FCC Test Report

Report No.:	AAOG-ESH-P24120408B-1
FCC ID:	2ABEU-YLYDD0091
Product:	Yeelight Smart LED Strip Lights
Test Model:	YLYDD-0091, YLYDD-0092, YLYDD-0093
Received Date:	Dec.09, 2024
Test Date:	Dec.09, 2024 to Jan.05, 2025
Issued Date:	Jan.08, 2025
Applicant:	Qingdao Yeelink Information Technology Co., Ltd.
Address:	10F-B4, Building B, Qingdao International Innovation Park, No.1 Keyuan Weiyi Road, Laoshan District, Qingdao City, Shandong Province, P. R. China
Manufacturer:	Qingdao Yeelink Information Technology Co., Ltd.
Address:	10F-B4, Building B, Qingdao International Innovation Park, No.1 Keyuan Weiyi Road, Laoshan District, Qingdao City, Shandong Province, P. R. China
Issued By:	BUREAU VERITAS ADT (Shanghai) Corporation
Lab Address:	No. 829, Xinzhuan Road, Shanghai, P.R.China (201612)
FCC Registration / Designation Number:	176467/ CN1213

Test Lab Cert 2343.01

Table of Contents

Issue No.	Description	Date Issued
AAOG-ESH-P24120408B-1	Original release	Jan.08, 2025

1 Certificate of Conformity

Product: Yeelight Smart LED Strip Lights

Brand: YEELIGHT

Test Model: YLYDD-0091, YLYDD-0092, YLYDD-0093

Applicant: Qingdao Yeelink Information Technology Co., Ltd.

Test Date: Dec.09, 2024 to Jan.05, 2025

Standards: **47 CFR FCC Part 15, Subpart C (Section 15.247)**

ANSI C63.10:2020

The above equipment has been tested by **BUREAU VERITAS ADT (Shanghai) Corporation**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by : _____ , **Date:** _____

Jan.08, 2025

Yan ZHOU

Project Engineer

Approved by : _____ , **Date:** _____

Jan.08, 2025

Sean YU

RF Supervisor

2 Summary of Test Results

The EUT has been tested according to the following specifications:

47 CFR FCC Part 15, Subpart C (SECTION 15.247)			
FCC Clause	Test Item	Result	Remarks
15.203	Antenna Requirement	PASS	No antenna connector is used.
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit.
15.247(a)(2)	Minimum 6dB Bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted Output Power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.247(d)	Conducted Band Edges Measurement	PASS	Meet the requirement of limit.
15.247(d)	Conducted Spurious Emissions	PASS	Meet the requirement of limit.
15.247(d)	Emissions in restricted frequency bands	PASS	Meet the requirement of limit.
15.205 / 15.209 / 15.247(d)	Radiated Emissions Measurement	PASS	Meet the requirement of limit.

2.1 Test Instruments

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Loop Antenna	ETS-LINDGREN	6502	E1A1039	Jul.30,24	Jul.29,26
Hybrid Antenna(25MHz-1.5GHz)	Schwarzbeck	VULB9168	E1A1001	Mar.28,24	Mar.27,26
Horn Antenna(1GHz -18GHz)	Schwarzbeck	BBHA9120D	E1A1017	Jul.31,24	Jul.30,26
Double Ridge Horn Antenna(18G-40G)	COM-POWER	AH-840	E1A1040	Jul.31,24	Jul.30,26
Pre-Amplifier(100kHz-1.3GHz)	Agilent	8447D	E1A2001	Feb.18,24	Feb.17,25
Pre-Amplifier(0.5GHz-18GHz)	EMCI	EMC184045SE	E1A2009	Jul.02,24	Jul.01,25
Pre-Amplifier(18GHz-40GHz)	EMCI	EMC051845SE	E1A2008	Aug.15,24	Aug.14,25
EMI test recerver	R&S	ESR26	E1R1009	Sep.03,24	Sep.02,25
Spectrum Analyzer	Keysight	N9030B	E1S1003	Aug.28,24	Aug.27,25
Spectrum Analyzer	Keysight	N9020A	E1S1004	Feb.19,24	Feb.18,25
EMI test recerver	R&S	ESR3	E1R1008	May.31,24	May.30,25
LISN	R&S	ENV216	E1L1013	Aug.12, 24	Aug.11, 25
Humidity&Temp Tester	ESPEC	SE TH-Z-042U	C1TH002	Jun.04,24	Jun.03,25
RF Control Unit	Toscend	JS0806-2	E1C5003	N/A	N/A
Test Software	Toscend	JS32-CE	N/A	N/A	N/A
Test Software	Toscend	JS32-RE	N/A	N/A	N/A
Test Software	Toscend	JS1120	N/A	N/A	N/A
Test Software	Toscend	JS1120-3	N/A	N/A	N/A

2.2   Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT:

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Measurement	Frequency	Expanded Uncertainty (k=2) ($\pm$)
Conducted Emissions at mains ports	150kHz ~ 30MHz	1.83 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.36 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	3.47 dB
	6GHz ~ 18GHz	3.75 dB
	18GHz ~ 40GHz	3.30 dB

2.3   Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Yeelight Smart LED Strip Lights
Brand	YEELIGHT
Test Model	YLYDD-0091, YLYDD-0092, YLYDD-0093
Model Difference	All models are identical except adaptor, length, ratings and controller.
Power Rating	YLYDD-0091: DC 24V 0.5A, Powered by adaptor YLYDD-0092: DC 24V 1A, Powered by adaptor YLYDD-0093: DC 24V 2A, Powered by adaptor
Modulation Type	GFSK
Modulation Technology	Bluetooth Low Energy 4.2
Operating Frequency	2402MHz ~ 2480MHz
Number of Channel	40
Antenna Type	PCB Antenna
Antenna Connector	--
Antenna Gain	1.96dBi

Note:

1. For more details, please refer to the User's manual of the EUT.

3.2 Description of Support Unit

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.
Adaptor for YLYDD-0091	Guangdong Tiantongjiuheng Technology Co., Ltd	TJ01501L2400500US	NA
Adaptor for YLYDD-0092	Guangdong Tiantongjiuheng Technology Co., Ltd	TJ02402W2401000US	NA
Adaptor for YLYDD-0093	Guangdong Tiantongjiuheng Technology Co., Ltd	TJ05301W2402000US	NA

3.3 Description of Test Modes

40 channels are provided for Bluetooth LE.

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
0	2402 MHz	20	2442 MHz
1	2404 MHz	21	2444 MHz
2	2406 MHz	22	2446 MHz
3	2408 MHz	23	2448 MHz
4	2410 MHz	24	2450 MHz
5	2412 MHz	25	2452 MHz
6	2414 MHz	26	2454 MHz
7	2416 MHz	27	2456 MHz
8	2418 MHz	28	2458 MHz
9	2420 MHz	29	2460 MHz
10	2422 MHz	30	2462 MHz
11	2424 MHz	31	2464 MHz
12	2426 MHz	32	2466 MHz
13	2428 MHz	33	2468 MHz
14	2430 MHz	34	2470 MHz
15	2432 MHz	35	2472 MHz
16	2434 MHz	36	2474 MHz
17	2436 MHz	37	2476 MHz
18	2438 MHz	38	2478 MHz
19	2440 MHz	39	2480 MHz

3.4 DESCRIPTION OF SYSTEM UNDER TEST

RADIATED TEST CONFIGURATION

Adapter

EUT

- Turn Table
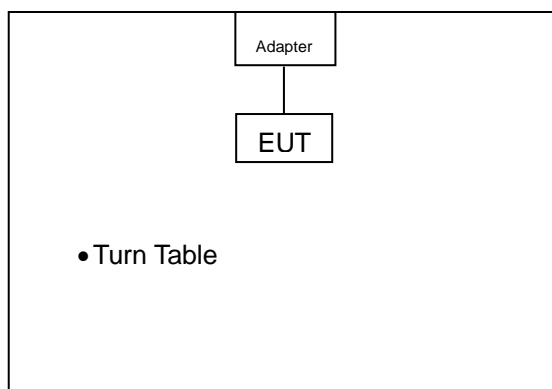
3.4.1 Test Mode Applicability:

EUT Configure Mode	Applicable to				Description
	RE ≥ 1G	RE < 1G	PLC	APCM	
-	√	√	√	√	-

Where   **RE≥1G:** Radiated Emission above 1GHz   **RE< 1G:** Radiated Emission below 1GHz

                PLC: Power Line Conducted Emission   **APCM:** Antenna Port Conducted Measurement

Radiated Emission Test (Above 1 GHz):

☒   Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒   Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
-	BLE	0 to 39	0, 19, 39	GFSK

Radiated Emission Test (Below 1 GHz):

☒   Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒   Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
-	BLE	0 to 39	0	GFSK

Power Line Conducted Emission Test:

☒   Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒   Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
-	BLE	0 to 39	0	GFSK

Antenna Port Conducted Measurement

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
-	BLE	0 to 39	0, 19, 39	GFSK

3.4.2 Test Condition:

Applicable to	Normal Environmental Conditions	Normal Input Power
RE ≥ 1G	25deg. C, 60%RH	DC 3.3V
RE < 1G	25deg. C, 60%RH	DC 3.3V
PLC	25deg. C, 60%RH	DC 24V, Powered by adaptor
APCM	25deg. C, 60%RH	DC 3.3V

3.5 Duty Cycle of Test Signal

Test Mode	Antenna	Channel [MHz]	Duty Cycle [%]	10log(1/x) Factor[dB]
BLE_1M	Ant1	2402	85.20	0.70
		2440	85.20	0.70
		2480	85.20	0.70
BLE_2M	Ant1	2402	43.20	3.65
		2440	43.20	3.65
		2480	42.80	3.69

Note: Duty Cycle Factor=10* Log[1/Duty Cycle(%)*100], Duty Cycle= T_{on}/T_{period} *100%

