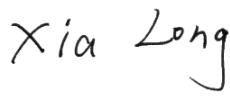


TEST REPORT

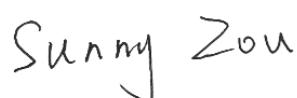
Applicant: MATTER INNOVATION PTE. LTD.
Address: 1 KIM SENG PROMENADE #17-04 GREAT WORLD CITY SINGAPORE (237994)
Equipment Type: AI device
Model Name: G001
Brand Name: JARVIS
FCC ID: 2BGOW-G001
Test Standard: 47 CFR Part 15 Subpart C
ANSI C63.10-2013
Sample Arrival Date: Jun. 25, 2024
Test Date: Jul. 10, 2024 - Jul. 11, 2024
Date of Issue: Oct. 09, 2024

ISSUED BY:

Shenzhen BALUN Technology Co., Ltd.

Tested by: He Shichang**Checked by:** Xia Long**Approved by:** Sunny Zou

(Technical Director)



Revision History

Version	Issue Date	Revisions Content
<u>Rev. 01</u>	<u>Oct. 09, 2024</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	<input checked="" type="checkbox"/> Block B, 1/F, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China <input type="checkbox"/> 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	MATTER INNOVATION PTE. LTD.
Address	1 KIM SENG PROMENADE #17-04 GREAT WORLD CITY SINGAPORE (237994)

2.2 Manufacturer Information

Manufacturer	MATTER INNOVATION PTE. LTD.
Address	1 KIM SENG PROMENADE #17-04 GREAT WORLD CITY SINGAPORE (237994)

2.3 General Description for Equipment under Test (EUT)

EUT Name	AI device
Model Name Under Test	G001
Series Model Name	N/A
Description of Model name differentiation	N/A
Hardware Version	Cdk8A
Software Version	QL7282A_FAC_USERDEBUG_0615_01
Dimensions (Approx.)	98.43mm*65.41mm*4.93mm
Weight (Approx.)	N/A

2.4 Technical Information

Network and Wireless connectivity	Bluetooth, WIFI, Galileo, GPS, SBAS, WPC
-----------------------------------	--

The requirement for the following technical information of the EUT was tested in this report:

Modulation Type	QI
Operating Frequency	111 ~148 kHz
Product Type	<input checked="" type="checkbox"/> Mobile <input type="checkbox"/> Portable <input type="checkbox"/> Fix Location
Antenna Type	Coil Antenna

3 SUMMARY OF TEST RESULTS

3.1 Test Standards

No.	Identity	Document Title
1	47 CFR Part 15, Subpart C	Intentional Radiators
2	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices

3.2 Verdict

No.	Description	FCC Part No.	Verdict
1	Antenna Requirement	15.203	Pass <small>Note</small>
2	Radiated Emission	15.209,15.215(b)	Pass
3	Conducted Emission, AC Ports	15.207	Pass
4	20 dB Bandwidth	15.215(c)	Pass

Note: The EUT has a permanently and irreplaceable attached antenna, which complies with the requirement FCC 15.203.

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 (9 kHz-30 MHz)	4.3 dB
Radiated emissions (30 MHz-1 GHz)-10m	4.3 dB

4 GENERAL TEST CONFIGURATIONS

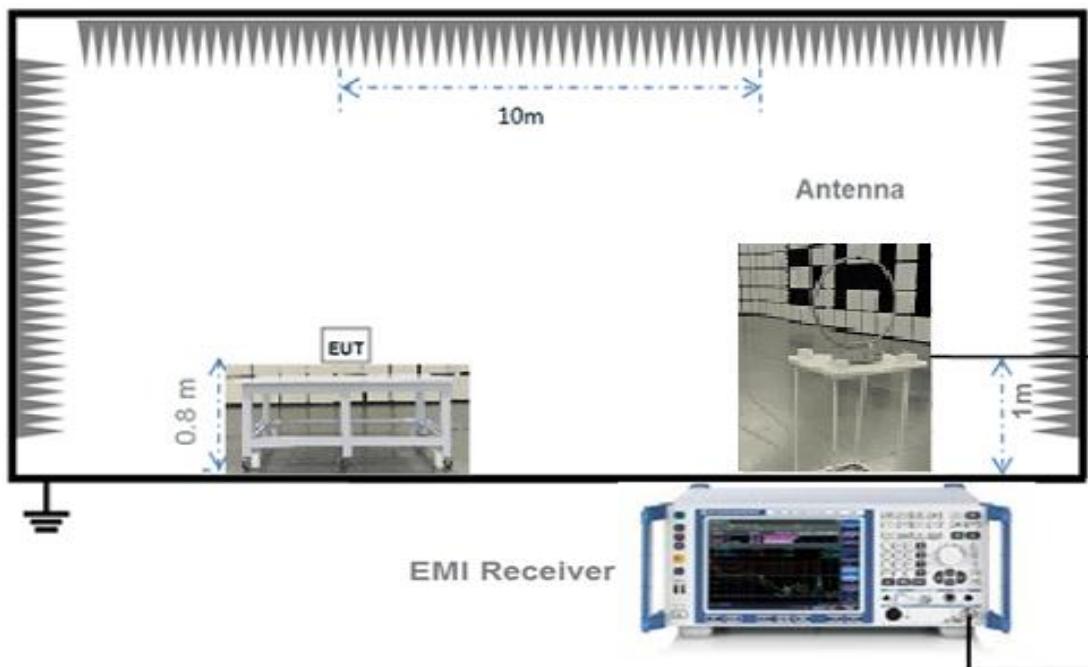
4.1 Test Environments

Relative Humidity	53% to 58%	
Atmospheric Pressure	100 kPa to 102 kPa	
Temperature	NT (Normal Temperature)	+23.2°C to +23.8°C
Working Voltage of the EUT	NV (Normal Voltage)	3.91 V

