

APPENDIX REPORT

Project No.	SHT2209003601EW	Radio Specification	Bluetooth EDR
Test sample No.	YPHT22090036003	Model No.	C55 PLUS
Start test date	2022-09-14	Finish date	2022-09-14
Temperature	24.9°C	Humidity	29%
Test Engineer	Xiaoxiao Li	Auditor	Xiaodong Zhuo

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

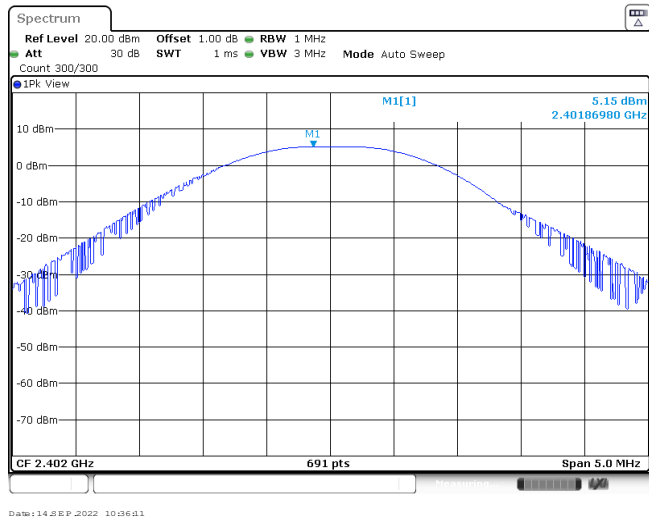
Appendix A: Peak Output Power

Modulation type	Channel	Peak Output power (dBm)	Average Output power (dBm)	Limit (dBm)	Result
GFSK	00	5.15	5.12	≤ 30.00	Pass
	39	5.46	5.23		
	78	4.97	4.95		
π/4DQPSK	00	5.51	5.48	≤ 21.00	Pass
	39	5.86	5.83		
	78	6.15	6.11		
8DPSK	00	5.80	5.77	≤ 21.00	Pass
	39	6.09	6.07		
	78	6.17	6.14		

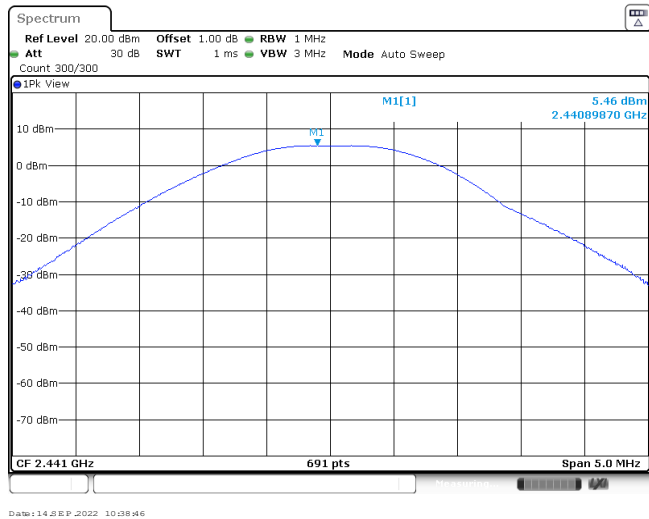
Modulation Type:

GFSK

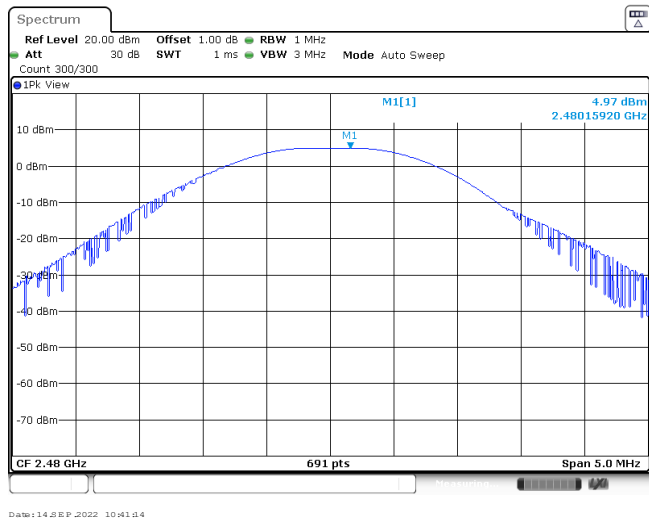
CH00



CH39



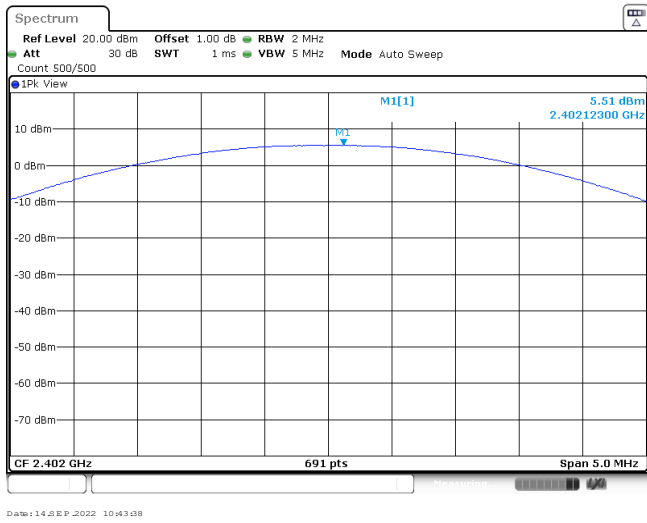
CH78



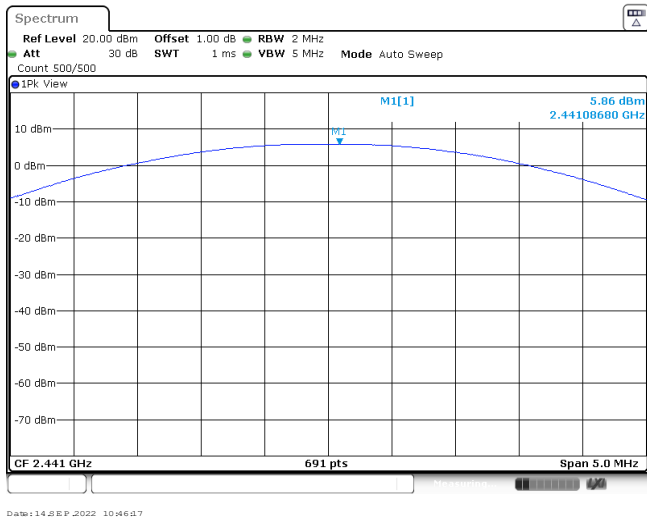
Modulation Type:

$\pi/4$ DQPSK

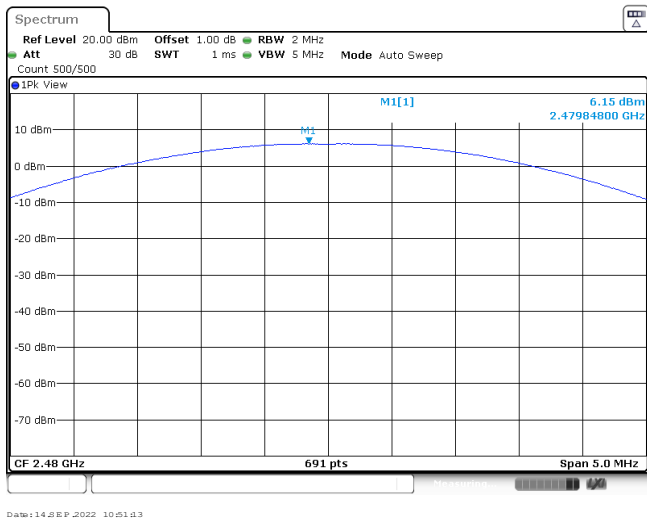
CH00



CH39



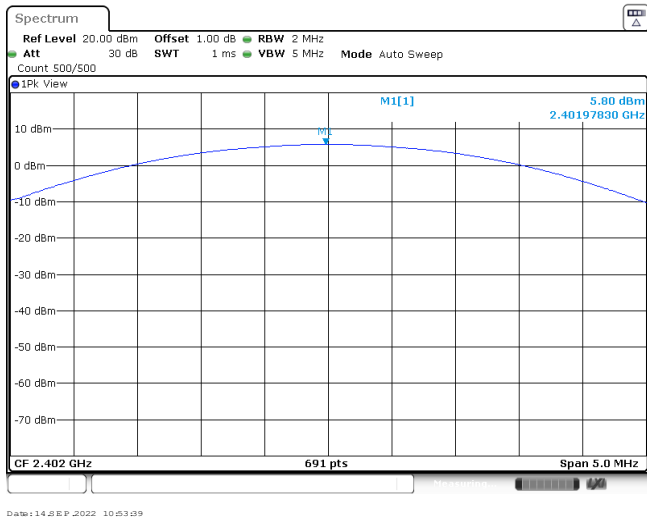
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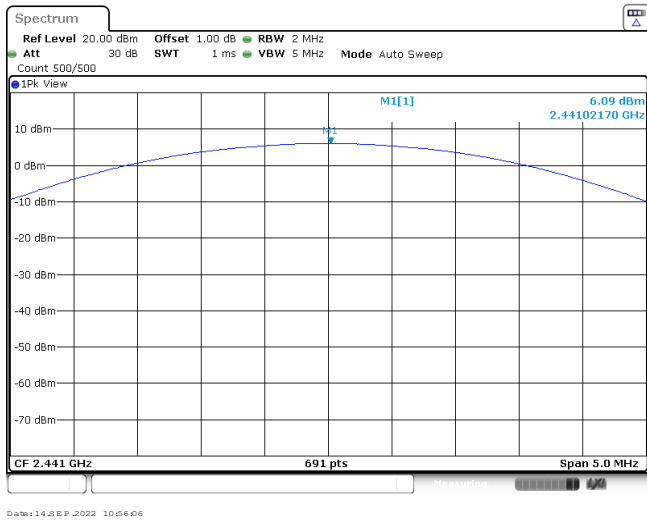
Modulation Type:

8DPSK

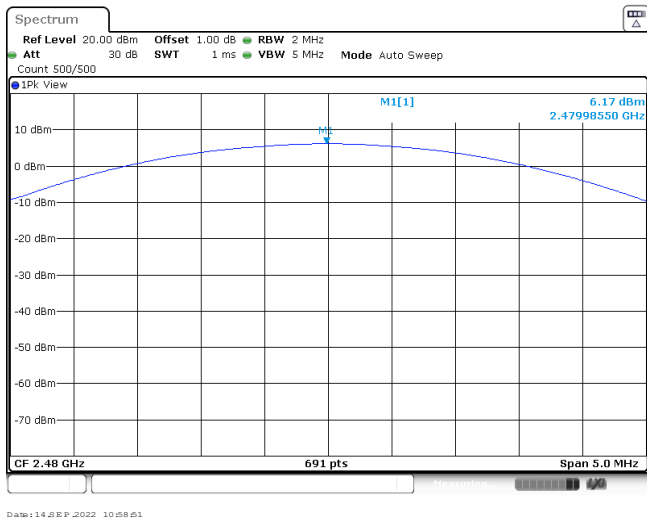
CH00



CH39



CH78

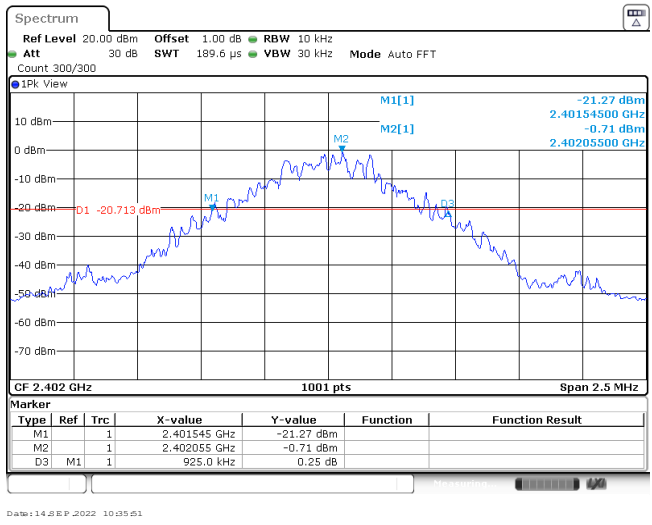


Appendix B : 20 dB Bandwidth

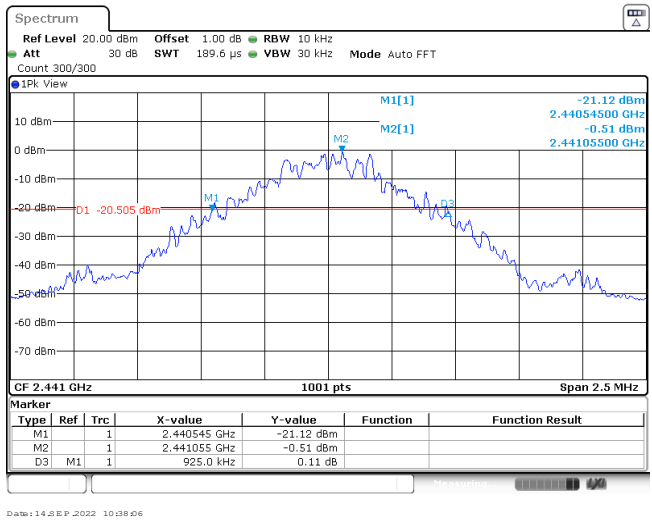
Modulation type	Channel	20 dB Bandwidth (kHz)	Limit (kHz)	Result
GFSK	00	925.00	-	Pass
	39	925.00		
	78	925.00		
$\pi/4$ DQPSK	00	1287.50	-	Pass
	39	1290.00		
	78	1290.00		
8DPSK	00	1295.00	-	Pass
	39	1295.00		
	78	1295.00		

