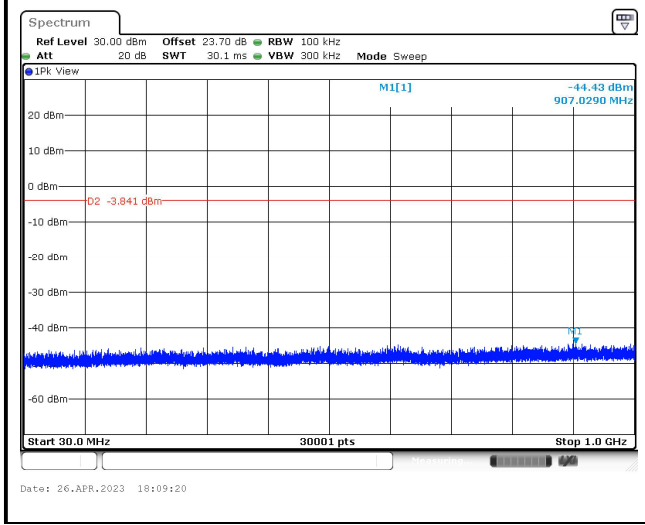
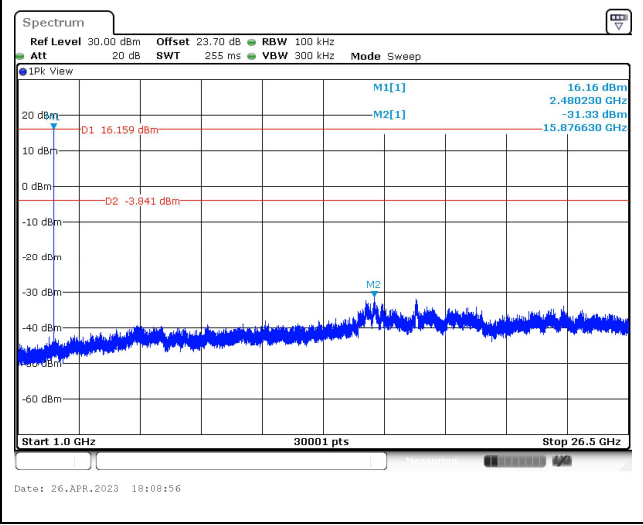




CSE Plot on Ch 78 between 30MHz ~ 1 GHz



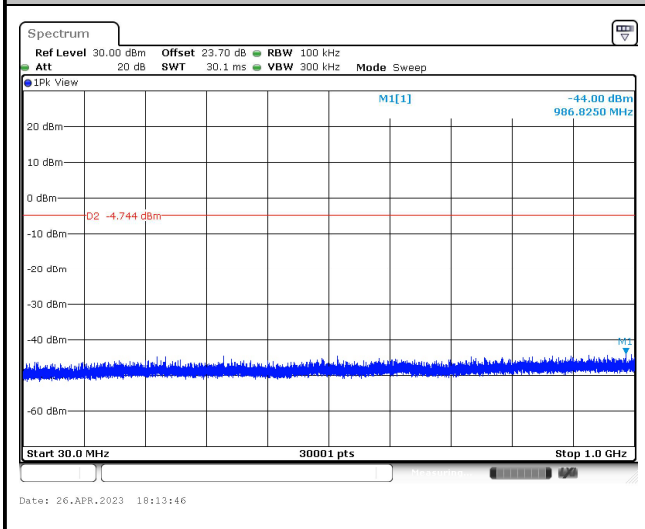
CSE Plot on Ch 78 between 1 GHz ~ 26.5 GHz



