

PMC2

User Manual

Version: 20200918

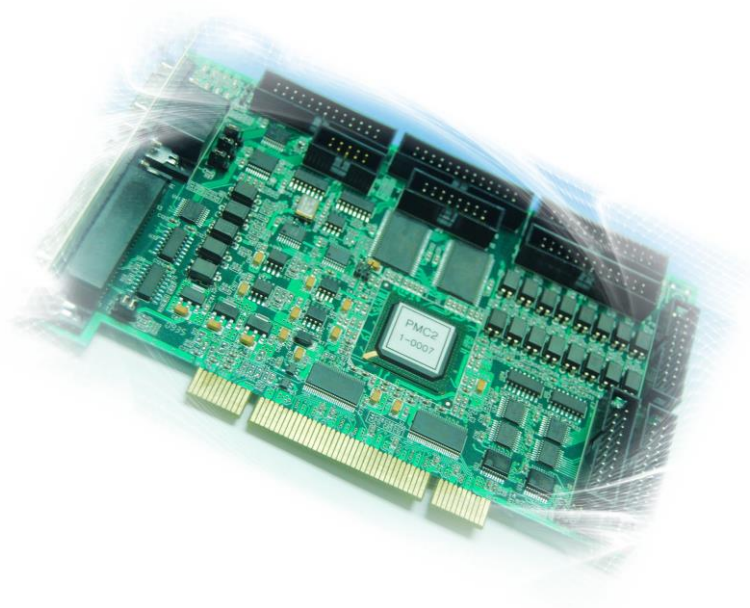


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1. Introduction

PMC2 is the high performance PCI interface card designed for Laser Marking System. The card supports digital galvo motor, compatible with XY2-100 protocol, and through DA2-16 daughter board can control analog galvo motor precisely. It reserves plenty I/O points for flexibly connect with automatic equipment or lasers requiring additional I/O. PMC2 features complete stepper motor and servo motor control function, and can control four axes at the same time. Besides, it provides a variety of expanded boards for all kinds of connection requirements.

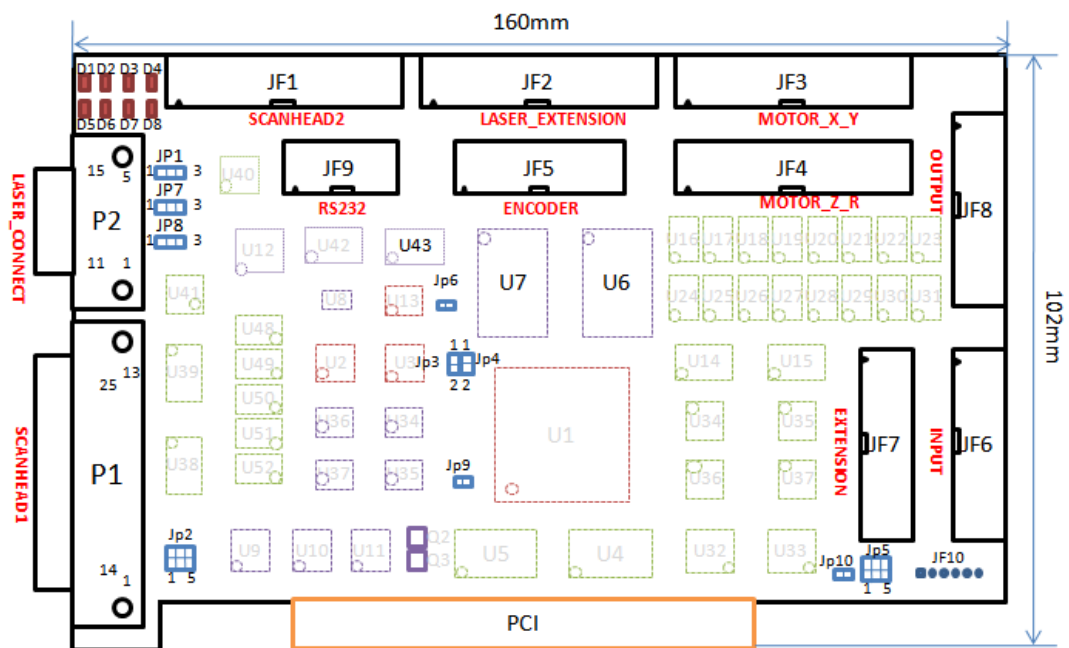
1-1 Specification

- ◆ Built-in DSP, marking computing do not occupy computer CPU time.
- ◆ Support one 16Bit XY2-100 digital control signal output, 10 μ s cycle update galvo motor position.
- ◆ FPK, PPK, R05 first pulse suppression.
- ◆ Two 10-bits analog control signals.
- ◆ 3-way encoder inputs, 3-way XY2-100 channel for XYZ signals.
- ◆ PWM maximum output frequency is 10MHz, minimum pulse width is 0.08 μ s.
- ◆ 4-way Pulse/Direction digital step/servo motor control signals at the same time, the maximum output frequency is 2MHz.
- ◆ General 16-bits digital outputs, 16 bit digital inputs.
- ◆ Specific 16-bits laser control digital outputs.
- ◆ Support for Windows XP/2000/Vista/Windows 7.

1-2 Appearance



1-3 Layout

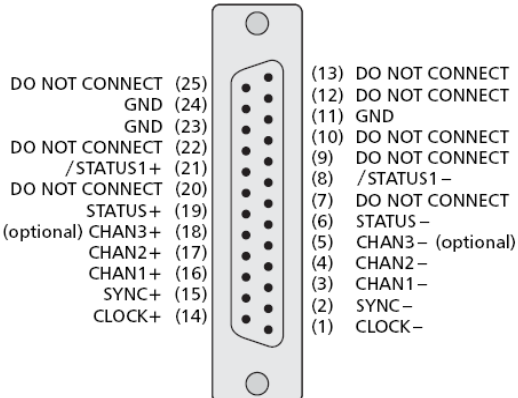


Name	Purpose	Descriptions
P1	SCANHEAD1	Main marking port (D-SUB 25-Pin female connector)
P2	LASER_CONNECTOR	Laser control and analog output port (D-SUB 15-Pin female connector)
JF1	SCANHEAD2	DA2-16 board interface port (26-Pin box header connector)
JF2	LASER_EXTENSION	Extension laser control and 16-bit digital output port (26-Pin box header connector)
JF3	MOTOR_X_Y	XY Table port (26-Pin box header connector)
JF4	MOTOR_Z_R	Z-axis and rotary port (26-Pin box header connector)
JF5	ENCODER	XYZ encoder port (16-Pin box header connector)
JF6	INPUT	16-bit digital input port (20-Pin box header connector)
JF7	EXTENSION	Extension 16-bit digital output port (20-Pin box header connector)
JF8	OUTPUT	16-bit digital output port (20-Pin box header connector)
JF9	RS232	RS232 port (10-Pin box header connector) (Reserved port)
JP1	JUMPER1	LASER2 (FPH or R05)
JP2	JUMPER2	PMC2 card ID
JP3	JUMPER3	LASER1 reverse output (PWM reverse)
JP4	JUMPER4	LASER2 reverse output (FPK reverse)
JP7	JUMPER7	Analog Out1 voltage setting (0~+5V or 0~+10V)
JP8	JUMPER8	Analog Out2 voltage setting (0~+5V or 0~+10V)
JP6, 9,10	JUMPER6, 9, 10	For testing

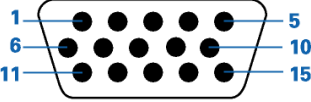
2. Pin Assignment

2-1 Laser Control Connector

2-1-1 P1 (SCANHEAD1): XY2-100 Interface Port

25-pin Female Connector	Pin		Descriptions
	(-)	(+)	
 <p>DO NOT CONNECT (25) GND (24) GND (23) DO NOT CONNECT (22) /STATUS1+ (21) DO NOT CONNECT (20) STATUS+ (19) (optional) CHAN3+ (18) CHAN2+ (17) CHAN1+ (16) SYNC+ (15) CLOCK+ (14)</p> <p>(13) DO NOT CONNECT (12) DO NOT CONNECT (11) GND (10) DO NOT CONNECT (9) DO NOT CONNECT (8) /STATUS1- (7) DO NOT CONNECT (6) STATUS- (5) CHAN3- (optional) (4) CHAN2- (3) CHAN1- (2) SYNC- (1) CLOCK-</p>	1	14	Differential Out (CLOCK)
	2	15	Differential Out (SYNC)
	3	16	Differential Out(CHAN1)
	4	17	Differential Out (CHAN2)
	5	18	Differential Out (CHAN3)
	6	19	Differential In (STATUS)
	8	21	Differential In (/STATUS)
	11, 23, 24		GND

2-1-2 P2 (LASER_CONNECTOR): Laser Control Port














15-pin Female Connector	Pin	Descriptions
	1	Analog Out1
	2	Analog Out2
	3	GND2 [1]
	4	Laser1 (PWM) [2]
	5	Laser2 (FPK) or R05 [2]
	6	L0 (Laser On/Off)
	7	L1 (Leading Light On/Off)
	8	L2 (Shutter)
	9	L3 (CW select)
	10	L4 (Lamp On/Off)
	11	L5 (Start power saving mode)
	12	/START (Dry connect input) (Let Pin12 & Pin15 short-circuit will get START signal)
	13	/STOP(Dry connect input) (Let Pin13 & Pin15 short-circuit will get STOP signal)
	14	+5V
	15	GND [1]

※[1]GND is digital and GND2 is analog. If no need to distinguish, they can connect with each other.



























※[2]The output signal of Laser1 and Laser2 depend on the selected laser control mode.

	CO ₂ Mode (JP1: 1, 2 Close)	YAG Mode (JP1: 1, 2 Close)	RO5 (JP1: 2, 3 Close)
Laser1	Modulation Pulse 1	Q-Switch signal	Q-Switch signal
Laser2	Modulation Pulse 2	First Pulse Killer	Analog out R05

2-1-3 JF1 (SCANHEAD2): DA2-16 Board Interface Port

26-Pin Connector	Pin		Descriptions
	(-)	(+)	
CLOCK- (1)  (2) CLOCK+	1	2	Differential Out (Clock)
SYNC- (3)  (4) SYNC+	3	4	Differential Out (SYNC)
CHAN1- (5)  (6) CHAN1+	5	6	Differential Out (CHAN1)
CHAN2- (7)  (8) CHAN2+	7	8	Differential Out (CHAN2)
CHAN3- (9)  (10) CHAN3+	9	10	Differential Out (CHAN3)
STATUS- (11)  (12) STATUS+	11	12	Differential In (STATUS)
DO NOT CONNECT (13)  (14) DO NOT CONNECT	15	16	Differential In (/STATUS)
/STATUS1- (15)  (16) /STATUS1+	17, 18, 19		+12V Power
+12V (17)  (18) +12V	20, 21, 22		GND
+12V (19)  (20) GND	23, 24, 25		-12V Power
GND (21)  (22) GND			
-12V (23)  (24) -12V			
-12V (25)  (26) DO NOT CONNECT			

2-1-4 JF2 (LASER_EXTENSION): Extension Laser Control Port

26-pin Connector		25-pin Connector		Descriptions
Analog1 (1) 	(2) GND	Analog Out1 (1) 	(14) GND	
Analog2 (3) 	(4) GND	Analog Out2 (2) 	(15) GND	
LEASER1 (5) 	(6) /START+	LASER 1 (PWM) (3) 	(16) /START+	
LEASER2 / R05 (7) 	(8) /START-	LASER 2 (FPK or R05) (4) 	(17) /START-	
L0 (9) 	(10) /STOP+	L0 (Laser On/Off) (5) 	(18) /STOP+	
L1 (11) 	(12) /STOP-	L1 (Leading Light On/Off) (6) 	(19) /STOP-	
L2 (13) 	(14) Program Ready+	L2 (Shutter) (7) 	(20) Program Ready+	
L3 (15) 	(16) Program Ready-	L3 (CW Select) (8) 	(21) Program Ready-	
L4 (17) 	(18) Marking Ready+	L4 (Lamp On/Off) (9) 	(22) Marking Ready+	
L5 (19) 	(20) Marking Ready-	L5 (Power Saving Mode) (10) 	(23) Marking Ready-	
L6 (21) 	(22) Marking End+	L6 (Reserved Output) (11) 	(24) Marking End+	
L7 (23) 	(24) Marking End-	L7 (Reserved Output) (12) 	(25) Marking End-	
GND (25) 	(26) NC	GND (13) 		
26-pin	25-pin			Descriptions
1	1			Analog Out1
3	2			Analog Out2
5	3			LASER1 (PWM)
7	4			LASER2 (FPK or R05)
9	5			L0 (Laser On/Off)



























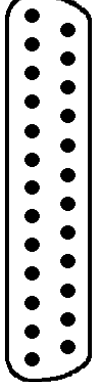
11		6		L1 (Leading Light On/Off)
13		7		L2 (Shutter)
15		8		L3 (CW select)
17		9		L4 (Lamp On/Off)
19		10		L5 (Power saving mode)
21		11		L6 (IPG MO)
23		12		L7 (Power saving mode)
(+)	(-)	(+)	(-)	
6	8	16	17	/Start (Dry connect input) (Let /Start+ & /Start-short-circuit will get START signal)
10	12	18	19	/Stop (Dry connect input) (Let /Stop+ & /Stop-short-circuit will get STOP signal)
14	16	20	21	Program Ready (Optocouplers output) 0:Open-circuit, 1:Close-circuit
18	20	22	23	Marking Ready (Optocouplers output) 0:Open-circuit, 1:Close-circuit
22	24	24	25	Marking End (Optocouplers output) 0:Open-circuit, 1:Close-circuit
25		13		GND
2, 4		14, 15		GND

****Warning—**



























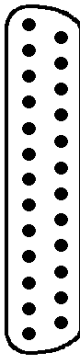


























Users use the original PCMark 25-Pin D-SUB connections, please note that the pin 10 (IPG MO) and pin 11 (Power saving mode) has been reversed.

