

Driving a Brushed DC Motor

TI Precision Labs – Brushed DC Motors #5

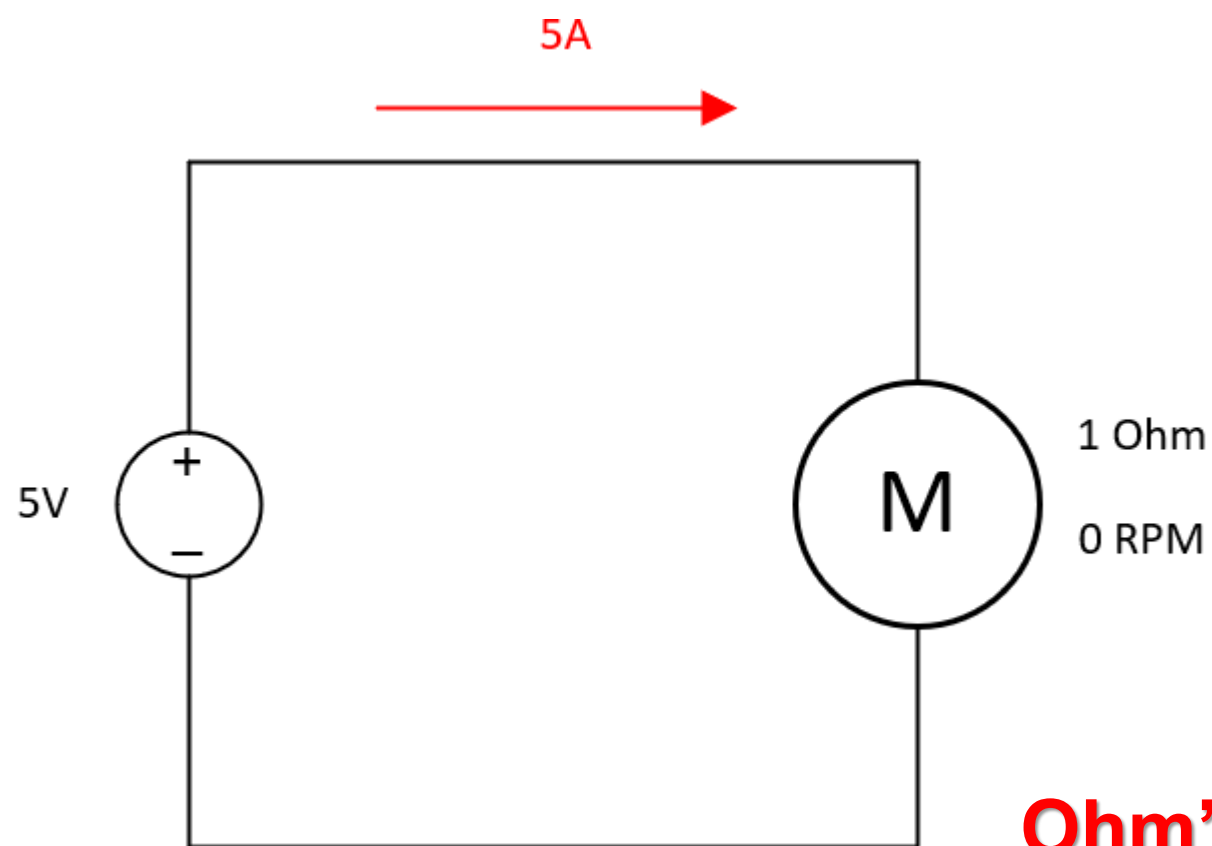
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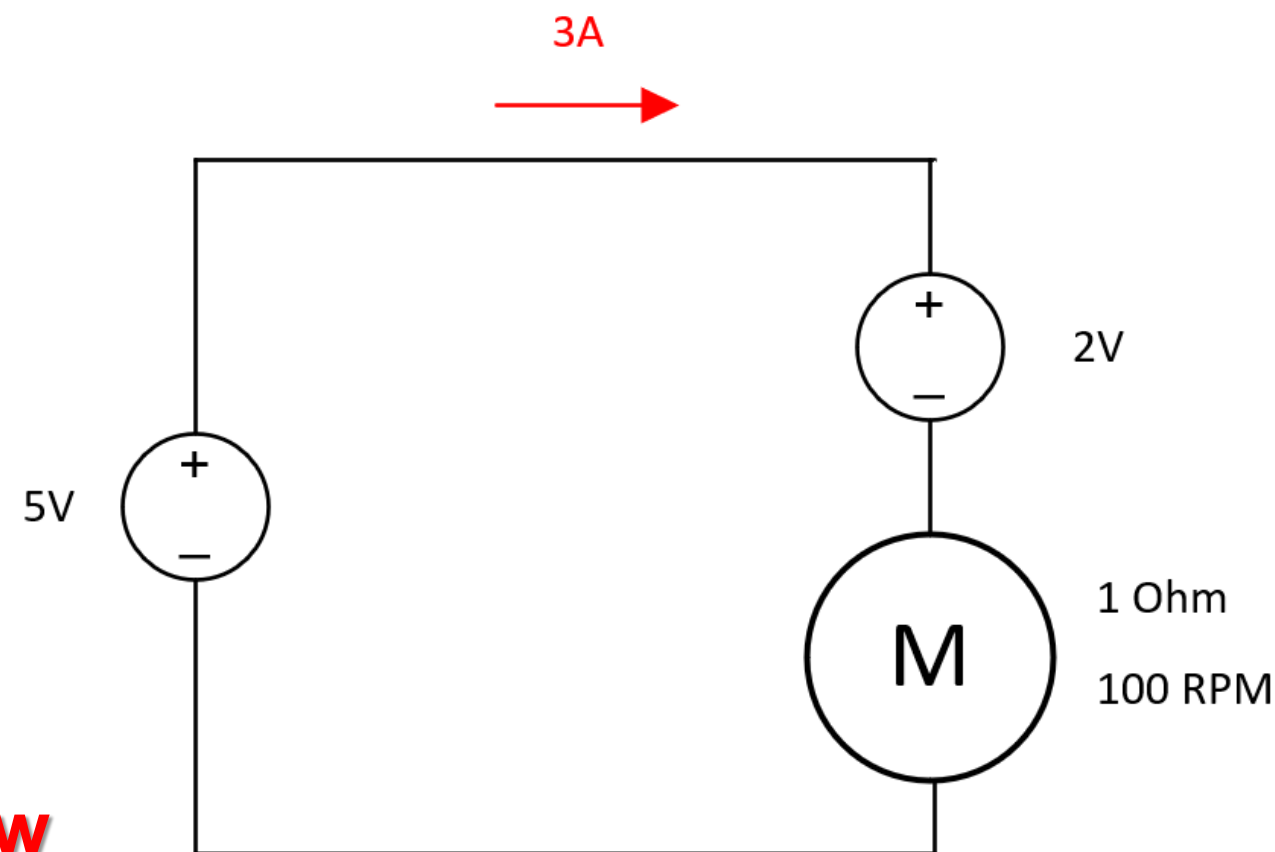


