## PCI Express x4, 2-channel/4-channel Gigabit LAN, IEEE 802.3at Compliant PoE<sup>+</sup> Expansion Card



1.1.0 Edition 20150713

## **Record of Revision**

Version	Date	Page	Description	Remark
0.9	01/20/2015	All	Preliminary Release	
1.0	03/03/2015	All	Official Release	
1.1	07/13/2015	All	Update Release	

## Declaimer

This manual is released by Vecow Co., Ltd. for reference purpose only. All product offerings and specifications are subject to change without prior notice. It does not represent commitment of Vecow Co., Ltd. Vecow 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**

This document contains proprietary information protected by copyright. No part of this publication may be reproduced in any form or by any means, electric, photocopying, recording or otherwise, without prior written authorization by Vecow Co., Ltd. The rights of all the brand names, product names and trademarks belong to their respective owners.

## **Order Information**

Part Number	Description
PE-1002	PCI Express by 4, PoE⁺, 2-CH, Gigabit, IEEE 802.3at Compliant
PE-1004	PCI Express by 4, PoE⁺, 4-CH, Gigabit, IEEE 802.3at Compliant

## **Table of Contents**

1	<b>GENERAL INTRODUCTION</b>	1
1.1	Overview	1
1.2	Features	1
1.3	Product Specification	2
	1.3.1 Specifications of Vecow PE-1002	2
	1.3.2 Specifications of Vecow PE-1004	3
1.4	Mechanical Dimension	4
	1.4.1 PE-1002	4
	1.4.2 PE-1004	4
2	GETTING TO KNOW YOUR PE-1000	5
2.1	Packing List	5
2.2	I/O and Indication	6
	2.2.1 LED1 CN3 CN4 CN5 CN6	6
	2.2.2 CN1	7
	2.2.3 CN2	8
3	GETTING START	9
3.1	Installing PE-1002/ PE-1004	9
4	DRIVER INSTALLATION AND SETTING	11
4.1	Driver Installation	11
4.2	Jumbo Frame	14
4.3	Link Aggregation	16
Α	<b>DIO FUNCTION</b>	18
	1.1 1.2 1.3 1.4 2 2.1 2.2 3 3.1 4 4.1 4.2	<ul> <li>1.1 Overview</li> <li>Features</li> <li>Product Specification <ul> <li>1.3.1 Specifications of Vecow PE-1002</li> <li>1.3.2 Specifications of Vecow PE-1004</li> </ul> </li> <li>1.4.1 PE-1002 <ul> <li>1.4.2 PE-1004</li> </ul> </li> <li>2.0 GETTTING TO KNOW YOUR PE-10000</li> </ul> <li>2.1 Packing List <ul> <li>2.2.1 LED1 CN3 CN4 CN5 CN6</li> <li>2.2.2 CN1</li> <li>2.2.3 CN2</li> </ul> </li> <li>3 GETTING START</li> <li>3.1 Installing PE-1002/ PE-1004</li> <li>4 DRIVER INSTALLATION AND SETTING <ul> <li>4.1 Driver Installation</li> <li>4.2 Jumbo Frame</li> <li>4.3 Link Aggregation</li> </ul></li>

# 1

## **GENERAL INTRODUCTION**

#### **1.1 Overview**

PE-1000 is a series of PoE<sup>+</sup> expansion cards which is powered by independent gigabit LAN chips. With up to 25.5W at 48V DC power output on each 10/100/1000 Mbps IEEE 802.3at compliant connection, link aggregation (LAG) & 9KB Jumbo Frame supported, and wide range of operating temperature, PE-1000 series PoE<sup>+</sup> expansion card is your cost effective choice for Intelligent Transportation System (ITS), IP Video Surveillance, Automation Optical Inspection, Industrial Automation and any PoE<sup>+</sup> required applications.

