



## Duty Cycle

### Test Result

TestMode	Antenna	Freq(MHz)	ON Time [ms]	Period [ms]	DC [%]	xFactor	Limit	Verdict
DH1	Ant1	2441	0.39	1.25	31.20	5.06	---	---
DH3	Ant1	2441	1.64	2.50	65.60	1.83	---	---
DH5	Ant1	2441	2.89	3.75	77.07	1.13	---	---
2DH1	Ant1	2441	0.39	1.25	31.20	5.06	---	---
2DH3	Ant1	2441	1.64	2.50	65.60	1.83	---	---
2DH5	Ant1	2441	2.89	3.76	76.86	1.14	---	---
3DH1	Ant1	2441	0.39	1.25	31.20	5.06	---	---
3DH3	Ant1	2441	1.64	2.50	65.60	1.83	---	---
3DH5	Ant1	2441	2.89	3.75	77.07	1.13	---	---

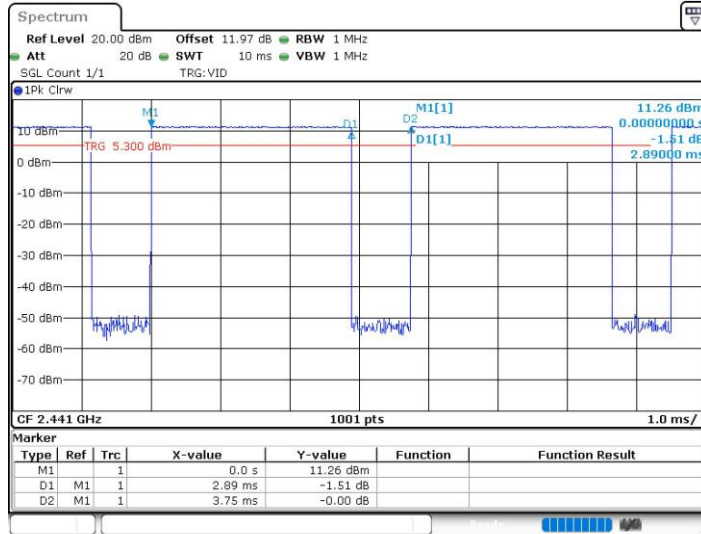


Test Graphs



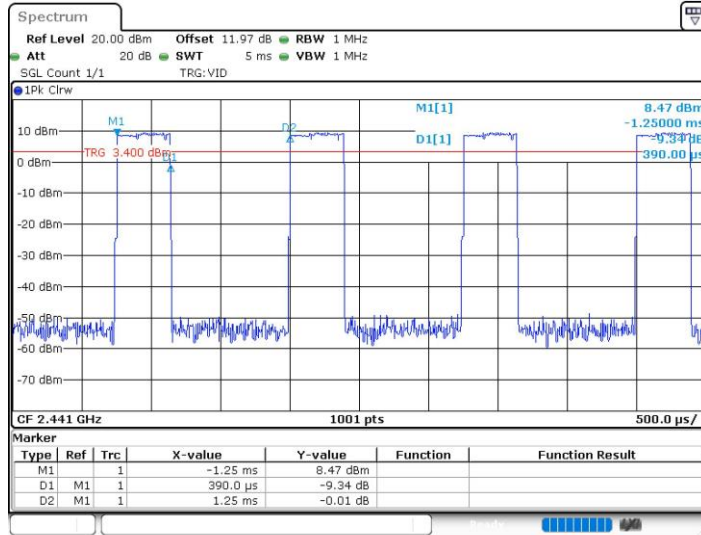


DH5\_Ant1\_2441



Date: 2.MAY.2022 15:43:12

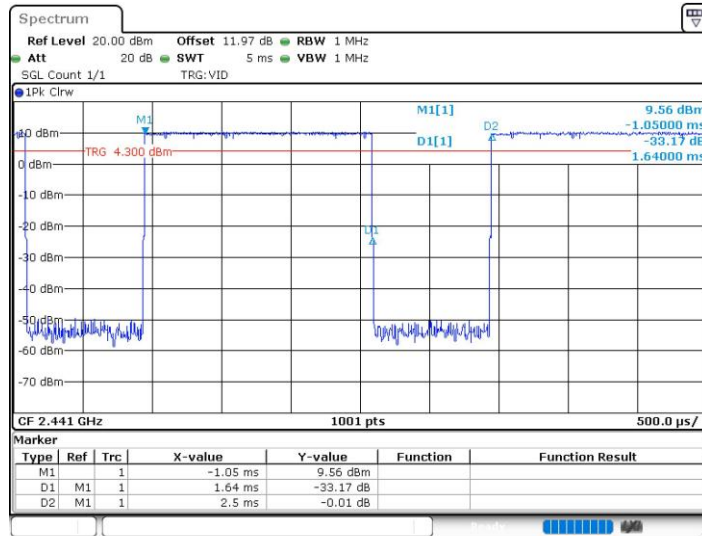
2DH1\_Ant1\_2441



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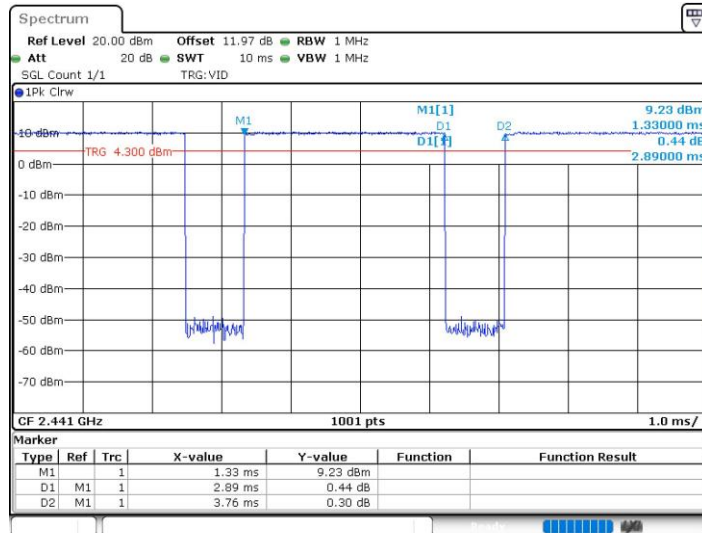


2DH3\_Ant1\_2441



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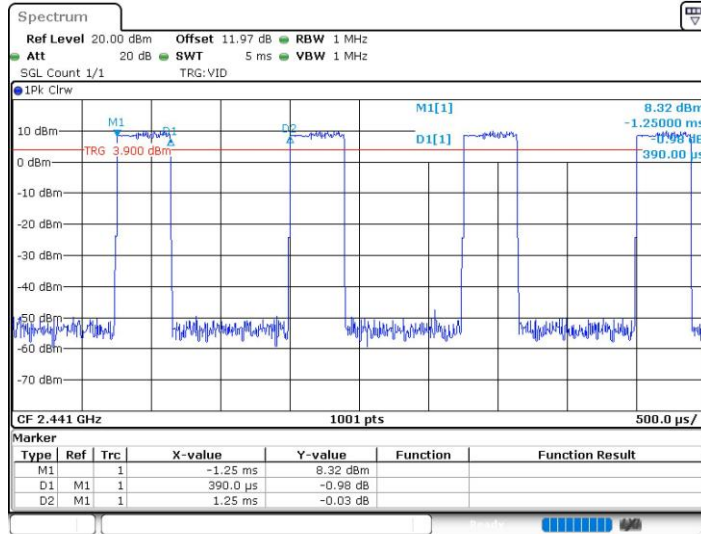
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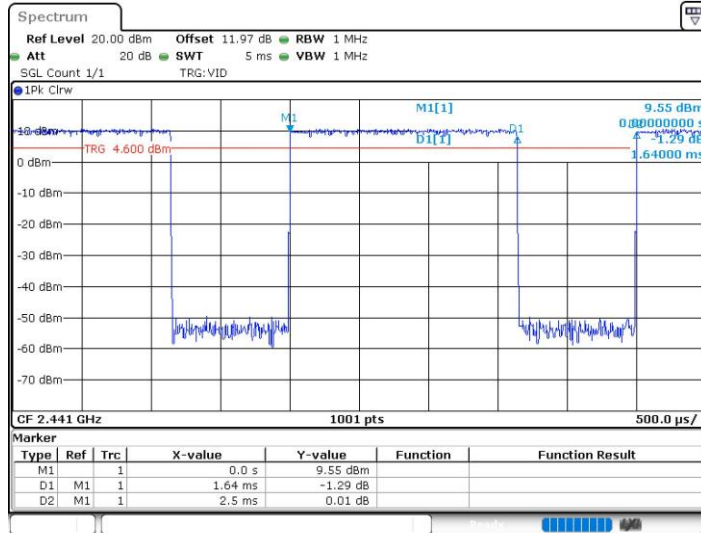


