



EMC & ELECTRICAL SAFETY COMPLIANCE TESTS LABORATORY

CE Notified Body n. 0397 (Electromagnetic Compatibility – Decree MI.S.E. 04.04.13)

Ministry of Communications EMC credit certificate: n. 110 of 04.10.11

Notified Body Electric Material Safety Test (Decree MI.S.E. 17.04.13)

TEST REPORT NUMBER N. 71L/2013

| | |
|-----------------------------|---|
| Customer | ACME SYSTEMS S.r.l. Via Aldo Moro, 53 00055 Ladispoli (RM) - Italy |
| Item | Terra-M |
| Target | Tests on emission and immunity electromagnetic compatibility |
| Normative References | EN 55022; EN 55024; EN 301 489-7 |
| Date of tests | 27;28.06.2013 |
| Nr. of pages | 17 |
| Test result | Passed |
| Date | 28.06.2013 |

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1. TARGET

Target of this report is the tests on emission and immunity electromagnetic compatibility concerning a system called Terra-M, assembled by ACME SYSTEMS S.r.l.. The Tests have been made at the OCE Laboratory in Palestrina (Rome).





2. DEVICE UNDER TEST

2.1 Identification of device under test

| | |
|----------------|----------------------------|
| Applicant: | ACME SYSTEMS S.r.l. |
| Description: | Embedded Linux Miniserver |
| Manufacturer: | ACME SYSTEMS S.r.l. |
| Model: | Terra-M |
| Serial number: | Absent |
| Destination: | Residential |





2.2 Description of device under test

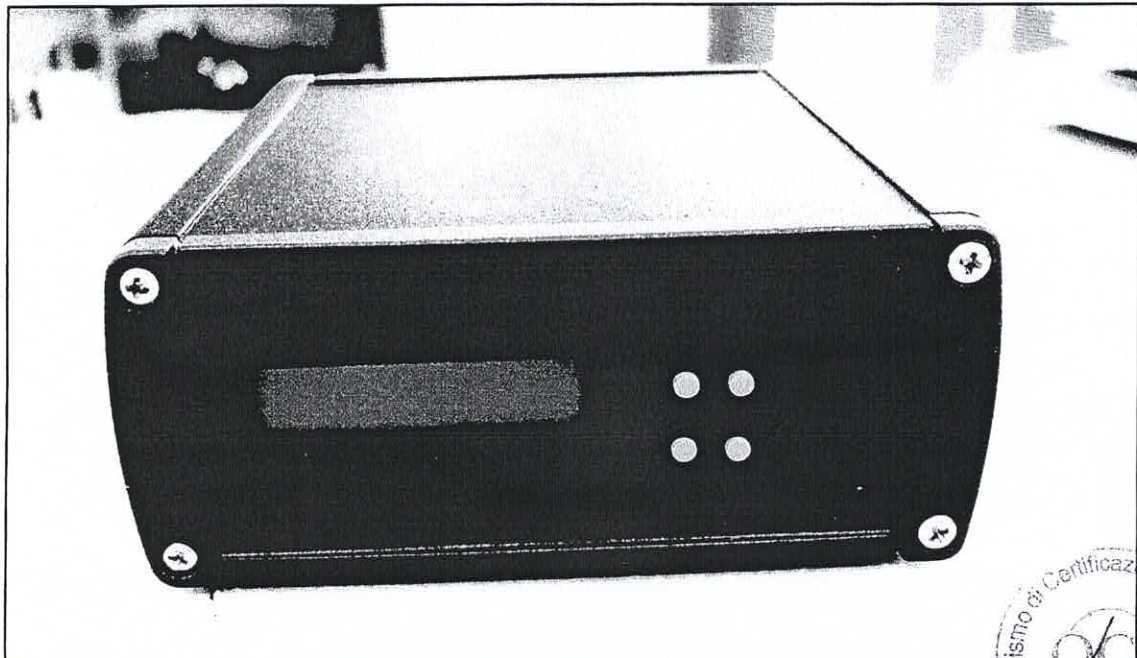
The Terra-M board is a computer Linux embedded miniserver solution able to integrate with GSM network to send and receive SMS (Short Message Service) and receive MMS (Multimedia Message Service) with a normal mobile SIM card.

