

# **ECD8217**

## **EtherCAT Digital I/O module**

### **User's Manual (V1.2)**

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## Correction record

Version	Record
1.0	firmware version 1.0 up
1.1	1. Modify board dimension drawing (chapt. <b>4.1</b> )
	2. Change connector drawings to photos (chapt. <b>5</b> )
1.2	1. Modify <b>Ordering information</b> (chapt. <b>9</b> )
	2. Modify <b>I/O Interface diagram</b> (chapt. <b>6</b> )
	3. Add <b>External wiring diagram</b> (chapt. <b>7</b> )

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# Warranty

The product ECD8217 is warranted against defects in materials and workmanship for a period of two years from the date of shipment, as evidenced by receipts or serial no. on board. JS automation Corp. will, at its option, repair or replace product that proves to be defective during the warranty period. This warranty includes parts, labor and shipping costs of returning.

Except as specified herein, JS automation Corp. makes no warranties, express or implied, and specifically disclaims any warranty of merchantability or fitness for a particular purpose. Customer's right to recover damages caused by fault or negligence on the part of JS automation Corp. shall be limited to the amount theretofore paid by the customer. JS automation Corp. will not be liable for damages resulting from loss of data, profits, use of products, or incidental or consequential damages, even if advised of the possibility thereof. This limitation of the liability of JS automation Corp. will apply regardless of the form of action, whether in contract or tort, including negligence. Any action against JS automation Corp. must be brought within one year after the cause of action accrues.

JS automation Corp. shall not be liable for any delay in performance due to causes beyond its reasonable control. The warranty provided herein does not cover damages, defects, malfunctions, or service failures caused by owner's failure to follow the JS automation Corp. installation, operation, or maintenance instructions; owner's modification of the product; owner's abuse, misuse, or negligent acts; and power failure or surges, fire, flood, accident, actions of third parties, or other events outside reasonable control.

If any defect occurs, you should email to us (control.cards@automation.com.tw) as the following form to get the fast response:

## **Detailed Company Information**

Company/Organization:

Contact Person:

E-mail:

Address:

Country:

Tel/Fax:

Web Site:

## **Product information**

product model:

serial no.:

Environment to Use: such as CPU board, Operating System, target application...

description of defect: (as detail as possible)

## 1. **Forward**

Thank you for your selection of EtherCAT module ECD8217 digital output interface.

Thanks to the booming of network, EtherCAT become a reliable and low cost solution of real time control data communication standard. To utilize the EtherCAT as data communication highway of industrial control devices is more attractive than ever.

ECD8217 module is a multifunction digital output control module. We provide the dll's of Window's or Linux system, enabling you to code the flexible application as if it is an add-on card without the knowledge of EtherCAT protocol. But for the expert of EtherCAT, you can also use the basic EtherCAT command to your application.

Stable, high reliability and remote addressable module give you a new approach of application.

In the same series:

ECD8208 EtherCAT DIO module, 8 photo isolated input and 8 relay output

ECD8215 EtherCAT DIO module, 32 photo isolated input

ECD8216N EtherCAT DIO module, 16 photo isolated input and 16 photo isolated NMOS output

ECD8216P EtherCAT DIO module, 16 photo isolated input and 16 photo isolated PMOS output

Any comment is welcome,

please visit our website

<http://www.automation.com.tw/> for the up to date information.

## 2. Features

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- EtherCAT compliant slave module
- Bi-directional photo-coupler input with multiple input configuration
- Photo-coupled MOS output, optional PMOS or NMOS
- EtherCAT distributed clock (DC) function enabled
- No extra real time master stack software
- Easy to program as if traditional add-on card

