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APPLICATION NOTE 3361

Using the MAX6650 and MAX6651 Fan Speed Regulators with 24V and 48V Fans

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Abstract: The MAX6650 and MAX6651 are fan speed regulators that control the speed of brushless dc fans using tachometer feedback from the fans. In normal operation, fans with nominal supply voltages from 5V to 12V can be accommodated. This application note shows how to use the MAX6650 and MAX6651 with higher-voltage fans. Examples are shown with 24V and 48V fans.

The MAX6650 and MAX6651 are fan speed regulators that produce a dc voltage to drive a brushless dc (BLDC) fan with a nominal supply voltage of either 5V or 12V. They measure the fan's speed using a tachometer signal from the fan and regulate speed by adjusting the applied supply voltage to produce the desired tachometer count. In normal operation, the fan's positive supply terminal is connected to the fan supply voltage, VFAN (nominally 12V or 5V) and the negative terminal is driven by an N-Channel MOSFET to adjust the supply voltage.

Some designs require the use of higher-voltage fans than those for which the MAX6650 and MAX6651 were designed. Adapting these ICs to higher-voltage fans is largely a matter of ensuring that their input pins are driven with correctly scaled voltages within the acceptable operating ranges. This can be done by adding a handful of external resistors.

Figure 1 shows a typical MAX6651 circuit with a 12V BLDC fan. (The MAX6651 is shown in the schematics throughout this application note. The same pin names apply for the MAX6650.) OUT drives the gate of the external N-channel MOSFET, and FB is the input that closes the feedback loop at the MOSFET's drain. This voltage will vary from 0V to VFAN (12V in this example). The fan's tachometer output is usually open-drain, and is pulled up to VFAN through an external resistor. TACH0 accepts the tachometer signal and adjusts its logic level according to the voltage on FB; the logic level therefore follows the voltage at the fan's tachometer output as it changes with the fan's drive level. The FB and TACH inputs can accept voltages up to 13.2V, so VFAN can be as large as 12V nominal.

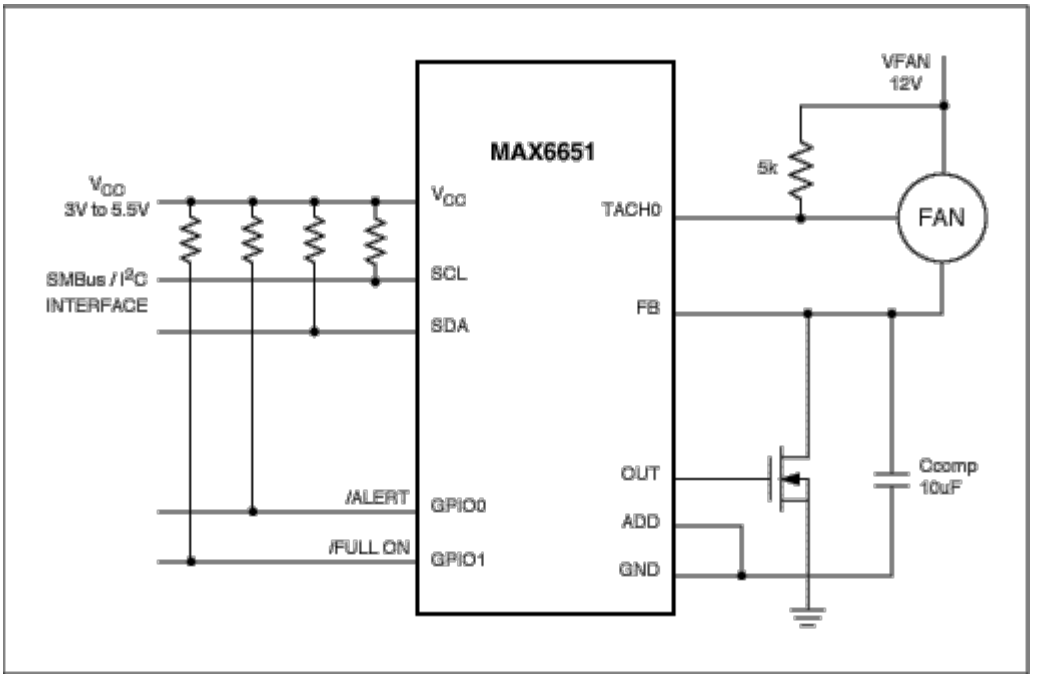

Figure 1. Normal 12V operating circuit for the MAX6651.

To control a 24V fan with the MAX6650, the circuit in **Figure 2** may be used. The only change from the circuit in Figure 1 is the addition of two pairs of resistors to attenuate the voltages at the TACH0 and FB inputs to 12V or less. Similarly, the circuit in **Figure 3** provides further attenuation to reduce the input voltage from 48V to 12V or less.

