

Appendix A2

BLE Test Data

"Shanghai ATBL Technology Co., Ltd." hereby certifies that according to actual testing conditions. The test results or observations are provided in accordance with measured value, without taking risks caused by uncertainty into account. Without explicit stipulation in special agreements, standards, or regulations, ATBL shall not assume any responsibility. The test results or observations are applicable only to tested sample. Client shall be responsible for representativeness of the sample and authenticity of the material. This report will be void without authorized signature or special seal for testing report. Do not copied without authorization.

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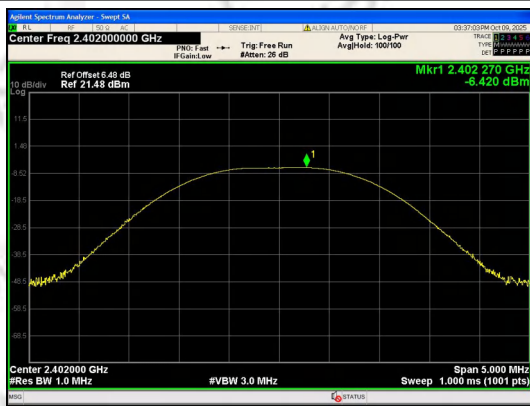
Conducted Test Data

Conducted Output Power

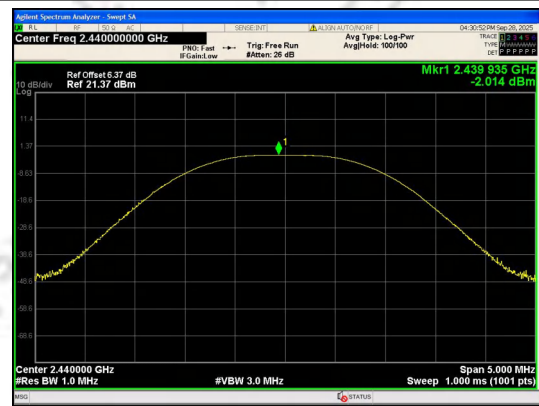
Test Result

Mode	Channel	Peak Output Power (dBm)	Peak Output Power (mW)	Limit (dBm)	Result
BLE 1M	0	-6.42	0.23	≤30	PASS
	19	-2.01	0.63	≤30	PASS
	39	-3.30	0.47	≤30	PASS
BLE 2M	0	-6.08	0.25	≤30	PASS
	19	-3.37	0.46	≤30	PASS
	39	-3.35	0.46	≤30	PASS

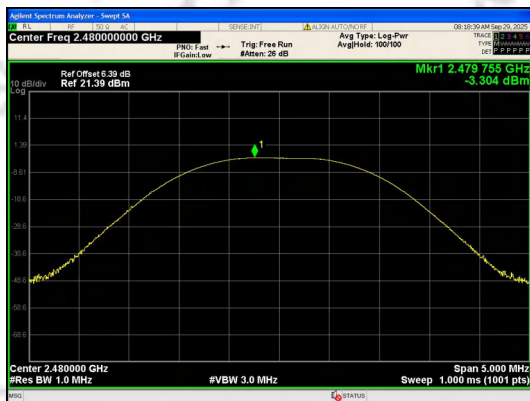
Test Graphs



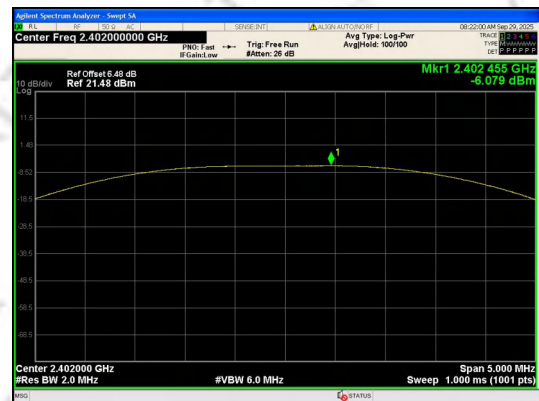
Peak Output Power
BLE 1M_Channel 0



Peak Output Power
BLE 1M_Channel 19



Peak Output Power
BLE 1M_Channel 39



Peak Output Power
BLE 2M_Channel 0

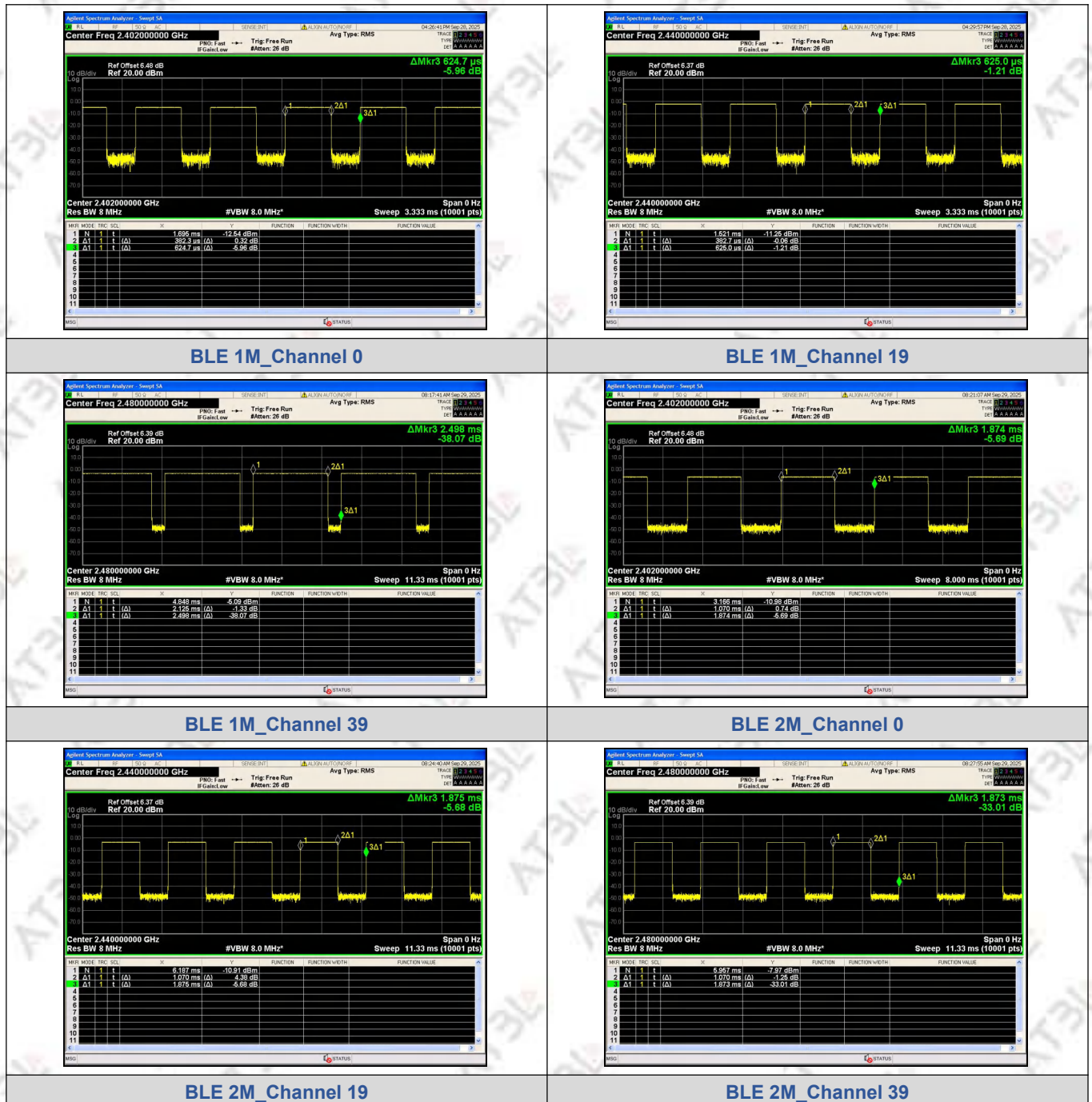


Duty Cycle

Test Result

Mode	Channel	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle (linear)	Duty Cycle Factor (dB)	1/T
BLE 1M	0	0.382	0.625	61.21	0.6121	2.1318	2.6178
	19	0.383	0.625	61.23	0.6123	2.1304	2.6110
	39	2.125	2.498	85.07	0.8507	0.7022	0.4706
BLE 2M	0	1.070	1.874	57.06	0.5706	2.4367	0.9346
	19	1.070	1.875	57.07	0.5707	2.4359	0.9346
	39	1.070	1.873	57.11	0.5711	2.4329	0.9346

Test Graphs



6dB Bandwidth

Test Result

Mode	Channel	Center Frequency (MHz)	6 dB Bandwidth (MHz)	Limit (MHz)	Result
BLE 1M	0	2402	0.6400	≥0.5	PASS
	19	2440	0.6400		PASS
	39	2480	0.6300		PASS
BLE 2M	0	2402	1.240		PASS
	19	2440	1.240		PASS
	39	2480	1.240		PASS