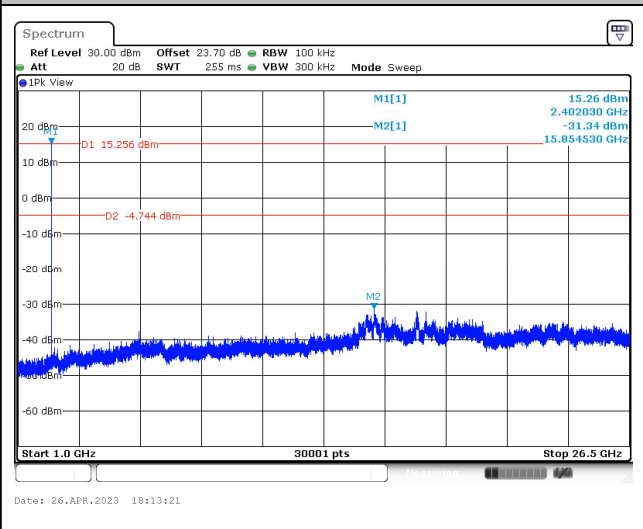


<2Mbps>

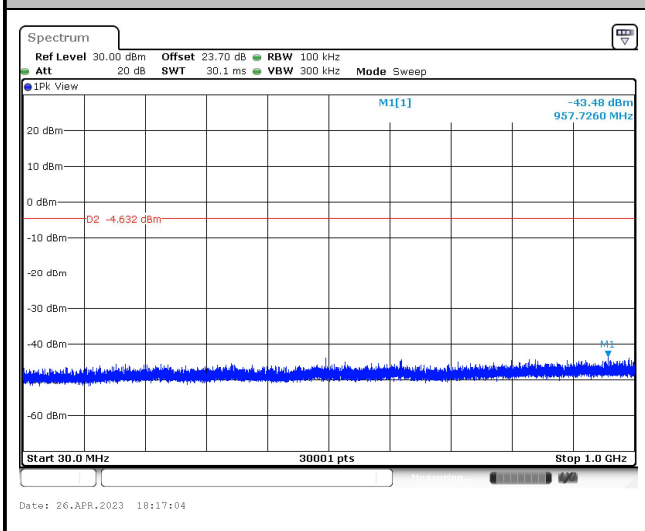
CSE Plot on Ch 00 between 30MHz ~ 1 GHz



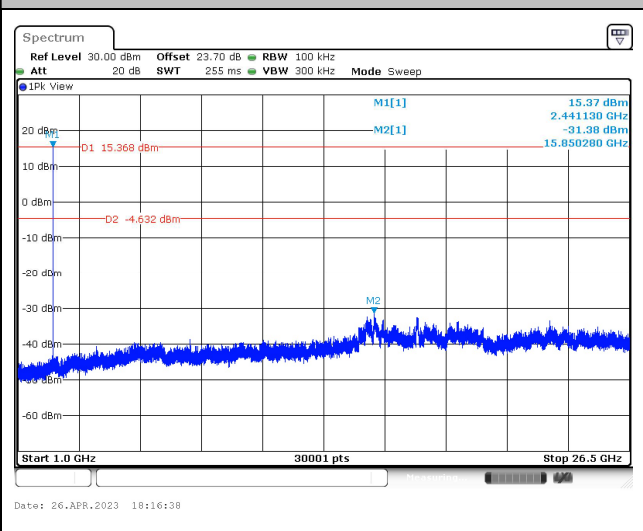
CSE Plot on Ch 00 between 1 GHz ~ 26.5 GHz



CSE Plot on Ch 39 between 30MHz ~ 1 GHz

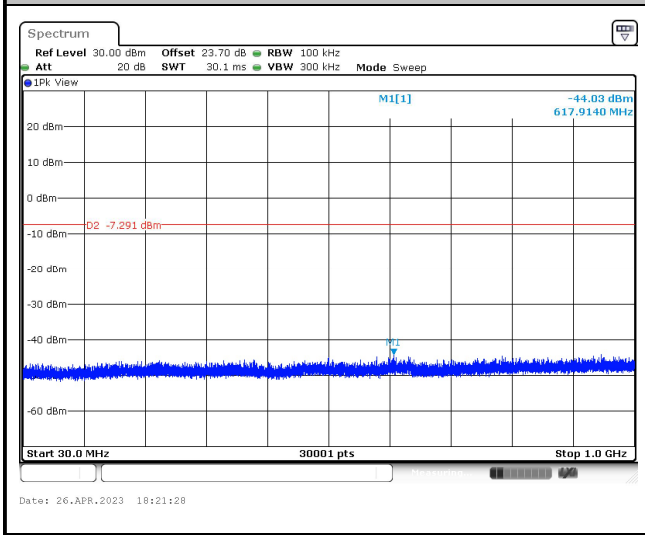


CSE Plot on Ch 39 between 1 GHz ~ 26.5 GHz

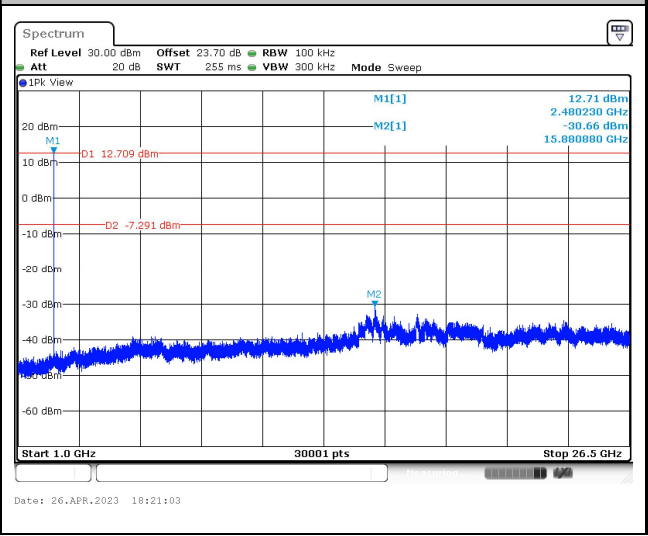




CSE Plot on Ch 78 between 30MHz ~ 1 GHz



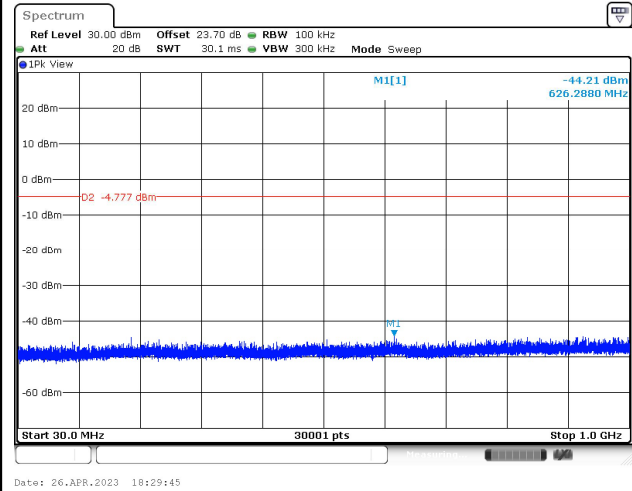
CSE Plot on Ch 78 between 1 GHz ~ 26.5 GHz



