# TEST REPORT

| | |
|---|---|
| Report No.: | PBJ-NQN2412130113EM01 |
| Product Name: | Industrial Cellular Router |
| Model Name: | IR624 Series Model: IR654, IR694 |
| Applicant: | Beijing InHand Networks Technology Co., Ltd. |
| Manufacturer: | Beijing InHand Networks Technology Co., Ltd. |
| Specification: | FCC Part 15B (Certification) (2023 edition) ANSI C63.4-2014 |
| FCC ID： | 2AANY-IR624 |

| Prepared by Simon Wang<br>Engineer / Mobile Department | Approved by Luke Lu<br>Manager / Mobile Department |
|---|---|
| Simon Wang<br>Date: Dec. 06, 2024 | Luke Lu<br>Date: Dec. 06, 2024 |

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# 1. General information

## 1.1 Notes of the test report

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

## 1.2 Information about the testing laboratory

| | |
|---|---|
| Company: | BV 7Layers Communications Technology (Shenzhen) Co., Ltd |
| Address: | Room B37, Warehouse A5, No.3 Chiwan 4th Road, Zhaoshang Street, Nanshan District Shenzhen, Guangdong, People's Republic of China |
| City: | Shenzhen |
| Country or Region: | China |
| Tel: | +86 755 8869 6566 |
| Fax: | +86 755 8869 6577 |
| Email: | customerservice.sw@bureauveritas.com |
| Designation Number: | CN1171 |
| Registration number: | 525120 |

## 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 |

## 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 |

## 1.5 Application details

Date of reception of test sample: 6th November 2024
Date of test: 11th November to March 22th November 2024

## 1.6 Reference specification

FCC Part 15B, 2023 (Certification)
ANSI C63.4-2014

# 1.7 Information of EUT

## 1.7.1 General information

| Name of EUT | Industrial Cellular Router |
|---|---|
| Model Name | IR624,IR654, IR694 |
| Frequency Range | **LTE:**<br>1920MHz ~ 1980MHz (FOR LTE Band1)<br>1850.7MHz ~ 1909.3MHz (FOR LTE Band2)<br>1710.7MHz ~ 1754.3MHz (FOR LTE Band4)<br>824.7MHz ~ 848.3MHz (FOR LTE Band5)<br>2502.5MHz ~ 2567.5MHz (FOR LTE Band7)<br>880MHz ~ 915MHz (FOR LTE Band8)<br>699.7MHz ~ 715.3MHz (FOR LTE Band12)<br>779.5MHz ~ 784.5MHz (FOR LTE Band13)<br>790.5MHz ~ 795.5MHz (FOR LTE Band14)<br>706.5MHz ~ 713.5MHz (FOR LTE Band17)<br>815 MHz – 830 MHz (FOR LTE Band18)<br>830 MHz – 845 MHz (FOR LTE Band19)<br>832 MHz – 862 MHz (FOR LTE Band20<br>1850.7MHz ~ 1914.3MHz (FOR LTE Band25)<br>814.7MHz ~ 848.3MHz (FOR LTE Band26)<br>703 MHz-748 MHz(FOR LTE Band28)<br>RX only for LTE band29&32<br>2307.5MHz ~ 2312.5MHz (FOR LTE Band30)<br>2010MHz ~ 2025MHz (FOR LTE Band34)<br>2572.5MHz ~ 2617.5MHz (FOR LTE Band38)<br>1880MHz ~ 1920MHz (FOR LTE Band39)<br>2300 MHz – 2400 MHz (FOR LTE Band40)<br>2498.5MHz ~2687.5MHz (FOR LTE Band41)<br>3452.5MHz ~3547.5MHz (FOR LTE Band42)<br>3602.5MHz ~3697.5MHz (FOR LTE Band43)<br>3552.5MHz ~3697.5MHz (FOR LTE Band48)<br>1710.7MHz ~ 1779.3MHz (FOR LTE Band66)<br>665.5MHz ~ 695.5MHz (FOR LTE Band71)<br>**5G NR：**<br>n2 (1852.5MHz ~1907.5MHz)<br>n5(826.5MHz ~ 846.5MHz)<br>n7(2502.5MHz ~ 2567.5MHz)<br>n12(701.5MHz ~ 713.5MHz)<br>n13(779.5MHz ~ 784.5MHz)<br>n14(790.5MHz ~ 795.5MHz)<br>n25(1852.5MHz ~ 1912.5MHz)<br>n26(814.7MHz ~ 848.3MHz) |