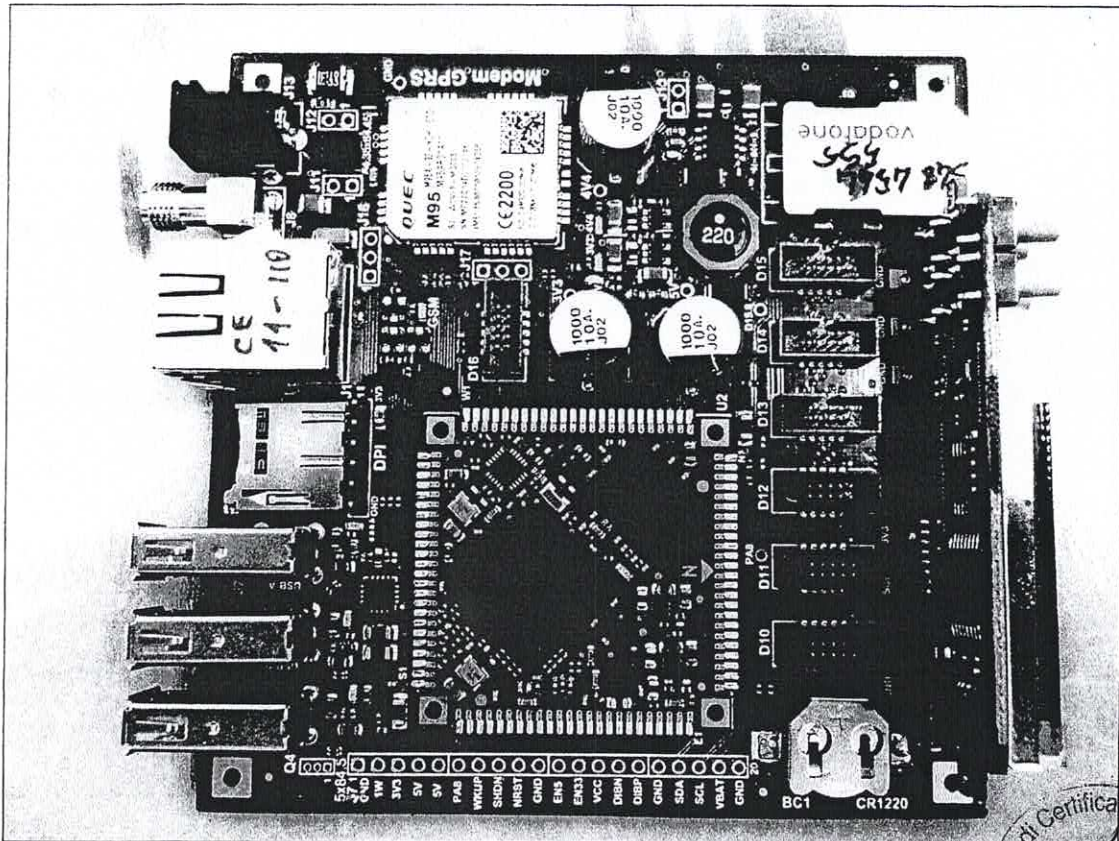
The equipment includes:

- a Quad-band GSM modem
- a 4GB or higher microSD HC memory card
- a AriaG25 true solid state miniserver, able to run the Linux Operating System
- a 10/100 Mbit/s Ethernet port
- 3 USB 2.0 Host ports
- display LCD 16X2 characters and 4 pushbuttons

Power Supply input: 12V_{DC}

Here two pictures of the equipment presented for the test:







3. OPERATIVE CONDITION OF DUT (Device Under Test)

3.1 Power supply type

During the test the device has been supplied by a 12V_{DC} power supply (commercial, CE marked - 12V_{DC} ; 2A) given from the manufacturer.

3.2 Operative conditions

All tests were performed with the DUT system turned on as in the normal operating conditions.

3.3 Performance evaluation criteria (only for immunity tests)

The performance evaluation of the DUT system operation during the tests of immunity to electromagnetic disturbances is based on the tests outlined in paragraph 3.4.

The EN 55024 and EN 301 489-7 **susceptibility criteria** were observed during all the immunity tests for evaluating the performance of the DUT:

3.4 Performance evaluation of DUT (only for immunity tests)

During immunity test the DUT was operated as in normal operational environment, checking the functionality.





4. VARIATION TO THE DUT

During the tests execution, no variation has been made on the DUT.





