

APPENDIX REPORT

Project No.	SHT2307060502EW	Radio Specification	Bluetooth BLE
Test sample No.	YPHT23070605001	Model No.	Specna Arms HAL ²
Start test date	2023/7/25	Finish date	2023/9/8
Temperature	24.9℃	Humidity	47%
Test Engineer	Caspar Chen	Auditor	Xiaodong Zheo

Appendix clause	Test item	Result
A	Peak Output Power	PASS
B	Power Spectral Density	PASS
C	6 dB Bandwidth	PASS
D	99% Occupied Bandwidth	PASS
E	Duty cycle	PASS
F	Band edge and Spurious Emissions (conducted)	PASS

Appendix A: Peak Output Power

Test rate	Channel	Peak Output power (dBm)	Average Output power (dBm)	Limit (dBm)	Result
1Mbps	00	2.98	2.97	≤ 30.00	Pass
	19	2.92	2.90		
	39	2.57	2.55		
2Mbps	00	2.91	2.90	≤ 30.00	Pass
	19	2.88	2.86		
	39	2.53	2.51		

Test rate:		1Mbps
CH00	Spectrum Ref Level 20.50 dBm Offset 0.50 dB RBW 2 MHz Att 30 dB SWT 1 ms VBW 5 MHz Mode Auto Sweep Count 500/500 1Pk View M1 M1[1] 2.98 dBm 2.40173230 GHz CF 2.402 GHz 691 pts Span 5.0 MHz Date: 8 SEP 2023 15:53:19	
CH19	Spectrum Ref Level 20.50 dBm Offset 0.50 dB RBW 2 MHz Att 30 dB SWT 1 ms VBW 5 MHz Mode Auto Sweep Count 500/500 1Pk View M1 M1[1] 2.92 dBm 2.44026770 GHz CF 2.44 GHz 691 pts Span 5.0 MHz Date: 8 SEP 2023 15:55:11	
CH39	Spectrum Ref Level 20.50 dBm Offset 0.50 dB RBW 2 MHz Att 30 dB SWT 1 ms VBW 5 MHz Mode Auto Sweep Count 500/500 1Pk View M1 M1[1] 2.57 dBm 2.47978290 GHz CF 2.48 GHz 691 pts Span 5.0 MHz Date: 8 SEP 2023 15:56:37	

Test rate:		2Mbps
CH00	Spectrum Ref Level 20.50 dBm Offset 0.50 dB RBW 3 MHz Att 30 dB SWT 1 ms VBW 10 MHz Mode Auto Sweep Count 500/500 IPk View M1 M1[1] 2.91 dBm 2.4015220 GHz CF 2.402 GHz691 ptsSpan 10.0 MHz Date: 2 SEP 2023 15:58:37	
CH19	Spectrum Ref Level 20.50 dBm Offset 0.50 dB RBW 3 MHz Att 30 dB SWT 1 ms VBW 10 MHz Mode Auto Sweep Count 500/500 IPk View M1 M1[1] 2.88 dBm 2.4394790 GHz CF 2.44 GHz691 ptsSpan 10.0 MHz Date: 2 SEP 2023 16:00:26	
CH39	Spectrum Ref Level 20.50 dBm Offset 0.50 dB RBW 3 MHz Att 30 dB SWT 1 ms VBW 10 MHz Mode Auto Sweep Count 500/500 IPk View M1 M1[1] 2.53 dBm 2.4795220 GHz CF 2.48 GHz691 ptsSpan 10.0 MHz Date: 2 SEP 2023 16:01:54	

Appendix B: Power Spectral Density

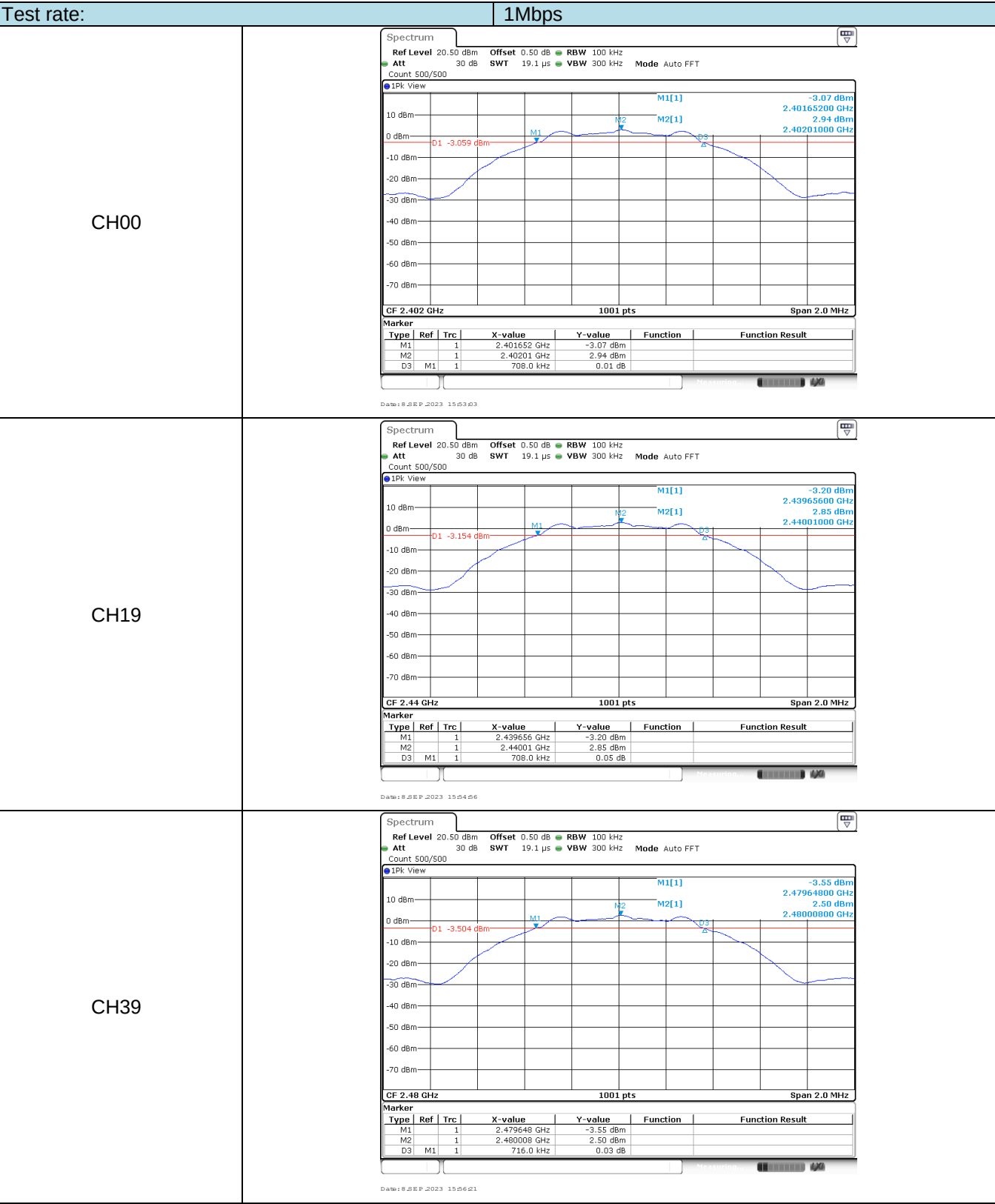
Test rate	Channel	Power Spectral Density(dBm/3KHz)	Limit (dBm/3KHz)	Result
1Mbps	00	-12.46	≤8.00	Pass
	19	-12.60		
	39	-12.92		
2Mbps	00	-15.29	≤8.00	Pass
	19	-15.50		
	39	-15.79		

