

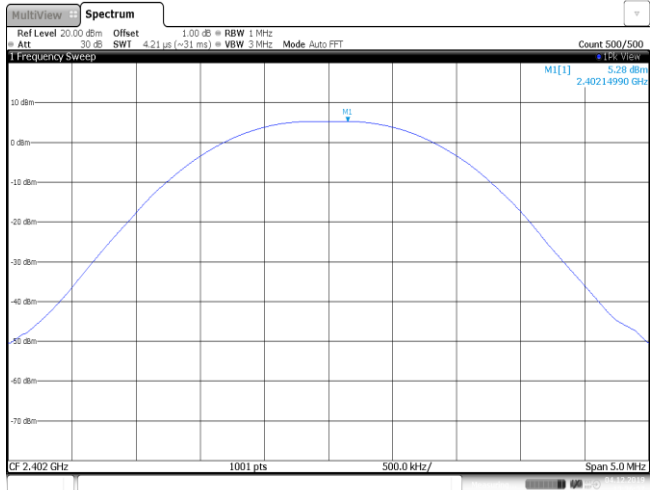
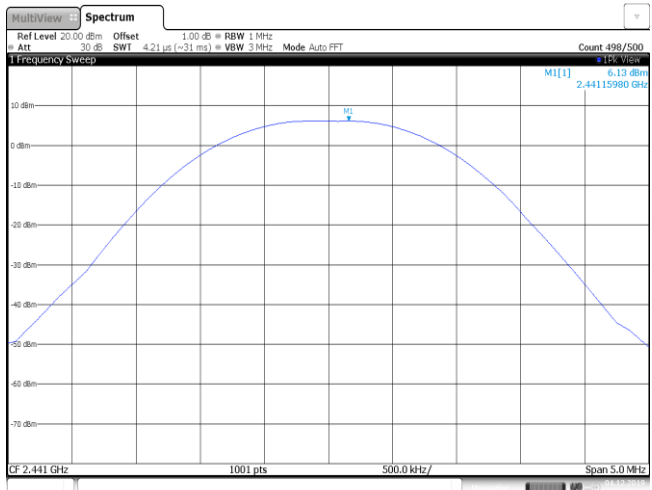
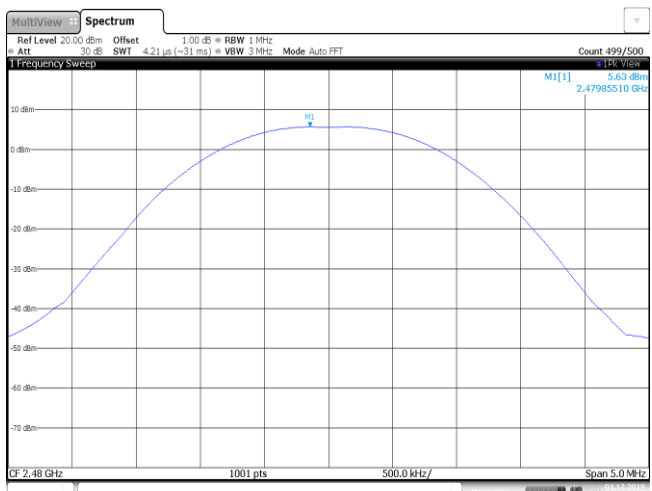
APPENDIX REPORT

Project No.	SHT1911023801EW	Radio Specification	Bluetooth EDR
Test sample No.	YPHT19110238004	Model No.	XO-9860
Start test date	2019/12/4	Finish date	2019/12/4
Temperature	25°C	Humidity	50%
Test Engineer	Jiongsheng.Feng	Auditor	<i>William.wang</i>

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	Output power (dBm)	Average Output power (dBm)	Limit (dBm)	Result
GFSK	00	5.28	5.18	≤ 30.00	Pass
	39	6.13	6.04		
	78	5.63	5.57		
$\pi/4$ DQPSK	00	5.41	4.78	≤ 21.00	Pass
	39	5.43	4.97		
	78	5.11	4.45		
8DPSK	00	5.50	4.84	≤ 21.00	Pass
	39	5.69	5.04		
	78	5.19	4.53		

Modulation Type:	GFSK
CH00	 The spectrum plot for CH00 shows a GFSK signal centered at 2.402 GHz. The y-axis represents power in dBm, ranging from -80 to 10. The x-axis represents frequency in GHz, ranging from 2.402 to 2.407. The signal is a smooth, bell-shaped curve. The peak power is approximately 5.28 dBm. The plot includes a frequency sweep from 2.402 GHz to 2.407 GHz with a span of 5.0 MHz. The resolution bandwidth (RBW) is 1 MHz, and the video bandwidth (VBW) is 3 MHz. The mode is Auto FFT. The date is 4 DEC 2019 13:36:38.
CH39	 The spectrum plot for CH39 shows a GFSK signal centered at 2.441 GHz. The y-axis represents power in dBm, ranging from -80 to 10. The x-axis represents frequency in GHz, ranging from 2.441 to 2.446. The signal is a smooth, bell-shaped curve. The peak power is approximately 6.13 dBm. The plot includes a frequency sweep from 2.441 GHz to 2.446 GHz with a span of 5.0 MHz. The resolution bandwidth (RBW) is 1 MHz, and the video bandwidth (VBW) is 3 MHz. The mode is Auto FFT. The date is 4 DEC 2019 13:38:11.
CH78	 The spectrum plot for CH78 shows a GFSK signal centered at 2.478 GHz. The y-axis represents power in dBm, ranging from -80 to 10. The x-axis represents frequency in GHz, ranging from 2.478 to 2.483. The signal is a smooth, bell-shaped curve. The peak power is approximately 5.63 dBm. The plot includes a frequency sweep from 2.478 GHz to 2.483 GHz with a span of 5.0 MHz. The resolution bandwidth (RBW) is 1 MHz, and the video bandwidth (VBW) is 3 MHz. The mode is Auto FFT. The date is 4 DEC 2019 13:40:31.

Modulation Type:		$\pi/4$ DQPSK
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] 5.41 dBm 2.40209990 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: 4 DEC 2019 13:46:30	
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] 5.43 dBm 2.44109990 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: 4 DEC 2019 13:48:05	
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] 5.11 dBm 2.48009990 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: 4 DEC 2019 13:49:24	

Modulation Type: 8DPSK	
CH00	MultViewSpectrum 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] 5.50 dBm 2.40193010 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: 4.DEC.2019 13:51:05
CH39	MultViewSpectrum 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] 5.69 dBm 2.44099500 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: 4.DEC.2019 13:52:41
CH78	MultViewSpectrum 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] 5.19 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: 4.DEC.2019 13:54:13

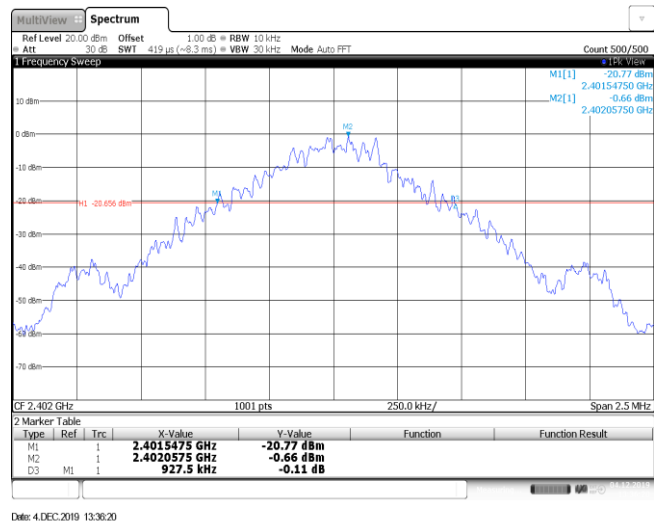
Appendix B : 20 dB Bandwidth

Modulation type	Channel	20 dB Bandwidth (kHz)	Limit (kHz)	Result
GFSK	00	928.00	-	Pass
	39	928.00		
	78	928.00		
$\pi/4$ DQPSK	00	1288.00	-	Pass
	39	1308.00		
	78	1300.00		
8DPSK	00	1305.00	-	Pass
	39	1310.00		
	78	1298.00		

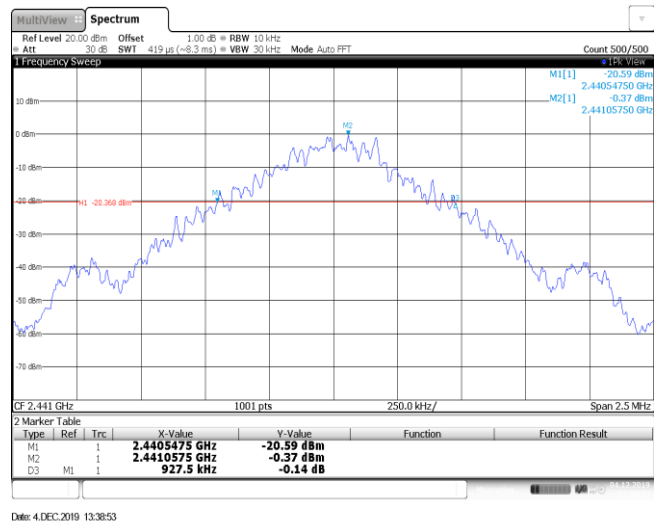
Modulation Type:

GFSK

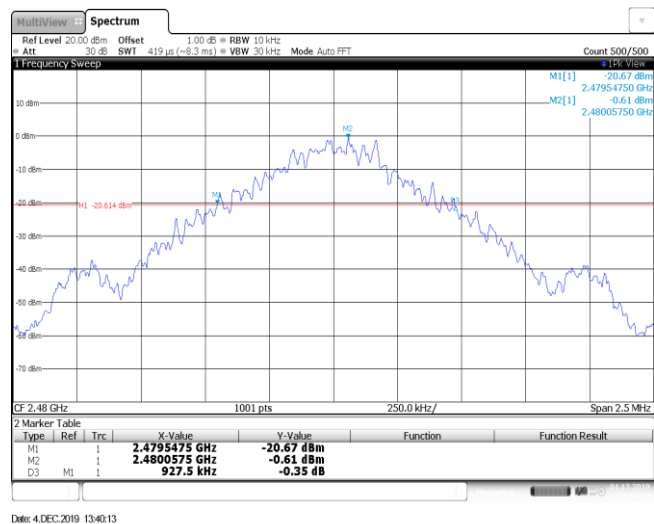
CH00



CH39



CH78

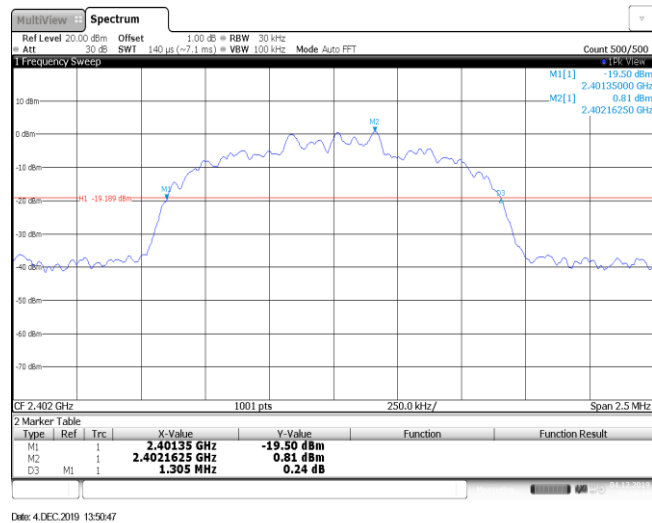


Modulation Type:		$\pi/4$ DQPSK
CH00	MultiView Spectrum Ref Level 20.00 dBm Offset 30 dB SWI 140 μs ($\approx$7.1 ms) 1.00 dB $\approx$ RBW 30 kHz Mode Auto FFT Count 500/500 1 Frequency Sweep	

