

User Manual

AMAX-3285IO

ADVANTECH

Enabling an Intelligent Planet

Copyright

The documentation and the software included with this product are copyrighted 2018 by Advantech Co., Ltd. All rights are reserved. Advantech Co., Ltd. reserves the right to make improvements in the products described in this manual at any time without notice. No part of this manual may be reproduced, copied, translated or transmitted in any form or by any means without the prior written permission of Advantech Co., Ltd. Information provided in this manual is intended to be accurate and reliable. However, Advantech Co., Ltd. assumes no responsibility for its use, nor for any infringements of the rights of third parties, which may result from its use.

Acknowledgements

Intel and Pentium are trademarks of Intel Corporation.

All other product names or trademarks are properties of their respective owners.

Product Warranty (2 years)

Advantech warrants to you, the original purchaser, that each of its products will be free from defects in materials and workmanship for two years from the date of purchase.

This warranty does not apply to any products which have been repaired or altered by persons other than repair personnel authorized by Advantech, or which have been subject to misuse, abuse, accident or improper installation. Advantech assumes no liability under the terms of this warranty as a consequence of such events.

Because of Advantech's high quality-control standards and rigorous testing, most of our customers never need to use our repair service. If an Advantech product is defective, it will be repaired or replaced at no charge during the warranty period. For out-of-warranty repairs, you will be billed according to the cost of replacement materials, service time and freight. Please consult your dealer for more details.

If you think you have a defective product, follow these steps:

1. Collect all the information about the problem encountered. (For example, CPU speed, Advantech products used, other hardware and software used, etc.) Note anything abnormal and list any onscreen messages you get when the problem occurs.
2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information readily available.
3. If your product is diagnosed as defective, obtain an RMA (return merchandise authorization) number from your dealer. This allows us to process your return more quickly.
4. Carefully pack the defective product, a fully-completed Repair and Replacement Order Card and a photocopy proof of purchase date (such as your sales receipt) in a shippable container. A product returned without proof of the purchase date is not eligible for warranty service.
5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

Declaration of Conformity

CE

This product has passed the CE test for environmental specifications when shielded cables are used for external wiring. We recommend the use of shielded cables. This kind of cable is available from Advantech. Please contact your local supplier for ordering information.

Technical Support and Assistance

1. Visit the Advantech web site at www.advantech.com/support where you can find the latest information about the product.
2. Contact your distributor, sales representative, or Advantech's customer service center for technical support if you need additional assistance. Please have the following information ready before you call:
 - Product name and serial number
 - Description of your peripheral attachments
 - Description of your software (OS, version, application software, etc.)
 - A complete description of the problem
 - The exact wording of any error messages

Safety Precaution - Static Electricity

Follow these simple precautions to protect yourself from harm and the products from damage.

- To avoid electrical shock, always disconnect the power from your PC chassis before you work on it. Don't touch any components on the CPU card or other cards while the PC is on.
- Disconnect power before making any configuration changes. The sudden rush of power as you connect a jumper or install a card may damage sensitive electronic components.