| | |
|---|---|
| | n30(2307.5MHz ~ 2312.5MHz)<br>n38(2582.52MHz ~ 2607.48MHz)<br>n41(2506.02 ~ 2679.99MHz)<br>n66(1712.5 ~ 1777.5MHz)<br>n70(1695 ~ 1671MHz)<br>n71(665.5 ~ 695.5MHz)<br>n77(Part27Q)(3460.02 ~ 3540MHz)<br>n77(Part27O)(3710.01 ~ 3969.99MHz)<br>n78(Part27Q)(3460.02 ~ 3540MHz)<br>**WiFi:**<br>2.412GHz~2.462GHz/<br>5.15GHz-5.25GHz/<br>5.725GHz-5.85GHz |
| Equipment Class | Class B |
| Power Supply | Charger |
| HW Version | V1.1 |
| SW Version | V3.0 |

### 1.7.2EUT details

| No. | Model Name | IMEI |
|---|---|---|
| EUT1 | IR624, IR654, IR694 | 866407060011921 |

### 1.7.3 Auxiliary equipment details

AE (Auxiliary Equipment) 1#: AC Adaptor

| | |
|---|---|
| Manufacturer | SHENZHEN KUANTEN LIMITED |
| Model Number | KT241120200CHL |
| Input Voltage | 100V-240V AC |
| Output Voltage | 12V /2A |

### 1.7.4 Test mode

| Mode No. | Description of test mode |
|---|---|
| Mode 1 | LTE/ WLAN receiver |

# 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 |

**Lab A:**
BV 7Layers Communications Technology (Shenzhen) Co. Ltd
**Lab Address:**
Room B37, Warehouse A5, No.3 Chiwan 4th Road, Zhaoshang Street, Nanshan District Shenzhen, Guangdong, People's Republic of China
**Accredited Test Lab Cert 3939.01**

The FCC Site Registration No. is 525120; The Designation No. is CN1171.

## 2.2 Test result

### 2.2.1Conducted Emissions-FCC Part15.107

Ambient condition:

| Temperature | Relative humidity | Pressure |
|---|---|---|
| 21.1°C | 42.1% | 100.8kPa |

Test Setup with charger:

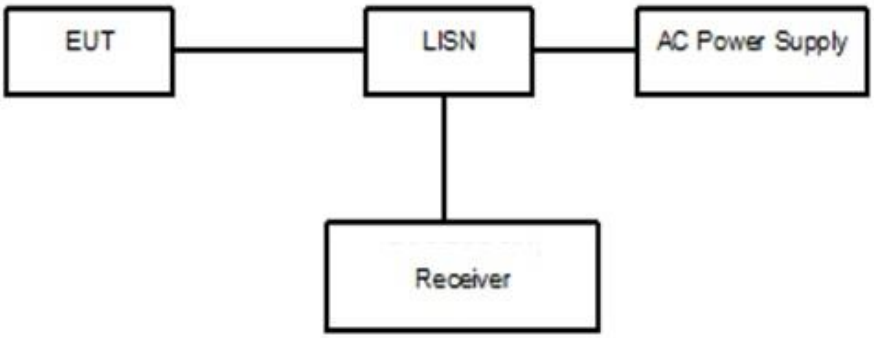



Figure 1

Test Procedure:

The EUT is placed on a non-matellic 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 accessories of the EUT are connected with the EUT such as headset etc.Open the following functions of EUT: GPS, Camera and video.
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 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 $L_{cable}$+ATT+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:
$P_{result}=P_{mea}$+ Corr.(dB)