#### **1.2 Features**

- PCI Express x4 Interface
- IEEE 802.3at compliant for PoE<sup>+</sup>
- Up to 4 Independent Gigabit LAN Ports
- Up to 25.5W Power Output at 48V DC per port
- -25°C to 70°C Operating Temperature
- 9KB Jumbo Frame
- Link Aggregation
- 16 Isolated DIO for 8 DI & 8 DO (Optional)

## **1.3 Product Specification**

#### 1.3.1 Specifications of Vecow PE-1002

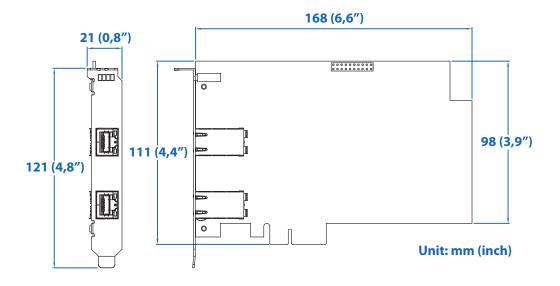
Ethernet					
Interface	PCI Express x4				
Chipset	2 Intel <sup>®</sup> 82574L Gigabit LAN				
Data Rate	10/ 100/ 1000 Mbps (Vary by attached Ethernet device)				
Jumbo Frame	9КВ				
Link Aggregation (LAG)	Present				
Connector	8-pin RJ45				
PoE Standard	IEEE 802.3at compliant				
Power Requirements					
Output	2 PoE Ports, up to 25.5W Power Output at 48V DC per port				
Power Connector	1 4-pin ATX 12V Power Connector				
DIO	16 Isolated DIO for 8 DI & 8 DO (Optional)				
Environment					
Operating Temperature	-25°C to 70°C (-13°F to 158°F)				
Storage Temperature	-40°C to 85°C (-40°F to 185°F)				
Certifications	FCC, CE, RoHS compliant				
Mechanical					
Dimension (W x D x H)	168mm x 121mm x 21mm (6.6" x 4.8" x 0.8")				

#### 1.3.2 Specifications of Vecow PE-1004

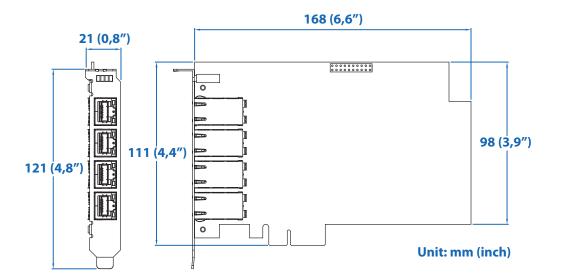
Ethernet					
Interface	PCI Express x4				
Chipset	4 Intel <sup>®</sup> 82574L Gigabit LAN				
Data Rate	10/ 100/ 1000 Mbps (Vary by attached Ethernet device)				
Jumbo Frame	9КВ				
Link Aggregation (LAG)	Present				
Connector	8-pin RJ45				
PoE Standard	EEE 802.3at compliant				
Power Requirements					
Output	4 PoE Ports, up to 25.5W Power Output at 48V DC per port				
Power Connector	1 4-pin ATX 12V Power Connector				
DIO	16 Isolated DIO for 8 DI & 8 DO (Optional)				
Environment					
Operating Temperature	-25°C to 70°C (-13°F to 158°F)				
Storage Temperature	-40°C to 85°C (-40°F to 185°F)				
Certifications	FCC, CE, RoHS compliant				
Mechanical					
Dimension (W x D x H)	168mm x 121mm x 21mm (6.6" x 4.8" x 0.8")				

