

Neosys Technology Inc.

Nuvo-3000 Series

Intel® 3rd-Gen Core™ i7/i5/i3 Fanless Controller

Nuvo-3005E/3005P

Nuvo-3003E/3003P

Nuvo-3005TB/3003TB

User's Manual

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Disclaimer

This manual is intended to be used as a practical and informative guide only and is subject to change without prior notice. It does not represent commitment from Neousys Technology Inc. Neousys shall not be liable for direct, indirect, special, incidental, or consequential damages arising out of the use of the product or documentation, nor for any infringements upon the rights of third parties, which may result from such use.

Declaration of Conformity

FCC

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

CE

The product(s) described in this manual complies with all applicable European Union (CE) directives if it has a CE marking. For computer systems to remain CE compliant, only CE-compliant parts may be used. Maintaining CE compliance also requires proper cable and cabling techniques.

Copyright and Trademarks

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Chapter 1 Introduction

1.1 Overview

Discover a leaping of embedded controller design with Neosys Nuvo-3000 series! Nuvo-3000 incorporates the cutting-edge processor technology and Neosys' innovative Cassette architecture to construct a truly reliable and versatile embedded controller. Its 3rd-Gen i7 Quad-core processor delivers tremendous boost of computing power as well as significant improvement of graphics performance. This platform also natively supports new features such as triple display outputs and USB 3.0.

Inheriting the heritage of proven Nuvo series, Nuvo-3000 is extremely reliable mechanically and allows -25 to 70°C operating temperature. Moreover, it comes with Neosys' patent Cassette design*. This unique expansion Cassette offers PCI/PCIe slot with minimal thermal interference between system and add-on card, so that your system can always operate in expected thermal condition. For users who need expanded storage capacity, Nuvo-3000TB series can accommodate one 2.5" and one 3.5" hard drives to support terabytes capacity.

I/O functions on Nuvo-3000 are versatile. Gigabit Ethernet, USB 3.0 and multiple display outputs are natively supported on Nuvo-3000. Its optional isolated digital I/O now supports Change-of-State interrupt to give more usability. We also introduce the function of intelligent ignition control to Nuvo-3000 to make it suitable for in-vehicle applications.

As the quad-core processor boosting performance, innovative Cassette increasing expandability, and ignition control bringing in-vehicle mobility, Nuvo-3000 is ready for arbitrary application requirements.



Nuvo-3000E/3000P



Nuvo-3000TB

* R.O.C. Patent No. M456527

1.2 Product Specification

1.2.1 Specification of Nuvo-3005E

System Core	
Processor	Supports the following CPU <ul style="list-style-type: none"> ● Intel® Core™ i7-3610QE (2.3/3.3 GHz, 6 MB cache) ● Intel® Core™ i5-3610ME (2.7/3.3 GHz, 3 MB cache) ● Intel® Celeron™ 1020E (2.2 GHz, 2 MB cache)
Chipset	Intel® HM76 Platform Controller Hub
Graphics	Integrated Intel® HD Graphics 4000 Controller
Memory	2x 204-pin SO-DIMM sockets, up to 16 GB DDR3 1333/1600 MHz SDRAM
I/O Interface	
Ethernet	5x Gigabit Ethernet ports by Intel® i210
Video Port	1x DB-15 connector for analog RGB, supporting 2048x1536 resolution 2x DVI connectors for HDMI/DVI outputs, supporting 1920x1200 resolution
USB	4x USB 3.0 ports and 4x USB 2.0 ports
Serial Port	2x software-programmable RS-232/422/485 (COM1 & COM2)
KB/MS	1x 6-pin mini-DIN connector for PS/2 keyboard/mouse
Audio	1x mic-in and 1x speaker-out
Storage Interface	
SATA HDD	1x Internal SATA port for 2.5" HDD/SSD installation
CFast	1x CFast socket
Expansion Bus	
Mini PCI-E	1x internal mini PCI Express socket with USIM socket 1x internal mini PCI Express socket
PCI Express	1x PCIe x16 slot @ 8-lanes PCIE signals in Cassette
Power Supply & Ignition Control	
DC Input	1x 4-pin power connector for 8~25V DC input (for AC adapter) 1x 3-pin pluggable terminal block for 8~25V DC input (for direct DC wiring)
Ignition Control	optional ignition power control with configurable on/off delay
Max. Power Consumption	With Core™ i7-3610QE: 72.96W (3.84A@19V) With Core™ i5-3610ME: 48.83W (2.57A@19V) With Celeron™ 1020E: 42.75W (2.25A@19V)
Remote Ctrl. & Status Output	1x 10-pin (2x5) wafer connector for remote on/off control and status LED output
Mechanical	



Dimension	240 mm (W) x 225 mm (D) x 88 mm (H)
Weight	4.4 Kg (including 2.5" HDD and DDR3 SODIMM)
Mounting	Wall-mounting (Standard) or DIN-Rail mounting (optional)
Environmental	
Operating Temperature	-25°C ~ 70°C **/** (with i5-3610ME & i3-3120ME) -25°C ~ 60°C **/** (with i7-3610QM)
Storage Temperature	-40°C ~85°C
Humidity	10%~90% , non-condensing
Vibration	Operating, 5 Grms, 5-500 Hz, 3 Axes (w/ SSD, according to IEC60068-2-64)
Shock	Operating, 50 Grms, Half-sine 11 ms Duration (w/ SSD, according to IEC60068-2-27)
EMC	CE/FCC Class A, according to EN 55022 & EN 55024

* Full-loading power consumption is measured with 16GB DDR3 memory and one 2.5" SATA SSD installed under the following conditions:

- 100% CPU package power
- Operating for all GbE ports

** The CPU loading for high-temperature test is applied using Intel® Thermal Analysis Tool. For detail testing criteria, please contact Neosys Technology

*** For sub-zero operating temperature, a wide temperature HDD drive or Solid State Disk (SSD) is required.

1.2.2 Specification of Nuvo-3005P

System Core	
Processor	Supports the following CPU <ul style="list-style-type: none"> ● Intel® Core™ i7-3610QE (2.3/3.3 GHz, 6 MB cache) ● Intel® Core™ i5-3610ME (2.7/3.3 GHz, 3 MB cache) ● Intel® Celeron™ 1020E (2.2 GHz, 2 MB cache)
Chipset	Intel® HM76 Platform Controller Hub
Graphics	Integrated Intel® HD Graphics 4000 Controller
Memory	2x 204-pin SO-DIMM sockets, up to 16 GB DDR3 1333/1600 MHz SDRAM
I/O Interface	
Ethernet	5x Gigabit Ethernet ports by Intel® i210
Video Port	1x DB-15 connector for analog RGB, supporting 2048x1536 resolution 2x DVI connectors for HDMI/DVI outputs, supporting 1920x1200 resolution
USB	4x USB 3.0 ports and 4x USB 2.0 ports
Serial Port	2x software-programmable RS-232/422/485 (COM1 & COM2)
KB/MS	1x 6-pin mini-DIN connector for PS/2 keyboard/mouse
Audio	1x mic-in and 1x speaker-out
Storage Interface	
SATA HDD	1x Internal SATA port for 2.5" HDD/SSD installation



	1x SATA port in Cassette for 3.5" HDD installation
CFAST	1x CFAST socket
Expansion Bus	
Mini PCI-E	1x internal mini PCI Express socket with USIM socket 1x internal mini PCI Express socket
PCI	1x PCI slot in Cassette
Power Supply & Ignition Control	
DC Input	1x 4-pin power connector for 8~25V DC input (for AC adapter) 1x 3-pin pluggable terminal block for 8~25V DC input (for direct DC wiring)
Ignition Control	optional ignition power control with configurable on/off delay
Max. Power Consumption	With Core™ i7-3610QE: 72.96W (3.84A@19V) With Core™ i5-3610ME: 48.83W (2.57A@19V) With Celeron™ 1020E: 42.75W (2.25A@19V)
Remote Ctrl. & Status Output	1x 10-pin (2x5) wafer connector for remote on/off control and status LED output
Mechanical	
Dimension	240 mm (W) x 225 mm (D) x 88 mm (H)
Weight	4.4 Kg (including 2.5" HDD and DDR3 SODIMM)
Mounting	Wall-mounting (Standard) or DIN-Rail mounting (optional)
Environmental	
Operating Temperature	-25°C ~ 70°C **/** (with i5-3610ME & i3-3120ME) -25°C ~ 60°C **/** (with i7-3610QM)
Storage Temperature	-40°C ~85°C
Humidity	10%~90% , non-condensing
Vibration	Operating, 5 Grms, 5-500 Hz, 3 Axes (w/ SSD, according to IEC60068-2-64)
Shock	Operating, 50 Grms, Half-sine 11 ms Duration (w/ SSD, according to IEC60068-2-27)
EMC	CE/FCC Class A, according to EN 55022 & EN 55024

* Full-loading power consumption is measured with 16GB DDR3 memory and one 2.5" SATA SSD installed under the following conditions:

- 100% CPU package power
- Operating for all GbE ports

** The CPU loading for high-temperature test is applied using Intel® Thermal Analysis Tool. For detail testing criteria, please contact Neosys Technology

*** For sub-zero operating temperature, a wide temperature HDD drive or Solid State Disk (SSD) is required.



1.2.3 Specification of Nuvo-3003E

System Core	
Processor	Supports the following CPU <ul style="list-style-type: none"> ● Intel® Core™ i7-3610QE (2.3/3.3 GHz, 6 MB cache) ● Intel® Core™ i5-3610ME (2.7/3.3 GHz, 3 MB cache) ● Intel® Celeron™ 1020E (2.2 GHz, 2 MB cache)
Chipset	Intel® HM76 Platform Controller Hub
Graphics	Integrated Intel® HD Graphics 4000 Controller
Memory	2x 204-pin SO-DIMM sockets, up to 16 GB DDR3 1333/1600 MHz SDRAM
I/O Interface	
Ethernet	3x Gigabit Ethernet ports by Intel® i210
Video Port	1x DB-15 connector for analog RGB, supporting 2048x1536 resolution 2x DVI connectors for HDMI/DVI outputs, supporting 1920x1200 resolution
USB	4x USB 3.0 ports and 4x USB 2.0 ports
Serial Port	2x software-programmable RS-232/422/485 (COM1 & COM2)
KB/MS	1x 6-pin mini-DIN connector for PS/2 keyboard/mouse
Audio	1x mic-in and 1x speaker-out
Storage Interface	
SATA HDD	1x Internal SATA port for 2.5" HDD/SSD installation
CFast	1x CFast socket
Expansion Bus	
Mini PCI-E	1x internal mini PCI Express socket with USIM socket 1x internal mini PCI Express socket
PCI Express	1x PCIe x16 slot @ 8-lanes PCIE signals in Cassette
Power Supply & Ignition Control	
DC Input	1x 4-pin power connector for 8~25V DC input (for AC adapter) 1x 3-pin pluggable terminal block for 8~25V DC input (for direct DC wiring)
Ignition Control	optional ignition power control with configurable on/off delay
Max. Power Consumption	With Core™ i7-3610QE: 71.80W (3.78A@19V) With Core™ i5-3610ME: 47.73W (2.51A@19V) With Celeron™ 1020E: 41.65W (2.19A@19V)
Remote Ctrl. & Status Output	1x 10-pin (2x5) wafer connector for remote on/off control and status LED output
Mechanical	
Dimension	240 mm (W) x 225 mm (D) x 88 mm (H)
Weight	4.4 Kg (including 2.5" HDD and DDR3 SODIMM)
Mounting	Wall-mounting (Standard) or DIN-Rail mounting (optional)



Environmental	
Operating Temperature	-25°C ~ 70°C **/** (with i5-3610ME & i3-3120ME) -25°C ~ 60°C **/** (with i7-3610QM)
Storage Temperature	-40°C ~85°C
Humidity	10%~90% , non-condensing
Vibration	Operating, 5 Grms, 5-500 Hz, 3 Axes (w/ SSD, according to IEC60068-2-64)
Shock	Operating, 50 Grms, Half-sine 11 ms Duration (w/ SSD, according to IEC60068-2-27)
EMC	CE/FCC Class A, according to EN 55022 & EN 55024

* Full-loading power consumption is measured with 16GB DDR3 memory and one 2.5" SATA SSD installed under the following conditions:

- 100% CPU package power
- Operating for all GbE ports

** The CPU loading for high-temperature test is applied using Intel® Thermal Analysis Tool. For detail testing criteria, please contact Neosys Technology

*** For sub-zero operating temperature, a wide temperature HDD drive or Solid State Disk (SSD) is required.

1.2.4 Specification of Nuvo-3003P

System Core	
Processor	Supports the following CPU <ul style="list-style-type: none"> ● Intel® Core™ i7-3610QE (2.3/3.3 GHz, 6 MB cache) ● Intel® Core™ i5-3610ME (2.7/3.3 GHz, 3 MB cache) ● Intel® Celeron™ 1020E (2.2 GHz, 2 MB cache)
Chipset	Intel® HM76 Platform Controller Hub
Graphics	Integrated Intel® HD Graphics 4000 Controller
Memory	2x 204-pin SO-DIMM sockets, up to 16 GB DDR3 1333/1600 MHz SDRAM
I/O Interface	
Ethernet	3x Gigabit Ethernet ports by Intel® i210
Video Port	1x DB-15 connector for analog RGB, supporting 2048x1536 resolution 2x DVI connectors for HDMI/DVI outputs, supporting 1920x1200 resolution
USB	4x USB 3.0 ports and 4x USB 2.0 ports
Serial Port	2x software-programmable RS-232/422/485 (COM1 & COM2)
KB/MS	1x 6-pin mini-DIN connector for PS/2 keyboard/mouse
Audio	1x mic-in and 1x speaker-out
Storage Interface	
SATA HDD	1x Internal SATA port for 2.5" HDD/SSD installation 1x SATA port in Cassette for 3.5" HDD installation
CFast	1x CFast socket
Expansion Bus	



Mini PCI-E	1x internal mini PCI Express socket with USIM socket 1x internal mini PCI Express socket
PCI	1x PCI slot in Cassette
Power Supply & Ignition Control	
DC Input	1x 4-pin power connector for 8~25V DC input (for AC adapter) 1x 3-pin pluggable terminal block for 8~25V DC input (for direct DC wiring)
Ignition Control	optional ignition power control with configurable on/off delay
Max. Power Consumption	With Core™ i7-3610QE: 71.80W (3.78A@19V) With Core™ i5-3610ME: 47.73W (2.51A@19V) With Celeron™ 1020E: 41.65W (2.19A@19V)
Remote Ctrl. & Status Output	1x 10-pin (2x5) wafer connector for remote on/off control and status LED output
Mechanical	
Dimension	240 mm (W) x 225 mm (D) x 88 mm (H)
Weight	4.4 Kg (including 2.5" HDD and DDR3 SODIMM)
Mounting	Wall-mounting (Standard) or DIN-Rail mounting (optional)
Environmental	
Operating Temperature	-25°C ~ 70°C **/** (with i5-3610ME & i3-3120ME) -25°C ~ 60°C **/** (with i7-3610QM)
Storage Temperature	-40°C ~85°C
Humidity	10%~90% , non-condensing
Vibration	Operating, 5 Grms, 5-500 Hz, 3 Axes (w/ SSD, according to IEC60068-2-64)
Shock	Operating, 50 Grms, Half-sine 11 ms Duration (w/ SSD, according to IEC60068-2-27)
EMC	CE/FCC Class A, according to EN 55022 & EN 55024

* Full-loading power consumption is measured with 16GB DDR3 memory and one 2.5" SATA SSD installed under the following conditions:

- 100% CPU package power
- Operating for all GbE ports

** The CPU loading for high-temperature test is applied using Intel® Thermal Analysis Tool. For detail testing criteria, please contact Neosys Technology

*** For sub-zero operating temperature, a wide temperature HDD drive or Solid State Disk (SSD) is required.



1.2.5 Specification of Nuvo-3005TB

System Core	
Processor	Supports the following CPU <ul style="list-style-type: none"> ● Intel® Core™ i7-3610QE (2.3/3.3 GHz, 6 MB cache) ● Intel® Core™ i5-3610ME (2.7/3.3 GHz, 3 MB cache) ● Intel® Celeron™ 1020E (2.2 GHz, 2 MB cache)
Chipset	Intel® HM76 Platform Controller Hub
Graphics	Integrated Intel® HD Graphics 4000 Controller
Memory	2x 204-pin SO-DIMM sockets, up to 16 GB DDR3 1333/1600 MHz SDRAM
I/O Interface	
Ethernet	5x Gigabit Ethernet ports by Intel® i210
Video Port	1x DB-15 connector for analog RGB, supporting 2048x1536 resolution 2x DVI connectors for HDMI/DVI outputs, supporting 1920x1200 resolution
USB	4x USB 3.0 ports and 4x USB 2.0 ports
Serial Port	2x software-programmable RS-232/422/485 (COM1 & COM2)
KB/MS	1x 6-pin mini-DIN connector for PS/2 keyboard/mouse
Audio	1x mic-in and 1x speaker-out
Storage Interface	
SATA HDD	1x Internal SATA port for 2.5" HDD/SSD installation 1x Internal SATA port for 3.5" HDD installation
CFast	1x CFast socket
Expansion Bus	
Mini PCI-E	1x internal mini PCI Express socket with USIM socket 1x internal mini PCI Express socket
Power Supply & Ignition Control	
DC Input	1x 4-pin power connector for 8~25V DC input (for AC adapter) 1x 3-pin pluggable terminal block for 8~25V DC input (for direct DC wiring)
Ignition Control	optional ignition power control with configurable on/off delay
Max. Power Consumption	With Core™ i7-3610QE: 72.96W (3.84A@19V) With Core™ i5-3610ME: 48.83W (2.57A@19V) With Celeron™ 1020E: 42.75W (2.25A@19V)
Remote Ctrl. & Status Output	1x 10-pin (2x5) wafer connector for remote on/off control and status LED output
Mechanical	
Dimension	240 mm (W) x 225 mm (D) x 85.5 mm (H)
Weight	4.2 Kg (including 2.5" HDD and DDR3 SODIMM)
Mounting	Wall-mounting (Standard) or DIN-Rail mounting (optional)



Environmental	
Operating Temperature	-25°C ~ 70°C **/** (with i5-3610ME & i3-3120ME) -25°C ~ 60°C **/** (with i7-3610QM)
Storage Temperature	-40°C ~85°C
Humidity	10%~90% , non-condensing
Vibration	Operating, 5 Grms, 5-500 Hz, 3 Axes (w/ SSD, according to IEC60068-2-64)
Shock	Operating, 50 Grms, Half-sine 11 ms Duration (w/ SSD, according to IEC60068-2-27)
EMC	CE/FCC Class A, according to EN 55022 & EN 55024

* Full-loading power consumption is measured with 16GB DDR3 memory and one 2.5" SATA SSD installed under the following conditions:

- 100% CPU package power
- Operating for all GbE ports

** The CPU loading for high-temperature test is applied using Intel® Thermal Analysis Tool. For detail testing criteria, please contact Neosys Technology

*** For sub-zero operating temperature, a wide temperature HDD drive or Solid State Disk (SSD) is required.

1.2.6 Specification of Nuvo-3003TB

System Core	
Processor	Supports the following CPU <ul style="list-style-type: none"> ● Intel® Core™ i7-3610QE (2.3/3.3 GHz, 6 MB cache) ● Intel® Core™ i5-3610ME (2.7/3.3 GHz, 3 MB cache) ● Intel® Celeron™ 1020E (2.2 GHz, 2 MB cache)
Chipset	Intel® HM76 Platform Controller Hub
Graphics	Integrated Intel® HD Graphics 4000 Controller
Memory	2x 204-pin SO-DIMM sockets, up to 16 GB DDR3 1333/1600 MHz SDRAM
I/O Interface	
Ethernet	3x Gigabit Ethernet ports by Intel® i210
Video Port	1x DB-15 connector for analog RGB, supporting 2048x1536 resolution 2x DVI connectors for HDMI/DVI outputs, supporting 1920x1200 resolution
USB	4x USB 3.0 ports and 4x USB 2.0 ports
Serial Port	2x software-programmable RS-232/422/485 (COM1 & COM2)
KB/MS	1x 6-pin mini-DIN connector for PS/2 keyboard/mouse
Audio	1x mic-in and 1x speaker-out
Storage Interface	
SATA HDD	1x Internal SATA port for 2.5" HDD/SSD installation 1x Internal SATA port for 3.5" HDD installation
CFast	1x CFast socket
Expansion Bus	



Mini PCI-E	1x internal mini PCI Express socket with USIM socket 1x internal mini PCI Express socket
Power Supply & Ignition Control	
DC Input	1x 4-pin power connector for 8~25V DC input (for AC adapter) 1x 3-pin pluggable terminal block for 8~25V DC input (for direct DC wiring)
Ignition Control	optional ignition power control with configurable on/off delay
Max. Power Consumption	With Core™ i7-3610QE: 71.80W (3.78A@19V) With Core™ i5-3610ME: 47.73W (2.51A@19V) With Celeron™ 1020E: 41.65W (2.19A@19V)
Remote Ctrl. & Status Output	1x 10-pin (2x5) wafer connector for remote on/off control and status LED output
Mechanical	
Dimension	240 mm (W) x 225 mm (D) x 85.5 mm (H)
Weight	4.2 Kg (including 2.5" HDD and DDR3 SODIMM)
Mounting	Wall-mounting (Standard) or DIN-Rail mounting (optional)
Environmental	
Operating Temperature	-25°C ~ 70°C **/** (with i5-3610ME & i3-3120ME) -25°C ~ 60°C **/** (with i7-3610QM)
Storage Temperature	-40°C ~85°C
Humidity	10%~90% , non-condensing
Vibration	Operating, 5 Grms, 5-500 Hz, 3 Axes (w/ SSD, according to IEC60068-2-64)
Shock	Operating, 50 Grms, Half-sine 11 ms Duration (w/ SSD, according to IEC60068-2-27)
EMC	CE/FCC Class A, according to EN 55022 & EN 55024

* Full-loading power consumption is measured with 16GB DDR3 memory and one 2.5" SATA SSD installed under the following conditions:

- 100% CPU package power
- Operating for all GbE ports

** The CPU loading for high-temperature test is applied using Intel® Thermal Analysis Tool. For detail testing criteria, please contact Neosys Technology

*** For sub-zero operating temperature, a wide temperature HDD drive or Solid State Disk (SSD) is required.



1.2.7 Specification of Optional Isolated DIO

Isolated Digital Input	
No. of Channel	8-CH Isolated Digital Input Channels
Logic Level	Logic High: 5 to 24V Logic Low: 0 to 1.5V
Isolated Voltage	2500 Vrms
Input Resistance	4.7k Ω
Operation Mode	Polling I/O, Change-of-State Interrupt
Isolated Digital Output	
No. of Channel	8-CH Isolated Digital Output Channels
Sink Current (per channel)	100 mA (sustained loading) 250 mA (peak loading)
Isolated Voltage	2500 Vrms
Operation Mode	Polling, Change-of-State Interrupt
Output Type	Power MOSFET + Analog Device iCoupler®
Operation Mode	Polling I/O

1.3 Supported CPU List

Nuvo-3000 series accepts a PGA-type Intel® 3rd-Gen i7/i5/3 processor via the rPGA988 CPU socket. In addition to i7-3610QE, i5-3610ME and Celeron 1020E, you may also select other processor listed below according to your consideration of cost and performance.

- Intel® Core™ i7-3840QM Processor (8M Cache, up to 3.80 GHz)
- Intel® Core™ i7-3820QM Processor (8M Cache, up to 3.70 GHz)
- Intel® Core™ i7-3740QM Processor (6M Cache, up to 3.70 GHz)
- Intel® Core™ i7-3720QM Processor (6M Cache, up to 3.60 GHz)
- Intel® Core™ i7-3630QM Processor (6M Cache, up to 3.40 GHz)
- Intel® Core™ i7-3612QM Processor (6M Cache, up to 3.10 GHz)
- Intel® Core™ i7-3610QM Processor (6M Cache, up to 3.30 GHz)
- Intel® Core™ i7-3610QM Processor (6M Cache, up to 3.30 GHz)
- **Intel® Core™ i7-3610QE Processor (6M Cache, up to 3.30 GHz) ***
- Intel® Core™ i7-3540M Processor (4M Cache, up to 3.70 GHz)
- Intel® Core™ i7-3520M Processor (4M Cache, up to 3.60 GHz)
- **Intel® Core™ i5-3610ME Processor (3M Cache, up to 3.30 GHz) ***
- Intel® Core™ i5-3380M Processor (3M Cache, up to 3.60 GHz)
- Intel® Core™ i5-3360M Processor (3M Cache, up to 3.50 GHz)
- Intel® Core™ i5-3340M Processor (3M Cache, up to 3.40 GHz)
- Intel® Core™ i5-3320M Processor (3M Cache, up to 3.30 GHz)
- Intel® Core™ i5-3230M Processor (3M Cache, up to 3.20 GHz)
- Intel® Core™ i5-3210M Processor (3M Cache, up to 3.10 GHz)
- **Intel® Core™ i3-3120ME Processor (3M Cache, 2.40 GHz) ***
- Intel® Core™ i3-3120M Processor (3M Cache, 2.50 GHz)
- Intel® Core™ i3-3110M Processor (3M Cache, 2.40 GHz)
- Intel® Celeron® Processor 1020M (2M Cache, 2.10 GHz)
- **Intel® Celeron® Processor 1020E (2M Cache, 2.20 GHz) ***
- Intel® Celeron® Processor 1000M (2M Cache, 1.80 GHz)

*The processors with * are listed in Intel® Embedded Roadmap and with a 7-year life cycle support (2013~2019).*



Chapter 2 Getting to know your Nuvo-3000

2.1 Unpacking your Nuvo-3000

When you receive the package of Nuvo-3000 series, please check immediately if the package contains all the items listed in the following table. If any item is missing or damaged, please contact your local dealer or Neusys Technology Inc. for further assistance.