2-2 Motor Control Connector

2-2-1 JF3 (MOTOR_X_Y): X-Y Axis Control Port

















26-pin Connector		25-pin Connector		
Pulse X+ (1)   (2) Pulse X- Dir X+ (3)   (4) Dir X- InPosition X -- Input 16+ (5)   (6) Input 16- -- InPosition X Home X -- Input 17+ (7)   (8) Input 17- -- Home X Limit X (Pos.) -- Input 18+ (9)   (10) Input 18- -- Limit X (Pos.) Limit X (Neg.) -- Input 19+ (11)   (12) Input 19- -- Limit X (Neg.) +5V (13)   (14) Pulse Y- Pulse Y+ (15)   (16) Dir Y- Dir Y+ (17)   (18) Input 20- -- InPosition Y InPosition Y -- Input 20+ (19)   (20) Input 21- -- Home Y Home Y -- Input 21+ (21)   (22) Input 22- -- Limit Y (Pos.) Limit Y (Pos.) -- Input 22+ (23)   (24) Input 23- -- Limit Y (Neg.) Limit Y (Neg.) -- Input 23+ (25)   (26) GND	 Pulse X+ (1) (14) Pulse X- Dir X+ (2) (15) Dir X- InPosition X -- Input 16+ (3) (16) Input 16- -- InPosition X Home X -- Input 17+ (4) (17) Input 17- -- Home X Limit X (Pos.) -- Input 18+ (5) (18) Input 18- -- Limit X (Pos.) Limit X (Neg.) -- Input 19+ (6) (19) Input 19- -- Limit X (Neg.) +5V (7) Pulse Y+ (8) (20) Pulse Y- Dir Y+ (9) (21) Dir Y- InPosition Y -- Input 20+ (10) (22) Input 20- -- InPosition Y Home Y -- Input 21+ (11) (23) Input 21- -- Home Y Limit Y (Pos.) -- Input 22+ (12) (24) Input 22- -- Limit Y (Pos.) Limit Y (Neg.) -- Input 23+ (13) (25) Input 23- -- Limit Y (Neg.)			
26-pin		25-pin		Descriptions
(+)	(-)	(+)	(-)	
1	2	1	14	Differential Out (Pulse_X)
3	4	2	15	Differential Out (Direction_X)
5	6	3	16	Optocouplers In (InPosition_X)
7	8	4	17	Optocouplers In (Home_X)
9	10	5	18	Optocouplers In (Limit+_X)
11	12	6	19	Optocouplers In (Limit-_X)
15	14	8	20	Differential Out (Pulse_Y)
17	16	9	21	Differential Out (Direction_Y)
19	18	10	22	Optocouplers In (InPosition_Y)
21	20	11	23	Optocouplers In (Home_Y)
23	22	12	24	Optocouplers In (Limit+_Y)
25	24	13	25	Optocouplers In (Limit-_Y)
13		7		+5V
26		Shell		GND

2-2-2 JF4 (MOTOR_Z_R): Z-R Axis Control Port

26-pin Connector		25-pin Connector		
Pulse Z+ (1)   (2) Pulse Z- Dir Z+ (3)   (4) Dir Z- InPosition Z -- Input 24+ (5)   (6) Input 24- -- InPosition Z Home Z -- Input 25+ (7)   (8) Input 25- -- Home Z Limit Z (Pos.) -- Input 26+ (9)   (10) Input 26- -- Limit Z (Pos.) Limit Z (Neg.) -- Input 27+ (11)   (12) Input 27- -- Limit Z (Neg.) +5V (13)   (14) Pulse R- Limit Rotary (Neg.) Pulse R+ (15)   (16) Dir R- Dir R+ (17)   (18) Input 28- -- InPosition Rotary InPosition Rotary -- Input 28+ (19)   (20) Input 29- -- Home Rotary Home Rotary -- Input 29+ (21)   (22) Input 30- -- Limit Rotary (Pos.) Limit Rotary (Pos.)-- Input 30+ (23)   (24) Input 31- -- Limit Rotary (Neg.) Limit Rotary (Neg.)-- Input 31+ (25)   (26) GND	 Pulse Z+ (1)   (14) Pulse Z- Dir Z+ (2)   (15) Dir Z- InPosition Z -- Input 24+ (3)   (16) Input 24- -- InPosition Z Home Z -- Input 25+ (4)   (17) Input 25- -- Home Z Limit Z (Pos.) -- Input 26+ (5)   (18) Input 26- -- Limit Z (Pos.) Limit Z (Neg.) -- Input 27+ (6)   (19) Input 27- -- Limit Z (Neg.) +5V (7)   (20) Pulse R- Pulse R+ (8)   (21) Dir R- Dir R+ (9)   (22) Input 28- -- InPosition Rotary InPosition Rotary -- Input 28+ (10)   (23) Input 29- -- Home Rotary Home Rotary -- Input 29+ (11)   (24) Input 30- -- Limit Rotary (Pos.) Limit Rotary (Pos.)-- Input 30+ (12)   (25) Input 31- -- Limit Rotary (Neg.) Limit Rotary (Neg.)-- Input 31+ (13)  			
26-pin		25-pin		Descriptions
(+)	(-)	(+)	(-)	
1	2	1	14	Differential Out (Pulse_Z)
3	4	2	15	Differential Out (Direction_Z)
5	6	3	16	Optocouplers In (InPosition_Z)
7	8	4	17	Optocouplers In (Home_Z)
9	10	5	18	Optocouplers In (Limit+_Z)
11	12	6	19	Optocouplers In (Limit-_Z)
15	14	8	20	Differential Out (Pulse_R)
17	16	9	21	Differential Out (Direction_R)
19	18	10	22	Optocouplers In (InPosition_R)
21	20	11	23	Optocouplers In (Home_R)
23	22	12	24	Optocouplers In (Limit+_R)
25	24	13	25	Optocouplers In (Limit-_R)
13		7		+5V
26		Shell		GND

2-3 Others Control Connectors

2-3-1 JF5 (ENCODER): X/Y/Z Position Encoder Port

16-pin Connector		Pin		Descriptions			
		(+)	(-)				
ENCODER XA-	(1) 		(2) 	ENCODER XA+	1	2	Differential In (XA)
ENCODER XB-	(3) 		(4) 	ENCODER XB+	3	4	Differential In (XB)
ENCODER YA-	(5) 		(6) 	ENCODER YA+	5	6	Differential In (YA)
ENCODER YB-	(7) 		(8) 	ENCODER YB+	7	8	Differential In (YB)
ENCODER ZA-	(9) 		(10) 	ENCODER ZA+	9	10	Differential In (ZA)
ENCODER ZB-	(11) 		(12) 	ENCODER ZB+	11	12	Differential In (ZB)
GND	(13) 		(14) 	GND	13	14	GND
+5V	(15) 		(16) 	+12V			
					15		+5V
					16		+12V

2-3-2 JF6 (INPUT): TTL Input Port

When there is no any connection to TTL input, the program receives 0 value; while if input 0V, the program will read 0, if input 5V, the program will read 1. You must consider about the noise issue. The pin assignment of JF6 connector is compatible to the general purpose input daughter boards such as PCLD-782 of Advantech Co., Ltd. or the DB-16P of ICPDAS Co., Ltd. Using these kinds of daughter boards can isolate power source while provide protection and easy cable connections.

Pin	Name	Descriptions	20-pin Connector
1	General Digital Input 1		
2	General Digital Input 2		
3	General Digital Input 3		
4	General Digital Input 4		
5	General Digital Input 5		
6	General Digital Input 6		
7	General Digital Input 7		
8	General Digital Input 8		
9	General Digital Input 9		
10	General Digital Input 10		
11	General Digital Input 11		
12	General Digital Input 12		
13	General Digital Input 13		
14	General Digital Input 14		
15	General Digital Input 15	Start	
16	General Digital Input 16	E. Stop	
17	GND		
18	GND		
19	+5V		
20	+12V		

2-3-3 JF7 (EXTENSION): TTL Extension Output Port

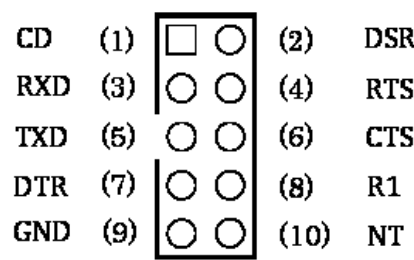
Pin	Name	Descriptions	20-pin Connector
1	General Digital Output 17	(Reserved for laser control)	
2	General Digital Output 18	(Reserved for laser control)	
3	General Digital Output 19	(Reserved for laser control)	
4	General Digital Output 20	(Reserved for laser control)	
5	General Digital Output 21	(Reserved for laser control)	
6	General Digital Output 22	(Reserved for laser control)	
7	General Digital Output 23	(Reserved for laser control)	
8	General Digital Output 24	(Reserved for laser control)	
9	General Digital Output 25	(Reserved for laser control)	
10	General Digital Output 26	(Reserved for laser control)	
11	General Digital Output 27	(Reserved for laser control)	
12	General Digital Output 28	(Reserved for laser control)	
13	General Digital Output 29	(Reserved for laser control)	
14	General Digital Output 30		
15	General Digital Output 31		
16	General Digital Output 32		
17	GND		
18	GND		
19	+5V		
20	+12V		

2-3-4 JF8 (OUTPUT): TTL Output Port

As for the output of TTL, when an output is set as inactive in the software; the output voltage is 0V. When an output is set as active in the software; the output voltage is 5V. The pin assignment of JF8 connector is compatible to the general purpose relay output boards such as PCLD-885 of Advantech Co., Ltd. or the DB-16R of ICPDAS Co., Ltd. Using these kinds of daughter boards can isolate external power and drive the peripheral devices more powerfully, it provides benefits of protection and easy cable connections.


Pin	Name	Descriptions	20-pin Connector
1	General Digital Output 1		
2	General Digital Output 2		
3	General Digital Output 3		
4	General Digital Output 4		
5	General Digital Output 5		
6	General Digital Output 6		
7	General Digital Output 7		
8	General Digital Output 8		
9	General Digital Output 9		
10	General Digital Output 10		
11	General Digital Output 11		
12	General Digital Output 12		
13	General Digital Output 13		
14	General Digital Output 14	Marking Ready	
15	General Digital Output 15	Program Ready	
16	General Digital Output 16	Marking End	
17	GND		
18	GND		
19	+5V		
20	+12V		

2-3-5 JF9 (RS232): RS232 Port

10-pin Connector	Pin	Descriptions
	1	CD
	2	DSR
	3	RXD
	4	RTS
	5	TXD
	6	CTS
	7	DTR
	8	R1
	9	GND
	10	NT

2-4 JUMPER Settings

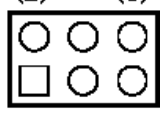
2-4-1 JP1: Set Laser2 Mode

Jumper	Pin	Function
 (1) (2) (3)	1, 2 Close	LASER2 (FPK)
	2, 3 Close	LASER2 (R05)

2-4-2 JP2 (PMC2 Card ID): Distinguish PMC2 from other PMC2s

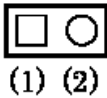
Card ID: for distinguish one card from other cards when using more than one PMC2.

XY exchange: the XY2-100 output of CHAN1(X) and CHAN2(Y) of P1 and JF1 exchange.

