TOP242-250

TOPSwitch®-GX Family

Extended Power, Design Flexible, *EcoSmart®*, Integrated Off-line Switcher

Product Highlights

Lower System Cost, High Design Flexibility

- Extended power range for higher power applications
- No heatsink required up to 34 W using P package
- Features eliminate or reduce cost of external components
- Fully integrated soft-start for minimum stress/overshoot
- Externally programmable accurate current limit
- Wider duty cycle for more power, smaller input capacitor
- Separate line sense and current limit pins on Y/R/F packages
- Line under-voltage (UV) detection: no turn off glitches
- Line overvoltage (OV) shutdown extends line surge limit
- Line feed-forward with maximum duty cycle (DC_{MAX}) reduction rejects line ripple and limits DC_{MAX} at high line
- Frequency jittering reduces EMI and EMI filtering costs
- Regulates to zero load without dummy loading
- 132 kHz frequency reduces transformer/power supply size
- Half frequency option in Y/R/F packages for video applications
- Hysteretic thermal shutdown for automatic fault recovery
- Large thermal hysteresis prevents PC board overheating

EcoSmart - Energy Efficient

- Extremely low consumption in remote off mode (80 mW at 110 VAC, 160 mW at 230 VAC)
- Frequency lowered with load for high standby efficiency
- Allows shutdown/wake-up via LAN/input port

Description

TOPSwitch-GX uses the same proven topology as *TOPSwitch*, cost effectively integrating the high voltage power MOSFET, PWM control, fault protection and other control circuitry onto a single CMOS chip. Many new functions are integrated to reduce system cost and improve design flexibility, performance and energy efficiency.

Depending on package type, either 1 or 3 additional pins over the *TOPSwitch* standard DRAIN, SOURCE and CONTROL terminals allow the following functions: line sensing (OV/UV, line feed-forward/DC_{MAX} reduction), accurate externally set current limit, remote ON/OFF, synchronization to an external lower frequency, and frequency selection (132 kHz/66 kHz).

All package types provide the following transparent features: Soft-start, 132 kHz switching frequency (automatically reduced at light load), frequency jittering for lower EMI, wider DC_{MAX}, hysteretic thermal shutdown, and larger creepage packages. In addition, all critical parameters (i.e. current limit, frequency, PWM gain) have tighter temperature and absolute tolerances to simplify design and optimize system cost.

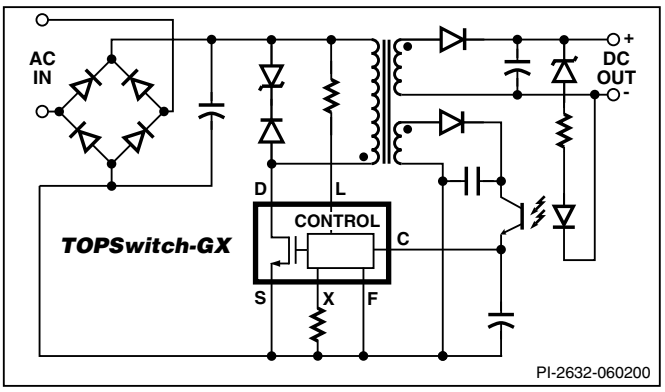

Figure 1. Typical Flyback Application.

OUTPUT POWER TABLE				
PRODUCT[3]	230 VAC ±15%[4]		85-265 VAC	
	Adapter[1]	Open Frame[2]	Adapter[1]	Open Frame[2]
TOP242 P or G	9 W	15 W	6.5 W	10 W
TOP242 R	15 W	22 W	11 W	14 W
TOP242 Y or F	10 W	22 W	7 W	14 W
TOP242 P or G	13 W	25 W	9 W	15 W
TOP243 R	29 W	45 W	17 W	23 W
TOP243 Y or F	20 W	45 W	15 W	30 W
TOP244 P or G	16 W	28 W	11 W	20 W
TOP244 R	34 W	50 W	20 W	28 W
TOP244 Y or F	30 W	65 W	20 W	45 W
TOP245 P	19 W	30 W	13 W	22 W
TOP245 R	37 W	57 W	23 W	33 W
TOP245 Y or F	40 W	85 W	26 W	60 W
TOP246 P	21 W	34 W	15 W	26 W
TOP246 R	40 W	64 W	26 W	38 W
TOP246 Y or F	60 W	125 W	40 W	90 W
TOP247 R	42 W	70 W	28 W	43 W
TOP247 Y or F	85 W	165 W	55 W	125 W
TOP248 R	43 W	75 W	30 W	48 W
TOP248 Y or F	105 W	205 W	70 W	155 W
TOP249 R	44 W	79 W	31 W	53 W
TOP249 Y or F	120 W	250 W	80 W	180 W
TOP250 R	45 W	82 W	32 W	55 W
TOP250 Y or F	135 W	290 W	90 W	210 W

Table 1. Notes: **1.** Typical continuous power in a non-ventilated enclosed adapter measured at 50 °C ambient. **2.** Maximum practical continuous power in an open frame design at 50 °C ambient. See Key Applications for detailed conditions. **3.** For lead-free package options, see Part Ordering Information. **4.** 230 VAC or 100/115 VAC with doubler.