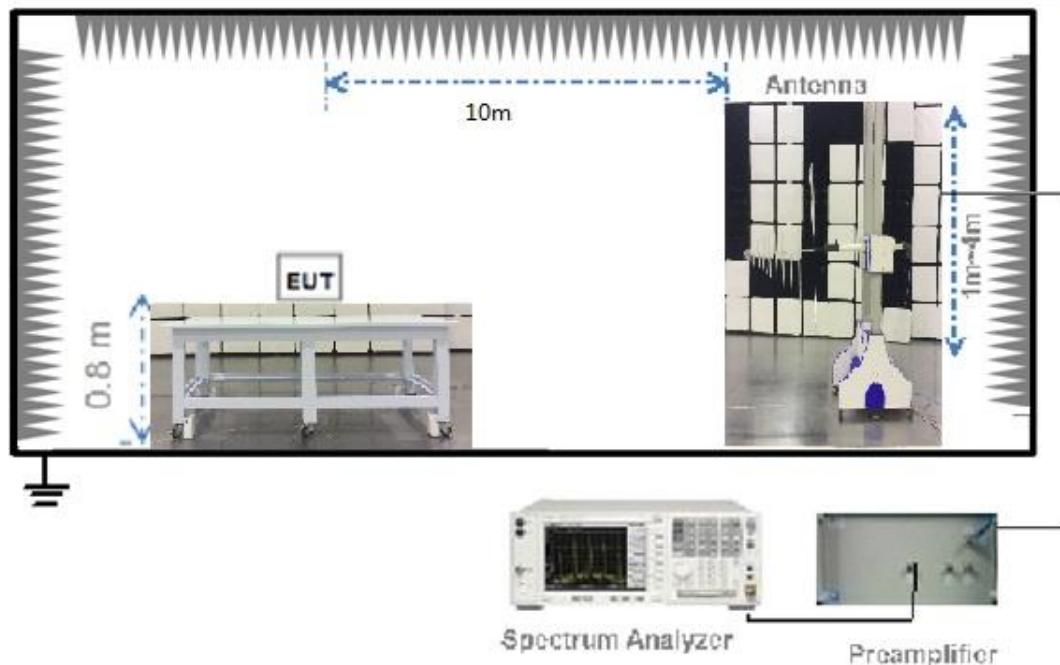
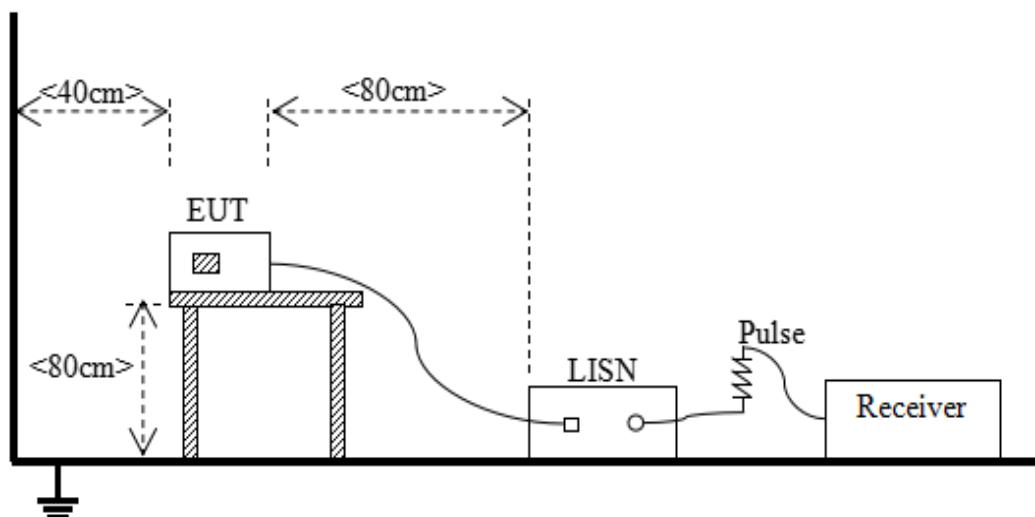
4.2 Test Setups

Test Setup 1

Radiated Test (Below 30 MHz)



(Diagram 1)

Test Setup 2**Radiated Test (30 MHz-1 GHz)****(Diagram 2)****Test Setup 3****AC Power Supply Port Test****(Diagram 3)**

5 TEST ITEMS

5.1 Antenna Requirements

5.1.1 Relevant Standards

FCC §15.203

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of § 15.211, § 15.213, § 15.217, § 15.219, or § 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with § 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

5.1.2 Antenna Anti-Replacement Construction

The Antenna Anti-Replacement as following method:

Protected Method	Description
The antenna is embedded in the product.	An embedded-in antenna design is used.