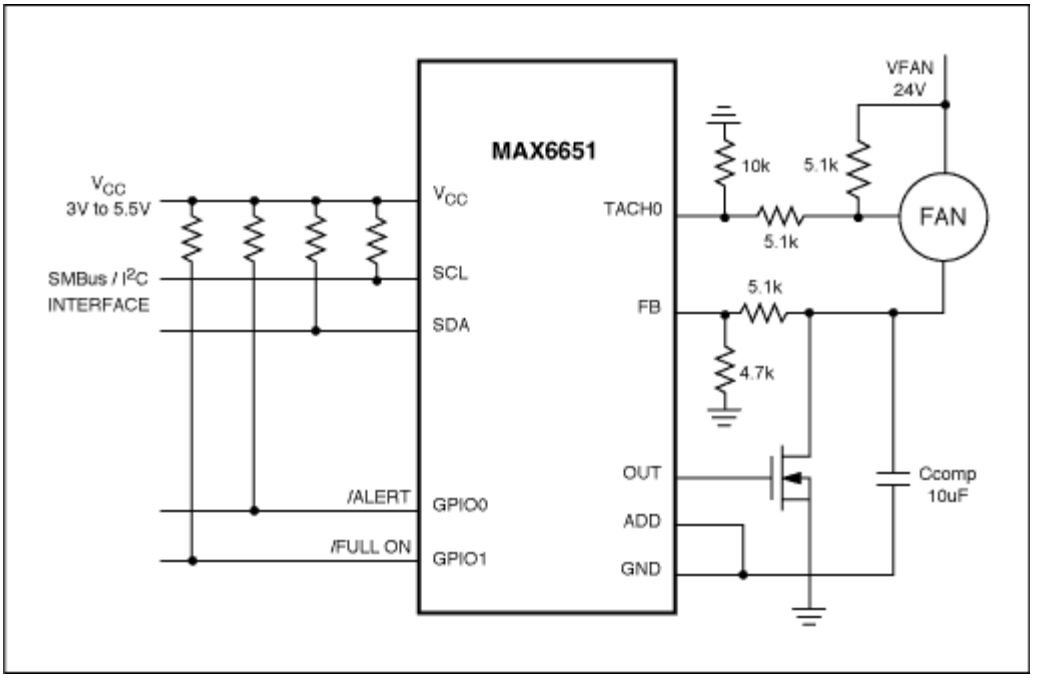

Figure 2. Driving a 24V fan with the MAX6651.

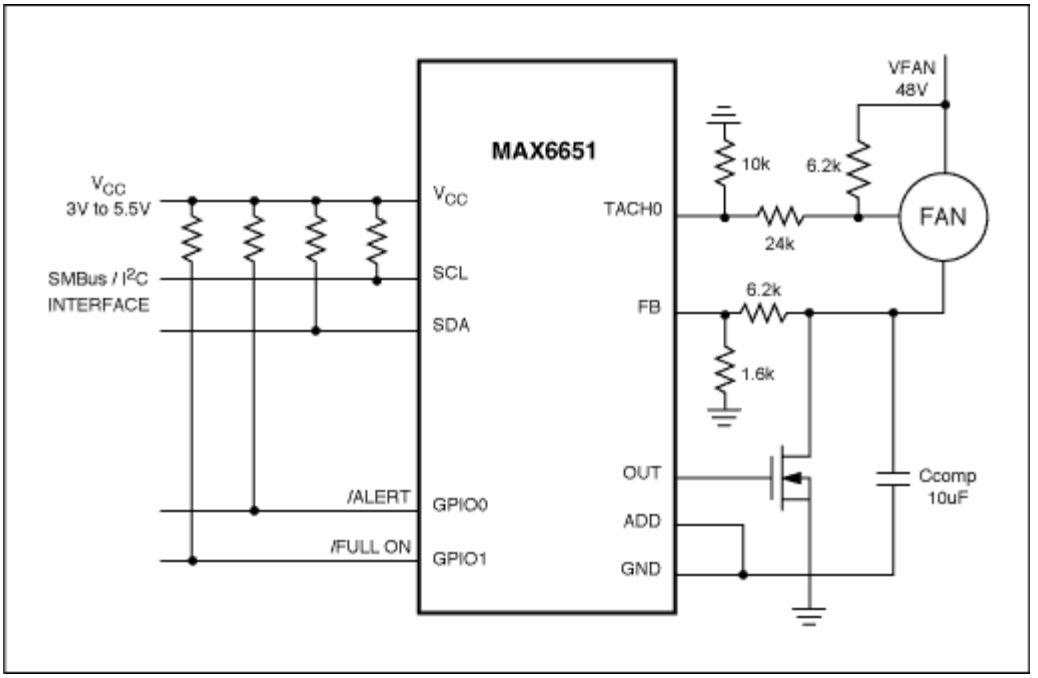

Figure 3. Driving a 48V fan with the MAX6651.

Related Parts		
MAX6650	Fan-Speed Regulators and Monitors with SMBus™/I²C-Compatible Interface	Free Samples
MAX6651	Fan-Speed Regulators and Monitors with SMBus™/I²C-Compatible Interface	Free Samples

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