TEST REPORT

Applicant:	Chongqing Huiye IoT Technology Co.,Ltd
Address:	No.6-4,Zong bao Avenue, Shapingba District, Chongqing City, P.R.China
Equipment Type:	LED Display
Model Name:	L02
Brand Name:	Huiye
FCC ID:	2A5B3-L02
Test Standard:	47 CFR Part 15 Subpart B ANSI C63.4-2014
Sample Arrival Date:	Jun. 26, 2024
Test Date:	Jun. 27, 2024- Jul. 8, 2024
Date of Issue:	Aug. 02, 2024

ISSUED BY:

Shenzhen BALUN Technology Co., Ltd.

Tested by: Xiong Chong **Checked by:** Xia Long **Approved by:** Liao Jianming (Technical Director)

Revision History

Version	Issue Date	Revisions
Rev. 01	Aug. 02, 2024	Initial Issue

TABLE OF CONTENTS

1 GENERAL INFORMATION 4

1.1 Test Laboratory 4

1.2 Test Location 4

2 PRODUCT INFORMATION 5

2.1 Applicant Information 5

2.2 Manufacturer Information 5

2.3 General Description for Equipment under Test (EUT) 5

2.4 Ancillary Equipment 6

2.5 Technical Information 6

3 SUMMARY OF TEST RESULTS 7

3.1 Test Standards 7

3.2 Verdict 7

3.3 Test Uncertainty 7

4 GENERAL TEST CONFIGURATIONS 8

4.1 Test Enclosure List 8

4.2 Test Configurations 8

4.3 Test Setups 9

5 TEST ITEMS 11

5.1 Emission Tests 11

ANNEX A TEST RESULTS 16

A.1 Radiated Emission 16

A.2 Conducted Emission, AC Ports 23

ANNEX B TEST SETUP PHOTOS 27

ANNEX C EUT EXTERNAL PHOTOS 27

ANNEX D EUT INTERNAL PHOTOS 27

1 GENERAL INFORMATION

1.1 Test Laboratory

Name	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1/F, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Phone Number	+86 755 6685 0100

1.2 Test Location

Name	Shenzhen BALUN Technology Co., Ltd.
Location	☑ Block B, 1/F, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
	☐ 1/F, Building B, Ganghongji High-tech Intelligent Industrial Park, No. 1008, Songbai Road, Yangguang Community, Xili Sub-district, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Accreditation Certificate	The laboratory is a testing organization accredited by FCC as a accredited testing laboratory. The designation number is CN1196.

2 PRODUCT INFORMATION

2.1 Applicant Information

Applicant	Chongqing Huiye IoT Technology Co.,Ltd
Address	No.6-4,Zong bao Avenue, Shapingba District, Chongqing City, P.R.China

2.2 Manufacturer Information

Manufacturer	Chongqing Huiye IoT Technology Co.,Ltd
Address	No.6-4,Zong bao Avenue, Shapingba District, Chongqing City, P.R.China

2.3 General Description for Equipment under Test (EUT)

EUT Name	LED Display
Model Name Under Test	L02
Series Model Name	N/A
Description of Model name differentiation	N/A
Hardware Version	V1.01
Software Version	L02U_F423_B_BF_V07
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A

2.4 Ancillary Equipment

Note: Not applicable.

2.5 Technical Information

Network and Wireless connectivity	Bluetooth
Classification of equipment	Class B
The highest internal frequency of EUT	2480 MHz

3 SUMMARY OF TEST RESULTS

3.1 Test Standards

No.	Identity	Document Title
1	47 CFR Part 15 Subpart B	Unintentional Radiators
2	ANSI C63.4-2014	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

3.2 Verdict

No.	Description	FCC Rule	Test Verdict	Remark
1	Radiated Emission	15.109	Pass	--
2	Conducted Emission, DC Ports	15.107	Pass	--

3.3 Test Uncertainty

The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Measurement	Value
Conducted emissions (9 kHz-30 MHz)	3.2 dB
Radiated emissions (30 MHz-1 GHz)-966#2	4.4 dB
Radiated emissions (1 GHz-18 GHz)-966#2	5.0 dB

4 GENERAL TEST CONFIGURATIONS

4.1 Test Enclosure List

Description	Manufacturer	Model	Serial No.	Length	Description	Use
DC Power Supply	ITECH	IT6873A	800446020 747300002	N/A	N/A	☒

