CSD205H™

MICROSTEPPING DRIVE MODULE

USER'S MANUAL

CSIM Inc.

"Control System In Motion"

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SECTION 1: INTRODUCTION

1.1 Overview

The CSD205H Microstepping Drive Module is a high performance microstepping driver. It can provide an output current up to 6(rms) amperes per phase to operate a step motor at 40,000 microsteps per revolution.

1.2 Product Features

- Single power supply input
- High and wide range input voltage (24 to 75Vdc)
- Switch selectable current level from 3 to 6 Amps rms (4.2 to 8.4 Amps peak)
- Switch selectable microstepping resolution from 400 to 40,000 microsteps per revolution
- Automatic idle current reduction
- Optically isolated inputs
- Input signals use Pulse/Direction mode or CW/CCW pulse mode is selectable by a switch
- Selectable current damping function to reduces resonant vibration and noise at low speed
- Motor clockwise or counterclockwise rotate can be swapped by a switch
- All input signal terminals are equipped with convenient Snap-In head

1.3 Electrical Specifications

ITEM	Min	Typ	Max
Input power	24Vdc	65Vdc	75Vdc
Output current per phase	3 Amps RMS 4.2 Amps Peak		6 Amps RMS 8.4 Amps Peak
Microstep resolution	400 steps/revolution		40,000 steps/revolution
Maximum input pulse rate			1,000,000 pulses/sec

SETCTION 2:   EXPRESS START UP PROCEDURE

The following instructions define the minimum procedures necessary to make the CSD205H microstepping drive module operational.

1.   Check the motor used is suitable to the CSD205H.   Please refer to the section 5.1 about how to select a motor.

2.   Set the correct current level for the motor as described in section 4 and section 5.3. While the current setting is more than 3 amps, heat sinking may be required to maintain case temperature below +70° C.

3.   Select the appropriate step resolution and set the switches as described in section 4.

4.   Connect the motor following the "Motor Connections" description in section 3.1.

5.   Connect the control input signal as described in section 3.3.

6.   Connect the power source to the DC input terminal as described in section 3.2. The indicate LED should turn on immediately after power on.   The motor will be locked by a holding torque.

7.   Send the pulses signal input to driver, the motor should rotate according to the pulse rate and the step resolution set.

8.   If the motor's rotation direction is improperly, swap the dip switch #4 as description in section4 will change it.

Caution:

Always disconnect the power to the module before connecting or disconnecting the motor leads.   Failure to do this will result in a shock and may damage the driver.

SECTION 3: TERMINAL LOCATIONS AND ASSIGNMENTS

3.1 Motor Connection

The motor connections are made via the 4-terminal Head JP2.

Table 3.1

JP2 Pin	Assignment
4	Phase B
3	Phase B
2	Phase A
1	Phase A

The CSD205H is a Bipolar driver. It could work equally well with both Bipolar motors, i.e. 4 and 8 lead motors and Unipolar motors, i.e. 6 lead center tapped motors.
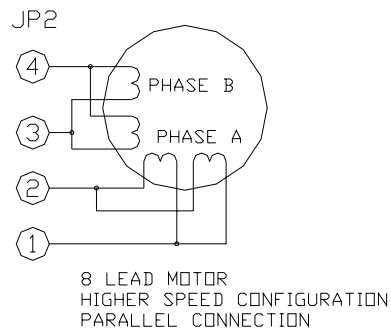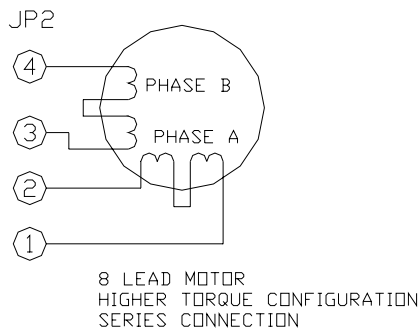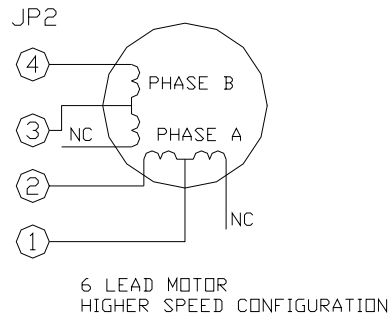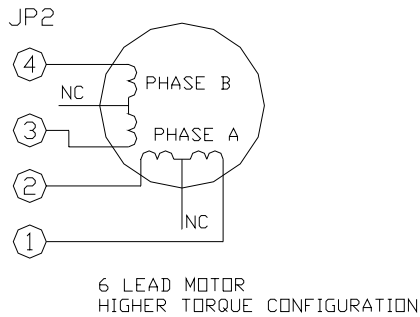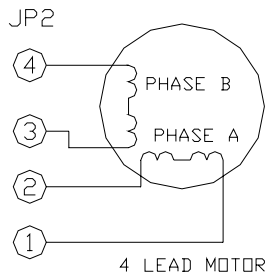

