

Vision Box
User Manual

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Quick Start Guide

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About this Manual

This Manual is applicable to Vision Box.

The Manual includes instructions for using and managing the product. Pictures, charts, images and all other information hereinafter are for description and explanation only. The information contained in the Manual is subject to change, without notice, due to firmware updates or other reasons. Please find the latest version in the company website (<http://www.hikrobotics.com/en/index.aspx>).

Please use this user manual under the guidance of professionals.

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Regulatory Information

FCC Information

Please take attention that changes or modification not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC compliance: 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.

FCC Conditions

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

EU Conformity Statement

 This product and - if applicable - the supplied accessories too are marked with "CE" and comply therefore with the applicable harmonized European standards listed under the EMC Directive 2014/30/EU, the LVD Directive 2014/35/EU, the RoHS Directive 2011/65/EU.

 2012/19/EU (WEEE directive): Products marked with this symbol cannot be disposed of as unsorted municipal waste in the European Union. For proper recycling, return this product to your local supplier upon the purchase of equivalent new equipment, or dispose of it at designated collection points. For more information see: www.recyclethis.info

 2006/66/EC (battery directive): This product contains a battery that cannot be disposed of as unsorted municipal waste in the European Union. See the product documentation for specific battery information. The battery is marked with this symbol, which may include lettering to indicate cadmium (Cd), lead (Pb), or mercury (Hg). For proper recycling, return the battery to your supplier or to a designated collection point. For more information see: www.recyclethis.info

Industry Canada ICES-003 Compliance

This device meets the CAN ICES-3 (A)/NMB-3(A) standards requirements.

Applicable Models

This manual is applicable to the MV-VB2100-032/120G Vision Box.

Symbol Conventions

The symbols that may be found in this document are defined as follows.

Symbol	Description
 NOTE	Provides additional information to emphasize or supplement important points of the main text.
 WARNING	Indicates a potentially hazardous situation, which if not avoided, could result in equipment damage, data loss, performance degradation, or unexpected results.
 DANGER	Indicates a hazard with a high level of risk, which if not avoided, will result in death or serious injury.

Safety Instructions

- Proper configuration of all passwords and other security settings is the responsibility of the installer and/or end-user.
- In the use of the product, you must be in strict compliance with the electrical safety regulations of the nation and region. Please refer to technical specifications for detailed information.
- Input voltage should meet both the SELV (Safety Extra Low Voltage) and the Limited Power Source with 100~240 VAC or 12 VDC according to the IEC60950-1 standard. Please refer to technical specifications for detailed information.
- Do not connect several devices to one power adapter as adapter overload may cause over-heating or a fire hazard.
- Please make sure that the plug is firmly connected to the power socket.
- If smoke, odor or noise rise from the device, turn off the power at once and unplug the power cable, and then please contact the service center.

Preventive and Cautionary Tips

Before connecting and operating your device, please be advised of the following tips:

- Ensure unit is installed in a well-ventilated, dust-free environment.
- Unit is designed for indoor use only.
- Keep all liquids away from the device.
- Ensure environmental conditions meet factory specifications.
- Ensure unit is properly secured to a rack or shelf. Major shocks or jolts to the unit as a result of dropping it may cause damage to the sensitive electronics within the unit.
- Use the device in conjunction with an UPS if possible.
- You shall acknowledge that the use of the product with Internet access might be under network security risks. For avoidance of any network attacks and information leakage, please strengthen your own protection. If the product does not work properly, please contact with your dealer or the nearest service center.
- Power down the unit before connecting and disconnecting accessories and peripherals.
- Improper use or replacement of the battery may result in hazard of explosion. Replace with the same or equivalent type only. Dispose of used batteries according to the instructions provided by the battery manufacturer.

Chapter 1 Overview

1.1 Introduction

Designed for the control system, the Vision Box has integrated with the various interfaces and image processing algorithms in the machine vision applications, featuring stable performance, compact structure, fast response, etc. The Box adopts the Intel® Atom™ E3845 Quad-core SoC processor, with the excellent computing performance, low consumption and outstanding system expandability.

It can be widely applied to the robots, medical instruments, laser equipment, numerical control machine tools, package test, etc.

1.2 Features

- Onboard Intel E3845 SOC, 1.91GHz CPU, providing 200% CPU and 350% GPU performance more than the last-generation D525/D2550 processor.
- Adoption of Gen7 GPU greatly enhances the image processing performance.
- Compact structure design
- 4GB DDR3L memory
- -10 °C to +50 °C fanless working temperature
- Two Intel-chip Gigabit network interfaces, with the enhanced surge-protection design to ensure the stable access by machine vision cameras.
- Two independent HDMI video outputs.
- 8 GPIO.

