Four-Output, Low-Noise PMIC for Safety Applications

MAX20433

General Description

The MAX20433 is a high-efficiency, four-output DC-DC converter with a windowed watchdog. The OUT1 is a synchronous step-down converter that converts vehicle battery voltage to 3.3V at up to 3A. The OUT3 boosts the OUT1 to 5V at up to 0.5A, while the OUT2/4 low-noise, low-voltage, synchronous step-down converters operate from OUT1 and provide a 0.5V to 3.6875V output voltage range at up to 3.2A. The low-noise performance eliminates the need for external LDOs and allows the use of a ferrite bead (LC) filter instead. All outputs achieve ±1.5% output error.

The device features a 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 the external components. The programmable spread-spectrum frequency modulation minimizes the radiated electromagnetic emissions. Integrated low-R_{DSON} switches improve efficiency at heavy loads and make the layout much simpler with respect to discrete solutions.

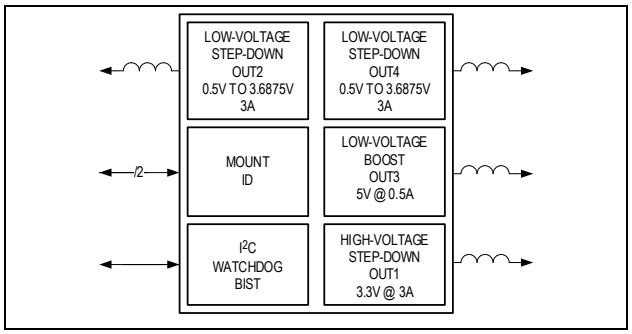
The MAX20433 features the MAXQ™ power architecture, which provides precision transient performance and phase margin. This allows to obtain the maximum power, performance, and precision while minimizing system cost for any specific application.

The devices are offered with factory-preset output voltages. Other features include soft-start, overcurrent, and overtemperature protection.

Key Application

- Advanced Driver-Assistance Systems (ADAS)

Simplified Block Diagram



Benefits and Features

- Multiple Functions for Small Size
  - 3A Synchronous High-Voltage Buck Converter
    - Input Voltage Range 3.5V to 40V
    - Output Voltage of 3.3V
  - 5V Synchronous 0.5A Boost Converter
  - Dual 3.2A Low-Noise Buck Converter
    - 0.5V to 3.6875V in 12.5mV Steps
  - Flexible Power Sequencer
  - Programmable Challenge/Response or Windowed Watchdog
  - I²C Fast-Mode Plus Compatible Interface with Packet Error-Checking Option (PEC)
  - 2.1MHz Internal Operation with Spread Spectrum
  - $\overline{\text{RESET}}$ Output
  - Current-Mode, Forced-PWM Operation
- High-Precision for ASIL Applications
  - ±1.5% Output Voltage Accuracy
  - ±1% OV/UV Monitoring
  - MAXQ Power Architecture
- 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
- AEC-Q100 Qualified
- -40°C to +125°C Automotive Temperature

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

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

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