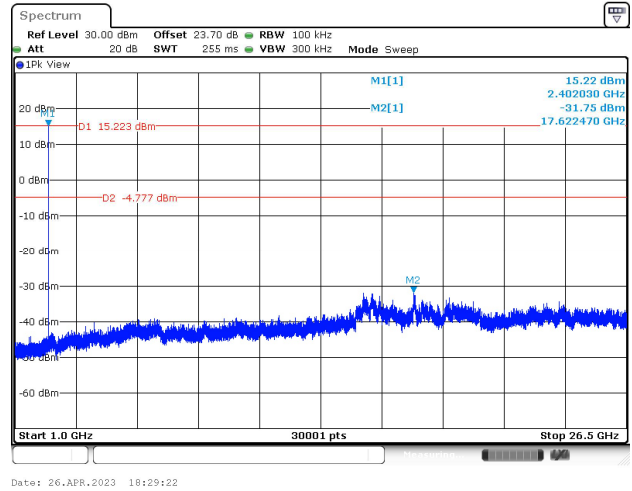


<3Mbps>

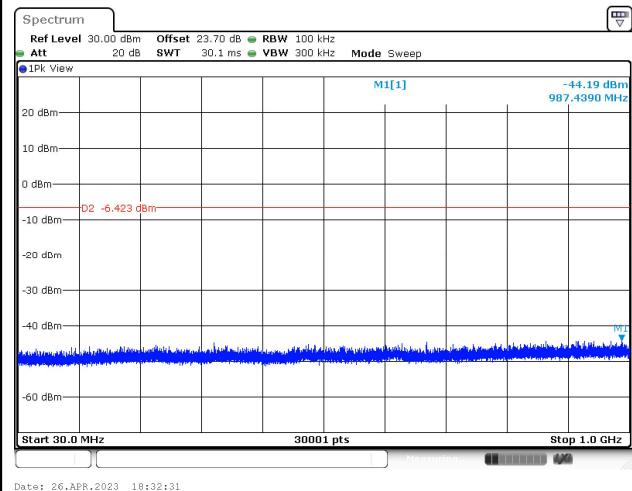
CSE Plot on Ch 00 between 30MHz ~ 1 GHz



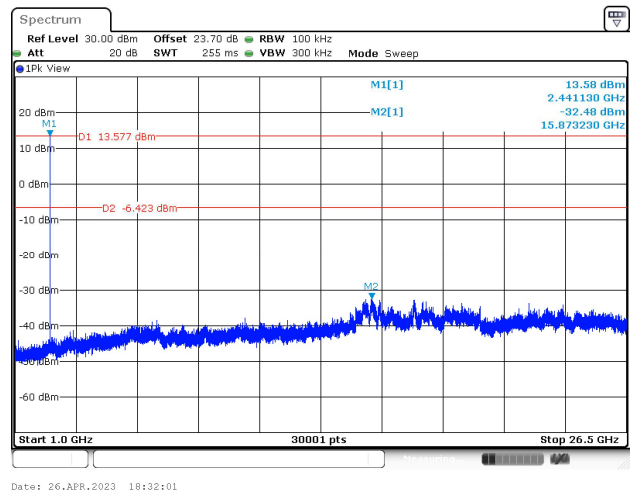
CSE Plot on Ch 00 between 1 GHz ~ 26.5 GHz



