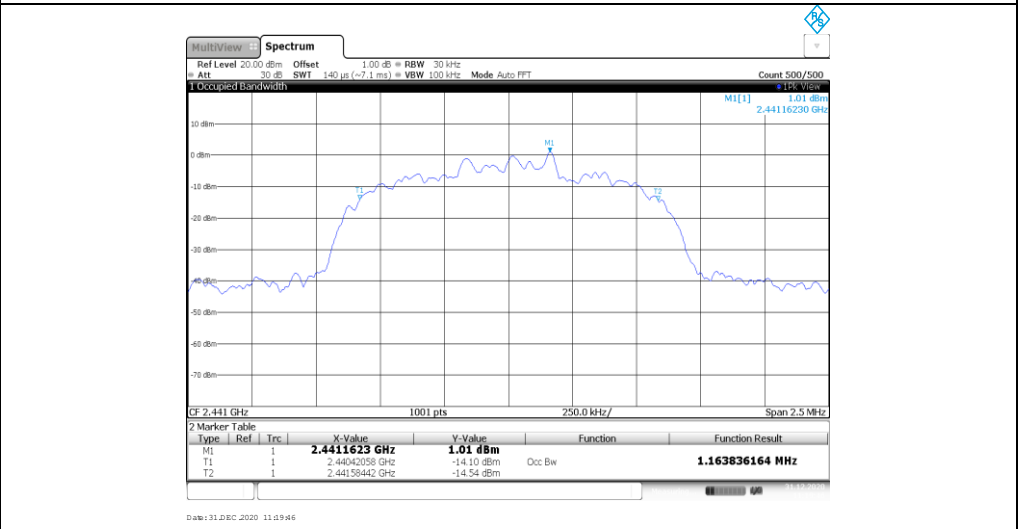
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Modulation Type: 8DPSK

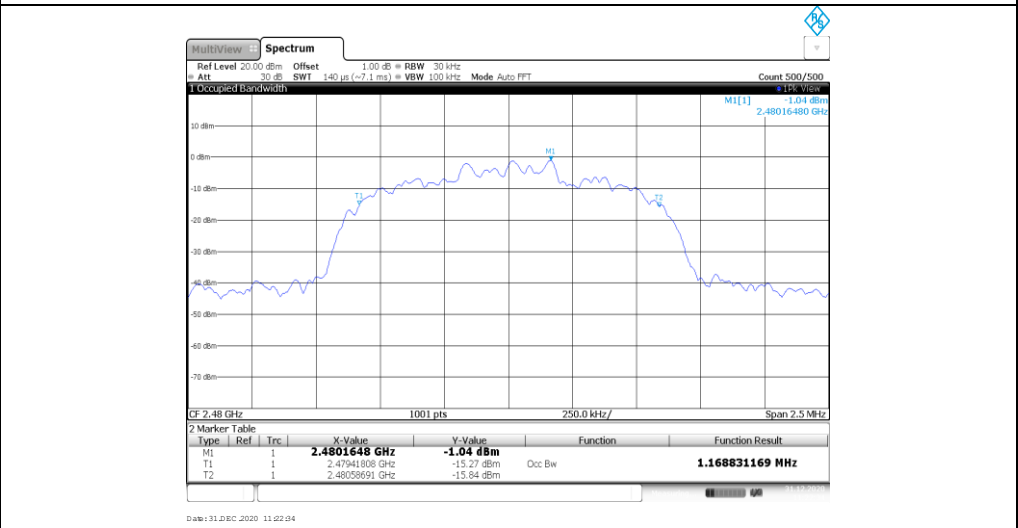
CH00



CH39



CH78



Appendix D: Carrier Frequencies Separation

Modulation type	Channel	Carrier Frequencies Separation (MHz)	Limit (kHz) *	Result
GFSK	39	1.00	≥930.00	Pass
$\pi/4$ DQPSK	39	1.00	≥875.00	Pass
8DPSK	39	1.00	≥855.00	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.

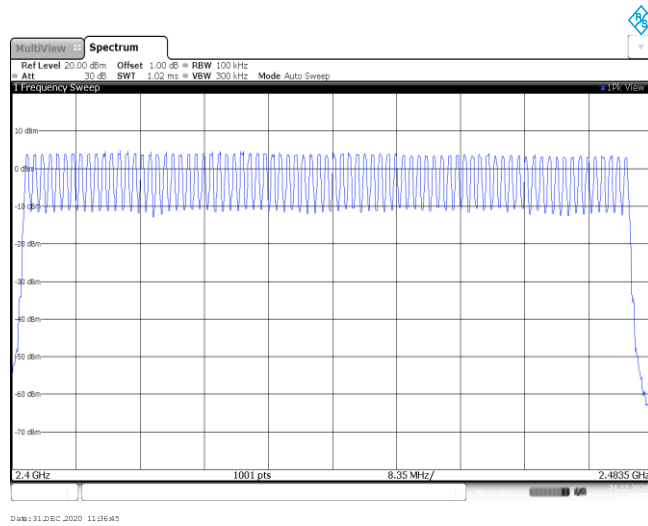
8DPSK limit = $2/3$ * The maximum 20 dB Bandwidth for 8DPSK modulation on the appendix B

<p style="text-align: center;">GFSK</p>	<p>Ref Level 20.00 dBm Offset 1.00 dB RBW 30 kHz Att 30 dB SWI 140 μs (<7.0 ms) VBW 100 kHz Mode Auto FFT Count 100/100 M1[1] 2.44115400 GHz 2.12 dBm D1[1] 2.44115400 GHz -0.51 dBm 999.00 kHz 2.44 GHz 1001 pts 300.0 kHz/ 2.443 GHz Date: 31.Dec.2020 11:05:17</p>
<p style="text-align: center;">$\pi/4$DQPSK</p>	<p>Ref Level 20.00 dBm Offset 1.00 dB RBW 30 kHz Att 30 dB SWI 140 μs (<7.0 ms) VBW 100 kHz Mode Auto FFT Count 100/100 M1[1] 2.44101774 GHz 2.02 dBm D1[1] 2.44101774 GHz 0.92 dBm 1.00810 MHz 2.44 GHz 1001 pts 300.0 kHz/ 2.443 GHz Date: 31.Dec.2020 11:16:09</p>
<p style="text-align: center;">8DPSK</p>	<p>Ref Level 20.00 dBm Offset 1.00 dB RBW 30 kHz Att 30 dB SWI 140 μs (<7.0 ms) VBW 100 kHz Mode Auto FFT Count 100/100 M1[1] 2.44116513 GHz -1.77 dBm D1[1] 2.44116513 GHz 0.10 dBm 1.00110 MHz 2.44 GHz 1001 pts 300.0 kHz/ 2.443 GHz Date: 31.Dec.2020 11:07:04</p>

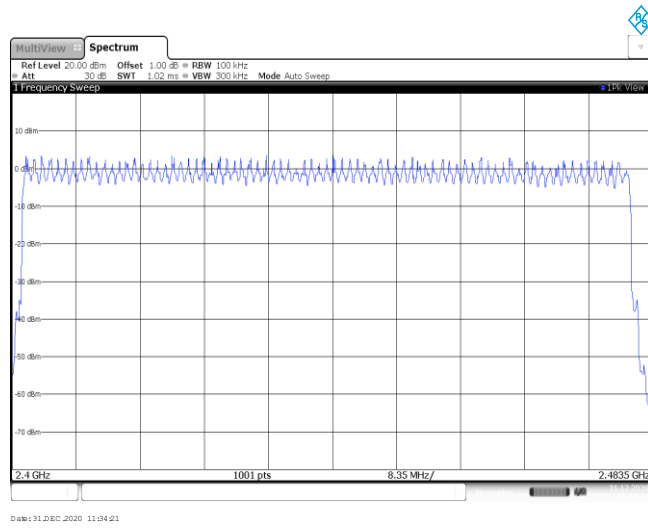
Appendix E: Hopping Channel Number

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

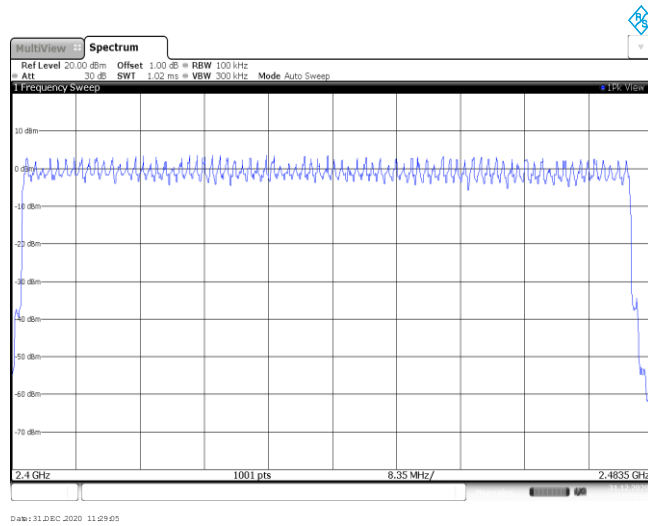
GFSK



$\pi/4$ DQPSK



8DPSK

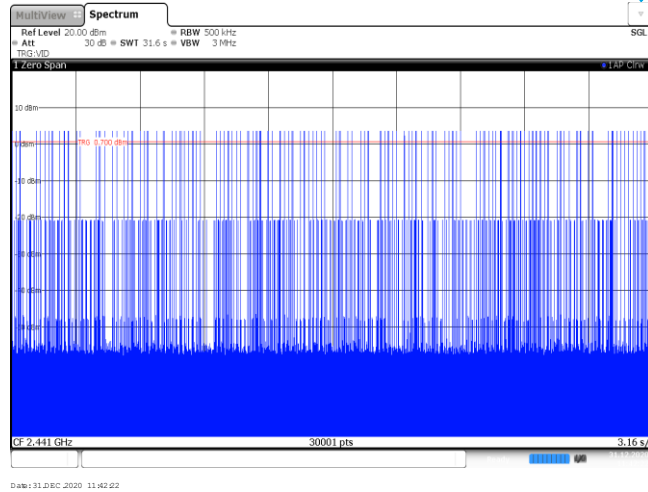


Appendix F: Dwell Time

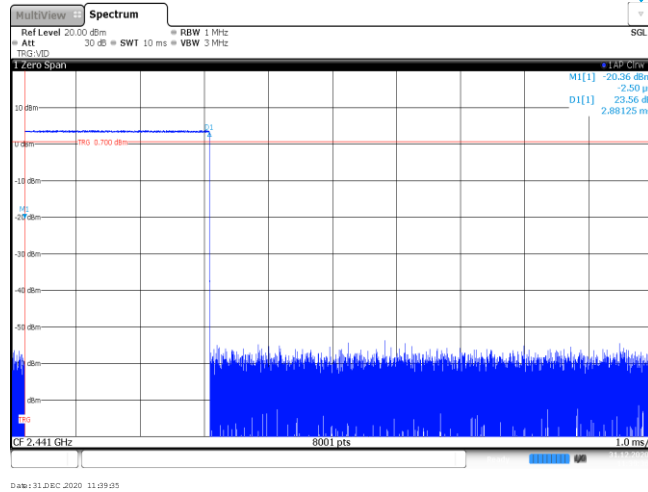
Modulation type	Packet	Burst Width [ms]	Total Hops[hop*ch]	Dwell time (Second)	Limit (Second)	Result
GFSK	DH1	0.38	313	0.12	≤ 0.40	Pass
	DH3	1.63	158	0.26		
	DH5	2.88	125	0.36		
π/4DQPSK	2DH1	0.38	316	0.12	≤ 0.40	Pass
	2DH3	1.64	158	0.26		
	2DH5	2.88	107	0.31		
8DPSK	3DH1	0.38	313	0.12	≤ 0.40	Pass
	3DH3	1.63	157	0.26		
	3DH5	2.89	101	0.29		

