

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 (Y axis) and the loop antenna is coplanar, the others are vertical and horizontal. and the worst case was recorded.

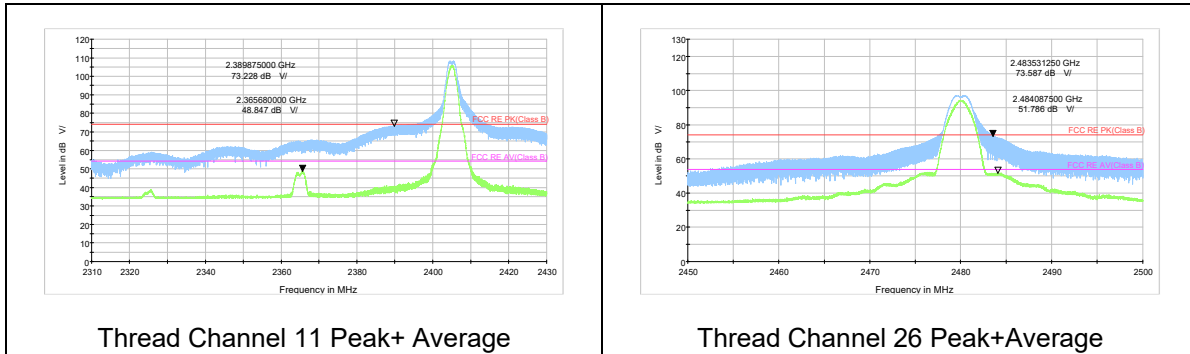
1. Unwanted Emission

1.1. Thread

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

The signal beyond the limit is carrier.



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. A symbol ($\text{dB } \mu\text{V/m}$) in the test plot below means ($\text{dB}\mu\text{V/m}$)
4. The following graphs display the maximum values of coaxial and coplanar for 9k-30MHz; horizontal and vertical for above 30MHz by software.
5. For below 1GHz

 QP Level @Spectrum Overview H
  QP Level @Spectrum Overview V
  QP Level @Final Results
  QP Limit

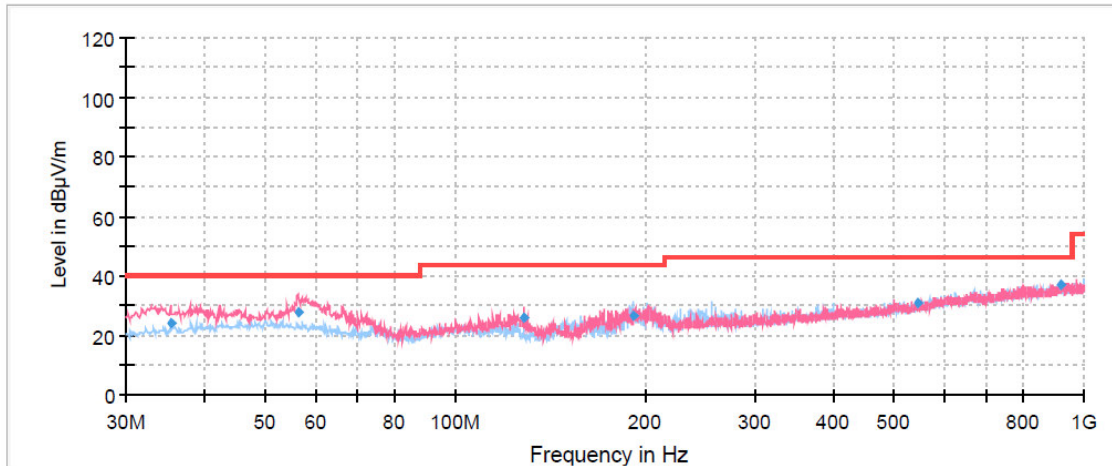
For above 1GHz

 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 (**Thread-Channel 11**) was recorded in this report.