### 3. **Specifications**

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#### **Digital output**

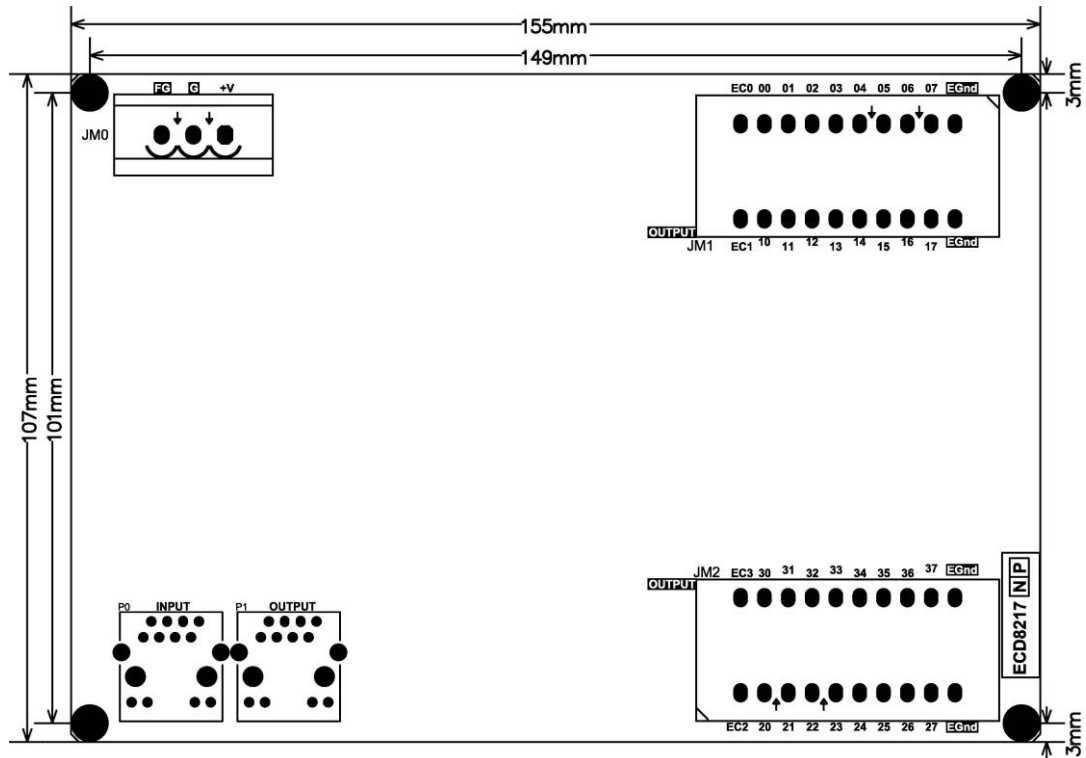
- MOS output points: 32 with LED indicator (NMOS ECD8217N or PMOS ECD8217P)
- MOS capacity: 1A @48Vdc

#### **General**

- Power requirement: 24Vdc (18-36Vdc) 0.5A
- Operation Temperature: 0 ~ +70 degree C
- Storage Temperature: -20 ~ +80 degree C
- Operation Humidity: 5~95% RH, non-condensing
- Dimension: 158(D)\*120(W)\*58(H) mm  
6.3(D)\*4.8(W)\*2.3(H) in

