

ANNEX A: Test Result

The radiated emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in lie-down position (X axis) and the loop antenna is vertical, the others are vertical and horizontal. and the worst case was recorded.

1. Unwanted Emission

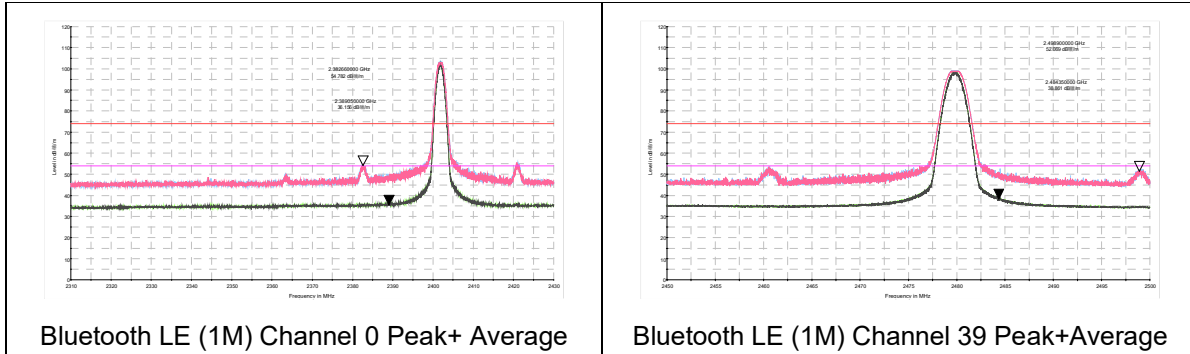
1.1. Bluetooth LE

The following graphs display the maximum values of horizontal and vertical by software. Blue trace uses the peak detection, Green trace uses the average detection.

A symbol ($\text{dB}_{\text{磁}}/\text{m}$) in the test plot below means ($\text{dB}\mu\text{V}/\text{m}$)

The signal beyond the limit is carrier.

After the pretest, Bluetooth LE (1M) was selected as the worst Mode for Bluetooth LE.



Result of RE

Sweep the whole frequency band through the range from 9kHz to the 10th harmonic of the carrier. The Radiates Emission from 9kHz to 30MHz and 18GHz to 26.5GHz are more than 20dB below the limit are not reported.

Remark:

1. **Correction Factor = Antenna factor + Insertion loss (cable loss + amplifier gain)**
2. **Margin = Limit – Quasi-Peak/ MAX Peak/ Average**
3. **The following graphs display the maximum values of horizontal and vertical by software.**
4. **For below 1GHz**

~ QP Level @Spectrum Overview H
 ~ QP Level @Spectrum Overview V
 ◆ QP Level @Final Results
 — QP Limit