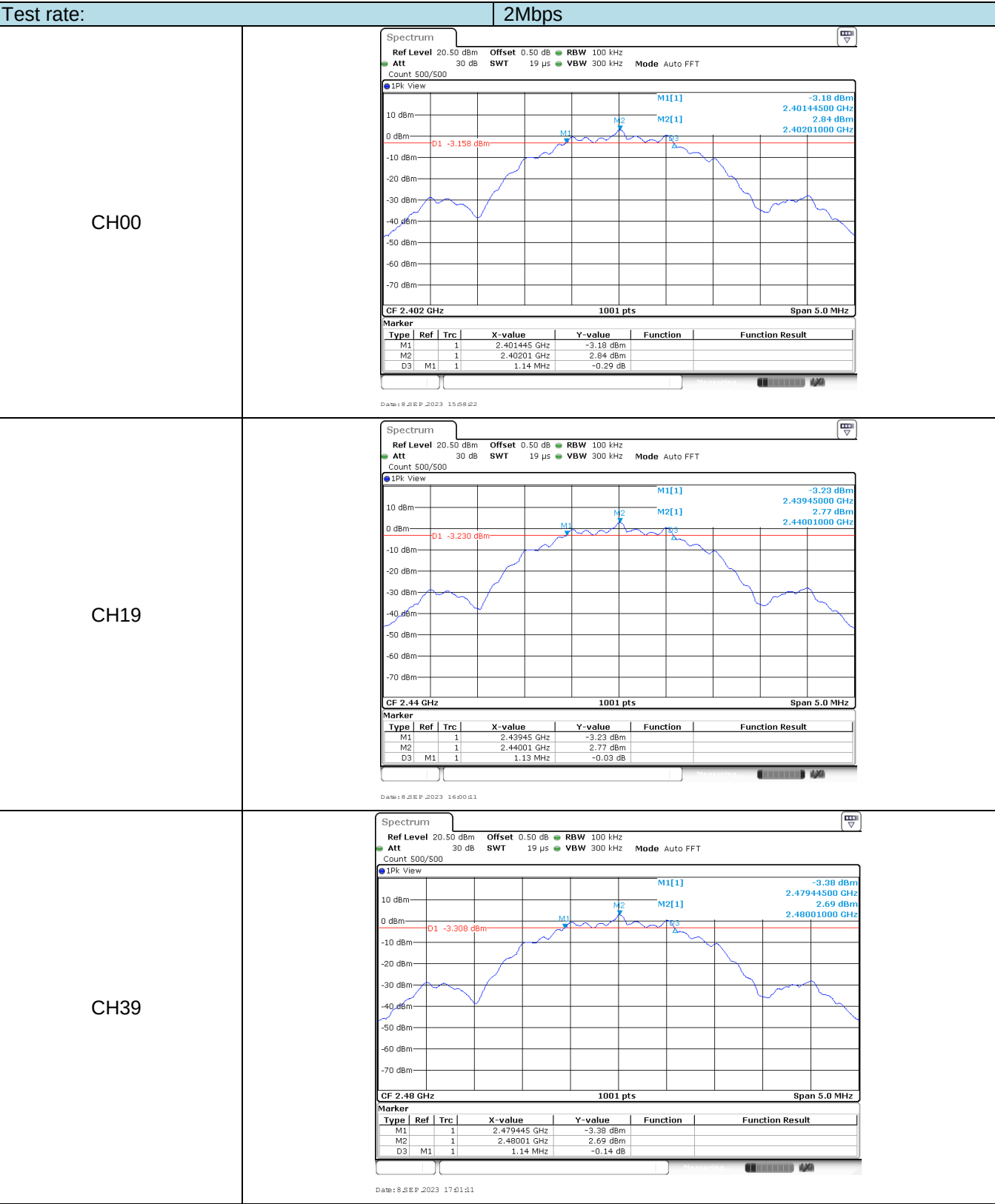
Test rate: 1Mbps	
CH00	Spectrum Ref Level 20.50 dBm Att 30 dB Offset 0.50 dB SWT 632.3 μs RBW 3 kHz VBW 10 kHz Mode Auto FFT Count 100/100 IPk Max M1[1] -12.46 dBm 2.40199420 GHz 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm CF 2.402 GHz 691 pts Span 1.0 MHz Date: 2 SEP 2023 15:53:33
CH19	Spectrum Ref Level 20.50 dBm Att 30 dB Offset 0.50 dB SWT 632.3 μs RBW 3 kHz VBW 10 kHz Mode Auto FFT Count 100/100 IPk Max M1[1] -12.60 dBm 2.43999280 GHz 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm CF 2.44 GHz 691 pts Span 1.0 MHz Date: 2 SEP 2023 15:55:56
CH39	Spectrum Ref Level 20.50 dBm Att 30 dB Offset 0.50 dB SWT 632.3 μs RBW 3 kHz VBW 10 kHz Mode Auto FFT Count 100/100 IPk Max M1[1] -12.92 dBm 2.47999280 GHz 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm CF 2.48 GHz 691 pts Span 1.0 MHz Date: 2 SEP 2023 15:56:51