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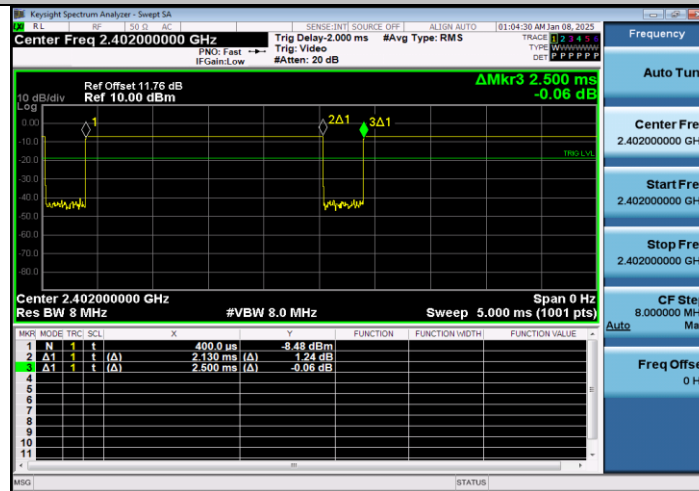
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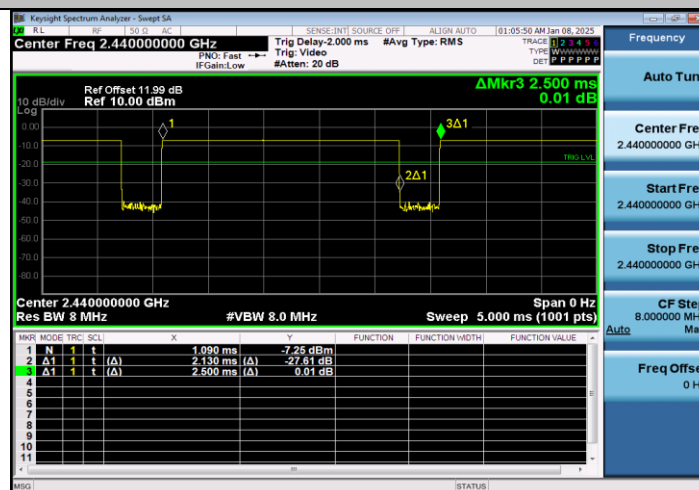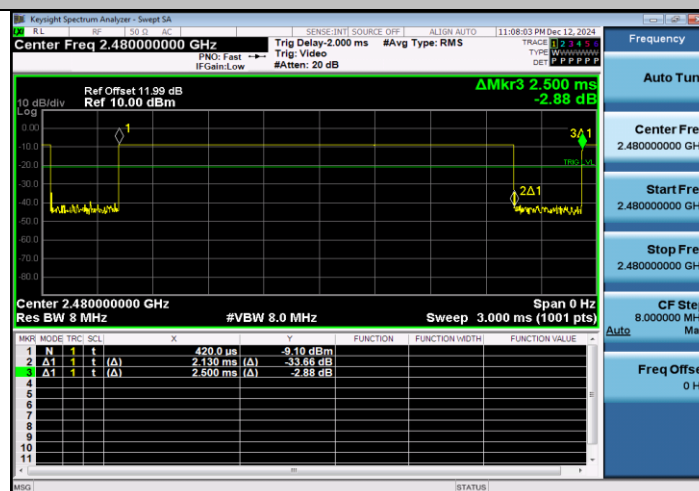
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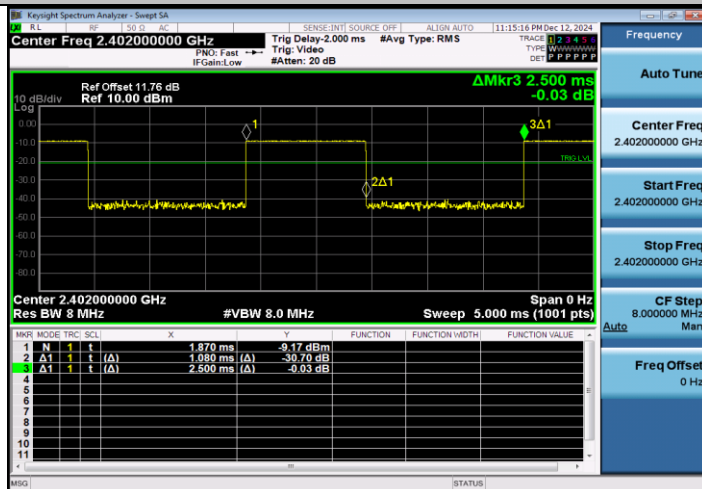
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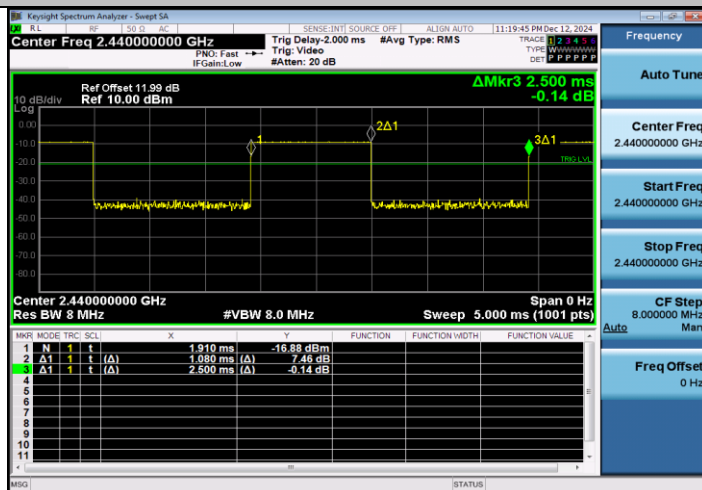
BLE_2M_Ant1_2440

BLE_2M_Ant1_2480
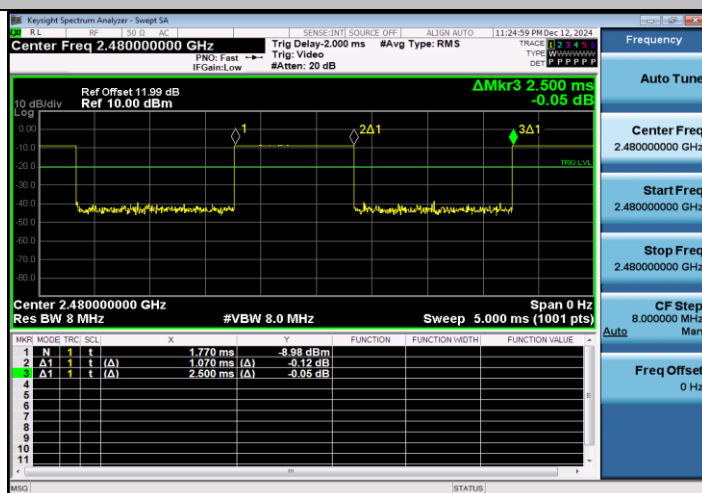
3.6 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standard:

FCC Part 15, Subpart C (15.247)

KDB 558074 D01 DTS Meas Guidance v05r02

ANSI C63.10:2020

All relaxed test items have been performed and recorded as per the above standard.

4   Test Procedure and Results

4.1   AC Power Conducted Emission

4.1.1   Limits

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies.

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.1.2   Test Procedures

a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.

b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

NOTE: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

4.1.3   Deviation from Test Standard

No deviation.

4.1.4 Test Setup
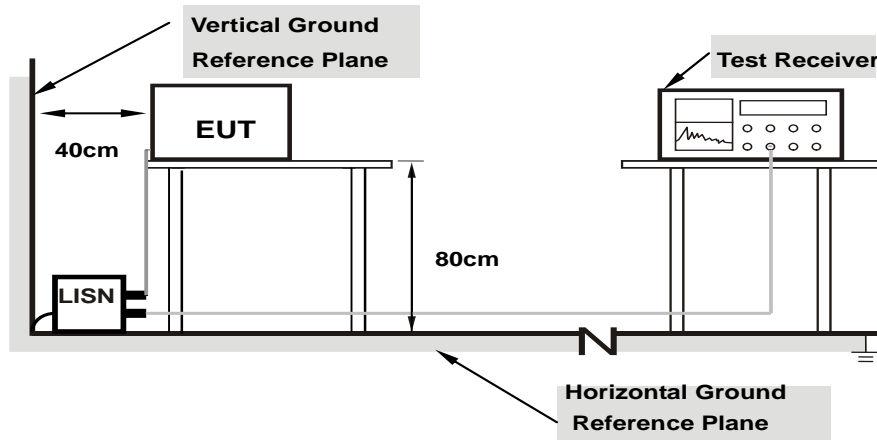
Note: 1.Support units were connected to second LISN.

For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.5 EUT Operating Conditions

Same as 4.1.6.