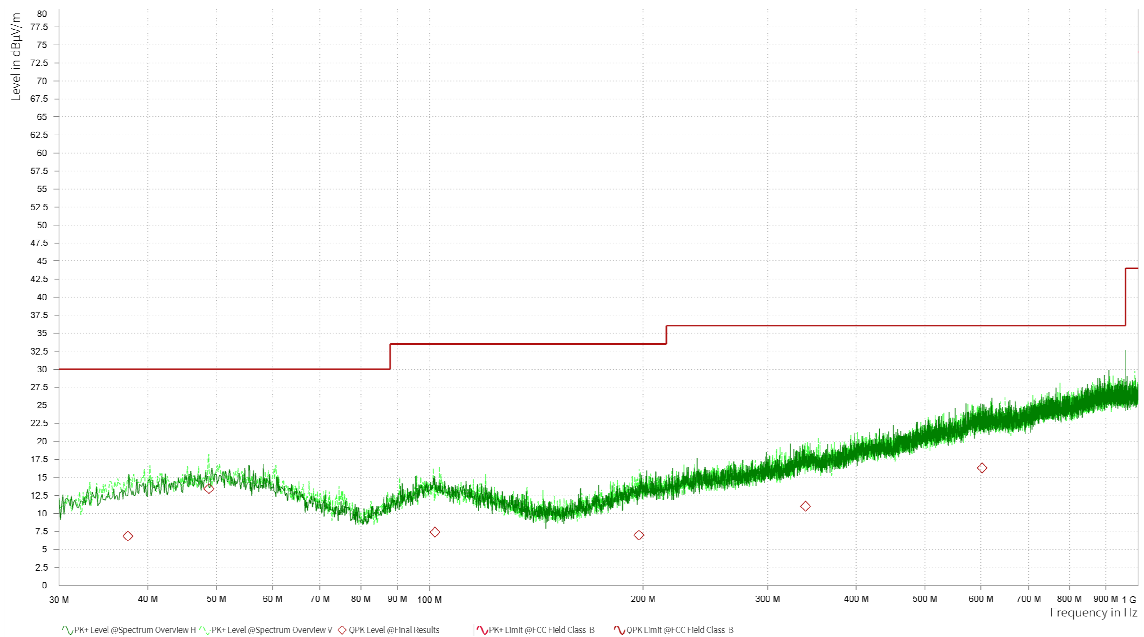
For above 1GHz

~ PK Level @Spectrum Overview H
 ~ PK Level @Spectrum Overview V
 ◆ PK Level @Final Results
 — PK Limit
~ AVG Level @Spectrum Overview H
 ~ AVG Level @Spectrum Overview V
 ◆ AVG Level @Final Results
 — AVG Limit

Continuous TX mode:

During the test, the Radiates Emission from 30MHz to 1GHz was performed in all modes with all channels. The test data of the worst-case condition was recorded in this report.

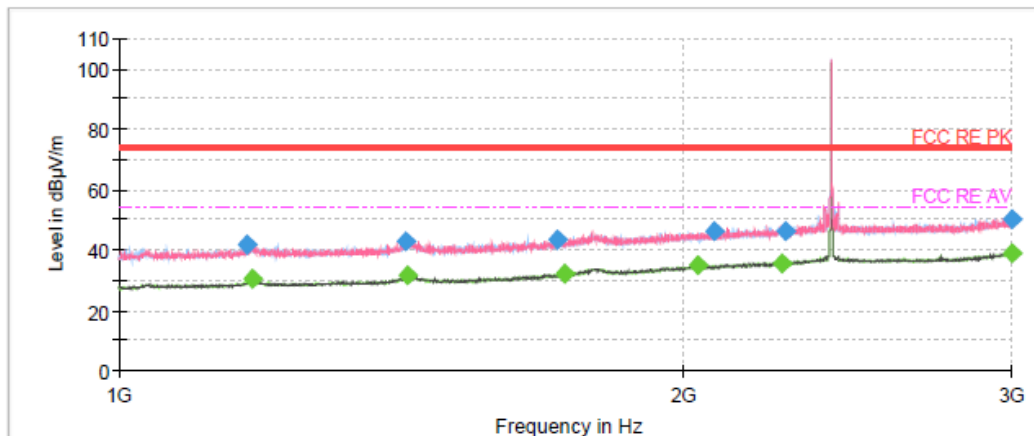
Spectrum Overview H/V



Radiates Emission from 30MHz to 1GHz

Frequency [MHz]	QPK Level [dBμV/m]	QPK Limit [dBμV/m]	QPK Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]	Meas. BW [kHz]	Meas. Time [s]
37.519	6.83	30.00	23.17	-9.96	H	149.6	1.07	120.000	1.000
48.794	13.39	30.00	16.61	-8.10	V	124	1.17	120.000	1.000
101.726	7.36	33.50	26.14	-9.81	V	188.5	1.17	120.000	1.000
197.460	6.94	33.50	26.56	-9.96	V	89.1	1.17	120.000	1.000
339.124	10.95	36.00	25.05	-5.92	V	182.6	1.25	120.000	1.000
602.112	16.27	36.00	19.73	-0.75	H	188.3	1.10	120.000	1.000