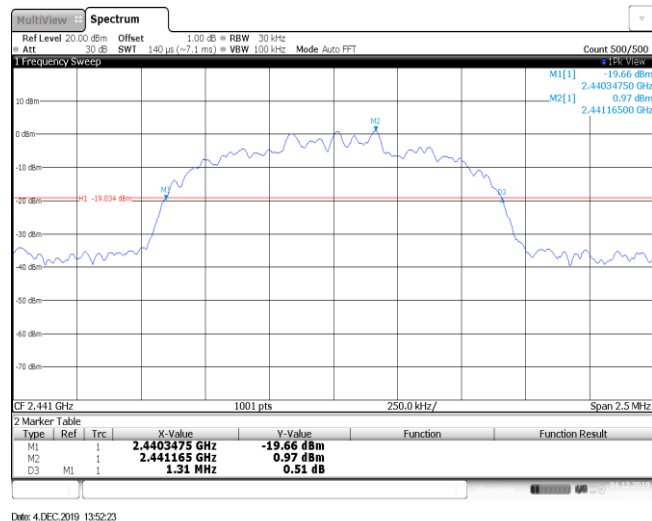
Modulation Type:

8DPSK

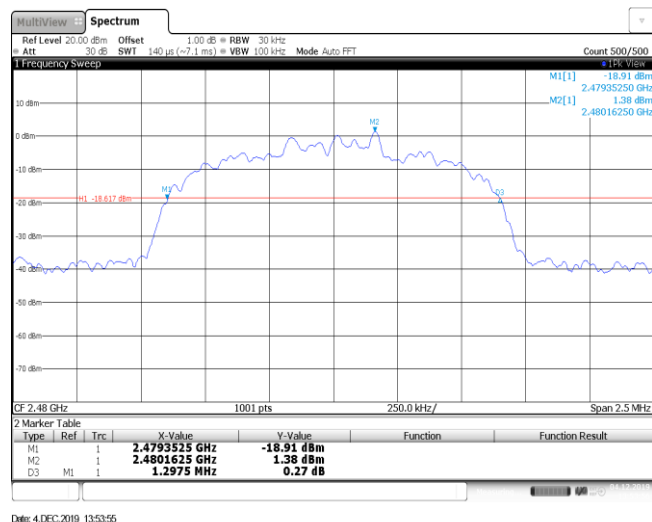
CH00



CH39

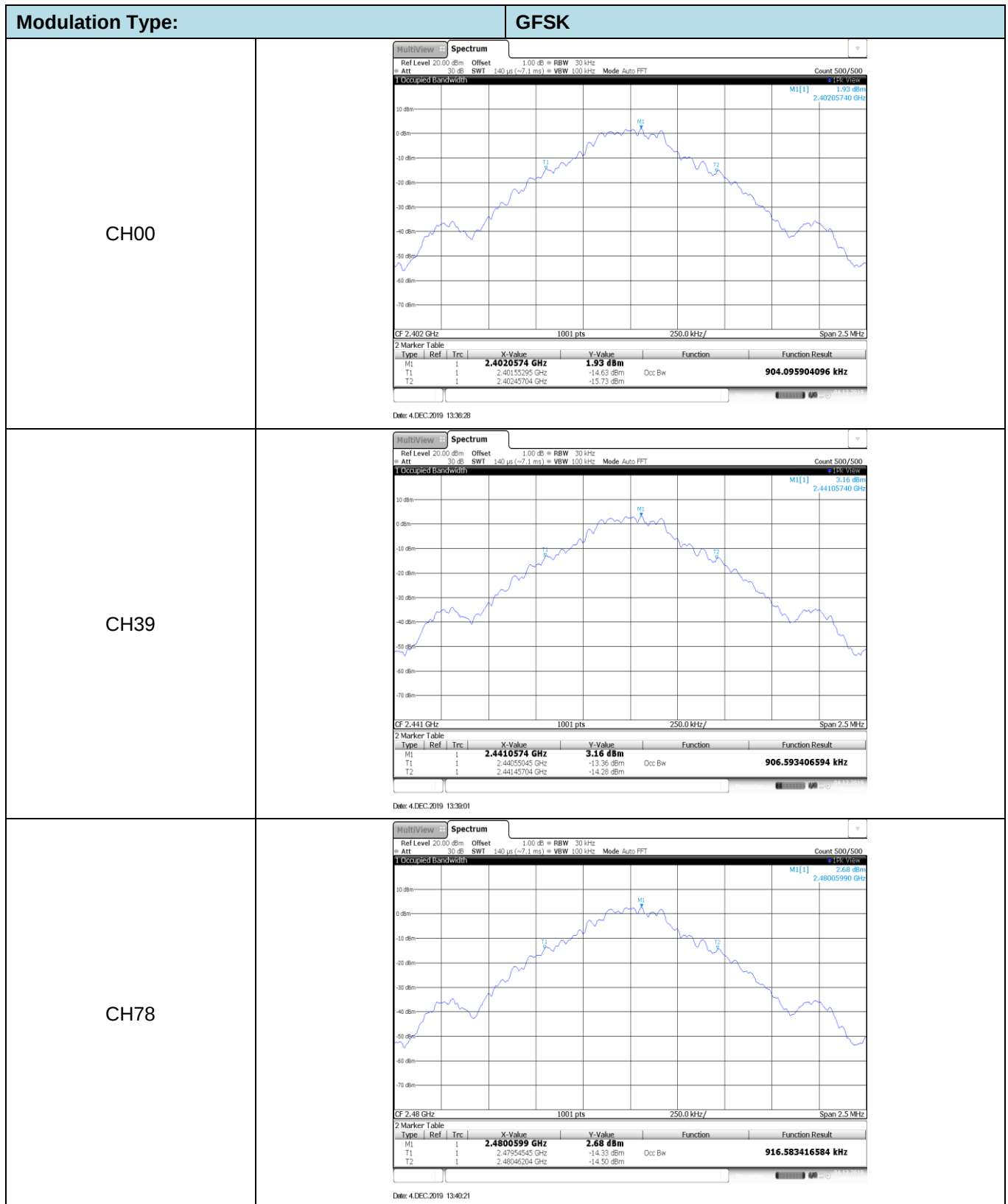


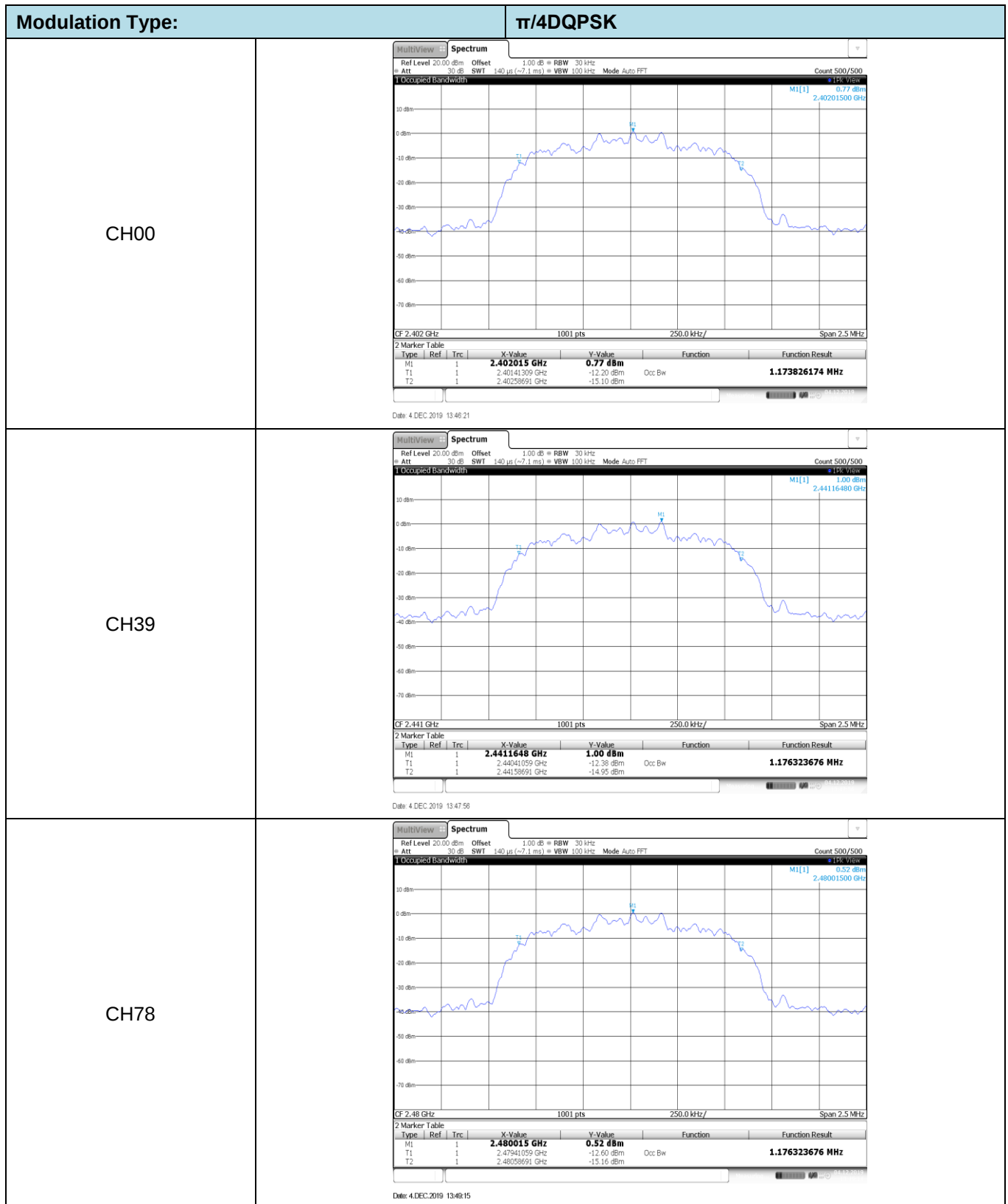
CH78

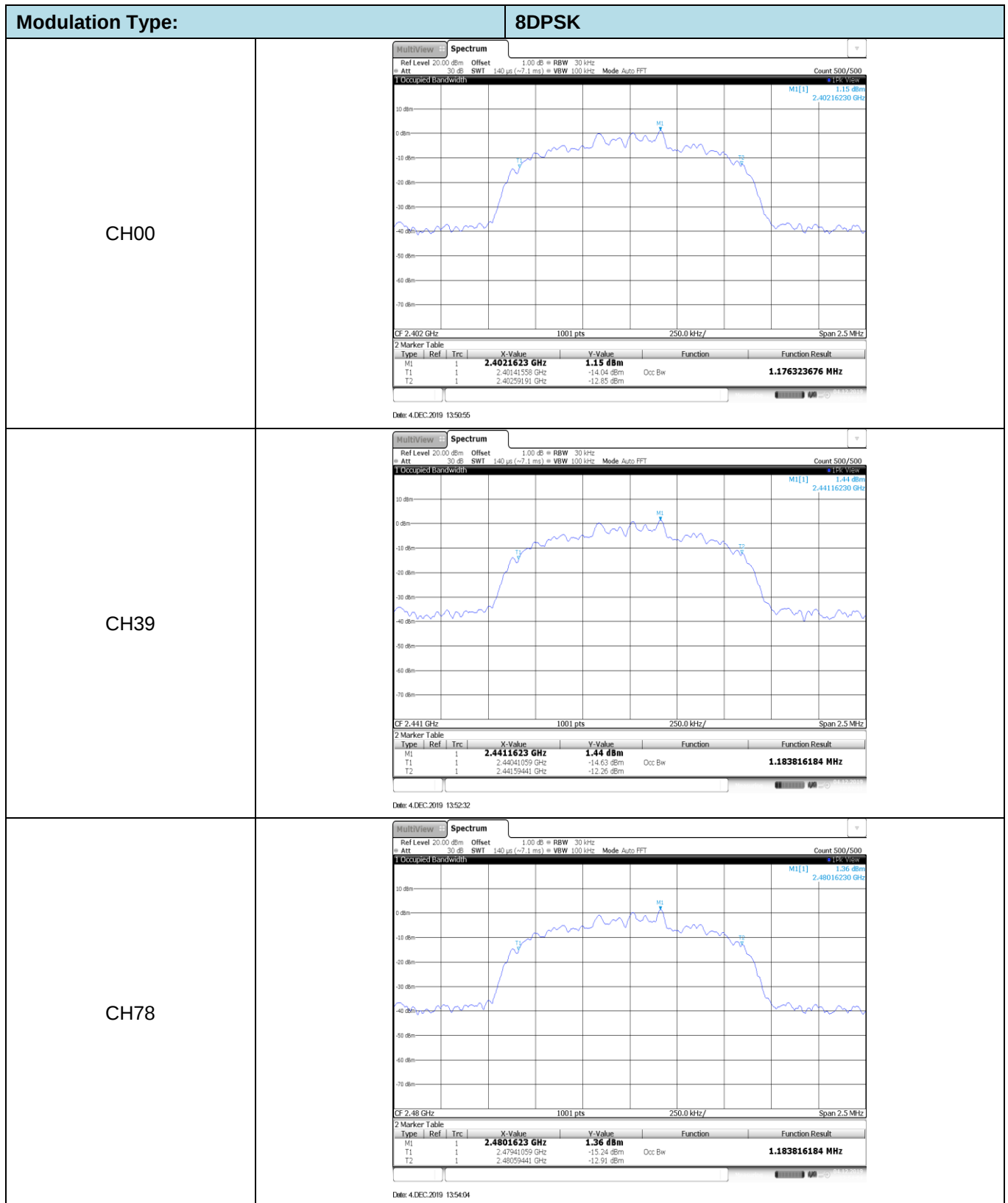


Appendix C: 99% Occupied Bandwidth

Modulation type	Channel	99% Occupied Bandwidth (MHz)	Limit (MHz)	Result
GFSK	00	0.90	-	Pass
	39	0.91		
	78	0.92		
$\pi/4$ DQPSK	00	1.17	-	Pass
	39	1.18		
	78	1.18		
8DPSK	00	1.18	-	Pass
	39	1.18		
	78	1.18		







