MPQ70240FS

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

PRELIMINARY SPECIFICATIONS SUBJECT TO CHANGE

DESCRIPTION

The MPQ70240FS is a complete power management solution, which integrates three high efficiency step-down DC/DC converters, and a low noise LDO (low dropout) and flexible logic interface. Unique 2 first stage bucks architecture redefines the size, efficiency, and EMI of high resolution camera modules.

Constant on time control with PLL provides fast transient response and stable frequency. 2.2MHz fixed switching frequency during CCM mode greatly reduces external inductor and capacitor value. Full protection features include UVLO, OCP, OVP and thermal shutdown.

Output voltage is adjustable through PMBus bus or preset by multi page OTP (One Time Programmable). The power on sequence is also programmable by OTP or can be controlled through PMBus bus online. 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 diagnostic, this ASIL-certified device supports applications with a high automotive safety integrity level up to ASIL-B. It is developed under MPS' 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 space-saving QFN-15 (2.5mmx3.5mm) package with wettable flanks.

APPLICATIONS

- Automotive Camera Modules
- Automotive Sensor Applications
- Automotive Secondary Regulation
- Space Constrained Applications

FEATURES

Designed for Automotive Camera Applications

- Buck1:
  – 600mA with 3.5V-16V input
  – Provide the Bus Voltage with Minimum Inductor Size
- Buck2:
  – 600mA with 3.5V-16V input
  – Directly Power the 1.8V Rail for Best Efficiency
- Buck3:
  – 1A with 2.5V- 4V input
  – Fast Transient for the Core
- LDO:
  – Support 200mA for Big CMOS Sensors
  – Low Output Ripple, Low Noise to Achieve Best Image Quality

Optimized for EMC/EMI

- 2.2MHz Switching Frequency
- Stepped Triangle Spread Spectrum with on/off Function
- Symmetric Input Cap for Better EMI
- CISPR25 Class 5 Compliant
- MeshConnect™ Flip-Chip Package

Additional Features

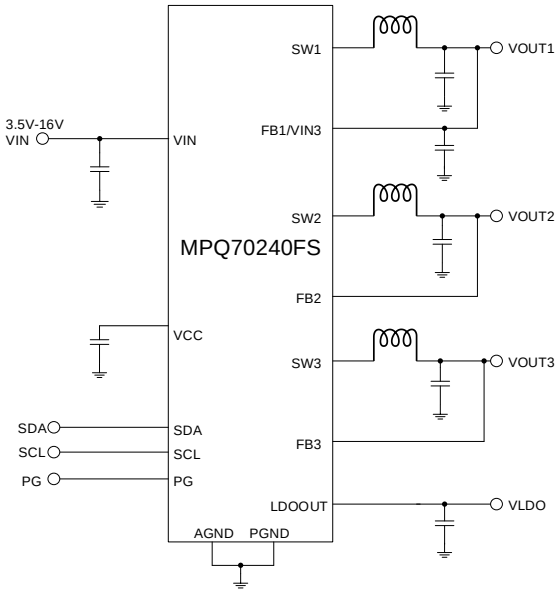
- Over-Current Protection (OCP) with Valley-Current Detection and Hiccup
- Flexible Power Good Output
- PMBus/I2C Compliant Interface with PEC
- QFN-15 (2.5mmx3.5mm) Package with Wettable Flank
- AEC-Q100 Grade 1

Functional Safety

- Integrated ABIST and Reference Monitor
- Hardware Capability to ASIL B
- Documents Available for ISO26262 System Design
- Failure Modes Effects and Diagnostic Analysis (FMEDA)
- Safety Manual

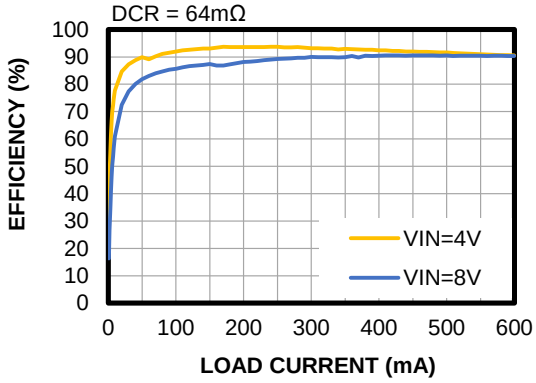
MPSafe Developed for Functional Safety Applications: ISO26262 Compliant

TYPICAL APPLICATION



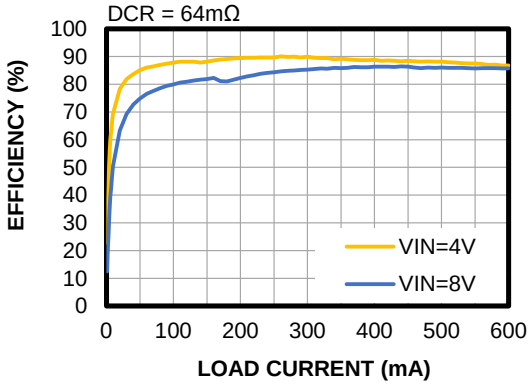
Efficiency vs. Load Current (Buck 1)

V_{OUT1} = 3.0V, f_{SW1} = 2.2MHz, DCM, other channels are disabled, L1 =2.2µH, DCR = 64mΩ



Efficiency vs. Load Current (Buck 2)

V_{OUT2} = 1.8V, f_{SW2} = 2.2MHz, DCM, other channels are disabled, L2 = 2.2µH, DCR = 64mΩ



Efficiency vs. Load Current (Buck 3)

V_{OUT3} = 1.2V, f_{SW3} = 2.2MHz, DCM, LDO is disabled, L3 = 1µH, DCR = 35mΩ