



General Description

The FS6808DG represents a major leap towards achieving low standby power in medium-to-high power Switched-Mode Power Supplies such as notebook adapters, off-line battery chargers and consumer electronics equipment. The FS6808DG contains all needed control functionality to build a rugged and efficient power supply. The FS6808DG is a current mode controller with internal ramp compensation. Among the unique features offered by the FS6808DG is an event management scheme that can disable the front-end PFC circuit during standby, thus reducing the no load power consumption. The FS6808DG itself goes into cycle skipping at light loads while limiting peak current so that no acoustic noise is generated. The FS6808DG has a high-voltage (500V) startup circuit that eliminates external components and reduces power consumption. The FS6808DG also features an internal latching function that can be used for OVP protection. True overload protection, internal 2.5 ms soft-start, internal leading edge blanking, internal frequency dithering for low EMI are some of the other important features offered by the FS6808DG. offered in SOP-8 package.

Features

- Internal High-Voltage(500V) Startup Current Source for Loss-Less Startup
- MAX 18V Power Supply Voltage
- Current-Mode Operation with Internal Ramp Compensation
- Extremely Low No-Load Standby Power
- Direct Connection to PFC Controller for Improved No-Load Standby Power
- Internal Leading Edge Blanking
- Latched Primary Overcurrent and Overvoltage Protection
- Short-Circuit Protection Independent of Auxiliary Level
- +500 mA/-800 mA Peak Current Drive Capability

Typical Applications

- High Power AC–DC Adapters for Notebooks, etc.
- Offline Battery Chargers
- Set–Top Boxes Power Supplies, TV, Monitors, etc.