Appendix D: Carrier Frequencies Separation

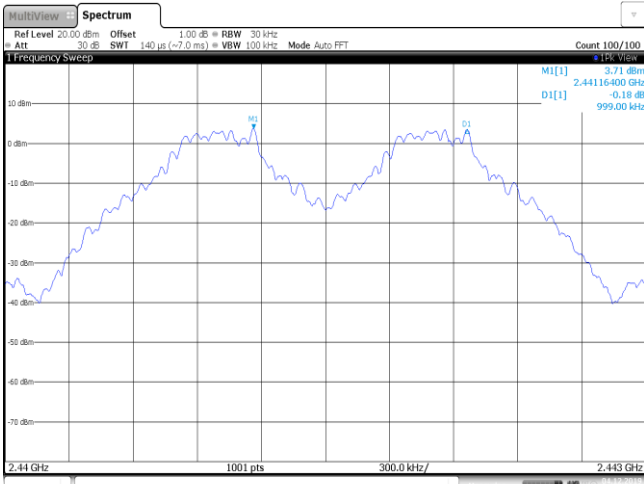
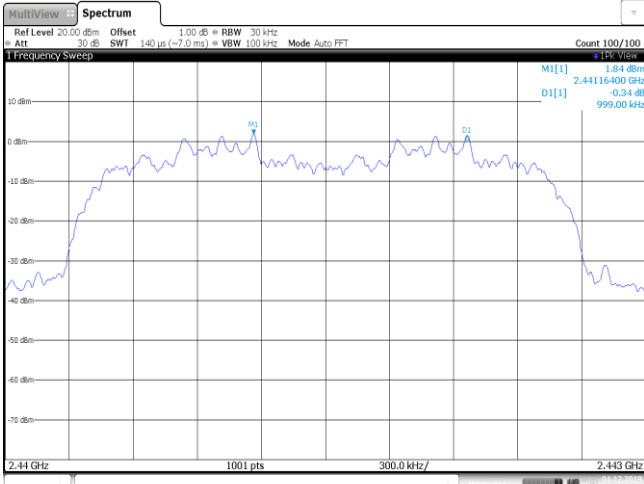
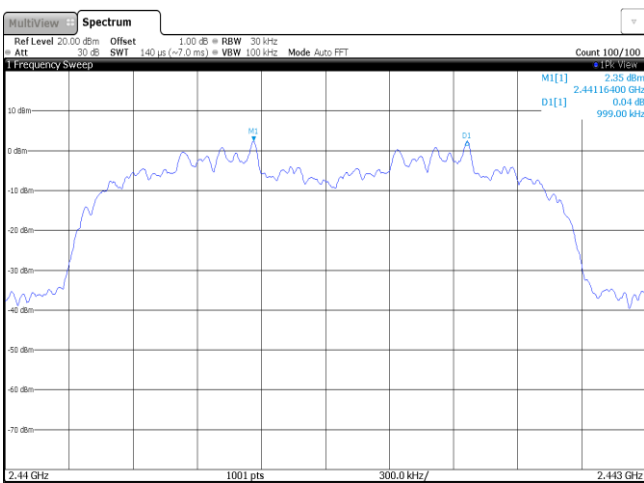
Modulation type	Channel	Carrier Frequencies Separation (MHz)	Limit (kHz) *	Result
GFSK	39	1.00	≥928.00	Pass
π/4DQPSK	39	1.00	≥872.00	Pass
8DPSK	39	1.00	≥873.33	Pass

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.

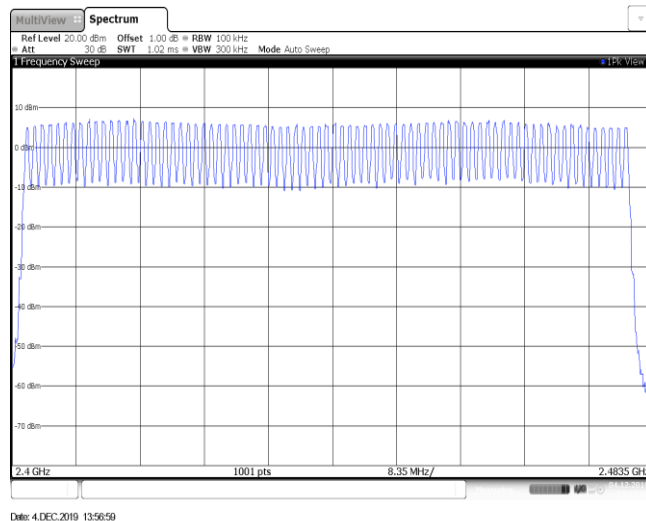
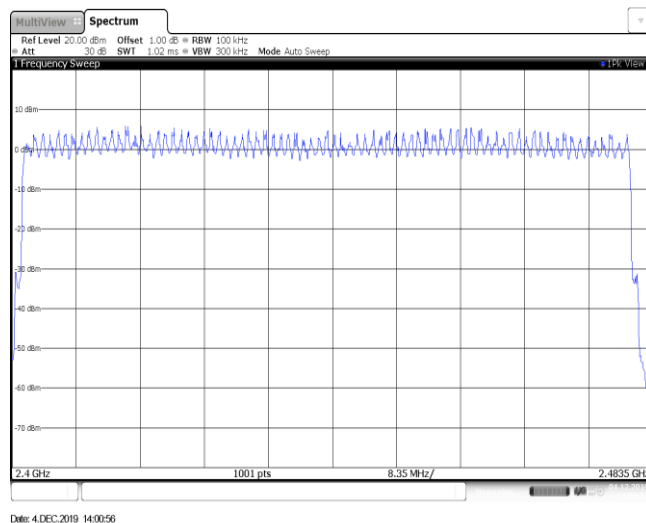
8DPSK limit = 2/3 * The maximum 20 dB Bandwidth for 8DPSK modulation on the appendix B

GFSK	 4.DEC.2019 13:56:16
$\pi/4$ DQPSK	 4.DEC.2019 13:58:33
8DPSK	 4.DEC.2019 14:10:19

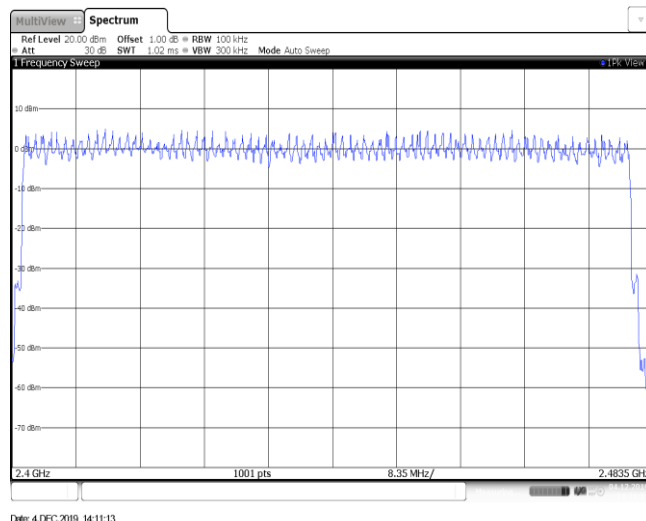
Appendix E: Hopping Channel Number

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

GFSK

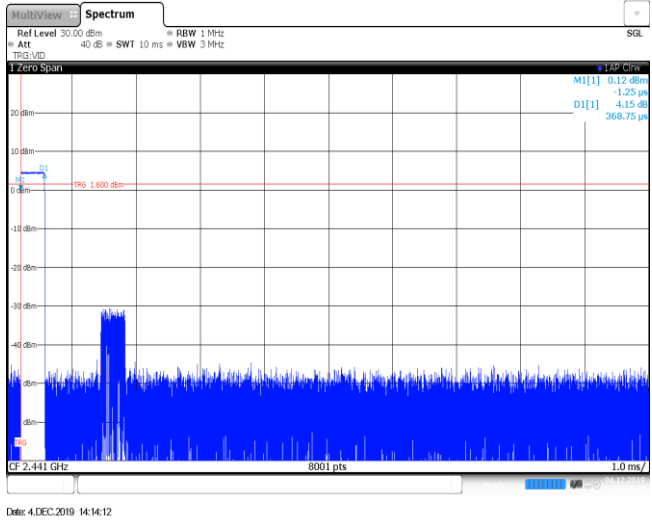
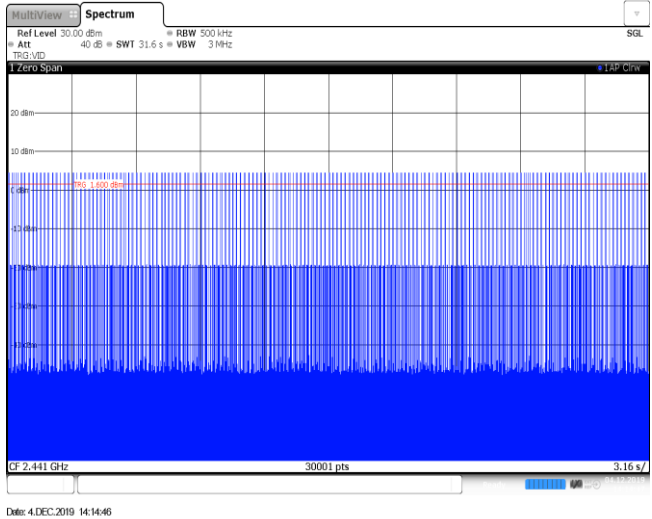
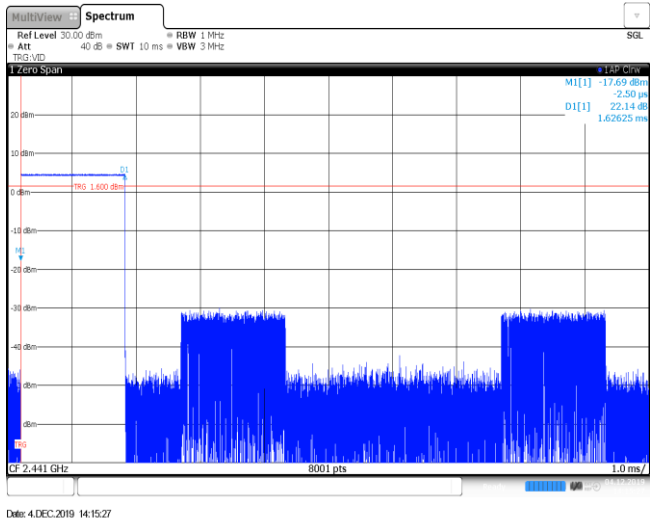
 $\pi/4$ DQPSK

