

ANNEX A: Test Result

1. Unwanted Emission

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 coplanar, the others are vertical and horizontal. and the worst case was recorded.

1.1. Bluetooth

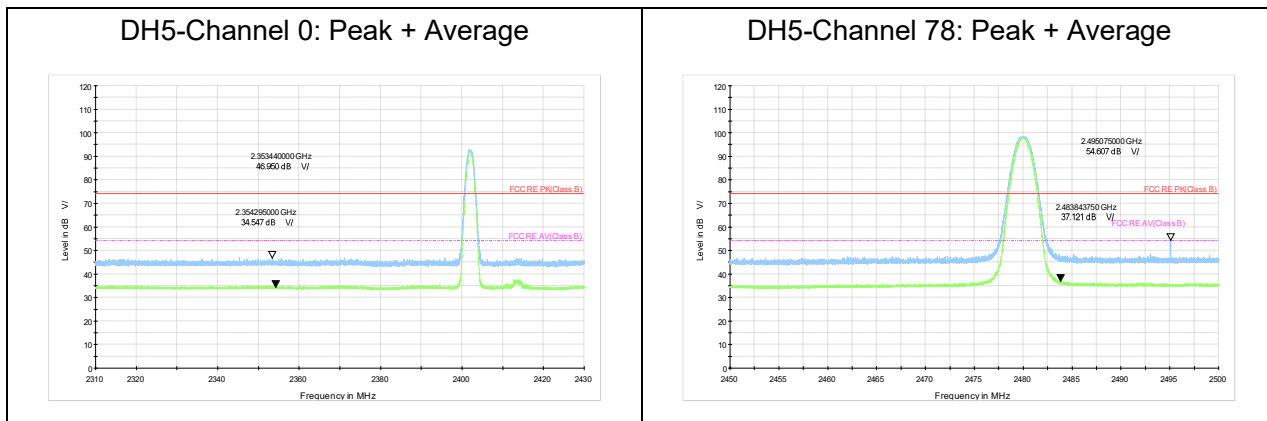
The following graphs display the maximum values of horizontal and vertical by software.
Blue trace uses the peak detection, Green trace uses the average detection.

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

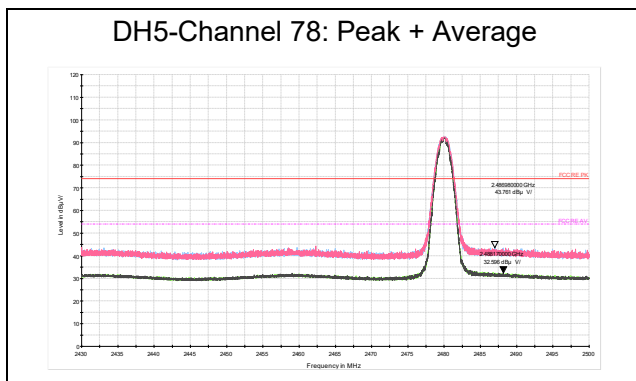
The signal beyond the limit is carrier.

The bandage was performed in all mode (DH5, 2DH5 and 3DH5), DH5 was selected as the worse condition. The test data of the worst-case condition was recorded in this report.

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Result of RE

Sweep the whole frequency band through the range from 9kHz to the 10th harmonic of the carrier.
The Radiates Emission from 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 horizontal and vertical by software.
5. For below 1GHz

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

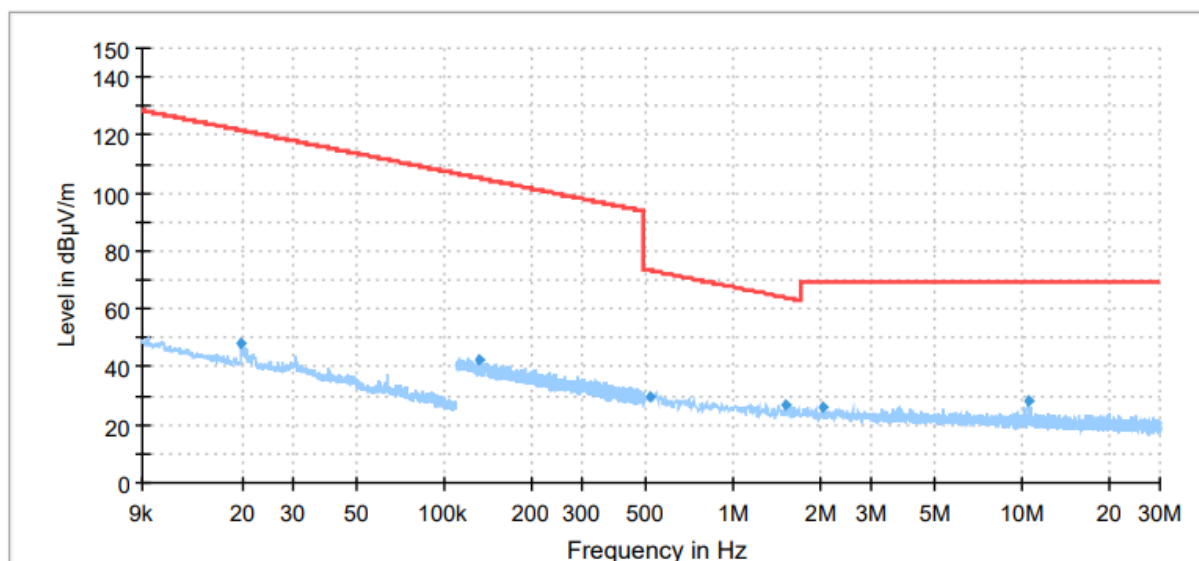
For above 1GHz

 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:

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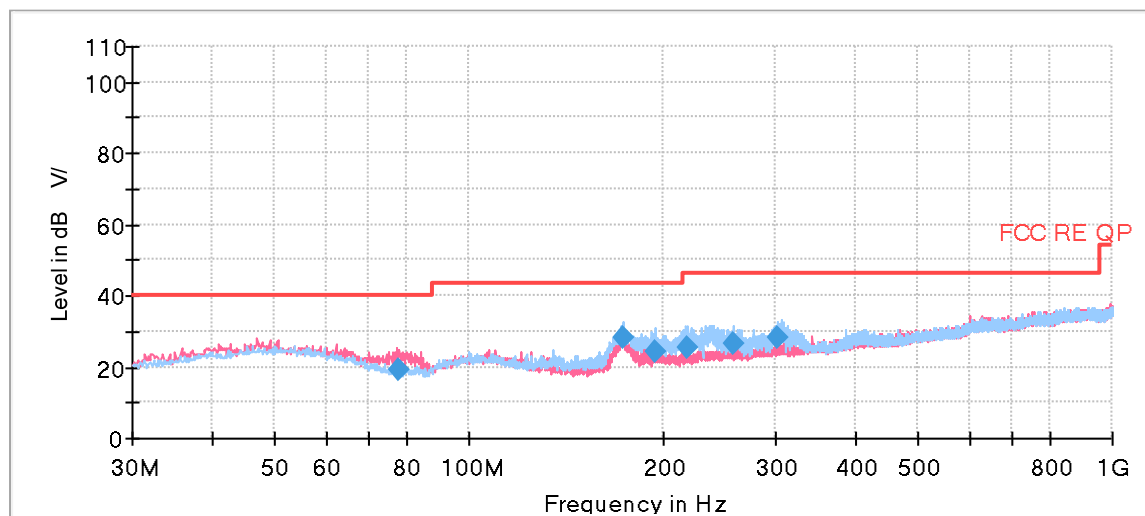
During the test, the Radiates Emission from 9kHz to 1GHz was performed in all modes with all channels. The test data of the worst-case condition was recorded in this report.



Radiates Emission from 9kHz to 30MHz

Final Result

Frequency (MHz)	MaxPeak (dB $\mu\text{V/m}$)	Limit (dB $\mu\text{V/m}$)	Margin (dB)	Meas. Time (ms)	Pol	Azimuth (deg)	Corr. (dB/m)
0.02	48.28	121.70	73.42	500.00	V	93.00	17
0.13	42.55	105.24	62.69	150.00	V	19.00	17
0.51	29.64	73.42	43.78	150.00	V	282.00	17
1.52	26.96	63.96	37.00	150.00	V	329.00	17
2.05	26.19	69.50	43.31	150.00	V	25.00	17
10.60	28.40	69.50	41.10	150.00	V	158.00	17

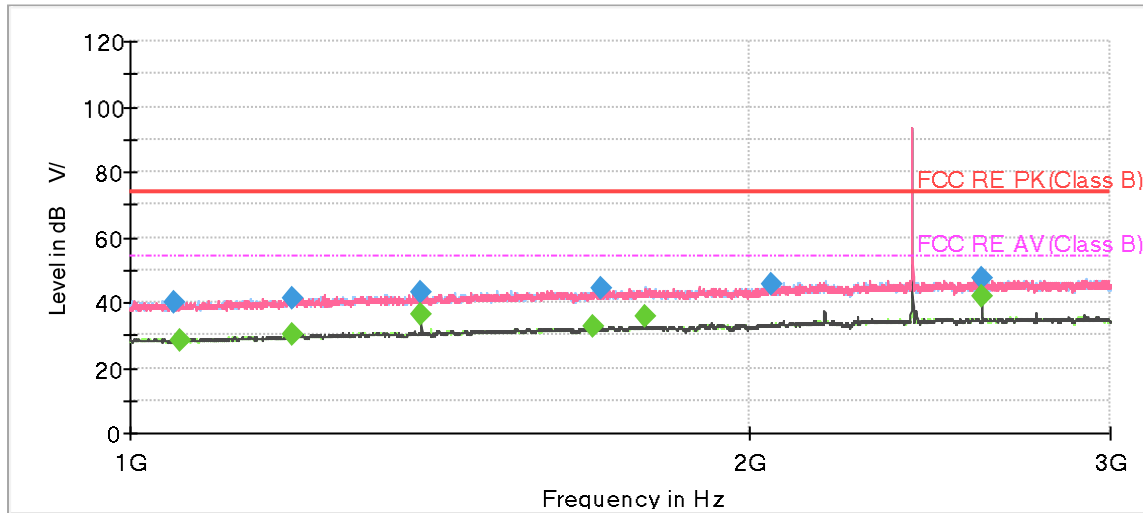


Radiates Emission from 30MHz to 1GHz

Frequency (MHz)	Quasi-Peak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Polarization	Azimuth (deg)	Correct Factor (dB)
77.728750	19.04	40.00	20.96	100.0	V	2.0	15.4
174.002500	28.28	43.50	15.22	175.0	H	283.0	20.2
194.695000	24.24	43.50	19.26	100.0	H	125.0	19.0
218.816250	25.50	46.00	20.50	100.0	H	123.0	18.8
258.032500	26.32	46.00	19.68	100.0	H	106.0	20.3
302.477500	28.28	46.00	17.72	100.0	H	211.0	21.2

The bandage was performed in all mode (DH5, 2DH5 and 3DH5), DH5 was selected as the worse condition. The test data of the worst-case condition was recorded in this report.

