

TEST REPORT

Applicant: OnePlus Technology (Shenzhen) Co., Ltd.
Address: 18C02, 18C03, 18C04, and 18C05, Shum Yip Terra Building, Binhe Avenue North, Futian District, Shenzhen, Guangdong, P.R. China
Equipment Type: Pencil
Model Name: OPN2502
Brand Name: ONEPLUS
FCC ID: 2ABZ2-OPN2502
Test Standard: 47 CFR Part 15 Subpart B
ANSI C63.4-2014
Sample Arrival Date: Aug. 15, 2025
Test Date: Aug. 21, 2025 - Aug. 22, 2025
Date of Issue: Sep. 29, 2025

ISSUED BY:

Shenzhen BALUN Technology Co., Ltd.

Tested by: Qiu Yongjing**Checked by:** Zong Liyao**Approved by:** Tolan Tu
(Technical Director)

Revision History

Version	Issue Date	Revisions
<u>Rev. 01</u>	<u>Sep. 29, 2025</u>	<u>Initial Issue</u>

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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. The certification body is American Association for Laboratory Accreditation (A2LA).

2 PRODUCT INFORMATION

2.1 Applicant Information

Applicant	OnePlus Technology (Shenzhen) Co., Ltd.
Address	18C02, 18C03, 18C04, and 18C05, Shum Yip Terra Building, Binhe Avenue North, Futian District, Shenzhen, Guangdong, P.R. China

2.2 Manufacturer Information

Manufacturer	OnePlus Technology (Shenzhen) Co., Ltd.
Address	18C02, 18C03, 18C04, and 18C05, Shum Yip Terra Building, Binhe Avenue North, Futian District, Shenzhen, Guangdong, P.R. China

2.3 General Description for Equipment under Test (EUT)

EUT Name	Pencil
Model Name Under Test	OPN2502
Series Model Name	N/A
Description of Model name differentiation	N/A
Hardware Version	N/A
Software Version	N/A
Dimensions (Approx.)	165.32mm(L)*8.69mm(W)*8.88mm(H)
Weight (Approx.)	N/A

2.4 Ancillary Equipment

Ancillary Equipment 1	Battery	
	Brand Name	EVE
	Model No.	60340
	Serial No.	N/A
	Capacity	80mAh
	Rated Voltage	3.85V
	Limit Charge Voltage	4.43V
	Manufacturer	EVE Energy Co.,Ltd

2.5 Technical Information

Network and Wireless connectivity	Bluetooth
Classification of equipment	Class B
The highest internal frequency of EUT	5850 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, AC 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
USB cable	N/A	N/A	N/A	N/A	N/A	☒
Adapter	N/A	N/A	N/A	N/A	N/A	☒

4.2 Test Configurations

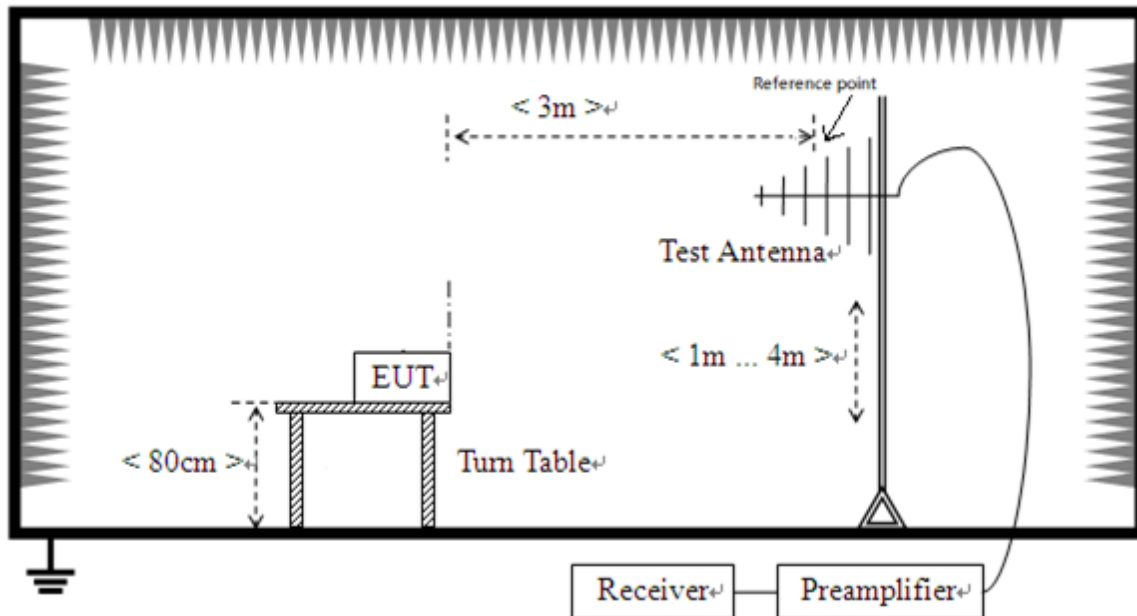
All test modes of EUT are listed in the table below.

