

MAX20430

Four-Output Mini PMICs for Safety Applications

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 $\pm 1.5\%$ 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 $R_{DS(on)}$ 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

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
 - I²C 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
 - $\pm 1.5\%$ Output Voltage Accuracy
 - $\pm 1\%$ 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 $+125^{\circ}\text{C}$, Grade 1 Automotive Temperature Range

Simplified Block Diagram