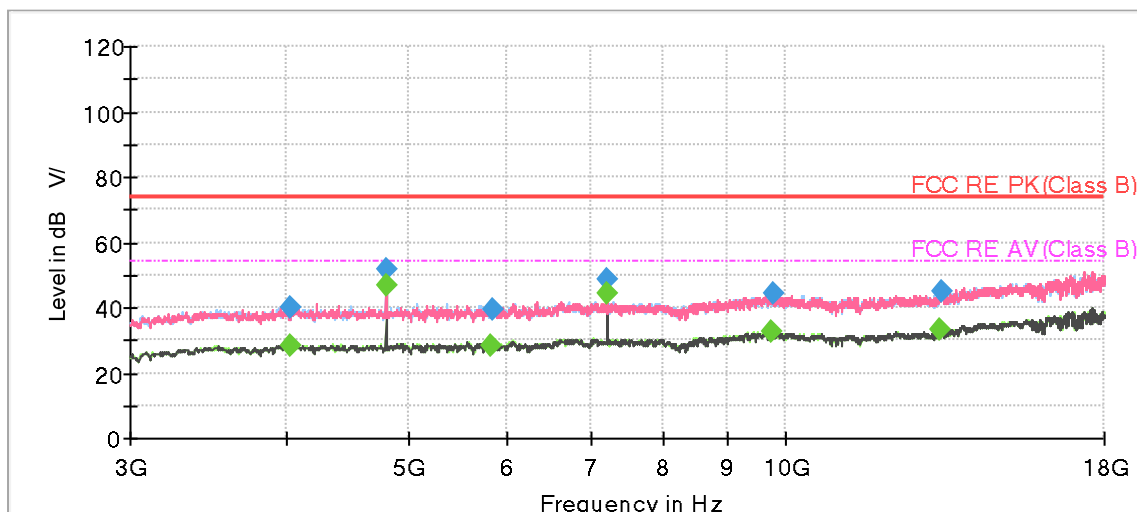
DH5-Channel 0



Note: The signal beyond the limit is carrier.

Radiates Emission from 1GHz to 3GHz

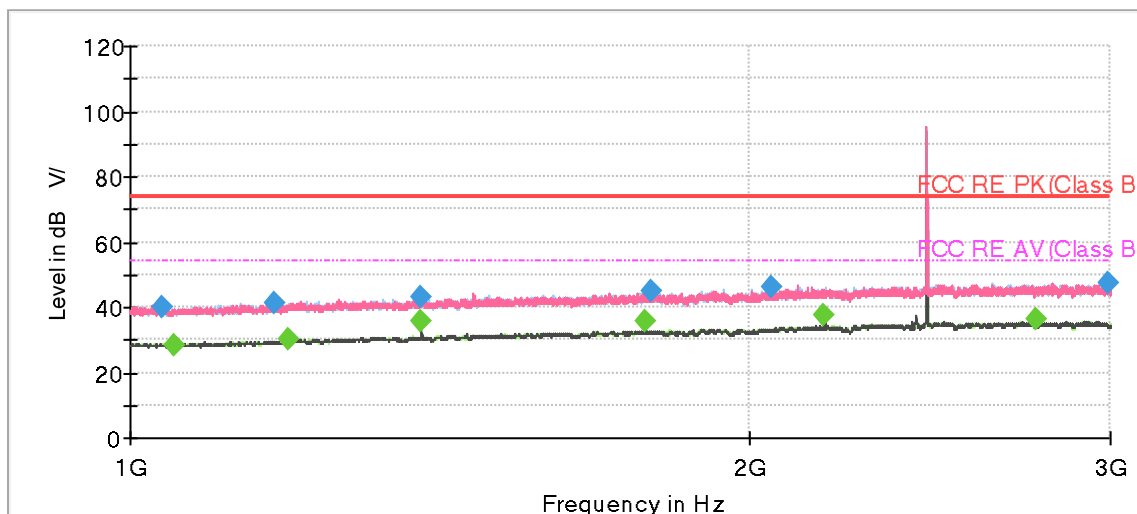
Frequency (MHz)	MaxPeak (dB μ V/m)	Average (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1051.250000	39.78	---	74.00	34.22	500.0	200.0	H	0.0	-10.5
1058.500000	---	28.43	54.00	25.57	500.0	200.0	H	120.0	-10.4
1200.500000	---	30.04	54.00	23.96	500.0	200.0	H	91.0	-8.8
1200.500000	41.15	---	74.00	32.85	500.0	200.0	V	18.0	-8.8
1385.750000	---	36.05	54.00	17.95	500.0	100.0	V	208.0	-7.7
1386.000000	43.35	---	74.00	30.65	500.0	200.0	V	200.0	-7.7
1681.250000	---	32.63	54.00	21.37	500.0	200.0	V	250.0	-6.0
1695.000000	44.12	---	74.00	29.88	500.0	200.0	H	329.0	-6.0
1782.000000	---	35.55	54.00	18.45	500.0	200.0	H	162.0	-5.6
2051.750000	45.59	---	74.00	28.41	500.0	200.0	H	322.0	-4.2
2600.000000	---	41.80	54.00	12.20	500.0	100.0	V	91.0	-2.0
2600.000000	47.33	---	74.00	26.67	500.0	100.0	V	91.0	-2.0



