

# VB2200 Series Vision Box

User Manual

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### **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**

**CE** 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.



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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 which many include lattering to indicate and draining (Cd) load (Db) an many (Ua)

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

# Symbol Convention

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

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

# Available Model

This manual is applicable to the VB2200 Series Vision Box.

# Safety Instructions

These instructions are intended to ensure that the user can use the product correctly to avoid danger or property loss.

#### Laws and Regulations

The device should be used in compliance with local laws, electrical safety regulations, and fire prevention regulations.

#### **Power Supply**

• When wiring or dismounting, make sure that the device power is cut off, and do not operate under electrification.

- Avoid contact with exposed circuit. When the device is powered on, avoid contact with exposed junctions and parts.
- Use the power adapter provided by the regular manufacturer.
- DO NOT connect multiple devices to one power adapter, to avoid over-heating or fire hazards caused by overload.
- Make sure the plug is properly connected to the power socket.

#### Transportation

- The product contains precision optical components and electronic components. During transportation, storage and installation, incorrect operations like heavy pressure and violent vibration should be avoided. Otherwise, the product may be damaged.
- Avoid sudden collision, and pack the product with the accompanied carton and cushioning material or similar package.

#### **Using Environment**

- In order to reduce the risk of fire or electric shock, do not let the product get wet or damp.
- Do not drop objects onto the product and avoid vigorous vibration.
- Keep the product away from magnetic interference.
- Do not use the product in extremely heat, extremely cold, dusty environment, corrosive environment or high humidity environment.
- The product should be stored in dry environment without corrosive gas. Avoid placing the product in direct sunlight and poorly ventilated locations, or near heat sources such as heater or heating (ignoring this warning may lead to fire hazards).
- Do not operate in explosive environment.
- Keep the surrounding area well ventilated to avoid heat accumulation. Do not contact the radiator directly to avoid scald.

#### **Electrostatic Protection**

- Remove all conductive objects (such as jewelry, watch, etc.) on the product body before touching the product, and touch the grounding metal bracket by hand to release the static electricity.
- It is suggested to wear anti-static suit to prevent damage to the equipment caused by static electricity.
- When installing or maintaining the product, please wear anti-static wrist band or anti-static gloves. Make sure that the wristband is tightly attached to the skin and is reliably grounded.
- It is forbidden to touch exposed circuit boards with bare hands. Static electricity generated by human body may damage electrostatic sensitive components on circuit boards.
- When touching electrostatic sensitive components or devices, proper grounding measures must be taken.
- Put electrostatic sensitive components into anti-static bags for protection.
- It is suggested to place humidifier in dry environment to maintain suitable humidity and reduce static electricity generation.

#### Maintenance

• If the product is not working properly, contact the store or the nearest service center. Do not

disassemble or modify the device in any way. (The company does not bear any liability for any problem arising from unauthorized modification or maintenance).

- Please properly preserve all the original packaging materials of the product so that when problems arise, the product can be packed with packaging materials and sent to the agent or returned to the manufacturer for processing. The company does not bear any liability for accidental damage during transportation caused by non-original packaging.
- This product is a precision electronic device, no components can be maintained by user, please do not disassemble the device arbitrarily.

#### Installation

Please do not install the product on vibrating surface or places that are vulnerable to impact.

#### **Personnel Requirement**

Quality requirements for installation and maintenance personnel: qualification certificate or working experience in weak current system installation and maintenance, and relevant working experience and qualifications. Besides, the personnel must possess the following knowledge and operation skills:

- The basic knowledge and operation skills of low voltage wiring and Low voltage electronic circuit connection.
- The ability to comprehend the contents of this manual.

#### **Contact Information**

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# Chapter 1 Overview

## 1.1 Introduction

Designed for the control system, the VB2200 series vision box adopts the Intel<sup>®</sup> E3845 Quad-core SoC processor and integrates with the various interfaces in the machine vision applications, such as Gigabit Ethernet interface, USB, I/O, etc., featuring stable performance, compact structure, fast response, etc.

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

# 1.2 Key Features

- Onboard Intel E3845 SOC, 1.91GHz CPU.
- 4GB DDR3L memory with high-reliability SSD storage.
- Integrates with GPU to support the optimization of specific algorithms and greatly enhances the image processing performance.
- 3 Intel-chip Gigabit network interfaces, with the enhanced surge-protection design to ensure the stable access by machine vision cameras.
- 2 independent HDMI video outputs.
- Supports GPIO input and output.
- Supports light source switch control and brightness adjustment by light source control interface.
- Compact structure design.

