Power Supply Design

The power supply architecture of the "Dripito" IV flow rate monitor has been deliberately designed to be simple, robust, and appropriate for low-resource, humanitarian settings. This section details the power path from battery to regulated system voltage and highlights the rationale for each component and configuration.

# Battery Selection and Holder Design

Dripito is powered by a single AA alkaline battery. This choice is driven by availability (ubiquity in nearly every healthcare setting), low cost, and its typical capacity of ~2000 mAh. The battery holder used is the [BK-92 model](https://www.digikey.ch/de/products/detail/mpd-memory-protection-devices/BK-92/2079904), a low-cost through-hole component that provides reliable retention force and mechanical robustness.



Figure 1:BK-92 Battery Holder

A diagram of a diagram

AI-generated content may be incorrect.

Figure 2:BK-92 PCB Mounting Holes (Datasheet)

A diagram of a circuit

AI-generated content may be incorrect.

A green circuit board with white and yellow dots

AI-generated content may be incorrect.Figure 3: Battery Holders — Schematic Extract

Figure 4:BK-92 PCB Mounting Holes

# Reverse Polarity Protection

To protect against incorrect battery insertion — a realistic risk in pediatric or emergency contexts — reverse polarity protection was implemented using a P-Channel MOSFET (AO3401A). Unlike a diode-based approach, this introduces nearly no forward voltage drop, preserving valuable millivolts in a low-voltage supply. The gate is pulled low via a 100k resistor, allowing current to flow only when the polarity is correct.

A diagram of a circuit

AI-generated content may be incorrect.

Figure 5:Reverse Polarity Protection Circuit — Schematic Extract

A green circuit board with white text

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Figure 6: Reverse Polarity Protection Mosfet

A large positive battery symbol on the silkscreen further guides correct insertion, but the MOSFET ensures resilience against human error.

# Boost Conversion with TPS610982

Given the wide voltage range of an AA battery (1.5 V fresh, ~0.7 V depleted), a DC-DC boost converter is necessary. The Texas Instruments [TPS610981DSET](https://www.digikey.ch/de/products/detail/texas-instruments/TPS610982DSET/5404237?s=N4IgTCBcDaICoAUDKA2AjABgJwA4wBEkBROEAXQF8g) was selected due to its high efficiency, compact footprint, and suitability for low startup voltages.

A diagram of a circuit

AI-generated content may be incorrect.The device converts the battery voltage up to a regulated 3.3 V supply for the microcontroller and sensors. Its internal feedback loop ensures tight voltage regulation even as battery capacity diminishes.

Figure 7:Boost Converter— Schematic Extract

A diagram of a circuit board

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Figure 8:TPS610982 — Example Layout from Datasheet for Comparison

A green circuit board with white text and black and white objects

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Figure 9:Boost Converter — PCB Layout

# Battery Voltage Monitoring (Gauge)

The node labeled VIN\_RC\_FILTER is directly routed to an analog-capable pin on the STM32G030 microcontroller. This connection allows the firmware to sample the battery voltage (pre-boost) periodically. This setup enables simple estimation of battery fullness, which may be used to trigger low-battery warnings.