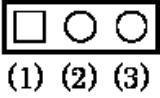
Jumper	Pin	Function
 (1) (2) (3) (4) (5) (6)	1, 2 Open	XY not exchange
	1, 2 Close	XY exchange
	3, 4 Open	Bit1: 0
	3, 4 Close	Bit1: 1
	5, 6 Open	Bit2: 0
	5, 6 Close	Bit2: 1

Bit1 Bit0	Card ID	Bit1 Bit0	Card ID
00	0	10	2
01	1	11	3

2-4-3 JP3 & JP4: Set PWM & FPK Signal Polarity

Jumper	Pin	Function
 (1) (2)	1, 2 Close	LOW active
	1, 2 Open	HIGH active

2-4-4 JP7 & JP8: Set Analog Out 1 & Out 2 Voltage Range

Jumper	Pin	Function
 (1) (2) (3)	1, 2 Close	+10V
	2, 3 Close	+5V

****Warning: If JP7 or JP8 do not connect with any JUMPER, it will output +10V.**

2-5 LED Status Descriptions

Name	Descriptions
D1	Power +3.3V indicator
D2	Power +2.5V indicator
D3	Power +1.2V indicator
D4	Ready

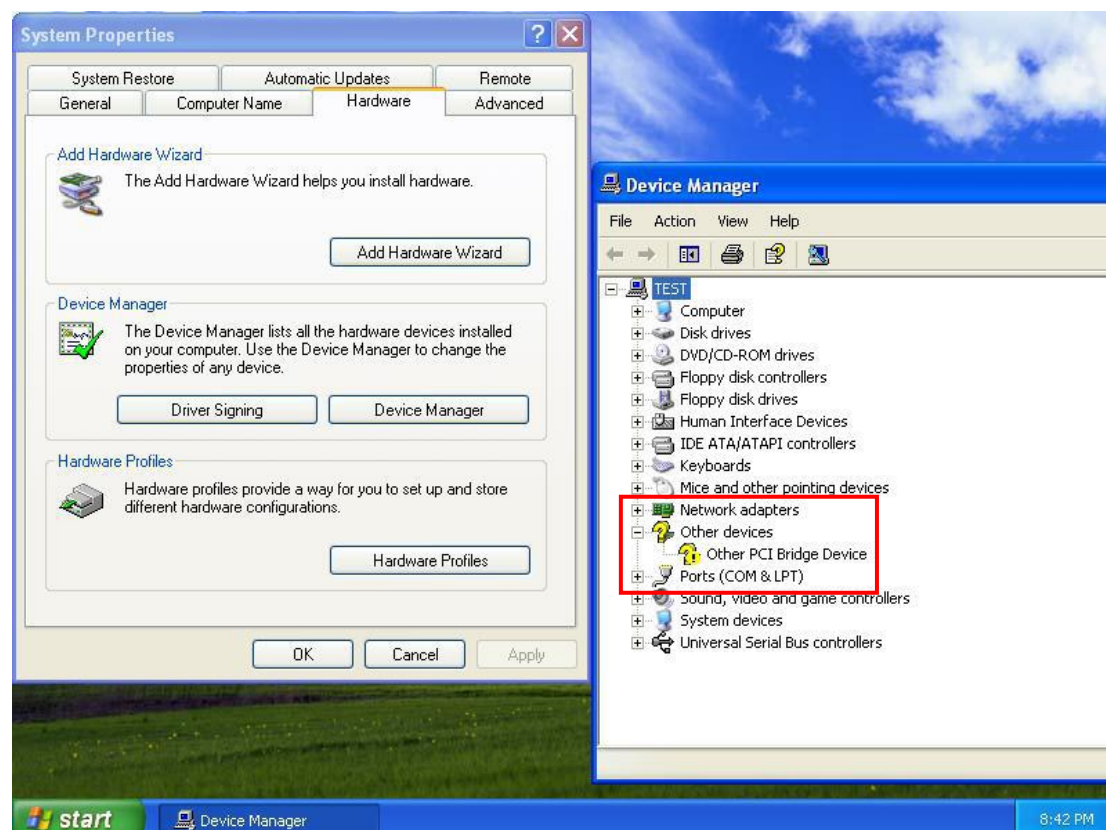
3. Installation and Cable Connection

3-1 PMC2 Installation

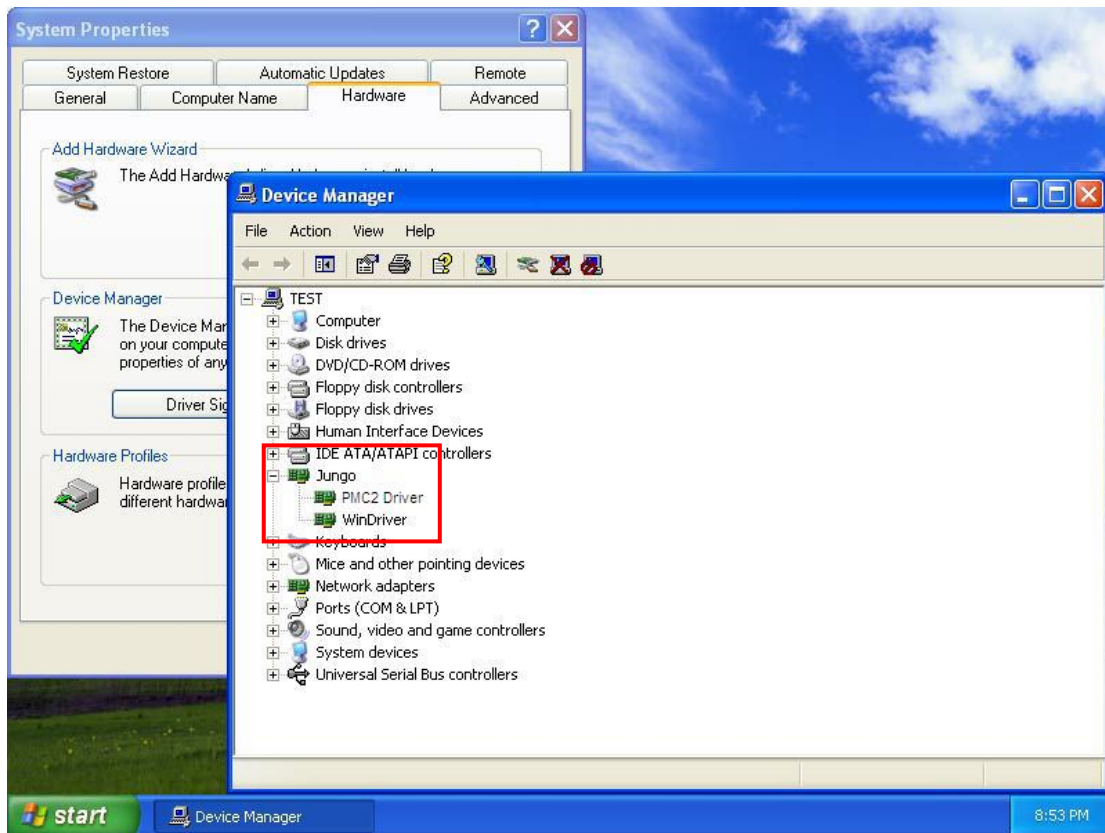
Before plugging PMC2 card into computer, be sure that the PC has been shut down. It is better to switch the power supply to 'OFF' or disconnect the power cord. After finish the above actions, plug-in the PMC2 card to the PCI slot and then restart the computer.

Normally, the MarkingMate program can work properly and can control the laser machine through PMC2 card at this moment. However, if you execute the 'Mark' function in the program, and a warning message of 'Exceed the Mark Area' appeared even through your object did not exceed the Mark Area; it could be that the PMC2 card did not insert well into the PCI slot. Please shut down the PC, pull out and re-plug the card.

If you find [Unknown PCI Device] in the window of [Device Manger] as below, it means that the PMC2 card did not install well. Please delete the [PCI Device] item and reinstall PMC2 card.



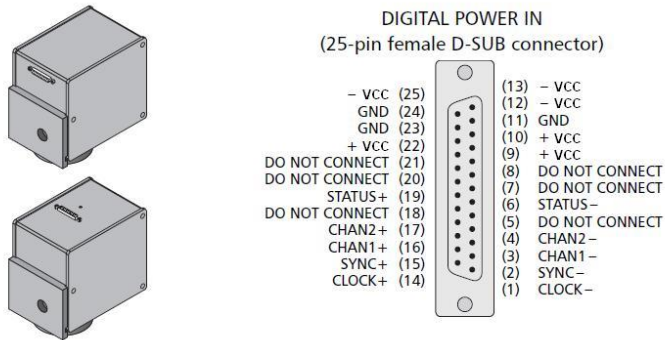
If the PMC2 card installed well, you should see a [PMC2 Driver] item in the [Device Manger] as below:



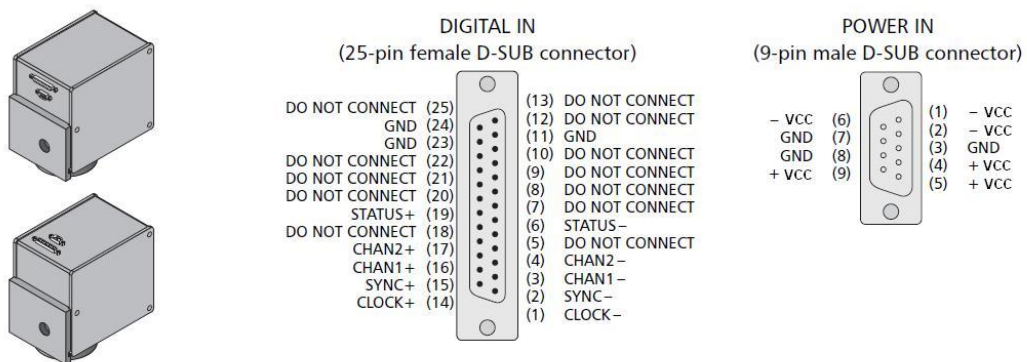
3-2 XY2-100 Digital Scanner

Currently common seen digital galvanometer could divide into the following 2 types:

3-2-1 Type 1: With one D-SUB 25Pin connector ◦



3-2-2 Type 2: With D-SUB 25Pin connector + D-SUB 9Pin connector ◦



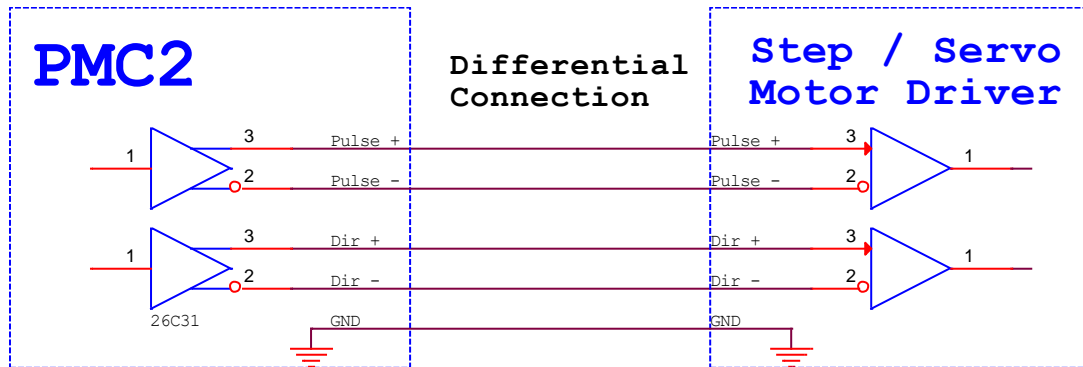
Notice:

- PMC2 P1 is corresponding to digital galvanometer D-SUB25Pin. User could easily connect them by 25-pin 1 to 1 cable; however, if using type 1 galvanometer, user has to wire to power source from the cable.
- For the power source: User has to wire all pins of them, which means has to wire 3 pins of the +VCC, 3 pins of the - VCC, and 3 pins of the GND. **Only wire to 1 pin of +VCC, 1 pin of - VCC, or 1 pin of GND is forbidden.**

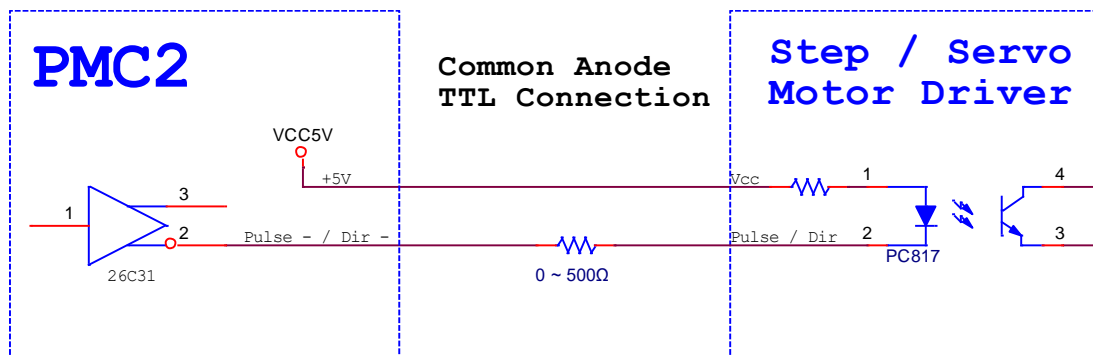
3-3 Pulse/Direction Signal Connection

According to the different types of Motor Driver, there are three ways of connection between Motor Driver and PMC2's JF3 and JF4 connectors.