Modulation Type: GFSK	
DH1 Burst width	
DH1 Burst number	
DH3 Burst width	

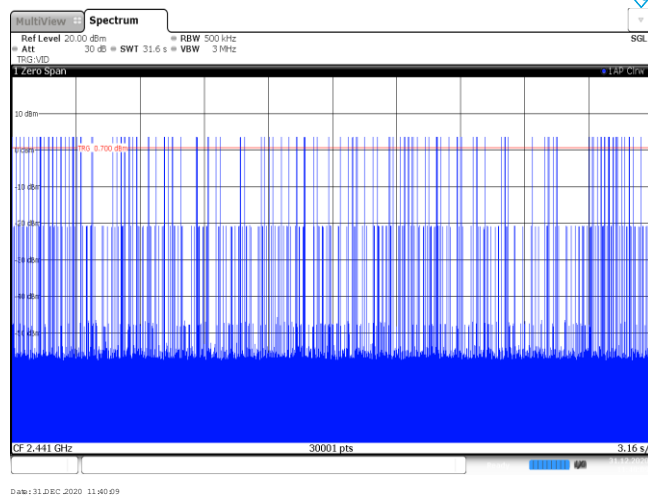
DH3
Burst number

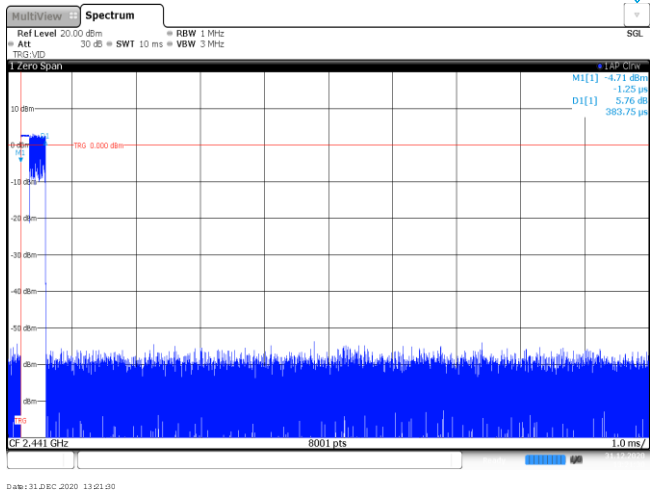
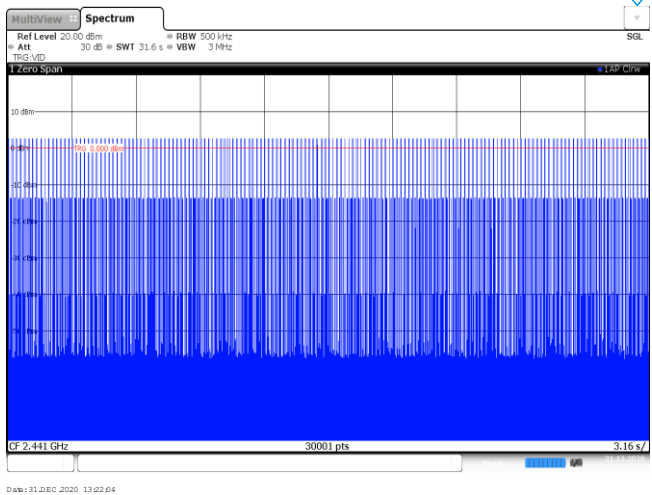
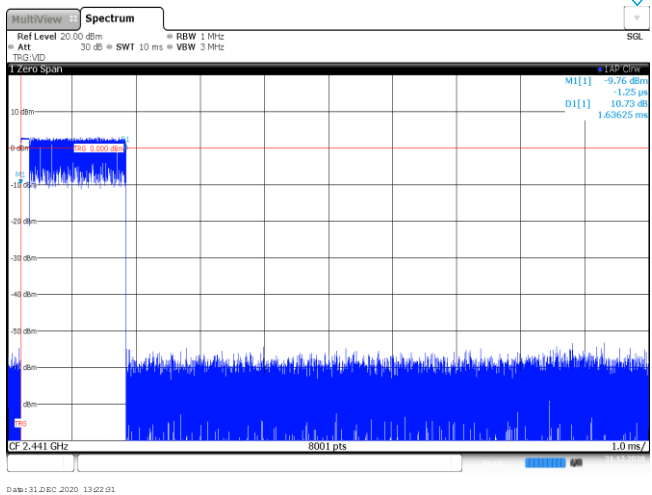


DH5
Burst width

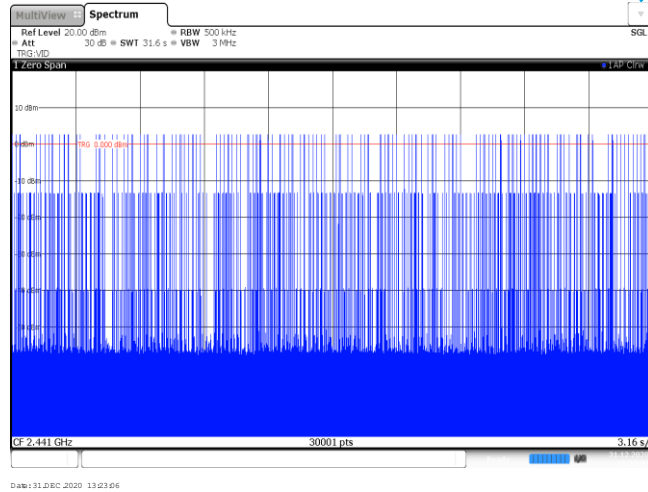


DH5
Burst number

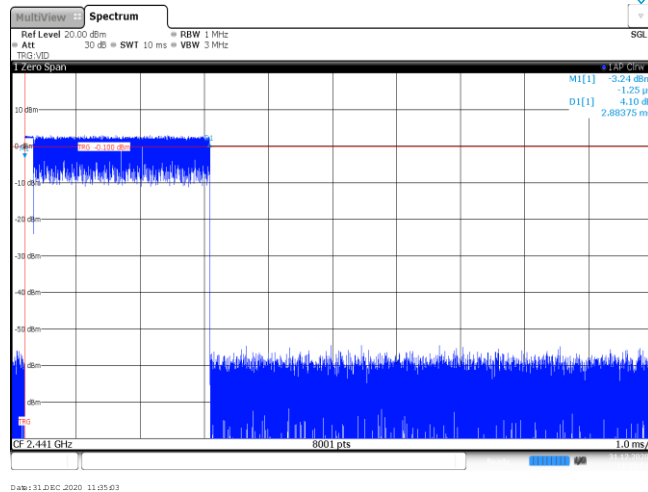


Modulation Type:	$\pi/4$ DQPSK
<p>2DH1 Burst width</p>	 <p>MultiView Spectrum Ref Level 20.00 dBm RBW 1 MHz Att 30 dB SWT 10 ms VBW 3 MHz TRIG:VID 1 Zero Span IAP Cir MI[1] -4.71 dBm D1[1] 5.76 dB 383.75 μs CF 2.441 GHz 8001 pts 1.0 ms/ Date: 31.DEC.2020 13:21:20</p>
<p>2DH1 Burst number</p>	 <p>MultiView Spectrum Ref Level 20.00 dBm RBW 500 kHz Att 30 dB SWT 31.6 s VBW 3 MHz TRIG:VID 1 Zero Span IAP Cir MI[1] -4.71 dBm D1[1] 5.76 dB 383.75 μs CF 2.441 GHz 30001 pts 3.16 s/ Date: 31.DEC.2020 13:22:24</p>
<p>2DH3 Burst width</p>	 <p>MultiView Spectrum Ref Level 20.00 dBm RBW 1 MHz Att 30 dB SWT 10 ms VBW 3 MHz TRIG:VID 1 Zero Span IAP Cir MI[1] -9.76 dBm D1[1] 10.73 dB 1.63625 ms CF 2.441 GHz 8001 pts 1.0 ms/ Date: 31.DEC.2020 13:22:21</p>