#### **1.4 Mechanical Dimension**

1.4.1 PE-1002



1.4.2 PE-1004





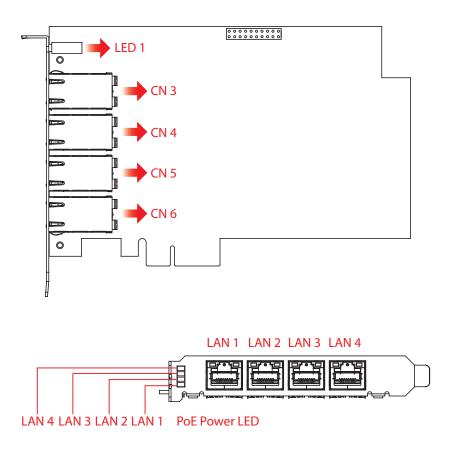
## **GETTING TO KNOW YOUR PE-1000**

## 2.1 Packing List

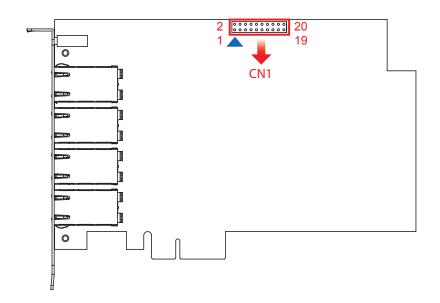
Item	Description	Qty
1	PE-1000, PCI Express x4 PoE <sup>+</sup> , 2-Channel/ 4-Channel, Gigabit, IEEE 802.3at Compliant Expansion Card (According to the configuration you order.)	1
2	Accessory box, which contains Vecow Drivers & Utilities DVD	1

#### 2.2 I/O and Indication

#### 2.2.1 LED1 CN3 CN4 CN5 CN6

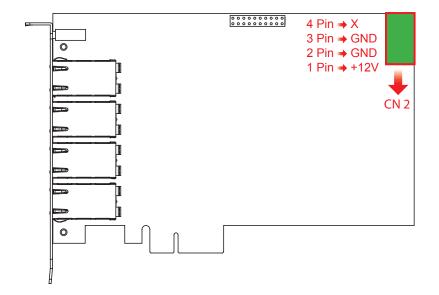


PE-1000 equipped with 4 IEEE 802.3at PoE<sup>+</sup> ports for transmitting power as much as 25.5W / 48V per port and 1000BASE-T gigabit data signals over standard Ethernet CAT-5/CAT-6 cable. Every PoE port applies one Intel<sup>®</sup> 82574L Gigabit Ethernet controller and independent PCI express interface to connect with multi-core processor for network and data transmit optimization. Only when PoE port starts to supply power to power devices, the dedicated LED will be light on.



The PE-1000 offers a 16-bit Isolated DIO (8-DI / 8-DO) connector. Each bit of DI and DO equipped with a photo-coupler for protection. A power buffer device TPD2007F integrated in 8-DO circuit for industrial applications.

Pin No.	Definition	Pin No.	Definition
1	INPUT 0	11	OUTPUT 0
2	INPUT 1	12	OUTPUT 1
3	INPUT 2	13	OUTPUT 2
4	INPUT 3	14	OUTPUT 3
5	INPUT 4	15	OUTPUT 4
6	INPUT 5	16	OUTPUT 5
7	INPUT 6	17	OUTPUT 6
8	INPUT 7	18	OUTPUT 7
9	DI_COM	19	N.C.
10	GND	20	External 24VDC Input



The PE-1000 also equipped with one 4-pin power plug (12V, 6A max) for additional power supply. For most cases, the power obtained from PCIe bus is sufficient for the PoE devices, and you do not need to supply extra power to the card.

In case the external power is needed, you can use 4-pin ATX power connector (+5V/Red, GND/Black, GND/Black, +12V/Yellow) inside the host computer. Please always confirm the polarity before you plug into the onboard 4-pin power plug.

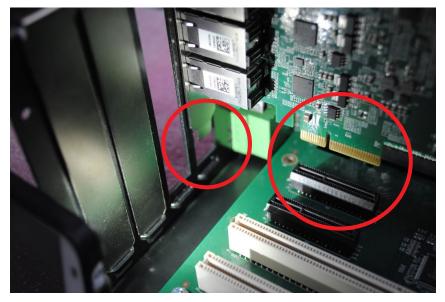
Pin No.	Definition		
1	+12V		
2	GND		
3	GND		
4	Х		



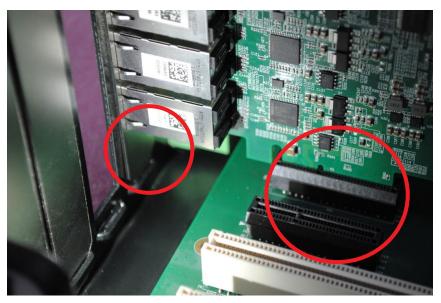
## **GETTING START**

## 3.1 Installing PE-1002/ PE-1004

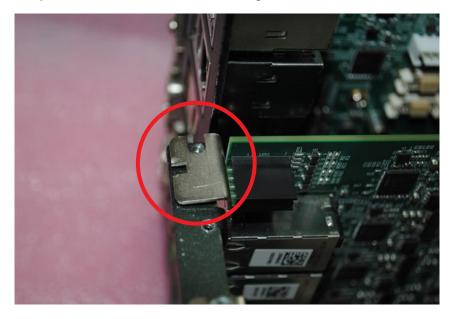
**Step 1.** Insert PE-1000 golden finger and PCI bracket into PCIe socket carefully.



