

MTX-GTW

Hardware User Guide



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Important information

This technical description contains important information for the start up and use of the MTX-GTW modems. Read it carefully before you start working with the MTX-GTW modems. The warranty will be void should damage occur due to non-compliance with these instructions for use.

We cannot accept any responsibility for consequential loss.

Service and Support

To contact customer support please use the contact details below:

Matrix Electrónica
Alejandro Sánchez, 109
28019 Madrid (SPAIN)
gsmsupport@matrix.es

Information about the MTX-GTW product and its accessories is available on the following web site:

www.mtxm2m.com

Or contact your local distributor / sales agent.

Revision information

| Revision | Date | Author | Changes |
|----------|---------|--------|--|
| 1.0 | 2014/09 | RR | First draft |
| 1.1 | 2014/10 | AEM/TP | Language style revision |
| 1.2 | 2014/12 | AEM | Minor revision |
| 1.3 | 2015/04 | AEM | Minor revision |
| 1.4 | 2015/04 | RR | MTX-GTW Versions added |
| 1.5 | 2015/04 | AEM | Product label information |
| 1.6 | 2015/08 | AEM | HW & FW revisions added Conformity assessment added |
| 1.7 | 2017/06 | JS | Conformity assessment added |

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1. Description

The MTX-GTW is designed to be driven by the TQMa28 module and offers PC core functionalities and standard interfaces. This user guide provides information about the components, features, connectors and signals available on the MTX-GTW.

1.1 Product label

The label fixed to the bottom of a MTX device comprises the following information:

| No. | Information |
|-----|---------------------------------|
| 1 | MTX M2M logo |
| 2 | Product name (model) |
| 3 | Product ordering number |
| 4 | Hardware and Firmware Revisions |
| 5 | MAC address |
| 6 | Year/Week of fabrication |
| 7 | Barcode (Code 128) (IMEI) |
| 8 | Product IMEI |
| 9 | RoHS symbol |
| 10 | Pb-Free symbol |
| 11 | WEEE symbol |
| 12 | CE logo |
| 13 | PTCRB Certification logo |



1.2 Hardware revisions

| Hardware Revision | Starting production date | Changes |
|-------------------|--------------------------|--|
| 1.01 | 09/2014 | Initial version. Production date: <ul style="list-style-type: none">- Before year 2015 week 19 (1519): WiFi antenna connector SMA F- Year 2015 week 19 (1519) and after: WiFi antenna connector SMA F RP |
| 1.01A | 09/2014 | WiFi antenna SMA F RP |

1.3 Firmware revisions

| Hardware Revision | Starting production date | Changes |
|-------------------|--------------------------|-----------------------------------|
| 1.00 | 09/2014 | Initial release |
| 1.01 | 09/2014 | Minor revision and bug fixes |
| 2.00 | 06/2015 | 3G PPP connections problem solved |

2. Warranty

The information contained within this user guide, including but not limited to any product specification, is subject to change without notice. Matrix Electronica provides no warranty with regard to this user guide or any other information contained herein and hereby expressly disclaims any implied warranties of merchantability or fitness for any particular purpose with regard to any of the foregoing. Matrix Electronica assumes no liability for any damages incurred directly or indirectly from any technical or typographical errors or omissions contained herein or for discrepancies between the product and the uses guide. In no event shall Matrix Electronica be liable for any incidental, consequential, special, or exemplary damages, whether based on tort, contract or otherwise, arising out of or in connection with this user guide or any other information contained herein or the use thereof.

3. References

- STK-MBa28 User Manual
- TQMa28 User Manual
- iMX28 Freescale Reference Manual

4. Technical Data

4.1 System architecture and system functionality

4.1.1 Block diagram

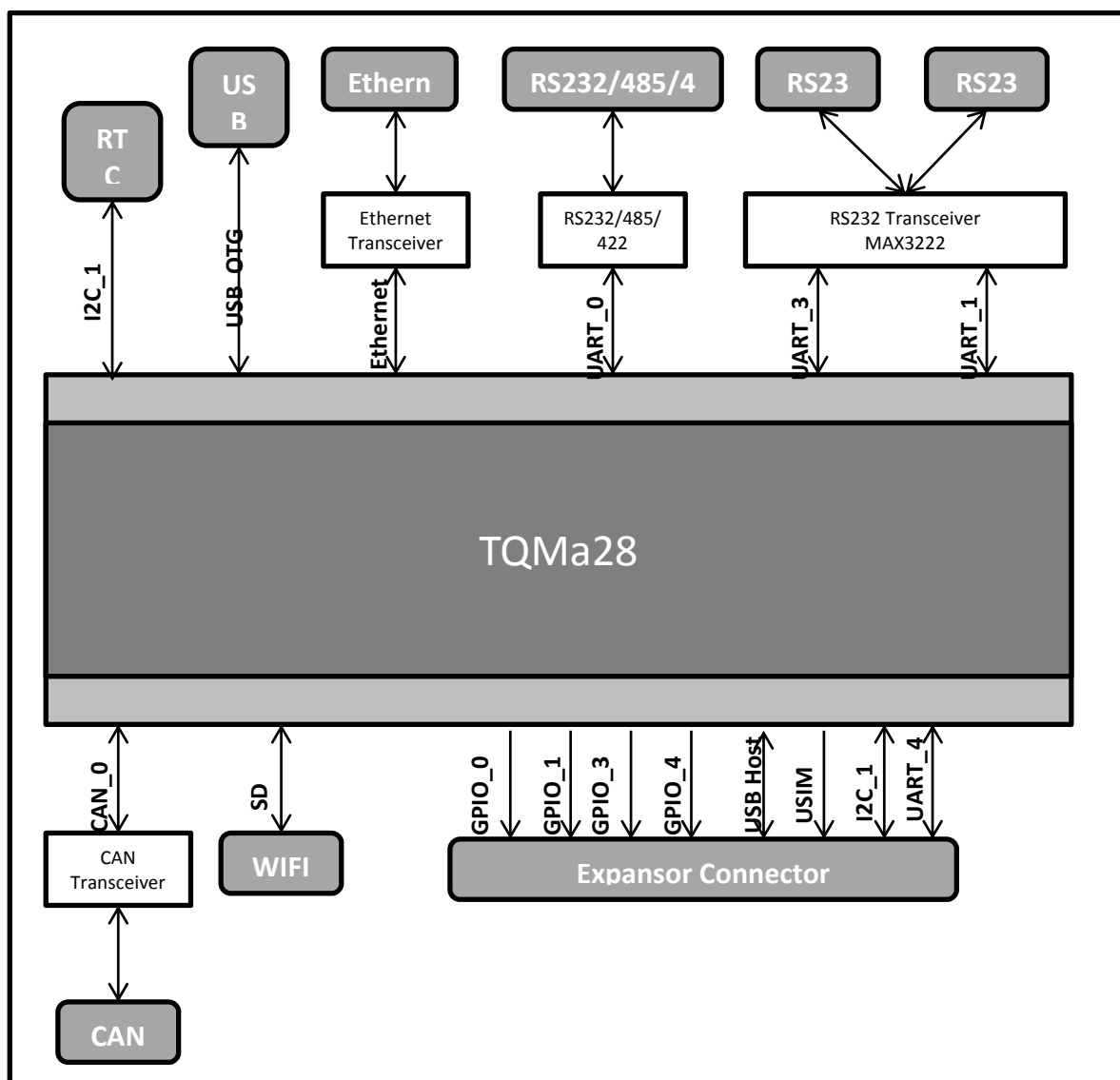


Illustration 1: MTX-GTW block diagram

4.1.2 Technical data electronics

The interfaces and system components listed in the following are implemented on the MTX-GTW. Due to the fact that the board can be installed in a casing, the interfaces are divided into external and internal interfaces.