Reference Documents	Item
Photo	Please refer EUT internal photos.

5.2 Emission Tests

5.2.1 Radiated Emission

5.2.1.1 Limit

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

NOTE:

- 1) Field Strength ($\text{dB}\mu\text{V}/\text{m}$) = $20 * \log [\text{Field Strength} (\mu\text{V}/\text{m})]$.
- 2) In the emission tables above, the tighter limit applies at the band edges.
- 3) For above 1000 MHz, limit field strength of harmonics: 54 $\text{dB}\mu\text{V}/\text{m}$ @3 m (AV) and 74 $\text{dB}\mu\text{V}/\text{m}$ @3 m (PK)
- 4) At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). For example, at the frequency 9 kHz, limit @10m = $20 * \log (2400/f) + 40\log (d\text{limit}/d\text{measure})$ where limit = 300m, dmeasure=10m. limit @10m = $20 * \log (2400/9) + 40\log (300/10) = 107.5$ ($\text{dB}\mu\text{V}/\text{m}$).
- 5) At frequencies at or above 30 MHz, measurements may be performed at a distance other than what is specified provided, When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse linear-distance for field strength measurements; inverse-linear-distance-squared for power density measurements). For example, at the frequency 30 MHz, limit @10m = $20 * \log (100) + 20\log (d\text{limit}/d\text{measure})$ where limit = 3m, dmeasure=10m. limit @10m = $20 * \log (100) + 20\log (3/10) = 29.5$ ($\text{dB}\mu\text{V}/\text{m}$).

5.2.1.2 Test Setup

Refer to 4.2 section (test setup 1 to test setup 2) for radiated emission test, the photo of test setup please refer to ANNEX B.

5.2.1.3 Test Procedure

The measurement frequency range is from 9 kHz to the 10th harmonic of the fundamental frequency. 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. The power of the EUT transmitting frequency should be ignored.

All Spurious Emission tests were performed in X, Y, Z axis direction. And only the worst axis test

condition was recorded in this test report.

Use the following spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured

RBW = 1 MHz for $f \geq 1$ GHz, 100 kHz for 30 MHz $< f < 1$ GHz, 10 kHz for 150 kHz $< f < 30$ MHz, 300 Hz for $f < 150$ kHz

VBW \geq RBW

Sweep = auto

Detector function = peak

Trace = max hold

5.2.1.4 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

5.2.2 Conduct Emission

5.2.2.1 Test Limit

Frequency range (MHz)	Conducted Limit (dB μ V)	
	Quasi-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

NOTE:

- 1) The limit is applicable to Class B ITE.
- 2) The lower limit shall apply at the band edges.
- 3) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50 MHz.

5.2.2.2 Test Setup

Refer to 4.2 section test (test setup 3) for conducted emission, the photo of test setup please refer to ANNEX B.

5.2.2.3 Test Procedure

The EUT is connected to the power mains through a LISN which provides $50 \Omega/50 \mu\text{H}$ 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.

5.2.2.4 Test Result and Test Equipment List

Please refer to ANNEX A.2.

NOTE:

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

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

2. Factor = Insertion loss + Cable loss

3. Margin = Limit – Results

5.2.3 20 dB Bandwidth

5.2.3.1 Limit

FCC §15.215(c)

The 20 dB bandwidth is known as the 99% emission bandwidth, or 20 dB bandwidth ($10 \log 1\% = 20$ dB) taking the total RF output power.

5.2.3.2 Test Setup

Refer to 4.2 section test (test setup 1) for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.2.3.3 Test Procedure

The 20dB bandwidth is measured with a spectrum analyzer connected via a receiver antenna placed near the EUT while the EUT is operating in transmission mode.

Use the following spectrum analyzer settings:

Span = between 2 to 5 times the OBW

RBW = 1% to 5% the OBW

VBW \geq 3RBW

Sweep = auto

Detector function = peak

Trace = max hold

The 99% emission bandwidth is measured with a spectrum analyzer connected via a receiver antenna placed near the EUT while the EUT is operating in transmission mode.

Use the following spectrum analyzer settings:

Span = between 1.5 to 5 times the OBW

RBW = 1% to 5% OBW

VBW \geq 3RBW

Sweep = auto

Detector function = peak

Trace = max hold

The EUT should be transmitting at its maximum data rate, Allow the trace to stabilize.

5.2.3.4 Test Result and Test Equipment List

Please refer to ANNEX A.3.