Bluetooth LE-Channel 0

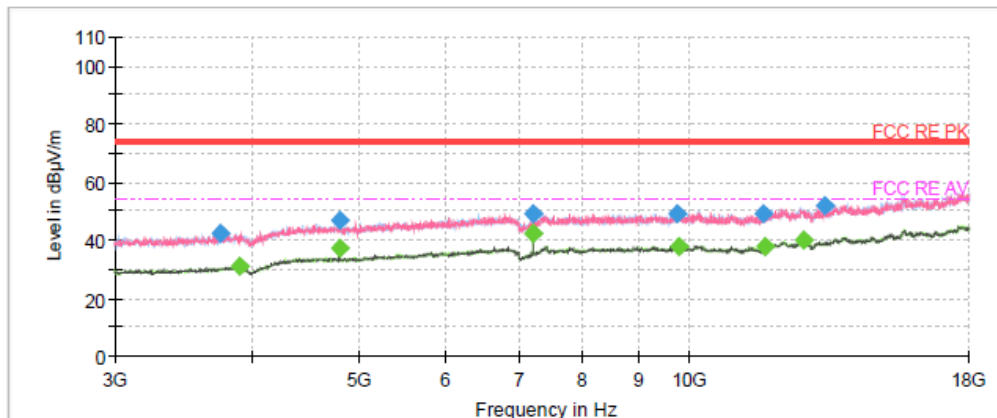


Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1171.000000	41.54	---	74.00	32.46	500.0	100.0	V	330.0	-6
1179.000000	---	30.36	54.00	23.64	500.0	200.0	V	208.0	-6
1422.750000	43.00	---	74.00	31.00	500.0	100.0	H	37.0	-4
1425.250000	---	31.46	54.00	22.54	500.0	100.0	H	102.0	-4
1715.000000	43.48	---	74.00	30.52	500.0	200.0	H	236.0	-2
1729.000000	---	32.08	54.00	21.92	500.0	100.0	V	227.0	-2
2040.500000	---	35.16	54.00	18.84	500.0	200.0	H	340.0	0
2080.000000	46.34	---	74.00	27.66	500.0	100.0	V	190.0	0
2259.750000	---	35.41	54.00	18.59	500.0	100.0	H	198.0	1
2271.750000	46.28	---	74.00	27.72	500.0	200.0	V	170.0	1
2999.000000	---	39.06	54.00	14.94	500.0	200.0	V	78.0	3
2999.250000	50.44	---	74.00	23.56	500.0	100.0	V	293.0	3

Note: The signal beyond the limit is carrier.

Radiates Emission from 1GHz to 3GHz

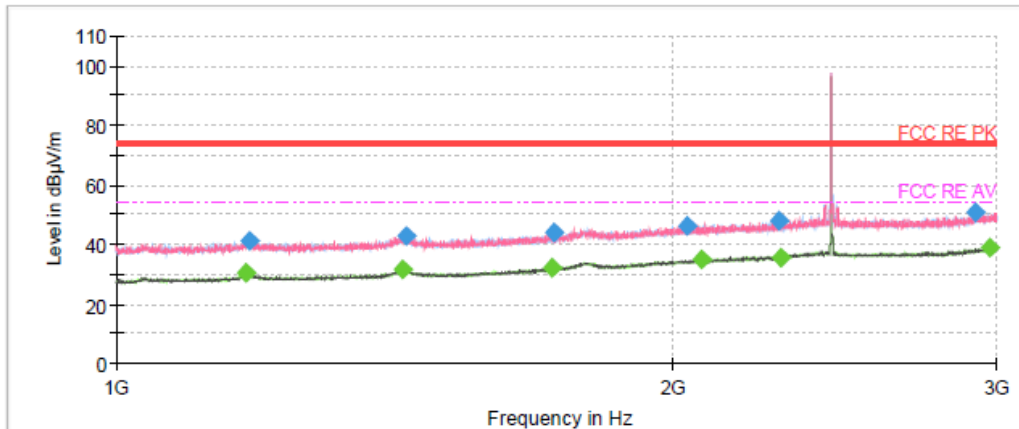


Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
3736.875000	42.14	---	74.00	31.86	500.0	100.0	V	64.0	-6
3890.625000	---	30.91	54.00	23.09	500.0	100.0	V	215.0	-5
4801.875000	46.62	---	74.00	27.38	500.0	200.0	H	118.0	-2
4803.750000	---	37.14	54.00	16.86	500.0	200.0	H	97.0	-2
7205.625000	49.34	---	74.00	24.66	500.0	100.0	V	115.0	1
7205.625000	---	42.18	54.00	11.82	500.0	200.0	V	115.0	1
9768.750000	49.31	---	74.00	24.69	500.0	100.0	H	236.0	3
9796.875000	---	38.00	54.00	16.00	500.0	200.0	V	0.0	3
11683.125000	48.99	---	74.00	25.01	500.0	100.0	V	175.0	3
11731.875000	---	37.84	54.00	16.16	500.0	100.0	H	104.0	3
12721.875000	---	39.79	54.00	14.21	500.0	200.0	H	88.0	5
13301.250000	51.69	---	74.00	22.31	500.0	200.0	H	0.0	5