Explaining Back Electromotive Force (Back EMF)

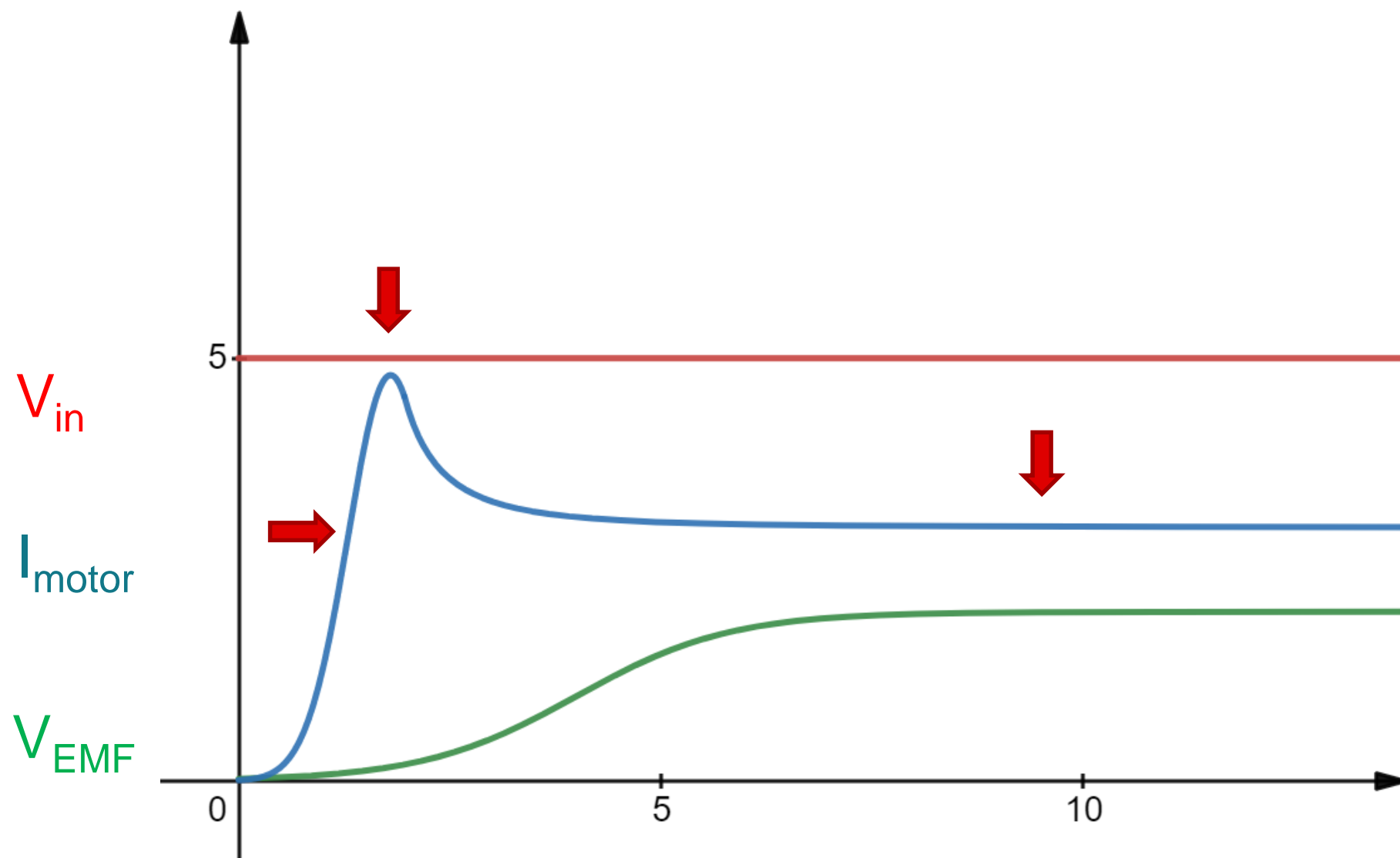
- Back EMF is the voltage in the coil of an electric motor that opposes the current flowing through the coil, when the armature rotates.
- As the motor increases in speed the back emf increases.



