# MXE-100i Series

## MXE-101i

IoT Gateway

**User's Manual**




**Manual Rev.:** 2.00

**Revision Date:** May 29, 2015

**Part No:** 50-1Z185-2000

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

**Advance Technologies; Automate the World.**

# Revision History

| Revision | Release Date | Description of Change(s) |
|---|---|---|
| 2.00 | May 29, 2015 | Initial Release |


LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

# Preface

**Copyright 2015 ADLINK Technology, Inc.**

This document contains proprietary information protected by copyright. All rights are reserved. No part of this manual may be reproduced by any mechanical, electronic, or other means in any form without prior written permission of the manufacturer.

**Disclaimer**

The information in this document is subject to change without prior notice in order to improve reliability, design, and function and does not represent a commitment on the part of the manufacturer.

In no event will the manufacturer be liable for direct, indirect, special, incidental, or consequential damages arising out of the use or inability to use the product or documentation, even if advised of the possibility of such damages.

**Environmental Responsibility**

ADLINK is committed to fulfill its social responsibility to global environmental preservation through compliance with the European Union's Restriction of Hazardous Substances (RoHS) directive and Waste Electrical and Electronic Equipment (WEEE) directive. Environmental protection is a top priority for ADLINK. We have enforced measures to ensure that our products, manufacturing processes, components, and raw materials have as little impact on the environment as possible. When products are at their end of life, our customers are encouraged to dispose of them in accordance with the product disposal and/or recovery programs prescribed by their nation or company.

**Trademarks**

Product names mentioned herein are used for identification purposes only and may be trademarks and/or registered trademarks of their respective companies.



LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

## Conventions

Take note of the following conventions used throughout this manual to make sure that users perform certain tasks and instructions properly.




Additional information, aids, and tips that help users perform tasks.




Information to prevent ***minor*** physical injury, component damage, data loss, and/or program corruption when trying to complete a task.




Information to prevent ***serious*** physical injury, component damage, data loss, and/or program corruption when trying to complete a specific task.



LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

# Table of Contents

**Preface** ..... **iii**

**List of Tables** ..... **ix**

**List of Figures** ..... **xi**

**1 Introduction** ..... **1**

1.1 Overview ..... 1
1.2 Features ..... 2
1.3 Specifications ..... 3
1.4 Unpacking Checklist ..... 5
1.5 Mechanical Drawings ..... 6
1.6 Front Panel I/O Connectors ..... 8
1.6.1 Power Button ..... 8
1.6.2 LED Indicators ..... 9
1.6.3 Reset Button ..... 9
1.6.4 Dual Fast Ethernet Ports ..... 9
1.7 (Right) Side Panel I/O Connectors ..... 9
1.7.1 DB-9P COM Port Connector ..... 10
1.8 Internal I/O Connectors ..... 12
1.8.1 DC 5V and 3.3V Connectors for GPS Module ..... 14
1.8.2 USIM Port ..... 14
1.8.3 Extendable Power/Reset/LED ..... 14

**2 Getting Started** ..... **17**

2.1 Installing a Mini-PCIe Device ..... 17
2.2 Connecting DC power ..... 24
2.3 DIN-RAIL mounting of the MXE-100i ..... 26
2.4 Cooling Considerations ..... 27

**A Appendix: Using IDP** ..... **29**



LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

A.1 MXE-100i Setup ..... 29
A.2 MXE-100i Network Connection ..... 32
To the internet or another network ..... 32
To a local network ..... 32
To WiFi-enabled devices ..... 32
A.3 Wind River Web Interface (webif) ..... 33

**B Appendix: Watchdog Timer (WDT) & DI/O Function Libraries ..... 35**
B.1 WDT with API ..... 35
InitWDT ..... 35
SetWDT ..... 36
B.2 DI/O with API ..... 38
GPIO_Init ..... 38
GPI_Read() ..... 38
GPO_Write() ..... 39
GPO_Read() ..... 39

**C Appendix: BIOS Setup ..... 41**
C.1 Main ..... 42
C.1.1 BIOS Information ..... 42
C.1.2 System Time/System Date ..... 42
C.2 Advanced ..... 43
C.2.1 COM Port Settings ..... 44
C.3 Security ..... 45
User Password ..... 45
C.4 Boot ..... 46
Boot Option Priorities ..... 46
C.5 Exit ..... 46
Save Changes and Exit ..... 47
Discard Changes and Exit ..... 47
Save Changes and Reset ..... 47
Discard Changes and Reset ..... 47


LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Save Changes ..... 47
Discard Changes ..... 47
Restore Defaults ..... 47
Save as User Defaults ..... 47
Restore User Defaults ..... 47
Launch EFI Shell from filesystem device ..... 47

**Important Safety Instructions ..... 49**

**Getting Service ..... 51**



LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

This page intentionally left blank.


Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

# List of Tables

Table 1-1: MXE-100i Front Panel I/O Connector Legend ..... 8
Table 1-2: LED Indicators ..... 9
Table 1-3: Gigabit Ethernet Port LED Function ..... 9
Table 1-4: MXE-100i Rear Panel I/O Connector Legend ..... 10
Table 1-5: DB-9P COM Port Pin Assignment ..... 11
Table 1-6: MXE-100i Internal I/O Legend ..... 13
Table 1-7: DC 5V and 3.3V Connectors Pin Assignments ..... 14
Table 1-8: Extendable Power/Reset Connectors Pin Assignments ..... 15



LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

This page intentionally left blank.


Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

# List of Figures

Figure 1-1: MXE-100i Functional Block Diagram ..... 5
Figure 1-2: Top View ..... 6
Figure 1-3: Front View ..... 7
Figure 1-4: (Right) Side View ..... 7
Figure 1-5: Front Panel I/O ..... 8
Figure 1-6: (Right) Side Panel I/O ..... 10
Figure 1-7: DB-9P COM Port ..... 11
Figure 1-8: Mainboard Top View ..... 12
Figure 1-9: Mainboard Underside View ..... 13
Figure 1-10: DC 5V and 3.3V Connectors Configuration ..... 14
Figure 1-11: Extendable Power/Reset Configuration ..... 15



LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

This page intentionally left blank.


Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

# 1 Introduction




## 1.1 Overview

ADLINK's new Matrix MXE-100i ultra-compact embedded IoT gateway, based on the Intel® Quark™ SoC processor X1021, delivers reliable I/O design for maximum connectivity. A full aluminum alloy enclosure with industry-class construction makes it the embedded system of choice for industrial automation and applications demanding reliability in harsh environments.

Combined with ADLINK's embedded SEMA Cloud solution, the MXE-100i delivers manageability and robustness required by mission critical operations. In addition, the MXE-100i fully supports Intel® Gateway Solutions for the Internet of Things (IoT), integrated Wind River® Intelligent Device Platform XT, and McAfee Embedded Control, together guaranteeing the cornerstone manageability and security critical to IoT-ready platforms.

With its two Fast LAN, two COM, three USB 2.0 host ports, optional four isolated DI and four isolated DO, dual mini PCIe slots and USIM socket support communication with connections such as WiFi, BT, and 3G, the MXE-100i enables seamless interconnection, ensuring interoperability between systems. Matrix's proven rugged construction assures operation in harsh environments with operating shock tolerance up to 100 G and an extended optional operating temperature range of -20°C to 70°C.

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Implementing the Intel® IoT Gateway Solution with ADLINK's SEMA, the MXE-100i maximizes manageability and security for a world of applications, delivering efficient remote monitoring of system activity and health in real time, complete control over a robust secured channel, and fully manageable utilization of system resources. All told, the MXE-100i presents an intelligent, robust embedded system supporting wide application development and easy service deployment, for outstanding performance in facility management, industrial automation, and IoT applications.