Radiates Emission from 3GHz to 18GHz

Frequency (MHz)	MaxPeak (dB μ V/m)	Average (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4035.000000	---	28.55	54.00	25.45	500.0	200.0	H	14.0	-6.7
4035.000000	40.15	---	74.00	33.85	500.0	200.0	H	14.0	-6.7
4803.750000	---	46.54	54.00	7.46	500.0	100.0	H	35.0	-6.1
4803.750000	51.77	---	74.00	22.23	500.0	100.0	H	35.0	-6.1
5818.125000	---	28.42	54.00	25.58	500.0	100.0	H	352.0	-4.9
5844.375000	39.32	---	74.00	34.68	500.0	200.0	V	213.0	-4.9
7205.625000	48.70	---	74.00	25.30	500.0	100.0	H	184.0	-3.0
7205.625000	---	44.02	54.00	9.98	500.0	100.0	H	184.0	-3.0
9774.375000	---	32.67	54.00	21.33	500.0	100.0	V	3.0	-0.5
9802.500000	44.21	---	74.00	29.79	500.0	200.0	V	352.0	-0.4
13312.500000	---	33.35	54.00	20.65	500.0	100.0	V	180.0	2.3
13338.750000	44.98	---	74.00	29.02	500.0	200.0	H	33.0	2.3

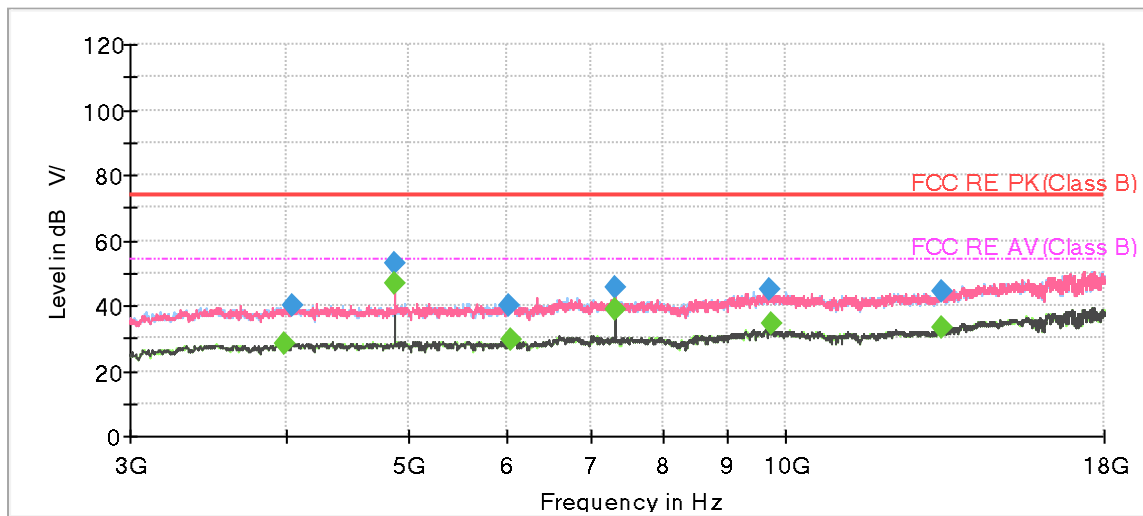
DH5-Channel 39



Note: The signal beyond the limit is carrier.

Radiates Emission from 1GHz to 3GHz

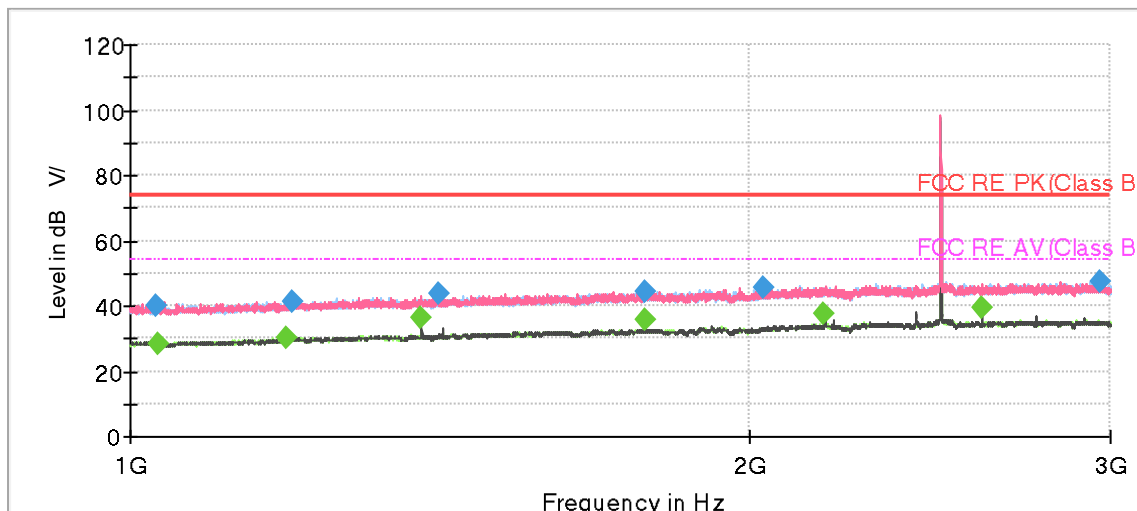
Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1037.750000	39.76	---	74.00	34.24	500.0	100.0	H	277.0	-10.5
1050.500000	---	28.54	54.00	25.46	500.0	100.0	H	253.0	-10.5
1175.750000	41.28	---	74.00	32.72	500.0	200.0	V	157.0	-9.3
1194.750000	---	30.23	54.00	23.77	500.0	100.0	V	338.0	-8.9
1386.000000	42.83	---	74.00	31.17	500.0	200.0	V	190.0	-7.7
1386.000000	---	35.96	54.00	18.04	500.0	200.0	V	190.0	-7.7
1781.750000	---	35.93	54.00	18.07	500.0	200.0	H	117.0	-5.6
1793.750000	44.84	---	74.00	29.16	500.0	200.0	H	1.0	-5.4
2052.750000	46.11	---	74.00	27.89	500.0	200.0	H	134.0	-4.2
2178.000000	---	37.66	54.00	16.34	500.0	100.0	V	255.0	-3.4
2760.250000	---	36.43	54.00	17.57	500.0	100.0	V	205.0	-1.5
2991.000000	47.47	---	74.00	26.53	500.0	200.0	V	332.0	-0.6



