LMC2011_ SPI_ CUH_V1(0)

LMC2011 SPI user manul

For SPI G3

Version recorder

Version NO.	Update date	Illustration
V1.0	2008-5-12	SPI G3 specially card IO illustration
V2.0	2009-9-22	Add RS232 connector; Add Global Enable connector
V2.1	2010-11-19	Add more IO ports, change pins definition, change 'Start' to 'Remark'
V3.0	2011-4-6	Update to 2011 version

Content

Safety During Installation And Operation

Please read these operating instruction completely before you proceed with installing and operating this product. If there are any questions regarding the contents of this manual, please contact BJJCZ.

1. Steps For Safe Operation
   - Carefully check your application program before running it. Programming errors can cause a break down of the system. In this case neither the laser nor the scan head can be controlled.
   - Protect the board from humidity, dust, corrosive vapors and mechanical stress.
   - For storage and operation, avoid electromagnetic fields and static electricity. These can damage the electronics on the product. For storage, always use the antistatic bag.
   - The allowed operating temperature range is 25℃ ± 10℃.
   - The storage temperature should be between –10℃ and +60℃.
2. Laser Safety
   - This product is intended for controlling a laser scan system. Therefore all relevant laser safety directives must be known and applied before installation and operation. The customer is solely responsible for ensuring the laser safety of the entire system.
   - All applicable laser safety directives must be adhered to. Safety regulation may differ from country to country. It is the responsibility of the customer to comply with all local regulations.
   - Please observe all laser safety instructions as described in you scan head or laser module manual, and this manual.
   - **Always turn on the power of this product and the power supply for the scan head first before turning on the laser. Otherwise there is the danger of uncontrolled deflection of the laser beam.**
     We recommend the use of a shutter to prevent uncontrolled emission of laser radiation.

1. Introduction

USBLMC marking control board is developed specially for laser marking machine, which exchange data with PC through USB interface. According to the different laser modules, several model of the USBLMC have been designed. This model is intended for the SPI G3 fiber laser module. To control the board, please use EzCad software released after April 6th, 2011.

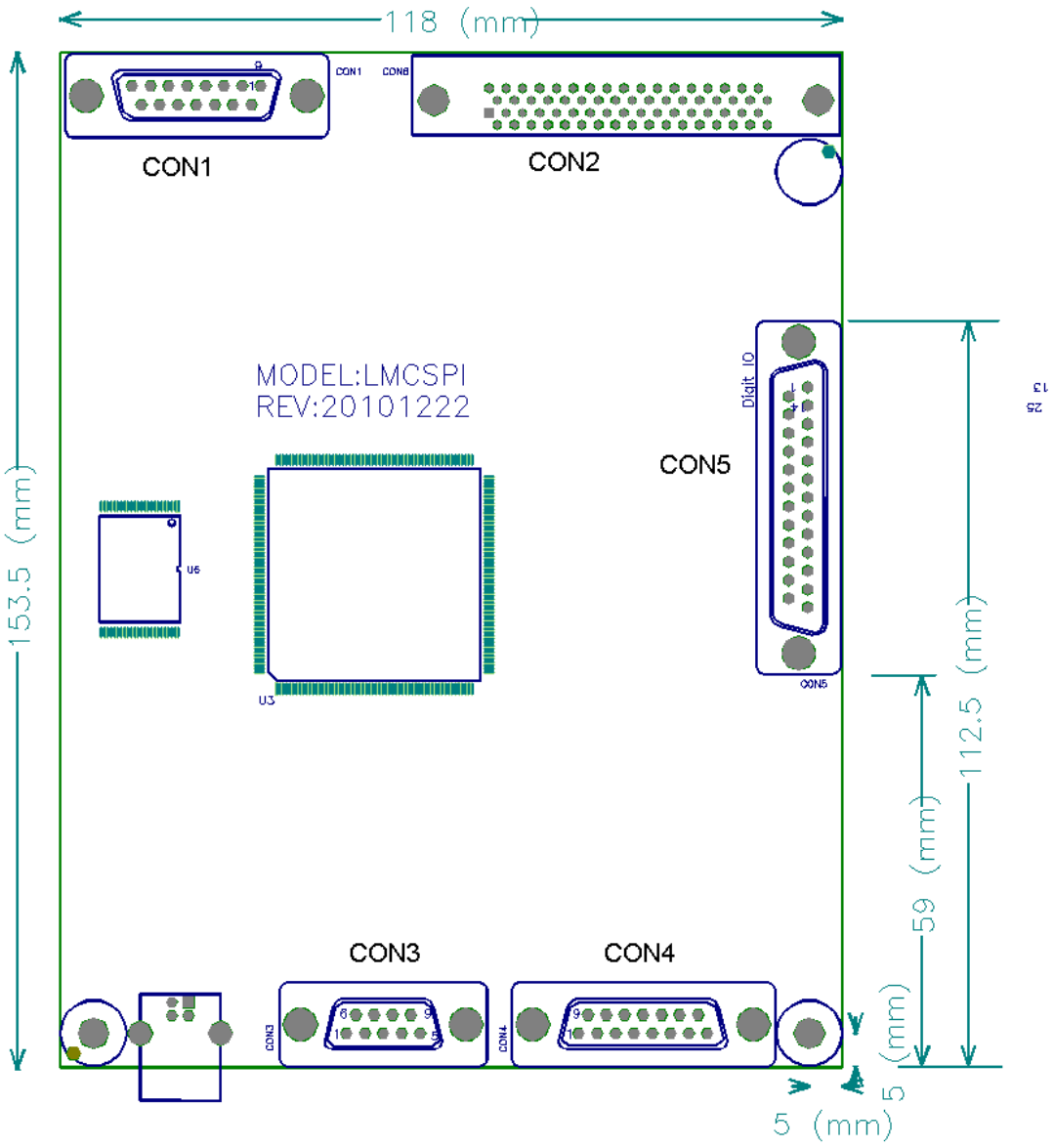

Fig 1 1 LMC2010 control board for SPI G3

On the board:

CON1: Connector for Scan head, in the form of DB15.
CON2: Connector for SPI G3 fiber laser module, in the form of SCSI 3 socket with 68 pins.
CON3: Connector for mark-on-fly, in the form of DB9. It is used to connect the encoder.
CON4: Connector for IO, in the form of DB15.
CON6: Connector for IO, DB25.

1.2 Features

- Use 68-pins SCSI 3 socket, connect SPI G3 laser module via 68-pin cable directly.
- Output digital signals for digital scanhead.
- Supports Mark-on-fly function with an encoder connected.
- Support multi-board mode. Up to 8 boards can be controlled by one computer. The 8 boards can process different jobs (The function needs special software).
- Two axes for step/servo motor are available.
- 12 routes of input（TTL compliant）.In0，In4-In13， XORG0（IN14），YORG0（IN15）.
- 8 routes of output（TTL compliant）.Out0-7 output from CON5 ,and out4-7 could be OC.
- Remark function: this function is used to remark what ever is in the memory of the board, especially convenient for high speed marking of a same pattern.
- Compatible with USB2.0 specifications.

1. Electric connection

2.1 Connector

2.1.1 Power Supply

A 5V/3A DC power supply is recommended. Power socket is located at CON4 4/5/12/13.

Note: suggest to connect the power supply as follow!!

CON4	Name	Illustration
4， 5	VCC	+5V anode of the power
12，13	GND	Ground cathode of the power

2.1.2 CON1 ： DB15 Galvo output

Galvo signal is digital signal, which can be directly connected to digital scanhead. Please confirmed that the transfer protocols is matched when using digital scanhead for there are different protocols. In order to connect analog scanhead, the transfer board is required to

convert the digital signal to analog signal.

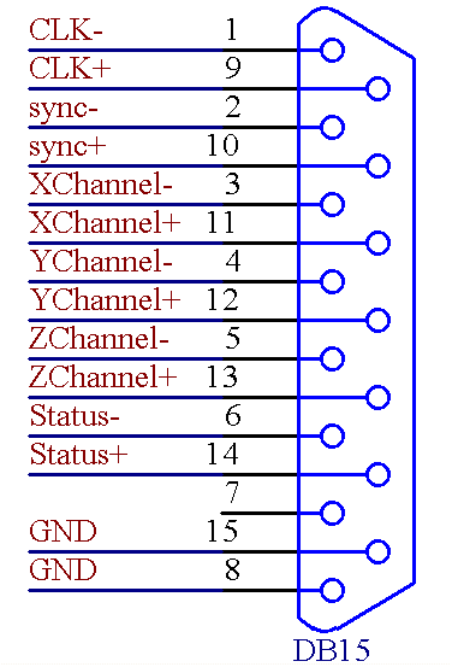

Fig. 2-2 Pin out of the CON1

Pin No.	Name	Comments
1，9	CLK-/CLK+	Clock signal. Differential output
2，10	SYNC-/ SYNC+	Synchronized signal. Differential output
3，11	XChannel-/ XChannel+	Digital signal of axis X. Differential output
4，12	YChannel-/ YChannel+	Digital signal of axis Y. Differential output
5，13	ZChannel-/ ZChannel+	Digital signal of axis Z. Differential output
6，14	Status-/ Status+	Reserved
7		Reserved
8，15	Gnd	The reference ground of control card.

For the two-axes scanhead, the signal pair CLK/SYNC/Xchannel/Ychannel are required to connect. **The shielded twisted-pair cable is recommended to wire these signal.**

2.1.3 CON2: 68 PINS SCSI 3, Laser control

Socket CON2 can be directly connected to the 68 pins socket on SPI G3 fiber laser module via a 68 pins cable.

