

Description

The UC3842B/43B series are high performance fixed frequency current mode controllers. They are specifically designed for Off-Line and DC-to-DC converter applications offering the designer a cost effective solution with minimal external components. These integrated circuits feature a trimmed oscillator for precise duty cycle control, a temperature compensated reference, high gain error amplifier, current sensing comparator, and a high current totem pole output ideally suited for driving a power MOSFET.

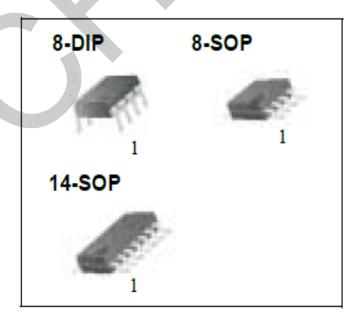
Also included are protective features consisting of input and reference under voltage lockouts each with hysteresis, cycle-by-cycle current limiting, programmable output dead time, and a latch for single pulse metering.

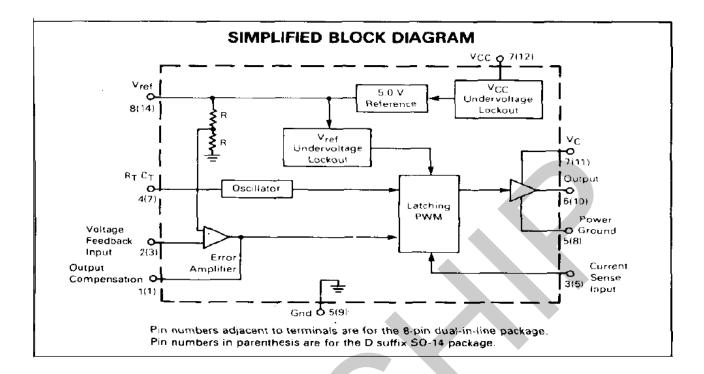
These devices are available in 8-pin dual-in-line ceramic and plastic packages as well as the 8-pin plastic surface mount (SO-8). And 14-pin plastic surface mount (SO-14). SO-14 package Figure Teng column output stage has a separate power and ground pins.

Difference between members of this series is the under-voltage lockout thresholds. The UC3842B has UVLO thresholds of 16 V (on) and 10 V (off), ideally suited for off-line converters. The corresponding thresholds for the UC3843B are 8.5 V and 7.9 V.

Feature

- Trimmed Oscillator Discharge Current for Precise Duty Cycle Control
- Current Mode Operation to 500 kHz
- Automatic Feed Forward Compensation
- ◆ Latching PWM for Cycle-By-Cycle Current Limiting
- Internally Trimmed Reference with Under voltage Lockout
- ◆ High Current Totem Pole Output
- Under voltage Lockout with hysteresis
- ◆ Low Start-Up and Operating Current





Absolute Maximum Ratings

Rating	Symbol	Value	Unit
Total Power Supply and Zenger Current	(lcc+lz)	30	mA
Output Current, Source or Sink (Note 1)	lo	1	А
Output Energy (Capacitive Load per Cycle)	W	5	uJ
Current Sense and Voltage Feedback Inputs	V_{in}	-0.3 to +5.5	V
Error Amp Output Sink Current	lo	10	mA
Power Dissipation and Thermal Characteristics NF Suffix, Plastic Package Maximum Power Dissipation @ T _A =25°C Thermal Resistance Junction to Air N Suffix, Plastic Package Maximum Power Dissipation @ T _A =25°C Thermal Resistance Junction to Air	P _D Reja P _D Reja	862 145 1.25 100	mW °C/W W °C/W
Operating Junction Temperature	TJ	+150	$^{\circ}$
Operating Ambient Temperature	T _A	0 to +70	${\mathbb C}$
Storage Temperature Range	T _{stg}	-65 to + 150	$^{\circ}$



Electrical Characteristics (VCC=15 V [Note 2], RT=10 k, CT=3.3 nF, TA=TLOW to THIGH [Note 3] unless otherwise noted)