1.3 Specifications

Model	MV-VB2100-032G	MV-VB2100-120G
Processor	Intel E3845 chip, 4-core 1.91GHz	
Memory	4GB DDR3L-1333	
Operating System	Win7, Win8, Linux	
Graphic/Video	Gen7 GPU Hardware accelerated H.264 video encoding Hardware accelerated multiple video decoding formats	

Display	2 independent HDMI outputs at 2560×1600 resolution	
Network	2 Intel i210 Gigabit Ethernet chips 2 RJ45 Gigabit Ethernet interfaces Enhanced surge-protection	
Storage	32GB SSD	120GB SSD
USB interface	1 × USB 3.0 host interface 1 × composite interface (USB3.0 client+ USB2.0 host) 2 × USB 2.0 host interface	
External interfaces	1 RS-485(half-duplex) 1 RS-232	
GPIO	4 inputs/4 outputs	
Audio	HAD Stereo Line-out and single-track Mic-in	
Power supply	24 VDC /1A	
Consumption (without hard disk)	≤ 12 W	
Working temperature	-10 °C to +50 °C	
Working humidity	10% to 90%RH non-condensing	
Dimensions (W × D × H)	135mm × 91mm × 45mm (5.3inch × 3.6inch × 1.8inch)	

Chapter 2 Panels and Connections

2.1 Dimensions

Refer to the following figure for the outline and dimensions of the Vision Box:

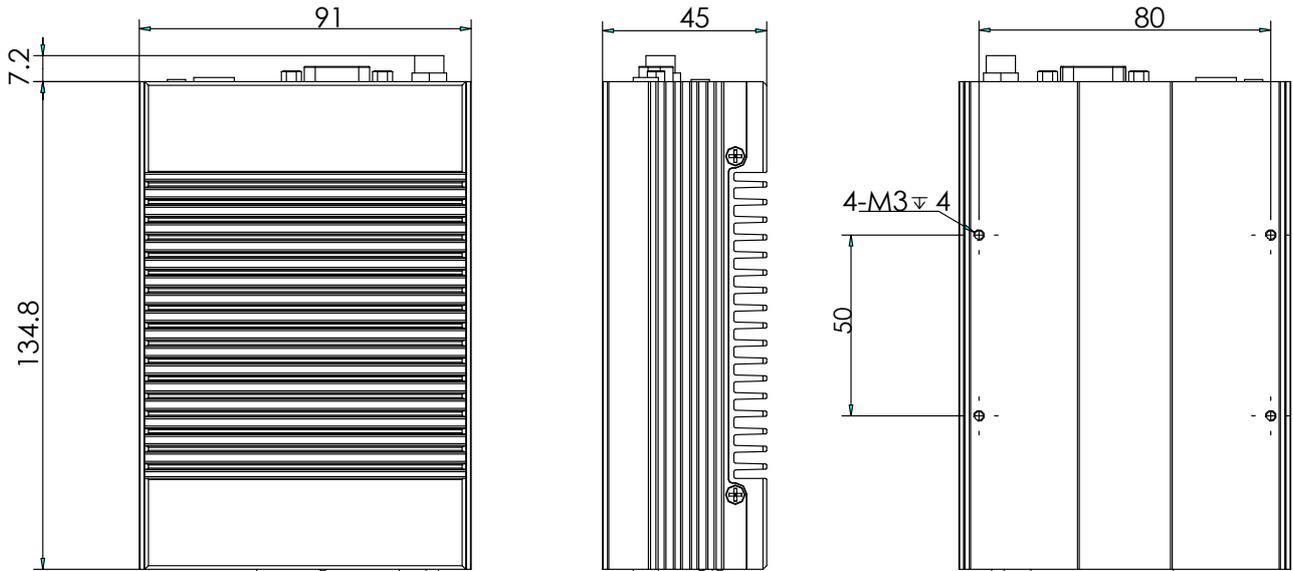


Figure 2-1 Outline and Dimensions

2.2 Installation

Use four M3 set screws to install the Vision Box.

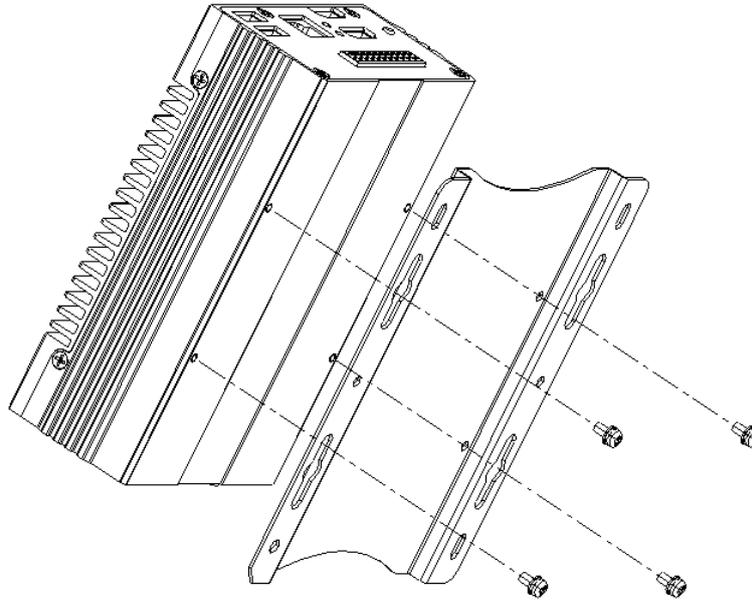


Figure 2-2 Installation

2.3 Panels

Refer to the following figure for the interfaces on the panel of Vision Box:

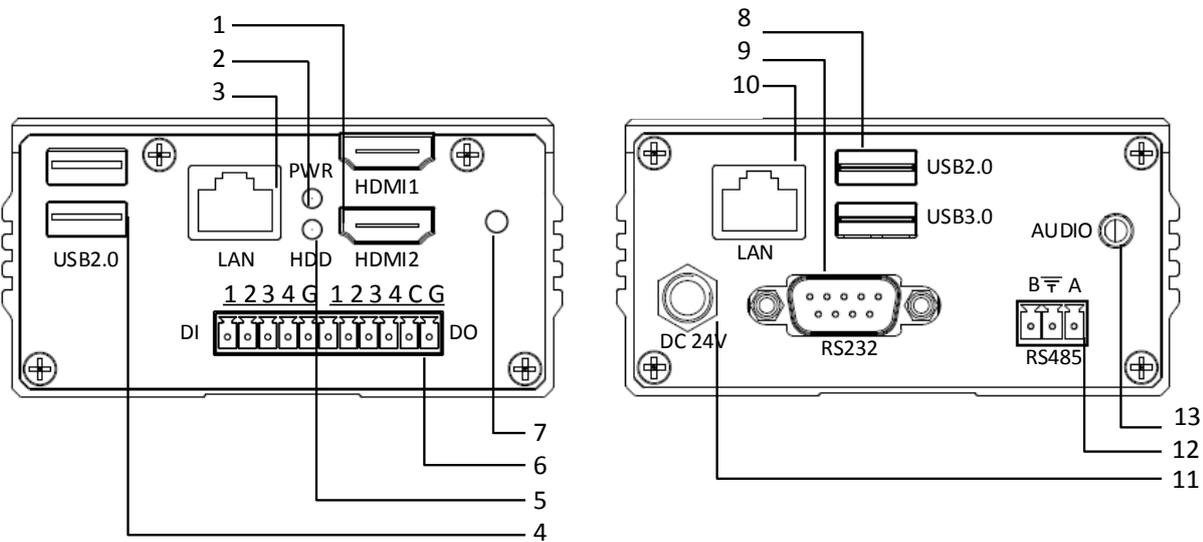


Figure 2-3 Indicators and Interfaces on the Panels

Table 2-1 Panel Description

No.	Name	Descriptions
1	HDMI1/HDMI2	HDMI video output at up to 2560×1600 resolution.
2	POWER	Power indicator turns yellow when the device is running.

3	LAN Interface	RJ-45 10/100/1000 Mbps self-adaptive Ethernet interface.
4	USB 2.0 interface	2 USB 2.0 Universal Serial Bus (USB) interfaces for additional devices such as USB mouse and USB Hard Disk Drive (HDD).
5	HDD	HDD indicator blinks red when data is being read from or written to HDD.
6	GPIO	4 GPIO input and 4 GPIO output connectors.
7	Power	Switch for turning on/off the device.
8	USB 3.0 interface	1 USB 3.0 host interface 1 composite interface (USB3.0 client+ USB2.0 host)
9	RS-232 Interface	Connector for RS-232 devices.
10	LAN Interface	RJ-45 10/100/1000 Mbps self-adaptive Ethernet interface.
11	Power Supply	24V DC,1A power supply
12	RS-485 Interface	Connector for RS-485 devices.
13	Audio In/Out	HAD Stereo Line-out and single-track Mic-in

2.4 GPIO Connections

2.4.1 Pin Definitions

Refer to the following table for the pin definitions of GPIO inputs and outputs:

Table 2-2 Pin Definitions

Pin No.	Name	Definition
1	DI1	Optical isolation input 1
2	DI2	Optical isolation input 2
3	DI3	Optical isolation input 3
4	DI4	Optical isolation input 4
5	IN_GND	Optical isolation input GND
6	DO1	Optical isolation output 1
7	DO2	Optical isolation output 2
8	DO3	Optical isolation output 3
9	DO4	Optical isolation output 4
10	COMMON	Common
11	OUT_GND	Optical isolation output GND



NOTE

The voltage for the optical isolation input is: 10-30V high TTL, 0-2V TTL.

The voltage for the optical isolation output is: 5-30V high TTL, 0-1.1V TTL, max. 90mA reverse current.

2.4.2 OutputConnections

Connection Mode A

The following connection can be adopted when the external device are connected, such as the LED, relay, beeper, etc.

