





A.6 Transmitter Spurious Emission - Radiated

Method of Measurement: See ANSI C63.10-clause 11.11&11.12.

Measurement Limit:

Standard	Limit (dBm)
FCC 47 CFR Part 15.247, 15.205, 15.209 & RSS-247 section 5.5/RSS-Gen section 6.13	20dBm below peak output power

In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

Limit in restricted band:

Frequency of emission (MHz)	Field strength(μ V/m)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Condition:

The EUT was placed on a non-conductive table. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

Frequency of emission (MHz)	RBW/VBW	Sweep Time(s)
30-1000	120kHz/300kHz	5
1000-4000	1MHz/3MHz	15
4000-18000	1MHz/3MHz	40
18000-26500	1MHz/3MHz	20

Note: According to the performance evaluation, the radiated emission margin of EUT is over 20dB in the band from 9kHz to 30MHz. Therefore, the measurement starts from 30MHz to tenth harmonic. The measurement results include the horizontal polarization and vertical polarization measurements. For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases were recorded in this report.

Measurement Results:

Mode	Frequency (MHz)	Frequency Range	Test Results	Conclusion
LE 1M	2402(CH0)	1 GHz ~18 GHz	Fig.1	P
	2440(CH19)	1 GHz ~18 GHz	Fig.2	P
	2480(CH39)	1 GHz ~18 GHz	Fig.3	P
	Restricted Band(CH0)	2.38 GHz ~ 2.45 GHz	Fig.4	P
	Restricted Band(CH39)	2.45 GHz ~ 2.5 GHz	Fig.5	P
LE 2M	2404(CH1)	1 GHz ~18 GHz	Fig.6	P
	2440(CH19)	1 GHz ~18 GHz	Fig.7	P
	2478(CH38)	1 GHz ~18 GHz	Fig.8	P
	Restricted Band(CH0)	2.38 GHz ~ 2.45 GHz	Fig.9	P
	Restricted Band(CH39)	2.45 GHz ~ 2.5 GHz	Fig.10	P
/	All channels	9 kHz ~30 MHz	Fig.11	P
		30 MHz ~1 GHz	Fig.12	P
		18 GHz ~ 26.5 GHz	Fig.13	P

Worst Case Result:
For LE 1M:
CH19 (1-18GHz)

Frequency (MHz)	MaxPeak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Pol	Corr. (dB/m)
5448.600000	50.36	74.00	23.64	V	7.4
7473.857143	46.04	74.00	27.96	V	7.0
9233.142857	46.16	74.00	27.84	H	7.9
11995.285714	47.58	74.00	26.42	V	11.7
14947.285714	50.68	74.00	23.32	V	14.9
17493.428571	54.23	74.00	19.77	V	20.2

Frequency (MHz)	Average (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Pol	Corr. (dB/m)
5448.600000	38.33	54.00	15.67	V	7.4
7473.857143	33.80	54.00	20.20	V	7.0
9233.142857	34.08	54.00	19.92	H	7.9
11995.285714	35.63	54.00	18.37	V	11.7
14947.285714	38.72	54.00	15.28	V	14.9
17493.428571	42.26	54.00	11.74	V	20.2

For LE 2M:

CH19 (1-18GHz)

Frequency (MHz)	MaxPeak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Pol	Corr. (dB/m)
9212.571429	46.74	74.00	27.26	V	7.9
11080.714286	47.55	74.00	26.45	H	11.0
13373.142857	49.77	74.00	24.24	V	12.9
14972.142857	50.81	74.00	23.19	V	14.7
16625.571429	55.05	74.00	18.95	H	18.9
17685.000000	56.07	74.00	17.93	V	20.6

Frequency (MHz)	Average (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Pol	Corr. (dB/m)
9212.571429	34.34	54.00	19.66	V	7.4
11080.714286	35.56	54.00	18.44	V	7.0
13373.142857	37.58	54.00	16.42	H	7.9
14972.142857	38.65	54.00	15.35	V	11.7
16625.571429	42.13	54.00	11.87	V	14.9
17685.000000	43.32	54.00	10.68	V	20.2

Note:

A "reference path loss" is established and the A_{Rpl} is the attenuation of "reference path loss", and Antenna Factor, the gain of the preamplifier, the cable loss. P_{Mea} is the field strength recorded from the instrument.

The measurement results are obtained as described below:

Result= P_{Mea} +Cable Loss +Antenna Factor-Gain of the preamplifier.

See below for test graphs.

