MBC10081NTB Bipolar Microstep Driver

- *1.0 Amps/Phase Output Current*
- *Bipolar Microstepping Drive Operation*
- *Over Temperature and Short Circuit Shutdown*
- *Microstep Divisors of 8, 4, 2, or Full Step*
- *12-24VDC Power Requirement*
- *Accepts TTL Logic or 24V Level Inputs*
- *Ideal for Precise Positioning*
- *Efficient and Durable*
- *Long Life Expectancy*

The MBC10081NTB is a 1.0 amps/phase bipolar microstep driver capable of running four, six, and eight lead step motors. The MBC10081NTB has an output current range of 0.1 to 1.0 amps/phase and operates off 12VDC minimum to 24VDC maximum. The inputs are capable of running from either open collector or TTL level logic outputs, or sourcing 24VDC outputs from PLCs. The MBC10081NTB features resolutions from 200 - 1600 steps/ revolution, providing smooth rotary operation, built in over temperature and short circuit shut down, automatic 70% reduction in current after clock pulses stop being received, and status LED's to indicate power on (green LED) and clocks being received (yellow LED). The MBC10081NTB is a compact, low profile package meant to be used where space is limited but performance is expected.
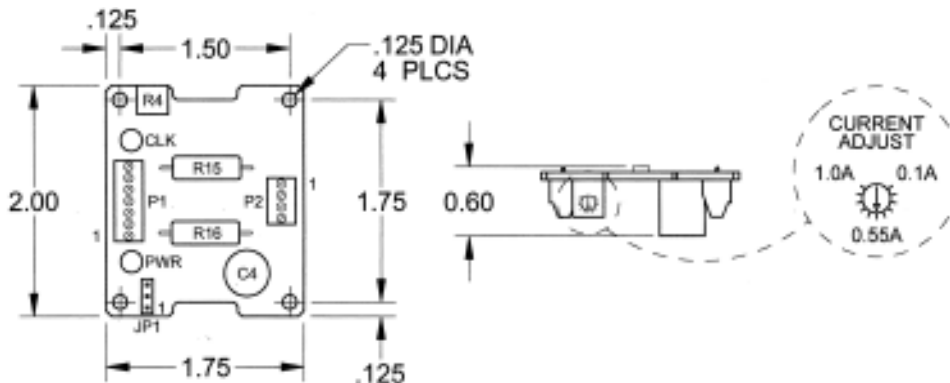
| Ordering Information	
Part Number	Description
MBC10081NTB	12-24VDC, 0.1-1.0A Bipolar Microstep Driver, Open-Frame with terminal blocks (Featured)
MBC25081TB	12-24VDC, 0.5-2.5A Bipolar Microstep Driver, Packaged with Heat Sink and detachable terminal blocks
MBC15081	12-24VDC, 0.3-1.5A Bipolar Microstep Driver, Open-Frame
PSAM24V2.7A	24V @ 2.7A Universal Input Power Supply

Hook-Up Drawings

Sinking (JP1 1-2)

Sourcing (JP1 2-3)
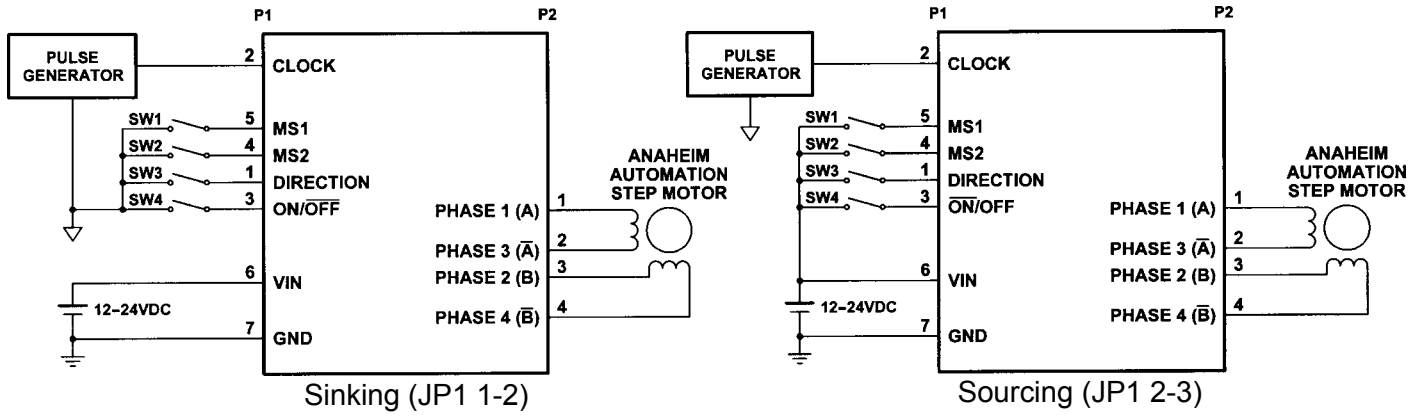
Input Pin Descriptions	
Pin #	Description
1	Direction
2	Clock
3	On/Off
4	MS2
5	MS1
6	12VDC-24VDC
7	0VDC (Gnd)

