TEST REPORT

Applicant:	Franklin Technology
Address:	906 JEI Platz, 186, Gasan digital1-ro, Geumcheon-gu, Seoul 08502 Korea
Equipment Type:	M2M Box
Model Name:	RT410S
Brand Name:	N/A
FCC ID:	XHG-RT410S
Test Standard:	47 CFR Part 15 Subpart B ANSI C63.4-2014
Sample Arrival Date:	Feb. 10, 2025
Test Date:	Feb. 17, 2025
Date of Issue:	Mar. 11, 2025

ISSUED BY:

Shanghai Tejet Communications Technology Co., Ltd. Testing Center

Tested by: Chai Yong

Chai Yong

Checked by: Huang Chengkun

Huang Chengkun

Approved by: Chen Zidong

(Technical Director)

Chen Zidong

Revision History

Version	Issue Date	Revisions Content
Rev. 01	Mar. 11, 2025	Initial Issue

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1 GENERAL INFORMATION

1.1 Test Laboratory

Name	Shanghai Tejet Communications Technology Co., Ltd. Testing Center
Address	1st to 2nd floors, Building 1, No. 222 Xuanlan Road, Xuanqiao Town, Pudong New District, Shanghai

1.2 Test Location

Name	Shanghai Tejet Communications Technology Co., Ltd. Testing Center
Location	1st to 2nd floors, Building 1, No. 222 Xuanlan Road, Xuanqiao Town, Pudong New District, Shanghai
Accreditation Certificate	The laboratory is a testing organization accredited by FCC as a accredited testing laboratory. The designation number is CN1352.

2 PRODUCT INFORMATION

2.1 Applicant Information

Applicant	Franklin Technology
Address	906 JEI Platz, 186, Gasan digital1-ro, Geumcheon-gu, Seoul 08502 Korea

2.2 Manufacturer Information

Manufacturer	Franklin Technology
Address	906 JEI Platz, 186, Gasan digital1-ro, Geumcheon-gu, Seoul 08502 Korea

2.3 General Description for Equipment under Test (EUT)

Equipment Type	M2M Box
Model Name Under Test	RT410S
Series Model Name	N/A
Description of Model Name Differentiation	N/A
Hardware Version	P2
Software Version	RT41021.TO.3305
Dimensions (Approx.)	131.9mm(L) × 64mm(W) × 19.5mm(H)
Weight (Approx.)	N/A

2.4 Ancillary Equipment

Ancillary Equipment 1	Antenna	
	Brand Name	SUNNYWAY
	Model No.	SWE027

2.5 Technical Information

Network and wireless connectivity	3G Network WCDMA/HSDPA/HSUPA Band 2/4/5 4G Network FDD LTE Band 2/4/5/12/25/26/66/71 TDD LTE Band 41 2.4G WIFI, 5G WIFI, GPS
Classification of equipment	Class B
Highest frequency generatedor used in the device or onwhich the device operates oltunes(MHz)	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 Decision Rule

☐ No Need

☒ Use General conformity decision rule (Consider uncertainty or not ☒ No ☐ Yes)

☐ Use Special Conformity Decision Rule (Consider uncertainty or not ☐ No ☐ Yes)

3.4 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 (150 kHz-30 MHz)-AMN	2.6 dB
Radiated emissions (30 MHz-1 GHz)-966#1	4.2 dB
Radiated emissions (1 GHz-18 GHz) -966#1	5.3 dB
Radiated emissions (18 GHz-40 GHz) -966#1	5.6 dB

4 GENERAL TEST CONFIGURATIONS

4.1 Test Enclosure List

Description	Manufacturer	Model	Serial No.	Length	Description	Use
Adapter	N/A	A1443	N/A	N/A	N/A	☒
RJ45 Cable	N/A	N/A	N/A	1.5m	N/A	☒
USB Cable	N/A	N/A	N/A	0.8m	N/A	☒