Radiates Emission from 3GHz to 18GHz

Frequency (MHz)	MaxPeak (dB μ V/m)	Average (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
3988.125000	---	28.61	54.00	25.39	500.0	100.0	V	122.0	-6.8
4036.875000	39.85	---	74.00	34.15	500.0	100.0	H	269.0	-6.7
4880.625000	---	46.63	54.00	7.37	500.0	200.0	H	187.0	-5.7
4882.500000	52.68	---	74.00	21.32	500.0	200.0	V	176.0	-5.7
6013.125000	39.91	---	74.00	34.09	500.0	200.0	H	259.0	-4.4
6054.375000	---	29.51	54.00	24.49	500.0	200.0	H	250.0	-4.1
7321.875000	---	38.54	54.00	15.46	500.0	100.0	H	184.0	-3.0
7323.750000	45.44	---	74.00	28.56	500.0	100.0	H	184.0	-3.0
9729.375000	44.68	---	74.00	29.32	500.0	200.0	V	240.0	-0.6
9763.125000	---	34.63	54.00	19.37	500.0	200.0	V	268.0	-0.5
13333.125000	44.30	---	74.00	29.70	500.0	100.0	V	0.0	2.3
13335.000000	---	33.36	54.00	20.64	500.0	200.0	H	283.0	2.3

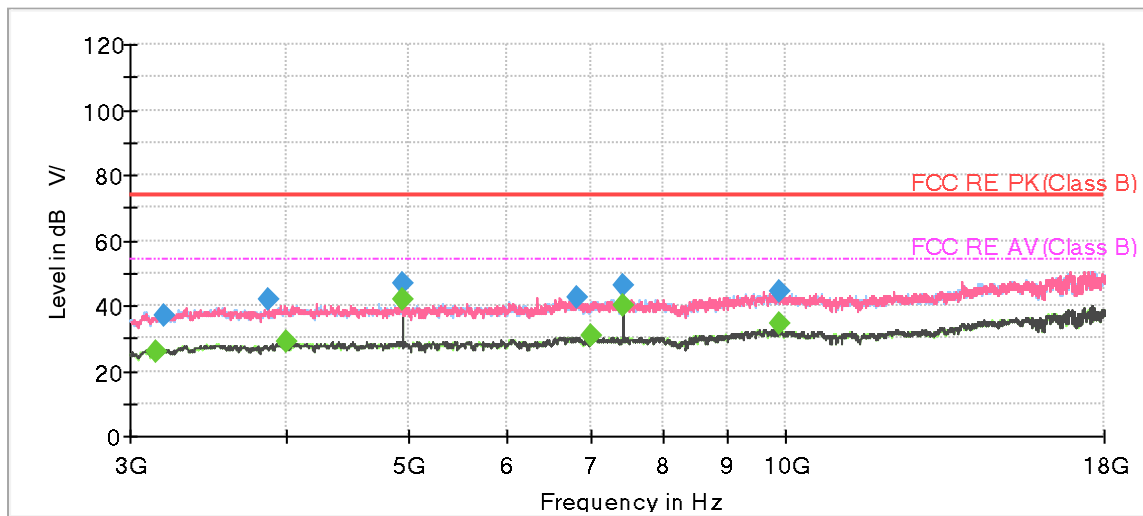
DH5-Channel 78



Note: The signal beyond the limit is carrier.

Radiates Emission from 1GHz to 3GHz

Frequency (MHz)	MaxPeak (dB μ V/m)	Average (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1030.000000	40.29	---	74.00	33.71	500.0	200.0	H	98.0	-10.6
1033.000000	---	28.45	54.00	25.55	500.0	200.0	H	224.0	-10.6
1191.750000	---	30.16	54.00	23.84	500.0	100.0	H	162.0	-9.0
1199.500000	41.41	---	74.00	32.59	500.0	100.0	V	0.0	-8.8
1386.000000	---	36.00	54.00	18.00	500.0	100.0	V	164.0	-7.7
1412.000000	43.41	---	74.00	30.59	500.0	200.0	V	100.0	-7.5
1782.000000	44.27	---	74.00	29.73	500.0	200.0	V	249.0	-5.6
1782.000000	---	35.72	54.00	18.28	500.0	200.0	H	165.0	-5.6
2032.750000	45.47	---	74.00	28.53	500.0	100.0	V	284.0	-4.3
2177.750000	---	37.31	54.00	16.69	500.0	100.0	V	263.0	-3.4
2600.000000	---	39.29	54.00	14.71	500.0	200.0	V	79.0	-2.0
2963.500000	47.48	---	74.00	26.52	500.0	100.0	V	38.0	-0.8