For Nuvo-3005E/3005P/3003E/3003P

Item	Description	Qty
1	Nuvo-3005E/3005P/3003E/3003P fanless controller (According to the configuration you order, CPU/DDR3/HDD may be included. Please verify these items if necessary.)	1
2	Accessory box, which contains <ul style="list-style-type: none"> ● Neusys Drivers & Utilities DVD ● Wall-mounting bracket ● M4 screws for wall-mounting bracket ● Foot pad ● 3-pin pluggable terminal block ● HDD thermal pad for 2.5" HDD/SSD (if HDD is not installed) 	1 2 4 4 1 1

For Nuvo-3005TB/3003TB

Item	Description	Qty
1	Nuvo-3005TB/3003TB fanless controller (According to the configuration you order, CPU/DDR3/HDD may be included. Please verify these items if necessary.)	1
2	Accessory box, which contains <ul style="list-style-type: none"> ● Neusys Drivers & Utilities DVD ● 3.5" HDD bracket ● 3.5" HDD thermal insulation mylar ● #6-32 Screws for 3.5" HDD ● M3 step screws ● Wall-mounting bracket 	1 2 1 4 4 2



● M4 screws for wall-mounting bracket	4
● Foot pad	4
● 3-pin pluggable terminal block	1
● HDD thermal pads for 2.5" HDD/SSD and 3.5" HDD (if HDD is not installed)	3



2.2 Front Panel I/O Functions

On Nuvo-3000, plenty of I/O functions are provided on front panel and back panel so you can easily access them. Most common computer I/O functions are placed on the front panel. In this section, we'll illustrate each I/O function on the front panel.

2.2.1 Power Button



The power button is a non-latched switch with LED for ATX mode on/off operation. To turn on the Nuvo-3000, press the power button and the blue LED is lighted up. To turn off the Nuvo-3000, you can either issue a shutdown command in OS, or just simply press the power button. In case of system halts, you can press and hold the power button for 5 seconds to compulsorily shut down the system. Please note that a 5 seconds interval is kept by the system between two on/off operations (i.e. once turning off the system, you shall wait for 5 seconds to initiate another power-on operation).

2.2.2 Reset Button



The reset button is used to manually reset the system in case of any abnormal condition. To avoid unexpected operation, the reset button is hidden behind the front panel. You need to use a pin-like object to push the reset button.

2.2.3 LED Indicators



There are three LED indicators on the front panel: HDD, WDT and a non-marked LED (reserved for future usage). The descriptions of these three LED are listed in the following table.

Indicator	Color	Description
HDD	Red	Hard drive indicator, flashing when SATA hard drive is active.
WDT	Yellow	Watchdog timer indicator, flashing when watchdog timer is started.
AUX/IGN	Green	Use for auxiliary function. If ignition option is applied, this LED is used to indicate ignition signal status.

2.2.4 CFast Socket



Nuvo-3000 provides a CFast socket on the front panel. CFast is a new interface for portable storage device. It shares a similar form-factor as CompactFlash but leverages Serial ATA interface to offer higher data transfer rate. The CFast socket on Nuvo-3000 is a push-push type. You can insert and push a CFast card to the end to install it, and push the installed CFast card again to eject it.

2.2.5 PS/2 Keyboard and Mouse Connectors



Support of legacy PS/2 keyboard and mouse on Nuvo-3000 is implemented using industrial-grade ITE8783 Super IO chip (-40 to 85°C). There is one 6-pin Mini-DIN connector on the front panel to provide PS/2 KB/MS signals. You shall need to use a Y-cable to connect PS/2 keyboard and mouse at the same time.

2.2.6 Gigabit Ethernet Port



Nuvo-3000 controller offers 5 GbE ports (Nuvo-3005) or 3 GbE ports (Nuvo-3003) using Intel® I210 Gigabit Ethernet controllers. Each port has one dedicated GbE controller and one dedicated PCI Express link to present maximal network performance. One of these GbE ports is located on the front panel and it support Wake-on-LAN function (please refer to section 3.7.3 for detail). When plugging in the Ethernet cable, you can tell the Ethernet status and speed from the LED indicators on the RJ45 connector as following:

Active/Link LED

LED Color	Status	Description
Yellow	Off	Ethernet port is disconnected
	On	Ethernet port is connected and no data transmission
	Flashing	Ethernet port is connected and data is transmitting/receiving

Speed LED

LED Color	Status	Description
Green or Orange	Off	10 Mbps
	Green	100 Mbps
	Orange	1000 Mbps

To utilize the GbE port in Windows, you need to install corresponding driver for Intel® I210 GbE controller. Please refer to section 4.3.2 for information of driver installation.



2.2.7 VGA Connector

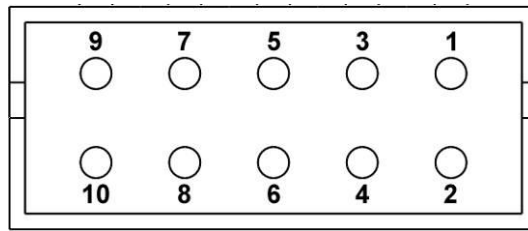


Nuvo-3000 has multiple display outputs on its front panel for connecting different displays according to your system configuration. VGA connector is the most popular way for connecting a display. The VGA output of Nuvo-3000 supports up to 2048 x 1536 resolution. By BIOS default and hardware implementation, the VGA output is always enabled in any case. To achieve best VGA output resolution in Windows, you need to install corresponding graphics driver. Please refer to section 4.3.2 for information of driver installation.

2.2.8 Remote On/Off Control and Status LED Output



For an application which places Nuvo-3000 inside a cabinet, it's useful to control the on/off of the system via an external switch, as well as check how the system's running via some external LED indicators. Nuvo-3000 provides a 2x5, 2.0mm pitch wafer connector on the front panel for this purpose.



Pin#	Definition	Description
1	Ctrl+	[Input] Remote on/off control, connecting to an external switch to turn on/off the system (polarity is negligible).
2	Ctrl-	
3	Power+	[Output] System power indicator, on if system is turned on, off if system is turned off.
4	Power-	
5	HDD+	[Output] Hard drive indicator, flashing when SATA hard drive is active.
6	HDD-	
7	IGN+	[Output] Ignition signal indicator, on when ignition signal is supplied.
8	IGN-	
9	WDT+	[Output] Watchdog timer indicator, flashing when watchdog timer is started.
10	WDT-	

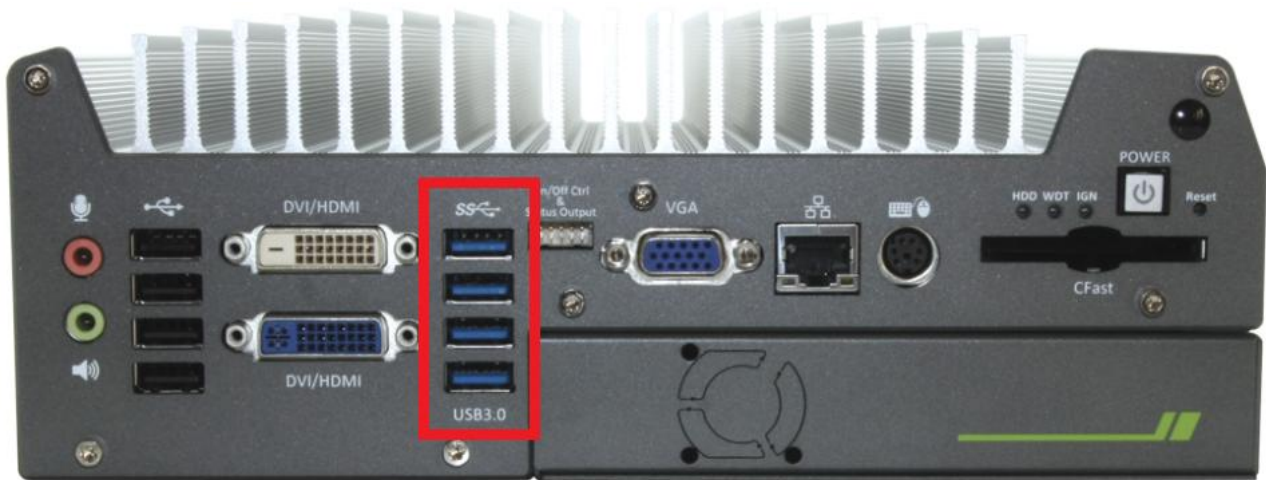
Note

Please make sure the polarity is correct when you connect the external LED indicator to the Status LED Output.

Pin#1 and pin#2 are used to turn on or turn off the system remotely by connecting to an external switch. Users should connect a non-latched switch to Ctrl+/Ctrl- as it acts exactly the same as the power button on the front panel. For detail information of using remote on/off control function, please refer to section 3.7.2.

Pin#3 to pin#10 are used to output the system status including power, HDD, ignition signal and watchdog timer status. The status LED output has a built-in series-resistor and provides 3.3V, 10mA current, which means you can use these pins to directly drive an external LED indicator.

2.2.9 USB 3.0 Connectors



Nuvo-3000 offers four USB 3.0 (SuperSpeed USB) ports on its front panel. By BIOS default, these USB ports are operated in xHCI (eXtensible Host Controller Interface) mode and are compatible with USB 3.0, USB 2.0, USB 1.1 and USB 1.0 devices. Legacy USB support is also provided so you can use USB keyboard/mouse in DOS environment. To use USB 3.0 ports in Windows 7, you need to install USB 3.0 driver. Please refer to section 4.3.2 for information of driver installation.

Note

1. *Intel USB 3.0 driver does not support Windows XP. In Windows XP, all USB 3.0 ports will work in USB 2.0 mode.*

2.2.10 DVI/HDMI Connectors



Nuvo-3000 has multiple display outputs on its front panel for connecting different displays according to your system configuration. DVI/HDMI transmits graphics data in digital format and therefore can deliver better image quality at high resolution. Two DVI/HDMI connectors on the front panel can either output DVI signals or HDMI signal depending on the display device connected. They support up to 1920x1200 resolution. You shall need a DVI to HDMI cable when connecting to a HDMI display device.



To achieve best DVI/HDMI output resolution in Windows, you need to install corresponding graphics driver. Please refer to section 4.3.2 for information of driver installation.

2.2.11 USB 2.0 Connectors



In addition to four USB 3.0 ports, Nuvo-3000 provides another four USB 2.0 ports on the front panel. By BIOS default, these USB 2.0 ports are operated in EHCI (Enhanced Host Control Interface) mode and are compatible with USB 2.0, USB 1.1 and USB 1.0 devices. Legacy USB support is provided so you can use USB keyboard/mouse in DOS environment.

2.2.12 Speaker-out and MIC-in Audio Jacks



Nuvo-3000 provides audio function using Intel® High Definition Audio (built-in in HM76 PCH) and Realtek ALC262 codec. There are two audio jacks on the front panel. The pink one is used for microphone input, and the green one is used for speaker output. To utilize the audio function in Windows, you need to install corresponding drivers for both Intel® HM76 PCH chipset and Realtek ALC262 codec. Please refer to section 4.3.2 for information of driver installation.

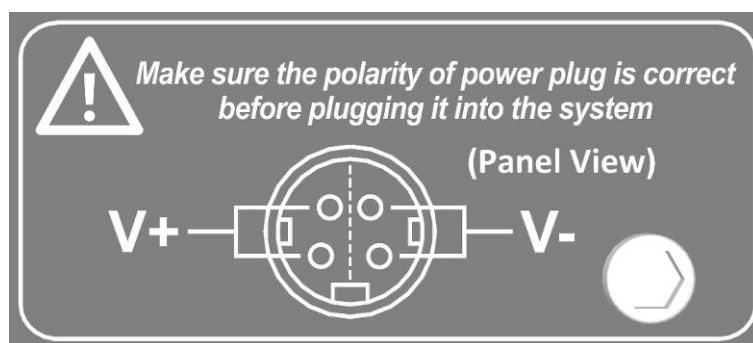
2.3 Back Panel I/O Functions

To fit more general application requirements, Nuvo-3000 offers more I/O functions on its back panel. In this section, we'll illustrate each I/O function on the back panel.

2.3.1 4-Pin Mini-DIN Power Connector



Nuvo-3000 allows a wide range of DC power input from 8 to 25V. It offers two ways for connecting DC power: a 4-pin mini-DIN power connector or a 3-pin pluggable terminal block. The 4-pin mini-DIN power connector is used to connect the power plug of an AC/DC adapter. It's convenient for indoor usage where AC power is usually available. Since there is no specific rule of pin definition for this type of connector, please always confirm the polarity of the power connector in prior to plug it into Nuvo-3000 if you're not using the power adapter provided by Neosys.



Caution

1. Please make sure the voltage of DC power is correct before you connect it to Nuvo-3000. Supplying a voltage over 25V will damage the system.
2. You should use either 4-pin mini-DIN power connector or 3-pin pluggable terminal block for DC power input. **DO NOT** supply power to both connectors at the same time.

2.3.2 3-Pin Terminal Block for DC Input & Ignition Input



Nuvo-3000 allows a wide range of DC power input from 8 to 25V. It offers two ways for connecting DC power: a 4-pin mini-DIN power connector or a 3-pin pluggable terminal block. The 3-pin pluggable terminal block is fit for field usage where DC power is usually provided. And the screw clamping connection of terminal block gives a very reliable way of wiring the DC power. For detail information of supplying DC power via pluggable terminal block, please refer to section 3.6.2.

In addition to DC power input, this terminal block is also used for ignition signal input if the option of ignition power control is applied. For detail information of ignition power control, please refer to section 3.8.

Caution

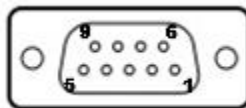
1. Please make sure the voltage of DC power is correct before you connect it to Nuvo-3000. Supplying a voltage over 25V will damage the system.
2. You should use either 4-pin mini-DIN power connector or 3-pin pluggable terminal block for DC power input. **DO NOT** supply power to both connectors at the same time.

2.3.3 COM Ports (COM1 & COM2)



Nuvo-3000 provides two COM ports on the back panel for communicating with external devices. COM1 and COM2 are located on the back panel via 9-pin D-Sub male connectors. They are implemented using industrial-grade ITE8783 Super IO chip (-40 to 85°C) and provide up to 115200 bps baud rate.

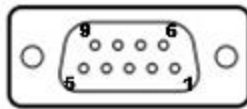
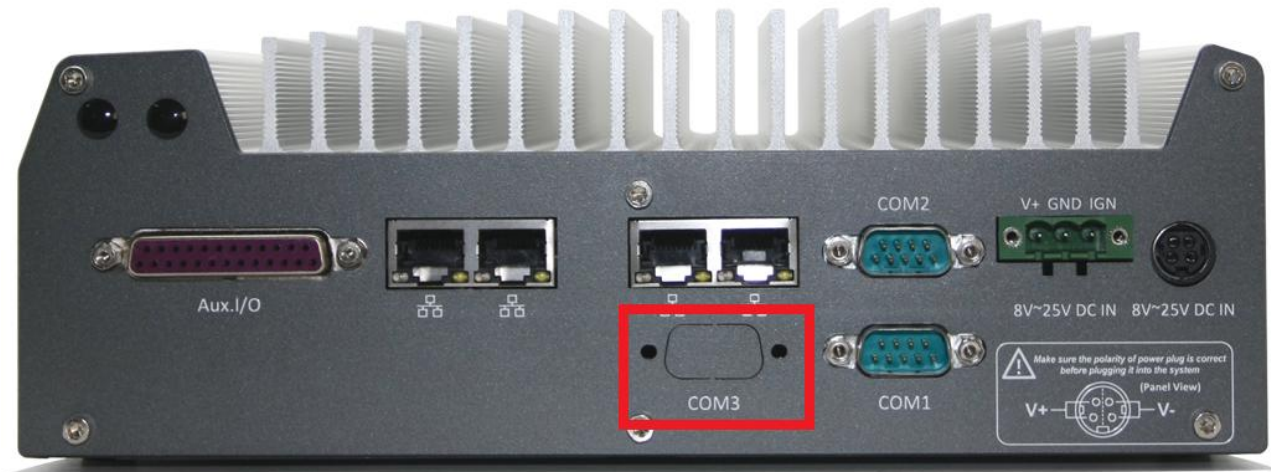
Both COM1 and COM2 support software-selectable RS-232/422/485 mode. The operation mode of COM1/COM2 can be set in BIOS setup utility (refer to section 4.1.1 for detail). The following table describes the pin definition of COM ports.



Pin#	RS-232 Mode	RS-422 Mode	RS-485 Mode (Two-wire 485)
1	DCD		
2	RX	422 TXD+	485 TXD+/RXD+
3	TX	422 RXD+	
4	DTR	422 RXD-	
5	GND	GND	GND
6	DSR		
7	RTS		
8	CTS	422 TXD-	485 TXD-/RXD-
9	RI		

For Nuvo-3000TB series, one additional RS-232 port (COM3) is provided via an internal box header. For users who need the 3rd COM port, Neusys offers a cable kit to connect the internal connector and expose a 9-pin D-Sub connector on the back panel.





Pin#	RS-232 Mode
1	DCD
2	RX
3	TX
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI

2.3.4 Gigabit Ethernet Ports



Nuvo-3000 controller offers 5 GbE ports (Nuvo-3005) or 3 GbE ports (Nuvo-3003) using Intel® I210 Gigabit Ethernet controllers. Each port has one dedicated GbE controller and one dedicated PCI Express link to present maximal network performance. One of these GbE ports is located on the front panel and the rest GbE ports are located on the back panel. When plugging in the Ethernet cable, you can tell the Ethernet status and speed from the LED indicators on the RJ45 connector as following:

Active/Link LED

LED Color	Status	Description
Yellow	Off	Ethernet port is disconnected
	On	Ethernet port is connected and no data transmission
	Flashing	Ethernet port is connected and data is transmitting/receiving

Speed LED

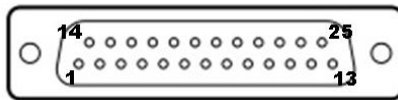
LED Color	Status	Description
Green or Orange	Off	10 Mbps
	Green	100 Mbps
	Orange	1000 Mbps

To utilize the GbE port in Windows, you need to install corresponding driver for Intel® I210 GbE controller. Please refer to section 4.3.2 for information of driver installation.

2.3.5 Auxiliary I/O



The auxiliary I/O connector on the back panel is used for optional digital I/O function. Nuvo-3000 provides the option of 8x isolated digital input channels and 8x isolated digital output channels. The optional DIO function on Nuvo-3000 supports polling mode I/O access and DI Change-of-State interrupt. Please refer to **Appendix A Using Watchdog Timer & Isolated DIO** for information about wiring and programming the isolated DIO channels.

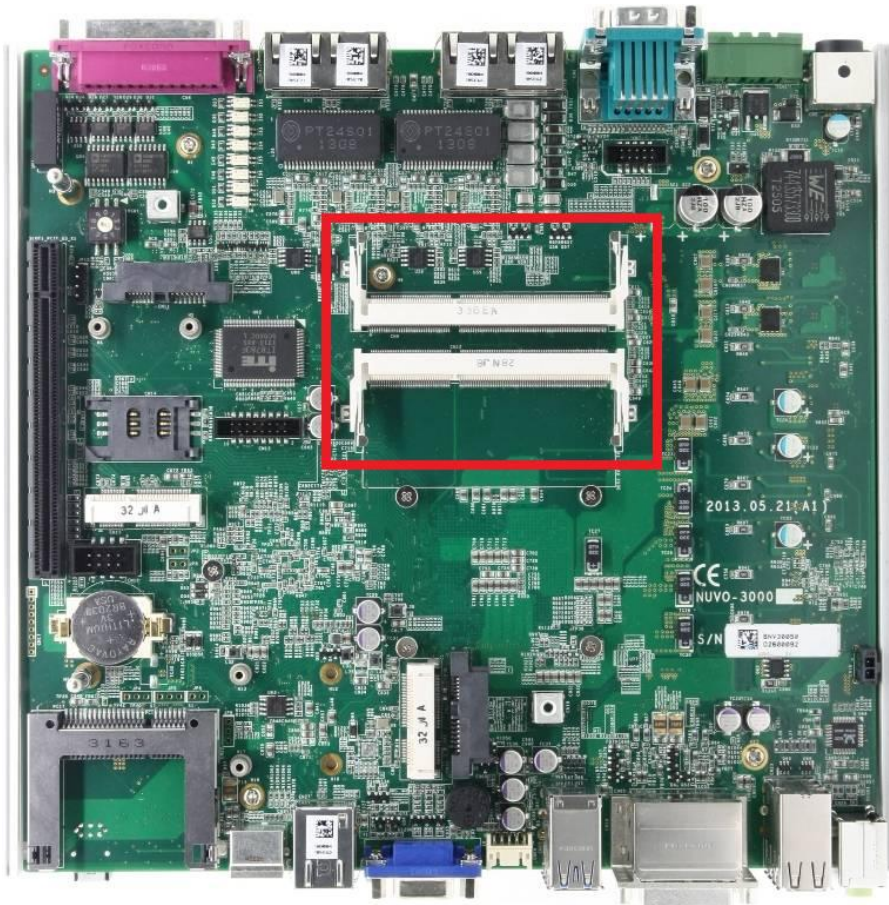


Pin#	Pin Definition	Pin#	Pin Definition
1	VDD	14	ISO_5V
2	DO_0	15	DO_GND
3	DO_3	16	DO_1
4	DO_GND	17	DO_2
5	DO_5	18	DO_4
6	DO_7	19	DO_6
7	DI_GND	20	DO_GND
8	DI_6	21	DI_GND
9	DI_1	22	DI_5
10	DI_GND	23	DI_3
11	DI_0	24	DI_7
12	DI_2	25	DI_GND
13	DI_4		

2.4 Internal I/O Functions

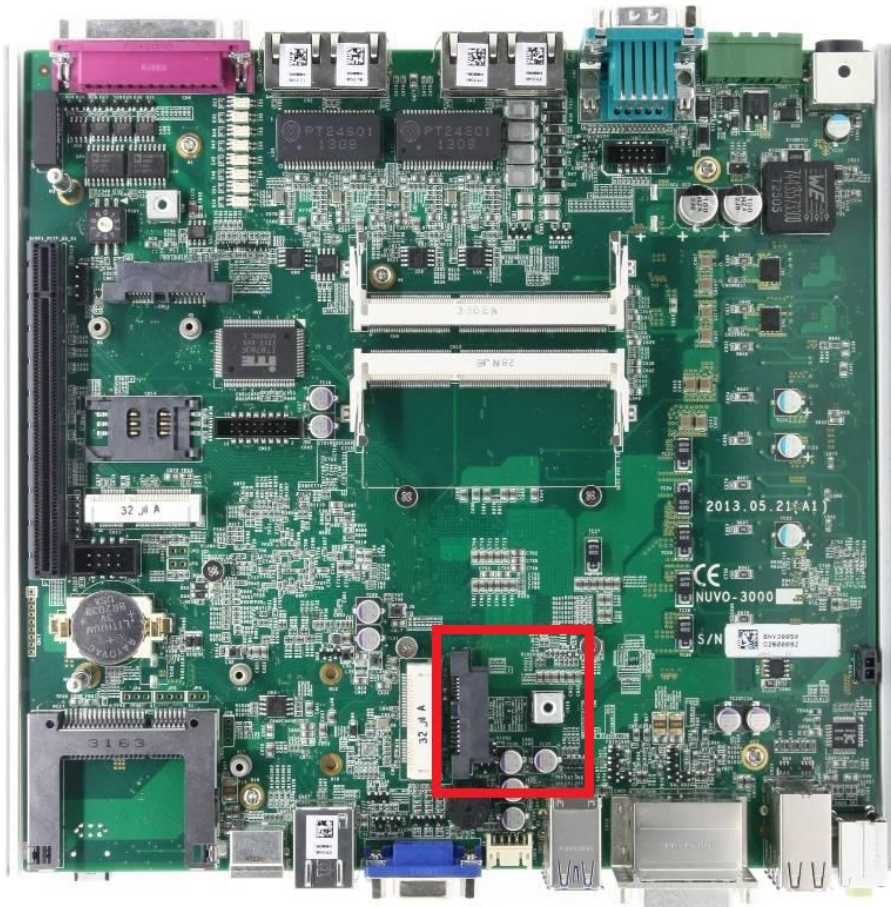
In addition to I/O connectors on the front/back panel, Nuvo-3000 provides other useful features via its on-board connectors, such as SATA ports, mini-PCIe sockets, internal USB ports, optional COM ports and etc. In this section, we'll illustrate these internal I/O functions.