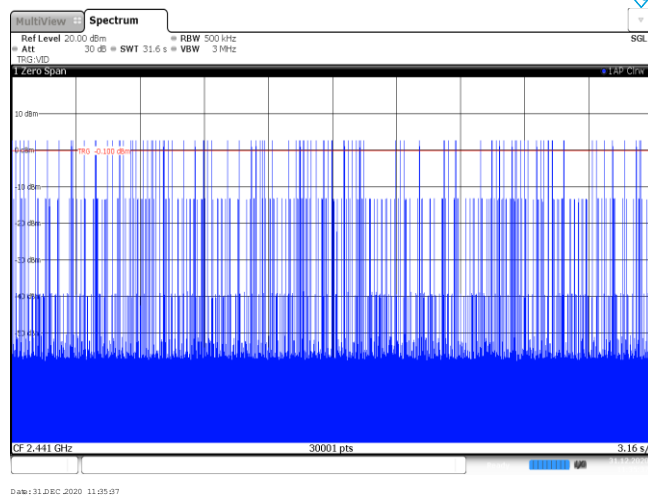
2DH3
Burst number



2DH5
Burst width

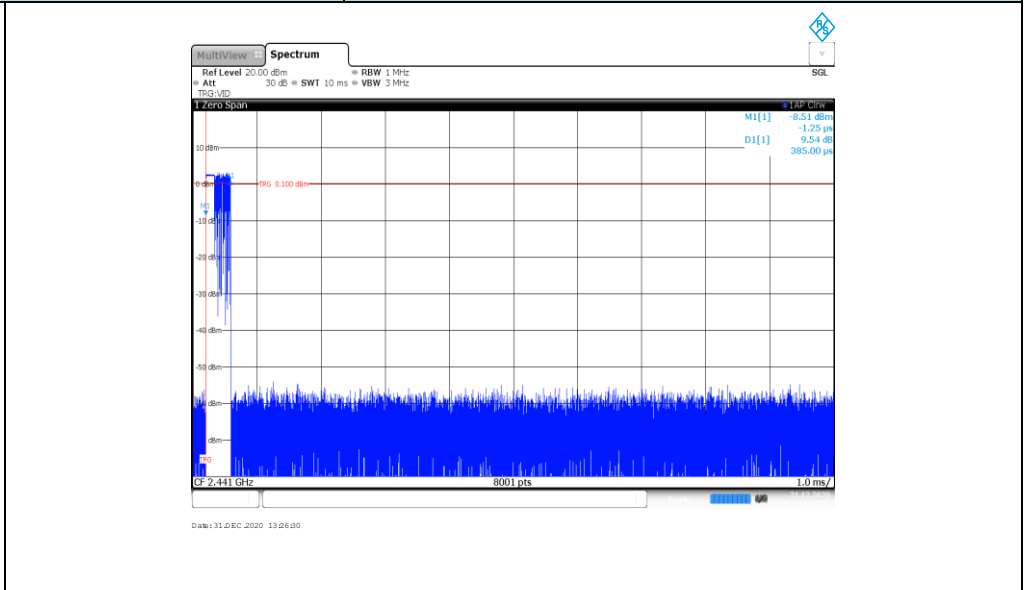


2DH5
Burst number

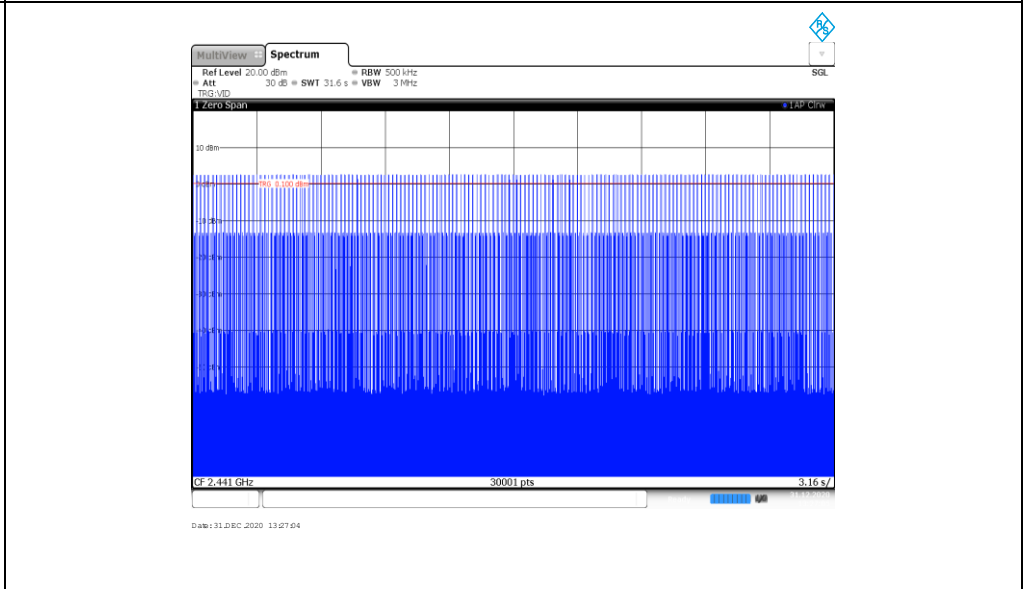


Modulation Type: 8DPSK

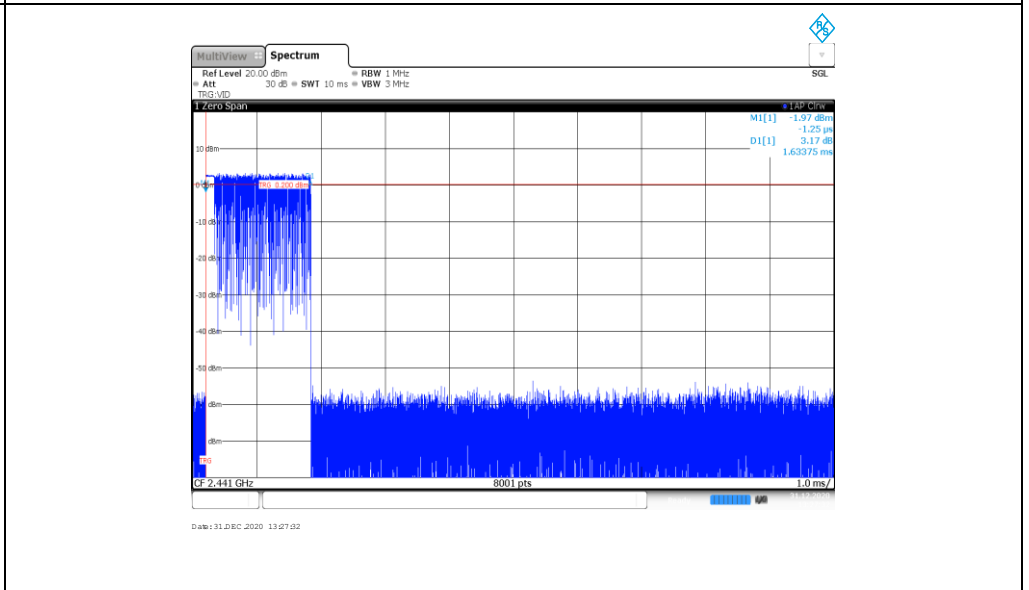
3DH1
Burst width



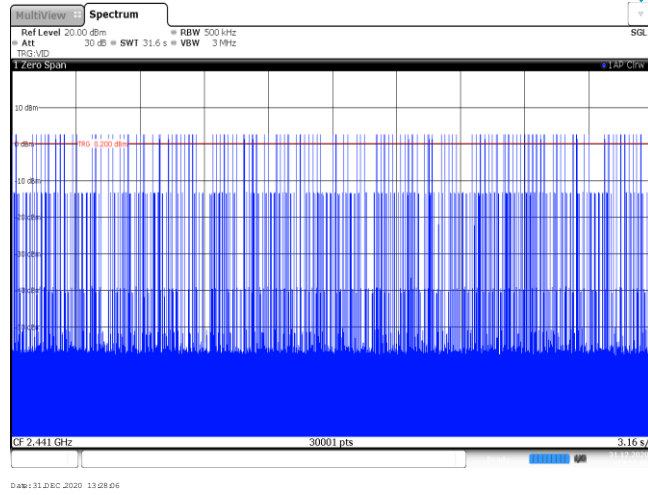
3DH1
Burst number



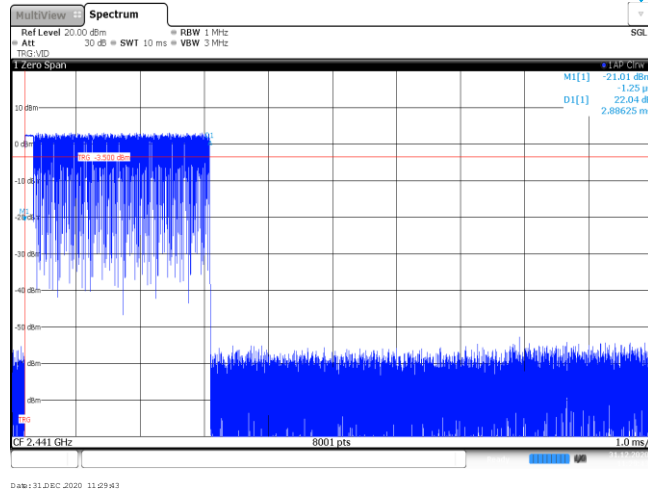
3DH3
Burst width



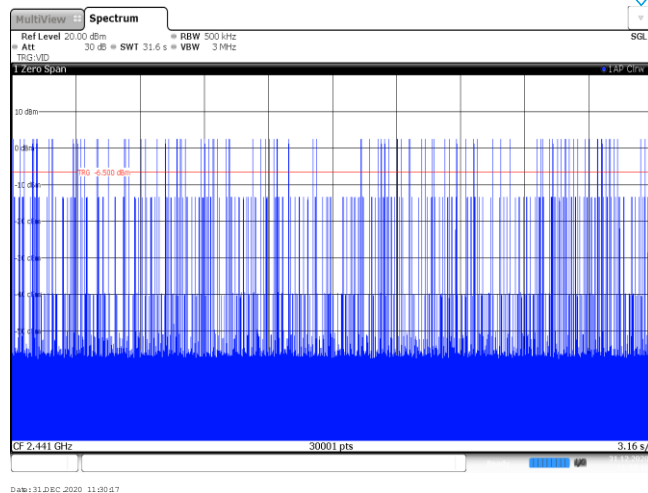
3DH3
Burst number



3DH5
Burst width



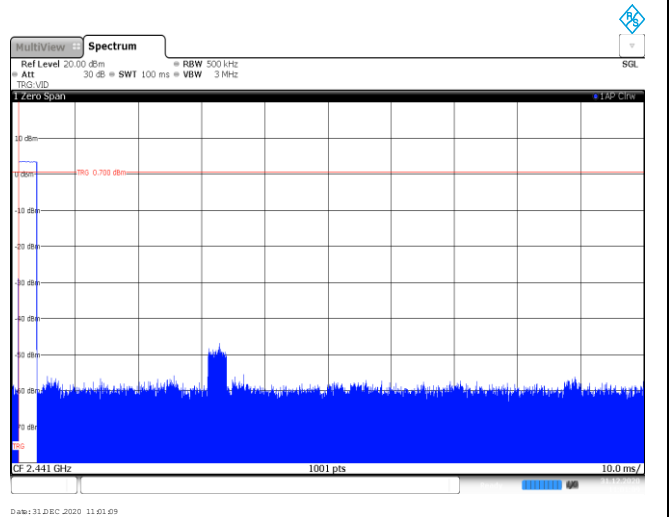
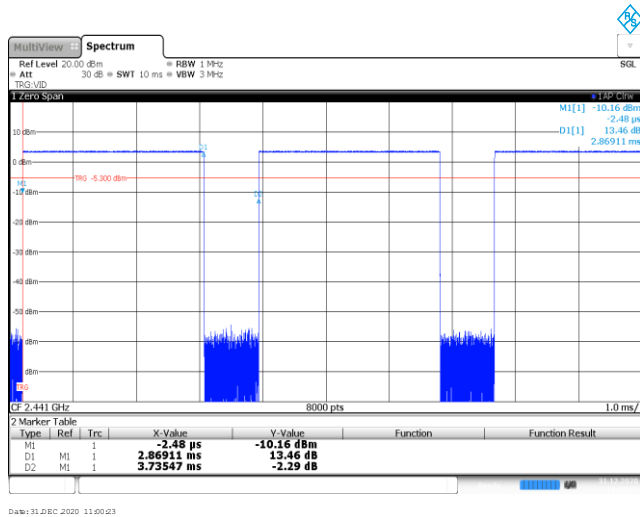
