INTRODUCTION

Certain applications, such as file servers, require redundant cooling fans to ensure uninterrupted system service, even with cooling fan malfunctions present. Typically, such systems have a primary fan to cool the system and one or more “standby” fans that are automatically placed into service should the primary fan fail. Multiple TC647s can be used to implement such a system as shown in Figure 1.

DETAILED DESCRIPTION

The TC647 is a combination proportional brushless DC (BDC) fan controller and fault detector (see the TC647 datasheet (DS21447) for more details). As shown in Figure 1, individual TC647s are driven by a common input signal. Normally, the circuit labeled “Unit 1” is in service and provides proportional speed control for Fan 1 based on the VIN input voltage. During normal operation (Fan 1 rotating), Unit 1’s FAULT line is high, causing Q2 to pull the VMIN2 node of Unit 2 low. This causes the TC647 in Unit 2 to be in shutdown mode.

Should a fan fault occur in Unit 1 (fan stops rotating), the Unit 1 FAULT output will be driven low. This acts to turn Q2 off, which will activate the TC647 in Unit 2. Unit 2 will now respond to the VIN voltage as long as there is no fan fault present on Fan 2 (see the TC647 datasheet (DS21447) for more information on TC647 modes of operation).

The values of R1, R2, R5 and R6 should be chosen based on the desired minimum fan speed and biasing current for these divider networks. Once the R5 and R6 values have been selected, the Q2 base resistor (Rb) value can be selected. When Unit 1 is operating, the voltage at the VMIN pin must be pulled below 0.65V to ensure Unit 2 is in shutdown mode. If reset capability for Unit 1 is desired, the VMIN pin of this unit can be pulled low momentarily and then released to initiate a new startup cycle. See the TC647 datasheet (DS21447) for more information on device reset.

SUMMARY

By using two TC647 devices and a minimal amount of external components, the system now has redundant cooling, temperature proportional fan speed control and fan fault reporting capability.
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