Modulation Type: GFSK

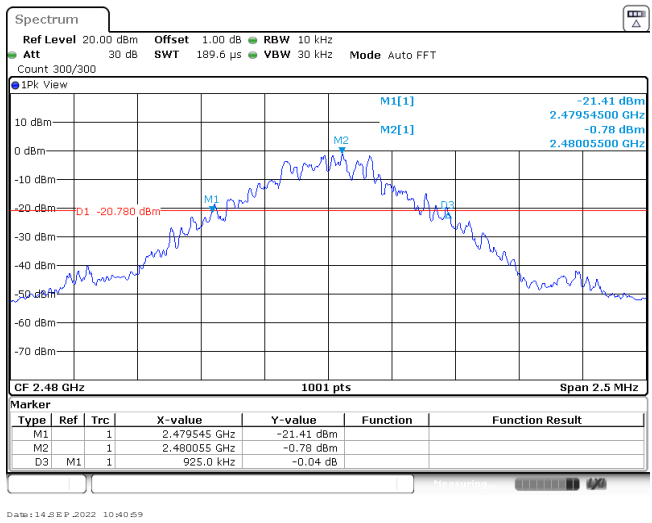
CH00



CH39

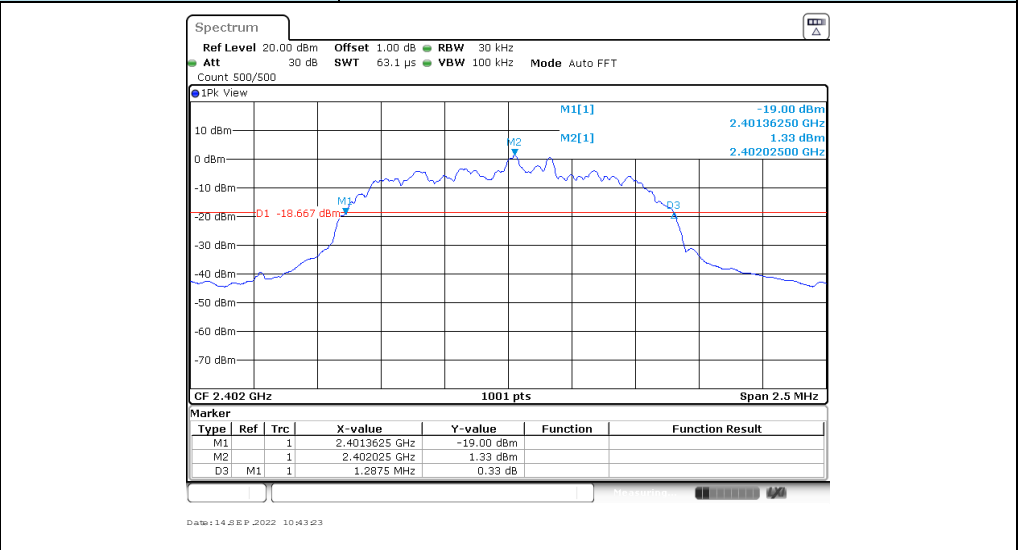


CH78

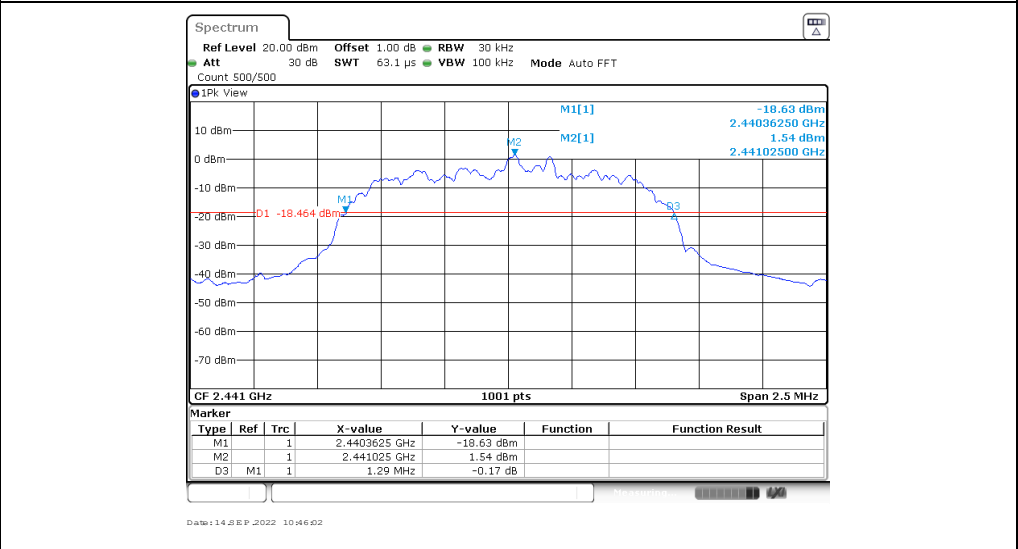


Modulation Type: **$\pi/4$ DQPSK**

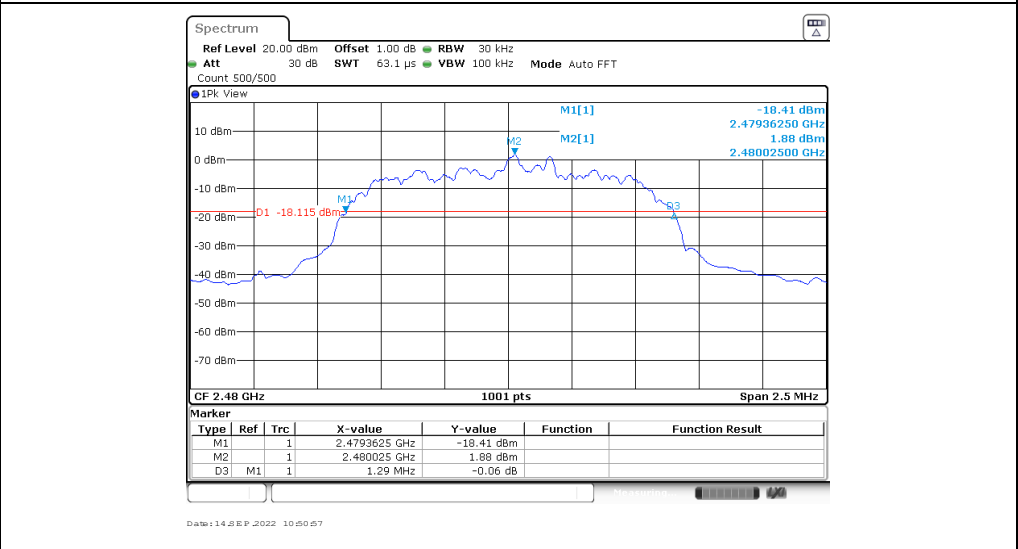
CH00



CH39



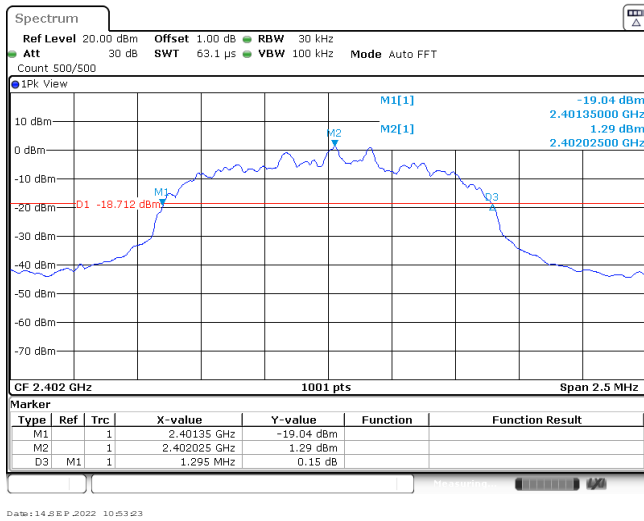
CH78



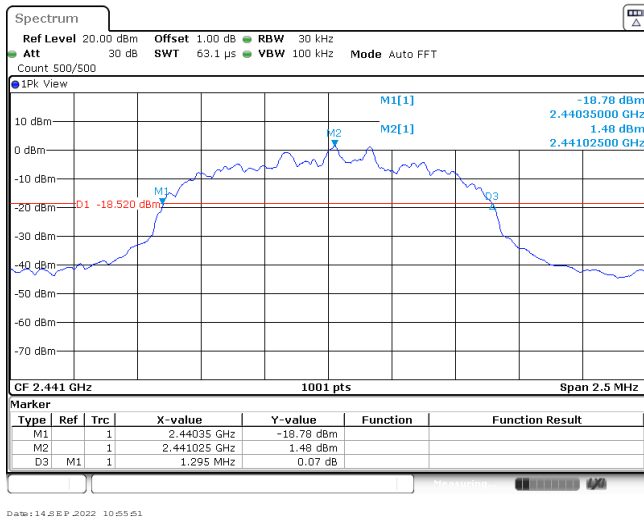
Modulation Type:

8DPSK

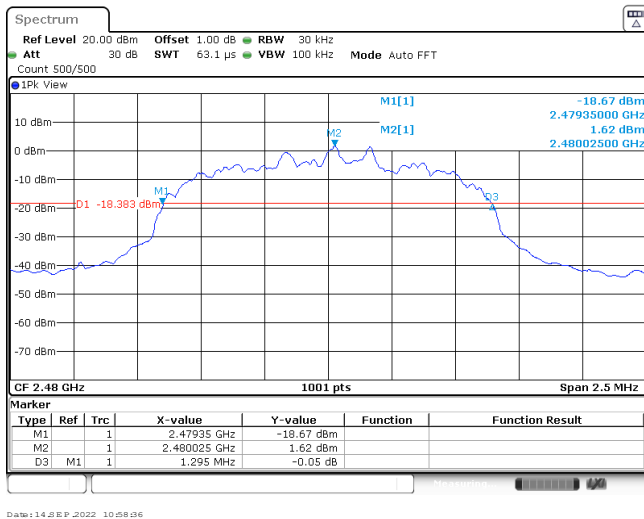
CH00



CH39



CH78



Appendix C: 99% Occupied Bandwidth

Modulation type	Channel	99% Occupied Bandwidth (MHz)	Limit (MHz)	Result
GFSK	00	0.86	-	Pass
	39	0.86		
	78	0.86		
$\pi/4$ DQPSK	00	1.18	-	Pass
	39	1.18		
	78	1.18		
8DPSK	00	1.18	-	Pass
	39	1.18		
	78	1.18		

Modulation Type:

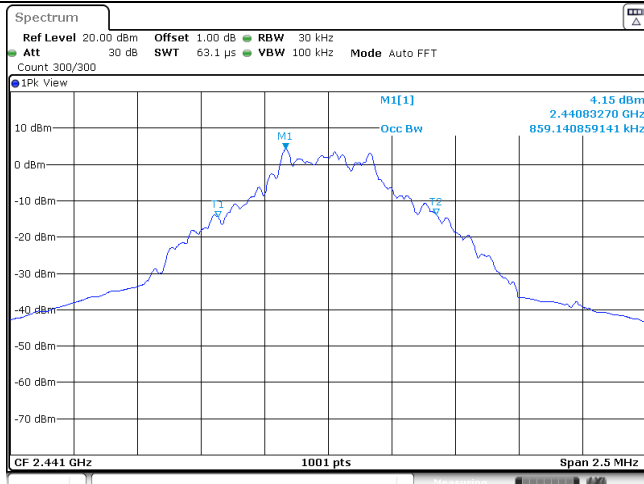
GFSK

CH00



Date: 14 SEP 2022 10:36:03

CH39



Date: 14 SEP 2022 10:38:13

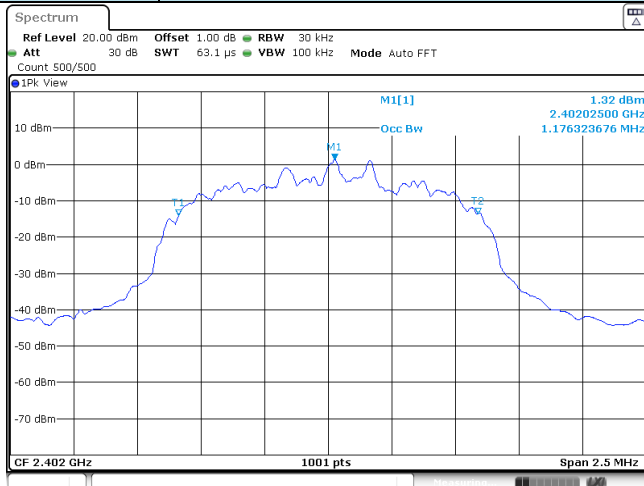
CH78



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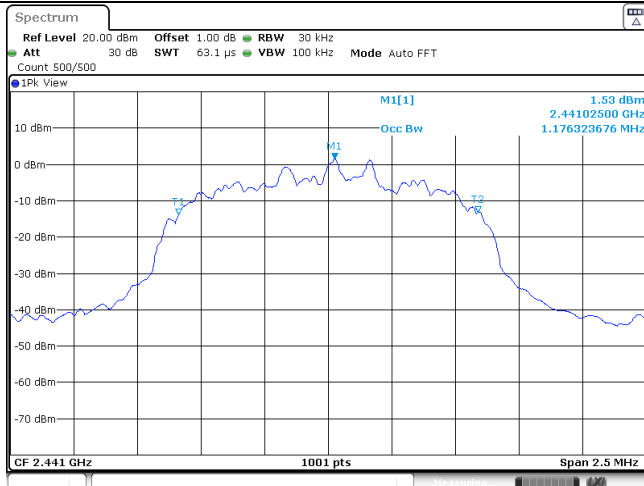
Modulation Type: 8DPSK