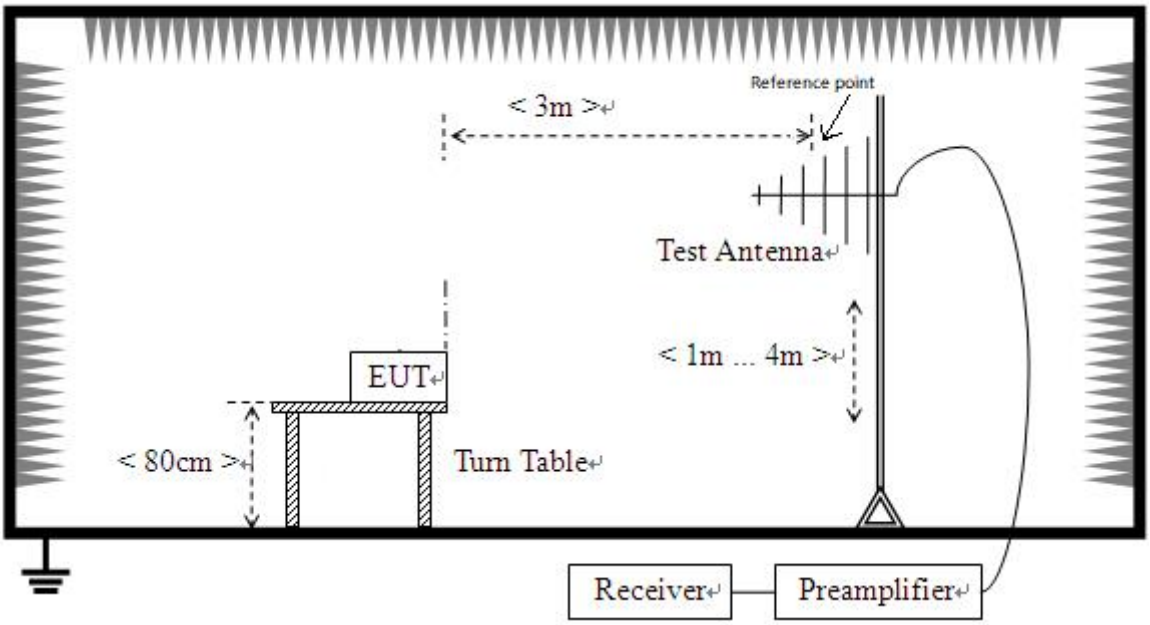
4.2 Test Configurations

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

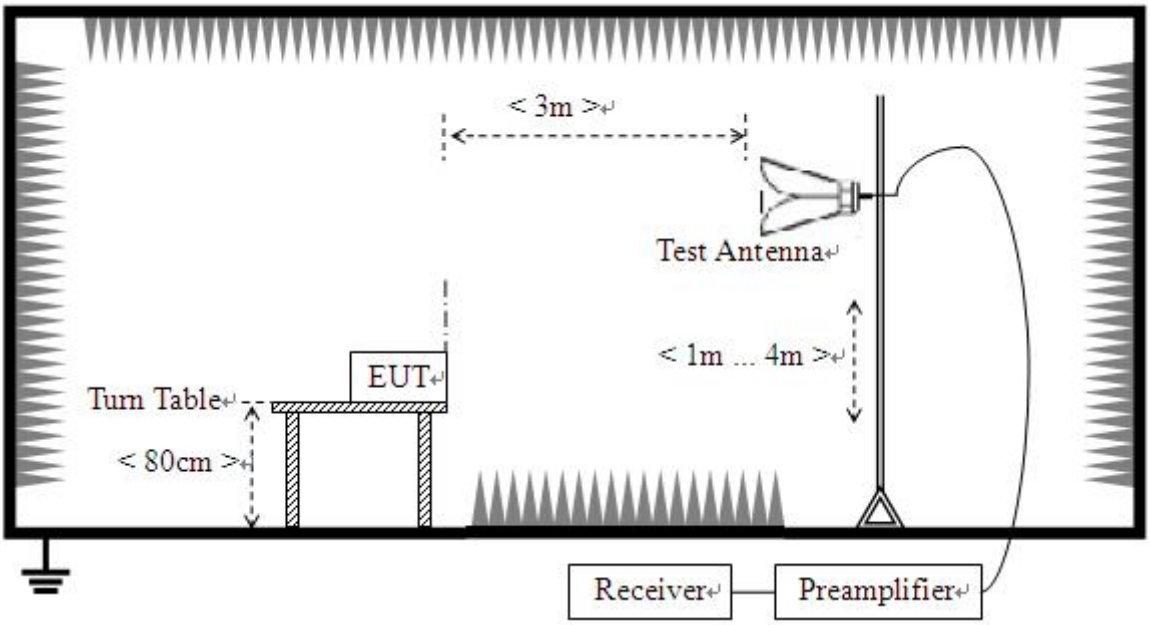
Test Mode Configuration	Description
Mode 1	The Full System Test Mode EUT + Adapter + USB Cable + RJ45 Cable + Antenna

4.3 Test Setups

Test Setup 1

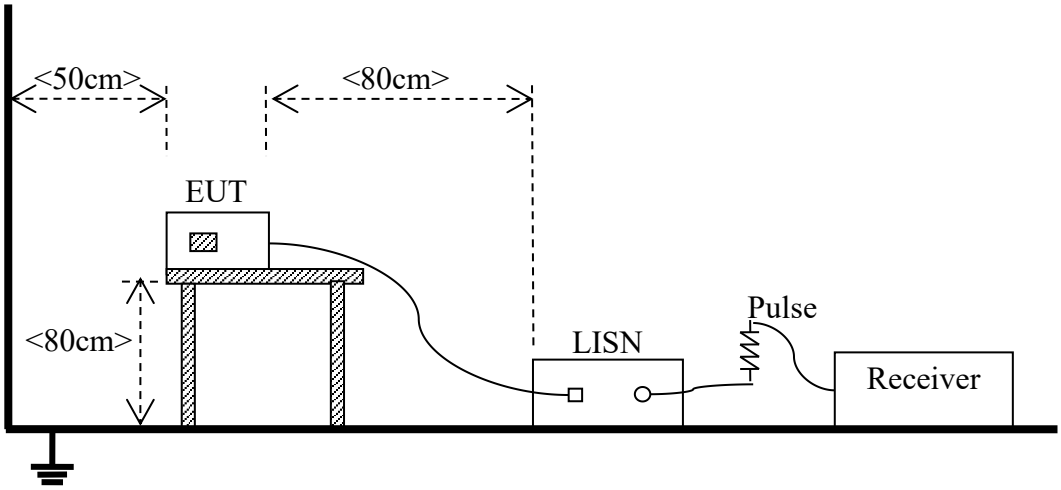


Radiated Emission (30 MHz-1 GHz)