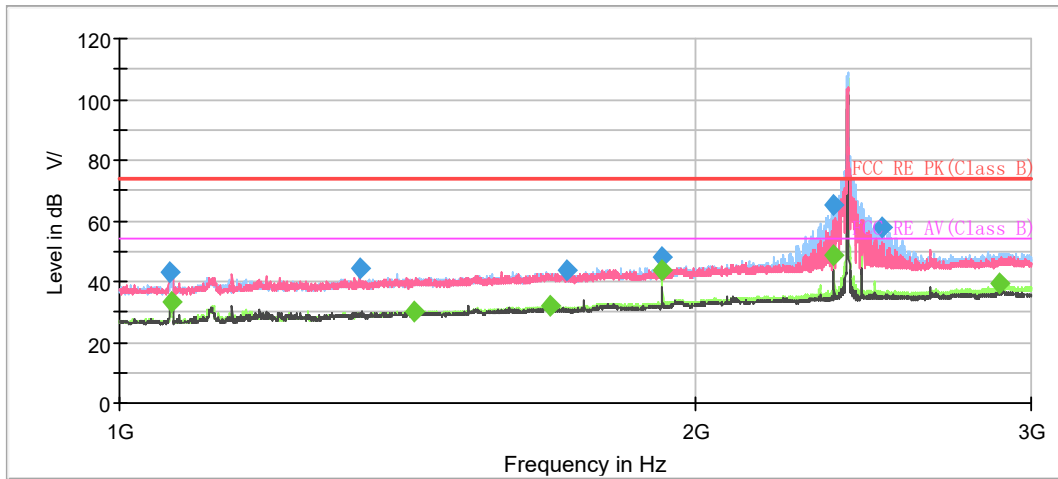


Radiates Emission from 30MHz to 1GHz

Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
35.34	23.82	40.00	16.18	1000.00	100.0	V	12.00	18
56.43	27.47	40.00	12.53	1000.00	100.0	V	12.00	20
128.46	26.02	43.50	17.48	1000.00	100.0	V	200.00	16
191.75	26.31	43.50	17.19	1000.00	200.0	H	272.00	18
545.31	30.99	46.00	15.01	1000.00	200.0	H	25.00	26
915.13	36.71	46.00	9.29	1000.00	100.0	H	230.00	31

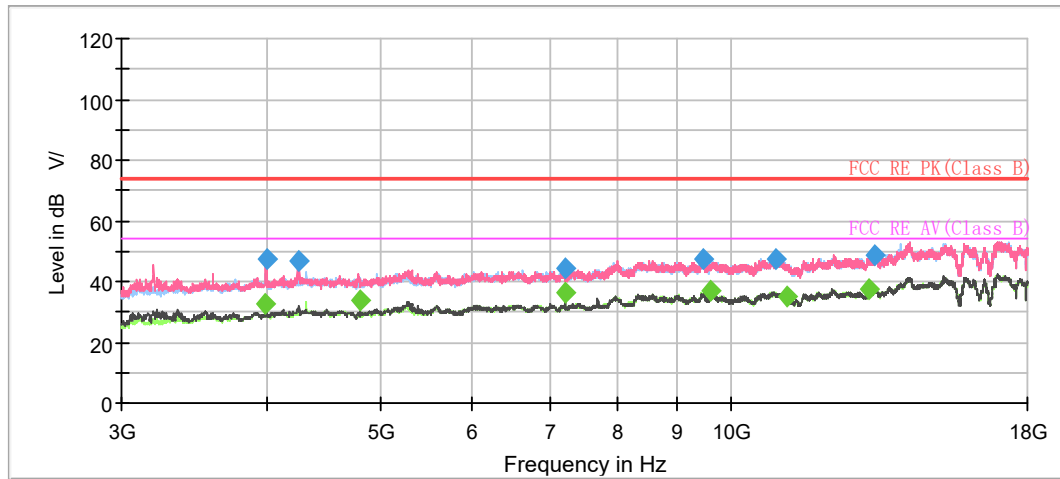
Thread-Channel 11



Note: The signal beyond the limit is carrier.

