

UC3842B, UC3843B, UC2842B, UC2843B

High Performance Current Mode Controllers

The UC3842B, UC3843B series are high performance fixed frequency current mode controllers. They are specifically designed for Off-Line and DC-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.

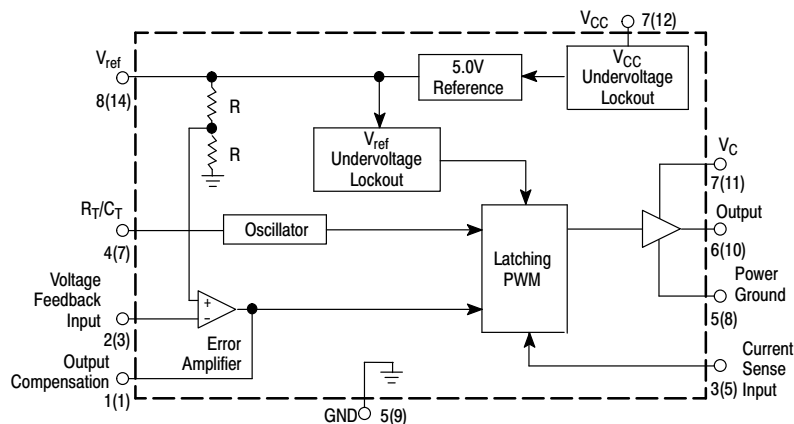
Also included are protective features consisting of input and reference undervoltage lockouts each with hysteresis, cycle-by-cycle current limiting, programmable output deadtime, and a latch for single pulse metering.

These devices are available in an 8-pin dual-in-line and surface mount (SOIC-8) plastic package as well as the 14-pin plastic surface mount (SOIC-14). The SOIC-14 package has separate power and ground pins for the totem pole output stage.

The UC3842B has UVLO thresholds of 16 V (on) and 10 V (off), ideally suited for off-line converters. The UC3843B is tailored for lower voltage applications having UVLO thresholds of 8.5 V (on) and 7.6 V (off).

Features

- Trimmed Oscillator for Precise Frequency Control
- Oscillator Frequency Guaranteed at 250 kHz
- Current Mode Operation to 500 kHz
- Automatic Feed Forward Compensation
- Latching PWM for Cycle-By-Cycle Current Limiting
- Internally Trimmed Reference with Undervoltage Lockout
- High Current Totem Pole Output
- Undervoltage Lockout with Hysteresis
- Low Startup and Operating Current
- Pb-Free Packages are Available

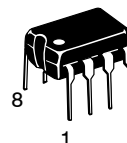


Pin numbers in parenthesis are for the D suffix SOIC-14 package.

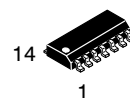
Figure 1. Simplified Block Diagram



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**PDIP-8
N SUFFIX
CASE 626**

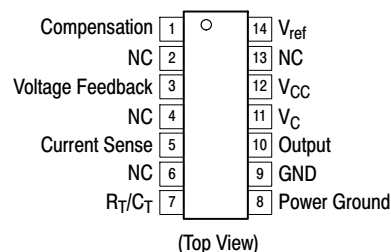
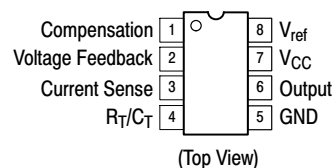


**SOIC-14
D SUFFIX
CASE 751A**



**SOIC-8
D1 SUFFIX
CASE 751**

PIN CONNECTIONS



ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 16 of this data sheet.

DEVICE MARKING INFORMATION

See general marking information in the device marking section on page 18 of this data sheet.

