



ON Semiconductor®

November 2016

FDMF3180 – Smart Power Stage (SPS) Module with Integrated Current and Temperature Monitors

Features

- ON's PowerTrench® 11 MOSFET Technology: ~0.5% Higher Peak Efficiency vs. Prior Generation
- 30 V/25 V Breakdown Voltage MOSFETs to Ensure Long Term Reliability
- Up to 70 A of Peak Current Handling Capability
- High-Performance, 5 mm x 6 mm, Universal Footprint PQFN Package
- Integrated Current Monitor (IMON) Compliant with Intel's VR13 Accuracy Requirements
- Integrated Temperature Monitor (TMON)
- Catastrophic Fault Detection Features
 - Thermal Flag (OTP) for Over-Temperature Condition
 - Over-Current Protection FAULT (OCP)
 - High--Side Short Detect FAULT
 - Under-Voltage Lockout (UVLO) on VCC and PVCC
- Green Packaging and RoHS Compliance

Applications

- CPU and Memory Voltage Regulators in VR13 Purley Systems
- High-Current Utility Rails in Server Systems
- Communications Infrastructure Equipment

Description

The FDMF3180 is ON's latest generation Smart Power Stage (SPS) module for high-current, high frequency, synchronous DC-DC buck converter applications. It integrates fully optimized High Side and Low Side PowerTrench® 11 power MOSFETs with an advanced driver IC featuring current and temperature sensors.

With an integrated approach, the SPS switching power stage is optimized for driver and MOSFET dynamic performance, minimized system inductance, and power MOSFET $R_{DS(ON)}$.

The integration of Power MOSFETs with a driver IC enables advanced high accuracy module thermal and current monitoring. The FDMF3180 provides an output signal (IMON), which reports the real-time module current. IMON is a very accurate, 5 μ A/A signal representing the real-time Power MOSFET drain currents. The IMON signal can be used to replace output filter inductor DCR current sense or resistor sense methods.

The FDMF3180 also includes very accurate module thermal monitor (TMON). TMON is a voltage sourced PTAT signal that is calibrated to provide a 0.8 V output at 25°C with an 8 mV / °C slope.

Ordering Information

| Part Number | Rated Output Current | Operating Junction Temperature Range | Package |
|-------------|----------------------|--------------------------------------|------------------------|
| FDMF3180 | 70 A | -40°C to 125°C | SPS3 5 mm x 6 mm (QFN) |