3DH5
Burst number



Appendix G: Duty Cycle Correction Factor (DCCF)

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

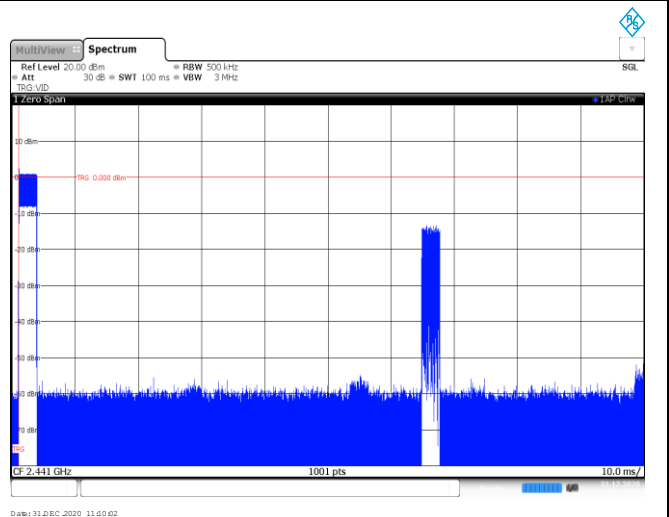
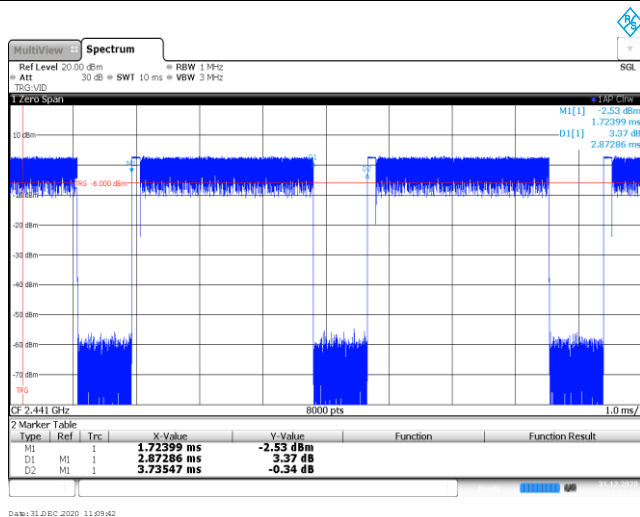
GFSK



T_{on} time for single burst

Burst Quantity

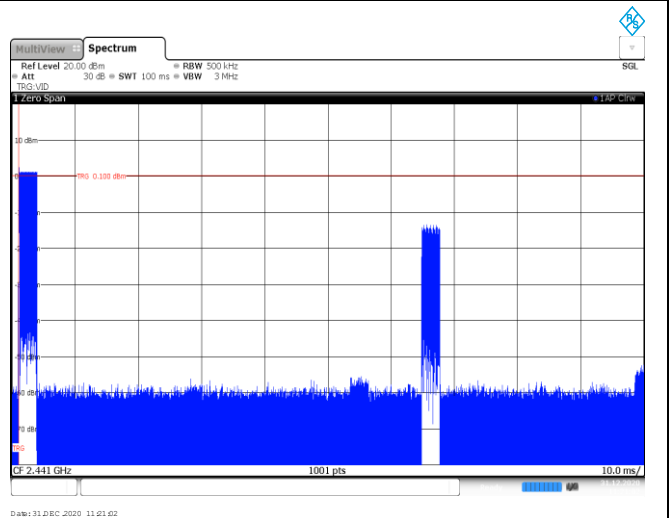
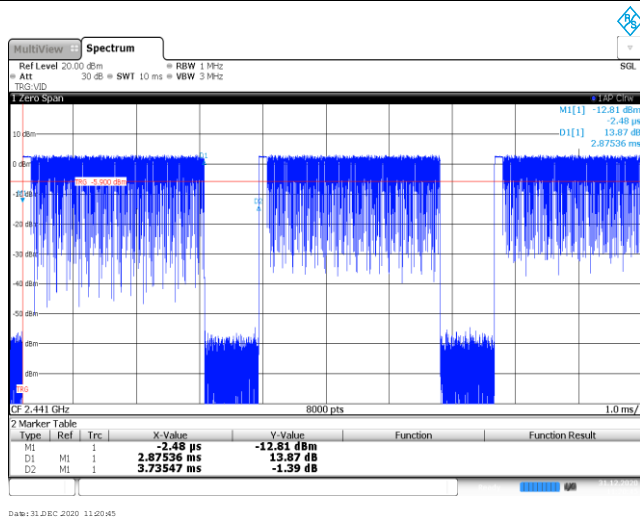
$\pi/4$ DQPSK



T_{on} time for single burst

Burst Quantity

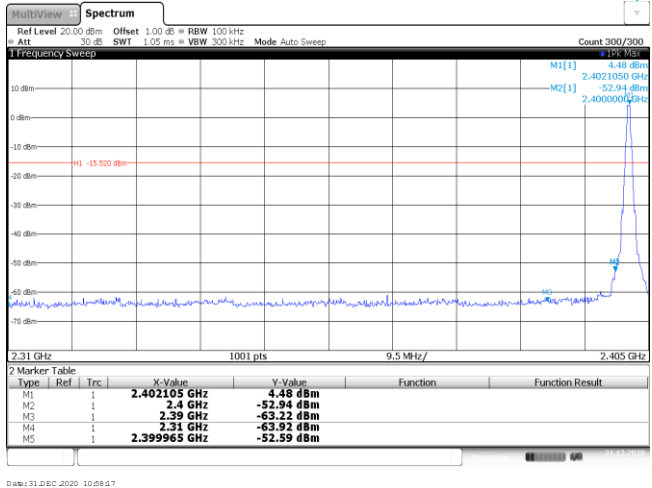
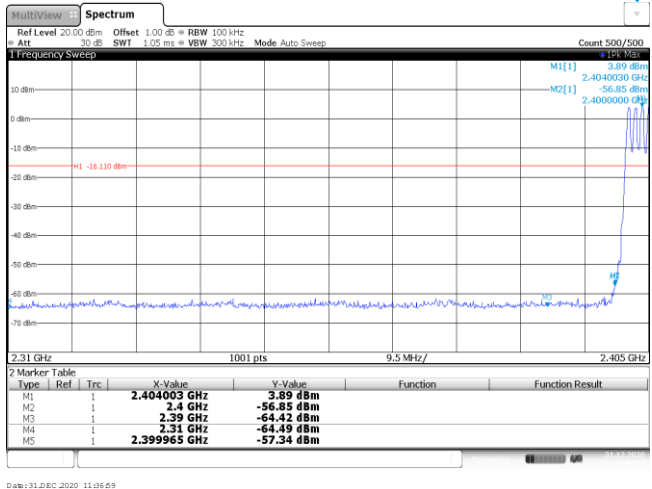
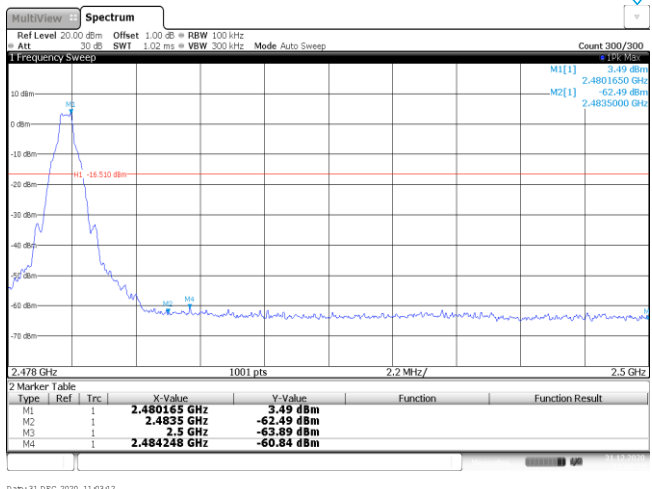
8DPSK



