# NEON-1020/1040

Quad Core x86 Smart Camera

**User's Manual**




| | |
|---|---|
| **Manual Rev.:** | 2.00 |
| **Revision Date:** | May 13, 2015 |
| **Part No:** | 50-1Z168-2000 |

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# Revision History

| Revision | Release Date | Description of Change(s) |
|---|---|---|
| 2.00 | May 13, 2015 | Initial release |


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# Preface

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## Conventions

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




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




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




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

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# 1 Introduction

## 1.1 Overview

The NEON-1040 is a powerful new generation x86 smart camera that features the Intel® Atom™ Processor E3845 1.9 GHz, 4 MP at 60 fps, global shutter image sensor, and PWM lighting control support. The NEON-1040 stands out with its minimal footprint and superior computing power, and rugged IP67-rated construction and M12 connectors enable the NEON-1040 to withstand the harshest industrial environments.

High-end quad-core processor with FPGA coprocessors, GPU and up to 32GB storage for image processing, programs, and archiving, all provide advanced image processing ability ideally suited to high speed high resolution industrial imaging. Optimal I/O connectivity includes one additional slave GigE Vision camera connection, 4x digital inputs, 4x digital outputs, and VGA output, all maximizing integration with external devices.

Flexible software development support, including GenTL support for image acquisition and Open CV and Open CL programming, further significantly benefits developers by easing migration from x86 platforms.

## 1.2 Features

- Intel® Atom™ Quad-Core Processor E3845 1.91GHz
- 4MP, 60fps, monochrome global shutter CMOS sensor
- IP67-rated housing and M12 connectors
- Advanced image processing support
- Additional GigE Vision slave camera support
- Built-in PWM lighting control
- 4x digital inputs, 4x digital outputs, USB 2.0 port, RS-232 ports
- VGA output, max. 2048x1152 @60 Hz
- Flexible software support with STEMMER Common Vision Blox, MVTec HALCON, and many others
- GeniCam , GenTL, Open CV and Open CL compatible with image acquisition

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## 1.3 Specifications

| | | NEON-1020 | NEON-1040 |
|---|---|---|---|
| **Processing & Memory** | | | |
| Processor | | Quad core Intel Atom E3845 @ 1.91GHz | |
| Display | | VGA output, max 2048x1152 at 60 Hz. | |
| RAM | | 2GB/4GB DDR3L | |
| Storage | | 16GB/32GB solid state drive | |
| Advanced Processing | | ROI, LUT, Shading Correction | |
| **Sensor** | | | |
| Image Sensor | | CMV2000 | CMV4000 |
| Resolution | | 2048 x 1088 | 2048 x 2048 |
| Sensor Size | | 2/3” | 1” |
| Frame Rate | | 120fps (8bit)<br>60fps (12bit) | 60fps (8bit)<br>30fps (12bit) |
| Format | | Monochrome | |
| Pixel Size (µm) | | 5.5 | |
| Shutter | | Global | |
| Trigger Mode | | External trigger, software trigger, free run | |
| **I/O** | | | |
| Trigger Input | | 1x Opto-isolated trigger input | |
| Digital Output | | 4x sink type output, max sink 100mA<br>sink voltage max 30VDC | |
| Digital Input | | 4x TTL level input | |
| PWM Lighting Control | Drive Method | Constant current, max. 500 mA | |
| | Applicable Light Units | 12 VDC to 24 VDC illuminators | |
| Dimming Resolution | | 1000:1 | |
| Ethernet | | 1 x GbE | |
| Serial Communication | | 1 x RS-232 (TX and RX only) | |
| USB | | 1 x USB 2.0 | |
| **Physical** | | | |
| Dimensions | | 68.5W x 110D x 52.7 mm | |
| Lens mount | | C mount | |
| Connectors | | 1xM12 8-pin female, 1xM12 17-pin male,<br>1x M12 12-pin male | |

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| | NEON-1020 | NEON-1040 |
|---|---|---|
| **Software** | | |
| OS | Windows 7, Windows Embedded Standard 7 | |
| **Environmental & Electrical** | | |
| Power Consumption | 24 VDC +/-10%, 13W, 0.62A(typical) | |
| Operating Temperature | 0 to 50°C | |
| Vibration | Operating, 5 Grms, 5-500 Hz, 3 axes | |
| Certification | IP67, CE, CB, FCC Class A. UL | |

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## 1.4 Schematics

NOTE:

- All units are in millimeters (mm)
- External dimensions for the NEON-1020 and NEON-1040 are identical