2.4.1 DDR3 SODIMM Sockets



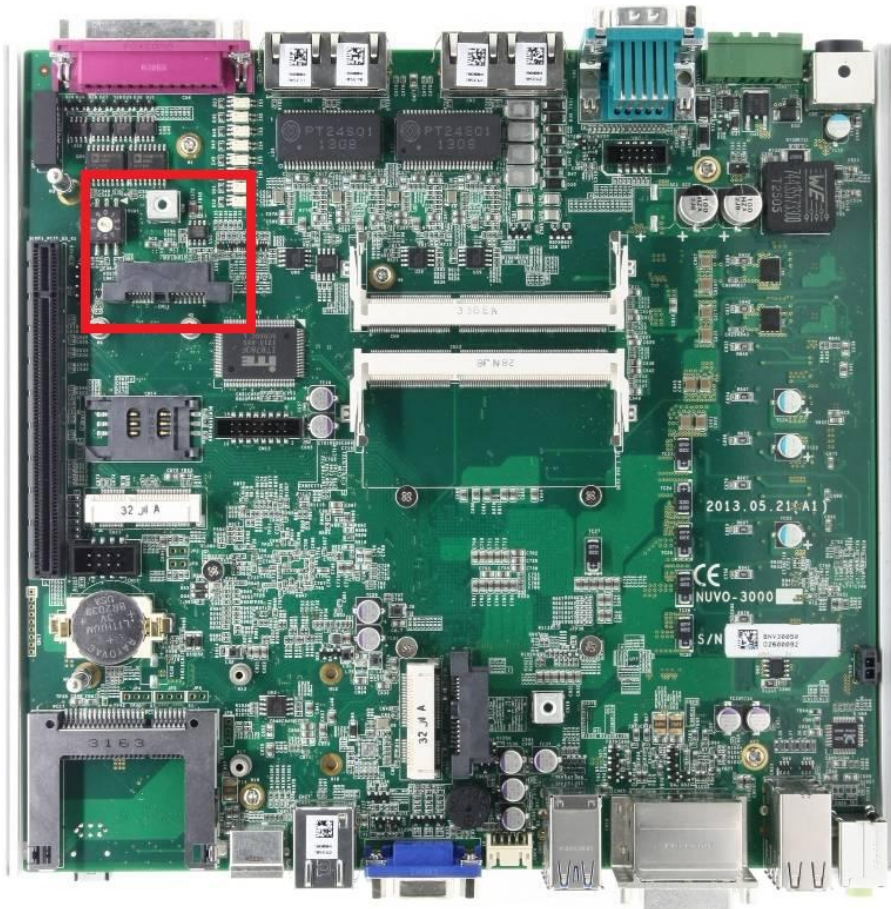
Nuvo-3000 provides two 204-pin, SODIMM sockets for installing DDR3 memory modules. It supports a maximal 16GB capacity by installing two 8GB DDR3 1600MHz SODIMM modules. For information of installing DDR3 memory modules, please refer to section 3.1 for detail.

2.4.2 Internal SATA#1 Port



Nuvo-3000 provides two internal SATA ports to accommodate SATA hard drives. According to mechanical design, Nuvo-3000E/3000P can accommodate one 2.5" HDD/SDD and Nuvo-3000TB can accommodate one 2.5" HDD/SDD plus one 3.5" HDD. SATA#1 Port is used in conjunction with the HDD bracket on "Pet-Door" to accommodate a 2.5" HDD/SSD. A special washer is installed to fix the SATA cable and make sure a very robust connection. For information of installing a HDD/SSD to SATA#1 port, please refer to section 3.2 for detail.

2.4.3 Internal SATA#2 Port

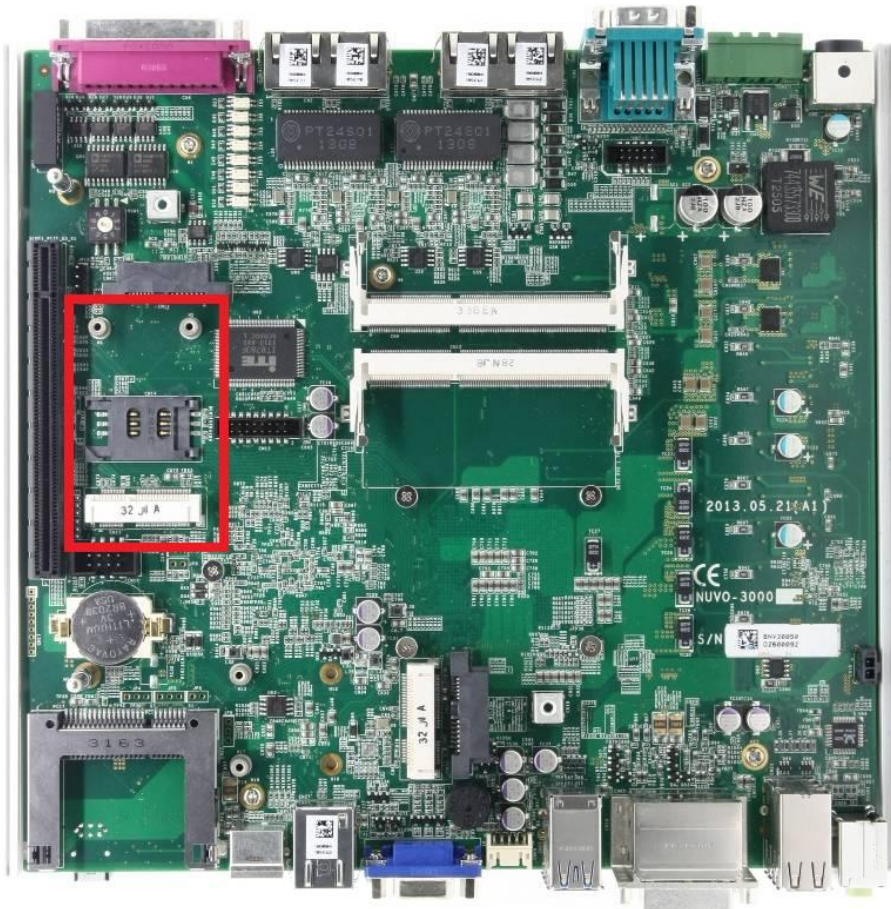


Nuvo-3000 provides two internal SATA ports to accommodate SATA hard drives. According to mechanical design, Nuvo-3000E/3000P can accommodate one 2.5" HDD/SDD and Nuvo-3000TB can accommodate one 2.5" HDD/SDD plus one 3.5" HDD. SATA#2 Port is only used in Nuvo-3000TB. It's used in conjunction with shock-absorbing brackets and a thermal insulation mylar to accommodate a 3.5" HDD. A special washer is installed to fix the SATA cable and make sure a very robust connection. For information of installing a HDD/SSD to SATA#2 port, please refer to section 3.3 for detail.

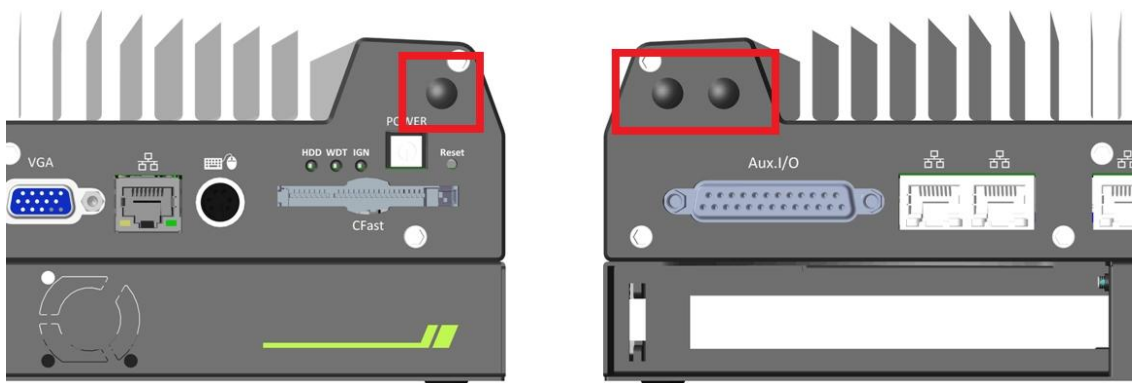


One 2.5" HDD and one 3.5" HDD installed in Nuvo-300TB

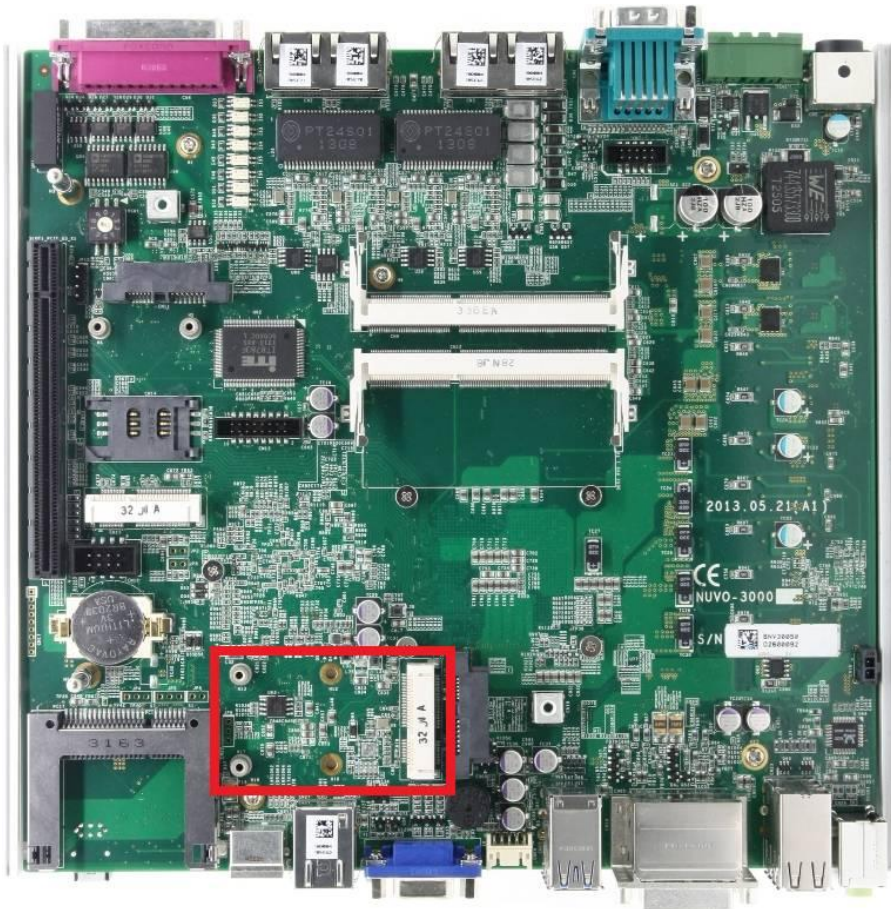
2.4.4 Mini PCI Express Connector#1 (with SIM Socket)



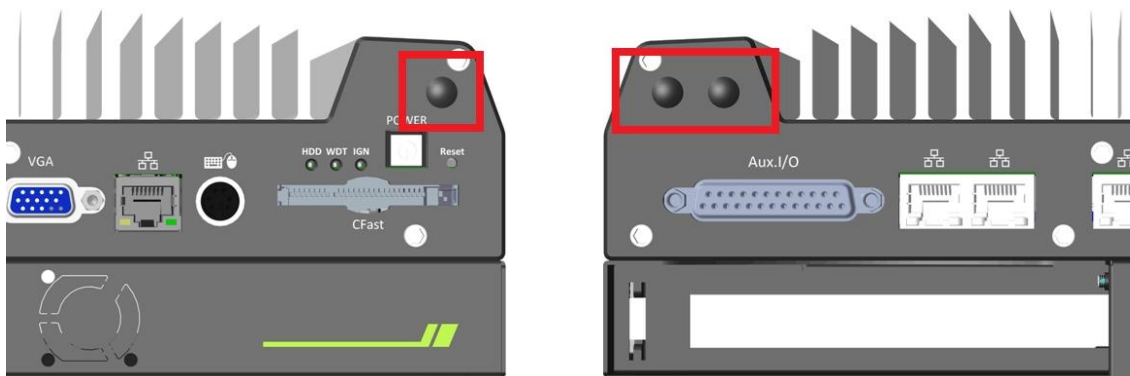
Nuvo-3000 provides two on-board Mini PCI Express connectors. There are plenty of off-the-shelf mini-PCIe modules with versatile capabilities. By installing a mini-PCIe module, your system can have expanded features such as WIFI, 3G, GPS, RAID and etc. Mini PCI Express Connector#1 is designed with SIM card support. With a SIM card installed, it's capable to connect your system to Internet in wide territory through telecom operator's GPRS/3G network. For WIFI/3G communication, Nuvo-3000 provides multiple SMA antenna apertures on the front and back panel for multi-antenna configuration.



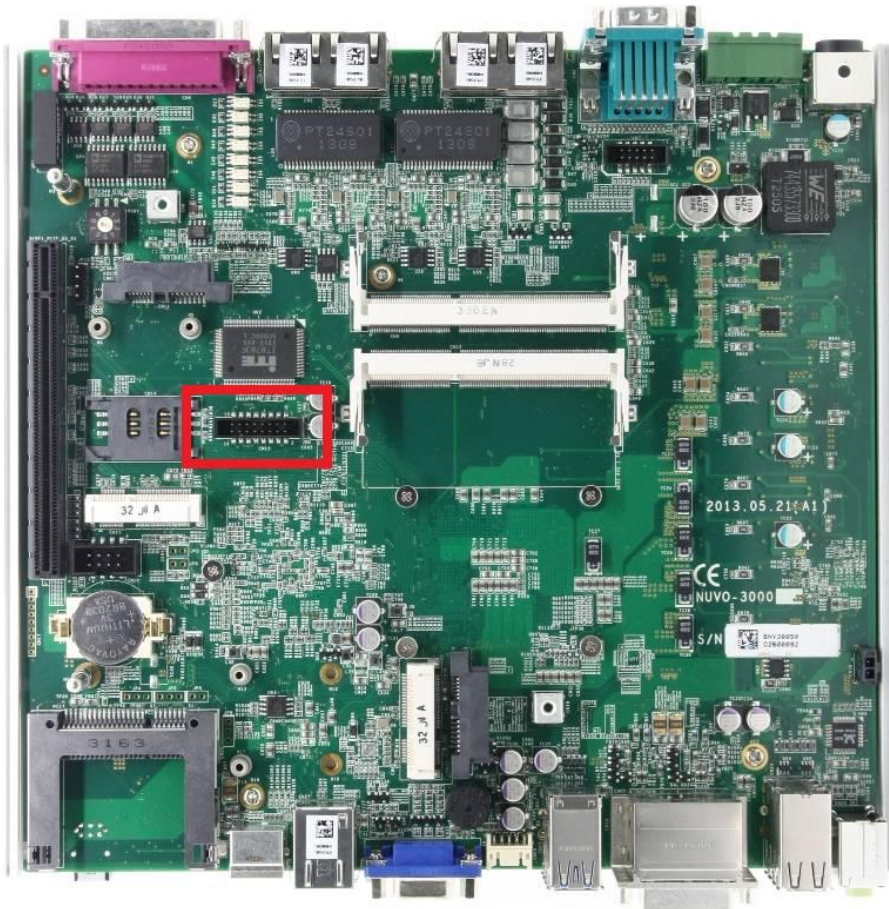
2.4.5 Mini PCI Express Connector#2



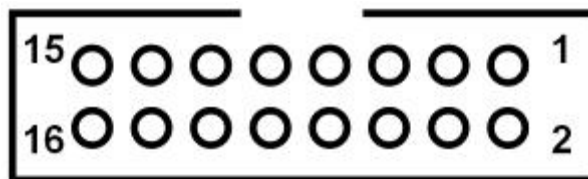
Nuvo-3000 provides two on-board Mini PCI Express connectors. There are plenty of off-the-shelf mini-PCIe modules with versatile capabilities. By installing a mini-PCIe module, your system can have expanded features such as WIFI, 3G, GPS, RAID and etc. Mini PCI Express Connector#2 is designed to accommodate full-size and half-size mini PCI-E module. You can install versatile modules, such as WIFI, GPS, RAID controller, mini PCI-E DOM and etc. For communication modules which need external antenna connection, Nuvo-3000 provides multiple SMA antenna apertures on the front and back panel for multi-antenna configuration.



2.4.6 Internal USB 2.0 Ports



Nuvo-3000 provides additional two USB 2.0 ports internally via a 2x8 pins, 2.0mm pitch box header. The internal USB ports are designed to allow users attaching a protection dongle inside the chassis. To use the internal USB port, you need a dedicated box-header to USB cable. Please contact Neosys for further information

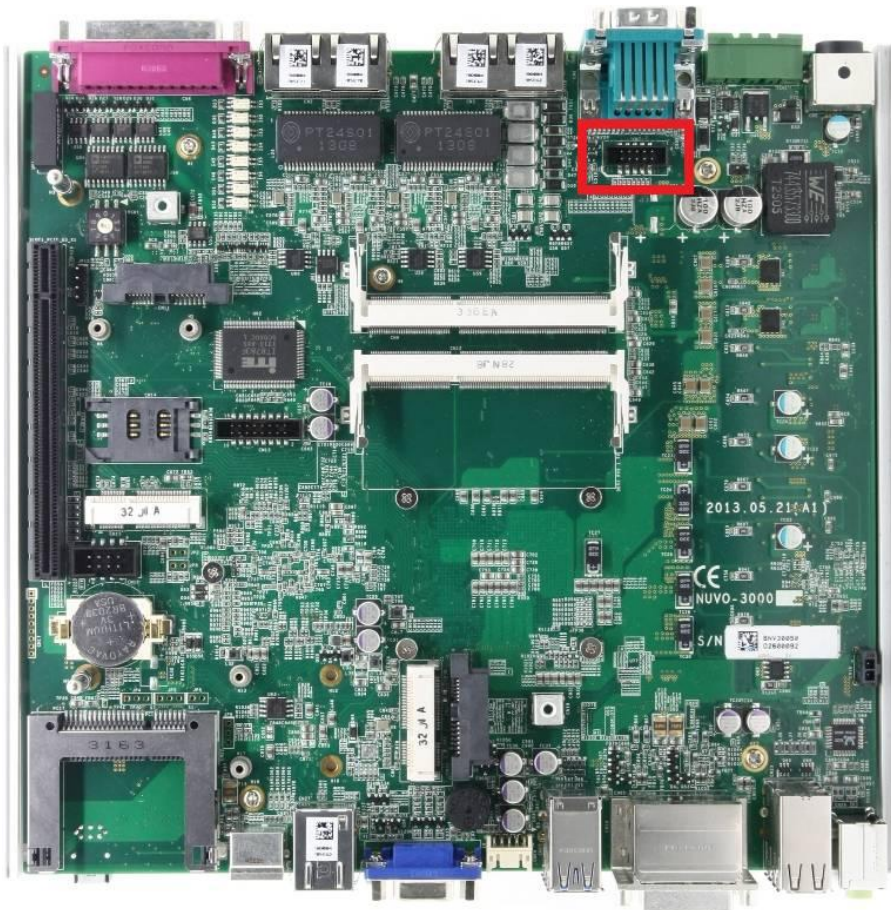


Pin#	Definition	Description
1	VCC_USB	5V USB power
2	VCC_USB	5V USB power
3	USB_4_N	USB4 Differential data output - negative
4	USB_5_N	USB5 Differential data output - negative
5	USB_4_P	USB4 Differential data output - positive
6	USB_5_P	USB5 Differential data output - positive



7	GND	Ground
8	GND	Ground
9	VCC_USB	5V USB power
10	VCC_USB	5V USB power
11	N/A	N/A
12	N/A	N/A
13	N/A	N/A
14	N/A	N/A
15	GND	Ground
16	GND	Ground

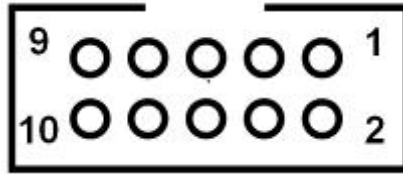
2.4.7 Internal COM Port (COM3)



In addition to two COM ports on the back panel, Nuvo-3000 provides another COM port (COM3) via an on-board 2x5 pins, 2.0mm pitch box header. It's also implemented using industrial-grade ITE8783 Super IO chip (-40 to 85°C) and support up to 115200 bps baud rate.

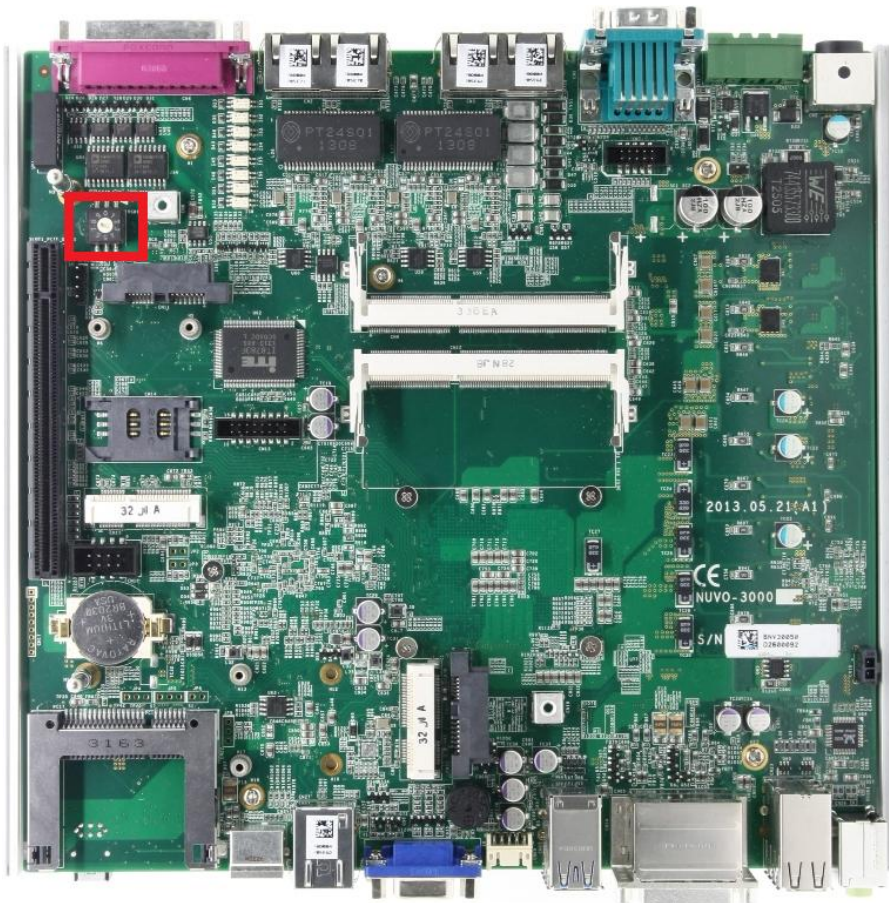
COM3 supports RS-232 mode only. For users who need to connect devices via standard DSub-9 connectors, please refer to the following pin definition for wiring. Neusys also provides an optional cable kit to expose the DSub-9 connector.





Pin#	RS-232 Mode
1	DCD
2	DSR
3	RX
4	RTS
5	TX
6	CTS
7	DTR
8	RI
9	GND

2.4.8 Rotary Switch for Ignition Power Control Mode



Nuvo-3000 series offers the option of ignition power control module for in-vehicle applications. For Nuvo-3000 equipped with this option, the on-board rotary switch is used to configure the operation mode of ignition power control. Please refer to section 3.8 for information of using ignition power control. For Nuvo-3000 which is not equipped with this option, please always set the rotary switch to 8 so that the system can normally operate.

Note

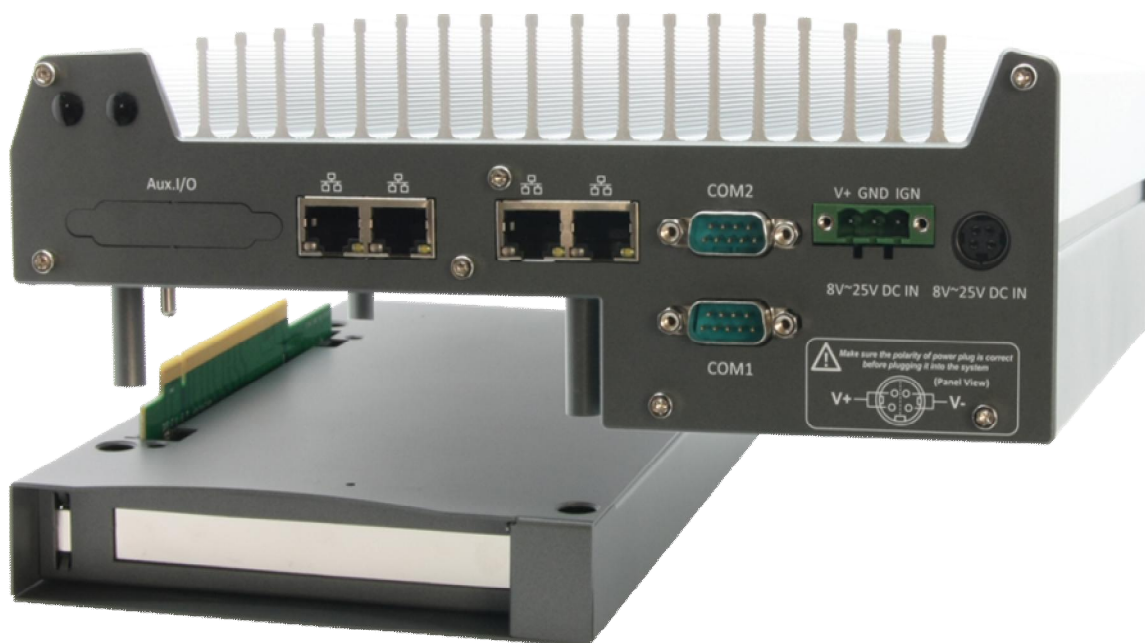
For Nuvo-3000 which doesn't have the option of ignition power control module, please always set the rotary switch to 8 otherwise the system may be failed to operate.



2.5 Expansion Cassette

The expansion Cassette is an innovation design on Nuvo-3000 series. By providing a separated chassis to accommodate add-on card, it's more effective to manage the thermal conditions of both the system and the add-on card. The modular concept of Cassette also reduces the complexity of installing an add-on card into the fanless controller.



Nuvo-3000E contains a Cassette with PCI Express slot, and Nuvo-3000P contains a Cassette with PCI slot. If users want to use an add-on card with higher power consumption, a fan option is offered by Neusys to create active air flow and maintain the stable thermal condition for Cassette.



2.5.1 Cassette of Nuvo-3000E

The expansion Cassette of Nuvo-3000E contains a backplane with a x16 PCI Express connector. It runs 8-lanes, Gen2 PCI Express signals to provide a maximal 4GB/s bandwidth. Nuvo-3000E supports 4A@12V rated current for a PCI Express add-on card with higher power consumption. You can also get the 12VDC from the on-board power connectors if necessary.