Radiates Emission from 1GHz to 3GHz

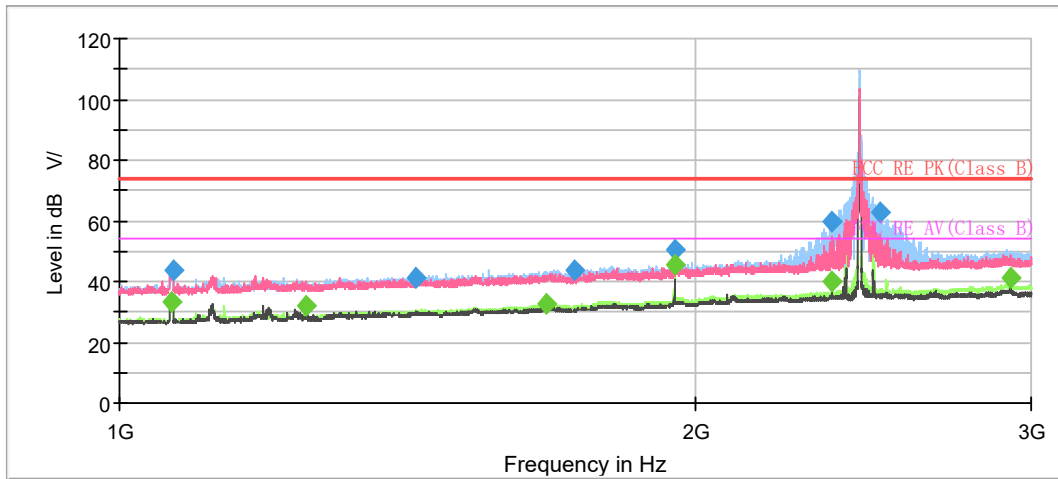
Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1063.500000	43.12	---	74.00	30.88	500.0	200.0	V	204.0	-16.0
1065.500000	---	32.98	54.00	21.02	500.0	200.0	V	204.0	-16.0
1334.750000	44.08	---	74.00	29.92	500.0	200.0	V	236.0	-13.5
1426.750000	---	30.19	54.00	23.81	500.0	100.0	H	0.0	-12.8
1681.250000	---	31.99	54.00	22.01	500.0	100.0	H	0.0	-10.7
1712.750000	43.51	---	74.00	30.49	500.0	200.0	H	66.0	-10.8
1924.000000	47.98	---	74.00	26.02	500.0	100.0	H	296.0	-9.6
1924.000000	---	43.58	54.00	10.42	500.0	100.0	H	296.0	-9.6
2364.750000	65.19	---	74.00	8.81	500.0	100.0	H	330.0	-6.1
2365.750000	---	48.73	54.00	5.27	500.0	100.0	H	0.0	-6.1
2508.750000	57.73	---	74.00	16.27	500.0	100.0	H	355.0	-5.4
2885.000000	---	39.21	54.00	14.79	500.0	100.0	H	355.0	-3.7



Radiates Emission from 3GHz to 18GHz

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
3984.375000	---	32.81	54.00	21.19	500.0	200.0	V	158.0	-10.3
3995.625000	47.41	---	74.00	26.59	500.0	200.0	V	158.0	-10.1
4250.625000	46.51	---	74.00	27.49	500.0	100.0	V	190.0	-9.1
4809.375000	---	33.92	54.00	20.08	500.0	200.0	H	329.0	-9.1
7213.125000	44.15	---	74.00	29.85	500.0	100.0	V	134.0	-2.0
7215.000000	---	36.52	54.00	17.48	500.0	100.0	V	0.0	-2.0
9465.000000	47.15	---	74.00	26.85	500.0	100.0	V	26.0	1.0
9620.625000	---	36.84	54.00	17.16	500.0	100.0	V	311.0	0.0
10951.875000	47.17	---	74.00	26.83	500.0	100.0	H	124.0	1.5
11169.375000	---	35.27	54.00	18.73	500.0	200.0	H	0.0	0.5
13173.750000	---	37.57	54.00	16.43	500.0	100.0	V	0.0	2.6
13327.500000	48.77	---	74.00	25.23	500.0	200.0	H	179.0	2.2

