MVP-5000 Series

High Performance 6th Generation Intel® Core™

i7/i5/i3 Fanless Computer

MVP-5001/MVP-5002/MVP-5003

User's Manual



Manual Rev.: 2.00

Revision Date: February 21, 2016

Part No: 50-1Z228-2000

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Revision History

Revision	Release Date	Description of Change(s)
2.00	February 21, 2016	Initial Release

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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

ADLINK's MVP-5000 series of value line fanless embedded computing platforms, incorporating the 6th Generation Intel® Core™ processor, provides single-side access for I/O ports, optimizing easy maintenance in industrial automation environments. The series retains the robust design of all ADLINK MXC/MXE lines, at a new extremely cost-effective price point. The MVP-5000 series supports DDR4 memory for more powerful computing and the Intel® HD Graphics 530 speeds graphics performance. Along with a versatile I/O array and flexible expansion capacity, the MVP-5000 Series fully satisfies all the needs of industrial automation with the performance demanded by central controller, detection equipment, signage, and kiosk applications. Fanless construction not only overcomes contaminant and noise challenges presented by harsh IA environments, the elimination of problematic structural elements that negatively affect MTBF greatly increases lifecycle expectations for the platform.

1.2 Features

- 6th Generation Intel® Core™ i7/i5/i3 Skylake FCLGA1151 processor + H110 chipset
- 2 x DDR4 SO-DIMM socket, supporting up to 2 x 16GB DDR4 2133 SO-DIMM modules
- Supports 3 independent displays with 2x DisplayPort, 1x DVI-D, and 1x VGA ports
- 6 External USB ports (4x USB 3.0, 2x USB 2.0), 1 internal USB 2.0 port
- 3 Intel GbE LAN ports with teaming function
- Built-in 8CH DI and 8CH DO, 2 software-programmable RS-232/422/485 + 2 RS-232 ports
- CFast socket and SATA III port for 2.5" HDD/SSD installation
- Built-in wide-range 12V DC to 24V DC power input

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- Fanless operation from 0°C to 50°C (w/ industrial SSD)

NOTE: This option guarantees cold boot of the system at 0°c and operation with 100% loading at 50° without sacrificing CPU frequency. The industrial solid-state drive storage option is required.

1.3 Specifications

	MVP-5001	MVP-5002	MVP-5003
System Core			
Processor	Intel® Core™ i7-6700TE Quad Core, 2.4GHz, 8M L3 cache (Turbo Frequency up to 3.40 GHz)	Intel® Core™ i5-6500TE Quad Core, 2.3GHz, 6M L3 cache (Turbo Frequency up to 3.30 GHz)	Intel® Core™ i3-6100TE Dual Core, 2.7GHz, 4M L3 cache
Chipset	Intel® Mobile Platform Controller Hub (H110)		
Video	2x DisplayPort (Supports DP1.2, resolution up to 4096x2304 @60Hz, 24bpp) 1x DVI-D (Resolution up to 1920X1080) 1x VGA up to 1920x1200		
Memory	4GB DDR4 2133MHz SODIMM, max. capacity 32GB with 2x SODIMM)		
I/O Interface			
Ethernet	3x Intel® GbE ports (3x Intel® Ethernet controller I211-AT) Supports teaming, Wake On LAN		
Serial Ports	2 software-programmable RS-232/422/485 (COM1 & COM2) with auto flow control 2 RS-232 (COM3 & COM4)		
USB	4x external USB 3.0 2x external USB 2.0 1x internal USB 2.0 (optional)*** All USB ports support up to 1.6A power supply		
DI/O	8CH DI 8CH DO		
Audio	1 Mic-in and 1 Line-out		
Power Supply			

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	MVP-5001	MVP-5002	MVP-5003
DC Input	Built-in wide-range 12 to 24V DC input 3P pluggable connectors with latch (GND, V-, V+)		
AC Input	Optional 160 W external AC-DC adapter for AC input		
Storage			
SATA	Internal SATA-III port for 2.5" HDD/SSD installation High speed SATA 6 Gb/s support		
CFast	CFast (external,), supporting PI/O and DMA modes		
Mechanical			
Fan Module	Optional fan module, Smart Fan Control		
Dimensions	220(W) x 210(D) x 121(H) mm (8.67 x 8.27 x 4.77 in.)		
Weight	3.6 kg (7.94lb)		
Mounting	Wall-mount kit		
Environmental			
Operating Temperature (Ambient w/o airflow)	0°C to 50°C		
Storage Temperature	-40°C to 85°C (-40 to 185°F) excl. HDD/SSD/CFast		
Humidity	Approx. 95% @ 40°C (non-condensing)		
ESD	Contact +/-4 kV and Air +/-8 kV		
Shock	Operating, 100G, half sine 11 ms duration (w/ CFast or SSD)		
EMC	CE and FCC Class A		

Power Supply (24VDC)	Power Off	System Idle*	System Full Load**	Recommended Power Supply***
Integrated Embedded Computer				
MVP-5001	3.1W	20.33 W	66.7 W	160W
MVP-5002	2.8 W	20.9 W	57.8 W	160W
MVP-5003	2.9 W	20.1 W	41.3 W	160W

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*Under Windows 10 IoT Enterprise desktop with no application programs executed

**Under Windows 10 IoT Enterprise with 100% CPU utilization

***Under conditions in which excessive environmental vibration may occur, it is recommended that an optional bracket be installed to secure USB and cable connectivity

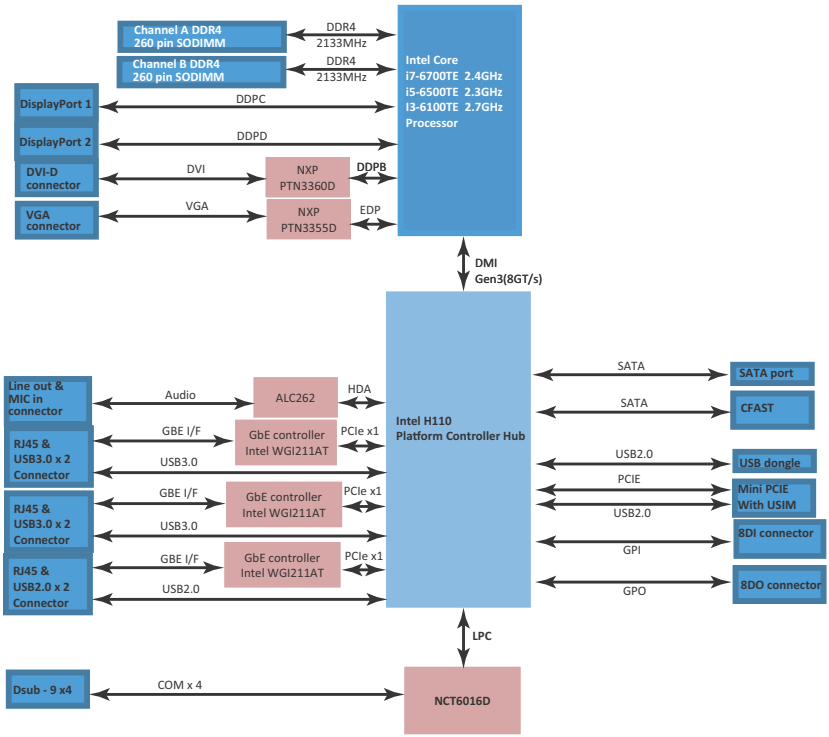


Figure 1-1: MVP-5000 Functional Block Diagram

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1.4 Schematics and Dimensions

NOTE:

All dimensions shown are in mm (millimeters).

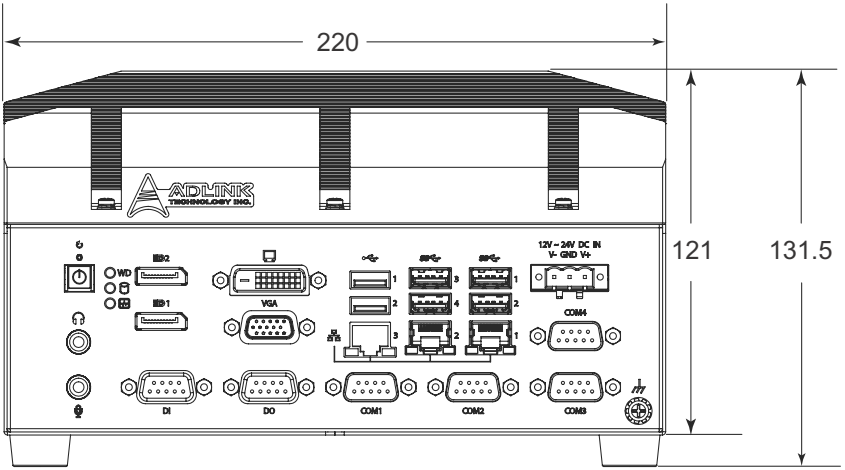


Figure 1-2: Front View

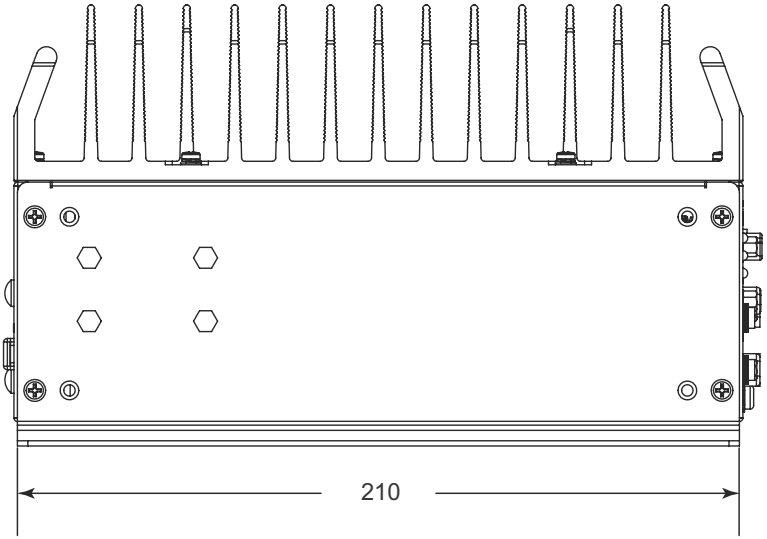


Figure 1-3: Left Side View

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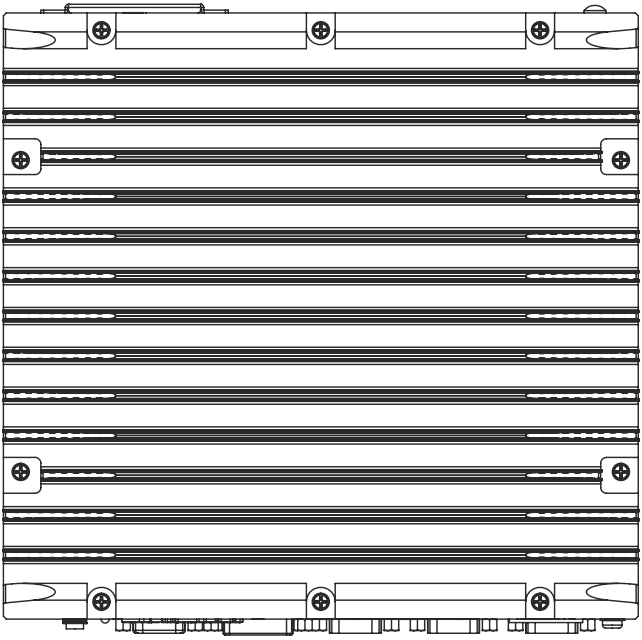


