

TEST REPORT

Report No.: SRTC2024-9003(R)-0068
Product Name: Industrial Cellular Router
Model Name: IR315, IR325, IR365, IR395
Applicant: Beijing InHand Networks Technology Co., Ltd.
Manufacturer: Beijing InHand Networks Technology Co., Ltd.
Specification: FCC Part15B (Certification)
(2023 edition)
ANSI C63.4-2014

The State Radio_monitoring_center Testing Center (SRTC)
15th Building, No.30 Shixing Street, Shijingshan District,
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1. General information

1.1 Notes of the test report

The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written permission of The State Radio_monitoring_center Testing Center (SRTC).

The test results relate only to individual items of the samples which have been tested.

1.2 Information about the testing laboratory

Company: The State Radio_monitoring_center Testing Center (SRTC)
Address: 15th Building, No.30 Shixing Street, Shijingshan District
Testing location: No.80, Zhaojiachang, BeizangCun, Daxing District, Beijing, China.
City: Beijing
Country or Region: China
Contacted person: Liu Jia
Tel: +86 10 57996183
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Email: liujiaf@srtc.org.cn

1.3 Applicant's details

Company: Beijing InHand Networks Technology Co., Ltd.
Address: Room 501, floor 5, building 3, yard 18, ziyue road, chaoyang district, Beijing
City: BeiJing
Country or Region: China
Contacted person: ---
Email: ---
Tel: ---

1.4 Manufacturer's details

Company: Beijing InHand Networks Technology Co., Ltd.
Address: Room 501, floor 5, building 3, yard 18, ziyue road, chaoyang district, Beijing
City: BeiJing
Country or Region: China
Contacted person: ---
Email: ---
Tel: ---

1.5 Application details

Date of reception of test sample: 29th March 2024

Date of test: 29th March 2024 to 10th April 2024

1.6 Reference specification

FCC Part 15B, 2023 (Certification)

1.7 Information of EUT

1.7.1 General information

Product Name of EUT	Industrial Cellular Router
Model name	IR315, IR325, IR365, IR395
Frequency Range	WiFi: 2.4~2.4835GHz
Power Supply	---
Nominal Voltage	12V
Extreme Temperature	Lowest: -20°C Highest: +70°C
Extreme Voltage	Minimum: 9V Maximum: 36V
HW Version	V1.1
SW Version	V1.0

1.7.2 EUT details

No.	Product Name	Model name	SN
EUT1	Industrial Cellular Router	IR315, IR325, IR365, IR395	---

Note: Beijing InHand Networks Technology Co., Ltd. declared that the four models are the same in these: appearance, PCB layout and basic software function; The only difference is that the products are used in different markets.

1.7.3 Auxiliary equipment details

AE (Auxiliary Equipment) 1#: AC Adaptor

Manufacturer	SHENZHEN KUANTEN LIMITED
Model Number	KT12W120100US
Input Voltage	100-240VAC
Output Voltage	12V-1.0A

2. Test information

2.1 Summary of the test results

No.	Test case	FCC reference	Verdict
1	Conducted emissions	15.107	Pass
2	Radiated emissions	15.109	Pass

Approved By: Mr.LiuWei Director of the test department 	Checked By: Mr.Guoyu Vice director of the test department 
Tested By: Mr. Lv Youyou 	Issued date: 2024.4.29

2.2 Test result

2.2.1 Conducted Emissions-FCC Part15.107

Ambient condition:

Temperature	Relative humidity	Pressure
24.7°C	39.9%	100.7kPa

Test Setup with charger:

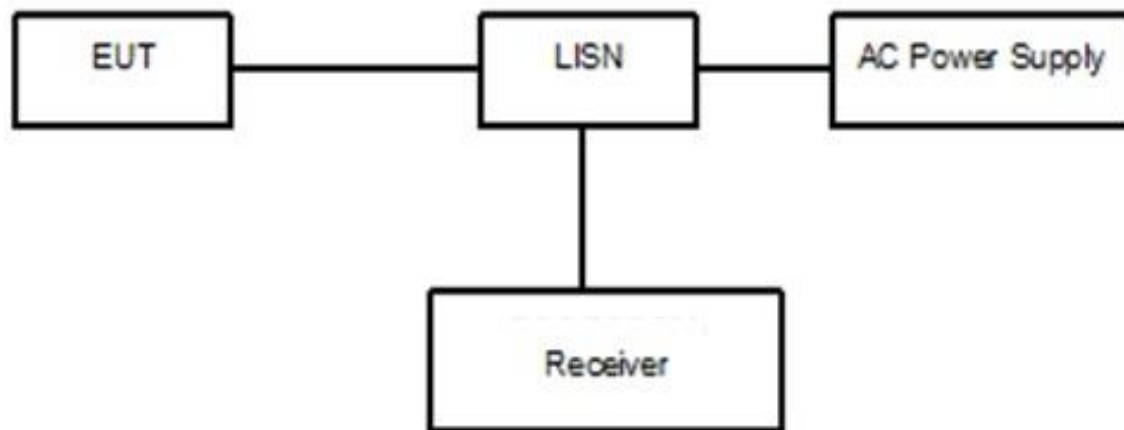


Figure 1

Test Procedure:

The EUT is placed on a non-metallic table 0.8m above the horizontal metal reference ground plane. The EUT is connected with LISN via the charger. The LISN is connected to the reference ground.

The test set-up and the test methods are performed according to ANSI C63.4:2014.

After EUT is powered on, the WLAN、WWAN function should work in standby mode and the charger is charging. Then start the test software EMC32. Sweep the whole frequency band through the range from 150 KHz to 30 MHz with RBW 9kHz, VBW 30kHz. The measurement should be done for both L line and N line. During pre-test, the receiver uses both peak detector and average detector. And the final test, the receiver uses both average detector and Quasi-peak detector.

The data of cable loss has been calibrated in full testing frequency range before the testing.

A “reference path loss” Corr.(dB) is established and the $L_{\text{cable}} + \text{ATT} + \text{VDF}$ is the attenuation of “reference path loss”, and including the cable loss, the attenuation of the attenuator, the voltage division factor of AMN.

The measurement results are obtained as described below:

$$P_{\text{result}} = P_{\text{mea}} + \text{Corr.}(\text{dB})$$

$$A = C + D$$

$$B = C + E$$

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Line	Corr. (dB)	P _{mea} QuasiPeak (dBμV)	P _{mea} Average (dBμV)
---	A	B	---	---	---	C	D	E

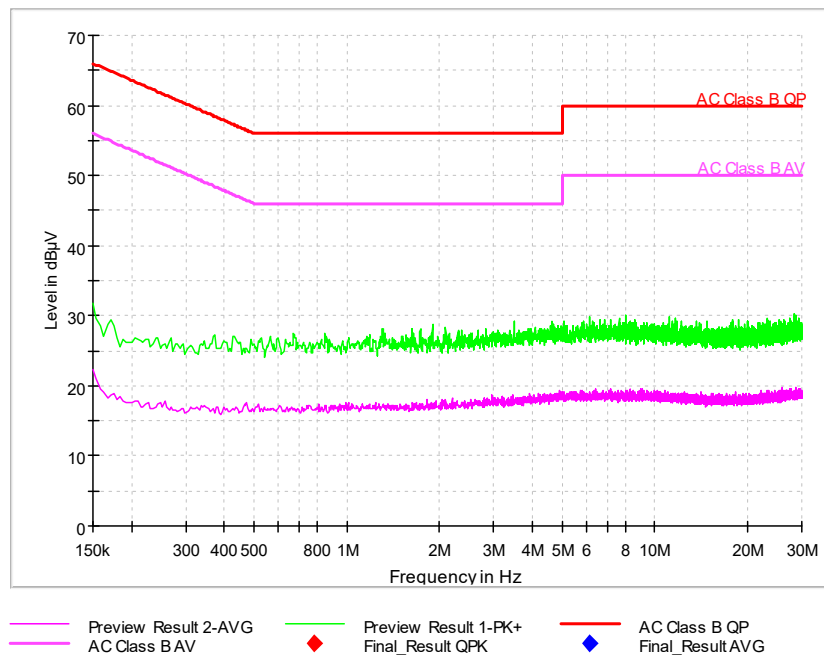
Limit:

Frequency of Emission(MHz)	Limits(dBμV)	
	Quasi-peak	Average
0.15~0.5	66 to 56*	56 to 46*
0.5~5	56	46
5~30	60	50

Note: * Decreases with the logarithm of the frequency

Test result:

Noise Level of the Measuring Instrument



Pic1.Conducted emission L and N Line

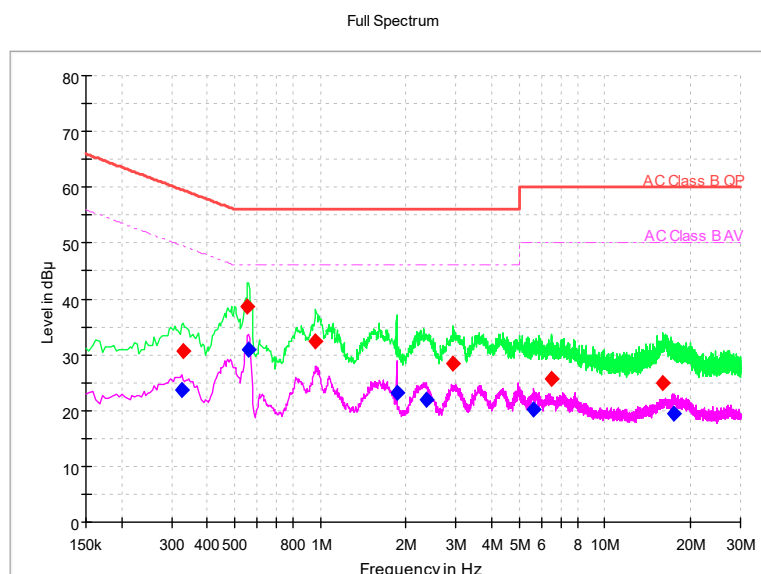
EUT1:



Pic2. Conducted emission L&N Line Voltage: 120VAC

MEASUREMENT RESULT:

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Line	Corr. (dB)	Pme a QuasiPeak (dBμV)	Pme a Average (dBμV)
0.354686	---	16.55	48.85	32.30	N	29.8	---	-13.2
0.354686	19.00	---	58.85	39.85	L1	29.8	-10.8	---
0.555107	---	21.85	46.00	24.15	N	29.8	---	-7.95
0.555107	33.85	---	56.00	22.15	L1	29.8	4.05	---
1.859979	25.93	---	56.00	30.07	L1	29.9	-3.97	---
1.859979	---	20.36	46.00	25.64	L1	29.9	---	-9.54
3.194700	---	17.54	46.00	28.46	L1	29.9	---	-12.3
4.290622	19.89	---	56.00	36.11	L1	29.9	-10.0	---
11.335221	---	18.06	50.00	31.94	N	30.0	---	-11.9
11.791500	19.98	---	60.00	40.02	L1	30.0	-10.0	---
23.970300	24.66	---	60.00	35.34	L1	30.1	-5.44	---
26.400943	---	19.14	50.00	30.86	L1	30.1	---	-10.9



Pic3. Conducted emission L&N Line Voltage: 240VAC

MEASUREMENT RESULT:

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Line	Corr. (dB)	Pme a QuasiPeak (dBμV)	Pme a Average (dBμV)
0.324836	---	23.58	49.58	26.00	N	29.8	---	-6.22
0.329100	30.69	---	59.47	28.78	L1	29.8	0.89	---
0.555107	38.69	---	56.00	17.31	L1	29.8	8.89	---
0.559372	---	30.85	46.00	15.15	L1	29.8	---	1.05
0.964479	32.35	---	56.00	23.65	L1	29.9	2.45	---
1.855714	---	23.24	46.00	22.76	L1	29.9	---	-6.66
2.367429	---	22.03	46.00	23.97	L1	29.9	---	-7.87
2.917522	28.38	---	56.00	27.62	L1	29.9	-1.52	---
5.638136	---	20.26	50.00	29.74	N	30.0	---	-9.74
6.469672	25.58	---	60.00	34.42	L1	30.0	-4.42	---
15.996086	24.84	---	60.00	35.16	L1	30.1	-5.26	---
17.450207	---	19.55	50.00	30.45	N	30.1	---	-10.5

2.2.2 Radiated Emissions-FCC Part15.109

Ambient condition:

Temperature	Relative humidity	Pressure
24.7°C	39.9%	100.7kPa

Test Setup:

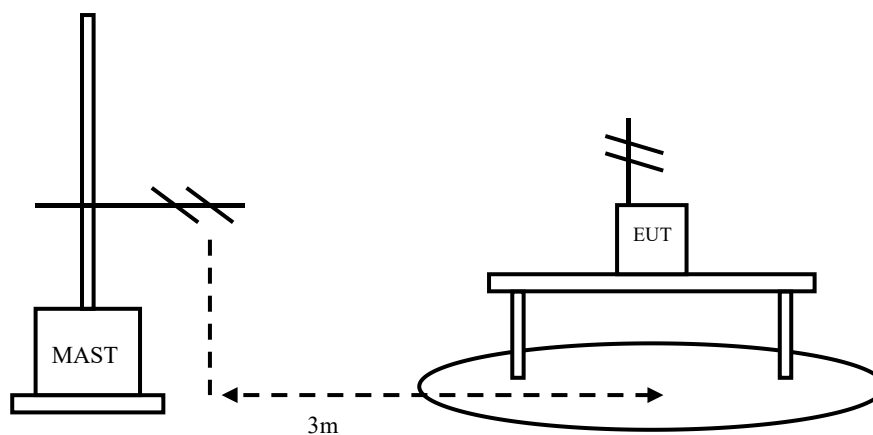


Figure 2

Test Procedure:

EUT+Charger:

The EUT should be placed on a non-metallic table 80cm above the ground plane. The receive antennas shall be moved from 1 to 4 meters. The distance between EUT and receive antenna should be 3 meters.

After EUT is powered on, the WLAN、WWAN function should work in standby mode and the charger is charging. The test set-up and the test methods are performed according to ANSI C63.4:2014.

Then start the test software EMC32. Sweep the whole frequency band through the range from 30MHz to 1GHz, using receive log period antenna VULB 9163.

During the test, the height of receive antenna shall be moved from 1 to 4 meters, and the antenna shall be performed under horizontal and vertical polarization. The turn table shall be rotated from 0 to 360 degrees for detecting the maximum of radiated spurious signal level. The measurements shall be repeated with orthogonal polarization of the test antenna. The EUT is laid in two modes as follow: 1. put the EUT in horizontal direction; 2. put the EUT in vertical direction.

The data of cable loss and antenna factor have been calibrated in full testing frequency range before the testing. All test results are performed with max hold at the horizontal and vertical polarity.

RBW=120kHz, VBW=300kHz, when the test frequency: 30MHz<f<1GHz

RBW=1MHz, VBW=3MHz, when the test frequency: $f > 1\text{GHz}$

A “reference path loss” is established and the A_{Rpl} is the attenuation of “reference path loss”, and including the gain of receive antenna, the gain of the preamplifier, the cable loss.

The measurement results are obtained as described below:

$$\text{Result} = P_{\text{mea}} + A_{Rpl}$$

Sample calculation: $(A) = (B) + (C)$.