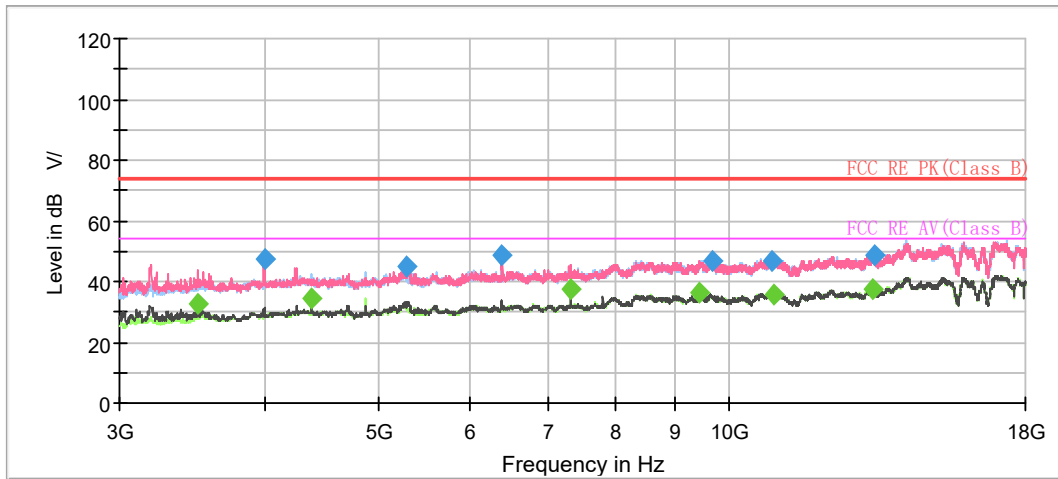
Thread-Channel 18



Note: The signal beyond the limit is carrier.

Radiates Emission from 1GHz to 3GHz

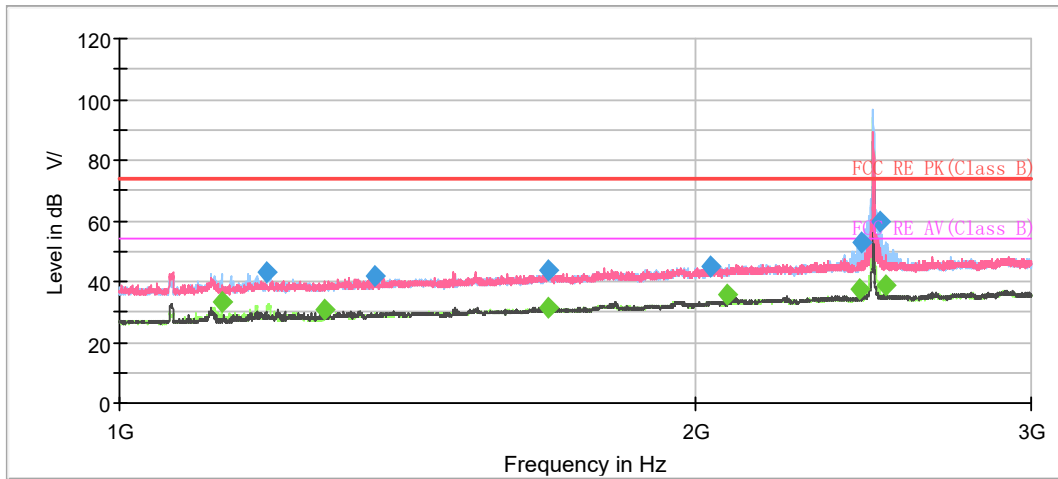
Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1065.250000	---	33.28	54.00	20.72	500.0	200.0	V	210.0	-16.0
1066.500000	43.77	---	74.00	30.23	500.0	200.0	V	210.0	-16.0
1252.000000	---	31.76	54.00	22.24	500.0	200.0	V	110.0	-14.4
1428.750000	41.53	---	74.00	32.47	500.0	200.0	H	241.0	-12.7
1672.000000	---	32.36	54.00	21.64	500.0	200.0	H	230.0	-10.8
1730.000000	43.92	---	74.00	30.08	500.0	200.0	H	4.0	-11.1
1952.000000	50.39	---	74.00	23.61	500.0	200.0	H	292.0	-8.9
1952.000000	---	45.76	54.00	8.24	500.0	100.0	H	275.0	-8.9
2361.000000	---	40.21	54.00	13.79	500.0	200.0	H	292.0	-6.1
2361.500000	59.87	---	74.00	14.13	500.0	200.0	H	309.0	-6.1
2500.500000	62.96	---	74.00	11.04	500.0	200.0	H	309.0	-5.4
2929.000000	---	41.25	54.00	12.75	500.0	200.0	H	309.0	-3.3