Radiated Emission (above 1 GHz)

Test Setup 2



Conducted emission, 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) The limits using ANSI C63.4-2014.
4) For 30-1000 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 $\leq F_X \leq$ 500 MHz	2 GHz
500 MHz $\leq F_X \leq$ 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

Please refer to 4.2 section description of test setup of test setup 1. The photo of test setup please refer to ANNEX B.

5.1.1.3 Test procedure

1. The test employing the methods of measurement described in the publication referenced in Section 3(b) (ANSI C63.4);
2. 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.
3. 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.
4. 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.
5. 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/m) + 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

5.1.2.1 Limit

Frequency range (MHz)	Class A		Class B	
	Quasi-peak (dBμV)	Average (dBμV)	Quasi-peak (dBμV)	Average (dBμV)
0.15 - 0.50	79	66	66 to 56	56 to 46
0.50 - 5	73	60	56	46
5 - 30	73	60	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.
3) The limit using ANSI C63.4.

5.1.2.2 Test setup

Please refer to 4.2 section description of test setup of test setup 2. The photo of test setup please refer to ANNEX B.

5.1.2.3 Test procedure

1. The test employing the methods of measurement described in the publication referenced in Section 3(b) (ANSI C63.4);
2. 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.
3. 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 AND TEST EQUIPMENT LIST

A.1 Radiated emission

Note 1: Measurements shall be made with a quasi-peak measuring receiver in the frequency range 30 MHz to 1000 MHz. To reduce the testing time, a peak measuring receiver may be used instead of a quasi-peak measuring receiver. In case of dispute, measurement with a quasi-peak measuring receiver will take precedence.

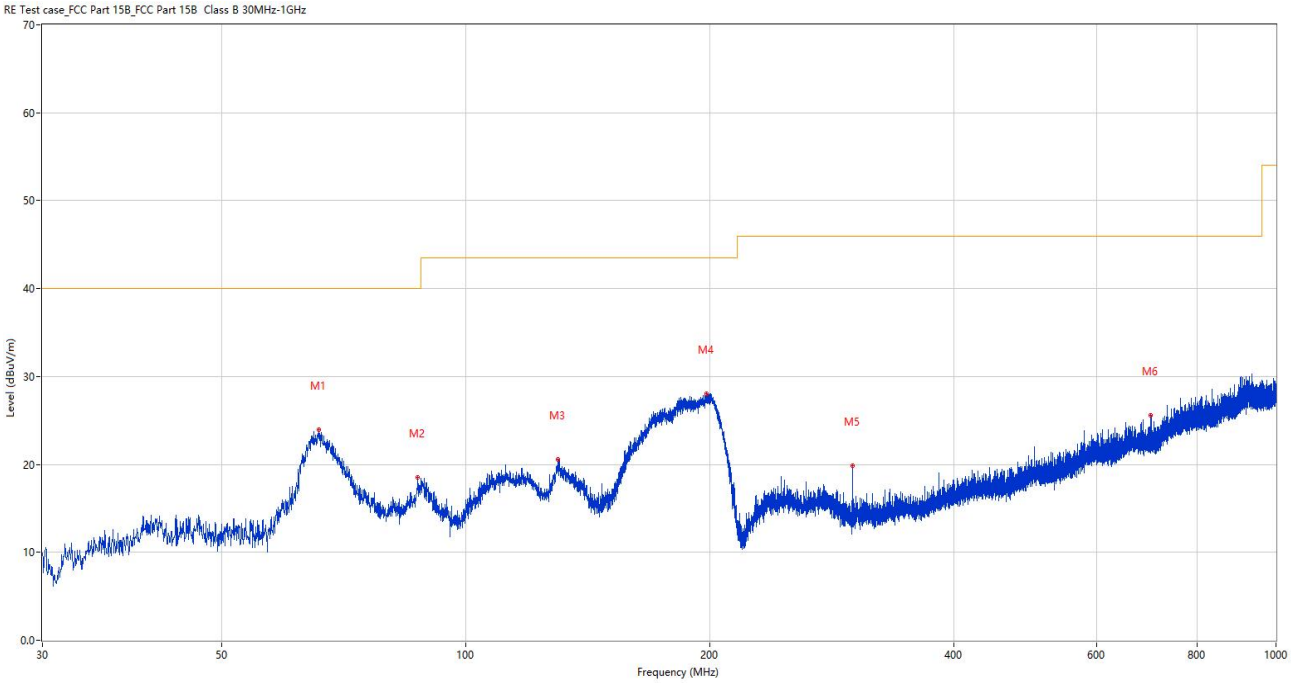
Note 2: When the EUT is on, it will automatically emit Wifi signal and cannot be turned off. So the marked spikes near 2400 MHz with circle should be ignored because they are Wifi carrier frequencies.

