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SMART SOLUTIONS FOR A CHANGING WORLD

MTX-GATEWAY

HARDWARE
USER GUIDE

www.mtxm2m.com

Index

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IMPORTANT INFORMATION

This technical description contains important information for the start up and use of the MTX-Gateway modems. Read it carefully before you start working with the MTX-Gateway 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 contact your local distributor/sales agent or use the details below:

Address: Alejandro Sánchez 109, 28019 Madrid (Spain)
Email: iotsupport@mtxm2m.com
Website: mtxm2m.com

REVISION INFORMATION

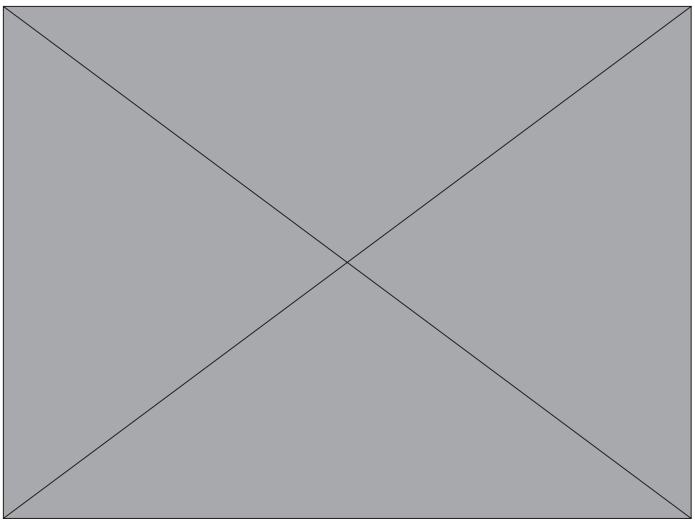
REVISION	DATE	AUTHOR	CHANGES
1.0	2013/07	RR	First draft
1.1	2013/11	RR	General update
1.2	2014/05	RR	HW V1.02 update
1.3	2014/10	AEM/TP	Language style revision
1.4	2014/11	AEM	Added mechanical drawings
1.5	2014/12	AEM	Minor revision
1.6	2015/05	AEM	Minor revision
1.7	2015/08	AEM	Conformity assessment added
1.8	2015/12	AEM	Minor revision
1.95	2017/06	JS	Conformity assessment changes

DESCRIPTION

The MTX-Gateway 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-Gateway.

1. Product Label

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



1. MTX logo
2. Product name (model)
3. Part number/ordering code
4. Hardware and firmware versions
5. Year/week of fabrication
6. IMEI number
7. MAC address
8. Data matrix code (IMEI)
9. Data matrix code (MAC)
10. RoHS symbol
11. CE logo
12. Pb-free symbol
13. WEEE symbol
14. PTCRB certification logo

WARRANTY

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REFERENCES

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

TECHNICAL DATA

1. System Architecture and System Functionality

1.1 Block Diagram

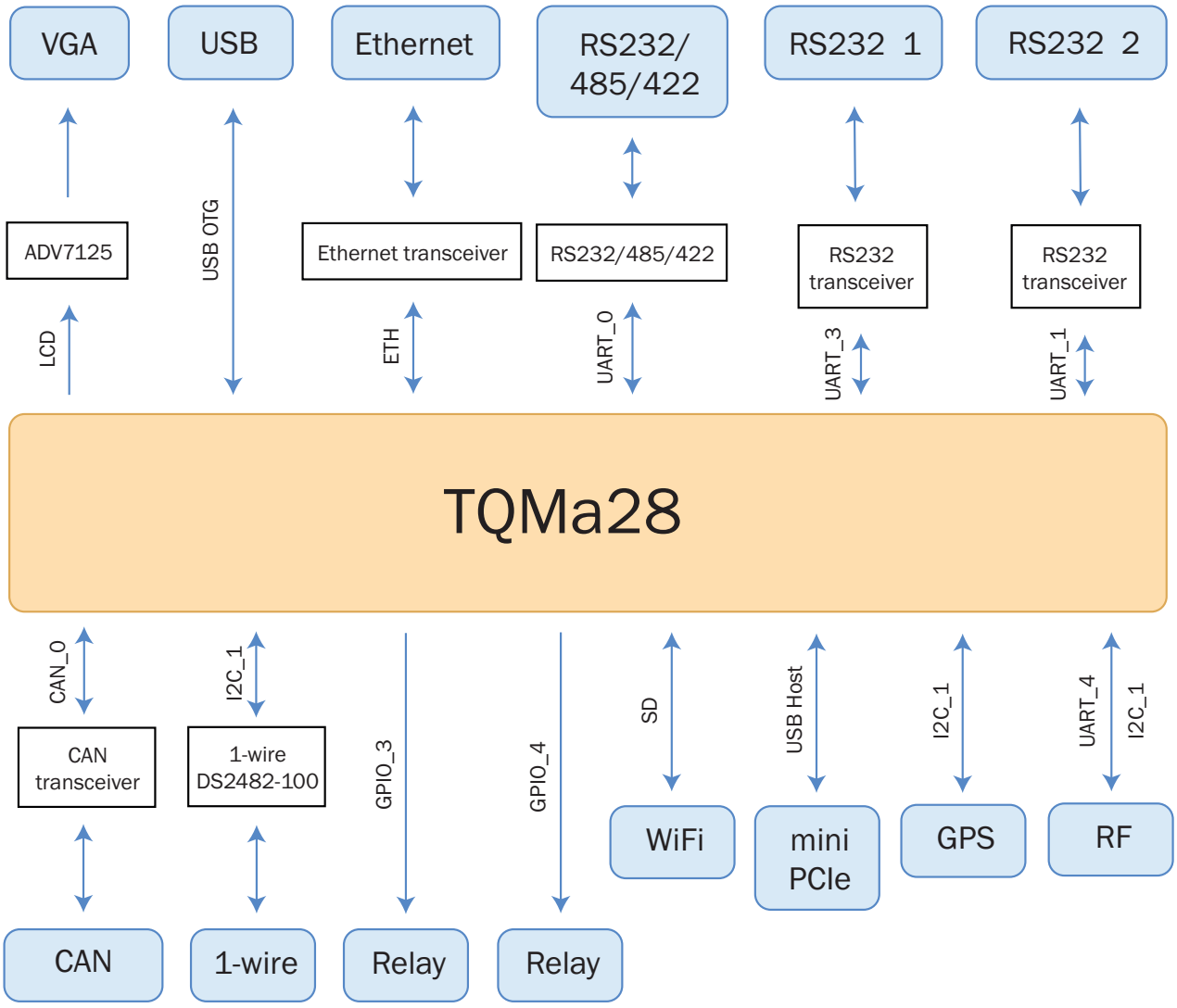


Illustration 1: MTX-Gateway block diagram

1.2 Technical Data Electronics

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

1.2.1 External Interfaces

- 1x VGA
- 1x USB OTG 2.0
- 1x Ethernet
- 1x RS232/485/422
- 2x RS232
- 1x CAN
- 1x 1-Wire
- Up to 2 x Relay
- 1x Power Supply

1.2.2 Internal Interfaces

- 1x TQMa28
- 1x miniPCIe Card
- 1x WiFi b/g/n
- 1x RF Card
- 1x Header for specific extension