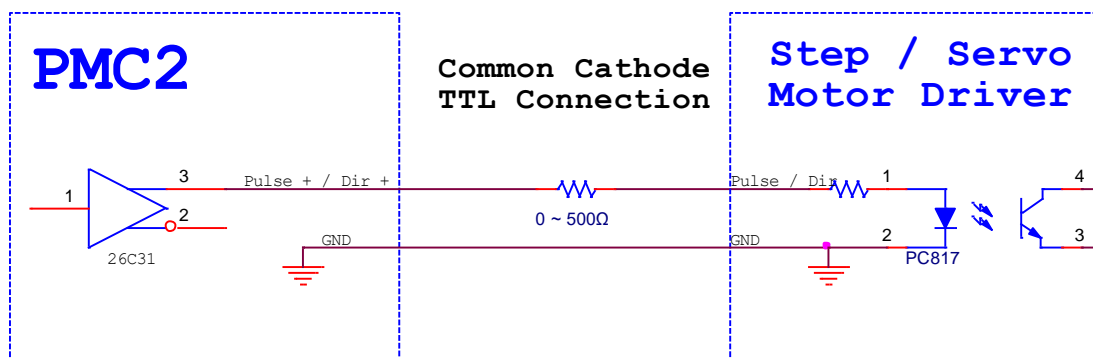
3-3-1 Differential Signal



3-3-2 Common Anode TTL

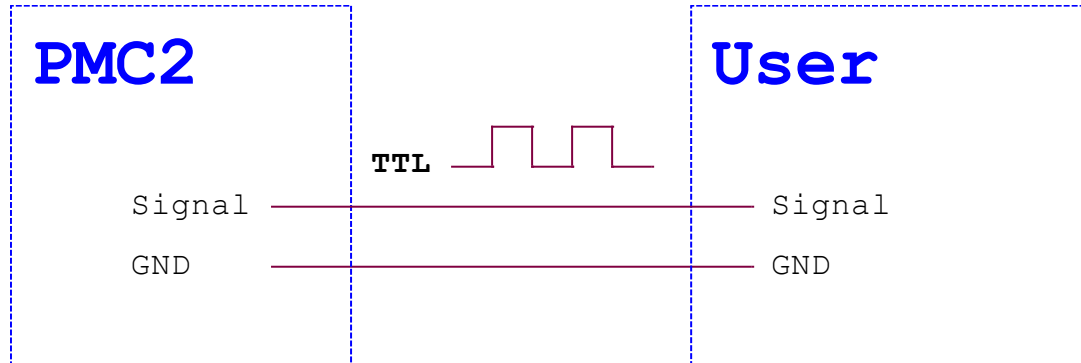


3-3-3 Common Cathode TTL



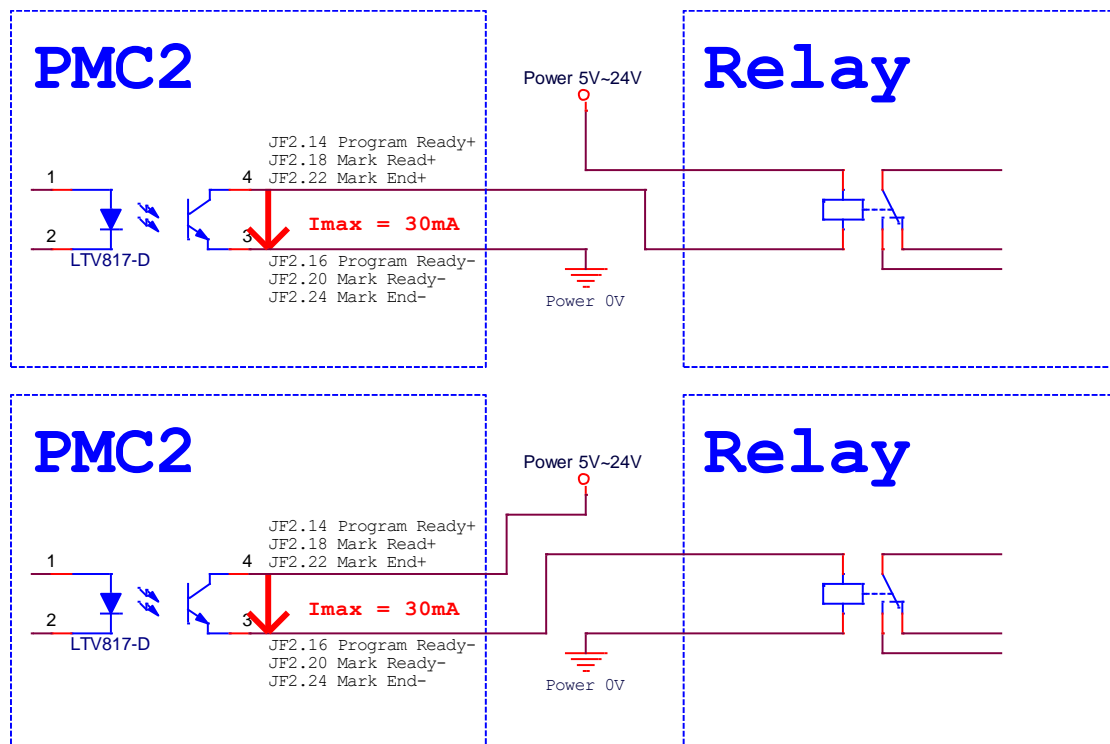
3-4 TTL Signal Connection

TTL signal is connected by pin to pin as below.



3-5 Photo Couple Signal Connection

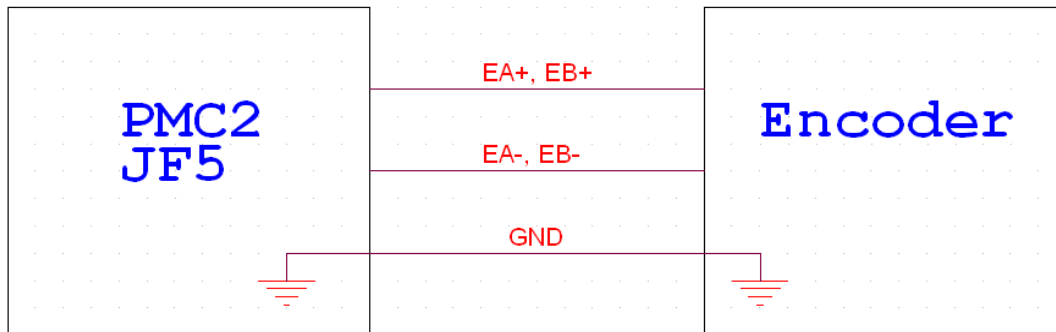
Program Ready / Marking Ready / Marking End signal are photo couple signal. The way of connection is as below.



P.S.1: The max electric current for PC817 pin4 to pin3 is 40mA. If needed more than 40mA for the relay, user will have to add external current enlarge circuit.

3-6 Encoder Signal Connection

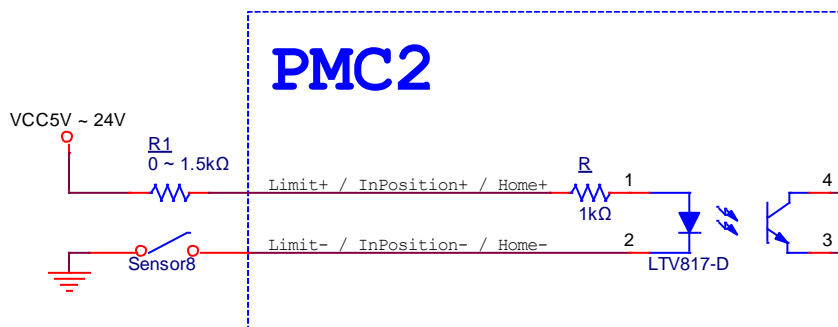
The way of encoder signal connection is as below.



3-7 Axis Control Signal Connection

The way of Axis Control signal such as Limit, InPosition and Home signal connection are as below.

3-7-1 Basic Circuit

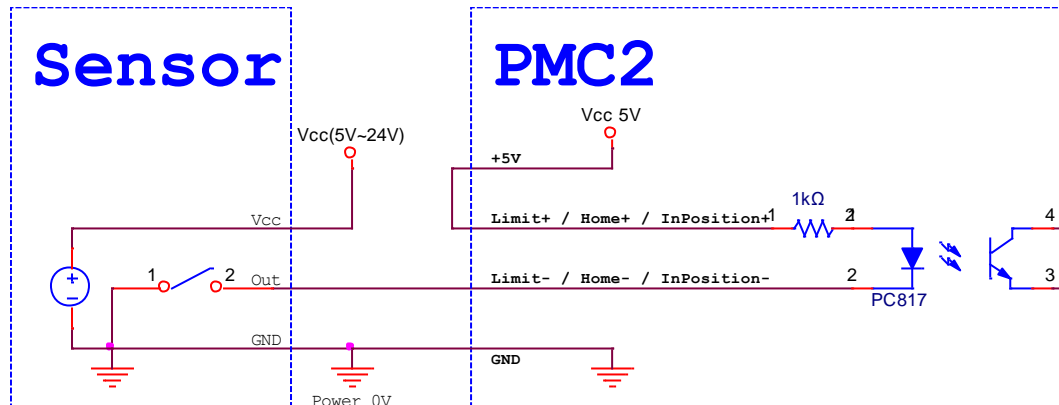


#Table 1

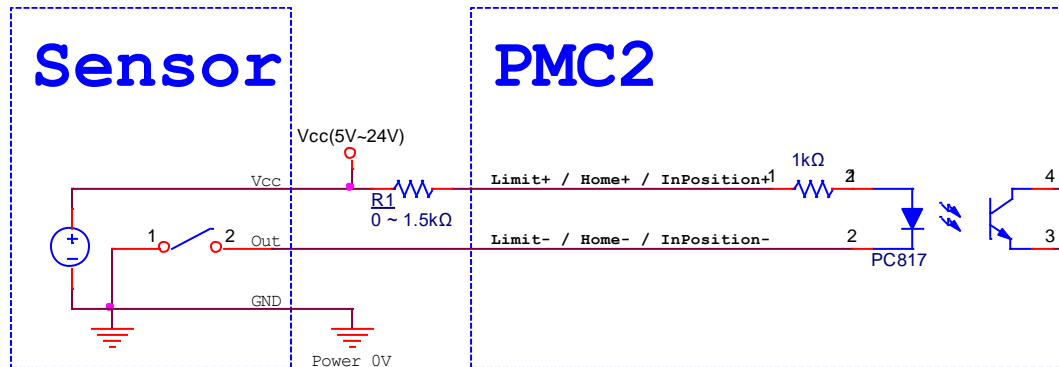
5V ≤ VCC < 10V	R1 = 0Ω
10V ≤ VCC < 20V	R1 = 1kΩ
20V ≤ VCC < 30V	R1 = 2kΩ

3-7-2 Common Cathode Sensor

3-7-2-1 Internal Power Supply Connection

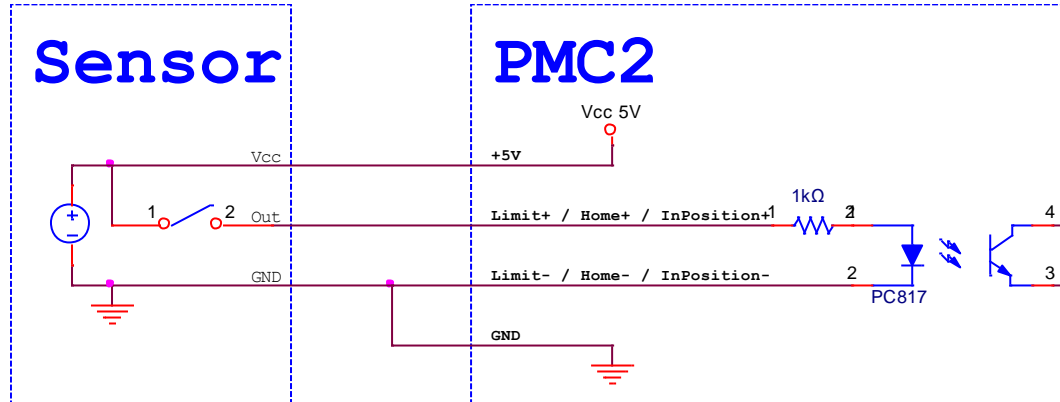


3-7-2-2 External Power Supply Connection (VCC and R1 please refer to Table 1)

