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semiconductors

Highly Versatile Buck-Boost Ambient Energy Manager Battery Charger For AC/DC Sources

Features

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 35% to 80% or fixed impedance
- Programmable MPPT sensing period
- MPPT voltage operation range from 100 mV to 4.5 V

Adaptive and smart energy management
- Switches automatically between boost, buck-boost and buck operation, to maximize energy transfer from its input to the output

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 three external components are required
- One 10 µH inductor
- Two capacitors: one 10 µF, one 15 µF
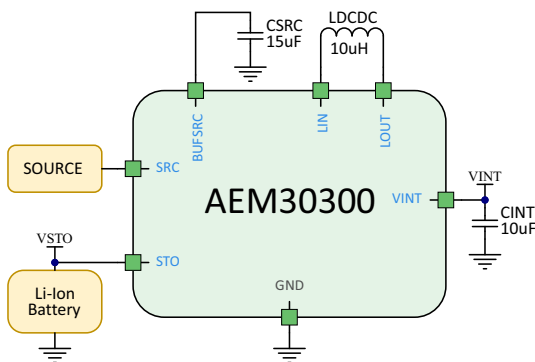
Description

The AEM30300 is an integrated energy management circuit that extracts DC power from an ambient energy harvesting source to store energy in a storage element. The AEM30300 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 AEM30300 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.

With its unique cold start circuit, the AEM30300 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 chip integrates all active elements for powering a typical wireless sensor. Only two capacitors and one inductor are required.

Applications

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

Device Information

Part Number	Package	Body size [mm]
10AEM30300C0000	QFN 28-pin	4x4mm

Evaluation Board

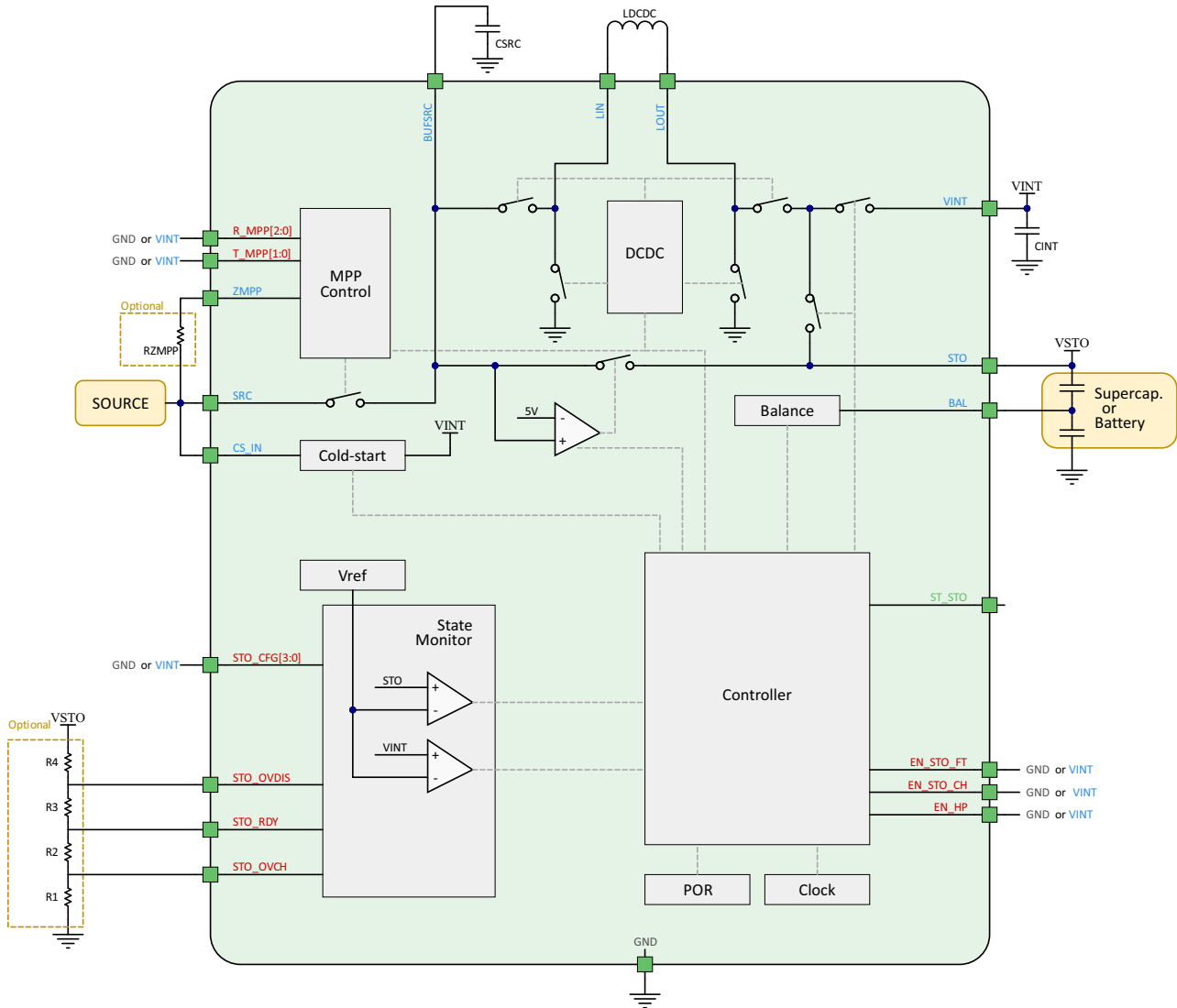| Part Number |
|---|
| 2AAEM30300C0010 |