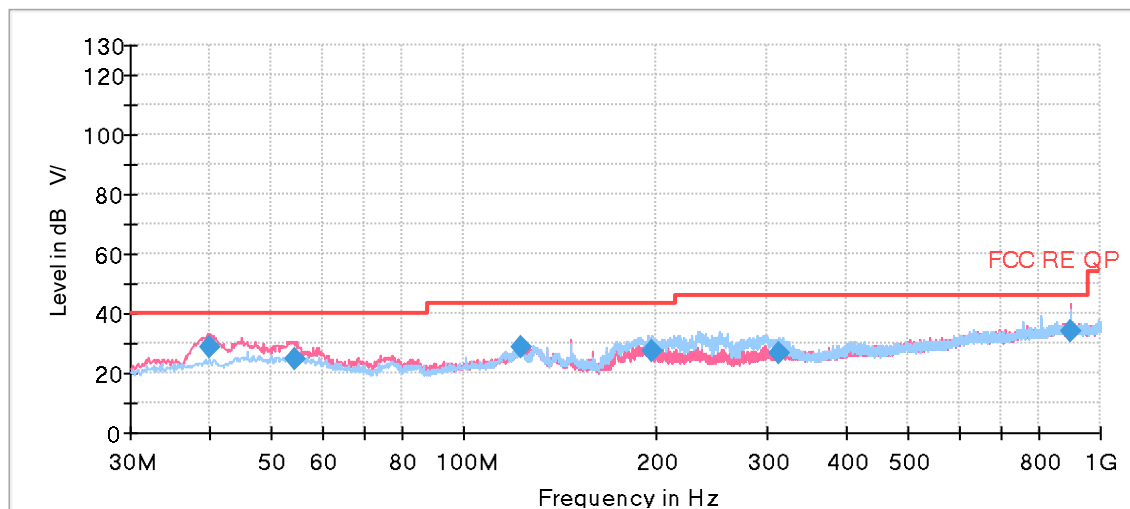


Radiates Emission from 3GHz to 18GHz

Frequency (MHz)	MaxPeak (dB μ V/m)	Average (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
3151.875000	---	25.97	54.00	28.03	500.0	200.0	H	28.0	-10.3
3191.250000	37.07	---	74.00	36.93	500.0	200.0	V	59.0	-10.0
3866.250000	41.67	---	74.00	32.33	500.0	200.0	V	326.0	-7.4
4006.875000	---	28.84	54.00	25.16	500.0	200.0	V	26.0	-6.8
4959.375000	---	41.89	54.00	12.11	500.0	100.0	H	30.0	-5.4
4959.375000	46.52	---	74.00	27.48	500.0	200.0	H	187.0	-5.4
6819.375000	42.28	---	74.00	31.72	500.0	200.0	H	322.0	-3.2
7001.250000	---	30.47	54.00	23.53	500.0	100.0	V	77.0	-3.0
7440.000000	45.98	---	74.00	28.02	500.0	100.0	H	187.0	-2.9
7440.000000	---	40.20	54.00	13.80	500.0	200.0	V	177.0	-2.9
9918.750000	44.60	---	74.00	29.40	500.0	200.0	V	271.0	-0.9
9920.625000	---	34.66	54.00	19.34	500.0	200.0	V	271.0	-0.9

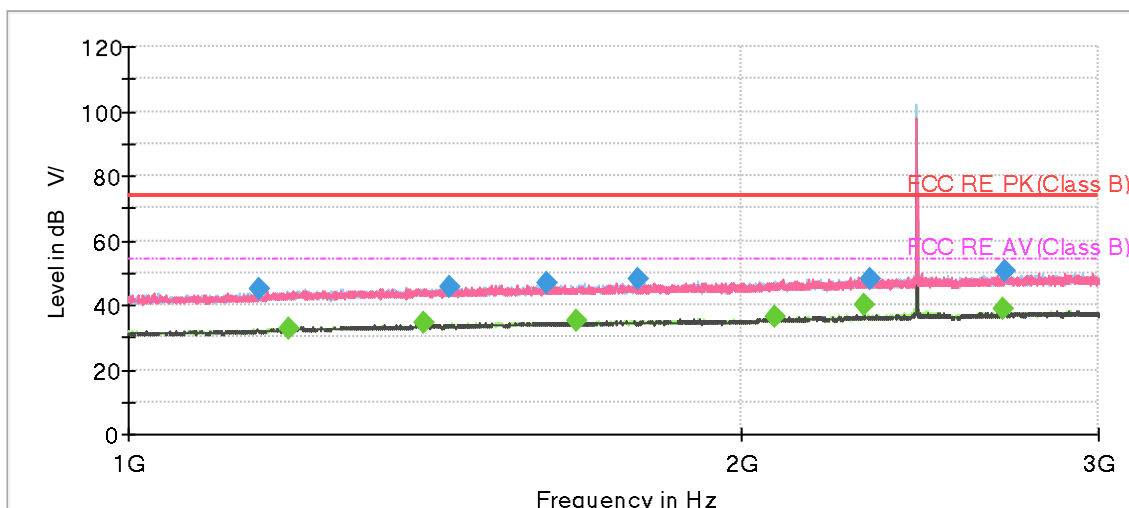
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DH5-Channel 39