Note 3: The Radiated Emission is required to be investigated to the upper frequency of 5th harmonic of the highest internal frequency of EUT or 40 GHz, whichever is lower. The test results above 18GHz are only noise and are not recorded in the report.

Sample No.	SC-SH2520006-S03	Temperature	21.2°C
Humidity	41%RH	Test Voltage	AC 120V/60Hz
Test Engineer	Hao Longda	Test Date	2025.02.17

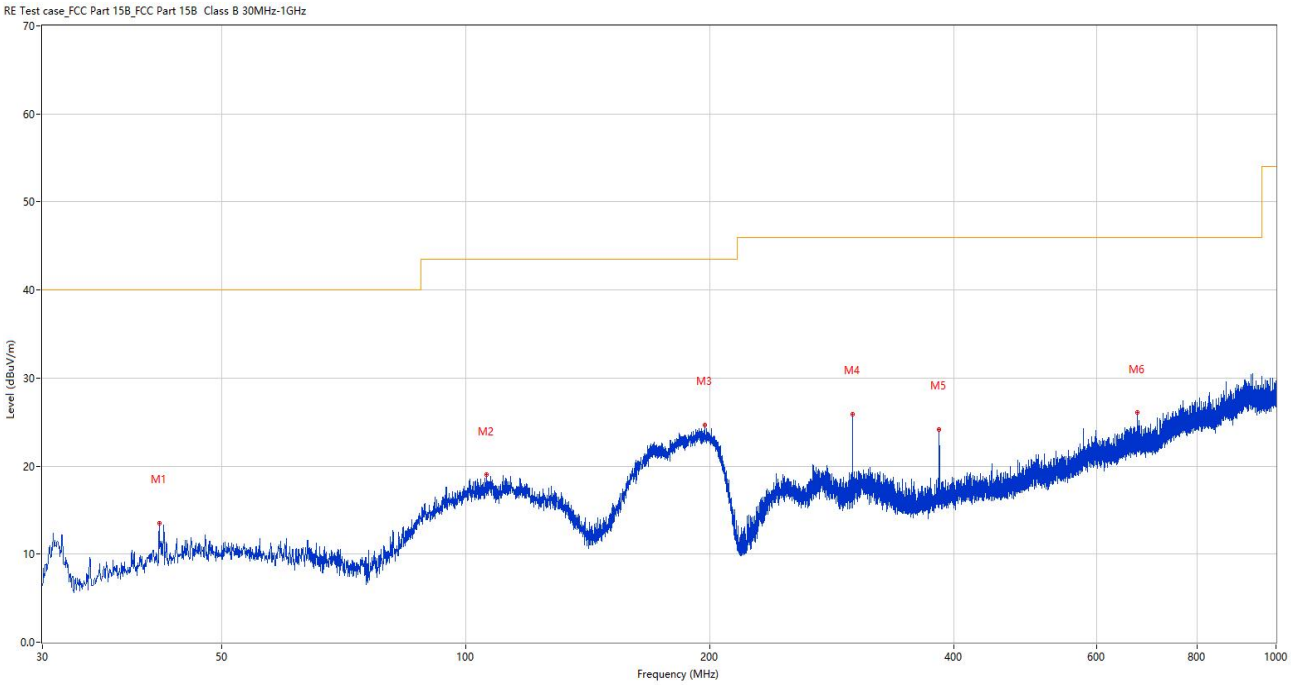
Test Mode 1

A.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	65.890	23.94	-28.23	40.0	16.06	Peak	113.00	100	Vertical	Pass
2	87.230	18.51	-29.96	40.0	21.49	Peak	97.00	100	Vertical	Pass
3	129.861	20.61	-29.83	43.5	22.89	Peak	87.00	100	Vertical	Pass
4	198.004	28.09	-26.38	43.5	15.41	Peak	185.00	100	Vertical	Pass
5	300.242	19.90	-23.74	46.0	26.10	Peak	213.00	200	Vertical	Pass
6	699.882	25.61	-14.50	46.0	20.39	Peak	92.00	100	Vertical	Pass

