MxL77904

High-Performance Multiphase PMIC
Product Brief

General Description

The MxL77904 is a high-performance multiphase power management integrated circuit (PMIC) designed to provide multiphase and single-phase outputs for a wide range of power management solutions. It supports programmable high switching frequencies, enabling high efficiency across operating conditions. The device also offers multiphase configuration options, including single-, dual-, triple-, and quad-phase outputs.

The MxL77904 integrates a low ON-resistance MOSFET, improving efficiency and offering a programmable switching frequency. It supports advanced operating modes such as diode emulation, pulse-frequency modulation (PFM), and multiphase with automatic phase shedding and phase adding. These features enhance efficiency while maintaining excellent dynamic transient performance.

The device also supports dynamic voltage scaling (DVS) through multiple control methods, including direct register writes via I^2C or control through GPIO pins. It incorporates several protections mechanisms—over-voltage protection (OVP), under-voltage protection (UVP), over-current protection (OCP), negative current protection (NOCP), short-circuit protection (SCP), and over-temperature protection (OTP)—without requiring external sensing components.

The MxL77904 uses a proprietary valley current mode (VCM) constant on-time (COT) control architecture, which simplifies loop compensation and enables rapid recovery from line and load transients. This architecture provides fast transient response with minimized voltage overshoot and undershoot during load transient.

Features

- Input supply voltage from 2.7V to 5.5V
- Output voltage ranges:
  - 0.3V~1.15V (1.2mV step)
  - 0.375V~1.43V (1.5mV step)
  - 0.5V~1.92V (2mV step)
  - 1.5V~3.3V (6mV step)
- 5A per phase output current
- DVS for each output
- High efficiency (95%)
- Programmable startup and shutdown sequence
- Programmable switching frequency (from 600kHz to 4MHz)
- Automatic phase shedding and phase adding
- Programmable soft-start and DVS ramp
- Fault handling, OVP, UVP, OCP and NOCP, SCP, OTP, input under-voltage lockout (UVLO)
- Configurable output phase combinations: (1 + 1 + 1 + 1), (2 + 1 + 1), (3 + 1), (4 + 0)
- Mode selection for forced continuous conduction mode (FCCM) and Auto-PFM
- I^2C interface
- Remote sensing at point of load
- Wafer Level Chip Scale Package (WLCSP) 6 × 9 balls, 0.4mm pitch

Applications

- Data centers
- Optical modules
- Storage systems
- Surveillance systems
- ASIC, FPGA, and MCU power supplies
- Smartphones, consumer products, drones

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