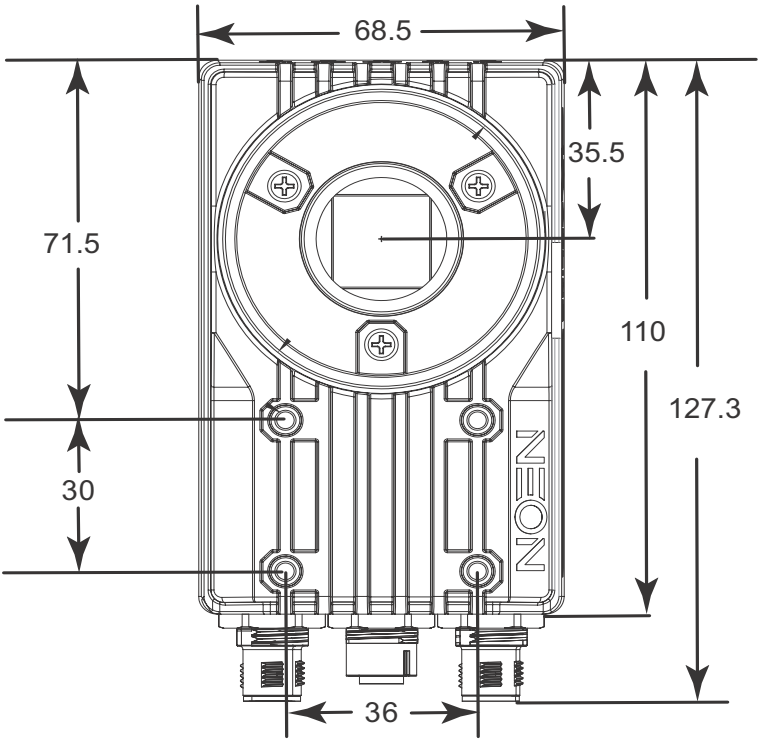



**Figure 1-1: NEON-1040 Front View**

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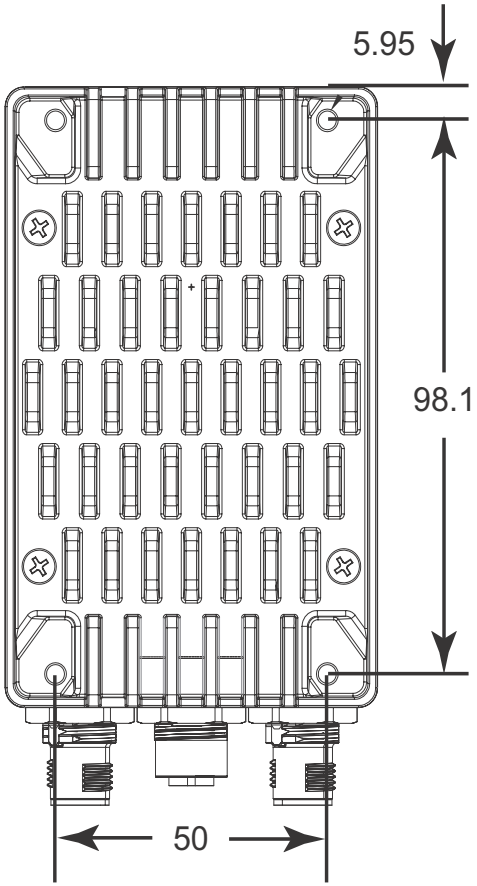



**Figure 1-2: NEON-1020/1040 Rear View**

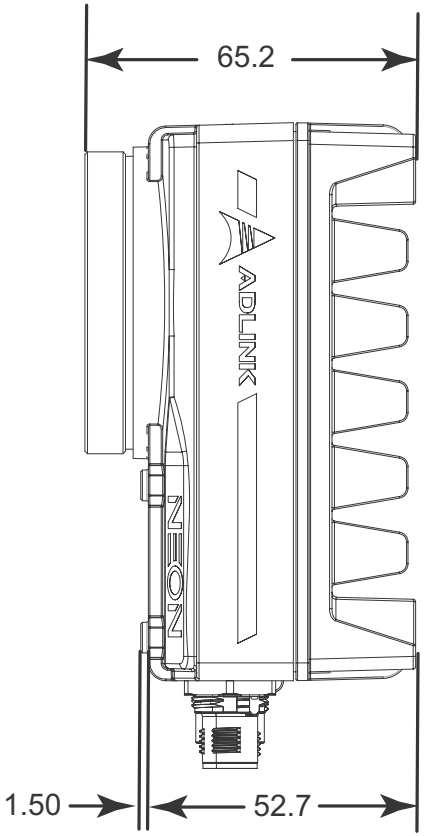



**Figure 1-3: NEON-1020/1040 Side View**

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## 1.5 Indicators




**Figure 1-4: NEON-1020/1040 LED Array**

The NEON 1020/1040 provides five labeled LED indicators on the top side, with function as follows.

