MXC-6000

Fanless, Expandable Intel® Core™ i7-620LE
Processor 2.0 GHz Embedded Computer

User's Manual



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Revision History

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Preface

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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.

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1 Introduction

1.1 Overview

The Matrix MXC-6000 series provides powerful, fanless, expandable embedded computing using the new Intel® Core™ i7-620LE Processor 2.0 GHz with improved computing performance. The MXC-6000 continues the exceptional fanless and cable-free design from the existing Matrix C series.

The MXC-6000 series features an Intel® Core™ i7-620LE Processor 2.0 GHz and Intel® QM57 chipset to boost performance, making it ideal for image and vision measurement and automation applications. Its PCI and PCIe slots allow integration of off-the-shelf PCI/PCIe cards to develop a configurable application platform. The built-in 16 isolated DIO channels are provided for general industrial control. A DVI-I connector output on the front panel allows direct connection to an LCD panel, and the MXC-6000 series also provides one eSATA port to enable expansion of current storage capacity or use of hot-swappable SATA drives.

Leveraging a reliable fanless and durable cable-free design, the MXC-6000 series exhibits excellent dependability in -harsh environments, where severe temperature variation and vibration may occur. The MXC-6000 series provides an optional hot-pluggable fan module to dissipate heat generated within the system when high power consumption PCI/PCIe cards are installed. This innovative mechanical design retains a cable-free structure which dramatically improves thermal stability when PCI/PCIe cards are installed.

The MXC-6000 also provides a USB 2.0 port internally on riser card. This function provides more reliable usage in security applications where license keys or password encryption through an internal USB dongle dramatically improve the security of the Matrix I/O controller. Combining a reliable design with more computing power and innovative features, the Matrix MXC-6000 series is the optimal choice on which to base any rugged application system.

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1.2 Features

- Intel® Core i7-620LE 2.0 GHz processor + Intel® QM57 chipset
- Expandable PCI and PCIe x4 slots
- Rugged, -10°C to 60°C fanless operation*
- Built-in 9 V DC to 32 V DC wide-range DC power input
- VGA+DVI display by DVI-I connector
- Dual 1000/100/10 Mbps Ethernet ports
- 4 USB 2.0 ports (external),1 USB 2.0 port (internal)
- Four serial ports:, two RS-232 and two RS-232/422/485 (software-selectable)
- Built-in 16-CH isolated DI and 16-CH isolated DO



This option guarantees cold boot of the system at -10°c and operation with 100% loading at 60° without add-on cards. The industrial solid-state drive storage option is required.

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1.3 Specifications

	MXC-6101D	MXC-6201D
System Core		
Processor	Intel® Core i7-620LE 2.0 GHz CPU	
Chipset	Intel® QM57	
Video	One DVI connector provides DVI display, with support for analog VGA with ADLINK Y-cable* 48bit LVDS support by internal header *The Y-cable converts the DVI connector to one D-DUB connector for Analog VGA and one DVI-D connector for digital LCD panel , such that both connectors can function with requisite driver support Analog CRT, supports QXGA (2048 x 1536) resolution DVI-I 1.0 (DVI + VGA) (with external cable for connecting DVI-I connector to DVI and VGA device) Optional 48-bit LVDS (by internal box header)	
Memory	2 GB DDR3 800/1066 MHz SODIMM module (Max. capacity 4GB w/ optional SODIMM module support)	
I/O Interface		
Ethernet	2x GbE port (2x Intel® 82574L)	
Serial Port	2x software-programmable RS-232/422/485 (COM1 & COM2) 2x RS-232 (COM3 & COM4)	
USB	4x USB 2.0 ports (external), 1xUSB 2.0 port (internally on riser card)	
Audio	1x mic-in and 1x line-out	
KB/MS	1x PS/2 keyboard and 1x PS/2 mouse	
Expansion	2* PCI slots	1* PCIex4 slot + 1* PCI slot
DI/O	16DI + 16DO with isolation	
Power Supply		
DC Input	AT/ATX, Built-in 9-32 V DC wide-range DC input , 3P pluggable connector with latch (V-, GND, V+)	

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AC Input	Optional 100 W external AC-DC adapter for AC input	
Storage		
SATA HDD	2 x Onboard SATA port for 2.5" HDD/SSD installation	
CF	1x external type I CompactFlash socket, 1x internal type I CompactFlash socket	
eSATA	1x eSATA port	
Mechanical		
Fan	Optional hot-pluggable fan module cooling PCI/PCIe card	
Dimensions	130(W) x 225 (D) x 183(H) mm (5.12x8.86x7.2 in)	
Weight	3.5 kg (7.71 lb)	
Mounting	Wall-mount kit	
Environmental		
Operating Temperature	Standard: 0°C to 50°C (32 to 122°F) (w/ HDD) Extended: -10°C to 60°C (-14 to 140°F) (w/o HDD or w/ Industrial SSD/CF)	
Storage Temperature	-40°C to 85°C (-40 to 185°F)	
Humidity	approx. 95% @ 40°C (non-condensing)	
Vibration	Operating, 5 Grms, 5-500 Hz, 3 axes (w/ CF or SSD)	
	Operating, 0.5 Grms, 5-500 Hz, 3 axes (w/ HDD)	
EMC	CE, FCC	
Shock	Operating, 50 G, half sine 11ms duration (w/ CF or SSD)	
Power Consumption		
Power Off	0.72 W	In shutdown status with DC input and only PS2 keyboard/mouse connected
System Idle	41.28 W	Under Windows XP desktop with no application programs executed

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System Full Load	78.72 W	Under Windows XP with 100% CPU utilization and simultaneous access to all I/O devices
Recommended Power Supply	100 W	Additional power supply is necessary if add-on cards are installed and in use

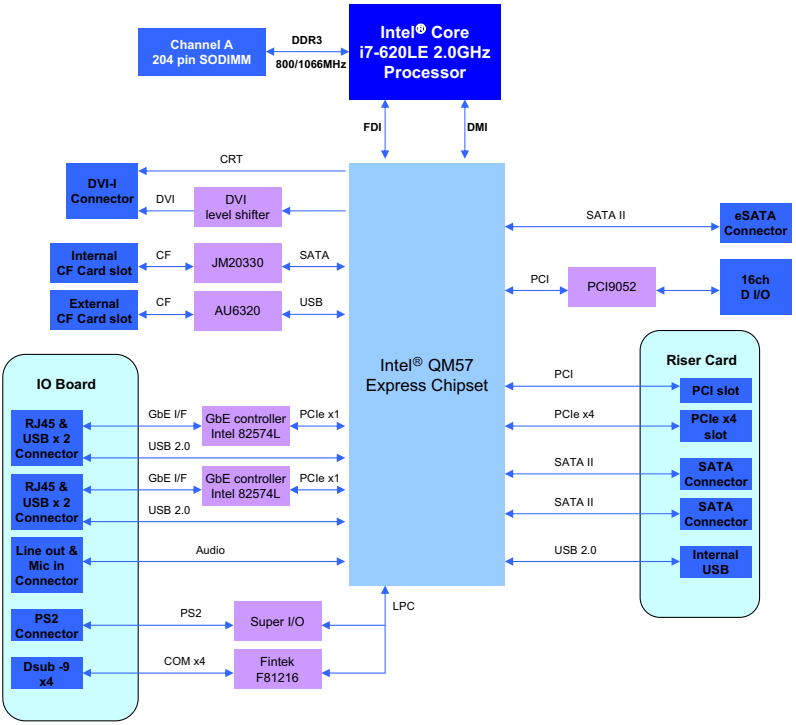


Figure 1-1: MXC-6000 Functional Block Diagram

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1.4 Mechanical Drawings

This section describes the appearance and connectors of the MXC-6000 controllers, including chassis dimensions, front panel connectors, rear panel connectors, and internal IO connectors.

NOTE:

All dimensions shown are in mm (millimeters).

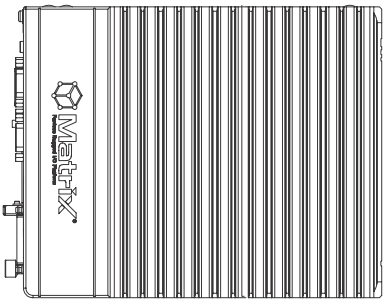


Figure 1-2: MXC-6000 Left Side View

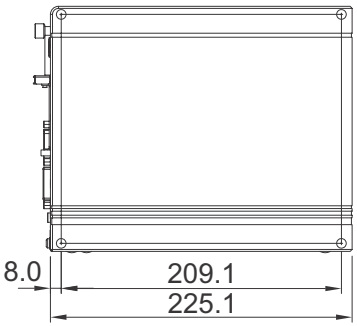


Figure 1-3: MXC-6000 Right Side View

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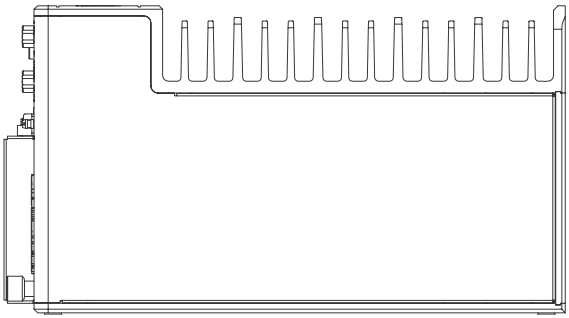


Figure 1-4: MXC-6000 Top View

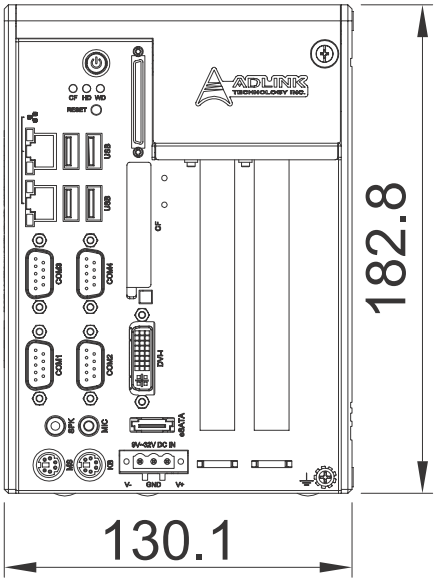


Figure 1-5: MXC-6000 Front View

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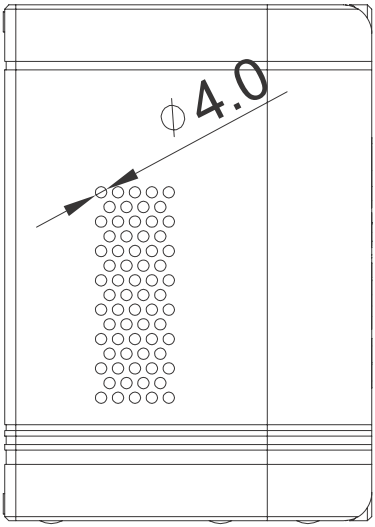


Figure 1-6: MXC-6000 Rear View

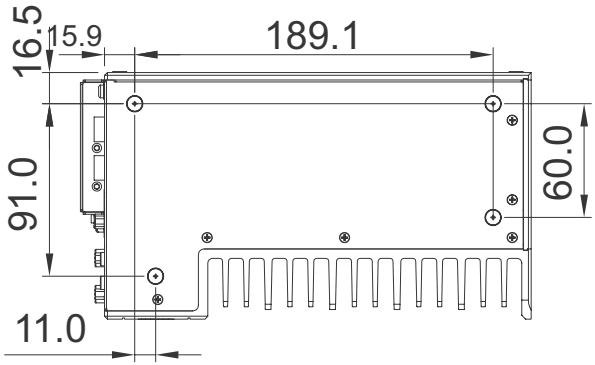


Figure 1-7: MXC-6000 Underside View

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1.5 Front Panel I/O Connectors.