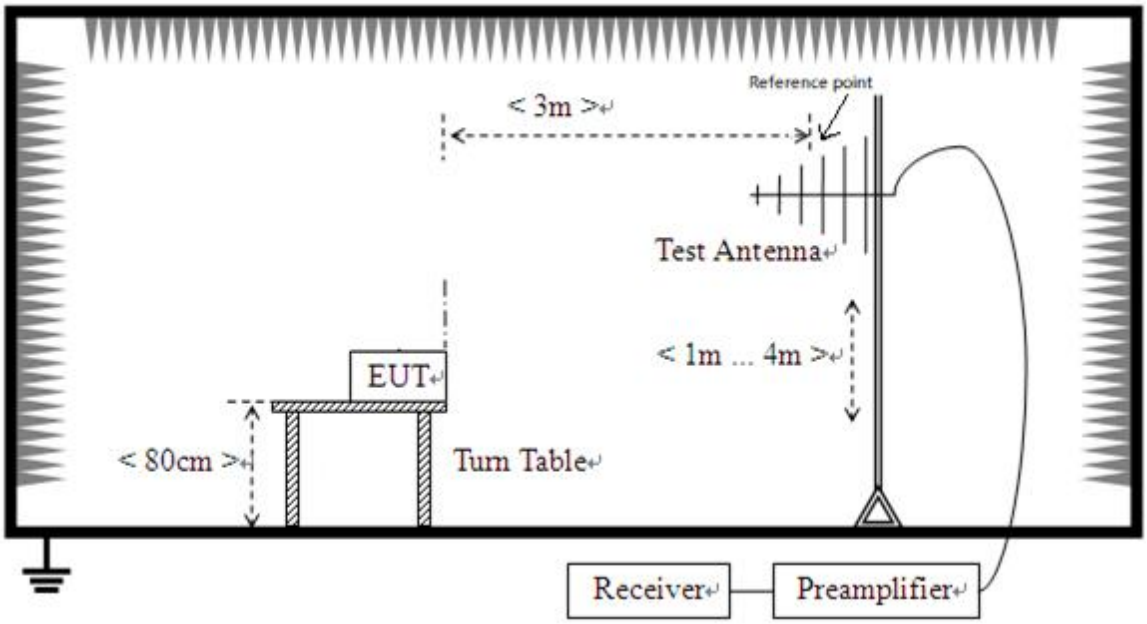
4.2 Test Configurations

All test modes of EUT are listed in the table below.

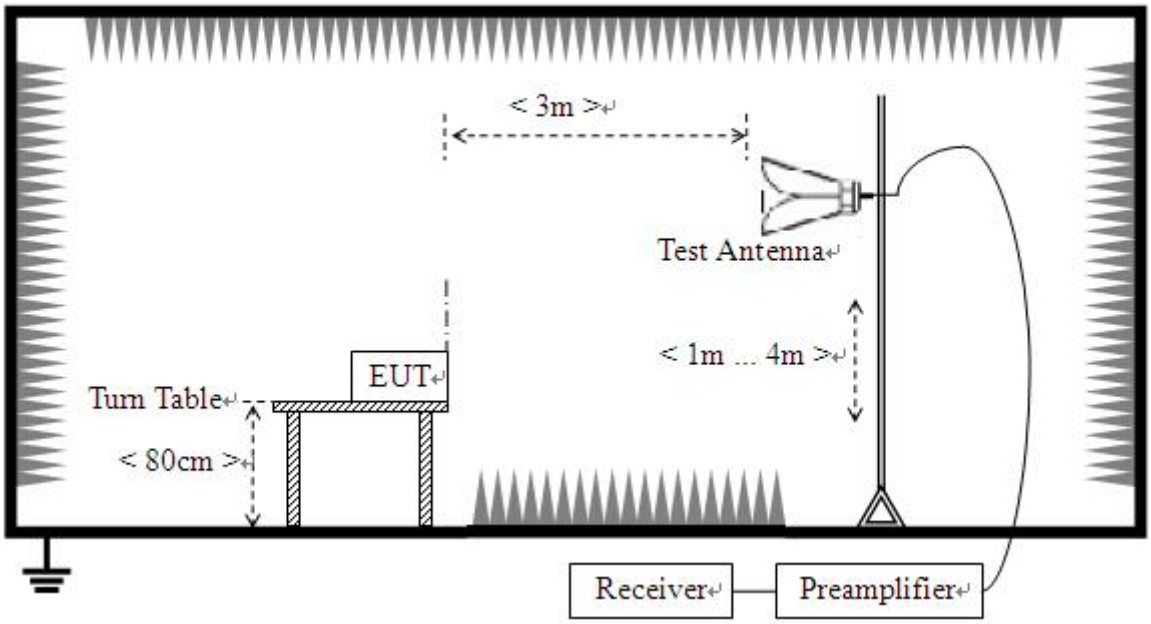
Test Mode Configuration	Description
Mode 1	The Normal Working Test Mode EUT +DC Power Supply

4.3 Test Setups

Test Setup 1

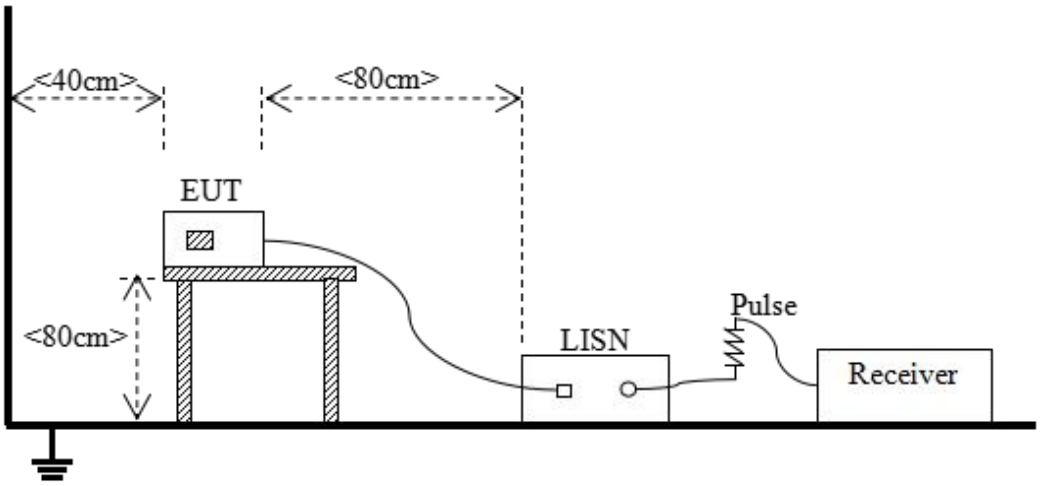


Radiated Emission (30 MHz-1 GHz)