4.1.2.1 External interfaces

- 1x USB OTG 2.0
- 1x Ethernet
- 1x RS232/485/422
- 2x RS232
- 1x CAN
- 1x SIM Holder
- 1x Antenna connector

4.1.2.2 Internal interfaces

- 1x TQMa28
- 1x WiFi b/g/n
- 3x Headers for specific extension

4.1.2.3 User's interfaces

- 4x Status LEDs
- 1x DIP switch

4.1.2.4 System components

- Temperature sensor
- EEprom
- RTC

4.1.3 Technical data mechanics, design

Dimensions PCB (WxDxH): 78.1x66.8x37.2 mm

Weight: < 190g

5. Electronics Specification

5.1 External interfaces

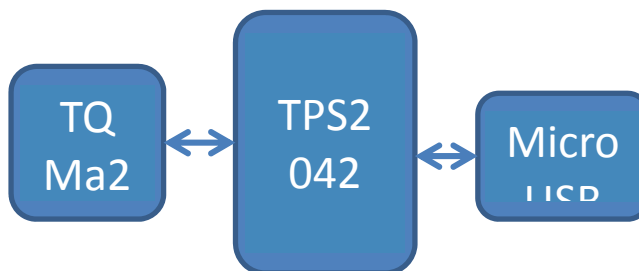


Illustration 2: MTX-GTW external interfaces

5.1.1 Function specification

5.1.1.1 USB OTG

The USB OTG interface of the TQMa28 (USB0) is offered as a Mini USB AB-Type

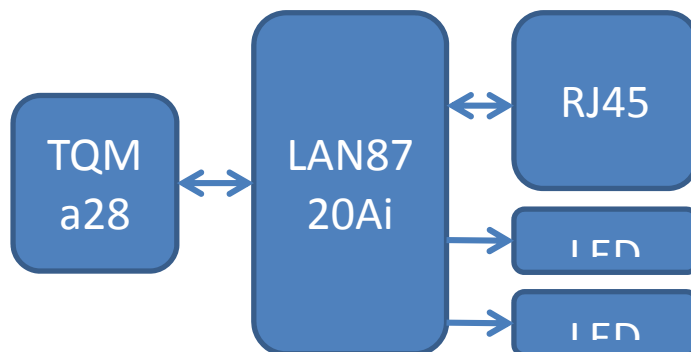


| | |
|------------------------|---|
| Type of media: | USB OTG 2.0 Hi-Speed, 5V bus voltage (limited to 500mA) |
| Interface on module: | USB OTG |
| Signal characteristic: | Compatible with the Universal Serial Bus Specification REV. 2.0 |
| ESD protection: | ±15kV human body model |

| Manufacturer | Description |
|--------------------------|--------------------------|
| MOLEX: 47590-0001 | Right angle Micro USB AB |

5.1.1.2 Ethernet

The MTX-GTW directly drives the Ethernet 1 interface. The SMSC LAN8720Ai is used as PHY.

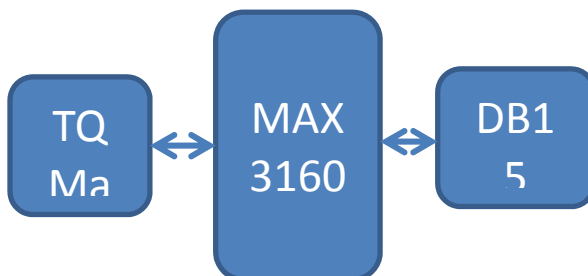


Type of media: 10/100 Mbit
 Signal characteristic: Compatible with the IEEE-802.3 standard
 Status LEDs: 2
 Modes: MDI, Auto-MDIX
 Interface on module: RMII/ENET0

| Manufacturer | Description |
|--------------------------|-----------------------|
| Molex: 85502-5008 | Right angle RJ45 jack |

5.1.1.3 RS232/485/422

The AUART0 of the TQMa28 drives the RS232/485/422 interface on the MTX-GTW. The Maxim MAX3160 is used as a transceiver.



In addition, two signals are used in order to configure the Maxim transceiver in one of its operational modes:

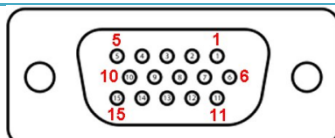
| Signal | Description |
|--------------|--------------------------|
| SW1_3 | RS485/RS232# |
| SW1_4 | Half_Duplex/Full_Duplex# |

Transfer rate: Up to 10Mbit/s (full-duplex)
 Interface on module: AUART0
 Handshake: RTS# used for clearing the transmission direction
 ESD protection: ±15kV human body model

The following tables show the configuration of the DB15 of the RS232/485/422 interface (DTE interface).

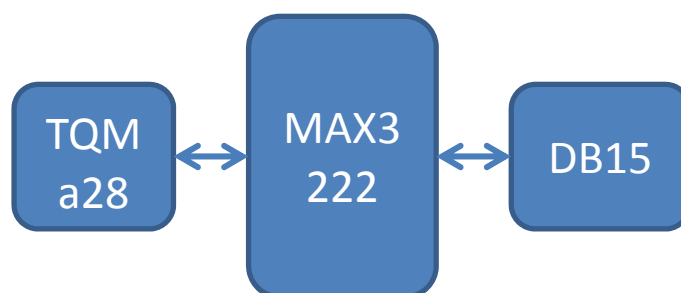
DB15 Connector pinout:

| Pin | Signal | Type | Remark |
|-----------|--------|------|-----------------|
| 2 | RXD0 | I | Receive Data |
| 3 | TXD0 | O | Transmit Data |
| 7 | RTS0 | O | Request to Send |
| 8 | CTS0 | I | Clear To Send |
| 14 | GND | P | Ground |



5.1.1.4 RS232 1

The AUART3 interface of the TQMA28 drives the RS232 interface of the MTX-GTW by default. The Maxim MAX3222 is used as a driver.

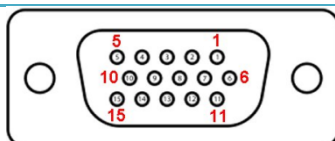


Transfer rate: Up to 250Kbit/s
 Interface on module: AUART3
 Handshake: None
 ESD protection: ±15kV human body model

The following tables show the configuration of the DB15 of the RS232_1 interface.

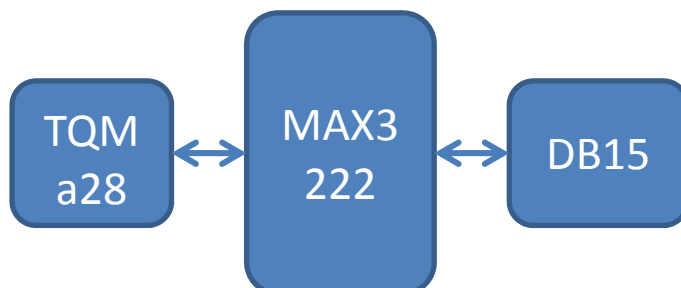
DB15 Connector pinout:

| Pin | Signal | Type | Remark |
|-----------|--------|------|---------------|
| 4 | TXD1 | O | Transmit Data |
| 9 | RXD1 | I | Receive Data |
| 14 | GND | P | Ground |



5.1.1.5 RS232 2

The AUART1 interface of the TQMA28 drives the RS232 interface of the MTX-GTW by default. The Maxim MAX3222 is used as a driver.