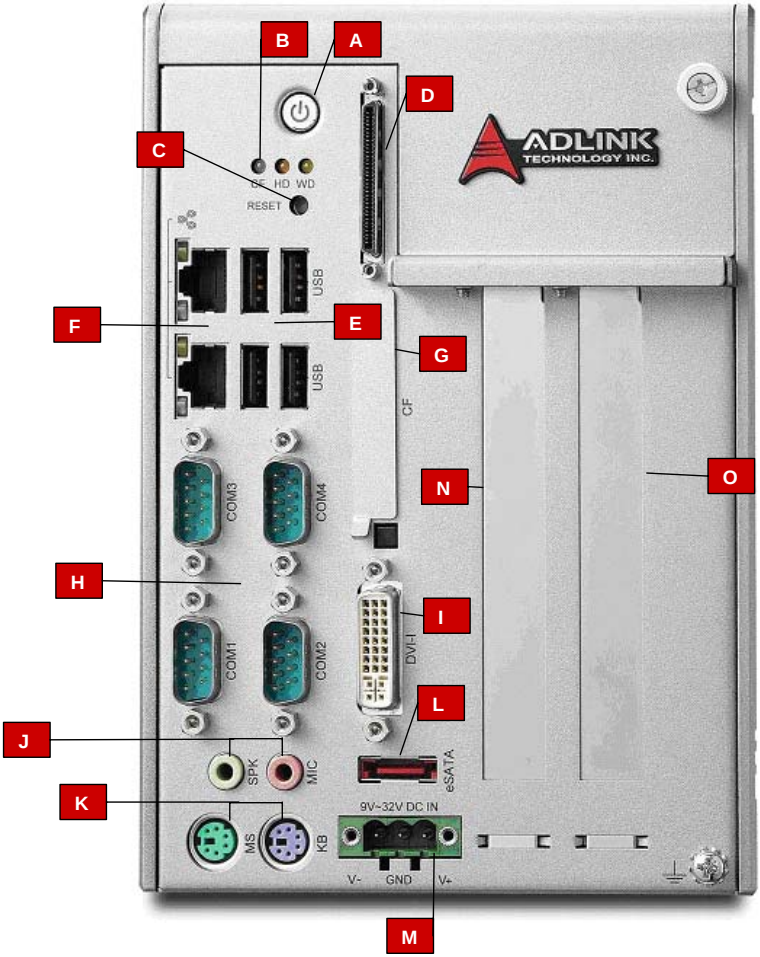


Figure 1-8: Front Panel I/O Connector

A	Power button	I	DVI-I
B	LED indicators	J	MIC & Speaker
C	Reset button	K	Keyboard/Mouse PS2
D	Digital I/O	L	eSATA
E	USB 2.0 x4 (Type A)	M	DC power

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F	Dual Gigabit Ethernet	N	PCI
G	CompactFlash	O	MXC-6101 PCI MXC-6201 PCI express x4
H	COM port x4	I	DVI-I

Table 1-1: Front Panel I/O Connector Legend

1.5.1 Power Button

The power button is a non-latched push button with a blue LED indicator. System is turned on when the button is depressed, and the power LED lights. If the system hangs, depress the button for 5 seconds to turn off the system completely.

1.5.2 LED Indicators

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

LED indicator	Color	Description
Watchdog (WD)	Yellow	Indicates watchdog timer status. When watchdog timer starts, the LED flashes. When the timer is expired, the LED remains lit..
Hard disk drive (HD)	Orange	Indicates the HDD operating state. When the SATA hard drive or CF card is active, the LED indicator flashes.
CompactFlash card (CF)	Green	Indicates the operating state of the CF card on the front panel. The LED indicator flashes when CF card is active.

Table 1-2: LED Indicators

1.5.3 Reset Button

The reset button executes a hard reset for the MXC-6000 series controller.

1.6 Digital I/O Connector

The MXC-6000 controller features an onboard isolated digital I/O circuit with a 68-pin VHDCI (Very High Density Cable Intercon-

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nect) connector on the front panel. The onboard digital I/O card supports the following features:

16-CH Isolated DI

- Logic high: 5 to 24 V
- Logic low: 0 to 1.5 V
- Input resistance: 2.4K @ 0.5W
- Isolation type: photocoupler
- Isolation voltage: 2500 V RMS
- Interrupt source: DI channel 0 and 1

16-CH Isolated DO

- Output Type: MOSFET transistor
- Sink current up to 100 mA (sustained loading) or 250 mA (peak loading) on each isolated output channel
- Supply voltage: 5 to 35 V DC
- Isolation type: Digital Isolator
- Isolation voltage: 2500 VRMS
- Flywheel diode for VDD on all DO channels

Isolated 5V DC Power Source for DO

- Supply voltage: 5 to 0.5V DC
- Supply current: 180 mA (maximum)
- Isolation type: DC-to-DC transformer
- Isolation voltage: 1000 VRMS (channel to system)

General Specification

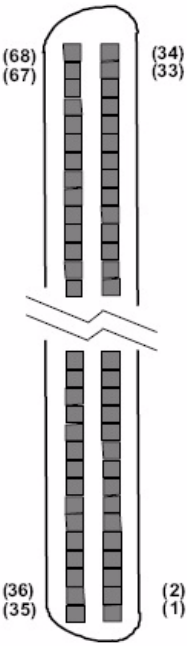
68-pin VHDCI(Very High Density Cable Interconnect) connector (mating with AMP 787082-7) on the front panel

Optional accessories: DIN-68S-01 and ACL-10568-1

Data transfer: programmed IO

Software Driver support: PCIS-DASK for Windows

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PIN	Signal Name	PIN	Signal Name	PIN	Signal Name
1	VDD	24	IDI_1L	47	EOGND
2	EOGND	25	IDI_0H	48	IDO_10
3	IDO7	26	IDI_0L	49	EOGND
4	EOGND	27	IDI_11	50	IDO_9
5	IDO6	28	IGND	51	EOGND
6	EOGND	29	IDI_10	52	IDO_8
7	IDO5	30	IGND	53	IDI_7H
8	EOGND	31	IDI_9	54	IDI_7L
9	IDO4	32	IGND	55	IDI_6H
10	EOGND	33	IDI_8	56	IDI_6L
11	IDO3	34	IGND	57	IDI_5H
12	EOGND	35	VDD	58	IDI_5L
13	IDO2	36	ISO5V	59	IDI_4H
14	EOGND	37	EOGND	60	IDI_4L
15	IDO1	38	IDO_15	61	IDI_15
16	EOGND	39	EOGND	62	IGND
17	IDO0	40	IDO_14	63	IDI_14
18	EOGND	41	EOGND	64	IGND
19	IDI_3H	42	IDO_13	65	IDI_13
20	IDI_3L	43	EOGND	66	IGND
21	IDI_2H	44	IDO_12	67	IDI_12
22	IDI_2L	45	EOGND	68	IGND
23	IDI_1H	46	IDO_11		

Table 1-3: Digital I/O Connector Pin Signals

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DI Pin Definition:	IDI_nH	High input of isolated differential DI channel (n=0 to 7)
	IDI_nL	Low input of isolated differential DI channel (n=0 to 7)
	IDI_n	Input of isolated DI channel (n=8 to 15)
	IGND	Common ground of isolated DI channel 8 to 15
DO Pin Definition:	IDO_n	Output of isolated DO channel (n=0 to 15)
	EOGND	Ground return path of isolated DO channel 0 to 15 and ISO5V
	VDD	Power input signal for flywheel diode of isolated DO channel 0 to 15
	ISO5V	Isolated 5V DC power, maximum output 180mA

Table 1-4: Digital I/O Connector Pin Legend

1.6.1 Isolated Digital Input Circuits

Input accepts voltages up to 24V, with input resistors of 2.4KΩ, and connections between outside signals as shown.

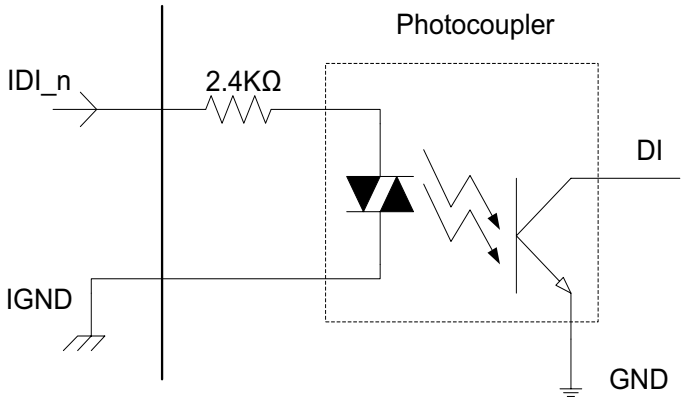


Figure 1-9: Isolated Digital Input Circuit

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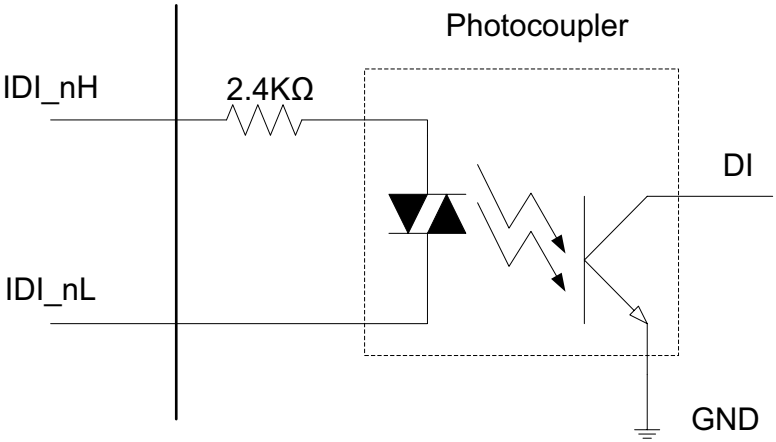


Figure 1-10: Isolated Digital Input Differential Input Circuit

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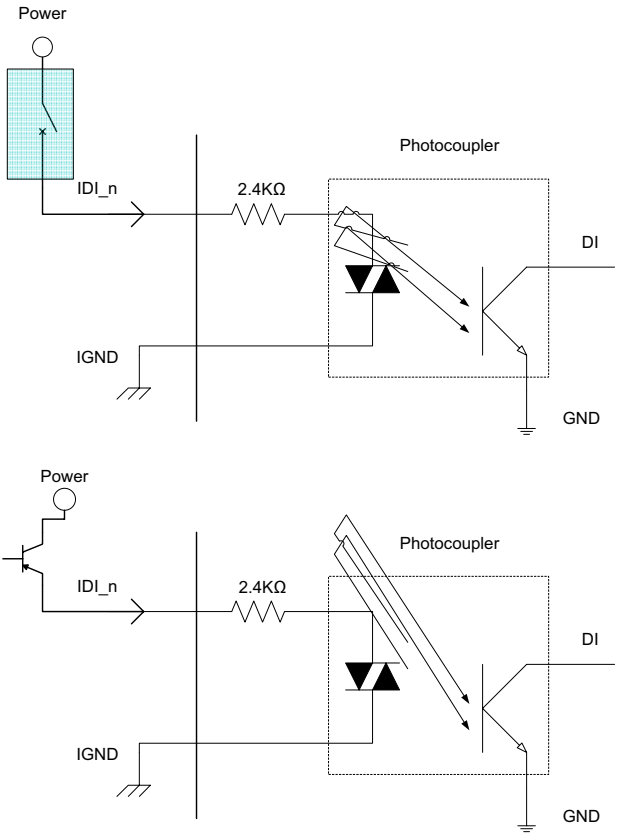


Figure 1-11: Isolated Digital Input Sample Application Circuit

1.6.2 Isolated Digital Output Circuits

Each isolation digital output channel adopts a MOSFET transistor, capable of driving peak current up to 250mA (sustained current up to 100 mA) with voltage ranges from 5V to 35V.

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The VDD pin is connected in serial with a flywheel diode protecting the driver during inductance loading, such as relay, motor, or solenoid, wherein the VDD must connect to external power to form a flywheel current loop.

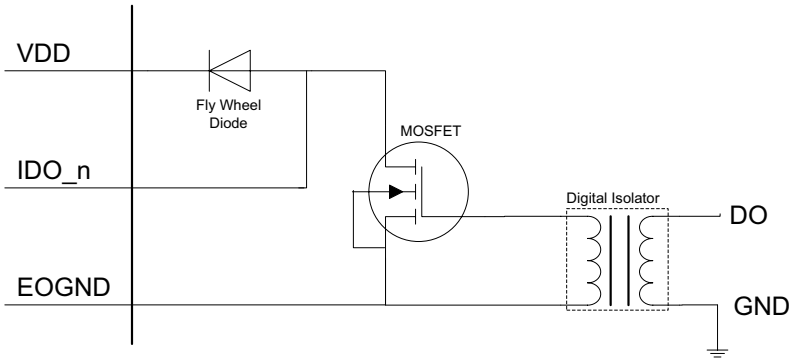


Figure 1-12: Isolated Digital Output Circuits

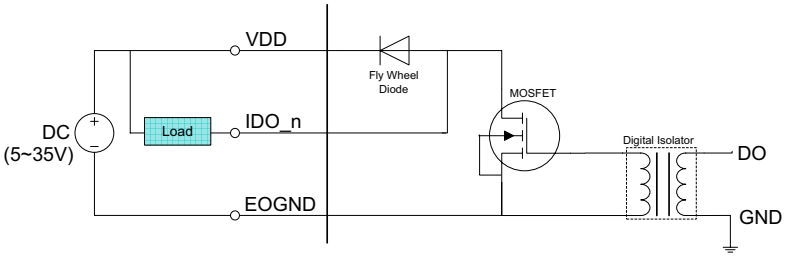


Figure 1-13: Isolated Digital Output Sample Application Circuit

1.6.3 Digital I/O Windows Driver and API

The MXC-6000 DIO incorporates Adlink PCI-7230 Windows driver support through the PCIS-DASK software package, on the bundled driver CD or downloadable from Adlink's MXC-6000 web sup-

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port page (driver for MXC-6000 DIO). PCIS-DASK contains Windows drivers, the API library, demo programs, and manuals.


