



For BLE 1Mbps Ant 2

2.4GHz 2400~2483.5MHz
BLE (Band Edge @ 3m)

BLE	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)
BLE CH 00 2402MHz	*	2346.12	45.45	-28.55	74	47.01	26.98	5.34	33.88	138	323	P	H
		2389.17	36.23	-17.77	54	37.7	27.02	5.37	33.86	138	323	A	H
	*	2402	95.32	-	-	96.76	27.02	5.37	33.83	138	323	P	H
		2402	94.78	-	-	96.22	27.02	5.37	33.83	138	323	A	H
	*	2350.74	46.42	-27.58	74	47.98	26.98	5.34	33.88	374	244	P	V
		2347.905	36.91	-17.09	54	38.47	26.98	5.34	33.88	374	244	A	V
	*	2402	93.87	-	-	95.31	27.02	5.37	33.83	374	244	P	V
		2402	93.33	-	-	94.77	27.02	5.37	33.83	374	244	A	V
BLE CH 19 2440MHz	*	2333.24	45.27	-28.73	74	46.9	26.96	5.31	33.9	141	322	P	H
		2384.48	36.4	-17.60	54	37.92	27	5.34	33.86	141	322	A	H
	*	2440	97.62	-	-	98.94	27.06	5.41	33.79	141	322	P	H
		2440	97.04	-	-	98.36	27.06	5.41	33.79	141	322	A	H
	*	2487.05	46.22	-27.78	74	47.39	27.09	5.46	33.72	141	322	P	H
		2494.47	36.84	-17.16	54	37.96	27.1	5.46	33.68	141	322	A	H
	*	2331.56	45.61	-28.39	74	47.24	26.96	5.31	33.9	368	244	P	V
		2345.84	36.91	-17.09	54	38.47	26.98	5.34	33.88	368	244	A	V
	*	2440	95.08	-	-	96.4	27.06	5.41	33.79	368	244	P	V
		2440	94.54	-	-	95.86	27.06	5.41	33.79	368	244	A	V
BLE CH 39 2480MHz	*	2480	99.56	-	-	100.73	27.09	5.46	33.72	341	100	P	H
		2480	99	-	-	100.17	27.09	5.46	33.72	341	100	A	H
	*	2490.96	46.64	-27.36	74	47.8	27.1	5.46	33.72	341	100	P	H
		2485.52	36.83	-17.17	54	38	27.09	5.46	33.72	341	100	A	H
	*	2480	95.89	-	-	97.06	27.09	5.46	33.72	400	233	P	V
		2480	95.34	-	-	96.51	27.09	5.46	33.72	400	233	A	V
	*	2499.76	46.33	-27.67	74	47.45	27.1	5.46	33.68	400	233	P	V
		2491.64	36.73	-17.27	54	37.89	27.1	5.46	33.72	400	233	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

BLE (Harmonic @ 3m)

BLE	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)
BLE CH 00 2402MHz	*	4804	42.05	-31.95	74	51.33	31.19	8.88	49.35	-	-	P	H
	*	4804	42.31	-31.69	74	51.59	31.19	8.88	49.35	-	-	P	V
BLE CH 19 2440MHz		4880	42.35	-31.65	74	51.18	31.41	8.76	49	-	-	P	H
	*	7320	45.54	-28.46	74	50.7	36.49	10.18	51.83	-	-	P	H
		4880	42.92	-31.08	74	51.75	31.41	8.76	49	-	-	P	V
	*	7320	45.25	-28.75	74	50.41	36.49	10.18	51.83	-	-	P	V
BLE CH 39 2480MHz		4960	43.17	-30.83	74	51.64	31.69	8.41	48.57	-	-	P	H
	*	7440	45.87	-28.13	74	50.94	36.71	10.17	51.95	-	-	P	H
		4960	43.66	-30.34	74	52.13	31.69	8.41	48.57	-	-	P	V
	*	7440	44.87	-29.13	74	49.94	36.71	10.17	51.95	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission below 1GHz

2.4GHz BLE (LF)