3DH1\_Ant1\_2441

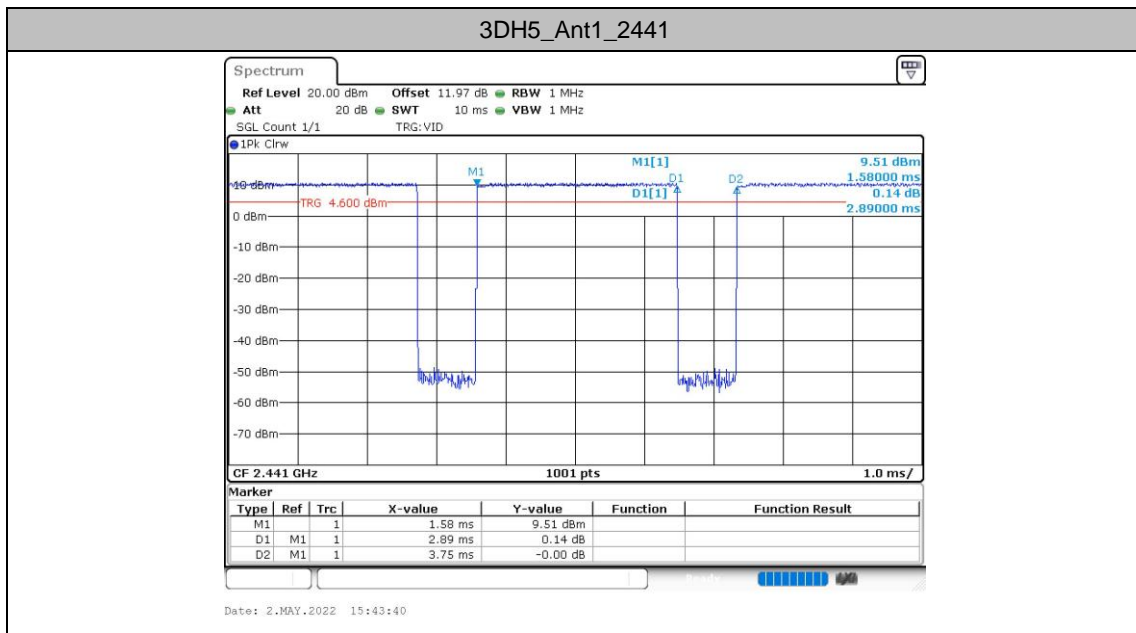


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3DH3\_Ant1\_2441



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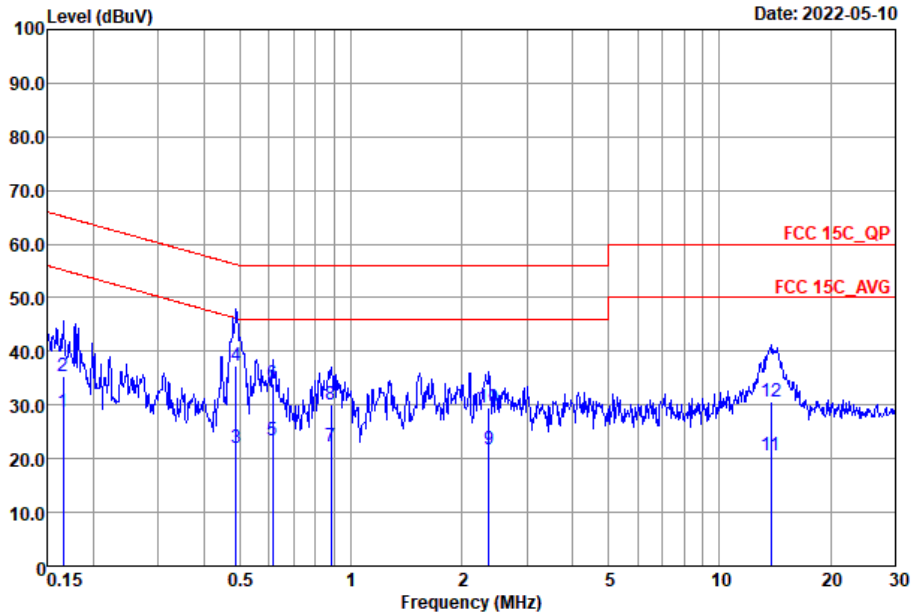