Test Graphs

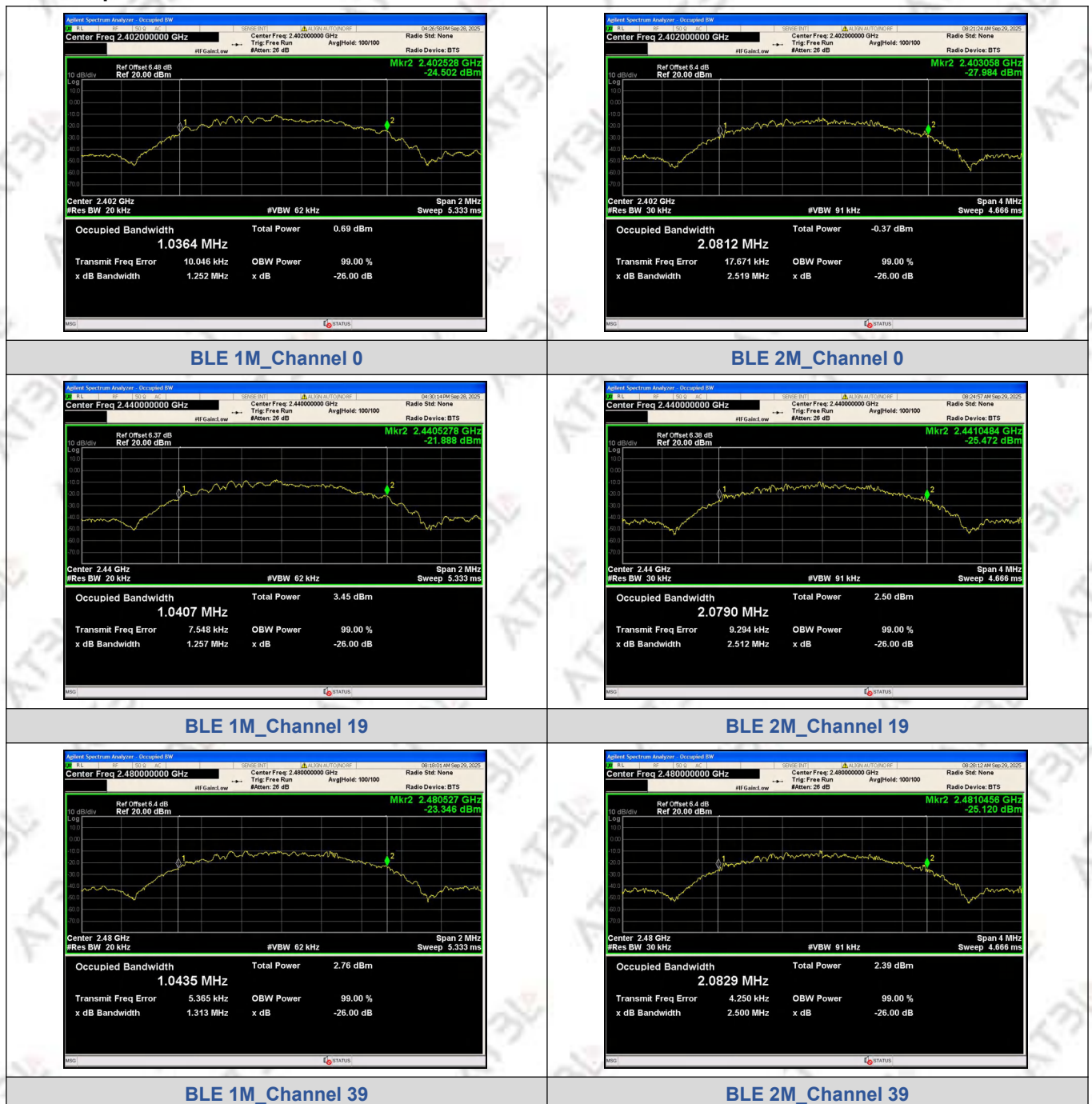
BLE 1M_Channel 0	BLE 2M_Channel 0
BLE 1M_Channel 19	BLE 2M_Channel 19
BLE 1M_Channel 39	BLE 2M_Channel 39

99% Bandwidth

Test Result

Mode	Channel	Center Frequency (MHz)	99% BW (MHz)
BLE 1M	0	2402	1.0364
BLE 1M	19	2440	1.0407
BLE 1M	39	2480	1.0435
BLE 2M	0	2402	2.0812
BLE 2M	19	2440	2.0790
BLE 2M	39	2480	2.0829

Test Graphs

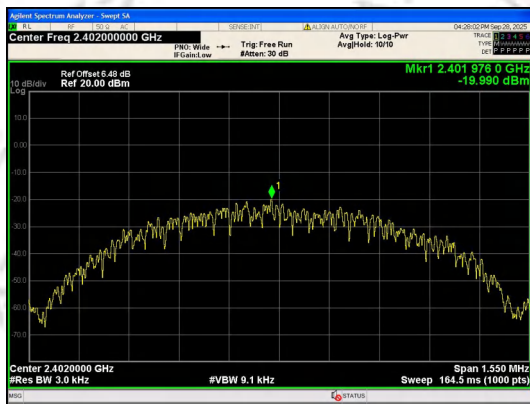


Power Spectral Density

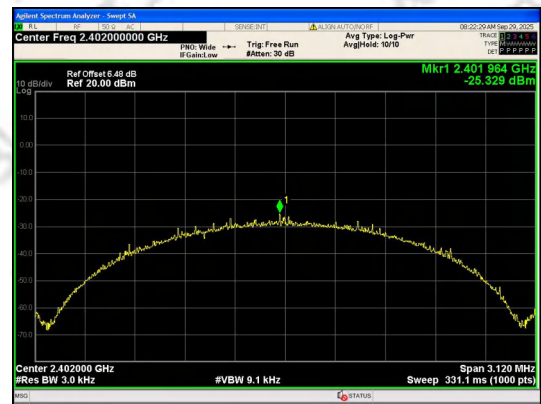
Test Result

Mode	Channel	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Result
BLE 1M	0	-19.990	≤8	PASS
BLE 1M	19	-17.100	≤8	PASS
BLE 1M	39	-20.220	≤8	PASS
BLE 2M	0	-25.330	≤8	PASS
BLE 2M	19	-22.530	≤8	PASS
BLE 2M	39	-22.300	≤8	PASS

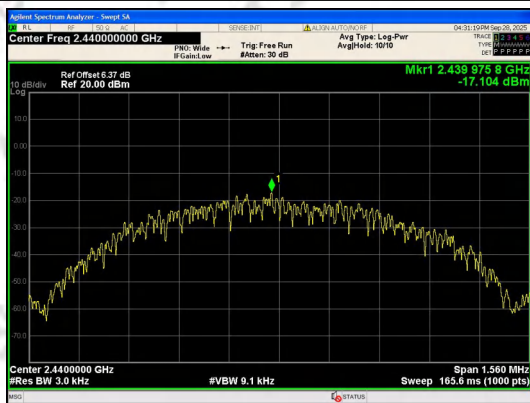
Test Graphs



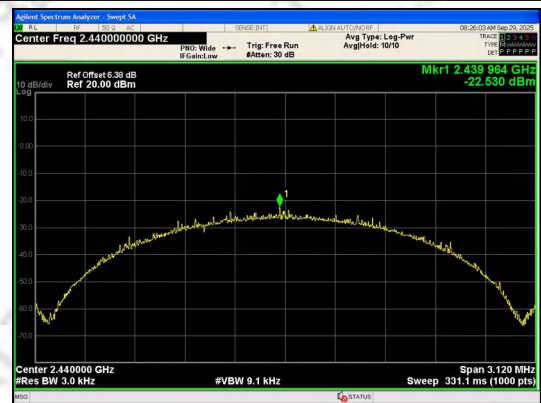
BLE 1M_Channel 0



BLE 2M_Channel 0



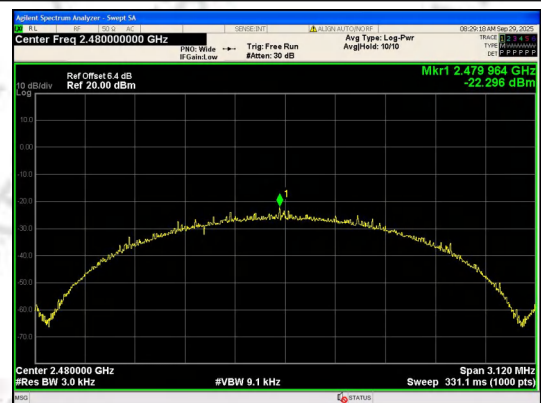
BLE 1M_Channel 19



BLE 2M_Channel 19



BLE 1M_Channel 39



BLE 2M_Channel 39

Conducted Out Of Band Emission

Note: The maximum loss of the test system for testing at 30MHz-26.5GHz is 17.2dB. The offset on the test chart is the offset of the main frequency, and the margin is sufficient to offset the difference between the maximum loss of the system and the offset of the main frequency.