CSE Plot on Ch 39 between 30MHz ~ 1 GHz

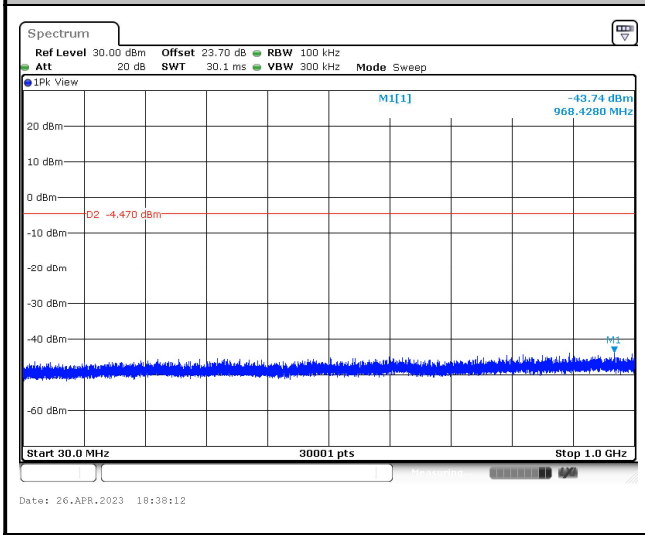


CSE Plot on Ch 39 between 1 GHz ~ 26.5 GHz

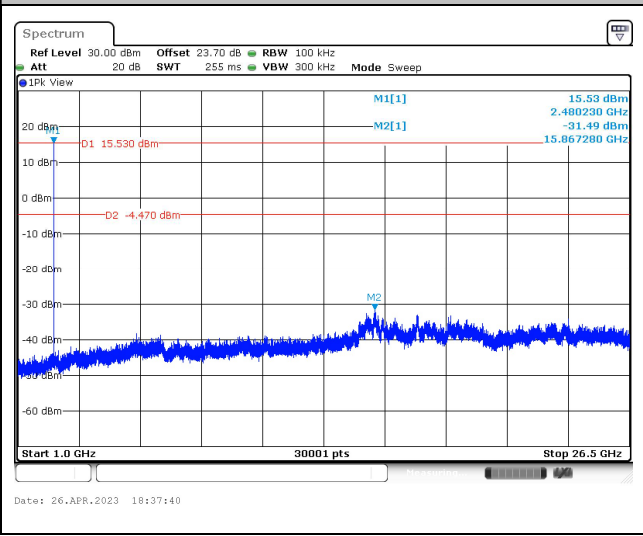




CSE Plot on Ch 78 between 30MHz ~ 1 GHz



CSE Plot on Ch 78 between 1 GHz ~ 26.5 GHz





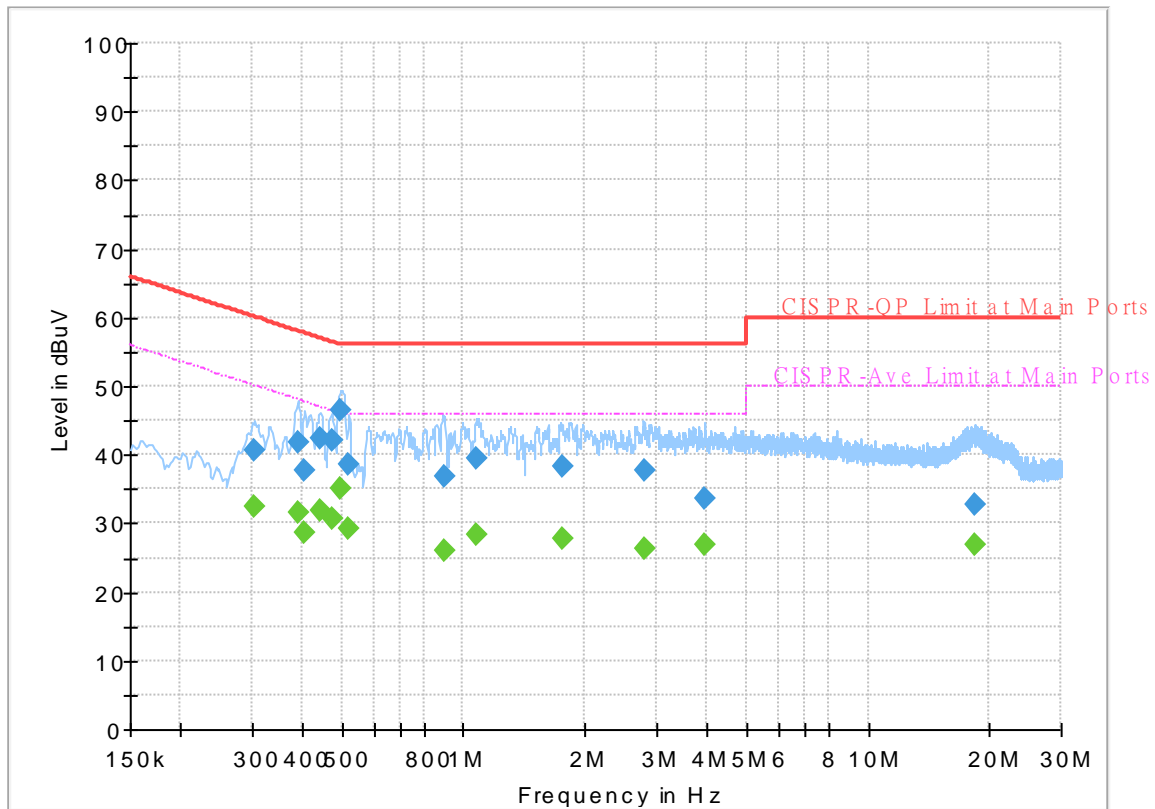
Appendix B. AC Conducted Emission Test Results

Test Engineer :	Calvin Wang	Temperature :	23~26°C
		Relative Humidity :	45~55%

EUT Information

Report NO : 322209
 Test Mode : Mode 1
 Test Voltage : 120Vac/60Hz
 Phase : Line

Full Spectrum



Final_Result

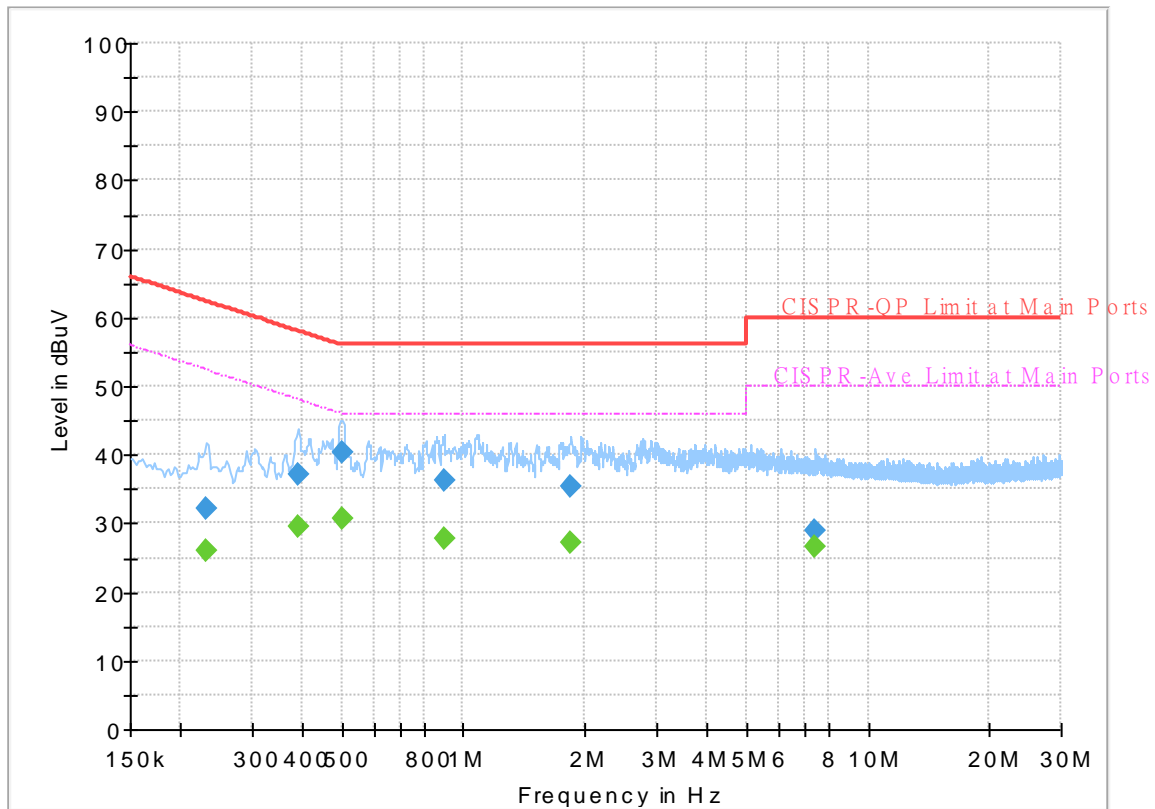
Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.305250	---	32.35	50.10	17.75	L1	OFF	19.9
0.305250	40.59	---	60.10	19.51	L1	OFF	19.9
0.388500	---	31.72	48.10	16.38	L1	OFF	19.9
0.388500	41.75	---	58.10	16.35	L1	OFF	19.9
0.406500	---	28.51	47.72	19.21	L1	OFF	19.9
0.406500	37.70	---	57.72	20.02	L1	OFF	19.9
0.442500	---	32.02	47.02	15.00	L1	OFF	19.9
0.442500	42.47	---	57.02	14.55	L1	OFF	19.9
0.474000	---	30.83	46.44	15.61	L1	OFF	19.9
0.474000	42.01	---	56.44	14.43	L1	OFF	19.9
0.498750	---	35.20	46.02	10.82	L1	OFF	19.9
0.498750	46.45	---	56.02	9.57	L1	OFF	19.9
0.521250	---	29.23	46.00	16.77	L1	OFF	19.9
0.521250	38.73	---	56.00	17.27	L1	OFF	19.9
0.897000	---	25.94	46.00	20.06	L1	OFF	19.9
0.897000	36.86	---	56.00	19.14	L1	OFF	19.9
1.079250	---	28.46	46.00	17.54	L1	OFF	19.9
1.079250	39.55	---	56.00	16.45	L1	OFF	19.9
1.749750	---	27.77	46.00	18.23	L1	OFF	19.9
1.749750	38.22	---	56.00	17.78	L1	OFF	19.9
2.789250	---	26.21	46.00	19.79	L1	OFF	19.9