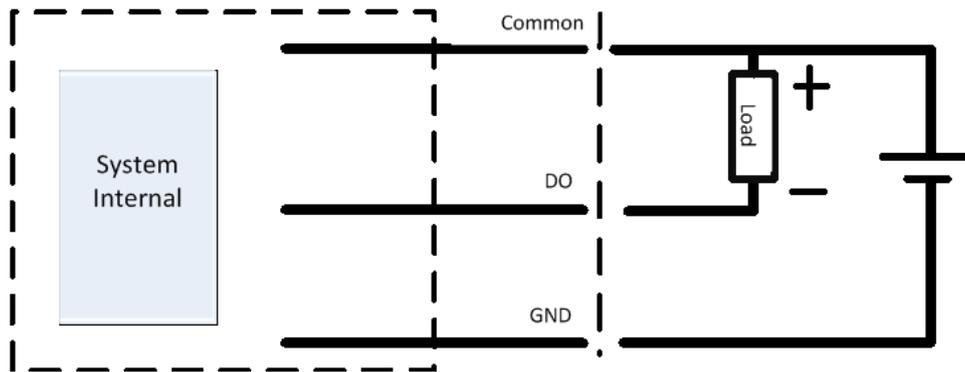


Figure 2-4 Connection Mode A

Connection Mode B

When the output is used as the signal, you need to add a pull-up resistor (12V/1~ 4k, 24V/2 ~ 8k) between the Common and Output to form a level signal. Refer to the following figure:

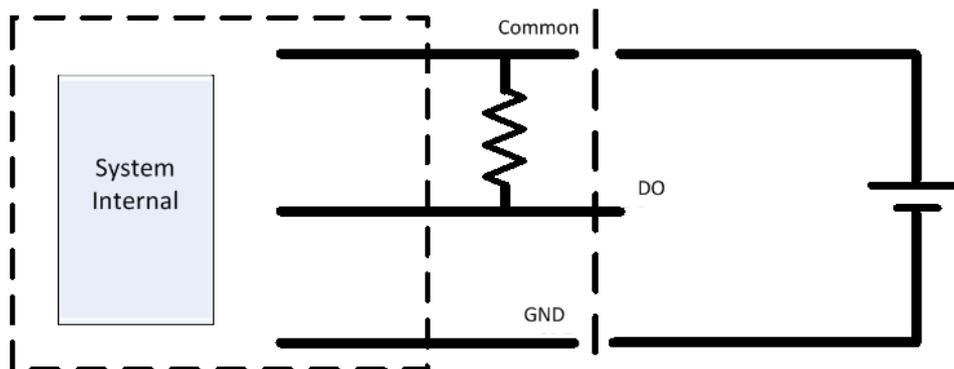


Figure 2-5 Connection Mode B

Chapter 3 Operation of I/O and Demo

3.1 Input/Output Pattern

The input channel can be triggered by the upper level device control or the I/O control. And the PWM output and pulse output are provided.

The following three configuration patterns are selectable:

- Pattern 1 (All): triggering input by I/O or serial port triggering is configurable.
- Pattern 2: triggering input by I/O is configurable only.
- Pattern 3: triggering input by serial port enabling command is configurable only.

3.2 Operation of Demo

Open the Vision Box Mfc Demo to enter the following window:

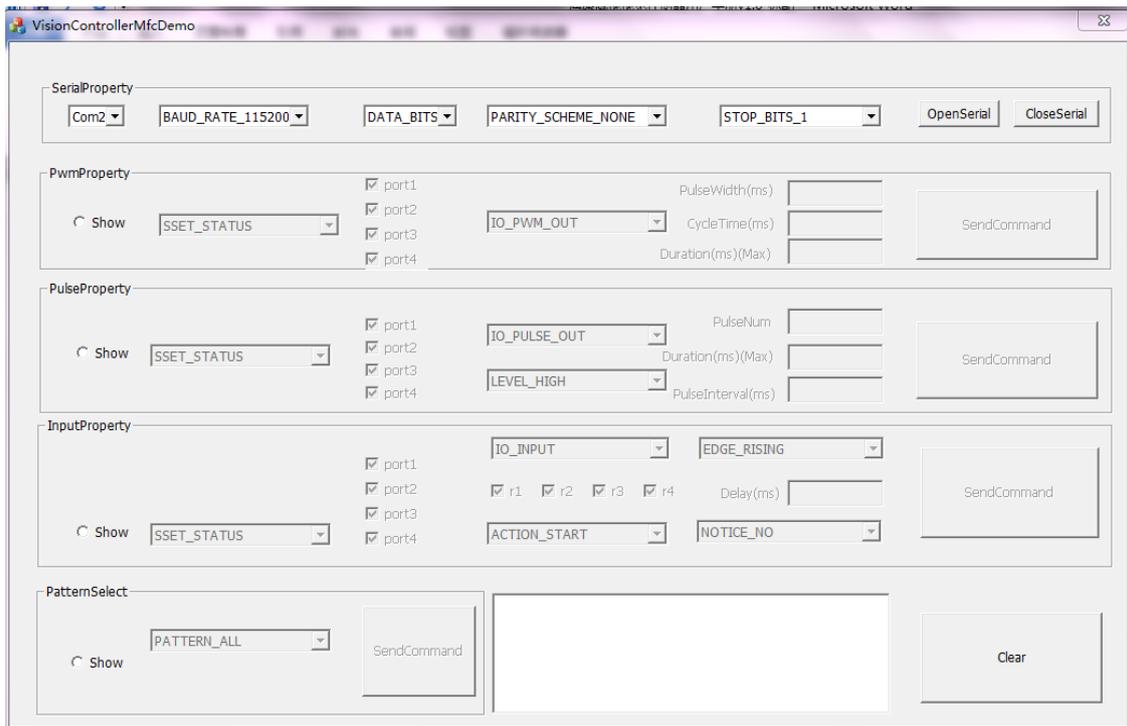


Figure 3-1 Demo Interface



NOTE

Please go to the official website to download the latest Demo.

3.2.1 Selecting Pattern

Three patterns are selectable: PATTERN_ALL (pattern 1), PATTERN_I_O (pattern 2) and PATTERN_SERIAL (pattern 3).

Step 1 Check the checkbox of **Show** to enable the settings.

Step 2 Select a pattern from the drop-down list.

- PATTERN_ALL: trigger the input by I/O or serial port enabling as user demand.
- PATTERN_I_O: trigger input by I/O only.
- PATTERN_SERIAL: trigger input by serial port enabling command only.

Step 3 Click the SendCommand to complete the settings.

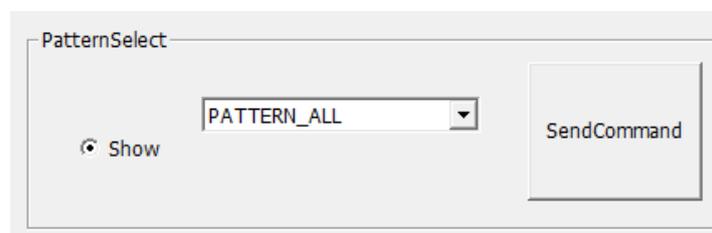


Figure 3-2 Select Pattern

3.2.2 Triggering by I/O

- **Task1: Input Settings**

The input settings must be configured when the external signal (e.g., photoelectric sensor) is used for triggering the input port.

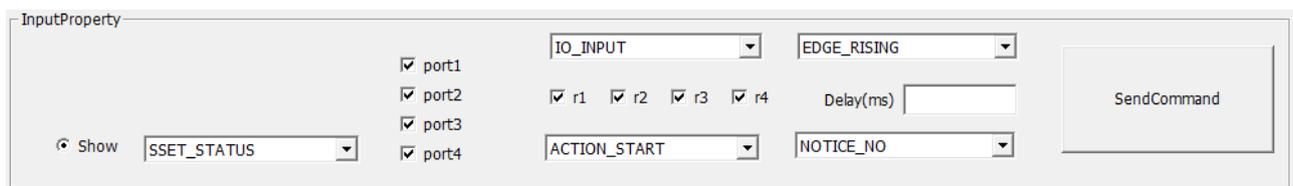


Figure 3-3 Input Triggering Pattern

Step 1 Check the checkbox of **Show** to enable the settings.

Step 2 Select the SSET_STATU mode to configure the parameters.

- 1) Check the checkbox of port 1-4 as demand.
- 2) Select the IO_INPUT from the drop-down list.
- 3) Check the checkbox of output ports.
- 4) Select the ACTION_START and configure it to EDGE_RISING or EDGE_FALLING triggering mode.
- 5) Set the delay time (ms) and select the NOTICE_ON or NOTICE_SEND to send the notice or not.
- 6) Click the SendCommand to complete the settings.

Step 3 Repeat the sub steps 1) to 3) of Step 2, and select the ACTION_END and configure it to EDGE_RISING or EDGE_FALLING triggering mode. And repeat the sub steps 5) to 6) of Step 2 to complete the settings.

● **Task2: Output Settings**

The PWM output and pulse output can be configured. The PWM output setting is taken as the example in the following instructions.

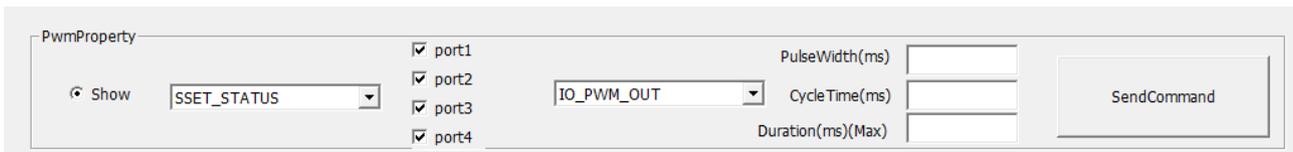


Figure 3-4 PWM Output Settings

Step 1 Select the SSET_STATU mode to configure the parameters.