Test Mode Configuration	Description
Mode 1	<u>The Charging Test Mode</u> EUT + Adapter + USB Cable + Battery
Mode 2	<u>The Normal operating Test Mode</u> EUT + Battery

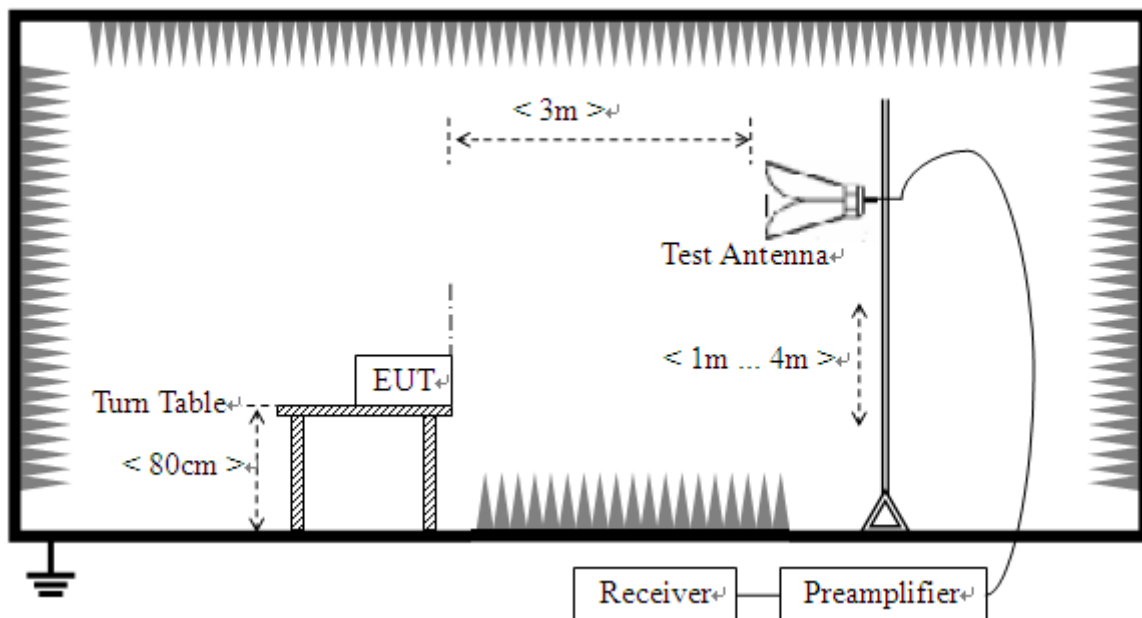
Test Case	Test Mode Configuration	Worst Mode
Radiated Emission	Mode 1~Mode 2	1
Conducted Emission, AC Ports	Mode 1	1
Note: All operation modes were tested, but only test data of the worst mode was presented in this report.		