#	Connector	Function Description										
1	x16 PCI Express	x16 PCI Express connector that runs 8-lane, Gen2 signal. Compatible with x16, x8, x4 and x1 PCI Express add-on card.										
2	12VDC Fan Power	3-pin, 2.54mm pitch power connector for supplying 12VDC to the optional fan. <div style="text-align: center;">  <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Pin</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>N/A</td> </tr> <tr> <td>2</td> <td>12V (2A rated Current)</td> </tr> <tr> <td>3</td> <td>GND</td> </tr> </tbody> </table> </div>	Pin	Description	1	N/A	2	12V (2A rated Current)	3	GND		
Pin	Description											
1	N/A											
2	12V (2A rated Current)											
3	GND											
3	SATA Signal	Standard 7-pin SATA connector										
4	5/12VDC Power	4-pin, 2.0mm pitch wafer connector for supplying 5/12VDC <div style="text-align: center;">  <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Pin</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>12V (2A rated Current)</td> </tr> <tr> <td>2</td> <td>GND</td> </tr> <tr> <td>3</td> <td>GND</td> </tr> <tr> <td>4</td> <td>5V (2A rated Current)</td> </tr> </tbody> </table> </div>	Pin	Description	1	12V (2A rated Current)	2	GND	3	GND	4	5V (2A rated Current)
Pin	Description											
1	12V (2A rated Current)											
2	GND											
3	GND											
4	5V (2A rated Current)											

2.5.2 Cassette of Nuvo-3000P

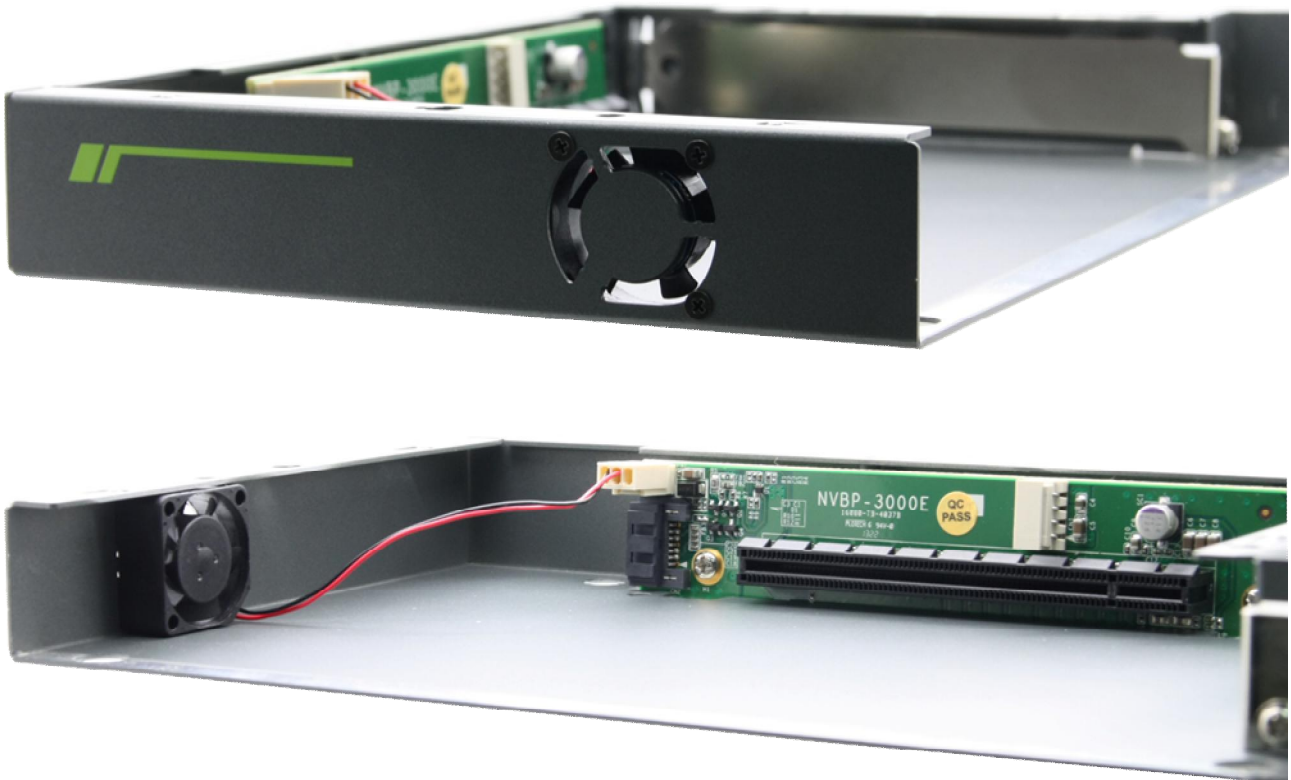
The expansion Cassette of Nuvo-3000P contains a backplane with a 32-bit/33MHz PCI connector. Nuvo-3000P supports 4A@12V rated current. You can get the 12VDC from the on-board power connectors if necessary.



#	Connector	Function Description										
1	33MHz/32-bit PCI	33MHz/32-bit PCI bus via PLX8112 PCIe-to-PCI bridge										
2	12VDC Fan Power	3-pin, 2.54mm pitch power connector for supplying 12VDC to the optional fan. <div style="text-align: center;">  <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Pin</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>N/A</td> </tr> <tr> <td>2</td> <td>12V (2A rated Current)</td> </tr> <tr> <td>3</td> <td>GND</td> </tr> </tbody> </table> </div>	Pin	Description	1	N/A	2	12V (2A rated Current)	3	GND		
Pin	Description											
1	N/A											
2	12V (2A rated Current)											
3	GND											
3	SATA Signal	Standard 7-pin SATA connector										
4	5/12VDC Power	4-pin, 2.0mm pitch wafer connector for supplying 5/12VDC <div style="text-align: center;">  <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Pin</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>12V (2A rated Current)</td> </tr> <tr> <td>2</td> <td>GND</td> </tr> <tr> <td>3</td> <td>GND</td> </tr> <tr> <td>4</td> <td>5V (2A rated Current)</td> </tr> </tbody> </table> </div>	Pin	Description	1	12V (2A rated Current)	2	GND	3	GND	4	5V (2A rated Current)
Pin	Description											
1	12V (2A rated Current)											
2	GND											
3	GND											
4	5V (2A rated Current)											

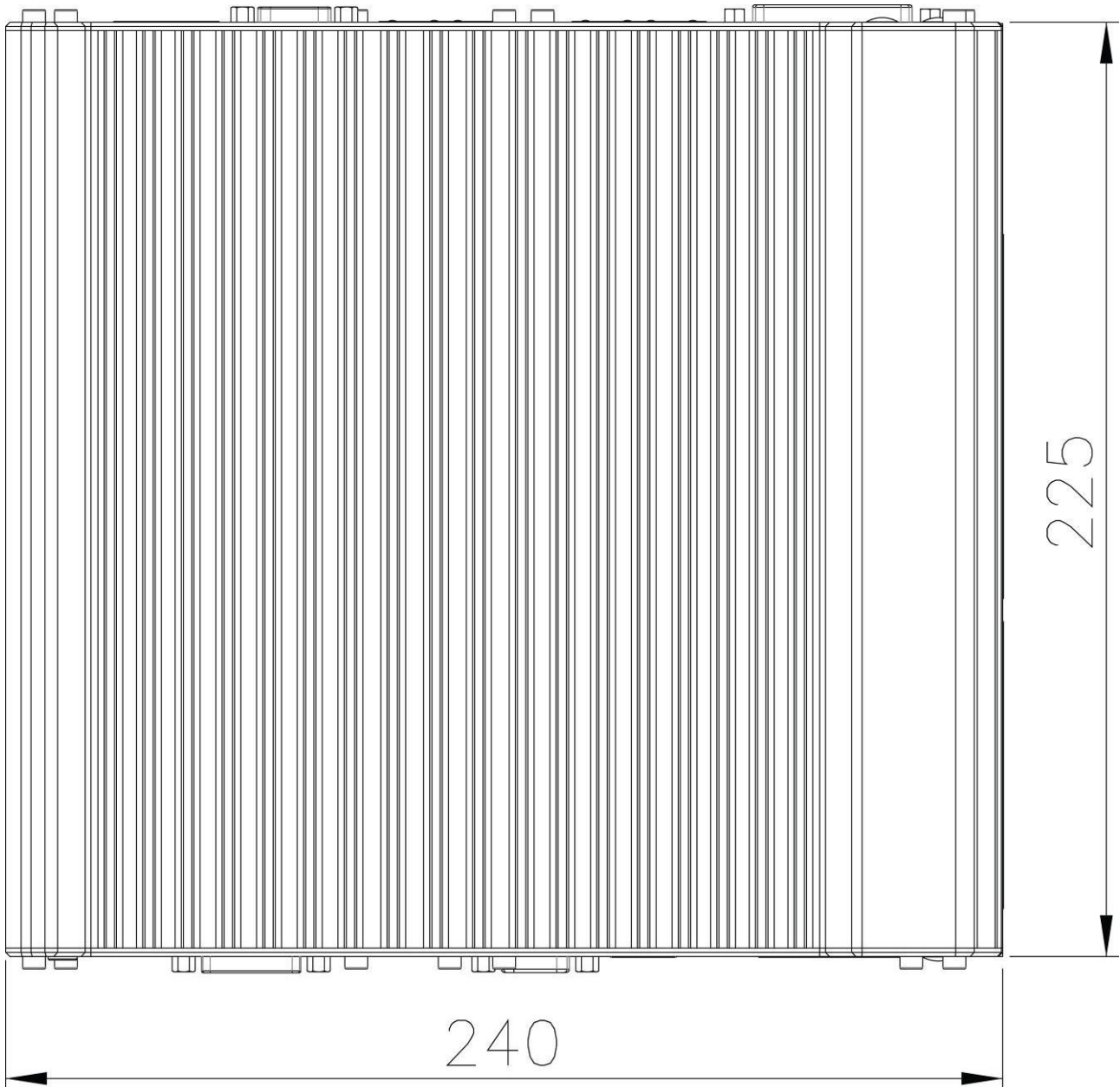
2.5.3 Fan Option of Cassette

When an add-on card with higher power consumption installed in Cassette, it is user's liability to consider the thermal dissipation. Neusys offers a fan option, as a general solution for versatile add-on cards, to create active air flow and maintain a proper ambient temperature inside Cassette. If conduction-cooling scheme is needed, a customized a heat-spreader shall be made accordingly to contact components on add-on card and the surface of Cassette.

