

# TC-6110 Series Hardware User's Manual

---

Edition 6.0, February 2017

[www.moxa.com/product](http://www.moxa.com/product)



© 2017 Moxa Inc. All rights reserved.

# TC-6110 Series Hardware User's Manual

The software described in this manual is furnished under a license agreement and may be used only in accordance with the terms of that agreement.

## Copyright Notice

© 2017 Moxa Inc. All rights reserved.

## Trademarks

The MOXA logo is a registered trademark of Moxa Inc.  
All other trademarks or registered marks in this manual belong to their respective manufacturers.

## Disclaimer

Information in this document is subject to change without notice and does not represent a commitment on the part of Moxa.

Moxa provides this document as is, without warranty of any kind, either expressed or implied, including, but not limited to, its particular purpose. Moxa reserves the right to make improvements and/or changes to this manual, or to the products and/or the programs described in this manual, at any time.

Information provided in this manual is intended to be accurate and reliable. However, Moxa assumes no responsibility for its use, or for any infringements on the rights of third parties that may result from its use.

This product might include unintentional technical or typographical errors. Changes are periodically made to the information herein to correct such errors, and these changes are incorporated into new editions of the publication.

## Technical Support Contact Information

[www.moxa.com/support](http://www.moxa.com/support)

### **Moxa Americas**

Toll-free: 1-888-669-2872  
Tel: +1-714-528-6777  
Fax: +1-714-528-6778

### **Moxa Europe**

Tel: +49-89-3 70 03 99-0  
Fax: +49-89-3 70 03 99-99

### **Moxa India**

Tel: +91-80-4172-9088  
Fax: +91-80-4132-1045

### **Moxa China (Shanghai office)**

Toll-free: 800-820-5036  
Tel: +86-21-5258-9955  
Fax: +86-21-5258-5505

### **Moxa Asia-Pacific**

Tel: +886-2-8919-1230  
Fax: +886-2-8919-1231

# Table of Contents

<b>1. Introduction</b> .....	<b>1-1</b>
Overview .....	1-2
Model Descriptions and Package Checklist.....	1-2
Appearance.....	1-3
LED Indicators.....	1-4
Reset Button .....	1-4
Features .....	1-4
Hardware Specifications .....	1-4
Hardware Block Diagram .....	1-7
<b>2. Hardware Installation</b> .....	<b>2-1</b>
Mounting .....	2-2
Desktop .....	2-2
Rack Mounting .....	2-2
Optional Rack Panel Extender Installation.....	2-4
Wiring Requirements.....	2-6
Connecting the Power Supply .....	2-7
Connecting to a Display .....	2-9
Connecting Audio Input/Output .....	2-9
Connecting USB Devices .....	2-10
Connecting Serial Devices .....	2-11
LAN Ports .....	2-11
Installing the SSD/HDD in the Storage Tray .....	2-12
Replacing the Battery .....	2-15
Installing System Memory and CF Card .....	2-19
<b>3. BIOS Setup</b> .....	<b>3-1</b>
Entering the BIOS Setup Utility .....	3-2
BIOS Main Page.....	3-2
Modifying BIOS Settings .....	3-3
Advanced Settings.....	3-3
Security Settings.....	3-8
Power Settings.....	3-9
Boot Settings.....	3-10
Exit Settings .....	3-12
Upgrading the BIOS .....	3-13
<b>A. Safety Installation Instructions</b> .....	<b>A-1</b>
<b>B. Regulatory Statement Approval</b> .....	<b>B-1</b>

# Introduction

---

Thank you for purchasing the Moxa TC-6110 series x86 ready-to-run industrial computer.

This manual introduces the hardware installation, connector interfaces, and BIOS setup of the TC-6110. For software configuration and management, please refer to the software manual for the operating system installed on your computer.

The following topics are covered in this chapter:

- ❑ **Overview**
- ❑ **Model Descriptions and Package Checklist**
- ❑ **Appearance**
- ❑ **LED Indicators**
- ❑ **Reset Button**
- ❑ **Features**
- ❑ **Hardware Specifications**
- ❑ **Hardware Block Diagram**

## Overview

TC-6110 train computers are specifically designed for auxiliary train applications such as network video recorders, passenger infotainment systems, train condition monitoring, and train-to-ground communications. They come with two Gigabit LAN ports, one RS-232 serial port, three USB 2.0 ports, and two TC-SATA-T storage modules, giving customers a versatile solution for on-board train computing.

The TC-6110 computers come with M12 connectors for Gigabit LAN ports, USB 2.0 ports, and the dual power inputs to provide a highly reliable and durable platform for train operation. In addition, the expansion modules offer high flexibility for system integration. Users can easily add storage modules for additional data storage capacity, the Gigabit switch module to expand connectivity and/or bandwidth, and the mini PCIe module for additional peripheral communications. All TC-6110 series computers come with conformal coating for component protection promising the most reliable operation under harsh environments.

## Model Descriptions and Package Checklist

The TC-6110 Series includes the following models:

**TC-6110-W7E:** Modular 3U/42HP train computer, Intel Atom D525 1.8 GHz CPU, 4 expansion slots, 24 to 110 VDC isolated power, WLAN module (available on request), Win7 Embedded (32-bit), -25 to 55°C operating temperature range, compliant with EN 50155 Class T1

**TC-6110-T-W7E:** Modular 3U/42HP train computer, Intel Atom D525 1.8 GHz CPU, 4 expansion slots, 24 to 110 VDC isolated power, WLAN module (available on request), Win7 Embedded (32-bit), -40 to 70°C operating temperature range, compliant with EN 50155 Class TX

**TC-6110-CT-W7E:** Modular 3U/42HP train computer, Intel Atom D525 1.8 GHz CPU, 4 expansion slots, 24 to 110 VDC isolated power, conformal coating, WLAN module (available on request), Win7 Embedded (32-bit), -25 to 55°C operating temperature range, compliant with EN 50155 Class T1

**TC-6110-CT-T-W7E:** Modular 3U/42HP train computer, Intel Atom D525 1.8 GHz CPU, 4 expansion slots, 24 to 110 VDC isolated power, conformal coating, WLAN module (available on request), Win7 Embedded (32-bit), -40 to 70°C operating temperature range, compliant with EN 50155 Class TX

**TC-6110-LX:** Modular 3U/42HP train computer, Intel Atom D525 1.8 GHz CPU, 4 expansion slots, 24 to 110 VDC isolated power, WLAN module (available on request), Linux Debian 7, -25 to 55°C operating temperature range, compliant with EN 50155 Class T1

**TC-6110-T-LX:** Modular 3U/42HP train computer, Intel Atom D525 1.8 GHz CPU, 4 expansion slots, 24 to 110 VDC isolated power, WLAN module (available on request), Linux Debian 7, -40 to 70°C operating temperature range, compliant with EN 50155 Class TX

**TC-6110-CT-LX:** Modular 3U/42HP train computer, Intel Atom D525 1.8 GHz CPU, 4 expansion slots, 24 to 110 VDC isolated power, conformal coating, WLAN module (available on request), Linux Debian 7, -25 to 55°C operating temperature range, compliant with EN 50155 Class T1

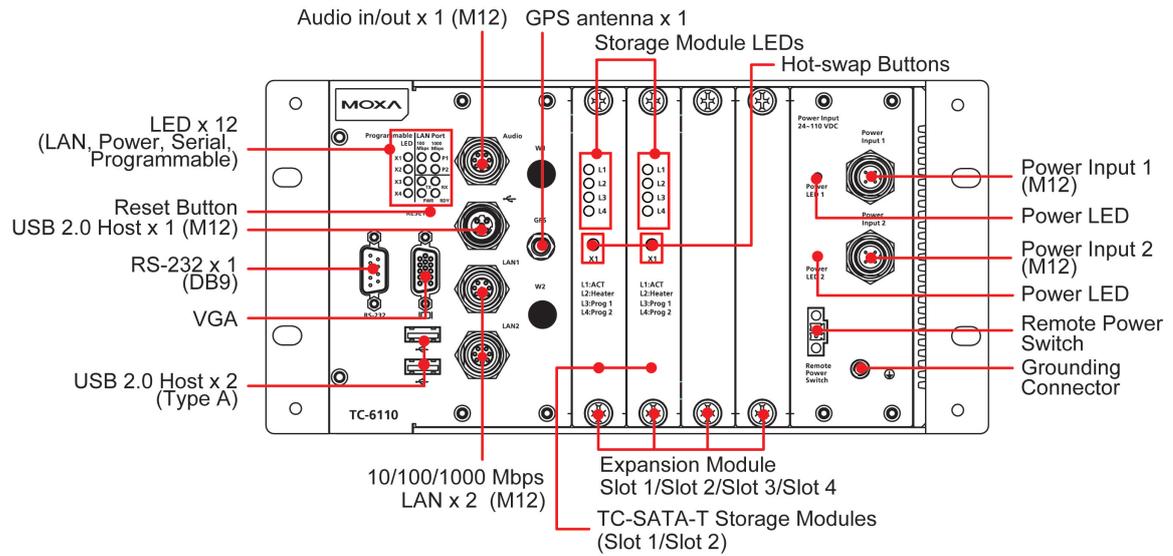
**TC-6110-CT-T-LX:** Modular 3U/42HP train computer, Intel Atom D525 1.8 GHz CPU, 4 expansion slots, 24 to 110 VDC isolated power, conformal coating, WLAN module (available on request), Linux Debian 7, -40 to 70°C operating temperature range, compliant with EN 50155 Class TX

Each model is shipped with following standard items:

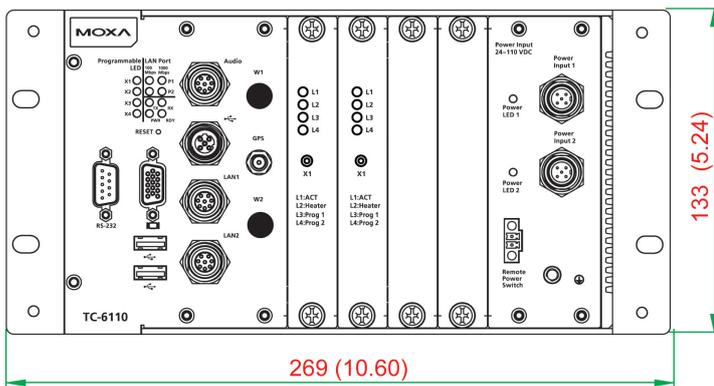
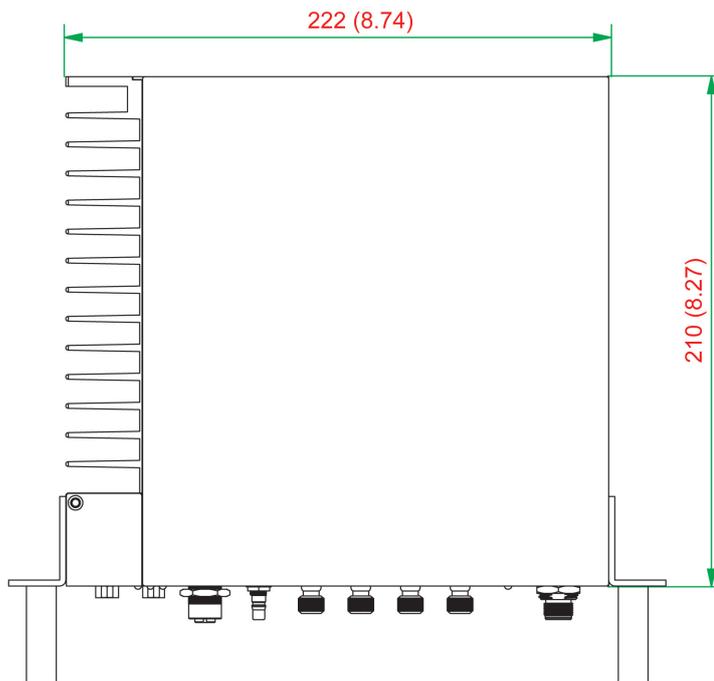
- TC-6110 train computer
- Rackmount kit
- Power switch with cable extender
- M12 connector (M12A-5P-IP68)
- Power cable (CBL-Power Jack to M12)
- Documentation CD or DVD
- Quick installation guide (printed)
- Warranty card

# Appearance

## Front View



## Dimensions



unit = mm (inch)

## LED Indicators

LED Name	LED Color	LED Function
Power	Green	Power is on and functioning normally
	Off	Power is off or power system error
System Ready	Yellow	Logged in to OS, functioning normally
	Off	Login failure or OS not functioning normally
Tx(P1)	Green	Serial port P1 transmitting data
	Off	Serial port P1 not transmitting data
Rx(P1)	Yellow	Serial port P1 receiving data
	Off	Serial port P1 not receiving data
LAN(P1-P2)	Green	Programmable by users
	Yellow	Programmable by users
	Off	Working 100 Mbps Ethernet link
X1-X4	Green	Working 1000 Mbps Ethernet link
	Off	Disconnected or short circuit

## Reset Button

The reset button on the TC-6110's front panel initiates a soft system reboot. Once the system has completed the reboot the **System Ready** LED will maintain a steady glow.