4.3 Test Setups

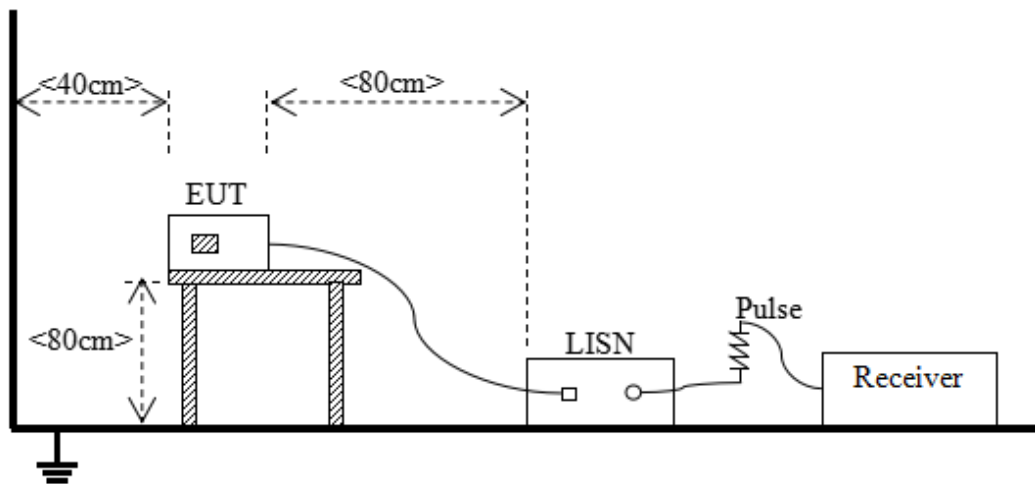
Test Setup 1



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 ($\mu\text{V/m}$)	Field Strength (dB $\mu\text{V/m}$)	Field Strength (dB $\mu\text{V/m}$)
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 (dB $\mu\text{V/m}$) = $20 \cdot \log [\text{Field Strength } (\mu\text{V/m})]$.			
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 ($\mu\text{V/m}$)	Field Strength Average (dB $\mu\text{V/m}$)	Field Strength Peak (dB $\mu\text{V/m}$)	Field Strength Average (dB $\mu\text{V/m}$)	Field Strength Peak (dB $\mu\text{V/m}$)
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:					
$L_{3m} = L_{10m} + 20 \cdot \log(d_{10m}/d_{3m})$					
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: $L_{3m} = 49.5 + 20 \cdot \log(10/3) = 60$ (dB $\mu\text{V/m}$).					

Highest internal frequency (F_X)	Highest measurement frequency (F_M)
$F_X \leq 108 \text{ MHz}$	1 GHz
$108 \text{ MHz} \leq F_X \leq 500 \text{ MHz}$	2 GHz
$500 \text{ MHz} \leq F_X \leq 1 \text{ GHz}$	5 GHz
$F_X \geq 1 \text{ GHz}$	$5 * F_X$ 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 $f \geq 1 \text{ GHz}$, 100 kHz for $f < 1 \text{ GHz}$

VBW $\geq$ RBW

Sweep = auto

Detector function = peak for $f < 1 \text{ GHz}$, peak & RMS Average for $f \geq 1 \text{ GHz}$

Trace = max hold

5.1.1.4 Test Result and Test Equipment List

Please refer to ANNEX A.1.

NOTE:

1. Results (dB μ V/m) = Reading (dB μ V) + 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 (dB μ V)	Average (dB μ V)
0.15 - 0.50	79	66
0.50 - 30	73	60

Frequency range (MHz)	Class B	
	Quasi-peak (dB μ V)	Average (dB μ V)
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 μ H 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 $\geq$ 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

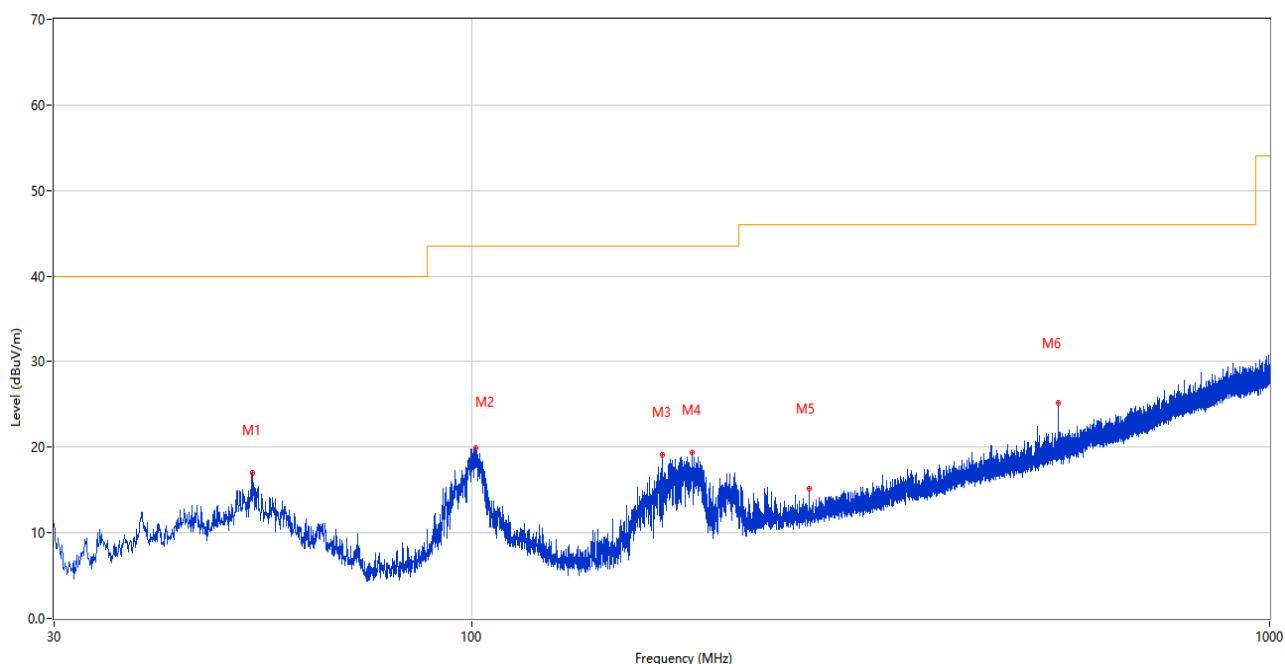
Note 1: The symbol of "--" in the table which means not application.