4.1.6 Test Results

Test model: YLYDD-0091 with adaptor: TJ01501L2400500US

Phase: L Voltage: 120V 60Hz
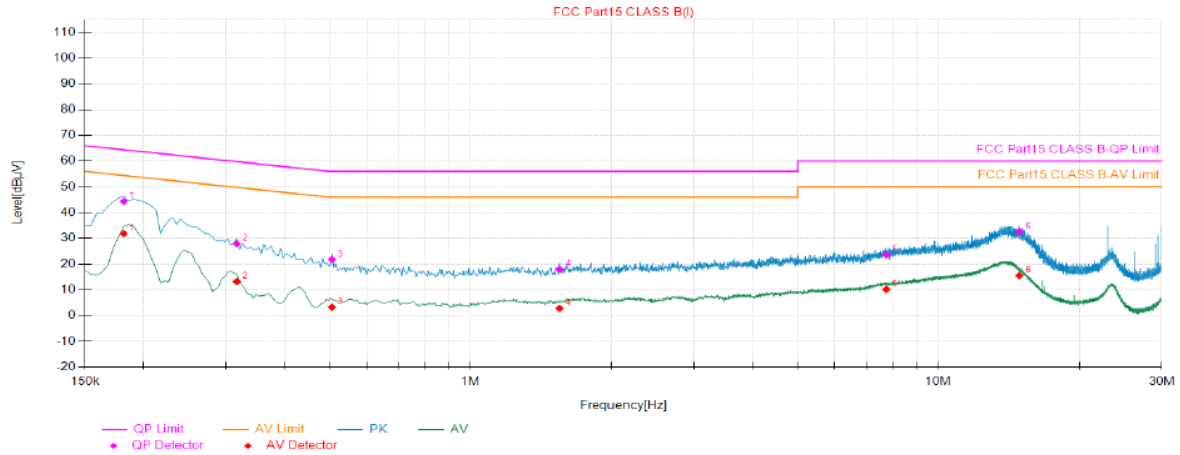
Final Data List

NO.	Freq. [MHz]	Factor [dB]	QP Reading [dBμV]	QP Value [dBμV]	QP Limit [dBμV]	QP Margin [dB]	AV Reading [dBμV]	AV Value [dBμV]	AV Limit [dBμV]	AV Margin [dB]
1	0.18	9.69	34.67	44.36	64.42	20.06	22.13	31.82	54.42	22.60
2	0.32	9.45	18.41	27.86	59.80	31.94	3.76	13.21	49.80	36.59
3	0.51	9.51	12.33	21.84	56.00	34.16	-6.29	3.22	46.00	42.78
4	1.55	9.50	8.45	17.95	56.00	38.05	-6.69	2.81	46.00	43.19
5	7.74	9.71	13.85	23.56	60.00	36.44	0.49	10.20	50.00	39.80
6	14.89	9.95	22.64	32.59	60.00	27.41	5.56	15.51	50.00	34.49

REMARKS:

    1. Q.P. and AV. are abbreviations of quasi-peak and average individually.

    2. The emission levels of other frequencies were very low against the limit.

    3. Margin value = Limit value - Emission level

    4. Correction factor = Insertion loss + Cable loss

    5. Emission Level = Correction Factor + Reading Value.

Phase: N Voltage: 120V 60Hz
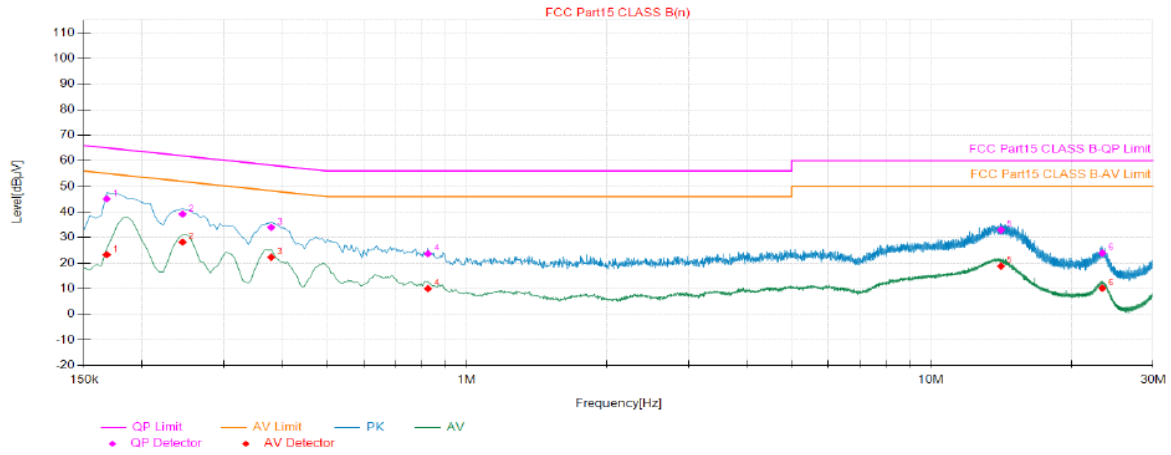
Final Data List

NO.	Freq. [MHz]	Factor [dB]	QP Reading [dBµV]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	AV Reading [dBµV]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]
1	0.17	9.67	35.39	45.06	65.06	20.00	13.60	23.27	55.06	31.79
2	0.24	9.61	29.53	39.14	61.94	22.80	18.57	28.18	51.94	23.76
3	0.38	9.51	24.47	33.98	58.29	24.31	12.75	22.26	48.29	26.03
4	0.83	9.30	14.35	23.65	56.00	32.35	0.73	10.03	46.00	35.97
5	14.12	9.93	23.01	32.94	60.00	27.06	8.87	18.80	50.00	31.20
6	23.34	9.98	13.93	23.91	60.00	36.09	0.22	10.20	50.00	39.80

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.

2. The emission levels of other frequencies were very low against the limit.

3. Margin value = Limit value - Emission level

4. Correction factor = Insertion loss + Cable loss

5. Emission Level = Correction Factor + Reading Value.
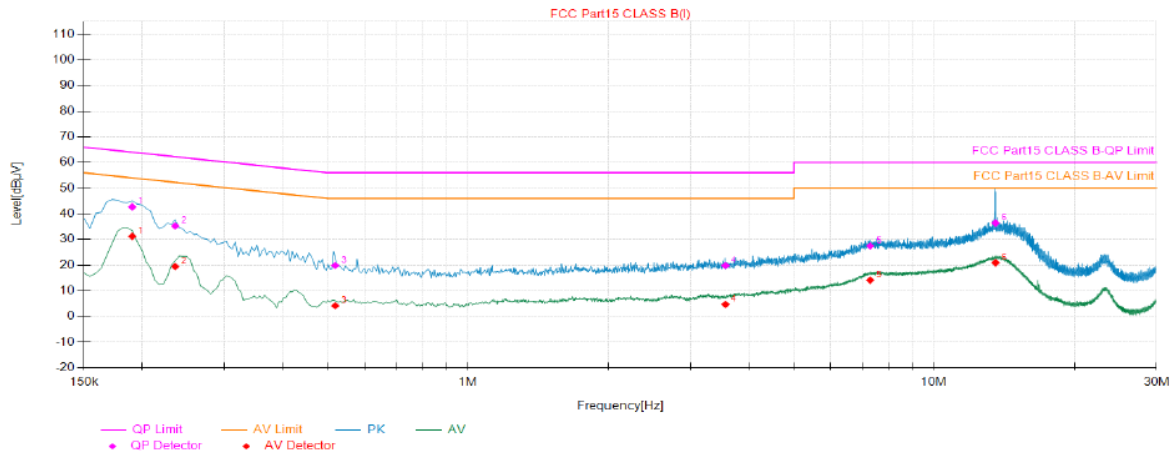
Phase: L Voltage: 230V 50Hz

Final Data List

NO.	Freq. [MHz]	Factor [dB]	QP Reading [dBμV]	QP Value [dBμV]	QP Limit [dBμV]	QP Margin [dB]	AV Reading [dBμV]	AV Value [dBμV]	AV Limit [dBμV]	AV Margin [dB]
1	0.19	9.69	32.98	42.67	64.01	21.34	21.53	31.22	54.01	22.79
2	0.24	9.59	25.66	35.25	62.25	27.00	9.81	19.40	52.25	32.85
3	0.52	9.51	10.33	19.84	56.00	36.16	-5.38	4.13	46.00	41.87
4	3.57	9.64	10.18	19.82	56.00	36.18	-4.95	4.69	46.00	41.31
5	7.29	9.74	17.73	27.47	60.00	32.53	4.36	14.10	50.00	35.90
6	13.55	10.00	26.39	36.39	60.00	23.61	10.89	20.89	50.00	29.11

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.

2. The emission levels of other frequencies were very low against the limit.

3. Margin value = Limit value - Emission level

4. Correction factor = Insertion loss + Cable loss

5. Emission Level = Correction Factor + Reading Value.
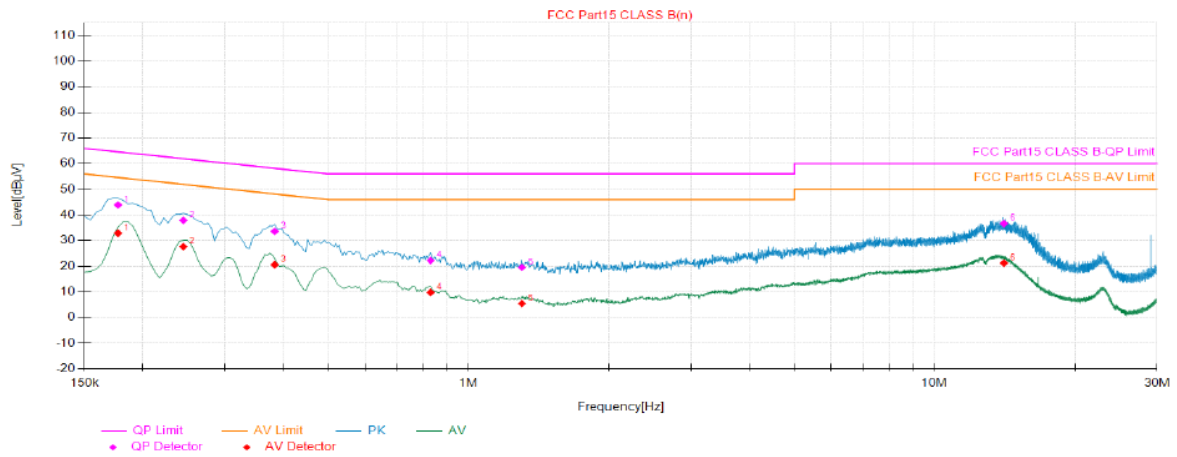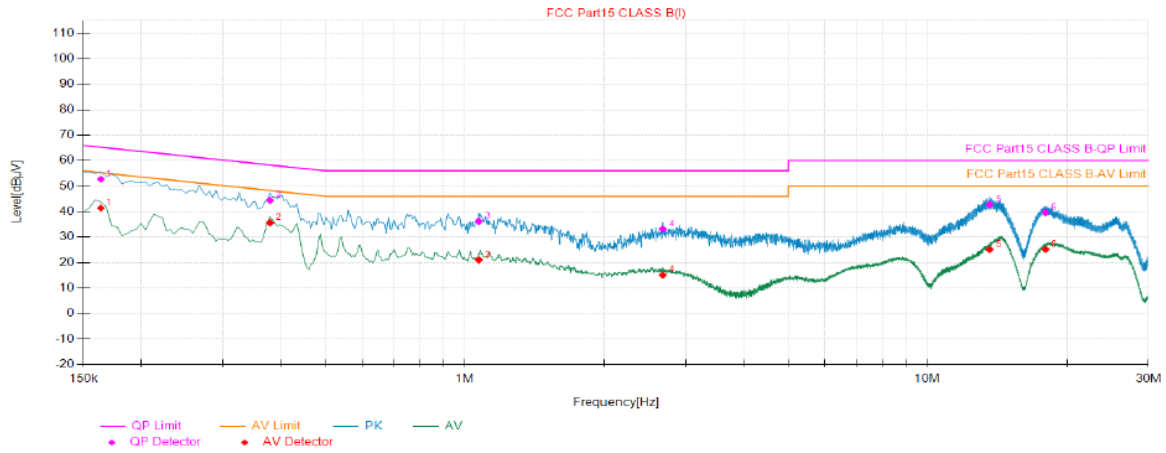
Phase: N Voltage: 230V 50Hz