Radiates Emission from 3GHz to 18GHz

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
3506.250000	---	32.80	54.00	21.20	500.0	100.0	V	204.0	-10.9
3993.750000	47.29	---	74.00	26.71	500.0	200.0	V	145.0	-10.1
4391.250000	---	34.49	54.00	19.51	500.0	200.0	H	328.0	-8.7
5295.000000	44.85	---	74.00	29.15	500.0	100.0	V	0.0	-5.9
6399.375000	48.77	---	74.00	25.23	500.0	200.0	V	241.0	-4.7
7320.000000	---	37.47	54.00	16.53	500.0	200.0	H	274.0	-1.4
9459.375000	---	36.12	54.00	17.88	500.0	100.0	H	55.0	0.9
9697.500000	46.88	---	74.00	27.12	500.0	100.0	H	0.0	0.2
10905.000000	47.02	---	74.00	26.98	500.0	200.0	H	168.0	1.6
10957.500000	---	35.46	54.00	18.54	500.0	200.0	H	328.0	1.5
13323.750000	---	37.59	54.00	16.41	500.0	100.0	V	258.0	2.2
13344.375000	48.56	---	74.00	25.44	500.0	100.0	H	216.0	2.1

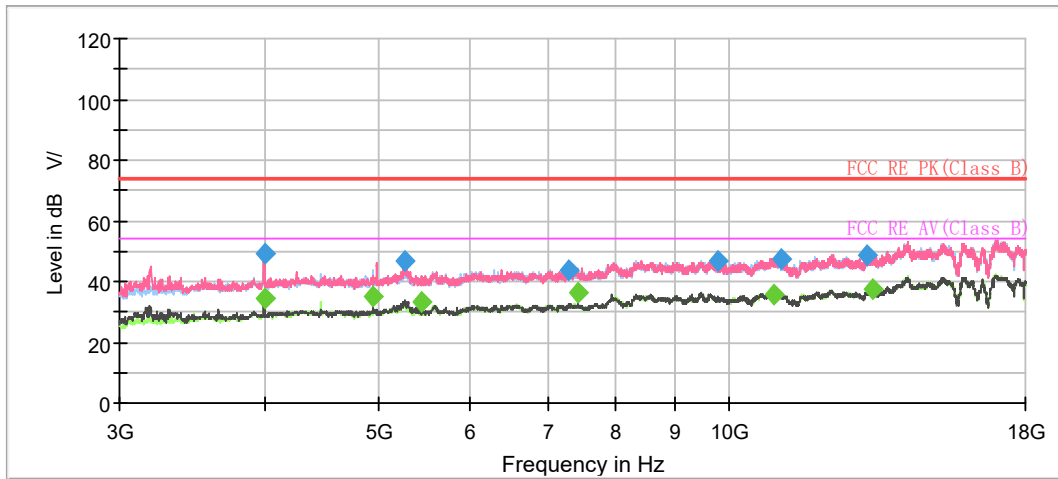
Thread-Channel 26



Note: The signal beyond the limit is carrier.

Radiates Emission from 1GHz to 3GHz

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1130.750000	---	33.32	54.00	20.68	500.0	100.0	H	221.0	-15.6
1195.500000	43.08	---	74.00	30.92	500.0	100.0	H	221.0	-14.6
1279.750000	---	30.79	54.00	23.21	500.0	200.0	V	181.0	-14.2
1361.250000	41.56	---	74.00	32.44	500.0	100.0	V	0.0	-13.4
1676.250000	43.64	---	74.00	30.36	500.0	100.0	H	75.0	-10.7
1677.000000	---	31.55	54.00	22.45	500.0	100.0	H	255.0	-10.7
2039.750000	44.77	---	74.00	29.23	500.0	100.0	V	137.0	-8.0
2079.000000	---	35.83	54.00	18.17	500.0	100.0	V	124.0	-8.0
2440.750000	---	37.41	54.00	16.59	500.0	100.0	H	320.0	-6.0
2442.750000	52.76	---	74.00	21.24	500.0	200.0	H	303.0	-6.0
2500.000000	59.47	---	74.00	14.53	500.0	200.0	H	291.0	-5.4
2519.250000	---	38.65	54.00	15.35	500.0	200.0	H	291.0	-5.5