Test Result

Mode	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm/MHz)	Over Limit (dB)	Result
BLE 1M	0	2329.30	-53.340	-25.42	-27.919	PASS
		2400.00	-55.953	-25.42	-30.533	PASS
		4803.60	-66.047	-25.42	-40.627	PASS
		7206.40	-63.923	-25.42	-38.503	PASS
		9607.20	-66.317	-25.42	-40.897	PASS
		24907.0	-53.562	-25.42	-28.142	PASS
	19	4880.42	-65.406	-22.56	-42.846	PASS
		7319.99	-65.981	-22.56	-43.421	PASS
		9758.31	-67.754	-22.56	-45.194	PASS
		24798.4	-53.237	-22.56	-30.677	PASS
	39	2483.50	-57.697	-23.77	-33.927	PASS
		4958.45	-66.898	-23.77	-43.128	PASS
		7441.72	-65.848	-23.77	-42.078	PASS
		9919.37	-68.374	-23.77	-44.604	PASS
		24767.2	-54.987	-23.77	-31.217	PASS
BLE 2M	0	2400.00	-37.971	-26.89	-11.081	PASS
		4805.51	-67.338	-26.89	-40.448	PASS
		7206.38	-66.795	-26.89	-39.905	PASS
		9607.24	-67.536	-26.89	-40.646	PASS
		24993.8	-54.743	-26.89	-27.853	PASS
	19	4881.05	-67.280	-24.12	-43.160	PASS
		7321.86	-66.928	-24.12	-42.808	PASS
		9760.18	-68.327	-24.12	-44.207	PASS
		24563.0	-54.959	-24.12	-30.839	PASS
	39	2483.50	-57.697	-24.19	-33.507	PASS
		4960.95	-65.092	-24.19	-40.902	PASS
		7439.85	-68.058	-24.19	-43.868	PASS
		9921.24	-69.058	-24.19	-44.868	PASS
		24709.7	-53.936	-24.19	-29.746	PASS

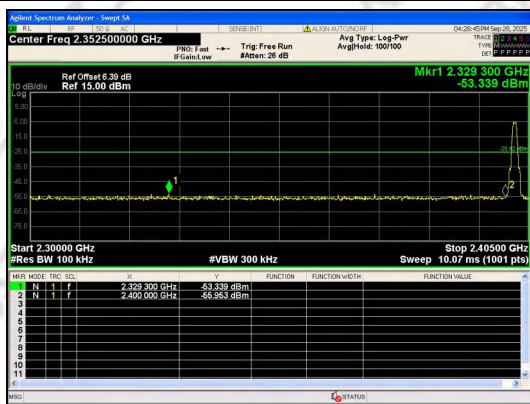
Test Graphs



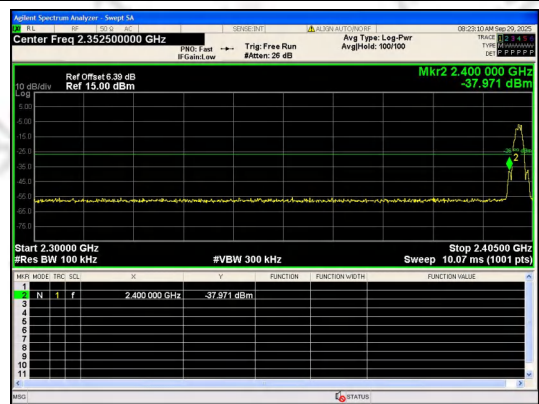
In-Band Reference Level
BLE 1M_Channel 0



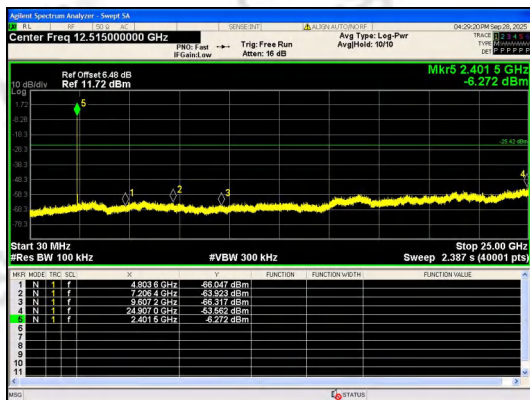
In-Band Reference Level
BLE 2M_Channel 0



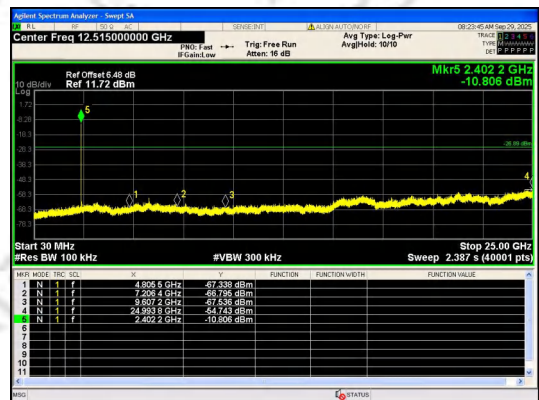
Out Of Band Emission
BLE 1M_Channel 0



Out Of Band Emission
BLE 2M_Channel 0



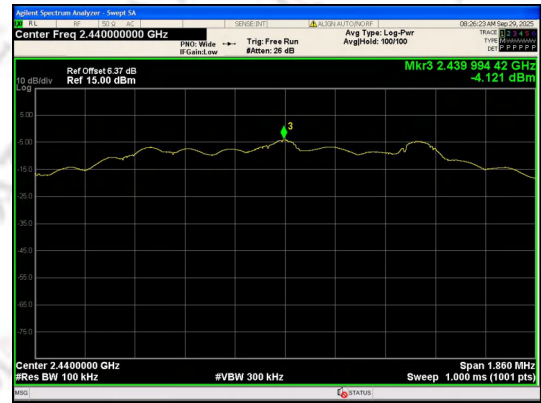
30.0 MHz - 25000.0 MHz
BLE 1M_Channel 0



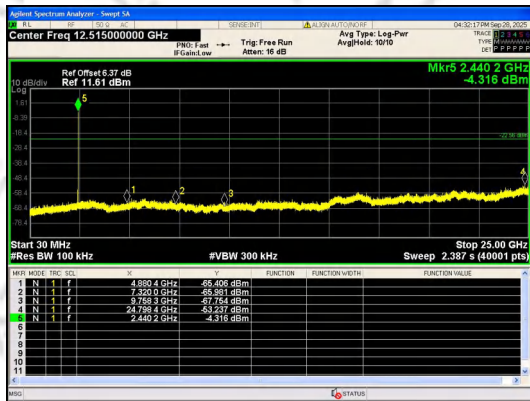
30.0 MHz - 25000.0 MHz
BLE 2M_Channel 0



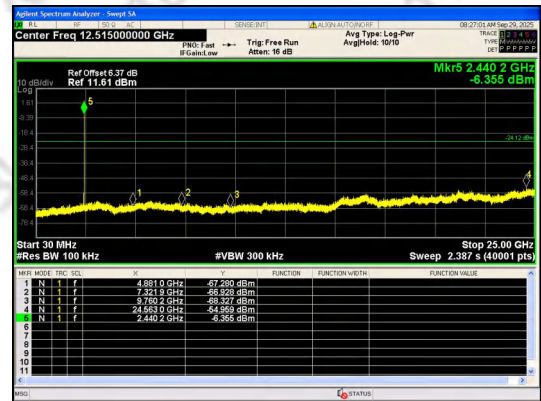
In-Band Reference Level
BLE 1M_Channel 19



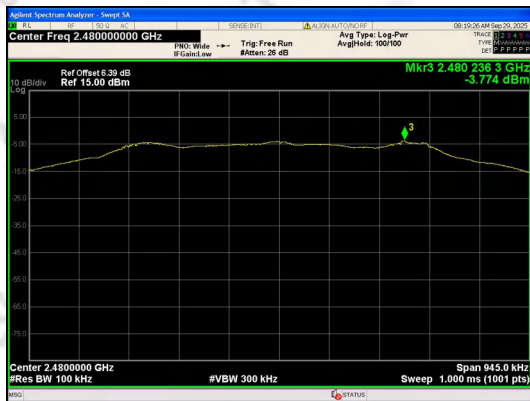
In-Band Reference Level
BLE 2M_Channel 19



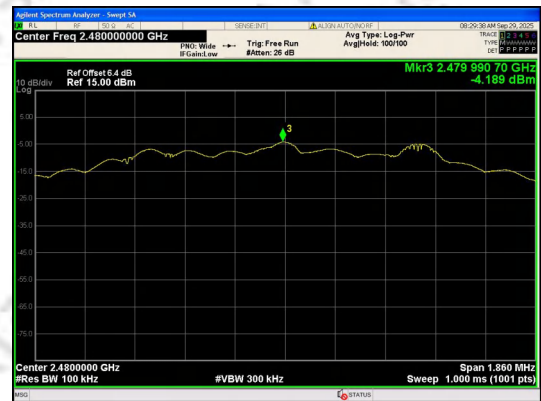
30.0 MHz - 25000.0 MHz
BLE 1M_Channel 19