## 4. Layout and dimensions

### 4.1 ECD8217 board dimension

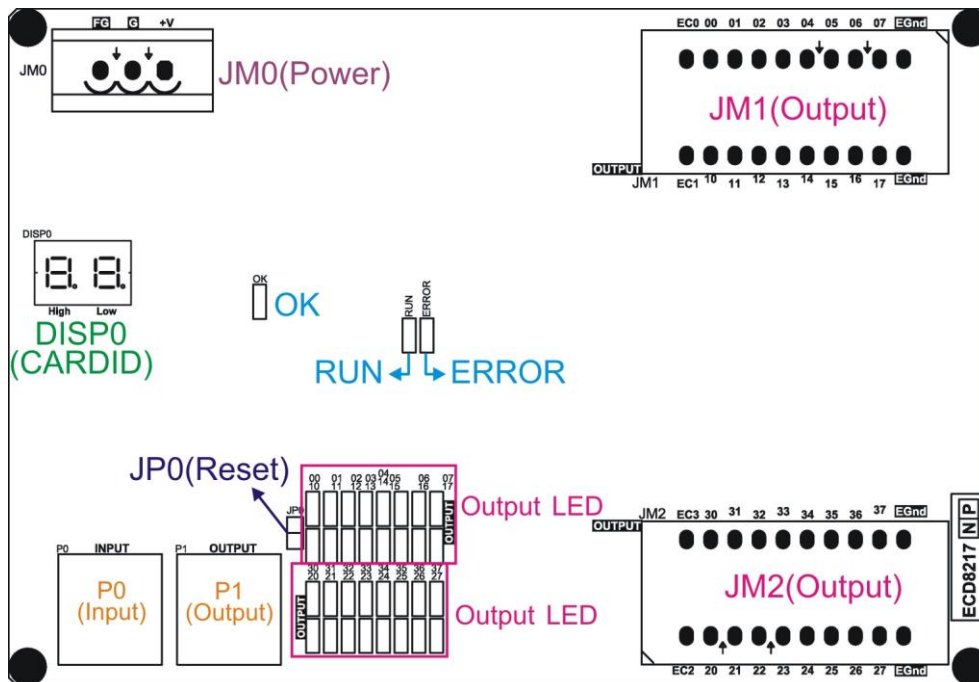


\*dimension in bare board



## 5. Pin definitions

### 5.1 Overview of connectors and indicators



JM0: external power 18-36Vdc connector

DISP0: CardID or module address display

OK: system active LED, flashing per second

RUN: ESC (EtherCAT slave controller) status LED, while

LED off: ESC initialization

LED blinking (slow): ESC in pre op state

LED single flash: ESC in safe op state

LED on: ESC in op state

LED flickering(fast): ESC in bootstrap state

ERROR: ESC (EtherCAT slave controller) error LED, while

LED off: ESC no error

LED flickering (fast): ESC error in bootstrap state

LED blinking (slow): ESC error in pre op state

LED single flash: local application error

LED double flash: master is disconnected

LED on: local controller fail

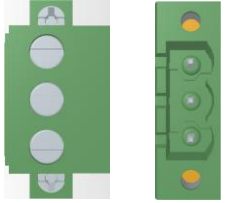
P0: EtherCAT RJ45 input socket

P1: EtherCAT RJ45 output socket

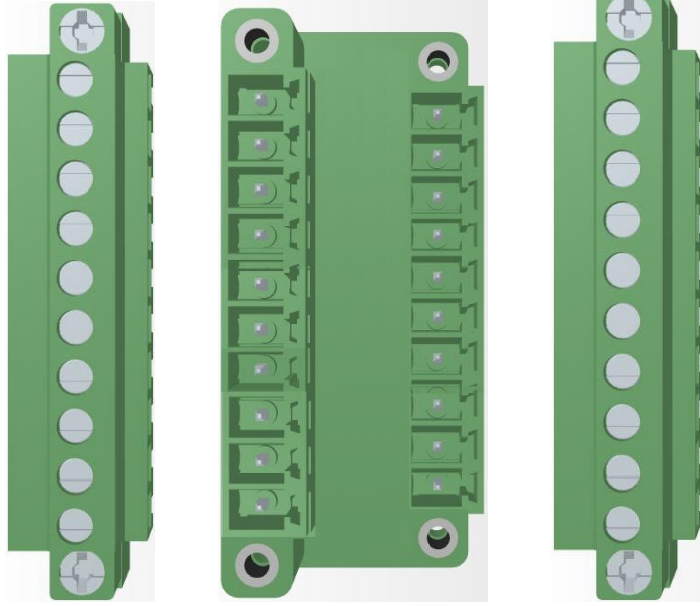
Output LED: Output status display

JM1 、JM2: Output connector

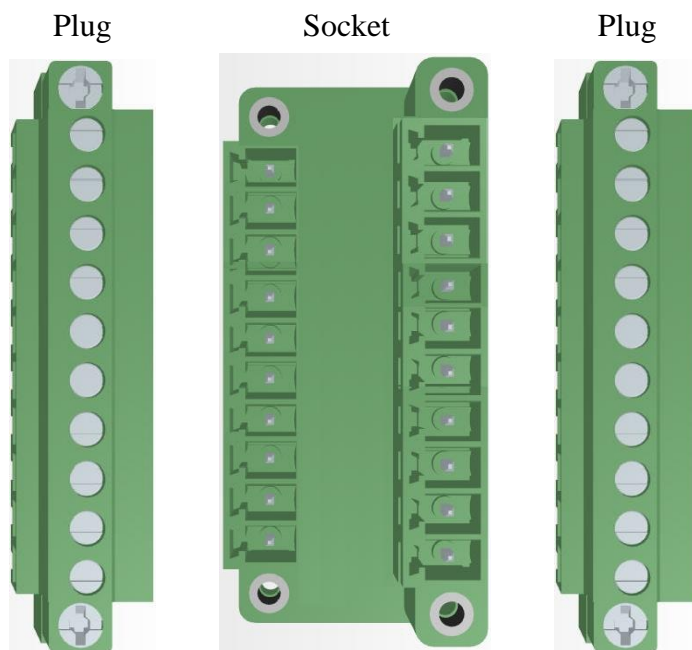
### 5.2 JM0 pin definitions

	Plug	Socket	+V	External power supply +24V(18-36Vdc)
			G	External power supply ground
			FG	Frame ground for the device

### 5.3 JM1 pin definitions (Output connector)

			
EC1	Common reference of output port1 (connect to external power)	EC0	Common reference of output port0 (connect to external power)
OUT10	output point 0 of port 1	OUT00	output point 0 of port 0
OUT11	output point 1 of port 1	OUT01	output point 1 of port 0
OUT12	output point 2 of port 1	OUT02	output point 2 of port 0
OUT13	output point 3 of port 1	OUT03	output point 3 of port 0
OUT14	output point 4 of port 1	OUT04	output point 4 of port 0
OUT15	output point 5 of port 1	OUT05	output point 5 of port 0
OUT16	output point 6 of port 1	OUT06	output point 6 of port 0
OUT17	output point 7 of port 1	OUT07	output point 7 of port 0
<b>EGnd</b>	External power ground	<b>EGnd</b>	External power ground
for the output connection, please refer <b>6.1 Output diagram</b>			

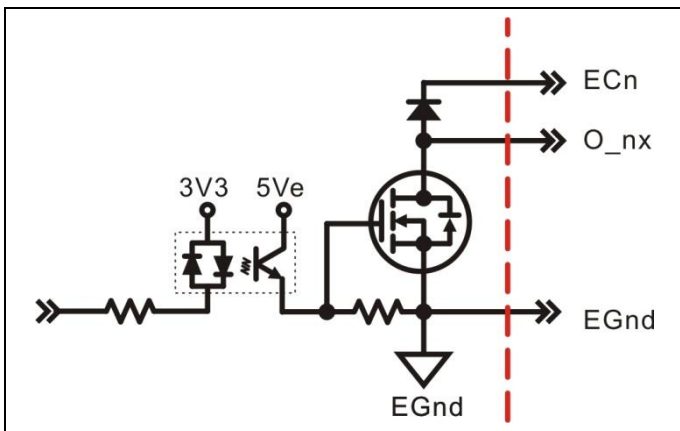
#### 5.4 JM2 pin definitions (Output connector)