Refer to the specification for detailed parameters.

# Chapter 2 Installation

## 2.1 Dimension

Refer to the following figure for the dimensions of the vision box.



Figure 2-1 Dimension

## 2.2 Installation

Install and fix the vision box on the mounting plate with four M3 screws, and then fix the device on other mechanical parts.



Figure 2-2 Installation

# 

The mounting plate should be purchased separately.

## 2.3 Remote Access

You can operate the device in the monitor after connecting them via HDMI cable. You also can remotely access the device via the PC in the same network segment. IP address can be got by packet capturing tools or others.

Remote desktop is connected via IP address, user name and password. The default user name is Administrator, and the default password is Operation666.

#### 

For security, it is highly recommended to change the default password for the first time use.

## 2.4 Accessories

Refer to the table below for recommended accessories.

No.	Name	Quantity	Description
1	Power Adapter	1	24 V, 2.5 A power adapter. It is included in the package.
2	HDMI to VGA Cable	1	Needed if your monitor only supports VGA interface (purchase separately).
3	Mounting Plate	1	For fixing vision box and other mechanical parts (purchase separately).
4	USB Cable	1	For built-in USB device.

Table	2-1	Accessories
1 a b i c	~ -	/ 1000001100

# Chapter 3 Interface Description

# 3.1 Interface Description

Refer to the following figure for the interfaces on the panel of vision box:



Figure 3-1 Indicators and Interfaces

No.	Name	No.	Name
1	HDMI Interface	8	Light Source Interface
2	POWER Indicator	9	USB Interface
3	LAN Interface	10	RS-232 Interface
4	USB Interface	11	LAN Interface
5	HDD Indicator	12	Power Supply
6	GPIO Interface	13	LAN Interface
7	Power	14	RS-485 Interface

# 3.2 GPIO Interface

### 3.2.1 Pin Definitions

The device IO interface has 11 pins. Refer to the following table for the pin definitions of GPIO inputs and outputs:

Pin No.	Signal Name	Description	Mark
1	DI1	Opto-isolated input 1	1
2	DI2	Opto-isolated input 2	2
3	DI3	Opto-isolated input 3	3
4	DI4	Opto-isolated input 4	4
5	IN_GND	Input common ground	G
6	D01	Opto-isolated output 1	1
7	DO2	Opto-isolated output 2	2
8	DO3	Opto-isolated output 3	3
9	DO4	Opto-isolated output 4	4
10	OUT_COMMON	Output common ground	С
11	GND	Reversed	G

### 

GPIO is controlled via serial port, and corresponds to COM2 in the default system.

### 3.2.2 Opto-Isolated Input

Different electrical level types correspond to different input voltage ranges. Refer to the following table for the relation between electrical level type and voltage range.

Electrical Level Input Type	Voltage Range
High electrical level input	10 V to 30 V
Low electrical level input	0 V to 2 V

Table 3-3 Voltage Range of Opto-Isolated Input

#### 

The voltage range of low electrical level Input is set to 0 V to 2 V due to the voltage fluctuation of 0 V voltage under industrial application.

The vision box adopts NPN opto-isolated input, so different connection modes need to be adopted according to the electrical features of different connected devices when they send signal.

#### • PNP External Device



Figure 3-2 Opto-Isolated Input Connects PNP Device



NPN External Device



### 

You can design circuit diagram for other devices according to the two diagrams above.

### 3.2.3 Opto-Isolated Output

The opto-isolated output of vision box adopts open collector and unidirectional output. When the circuit is used for output, current from external power supply flows into opto-isolated output port, then flows out. The current of every output pin cannot exceed 90 mA. Refer to the following table for the voltage threshold of output channel.

Electrical Level Output Type	Voltage Range
High electrical level output	5 V to 30 V
Low electrical level output	0 V to 1.1 V

Table 3-4 Voltage Range of Opto-Isolated Output

The vision box adopts NPN opto-isolated output, so different connection modes need to be adopted according to the electrical features of different connected devices when they send signal.

#### • PNP External Device





• NPN External Device



Figure 3-5 Output Signal Connects NPN Device

# 3.3 Built-In USB Interface

You can expand a USB2.0 interface via USB cable for dongle installation and other USB devices for fixed use to avoid pulling out USB by mistake.

The built-in USB interface is disabled by default. If you need to use it, please notify us when making the order. Then, you can remove the device case and install the USB cable to the device.

The USB interface is shown below.