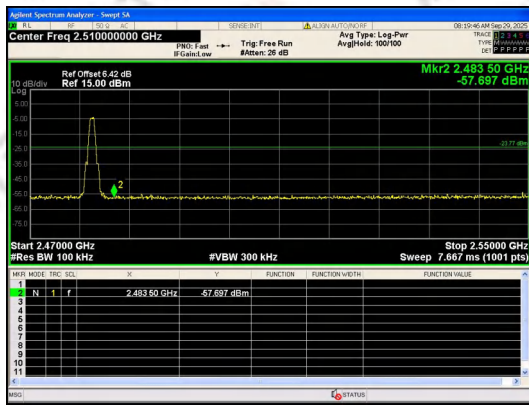
30.0 MHz - 25000.0 MHz
BLE 2M_Channel 19



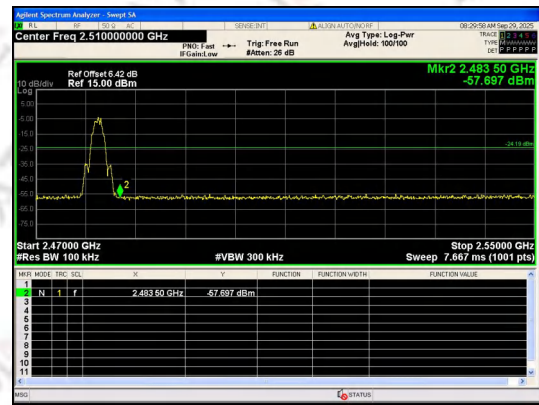
In-Band Reference Level
BLE 1M_Channel 39



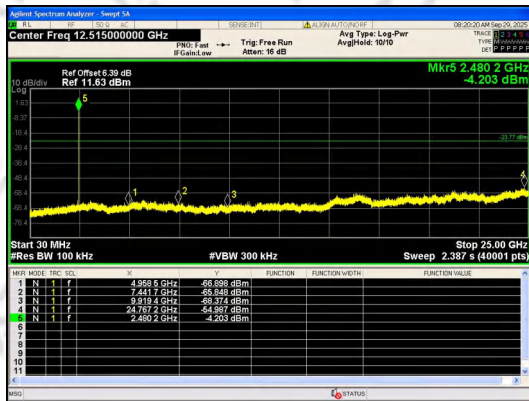
In-Band Reference Level
BLE 2M_Channel 39



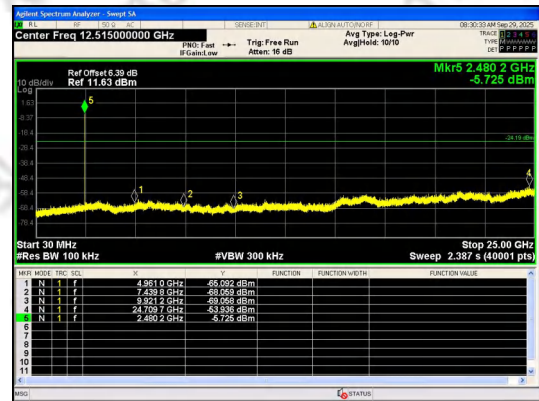
Out Of Band Emission
BLE 1M_Channel 39



Out Of Band Emission
BLE 2M_Channel 39



30.0 MHz - 25000.0 MHz
BLE 1M_Channel 39



30.0 MHz - 25000.0 MHz
BLE 2M_Channel 39

Radiated Test Data

Radiated Spurious Emission

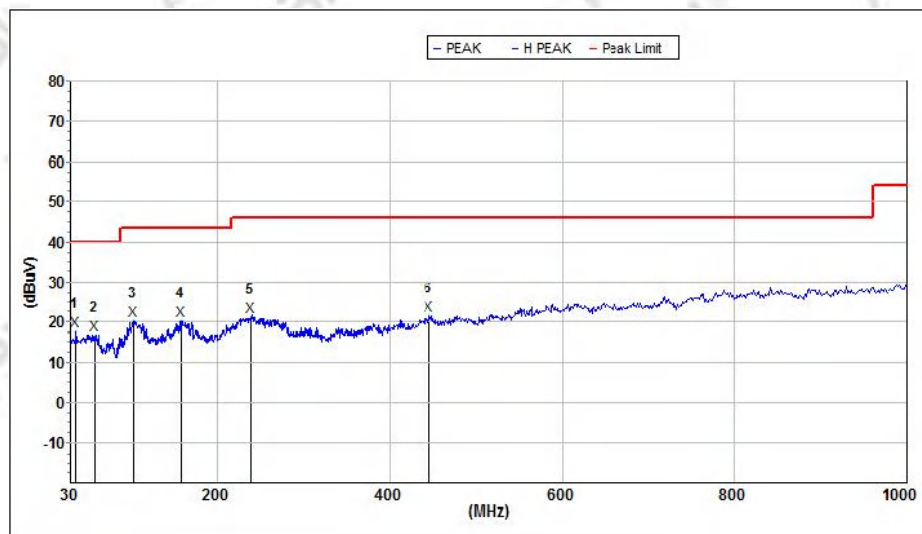
Radiated Emission (9KHz-30MHz)

Note:The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Radiated Emission (30MHz-1GHz)

Note:All modes have been tested, only worst case mode(BLE 2M) was recorded in the test report.

Temperature:	26℃	Relative Humidity:	39%
Test Voltage:	AC 120V/60Hz	Phase:	Horizontal
Test Mode:	BLE 2M-2402MHz	Comment:	30MHz-1GHz



Test Summary Result

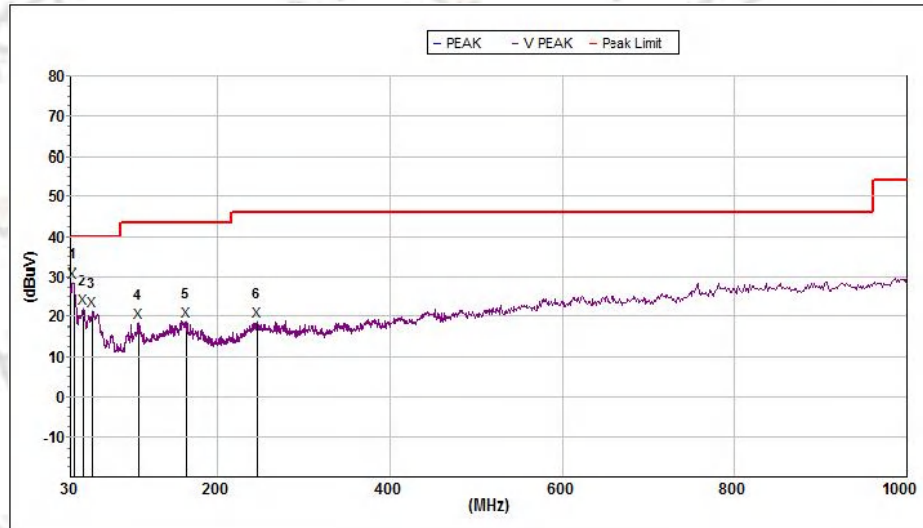
Mk.	Freq. (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Ant.F/G. (dB)	Amp.G. (dB)	Pol.
Peak:							
1	36.254	17.8	40.0	22.2	18.8	31.8	H
2	58.613	16.9	40.0	23.1	18.2	31.2	H
3	102.180	20.4	43.5	23.1	15.0	30.8	H
4	157.835	20.3	43.5	23.2	18.7	31.4	H
5	239.147	21.3	46.0	24.7	17.2	32.0	H
6	446.414	21.7	46.0	24.3	22.8	32.4	H

Note:

1.Margin = Result (Result =Reading + Factor)-Limit

2.Factor= Cable Loss +Antenna Factor-Amplifier Gain

Temperature:	26°C	Relative Humidity:	39%
Test Voltage:	AC 120V/60Hz	Phase:	Vertical
Test Mode:	BLE 2M-2402MHz	Comment:	30MHz-1GHz