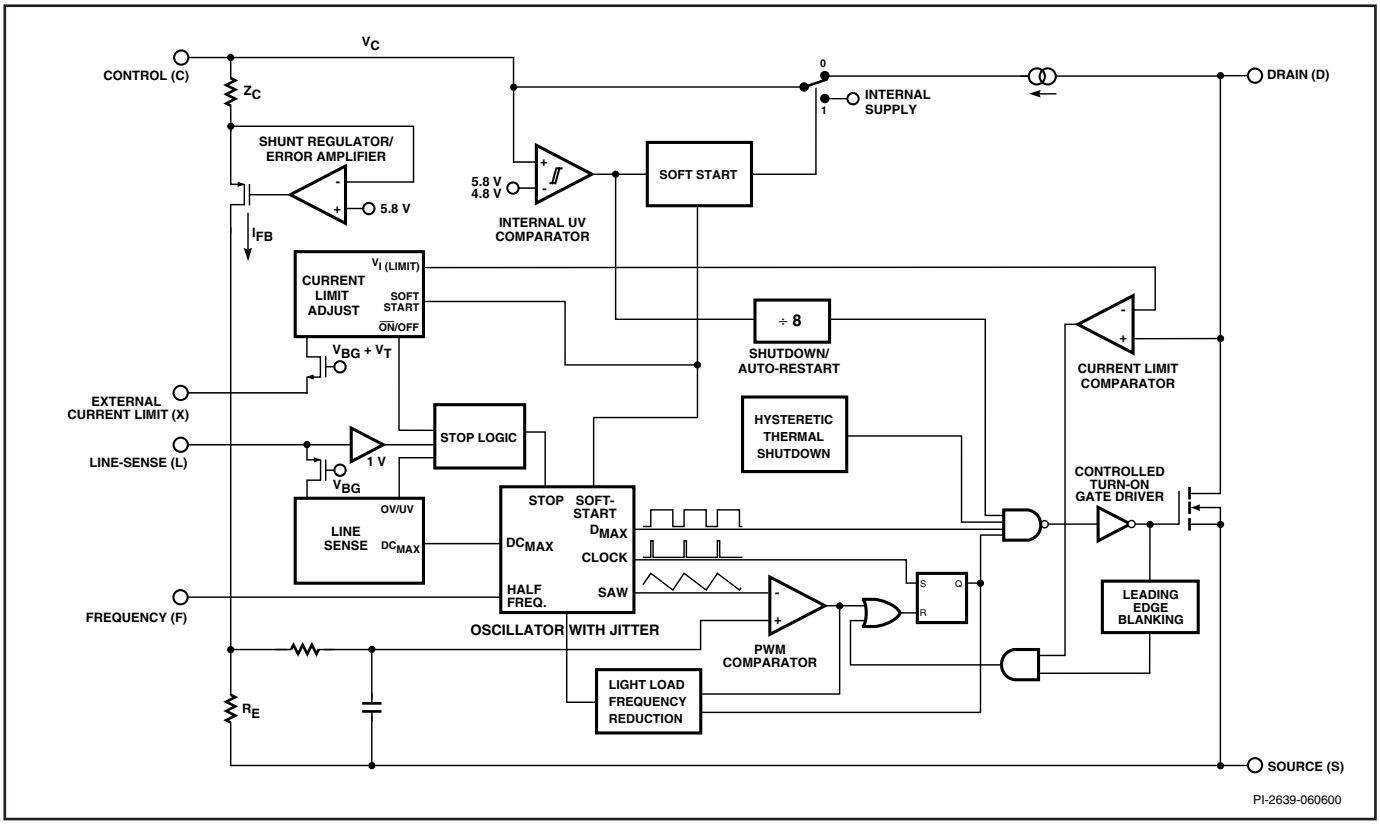

Figure 2a. Functional Block Diagram (Y, R or F Package).

