Voltage monitor prevents deep discharge of battery

ROGER KENYON, MAXIM INTEGRATED PRODUCTS, SUNNYVALE, CA

The circuit in **Figure 1** monitors battery voltages from 2.7 to 5.5V while drawing less than 25 µA. When the voltage reaches a minimum threshold established by R_1 and R_2, (V_{TH}=2.63V for the values shown), the high-side switch (IC_2) turns off and disconnects the battery from the load.

IC_1 is a voltage monitor with an open-drain latched output. Normally high, the output latches low when the battery voltage drops below V_{TH}. Once triggered, the output remains low even when the now-unloaded battery voltage rebounds to a level above V_{TH}. This behavior prevents the oscillation that would otherwise occur as connect/disconnect action causes the battery voltage to fluctuate. To reset the latch, the CLEAR input must go high for a minimum of 1 µsec.

The $C_1/C_2/R_3$ network applies the latch-clearing pulse when you connect a new battery. Rechargeable-battery applications require other schemes for clearing the IC_1 output, such as an spst momentary pushbutton switch (**Figure 2a**) or simply a connection via the battery-charger connector (**Figure 2b**).

To set a different value of V_{TH}, choose a convenient value for R_1, and then calculate R_2: $R_2=R_1\times V_{TH}/(1.204–1)$. IC_2 limits its switch current at a level that the value of R_4 determines: $I_{LIMIT}=1240/R_4$, where R_4 is in ohms and I_{LIMIT} is in amperes, with a maximum of 1A. For the R_4 value in **Figure 1**, this limit is 500 mA. (DI #2191)

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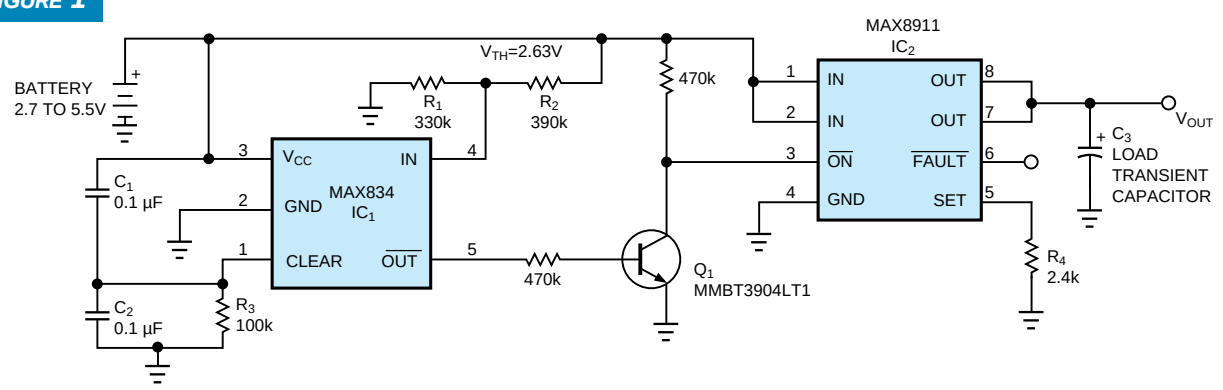
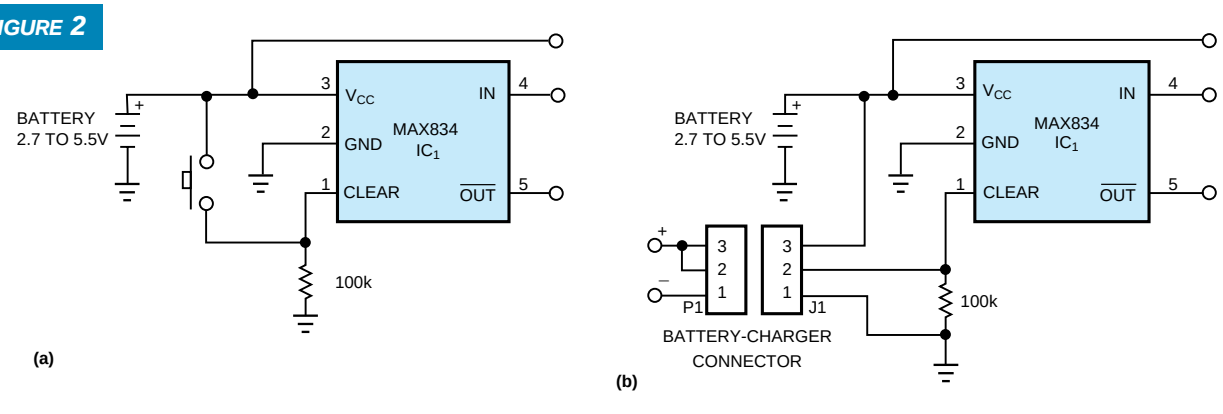
FIGURE 1



When the voltage reaches a minimum threshold established by R_1 and R_2, the high-side switch, IC_2, turns off and disconnects the battery from the load.

FIGURE 2



Other schemes for clearing IC_1's output include an spst momentary pushbutton switch (a) and a connection through the battery-charger connector (b).