UC3842B, UC3843B, UC2842B, UC2843B

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Bias and Driver Voltages (Zero Series Impedance, see also Total Device spec)	V_{CC}, V_C	30	V
Total Power Supply and Zener Current	$(I_{CC} + I_Z)$	30	mA
Output Current, Source or Sink	I_O	1.0	A
Output Energy (Capacitive Load per Cycle)	W	5.0	μ J
Current Sense and Voltage Feedback Inputs	V_{in}	- 0.3 to + 5.5	V
Error Amp Output Sink Current	I_O	10	mA
Power Dissipation and Thermal Characteristics			
D Suffix, Plastic Package, SOIC-14 Case 751A			
Maximum Power Dissipation @ $T_A = 25^\circ\text{C}$	P_D	862	mW
Thermal Resistance, Junction-to-Air	$R_{\theta JA}$	145	$^\circ\text{C/W}$
D1 Suffix, Plastic Package, SOIC-8 Case 751			
Maximum Power Dissipation @ $T_A = 25^\circ\text{C}$	P_D	702	mW
Thermal Resistance, Junction-to-Air	$R_{\theta JA}$	178	$^\circ\text{C/W}$
N Suffix, Plastic Package, Case 626			
Maximum Power Dissipation @ $T_A = 25^\circ\text{C}$	P_D	1.25	W
Thermal Resistance, Junction-to-Air	$R_{\theta JA}$	100	$^\circ\text{C/W}$
Operating Junction Temperature	T_J	+150	$^\circ\text{C}$
Operating Ambient Temperature	T_A	0 to 70 - 25 to + 85 -40 to +105	$^\circ\text{C}$
		UC3842B, UC3843B UC2842B, UC2843B UC3842BV, UC3843BV	
Storage Temperature Range	T_{stg}	- 65 to +150	$^\circ\text{C}$

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

- This device series contains ESD protection and exceeds the following tests:
Human Body Model 4000 V per JEDEC Standard JESD22-A114B
Machine Model Method 200 V per JEDEC Standard JESD22-A115-A
- This device contains latch-up protection and exceeds 100 mA per JEDEC Standard JESD78

UC3842B, UC3843B, UC2842B, UC2843B

ELECTRICAL CHARACTERISTICS ($V_{CC} = 15\text{ V}$ [Note 3], $R_T = 10\text{ k}$, $C_T = 3.3\text{ nF}$. For typical values $T_A = 25^\circ\text{C}$, for min/max values T_A is the operating ambient temperature range that applies [Note 4], unless otherwise noted.)

Characteristics	Symbol	UC284XB			UC384XB, XBV			Unit
		Min	Typ	Max	Min	Typ	Max	

REFERENCE SECTION

Reference Output Voltage ($I_O = 1.0\text{ mA}$, $T_J = 25^\circ\text{C}$)	V_{ref}	4.95	5.0	5.05	4.9	5.0	5.1	V
Line Regulation ($V_{CC} = 12\text{ V to } 25\text{ V}$)	Reg_{line}	-	2.0	20	-	2.0	20	mV
Load Regulation ($I_O = 1.0\text{ mA to } 20\text{ mA}$)	Reg_{load}	-	3.0	25	-	3.0	25	mV
Temperature Stability	T_S	-	0.2	-	-	0.2	-	mV/ $^\circ\text{C}$
Total Output Variation over Line, Load, and Temperature	V_{ref}	4.9	-	5.1	4.82	-	5.18	V
Output Noise Voltage ($f = 10\text{ Hz to } 10\text{ kHz}$, $T_J = 25^\circ\text{C}$)	V_n	-	50	-	-	50	-	μV
Long Term Stability ($T_A = 125^\circ\text{C}$ for 1000 Hours)	S	-	5.0	-	-	5.0	-	mV
Output Short Circuit Current	I_{SC}	-30	-85	-180	-30	-85	-180	mA

OSCILLATOR SECTION

Frequency $T_J = 25^\circ\text{C}$ $T_A = T_{low}$ to T_{high} $T_J = 25^\circ\text{C}$ ($R_T = 6.2\text{ k}$, $C_T = 1.0\text{ nF}$)	f_{osc}	49 48 225	52 250	55 56 275	49 48 225	52 - 250	55 56 275	kHz
Frequency Change with Voltage ($V_{CC} = 12\text{ V to } 25\text{ V}$)	$\Delta f_{osc}/\Delta V$	-	0.2	1.0	-	0.2	1.0	%
Frequency Change with Temperature, $T_A = T_{low}$ to T_{high}	$\Delta f_{osc}/\Delta T$	-	1.0	-	-	0.5	-	%
Oscillator Voltage Swing (Peak-to-Peak)	V_{osc}	-	1.6	-	-	1.6	-	V
Discharge Current ($V_{osc} = 2.0\text{ V}$) $T_J = 25^\circ\text{C}$, $T_A = T_{low}$ to T_{high}	I_{dischg}	7.8 7.5 -	8.3 -	8.8 8.8 -	7.8 7.6 7.2	8.3 -	8.8 8.8 8.8	mA

