

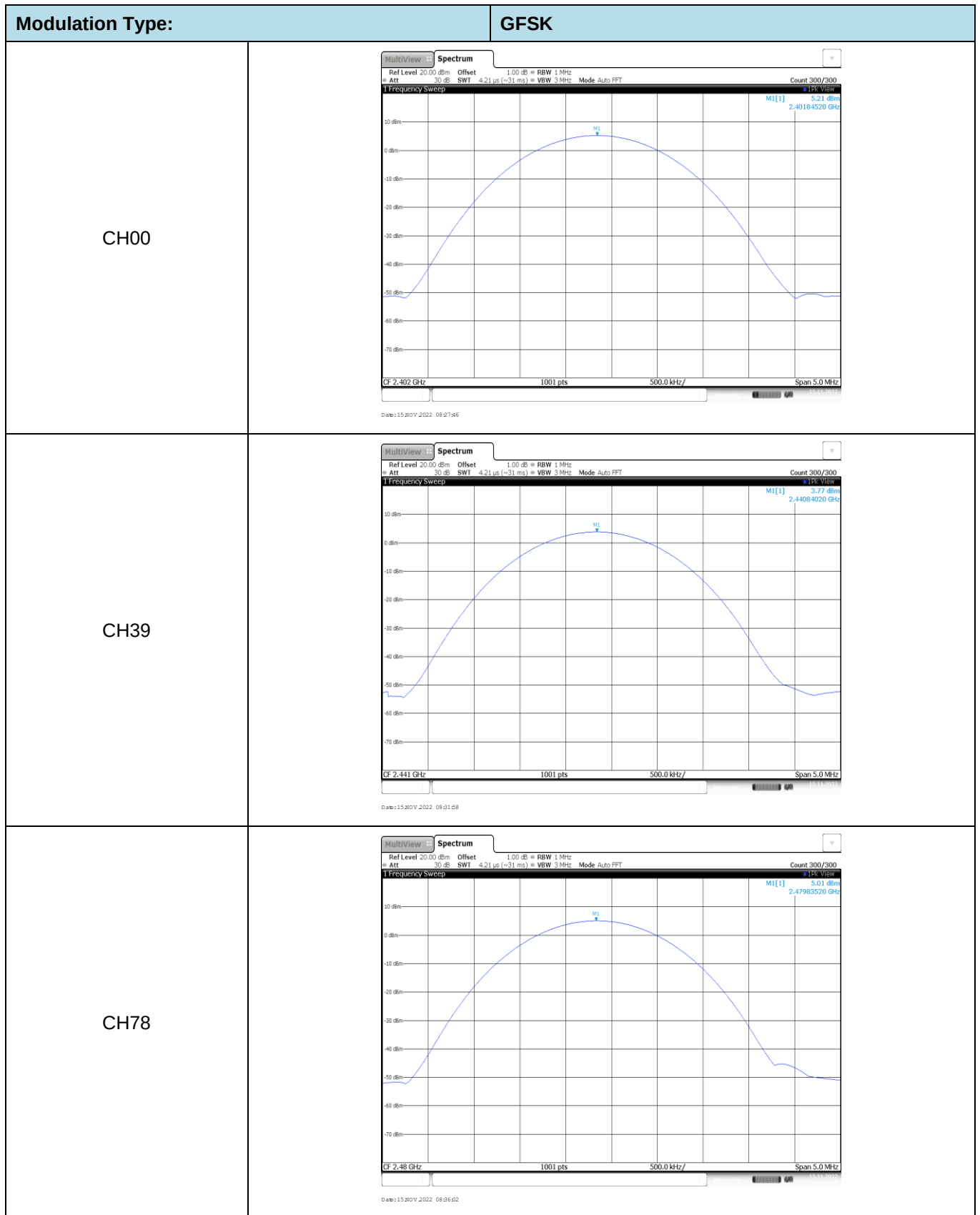
APPENDIX REPORT

Project No.	SHT2210112901EW	Radio Specification	Bluetooth EDR
Test sample No.	YPHT22101129001	Model No.	Stark 8
Start test date	2022-11-15	Finish date	2022-11-15
Temperature	25.6℃	Humidity	35%
Test Engineer	Xiaoxiao Li	Auditor	Xiaodong Zhe

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	5.21	5.14	≤ 30.00	Pass
	39	3.77	3.68		
	78	5.01	4.88		
$\pi/4$ DQPSK	00	4.48	4.36	≤ 21.00	Pass
	39	3.44	3.36		
	78	4.14	4.05		
8DPSK	00	4.38	4.23	≤ 21.00	Pass
	39	3.33	3.24		
	78	4.10	4.01		

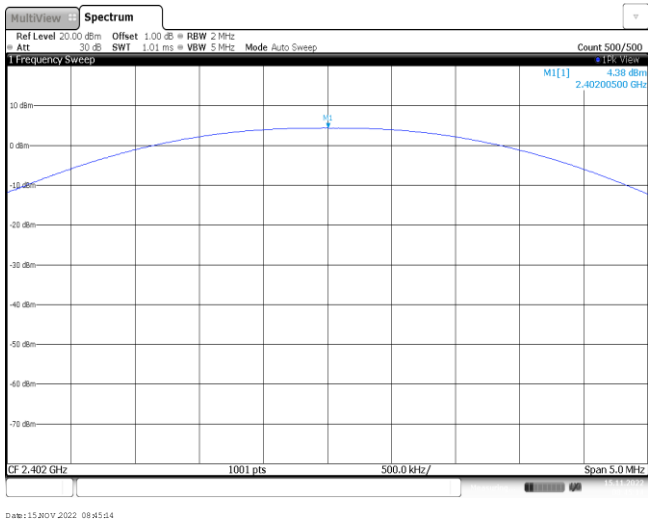


Modulation Type:		π /4DQPSK
CH00	MultiView Spectrum Ref Level 20.00 dBm Offset 1.00 dB RBW 2 MHz Att 30 dB SWT 1.01 ms VBW 5 MHz Mode Auto Sweep Count 500/500 1 Frequency Sweep M1[1] 4.48 dBm 2.40200000 GHz 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm CF 2.402 GHz 1001 pts 500.0 kHz/ Span 5.0 MHz Date: 15.NOV.2022 08:38:07	
CH39	MultiView Spectrum Ref Level 20.00 dBm Offset 1.00 dB RBW 2 MHz Att 30 dB SWT 1.01 ms VBW 5 MHz Mode Auto Sweep Count 500/500 1 Frequency Sweep M1[1] 3.44 dBm 2.44107990 GHz 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm CF 2.441 GHz 1001 pts 500.0 kHz/ Span 5.0 MHz Date: 15.NOV.2022 08:40:09	
CH78	MultiView Spectrum Ref Level 20.00 dBm Offset 1.00 dB RBW 2 MHz Att 30 dB SWT 1.01 ms VBW 5 MHz Mode Auto Sweep Count 500/500 1 Frequency Sweep M1[1] 4.14 dBm 2.47998000 GHz 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm CF 2.48 GHz 1001 pts 500.0 kHz/ Span 5.0 MHz Date: 15.NOV.2022 08:43:14	

Modulation Type:

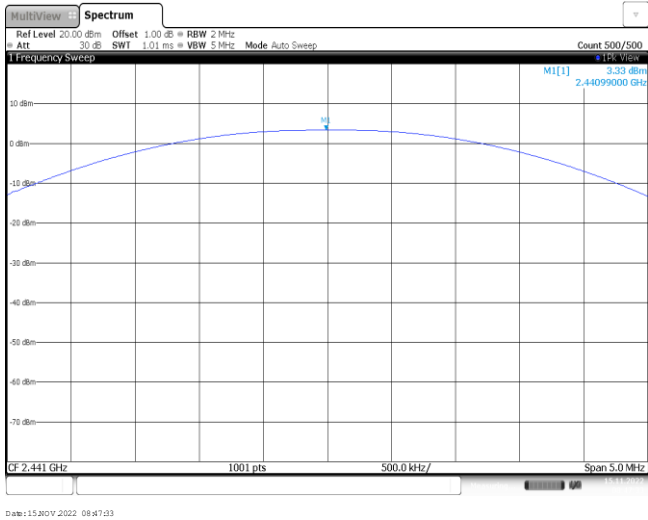
8DPSK

CH00



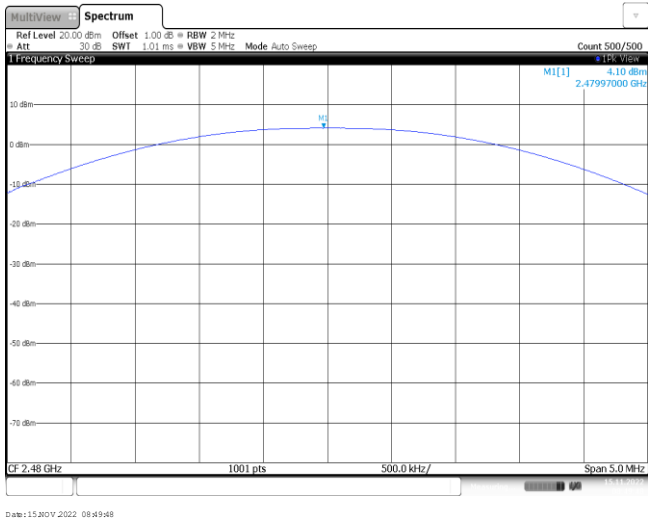
Date: 15 NOV 2022 08:45:14

CH39



Date: 15 NOV 2022 08:47:23

CH78



Date: 15 NOV 2022 08:49:48

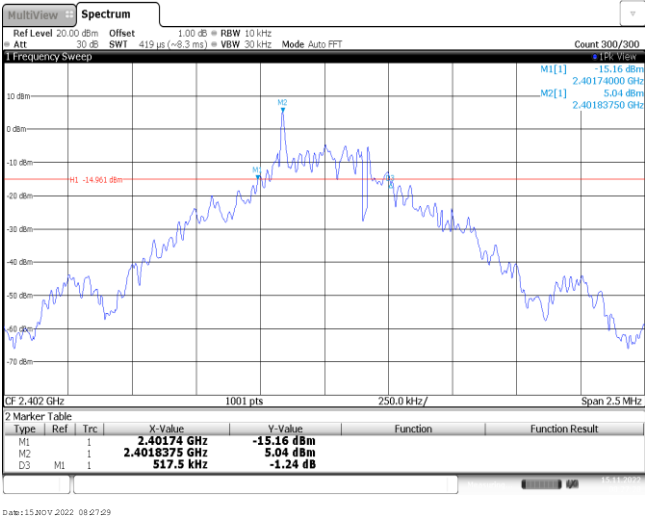
Appendix B : 20 dB Bandwidth

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	1120.00	-	Pass
	39	1117.50		
	78	1120.00		
8DPSK	00	1115.00	-	Pass
	39	1112.50		
	78	1110.00		

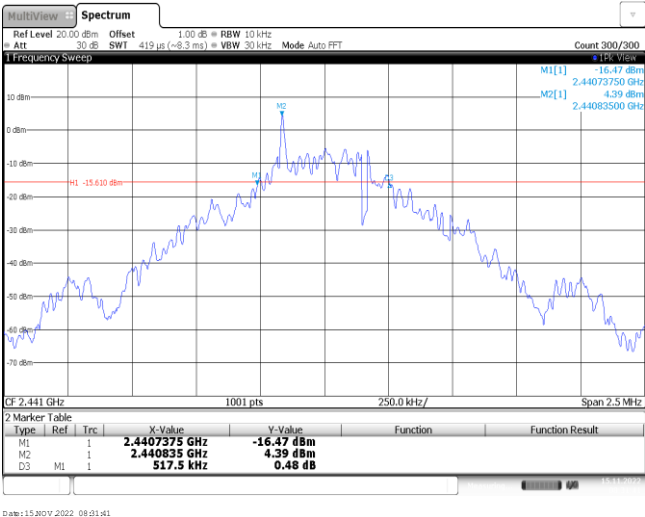
Modulation Type:

GFSK

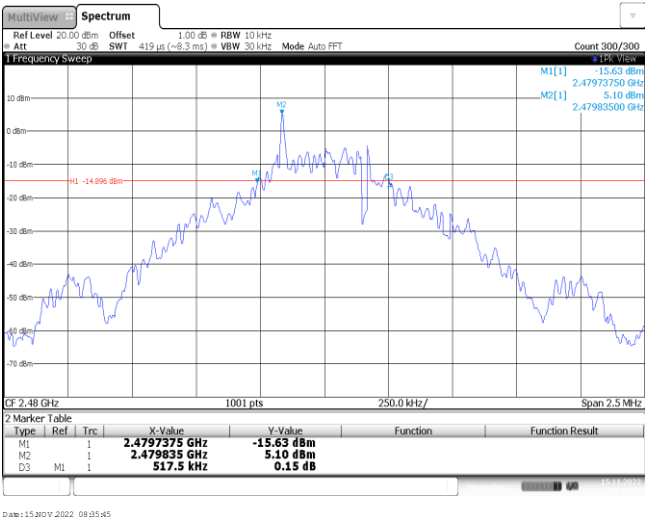
CH00



CH39



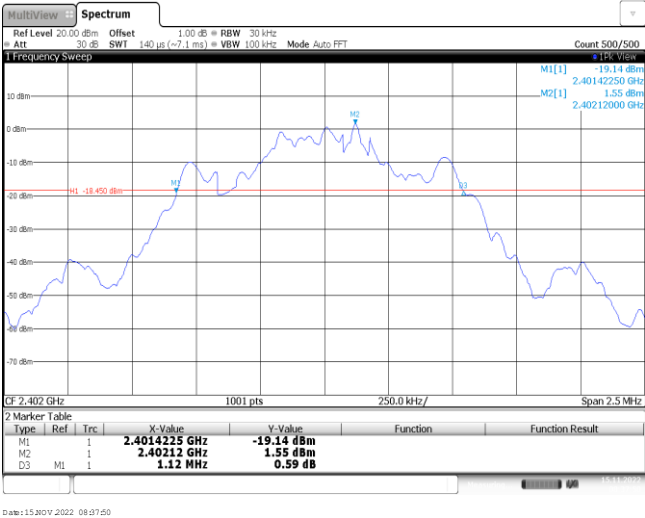
CH78



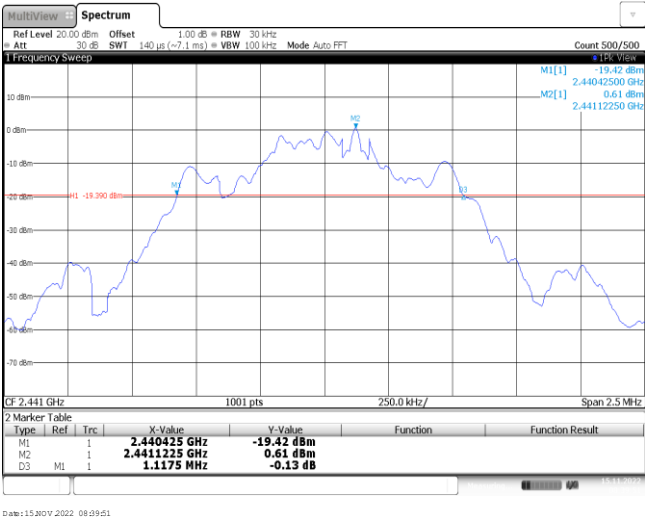
Modulation Type:

$\pi/4$ DQPSK

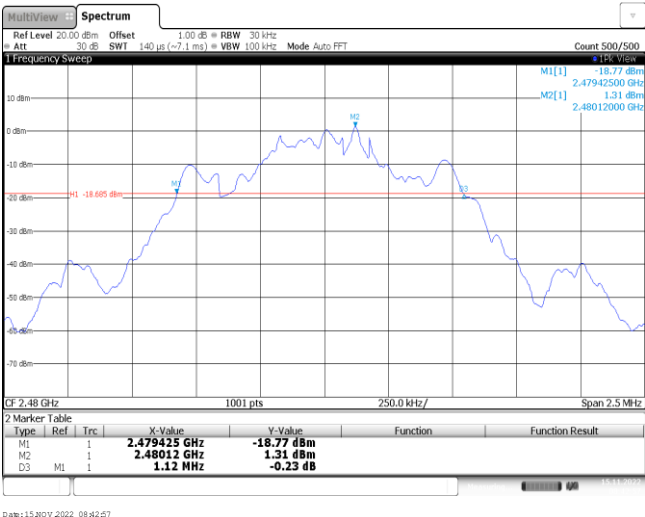
CH00



CH39



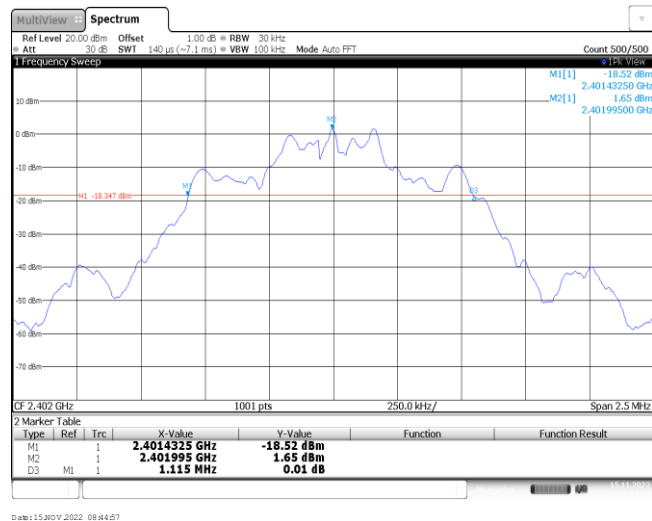
CH78



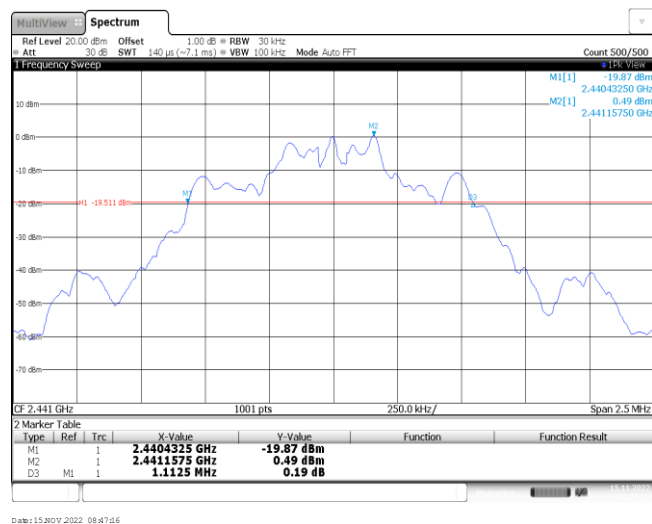
Modulation Type:

8DPSK

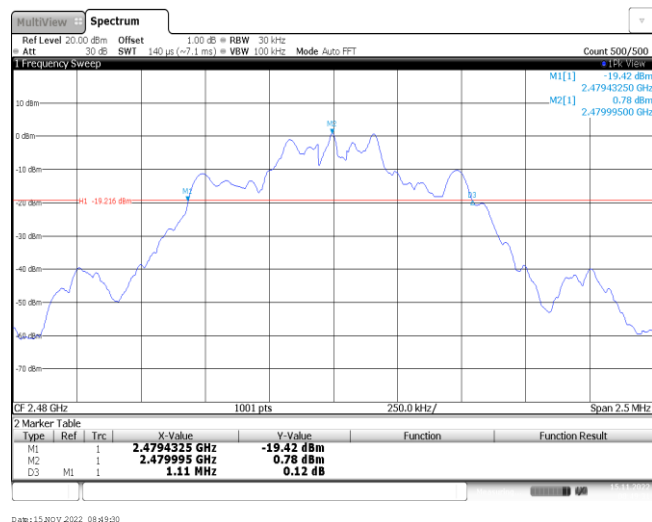
CH00



CH39



CH78



Appendix C: 99% Occupied Bandwidth

Modulation type	Channel	99% Occupied Bandwidth (MHz)	Limit (MHz)	Result
GFSK	00	0.83	-	Pass
	39	0.86		
	78	0.84		
$\pi/4$ DQPSK	00	1.07	-	Pass
	39	1.06		
	78	1.07		
8DPSK	00	1.06	-	Pass
	39	1.06		
	78	1.06		

Modulation Type:

GFSK

CH00



CH39



CH78



Modulation Type:

 $\pi/4$ DQPSK

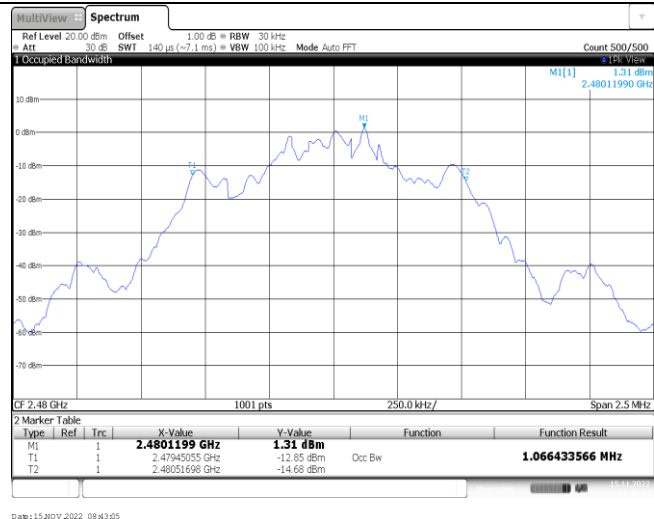
CH00



CH39



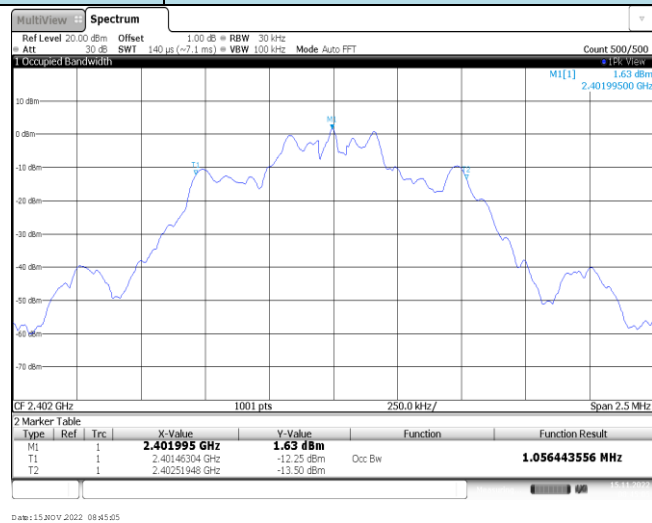
CH78



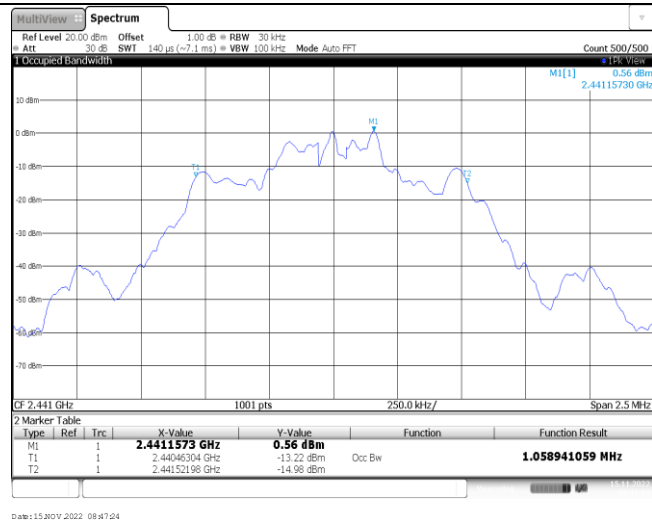
Modulation Type:

8DPSK

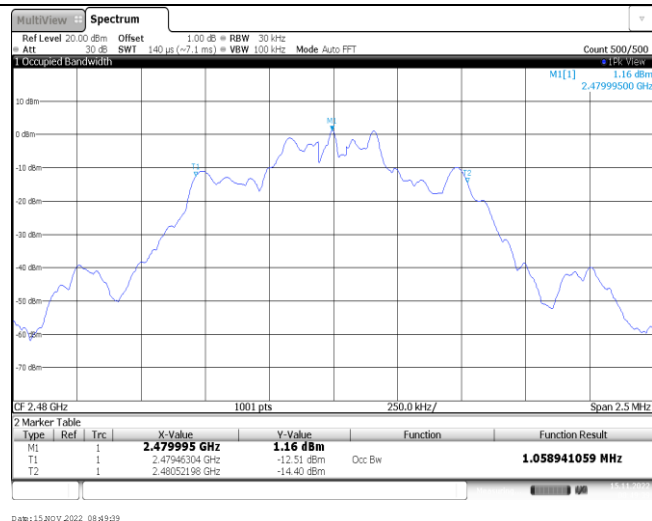
CH00



CH39



CH78



Appendix D: Carrier Frequencies Separation

Modulation type	Channel	Carrier Frequencies Separation (MHz)	Limit (kHz) *	Result
GFSK	39	1.00	≥ 517.50	Pass
$\pi/4$ DQPSK	39	1.00	≥ 746.67	Pass
8DPSK	39	1.00	≥ 743.33	Pass

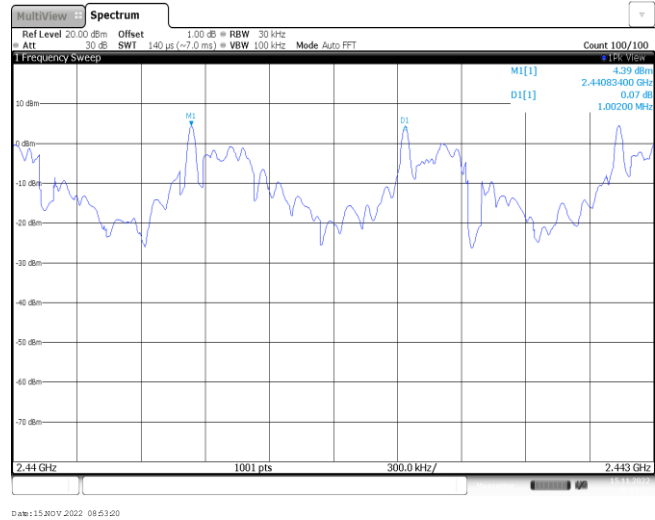
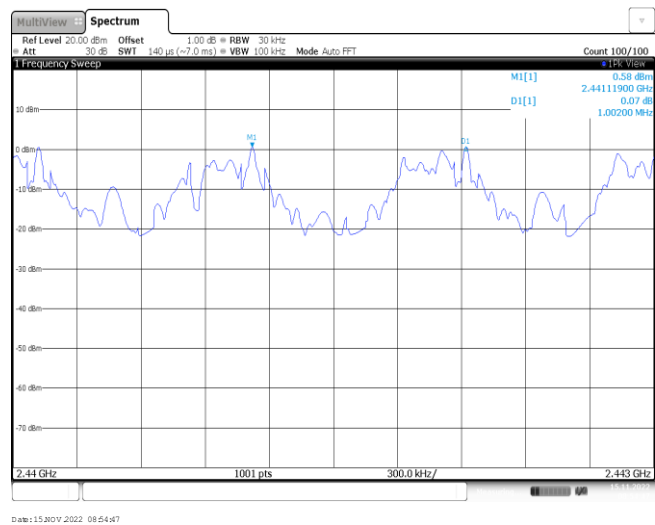
Note:

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

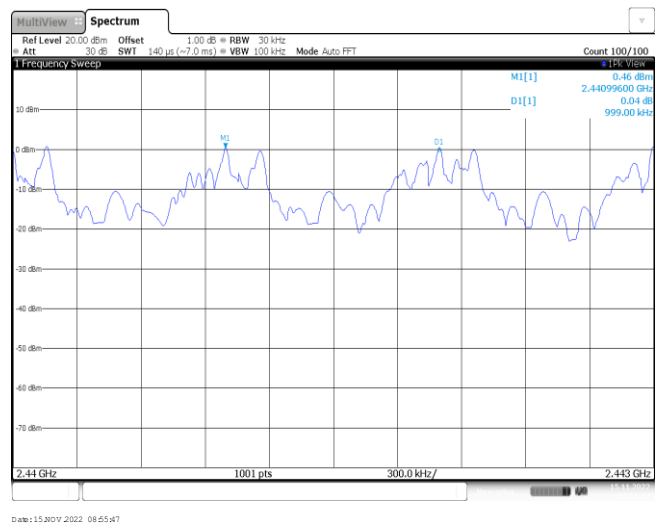
$\pi/4$ DQPSK limit = $2/3$ * The maximum 20 dB Bandwidth for $\pi/4$ DQPSK modulation on the appendix B.

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

GFSK

 $\pi/4$ DQPSK

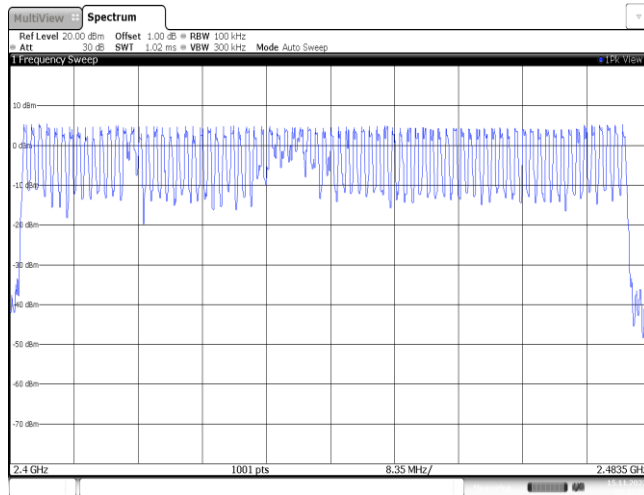
8DPSK



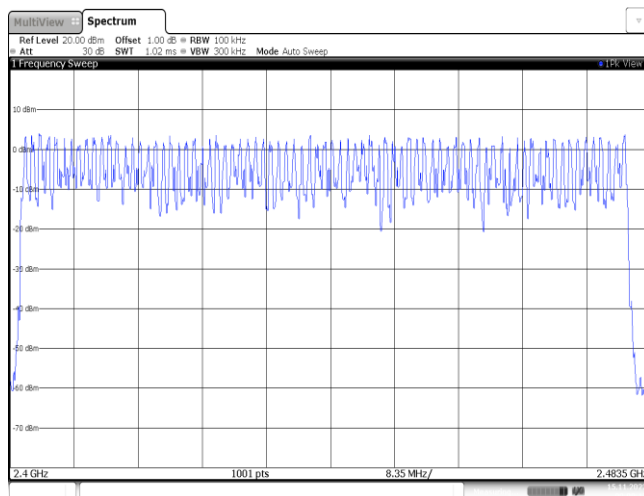
Appendix E: Hopping Channel Number

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

GFSK

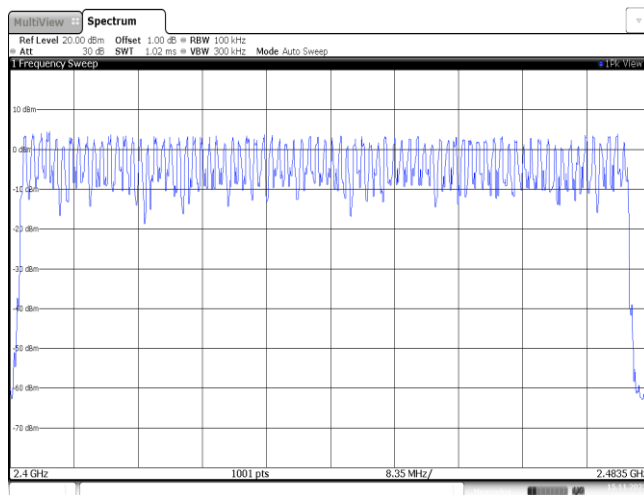


Date: 15 NOV 2022 08:57:24

 $\pi/4$ DQPSK

Date: 15 NOV 2022 09:00:13

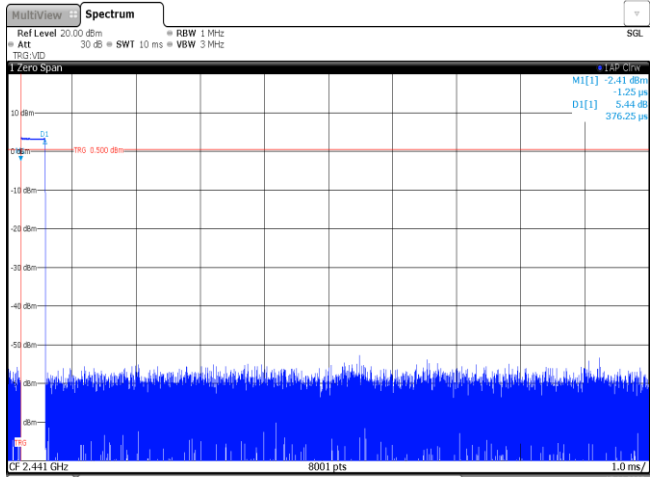
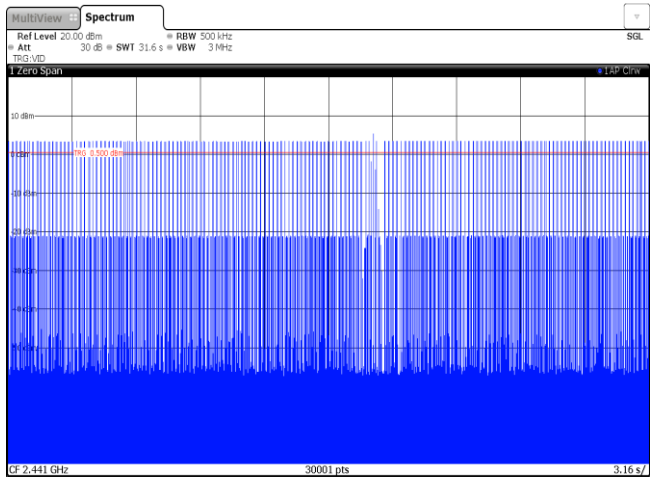
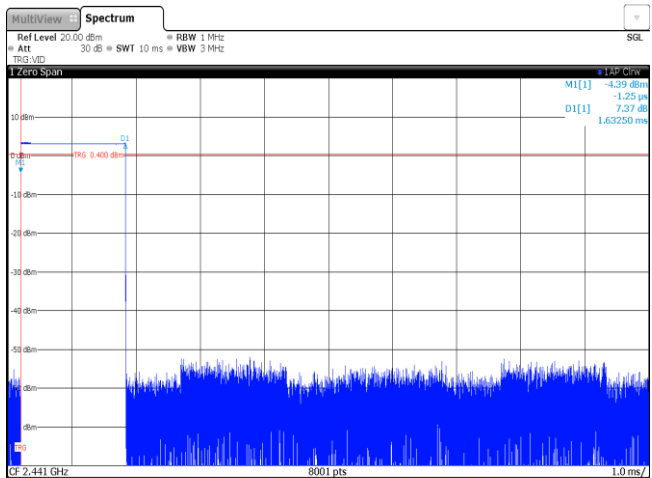
8DPSK