Radiated Emission (above 1 GHz)

Test Setup 2



Conducted Emissions, AC Ports

5 TEST ITEMS

5.1 Emission Tests

5.1.1 Radiated Emission

5.1.1.1 Limit

Frequency range (MHz)	Class B (at 3 m)		Class A (at 3 m)
	Field Strength (μV/m)	Field Strength (dBμV/m)	Field Strength (dBμV/m)
30 - 88	100	40	49.5
88 - 216	150	43.5	54
216 - 960	200	46	56.9
Above 960	500	54	60

NOTE:
1) Field Strength (dBμV/m) = 20*log [Field Strength (μV/m)].
2) In the emission tables above, the tighter limit applies at the band edges.
3) For 30 MHz to 1000 MHz, the CISPR quasi-peak is employed.

For above 1000 MHz, according to the requirements of FCC 15.35, unless otherwise specified, the limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test.

Frequency range (GHz)	Class B (at 3 m)			Class A (at 3 m)	
	Field Strength (μV/m)	Field Strength Average (dBμV/m)	Field Strength Peak (dBμV/m)	Field Strength Average (dBμV/m)	Field Strength Peak (dBμV/m)
1 - F_M	500	54	74	60	80

Note 1: The highest measurement frequency, F_M, in GHz, shall be determined as next Table.
Note 2: Average Class A limit at 3m L_{3m} is determined by the following conversion formula:
$L_{3m} = L_{10m} + 20*\log(d_{10m}/d_{3m})$
Where:
L_{3m} is Average Class A limit at 3m;
L_{10m} is Average Class A limit at 10m;
d_{10m} is Measurement distance in 10m;
d_{3m} is Measurement distance in 3m.
For this case: L_{3m} = 49.5 + 20*log(10/3)=60 (dBμV/m).

Highest internal frequency (F_X)	Highest measurement frequency (F_M)
$F_X \leq$ 108 MHz	1 GHz
108 MHz ≤ $F_X \leq$ 500 MHz	2 GHz
500 MHz ≤ $F_X \leq$ 1 GHz	5 GHz
$F_X \geq$ 1 GHz	5 *F_X or 40 GHz, whichever is lower.
Note: F_X is Highest frequency generated or used in the device or on which the device operates or tunes.	

5.1.1.2 Test Setup

Refer to 4.3 section (test setup 1) for radiated emission test, the photo of test setup please refer to ANNEX B.

5.1.1.3 Test Procedure

All Radiated Emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

An initial pre-scan was performed in the chamber using the EMI Receiver in peak detection mode. Quasi-peak measurements were conducted based on the peak sweep graph. The EUT was measured by Bi-Log antenna with 2 orthogonal polarities.

The measurement frequency range is from 30 MHz to the 5th harmonic of the maximum frequency of the EUT internal source. The Turn Table is actuated to turn from 0° to 360°, and both horizontal and vertical polarizations of the Test Antenna are used to find the maximum radiated power. Mid channels on all channel bandwidth verified. Only the worst RB size/offset presented.

Use the following spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured

RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz

VBW ≥ RBW

Sweep = auto

Detector function = peak for f <1 GHz, peak & RMS Average for f ≥ 1 GHz

Trace = max hold

5.1.1.4 Test Result and Test Equipment List

Please refer to ANNEX A.1.

NOTE:

1. Results (dBμV/m) = Reading (dBμV) + Factor (dB/m)

The reading level is calculated by software which is not shown in the sheet

2. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Amplifier Gain (dB)

3. Margin = Limit - Results

5.1.2 Conducted Emission, AC Ports

5.1.2.1 Test Limit

Frequency range (MHz)	Class A	
	Quasi-peak (dBμV)	Average (dBμV)
0.15 - 0.50	79	66
0.50 - 30	73	60

Frequency range (MHz)	Class B	
	Quasi-peak (dBμV)	Average (dBμV)
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

NOTE:

1) The lower limit shall apply at the band edges.
2) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50 MHz.

5.1.2.2 Test Setup

Refer to 4.3 section test (test setup 2) for conducted emission, the photo of test setup please refer to ANNEX B.

5.1.2.3 Test Procedure

The EUT is connected to the power mains through a LISN which provides 50 Ω/50 μH of coupling impedance for the measuring instrument. The test frequency range is from 150 kHz to 30 MHz. The maximum conducted interference is searched using Peak (PK), Quasi-peak (QP) and Average (AV) detectors; the emission levels that are more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed.

Devices subject to Part 15 must be tested for all available U.S. voltages and frequencies (such as a nominal 120 VAC, 50/60 Hz and 240 VAC, 50/60 Hz) for which the device is capable of operation. A device rated for 50/60 Hz operation need not be tested at both frequencies provided the radiated and line conducted emissions are the same at both frequencies.

Use the following spectrum analyzer settings:

RBW = 9 kHz

VBW ≥ RBW

Sweep = 10ms

Detector function =peak & Average

Trace = max hold

5.1.2.4 Test Result and Test Equipment List

Please refer to ANNEX A.2.

NOTE:

1. Results (dBμV) = Reading (dBμV) + Factor (dB)

The reading level is calculated by software which is not shown in the sheet

2. Factor = Insertion loss + Cable loss

3. Margin = Limit - Results

ANNEX A TEST RESULTS

A.1 Radiated Emission

Note 1: The symbol of “--” in the table which means not application.