Test Summary Result

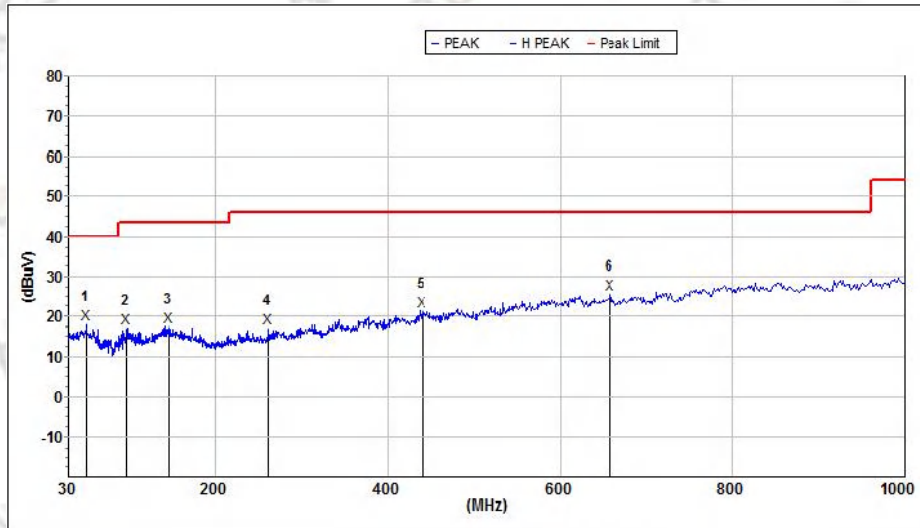
Mk.	Freq. (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Ant.F/G. (dB)	Amp.G. (dB)	Pol.
Peak:							
1	32.806	28.8	40.0	11.2	18.6	31.8	V
2	44.509	22.1	40.0	17.9	19.3	31.4	V
3	55.609	21.3	40.0	18.7	18.7	31.1	V
4	107.510	18.4	43.5	25.1	15.5	30.9	V
5	163.755	18.9	43.5	24.6	18.2	31.4	V
6	246.383	18.8	46.0	27.2	17.5	32.0	V

Note:

1.Margin = Result (Result =Reading + Factor)-Limit

2.Factor= Cable Loss +Antenna Factor-Amplifier Gain

Temperature:	26°C	Relative Humidity:	39%
Test Voltage:	AC 120V/60Hz	Phase:	Horizontal
Test Mode:	BLE 2M-2480MHz	Comment:	30MHz-1GHz



Test Summary Result

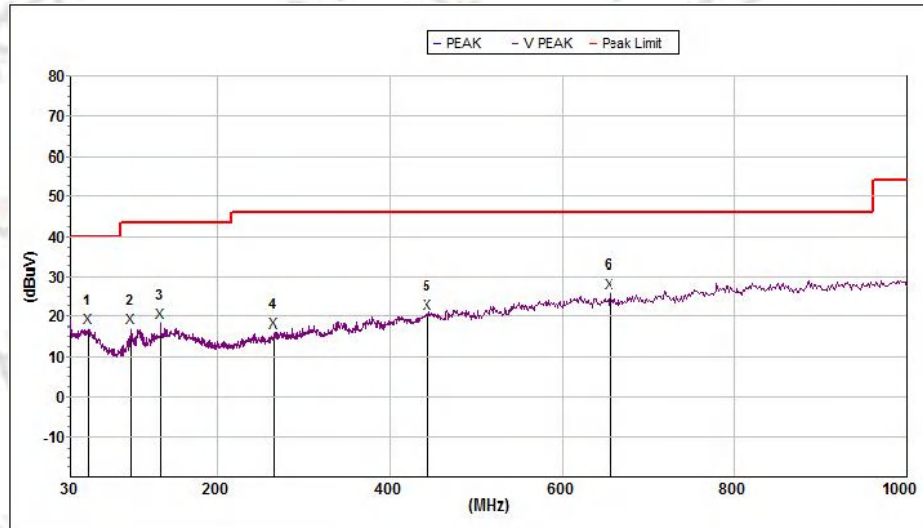
Mk.	Freq. (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Ant.F/G. (dB)	Amp.G. (dB)	Pol.
Peak:							
1	50.321	18.0	40.0	22.0	19.5	30.9	H
2	96.436	17.2	43.5	26.3	14.8	31.0	H
3	147.145	17.5	43.5	26.0	18.9	31.3	H
4	261.975	17.1	46.0	28.9	18.0	32.1	H
5	439.425	21.6	46.0	24.4	22.6	32.5	H
6	657.682	25.7	46.0	20.3	26.4	31.8	H

Note:

1.Margin = Result (Result =Reading + Factor)-Limit

2.Factor= Cable Loss +Antenna Factor-Amplifier Gain

Temperature:	26°C	Relative Humidity:	39%
Test Voltage:	AC 120V/60Hz	Phase:	Vertical
Test Mode:	BLE 2M-2480MHz	Comment:	30MHz-1GHz



Test Summary Result

Mk.	Freq. (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Ant.F/G. (dB)	Amp.G. (dB)	Pol.
Peak:							
1	51.301	17.1	40.0	22.9	19.4	30.9	V
2	99.354	17.3	43.5	26.2	14.8	30.8	V
3	135.032	18.4	43.5	25.1	17.9	31.2	V
4	266.142	16.3	46.0	29.7	18.1	32.1	V
5	444.072	20.8	46.0	25.2	22.7	32.5	V
6	655.380	26.0	46.0	20.0	26.4	31.8	V

Note:

1.Margin = Result (Result =Reading + Factor)-Limit

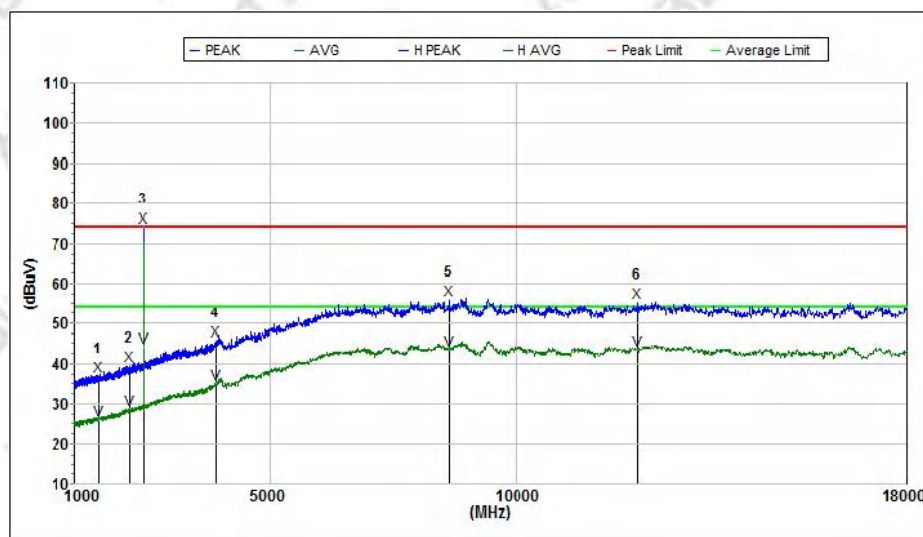
2.Factor= Cable Loss +Antenna Factor-Amplifier Gain

Radiated Emission (Above 1GHz)

Note:

- 1.All modes have been tested, only worst case mode(BLE 1M) was recorded in the test report.
- 2.We used the filter to test and the main frequency was filtered out.
- 3.Other 18G-25G Emission detected are more than 20dB below the limit.

Temperature:	26°C	Relative Humidity:	39%
Test Voltage:	AC 120V/60Hz	Phase:	Horizontal
Test Mode:	BLE 2M-2402MHz	Comment:	1GHz-18GHz



Test Summary Result

Mk.	Freq. (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Ant.F/G. (dB)	Amp.G. (dB)	Pol.
Peak:							
1	1502.500	37.1	74.0	36.9	25.4	53.4	H
2	2114.500	39.5	74.0	34.5	26.8	53.9	H
3	2401.000	74.3	74.0	-0.3	27.4	54.1	H
4	3881.500	46.0	74.0	28.0	30.6	53.3	H
5	8662.000	55.9	74.0	18.1	37.6	52.3	H
6	12491.000	55.5	74.0	18.5	39.3	51.6	H
Avg:							
1	1502.500	26.0	54.0	28.0	25.4	53.4	H
2	2114.500	28.6	54.0	25.4	26.8	53.9	H
3	2401.000	44.2	54.0	9.8	27.4	54.1	H
4	3881.500	34.9	54.0	19.1	30.6	53.3	H
5	8662.000	43.7	54.0	10.3	37.6	52.3	H
6	12491.000	43.5	54.0	10.5	39.3	51.6	H

Note:

- 1.Margin = Result (Result =Reading + Factor)-Limit
- 2.Factor= Cable Loss +Antenna Factor-Amplifier Gain
- 3.Point 3 serves as the primary frequency signal.