Figure 1-4: Top View

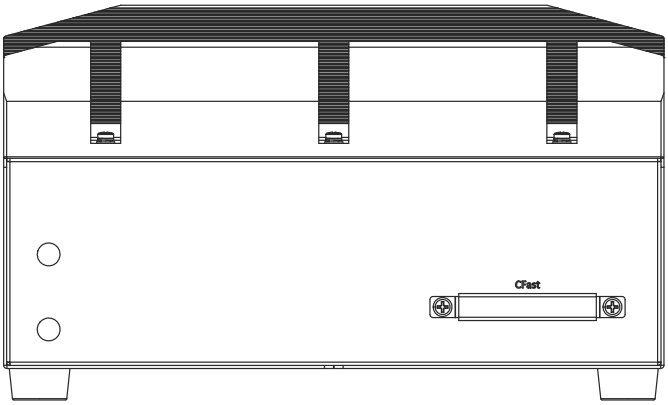


Figure 1-5: Rear View

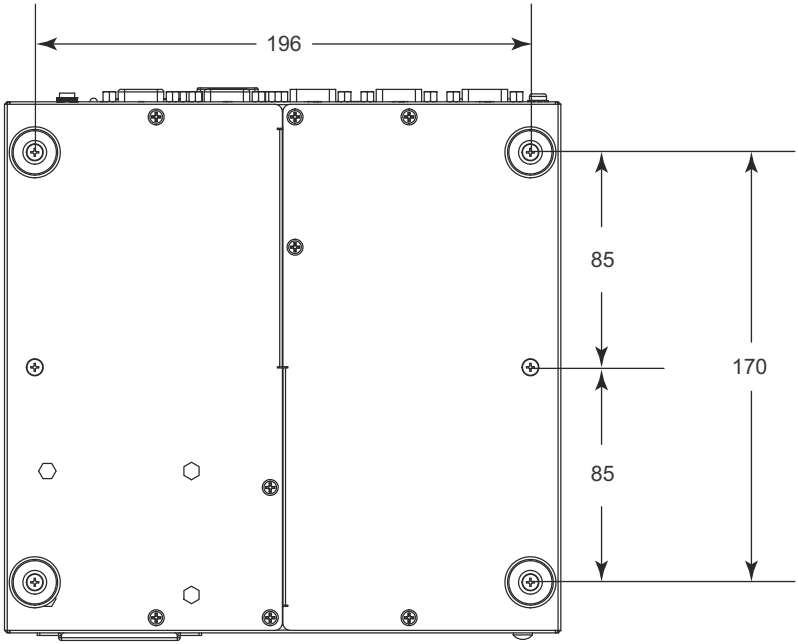


Figure 1-6: Underside View

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1.5 Front Panel I/O Connectors



Figure 1-7: Front Panel

I/O connectors and controls on the MVP-5000 front panel, as labeled, are as follows

- Power Button
- LED Indicators
- Audio (Mic, Phones)
- Reset Button
- DisplayPort x2
- Digital Input
- Digital Output
- DVI-D
- VGA
- USB 2.0 (Type A) x2
- Gigabit Ethernet x3
- USB3.0 (Type A) x4
- DC power supply
- COM port x4

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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 CFast card is active, the LED indicator flashes.
Diagnostic (DG)	Green	When lit continuously, indicates no physical storage is connected, and if blinking, indicates no memory is installed on either SODIMM socket.

Table 1-1: LED Indicators

1.5.3 Reset Button

The reset button executes a hard reset for the MVP-5000.

1.5.4 DisplayPort Connectors

Two DisplayPort connectors on the front panel can connect to VGA, DVI, HDMI (via adapter cable) and DisplayPort monitors.

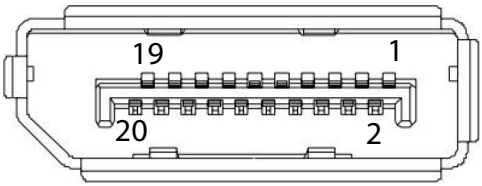


Figure 1-8: DisplayPort Connector

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Pin	Signal	Pin	Signal
1	CN_DDPx0+	11	GND
2	GND	12	CN_DDPx3-
3	CN_DDPx0-	13	CN_DDPx_AUX_SEL
4	CN_DDPx1+	14	CN_DDPx_CONFIG2
5	GND	15	CN_DDPx_AUX+
6	CN_DDPx1-	16	GND
7	CN_DDPx2+	17	CN_DDPx_AUX-
8	GND	18	CN_DDPx_HPD
9	CN_DDPx2-	19	GND
10	CN_DDPx3+	20	+V3.3_DDPx_PWR_CN

Table 1-2: DisplayPort Pin Assignments

P/N	Description
30-01119-0010	Active DisplayPort to HDMI adapter cable
30-01120-0010	Active DisplayPort to DVI adapter cable
30-01121-0010	Active DisplayPort to VGA adapter cable

Table 1-3: Applicable Cable Types

Display Options

With computing and graphic performance enhancement from its 6th Generation Intel processor, the MVP-5000 controller can support two independent displays, with configuration as follows.

Display Option 1	Display Option 2
DisplayPort1 4096x2304@60Hz	DisplayPort2 4096x2304@60Hz
DisplayPort1 4096x2304@60Hz	DVI-D 1920X1080@60Hz
DisplayPort1 4096x2304@60Hz	VGA 1920x1080@60Hz

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Display Option 1	Display Option 2
DisplayPort2 4096x2304@60Hz	DVI-D 1920X1080@60Hz
DisplayPort2 4096x2304@60Hz	VGA 1920x1080@60Hz
DVI-D 1920X1080@60Hz	VGA 1920x1080@60Hz

Table 1-4: Maximum Available Resolutions with 2-Display Configuration

1.5.5 Digital I/O Connector

The MVP-5000 provides 8 channels of non-isolation digital input and 8 channels of non-isolation digital output circuits, with spec and circuits as follows.

8-channel Digital Input

- VIH: 2 to 5.25V
- VIL: 0 to 0.8V

8-channel Digital Output

- Output type: Open drain N-channel
- MOSFET driver with internal pull high of 200Ω resistance.
- Source/Sink current for all channels: 24mA
- VOH: 2.4 to 5V
- VOL: 0 to 0.5V

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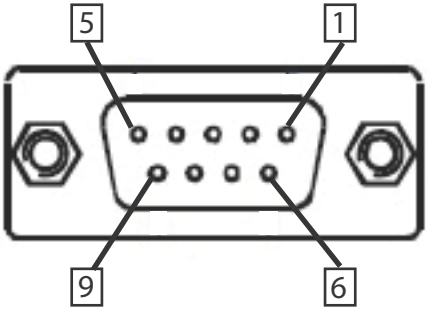


Figure 1-9: Digital I/O Connector Pin Assignment

Pin	Signal
1	DI0
2	DI1
3	DI2
4	DI3
5	DI4
6	DI5
7	DI6
8	DI7
9	DI_GND

Table 1-5: Digital Input Connector Pin Legend

Pin	Signal
1	DO0
2	DO1
3	DO2
4	DO3
5	DO4

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Pin	Signal
6	DO5
7	DO6
8	DO7
9	DO_GND

Table 1-6: Digital Output Connector Pin Legend

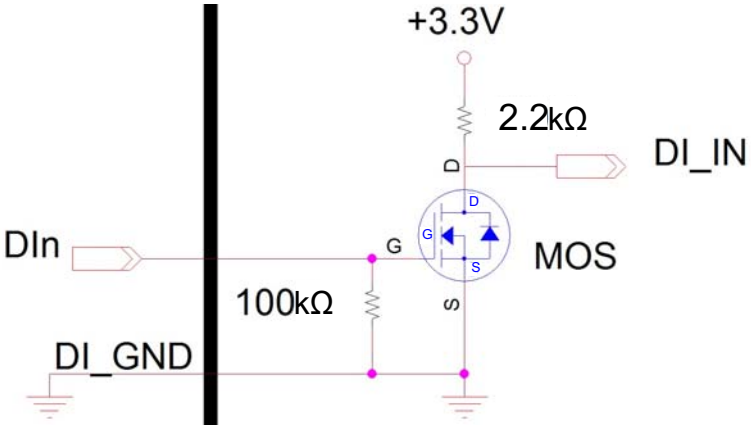


Figure 1-10: Digital Input Circuit

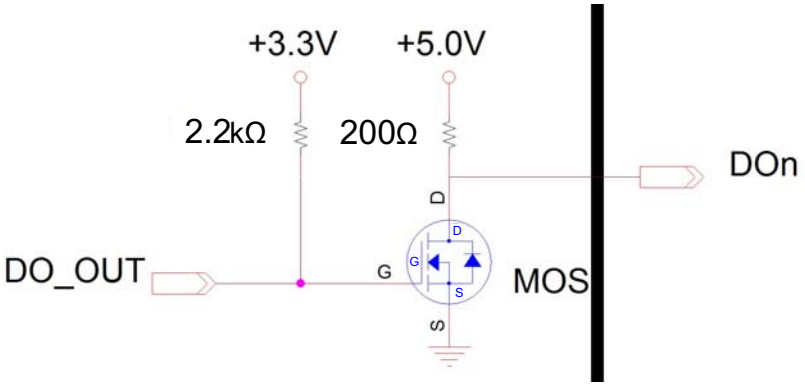


Figure 1-11: Digital Output Circuit

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1.5.6 DVI-D Connector

The MVP-5000 provides one DVI-D connector for connection to an external monitor.



Figure 1-12: DVI-D Connector Pin Assignment

Pin	Signal	Pin	Signal	Pin	Signal
1	DVIdata 2-	9	DVIdata 1-	17	DVIdata 0-
2	DVIdata 2+	10	DVIdata 1+	18	DVIdata 0+
3	GND	11	GND	19	GND
4	N/C	12	N/C	20	N/C
5	N/C	13	N/C	21	N/C
6	DVIDC clock	14	+5V	22	GND
7	DVIDC data	15	GND	23	DVI clock +
8	N/C	16	Hot plug detect	24	DVI clock -

Table 1-7: DVI-D Connector Pin Legend

1.5.7 VGA Connector

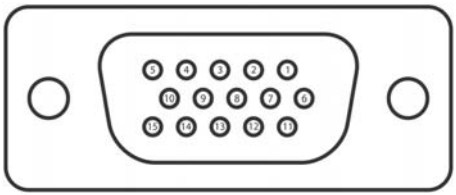


Figure 1-13: VGA Connector Pin Assignment

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Pin	Signal
1	G_VGA_R
2	G_VGA_G
3	G_VGA_B
4	N/C
5	GND
6	GND
7	GND
8	GND
9	N/C
10	GND
11	N/C
12	CRT_DDAT_CN
13	G_VGA_HSYNC
14	G_VGA_VSYNC
15	CRT_DCLK_CN

Table 1-8: VGA Connector Pin Legend

1.5.8 USB 2.0 Ports

The MVP-5000 provides two 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 MVP-5000 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 Section B.4: Boot on page 57 for details.