CH00



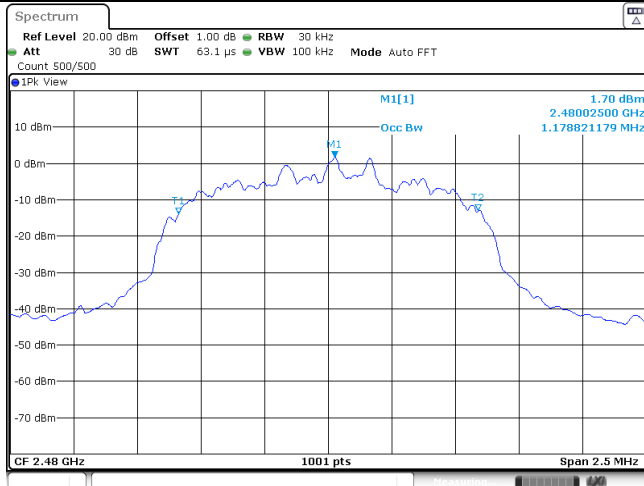
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CH39



Date: 14 SEP 2022 10:55:58

CH78



Date: 14 SEP 2022 10:58:43

Appendix D: Carrier Frequencies Separation

Modulation type	Channel	Carrier Frequencies Separation (MHz)	Limit (kHz) *	Result
GFSK	39	1.00	≥925.00	Pass
π/4DQPSK	39	1.00	≥860.00	Pass
8DPSK	39	1.00	≥863.33	Pass

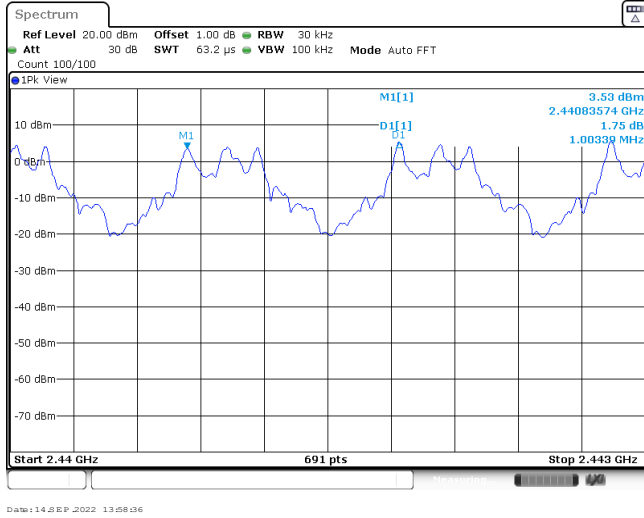
Note:

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

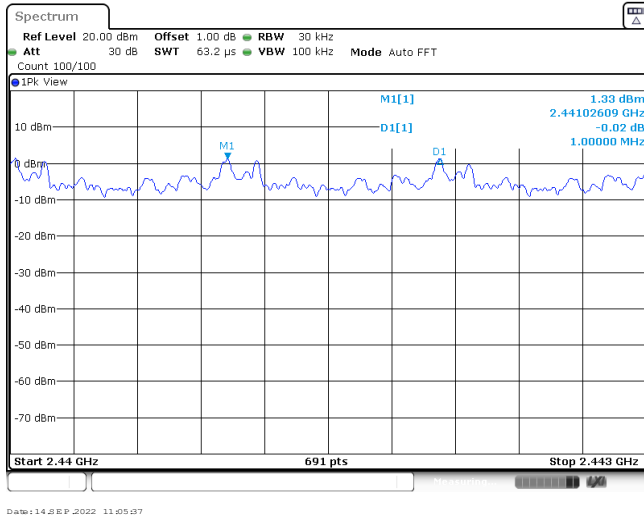
π/4DQPSK limit = 2/3 * The maximum 20 dB Bandwidth for π/4DQPSK modulation on the appendix B.

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

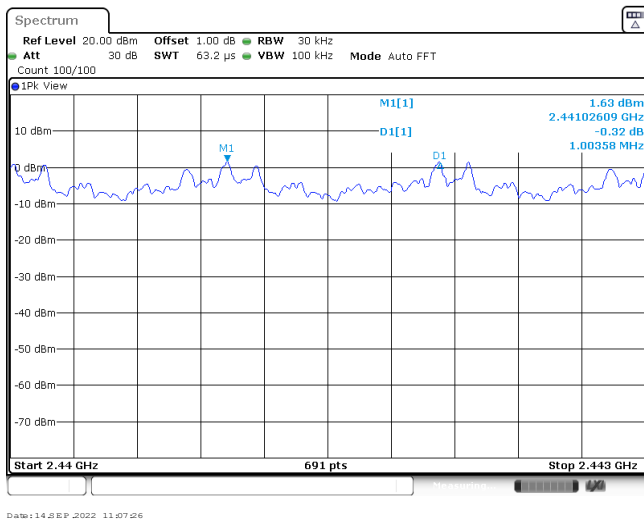
GFSK



$\pi/4$ DQPSK



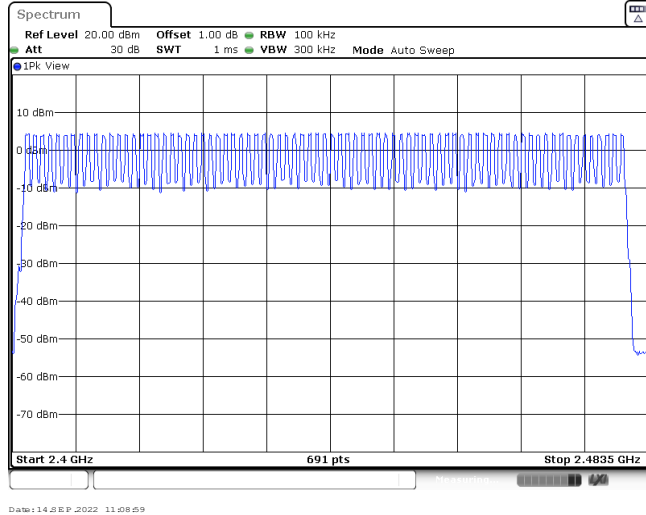
8DPSK



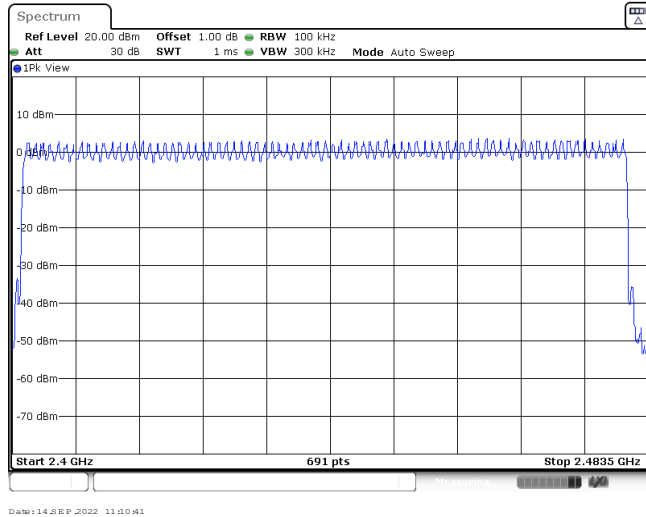
Appendix E: Hopping Channel Number

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

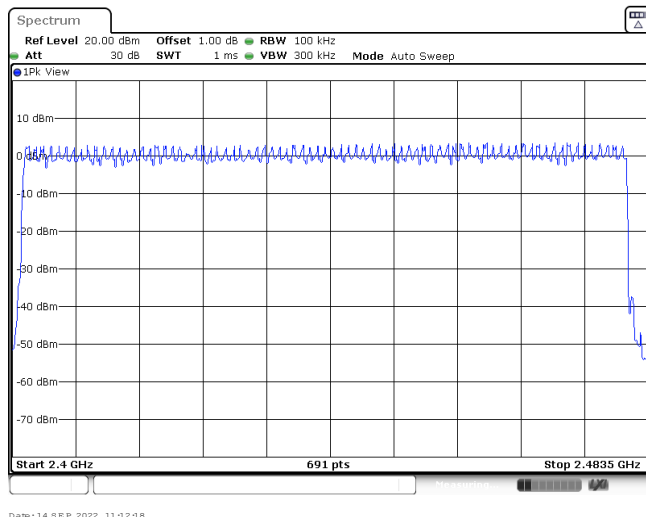
GFSK



$\pi/4$ DQPSK



8DPSK



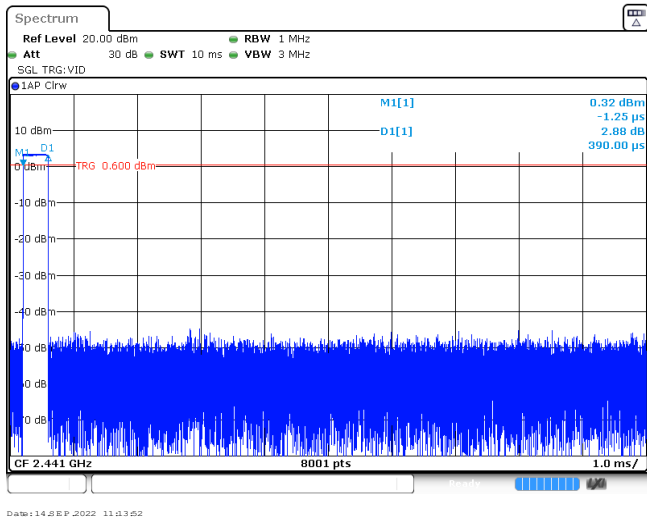
Appendix F: Dwell Time

Modulation type	Packet	Burst Width [ms]	Total Hops[hop*ch]	Dwell time (Second)	Limit (Second)	Result
GFSK	DH1	0.39	320	0.13	≤ 0.40	Pass
	DH3	1.65	174	0.29		
	DH5	2.89	110	0.32		
π/4DQPSK	2DH1	0.38	321	0.12	≤ 0.40	Pass
	2DH3	1.64	160	0.26		
	2DH5	2.88	106	0.31		
8DPSK	3DH1	0.38	317	0.12	≤ 0.40	Pass
	3DH3	1.63	159	0.26		
	3DH5	2.88	113	0.33		

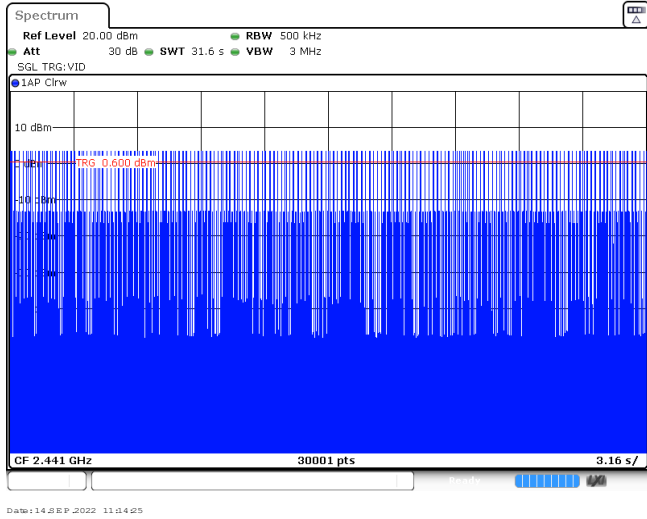
Modulation Type:

GFSK

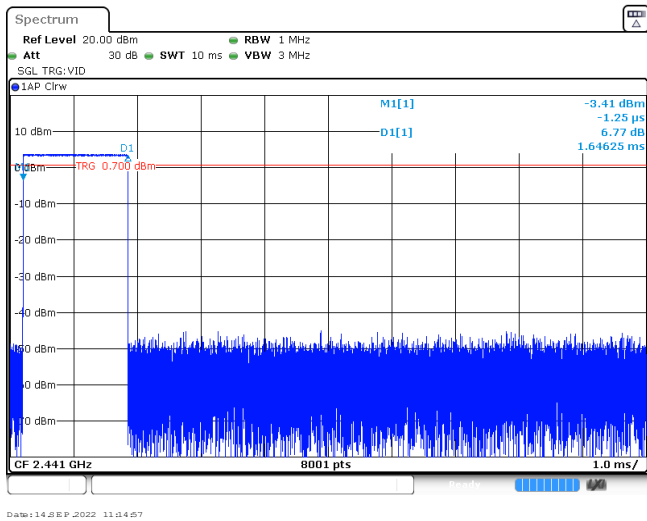
DH1
Burst width



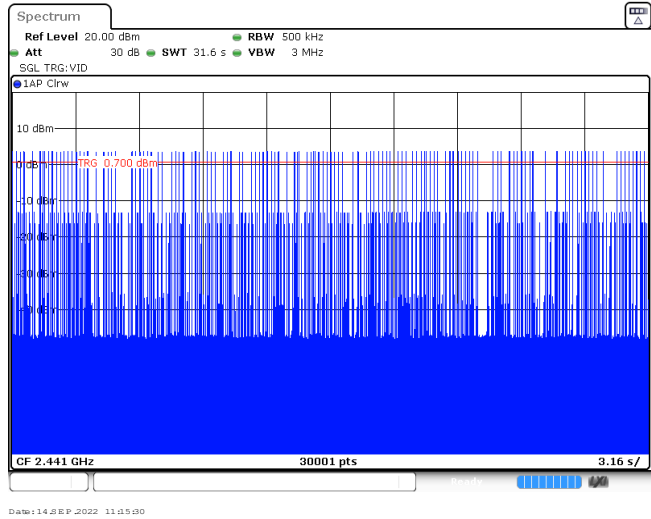
DH1
Burst number



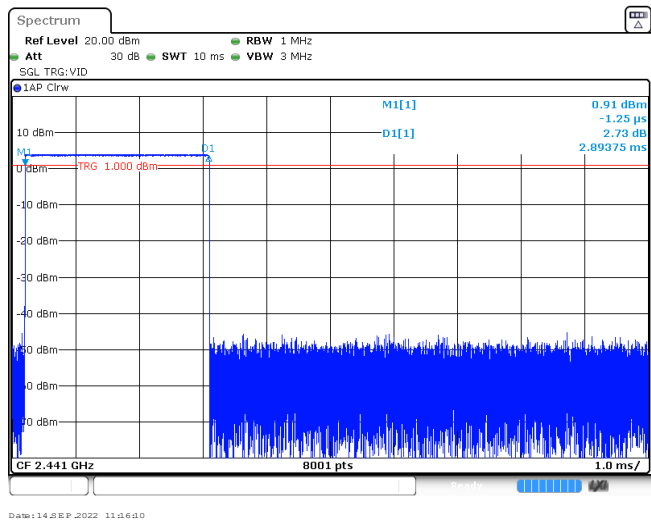
DH3
Burst width



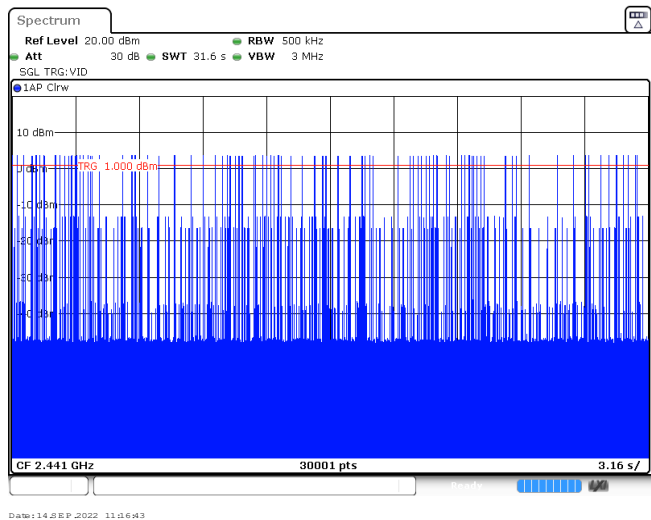
DH3
Burst number



DH5
Burst width



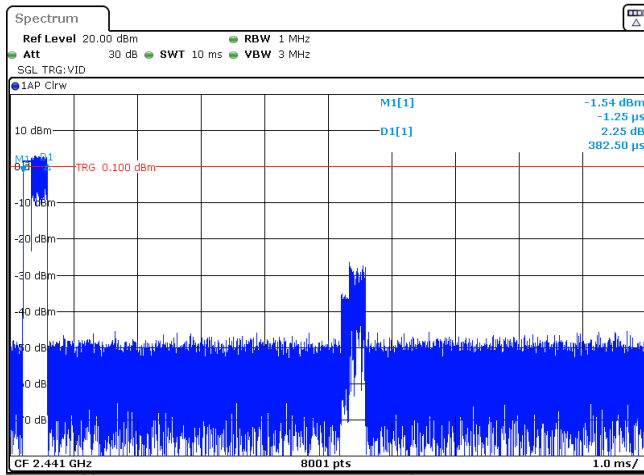
DH5
Burst number



Modulation Type:

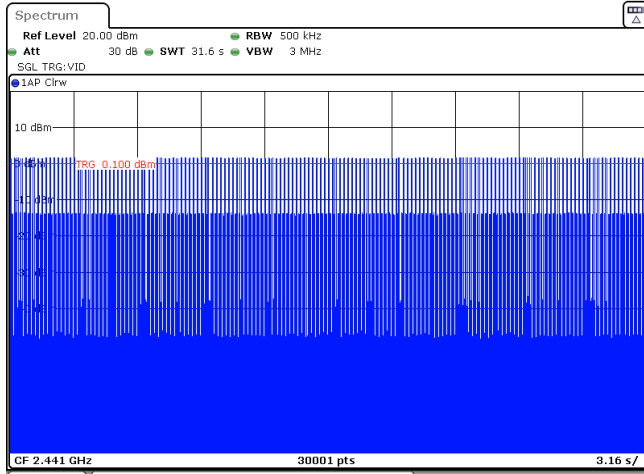
$\pi/4$ DQPSK

2DH1
Burst width



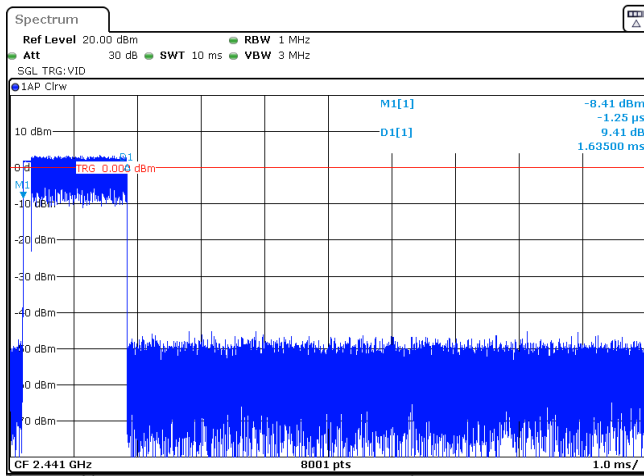
Date: 14 SEP 2022 11:17:25

2DH1
Burst number



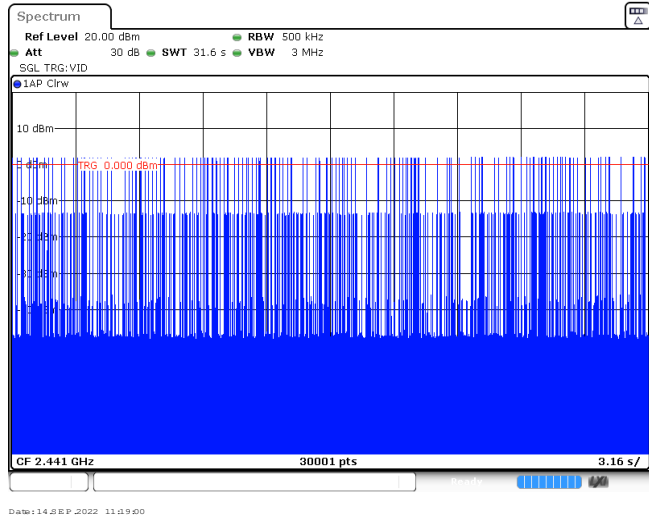
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2DH3
Burst width

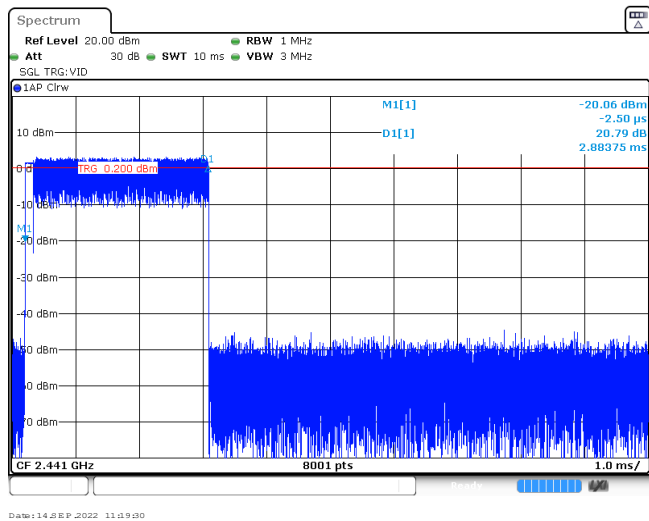


Date: 14 SEP 2022 11:18:27

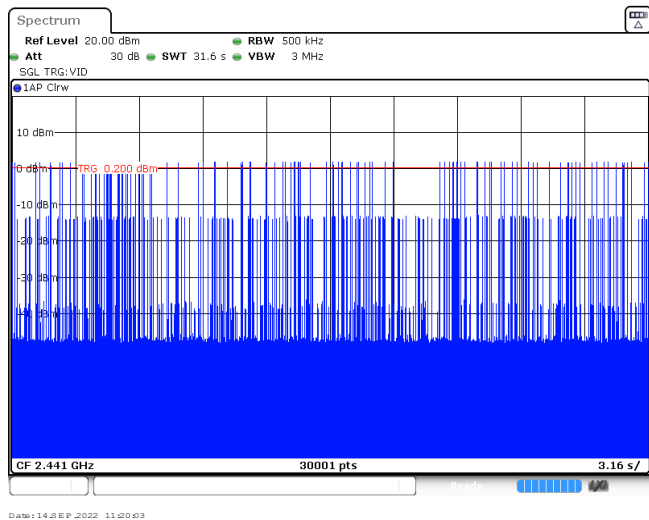
2DH3
Burst number



2DH5
Burst width



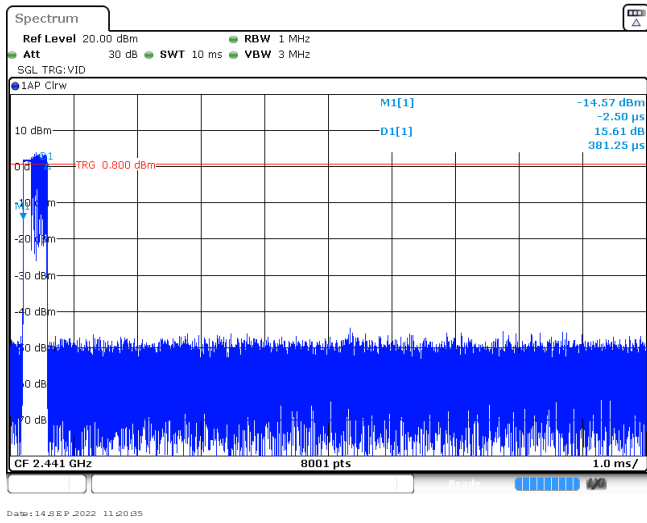
2DH5
Burst number



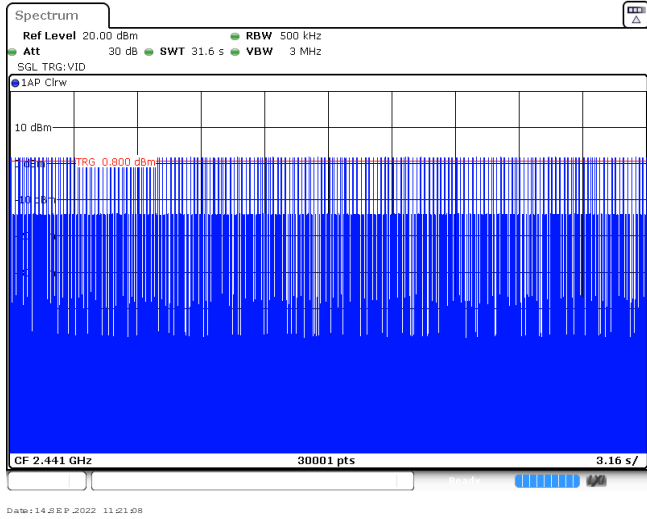
Modulation Type:

8DPSK

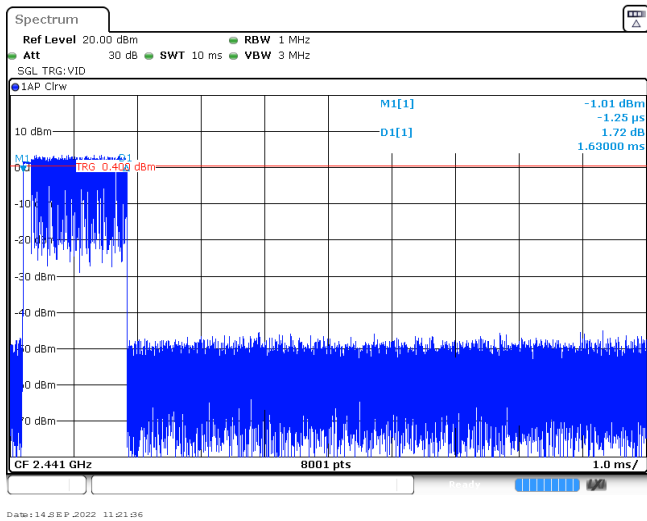
3DH1
Burst width



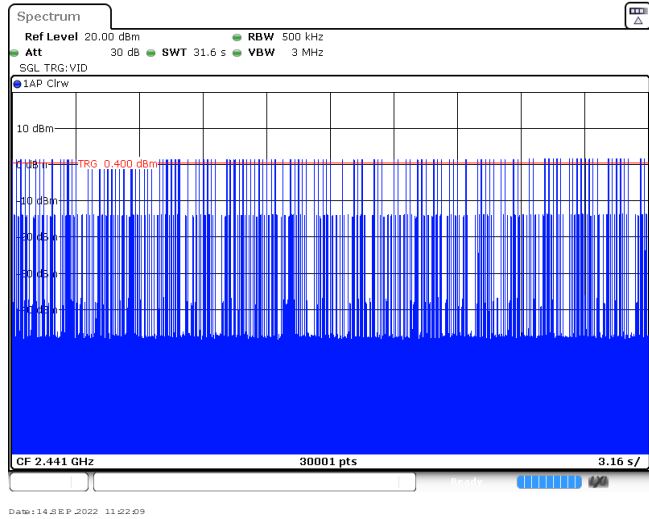
3DH1
Burst number



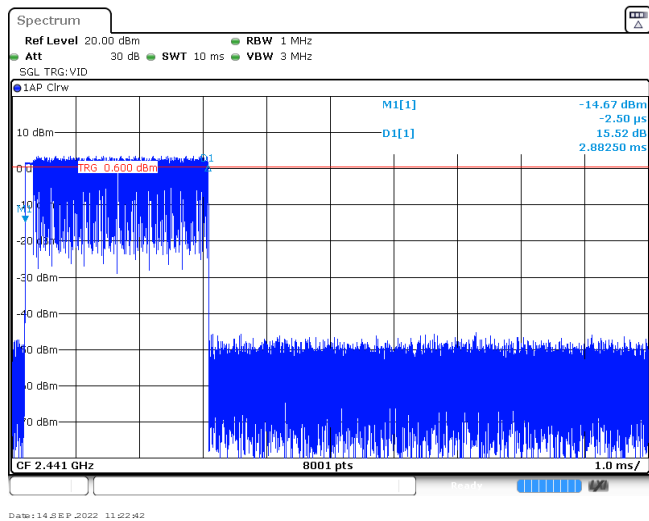
3DH3
Burst width



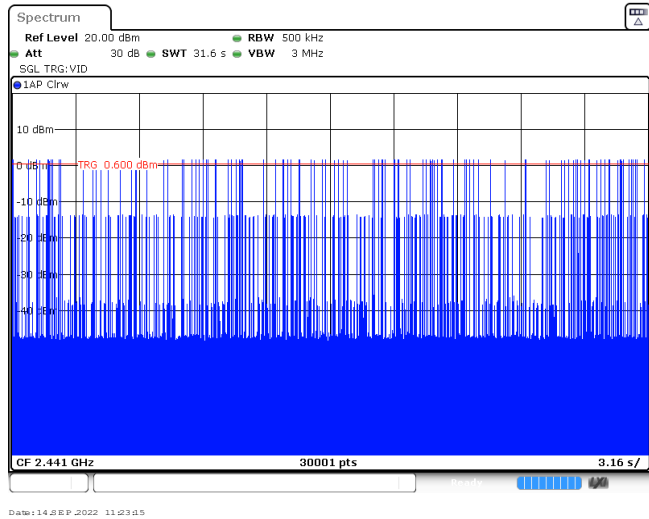
3DH3
Burst number



3DH5
Burst width



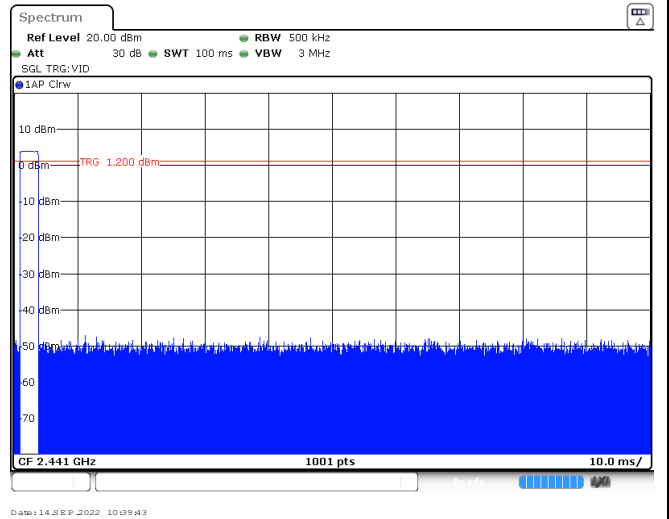
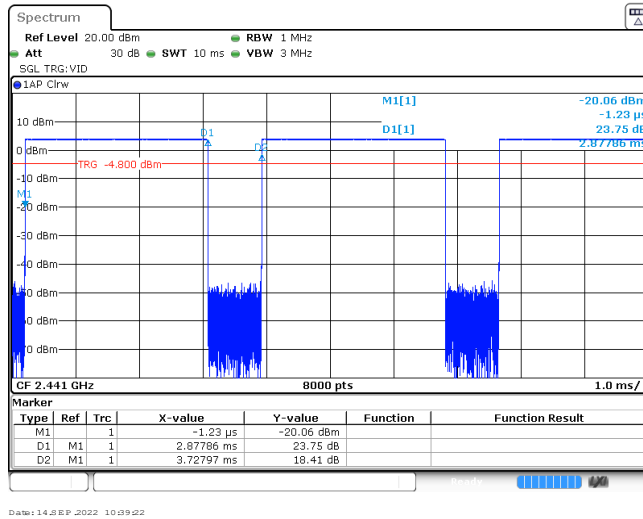
3DH5
Burst number



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	2.88	100	1	-30.81
$\pi/4$ DQPSK	2441	2.86	100	1	-30.87
8DPSK	2441	2.86	100	2	-24.85

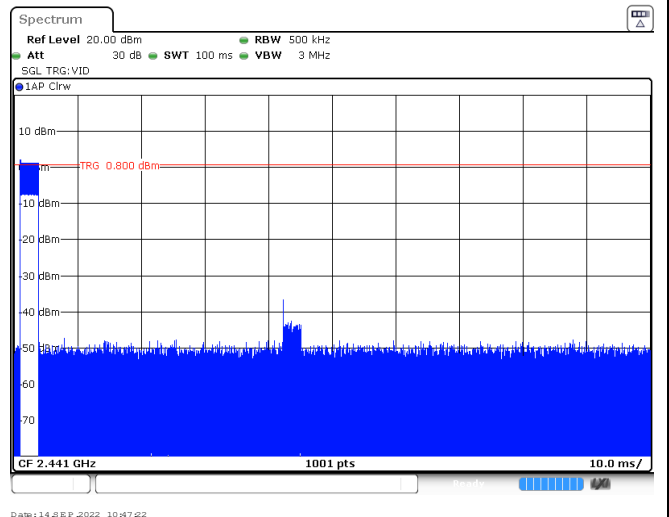
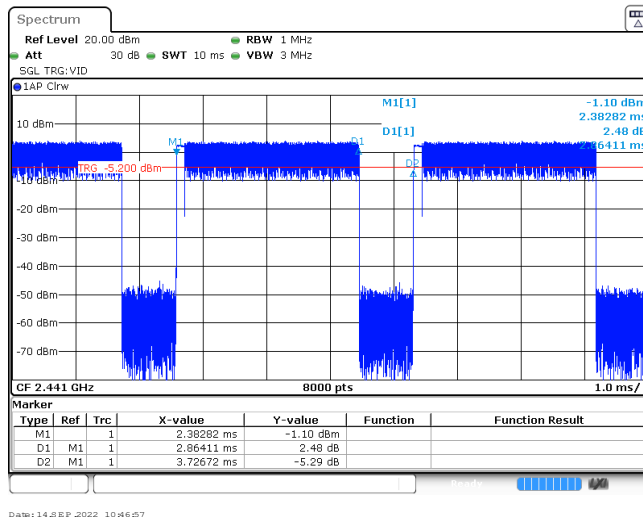
GFSK



T_{on} time for single burst

Burst Quantity

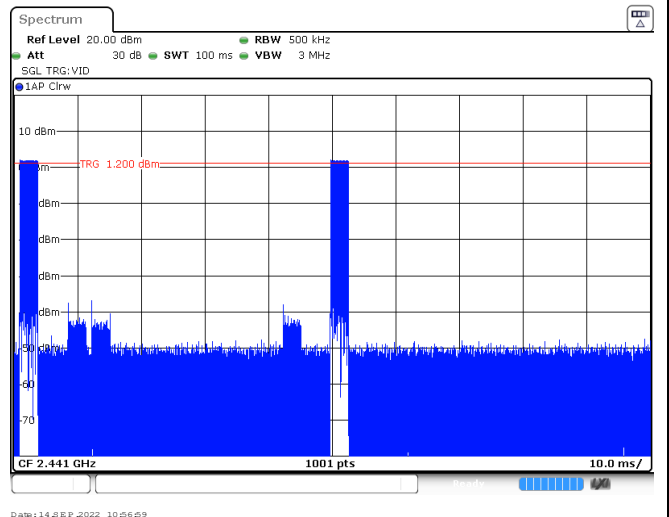
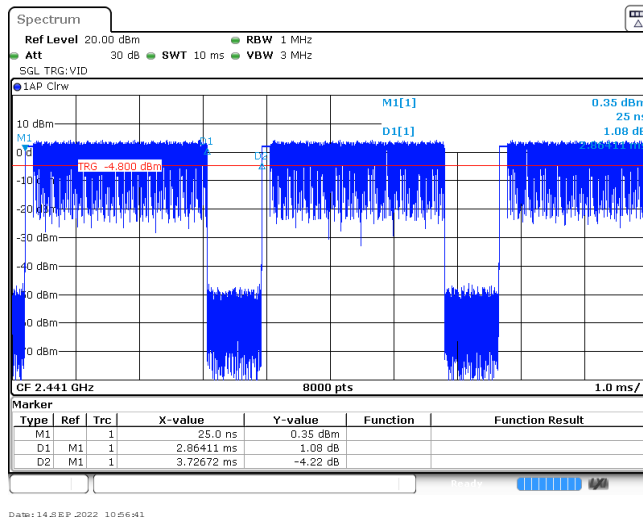
$\pi/4$ DQPSK



T_{on} time for single burst

Burst Quantity

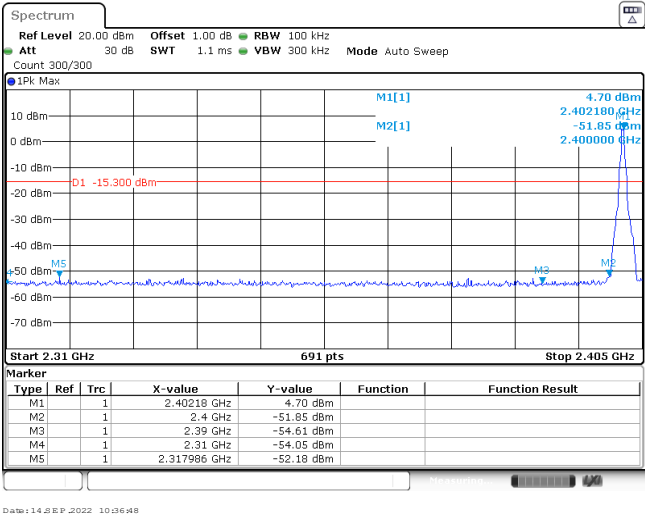
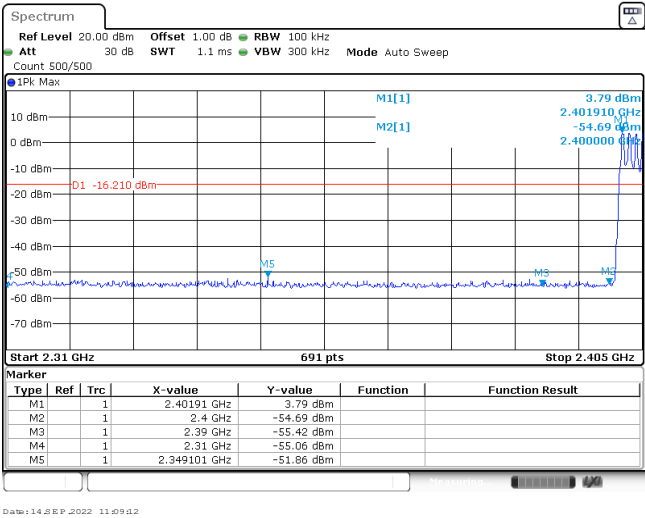
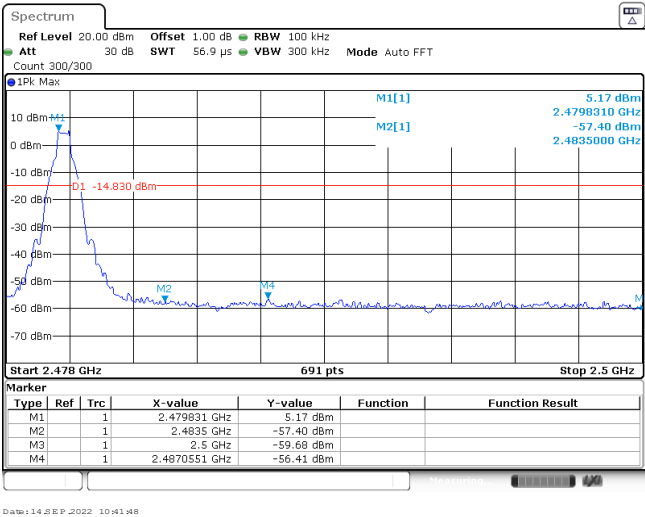
8DPSK



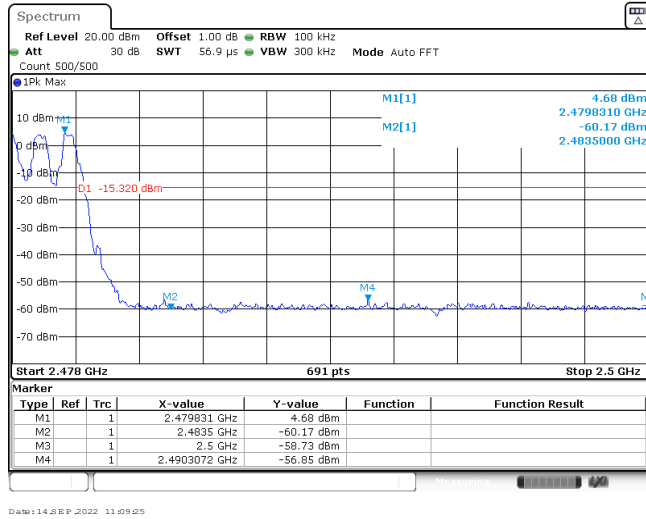
T_{on} time for single burst

Burst Quantity

Appendix H: Band edge and Spurious Emissions (conducted)