Contents

Chapter 1	Introduction.....	1
1.1	Introduction	2
1.2	Features	2
1.3	Hardware Specifications	2
1.3.1	Axis	2
1.3.2	Digital Input	3
1.3.3	Digital Output	3
1.3.4	Pulse Input	3
1.3.5	Pulse Output	3
1.3.6	General	4
Chapter 2	Hardware Wiring	5
2.1	Dimensions	6
2.1.1	Top view	6
2.1.2	Front View	6
2.1.3	Side View	6
2.2	Connection Terminal	7
2.2.1	Rotary switch (SW1-3)	7
2.2.2	Power terminal (CN1)	7
2.2.3	+5V Output Terminal (CN39)	7
2.2.4	D-Sub Output Terminal (CN2-CN9)	8
2.2.5	16-pin Terminal Block (CN10-CN17)	9
2.2.6	Single-ended/Differential Output Jumper (CN18-CN25)	9
2.2.7	ERC/RST Output Jumper (CN31-CN38)	10
2.2.8	LED Indicators	10
Chapter 3	Signal Connections	11
3.1	Output Pulse [CW \pm /PULS \pm , CCW \pm /DIR \pm]	12
	Figure 3.1: Optocoupler Interface	12
	Figure 3.2: Linear Drive Interface	12
3.2	Over Traveling Limit Switch Input [LMT+/-]	12
	Figure 3.3: Circuit Diagram of Limit Input Signals	12
3.3	Position latch [LTC]	13
3.4	Servo Ready Signal [RDY]	13
3.5	Home Position [ORG]	13
3.6	In-Position Signal [INP]	13
3.7	Servo Error & Alarm [ALM]	13
3.8	Encoder Input [ECA+/-, ECB+/-, ECZ+/-]	13
	Figure 3.4: Circuit Diagram of Encoder Feedback	13
3.9	Emergency Stop Input [EMG]	14
	Figure 3.5: Circuit Diagram of Emergency Stop Input Signal	14
3.10	External Power Input [VEX]	14
3.11	Position Window Output [CAM-DO]	14
	Figure 3.6: Circuit Diagram of Position Window Output	14
3.12	Activate Servo ON [SVON]	15
3.13	Servo Error Counter Clear [ERC]	15
3.14	Position Compare Output [CMP]	15
3.15	Jog & MPG	15
	Figure 3.7: Circuit Diagram of JOG Input	15
3.16	Digital Input/Output	16

Chapter 1

Introduction

1.1 Introduction

The AMAX-3285IO is an 8-axis EtherCAT pulse module that can connect to the upper EtherCAT motion control card PCI-1203 and pulsed stepper and servo motors. The open frame design makes it convenient to connect to Mitsubishi J3/J4, Yaskwa Sigma V/7 and Panasonic A4/A5 servo motor drives via a dedicated cable through the D-sub 26-pin interface.

In addition to high-precision motion interpolation, continuous contouring and axes synchronization, the AMAX-3285IO also offers high-speed position comparison trigger (Compare Trigger) and latch (Latch) functions, making it ideal for a variety of automation industry applications.

In addition to the motion control dedicated I/O, an additional 16-channel universal digital input and 16-channel digital output are provided, which are highly flexible to meet the user's need for I/O points.

1.2 Features

- Max. 5 MHz pulse output
- Up to 32 bit incremental encoder input, encoder input is 2.5 MHz for 4xAB mode, 2.5 MHz for CW/CCW mode
- Suitable for DIN-rail mounting; terminal on the module which can be directly connected to third party servo drive
- Easily visible LED indicators on board to do diagnosis
- 16-ch digital output and 16-ch digital output
- Programmable interrupt
- Memory buffer (10K points) for trajectory planning
- 2-axis position compare triggering up to 100 KHz, and memory buffer is up to 100 K points
- Position latch
- Supports gantry control

1.3 Hardware Specifications

1.3.1 Axis

Item	Description
Number of axes	8
Control type	Pulse

1.3.2 Digital Input

Item		Description
Channels		LMT+, LMT-, ORG, INP, ALM, EMG, LTC, RDY
Type		Single-ended, optical isolation
Input voltage:	L (max)	4Vdc
	H (min)	10Vdc
	H (max)	30Vdc
Max. input delay time		100Us
Protection		2,500V isolation
Input impedance		8.4kΩ

1.3.3 Digital Output

Item		Description
Channels		SVON, ERC, CAM-DO, CMP
Type		Single-ended, optical isolation, sink (Sink)
Operating voltage	Low	10Vdc
	High	30Vdc
Max. sink current		100mA/??
Max. output delay		100us
Protection		2,500V isolation

1.3.4 Pulse Input

Item		Description
Max. frequency		2.5MHz x1, x2, x4 (A/B phase only)
Type		Differential, optical isolation
Input voltage	L (max)	1Vdc
	H (min)	3.5Vdc
	H (max)	10Vdc
Protection		2,500V isolation
Min. width for Hi / Lo pulse		200ns