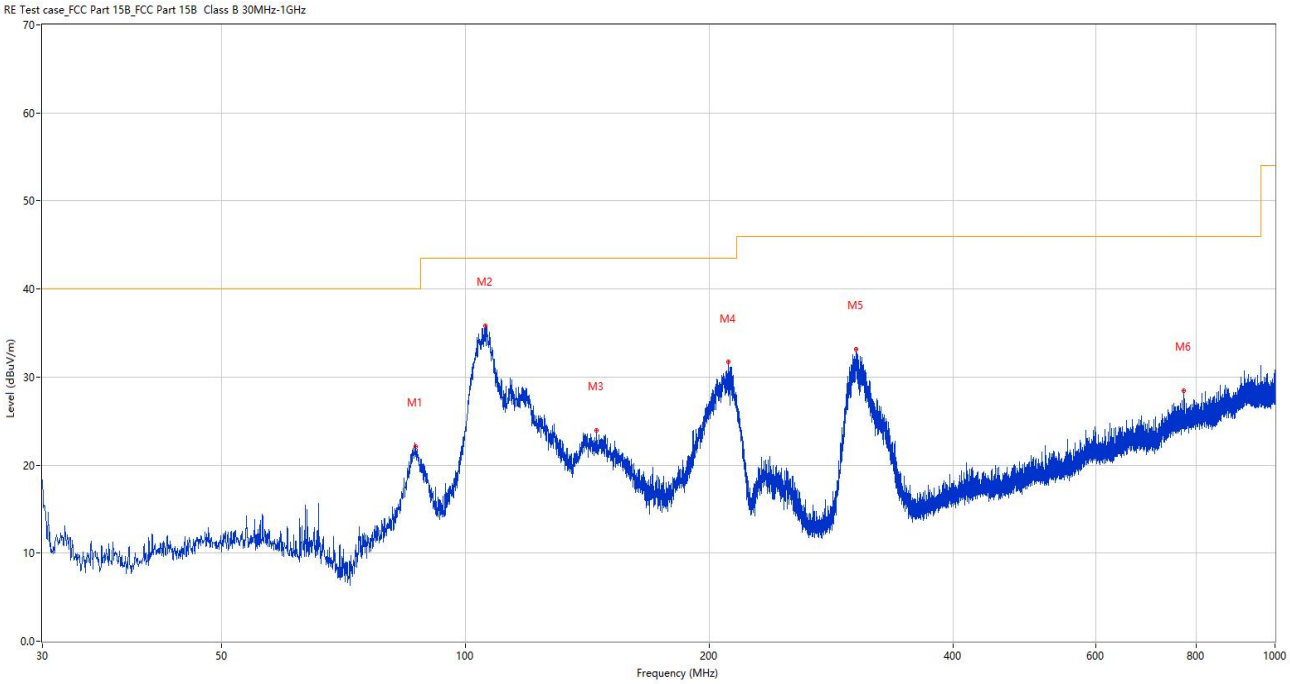
Note 2: For the test data above 1 GHz, according the ANSI C63.4-2014, where limits are specified for both average and peak (or quasi-peak) detector functions, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement.

Note 3: When the EUT is on, it will automatically emit Bluetooth signal and cannot be turned off. So the marked spikes near 2400 MHz with circle should be ignored because they are Bluetooth carrier frequencies.

Sample No.	S01	Temperature	23.5℃
Humidity	50%RH	Pressure	101kPa
Test Engineer	He Shichang	Test Date	2024.07.06