Figure 3.1 Motor connection

3.2　Power Input

The DC input power is connected to head JP1.　Please be aware that pin+ is the power supply plus(+) connection and pin- is the power supply minus(-) connection.　Connecting the pins incorrectly will not damage the CSD205H because of the built-in protect circuit, but the CSD205H will not operate.　An unregulated power supply coupled with a filter capacitor is preferable.　A switching regulated power supply may not be suitable for use with the CSD205H.　Please refer to section5.2 about the supply voltage.

3.3　CONTROL SIGNAL INPUT

The control signal input is made via the 4-terminal Head JP3.

Table 3.2

JP3 Pin	Pin Name	Function Description	
1	OPTO	This terminal should be connected to +5Vdc supplied power for the opto-isolators.	
2	Pulse/CW	In pulse mode (SW #8 On)	A high to low transition on this terminal will advances the motor one step. The direction is determined by Pin 3 state.
		In CW/CCW mode (SW #8 Off)	A high to low transition on this terminal will advance the motor one step in clockwise direction.
3	OPTO	This terminal should be connected to +5Vdc supplied power for the opto-isolators.	
4	DIR/CCW	In pulse mode (SW #8 On)	When the signal is high, motor rotation will be clockwise.　Rotation will be counterclockwise when the signal is low.
		In CW/CCW mode (SW #8 Off)	A high to low transition on this terminal will advance the motor one step in counterclockwise direction.
5	OPTO	This terminal should be connected to +5Vdc supplied power for the opto-isolators.	
6	Hold Off	When the signal is low, output current will be zero.　There will be no holding torque at this state.	

