



Highly-Efficient Regulated Dual-Output, Ambient Energy Manager for High-Frequency RF input with optional primary battery

FEATURES

Ultra-low power start-up

- Cold start from 380 mV input voltage and 3 μ W input power (typical)

Wide RF input power range

- RF input power from -19 dBm up to 0 dBm

Ultra-low power boost regulator

- Open-circuit voltage sensing for MPPT every 1.3 s
- Configurable MPPT with 2-pin programming
- Selectable Voc ratio of 60, 65, 70, 100 %
- Input voltage operation range from 50 mV to 2.5 V
- MPPT voltage operation range from 50 mV to 2.5 V

Integrated 1.2/1.8 V LDO regulator

- Up to 20 mA load current
- Power gated dynamically by external control

Integrated 1.8 V-3.3 V LDO regulator

- Up to 80 mA load current with 300 mV drop-out
- Power gated dynamically by external control

Flexible energy storage management

- Programmable overcharge and overdischarge protection
- For any type of rechargeable battery or (super)capacitor
- Fast supercapacitor charging
- Warns load when battery is running low
- Warns when output voltage regulators are switched on

Smallest footprint, smallest BOM

- Only seven passive external components

Optional primary battery

- Automatically switches to the primary battery when secondary battery is exhausted

Integrated balun for dual cells supercapacitor

APPLICATIONS

- Harvesting from RF source
- Industrial monitoring
- Indoor geolocation
- Home automation
- E-health monitoring
- Wireless Sensor Nodes

DESCRIPTION

The AEM40940 is an integrated energy management subsystem that extracts AC power from high-frequency RF inputs to simultaneously store energy in a rechargeable element and supply the system with two independent regulated voltages. The AEM40940 allows to extend battery lifetime and ultimately eliminate the primary energy storage element in a large range of wireless applications, such as industrial monitoring, indoor geolocation, home automation, e-health monitoring and wireless sensor nodes.

The AEM40940 harvests the available AC input power from -19 dBm up to 0 dBm thanks to an integrated high frequency rectifier. It integrates an ultra-low power boost converter to charge a storage element, such as a Li-ion battery, a thin film battery or a super- or conventional capacitor. The boost converter operates with input voltages in a range from 50 mV to 2.5 V. With its unique cold-start circuit, it can start operating with empty storage elements at an input power of just -19 dBm.

The low voltage supply typically drives a microcontroller at 1.2 V or 1.8 V. The high voltage supply may typically drive a radio transceiver at a configurable voltage between 1.8 V and 3.3 V. Both are driven by highly efficient LDO (Low Drop-Out) regulators for low noise and high stability.

Configuration pins determine various operating modes by setting predefined conditions for the energy storage element (overcharge or overdischarge voltages), and by selecting the voltage of the high voltage supply. Moreover, special modes can be obtained at the expense of a few configuration resistors.

The chip integrates all the active elements for powering a typical wireless sensor. Five capacitors and two inductors are required, available respectively in the small 0402 and 0603 SMD formats.

With only seven external components, integration is maximum, footprint and BOM are minimum, optimizing the time-to-market and the costs of WSN designs in all markets.

DEVICE INFORMATION

PART NUMBER	PACKAGE	BODY SIZE
AEM40940_b	QFN 28-pin	5mm x 5mm

TYPICAL APPLICATION CIRCUIT

