

BLE_1M_Ant1_2402



BLE_1M_Ant1_2440



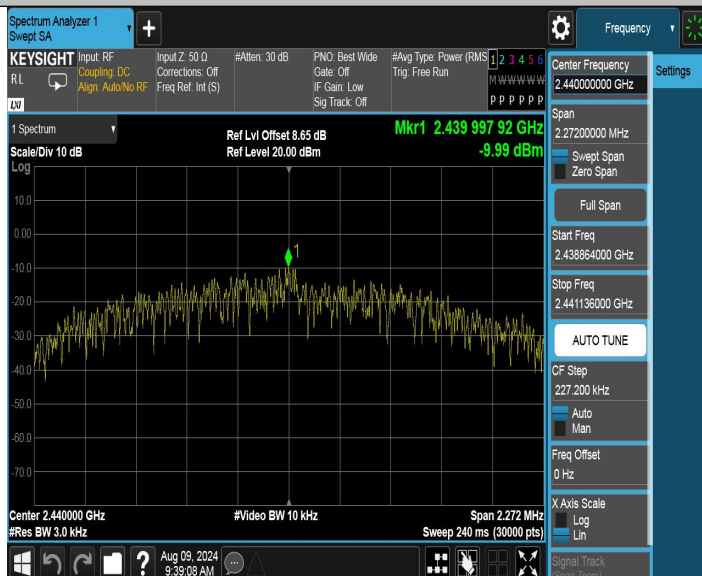
BLE_1M_Ant1_2480



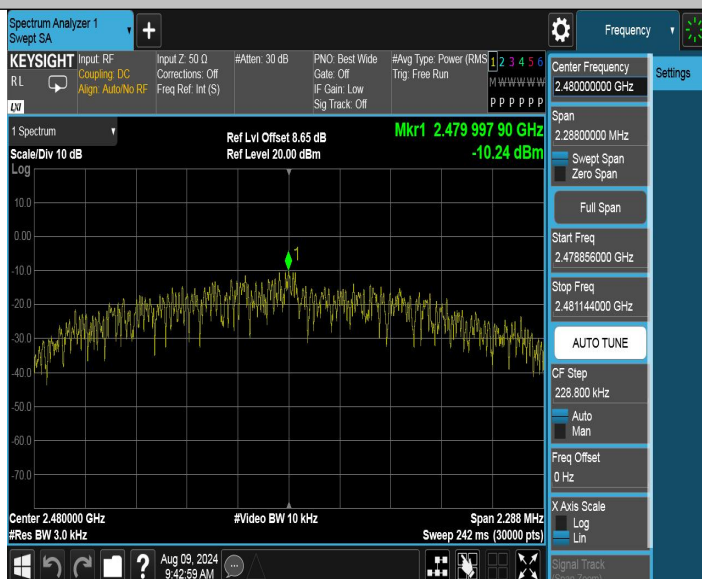
BLE_2M_Ant1_2402



BLE_2M_Ant1_2440



BLE_2M_Ant1_2480



7.5. Conducted Band Edge and Out-of-Band Emissions

7.5.1. Test Limit

The limit for out-of-band spurious emissions at the band edge is 20dB below the fundamental emission level, as determined from the in-band power measurement of the DTS channel performed in a 100 kHz bandwidth per the PSD procedure.

7.5.2. Test Procedure Used

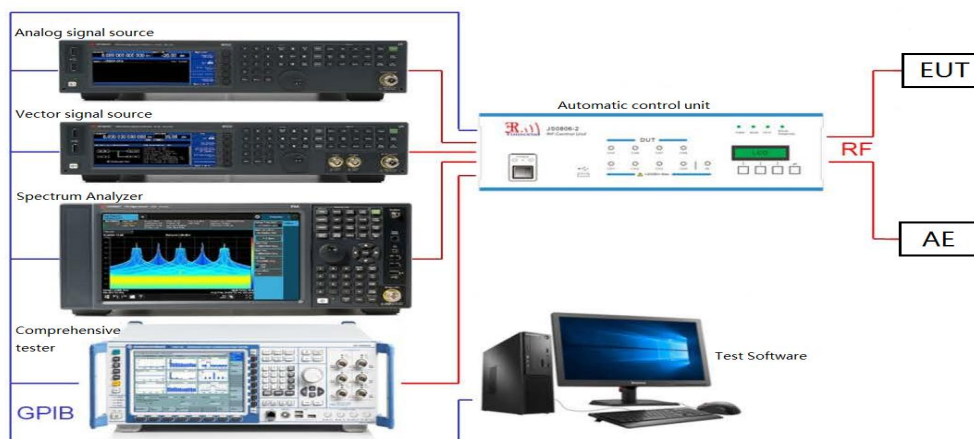
KDB 558074 D01 v05r02 - Section 8.5 & Section 8.6

ANSI C63.10 – Section 11.11&11.12

7.5.3. Test Settintg

- (a) Set the center frequency and span to encompass frequency range to be measured
- (b) RBW = 100kHz
- (c) VBW = 300kHz
- (d) Detector = Peak
- (e) Trace mode = max hold
- (f) Sweep time = auto couple
- (g) The trace was allowed to stabilize

7.5.4. Test Setup



7.5.5. Test Result

Test Mode	Antenna	ChName	Channel	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	Low	2402	8.51	-42.83	≤-11.49	PASS
		High	2480	7.65	-48.84	≤-12.35	PASS
BLE_2M	Ant1	Low	2402	8.60	-24.36	≤-11.41	PASS
		High	2480	7.67	-46.64	≤-12.33	PASS

Test Mode	Antenna	Channel	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	Reference	8.47	8.47	---	PASS
			30~1000	8.47	-61.38	≤-11.53	PASS
			1000~26500	8.47	-52.36	≤-11.53	PASS
		2440	Reference	7.91	7.91	---	PASS
			30~1000	7.91	-61.46	≤-12.09	PASS
			1000~26500	7.91	-52.42	≤-12.09	PASS
		2480	Reference	7.63	7.63	---	PASS
			30~1000	7.63	-61.13	≤-12.37	PASS
			1000~26500	7.63	-52.51	≤-12.37	PASS
BLE_2M	Ant1	2402	Reference	8.48	8.48	---	PASS
			30~1000	8.48	-61.17	≤-11.52	PASS
			1000~26500	8.48	-51.41	≤-11.52	PASS
		2440	Reference	7.91	7.91	---	PASS
			30~1000	7.91	-61.21	≤-12.09	PASS
			1000~26500	7.91	-52.89	≤-12.09	PASS
		2480	Reference	7.64	7.64	---	PASS
			30~1000	7.64	-61.32	≤-12.36	PASS
			1000~26500	7.64	-52.37	≤-12.36	PASS