1.3.5 Pulse Output

Item		Description
Max. frequency		5Mpps
Type		Differential, optical isolation
Output voltage	L (max)	0.7Vdc
	H (min)	2Vdc
	H (max)	3.9Vdc
Output current		3VDC/18mA
Output signal mode		Linear drive differential output
Protection		2,500V isolation
Control range		32bit

1.3.6 General

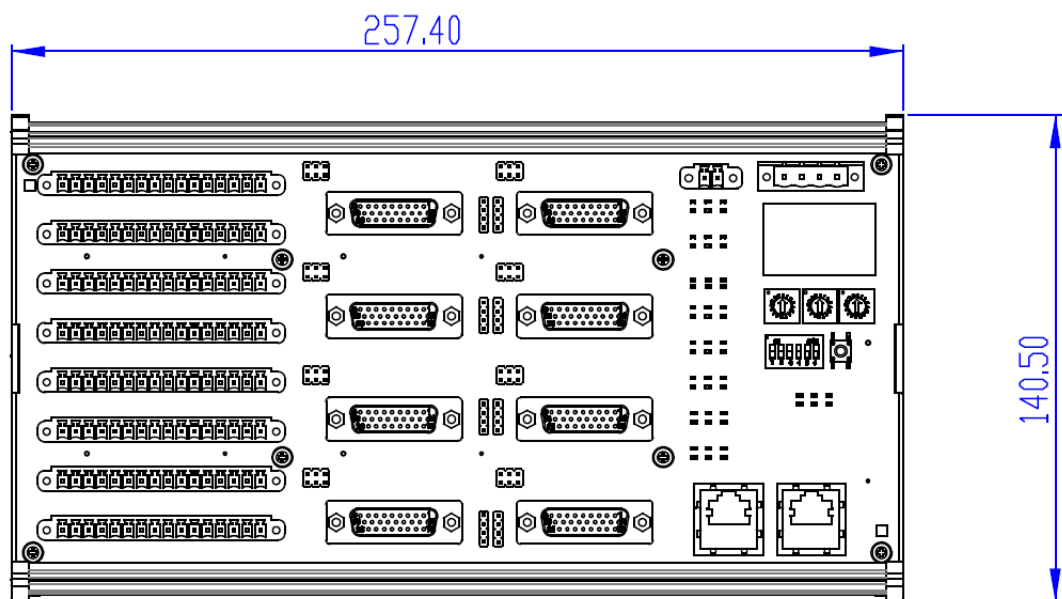
Item		Description
Connection terminal		2 x RJ-45: network interfaces
		1 x Terminal block (4P) for power
		1 x Terminal block (2P) for +5V output
		8 x DB-26: connect to the servo drive
		8 x Terminal block (16P) for home, Limit, LTC, CMP and extra 16DI/16DO
Dimension		258 x 141 x 60 mm (10.2 x 5.6 x 2.4")
Certification		CE, FCC Class A
Power consumption:	MAX	15W (625mA @ 24V)
Temperature	Operating	0-60? (refer to IEC 60068-2-1,2)
	Storage	-20~85?
Relative humidity:		5~95% RH non-condensing (refer to IEC 60068-2-3)
External Power Voltage		DC +24 V