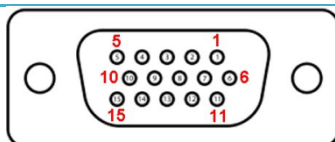


Transfer rate: Up to 250Kbit/s
 Interface on module: AUART1
 Handshake: None
 ESD protection: $\pm 15\text{kV}$ human body model

The following tables show the configuration of the DB15 of the RS232_2 interface.

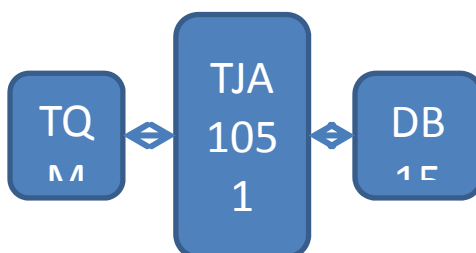
DB15 Connector pinout:

| Pin | Signal | Type | Remark |
|-----|--------|------|---------------|
| 12 | TXD2 | O | Transmit Data |
| 13 | RXD2 | I | Receive Data |
| 14 | GND | P | Ground |



5.1.1.6 CAN

The CAN 0 port of the TQMA28 directly drives the interface on the MTX-GTW. The NXP TJA1051T/3 is used as a CAN transceiver.

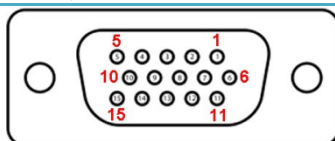


Transfer rate: Up to 1Mbit/s
 Interface on module: CAN_0
 Signal characteristic: Compatible with the ISO-11898 standard (CAN 2.0B)
 ESD protection: $\pm 8\text{kV}$ human body model

The following tables show the configuration of the DB15 of the CAN interface.

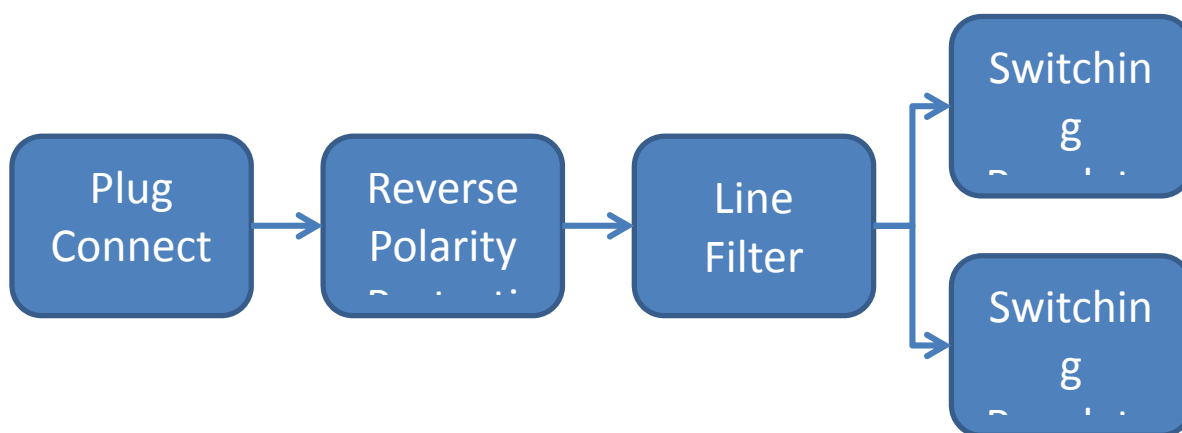
DB15 Connector pinout:

| Pin | Signal | Type | Remark |
|-----|--------|------|--------------------|
| 1 | CANH | I/O | CAN High-Level I/O |
| 6 | CANL | I/O | CAN Low-Level I/O |

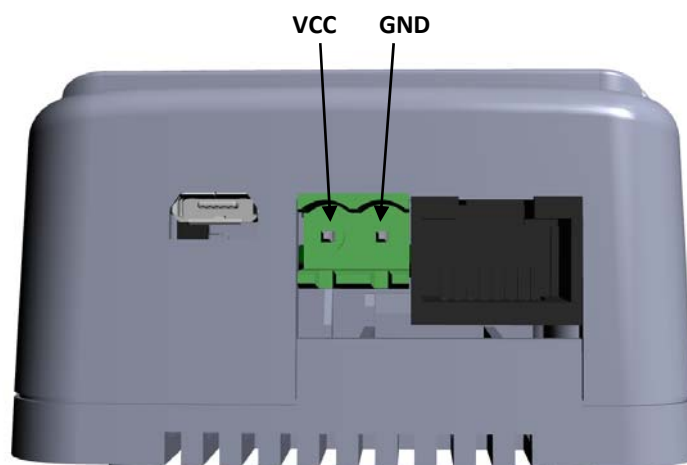


5.1.1.7 Power Supply

For protective and EMC reasons the supply input of the MTX-GTW is designed very robustly.



| Parameter | Min. | Typ. | Max. | Unit |
|-------------------|------|------|------|------|
| DC Input Voltage | 7 | 24 | 50 | V |
| Power consumption | | <2 | | W |



5.2 Internal Interfaces

5.2.1 TQMa28

The core of the MTX-GTW is the TQ Components TQMa28 module. The following table shows the key features of this module.

| Feature | Description |
|------------------|---------------------------|
| Processor | Freescale iMX287 @ 454MHz |
| RAM | 128MB DDR2 |
| FLASH | 4GB eMMC |
| EEPROM | 32Kb |

Detailed information about this module can be found on the following link:

<http://www.tq-group.com/en/products/industry-pcs/prod/embedded-module/tqma28/extb/Main/productdetail/>

5.2.2 Wifi

The MTX-GTW can be ordered with an integrated Bluegiga WF111 Wi-Fi module. The following table shows the key features of this module.

| Feature | Remark |
|--------------------------|--|
| IEEE 802.11 b/g/n | Single 2.4GHz band. Symbol rate up to 7.2Mbps |
| Encryption | WEP, WPA and WPA2 |
| Operation mode | Supports Client and Access Point (Up to 8 clients) |
| Module interface | SDIO |

5.2.3 Expansion Connector

An expansion connector is available on the MTX-GTW. One complete UART interface (RX,TX,CTS,RTS), two additional two-wire UARTs, I2C, USB Host, USIM, and 4 GPIOs are available on this connector.

5.3 User Interfaces

5.3.1 Status LED

The MTX-GTW has four LEDs to inform the user about different status conditions. The following table shows the different LED indications.

| Led | Status remark |
|-------------|---|
| DLp1 | Power Supply OK. (Green LED) |
| DL1 | Free for user information. Connected to GPIO3_6. (Red LED) |
| DL2 | Ethernet link speed LED indication. On with 100Mbps, OFF with 10Mbps. (Red LED) |
| DL3 | Ethernet link activity LED indication. (Green LED) |

Both DLp1 and DL1 are visible through the LED window placed on the top of the MTX-GTW box.

5.3.2 DIP Switch

The MTX-GTW has one Dip-Switch with configuration purposes. The following table shows information about the signals connected to the Dip Switch.