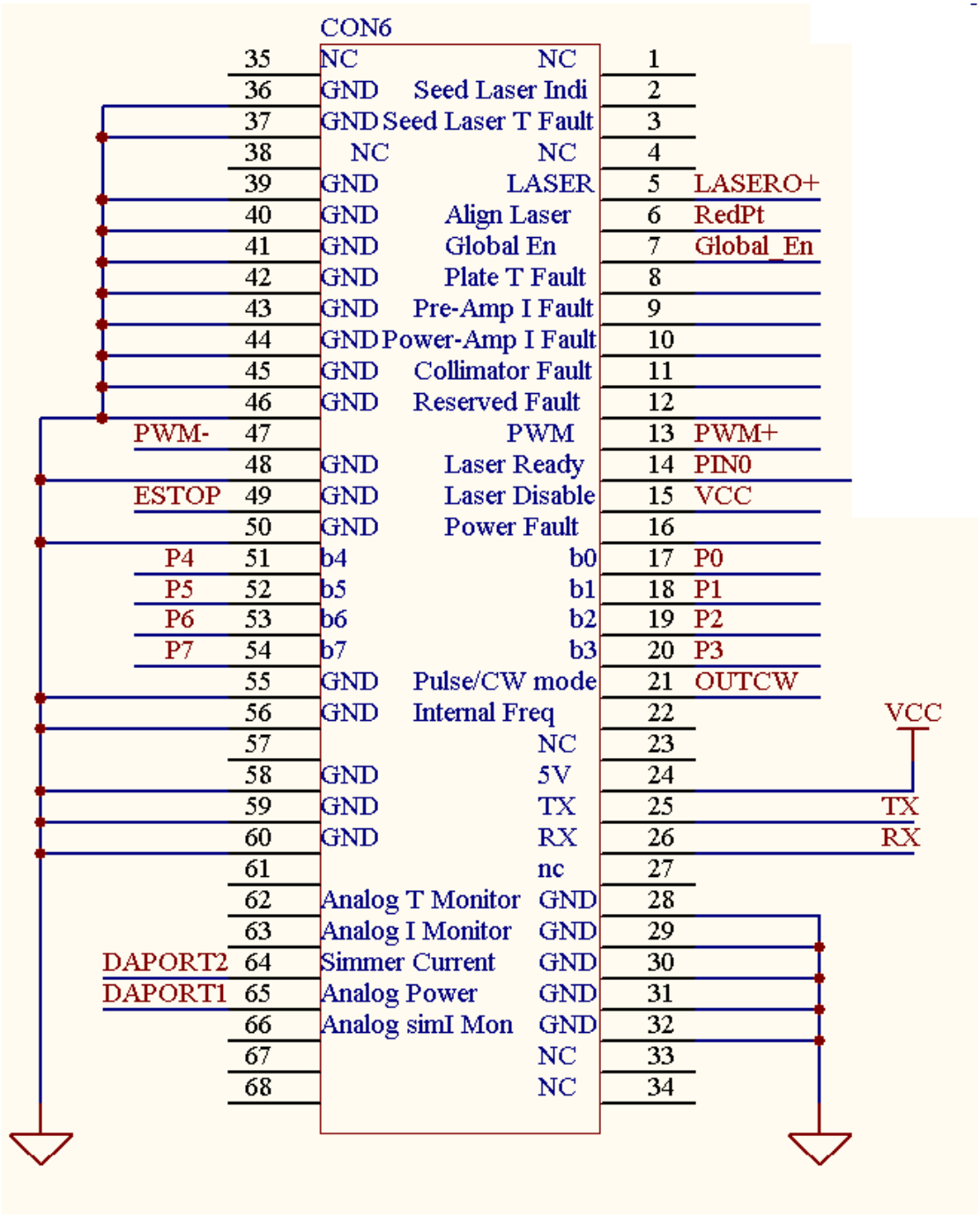

Fig. 2 3 Pin out of the CON2

PIN NO.	Name	Comments
5	LaserO+	Laser gate signal.
39	Gnd	Ground
6	RedPt	Red light output
40	Gnd	Ground
7	Global_En	Whole enable signal

41	Gnd	Ground
13	PWM＋	PWM signal plus
47	PWM－	PWM signal minus
14	PIN0	“Laser ready” signal
48	Gnd	Ground
15	Vcc	+5V that connect with inside of the board
49	ESTOP	Input, Emergency stop signal
17	P0	Output, Wave select b0
18	P1	Output, Wave select b1
19	P2	Output, Wave select b2
20	P3	Output, Wave select b3
51	P4	Output, Wave select b4
52	P5	Output, Wave select b5
53	P6	Output, Wave select b6
54	P7	Output, Wave select b7
21	OUTCW	Pulse/ continue module switch
55	Gnd	Ground
24	Vcc	+5V that connect with inside of the board
58	Gnd	Ground
30	Gnd	Ground
64	DAPORT2	Analog voltage output, used to setup the simmer current
31	Gnd	Ground
65	DAPORT1	Analog voltage output(0-10V), used to setup the power of laser

2.1.4 CON3 ： DB9 Mark-on-fly

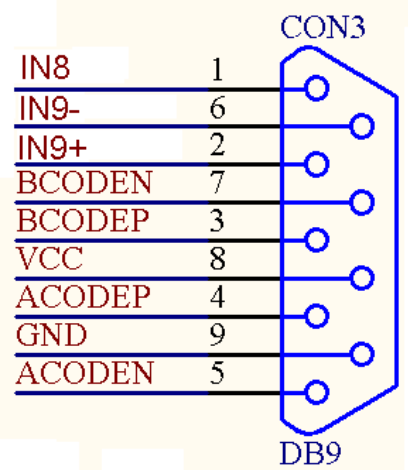

Fig. 2　4 Pin out of the CON3

PIN No.	Name	Comments
1	IN8	General input signal 8. Form a closed circuit with GND
2，6	IN 9+ / IN 9-	General input signal 9. A 330 Ω current-limited resistor is used Internally. External current-limited resistor is recommended when the voltage between IN9-/IN9+ is over 5V.
3，7	BCODEP /BCODEN	Encoder’s input B+/B-
4，5	ACODEP /ACODEN	Encoder’s input A+/A-
8	Vcc	+5V, Form a closed circuit with pin9
9	Gnd	Ground