ANNEX A TEST RESULTS

A.1 Radiated Emission

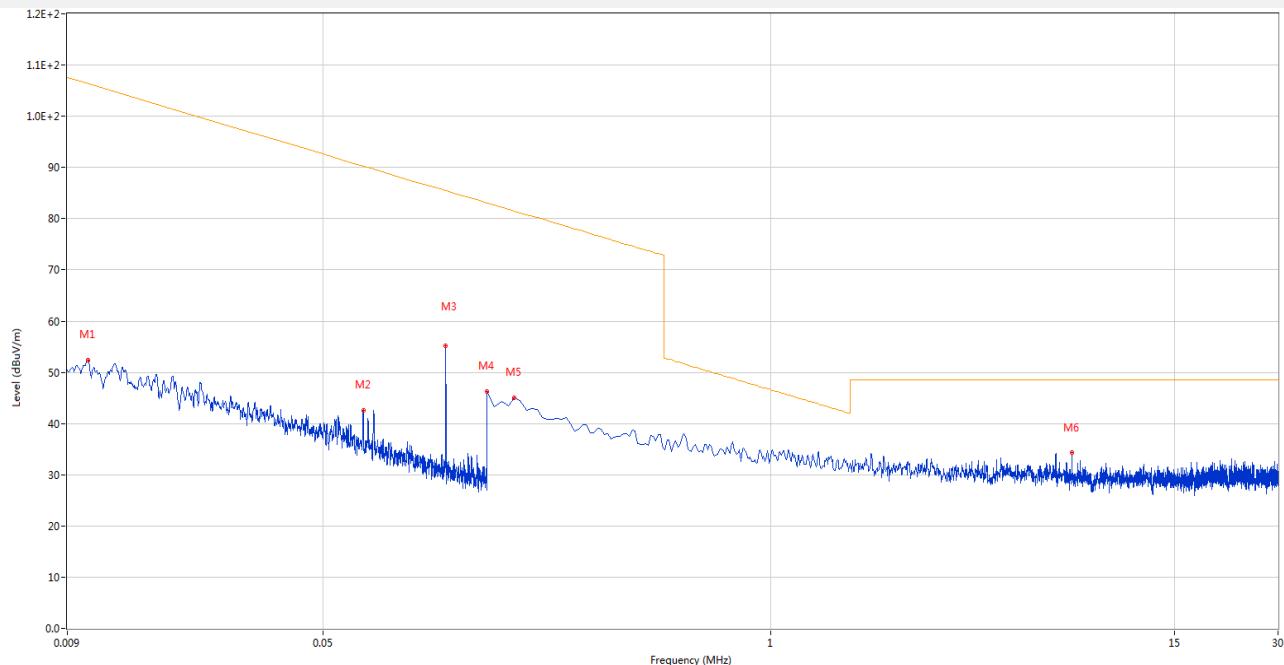
Note 1: This frequency which near 114 kHz with circle should be ignored because they are WPC carrier frequency.

Note 2: All Radiated Emissions tests were performed in X, Y, Z axis direction of EUT. And only the worst axis test condition was recorded in this test report.

Sample No.	S05	Temperature	23.8°C
Humidity	53%RH	Pressure	101kPa
Test Engineer	Xi Zifeng	Test Date	2024.07.10

Test Data and Plot

9 kHz to 30 MHz, ANT-H



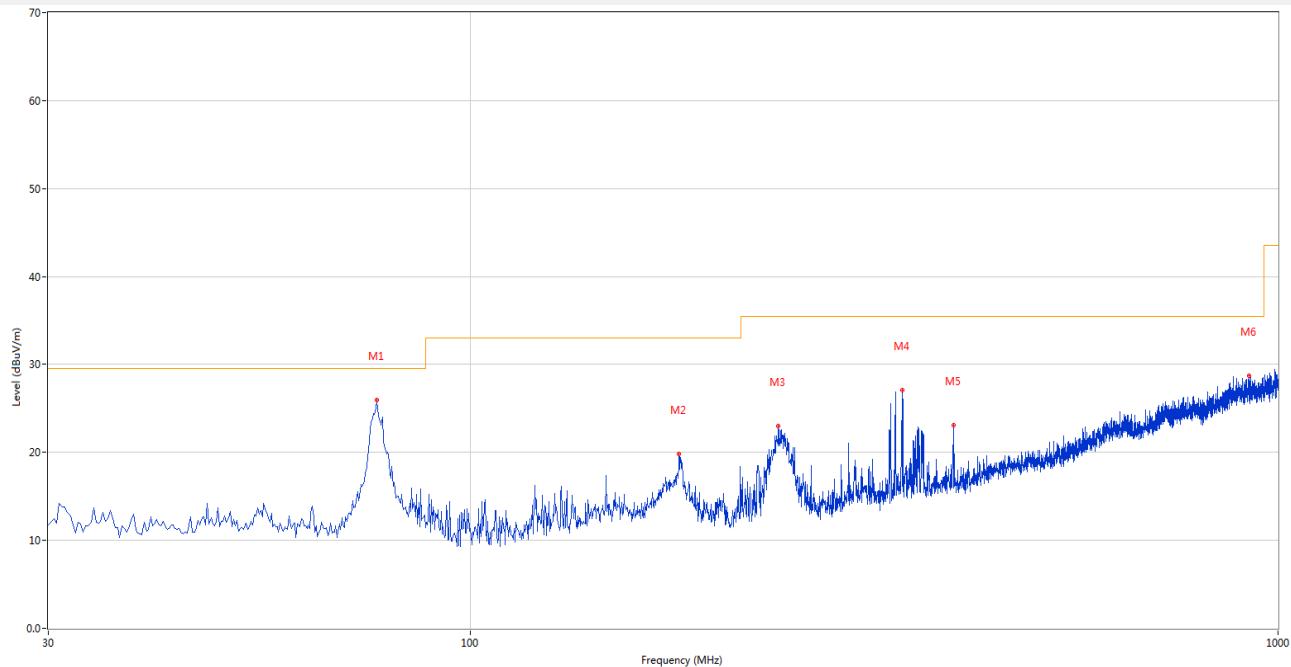
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	0.010	52.35	20.03	106.3	53.95	Peak	136.00	100	Horizontal	Pass
2	0.065	42.63	20.18	90.3	47.67	Peak	289.00	100	Horizontal	Pass
3	0.114	56.06	20.16	85.5	29.44	Peak	152.00	100	Horizontal	N/A
4	0.150	27.01	20.15	83.1	56.09	Peak	65.00	100	Horizontal	Pass
5	0.180	45.03	20.10	81.5	36.47	Peak	39.00	100	Horizontal	Pass
6	7.545	34.26	20.82	48.5	14.24	Peak	226.00	100	Horizontal	Pass