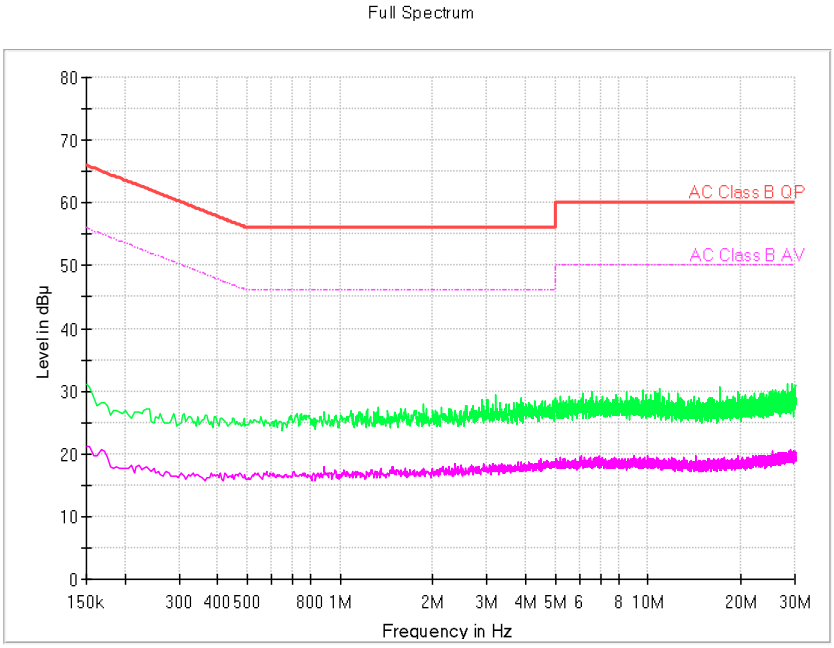
Sample calculation: (42.56 dBμV) = (12.96 dBμV) + (29.6 dB), the corresponding frequency is 0.15MHz.

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 |

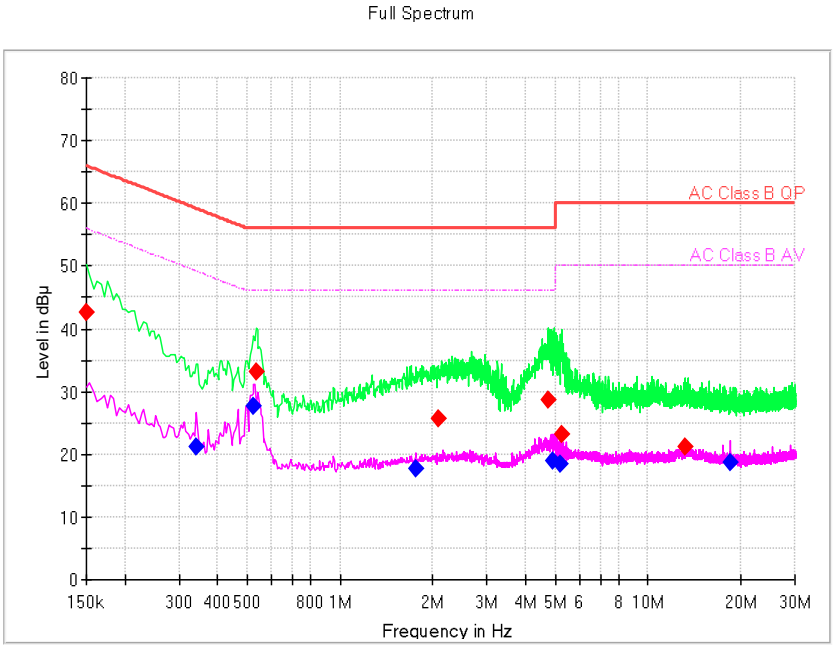
Note: * Decreases with the logarithm of the frequency

Test result:
Noise Level of the Measuring Instrument




Pic1.Conducted emission L and N Line

120V AC：
EUT +1#Charger:

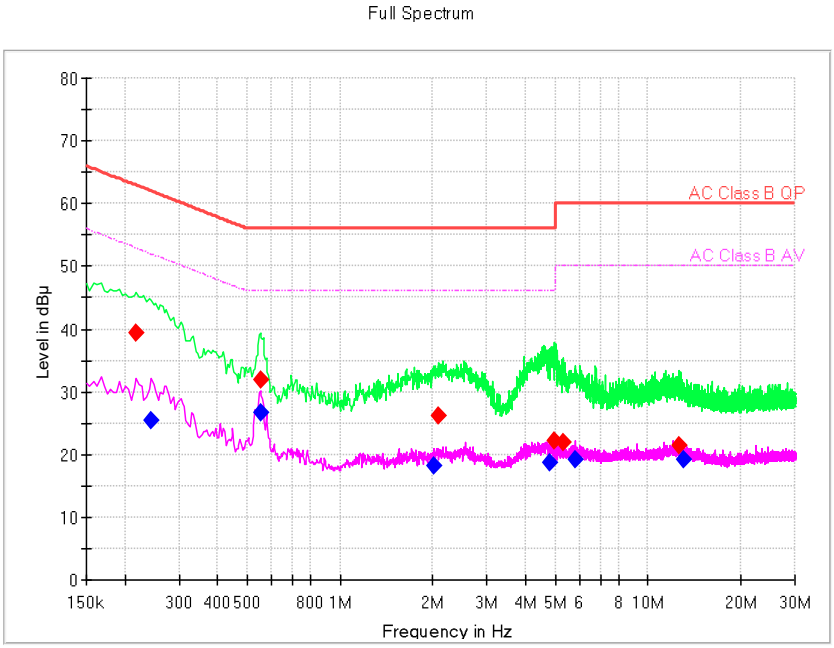



Pic2. Conducted emission L&N Line

| Frequency | QuasiPeak | Average | Limit | Margin | Line | Corr. | Pmea QuasiPeak | Pmea Average |
|---|---|---|---|---|---|---|---|---|
| (MHz) | (dBµV) | (dBµV) | (dBµV) | (dB) | | (dB) | (dBµV) | (dBµV) |
| 0.15000 | 42.56 | --- | 66.00 | 23.44 | N | 29.60 | 12.96 | --- |
| 0.34189 | --- | 21.28 | 49.16 | 27.88 | N | 29.60 | --- | -8.32 |
| 0.52526 | --- | 27.66 | 46.00 | 18.34 | L1 | 29.60 | --- | -1.94 |
| 0.53379 | 33.10 | --- | 56.00 | 22.90 | N | 29.60 | 3.50 | --- |
| 1.75764 | --- | 17.69 | 46.00 | 28.31 | L1 | 29.60 | --- | -11.91 |
| 2.07746 | 25.60 | --- | 56.00 | 30.40 | L1 | 29.60 | -4.00 | --- |
| 4.75969 | 28.61 | --- | 56.00 | 27.39 | N | 29.60 | -0.99 | --- |
| 4.89615 | --- | 19.00 | 46.00 | 27.00 | L1 | 29.70 | --- | -10.70 |
| 5.20318 | --- | 18.46 | 50.00 | 31.54 | L1 | 29.70 | --- | -11.24 |
| 5.24156 | 23.07 | --- | 60.00 | 36.93 | L1 | 29.70 | -6.63 | --- |
| 13.19019 | 21.06 | --- | 60.00 | 38.94 | N | 29.90 | -8.84 | --- |
| 18.52054 | --- | 18.61 | 50.00 | 31.39 | L1 | 30.20 | --- | -11.59 |

240V AC：

EUT +1#Charger:




Pic3. Conducted emission L&N Line

| Frequency | QuasiPeak | Average | Limit | Margin | Line | Corr. | Pmea QuasiPeak | Pmea Average |
|---|---|---|---|---|---|---|---|---|
| (MHz) | (dBµV) | (dBµV) | (dBµV) | (dB) | | (dB) | (dBµV) | (dBµV) |
| 0.21823 | 39.44 | --- | 62.89 | 23.45 | L1 | 29.60 | 9.84 | --- |
| 0.24381 | --- | 25.35 | 51.97 | 26.62 | N | 29.60 | --- | -4.25 |
| 0.55084 | --- | 26.79 | 46.00 | 19.21 | L1 | 29.60 | --- | -2.81 |
| 0.55084 | 31.83 | --- | 56.00 | 24.17 | N | 29.60 | 2.23 | --- |
| 2.01349 | --- | 18.10 | 46.00 | 27.90 | L1 | 29.60 | --- | -11.50 |
| 2.09451 | 26.13 | --- | 56.00 | 29.87 | N | 29.60 | -3.47 | --- |
| 4.79381 | --- | 18.62 | 46.00 | 27.38 | N | 29.60 | --- | -10.98 |
| 4.95159 | 22.22 | --- | 56.00 | 33.78 | L1 | 29.70 | -7.48 | --- |
| 5.30552 | 21.86 | --- | 60.00 | 38.14 | N | 29.70 | -7.84 | --- |
| 5.80018 | --- | 19.12 | 50.00 | 30.88 | L1 | 29.70 | --- | -10.58 |
| 12.55481 | 21.34 | --- | 60.00 | 38.66 | L1 | 29.90 | -8.56 | --- |
| 12.99403 | --- | 19.27 | 50.00 | 30.73 | N | 29.90 | --- | -10.63 |

## 2.2.2RadiatedEmissions-FCC Part15.109

Ambient condition:

| Temperature | Relative humidity | Pressure |
|---|---|---|
| 21.1°C | 42.1% | 100.8kPa |

Test Setup:

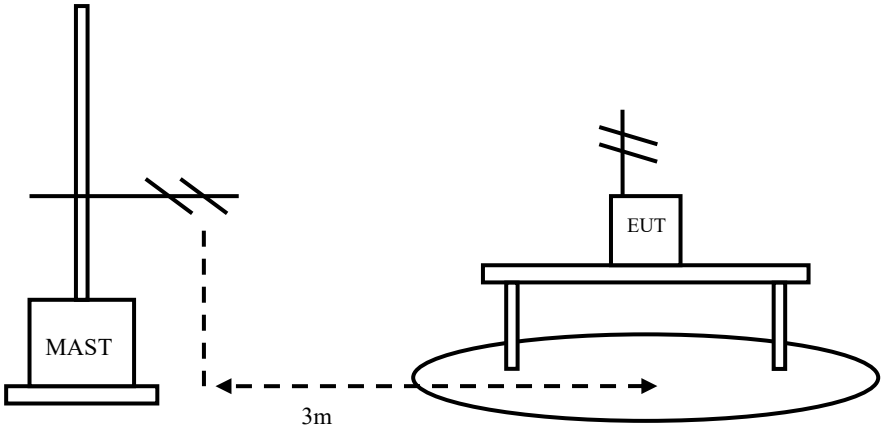



Figure 2

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.
The EUT should work in idle mode. The accessories of the EUT are connected with the EUT such as headset etc.Open the following functions of EUT: GPS, Camera and video. 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 to4 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>1GHz
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:
Result= $P_{mea} + A_{Rpl}$
Limit:

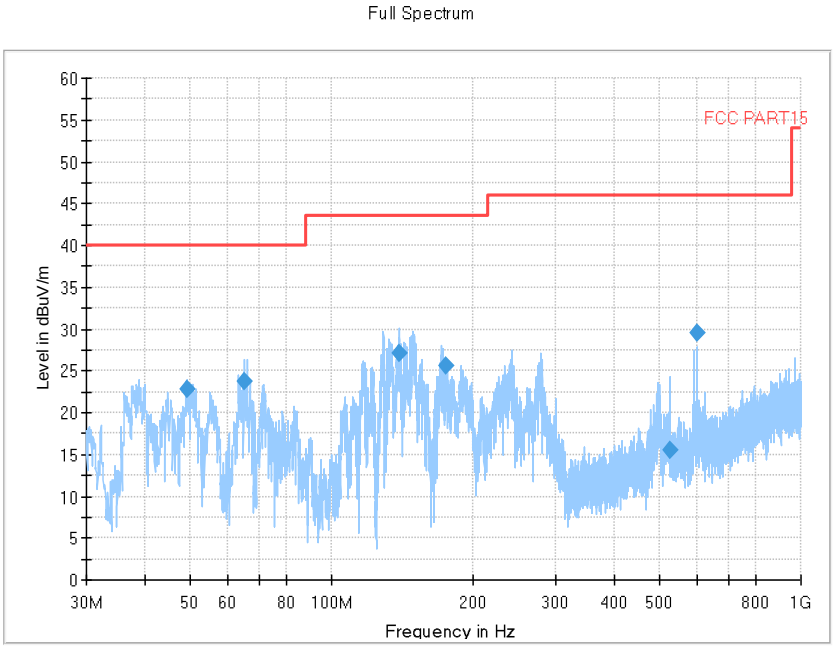
| Frequency of Emission(MHz) | Limits | |
|---|---|---|
| | Detector | Unit (dBμV/m) |
| 30～88 | Quasi-peak | 40 |
| 88～216 | Quasi-peak | 43.5 |
| 216～960 | Quasi-peak | 46 |
| 960～1000 | Quasi-peak | 54 |
| 1000～5th harmonic of the highest frequency or 40GHz, whichever is lower | Average<br>Peak |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