Conclusion: Pass

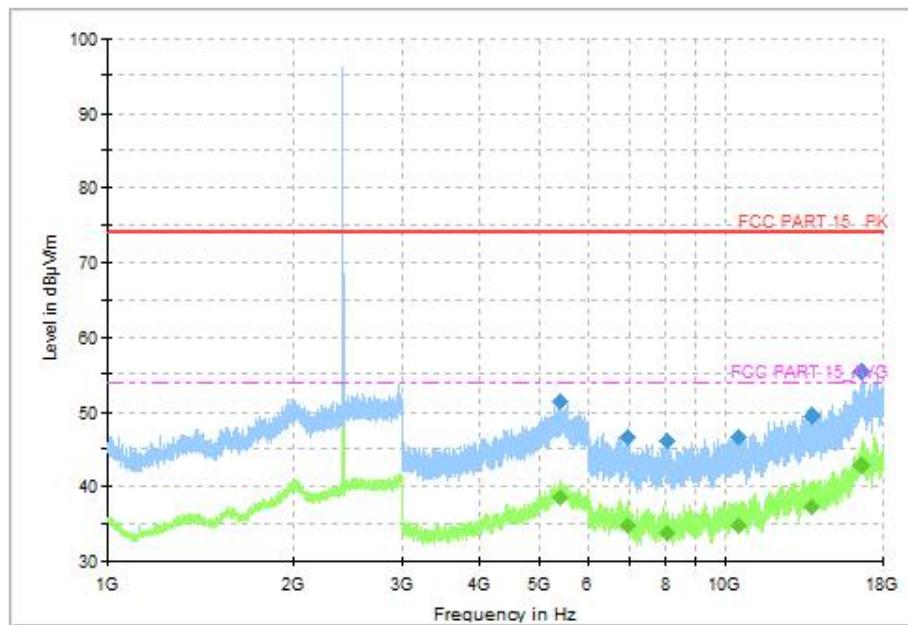


Fig.1 Radiated Spurious Emission (CH0, 1GHz ~18GHz), LE 1M

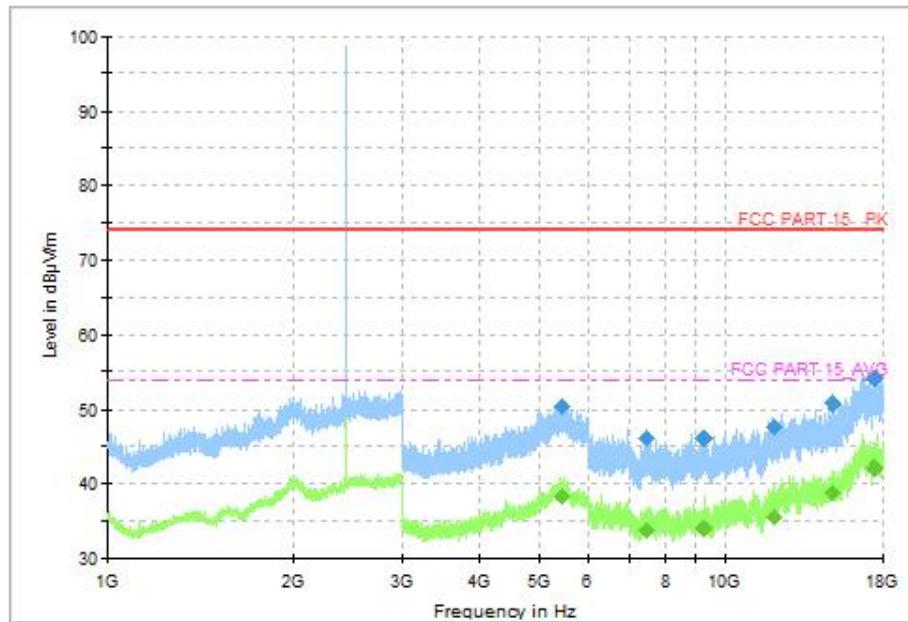


Fig.2 Radiated Spurious Emission (CH19, 1GHz ~18GHz), LE 1M

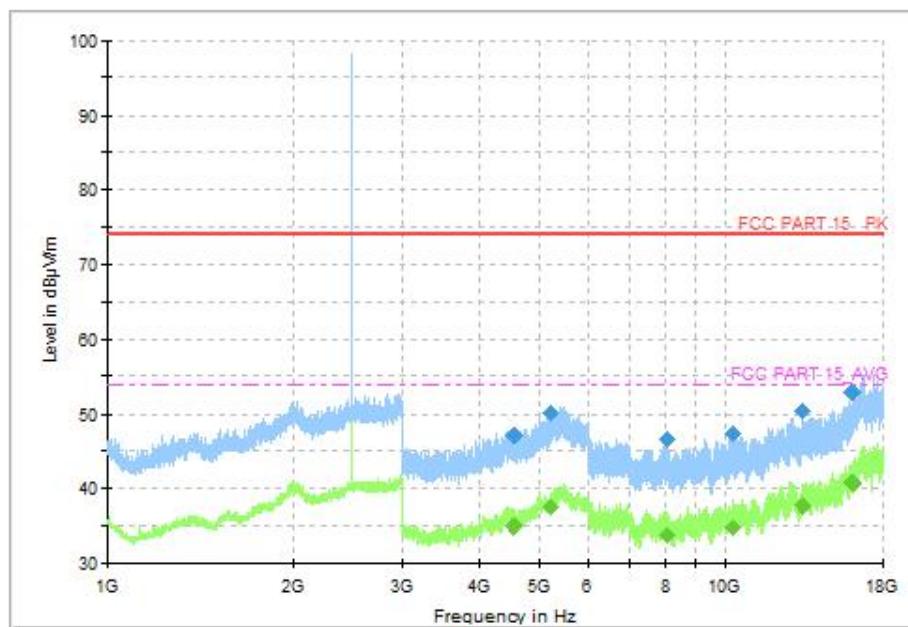


Fig.3 Radiated Spurious Emission (CH39, 1GHz ~18GHz), LE 1M