Radiates Emission from 3GHz to 18GHz

Bluetooth LE-Channel 19

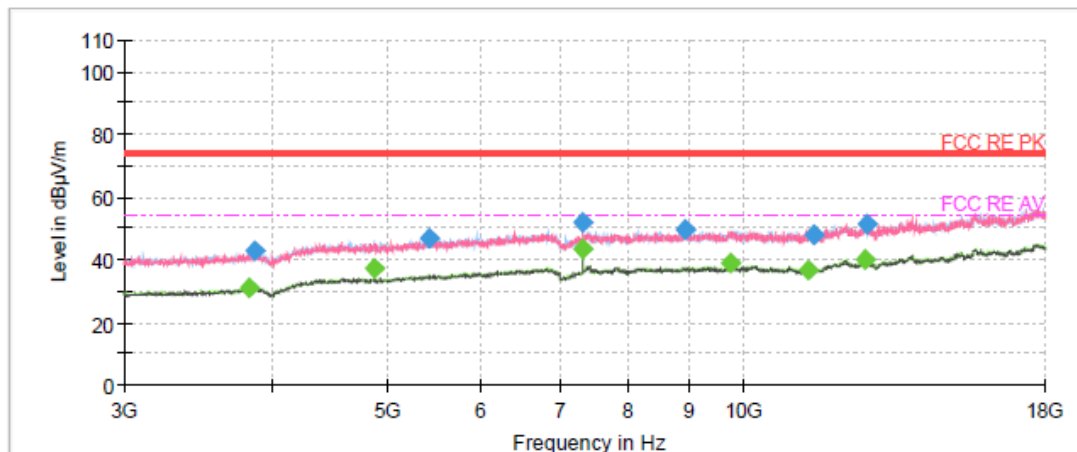


Final Result

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1176.250000	---	30.23	54.00	23.77	500.0	200.0	V	96.0	-6
1182.000000	40.99	---	74.00	33.01	500.0	100.0	V	41.0	-6
1429.500000	---	31.56	54.00	22.44	500.0	200.0	H	236.0	-4
1436.500000	42.98	---	74.00	31.02	500.0	200.0	V	4.0	-4
1723.250000	---	32.09	54.00	21.91	500.0	100.0	H	74.0	-2
1726.750000	43.96	---	74.00	30.04	500.0	100.0	H	28.0	-2
2039.750000	46.50	---	74.00	27.50	500.0	200.0	V	291.0	0
2075.750000	---	34.72	54.00	19.28	500.0	100.0	V	70.0	0
2283.750000	48.11	---	74.00	25.89	500.0	200.0	H	283.0	1
2289.750000	---	35.64	54.00	18.36	500.0	100.0	H	28.0	1
2917.500000	50.68	---	74.00	23.32	500.0	100.0	H	2.0	3
2970.500000	---	39.07	54.00	14.93	500.0	200.0	V	198.0	3

Note: The signal beyond the limit is carrier.