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.

Sample No.	S04	Temperature	22.6℃
Humidity	58%RH	Pressure	101kPa
Test Engineer	Chen Jingran	Test Date	2025.08.21

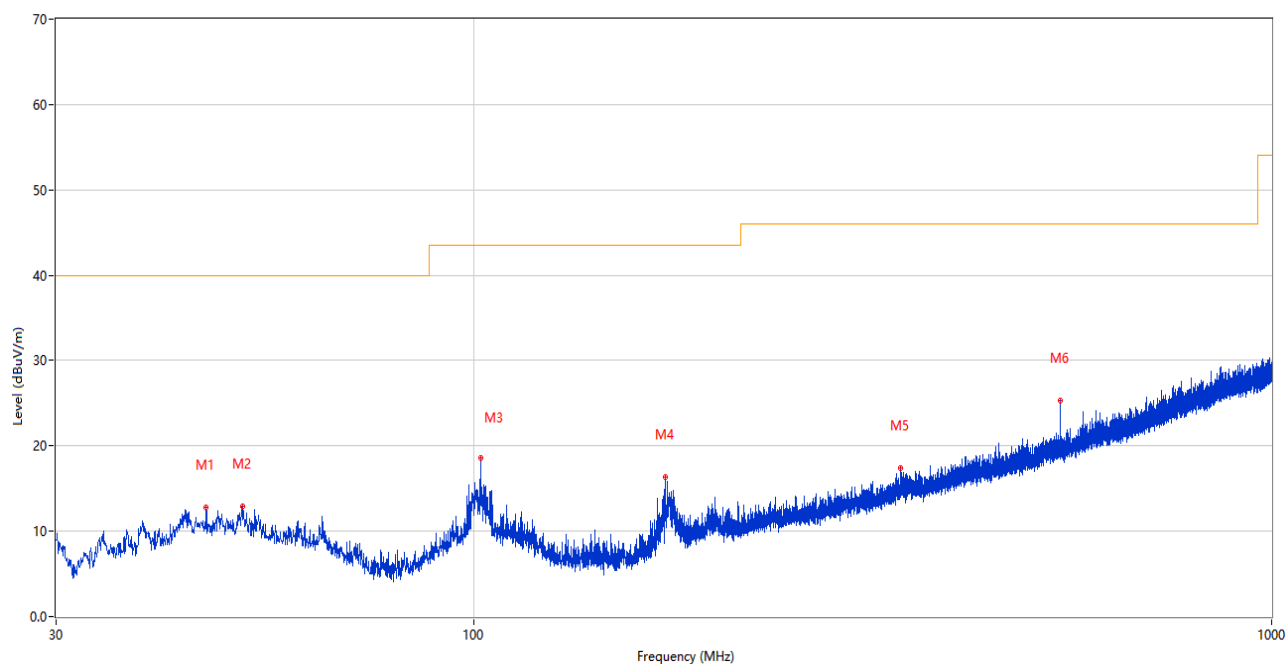
Test Mode 1

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	53.135	16.97	-25.38	40.0	23.03	Peak	352.00	100	Vertical	Pass
2	101.343	19.90	-26.98	43.5	23.60	Peak	65.00	100	Vertical	Pass
3	173.609	19.14	-28.74	43.5	24.36	Peak	189.00	100	Vertical	Pass
4	189.031	19.34	-27.19	43.5	24.16	Peak	186.00	100	Vertical	Pass
5	264.886	15.22	-24.62	46.0	30.78	Peak	71.00	100	Vertical	Pass
6	544.003	25.18	-17.50	46.0	20.82	Peak	268.00	100	Vertical	Pass