1.5.9 Gigabit Ethernet Ports

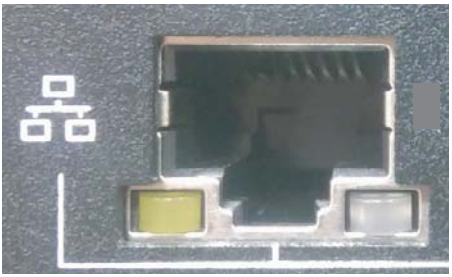
Three Gigabit Ethernet ports on the front panel support Intel WGI211AT Gigabit Ethernet PHY control.

WGI211AT provides:

- IEEE 802.3az Energy Efficient Ethernet

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- IEEE 1588/802.1AS precision time synchronization
- IEEE 802.3Qav traffic shaper
- Interrupt moderation, VLAN support, IP checksum offload
- RSS and MSI-X to lower CPU utilization in multi-core systems
- ECC - error correcting memory in packet buffers
- Wake-On-LAN
- Preboot eXecution Environment (PXE) flash interface
- Jumbo frame support



Active/Link Yellow	Speed LED Green/Orange

Figure 1-14: Ethernet Port and LED Legend

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 1-9: Active/Link LED Indicators

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

Table 1-10: Speed LED Indicators

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1.5.10 USB 3.0 Ports

The MVP-5000 provides four USB 3.0 ports supporting Type A USB3.0 connection on the front panel. All USB3.0 ports are compatible with super-speed, high-speed, full-speed and low-speed USB devices.

1.5.11 DC Power Connector

The DC power supply connector of the MVP-5000 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 MVP-5000 allows a voltage input range from 12VDC to 24VDC.

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



Figure 1-15: DC Power Connector

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

Table 1-11: DC Power Supply Connector Signals

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1.5.12 COM Port Connectors

The MVP-5000 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.

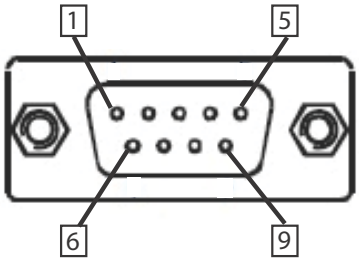


Figure 1-16: COM Port

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 1-12: D-Sub 9p Signal Function of COM Ports

1.6 Rear-Mounted CFast Host Connector

The MVP-5000 is equipped with a Type II Push Push CFlash host connector on the rear panel, by SATA interface. Data transfer rates up to 3.0Gb/s(300MB/s)/1.5Gb/s(150MB/s) are supported. The host SATA controller provides a legacy operating mode using

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I/O space, and an AHCI operating mode using memory space. The CFast card can function as a storage device for system installation.

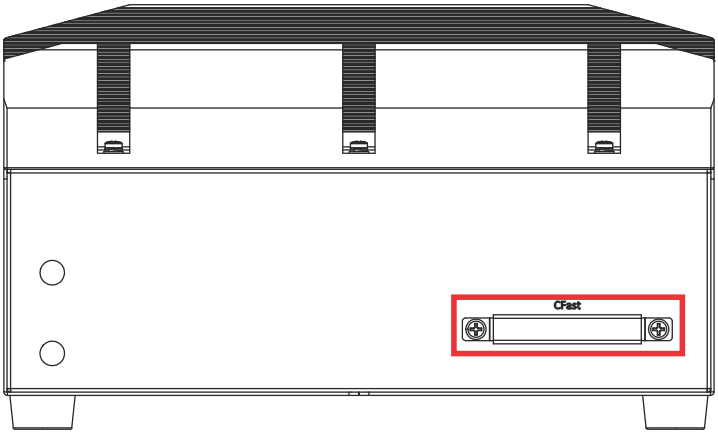


Figure 1-17: CFast Host Connector (on rear panel)

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1.7 Internal I/O Connectors

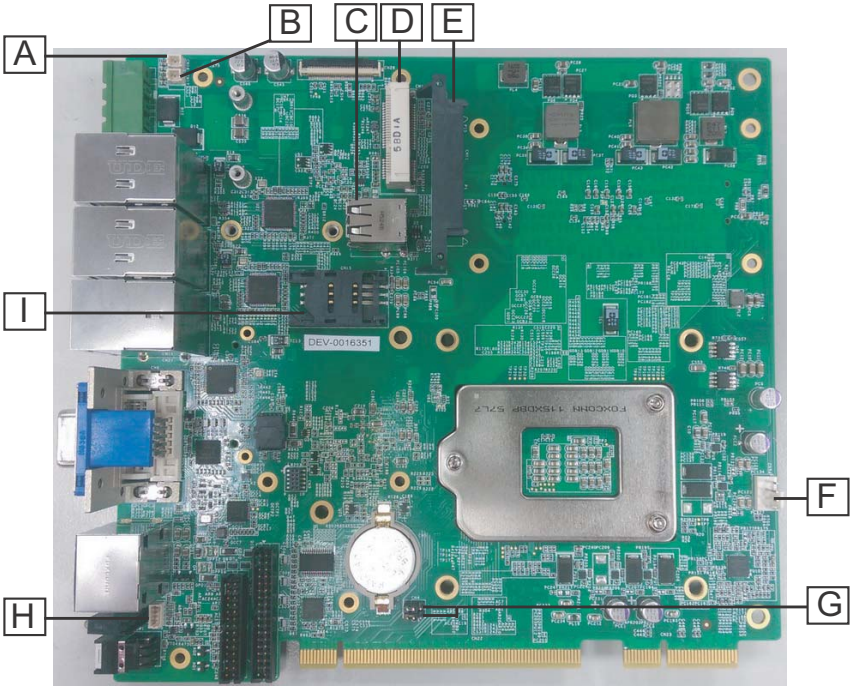


Figure 1-18: Mainboard I/O Connectors

A	5V GPS module power header
B	3.3V GPS module power header
C	USB2.0 connector
D	Mini PCIe socket
E	SATA connector
F	9V fan connector
G	Jumpers: ▶Clear CMOS (upper) ▶N/C (lower)
H	Extended PWR/RESET header
I	USIM slot

Table 1-13: Mainboard Connector Legend

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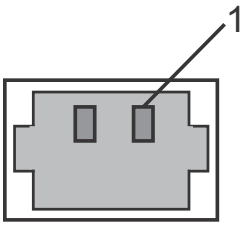
Figure 1-19: CFast Board Connectors

A	CFast socket
B	12V fan (optional)
C	PCIe slot (connects to mainboard)

Table 1-14: CFast Board Connector Legend

1.7.1 5V GPS Module Power Header

5V power supply via cable for mini PCIE GPS module cards.

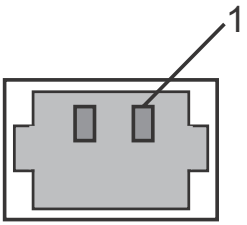


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Pin	
1	+V5_GPS
2	GND

1.7.2 3.3V GPS Module Power Headers

3.3V power supply via cable for mini PCIE GPS module cards.



Pin	
1	+V3.3_GPS
2	GND

1.7.3 USB 2.0 Connector

One onboard USB 2.0 Type-A connector is provided for the internal USB dongle, with only the upper port functional.

1.7.4 Mini PCIe Socket

The internal Mini PCIe socket (Rev. 1.2) supports full size Mini PCIe cards.

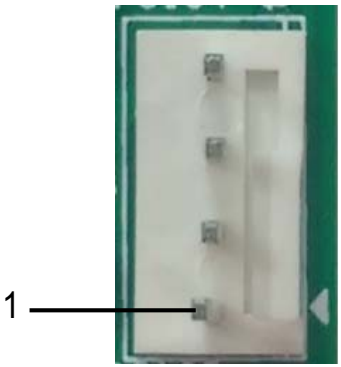
1.7.5 SATA Connector

The SATA connector supports transfer up to 3.0GB/s(300MB/s).

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1.7.6 9V Fan Connector

DC 9V fan module power supply is provided through the connector, to which the optional fan module connects when installed in the chassis.



Pin	Signal
1	FAN_GND
2	P_+9V0_FAN1
3	FAN_TACH_CN
4	FAN_PWM_CN

1.7.7 Clear CMOS Jumper

Upon encountering an abnormal condition preventing the MVP-5000 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 for a minimum of 3 seconds, and then remove the jumper to return to normal mode.

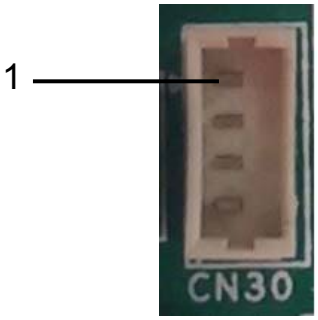


Figure 1-20: Clear CMOS Jumper Setting

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1.7.8 Extended PWR/RESET header

An internal header is provided for the Power and Reset buttons, with pin assignment as shown.



Pin	Signal
1	PWR_BTN-L
2	GND
3	GND
4	RESET_BTN-L

1.7.9 USIM Slot

The USIM slot connects to the Mini PCIe slot.