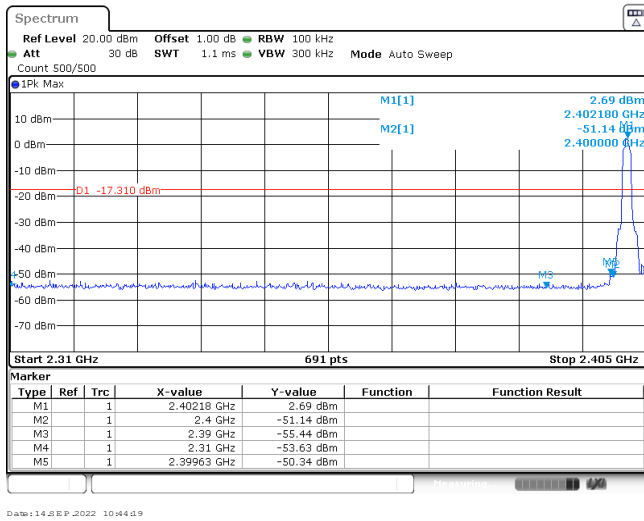
Test Item:	Band edge	Modulation type:	GFSK																																										
<p>CH00 No hopping mode</p>	 <table border="1" data-bbox="687 725 1334 824"> <thead> <tr> <th>Type</th> <th>Ref</th> <th>Trc</th> <th>X-value</th> <th>Y-value</th> <th>Function</th> <th>Function Result</th> </tr> </thead> <tbody> <tr> <td>M1</td> <td>1</td> <td></td> <td>2.40218 GHz</td> <td>4.70 dBm</td> <td></td> <td></td> </tr> <tr> <td>M2</td> <td>1</td> <td></td> <td>2.4 GHz</td> <td>-51.85 dBm</td> <td></td> <td></td> </tr> <tr> <td>M3</td> <td>1</td> <td></td> <td>2.39 GHz</td> <td>-54.61 dBm</td> <td></td> <td></td> </tr> <tr> <td>M4</td> <td>1</td> <td></td> <td>2.31 GHz</td> <td>-54.05 dBm</td> <td></td> <td></td> </tr> <tr> <td>M5</td> <td>1</td> <td></td> <td>2.317986 GHz</td> <td>-52.18 dBm</td> <td></td> <td></td> </tr> </tbody> </table>			Type	Ref	Trc	X-value	Y-value	Function	Function Result	M1	1		2.40218 GHz	4.70 dBm			M2	1		2.4 GHz	-51.85 dBm			M3	1		2.39 GHz	-54.61 dBm			M4	1		2.31 GHz	-54.05 dBm			M5	1		2.317986 GHz	-52.18 dBm		
Type	Ref	Trc	X-value	Y-value	Function	Function Result																																							
M1	1		2.40218 GHz	4.70 dBm																																									
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<p>CH00 Hopping mode</p>	 <table border="1" data-bbox="687 1272 1334 1370"> <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>2.40191 GHz</td> <td>3.79 dBm</td> <td></td> <td></td> </tr> <tr> <td>M2</td> <td>1</td> <td></td> <td>2.4 GHz</td> <td>-54.69 dBm</td> <td></td> <td></td> </tr> <tr> <td>M3</td> <td>1</td> <td></td> <td>2.39 GHz</td> <td>-55.42 dBm</td> <td></td> <td></td> </tr> <tr> <td>M4</td> <td>1</td> <td></td> <td>2.31 GHz</td> <td>-55.06 dBm</td> <td></td> <td></td> </tr> <tr> <td>M5</td> <td>1</td> <td></td> <td>2.349101 GHz</td> <td>-51.86 dBm</td> <td></td> <td></td> </tr> </tbody> </table>			Type	Ref	Trc	X-value	Y-value	Function	Function Result	M1	1		2.40191 GHz	3.79 dBm			M2	1		2.4 GHz	-54.69 dBm			M3	1		2.39 GHz	-55.42 dBm			M4	1		2.31 GHz	-55.06 dBm			M5	1		2.349101 GHz	-51.86 dBm		
Type	Ref	Trc	X-value	Y-value	Function	Function Result																																							
M1	1		2.40191 GHz	3.79 dBm																																									
M2	1		2.4 GHz	-54.69 dBm																																									
M3	1		2.39 GHz	-55.42 dBm																																									
M4	1		2.31 GHz	-55.06 dBm																																									
M5	1		2.349101 GHz	-51.86 dBm																																									
<p>CH78 No hopping mode</p>	 <table border="1" data-bbox="687 1818 1334 1917"> <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>2.479831 GHz</td> <td>5.17 dBm</td> <td></td> <td></td> </tr> <tr> <td>M2</td> <td>1</td> <td></td> <td>2.4835 GHz</td> <td>-57.40 dBm</td> <td></td> <td></td> </tr> <tr> <td>M3</td> <td>1</td> <td></td> <td>2.5 GHz</td> <td>-59.68 dBm</td> <td></td> <td></td> </tr> <tr> <td>M4</td> <td>1</td> <td></td> <td>2.4870551 GHz</td> <td>-56.41 dBm</td> <td></td> <td></td> </tr> </tbody> </table>			Type	Ref	Trc	X-value	Y-value	Function	Function Result	M1	1		2.479831 GHz	5.17 dBm			M2	1		2.4835 GHz	-57.40 dBm			M3	1		2.5 GHz	-59.68 dBm			M4	1		2.4870551 GHz	-56.41 dBm									
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CH78
Hopping mode

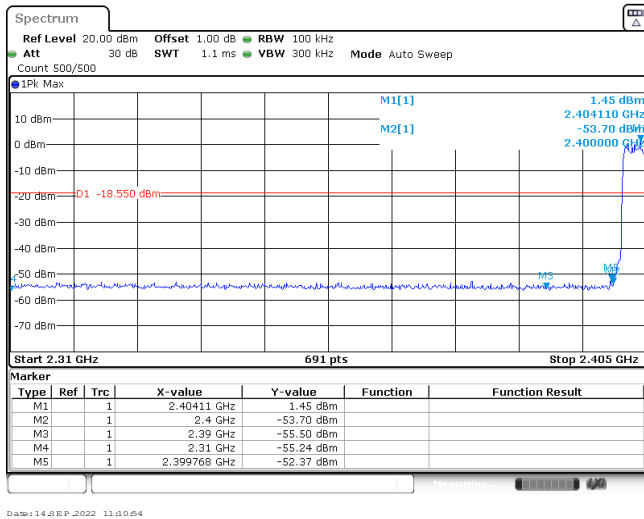


Test Item:	Band edge	Modulation type:	π/4DQPSK
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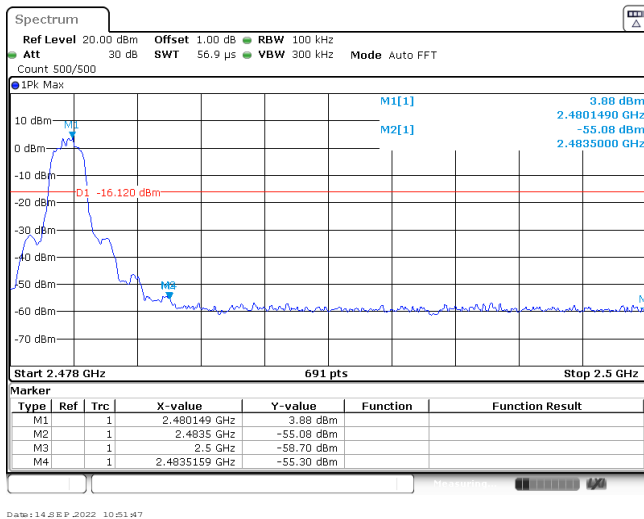
CH00
No hopping mode



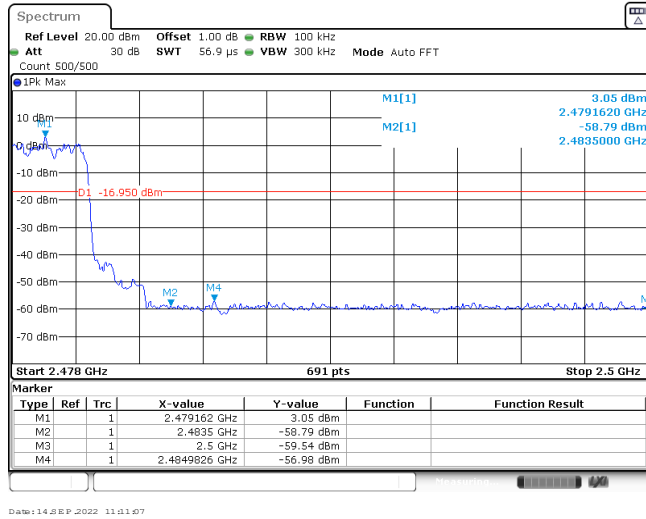
CH00
Hopping mode

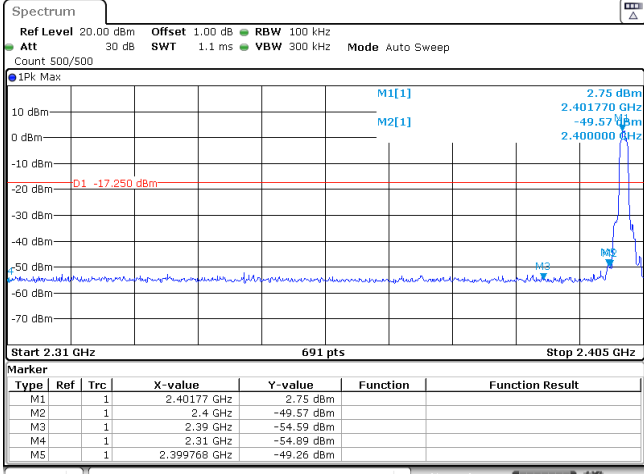
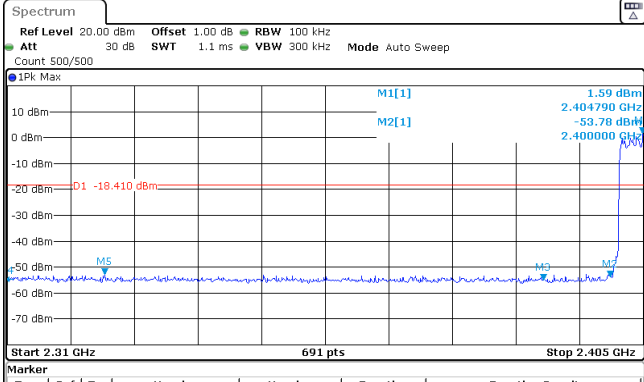
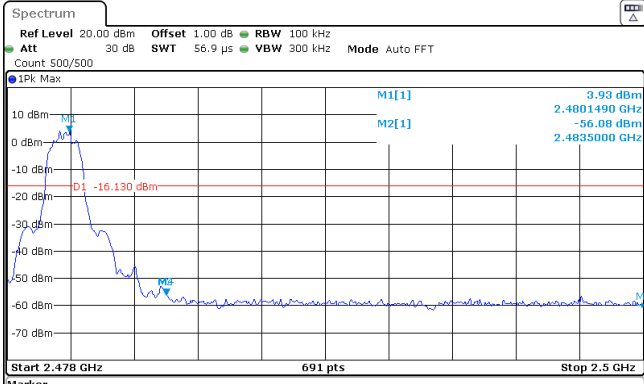