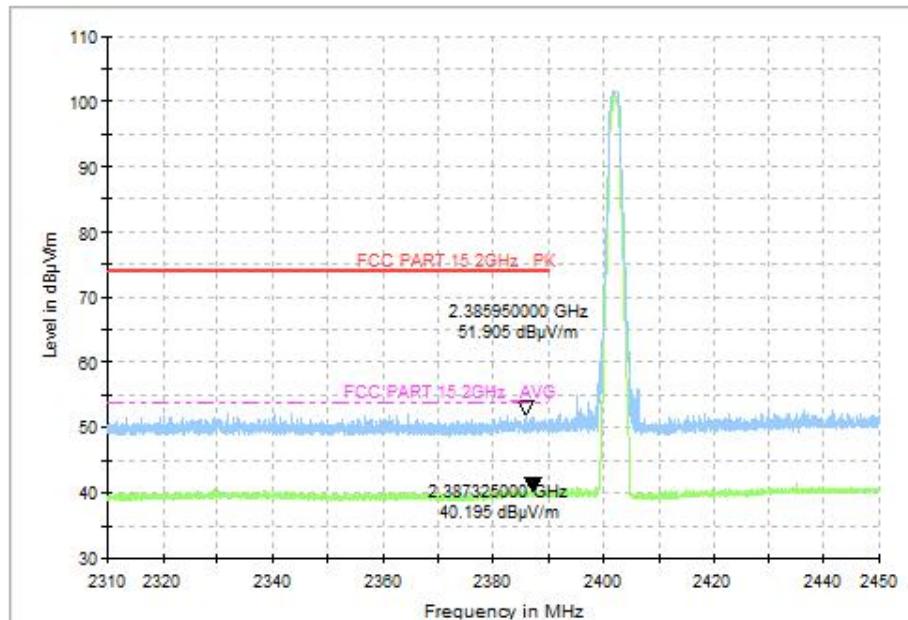


Fig.4 Radiated Band Edges (CH0, 2.38GHz~2.45GHz), LE 1M

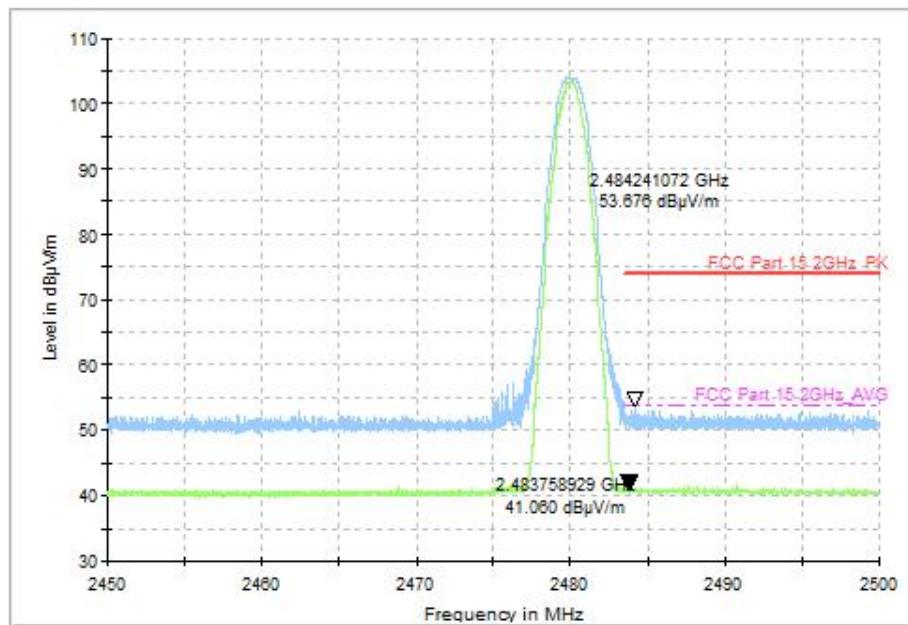


Fig.5 Radiated Band Edges (CH39, 2.45GHz~2.50GHz), LE 1M

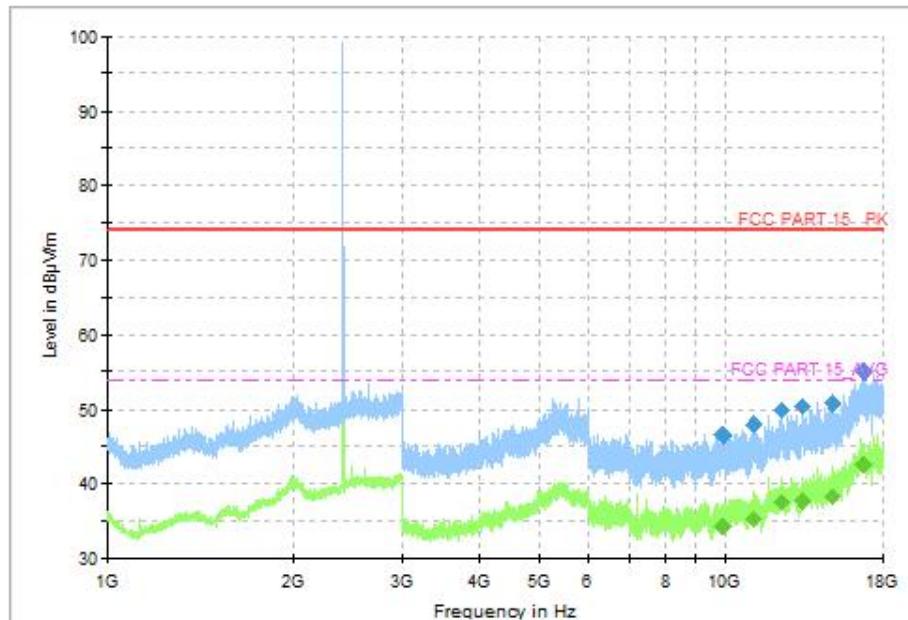


Fig.6 Radiated Spurious Emission (CH1, 1GHz ~18GHz), LE 2M