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2 Getting Started

2.1 Unpacking Checklist

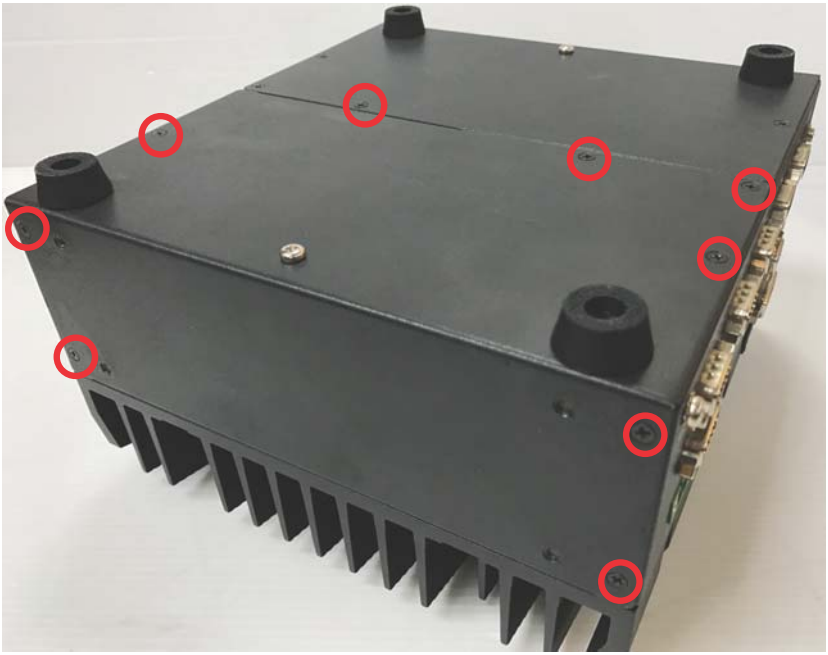
Before unpacking, check the shipping carton for any damage. If the shipping carton and/or contents are damaged, inform your dealer immediately. Retain the shipping carton and packing materials for inspection. Obtain authorization from your dealer before returning any product to ADLINK. Ensure that the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

- MVP-5000 controller
- Accessory pack
- Screw pack for wall-mounting and HDD installation
- Quick Start Guide

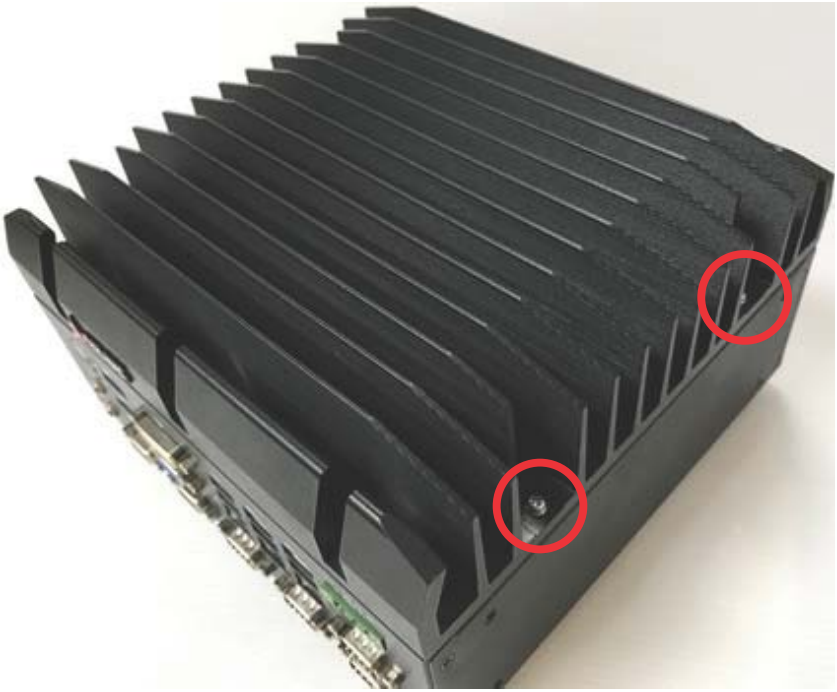
2.2 Installing Hard Disk Drives

1. Remove the 11 bottom cover screws by screwdriver

..



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2. Remove the bottom cover by lifting.



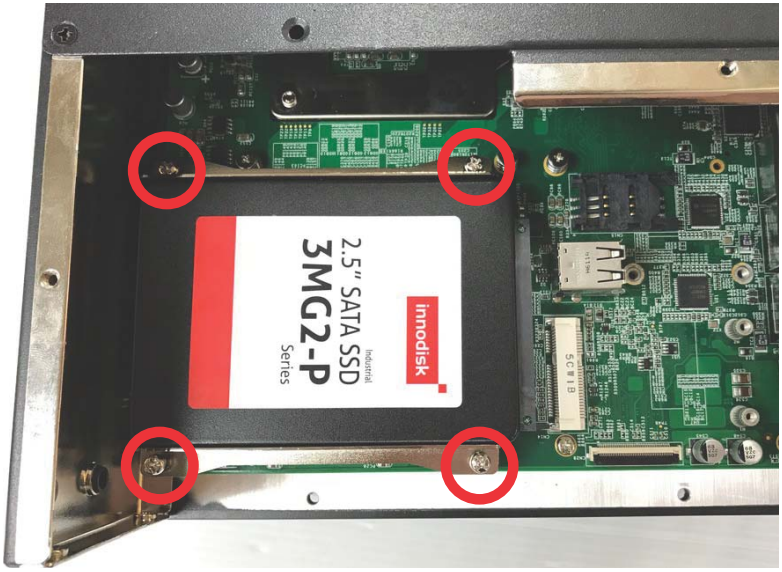
3. Use 4 of the included M3 screws to fix a 2.5" HDD or SSD unit to the bracket from the accessory pack..



4. Gently seat the drive into the SATA connector on the PCB.



5. Use 4 of the included M3 screws to mount the drive..



6. Replace the bottom cover and refasten screws.

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2.3 Installing CFast Cards

1. Remove the screws fixing the CFast socket cover on the rear panel and remove the cover.



2. True the CFast card with the alignment guide.

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3. Gently insert the CFast card until it is firmly seated in the socket.



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4. Replace the socket cover and screws.

2.4 Wall-mounting the MVP-5000

NOTE:

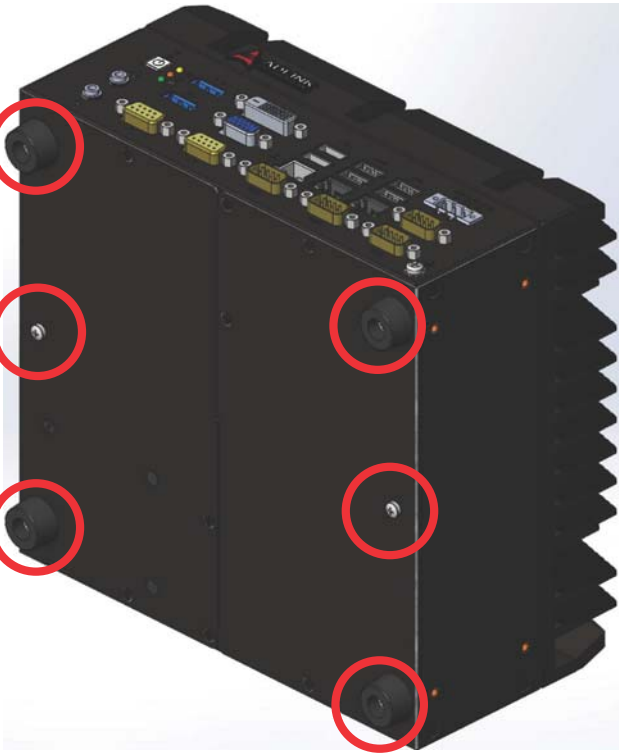
All dimensions shown are in mm (millimeters).

CAUTION:

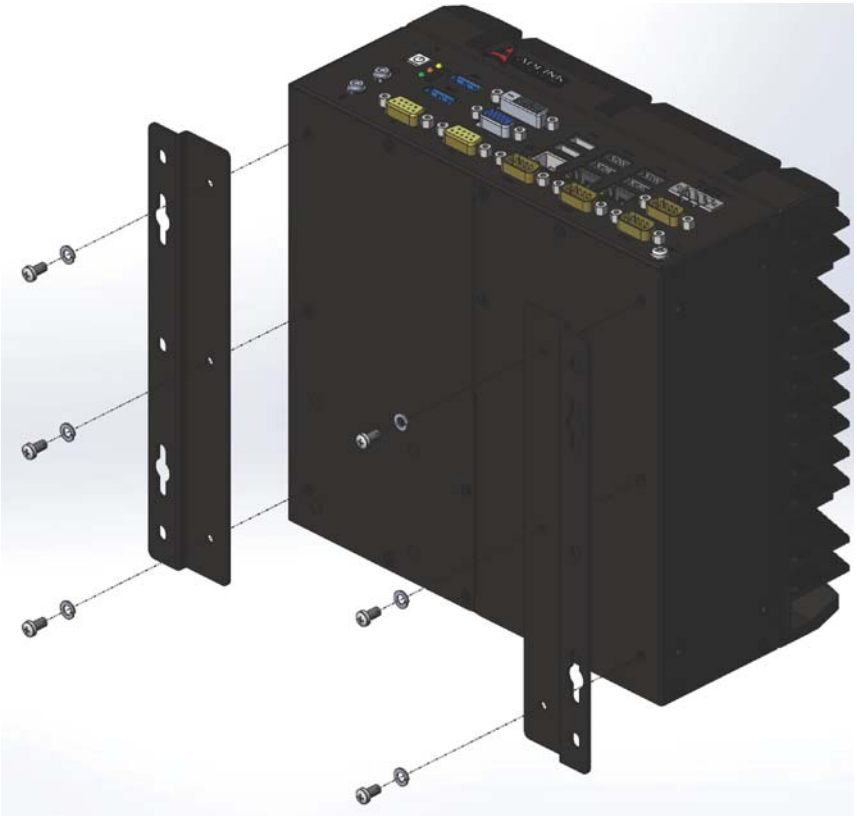
Due to the presence of ventilation holes, for safety, the device should ONLY be wall-mounted with the front and rear panels on the sides, NEVER on the top or underside.

The MVP-5000 ships with wall-mount brackets and accessory screws. To wall-mount the MVP-5000:

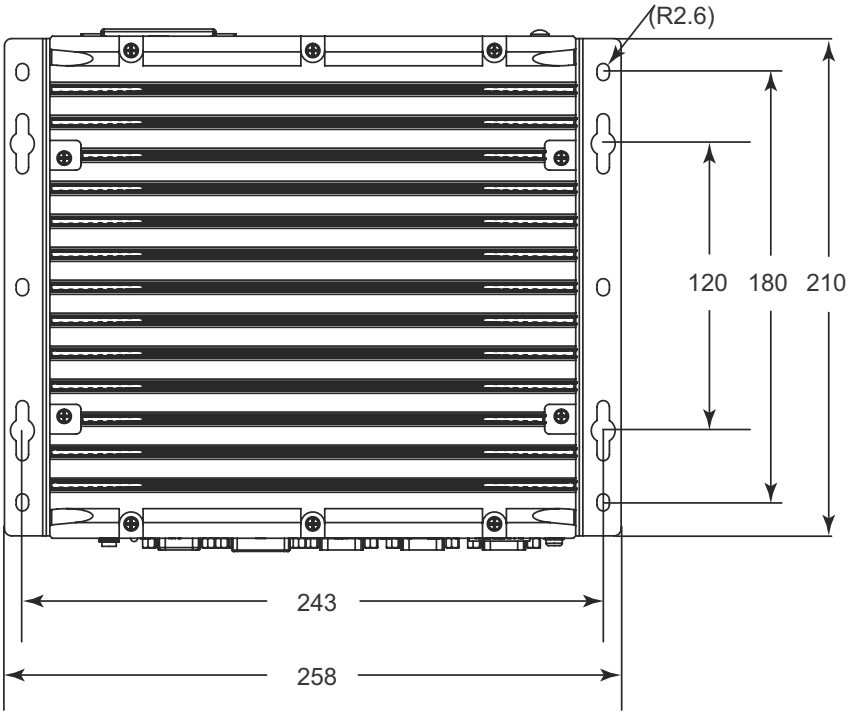
1. Remove the 4 plastic pads and 2 screws from the underside.



2. Use the 6 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.



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3. Once final assembly as shown is complete, mount the MVP-5000 on the wall via screw holes.

2.5 Driver Installation

Download requisite drivers, as follows, for your system from http://www.adlinktech.com and install.