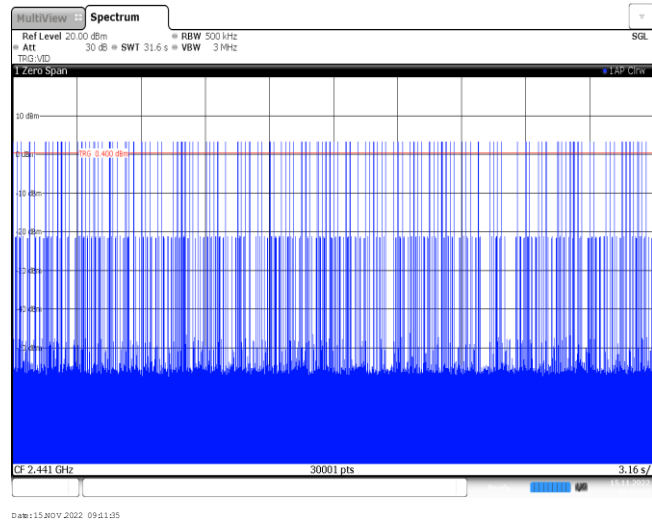
Date: 15 NOV 2022 09:09:28

Appendix F: Dwell Time

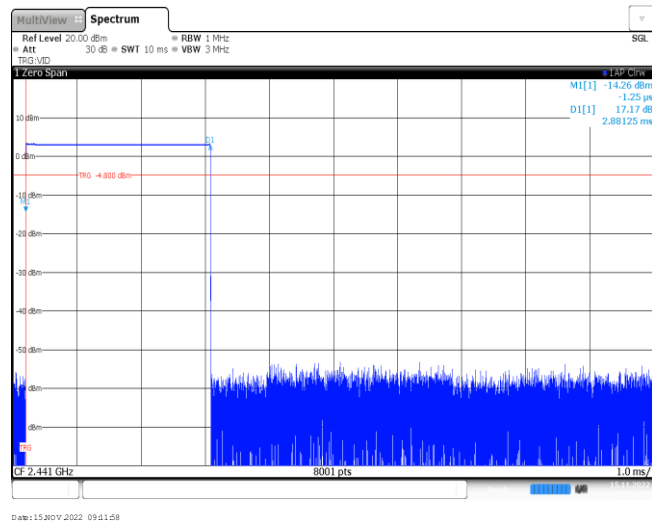
Modulation type	Packet	Burst Width [ms]	Total Hops[hop*ch]	Dwell time (Second)	Limit (Second)	Result
GFSK	DH1	0.38	308	0.12	≤ 0.40	Pass
	DH3	1.63	158	0.26		
	DH5	2.88	116	0.33		
$\pi/4$ DQPSK	2DH1	0.38	314	0.12	≤ 0.40	Pass
	2DH3	1.64	159	0.26		
	2DH5	2.89	103	0.30		
8DPSK	3DH1	0.38	313	0.12	≤ 0.40	Pass
	3DH3	1.64	157	0.26		
	3DH5	2.89	105	0.30		

Modulation Type:	GFSK
DH1 Burst width	 The spectrum plot shows a single burst of energy at 2.441 GHz. The y-axis represents power in dBm, ranging from -60 to 10. The x-axis represents frequency in MHz, ranging from 2.435 to 2.447. A red line indicates the reference level at 20.00 dBm. The plot shows a sharp peak at the carrier frequency, with a bandwidth of approximately 1 MHz. The signal is identified as M1[1] with a power of -2.41 dBm, a duration of 1.25 µs, and a data rate of 5.44 dB. The plot is titled 'Spectrum' and includes parameters: Ref Level 20.00 dBm, Att 30 dB, SWT 10 ms, VBW 3 MHz, RBW 1 MHz. The plot is titled '1 Zero Span' and includes parameters: CF 2.441 GHz, 8001 pts, 1.0 ms/.
DH1 Burst number	 The spectrum plot shows a continuous burst of energy at 2.441 GHz. The y-axis represents power in dBm, ranging from -60 to 10. The x-axis represents frequency in MHz, ranging from 2.435 to 2.447. A red line indicates the reference level at 20.00 dBm. The plot shows a sharp peak at the carrier frequency, with a bandwidth of approximately 1 MHz. The signal is identified as M1[1] with a power of -2.41 dBm, a duration of 1.25 µs, and a data rate of 5.44 dB. The plot is titled 'Spectrum' and includes parameters: Ref Level 20.00 dBm, Att 30 dB, SWT 31.6 s, VBW 3 MHz, RBW 500 kHz. The plot is titled '1 Zero Span' and includes parameters: CF 2.441 GHz, 30001 pts, 3.16 s/.
DH3 Burst width	 The spectrum plot shows a single burst of energy at 2.441 GHz. The y-axis represents power in dBm, ranging from -60 to 10. The x-axis represents frequency in MHz, ranging from 2.435 to 2.447. A red line indicates the reference level at 20.00 dBm. The plot shows a sharp peak at the carrier frequency, with a bandwidth of approximately 1 MHz. The signal is identified as M1[1] with a power of -4.39 dBm, a duration of 1.25 µs, and a data rate of 7.37 dB. The plot is titled 'Spectrum' and includes parameters: Ref Level 20.00 dBm, Att 30 dB, SWT 10 ms, VBW 3 MHz, RBW 1 MHz. The plot is titled '1 Zero Span' and includes parameters: CF 2.441 GHz, 8001 pts, 1.0 ms/.

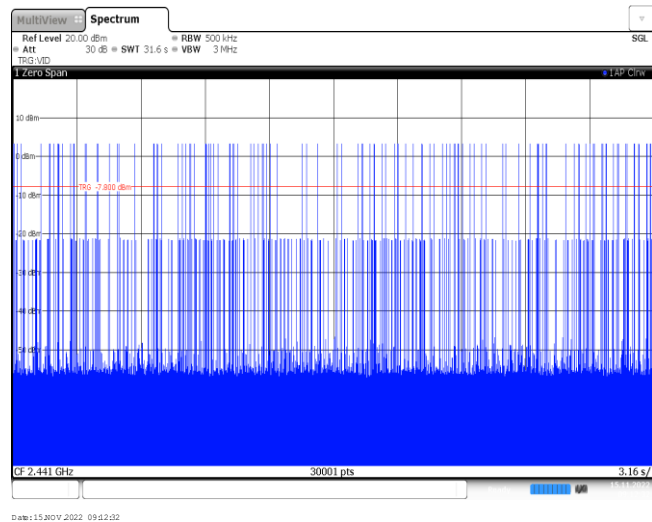
DH3
Burst number

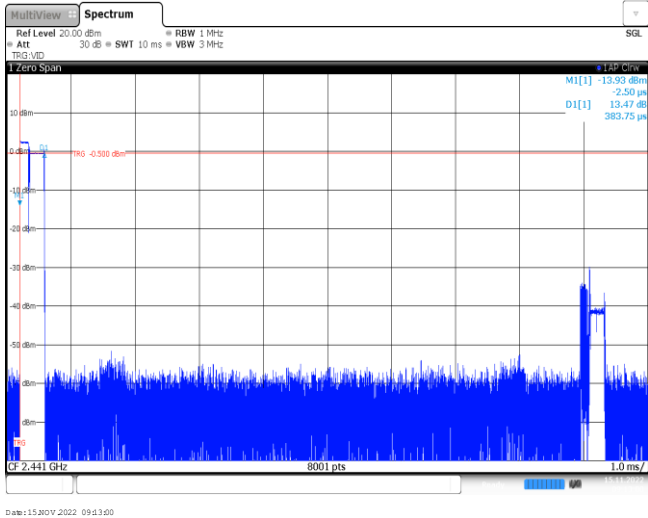
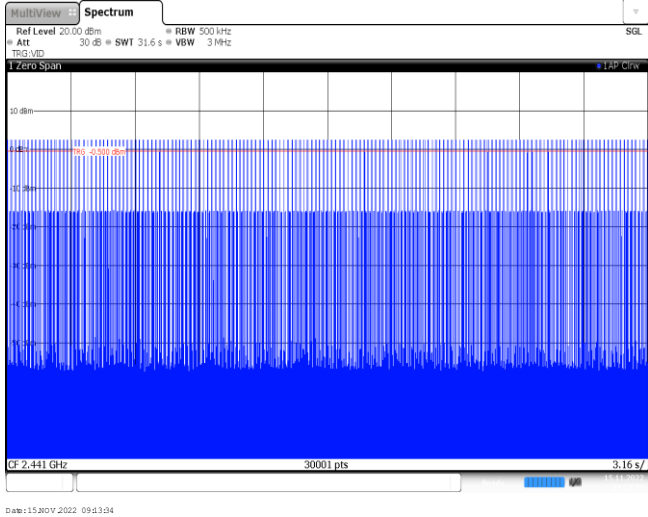
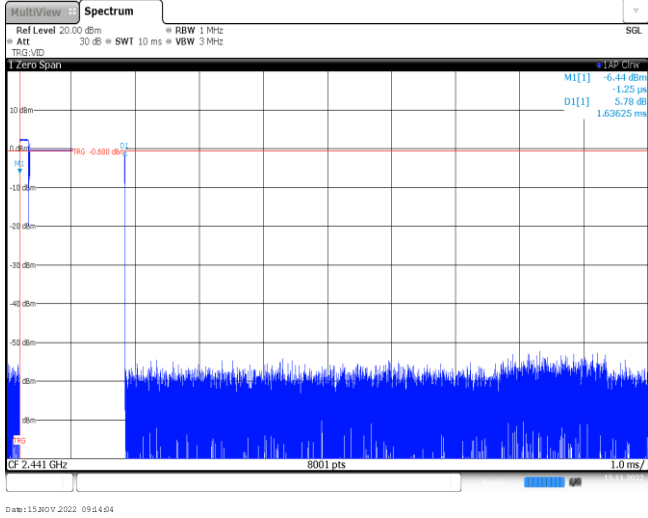


