# MPE TEST REPORT

| | |
|---|---|
| **Applicant** | Asiatelco Technologies Co. |
| **FCC ID** | XYO-AMA02R |
| **Product** | LTE Cellular Module |
| **Brand** | ATEL |
| **Model** | AMA-02R |
| **Report No.** | R2411A1747-M1V1 |
| **Issue Date** | January 3, 2025 |

Eurofins TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC 47 CFR Part 1 1.1310.** The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

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# 1 Test Laboratory

## 1.1 Notes of the Test Report

This report shall not be reproduced in full or partial, without the written approval of **Eurofins TA Technology (Shanghai) Co., Ltd.** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. Measurement Uncertainties were not taken into account and are published for informational purposes only. This report is written to support regulatory compliance of the applicable standards stated above.

## 1.2 Test Facility

**FCC (Designation number: CN1179, Test Firm Registration Number: 446626)**

Eurofins TA Technology (Shanghai) Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform measurements.

## 1.3 Testing Location

| | |
|---|---|
| Company: | Eurofins TA Technology (Shanghai) Co., Ltd. |
| Address: | Building 3, No.145, Jintang Rd, Pudong Shanghai, P.R.China |
| City: | Shanghai |
| Post code: | 201201 |
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| E-mail: | Kain.Xu@cpt.eurofinscn.com |

## 1.4 Laboratory Environment

| | |
|---|---|
| Temperature | Min. = 18°C, Max. = 25°C |
| Relative humidity | Min. = 20%, Max. = 80% |
| Ground system resistance | < 0.5 Ω |
| Ambient noise is checked and found very low and in compliance with requirement of standards. Reflection of surrounding objects is minimized and in compliance with requirement of standards. | |

# 2 Description of Equipment Under Test

**Client Information**

| | |
|---|---|
| **Applicant** | Asiatelco Technologies Co. |
| **Applicant address** | #289 Bisheng Road, Building-8, 3F, Zhang jiang Hi-Tech Park, Pudong,Shanghai,China |
| **Manufacturer** | Asiatelco Technologies Co. |
| **Manufacturer address** | #289 Bisheng Road, Building-8, 3F, Zhang jiang Hi-Tech Park, Pudong,Shanghai,China |

**General Technologies**

| **EUT Description** | | | |
|---|---|---|---|
| Model | AMA-02R | | |
| Lab internal SN | R2411A1747/S01 | | |
| Hardware Version | p2 | | |
| Software Version | V1.001.014 | | |
| Frequency | Band | TX (MHz) | RX (MHz) |
| | GSM 850 | 824 ~ 849 | 869 ~ 894 |
| | GSM 1900 | 1850 ~ 1910 | 1930 ~ 1990 |
| | LTE Band 2 | 1850 ~ 1910 | 1930 ~ 1990 |
| | LTE Band 4 | 1710 ~ 1755 | 2110 ~ 2155 |
| | LTE Band 5 | 824 ~ 849 | 869 ~ 894 |
| | LTE Band 7 | 2500 ~ 2570 | 2620 ~ 2690 |
| | LTE Band 66 | 1710 ~ 1780 | 2110 ~ 2180 |
| Date of Sample Received | November 18, 2024 | | |
| Note:<br>1. The EUT is sent from the applicant to Eurofins TA and the information of the EUT is declared by the applicant.<br>2. All indications of Pass/Fail in this report are opinions expressed by Eurofins TA Technology (Shanghai) Co., Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. | | | |

# 3 Maximum Tune up and Antenna Gain

The numeric gain (G) of the antenna with a gain specified in dB is determined by
Numeric gain (G)=10^(antenna gain/10)

According to specification 3GPP TS 51.010, the maximum power of the GSM can do the power reduction for the multi-slot. The allowed power reduction in the multi-slot configuration is as following:

| Number of timeslots in uplink assignment | Permissible nominal reduction of maximum output power (dB) |
|---|---|
| 1 | 0 |
| 2 | 0 to 3,0 |
| 3 | 1,8 to 4,8 |
| 4 | 3,0 to 6,0 |

Each Tx slots maximum tune up use the most strictest factor for evaluation by making calculation.

| Band | | Burst-Averaged output power (adjusted for tune up) (dBm) | Division Factors | Frame-Averaged output power (adjusted for tune up) (dBm) |
|---|---|---|---|---|
| GSM850 | GSM | 36.000 | -9.03 | 26.970 |
| | 1 Txslot | 36.000 | -9.03 | 26.970 |
| | 2 Txslots | 36.000 | -6.02 | 29.980 |
| | 3 Txslots | 34.200 | -4.26 | 29.940 |
| | 4 Txslots | 33.000 | -3.01 | **29.990** |
| GSM1900 | GSM | 33.000 | -9.03 | 23.970 |
| | 1 Txslot | 33.000 | -9.03 | 23.970 |
| | 2 Txslots | 33.000 | -6.02 | 26.980 |
| | 3 Txslots | 31.200 | -4.26 | 26.940 |
| | 4 Txslots | 30.000 | -3.01 | **26.990** |

