Si9986 Buffered H-Bridge

INTRODUCTION

The Si9986 is a buffered H-bridge that will eliminate all the external discretes that are normally needed to prevent shoot-through in low-voltage brushed motor, stepper motor, and actuator applications. Key features include the following:

- The output FETs are complementary, thus requiring no high-side drive power supply.
- Built-in shoot-through protection prevents both FETs on the same side of the H from being on at the same time. This protection ordinarily would require several external components or additional logic.
- Operating range is 3.8 to 13.2 V, making the Si9986 ideal for the common PC supply voltages of 5 and 12 V.
- Built-in logic provides four states controlled by CMOS level commands.
  - — The two on-states where current flows through the load from either terminal (OUT_A to OUT_B or OUT_B to OUT_A).
  - — A brake state where terminals OUT_A and OUT_B of the load are both connected to ground, resulting in a dynamic braking action.
  - — A high impedance state where neither terminal OUT_A nor OUT_B of the load is connected, except through the internal flywheel diodes.
- The inputs may be switched at frequencies up to 200 kHz, allowing PWM operation.
- No additional components are necessary, except for a possible snubber circuit, depending on the load and electrical noise requirements and any feedback signal processors.

APPLICATIONS

The examples and descriptions that follow refer to the truth table below for the Si9986.

TRUTH TABLE

State	IN_A	IN_B	OUT_A	OUT_B	Action
0	0	0	0	0	Brake
1	0	1	0	1	+Dir.
2	1	0	1	0	– Dir.
3	1	1	HiZ	HiZ	Open

Figure 1 shows a brushed dc motor operating in a full-on, bi-directional mode. Open loop control could be implemented by appropriate high-speed switching between states 1 and 2. (Refer to the Truth Table.)

Figure 2 shows a brushed dc motor operating in a controlled bi-directional, closed-loop mode. Speed control can be implemented by feeding back the low-pass filtered voltage at the load to control the duty cycle of the high-speed switching between states 1 and 2. (Refer to the Truth Table.)

Torque control can be accomplished by using the current feedback signal (Figure 3) to control the duty cycle of the high speed switching between states 1 or 2 and 3. (Refer to the Truth Table.)

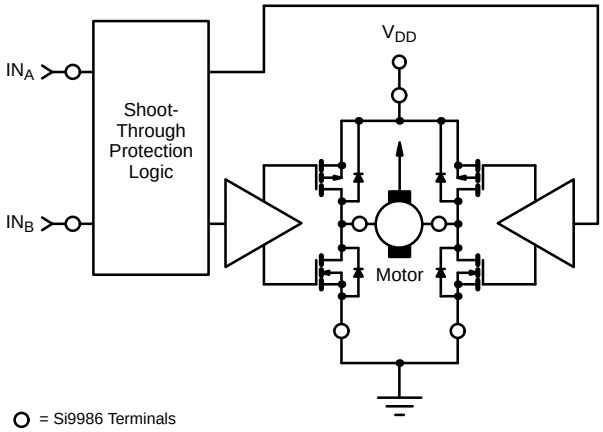

FIGURE 1. Basic Open Loop

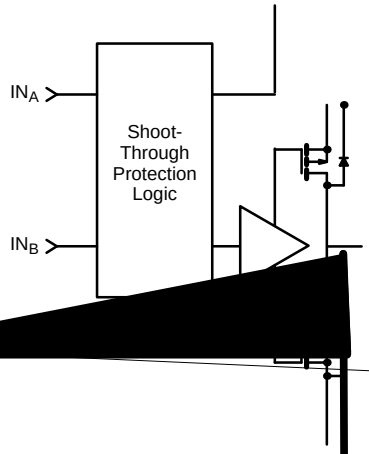

FIGURE 2. Voltage Feedback for PWM Motor Control