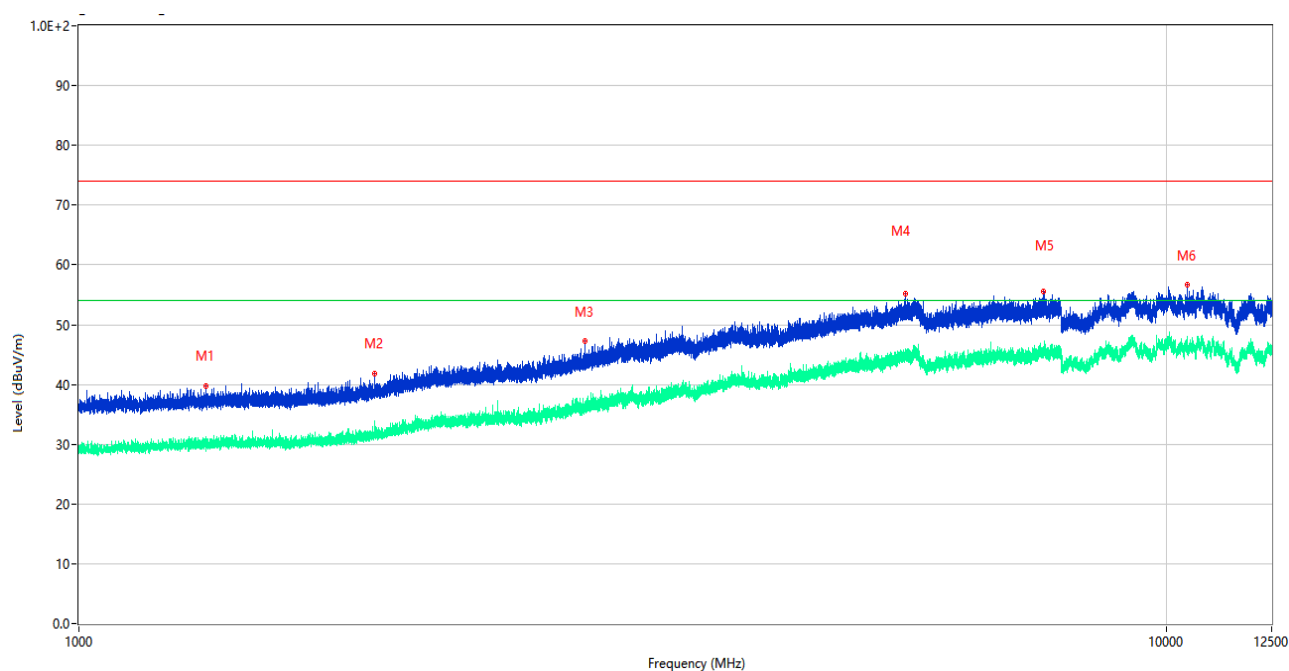
2) Test Antenna Horizontal, 30 MHz – 1 GHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	46.248	12.75	-26.12	40.0	27.25	Peak	132.00	200	Horizontal	Pass
2	51.340	12.94	-24.03	40.0	27.06	Peak	12.00	100	Horizontal	Pass
3	102.168	18.52	-26.79	43.5	24.98	Peak	165.00	200	Horizontal	Pass
4	174.045	16.30	-28.72	43.5	27.20	Peak	19.00	200	Horizontal	Pass
5	343.213	17.35	-22.08	46.0	28.65	Peak	95.00	100	Horizontal	Pass
6	544.003	25.26	-17.50	46.0	20.74	Peak	154.00	100	Horizontal	Pass