Radiates Emission from 1GHz to 3GHz

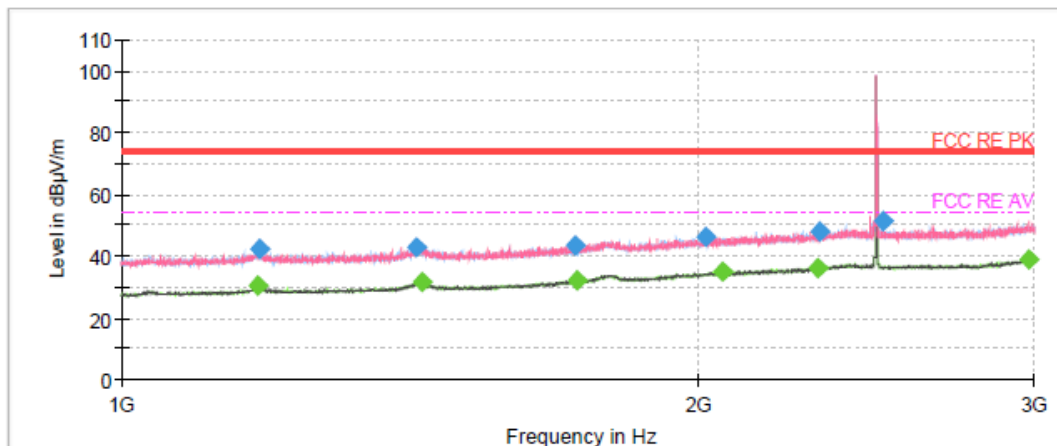


Final Result

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
3823.125000	---	30.89	54.00	23.11	500.0	100.0	H	62.0	-5
3862.500000	42.64	---	74.00	31.36	500.0	200.0	H	349.0	-5
4878.750000	---	37.23	54.00	16.78	500.0	200.0	V	114.0	-2
5431.875000	46.75	---	74.00	27.25	500.0	100.0	H	143.0	0
7318.125000	---	43.22	54.00	10.78	500.0	200.0	H	106.0	2
7320.000000	51.72	---	74.00	22.28	500.0	100.0	V	114.0	2
8940.000000	49.36	---	74.00	24.64	500.0	100.0	H	102.0	3
9759.375000	---	38.94	54.00	15.06	500.0	100.0	H	93.0	3
11338.125000	---	36.82	54.00	17.18	500.0	100.0	H	42.0	2
11491.875000	47.82	---	74.00	26.18	500.0	100.0	H	224.0	3
12695.625000	---	40.27	54.00	13.73	500.0	200.0	H	258.0	5
12725.625000	51.24	---	74.00	22.76	500.0	200.0	V	184.0	5

Radiates Emission from 3GHz to 18GHz

Bluetooth LE-Channel 39

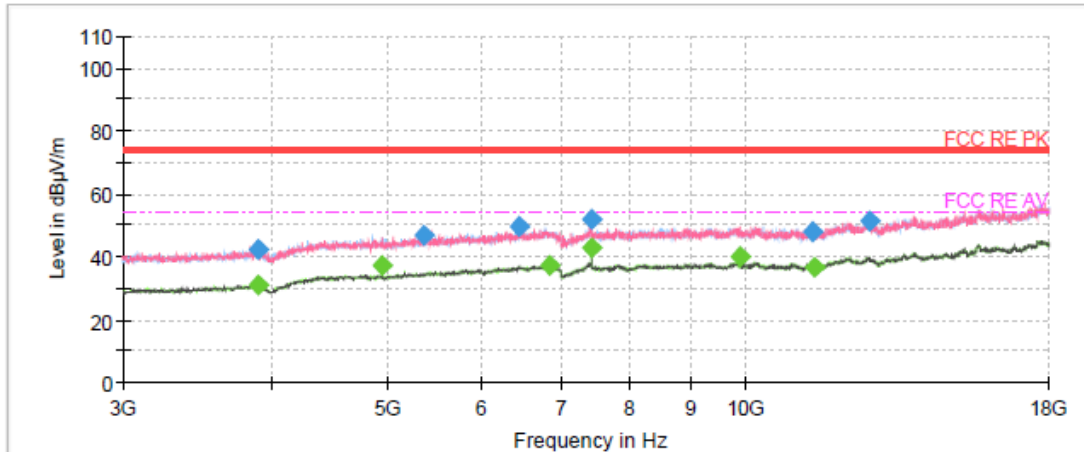


Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1177.500000	---	30.20	54.00	23.80	500.0	100.0	H	208.0	-6
1179.750000	42.56	---	74.00	31.44	500.0	100.0	H	198.0	-6
1427.500000	42.97	---	74.00	31.03	500.0	200.0	V	3.0	-4
1435.500000	---	31.50	54.00	22.50	500.0	100.0	H	58.0	-4
1726.250000	43.35	---	74.00	30.65	500.0	200.0	H	0.0	-2
1728.750000	---	32.05	54.00	21.95	500.0	200.0	H	358.0	-2
2019.000000	46.22	---	74.00	27.78	500.0	200.0	H	42.0	0
2062.000000	---	35.02	54.00	18.98	500.0	100.0	V	292.0	0
2309.250000	---	36.14	54.00	17.86	500.0	200.0	V	3.0	1
2317.000000	47.69	---	74.00	26.31	500.0	100.0	V	124.0	1
2499.250000	51.43	---	74.00	22.57	500.0	200.0	V	235.0	1
2979.750000	---	38.90	54.00	15.10	500.0	100.0	V	78.0	3

Note: The signal beyond the limit is carrier.