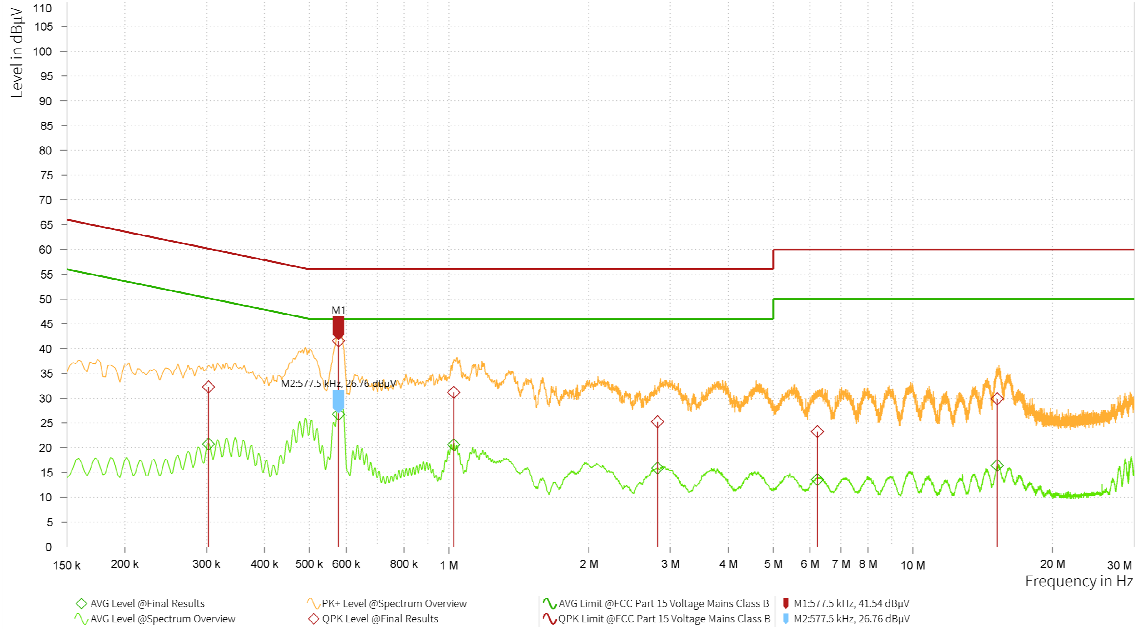
Radiates Emission from 3GHz to 18GHz

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
3995.625000	---	34.27	54.00	19.73	500.0	200.0	V	182.0	-10.1
3995.625000	49.35	---	74.00	24.65	500.0	200.0	V	182.0	-10.1
4959.375000	---	35.00	54.00	19.00	500.0	200.0	H	316.0	-7.3
5278.125000	46.68	---	74.00	27.32	500.0	100.0	V	152.0	-5.5
5456.250000	---	33.13	54.00	20.87	500.0	200.0	H	329.0	-7.1
7306.875000	43.63	---	74.00	30.37	500.0	100.0	H	135.0	-1.5
7440.000000	---	36.61	54.00	17.39	500.0	200.0	H	275.0	-1.6
9787.500000	46.90	---	74.00	27.10	500.0	100.0	H	201.0	-0.2
10931.250000	---	35.71	54.00	18.29	500.0	100.0	H	40.0	1.6
11100.000000	47.47	---	74.00	26.53	500.0	200.0	V	168.0	1.4
13171.875000	48.70	---	74.00	25.30	500.0	100.0	V	110.0	2.6
13325.625000	---	37.40	54.00	16.60	500.0	100.0	H	0.0	2.2