Test result:
Sample calculation: (22.78dB μ V/m) = (37.98dB μ V/m) + (-15.2dB), the corresponding frequency is 49.1575MHz.

EUT +1#Charger:

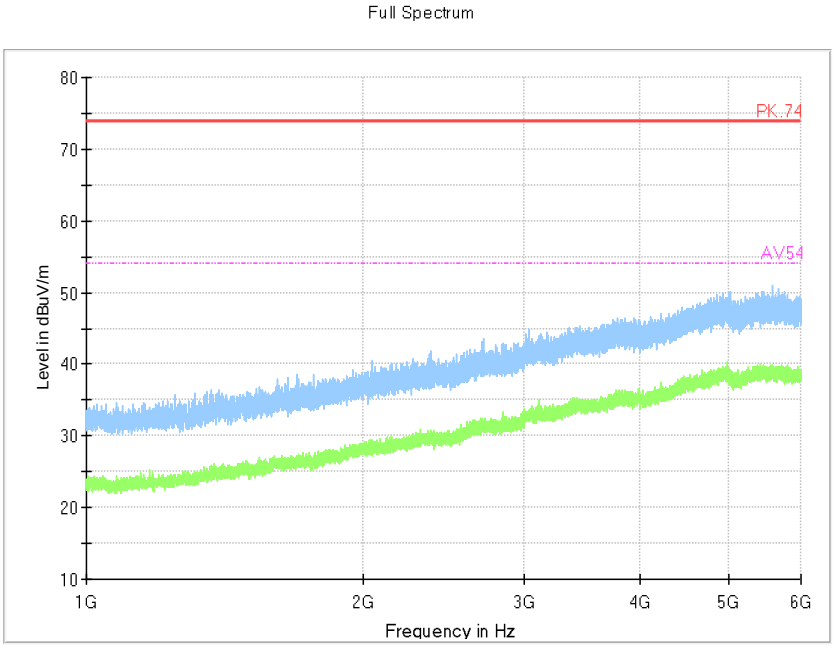
| Frequency(MHz) | Result( dB μ V/m ) | Limit (dB μ V/m) | ARpl (dB) | Pmea ( dB μ V/m ) | Polarity |
|---|---|---|---|---|---|
| 49.1575 | 22.78 | 40.0 | -15.2 | 37.98 | V |
| 65.114 | 23.75 | 40.0 | -17.3 | 41.05 | V |
| 138.931 | 27.19 | 43.5 | -20.0 | 47.19 | V |
| 174.579 | 25.54 | 43.5 | -19.0 | 44.54 | V |
| 525.913 | 15.48 | 46.0 | -7.8 | 23.28 | V |
| 600.021 | 29.50 | 46.0 | -5.5 | 35.00 | V |