Final Data List

NO.	Freq. [MHz]	Factor [dB]	QP Reading [dBµV]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	AV Reading [dBµV]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]
1	0.18	9.67	34.22	43.89	64.63	20.74	23.20	32.87	54.63	21.76
2	0.24	9.61	28.27	37.88	61.94	24.06	18.03	27.64	51.94	24.30
3	0.38	9.50	24.09	33.59	58.19	24.60	11.08	20.58	48.19	27.61
4	0.83	9.30	12.88	22.18	56.00	33.82	0.48	9.78	46.00	36.22
5	1.30	9.48	10.01	19.49	56.00	36.51	-4.04	5.44	46.00	40.56
6	14.08	9.94	26.68	36.62	60.00	23.38	11.23	21.17	50.00	28.83

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.

2. The emission levels of other frequencies were very low against the limit.

3. Margin value = Limit value - Emission level

4. Correction factor = Insertion loss + Cable loss

5. Emission Level = Correction Factor + Reading Value.

Test model: YLYDD-0092 with adaptor: TJ02402W2401000US
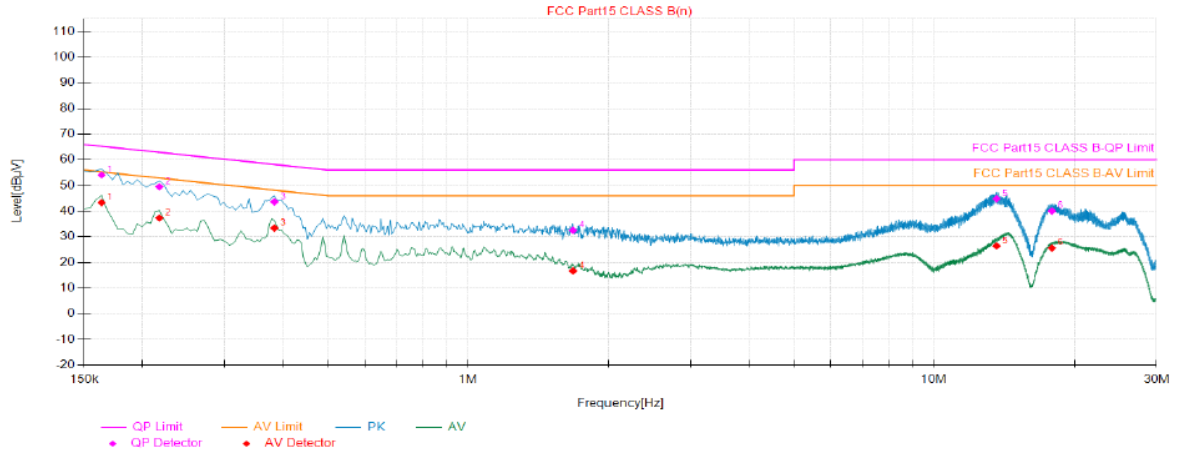
Phase: L Voltage: 120V 60Hz

Final Data List

NO.	Freq. [MHz]	Factor [dB]	QP Reading [dBμV]	QP Value [dBμV]	QP Limit [dBμV]	QP Margin [dB]	AV Reading [dBμV]	AV Value [dBμV]	AV Limit [dBμV]	AV Margin [dB]
1	0.16	9.70	43.04	52.74	65.28	12.54	31.66	41.36	55.28	13.92
2	0.38	9.47	34.92	44.39	58.29	13.90	26.15	35.62	48.29	12.67
3	1.07	9.42	26.78	36.20	56.00	19.80	11.59	21.01	46.00	24.99
4	2.68	9.63	23.52	33.15	56.00	22.85	5.46	15.09	46.00	30.91
5	13.62	10.00	32.73	42.73	60.00	17.27	15.10	25.10	50.00	24.90
6	17.97	9.84	29.76	39.60	60.00	20.40	15.33	25.17	50.00	24.83

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.

2. The emission levels of other frequencies were very low against the limit.

3. Margin value = Limit value - Emission level

4. Correction factor = Insertion loss + Cable loss

5. Emission Level = Correction Factor + Reading Value.
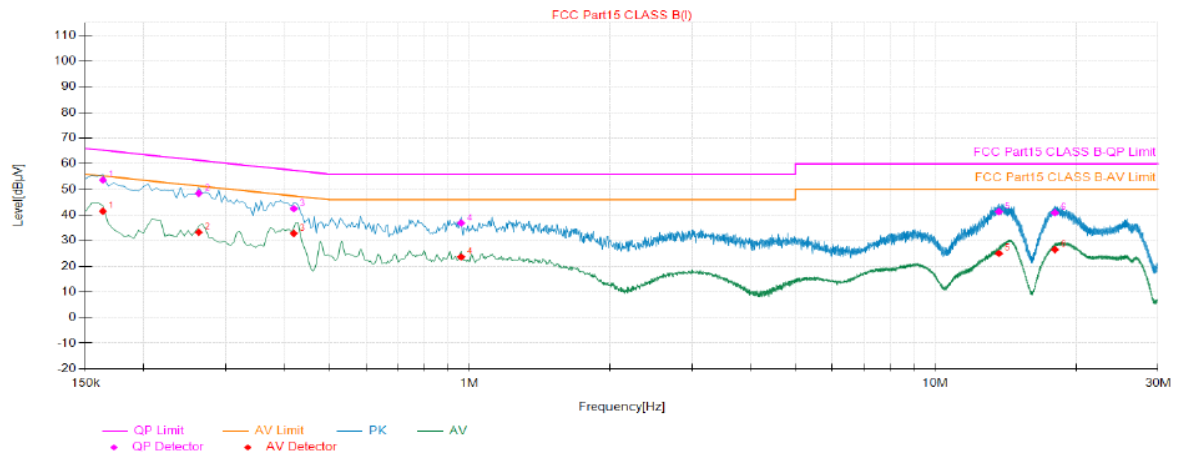
Phase: N Voltage: 120V 60Hz

Final Data List

NO.	Freq. [MHz]	Factor [dB]	QP Reading [dBµV]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	AV Reading [dBµV]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]
1	0.16	9.67	44.41	54.08	65.28	11.20	33.60	43.27	55.28	12.01
2	0.22	9.65	39.86	49.51	62.91	13.40	27.68	37.33	52.91	15.58
3	0.38	9.50	34.08	43.58	58.19	14.61	23.87	33.37	48.19	14.82
4	1.68	9.55	22.96	32.51	56.00	23.49	7.14	16.69	46.00	29.31
5	13.61	9.98	34.82	44.80	60.00	15.20	16.42	26.40	50.00	23.60
6	17.88	9.82	30.21	40.03	60.00	19.97	15.75	25.57	50.00	24.43

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.

2. The emission levels of other frequencies were very low against the limit.

3. Margin value = Limit value - Emission level

4. Correction factor = Insertion loss + Cable loss

5. Emission Level = Correction Factor + Reading Value.
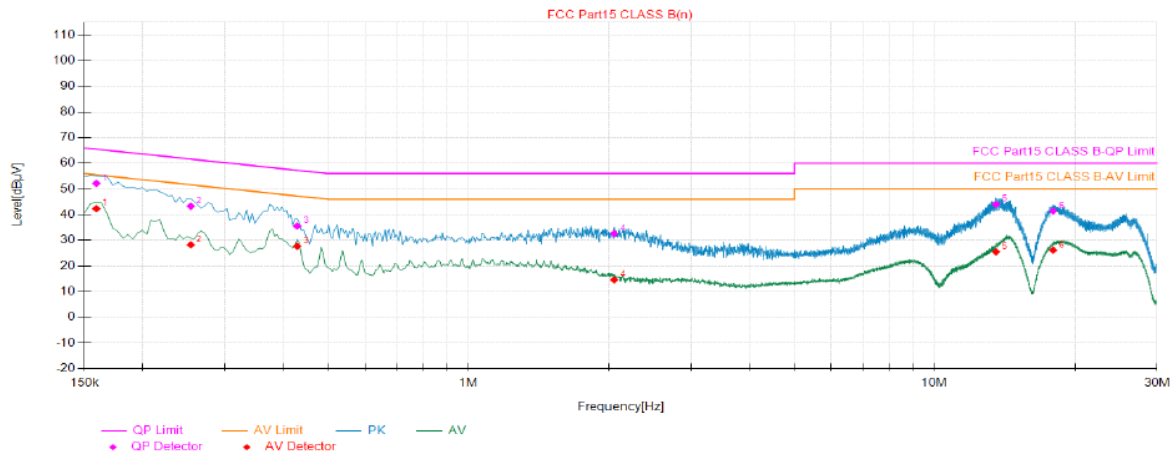
Phase: L Voltage: 230V 50Hz

Final Data List

NO.	Freq. [MHz]	Factor [dB]	QP Reading [dBμV]	QP Value [dBμV]	QP Limit [dBμV]	QP Margin [dB]	AV Reading [dBμV]	AV Value [dBμV]	AV Limit [dBμV]	AV Margin [dB]
1	0.16	9.70	43.98	53.68	65.28	11.60	31.80	41.50	55.28	13.78
2	0.26	9.53	38.92	48.45	61.35	12.90	23.76	33.29	51.35	18.06
3	0.42	9.48	33.01	42.49	57.45	14.96	23.38	32.86	47.45	14.59
4	0.96	9.40	27.49	36.89	56.00	19.11	14.25	23.65	46.00	22.35
5	13.67	10.00	31.32	41.32	60.00	18.68	15.01	25.01	50.00	24.99
6	18.02	9.84	31.06	40.90	60.00	19.10	16.71	26.55	50.00	23.45

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.