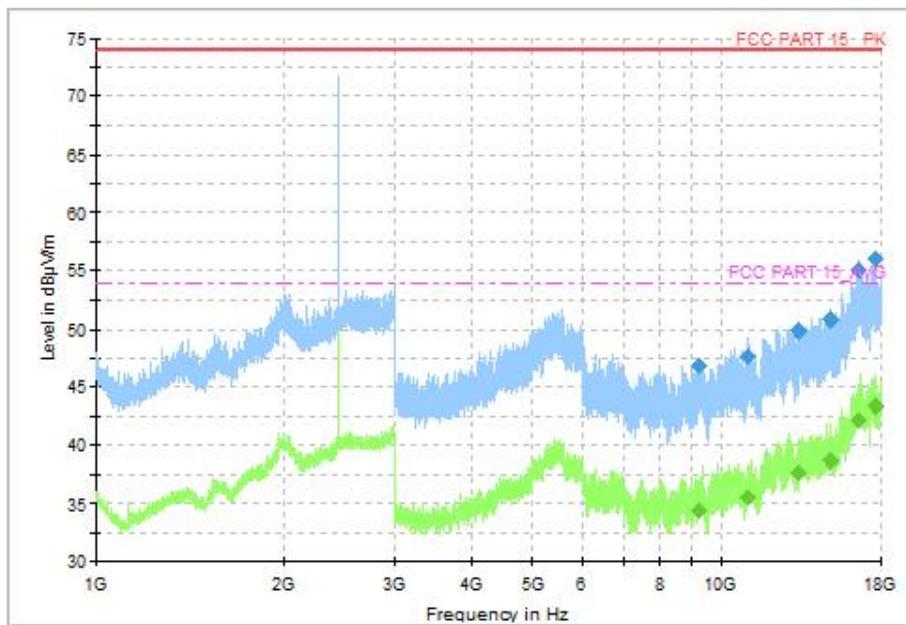


Fig.7 Radiated Spurious Emission (CH19, 1GHz ~18GHz), LE 2M

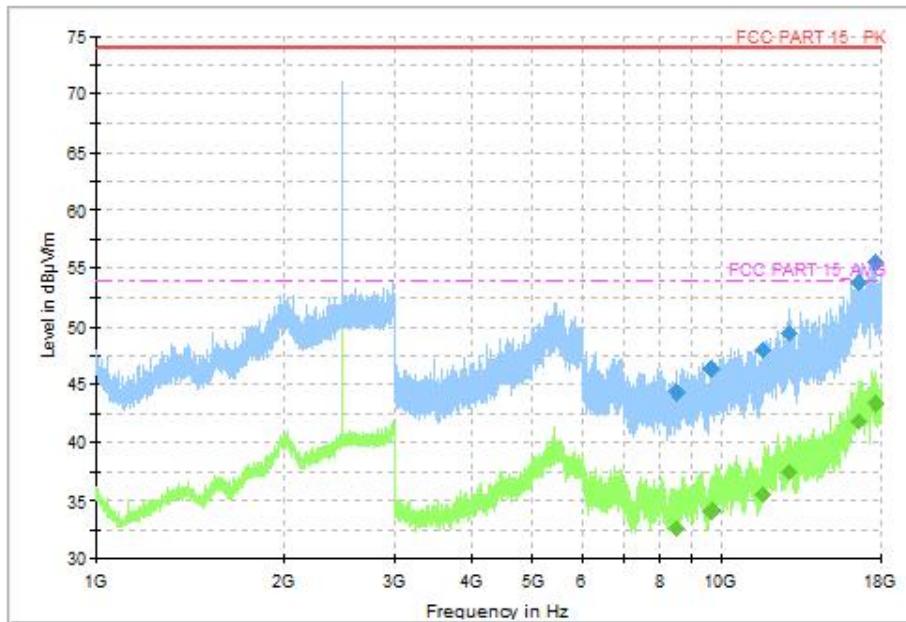


Fig.8 Radiated Spurious Emission (CH38, 1GHz ~18GHz), LE 2M

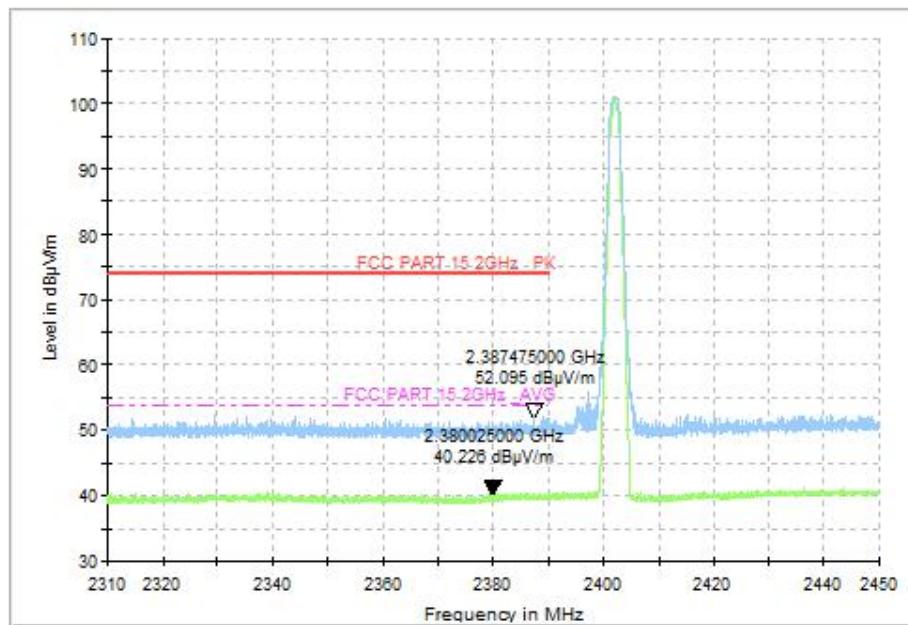


Fig.9 Radiated Band Edges (CH1, 2.38GHz~2.45GHz), LE 2M