1. Functional Block Diagram

Figure 1: Functional Block Diagram

2. Performance Data

2.1. DCDC Conversion Efficiency From SRC to STO in Low Power Mode
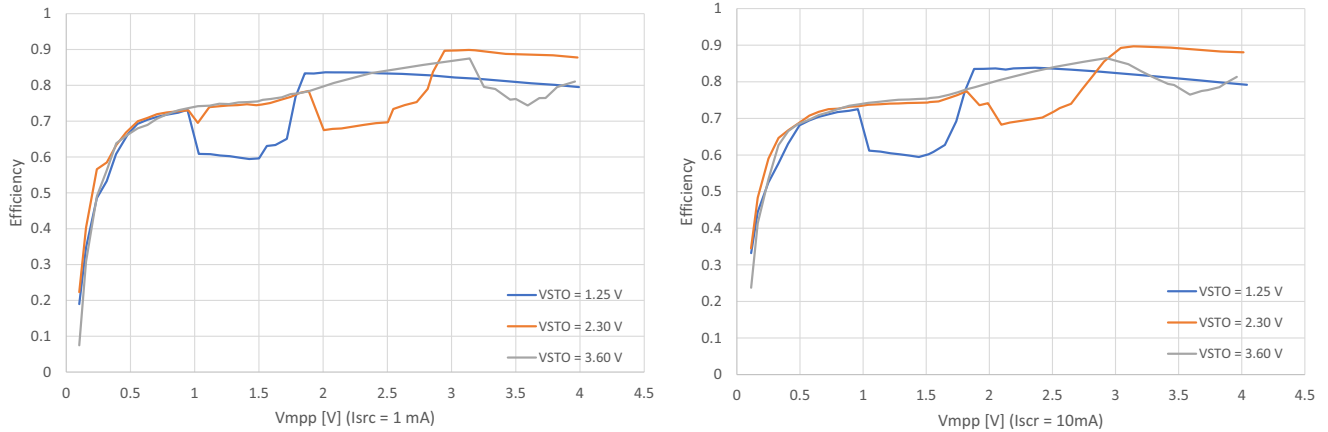
Figure 2: DCDC Efficiency from SRC to STO for 1 mA and 10 mA in Low Power Mode

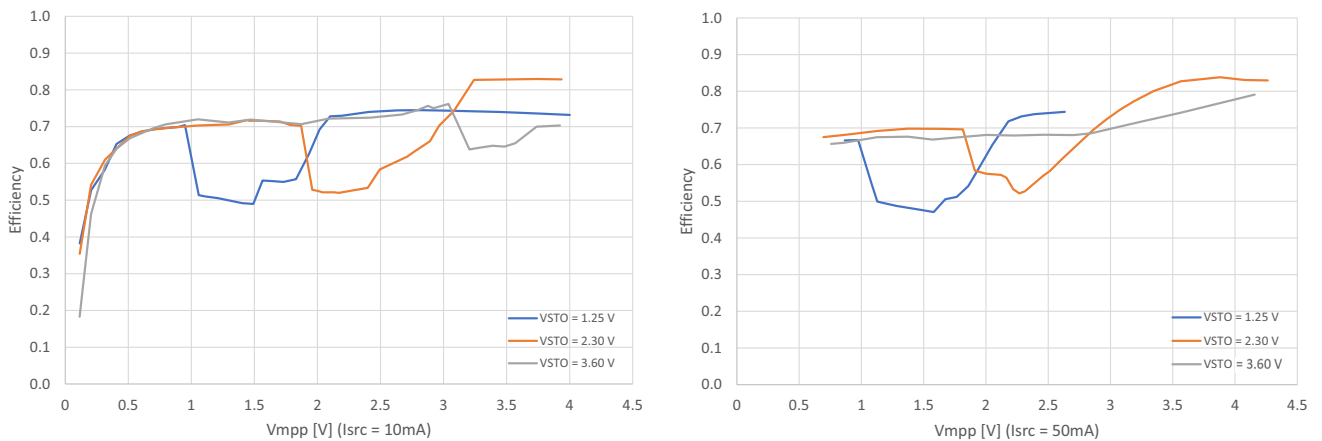## 2.2. DCDC Conversion Efficiency From SRC to STO in High Power Mode

Figure 3: DCDC Efficiency from SRC to STO for 10 mA and 50 mA in High Power Mode