2.789250	37.86	---	56.00	18.14	L1	OFF	19.9
3.930000	---	26.97	46.00	19.03	L1	OFF	20.0
3.930000	33.61	---	56.00	22.39	L1	OFF	20.0
18.397500	---	27.03	50.00	22.97	L1	OFF	20.5
18.397500	32.83	---	60.00	27.17	L1	OFF	20.5

EUT Information

Report NO : 322209
 Test Mode : Mode 1
 Test Voltage : 120Vac/60Hz
 Phase : Neutral

Full Spectrum



Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.231000	---	26.11	52.41	26.30	N	OFF	19.9
0.231000	32.28	---	62.41	30.13	N	OFF	19.9
0.388500	---	29.67	48.10	18.43	N	OFF	19.9
0.388500	37.01	---	58.10	21.09	N	OFF	19.9
0.503250	---	30.76	46.00	15.24	N	OFF	19.9
0.503250	40.30	---	56.00	15.70	N	OFF	19.9
0.894750	---	27.82	46.00	18.18	N	OFF	19.9
0.894750	36.24	---	56.00	19.76	N	OFF	19.9
1.844250	---	27.33	46.00	18.67	N	OFF	19.9
1.844250	35.28	---	56.00	20.72	N	OFF	19.9
7.426500	---	26.54	50.00	23.46	N	OFF	20.1
7.426500	28.89	---	60.00	31.11	N	OFF	20.1



Appendix C. Radiated Spurious Emission

Test Engineer :	Leo Li	Temperature :	18.3~24.5°C
		Relative Humidity :	42.3~68.5%

2.4GHz 2400~2483.5MHz

BT (Band Edge @ 3m)

BT	Note	Frequency	Level	Margin	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.	
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)	
BT CH00 2402MHz		2338.035	41.99	-32.01	74	38.06	27.1	8.62	31.79	104	53	P	H	
		2338.035	17.2	-36.8	54	-	-	-	-	-	-	A	H	
	*	2402	100.71	-	-	96.7	27.1	8.74	31.83	104	53	P	H	
	*	2402	75.92	-	-	-	-	-	-	-	-	A	H	
													H	
														H
			2376.57	42.11	-31.89	74	38.13	27.1	8.69	31.81	301	206	P	V
			2376.57	17.32	-36.68	54	-	-	-	-	-	-	A	V
	*		2402	102.59	-	-	98.58	27.1	8.74	31.83	301	206	P	V
	*		2402	77.8	-	-	-	-	-	-	-	-	A	V
														V
														V
BT CH 39 2441MHz		2360.26	42.04	-31.96	74	38.08	27.1	8.66	31.8	227	19	P	H	
		2360.26	17.25	-36.75	54	-	-	-	-	-	-	A	H	
	*	2441	102.84	-	-	98.87	27.02	8.81	31.86	227	19	P	H	
	*	2441	78.05	-	-	-	-	-	-	-	-	A	H	
			2488.1	42.36	-31.64	74	38.51	26.85	8.89	31.89	227	19	P	H
			2488.1	17.57	-36.43	54	-	-	-	-	-	-	A	H
			2368.66	42	-32	74	38.03	27.1	8.68	31.81	229	185	P	V
			2368.66	17.21	-36.79	54	-	-	-	-	-	-	A	V
	*		2441	104.93	-	-	100.96	27.02	8.81	31.86	229	185	P	V
	*		2441	80.14	-	-	-	-	-	-	-	-	A	V
			2483.9	42.73	-31.27	74	38.87	26.86	8.89	31.89	229	185	P	V
			2483.9	17.94	-36.06	54	-	-	-	-	-	-	A	V



BT CH 78 2480MHz	*	2480	104.22	-	-	100.35	26.88	8.88	31.89	221	23	P	H	
	*	2480	79.43	-	-	-	-	-	-	-	-	A	H	
		2483.88	43.66	-30.34	74	39.8	26.86	8.89	31.89	221	23	P	H	
		2483.88	18.87	-35.13	54	-	-	-	-	-	-	A	H	
													H	
													H	
	*	2480	105.01	-	-	101.14	26.88	8.88	31.89	200	94	P	V	
	*	2480	80.22	-	-	-	-	-	-	-	-	-	A	V
		2483.6	44.34	-29.66	74	40.47	26.87	8.89	31.89	200	94	P	V	
		2483.6	19.55	-34.45	54	-	-	-	-	-	-	A	V	
													V	
													V	
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.													