BLE	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)
2.4GHz BLE LF		30	24.08	-15.92	40	30.09	25.86	0.53	32.4	-	-	Peak	H
		159.01	19.06	-24.44	43.5	33.24	16.71	1.29	32.18	-	-	Peak	H
		276.38	31.96	-14.04	46	42.64	19.34	1.73	31.75	-	-	Peak	H
		370.47	26.7	-19.3	46	35.04	21.21	2.03	31.58	-	-	Peak	H
		724.52	30.08	-15.92	46	30.67	27.56	2.8	30.95	-	-	Peak	H
		940.83	32.67	-13.33	46	30.12	30.83	3.22	31.5	-	-	Peak	H
		30	24.9	-15.1	40	30.91	25.86	0.53	32.4	-	-	Peak	V
		54.25	25.62	-14.38	40	43.83	13.46	0.73	32.4	-	-	Peak	V
		159.01	19.89	-23.61	43.5	34.07	16.71	1.29	32.18	-	-	Peak	V
		281.23	26.18	-19.82	46	36.72	19.46	1.74	31.74	-	-	Peak	V
		770.11	30.54	-15.46	46	30.16	28.67	2.89	31.18	-	-	Peak	V
		951.5	32.61	-13.39	46	29.75	31.13	3.23	31.5	-	-	Peak	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												



For BLE 2Mbps Ant 1

2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 3m)

BLE	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)
BLE CH 00 2402MHz	*	2310.84	45.65	-28.35	74	47.32	26.95	5.31	33.93	295	293	P	H
		2359.665	37.86	-16.14	54	39.41	26.99	5.34	33.88	295	293	A	H
	*	2402	95.87	-	-	97.31	27.02	5.37	33.83	295	293	P	H
		2402	94.61	-	-	96.05	27.02	5.37	33.83	295	293	A	H
	*	2348.85	47.34	-26.66	74	48.9	26.98	5.34	33.88	374	273	P	V
		2347.38	40.56	-13.44	54	42.12	26.98	5.34	33.88	374	273	A	V
	*	2402	93.51	-	-	94.95	27.02	5.37	33.83	374	273	P	V
	2402	92.27	-	-	93.71	27.02	5.37	33.83	374	273	A	V	
BLE CH 19 2440MHz	*	2387.84	44.91	-29.09	74	46.38	27.02	5.37	33.86	111	292	P	H
		2349.2	37.42	-16.58	54	38.98	26.98	5.34	33.88	111	292	A	H
	*	2440	97.19	-	-	98.51	27.06	5.41	33.79	111	292	P	H
		2440	95.83	-	-	97.15	27.06	5.41	33.79	111	292	A	H
	*	2493.14	45.46	-28.54	74	46.58	27.1	5.46	33.68	111	292	P	H
		2490.2	38.08	-15.92	54	39.24	27.1	5.46	33.72	111	292	A	H
	*	2350.74	46.72	-27.28	74	48.28	26.98	5.34	33.88	368	277	P	V
		2347.52	39.89	-14.11	54	41.45	26.98	5.34	33.88	368	277	A	V
	*	2440	94.51	-	-	95.83	27.06	5.41	33.79	368	277	P	V
		2440	93.14	-	-	94.46	27.06	5.41	33.79	368	277	A	V
	*	2485.16	45.74	-28.26	74	46.91	27.09	5.46	33.72	368	277	P	V
	2483.83	38.65	-15.35	54	39.82	27.09	5.46	33.72	368	277	A	V	
BLE CH 39 2480MHz	*	2480	95.95	-	-	97.12	27.09	5.46	33.72	134	290	P	H
		2480	94.7	-	-	95.87	27.09	5.46	33.72	134	290	A	H
	*	2490.96	46.02	-27.98	74	47.18	27.1	5.46	33.72	134	290	P	H
		2493.16	38.12	-15.88	54	39.24	27.1	5.46	33.68	134	290	A	H
	*	2480	93.92	-	-	95.09	27.09	5.46	33.72	396	266	P	V
		2480	92.75	-	-	93.92	27.09	5.46	33.72	396	266	A	V
	*	2495.28	46.7	-27.3	74	47.82	27.1	5.46	33.68	396	266	P	V
		2499.48	38.77	-15.23	54	39.89	27.1	5.46	33.68	396	266	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



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

Table with 14 columns: BLE, Note, Frequency, Level, Margin, Limit Line, Read Level, Antenna Factor, Path Loss, Preamp Factor, Ant Pos, Table Pos, Peak Avg, Pol. Rows include BLE CH 00 2402MHz, BLE CH 19 2440MHz, BLE CH 39 2480MHz, and Remark section.