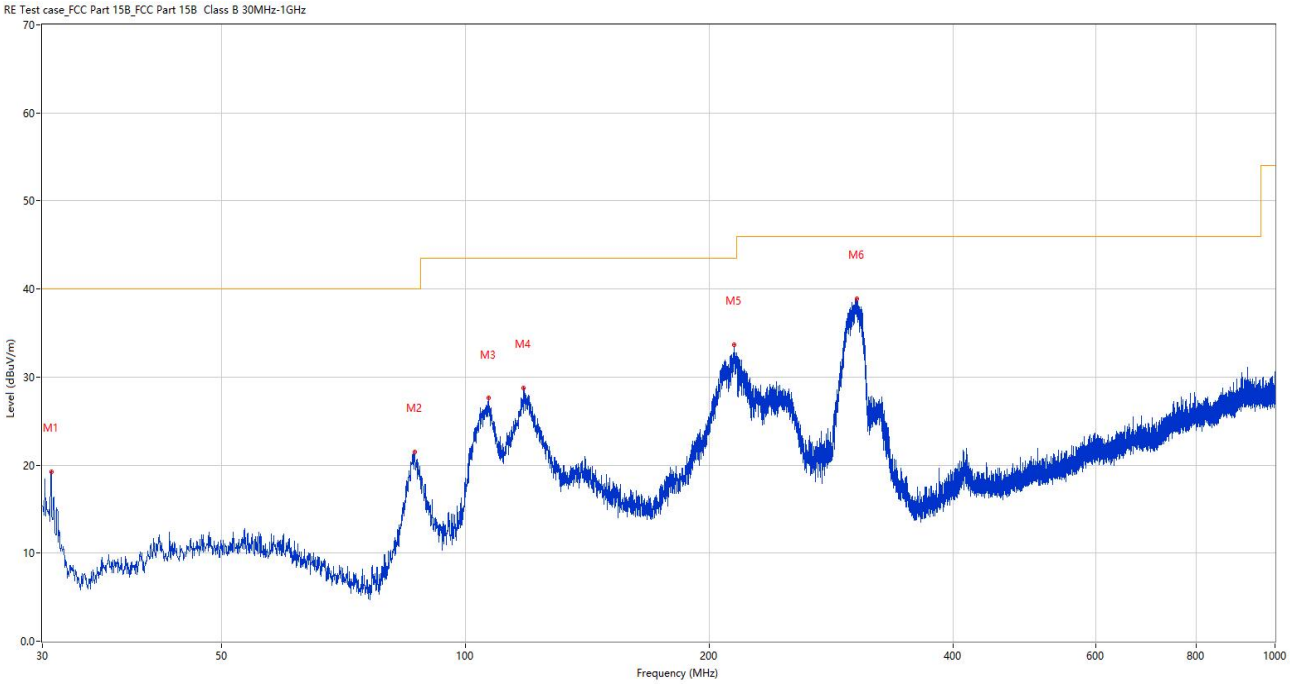
Test Mode 1

1) Test Antenna Vertical, 30 MHz – 1 GHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	86.745	22.08	-30.14	40.0	17.92	Peak	41.00	100	Vertical	Pass
2	105.854	35.85	-26.92	43.5	7.65	Peak	203.00	100	Vertical	Pass
3	145.042	23.99	-30.27	43.5	19.51	Peak	56.00	100	Vertical	Pass
4	211.245	31.68	-27.01	43.5	11.82	Peak	172.00	100	Vertical	Pass
5	303.782	33.15	-23.73	46.0	12.85	Peak	198.00	100	Vertical	Pass
6	770.644	28.45	-12.17	46.0	17.55	Peak	248.00	100	Vertical	Pass

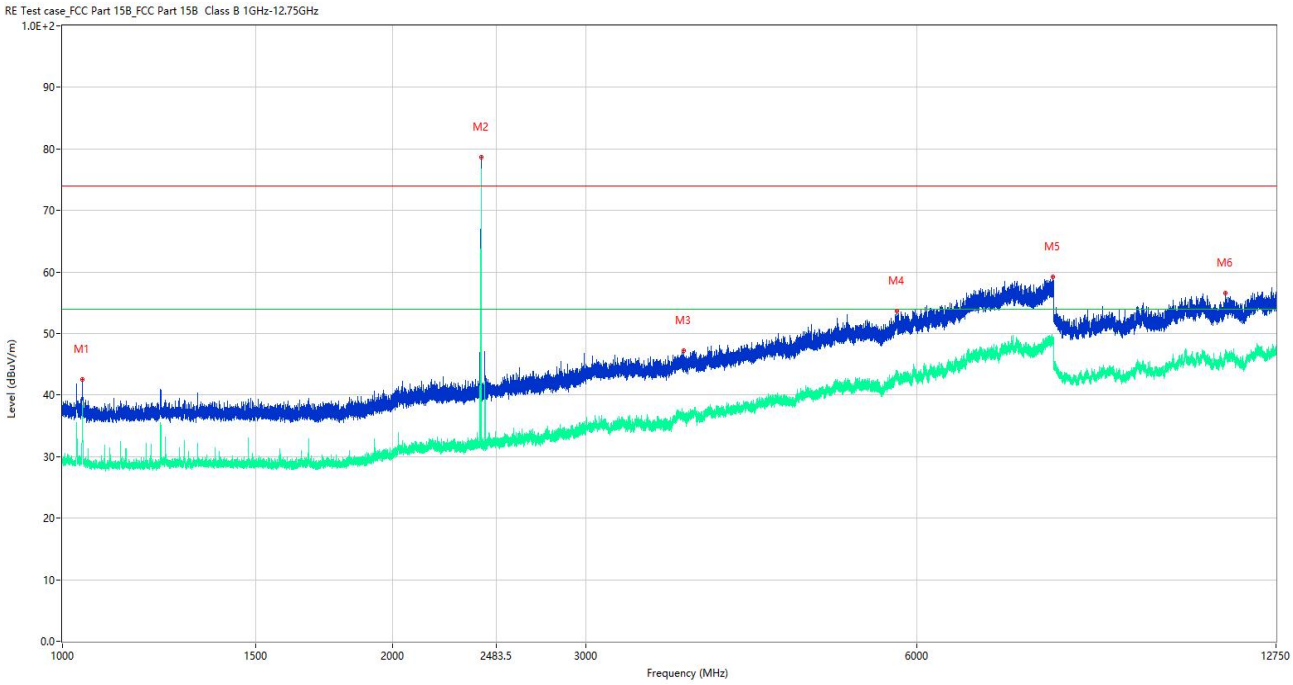
2) Test Antenna Horizontal, 30 MHz – 1 GHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	30.776	19.23	-30.31	40.0	20.77	Peak	237.00	100	Horizontal	Pass
2	86.551	21.53	-30.20	40.0	18.47	Peak	7.00	200	Horizontal	Pass
3	106.727	27.59	-27.00	43.5	15.91	Peak	329.00	100	Horizontal	Pass
4	118.027	28.74	-28.52	43.5	14.76	Peak	154.00	200	Horizontal	Pass
5	214.542	33.68	-26.87	43.5	9.82	Peak	139.00	100	Horizontal	Pass
6	304.267	38.89	-23.73	46.0	7.11	Peak	242.00	100	Horizontal	Pass