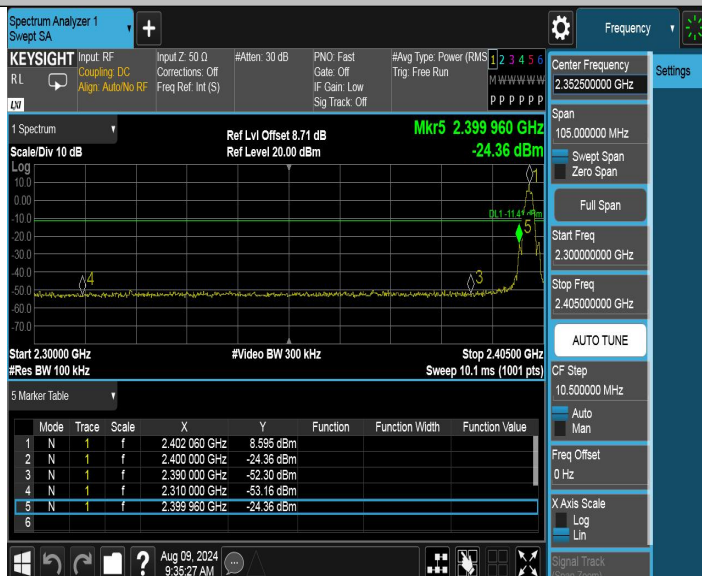
BLE_1M_Ant1_Low_2402



BLE_1M_Ant1_High_2480



BLE_2M_Ant1_Low_2402



BLE_2M_Ant1_High_2480



BLE_1M_Ant1_2402_0~Reference



BLE_1M_Ant1_2402_30~1000



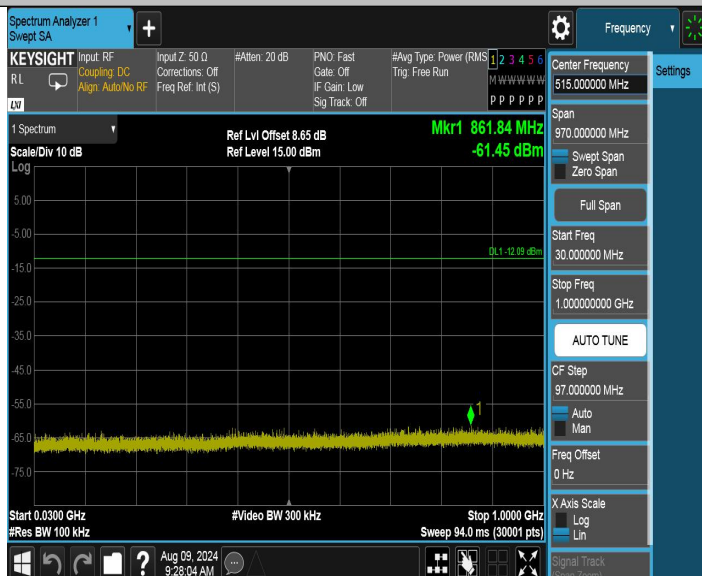
BLE_1M_Ant1_2402_1000~26500



BLE_1M_Ant1_2440_0~Reference



BLE_1M_Ant1_2440_30~1000



BLE_1M_Ant1_2440_1000~26500



BLE_1M_Ant1_2480_0~Reference



BLE_1M_Ant1_2480_30~1000



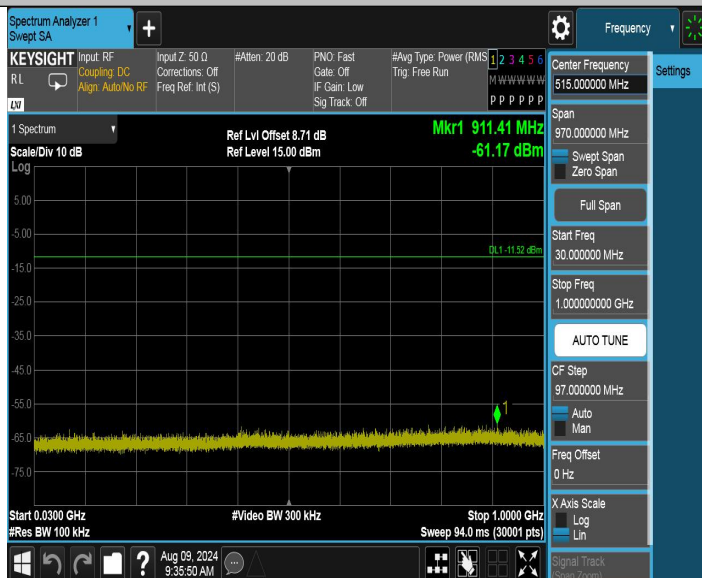
BLE_1M_Ant1_2480_1000~26500



BLE_2M_Ant1_2402_0~Reference



BLE_2M_Ant1_2402_30~1000



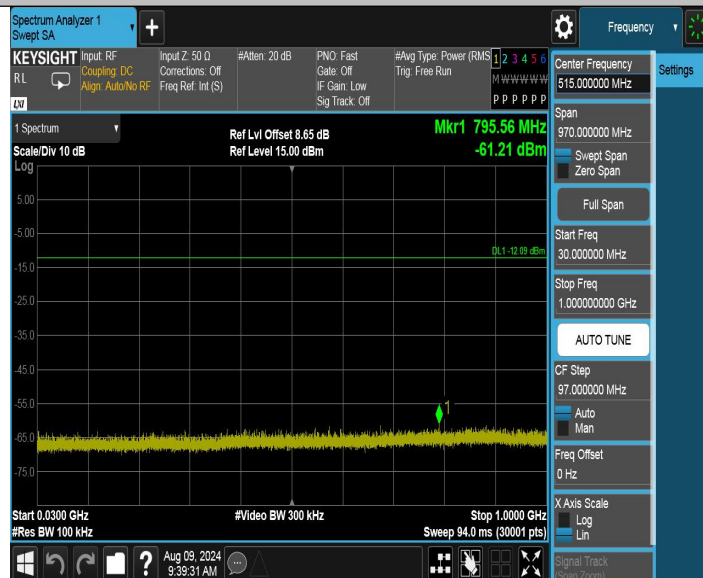
BLE_2M_Ant1_2402_1000~26500



BLE_2M_Ant1_2440_0~Reference



BLE_2M_Ant1_2440_30~1000



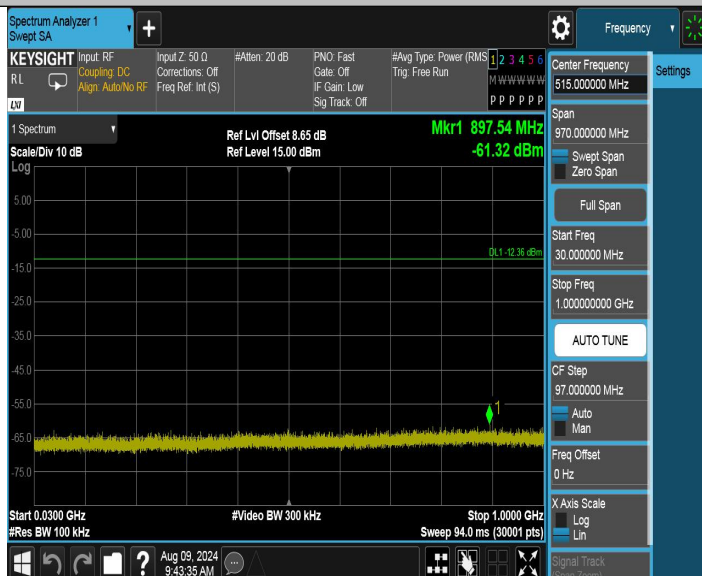
BLE_2M_Ant1_2440_1000~26500



BLE_2M_Ant1_2480_0~Reference



BLE_2M_Ant1_2480_30~1000



BLE_2M_Ant1_2480_1000~26500



7.6. Radiated Spurious Emission Measurement

7.6.1. Test Limit

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table per Section 15.209.