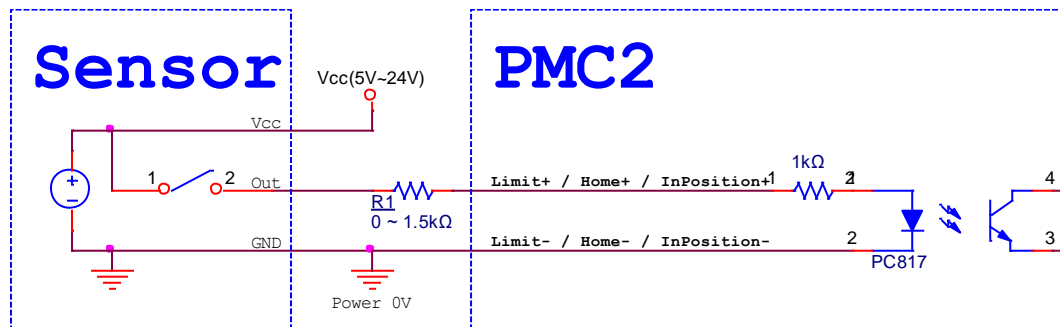


3-7-8 Common Anode Sensor

3-7-3-1 Internal Power Supply Connection

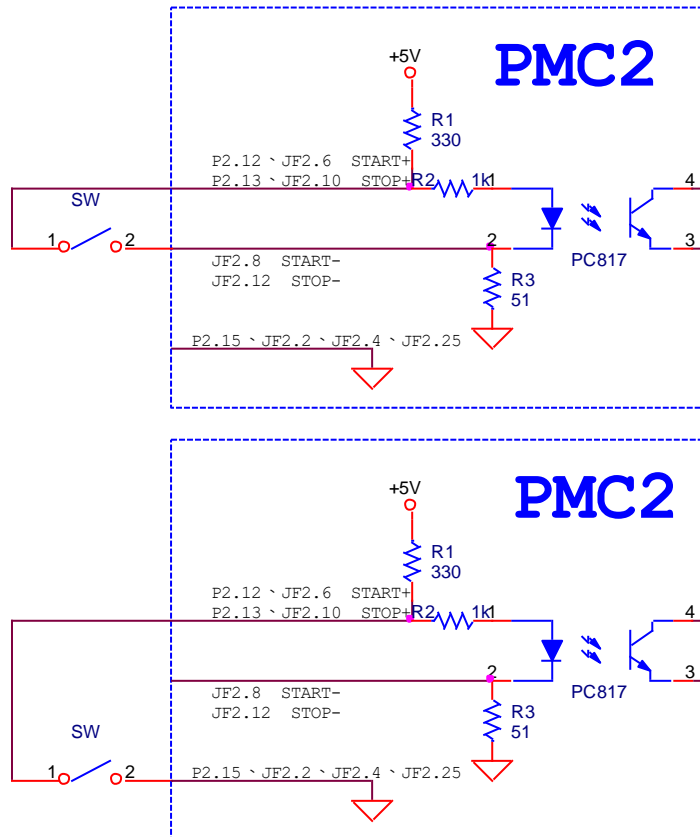


3-7-3-2 External Power Supply Connection (VCC and R1 please refer to Table 1)



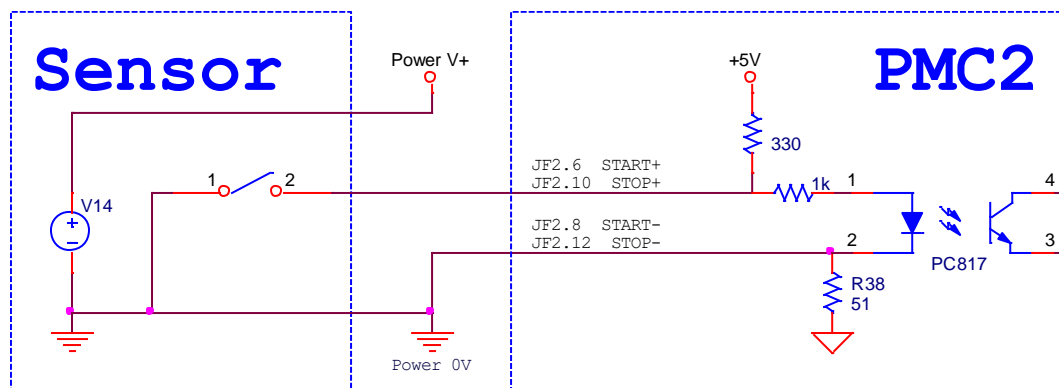
3-8 Start & Stop Signal Connection

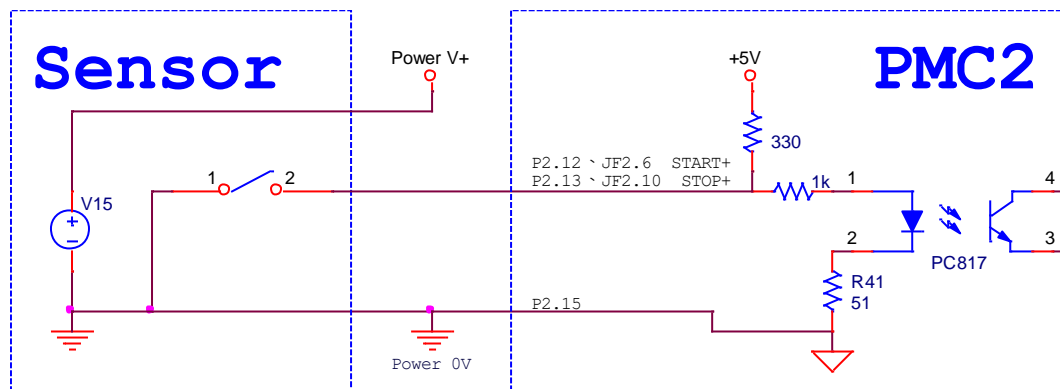
3-8-1 Connect with general buttons:



3-8-2 Connect with sensors:

3-8-2-1 For Common Cathode Sensor, short circuit the sensor output with GND.





3-8-2-2 For Common Anode Sensor, short circuit the sensor output with Vcc.

P.S. : UMC4 don't support common cathode sensor.

4. SPI Laser Settings

4-1 SPI Laser – Program Settings

If you want to use MarkingMate software to control SPI Laser, you have two ways to make it.

4-1-1 Software control interface

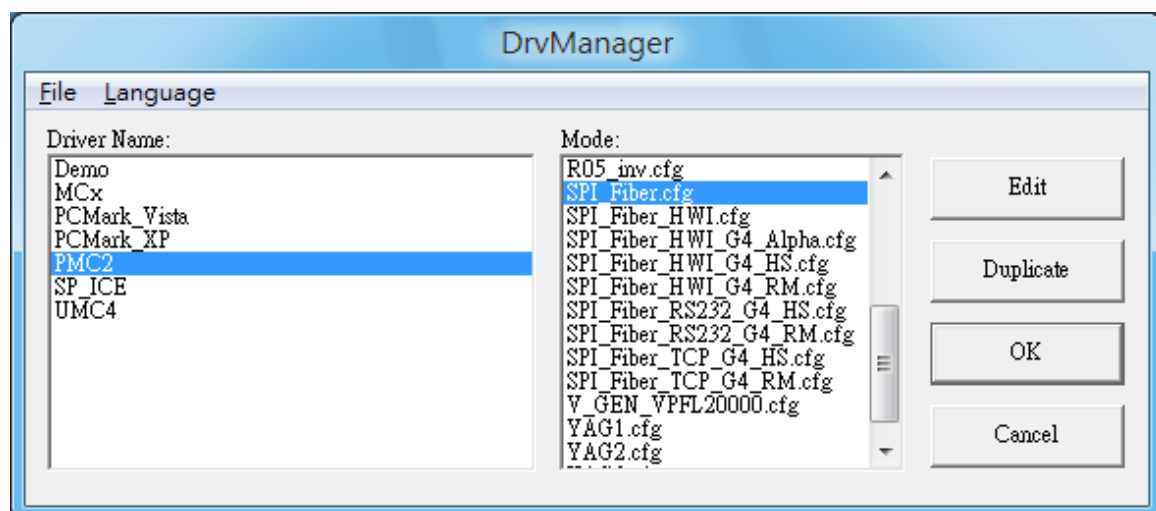
We recommend user to use software control mode to control SPI fiber laser by PMC2. By this mode user only have to connect to laser Break Out Board(BOB) by RS-232 cable and Gate signal.

The RS-232 port located on BOB which is needed to connect to COM port located on PC. If there is no such a COM port on PC, user could use a [USB to COM port convertor] to help.

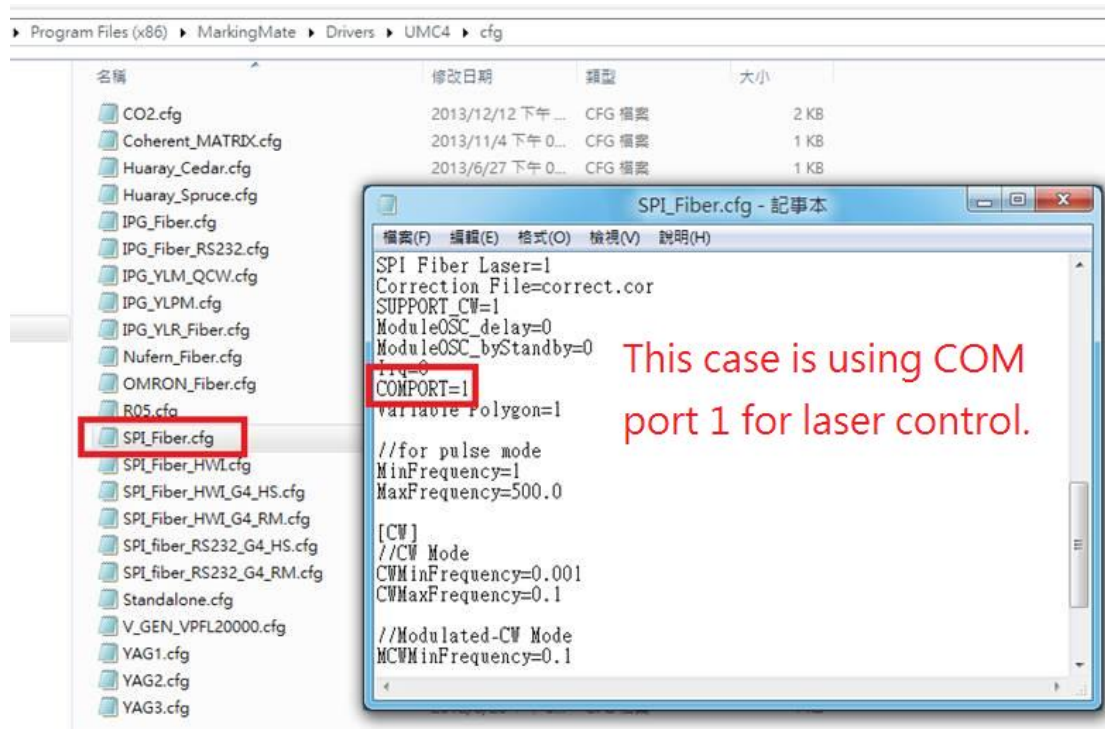
To connect [Gate] signal, user will need to prepare one BNC cable, which one side is connected to BOB [Gate], another side is connected to PMC2 JF2 pin 9 for laser on and pin 2 for ground.

After wiring is completed, user have to set cfg file to SPI_Fiber.cfg by \markingmate\DM.exe and edit [COMPORT = (the current COM port you are using)] within SPI_Fiber.cfg by any text editor.

Please refer to the following picture and cfg list:



SPI_Fiber.cfg	For G3 laser.
SPI_Fiber_RS232_G4_HS.cfg	For G4 HS laser controlled by RS232.
SPI_Fiber_RS232_G4_RM.cfg	For G4 RM laser controlled by RS232.
SPI_Fiber_TCP_G4_HS.cfg	For G4 HS laser controlled by TCP/IP.
SPI_Fiber_TCP_G4_RM.cfg	For G4 RM laser controlled by TCP/IP.

