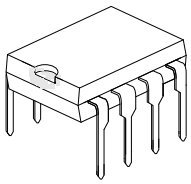
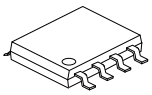
CURRENT MODE PWM CONTROL CIRCUITS



DIP-8



SOP-8

■ DESCRIPTION

The UTC **UC3842A/3843A** provide the necessary functions to implement off-line or DC to DC fixed frequency current mode, controlled switching circuits with minimal external components.

■ FEATURES

*Low Start Up Current (Typical 0.12mA)
*Automatic Feed Forward Compensation
*Pulse-by-Pulse Current Limiting
*Under-voltage Lockout with Hysteresis
*Double Pulse Suppression
*High Current Totem Pole Output to Drive MOSFET Directly
*Internally Trimmed Band Gap Reference
*500kHz Operation

■ ORDERING INFORMATION

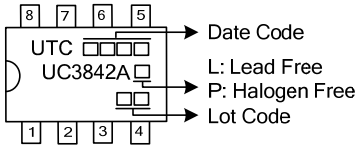
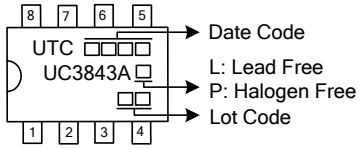
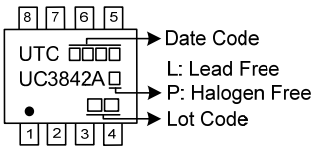
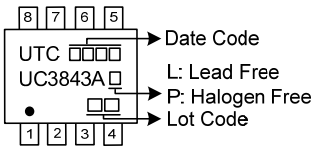
Ordering Number		Package	Packing
Lead Free	Halogen Free		
UC3842AL-D08-T	UC3842AP-D08-T	DIP-8	Tube
UC3842AL-S08-R	UC3842AP-S08-R	SOP-8	Tape Reel
UC3843AL-D08-T	UC3843AP-D08-T	DIP-8	Tube
UC3843AL-S08-R	UC3843AP-S08-R	SOP-8	Tape Reel

UC3842AP-D08-T

(1)Packing Type
(2)Package Type
(3)Green Package

(1) T: Tube, R: Tape Reel
(2) D08: DIP-8, S08: SOP-8
(3) P: Halogen Free and Lead Free, L: Lead Free

■ MARKING

Package	UC3842A	UC3843A
DIP-8		
SOP-8		

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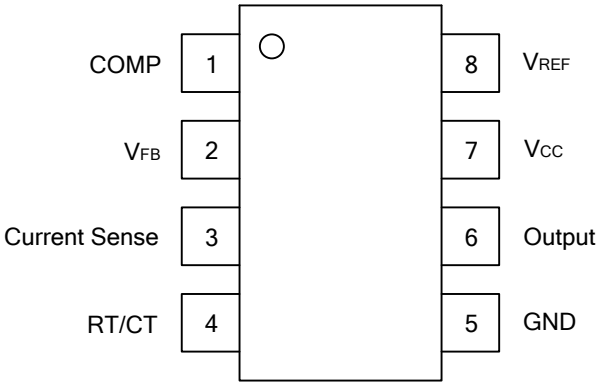
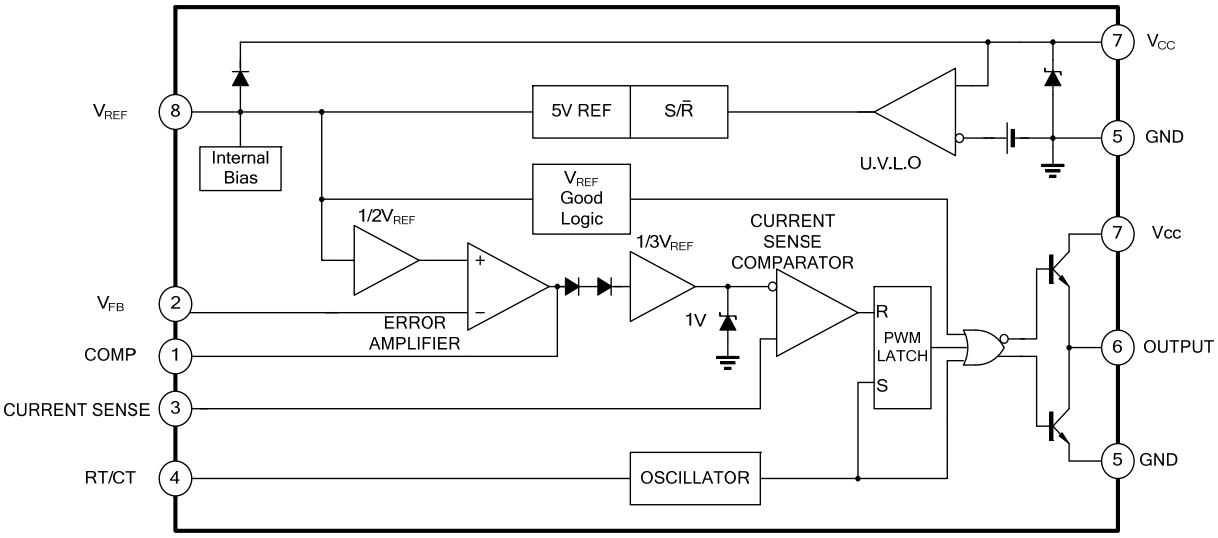
■ PIN CONFIGURATION