2.1.5 CON4：DB15 Power and external axis signal

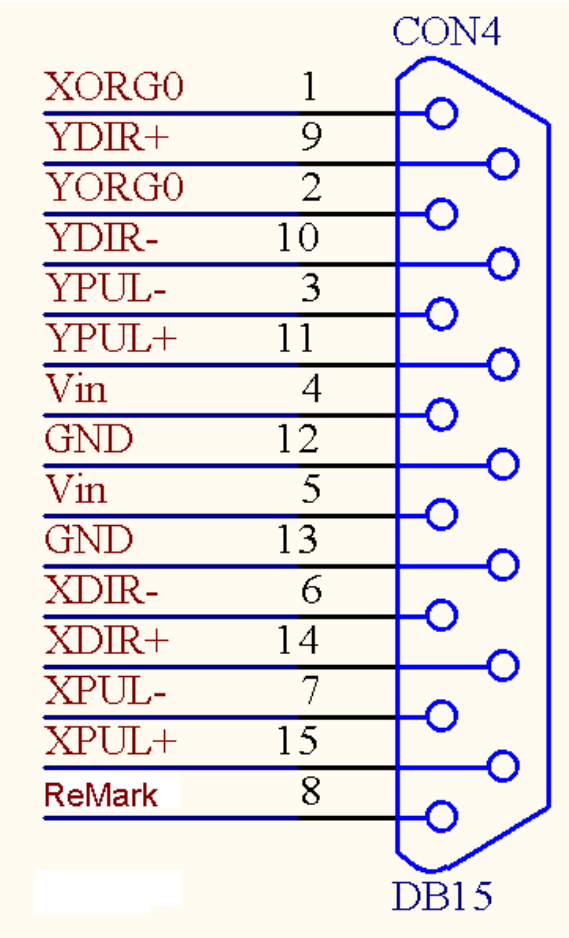

Fig. 2 5 Pin out of the CON4

PIN No.	Name	Comments
1	XORG0	X origin input signal, connect this signal and GND to switch
2	YORG0	Y origin input signal, connect this signal and GND to switch
9，10	YDIR+/YDIR-	Direction signal of extend axis Y. Output signal
3，11	YPUL+/YPUL-	Pulse signal of extend axis Y. Output signal
4，5	Vin	5V input for the 5V power supply, reference to GND
12，13	Gnd	GND for the 5V power supply
6，14	XDIR+/XDIR-	Direction signal of extend axis X. Output signal
7，15	XPUL+/XPUL-	Pulse signal of extend axis X. Output signal
8	ReMark	Make return with GND signal, when use this signal, control card will mark the same content with last marking. Input signal.

2.1.6 CON5 ： DB25 IO

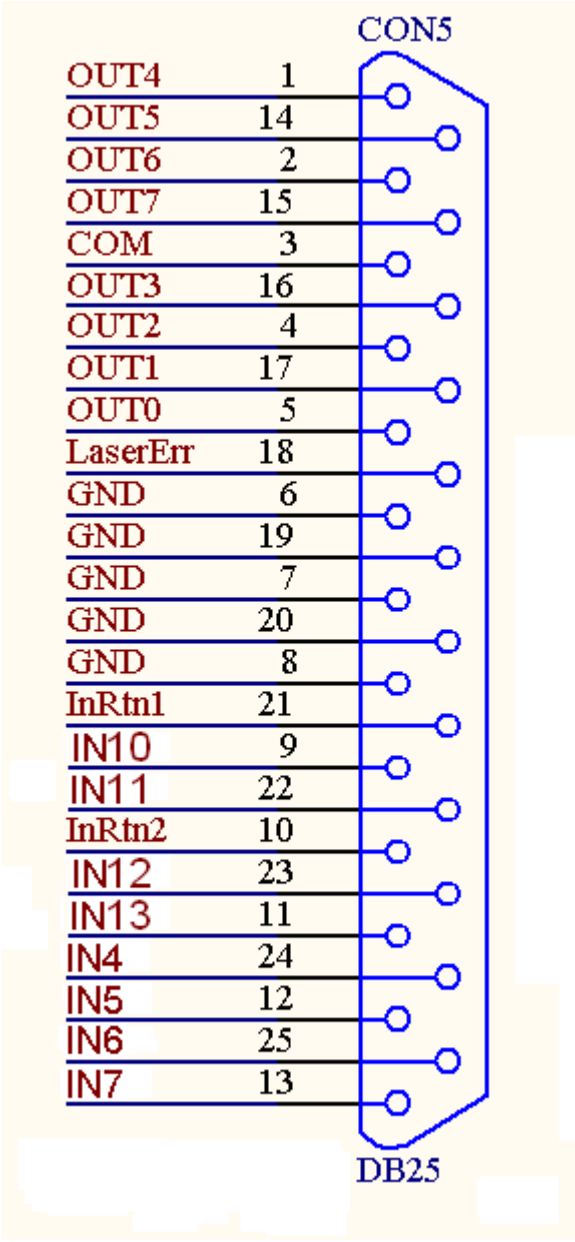

Fig 2-5 CON5 pins definition

PIN No.	Name	Comments
1，2，4，5，14，15，16，17	Out0——7	General output signal Out 0—Out 7. Reference to GND, and we can make Out4-7 as OC output through change the Jumper.
3	COM	When Out4-7 as OC output, need external Pull_up power ,connect this pin to plus of the Pull_up power
18	LaserErr	Reserved
6，7，8，	GND	Ground, supply return for the Out0——7 and In0——3