## Features

The TC-6110 computer has the following features:

- Fanless and rugged design for rolling stock applications
- Compliant with EN 50121-4 and all EN 50155 mandatory test items\*
- Protective conformal coating to prevent moisture, dust, and corrosion
- 3U high compact design, 24 to 110 VDC isolated wide range power supply
- Modular design for easy storage and peripheral expansion
- Moxa SafeGuard technology that provides:
  - Reliable HDD operation at low temperatures
  - Independent temperature sensor with custom API
  - Independent G-sensor returns system shock/vibration info with custom API
  - SNMP-based system configuration and monitoring supported

\*This product is suitable for rolling stock railway applications, as defined by the EN 50155 standard. For a more detailed statement, click here: [www.moxa.com/doc/specs/EN\\_50155\\_Compliance.pdf](http://www.moxa.com/doc/specs/EN_50155_Compliance.pdf)

## Hardware Specifications

### Computer

**CPU:** Intel Atom D525, dual-core 64-bit threaded 1.8 GHz, 1 MB for L2 cache

**OS:** Windows Embedded Standard 7 or Linux

**Note:** The OS is pre-installed.

**System Chipset:** ICH8-M

**System Memory:** 4 GB capacity, 2 GB pre-installed: 2 slots of 2 GB DDR3-1066 204 pin SO-DIMM SDRAM

**USB:** USB 2.0 hosts x 3 (Type A connectors x 2, supporting system boot up; D-coded, 5-pin, female M12 connectors x 1)

### Storage

**Built-in:** 8 GB onboard industrial CompactFlash card for operating system storage

**HDD Support:** 2 removable TC-SATA-T storage trays, for 2.5-inch SSD or HDD storage drive (with Intelligent Heating Solution)

### Other Peripherals

**Audio:** 1 line in / line out interface with A-coded, 8-pin, female M12 connector

**Independent Sensors:** Accelerometer (G-sensor), thermometer (T-sensor)

### Display

**Graphics Controller:** Integrated Intel GMA 3150 (Pineview) Graphics Engine

**VGA Interface:** Up to 2048 x 1536 resolution at 75 Hz, DB9 female connector

### Ethernet Interface

**LAN:** Auto-sensing 10/100/1000 Mbps ports (A-coded, 8-pin, female M12) x 2

### GPS Module

**Receiver Types:** 50 channels, GPS L1 C/A code, SBAS (WAAS), EGNOS, MSAS, GAGAN

#### Acquisition:

- Cold start: 29 s
- Warm start: 29 s
- Aided start: 1 s
- Hot start: 1 s

#### Sensitivity:

- Tracking & Navigation: -160 dBm
- Reacquisition: -160 dBm
- Cold start: -147 dBm

#### Accuracy:

- Autonomous: 2.5 m
- SBAS: 2.0 m

**Protocols:** NMEA, UBX binary, max. update rate: 5 Hz (ROM version)

**Time Pulse:** 0.25 Hz to 1 kHz

**Velocity Accuracy:** 0.1 m/s

**Heading Accuracy:** 0.5°

**A-GPS:** AssistNow Online/Offline, SUPL (Open Mobile Alliance) compliant

#### Operational Limits:

- Dynamics  $\leq 4$  g
- Altitude 50,000 m
- Velocity 500 m/s

**Connector Type:** QMA

### WLAN Module (Available on request)

**Standards:** IEEE 802.11 a/b/g/n for wireless LAN

**Security:** WEP, TKIP, and AES hardware encryption

**Antenna Type:** 2 QMA connectors (female type)

**Mode:** Client (default), Access Point (available on request)

### Serial Interface

**Serial Standards:** 1 RS-232 port (DB9 male)

**Data Bits:** 5, 6, 7, 8

**Stop Bits:** 1, 1.5, 2

**Parity:** None, Even, Odd, Space, Mark

**Flow Control:** RTS/CTS

**Baudrate:** Up to 115.2 kbps

### Serial Signals

**RS-232:** TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND

### LEDs

**System:** Independent "Power" and "System Ready" signals

**LAN:** 100M/Link x 2, 1000M/Link x 2

**Serial:** TX x 1, RX x 1

**Other:** Programmable x 4

### Physical Characteristics

**Housing:** Aluminum and SECC sheet metal (1 mm)

**Weight:** 5 kg (11.11 lb)

**Dimensions:**

- Without ears: 210 x 222 x 133 mm (8.27 x 8.74 x 5.24 in)
- With ears: 210 x 269 x 133 mm (8.27 x 10.60 x 5.24 in)

**Mounting:** Rack

### Environmental Limits

**Operating Temperature:**

- Standard models: -25 to 55°C (-13 to 140°F), (EN 50155 Class T1)
- Wide temp. models: -40 to 70°C (-40 to 158°F), (EN 50155 Class Tx)

**Storage Temperature:** -40 to 85°C (-40 to 185°F)

**Ambient Relative Humidity:** 5 to 95% (non-condensing)

**Anti-Vibration:** Meets EN 50155 standard

**Anti-Shock:** Meets EN 50155 standard

### Power

**Reset Button:** For warm reboot (front panel)

**Input Voltage:** 24 to 110 VDC; A-coded, 5-pin, male M12 connector

**Power Consumption:** 32 W (without heater), 62 W (with heater), no SSD/HDD attached

**Note:** 24 VDC and 110 VDC compliant with EN 50155

### Standards and Certifications

**Safety:** UL 60950-1, CSA C22.2 No. 60950-1-07, EN 60950-1

**EMC:** EN 55032:2010 Class A, EN 55024:2010, FCC CFR Title 47 Part 15 Subpart B: 2011 Class A, CISPR 32:2008, ANSI C63.4:2009, ICES-003 Issue 5:2012 Class A

**RF:** EN 62311:Jan 2008, ETSI EN 301 489-1:V1.9.2 (2011-09), ETSI EN 301 489-3:V1.4.1 (2002-08), ETSI EN 301 893:V1.6.1 (2011-11), ETSI EN 300 328:V1.7.1 (2006-10), ETSI EN 300 440-1:V1.6.1 (2010-08), ETSI EN 300 440-2:V1.4.1 (2010-08)

**Rail Traffic:** EN 50155:2007\*, EN 50121-1:2006 for EMC test, EN 50121-4:2006, EN 5011:2009+A1:2010, EN 61000-6-4:2007, CISPR 16-1-2:2003/A2:2006, CISPR 16-2-1:2003+A1:2005, CISPR 16-2-3:2006, EN 60068-2-1:2007, EN 60068-2-2:2007, EN 61373:1999

\*This product is suitable for rolling stock railway applications, as defined by the EN 50155 standard. For a more detailed statement, click here: [www.moxa.com/doc/specs/EN\\_50155\\_Compliance.pdf](http://www.moxa.com/doc/specs/EN_50155_Compliance.pdf)

**Environmental Tests:** EN 60068-2-1:2007, EN 60068-2-2:2007, EN 61373:1999

### Reliability

**Automatic Reboot Trigger:** Built-in WDT (watchdog timer) supporting system reset with software programmable time intervals of 1-255

**MTBF (mean time between failures)**

**Time:** 360,616 hrs

**Standard:** Telcordia (Bellcore) Standard TR/SR

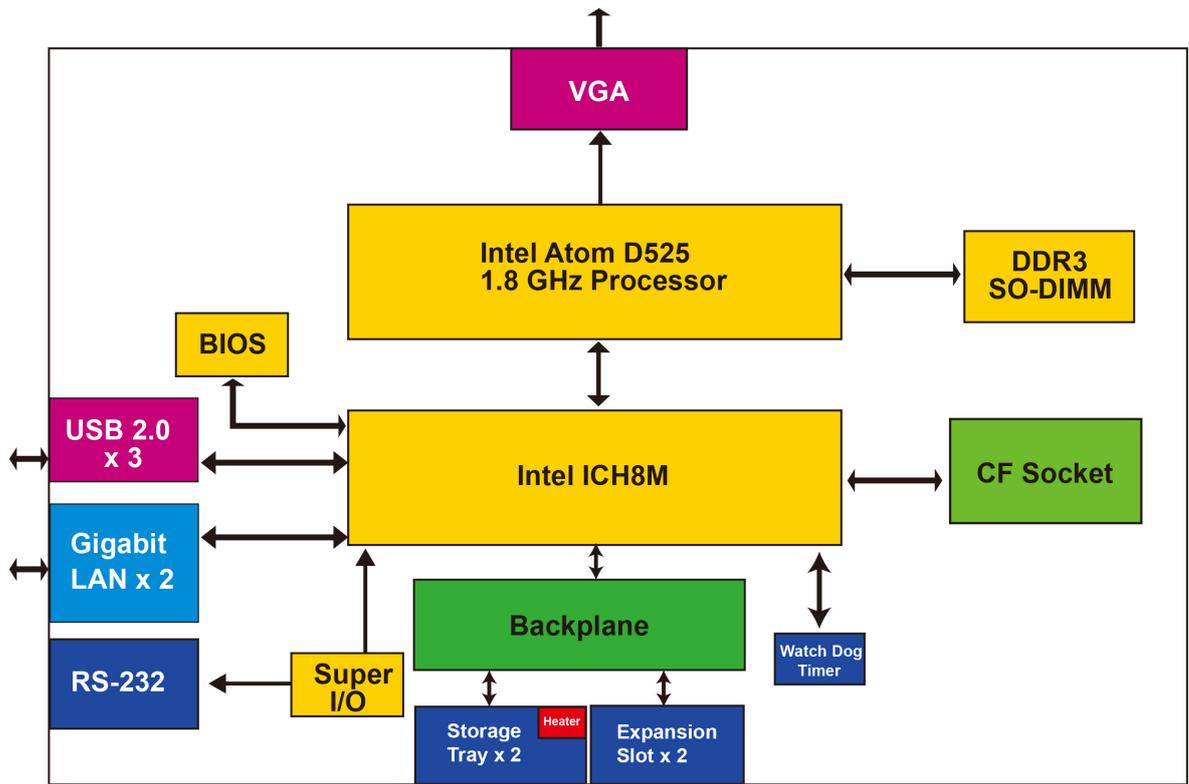
### Warranty

**Warranty Period:** 3 years

**Details:** See [www.moxa.com/warranty](http://www.moxa.com/warranty)

**Note:** These hardware specifications describe the embedded computer unit itself, but not its official accessories. In particular, the wide temperature specification does not apply to accessories such as power adapters and cables.

# Hardware Block Diagram



# Hardware Installation

---

TC-6110 train computers are specifically designed for the applications used onboard the trains. They come with 2 Gigabit LAN ports, 1 RS-232 serial port, 2 USB 2.0 hosts, and 2 expansion slots for inserting various modules, offering an ideal solution for train computing applications.

The following topics are covered in this chapter:

## ❑ **Mounting**

- Desktop
- Rack Mounting
- Optional Rack Panel Extender Installation

## ❑ **Wiring Requirements**

- ❑ **Connecting the Power Supply**
- ❑ **Connecting to a Display**
- ❑ **Connecting Audio Input/Output**
- ❑ **Connecting USB Devices**
- ❑ **Connecting Serial Devices**
- ❑ **LAN Ports**
- ❑ **Installing the SSD/HDD in the Storage Tray**
- ❑ **Replacing the Battery**
- ❑ **Installing System Memory and CF Card**

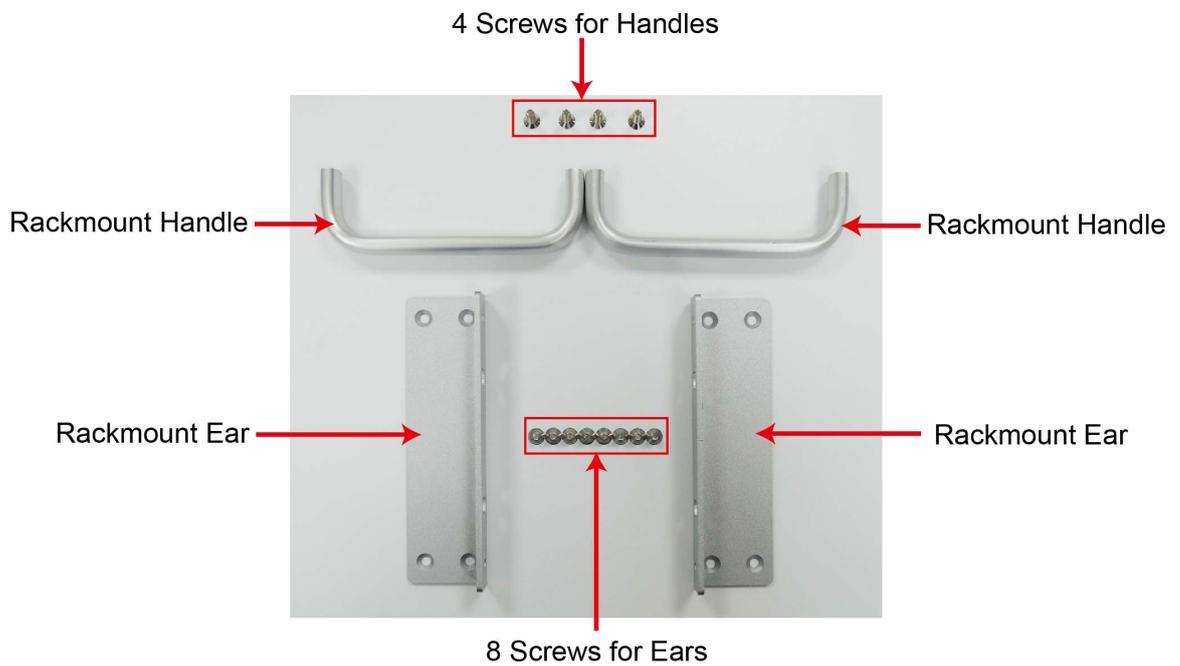
# Mounting

## Desktop

Place your TC-6110 on a clean, flat, well-ventilated desktop. For better ventilation, leave some space between the TC-6110 and other equipment. Do not place equipment or objects on top of the TC-6110 because this may insulate the heat sink, causing the computer to overheat, and severely damage the computer's internal components.

## Rack Mounting

TC-6110 computers come with a rackmount kit for installation onto a 19-inch rack. The following figure illustrates the mounting kit components:

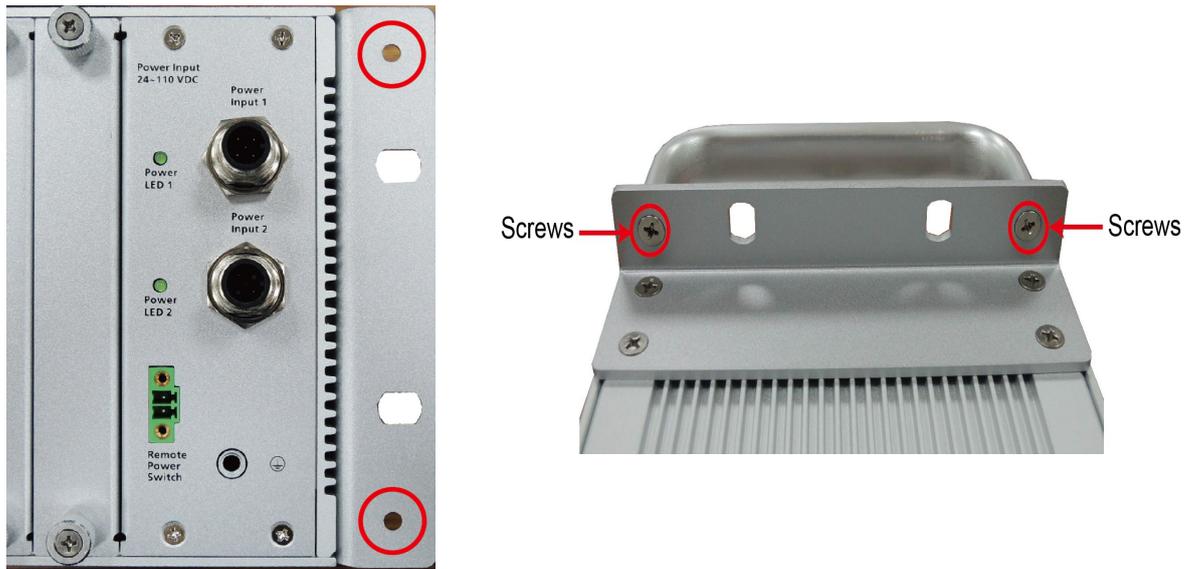


To install the computer's rackmount components, do the following:

**Step 1:** Use eight screws to fasten the mounting ears to each side of the computer.



**Step 2:** If you would like to install the handles, use the four screws provided to secure the handles to each of the mounting ears.