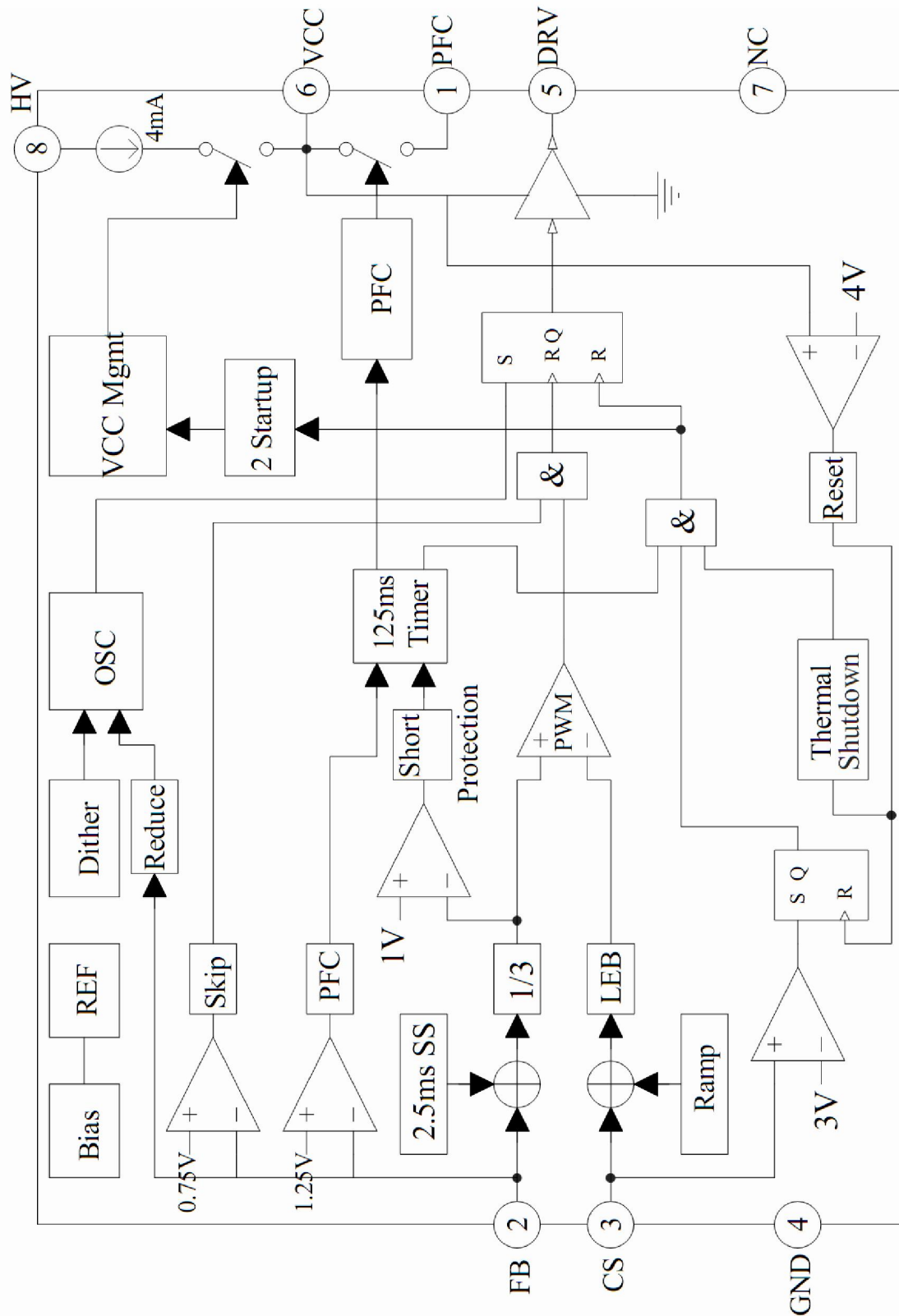
Maximum Ratings

| Rating | Rating | Value | Unit |
|-------------------------------------|-----------|-------------|------|
| Pin8 (HV) Maximum Voltage | V_{HV} | –0.3 to 500 | V |
| Pin6 (Vcc) Power Supply Voltage | V_{CC} | –0.3 to 20 | V |
| Pin5 (DRV) Drive Output Voltage | V_O | –0.3 to 20 | V |
| Pin2 (FB) Voltage Feedback | V_{FB} | –0.3 to 14 | V |
| Pin 3 (CS) Voltage Current Sense, | V_{CS} | –0.3 to 14 | V |
| Pin1 (PFC) Voltage, | V_{PFC} | –0.3 to 20 | V |
| Thermal Resistance | RJ | 178 | °C/W |
| Maximum Power Dissipation@ 25°C SOP | P_{max} | 0.7 | W |
| Maximum Junction Temperature | TJ | 150 | °C |
| Storage Temperature Range | Tstg | –60 to 150 | °C |

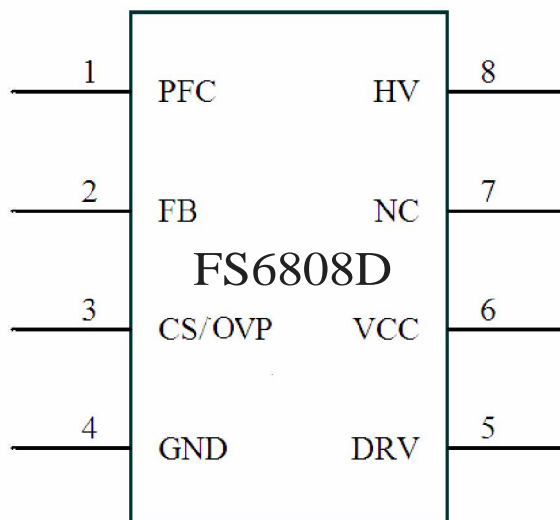
Recommended Condition

| Rating | Rating | Value | Unit |
|---------------------------------|----------|-------|------|
| Pin6 (Vcc) Power Supply Voltage | V_{CC} | 9~ 18 | V |