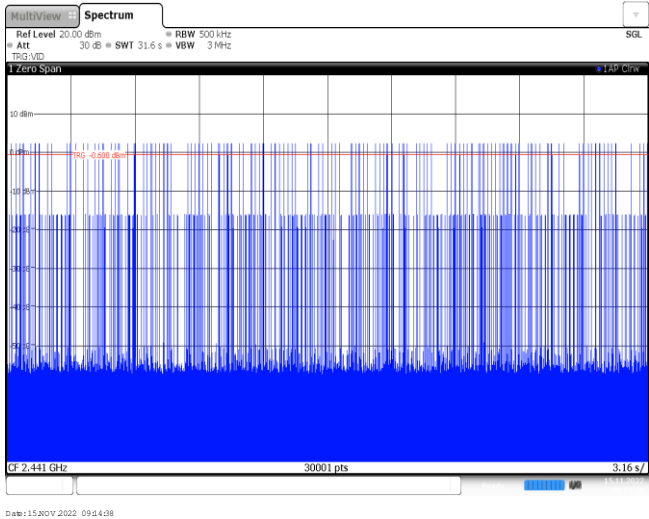
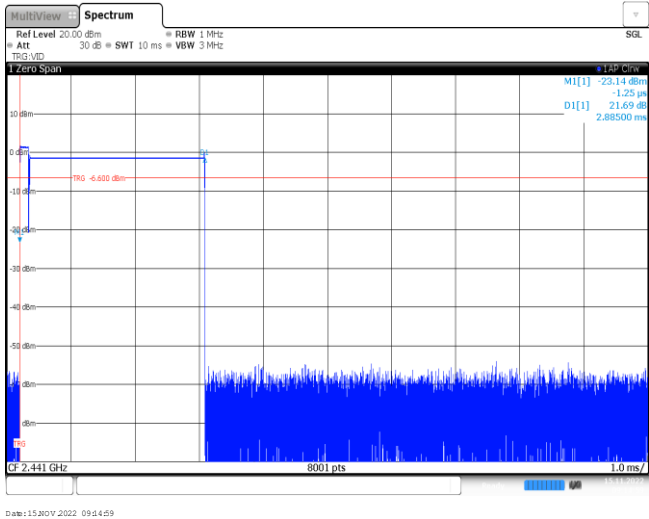
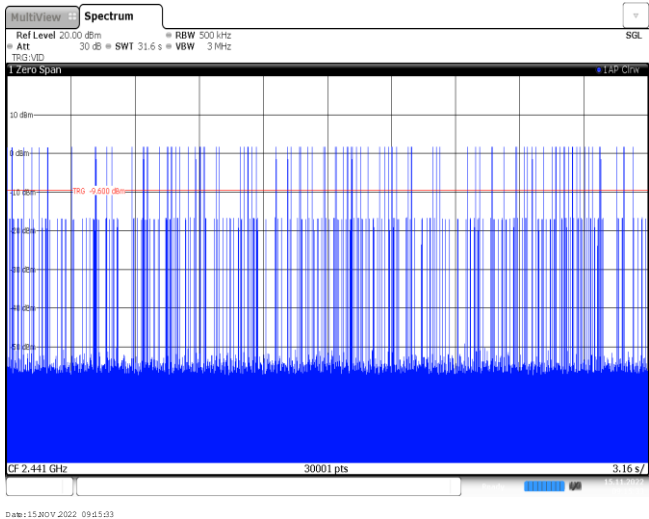
DH5
Burst width



DH5
Burst number



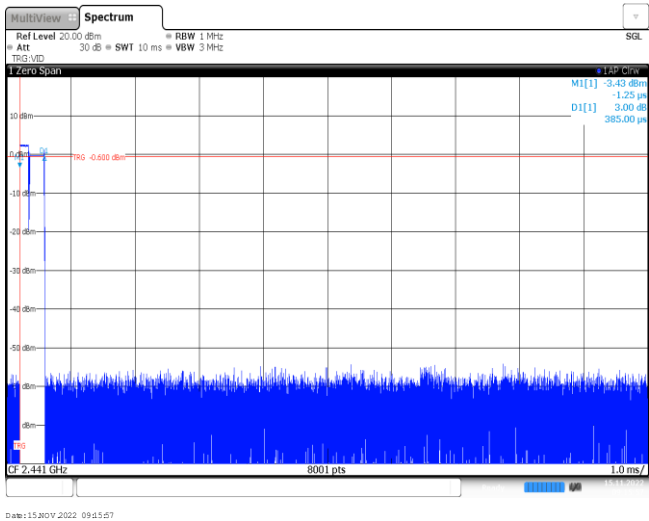
Modulation Type: $\pi/4$ DQPSK	
2DH1 Burst width	
2DH1 Burst number	
2DH3 Burst width	

2DH3 Burst number	
2DH5 Burst width	
2DH5 Burst number	

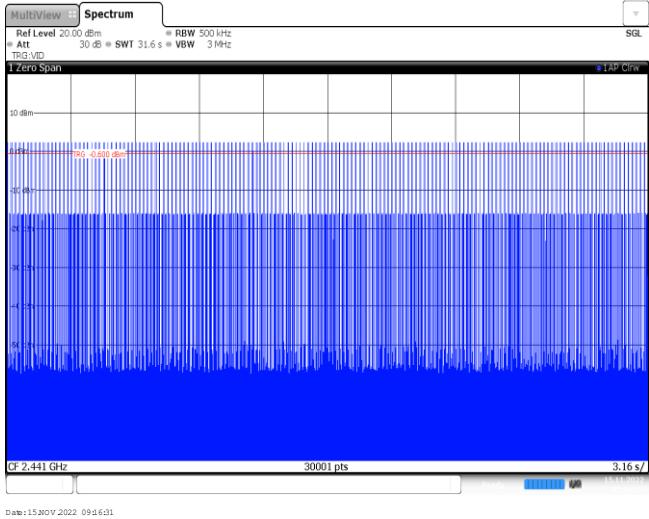
Modulation Type:

8DPSK

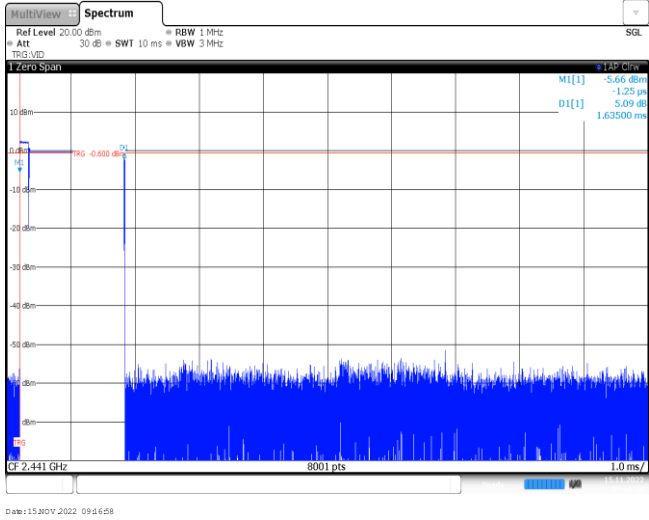
3DH1
Burst width



3DH1
Burst number



3DH3
Burst width

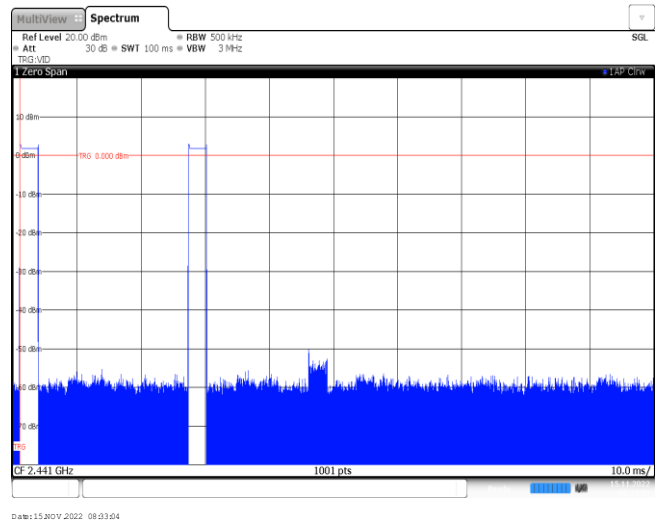
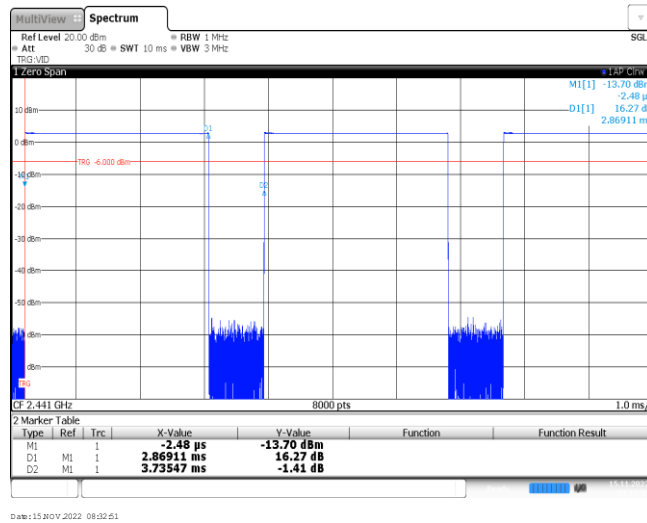


3DH3 Burst number	
3DH5 Burst width	
3DH5 Burst number	

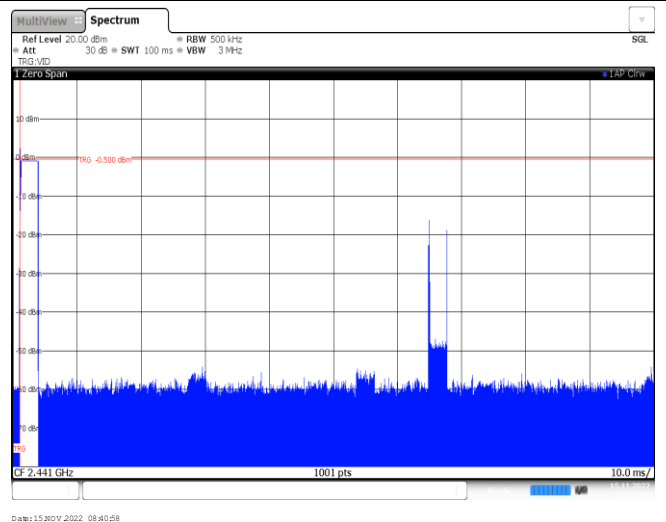
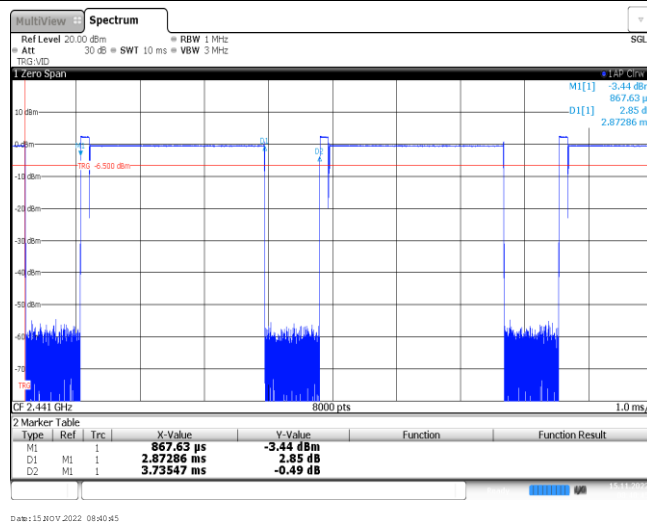
Appendix G: Duty Cycle Correction Factor (DCCF)