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Application Diagram

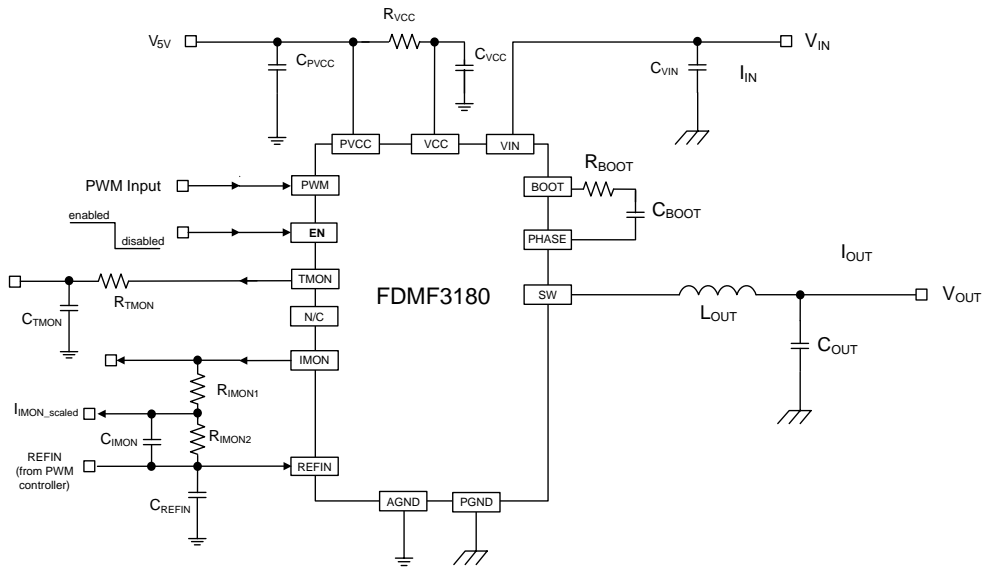


Figure 1. Typical Application Diagram

Functional Block Diagram

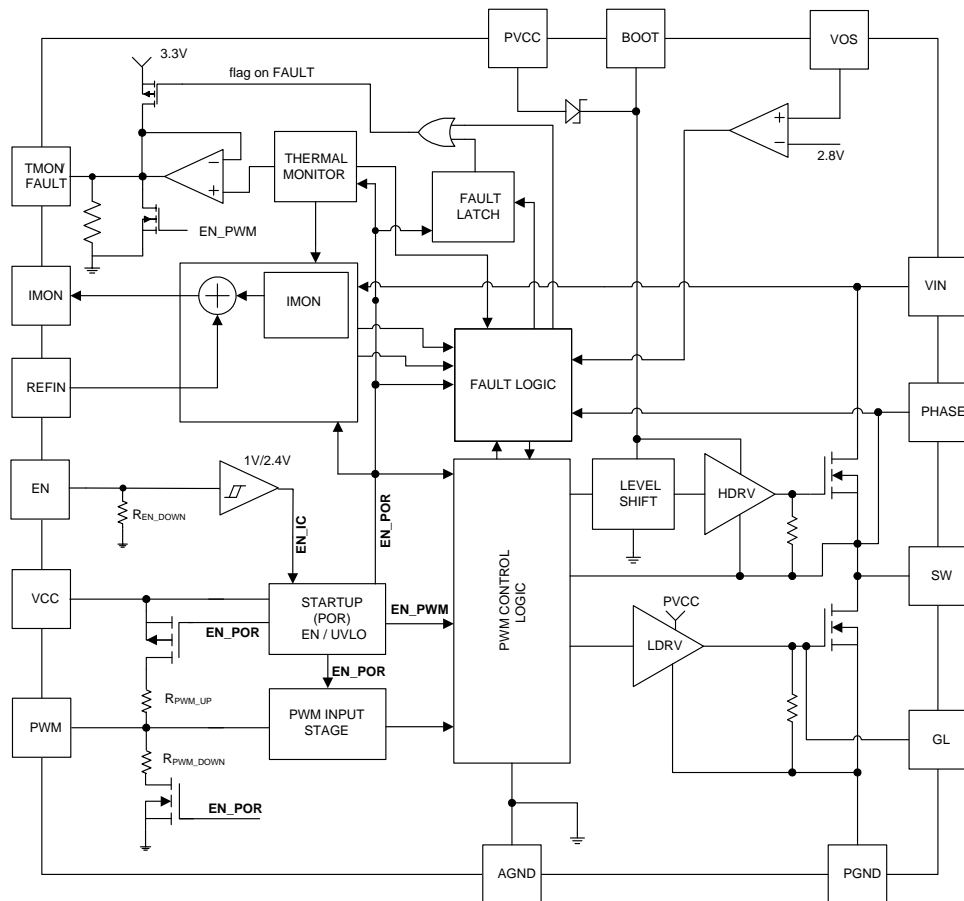


Figure 2. Functional Block Diagram

Pin Configuration

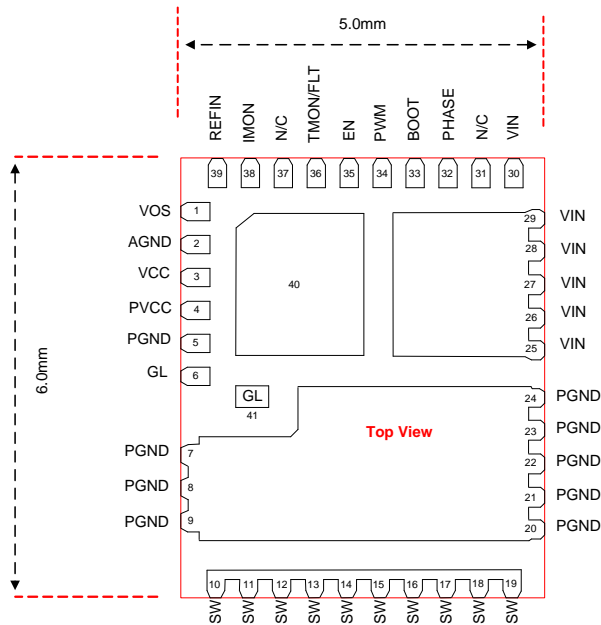



Figure 3. Pin Configuration

Pin Description

| Pin # | Name | Function |
|------------|------------|---|
| 1 | VOS | VR output voltage sensing pin for pre-OVP protection. Leave it floating if not used. |
| 2 | AGND | Analog Ground for the analog portions of the IC and for substrate. |
| 3 | VCC | Power Supply input for all analog control functions. |
| 4 | PVCC | Power Supply input for LS Gate Driver and Boot Diode. |
| 5, 40 | PGND | Reserved for PVCC de-coupling capacitor return. |
| 6, 41 | GL | Low-Side Gate Monitor. |
| 7-9, 20-24 | PGND | Power ground connection for Power Stage high current path. |
| 10-19 | SW | Switching node junction between high-and low-side MOSFETs. |
| 25-30 | VIN | Input Voltage to Power Stage. |
| 31 | NC | No connect. |
| 32 | PHASE | Return Connection for BOOT capacitor. |
| 33 | BOOT | Supply for high-side MOSFET gate driver. A capacitor from BOOT to PHASE supplies the charge to turn on the n-channel high side MOSFET. During the freewheeling interval (LS MOSFET on) the high side capacitor is recharged by an internal diode. |
| 34 | PWM | PWM input to gate driver IC. |
| 35 | EN | EN=LOW disables most blocks inside IC. EN=HIGH enables all blocks inside IC and requires 4 μ s power up time. |
| 36 | TMON / FLT | Temperature and FAULT Reporting Pin. Pin sources a (PTAT) voltage of 0.6 V at 0°C with an 8 mV/°C slope when no module FAULT is present. In the event of a module FAULT, this pin pulls HIGH to an internal driver IC rail = 3.0 V typical. |
| 37 | N/C | No connect. Some second source options require this pin to be connected. |
| 38 | IMON | Current monitor output (output is referenced to REFIN) – 5 μ A/A |
| 39 | REFIN | Referenced voltage used for IMON feature. DC input voltage supplied by external source (not generated on SPS driver IC). |

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