Equipment Information						
Equipment Name	Supplier	Model	Serial No.	Cal. Date	Cal. Due	Use
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2023.09.05	2024.09.04	<input checked="" type="checkbox"/>
Test Antenna-Loop	SCHWARZBECK	FMZB 1519	1519-037	2024.01.23	2027.01.22	<input checked="" type="checkbox"/>
Anechoic Chamber	EMC Electronic Co., Ltd	20.10*11.60*7 .35m	130	2021.08.15	2024.08.14	<input checked="" type="checkbox"/>
Description	Supplier	Name	Version	/		Use
Test Software	BALUN	BL410-E	V22.930	/		<input checked="" type="checkbox"/>

Sample No.	S05	Temperature	23.8 °C
Humidity	53%RH	Pressure	101kPa
Test Engineer	Xi Zifeng	Test Date	2024.07.10

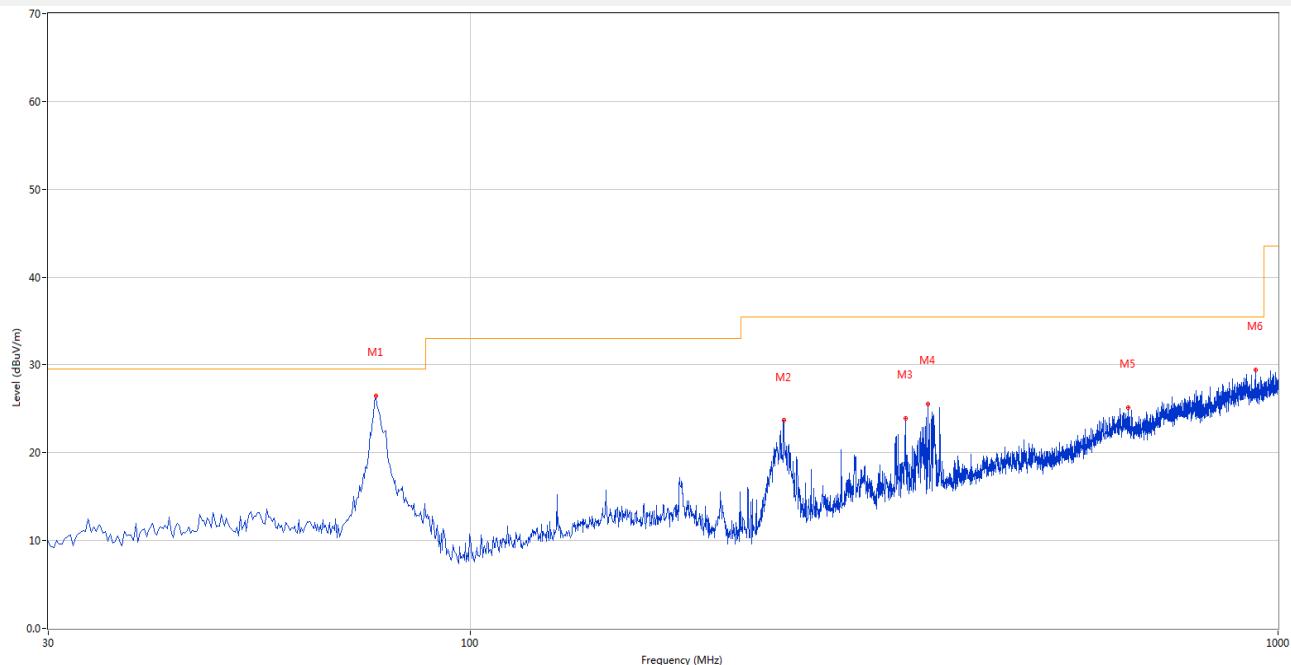
Test Data and Plot

30 MHz to 1 GHz, ANT-V



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	76.548	25.96	-29.58	29.5	3.54	Peak	0.00	200	Vertical	Pass
2	181.282	19.83	-27.07	33.0	13.17	Peak	0.00	200	Vertical	Pass
3	240.680	22.97	-27.09	35.5	12.53	Peak	126.00	100	Vertical	Pass
4	342.747	27.12	-23.81	35.5	8.38	Peak	0.00	200	Vertical	Pass
5	396.326	23.15	-22.43	35.5	12.35	Peak	0.00	100	Vertical	Pass
6	921.450	28.76	-10.62	35.5	6.74	Peak	0.00	200	Vertical	Pass

