



FCC PART 15B TEST REPORT

No. 24T04Z102024-019

for

HMD Global Oy

Product Type: Locator

Model Name: TA-1698

FCC ID: 2AJOTTA-1698

with

Hardware Version: V0.21

Software Version: TA1698.GLO_001

Issued Date: 2024-11-11

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of CTTL.

Test Laboratory:

CTTL-Telecommunication Technology Labs, CAICT

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REPORT HISTORY

| Report Number | Revision | Description | Issue Date |
|----------------------|-----------------|-------------------------|-------------------|
| 24T04Z102024-019 | Rev.0 | 1 st edition | 2024-11-11 |
| | | | |

Note: the latest revision of the test report supersedes all previous version.



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1. Test Laboratory

1.1. Testing Location

CTTL (huayuan North Road)

Address: No. 52, Huayuan North Road, Haidian District, Beijing,
P. R. China 100191

1.2. Testing Environment

Normal Temperature: 15-35°C

Relative Humidity: 20-75%

1.3. Project data

Testing Start Date: 2024-10-15

Testing End Date: 2024-10-29

1.4. Signature




An Hui

(Prepared this test report)



Zhang Ying

(Reviewed this test report)



Zhang Xia

(Approved this test report)



2. Client Information

2.1. Applicant Information

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3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

| | |
|-------------|--------------|
| Description | Locator |
| Model Name | TA-1698 |
| FCC ID: | 2AJOTTA-1698 |

Note: Components list, please refer to documents of the manufacturer; it is also included in the original test record of CTTL, Telecommunication Technology Labs, CAICT.

3.2. Internal Identification of EUT used during the test

| EUT ID* | SN or IMEI | HW Version | SW Version |
|----------------|-------------------|-------------------|-------------------|
| EUT1 | TA1698000000199 | V0.21 | TA1698.GLO_001 |

*EUT ID: is used to identify the test sample in the lab internally.

3.3. Internal Identification of AE used during the test

| AE ID* | Description | Model | Manufacturer |
|---------------|--------------------|--------------|--------------------------------------|
| AE1 | Battery | Horizon008 | SHENZHEN UTILITY ENERGY CO., LTD. |
| AE2 | Cable | 800040 | CHANGZHOU DOWELL ELECTRONICS CO.,LTD |
| AE3 | Charger | / | Not in box |

*AE ID: is used to identify the test sample in the lab internally.

3.4. EUT set-ups

| EUT set-up No. | Combination of EUT and AE | Remarks |
|-----------------------|----------------------------------|----------------|
| Set.1 | EUT1+ AE1 + AE2 + AE3 | Charge |

Note:

Equipment Under Test (EUT) is a model of Locator.
The EUT supports BLE and NB-IoT.

4. Reference Documents

4.1. Reference Documents for testing

The following documents listed in this section are referred for testing.

| Reference | Title | Version |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| FCC Part 15, Subpart B | Radio frequency devices - Unintentional Radiators | 2023 |
| ANSI C63.4 | 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 | 2014 |

Note: The test methods have no deviation with standards.



5. SUMMARY OF TEST RESULTS

| Abbreviations used in this clause: | | |
|------------------------------------|----|----------------|
| Verdict Column | P | Pass |
| | NA | Not applicable |
| | F | Fail |

| Items | Test Name | Clause in FCC rules | Section in this report | Verdict | Test Location |
|-------|--------------------|---------------------|------------------------|---------|--------------------------|
| 1 | Radiated Emission | 15.109(a) | B.1 | P | CTTL(huayuan North Road) |
| 2 | Conducted Emission | 15.107(a) | B.2 | P | CTTL(huayuan North Road) |

6. Test Equipments Utilized

| NO. | Description | TYPE | SERIES NUMBER | MANUFACTURE | CAL DUE DATE | CALIBRATION INTERVAL |
|-----|--------------------------------------|----------|---------------|-------------|--------------|----------------------|
| 1 | LISN | ENV216 | 101200 | R&S | 2025-06-16 | 1 year |
| 2 | Test Receiver | ESCI | 100344 | R&S | 2025-05-01 | 1 year |
| 3 | Test Receiver | ESW44 | 103023 | R&S | 2025-07-06 | 1 year |
| 4 | EMI Antenna | VULB9163 | 01222 | R&S | 2025-08-30 | 1 year |
| 5 | EMI Antenna | 3115 | 00167250 | R&S | 2025-05-11 | 1 year |
| 6 | Universal Radio Communication Tester | CMW500 | 168471 | R&S | 2024-11-01 | 1 Year |

| Test software information | | |
|---------------------------|----------|-----------|
| Test Item | Software | Version |
| Radiated Emission | EMC32 | V11.50.00 |
| Conducted Emission | EMC32 | V8.53.0 |