Emission below 1GHz
2.4GHz BLE (LF)

Table with 14 columns: BLE, Note, Frequency, Level, Margin, Limit Line, Read Level, Antenna Factor, Path Loss, Preamp Factor, Ant Pos, Table Pos, Peak Avg, Pol. Rows include 2.4GHz BLE LF and Remark section.



For BLE 2Mbps Ant 2

2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 3m)

BLE	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)
BLE CH 00 2402MHz	*	2388.645	46.76	-27.24	74	48.23	27.02	5.37	33.86	141	324	P	H
		2389.59	34.66	-19.34	54	36.13	27.02	5.37	33.86	141	324	A	H
	*	2402	96	-	-	97.44	27.02	5.37	33.83	141	324	P	H
		2402	93.12	-	-	94.56	27.02	5.37	33.83	141	324	A	H
	*	2335.515	47.17	-26.83	74	48.78	26.98	5.31	33.9	381	247	P	V
		2389.59	34.52	-19.48	54	35.99	27.02	5.37	33.86	381	247	A	V
	*	2402	93.35	-	-	94.79	27.02	5.37	33.83	381	247	P	V
		2402	90.58	-	-	92.02	27.02	5.37	33.83	381	247	A	V
BLE CH 19 2440MHz	*	2322.6	46.15	-27.85	74	47.78	26.96	5.31	33.9	347	122	P	H
		2388.96	34.55	-19.45	54	36.02	27.02	5.37	33.86	347	122	A	H
	*	2440	102.74	-	-	104.06	27.06	5.41	33.79	347	122	P	H
		2440	100	-	-	101.32	27.06	5.41	33.79	347	122	A	H
	*	2487.68	46.21	-27.79	74	47.37	27.1	5.46	33.72	347	122	P	H
		2496.01	34.88	-19.12	54	36	27.1	5.46	33.68	347	122	A	H
	*	2385.46	46.2	-27.8	74	47.69	27	5.37	33.86	362	242	P	V
		2389.94	34.65	-19.35	54	36.09	27.02	5.37	33.83	362	242	A	V
	*	2440	95.77	-	-	97.09	27.06	5.41	33.79	362	242	P	V
		2440	93.05	-	-	94.37	27.06	5.41	33.79	362	242	A	V
	*	2498.53	46.47	-27.53	74	47.59	27.1	5.46	33.68	362	242	P	V
		2499.23	35.09	-18.91	54	36.21	27.1	5.46	33.68	362	242	A	V
BLE CH 39 2480MHz	*	2480	95.64	-	-	96.81	27.09	5.46	33.72	162	321	P	H
		2480	92.93	-	-	94.1	27.09	5.46	33.72	162	321	A	H
	*	2483.56	46.69	-27.31	74	47.86	27.09	5.46	33.72	162	321	P	H
		2483.52	34.98	-19.02	54	36.15	27.09	5.46	33.72	162	321	A	H
	*	2480	94.47	-	-	95.64	27.09	5.46	33.72	400	245	P	V
		2480	91.8	-	-	92.97	27.09	5.46	33.72	400	245	A	V
	*	2484.36	46.17	-27.83	74	47.34	27.09	5.46	33.72	400	245	P	V
		2499.68	34.96	-19.04	54	36.08	27.1	5.46	33.68	400	245	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



