



For BLE 1Mbps Ant 2

2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 3m)

BLE	Note	Frequency	Level	Margin	Limit Line	Read Level	Antenna Factor	Path Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	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
	*	2483.5	46.41	-27.59	74	47.58	27.09	5.46	33.72	368	244	P	V
		2499.51	37.01	-16.99	54	38.13	27.1	5.46	33.68	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
BLE CH 39 2480MHz	*	7320	45.25	-28.75	74	50.41	36.49	10.18	51.83	-	-	P	V
		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
BLE CH 39 2480MHz	*	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)

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	43.36	-30.64	74	52.64	31.19	8.88	49.35	-	-	P	H
	*	4804	44.58	-29.42	74	53.86	31.19	8.88	49.35	-	-	P	V
BLE CH 19 2440MHz		4880	42.91	-31.09	74	51.74	31.41	8.76	49	-	-	P	H
	*	7320	45.01	-28.99	74	50.17	36.49	10.18	51.83	-	-	P	H
		4880	43.68	-30.32	74	52.51	31.41	8.76	49	-	-	P	V
	*	7320	46.47	-27.53	74	51.63	36.49	10.18	51.83	-	-	P	V
BLE CH 39 2480MHz		4960	43.4	-30.6	74	51.87	31.69	8.41	48.57	-	-	P	H
	*	7440	44.74	-29.26	74	49.81	36.71	10.17	51.95	-	-	P	H
		4960	43.34	-30.66	74	51.81	31.69	8.41	48.57	-	-	P	V
	*	7440	44.72	-29.28	74	49.79	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	24.49	-15.51	40	30.5	25.86	0.53	32.4	-	-	P	H
		103.72	18.89	-24.61	43.5	33.6	16.45	1.04	32.2	-	-	P	H
		276.38	32.06	-13.94	46	42.74	19.34	1.73	31.75	-	-	P	H
		370.47	26.8	-19.2	46	35.14	21.21	2.03	31.58	-	-	P	H
		575.14	28.41	-17.59	46	30.52	26.17	2.51	30.79	-	-	P	H
	*	940.83	32.47	-13.53	46	29.92	30.83	3.22	31.5	-	-	P	H
		30	24.47	-15.53	40	30.48	25.86	0.53	32.4	-	-	P	V
		54.25	25.19	-14.81	40	43.4	13.46	0.73	32.4	-	-	P	V
		159.01	19.46	-24.04	43.5	33.64	16.71	1.29	32.18	-	-	P	V
		281.23	25.75	-20.25	46	36.29	19.46	1.74	31.74	-	-	P	V
		616.85	30.39	-15.61	46	32.12	26.42	2.59	30.74	-	-	P	V
	*	951.5	32.09	-13.91	46	29.23	31.13	3.23	31.5	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												



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.
					Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BLE 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”.