**Step 3:** Place the TC-6110 computer into the rack, and carefully fasten the screws to hold it in place. Please note that the screws for fastening the TC-6110 to the rack are NOT included in the rackmount kit.



After installing the rack mounting assembly (handles and/or ears), four screws are required to fasten the TC-6110 to a rack.

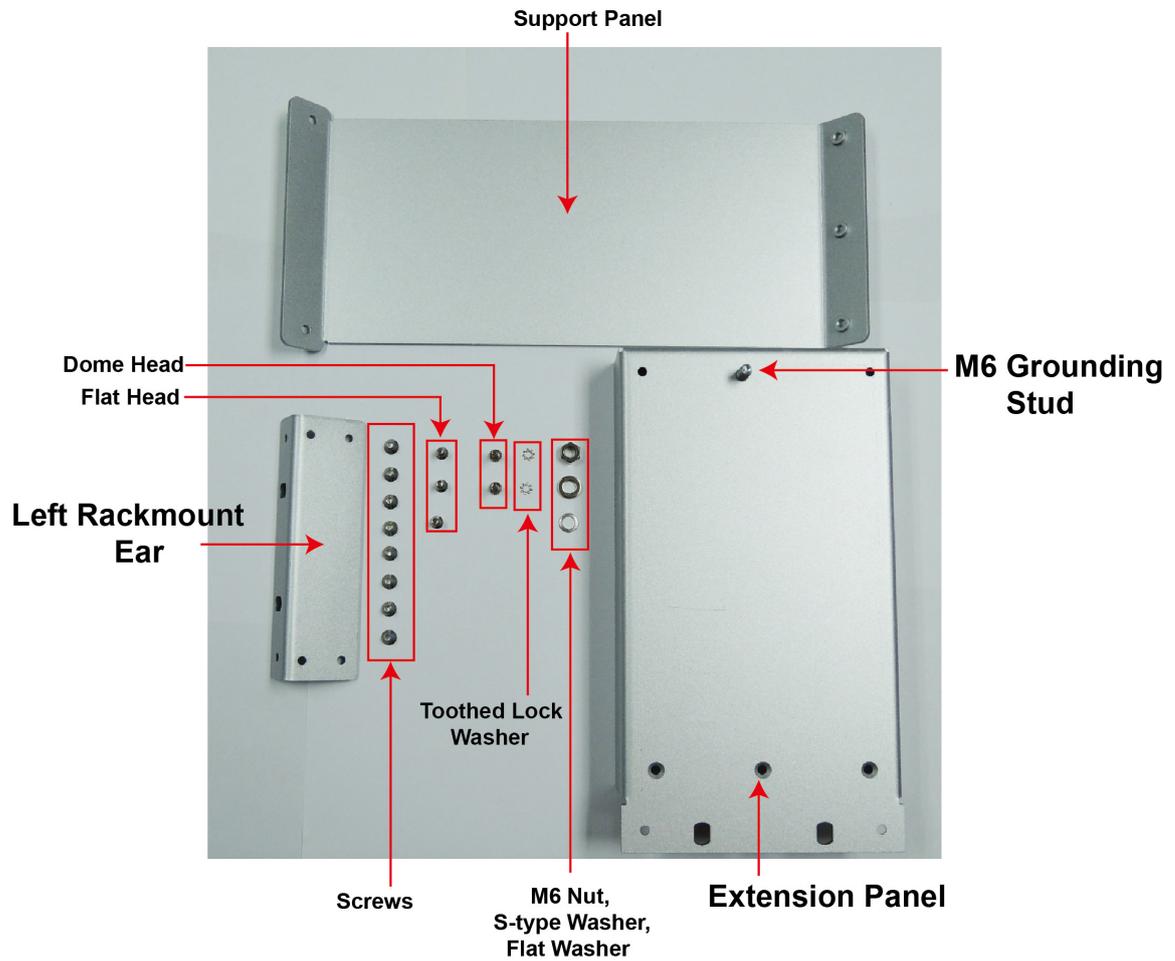


**ATTENTION**

- For maximum safety, at least two persons should work together to lift, place, and fasten the computer to the rack.
- Before you lift or move the computer, verify that the power sources to both the computer and the rack system are turned off.

## Optional Rack Panel Extender Installation

The TC-6110 comes with an optional half-rack extender kit, allowing users to install the TC-6110 computer on a full 19-inch rack. This kit includes the following components.



To install the half-rack extender, do the following:

**Step 1:** Use four standard screws to install the standard (short) rackmount ear on the computer's left side.

**Step 2:** Use another four standard screws to install the extension panel on the right side.



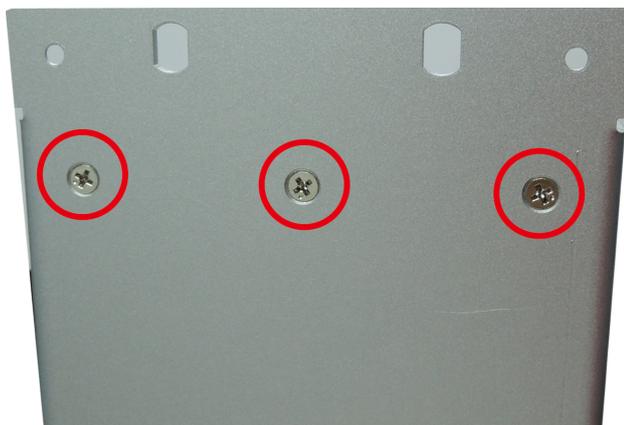
**Step 3:** Remove the two rear-most screws from the right side of the computer.



**Step 4:** Place the support panel so that it abuts the extension panel, with the screw holes aligning with the two flanges on both the panel and the right corner of the computer. Place the toothed locking washer over the screw holes on the computer's right side, then use the dome headed screws to fasten the support panel to the side of the computer.



**Step 5:** Next, use three flathead screws to fasten the other end of the support to the rear of the extended panel. The screws should penetrate from the front of the extension panel backwards, through the panel support.



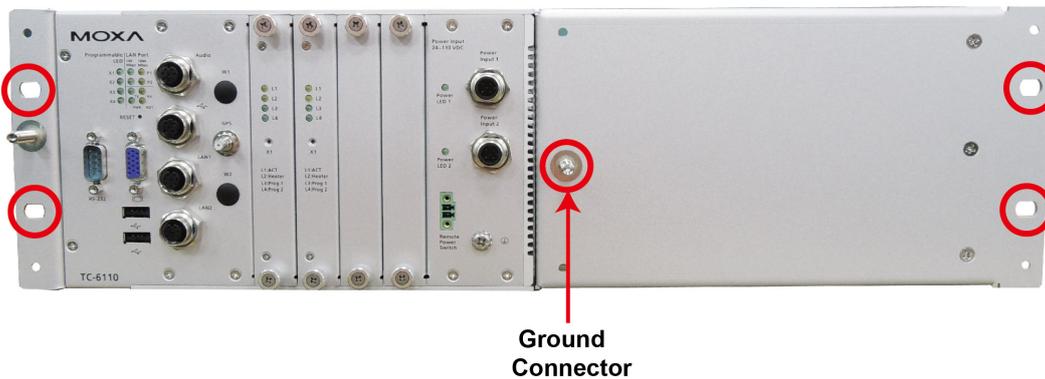
**Step 6:** An additional grounding point is available on the rack extension panel. To use the extension panel's grounding point, place the mounting ring of the ground wire over the threaded M6 grounding stud. Next, place the flat washer and S-type washer over the grounding stud, and use the M6 nut to fasten the ground wire to the stud.



**ATTENTION**

- For maximum safety, at least two persons should work together to lift, place, and fasten the computer to the rack.
- Before you lift or move the computer, verify that the power sources to both the computer and the rack system are turned off.

You may now install the computer on a full 19" rack. After installing the standard rack mounting assembly (ears, handles), four screws will be required to fasten the TC-6110 to a rack.



## Wiring Requirements

The following common safety precautions should be observed before installing any electronic device:

- Strive to use separate, non-intersecting paths to route power and networking wires. If power cables must be laid or mounted across communications cables, make sure the wires are perpendicular and well insulated at the point of intersection.
- Keep the wires separated according to interface. The rule of thumb is that wiring which shares similar electrical characteristics may be bundled together.
- Do not bundle input wiring with output wiring.
- We strongly advise that you label all wires in the system for easy identification.



**ATTENTION**

Do not run signal or communication wiring and power wiring in the same conduit. To avoid interference, wires with different signal characteristics (i.e., different interfaces) should be routed separately.



**ATTENTION**

**Safety First!**

Be sure to disconnect the power cord before installing and/or wiring your device.

**Caution! High Electrical Current!**

Calculate the maximum possible current for the diameter of each power wire and common wire. Observe all electrical codes dictating the maximum current allowable for each wire gauge.

If the current goes above the maximum ratings the wiring could overheat, causing serious damage to your equipment.

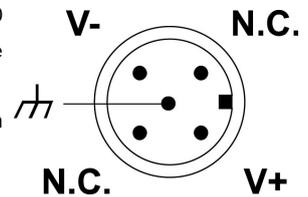
**Caution! High Temperatures!**

Be careful when handling the unit. When the unit is plugged in, the internal components generate a lot of heat which may leave the outer casing too hot to safely touch with bare hands.

## Connecting the Power Supply

The TC-6110 computers come with dual (redundant) DC power inputs, 24 to 110 volts each (variable). Refer to the figure on the right for the pin assignment of the power inputs.

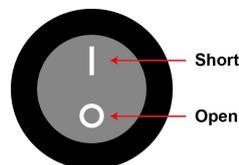
When setting up TC-6110 computers for testing and/or system development in an office or lab with an AC source, follow these steps to connect the AC power adaptor:



**Step 1:** Connect the exposed ends of the extended power switch cable to the male portion of the 2-pin Euroblock (provided in the package).

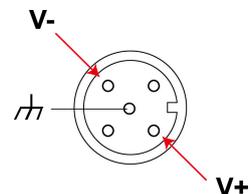
**Step 2:** Plug the male Euroblock into the matching female terminal on the front panel.

**Step 3:** Make sure the power switch is turned off (**Open** state as shown in the diagram below).



**Step 4:** Connect the earth/ground cable to the Phillips-head ground connector on the lower right corner of the front panel.

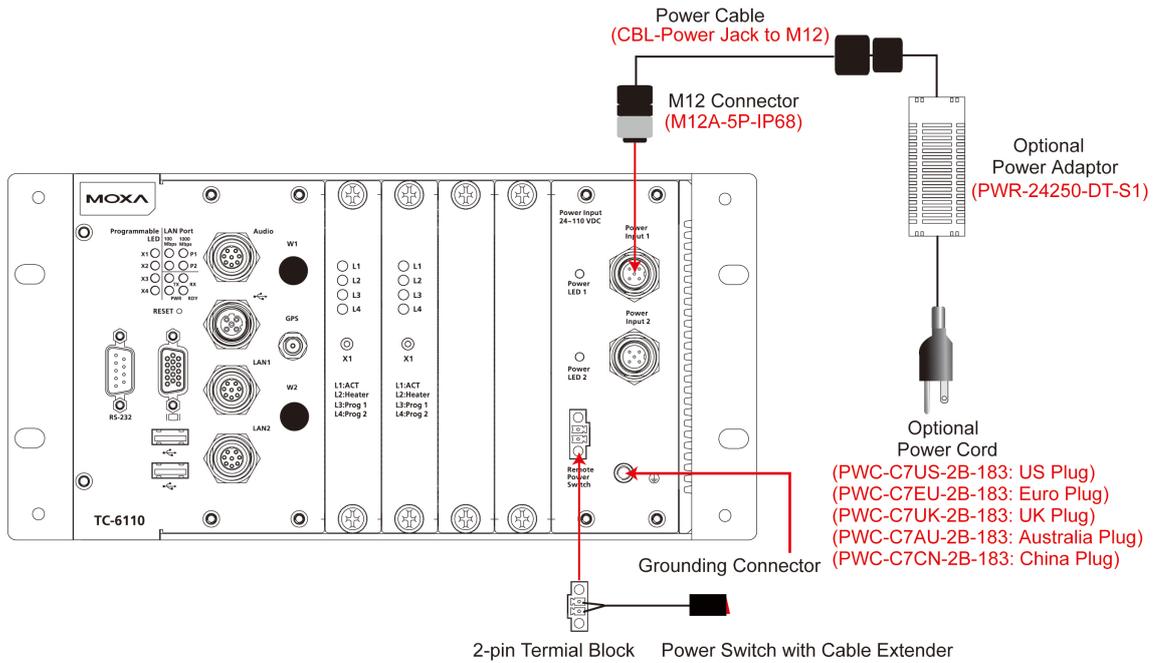
**Step 5:** Connect the power cable (CBL-Power Jack to M12) to the M12 connector as shown in the figure on the right. Then, connect the power connector to power input 1 on the front panel.



**Step 6:** On the other side of the power cable, connect to the PWR-24250-DT-S1 power adaptor (optional), and a PWC-series power cord (optional).

**Step 7:** To check power redundancy, use the same method to connect the power to the power input 2.

**Step 8:** Switch on the TC-6110 (**Short** state). If power supply is connected properly, both power input and system power LEDs will be on (green), as well as the yellow **Ready** LED.

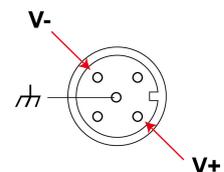


For the TC-6110 computers used in the field site, follow these steps to connect the power:

- Step 1:** Connect the ends of the extended power switch cable to the male portion of the 2-pin Euroblock (provided); you may also choose to not use the cable extender, and connect the switch to the terminal directly.
- Step 2:** Plug the male Euroblock into the matching female terminal on the front panel.
- Step 3:** Make sure the power switch is turned off (**Open** state as shown in the diagram below).



- Step 4:** Connect the earth/ground cable to the ground connector (Phillips head) on the lower right corner of the front panel.
- Step 5:** Connect the M12 connector to the power cable's output end using the pin assignment at right.
- Step 6:** Connect this M12 connector to power input 1 on the front panel of the computer.
- Step 7:** Use the same method to prepare a cable for power input 2.
- Step 8:** Turn on the computer. If the power supply is connected properly, the **Power** and **System Power** LEDs will be on, and the yellow **Ready** LED will also be on. If you need to disconnect the power, reverse these steps.