CSD205H
JP3

PIN 1

330 ohms

PIN 2

PIN 3

330 ohms

PIN 4

PIN 5

330 ohms

PIN 6

Figure 3.2 Input Interface Circuit

12Vdc

550 Ohms

1
JP3
2
same as pin 1
3
same as pin 2
4
CSD205H
same as pin 1
5
same as pin 2
6

5Vdc

1
JP3
2
same as pin 1
3
same as pin 2
4
CSD205H
same as pin 1
5
same as pin 2
6

5Vdc

U2A
1   2
7406

1
JP3
2
same as pin 1
3
same as pin 2
4
CSD205H
same as pin 1
5
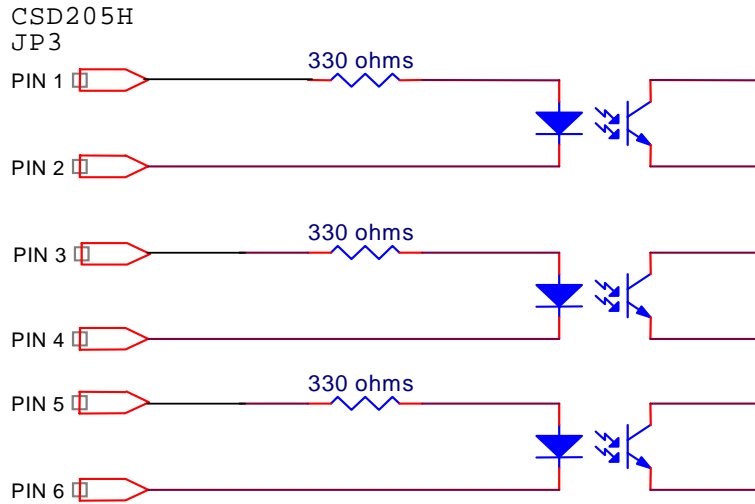same as pin 2
6

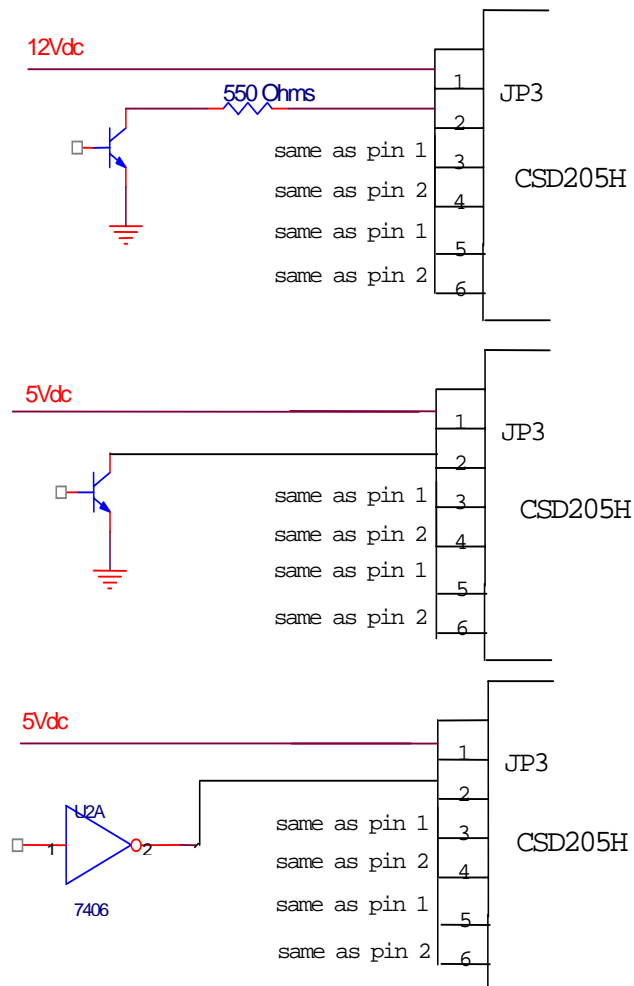Figure 3.3 Suggested Methods for Input

SECTION 4:   DIP SWITCH SETTINGS

Table 4.1

Dip Switch Channel No.	Function	Select Switch Position				Description
#1-2	Set Output Current	Sw1	Sw2	Output Current		Refer to section 5.3
				RMS	Peak	
		On	On	6 Amps	8.4Amps	
		Off	On	5 Amps	7 Amps	
		On	Off	4 Amps	5.6 Amps	
		Off	Off	3 Amps	4.2 Amps	
#3	Set Current Damping	On	Enable Current Damping			Refer to section 5.4
		Off	Disable Current Damping			
#4	Chang Motor Rotate Direction	Switch On/Off will alternate the motor's default rotate direction.				
#5-7	Select Microstep Resolution	Sw5	Sw6	Sw7	Microsteps Per Resolution	The value list is based on to use 1.8° Step Motor
		On	On	On	40,000	
		Off	On	On	20,000	
		On	Off	On	10,000	
		Off	Off	On	5,000	
		On	On	Off	2,000	
		Off	On	Off	1,600	
		On	Off	Off	1,000	
		Off	Off	Off	400	
#8	Select Input Signal Mode	On	CW/CCW Pulse Mode			
		Off	Pulse/Direction Mode			

SETCTION 5:　　OPERATION INSTRUCTIONS

5.1　Motor Selection

The CSD205H microstepping drive module is a current controlled driver to maintain a given set of motor current.　It chops the voltage using a constant chopping frequency and varying duty cycle.　This characteristic is directly related to the motor's winding resistance and inductance.　To avoid improperly chopping, it is necessary to choose a motor with a low winding resistance.　In fact, a motor's winding resistance is usually related to its current rating.　Lower winding resistance means higher current rating.　In this case, selecting the motor with current rating approximate to but no more than 5 Amps and with the lowest possible winding resistance is a good practice.　Since the CSD205H microstepping drive module is a constant current driver, it is not necessary to use a motor that is rated at the same voltage as the supply voltage.