1.2.3 User's Interfaces

- 6x Status LEDs
- 2x DIP switch

1.2.4 System Components

- Temperature sensor
- EEprom

1.3 Technical Data Mechanics, Design

Dimensions: PCB (WxDxH) 111x118x25 mm

Weight: < 500g

ELECTRONIC SPECIFICATIONS

1. External Interfaces

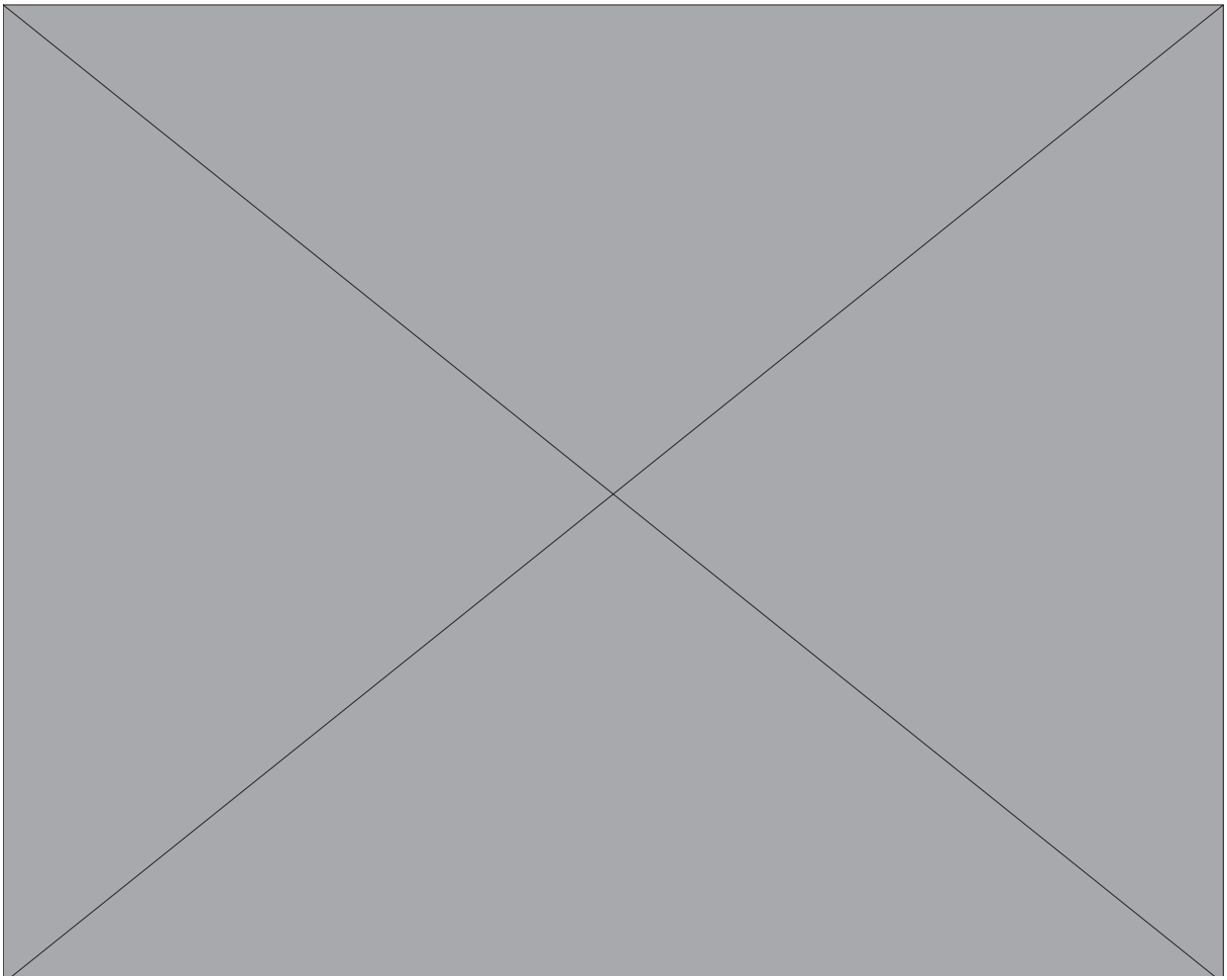
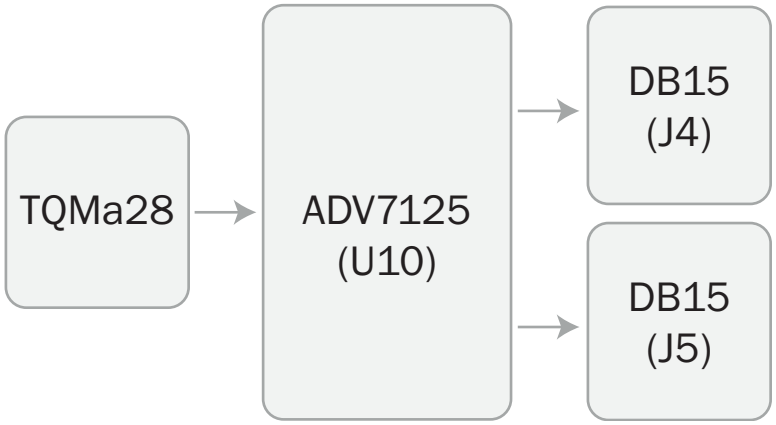


Illustration 2: MTX-Gateway PCB top view

1.1 Function Specification

1.1.1 VGA

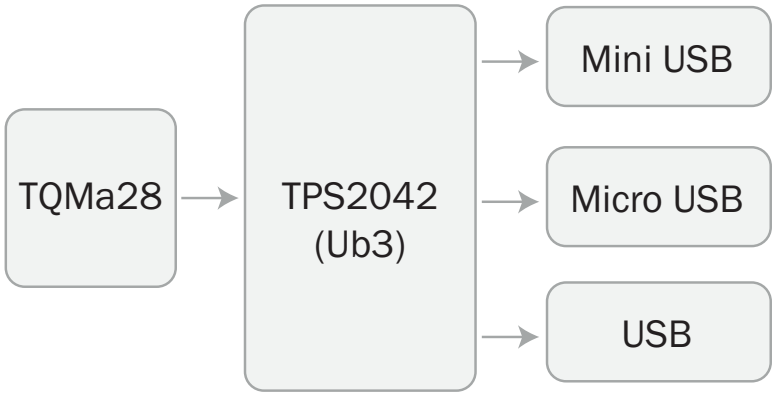
The LCD interface of the TQMa28 drives the Analog Devices ADV7125 to offer a VGA output on the MTX-Gateway.



Type of media:	VGA
Interface on module:	RGB, 18bit
Signal Characteristic:	Compatible with RS-343A and RS-170

1.1.2 USB OTG

The USB OTG interface of the TQMa28 (USB0) is offered as a Mini USB B-Type, Micro USB AB-type or USB A-type (mounting option).

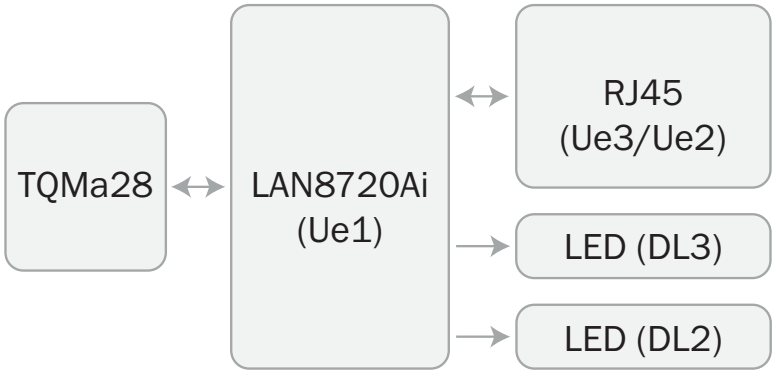


Type of media:	USB OTG 2.0 Hi-Speed, 5V bus voltage (limited to 500mA)
Interface on module:	USB OTG
Signal characteristic:	Compatible with the Universal Serial Bus Specification REV. 2.0
ESD protection:	±15kV human body model

MANUFACTURER	DESCRIPTION
OUPIIN: 8968-A04C00SWA	Top entry USB A (Default)
OUPIIN: 8969-B05C00SBA	Top entry Mini USB B
MOLEX: 47590-0001	Right angle Micro USB AB
OUPIIN: 8968-A04C00RWA	Right angle USB A

1.1.3 Ethernet

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



Type of media: 10/100 Mbit

Signal characteristic: Compatible with the IEEE-802.3 standard

Status LEDs: 2

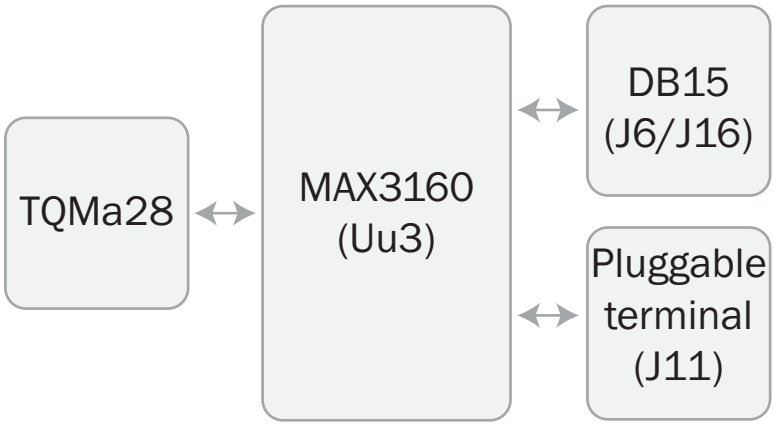
Modes: MDI, Auto-MDIX

Interface on module: RMII/ENET0

MANUFACTURER	DESCRIPTION
Oupiin: 8949-H4D88/06BNA	Top entry RJ45 jack (Default)
Molex: 85502-5008	Right angle RJ45 jack

