PROJECT MOTOR DRIVING FAQs
• Q: Why does the magic smoke come out of my (Hbridge/MOSFET) when I try to run my motor?
• A: The chip got too hot.
How hot?

Very hot
(click here)
• Q: But I checked the Amps on the (Hbridge/MOSFET) data sheet and it should be ok.

• A: You need to check the power on the data sheet as well:

Continuous output current, \( I_O \) .............................................................. \( \pm 1.1 \) A
Continuous total power dissipation at (or below) 25°C free-air temperature (see Note 2) ........ 2075 mW

2 W gives you very little current if you are running at 12V.
• Q: My driver chip doesn’t have that kind of power number on it. It has stuff like

| Continuous output current, \( I_O \): L293 | \( \pm 1 \) A |
| Continuous output current, \( I_O \): L293D | \( \pm 600 \) mA |
| Package thermal impedance, \( \theta_{JA} \) (see Notes 2 and 3): DWP package | TBD°C/W |
| N package | 67°C/W |
| NE package | TBD°C/W |
| Maximum junction temperature, \( T_J \) | 150°C |

NOTES:
1. All voltage values are with respect to the network ground terminal.
2. Maximum power dissipation is a function of \( T_J(max) \), \( \theta_{JA} \), and \( T_A \). The maximum allowable power dissipation at any allowable ambient temperature is \( P_D = (T_J(max) - T_A)/\theta_{JA} \). Operating at the absolute maximum \( T_J \) of 150°C can affect reliability.
3. The package thermal impedance is calculated in accordance with JESD 51-7.

• A: Make the calculation described in note 2. There is a book excerpt posted on the course web page that explains this in more detail.
• Q: Ok, my chip can’t handle the power. Now what do I do?

• A: You have two choices:
  – Get the chip cooler, so it can dissipate more power
  – Get a new motor driver circuit
Get the Chip Cooler (Choices)

1. Buy a heat sink and attach it to the chip.

2. Put the entire circuit in non-conductive oil, like canola oil. (Rumored to work, we haven’t tried this personally.)
Get a New Motor Driver Circuit (Choices)

1. Buy a chip with a larger power rating on the data sheet.

2. Buy a motor driver circuit with a heat sink from your instructor. $20. Can do bi-directional, but only one line. (Steppers need 4 lines.)

3. Use several MOSFETs in parallel. (Unidirectional only, of course.)