Charactaristic	UC3842B/43B					
Characteristic	Symbol	Min	Тур	Max	Unit	
Re	Reference Section					
Reference Output Voltage (I₀=1.0 mA, TJ=25°C)	V_{ref}	4.9	5.0	5.1	V	
Line Regulation (V _{CC} =12 V to 25 V)	Reg _{line}	-	2.0	20	mV	
Load Regulation (I _O =1 mA to 20 mA)	Reg _{load}	_	3.0	25	mV	
Temperature Stability	Ts	-	0.2	-	mV/℃	
Total Output Variation over Line, Load, and	V_{ref}	4.82	_	5.18	V	
Temperature Output Noise Voltage (f=10 Hz to 10 kHz,	Vn	_	50	_	μV	
T =25℃) Long Term Stability (T _A =125℃ for 1000 Hours)	S		5.0		mV	
Output Short Circuit Current	Isc	-30	-85	-180	mA	
0	scillator Sectior	1				
Oscillation Frequency						
TJ=25℃	fosc	47	52	57	kHz	
TA=TLOW to THIGH		46	_	60		
Frequency Change with Voltage (Vcc=12 V to 25V)	Δfosc/ΔV		0.2	1	%	
Frequency Change with Temperature TA=TLOW to THIGH	$\Delta_{ ext{fOSC}/\Delta V}$	ı	0.5	_	%	
Oscillator Voltage Swing (Peak-to-Peak)	Vosc	_	1.6	_	V	
Discharge Current (V _{OSC} =2.0 V) T _J =25 °C TA=T _{LOW} to T _{HIGH}	Idischg	7.5 7.2	8.4 —	9.3 9.5	mA	

Notes: 1. Maximum Package power dissipation limits must be observed.

- 2. Adjust VCC above the Start-Up threshold before setting to 15 V.
- 3. Low duty cycle pulse techniques are used during test to maintain junction temperature as close to ambient as possible. TLOW = 0°C THIGH = +70°C
- 4. This parameter is measured at the latch trip point with VFB = 0 V

5. Comparator gain is defined as:
$$A_{V} = \frac{\Delta V_{OUTPUT/COMP}}{\Delta V_{CURRENTSENSE}}$$



unless otherwise noted)

Characteristic -		UC3842B/43B				
		Symbol	Min	TYP	Max	Unit
Error Amplifier Section						
Voltage Feedback	Input (V ₀ =2.5 V)	V_{FB}	2.42	2.5	2.58	V
Input Bias Curre	nt (V _{FB} =5.0V)	I _{IB}	_	-0.1	-2	μΑ
Open-Loop Voltage Gai	n (V ₀ =2.0 V to 4.0 V)	A _{VOL}	65	90)	dB
Unity Gain Bandv	vidth (Tյ=25℃)	BW	0.7	1	_	MHz
Power Supply Rejection R	atio (V _{CC} =12 V to 25 V)	PSRR	60	70	_	dB
V		Isink I _{Source}	2 -0.5	12 -1	<u> </u>	mA
Output Volta High State (R∟=15 k to Low State (R∟=15 k	V _{OH} V _{OL}	5 —	6.2 0.8	— 1.1	٧	
	Current Sense Se	ection				
Current Sense Input Volta	age Gain (Notes 4 & 5)	Av	2.85	3	3.15	V/V
Maximum Current Sense I	nput Threshold (Note 4)	V _{th}	0.9	1	1.1	V
Power Supply Rejection Ratio	(V _{CC} =12 V to 25V, Note 4)	PSRR	_	70		dB
Input Bias	Current	I _{IB}	_	-2	-10	μΑ
Propagation Delay (Current Sense Input to Output)		t _{PLH(IN/OUT)}	_	150	300	ns
	Output Section	n				
Outrot V	islte as		_	0.1	0.4	
Output V Low State (Isink=20 n		VoL	_	1.6	2.2	V
High State (I _{Source} =20 r		Vон	13	13.5	_	V
Tilgii State (isource=201	(ISource 200 IIIA)		12	13.4	_	
Output Voltage with UVLO Activ	vated V _{CC} =6.0 V, I _{Sink} =1.0 mA	V _{OL(UVLO)}	_	0.1	1.1	V
Output Voltage Rise Time	e (C _L =1.0 nF, T _J =25℃)	tr	_	50	150	ns
Output Voltage Fall Time	e (C∟=1.0 nF, T」=25°C)	tf	_	50	150	ns
Under Voltage Lockout Section						
Start-Up Threshold (UC3842B/43B)		V_{th}	14.5/7.8	16/8.4	17.5/9.0	V
Minimum Operating Voltage After Turn-On		V _{CC(min)}	8.5	10	11.5	
UC3842B UC3843B		()	7.0	7.6	8.2	
PWM Section						
Duty Cycle	Maximum	Dmax	94	96		%
, ,,,,,,,	Minimum	D _{min}	_	_	0	
Total Device						

Electrical Characteristics (VCC=15 V [Note 2], RT=10 k, CT=3.3 nF, TA=TLOW to THIGH [Note 3]



Power Supply Current					
Start-Up (Vcc=14 V for UC3842B	Icc+Ic	_	0.15	0.3	mΑ
V _{CC} =6.5 V for UC3843B)					
Power Operating Supply Current (Note 2)	I _{CC} +I _c	_	12	17	mA
Power Supply Zener Voltage (I _{CC} =25 mA)	Vz	30	36	_	V