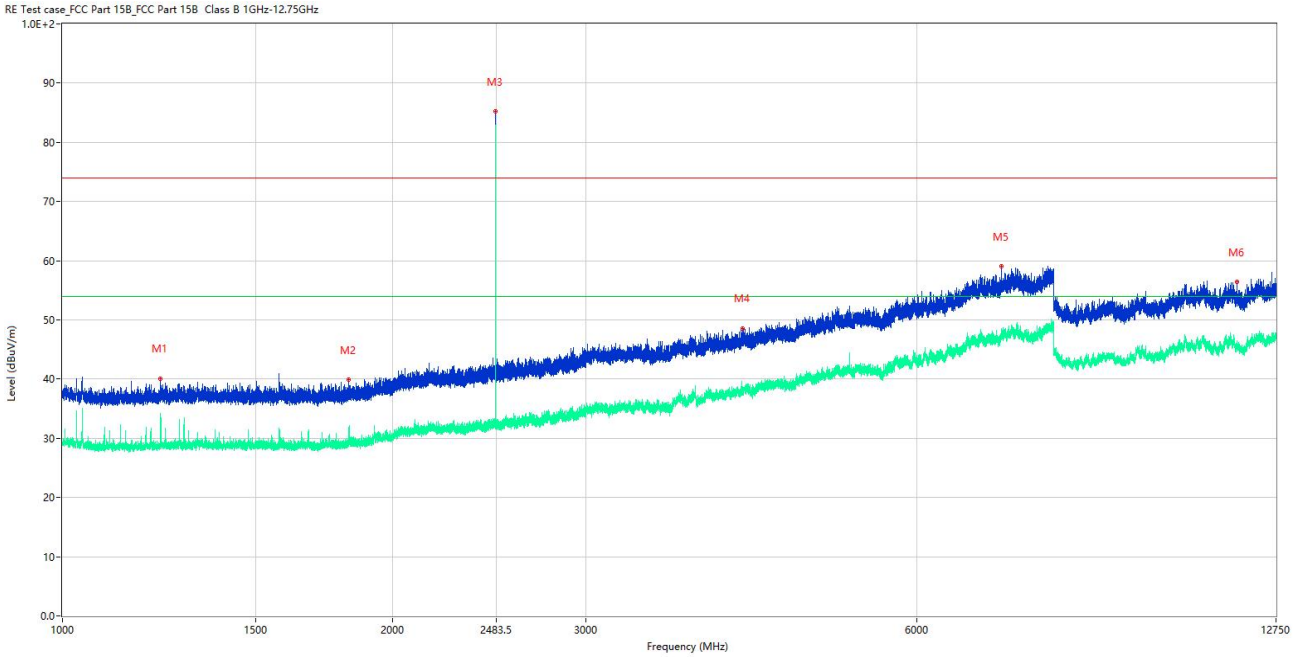
Equipment Information						
Equipment Name	Supplier	Model	Serial No.	Cal. Date	Cal. Due	Use
Frequency Below 1 GHz						
EMI Receiver	Keysight	N9038A	MY55330120	2023.09.05	2024.09.04	☒
Amplifier (30MHz-1GHz)	COM-MV	ZT30-1000M	B2017119081	2023.12.05	2024.12.04	☒
Test Antenna-Bi-Log	SCHWARZBECK	VULB 9168	9168-00867	2022.04.12	2025.04.11	☒
Anechoic Chamber（#2）	YiHeng	9m*6m*6m	142	2021.08.19	2024.08.18	☒
Description	Supplier	Name	Version	/		Use
Test Software	BALUN	BL410-E	V22.930	/		☒

3) Test Antenna Vertical, 1 GHz –12.75 GHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1042.900	42.52	-15.52	74.0	31.48	Peak	356.00	100	Vertical	Pass
1**	1042.900	37.64	-15.52	54.0	16.36	AV	356.00	100	Vertical	Pass
2	2406.700	78.65	-12.08	74.0	-4.65	Peak	38.00	100	Vertical	N/A
2**	2406.700	71.11	-12.08	54.0	-17.11	AV	38.00	100	Vertical	N/A
3	3680.500	47.17	-4.01	74.0	26.83	Peak	230.00	100	Vertical	Pass
3**	3680.500	36.27	-4.01	54.0	17.73	AV	230.00	100	Vertical	Pass
4	5760.250	53.59	1.26	74.0	20.41	Peak	211.00	100	Vertical	Pass
4**	5760.250	43.16	1.26	54.0	10.84	AV	211.00	100	Vertical	Pass
5	7982.500	59.17	7.19	74.0	14.83	Peak	156.00	100	Vertical	Pass
5**	7982.500	48.39	7.19	54.0	5.61	AV	156.00	100	Vertical	Pass
6	11469.500	56.61	4.02	74.0	17.39	Peak	180.00	100	Vertical	Pass
6**	11469.500	46.44	4.02	54.0	7.56	AV	180.00	100	Vertical	Pass

4) Test Antenna Horizontal, 1 GHz –12.75 GHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1228.700	40.13	-16.10	74.0	33.87	Peak	100.00	100	Horizontal	Pass
1**	1228.700	33.92	-16.10	54.0	20.08	AV	100.00	100	Horizontal	Pass
2	1823.400	39.90	-16.01	74.0	34.10	Peak	291.00	100	Horizontal	Pass
2**	1823.400	29.52	-16.01	54.0	24.48	AV	291.00	100	Horizontal	Pass
3	2479.500	85.20	-11.53	74.0	-11.20	Peak	59.00	100	Horizontal	N/A
3**	2479.500	80.36	-11.53	54.0	-26.36	AV	59.00	100	Horizontal	N/A
4	4162.000	48.47	-3.03	74.0	25.53	Peak	126.00	100	Horizontal	Pass
4**	4162.000	38.24	-3.03	54.0	15.76	AV	126.00	100	Horizontal	Pass
5	7173.000	59.06	5.04	74.0	14.94	Peak	207.00	100	Horizontal	Pass
5**	7173.000	47.60	5.04	54.0	6.40	AV	207.00	100	Horizontal	Pass
6	11748.500	56.43	3.65	74.0	17.57	Peak	37.00	100	Horizontal	Pass
6**	11748.500	45.61	3.65	54.0	8.39	AV	37.00	100	Horizontal	Pass

