Current-mode PWM controller — UC3842

DESCRIPTION

The UC3842 is available in an 8-Pin mini-DIP the necessary features to implement off-line, fixed-frequency current-mode control schemes with a minimal external parts count. This technique results in improved line regulation, enhanced load response characteristics, and a simpler, easier to design control loop. Topological advantages include inherent pulse-by-pulse current limiting.

Protection circuitry includes built-in undervoltage lock-out and current limiting. Other features include fully-latched operation, a 1% trimmed bandgap reference, and start-up current less than 1mA.

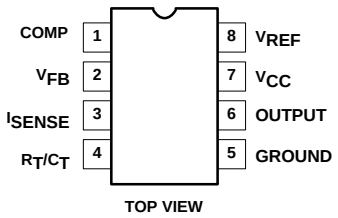
These devices feature a totem-pole output designed to source and sink high peak current from a capacitive load, such as the gate of a power MOSFET. Consistent with N-channel power devices, the output is low in the OFF-state.

FEATURES

- Low start-up current (≤1mA)
- Automatic feed-forward compensation
- Pulse-by-pulse current limiting
- Enhanced load response characteristics
- Undervoltage lock-out with hysteresis
- Double pulse suppression
- High current totem-pole output
- Internally-trimmed bandgap reference
- 400kHz operation, guaranteed min

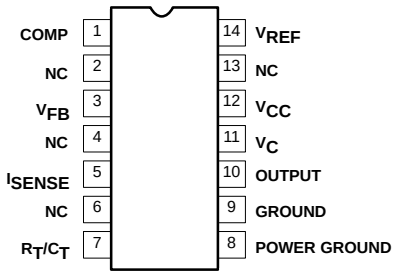
PIN CONFIGURATIONS

N Package



TOP VIEW

D Package

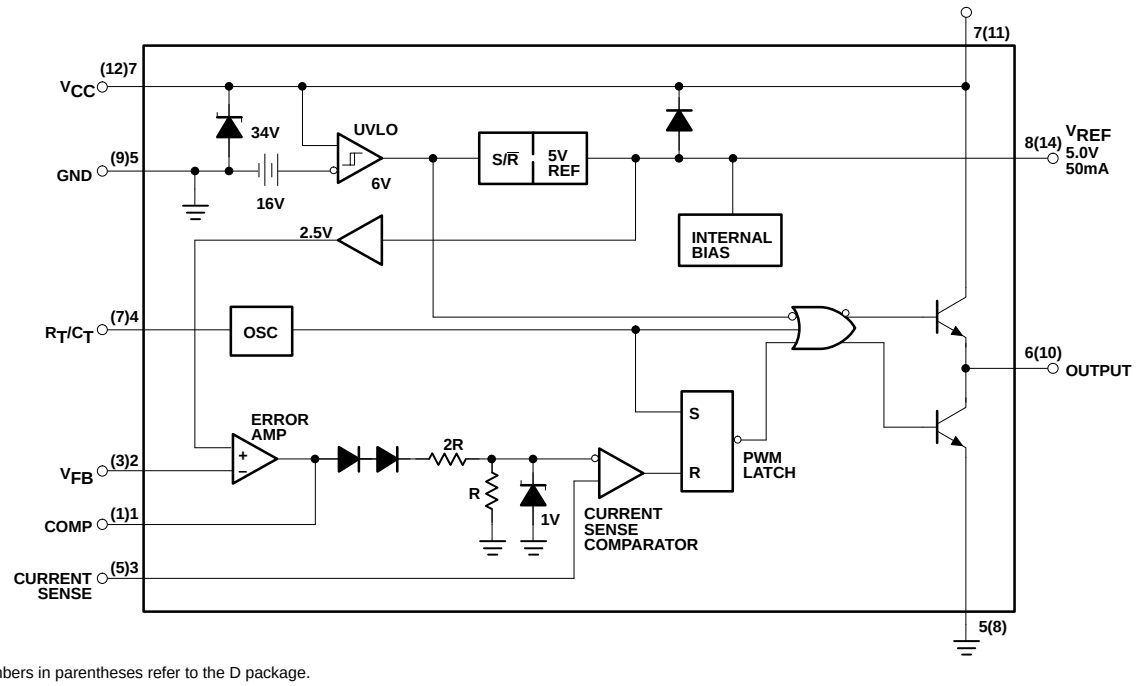


TOP VIEW

APPLICATIONS

- Off-line switched mode power supplies
- DC-to-DC converters UC3842

BLOCK DIAGRAM



NOTE:

Pin numbers in parentheses refer to the D package.

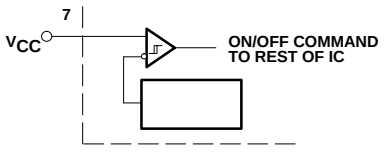
DC AND AC ELECTRICAL CHARACTERISTICS

$0 \le T_J \le 70°C$ for UC3842; V_{CC}=15[4]; R_T=10kΩ; C_T=3.3nF, unless otherwise specified