TYPICAL APPLICATION

27 WATT OFF-LINE FLYBACK REGULATOR 4.7 t) MBA1635 MBA1635 MBA1635 MURITIO 0 5.0 V.4.0 A 2200 1000 1

T1-Primary: 45 Turns#26 AWGL1-15µh at 5.0A, Coil craft Z7256

Secondary ±12V:9 Turns #30 AWG (2 strands) Bifilar Wound L2,L3-25µh at 1.0A, Coil craft

Z7257Secondary 5.0V:4 Turns (six strands)#26 Hexfiliar Wound

Secondary Feedback:10 Turns #30 AWG (2 strands) Bifilar Wound

Core: Ferro cube EC35-3C8
Bobbin: Ferro cube EC35PCB1

Gap≈0.01" for a primary inductance of 1.0 mH



UC3842/43(B)

High Performance Current Mode Controller

Test		Conditions	Results		
Line Regulation:	5.0 V	Vin=95 to 130 Vac	Δ = 50 mV or ±0.5%		
	±12 V	VIII-93 to 130 Vac	Δ = 24 mV or ±0.1%		
Load Regulation:	5.0V	Vin=115 Vac, lout= 1.0 A to 4.0 A	Δ = 300 mV or ±3.0%		
	±12V	Vin=115 Vac, lout=100 mA to 300 mA	Δ = 60 mV or ± 0.25%		
Output Ripple:	5.0 V	Vin=115 Vac	40 mVp.p		
	±12V	VIII- I IS VAC	80 mVp-p		
Efficiency Vin=115 Vac 70%		70%			
	All outputs are at nominal load currents unless otherwise noted.				

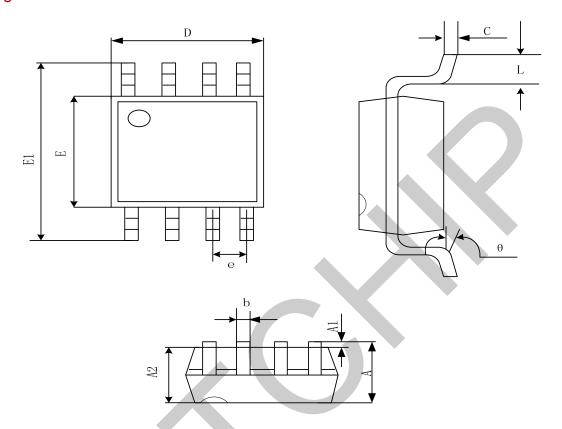
	Pin Function Description				
Pin No.	Function	Description			
1	Compensation	This pin is the Error Amplifier output and is made available for loop compensation.			
2	Voltage Feedback	This is the inverting input of the Error Amplifier. It is normally connected to the switching power supply output through a resistor divider.			
3	Current Sense	A voltage proportional to inductor current is connected to this input. The PWM uses this information to terminate the output switch conduction.			
4	RT/CT	The Oscillator frequency and maximum Output duty cycle are programmed by connecting resistor RT to Vref and capacitor CT to ground. Operation to 500 kHz is possible.			
5	Gnd	This pin is the combined control circuitry and power ground (8-pin package only).			
6	Output	This output directly drives the gate of a power MOSFET. Peak currents up to 1.0 A are sourced and sunk by this pin.			
7	VCC	This pin is the positive supply of the control IC.			
8	Vref	This is the reference output. It provides charging current for capacitor CT through resistor RT.			



UC3842/43(B)

PACKAGE MECHANICAL DATA

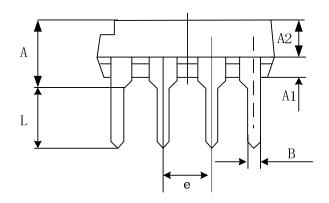
SOP-8

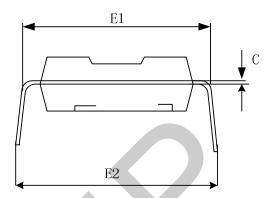


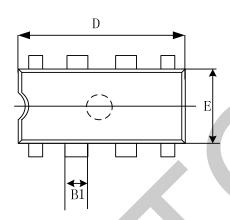
Symbol	Dimensions In Millimeters(mm)		
Symbol	Min	Max	
Α	1.350	1.750	
A1	0.100	0.250	
A2	1.350	1.550	
b	0.330	0.510	
С	0.170	0.250	
D	4.700	5.100	
E	3.800	4.00	
E1	5.800	6.2	
е	1.270(BSC)		
L	0.400	1.270	
θ	0°	8°	



DIP-8







Cumbal	Dimensions In Millimeters(mm)		
Symbol	Min	Max	
A	3.710	4.310	
A1	0.500		
A2	3.200	3.600	
В	0.350	0.620	
B1	1.524(BSC)		
C	0.204	0.360	
D	9.000	9.500	
E	6.200	6.600	
E1	7.320	7.920	
е	2.540(BSC)		
L	3.000	3.600	
E2	8.200	9.000	