4x6 Smart Power-Stage IC with Integrated LDO, Current, and Temperature Sensors

MAX20846

General Description

The MAX20846 is a feature-rich, smart power-stage IC designed to work with Analog Devices' controllers to implement a high-density multiphase voltage regulator. Multiple smart power-stage ICs plus a controller provide a compact synchronous buck converter that includes accurate individual phase current and temperature reporting through PMBus™. These smart power-stage devices include fault-protection circuits for overtemperature, VX short, I/O open/short, supply undervoltage lockout (UVLO), and main power-supply overvoltage lockout (OVLO). The MAX20846 immediately shuts down on fault detection, communicating the Fault_ID to the controller.

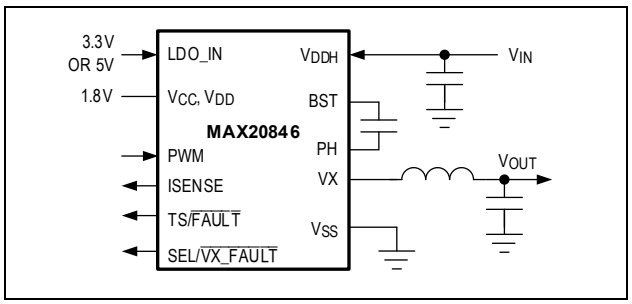
Monolithic integration and advanced packaging technology allow high-switching frequencies with significantly lower losses than conventional implementations. Phase shedding and discontinuous conduction modes (DCM) optimize efficiency over a wide range of load currents. The MAX20846 integrates an internal LDO simplifying bias generation for applications that do not have 1.8V available.

The MAX20846 is available in a 4mm x 6mm, 34-pin FC2QFN package.

Applications

- High-Current Multiphase-Voltage Regulators
  - VR13, VR13.HC, and VR14 CPU and Memory
  - Networking ASICs
  - AI and Machine Learning ASICs
  - Graphics Processors
- Servers, Workstations, and Enterprise Storage
- Communications and Networking Equipment

Typical Operating Circuit



Benefits and Features

- Space-Optimized Solution
  - Monolithic, Smart Power Stage
  - Phase-Current Steering for Thermal Balance
  - Small Footprint: 24mm^2
- 96.1% Peak Efficiency
  - 6-Phase, 400kHz, 12V V_{IN}, 1.8V V_{OUT}
- 300kHz to 1.3MHz Switching Frequency
- Telemetry and Fault Reporting through Controller IC PMBus
  - Accurate Temperature Monitoring and Reporting
  - Accurate Per-Phase Current Reporting
  - Fault_ID Indicates Parallel Phase Fault Type
- Advanced Self-Protection Features*
  - Supply and Boost UVLO Protection
  - Input Supply OVLO Protection
  - Boost Refresh
  - VX Short and Overtemperature Shutdown
  - VX Open and Short Detection at Power-Up
  - Fast Overcurrent Protection
  - Inductor Saturation Protection
  - Open/Short Pin Detection During Startup

  **Protection features vary with different part variants.*

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

PMBus is a trademark of SMIF, Inc.

Electrical and Thermal Ratings

DESCRIPTION	CURRENT RATING* (A)	INPUT VOLTAGE (V)	OUTPUT VOLTAGE (V)
Electrical Rating**	104.5	4.5 to 16	0.25 to 5.8
Thermal Rating T_A = +55°C, 200LFM	44	12	1.8
	47	12	1.0

**T_J = +125°C.*

***Maximum-phase DC current limited by POCP and FASTPOCP_R typical value. Maximum output voltage requires V_{DDH} > V_{OUT} + 2.2V.*

19-101639; Rev 0; 6/23