19，20		
21	InRtn1	Supply return for input signal of In10 / In11
9，22	In10，In11	Input signal In10 / In11 make return with InRtn1, inside resistant is 1K current-limiting resistance
10	InRtn2	Supply return for input signal of In12 / In13
11，23	In12，In13	Input signal In12/ In13 make return with InRtn1, inside resistant is 1K current-limiting resistance
12，13，24，25	In4——7	General input signal 4--7

2.1.7 CON7：laser

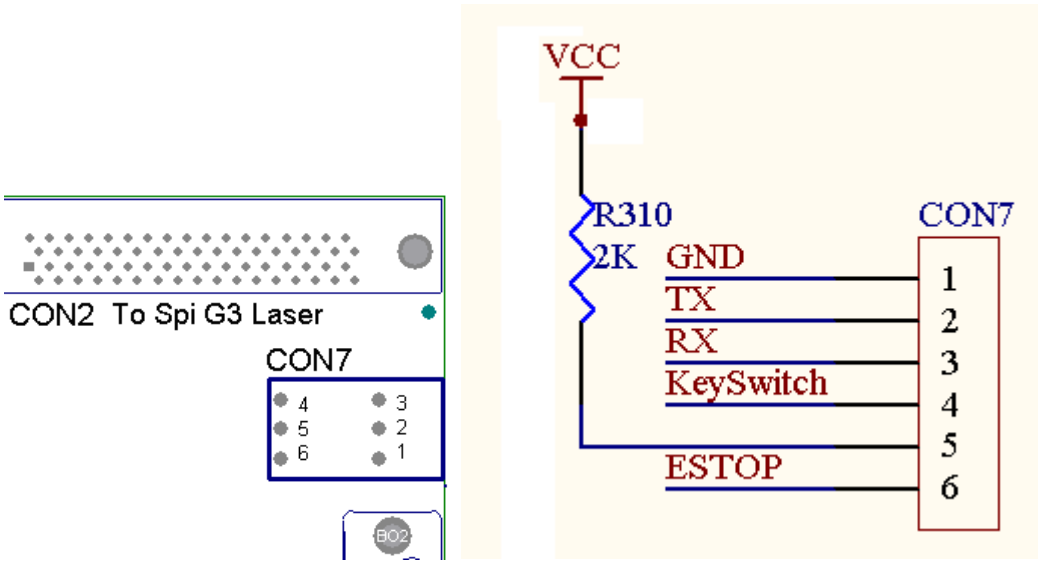

Fig 2 6 CON7 pins definition

PIN No.	Name	Comments
1	GND	Ground, supply return for pin6
2，3	TX，RX	connect through RS232 in the laser, and communicate with the laser through PC.
4，5	KeySwitch	When short connect pin 2-3 of JP12, KeySwitch connect with Global Enable signal, connect the two side of the keyswitch with two side of KW, then can control laser on/off through external key. When short connect pin 1-2 of JP12control board will produce Global Enable signal.
6	ESTOP	Emergency signal, connect it with Laser Disable signal, vacant default, if need to install emergency button, choose SPST-NO, and connect it with pin 1,6