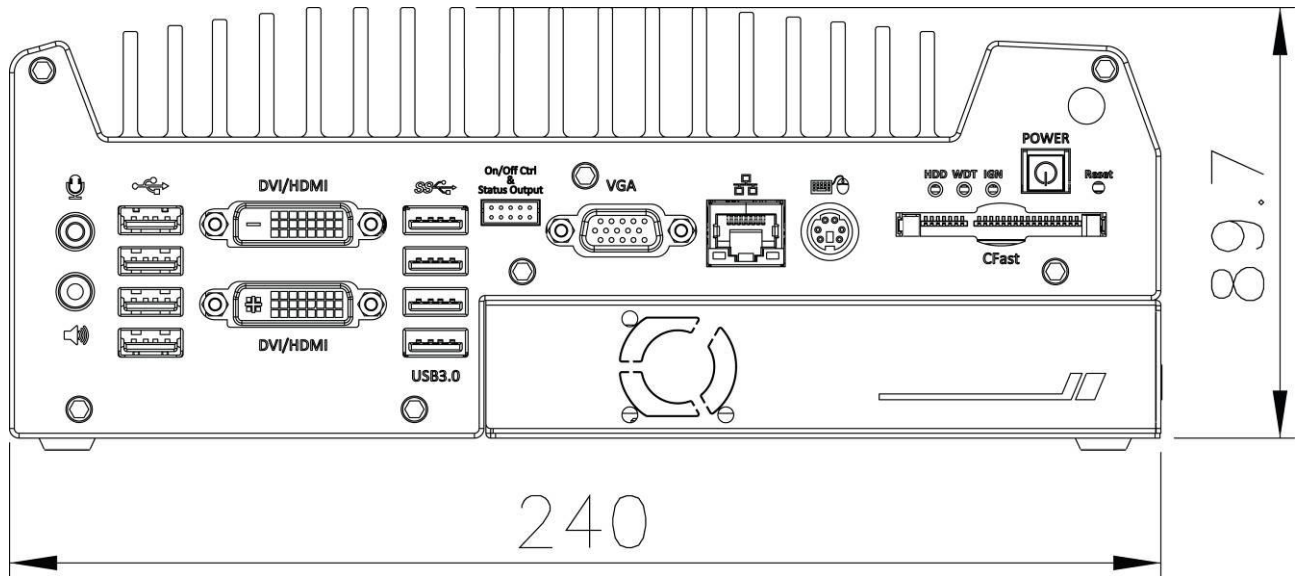


2.6 Mechanical Dimension

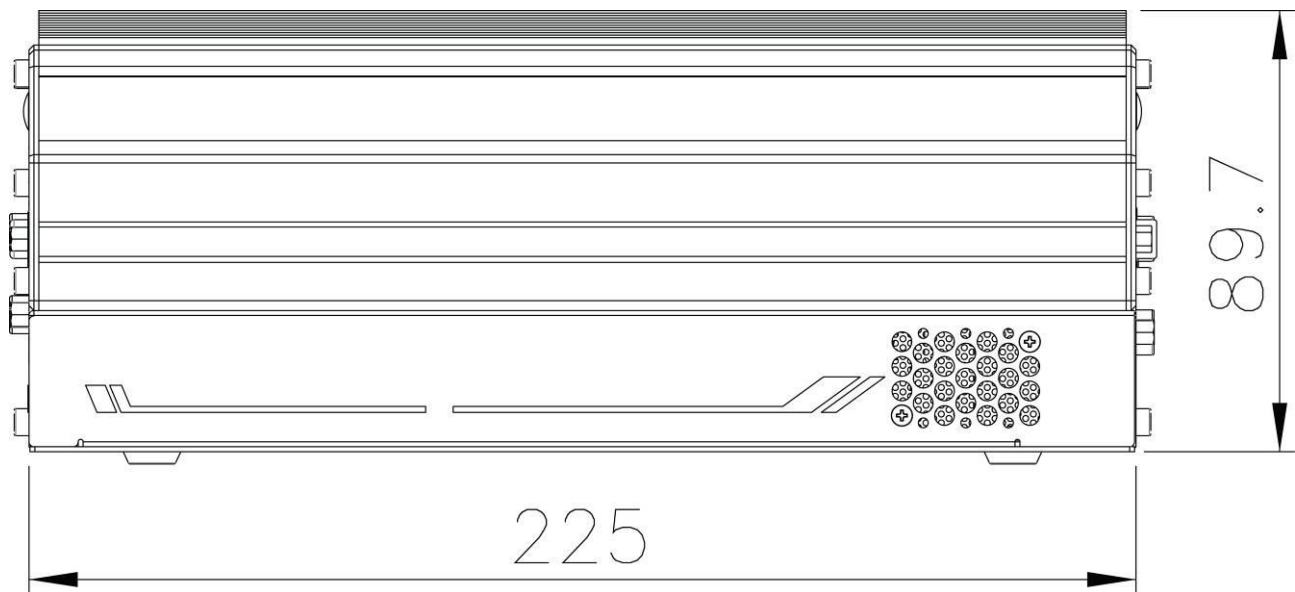
2.6.1 Top View of Nuvo-3000E/3000P



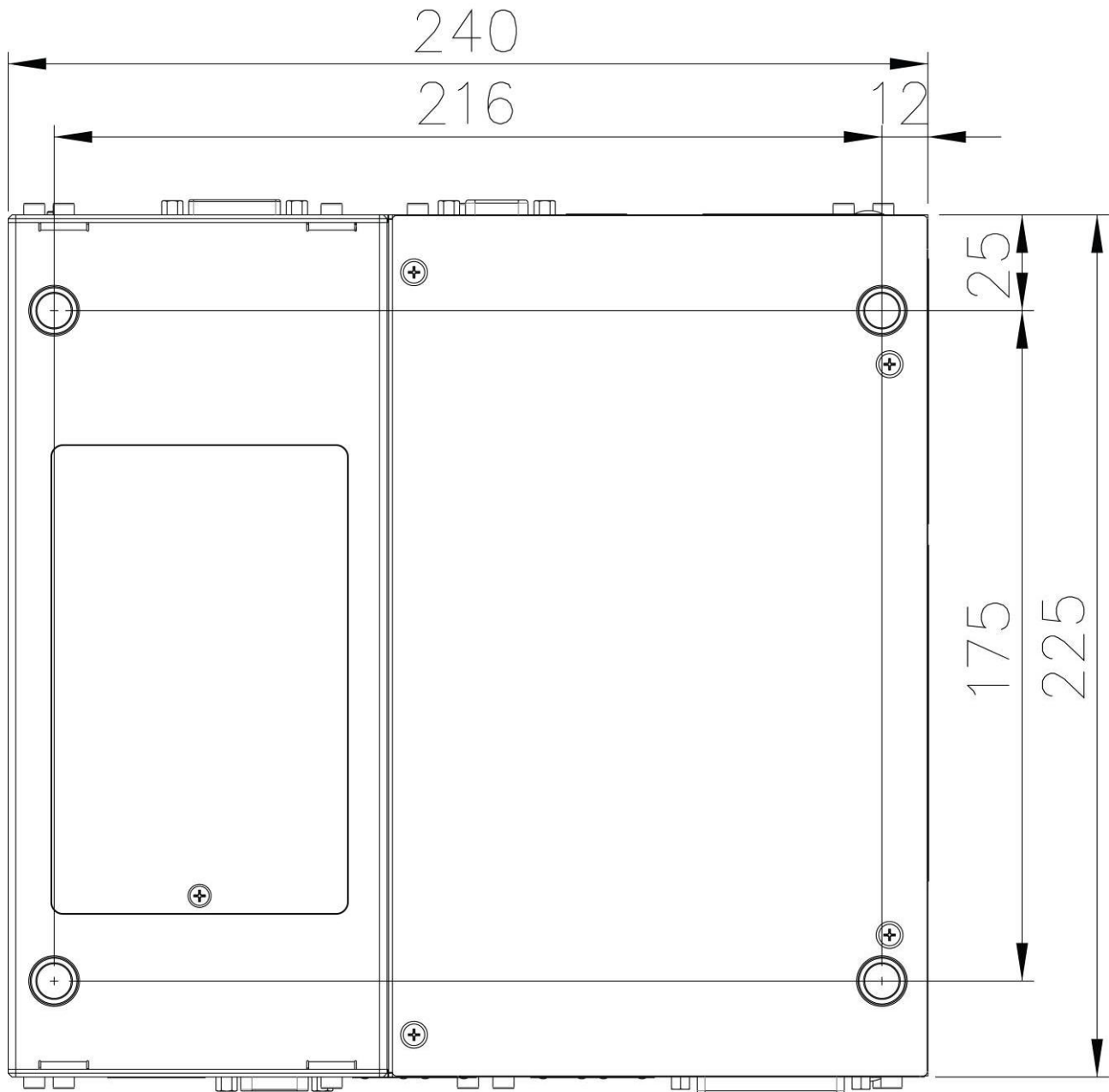
2.6.2 Front View of Nuvo-3000E/3000P



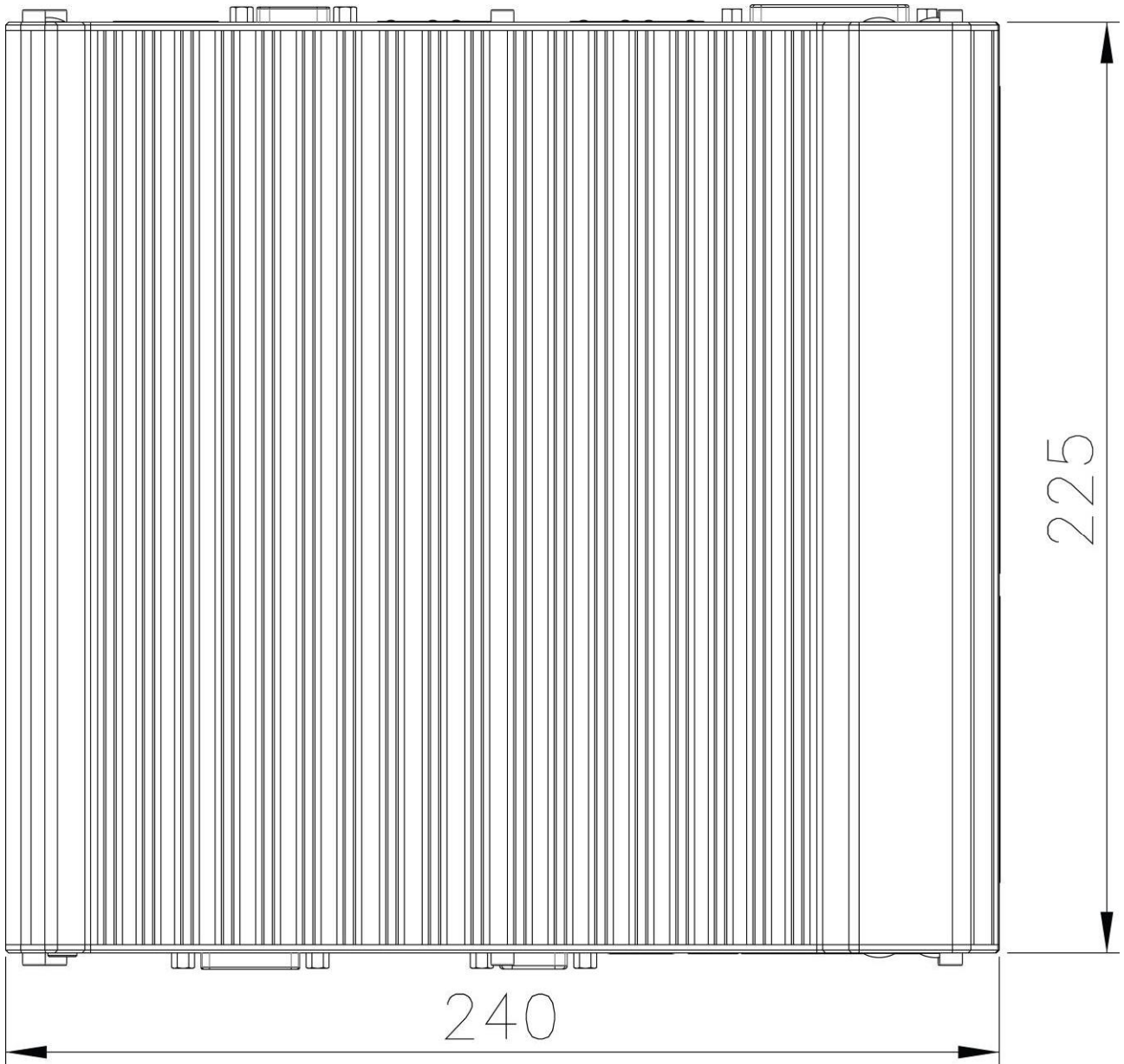
2.6.3 Side View of Nuvo-3000E/3000P



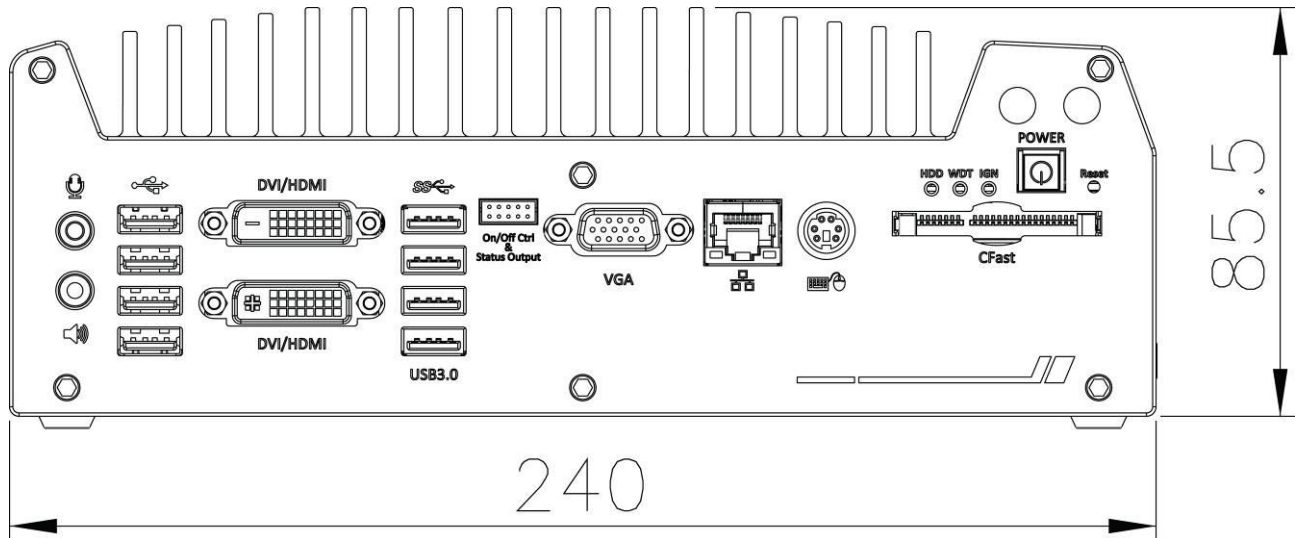
2.6.4 Bottom View of Nuvo-3000E/3000P



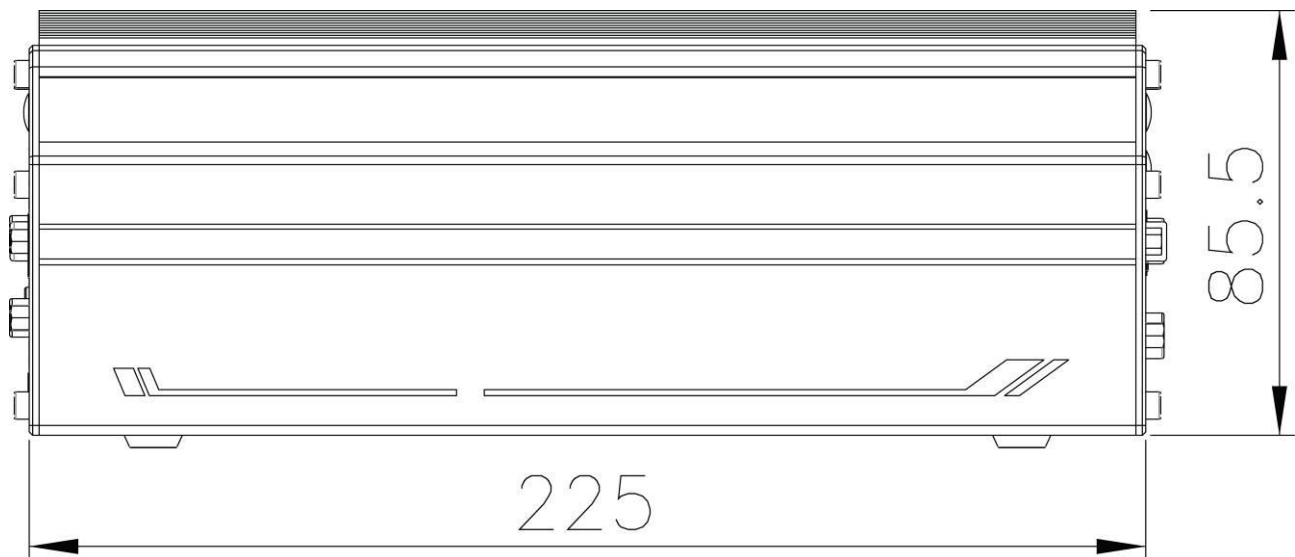
2.6.5 Top View of Nuvo-3000TB



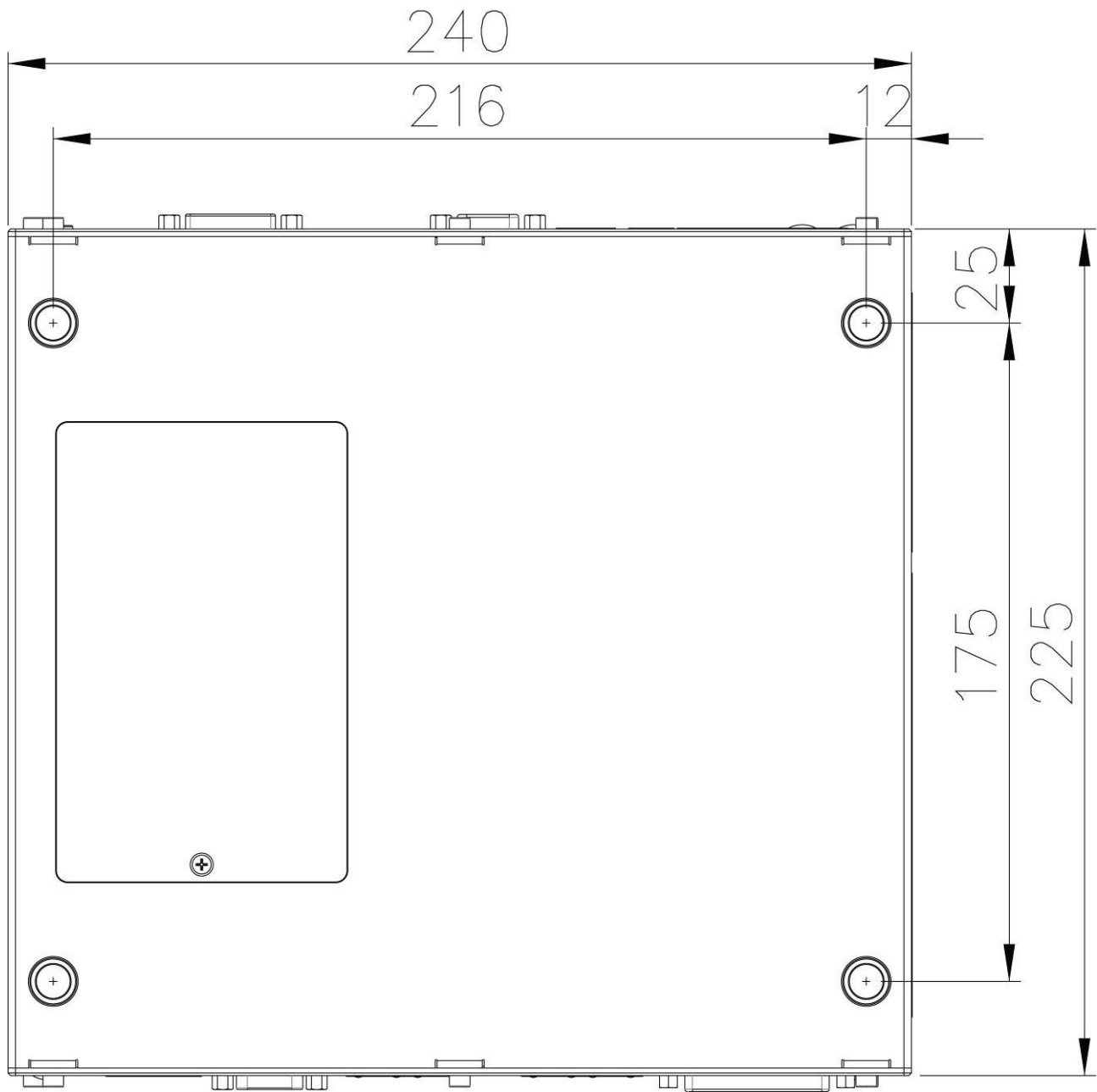
2.6.6 Front View of Nuvo-3000TB



2.6.7 Side View of Nuvo-3000TB



2.6.8 Bottom View of Nuvo-3000TB



Chapter 3 Getting Start

3.1 Install DDR3 SODIMM Modules

Nuvo-3000 provides two 204-pin, SODIMM sockets for installing DDR3 memory modules. It supports a maximal 16GB capacity by installing two 8GB DDR3 1600MHz SODIMM modules. You can install/replace DDR3 SODIMM modules by following the steps listed below.

For Nuvo-3000E/3000P

1. Put the Nuvo-3000E/3000P upside down on a flat surface. You can see the “Pet-Door” exposed. Use a Philips screwdriver to loosen the M3 flat-head screw and open the “Pet-Door”.



2. Use a Philips screwdriver to loosen four M4 flat-head screws on the Cassette. Pull up the Cassette to remove it from the Nuvo-3000E/3000P.



3. Tile the SODIMM module and insert it to the SODIMM socket. As it's firmly contacted with socket connectors, press it down until the clamps of the socket snap into the latching position of SODIMM module. Repeat this step if you want to install the second DDR3 SODIMM module.



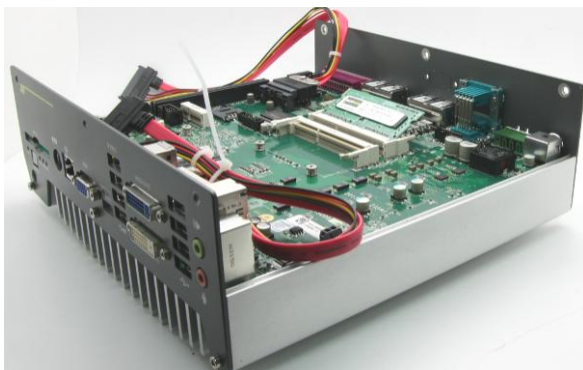
For Nuvo-3000TB

1. Put the Nuvo-3000 upside down on a flat surface. Unscrew three hex bolts on the front panel and another three hex bolts on the back panel. Remove the bottom cover of Nuvo-3000TB. You can see the SODIMM sockets on the PCBA.



(another 3 hex bolts are on the opposite side)

2. Tile the SODIMM module and insert it to the SODIMM socket. As it's firmly contacted with socket connectors, press it down until the clamps of the socket snap into the latching position of SODIMM module. Repeat this step if you want to install the second DDR3 SODIMM module.



3.2 Install a 2.5" HDD/SSD

Internal SATA#1 port on Nuvo-3000 is used in conjunction with the HDD bracket on "Pet-Door" to accommodate a 2.5" HDD/SSD. You can install/replace the HDD/SSD attached to SATA#1 port by following the steps listed below.

1. Follow step#1 in section 3.1 to open the "Pet-Door". You can see a SATA cable exposed. You can follow the same instruction to open the "Pet-Door" of Nuvo-3000TB.
2. Find the HDD bracket come with the "Pet-Door", M3 flat-head screws (4 pieces), and a HDD thermal pad in the accessory box. Remove the films on both sides of the thermal pad and place it on the center of HDD bracket.



3. Place the HDD into the bracket and gently push it down to make it contact with the thermal pad. Use a Philips screwdriver to fix the HDD with M3 flat-head screws. Please note that the HDD must be placed in the right direction as below.



(another 2 screws are on the opposite side)

4. Pull out the SATA cable inside the chassis and connect it to HDD



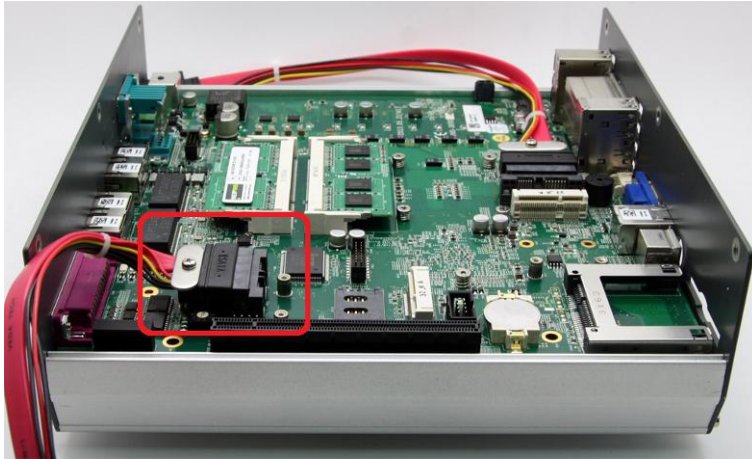
5. Tilt the HDD assembly and insert the wedge of HDD bracket to the bottom cover. Once it's firmly wedged, push it down and fix it using a M3 flat-head screw.



3.3 Install a 3.5" HDD (Nuvo-3000TB Only)

Nuvo-3000TB provides SATA#2 port which is used in conjunction with dedicated HDD brackets and thermal insulation mylar to accommodate the 3.5" HDD. You can install/replace the 3.5" HDD attached to SATA#2 port by following the steps listed below.

1. Follow step#1 in section 3.1 (for Nuvo-3000TB) to remove the bottom cover. You can see SATA#1 and SATA#2 ports on the PCBA. Identify SATA#2 to install the 3.5" HDD.



2. Find two HDD brackets, two HDD thermal pads, four #6-32 screws, four damping pads and four M3 step screws in the accessory box.



3. Attach the thermal pads to the bottom side of the 3.5" HDD. Please notice that two thermal pads are in different thickness. You can choose the proper one (or two) for your 3.5" HDD. Fix the HDD brackets to the 3.5" HDD using #6-32 screws and then insert the damping pads to the HDD brackets.



4. Fix the HDD assembly to the bottom cover of Nuvo-3000TB using four M3 step screws. Check if the thermal pad(s) contact well with both HDD and bottom cover.



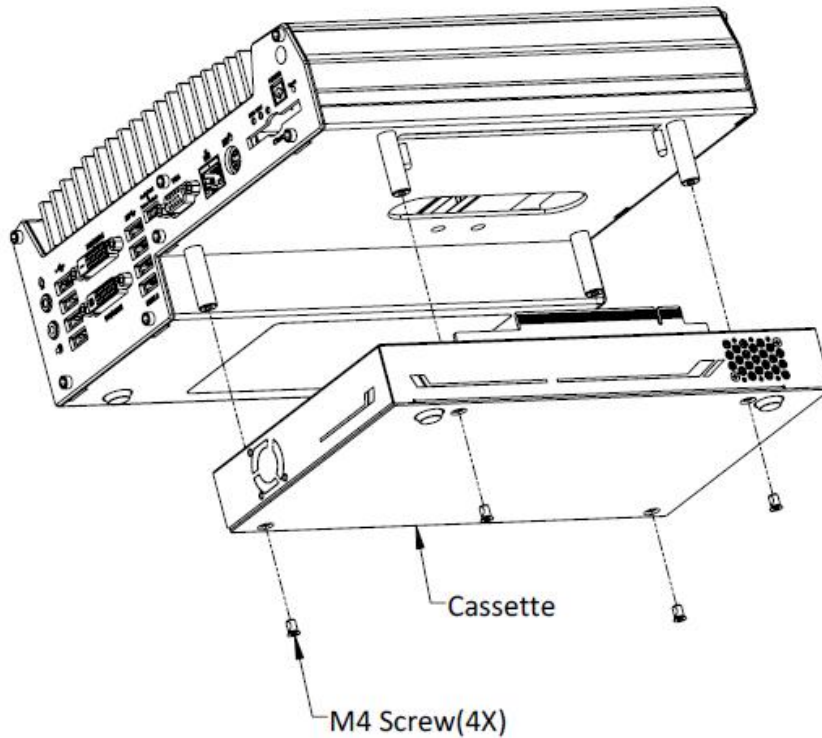
5. Attach the SATA cable from SATA#2 port to the 3.5" HDD. Recover the bottom cover of Nuvo-3000TB and fix it with hex bolts.



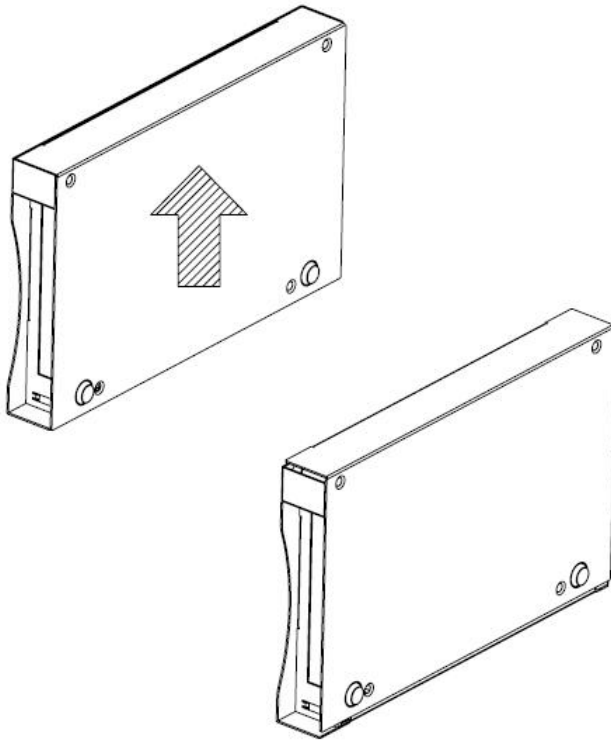
3.4 Install an Add-on Card into Cassette

The expansion Cassette is used to accommodate a PCI Express or PCI add-on card. To install an add-on card into Cassette, please refer to the information listed below.

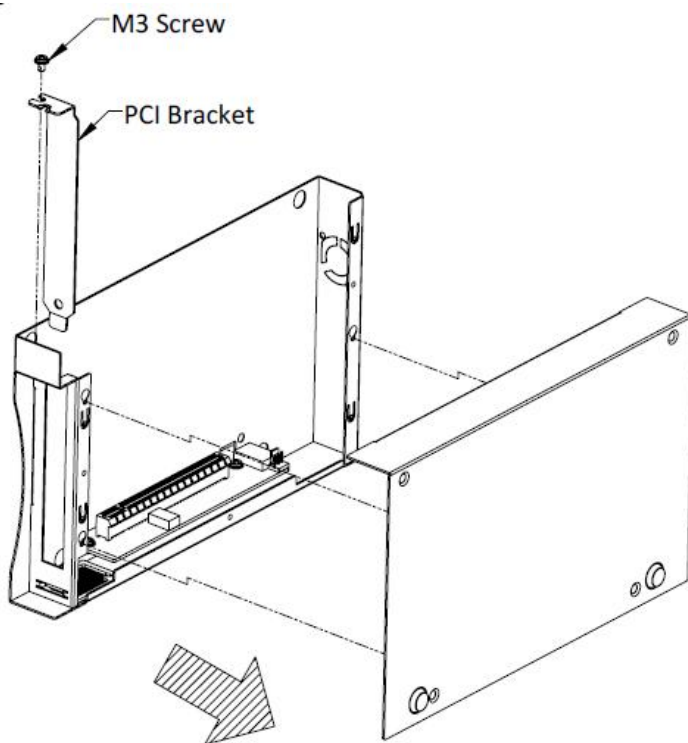
1. Remove Cassette from Nuvo-3000 by loosening four M4 screws.



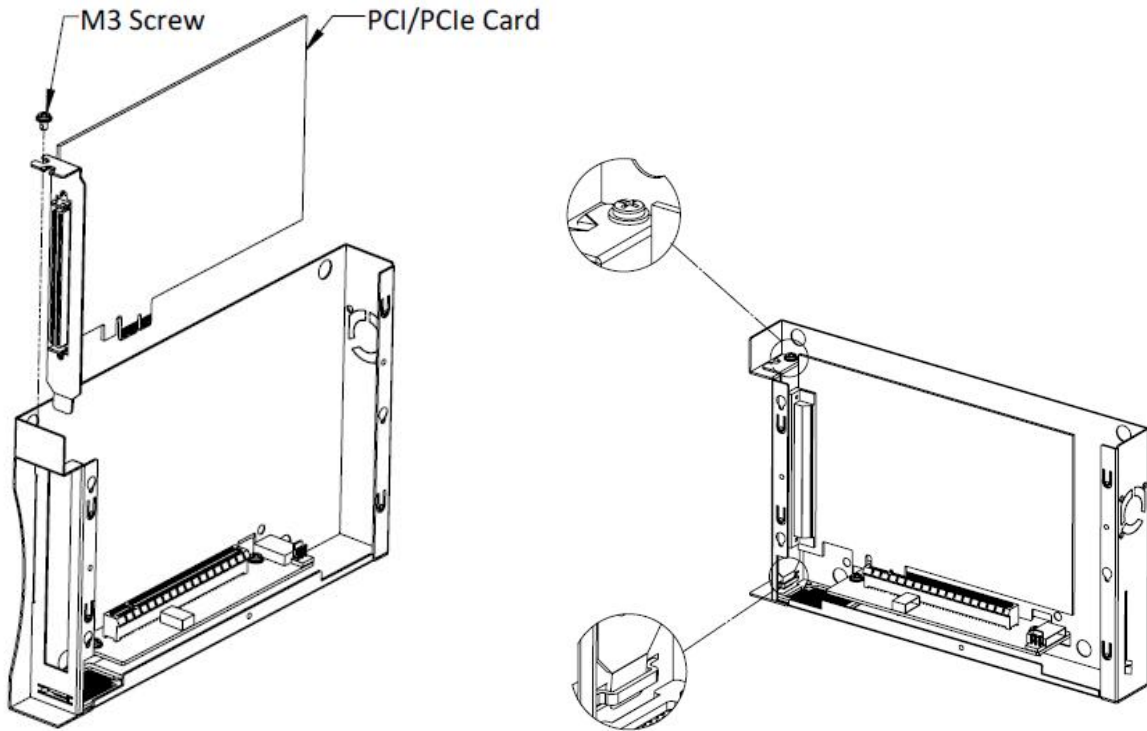
2. Open Cassette by pushing its cover toward arrow pointing direction.



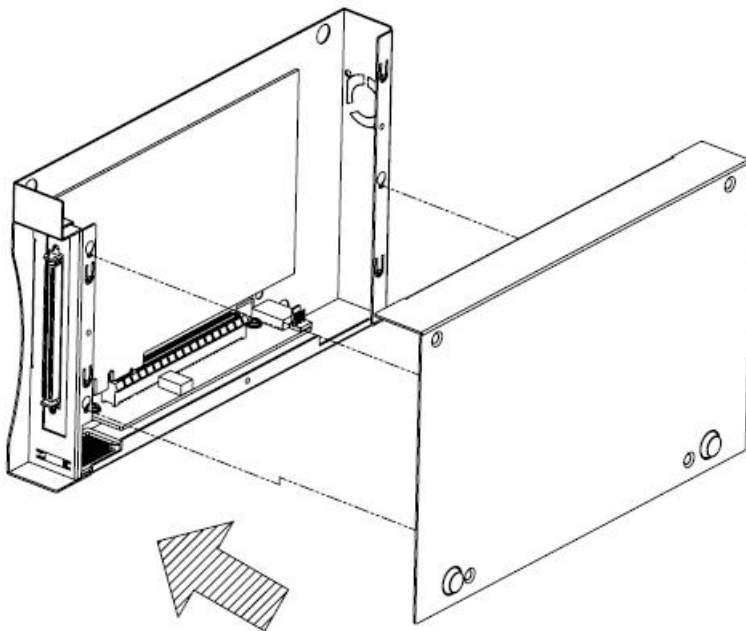
3. Pull the cover of Cassette toward arrow pointing direction to open it. And then remove the blank faceplate installed in Cassette by loosening a M3 screw.



4. Install a PCI/PCIe add-on card into the PCI/PCIe connector. Note that the tail of faceplate of the add-on card must be inserted into the mortise. Tighten the add-on card using a M3 screw.



5. Recover Cassette and assemble it to Nuvo-3000. Fix Cassette with four M4 screws.



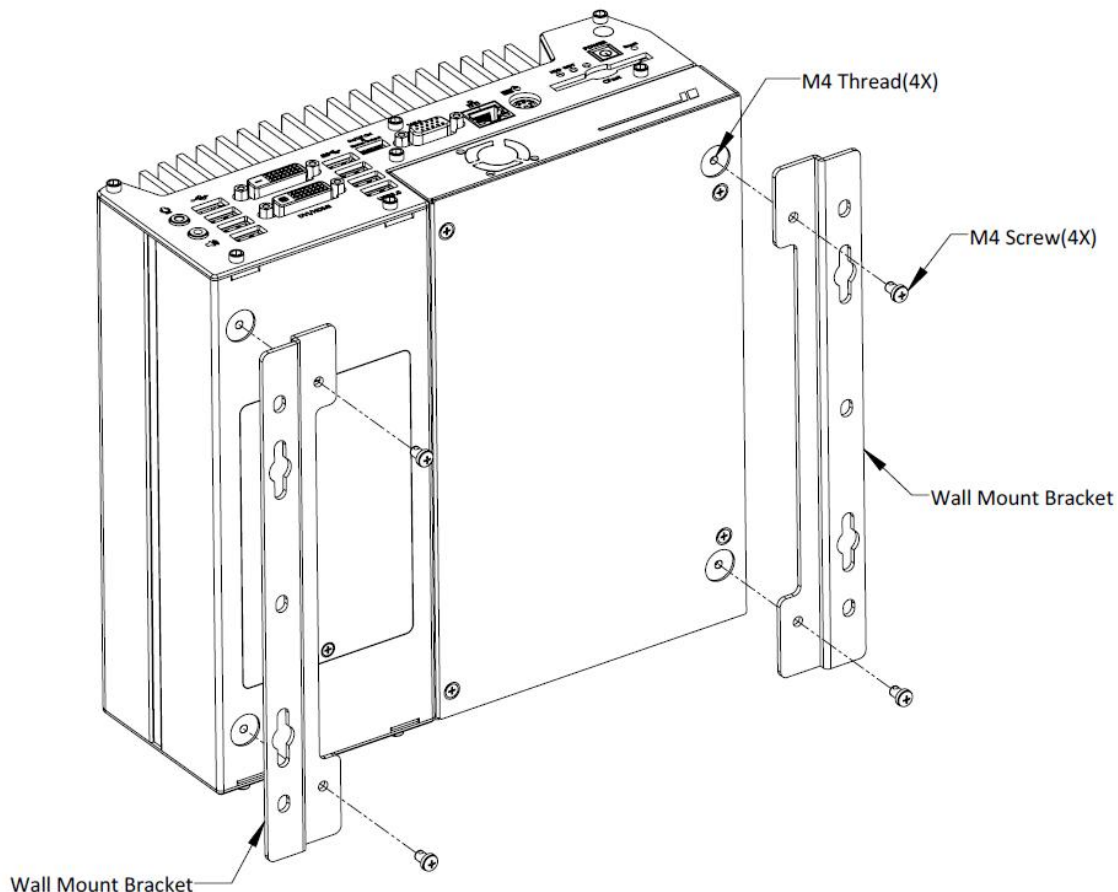
3.5 Mount your Nuvo-3000

Nuvo-3000 provides versatile ways of mounting. You can use wall-mounting brackets shipped with Nuvo-3000 to mount it on the wall. Neosys also offers optional bracket and DIN rail clip to mount Nuvo-3000 on a DIN rail. To mount your Nuvo-3000, please refer to the information listed below.