SW1:

| Pin | Signal | Remark |
|----------|---------------|--|
| 1 | LCD_D03 | Recovery Switch (Default OFF= Normal Boot) |
| 2 | LCD_D00 | Recovery Switch (Default OFF= Normal Boot) |
| 3 | SW1_3 | Connected to RS485/RS232#. (Default OFF=RS232) |
| 4 | SW1_4 | Connected to Half_Duplex/Full_Duplex#. (Default OFF = Full-Duplex) |
| 5 | VCC_OUT (3V3) | VCC_OUT (DB15_PIN10). ON = 3,3VDC |
| 6 | VCC_OUT (5V) | VCC_OUT (DB15_PIN10). ON = 5VDC |
| 7 | USB_OTG_ID | USB OTG Identification. (OFF=OTG, ON=Only Host) |
| 8 | GPIO_6 | Input signal for User information. Connected to GPIO0_24 |

5.4 System Components

5.4.1 Temperature Sensor

On the TQMa28 module there is a National Semiconductor LM73 temperature sensor. It can be read out via I2C bus 1. The base address can be taken from the following table.

| I2C Bus | Position | Device | Address |
|---------|----------|---------------------------|---------|
| 1 | TQMa28 | Temperature sensor - LM73 | 0x49 |

5.4.2 EEPROM

On the TQMa28 module there is a 64Kibit EEPROM (ST Microelectronics M24C64-WDW6TP). The EEPROM is controlled via I2C bus 1 of the processor. The writing protection (WP) of the EEPROM is not available. The base address can be taken from the following table.

| I2C Bus | Position | Device | Address |
|---------|----------|-----------------|---------|
| 1 | TQMa28 | EEPROM – M24C46 | 0x50 |

5.4.3 RTC

On the MTX-GTW board there is a DS1339U RTC module. The RTC is supplied by a super capacitor in order to maintain the information if the main supply is removed.

| I2C Bus | Position | Device | Address |
|---------|----------|----------------|---------|
| 1 | MTX-GTW | RTC DS1339U-33 | 0x68 |

6. MTX-GTW Versions

6.1 MTX-GTW-3G

The MTX-GTW-3G includes the Cinterion EHS5 3G modem. It also includes some features which are not available on the MTX-GTW version.

6.1.1 1-Wire

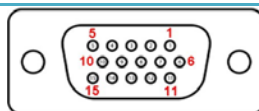
A 1-Wire interface is available on the MTX-GTW-3G via the Maxim DS2482-100 I2C chip.



Transfer rate: Up to 400KHz
 Interface on module: I2C1
 Signal characteristic: Standard and Overdrive 1-Wire communication

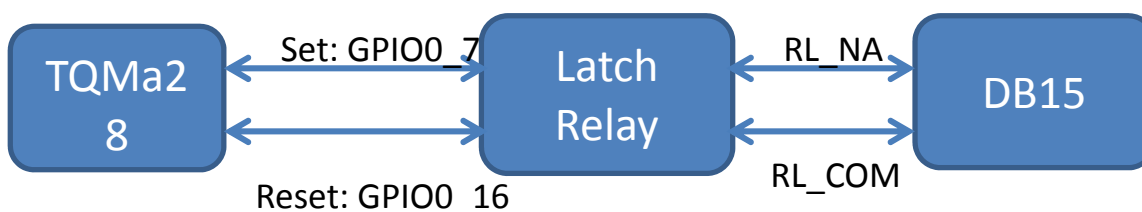
The following table shows the configuration of the DB15 of the 1-Wire interface:

| Pin | Signal | Type | Remark |
|-----|--------|------|--------|
| 5 | 1-WIRE | I/O | 1-WIRE |



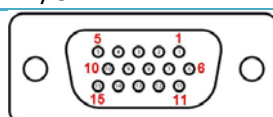
6.1.2 Relay Output

The MTX-GTW-3G also includes a Relay Output available on the DB15 female connector.



The following table shows the configuration of the DB15 of the Relay:

| Pin | Signal | Type | Remark |
|-----|--------|------|-------------------------|
| 11 | RL_COM | I/O | Relay common pin |
| 15 | RL_NA | I/O | Relay normally open pin |



6.1.3 GPIOs

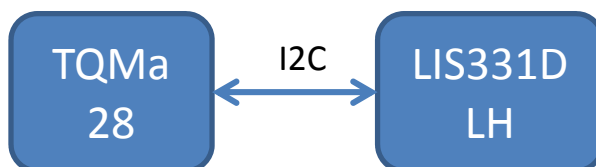
The MTX-GTW-3G is able to support up to 4 GPIOs (IRQ capable) but they are multiplexed with other interfaces. The following table shows the configuration of the DB15 connector and the multiplexed interfaces

| Pin | Signal | Type | Remark |
|-----|--------|--------|--|
| 13 | GPI 1 | Input | Shared with RX2 signal (GPIO3_4) |
| 9 | GPI 2 | Input | Shared with RX1 signal (GPIO3_12) |
| 15 | GPI 3 | Input | Incompatible with Relay NA signal (GPIO2_26)* |
| 11 | GPO 1 | Output | Incompatible with Relay COM signal (GPIO2_24)* |

*Mounting Option

6.1.4 Accelerometer

The MTX-GTW-3G includes the LIS331DLH ultra low power high performance 3-axes I2C accelerometer.



The following table shows the Accelerometer I2C configuration

| I2C Bus | Position | Device | Address |
|---------|----------|-----------|---------|
| 1 | MTX-GTW | LIS331DLH | 0x19 |

6.1.5 Antennas configuration

The MTX-GTW-3G has two external antenna connectors for the 3G and WiFi interfaces.



WiFi Antenna
SMA F



3G Antenna
FME M

6.2 MTX-GTW-3G-GPS

The MTX-GTW-3G includes the Cinterion PHS8 3G modem which integrates a GPS receiver. It also includes some features which are not available on the MTX-GTW version.

6.2.1 1-Wire

A 1-Wire interface is available on the MTX-GTW-3G via the Maxim DS2482-100 I2C chip.



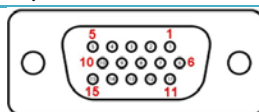
Transfer rate: Up to 400KHz

Interface on module: I2C1

Signal characteristic: Standard and Overdrive 1-Wire communication

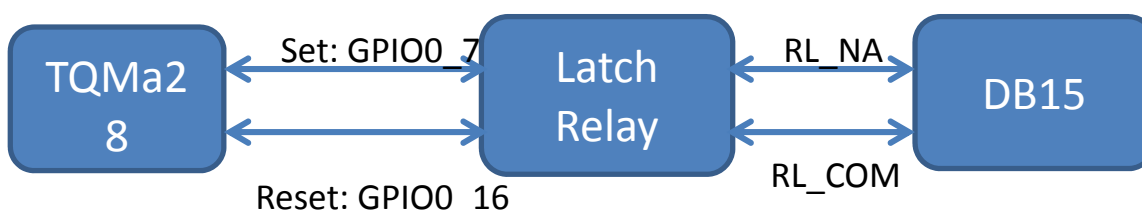
The following table shows the configuration of the DB15 of the 1-Wire interface:

| Pin | Signal | Type | Remark |
|-----|--------|------|--------|
| 5 | 1-WIRE | I/O | 1-WIRE |



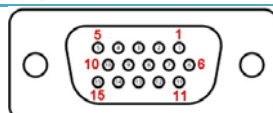
6.2.2 Relay Output

The MTX-GTW-3G also includes a Relay Output available on the DB15 female connector.