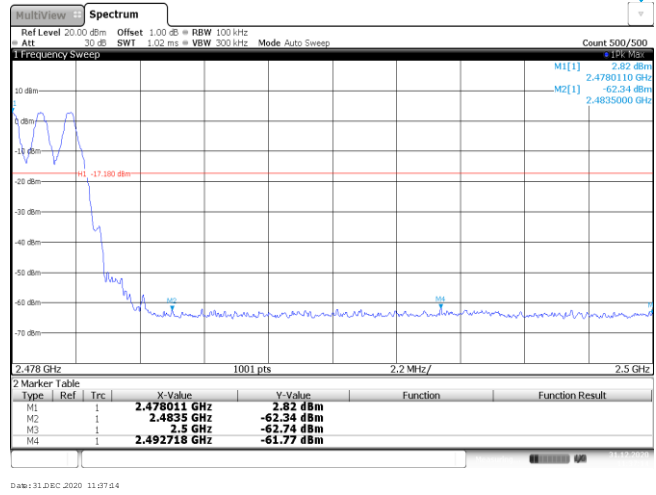
T_{on} time for single burst

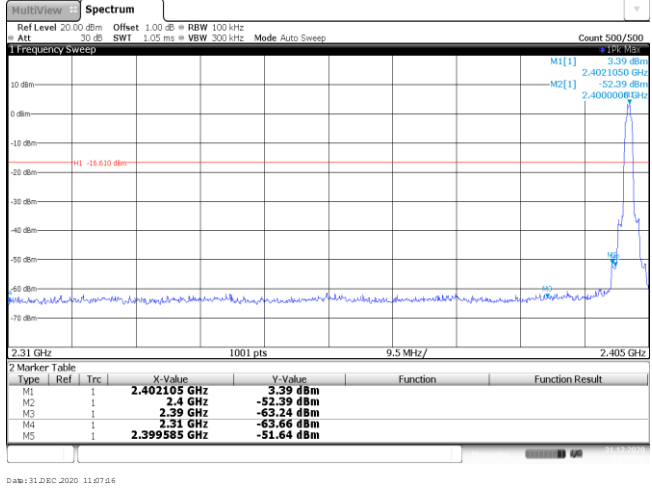
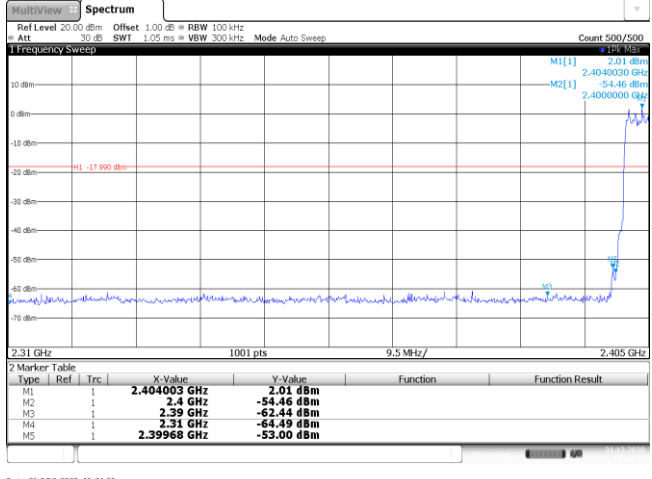
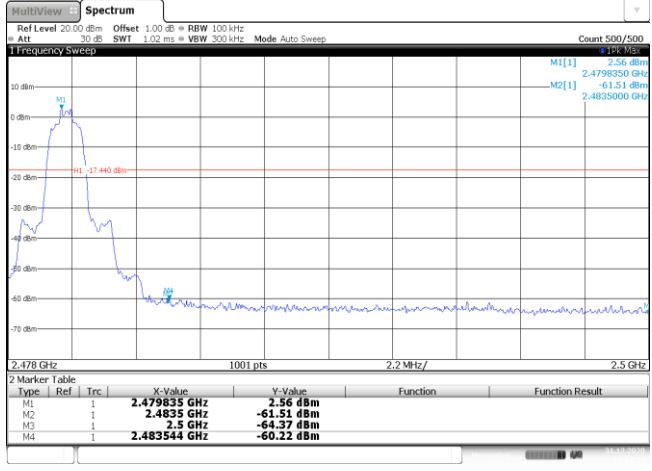
Burst Quantity

Appendix H: Band edge and Spurious Emissions (conducted)

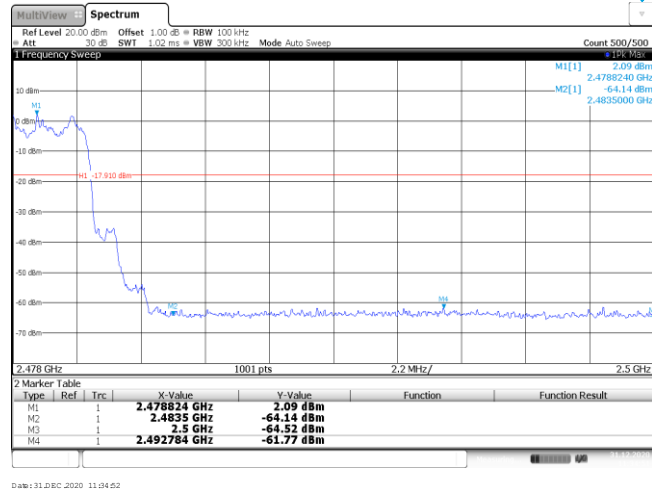
Test Item:	Band edge	Modulation type:	GFSK
<p>CH00 No hopping mode</p>			
<p>CH00 Hopping mode</p>			
<p>CH78 No hopping mode</p>			

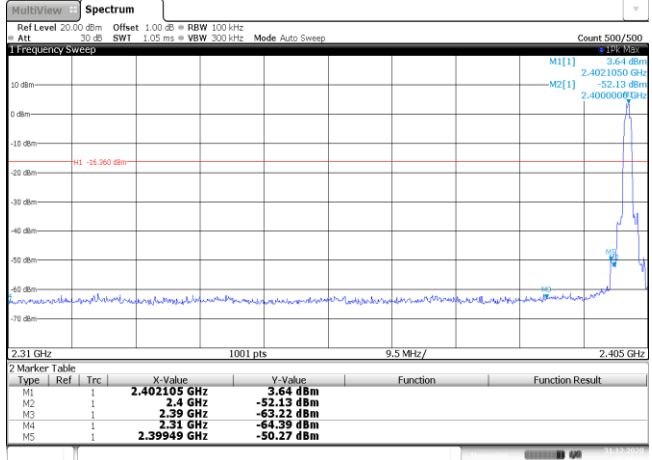
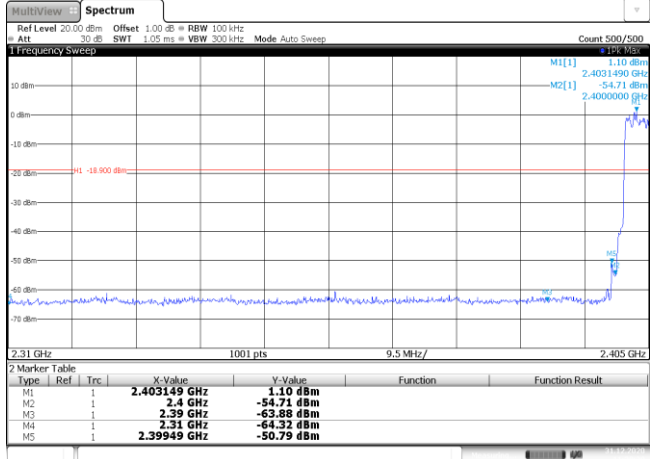
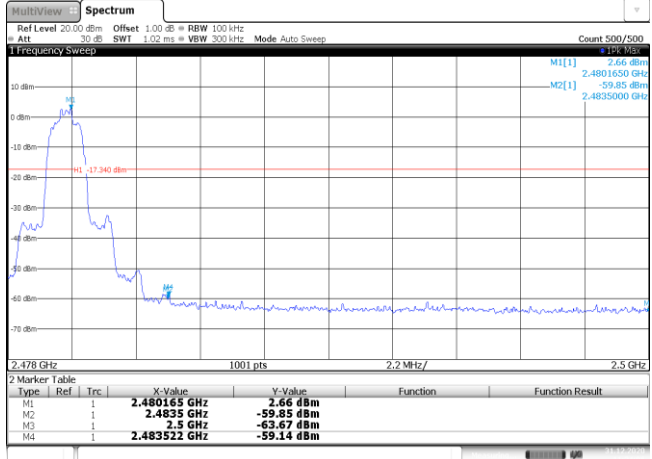
CH78
Hopping mode



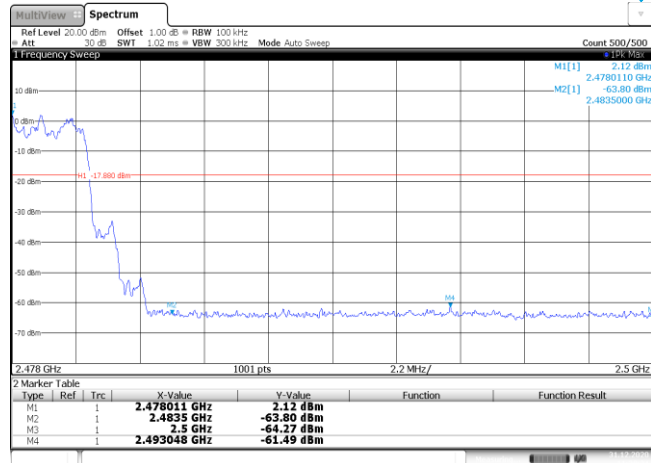
Test Item:	Band edge	Modulation type:	$\pi/4$ DQPSK
<p>CH00 No hopping mode</p>			
<p>CH00 Hopping mode</p>			
<p>CH78 No hopping mode</p>			