Step 2 Check the checkbox of port 1-4 as demand.

Step 3 Select the IO_PWM_OUT from the drop-down list.

Step 4 Set the parameters of pulse width (ms), cycle time (ms), and duration (ms).

 **NOTE**

You can enter Max in the duration to set continuous outputting.

Step 5 Click the SendCommand to complete the settings.

3.2.3 Triggering by Serial Port

Purpose

The serial port parameters must be configured when you use it to trigger the input. The pulse output setting is taken as the example in the following instructions.

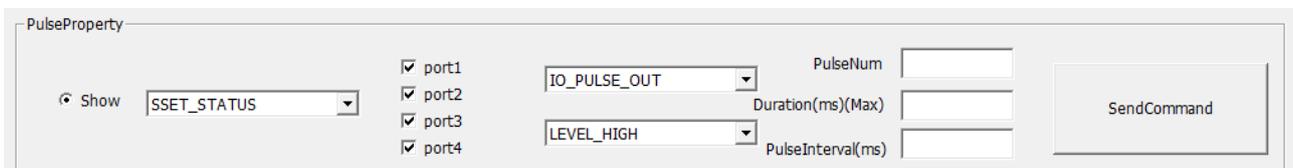


Figure 3-5 Pulse Output Settings

Step 1 Set the pulse parameters.

- 1) Select the SSET_STATU mode to configure the parameters.
- 2) Check the checkbox of port 1-4 as demand.
- 3) Select the IO_PULSE_OUT from the drop-down list.
- 4) Select the LEVEL_HIGHT, and set the parameters of pulse number, duration (ms) and pulse interval (ms).

NOTE

You can enter Max in the duration to set continuous outputting.

5) Click the SendCommand to complete the settings.

Step 2 Select the STROBE_STATUS mode and set the ENABLE_START to start enabling the serial port.

Click the SendCommand to complete the settings

Step 3 Select the STROBE_STATUS mode and set the ENABLE_END to end the serial port enabling.

Click the SendCommand to complete the settings

3.2.4 Configuring Serial Port Property

In the original operating system, the default port used by GPIO is Com2, with the baud rate of 115200, 8 data bits, and 1 stop bit.

Hardware of Vision Box serial port is corresponding to COM port, which can be seen and configured through “Device Manager” → “Ports (COM & LPT)”. Right click “COM1”, select “Properties”.

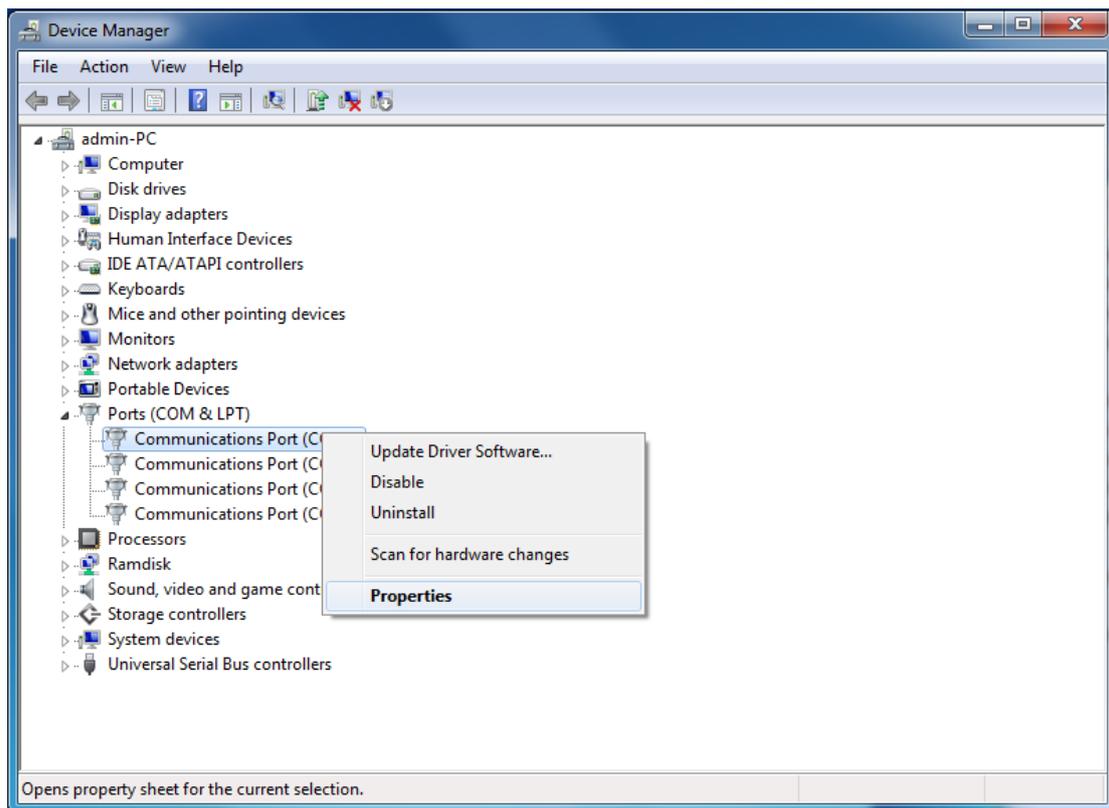


Figure 3-6 Serial port property entrance interface

In “Communications Port (Com1) Properties” interface, select “Resources” page, as shown in Figure. IRQ information can be found in this window, IRQ corresponded to each COM port is shown in Table 3-1.