30 MHz to 1 GHz, ANT-H



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	76.306	26.43	-29.51	29.5	3.07	Peak	0.00	200	Horizontal	Pass
2	244.316	23.66	-27.04	35.5	11.84	Peak	87.00	200	Horizontal	Pass
3	345.899	23.91	-23.84	35.5	11.59	Peak	104.00	100	Horizontal	Pass
4	368.445	25.52	-23.30	35.5	9.98	Peak	179.00	200	Horizontal	Pass
5	653.069	25.19	-15.64	35.5	10.31	Peak	202.00	100	Horizontal	Pass
6	937.208	29.44	-10.47	35.5	6.06	Peak	0.00	200	Horizontal	Pass

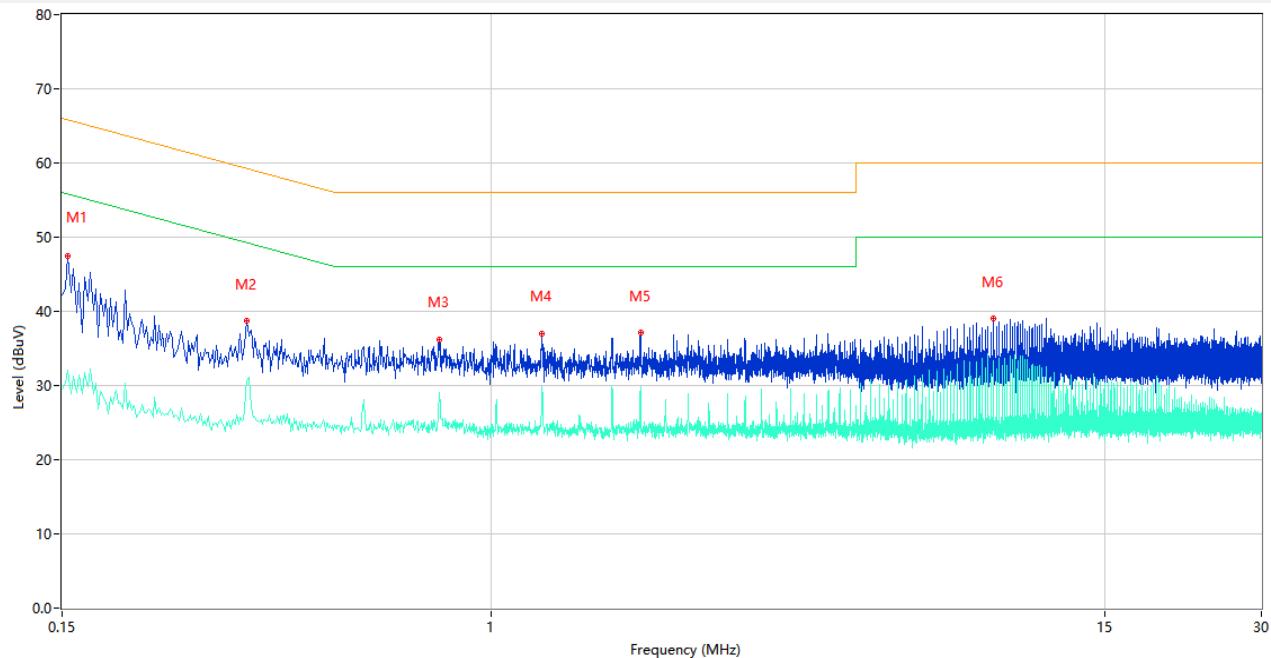
Equipment Information						
Equipment Name	Supplier	Model	Serial No.	Cal. Date	Cal. Due	Use
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2023.09.05	2024.09.04	<input checked="" type="checkbox"/>
Amplifier (30MHz-1GHz)	COM-MV	ZT30-1000M	B2018054558	2023.12.05	2024.12.04	<input checked="" type="checkbox"/>
Test Antenna-Bi-Log	SCHWARZBECK	VULB 9168	9168-01162	2023.08.04	2024.08.03	<input checked="" type="checkbox"/>
Anechoic Chamber	EMC Electronic Co., Ltd	20.10*11.60*7.35m	130	2021.08.15	2024.08.14	<input checked="" type="checkbox"/>
Description	Supplier	Name	Version	/		Use
Test Software	BALUN	BL410-E	V22.930	/		<input checked="" type="checkbox"/>

A.2 Conducted Emission

Sample No.	S05	Temperature	23.2 °C
Humidity	58%RH	Pressure	101kPa
Test Engineer	Yang Yang	Test Date	2024.07.11