2. The emission levels of other frequencies were very low against the limit.

3. Margin value = Limit value - Emission level

4. Correction factor = Insertion loss + Cable loss

5. Emission Level = Correction Factor + Reading Value.

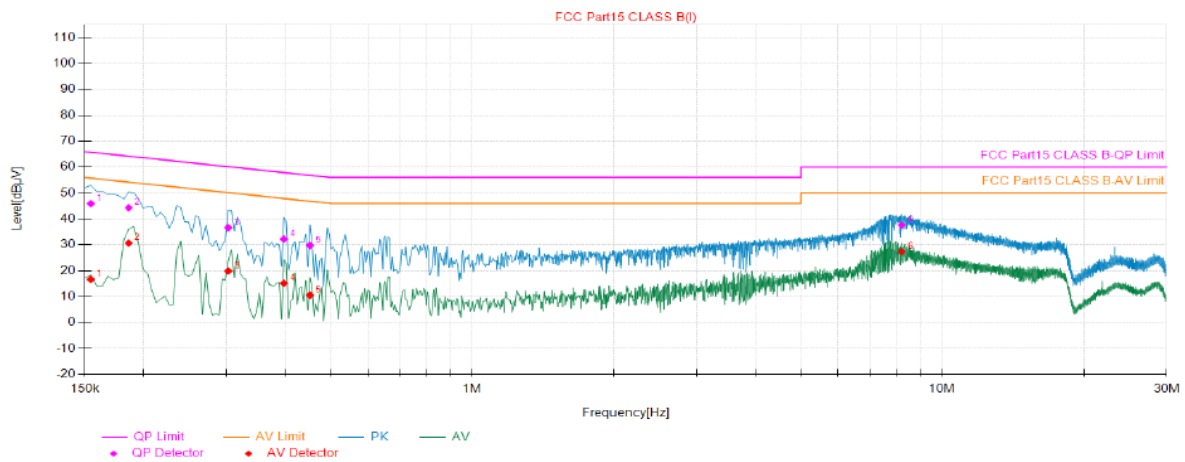Phase: N Voltage: 230V 50Hz

Final Data List

NO.	Freq. [MHz]	Factor [dB]	QP Reading [dBµV]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	AV Reading [dBµV]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]
1	0.16	9.66	42.51	52.17	65.52	13.35	32.64	42.30	55.52	13.22
2	0.25	9.60	33.66	43.26	61.64	18.38	18.62	28.22	51.64	23.42
3	0.43	9.49	26.06	35.55	57.27	21.72	18.19	27.68	47.27	19.59
4	2.05	9.61	22.95	32.56	56.00	23.44	4.94	14.55	46.00	31.45
5	13.54	9.99	34.00	43.99	60.00	16.01	15.49	25.48	50.00	24.52
6	17.94	9.82	31.56	41.38	60.00	18.62	16.27	26.09	50.00	23.91

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.

2. The emission levels of other frequencies were very low against the limit.

3. Margin value = Limit value - Emission level

4. Correction factor = Insertion loss + Cable loss

5. Emission Level = Correction Factor + Reading Value.

Test model: YLYDD-0093 with adaptor: TJ05301W2402000US
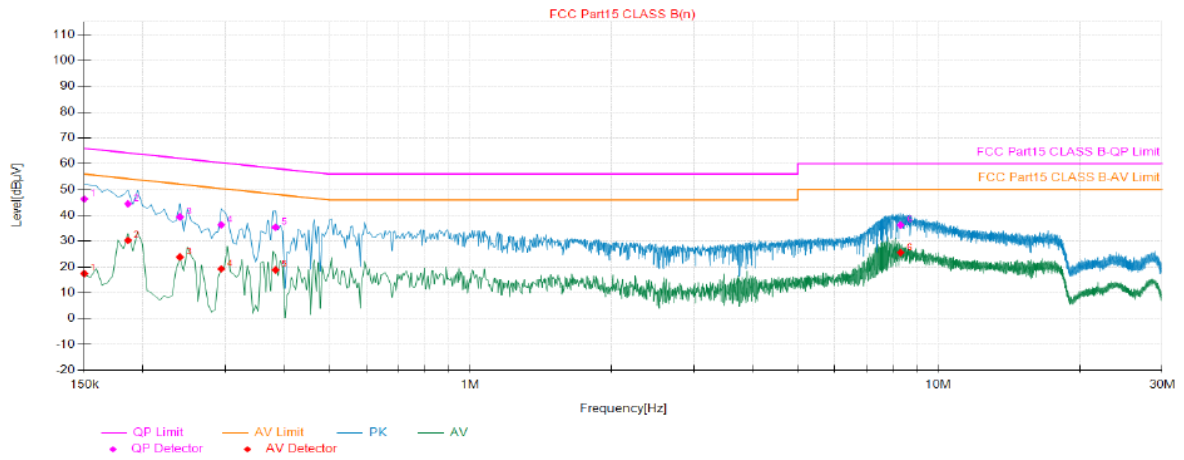
Phase: L Voltage: 120V 60Hz

Final Data List

NO.	Freq. [MHz]	Factor [dB]	QP Reading [dBμV]	QP Value [dBμV]	QP Limit [dBμV]	QP Margin [dB]	AV Reading [dBμV]	AV Value [dBμV]	AV Limit [dBμV]	AV Margin [dB]
1	0.15	9.71	36.22	45.93	65.75	19.82	6.94	16.65	55.75	39.10
2	0.19	9.69	34.62	44.31	64.21	19.90	21.00	30.69	54.21	23.52
3	0.30	9.44	27.14	36.58	60.16	23.58	10.42	19.86	50.16	30.30
4	0.40	9.47	22.75	32.22	57.91	25.69	5.69	15.16	47.91	32.75
5	0.45	9.49	20.27	29.76	56.85	27.09	1.05	10.54	46.85	36.31
6	8.20	9.73	27.90	37.63	60.00	22.37	17.68	27.41	50.00	22.59

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.

2. The emission levels of other frequencies were very low against the limit.

3. Margin value = Limit value - Emission level

4. Correction factor = Insertion loss + Cable loss

5. Emission Level = Correction Factor + Reading Value.
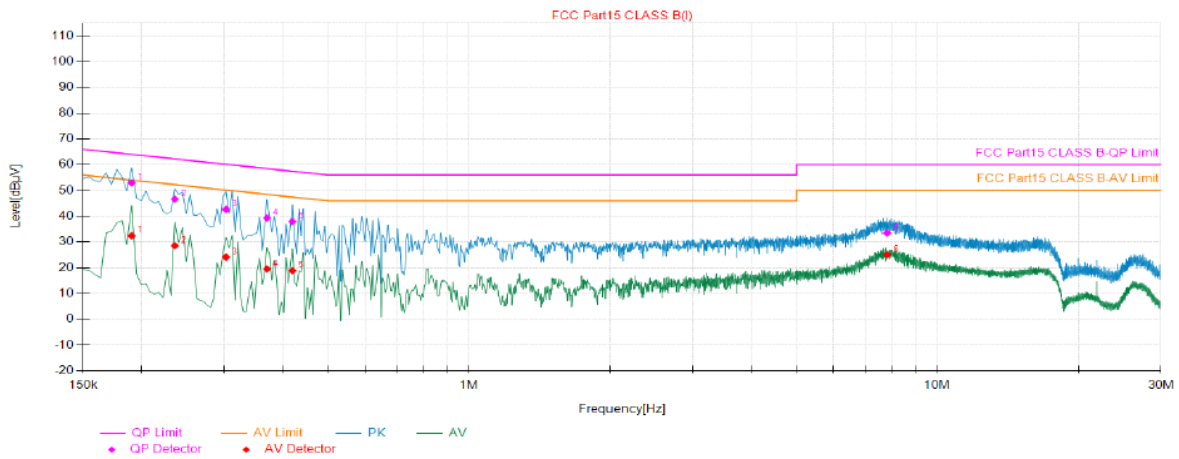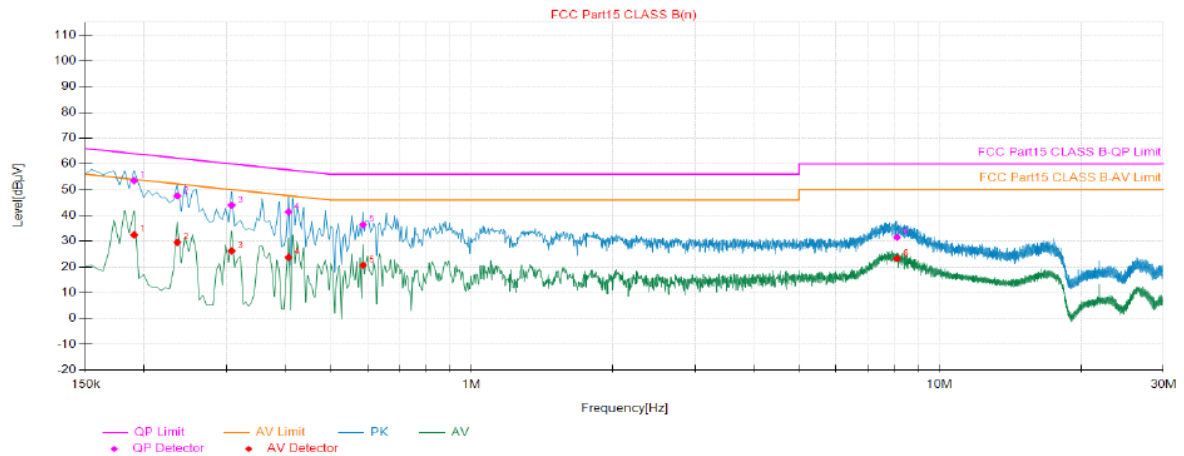
Phase: N Voltage: 120V 60Hz

Final Data List

NO.	Freq. [MHz]	Factor [dB]	QP Reading [dBµV]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	AV Reading [dBµV]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]
1	0.15	9.66	36.70	46.36	66.00	19.64	7.74	17.40	56.00	38.60
2	0.19	9.67	34.79	44.46	64.21	19.75	20.65	30.32	54.21	23.89
3	0.24	9.62	29.77	39.39	62.10	22.71	14.22	23.84	52.10	28.26
4	0.29	9.54	26.76	36.30	60.41	24.11	9.68	19.22	50.41	31.19
5	0.38	9.50	25.88	35.38	58.19	22.81	9.34	18.84	48.19	29.35
6	8.30	9.83	26.40	36.23	60.00	23.77	15.73	25.56	50.00	24.44

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.

