Four-Output Mini PMICs for Safety Applications

MAX20430

General Description

The MAX20430 is a high-efficiency, four-output DC-DC converter and windowed watchdog. OUT1 is a synchronous step-down converter that converts vehicle battery voltage to 3.3V at up to 2.5A. OUT3 boosts OUT1 to 5V at up to 500mA, while OUT2 and OUT4 low-voltage synchronous step-down converters operate from OUT1 and provide a 0.8V to 3.9875V output voltage range at up to 3A. All outputs achieve ±1.5% output error over load, line, and temperature range.

The device features 2.1MHz fixed-frequency PWM mode for all DC-DC outputs for better noise immunity and load-transient response. The 2.1MHz frequency operation allows for the use of all ceramic capacitors and minimizes external components. The programmable spread-spectrum frequency modulation minimizes radiated electromagnetic emissions. Integrated low R_{DSON} switches improve efficiency at heavy loads and make the layout much simpler with respect to discrete solutions.

The device is offered with factory-preset output voltages. Other features include soft-start, overcurrent, and overtemperature protections.

Applications

- ADAS

***Ordering Information* appears at end of data sheet.**

Benefits and Features

- Multiple Functions for Small Size
  - Synchronous High-Voltage Buck Converter up to 2.5A
    - Input Voltage Range 3.5V to 40V
    - Output Voltage of 3.3V
  - 5V, Synchronous 500mA Boost Converter
  - Dual Synchronous Buck Converters up to 3A
    - 0.8V to 3.9875V in 12.5mV Steps
  - Flexible Power Sequencer for OUT2, OUT3, and OUT4
  - Programmable Challenge/Response or Windowed Watchdog
  - Two Free Programmable UV/OV Voltage Monitors
    - 0.8V to 3.9875V in 12.5mV Steps
  - I^2C Fast-mode Plus-Compatible Interface with Packet Error-Checking Option (PEC)
  - 2.1MHz Internal Operation with Spread-Spectrum Option
  - $\overline{\text{RESET}}$ Output
  - Current-Mode, Forced-PWM Operation
- High Precision for ASIL Applications
  - ±1.5% Output Voltage Accuracy
  - ±1% OV/UV Monitoring
- Diagnostics and Redundant Circuits
  - ASIL C Compliant
  - Redundant Reference
  - BIST Diagnostics
  - Fail Safe on Open Pins
  - Shorted Pin Detection on $\overline{\text{RESET}}$
- Mount ID Location Detection
- Robust for the Automotive Environment
- Overtemperature and Short-Circuit Protection
- 5mm x 5mm, Side-Wettable TQFN Package
- -40°C to +125°C, Grade 1 Automotive Temperature Range

Visit Web Support to complete the nondisclosure agreement (NDA) required to receive additional product information.

19-100691; Rev 15; 12/24

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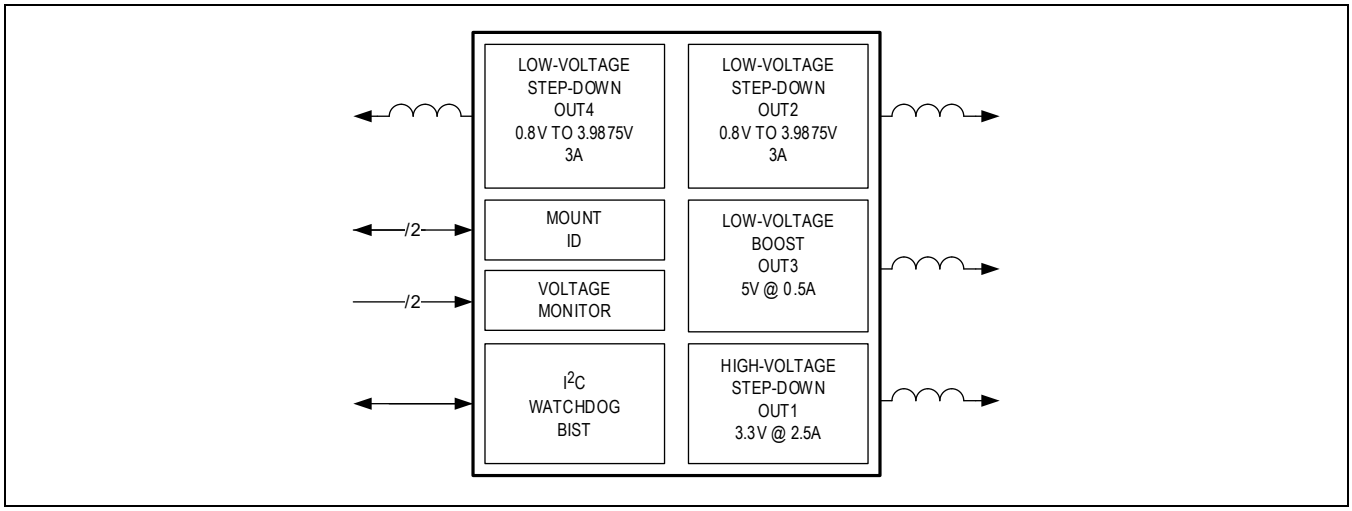
Simplified Block Diagram



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