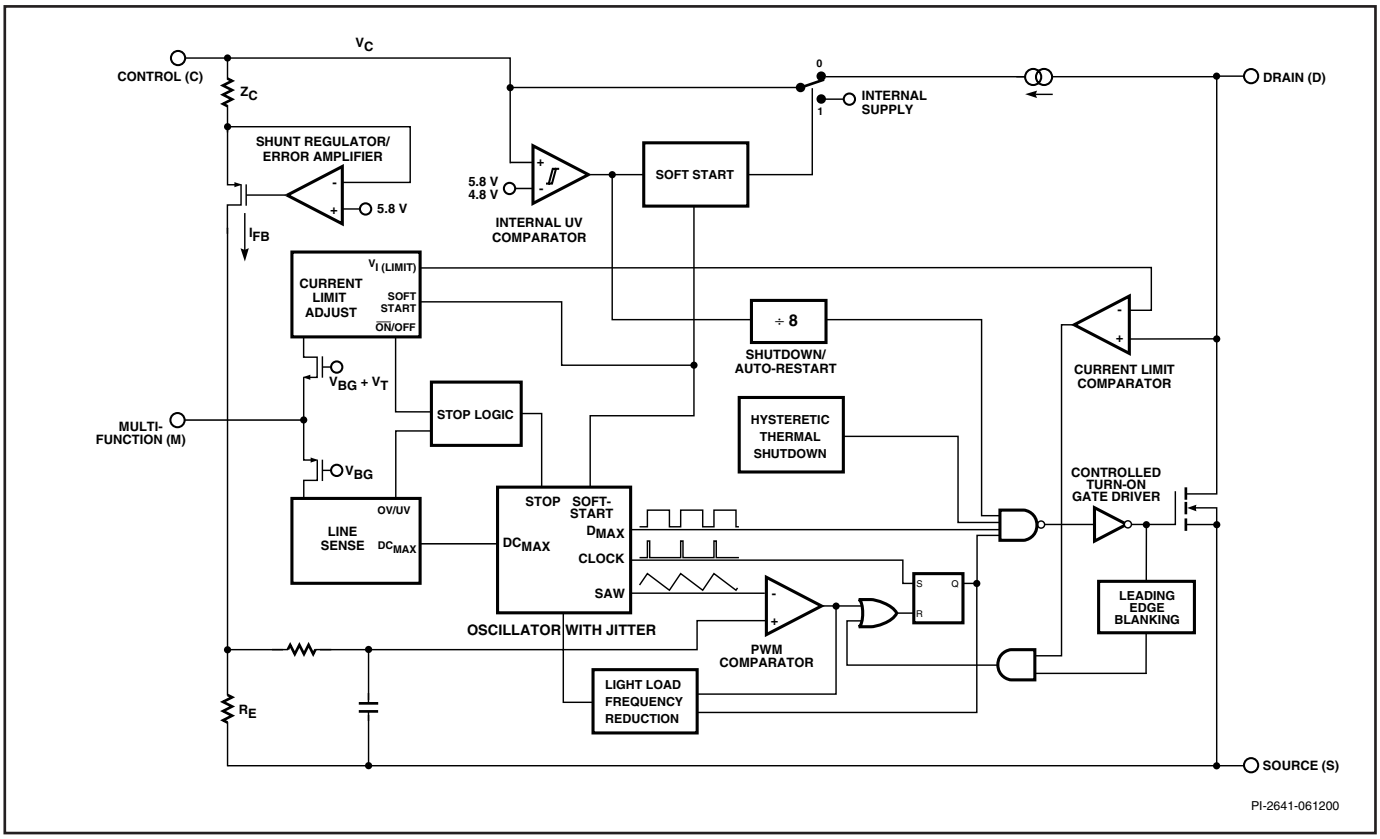

Figure 2b. Functional Block Diagram (P or G Package).

Pin Functional Description

DRAIN (D) Pin:
High voltage power MOSFET drain output. The internal start-up bias current is drawn from this pin through a switched high-voltage current source. Internal current limit sense point for drain current.

CONTROL (C) Pin:
Error amplifier and feedback current input pin for duty cycle control. Internal shunt regulator connection to provide internal bias current during normal operation. It is also used as the connection point for the supply bypass and auto-restart/ compensation capacitor.

LINE-SENSE (L) Pin: (Y, R or F package only)
Input pin for OV, UV, line feed forward with DC_{MAX} reduction, remote ON/OFF and synchronization. A connection to SOURCE pin disables all functions on this pin.

EXTERNAL CURRENT LIMIT (X) Pin: (Y, R or F package only)
Input pin for external current limit adjustment, remote ON/OFF, and synchronization. A connection to SOURCE pin disables all functions on this pin.

MULTI-FUNCTION (M) Pin: (P or G package only)
This pin combines the functions of the LINE-SENSE (L) and EXTERNAL CURRENT LIMIT (X) pins of the Y package into one pin. Input pin for OV, UV, line feed forward with DC_{MAX} reduction, external current limit adjustment, remote ON/OFF and synchronization. A connection to SOURCE pin disables all functions on this pin and makes *TOPSwitch-GX* operate in simple three terminal mode (like *TOPSwitch-II*).