Chapter 2

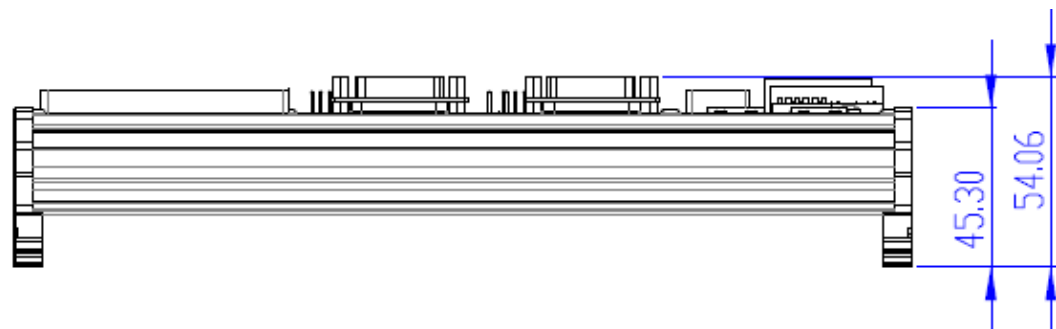
Hardware Wiring

2.1 Dimensions

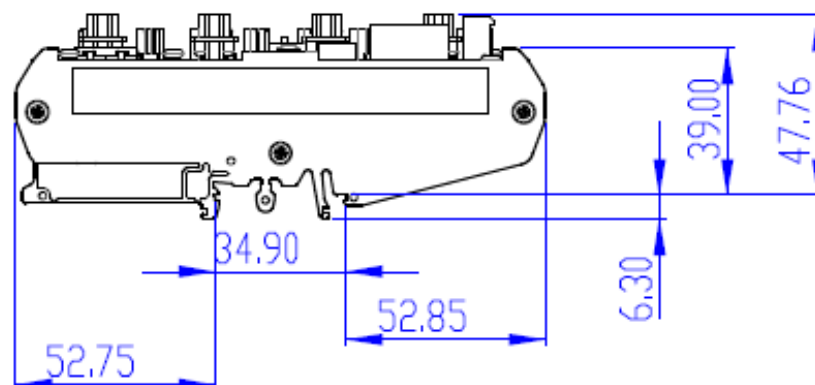
2.1.1 Top view



2.1.2 Front View



2.1.3 Side View



2.2 Connection Terminal

2.2.1 Rotary switch (SW1-3)

Three groups of rotary switches for salve module address configuration



Pin	Name	Description
SW1	X1	Range: 0-F
SW2	X10	Range: 0-F
SW3	X100	Range: 0-F

Note: (SW1, SW2, SW3)=(F,4,0), Slave ID=0 x 256 + 4 x 16 + F x 1= 79

2.2.2 Power terminal (CN1)



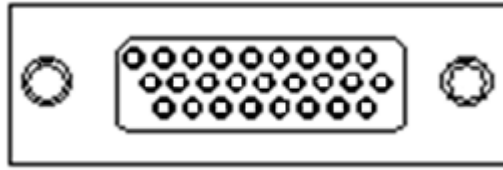
Pin	Name	Description
1	+VEX	+24V power input
2	-VEX	Power ground
3	EMG	Emergency stop
4	GND Earth	Earth

2.2.3 +5V Output Terminal (CN39)



Pin	Name	Description
1	+5V	+5V power output
2	Gnd	Power ground

2.2.4 D-Sub Output Terminal (CN2-CN9)



Pin	Name	Description
1	SVON	Servo motor excitation
2	INP	Servo motor in-position
3	Erc	Servo motor error cleared
4	RDY	Servo motor ready
5	CW-/PULS-	Output pulse CW/ Pulse-
6	CW+/PULS+	Output pulse CW/Pulse+
7	ECA-	Encoder phase A-
8	ECA+	Encoder phase A+
9	BREAK+	Brake signal +
10	RST	Servo drive reset
11	ALM	Servo error alarm
12	+VEX	External voltage (24VDC)
13	-VEX	?
14	BREAK-	Brake signal +
15	-VEX	Earth
16	ECB-	Encoder phase B-
17	ECB+	Encoder phase B+
18	-VEX	Earth
19	EMG	Emergency stop
20	-VEX	Earth
21	-VEX	Earth
22	-VEX	Earth
23	CCW-/DIR-	Output pulse CCW/DIR-
24	CCW+/DIR+	Output pulse CCW/DIR+
25	ECZ-	Encoder phase Z-
26	ECZ+	Encoder phase Z+

2.2.5 16-pin Terminal Block (CN10-CN17)



Pin	Name	Description
1	-VEX	Earth
2	IDO_XX	General Output (XX : 01,03,~15)
3	IDO_XX	General Output (XX : 00,02,~14)
4	IDI_XX	General Output (XX : 01,03,~15)
5	IDI_XX	General Output (XX : 00,02,~14)
6	OUT7	General Output
7	OUT5/CMP	General/Position comparison output
8	OUT4/CAM-DO	General/CAM output
9	IN5/JOG-	General/JOG- input
10	IN4/JOG+	General/JOG+ input
11	IN2	General input
12	IN1/LTC	General/position latch input
13	LMT-	Limit input-
14	LMT+	Limit input+
15	ORG	Home
16	+VEX	External voltage (24VDC)