Ohm's Law
 $I=V/R$



Visualizing Back EMF

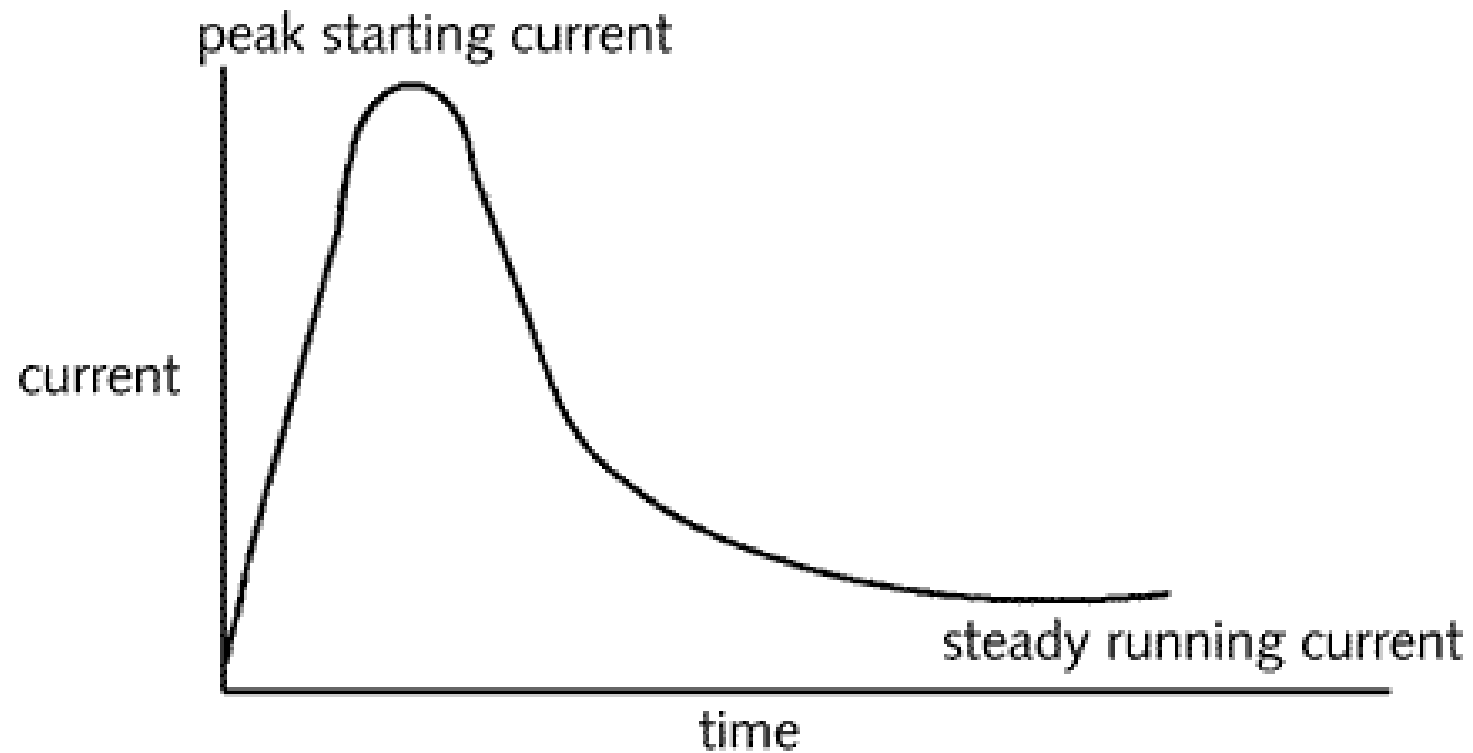


- Current quickly rises when input voltage is introduced
- Motor begins to spin.
- Back EMF develops
- Current starts decreasing as back EMF increases