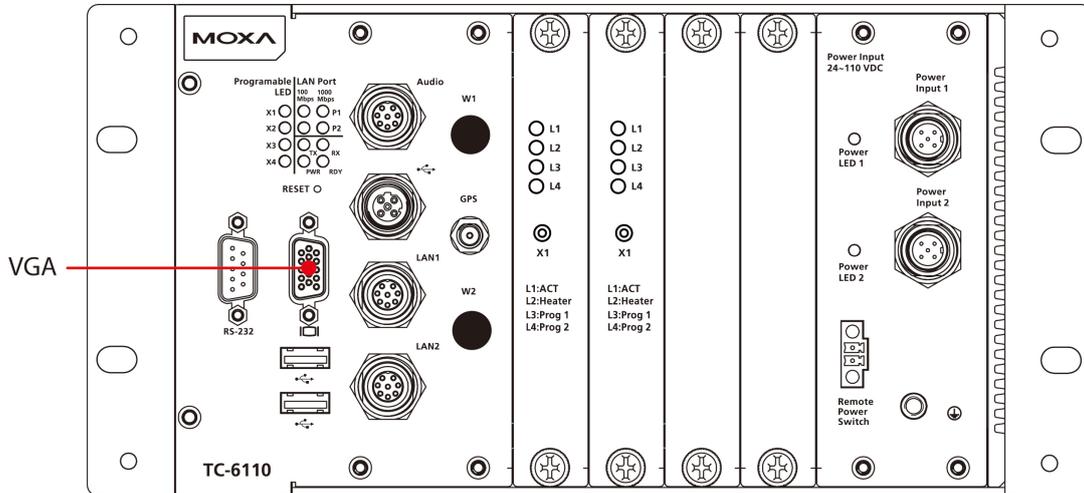
**ATTENTION**

Please note that the branch circuit over current protection must be rated maximum 10 A.

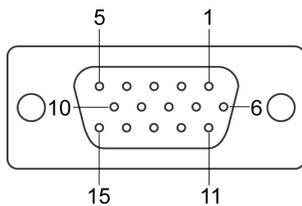
# Connecting to a Display

The TC-6110 comes with a female D-sub DE-15 VGA interface on the front panel. To ensure that the monitor connection remains stable, be sure to tighten the plug's thumbscrews after connecting it to the TC-6110 computer.

The location of the VGA connector and pin assignments of the VGA connector are shown below.



## DE-15 Female Connector

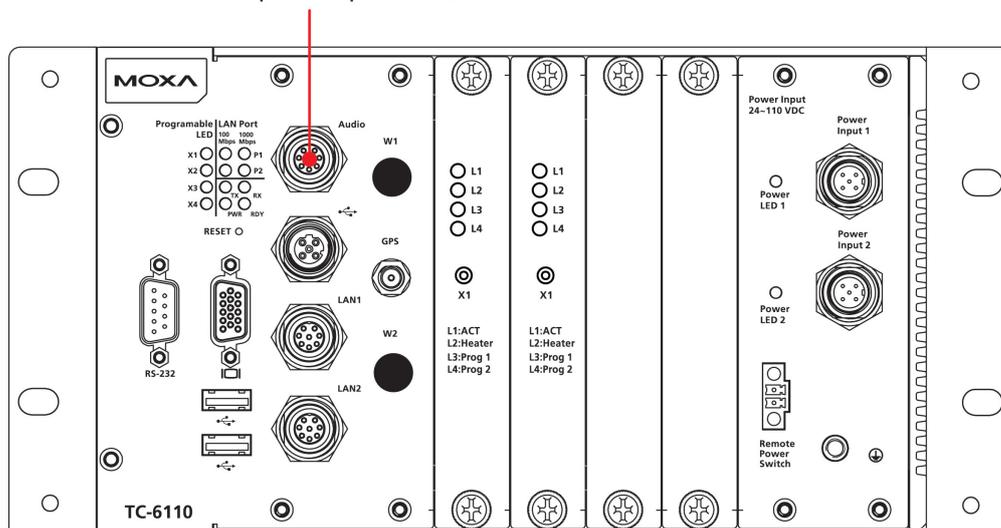


Pin No.	Signal Definition	Pin No.	Signal Definition
1	Red	9	VCC
2	Green	10	GND
3	Blue	11	NC
4	NC	12	DDC2B Data
5	GND	13	HSYNC
6	GND	14	VSYNC
7	GND	15	DDC2B Clock
8	GND		

# Connecting Audio Input/Output

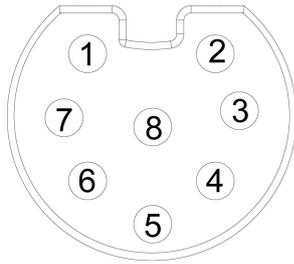
The TC-6100 series comes with an M12 audio input/output.

## Audio Input/Output (M12)



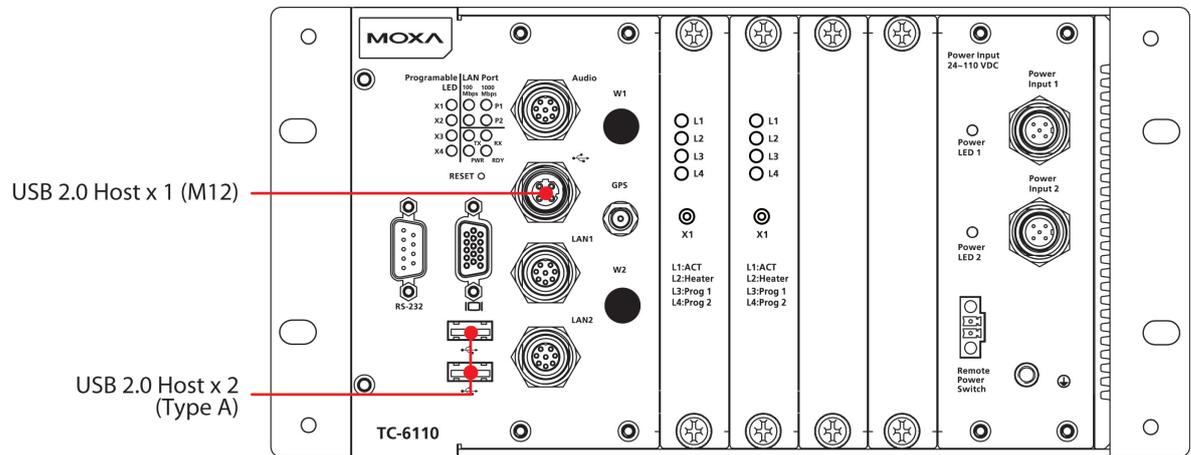
See the following figure and table for the pin assignment of the audio jack:

Pin	Audio
1	Line in-Right
2	GND
3	–
4	Line in-Left
5	Line out-Left
6	–
7	Line out-Right
8	GND



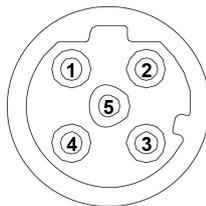
## Connecting USB Devices

The TC-6110 embedded computer has three USB 2.0 ports: two come with type A connectors, and one with M12 connector. All of the ports are UHCI, Rev 2.0 compliant and support Plug & Play and hot swapping. These ports can be used to connect USB devices such as keyboards, mice, USB flash disks, and USB CD-ROMs. In addition, both USB ports support system boot up, which can be activated by modifying the BIOS settings. The USB Configuration section in the BIOS Setup chapter describes the configuration process in detail.



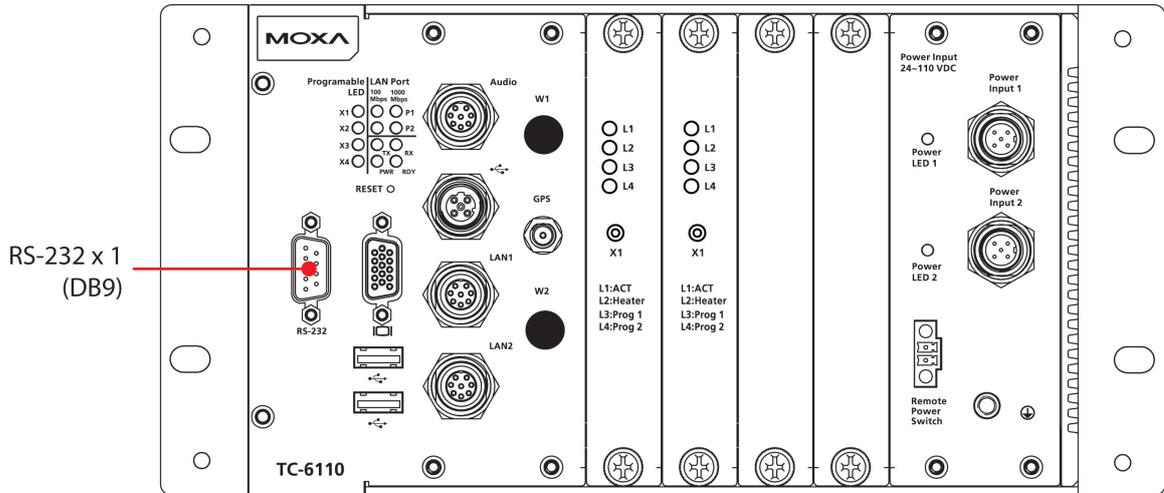
Refer to the following table for the pin assignment of the USB host's M12 connector:

Pin	USB
1	D+
2	D-
3	+5V
4	GND
5	N.C.

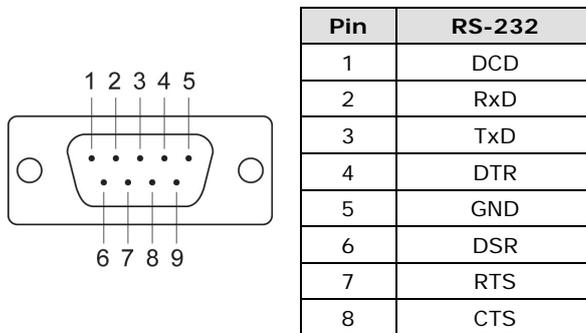


# Connecting Serial Devices

The TC-6110 comes with one DB-9 (male) RS-232 serial interface.

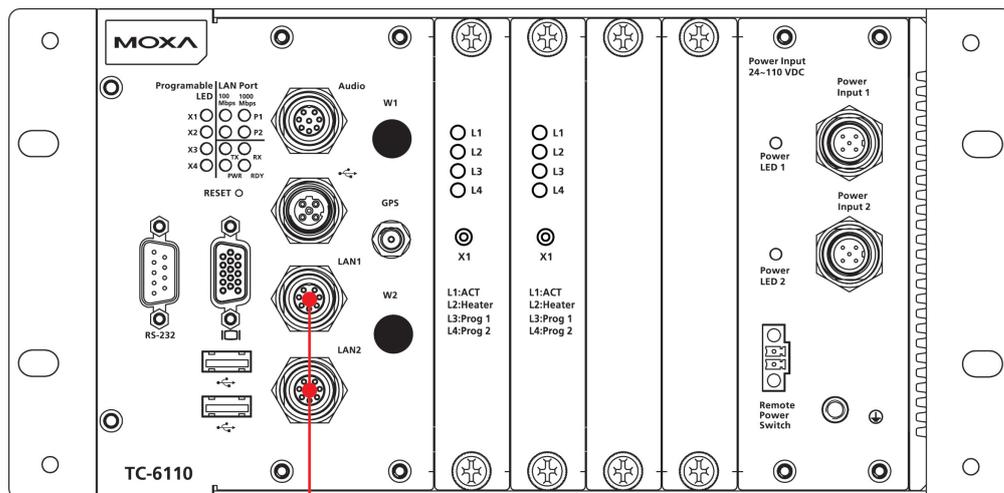


The pin assignments for the RS-232 serial port are shown in the following table:



# LAN Ports

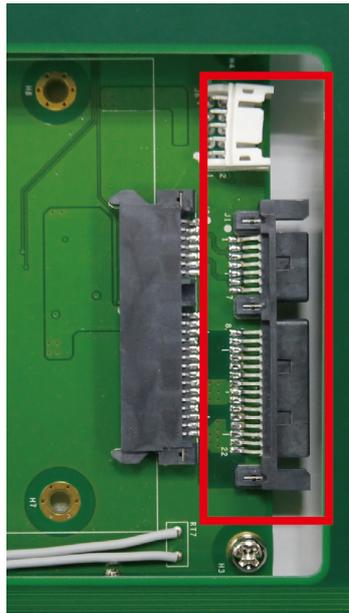
The TC-6110 has two 10/100/1000 Mbps LAN ports with M12 hardware interfaces. When the cable is properly connected, the LEDs on the front panel will glow to indicate a successful link.



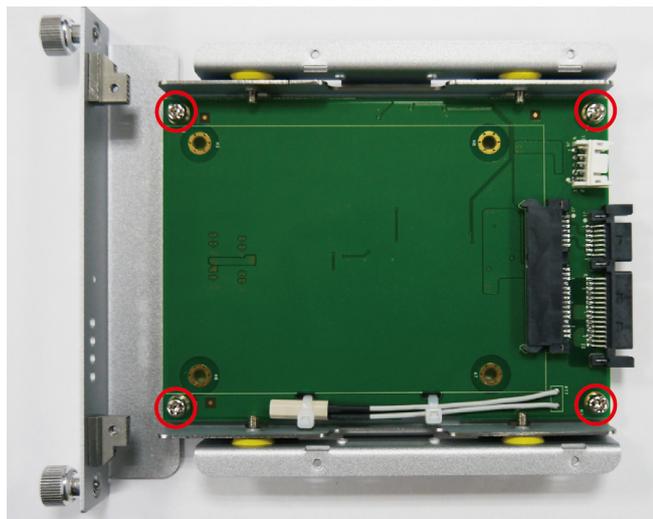
10/100/1000 Mbps  
LAN x 2 (M12)



**Step 3:** Detach the SATA power and data interfaces from the main board by carefully sliding the tray away from the main PCB.



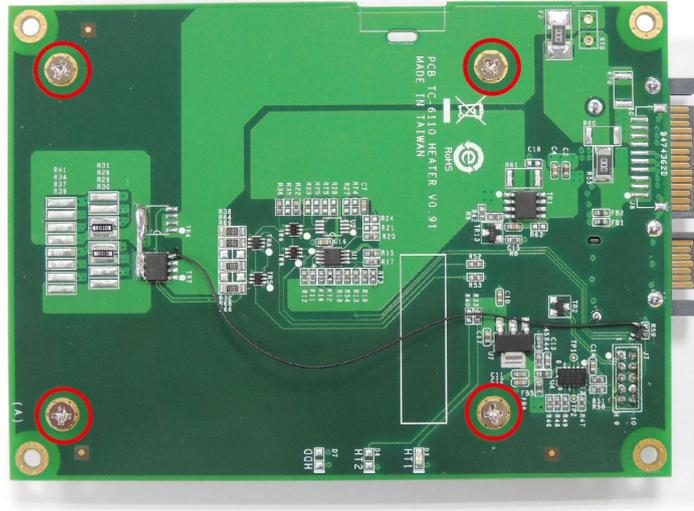
**Step 4:** Remove four screws on the tray.