## 1.2 Features

- Intel® Quark™ SoC processor X1021
- Extremely compact: 120 (W) x 100 (D) x 55 (H) mm
- Rich I/O:
  - 3 x USB 2.0, 2x Fast Ethernet ports, 2x COM ports, optional 4 isolated DI/O
  - 2x mPCIe slots, 1x USIM socket, 1x SDIO
- Optional DIN-rail/wall mounting
- Included ADLINK SEMA Cloud solution
- Full support for Intel® Gateway Solutions for the Internet of Things (IoT)

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

## 1.3 Specifications

| | |
|---|---|
| **System Core** | |
| Processor | Intel® Quark™ X1021 |
| Chipset | SoC with processor |
| Console | Output via RS-232(COM1) |
| Memory | 1GB DDR3 800MHz memory down |
| **I/O Interface** | |
| Ethernet | 2 Fast Ethernet |
| Serial Ports | 1x RS-232 (COM1)<br>1x BIOS-programmable RS-232/422/485 (Serial) |
| USB | 3 x USB 2.0 |
| DI/O | 4 optional DI/O w/ 1.5KV isolation |
| Mini PCIe | 2 internal PCIe mini card sockets |
| USIM | 1 USIM socket for 3G communication (used for a<br>3G-mini module ) |
| WDT | Supports watchdog timer |
| **Power Supply** | |
| DC Input | Built-in 6-36 VDC wide-range DC input<br>3P pluggable connectors with latch (GND, V-, V+) |
| AC Input | Optional 80 W external AC-DC adapter for AC input |
| **Storage** | |
| SD | 1 SD slot (SD/SDHC up to 16G) |
| **Physical** | |
| Dimensions | 120 (W) x 100 (D) x 55 (H) mm (4.68” x 3.9” x 2.17”) |
| Weight | 650 g (1.43 lbs) |
| Mounting | DIN-RAIL / Wall-mount kit |
| **Environmental** | |
| Operating Temperature | Standard: 0°C to 50°C |
| Extended Temperature | -20°C to 70°C (w/ industrial SD) |

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

| | |
|---|---|
| Storage Temperature | -40°C to 85°C (excl. HDD/SDD/CFAST) |
| Humidity | ~95% @ 40°C (non-condensing) |
| Vibration | Operating, 5 Grms, 5-500 Hz, 3 axes (w/ SD) |
| ESD | Contact +/-4 KV and Air +/-8 KV |
| Shock | Operating, 50 G, half sine 11 ms duration (w/ SD) |
| EMC | CE and FCC Class A |
| Safety | UL, CB |


NOTE:

Cold boot of the system at -20°c and operation with 100% loading at 70°c is provided when the industrial solid-state drive storage option is implemented.

| **Power Consumption** | | |
|---|---|---|
| Power off | 0.3W | In shutdown mode with DC input and only USB keyboard/mouse |
| System Idle | 4.3W | Under OS with no application programs executed |
| Processor full load | 6.7W | Under OS with 100% CPU utilization and 2D/3D graphics load |
| System full load | 8.3W | Under OS with 100% CPU utilization and simultaneous access to all I/O devices |
| Recommended power supply | 80W | With consideration of voltage de-rating under high environmental temperature |

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

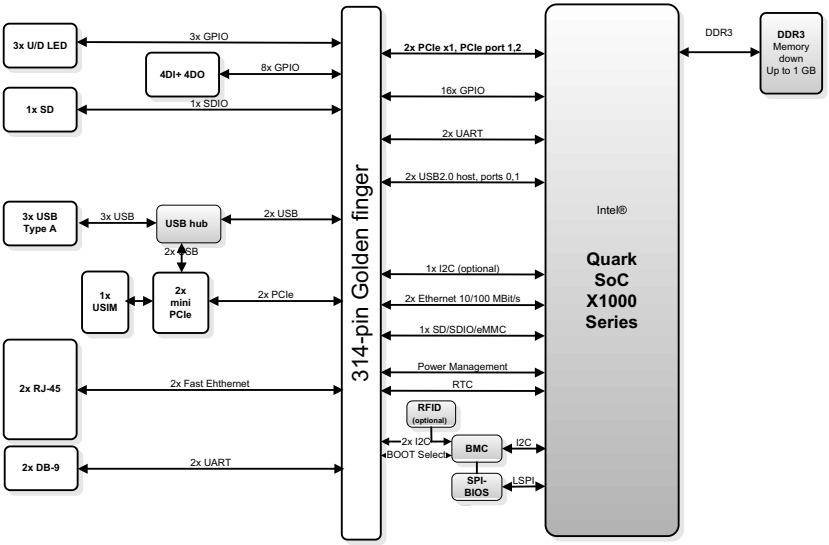



**Figure 1-1: MXE-100i Functional Block Diagram**

## 1.4 Unpacking Checklist

Before unpacking, check the shipping carton for any damage. If the shipping carton and/or contents are damaged, inform your dealer immediately. Retain the shipping carton and packing materials for inspection. Obtain authorization from your dealer before returning any product to ADLINK. Ensure that the following items are included in the package.

- MXE-100i unit
- DIN-RAIL/wall-mounting brackets
- Screw pack for DIN-RAIL/wall-mounting and storage fixing
- Quick Start Guide

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

## 1.5 Mechanical Drawings

NOTE: All dimensions shown are in millimeters (mm) unless otherwise stated.

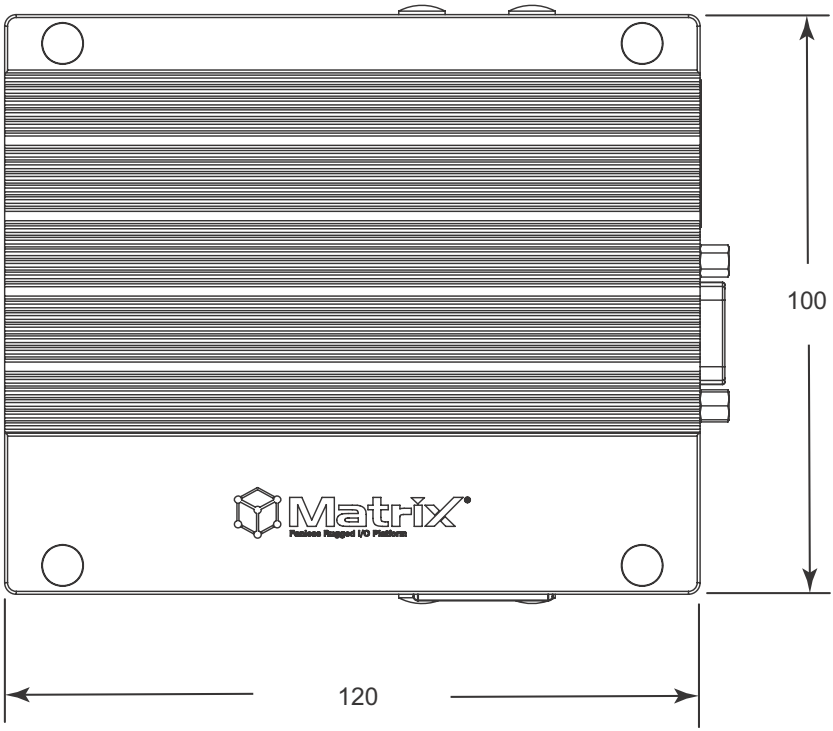



**Figure 1-2: Top View**

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

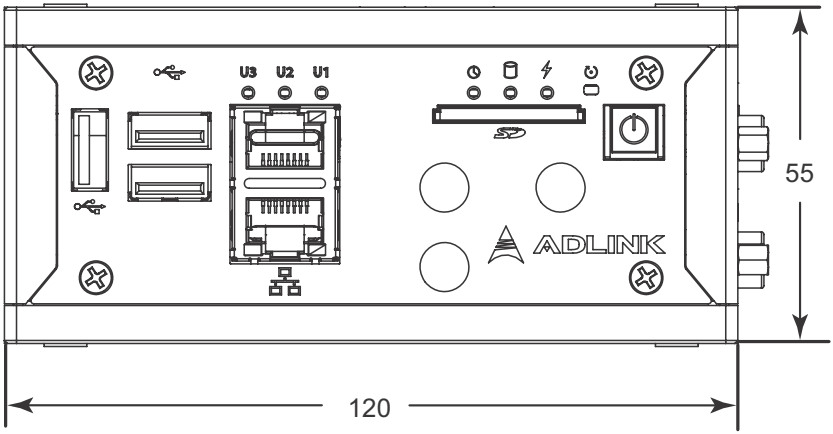



**Figure 1-3: Front View**

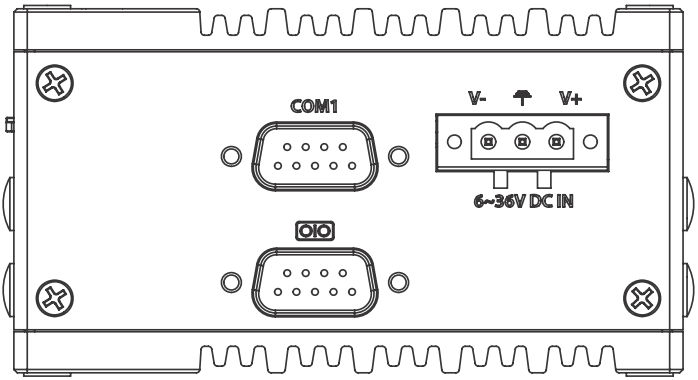



**Figure 1-4: (Right) Side View**

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

## 1.6 Front Panel I/O Connectors

This section describes the I/O connectors located on the front panel of the MXE-100i.

