

MPSafe™ 21V, 3W, 4-Rail PMIC with 3 Bucks and 1 LDO for Functional Safety Automotive ADAS Camera Modules, AEC-Q100 Qualified

Description

The MPQ70240FS is a complete power management solution that integrates three high-efficiency step-down DC/DC converters and a low-noise low-dropout (LDO) regulator and flexible logic interface. Unique architecture with two first-stage buck converters redefines the size, efficiency, and EMI of high-resolution camera modules.

Constant-on-time control (COT) with phase-locked loop (PLL) provides fast transient response and a stable frequency. A 2.2MHz fixed switching frequency (f_{sw}) during continuous conduction mode (CCM) greatly reduces the required external inductance and capacitance. Full protection features include under-voltage lockout (UVLO), over-current protection (OCP), over-voltage protection (OVP), and thermal shutdown. The output voltage (V_{OUT}) is adjustable via the PMBus or preset via the multi-page one-time programmable (MOTP) memory. The start-up sequence is also configurable via the OTP or the PMBus. The PMBus can be used to monitor the fault status.

With the integration of sophisticated functional safety features such as an analog built-in self-testing (ABIST) and diagnostics, this ASIL-certified device supports applications with a high automotive safety integrity level up to ASIL B. It is developed under MPS's advanced MPSafe™ Functional Safety Product Development process, which has been independently certified to meet ISO26262 guidelines.

The MPQ70240FS requires a minimal number of external components, and is available in a space-saving QFN-15 (2.5mmx3.5mm) package with wettable flanks.

Features & Benefits

- Designed for Automotive Camera Applications
 - Buck 1:
 - 600mA with 3.5V to 16V Input Voltage (V_{IN})
 - Provides the Bus Voltage (V_{BUS}) with Minimum Inductor Size
 - Buck 2:
 - 600mA with 3.5V to 16V V_{IN}
 - Directly Power the 1.8V Rail for Highest Efficiency
 - Buck 3:
 - 1A with 2.5V to 4V V_{IN}
 - Fast Transient for the Core
 - LDO:
 - Supports 200mA for Large CMOS Sensors
 - Low Output Ripple, Low Noise to Achieve Best Image Quality
- Optimized for EMC/EMI Reduction
 - 2.2MHz Switching Frequency (f_{sw})
 - Stepped Triangle Spread Spectrum with On/Off Function
 - Symmetric Input Capacitor for Reduced EMI

- CISPR25 Class 5 Compliant
- MeshConnect™ Flip-Chip Package
- Additional Features
 - Over-Current Protection (OCP) with Valley-Current Detection and Hiccup Mode
 - Flexible Power Good (PG) Output
 - PMBus/I²C Compliant Interface with Packet Error Checking (PEC)
 - Available in a QFN-15 (2.5mmx3.5mm) Package
 - Available in a Wettable Flank Package
 - Available in AEC-Q100 Grade 1
- Functional Safety
 - Integrated Analog Built-In Self-Test (ABIST) and Reference Monitor
 - Hardware Capability to ASIL B
 - Documents Available for ISO26262 System Design
 - Failure Modes Effects and Diagnostic Analysis (FMEDA)
 - Safety Manual