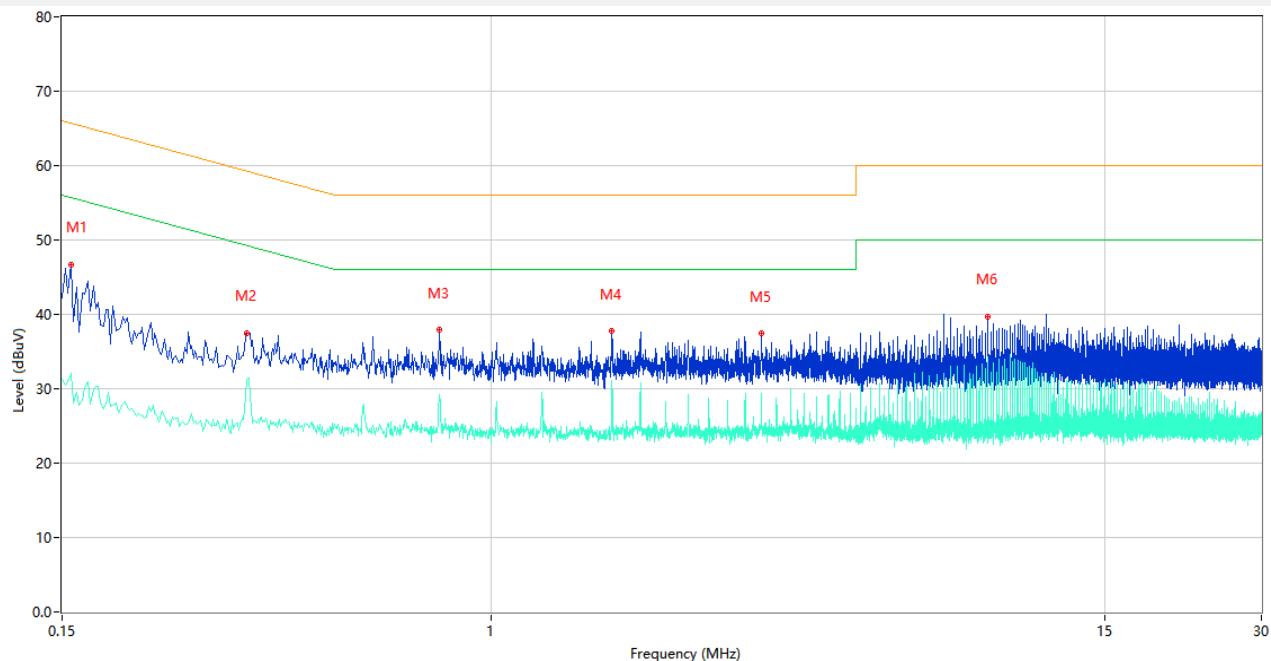
Test Data and Plot

PHASE L



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.154	47.44	9.78	65.78	18.34	Peak	L	Pass
1**	0.154	32.05	9.78	55.78	23.73	AV	L	Pass
2	0.340	38.70	10.56	59.20	20.50	Peak	L	Pass
2**	0.340	30.70	10.56	49.20	18.50	AV	L	Pass
3	0.796	36.19	10.50	56.00	19.81	Peak	L	Pass
3**	0.796	28.97	10.50	46.00	17.03	AV	L	Pass
4	1.250	37.00	10.45	56.00	19.00	Peak	L	Pass
4**	1.250	29.77	10.45	46.00	16.23	AV	L	Pass
5	1.930	37.12	10.38	56.00	18.88	Peak	L	Pass
5**	1.930	29.86	10.38	46.00	16.14	AV	L	Pass
6	9.198	38.97	10.60	60.00	21.03	Peak	L	Pass
6**	9.198	33.38	10.60	50.00	16.62	AV	L	Pass

PHASE N



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.156	46.67	9.78	65.67	19.00	Peak	N	Pass
1**	0.156	32.11	9.78	55.67	23.56	AV	N	Pass
2	0.340	37.54	10.56	59.20	21.66	Peak	N	Pass
2**	0.340	31.32	10.56	49.20	17.88	AV	N	Pass
3	0.796	37.93	10.50	56.00	18.07	Peak	N	Pass
3**	0.796	29.22	10.50	46.00	16.78	AV	N	Pass
4	1.704	37.77	10.19	56.00	18.23	Peak	N	Pass
4**	1.704	31.11	10.19	46.00	14.89	AV	N	Pass
5	3.292	37.40	10.31	56.00	18.60	Peak	N	Pass
5**	3.292	29.39	10.31	46.00	16.61	AV	N	Pass
6	8.970	39.76	10.44	60.00	20.24	Peak	N	Pass
6**	8.970	34.31	10.44	50.00	15.69	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	<input checked="" type="checkbox"/>
LISN	SCHWARZBECK	NSLK 8127	8127-687	2024.05.09	2025.05.08	<input checked="" type="checkbox"/>
Shielded Room	YiHeng Electronic Co., Ltd	3.5m*3.1m*2.8m	112	2022.02.19	2025.02.18	<input checked="" type="checkbox"/>
Description	Supplier	Name	Version	/		Use
Test Software	BALUN	BL410-E	V22.930	/		<input checked="" type="checkbox"/>

A.3 20 dB Bandwidth

Note: Because the measured signal is CW adjusting the RBW per C63.10 would not be practical since measured bandwidth will always follow the RBW and the result will be approximately twice the RBW.