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

BLE	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)
BLE CH 00 2402MHz	*	4804	42.38	-31.62	74	51.66	31.19	8.88	49.35	-	-	P	H
	*	4804	43.22	-30.78	74	52.5	31.19	8.88	49.35	-	-	P	V
BLE CH 19 2440MHz		4880	42.1	-31.9	74	50.93	31.41	8.76	49	-	-	P	H
	*	7320	45.5	-28.5	74	50.66	36.49	10.18	51.83	-	-	P	H
		4880	42.33	-31.67	74	51.16	31.41	8.76	49	-	-	P	V
	*	7320	44.95	-29.05	74	50.11	36.49	10.18	51.83	-	-	P	V
BLE CH 39 2480MHz		4960	42.88	-31.12	74	51.35	31.69	8.41	48.57	-	-	P	H
	*	7440	45.65	-28.35	74	50.72	36.71	10.17	51.95	-	-	P	H
		4960	43.48	-30.52	74	51.95	31.69	8.41	48.57	-	-	P	V
	*	7440	44.09	-29.91	74	49.16	36.71	10.17	51.95	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission after 18GHz

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:

BLE	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)
BLE		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
CH 00		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H
2402MHz													

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”.



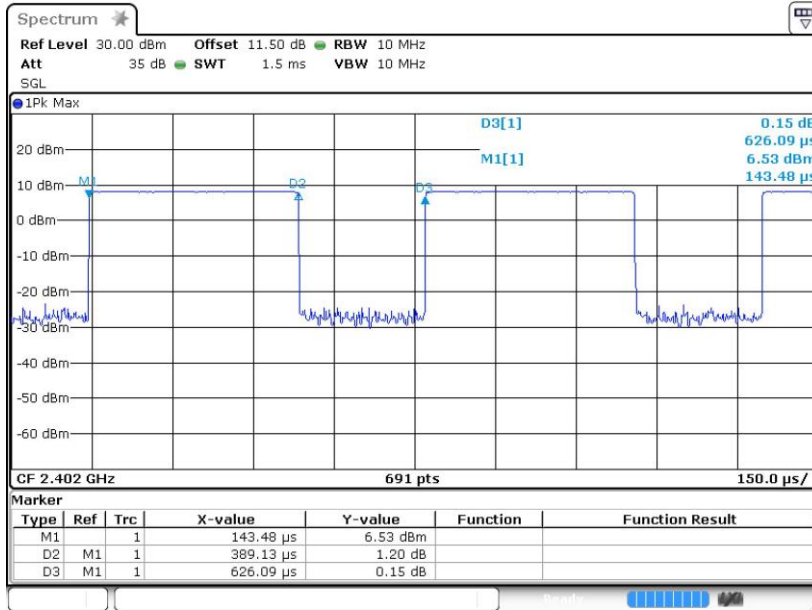
Appendix D. Duty Cycle Plots

Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
Bluetooth LE 1Mbps-Ant 3	62.15	0.389	2.570	3KHz
Bluetooth LE 2Mbps-Ant 3	32.64	0.204	4.894	10KHz
Bluetooth LE 1Mbps-Ant 5	62.15	0.389	2.570	3KHz
Bluetooth LE 2Mbps-Ant 5	32.64	0.204	4.894	10KHz