The following table shows the configuration of the DB15 of the Relay:

| Pin | Signal | Type | Remark |
|-----|--------|------|-------------------------|
| 11 | RL_COM | I/O | Relay common pin |
| 15 | RL_NA | I/O | Relay normally open pin |



6.2.3 GPIOs

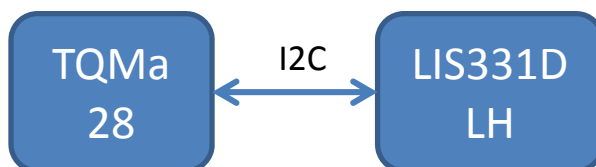
The MTX-GTW-3G is able to support up to 4 GPIOs (IRQ capable) but they are multiplexed with other interfaces. The following table shows the configuration of the DB15 connector and the multiplexed interfaces

| Pin | Signal | Type | Remark |
|-----|--------|--------|--|
| 13 | GPI 1 | Input | Shared with RX2 signal (GPIO3_4) |
| 9 | GPI 2 | Input | Shared with RX1 signal (GPIO3_12) |
| 15 | GPI 3 | Input | Incompatible with Relay NA signal (GPIO2_26)* |
| 11 | GPO 1 | Output | Incompatible with Relay COM signal (GPIO2_24)* |

*Mounting option

6.2.4 Accelerometer

The MTX-GTW-3G includes the LIS331DLH ultra low power high performance 3-axes I2C accelerometer.

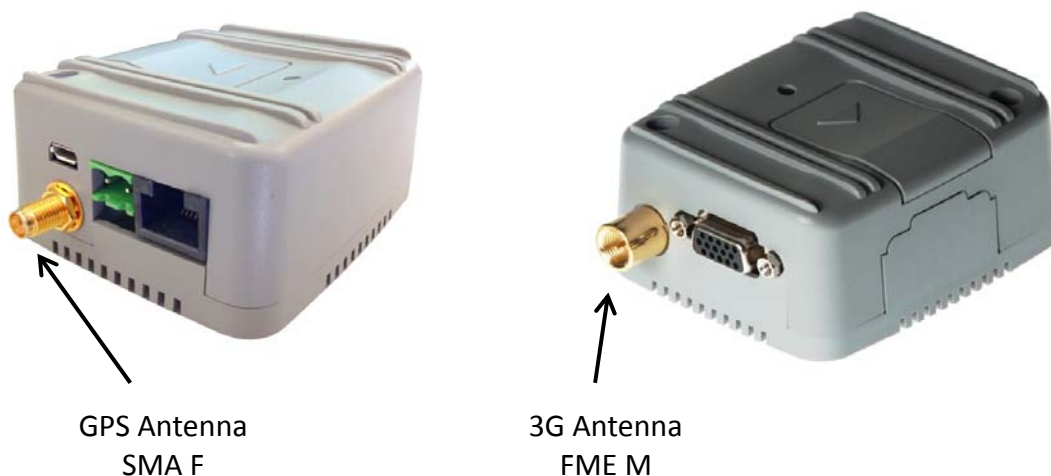


The following table shows the Accelerometer I2C configuration

| I2C Bus | Position | Device | Address |
|---------|----------|-----------|---------|
| 1 | MTX-GTW | LIS331DLH | 0x19 |

6.2.5 Antennas configuration

The MTX-GTW-3G-GPS has two external antenna connectors for the 3G and GPS interfaces. For the WiFi interface an internal PCB antenna is used.

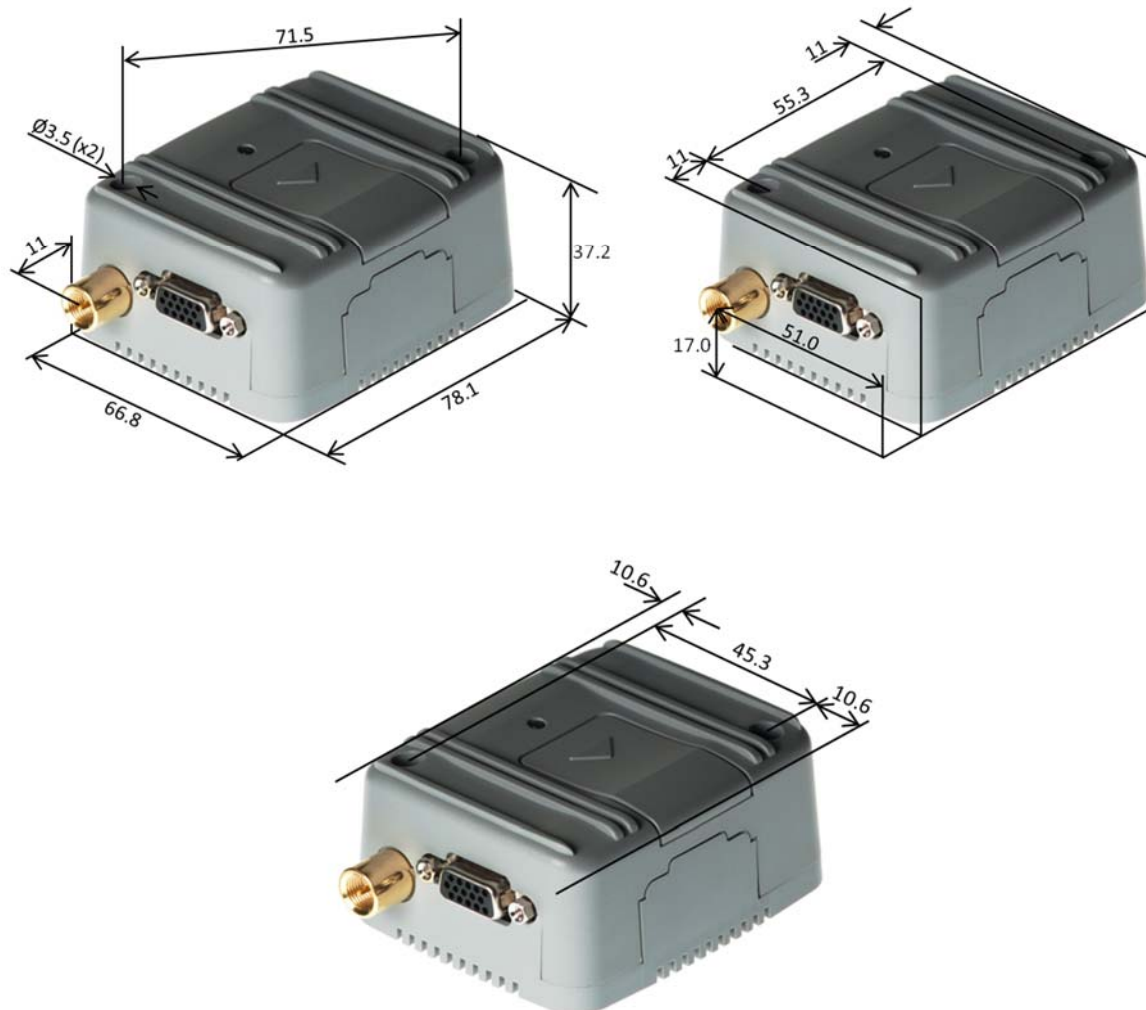


7. Mechanics Specification

7.1 Overview

The pictures below show the mechanical design of the terminal along with the positions of the different connectors, mounting holes and dimensions. The terminal case is made of durable PC/ABS plastic.





All dimensions are in millimeters.

7.2 Requirements for the superior system

The MTX-GTW has an enclosure which protects itself again dust, external impact and contact. However, as the MTX-GTW PCB can be bought as a standalone product, the following points must be taken into consideration.

7.2.1 Protection against external effects

The MTX-GTW PCB is not protected against dust, external impact and contact (IP00). An adequate protection has to be guaranteed by the surrounding system.

7.2.2 Thermal management

The main heat source is the TQMa28. Information about the cooling of the TQMa28 is to be taken from its specification.

8. Safety Requirements and protective Regulations

Please read the information in this section before starting your integration work!