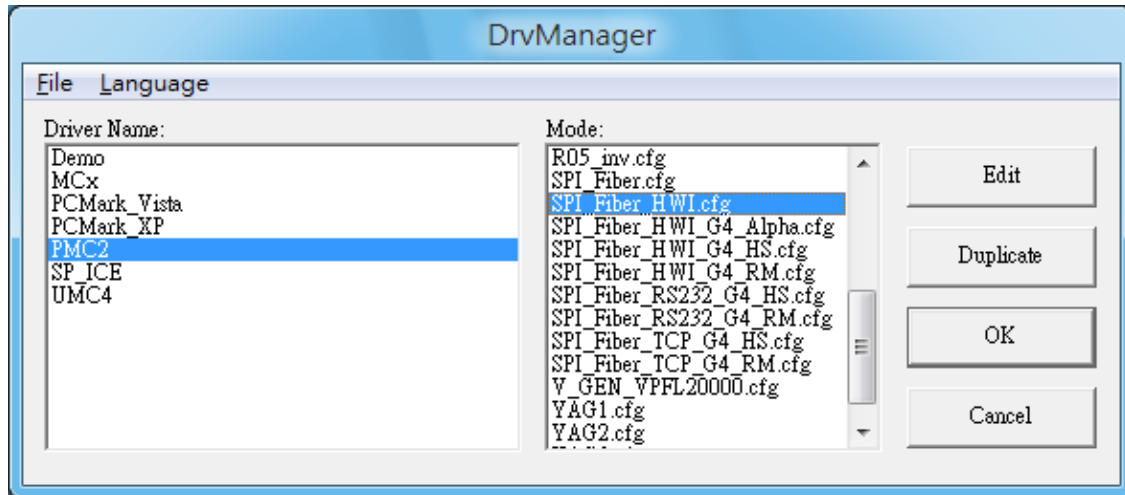


4-1-2 Hardware control interface

If user has to pursue highest performance for laser control, definitely have to use hardware control mode. Please refer to the following [4-2-2 Hardware connection mode(HWI)] for wiring.

After wiring is completed, user have to set cfg file to SPI_Fiber_HWI.cfg or other suitable cfg by \markingmate\DM.exe.

Please refer to the following picture and cfg list:



SPI_Fiber_HWI.cfg	For G3 laser
SPI_Fiber_HWI_G4_Alpha.cfg	For G4 Alpha laser.
SPI_Fiber_HWI_G4_HS.cfg	For G4 HS laser.
SPI_Fiber_HWI_G4_RM.cfg	For G4 RM laser.

4-2 PMC2 – SPI Laser Pin Assignment

4-2-1 Serial Mode (RS-232)

When you choose the driver of [SPI_Fiber.cfg], the pin assignments of PMC2 and SPI G3 Laser are as below:

PMC2-JF2 (LASER_EXTENSION)			SPI G3 Laser (68 pins)	
Pin No. (26pins)	Pin No. (25pins)	Name	Descriptions	Pin No.
1	1	DAC Output		
3	2	DAC Output		
5	3	PWM 0 Output (TTL)		
7	4	FPK & Current (DA)		
9	5	Laser On/off (TTL)	Laser Emission Gate High	5
11	6	Leading Light On/Off (TTL)		
13	7	Shutter (TTL)		
15	8	CW Mode (TTL)		
17	9	Lamp On/Off (TTL)		
19	10	Digital Output 5 (TTL)		
21	11	Digital Output 6 (TTL)		
23	12	Digital Output 7 (TTL)		
25	13	GND	Ground	31
2	14	GND	Laser Emission Gate Low	39, 47
4	15	GND		
6	16	Start +		
8	17	Start -		
10	18	Stop +		
12	19	Stop -		
14	20	Program Ready Ext +		
16	21	Program Ready Ext GND		
18	22	Marking Ready Ext +		
20	23	Marking Ready Ext GND		
22	24	Marking End Ext +		
24	25	Marking End Ext GND		
PC-RS232 port (9 pins)			SPI G3 Laser (68 pins)	
Pin No.	Name	Descriptions	Pin No.	
2	TX	RS-232_TX	25	
3	RX	RS-232_RX	26	
5	GND	Ground	31	
1、4、6、7、8	NC			

4-2-2 Hardware Connection Mode (HWI)

When you choose the driver of [SPI_Fiber_HWI.cfg], the pin assignments of PMC2 and SPI G3 laser will be as below:

PMC2-JF2 (LASER_EXTENSION)			SPI G3 Laser (68 pins)		SPI break-out board	
Pin No. (26pins)	Pin No. (25pins)	Name	Descriptions	Pin No.	Descriptions	Pin No.
1	1	DAC Output	Power-Amp Active-State Current Set Point	65	User_PWR_MOD_IN	J6 pin-7
3	2	DAC Output	Power-Amp Simmer State Current Set Point	64	User_PWR_BIAS_IN	J6 pin-6
5	3	PWM 0 Output (TTL)	External Pulse Trigger-High	13	User_EXT_TRIG_H	J7 pin-7
7	4	FPK & Current (DA)				
9	5	Laser On/off (TTL)	Laser Emission Gate High	5	User_Laser_Out_EN_H	J7 pin-1
11	6	Leading Light On/Off (TTL)				
13	7	Shutter (TTL)				
15	8	CW Mode (TTL)				
17	9	Lamp On/Off (TTL)				
19	10	Digital Output 5 (TTL)				
21	11	Digital Output 6 (TTL)				
23	12	Digital Output 7 (TTL)				
25	13	GND	Ground	31	0V_Analogue	J6 pin-1
2	14	GND	Laser Emission Gate Low	39, 47		N/C
4	15	GND	GND_ISOD	48	0V_ISO_D	J11 pin-1
6	16	Start +				
8	17	Start -				
10	18	Stop +				
12	19	Stop -				
14	20	Program Ready Ext +				
16	21	Program Ready Ext GND				
18	22	Marking Ready Ext +				
20	23	Marking Ready Ext GND				
22	24	Marking End Ext +				

24	25	Marking End Ext GND				
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PMC2-JF7 (EXTENSION)		SPI G3 Laser (68 pins)		SPI break-out board	
Pin No.	Name	Descriptions	Pin No.	Descriptions	Pin No.
1	General Digital Output 17				
2	General Digital Output 18				
3	General Digital Output 19				
4	General Digital Output 20				
5	General Digital Output 21				
6	General Digital Output 22	Pulsed/CW Mode Select-High	21	User_Pulse_N_CW_H	J7 pin-11
7	General Digital Output 23	Global Enable-High	7	User_Global_EN_H	J7 pin-5
8	General Digital Output 24	Alignment Laser Enable-High	6	User_PU_Laser_EN_H	J7 pin-3
9	General Digital Output 25	State Select Bit 0	17	User_CFG_0	J2 pin-1
10	General Digital Output 26	State Select Bit 1	18	User_CFG_1	J2 pin-2
11	General Digital Output 27	State Select Bit 2	19	User_CFG_2	J2 pin-3
12	General Digital Output 28	State Select Bit 3	20	User_CFG_3	J2 pin-4
13	General Digital Output 29	State Select Bit 4	51	User_CFG_4	J2 pin-5
14	General Digital Output 30	State Select Bit 5	52	User_CFG_5	J2 pin-6
15	General Digital Output 31				
16	General Digital Output 32				
17	GND	Ground	40, 41, 55, 56		N/C
18	GND	Ground	40, 41, 55, 56		N/C
19	+5V				
20	+12V				

PMC2-JF6 (INPUT)		SPI G3 Laser (68 pins)		SPI break-out board	
Pin No.	Name	Descriptions	Pin No.	Descriptions	Pin No.
1	General Digital Input 1				
2	General Digital Input 2				
3	General Digital Input 3				
4	General Digital Input 4				
5	General Digital Input 5				
6	General Digital Input 6				
7	General Digital Input 7				
8	General Digital Input 8				
9	General Digital Input 9				
10	General Digital Input 10				
11	General Digital Input 11				
12	General Digital Input 12	Beam Collimator Fault	11	User_BDO_Fault_N	J11 pin-7
13	General Digital Input 13	Power Supply Fault	16	User_DRV_PWR_MON_N	J11 pin-10
14	General Digital Input 14	Seed Laser Temperature Fault	3	User_Seed_Temp_Fault_N	J11 pin-3
15	General Digital Input 15	Base Plate Temperature Fault	8	User_Base_Temp_Fault_N	J11 pin-4
16	General Digital Input 16	Laser Ready	14	User_Laser_Ready	J11 pin-9
17	GND				
18	GND				
19	+5V				
20	+12V				

When you choose the driver of [SPI_Fiber_HWI_G4.cfg], the pin assignments of PMC2 and SPI G4 Laser are as below:

PMC2-JF2 (LASER_EXTENSION)			SPI G4 Laser (68-pin)	SPI G4 break-out board		
Pin No. (26pins)	Pin No. (25pins)	Name	Descriptions	Pin No.	Descriptions	Pin No.
1	1	DAC Output	AI_1 – ext power control	65	AI_1	J3 pin-7
3	2	DAC Output	AI_2 – ext simmer control	64	AI_2	J3 pin-8
5	3	PWM 0 Output (TTL)	Pulse_trigger_h	13	Pulse_Trigger_H	J3 pin-3
7	4	FPK & Current (DA)				
9	5	Laser On/off (TTL)	Laser_emission_gate_h	5	Laser_emission_gate_h	J3 pin-2
11	6	Leading Light On/Off (TTL)				
13	7	Shutter (TTL)				
15	8	CW Mode (TTL)				
17	9	Lamp On/Off (TTL)				
19	10	Digital Output 5 (TTL)				
21	11	Digital Output 6 (TTL)				
23	12	Digital Output 7 (TTL)				
25	13	GND	GND_A	31	GND_A	J3 pin-6
2	14	GND	Laser Emission Gate Low	39, 47		N/C
4	15	GND	GND_D	48	GND_D	J3 pin-1
6	16	Start +				
8	17	Start -				
10	18	Stop +				
12	19	Stop -				
14	20	Program Ready Ext +				
16	21	Program Ready Ext GND				
18	22	Marking Ready Ext +				
20	23	Marking Ready Ext GND				
22	24	Marking End Ext +				
24	25	Marking End Ext GND				

PMC2-JF7 (EXTENSION)		SPI G4 Laser (68-pin)		SPI G4 break-out board	
Pin No.	Name	Descriptions	Pin No.	Descriptions	Pin No.
1	General Digital Output 17				
2	General Digital Output 18				
3	General Digital Output 19				
4	General Digital Output 20				
5	General Digital Output 21				
6	General Digital Output 22	Pulsed/CW Mode Select-High	21	Laser_Pulse_CW_H	J2 pin-7
7	General Digital Output 23	Global Enable-High	7	Laser_Enable_H	J2 pin-1
8	General Digital Output 24	Alignment Laser Enable-High	6	Pilot_Laser_Enable_H	J2 pin-5
9	General Digital Output 25	State Select Bit 0	17	DI_0	J6 pin-2
10	General Digital Output 26	State Select Bit 1	18	DI_1	J6 pin-3
11	General Digital Output 27	State Select Bit 2	19	DI_2	J6 pin-4
12	General Digital Output 28	State Select Bit 3	20	DI_3	J6 pin-5
13	General Digital Output 29	State Select Bit 4	51	DI_4	J6 pin-6
14	General Digital Output 30	State Select Bit 5	52	DI_5	J6 pin-7
15	General Digital Output 31				
16	General Digital Output 32				
17	GND	Ground	40, 41, 55, 56		N/C
18	GND	Ground	40, 41, 55, 56		N/C
19	+5V				
20	+12V				

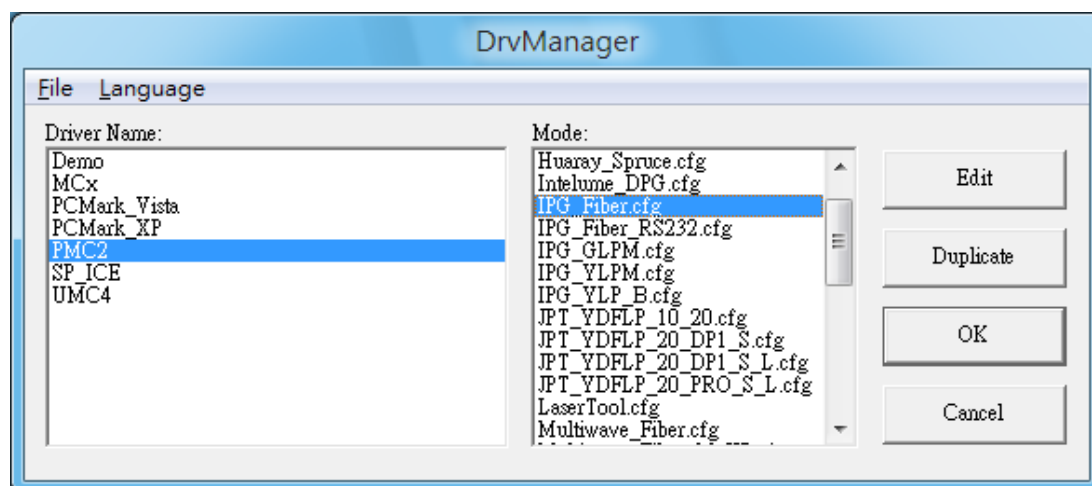
PMC2-JF6 (INPUT)		SPI G4 Laser (68-pin)		SPI G4 break-out board	
Pin No.	Name	Descriptions	Pin No.	Descriptions	Pin No.
1	General Digital Input 1				
2	General Digital Input 2				
3	General Digital Input 3				
4	General Digital Input 4				
5	General Digital Input 5				
6	General Digital Input 6				
7	General Digital Input 7				
8	General Digital Input 8				
9	General Digital Input 9	Monitor	3	Monitor	J1 pin-2
10	General Digital Input 10	Alarm	9	Alarm	J1 pin-3
11	General Digital Input 11	Laser Temperature	8	Laser Temperature	J1 pin-4
12	General Digital Input 12	Beam Delivery	11	Beam Delivery	J1 pin-5
13	General Digital Input 13	System Fault	10	System Fault	J1 pin-6
14	General Digital Input 14	Laser Deactivated	12	Laser Deactivated	J1 pin-7
15	General Digital Input 15	Laser Emission Warming	16	Laser Emission Warming	J1 pin-8
16	General Digital Input 16	Laser Is On	14	Laser Is On	J1 pin-9
17	GND				
18	GND				
19	+5V				
20	+12V				

5. IPG Laser Settings

5-1 IPG Laser – Program Settings(Also apply for Raycus and JPT Laser)

If you want to use MarkingMate software to control IPG Laser, you have to do the right program settings first, please follow the below steps.