2. The emission levels of other frequencies were very low against the limit.

3. Margin value = Limit value - Emission level

4. Correction factor = Insertion loss + Cable loss

5. Emission Level = Correction Factor + Reading Value.

Phase: L Voltage: 230V 50Hz

Final Data List

| NO.	Freq. [MHz]	Factor [dB]	QP Reading [dBµV]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	AV Reading [dBµV]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]
1	0.19	9.69	43.26	52.95	64.01	11.06	22.72	32.41	54.01	21.60
2	0.24	9.59	37.09	46.68	62.25	15.57	18.96	28.55	52.25	23.70
3	0.30	9.44	33.17	42.61	60.16	17.55	14.66	24.10	50.16	26.06
4	0.37	9.46	29.83	39.29	58.49	19.20	10.01	19.47	48.49	29.02
5	0.42	9.48	28.43	37.91	57.45	19.54	9.35	18.83	47.45	28.62
6	7.81	9.70	23.74	33.44	60.00	26.56	15.37	25.07	50.00	24.93

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.

2. The emission levels of other frequencies were very low against the limit.

3. Margin value = Limit value - Emission level

4. Correction factor = Insertion loss + Cable loss

5. Emission Level = Correction Factor + Reading Value.

Phase: N Voltage: 230V 50Hz

Final Data List

NO.	Freq. [MHz]	Factor [dB]	QP Reading [dBµV]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	AV Reading [dBµV]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]
1	0.19	9.68	43.83	53.51	64.01	10.50	22.76	32.44	54.01	21.57
2	0.24	9.63	37.98	47.61	62.25	14.64	19.91	29.54	52.25	22.71
3	0.31	9.53	34.43	43.96	60.04	16.08	16.65	26.18	50.04	23.86
4	0.41	9.50	31.85	41.35	57.72	16.37	14.20	23.70	47.72	24.02
5	0.59	9.45	26.90	36.35	56.00	19.65	11.17	20.62	46.00	25.38
6	8.10	9.79	21.73	31.52	60.00	28.48	13.45	23.24	50.00	26.76

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.

2. The emission levels of other frequencies were very low against the limit.

3. Margin value = Limit value - Emission level

4. Correction factor = Insertion loss + Cable loss

5. Emission Level = Correction Factor + Reading Value.

4.2   Minimum 6dB Bandwidth

4.2.1 Limit

For digital modulation systems, the minimum 6dB bandwidth shall be at least 500 kHz

4.2.2 Test Setup
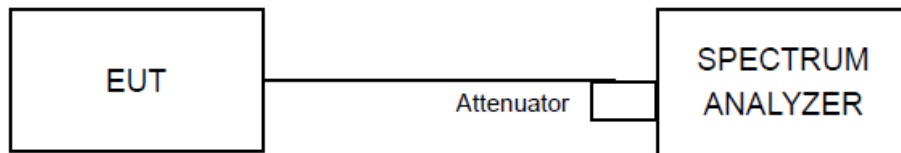
4.2.3 Test Procedures

The EUT was tested according to DTS test procedure of "KDB558074 D01 DTS Meas Guidance" for compliance to FCC 47CFR 15.247 requirements (clause 8.2).

The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described above (i.e., RBW = 100 kHz, VBW $\geqslant$ 3 RBW, peak detector with maximum hold) is implemented by the instrumentation function.

4.2.4 Deviation of Test Standard

No deviation.

4.2.5 Test Results

DTS Bandwidth

TestMode	Antenna	Freq(MHz)	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	0.660	2401.676	2402.336	0.5	PASS
		2440	0.684	2439.656	2440.340	0.5	PASS
		2480	0.652	2479.680	2480.332	0.5	PASS
BLE_2M	Ant1	2402	1.168	2401.420	2402.588	0.5	PASS
		2440	1.244	2439.352	2440.596	0.5	PASS
		2480	1.136	2479.444	2480.580	0.5	PASS

BLE_1M_Ant1_2402
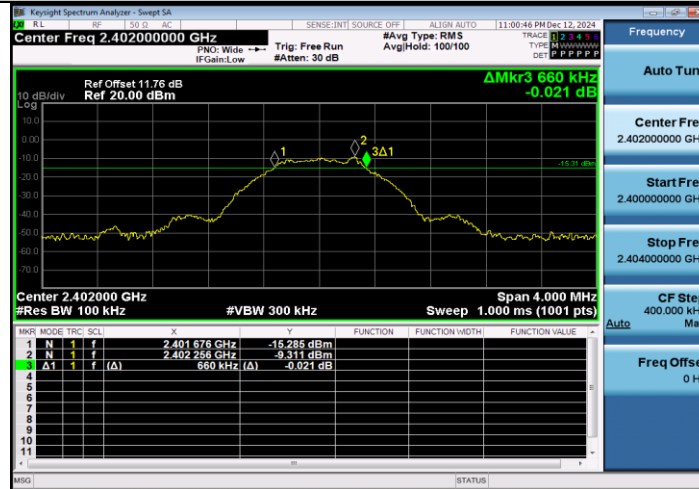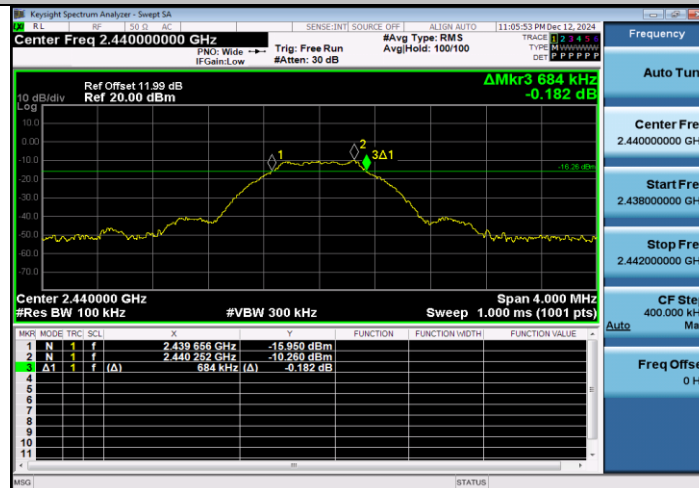
BLE_1M_Ant1_2440
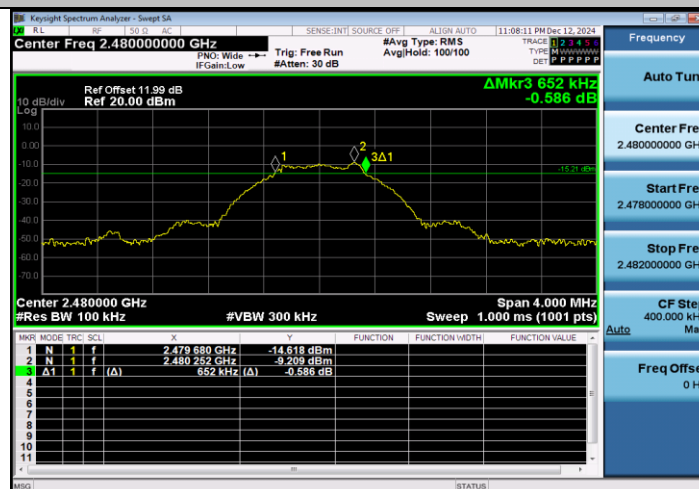
BLE_1M_Ant1_2480

BLE_2M_Ant1_2402

BLE_2M_Ant1_2440

BLE_2M_Ant1_2480

4.3 Conducted Output Power

4.3.1 Limit

For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30 dBm)

4.3.2 Test Setup
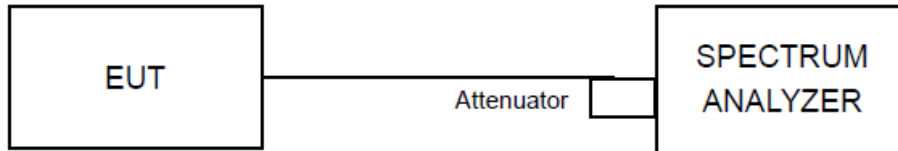
4.3.3 Test Procedures

The EUT was tested according to DTS test procedure of "KDB558074 D01 DTS Meas Guidance" for compliance to FCC 47CFR 15.247 requirements (clause 9.2.2.4).

a) Set RBW ≥ DTS bandwidth

b) Set VBW ≥ 3 RBW.

c) Set Span ≥ 3 RBW.

d) Sweep time = auto couple.

e) Detector = peak

f) Trace mode = max hold.

g) Allow trace to fully stabilize

h) Use peak marker function to determine the peak amplitude level.

4.3.4 Deviation of Test Standard

No deviation.