Note:
Division Factors
To average the power, the division factor is as follows:
1Txslot = 1 transmit time slot out of 8 time slots
=> conducted power divided by (8/1) => -9.03 dB
2Txslots = 2 transmit time slots out of 8 time slots
=> conducted power divided by (8/2) => -6.02 dB
3Txslots = 3 transmit time slots out of 8 time slots
=> conducted power divided by (8/3) => -4.26 dB
4Txslots = 4 transmit time slots out of 8 time slots
=> conducted power divided by (8/4) => -3.01 dB

| Band | Frame-Averaged output power (adjusted for tune up) | | Antenna Gain (dBi) | Numeric Gain |
|---|---|---|---|---|
| | (dBm) | (mW) | | |
| GSM850 | 29.990 | 997.700 | 3.53 | 2.254 |
| GSM1900 | 26.990 | 500.035 | 3.65 | 2.317 |
| Band | Maximum Tune up Power | | Antenna Gain (dBi) | Numeric Gain |
| | (dBm) | (mW) | | |
| LTE Band 2 | 25.700 | 371.535 | 3.65 | 2.317 |
| LTE Band 4 | 25.700 | 371.535 | 3.83 | 2.415 |
| LTE Band 5 | 25.700 | 371.535 | 3.53 | 2.254 |
| LTE Band 7 | 25.700 | 371.535 | 2.37 | 1.726 |
| LTE Band 66 | 25.700 | 371.535 | 3.83 | 2.415 |

# 4 MPE Limit

According to section 1.1310 of FCC 47 CFR Part 1, limits for maximum permissible exposure (MPE) are as following.

TABLE 1 – LIMITS FOR MAXIMUN PERMISSIBLE EXPOSURE (MPE)

| Frequency Range (MHz) | Electric Field Strength (V/m) | Magnetic Field Strength (A/m) | Power Density (mW/cm2) | Averaging Time (minutes) |
|---|---|---|---|---|
| (A) Limits for Occupational/Controlled Exposures | | | | |
| 0.3-3.0 | 614 | 1.63 | *(100) | 6 |
| 3-30 | 1842/f | 4.89/f | *(900/f2) | 6 |
| 30-300 | 61.4 | 0.163 | 1.0 | 6 |
| 300-1500 | | | f/300 | 6 |
| 1500-100,000 | | | 5 | 6 |
| (B) Limits for General Population/Uncontrolled Exposure | | | | |
| 0.3-1.34 | 614 | 1.63 | *(100) | 30 |
| 1.34-30 | 824/f | 2.19/f | *(180/f2) | 30 |
| 30-300 | 27.5 | 0.073 | 0.2 | 30 |
| 300-1500 | | | f/1500 | 30 |
| 1500-100,000 | | | 1.0 | 30 |

f = frequency in MHz
* = Plane-wave equivalent power density

Note1. Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational / controlled limits apply provided he or she is made aware of the potential for exposure.

Note2: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

The maximum permissible exposure for 300~1500 MHz is f/1500, for 1500~100,000MHz is 1.0. So

| Band | The Maximum Permissible Exposure ($mW/cm^2$) |
|---|---|
| GSM850 | 0.549 |
| GSM1900 | 1.000 |
| LTE Band 2 | 1.000 |
| LTE Band 4 | 1.000 |
| LTE Band 5 | 0.549 |
| LTE Band 7 | 1.000 |
| LTE Band 66 | 1.000 |

# 5 RF Exposure Evaluation Result

RF exposure evaluation method is based on KDB 447498 D01，this calculation is based on the conducted power, maximum power and antenna gain with provides the minimum separation distance. The formula shown below is from OET Bulletin 65 Edition 97-01 Per KDB 447498 D01:

$$S= PG / 4\pi R^2$$

Where: S = power density (in appropriate units, e.g. $mW/cm^2$)
P = Time-average maximum tune up procedure (in appropriate units, e.g., mW)
G = the numeric gain of the antenna
R = distance to the center of radiation of the antenna (20 cm = limit for MPE)

| Band | Maximum Tune up (dBm) | Antenna Gain (dBi) | Maximum EIRP (dBm) | PG (mW) | Result ($mW/cm^2$) | Limit Value ($mW/cm^2$) |
|---|---|---|---|---|---|---|
| GSM850 | 29.990 | 3.53 | 33.520 | 2249.055 | 0.447 | 0.549 |
| GSM1900 | 26.990 | 3.65 | 30.640 | 1158.777 | 0.231 | 1.000 |
| LTE Band 2 | 25.700 | 3.65 | 29.350 | 860.994 | 0.171 | 1.000 |
| LTE Band 4 | 25.700 | 3.83 | 29.530 | 897.429 | 0.179 | 1.000 |
| LTE Band 5 | 25.700 | 3.53 | 29.230 | 837.529 | 0.167 | 0.549 |
| LTE Band 7 | 25.700 | 2.37 | 28.070 | 641.210 | 0.128 | 1.000 |
| LTE Band 66 | 25.700 | 3.83 | 29.530 | 897.429 | 0.179 | 1.000 |
| Note: **R** = 20cm<br>**π**= 3.1416 | | | | | | |

Note: For transmitters, minimum separation distance is 20cm, even if calculations indicate MPE distance is less.

**IMPORTANT NOTE:** To comply with the FCC RF exposure compliance requirements, the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. No change to the antenna or the device is permitted. Any change to the antenna or the device could result in the device exceeding the RF exposure requirements and void user's authority to operate the device.

# ANNEX A: The EUT Appearance

**The EUT Appearance are submitted separately.**

********END OF REPORT ********