

### Circuit Description

#### Line Input

Alternating line voltage is rectified by D1 and filtered by C1 to provide a dc bus voltage for the main transformer T1 and MIC38HC43 controller IC1.

Thermistor RT1 limits the in-rush current to C1, protecting D1, and reducing the chance of an unacceptable momentary voltage drop on the ac input line during turn-on.

#### PWM Operation

Resistors R1 and R2 charge C2 until its voltage exceeds the UVLO (undervoltage lockout) of IC1 which causes output drive to be applied to Q1. This lowers Q1's drain voltage and charges T1's primary until the current sense voltage at pin 3 of IC1 exceeds 1V. IC1 then removes drive from Q1.

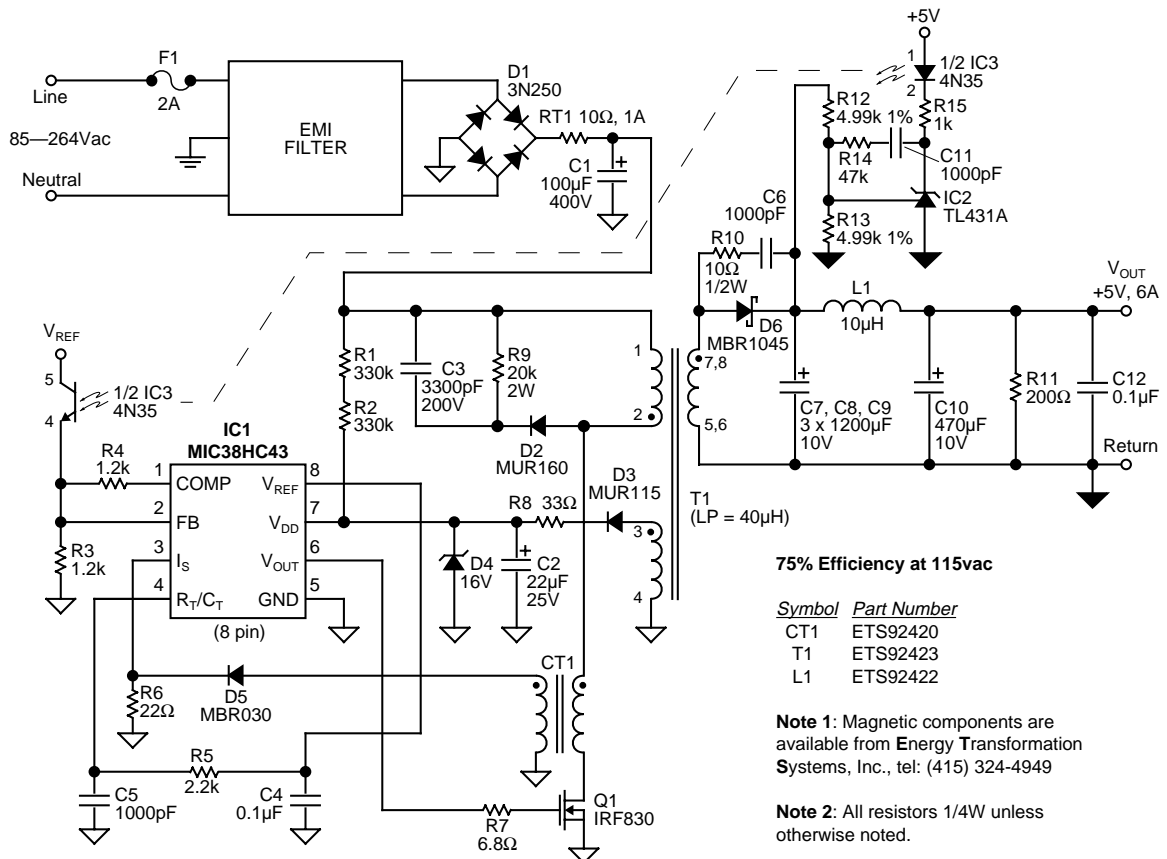
With Q1 off, T1 discharges into both the output (T1 pins 7,8 and 5,6) and tertiary (T1 pins 3 and 4) circuits and causes

Q1's drain voltage to rise above C1's voltage. IC1 voltage is now supplied from the low impedance winding of T1 (pins 3 and 4).

The output voltage rises until IC2's reference voltage reaches approximately 2.5V where it begins drawing current through the diode of optocoupler IC3. IC3's detector transistor conducts, raising the voltage on pin 2 of IC1. When the output voltage equals 5V, pin 2 of IC1 will be 2.5V and current mode PWM operation will regulate the output precisely over varying line and load changes. R14 and C11 provide stability compensation for IC2.