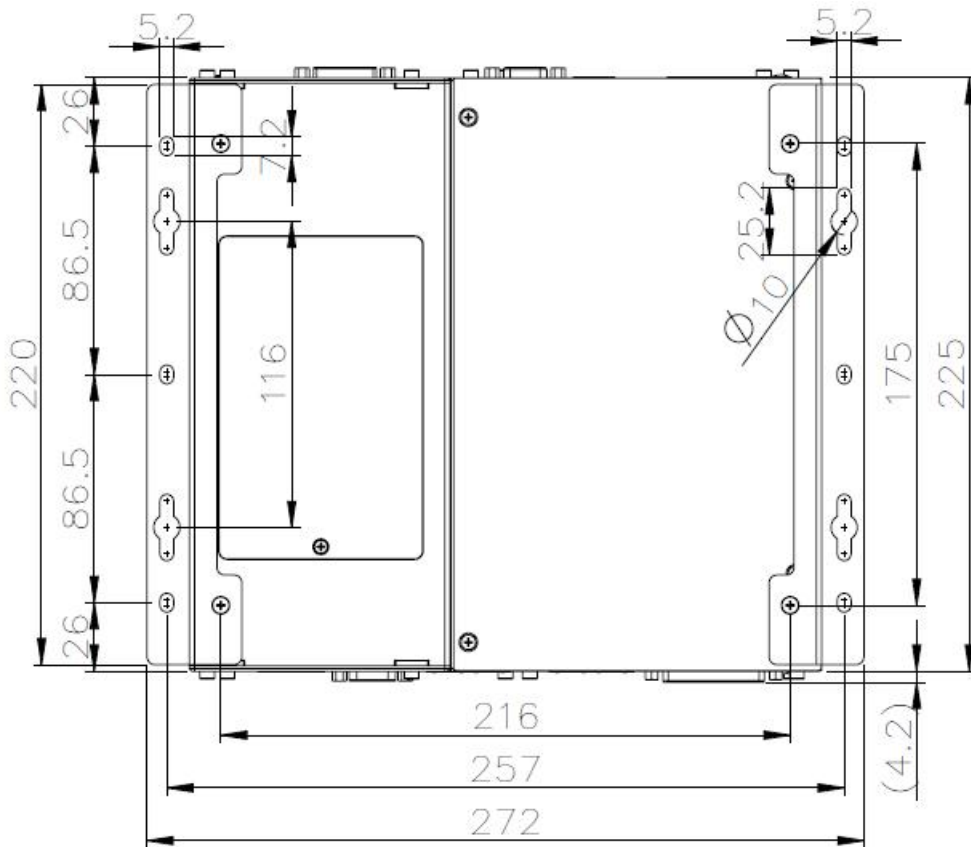
Mount your Nuvo-3000 on the Wall

Nuvo-3000 is shipped with wall-mount brackets as the standard mounting option. You can mount your Nuvo-3000 on the wall by following the steps listed below.

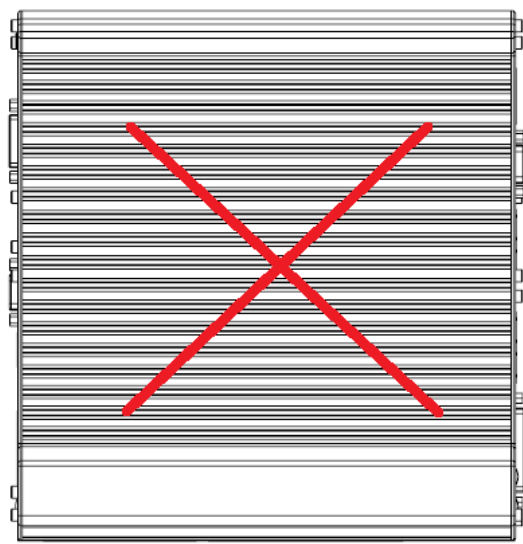
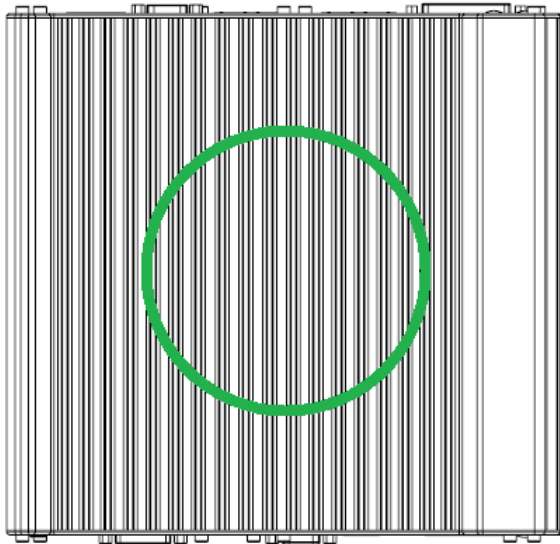
1. Get two wall-mounting brackets and four M4 screws from the accessory box. Fix the mounting brackets to Nuvo-3000 using M4 screws.



2. Place Nuvo-3000 on a flat surface and fix it with screws. You can also take advantage of the keyhole-shaped holes of mounting brackets to suspend Nuvo-3000 on the Wall.



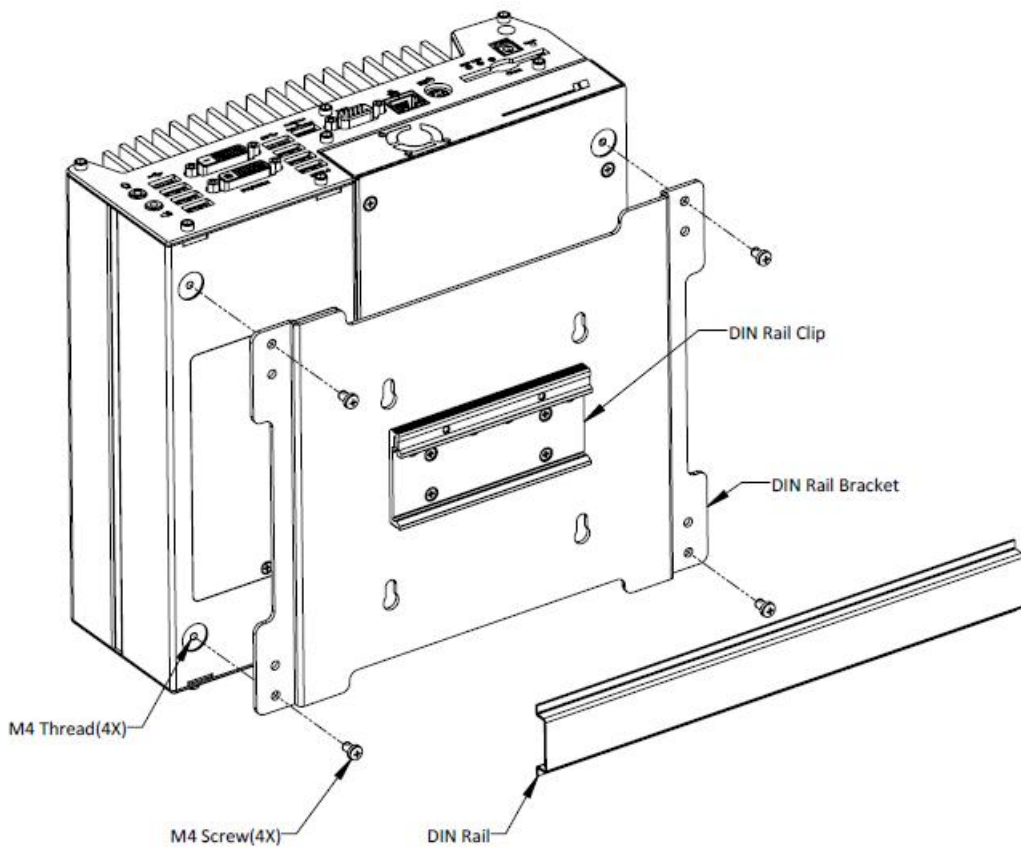
3. For best efficiency of heat dissipation, please mount Nuvo-3000 in a right direction.



Mount your Nuvo-3000 on the DIN Rail

Neusys also provides the option of the DIN-rail mounting kit. The kit includes a bracket and a DIN-rail mounting clip. You should fix the clip to the bracket using four M4 flat-head screws first, and then fix the bracket assembly to Nuvo-3000 with another four M4 screws. This option can be useful if you want to deploy Nuvo-3000 inside an equipment cabinet where DIN rail is available.





3.6 Connect DC power to you Nuvo-3000

There are two types of power connectors available for Nuvo-3000. A 4-pin mini-DIN power connector, which is used with an AC/DC adapter, and a 3-pin pluggable terminal block, which is used for direct DC input where DC power is available.

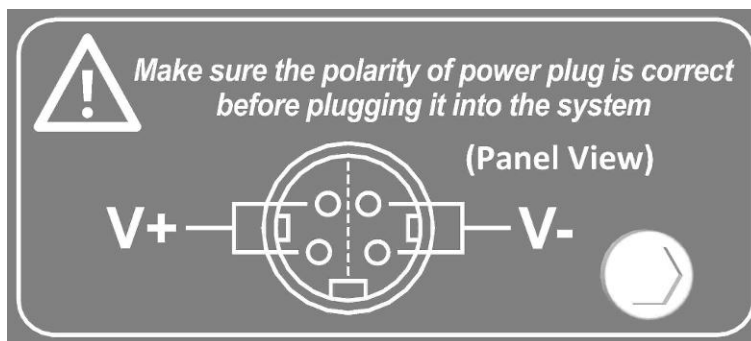
Caution

1. Please make sure the voltage of DC power is correct before you connect it to Nuvo-3000. Supplying a voltage over 25V will damage the system.
2. You should use either 4-pin power connector or 3-pin pluggable terminal block for DC power input. **DO NOT** supply power to both connectors at the same time.

3.6.1 Connect DC Power via 4-pin Power Connector

The 4-pin mini-DIN power connector provides a convenient way for power input especially in an indoor environment where AC/DC power adapter is usually applied. Neosys provides a 120W AC/DC adapter for Nuvo-3000 series. To connect DC power via 4-pin mini-DIN power connector, please follow the instructions below.

1. Find one AC-DC adapter with the matched 4-pin mini-DIN power connector. Note that the polarity of the 4-pin mini-DIN power connector must be correct.



2. Make sure the AC-DC adapter is off before you connect the power plug to your Nuvo-3000.
3. Plug the power plug of adapter into the 4-pin mini-DIN power connector and push it to the end until plug is firmly latched.

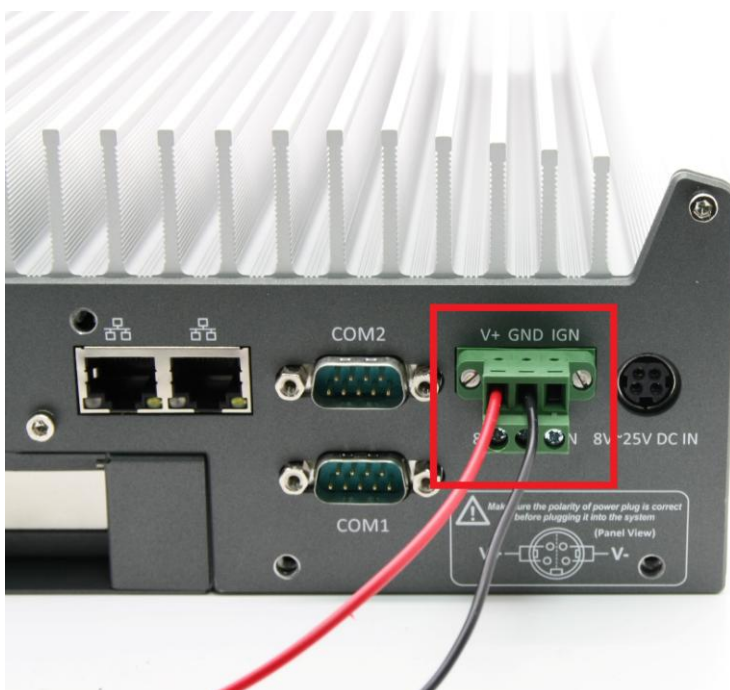
3.6.2 Connect DC Power via 3-pin Pluggable Terminal Block

For the field usage where DC power is available, the 3-pin pluggable terminal block of Nuvo-3000 provides the reliable way for directly wiring the DC power. The pluggable terminal block is also used as the input of ignition signal if the option of ignition power control is available. To connect DC power via the 3-pin pluggable terminal block, please follow the steps listed below.

1. Make sure the external DC power supply is power off or disconnected before wiring.
2. Get the 3-pin pluggable terminal block from the accessory box. The terminal block fits the wires with a gauge of 12~24 AWG.
3. Carefully identify the positive and negative contacts of your DC power supply and pluggable terminal block. The polarities between DC power supply and terminal block must be positive (+) to positive (+) and ground (GND) to ground (GND).



4. Insert the wires to correct contacts of pluggable terminal block and tighten clamping screws using a Philips screwdriver.



5. Firmly plug the terminal block into a receptacle on the rear panel, and tighten the captive screws using a Slotted screwdriver.

Caution

1. *Nuvo-3000 accepts 8~25 VDC when using terminal block for DC input. Please make sure the voltage of DC power is correct before you connect it to Nuvo-3000. Supplying a voltage over 25V will damage the system.*

3.7 Power on your Nuvo-3000

For better flexibility of operation, Nuvo-3000 provides three alternatives to power on your Nuvo-3000. You can turn on your Nuvo-3000 by pressing the power button, using an external non-latched on/off switch, or by sending a special LAN packet. In this section, we illustrate these ways to power on your Nuvo-3000.

3.7.1 Power on Nuvo-3000 Using the Power Button

This is the simplest way to turn on your Nuvo-3000. The power button on the front panel is a non-latched switch and behaves the ATX-mode on/off control. As DC power is connected, push the power button will turn on the system as well as the PWR LED indicator. Push the button when system is on will turn off the system. If your operating system supports ATX power mode (i.e. Microsoft Windows or Linux), push the power button causes a pre-defined system behavior, such as shutdown or hibernation.

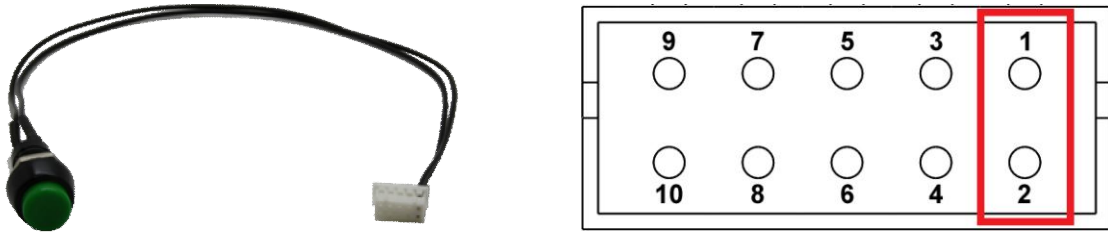


3.7.2 Power on Nuvo-3000 Using an External Non-latched Switch

For an application which places Nuvo-3000 inside a cabinet, it's useful to control the on/off of the system using an external switch. Nuvo-3000 provides a 2x5, 2.0mm pitch wafer connector (for detail, please refer to section 2.2.8) for connecting a non-latched switch and behaves ATX-mode power on/off control. The external non-latched switch acts exactly the same as the power button on the front panel. To power on Nuvo-3000 using an external non-latched switch (ATX-mode), please follow the steps listed below.



1. Prepare a non-latched switch with a 2x5, 2.0mm pitch wafer terminal. Note that the switch must be connected to pin#1 and pin#2 (polarity is negligible).



2. Connect the wafer terminal to the wafer connector on the front panel of Nuvo-3000.



3. Push the non-latched switch will turn on the system (the PWR LED indicator on the front panel is on at the same time). Push the non-latched switch when system is on will turn off the system. If your operating system supports ATX power mode (i.e. Microsoft Windows or Linux), push the power button causes a pre-defined system behavior, such as shutdown or hibernation.

3.7.3 Power on Nuvo-3000 Using Wake-on-LAN Function

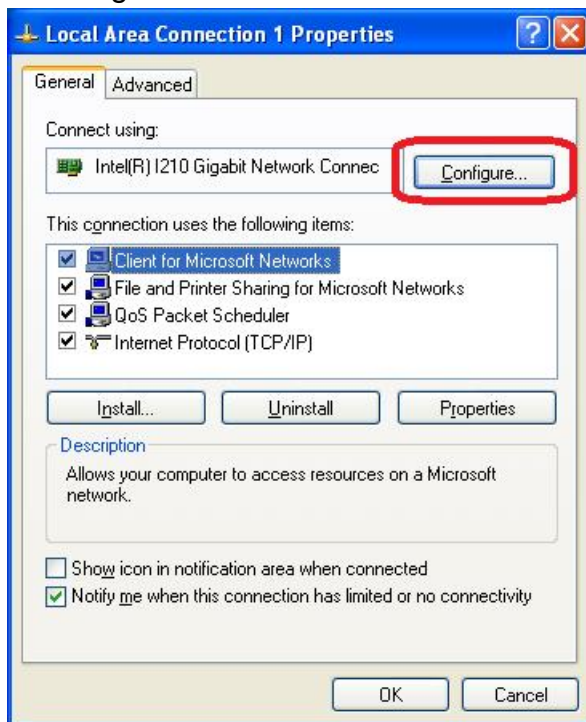
Wake-on-LAN (WOL) is a mechanism to wake up a computer system from a S5 (system off with standby power) state via issuing a magic packet. Nuvo-3000 implements the Wake-on-LAN function for its first GbE port.



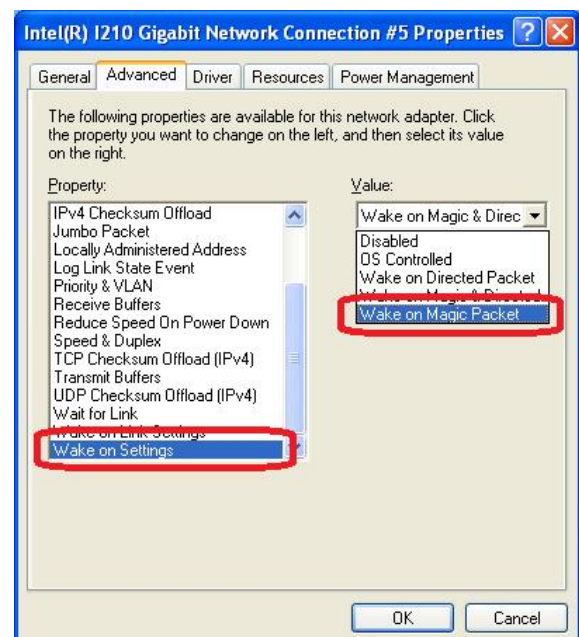
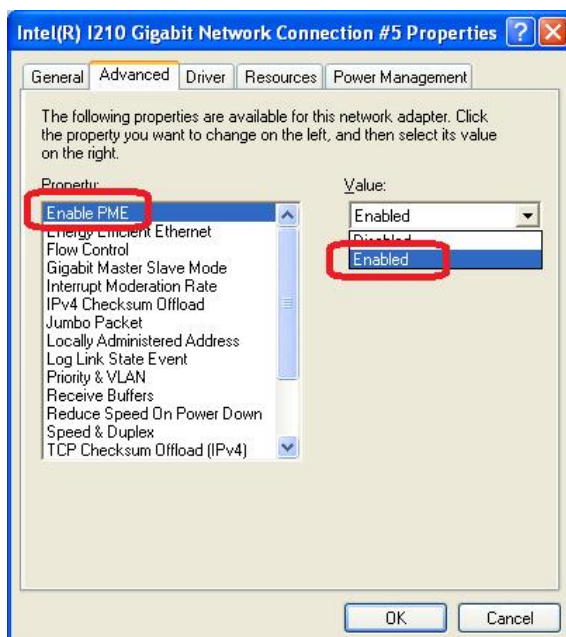
To enable WOL function and power on you Nuvo-3000, please follow the steps listed below.

For Windows XP

1. When Nuvo-3000 boots up, press F2 to enter BIOS setup utility.
2. Enter the **[Power]** menu. And configure the **[Wake On LAN]** option as **[Enabled]**.
This setting enables the Wake-on-LAN function for Nuvo-3000. Please refer to section 4.1.4 for the instruction of configuring this BIOS option.
3. In Windows XP system, identify the Local Area Connection of corresponding Intel® I210 Gigabit Controller and click the **Configure** button.



4. Click the **Advanced** tag, and configure the following two options accordingly.



- **Enable PME**

This option enables Intel® I210 to generate a power management event and signal the Nuvo-3000 to wake up from S5 state.

- **Wake on Magic Packet**

Nuvo-3000 can wake from S5 state when receiving a magic packet. The magic packet is a broadcast frame containing anywhere within its payload 6 bytes of all 255 (FF FF FF FF FF FF in hexadecimal), followed by sixteen repetitions of the target computer's 48-bit MAC address.

For example, NIC's 48-bit MAC Address is 78h D0h 04h 0Ah 0Bh 0Ch

```

DESTINATION SOURCE MISC
FF FF FF FF FF FF
78 D0 04 0A 0B 0C 78 D0 04 0A 0B 0C
78 D0 04 0A 0B 0C 78 D0 04 0A 0B 0C
78 D0 04 0A 0B 0C 78 D0 04 0A 0B 0C
78 D0 04 0A 0B 0C 78 D0 04 0A 0B 0C
78 D0 04 0A 0B 0C 78 D0 04 0A 0B 0C
78 D0 04 0A 0B 0C 78 D0 04 0A 0B 0C
78 D0 04 0A 0B 0C 78 D0 04 0A 0B 0C
78 D0 04 0A 0B 0C 78 D0 04 0A 0B 0C
MISC    CRC

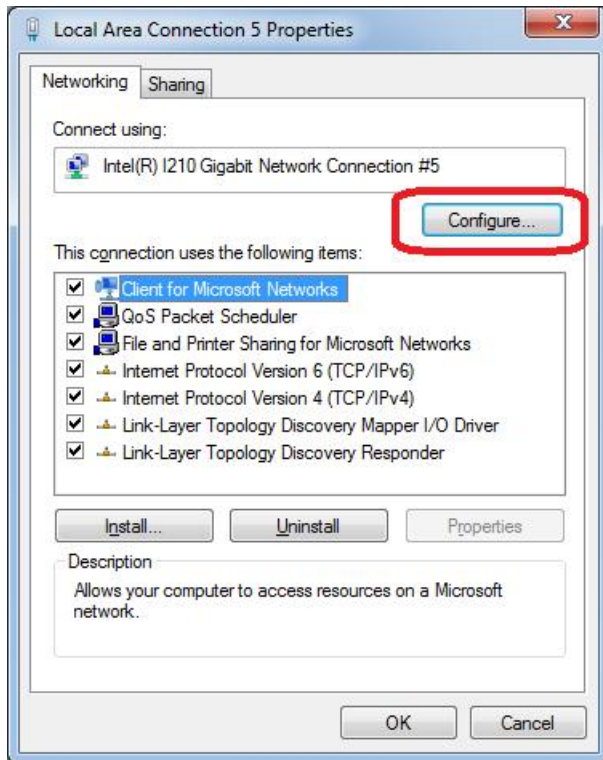
```

There are some free tools available on Internet that can be used to send a magic packet. Please refer to the following link to understand more about Magic Packet.
<http://en.wikipedia.org/wiki/Wake-on-LAN>

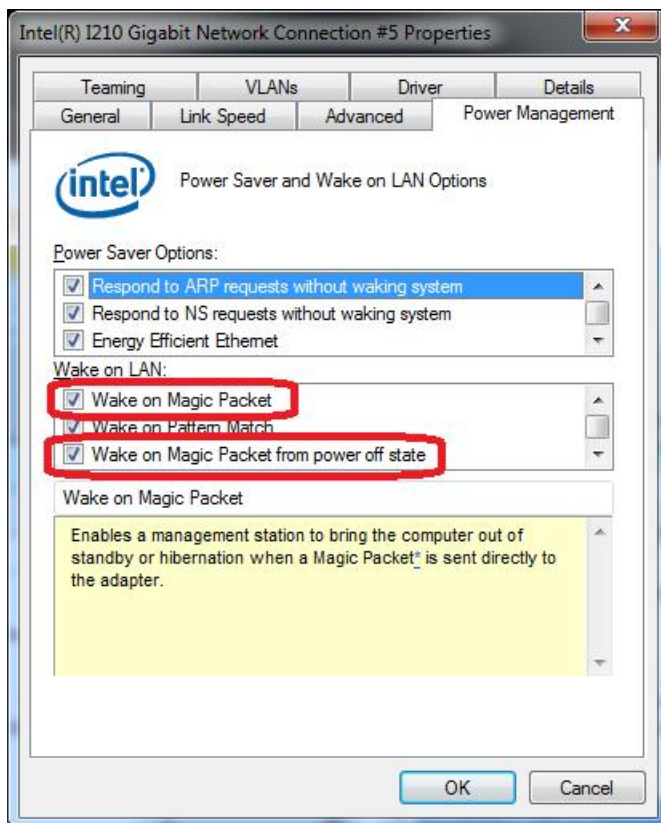
For Windows 7

1. When Nuvo-3000 boots up, press F2 to enter BIOS setup utility.
2. Enter the **[Power]** menu. And configure the **[Wake On LAN]** option as **[Enabled]**.
This setting enables the Wake-on-LAN function for Nuvo-3000. Please refer to section 4.1.4 for the instruction of configuring this BIOS option.
3. In Windows 7 system, identify the Local Area Connection of corresponding Intel® I210 Gigabit Controller and click the **Configure** button.





4. Click the **Power Management** tag, and check the following two options accordingly

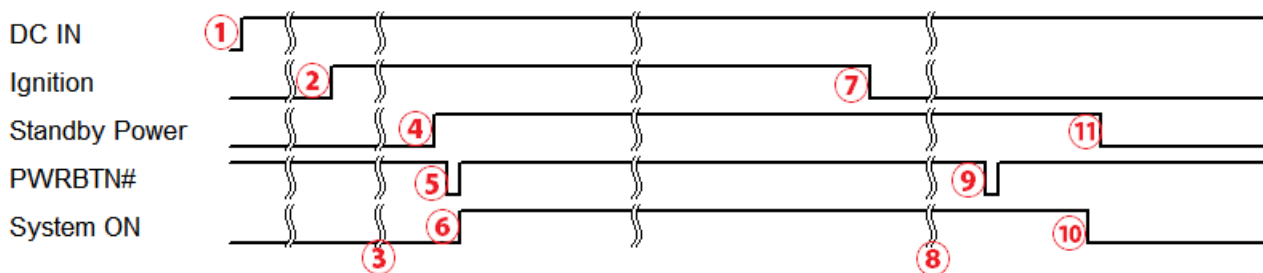


3.8 Ignition Power Control

Nuvo-3000 series offers the option of ignition power control module for in-vehicle applications. It's a MCU-based implementation that monitors the ignition signal and reacts to turn on/off the system according to predefined on/off delay. Its built-in algorithm supports further features such as ultra-low standby power, battery-low protection, system hard-off and etc. In this section, we'll illustrate the principle of ignition power control and operations modes on Nuvo-3000.