Semi-anechoic chamber utilized did not exceed following limits along the testing:

| | |
|-------------------------------------------------|-------------------------------------------------|
| Temperature | Min. = 15 °C, Max. = 35 °C |
| Relative humidity | Min. = 15 %, Max. = 75 % |
| Shielding effectiveness | 0.014MHz-1MHz, >60dB; 1MHz - 1000MHz, >90dB. |
| Electrical insulation | > 2 MΩ |
| Ground system resistance | < 4 Ω |
| Normalised site attenuation (NSA) | < ±4 dB, 10 m distance |
| Site voltage standing-wave ratio (S_{VSWR}) | Between 0 and 6 dB, from 1GHz to 6GHz |

Shielded room utilized did not exceed following limits along the testing:

| | |
|--------------------------|-------------------------------------------------|
| Temperature | Min. = 15 °C, Max. = 35 °C |
| Relative humidity | Min. = 20 %, Max. = 75 % |
| Shielding effectiveness | 0.014MHz-1MHz, >60dB; 1MHz - 1000MHz, >90dB. |
| Electrical insulation | > 2 MΩ |
| Ground system resistance | < 4 Ω |

7. Measurement Uncertainty

Where relevant, the following measurement uncertainty(worse case) levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Location 1: CTTL(huayuan North Road)

| Test item | Frequency ranges | Measurement uncertainty |
|--------------------|------------------|----------------------------|
| Radiated Emission | 30MHz-1GHz | 4.72dB(k=2) |
| | 1GHz-18GHz | 4.84dB(k=2) |
| Conducted Emission | 150kHz-30MHz | AC Power Line: 3.08dB(k=2) |

ANNEX A: MEASUREMENT RESULTS

A.1 Radiated Emission

Reference

FCC: CFR Part 15.109(a).

A.1.1 Method of measurement

The field strength of radiated emissions from the unintentional radiator (USB/WPT mode of MS and charging mode of MS) at distances of 3 meters is tested. Tested in accordance with the procedures of ANSI C63.4 – 2014, section 8.3.

The EUT was placed on a non-conductive table. The measurement antenna was placed at a distance of 3/10 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

A.1.2 EUT Operating Mode

The MS is operating in the USB mode, WPT mode and charging mode. During the test MS is connected to a PC via a USB cable in the case of USB mode, and is connected to the other device for charging in OTG mode and is connected to a charger in the case of charging mode.

The EUT was tested while operating in licensed band Rx mode. All licensed band receivers that tune in the range of 30MHz-960MHz, as listed in section 3.4, are investigated. Only the worst case emissions are reported.

All equipment is placed on the test table top and arranged in a typical configuration in accordance with ANSI C63.4-2014 and manipulated to obtain worst case emissions.

The model of the PC is M4000E-17, and the serial number of the PC is M706GWXD. The software is used to let the PC keep on copying data to MS, reading and erasing the data after copy action was finished.

The EUT was tested while operating in licensed band Rx mode. All licensed band receivers that tune in the range of 30MHz-960MHz, as listed in section 3.4, are investigated. Only the worst case emissions are reported.

All equipment is placed on the test table top and arranged in a typical configuration in accordance with ANSI C63.4-2014 and manipulated to obtain worst case emissions.

A.1.3 Measurement Limit

| Frequency range (MHz) | Field strength limit ($\mu\text{V}/\text{m}$) | | |
|--------------------------|-------------------------------------------------|---------|------|
| | Quasi-peak | Average | Peak |
| 30-88 | 100 | | |
| 88-216 | 150 | | |
| 216-960 | 200 | | |
| 960-1000 | 500 | | |
| >1000 | | 500 | 5000 |

Note: the above limit is for 3 meters test distance. 10 meters' limit is got by converting.