| Indicator | Color | Status | Description |
|---|---|---|---|
| POWER | Blue | On | System power on |
| | | Off | System power off |
| STATUS | Red | On | Image capture in progress |
| | | Off | Image capture idle |
| LAN ACT | Green | On | Ethernet port connected and inactive |
| | | Off | Ethernet port disconnected. |
| | | Flashing | Ethernet port connected and active |
| USER1 | Amber | On/Off/ Flashing | User defined LED1 |
| USER2 | Green | On/Off/ Flashing | User defined LED2 |

**Table 1-1: NEON-1020/1040 LED Function**

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## 1.6 I/O Connectors

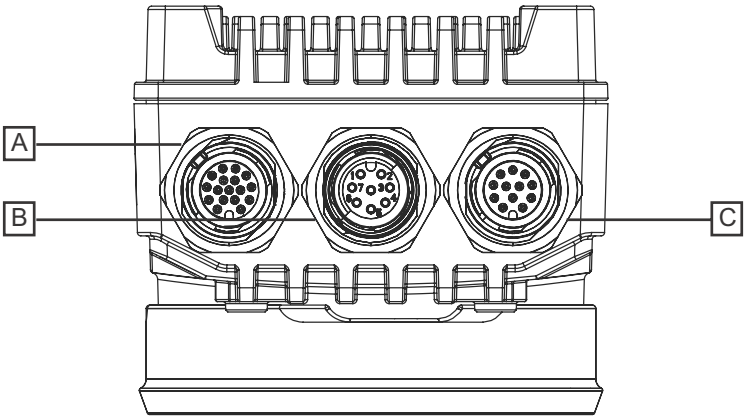



**Figure 1-5: NEON-1020/1040 I/O Array**

| | |
|---|---|
| **A** | Power/IO/UART |
| **B** | Ethernet |
| **C** | VGA/USB |

**Table 1-2: NEON-1020/1040 I/O Array Legend**

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### 1.6.1 Digital I/O and Power

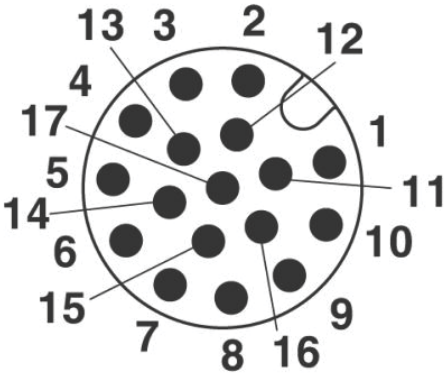



**Figure 1-6: Digital I/O and Power Connector**

| Pin | Signal | Type | Description | 17-Pin M12 Pigtail |
|---|---|---|---|---|
| 1 | RS232 RXD | Input | RS-232 receive. | Brown |
| 2 | DO3/<br>Strobe out 3 | Output | Open-collector output 3 or strobe out 3 | Blue |
| 3 | DO1/<br>Strobe out 1 | Output | Open-collector output 1 or strobe out 1 | White |
| 4 | Hardware trigger input (+) | Input | Hardware Trigger input positive | Green |
| 5 | Hardware trigger input (-) | Input | Hardware Trigger input negative | Pink |
| 6 | PWM light control out (+) | Output | PWM LED control out positive, for connection to LED lighting device; Power source of LED current control is shared System PWR | Yellow |

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| Pin | Signal | Type | Description | 17-Pin M12 Pigtail |
|---|---|---|---|---|
| 7 | PWM light control out (-) | Output | PWM LED control out negative, for connection to LED lighting device; Power source of LED current control is shared System PWR | Black |
| 8 | System PWR | Input | Power input w/ input range +24V +/-10% | Gray |
| 9 | System PWR | Input | Power input w/ input range +24V +/-10% | Red |
| 10 | RS232 TXD | Output | RS-232 transmit | Violet |
| 11 | DO2/ Strobe out 2 | Output | Open-collector output 2 or strobe out 2 | Gray/Pink |
| 12 | DO0/ Strobe out 0 | Output | Open-collector output 0 or strobe out 0 | Red/Blue |
| 13 | DI3 | Input | Digital input signal source 3 | White/Green |
| 14 | DI0 | Input | Digital input signal source 0 | Brown/Green |
| 15 | DI2 | Input | Digital input signal source 2 | White/Yellow |
| 16 | DI1 | Input | Digital input signal source 1 | Yellow/Brown |
| 17 | GND | GND | Ground, reserved for use with ground from power supply | White/Gray |