1.1.4 RS232/485/422

The AUART0 of the TQMa28 drives the RS232/485/422 interface on the MTX-Gateway. 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_1	RS485/RS232#
SW1_2	Half_Duplex/Full_Duplex#

Transfer rate: Up to 10Mbit/s (full-duplex)

Interface on module: AUART0

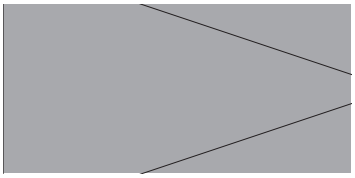
Handshake: RTS# used for clearing the transmission direction

ESD protection: ±15kV human body model

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

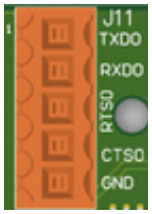
DB15 Connector pinout:

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



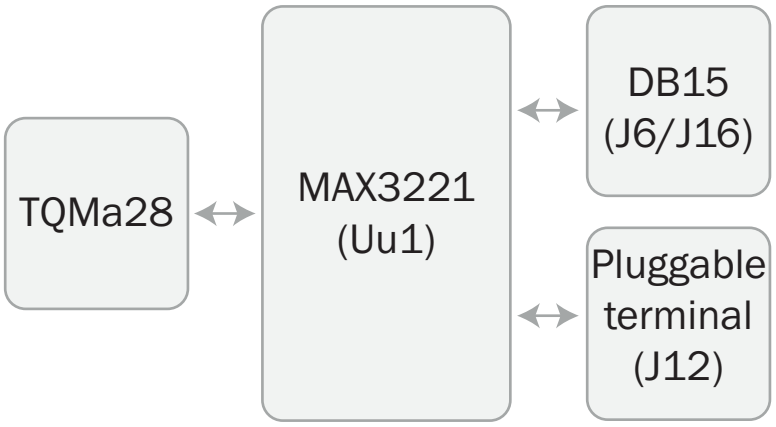
Pluggable terminal pinout (J11):

PIN	SIGNAL	TYPE	REMARK
1	TXD0	O	Transmit Data
2	RXD0	I	Receive Data
3	RTS0	O	Request to Send
4	CTS0	I	Clear To Send
5	GND	P	Ground



1.1.5 RS232_1

The AUART3 interface of the TQMA28 drives the RS232 interface of the MTX-Gateway by default. The Maxim MAX3221EEAE is used as a driver.



Transfer rate: Up to 250Kbit/s

Interface on module: AUART3

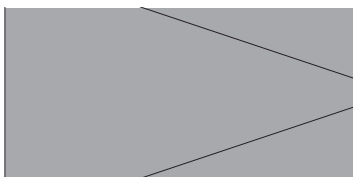
Handshake: None

ESD protection: ±15kV human body model

The following tables show the configuration of the DB15 and Pluggable Terminals of the RS232_1 interface.

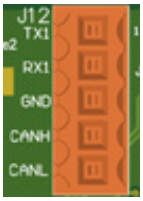
DB15 Connector pinout (J6/J16):

PIN	SIGNAL	TYPE	REMARK
4	TXD1	O	Transmit Data
9	RXD1	I	Receive Data
14	GND	P	Ground



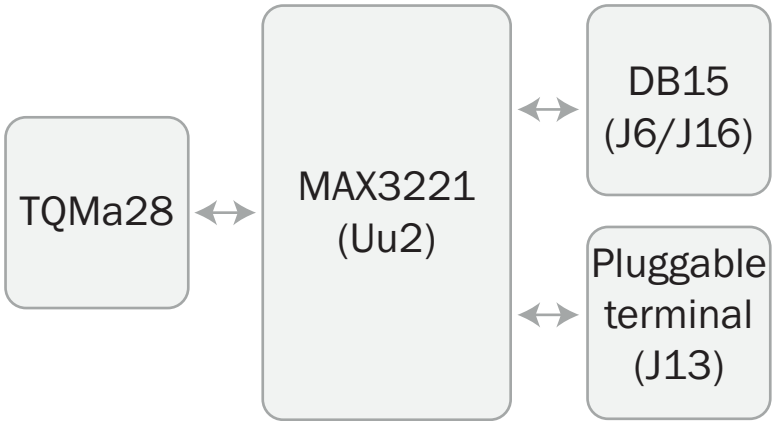
Pluggable terminal pinout (J12):

PIN	SIGNAL	TYPE	REMARK
1	TXD1	O	Transmit Data
2	RXD1	I	Receive Data
3	GND	P	Ground



1.1.6 RS232_2

The AUART1 interface of the TQMA28 drives the RS232 interface of the MTX-Gateway by default. The Maxim MAX3221EEAE is used as a driver.



Transfer rate: Up to 250Kbit/s

Interface on module: AUART1

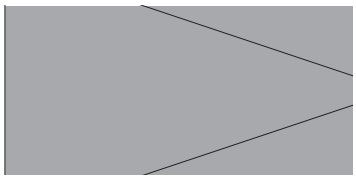
Handshake: None

ESD protection: ±15kV human body model

The following tables show the configuration of the DB15 and Pluggable Terminals of the RS232_2 interface.

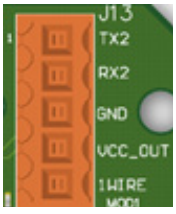
DB15 Connector pinout (J6/J16):

PIN	SIGNAL	TYPE	REMARK
4	TXD2	O	Transmit Data
9	RXD2	I	Receive Data
14	GND	P	Ground



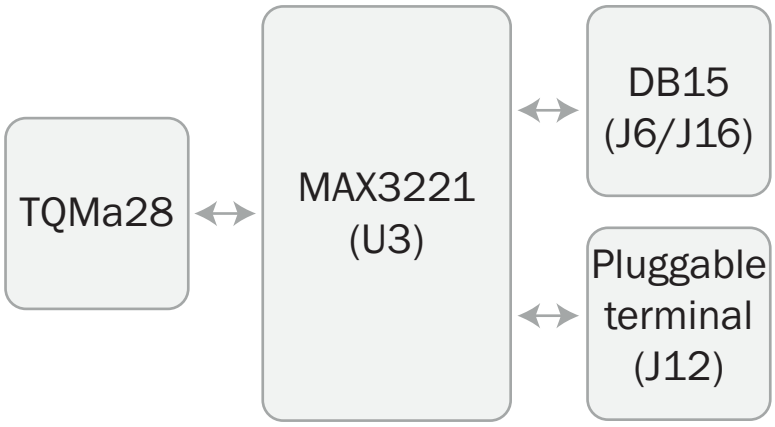
Pluggable terminal pinout (J13):

PIN	SIGNAL	TYPE	REMARK
1	TXD2	O	Transmit Data
2	RXD2	I	Receive Data
3	GND	P	Ground



1.1.7 CAN

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



Transfer rate: Up to 1Mbit/s

Interface on module: CAN_0

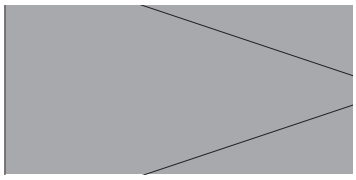
Signal characteristic: Compatible with the ISO-11898 standard (CAN 2.0B)

ESD protection: ±8kV human body model

The following tables show the configuration of the DB15 and Pluggable Terminals of the CAN interface.

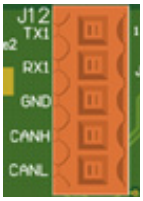
DB15 Connector pinout (J6/J16):

PIN	SIGNAL	TYPE	REMARK
1	CANH	I/O	CAN High-Level I/O
6	CANL	I/O	CAN Low-Level I/O



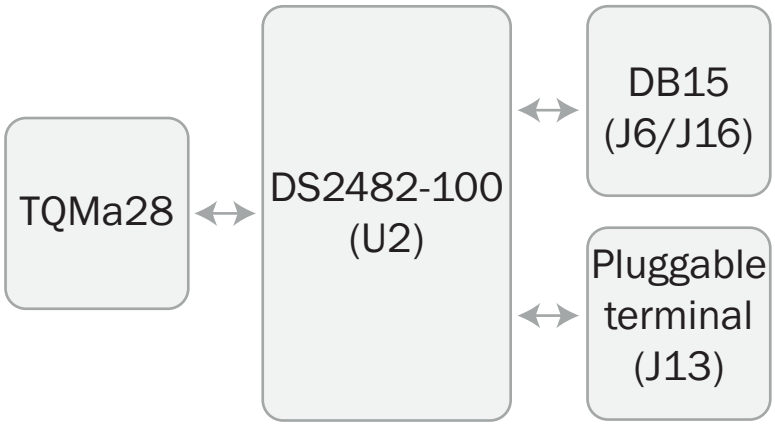
Pluggable terminal pinout (J12):

PIN	SIGNAL	TYPE	REMARK
4	CANH	I/O	CAN High-Level I/O
5	CANL	I/O	CAN Low-Level I/O



1.1.8 1-Wire

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



Transfer rate: Up to 400kHz

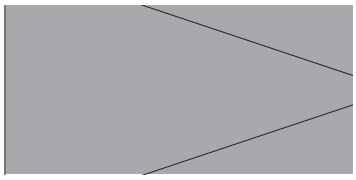
Interface on module: I2C1

Signal characteristic: Standard and Overdrive 1-Wire communication

The following tables show the configuration of the DB15 and Pluggable Terminals of the 1-Wire interface.