Test rate:		2Mbps
CH00	Spectrum Ref Level 20.50 dBm Att 30 dB Count 100/100 Offset 0.50 dB SWT 632.1 μs RBW 3 kHz VBW 10 kHz Mode Auto FFT 1Pk Max M1[1] -15.29 dBm 2.40200430 GHz 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm CF 2.402 GHz 691 pts Span 3.0 MHz Date: 8 SEP 2023 15:58:52	
CH19	Spectrum Ref Level 20.50 dBm Att 30 dB Count 100/100 Offset 0.50 dB SWT 632.1 μs RBW 3 kHz VBW 10 kHz Mode Auto FFT 1Pk Max M1[1] -15.50 dBm 2.44000430 GHz 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm CF 2.44 GHz 691 pts Span 3.0 MHz Date: 8 SEP 2023 16:00:41	
CH39	Spectrum Ref Level 20.50 dBm Att 30 dB Count 100/100 Offset 0.50 dB SWT 632.1 μs RBW 3 kHz VBW 10 kHz Mode Auto FFT 1Pk Max M1[1] -15.79 dBm 2.48000430 GHz 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm CF 2.48 GHz 691 pts Span 3.0 MHz Date: 8 SEP 2023 16:02:09	

Appendix C: 6dB bandwidth

Type	Channel	6dB Bandwidth(kHz)	Limit (kHz)	Result
1Mbps	00	708.00	≥500	Pass
	19	708.00		
	39	716.00		
2Mbps	00	1140.00	≥500	Pass
	19	1130.00		
	39	1140.00		