The following drivers must be installed:

- Chipset driver
- Graphics driver
- Ethernet driver
- Audio driver
- USB 3.0 driver
- Intel Management Engine driver
- Serial I/O driver

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2.6 Adapter

The MVP-5000 with verified adapter meets the following specifications.

Output Rating	12-24VDC/12.5-6.25A or 24VDC/6.25A min.
Operating Elevation	2000m max.
Operating Temperature	0-50°C (32-122°F)
UL	Listed certified

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Appendix A Power Consumption

NOTE: 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 and DVI monitors, CFast card, Ethernet, USB, COM, and audio loopback, and an internal SSD installed.

No MiniPCIe slots are occupied.

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

Power Supply: 24VDC	Power Off	System Idle	System Full Load	Recommended Power Supply
Integrated Embedded Computer				
MVP-5000 i7	2.9 W	19.68 W	53.52 W	160W
MVP-5000 i5	2.9 W	18.26 W	52.18W	160W
MVP-5000 i3	2.9 W	17.9 W	50.66 W	160W

Table A-1: Power Consumption

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

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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 MVP-5000. The BIOS setup program includes menus for configuring settings and enabling features of the MVP-5000. Most users do not need to use the BIOS setup program, as the MVP-5000 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 MVP-5000 controller supports one-time Boot Menu allowing selection of boot device. Enter the Boot Menu by selecting F7 at POST.


NOTE:

- BIOS options listed are for reference only.
- Different configurations can affect BIOS behavior.
- Displayed material may reflect only the BIOS version corresponding to initial release and may differ from that of the purchased motherboard.
- Users are welcome to download the latest BIOS version from our official website.

B.1 Main

Contains basic system information for the MVP-5000.


WARNING:

Changing BIOS settings may lead to incorrect controller behavior and possible inability to boot. In such a case, Section 1.7.7:Clear CMOS Jumper provides instruction on clearing the CMOS and restoring default settings

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BIOS Information

Shows current system BIOS Vendor, Core Version, BIOS Version, Board Version and Product Name.

Platform Information

Shows current system Platform Name, CPU Stepping, PCH SKU, PCH Stepping and GT information.

FW Information

Shows current system Memory RC version, Microcode Path, IGFX VBIOS version and ME FW version.

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System Time/System Date

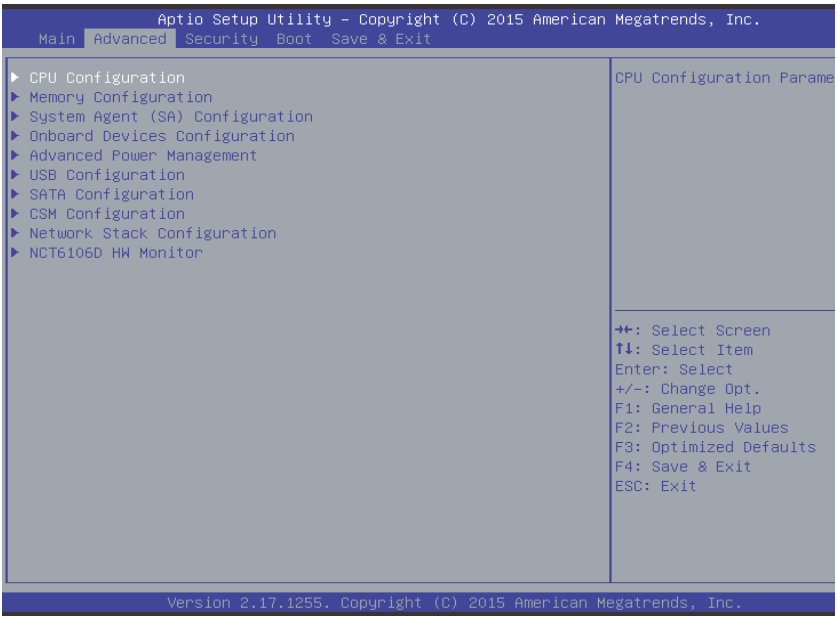
Allows adjustment of system time and date, as follows.

1. Highlight System Time or System Date using the up and down <Arrow> keys
2. Enter new values using the keyboard and select <Enter>
3. Select < Tab > to move between fields.

NOTE:

- The date must be entered in MM/DD/YY format, and the time in HH:MM:SS.
- 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



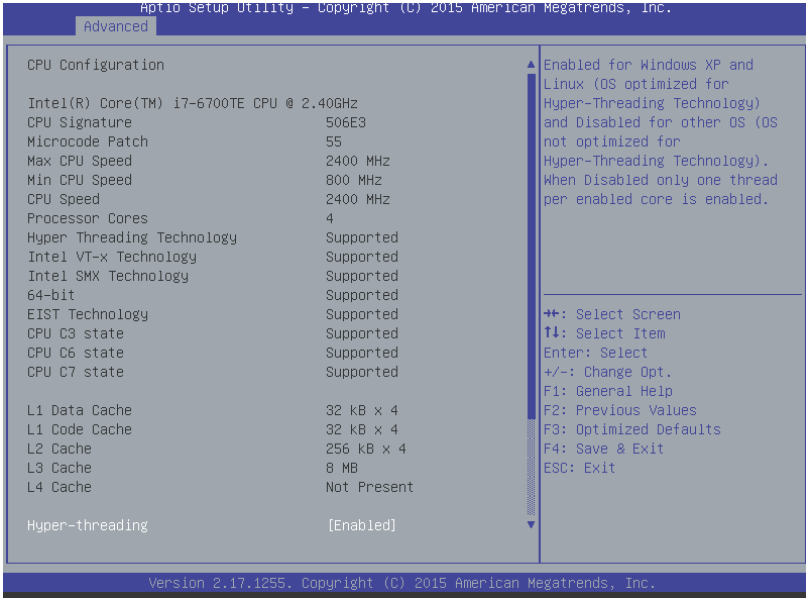
CAUTION:

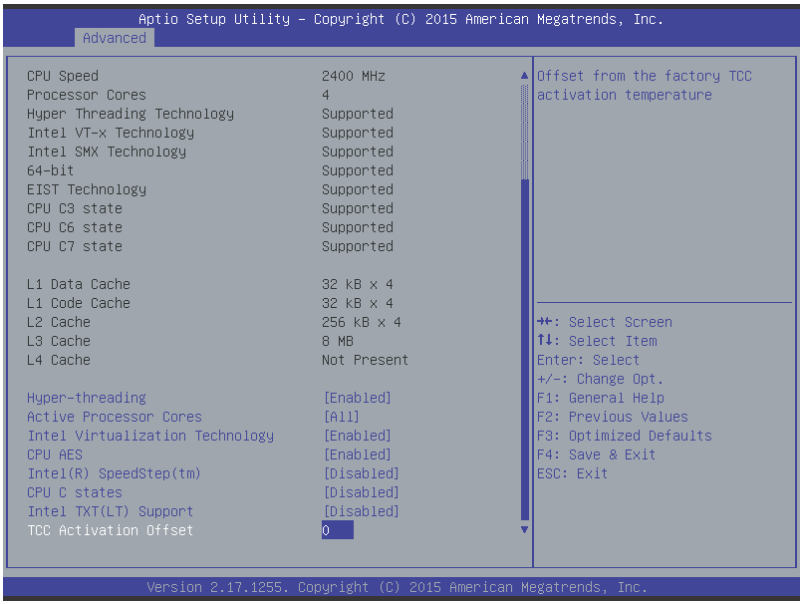
Setting incorrect or conflicting values in Advanced BIOS Setup may cause system malfunction

Accesses advanced options of the MVP-5000.

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B.2.1CPU Configuration





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Hyper-Threading

Enabled for Windows 7, 10 IoT Enterprise, and Linux (optimized for Hyper-Threading Technology). When Disabled only one thread per enabled core is enabled.

Active Processor Cores

Number of cores to enable in each processor package.

Intel Virtualization Technology

When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.

CPU AES

Enable/Disable CPU Advanced Encryption Standard instructions.

Intel(R) SpeedStep(tm)

Allows more than two frequency ranges to be supported.

CPU C States

Enable or disable CPU C states.

Intel TXT(LT) Support

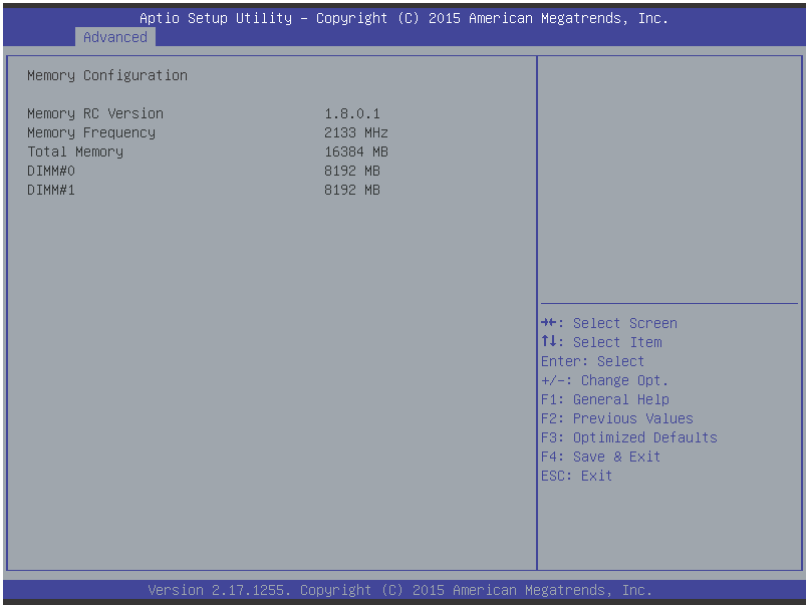
Enables or Disables Intel(R) TXT(LT) support.

TCC Activation Offset

Offset from the factory TCC activation temperature.

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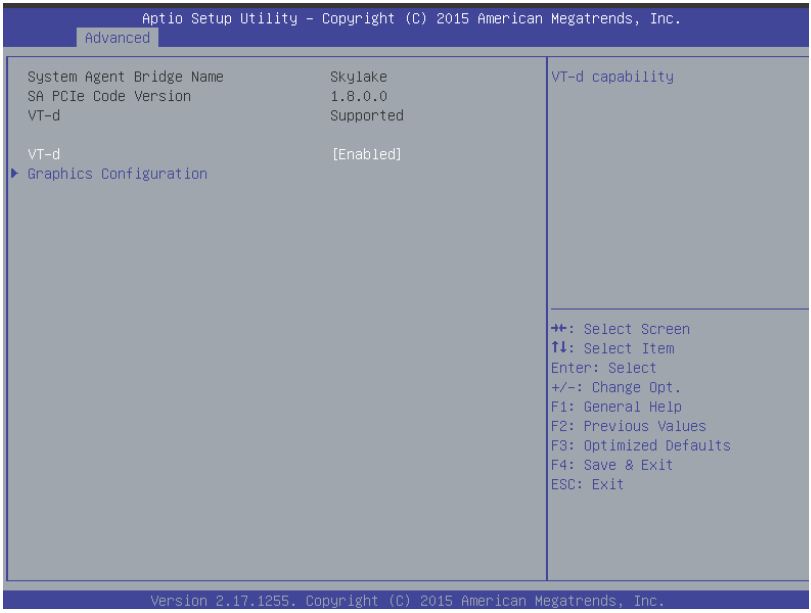
B.2.2 Memory Configuration



Shows current system Memory RC Version and values for memory frequency, total memory, DIMM#0, and DIMM#1.