2.2Jumpers

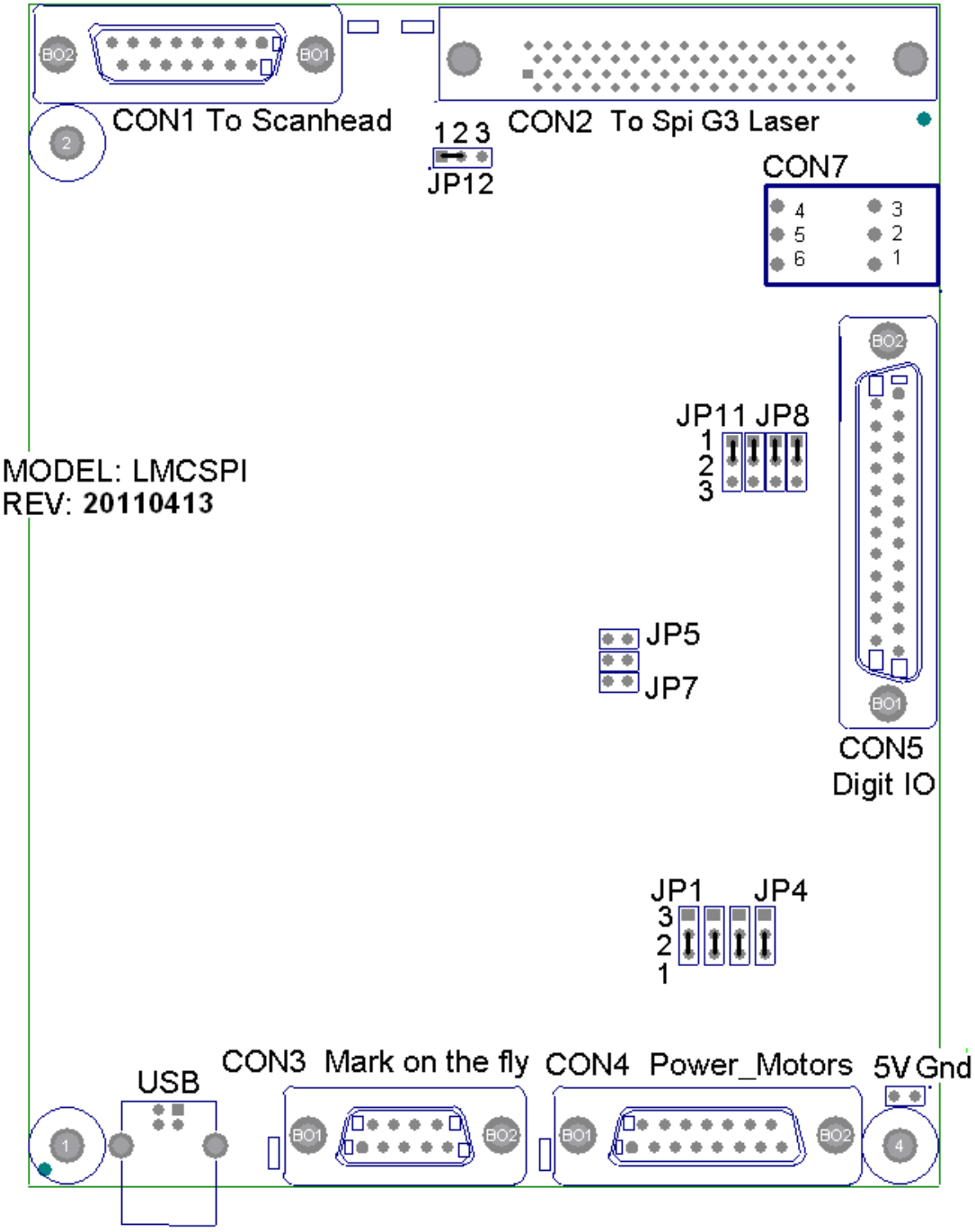

Fig. 2 7 Jumpers of the board

Name	Pin NO.	Comments

JP1，JP2 JP3，JP4	3	Setup the direction/pulse signal. JP1 and JP3 setup the direction signal, while JP2 and JP4 setup the pulse signal. JP1 and JP2 correspond to axis Y, while JP3 and JP4 correspond to axis X. Short pin1-2 of jumper will generate differential output. DIR-/DIR+/PUL-/PUL+ should be respectively connected to DIR-/DIR+/PUL-/PUL+ of step driver. Short pin2-3 will generate level output. In this case, VCC/DIR+/PUL+ should be respectively connected to VCC/DIR/PUL of step driver.
JP5，JP6，JP7	2	Index numbers 0~7, used to identify various cards when multiple cards are working on the same PC at a time. JP7/JP6/JP5 stand for bit b2/ b1/b0 respectively. Short the JUMPER stands for that the bit is equal 0, otherwise is 1.
JP8，JP9，JP10，JP11	2	To set the out4——7 as OC output, if short 1,2, it is TTL output, if short 2,3, it is OC output.
JP12	3	When short 2,3 of JP12 , KeySwitch connect with Global Enable signal, then we can control on/off of the laser through the KeySwitch. When short 1-2 of JP12, card output Global Enable single automatically, connect the KeySwitch to KW socket.

2.3 Interface circuit of digital IO

2.3.1 In4-In8, XORG0，YORG0，ReMark

The detailed interface circuit of input signals （ In4---In8 /XORG0/YORG0/Remark ） are shown as fig2-8.2-9:

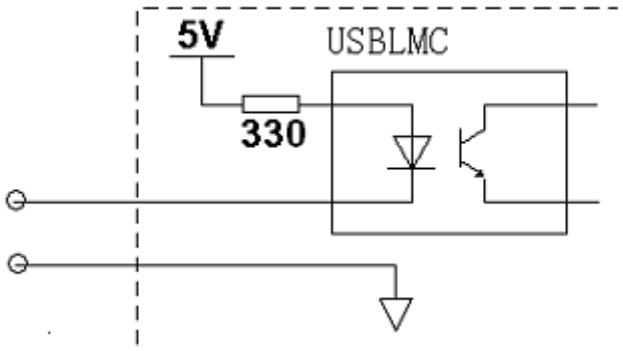

Fig 2-8 interface circuit

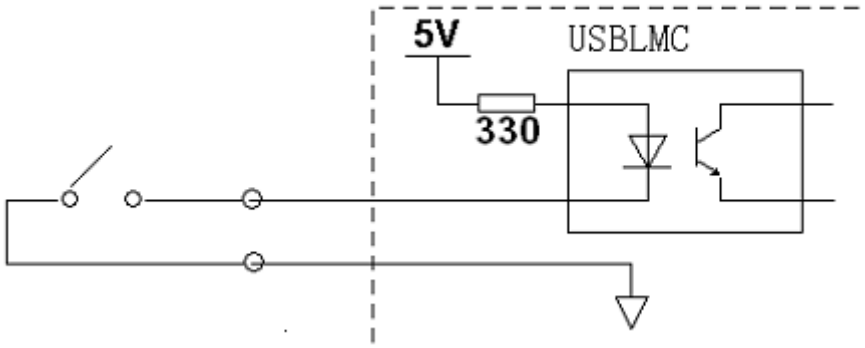

Fig 2-9 wiring example: Normal-Opened switch is used

For these input signals, only a normal-opened switch is required. The contact resistance of the switch should be less than 100 Oh.