FCC Part 15 Subpart C Paragraph 15.209		
Frequency [MHz]	Field Strength [uV/m]	Measured Distance [Meters]
0.009 – 0.490	2400/F (kHz)	300
0.490 – 1.705	24000/F (kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

7.6.2. Test Procedure Used

ANSI C63.10-2013 – Section 6.6.4.3

7.6.3. Test Setting

Peak Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = as specified in Table 1
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

Table 1 - RBW as a function of frequency

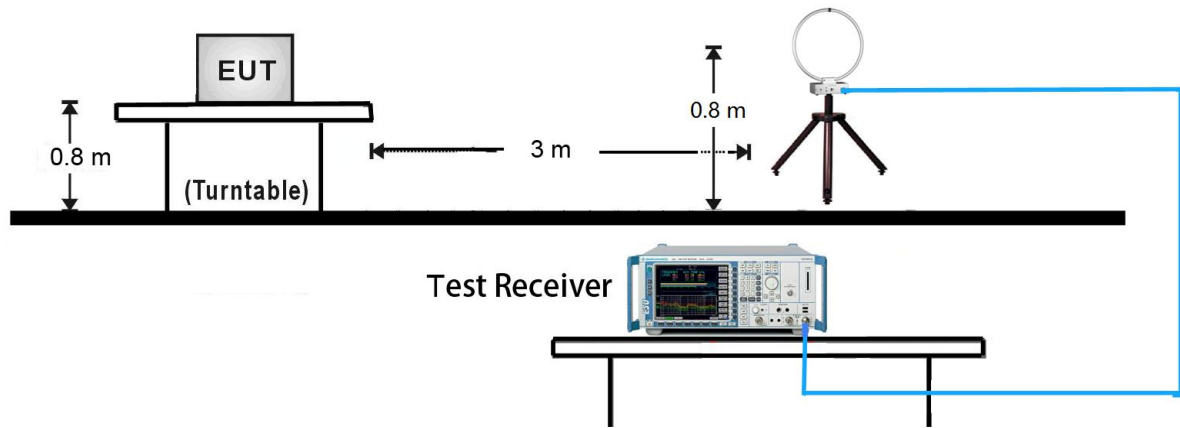
Frequency	RBW
9 ~ 150 kHz	200 ~ 300 Hz
0.15 ~ 30 MHz	9 ~ 10 kHz
30 ~ 1000 MHz	100 ~ 120 kHz
> 1000 MHz	1 MHz

Average Field Strength Measurements

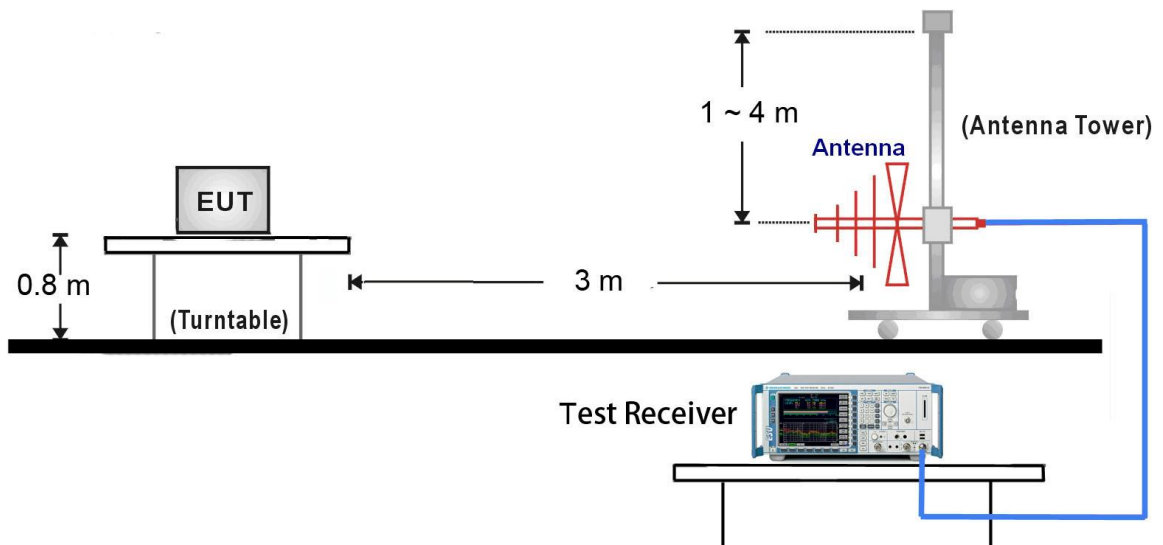
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = Power Average (RMS)
5. Number of sweep point = 2001 (Number of sweep points must be $\geq 2 \times \text{span} / \text{RBW}$)
6. Sweep time = auto
7. Trace (RMS) averaging was performed over at least 100 traces.

7.6.4. Test Setup

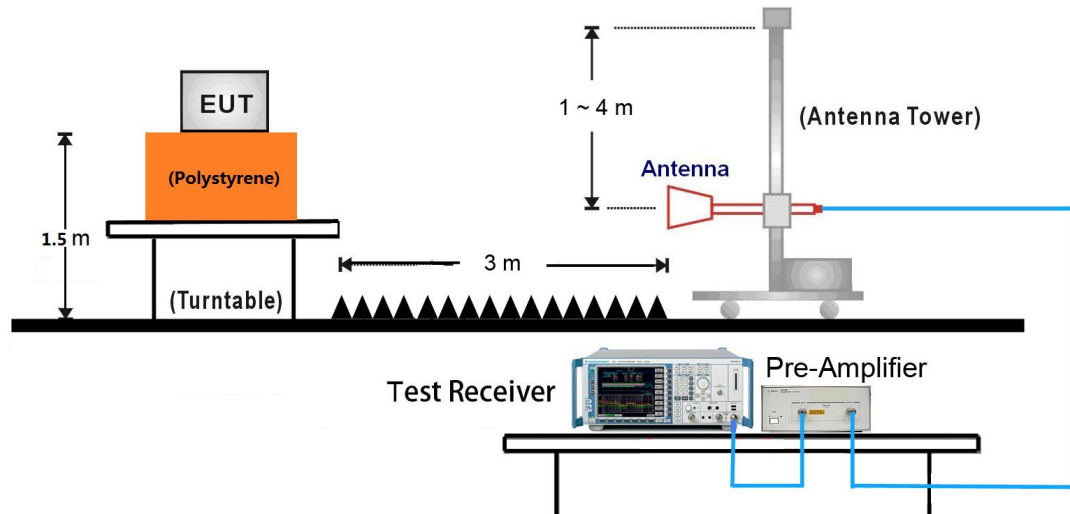
9kHz ~ 30MHz Test Setup:



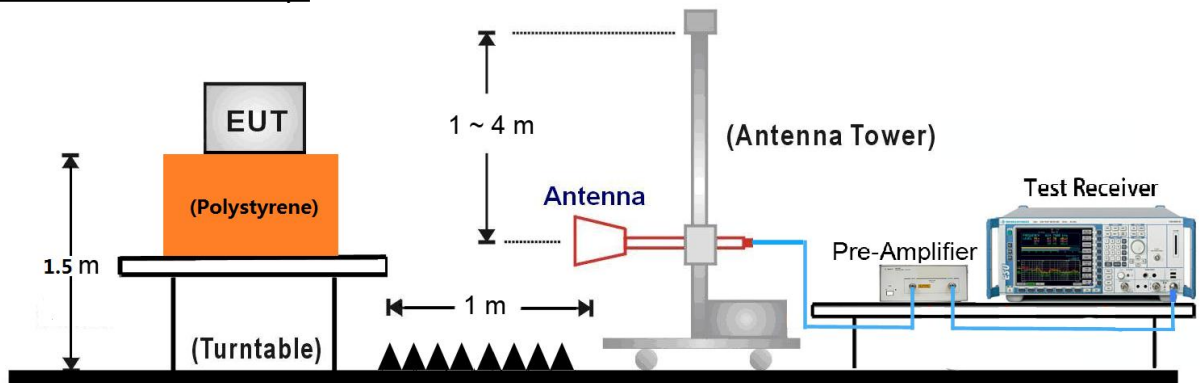
30MHz ~ 1GHz Test Setup:



1GHz ~ 18GHz Test Setup:



18GHz ~ 25GHz Test Setup:

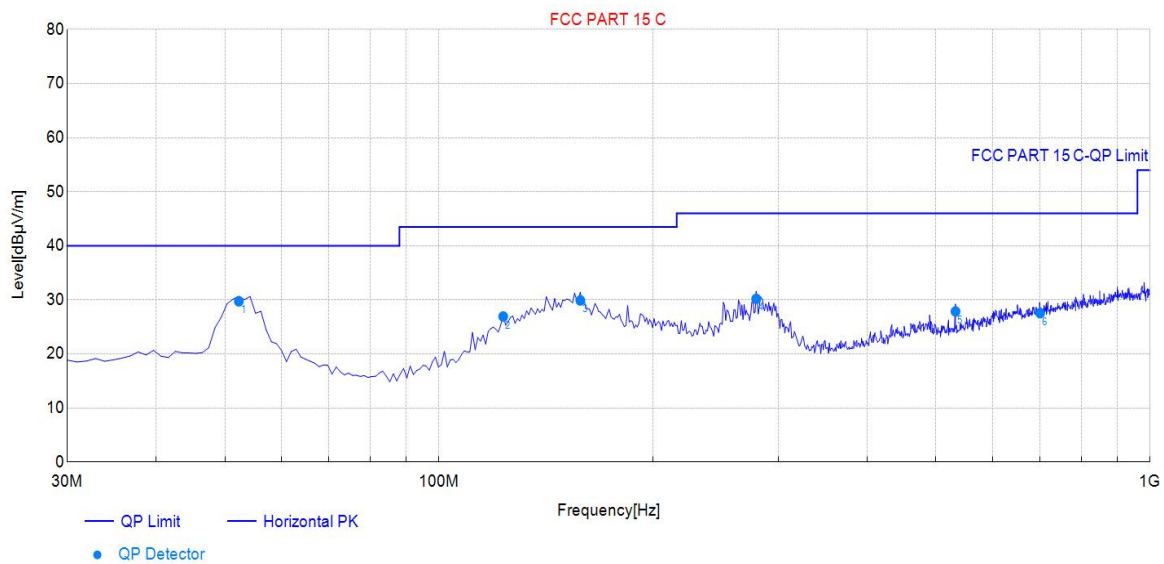


7.6.5. Test Result

The worst case of Radiated Emission below 1GHz:

30MHz – 1GHz Test Data

EUT:	BLE module	Polarity:	Horizontal
Model:	ETWBCLUL04	SN:	N/A
Mode:	Transmit at BLE_1M Channel 00	Voltage:	DC 3.3V
Environment:	Temp: 27.1°C; Humi:51%	Engineer:	Stone Zhang



Final Data List

NO.	Frequency [MHz]	Factor [dB/m]	QP Reading [dBμV]	QP Value [dBμV/m]	QP Limit [dBμV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Pol	Verdict
1	52.31	14.37	15.36	29.73	40.00	10.27	100	54	Horizontal	PASS
2	123.12	13.95	12.98	26.93	43.50	16.57	200	160	Horizontal	PASS
3	158.04	15.77	14.13	29.90	43.50	13.60	200	176	Horizontal	PASS
4	279.29	14.53	15.67	30.20	46.00	15.80	100	214	Horizontal	PASS
5	532.46	20.24	7.63	27.87	46.00	18.13	200	225	Horizontal	PASS
6	700.27	23.29	4.25	27.54	46.00	18.46	200	3	Horizontal	PASS

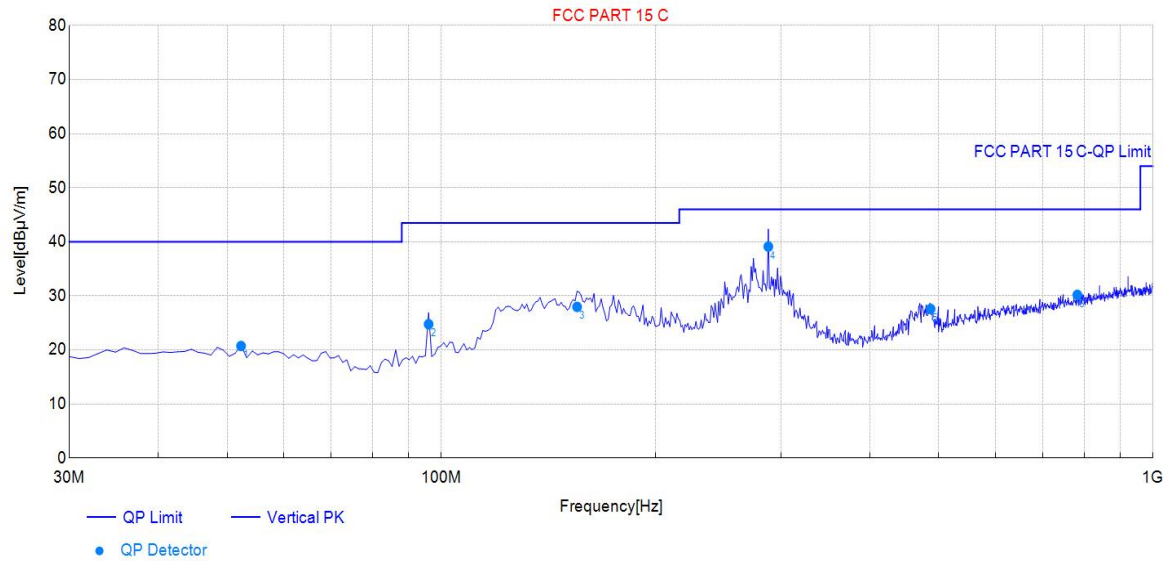
Note:

(1) Level=Reading + Factor

(2) Margin=Limit-Level

(3) The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 25GHz), therefore no data appear in the report.