A.1.2 Test Antenna Horizontal, 30 MHz – 1 GHz



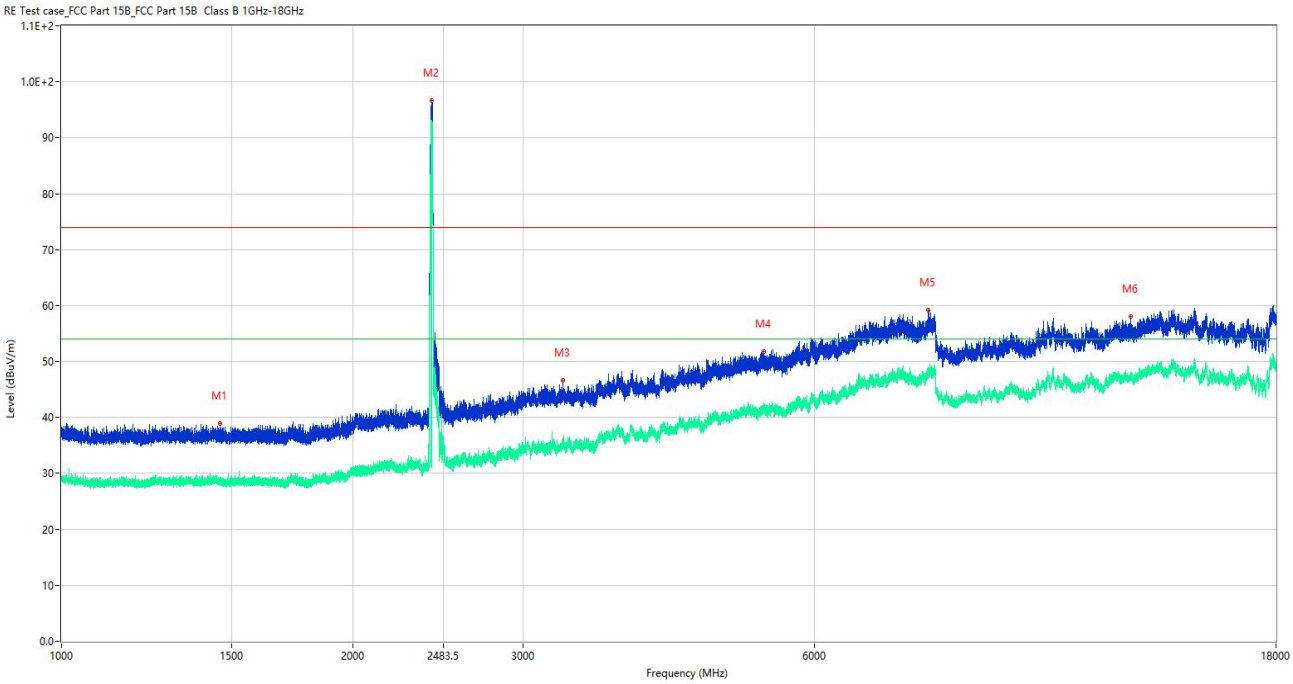
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	41.834	13.51	-26.66	40.0	26.49	Peak	21.00	100	Horizontal	Pass
2	106.145	18.99	-26.95	43.5	24.51	Peak	185.00	200	Horizontal	Pass
3	197.228	24.66	-26.37	43.5	18.84	Peak	293.00	200	Horizontal	Pass
4	300.339	25.88	-23.74	46.0	20.12	Peak	212.00	100	Horizontal	Pass
5	384.002	24.14	-21.50	46.0	21.86	Peak	308.00	100	Horizontal	Pass
6	674.614	26.05	-14.41	46.0	19.95	Peak	257.00	200	Horizontal	Pass

Equipment Information						
Equipment Name	Manufacturer	Model	Equipment No.	Cal. Date	Cal. Due	Use
EMI Receiver	KEYSIGHT	N9038A	BH-EMC-L127	2024.02.22	2025.02.21	☒
Test Antenna-Bi-Log	SCHWARZBECK	VULB 9163	BH-EMC-L132	2024.03.11	2027.03.10	☒
Anechoic Chamber	YiHeng	9m*6m*6m	BH-EMC-L001	2024.04.18	2027.04.17	☒
Description	Manufacturer	Name	Version	/		Use
Test Software	BALUN	BL410-E	V21.919	/		☒

Sample No.	SC-SH2520006-S03	Temperature	21.2°C
Humidity	41%RH	Test Voltage	AC 120V/60Hz
Test Engineer	Hao Longda	Test Date	2025.02.17