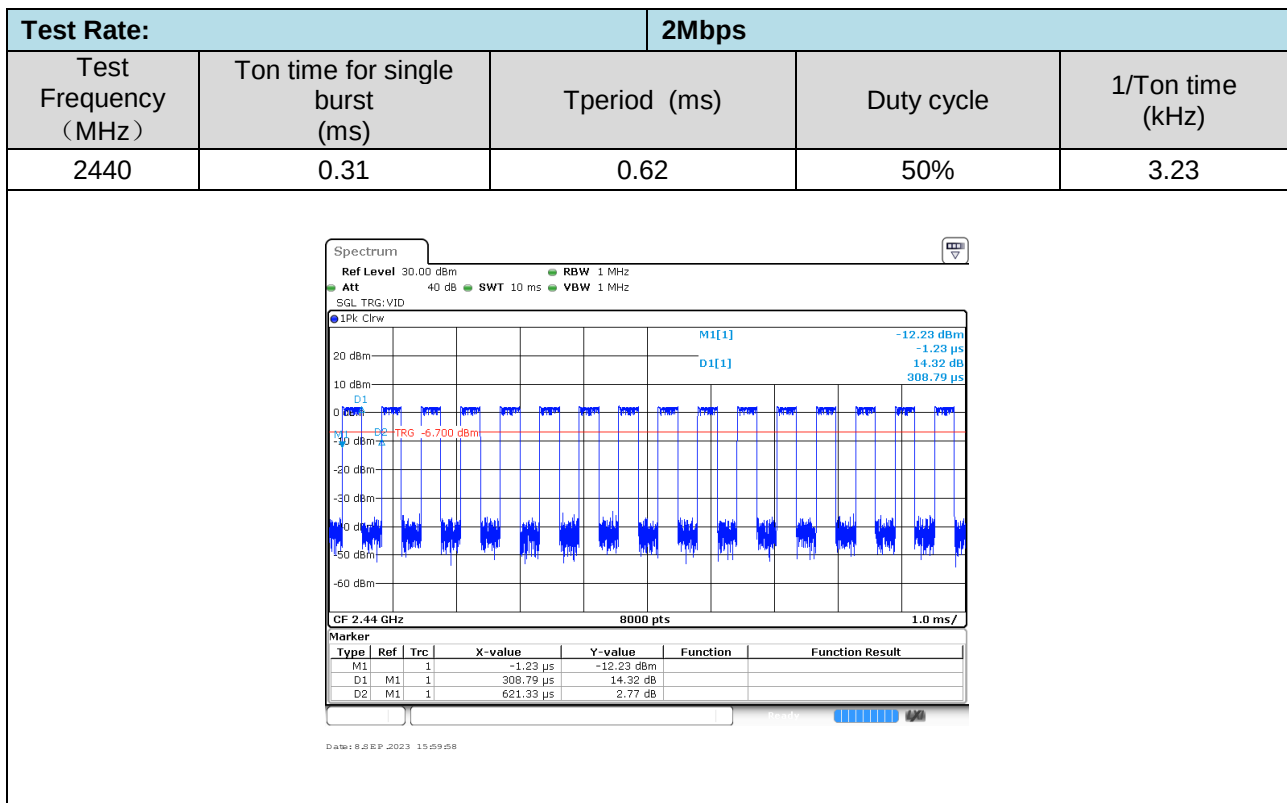
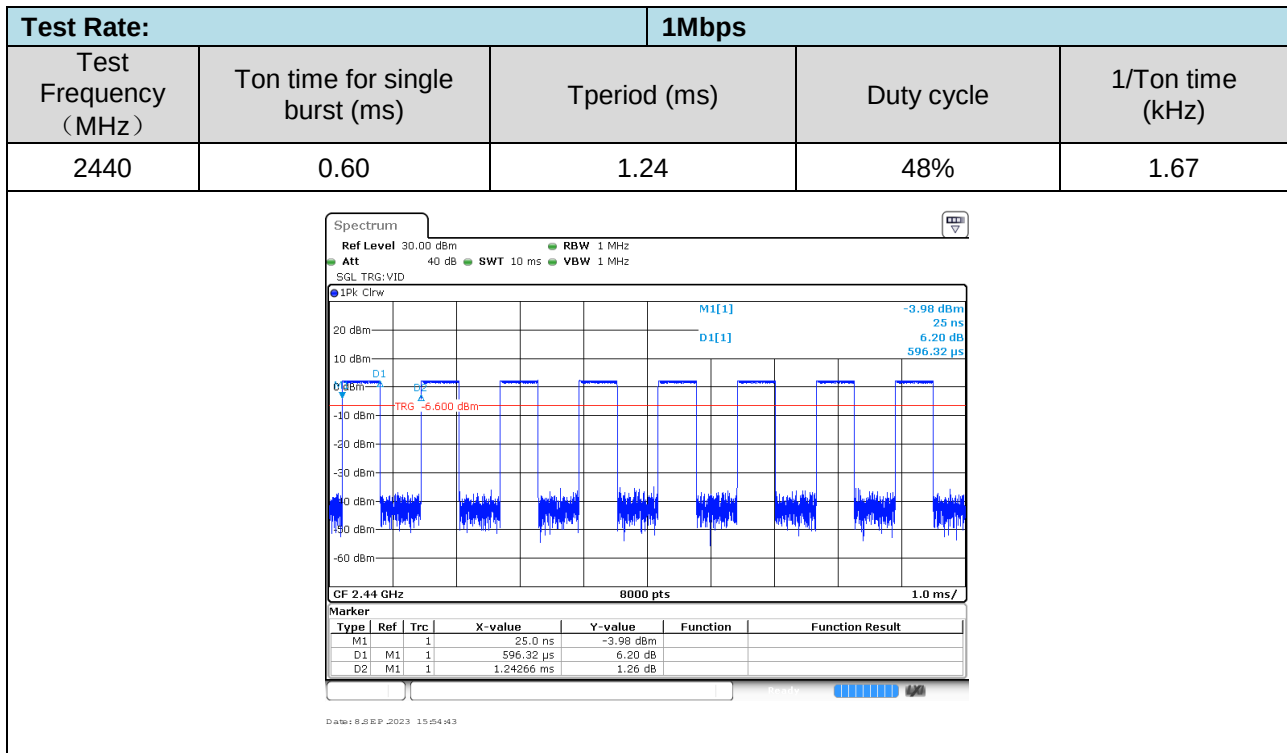
Appendix D: 99% Occupied Bandwidth

Test rate	Channel	99% Occupied Bandwidth(MHz)	Limit (kHz)	Result
1Mbps	00	1.04	-	Pass
	19	1.05		
	39	1.05		
2Mbps	00	2.05	-	Pass
	19	2.06		
	39	2.07		

Test rate:		1Mbps
CH00	Spectrum Ref Level 20.50 dBm Offset 0.50 dB RBW 30 kHz Att 30 dB SWT 63.3 μs VBW 100 kHz Mode Auto FFT Count 500/500 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] Occ Bw 0.71 dBm 2.40201200 GHz 1.040959041 MHz CF 2.402 GHz 1001 pts Span 2.0 MHz Date: 8 SEP 2023 15:53:11	
CH19	Spectrum Ref Level 20.50 dBm Offset 0.50 dB RBW 30 kHz Att 30 dB SWT 63.3 μs VBW 100 kHz Mode Auto FFT Count 500/500 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] Occ Bw 0.65 dBm 2.44001000 GHz 1.044955045 MHz CF 2.44 GHz 1001 pts Span 2.0 MHz Date: 8 SEP 2023 15:55:03	
CH39	Spectrum Ref Level 20.50 dBm Offset 0.50 dB RBW 30 kHz Att 30 dB SWT 63.3 μs VBW 100 kHz Mode Auto FFT Count 500/500 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] Occ Bw 0.26 dBm 2.48001000 GHz 1.046953047 MHz CF 2.48 GHz 1001 pts Span 2.0 MHz Date: 8 SEP 2023 15:56:29	