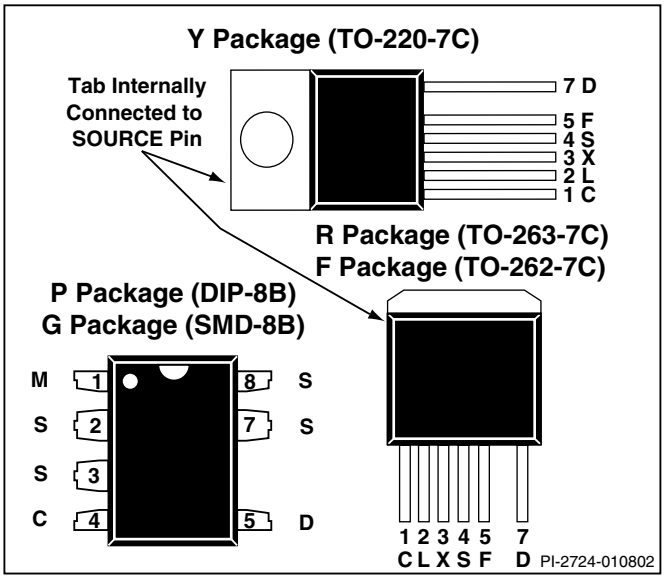

Figure 3. Pin Configuration (top view).

FREQUENCY (F) Pin: (Y, R or F package only)
Input pin for selecting switching frequency: 132 kHz if connected to SOURCE pin and 66 kHz if connected to CONTROL pin. The switching frequency is internally set for fixed 132 kHz operation in P and G packages.

SOURCE (S) Pin:
Output MOSFET source connection for high voltage power return. Primary side control circuit common and reference point.

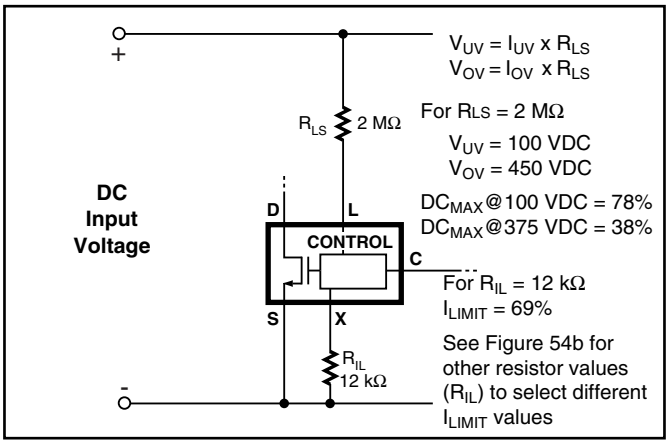

Figure 4. Y/R/F Pkg Line Sense and Externally Set Current Limit.

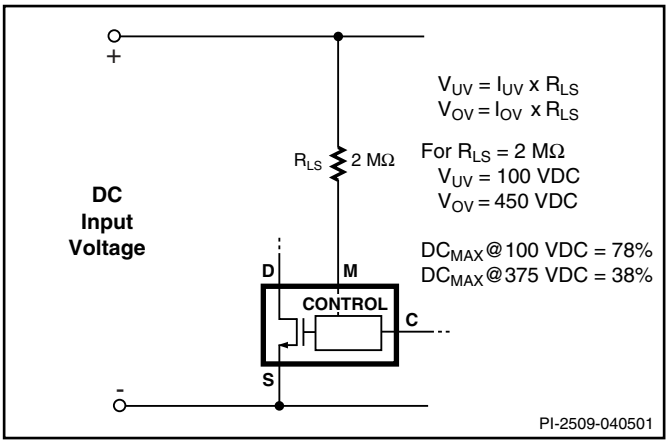

Figure 5. P/G Package Line Sense.

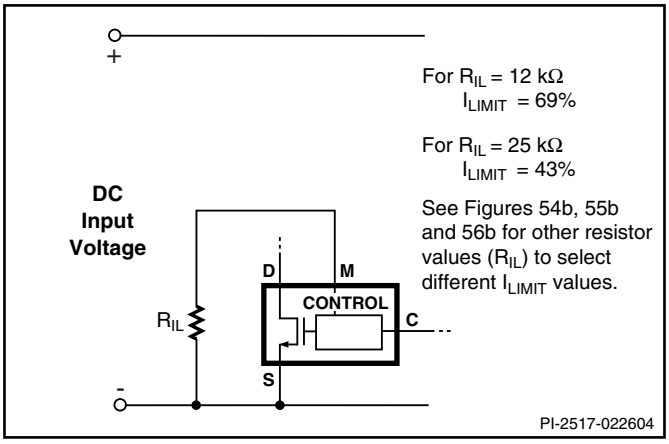

Figure 6. P/G Package Externally Set Current Limit.