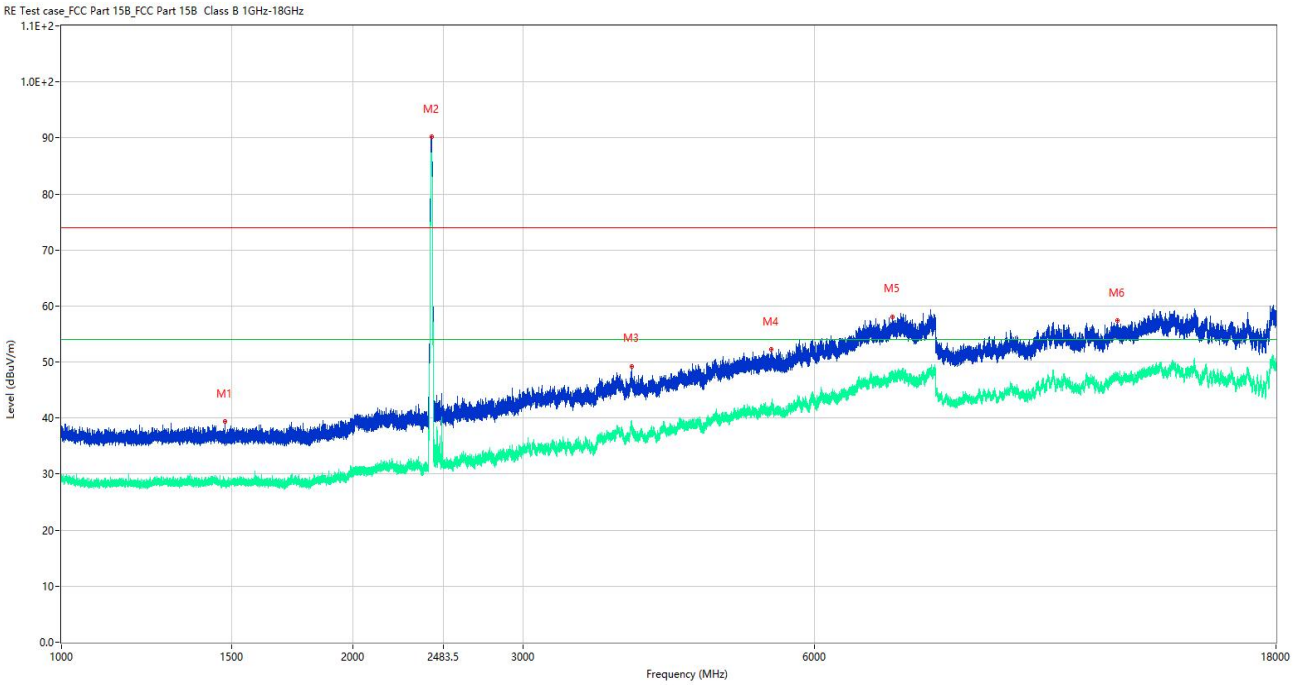
Test Mode 1

A.1.3 Test Antenna Vertical, 1 GHz – 18 GHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1457.400	38.94	-16.18	74.0	35.06	Peak	49.00	100	Vertical	Pass
1**	1457.400	28.29	-16.18	54.0	25.71	AV	49.00	100	Vertical	Pass
2	2415.400	96.61	-11.81	74.0	-22.61	Peak	109.00	100	Vertical	N/A
2**	2415.400	92.78	-11.81	54.0	-38.78	AV	109.00	100	Vertical	N/A
3	3301.000	46.58	-6.33	74.0	27.42	Peak	113.00	100	Vertical	Pass
3**	3301.000	35.35	-6.33	54.0	18.65	AV	113.00	100	Vertical	Pass
4	5322.500	51.72	-0.06	74.0	22.28	Peak	132.00	100	Vertical	Pass
4**	5322.500	41.59	-0.06	54.0	12.41	AV	132.00	100	Vertical	Pass
5	7860.250	59.17	6.48	74.0	14.83	Peak	338.00	100	Vertical	Pass
5**	7860.250	47.86	6.48	54.0	6.14	AV	338.00	100	Vertical	Pass
6	12747.500	58.05	5.91	74.0	15.95	Peak	161.00	100	Vertical	Pass
6**	12747.500	47.47	5.91	54.0	6.53	AV	161.00	100	Vertical	Pass

A.1.4 Test Antenna Horizontal, 1 GHz – 18 GHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1475.300	39.45	-16.21	74.0	34.55	Peak	88.00	100	Horizontal	Pass
1**	1475.300	28.15	-16.21	54.0	25.85	AV	88.00	100	Horizontal	Pass
2	2413.200	90.19	-11.88	74.0	-16.19	Peak	167.00	100	Horizontal	N/A
2**	2413.200	87.29	-11.88	54.0	-33.29	AV	167.00	100	Horizontal	N/A
3	3886.500	49.29	-2.92	74.0	24.71	Peak	0.00	100	Horizontal	Pass
3**	3886.500	37.77	-2.92	54.0	16.23	AV	0.00	100	Horizontal	Pass
4	5416.250	52.19	0.00	74.0	21.81	Peak	126.00	100	Horizontal	Pass
4**	5416.250	40.92	0.00	54.0	13.08	AV	126.00	100	Horizontal	Pass
5	7220.500	57.98	6.25	74.0	16.02	Peak	0.00	100	Horizontal	Pass
5**	7220.500	47.21	6.25	54.0	6.79	AV	0.00	100	Horizontal	Pass
6	12342.500	57.40	5.49	74.0	16.60	Peak	248.00	100	Horizontal	Pass
6**	12342.500	47.21	5.49	54.0	6.79	AV	248.00	100	Horizontal	Pass