NOTE:

The MXC-6000 DIO is recognized as PCI-7230 in PCIS-DASK. It can be accessed by PCI-7230 driver, API, and demo programs in PCIS-DASK. Please refer to the PCIS-DASK manual for more information.

1.6.4 Digital I/O Programming I/O Address

The MXC-6000 DIO can be programmed by an I/O address.

I/O Register Base Address

The base address as assigned by PCI PnP BIOS is located at offset 18h (Base Address Register 3) of the PCI Configuration Register (PCR), which can be read using the BIOS function call.


CAUTION:

Do not try to modify the base address and interrupt assigned by the PCI PnP BIOS as resource conflict within the system may result.

I/O Register Format

The MXC-6000 requires one 32-bit address in the PC I/O address space. I/O address of each register with respect to the base address is as follows.

Address	Write	Read
Base (0-1)	Isolated DO	Isolated DI


CAUTION:

All I/O ports shown are 32-bit width, with 8- or 16-bit access not allowed.

Digital Input Register:

In the MXC-6000's 16 DI channels, each bit corresponds to a signal on the digital input channel, based on:

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Address: BASE + 0 to BASE + 1

Attribute: read only

Data Format is as follows, wherein IDI_n is Isolated Digital Input CH n.

Bit	7	6	5	4	3	2	1	0
Base + 0	IDI_7	IDI_6	IDI_5	IDI_4	IDI_3	IDI_2	IDI_1	IDI_0
Base + 1	IDI_15	IDI_14	IDI_13	IDI_12	IDI_11	IDI_10	IDI_9	IDI_8

Digital Output Register

In the MXC-6000's 16 DO channels, each bit corresponds to a signal on the digital output channel, based on:

Address: BASE + 0 to BASE + 1

Attribute: write only

Data Format is as follows, wherein IDO_n is Isolated Digital Output CH n.

Bit	7	6	5	4	3	2	1	0
Base + 0	IDI_7	IDI_6	IDI_5	IDI_4	IDI_3	IDI_2	IDI_1	IDI_0
Base + 1	IDI_15	IDI_14	IDI_13	IDI_12	IDI_11	IDI_10	IDI_9	IDI_8

System Interrupt for DI Channels 0 and 1

MXC-6000's Digital Input will generate system interrupts when logic status of DI channels 0 and 1 changes from low to high.

DI Channel	Logic Status	System Interrupt
DI 0	From low to high	Generate INT1
DI 1	From low to high	Generate INT2

Table 1-5: DI Channel System Interrupt

Sample codes and more interrupt programming information are available in PCIS-DASK. Please refer to the PCIS-DASK manual.

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1.6.5 USB 2.0 Ports

The MXC-6000 series controller provides four USB 2.0 ports supporting Type A USB connection on the front panel. All USB ports are compatible with high-speed, full-speed and low-speed USB devices. The MXC-6000 series controller supports multiple boot devices, including USB flash drive, USB external hard drive, USB floppy, USB CD-ROM and others. The boot priority and boot device can be configured in BIOS. Please refer to B.2.6: USB Configuration on page 61 for details.

1.6.6 Dual Gigabit Ethernet Ports

The MXC-6000 series controller has two Gigabit Ethernet ports on the front panel supporting Intel 82574L controllers. The Ethernet controller supports the following features:

- x1 PCI Express® interface with 2.5 GHz signaling
- Advanced error reporting
- Message signaled interrupts
- TCP segmentation offload/large-send support
- 802.3x flow control-compliant
- IEEE 802.1p and 802.1q support
- 10/100/1000 IEEE 802.3-compliant
- Automatic MDI/MDIX crossover at all speeds
- ACPI 2.0 specification
- Wake-On-Link feature

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- Fully integrated ASF 2.0 functionality with on-chip µc
- SMBus 2.0 master interface for ASF functionality
- Preboot eXecution Environment (PXE) flash interface support



Active/Link Yellow	Speed LED Green/Orange

LED Color	Status	Description
Yellow	OFF	Ethernet port is disconnected.
	ON	Ethernet port is connected with no activity.
	Flashing	Ethernet port is connected and active.

Table 1-6: Active/Link LED

LED Color	Status	Description
Green/Orange	OFF	10 Mbps
	Green	100 Mbps
	Orange	1000 Mbps

Table 1-7: Speed LED

1.6.7 CompactFlash Socket

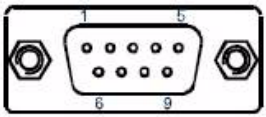
The Matrix MXC-6000 series is equipped with a Type I CompactFlash socket on the front panel, converted from USB. The CF card can be used as a USB device but not as an alternative storage

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device for operating system files. Installation of a CF card is described in Section 2.4: Installing CF Cards on page 40.

1.6.8 COM Port connectors

The MXC-6000 series controller provides four COM ports through D-sub 9 pin connectors. The COM1 & COM2 ports support RS-232/422/485 modes by BIOS setting, while COM3 and COM4 support only RS-232. Please refer to Section B.2.5 on page 61 for details of BIOS COM port mode settings.



PIN	Signal Name		
	RS-232	RS-422	RS-485
1	DCD#	TXD422-	485DATA-
2	RXD	TXD422+	485DATA+
3	TXD	RXD422+	N/S
4	DTR#	RXD422-	N/S
5	GND	N/S	N/S
6	DSR#	N/S	N/S
7	RTS#	N/S	N/S
8	CTS#	N/S	N/S
9	RI#	N/S	N/S

Table 1-8: D-sub 9P signal function of COM ports

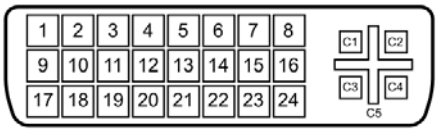
1.6.9 DVI-I connector

The MXC-6000 series controller provides one DVI-I connector providing connection to an external monitor. The DVI-I connector can be separated into VGA and DVI-D (single link) interfaces using the included ADLINK Y-cable.

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CAUTION:

Since VGA signals are analog based, VGA display quality is greatly affected by quality and length of cable used. We strongly recommended VGA cable less than 2 meters in length with effective shielding, such as UL style 2919 AWM.



PIN	Signal	PIN	Signal	PIN	Signal	PIN	Signal
1	DVIdata 2-	9	DVIdata 1-	17	DVIdata 0-	C1	Analog Red
2	DVIdata 2+	10	DVIdata 1+	18	DVIdata 0+	C2	Analog Green
3	GND	11	GND	19	GND	C3	Analog Blue
4	CRT DDC clock	12	N/C	20	N/C	C4	Analog horiz. sync
5	CRT DDC data	13	N/C	21	N/C	C5	Analog GND
6	DVIDC clock	14	+5V	22	GND	C1	Analog Red
7	DVIDC data	15	GND	23	DVI clock +		
8	Analog vert. sync	16	Hot plug detect	24	DVI clock -		

Table 1-9: DVI-I Connector Signals

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1.6.10 Audio Jacks

The MXC-6000 series controller implements Intel High Definition audio on a Realtek ALC262 chip. The HD audio supports up to 24-bit, 192 KHz sample rate high quality headphone/lineout and microphone input. Audio jack access is on the front panel. The pink jack provides microphone input, and the green jack lineout.



Color	Signal
Green	lineout
Pink	Mic In

Table 1-10: Audio Jack Signals

1.6.11 Keyboard & Mouse PS/2 connectors

The MXC-6000 series controller provides PS/2 connectors for keyboard and mouse. The green connector provides PS/ 2 mouse connection and the purple connector PS/2 keyboard



Color	Signal
Green	Mouse
Purple	Keyboard

Table 1-11: PS/2 Connector Signals

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NOTE:

Keyboard & mouse PS/2 connectors do not support hot-plug capability.

1.6.12 eSATA connector

The MXC-6000 controller provides one eSATA port connector on the front panel. The MXC-6000 series supports external SATA storage expansion, although the connector supports only the SATA signal, whereby the SATA HDD requires connection to external DC power to function.

1.6.13 DC Power connector

The DC power supply connector of the MXC-6000 series controller is on the front panel. The power supply connector consists of three pins, V+, chassis ground, and V- from right to left respectively. V+ and V- pins provide DC power input and the chassis ground pin allows connection of the chassis to ground for better EMC compatibility. The DC power input for the MXC-6000 series controller allows a voltage input range from 9 V DC to 32 V DC.

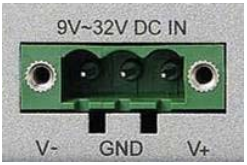

WARNING:

Ensure that the DC power supply:

- is within the input voltage range defined in the specification
- is stable and low-noise DC
- provides sufficient operating current

DC power supply over or under voltage, unstable, or of insufficient power may cause system instability and physical damage

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PIN	Signal
1	V+ (DC_IN)
2	GND (CHGND)
3	V- (DGND)

Table 1-12: DC Power Supply Connector Signals

1.6.14 PCI slot

The MXC-6201 provides one PCI slot, and the MXC-6101 provides two PCI slots for expansion. The PCI slot can support Universal or 5 V PCI 32-bit cards operating at 33MHz clock and peak transfer rate of 133MB/s speed.

1.6.15 PCI express x4 slot

The MXC-6201 controller provides one PCI express x4 slot for expansion. The PCI express slot can support support standard PCIe revision 2.2 short cards.

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1.7 Internal I/O connectors

This section describes the internal I/O connectors of the MXC-6000 series controller, as shown

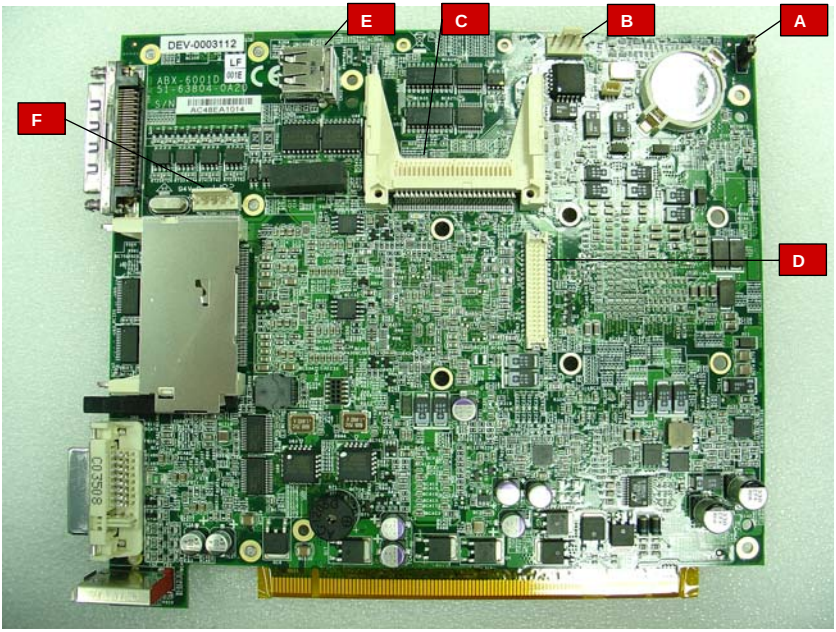


Figure 1-14: Mainboard PCB

A	Clear CMOS jumper
B	Internal reserved +5V and +12V connector
C	Internal CF Card connector
D	LVDS interface connector
E	12V DC fan connector
F	LVDS panel backlight control connector

Table 1-13: Mainboard Connector Legend

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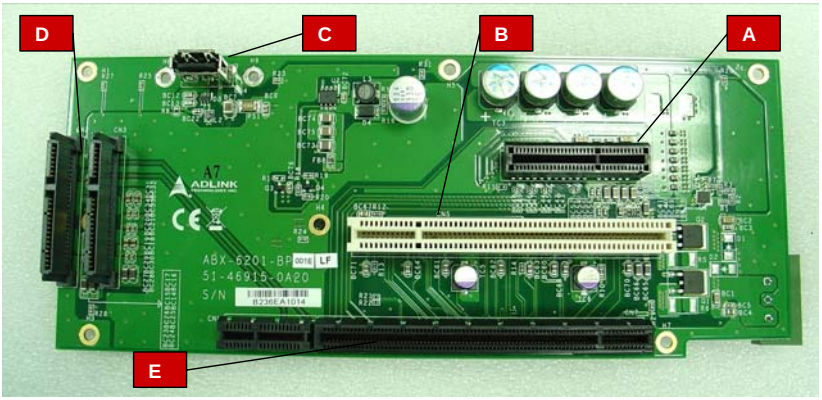


Figure 1-15: Backplane Board PCB

A	PCI express x4 slot
B	PCI slot
C	Internal USB connector
D	SATA connector x2
E	Back board to main board PCB connector

Table 1-14: Backplane Board Connector Legend

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1.7.1 Clear CMOS Jumper

Upon encountering an abnormal condition preventing the MXC-6000 series from booting, the jumper can clear the BIOS content stored in CMOS and restore default settings. To clear CMOS, short pin #2 to pin #3 of JP1 and then return to normal mode (short pin #1 to pin #2).