- Stability point is reached
- Result of V_{in} and V_{EMF}



Explaining Inrush Current

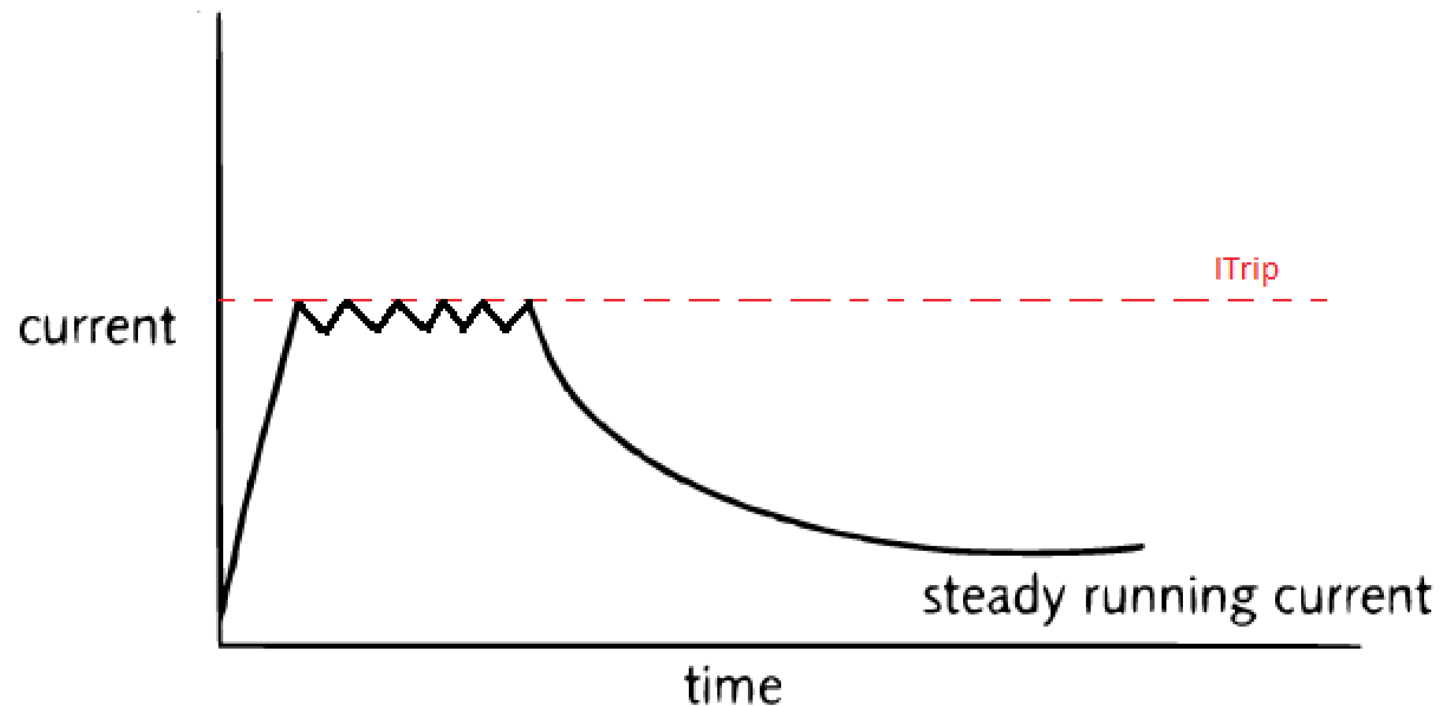
- Inrush current is a short-lived transient spike in current that occurs when input voltage is applied as a motor winds up to speed.