Test rate: 2Mbps	
CH00	Spectrum Ref Level 20.50 dBm Offset 0.50 dB RBW 30 kHz Att 30 dB SWT 63.2 μs VBW 100 kHz Mode Auto FFT Count 500/500 IPk View M1[1] 0.20 dBm 2.40201000 GHz 2.052947053 MHz Occ Bw T1 T2 CF 2.402 GHz 1001 pts Span 5.0 MHz Date: 9 SEP 2023 15:58:29
CH19	Spectrum Ref Level 20.50 dBm Offset 0.50 dB RBW 30 kHz Att 30 dB SWT 63.2 μs VBW 100 kHz Mode Auto FFT Count 500/500 IPk View M1[1] 0.18 dBm 2.44001000 GHz 2.062937063 MHz Occ Bw T1 T2 CF 2.44 GHz 1001 pts Span 5.0 MHz Date: 9 SEP 2023 16:00:18
CH39	Spectrum Ref Level 20.50 dBm Offset 0.50 dB RBW 30 kHz Att 30 dB SWT 63.2 μs VBW 100 kHz Mode Auto FFT Count 500/500 IPk View M1[1] -0.21 dBm 2.48001000 GHz 2.067932068 MHz Occ Bw T1 T2 CF 2.48 GHz 1001 pts Span 5.0 MHz Date: 9 SEP 2023 16:01:46

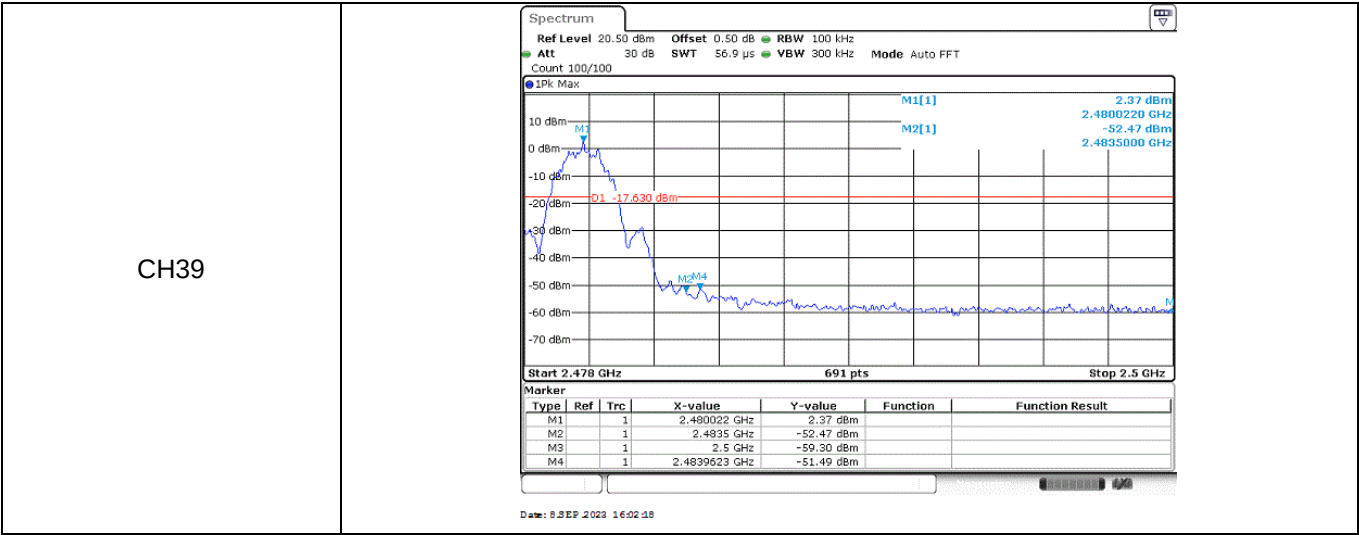
Appendix E: Duty cycle



Appendix F: Band edge and Spurious Emissions (conducted)