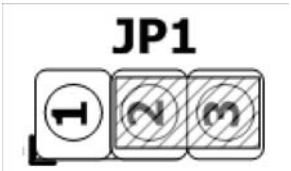
Normal	Clear
	

Table 1-15: Clear CMOS Jumper Settings

1.7.2 Internal Reserved +5V and +12V Connector

The MXC-6000 series controller provides one power pin header with +5V and +12V DC power, providing access for PCI and PCI express card external power supplies..



PIN	Signal
1	+5V
2	GND
3	GND
4	+12V

Table 1-16: +5V and +12V Connector Pin Functions

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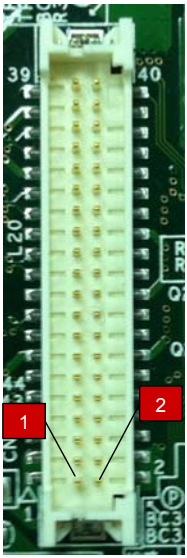
1.7.3 Internal CF Card Connector

The Matrix MXC-6000 series is equipped with an internal CompactFlash socket, converted from SATA interface, and provides alternative storage device for system installation data. The MXC-6000 series controller can boot via a CF card with OS installed. Due to the nature of the SATA interface, the CF card cannot hot-plug and must be installed prior to system power on. Installation of a CF card is described in 2.4: Installing CF Cards .

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1.7.4 LVDS Interface Connector

The MXC-6000 series controller provides an internal LVDS interface connector. The LVDS interface can support dual channel LVDS signals.



PIN	Signal	PIN	Signal
1	LVDS_VCC	2	LVDS_VCC
3	LVDS_VCC	4	LVDS_VCC
5	GND	6	GND
7	GND	8	GND
9	LVDS_A_CLK+	10	LVDS_B_CLK+
11	LVDS_A_CLK-	12	LVDS_B_CLK-
13	GND	14	GND
15	LVDS_A_DATA0+	16	LVDS_B_DATA0+
17	LVDS_A_DATA0-	18	LVDS_B_DATA0-
19	GND	20	GND
21	LVDS_A_DATA1+	22	LVDS_B_DATA1+
23	LVDS_A_DATA1-	24	LVDS_B_DATA1-
25	GND	26	GND
27	LVDS_A_DATA2+	28	LVDS_B_DATA2+
29	LVDS_A_DATA2-	30	LVDS_B_DATA2-
31	GND	32	GND
33	LVDS_A_DATA3+	34	LVDS_B_DATA3+
35	LVDS_A_DATA3-	36	LVDS_B_DATA3-
37	GND	38	GND
39	LDDC_CLK	40	LDDC_DATA

Table 1-17: LVDS Connector Pin Functions

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1.7.5 12V DC Fan Connector

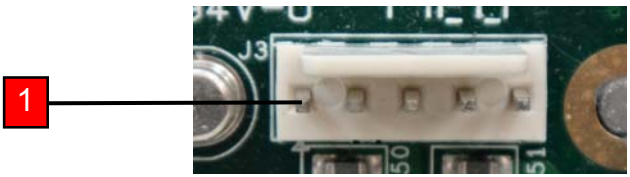
The MXC-6000 series controller provides a DC 12V to USB connector for fan module power. The optional fan module connects to the connector when assembled to the chassis.

Fan speed changes with CPU temperature according to thermal sensor, initiating at 40°C(104°F), and reaching maximum speed at 80°C (176°F). The fan rotates at maximum speed when Power On Self Test begins.

WARNING:	The USB connector does not support standard USB connections, which may be damaged by the DC 12V power supply.

1.7.6 LVDS Panel Backlight Control Connector

The MXC-6000 series controller provides backlight control to the LVDS panel by the pin header connector, controlling LVDS panel backlight on/off and brightness functions.



PIN	LED	CCFL
1	Back light Enable	Back light Enable
2	Back light Ctrl	N/C
3	N/C	Back light Ctrl
4	GND	GND
5	+12V	+12V

Table 1-18: Backlight Connector Pin Functions

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1.7.7 Internal USB Connector

The MXC-6000 series controller provides an internal USB connector on the back board PCB.

1.7.8 SATA Connectors

The MXC-6000 provides 2 SATA ports, supporting up to 2nd Generation (3GB/s) transfer rate. The SATA host controller can be set to operate in IDE or AHCI mode in BIOS.This SATA connector is designed to support a 2.5 inch hard disk drive (HDD) or solid state disk (SSD). The HDD or SSD must be installed into the SATA connector with a HDD bracket. Please refer to Section 3.1 for installation of a 2.5 inch HDD or SSD.

1.7.9 Backboard to System PCB Connector

This connector connects the backboard to a golden finger-equipped mainboard PCB.

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2 Getting Started

This chapter discusses installation of a hard disk drive, a PCI/PCIe card, and two CompactFlash cards in the system. In addition to connection and use of eSATA-to-SATA interface external storage device, MXC-6000 series wall-mounting is also described.

2.1 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.

- MXC-6000 controller
- Accessory Box
- Screw pack for wall-mounting and HDD fixing
- User's manual
- ADLINK All-in-One DVD

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2.2 Installing Hard Disk Drives

Before installing hard disk drives, remove the top cover of the chassis first as follows.

1. Remove the thumbscrew on the front panel by hand or screwdriver.

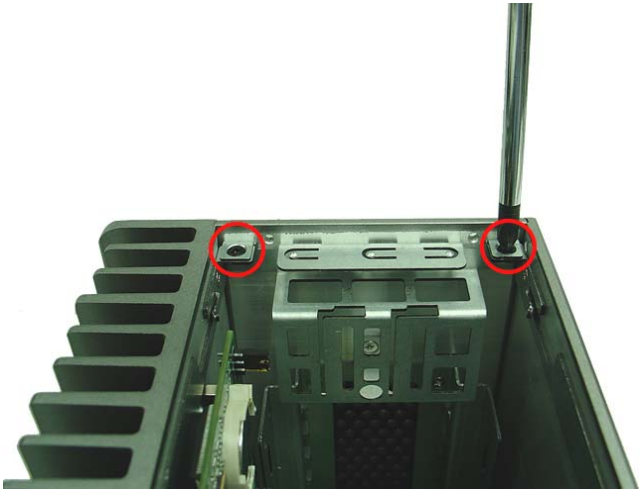


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2. Withdraw the thumbscrew and remove the top cover by lifting.



3. Remove 2 screws from the top of the HDD bracket.



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4. Place the chassis upside down and remove the other 2 screws from the bottom of the HDD bracket..



5. Lift the HDD bracket..



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6. Use the 8 M3 screws included in the package to fix one or two 2.5” HDD or SSD units to the bracket. The upper

2.5” HDD or SSD is SATA Revision 1, and the lower SATA Revision 2.



7. Gently push the HDD/SSD bracket down to the SATA connector on the PCB..



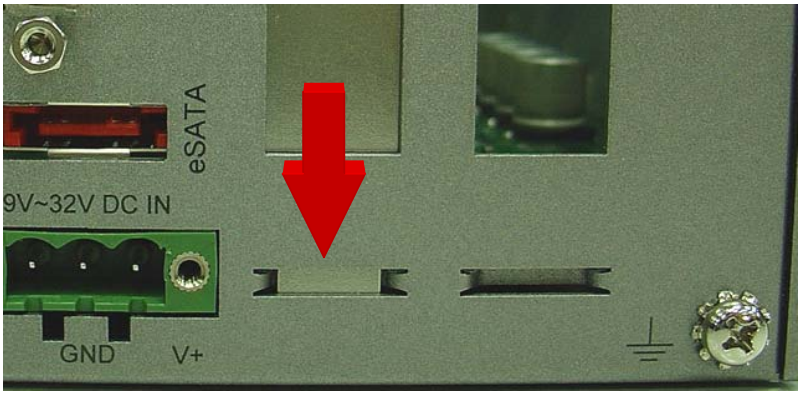
8. Reverse Steps 3 and 4 to fasten the 4 screws.
9. Replace the top cover and fasten the thumbscrew.

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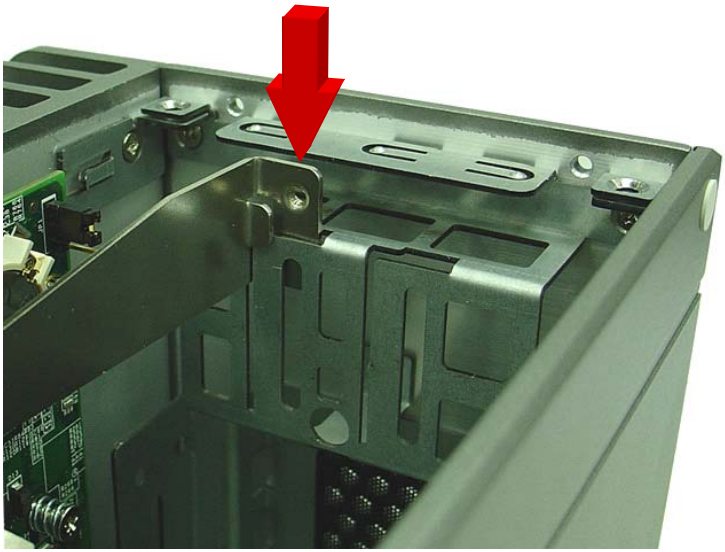
2.3 Installing a PCI/PCIe Card

Follow steps 1-2 in Section 2.2:Installing Hard Disk Drives to remove the top cover before installing a PCI/PCIe card.

1. Insert thePCI/PCIe card into the PCI/PCIe slot. Ensure that the lower edge of the PCI/PCIe card aligns with the alignment guide.

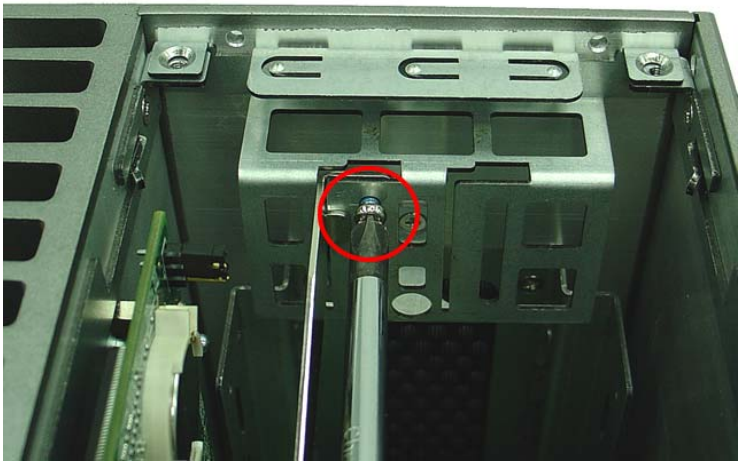


2. Adjust the position of the included card brace to firmly fix the card.



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Tighten the screw to fix the brace.



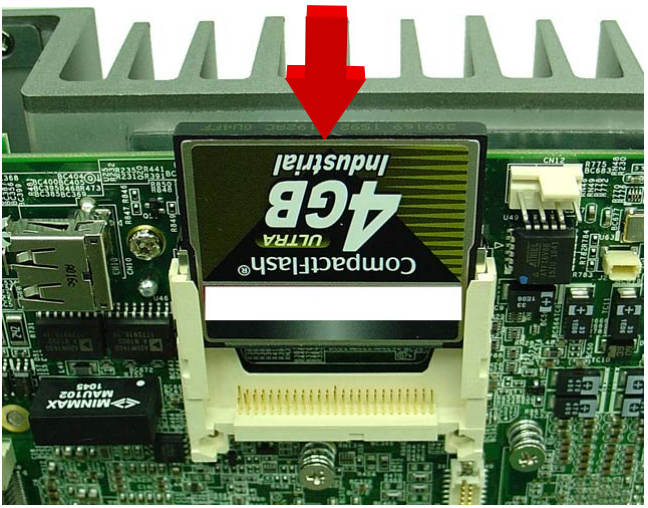
3. Replace the top cover and fasten the thumbscrew.

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2.4 Installing CF Cards

The MXC-6000 series controller provides internal and external CompactFlash sockets to accommodate a total of two CF cards. According to steps 1-2 in Section 2.2, remove the top cover.