■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS (T_A=25°C, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Supply Voltage(Low Impedance Source)		V_{CC}	30	V
Supply Voltage(I_{CC}<30mA)		V_{CC}	Self Limiting	V
Analog Inputs (Pin 2,3)		$V_{I(ANA)}$	-0.3 ~ +6.3	V
Output Current (Peak)		$I_{O(PEAK)}$	±1	A
Error Amplifier Output Sink Current		$I_{SINK(EA)}$	10	mA
Output Energy (Capacity Load)			5	μJ
Power Dissipation(T_A≦25°C)	DIP-8	P_D	1250	mW
	SOP-8		800	
Derated at T_A>25°C			8	mW/°C
Junction Temperature		T_J	+150	°C
Storage Temperature		T_{STG}	-65 ~ +150	°C

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ ELECTRICAL CHARACTERISTICS

(0°C≦T_A≦70°C, V_{CC}=15V, R_T=10kΩ, C_T=3.3nF, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
REFERENCE SECTION						
Output Voltage	V_{REF}	T_J=25°C, I_{OUT}=1mA	4.9	5	5.1	V
Line Regulation	ΔV_{REF}	12≦V_{IN}25V		6	20	mV
Load Regulation	ΔV_{REF}	1≦I_{OUT}=20mA		15	35	mV
Temperature Stability		(Note 1)		0.2	0.4	mV/°C
Total Output Variation		Line, Load, Temp (Note 1)	4.82		5.18	V
Output Noise Voltage	V_{OSC}	10Hz≦f≦10kHz,T_J=25°C (Note 1)		50		μV
Long Term Stability		T_A=25°C,1000Hrs (Note 1)		5	25	mV
Output Short Circuit	I_{SC}		-30	-100	-180	mA
OSCILLATOR SECTION						
Initial Accuracy	f	T_J=25°C	47	52	57	kHz
Voltage Stability	$\Delta f/\Delta V_{CC}$	12≦V_{CC}≦25V		0.2	1	%
Temperature Stability		T_{MIN}≦T_A≦T_{MAX} (Note 1)		5		%
Amplitude	V_{OSC}	V_{PIN4} peak to peak		1.7		V
ERROR AMPLIFIER SECTION						
Input Voltage	$V_{I(EA)}$	V_{PIN1}=2.5V	2.42	2.50	2.58	V
Input Bias Current	$I_{I(BIAS)}$			-0.3	-2	μA
AVOL		2V ≦V_{OUT}≦4V	60	90		dB
Unity Gain Bandwidth		T_J=25°C (Note 1)	0.7	1		MHz
PSRR		I_2≦V_{CC}≦25V	60	70		dB
Output Sink Current	$I_{O(SINK)}$	V_{PIN2}=2.7V,V_{PIN1}=1.1V	2	6		mA
Output Source Current	$I_{O(SOURCE)}$	V_{PIN2}=2.3V,V_{PIN1}=5V	-0.5	-0.8		mA
V_{OUT} High	V_{OH}	V_{PIN2}=2.3V, R_L=15kΩ to GND	5	6		V
V_{OUT} Low	V_{OL}	V_{PIN2}=2.7V,V_{PIN1}=1.1V		0.7	1.1	V