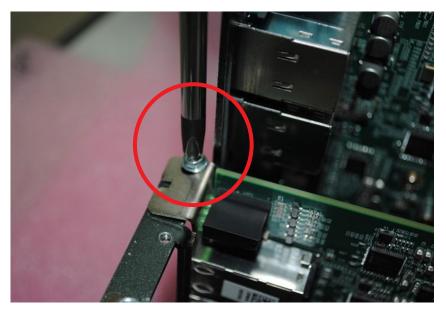
**Step 2.** Make sure golden finger and PCI bracket was inserted smoothly.



**Step 3.** Make sure the bracket aligns screw hole.



Step 4. Fasten the M3 screw.





## **DRIVER INSTALLATION AND SETTING**

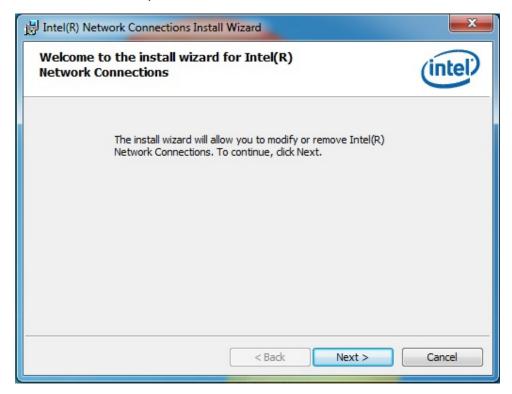
#### 4.1 Driver Installation

This section describes: How to install drivers for PE-1002/ PE-1004 PoE Card.

System OS:

Windows XP, Windows 7 32-bit, Windows 7 64-bit, Windows 8.

## Step 1. Execute LAN82574L\_PROWinx64.exe and then go "Next" step.



HINTER (R) Netwo	rk Connections Install Wizard	×
Program Main Modify or remo	tenance we the program.	(intel)
<ul> <li>Modify</li> <li>Modify</li> <li>Remove</li> </ul>	Change which program features are installed. This option displays Custom Setup dialog in which you can change the way features a installed. Remove Intel(R) Network Connections from your computer.	
	< Back Next >	Cancel

#### **Step 2.** Select "Modify" and then go to "Next" step.

#### **Step 3.** Select program features.

tel(R) Network Connections	×
Setup Options Select the program features you want installed.	(intel)
Install:	
✓ Drivers ✓ Intel(R) PROSet for Windows* Device Manager ✓ Advanced Network Services ✓ Intel(R) Network Connections SNMP Agent	
Feature Description	
< Back Next	> Cancel

HIII Intel(R) Network Connections Install Wizard **Ready to Modify the Program** (intel) The wizard is ready to begin installation.

х

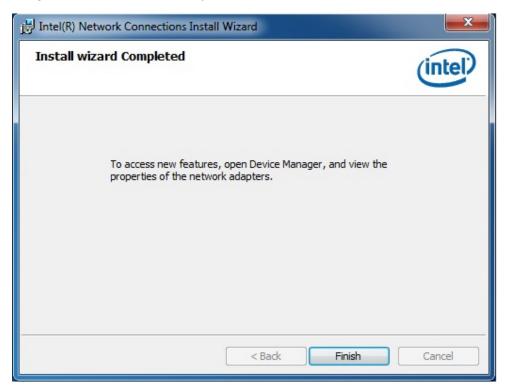
Click Install to begin the installation. If you want to review or change any of your installation settings, click Back. Click Cancel to exit the wizard.

< Back

Install

Cancel

Step 5. Install wizard completed.



Once you need this network driver , you could remove this program on Control panel directly.