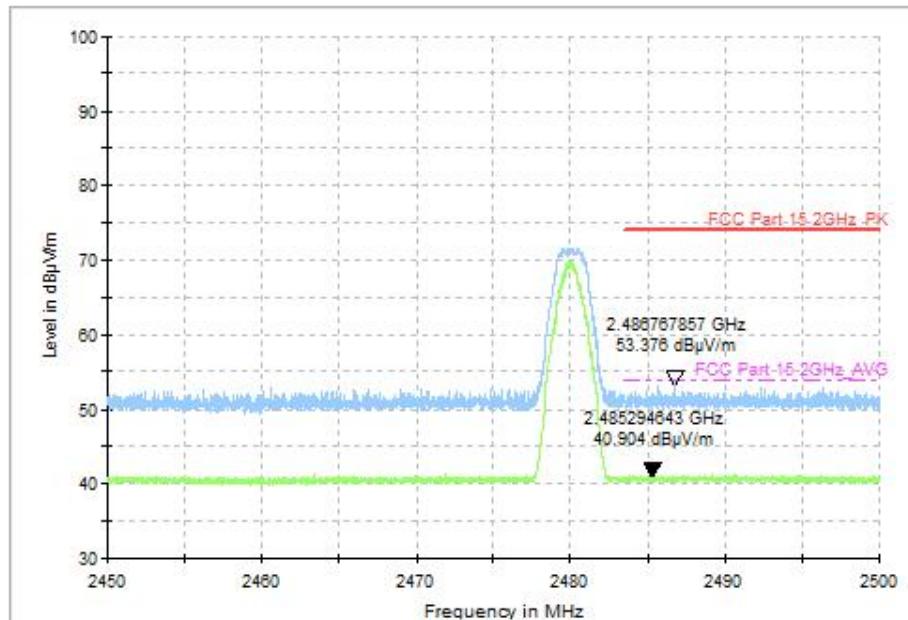


Fig.10 Radiated Band Edges (CH38, 2.45GHz~2.50GHz), LE 2M

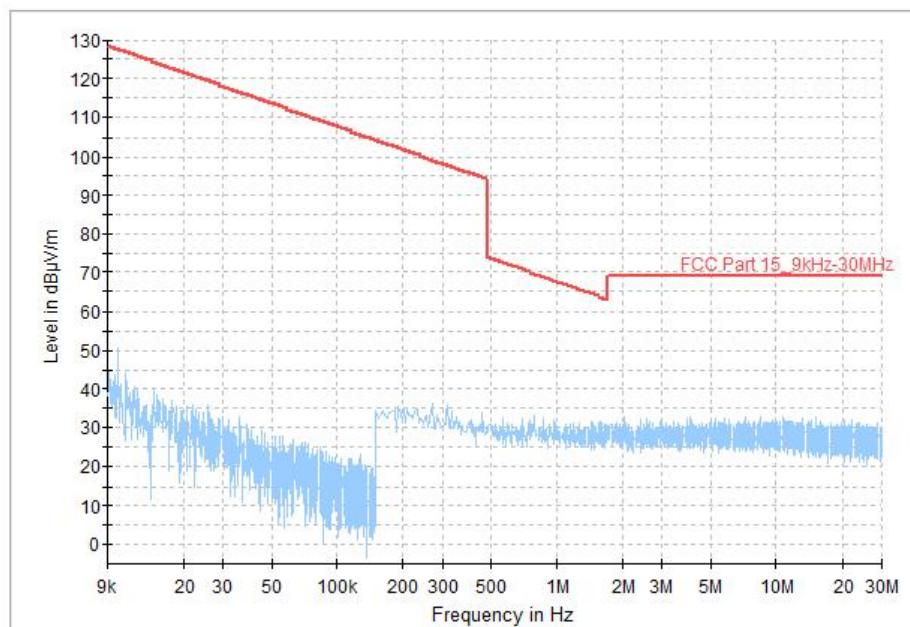


Fig.11 Radiated Spurious Emission (All Channels, 9kHz-30MHz)

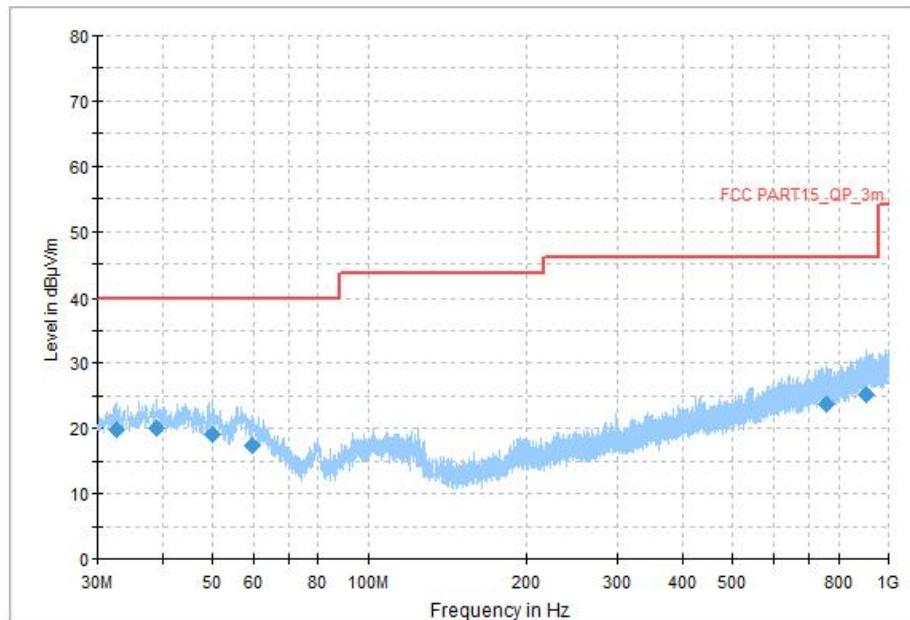


Fig.12 Radiated Spurious Emission (All Channels, 30MHz-1GHz)