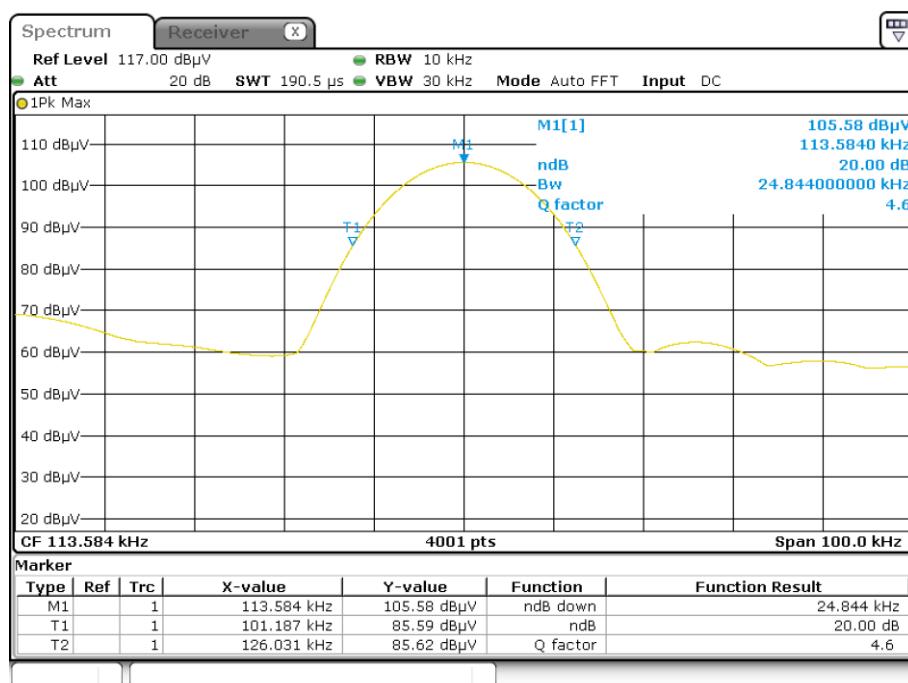
Sample No.	S05	Temperature	23.7°C
Humidity	54%RH	Pressure	101kPa
Test Engineer	Xi Zifeng	Test Date	2024.07.10

Emission Bandwidth

Test Data

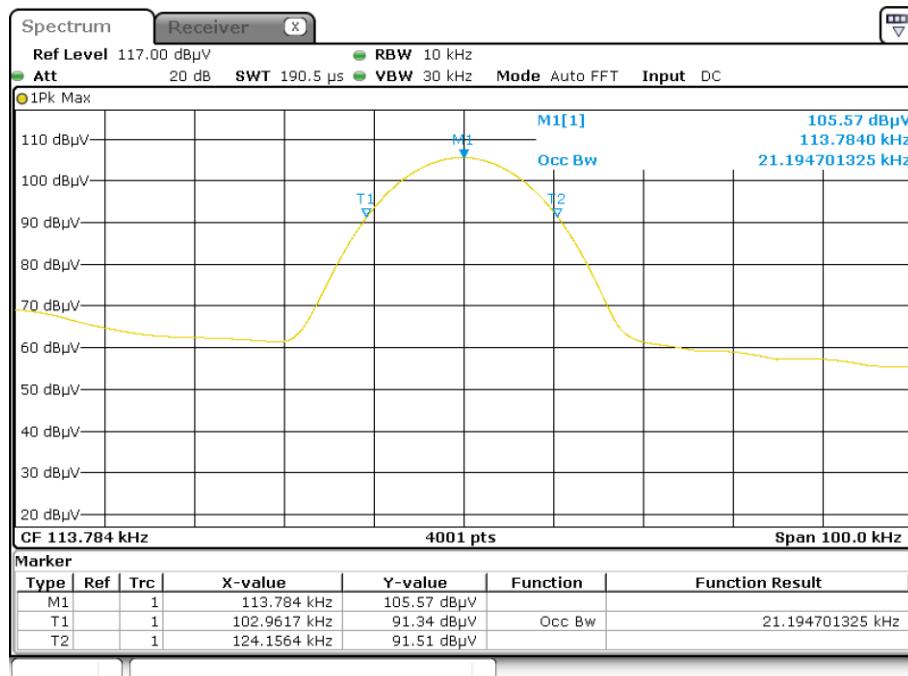
Frequency (kHz)	Emission Bandwidth (20dB down) (kHz)
113.584	24.844

Test Plots



99% Occupied Bandwidth**Test Data**

Frequency (kHz)	Emission Bandwidth (99%) (kHz)
113.784	21.194

Test Plots

Equipment Information						
Equipment Name	Supplier	Model	Serial No.	Cal. Date	Cal. Due	Use
EMI Receiver	ROHDE&SCHW ARZ	ESRP	101036	2023.09.05	2024.09.04	<input checked="" type="checkbox"/>
Test Antenna- Loop	SCHWARZBECK	FMZB 1519	1519-037	2024.01.23	2027.01.22	<input checked="" type="checkbox"/>
Anechoic Chamber (10m)	EMC TECHNOLOGY LTD	20.1m*11.6 m*7.35m	130	2021.08.15	2024.08.14	<input checked="" type="checkbox"/>

ANNEX B TEST SETUP PHOTOS

Please refer the document “BL-SZ2460995-AE-2.PDF”.

ANNEX C EUT EXTERNAL PHOTOS

Please refer the document “BL-SZ2460995-AW.PDF”.

ANNEX D EUT INTERNAL PHOTOS

Please refer the document “BL-SZ2460995-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--