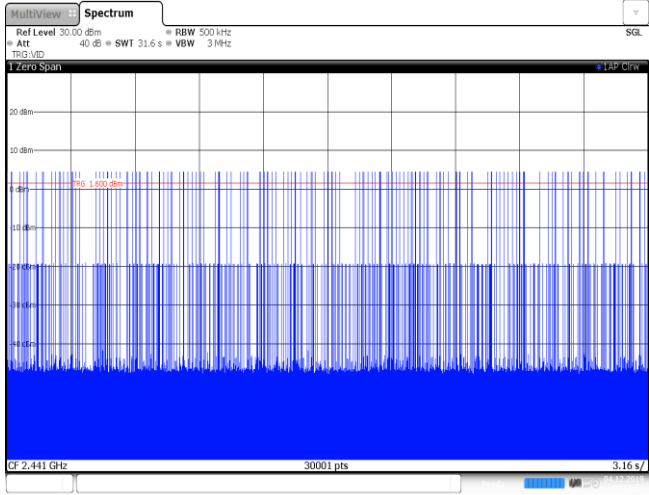
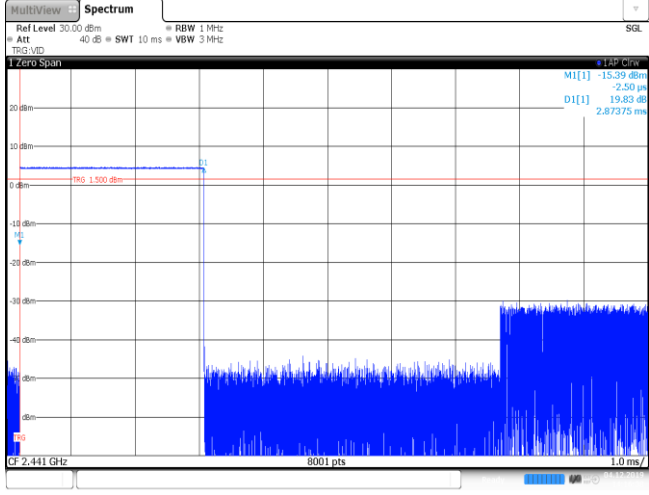
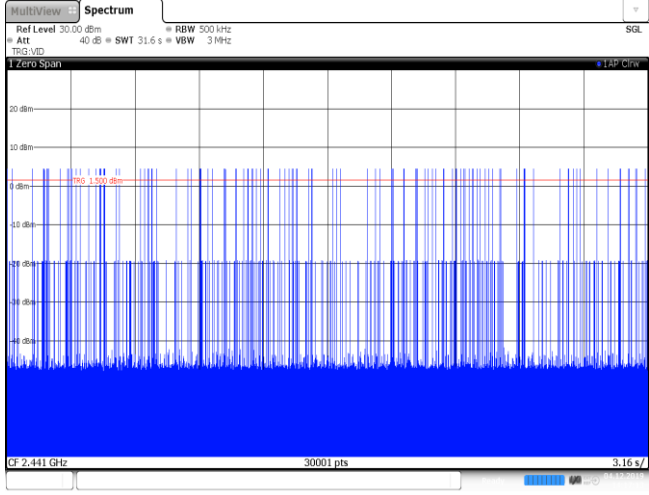
8DPSK

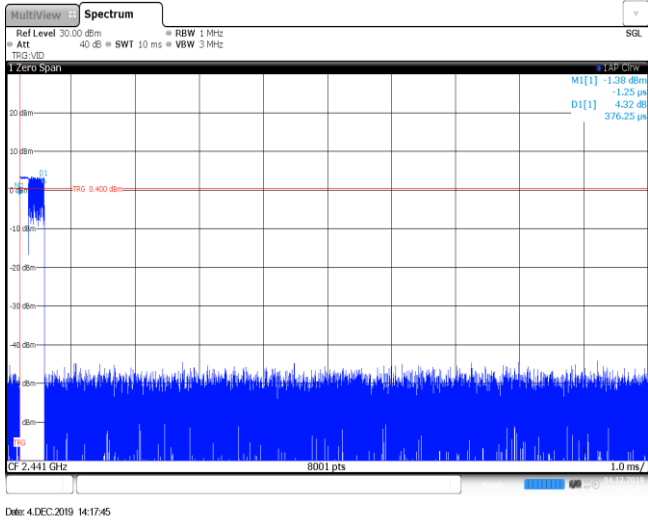
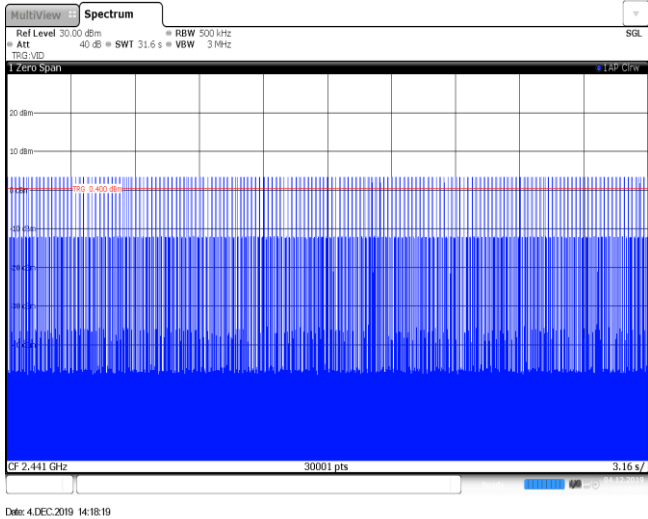
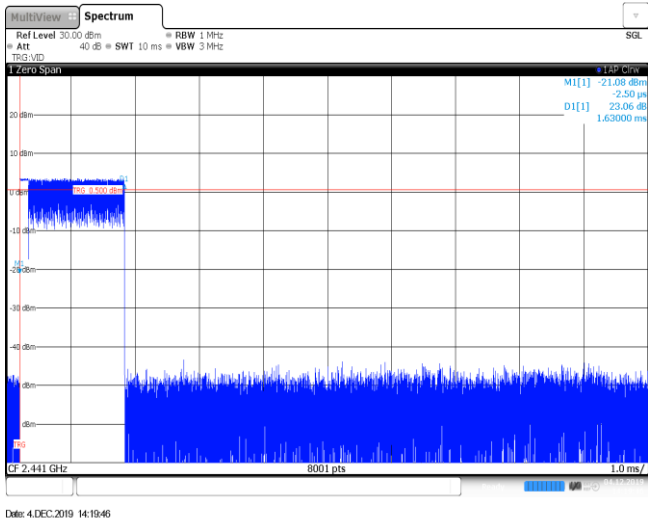


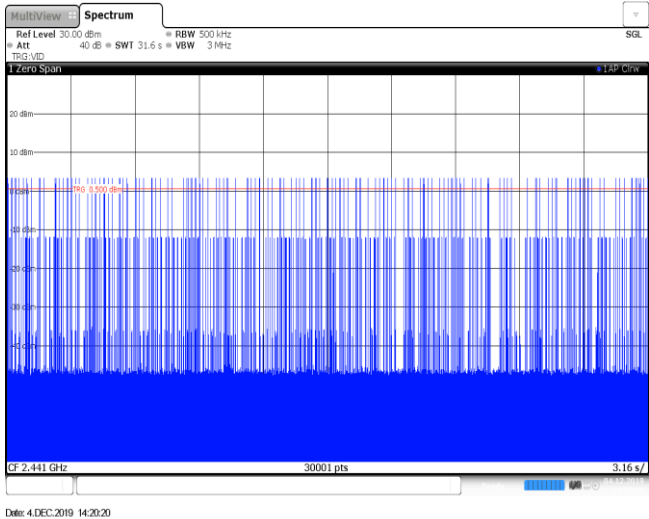
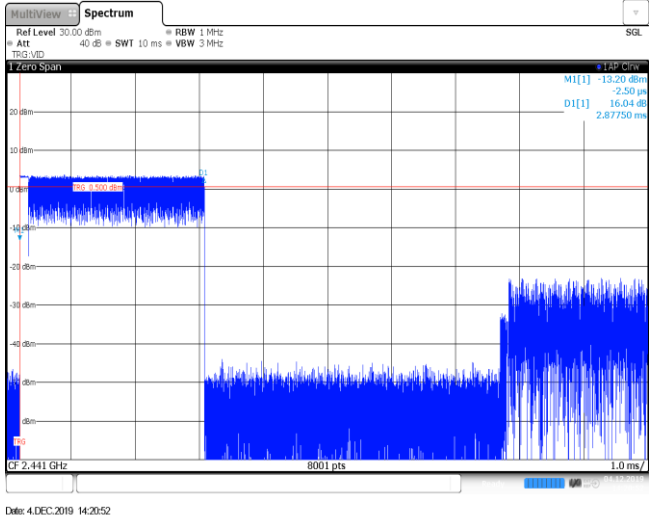
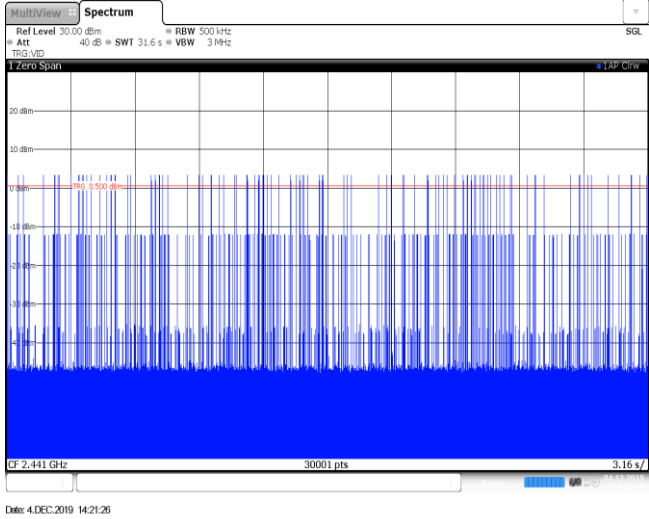
Appendix F: Dwell Time

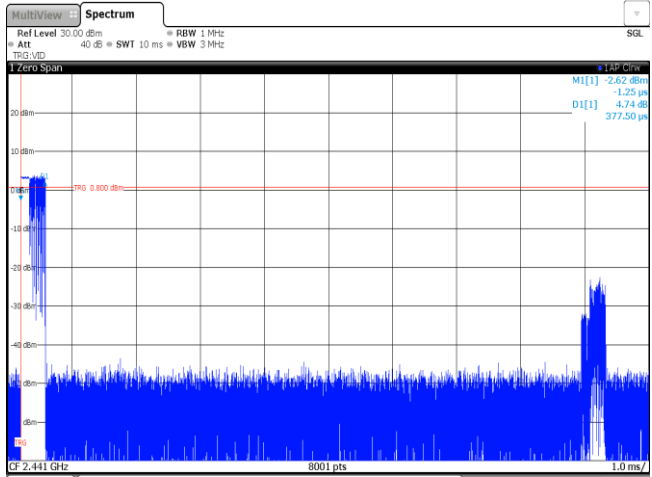
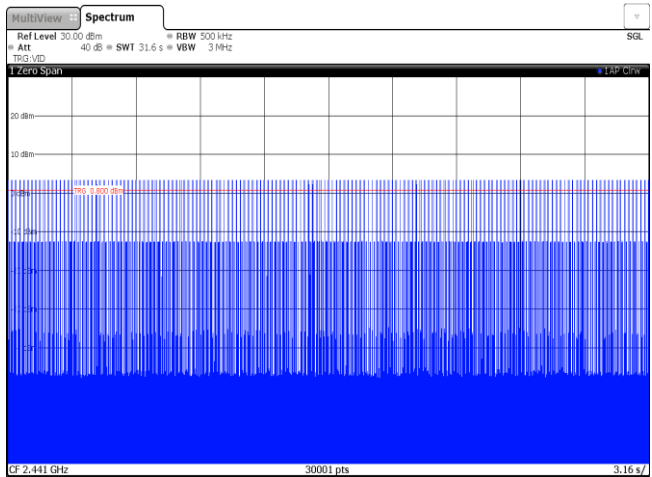
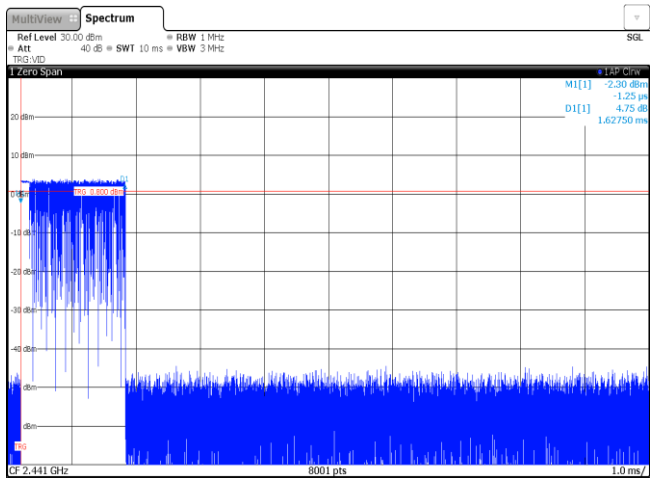
Modulation type	Packet	Burst Width [ms]	Total Hops[hop*ch]	Dwell time (Second)	Limit (Second)	Result
GFSK	DH1	0.37	314.00	0.12	≤ 0.40	Pass
	DH3	1.63	158.00	0.26		
	DH5	2.87	106.00	0.31		
$\pi/4$ DQPSK	2DH1	0.38	315.00	0.12	≤ 0.40	Pass
	2DH3	1.63	162.00	0.26		
	2DH5	2.88	105.00	0.30		
8DPSK	3DH1	0.38	314.00	0.12	≤ 0.40	Pass
	3DH3	1.63	158.00	0.26		
	3DH5	2.88	106.00	0.31		