8.1 Safety instructions

PLEASE READ THESE SAFETY INSTRUCTIONS AND KEEP A COPY OF THEM

- Always ensure that use of the modem is permitted. The modem may present a hazard if used in proximity to personal electronic medical devices. As a rule, the modem must not be used in hospitals, airports or planes.
- Never use the device at a gas station, refuelling point, blasting area or in any other environment where explosives may be present.
- Operating the device close to other electronic devices, such as antennas, television sets, and radios may cause electromagnetic interference.
- This product is intended to be used with the antenna or other radiating element at least 20cm away from any part of the human body. In applications where this rule cannot be applied, the application designer is responsible for providing the SAR measurement test report and declaration.
- You are responsible for observing your country's safety standards, and where applicable, the relevant wiring rules.

8.2 General precautions

The MTX-GTW Terminal as a standalone item is designed for indoor use only. For outdoor use it must be integrated into a weatherproof enclosure. Do not exceed the environmental and electrical limits as specified in "Technical Data".

- Avoid exposing the device to lighted cigarettes, naked flames or to extreme hot or cold temperatures.
- Never try to dismantle the device yourself. There are no components inside the modem that can be serviced by the user. If you attempt to dismantle the device, you may invalidate the warranty.

- The MTX-GTW Terminal must not be installed nor located in areas where the surface temperature of the plastic case could exceed 85°C.

In order to provide strain relief and to avoid transmitting excessive vibration to the device during installation, all cables connected to the MTX-GTW Terminal must be secured or clamped immediately adjacent to the device's connectors.

- To protect the power supply cables, and in order to comply with the fire safety requirements, when the unit is powered from a battery or a high current supply, a fast 1.25A fuse should be connected in line with the positive supply.
- Any incompatible components or products must not be connected to the MTX-GTW Terminal.

Note! MTX-GTW distributors and sales offices may refuse warranty claims where evidence of product misuse is found.

8.3 SIM card precautions

Before handling the SIM card in your application, ensure that you are not charged with static electricity. Use proper precautions to avoid electrostatic discharges.

- When the SIM card hatch is opened, the SIM card connectors lie exposed under the SIM card holder.

Caution! Do not touch these connectors! If you do, you may release an electrical discharge that could damage the modem or the SIM card.

- When designing your application, the SIM card's accessibility should be taken into account. We always recommend that you have the SIM card protected by a PIN code. This will ensure that the SIM card cannot be used by an unauthorized person.

8.4 Antenna precautions

If the antenna is to be mounted outside, consider the risk of lightning. Follow the instructions provided by the antenna manufacturer.

- Never connect more than one modem to a single antenna. The modem can be damaged by radio frequency energy from the transmitter of another modem.
- Like any mobile station, the antenna of the modem emits radio frequency energy. To avoid EMI (electromagnetic interference), you must determine whether the application itself, or equipment in the application's proximity, needs further protection against radio emission and the disturbances it might cause. Protection is secured either by shielding the surrounding electronics or by moving the antenna away from the electronics and the external signal cable.
- The modem and antenna may be damaged if either come into contact with ground potentials other than the one in your application. Beware: ground potentials are not always what they appear to be.

8.5 Radio Frequency (RF) exposure and SAR

Your wireless modem device is a low-power radio transmitter and receiver (transceiver). When it is turned on, it emits low levels of radio frequency energy (also known as radio waves or radio frequency fields).

Governments around the world have adopted comprehensive international safety guidelines, developed by scientific organizations such as ICNIRP (International Commission on Non-Ionizing Radiation Protection) and IEEE (The Institute of Electrical and Electronics Engineers Inc.), through periodic and thorough evaluation of scientific studies. These guidelines establish permitted levels of radio wave exposure for the general population. The levels include a safety margin designed to assure the safety of all persons, regardless of age and health, and to account for any variations in measurements.

Specific Absorption Rate (SAR) is the unit of measurement for the amount of radio frequency energy absorbed by the body when using a transceiver. The SAR value is determined at the highest certified power level in laboratory conditions, but the actual SAR level of the transceiver while operating can be well below this value. This is because the transceiver is designed to use the minimum power required to reach the network.

The MTX-GTW wireless modem device has been approved for applications where the antenna is located more than 20cm from the body. In all other configurations **the user** is responsible for meeting the local SAR regulations.

Users of the MTX-GTW wireless modem device are responsible for ensuring that they meet the SAR regulatory requirements of the countries in which they intend to operate the device and that their documentation contains the relevant SAR declaration, certification information and user guidance as appropriate.

8.6 Personal medical devices

Wireless modem devices may affect the operation of cardiac pacemakers, hearing aids and certain other implanted equipment. If a minimum distance of 15 cm (6 inches) is maintained between the MTX-GTW modem radiating antenna and a pacemaker, the risk of interference is limited. If the user's application is likely to be situated in the vicinity of personnel, a suitable warning should be contained in the equipment manual to this effect.

9. Conformity assessment

RED 2014/53/EU Conformity assessment

RED Declaration of Conformity (DoC)

MATRIX ELECTRONICA S.L.U.

C/ Alejandro Sanchez 109

28019 Madrid

Spain

Standards of European Type Approval

We declare under our sole responsibility that the products MTX-GTW family products

| | | |
|---------------------------|------------|-----------|
| MTX-GTW | | 199802110 |
| MTX-GTW-3G (EHS6) | World Wide | 199802120 |
| MTX-GTW-4G-GPS (PLS8-E) | | 199802123 |
| MTX-GTW-3G-GPS (EHS8) | | 199802143 |
| MTX-GTW CUSTOM RAL6032 | | 199802127 |
| MTX-GTW-3G CUSTOM RAL6032 | | 199802138 |
| MTX-GTW-3G-W5 | | 199802166 |

object of the declaration described above is in conformity with the relevant Union harmonization Legislation: RED Directive 2014/53/EU and R&TTE Directive 99/5/EC

The following harmonized standards and/or other normative documents were applied: are labeled with the CE conformity mark.



- EMC (art 3.1.b): EN 301 489-1 V2.2.0 EN 301 489-52 V1.1.0, EN 301 489-3 V2.1.1
- RADIO SPECTRUM (art 3. 2): EN 301 511 V12.5.1, EN 301 908-1 V11.1.1, EN 301 908-2 V11.1.1, EN 300 440 V2.1.1
- SAFETY (art 3.1.a): EN 60950-1:2006 + A11:2009 + A1:2010 + A12:2011 + A2:2013
- RF SAFETY: EN62311:2008

The technical documentation relevant to the above equipment will be held at

MATRIX ELECTRONICA S.L.

Alejandro Sanchez 109

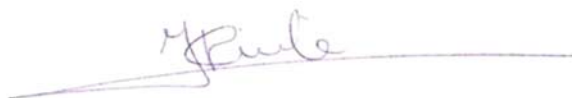
28019 Madrid

Spain

Madrid, 30/05/2015.

Mr. J. Vicente

Managing Board



9.1 FCC Compliant

MTX-GTW-3G and any variants contain FCC ID: QIPEHS6. The FCC Equipment Authorization Certification for the EHS6 Module is listed under the FCC identifier QIPEHS6

Industry Canada Certification Number: 7830A-EHS6 granted to Gemalto M2M GmbH.

The Cinterion reference application of the EHS6 Module registered under the above identifier is certified to be in accordance with the following Rules and Regulations of the Federal Communications Commission (FCC). Power listed is ERP for Part 22 and EIRP for Part 24. It is compliant with FCC regulations.

Equipment class: PCS Licensed Transmitter

Notes: Quad band GSM/GPRS Modem

9.1.1 SAR information

Cinterion Wireless Modules models: EHS6 is marketed without a defined antenna.