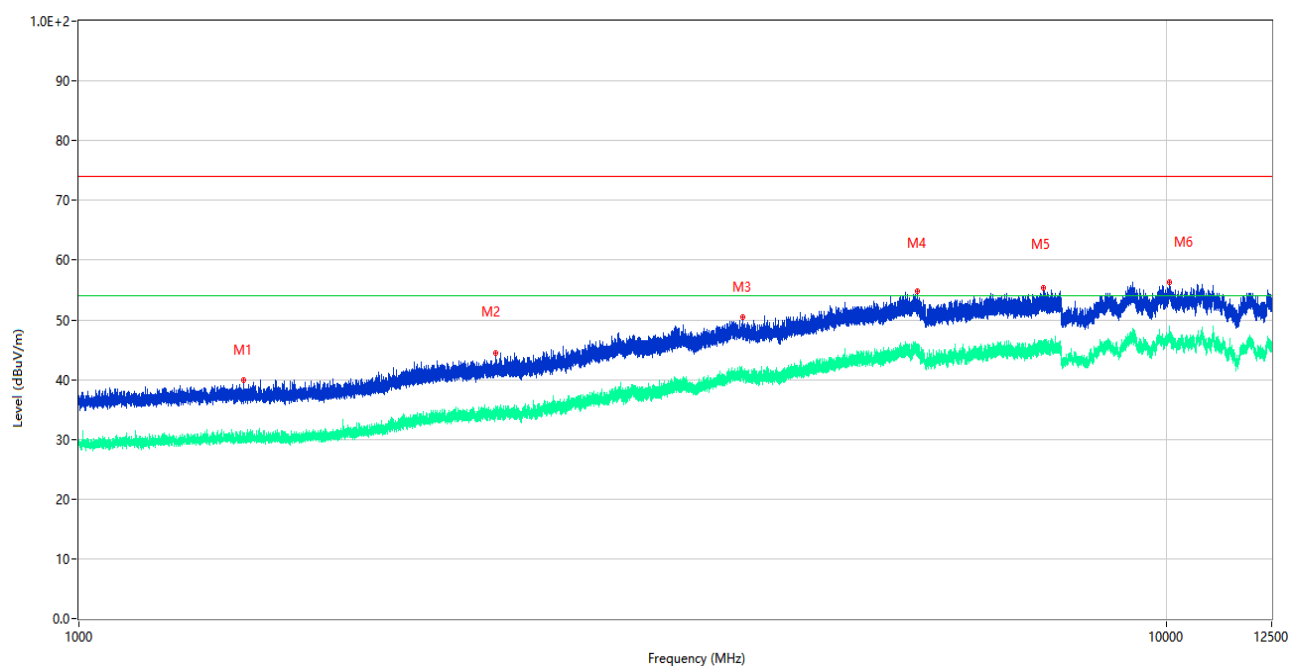
Equipment Information						
Equipment Name	Supplier	Model	Serial No.	Cal. Date	Cal. Due	Use
Frequency Below 1 GHz						
EMI Receiver	Keysight	N9038A	MY55330120	2025.06.17	2026.06.16	☒
Amplifier (30-1GHz)	COM-MV	ZT30-1000M	B2017119081	2024.11.28	2025.11.27	☒
Test Antenna- Bi-Log	SCHWARZB ECK	VULB 9168	9168-00883	2025.03.23	2028.03.22	☒
Anechoic Chamber (#2)	YiHeng	9m*6m*6m	142	2024.07.21	2027.07.20	☒
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	1309.140	39.77	-15.23	74.0	34.23	Peak	231.00	100	Vertical	Pass
1**	1309.140	29.82	-15.23	54.0	24.18	AV	231.00	100	Vertical	Pass
2	1871.780	41.89	-14.09	74.0	32.11	Peak	231.00	100	Vertical	Pass
2**	1871.780	33.97	-14.09	54.0	20.03	AV	231.00	100	Vertical	Pass
3	2918.280	47.22	-7.56	74.0	26.78	Peak	162.00	100	Vertical	Pass
3**	2918.280	35.45	-7.56	54.0	18.55	AV	162.00	100	Vertical	Pass
4	5754.240	55.14	1.74	74.0	18.86	Peak	228.00	100	Vertical	Pass
4**	5754.240	44.78	1.74	54.0	9.22	AV	228.00	100	Vertical	Pass
5	7706.740	55.58	1.63	74.0	18.42	Peak	276.00	100	Vertical	Pass
5**	7706.740	44.72	1.63	54.0	9.28	AV	276.00	100	Vertical	Pass
6	10448.000	56.67	3.24	74.0	17.33	Peak	297.00	100	Vertical	Pass
6**	10448.000	46.65	3.24	54.0	7.35	AV	297.00	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	1417.820	39.96	-15.41	74.0	34.04	Peak	8.00	100	Horizontal	Pass
1**	1417.820	30.06	-15.41	54.0	23.94	AV	8.00	100	Horizontal	Pass
2	2418.430	44.40	-10.75	74.0	29.60	Peak	360.00	100	Horizontal	Pass
2**	2418.430	35.07	-10.75	54.0	18.93	AV	360.00	100	Horizontal	Pass
3	4076.300	50.52	-1.23	74.0	23.48	Peak	85.00	100	Horizontal	Pass
3**	4076.300	39.97	-1.23	54.0	14.03	AV	85.00	100	Horizontal	Pass
4	5906.040	54.82	2.32	74.0	19.18	Peak	305.00	100	Horizontal	Pass
4**	5906.040	44.64	2.32	54.0	9.36	AV	305.00	100	Horizontal	Pass
5	7715.980	55.33	1.64	74.0	18.67	Peak	162.00	100	Horizontal	Pass
5**	7715.980	45.66	1.64	54.0	8.34	AV	162.00	100	Horizontal	Pass
6	10061.000	56.37	5.08	74.0	17.63	Peak	360.00	100	Horizontal	Pass
6**	10061.000	47.61	5.08	54.0	6.39	AV	360.00	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	2025.06.17	2026.06.16	☒
Amplifier (1-12GHz)	Advanced Microwave	WLA652A	1740103	2024.11.28	2025.11.27	☒
Amplifier (0.8-21GHz)	Mini-Circuits	ZVA-213-S+	225321316	2024.11.28	2025.11.27	☒
Test Antenna- Horn	SCHWARZB ECK	BBHA 9120D	01917	2025.05.20	2028.05.19	☒
Anechoic Chamber (#2)	YiHeng	9m*6m*6m	142	2024.07.21	2027.07.20	☒
Description	Supplier	Name	Version	/		Use
Test Software	BALUN	BL410-E	V22.930	/		☒