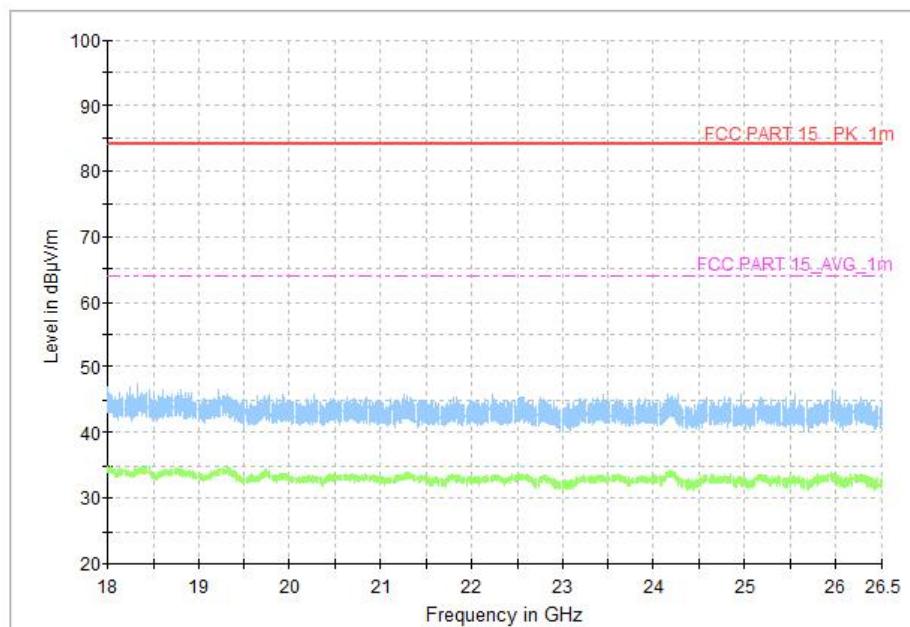


Fig.13 Radiated Spurious Emission (All Channels, 18GHz-26.5 GHz)

**A.7 99% Occupied Channel Bandwidth****Method of Measurement: See RSS-Gen Issue 5-clause 6.7.****Measurement Limit:**

Standard	Limit
RSS-Gen section 6.7	/

Measurement Result:

TestMode	Antenna	Frequency[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant8	2402	1.0188	2401.5324	2402.5512	---	---
BLE_1M	Ant8	2440	1.0182	2439.5324	2440.5506	---	---
BLE_1M	Ant8	2480	1.0222	2479.5298	2480.5520	---	---
BLE_2M	Ant8	2402	2.0064	2401.0483	2403.0547	---	---
BLE_2M	Ant8	2440	2.0126	2439.0450	2441.0576	---	---
BLE_2M	Ant8	2480	2.0020	2479.0470	2481.0490	---	---

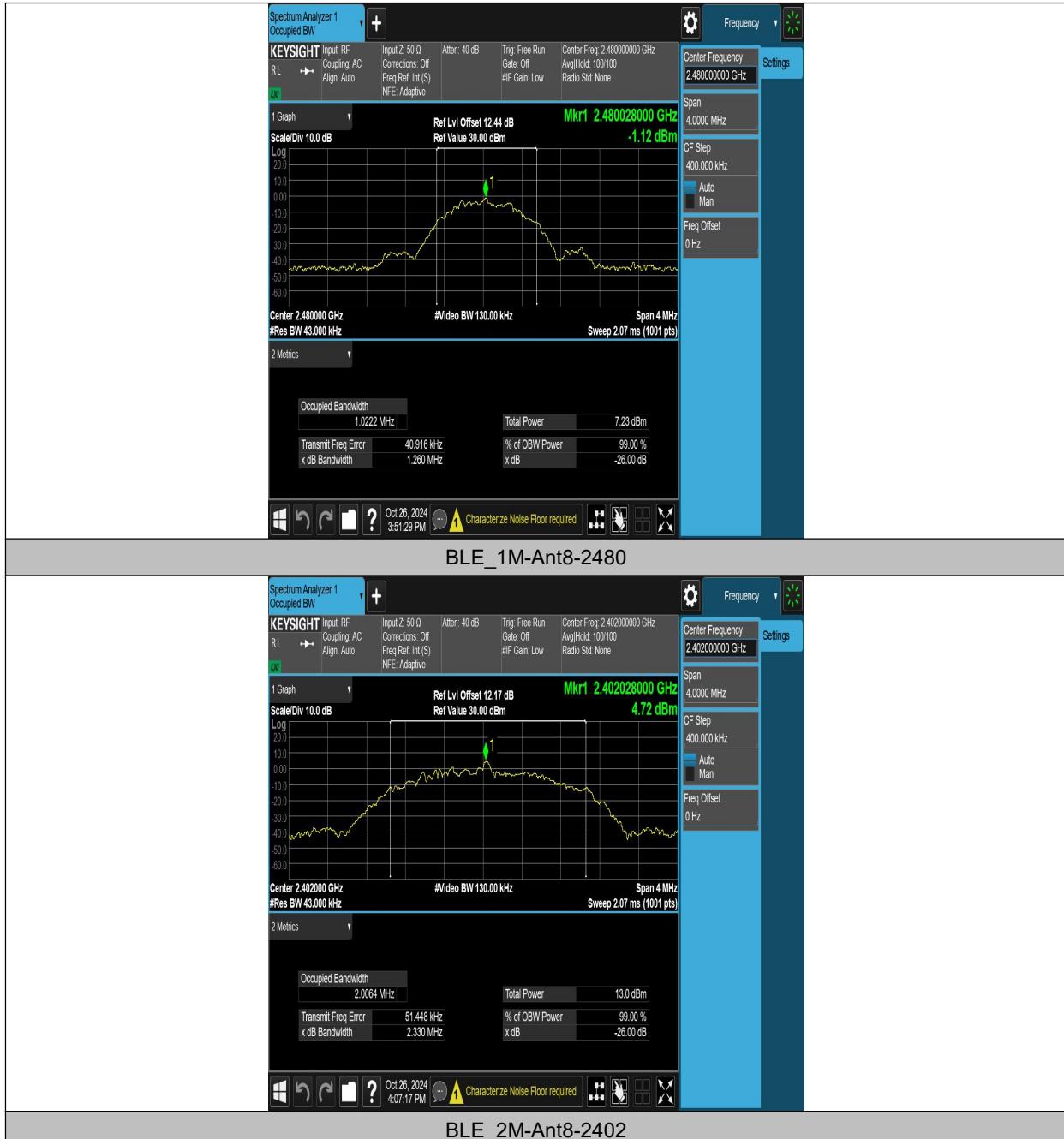
See below for test graphs.