CH78
Hopping mode

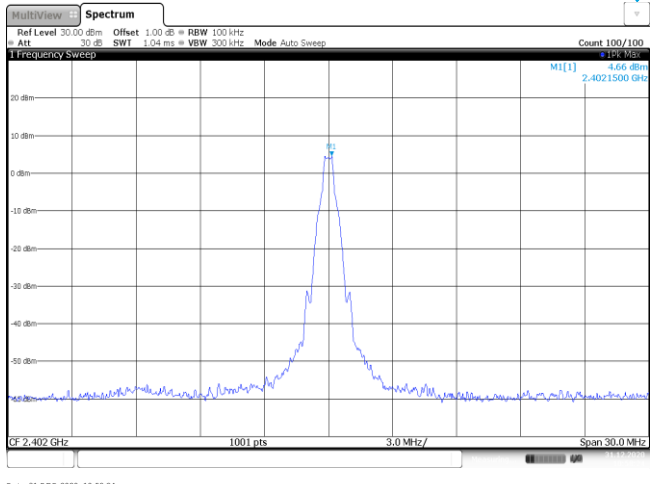
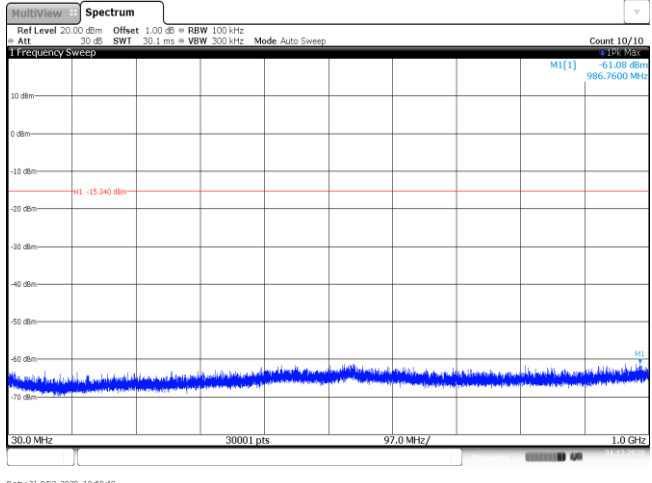
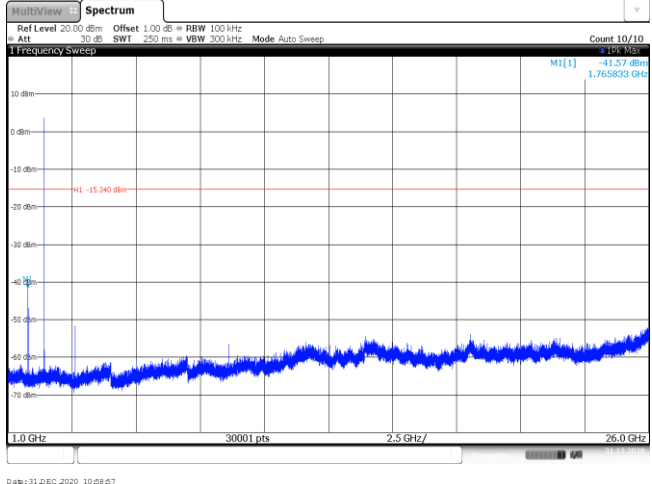


Test Item:	Band edge	Modulation type:	8DPSK																																										
<p>CH00 No hopping mode</p>	 <table border="1" data-bbox="683 645 1337 734"> <thead> <tr> <th>Type</th> <th>Ref</th> <th>Trc</th> <th>X-Value</th> <th>Y-Value</th> <th>Function</th> <th>Function Result</th> </tr> </thead> <tbody> <tr> <td>M1</td> <td>1</td> <td></td> <td>2.402105 GHz</td> <td>3.64 dBm</td> <td></td> <td></td> </tr> <tr> <td>M2</td> <td>1</td> <td></td> <td>2.4 GHz</td> <td>-52.13 dBm</td> <td></td> <td></td> </tr> <tr> <td>M3</td> <td>1</td> <td></td> <td>2.39 GHz</td> <td>-63.22 dBm</td> <td></td> <td></td> </tr> <tr> <td>M4</td> <td>1</td> <td></td> <td>2.31 GHz</td> <td>-64.39 dBm</td> <td></td> <td></td> </tr> <tr> <td>M5</td> <td>1</td> <td></td> <td>2.39949 GHz</td> <td>-50.27 dBm</td> <td></td> <td></td> </tr> </tbody> </table> <p>Date: 31.DEC.2020 13:49:25</p>			Type	Ref	Trc	X-Value	Y-Value	Function	Function Result	M1	1		2.402105 GHz	3.64 dBm			M2	1		2.4 GHz	-52.13 dBm			M3	1		2.39 GHz	-63.22 dBm			M4	1		2.31 GHz	-64.39 dBm			M5	1		2.39949 GHz	-50.27 dBm		
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<p>CH00 Hopping mode</p>	 <table border="1" data-bbox="683 1191 1337 1281"> <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>1.10 dBm</td> <td></td> <td></td> </tr> <tr> <td>M2</td> <td>1</td> <td></td> <td>2.4 GHz</td> <td>-54.71 dBm</td> <td></td> <td></td> </tr> <tr> <td>M3</td> <td>1</td> <td></td> <td>2.39 GHz</td> <td>-63.88 dBm</td> <td></td> <td></td> </tr> <tr> <td>M4</td> <td>1</td> <td></td> <td>2.31 GHz</td> <td>-64.32 dBm</td> <td></td> <td></td> </tr> <tr> <td>M5</td> <td>1</td> <td></td> <td>2.39949 GHz</td> <td>-50.79 dBm</td> <td></td> <td></td> </tr> </tbody> </table> <p>Date: 31.DEC.2020 11:09:20</p>			Type	Ref	Trc	X-Value	Y-Value	Function	Function Result	M1	1		2.403149 GHz	1.10 dBm			M2	1		2.4 GHz	-54.71 dBm			M3	1		2.39 GHz	-63.88 dBm			M4	1		2.31 GHz	-64.32 dBm			M5	1		2.39949 GHz	-50.79 dBm		
Type	Ref	Trc	X-Value	Y-Value	Function	Function Result																																							
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M5	1		2.39949 GHz	-50.79 dBm																																									
<p>CH78 No hopping mode</p>	 <table border="1" data-bbox="683 1738 1337 1827"> <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>2.480165 GHz</td> <td>2.66 dBm</td> <td></td> <td></td> </tr> <tr> <td>M2</td> <td>1</td> <td></td> <td>2.48335 GHz</td> <td>-59.85 dBm</td> <td></td> <td></td> </tr> <tr> <td>M3</td> <td>1</td> <td></td> <td>2.5 GHz</td> <td>-63.67 dBm</td> <td></td> <td></td> </tr> <tr> <td>M4</td> <td>1</td> <td></td> <td>2.483522 GHz</td> <td>-59.14 dBm</td> <td></td> <td></td> </tr> </tbody> </table> <p>Date: 31.DEC.2020 11:24:25</p>			Type	Ref	Trc	X-Value	Y-Value	Function	Function Result	M1	1		2.480165 GHz	2.66 dBm			M2	1		2.48335 GHz	-59.85 dBm			M3	1		2.5 GHz	-63.67 dBm			M4	1		2.483522 GHz	-59.14 dBm									
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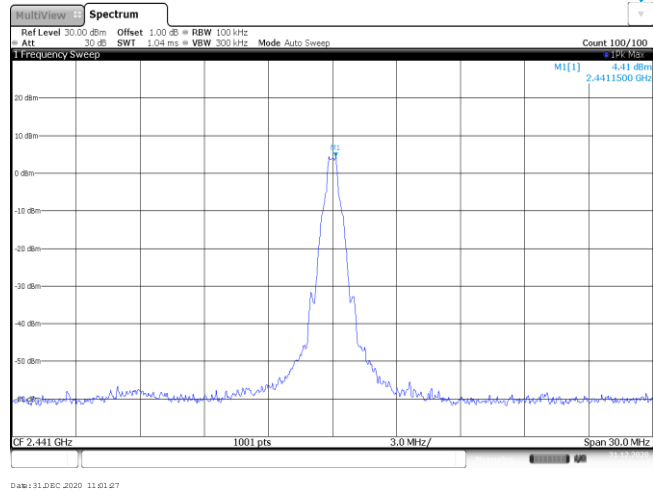
CH78
Hoppig mode



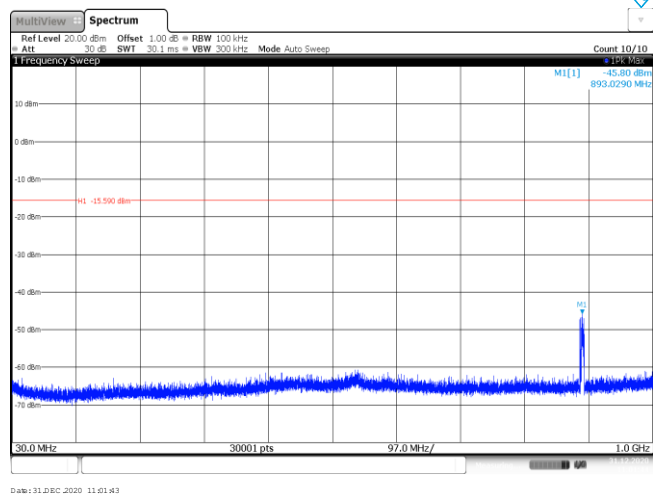
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Test Item:	Spurious Emission	Modulation type:	GFSK
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<p>CH00 30MHz~1000MHz</p>			
<p>CH00 1GHz~26GHz</p>			