5. PERFORMED TESTS

In the following table the performed tests are listed:

| Port | Range of freq. (MHz) | Level | Test | Reference Standard | Result |
|----------|----------------------|------------------------------------|---|--------------------------|--------|
| Envelope | 30 -1000 | Class B | Radiated emission | EN 55022 EN 301 489-7 | Ok |
| Envelope | ----- | ±8 KV (air) ±4 KV (contact) | Electrostatic discharge immunity | EN 55024 EN 301 489-7 | Ok |
| Envelope | 80-1000 1400-2000 | 3 V/m modulated 3 V/m modulated | Electromagnetic radiated field immunity | EN 55024 EN 301 489-7 | Ok |
| Envelope | 0.00005 | 1 A/m | Mains frequency magnetic field immunity | EN 55024 | Ok |
| DC Power | 0.15-80 | 3 V modulated | Immunity to conducted electromagnetic field | EN 55024 | Ok |
| DC Power | ----- | ±0,5 KV | Immunity against fast transients (Burst) | EN 55024 | Ok |
| Signal | 0.15-80 | 3 V modulated | Immunity to conducted electromagnetic field | EN 55024 | Ok |
| Signal | ----- | ±0,5 KV | Immunity against fast transients (Burst) | EN 55024 | Ok |





6. TEST RESULTS

6.1 Emission Measuring

The DUT and the cables connected to it were kept 80 cm away from the reference ground plane.

6.1.1 Radiated emission measurement

Ref. Std.: EN 55022
Limit: according to EN 55022
Test Equipment: Receiver PMM9060; Log-periodic Antenna Frankonia BTA-M
Environmental Conditions: Temperature: 22°C, RH: 40%
Uncertainty: -2.56 / +4.74 (dB)

| Port | Range of freq. (MHz) | Detector | Reference Standard | Figure |
|----------|----------------------|----------|--------------------------|--------|
| Envelope | 30 - 1000 | Peak | EN 55022 EN 301 489-7 | 1 |





RADIATED EMISSION PEAK

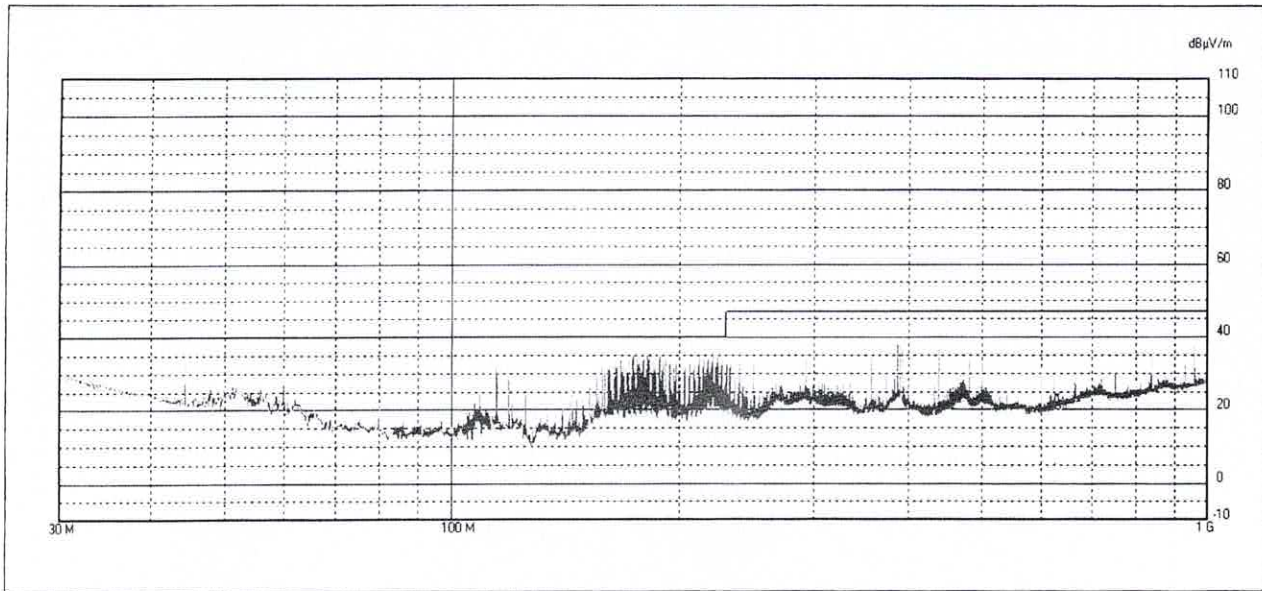


Figure 1

Measuring parameters:

| Preselector | Preampli | Attenuation | Limit | BW | Detector |
|-------------|----------|-------------|----------|---------|----------|
| ON | OFF | 0 dB | R022QP-B | 120 KHz | Peak |





