



**CURRENT LIMITATION**

Many applications need to limit the maximum current through the load. Limiting the current through a motor actually limits the torque. Figure 3 shows a solution using a TS922A, a dual low offset (0.9mV), rail-to-rail op-amp. This scheme can be used with analog or digital IN1 mode.

When the current measured through the shunt resistor placed in the bottom of the bridge becomes higher than the reference, the output of a comparator is pulled low and brings the IN1/IN2 inputs (that set the PWM ratio and the motion direction) near to ground, stopping the PWM signal and breaking the motor. The diodes D1/D2 are used to isolate the comparator output from IN1/IN2 when the current is lower than the threshold.

Op-amp U3A is used to amplify the voltage Vsense across the shunt resistor. Voltage at the output of U3A is:

$$V_{cur} = V_{sense} * (R9 + R10) / R10$$

Op-amp U3B is used as a comparator. The

reference level is set by the resistors R9, R10:  $V_{ref} = 5V * R12 / (R11 + R12)$ .

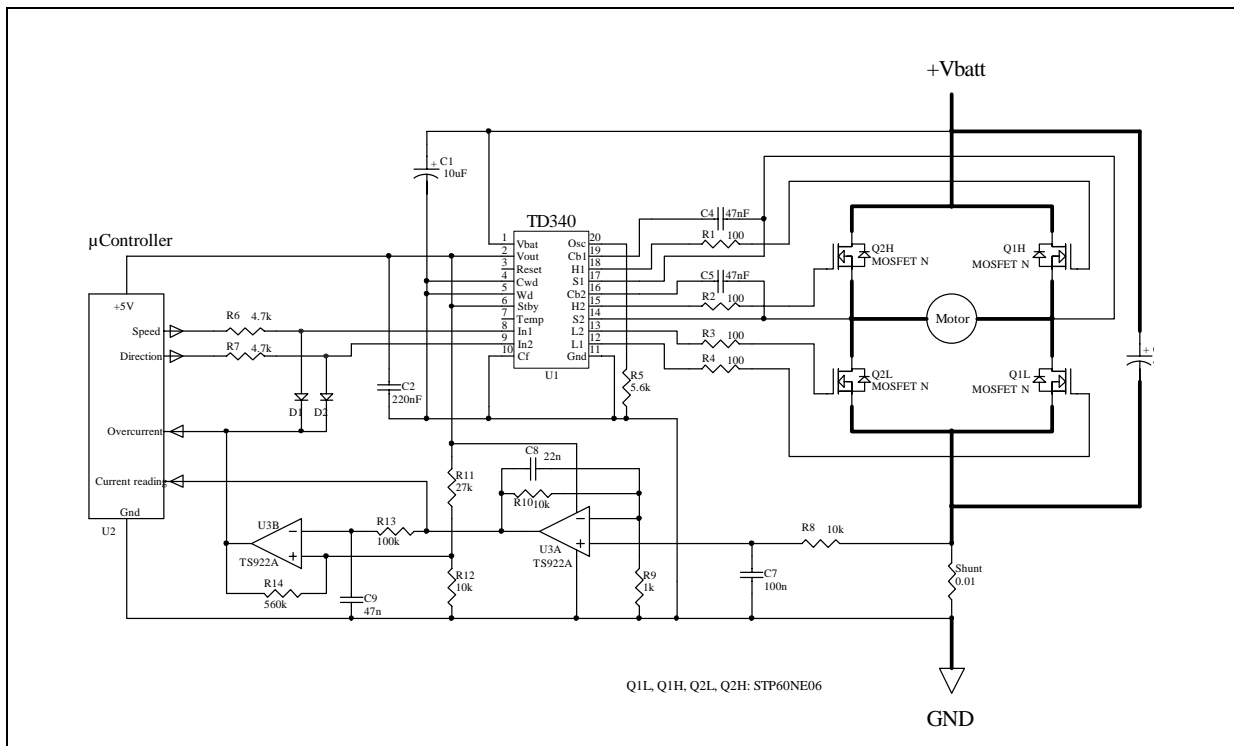
A small positive feedback is provided by the resistor R14 to add a little amount of hysteresis to the comparator.

The output of the comparator is also used to tell the microcontroller that an overcurrent event has occurred. The microcontroller can then lower the PWM level.

A R8-C7 network is used to filter the current waveform. This current is actually switched at the PWM frequency (about 25kHz). A good rule is to filter at least at a frequency 10 times less than the PWM frequency. For 25kHz, R=10k and C=100nF lead to about 1kHz filtering. The shunt value must be small enough to avoid useless dissipation. A voltage drop of about 200mV is adequate.