1. Align the internally mounted CF card with the guide of the internal CF socket.

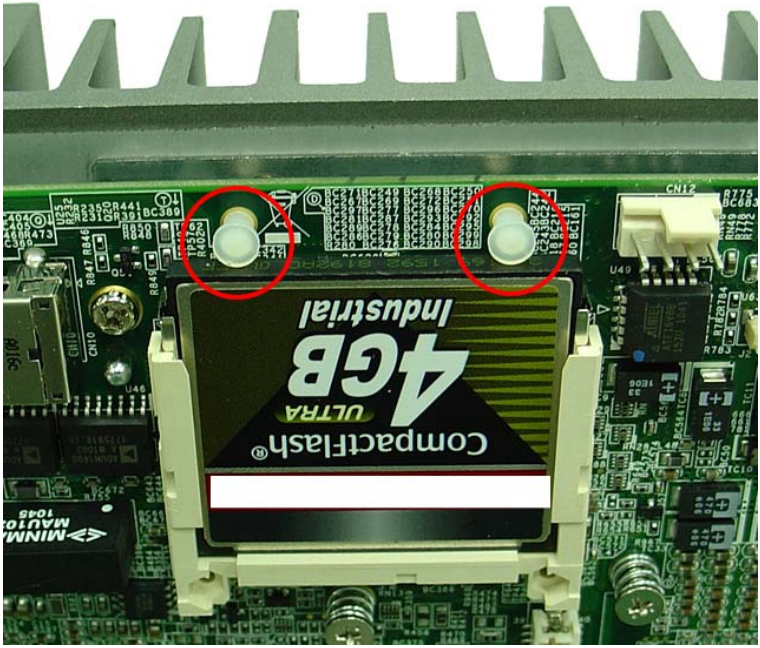


2. Gently depress the CF card until it is firmly seated in the internal CF socket.



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3. Place the two spacer supports, included as accessories, to prevent the CF card from dislodging.



4. Replace the top cover and refasten the thumbscrew.

5. Remove the external CF socket cover.



6. Align the externally mounted CF card with the guide of the external CF socket.



7. Gently insert the CF card until it is firmly seated in the

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external CF socket, as indicated by the extension of the eject button below the card slot, as shown.



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2.5 Connecting and Using eSATA Storage Device

WARNING:

The MXC-6000 does not provide DC output for an eSATA interface external storage device, additional DC power supply must be provided.

1. Plug an eSATA cable into the eSATA connector.



2. Connect the eSATA cable and a DC power supply to an

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external storage device.



2.6 Connecting DC Power

WARNING:

Before connecting DC power to the MXC-6000 series controller, ensure voltage and polarity are compliant with the DC input. Improper input voltage or polarity can cause system damage.

The DC power input connector of the MXC-6000 series controller has V+, V- , and chassis ground pins, and accepts input voltage as shown previously. Connect DC power as shown. Two screws fasten to secure the plug.



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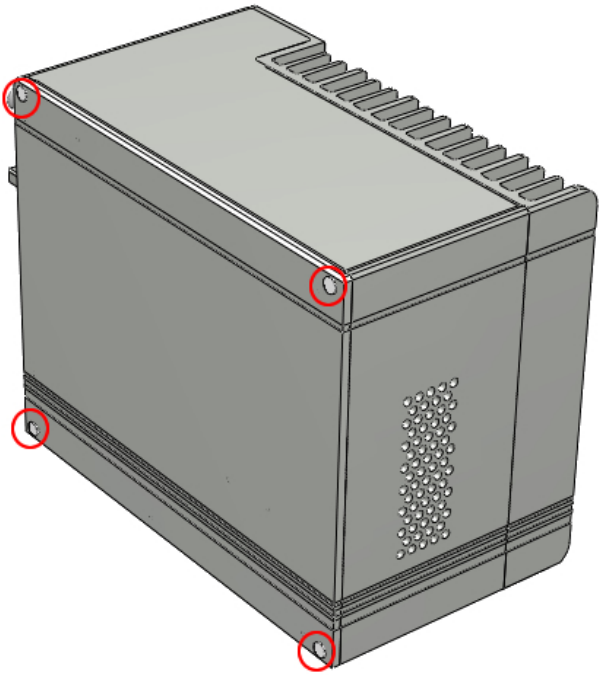
2.7 Wall-mounting the MXC-6000

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

The MXC-6000 series controller is shipped with wall-mount brackets and accessory screws.

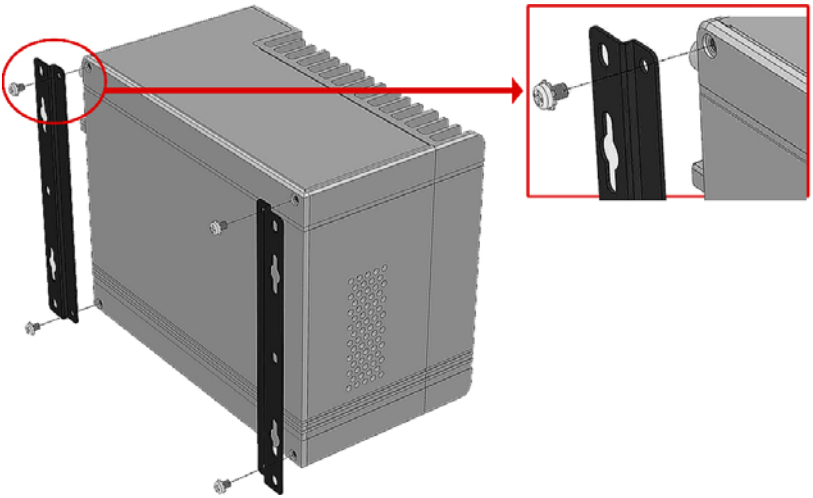
Wall–mounting procedures follow.

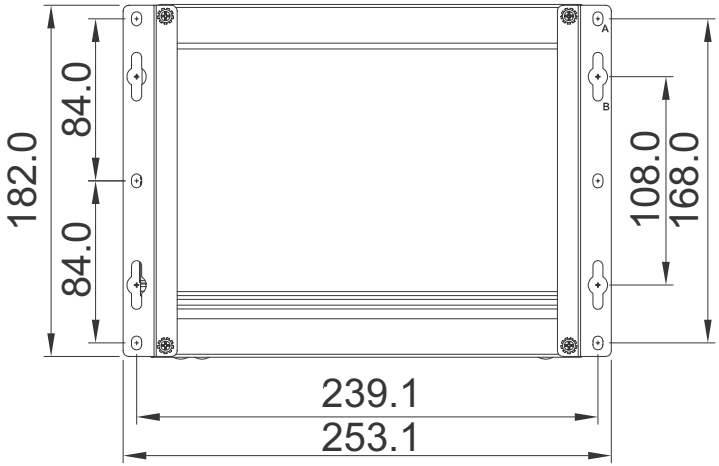
1. Remove the 4 plastic pads from the corners.

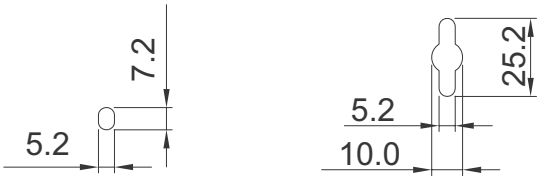


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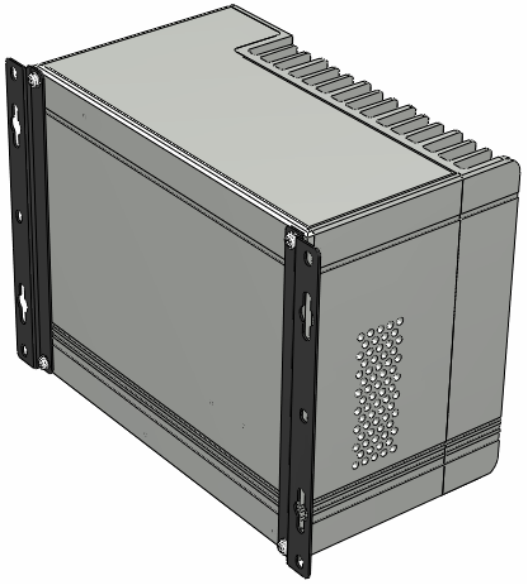
2. Use the 4 M4 screws shipped with the controller to fix the 2 wall-mount brackets, also included, to the chassis, according to the spacing dimensions of the screw holes and brackets, as shown.







3. Once final assembly as shown is complete, mount the MXC-6000 series controller on the wall via screw holes.



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2.8 Optional Fan Module

The MXC-6000 can be optionally equipped with an easily installed fan module providing heat dissipation.

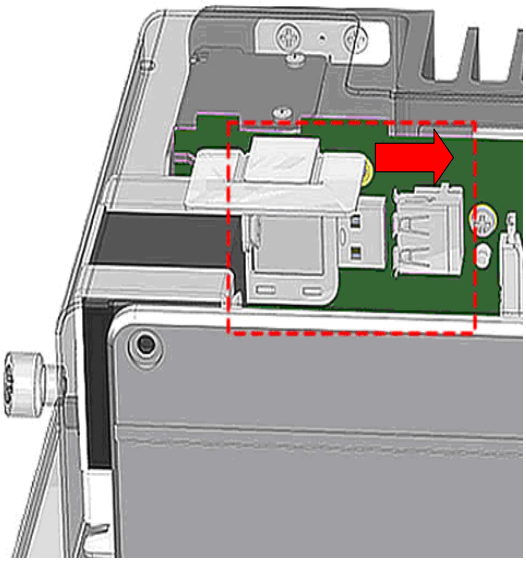
To install the fan module:

1. Follow steps 1-2 in Section 2.2 to remove the top cover. Seat the fan module in the chassis.



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2. Slide the fan module back until USB connection is secured, as shown.



3. Replace the thumbscrew.

2.9 Cooling Configuration

Heat-generating components of the MXC-6000 series controller (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 MXC-6000 controller.

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3 Driver Installation

After installing the operating system, all related drivers must be installed for the system to function properly. This section describes the drivers needed for Windows operating systems and the procedures to install them. For other OS support, please contact ADLINK for further information.

Install drivers as follows.

1. Fully install Microsoft Windows OS before installing any drivers. Most standard I/O device drivers have been included in Microsoft Windows OS.
2. Install the chipset driver.
3. Install the graphics driver.
4. Install the Ethernet driver.
5. Install the audio driver.
6. Install the WDT (watchdog timer) driver.
7. Install the DIO driver.

3.1 Installing the chipset driver

This section describes installation of the chipset driver for the MXC-6000 series controller. The chipset driver directs the operating system to configure the Intel® QM57 chipset components in order to ensure that the following features function properly:

- PCIe Support
- SATA Storage Support
- USB Support
- Identification of Intel® Chipset Components in the Device Manager

One of the following operating systems must be fully installed and running on the system before installing this software:

- Microsoft Windows 7
- Microsoft Windows XP

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The following steps install the chipset driver for the MXC-6000 series controller

1. Close any running applications.
2. Insert the ADLINK All-in-One DVD. The chipset driver is located in the directory
   x:\Driver Installation\Matrix\MXC-6000\Chipset
   where x: denotes the DVD-ROM drive.
3. Execute Setup.exe and follow onscreen instructions to complete the setup.
4. After installation is complete, reboot the system.

3.2 Installing the graphics driver

This section describes installation of the graphics driver for the MXC-6000 series controller. The MXC-6000 series controller is equipped with Intel® graphics media accelerator. The Intel® Graphics Media Accelerator Driver package supports the following operating systems:

- Windows 7
- Windows XP

To install the graphics driver:

1. Close any running applications.
2. Insert the ADLINK All-in-One DVD. The graphics driver is located in the directory
   x:\Driver Installation\Matrix\MXC-6000\Graphics
   where x: denotes the DVD-ROM drive.
3. Execute Setup.exe and follow onscreen instructions to complete the setup.
4. After installation is complete, reboot the system.

3.3 Installing the Ethernet driver

This section describes installation of the Ethernet driver for the MXC-6000 series controller. To install the driver for the Intel 82574L Gigabit Ethernet controller:

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For Microsoft Windows 7and XP users:

1. Close any running applications.
2. Insert the ADLINK All-in-One DVD. The Ethernet driver is located in the directory
   x:\Driver Installation\Matrix\MXC-6000\LAN-Realtek\
   where x: denotes the DVD-ROM drive.
3. Execute setup.exe and follow onscreen instructions to complete the setup.
4. After installation is complete, reboot the system.

3.4 Installing the audio driver

This section describes installation of the audio driver for the MXC-6000 series. The MXC-6000 series controller supports High Definition audio using the Realtek ALC262 audio codec. To install the audio driver for the MXC-6000 series controller for Microsoft Windows 7 and XP users:

1. Close any running applications.
2. Insert the ADLINK All-in-One DVD. The audio driver is located in the directory
   x:\Driver Installation\Matrix\MXC-6000\Audio\
   where x: denotes the DVD-ROM drive.
3. Execute Setup.exe and follow onscreen instructions to complete the setup.
4. After installation is complete, reboot the system.

3.5 Installing the WDT driver

A WDT (watchdog timer) is a hardware mechanism resetting the system when the operating system or application is halted. A typical usage of WDT is to start the timers and periodically reset the timer, and when timer is expired, the system resets. The WDT driver must be installed to program the WDT.