■ ELECTRICAL CHARACTERISTICS (Cont.)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
CURRENT SENSE SECTION							
Gain		G_V	(Note 2, 3)	2.85	3	3.15	V/V
Maximum Input signal		$V_{I(MAX)}$	V_{PIN1}=5V(Note 2)	0.9	1	1.1	V
PSRR			12V≦V_{CC}≦25V		70		dB
Input Bias Current		I_{BIAS}			-2	-10	μA
Delay to Output			V_{PIN3}=0 to 2V		150	300	ns
OUTPUT SECTION							
Output Level	Low	V_{OL}	$I_{O(SINK)}$=20mA		0.1	0.4	V
			$I_{O(SINK)}$=200mA		1.5	2.2	V
	High	V_{OH}	$I_{O(SOURCE)}$=20mA	13	13.5		V
			$I_{O(SOURCE)}$=200mA	12	13.5		V
Rise Time		t_R	T_J=25°C, C_L=1nF (Note 1)		50	150	ns
Fall Time		t_F	T_J=25°C, C_L=1nF (Note 1)		50	150	ns
UNDER-VOLTAGE LOCKOUT OUTPUT SECTION							
Start Threshold	3842A	$V_{TH(ST)}$		14.5	16	17.5	V
	3843A			7.8	8.4	9	V
Min. Operating Voltage	3842A	$V_{OPR(MIN)}$	After Turn On	8.5	10	11.5	V
	3843A			7	7.6	8.2	V
PWM SECTION							
Duty Cycle	MAX	$D_{(MAX)}$		95	97	100	%
	MIN	$D_{(MIN)}$				0	%
TOTAL STANDBY CURRENT							
Start-up Current		I_{ST}			0.12	0.3	mA
Operating Supply Current		$I_{CC(OPR)}$	V_{PIN2}=V_{PIN3}=0V		11	17	mA
V_{CC} Zener Voltage		V_z	I_{CC}=25mA		34		V

Notes: 1. These parameters, although guaranteed, are not 100% tested in production.

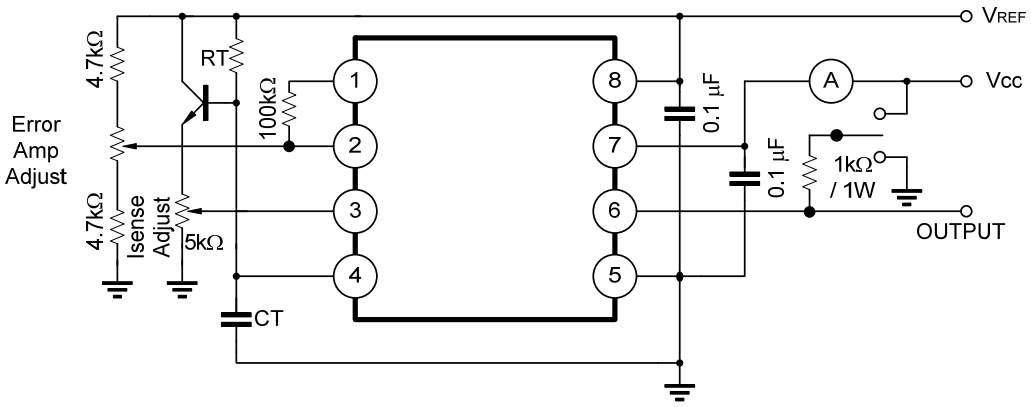
2. Parameters measured at trip point of latch with $V_{PIN\ 2}$=0.