Radiates Emission from 30MHz to 1GHz

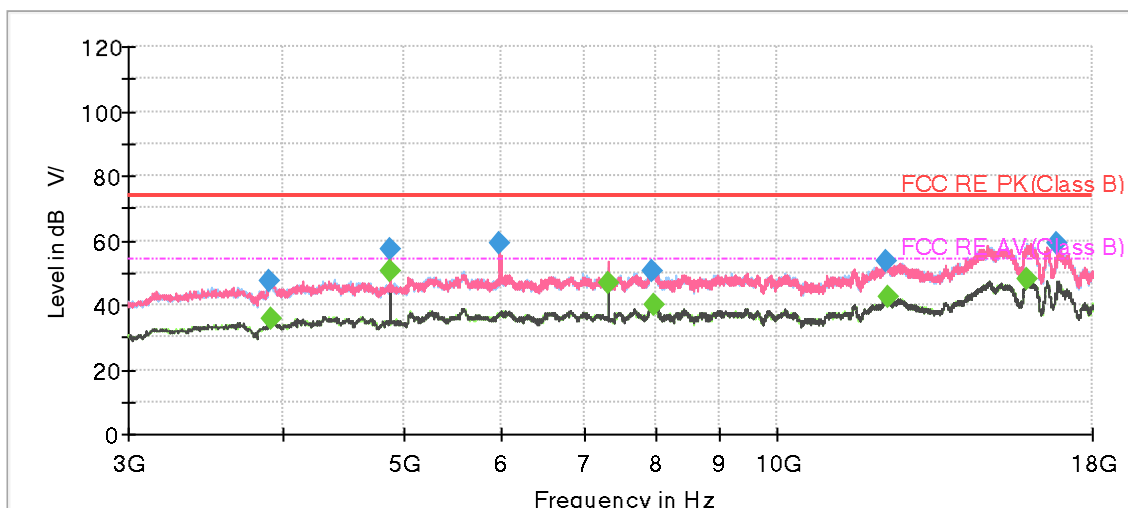
Frequency (MHz)	Quasi-Peak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Height (cm)	Polarization	Azimuth (deg)	Correct Factor (dB)
40.063750	28.44	40.00	11.56	100.0	V	155.0	19.9
54.371250	24.77	40.00	15.23	100.0	V	185.0	20.8
122.877500	28.45	43.50	15.05	107.0	V	0.0	16.7
197.931250	27.40	43.50	16.10	125.0	H	124.0	19.0
313.725000	26.83	46.00	19.17	121.0	H	292.0	21.4
899.847500	33.96	46.00	12.04	106.0	V	2.0	30.9



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)
1159.750000	44.65	---	74.00	29.35	500.0	100.0	H	176.0	1.9
1200.250000	---	32.77	54.00	21.23	500.0	200.0	H	0.0	2.7
1397.500000	---	34.26	54.00	19.74	500.0	100.0	H	176.0	3.8
1440.500000	45.59	---	74.00	28.41	500.0	100.0	H	4.0	4.0
1605.250000	46.84	---	74.00	27.16	500.0	200.0	V	335.0	4.9
1662.750000	---	34.94	54.00	19.06	500.0	200.0	H	285.0	5.1
1782.250000	48.13	---	74.00	25.87	500.0	200.0	H	310.0	5.6
2079.500000	---	36.18	54.00	17.82	500.0	200.0	V	102.0	7.0
2301.000000	---	40.02	54.00	13.98	500.0	200.0	H	192.0	7.9
2317.750000	47.98	---	74.00	26.02	500.0	200.0	V	39.0	7.9
2695.500000	---	38.48	54.00	15.52	500.0	100.0	H	234.0	8.8
2696.750000	50.64	---	74.00	23.36	500.0	100.0	H	234.0	8.8



Radiates Emission from 3GHz to 18GHz

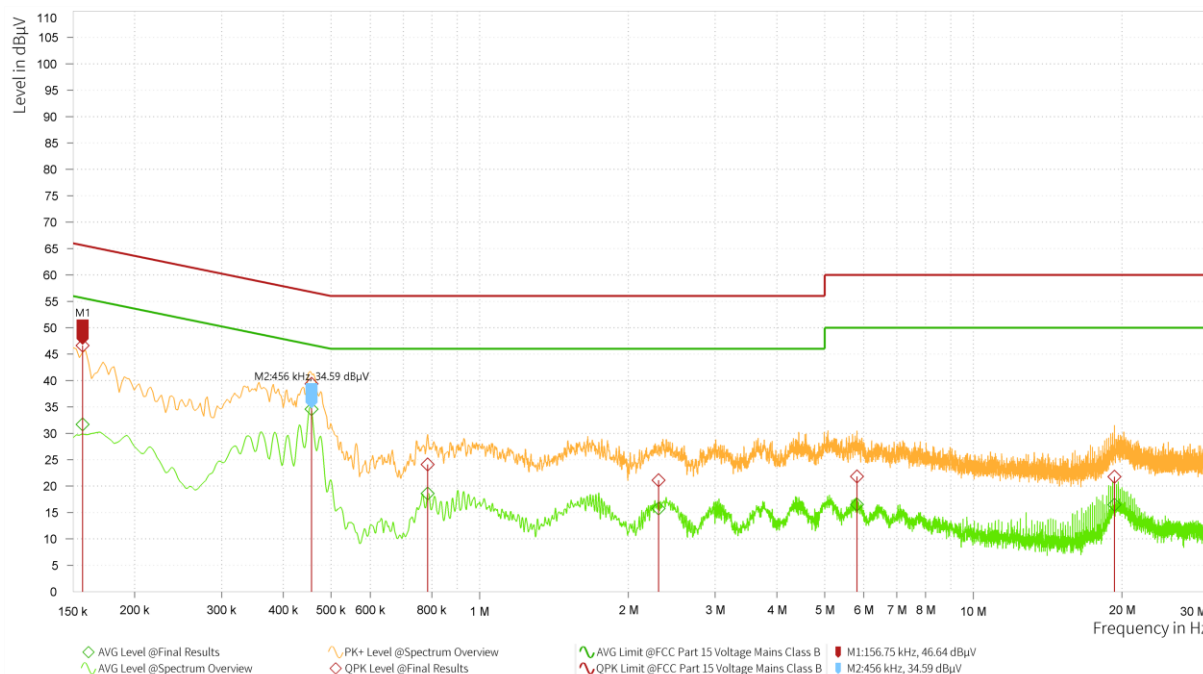
Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
3903.750000	47.37	---	74.00	26.63	500.0	200.0	V	203.0	3.3
3918.750000	---	35.80	54.00	18.20	500.0	100.0	V	28.0	3.1
4878.750000	---	50.55	54.00	3.45	500.0	100.0	V	234.0	3.1
4880.625000	57.47	---	74.00	16.53	500.0	100.0	V	210.0	3.0
5975.625000	59.31	---	74.00	14.69	500.0	100.0	V	0.0	6.0
7320.000000	---	46.58	54.00	7.42	500.0	100.0	V	18.0	6.0
7936.875000	50.76	---	74.00	23.24	500.0	100.0	H	349.0	9.9
7974.375000	---	39.87	54.00	14.13	500.0	100.0	V	200.0	9.9
12277.500000	53.69	---	74.00	20.31	500.0	100.0	V	62.0	14.6
12290.625000	---	42.45	54.00	11.55	500.0	200.0	V	58.0	14.3
15943.125000	---	47.85	54.00	6.15	500.0	100.0	V	74.0	19.5
16873.125000	59.05	---	74.00	14.95	500.0	200.0	V	214.0	18.9

