



UC384XA-BW Current Mode PWM Controller

(UC3842A-BW/43A-BW/44A-BW/45A-BW)

DESCRIPTION

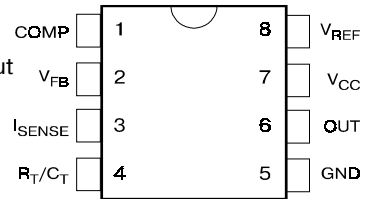
The UC3842A-BW/43A-BW/44A-BW/45A-BW are fixed frequency current mode PWM controller. They are specially designed for OFF-Line and DC to DC converter applications with a minimal external components. Internally implemented circuits include a trimmed oscillator for precise duty cycle control, a temperature compensated reference, high gain error amplifier, current sensing comparator, and a high current totem pole output ideally suited for driving a power MOSFET. Protection circuitry includes built undervoltage lockout and current limiting.

The UC3842A-BW and UC3844A-BW have UVLO thresholds of 16 V (on) and 10 V (off). The corresponding thresholds for the UC3843A-BW/45A-BW are 8.4V (on) and 7.6V (off). The UC3842A-BW and UC3843A-BW can operate within 100% duty cycle. The UC3844A-BW and UC3845A-BW can operate within 50% duty cycle.

The UC384XA-BW has Start-Up Current 0.17mA (typ).

The UC384XA-BW are revised UC384XAM and differ by higher Unity Gain bandwidth of Error Amplifier.

PIN CONNECTION (TOP VIEW)

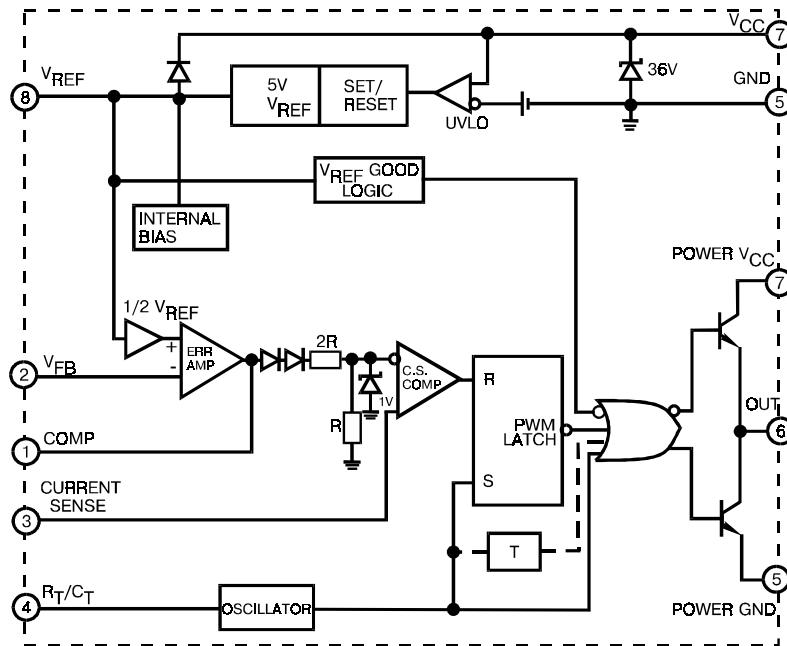


FEATURES

- Low Start-Up and Operating Current
- High Current Totem Pole Output
- Undervoltage Lockout With Hysteresis
- Operating Frequency Up To 500KHz

BLOCK DIAGRAM

(toggle flip flop used only in UC3844, UC3845)



Absolute Maximum Ratings

Characteristic	Symbol	Value	Unit
Supply Voltage (low impedance source)	V_{CC}	30	V
Output Current	I_O	± 1	A
Input Voltage (Analog Inputs pins 2,3)	V_I	-0.3 to 5.5	V
Error Amp Output Sink Current	$I_{SINK (E.A)}$	10	mA
Power Dissipation ($T_A=25^\circ\text{C}$)	P_O	1	W
Storage Temperature Range	T_{stg}	-65 to 150	$^\circ\text{C}$
Lead Temperature (soldering 5 sec.)	T_L	260	$^\circ\text{C}$