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To install the WDT driver for the MXC-6000 series controller:

1. Close any running applications.
2. Insert the ADLINK All-in-One DVD. The WDT driver is located in the directory:
   x:\Driver Installation\Matrix\MXC-6000\WDT\
   where x: denotes the DVD-ROM drive.
3. Execute Setup.exe and follow onscreen instructions to complete the setup.
4. After installation is complete, reboot the system.

3.6 Installing the DIO Driver

The MXC-6000 Digital I/O function uses ADLINK's PCI-7230 Windows driver package, available on the inlcuded MXC-6000 driver CD and, alternatively, downloadable at ADLINK's MXC-6000 web support page. 16 channel DI and 16 channel DO are both available.

To install the DIO driver:

1. Close any running applications.
2. Locate the Setup.exe file in the ADLINK All-in-One DVD or downloaded driver package.
3. Execute Setup.exe and follow onscreen instructions to complete the setup.
4. After installation is complete, reboot the system.

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Appendix A: Power Consumption



Information in this Appendix is for power budget planning and design purposes only. Actual power consumption may differ based on final application.

A.1 Power Consumption Reference

Power consumption as follows is based on lab data in which 24V DC is applied and current is measured by the DC power supply. The power consumption (W) is calculated as the product of applied voltage (V) and the current (A).

Platforms tested for this data have available external I/O interfaces, and are attached to supported devices such as VGA/DVI/LVDS monitor, CF card, PS2 keyboard/mouse, USB dummy load (5VDC 500mA), external SATA , COM loopback, and audio loopback, and an internal hard disk driver is installed.

No internal PCI/PCIe/mini PCIe slots are occupied.

Information is presented for reference only. Actual power consumption will vary with different attached devices and platform operations.

	Power Off	System Idle	System Full Load	Recommended Power Supply
Consumption	0.72 W	41.28 W	78.72 W	100W
Notes	In shutdown status with DC input, only PS2 keyboard/ mouse are connected	Under Windows XP desktop without executing any application program	Under Windows XP with 100% CPU utilization and accessing all I/O devices simultaneously	Additional power supply is required if add-on cards are installed

Table A-1: Power Consumption

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A.2 Power Supply Reference

+3.3V Power Rail	Maximum 7A	Total Power Supply Max. 25W
+5V Power Rail	Maximum 5A	
+12V Power Rail	Maximum 2A	
-12V Power Rail	Maximum 0.2A	
CN12 +12V	Maximum 2A	
CN12 +5V	Maximum 2A	

Table A-2: Power Supply

Sufficient power supply for the entire system is required to meet these specifications. At least 100W at 24V input is recommended.

Heat generated by add-in PCI/PCIe adapters affects system thermal stability. Additional heat dissipation is required when the system operates at high temperatures or in harsh environments with add-in adapters.

The power supply specifications shown are for total power consumption of all PCI/PCIe slots of individual MXC-6101D/MXC-6201D at the same time, not for single slot use.

A.3 Accessory Cabling

Power supply to add-on cards is provided by the auxiliary power cable (from CN12 to Molex 8981), Part number: 30-20592-0000.



Yellow	12V
Black	GND
Black	GND
Red	5V

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Appendix B: BIOS Setup

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 MXC-6000 series controller. The BIOS setup program includes menus for configuring settings and enabling features of the MXC-6000 series. Most users do not need to use the BIOS setup program, as the MXC-6000 series controller ships with default settings that work well for most configurations.

Enter BIOS setup by selecting DEL when the system is powered on the POST (Power On Self Test) message is displayed.The MXC-6000 controller supports one-time Boot Menu allowing selection of boot device. Enter the Boot Menu by selectiong F7 at POST.

B.1 Main

Contains basic system information for the MXC-6000.



Changing BIOS settings may lead to incorrect controller behavior and possible inability to boot. In such a case, Section 2.4.4 provides instruction on clearing the CMOS and restoring default settings

BIOS Information

BIOS Vendor: Provider of the BIOS code

BIOS Version: Current BIOS version

Build Date: Build date of the current BIOS.

Memory Information

Total Memory: Total installed memory size.

System Language

Currently only English is provided.

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System Date

Shows the current date based on the system's Real Time Clock, and can be adjusted if RTC is not synched to the current date.

System Time

Current time of the system's Real Time Clock, and can be adjusted if the RTC is not synched to the current time..

B.1.1 System Time/System Date

This option changes the system time and date. Highlight System Time or System Date using the up or down <Arrow> keys. Enter new values using the keyboard then press <Enter> key. Press the < Tab > key 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.

B.2 Advanced


CAUTION:

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

Accesses advanced options of the MXC-6000.

Intel PXE ROM Option

Enables/disables Intel PXE ROM, with enabling generating the Intel PXE menu at the next boot for detailed settings.

Intel IGD SWSCI OpRegion

Contains settings for the Integrated Graphics Device.

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DVMT/FIXED Memory

Sets the amount of memory allocated to IGD, with available options of 128 or 256MB, or Maximum.

IGD – Boot Type

Selects the Video Device to be activated during POST, with available options of VBIOS Default, CRT, LVDS, CRT+LVDS, or DVI

Active LFP

Determines whether LVDS is supported, with available options of No LVDS/ Int-LVDS.

B.2.1 ACPI Settings

Controls ACPI related features.

Enable ACPI Auto Configuration

Enables or disables BIOS ACPI Auto Configuration.

Enable Hibernation

Enables or disables system hibernation, requires OS support.

ACPI Sleep State

Allows selection of the ACPI sleep state the system is to enter when SUSPEND is selected, from among Suspend Disabled/ S1/ S3.

B.2.2 Intel IGD SWSCI OpRegion

DVMT/FIXED Memory

Select DVMT/FIXED Mode Memory size used by Internal Graphics Device.

IGD – Boot Type

Select the Video Device which will be activated during POST. This has no effect if external graphics support is present.

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Active LFP

Enables or disables Internal LVDs.

LCD Panel Type

Select the LCD panel used by LVDs by the appropriate setup item. Options include VBIOS Default, 800x600 18-bit 1-CH, 1024x768 18-bit 1-CH, 1280x1024 24-bit 2-CH, or 1920x1200 24-bit 2-CH.

B.2.3 CPU Configuration

Hyper Threading Technology

Enables or disables Hyper-Threading Technology.

Active Processor Cores

Defines the number of cores to be enabled in each processor package, with available options of All/ 1/ 2.

Limit CPUID Maximum

Enables or disables the maximum CPUID limit for Windows XP.

Hardware Prefetcher

Enables or disables the MLC streamer prefetcher.

Adjacent Cache Line Prefetch

Enables or disables prefetching of adjacent cache lines.

Intel Virtualization Technology

Enables or disables Intel Virtualization Technology, which, when enabled, allows a VHM to utilizeadditional hardware capabilities.

Power Technology

Selects power management profiles, with available options of Disable/ Energy Efficient/ Custom.

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B.2.4 SATA Configuration

SATA Mode

This option selects the SATA channel configuration from (1) IDE Mode (2) AHCI Mode or (3) RAID Mode.

S-ATA Controller

Enables/ Disables Serial ATA Controller 0.

B.2.5 Serial Port Configuration

Serial Port 1 Configuration

Options in this configuration include port enable/disable, port type (RS-232/422/485), or port settings (address).

Serial Port 2 Configuration

Options in this configuration include port enable/disable, port type (RS-232/422/485), or port settings (address).

Serial Port 3 Configuration

Options in this configuration include port enable/disable or port settings (address).

Serial Port 4 Configuration

Options in this configuration include port enable/disable or port settings (address).

B.2.6 USB Configuration

Legacy USB Support

Enables Legacy USB Support. AUTO option disables legacy support if no USB devices are connected. DISABLE option will keep USB devices available only for EFI applications.

EHCI Hands-Off

Enables BIOS support on EHCI Hands-Off feature. The default option is Enabled.

B.2.7 Watchdog Timer

Watchdog Timer

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Enables/ disables the watchdog timer

B.2.8 H/W Monitor

PC Health Status

The hardware health on SuperIO supports System Temperature, CPU Temperature, CPUcore, Vcc, +3.30V, +5.00V, +12.0V, CPU Fan0 Speed.

B.3 Chipset

B.3.1 Northbridge configuration

VT-d

Enable/disable VT-d technology.

IGD Memory

Choose the Internal Graphic Device's shared memory size, options are 32M, 64M or 128M.

PAVP Mode

Select PAVP Mode used by Internal Graphics Devices.

B.3.2 Southbridge configuration

SMBus Controller

Enables/ disables the SMBus controller.

HDA Controller

Enables or disables the HD Audio controller. The default option is Enabled.

Restore On AC Power Loss

Determines the state the computer enters when power is restored after a power loss. The options for this value are Last State, Power On and Power Off.

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Option	Description
Power Off	Set this value to always power the system down when power is restored.
Power On	Set this value to always power the system up when power is restored.
Last State	Set this value to power the system up or down based on the previous system power state when power is restored.

Table B-1: Restore On Power Loss

B.4 Security

If only the Administrator's password is set, then only access to Setup is limited and requested only when entering Setup. If only the user's password is set, then this is a power-on password and must be entered to boot or enter setup. In Setup the user will have Administrator rights.

Administrator Password

Set Administrator password for setup

User Password

Set boot/setup User password

B.5 Boot

B.5.1 Boot Settings Configuration

Fast Boot

Option	Description
Disabled	Directs BIOS to perform all POST tests
Enabled	Directs BIOS to skip certain POST tests to boot faster

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Quiet Boot

Option	Description
Disabled	Directs BIOS to display the POST messages
Enabled	Directs BIOS to display the OEM logo

Bootup Num-Lock State

Set this value to allow the Number Lock setting to be modified during boot.

B.5.2 Boot Option Priorities

Specifies the priority of boot devices. All installed boot devices are detected during POST and displayed on the screen.Boot Option Priorities.

B.6 Exit

Save Changes and Exit

When BIOS settings are complete, select this option to save all changes and reboot the system for the new settings to take effect.

Discard Changes and Exit

Select this option to discard all changes and exit BIOS setup.

Discard Changes and Reset

Resets system setup without saving any changes.

Restore Defaults

Select this option to set all BIOS options to default settings. The Default setting is designed for maximum system stability, but not maximum performance. Select the Restore Defaults Setup options if the computer encounters system configuration problems.

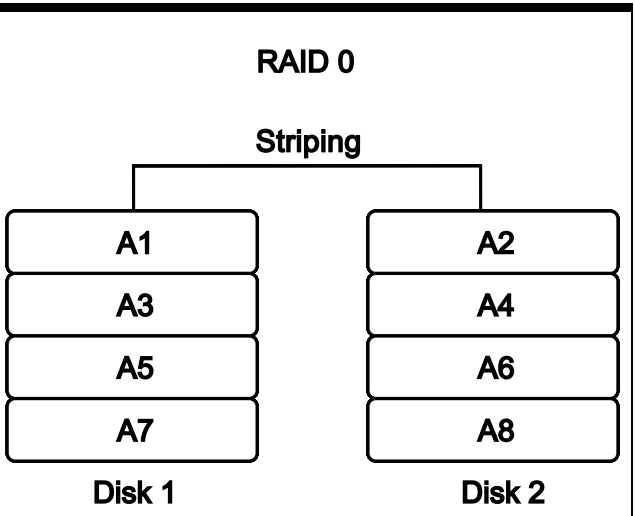
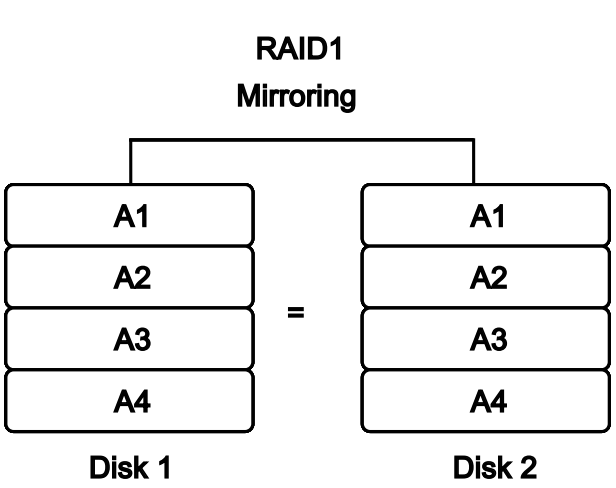
Launch EFI Shell from Filesystem Device

Attempts to launch EFI Shell application (Shellx64.efi) from one of the available filesystem devices.

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Appendix C: Activating RAID Function

The Matrix MXC-6000 utilizes Intel® Rapid Storage Technology provided by the Intel QM57 chipset, and supports RAID 0 and RAID 1 levels, differentiated as follows.

RAID 0 (Striping): Maximum Disk I/O performance, but no disk error tolerance	
RAID 1 (Mirrored): Data is strongly secured, but total disk size is halved.	

RAID function is disabled by default. Activation procedures are as follows.

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Ensure all data on the disks to be used in the RAID array is fully backed up.