Execute the program DM.exe under the directory of C:\Program Files\MarkingMate, a dialogue box will be displayed as below. Choose the PMC2 of Driver Name and choose the suitable cfg according to the following table, and then click [OK] button.



IPG_Fiber.cfg	For IPG Laser
IPG_Fiber_RS232.cfg	For RS232 control IPG Laser
IPG_GLPM.cfg	For IPG GLPM Laser
IPG_YLP_B.cfg	For IPG YLP-B Laser
IPG_YLPM.cfg	For IPG YLPM Laser
raycus.cfg	For Raycus Laser
JPT_YDFLP_10_20.cfg	For JPT YDFLP 10-20 Laser
JPT_YDFLP_20_DP1_S.cfg	For JPT YDFLP 20-DP1 Laser
JPT_YDFLP_20_DP1_S_L.cfg	For JPT YDFLP 20-DP1-S Laser
JPT_YDFLP_20_PRO_S_L.cfg	For JPT YDFLP 20-PRO-S Laser

5-2 PMC2 – IPG Laser Pin Assignment

5-2-1 IPG_Fiber.cfg Mode

When you choose the driver of [IPG_Fiber.cfg], the pin assignments of PMC2 and IPG laser will be as below:

PMC2-JF2 (LASER_EXTENSION)			IPG Laser (25 pins)	
Pin No. (26pins)	Pin No. (25pins)	Name	Descriptions	Pin No.
1	1	DAC Output		
3	2	DAC Output		
5	3	PWM 0 Output (TTL)	Pulse Repetition Rate Input	20
7	4	FPK & Current (DA)		
9	5	Laser On/off (TTL)	Laser Modulation Input	19
11	6	Leading Light On/Off (TTL)	[2]Guide Light On/Off	22
13	7	Shutter (TTL)		
15	8	CW Mode (TTL)		
17	9	Lamp On/Off (TTL)		
19	10	Power Saving Mode (TTL)		
21	11	MO (TTL)	[1] MO On/Off	18
23	12	Digital Output 7 (TTL)		
25	13	GND		
2	14	GND		
4	15	GND		
6	16	Start +		
8	17	Start -		
10	18	Stop +		
12	19	Stop -		
14	20	Program Ready Ext +		
16	21	Program Ready Ext GND		
18	22	Marking Ready Ext +		
20	23	Marking Ready Ext GND		
22	24	Marking End Ext +		
24	25	Marking End Ext GND		

[1]: You can select either JF2 pin 11 or JF7 pin 4 to connect with.

[2]: You can select either JF2 pin 6 or JF7 pin 3 to connect with.

PMC2-JF7 (EXTENSION)		IPG Laser (25 pins)	
Pin No.	Name	Descriptions	Pin No.
1	General Digital Output 17		
2	General Digital Output 18		
3	General Digital Output 19	[2] Guide Light On/Off	22
4	General Digital Output 20	[1] MO On/Off	18
5	General Digital Output 21	D0	1
6	General Digital Output 22	D1	2
7	General Digital Output 23	D2	3
8	General Digital Output 24	D3	4
9	General Digital Output 25	D4	5
10	General Digital Output 26	D5	6
11	General Digital Output 27	D6	7
12	General Digital Output 28	D7	8
13	General Digital Output 29	Latch	9
14	General Digital Output 30		
15	General Digital Output 31		
16	General Digital Output 32		
17	GND		
18	GND	Ground	10, 14
19	+5V	EMStop	17, 23
20	+12V		

[1]: You can select either JF2 pin 11 or JF7 pin 4 to connect with.

[2]: You can select either JF2 pin 6 or JF7 pin 3 to connect with.

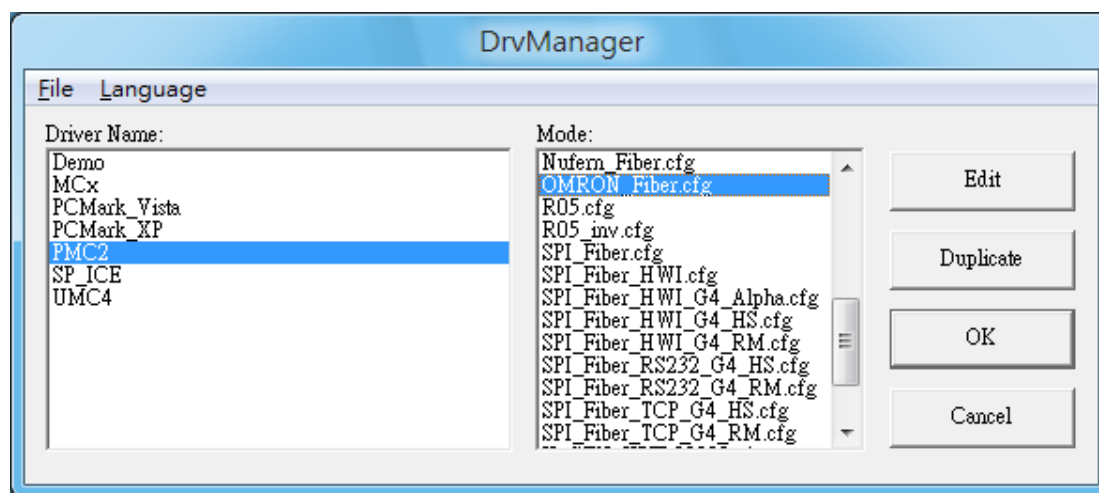
PMC2-JF6 (INPUT)		IPG Laser (25 pins)	
Pin No.	Name	Descriptions	Pin No.
1	General Digital Input 1		
2	General Digital Input 2		
3	General Digital Input 3		
4	General Digital Input 4		
5	General Digital Input 5		
6	General Digital Input 6		
7	General Digital Input 7		
8	General Digital Input 8		
9	General Digital Input 9		
10	General Digital Input 10		
11	General Digital Input 11	Refer to IPG Manual	12
12	General Digital Input 12	Refer to IPG Manual	16
13	General Digital Input 13	Refer to IPG Manual	21
14	General Digital Input 14	Refer to IPG Manual	11
15	General Digital Input 15		
16	General Digital Input 16		
17	GND		
18	GND		
19	+5V		
20	+12V		

6. OMRON Laser Settings

6-1 OMRON Laser - Program Settings

If you want to use MarkingMate software to control IPG Laser, you have to do the right program settings first, please follow the below steps.

Execute the program DM.exe under the directory of C:\Program Files\MarkingMate, a dialogue box will be displayed as below. Choose the PMC2 of Driver Name and choose the suitable cfg according to the following table, and then click [OK] button.



OMRON_Fiber.cfg	For OMRON Laser
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6-2 PMC2 – OMRON Laser Pin Assignment

When you choose the driver of [OMRON_Fiber.cfg], the pin assignments of PMC2 and OMRON laser will be as below:

PMC2 P2 (D-SUB 15M 3 Raw)	OMRON I/O Port (D-SUB 15M)
6 LASER ON	5 LASER ON H
15 GND	6 LASER ON L
10 LAMP	7 LD ON H
15 GND	8 LD ON L

PS : OMRON RS-232 Serial Port has to connect to RS-232 Port on PC.

7 Using RS-232

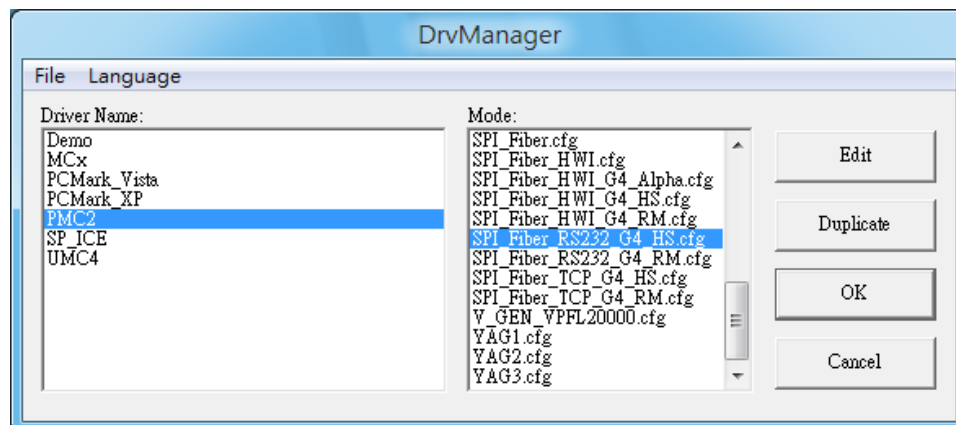
7-1 What is RS-232

RS-232 is a kind of serial port. Common type of RS-232 connector is 9 pin D-Sub.

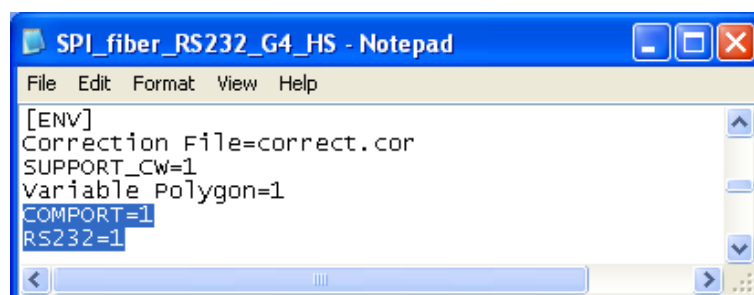
Some kinds of laser types needed to control by RS-232 port for tuning laser parameter, such as power percentage, frequency...etc.

7-2 Setting to use RS-232 to control laser

Take SPI G4 HS laser controlled by RS-232 as example. After user has executed \MarkingMate\DM.exe , chosen PMC2 at Driver Name column, and picked SPI_fiber_RS232_G4_HS.cfg at Mode column, to apply the setting by clicking OK. The location of cfg file is \MarkingMate\Drivers\PMC2\cfg\. Refer to the following picture:

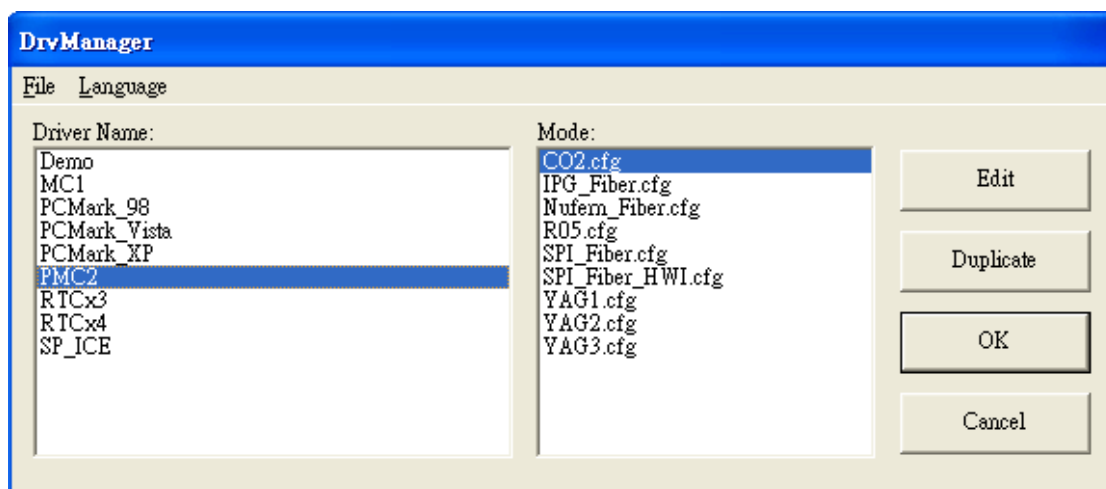


Open the given file by favorite text editor. There should be two instructions under [ENV] sector, such as RS232=1 and COMPORT=XXX. RS232=1 means control laser by RS-232. XXX within COMPORT=XXX means the using Com Port number. Default value is 1 which means using COM port 1 to control laser. Manually change this value to assign other port if necessary.