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

GFSK

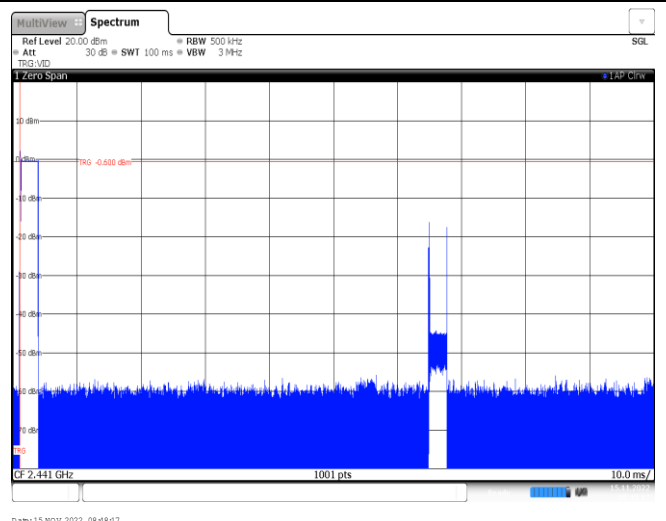
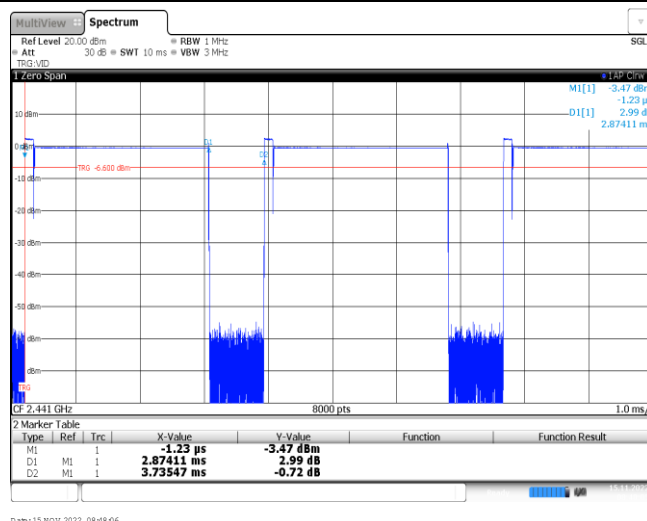
T_{on} time for single burst

Burst Quantity

 $\pi/4$ DQPSKT_{on} time for single burst

Burst Quantity

8DPSK

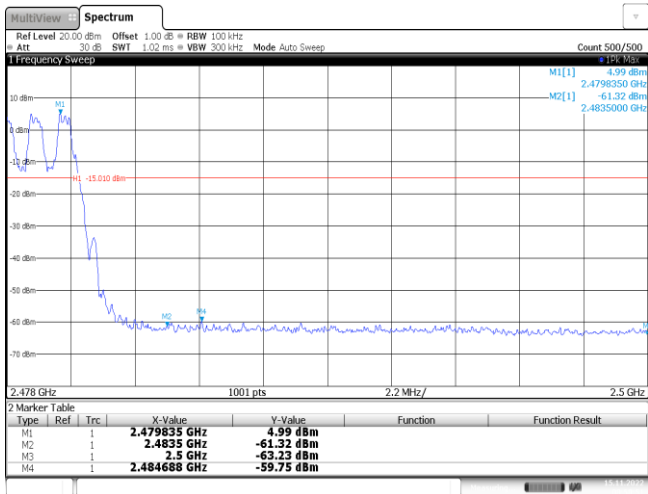
T_{on} time for single burst

Burst Quantity

Appendix H: Band edge and Spurious Emissions (conducted)

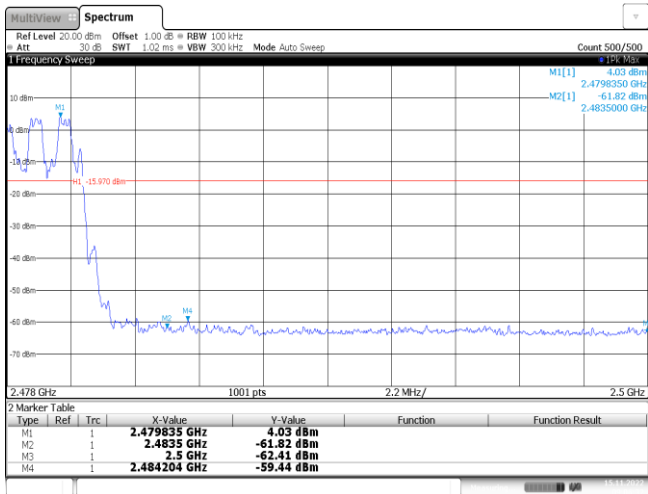
Test Item:	Band edge	Modulation type:	GFSK
CH00 No hopping mode	<		

CH78
Hopping mode



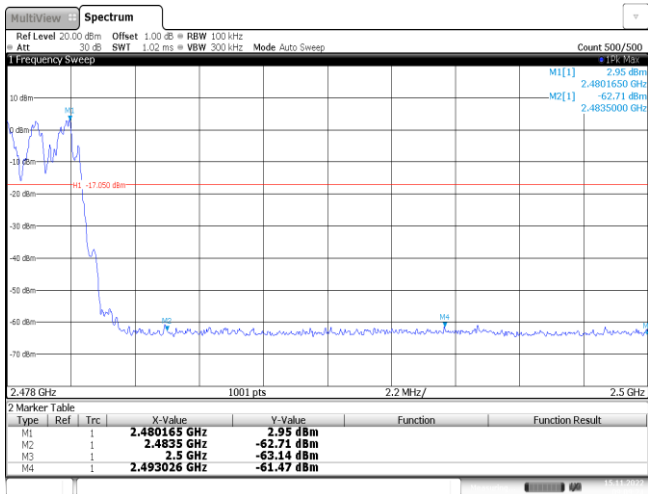
Test Item:	Band edge	Modulation type:	$\pi/4$ DQPSK
CH00 No hopping mode	<		

CH78
Hopping mode

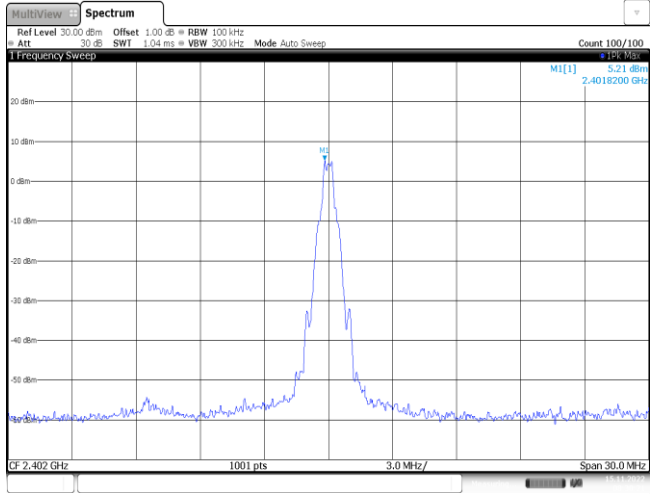
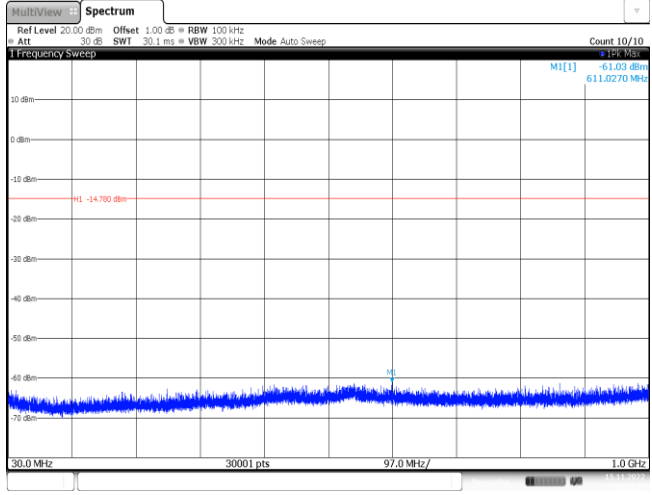
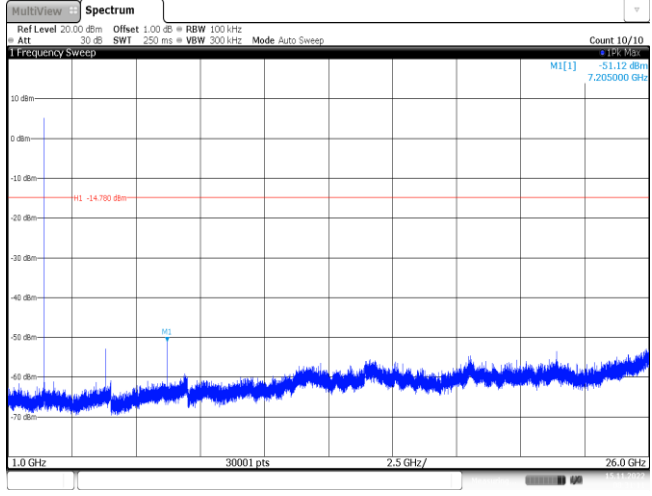


