Single 2.2MHz, Low-Voltage, Step-Down DC-DC Converter Family for Safety Applications

General Description

The MAX20015–MAX20018 family of ASIL B-compliant high-efficiency switching regulators delivers up to 3A load current from 0.5V to 3.8V. The devices operate from a 2.7V to 5.5V input voltage range, making them ideal for on-board point-of-load and post-regulation applications. Total output error is less than ±1.5% over load, line, and temperature.

The devices feature fixed-frequency PWM mode operation, with a 2.2MHz switching frequency. High-frequency operation allows for an all-ceramic capacitor design and small external components.

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. Following a simple layout and footprint ensures first-pass success in new designs.

The devices provide an enable input, spread-spectrum enable input, and $\overline{\text{RESET}}$ output. The output voltage can be preset at the factory to allow customers to achieve ±1.5% output-voltage accuracy without using expensive 0.1% resistors. In addition, the output voltage can be set to any customer value by using two external resistors at the feedback, with 0.5V internal reference. The devices offer factory-programmable soft-start and $\overline{\text{RESET}}$ hold times.

The 10-pin TDFN exposed pad devices include overtemperature shutdown and overcurrent limiting. All devices are designed to operate over the -40°C to +125°C ambient temperature range.

Applications

- Automotive
- Point-of-Load (PoL)

Benefits and Features

- High Feature Set in Ultra-Small Footprint
  - High-Efficiency DC-DC Converter
  - Up to 3A Output Current
  - 2.7V to 5.5V Operating Supply Voltage
  - Resistor-Adjustable or Factory-Preset Output Voltages
  - Synchronizable, 2.2MHz Switching Frequency
  - Enable Input
  - $\overline{\text{RESET}}$ Output•Spread-Spectrum Enable Input
  - Forced-PWM and Skip Modes
  - Current-Mode Architecture
  - 3mm x 3mm x 0.85mm 10-Pin TDFN
- High Precision
  - Selectable Overvoltage/Undervoltage Thresholds
  - ±1.5% OV/UV Accuracy
  - ±1.5% Output-Voltage Accuracy
  - Excellent Load-Transient Performance
  - Overtemperature and Short-Circuit Protection
  - -40°C to +125°C Operating Temperature Range
- Diagnostics and Redundant Circuits
  - ASIL B Compliant
  - Redundant Reference
  - Shorted Pin Detection on $\overline{\text{RESET}}$

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