EC2	Common reference of output port2 (connect to external power)	EC3	Common reference of output port3 (connect to external power)
OUT20	output point 0 of port 2	OUT30	output point 0 of port 3
OUT21	output point 1 of port 2	OUT31	output point 1 of port 3
OUT22	output point 2 of port 2	OUT32	output point 2 of port 3
OUT23	output point 3 of port 2	OUT33	output point 3 of port 3
OUT24	output point 4 of port 2	OUT34	output point 4 of port 3
OUT25	output point 5 of port 2	OUT35	output point 5 of port 3
OUT26	output point 6 of port 2	OUT36	output point 6 of port 3
OUT27	output point 7 of port 2	OUT37	output point 7 of port 3
<b>EGnd</b>	External power ground	<b>EGnd</b>	External power ground
for the output connection, please refer <b>6.1 Output diagram</b>			

## 6. I/O Interface diagram

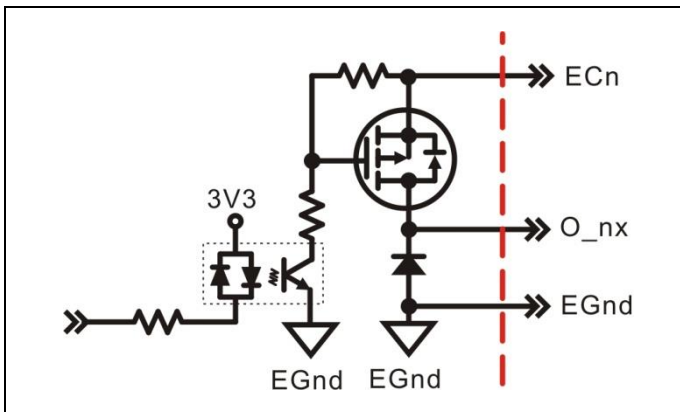
### 6.1 Output diagram



For NMOS output: OUT00~OUT07,  
OUT10~OUT17  
OUT20~OUT27,  
OUT30~OUT37

O/P specification:

<b>V<sub>O</sub> (output voltage)</b>	
V <sub>O</sub> (max)	48Vdc
<b>I<sub>O</sub> (output current)</b>	
I <sub>O</sub> (cont)	sink 1A(rms)

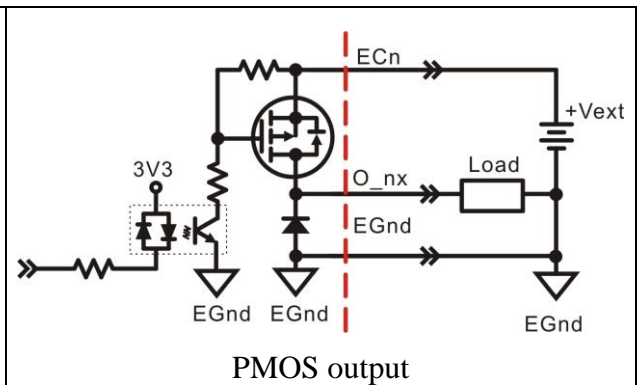
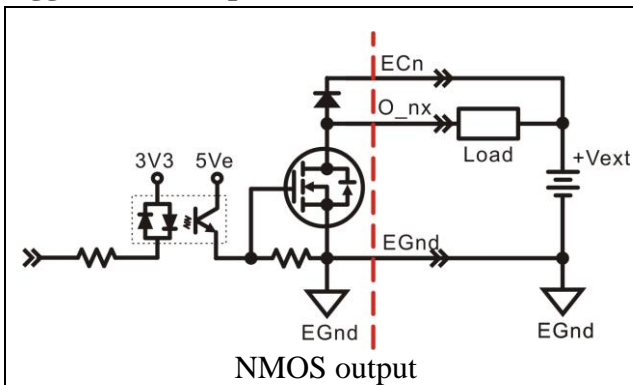


For PMOS output: OUT00~OUT07,  
OUT10~OUT17  
OUT20~OUT27,  
OUT30~OUT37

O/P specification:

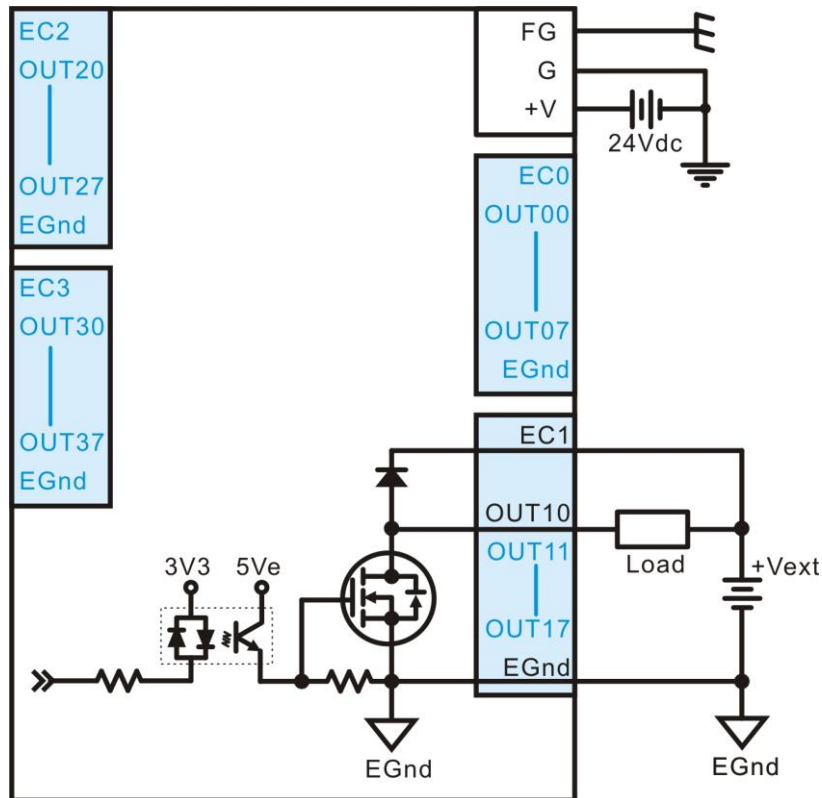
<b>V<sub>O</sub> (output voltage)</b>	
V <sub>O</sub> (max)	48Vdc
<b>I<sub>O</sub> (output current)</b>	
I <sub>O</sub> (cont)	source 1A(rms)

### Suggestion of output connection:

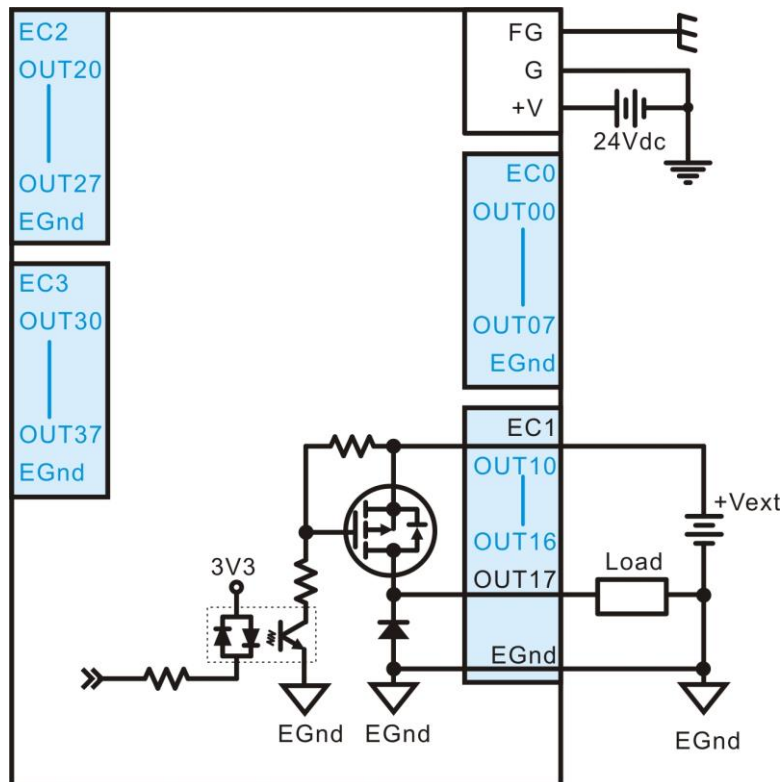


## 7. External wiring diagram

### 7.1 Output diagram



NMOS output



PMOS output

## 8. Applications

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- Synchronous trigger
- For remote contact make or break control, such as
  - window or door open close control
  - light control
  - power on/off control

## 9. **Ordering information**

Product	Descriptions
ECD8217N	EtherCAT DIO module, 32 photo isolated NMOS output
ECD8217P	EtherCAT DIO module, 32 photo isolated PMOS output
JD52038	110/220Vac to 24Vdc @1.5A power supply

## 10. ECD8217 Basic specifications

- **Based function :**
  - Software config CardID
  - Auto increment addressing
  - Addressing mode
  - I/O Led light level config
  - Firmware version
- **Digital I/O :**
  - 32 isolated digital output
  - digital output have polarity
- **WDT :**
  - WDT for All output

Description	Relay	NMOS	PMOS
Make	Relay contact operate	NMOS saturation, output short to ground	PMOS saturation, output short to Vc
Brake	Relay contact release	NMOS cutoff, output floating.	PMOS cutoff, output floating.