Equipment Information						
Equipment Name	Manufacturer	Model	Equipment No.	Cal. Date	Cal. Due	Use
EMI Receiver	KEYSIGHT	N9038A	BH-EMC-L127	2024.02.22	2025.02.21	☒
EMI Receiver	KEYSIGHT	N9010B	BH-EMC-L099	2024.02.22	2025.02.21	☒
Test Antenna-Horn	SCHWARZBECK	BBHA 9120D	BH-EMC-L111	2024.03.11	2027.03.10	☒
Test Antenna-Horn	A-INFO	LB-180400-KF	BH-EMC-L061	2024.03.11	2027.03.10	☒
Anechoic Chamber	YiHeng	9m*6m*6m	BH-EMC-L001	2024.04.18	2027.04.17	☒
Description	Manufacturer	Name	Version	/		Use
Test Software	BALUN	BL410-E	V21.919	/		☒

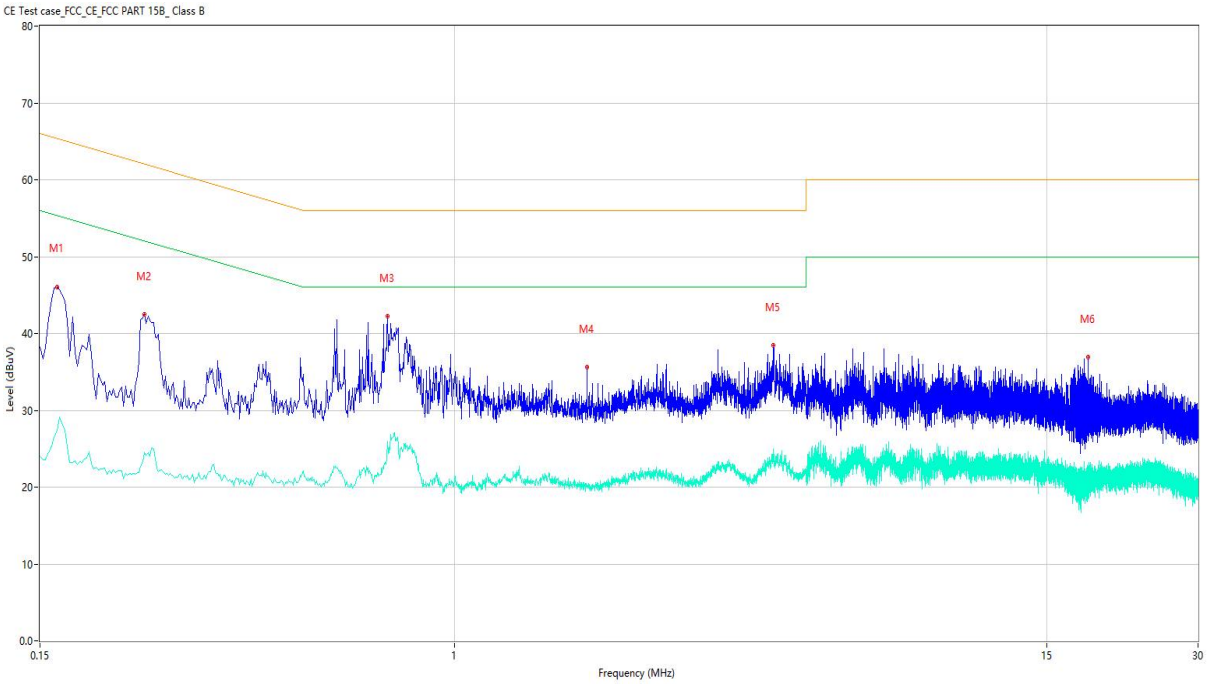
A.2 Conducted emission

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.	SC-SH2520006-S03	Temperature	23.2°C
Humidity	45%RH	Test Voltage	AC 120V/60Hz
Test Engineer	Tong Yingying	Test Date	2025.02.17