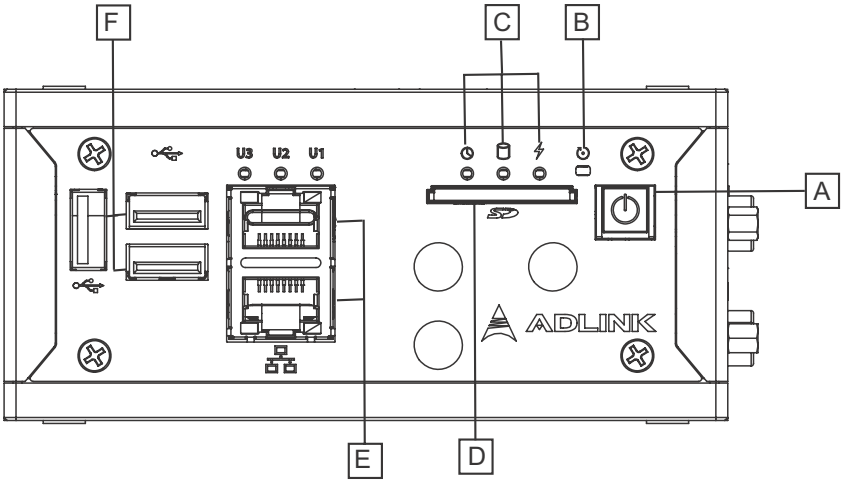



**Figure 1-5: Front Panel I/O**

| | | | |
|---|---|---|---|
| **A** | Power Button | **D** | SD Card |
| **B** | Reset Button | **E** | Fast LAN Port x2 |
| **C** | LED Indicators | **F** | USB 2.0 Port x3 |

**Table 1-1: MXE-100i Front Panel I/O Connector Legend**

### 1.6.1 Power Button

The power button is a non-latched push button with a blue LED indicator. System is turned on when button is pressed, and the power LED lit. If the system hangs, depressing the button for 5 seconds powers down the system.

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

### 1.6.2 LED Indicators

In addition to the LED of the power button, three LEDs on the front panel indicate the following operations.

| Indicator | Color | Description |
|---|---|---|
| Watchdog (WDT) | Yellow | Indicates watchdog timer status. Flashes when watchdog timer starts, and when timer is expired, system will auto-reboots. |
| Hard disk drive | Orange | When blinking, indicates the SATA hard driver is active |
| Standby | Blue | Indicates the system is in power standby mode |

**Table 1-2: LED Indicators**

### 1.6.3 Reset Button

The reset button executes hard reset for the MXE-100i.

### 1.6.4 Dual Fast Ethernet Ports

The two Fast Ethernet ports on the front panel are based on X1021 MAC and Ti DP83849 PHY.

| LED | LED Color | Status | Description |
|---|---|---|---|
| Active/Link | Yellow | OFF | Ethernet port is disconnected |
| | | ON | Ethernet port is connected with no activity |
| | | Flashing | Ethernet port is connected and active |
| Speed | Green | OFF | 10 Mbps |
| | | Green | 100 Mbps |

**Table 1-3: Gigabit Ethernet Port LED Function**

## 1.7 (Right) Side Panel I/O Connectors

This section describes I/O connectors located on the side panel of the MXE-100i.

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

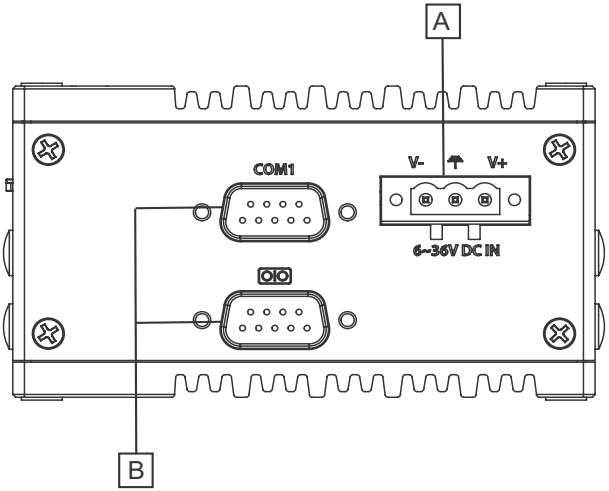



**Figure 1-6: (Right) Side Panel I/O**

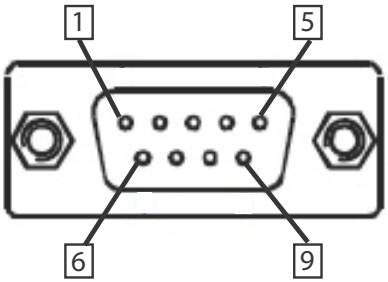
| | |
|---|---|
| **A** | DC power supply connector |
| **B** | DB-9P COM Ports |

**Table 1-4: MXE-100i Rear Panel I/O Connector Legend**

### 1.7.1 DB-9P COM Port Connector

2 serial ports connect via DB-9P connectors.

COM1 supports RS-232, and the other selectively supports RS-232/ RS-422/ RS-485 mode by BIOS setting.




LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

**Figure 1-7: DB-9P COM Port**

| Pin | Signal | | |
|---|---|---|---|
| | **RS-232** | **RS-422** | **RS-485** |
| 1 | N/C | TXD422- | 485DATA- |
| 2 | RXD | TXD422+ | 485DATA+ |
| 3 | TXD | RXD422+ | N/C |
| 4 | N/C | RXD422- | N/C |
| 5 | GND | N/C | N/C |
| 6 | N/C | N/C | N/C |
| 7 | RTS# | N/C | N/C |
| 8 | CTS# | N/C | N/C |
| 9 | N/C | N/C | N/C |