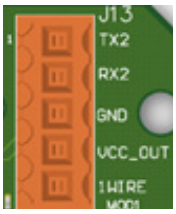
DB15 Connector pinout (J6/J16):

PIN	SIGNAL	TYPE	REMARK
5	1-Wire	I/O	1-Wire



Pluggable terminal pinout (J13):

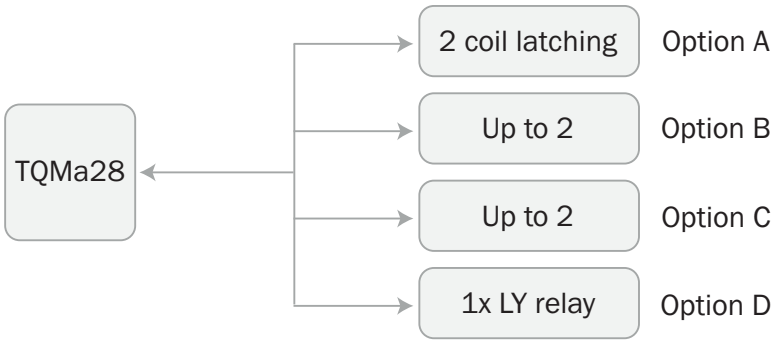
PIN	SIGNAL	TYPE	REMARK
5	1-Wire	I/O	1-Wire



I2C BUS	POSITION	DEVICE	ADDRESS
1	MTX-Gateway	1-Wire DS2482	0x18

1.1.9 Relays

There are four different relay configurations supported by the MTX-Gateway. The device must be ordered with its required corresponding relay.

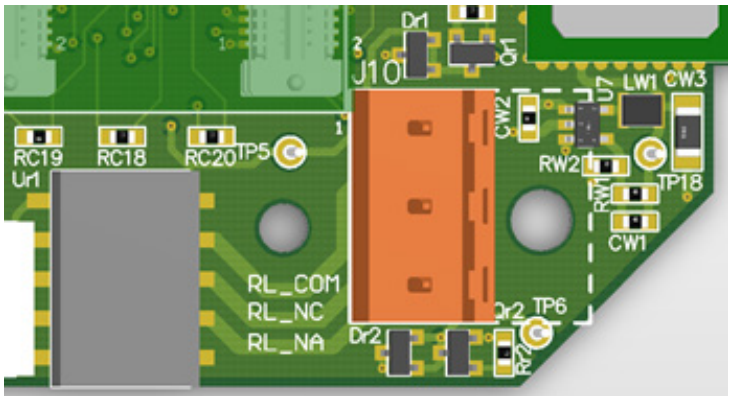


In order to control the chosen relay, the following TQMa28 GPIOs are available:

GPIO	TQMa28 internal GPIO reference
GPIO_3	gpio0_7
GPIO_4	gpio0_16

Option A:

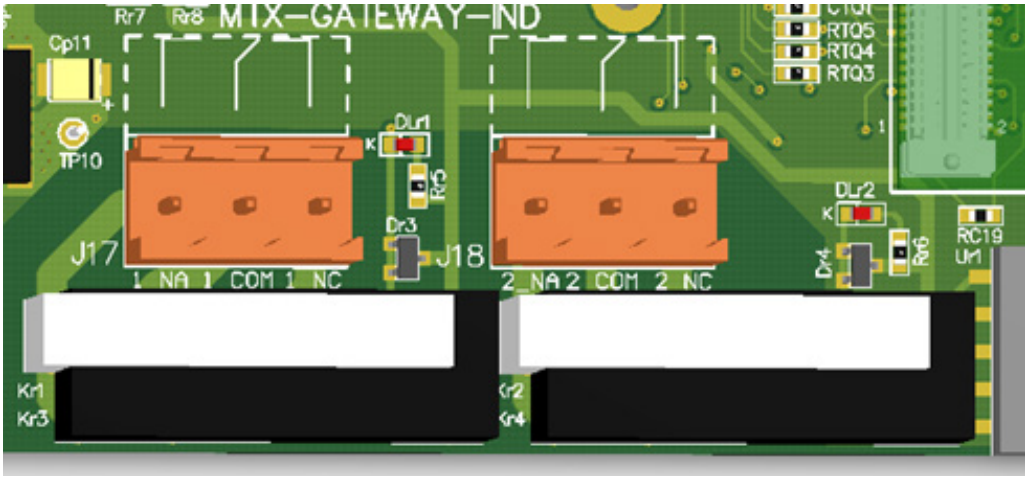
The GPIO_3 drives the SET coil of the Latching Relay meanwhile the GPIO_4 drives the Reset coil. The placement for this option is showed on the following picture (J10).



PIN	SIGNAL	TYPE	REMARK
1	RL_COM	O	Common
2	RL_NC	O	Normally-Closed
3	RL_NA	O	Normally-Open

Option B, C and D:

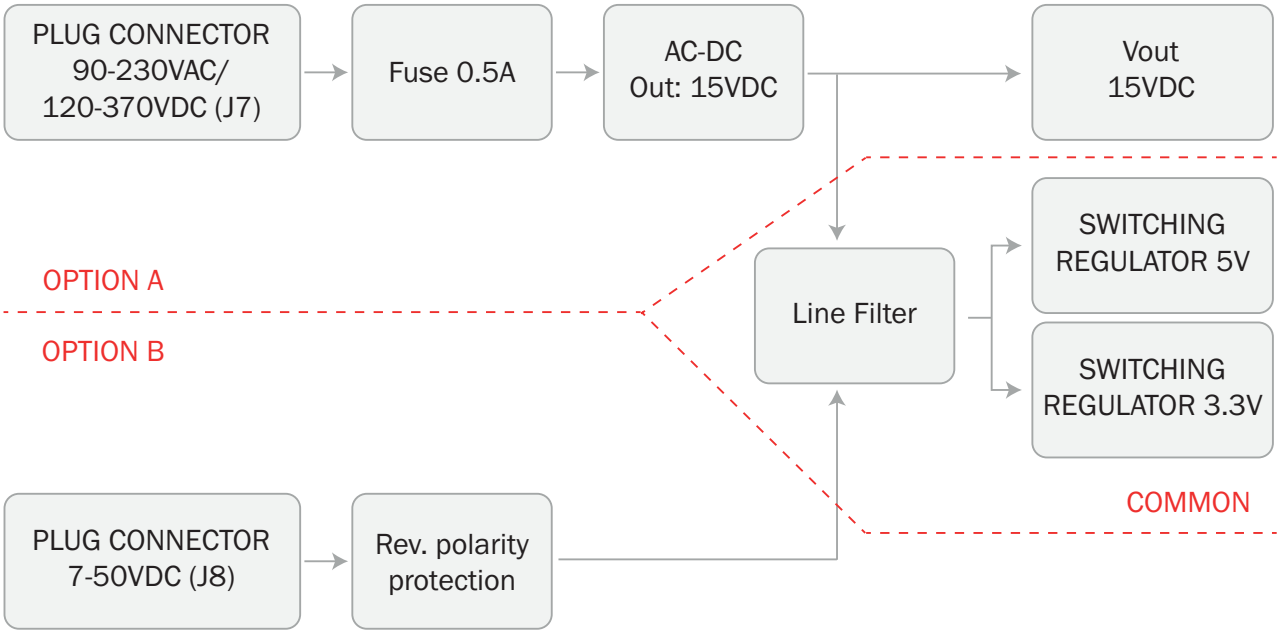
Each GPIO drives one different Relay. The placement for this option is showed on the following picture (J17 and J18).