**Table 1-3: Digital I/O and Power Pin Assignment**

NOTE: The negative pin of Digital OUT and Digital IN is GND.

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### 1.6.2 Ethernet

M12 8-pin (female) connector that provides communication capabilities at 10 Mbit/sec, 100 Mbit/sec, or 1 Gbit/sec(1000 Mbit/sec).

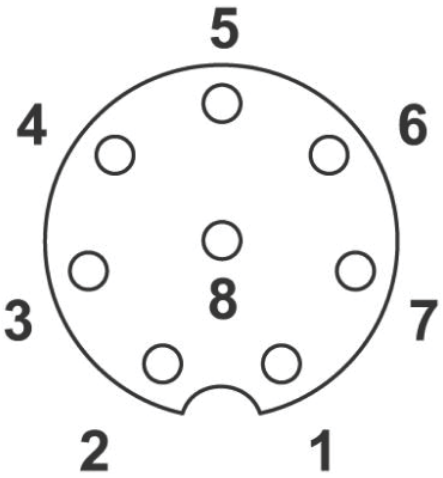



**Figure 1-7: Ethernet Connector**

| Pin | Signal | Description |
|---|---|---|
| 1 | MDI_3- | Data C- |
| 2 | MDI_4+ | Data D+ |
| 3 | MDI_4- | Data D- |
| 4 | MDI_1- | Data A- |
| 5 | MDI_2+ | Data B+ |
| 6 | MDI_1+ | Data A+ |
| 7 | MDI_3+ | Data C+ |
| 8 | MDI_2- | Data B- |

**Table 1-4: Ethernet Pin Assignment**

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### 1.6.3 VGA/USB

M12 12-pin (male) connector that transmits output video and USB 2.0 signals. The output video signal is a standard RGB analog video output transferring the OS desktop to connected independent display devices. The video output can display an extended Windows and/or an exclusive display.

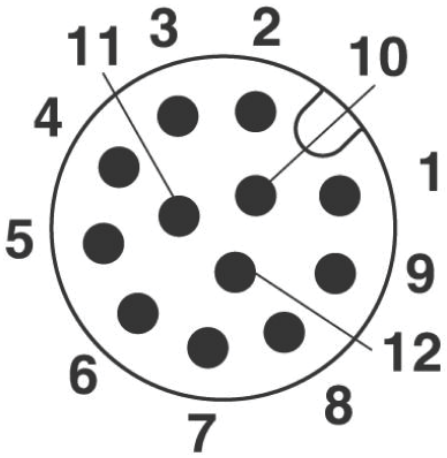



**Figure 1-8: VGA/USB Connector**

| Pin | Signal | Type | Description |
|---|---|---|---|
| 1 | USB Power | Output | 5 V supplied to USB peripherals |
| 2 | USB DATA (+) | Bidirectional | USB data + |
| 3 | USB_DATA (-) | Bidirectional | USB data - |
| 4 | GND | GND | Ground |
| 5 | VGA RED | Output | Red of RGB video signal |
| 6 | VGA BLUE | Output | Blue of RGB video signal |
| 7 | VGA VSYNC | Output | Vertical sync of RGB video signal |

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| Pin | Signal | Type | Description |
|---|---|---|---|
| 8 | VGA HSYNC | Output | Horizontal synch of RBG video signal |
| 9 | VGA GREEN | Output | Green of RGB video signal |
| 10 | GND | GND | Ground |
| 11 | VGA DDC SCL | Bidirectional | DDC serial clock line |
| 12 | VGA DDC SDA | Bidirectional | DDC serial data line |

**Table 1-5: VGA/USB Pin Assignment**

## 1.7 General Purpose Digital Signals

### 1.7.1 General Purpose Digital Output (EDO)

Four digital output channels are provided, such that, in the common ground connection of digital output, as shown, when a 1 (logic high) is written by FPGA to a DO channel, sink current passes through the transistors and the DO channel goes low, and when a 0 (logic low) is written by FPGA to a DO channel, no current passes through the transistors and the DO channel goes high.