2.4GHz 2400~2483.5MHz
BT (Harmonic @ 3m)

BT	Note	Frequency (MHz)	Level (dBμV/m)	Margin (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
BT CH 00 2402MHz		4804	50.7	-23.3	74	38.18	32.61	12.95	33.04	100	336	P	H
		4804	25.91	-28.09	54	-	-	-	-	-	-	A	H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
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													H
													H
													H
													H
			4804	46.2	-27.8	74	33.68	32.61	12.95	33.04	-	-	P
		4804	21.41	-32.59	54	-	-	-	-	-	-	A	V
													V
													V
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													V
													V
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													V
													V



BT	Note	Frequency (MHz)	Level (dBμV/m)	Margin (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
		4882	51.33	-22.67	74	38.58	32.76	13.02	33.03	201	334	P	H
		4882	26.54	-27.46	54	-	-	-	-	201	334	A	H
		7323	49.06	-24.94	74	31.32	37.45	15.9	35.61	100	351	P	H
		7323	24.27	-29.73	54	-	-	-	-	100	351	A	H
													H
													H
													H
													H
													H
													H
													H
BT													H
CH 39													H
2441MHz		4882	46.7	-27.3	74	33.95	32.76	13.02	33.03	-	-	P	V
		4882	21.91	-32.09	54	-	-	-	-	-	-	A	V
		7323	48.99	-25.01	74	31.25	37.45	15.9	35.61	100	254	P	V
		7323	24.2	-29.8	54	-	-	-	-	100	254	A	V
													V
													V
													V
													V
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													V
													V
													V
													V
													V



BT	Note	Frequency (MHz)	Level (dBµV/m)	Margin (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)	
BT CH 78 2480MHz		4960	50	-24	74	37.12	32.78	13.11	33.01	156	326	P	H	
		4960	25.21	-28.79	54	-	-	-	-	-	-	A	H	
		7440	50.07	-23.93	74	32.63	37.12	16.04	35.72	100	348	P	H	
		7440	25.28	-28.72	54	-	-	-	-	-	-	A	H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
			4960	48.03	-25.97	74	35.15	32.78	13.11	33.01	400	283	P	V
			4960	23.24	-30.76	54	-	-	-	-	-	-	A	V
			7440	48.48	-25.52	74	31.04	37.12	16.04	35.72	100	259	P	V
			7440	23.69	-30.31	54	-	-	-	-	-	-	A	V
														V
														V
														V
														V
														V
													V	
													V	
Remark	<ol style="list-style-type: none"> No other spurious found. All results are PASS against Peak and Average limit line. The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only. 													



Emission below 1GHz

2.4GHz BT (LF)

BT	Note	Frequency	Level	Margin	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.	
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)	
2.4GHz BT LF		31.94	22.78	-17.22	40	30.49	24.02	1.02	32.75	-	-	P	H	
		134.76	22.59	-20.91	43.5	35.69	17.42	2.16	32.68	-	-	P	H	
		247.28	29.76	-16.24	46	41.36	18.17	2.97	32.74	-	-	P	H	
		342.34	25.89	-20.11	46	35.16	20.09	3.45	32.81	-	-	P	H	
		795.33	32.35	-13.65	46	31.68	28.19	5.15	32.67	-	-	P	H	
		949.56	35.7	-10.3	46	30.45	31.07	5.69	31.51	-	-	P	H	
														H
														H
														H
														H
														H
														H
			30.97	26.36	-13.64	40	33.68	24.42	1.01	32.75	-	-	P	V
			179.38	19.46	-24.04	43.5	34.61	14.9	2.64	32.69	-	-	P	V
			265.71	22.23	-23.77	46	32.07	19.84	3.07	32.75	-	-	P	V
			565.44	28.3	-17.7	46	30.64	26.28	4.39	33.01	-	-	P	V
			759.44	32.94	-13.06	46	32.39	28.29	5.03	32.77	-	-	P	V
			939.86	35.37	-10.63	46	30.75	30.59	5.65	31.62	-	-	P	V
														V
														V
													V	
													V	
													V	

Remark

- No other spurious found.
- All results are PASS against limit line.
- The emission position marked as "-" means no suspected emission found and emission level has at least 6dB margin against limit or emission is noise floor only.



Note symbol

*	Fundamental Frequency which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
!	Test result is Margin line.
P/A	Peak or Average
H/V	Horizontal or Vertical



A calculation example for radiated spurious emission is shown as below:

BT	Note	Frequency	Level	Margin	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BT CH 00 2402MHz		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H

1. Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Attenuator loss(dB)
2. Level(dBμV/m) =
Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
3. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)
= Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
= 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)
= 55.45 (dBμV/m)
2. Over Limit(dB)
= Level(dBμV/m) – Limit Line(dBμV/m)
= 55.45(dBμV/m) – 74(dBμV/m)
= -18.55(dB)

Peak measured complies with the limit line, so test result is “PASS”.