**Step 4.** Click the "Install" icon to begin the installation.

#### 4.2 Jumbo Frame

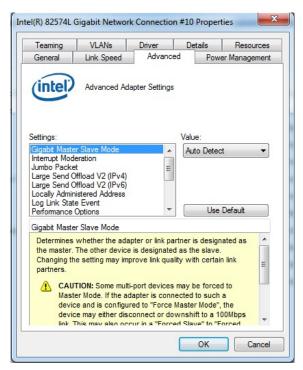
After installing the driver for Intel<sup>®</sup> 82574L GbE controller, you can get the enhance function that called jumbo frame, please find more instruction as below.

#### Step 1.

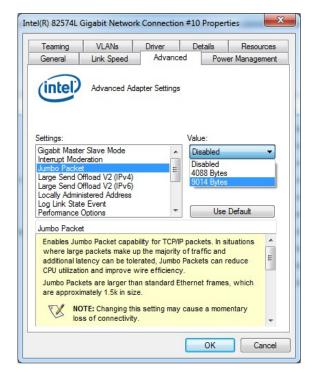
Open the "Control Panel  $\rightarrow$  Device Manager  $\rightarrow$  Network adapters".

🕖 - 📴 🕨 Control Panel 🕨	All Control Panel Items 🕨			<ul> <li>47 Search Control Panel</li> </ul>	
Adjust your computer's sett	ings			View by: Small icons 🔻	
P Action Center	🔞 Administrative Tools	🖏 AutoPlay	🐌 Backup and Restore		
💶 Color Management	Credential Manager	🔮 Date and Time	🛞 Default Programs		
🙀 Desktop Gadgets	Device Manager	Devices and Printers	🖳 Display		
Ease of Access Center	Device Manager	and the second s	B Setting Server		
🖏 HomeGroup	File Action View Help	wersoftware.			
Keyboard		R R 6			
Notification Area Icons	▲ 🚔 EC-7000-PC				
Phone and Modem	⊳ - 🖳 Computer				
P Recovery	Disk drives				
Speech Recognition	Human Interface Dev	ices			
Troubleshooting	D IDE ATA/ATAPI contr	ollers			
Windows Defender	▷ - Construction → Construction	na devices			
	Monitors	ing dentes			
	A 🔮 Network adapters	gabit Network Connection #10			
		gabit Network Connection #10 gabit Network Connection #11			
		gabit Network Connection #12			
		gabit Network Connection #13 gabit Network Connection #3			
		Sigabit Network Connection			
	<ul> <li>Other devices</li> </ul>				
	Base System Devices	te			
	Ports (COM & LPT)				
	Processors				
	Sound, video and gar	ne controllers			
	👂 🏺 Universal Serial Bus co	ontrollers			

**Step 2.** Select anyone "Intel<sup>®</sup> 82574L Gigabit Network Connection #xx", right Click and select "Properties", a property dialog appears and Click on the Advanced page.



**Step 3.** Select the "Jumbo Packet", settings, and select the expected jumbo frame size.



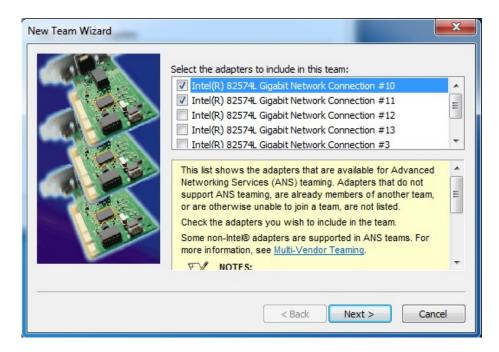
## 4.3 Link Aggregation

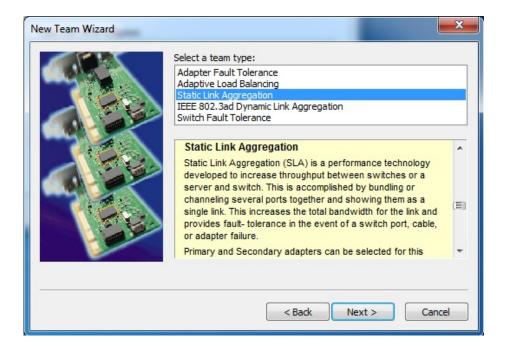
#### Step 1.