**Step 5:** Insert the SSD/HDD into the tray.



**Step 6:** Turn back the tray and fasten the drive to the PCB using the holes indicated below.



**Step 7:** Fasten four screws on the front.



**Step 8:** Connect the power cable and SSD/HDD cable with the main board. Reconnect the data and power interfaces and complete the installation by fastening the drive tray to the main PCB using the six screws.



**Step 9:** When finished, insert the storage tray back into the TC-6110 and tighten the external thumbscrews.

Please note that on each removable drive module there is a hot-swap button and four LED indicators. To hot swap storage drives users will need to first install the **Moxa hot swap software package**, as described in the **TC-6110 software manual**. Once installed, to hot swap a drive users must use a sharp object to push the hot swap button (X1, on the front panel map) and wait until the L1 LED indicator goes dark, indicating the drive has unmounted and is ready for extraction. The L3 and L4 LEDs are programmable, to be defined by users. Refer to the software manual for more details about the Moxa hot swap software package and programming the LEDs.

The following table describes the functions associated with hot-swap button and the four LEDs:

LED Indicator/Button		Function
L1	On	HDD is accessing data
	Off	No activity
L2	Blinking	Heater is on in specific environments. Refer to the following conditions: <ul style="list-style-type: none"> <li>• Below 55°C when power is available.</li> <li>• Below 15°C when system is on.</li> </ul>
	Off	Heater is off
L3		Defined by admin
L4		Defined by admin
X1		hot-swap button, for unmounting drives

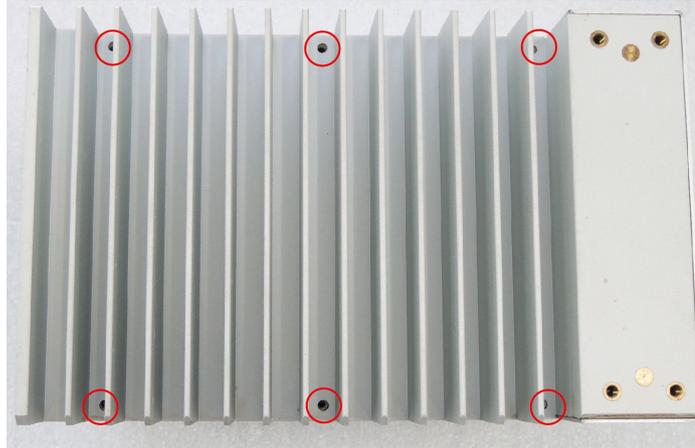
## Replacing the Battery

TC-6110 computers come with an internal battery that provides power for the built-in RTC. To replace the battery, follow these steps.

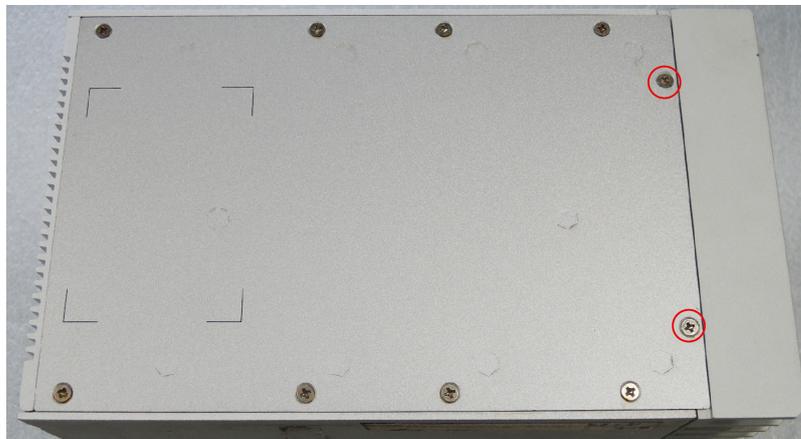
**Step 1:** Remove the four screws on the front panel of the computer.



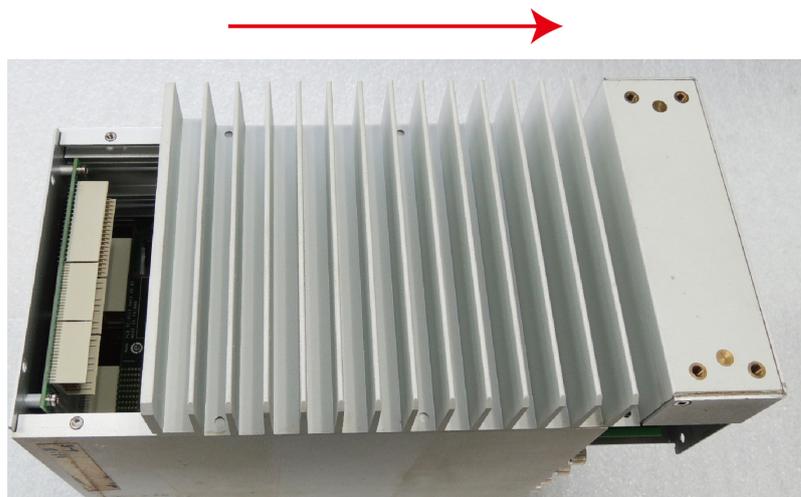
**Step 2:** Remove the six screws from between the computer's longest heat-sink fins.



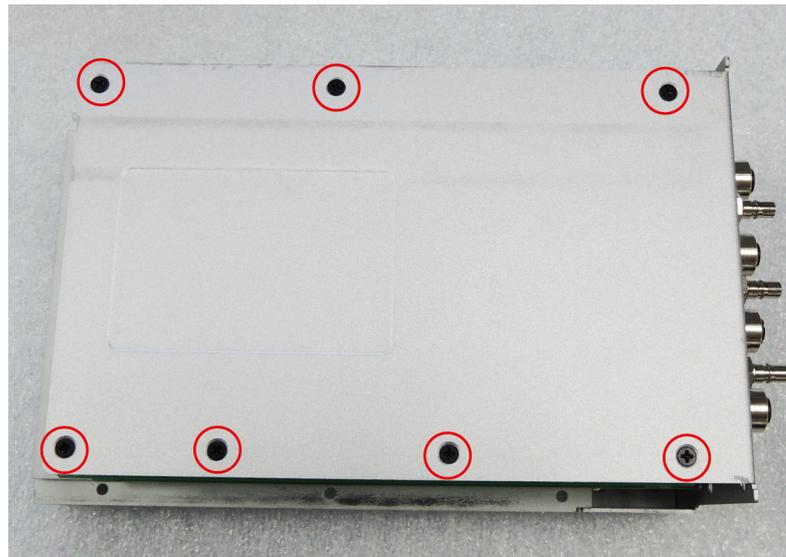
**Step 3:** Turn the computer around and remove the two screws fastening the large heat sink to the rest of the computer as illustrated in the figure below. *It is not necessary to remove the other screws.*



**Step 4:** To get access to the interior of the TC-6110, slide the large heat sink / main interface module in one direction, and the rest of the unit in another.



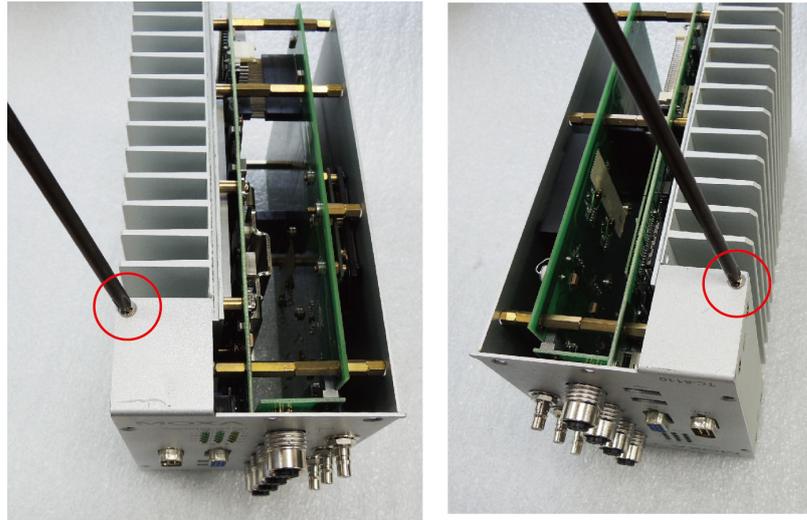
**Step 5:** Place the module so it is sitting with the heat sink face down, and remove all seven screws from the rear of the module. These screws hold the main interface module in place.



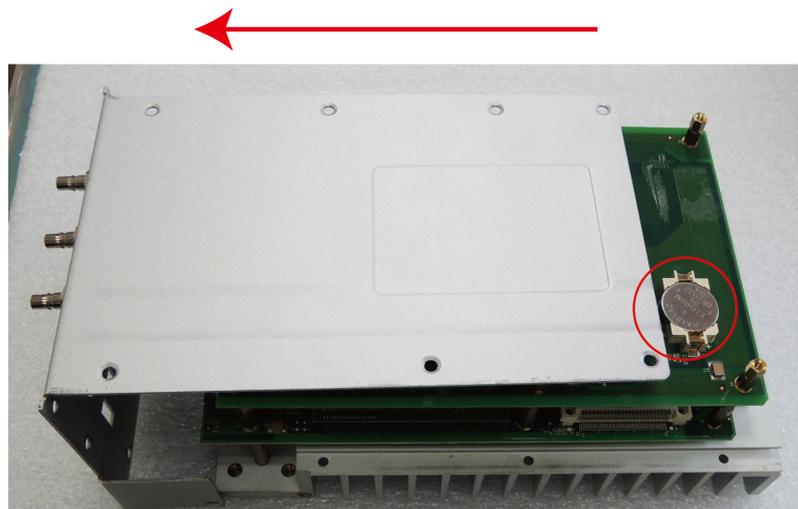
**Step 6:** In addition, you will need to release all hardware interfaces from the front plate of the main interface module. These are two panel screws, four screws holding the D-Sub connectors in place, and the four rings that fasten the four M12 connectors in place (audio, USB, and two LAN ports) as shown in the figure below:



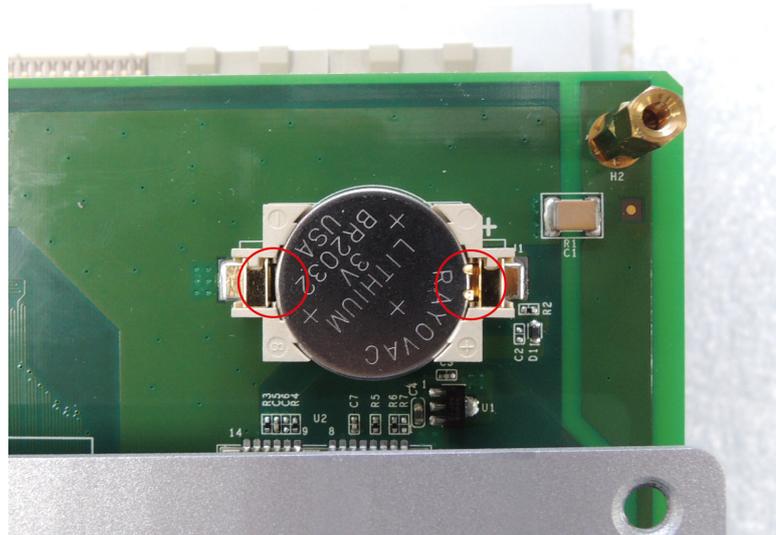
**Step 7:** Finally, one screw each on either side of the heat sink also needs to be removed.



**Step 8:** Once all screws have been unfastened, gently push the cover to the left to reveal the battery's location.



**Step 9:** Use a small screwdriver or other tool to release the clutches on the battery socket, and remove the old battery. Gently place the new battery into the socket.



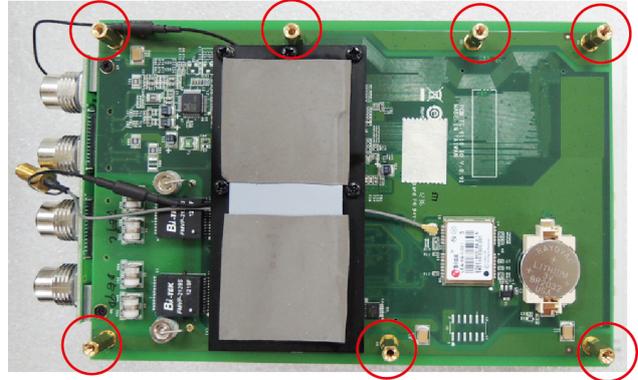
**Step 10:** When finished, reverse the steps above to rebuild the TC-6110 unit.

# Installing System Memory and CF Card

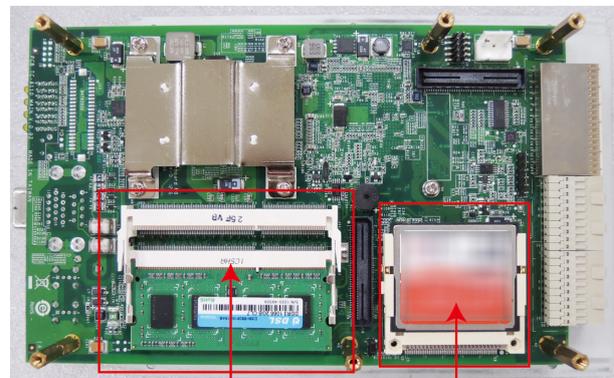
The TC-6110 computer comes with two system memory sockets; one of these is pre-installed with 2 GB of memory. In addition, an 8 GB CompactFlash card is also pre-installed in the computer. To add or replace either the system memory or the CF card, do the following:

Refer to **Steps 1 through 8** in the section, **Replacing the Battery**; then follow the steps below.

**Step 9:** Remove the seven brass standoffs on the upper main board.



**Step 10:** Gently remove the upper main board, and then locate the system memory and CF socket.



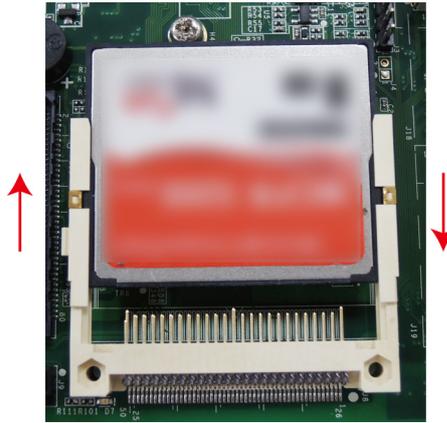
Memory Sockets      CF Card socket

**Step 11:**

**A) To remove the memory cards:** Push the two clutches on either side of the socket outwards to free the memory card, and then carefully remove the card. Install the new memory card into the slot. Make sure you install it in the correct direction, and then push it down to complete the installation.



- B) To remove the CompactFlash card:** Gently lift the plastic cradle holding the CF card, and then slide the card out. After inserting a replacement, gently push the cradle downwards, being careful not to bend the interface pins.