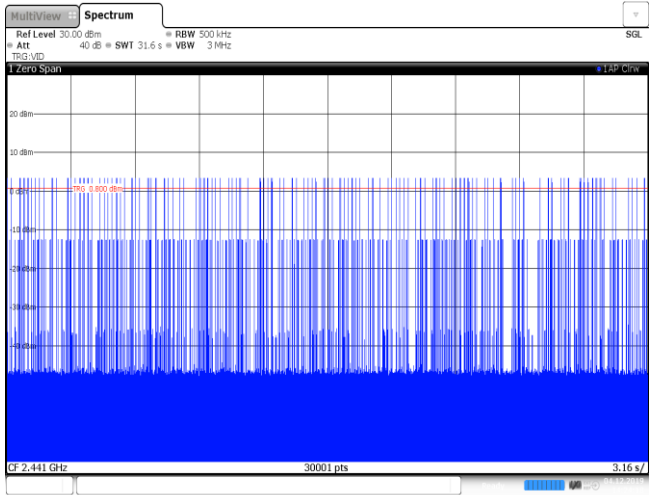
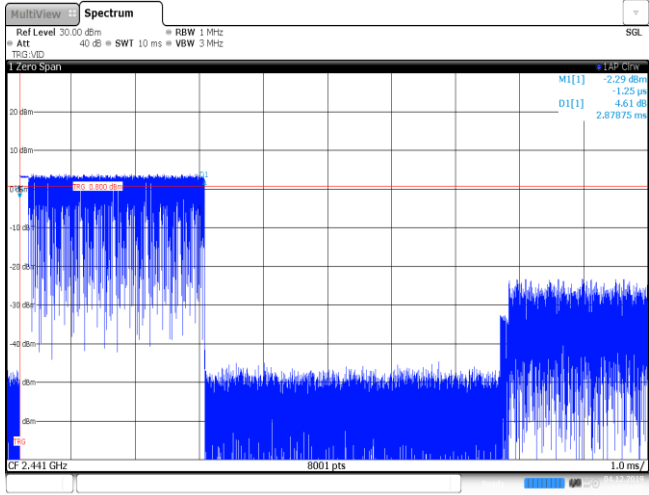
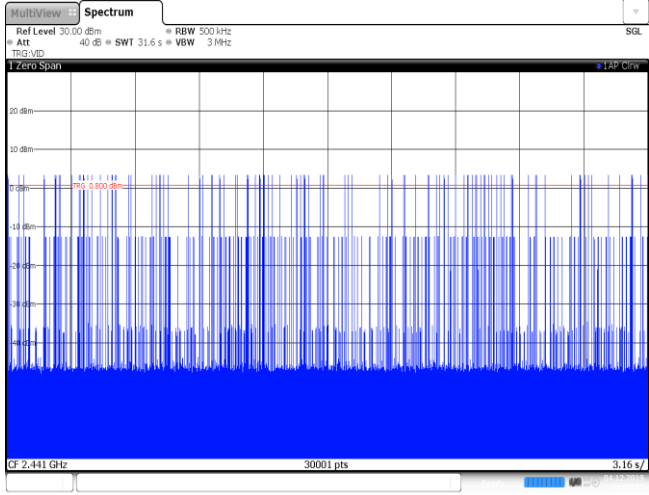
Modulation Type: GFSK	
DH1 Burst width	
DH1 Burst number	
DH3 Burst width	

DH3 Burst number	 MultiView Spectrum Ref Level 30.00 dBm Att 40 dB RBW 500 kHz SWT 31.6 s VBW 3 MHz 1 Zero Span CF 2.441 GHz 30001 pts 3.16 s Date: 4.DEC.2019 14:16:01
DH5 Burst width	 MultiView Spectrum Ref Level 30.00 dBm Att 40 dB RBW 1 MHz SWT 10 ms VBW 3 MHz 1 Zero Span CF 2.441 GHz 8001 pts 1.0 ms Date: 4.DEC.2019 14:16:38
DH5 Burst number	 MultiView Spectrum Ref Level 30.00 dBm Att 40 dB RBW 500 kHz SWT 31.6 s VBW 3 MHz 1 Zero Span CF 2.441 GHz 30001 pts 3.16 s Date: 4.DEC.2019 14:17:13

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

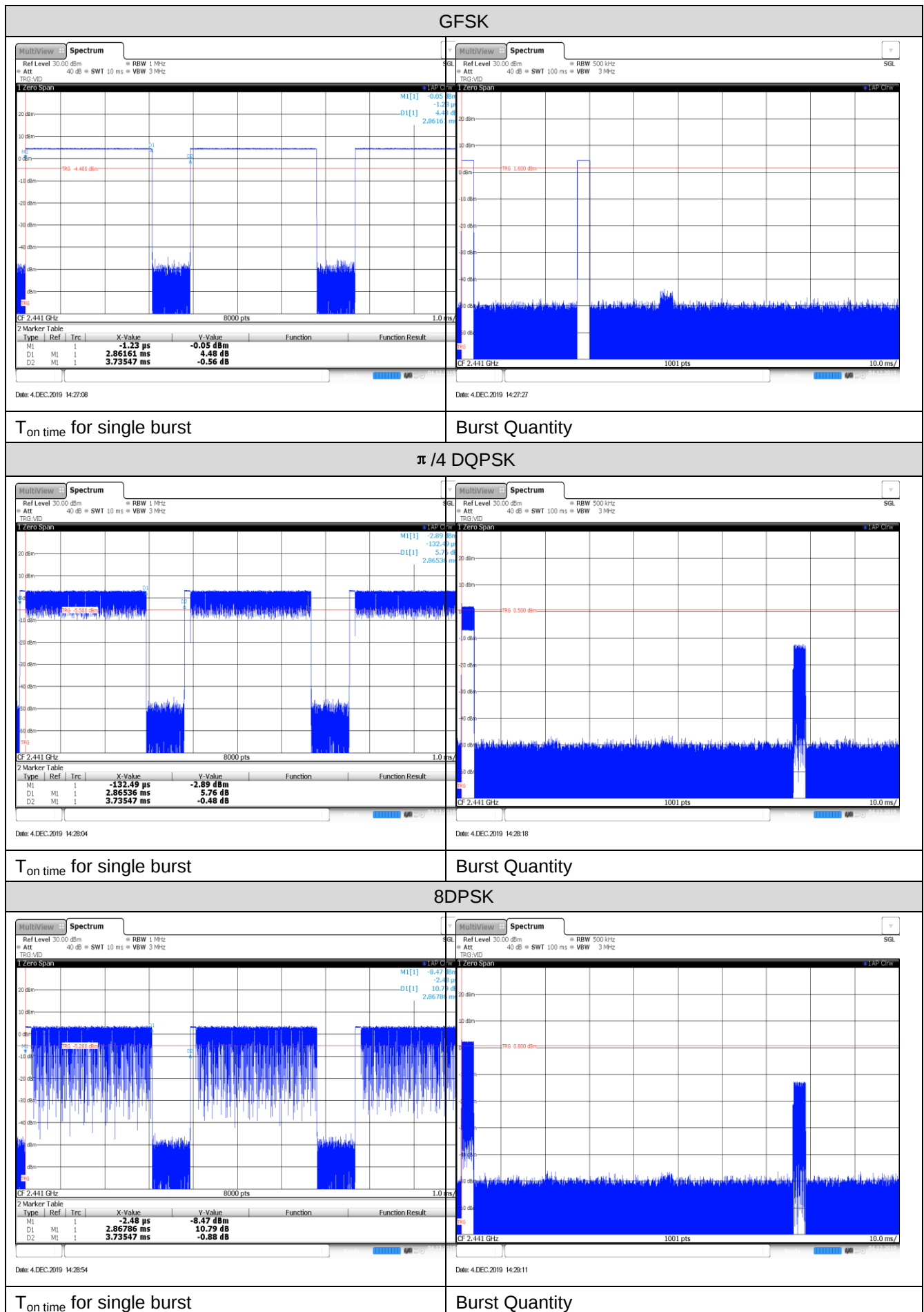
2DH3 Burst number	
2DH5 Burst width	
2DH5 Burst number	

Modulation Type:	8DPSK
3DH1 Burst width	 The spectrum plot shows a signal at 2.441 GHz with a bandwidth of 8001 pts. The y-axis represents power in dBm, ranging from -50 to 20. The x-axis represents time in ms, ranging from 0 to 1.0. A red horizontal line indicates a threshold at 0.000 dBm. The signal is a burst of energy, with a peak power of approximately 0 dBm. The plot includes a 'Zero Span' view and a 'Spectrum' view. The 'Spectrum' view shows the signal's frequency components, with a peak at 2.441 GHz. The 'Zero Span' view shows the signal's time-domain characteristics, with a burst of energy at 0.000 dBm. The plot also includes a 'Date' field showing 4.DEC.2019 14:22:17.
3DH1 Burst number	 The spectrum plot shows a signal at 2.441 GHz with a bandwidth of 30001 pts. The y-axis represents power in dBm, ranging from -50 to 20. The x-axis represents time in s, ranging from 0 to 3.16. A red horizontal line indicates a threshold at 0.000 dBm. The signal is a burst of energy, with a peak power of approximately 0 dBm. The plot includes a 'Zero Span' view and a 'Spectrum' view. The 'Spectrum' view shows the signal's frequency components, with a peak at 2.441 GHz. The 'Zero Span' view shows the signal's time-domain characteristics, with a burst of energy at 0.000 dBm. The plot also includes a 'Date' field showing 4.DEC.2019 14:22:51.
3DH3 Burst width	 The spectrum plot shows a signal at 2.441 GHz with a bandwidth of 8001 pts. The y-axis represents power in dBm, ranging from -50 to 20. The x-axis represents time in ms, ranging from 0 to 1.0. A red horizontal line indicates a threshold at 0.000 dBm. The signal is a burst of energy, with a peak power of approximately 0 dBm. The plot includes a 'Zero Span' view and a 'Spectrum' view. The 'Spectrum' view shows the signal's frequency components, with a peak at 2.441 GHz. The 'Zero Span' view shows the signal's time-domain characteristics, with a burst of energy at 0.000 dBm. The plot also includes a 'Date' field showing 4.DEC.2019 14:23:44.