5.2　Supply Voltage

The CSD205H microstepping drive module works with a wide range of input voltage from 24Vdc to 75Vdc.　For better performance, however, use of higher voltage is recommended.　The higher the voltage used, the faster the current can flow through the motor coils.　This means the higher step rate.　However care should be taken not to exceed the maximum voltage 75Vdc.　An unregulated supply similar to that shown in Figure 5.1 is preferable.　If a regulated supply is used, it must be a linear regulated supply and should be capable of operating with added filter capacitor.　A switching regulated supply is not recommended.
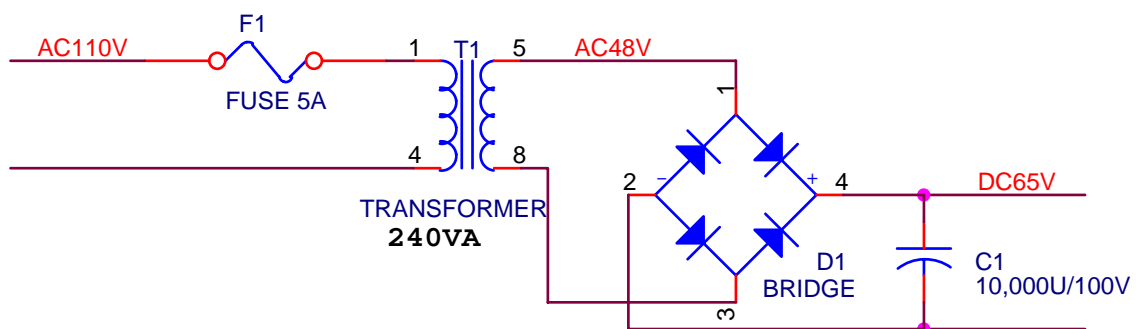

Figure 5.1

5.3   Current Setting

The CSD205H can provide 4 different current levels from 3 to 6 Amps.   This is selected by the dip switch #1 to #2.   Please refer to the Table 4.1.   It is important to set the current level according to the motor's current rating.   A lower current setting will reduce the motor's torque and speed performance. On the other hand, a higher current setting will cause the motor over heating.

5.4   Current Damping Function

The CSD205H has a selectable current damping function.   Setting the dip switch #3 to "On" position will reduce output current at low speed.   This could reduce the motor's resonant vibration and noise.   However it may also reduces the motor's low speed output torque.   Setting the current damping "On" will not affect the high speed performance

5.5   AUTOMATIC CURRENT REDUCTION

The CSD205H microstepping drive module will automatically reduce the output current to the motor while in idle state.   The reduction occurs approximately 1 second after the last falling edge of the step pulse input.   The CSD205H microstepping drive module will reduce the current to a 50% level

SECTION 6: TROUBLESHOOTING

6.1 In General

If installation and operating instructions have been followed carefully, the CSD205H microstepping drive module should operate correctly. In case the motor fails to rotate properly, the following check list will be helpful to locate and correct the problem.

- Check all installation wiring carefully for wiring errors or poor connections.
- Check to see that a proper voltage level (i.e. 24Vdc – 75Vdc) is being supplied.
- Be sure that the motor's leads are correctly connected to CSD205H microstepping drive module's corresponding phase terminals.

6.2 Check List

SYMPTON	PROBLEM	POSSIBLE SOLUTION
Indicator LED not lit	Without input voltage or the power polarity is inversed	Connect input voltage properly.
	The fuse is burned	Replace a new fuse of 6 Amps rating. But if the fuse is still burned, don't try this again.
Motor has no holding torque with power applied to the driver	Motor is cross wired with each winding connected to both Phase A and Phase B.	Reconnect motor windings to the corresponding phase terminal.
	"Hold Off" Input is enabled.	"Hold Off" input (Pin4 of JP4) should be high or not connect.
Motor has holding torque but can not rotate.	Step pulse input is absent.	Check pulse input with an oscilloscope. If the pulse train is absent, troubleshoot stepping source and interconnection wiring.
	Only one motor phase has been driven.	Check phase current in both phases by placing an ammeter in series with each winding. If not present, check for open circuit in motor phase winding by measure the resistance.
	Start speed is too high	Lower the start speed.

SYMPTON	PROBLEM	POSSIBLE SOLUTION
Motor misses steps.	Output current level setting is too low	Set current to higher level.
	Improper use " Current Damping"	Disable "Current Damping"
	Speed or acceleration is too high.	Lower the speed.
Motor operation is rough or erratic	Operation is on resonance region	Change work speed.
		Use " Current Damping" function
	Microstep resolution setting is improper (For instance 400 steps per revolution at low speed)	Adjust microstep resolution to a higher value.
	Output current level setting is too high.	Set current to a lower level.

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