The Maximum Antenna Gain when using indoor antennas depends on the distance from the antenna to any nearby persons when in normal operation. It should not exceed the values shown on the table below.

According to the limit in 47 CFR 1.1310, we get the value of the maximum antenna gain as follows:

The maximum measured power output in the 850 MHz band is 1866.38 mW (32.71 dBm, see 7layers test report MDE_Siem_0714_FCCb).

The maximum permissible exposure is defined as 47 CFR 1.1310 with 0.55773 mW/cm².

The maximum measured power output in the 1900 MHz band is 974.99 mW (29.89 dBm, see 7layers test report MDE_Siem_0714_FCCc).

The maximum permissible exposure is defined as 47 CFR 1.1310 with 1 mW/cm².

According to the limit in 47 CFR 1.1310, we get the value of the maximum antenna gain as follows:

$$S = P \cdot G / 4\pi R^2$$

$$S = 0.55773 \text{ mW/cm}^2 \text{ or } 1 \text{ mW/cm}^2$$

$$P = 1866.38 \text{ mW or } 974.99 \text{ mW}$$

$$R = 20 \text{ cm or } 100 \text{ cm}$$

$$\pi = 3.1416$$

$$G(\text{dBi}) = 10 \cdot \log_{10}(G)$$

Solving for G; the maximum antenna gain is

| Band | Distance | Maximum Gain in dBi |
|---------|----------|---------------------|
| 850MHz | 20cm | 1.7669 |
| 850MHz | 50cm | 9.7257 |
| 1900MHz | 20cm | 7.1227 |
| 1900MHz | 50cm | 15.0815 |

10. Declaración de conformidad (Spanish)

MATRIX ELECTRONICA S.L.U.

C/ Alejandro Sanchez 109

28019 Madrid

Spain

10.1 Marcado CE- Directiva RED

Declaramos bajo nuestra responsabilidad que los productos MTX-GTW-3G que contienen un módulo celular Cinterion EHS6 (tipo L30960-N2950-A100), al cual se refiere esta declaración, están conformes con la Directiva RED 2014/53/EU

- EMC (art 3.1.b): EN 301 489-1 V2.2.0 EN 301 489-52 V1.1.0, EN 301 489-3 V2.1.1
- RADIO SPECTRUM (art 3. 2): EN 301 511 V12.5.1, EN 301 908-1 V11.1.1, EN 301 908-2 V11.1.1, EN 300 440 V2.1.1
- SAFETY (art 3.1.a): EN 60950-1:2006 + A11:2009 + A1:2010 + A12:2011 + A2:2013
- RF SAFETY: EN62311:2008
-

Estos estándares armonizados permiten etiquetar al producto con el marcado CE



La documentación técnica referente al equipo anterior está disponible en:

MATRIX ELECTRONICA S.L.U.

Alejandro Sanchez 109

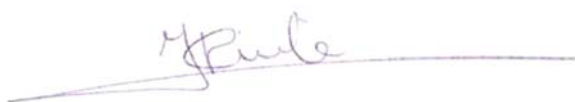
28019 Madrid

España

Madrid, 30/05/2017

Sr. J. Vicente

Managing Board



10.2 Conformidad FCC

MTX-GTW-3G y todas sus variantes contienen el FCC ID: QIPEHS6. El Certificado de Autorización de Equipo de la FCC para el módulo EHS6 está listado con el identificador FCC QIPEHS6

Número de Certificación de Industria en Canadá: 7830A-EHS6 asignado a Gemalto M2M GmbH.

El formulario de referencia del módulo EHS6 registrado bajo el anterior identificador está conforme con las siguientes Reglas y Regulaciones de la Comisión Federal de Comunicaciones (FCC). La potencia listada como ERP para la parte 22 y como EIRP para la parte 24 cumple con las regulaciones de la FCC.

Clase de equipo: Transmisor PCS Licenciado

Notas: Quad band GSM/GPRS Modem

10.2.1 Tasa de absorción específica (SAR)

El modulo Cinterion EHS6 es comercializado sin una antena definida. La ganancia máxima de antena usando antenas de interior depende de la distancia de esta a las personas cercanas y en condiciones normales no debe sobrepasar los límites mostrados en la tabla siguiente.

La máxima potencia de salida medida en la banda de 850MHz es 1866.38 mW (32.71 dBm, ver el reporte de test de 7layers MDE_Siem_0714_FCCb).

La máxima exposición permisible se define en 47 CFR 1.1310 con un valor de 0.55773 mW/cm².

La máxima potencia de salida medida en la banda de 1900 MHz es 974.99 mW (29.89 dBm, ver el reporte de test de 7layers MDE_Siem_0714_FCCc).

La máxima exposición permisible se define en 47 CFR 1.1310 con un valor de 1 mW/cm².

De acuerdo al límite en 47 CFR 1.1310, obtenemos el valor de la máxima ganancia de antena como sigue:

$$S = P \cdot G / 4\pi R^2$$

$$S = 0.55773 \text{ mW/cm}^2 \text{ o } 1 \text{ mW/cm}^2$$

$$P = 1866.38 \text{ mW o } 974.99 \text{ mW}$$

$$R = 20 \text{ cm o } 100\text{cm}$$

$$\pi = 3.1416$$

$$G(\text{dBi}) = 10 \cdot \log_{10}(G)$$

Despejando G; la máxima ganancia de antena es:

| Banda | Distancia | Ganancia Máxima en dBi |
|---------|-----------|------------------------|
| 850MHz | 20cm | 1.7669 |
| 850MHz | 50cm | 9.7257 |
| 1900MHz | 20cm | 7.1227 |
| 1900MHz | 50cm | 15.0815 |

11. Regulatory and type approval information

11.1 Directives and standards

The MTX-GTW-3G modem has been designed to comply with the directives and standards listed below.

It is the responsibility of the application manufacturer to ensure compliance of the final product with all provisions of the applicable directives and standards, as well as with the technical specifications provided in this document.

| Directives | |
|--|---|
| RED Directive 2014/53/EU and R&TTE Directive 99/5/EC | <p>Directive of the European Parliament on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity</p> <p>The product is labeled with the CE conformity mark</p> |
| ECE-R 10 | Economic Commission for Europe (ECE) Regulation No. 10: Uniform provisions concerning the approval of vehicles with regard to electromagnetic compatibility |
| 2002/95/EC (RoHS 1) 2011/65/EC (RoHS 2) | Directive of the European Parliament and of the Council of 27 January 2003 (and revised on 8 June 2011) on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS) |

| Standards of North American type approval | |
|---|---|
| CFR Title 47 | Code of Federal Regulations, Part 22 and Part 24 (Telecommunications, PCS); US Equipment Authorization FCC |
| OET Bulletin 65 (Edition 97-01) | Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields |
| UL 60 950-1 | Product Safety Certification (Safety requirements) |
| NAPRD.03 V5.15 | <p>Overview of PCS Type certification review board Mobile Equipment Type</p> <p>Certification and IMEI control</p> <p>PCS Type Certification Review board (PTCRB)</p> |
| RSS132 (Issue2) RSS133 (Issue5) | Canadian Standard |

| Standards of European type approval | |
|-------------------------------------|---|
| 3GPP TS 51.010-1 | Digital cellular telecommunications system (Release 7); Mobile Station (MS) conformance specification; |
| ETSI EN 301 511 V9.0.2 | Global System for Mobile communications (GSM); Harmonized standard for mobile stations in the GSM 900 and DCS 1800 bands covering essential requirements under article 3.2 of the R&TTE directive (1999/5/EC) |
| GCF-CC V3.49 | Global Certification Forum - Certification Criteria |

