Fan Control IC with Over-temperature Output

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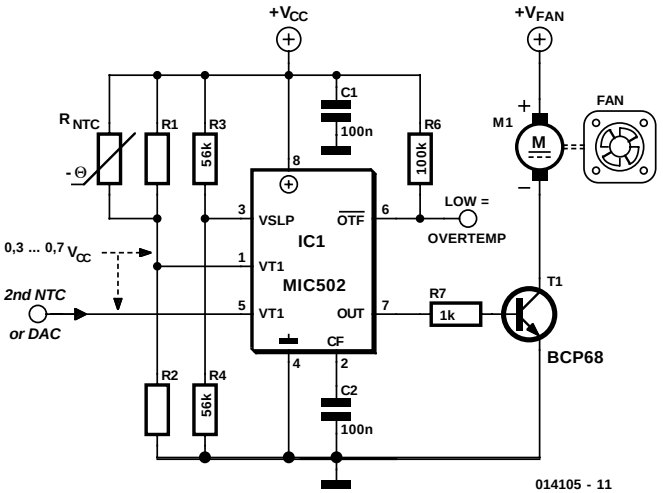
A simple proportional fan controller can be built using the MIC502 from Micrel (www.micrel.com). With this IC the speed of the fan runs slowly at low temperatures, reducing noise and wear. Any fan can be controlled using the pulse width modulated output signal via a driver transistor. Using PWM control has the advantage that the fan can be run much slower than using variable DC control. Up to two NTC thermistors can be connected. The second control voltage can alternatively be derived from a DAC output from a processor system, for example. The MIC502 operates from a supply between 4.5 V and 13.2 V (V_{cc}). Since drive is via a transistor, the actual fan voltage can be higher than the supply voltage: you can drive a 12 V fan from a 5 V controller.

Control is independent of supply voltage, since the device only uses the ratio of the voltages at inputs VT1 and VT2 (so-called 'ratiometric' operation). A voltage of 0.3 V_{cc} gives rise to an output duty cycle of 0 %, stopping the fan.

0.7 V_{CC} at input VT1 and/or VT2 produces an output duty cycle of 100 %, making the fan run at full speed. Whichever of the two inputs VT1 and VT2 has the higher voltage (corresponding to the higher temperature) takes priority.

The VSLP input can be used to set the voltage below which the fan is switched off (*sleep mode)*: both inputs VT1 and VT2 must be below this voltage. The fan starts again if either input VT1 or VT2 rises above VSLP + 0.12 V_{CC}. If sleep mode is not required, the VSLP input should be tied to ground. A capacitor is connected to the CF pin to set the basic frequency of the PWM signal: a value of 100 nF is recommended, giving a frequency of about 30 Hz. At power up or at exit from sleep mode an integrated start-up timer causes the fan motor to receive full voltage for a time 64/f (around 2 s at 30 Hz), ensuring a reliable start.

Finally an open-collector over-temperature output $\overline{OTF}$ ('over-temperature failure') is provided that can be pulled up to the desired logic level with an external resistor. $\overline{OTF}$ switches low when one of the two inputs VT1 or VT2 rises above 0.75 V_{CC}.



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