## Appendix B. AC Conducted Emission Test Results

Test Engineer :	ZhangXu	Temperature :	22~25°C
		Relative Humidity :	50~55%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		

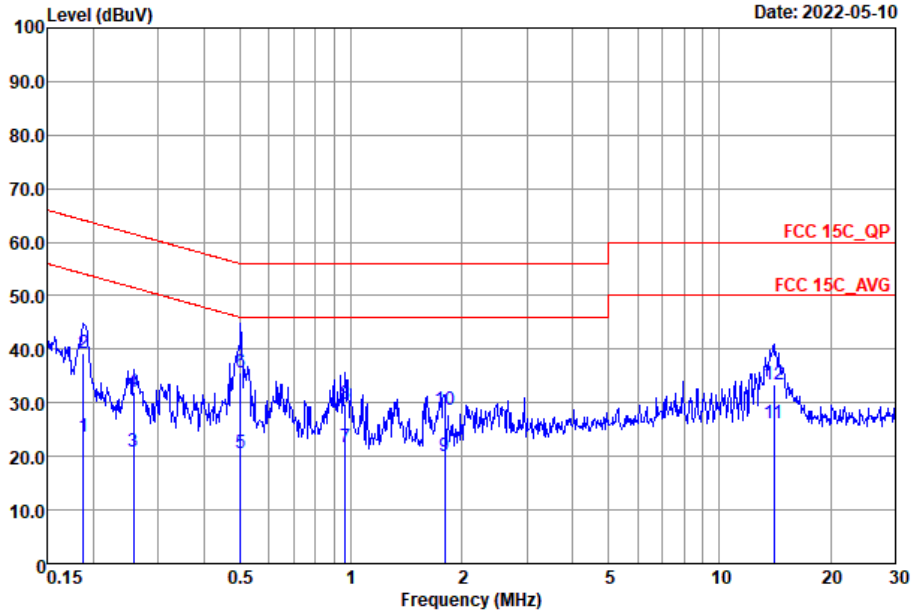


Site : CO02-SZ  
Condition : FCC 15C\_QP LISN\_2022\_L

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.17	28.74	-26.42	55.16	9.09	9.62	10.03	Average
2	0.17	35.44	-29.72	65.16	15.79	9.62	10.03	QP
3	0.49	21.89	-24.30	46.19	2.20	9.65	10.04	Average
4 *	0.49	37.39	-18.80	56.19	17.70	9.65	10.04	QP
5	0.61	23.30	-22.70	46.00	3.60	9.66	10.04	Average
6	0.61	34.00	-22.00	56.00	14.30	9.66	10.04	QP
7	0.88	22.28	-23.72	46.00	2.49	9.73	10.06	Average
8	0.88	29.98	-26.02	56.00	10.19	9.73	10.06	QP
9	2.37	21.64	-24.36	46.00	1.80	9.78	10.06	Average
10	2.37	29.44	-26.56	56.00	9.60	9.78	10.06	QP
11	13.77	20.70	-29.30	50.00	0.50	9.96	10.24	Average
12	13.77	30.70	-29.30	60.00	10.50	9.96	10.24	QP



Test Engineer :	ZhangXu	Temperature :	22~25°C
		Relative Humidity :	50~55%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



Site : CO02-SZ  
 Condition : FCC 15C\_QP LISN\_2022\_N  
 Project : 232517  
 Mode : Mode 1  
 IMEI : 869835050002343/869835050003143