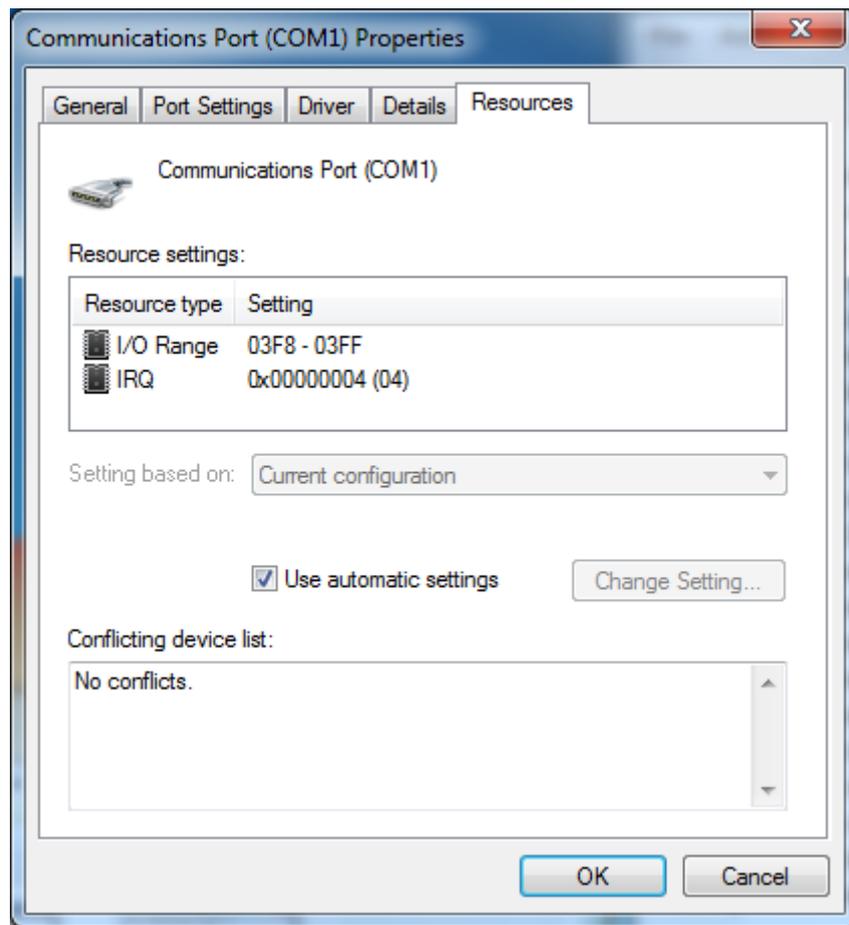


Figure 3-7 Serial port “Resource” window

Table 3-1 Information correspond to function and serial port hardware IRQ

Original Serial Port No.	Correspond Function	IRQ Information
COM1	RS232	0x00000004 (04)
COM2	GPIO	0x0000000A (10)
COM3	RS485	0x00000003 (03)
COM4	NULL	0x0000000B (11)

Click “Advanced” in “Port Settings” page of “Communications Port (Com1) Properties” interface, modify the serial port number correspond to hardware in system, as shown in Figure 3-8.