ERROR AMPLIFIER SECTION

Voltage Feedback Input ($V_O = 2.5\text{ V}$)	V_{FB}	2.45	2.5	2.55	2.42	2.5	2.58	V
Input Bias Current ($V_{FB} = 5.0\text{ V}$)	I_{IB}	-	-0.1	-1.0	-	-0.1	-2.0	μA
Open Loop Voltage Gain ($V_O = 2.0\text{ V to } 4.0\text{ V}$)	A_{VOL}	65	90	-	65	90	-	dB
Unity Gain Bandwidth ($T_J = 25^\circ\text{C}$)	BW	0.7	1.0	-	0.7	1.0	-	MHz
Power Supply Rejection Ratio ($V_{CC} = 12\text{ V to } 25\text{ V}$)	PSRR	60	70	-	60	70	-	dB
Output Current Sink ($V_O = 1.1\text{ V}$, $V_{FB} = 2.7\text{ V}$) Source ($V_O = 5.0\text{ V}$, $V_{FB} = 2.3\text{ V}$)	I_{Sink} I_{Source}	2.0 -0.5	12 -1.0	- -	2.0 -0.5	12 -1.0	- -	mA
Output Voltage Swing High State ($R_L = 15\text{ k to ground}$, $V_{FB} = 2.3\text{ V}$) Low State ($R_L = 15\text{ k to } V_{ref}$, $V_{FB} = 2.7\text{ V}$)	V_{OH} V_{OL}	5.0 - -	6.2 0.8 -	- 1.1 -	5.0 - -	6.2 0.8 0.8	- 1.1 1.2	V

CURRENT SENSE SECTION

Current Sense Input Voltage Gain (Notes 5 and 6) UC284XB, UC384XB UC384XBV	A_V	2.85 -	3.0 -	3.15 -	2.85 2.85	3.0 3.0	3.15 3.25	V/V
Maximum Current Sense Input Threshold (Note 5) UC284XB, UC384XB UC384XBV	V_{th}	0.9 -	1.0 -	1.1 -	0.9 0.85	1.0 1.0	1.1 1.1	V
Power Supply Rejection Ratio ($V_{CC} = 12\text{ V to } 25\text{ V}$, Note 5)	PSRR	-	70	-	-	70	-	dB
Input Bias Current	I_{IB}	-	-2.0	-10	-	-2.0	-10	μA
Propagation Delay (Current Sense Input to Output)	$t_{PLH}(In/Out)$	-	150	300	-	150	300	ns

- Adjust V_{CC} above the Startup threshold before setting to 15 V.
- Low duty cycle pulse techniques are used during test to maintain junction temperature as close to ambient as possible.
 $T_{low} = 0^\circ\text{C}$ for UC3842B, UC3843B; -25°C for UC2842B, UC2843B; -40°C for UC3842BV, UC3843BV
 $T_{high} = +70^\circ\text{C}$ for UC3842B, UC3843B; $+85^\circ\text{C}$ for UC2842B, UC2843B; $+105^\circ\text{C}$ for UC3842BV, UC3843BV
- This parameter is measured at the latch trip point with $V_{FB} = 0\text{ V}$.
- Comparator gain is defined as: $A_V = \frac{\Delta V \text{ Output Compensation}}{\Delta V \text{ Current Sense Input}}$

UC3842B, UC3843B, UC2842B, UC2843B

ELECTRICAL CHARACTERISTICS ($V_{CC} = 15\text{ V}$ [Note 7], $R_T = 10\text{ k}$, $C_T = 3.3\text{ nF}$. For typical values $T_A = 25^\circ\text{C}$, for min/max values T_A is the operating ambient temperature range that applies [Note 8], unless otherwise noted.)

Characteristics	Symbol	UC284XB			UC384XB, XBV			Unit
		Min	Typ	Max	Min	Typ	Max	
OUTPUT SECTION								
Output Voltage								
Low State ($I_{\text{Sink}} = 20\text{ mA}$)	V_{OL}	-	0.1	0.4	-	0.1	0.4	V
($I_{\text{Sink}} = 200\text{ mA}$)		UC284XB, UC384XB	-	1.6	2.2	-	1.6	
High State ($I_{\text{Source}} = 20\text{ mA}$)	V_{OH}	-	-	-	-	1.6	2.3	
($I_{\text{Source}} = 200\text{ mA}$)		UC384XBV	13	13.5	-	13	13.5	
Output Voltage with UVLO Activated ($V_{CC} = 6.0\text{ V}$, $I_{\text{Sink}} = 1.0\text{ mA}$)	$V_{\text{OL(UVLO)}}$	-	0.1	1.1	-	0.1	1.1	V
Output Voltage Rise Time ($C_L = 1.0\text{ nF}$, $T_J = 25^\circ\text{C}$)	t_r	-	50	150	-	50	150	ns
Output Voltage Fall Time ($C_L = 1.0\text{ nF}$, $T_J = 25^\circ\text{C}$)	t_f	-	50	150	-	50	150	ns