4.3.5 Test Results

TestMode	Antenna	Freq(MHz)	Conducted Peak Powert[dBm]	Conducted Limit[dBm]	EIRP[dBm]	EIRP Limit[dBm]	Verdict
BLE_1M	Ant1	2402	-8.91	≤30	-6.95	≤36	PASS
		2440	-9.07	≤30	-7.11	≤36	PASS
		2480	-8.83	≤30	-6.87	≤36	PASS
BLE_2M	Ant1	2402	-8.87	≤30	-6.91	≤36	PASS
		2440	-9.01	≤30	-7.05	≤36	PASS
		2480	-8.77	≤30	-6.81	≤36	PASS

BLE_1M_Ant1_2402
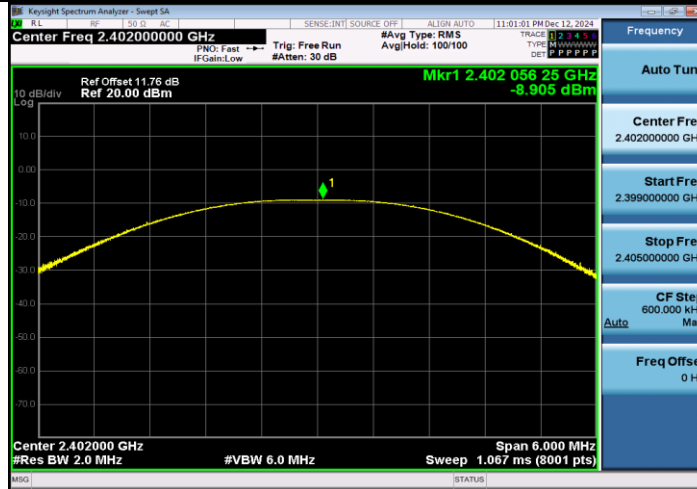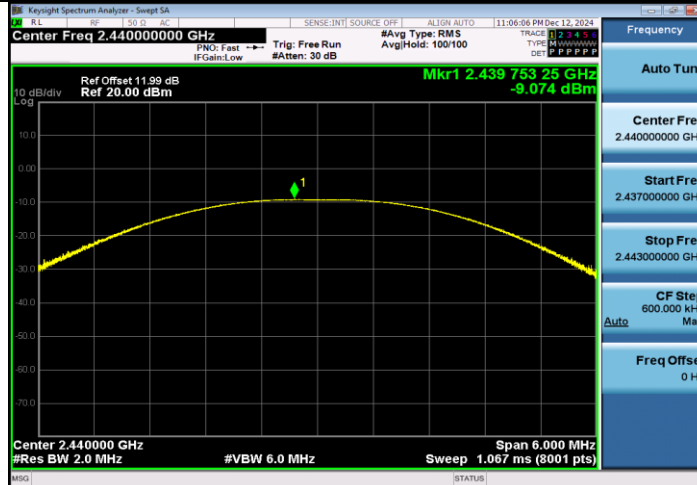
BLE_1M_Ant1_2440
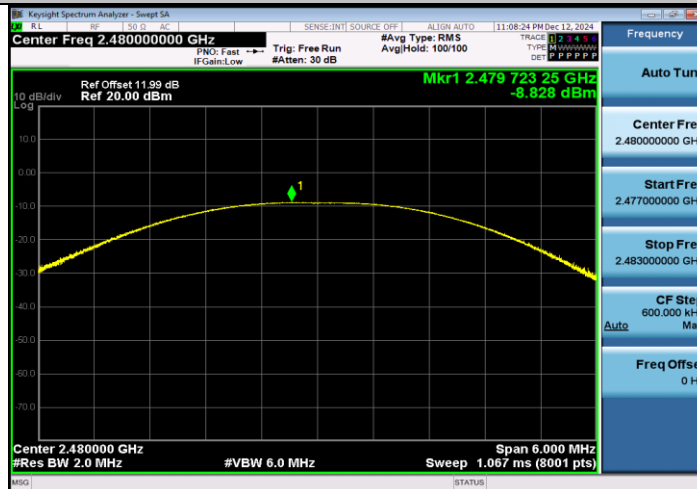
BLE_1M_Ant1_2480
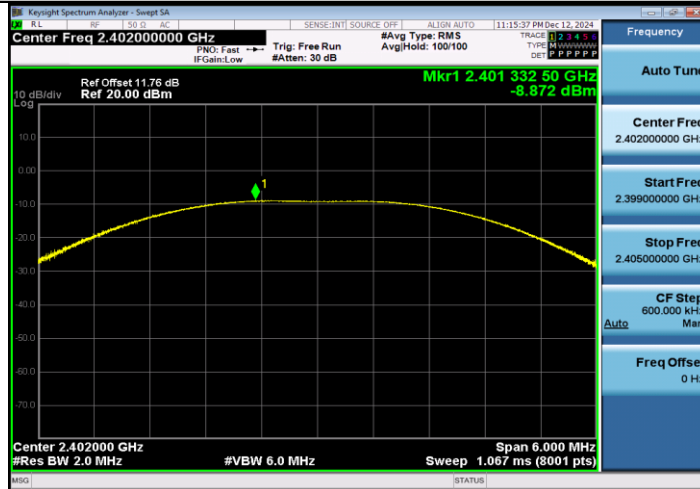
BLE_2M_Ant1_2402
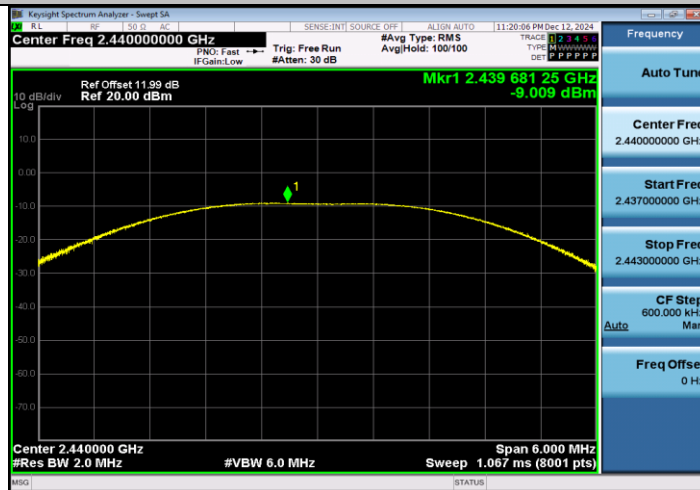
BLE_2M_Ant1_2440

BLE_2M_Ant1_2480
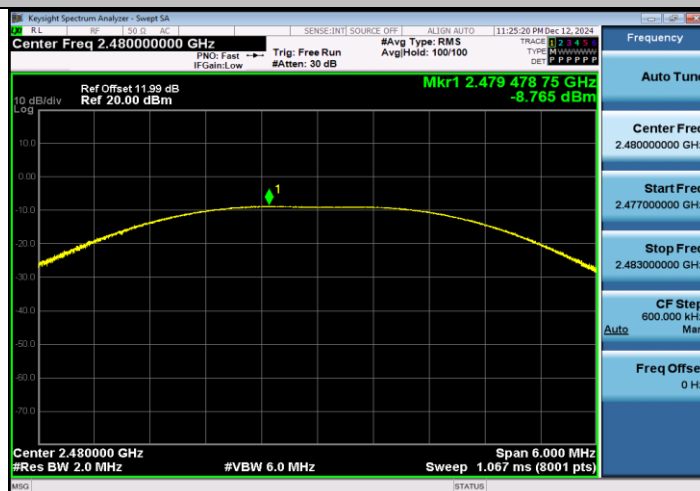
4.4 Power Spectral Density

4.4.1 Limit

The Maximum of Power Spectral Density Measurement is 8 dBm.

4.4.2 Test Setup
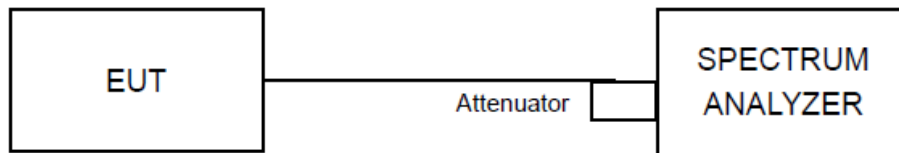
4.4.3 Test Procedures

The power output per FCC §15.247(e) was tested according to DTS test procedure of "KDB558074 D01 DTS Meas Guidance" (clause 10.5) for compliance to FCC 47CFR 15.247 requirements.

a) Set analyzer center frequency to DTS channel center frequency.

b) Set the span to 1.5 times the DTS bandwidth.

c) Set the RBW to: 3 kHz $\leqslant$ RBW $\leqslant$ 100 kHz.

d) Set the VBW $\geqslant$ 3 ×RBW.

e) Detector = peak.

f) Sweep time = auto couple.

g) Trace mode = max hold.

h) Allow trace to fully stabilize.

i) Use the peak marker function to determine the maximum amplitude level within the RBW.

j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.
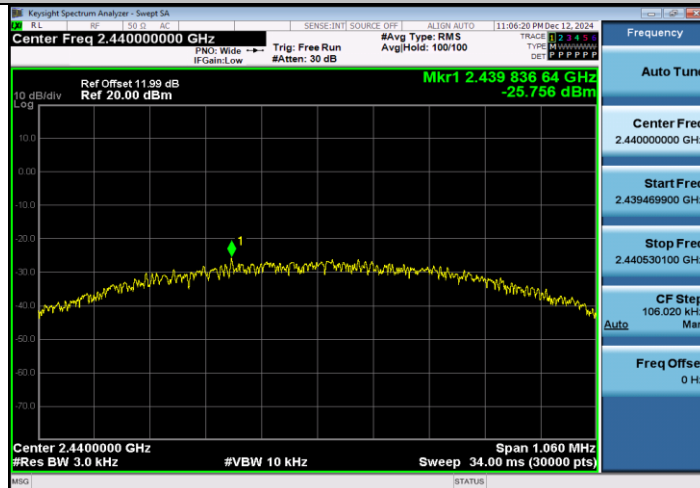
4.4.4 Deviation of Test Standard

No deviation.