Test Item:	Band edge	Modulation type:	8DPSK
CH00 No hopping mode			

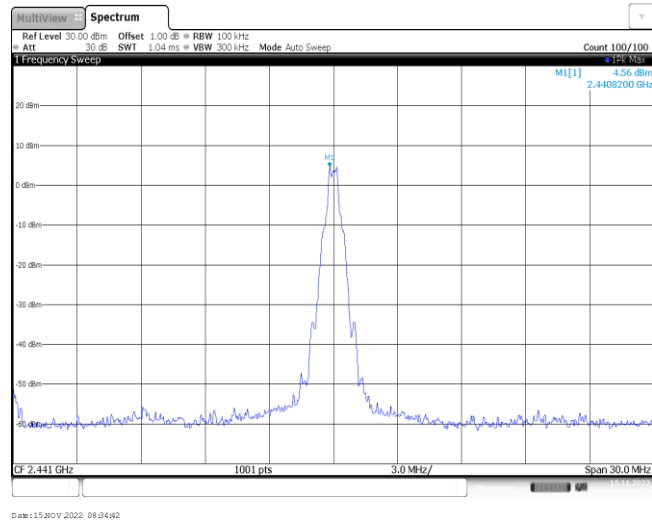
CH78
Hoppig mode



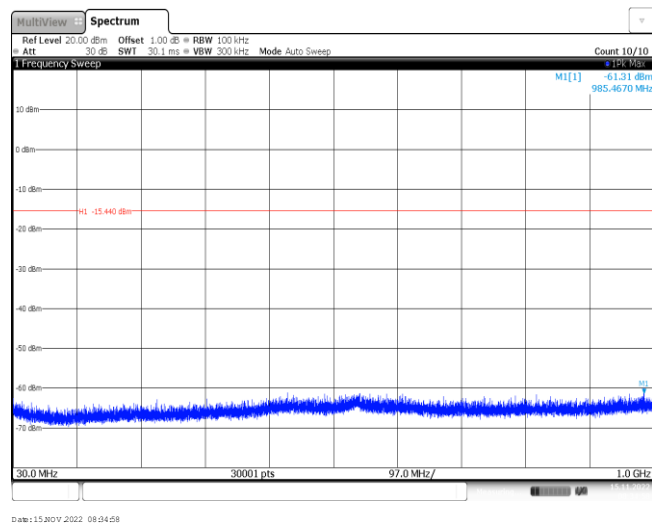
Date: 15/01/2022 09:09:24

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

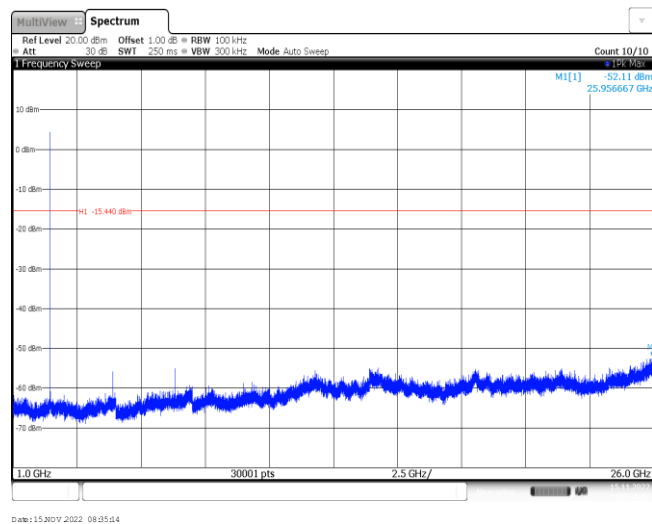
CH39
Reference level



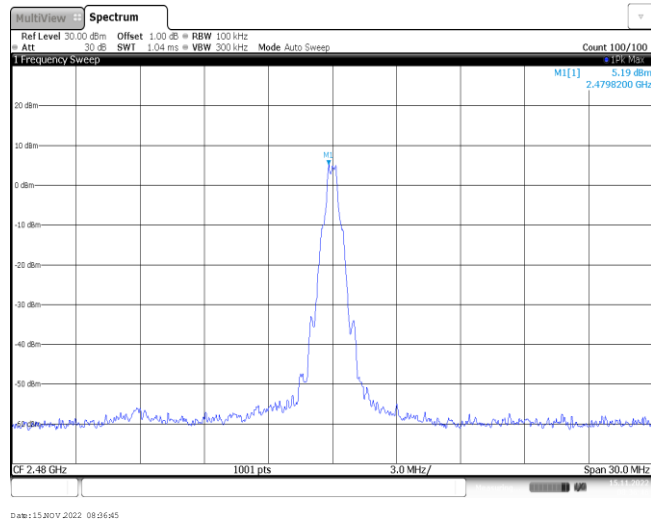
CH39
30MHz~1000MHz



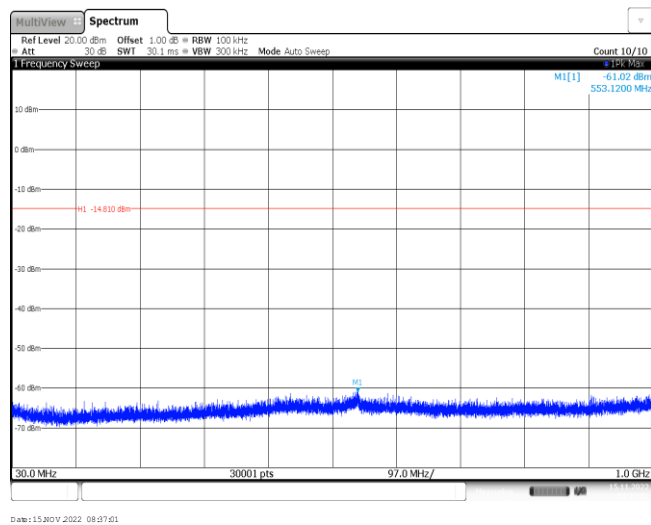
CH39
1GHz~26GHz



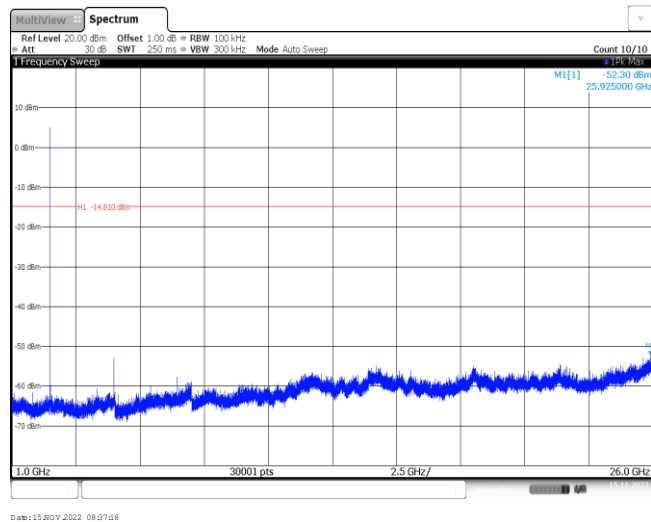
CH78
Reference level

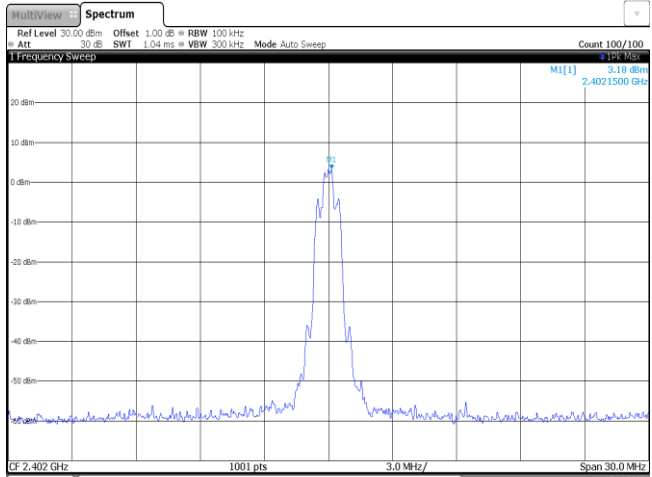
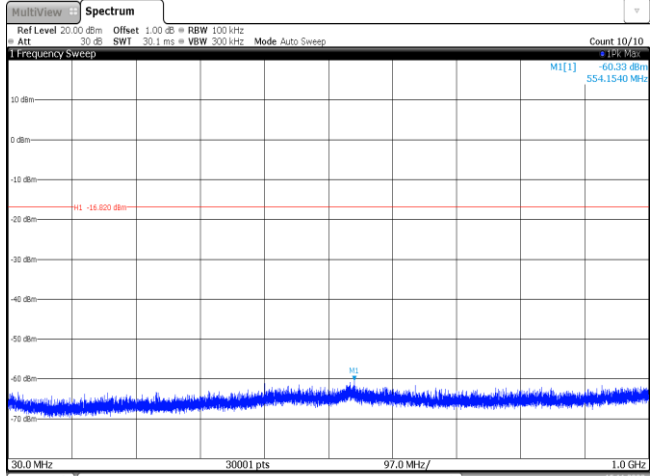
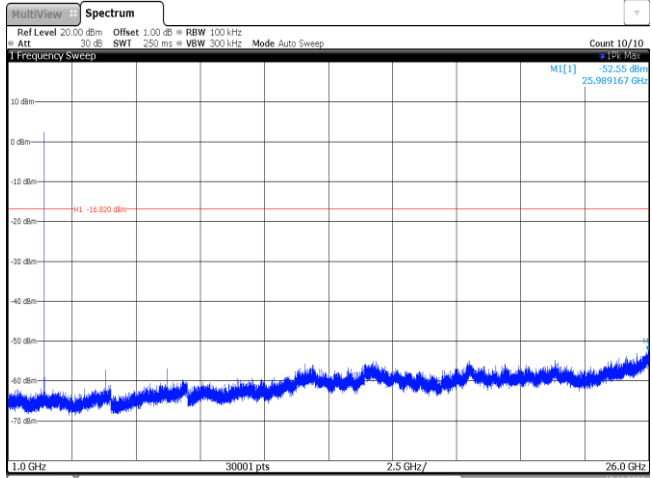


CH78
30MHz~1000MHz



CH78
1GHz~26GHz



Test Item:	Spurious Emission	Modulation type:	$\pi/4$ DQPSK
CH00 Reference level	 Ref Level 30.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SW1 1.04 ms VBW 300 kHz Mode Auto Sweep Count 100/100 M1[1] 3.18 dBm 2.4021500 GHz CF 2.402 GHz 1001 pts 3.0 MHz/ Span 30.0 MHz Date: 15 NOV 2022 08:38:54		
CH00 30MHz~1000MHz	 Ref Level 20.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SW1 30.1 ms VBW 300 kHz Mode Auto Sweep Count 10/10 M1[1] -60.03 dBm 554.1540 MHz M1 -16.600 dBm 30.0 MHz 30001 pts 97.0 MHz/ 1.0 GHz Date: 15 NOV 2022 08:39:10		
CH00 1GHz~26GHz	 Ref Level 20.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SW1 250 ms VBW 300 kHz Mode Auto Sweep Count 10/10 M1[1] -52.55 dBm 25.989167 GHz M1 -16.600 dBm 1.0 GHz 30001 pts 2.5 GHz/ 26.0 GHz Date: 15 NOV 2022 08:39:27		

MultiView Spectrum

Ref Level 20.00 dBm Offset 1.00 dB = RBW 100 kHz
 Att 30 dB SWT 250 ms = VBW 300 kHz Mode Auto Sweep Count 10/10

Frequency Sweep

M11 -51.79 dBm
 25.985833 GHz

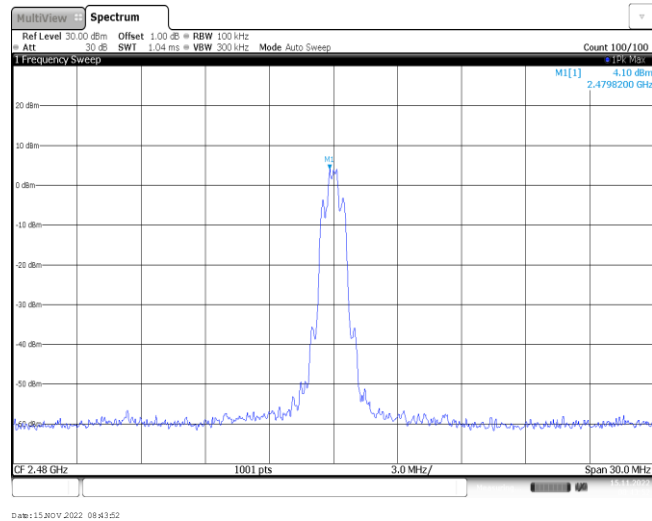
10 dBm
 0 dBm
 -10 dBm
 -20 dBm
 -30 dBm
 -40 dBm
 -50 dBm
 -60 dBm
 -70 dBm