#### Q1 Protection

Components D2, C3, and R9 protect Q1 from avalanche breakdown and possible destruction by clamping the leakage inductance spike to a safe level. C6 and R10 suppress parasitic oscillations from D6.



500kHz 30W Off-Line Switching Power Supply

**EMI Filter**

Electromagnetic interference feedback into the ac input line from the operation of switched mode power supplies requires EMI filtering to comply with national and international standards. Use these standards to determine the acceptable levels of line conducted emissions for the specific application and location.

EMI filtering may be simplified by procuring several packaged EMI filters from a reputable source. Select the appropriate filter by EMI measurement. Include the selected filter in the final design or substitute the individual components (from the filter's parts list). Printed circuit board layout and component placement will affect conducted emissions. If you are not qualified in this area consult an expert.

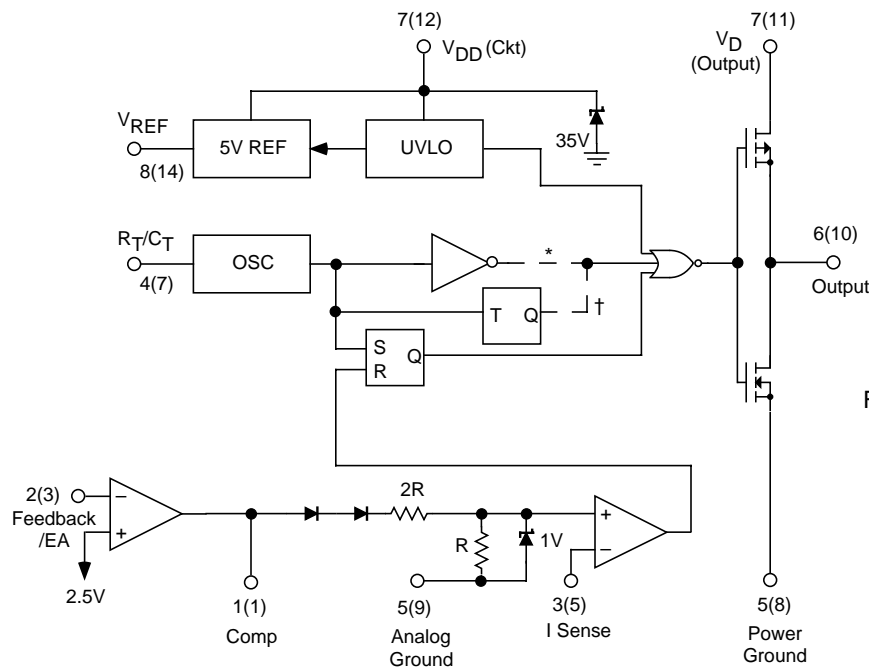
**Circuit Layout**

Care should be taken when designing high frequency converters to avoid capacitive and inductive coupling of the switching waveform into high impedance circuitry such as the error amplifier, oscillator, and current sense amplifier. Avoid long printed circuit traces and component lead lengths. Locate oscillator and compensation circuitry near the IC. Use high frequency decoupling capacitors on  $V_{REF}$  and, if necessary, on  $V_{DD}$ . Return high di/dt currents directly to the source and use large area ground planes where possible.

**Safety**

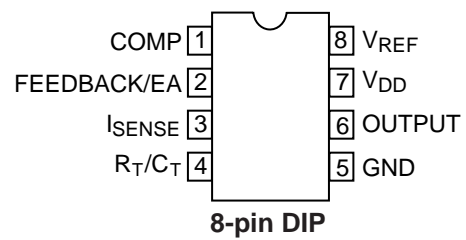
Always proceed with caution when working on off-line supplies as lethal voltages are present. Never work on the supply without someone nearby who is aware of the hazards and can take steps to avoid serious injury to yourself in the event of an accident.

**Block Diagram**

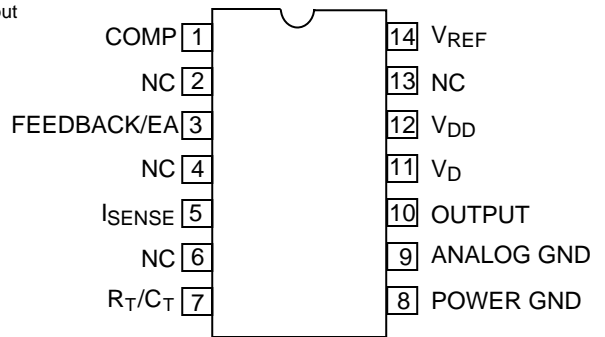


\* MICx8C42, 43 / MICx8HC42, 43  
 † MICx8C44, 45 / MICx8HC44, 45

**Pin Configurations**



**8-pin DIP**



**14-pin DIP**

(suffix -1, full featured parts)

Also available in 8-pin and 14-pin SOIC packages.