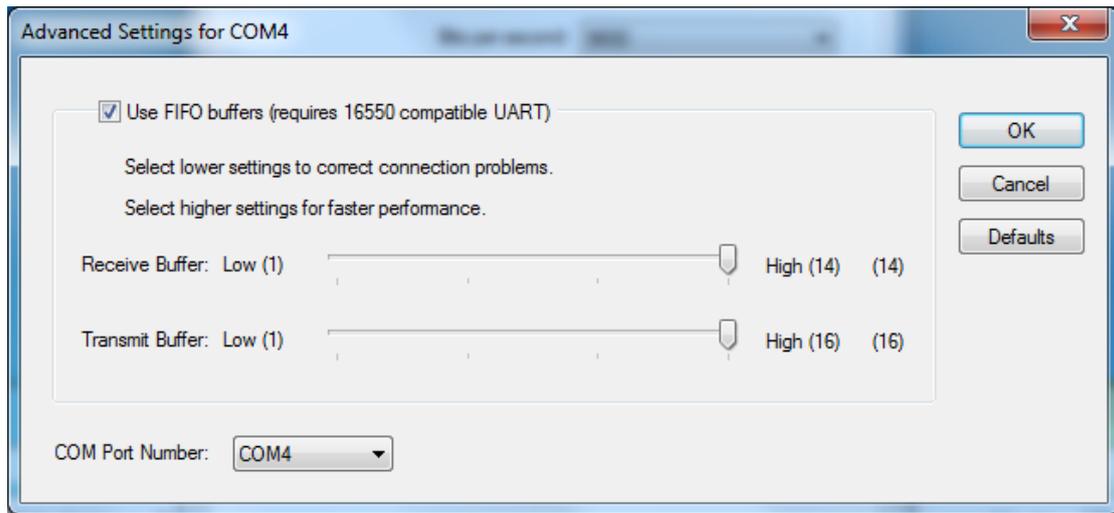


Figure 3-8 Hardware modification window correspond to serial port

The Com1 of the Vision Box corresponds to the RS-232, the Com3 to RS-485, and the Com4 is null.

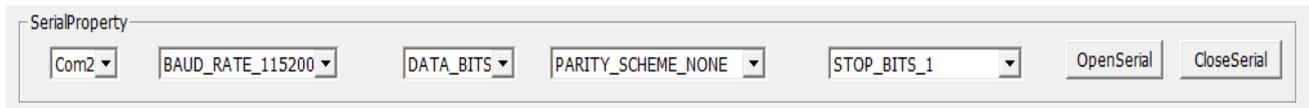


Figure 3-9 Serial Port Property

Chapter 4 Video Output Configuration

4.1 HDMI Video Output

The Vision Box provides two HDMI output interfaces for connection to the HDMI display unit (or to VGA display unit with HDMI-to-VGA adapter). Up to 2560 x 1600 resolution is supported.

4.2 Remote Access

The Vision Box is installed with the MVWhere client software for device access to the LAN. Use the MVWhere client software to find the IP address of the controller for remote access.

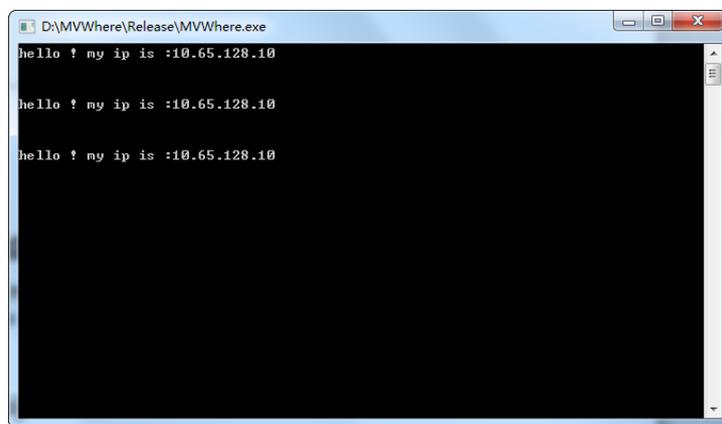


Figure 4-1 Use MVWhere to Find Box IP Address

NOTE

Default user name: administrator, password: 123456. Based on the security requirements, it is strongly recommended that the user modify the initial password when first using Vision Box.

Chapter 5 System and Driver Installation

5.1 Installing Operating System

The operating system can be installed via USB storage device (e.g., USB DVD, USB mobile disk, etc.). Connect the USB storage device and operate the following instructions to install the system in the BIOS mode.

Option 1

Step 1 Start up the device and press the DELETE key to enter the BIOS settings page.

Step 2 Enter the Save&Quit menu, find the USB storage device you connect and enter it to install the system according to the prompts.

Option 2

Step 1 Start up the device and press the DELETE key to enter the BIOS settings page.

Step 2 Enter the Advanced > CSM Configuration menu and set the *Boot option filer* to *Legacy only*.

Step 3 Enter the BOOT menu, and set the *Boot Option #1* to the boot from your USB storage device.

Step 4 Save the settings and exit from the BIOS.

Step 5 Reboot the device to load the operating system from the USB storage device.



NOTE

After the completion of the operating system, you need the change the *Boot Option #1* back to the boot from hard disk.

5.2 Installing the Driver

Select and install the driver programs from the provided CD-ROM of the product. For upgrading requirement, go to the official website to download the latest driver package.

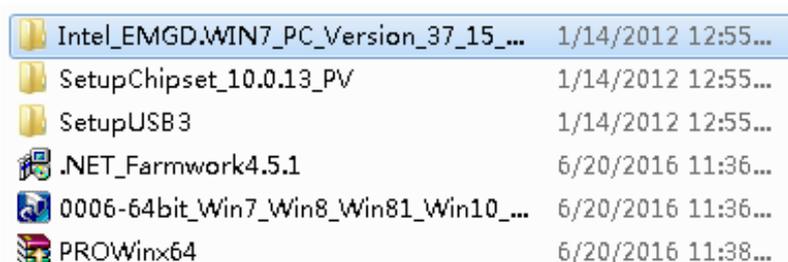


Figure 5-1 Install the Driver