Motor Pin Descriptions	
Pin #	Description
1	Phase A
2	Phase $\overline{A}$
3	Phase B
4	Phase $\overline{B}$

Control Inputs (Pins 1, 2, 3, 4, 5):

Microstep Resolution Truth Table		
MS1	MS2	Resolution
Active	Active	Full Step
Inactive (Open)	Active	Half Step
Active	Inactive (Open)	Quarter Step
Inactive (Open)	Inactive (Open)	Eighth Step

Direction: Logic "1" CW
Logic "0" CCW
Clock: Active - 1 Step
Inactive (open) - Reduce Current Mode
On/Off: Active - Off
Inactive (open) - On

Notes:
Open Inputs are inactive and internally pulled up to +5VDC for JP1 position 1-2 (Sinking)
Open Inputs are inactive and internally pulled down to 0VDC for JP1 position 2-3 (Sourcing)
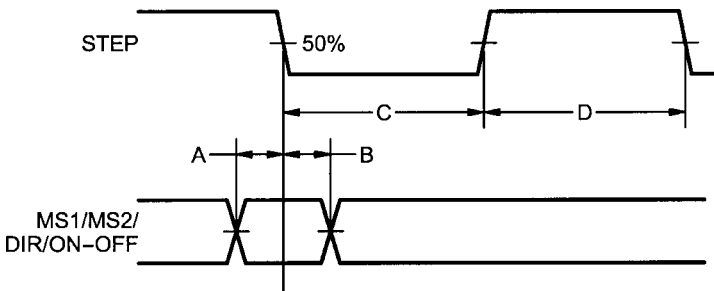
A. Minimum Command Active Time
Before Clock Pulse (Data Set-Up Time) ... 200nS
B. Minimum Command Active Time
After Clock Pulse (Data Hold Time) 200nS
C. Minimum CLOCK Pulse Width 1.0uS
D. Minimum CLOCK Inactive Time 1.0uS
Maximum CLOCK Frequency 500kHz

With JP1 in position 1-2 (sinking) the inputs are considered inactive or Logic "1" if left open, or active or Logic "0" if grounded. With JP1 in position 2-3 (sourcing) the inputs are considered inactive or Logic "0" if left open, and active or Logic "1" if pulled to 3.5 - 24VDC.

Setting the Output Current

The output current on the MBC10081NTB is set by the onboard potentiometer. This potentiometer determines the per phase peak output current of the driver. The relationship between the output current and the potentiometer value is as follows:

WARNING! Step motors will run hot even when configured correctly. Damage may occur to the motor if a higher than specified current is used. Most specified motor currents are maximum values. Care should be taken to not exceed these ratings.

MBC10081NTB Potentiometer Settings

Peak Current	Potentiometer Setting	Peak Current	Potentiometer Setting
0.10A	0%	0.64A	60%
0.19A	10%	0.73A	70%
0.28A	20%	0.82A	80%
0.37A	30%	0.91A	90%
0.46A	40%	1.00A	100%
0.55A	50%	--	--

Reducing Output Current

Reducing the output current is accomplished automatically and occurs approximately 20mSec after the last the clock input has been received. The amount of current per phase in the reduction mode is approximately 70% of the set current. When the current reduction circuit is activated, the current reduction resistor is paralleled with the current adjustment potentiometer. This lowers the total resistance value, and thus lowers the per phase output current.