UNDERVOLTAGE LOCKOUT SECTION

Startup Threshold (V_{CC})	V_{th}	15	16	17	14.5	16	17.5	V
UCX842B, BV UCX843B, BV		7.8	8.4	9.0	7.8	8.4	9.0	
Minimum Operating Voltage After Turn-On (V_{CC})	$V_{\text{CC(min)}}$	9.0	10	11	8.5	10	11.5	V
UCX842B, BV UCX843B, BV		7.0	7.6	8.2	7.0	7.6	8.2	

PWM SECTION

Duty Cycle								
Maximum	UC284XB, UC384XB UC384XBV	$\text{DC}_{(\text{max})}$	94	96	-	94	96	%
			-	-	-	93	96	
Minimum		$\text{DC}_{(\text{min})}$	-	-	0	-	-	0

TOTAL DEVICE

Power Supply Current	$I_{\text{CC}} + I_{\text{C}}$							mA
Startup ($V_{CC} = 6.5\text{ V}$ for UCX843B, $V_{CC} = 14\text{ V}$ for UCX842B, BV) (Note 7)		-	0.3	0.5	-	0.3	0.5	
Power Supply Zener Voltage ($I_{\text{CC}} = 25\text{ mA}$)	V_Z	30	36	-	30	36	-	V

7. Adjust V_{CC} above the Startup threshold before setting to 15 V.
8. Low duty cycle pulse techniques are used during test to maintain junction temperature as close to ambient as possible.
 $T_{\text{low}} = 0^\circ\text{C}$ for UC3842B, UC3843B; -25°C for UC2842B, UC2843B; -40°C for UC3842BV, UC3843BV
 $T_{\text{high}} = +70^\circ\text{C}$ for UC3842B, UC3843B; $+85^\circ\text{C}$ for UC2842B, UC2843B; $+105^\circ\text{C}$ for UC3842BV, UC3843BV

UC3842B, UC3843B, UC2842B, UC2843B

ORDERING INFORMATION

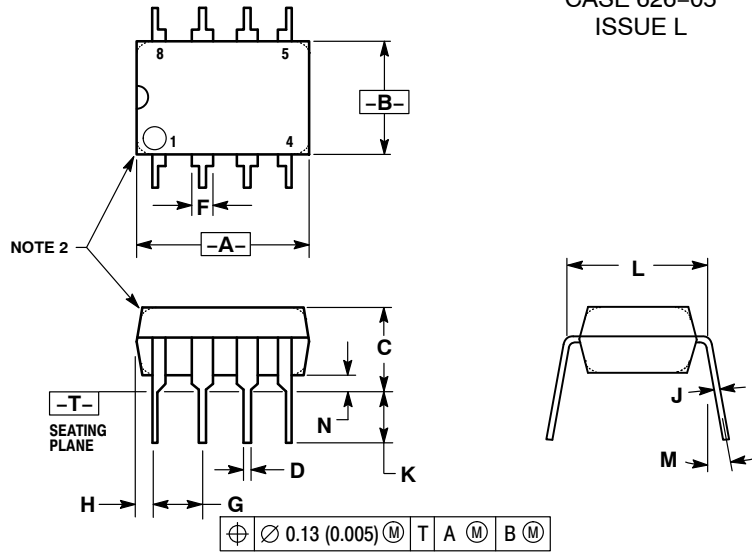
Device	Operating Temperature Range	Package	Shipping†	
UC2842BD	$T_A = -25^\circ$ to $+85^\circ\text{C}$	SOIC-14	55 Units/Rail	
UC2842BDG		SOIC-14 (Pb-Free)	55 Units/Rail	
UC2842BD1		SOIC-8	98 Units/Rail	
UC2842BD1G		SOIC-8 (Pb-Free)	98 Units/Rail	
UC2842BD1R2		SOIC-8	2500 Tape & Reel	
UC2842BD1R2G		SOIC-8 (Pb-Free)	2500 Tape & Reel	
UC2842BN		PDIP-8	1000 Units/Rail	
UC2842BNG		PDIP-8 (Pb-Free)		
UC3842BN	$T_A = 0^\circ$ to $+70^\circ\text{C}$	PDIP-8	1000 Units/Rail	
UC3842BNG		PDIP-8 (Pb-Free)		
UC3842BD		SOIC-14	55 Units/Rail	
UC3842BDG		SOIC-14 (Pb-Free)	55 Units/Rail	
UC3842BDR2		SOIC-14	2500 Tape & Reel	
UC3842BDR2G		SOIC-14 (Pb-Free)	2500 Tape & Reel	
UC3842BD1		SOIC-8	98 Units/Rail	
UC3842BD1G		SOIC-8 (Pb-Free)	98 Units/Rail	
UC3842BD1R2		SOIC-8	2500 Tape & Reel	
UC3842BD1R2G		SOIC-8 (Pb-Free)		
UC3842BVDR2		$T_A = -40^\circ$ to $+105^\circ\text{C}$	SOIC-14	2500 Tape & Reel
UC3842BVDR2G			SOIC-14 (Pb-Free)	
UC3842BVD1	SOIC-8		98 Units/Rail	
UC3842BVD1G	SOIC-8 (Pb-Free)		98 Units/Rail	
UC3842BVD1R2	SOIC-8		2500 Tape & Reel	
UC3842BVD1R2G	SOIC-8 (Pb-Free)		2500 Tape & Reel	
UC2843BD	$T_A = -25^\circ$ to $+85^\circ\text{C}$	SOIC-14	55 Units/Rail	
UC2843BDG		SOIC-14 (Pb-Free)	55 Units/Rail	
UC2843BDR2		SOIC-14	2500 Tape & Reel	
UC2843BDR2G		SOIC-14 (Pb-Free)	2500 Tape & Reel	
UC2843BD1		SOIC-8	98 Units/Rail	
UC2843BD1G		SOIC-8 (Pb-Free)	98 Units/Rail	
UC2843BD1R2	$T_A = -25^\circ$ to $+85^\circ\text{C}$	SOIC-8	2500 Tape & Reel	
UC2843BD1R2G		SOIC-8 (Pb-Free)	2500 Tape & Reel	
UC2843BN		PDIP-8	1000 Units/Rail	
UC2843BNG		PDIP-8 (Pb-Free)	1000 Units/Rail	