2.3.2 In9---In13,

The detailed interface circuit of input signal In9—In3 are shown as figure 2-10,2-11:

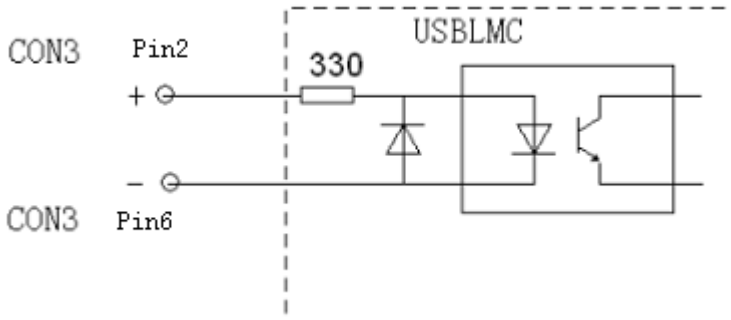

Fig 2-10 Interface circuit

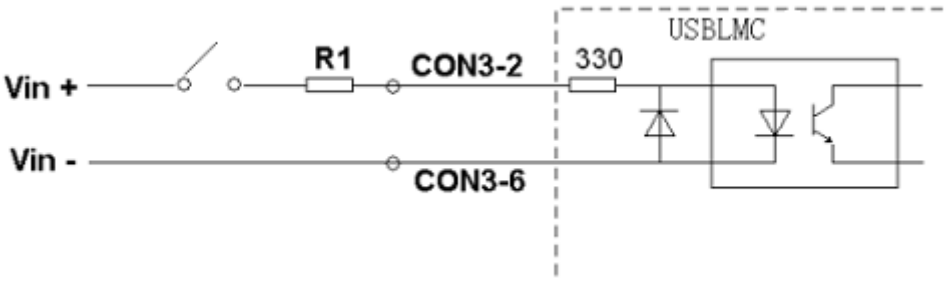

Fig 2-11 wiring example: Normal-Opened switch is used

Resistor R1 is used to limit the input current between 10mA and 15mA. Assume that the input voltage of VIN is larger than 5V, and input current is 12mA, then the resistance of R1 is calculated by the formula:

$$R1 = \left(\frac{Vin}{12} - 0.33 \right) \times 1000 \quad \Omega$$

2.3.3 Out0——Out7

Out0/1/2/3 is TTL, Out4/5/6/7 can be adjusted to OC or TTL through JP8/9/10/11.

When TTL output, must in case of short connection or ground connection, or the board will be ruin.

When OC output, please refer to fig 2-11, when connect with inductive load (Perceptual relay), must make sure to connect pin3 of COM with anode of the power supply. Drive current is 250mA, and drive voltage is 40V.

