LM10524

Power Management Unit Optimized for LSI Controllers

TEXAS INSTRUMENTS

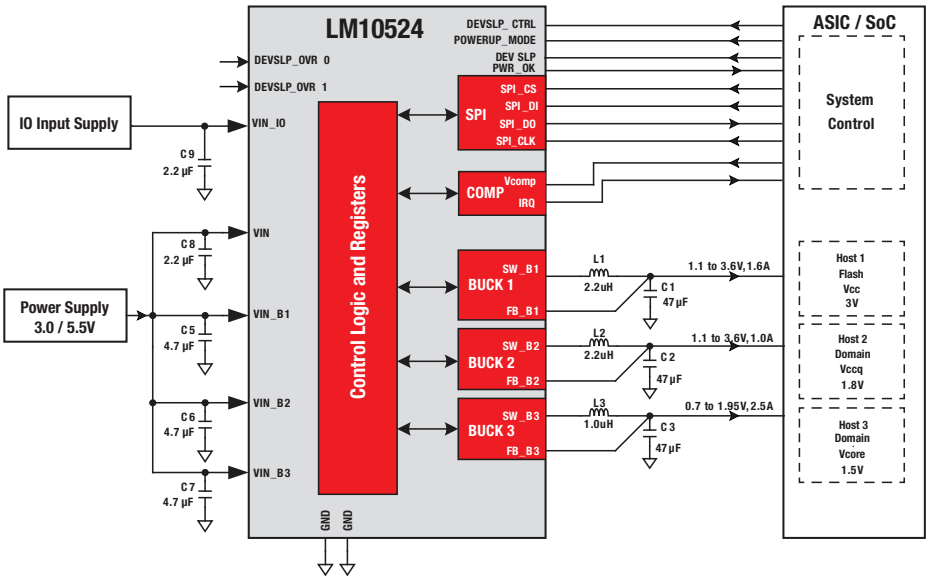
Product Bulletin

High Efficiency Solution Optimized for Solid State Drives

Overview

The LM10524 from Texas Instruments is a fully integrated power management unit (PMU) capable of powering all supply rails in Solid State Drives (SSD). This ultra-compact, reliable/flexible, and highly efficient power solution replaces up to three (3) discrete components typically used in these drives. It functions cooperatively with a controller IC to optimize the supply voltage for low power conditions and features additional proprietary power saving modes to obtain maximum system efficiency.

This design scheme delivers longer battery life for portable devices with SSDs, particularly those driven by LSI Client controllers. The chip also uses a 4-wire SPI interface to communicate with processors to achieve output voltage programmability. Unlike discrete solutions available today, the highly integrated, all-in-one PMU solution from TI delivers a higher performance-to-cost ratio and is specifically designed and optimized with features geared for SSD and flash drive applications.



LM10524 typical application diagram

Product Highlights

- Three highly efficient SPI-programmable buck regulators
- Deep sleep mode saves power during idle times (DEVSLP)
- Automatic internal soft-start on each supply limits startup inrush current
- Phase-shifted buck operation reduces input current ripple and capacitor size

Key Specifications

- ±3% feedback voltage accuracy
- Up to 95% efficient buck regulators
- 2 MHz switching frequency for smaller inductor size
- 2.8 x 3.2 mm with 0.4 mm pitch microSMD package

Features and Benefits

Better performance to cost ratio compared to discrete solutions

- Integrated all-in-one power solution saves valuable board space
- 2 MHz switching frequency for smaller inductor size
- PWR_OK pin
- High bandwidth provides fast turn-on without overshoot
- No loop compensation needed
- PFM mode for low load high efficiency operation

Reliability and flexibility at a low cost

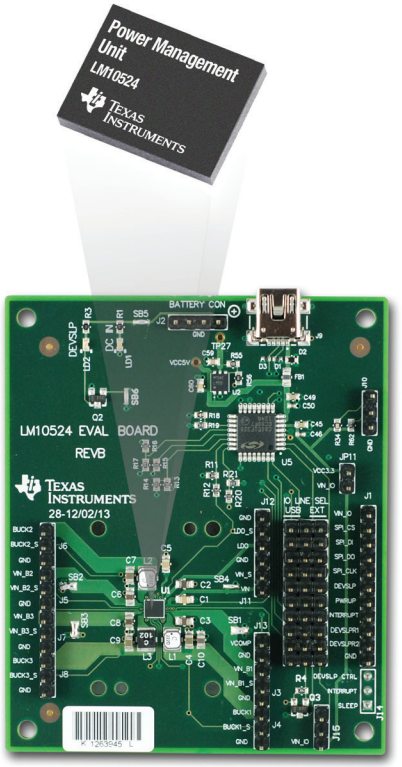
- Built-in over-current limit and thermal protection improves safety
- All three supply voltages offer user-programmable options for maximum flexibility
- Customizable startup sequencing for greater flexibility
- Bypass mode on Buck1 for power down data protection to enhance data integrity
- Easy-to-interface GUI for accelerated design
- Integrated solution leads to higher overall reliability of SSD

Extremely energy-efficient design

- Operates cooperatively with ASIC to optimize the supply voltage for low power conditions
  – Dynamic Voltage Scaling (DVS)
- Power saving modes via SPI interface
  – Sleep mode (DEVSLP) and DVS

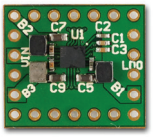
Regulator Table

Regulator	Programmable V_{OUT}	Maximum Output Current	Description
Buck1	1.1 to 3.6V, 50 mV steps	1.6A	Flash power
Buck2	1.1 to 3.6V , 50 mV steps	1A	Interface
Buck3	0.7V to 1.95V, 10 mV steps	2.5A	Core



LM10524 evaluation board

LM10524 SSD solution board demonstrates the reduced size possible with the integrated PMU, actual size 18 mm x 16 mm



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