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

Appendix G: Duty Cycle Correction Factor (DCCF)

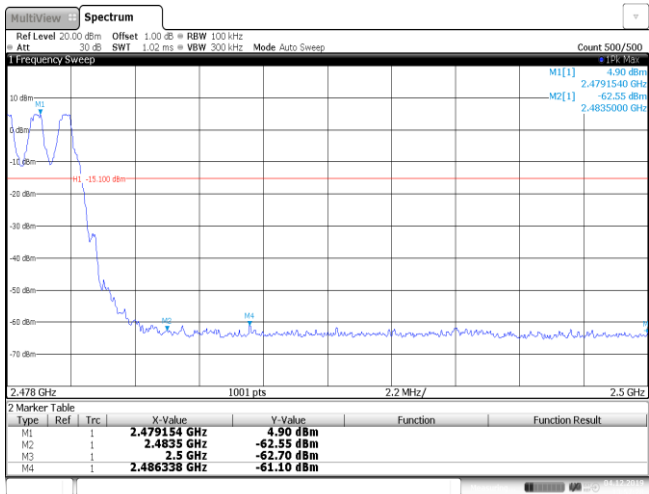
DCCF Calculate Formula					
$DCCF = 20 * \text{Log}(\text{duty cycle}) = 20 * \text{Log}(T_{\text{on time}} / T_{\text{period}})$					
Modulation type	Test Frequency (MHz)	$T_{\text{on time}}$ for single burst [ms]	T_{period} [ms]	Burst Quantity	DCCF [dB]
GFSK	2441	2.86	100	2	-24.85
$\pi/4$ DQPSK	2441	2.87	100	2	-24.82
8DPSK	2441	2.87	100	2	-24.82



Appendix H: Band edge and Spurious Emissions (conducted)

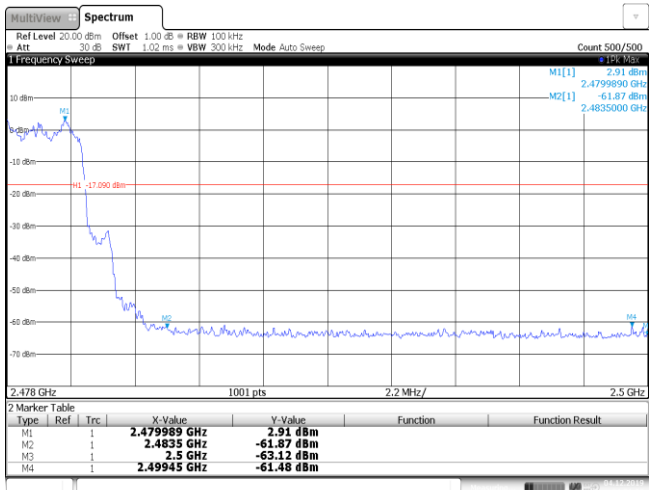
Test Item:	Band edge	Modulation type:	GFSK
CH00 No hopping mode	</		

CH78
Hopping mode



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

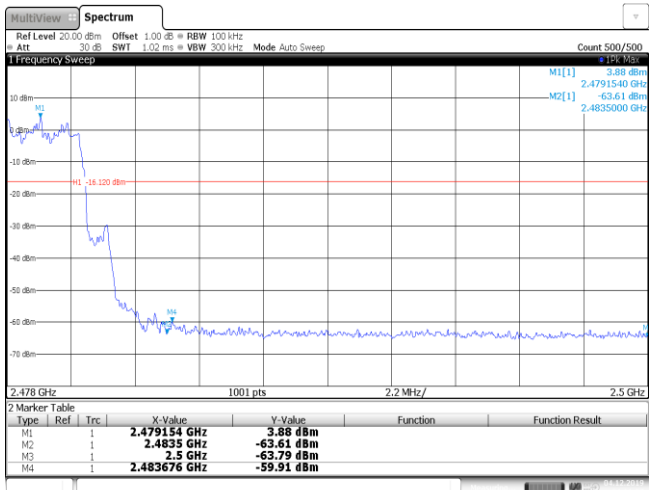
CH78
Hopping mode



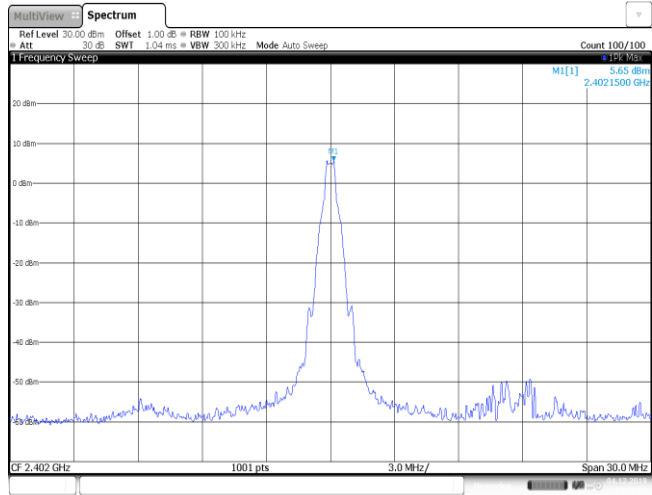
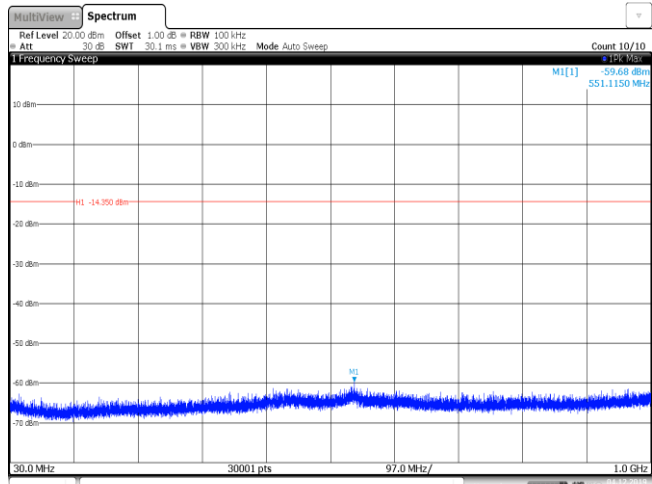
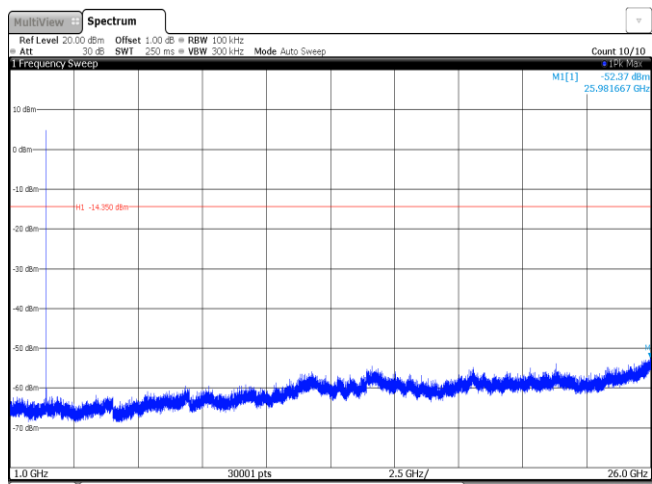
Date: 4.DEC.2019 14:01:25

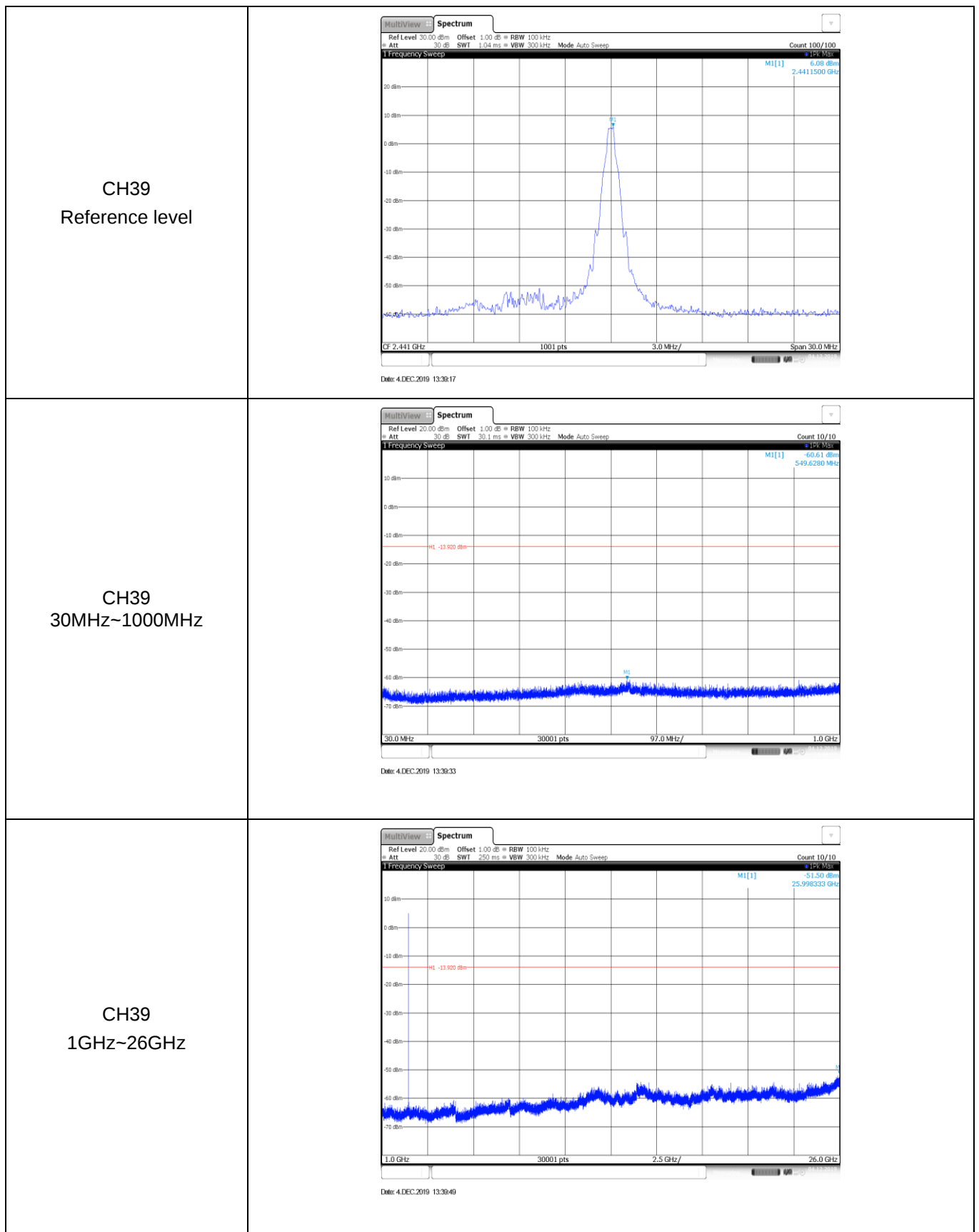
Test Item:	Band edge	Modulation type:	8DPSK
CH00 No hopping mode	</		