Equipment Information						
Equipment Name	Supplier	Model	Serial No.	Cal. Date	Cal. Due	Use
Frequency Above 1 GHz						
EMI Receiver	Keysight	N9038A	MY55330120	2023.09.05	2024.09.04	☒
Amplifier (1-12GHz)	Advanced Microwave	WLA652A	1740103	2023.12.05	2024.12.04	☒
Amplifier（0.8-21GHz）	Mini-Circuits	ZVA-213-S+	619201336	2023.12.05	2024.12.04	☒
Test Antenna-Horn	SCHWARZBECK	BBHA 9120D	1148	2022.04.12	2025.04.11	☒
Anechoic Chamber（#2）	YiHeng	9m*6m*6m	142	2021.08.19	2024.08.18	☒
Description	Supplier	Name	Version	/		Use
Test Software	BALUN	BL410-E	V22.930	/		☒

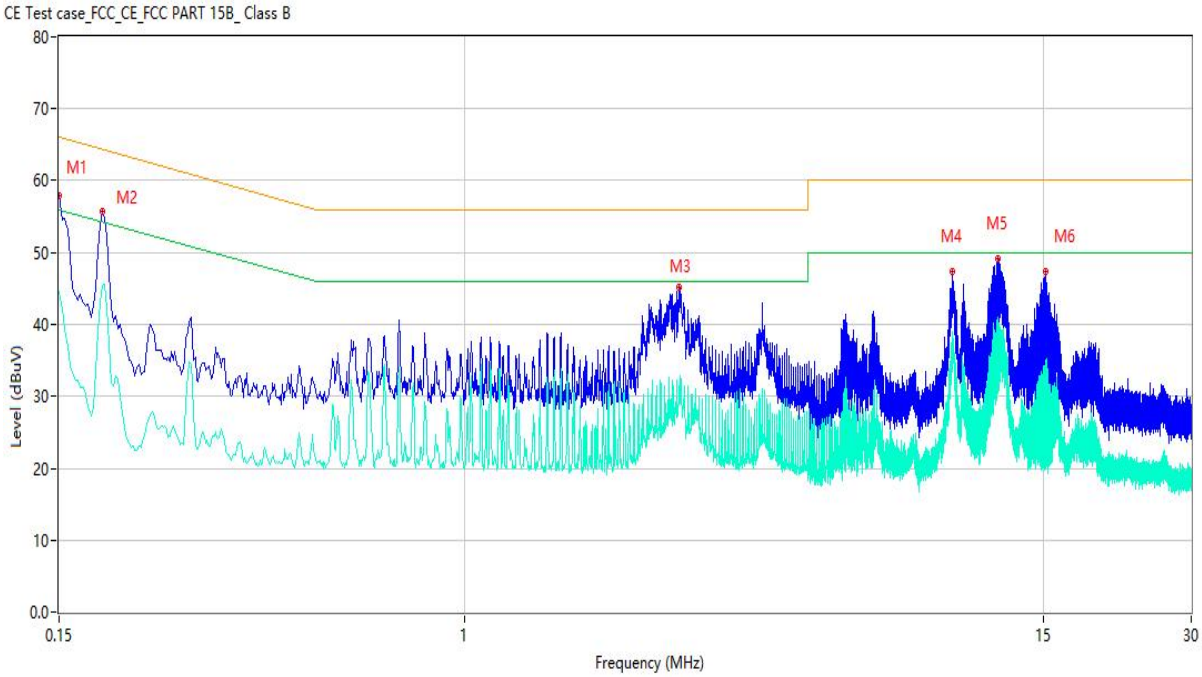
A.2 Conducted Emission, AC Ports

Note: Devices subject to Part 15 must be tested for all available U.S. voltages and frequencies (such as a nominal 120 VAC, 50/60 Hz and 240 VAC, 50/60 Hz) for which the device is capable of operation. So, The configuration 120 VAC, 60 Hz and 240 VAC, 50 Hz were tested respectively, but only the worst configuration (120 VAC, 60 Hz) shown here.

Sample No.	S01	Temperature	20.1℃
Humidity	53%RH	Pressure	101kPa
Test Engineer	Yang Yang	Test Date	2024.07.08