Here shows another enhance network function "Teaming".

Intel(R) 82574L	Gigabit Network	Connection #10	Properties	×	J	
General	Link Speed	Advanced	Power M	anagement		
Teaming	VLANs	Driver De	etails	Resources		
Team	Adapter Teamin this adapter with ot  eams available		New Tea Propertie			
New Team	Wizard					×
		Specify a name Team #0 Advanced N to 48 charac system. The team na	e for the team etworking Se ters. Team n me can be ch odify Team	ervices (ANS) te ames must be u nanged after the	am names are limite nique within the team is created by ettings tab of the	
			<	Back	ext > Car	ncel

## **Step 2.** You could multi-select network device to get a high performance net





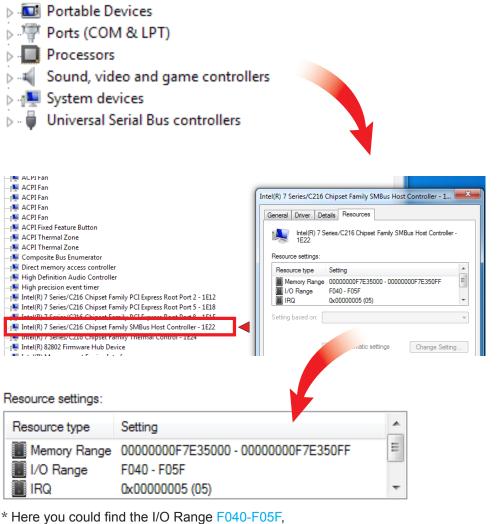


## **APPENDIX : DIO FUNCTION**

PE-1000 series include 16 Isolated Digital I/O extension function.

Step 1. Pin assignment: Please refer to section 2.2.1 for pin assign.

Step 2. SMbus base address :



- IRQ is 0x0000005(05).
- \* The 0xF040 is start address(SMB\_BASE) of SMbus function

SMB_BASE + Offset	Mnemonic	Register Name	Default	Туре
00h	HST_STS	Host Status	00h	R/WC, RO, R/WC (special)
02h	HST_CNT	Host Control	00h	R/W, WO
03h	HST_CMD	Host Command	00h	R/W
04h	XMIT_SLVA	Transmit Slave Address	00h	R/W
05h	HST_D0	Host Data 0	00h	R/W
06h	HST_D1	Host Data 1	00h	R/W
07h	HOST_BLOCK_DB	Host Block Data Byte	00h	R/W
08h	PEC	Packet Error Check	00h	R/W
09h	RCV_SLVA	Receive Slave Address	44h	R/W
0Ah-0Bh	SLV_DATA	Receive Slave Data	0000h	RO
0Ch	AUX_STS	Auxiliary Status	00h	R/WC, RO
0Dh	AUX_CTL	Auxiliary Control	00h	R/W
0Eh	SMLINK_PIN_CTL	SMLink Pin Control (TCO Compatible Mode)	See register description	R/W, RO

Step 3.	SMbus	IO Address	Mapping	table
---------	-------	------------	---------	-------

**Step 4.** To Access SMBus register, below shows standard Read/Write scenarios. You refer to demo code that follow SMbus protocol to complete the process.

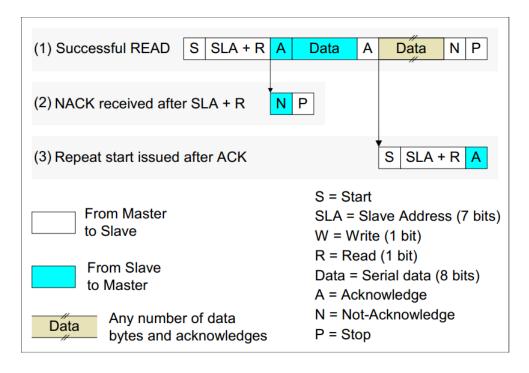
(1)Successful WRITE S SLA + W A	Data A Data A P		
(2) NACK received after SLA + W	2		
(3) Repeat start issued after Acknowledge	S SLA + R A		
(4) NACK received after data	N P		
From Master to Slave From Slave to Master	S = Start SLA = Slave Address (7 bits) W = Write (1 bit) R = Read (1 bit) Data = Serial data (8 bits) A = Acknowledge		
Data Any number of data bytes and acknowledges	N= Not-Acknowledge P = Stop		