	Freq	Level	Over	Limit	Read	LISN	Cable	Remark
	MHz	dBuV	Limit	Line	Level	Factor	Loss	
		dBuV	dB	dBuV	dBuV	dB	dB	
1	0.19	23.75	-30.36	54.11	4.11	9.62	10.02	Average
2	0.19	39.15	-24.96	64.11	19.51	9.62	10.02	QP
3	0.26	20.86	-30.65	51.51	1.20	9.64	10.02	Average
4	0.26	32.06	-29.45	61.51	12.40	9.64	10.02	QP
5	0.50	20.65	-25.35	46.00	1.00	9.61	10.04	Average
6 *	0.50	35.55	-20.45	56.00	15.90	9.61	10.04	QP
7	0.96	21.78	-24.22	46.00	2.10	9.62	10.06	Average
8	0.96	29.78	-26.22	56.00	10.10	9.62	10.06	QP
9	1.80	20.17	-25.83	46.00	0.50	9.62	10.05	Average
10	1.80	28.57	-27.43	56.00	8.90	9.62	10.05	QP
11	14.06	26.09	-23.91	50.00	6.00	9.85	10.24	Average
12	14.06	33.49	-26.51	60.00	13.40	9.85	10.24	QP

Note:

- Level(dBμV) = Read Level(dBμV) + LISN Factor(dB) + Cable Loss(dB)
- Over Limit(dB) = Level(dBμV) – Limit Line(dBμV)



## Appendix C. Radiated Spurious Emission

2.4GHz 2400~2483.5MHz

BT (Band Edge @ 3m)

BT	Note	Frequency	Level	Margin	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
		( MHz )	( dB $\mu$ V/m )	( dB )	( dB $\mu$ V/m )	( dB $\mu$ V )	( dB/m )	( dB )	( dB )	( cm )	( deg )	(P/A)	(H/V)
BT CH00 2402MHz		2371.215	46.46	-27.54	74	43.36	31.9	4.88	33.68	370	135	P	H
		2371.215	21.67	-32.33	54	-	-	-	-	370	135	A	H
		2402	106.32	-	-	103.16	31.91	4.91	33.66	370	135	P	H
	*	2402	81.53	-	-	-	-	-	-	370	135	A	H
		2385.495	46.99	-27.01	74	43.87	31.9	4.88	33.66	375	277	P	V
		2385.495	22.2	-31.8	54	-	-	-	-	375	277	A	V
		2402	106.25	-	-	103.09	31.91	4.91	33.66	375	277	P	V
	*	2402	81.46	-	-	-	-	-	-	375	277	A	V
BT CH 39 2441MHz		2348.22	46.48	-27.52	74	43.47	31.89	4.81	33.69	353	135	P	H
		2348.22	21.69	-32.31	54	-	-	-	-	353	135	A	H
		2441	107.38	-	-	103.9	32.15	4.96	33.63	353	135	P	H
	*	2441	82.59	-	-	-	-	-	-	353	135	A	H
		2499.44	47.01	-26.99	74	43.5	32.1	5.01	33.6	353	135	P	H
		2499.44	22.22	-31.78	54	-	-	-	-	353	135	A	H
		2346.4	46.92	-27.08	74	43.91	31.89	4.81	33.69	359	276	P	V
		2346.4	22.13	-31.87	54	-	-	-	-	359	276	A	V
		2441	107.55	-	-	104.07	32.15	4.96	33.63	359	276	P	V
	*	2441	82.76	-	-	-	-	-	-	359	276	A	V
		2489.57	47.43	-26.57	74	43.9	32.12	5.01	33.6	359	276	P	V
		2489.57	22.64	-31.36	54	-	-	-	-	359	276	A	V