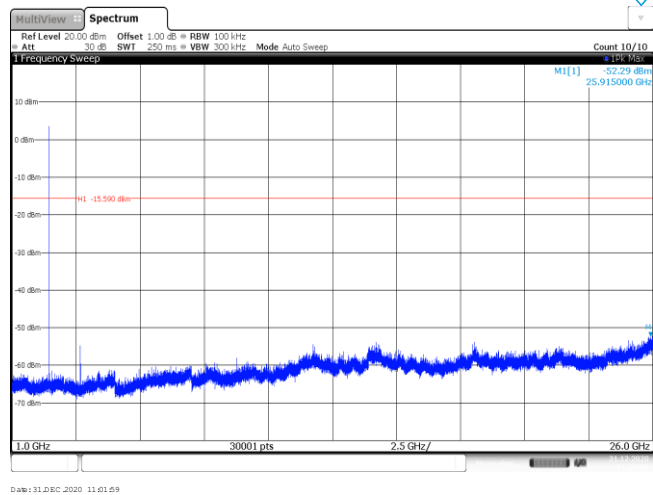
CH39
Reference level



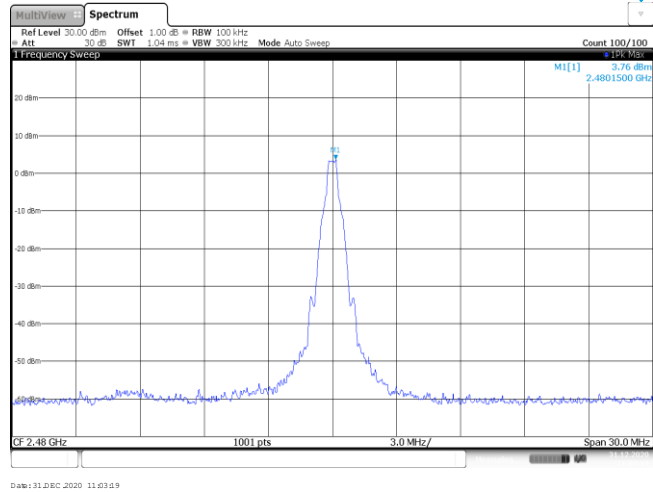
CH39
30MHz~1000MHz



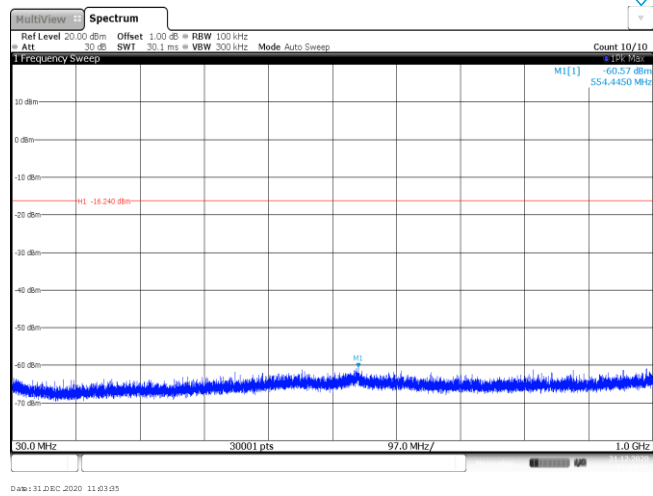
CH39
1GHz~26GHz



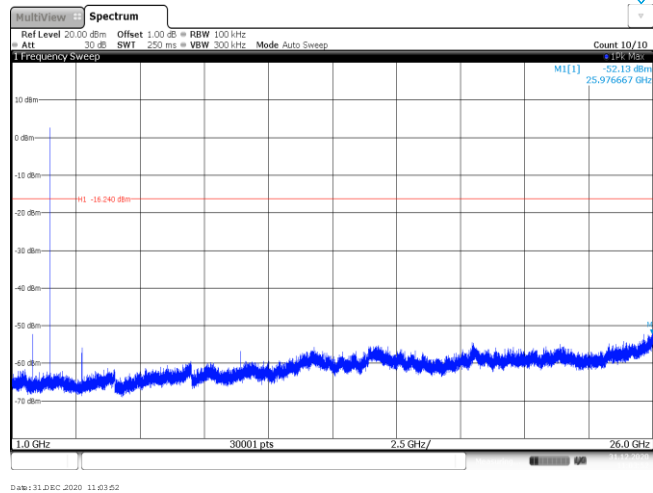
CH78
Reference level

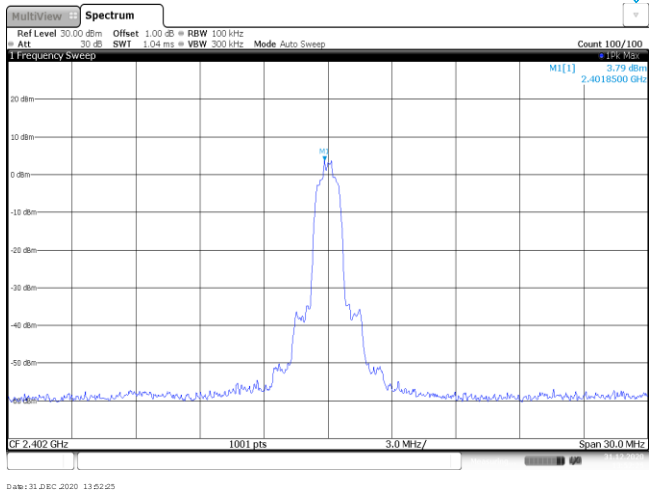
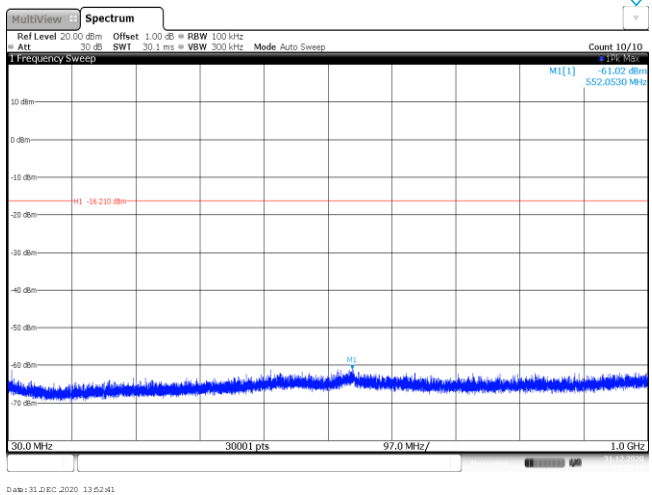
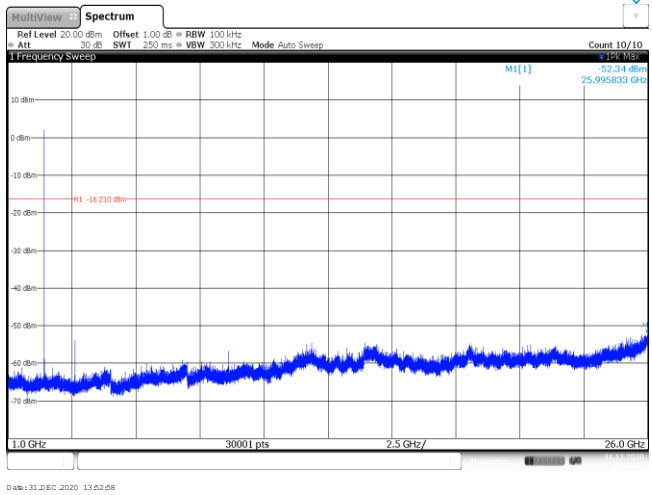


CH78
30MHz~1000MHz

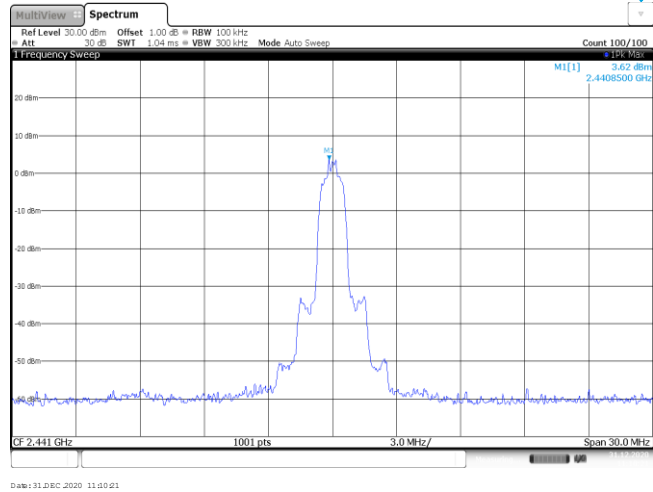


CH78
1GHz~26GHz

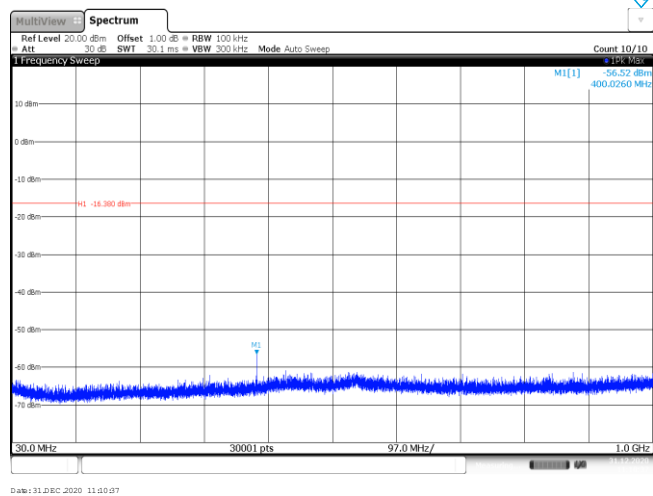


Test Item:	Spurious Emission	Modulation type:	π/4DQPSK
<p>CH00 Reference level</p>	 <p>Ref Level 30.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SWI 1.04 ms VBW 300 kHz Mode Auto Sweep Count 100/100 M1[1] -3.79 dBm 2.4018500 GHz CF 2.402 GHz 1001 pts 3.0 MHz/ Span 30.0 MHz Date: 31 DEC 2020 13:52:25</p>		
<p>CH00 30MHz~1000MHz</p>	 <p>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] -61.02 dBm 552.8530 MHz M1 -16.210 dBm 30.0 MHz 30001 pts 97.0 MHz/ 1.0 GHz Date: 31 DEC 2020 13:52:41</p>		
<p>CH00 1GHz~26GHz</p>	 <p>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] -32.24 dBm 25.995833 GHz M1 -16.210 dBm 1.0 GHz 30001 pts 2.5 GHz/ 26.0 GHz Date: 31 DEC 2020 13:52:58</p>		