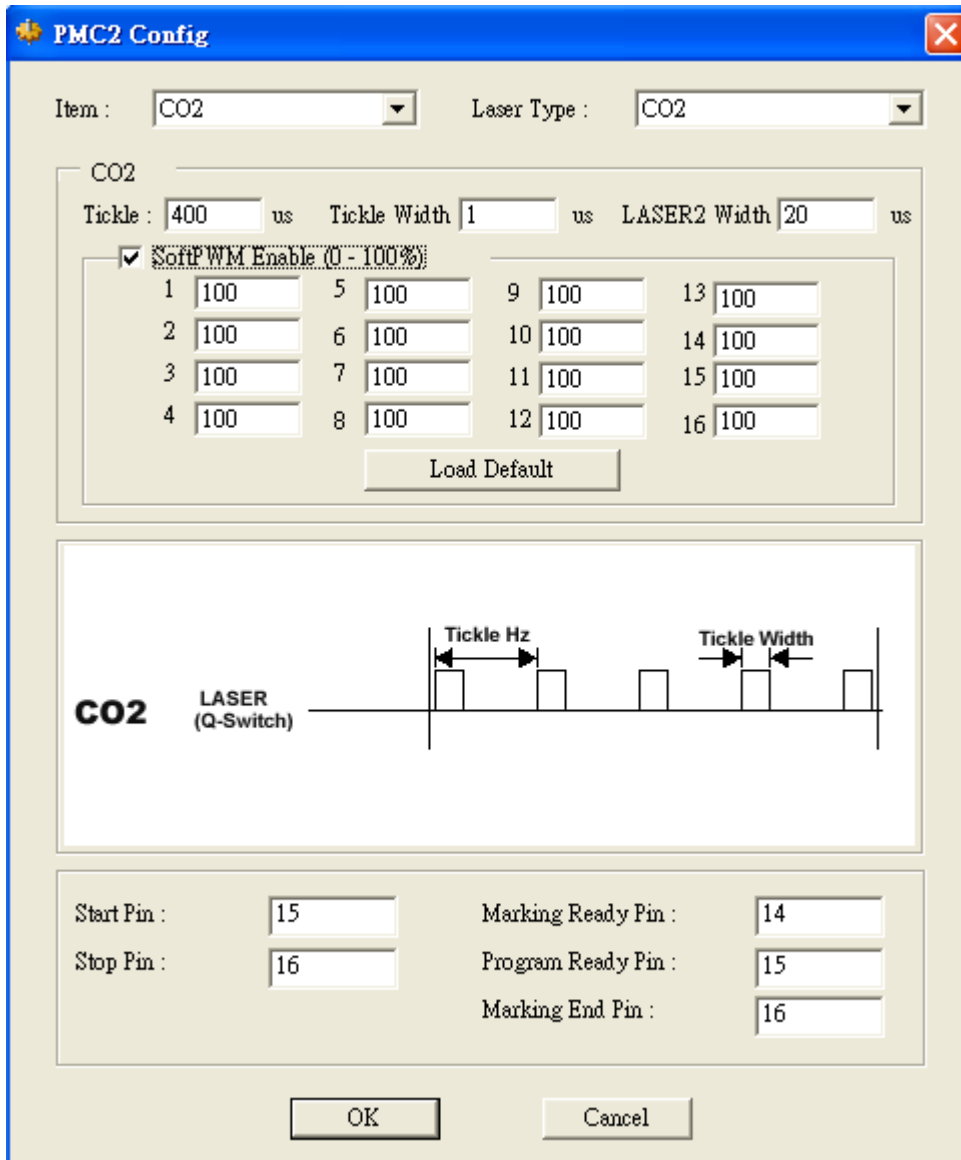


Appendix I: Laser Mode Settings

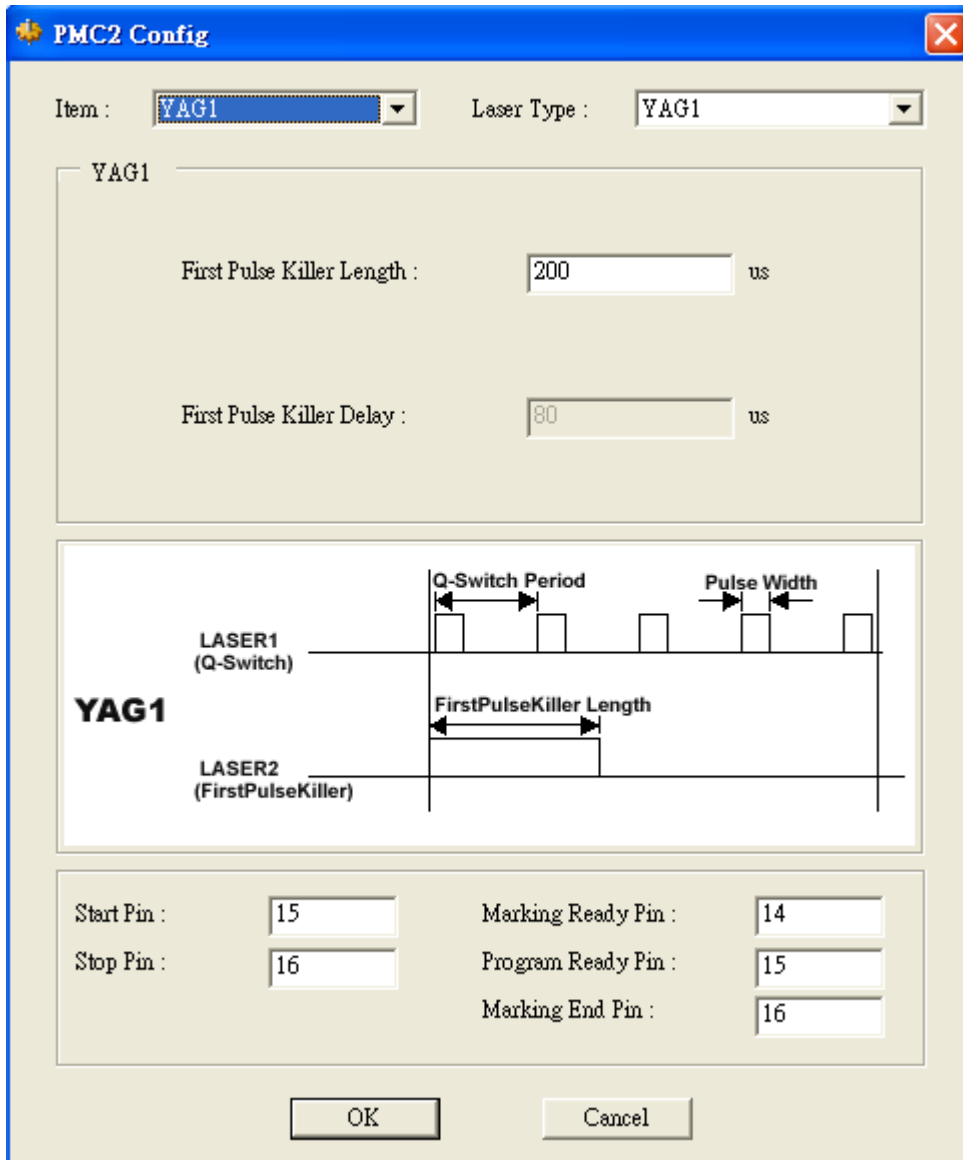
After installation of MarkingMate, you have to be in the file of C:\Program files\MarkingMate\Drivers\PMC2\config.ini to implement a setting up action. You can also click from [Start] – [All Programs] – [MarkingMate System] – [Driver Manager] to open a dialogue box as below. Please note that you can not execute the config.ini and MarkingMate program at the same time. Therefore, before the setting up action, you have to close the MarkingMate software first.



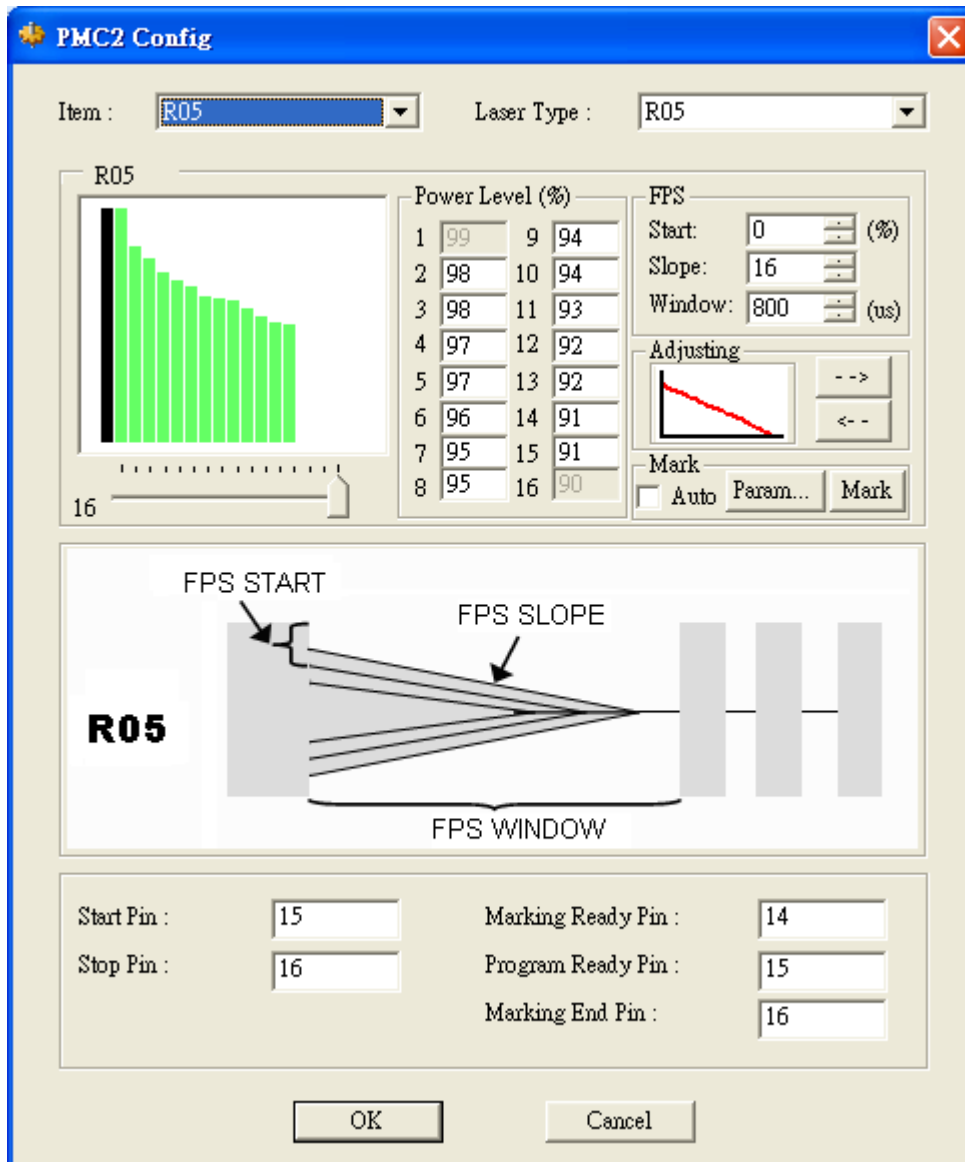
Select the [PMC2] driver and choose [CO2.cfg] or other modes you want and then click [Edit] button:



The CO2 laser settings will be as above. You can modify the tickle values and enable SoftPWM function to control the first 16 outputs of the laser.



If you choose YAG1 or YAG2 mode as above, you can adjust the length of [First Pulse Killer]. When you choose YAG3 mode, you can even adjust the length and delay values of [First Pulse Killer] to meet your requirements.



For the R05 mode as above, you can adjust the power level for the first 16 points (see the waveform in the window). Click the direction button can also see the change of waveform. To make sure the setting is OK or not, please click [Mark] button to see the mark result. The system will mark a fill rectangle for examination. The parameters of this rectangle can be adjusted by clicking the [Param...] button as below. If users checked the [Auto] checkbox and then click [Mark] button, the system will repeat the mark action automatically until unchecked [Auto] or press [ESC] button.



Figure: Various Setting Modes for PMC2