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B.2.3 System Agent (SA) Configuration

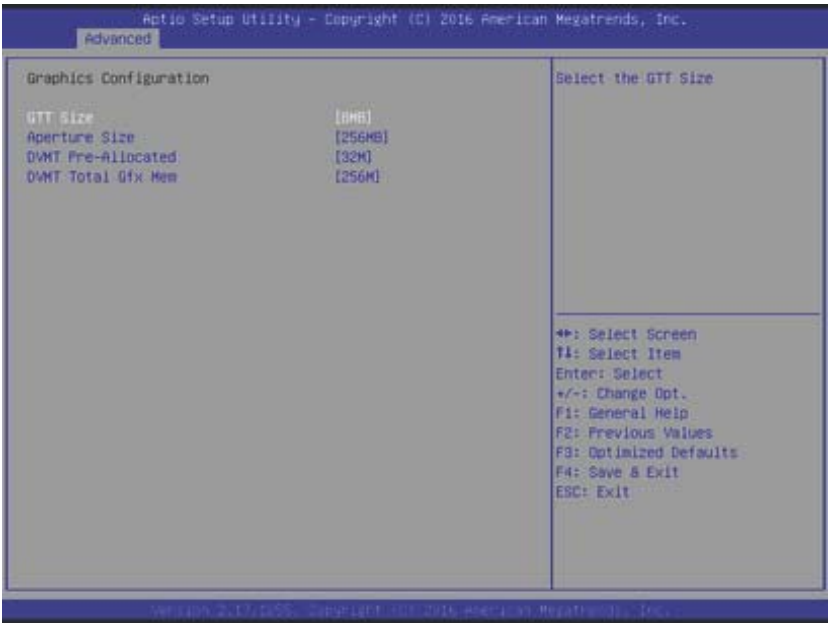


VT-d

Enables/disables VT-d capability.

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B.2.4 Graphics Configuration



GTT Size

Sets GTT size.

Aperture Size

Sets aperture size, with MMIO BIOS assignment exceeding 4GB automatically enabled when 2048MB aperture is selected, available when CSM Support is disabled.

DVMT Pre-Allocated

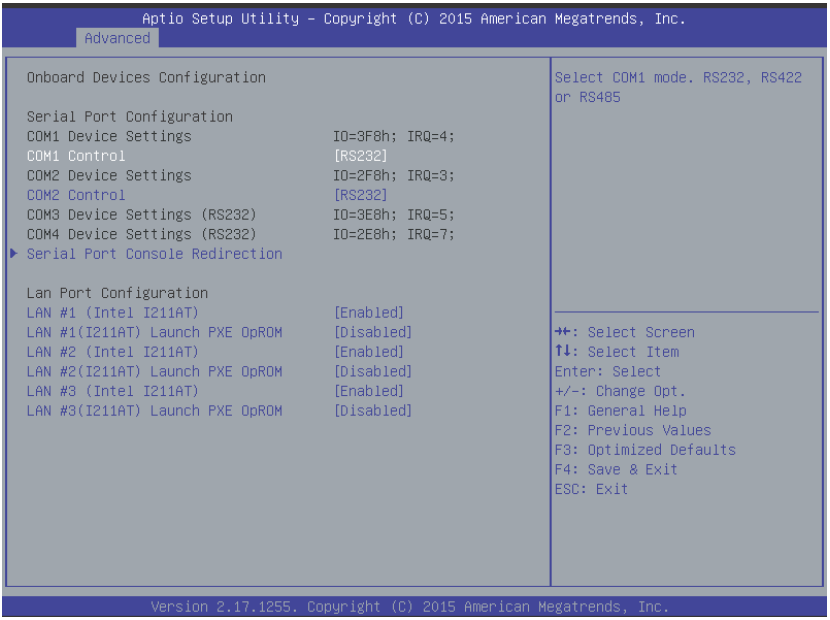
Sets size of DVMT 5.0 pre-allocated (fixed) graphics memory used by the internal graphics device.

DVMT Total Gfx Mem

Sets size of DVMT5.0 total graphic memory used by the internal graphics device.

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B.2.5 Onboard Device Configuration



Serial Port 1 to 4 Configuration

Sets port type (RS-232/422/485) for Serial Ports 1 and 2 only.

LAN #1 (Intel I211AT)

Enables/Disables onboard Intel I211AT LAN controller.

LAN #1(I211AT) Launch PXE OpROM

Enables or disables execution of LAN boot-rom to add boot option for legacy network devices.

LAN #2 (Intel I211AT)

Enables/Disables onboard Intel I211AT LAN controller.

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LAN #2(I211AT) Launch PXE OpROM

Enables or disables execution of LAN boot-rom to add boot option for legacy network devices.

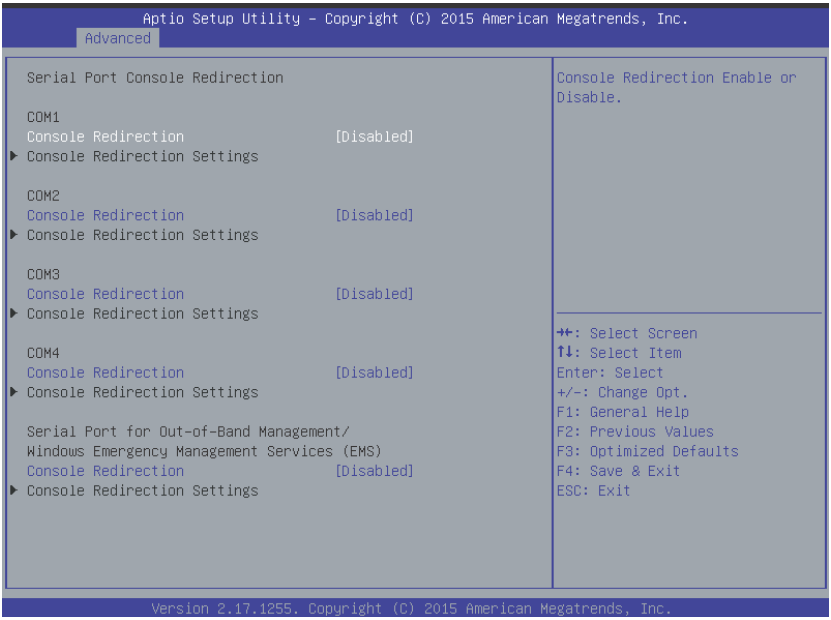
LAN #3 (Intel I211AT)

Enables/Disables onboard Intel I211AT LAN controller.

LAN #3(I211AT) Launch PXE OpROM

Enables or disables execution of LAN boot-rom to add boot option for legacy network devices.

Serial Port Console Redirection



Console Redirection

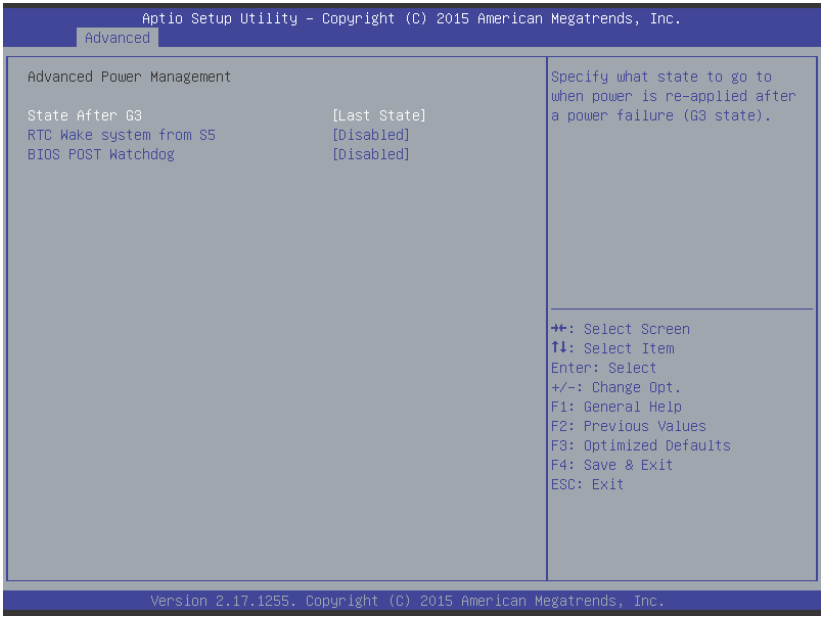
Enables console redirection on COM 1 to 4 and EMS COM.

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Console Redirection Settings

Sets miscellaneous parameters for COM Ports 1 to 4 and EMS COM.

B.2.6 Advanced Power Management



State After G3

Determines the state the computer enters when power is restored after power loss, from among Last State, Power On, and Power Off

Option	Description
Power Off	Retains system power off after power is restored
Power On	Powers the system up when power is restored
Last State	When power is restored, returns the system to the state in which power was interrupted

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State After G3

Sets the state entered when power is re-applied after a power failure (G3 state).

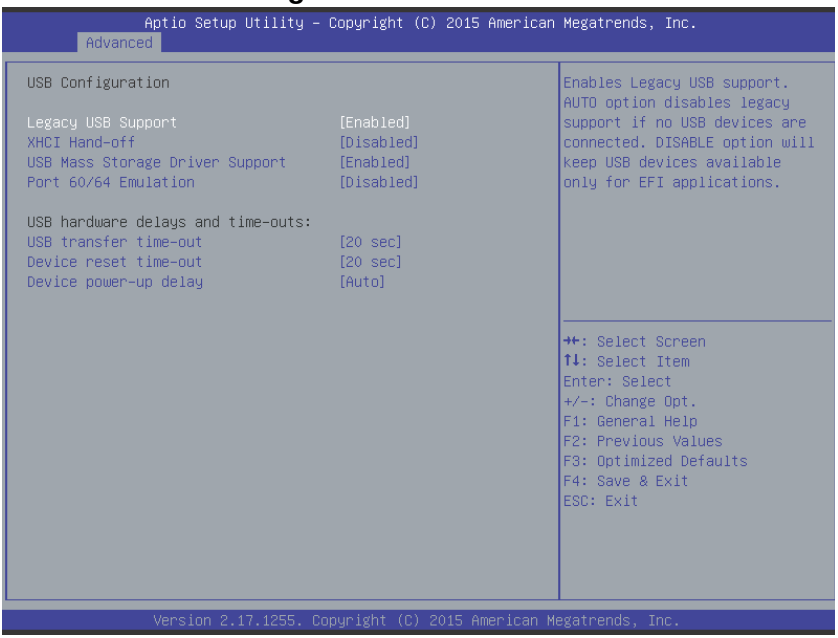
RTC Wake system from S5

Enable or disable system wake on alarm event, with FixedTime waking the system at the hr/min/sec specified, and DynamicTime waking the system at the current time + Increase minute(s).

