Low-Input-Voltage, Smart Power-Stage ICs with Integrated Current and Temperature Sensors

MAX16625/MAX16627

General Description

The MAX16625/MAX16627 are feature-rich low input voltage smart power-stage ICs 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 MAX16625/MAX16627 immediately shut down on fault detection, communicating the Fault_ID to the controller.

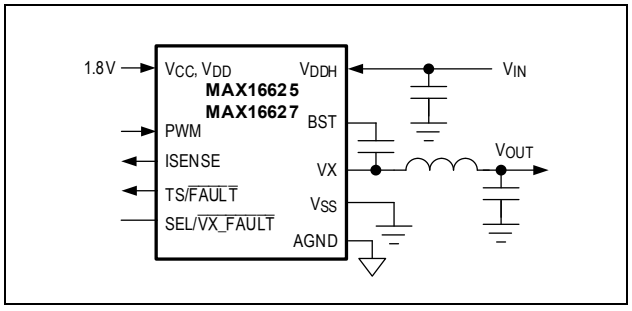
Monolithic integration and advanced packaging technology allow high-switching frequencies with significantly lower losses than conventional implementations. Phase shedding and discontinuous conduction modes (DCM) optimize efficiency over a wide range of load currents.

The MAX16625 is available in a standard (3.25mm x 7.4mm) 12-pin FC2QFN package, while the MAX16627 is in a narrow (3.05mm x 7.25mm) 12-pin FC2QFN package. Both packages have an exposed top-side thermal pad.

Applications

- High-Current Multiphase-Voltage Regulators
  - AI and Machine Learning ASICs
  - Networking 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
  - Small Footprint: 22mm^2 or 24mm^2
- Peak Efficiency with 8-Phase, 600kHz, 4.5V V_{IN}
  - 95.4% at 1V V_{OUT}
  - 93.1% at 0.6V 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 Type of Fault
  - SEL Input for Single-/Parallel-Mode Operation (MAX16625C/MAX16627C) or $\overline{VX\_FAULT}$ Output (MAX16625A/B, MAX16627A/B)
- 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
  - I/O Open/Short Pin Startup Check

***Ordering Information* appears at 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**	98	3 to 6	0.25 to 2.3
Thermal Rating, T_A = +55°C,	64	4.8	1.0
200LFM	66	4.8	0.6

**T_J = +125°C. For specific operating conditions, see SOA curves in the Typical Operating Characteristics section.*

***Maximum-phase DC current limited by POCP and FASTPOCP_R typical values.*

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

19-101302; Rev 1; 4/24