3. Gain defined as:

$$A=\frac{\Delta V_{PIN1}}{\Delta V_{PIN3}}\ ;\ 0 \leqq V_{PIN3} \leqq 0.8V$$

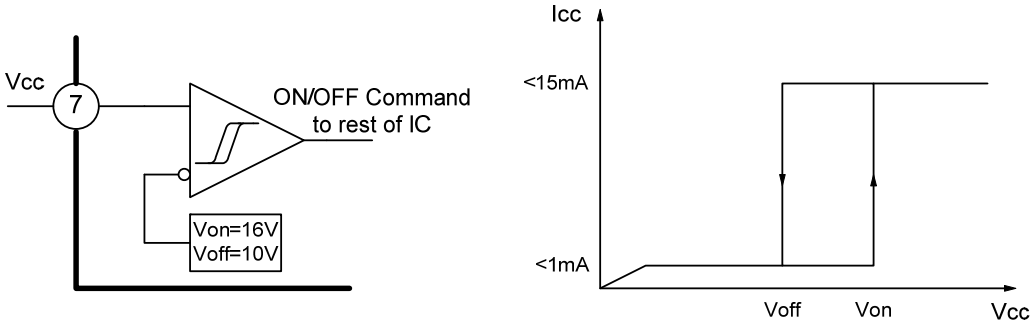
4. Adjust V_{CC} above the start threshold before setting at 15V.

■ OPEN-LOOP LABORATORY TEST FIXTURE



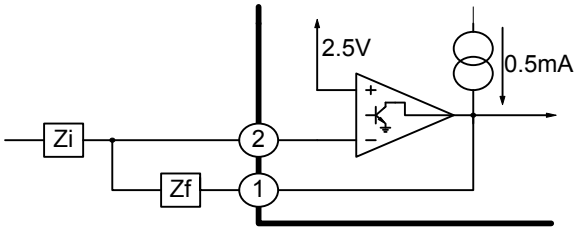
High peak current associated with capacity loads necessitate careful grounding techniques. Timing and bypass capacitors should be connected close to Pin 5 in single point GND. The transistor and 5kΩ potentio-meter are used to sample the oscillator waveform and apply an adjustable Ramp to Pin 3.

■ UNDER-VOLTAGE LOCKOUT



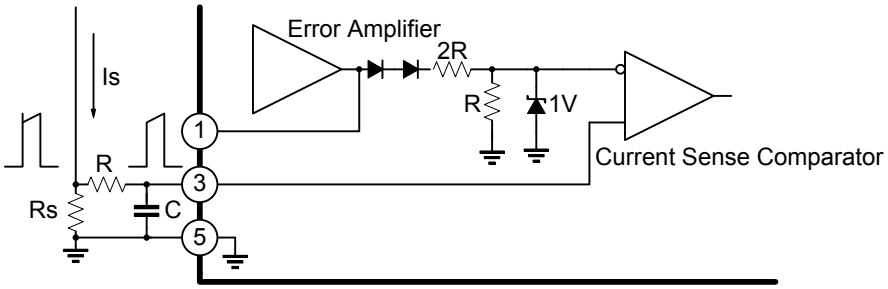
During Under-Voltage Lockout, the output driver is biased to a high impedance state. Pin 6 should be shunt to GND with a bleeder resistor to prevent activating the power switch with output leakage currents.

■ ERROR AMPLIFIER CONFIGURATION



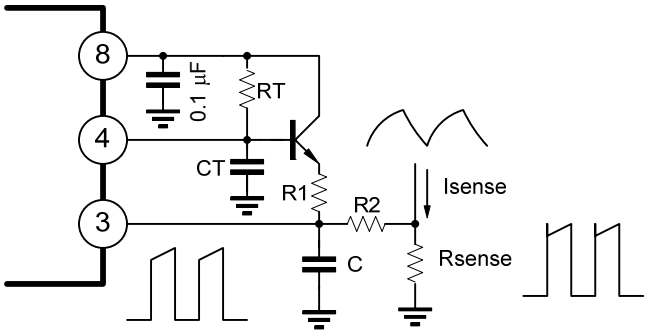
Error amplifier can source or sink up to 0.5mA