Radiates Emission from 1GHz to 3GHz



Final Result

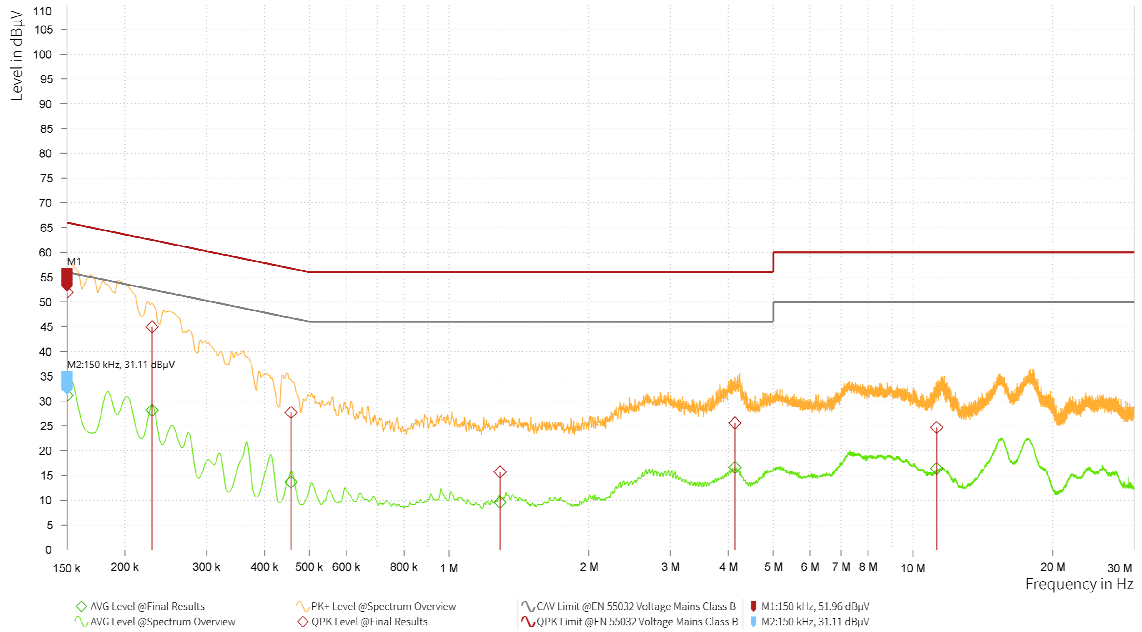
Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
3890.625000	---	30.94	54.00	23.06	500.0	200.0	V	62.0	-5
3896.250000	42.34	---	74.00	31.66	500.0	100.0	V	220.0	-5
4959.375000	---	37.37	54.00	16.63	500.0	100.0	H	123.0	-2
5379.375000	46.83	---	74.00	27.17	500.0	100.0	V	312.0	-1
6468.750000	49.51	---	74.00	24.49	500.0	100.0	V	321.0	1
6862.500000	---	37.23	54.00	16.77	500.0	200.0	H	247.0	1
7438.125000	52.02	---	74.00	21.98	500.0	200.0	H	115.0	2
7440.000000	---	43.08	54.00	10.92	500.0	100.0	V	107.0	2
9918.750000	---	39.87	54.00	14.13	500.0	200.0	H	247.0	3
11396.250000	47.77	---	74.00	26.23	500.0	200.0	H	317.0	2
11458.125000	---	36.77	54.00	17.23	500.0	100.0	H	113.0	3
12721.875000	51.22	---	74.00	22.78	500.0	100.0	H	3.0	5