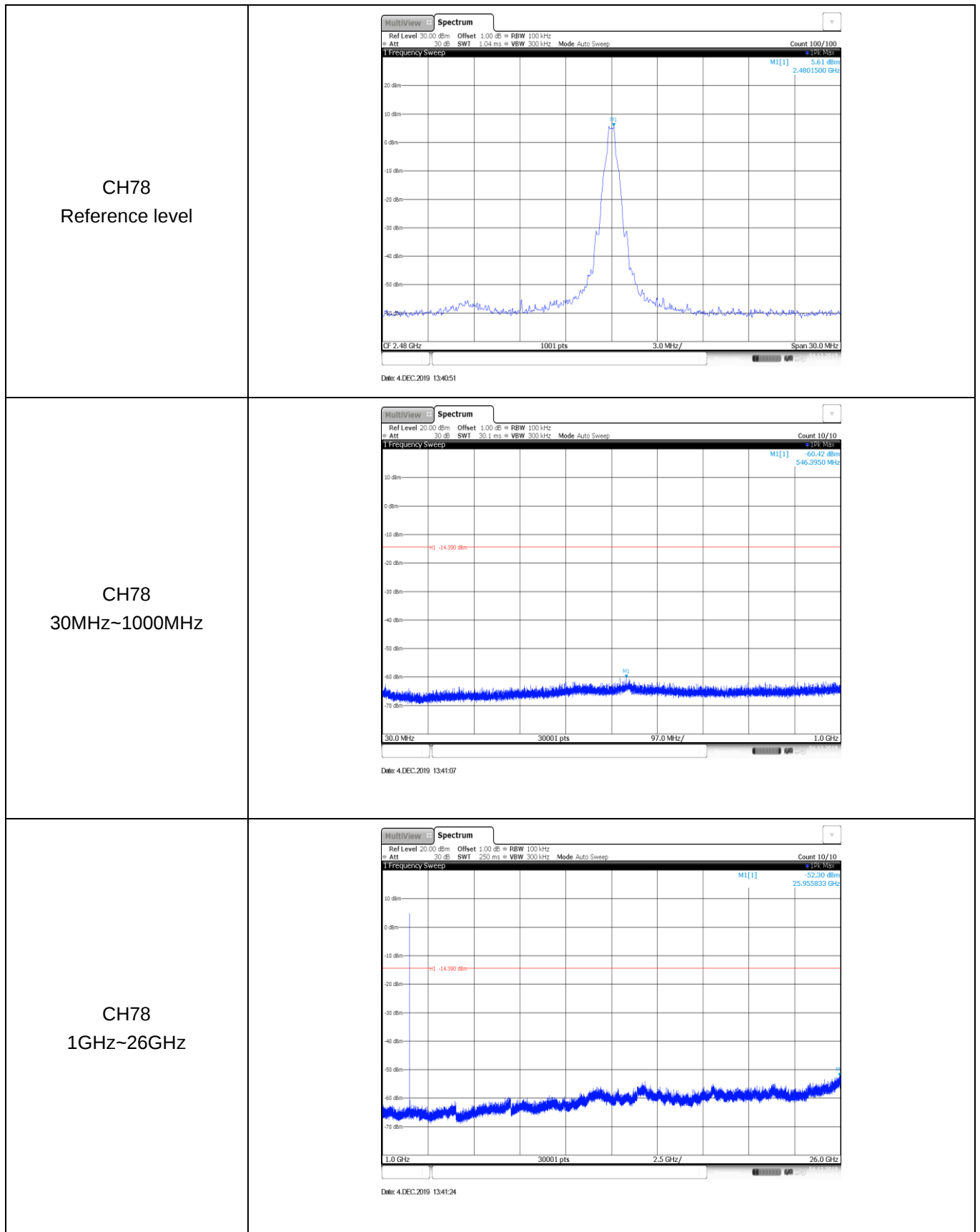
CH78
Hoppig mode

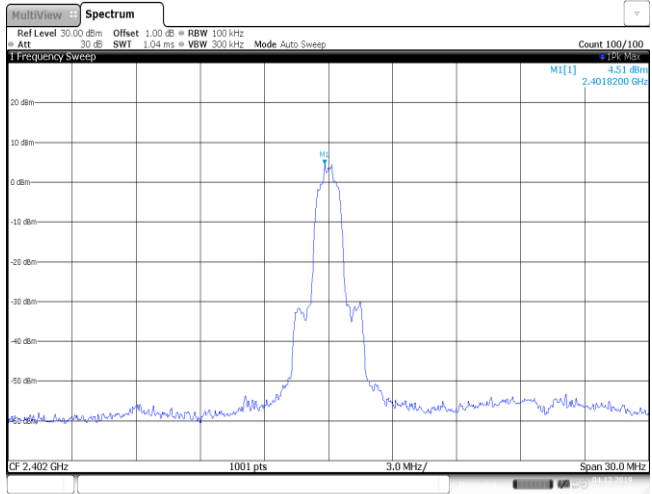
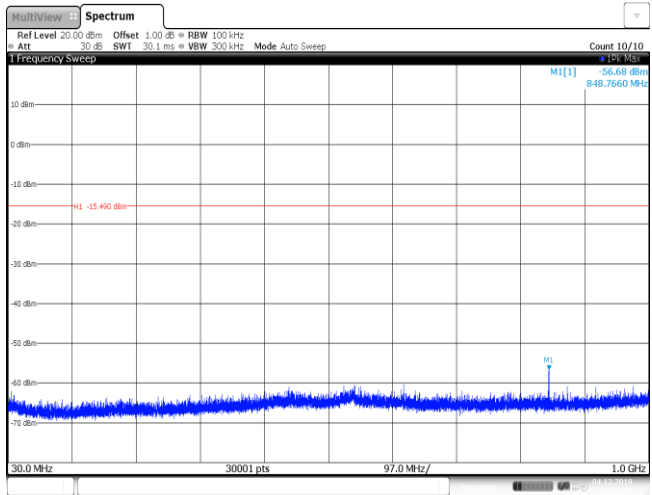
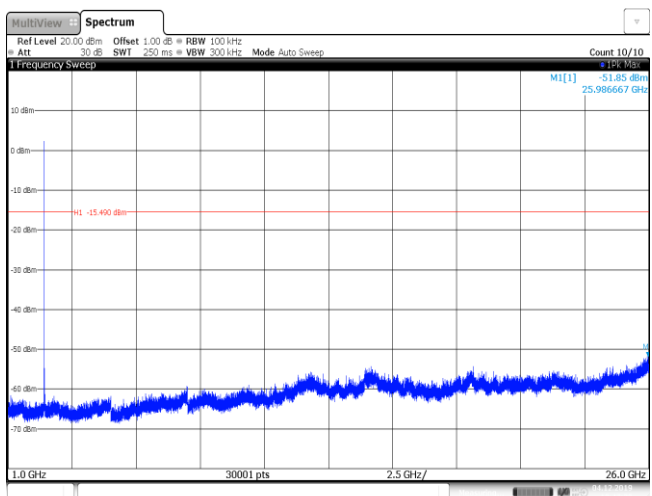


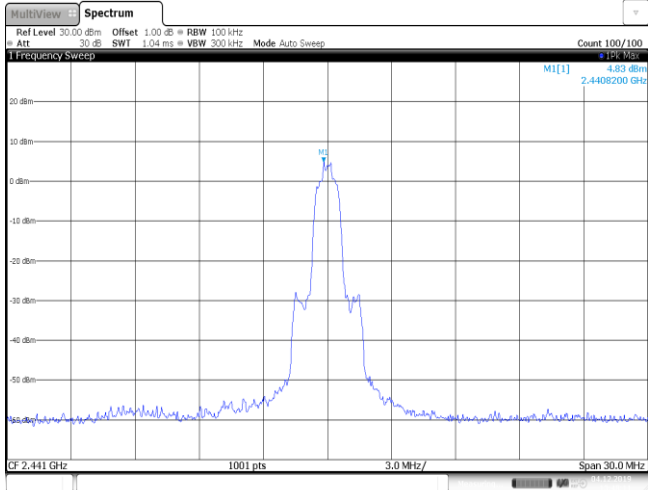
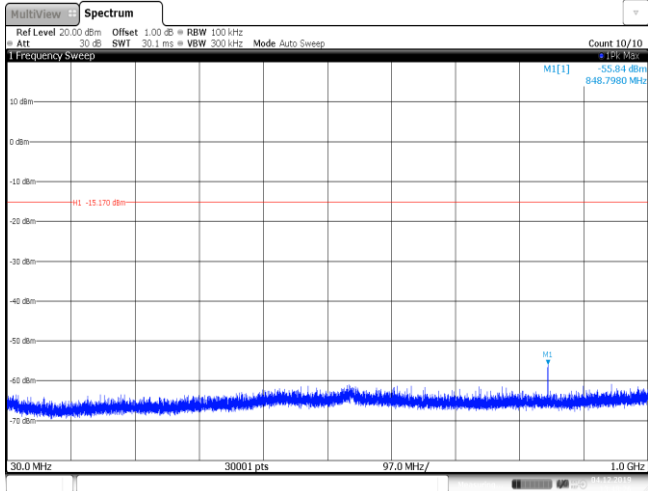
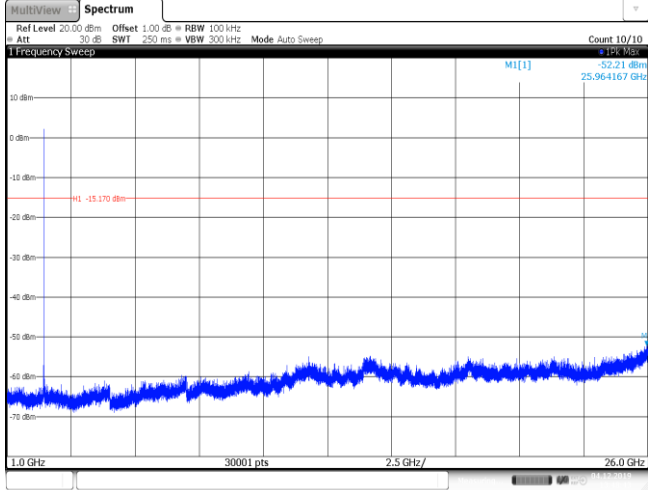
Date: 4.DEC.2019 14:11:57

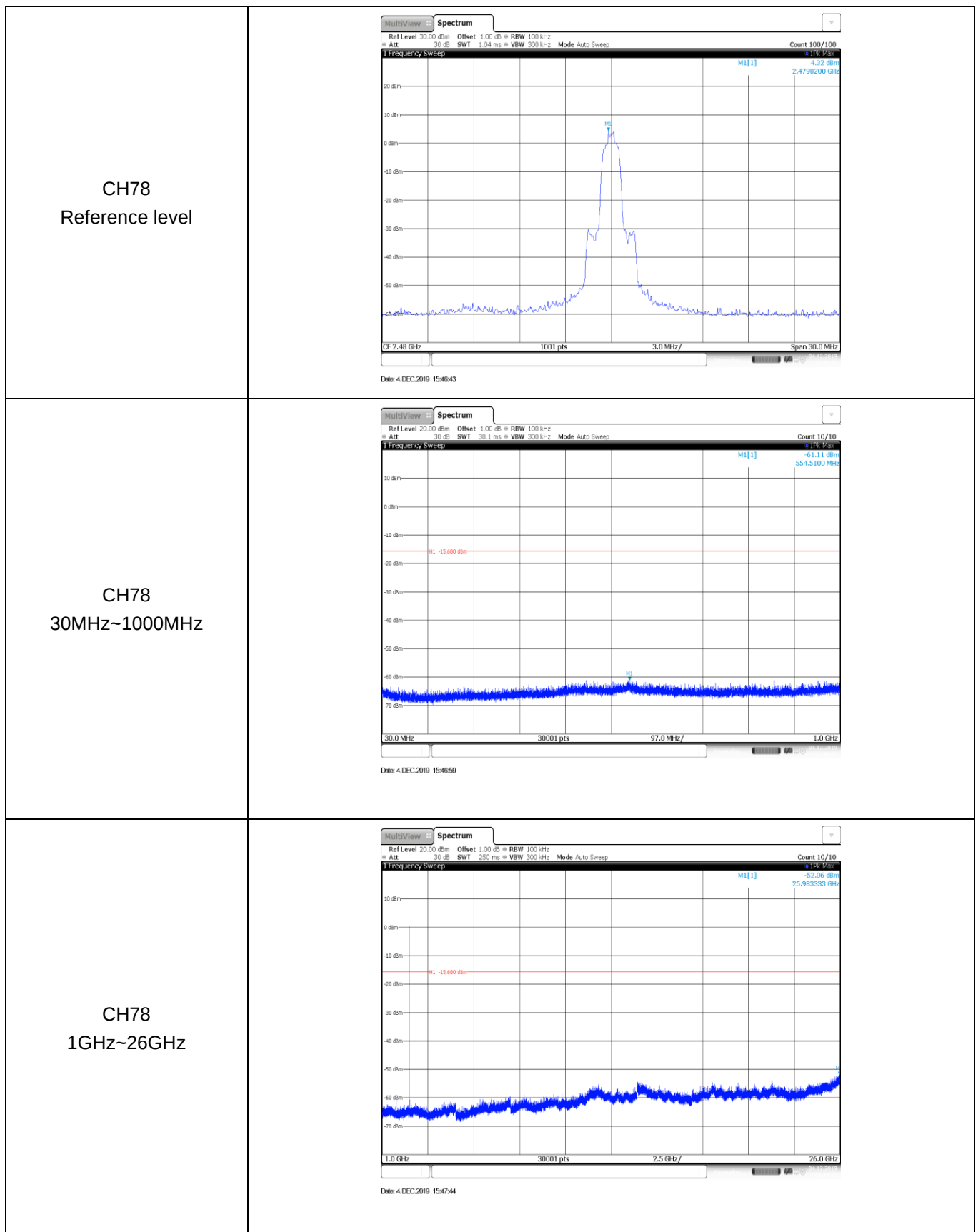
Test Item:	Spurious Emission	Modulation type:	GFSK
CH00 Reference level	 Ref Level 30.00 dBm Offset 1.00 dB BW 100 kHz Att 30 dB SWI 1.04 ms VBW 300 kHz Mode Auto Sweep Count 100/100 MI[1] -54.65 dBm 2.4021500 GHz CF 2.402 GHz 1001 pts 3.0 MHz/ Span 30.0 MHz Date: 4.DEC.2019 13:37:00		
CH00 30MHz~1000MHz	 Ref Level 20.00 dBm Offset 1.00 dB BW 100 kHz Att 30 dB SWI 30.1 ms VBW 300 kHz Mode Auto Sweep Count 10/10 MI[1] -59.68 dBm 551.1150 MHz H1 -14.950 dBm 30.0 MHz 30001 pts 97.0 MHz/ 1.0 GHz Date: 4.DEC.2019 13:37:16		
CH00 1GHz~26GHz	 Ref Level 20.00 dBm Offset 1.00 dB BW 100 kHz Att 30 dB SWI 250 ms VBW 300 kHz Mode Auto Sweep Count 10/10 MI[1] -52.37 dBm 25.981667 GHz H1 -14.950 dBm 1.0 GHz 30001 pts 2.5 GHz/ 26.0 GHz Date: 4.DEC.2019 13:37:33		