CH78
No hopping mode

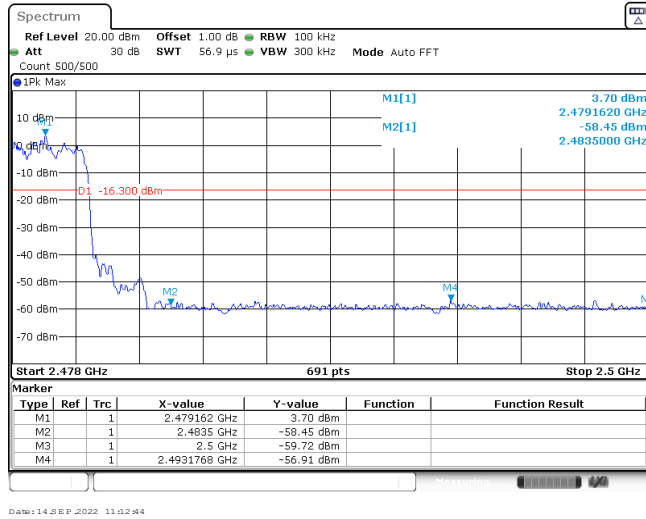


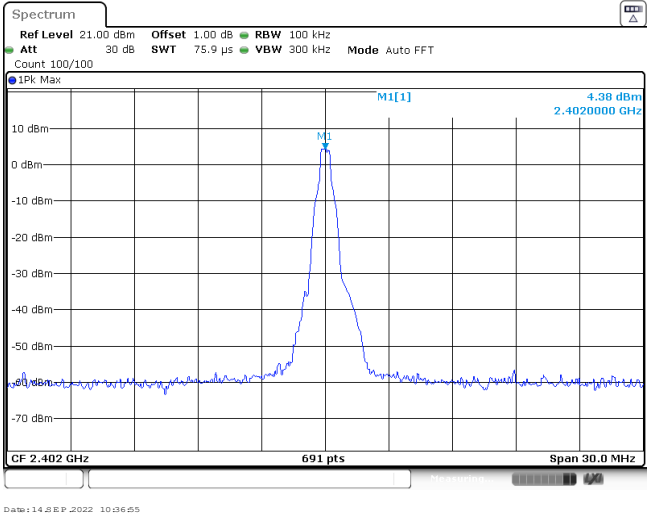
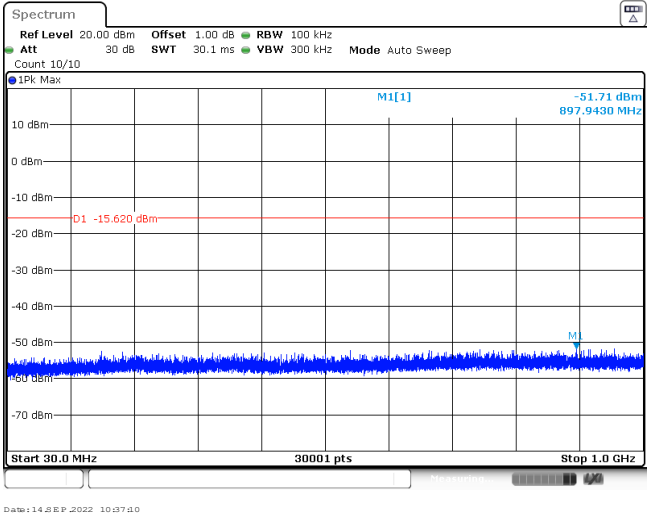
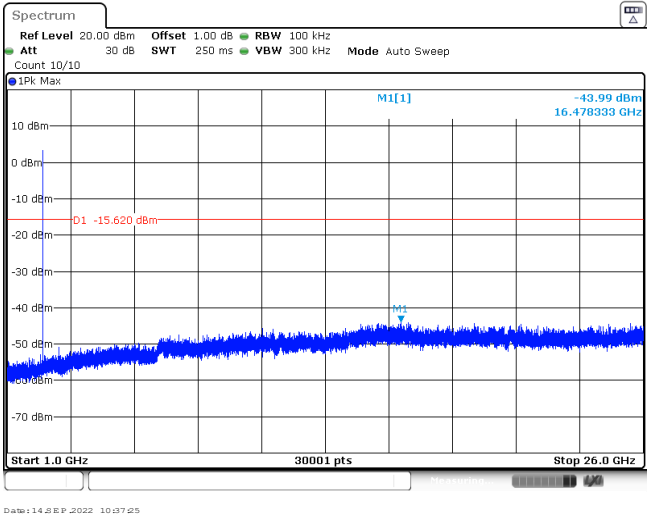
CH78
Hopping mode



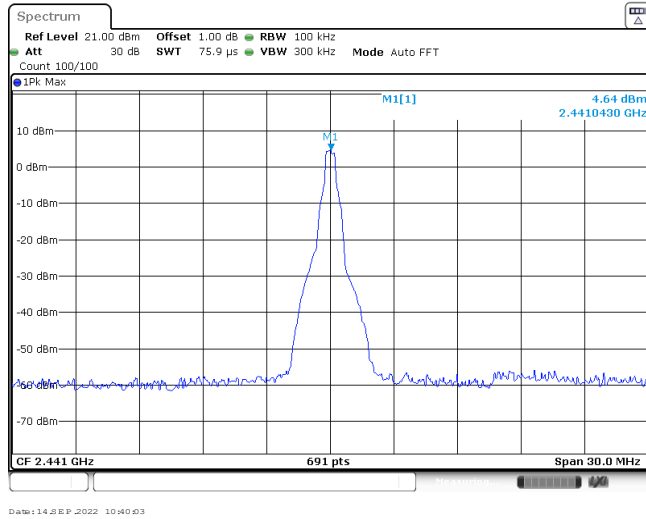
Test Item:	Band edge	Modulation type:	8DPSK																																																
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CH78
Hoppig mode

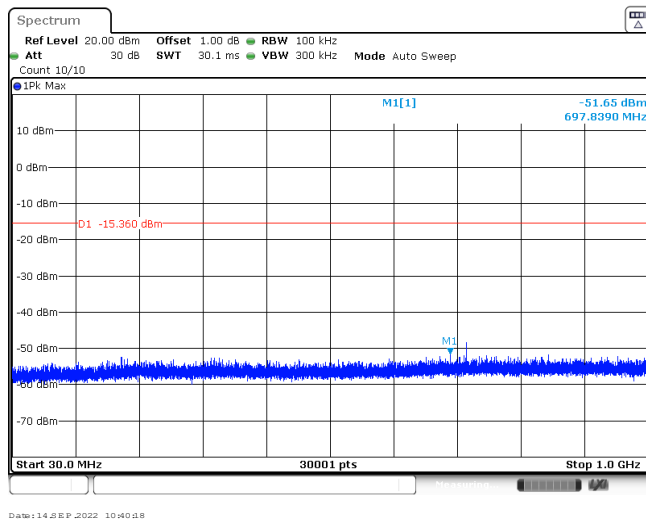


Test Item:	Spurious Emission	Modulation type:	GFSK
<p>CH00 Reference level</p>			
<p>CH00 30MHz~1000MHz</p>			
<p>CH00 1GHz~26GHz</p>			

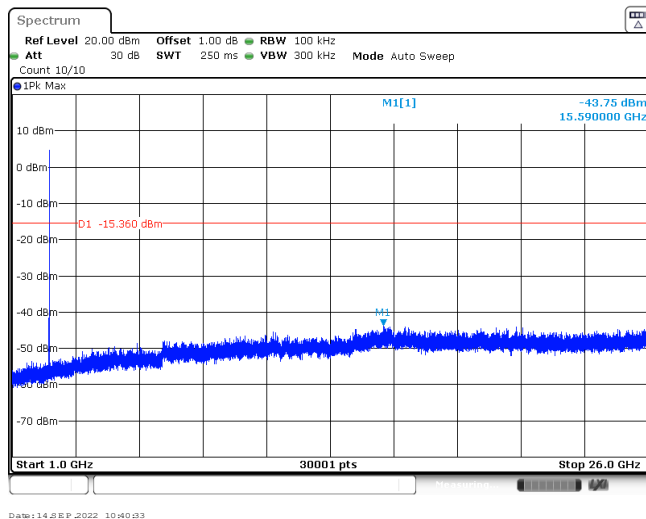
CH39
Reference level



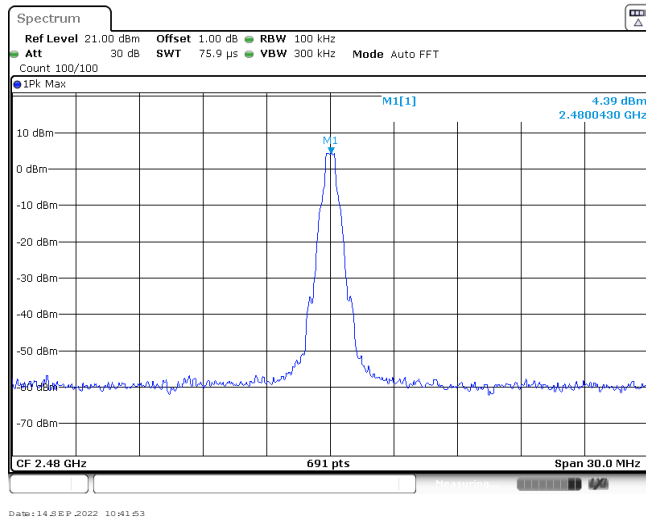
CH39
30MHz~1000MHz



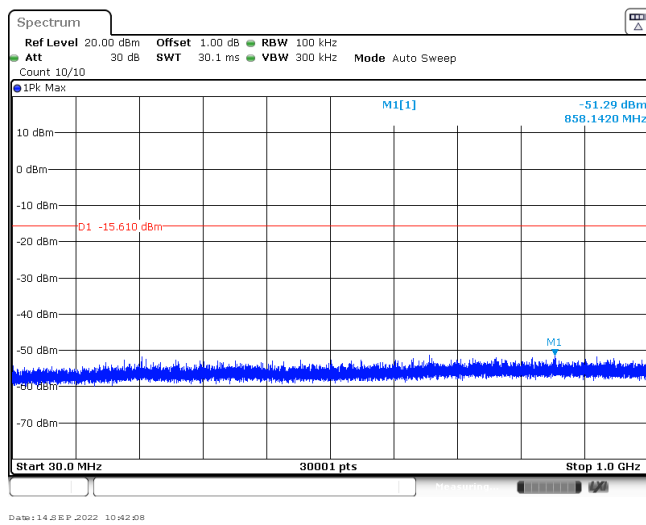
CH39
1GHz~26GHz



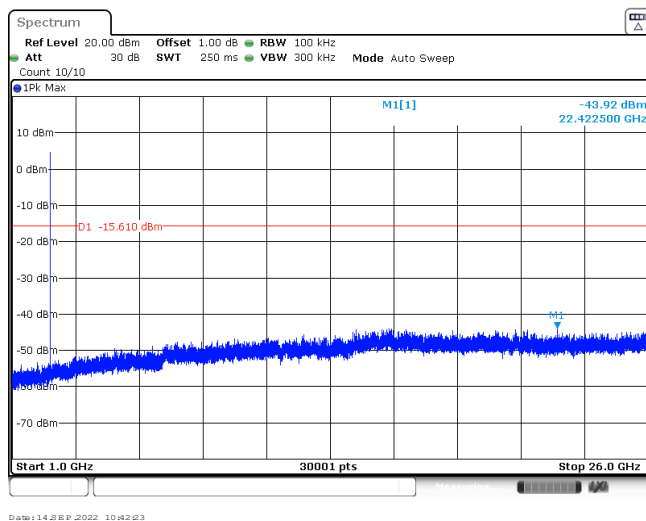
CH78
Reference level



CH78
30MHz~1000MHz

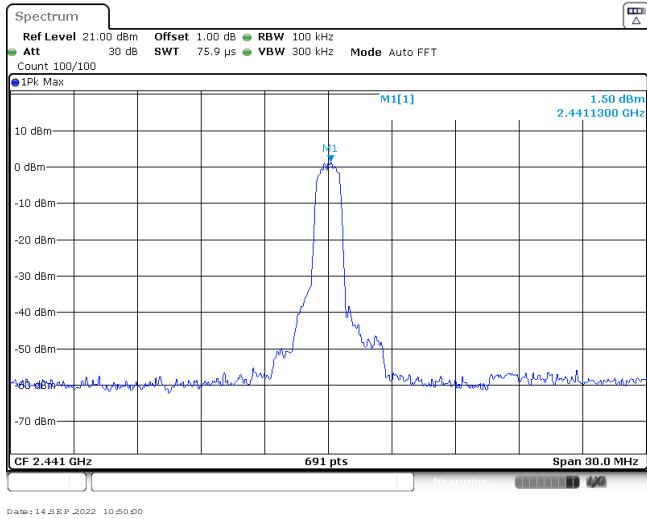


CH78
1GHz~26GHz

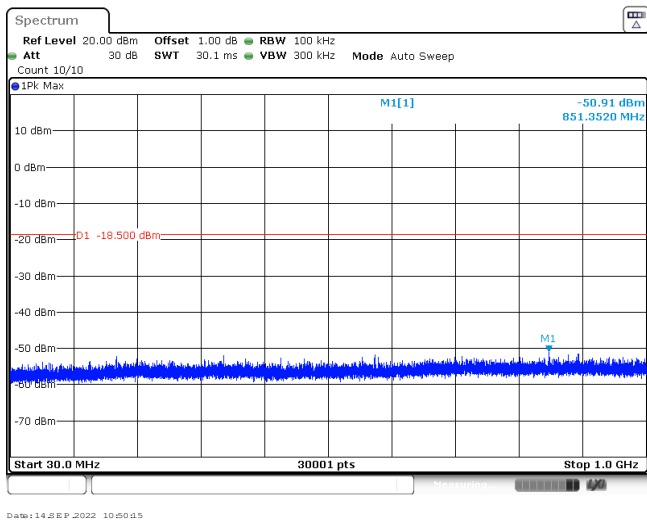


Test Item:	Spurious Emission	Modulation type:	$\pi/4$ DQPSK
<p>CH00 Reference level</p>			
<p>CH00 30MHz~1000MHz</p>			
<p>CH00 1GHz~26GHz</p>			