A.1.4 Test Condition

| Frequency range (MHz) | RBW/VBW | Sweep Time (s) | Detector |
|-----------------------|-----------------------|----------------|-----------------|
| 30-1000 | 120kHz (IF Bandwidth) | 5 | Peak/Quasi-peak |
| Above 1000 | 1MHz/3MHz | 15 | Peak, Average |

A.1.5 Measurement Results

A "reference path loss" is established and the A_{Rpl} is the attenuation of "reference path loss". It includes the antenna factor of receive antenna and the path loss.

The measurement results are obtained as described below:

$$\text{Result} = P_{\text{Mea}} + A_{\text{Rpl}} = P_{\text{Mea}} + G_A + G_{\text{PL}}$$

Where

G_A : Antenna factor of receive antenna

G_{PL} : Path Loss

P_{Mea} : Measurement result on receiver.

Measurement uncertainty (worst case): $U = 4.84 \text{ dB}$, $k=2$.

Measurement results for Set.1:

Charing Mode/Average detector

| Frequency (MHz) | Measurement Result (dB μ V/m) | Cable loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dB μ V) | Limit (dB μ V/m) | Margin (dB) | Antenna Pol. (H/V) |
|-----------------|-----------------------------------|-----------------|-----------------------|-------------------------------|----------------------|-------------|--------------------|
| 2485.460 | 34.8 | -38.9 | 27.8 | 45.858 | 54.0 | 19.2 | V |
| 13750.000 | 40.6 | -30.6 | 40.6 | 30.582 | 54.0 | 13.4 | H |
| 14096.460 | 40.2 | -30.3 | 40.9 | 29.606 | 54.0 | 13.8 | H |
| 16704.940 | 42.2 | -28.1 | 40.4 | 29.860 | 54.0 | 11.8 | H |
| 17400.920 | 44.1 | -27.5 | 42.0 | 29.639 | 54.0 | 9.9 | H |
| 17941.520 | 44.9 | -27.0 | 42.3 | 29.591 | 54.0 | 9.1 | H |

Charging Mode/Peak detector

| Frequency (MHz) | Measurement Result (dB μ V/m) | Cable loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dB μ V) | Limit (dB μ V/m) | Margin (dB) | Antenna Pol. (H/V) |
|-----------------|-----------------------------------|-----------------|-----------------------|-------------------------------|----------------------|-------------|--------------------|
| 2485.800 | 44.6 | -38.9 | 27.8 | 55.7 | 74.0 | 29.4 | V |
| 13765.640 | 51.3 | -30.5 | 40.6 | 41.2 | 74.0 | 22.7 | H |
| 14605.440 | 50.7 | -29.1 | 40.1 | 39.6 | 74.0 | 23.3 | H |
| 16662.440 | 52.8 | -28.1 | 40.4 | 40.5 | 74.0 | 21.2 | H |
| 17463.820 | 54.6 | -27.7 | 42.0 | 40.3 | 74.0 | 19.4 | H |
| 17958.860 | 55.9 | -27.0 | 42.3 | 40.6 | 74.0 | 18.1 | H |

Measurement results for Set.1:

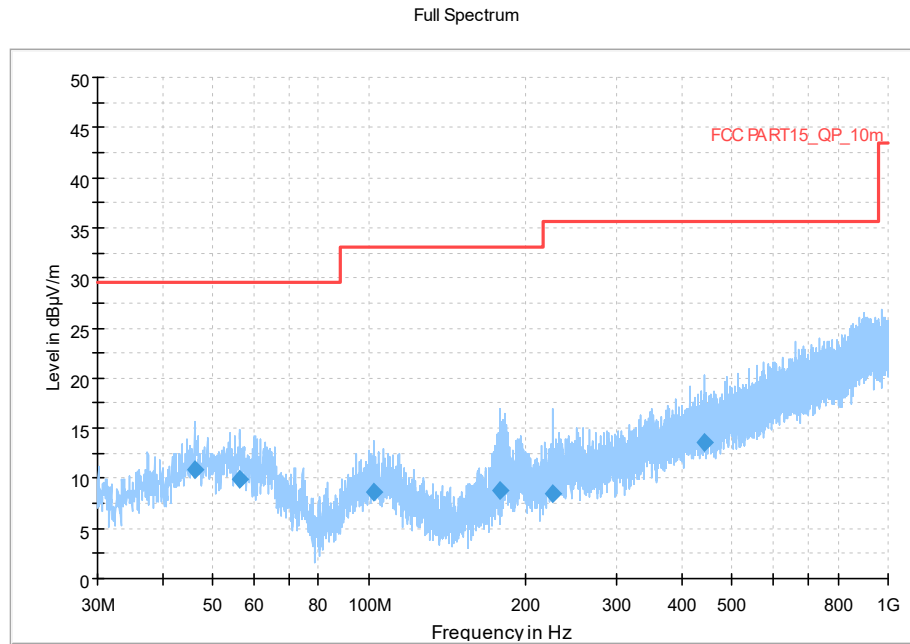


Fig A.1 Radiated Emission from 30MHz to 1GHz

Final Result 1

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) |
|-----------------|--------------------|----------------|-------------|-----------------|-------------|-----|---------------|
| 46.101900 | 10.80 | 29.54 | 18.74 | 120.000 | 208.0 | V | 135.0 |
| 56.432500 | 9.91 | 29.54 | 19.63 | 120.000 | 125.0 | V | 315.0 |
| 102.022500 | 8.68 | 33.06 | 24.38 | 120.000 | 125.0 | H | 165.0 |
| 179.380000 | 8.71 | 33.06 | 24.35 | 120.000 | 104.0 | V | 61.0 |
| 225.697500 | 8.42 | 35.56 | 27.14 | 120.000 | 101.0 | V | 225.0 |
| 443.220000 | 13.60 | 35.56 | 21.96 | 120.000 | 297.0 | V | 120.0 |

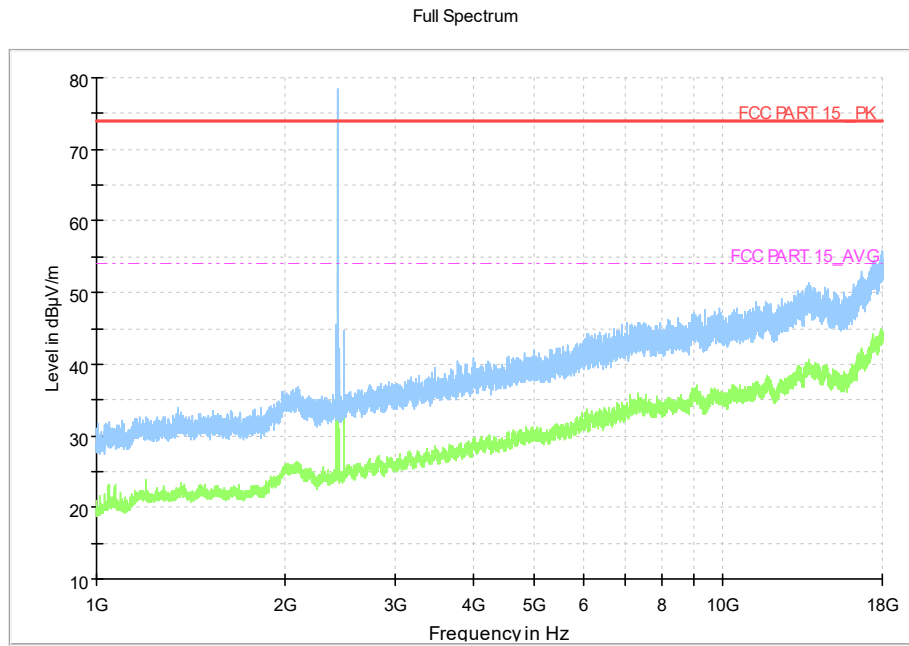


Fig A.2 Radiated Emission from 1GHz to 18GHz

Note: the spike over the limit is coming from the traffic carrier(BLE).

A.2 Conducted Emission

Reference

FCC: CFR Part 15.107(a).

A.2.1 Method of measurement

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits. Tested in accordance with the procedures of ANSI C63.4 – 2014, section 7.3.

A.2.2 EUT Operating Mode

The MS is operating in the USB mode and charging mode. During the test MS is connected to a PC via a USB cable in the case of USB mode and is connected to a charger in the case of charging mode. The model of the PC is DELL M4000E-17, and the serial number of the PC is M706GWXD. The software is used to let the PC keep on copying data to MS, reading and erasing the data after copy action was finished.

Note: I/O information: Printer – USB, Mouse – PS/2, Keyboard – USB.

