

Ultra-High-Efficiency, Low-Voltage Buck Converter

General Description

The MAX20438 is an ultra-high-efficiency switching regulator that delivers up to 12A load current from 0.5V to 1.2V. The IC operates from 2.5V to 5.5V, making it ideal for on-board, point-of-load (PoL) and post regulation applications. The total output error is less than $\pm 1.0\%$ over load, line, and temperature.

The MAX20438 features adaptive on-time with a switching frequency of 2.1MHz or 4.2MHz. High-frequency operation allows for small-size, all-ceramic capacitor design.

The low-resistance, on-chip switches ensure high efficiency at heavy loads while minimizing critical inductances, making the layout a much simpler task with respect to discrete solutions.

The device features the MAXQ™ power architecture which provides precision transient performance and phase margin. This allows obtaining the maximum power, performance, and precision from the converter over a very wide range of configurations.

The output voltage is preset at the factory to allow customers to achieve $\pm 1\%$ output-voltage accuracy without using expensive 0.1% resistors. The device offers factory-programmable soft-start and $\overline{\text{RESET}}$ times.

The device includes overtemperature shutdown and overcurrent limiting. The MAX20438 is designed to operate in the -40°C to $+125^{\circ}\text{C}$ ambient temperature range.

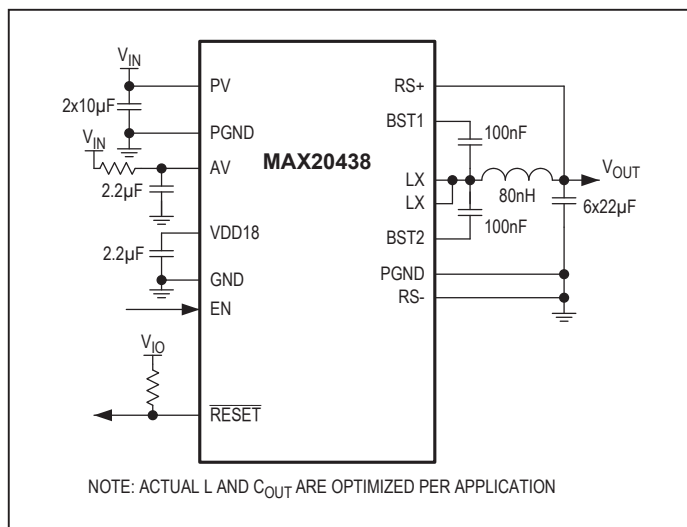
Applications

- Secondary Regulator for SoC/MCU Supply
- PoL and Post-Regulation Applications

Benefits and Features

- High Feature Set in Ultra-Small Footprint
 - High-Efficiency DC-DC Converter
 - Up to 12A Output Current
 - 2.5V to 5.5V Operating Supply Voltage
 - Optional Factory-Preset Output Voltage
 - 2.1MHz/4.2MHz Options
 - Enable Input
 - $\overline{\text{RESET}}$ Output
 - Spread-Spectrum Option
 - Adaptive On-Time
 - 3mm x 3.5mm FCQFN
- High Precision
 - 107%/93% OV/UV Monitor
 - $\pm 2\%$ OV/UV Accuracy
 - $\pm 1\%$ Output Voltage Accuracy
 - Excellent Load Transient Performance
 - Differential Remote Sense
 - PWM and SKIP Mode Operation
 - MAXQ Power Architecture
- Ultra-High Efficiency
 - Up to 93% Efficiency 5V to 1V
- -40°C to $+125^{\circ}\text{C}$ Operating Temperature Range
- AEC-Q100 Qualified

Simplified Block Diagram



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Rev. 0

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