6.2 Immunity tests

6.2.1 Electrostatic discharge immunity test

Reference document: EN 61000-4-2
Level: ± 8 KV(air), ± 4 KV(contact)
Test Equipment: Schaffner NSG 435.
Environmental Conditions: Temperature: 22°C, RH: 40%
Uncertainty: $\pm 5\%$

| Test Points | Number of Discharges | Discharge Voltage (KV) | Reference Standard | Susceptibility Criterion |
|-------------|----------------------|------------------------|--------------------------|--------------------------|
| Envelope | 10 | ± 4 (air) | EN 55024 EN 301 489-7 | B |
| Envelope | 10 | ± 4 (contact) | EN 55024 EN 301 489-7 | B |





6.2.2 Radiated electromagnetic field immunity test

Reference document: EN 61000-4-3
Level: see table
Test Equipment: Generator: Rhode & Schwarz SM300; Amplifier: Kalmus 737FC; Frankonia Amplifier FLG30C; Log-periodic antenna Frankonia BTA-M; Management software Frankonia; Isotropic sensor PMM OR 03.
Environmental Conditions: Temperature 22°C, RH 40%
Uncertainty: ± 3.26 (V/m)

| Port | Freq. Range (MHz) | Step Freq. | Polariz. Antenna | Level (V/m) | Reference Standard | Susceptibility Criterion |
|----------|-------------------|------------|------------------|-------------|--------------------------|--------------------------|
| Envelope | 80-1000 | 1% f | V | 3 | EN 55024 EN 301 489-7 | A |
| Envelope | 80-1000 | 1% f | O | 3 | EN 55024 EN 301 489-7 | A |
| Envelope | 1400-2000 | 1% f | V | 3 | EN 55024 EN 301 489-7 | A |
| Envelope | 1400-2000 | 1% f | O | 3 | EN 55024 EN 301 489-7 | A |





6.2.3 Mains frequency magnetic field immunity test

Ref. doc.: EN 61000-4-8
Level: EN 55024
Instrumentation: Generator PMM DAS-G120, coil DANA DAS S120
Environment Condition: Temperature 22°C, humidity 40%
Uncertainty: < 8%

| Port | Range freq. (Hz) | Level (A/m) | Reference Standard | Susceptibility Criterion |
|----------|---------------------|----------------|-----------------------|-----------------------------|
| Envelope | 50 | 1 | EN 55024 | A |





6.2.4 Conducted Electromagnetic Immunity

Reference document: EN 61000-4-6
Test Level: 3 V AM (amplitude modulation) 80% 1 KHz
Test Equipment: Generator: Rhode & Schwarz SMY01; Amplifier: PMM6000; CDN Fisher FCC - 801-M3-16 for supply line; Management software PMM SW06.
Environmental Conditions: Temperature: 22°C, RH: 40%
Uncertainty: ± 1.17 (dB)

| Port | Frequency Range. (MHz) | Test level (V) | Reference Standard | Susceptibility Criterion |
|----------|------------------------|-----------------|--------------------|--------------------------|
| DC power | 0,15 – 80 | 3 V (modulated) | EN 55024 | A |
| Signal | 0,15 – 80 | 3 V (modulated) | EN 55024 | A |





6.2.5 Immunity against fast transients (Burst)

Reference document: EN 61000-4-4
Level: 0,5 KV
Test Equipment: Schaffner NSG2025; CDN 126
Environmental Conditions: Temperature: 22°C, RH: 40%
Uncertainty: ± 10%

| Port | Burst Freq. (KHz) | No. Burst | Test Voltage | Reference Standard | Susceptibility Criterion |
|----------|-------------------|-----------|--------------|--------------------|--------------------------|
| DC power | 5 | 75 | ±0,5KV | EN 55024 | B |
| Signal | 5 | 75 | ±0,5KV | EN 55024 | B |





The test results of this document refer just to the tested sample.

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Palestrina, 28 June 2013