| | |
|---|--|
| ETSI EN 301 489-01 V1.9.2 | Electromagnetic Compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common Technical Requirements |
| ETSI EN 301 489-07 V1.3.1 | Electromagnetic Compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 7: Specific conditions for mobile and portable radio and ancillary equipment of digital cellular radio telecommunications systems (GSM and DCS) |
| ETSI EN 301 489-24 V1.5.1 | Electromagnetic Compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 24: Specific conditions for IMT-2000 CDMA Direct Spread (UTRA) for Mobile and portable (UE) radio and ancillary equipment |
| EN 301 908-01 V5.2.1 | Electromagnetic compatibility and Radio spectrum Matters (ERM); Base Stations (BS) and User Equipment (UE) for IMT-2000 Third Generation cellular networks; Part 1: Harmonized EN for IMT-2000, introduction and common requirements of article 3.2 of the R&TTE Directive |
| EN 301 908-02 V5.2.1 | Electromagnetic compatibility and Radio spectrum Matters (ERM); Base Stations (BS) and User Equipment (UE) for IMT-2000 Third Generation cellular networks; Part 2: Harmonized EN for IMT-2000, CDMA Direct Spread (UTRA FDD) (UE) covering essential requirements of article 3.2 of the R&TTE Directive |
| EN 62311:2008 | Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz - 300 GHz) |
| IEC/EN 60950-1:2006+ A11:2009+A1:2010+ A12:2011 | Safety of information technology equipment |

| Requirements of quality | |
|-------------------------|-----------------------|
| IEC 60068 | Environmental testing |
| DIN EN 60529 | IP codes |

| Standards of the Ministry of Information Industry of the People's Republic of China | |
|---|---|
| SJ/T 11363-2006 | “Requirements for Concentration Limits for Certain Hazardous Substances in Electronic Information Products” (2006-06). |
| SJ/T 11364-2006 | <p>“Marking for Control of Pollution Caused by Electronic Information Products” (2006-06).</p> <p>According to the “Chinese Administration on the Control of Pollution caused by Electronic Information Products” (ACPEIP) the EPUP, i.e., Environmental Protection Use Period, of this product is 20 years as per the symbol shown here, unless otherwise marked. The EPUP is valid only as long as the product is operated within the operating limits described in the Gemalto M2M Hardware Interface Description.</p> <p>Please see next table for an overview of toxic or hazardous substances or elements that might be contained in product parts in concentrations above the limits defined by SJ/T 11363-2006.</p> |

| 部件名称 Name of the part | 有毒有害物质或元素 Hazardous substances | | | | | |
|--|--------------------------------|-----------|-----------|-----------------|---------------|-----------------|
| | 铅 (Pb) | 汞 (Hg) | 镉 (Cd) | 六价铬 (Cr(VI)) | 多溴联苯 (PBB) | 多溴二苯醚 (PBDE) |
| 金属部件 (Metal Parts) | O | O | O | O | O | O |
| 电路模块 (Circuit Modules) | X | O | O | O | O | O |
| 电缆及电缆组件 (Cables and Cable Assemblies) | O | O | O | O | O | O |
| 塑料和聚合物部件 (Plastic and Polymeric parts) | O | O | O | O | O | O |
| <p>O: 表示该有毒有害物质在该部件所有均质材料中的含量均在SJ/T11363-2006 标准规定的限量要求以下。 Indicates that this toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in SJ/T11363-2006.</p> <p>X: 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出SJ/T11363-2006标准规定的限量要求。 Indicates that this toxic or hazardous substance contained in at least one of the homogeneous materials used for this part <i>might exceed</i> the limit requirement in SJ/T11363-2006.</p> | | | | | | |

11.2 SAR requirements specific to portable mobiles

Mobile phones, PDAs or other portable transmitters and receivers incorporating a GSM module must be in accordance with the guidelines for human exposure to radio frequency energy. This requires the Specific Absorption Rate (SAR) of portable EHS6 based applications to be evaluated and approved for compliance with national and/or international regulations.

Since the SAR value varies significantly with the individual product design, manufacturers are advised to submit their product for approval if designed for portable use. For European markets the relevant directives are mentioned below. It is the responsibility of the manufacturer of the final product to verify whether or not further standards, recommendations or directives are in force outside these areas.

Products intended for sale in US markets

EN 59005/ANSI C95.1: Considerations for evaluation of human exposure to Electromagnetic Fields (EMFs) from Mobile Telecommunication Equipment (MTE) in the frequency range 30MHz – 6GHz

Products intended for sale in European markets

EN 50360: Product standard to demonstrate the compliance of mobile phones with the basic restrictions related to human exposure to electromagnetic fields (300MHz - 3GHz)

Please note that SAR requirements are specific only for portable devices and not for mobile devices as defined below:

- **Portable device:**
A portable device is defined as a transmitting device designed to be used so that the radiating structure(s) of the device is/are within 20 centimeters of the user's body.
- **Mobile device:**
A mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure(s) and the user's body or that of nearby persons. In this context, the term "fixed location" means that the device is physically secured at one location and cannot be easily moved to another location.

11.3 SELV requirements

The power supply connected to the MTX-3G-JAVA modem shall be in compliance with the SELV requirements defined in EN 60950-1.

12. RoHS Statement

The MTX-GTW modem is compliant with the 2002/95/EC Directive of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS).



13. Disposal of old electrical & electronic equipment



This symbol, applied on our products and/or on its packaging, indicates that this product should not be treated as household waste when you wish to dispose of it. Instead, it should be handed over to an applicable collection point for the recycling of electrical and electronic equipment. By ensuring this product is disposed of correctly, you will help prevent potential negative consequences to the environment and human health, which could otherwise be caused by inappropriate disposal of this product. The recycling of materials will help to conserve natural resources. For more detailed information about the recycling of this product, please contact your local city office, household waste disposal service or the retail store where you purchased this product.

14. Sales contact

www.mtxm2m.com

| Matrix Madrid | Matrix Barcelona | Matrix Bilbao | Matrix Valencia |
|--|--|--|---|
| Matrix Electrónica S.L. C/ Alejandro Sánchez, 109 28019 Madrid (SPAIN) Phone 1: 902 19 81 46 Phone 2: +34915602737 Fax 1: 902 99 54 14 Fax 2: +34915652865 | Matrix Electrónica S.L. Ctra. Rubí a Sabadell Km 13 Nave 109, Oficinas 6-9 08191 Rubí, Barcelona (SPAIN) Phone 1: 902 19 81 46 Fax 1: 902 99 54 14 | Matrix Electrónica S.L. Pol. Aliendalde, 11 Oficina 2G 48200 - Durango, Vizcaya (SPAIN) Phone 1: 902 19 81 46 Fax 1: 902 99 54 14 | Matrix Electrónica S.L. Valencia (SPAIN) Phone 1: 902 19 81 46 Fax 1: 902 99 54 14 |
| Matrix Sevilla | Matrix Lisboa | Matrix Santiago de Chile | |
| Matrix Electrónica S.L. Sevilla (SPAIN) Phone: 902 19 81 46 Fax: 902 99 54 14 Phone 1: 902 19 81 46 Fax 1: 902 99 54 14 | LusoMatrix Lda. Av. Coronel Eduardo Galhardo, 7 1ºC 1170-105 - Lisboa (PORTUGAL) Phone 1: +351218162625 Fax 1: +351218149482 | Matrix Electrónica S.L. Calle Badajoz, 100 Oficina 1305 Santiago de Chile (CHILE) Phone 1: +56(9)53369943 Phone 2: +56(9)74822647 | |
| | | | |