**Table 1-5: DB-9P COM Port Pin Assignment**

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

## 1.8 Internal I/O Connectors

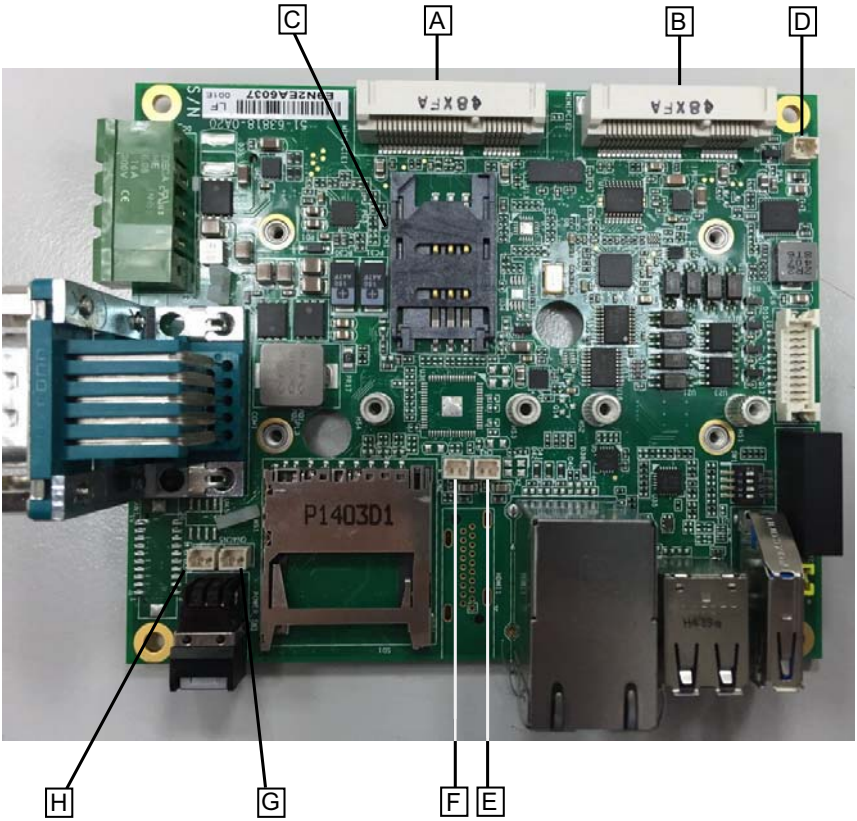



**Figure 1-8: Mainboard Top View**

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

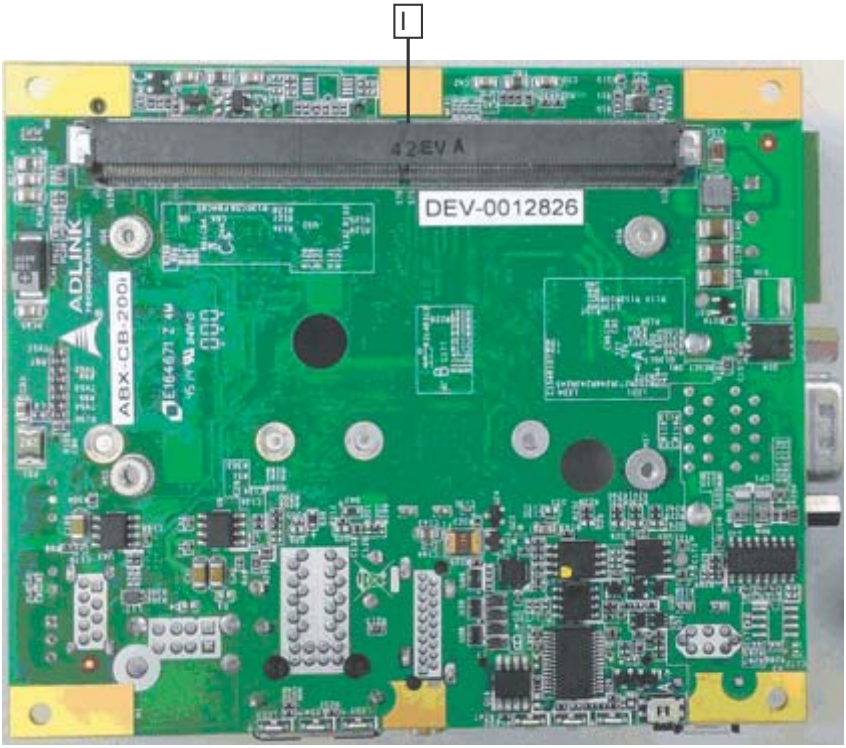



**Figure 1-9: Mainboard Underside View**

| | | | |
|---|---|---|---|
| **A** | Mini-PCIe slot1 | **F** | DC 5V connector for GPS module |
| **B** | Mini-PCIe slot2 | **G** | Extended reset wafer |
| **C** | USIM slot | **H** | Extended power wafer |
| **D** | RTC battery wafer | **I** | SMARC module slot |
| **E** | DC 3.3V connector for GPS module | | |

**Table 1-6: MXE-100i Internal I/O Legend**

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

### 1.8.1 DC 5V and 3.3V Connectors for GPS Module

The two power connectors, for GPS module use, carry a maximum current rating of 1A each.

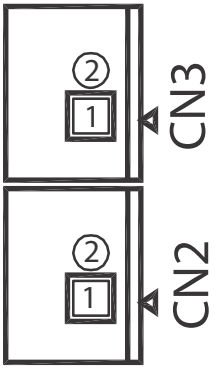



**Figure 1-10: DC 5V and 3.3V Connectors Configuration**

| Pin | Description |
|---|---|
| **CN19** | |
| 1 | +5V |
| 2 | Gnd |
| **CN20** | |
| 1 | +3.3V |
| 2 | Gnd |

**Table 1-7: DC 5V and 3.3V Connectors Pin Assignments**

### 1.8.2 USIM Port

Use of 3.5G mini-PCIe module requires a SIM card for communication with a telecom operator. The MXE-100i provides a USIM port connected to the mini-PCIe connector, with which a SIM card and 3.5G mini-PCIe module can be installed to facilitate 3.5G communication.

### 1.8.3 Extendable Power/Reset/LED

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

The MXE-100i provides internal connectors for the Power button (from CN5) and Reset button (CN4) assigned as shown.

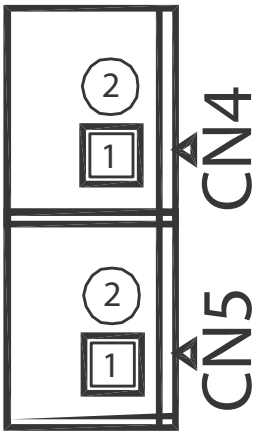



**Figure 1-11: Extendable Power/Reset Configuration**

| Pin | Description |
|---|---|
| **CN4** | |
| 1 | Reset Button |
| 2 | GND |
| **CN5** | |
| 1 | Power Button |
| 2 | GND |

**Table 1-8: Extendable Power/Reset Connectors Pin Assignments**

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

This page intentionally left blank.

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

# 2 Getting Started

This chapter discusses installation of a mini-PCI-E module and mSATA. Wall-mount installation is also described.

## 2.1 Installing a Mini-PCIe Device

Before installing, remove the chassis underside as follows.

1. Remove the 8 screws as shown.




COM1
V-
V+
6V~36V DC IN








Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

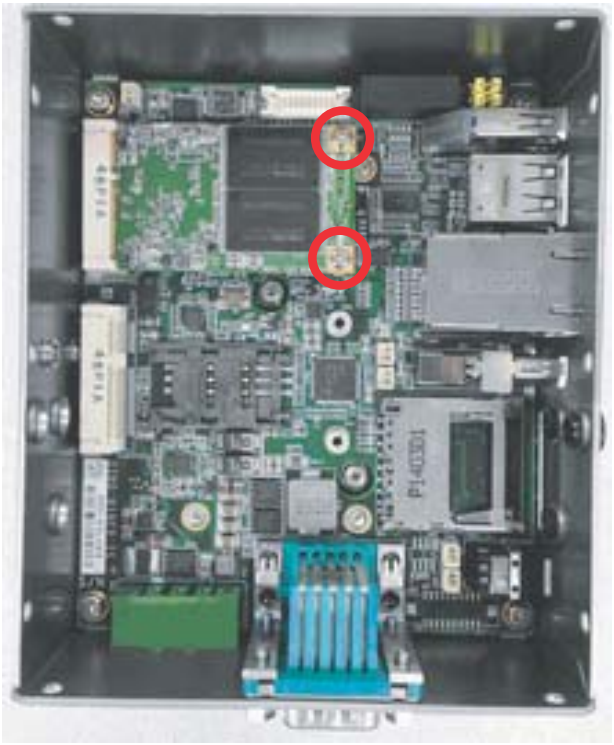
2. Remove the chassis underside.



3. Insert the mini-PCIE module into the slot at an angle



4. Depress the mini-PCI-E module until seated and fix with two 2 M2.5-P-head-L5 screws.



5. Insert the mini-PCIE wireless module into the slot at an angle.



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

6. Depress the mini-PCI-E wireless module until seated and fix with two 2 M2.5-P-head-L5 screws.




## 2.2 Connecting DC power

WARNING:

Before providing DC power to the MXE-100i, ensure the voltage and polarity provided are compatible with the DC input. Improper input voltage and/or polarity can be responsible for system damage.

The DC power input connector of the MXE-100i utilizes V+, V- , and chassis ground pins, and accepts input voltage as shown previously.