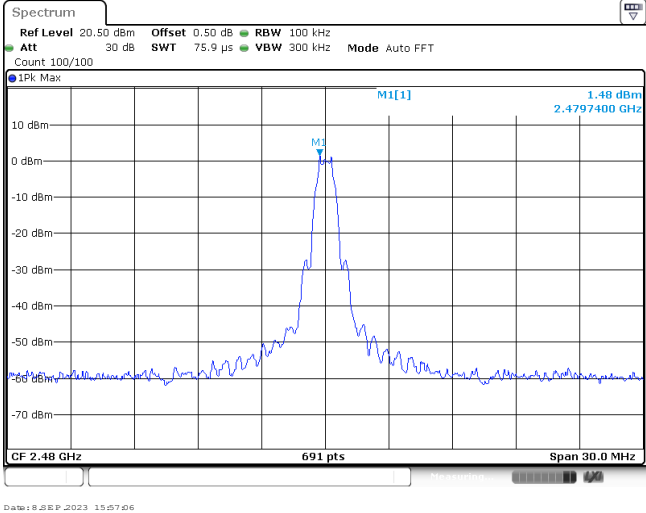
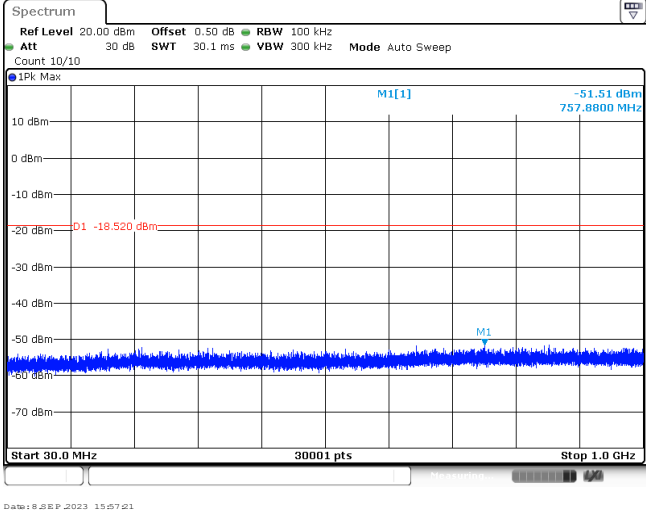
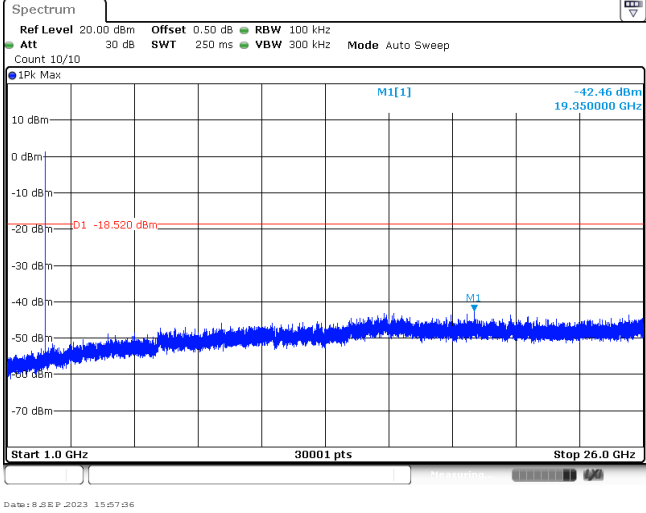
Test Item:	Band edge	Test Rate:	1Mbps																																									
CH00	Spectrum Ref Level 20.50 dBm Offset 0.50 dB RBW 100 kHz Att 30 dB SWT 1.1 ms VBW 300 kHz Mode Auto Sweep Count 300/300 1Pk Max 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] M2[1] M3 M4 M5 2.39 dBm 2.402040 GHz -48.96 dBm 2.400000 GHz -17.610 dBm Start 2.31 GHz 691 pts Stop 2.405 GHz Marker <table><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><tr><td>M1</td><td></td><td>1</td><td>2.40204 GHz</td><td>2.39 dBm</td><td></td><td></td></tr><tr><td>M2</td><td></td><td>1</td><td>2.4 GHz</td><td>-48.96 dBm</td><td></td><td></td></tr><tr><td>M3</td><td></td><td>1</td><td>2.39 GHz</td><td>-55.19 dBm</td><td></td><td></td></tr><tr><td>M4</td><td></td><td>1</td><td>2.31 GHz</td><td>-53.99 dBm</td><td></td><td></td></tr><tr><td>M5</td><td></td><td>1</td><td>2.399906 GHz</td><td>-48.21 dBm</td><td></td><td></td></tr></table> Date: 8 SEP 2023 15:58:42	Type	Ref	Trc	X-value	Y-value	Function	Function Result	M1		1	2.40204 GHz	2.39 dBm			M2		1	2.4 GHz	-48.96 dBm			M3		1	2.39 GHz	-55.19 dBm			M4		1	2.31 GHz	-53.99 dBm			M5		1	2.399906 GHz	-48.21 dBm			
Type	Ref	Trc	X-value	Y-value	Function	Function Result																																						
M1		1	2.40204 GHz	2.39 dBm																																								
M2		1	2.4 GHz	-48.96 dBm																																								
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M4		1	2.31 GHz	-53.99 dBm																																								
M5		1	2.399906 GHz	-48.21 dBm																																								
CH39	Spectrum Ref Level 20.50 dBm Offset 0.50 dB RBW 100 kHz Att 30 dB SWT 56.9 μs VBW 300 kHz Mode Auto FFT Count 100/100 1Pk Max 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] M2[1] M3 M4 2.44 dBm 2.4800220 GHz -51.06 dBm 2.4835000 GHz -17.560 dBm Start 2.478 GHz 691 pts Stop 2.5 GHz Marker <table><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><tr><td>M1</td><td></td><td>1</td><td>2.480022 GHz</td><td>2.44 dBm</td><td></td><td></td></tr><tr><td>M2</td><td></td><td>1</td><td>2.4835 GHz</td><td>-51.06 dBm</td><td></td><td></td></tr><tr><td>M3</td><td></td><td>1</td><td>2.5 GHz</td><td>-59.50 dBm</td><td></td><td></td></tr><tr><td>M4</td><td></td><td>1</td><td>2.483519 GHz</td><td>-50.98 dBm</td><td></td><td></td></tr></table> Date: 8 SEP 2023 15:57:50	Type	Ref	Trc	X-value	Y-value	Function	Function Result	M1		1	2.480022 GHz	2.44 dBm			M2		1	2.4835 GHz	-51.06 dBm			M3		1	2.5 GHz	-59.50 dBm			M4		1	2.483519 GHz	-50.98 dBm										
Type	Ref	Trc	X-value	Y-value	Function	Function Result																																						
M1		1	2.480022 GHz	2.44 dBm																																								
M2		1	2.4835 GHz	-51.06 dBm																																								
M3		1	2.5 GHz	-59.50 dBm																																								
M4		1	2.483519 GHz	-50.98 dBm																																								