Temperature:	26°C	Relative Humidity:	39%
Test Voltage:	AC 120V/60Hz	Phase:	Vertical
Test Mode:	BLE 2M-2402MHz	Comment:	1GHz-18GHz

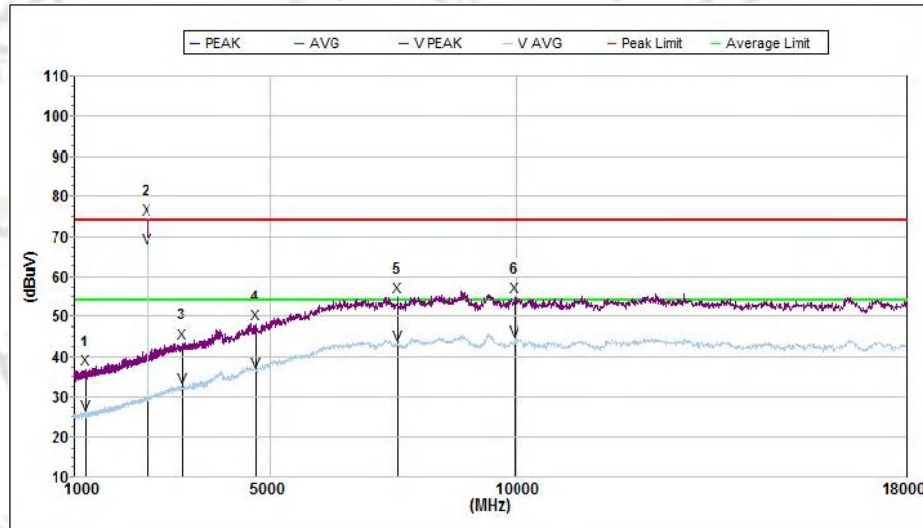
Test Summary Result

Mk.	Freq. (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Ant.F/G. (dB)	Amp.G. (dB)	Pol.
Peak:							
1	1207.000	36.8	74.0	37.2	25.7	53.6	V
2	1907.500	38.4	74.0	35.6	25.9	53.8	V
3	2402.500	72.9	74.0	1.1	27.4	54.1	V
4	3202.000	43.2	74.0	30.8	29.4	54.0	V
5	7857.000	54.6	74.0	19.4	36.7	52.0	V
6	9460.000	56.0	74.0	18.0	38.1	52.2	V
Avg:							
1	1207.000	25.8	54.0	28.2	25.7	53.6	V
2	1907.500	27.5	54.0	26.5	25.9	53.8	V
3	2402.500	66.5	54.0	-12.5	27.4	54.1	V
4	3202.000	32.4	54.0	21.6	29.4	54.0	V
5	7857.000	43.8	54.0	10.2	36.7	52.0	V
6	9460.000	45.7	54.0	8.3	38.1	52.2	V

Note:

- 1.Margin = Result (Result =Reading + Factor)-Limit
- 2.Factor= Cable Loss +Antenna Factor-Amplifier Gain
- 3.Point 3 serves as the primary frequency signal.

Temperature:	26°C	Relative Humidity:	39%
Test Voltage:	AC 120V/60Hz	Phase:	Vertical
Test Mode:	BLE 2M-2480MHz	Comment:	1GHz-18GHz



Test Summary Result

Mk.	Freq. (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Ant.F/G. (dB)	Amp.G. (dB)	Pol.
Peak:							
1	1225.000	37.0	74.0	37.0	25.7	53.6	V
2	2480.500	74.4	74.0	-0.4	27.6	54.1	V
3	3217.000	43.5	74.0	30.5	29.4	54.0	V
4	4707.000	48.0	74.0	26.0	32.2	52.8	V
5	7598.000	55.0	74.0	19.0	36.4	51.9	V
6	9978.000	55.0	74.0	19.0	38.4	51.9	V
Avg:							
1	1225.000	25.7	54.0	28.3	25.7	53.6	V
2	2480.500	67.4	54.0	-13.4	27.6	54.1	V
3	3217.000	32.4	54.0	21.6	29.4	54.0	V
4	4707.000	36.2	54.0	17.8	32.2	52.8	V
5	7598.000	43.3	54.0	10.7	36.4	51.9	V
6	9978.000	44.1	54.0	9.9	38.4	51.9	V

Note:

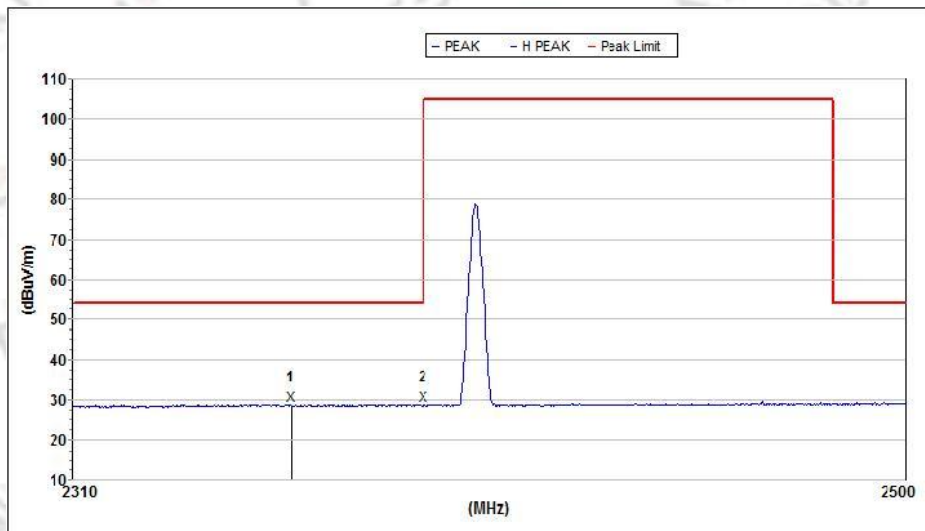
- 1.Margin = Result (Result =Reading + Factor)-Limit
- 2.Factor= Cable Loss +Antenna Factor-Amplifier Gain
- 3.Point 3 serves as the primary frequency signal.

Restricted Band

Note: During the test, pre-scan All mode, the report only reflects the test data of worst mode(BLE 2M).

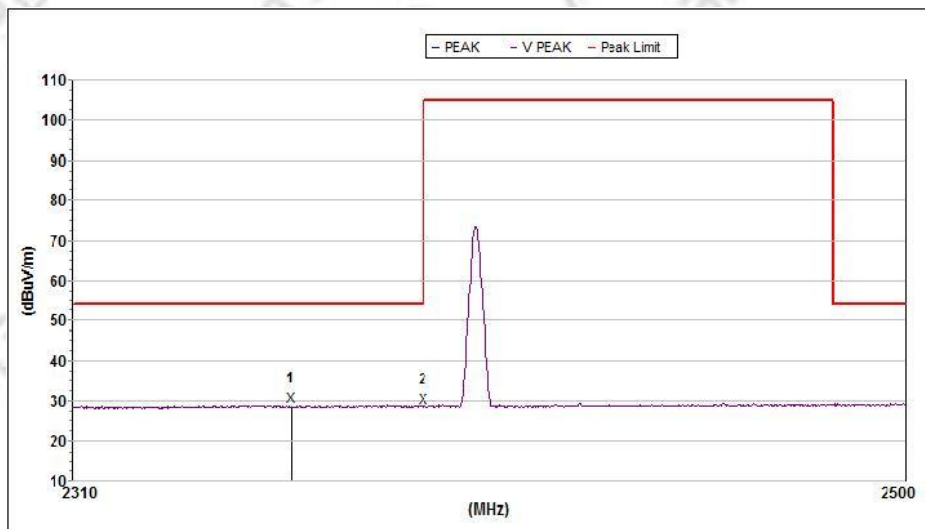
Test Mode: BLE 2M

Test Channel: Lowest channel, Test Polarization: Horizontal



Mk.	Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Pol.
AVG							
1	2360.000	28.7	54.0	25.3	27.3	54.0	H
2	2390.000	28.7	54.0	25.3	27.4	54.1	H

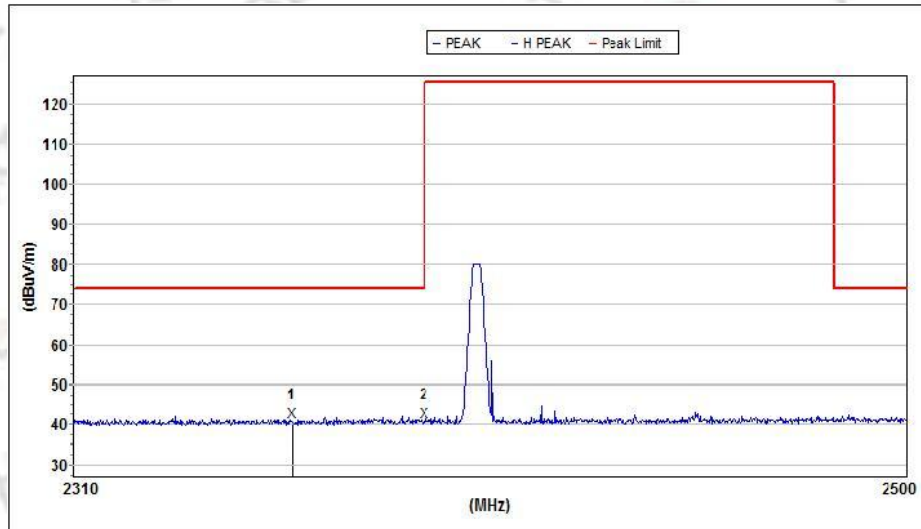
Test Channel: Lowest channel, Test Polarization: Vertical