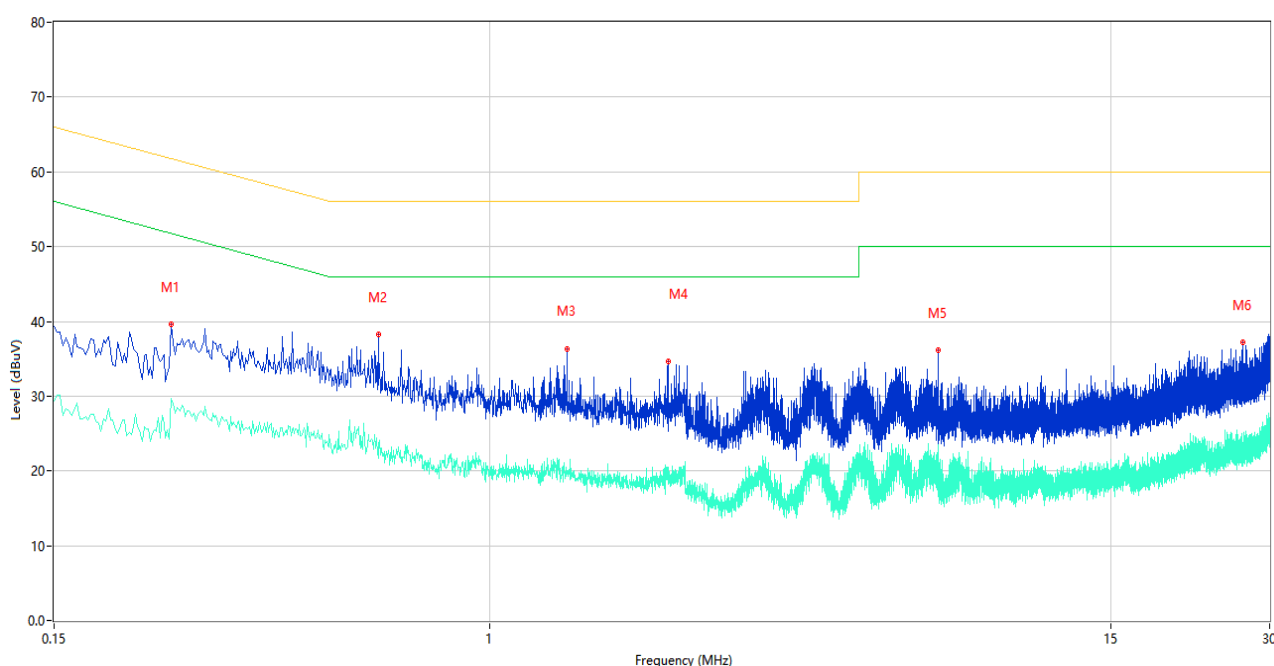
A.2 Conducted Emission, AC Ports

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.	S03	Temperature	22.6°C
Humidity	58%RH	Pressure	101kPa
Test Engineer	Yang Panxia	Test Date	2025.08.20