Test Item:	Band edge	Test Rate:	2Mbps																																									
CH00	Spectrum Ref Level 20.50 dBm Offset 0.50 dB RBW 100 kHz Att 30 dB SWT 1.1 ms VBW 300 kHz Mode Auto Sweep Count 300/300 1Pk Max 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] M2[1] M3 M4 M5 2.35 dBm 2.402040 GHz -29.25 dBm 2.400000 GHz -17.650 dBm Start 2.31 GHz 691 pts Stop 2.405 GHz Marker <table><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><tr><td>M1</td><td></td><td>1</td><td>2.40204 GHz</td><td>2.35 dBm</td><td></td><td></td></tr><tr><td>M2</td><td></td><td>1</td><td>2.4 GHz</td><td>-29.25 dBm</td><td></td><td></td></tr><tr><td>M3</td><td></td><td>1</td><td>2.39 GHz</td><td>-54.80 dBm</td><td></td><td></td></tr><tr><td>M4</td><td></td><td>1</td><td>2.31 GHz</td><td>-53.99 dBm</td><td></td><td></td></tr><tr><td>M5</td><td></td><td>1</td><td>2.399906 GHz</td><td>-36.12 dBm</td><td></td><td></td></tr></table> Date: 8 SEP 2023 15:59:01	Type	Ref	Trc	X-value	Y-value	Function	Function Result	M1		1	2.40204 GHz	2.35 dBm			M2		1	2.4 GHz	-29.25 dBm			M3		1	2.39 GHz	-54.80 dBm			M4		1	2.31 GHz	-53.99 dBm			M5		1	2.399906 GHz	-36.12 dBm			
Type	Ref	Trc	X-value	Y-value	Function	Function Result																																						
M1		1	2.40204 GHz	2.35 dBm																																								
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M5		1	2.399906 GHz	-36.12 dBm																																								



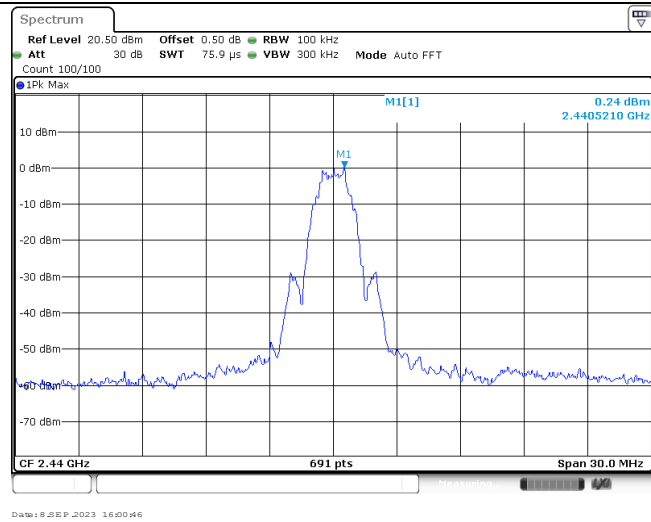
Test Item:	SE	Test Rate:	1Mbps
CH00 Reference level	Spectrum Ref Level 20.50 dBm Att 30 dB Offset 0.50 dB SWT 75.9 μs RBW 100 kHz VBW 300 kHz Mode Auto FFT Count 100/100 1Pk Max M1[1] 1.85 dBm 2.4017400 GHz 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm CF 2.402 GHz 691 pts Span 30.0 MHz Date: 8 SEP 2023 15:53:48		
CH00 30MHz~1000MHz	Spectrum Ref Level 20.00 dBm Att 30 dB Offset 0.50 dB SWT 30.1 ms RBW 100 kHz VBW 300 kHz Mode Auto Sweep Count 10/10 1Pk Max M1[1] -51.64 dBm 721.4410 MHz 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm Start 30.0 MHz 30001 pts Stop 1.0 GHz Date: 8 SEP 2023 15:54:03		
CH00 1GHz~26GHz	Spectrum Ref Level 20.00 dBm Att 30 dB Offset 0.50 dB SWT 250 ms RBW 100 kHz VBW 300 kHz Mode Auto Sweep Count 10/10 1Pk Max M1[1] -43.18 dBm 18.762500 GHz 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm Start 1.0 GHz 30001 pts Stop 26.0 GHz Date: 8 SEP 2023 15:54:18		

CH19 Reference level	
CH19 30MHz~1000MHz	
CH19 1GHz~26GHz	

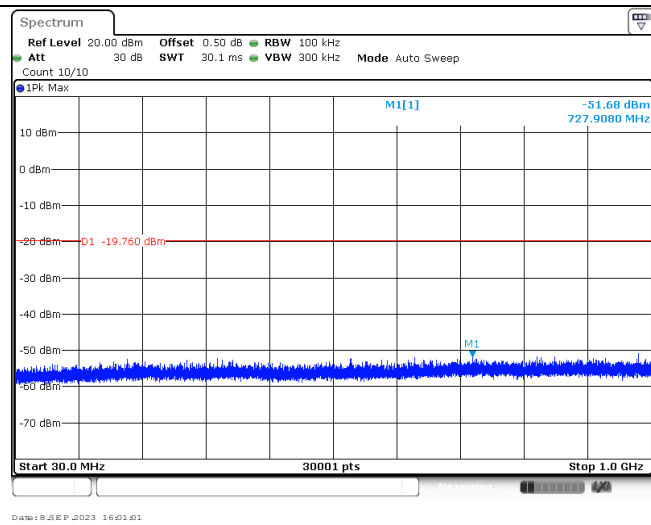
CH39 Reference level	
CH39 30MHz~1000MHz	
CH39 1GHz~26GHz	

