Using the L293D H-Bridge

L293 . . . N OR NE PACKAGE
L293D . . . NE PACKAGE
(TOP VIEW)

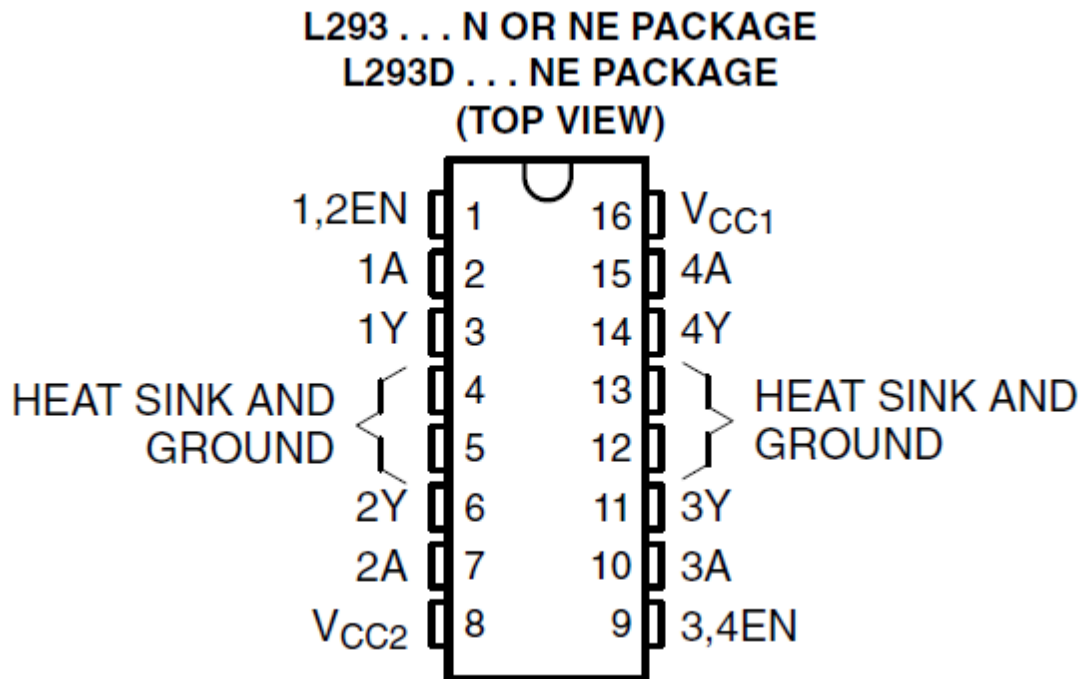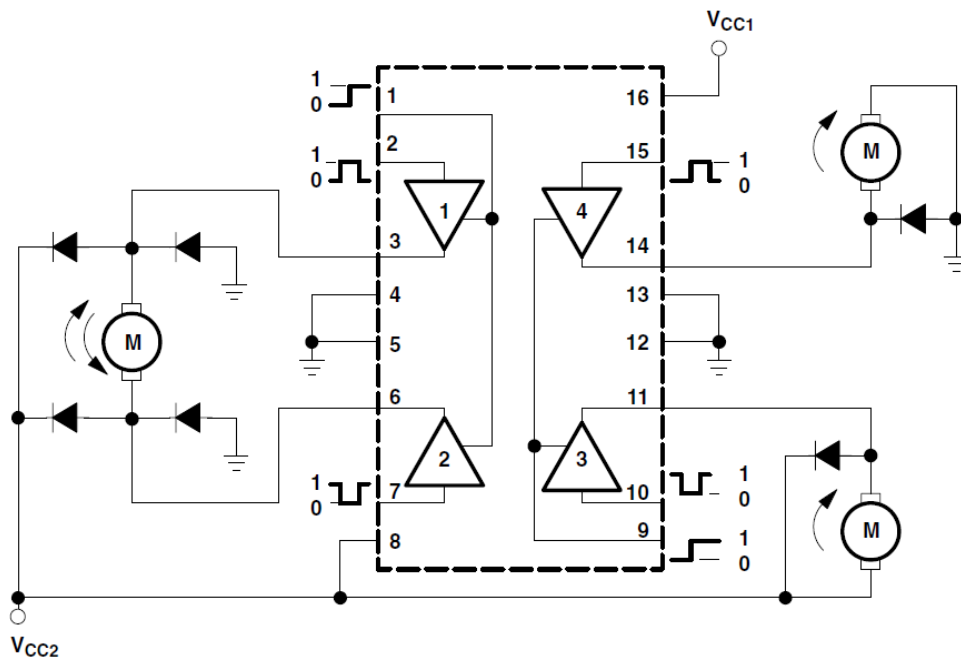|			
1,2EN	1	16	V_{CC1}
1A	2	15	4A
1Y	3	14	4Y
HEAT SINK AND GROUND	4	13	HEAT SINK AND GROUND
	5	12	
2Y	6	11	3Y
2A	7	10	3A
V_{CC2}	8	9	3,4EN

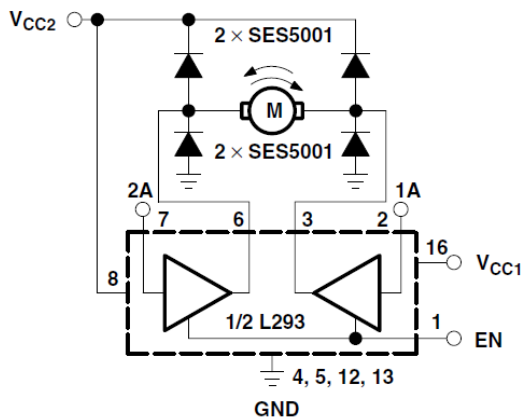Note the internal diodes and max output of 600mA

NOTE: Output diodes are internal in L293D.

To control a bidirectional motor, wire as show on the left hand side of the schematic above (you can leave out the diodes). VCC1 is logic voltage, hook it up to 3.3V. VCC2 is motor voltage, hook it up to VIN. If you hook it up to 5V or 3.3V, the current through the motor will come from the voltage regulators, so your heat sink will get hot! Use VIN, don't get hot.

Pin 1 on the L293D enables the H Bridge when it is high, hook it up to a general IO pin. Pin 2 and 7 control the motor. Make Pin 2 a general IO pin, which will control the direction your motor spins. Make pin 7 the PWM pin (there are only 5 of them, in port D).

Using your enable pin, direction pin, and PWM signal, you control your motor through the following table:

EN	1A	2A	FUNCTION
H	L	H	Turn right
H	H	L	Turn left
H	L	L	Fast motor stop
H	H	H	Fast motor stop
L	X	X	Fast motor stop

L = low, H = high, X = don't care

Figure 5. Bidirectional DC Motor Control

Note that bringing enable low stops the motor by making the H Bridge outputs high impedance.

When enable is high, your direction and pwm pins control the motor speed and direction. When both are high or both are low, the motor will stop.

When the direction pin is different from the pwm pin, the motor will turn. Imagine you have a 75% duty cycle, and direction is low. That will apply roughly 75% speed to your motor. Now image you change the direction pin, leaving pwm at 75%. The motor will change direction, but the speed will now be 25%!

Draw yourself a graph of the pin states over time and use the table above to convince yourself how this works.