Figure 3-6 Built-In USB Interface

# 3.4 RS-232 Interface

The device provides a standard D-sub 9-pin RS-232 communication interface. Refer to the following table for the pin definitions.



Figure 3-7 RS-232 Interface

Pin No.	Definitions
2	RXD
3	TXD
5	SGND

#### 

RS-232 corresponds to COM1 in the default system.

# 3.5 RS-485 Interface

Based on the RS-485 communication standard, the vision box provides a differential half-duplex RS-485 interface. You need to connect the corresponding pins with cables (for example, A-A, G-G, B-B). Refer to the following table for the pin definitions.



Figure 3-8 RS-485 Interface

Pin No.	Definitions
В	485-
G	GND
А	485+

Table 3-6 RS-485 Pin Definitions

### 

RS-485 corresponds to COM3 in the default system.

# 3.6 HDMI Interface

The device provides 2 HDMI interfaces for connecting with the monitor with max. resolution of  $2560 \times 1600$ . If there is no monitor supporting HDMI interface, you can connect to the monitor supporting VGA via HDMI-to-VGA devices or cables.

# Chapter 4 IO Controller Settings

## 4.1 IO Controller

The vision box's GPIO and light source interfaces can be controlled via SDK and IO controller. The main interface of the IO controller is shown below.

Initial Conne	ection		Message	
Port No.	Com 1 $\sim$			View
Baud Rate	115200 ~			
Data Bit	8 ~	Connect	Clear	r
Stop Bit	1 ~			
Parity Bit	None 🗸		Save	e
nput Settings	S		Light Source Settings	
			Port Status Brightness	
Port	Port1 ~		• On 100	
Trigger Sign	Rising_Edge $\sim$		O Off Apply	
Upload Sign	nal Disable 🗸	Apply		
Trioger Dela	av 0 ms		Input Signal Detection	
	T 0 ms		Level1 Level2 Level3 Level4 Level5 Level6 Level7 Level8 Detec	zt
Debouncer	Time 0 ms		Level1 Level2 Level3 Level4 Level5 Level6 Level7 Level8 Detec	t
Debouncer Output Settin	Time 0 ms		Level1 Level2 Level3 Level4 Level5 Level6 Level7 Level8 Detec	t
Debouncer Output Settin	Time 0 ms		Level1     Level2     Level3     Level4     Level5     Level6     Level7     Level8       Input associated output     Input Port     1     2     3     4     5     6     7     8	ct
Debouncer Putput Settin Port	Time 0 ms		Level1         Level2         Level3         Level4         Level5         Level6         Level7         Level8         Detection           Input associated output         Input Port         1         2         3         4         5         6         7         8         Apply           Output Port         1         2         3         4         5         6         7         8	ct y
Debouncer Putput Settin Port Mode	Time 0 ms		Level1       Level2       Level3       Level4       Level5       Level6       Level7       Level8       Detection         Input associated output       Input Port       1       2       3       4       5       6       7       8       Apply         Output Port       1       2       3       4       5       6       7       8       Apply         Output Port       1       2       3       4       5       6       7       8	et y
Debouncer utput Settin <sup>P</sup> ort Mode	Time 0 ms mgs Port1  V Multi_Pulse  V Low_Level  V		Level1         Level2         Level3         Level4         Level5         Level6         Level7         Level8         Detection           Input associated output         Input Port         1         2         3         4         5         6         7         8         Apply           Output Port         1         2         3         4         5         6         7         8         Apply           Output Port         1         2         3         4         5         6         7         8           Output Enable         1         2         3         4         5         6         7         8	st Y
Debouncer Jutput Settin Port Mode Jectrical evel	Time 0 ms	Apply	Level1         Level2         Level3         Level4         Level5         Level6         Level7         Level8         Detection           Input associated output         Input Port         1         2         3         4         5         6         7         8         Apply           Output Port         1         2         3         4         5         6         7         8         Apply           Output Enable	ct y
Debouncer utput Settin Port Vode lectrical evel Duration	Time 0 ms	Apply	Level1         Level2         Level3         Level4         Level5         Level6         Level7         Level8         Detection           Input associated output         Input Port         1         2         3         4         5         6         7         8         Apply           Output Port         1         2         3         4         5         6         7         8         Apply           Output Enable         1         2         3         4         5         6         7         8         Apply           Open Enable         Disable         V	st y
Debouncer utput Settin Port Mode lectrical evel Duration Pulse Period	Time 0 ms  gs Port 1   Multi_Pulse   Low_Level   0 ms 0 ms	Apply	Level1       Level2       Level3       Level4       Level5       Level6       Level7       Level8       Detection         Input associated output       Input Port       1       2       3       4       5       6       7       8       Apply         Output Port       1       2       3       4       5       6       7       8       Apply         Output Port       1       2       3       4       5       6       7       8       Apply         Output Enable       1       2       3       4       5       6       7       8       Apply         Open Enable       Disable            0.0.00000         Other       Emware Version       0.0.00000         0.0.00000	st y
Debouncer lutput Settin Port Mode evel Duration Pulse Period Pulse Width	Time 0 ms mgs Port1  V Multi_Pulse  V Low_Level  0 ms 0 ms 0 ms	Apply	Level1       Level2       Level3       Level4       Level5       Level6       Level7       Level8       Detection         Input associated output       Input Port       1       2       3       4       5       6       7       8       Apply         Output Port       1       2       3       4       5       6       7       8       Apply         Output Enable       1       2       3       4       5       6       7       8       Apply         Open Enable       1       2       3       4       5       6       7       8       Apply         Other       Finable <td>st y lly 00000</td>	st y lly 00000