PIN	SIGNAL	TYPE	REMARK
1	NA	O	Normally-Open
2	COM	O	Common
3	NC	O	Normally-Closed

1.1.10 Power Supply

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



Configuration Option A:

PARAMETER	MIN.	TYP.	MAX.	UNIT
AC Input Voltage	90	240	264	V
DC Input Voltage	120		370	V
Input current			220	mA
Power consumption		3		W
Rated current of the fuse (AC)		0,5		A

Upon request, the configuration described under Option A can meet the following conditions:

PARAMETER	MIN.	TYP.	MAX.	UNIT
AC Input Voltage	5	-	35	V

Configuration Option B:

PARAMETER	MIN.	TYP.	MAX.	UNIT
AC Input Voltage	5	-	35	V
Power consumption		3		W

2. Internal Interfaces

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-modul-tqma28/extb/Main/productdetail/

2.2 miniPCIe Card

A miniPCIe Card slot (also known as Mini PCI Express, Mini PCIe and Mini PCI-E) is available on the MTX-Gateway. The following table shows the buses supported by the device:

BUS	REMARK
USB	USB 2.0
SIM	UIM signals for GSM and WCDMA applications
Diagnostics LEDs	LED_WWAN#
Control signals	PERST#, WDISABLE#

One of the following miniPCIe Cards, already tested by Matrix Electronica, can be included on the MTX-Gateway:

NAME	DESCRIPTION
EHS5-E	Dual-Band UMTS (WCDMA/FDD): 900/2100 MHz
BGS2-W	GPRS Class 10
EWM-W150H01E	USB WiFi 802.11 b/g/n, Ralink RT5390, 1T1R, (2-Antenna)

More miniPCIe cards are available upon request.

2.3 WiFi

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

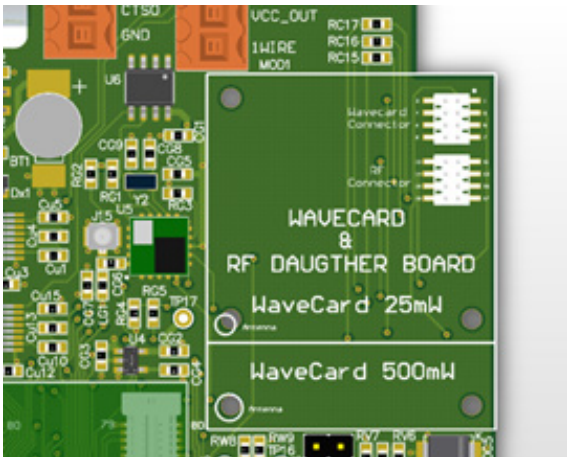
FEATURE	REMARK
IEEE 802.11 b/g/n	Single 2.4GHz band. Symbol rate up to 7.2Mbps
Encryption	WEP, WPA and WPA2
Operation mode	Supports Client and Access Point (Up to 8 clients)
Module interface	SDIO

2.4 RF Card

An RF Card connector is available on the MTX-Gateway. Two complete UART interfaces (RX,TX,CTS,RTS), I2C, and 3 GPIOs are available on this connector. The following table shows the connector pinout (MOD1).

PIN	SIGNAL	TYPE	REMARK
1	UART4_RX	I	UART4 Receive Data
2	UART4_TX	O	UART4 Transmit Data
3	GPIO_7	I/O	gpio0_26
4	GPIO_9	I/O	gpio2_9
5	GPIO_8	I/O	Gpio0_27
6	GND	P	Ground
7	-	-	N.C.
8	VCC	P	5VDC
9	-	-	Not Placed
10	-	-	Not Placed
11	UART4_CTS#	I	UART4 Clear to Send

12	UART4_RTS#	O	UART4 Request to Send
13	I2C_SCL	O	I2C Clock signal
14	I2C_SDA	I/O	I2C Data signal
15	UART3_RX	I	UART3 Receive Data
16	UART3_TX	O	UART3 Transmit Data
17	UART3_CTS#	I	UART3 Clear to Send
18	UART3_RTS#	O	UART3 Request to Send



2.4.1 Wavecard

The MOD1 connector has been designed in order to allow the connection of one Coronis Wavecard module. The following table shows the key features of this module.

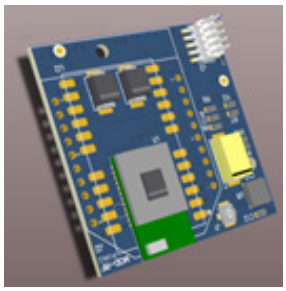
FEATURE	DESCRIPTION
Frequency	868/433/915MHz
Network Topology	Point-to-Point, Star and Mesh
Typical Transfer rate	9,6 kbps @ 433 & 868 MHz 19,2 kbps @ 915MHz
Line-of-sight	25mW: Up to 1km 500mW: Up to 4km
Dimensions	25mW: 30x28x7 mm 500mW: 37x30x7 mm

Detailed information about this module can be found on the following link: http://www.coronis.com/en/wavecard.html

2.4.2 MOD-RF

The MOD1 connector also supports the connection of the Matrix Electronica MOD-RF module. The following table shows the key features of this module.

FEATURE	DESCRIPTION
RF Technology	Bluetooth 2.1 (Bluegiga WT12) Bluetooth 4.0 (Bluegiga BLE112) Xbee Form Factor compatible RF 2,4GHz (Amber 8426: 868/WMBUS)



2.5 Extension Header

T.B.D

3. User Interfaces

3.1 Status LED

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

LED	STATUS REMARK
DL1	Connected to miniPCIe Card WWLAN# signal.
DLp1	On when 5VCC is good
DL4	On when 3,3VCC is good
DL2	Ethernet link activity LED indication
DL3	Ethernet link speed LED indication (On with 100Mbps, OFF with 10Mbps)
DLp2	Free for User information. Connected to gpio3_6

3.2 DIP Switches

The MTX-Gateway has two Dip-Switches for configuration purposes. The following tables show information about the signals connected to each Dip Switch.

SW1:

PIN	SIGNAL	REMARK
8	LCD_D04	Booting Configuration Signals Check TQMa28 User Guide for more information
7	LCD_D03	
6	LCD_D02	
5	LCD_D01	
4	LCD_D00	
3	LCD_RS	
2	LCD_DEBUG	
1	GPIO_6	Input signal for User information. Connected to gpio0_24

SW1:

PIN	SIGNAL	REMARK
1	SW2_1	Connected to RS485/RS232#. (Default OFF=RS232)
2	SW2_2	Connected to Half_Duplex/Full_Duplex#. (Default OFF = Full-Duplex)
3	3,3VDC	VCC_OUT (J6/J16). ON = 3,3VDC
4	5VDC	VCC_OUT (J6/J16). ON = 5VDC
5	USB_0_ID	USB OTG Identification. (OFF=OTG, ON=Only Host)
6	-	
7	-	
8	-	

4. System Components

4.1 Temperature Sensor

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

I2C BUS	POSITION	DEVICE	ADDRESS
1	TQMa28	Temperature sensor - LM73	0x49

4.2 EEPROM

A 64Kibit EEPROM (ST Microelectronics M24C64-WDW6TP) is on the TQMa28 module. The EEPROM is controlled via the processor's I2C bus 1. 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

4.3 RTC

A DS1339U RTC module is on the MTX-Gateway board. The RTC is supplied by a super capacitor in order to maintain the information should the main supply be removed.