Internal Circuit Architecture



Pin Connections

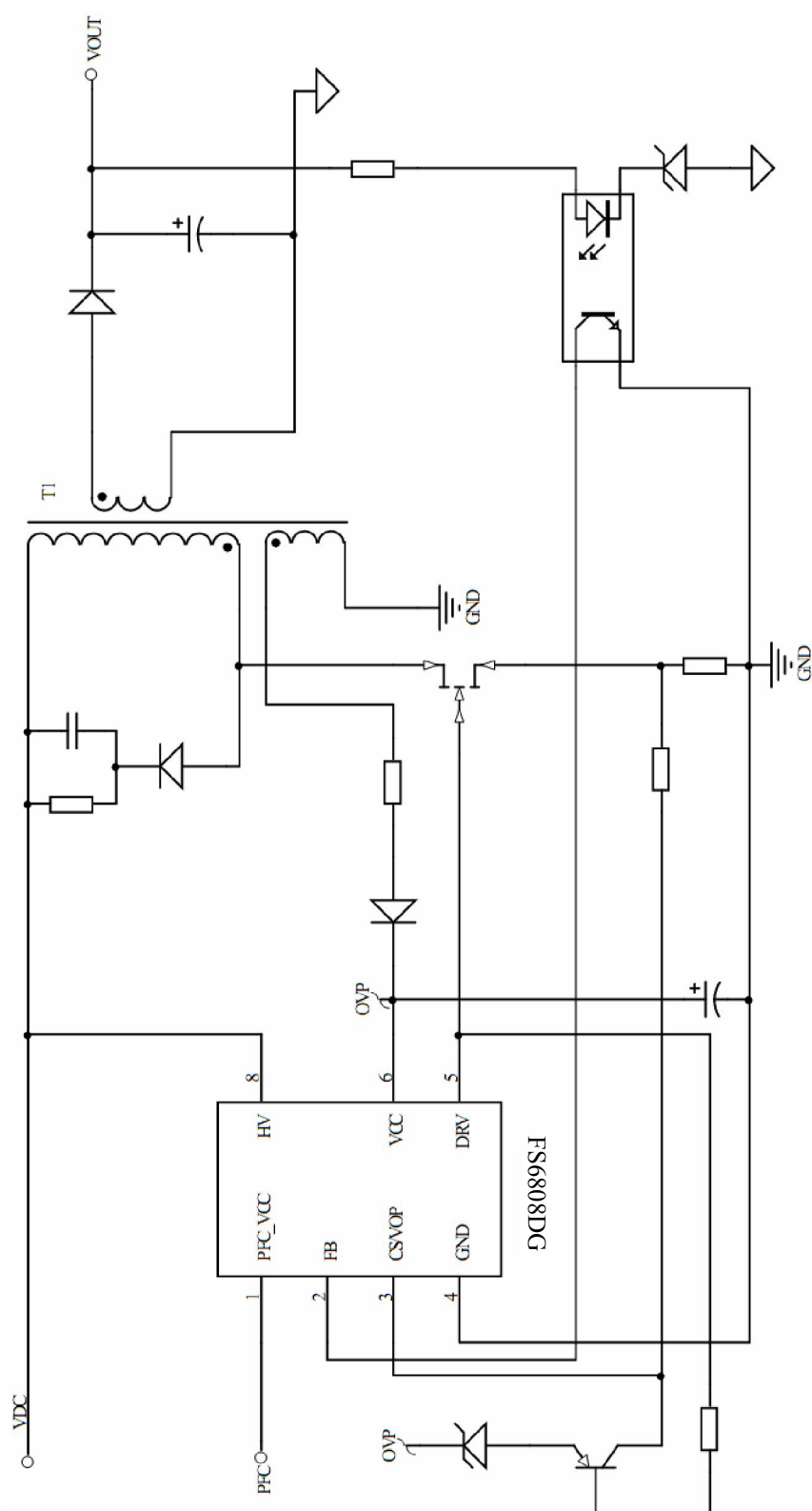


| Pin No. | Pin Name | Pin Description |
|---------|----------|---|
| 1 | PFC Vcc | This pin is a direct connection to the VCC pin (Pin 6) via a low impedance switch. In standby and during the startup sequence, the switch is open and the PFC VCC is shut down. As soon as the aux. winding is stabilized, Pin 1 connects to the VCC pin and provides bias to the PFC controller. It goes down in standby and fault conditions. |
| 2 | FB | An optocoupler collector pulls this pin low to regulate. When the current setpoint reaches 25% of the maximum peak, the controller skips cycles. |
| 3 | CS/OVP | This pin incorporates three different functions: the current sense function, an internal ramp compensation signal and a 3.0 V latch-off level which latches the output off until VCC is recycled. |
| 4 | GND | IC Ground |
| 5 | DRV | With a drive capability of +500 mA / -800 mA, the FS6808DG can drive large Qg MOSFETs. |
| 6 | Vcc | The controller accepts voltages up to 18 V and features a UVLO turn-off threshold of 7.7 V typical. |
| 7 | NC | |
| 8 | HV | This pin connects to the bulk voltage and offers a lossless startup sequence. The charging current is high enough to support the bias needs of a PWM controller through Pin 1. |