Appendix D. Radiated Spurious Emission Plots

Test Engineer :	Leo Li	Temperature :	18.3~24.5°C
		Relative Humidity :	42.3~68.5%

2.4GHz 2400~2483.5MHz

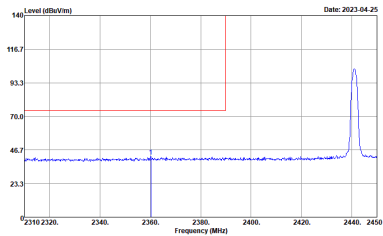
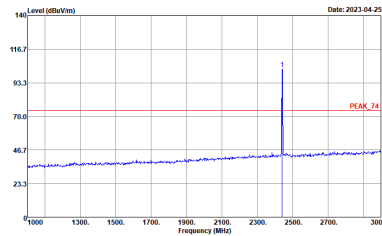
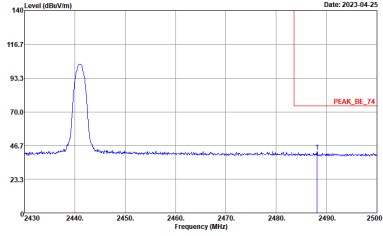
BT (Band Edge @ 3m)

BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BT CH00 2402MHz	
	Horizontal	Fundamental
Peak	<p>Site : 03CH23-HY Condition : PEAK_BE_74 3m LEZ05A18EN_230705 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>	<p>Site : 03CH23-HY Condition : PEAK_74 3m LEZ05A18EN_230705 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto</p>

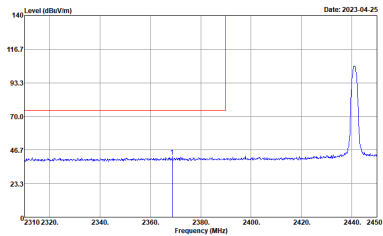
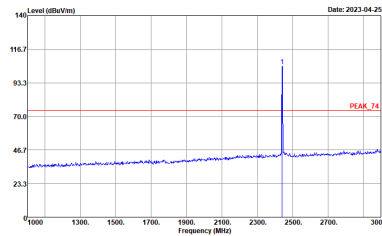
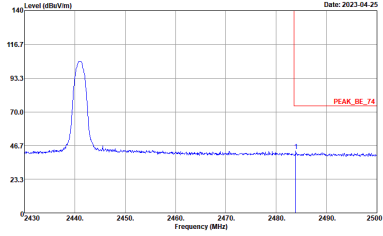


BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH00 2402MHz	
4	Vertical	Fundamental
Peak	<p>Site : 03CH23-HY Condition : PEAK_74 3m LE2205A18ENL_230705 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	<p>Site : 03CH23-HY Condition : PEAK_74 3m LE2205A18ENL_230705 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>

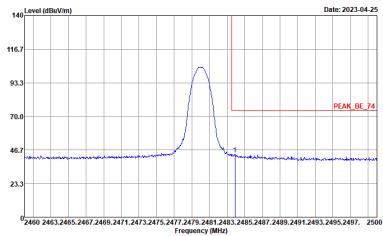
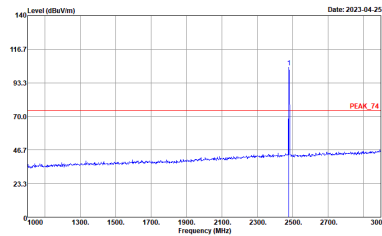


BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BT CH39 2441MHz	
	Horizontal	Fundamental
Peak	 <p>Date: 2023-04-25</p> <p>Site : 03CH23-HY Condition : PEAK_BE_74 3m LE2C05A18ENL_230705 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Date: 2023-04-25</p> <p>Site : 03CH23-HY Condition : PEAK_74 3m LE2C05A18ENL_230705 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Peak	 <p>Date: 2023-04-25</p> <p>Site : 03CH23-HY Condition : PEAK_BE_74 3m LE2C05A18ENL_230705 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	Left blank

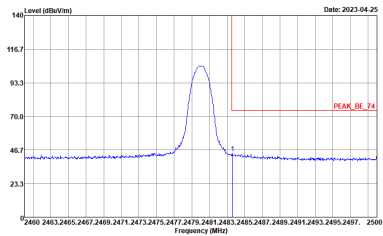
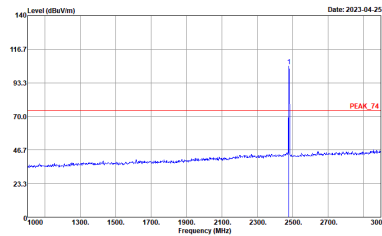


BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BT CH39 2441MHz	
	Vertical	Fundamental
Peak	 <p>Site : 03CH23-HY Condition : PEAK_BE_74 3m LE2C05A18ENL_230705 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Site : 03CH23-HY Condition : PEAK_74 3m LE2C05A18ENL_230705 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Peak	 <p>Site : 03CH23-HY Condition : PEAK_BE_74 3m LE2C05A18ENL_230705 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	Left blank



BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BT CH78 2480MHz	
	Horizontal	Fundamental
Peak	 <p>Site : 03CH23-HY Condition : PEAK_BC_74 3m LE2205A18ENL_230705 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Site : 03CH23-HY Condition : PEAK_74 3m LE2205A18ENL_230705 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>



BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BT CH78 2480MHz	
	Vertical	Fundamental
Peak	 <p>Site : 03CH23-HY Condition : PEAK_BC_74 3m LE2205A18ENL_230705 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Site : 03CH23-HY Condition : PEAK_74 3m LE2205A18ENL_230705 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>



2.4GHz 2400~2483.5MHz

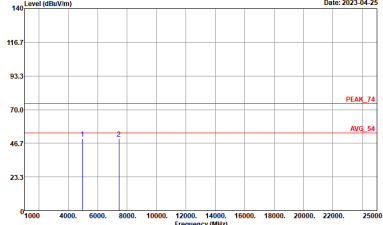
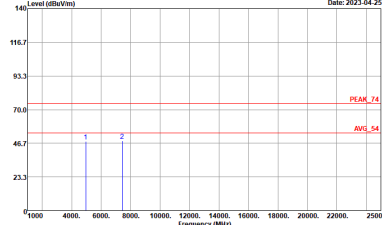
BT (Harmonic @ 3m)