Figure 4-1 Main Interface

### 

The vision box in the manual has 4 input and 4 output interfaces only, which are port 1 to port 4 in input port, output port and input level displayed in the IO controller.

## 4.2 Communication Port

You can go to **Device Manager** > **Ports (COM & LPT)** to view the corresponding relation between serial physical port and COM.

#### Steps:

- 1. Right click on This PC icon on the desktop, and select **Manage** from the context menu.
- 2. Select Device Manager under System Tools.



Figure 4-2 Communications Port

#### 

The specific graphical user interface may differ by device models.

- 3. Select View from the menu bar, and click Show hidden devices from the submenu.
- 4. Locate **Ports (COM & LPT)** from the list in the right pane.
- 5. Expand it to find **Communications Port (COM)**, right click one COM and select **Properties**.
- 6. Find Resources, and view Interrupt Request.

Refer to the table below for specific COM port and IRQ information.

COM Port	Function	IRQ
COM1	RS-232	0x0000004 (04)

Table 4-1 COM Port and IRQ

COM Port	Function	IRQ
COM2	GPIO	0x000000A (10)
СОМЗ	RS-485	0x0000003 (03)
COM4		0x000000B (11)

## 

You need to configure COM port settings according to the table above if the device's system is not a default one.

# 4.3 Serial Port Connection Settings

The serial port connection settings are used to select specific serial port No. and set corresponding parameters including baud rate, data bit, stop bit, and parity bit. After settings, you should click **Connect**.

Initial Conne	ction		
Port No.	Com1	$\sim$	
Baud Rate	115200	~	
Data Bit	8	~	Connect
Stop Bit	1	~	
Parity Bit	None	~	

Figure 4-3 Serial Port Connection Settings

# 4.4 Input

### 4.4.1 Input Level

Click **Detect** in **Input Signal Detection** to get the electrical level of the input port. Red color stands for the high electrical level, and green color stands for the low electrical level.

Inp	ut Signal D	etection							
	Level1	Level2	Level3	Level4	Level5	Level6	Level7	Level8	Detect

Figure 4-4 Input Level

#### 4.4.2 Input Settings

In **Input Settings**, select **Port**, set **Trigger Signal** and **Upload Signal** according to actual demands. Enter **Trigger Delay** and **Debouncer Time** to delay the trigger signal received time, and to filter out unwanted short input signals respectively. Click **Apply** after settings.

Input Settings			
Port	Port1	$\sim$	
Trigger Signal	Rising_Edge	$\sim$	
Upload Signal	Disable	$\sim$	Apply
Trigger Delay	0	ms	
Debouncer Time	0	ms	

Figure 4-5 Input Settings

### 4.5 Output

#### 4.5.1 Output Settings

In **Output Settings**, after selecting **Port**, you can set these parameters: **Mode**, **Electrical Level**, **Duration**, **Pulse Period**, and **Pulse Width**. Click **Apply** after settings.

-Output Setti	ngs		
Port	Port1	$\sim$	
Mode	Multi_Pulse	$\sim$	
Electrical Level	Low_Level	$\sim$	Apply
Duration	0	ms	
Pulse Period	0	ms	
Pulse Width	0	ms	

Figure 4-6 Output Settings

### 

- Pulse Period and Pulse Width are only valid when you select Multi\_Pulse as Mode.
- The **Duration** cannot be smaller than the **Pulse Period** when **Multi\_Pulse** is selected as **Mode**.