EUT +1#Charger: refer to Pic4,Pic5, Pic6, Pic7



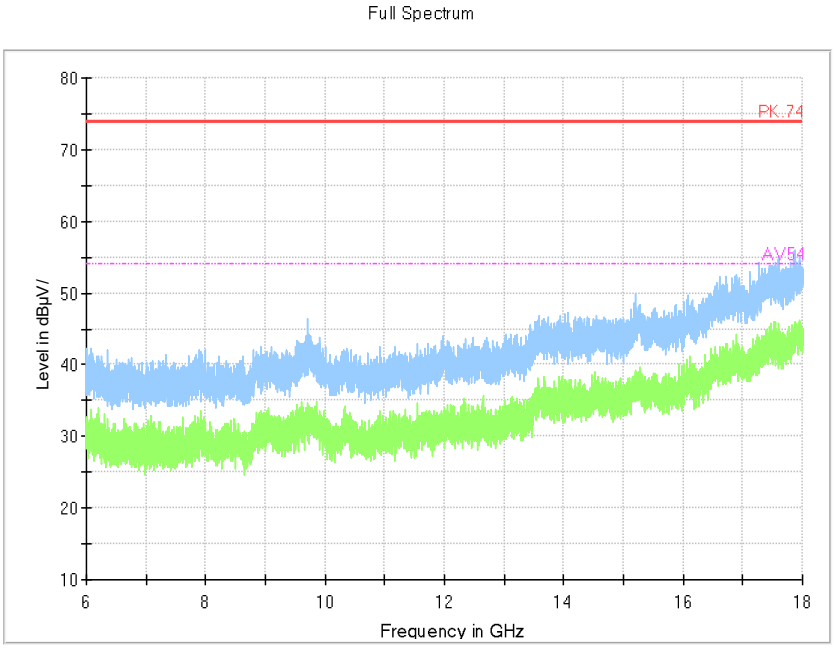

Pic4. Radiated emission(30MHz – 1GHz)

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



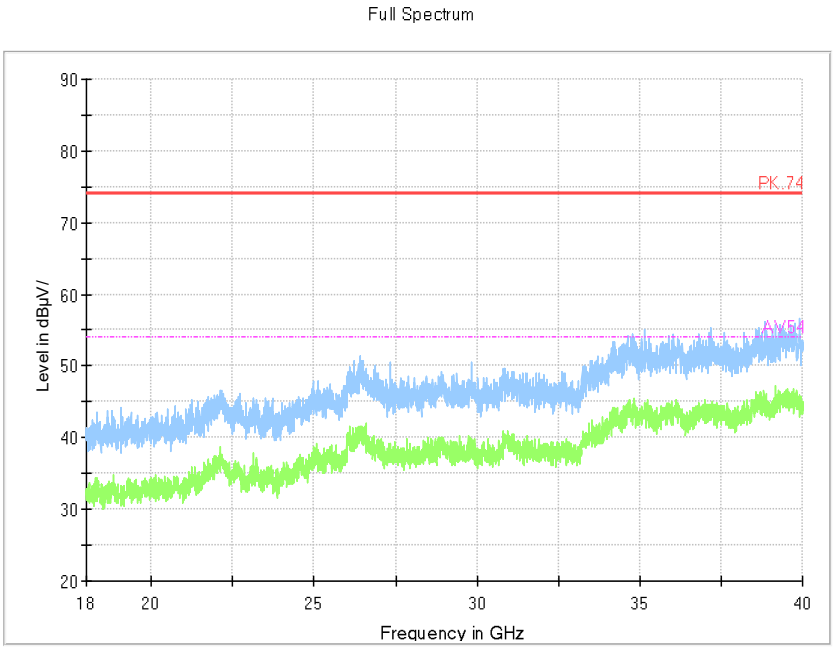

Pic5. Radiated emission (1GHz –6GHz)

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




Pic6. Radiated emission (6GHz –18GHz)

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




Pic7. Radiated emission (18GHz –40GHz)

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×9.60mSemi-AnechoicChamber | FRANKONIA | ----- | 2028.09.05 | 2023.09.05 |
| 2 | ESW EMI test receiver | R&S | 101574 | 2025.03.06 | 2024.03.06 |
| 3 | ESR3 EMI test receiver | R&S | 102361 | 2025.03.06 | 2024.03.06 |
| 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 | 2025.06.21 | 2024.06.21 |
| 9 | EMC32EMI test software | R&S | V10 | ----- | ----- |

----------The End----------