Reverse **steps 9 to 1** to rebuild the unit and complete the system memory and CF card installation.

This chapter describes the BIOS settings of the TC-6110 computer. The BIOS is a set of input/output control routines for peripherals. The BIOS is used to initialize basic peripherals and to load the operating system. The BIOS setup allows the user to modify the system configurations of these basic input/output peripherals. All of the configurations will be stored in the NVRAM (flash memory), which retains the system information after system reboots or the power source is removed.

The following topics are covered in this chapter:

- ❑ **Entering the BIOS Setup Utility**
- ❑ **BIOS Main Page**
- ❑ **Modifying BIOS Settings**
  - Advanced Settings
  - Security Settings
  - Power Settings
  - Boot Settings
  - Exit Settings
- ❑ **Upgrading the BIOS**

# Entering the BIOS Setup Utility

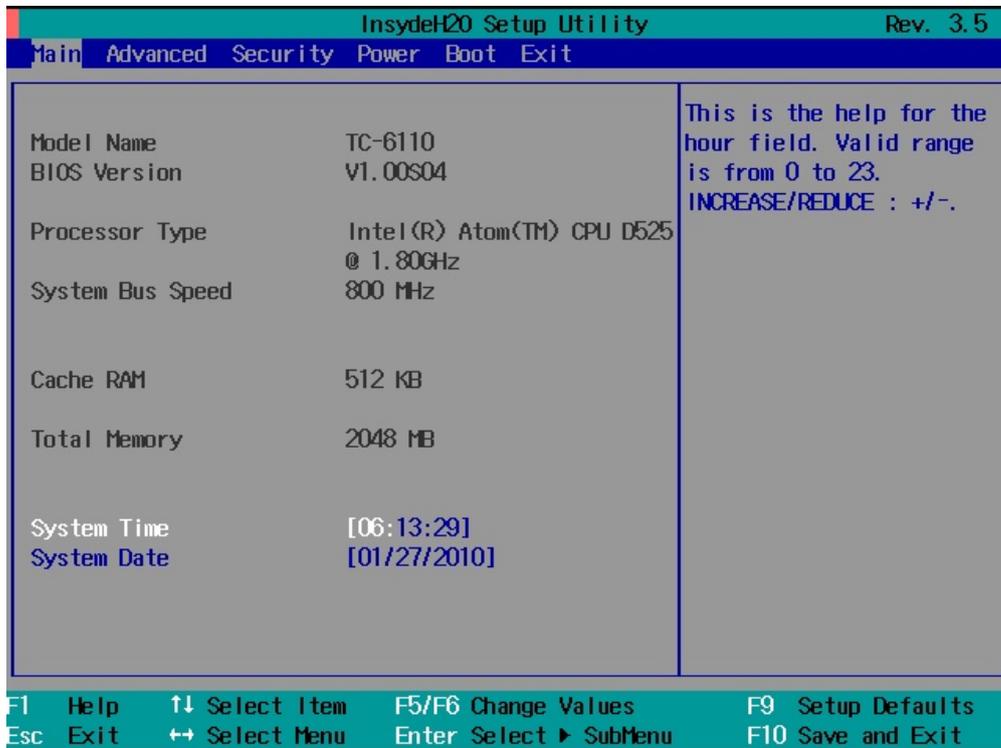
To enter the BIOS setup utility, press the "F2" key while the system is booting up. The main BIOS Setup screen will appear.

A basic description of each function key is listed at the bottom of the screen. Refer to these descriptions to learn how to use them.

- |                             |                                       |
|-----------------------------|---------------------------------------|
| <b>F1: General Help</b>     | <b>↑ ↓: Select Item</b>               |
| <b>F5/F6: Change Values</b> | <b>← →: Select Menu</b>               |
| <b>F9: Setup Defaults</b>   | <b>ESC: Exit</b>                      |
| <b>F10: Save and Exit</b>   | <b>ENTER: Select or go to Submenu</b> |

# BIOS Main Page

The main page of the BIOS displays basic low-level information about system hardware, including details like model names, CPU type, and BIOS version.

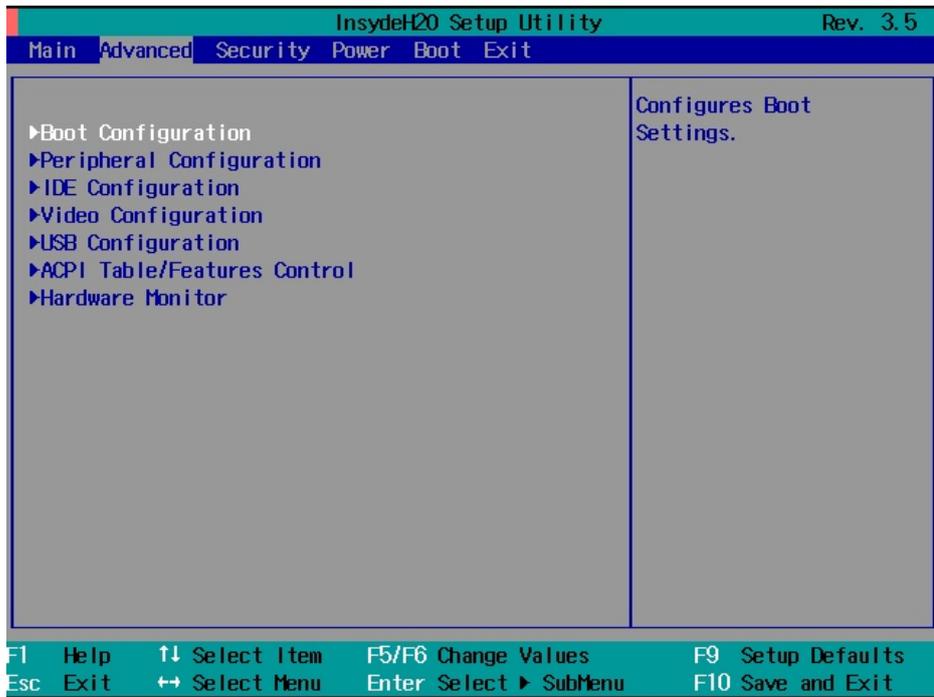


# Modifying BIOS Settings

Navigate the BIOS menus using the arrow keys; up (↑) and down (↓) arrows navigate the menu, while left (←) and right (→) arrows will open or close sub-menus from entries marked with a triangle (▶) at the beginning of the line.

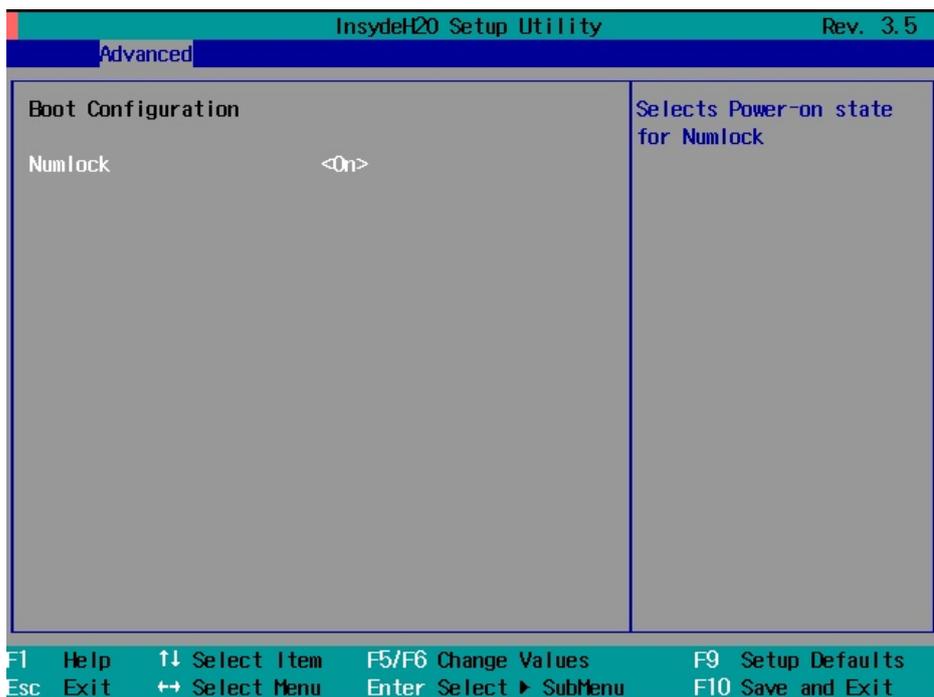
## Advanced Settings

The Advanced features screen is displayed when you select the **Advanced** option in the main menu.



## Boot Configuration

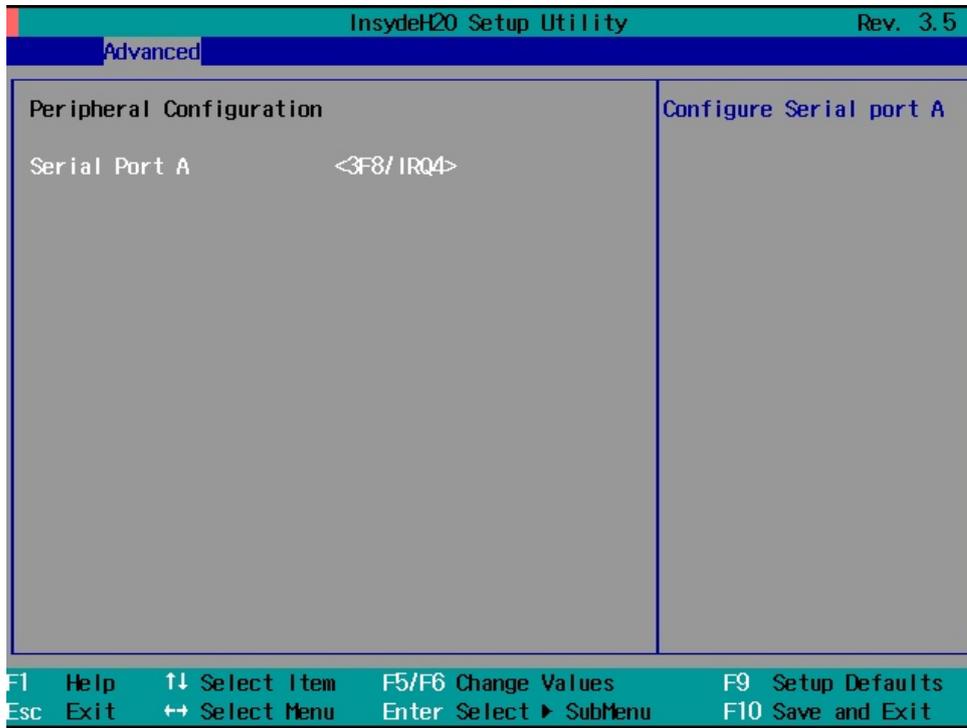
This feature allows you to toggle the number pad into "on" or "off" state when the system boots up.



## Peripheral Configuration

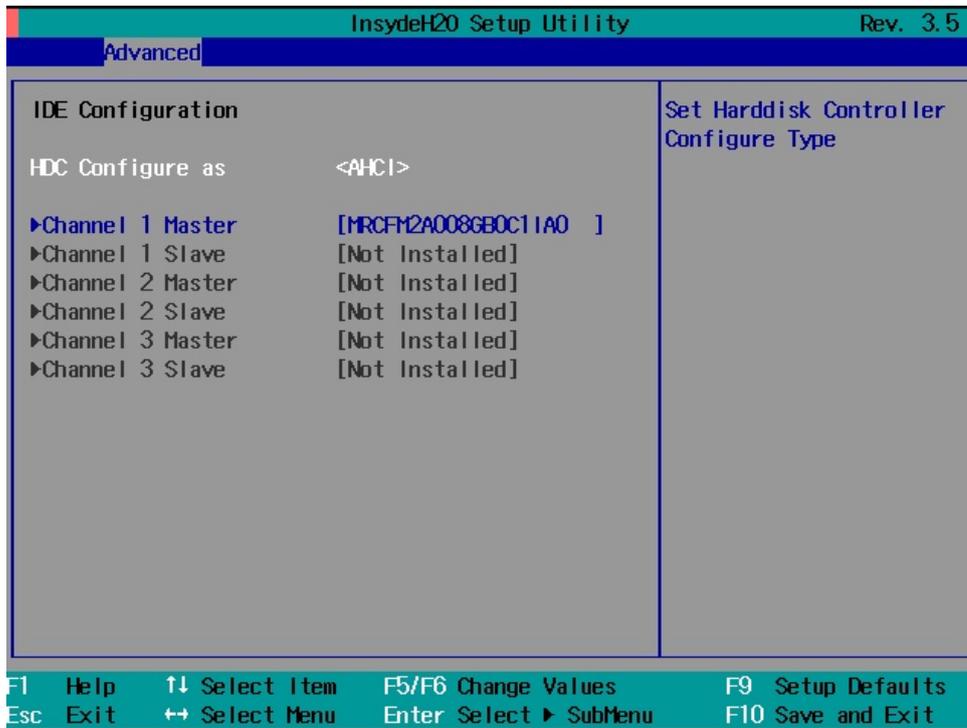
The **Serial Port A** option under **Peripheral Configuration** allows you to select the serial port.

Options: 3F8/IRQ4, Disabled (default)



## IDE Configuration

This feature allows you to configure the storage drive controllers.



### HDC Configure As

This setting allows you to configure the storage drive type. The options are:

**AHCI** (default); **PATA**; **SATA**; and **IDE Non-Combined**

**Channel Master 1 to 3**

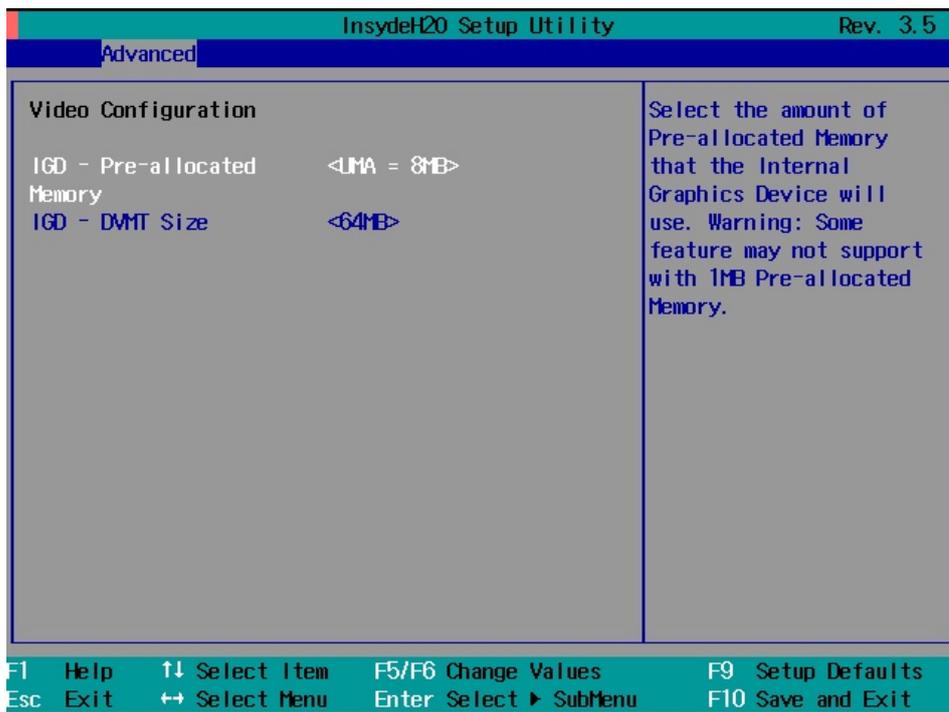
This setting displays the storage devices installed on the computer's master bus. These storage devices may be DOMs, HDDs, SSDs, or a CF card.

