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AEM10330

Highly Versatile, Regulated Single-Output, Buck-Boost Ambient Energy Manager For Up to 7-cell Solar Panels

Feature

Ultra-low power start-up
- Cold start from 275 mV input voltage and 3 µW input power (typical)

Very efficient energy extraction
- Open-circuit voltage sensing for Maximum Power Point Tracking (MPPT)
- Selectable open-circuit voltage ratios from 60% to 90% or fixed impedance
- Programmable MPPT sensing period
- MPPT voltage operation range from 100 mV to 4.5 V
- Optimized for intermittent and pulse power

Adaptive and smart energy management
- Switches automatically between boost, buck-boost and buck operation, to maximize energy transfer from its input to the output
- Automatically selects between the source, storage element
- Automatically select the output between the internal supply, the load and the storage element

Load supply voltage
- Current drive capability: 30 mA in low power mode, 60 mA in high power mode
- Selectable load voltage from 1.2 V to 3.3 V

Battery protection features
- Selectable over-charge and over-discharge protection for any type of rechargeable battery or (super-)capacitor
- Fast super-capacitor charging
- Dual cell super-capacitor balancing circuit

Smallest footprint, smallest BOM
- Only four external components are required
- One 10 µH inductor
- Three capacitors: one 10 µF, one 15 µF, one at least 47 µF
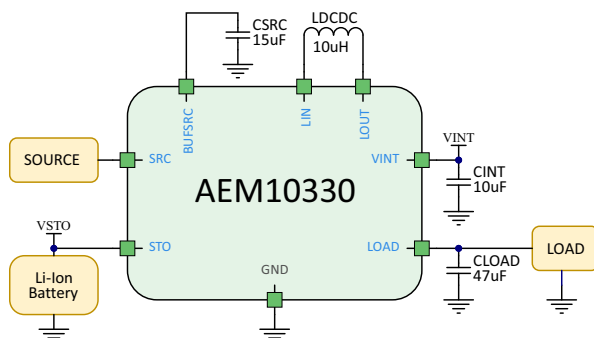
Description

The AEM10330 is an integrated energy management circuit that extracts DC power from an ambient energy harvesting source to simultaneously supply an application and store energy in a storage element. The AEM10330 allows to extend battery lifetime and ultimately eliminates the primary energy storage element in a large range of applications.

Thanks to its Maximum Power Point Tracking system, the AEM10330 extracts the maximum energy available from the source. It integrates an ultra-low power DCDC converter which operates with input voltages ranging from 100 mV to 4.5 V.

Two different storage elements can be connected: one for storing energy and another one for coupling the load output voltage. At start-up, user can choose to charge the storage element first or the load capacitor first.

With its unique cold start circuit, the AEM10330 can start harvesting with an input voltage as low as 275 mV and from an input power of 3 µW. The preset protection levels determine the storage element voltages protection thresholds to avoid over-charging and over-discharging the storage element and thus avoiding damaging it. Those are set through configuration pins. Moreover, special modes can be obtained at the expense of a few configuration resistors.

The load voltage can be selected to cover most application needs, with a maximum available load current of 60 mA.

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Applications

- Asset Tracking/Monitoring
- Retail ESL/Smart sensors
- Smart home/Building
- Industrial applications
- Aftermarket automotive

Device Information

Part Number	Package	Body size [mm]
10AEM10330J0000	QFN 40-pin	5x5mm

Evaluation Board
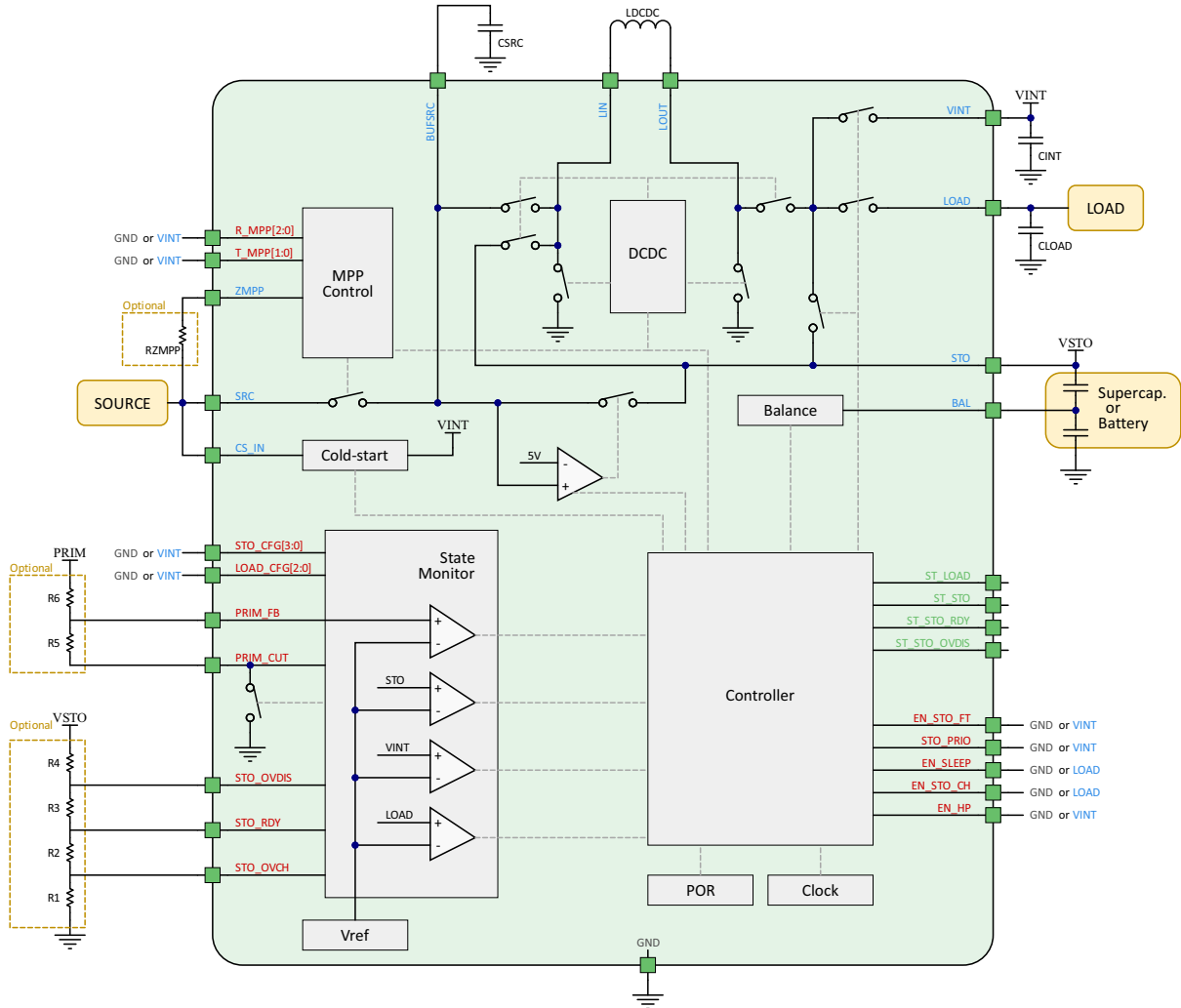
Part Number
2AAEM10330J0010

1. Functional Block Diagram

Figure 1: Functional Block Diagram