1. Connect DC power cables as shown.
2. Fix the DC connector using the 2 screws.



LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000




LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

## 2.3 DIN-RAIL mounting of the MXE-100i

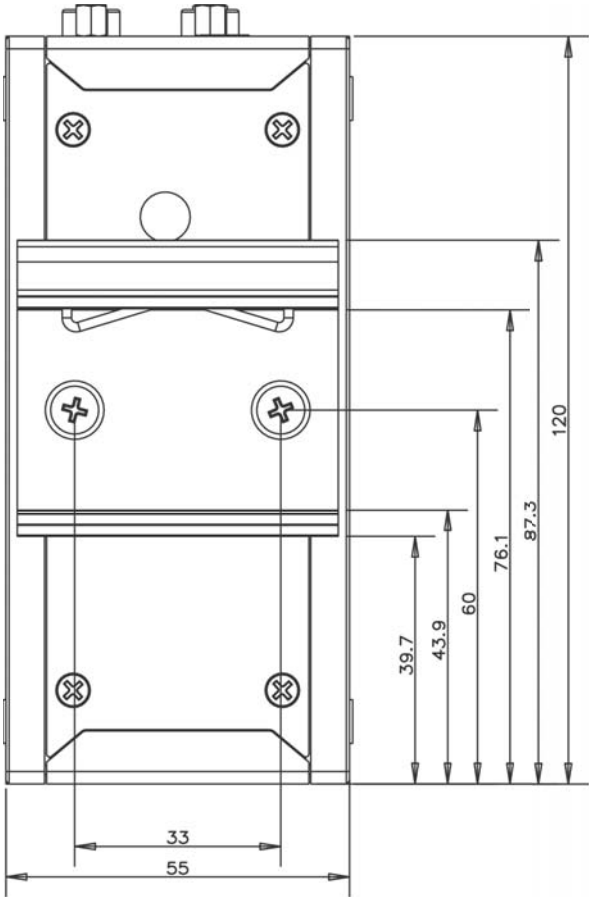
The MXE-100i controller is shipped with DIN-RAIL mounting brackets and accessory screws, with mounting procedures as follows.

1. Prepare the one DIN-RAIL mount brackets and 2 M4-F head screws included in the package.



2. Use the 2 included M4-F head screws to fix the DIN-RAIL mount brackets to the chassis, according to the spacing dimensions of the screw holes and brackets, as shown.

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000




## 2.4 Cooling Considerations

Heat-generating components of the MXE-100i (such as CPU and PCH) are all situated on the left side of the system. These components directly contact the heat sink via thermal pads and dissipate heat generated by the components. To maximize efficiency of heat dissipation, maintain a minimum of 2 inches (5 cm) clearance on the top of the MXE-100i.

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

This page intentionally left blank.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

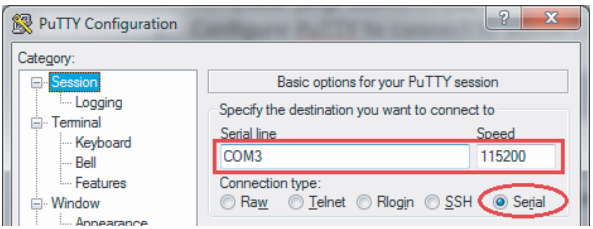
# Appendix A Using IDP

## A.1 MXE-100i Setup

The platform is designed for headless operation and does not support keyboard, mouse or video output. Connection must be made remotely using terminal over serial connection (RS232).

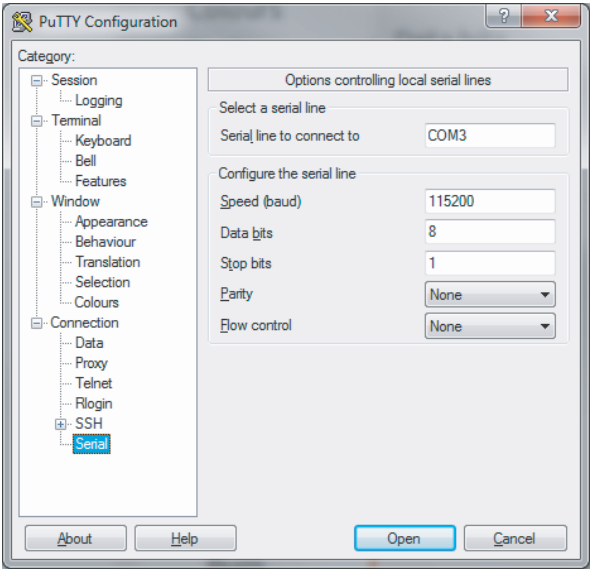
NOTE: The following procedure is based on a system on which PuTTY has been installed. PuTTY for Windows is available for download at: http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html

1. Connect the RS-232 console port on the MXE-100i to the host computer with the USB DB-9 to USB adapter. A COM port (COM3 in this example) appears in the host computer's listings as follows.






LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

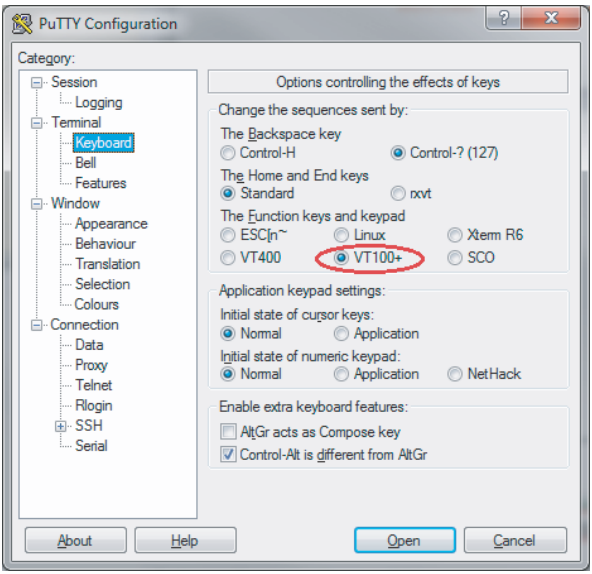



2. Configure PuTTY to connect to the new COM port with settings as follows:

| | |
|---|---|
| **Serial line** | COM3 (in this example) |
| **Speed** | 115200 |
| **Data bits** | 8 |
| **Stop bits** | 1 |
| **Parity** | None |
| **Flow control** | None |


LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

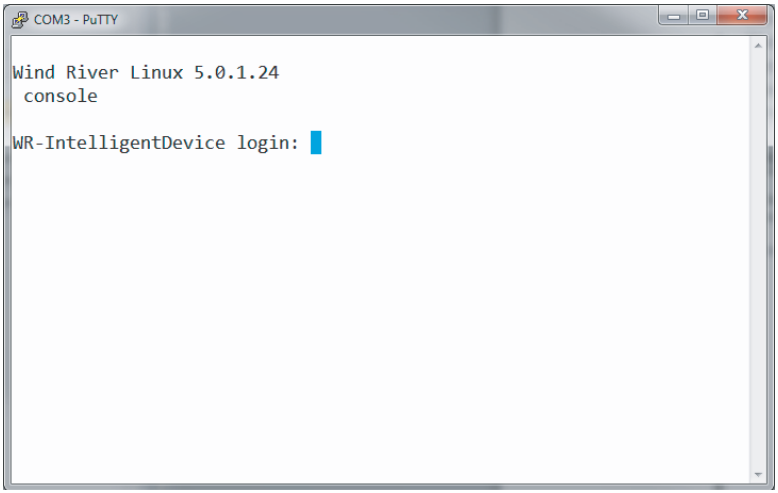
3. Configure PuTTY keyboard settings as follows.




4. Attach the AC adaptor plug to the external power supply.
5. Attach the power cable from the adaptor to the MXE-100i. One LED lights on each LAN port.
6. The MXE-100i platform will initiate the boot process, which can be monitored via the PuTTY console on the host computer.


LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

7. Boot will take approximately 2-5 minutes, after which the login screen appears:




8. Log in with:
   Login: root
   Password: root

## A.2 MXE-100i Network Connection

The MXE-100i can be connected in various ways.