**Channel Slave 1 to 3**

This setting displays storage devices installed on the computer's slave bus. These storage drives may be DOMs, HDDs, SSDs, or a CF card.

## Video Configuration

This feature allows you to configure the video settings.



**IGD – Pre-Allocated**

This setting allows you to configure the pre-allocated capacity for the graphic memory capacity.

Options: 8 MB (default), 1 MB

**IGD – DVMT Size**

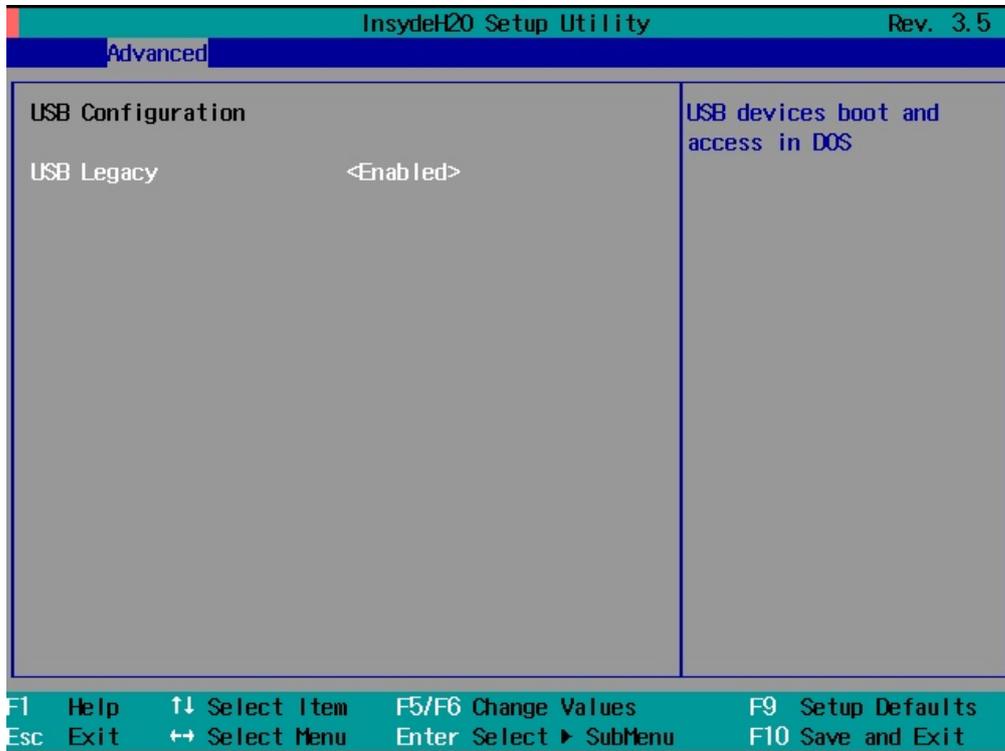
This setting allows you to configure the capacity of the DVMT 5.0 used by the internal graphics device.

Options: 64 MB (default), 128 MB, 224 MB

## USB Configuration

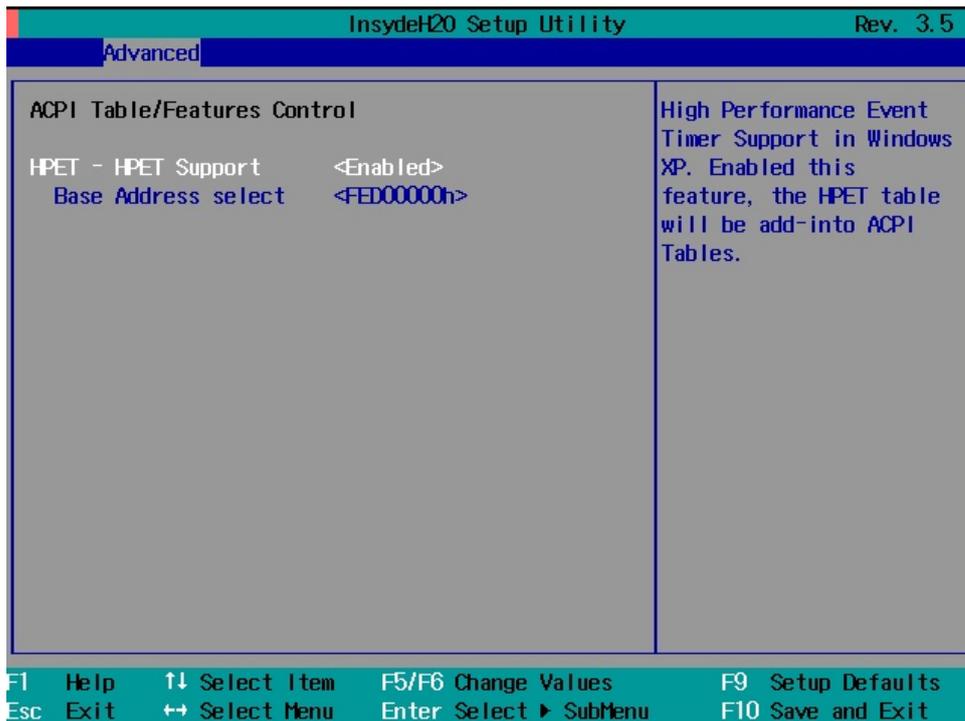
This feature allows you to turn **USB Legacy** mode on or off. **USB Legacy** mode allows older USB devices to be accessed from the earliest boot initialization, and/or DOS.

Options: Enabled (default), Disabled



## ACPI Table/Features Control

This feature allows you to configure the HPET functions.



**HPET – HPET Support**

This setting allows you to enable/disable the HPET (High Precision Event Timer), which produces periodic interrupts at a much higher resolution than the RTC and may be used to synchronize multimedia streams. HPET can sometimes introduce system instability, so some users may wish to disable it.

Option: Enabled (default), Disabled

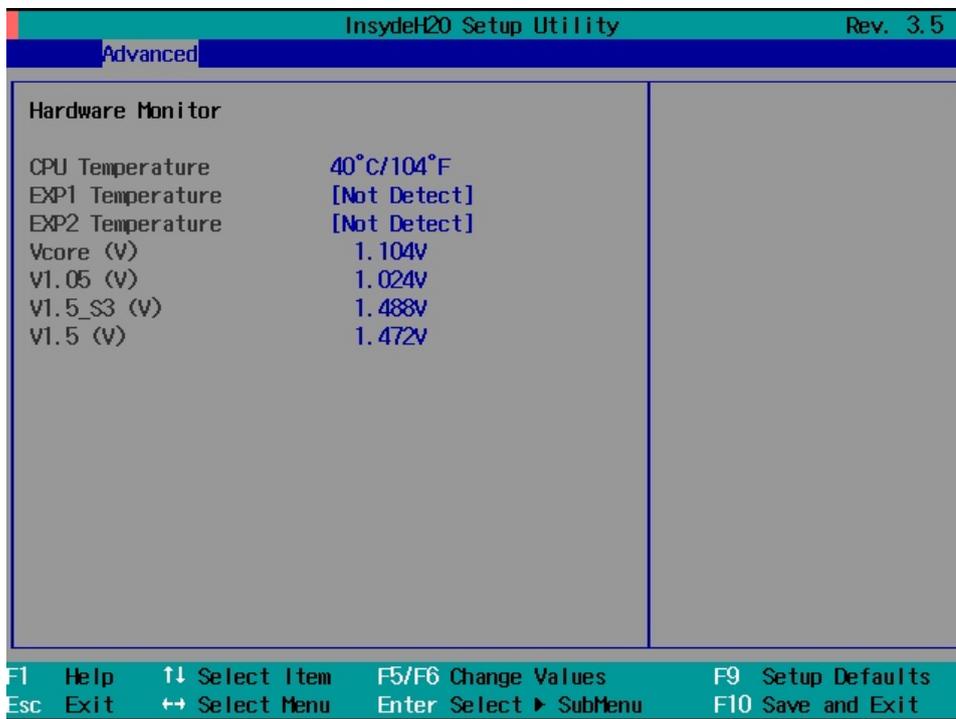
**Base Address Select**

This setting allows you to select the memory address range for the HPET.

Options: FED0000h (default), FED01000h, FED02000h, FED03000h

**Hardware Monitor**

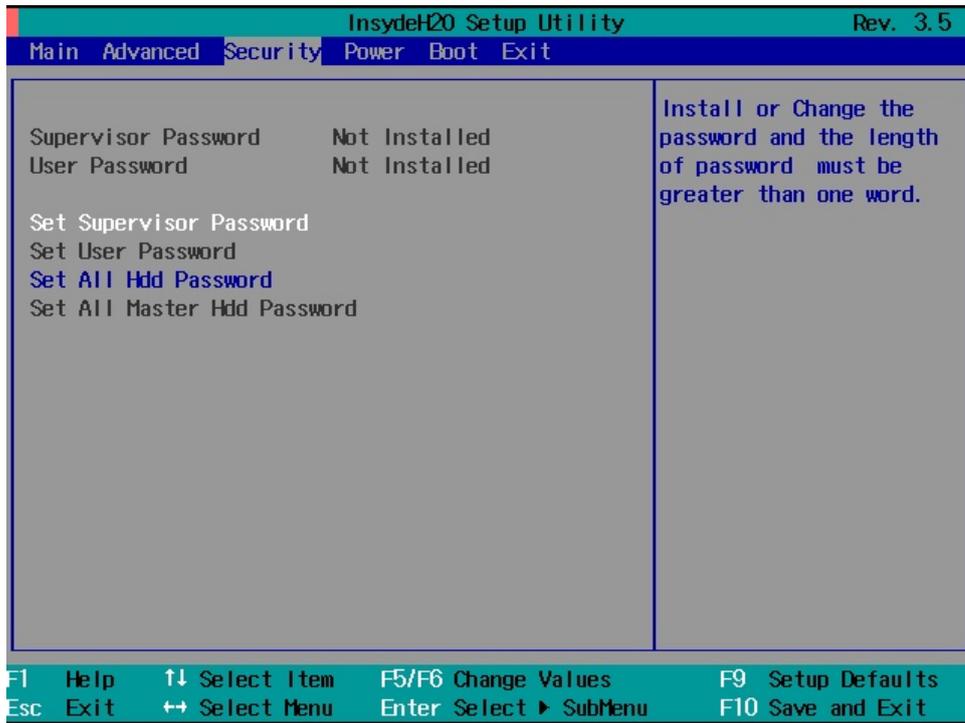
This feature allows you to view various self-reported hardware states that include CPU temperature, system temperature, and CPU voltage.



Please note that at 100°C the accuracy of CPU temperature readings are in the range of -5°C to +10°C. This deteriorates to -10°C to +15°C at 50°C. The CPU temperature readings saturates at some point below 50°C. Any CPU reading below 50°C is unreliable, and may only be interpreted as indicating a temperature below 50°C.

## Security Settings

The feature allows you to configure security settings such as system supervisor password and user password.



### Set Supervisor Password

This setting allows you to set the supervisor password. Select and then enter the password, and then confirm the password again.

### Set User Password

This setting allows you to set the user password. Select and enter the password, and then confirm the password.

### Set All HDD Password

This feature allows you to set the password for all storage devices on your computers, including CF, DOM and hard disk. You need to enter the password when booting up to use these storage devices.

Please note that to update the password you need to first enter the current password, and then enter a new password. If you wish to simply cancel the password and leave the system unprotected, you may leave the password update box blank **but Moxa strongly recommends against this.**



#### WARNING

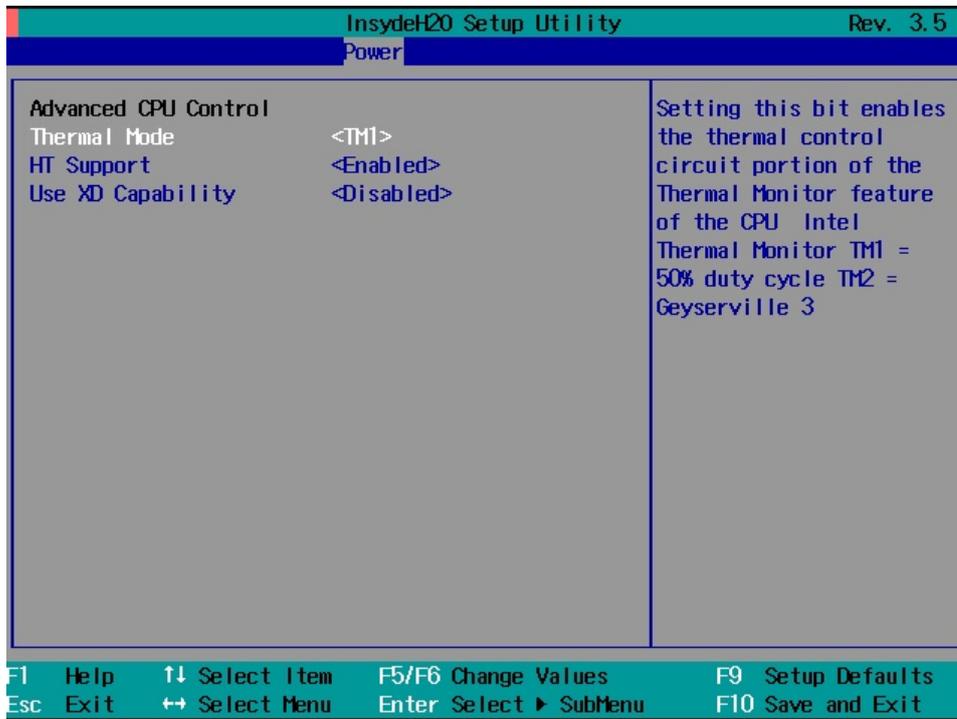
**To guarantee your hard drive remains accessible, remember to record your hard disk drive passwords in a secure place for future reference.** If you set a security password on your hard drive you will need to enter the same password whenever you access it, even if it is transferred to another computer.