void smbwrite(Data\_BYTE device\_id, Data\_BYTE reg\_no, unsigned char data)

```
Data_BYTE err_no;
WriteAByte(SMBus_Host_Status, 0xFF);
Delay_T(1);
err_no = Check_SMBus_Ready();
if (err_no != 0) return;
WriteAByte(SMBus_Trans_Addr, device_id);
WriteAByte(SMBus_Host_Command, reg_no);
WriteAByte(SMBus_Host_Command, reg_no);
WriteAByte(SMBus_Host_Control, 0x48);
Delay_T(200);
Check_SMBus_Ready();
```

}

{



Data\_BYTE smbread(Data\_BYTE device\_id, Data\_BYTE reg\_no, unsigned char \*dat)

```
Data_BYTE err_no;

WriteAByte(SMBus_Host_Status, 0xff);

WriteAByte(SMBus_Host_Data0, 0x00);

err_no = Check_SMBus_Ready();

if (err_no != 0) return err_no;

WriteAByte(SMBus_Trans_Addr, device_id+1);

WriteAByte(SMBus_Host_Command, reg_no);

WriteAByte(SMBus_Host_Control, 0x48);

Delay_T(20);

err_no = Check_SMBus_Ready();

if (err_no != 0) return err_no;

    *dat = ReadAByte(SMBus_Host_Data0);

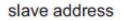
return (err_no); //Data 0
```

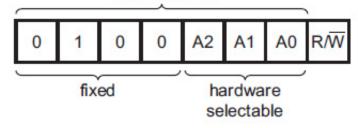
{

}

#### Step 5. Control DIO port

 a. DIO port device slave address : As SMbus protocol, you need slave address to identify your target device on runtime control. The default value is "0x40", at the lower three bit, you can adjust the address through "J1".





b. DIO port device configuration

I/O Pin	Direction	Command
GPIO Port 0	Output	0x06
GPIO Port 1	Input	0x07

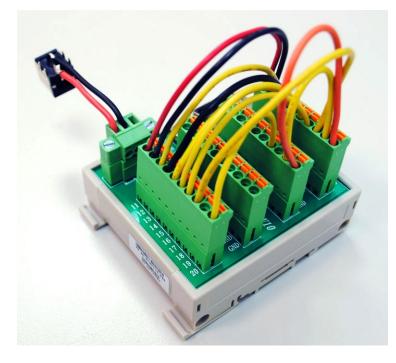
Output Mode : 1 , Input Mode : 0

 Access Output port / Input port : Input port register = 0x00 Output port register = 0x03

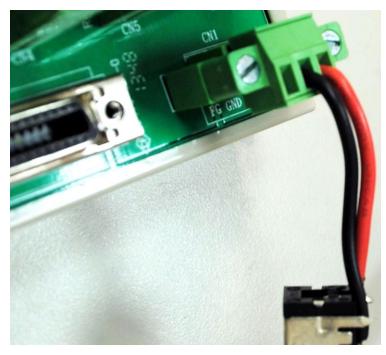
#### Step 6. Connect DIO demo tool

Make DI to DO loopback wire connection

- a. Data line : CN3[01~08] wire to CN6[01~08]
- b. Powerline : CN6[10] wire to CN4[07], CN3[09] wire to CN4[09]
- c. Grounding : CN3[10] wire to CN4[10]



d. Connect 24V to Terminal board



\* If more help is needed, please contact Vecow Technical Support



For further support information, please visit www.vecow.com

This document is released for reference purpose only. All product offerings and specifications are subject to change without prior notice. No part of this publication may be reproduced in any form or by any means, ele

No part of this publication may be reproduced in any form or by any means, electric, photocopying, recording or otherwise, without prior authorization of the publisher.

The rights of all the brand names, product names and trademarks belong to their respective owners. © Vecow Co., Ltd. 2015. All rights reserved.