<b>BT CH 78 2480MHz</b>		2480	107.12	-	-	103.61	32.14	4.99	33.62	395	131	P	H
	*	2480	82.33	-	-	-	-	-	-	395	131	A	H
		2483.56	64.06	-9.94	74	60.56	32.13	4.99	33.62	395	131	P	H
		2483.56	39.27	-14.73	54	-	-	-	-	395	131	A	H
		2480	106.39	-	-	102.88	32.14	4.99	33.62	307	263	P	V
	*	2480	81.6	-	-	-	-	-	-	307	263	A	V
		2483.52	63.91	-10.09	74	60.41	32.13	4.99	33.62	307	263	P	V
		2483.52	39.12	-14.88	54	-	-	-	-	307	263	A	V
<b>Remark</b>	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	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		4804	45.19	-28.81	74	57.14	33.89	7.09	52.93	-	-	P	H
		4804	20.4	-33.6	54	-	-	-	-	-	-	A	H
		4804	45.62	-28.38	74	57.57	33.89	7.09	52.93	-	-	P	V
		4804	20.83	-33.17	54	-	-	-	-	-	-	A	V
BT CH 39 2441MHz		4882	45.85	-28.15	74	57.7	33.8	7.19	52.84	-	-	P	H
		4882	21.06	-32.94	54	-	-	-	-	-	-	A	H
		7323	43.4	-30.6	74	53.08	35.63	8.8	54.11	-	-	P	H
		7323	18.61	-35.39	54	-	-	-	-	-	-	A	H
		4882	45.09	-28.91	74	56.94	33.8	7.19	52.84	-	-	P	V
		4882	20.3	-33.7	54	-	-	-	-	-	-	A	V
		7323	42.46	-31.54	74	52.14	35.63	8.8	54.11	-	-	P	V
		7323	17.67	-36.33	54	-	-	-	-	-	-	A	V
BT CH 78 2480MHz		4960	45.09	-28.91	74	56.79	33.82	7.22	52.74	-	-	P	H
		4960	20.3	-33.7	54	-	-	-	-	-	-	A	H
		7440	43.65	-30.35	74	53.06	35.68	8.95	54.04	-	-	P	H
		7440	18.86	-35.14	54	-	-	-	-	-	-	A	H
		4960	43.98	-30.02	74	55.68	33.82	7.22	52.74	-	-	P	V
		4960	19.19	-34.81	54	-	-	-	-	-	-	A	V
		7440	43.63	-30.37	74	53.04	35.68	8.95	54.04	-	-	P	V
		7440	18.84	-35.16	54	-	-	-	-	-	-	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

BT (LF @ 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 78 2480MHz		56.19	21.12	-18.88	40	39.88	13.1	0.64	32.5	-	-	P	H
		137.67	18.04	-25.46	43.5	31.64	17.55	1.02	32.17	-	-	P	H
		249.22	30.93	-15.07	46	43.55	18.35	1.13	32.1	-	-	P	H
		480.08	20.88	-25.12	46	27.36	23.04	1.92	31.44	-	-	P	H
		725.49	25.64	-20.36	46	29.8	25.23	2.31	31.7	-	-	P	H
		864.2	28.4	-17.6	46	31.33	26.46	2.47	31.86	-	-	P	H
		40.67	32.25	-7.75	40	47.66	18.94	0.66	35.01	-	-	P	V
		132.82	23.5	-20	43.5	39.76	17.67	1.2	35.13	-	-	P	V
		229.82	24.2	-21.8	46	41.31	16.35	1.58	35.04	-	-	P	V
		249.22	26.99	-19.01	46	41.98	18.35	1.66	35	-	-	P	V
		495.6	23.91	-22.09	46	32.92	23.31	2.38	34.7	-	-	P	V
		691.54	27.43	-18.57	46	34.21	24.88	2.84	34.5	-	-	P	V

Co-location

BT\_TX\_CH78 + LTE B7 Link

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	44.4	-29.6	74	56.1	33.82	7.22	52.74	-	-	P	H
		5052	48.74	-25.26	74	60.21	33.9	7.32	52.69	-	-	P	H
		7440	44.14	-29.86	74	53.55	35.68	8.95	54.04	-	-	P	H
		7578	47.81	-26.19	74	57	35.7	9.06	53.95	-	-	P	H
		10104	47.74	-26.26	74	52.95	36.98	10.66	52.85	-	-	P	H
		4960	43.63	-30.37	74	55.33	33.82	7.22	52.74	-	-	P	V
		5052	55.82	-18.18	74	67.29	33.9	7.32	52.69	-	-	P	V
		7440	45.52	-28.48	74	54.93	35.68	8.95	54.04	-	-	P	V
		7578	50.83	-23.17	74	60.02	35.7	9.06	53.95	-	-	P	V
		10104	47.2	-26.8	74	52.41	36.98	10.66	52.85	-	-	P	V



**Note symbol**

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



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
		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	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. Margin (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. Margin (dB)  
= Level(dBμV/m) – Limit Line(dBμV/m)  
= 55.45(dBμV/m) – 74(dBμV/m)  
= -18.55(dB)

**For Average 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) + 42.6(dBμV) – 35.86 (dB)  
= 43.54 (dBμV/m)
2. Margin (dB)  
= Level(dBμV/m) – Limit Line(dBμV/m)  
= 43.54(dBμV/m) – 54(dBμV/m)  
= -10.46(dB)