BIOS POST Watchdog

From among Disabled, Second Mode and Minute Mode.

B.2.7 USB Configuration



Legacy USB Support

With AUTO disabling legacy support if no USB devices are connected, and DISABLE keeping USB devices available only for EFI applications.

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XHCI Hand-off

A workaround for OS without XHCI hand-off support, where XHCI ownership change should be claimed by the XHCI driver.

USB Mass Storage Driver Support

Enable/Disable USB mass storage driver support.

Port 60/64 Emulation

Enables I/O port 60h/64h emulation support, should be enabled for complete USB keyboard legacy support for OS not recognizing USB ports.

USB transfer time-out

Timeout value for Control, Bulk, and Interrupt transfers.

Device reset time-out

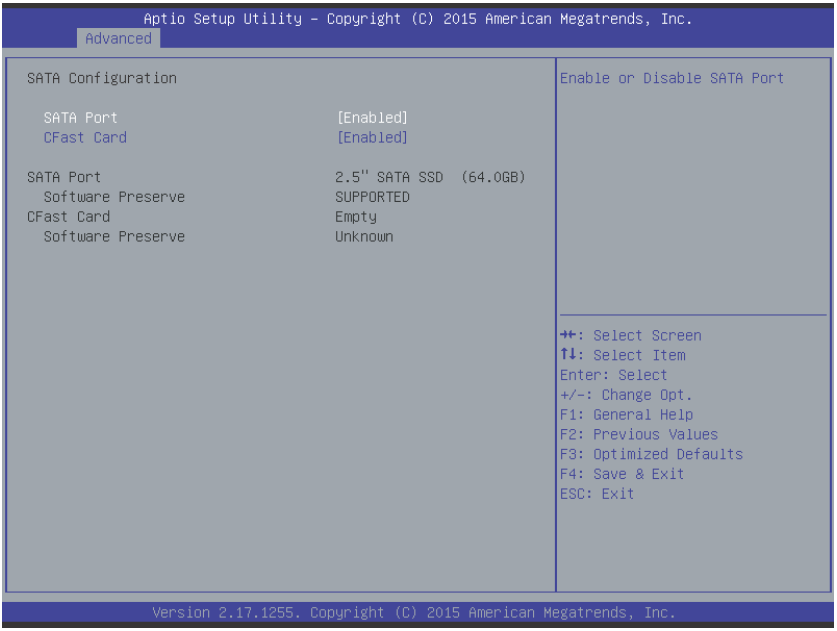
USB mass storage device Start Unit command timeout.

Device power-up delay

Maximum time taken before the device reports itself to the Host Controller, with Auto using a default value of 100 ms for a Root port, and for Hub port the delay is taken from the Hub descriptor.

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B.2.8 SATA Configuration



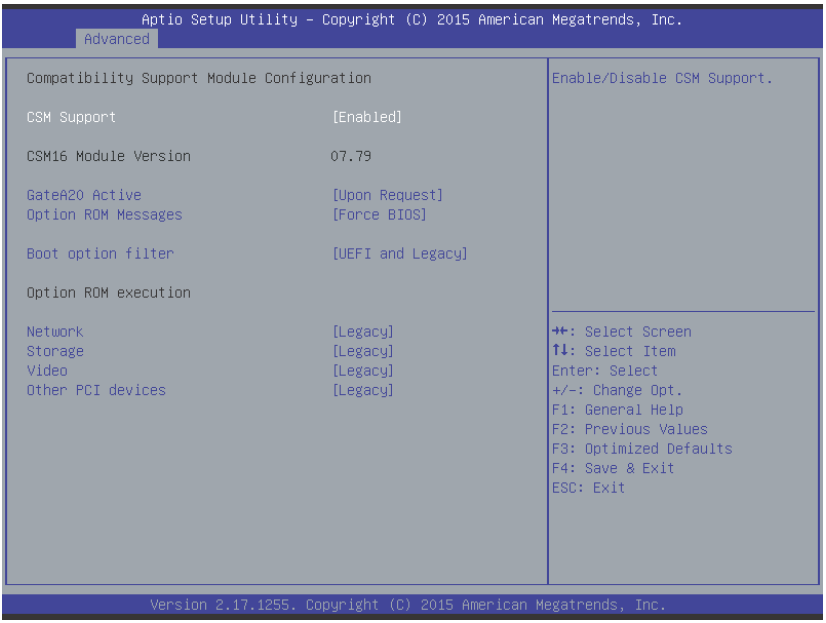
SATA Port and CFast Card

Enable or Disable SATA Port and CFast Card.

for Hub port the delay is taken from the Hub descriptor.

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B.2.9 CSM Configuration



CSM Support

Enable or Disable CSM Support.

GateA20 Active

UPON REQUEST disables GA20 using BIOS services, and ALWAYS prevents GA20 from being disabled, useful when any RT code exceeding 1MB is executed.

Option ROM Messages

Sets display mode for Option ROM.

Boot option filter

Controls Legacy/UEFI ROM priority.

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Network

Controls execution of UEFI and Legacy PXE OpROM.

Storage

Controls execution of UEFI and Legacy Storage OpROM.

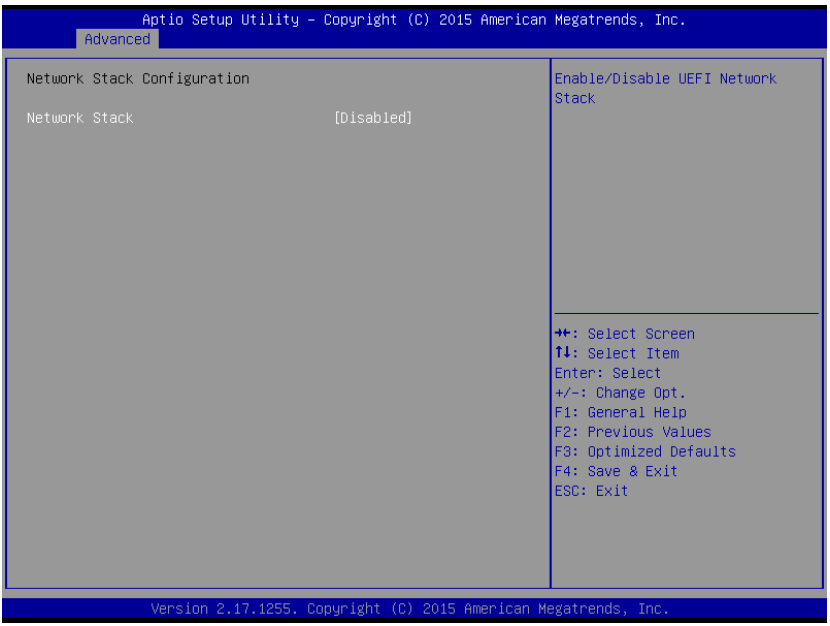
Video

Controls execution of UEFI and Legacy Video OpROM.

Other PCI devices

Determines OpROM execution policy for devices other than Network, Storage, and Video.

B.2.10 Network Stack Configuration

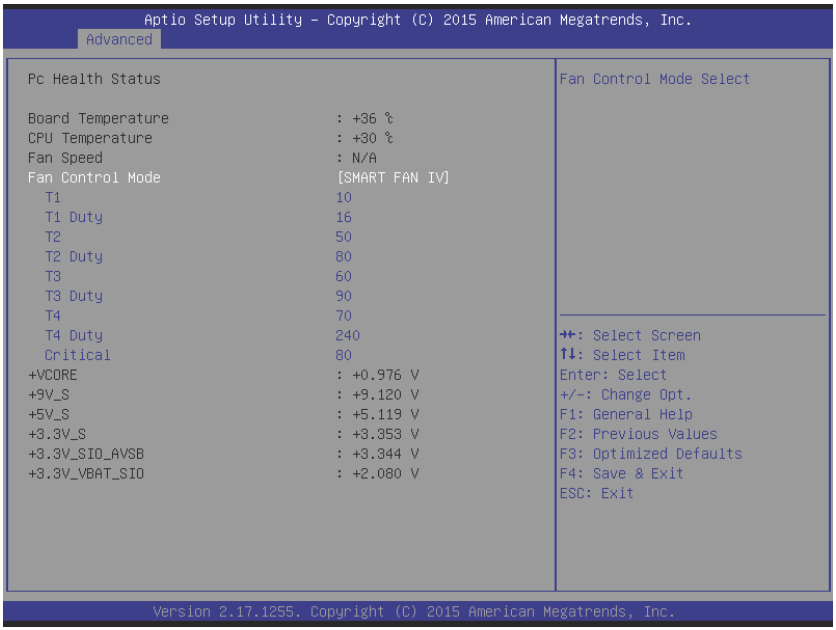


Enables/disables UEFI Ipv4/Ipv6 network stack function.

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B.2.11 PC Health Status

(Opens from **Advanced/NCT6106D HW Monitor**)



Hardware monitor based on Super I/O shows Board Temperature, CPU Temperature, Fan Speed, Fan Control Mode, and Voltage values.

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B.3 Security



If only the Administrator password is set, access s limited and the password requested on Setup. If User password is set, it acts as a power-on password and must be entered to boot or enter setup. In Setup the user receives

Administrator Password

Sets Administrator Password.

User Password

Sets User Password.

RTC Lock

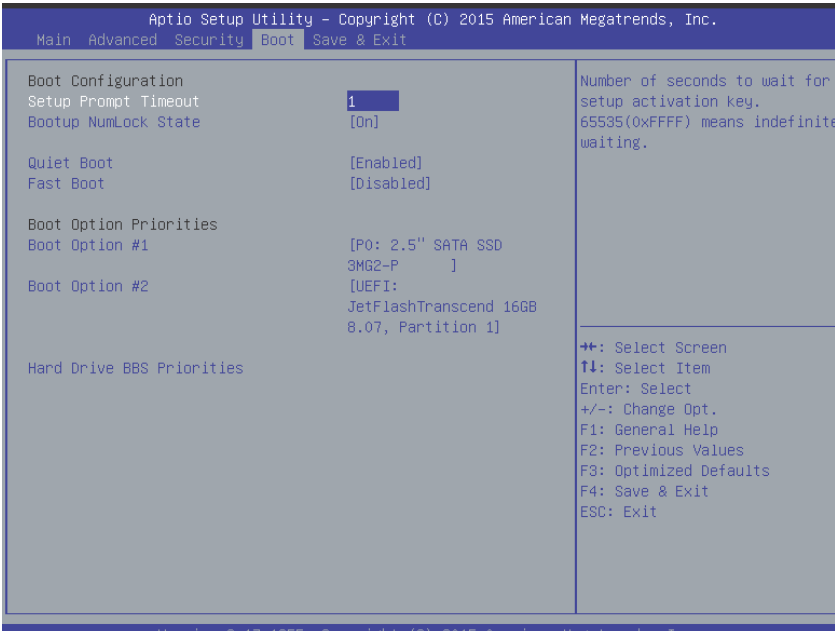
Enable locks bytes 38h-3Fh in the lower/upper 128-byte bank of RTC RAM.