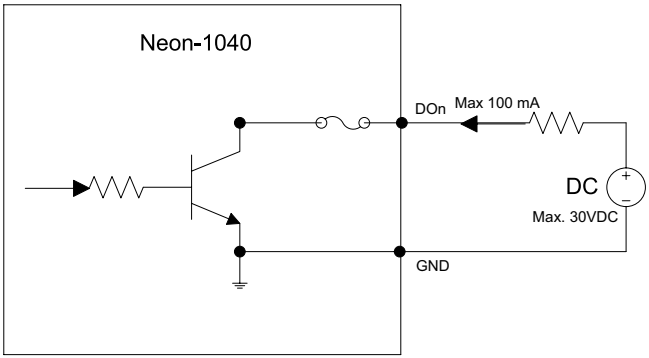



**Figure 1-9: General Purpose Digital Output (EDO) Circuit**

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### 1.7.2 General Purpose Digital Input (EDI)

Four digital input channels are provided.

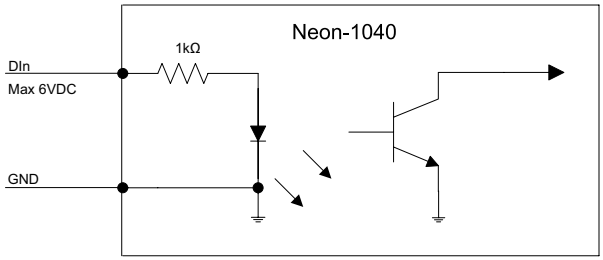



**Figure 1-10: General Purpose Digital Input (EDI) Circuit**

### 1.7.3 Hardware Trigger Input

Four digital input channels are provided.

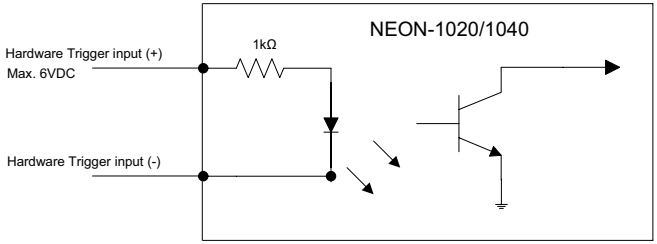
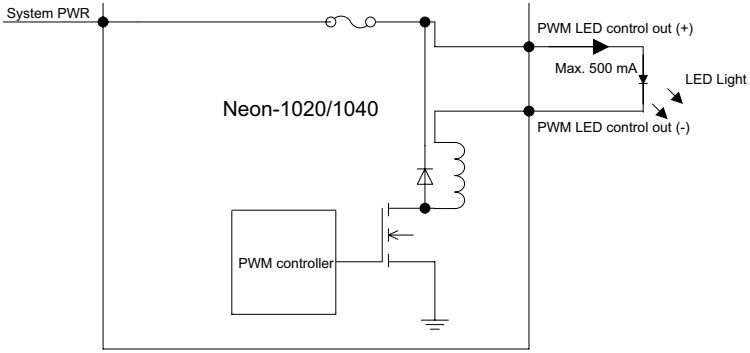



**Figure 1-11: Hardware Trigger Input Circuit**

### 1.7.4 PWM Light Control Output

One channel constant-current sink LED driver, max. constant 500mA output current with 1000 level light control regulates brightness of LED lighting devices, sharing the NEON-1020/1040 System PWR input, requiring that System PWR voltage matches the LED lighting device's operating voltage.

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PWM Light Control Output Circuit

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# 2 Getting Started

This chapter describes connection and configuration of the NEON-1020/1040.

## 2.1 Unpacking Checklist

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

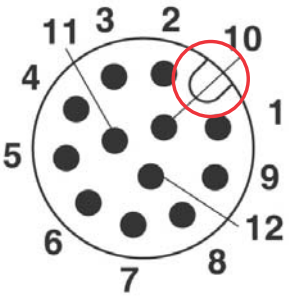
- NEON-1020/1040
- Quick Start Guide

CAUTION:

In environments where temperatures approach 50°C or more, seat the camera face down or in an upright position for optimum heat dissipation efficiency.
Dans les environnements où les températures atteignent les 50°C ou plus, placez la caméra vers le bas ou le haut pour une dissipation thermique optimale.