A.2.3 Measurement Limit

| Frequency of emission (MHz) | Conducted limit (dB μ V) | |
|-----------------------------|------------------------------|-----------|
| | Quasi-peak | Average |
| 0.15-0.5 | 66 to 56* | 56 to 46* |
| 0.5-5 | 56 | 46 |
| 5-30 | 60 | 50 |

*Decreases with the logarithm of the frequency

A.2.4 Test Condition in charging mode

| Voltage (V) | Frequency (Hz) |
|-------------|----------------|
| 120 | 60 |

| RBW/IF bandwidth | Sweep Time(s) |
|------------------|---------------|
| 9kHz | 1 |

A.2.5 Measurement Results

Measurement uncertainty: $U= 3.08$ dB, $k=2$.

Charging Mode, Set.1:

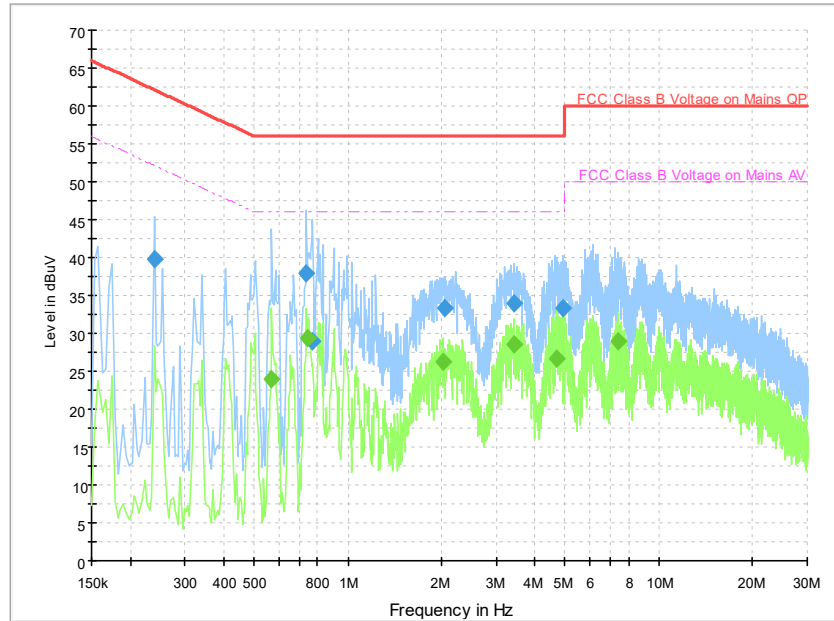


Fig A.3 Conducted Emission from 150kHz to 30MHz

Final Result 1

| Frequency (MHz) | QuasiPeak (dBuV) | Meas. Time (ms) | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBuV) | Comment |
|-----------------|------------------|-----------------|-----------------|--------|------|------------|-------------|--------------|---------|
| 0.238000 | 39.9 | 2000.0 | 9.000 | On | L1 | 19.9 | 22.3 | 62.2 | |
| 0.734000 | 37.8 | 2000.0 | 9.000 | On | N | 19.8 | 18.2 | 56.0 | |
| 0.770000 | 29.0 | 2000.0 | 9.000 | On | L1 | 19.9 | 27.0 | 56.0 | |
| 2.042000 | 33.3 | 2000.0 | 9.000 | On | N | 19.6 | 22.7 | 56.0 | |
| 3.414000 | 34.0 | 2000.0 | 9.000 | On | N | 19.6 | 22.0 | 56.0 | |
| 4.930000 | 33.3 | 2000.0 | 9.000 | On | N | 19.6 | 22.7 | 56.0 | |

Final Result 2

| Frequency (MHz) | Average (dBuV) | Meas. Time (ms) | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBuV) | Comment |
|-----------------|----------------|-----------------|-----------------|--------|------|------------|-------------|--------------|---------|
| 0.570000 | 24.0 | 2000.0 | 9.000 | On | L1 | 20.0 | 22.0 | 46.0 | |
| 0.746000 | 29.4 | 2000.0 | 9.000 | On | N | 19.8 | 16.6 | 46.0 | |
| 2.022000 | 26.3 | 2000.0 | 9.000 | On | N | 19.6 | 19.7 | 46.0 | |
| 3.426000 | 28.6 | 2000.0 | 9.000 | On | N | 19.6 | 17.4 | 46.0 | |
| 4.682000 | 26.7 | 2000.0 | 9.000 | On | L1 | 19.8 | 19.3 | 46.0 | |
| 7.366000 | 29.0 | 2000.0 | 9.000 | On | L1 | 19.9 | 21.0 | 50.0 | |

END OF REPORT