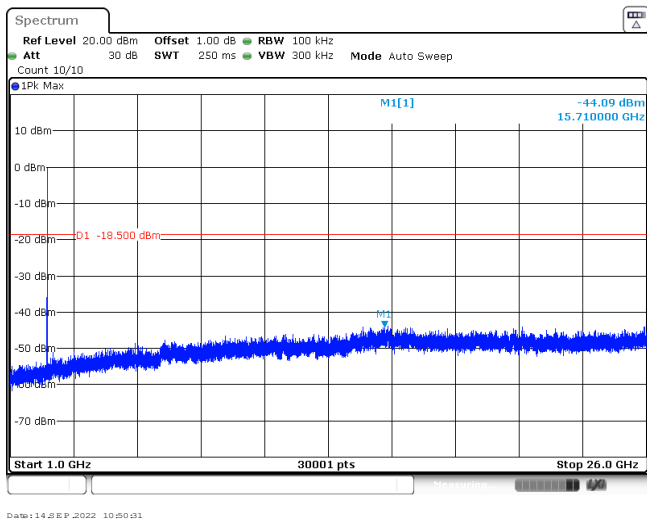
CH39
Reference level



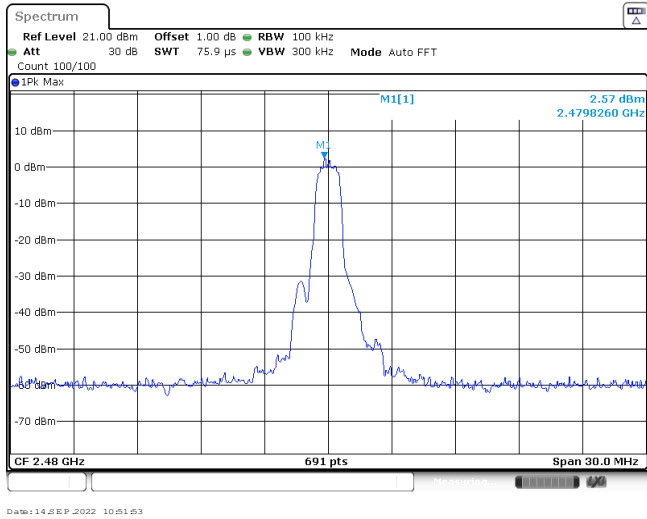
CH39
30MHz~1000MHz



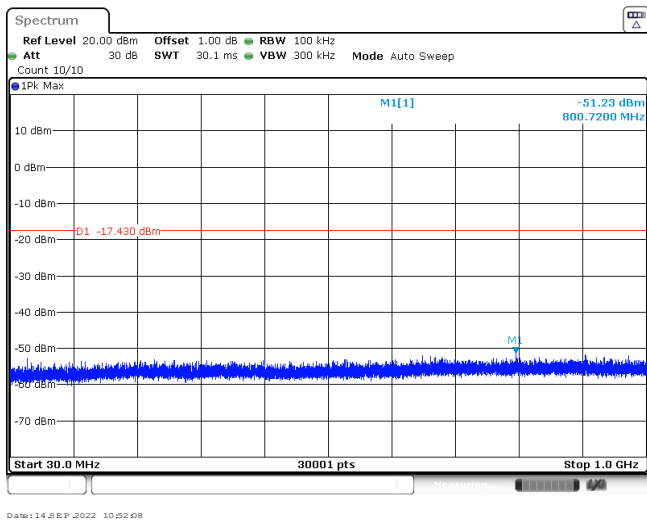
CH39
1GHz~26GHz



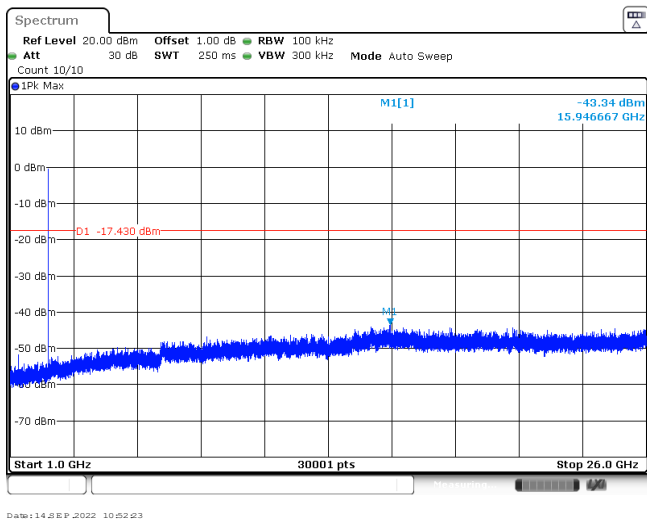
CH78
Reference level

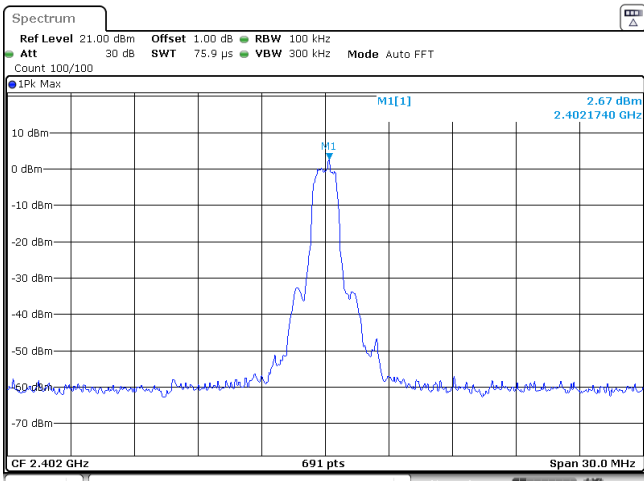
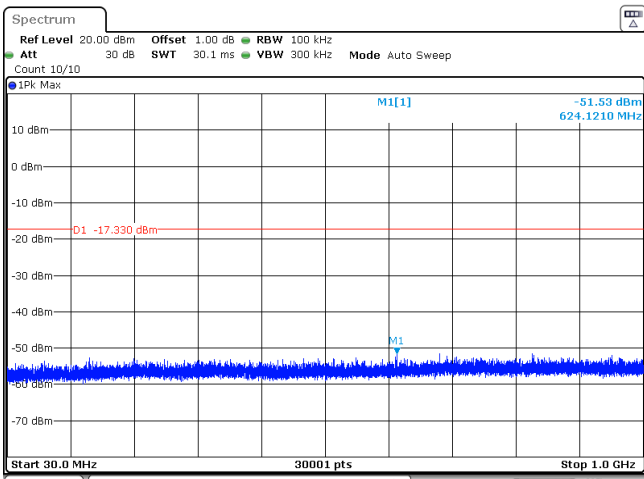
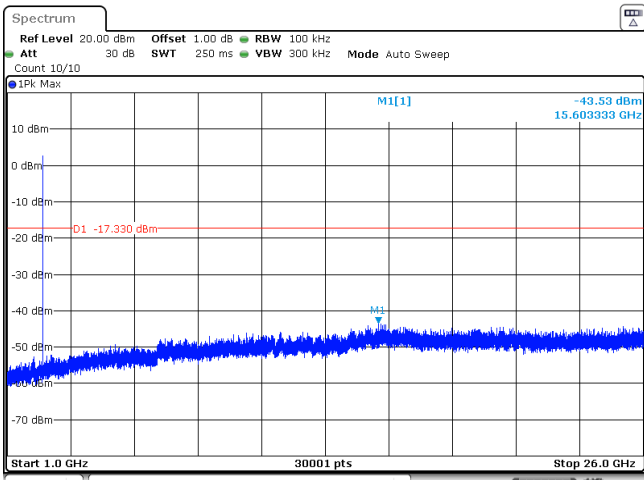


CH78
30MHz~1000MHz

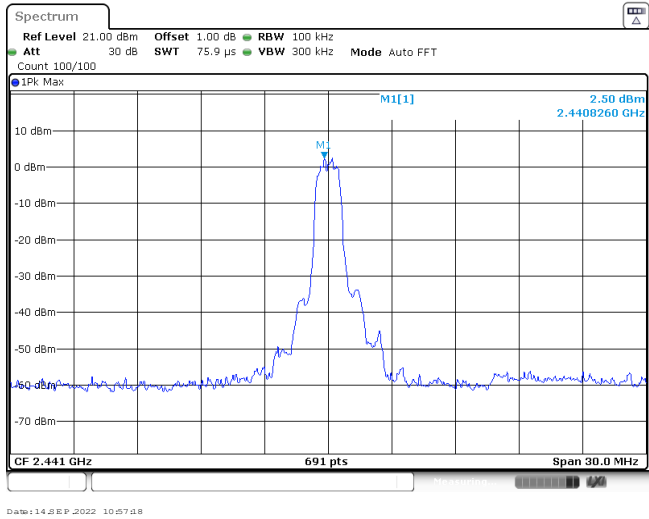


CH78
1GHz~26GHz

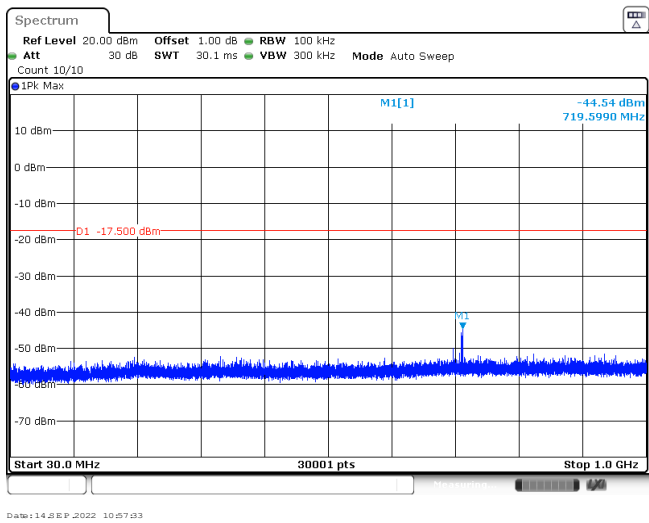


Test Item:	Spurious Emission	Modulation type:	8DPSK
CH00 Reference level	 <p>1Pk Max: 2.67 dBm, 2.4021740 GHz</p> <p>CF 2.402 GHz, 691 pts, Span 30.0 MHz</p> <p>Date: 14 SEP 2022 10:54:15</p>		
CH00 30MHz~1000MHz	 <p>1Pk Max: -51.53 dBm, 624.1210 MHz</p> <p>D1 -17.330 dBm</p> <p>Start 30.0 MHz, 30001 pts, Stop 1.0 GHz</p> <p>Date: 14 SEP 2022 10:54:30</p>		
CH00 1GHz~26GHz	 <p>1Pk Max: -43.53 dBm, 15.603333 GHz</p> <p>D1 -17.330 dBm</p> <p>Start 1.0 GHz, 30001 pts, Stop 26.0 GHz</p> <p>Date: 14 SEP 2022 10:54:46</p>		

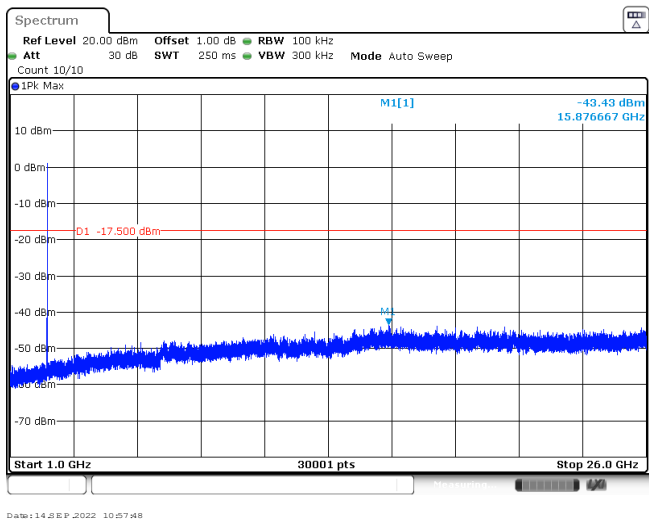
CH39
Reference level



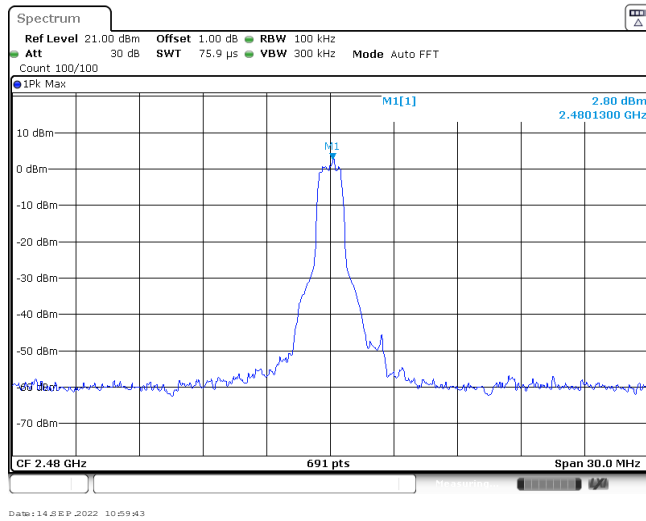
CH39
30MHz~1000MHz



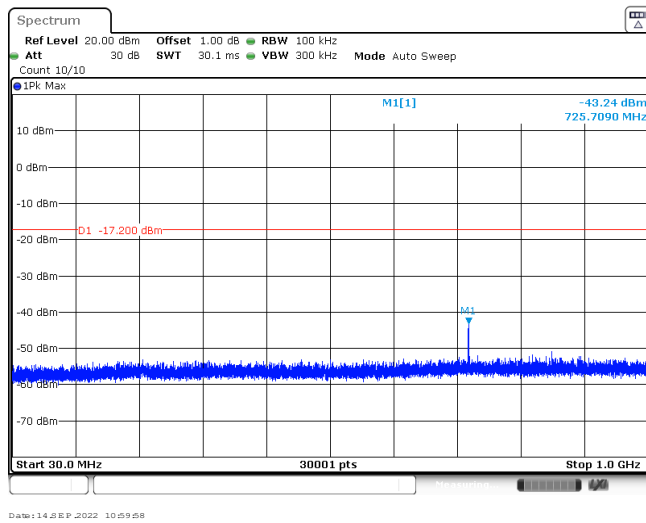
CH39
1GHz~26GHz



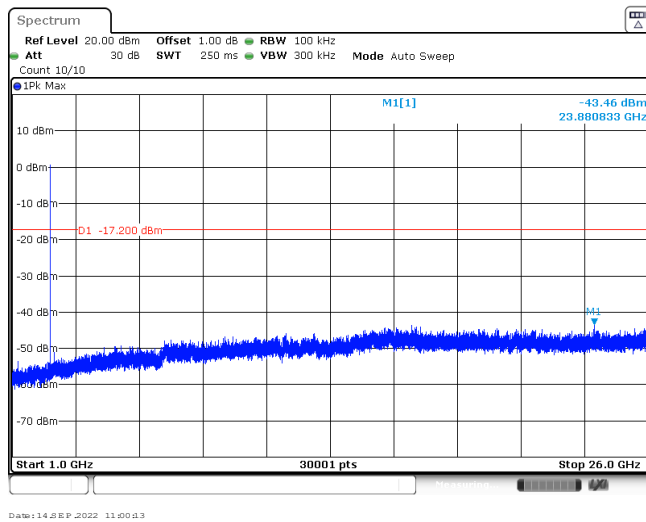
CH78
Reference level



CH78
30MHz~1000MHz



CH78
1GHz~26GHz



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