2.2.6 Single-ended/Differential Output Jumper (CN18-CN25)

CN2(Axis0), CN3(Axis1),..., CN9(Axis7)

Jumper	Description
	Set pin 6 of CN2-CN9 to +5V
	Set pin 6 of CN2-CN9 to CW+/PULS+

2.2.7 ERC/RST Output Jumper (CN31-CN38)

CN31(Axis0), CN32(Axis1),..., CN38(Axis7)

Jumper	Description
	Set out7 of CN10-17 to ERC output
	Set out7 of CN10-17 to RST output
	Set out7 of CN10-17 to General output

2.2.8 LED Indicators

2.2.8.1 Status

LED	Name	Description
D1	PWR	Power supply
D2	STS	Running status
D3	RUN	Running
D4	ERR	Error
D5	LINK0	Communication in
D6	LINK1	Communication out

2.2.8.2 Running

LED	Axis	Name	Description
D7/13/19/25/31/37/43/49	Axis 0-8	LMT+	Limit+
D8/14/20/26/32/38/44/50	Axis 0-8	SON	Servo excitation
D9/15/21/27/33/39/45/51	Axis 0-8	ALM	Alarm
D10/16/22/28/34/40/46/52	Axis 0-8	ORG	Home
D11/17/23/29/35/41/47/53	Axis 0-8	LMT-	Stop-
D12/18/24/30/36/37/38/54	Axis 0-8	BSY	In-position

Chapter 3

Signal Connections

3.1 Output Pulse [CW±/PULS±, CCW±/DIR±]

The pulse command has two types: one is in clockwise/ counterclockwise mode; the other is in pulse/direction mode. CW+/PULS+ and CW-/PULS- are differential signal pairs, and CCW+/DIR+ and CCW-/DIR- are differential signal pairs. The default setting for pulse output mode is Pulse/Direction. User can change the output mode by programming.



Figure 3.1: Optocoupler Interface

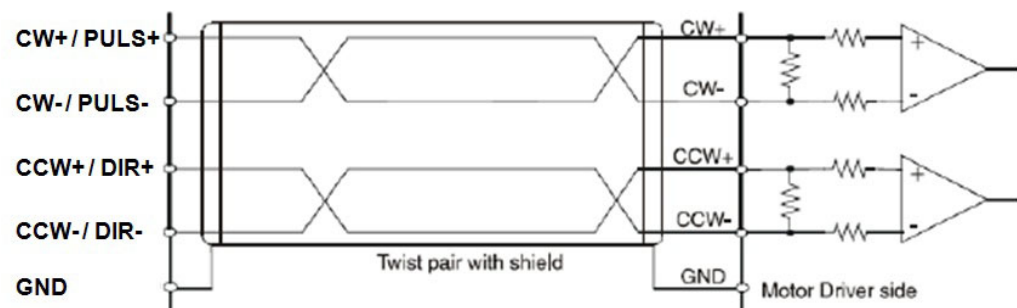


Figure 3.2: Linear Drive Interface

3.2 Over Traveling Limit Switch Input [LMT+/-]

Over traveling limit switches are used for system protection. This input signal is connected through the connection of photo coupler and RC filter. When the limit switch is applied, the external power VEX DC 12 ~ 24 V will be the source of the photo coupler. This enables the over traveling function.

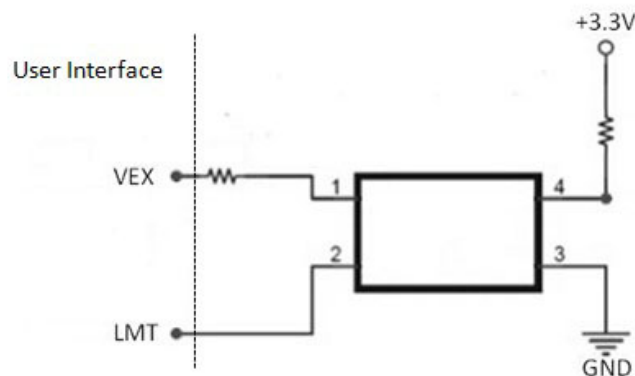


Figure 3.3: Circuit Diagram of Limit Input Signals

3.3 Position latch [LTC]

When the position capture signal LTC is triggered, the buffer will latch the current encoder position information, and the user can read the position counter by programming.