#### 4.5.2 Output Enable

Output enable is used to set whether the device outputs signal or not. After above-mentioned settings, if you want to let the port output signals, you should check the specific port No., select **Enable** as **Open Enable**, and click **Apply** after settings.

# 4.6 Input and Output Connection

The input and output connection module is used to set the connection between the device's opto-isolated input and output. After receiving valid input signals, the device's connected output interface will output signals according to specific output settings.

Input associate	ed output								
Input Port	1	2	3	4	5	6	7	8	Apply
Output Port	1	2	3	4	5	6	7	8	

Figure 4-7 Input and Output Connection

### 

- New input signal received during processing will be filtered directly.
- The device can connect one input port with one output input only.

After checking one input port and one output port, you should click **Apply** to apply settings. If you want to cancel connection, do not check any input and output ports, and click **Apply** to apply settings.

## 4.7 Light Source Settings

The light source settings allow you to set light source related parameters. After selecting **Port**, **Status** and **Brightness**, you should click **Apply** to apply it.

Regarding **Status**, you can check **On** or **Off** to let the light source turn on or turn off after receiving a trigger signal that can be rising edge or falling edge.

### 4.8 View Message

The message window displays messages in real time. You can clear them or save them in txt file.

# 4.9 Enable Edge Detection

Edge detection allows you to view the input edge signals and its quantity via message window in real time.

# 4.10 Upgrade Firmware

Click Firmware Upgrade to upgrade the device's firmware.



Contact the technical support staff to get the latest firmware.

# Chapter 5 System Reinstallation

The default system of the device is Windows Embedded Standard 7 or Windows 10 IoT. If the system exception occurs, or you need to use other systems, and then system reinstallation is required.

#### 

For specific operating system that the device supports, please refer to the specification of the device.

You can reinstall system by connecting the device to USB flash disk, USB optical disk driver, mobile hard disk, etc. After connection, you need to set in BIOS as follows.

#### Steps:

- 1. Power on the device, and press **DELETE** to enter BIOS setting interface.
- 2. Enter Save & Quit sub-menu, find USB device you use, and start system reinstallation.

Or,

#### Steps:

- 1. Power on the device, and press **DELETE** to enter BIOS setting interface.
- 2. Go to Advanced > CSM Configuration, and set Boot option filer as Legacy only.
- 3. Enter **BOOT** sub-menu, and set **Boot Option #1** as your startup item.
- 4. Save settings, exit BIOS, and reboot the device.

#### 

After system reinstallation, you need to set 1st boot device in **Boot Priority Order** as HDD (Hard Disk Drive).

# Chapter 6 Trouble Shooting

No.	Trouble	Solution
1	The device does not have the VGA interface.	Order original HDMI-to-VGA cable or purchase suitable cable.
2		1. Reconnect the HDMI cable, or replace VGA cable.
		2. Reboot the device.
		3. After rebooting the device, press "Ctrl + Alt + Delete", and press "Delete" quickly.
	The monitor screen can not be lit.	4. Long hold "F8" to enter the security mode after powering on, delete or uninstall the driver or software wich is intalled before the blank screen, and then reboot the controller.
		5. Intsall the device system again. The default system of the device is Windows Embedded Standard 7 64bit. Contact the technical support for system file.
3	IP address cannot be	1 Connect to the network port and use packet capturing tool to acquire IP address.
	found in the remote	2. Connect to the screen and set the network port for static IP use.
	name and password are incorrect.	3. The default user name is "Administrator", and the default password is "Operation666". You can go to <b>Control Panel &gt; User Account</b> to view and modify the user name and password.
4		1. Reboot the device.
	Blue Screen, system	2. Long hold "F8" to enter the security mode after powering on, delete or uninstall the driver or software which is intalled before the blank screen, and then reboot the controller.
	crash, frequent	3. Solve the problems according to the error codes.
	rebooting.	4. Intsall the device system again. The default system of the device is Windows Embedded
		Standard 7 64bit. Contact the technical support for system file.
5	No signal feedback from GPIO input signal, and output electrical level does	1. Check whether the signal source has any edge singal triggering; check whether the parameters are correctly configured (for example, filter parameter, mode configuration delay); check whether the connections are correct.
	not change.	<ol><li>If the electrical output level does not change, check whether the connections are correct (C port and G port need external power supply) and</li></ol>

#### Table 6-1 Trouble Shooting

No.	Trouble	Solution
		whether the the paramater configurations are completely enabled.
		3. Replace the vision box and check whether the IO port is burned out.



UD23619B