## 2.2 Connecting a VGA/USB cable

1. Align the alignment pin (device side) with the alignment channel (cable side)




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**Figure 2-1: VGA/USB Alignment Pin (device side)**

2. Fully insert the cable connector.
3. Tighten the threaded collar (cable side) to fix the connection.

## 2.3 Connecting an Ethernet cable

1. Align the alignment pin (cable side) with the alignment channel (device side)

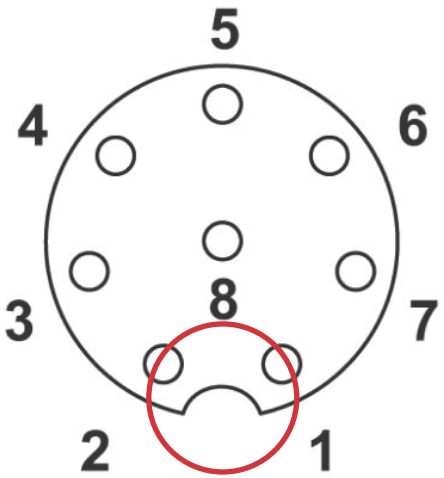



**Figure 2-2: Ethernet Alignment Channel (device side)**

2. Fully insert the cable connector.
3. Tighten the threaded collar (cable side) to fix the connection.

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## 2.4 Connecting a power cable

1. Align the alignment pin (device side) with the alignment channel (cable side)

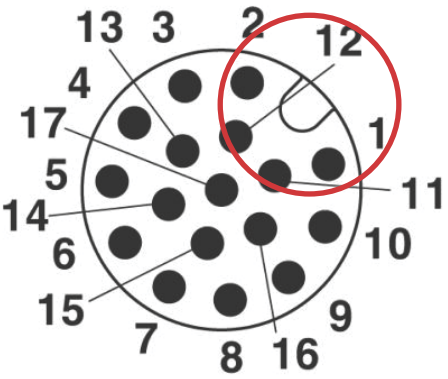



**Figure 2-3: Power Alignment Pin (device side)**

2. Fully insert the cable connector.
3. Tighten the threaded collar (cable side) to fix the connection.

## 2.5 Operating System Installation

The NEON-1020/1040 is compatible with Windows Embedded Standard 7 (WES7E),and supports File-Based Write Filter (FBWF), providing a stable, secure, and high performance software operating environment. The device OS is pre-installed. For other OS support, please contact ADLINK directly.

## 2.6 Driver Installation

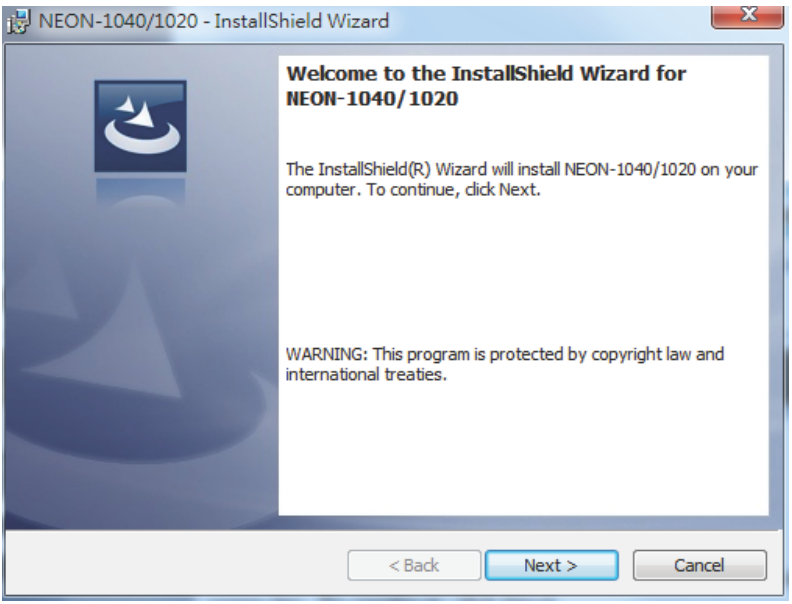
While the following describes NEON-1020/1040 driver installation for WES 7 and Windows 7, with other Windows systems following similar procedures.