2. Conducted Emission

2.1. Bluetooth

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.

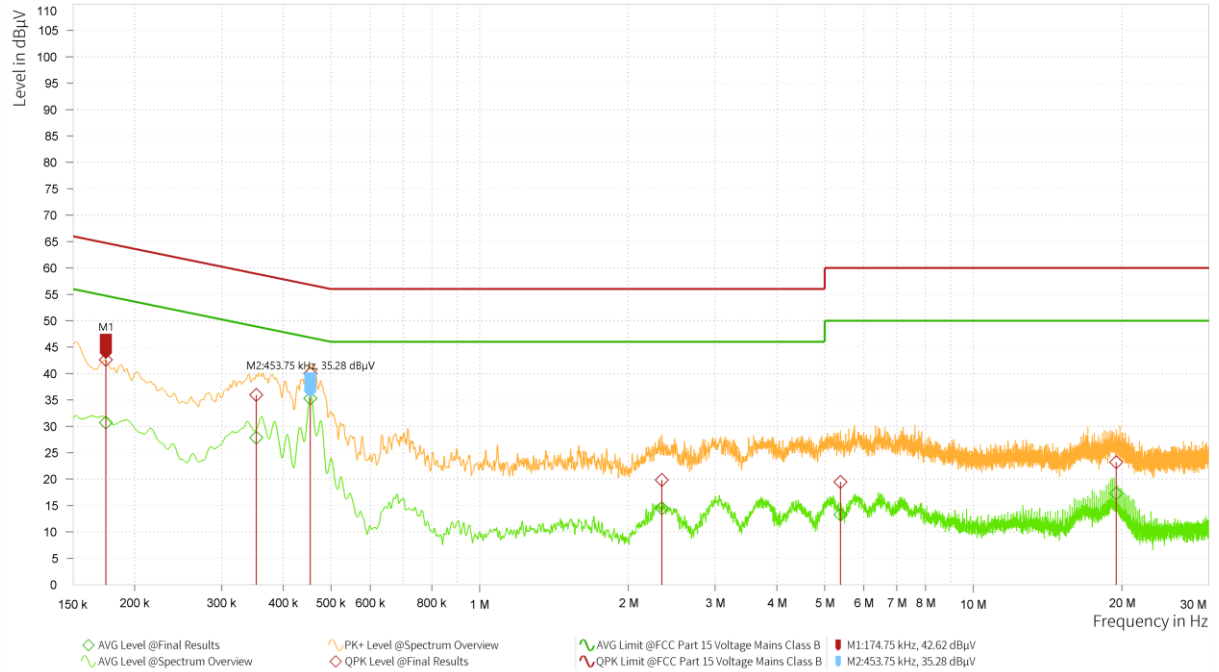
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Frequency [MHz]	QPK Level [dBµV]	QPK Limit [dBµV]	QPK Margin [dB]	AVG Level [dBµV]	AVG Limit [dBµV]	AVG Margin [dB]	Correction [dB]	Line	Meas. BW [kHz]	Meas. Time [s]
0.157	46.64	65.63	19.00	31.66	55.63	23.97	20.90	L1	9.000	1.000
0.456	39.39	56.77	17.38	34.59	46.77	12.18	20.82	L1	9.000	1.000
0.785	24.08	56.00	31.92	18.58	46.00	27.42	20.34	L1	9.000	1.000
2.303	21.10	56.00	34.90	15.75	46.00	30.25	19.58	L1	9.000	1.000
5.813	21.83	60.00	38.17	16.52	50.00	33.48	19.40	L1	9.000	1.000
19.327	21.77	60.00	38.23	16.48	50.00	33.52	19.64	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]
0.175	42.62	64.73	22.11	30.71	54.73	24.02	21.04	N	9.000	1.000
0.353	35.96	58.90	22.94	27.85	48.90	21.05	20.93	N	9.000	1.000
0.454	39.98	56.81	16.82	35.28	46.81	11.53	20.83	N	9.000	1.000
2.339	19.82	56.00	36.18	14.49	46.00	31.51	19.58	N	9.000	1.000
5.379	19.44	60.00	40.56	13.28	50.00	36.72	19.41	N	9.000	1.000
19.471	23.18	60.00	36.82	17.27	50.00	32.73	19.69	N	9.000	1.000

Remark: Correct factor=cable loss + LISN factor

N line Conducted Emission from 150 kHz to 30 MHz