## 11. List of registers

Direct address	R/W	Descriptions	Mnemonics	Ref.
2000H	R/W	card ID register	<b>CARD_ID</b>	0x2000
2001H	R/W	Auto increment addressing	<b>AP_ADDRESS</b>	
2002H	R/W	Addressing mode	<b>ADDRESS_MODE</b>	
2003H	R/W	I/O led level	<b>LED_LEVEL</b>	
2004H	RO	Firmware version	<b>FIRMWARE_VERSION</b>	
2030H	R/W	WDT enable / disable	<b>WDT_CONTROL</b>	
2031H	R/W	WDT config	<b>WDT_CONFIG</b>	
2032H	R/W	WDT reload	<b>WDT_RELOAD</b>	
6200H	R/W	output state 8bit. (byte array)	<b>OUTPURT_U8</b>	0X6000
6202H	R/W	output polarity 8bit. (byte array)	<b>OUT_POLARITY_U8</b>	
6220H	R/W	output state bit. (Boolean array)	<b>OUTPURT_BIT</b>	
6240H	R/W	output polarity bit. (Boolean array)	<b>OUT_POLARITY_BIT</b>	
6300H	R/W	output state 16 bit. (U16)	<b>OUTPURT_U16</b>	
6302H	R/W	output polarity 16 bit. (U16)	<b>OUT_POLARITY_U16</b>	
6320H	R/W	output state 32 bit. (U32)	<b>OUTPURT_U32</b>	
6322H	R/W	output polarity 32 bit. (U32)	<b>OUT_POLARITY_U32</b>	

## 12. Comment register

<b>CARD_ID</b> User defined modules ID						
Index	Data type	AL-state	Access	SDO/PDO	range	Default
2000H	UINT8	Pre-Op Safe-Op Op	R/W	SDO	0x00 ~ 0xFF	0x00

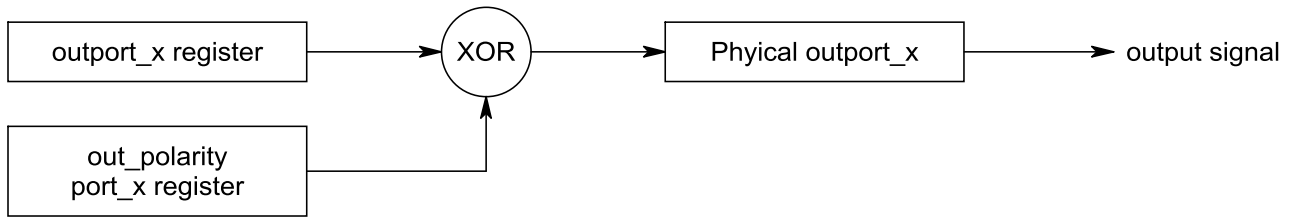
<b>AP_ADDRESS</b> Auto Increment Address						
Index	Data type	AL-state	Access	SDO/PDO	range	Default
2001H	UINT8	Pre-Op Safe-Op Op	R/W	SDO	0x00 ~ 0xFF	0x00

<b>ADDRESS_MODE</b> Select SEG7 show address 0x1 is CARD_ID, 0x2 is AP_address						
Index	Data type	AL-state	Access	SDO/PDO	range	Default
2002H	UINT8	Pre-Op Safe-Op Op	R/W	SDO	0x1 or 0x2	Show CARD_ID

<b>LED_LEVEL</b> Led light level, Light level = $(LED\_level + 1) * 2.5\%$						
Index	Data type	AL-state	Access	SDO/PDO	range	Default
2003H	UINT8	Pre-Op Safe-Op Op	R/W	SDO	0 ~ 39	30

<b>FIRMWARE_VERSION</b> When value = 0x0120, Firmware Version is V1.2						
Index	Data type	AL-state	Access	SDO/PDO	Range	Default
2004H	UINT16	Pre-Op Safe-Op Op	RO	SDO	0x0000 ~ 0xFFFF	Version

## 12.1 Output function



<b>OUTPUT_U8</b>						
output state by U8 type.						
<b>Index</b>	<b>Data type</b>		<b>AL-state</b>			
6200H	UINT8 Array		Pre-Op / Safe-Op / Op			
<b>Sub Index</b>	<b>Data type</b>	<b>Description</b>	<b>Access</b>	<b>SDO/PDO</b>	<b>Range</b>	<b>Default</b>
00h	UINT8	Number Of Out port	RO	N/A	4	4
01h	UINT8	Outport0 state	R/W	SDO and PDO mapping	0x00 ~ 0xFF	0x00
02h	UINT8	Outport1 state				
03h	UINT8	Outport2 state				
04h	UINT8	Outport3 state				
05h	UINT8	Outport4 state				
06h	UINT8	Outport5 state				
07h	UINT8	Outport6 state				
08h	UINT8	Outport7 state				

**OUT\_POLARITY\_U8**

Output polarity by U8 type.