For a full discussion and other methods, see Application Note AN1305: Current Measurement and Limitation in TD340 Based Motor Control Systems.

**Figure 2 : Current Limitation**

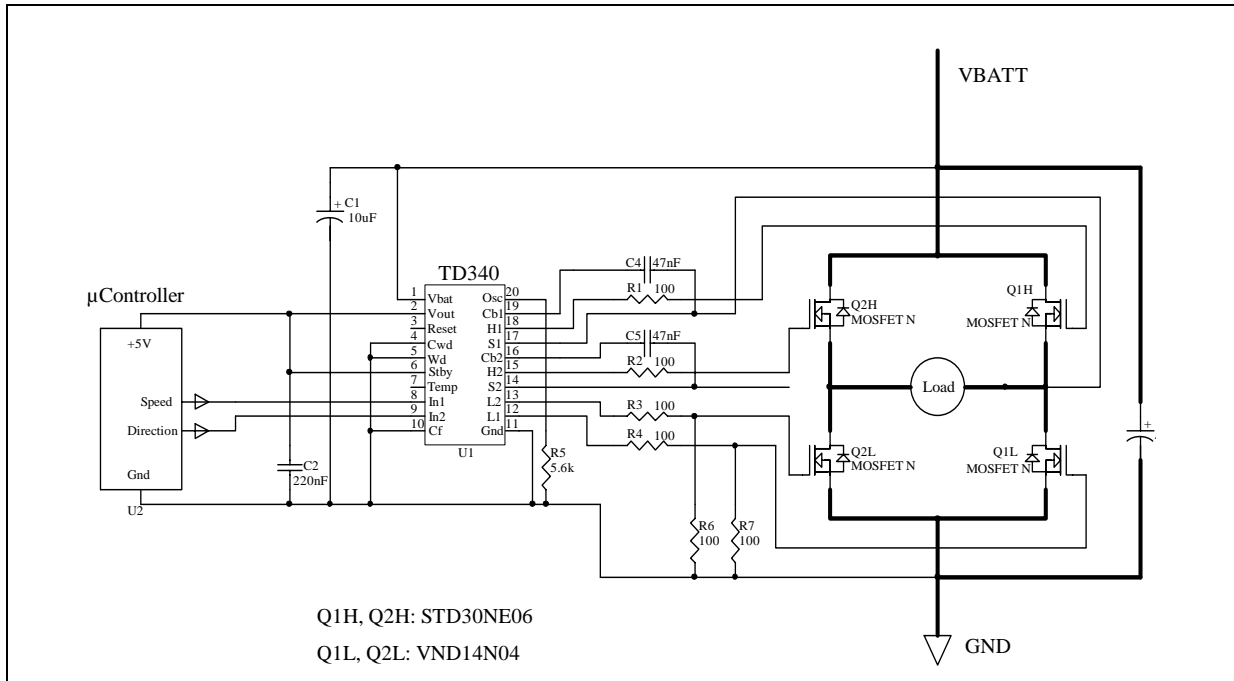


**AUTOPROTECTED H-BRIDGE**

Instead of using a current limiting circuit, an autoprotected full bridge can be built with two OMNIFETs. These devices, part of the ST VIPower family, provide current limiting and thermal shunt-down. OMNIFETs can be used as standard MOSFETs with the exception of a small current in the gate input. Therefore, they should be used only for low side. MOSFETs in high side should be rated to higher currents, so the

protection against overcurrent and overtemperature is provided by the OMNIFETs. Figure 3 illustrates an application of these devices. OMNIFETs VND14NV04 limit the current to 14A maximum, and the upper MOSFETs STD30NE06L (30A) are protected. Note that resistor bridge are used for driving the OMNIFETs, due to their lower gate voltage capability.

**Figure 3 :** Autoprotected H-bridge



Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

© The ST logo is a registered trademark of STMicroelectronics

© 2000 STMicroelectronics - Printed in Italy - All Rights Reserved  
STMicroelectronics GROUP OF COMPANIES

Australia - Brazil - China - Finland - France - Germany - Hong Kong - India - Italy - Japan - Malaysia - Malta - Morocco  
Singapore - Spain - Sweden - Switzerland - United Kingdom

© <http://www.st.com>





LittleDiode supplies new, hard to find or obsolete electronic components and semiconductors all over the world.

With over two million different components listed you are sure to find the part you need.

Feel free to visit us today at our online store:

[LittleDiode.com](http://LittleDiode.com)

Looking forward to providing you with the best possible service.