BT	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BT CH00 2402MHz	
	Horizontal	Vertical
Peak Avg.	<p>Site : 03CH23-HY Condition : PEAK_74 3m LEZC05A1BEN_230705 HORIZONTAL</p>	<p>Site : 03CH23-HY Condition : PEAK_74 3m LEZC05A1BEN_230705 VERTICAL</p>



BT	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BT CH39 2441MHz	
4	Horizontal	Vertical
<p>Peak Avg.</p>	<p>Site : 03CH23-HY Condition : PEAK_74 3m LE2C05A18EN_230705 HORIZONTAL</p>	<p>Site : 03CH23-HY Condition : PEAK_74 3m LE2C05A18EN_230705 VERTICAL</p>

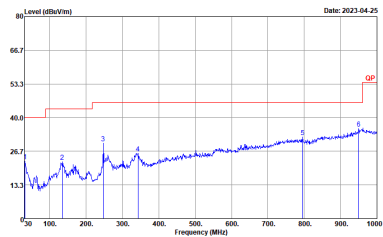
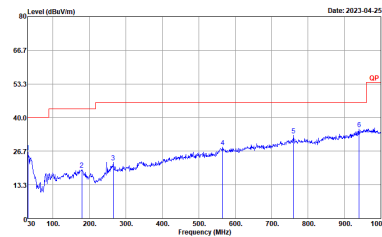


BT	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BT CH78 2480MHz	
4	Horizontal	Vertical
<p>Peak</p> <p>Avg.</p>	 <p>Site : 03CH23-HY Condition : PEAK_74 3m LE2C05A1BEN_230705 HORIZONTAL</p>	 <p>Site : 03CH23-HY Condition : PEAK_74 3m LE2C05A1BEN_230705 VERTICAL</p>

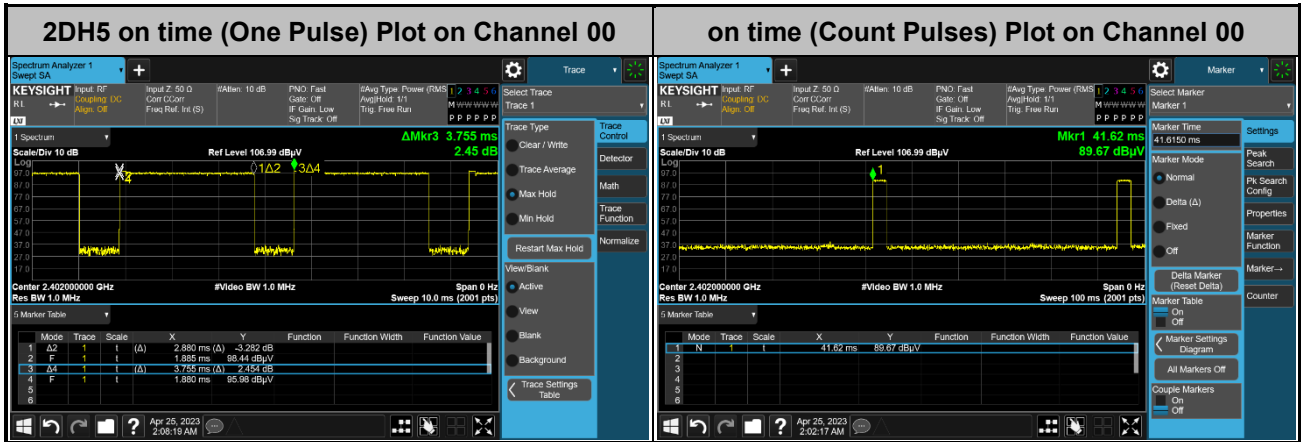


Emission below 1GHz

2.4GHz BT (LF)

BT	2.4GHz 2400~2483.5MHz	
	BT LF	
	Horizontal	Vertical
QP / Peak	 <p>Site : 03CH23-HY Condition : QP 3m B1LOG_62028_231010 HORIZONTAL</p>	 <p>Site : 03CH23-HY Condition : QP 3m B1LOG_62028_231010 VERTICAL</p>

Appendix E. Duty Cycle Plots



Note:

1. Worst case Duty cycle = on time/100 milliseconds = 2 * 2.88 / 100 = 5.76 %
2. Worst case Duty cycle correction factor = 20*log(Duty cycle) = -24.79 dB
3. 2DH5 has the highest duty cycle worst case and is reported.

Duty Cycle Correction Factor Consideration for AFH mode:

Bluetooth normal hopping rate is 1600Hz and reduced to 800Hz in AFH mode; due to the reduced number of hopping frequencies, with the same packet configuration the dwell time in each channel frequency within 100msec period is longer in AFH mode than normal mode.

In AFH mode, the minimum hopping frequencies are 20, to get the longest dwell time DH5 packet is observed; the on time period to have DH5 packet completing one hopping sequence is

$$2.88 \text{ ms} \times 20 \text{ channels} = 57.6 \text{ ms}$$

There cannot be 2 complete hopping sequences within 100ms period, considering the random hopping behavior, maximum 2 hops can be possibly observed within the period. [100 ms / 57.6 ms] = 2 hops

Thus, the maximum possible ON time:

$$2.88 \text{ ms} \times 2 = 5.76 \text{ ms}$$

Worst case Duty Cycle Correction factor, which is derived from the maximum possible ON time,

$$20 \times \log(5.76 \text{ ms}/100 \text{ ms}) = -24.79 \text{ dB}$$