<b>Index</b>	<b>Data type</b>		<b>AL-state</b>			
6202H	UINT8 Array		Pre-Op / Safe-Op / Op			
<b>Sub Index</b>	<b>Data type</b>	<b>Description</b>	<b>Access</b>	<b>SDO/PDO</b>	<b>Range</b>	<b>Default</b>
00h	UINT8	Number Of Out port	RO	N/A	4	4
01h	UINT8	Outport0 polarity	R/W	SDO and PDO mapping	0x00 ~ 0xFF	0x00
02h	UINT8	Outport1 polarity				
03h	UINT8	Outport2 polarity				
04h	UINT8	Outport3 polarity				
05h	UINT8	Outport4 polarity				
06h	UINT8	Outport5 polarity				
07h	UINT8	Outport6 polarity				
08h	UINT8	Outport7 polarity				

<b>OUTPURT_BIT</b>						
output state by Boolean type.						
<b>Index</b>	<b>Data type</b>		<b>AL-state</b>			
6220H	Boolean Array		Pre-Op / Safe-Op / Op			
<b>Sub Index</b>	<b>Data type</b>	<b>Description</b>	<b>Access</b>	<b>SDO/PDO</b>	<b>Range</b>	<b>Default</b>
00h	UINT8	Number Of Out port	RO	N/A	32	32
01h	Boolean	Outport00 state	R/W	SDO	True or False	False
02h	Boolean	Outport01 state				
03h	Boolean	Outport02 state				
04h	Boolean	Outport03 state				
05h	Boolean	Outport04 state				
06h	Boolean	Outport05 state				
07h	Boolean	Outport06 state				
08h	Boolean	Outport07 state				
To						
19h	Boolean	Outport30 state	R/W	SDO	True or False	False
1Ah	Boolean	Outport31 state				
1Bh	Boolean	Outport32 state				
1Ch	Boolean	Outport33 state				
1Dh	Boolean	Outport34 state				
1Eh	Boolean	Outport35 state				
1Fh	Boolean	Outport36 state				
20h	Boolean	Outport37 state				

<b>OUT_POLARITY_BIT</b>						
output polarity by Boolean type.						
<b>Index</b>	<b>Data type</b>		<b>AL-state</b>			
6240H	Boolean Array		Pre-Op / Safe-Op / Op			
<b>Sub Index</b>	<b>Data type</b>	<b>Description</b>	<b>Access</b>	<b>SDO/PDO</b>	<b>Range</b>	<b>Default</b>
00h	UINT8	Number Of Out port	RO	N/A	32	32
01h	Boolean	Out00 polarity	R/W	SDO	True or False	False
02h	Boolean	Out01 polarity				
03h	Boolean	Out02 polarity				
04h	Boolean	Out03 polarity				
05h	Boolean	Out04 polarity				
06h	Boolean	Out05 polarity				
07h	Boolean	Out06 polarity				
08h	Boolean	Out07 polarity				
To						
19h	Boolean	Out30 polarity	R/W	SDO	True or False	False
1Ah	Boolean	Out31 polarity				
1Bh	Boolean	Out32 polarity				
1Ch	Boolean	Out33 polarity				
1Dh	Boolean	Out34 polarity				
1Eh	Boolean	Out35 polarity				
1Fh	Boolean	Out36 polarity				
20h	Boolean	Out37 polarity				

<b>OUTPURT_U16</b>						
output state by U16 type.						
<b>Index</b>	<b>Data type</b>		<b>AL-state</b>			
6300H	UINT16 Array		Pre-Op / Safe-Op / Op			
<b>Sub Index</b>	<b>Data type</b>	<b>Description</b>	<b>Access</b>	<b>SDO/PDO</b>	<b>Range</b>	<b>Default</b>
00h	UINT8	Number Of In port	RO	N/A	2	2
01h	UINT16	Outport1_0 state	R/W	SDO	0x0000 ~ 0xFFFF	0xFFFF
02h	UINT16	Outport3_2 state				