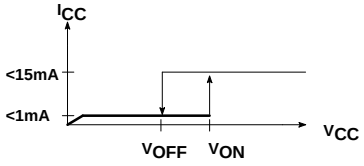
SYMBOL	PARAMETER	TEST CONDITIONS	UC3842			UNIT
			Min	Typ	Max	
Output section						
V_{OL}	Output Low-Level	I_{SINK}=20mA		0.1	0.4	V
		I_{SINK}=200mA		1.5	2.2	
V_{OH}	Output High-Level	I_{SOURCE}=20mA	13	13.5		V
		I_{SOURCE}=200mA	12	13.5		
t_R	Rise time	C_L=1nF		50	150	ns
t_F	Fall time	C_L=1nF		50	150	ns
Undervoltage lockout section						
	Start threshold		14.5	16	17.5	V
	Min. operating voltage after turn on		8.5	10	11.5	V
PWM section						
	Maximum duty cycle		93	97	100	%
	Minimum duty cycle				0	
Total standby current						
	Start-up current			0.5	1	mA
I_{CC}	Operating supply current	$V_{PIN\ 2}$=$V_{PIN\ 3}$=0V		11	17	mA
	V_{CC} zener voltage	I_{CC}=25mA		34		V
Maximum operating frequency section						
	Maximum operating frequency for all functions operating cycle-by-cycle		400			kHz

NOTES:
1. These parameters, although guaranteed, are not 100% tested in production.
2. Parameter measured at trip point of latch with $V_{PIN\ 2}$=0.
3. Gain defined as: $A = \frac{\Delta V_{PIN\ 1}}{\Delta V_{PIN\ 3}}$; $0 \le V_{PIN\ 3} \le 0.8V$

UNDERVOLTAGE LOCKOUT

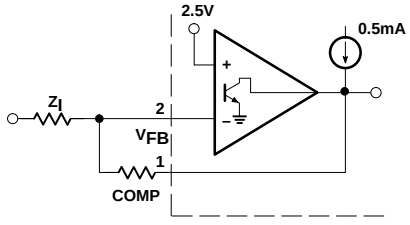


	UC3842
V_{ON}	16V
V_{OFF}	10V



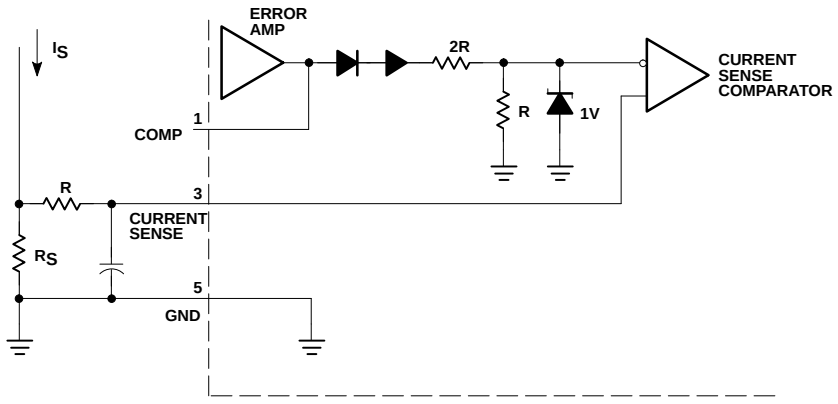
NOTE:
During Undervoltage Lock-Out, the output driver is biased to a high impedance state. Pin 6 should be shunted to ground with a bleeder resistor to prevent activating the power switch with output leakage current.

ERROR AMP CONFIGURATION



NOTE:
Error AMP can source or sink up to 0.5mA.

CURRENT SENSE CIRCUIT



NOTE:

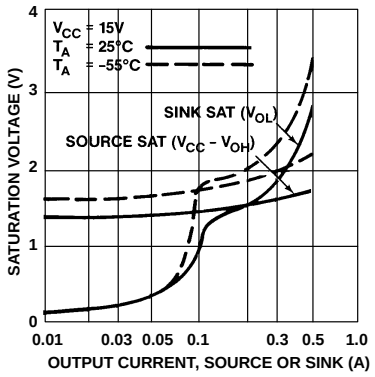
Peak current (I_S) is determined by the formula:

$$I_{S\ MAX} = \frac{1.0V}{R_S}$$

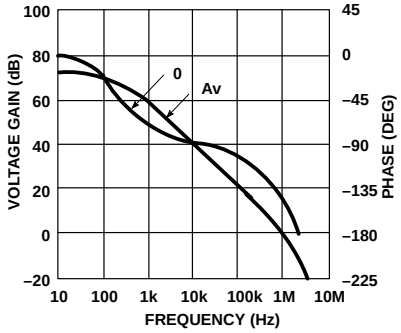
A small RC filter may be required to suppress switch transients.

TYPICAL PERFORMANCE CHARACTERISTICS

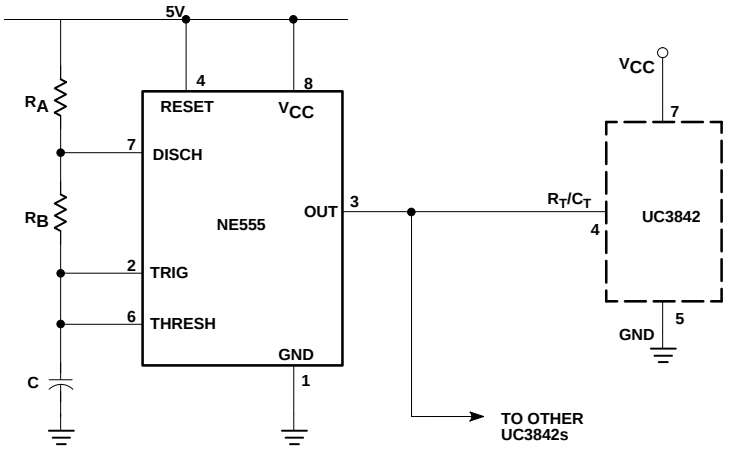
Output Saturation Characteristics



Error Amplifier Open-Loop Frequency Response



SYNCHRONIZATION AND MAXIMUM DUTY CYCLE CLAMP



NOTES:

$$f = \frac{1.44}{(R_A \quad 2R_B)\ C}$$

$$D_{MAX} = \frac{R_B}{R_A \quad 2R_B}$$