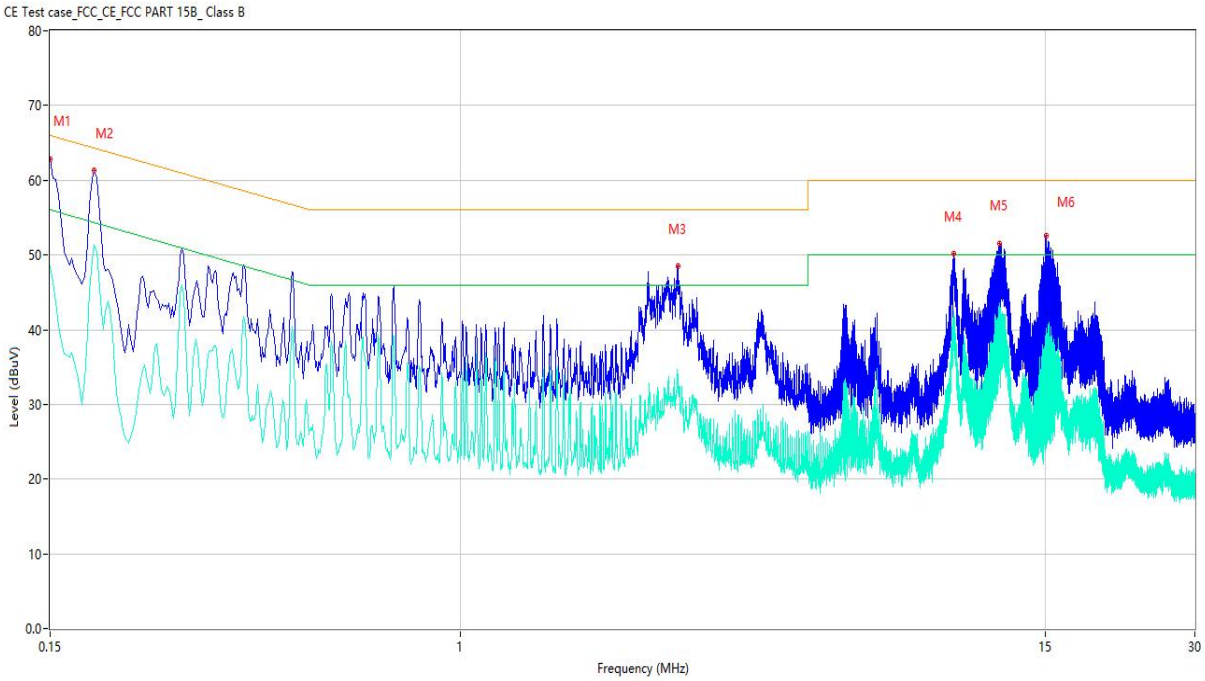
Test Mode 1

1) AC Ports - L Phase



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.150	57.88	9.75	66.00	8.12	Peak	L	Pass
1**	0.150	44.61	9.75	56.00	11.39	AV	L	Pass
2	0.184	55.72	9.75	64.30	8.58	Peak	L	Pass
2**	0.184	45.44	9.75	54.30	8.86	AV	L	Pass
3	2.732	45.27	9.67	56.00	10.73	Peak	L	Pass
3**	2.732	30.90	9.67	46.00	15.10	AV	L	Pass
4	9.828	47.43	9.49	60.00	12.57	Peak	L	Pass
4**	9.828	36.83	9.49	50.00	13.17	AV	L	Pass
5	12.146	49.22	9.38	60.00	10.78	Peak	L	Pass
5**	12.146	38.11	9.38	50.00	11.89	AV	L	Pass
6	15.210	47.41	9.24	60.00	12.59	Peak	L	Pass
6**	15.210	34.97	9.24	50.00	15.03	AV	L	Pass

2) AC Ports - N Phase



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.150	62.87	9.69	66.00	3.13	Peak	N	Pass
1**	0.150	48.57	9.69	56.00	7.43	AV	N	Pass
2	0.184	61.36	9.74	64.30	2.94	Peak	N	Pass
2**	0.184	51.34	9.74	54.30	2.96	AV	N	Pass
3	2.738	48.47	9.85	56.00	7.53	Peak	N	Pass
3**	2.738	33.96	9.85	46.00	12.04	AV	N	Pass
4	9.828	50.22	9.74	60.00	9.78	Peak	N	Pass
4**	9.828	41.32	9.74	50.00	8.68	AV	N	Pass
5	12.166	51.59	9.64	60.00	8.41	Peak	N	Pass
5**	12.166	43.47	9.64	50.00	6.53	AV	N	Pass
6	15.106	52.62	9.51	60.00	7.38	Peak	N	Pass
6**	15.106	40.30	9.51	50.00	9.70	AV	N	Pass

Equipment Information						
Equipment Name	Supplier	Model	Serial No.	Cal. Date	Cal. Due	Use
EMI Receiver	KEYSIGHT	N9010B	MY57110309	2023.09.05	2024.09.04	☒
LISN	SCHWARZBECK	NSLK 8127	8127-687	2024.05.09	2025.05.08	☒
Shielded Room	YiHeng Electronic Co., Ltd	3.5m*3.1m*2.8m	112	2022.02.19	2025.02.18	☒
Description	Supplier	Name	Version	/		Use
Test Software	BALUN	BL410-E	V22.930	/		☒

ANNEX B TEST SETUP PHOTOS

Please refer the document “BL-SH2460354-AE-1.PDF”.

ANNEX C EUT EXTERNAL PHOTOS

Please refer the document “BL-SH2460354-AW.PDF”.

ANNEX D EUT INTERNAL PHOTOS

Please refer the document “BL-SH2460354-AI.PDF”.

Statement

1. The laboratory guarantees the scientificity, accuracy and impartiality of the test, and is responsible for all the information in the report, except the information provided by the customer. The customer is responsible for the impact of the information provided on the validity of the results.
2. The report without China inspection body and laboratory Mandatory Approval (CMA) mark has no effect of proving to the society.
3. For the report with CNAS mark or A2LA mark, the items marked with "☆" are not within the accredited scope.
4. This report is invalid if it is altered, without the signature of the testing and approval personnel, or without the “inspection and testing dedicated stamp” or test report stamp.
5. The test data and results are only valid for the tested samples provided by the customer.
6. This report shall not be partially reproduced without the written permission of the laboratory.
7. Any objection shall be raised to the laboratory within 30 days after receiving the report.

--END OF REPORT--