3.4 Servo Ready Signal [RDY]

It is a general purpose digital input which is used to check the servo ready status from servo drive connection. For example, you can check the status before any command is issued. Users can also use this RDY as general purpose input for other usages.

3.5 Home Position [ORG]

Home position is to define the original position or home signal for each axis.

3.6 In-Position Signal [INP]

The In-Position range (or deviation) is usually defined by servo drive. When the motor moves and converges within this range (or deviation), the servo driver will send the signal out to indicate that the motor is in the defined position.

3.7 Servo Error & Alarm [ALM]

This input is from servo drive which will generate the alarm signal to indicate any operation error.

3.8 Encoder Input [ECA+/-, ECB+/-, ECZ+/-]

When the feedback encoder signals arrive, connect ECA+/ECA- to phase A of encoder output. It is a differential pair. The same rule is for ECB+/- and ECZ+/- . The default setting is quadrature input (4xAB phase). The following diagram shows the interface circuit for one channel:

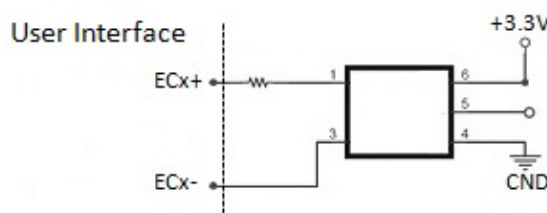


Figure 3.4: Circuit Diagram of Encoder Feedback

In the circuit diagram above, high speed optocoupler is used for isolation. The source's encoder output can be differential mode or open-collector mode. And the maximum acceptable 4xAB phase feedback frequency is about 10 MHz.

3.9 Emergency Stop Input [EMG]

When emergency stop input signal is enabled, the output of the drive pulse for all axes will be stopped.

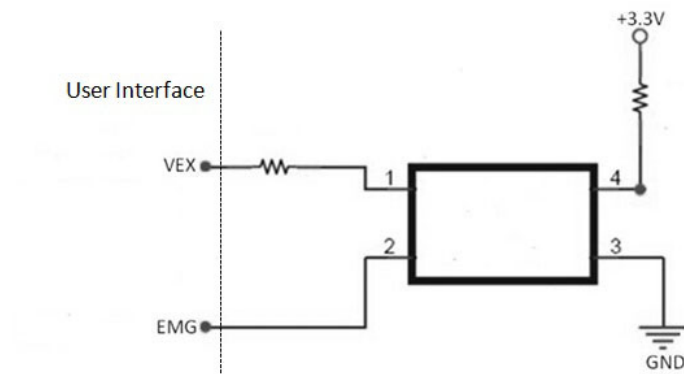


Figure 3.5: Circuit Diagram of Emergency Stop Input Signal

This signal should be used in combination with external power DC 12 ~24 V. The response time of circuitry should take about 0.25 msec because of the delay of photo coupled and RC filter.

3.10 External Power Input [VEX]

External power is necessary for all input signals of each axis. Apply DC 12 ~ 24 V voltage as required.

Note! Do not connect the VEX pin directly to an inductive load.



3.11 Position Window Output [CAM-DO]

As the following figure shows, users can define the interval and level to generate a digital output with a defined duration.