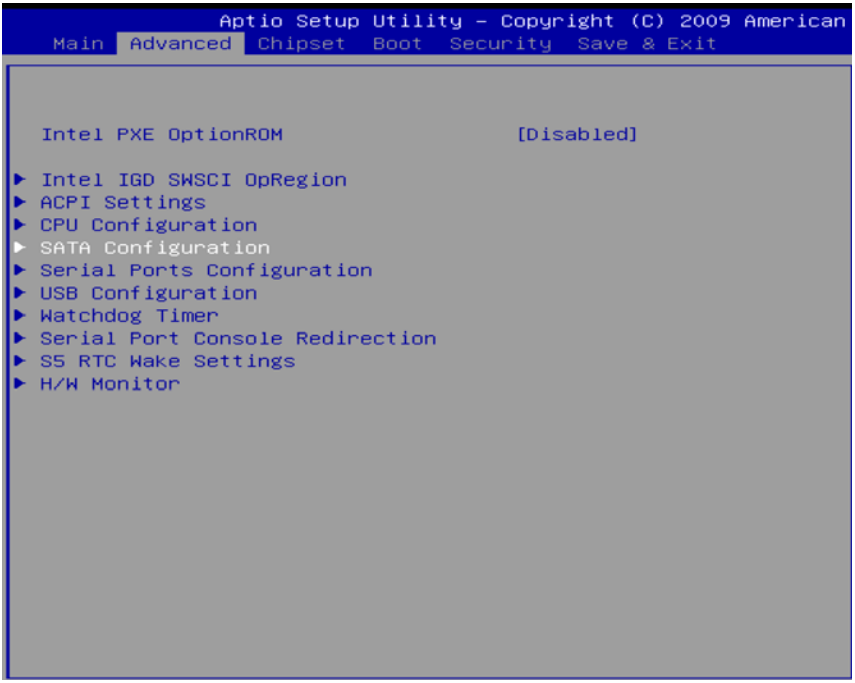
Refer to Section 2.2 to install the two hard disks in the chassis.

CAUTION:

It is strongly recommended that both HDDs are the same model and size for maximal compatibility.

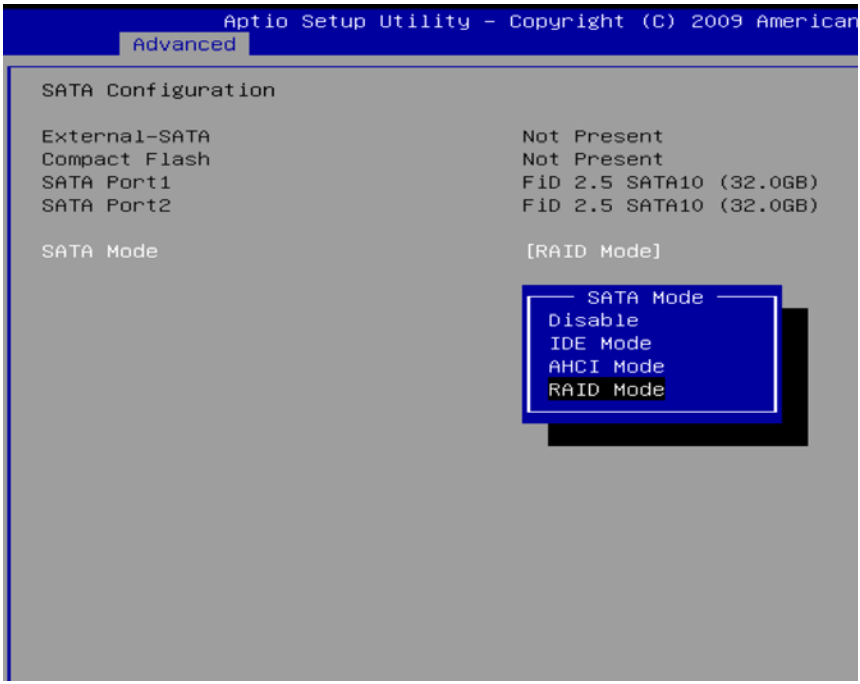
C.1 RAID Activation in System Manangement

1. In the BIOS menu, enter “SATA Configuration” under “Advanced” tab



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2. Set SATA Mode to “RAID Mode”, and save and exit BIOS.

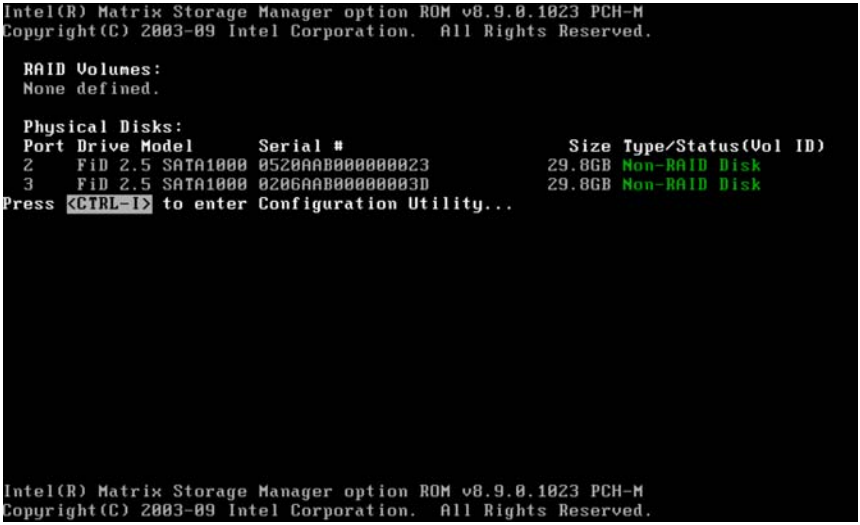


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C.1.1 Intel Matrix Storage Manager

After the SATA is set to RAID mode, the Intel Matrix Storage Manager appears in POST.

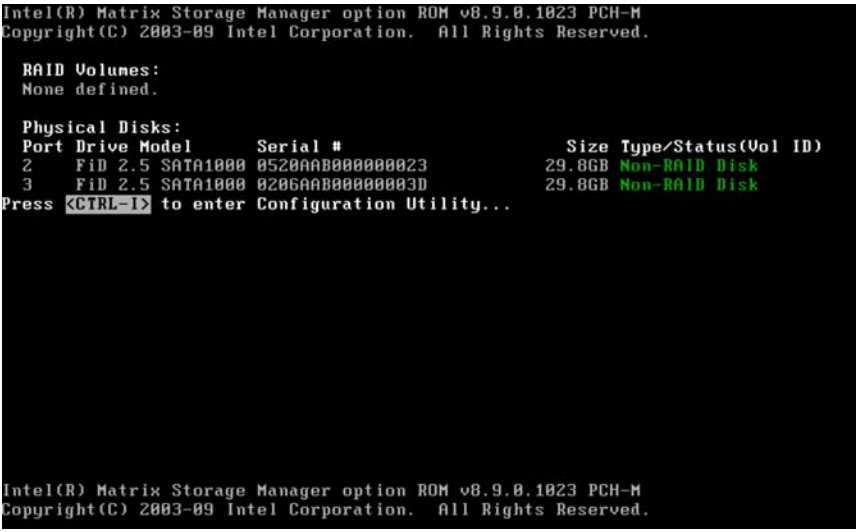
1. Select “Ctrl + I” to enter the utility when prompted.



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The menu lists the 2 installed HDDs as “Non-RAID Disk” since the RAID volume has not yet been created.

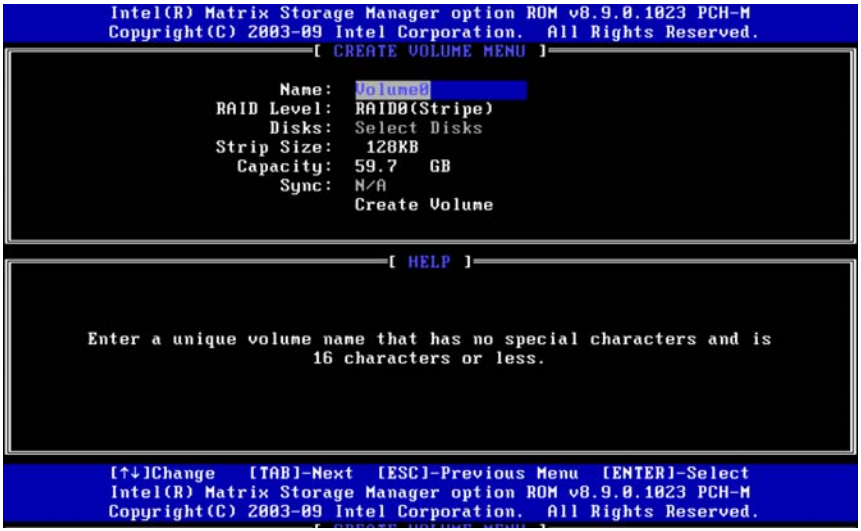
2. Select “Create RAID Volume” to continue.



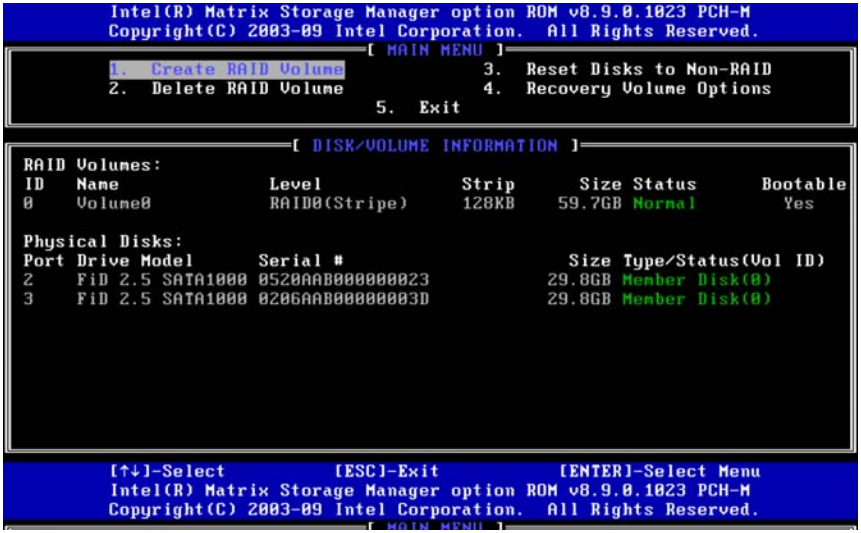
3. In the menu, set the Volume name, choose the RAID level (from RAID0 (Stripe) and RAID1 (Mirror)) and con-

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figure other parameters. Select “Create Volume”. All data will be erased from the HDD.



4. After the RAID Volume is created, it should appear in the RAID volume list.



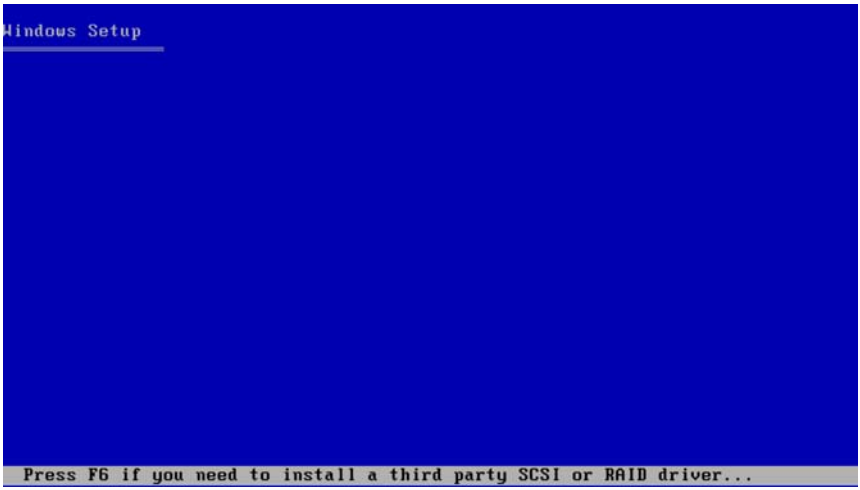
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C.2 OS Activation

C.2.1 Windows XP

Download the MXC-6000 RAID drivers from the ADLINK website, unzip, and copy the files to a floppy disk, and connect to the MXC-6000 via a USB floppy disk drive.