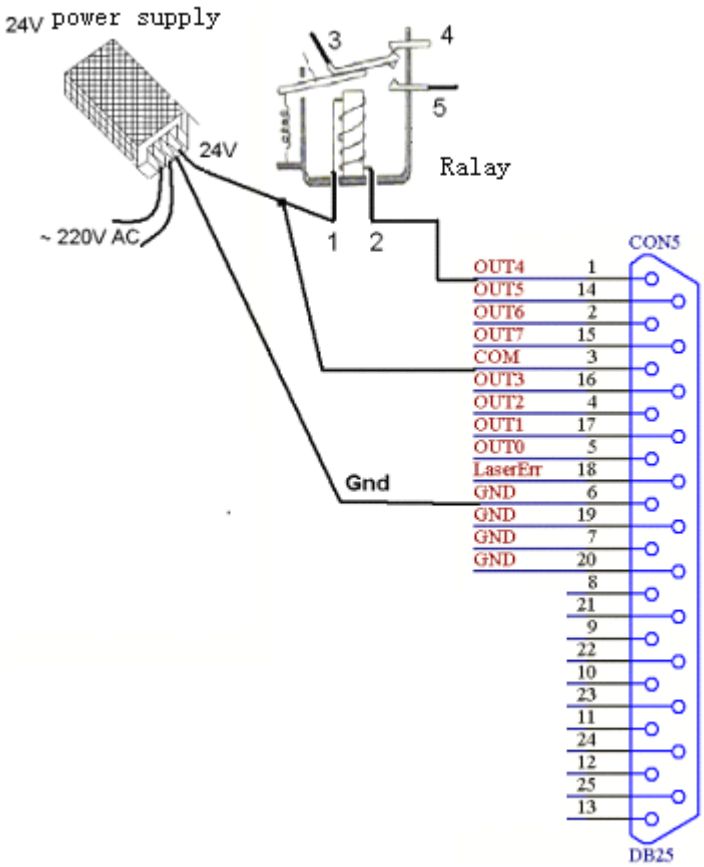

Fig 2 11 OC output and with relay

2.4 Emergency Stop / Key Switch

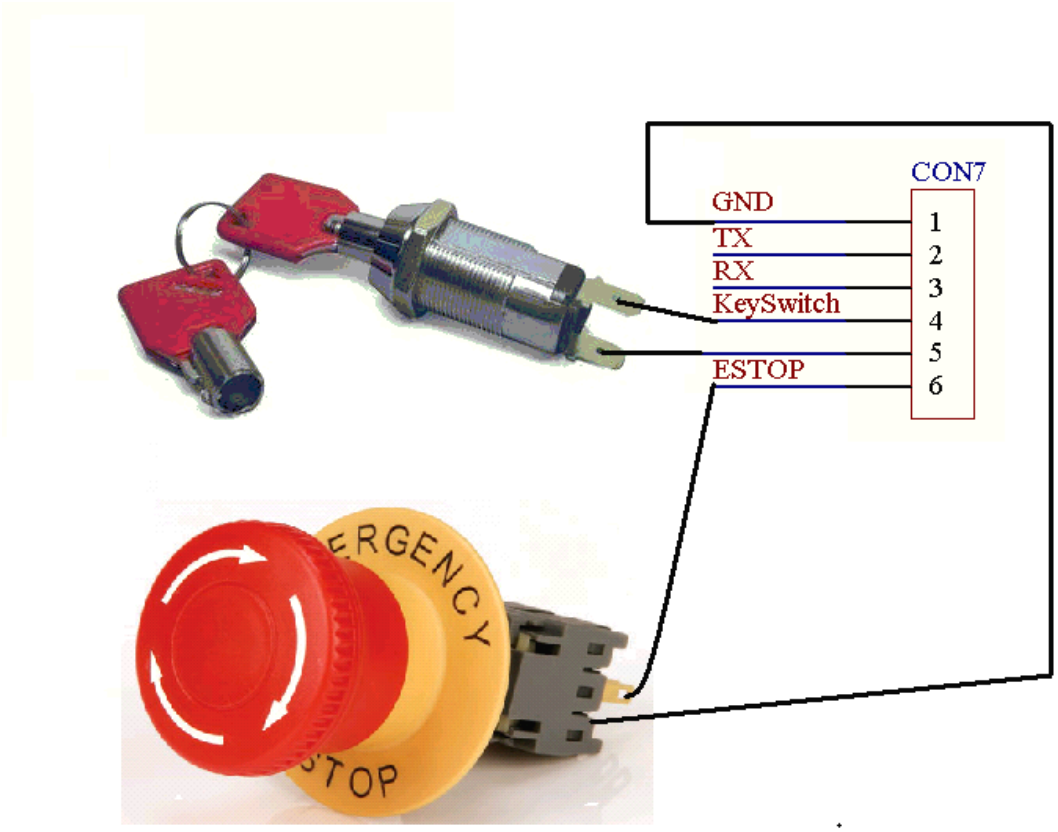

Fig 2　12 Wiring of Emergency-STOP

2.5 Typical Connection of Digital Module

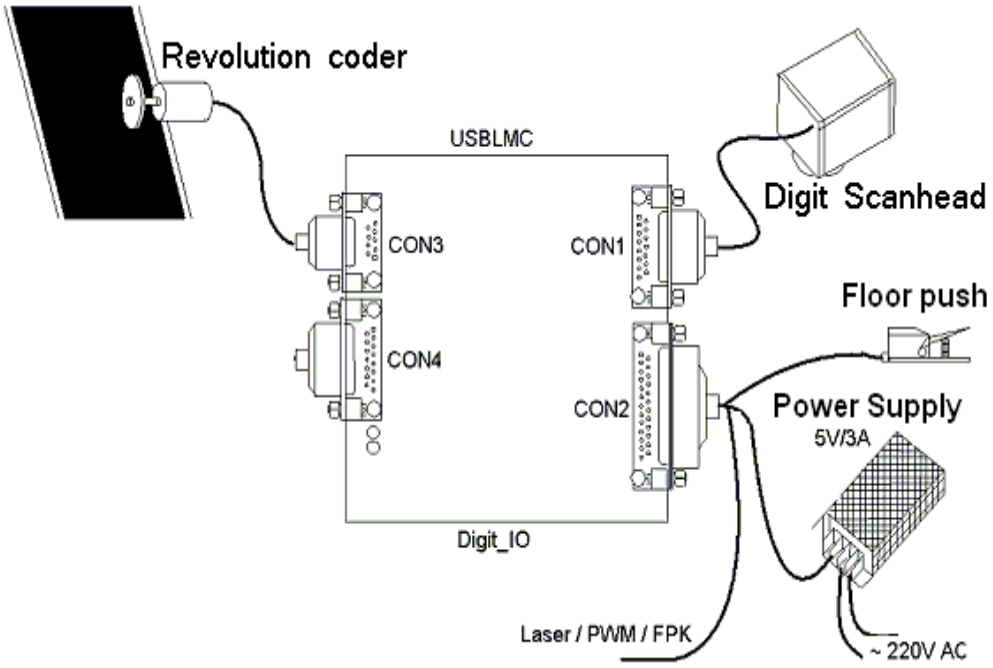

Fig. 1-15 Typical Connection of Digital Module

For the Floor push, it depends whether the rotary encoder needs connected. If the marking-on-fly function is not used, then there is no need to connect the rotary encoder.