4.4.5 Test Results

TestMode	Antenna	Freq(MHz)	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-25.79	≤8.00	PASS
		2440	-25.76	≤8.00	PASS
		2480	-25.73	≤8.00	PASS
BLE_2M	Ant1	2402	-28.69	≤8.00	PASS
		2440	-29.28	≤8.00	PASS
		2480	-28.60	≤8.00	PASS

BLE_1M_Ant1_2402
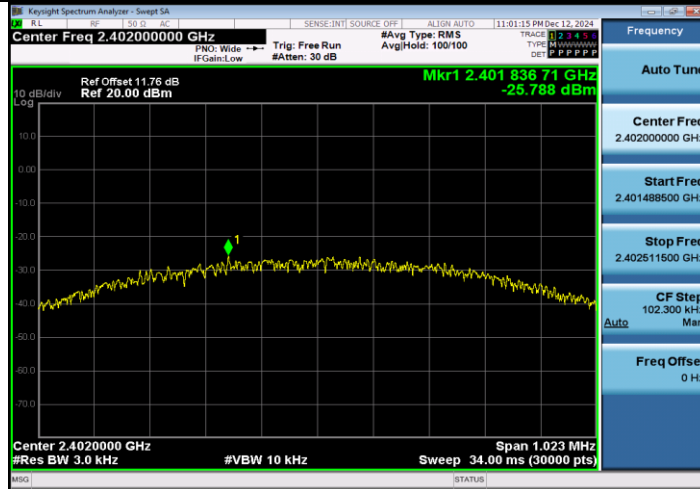
BLE_1M_Ant1_2440
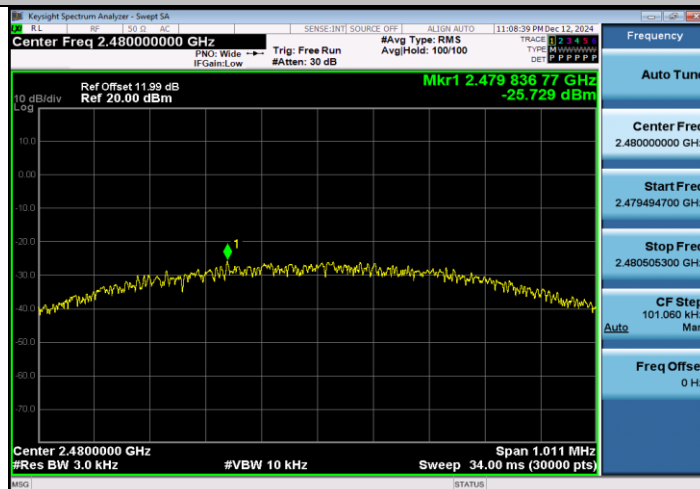
BLE_1M_Ant1_2480
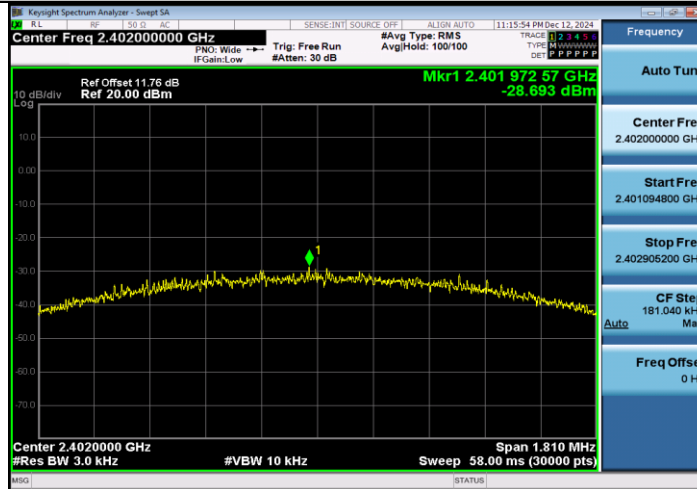
BLE_2M_Ant1_2402
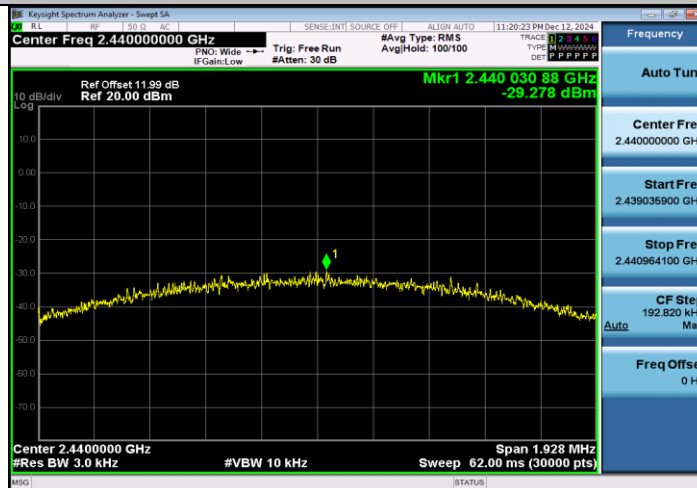
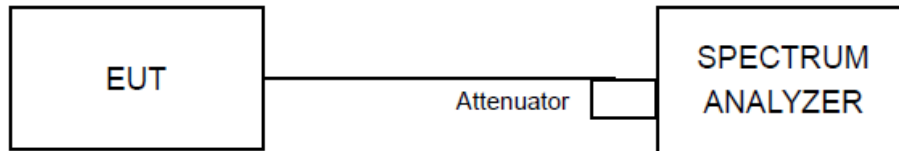| BLE_2M_Ant1_2440 |
|---|

BLE_2M_Ant1_2480
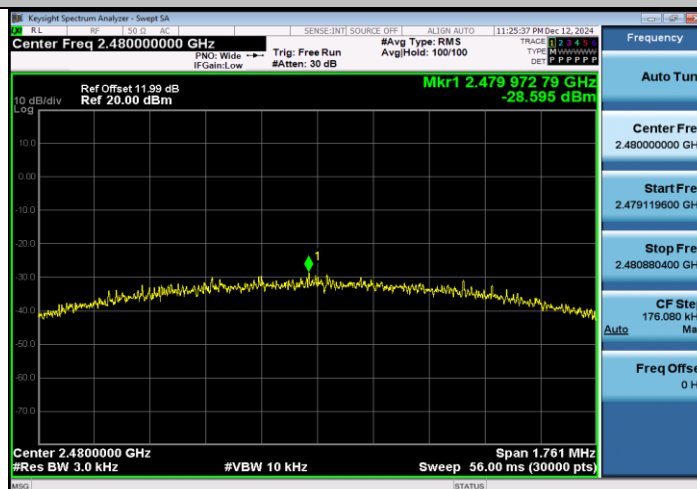
4.5 Conducted Band Edges Measurement

4.5.1 Limit

Below 20 dB of the highest emission level of operating band (in 100 kHz Resolution Bandwidth).

4.5.2 Test Setup

4.5.3 Test Procedures

The EUT was tested according to DTS test procedure of "KDB558074 D01 DTS Meas Guidance" (clause 11.0) for compliance to FCC 47CFR 15.247 requirements.

MEASUREMENT PROCEDURE REF

1. Set the RBW = 100 kHz.

2. Set the VBW ≥ 300 kHz.

3. Detector = peak.

4. Sweep time = auto couple.

5. Trace mode = max hold.

6. Allow trace to fully stabilize.

7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

MEASUREMENT PROCEDURE OOBE

1. Set RBW = 100 kHz.

2. Set VBW ≥ 300 kHz.

3. Detector = peak.

4. Sweep = auto couple.

5. Trace Mode = max hold.

6. Allow trace to fully stabilize.

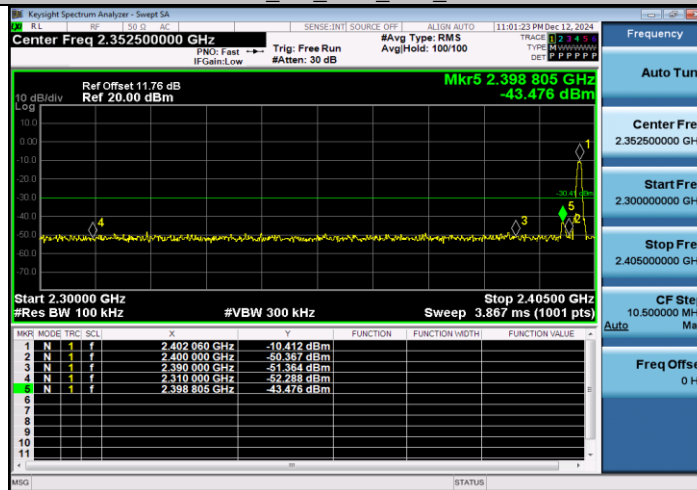7. Use the peak marker function to determine the maximum amplitude level.

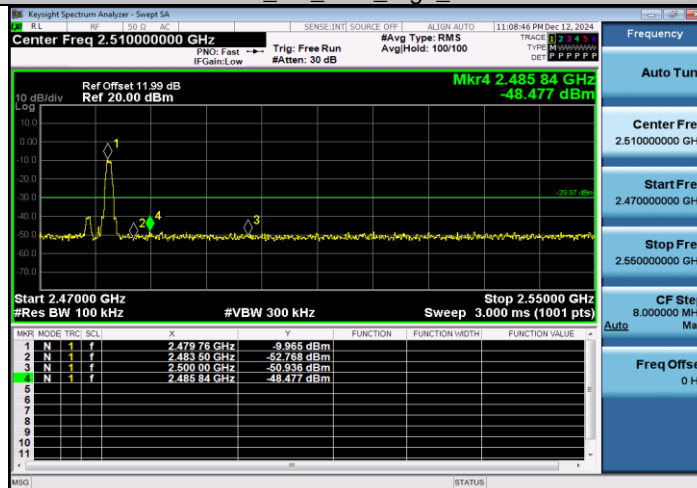#### 4.5.4 Deviation of Test Standard

No deviation.

4.5.5 Test Results

TestMode	Antenna	ChName	Freq(MHz)	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	Low	2402	-10.41	-43.48	≤-30.41	PASS
		High	2480	-9.97	-48.48	≤-29.97	PASS
BLE_2M	Ant1	Low	2402	-11.04	-43.85	≤-31.04	PASS
		High	2480	-12.90	-48.27	≤-32.9	PASS

BLE_1M_Ant1_Low_2402

BLE_1M_Ant1_High_2480

BLE_2M_Ant1_Low_2402