■ CURRENT SENSE CIRCUIT



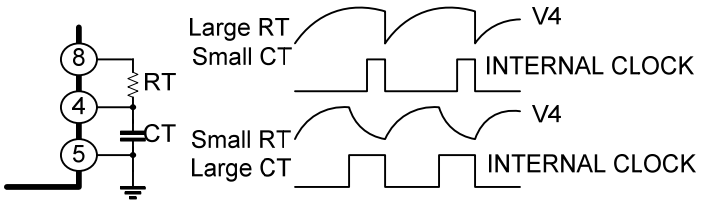
Peak current (Is) determined by the formula: I_{SMAX}=1.0V/Rs.
A small RC filter be required to suppress switch transients.

■ SLOPE COMPENSATION

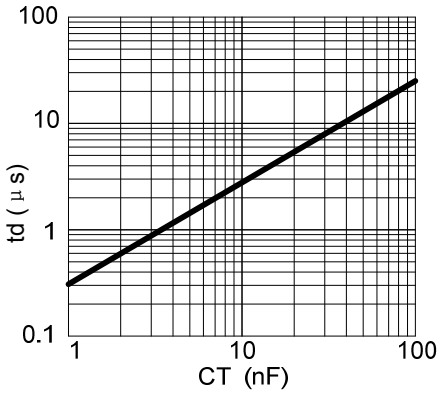


A fraction of the oscillator ramp can be resistively summed with the current sense signal to provide slope compensation for converts requiring duty cycles over 50%.Note that capacitor C, forms a filter with R2 to suppress the leading edge switch spikes.

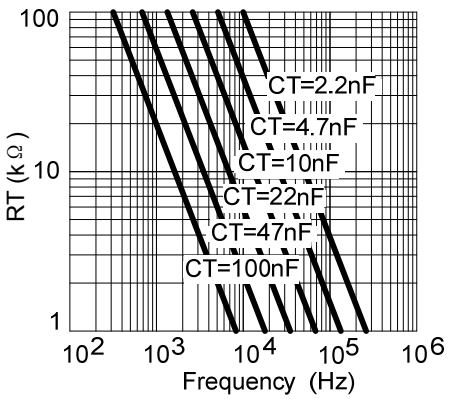
■ OSCILLATOR SECTION



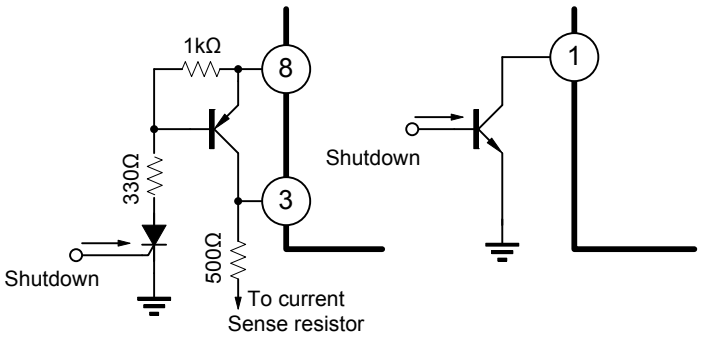
Dead time vs. C_T(R_T>5kΩ)