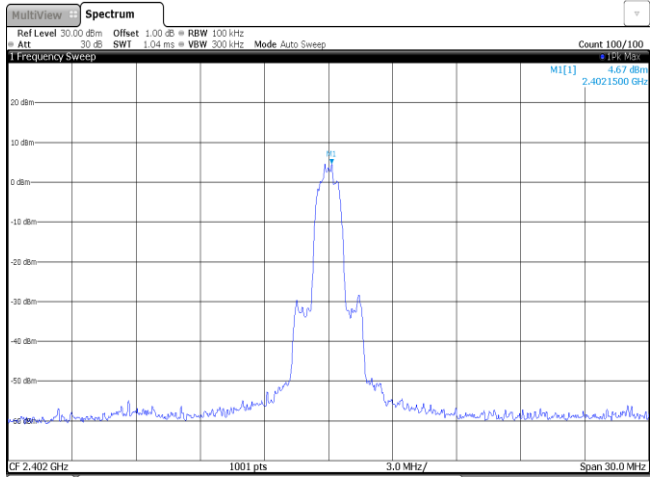
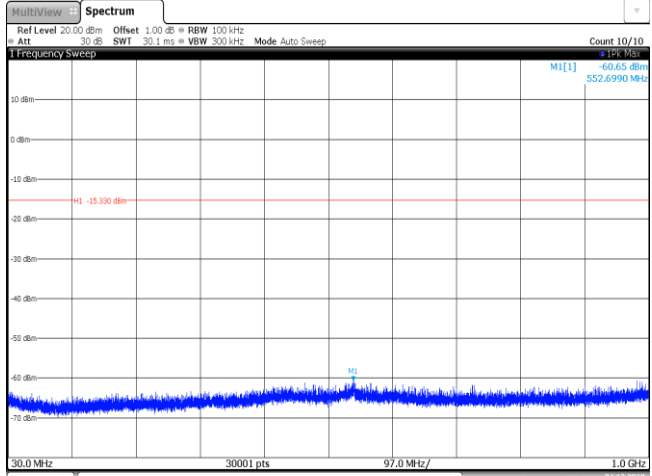
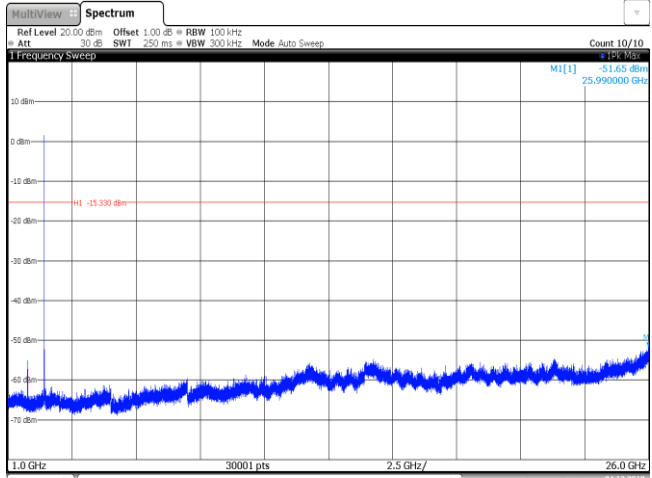


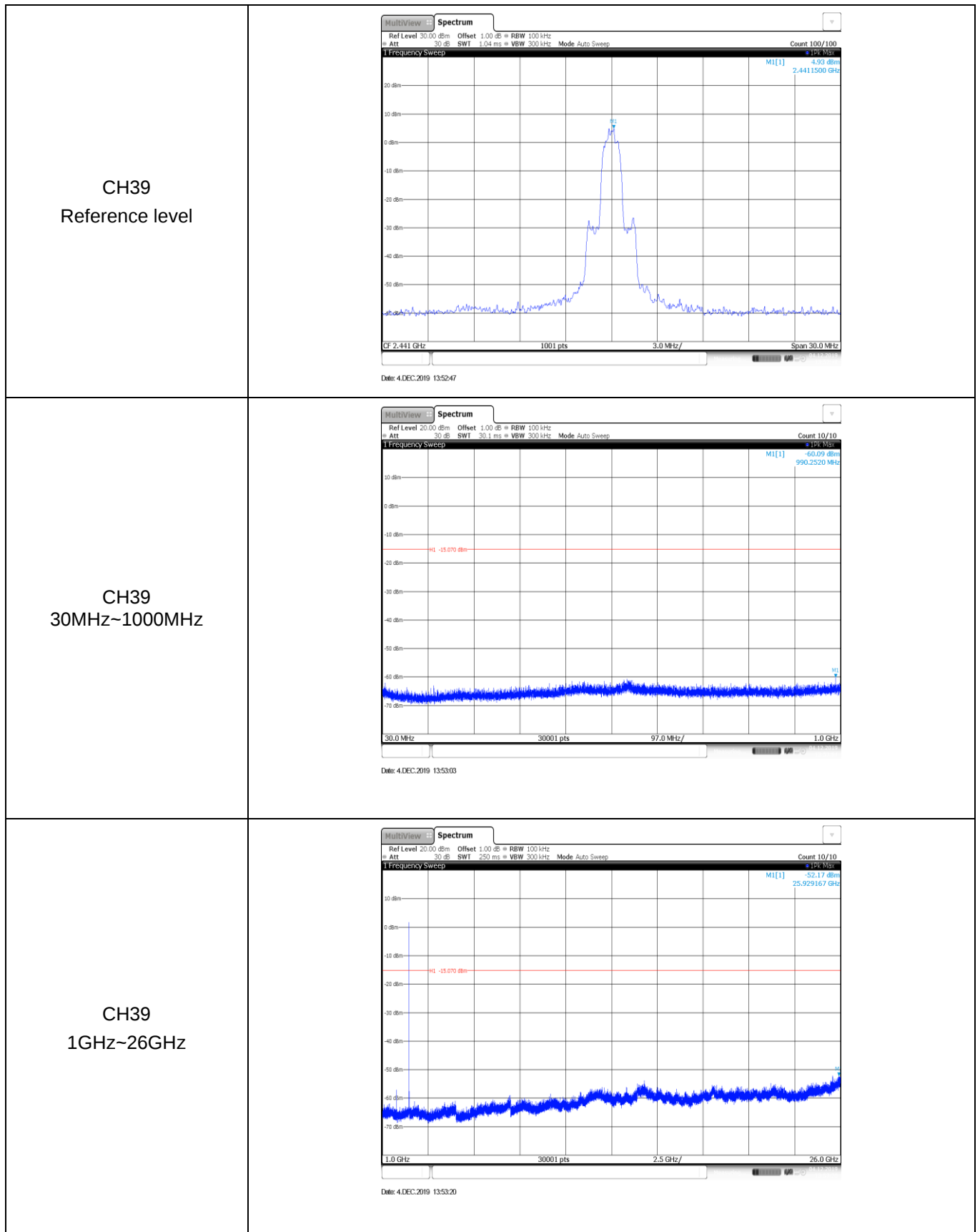


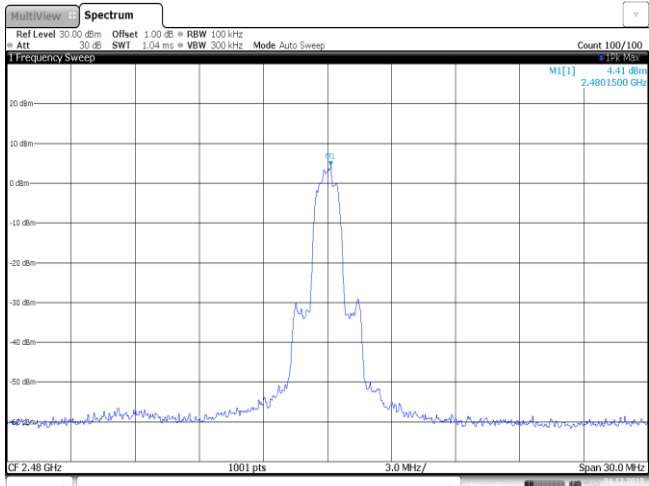
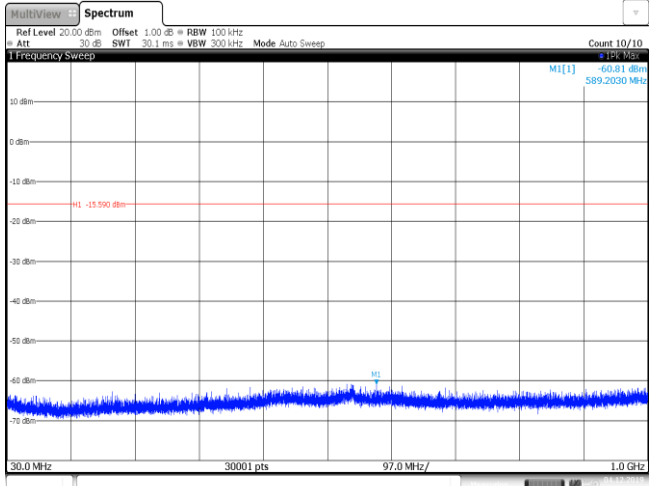
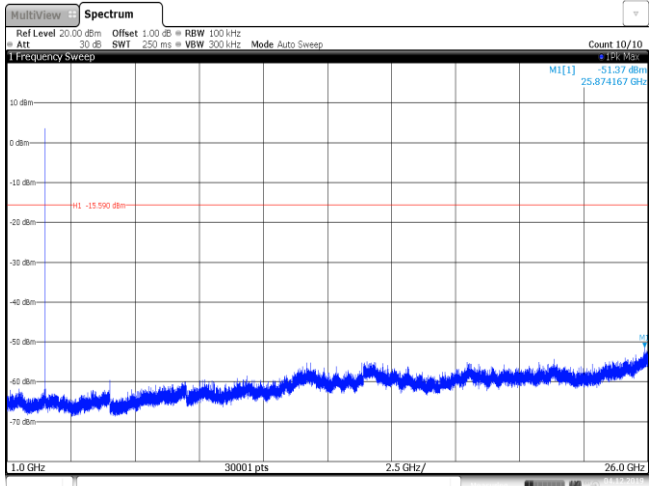
Test Item:	Spurious Emission	Modulation type:	$\pi/4$ DQPSK
CH00 Reference level	 CH00 Reference level		
CH00 30MHz~1000MHz	 CH00 30MHz~1000MHz		
CH00 1GHz~26GHz	 CH00 1GHz~26GHz		

CH39 Reference level	 4 DEC 2019 13:48:11
CH39 30MHz~1000MHz	 4 DEC 2019 13:48:27
CH39 1GHz~26GHz	 4 DEC 2019 13:48:43



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



CH78 Reference level	 The spectrum plot for CH78 Reference level shows a single sharp peak at 2.48 GHz. The y-axis represents power in dBm, ranging from -70 to 20. The x-axis represents frequency in GHz, ranging from 2.4 to 2.5. The peak is labeled with a count of 100/100 and a value of 4.41 dBm. The plot is titled 'Spectrum' and includes parameters: Ref Level 30.00 dBm, Offset 1.00 dB, RBW 100 kHz, Mode Auto Sweep, Count 100/100, Att 30 dB, SWF 1.04 ms, VBW 300 kHz. The date is 4.DEC.2019 13:54:34.
CH78 30MHz~1000MHz	 The spectrum plot for CH78 30MHz~1000MHz shows a flat noise floor across the entire frequency range. The y-axis represents power in dBm, ranging from -70 to 10. The x-axis represents frequency in MHz, ranging from 30.0 to 1000.0. The plot is titled 'Spectrum' and includes parameters: Ref Level 20.00 dBm, Offset 1.00 dB, RBW 100 kHz, Mode Auto Sweep, Count 10/10, Att 30 dB, SWF 30.1 ms, VBW 300 kHz. The date is 4.DEC.2019 13:54:50.
CH78 1GHz~26GHz	 The spectrum plot for CH78 1GHz~26GHz shows a flat noise floor across the entire frequency range. The y-axis represents power in dBm, ranging from -70 to 10. The x-axis represents frequency in GHz, ranging from 1.0 to 26.0. The plot is titled 'Spectrum' and includes parameters: Ref Level 20.00 dBm, Offset 1.00 dB, RBW 100 kHz, Mode Auto Sweep, Count 10/10, Att 30 dB, SWF 250 ms, VBW 300 kHz. The date is 4.DEC.2019 13:55:06.

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