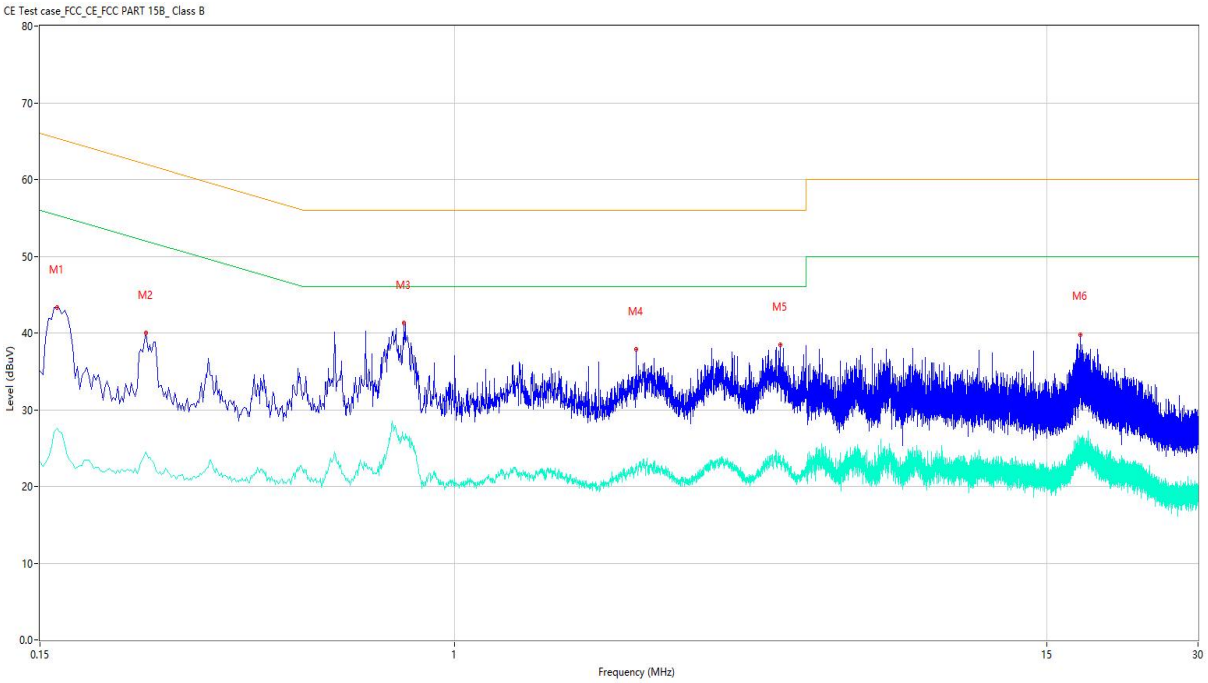
Test Mode 1

A.2.1 AC ports - L Phase



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.162	46.08	9.75	65.36	19.28	Peak	L	Pass
1**	0.162	27.29	9.75	55.36	28.07	AV	L	Pass
2	0.242	42.50	9.74	62.03	19.53	Peak	L	Pass
2**	0.242	24.47	9.74	52.03	27.56	AV	L	Pass
3	0.736	42.24	9.72	56.00	13.76	Peak	L	Pass
3**	0.736	25.88	9.72	46.00	20.12	AV	L	Pass
4	1.832	35.58	9.69	56.00	20.42	Peak	L	Pass
4**	1.832	20.14	9.69	46.00	25.86	AV	L	Pass
5	4.300	38.40	9.65	56.00	17.60	Peak	L	Pass
5**	4.300	24.98	9.65	46.00	21.02	AV	L	Pass
6	18.120	36.92	9.05	60.00	23.08	Peak	L	Pass
6**	18.120	20.42	9.05	50.00	29.58	AV	L	Pass

A.2.2 AC ports - N Phase



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.162	43.32	9.71	65.36	22.04	Peak	N	Pass
1**	0.162	27.59	9.71	55.36	27.77	AV	N	Pass
2	0.244	40.01	9.76	61.96	21.95	Peak	N	Pass
2**	0.244	24.55	9.76	51.96	27.41	AV	N	Pass
3	0.794	41.29	9.88	56.00	14.71	Peak	N	Pass
3**	0.794	26.52	9.88	46.00	19.48	AV	N	Pass
4	2.294	37.82	9.86	56.00	18.18	Peak	N	Pass
4**	2.294	22.90	9.86	46.00	23.10	AV	N	Pass
5	4.436	38.43	9.83	56.00	17.57	Peak	N	Pass
5**	4.436	23.72	9.83	46.00	22.28	AV	N	Pass
6	17.536	39.80	9.32	60.00	20.20	Peak	N	Pass
6**	17.536	26.19	9.32	50.00	23.81	AV	N	Pass

Equipment Information						
Equipment Name	Manufacturer	Model	Equipment No.	Cal. Date	Cal. Due	Use
EMI Receiver	KEYSIGHT	N9038A	TJEMC144	2024.04.06	2025.04.05	☒
LISN	SCHWARZBECK	NSLK 8127	BH-EMC-L011	2024.02.25	2025.02.24	☒
10dB Limiter	SCHWARZBECK	VTSD 9561-F	BH-EMC-L014	2024.02.19	2025.02.18	☒
Shielded Room	YiHeng	4.1m*4.0m*3.2m	BH-EMC-L006	2024.02.22	2027.02.21	☒
Description	Manufacturer	Name	Version	/		Use
Test Software	BALUN	BL410-E	V21.919	/		☒

ANNEX B TEST SETUP PHOTOS

Please refer the document “BL-SH2520085-AE.PDF”.

ANNEX C EUT EXTERNAL PHOTOS

Please refer the document “BL-SH2520085-AW.PDF”.

ANNEX D EUT INTERNAL PHOTOS

Please refer the document “BL-SH2520085-AI.PDF”.

Statement

1. The Testing Center 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. For the report with Accreditation Symbol, the items marked with "☆" are not within the accredited scope.

3. This report is invalid if it is altered, without the signature of the testing and approval personnel, or without the test report stamp.

4. The test data and results are only valid for the tested samples provided by the customer.

5. This report shall not be partially reproduced without the written permission of the Testing Center.

6. Any objection shall be raised to the Testing Center within 30 days after receiving the report.

--END OF REPORT--