### To the internet or another network

Via WAN port to a router with DHCP server enabled, with the MXE-100i's IP address assigned by the DHCP server.

### To a local network

Via LAN port to local computers (with/without hub), with the MXE-100i's IP address 172.31.255.1

### To WiFi-enabled devices

WiFi network information is:

SSID: IDPDK-xxxx


LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Password: windriveridp

MXE-100i's IP address: 192.168.1.1

Where xxxx is the last 4 characters of the MXE-100i WiFi MAC address, which can be found using command:

```
ifconfig wlan0
```

and find for HWaddr. The WiFi SSID in the example shown is IDPDK-cd23.

```
root@WR-IntelligentDevice:~# ifconfig wlan0
wlan0     Link encap:Ethernet  HWaddr 40:e2:30:0d:cd:23
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:157 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:13648 (13.3 KiB)

root@WR-IntelligentDevice:~#
```

## A.3 Wind River Web Interface (webif)

Wind River Systems, Inc. provides a Web Interface tool (webif) allowing many Target System settings to be to controlled and changed.

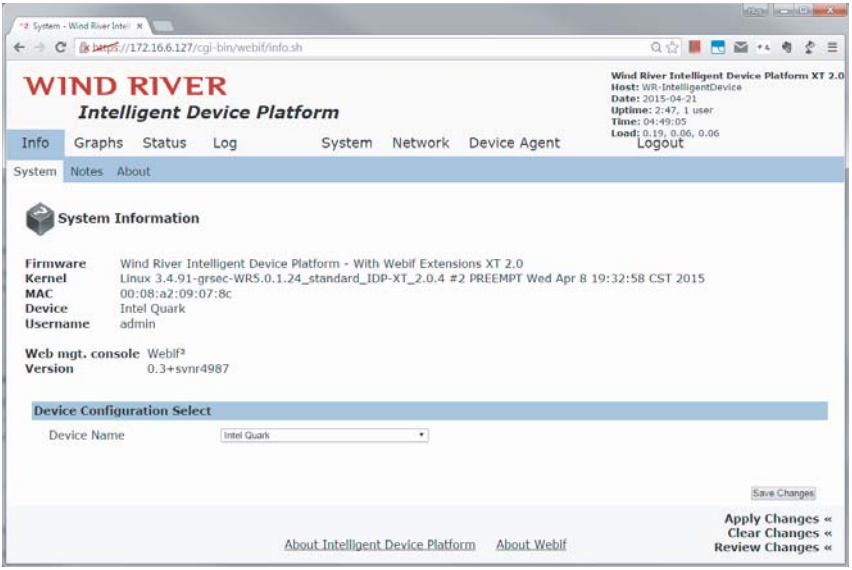
To access the Web Interface tool:

1. Connect Host System to the same network as the MXE-100i (via WiFi, router, or LAN port as described previously).
2. On the Host System, open an internet browser and go to https://<MXE-100i IP Address>
3. When connection to the Web Interface is successful, user name and password are requested.
4. Login with:
   user name: admin
   password: admin.

A sample webif UI is shown.



LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000





Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

# Appendix B Watchdog Timer (WDT) & DI/O Function Libraries

This appendix describes use of the watchdog timer (WDT) function library for the MXE-100i.

The watchdog timer is a hardware mechanism provided to reset the system if the operating system or an application stalls. After starting, the watchdog timer in the application must be periodically reset before the timer expires. Once the watchdog timer expires, a hardware-generated signal is sent to reset the system.

DI/O provides input/output to support inter-device communications. Simple programming guides allow easy transmission of digital signals between the system and attached peripherals.

## B.1 WDT with API

To use the WDT function library for MXE-100i series, include the header file matrix_wdt.h and linkage library matrix_wdt.lib in the C++ project.

### InitWDT

Initializes watchdog timer function of MXE-100i. InitWDT must be called before the invocation of any other WDT function.

**@ Syntax**

C/C++

```
BOOL InitWDT()
```

**@ Parameters**

None

**@ Return code**

**TRUE** if watchdog timer is successfully initialized.

**FALSE** if watchdog timer fails to initialize.



LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

## SetWDT

Sets the timeout value of the watchdog timer. There are two parameters for this function to indicate the timeout ticks and unit. ResetWDT or StopWDT should be called before the expiration of watchdog timer, or the system will reset.

### @ Syntax

C/C++

```
BOOL SetWDT(BYTE tick, BYTE unit)
```

### @ Parameters

**`tick`**

Specify the number of ticks for watchdog timer. A valid value is 1 - 255.

**`unit`**

Specify the timeout ticks of the watchdog timer.

| Value | Description |
|---|---|
| 0 | The unit for one tick is one second. For example, when one tick is specified as 100 and the unit as 0, the timeout value is 100 seconds. |
| 1 | The unit for one tick is one minute. For example, whenone tick is specified as 100 and the unit as 1, the timeout value is 100 minutes. |

### @ Return codes

**TRUE** if timeout value of watchdog timer is successfully set.

**FALSE** if timeout value of watchdog timer is failed to set.

## StartWDT

Starts watchdog timer function. Once the StartWDT is invoked, the watchdog timer starts. ResetWDT or StopWDT should be called before the expiration of watchdog timer, or the system will reset.

### @ Syntax

C/C++



LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

```
BOOL StartWDT()
```

@ **Parameters**

None

@ **Return codes**

**TRUE** if watchdog timer is successfully started.

**FALSE** if watchdog timer is failed to start.

## ResetWDT

Resets the watchdog timer. The invocation of ResetWDT allows restoration of the watchdog timer to the initial timeout value specified in SetWDT function. ResetWDT or StopWDT should be called before the expiration of the watchdog timer, or the system will reset.

@ **Syntax**

C/C++

```
BOOL ResetWDT()
```

@ **Parameters**

None

@ **Return codes**

**TRUE** if watchdog timer is successfully reset.

**FALSE** if watchdog timer fails to reset.

## StopWDT

Stops the watchdog timer.

@ **Syntax**

C/C++

```
BOOL StopWDT()
```

@ **Parameters**

None

@ **Return codes**

**TRUE** if watchdog timer is successfully stopped.



LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

**FALSE** if watchdog timer fails to stop.

## B.2 DI/O with API

To use the DI/O function library for MXE-100i series, include the header file matrix_dio.h and linkage library matrix_dio.lib in the C++ project.

DI/O functions are as follows.

### GPIO_Init

Reserves system resources for digital input/output API service.It is necessary to call this function before using other MXE-100i DI/O functions.

@ **Syntax**

C/C++

```
I16 GPIO_Init(void)
```

@ **Parameters**

None

@ **Return code**

```
NoError
ErrorOpenDriverFailed
ErrorDeviceIoctl
```

### GPI_Read()

Reads the digital logic state of the digital input line..

@ **Syntax**

C/C++

```
I16 GPI_Read(U16 *pwState)
```

@ **Parameters**

*pwState*

Returns the digital logic state of MXE-100i digital input channels 1 to 8 (bit 0 to 7)

@ **Return code**


LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

```
NoError
ErrorOpenDriverFailed
ErrorDeviceIoctl
```

### GPO_Write()

Sets the digital logic state of the digital output line.

**@ Syntax**

C/C++

```
I16 GPO_Write(U16 wState)
```

**@ Parameters**

*State*

Sets the digital logic state of MXE-100i digital output channels 1 to 8 (bit 0 to 7) to 0 or 1.

**@ Return code**

```
NoError
ErrorOpenDriverFailed
ErrorDeviceIoctl
```

### GPO_Read()

Reads the digital logic state of the digital output line.

**@ Syntax**

C/C++

```
I16 GPO_Read(U16 *pwState)
```

**@ Parameters**

*pwState*

Returns the digital logic state of MXE-100i digital output channels 1 to 8 (bit 0 to 7).

**@ Return code**

```
NoError
ErrorOpenDriverFailed
ErrorDeviceIoctl
```


LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

# Appendix C BIOS Setup


NOTE:

BIOS options in the manual are for reference only, and are subject to configuration. Users are welcome to download the latest BIOS version from the ADLINK website.