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

UC3842B, UC3843B, UC2842B, UC2843B

PACKAGE DIMENSIONS

PDIP-8
N SUFFIX
CASE 626-05
ISSUE L



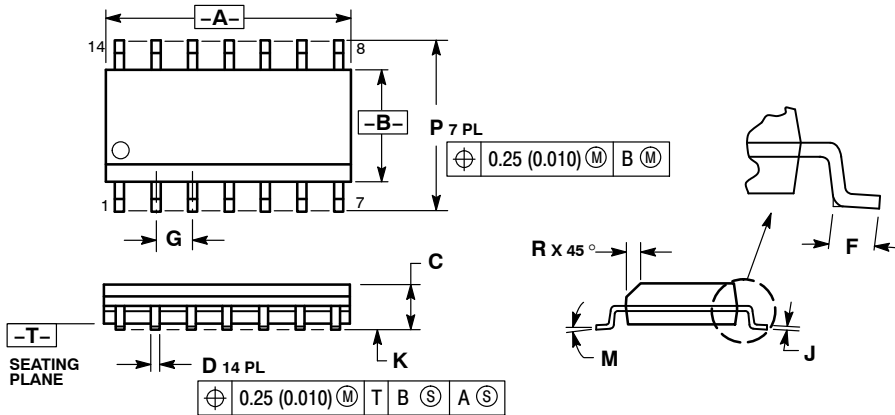
- NOTES:
1. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.
 2. PACKAGE CONTOUR OPTIONAL (ROUND OR SQUARE CORNERS).
 3. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.40	10.16	0.370	0.400
B	6.10	6.60	0.240	0.260
C	3.94	4.45	0.155	0.175
D	0.38	0.51	0.015	0.020
F	1.02	1.78	0.040	0.070
G	2.54 BSC		0.100 BSC	
H	0.76	1.27	0.030	0.050
J	0.20	0.30	0.008	0.012
K	2.92	3.43	0.115	0.135
L	7.62 BSC		0.300 BSC	
M	---	10°	---	10°
N	0.76	1.01	0.030	0.040

UC3842B, UC3843B, UC2842B, UC2843B

PACKAGE DIMENSIONS

SOIC-14
D SUFFIX
CASE 751A-03
ISSUE J



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	8.55	8.75	0.337	0.344
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.054	0.068
D	0.35	0.49	0.014	0.019
F	0.40	1.25	0.016	0.049
G	1.27 BSC		0.050 BSC	
J	0.19	0.25	0.008	0.009
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	5.80	6.20	0.228	0.244
R	0.25	0.50	0.010	0.019

SOLDERING FOOTPRINT