Electrical Characteristics ($T_a=25^{\circ}\text{C}$, $V_{CC}=13\text{V}$, $V_{PIN8} = 30\text{V}$,)

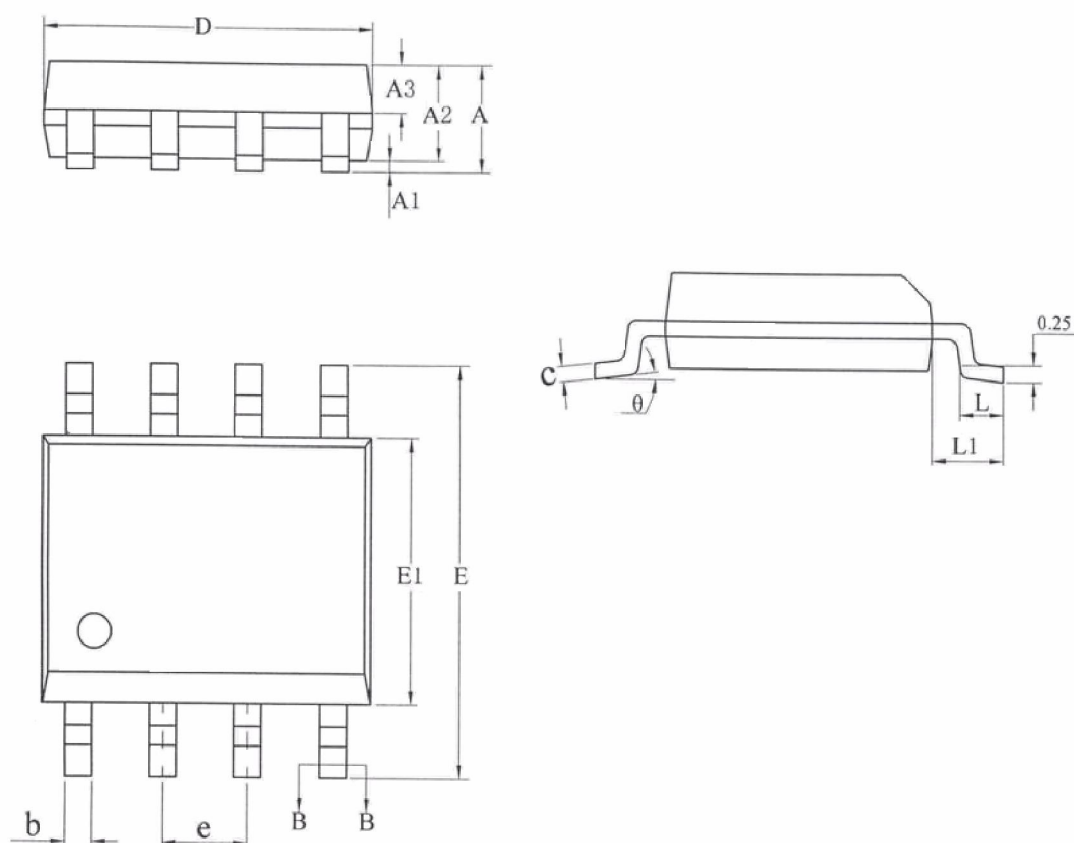
| Characteristic | Symbol | Pin | Condition | Min | Typ | Max | Unit |
|--|----------------|-----|--|-------|-----------|-------|--------------------|
| Turn-On Threshold | V_{CCOFF} | 6 | $V_{FB}=2.0\text{V}$ V_{CC} Going Up | 11.6 | 12.6 | 13.6 | V |
| Minimum Operating Voltage after Turn-On | V_{CCMIN} | 6 | | 7.0 | 7.7 | 8.4 | V |
| VCC Decreasing Level at which the Latch-Off Phase Ends | $V_{CCLATCH}$ | 6 | $V_{FB}=3.5\text{V}$ | 5.0 | 5.6 | 6.2 | V |
| VCC Level at which the Internal Logic gets Reset | $V_{CCRESET}$ | 6 | | - | 4.0 | - | V |
| Internal IC Consumption, No Output Load on Pin 6 | I_{CC1} | 6 | $V_{FB}=2.5\text{V}$ | 0.6 | 1.1 | 1.8 | mA |
| Internal IC Consumption, 1.0 nF Output Load on Pin 6 | I_{CC2} | 6 | $PIN5\ C_L = 1.0\text{ nF}$ $V_{FB}=2.5\text{V}$ | 1.3 | 2.2 | 3 | mA |
| Internal IC Consumption, Latch-Off Phase | I_{CC3} | 6 | $V_{CC}=7\text{V}$ | 400 | 680 | 1000 | uA |
| High-Voltage Current Source, 1.0 nF Load | I_{C1} | 8 | $V_{CCOFF}=0.2\text{V}$ $PIN5\ C_L = 1.0\text{ nF}$ | 1.8 | 3.2 | 4.2 | mA |
| High-Voltage Current Source | I_{C2} | 8 | $V_{CC}=0\text{V}$ | 1.8 | 4.4 | 5.6 | mA |
| Minimum Startup Voltage | V_{HVMIN} | 8 | $I_{C1} = 0.5\text{ mA}$, $V_{CCOFF} = -0.2\text{ V}$, $V_{FB} = 2.5\text{ V}$ | - | 20 | 23 | V |
| Startup Leakage | $I_{LEAKAGE}$ | 8 | $V_{HV}=500\text{V}$ | 10 | 30 | 80 | uA |
| Output Voltage Rise-Time | T_R | 5 | $PIN5\ C_L = 1.0\text{ nF}$, 10-90% | - | 40 | - | nS |
| Output Voltage Fall-Time | T_F | 5 | $PIN5\ C_L = 1.0\text{ nF}$, 10-90% | - | 15 | - | nS |