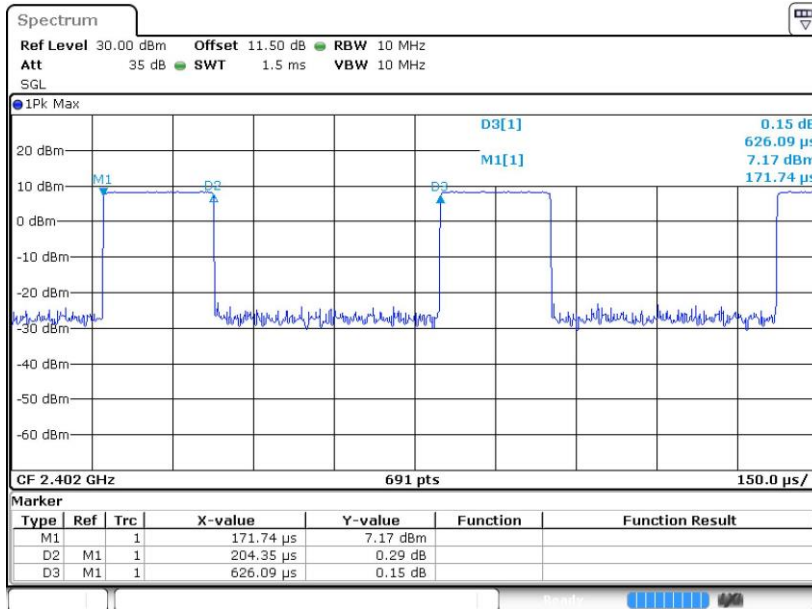
Ant 3

Bluetooth LE 1Mbps



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Bluetooth LE 2Mbps

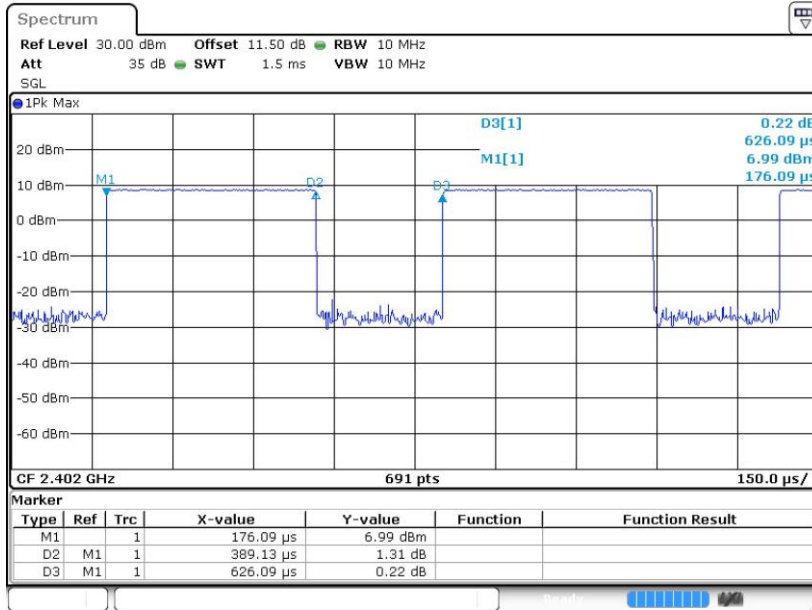


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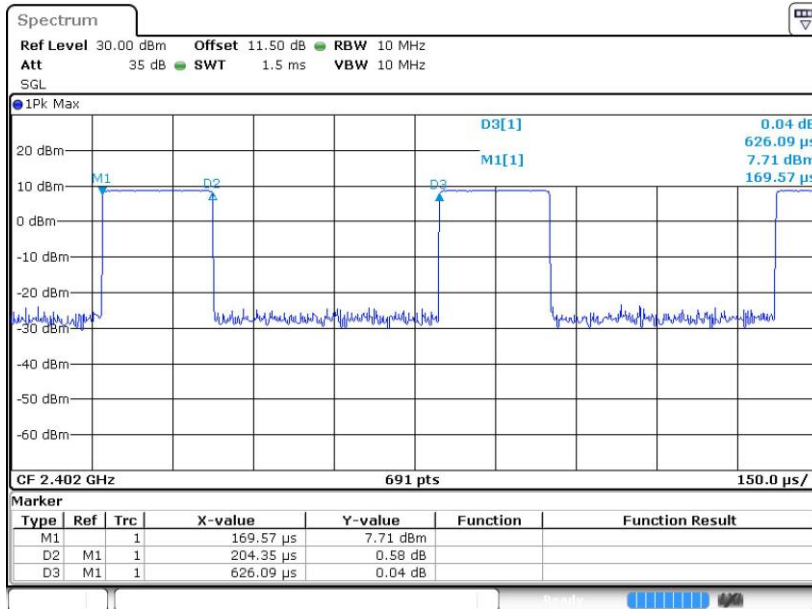
Ant 5

Bluetooth LE 1Mbps



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Bluetooth LE 2Mbps



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