3.8.1 Principle of Ignition Power Control

The basic concept of ignition power control module is to control the timing correlation between ignition signal and system power status. A typical timing correlation can be described in following diagram.



- 1) When DC input is supplied to Nuvo-3000, MCU starts to periodically detect ignition signal. Note that only MCU is working at this moment and the overall power consumption is less than 2 mW.
- 2) Ignition signal is active. (Both 12VDC and 24VDC ignition signals are accepted)
- 3) MCU starts to count a pre-defined power-on delay.
- 4) Once power-on delay expired, MCU turns on necessary standby power for Nuvo-3000 (3.3VSB & 5VSB).
- 5) A PWRBTN# pulse is then issued to turn on the system (a similar behavior as you press the power button on the front panel).
- 6) Nuvo-3000 is booting up and running.
- 7) After a period of time, the ignition signal is inactive.
- 8) MCU starts to count a pre-defined power-off delay.
- 9) Once power-off delay expired, another PWRBTN# pulse is issued to perform a soft-off for the system (e.x. a normal shutdown process for Windows system).
- 10) Nuvo-3000 is completely shut down.
- 11) As MCU detects system is off, it turns off the standby power for Nuvo-3000, and then operates in low power mode again (< 2mW power consumption).

In addition to the typical timing correlation, the ignition power control module offers some further features to make Nuvo-3000 more reliable for in-vehicle applications.

1. Low battery detection

The ignition power control module is capable to continuously monitor the voltage of DC input when system is running. If input voltage is less than 9V (for 12VDC input) or less than 18V (for 24VDC input) over a 60 seconds duration, it will shut down the system automatically.

2. Guarded power-on/power-off delay duration

If ignition signal goes inactive during the power-on delay duration, the ignition power control module will cancel the power-on delay process and go back to idle status.

Likewise if ignition signal goes active during the power-off delay duration, the ignition power control module will cancel the power-off delay process and keep the system running.

3. System hard-off

In some cases, system may be failed to normally shutdown via a soft-off operation due to system/application halts. The ignition power control module on Nuvo-3000 offers a mechanism called "hard-off" to handle this unexpected condition. By detecting the system status, it can determine whether the system is normally shutdown. If not, the ignition power control module will compulsively cut off the system power 10 minutes after the power-off delay duration.

4. Smart off-delay

The ignition power control module on Nuvo-3000 offers two modes (mode 6 & mode 7) which have very long power-off delay duration for applications require some off-line processing after vehicle is stopped. In these two modes, the ignition power control module will automatically detect the system status during the power-off delay duration. If the system is shutdown (by the application software) in prior to power-off delay expired, it will cut off the system power immediately to prevent further consumption of battery power.



3.8.2 Operation Modes of Ignition Power Control

If the option of ignition power control modules is available, you can use the rotary switch on SBC to configure the operation mode. Nuvo-3000 offers 8 operation modes with different power-on/power-off delay configurations.



Note

For Nuvo-3000 which doesn't have the option of ignition power control module, please always set the rotary switch to 8 otherwise the system may be failed to operate.

● Mode 0

Mode 0 is the ATX mode without power-on and power-off delay. User can only use the power button on the front panel to turn on or turn off the Nuvo-3000 system.

Mode	Power-on Delay	Power-off Delay	Hard-off Timeout
0	N/A	N/A	N/A

● Mode 1

If Mode 1 is specified, the system automatically turns on the system when DC power is applied. A retry mechanism is designed to repeat the power-on cycle if the system is failed to boot up.

Mode	Power-on Delay	Power-off Delay	Hard-off Timeout
1	N/A	N/A	N/A

- **Mode 2 / Mode 3 / Mode 4 / Mode 5**

Mode 2 ~ Mode 5 are ignition power control modes with various power-on delay and power-off delay. Each mode supports a hard-off timeout of 10 minutes.

Mode	Power-on Delay	Power-off Delay	Hard-off Timeout
2	10 seconds	10 seconds	10 minutes
3	30 seconds	1 minute	10 minutes
4	30 seconds	5 minutes	10 minutes
5	30 seconds	30 minutes	10 minutes

- **Mode 6 / Mode 7**

Mode 6 and Mode 7 are ignition power control modes with very long power-off delay. Both modes support the feature of “smart off-delay”, which automatically detect system status during power-off delay duration and cut off system power if system is off in prior to power-off delay expired.

Mode	Power-on Delay	Power-off Delay	Hard-off Timeout
6	30 seconds	2 hours	10 minutes
7	30 seconds	5 hours	10 minutes



Chapter 4 BIOS and Driver

4.1 BIOS Settings

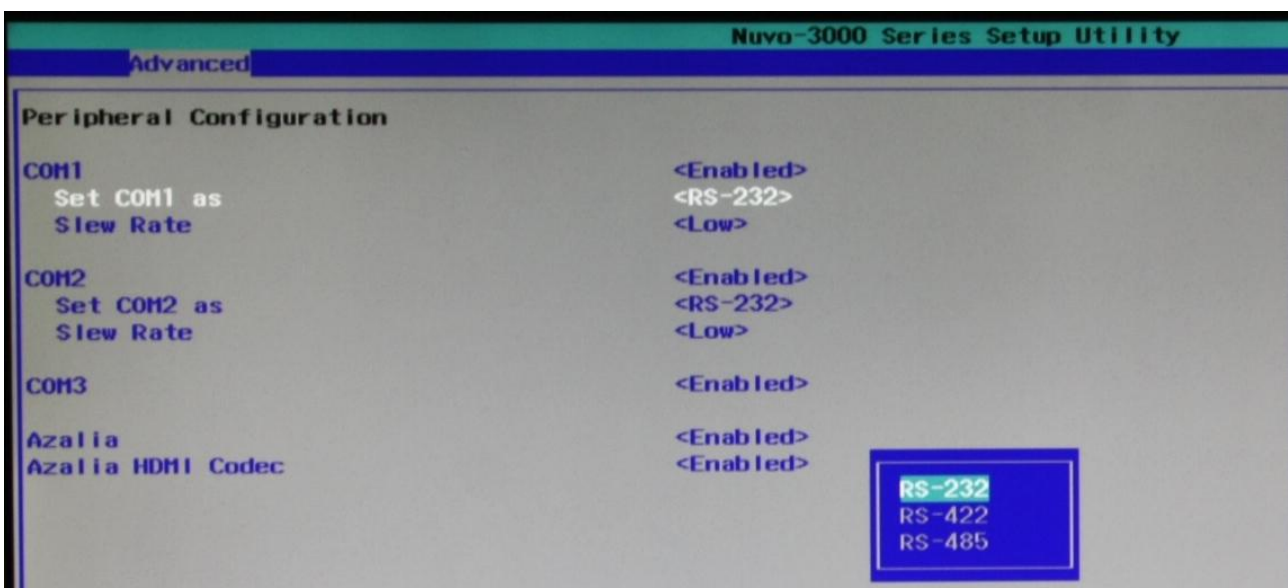
Nuvo-3000 is shipped with factory-default BIOS settings cautiously programmed for best performance and compatibility. In this section, we'll illustrate some of BIOS settings you may need to modify. Please always make sure you understand the effect of change before you proceed with any modification.

4.1.1 COM1 & COM2 Operating Mode

COM1 and COM2 of Nuvo-3000 support RS-232 (full-duplex), RS-422 (full-duplex) and RS-485 (half-duplex) mode. You can set the COM1/COM2 operating mode via BIOS settings. Another option in BIOS called "*Slew Rate*" defines how sharp the rising/falling edge is for the output signal of COM1/COM2. For long-distance RS-422/485 transmission, you may set the "*Slew Rate*" option as "High" to improve signal quality.

To set COM1/COM2 operating mode:

1. When Nuvo-3000 boots up, press F2 to enter BIOS setup utility.
2. Go to **[Advanced]** → **[Peripheral Configuration]**.
3. Set the **[Set COM1 as]** to a proper mode for COM1 of your Nuvo-3000.
4. Set the **[Set COM2 as]** to a proper mode for COM2 of your Nuvo-3000.



4.1.2 SATA Controller Mode

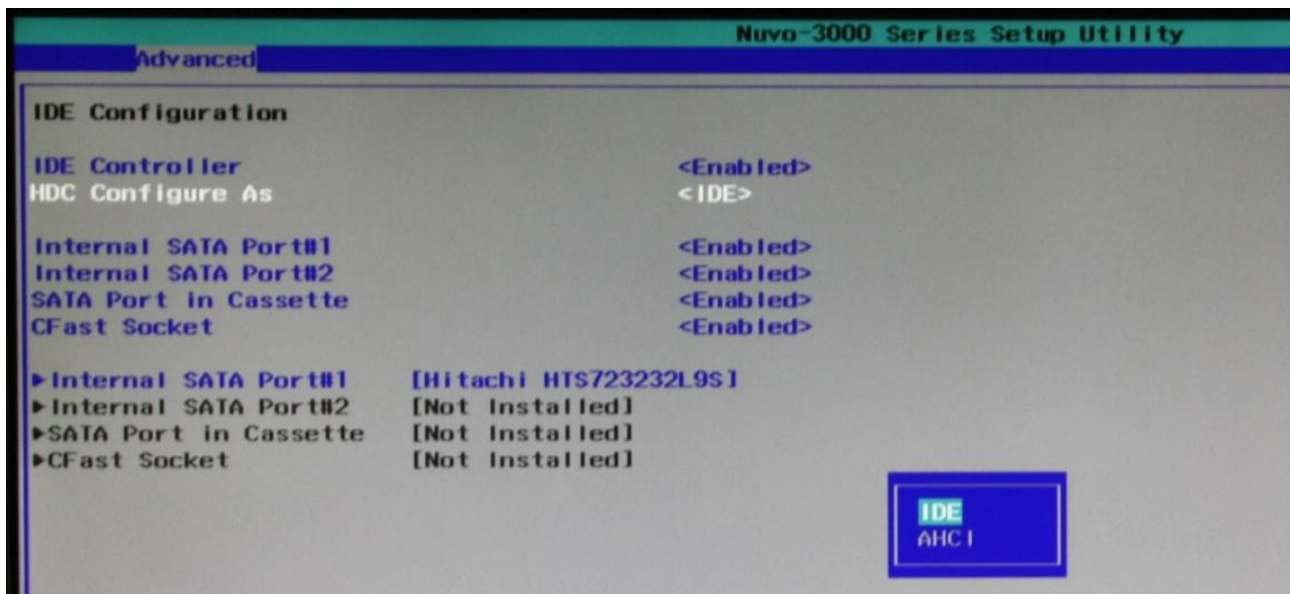
The SATA controller of Nuvo-3000 supports two modes of operations, **IDE** and **AHCI** mode. **IDE** mode configures SATA controller to access SATA interface in legacy IDE mode, and is compatible with most storage devices. **AHCI** mode, which exposes SATA's advanced capabilities such as hot swapping and native command queuing, is supported in several later version of operating systems.

Our suggestion of how to set SATA controller mode is

- If you're using Windows XP, Linux kernel earlier than 2.6.19, you should select **IDE** mode.
- If you're using Windows Vista, Windows 7, Windows 8, or Linux kernel from 2.6.19 onward, you can select **AHCI** mode for better performance.

To set SATA controller mode:

1. When Nuvo-3000 boots up, press F2 to enter BIOS setup utility.
2. Go to **[Advanced]** → **[SATA Configuration]**.
3. Set the **[HDC Configure as]** to a proper mode for your Nuvo-3000.



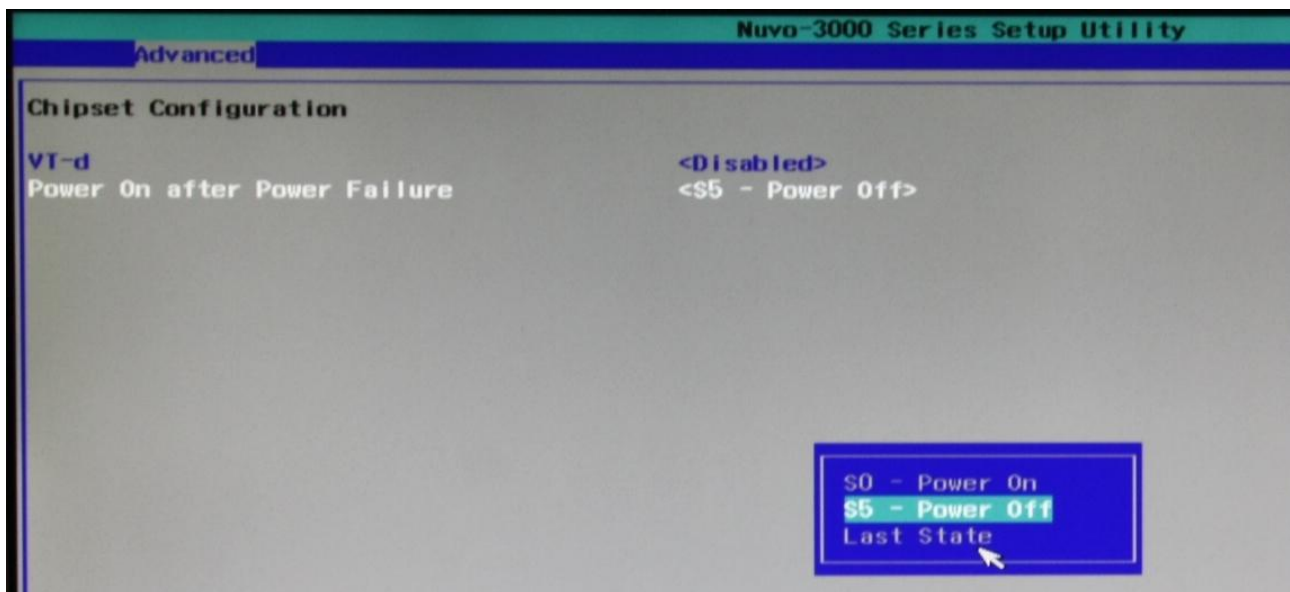
4.1.3 Power On after Power Failure Option

This option defines the behavior of Nuvo-3000 when DC power is supplied.

Value	Description
S0 – Power On	System is powered on when DC power is supplied.
S5 – Power Off	System is kept in off state when DC power is supplied.
Last State	The on/off state of the system is determined according to the last state when DC power is disconnected. For example, if system is still on but DC power is unplugged, the system is powered on next time when DC power is supplied.

To set “Power On after Power Failure” option:

1. When Nuvo-3000 boots up, press F2 to enter BIOS setup utility.
2. Go to **[Advanced]** → **[Chipset Configuration]**.
3. Set the **[Power On after Power Failure]** to a proper value for your Nuvo-3000.



4.1.4 Wake-on-LAN Option

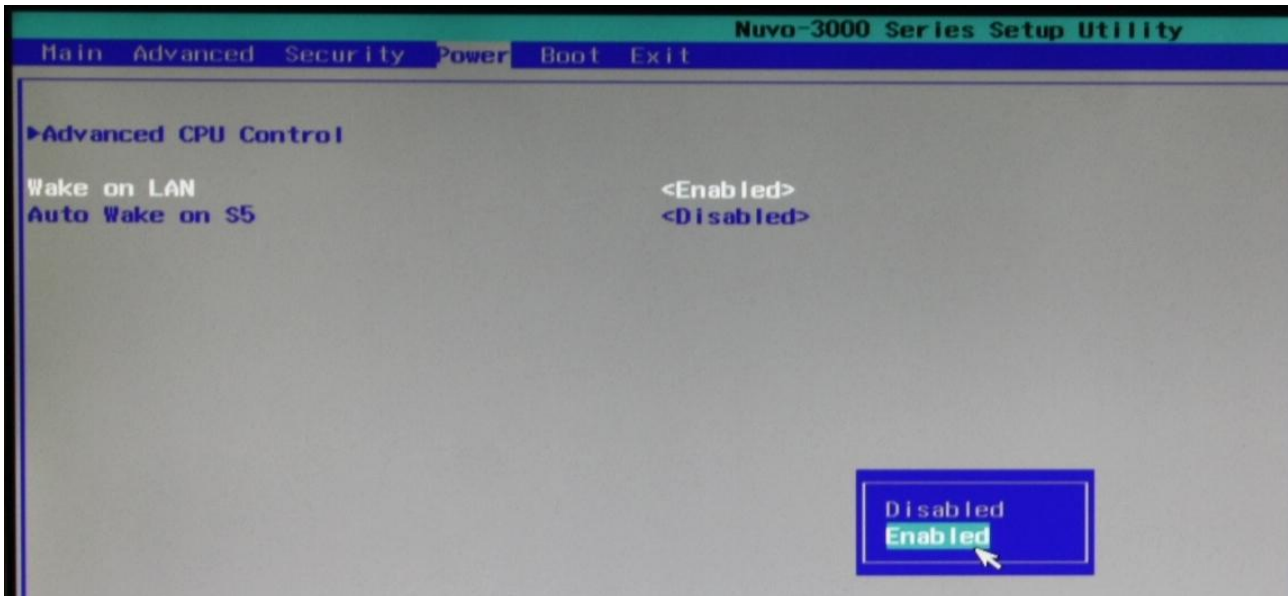
Wake-on-LAN (WOL) is a mechanism which allows you to turn on your Nuvo-3000 via Ethernet connection. To utilize Wake-on-LAN function, you have to enable this option first in BIOS settings. Please refer to section 3.7.3 for instructions of using WOL function.

To enable/disable “Wake on LAN” option:

1. When Nuvo-3000 boots up, press F2 to enter BIOS setup utility.
2. Go to **[Power]**.



3. Enable/disable the **[Wake on LAN]** option according to your application.

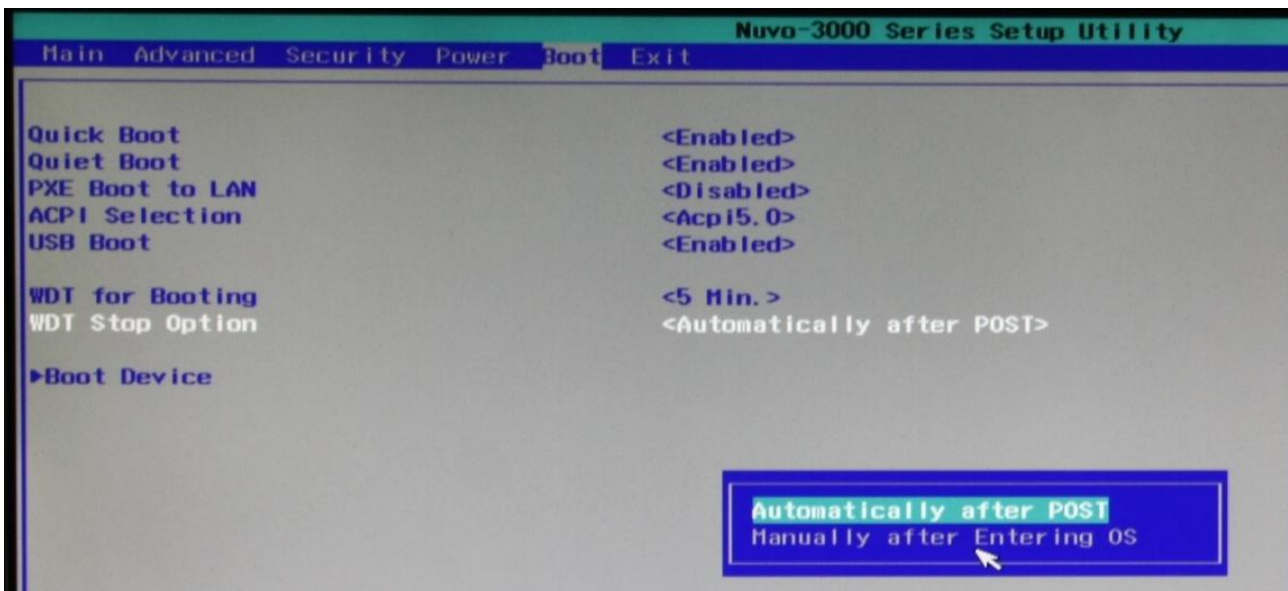
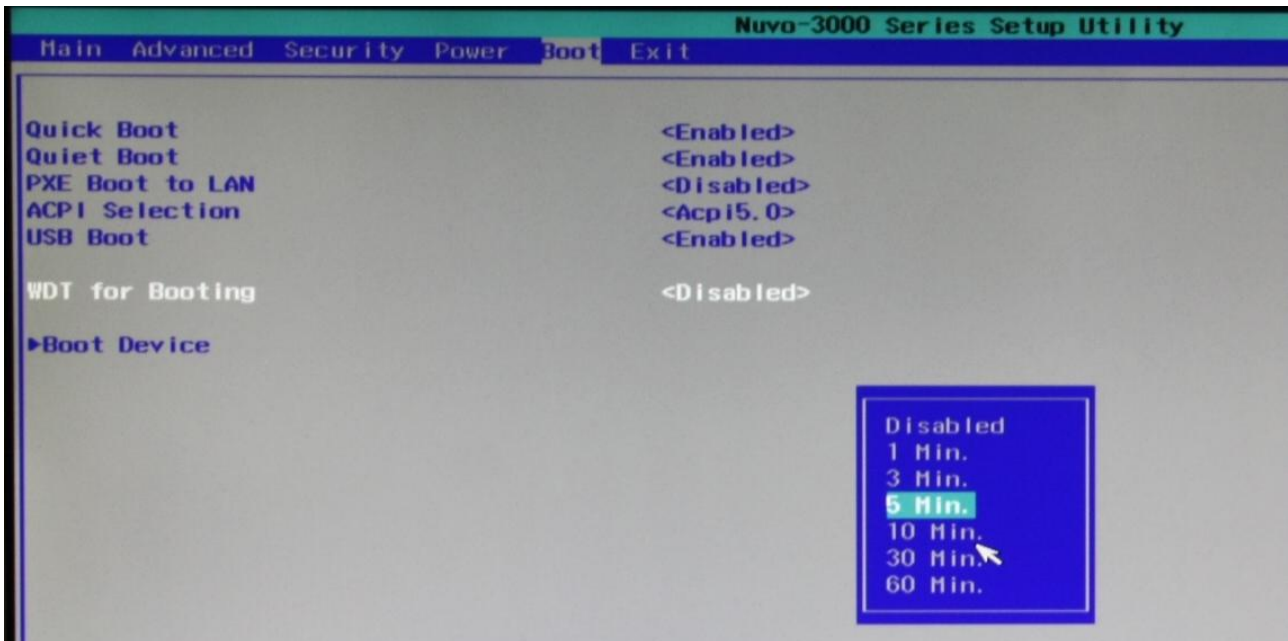


4.1.5 Watchdog Timer for Booting

The BIOS of Nuvo-3000 has a useful feature which allows users to use the watchdog timer to secure the booting process. You can specify the timeout value for watchdog timer. Once the watchdog timer expires, the BIOS issues a reset command to initiate another booting process. You can also set the behavior of how to stop the watchdog timer. There are two options in BIOS menu, “*Automatically after POST*” and “*Manually after Entering OS*”. When “*Automatically after POST*” is selected, the BIOS automatically stop the watchdog timer after POST (Power-On Self Test) OK. When “*Manually after Entering OS*” is selected, it’s user’s responsibility to stop the watchdog timer when entering OS. This guarantees the system can always boot to OS, otherwise another booting process will be initiated. For information about programming watchdog timer, please refer to **Appendix A Using Watchdog Timer & Isolated DIO**.

To set the watchdog timer for boot in BIOS:

1. When Nuvo-3000 boots up, press F2 to enter BIOS setup utility.
2. Go to **[Boot]** menu.
3. Disable or select timeout value for **[WDT for Booting]** option.
4. Once you give a timeout value, the **[WDT Stop Option]** option appears. You can select “*Automatically after POST*” or “*Manually after Entering OS*”.



4.1.6 Select a Boot Device

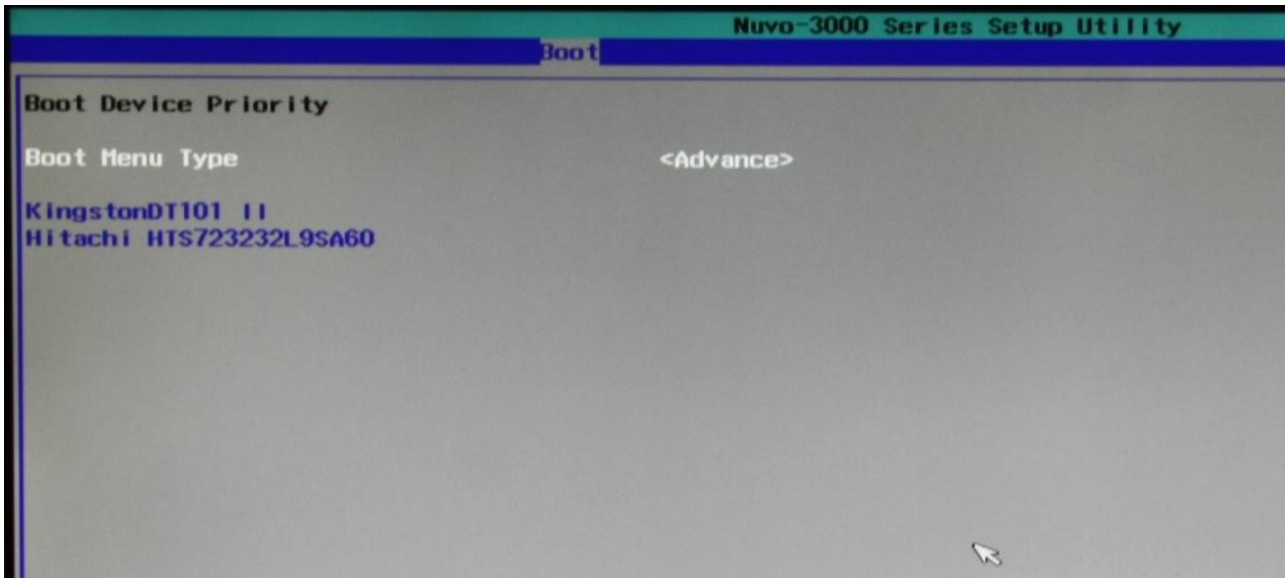
When you have multiple bootable devices connected to your Nuvo-3000 (i.e. HDD, mSATA, USB flash disk, USB DVD-drive), you may need to select one of them as the boot device. There are two ways to select the device. You can either, press F12 when system boots up to go to Boot Manager and then select one of the devices, or select the boot device in BIOS settings.