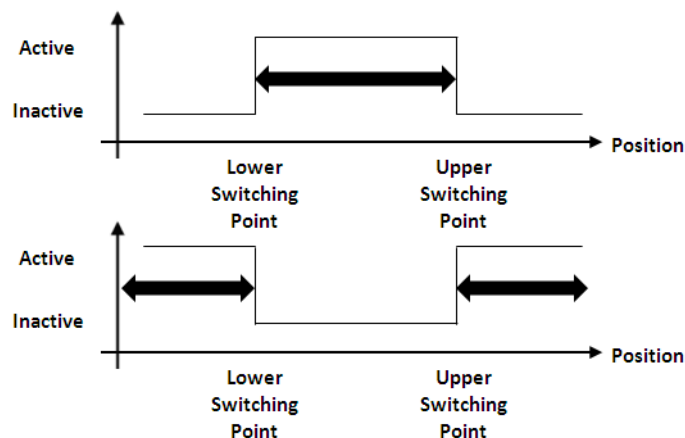


Figure 3.6: Circuit Diagram of Position Window Output

3.12 Activate Servo ON [SVON]

This SVON is to generate a digital output to activate the servo drive to beready for move status.

3.13 Servo Error Counter Clear [ERC]

The deviation counter clear is generated by servo drive and the board canreceive it as a general purpose input. The counter will be cleared by some instances: homing, emergency stop case, servo alarm and over travelling limit activated.

3.14 Position Compare Output [CMP]

This is specially designed for the customers who can use the position compare out-put to synchronize with other 3rd party vision devices. The position compare output channel is determined by pin definition - CMP.

3.15 Jog & MPG

The JOG and MPG mode could be supported by pin assignment - X_IN4 & X_IN5. These two pins could be switchable. The circuit is as follow:

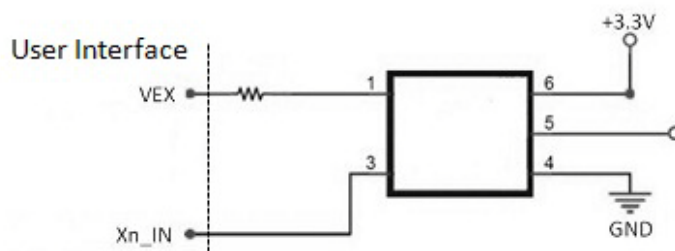
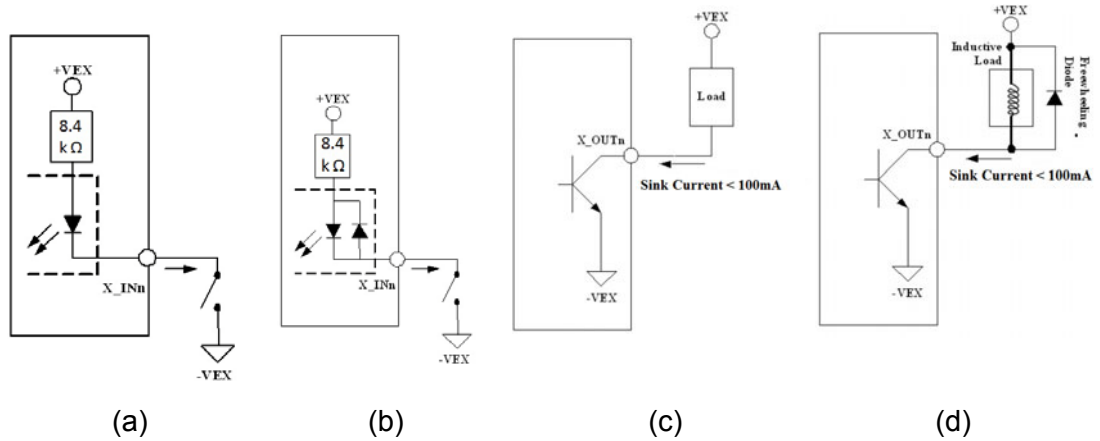


Figure 3.7: Circuit Diagram of JOG Input

3.16 Digital Input/Output

The wiring recommendations for external digital inputs and digital outputs are as follows:

- (a) High speed optical isolation DI
- (b) General purpose optical isolation DI
- (c) Optically isolated DO external general load
- (d) Optically isolated DO external inductive load





Enabling an Intelligent Planet

www.advantech.com

Please verify specifications before quoting. This guide is intended for reference purposes only.

All product specifications are subject to change without notice.

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

All brand and product names are trademarks or registered trademarks of their respective companies.

© Advantech Co., Ltd. 2018