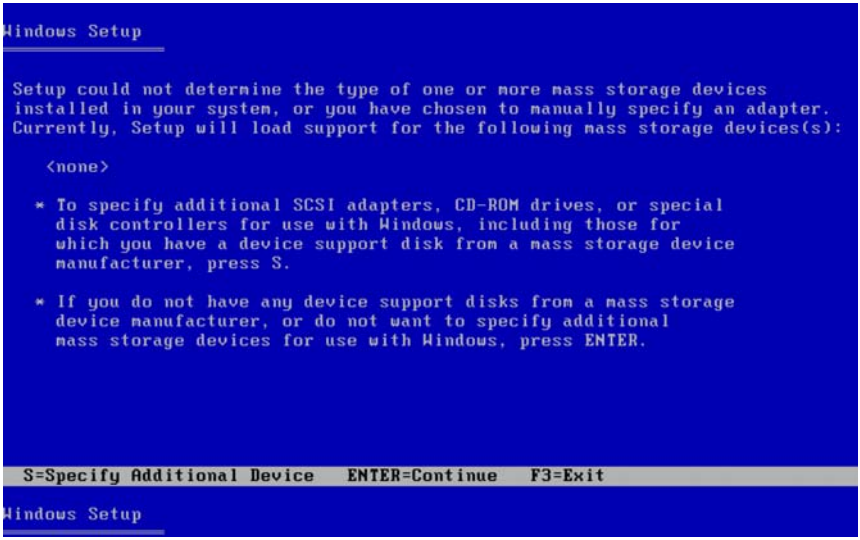
1. Begin Windows XP installation. When the disk is requested, press F6.



The Installer will show no storage devices before installing the RAID drivers.

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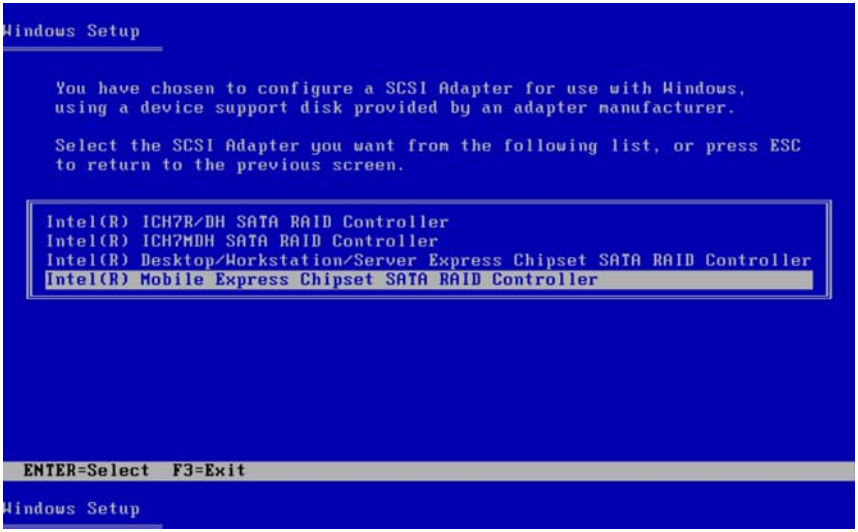
2. When an additional device driver is requested, press S.



An Intel controller list is displayed.

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3. From the list, select “Intel® Mobile Express Chipset SATA RAID Controller”. Required drivers are copied from the floppy disk.



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4. The Intel® Mobile Express Chipset SATA RAID Controller is displayed in the mass storage device list. OS Installation can continue.

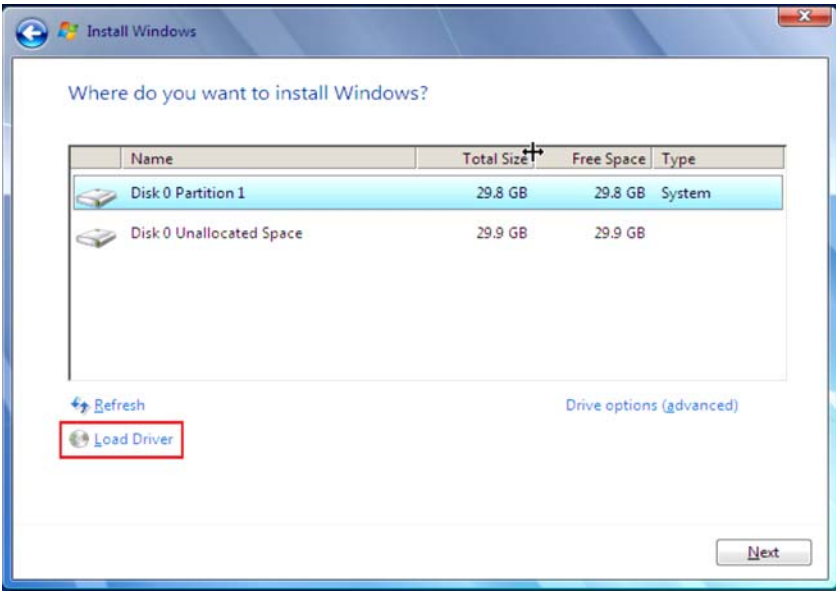


C.2.2 Windows 7

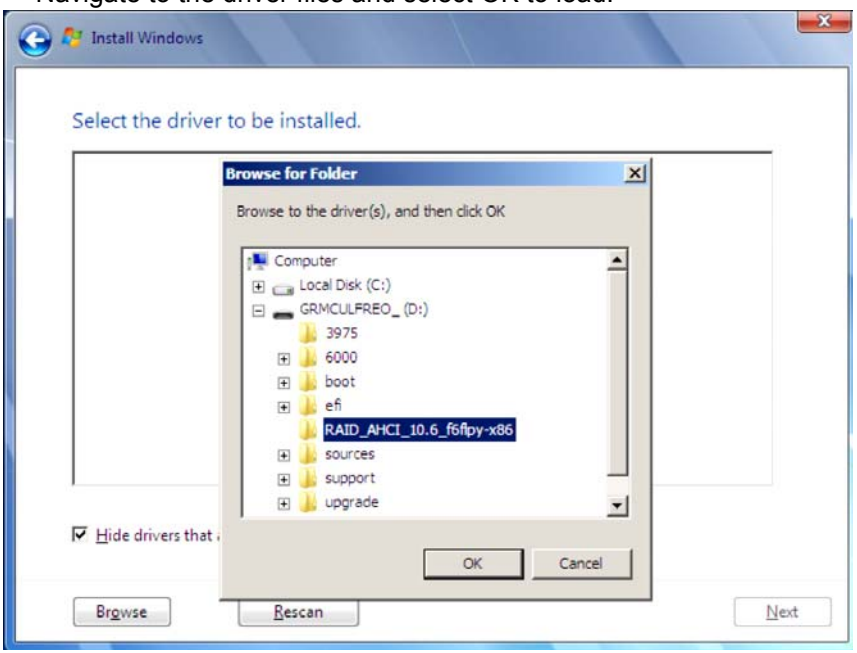
Download the MXC-6000 RAID drivers from the ADLINK website, and unzip and copy the files to a USB storage device.

Connect the connect the storage device to the MXC-6000 and start Windows 7 installation. When the Installer requests an installation location, select Load Driver.

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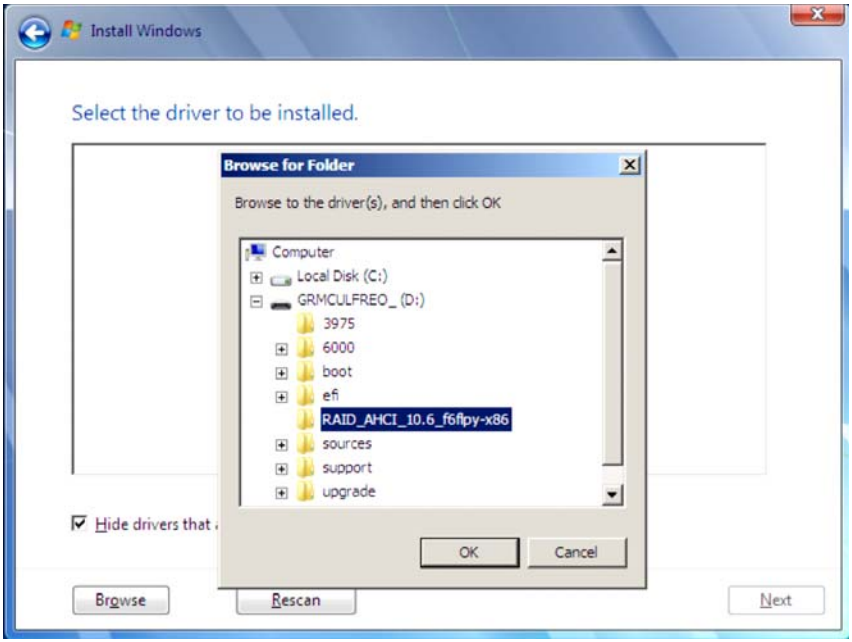


Navigate to the driver files and select OK to load.



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Select Intel Mobile Express Chipset SATA RAID Controller. The required drivers are then copied. After the drivers are loaded, OS installation to the RAID volume can continue.



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Appendix D: Watchdog Timer (WDT) Function Library

This appendix describes use of the watchdog timer (WDT) function library for the MXC-6000 controller. 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.

D.1 WDT with API/Windows

Matrix WDT API library files and a demo program (incl. source code) can be found on the included driver CD or downloaded from http://www.adlinktech.com.

To use the WDT function library for MXC-6000 series, include the header file WDT.h and linkage library WDT.lib in the C++ project.

InitWDT

@ Description

Initialize the watchdog timer function of MXC-6000 controller. InitWDT must be called before the invocation of any other WDT function.

@ Supported controllers

MXC-6000

@ Syntax

C/C++

```
BOOL InitWDT()
```

@ Parameters

None

@ Return code

TRUE if watchdog timer is successfully initialized.

FALSE if watchdog timer fails to initialize.

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SetWDT

@ Description

Set 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.

@ Supported controllers

MXC-6000

@ 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.

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StartWDT

@ Description

Start the 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.

@ Supported controllers

MXC-6000

@ Syntax

C/C++

```
BOOL StartWDT()
```

@ Parameters

None

@ Return codes

TRUE if watchdog timer is successfully started.

FALSE if watchdog timer is failed to start.

ResetWDT

@ Description

Reset 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.

@ Supported controllers

MXC-6000

@ Syntax

C/C++

```
BOOL ResetWDT()
```

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@ **Parameters**

None

@ **Return codes**

TRUE if watchdog timer is successfully reset.

FALSE if watchdog timer fails to reset.

StopWDT

@ **Description**

Stop the watchdog timer.

@ **Supported controllers**

MXC-6000

@ **Syntax**

C/C++

```
BOOL StopWDT()
```

@ **Parameters**

None

@ **Return codes**

TRUE if watchdog timer is successfully stopped.

FALSE if watchdog timer fails to stop.

D.2 WDT with DOS/Linux

Under Linux, please program WDT function using the same LPC IO registers according to the sample program as follows.

```
#include <dos.h>
#include <stddef.h>
#include <stdio.h>

/* Config LPC IO to enter config mode */
EnterConfig(void)
{
```

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```
outp(0x2E, 0x87);
outp(0x2E, 0x87);
}

/* Config LPC IO to exit config mode */
ExitConfig(void)
{
outp(0x2E, 0xAA);
}

/* Read byte from LPC IO register */
unsigned char r_reg(unsigned char regoffset)
{
outp(0x2E, regoffset);
return inp(0x2F);
}

/* Write byte to LPC IO register */
void  w_reg(unsigned  char  regoffset,  unsigned  char
data)
{
outp(0x2E, regoffset);
outp(0x2F, data);
}

main(void)
{
unsigned int    count;
/* print program title  */
printf("-----------------MXC-6000 WDT Demo------------
-----\n");
printf("Init          and          config          GPIO
ports<<<<<<<<<<<<<<<<<<<<<<<<\n");
```

```
printf("-------------------------------------------
-----\n");

EnterConfig();

/* config WDT registers */
w_reg(0x07,0x08);
w_reg(0x30,0x01);
w_reg(0xF5,0x00);
w_reg(0xF7,0x00);

/* enable keyboard interrupt to reset WDT timeout
value */
w_reg(0xF7,r_reg(0xF7)|0x40);

/* set unit as second */
w_reg(0xF5,r_reg(0xF5)&0xF7);

/* enable reset when timeout  */
w_reg(0xF5,r_reg(0xF5)|0x02);

/* set timeout value as 10 seconds */
/* WDT start automatically while timeout value is set
*/
w_reg(0xF6,0x0A);

printf("-------------------------------------------
-----\n");
printf("WDT    is    set    and    counting    down
now.<<<<<<<<<<<<<<<<<\n");
printf("-------------------------------------------
-----\n");

for(count=10;count!=0;count--)
```

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```
{
printf("Countdown %2d : 0xF6=%2x Press any key to
invoke keyboard interrupt.\n",count,r_reg(0xF6));
/* reset WDT timeout value to 10 seconds */
/* w_reg(0xF6,0x0A); */
            sleep(1);
}

printf("At least one keyboard interrupt must occur
during countdown.\n");
printf("Otherwise WDT has already reset system.\n\n");
printf("Try again and leave keyboard.\n\n");

/* disable WDT */
/* WDT stop while timeout value is set to zero */
        w_reg(0xF6,0x00);
printf("WDT is disable. Program is terminating.");

ExitConfig();

return 0;
}
```

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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.

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- 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.



There is risk of explosion if the battery is replaced with an incorrect type. 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.

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