Mk.	Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Pol.
AVG							
1	2360.000	28.6	54.0	25.4	27.3	54.0	V
2	2390.000	28.5	54.0	25.5	27.4	54.1	V

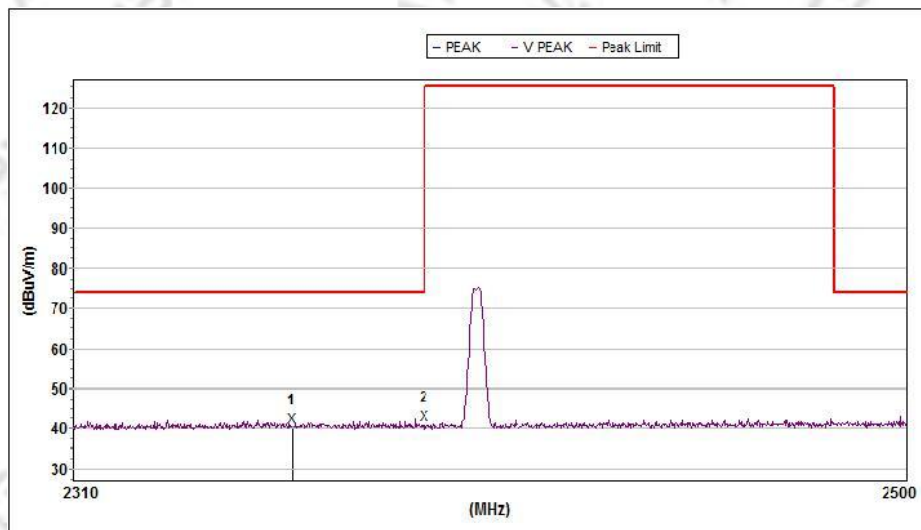
Test Mode: BLE 2M

Test Channel: Lowest channel, Test Polarization: Horizontal



Mk.	Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Pol.
PEAK							
1	2360.000	40.9	74.0	33.1	27.3	54.0	H
2	2390.000	40.7	74.0	33.3	27.4	54.1	H

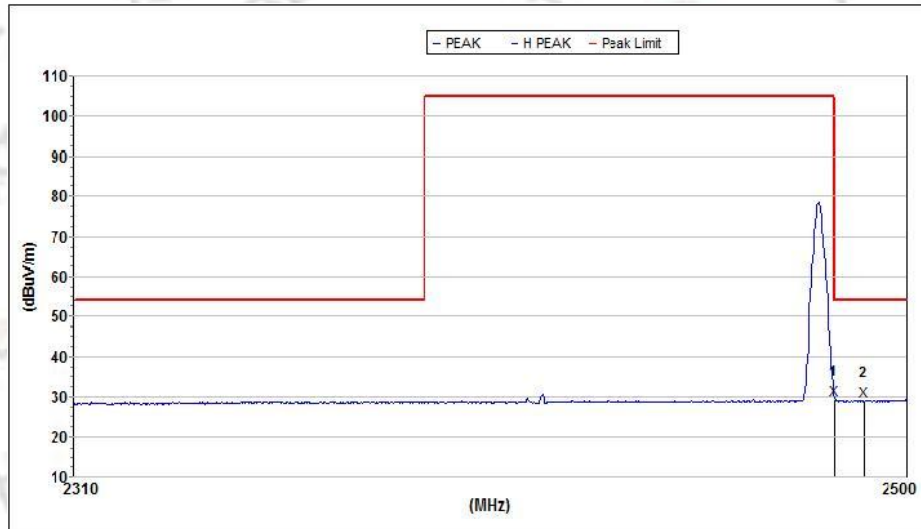
Test Channel: Lowest channel, Test Polarization: Vertical



Mk.	Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Pol.
PEAK							
1	2360.000	40.5	74.0	33.5	27.3	54.1	V
2	2390.000	41.0	74.0	33.0	27.4	54.1	V

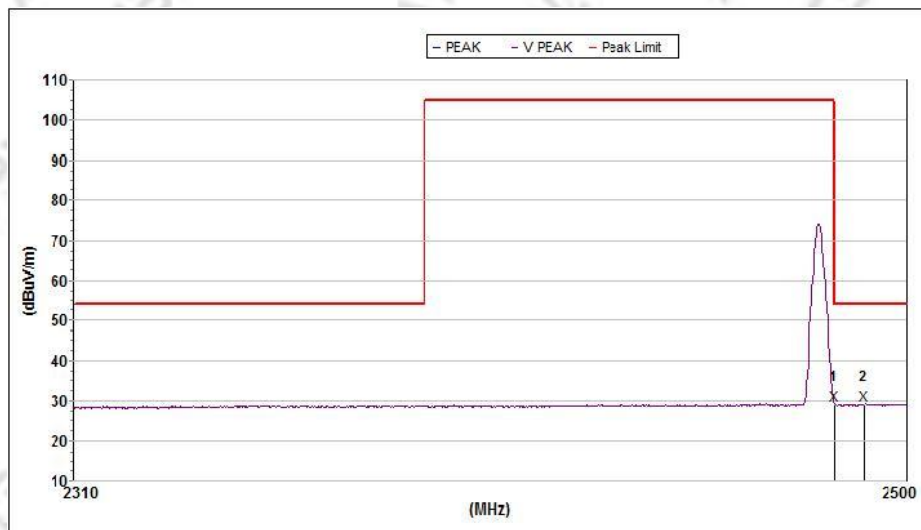
Test Mode: BLE 2M

Test Channel: Highest channel, Test Polarization: Horizontal



Mk.	Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Pol.
AVG							
1	2483.600	29.5	54.0	24.5	27.6	54.1	H
2	2490.000	29.0	54.0	25.0	27.6	54.1	H

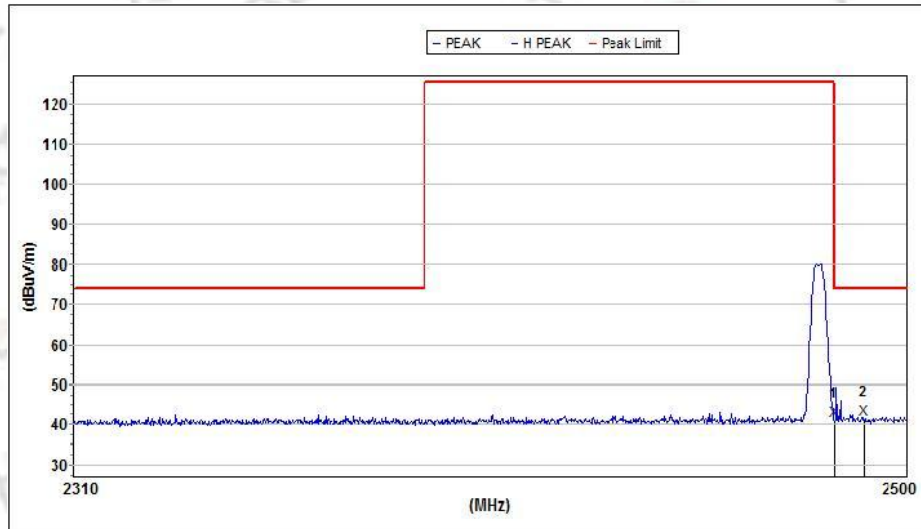
Test Channel: Highest channel, Test Polarization: Vertical



Mk.	Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Pol.
AVG							
1	2483.600	29.1	54.0	24.9	27.6	54.1	V
2	2490.000	29.1	54.0	24.9	27.6	54.1	V

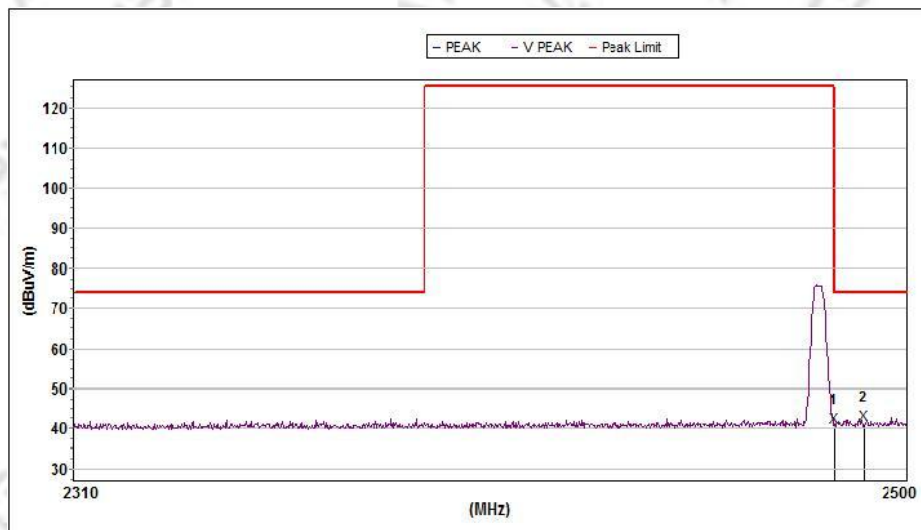
Test Mode: BLE 2M

Test Channel: Highest channel, Test Polarization: Horizontal



Mk.	Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Pol.
PEAK							
1	2483.600	41.1	74.0	32.9	27.6	54.1	H
2	2490.000	41.4	74.0	32.6	27.6	54.1	H