Connecting the Step Motor

Phase 1 and Phase 3 of the step motor are connected to pins 1 and 2 on connector P2. Phase 2 and Phase 4 of the step motor are connected to pins 3 and 4 on connector P2. Please refer to the figure for a TYPICAL APPLICATION HOOK-UP.

Note: The physical direction of the motor with respect to the direction input will depend on the connection of the motor windings. To reverse the direction of the motor with respect to the direction input, switch the wires on Phase 1 and Phase 3.

WARNING: DO NOT CONNECT OR DISCONNECT MOTOR WIRES WHILE POWER IS APPLIED!

Motor Selection

The MBC10081NTB is a Bipolar Microstep Driver that is compatible with both Bipolar and Unipolar Motor Configurations, (i.e. 8 and 4 lead motors, and 6 lead center tapped motors).

Step motors with low current ratings and high inductance will perform better at low speeds, providing higher low-end torque. Motors with high current ratings and low inductance will perform better at higher speeds, providing more high-end torque.

Since the MBC10081NTB uses a constant current source drive technique, it is not necessary to use a motor that is rated at the same voltage as the supply voltage. What is important is that the potentiometer is set to the appropriate current level based on the motor being used. Higher voltages will cause the current to flow faster through the motor coils. This in turn means higher step rates can be achieved. ***Care should be taken not to exceed the maximum voltage of the driver.***

Step Motor Configurations
Step motors can be configured as 4, 6, or 8 leads. Each configuration requires different currents. Refer to the lead configurations and the procedures to determine their output current.

Determining Output Current
The output current for a motor used with a bipolar driver is determined differently from that of a unipolar driver. In the MBC10081NTB, a sine/cosine output function is used in rotating the motor. The output current for a given motor is determined by the motors current rating and the wiring configuration of the motor. There is a current adjustment potentiometer used to set the output current of the MBC10081NTB. This sets the peak output current of the sine/cosine waves. The specified motor current (which is the unipolar value) is multiplied by a factor of 1.0, 1.4, or 2.0 depending on the motor configuration (series, half-coil, or parallel).

6 Lead Motors
Half-Coil Connection: When configuring a 6 lead motor in half-coil (connected from one end of the coil to the center tap), multiply the specified per Phase (or unipolar) current rating by 1.4 to determine the current setting potentiometer value. This configuration will provide more torque at higher speeds when compared to the series configuration.

Series: When configuring the motor in series (connected from end to end with the center tap floating) use the specified per Phase (or unipolar) current rating to determine the current setting potentiometer value.
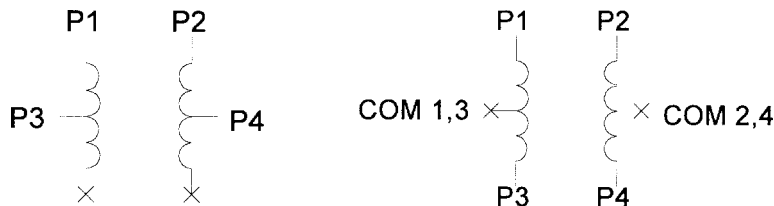
8 Lead Motors
Series Connection: When configuring the motor windings in series, use the per Phase (or unipolar) current rating to determine the current setting potentiometer value.

Parallel Connection: When configuring the motor windings in parallel, multiply the per Phase (or unipolar) current rating by 2.0 to determine the current setting potentiometer value.
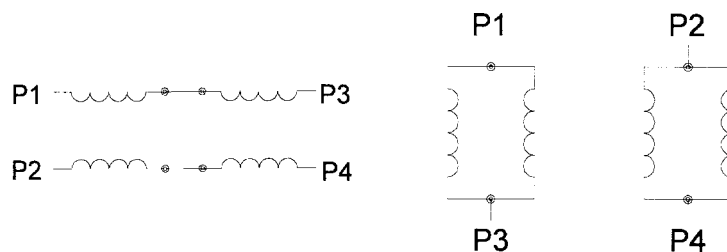
4 Lead Motors
Series Connection: Multiply the specified series motor current by 1.4 to determine the current adjustment poten- tiometer value. Four Lead Motors are usually rated with their appropriate series current, as opposed to the *Phase Current*, which is the rating for 6 and 8 lead motors.