-15.620 dBm

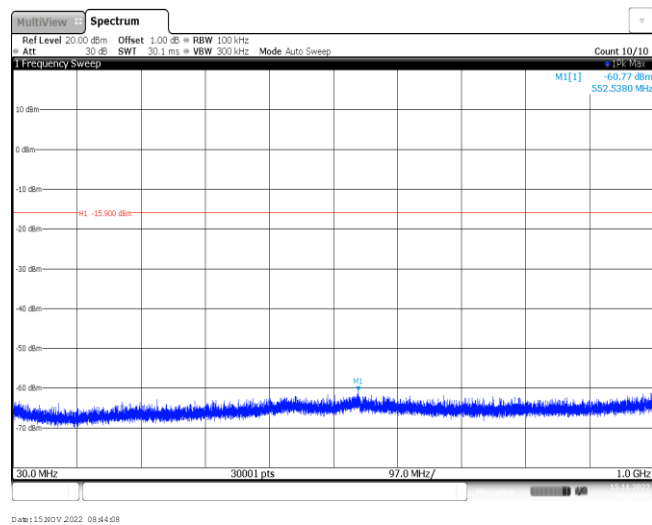
1.0 GHz 30001 pts 2.5 GHz/ 26.0 GHz

Date: 15.06.2022 08:42:34

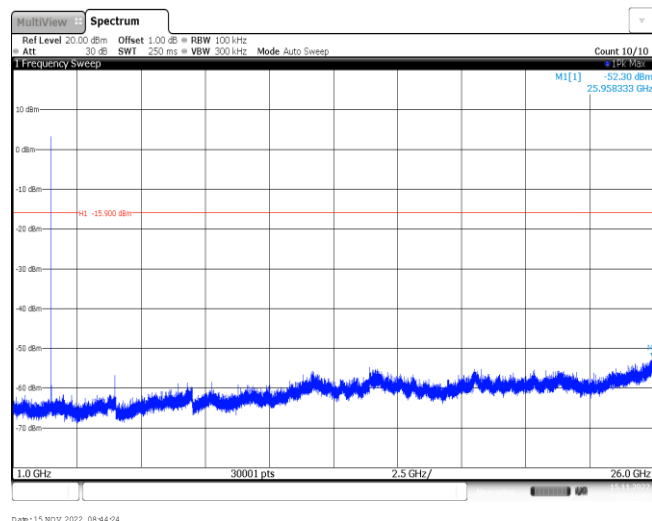
CH78
Reference level

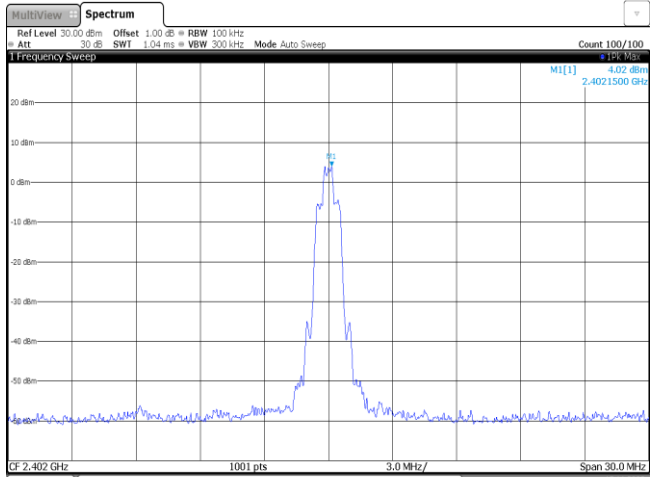
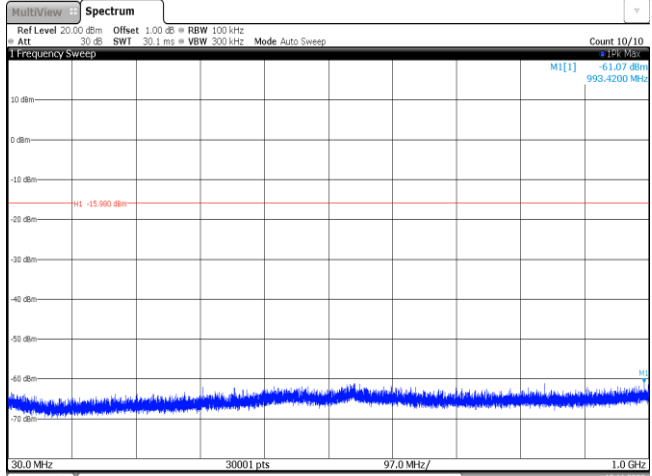
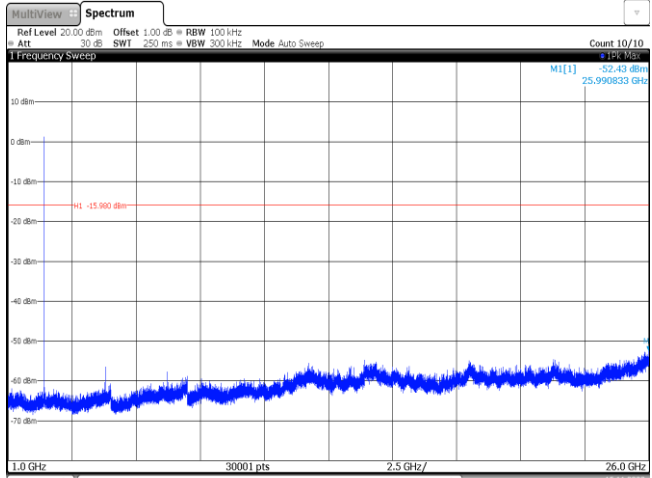


CH78
30MHz~1000MHz

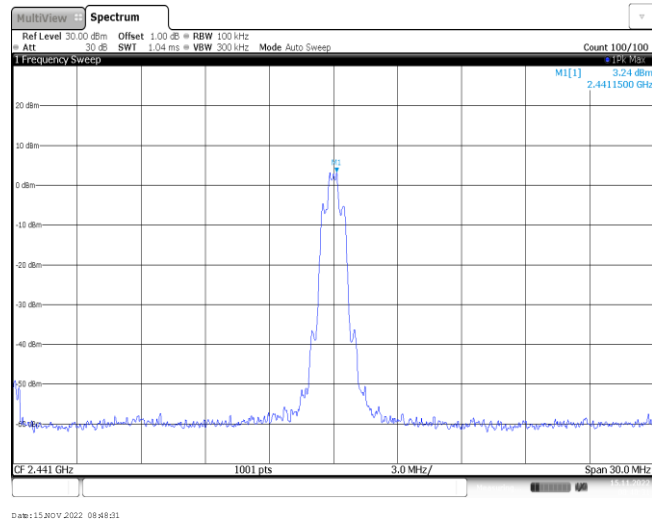


CH78
1GHz~26GHz

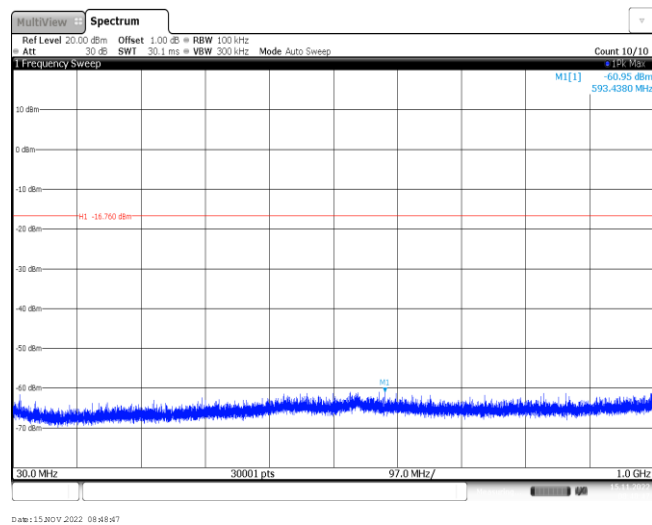


Test Item:	Spurious Emission	Modulation type:	8DPSK
CH00 Reference level	 Date: 15 NOV 2022 08:46:20		
CH00 30MHz~1000MHz	 Date: 15 NOV 2022 08:46:26		
CH00 1GHz~26GHz	 Date: 15 NOV 2022 08:46:52		

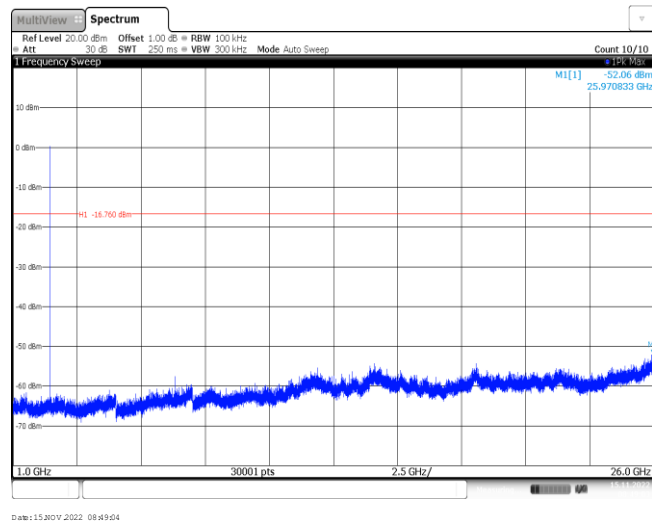
CH39
Reference level



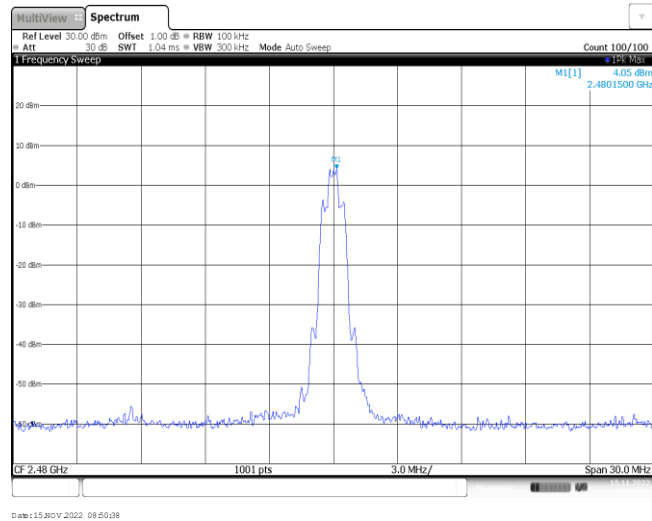
CH39
30MHz~1000MHz



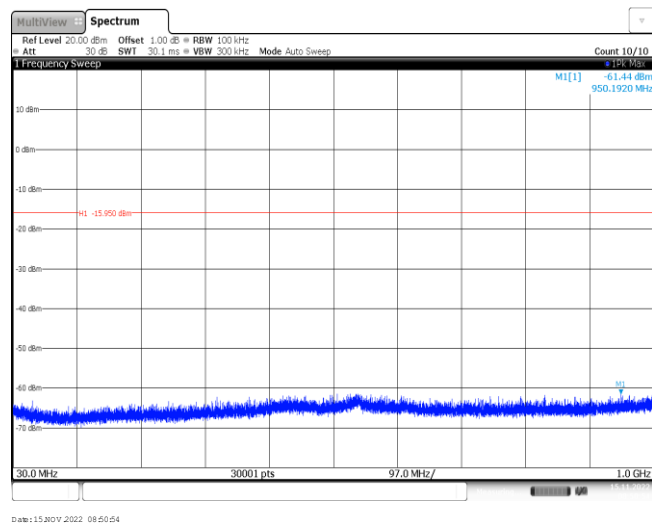
CH39
1GHz~26GHz



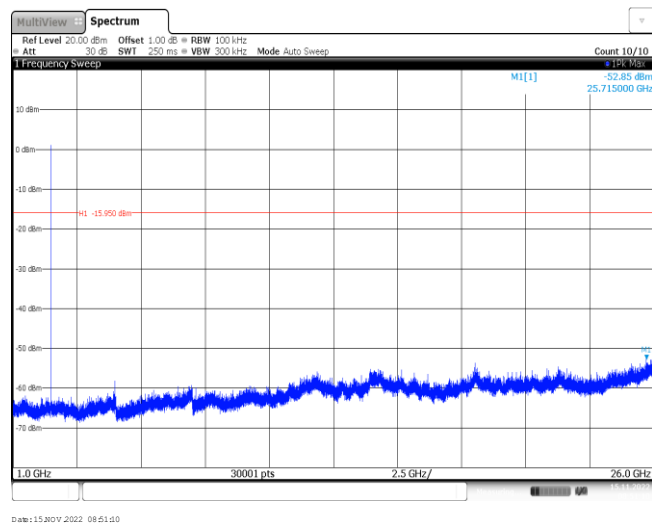
CH78
Reference level



CH78
30MHz~1000MHz



CH78
1GHz~26GHz



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