I2C BUS	POSITION	DEVICE	ADDRESS
1	MTX-Gateway	RTC DS1339U-33	0x68

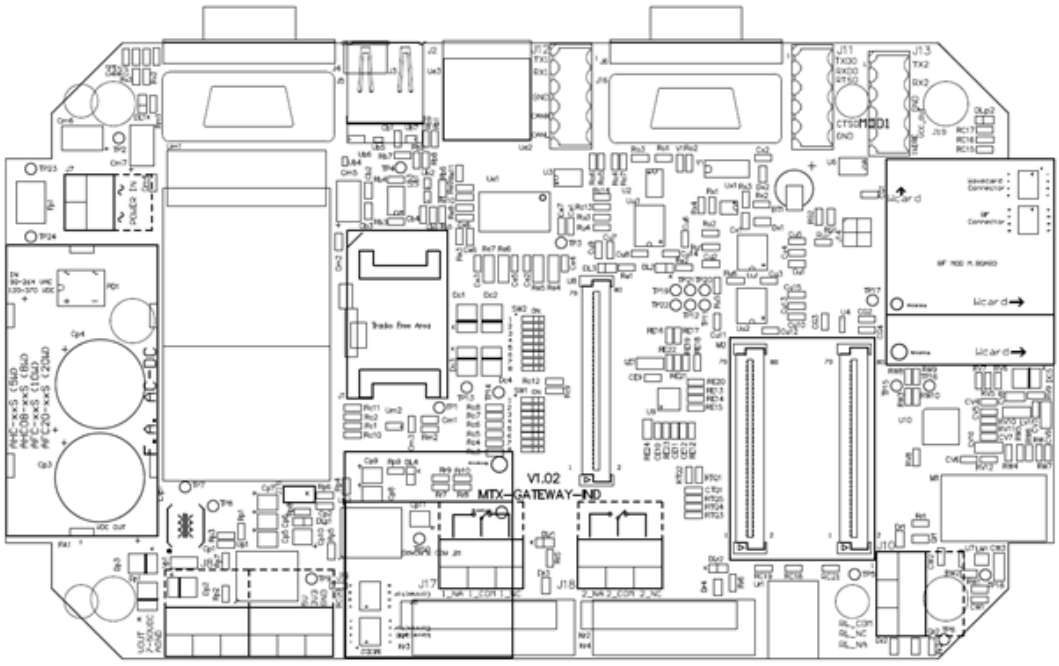
MECHANIC SPECIFICATIONS

1. Construction

PCB outlines including mounting holes

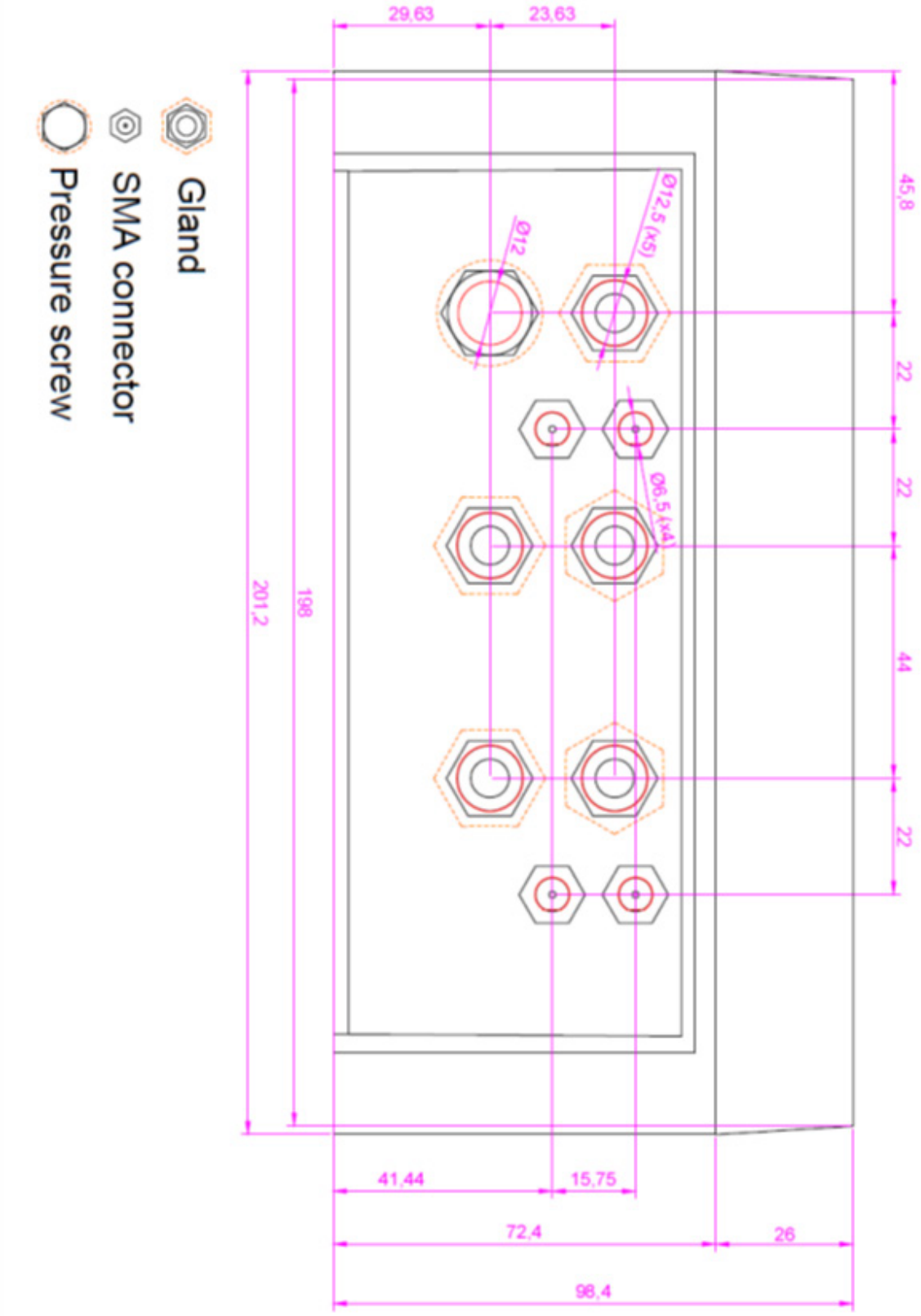
1.1 PCB Outlines MTX-Gateway

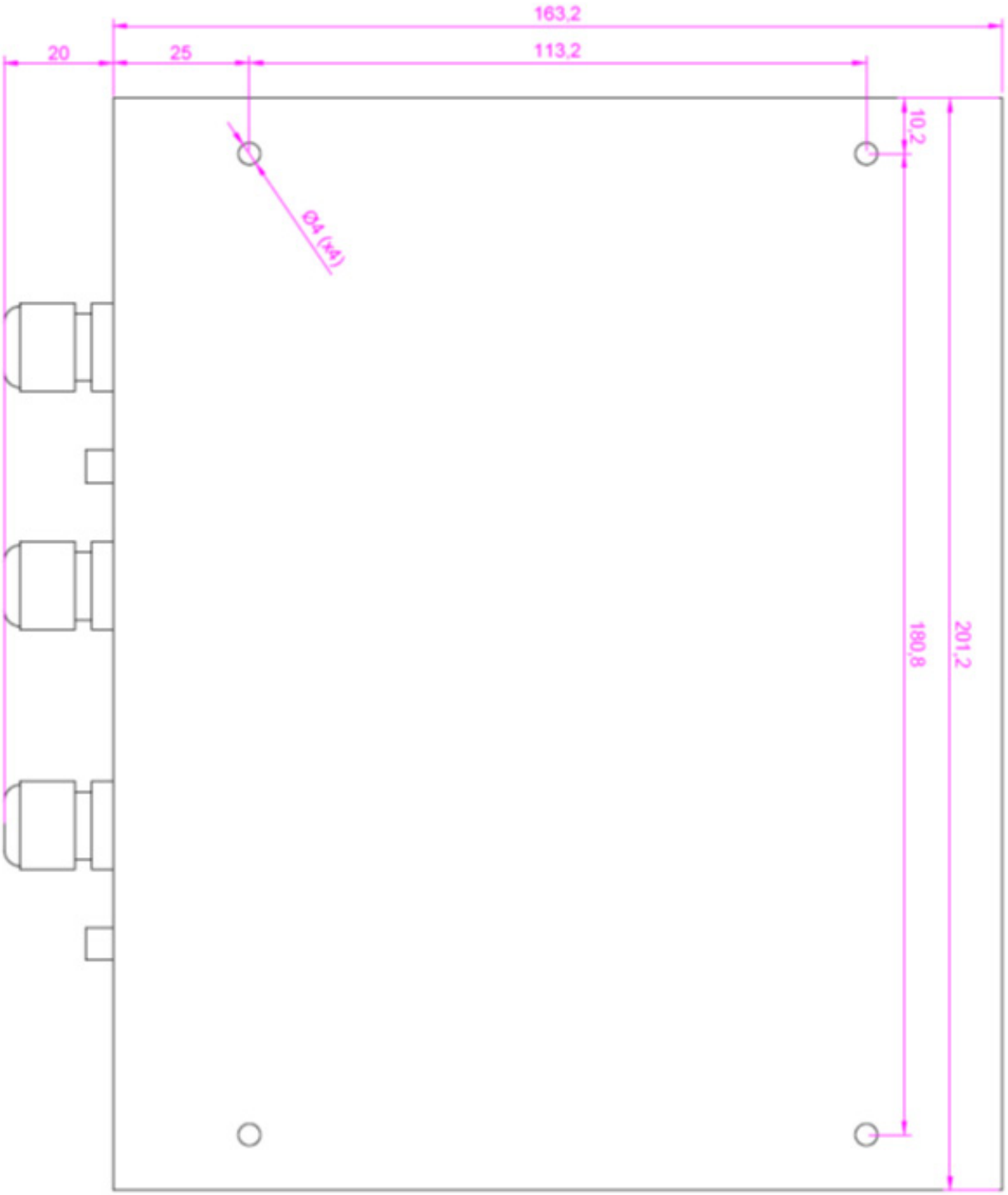
1.2 MTX-Gateway PCB Top View

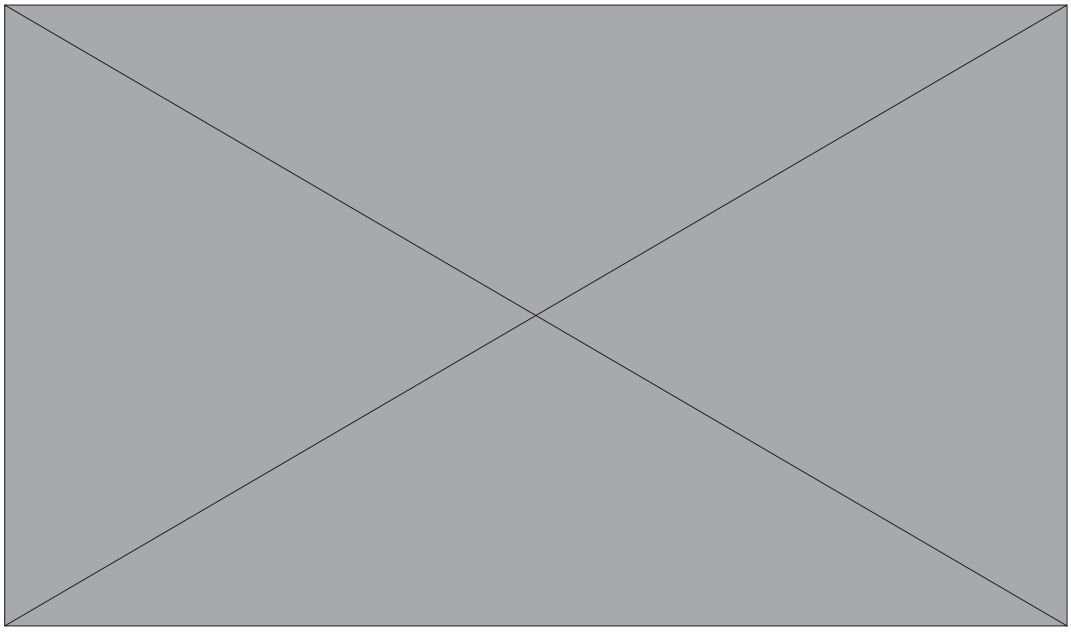


MTX © by MATRIX ELECTRONICA S.L.U.

