

Microprocessor Supervisory Circuit

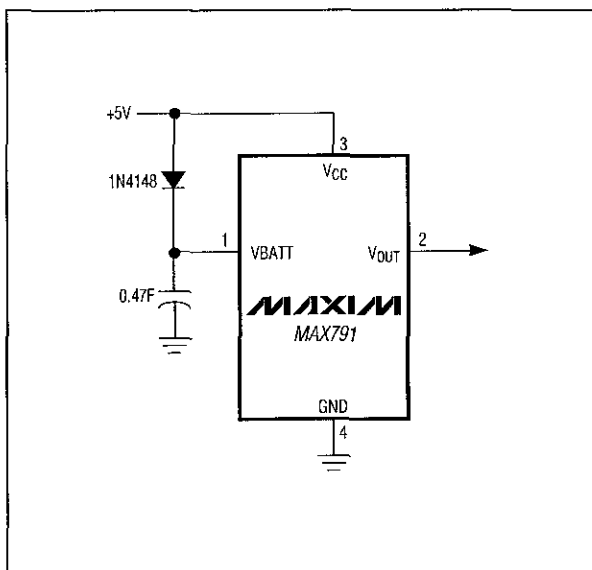


Figure 12. SuperCap or MaxCap on VBATT

Applications Information

The MAX791 is not short-circuit protected. Shorting VOUT to ground, other than power-up transients such as charging a decoupling capacitor, destroys the device.

All open-circuit outputs swing between VOUT and GND rather than VCC and GND.

If long leads connect to the chip inputs, ensure that these lines are free from ringing and other conditions that would forward bias the chip's protection diodes.

There are three distinct modes of operation:

- 1) Normal operating mode with all circuitry powered up. Typical supply current from VCC is 60 μ A, while only leakage currents flow from the battery.
- 2) Battery-backup mode where VCC is typically within 0.7V below VBATT. All circuitry is powered up and the supply current from the battery is typically less than 60 μ A.
- 3) Battery-backup mode where VCC is less than VBATT by at least 0.7V. VBATT supply current is less than 1 μ A max.

Using SuperCaps or MaxCaps with the MAX791

VBATT has the same operating voltage range as VCC, and the battery-switchover threshold voltages are typi-

cally ± 30 mV centered at VBATT, allowing use of a SuperCap and a simple charging circuit as a backup source (Figure 12).

If VCC is above the reset threshold and VBATT is 0.5V above VCC, current flows to VOUT and VCC from VBATT until the voltage at VBATT is less than 0.5V above VCC. For example, with a SuperCap connected to VBATT and through a diode to VCC, if VCC quickly changes from 5.4V to 4.9V, the capacitor discharges through VOUT and VCC until VBATT reaches 5.3V typ. Leakage current through the SuperCap charging diode and MAX791 internal power diode eventually discharges the SuperCap to VCC. Also, if VCC and VBATT start from 0.5V above the reset threshold and power is lost at VCC, the SuperCap on VBATT discharges through VCC until VBATT reaches the reset threshold; the MAX791 then switches to battery-backup mode and the current through VCC goes to zero (Figure 10).

Using Separate Power Supplies for VBATT and VCC

If using separate power supplies for VCC and VBATT, VBATT must be less than 0.3V above VCC when VCC is above the reset threshold. As described in the previous section, if VBATT exceeds this limit and power is lost at VCC, current flows continuously from VBATT to VCC via the VBATT-to-VOUT diode and the VOUT-to-VCC switch until the circuit is broken (Figure 10).

Alternative Chip-Enable Gating

Using memory devices with CE and $\overline{\text{CE}}$ inputs allows the MAX791 CE loop to be bypassed. To do this, connect CE IN to ground, pull up CE OUT to VOUT, and connect CE OUT to the CE input of each memory device (Figure 13). The CE input of each part then connects directly to the chip-select logic, which does not have to be gated by the MAX791.

Adding Hysteresis to the Power-Fail Comparator

Hysteresis adds a noise margin to the power-fail comparator and prevents repeated triggering of PFO when VIN is near the power-fail comparator trip point. Figure 14 shows how to add hysteresis to the power-fail comparator. Select the ratio of R1 and R2 so that PFI sees 1.25V when VIN falls to the desired trip point (VTRIP). Resistor R3 adds hysteresis. It will typically be an order of magnitude greater than R1 or R2. The current through R1 and R2 should be at least 1 μ A to ensure that the 25nA (max) PFI input current does not shift the trip point. R3 should be larger than 10k Ω to prevent it from loading down the PFO pin. Capacitor C1 adds additional noise rejection.