EUT:	BLE module	Polarity:	Vertical
Model:	ETWBCLUL04	SN:	N/A
Mode:	Transmit at BLE_1M Channel 00	Voltage:	DC 3.3V
Environment:	Temp: 27.1℃; Humi:51%	Engineer:	Stone Zhang



Final Data List										
NO.	Frequency [MHz]	Factor [dB/m]	QP Reading [dBμV]	QP Value [dBμV/m]	QP Limit [dBμV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Pol	Verdict
1	52.31	14.37	6.36	20.73	40.00	19.27	200	217	Vertical	PASS
2	95.96	11.19	13.57	24.76	43.50	18.74	200	360	Vertical	PASS
3	155.13	15.68	12.29	27.97	43.50	15.53	100	200	Vertical	PASS
4	288.02	14.75	24.37	39.12	46.00	6.88	200	292	Vertical	PASS
5	486.87	19.34	8.24	27.58	46.00	18.42	200	292	Vertical	PASS
6	782.72	24.32	5.87	30.19	46.00	15.81	100	262	Vertical	PASS

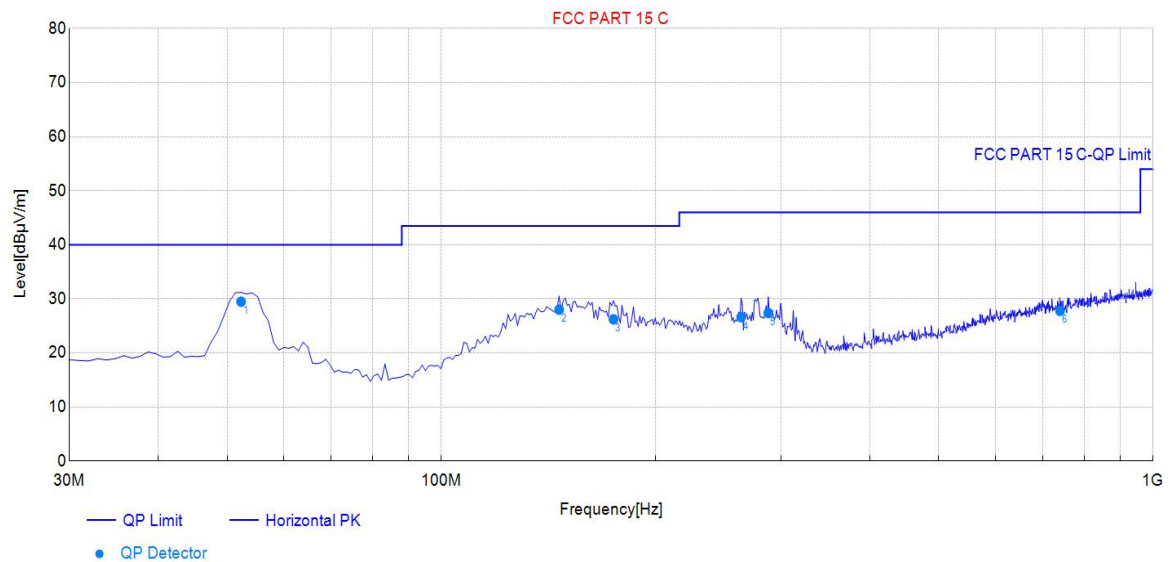
Note:

(1) Level=Reading + Factor

(2) Margin=Limit-Level

(3) The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 25GHz), therefore no data appear in the report.

EUT:	BLE module	Polarity:	Horizontal
Model:	ETWBCLUL04	SN:	N/A
Mode:	Transmit at BLE_2M Channel 00	Voltage:	DC 3.3V
Environment:	Temp: 27.1°C; Humi:51%	Engineer:	Stone Zhang



Final Data List										
NO.	Frequency [MHz]	Factor [dB/m]	QP Reading [dBμV]	QP Value [dBμV/m]	QP Limit [dBμV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Pol	Verdict
1	52.31	14.37	15.11	29.48	40.00	10.52	100	12	Horizontal	PASS
2	146.40	15.37	12.64	28.01	43.50	15.49	200	227	Horizontal	PASS
3	174.53	14.16	12.06	26.22	43.50	17.28	200	199	Horizontal	PASS
4	263.77	14.14	12.48	26.62	46.00	19.38	100	254	Horizontal	PASS
5	288.02	14.75	12.65	27.40	46.00	18.60	100	212	Horizontal	PASS
6	740.04	23.82	3.97	27.79	46.00	18.21	100	274	Horizontal	PASS

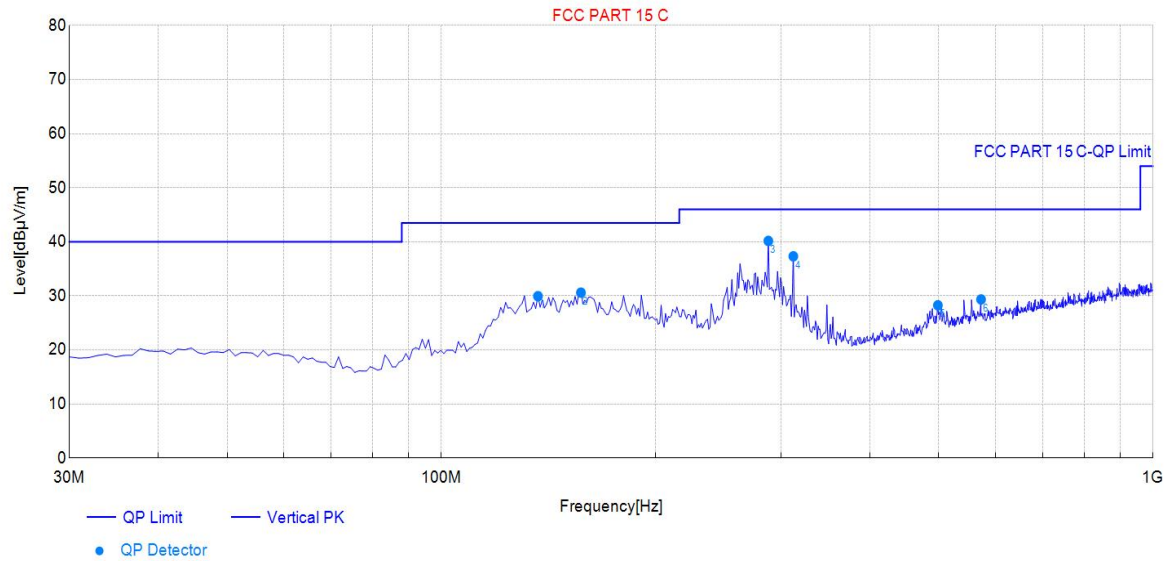
Note:

(1) Level=Reading + Factor

(2) Margin=Limit-Level

(3) The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 25GHz), therefore no data appear in the report.

EUT:	BLE module	Polarity:	Vertical
Model:	ETWBCLUL04	SN:	N/A
Mode:	Transmit at BLE_1M Channel 00	Voltage:	DC 3.3V
Environment:	Temp: 27.1°C; Humi:51%	Engineer:	Stone Zhang



Final Data List										
NO.	Frequency [MHz]	Factor [dB/m]	QP Reading [dBμV]	QP Value [dBμV/m]	QP Limit [dBμV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Pol	Verdict
1	136.70	14.90	15.05	29.95	43.50	13.55	100	191	Vertical	PASS
2	157.07	15.74	14.87	30.61	43.50	12.89	100	214	Vertical	PASS
3	288.02	14.75	25.42	40.17	46.00	5.83	100	191	Vertical	PASS
4	312.27	15.48	21.84	37.32	46.00	8.68	100	168	Vertical	PASS
5	498.51	19.48	8.78	28.26	46.00	17.74	200	139	Vertical	PASS
6	573.20	21.08	8.27	29.35	46.00	16.65	200	220	Vertical	PASS

Note:

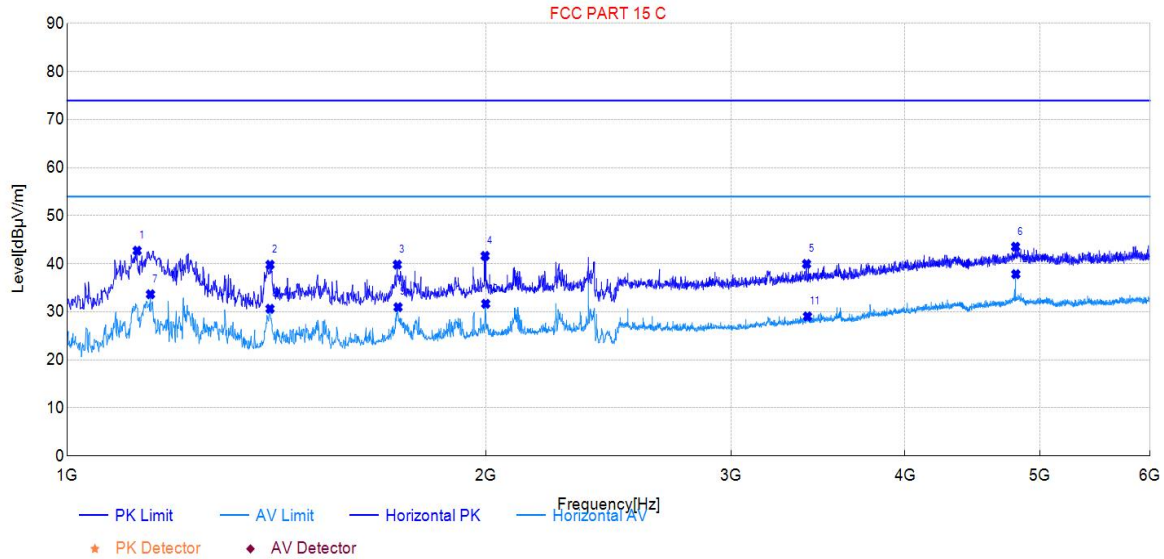
(1) Level=Reading + Factor

(2) Margin=Limit-Level

(3) The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 25GHz), therefore no data appear in the report.

1GHz-6GHz

Test Mode:	BLE_1M	Test Date:	2024-08-23
Test Channel:	00	Test Engineer:	Stone Zhang

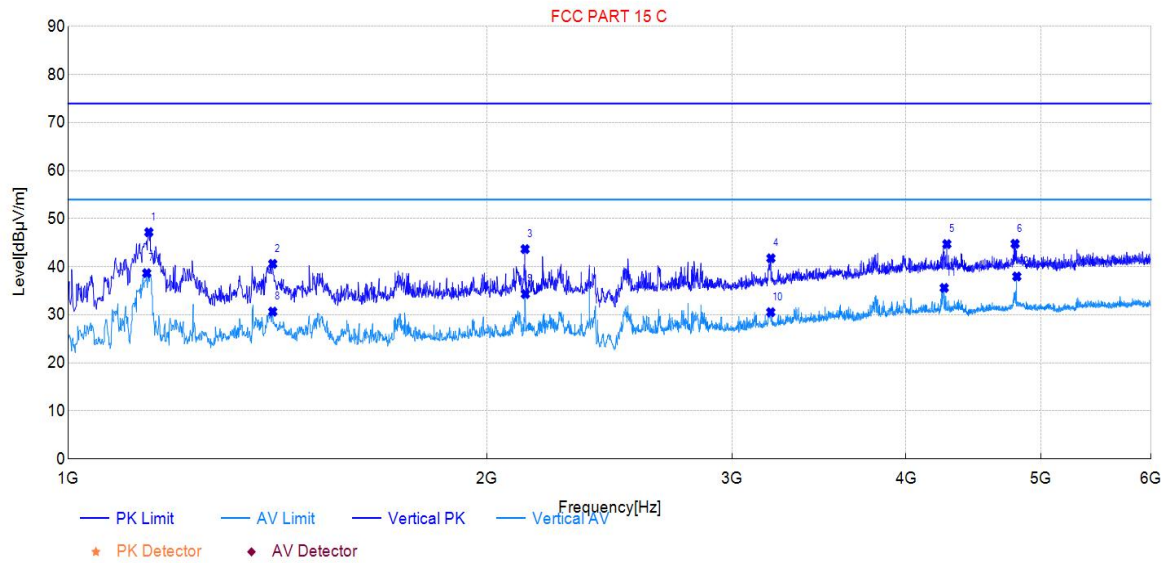


Suspected Data List											
NO.	Frequency [MHz]	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Det	Pol	Verdict
1	1123.00	66.48	42.73	-23.75	74.00	31.27	150	159	PK	Horizontal	PASS
2	1399.00	62.00	39.81	-22.19	74.00	34.19	150	136	PK	Horizontal	PASS
3	1727.00	59.94	39.84	-20.10	74.00	34.16	150	136	PK	Horizontal	PASS
4	1997.00	59.84	41.65	-18.19	74.00	32.35	150	123	PK	Horizontal	PASS
5	3399.00	52.76	39.98	-12.78	74.00	34.02	150	4	PK	Horizontal	PASS
6	4803.00	50.34	43.56	-6.78	74.00	30.44	150	0	PK	Horizontal	PASS
7	1148.00	57.31	33.66	-23.65	54.00	20.34	150	123	AV	Horizontal	PASS
8	1399.00	52.84	30.65	-22.19	54.00	23.35	150	141	AV	Horizontal	PASS
9	1729.00	51.07	30.98	-20.09	54.00	23.02	150	136	AV	Horizontal	PASS
10	1999.00	49.85	31.68	-18.17	54.00	22.32	150	123	AV	Horizontal	PASS
11	3404.00	41.82	29.06	-12.76	54.00	24.94	150	17	AV	Horizontal	PASS
12	4805.00	44.63	37.85	-6.78	54.00	16.15	150	39	AV	Horizontal	PASS

Note:

(1) Level=Reading + Factor

(2) Margin=Limit-Level



Suspected Data List

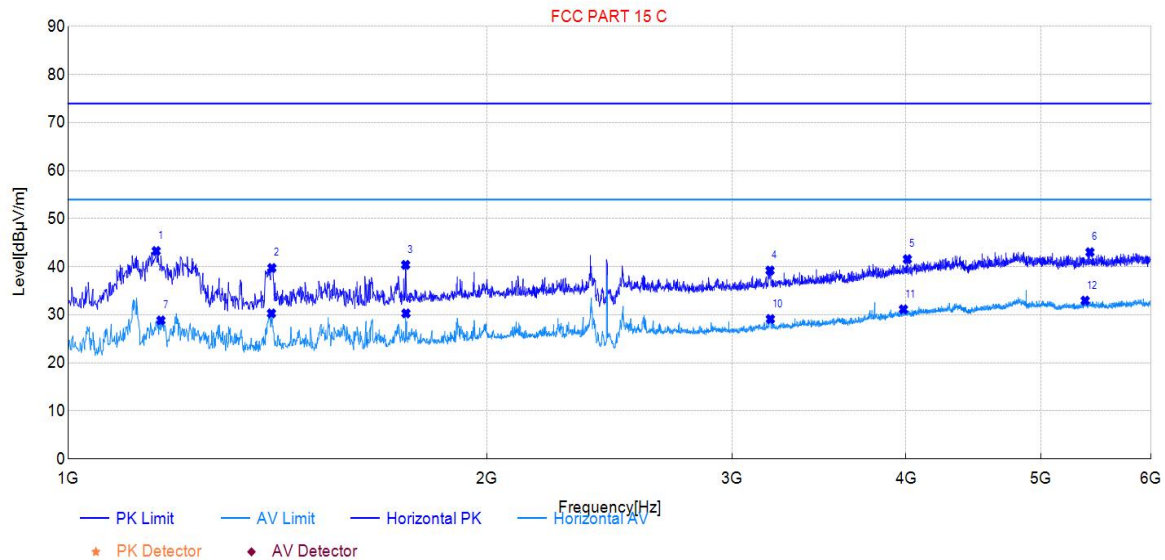
NO.	Frequency [MHz]	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Det	Pol	Verdict
1	1143.00	69.86	47.20	-22.66	74.00	26.80	150	118	PK	Vertical	PASS
2	1403.00	61.94	40.62	-21.32	74.00	33.38	150	79	PK	Vertical	PASS
3	2130.00	60.99	43.69	-17.30	74.00	30.31	150	36	PK	Vertical	PASS
4	3199.00	54.94	41.78	-13.16	74.00	32.22	150	110	PK	Vertical	PASS
5	4280.00	52.46	44.73	-7.73	74.00	29.27	150	348	PK	Vertical	PASS
6	4791.00	52.14	44.79	-7.35	74.00	29.21	150	84	PK	Vertical	PASS
7	1139.00	61.35	38.68	-22.67	54.00	15.32	150	118	AV	Vertical	PASS
8	1403.00	51.99	30.67	-21.32	54.00	23.33	150	74	AV	Vertical	PASS
9	2131.00	51.64	34.34	-17.30	54.00	19.66	150	36	AV	Vertical	PASS
10	3198.00	43.74	30.56	-13.18	54.00	23.44	150	115	AV	Vertical	PASS
11	4261.00	43.38	35.61	-7.77	54.00	18.39	150	167	AV	Vertical	PASS
12	4805.00	45.31	37.99	-7.32	54.00	16.01	150	223	AV	Vertical	PASS

Note:

(1) Level=Reading + Factor

(2) Margin=Limit-Level

Test Mode:	BLE_1M	Test Date:	2024-08-23
Test Channel:	19	Test Engineer:	Stone Zhang

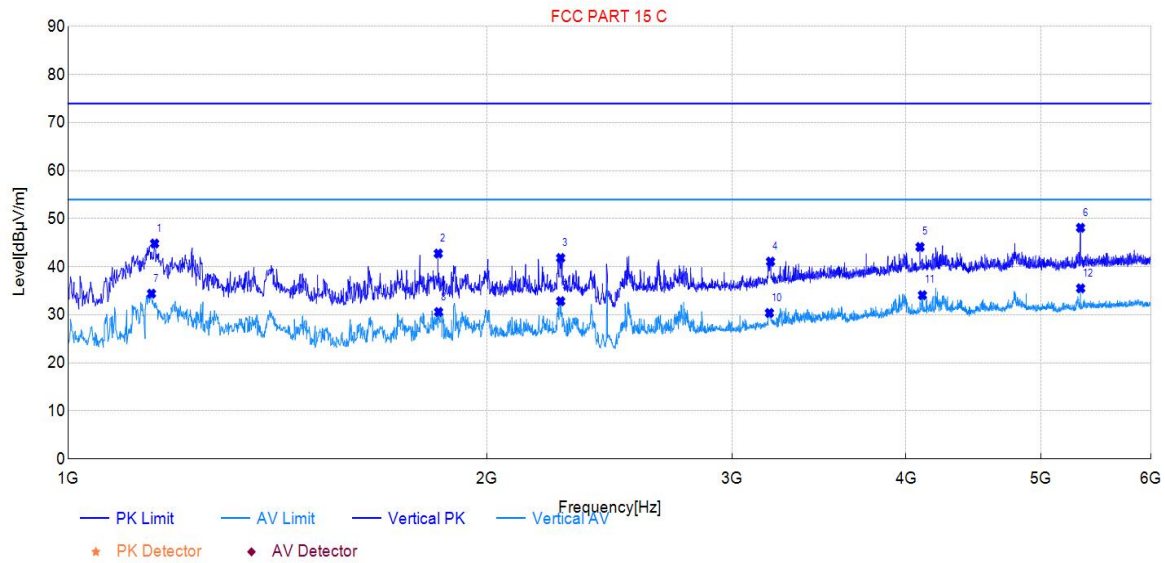


Suspected Data List											
NO.	Frequency [MHz]	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Det	Pol	Verdict
1	1157.00	66.91	43.29	-23.62	74.00	30.71	150	230	PK	Horizontal	PASS
2	1401.00	61.95	39.76	-22.19	74.00	34.24	150	141	PK	Horizontal	PASS
3	1748.00	60.33	40.41	-19.92	74.00	33.59	150	141	PK	Horizontal	PASS
4	3194.00	52.87	39.24	-13.63	74.00	34.76	150	12	PK	Horizontal	PASS
5	4009.00	50.12	41.59	-8.53	74.00	32.41	150	360	PK	Horizontal	PASS
6	5423.00	48.99	43.04	-5.95	74.00	30.96	150	0	PK	Horizontal	PASS
7	1166.00	52.44	28.85	-23.59	54.00	25.15	150	98	AV	Horizontal	PASS
8	1400.00	52.50	30.31	-22.19	54.00	23.69	150	136	AV	Horizontal	PASS
9	1749.00	50.23	30.31	-19.92	54.00	23.69	150	141	AV	Horizontal	PASS
10	3196.00	42.75	29.13	-13.62	54.00	24.87	150	68	AV	Horizontal	PASS
11	3983.00	39.84	31.15	-8.69	54.00	22.85	150	345	AV	Horizontal	PASS
12	5380.00	38.97	32.97	-6.00	54.00	21.03	150	196	AV	Horizontal	PASS

Note:

(1) Level=Reading + Factor

(2) Margin=Limit-Level



Suspected Data List

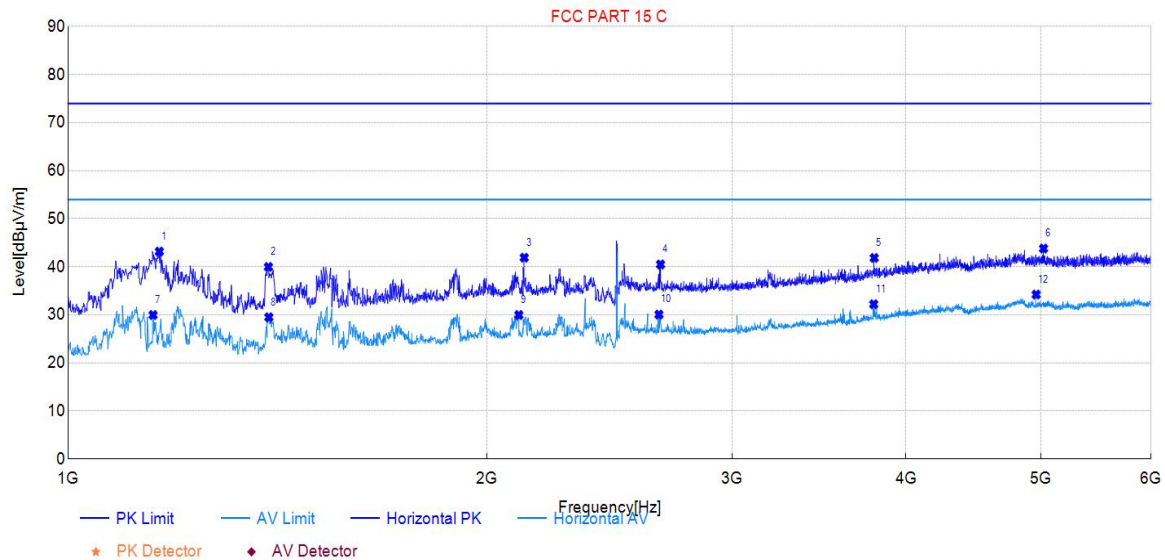
NO	Frequency [MHz]	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Det	Pol	Verdict
1	1154.00	67.47	44.85	-22.6	74.00	29.15	150	60	PK	Vertical	PASS
2	1845.00	61.53	42.77	-18.7	74.00	31.23	150	51	PK	Vertical	PASS
3	2259.00	58.79	41.84	-16.9	74.00	32.16	150	122	PK	Vertical	PASS
4	3197.00	54.26	41.08	-13.1	74.00	32.92	150	109	PK	Vertical	PASS
5	4094.00	52.06	44.13	-7.93	74.00	29.87	150	74	PK	Vertical	PASS
6	5339.00	54.47	48.13	-6.34	74.00	25.87	150	131	PK	Vertical	PASS
7	1148.00	57.06	34.42	-22.6	54.00	19.58	150	114	AV	Vertical	PASS
8	1846.00	49.36	30.61	-18.7	54.00	23.39	150	51	AV	Vertical	PASS
9	2259.00	49.80	32.85	-16.9	54.00	21.15	150	60	AV	Vertical	PASS
10	3191.00	43.61	30.40	-13.2	54.00	23.60	150	348	AV	Vertical	PASS
11	4110.00	42.00	34.09	-7.91	54.00	19.91	150	74	AV	Vertical	PASS
12	5340.00	41.86	35.52	-6.34	54.00	18.48	150	131	AV	Vertical	PASS

Note:

(1) Level=Reading + Factor

(2) Margin=Limit-Level

Test Mode:	BLE_1M	Test Date:	2024-08-23
Test Channel:	39	Test Engineer:	Stone Zhang

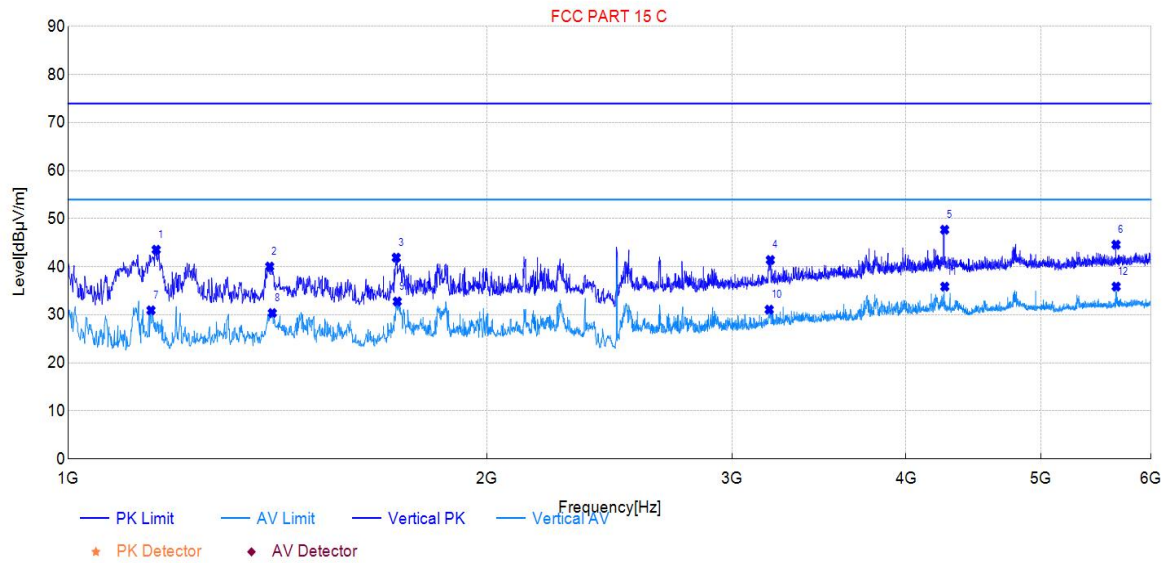


Suspected Data List											
NO.	Frequency [MHz]	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Det	Pol	Verdict
1	1163.00	66.77	43.18	-23.59	74.00	30.82	150	111	PK	Horizontal	PASS
2	1393.00	62.23	39.99	-22.24	74.00	34.01	150	137	PK	Horizontal	PASS
3	2127.00	59.45	41.91	-17.54	74.00	32.09	150	313	PK	Horizontal	PASS
4	2665.00	55.81	40.50	-15.31	74.00	33.50	150	332	PK	Horizontal	PASS
5	3795.00	52.08	41.85	-10.23	74.00	32.15	150	4	PK	Horizontal	PASS
6	5022.00	49.84	43.81	-6.03	74.00	30.19	150	323	PK	Horizontal	PASS
7	1151.00	53.63	29.98	-23.65	54.00	24.02	150	155	AV	Horizontal	PASS
8	1394.00	51.74	29.51	-22.23	54.00	24.49	150	137	AV	Horizontal	PASS
9	2108.00	47.59	29.98	-17.61	54.00	24.02	150	305	AV	Horizontal	PASS
10	2658.00	45.40	30.07	-15.33	54.00	23.93	150	332	AV	Horizontal	PASS
11	3792.00	42.47	32.22	-10.25	54.00	21.78	150	4	AV	Horizontal	PASS
12	4961.00	40.44	34.23	-6.21	54.00	19.77	150	42	AV	Horizontal	PASS

Note:

(1) Level=Reading + Factor

(2) Margin=Limit-Level



Suspected Data List

NO.	Frequency [MHz]	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Det	Pol	Verdict
1	1157.00	66.17	43.56	-22.61	74.00	30.44	150	60	PK	Vertical	PASS
2	1396.00	61.42	40.06	-21.36	74.00	33.94	150	78	PK	Vertical	PASS
3	1721.00	61.45	41.92	-19.53	74.00	32.08	150	104	PK	Vertical	PASS
4	3196.00	54.61	41.43	-13.18	74.00	32.57	150	108	PK	Vertical	PASS
5	4264.00	55.48	47.72	-7.76	74.00	26.28	150	160	PK	Vertical	PASS
6	5662.00	50.33	44.61	-5.72	74.00	29.39	150	99	PK	Vertical	PASS
7	1147.00	53.59	30.95	-22.64	54.00	23.05	150	294	AV	Vertical	PASS
8	1402.00	51.70	30.38	-21.32	54.00	23.62	150	81	AV	Vertical	PASS
9	1724.00	52.29	32.78	-19.51	54.00	21.22	150	78	AV	Vertical	PASS
10	3190.00	44.32	31.09	-13.23	54.00	22.91	150	108	AV	Vertical	PASS
11	4265.00	43.64	35.88	-7.76	54.00	18.12	150	160	AV	Vertical	PASS
12	5663.00	41.61	35.89	-5.72	54.00	18.11	150	99	AV	Vertical	PASS

Note:

(1) Level=Reading + Factor

(2) Margin=Limit-Level