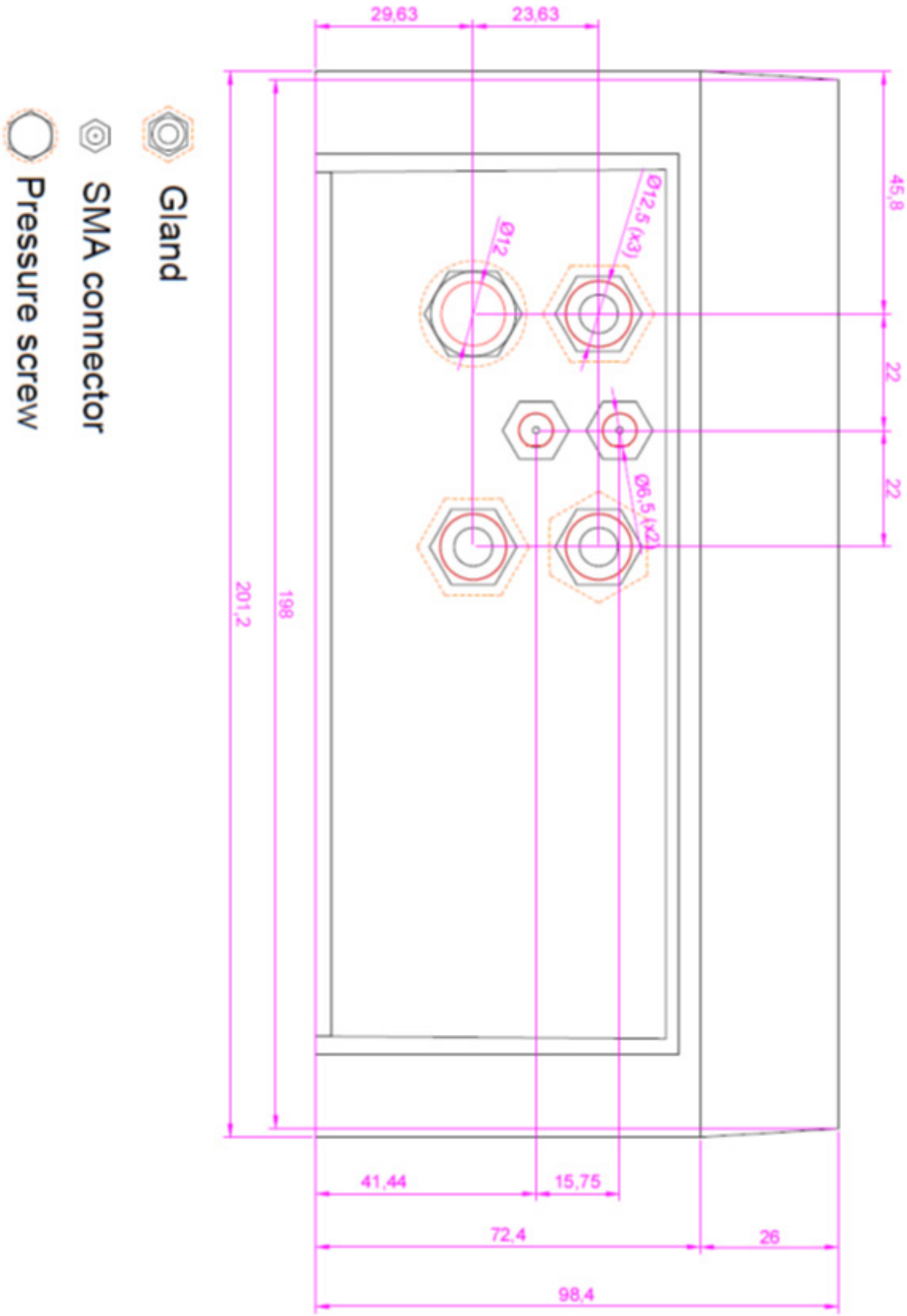
1.3 MTX-Gateway Enclosure Drawings

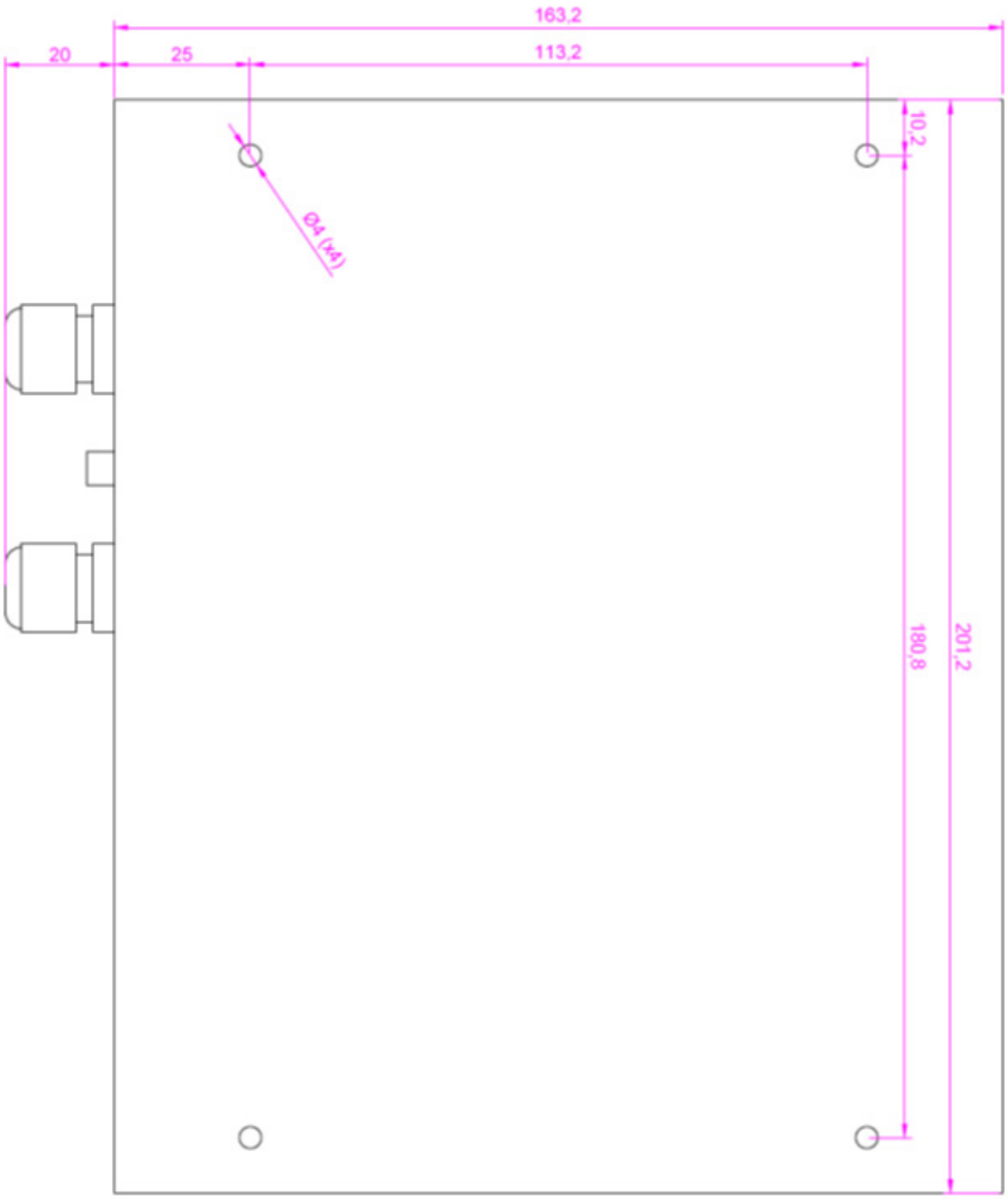



163,2
20
25
113,2
10,2
Ø4 (x4)
180,8
201,2



1.4 MTX-Gateway-LC Enclosure Drawings




163,2
20
25
113,2
10,2
Ø4 (x4)
180,8
201,2

2. General Precautions

The MTX-Gateway has an IP65 enclosure which protects itself again dust, external impact and contact. However, as the MTX-Gateway PCB can be bought as a standalone product, the following points must be considered:

2.1 Protection Against External Effects

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

2.2 Thermal Management

The main heat source is the TQMa28 (in case of the use of a miniPCIe Card, this also has to be taken into account). Information on the cooling of the TQMa28 is to be taken from its specification.

SAFETY REQUIREMENTS AND PROTECTION REGULATIONS

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

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.

2. General Precautions

The MTX-Gateway 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-Gateway 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-Gateway 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-Gateway terminal.

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

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.

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.

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-Gateway 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-Gateway 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.

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-Gateway 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.

CONFORMITY ASSESSMENT

RED Declaration of Conformity (DoC)

Unique identification of this DoC: MTX-Gateway RED DoC

We

MATRIX ELECTRÓNICA S.L., C/ Alejandro Sanchez 109, 28019 Madrid, Spain

declare under our sole responsibility that the products MTX-Gateway family

MTX-Gateway	199802101
MTX-Gateway-3G (EHS6)	199802121
MTX-Gateway-3G-GPS (EHS8)	199802144
MTX-Gateway-4G-GPS (PLS8-E)	199802104
MTX-Gateway-OEM	199802106
MTX-Gateway-LC	199802111
MTX-Gateway-LC-OEM	199802107

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.

CE

- 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 ELECTRÓNICA S.L., C/ Alejandro Sanchez 109, 28019 Madrid, Spain

Madrid, 30/05/2017

Mr. J. Vicente

Managing Board

1. PTCRB Approval

PTCRB is the regional approval needed in North American Market.

MTX-Gateway is now PTCRB Certified:

Request #: 39216

Manufacturer: Matrix Electronica

Model #: MTX-Gateway

Technologies and Frequency Bands: GSM 850/900/1800/1900, UMTS FDD: Band I/Band II/Band V/ Band VIII

FCCID: QIPEHS6

Industry Canada #: 7830A-EHS6

IMEI TAC: 35888405

Hardware Version: 1.12

Software Version: 02.000

SVN: 08

NAPRD.03 Version: GSM Test: 5.15/OTA Performance Test: 5.15

2. FCC Compliant

MTX-Gateway 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.

2.1 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/cm^2.

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/cm^2.

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

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

S = 0.55773 mW/cm^2 or 1 mW/cm^2

P = 1866.38 mW or 974.99 mW

R = 20 cm or 100cm

π = 3.1416

G(dBi)=10*log10(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

3. AT&T Certification

AT&T performed applicable testing on the MTX-Gateway. This includes testing for:

- Negative impacts on AT&T's wireless network
- Baseline regulatory confirmation
- RF testing against components in the wireless AT&T network
- Network selection testing

The MTX-Gateway device was not observed to cause any adverse problems to the AT&T network when activated and used in the lab. The MTX-3G-JAVA is certified for both CS and PS services (as applicable). Any change to the mode of operation invalidates the AT&T Certification.

DECLARACIÓN DE CONFORMIDAD (SPANISH)

MATRIX ELECTRÓNICA S.L., C/ Alejandro Sanchez 109, 28019 Madrid, Spain