To select a boot device in BIOS:

1. When Nuvo-3000 boots up, press F2 to enter BIOS setup utility.
2. Go to **[Boot]** → **[Boot Device]**.



- The **[Boot Menu Type]** option decides whether to list all bootable devices connected to your Nuvo-3000 according to device (**Advanced** mode) or device category (**Normal** mode). You can use F5/F6 or +/- to change the boot order of devices or device categories.



4.2 Operating System Support

Nuvo-3000 supports most operating system developed for Intel® x86 architecture. The following list contains the operating systems which have been tested in Neosys Technology Inc.

- Microsoft Window XP 32-bit
- Microsoft Window 7 32-bit
- Microsoft Window 7 64-bit
- Ubuntu (version later than 11.04 Desktop 64bit)*
- Ubuntu (version later than 10.10 Desktop 32bit)*
- Debian (version later than 6.0 64bit)*
- Fedora 14 i386 32bit*
- CentOS 6.4 32bit

**For Linux system, user may need to manually compile and install the driver for Intel I210 GbE controller if the driver is not embedded in kernel. You can visit Intel website for further information.*

Neosys will keep this list updated as we continuously test other operating systems with Nuvo-3000. Please contact us for the latest OS support list.



4.3 Driver Installation

Neosys Technology Inc. provides a very convenient utility in “Drivers & Utilities DVD” to allow the “One-Click” driver installation. This utility automatically detects your Windows operating system and installs all necessary drivers to your Nuvo-3000 with just one mouse click.

4.3.1 Install All Drivers Using “One-Click” Driver Installation

1. Insert the “Drivers & Utilities DVD” into a USB DVD-drive attached to your Nuvo-3000. A setup utility launches and the following dialog appears.



2. Click on the “**Automatic Driver Installation**”. The setup utility will automatically detect your Windows operating system and install all necessary drivers. According to different versions of Windows, the installation process takes about 6~8 minutes. Once driver installation is done, the setup utility reboots your Windows and your system works normally afterward.



4.3.2 Install Drivers Manually

You can also manually install each driver for Nuvo-3000. Please refer to the following information about installing drivers for different operating system.

Windows XP SP3

The recommended driver installation sequence is

1. Chipset driver (x:\Driver_Pool\Chipset_7_Series\ALL\infinst_autol.exe)
2. .NET Framework 3.5 (x:\Driver_Pool\DotNET35\XP\dotnetfx35.exe)
3. Graphics driver (x:\Driver_Pool\Graphics_3rd_i7\XP\Setup.exe)
4. Audio driver (x:\Driver_Pool\Audio_ALC262\XP\Setup.exe)
5. LAN driver (x:\Driver_Pool\GbE_I210\XP\I210_XP_Install.exe)
6. ME driver (x:\Driver_Pool\ME_7_Series\ALL\Setup.exe)

Windows XP SP2

The recommended driver installation sequence is

1. Chipset driver (x:\Driver_Pool\Chipset_7_Series\ALL\infinst_autol.exe)
2. Windows Installer 3.1
(x:\Driver_Pool\DotNET35\XP\WindowsInstaller-KB893803-v2-x86.exe)
3. .NET Framework 3.5 (x:\Driver_Pool\DotNET35\XP\dotnetfx35.exe)
4. Audio patch for HD audio
(x:\Driver_Pool\Audio_ALC262\XP\MSHDQFE\Win2K_XP\us\kb888111xpsp2.exe)
5. Graphics driver (x:\Driver_Pool\Graphics_3rd_i7\XP\Setup.exe)
6. Audio driver (x:\Driver_Pool\Audio_ALC262\XP\Setup.exe)
7. LAN driver (x:\Driver_Pool\GbE_I210\XP\I210_XP_Install.exe)
8. ME driver (x:\Driver_Pool\ME_7_Series\ALL\Setup.exe)

Windows 7 32-bit

The recommended driver installation sequence is

1. Chipset driver (x:\Driver_Pool\Chipset_7_Series\ALL\infinst_autol.exe)
2. Graphics driver (x:\Driver_Pool\Graphics_3rd_i7\Win7_32\Setup.exe)
3. Audio driver (x:\Driver_Pool\Audio_ALC262\Win7_ALL\Setup.exe)
4. LAN driver
(x:\Driver_Pool\GbE_I210\Win7_32\APPS\PROSETDX\Win32\DxSetup.exe)
5. USB 3.0 driver (x:\Driver_Pool\USB3_7_Series\Win7_ALL\Setup.exe)
6. ME driver (x:\Driver_Pool\ME_7_Series\ALL\Setup.exe)

Windows 7 64-bit



The recommended driver installation sequence is

1. Chipset driver (x:\Driver_Pool\Chipset_7_Series\ALL\infinst_autol.exe)
2. Graphics driver (x:\Driver_Pool\Graphics_3rd_i7\Win7_64\Setup.exe)
3. Audio driver (x:\Driver_Pool\Audio_ALC262\Win7_ALL\Setup.exe)
4. LAN driver
(x:\Driver_Pool\GbE_I210\Win7_64\APPS\PROSETDX\Winx64\DxSetup.exe)
5. USB 3.0 driver (x:\Driver_Pool\USB3_7_Series\Win7_ALL\Setup.exe)
6. ME driver (x:\Driver_Pool\ME_7_Series\ALL\Setup.exe)



Appendix A Using Watchdog Timer & Isolated DIO

Neosys Nuvo-3000 series provide a watchdog (WDT) timer function to ensure a more reliable system operation. The WDT is a hardware mechanism to reset the system if the watchdog timer is expired. Users can start the WDT and keep resetting the timer to make sure the system or program is running. Otherwise, the system shall be reset.

Except for hardware watchdog function, an option of isolated digital I/O is available for extended range of applications. Nuvo-3000 feature the option of 8x DI channels and 8x DO channels via a DSub-25 connector. The optional digital I/O supports standard polling mode I/O access so users' program can read or write DIO channel(s) using this function library. Furthermore, it also features an enhanced mode of DIO operation called "Change-of-State Interrupt". By detecting any change on digital input channel(s), an interrupt is generated according to a user-defined interrupt mask and level/edge setting, so user's program can react to the change.

In this document, we'll illustrate how to use the function library provided by Neosys to program the WDT and DIO functions. Currently, WDT & DIO driver library supports the following operating systems:

- Windows XP
- Windows Vista (32-bit)
- Windows 7 (32-bit & 64-bit)

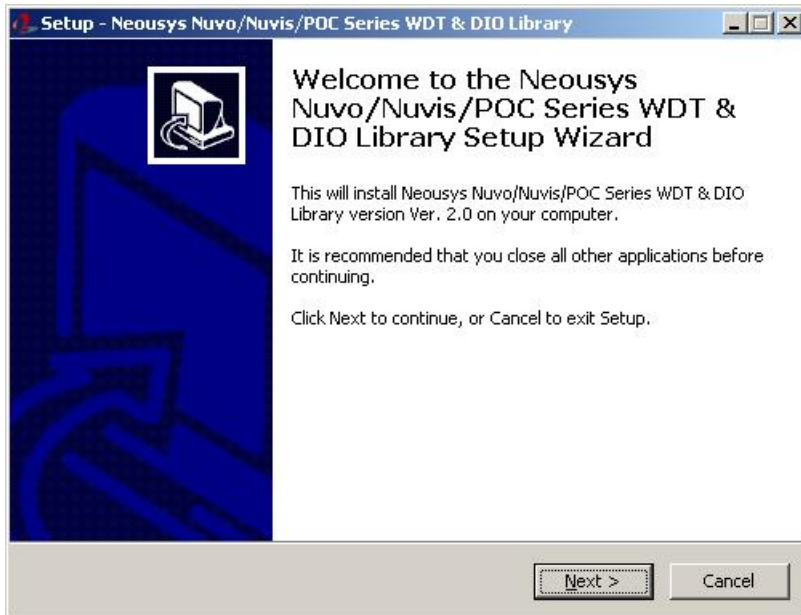
For other OS support, please contact Neosys Technology for further information.



Install WDT and DIO Library

The WDT_DIO function library is delivered in the form of a setup package named **WDT_DIO_Setup.exe**. In prior to program WDT and DIO on Nuvo and POC series, you should execute the setup program and install the WDT and DIO library.

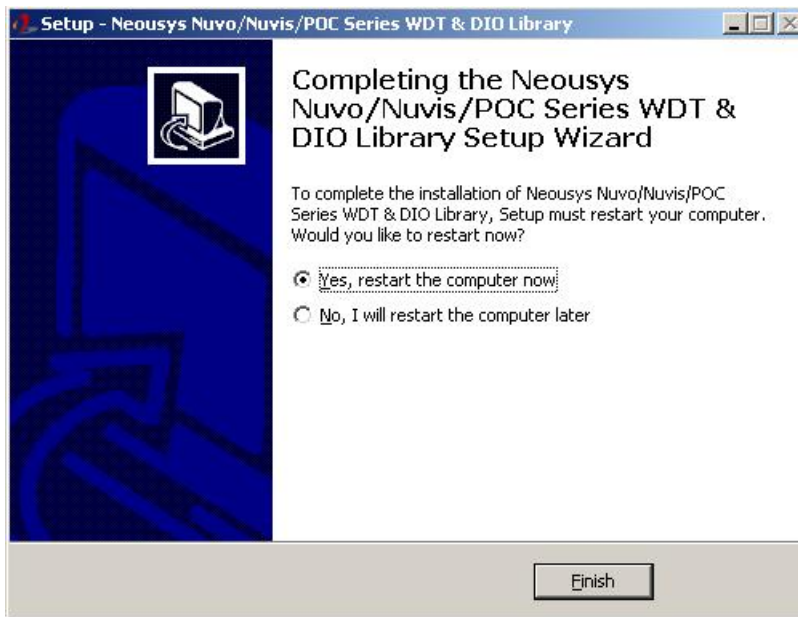
1. Execute **WDT_DIO_Setup.exe**. The following dialog appears.



2. Click "Next >" and specify the directory of installing related files. The default directory is `C:\Neosys\WDT_DIO`.



- Once the installation is finished, a dialog appears to prompt you to reboot the system. The WDT & DIO library will take effect after system rebooting.



- When you programming your WDT or DIO program, the related files are located in
 - Header file: \Include
 - Lib file: \Lib
 - Function Reference: \Manual
 - Sample Code: \Sample

Using WDT Function

WDT Function Reference

InitWDT

Description

Initialize the WDT function. You should always invoke InitWDT() before set or start watchdog timer.

Parameter

None

Return Value

Returns TRUE if initialization successes, FALSE if initialization failed.

Usage

```
BOOL bRet = InitWDT();
```

SetWDT

Description

Set timeout value and unit for watchdog timer. When InitWDT() is invoked, a default timeout value of 255 seconds is assigned.

Parameter

tick

WORD value (1 ~ 65535) to indicate timeout ticks.

unit

BYTE value (0 or 1) to indicate unit of timeout ticks.

0 : unit is minute

1: unit is second

Return Value

If value of unit is correct (0 or 1), this function returns TRUE, otherwise FALSE.

Usage

```
WORD tick=255;
```

```
BYTE unit=1; //unit is second.
```

```
BOOL bRet = SetWDT(tick, unit); //timeout value is 255 seconds
```



StartWDT

Description

Start countdown of WDT. When WDT is started, the WDT LED indicator starts to blink in a frequency of 1Hz. If no ResetWDT() or StopWDT is invoked before WDT is counted to 0, the WDT expires and system resets.

Parameter

None

Return Value

If the timeout value is given in correct format, this function returns TRUE, otherwise FALSE.

Usage

```
BOOL bRet = StartWDT()
```

ResetWDT

Description

Reset the timeout value to the value given by SetWDT(). If no ResetWDT() or StopWDT is invoked before WDT is counted to 0, the WDT expires and system resets.

Parameter

None

Return Value

Always returns TRUE;

Usage

```
BOOL bRet = ResetWDT()
```

StopWDT

Description

Stop the countdown of WDT. When WDT is stopped, the WDT LED indicator stops blinking.

Parameter

None

Return Value

Always returns TRUE;

Usage

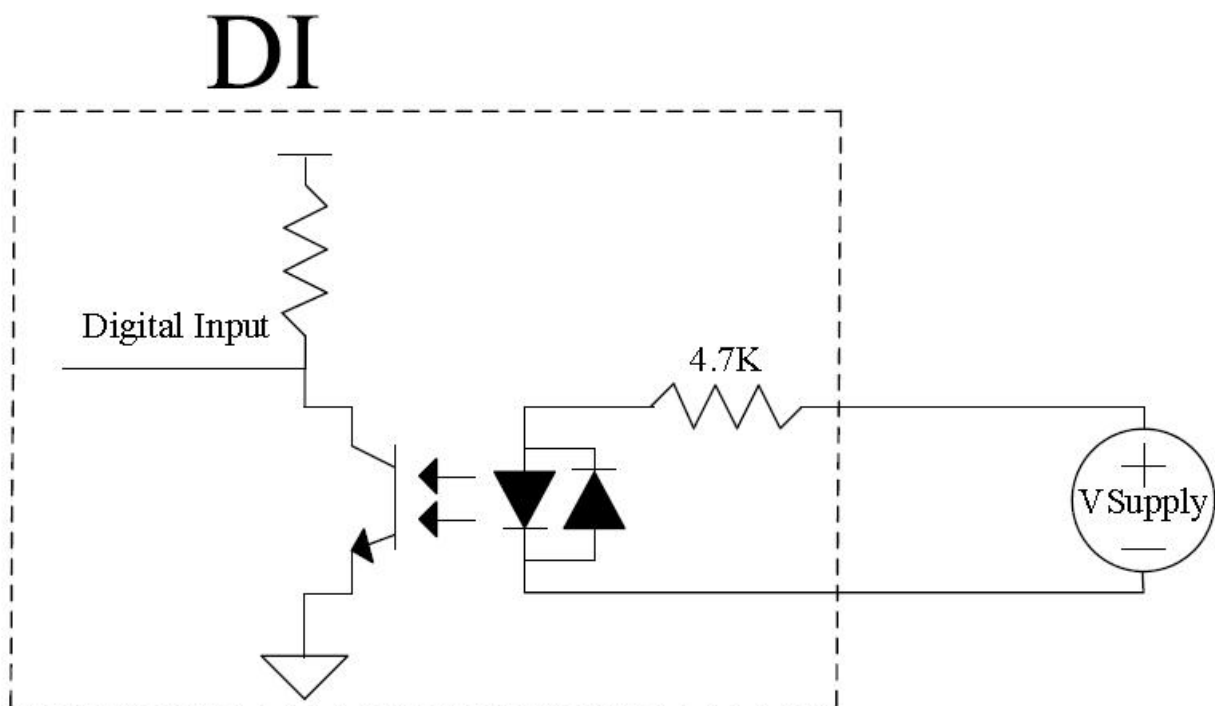


```
BOOL bRet = StopWDT();
```

Using DIO Function

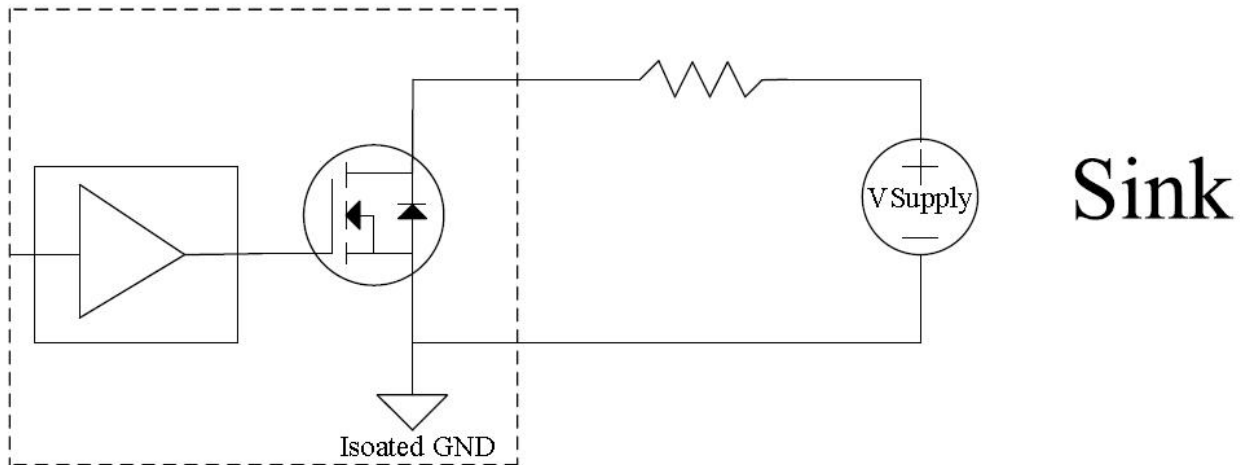
Wiring for DIO

The digital input function of Nuvo-3000 is implemented using a photo-coupler with an internally series-connected 4.7kΩ resistor. You need to provide a voltage to specify the logic high/low state. The input voltage for logic high is 5~24V, and the input voltage for logic low is 0~1.5V.

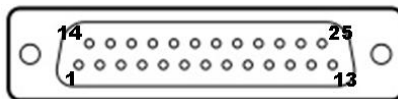


The digital output function of Nuvo-3000 is implemented using Power MOSFET + Analog Device iCoupler® component. The DO channels are configured as NO (normally-open) configuration. When you turn on system, all DO channels have a deterministic state of logic 0 (circuit disconnected from GND return). When logic 1 is specified, MOSFET is activated and GND return path is established. The digital output function on Nuvo-3000 series supports sinking current connection. The following diagrams are the suggested wiring for DO:

DO



DIO Channel Definition



Pin#	Pin Definition	Pin#	Pin Definition
1	VDD	14	ISO_5V
2	DO_0	15	DO_GND
3	DO_3	16	DO_1
4	DO_GND	17	DO_2
5	DO_5	18	DO_4
6	DO_7	19	DO_6
7	DI_GND	20	DO_GND
8	DI_6	21	DI_GND
9	DI_1	22	DI_5
10	DI_GND	23	DI_3
11	DI_0	24	DI_7
12	DI_2	25	DI_GND
13	DI_4		

DIO Function Reference

InitDIO

Description

Initialize the DIO function. You should always invoke InitDIO() before write/read any DIO port/channel.

Parameter

None

Return Value

Returns TRUE if initialization successes, FALSE if initialization failed.

Usage

```
BOOL bRet = InitWDT();
```

DIReadLine

Description

Read a single channel of isolated digital input.

Parameter

ch

BYTE value specifies the DI channel to be read.

For Nuvo-1000/2000+/1300af/3000, *ch* should be a value of 0 ~ 7. For Nuvo-2000, *ch* should be a value of 0 ~ 11.

Return Value

The status (TRUE or FALSE) of the specified DI channel.

Usage

```
BYTE ch=3; //DI channel #3
```

```
BOOL DIChValue = DIReadLine(ch); //read DI channel #3
```

DIReadPort

Description

Read the entire isolated digital input port (8 channels).

Parameter

None



Return Value

A WORD value indicates the status of DI port (8 DI channels).

For Nuvo-1000/2000+/1300af/3000, *the return value is a* . For Nuvo-2000, *ch* should be a value of 0 ~ 11.

Usage

```
WORD  DIPortValue = DIRReadPort ();
```

DOWriteLine**Description**

Write a single channel of isolated digital output.

Parameter

ch

BYTE value specifies the DO channel to be written.

For Nuvo-1000/2000+/1300af/3000, *ch* should be a value of 0 ~ 7. For Nuvo-2000, *ch* should be a value of 0 ~ 11.

value

BOOL value (TRUE or FALSE) specifies the status of DO channel.

Return Value

None

Usage

```
BYTE  ch=3; //DI channel #3
```

```
BOOL  DOChValue=TRUE;
```

```
DOWriteLine(ch, DOChValue); //write DO channel #3 as TRUE
```

DOWritePort**Description**

Write the entire isolated digital output port (8 channels).

Parameter

value

WORD value specifies the status of the DO port. For Nuvo-1000/1300af, *value* should be a value of 0~255. For Nuvo-2000, *value* should be a value of 0~4095.

Return Value

None



Usage

```
WORD DOPortValue=0xFF; //11111111b
```

```
DOWritePort(DOPortValue); //write DO port as 11111111b
```



Using COS Function

SetupDICOS

Syntax

```
BOOL SetupDICOS(COS_INT_SETUP *lpSetup, DWORD cbSetup);
```

Description

Setup Digital-Input(DI) Change-of-State(COS) interrupt parameters.

Parameter

lpSetup [in]

A pointer to a **COS_INT_SETUP** structure that contains the COS configuration information for the DI device.

This data structure contains the following variables:

portMask

WORD value specifies the interrupt mask for corresponding channel(s).

edgeMode

WORD value specifies that interrupt is generated when level change (set to 0) or on rising/falling edge (set to 1) for the corresponding channel(s).

edgeType

WORD value specifies that interrupt is generated on rising edge (set to 0) or falling (set to 1) edge for corresponding channel(s). This value is neglected if *edgeMode* is set to 0 for the corresponding channel(s).

cbSetup [in]

The length of the structure, in bytes. The caller must set this member to `sizeof(COS_INT_SETUP)`.

Return Value

Returns TRUE if setup successes, FALSE if setup failed.

Usage

```
COS_INT_SETUP  setup;
```

```
memset(&setup, 0, sizeof(setup));
```

```
setup.portMask = 0xff; // enable ch.0~7
```

```
setup.edgeMode = 0; // level
```

```
setup.edgeType = 0x00; // Lo/Hi
```

```
BOOL  bRet = SetupDICOS(&setup, sizeof(setup));
```



RegisterCallbackDICOS

Syntax

```
BOOL RegisterCallbackDICOS(COS_INT_CALLBACK callback);
```

Description

Registers a callback function, which is called when the DICOS interrupt occurred.

Parameter

callback [in]

Specifies the callback function. The prototype for this function is described as follow.

```
void __stdcall callback_func(COS_INT_CALLBACK_ARG* arg);
```

Return Value

Returns TRUE if setup successes, FALSE if setup failed.

Usage

```
void __stdcall callback_func(COS_INT_CALLBACK_ARG* arg)
{
    printf("data=0x%02x, flag=0x%02x, seq=%02d\n",
        arg->portData, arg->intrFlag, arg->intrSeq);
}
BOOL bRet = RegisterCallbackDICOS(callback_func);
```

StartDICOS

Syntax

```
BOOL StartDICOS(void);
```

Description

Start DI Change-of-State interrupt

Parameter

None

Return Value

Returns TRUE if start procedure successes, FALSE if start procedure failed.

Usage

```
BOOL bRet = StartDICOS();
```



StopDICOS

Syntax

```
BOOL StopDICOS(void);
```

Description

Stop DI Change-of-State interrupt

Parameter

None

Return Value

Returns TRUE if stop procedure successes, FALSE if stop procedure failed.

Usage

```
BOOL bRet = StopDICOS();
```

DI COS Example

```
#include <stdio.h>
#include <stdlib.h>
#include <windows.h>
#include "WDT_DIO.h"

//Step 0, define a Change-of-State Interrupt callback function
void __stdcall callback_function(COS_INT_CALLBACK_ARG* arg)
{
    printf("data=0x%02x, flag=0x%02x, seq=%02d\n",
        arg->portData, arg->intrFlag, arg->intrSeq);
}

int main(int argc, char* argv[])
{
    //Step 1, initialize DIO library by invoking InitDIO()
    if (! InitDIO() )
    {
        printf("InitDIO --> FAILED\n");
        return -1;
    }
    printf("InitDIO --> PASSED\n");
}
```

```

//Step 2, setup Change-of-State Interrupt mask and level/edge mode
COS_INT_SETUP  setup;

memset(&setup, 0, sizeof(setup));

setup.portMask = 0x0f;    // 00001111b, enable ch.0~3
setup.edgeMode = 0x00;   // generate interrupt on level change
setup.edgeType = 0x00;   // rising/falling edge, only effective when edgeMode = 1

if ( ! SetupDICOS(&setup, sizeof(setup)) )
{
    printf("SetupDICOS --> FAILED\n");
    return -2;
}
printf("SetupDICOS --> PASSED\n");

//Step 3, register the callback function
if ( ! RegisterCallbackDICOS(callback_function) )
{
    printf("RegisterCallbackDICOS --> FAILED\n");
    return -3;
}
printf("RegisterCallbackDICOS --> PASSED\n");

//Step 4, start the DI Change-of-State Interrupt
if ( ! StartDICOS() )
{
    printf("StartDICOS --> FAILED\n");
    return -4;
}
printf("StartDICOS --> PASSED\n");

printf("\npress any key to stop...\n");
system("pause >nul");

//Step 5, stop the DI Change-of-State Interrupt operation
if ( ! StopDICOS() )
{
    printf("StopDICOS --> FAILED\n");
}

```



```
        return -5;
    }
    printf("StopDICOS --> PASSED\n");

    printf("\npress any key to exit...\n");
    system("pause >nul");
    return 0;
}
```