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BIOS Lock

Enable/Disable the PCH BIOS Lock (BLE bit).

B.4 Boot



Setup Prompt Timeout

Number of seconds before setup activation key is launched, with 65535(0xFFFF) setting indefinite waiting.

Bootup Num-Lock State

Sets keypad Number Lock status following boot.

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Quiet Boot

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

Fast Boot

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

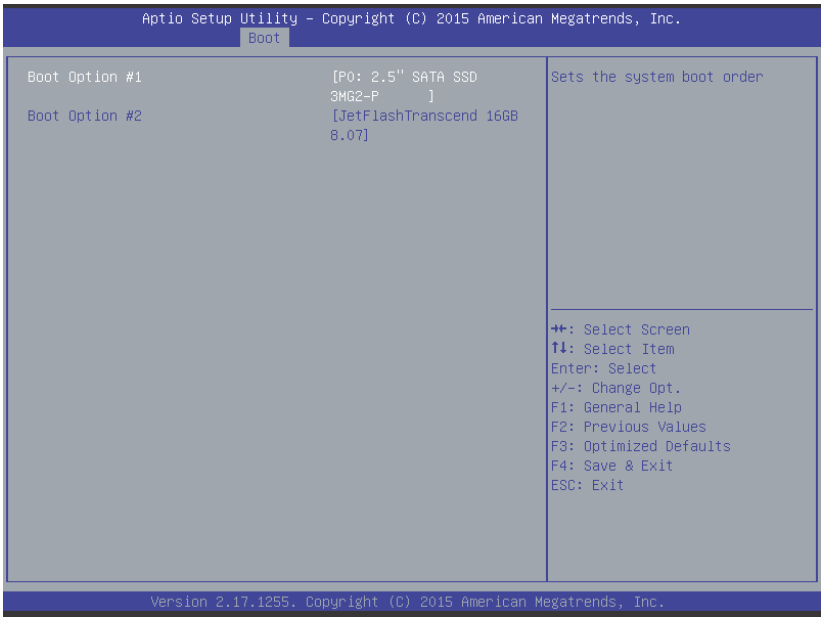
While enabling Fast Boot can reduce system ready time, some prerequisites can reduce effectiveness

Boot Option Priorities

Specifies the priority of boot devices, all of which are detected during POST and displayed. Target Boot Option # and click to select the desired device

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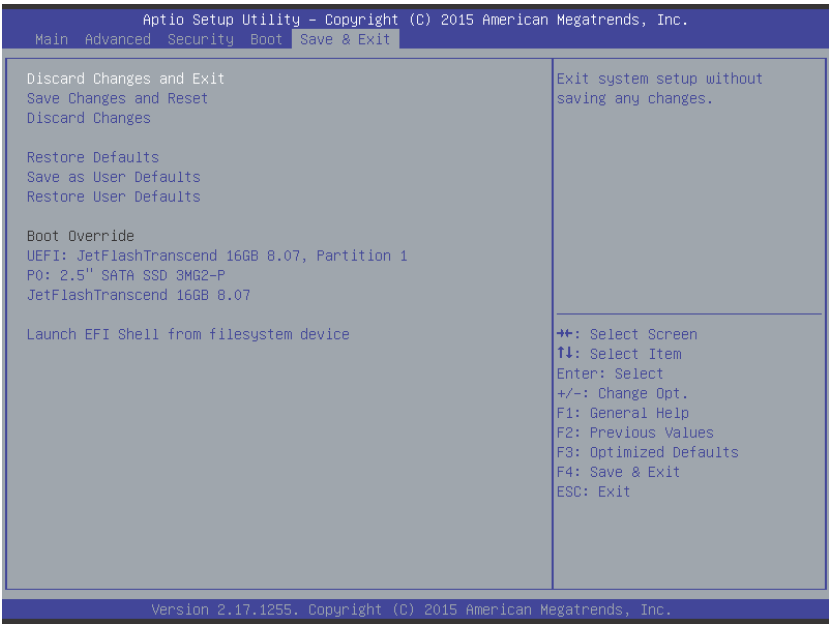
Hard Drive BBS Priorities



Specifies the priority of boot devices. All installed boot devices are detected during POST and displayed. Target Boot Option # and click to select the desired device.

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B.5 Save & Exit



Discard Changes and Exit

Discards all changes and exits BIOS setup

Save Changes and Reset

Saves all changes and reboots the system, with new settings taking effect

Discard Changes

Resets system setup without saving any changes

Restore Defaults

Sets all BIOS options to default settings, designed for maximum system stability but less than maximum performance. Select

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Restore Defaults if the computer encounters system configuration problems.

Save as User Defaults

Saves all changes to this point as user defaults

Restore User Defaults

Restores user defaults to all setup options

Launch EFI Shell from filesystem device

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

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Appendix C Watchdog Timer (WDT) Function Library

This appendix describes use of the watchdog timer (WDT) function library for the MVP-5000 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.

C.1 WDT with API/Windows

Matrix WDT API library files and a demo program (incl. source code) can be downloaded from http://www.adlinktech.com.

To use the WDT function library for MVP-5000, include the header file matrix_dio.h and linkage matrix_dio.lib (matrix_diox64.lib for 64-bit OS) in the C++ project.

WDT functions are as follows.

AwlWatchdogGetCount

Determines whether WDT is supported.

Syntax

C/C++

```
int __stdcall AwlWatchdogGetCount (Void)
```

Parameters

None

Return codes

```
0: No WDT supported
1: WDT supported
```

AwlWatchdogSetTrigger

Sets/disables WDT.

Syntax

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C/C++

```
int __stdcall AwlWatchdogSetTrigger(int Time, int
    isEnbaled)
```

Parameters

Time

The period (in seconds) before WDT is triggered.

isEnabled

Directs WDT whether to start run timer, where 0 stops running or doesn't run, 1 starts running timer.

Return codes

0: Operation successful

-1: Operation failed

AwlWatchdogSetTrigger_ex

Sets/disables WDT allows counter unit to be set to seconds or minutes.

Syntax

C/C++

```
int __stdcall AwlWatchdogSetTrigger_ex(int Time,
    int Unit, int isEnbaled)
```

Parameters

Time

The period (in seconds) before WDT is triggered.

Unit

Sets WDT counter unit to seconds or minutes, where 1 is in seconds, 60 is in minutes.

isEnabled

Directs WDT whether to start run timer, where 0 stops running or doesn't run, 1 starts running timer.

Return codes

0: Operation successful

-1: Operation failed

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Appendix D Digital Input/Output Function Library

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

D.1 DI/O with API/Windows

Matrix DI/O API library files and a demo program (incl. source code) can be downloaded from http://www.adlinktech.com.

To use the DI/O function library for MVP-5000 series, include the header file matrix_dio.h and linkage library matrix_dio.lib (matrix_diox64.lib for x64 OS) in the C++ project. DI/O functions are as follows.

AwlDioCount

Retrieves the number of digital input/output lines supported by platform.

Syntax

C/C++

```
int __stdcall AwlDioCount(void)
```

Parameter(s)

None

Return codes

```
int : number of digital input/output lines
      supported by platform
```

AwlDioGetValue

Reads the digital logic state of a digital input/output line.

Syntax

C/C++

```
int __stdcall AwlDioGetValue(int Index)
```

Parameter(s)

Index

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Indexes MVP-5000 digital input channels 1 to 8 (corresponding value 0 to 7)

Index of MVP-5000 digital input channels 9 to 16 (corresponding value 8 to 15).

Return codes

```
0:   Corresponding input/output line is HIGH
-1:  Corresponding input/output line is LOw
```

AwlDioGetInfo

Reads the info string of a digital input/output line.

Syntax

C/C++

```
int __stdcall AwlDioGetInfo(int Index)
```

Parameter(s)

Index

Indexes MVP-5000 digital input channels 1 to 8 (corresponding value 0 to 7), index of MVP-5000 digital input channels 9 to 16 (corresponding value 8 to 15)

Return codes

```
0: Operation is successful
-1: Operation failed
```

AwlDioSetValue

Sets the digital logic state of the digital output line.

Syntax

C/C++

```
int __stdcall AwlDioSetValue(int Index , int
     Value)
```

Parameter(s)

Index

Indexes the digital logic state of MVP-5000 digital output channels 1 to 8 (corresponding value 0 to 7)

Value

Sets the digital logic state of MVP-5000 digital output channels 1 to 8 ((corresponding value 0 to 7) to 0 (low) or 1 (high).

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Return codes

```
0: Operation Success
-1: Operation Failed
```

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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 device before handling/operating the device, to avoid injury or damage.

S'il vous plaît prêter attention stricte à tous les avertissements et mises en garde figurant sur l'appareil , pour éviter des blessures ou des dommages.

- Read these safety instructions carefully
- Keep the User's Manual for future reference
- Read the Specifications section of this manual for detailed information on the recommended operating environment
- The device can be operated at an ambient temperature of 50ºC
- When installing/mounting or uninstalling/removing device; or when removal of a chassis cover is required for user servicing (See "Getting Started" on page 27.):
  - Turn off power and unplug any power cords/cables
  - Reinstall all chassis covers before restoring power
- To avoid electrical shock and/or damage to device:
  - Keep device away from water or liquid sources
  - Keep device away from high heat or humidity
  - Keep device properly ventilated (do not block or cover ventilation openings)
  - Always use recommended voltage and power source settings
  - Always install and operate device near an easily accessible electrical outlet
  - Secure the power cord (do not place any object on/over the power cord)
  - Only install/attach and operate device on stable surfaces and/or recommended mountings
- If the device will not be used for long periods of time, turn off and unplug from its power source

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- Never attempt to repair the device, which should only be serviced by qualified technical personnel using suitable tools
- A Lithium-type battery may be provided for uninterrupted backup or emergency power.



Risk of explosion if battery is replaced with one of an incorrect type; please dispose of used batteries appropriately.
Risque d'explosion si la pile est remplacée par une autre de type incorrect. Veuillez jeter les piles usagées de façon appropriée.

- The device must be serviced by authorized technicians when:
  - The power cord or plug is damaged
  - Liquid has entered the device interior
  - The device has been exposed to high humidity and/or moisture
  - The device is not functioning or does not function according to the User's Manual
  - The device has been dropped and/or damaged and/or shows obvious signs of breakage
- Disconnect the power supply cord before loosening the thumbscrews and always fasten the thumbscrews with a screwdriver before starting the system up
- It is recommended that the device be installed only in a server room or computer room where access is:
  - Restricted to qualified service personnel or users familiar with restrictions applied to the location, reasons therefor, and any precautions required
  - Only afforded by the use of a tool or lock and key, or other means of security, and controlled by the authority responsible for the location

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	**BURN HAZARD** Touching this surface could result in bodily injury. To reduce risk, allow the surface to cool before touching. ***RISQUE DE BRÛLURES*** *Ne touchez pas cette surface, cela pourrait entraîner des blessures.* *Pour éviter tout danger, laissez la surface refroidir avant de la toucher.*

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