The Basic Input/Output System (BIOS) is a program that provides a basic level of communication between the processor and peripherals. In addition, the BIOS also contains codes for various advanced features applied to the MXE-100i. The BIOS setup program includes menus for configuring settings and enabling features of the MXE-100i series. Most users do not need to use the BIOS setup program, as the MXE-100i ships with default settings that work well for most configurations.

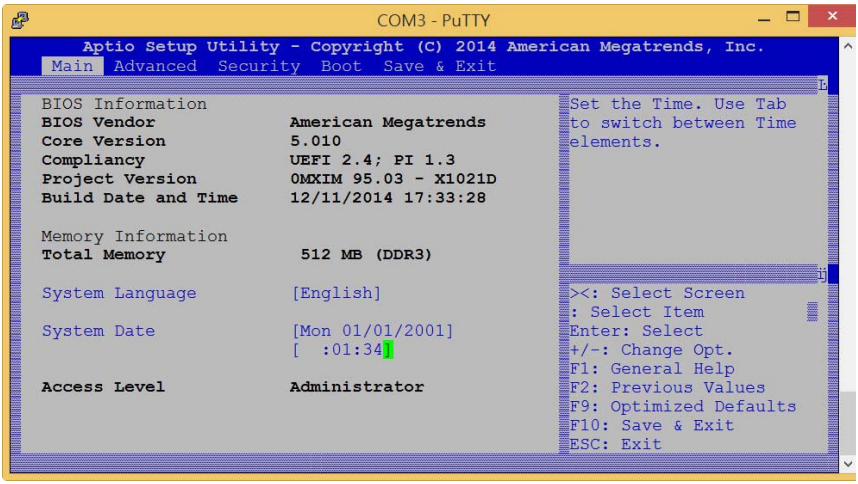

WARNING:

Changing BIOS settings may lead to incorrect controller behavior and possible inability to boot.



LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

## C.1 Main




### C.1.1 BIOS Information

Shows current system BIOS core version, BIOS version and Board version.

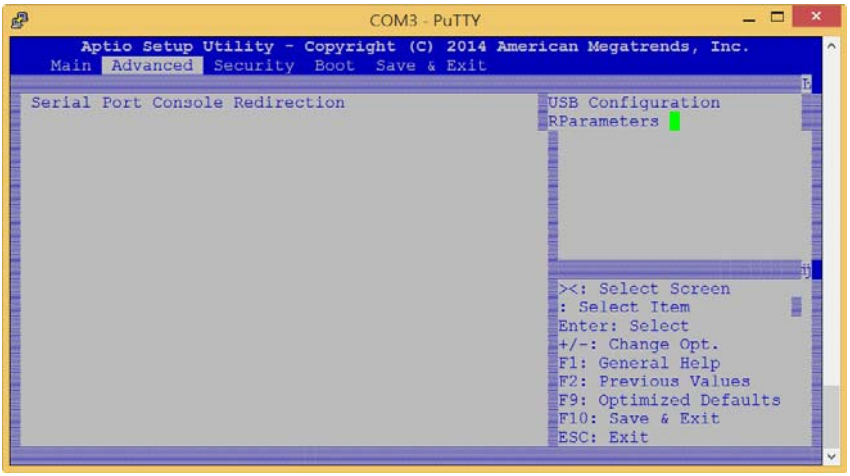
### C.1.2 System Time/System Date

Changes system time and date. Highlight System Time or System Date using the up or down <Arrow> keys. Enter new values using the keyboard then <Enter>. Use < Tab > to move between fields. The date must be entered in MM/DD/YY format. The time is entered in HH:MM:SS format.

NOTE: The time is in 24-hour format, for example, 5:30 A.M. appears as 05:30:00, and 5:30 P.M. as 17:30:00.


LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

## C.2 Advanced



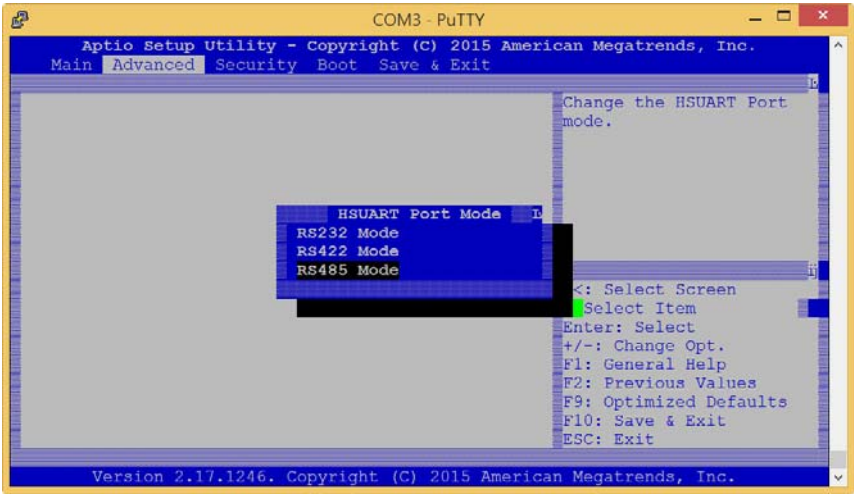

CAUTION:

Setting incorrect or conflicting values in Advanced BIOS Setup may cause system malfunction.



LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

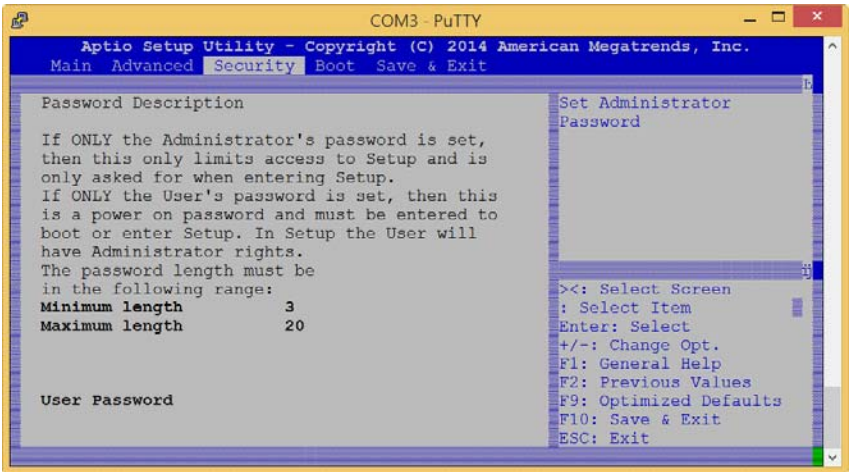
### C.2.1 COM Port Settings





LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

## C.3 Security




NOTE:

If only the Administrator's password is set, only access to Setup is limited and authorization requested only when entering Setup. If only the User's password is set, a password must be entered to boot or enter setup. In Setup the user has Administrator rights.

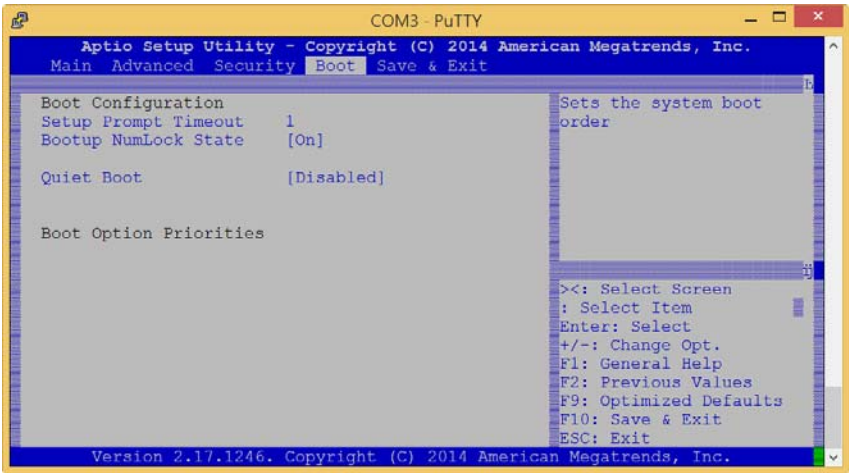
### User Password

Sets boot/setup User password.



LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

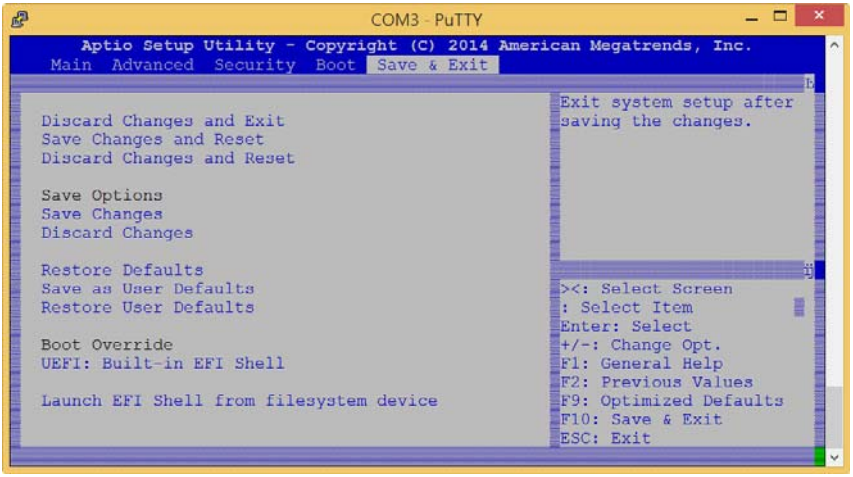
## C.4 Boot




### Boot Option Priorities

Specifies the priority of boot devices, with all installed boot devices detected during POST and displayed, where selecting Boot Option # specifies the desired boot device.

## C.5 Exit





LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

### Save Changes and Exit

Exits Setup after saving changes.

### Discard Changes and Exit

Exits Setup without saving any changes.

### Save Changes and Reset

Resets the system after saving changes.

### Discard Changes and Reset

Resets system setup without saving any changes.

### Save Changes

Saves all changes made to Setup options.

### Discard Changes

Discards changes made to Setup options.

### Restore Defaults

Returns all BIOS options to Default settings, providing maximum system stability with limited performance. Applicable in the event of system configuration problems.

### Save as User Defaults

Save changes as User Defaults.

### Restore User Defaults

Restores User Defaults to all Setup options.

### Launch EFI Shell from filesystem device

Initiates launch of EFI Shell application (Shellx64.efi) from an available filesystem device.



LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

This page intentionally left blank.


Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

# Important Safety Instructions

For user safety, please read and follow all **instructions**, **WARNINGS**, **CAUTIONS,** and **NOTES** marked in this manual and on the associated equipment before handling/operating the equipment.

- Read these safety instructions carefully.
- Keep this user's manual for future reference.
- Read the specifications section of this manual for detailed information on the operating environment of this equipment.
- When installing/mounting or uninstalling/removing equipment:
  - Turn off power and unplug any power cords/cables.
- To avoid electrical shock and/or damage to equipment:
  - Keep equipment away from water or liquid sources;
  - Keep equipment away from high heat or high humidity;
  - Keep equipment properly ventilated (do not block or cover ventilation openings);
  - Make sure to use recommended voltage and power source settings;
  - Always install and operate equipment near an easily accessible electrical socket-outlet;
  - Secure the power cord (do not place any object on/over the power cord);
  - Only install/attach and operate equipment on stable surfaces and/or recommended mountings; and,
  - If the equipment will not be used for long periods of time, turn off and unplug the equipment from its power source.


LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

- Never attempt to fix the equipment. Equipment should only be serviced by qualified personnel.
- A Lithium-type battery may be provided for uninterrupted, backup or emergency power.

---

WARNING:

Risk of explosion if battery is replaced with an incorrect type; please dispose of used batteries appropriately.

---

- Equipment must be serviced by authorized technicians when:
  - The power cord or plug is damaged;
  - Liquid has penetrated the equipment;
  - It has been exposed to high humidity/moisture;
  - It is not functioning or does not function according to the user's manual;
  - It has been dropped and/or damaged; and/or,
  - It has an obvious sign of breakage.

Please pay strict attention to all warnings and advisories appearing on the device, to avoid injury or damage.





LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

# Getting Service

Contact us should you require any service or assistance.

**ADLINK Technology, Inc.**
Address: 9F, No.166 Jian Yi Road, Zhonghe District
New Taipei City 235, Taiwan
新北市中和區建一路 166 號 9 樓
Tel: +886-2-8226-5877
Fax: +886-2-8226-5717
Email: service@adlinktech.com

**Ampro ADLINK Technology, Inc.**
Address: 5215 Hellyer Avenue, #110
San Jose, CA 95138, USA
Tel: +1-408-360-0200
Toll Free: +1-800-966-5200 (USA only)
Fax: +1-408-360-0222
Email: info@adlinktech.com

**ADLINK Technology (China) Co., Ltd.**
Address: 上海市浦东新区张江高科技园区芳春路 300 号 (201203)
300 Fang Chun Rd., Zhangjiang Hi-Tech Park
Pudong New Area, Shanghai, 201203 China
Tel: +86-21-5132-8988
Fax: +86-21-5132-3588
Email: market@adlinktech.com

**ADLINK Technology Beijing**
Address: 北京市海淀区上地东路 1 号盈创动力大厦 E 座 801 室(100085)
Rm. 801, Power Creative E, No. 1 Shang Di East Rd.
Beijing, 100085 China
Tel: +86-10-5885-8666
Fax: +86-10-5885-8626
Email: market@adlinktech.com

**ADLINK Technology Shenzhen**
Address: 深圳市南山区科技园南区高新南七道 数字技术园
A1 栋 2 楼 C 区 (518057)
2F, C Block, Bldg. A1, Cyber-Tech Zone, Gao Xin Ave. Sec. 7
High-Tech Industrial Park S., Shenzhen, 518054 China
Tel: +86-755-2643-4858
Fax: +86-755-2664-6353
Email: market@adlinktech.com

**LiPPERT ADLINK Technology GmbH**
Address: Hans-Thoma-Strasse 11, D-68163
Mannheim, Germany
Tel: +49-621-43214-0
Fax: +49-621 43214-30
Email: emea@adlinktech.com



LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

**ADLINK Technology, Inc. (French Liaison Office)**
Address: 6 allée de Londres, Immeuble Ceylan
91940 Les Ulis, France
Tel: +33 (0) 1 60 12 35 66
Fax: +33 (0) 1 60 12 35 66
Email: france@adlinktech.com

**ADLINK Technology Japan Corporation**
Address: 〒101-0045 東京都千代田区神田鍛冶町 3-7-4
神田 374 ビル 4F
KANDA374 Bldg. 4F, 3-7-4 Kanda Kajicho,
Chiyoda-ku, Tokyo 101-0045, Japan
Tel: +81-3-4455-3722
Fax: +81-3-5209-6013
Email: japan@adlinktech.com

**ADLINK Technology, Inc. (Korean Liaison Office)**
Address: 137-881 서울시 서초구 서초대로 326, 802 (서초동, 모인터빌딩)
802, Mointer B/D, 326 Seocho-daero, Seocho-Gu,
Seoul 137-881, Korea
Tel: +82-2-2057-0565
Fax: +82-2-2057-0563
Email: korea@adlinktech.com

**ADLINK Technology Singapore Pte. Ltd.**
Address: 84 Genting Lane #07-02A, Cityneon Design Centre
Singapore 349584
Tel: +65-6844-2261
Fax: +65-6844-2263
Email: singapore@adlinktech.com

**ADLINK Technology Singapore Pte. Ltd. (Indian Liaison Office)**
Address: #50-56, First Floor, Spearhead Towers
Margosa Main Road (between 16th/17th Cross)
Malleswaram, Bangalore - 560 055, India
Tel: +91-80-65605817, +91-80-42246107
Fax: +91-80-23464606
Email: india@adlinktech.com

**ADLINK Technology, Inc. (Israeli Liaison Office)**
Address: 27 Maskit St., Corex Building
PO Box 12777
Herzliya 4673300, Israel
Tel: +972-54-632-5251
Fax: +972-77-208-0230
Email: israel@adlinktech.com

**ADLINK Technology, Inc. (UK Liaison Office)**
Tel: +44 774 010 59 65
Email: UK@adlinktech.com



LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000