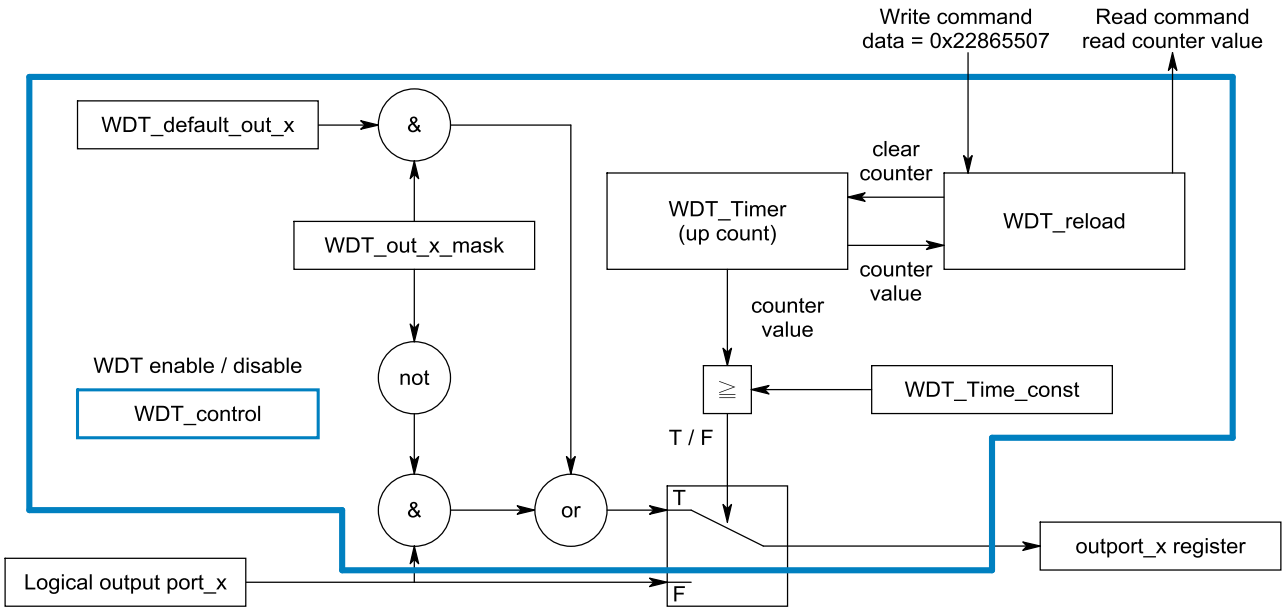
<b>OUT_POLARITY_U16</b>						
Output polarity by U16 type.						
<b>Index</b>	<b>Data type</b>		<b>AL-state</b>			
6302H	UINT16 Array		Pre-Op / Safe-Op / Op			
<b>Sub Index</b>	<b>Data type</b>	<b>Description</b>	<b>Access</b>	<b>SDO/PDO</b>	<b>Range</b>	<b>Default</b>
00h	UINT8	Number Of In polarity	RO	N/A	2	2
01h	UINT16	Out1_0_polarity	R/W	SDO	0x0000 ~ 0xFFFF	0x0000
02h	UINT16	Out3_2_polarity				

<b>OUTPURT_U32</b> output state by U32 type.						
<b>Index</b>	<b>Data type</b>		<b>AL-state</b>			
6320H	UINT32 Array		Pre-Op / Safe-Op / Op			
<b>Sub Index</b>	<b>Data type</b>	<b>Description</b>	<b>Access</b>	<b>SDO/PDO</b>	<b>Range</b>	<b>Default</b>
00h	UINT8	Number Of In port	RO	N/A	1	1
01h	UINT32	Outport3_0 state	R/W	SDO	0x00000000 ~ 0xFFFFFFFF	0x0000_0000

<b>OUT_POLARITY_U32</b> Output polarity by U32 type.						
<b>Index</b>	<b>Data type</b>		<b>AL-state</b>			
6322H	UINT16 Array		Pre-Op / Safe-Op / Op			
<b>Sub Index</b>	<b>Data type</b>	<b>Description</b>	<b>Access</b>	<b>SDO/PDO</b>	<b>Range</b>	<b>Default</b>
00h	UINT8	Number Of In polarity	RO	N/A	1	1
01h	UINT32	Out3_0_polarity	R/W	SDO	0x00000000 ~ 0xFFFFFFFF	0x0000_0000



## 12.2 WDT function



### WDT\_CONTROL

WDT\_control = 1, Enable WDT function

WDT\_control = 0, Disable WDT function

Index	Data type	AL-state	Access	SDO/PDO	Range	Default
2030H	UINT8	Pre-Op Safe-Op Op	R/W	SDO	0x0 or 0x1	Disable

### WDT\_RELOAD

write 0x22865507 to WDT\_RELOAD and triggers wdt\_clear\_command for resetting wdt\_counter\*1.

Read back WDT\_counter from WDT\_RELOAD.

Index	Data type	AL-state	Access	SDO/PDO	Range	Default
2032H	UINT32	Pre-Op Safe-Op Op	R/W	SDO	0x00000000 ~ 0xFFFFFFFF	wdt_counter

\*1 : Logical address polling also reset WDT .

<b>WDT_CONFIG</b>						
1. WDT time constant is 100uS time based. WDT_Time = constant * 100us, when constant is 1000, WDT_Time is 100mS						
2. While WDT triggers the preset data will override the output port_x.						
<b>Index</b>	<b>Data type</b>		<b>AL-state</b>			
2031H	WDT config structure		Pre-Op / Safe-Op / Op			
<b>Sub Index</b>	<b>Data type</b>	<b>Description</b>	<b>Access</b>	<b>SDO/PDO</b>	<b>Range</b>	<b>Default</b>
00h	UINT8	Number Of Debounce channel	RO	N/A	10	10
01h	UINT32	WDT time constant	R/W	SDO	1 ~ 1000000	1000
02h	UINT8	WDT_default_out_0	R/W	SDO	0x00 ~ 0xFF	0x00
03h	UINT8	WDT_default_out_1				
04h	UINT8	WDT_default_out_2				
05h	UINT8	WDT_default_out_3				
06h	UINT8	WDT_default_out_4				
0Ah	UINT8	WDT_out_0_mask	R/W	SDO	0x00 ~ 0xFF	0x00
0Bh	UINT8	WDT_out_1_mask				
0Ch	UINT8	WDT_out_2_mask				
0Dh	UINT8	WDT_out_3_mask				