Timing Resistance vs. Frequency



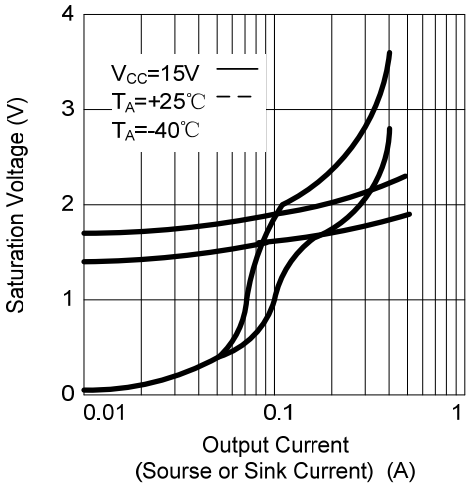
■ SHUTDOWN TECHNIQUES



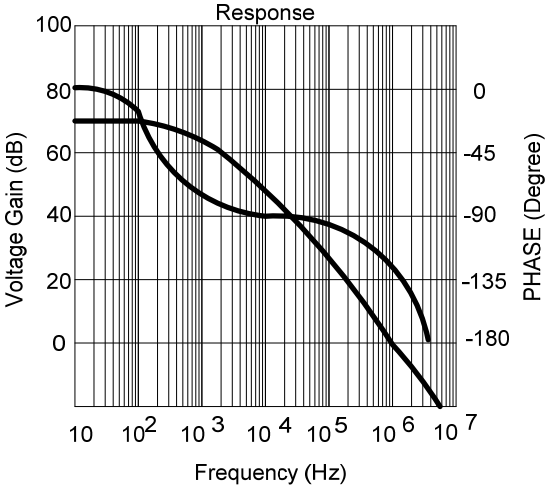
Shutdown UTC **UC3842A** can be accomplished by two methods; either raise Pin 3 above 1V or pull Pin 1 below a voltage two diode drops above ground. Either method caused the output of PWM comparator to be high(refer to block diagram). The PWM latch is reset dominant so that the output will remain low until the next clock cycle after the shutdown condition at Pins 1 and/or 3 is removed. In one example, an externally latched shut-down may be accomplished by adding an SCR which be reset by cycling V_{CC} below the lower UVLO threshold. At this point the reference turns off allowing the SCR to reset.

■ TYPICAL CHARACTERISTICS

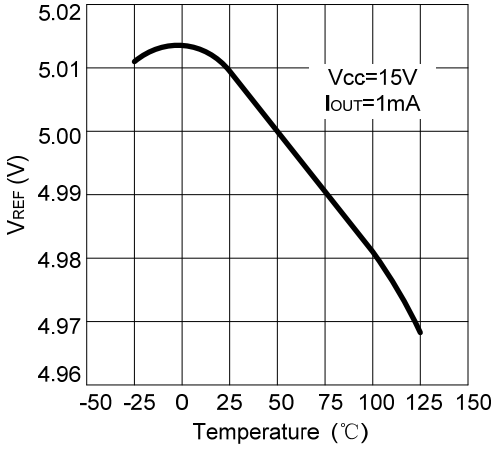
Output Saturation Characteristics



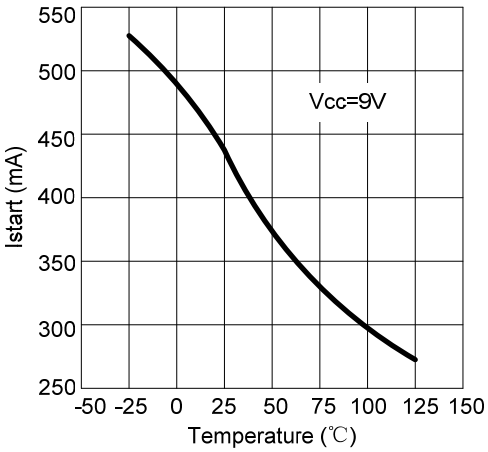
Error Amplifier Open-Loop Frequency Response



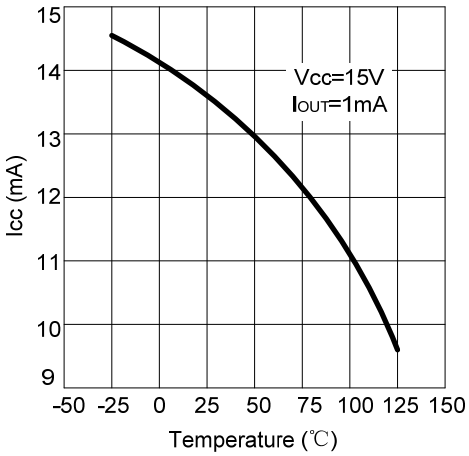
VREF Temperature Drift



Istart Temperature Drift



Icc Temperature Drift



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