1. Estándares de homologación europea

Declaramos bajo nuestra responsabilidad que los productos MTX-Gateway que contienen un modulo celular Cinterion EHS6 (tipo L30960-N2950-A100), al cual se refiere esta declaración, están 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

CE

La documentación técnica referente al equipo anterior está disponible en:

MATRIX ELECTRÓNICA S.L., C/ Alejandro Sanchez 109, 28019 Madrid, Spain

Madrid, 30/05/2017

Sr. J. Vicente

Managing Board

2. Aprobación PTCRB

PTCRB es un aprobado regional necesario en el mercado norteamericano.

MTX-Gateway tiene la certificación PTCRB:

Solicitud #: 39216

Fabricante: Matrix Electronica

Modelo#: MTX-Gateway

Tecnologías y bandas de frecuencias: GSM 850/900/1800/1900, UMTS FDD: Band I/Band II/Band V/ Band VIII

FCCID: QIPEHS6

Industry Canada #: 7830A-EHS6

IMEI TAC: 35888405

Version Hardware: 1.12

Version Software: 02.000

SVN: 08

NAPRD.03 Version: GSM Test: 5.15/OTA Performance Test: 5.1

3. Conformidad FCC

MTX-Gateway 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.

3.1 Tasa de absorción específica (SAR)

El módulo 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/cm^2.

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/cm^2.

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

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

S = 0.55773 mW/cm^2 o 1 mW/cm^2

P = 1866.38 mW o 974.99 mW

R = 20 cm o 100cm

π = 3.1416

G(dBi)=10*log10(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

4. Certificación AT&T

AT&T ha realizado los test aplicables al terminal MTX-Gateway. Esto incluye las siguientes comprobaciones:

- Impactos negatives en la red inalámbrica de AT&T
- Confirmación del cumplimiento de la normativa básica aplicable
- Prueba de RF contra los distintos components usados en la red de AT&T
- Prueba de selección de red

El dispositivo MTX-Gateway no ha evidenciado ni causado ningún tipo de problema en la red de AT&T cuando ha sido activado y utilizado en el laboratorio. El MTX-3G-JAVA está certificado para servicios CS y PS. Cualquier cambio en el modo de operación del equipo invalidará la certificación de AT&T.

REGULATORY AND TYPE APPROVAL INFORMATION

1. Directives and Standards

The MTX-Gateway 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	
1999/05/EC	Directive of the European Parliament and of the council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity (in short referred to as R&TTE Directive 1999/5/EC). The product is labeled with the CE conformity mark.
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	Overview of PCS Type certification review board Mobile Equipment Type. Certification and IMEI control. PCS Type Certification Review board (PTCRB).
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 Tech. 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 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	“Marking for Control of Pollution Caused by Electronic Information Products.” (2006-06) 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? 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.

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

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.

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 *might exceed* the limit requirement in SJ/T11363-2006.

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.

3. SELV Requirements

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

ROHS STATEMENT

The MTX-Gateway 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).

DISPOSAL OF OLD ELECTRICAL AND ELECTRONIC EQUIPMENT DESCRIPTION

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.

MTBF

Standard IEC61709 (SN 29500) “Electronic components - Reliability - Reference conditions for failure rates and stress models for conversion.”

Ambient temperature: 25ºC

24h/day powered and 22h/day idle mode, 2h/day talktime

MTTF/h: 1685393

MTTF/year 192.40

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