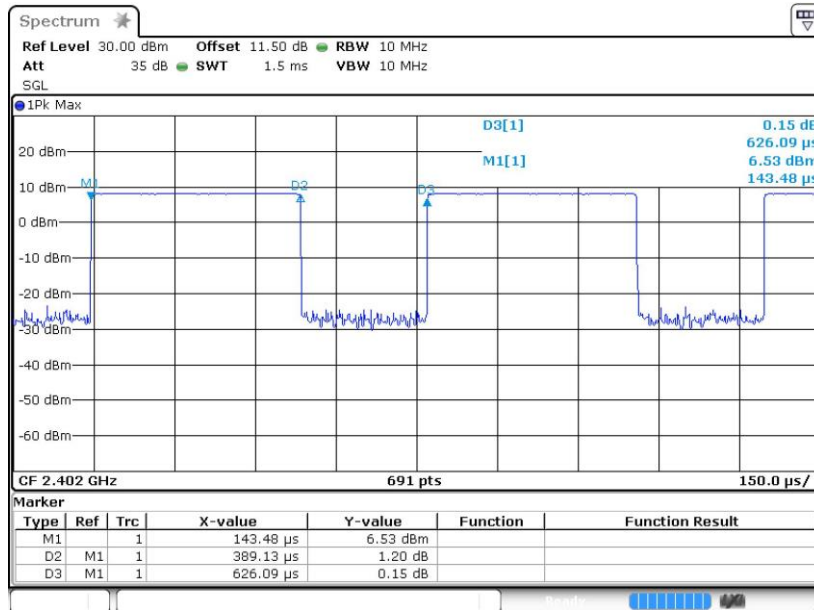
Appendix D. Duty Cycle Plots

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



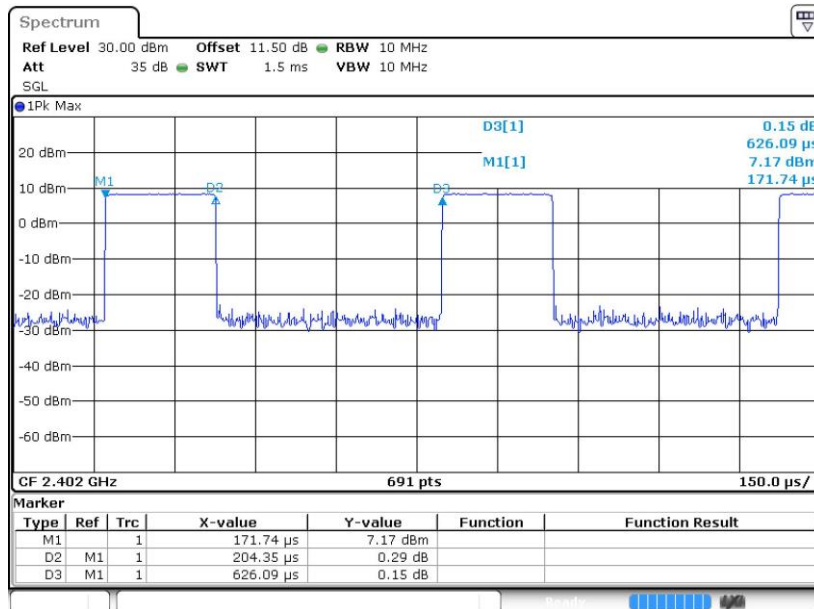
Ant 3

Bluetooth LE 1Mbps



Date: 27.MAY.2022 13:52:34

Bluetooth LE 2Mbps

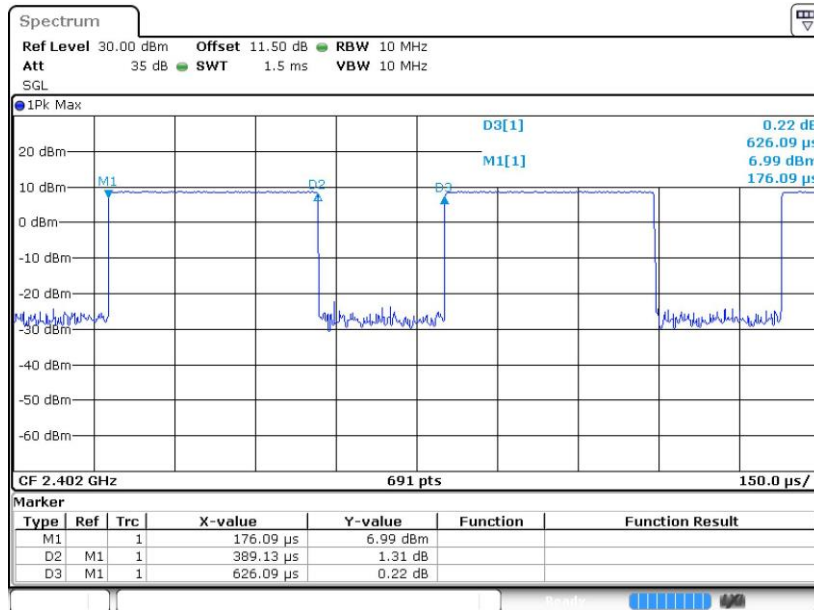


Date: 27.MAY.2022 13:53:16



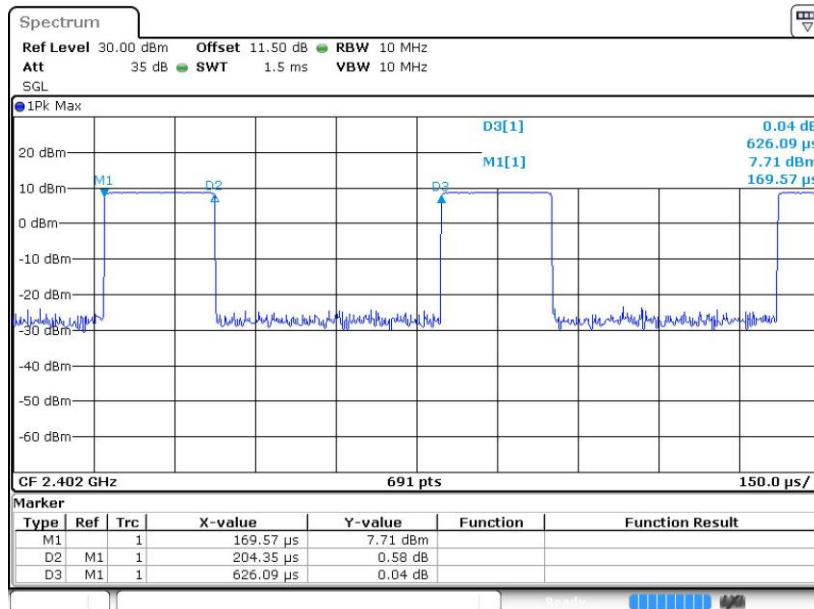
Ant 5

Bluetooth LE 1Mbps



Date: 27.MAY.2022 13:56:14

Bluetooth LE 2Mbps



Date: 27.MAY.2022 13:55:29