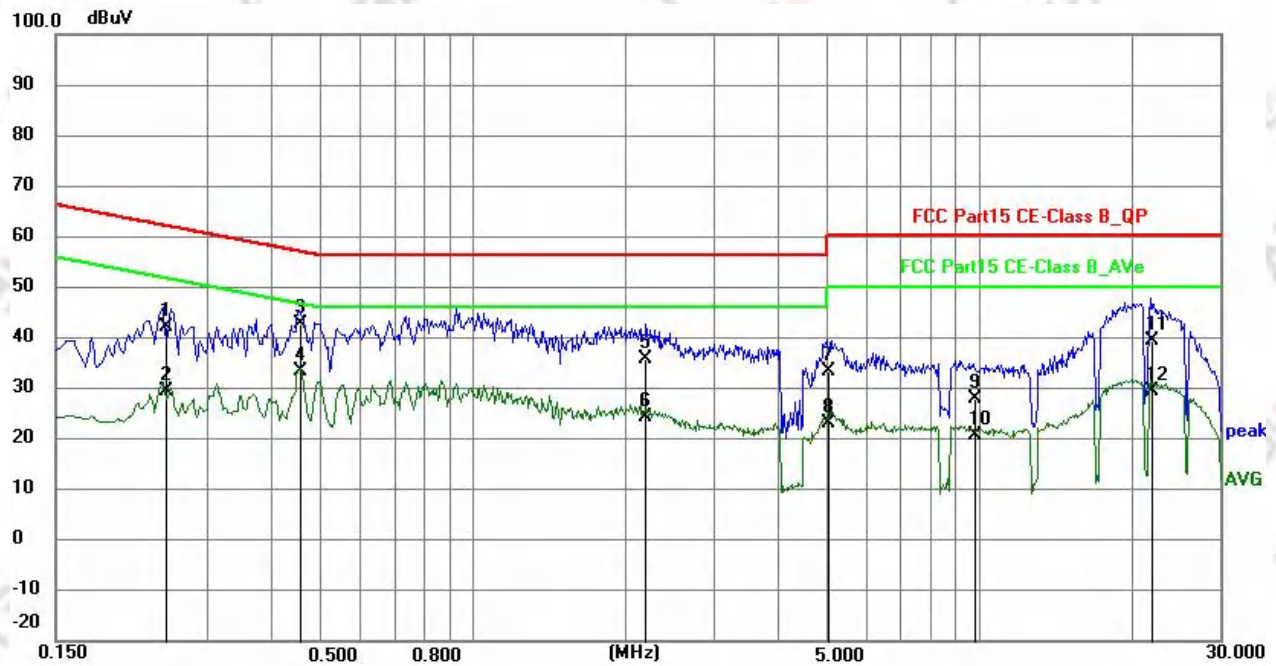
Test Channel: Highest channel, Test Polarization: Vertical



Mk.	Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Pol.
PEAK							
1	2483.600	40.5	74.0	33.5	27.6	54.1	V
2	2490.000	41.2	74.0	32.8	27.6	54.1	V

AC Power-Line Conducted Emission Test Data

Temperature:	24℃	Relative Humidity:	40%
Phase:	L	Test Mode:	Mode 7
Test Voltage:	AC 120V/60Hz	Test Date:	2025.09.25

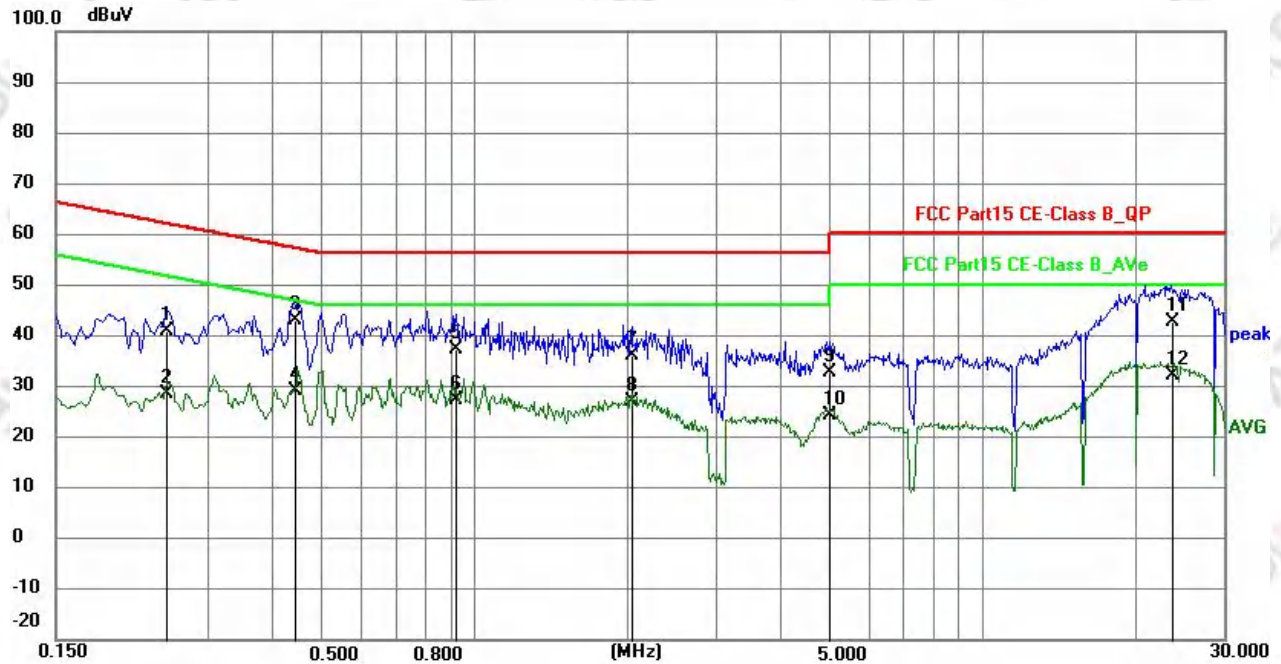


No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.2470	31.47	10.56	42.03	61.86	-19.83	QP
2	0.2470	19.00	10.56	29.56	51.86	-22.30	AVG
3	0.4570	32.20	10.41	42.61	56.75	-14.14	QP
4	0.4570	22.98	10.41	33.39	46.75	-13.36	AVG
5	2.1950	25.24	10.49	35.73	56.00	-20.27	QP
6	2.1950	13.93	10.49	24.42	46.00	-21.58	AVG
7	5.0480	22.68	10.54	33.22	60.00	-26.78	QP
8	5.0480	12.41	10.54	22.95	50.00	-27.05	AVG
9	9.7680	17.18	10.81	27.99	60.00	-32.01	QP
10	9.7680	9.80	10.81	20.61	50.00	-29.39	AVG
11	22.0340	25.35	13.97	39.32	60.00	-20.68	QP
12	22.0340	15.35	13.97	29.32	50.00	-20.68	AVG

Remark:

1. Margin = Result (Result =Reading + Factor)–Limit
2. Factor= Cable Loss +Antenna Factor-Amplifier Gain

Temperature:	24℃	Relative Humidity:	40%
Phase:	N	Test Mode:	Mode 7
Test Voltage:	AC 120V/60Hz	Test Date:	2025.09.25



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.2480	30.46	10.55	41.01	61.82	-20.81	QP
2	0.2480	18.10	10.55	28.65	51.82	-23.17	AVG
3	0.4430	32.47	10.41	42.88	57.01	-14.13	QP
4	0.4430	18.66	10.41	29.07	47.01	-17.94	AVG
5	0.9220	26.77	10.40	37.17	56.00	-18.83	QP
6	0.9220	16.98	10.40	27.38	46.00	-18.62	AVG
7	2.0420	25.48	10.48	35.96	56.00	-20.04	QP
8	2.0420	16.50	10.48	26.98	46.00	-19.02	AVG
9	5.0210	22.06	10.60	32.66	60.00	-27.34	QP
10	5.0210	13.55	10.60	24.15	50.00	-25.85	AVG
11	23.6970	28.54	14.32	42.86	60.00	-17.14	QP
12	23.6970	17.67	14.32	31.99	50.00	-18.01	AVG

Remark:

1. Margin = Result (Result =Reading + Factor)–Limit
2. Factor= Cable Loss +Antenna Factor–Amplifier Gain

*****END OF THE Appendix A2*****