Frequency(MHz)	Result(dBuV/m)	Limit (dBuV/m)	A_{Rpl} (dB/m)	P_{mea} (dBuV)	Polarity
---	A	---	B	C	---

Limit:

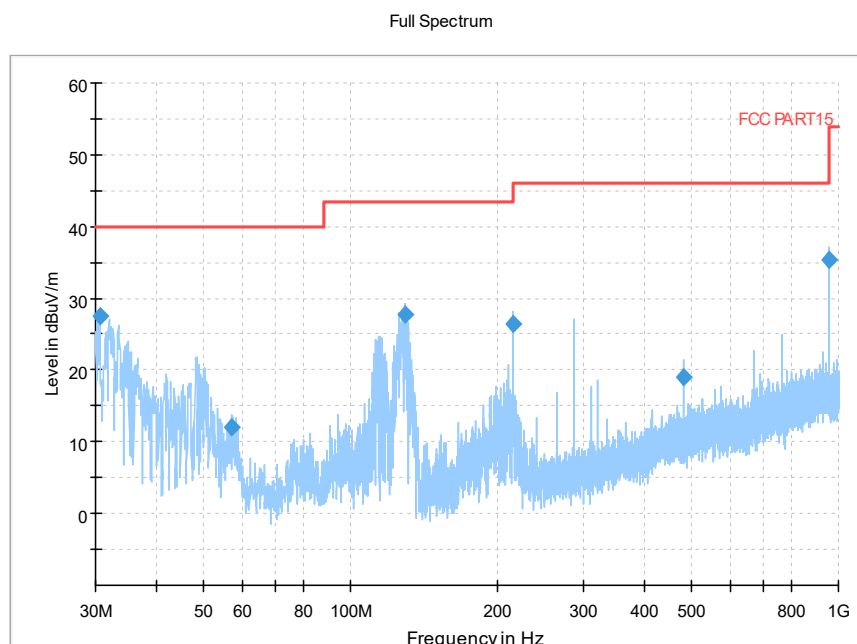
Frequency of Emission(MHz)	Limits	
	Detector	Unit (dBμV/m)
30~88	Quasi-peak	40
88~216	Quasi-peak	43.5
216~960	Quasi-peak	46
960~1000	Quasi-peak	54
1000~5th harmonic of the highest frequency or 40GHz, whichever is lower	Average Peak	54 74

Test result:

EUT 1

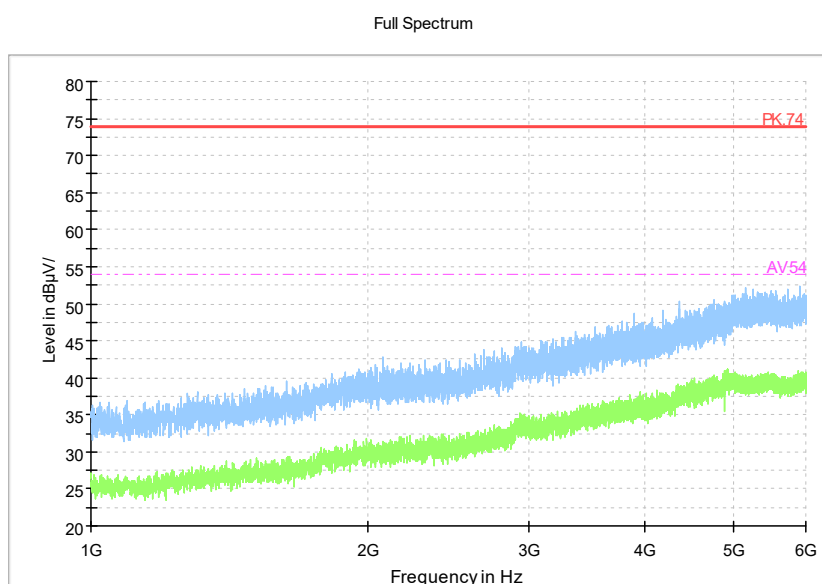
Frequency(MHz)	Result(dBuV/m)	Limit (dBuV/m)	Margin (dB)	A_{Rpl} (dB/m)	P_{mea} (dBuV)	Polarity
30.630500	27.42	40.00	12.58	-20.7	48.12	V
57.208500	11.94	40.00	28.06	-19.6	31.54	V
128.988500	27.62	43.50	15.88	-21.7	49.32	V
215.949000	26.36	43.50	17.14	-19.4	45.76	V
479.934500	18.93	46.00	27.07	-12.7	31.63	V
959.939000	35.30	46.00	10.70	-5.0	40.30	V

