

MAX15301

InTune Automatically Compensated Digital PoL Controller with Driver and PMBus Telemetry

General Description

The MAX15301 is a full-featured, highly efficient, digital point-of-load (PoL) controller with advanced power management and telemetry features. Unlike PID-based digital power regulators, the MAX15301 uses Maxim's patented InTune™ automatically compensated, state-space control algorithm. The InTune control law is valid for both the small- and large-signal response and accounts for duty-cycle saturation effects. This eliminates the need for users to determine and set thresholds for transitioning from linear to nonlinear modes. These capabilities result in fast loop transient response and reduce the number of output capacitors compared to competing analog and digital controllers.

The MAX15301 includes multiple features to optimize efficiency. An internal switch BabyBuck regulator generates the gate drive and the internal bias supplies for the controller with low power loss. An advanced, high-efficiency MOSFET gate driver has adaptive nonoverlap timing, which continuously adjusts the high-side and low-side timing and drive voltage to minimize switching losses over the full range of voltage, current, and temperature.

The MAX15301 was designed with the end-customer's design environment in mind. An on-board PMBus™-compliant serial bus interface enables communication with a supervisory controller for monitoring and fault management. A full suite of power management features eliminates the need for complicated and expensive sequencing and monitoring ICs. Basic DC-DC conversion operation can be set up via pin strapping and does not require user configuration firmware. This allows for rapid development of the power-supply subsystem before board-level systems engineering is completed. Maxim provides support hardware and software for configuring the MAX15301.

The MAX15301 is available in a 32-lead, 5mm x 5mm TQFN package and operates over the -40°C to +85°C temperature range.

InTune is a trademark of Maxim Integrated Products, Inc.

PMBus is a trademark of SMIF, Inc.

Maxim patents apply: 7498781, 7880454, 7696736, 7746048, 7466254, 798613, 7498781, 8,120,401, 8,014,879.

This product is subject to a license from Power-One, Inc. related to digital power technology patents owned by Power-One, Inc. This license does not extend to merchant market stand-alone power-supply products.

Features

- ◆ **InTune Automatic Compensation Ensures Stability While Optimizing Transient Performance**
- ◆ **Nonlinear Compensation Results in Fast Transient Response with Reduced Output Capacitance**
- ◆ **Differential Remote Voltage Sensing Enables $\pm 1\%$ V_{OUT} Accuracy over Temperature (-40°C to +85°C)**
- ◆ **PMBus Interface for Configuration, Control, and Monitoring**
- ◆ **Supports Voltage Positioning**
- ◆ **Improved Efficiency**
 - ◇ **Drivers with Adaptive Nonoverlap Timing**
- ◆ **Wide Input Range of 4.5V to 14V**
- ◆ **Efficient On-Chip BabyBuck Regulator for Self-Bias**
- ◆ **Output Voltage Range from 0.5V to 5.25V**
- ◆ **Startup into a Prebiased Output**
- ◆ **Configurable Soft-Start and Soft-Stop Time**
- ◆ **Fixed-Frequency Operation with SYNC (300kHz to 1MHz)**
- ◆ **Flexible Sequencing and Fault Management**
- ◆ **Pin-Strappable Configuration**
 - ◇ **Output Voltage, Slave Address, Switching Frequency, Current Limit**
- ◆ **Out-of-the-Box Operation Enables Fast Prototyping**

Applications

Servers
Storage Systems
Routers/Switches
Base Station Equipment
Power Modules
Graphic Cards

[Ordering Information](#) and [Typical Operating Circuit](#) appears at end of data sheet.

For related parts and recommended products to use with this part, refer to www.maximintegrated.com/MAX15301.related.

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Ordering Information

PART	TEMP RANGE	PIN-PACKAGE
MAX15301ETJ+	-40°C to +85°C	32 TQFN-EP*

+Denotes a lead(Pb)-free/RoHS-compliant package.

*EP = Exposed pad.

Chip Information

PROCESS: BiCMOS

Package Information

For the latest package outline information and land patterns (footprints), go to www.maximintegrated.com/packages. Note that a "+", "#", or "-" in the package code indicates RoHS status only. Package drawings may show a different suffix character, but the drawing pertains to the package regardless of RoHS status.

PACKAGE TYPE	PACKAGE CODE	OUTLINE NO.	LAND PATTERN NO.
32 TQFN-EP	T3255M-51	21-0140	90-0013