| Source Resistance | R_{OH} | 5 | $R_L=300\Omega$, $V_{FB} = 2.5\text{ V}$ | 6.0 | 12.3 | 25 | Ω |
| Sink Resistance | R_{OI} | 5 | $V_{PIN5}=1\text{V}$, $V_{FB} = 3.5\text{ V}$ | 3.0 | 7.5 | 18 | Ω |
| Output Impedance | R_{PFC} | 1 | $R_L\ (PIN1) = 680\ \Omega$ | 6.0 | 11.7 | 23 | Ω |
| Input Bias Current | I_{IB} | 3 | | - | 0.02 | - | uA |
| Maximum Internal Current Setpoint | I_{Limit} | 3 | | 1.010 | 1.063 | 1.116 | V |
| Over voltage protection | V_{latch} | 3 | | 2.7 | 3.0 | 3.3 | V |
| Leading Edge Blanking Duration | T_{LEB} | | | 100 | 200 | 350 | nS |
| Default Internal Setpoint for Skip Cycle Operation and Standby Detection | V_{skip} | 2 | V_{FB} Increase | 600 | 750 | 900 | mV |
| Default Internal Setpoint to Leave Standby | $V_{stby-out}$ | 2 | V_{FB} Decrease | 1.0 | 1.25 | 1.5 | V |
| Opto Current Source | I_{sop} | 2 | | 200 | 235 | 270 | uA |
| Soft start | S_s | - | | - | 2.5 | - | mS |
| Temperature Shutdown | | | | 150 | 165 | 150 | $^{\circ}\text{C}$ |
| Temperature Shutdown Hysteresis | | | | | 25 | | $^{\circ}\text{C}$ |
| Oscillation Frequency | F_{OSC} | | | 90 | 100 | 110 | KHz |
| Internal Modulation Swing | | | | | ± 6.4 | | % |
| Maximum Duty-Cycle | D_{max} | | | 75 | 80 | 85 | % |
| Internal Resistor | R_{up} | | | 9.0 | 18 | 36 | K Ω |
| Ramp Compensation Sawtooth Amplitude | | | | | 2.3 | | V |

Typical Application



Package Dimentions

Units: mm



| Symbol | Characteristic | | |
|----------|----------------|------|------|
| | min | Typ | Max |
| A | -- | -- | 1.77 |
| A1 | 0.08 | 0.18 | 0.28 |
| A2 | 1.20 | 1.40 | 1.60 |
| A3 | 0.55 | 0.65 | 0.75 |
| D | 4.70 | 4.90 | 5.10 |
| E | 5.80 | 6.00 | 6.20 |
| E1 | 3.70 | 3.90 | 4.10 |
| e | 1.27BSC | | |
| L | 0.50 | 0.65 | 0.80 |
| L1 | 1.05BSC | | |
| θ | 0 | -- | 8° |