EUT 1:



Pic4. Radiated emission (30MHz – 1GHz)

Note: The test data in the graph includes two polarizations: horizontal and vertical

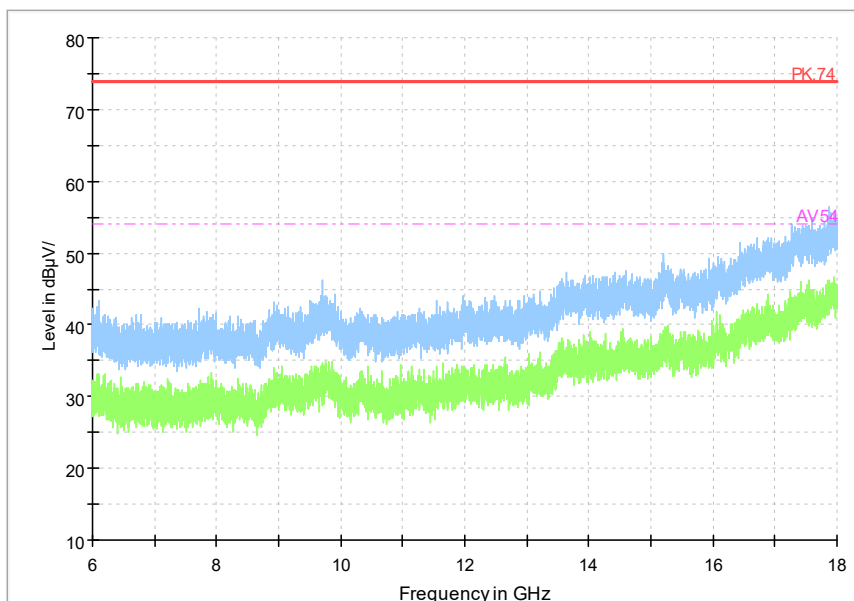


Comment

Pic5. Radiated emission (1GHz –6GHz)

Note: The test data in the graph includes two polarizations: horizontal and vertical

Full Spectrum



Pic6. Radiated emission (6GHz –18GHz)

Note: The test data in the graph includes two polarizations: horizontal and vertical

2.3. List of test equipments

No.	Name/Model	Manufacturer	S/N	Calibration Due Date	Calibration Date
1	23.18m×16.88m×9.60mS emi-AnechoicChamber	FRANKONIA	-----	2028.09.05	2023.09.05
2	ESW EMI test receiver	R&S	101574	2025.03.06	2023.03.06
3	ESR3 EMI test receiver	R&S	102361	2025.03.06	2023.03.06
4	9.080m×5.255m×3.525m Shielding room	FRANKONIA	-----	2027.03.25	2022.03.25
5	VULB 9163 Ultra log test antenna	schwarzbeck	727	2025.05.28	2023.05.28
6	HF 907 Double-Ridged Waveguide Horn Antenna	R&S	100512	2025.07.20	2023.07.20
7	SAS-574 Horn Antenna	schwarzbeck	535	2025.05.12	2023.05.12
8	ENV216 AMN	R&S	101881	2024.06.21	2023.06.21
9	EMC32EMI test software	R&S	V10	-----	-----

-----The end-----