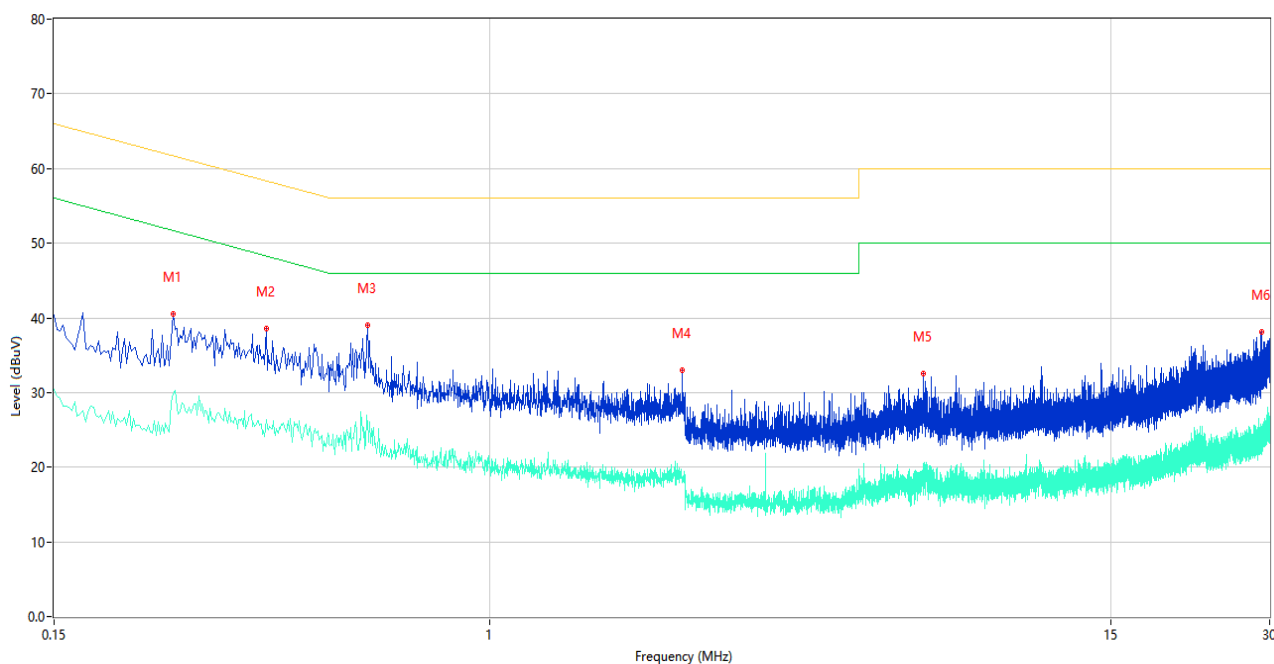
Test Mode 1

1) AC Ports - L Phase



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.250	39.66	9.97	61.76	22.10	Peak	L	Pass
1**	0.250	29.72	9.97	51.76	22.04	AV	L	Pass
2	0.616	38.30	10.48	56.00	17.70	Peak	L	Pass
2**	0.616	23.82	10.48	46.00	22.18	AV	L	Pass
3	1.404	36.37	10.78	56.00	19.63	Peak	L	Pass
3**	1.404	19.65	10.78	46.00	26.35	AV	L	Pass
4	2.178	34.69	10.63	56.00	21.31	Peak	L	Pass
4**	2.178	18.71	10.63	46.00	27.29	AV	L	Pass
5	7.072	36.13	11.10	60.00	23.87	Peak	L	Pass
5**	7.072	17.80	11.10	50.00	32.20	AV	L	Pass
6	26.740	37.20	15.84	60.00	22.80	Peak	L	Pass
6**	26.740	23.21	15.84	50.00	26.79	AV	L	Pass

2) AC Ports - N Phase



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.252	40.47	9.97	61.69	21.22	Peak	N	Pass
1**	0.252	29.84	9.97	51.69	21.85	AV	N	Pass
2	0.378	38.55	10.26	58.32	19.77	Peak	N	Pass
2**	0.378	26.39	10.26	48.32	21.93	AV	N	Pass
3	0.588	39.06	10.55	56.00	16.94	Peak	N	Pass
3**	0.588	25.66	10.55	46.00	20.34	AV	N	Pass
4	2.322	32.95	10.56	56.00	23.05	Peak	N	Pass
4**	2.322	18.23	10.56	46.00	27.77	AV	N	Pass
5	6.622	32.54	11.18	60.00	27.46	Peak	N	Pass
5**	6.622	17.15	11.18	50.00	32.85	AV	N	Pass
6	29.012	38.08	16.34	60.00	21.92	Peak	N	Pass
6**	29.012	25.49	16.34	50.00	24.51	AV	N	Pass

Equipment Information						
Equipment Name	Supplier	Model	Serial No.	Cal. Date	Cal. Due	Use
EMI Receiver	KEYSIGHT	N9010B	MY57110309	2025.06.16	2026.06.15	☒
LISN	SCHWARZBECK	NSLK 8127	8127-687	2025.04.29	2026.04.28	☒
Shielded Room	YiHeng Electronic Co., Ltd	3.5m*3.1m*2.8m	112	2025.02.14	2028.02.13	☒
Description	Supplier	Name	Version	/		Use
Test Software	BALUN	BL410-E	V22.930	/		☒

ANNEX B TEST SETUP PHOTOS

Please refer the document “BL-SZ2580754-AE.PDF”.

ANNEX C EUT EXTERNAL PHOTOS

Please refer the document “BL-SZ2580754-AW.PDF”.

ANNEX D EUT INTERNAL PHOTOS

Please refer the document “BL-SZ2580754-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--