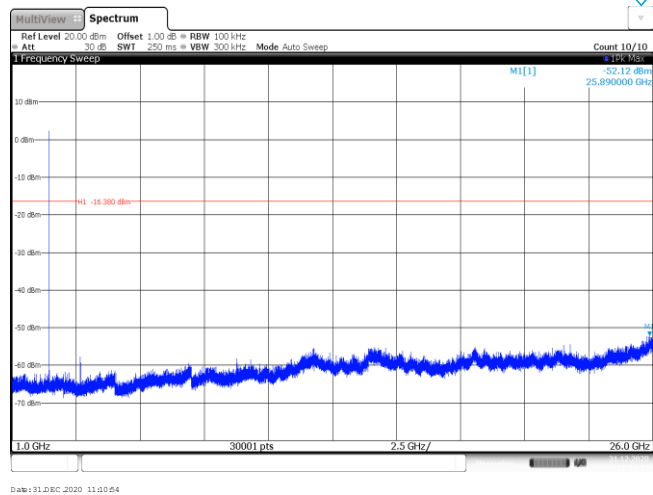
CH39
Reference level



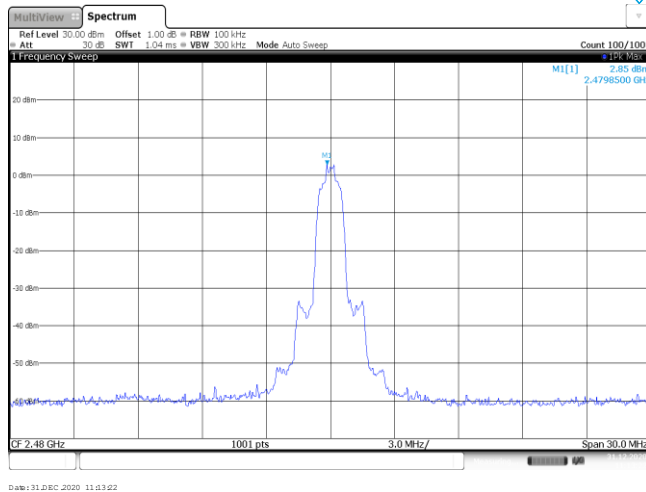
CH39
30MHz~1000MHz



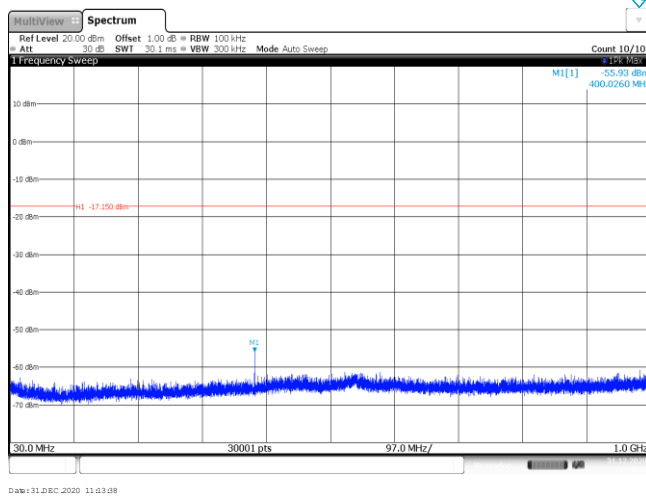
CH39
1GHz~26GHz



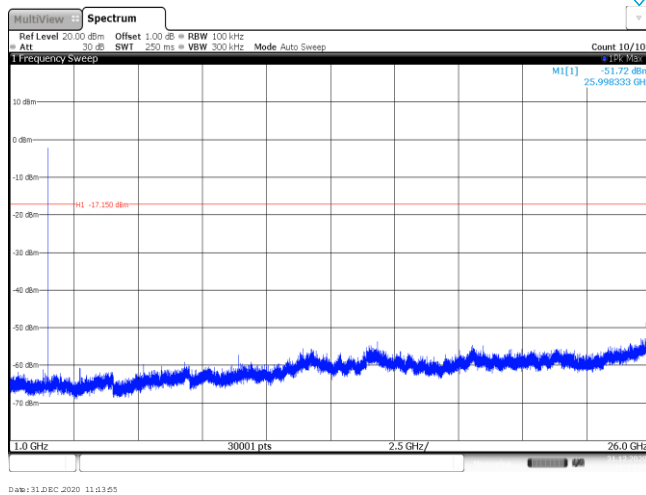
CH78
Reference level

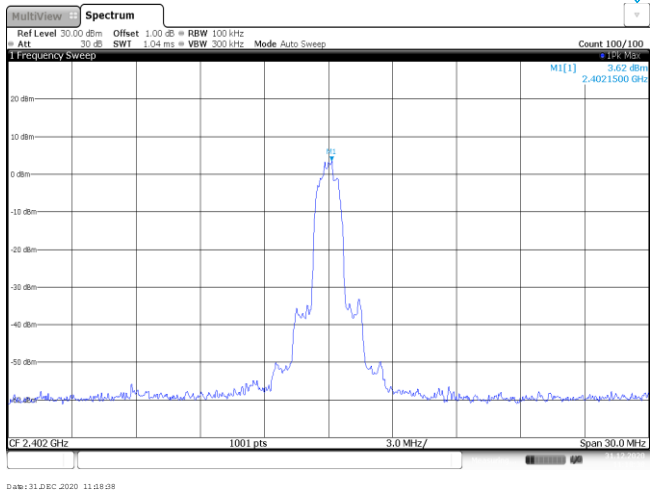
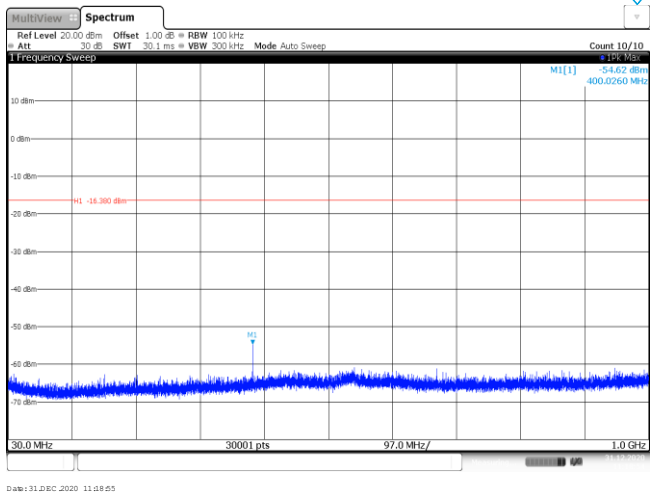
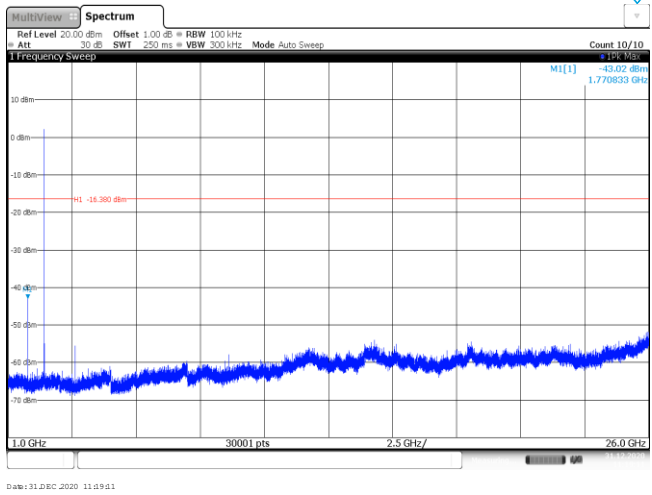


CH78
30MHz~1000MHz



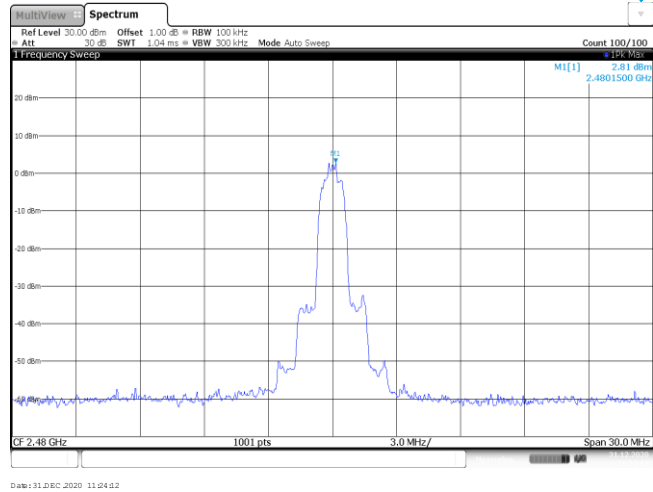
CH78
1GHz~26GHz



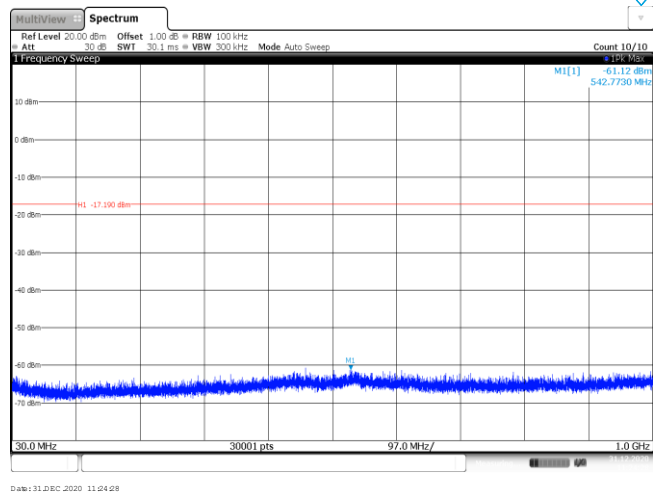
Test Item:	Spurious Emission	Modulation type:	8DPSK
<p>CH00 Reference level</p>			
<p>CH00 30MHz~1000MHz</p>			
<p>CH00 1GHz~26GHz</p>			

<p>CH39 Reference level</p>	<p>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] 2.61 dBm 2.4411500 GHz CF 2.441 GHz 1001 pts 3.0 MHz/ Span 30.0 MHz Date: 31 DEC 2020 11:01:26</p>
<p>CH39 30MHz~1000MHz</p>	<p>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] -60.67 dBm 553.7660 MHz M1 -16.200 dBm 30.0 MHz 30001 pts 97.0 MHz/ 1.0 GHz Date: 31 DEC 2020 11:01:42</p>
<p>CH39 1GHz~26GHz</p>	<p>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] -62.07 dBm 25.974167 GHz M1 -16.200 dBm 1.0 GHz 30001 pts 2.5 GHz/ 26.0 GHz Date: 31 DEC 2020 11:01:59</p>

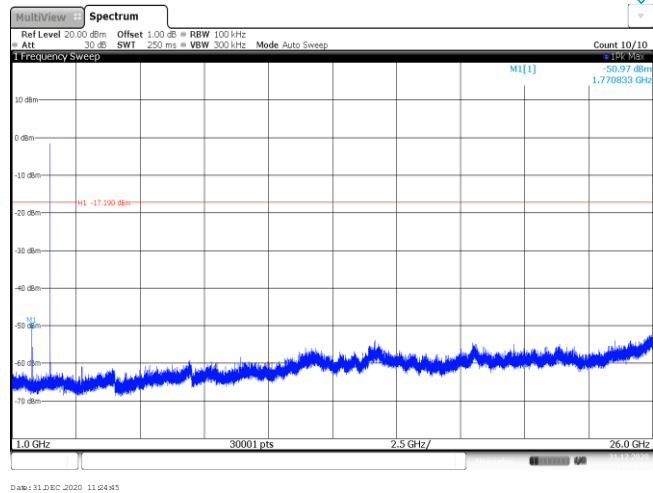
CH78
Reference level



CH78
30MHz~1000MHz



CH78
1GHz~26GHz



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