1. Run Setup, installation begins.

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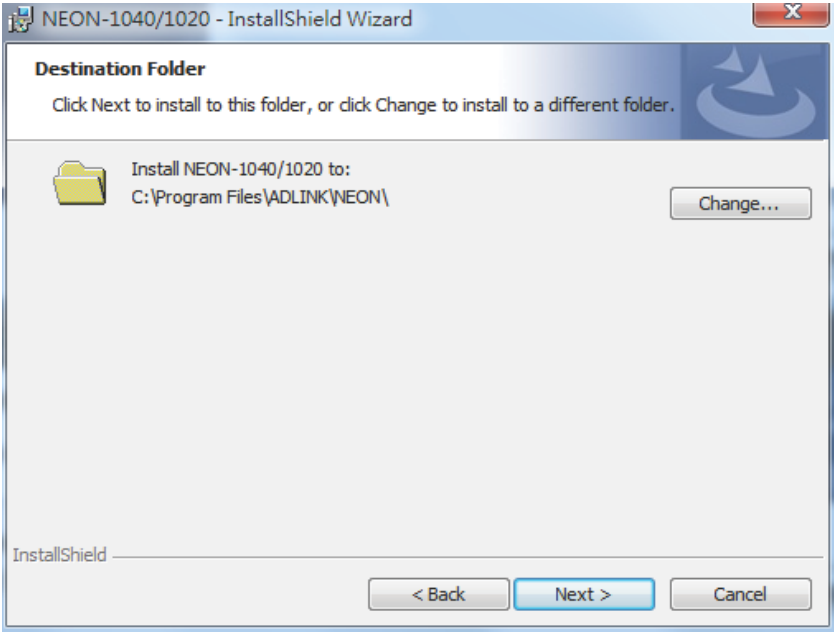



2. Select Next when prompted until installation is complete.

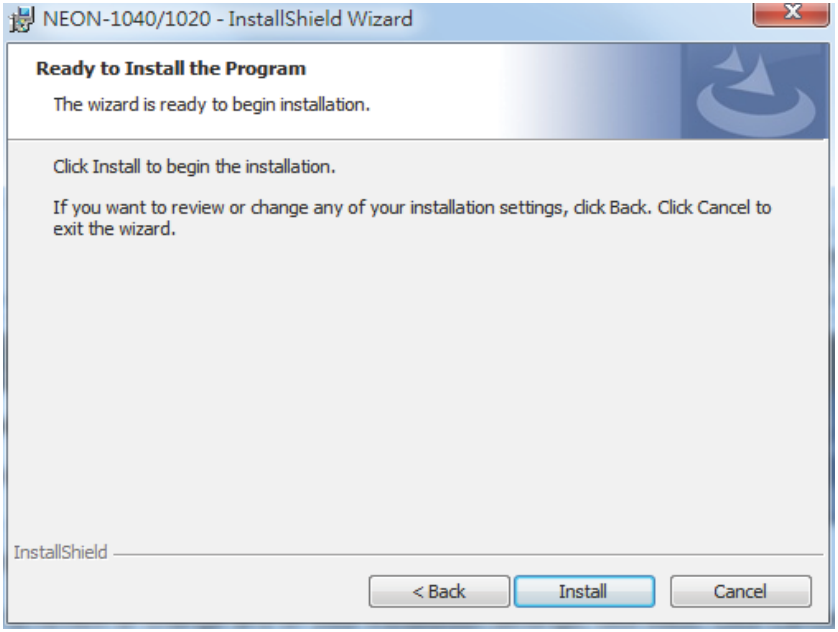





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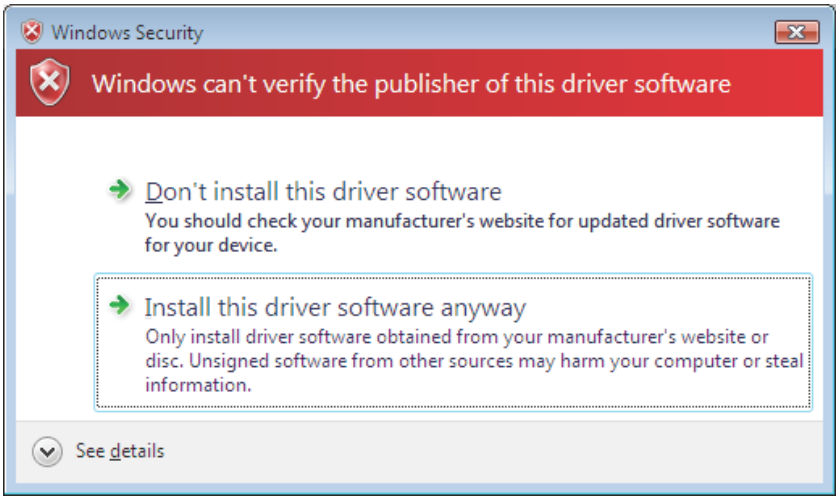