2. Conducted Emission

2.1. Thread

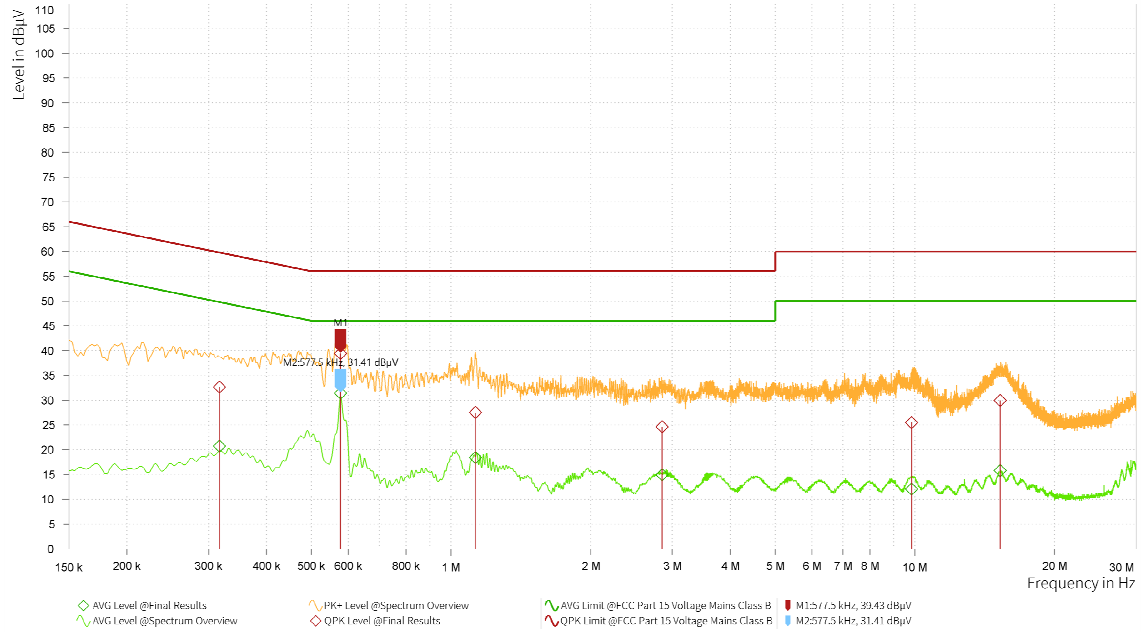
During the test, the Conducted Emission was performed in all modes with all channel. The test data of the worst-case condition (**Thread-Channel 11**) was recorded in this report.



Frequency [MHz]	QPK Level [dBμV]	QPK Limit [dBμV]	QPK Margin [dB]	AVG Level [dBμV]	AVG Limit [dBμV]	AVG Margin [dB]	Correction [dB]	Line	Meas. BW [kHz]	Meas. Time [s]
0.303	32.23	60.16	27.93	20.75	50.16	29.41	21.27	L1	9.000	1.000
0.578	41.54	56.00	14.46	26.76	46.00	19.24	21.05	L1	9.000	1.000
1.023	31.18	56.00	24.82	20.60	46.00	25.40	20.44	L1	9.000	1.000
2.816	25.23	56.00	30.77	15.88	46.00	30.12	19.86	L1	9.000	1.000
6.230	23.25	60.00	36.75	13.58	50.00	36.42	19.72	L1	9.000	1.000
15.207	29.88	60.00	30.12	16.41	50.00	33.59	19.77	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 Limit [dBμV]	AVG Margin [dB]	Correction [dB]	Line	Meas. BW [kHz]	Meas. Time [s]
0.317	32.62	59.80	27.17	20.72	49.80	29.08	21.21	N	9.000	1.000
0.578	39.43	56.00	16.57	31.41	46.00	14.59	21.00	N	9.000	1.000
1.129	27.52	56.00	28.48	18.40	46.00	27.60	20.40	N	9.000	1.000
2.852	24.63	56.00	31.37	14.94	46.00	31.06	19.84	N	9.000	1.000
9.839	25.46	60.00	34.54	12.03	50.00	37.97	19.73	N	9.000	1.000
15.277	29.94	60.00	30.06	15.80	50.00	34.20	19.81	N	9.000	1.000

Remark: Correct factor=cable loss + LISN factor

N line Conducted Emission from 150 kHz to 30 MHz