Test Item:	SE	Test Rate:	2Mbps
CH00 Reference level	Spectrum Ref Level 20.50 dBm Att 30 dB Count 100/100 Offset 0.50 dB SWT 75.9 μs RBW 100 kHz VBW 300 kHz Mode Auto FFT 1Pk Max M1[1] 1.15 dBm 2.4020430 GHz 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm CF 2.402 GHz 691 pts Span 30.0 MHz Date: 8 SEP 2023 15:59:07		
CH00 30MHz~1000MHz	Spectrum Ref Level 20.00 dBm Att 30 dB Count 10/10 Offset 0.50 dB SWT 30.1 ms RBW 100 kHz VBW 300 kHz Mode Auto Sweep 1Pk Max M1[1] -51.22 dBm 697.7420 MHz 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm Start 30.0 MHz 30001 pts Stop 1.0 GHz Date: 8 SEP 2023 15:59:22		
CH00 1GHz~26GHz	Spectrum Ref Level 20.00 dBm Att 30 dB Count 10/10 Offset 0.50 dB SWT 250 ms RBW 100 kHz VBW 300 kHz Mode Auto Sweep 1Pk Max M1[1] -43.34 dBm 15.870833 GHz 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm Start 1.0 GHz 30001 pts Stop 26.0 GHz Date: 8 SEP 2023 15:59:27		

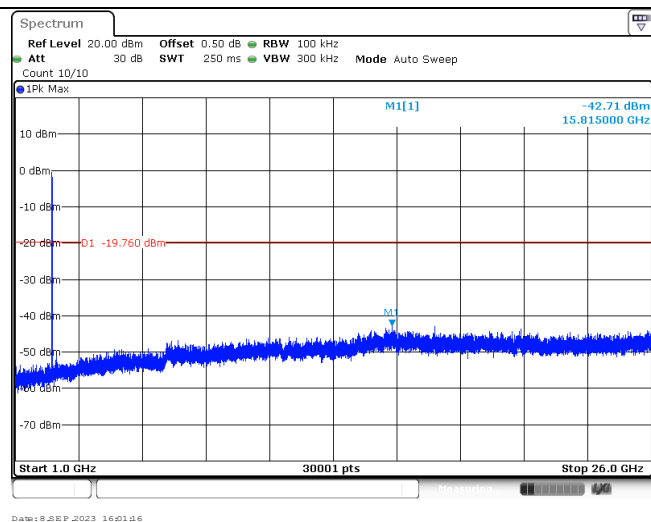
CH19
Reference level

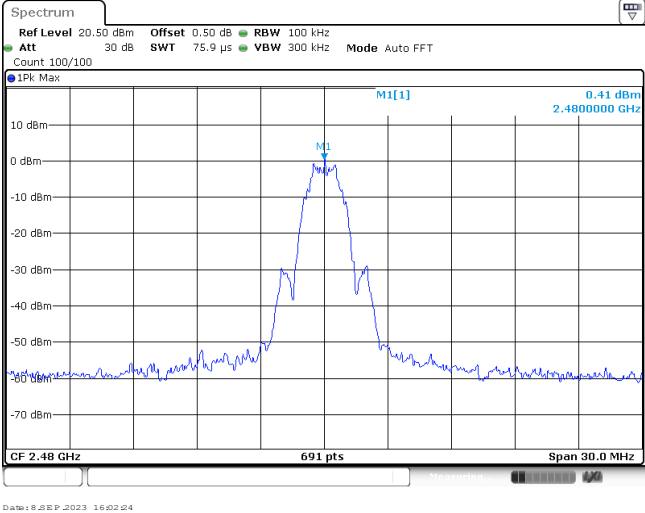
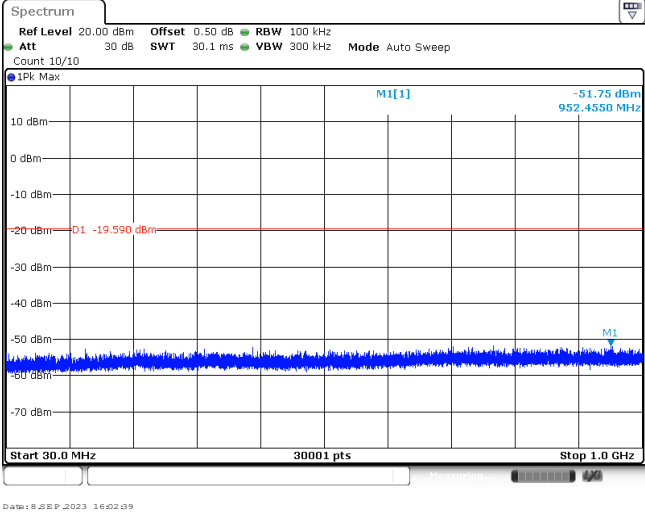
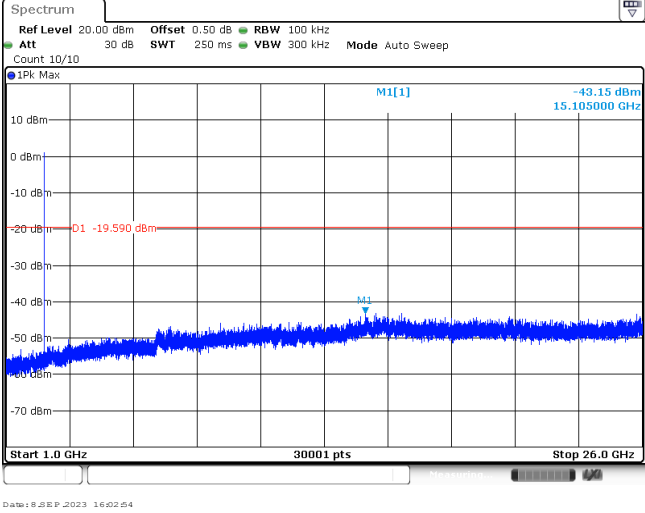


CH19
30MHz~1000MHz



CH19
1GHz~26GHz



CH39 Reference level	
CH39 30MHz~1000MHz	
CH39 1GHz~26GHz	

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