

## Application Examples

### A High Efficiency, 30 W, Universal Input Power Supply

The circuit shown in Figure 41 takes advantage of several of the *TOPSwitch-GX* features to reduce system cost and power supply size and to improve efficiency. This design delivers 30 W at 12 V, from an 85 VAC to 265 VAC input, at an ambient of 50 °C, in an open frame configuration. A nominal efficiency of 80% at full load is achieved using TOP244Y.

The current limit is externally set by resistors R1 and R2 to a value just above the low line operating peak DRAIN current of approximately 70% of the default current limit. This allows use of a smaller transformer core size and/or higher transformer primary inductance for a given output power, reducing *TOPSwitch-GX* power dissipation, while at the same time avoiding transformer core saturation during startup and output transient conditions. The resistors R1 & R2 provide a signal that reduces the current limit with increasing line voltage, which in turn limits the maximum overload power at high input line voltage. This function in combination with the built-in soft-start feature of *TOPSwitch-GX*, allows the use of a low cost RCD clamp (R3, C3 and D1) with a higher reflected voltage, by safely limiting the *TOPSwitch-GX* drain voltage, with adequate margin under worst case conditions. Resistor R4 provides line sensing, setting UV at 100 VDC and OV at 450 VDC. The extended maximum duty cycle feature of

*TOPSwitch-GX* (guaranteed minimum value of 75% vs. 64% for *TOPSwitch-II*) allows the use of a smaller input capacitor (C1). The extended maximum duty cycle and the higher reflected voltage possible with the RCD clamp also permit the use of a higher primary to secondary turns ratio for T1, which reduces the peak reverse voltage experienced by the secondary rectifier D8. As a result a 60 V Schottky rectifier can be used for up to 15 V outputs, which greatly improves power supply efficiency. The frequency reduction feature of the *TOPSwitch-GX* eliminates the need for any dummy loading for regulation at no load and reduces the no-load/standby consumption of the power supply. Frequency jitter provides improved margin for conducted EMI, meeting the CISPR 22 (FCC B) specification.

Output regulation is achieved by using a simple Zener sense circuit for low cost. The output voltage is determined by the Zener diode (VR2) voltage and the voltage drops across the optocoupler (U2) LED and resistor R6. Resistor R8 provides bias current to Zener VR2 for typical regulation of  $\pm 5\%$  at the 12 V output level, over line and load and component variations.

### A High Efficiency, Enclosed, 70 W, Universal Adapter Supply

The circuit shown in Figure 42 takes advantage of several of the *TOPSwitch-GX* features to reduce cost, power supply size and

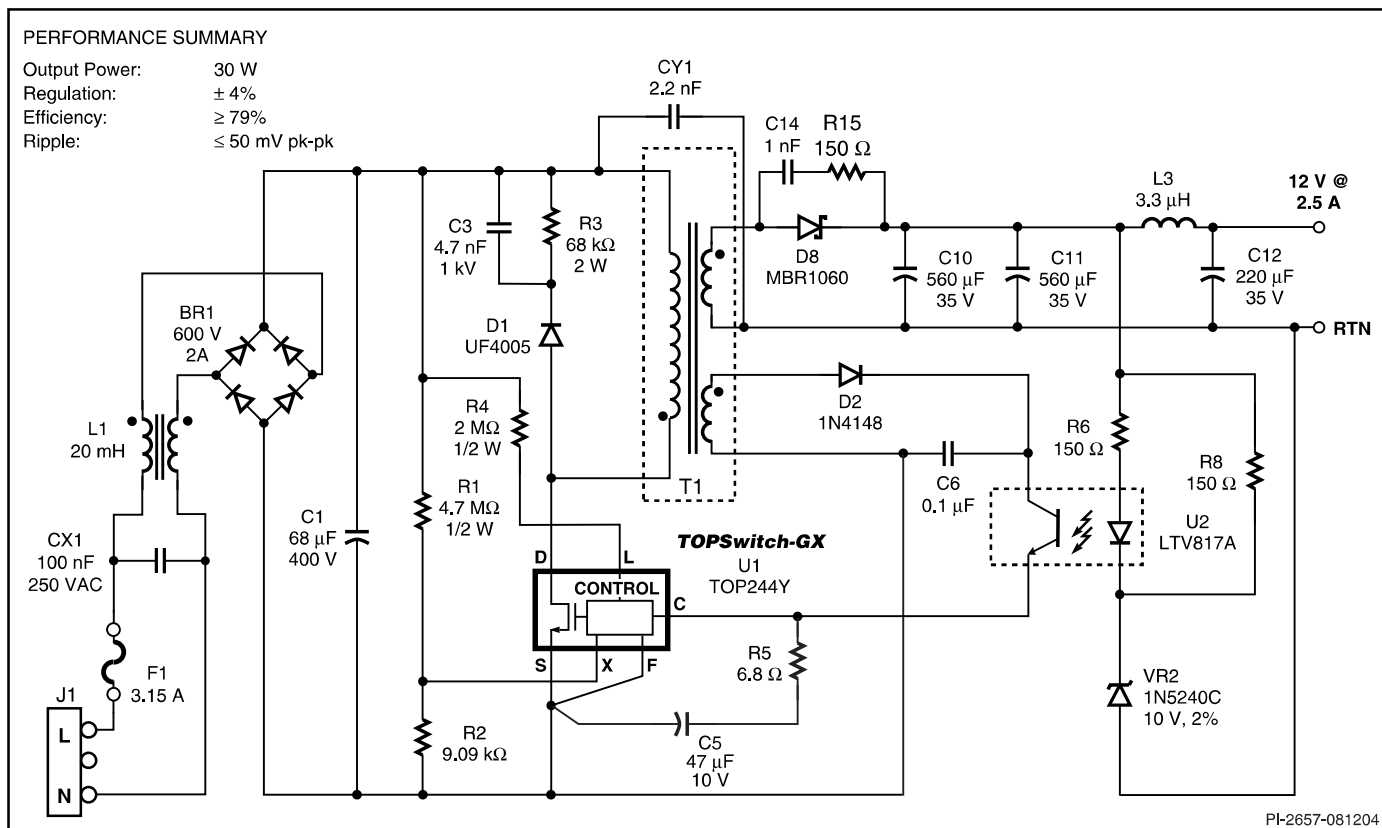


Figure 41. 30 W Power Supply using External Current Limit Programming and Line Sensing for UV and OV.