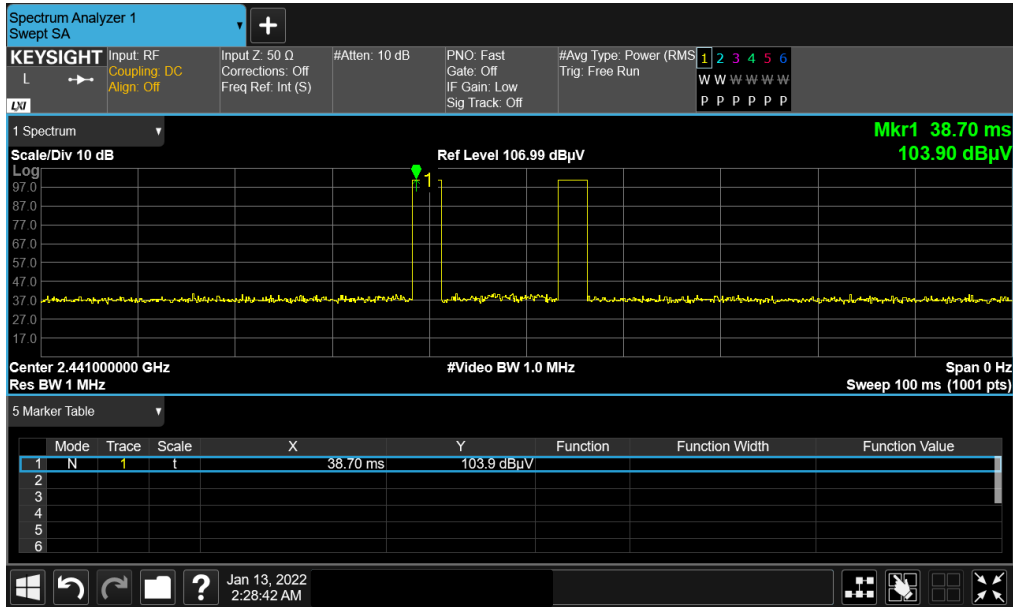
**Both peak and average measured complies with the limit line, so test result is “PASS”.**



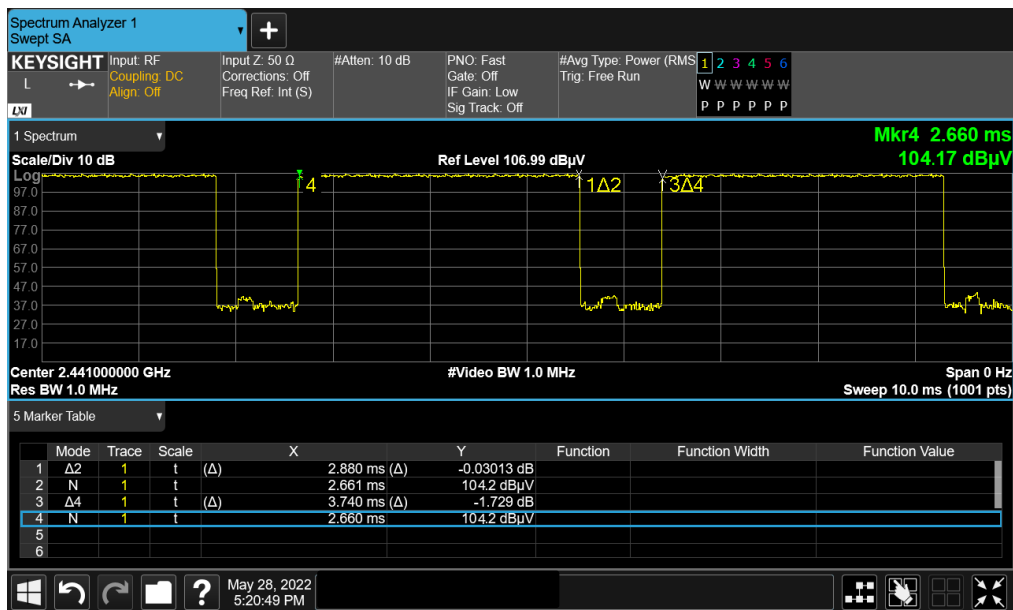


# Appendix D. Duty Cycle Plots

## DH5 on time (One Pulse) Plot on Channel 39



## DH5 on time (Count Pulses) Plot on Channel 39



### Note:

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