Radiates Emission from 3GHz to 18GHz

2. Conducted Emission

2.1. Bluetooth LE

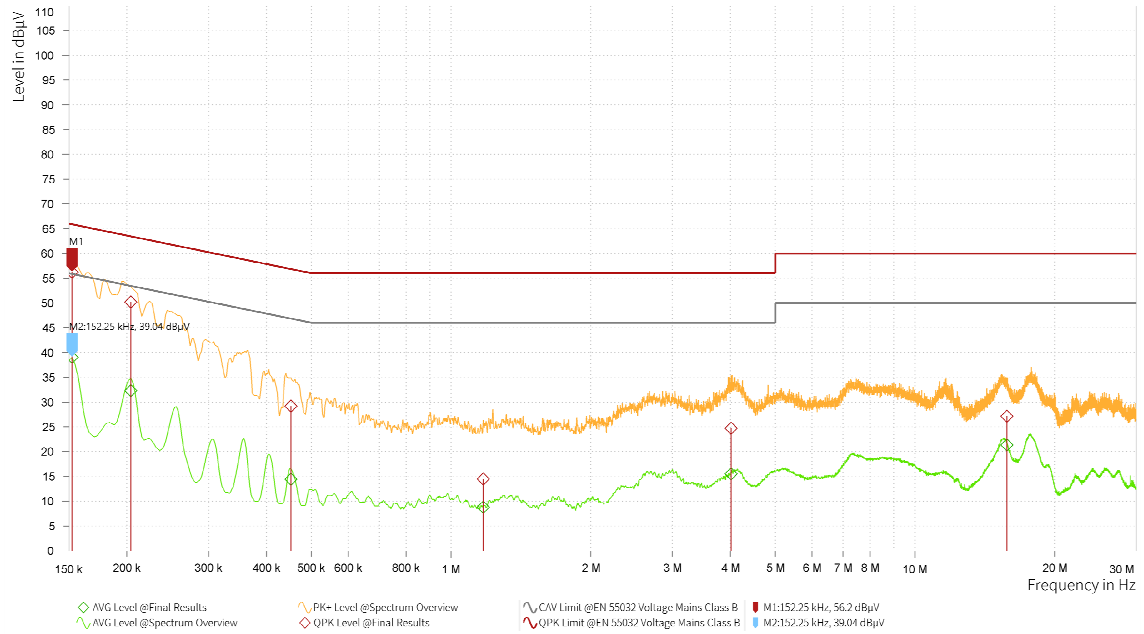
During the test, the Conducted Emission was performed in all modes with all channels. The test data of the worst-case condition was recorded in this report.



Frequency [MHz]	QPK Level [dBμV]	QPK Limit [dBμV]	QPK Margin [dB]	AVG Level [dBμV]	AVG: CAV Limit [dBμV]	AVG Margin [dB]	Correction [dB]	Line	Meas. BW [kHz]	Meas. Time [s]
0.150	51.96	66.00	14.04	31.11	56.00	24.89	20.90	L1	9.000	1.000
0.229	44.98	62.49	17.52	28.13	52.49	24.37	21.00	L1	9.000	1.000
0.456	27.70	56.77	29.06	13.65	46.77	33.12	20.82	L1	9.000	1.000
1.289	15.70	56.00	40.30	9.59	46.00	36.41	19.96	L1	9.000	1.000
4.135	25.57	56.00	30.43	16.60	46.00	29.40	19.42	L1	9.000	1.000
11.252	24.67	60.00	35.33	16.37	50.00	33.63	19.41	L1	9.000	1.000

Remark: Correct factor=cable loss + LISN factor

L line Conducted Emission from 150 kHz to 30 MHz



Frequency [MHz]	QPK Level [dBµV]	QPK Limit [dBµV]	QPK Margin [dB]	AVG Level [dBµV]	AVG: CAV Limit [dBµV]	AVG Margin [dB]	Correction [dB]	Line	Meas. BW [kHz]	Meas. Time [s]
0.152	56.20	65.88	9.68	39.04	55.88	16.83	20.91	N	9.000	1.000
0.204	50.16	63.45	13.28	32.32	53.45	21.13	21.02	N	9.000	1.000
0.452	29.16	56.85	27.69	14.40	46.85	32.45	20.83	N	9.000	1.000
1.174	14.49	56.00	41.51	8.79	46.00	37.21	20.04	N	9.000	1.000
4.016	24.71	56.00	31.29	15.52	46.00	30.48	19.44	N	9.000	1.000
15.779	27.13	60.00	32.87	21.37	50.00	28.63	19.56	N	9.000	1.000

Remark: Correct factor=cable loss + LISN factor

N line Conducted Emission from 150 kHz to 30 MHz