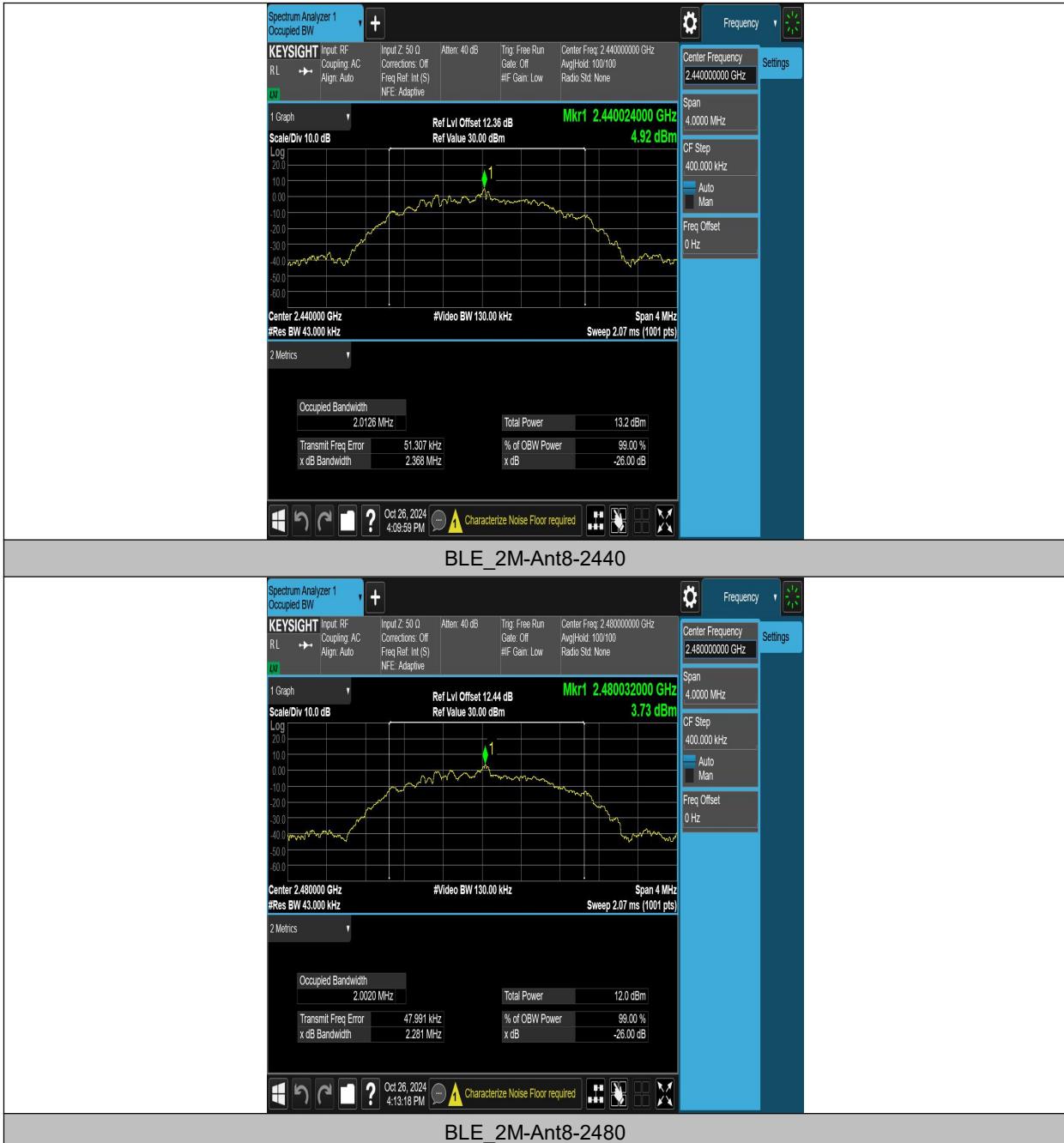


BLE_1M-Ant8-2402



BLE_1M-Ant8-2440





A.8 AC Power line Conducted Emission

Method of Measurement: See ANSI C63.10-clause 6.2.

Test Condition:

Voltage (V)	Frequency (Hz)
120	60

Measurement Result and limit:

Frequency range (MHz)	Quasi-peak Limit (dB μ V)	Average-peak Limit (dB μ V)	Result (dB μ V)		Conclusion
			Traffic	Idle	
0.15 to 0.5	66 to 56	56 to 46	Fig.1	Fig.2	P
0.5 to 5	56	46			
5 to 30	60	50			

NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

Note: The measurement results include the L1 and N measurements.

See below for test graphs.

