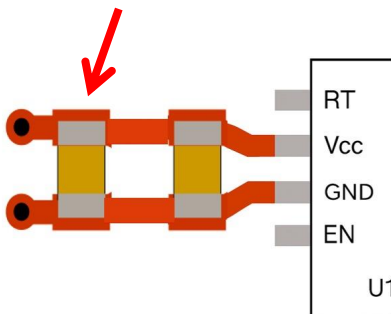


What is an **Input (Bulk)** Capacitor ?

How Missing a Capacitor Caused Resets in a Wearable Device



Swipe >



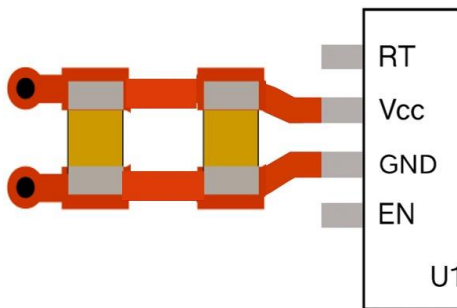
Fahad Bhatti

Founder Oxeltech (Embedded Development Service)

What is an **Input (Bulk) Capacitor**?

A bulk capacitor is placed at the power input to:

- **Store energy** for sudden current demands
- **Stabilize voltage** during supply dips or transients
- **Prevent brownouts** in sensitive components
- **Support decoupling capacitors** to maintain power integrity





Case Study

Resets in a Wearable Device

- Customer reached out to **Oxeltech** for support
- Their wearable band was **randomly resetting during normal use.**
- We enabled firmware logs that pointed to **brownout events** (brownout is when an IC turns off due to low voltage)



What We **Found**

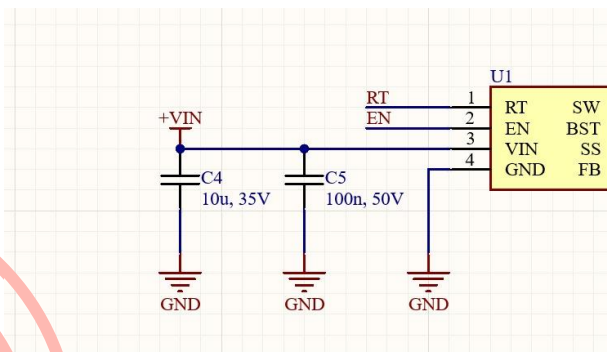
- Scope measurements showed **voltage drops below 2.5 V** at the regulator input.
- Resets aligned with **vibration motor activation** and **radio transmission**.





The Root Cause

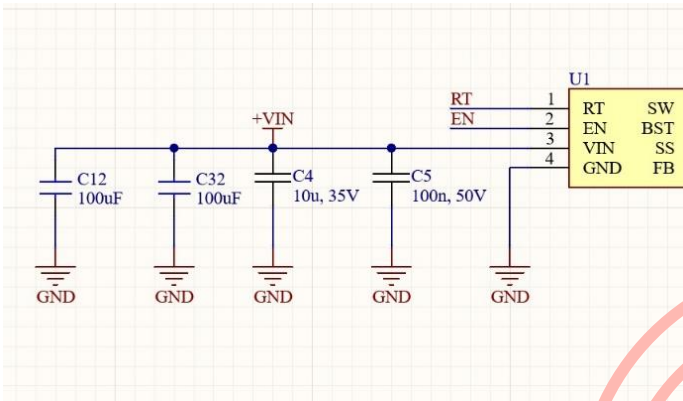
- The **vibration motor** caused an **inrush current** of **up to 200 mA**.
- The small input capacitors couldn't buffer this load.
- This led to **brief voltage dips** and **undervoltage lockout**.





The Fix

- We added **two 100 μ F bulk capacitors** at VIN.
- These act as **energy buffers** (also called hold-up capacitors) to handle sudden loads.





The Result

- No more random resets after the fix
- Voltage rail was stable even during haptic motor operation

Key Takeaways

- Don't size capacitors for average current.
- **Design for peak loads**, especially in systems with motors or radios.
- Even low-power devices need proper **input energy buffering**.





Reach Out for **Embedded**, IoT, and Hardware Development Services

www.oxeltech.de



Fahad Bhatti
Founder Oxeltech
(Embedded Development Service)