## Set All Master HDD Password

This setting allows you to set the password for the master storage drive on your computer. You need to enter the password when booting up to use the master hard disk.

## Power Settings

The feature allows you to configure power settings.



## Advanced CPU Control

### Thermal Mode

This setting enables Intel’s thermal throttling 1 technology in the CPU; it functions as a temperature trip that will throttle the CPU (and thereby decrease performance) when a certain temperature is reached. Enabling this function allows you to configure the thermal control circuit in the operating system userspace.

Options: TM1 (default), Disabled

### HT Support: Hyper-Threading Technology

This setting enables Hyper-Threading (HT) technology, so that the CPU can utilize simultaneous multithreading. This improves performance for multi-threaded code and gives improved reaction and response time. However, in some instances users may want to disable it to conserve power or reduce CPU cache paging.

Options: Enable (default), Disabled

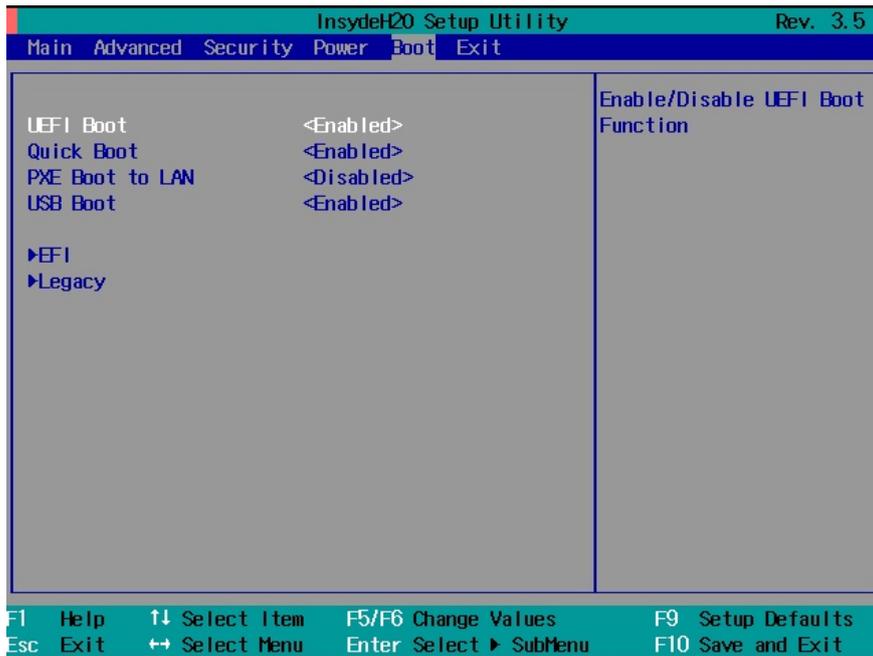
## Use XD Capability

This setting allows you to enable/disable the Intel XD function, which provides executable space protection by toggling the NX bit in memory spaces designated as data. This gives a strong protection against buffer overflows by preventing the execution of malicious code that has been delivered into memory space in a hidden data packet.

Options: Disabled (default), Enable

## Boot Settings

This feature allows users to configure boot settings.



### UEFI Boot

This setting allows you to enable/disable the **Unified Extensible Firmware Interface**, which allows for remote diagnostics and repair of computers even without an operating system. Users who are concerned about safety or ownership issues may disable it.

Options: Enabled (default), Disabled

### Quick Boot

This setting allows you to enable/disable quick boot function to reduce OS loading times.

Options: Enabled (default), Disabled

### PXE Boot to LAN

This setting allows you to configure the **Preboot eXecution Environment's** boot-to-LAN function. **PXE** provides an independent boot environment that may be initialized over a network interface, without intermediary storage devices or local operating systems.

Options: Disabled (function), enabled

## USB Boot

This setting allows you to enable/disable the system to boot from a USB storage device or network connection.

Options: Enabled (default), Disabled

## EFI

This setting displays the boot selection for the UEFI boot function.

## Legacy

### Normal Boot Menu

This setting allows you to configure the boot menu.

Options: Normal (default), Advanced

### Boot Type Order

This setting allows you to select the order in which the computer will search storage devices for bootable images; the highest device on the list will be searched first, then the second, and so on until the computer finds a bootable image. F5/F6 will allow you to change the boot order.

Options: Hard Disk Drive (default), CD/DVD-ROM Drive, USB, Others.

### Hard Disk Drive

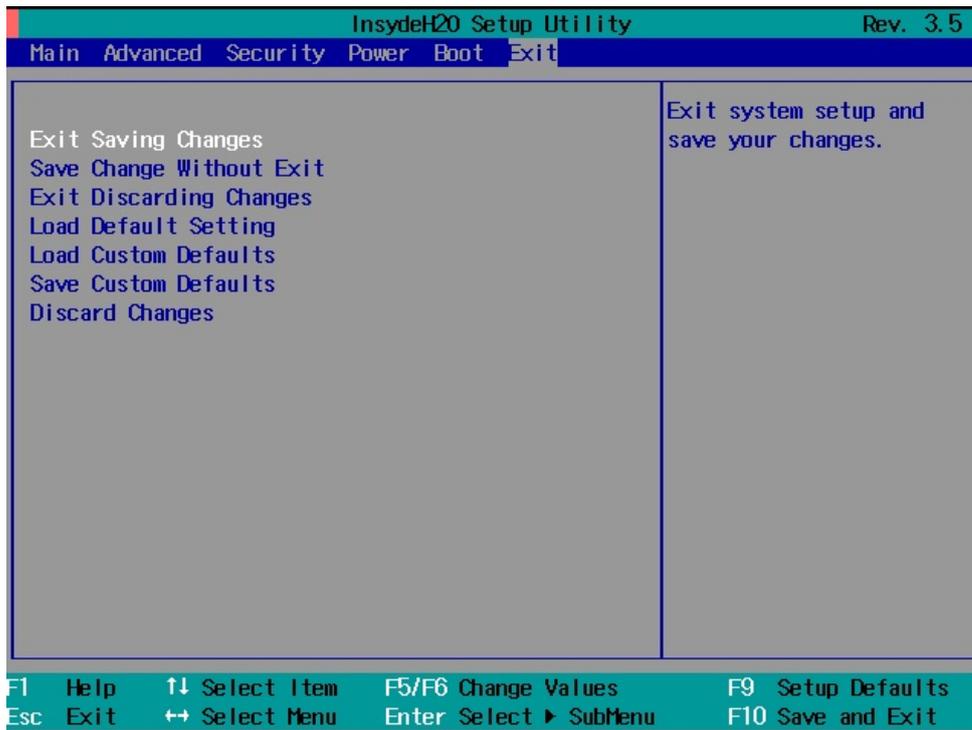
This setting allows you to view information returned by the storage device (SSD, HDD) installed in the computer.

### USB

This setting allows you to view information about any USB device connected to the computer.

## Exit Settings

The feature allows users to exit the BIOS.



### Exit Saving Changes

This setting saves the values you have just configured and exits the BIOS.

Options: Yes (default), No

### Save Change Without Exit

This setting saves changes but does not exit the BIOS.

Options: Yes (default), No

### Exit Discarding Changes

This setting allows you to exit the BIOS without saving any new settings from the user session.

Options: Yes (default), No

### Load Defaults Setting

This setting resets the entire BIOS to factory default values.

Options: Yes (default), No

### Load Custom Defaults

This setting loads custom defaults across the entire BIOS.

Options: Yes (default), No

## Save Custom Defaults

This setting saves the current BIOS settings as the new custom defaults.

Options: Yes (default), No

## Discard Changes

This setting allows you to discard all settings you have just configured.

Options: Yes (default), No

# Upgrading the BIOS

This section describes how to upgrade the BIOS.



### WARNING

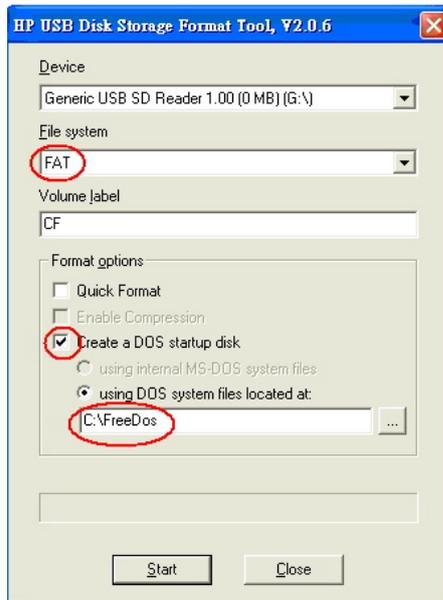
BIOS upgrades, if not done correctly, can permanently damage the computer. We strongly recommend that you contact Moxa's technical support staff for assistance in order to obtain all necessary tools and the most current advice before attempting to upgrade the BIOS on any Moxa device.

#### Step 1: Create a Bootable USB Disk.

Before upgrading the BIOS every you must create a bootable USB RAM drive as a system rescue device. A useful software suite for building USB RAM drives can be found by searching for **HP USB Disk Storage Format Tool**, which you can download and use to create a bootable RAM drive.

To create a rescue system, you will also need to download the FreeDos system files **kernel.sys** and **command.com** at: <http://www.freedos.org/kernel/>

- a) Copy the DOS files **kernel.sys** and **command.com** to a specified directory (**C:\FreeDOS** in this example).
- b) Start the HP USB Disk Storage Format Tool and in the drop-down menu labeled **Device** select the USB device that you want to use as a bootable disk.
- c) Configure it to use a **FAT** file system from the **File System** drop-down.
- d) Enter a drive name in the **Volume Label** field.
- e) Check the option **Create a DOS Startup Disk** under **Format Options**.
- f) Specify the directory where the system files are located (for example, **C:\FreeDOS**).
- g) Click **Start** to format and create the bootable USB drive.



**ATTENTION**

We suggest you use a USB drive with under 2 GB of disk space because larger USB drives may not support the FAT file format and will consequently fail to boot.

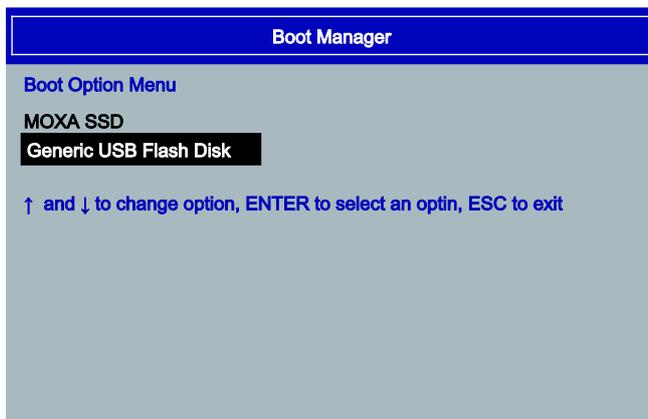
**Step 2: Prepare the Upgrade File.**

You must use the BIOS upgrade installation file to upgrade the BIOS. You can send your request to Moxa's technical support team at support@moxa.com to get an updated version of the BIOS.

- a) Get the BIOS upgrade installation file. The file name should have following format: 6110xxSxx.exe (xx refers to version numbers)
- b) Copy the file to the Bootable USB Disk.

**Step 3: Run the upgrade program on the TC-6110 computer**

- a) Reboot the computer and go to the Boot Manager by pressing F12 while booting up, before the operating system has begun to load.
- b) Select USB Disk as the first boot source. Press Enter to continue.



- c) When the boot-up process is complete, the DOS screen is displayed. Go to the directory where the upgrade file is located. For example, if the upgrade file is stored in the TC6110 folder, type:

```
C:\ cd TC6110
```

- d) Run the upgrade program by typing:

```
C:\ TC6110>611010S05.exe
```

Please note that the upgrade filename may vary depending on the firmware version.

- e) Wait until the upgrade process is complete.

**DO NOT ALLOW THE COMPUTER TO POWER DOWN! DO NOT REMOVE THE USB DRIVE!**

```
C:\>61110S04.exe
Reading file...
Flash package mode.
Option:

Please do not remove the AC power!

Insyde Flash Utility for InsydeH20
Version 1.4b

Initializing

Current BIOS Model name : TC-6110
New BIOS Model name : TC-6110

Current BIOS version: V1.00S03
New BIOS version: V1.00S04

Updating Block at FFE22000
```

- f) When the upgrade is finished, the computer will automatically reboot. To check and see if the upgrade was successful, navigate to the BIOS Main Page and note the BIOS Version number.

```
InsydeH20 Setup Utility
Main Advanced Security Power Boot Exit

Model Name          TC-6110
BIOS Version        V1.00S04
Processor Type      Intel(R) Atom(TM) CPU D525
                    @ 1.80GHz
System Bus Speed    800 MHz
```



**ATTENTION**

*Do NOT switch off the power supply during the BIOS upgrade. Doing so will likely cause permanent damage to your system!*

## Safety Installation Instructions

---

### A. RTC Battery Warning

**CAUTION:** There is a risk of explosion if battery is replaced by an incorrect type. Dispose of used batteries according to the instructions.

### B. Fuse Warning

**CAUTION:** For continued protection against fire, replace only with same type and rating of fuse.

### C. Rackmount Warning

The following or similar rack mount instructions are included with the installation instructions:

**(1) Elevated Operating Ambient:** If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than the room ambient temperature. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature (T<sub>ma</sub>) specified by the manufacturer.

**(2) Reduced Air Flow:** Installation of the equipment in a rack should be such that the air flow required for safe operation is not obstructed.

**(3) Mechanical Loading:** Mounting of the equipment in the rack should not create hazards that result from uneven mechanical loading.

**(4) Circuit Overloading:** Consideration should be given to the connection of the equipment to the power supply and the effect that overloading of the circuits might have on overcurrent protections or supply wiring. Appropriate consideration of equipment nameplate ratings must be noted when evaluating this concern.

**(5) Reliable Grounding:** Reliable grounding of rack-mounted equipment should be maintained. Particular attention must be given to indirect power connections that do not directly link to the branch circuit (e.g., over power strips).

### D. High Temperature Warning

**(1)** This equipment is intended to be used in a **Restricted Access** location like a locked computer room. Access to this equipment should only be granted to **AUTHORIZED SERVICE PERSONNEL** or to users who have been instructed about the potential heat hazard posed by the metal chassis. This computer can become so hot that after a long period of operations users and service personnel must take special care to wear protective clothing before touching it. Only **AUTHORIZED PROFESSIONALS** should be allowed direct access to an operating device.

**(2)** External metal parts can get dangerously hot!! Before touching it, give special attention to device temperature! Protective wear will likely be necessary!



## Regulatory Statement Approval

---



This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

**Class A:** FCC Warning! This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his/her own expense.



**European Community**

**Warning:**

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.