Conclusion: Pass

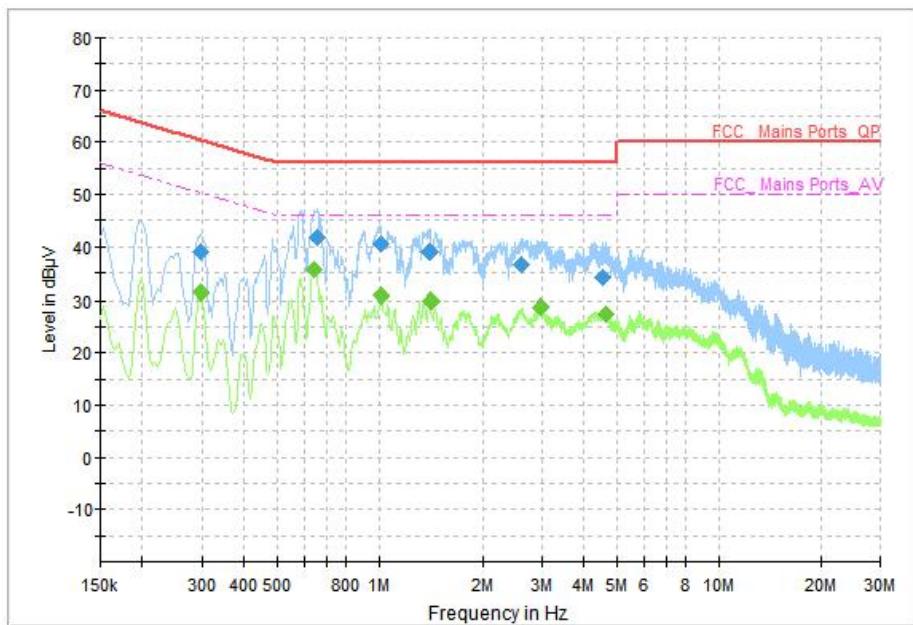


Fig.1 AC Power line Conducted Emission (Traffic)

Measurement Results: Quasi Peak

Frequency (MHz)	Quasi Peak (dB μ V)	Limit (dB μ V)	Margin (dB)	Line	Filter	Corr. (dB)
0.298000	39.15	60.30	21.15	L1	ON	10
0.658000	41.88	56.00	14.12	L1	ON	10
1.014000	40.53	56.00	15.47	L1	ON	10
1.402000	38.97	56.00	17.03	N	ON	10
2.618000	36.70	56.00	19.30	N	ON	10
4.526000	34.26	56.00	21.74	L1	ON	10

Measurement Results: Average

Frequency (MHz)	Average (dB μ V)	Limit (dB μ V)	Margin (dB)	Line	Filter	Corr. (dB)
0.298000	31.48	50.30	18.82	L1	ON	10
0.646000	35.79	46.00	10.21	N	ON	10
1.010000	30.89	46.00	15.11	N	ON	10
1.418000	29.92	46.00	16.08	L1	ON	10
2.986000	28.61	46.00	17.39	L1	ON	10
4.618000	27.26	46.00	18.74	L1	ON	10

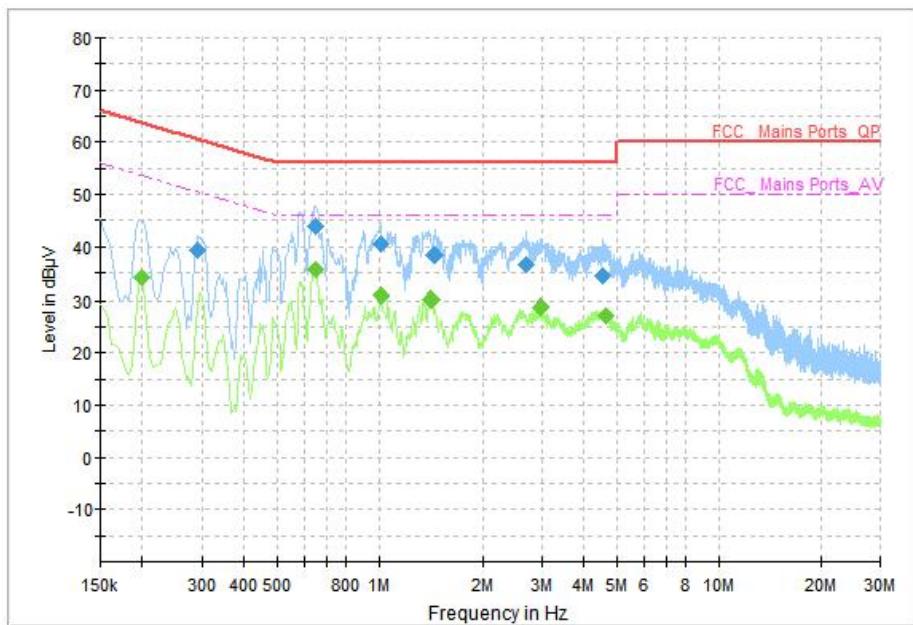


Fig.2 AC Power line Conducted Emission (Idle)

Measurement Results: Quasi Peak

Frequency (MHz)	Quasi Peak (dBμV)	Limit (dBμV)	Margin (dB)	Line	Filter	Corr. (dB)
0.290000	39.45	60.52	21.07	L1	ON	10
0.650000	43.78	56.00	12.22	N	ON	10
1.014000	40.63	56.00	15.37	N	ON	10
1.450000	38.52	56.00	17.48	N	ON	10
2.694000	36.50	56.00	19.50	L1	ON	10
4.522000	34.47	56.00	21.53	L1	ON	10

Measurement Results: Average

Frequency (MHz)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Line	Filter	Corr. (dB)
0.198000	34.21	53.69	19.49	L1	ON	10
0.650000	35.51	46.00	10.49	L1	ON	10
1.010000	30.64	46.00	15.36	N	ON	10
1.414000	30.02	46.00	15.98	N	ON	10
2.986000	28.51	46.00	17.49	N	ON	10
4.630000	26.99	46.00	19.01	L1	ON	10

*****END OF REPORT*****