- Inductive nature of motor does not allow for current to rise instantly.
- The peak starting current can cause damage to the system if it is not regulated.

Inrush Current Control with Current Regulation

- Regulation can be applied to maintain the inrush current under control. This way current stays below the acceptable level

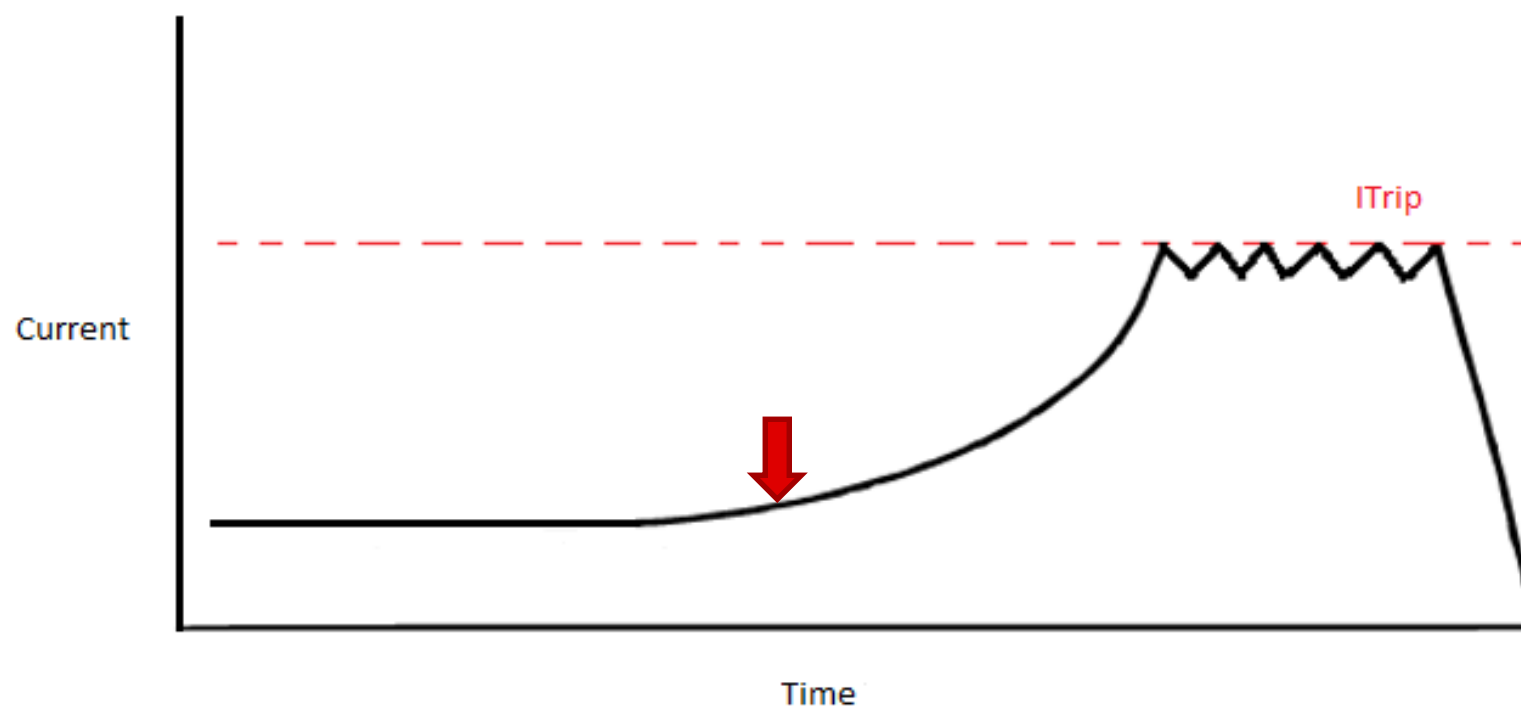


- Current regulation keeps the current below the threshold in a variety of ways.
- Over current protection and overtemperature protection can be triggered by inrush.



Explaining Stall Current and IPROPI

- Stall current occurs when the motor stops spinning and the back emf disappears, causing current to spike.



- The rising stall current can cause damage to the system if it is not regulated.
- There are different ways in which a stall condition can be detected.
- IPROPI uses a current mirror to create a measurable voltage drop through a desired resistor.



To find more motor driver technical resources and search products, visit
www.ti.com/motor-drivers/overview.html