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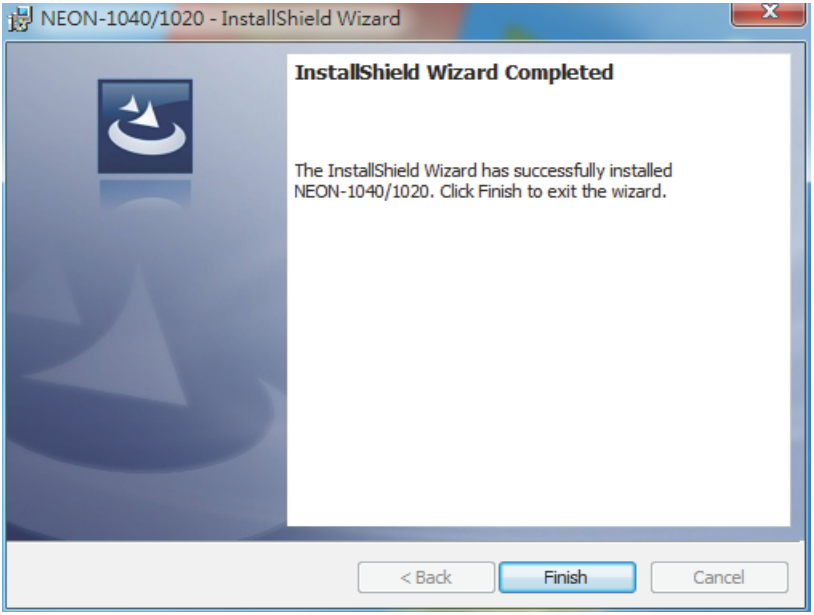



3. If a Security Warning window appears, select “Install this driver anyway”.

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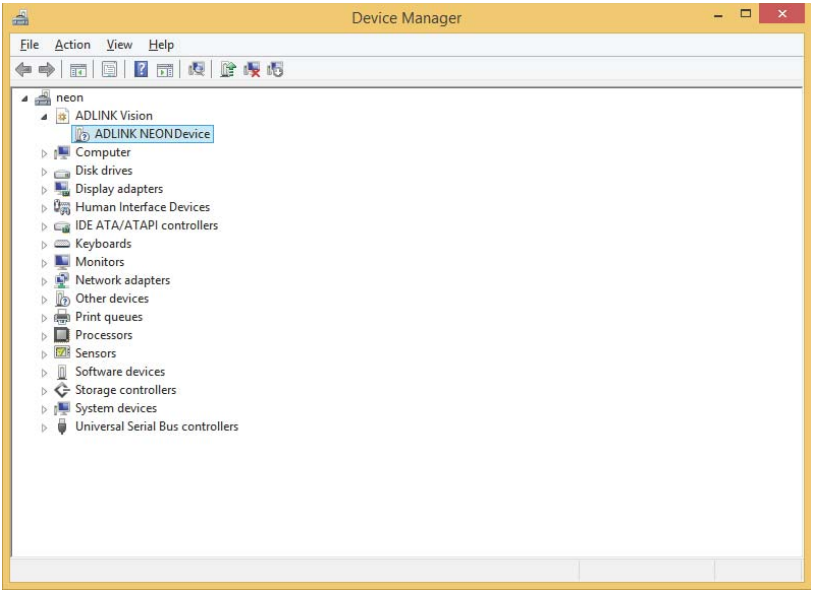



4. If a “Found New Hardware Wizard” window appears, ignore and the window automatically closes after installation is complete.
5. When installation is complete, select Finish.




The device should appear in the Device Manager, as shown

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NOTE:

If an error occurs and installation is rolled back, e-mail the file *setupapi.log* in the Windows folder to ADLINK. Log files on Vista systems are moved to %windir%\inf and renamed to *setupapi.app.log* and *setupapi.dev.log* where windir is the Windows folder.

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# Important Safety Instructions

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

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

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- Never attempt to fix the equipment. Equipment should only be serviced by qualified personnel.

A Lithium-type battery may be provided for uninterrupted, backup or emergency power.




Risk of explosion if battery is replaced with one of an incorrect type. Dispose of used batteries appropriately.
Il y a un risqué d'explosion si la pile est remplacée par une pile de type différent. Eliminez les piles via les points de collecte prévus à cet effet.

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

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# Getting Service

Contact us should you require any service or assistance.

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