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

Characteristics	Symbol	Test Condition	Min	Typ	Max	Unit
Reference Section						
Reference Output Voltage	V _{REF}	T _J = 25°C, I _{REF} = 1 mA	4.9	5.0	5.1	V
Line Regulation	ΔV _{REF}	12V ≤ V _{CC} ≤ 25 V		6.0	20	mV
Load Regulation	ΔV _{REF}	1 mA ≤ I _{REF} ≤ 20mA		6.0	25	
Short Circuit Output Current	I _{SC}	T _A = 25°C		-100	-180	mA
Oscillator Section						
Oscillation Frequency	f	T _J = 25°C	47	52	57	KHz
Frequency Change with Voltage	Δf/ΔV _{CC}	12V ≤ V _{CC} ≤ 25 V		0.05	1.0	%
Oscillator Amplitude	V _(OSC)	(peak to peak)		1.6		V
Error Amplifier Section						
Input Bias Current	I _{BIAS}	V _{FB} =3V		-0.1	-2	μA
Input Voltage	V _{I(E.A)}	V _{pin1} = 2.5V	2.42	2.5	2.58	V
Open Loop Voltage Gain	A _{VOL}	2V ≤ V ₀ ≤ 4V	65	90		dB
Unity Gain Bandwidth	UGBW	T _J =25°C, Note 3	0.5	0.6		MHz
Power Supply Rejection Ratio	PSRR	12V ≤ V _{CC} ≤ 25 V	60	70		dB
Output Sink Current	I _{SINK}	V _{pin2} = 2.7V, V _{pin1} = 1.1V	2	7		mA
Output Source Current	I _{SOURCE}	V _{pin2} = 2.3V, V _{pin1} = 5V	-0.5	-1.0		mA
High Output Voltage	V _{OH}	V _{pin2} = 2.3V, R _L = 15KΩ to GND	5.0	6.0		V
Low Output Voltage	V _{OL}	V _{pin2} = 2.7V, R _L = 15KΩ to PIN 8		0.8	1.1	
Current Sense Section						
Gain	G _V	(Note 1 & 2)	2.85	3.0	3.15	V/V
Maximum Input Signal	V _{I(MAX)}	V _{pin1} = 5V (Note1)	0.9	1.0	1.1	V
Supply Voltage Rejection	SVR	12V ≤ V _{CC} ≤ 25 V (Note 1)		70		dB
Input Bias Current	I _{BIAS}	V _{pin3} = 3V		-3.0	-10	μA
Output Section						
Low Output Voltage	V _{OL}	I _{SINK} = 20 mA		0.08	0.4	V
		I _{SINK} = 200 mA		1.4	2.2	
High Output Voltage	V _{OH}	I _{SINK} = 20 mA	13	13.5		
		I _{SINK} = 200 mA	12	13.0		
Rise Time	t _R	T _J = 25°C, C _L = 1nF (Note 3)		45	150	nS
Fall Time	t _F	T _J = 25°C, C _L = 1nF (Note 3)		35	150	
Undervoltage Lockout Section						
Start Theshold	V _{TH(ST)}	UC3842A-BW/44A-BW	14.5	16.0	17.5	V
		UC3843A-BW/45A-BW	7.8	8.4	9.0	
Min. Operating Voltage (After Turn On)	V _{OPR(min)}	UC3842A-BW/44A-BW	8.5	10	11.5	V
		UC3843A-BW/45A-BW	7.0	7.6	8.2	
PWM Section						
Max. Duty Cycle	D _(MAX)	UC3842A-BW/43A-BW	95	97	100	%
		UC3844A-BW/45A-BW	47	48	50	
Min. Duty Cycle	D _(MAX)			0		
Total Standby Current						
Start-Up Current	I _{ST}	UC384XA-BW		0.17	0.3	mA
Operating Supply Current	I _{CC (OPR)}	V _{pin3} = V _{pin2} = 0V		13	17	
Zener Voltage	V _Z	I _{CC} =25 mA	30	38		V

* Adjust V_{CC} above the start threshold before setting it to 15V.

Note 1: Parameter measured at trip point of latch with V_{pin2}=0.

Note 2: Gain defined as A=ΔV_{pin1}/ΔV_{pin3} ; 0 ≤ V_{pin3} ≤ 0.8V.

Note 3: These parameters, although guaranteed, are not 100% tested in production.



(UC3842A-BW/43A-BW/44A-BW/45A-BW)

PIN FUNCTION

N	FUNCTION	DESCRIPTION
1	COMP	This pin is the Error Amplifier output and is made for loop compensation.
2	V_{FB}	This is the inverting input of the Error Amplifier. It is normally connected to the switching power supply output through a resistor divider.
3	I_{SENSE}	A voltage proportional to inductor current is connected to this input. The PWM uses this information to terminate the output switch conduction.
4	R_T/C_T	The oscillator frequency and maximum Output duty cycle are programmed by connecting resistor R_T to V_{ref} and capacitor C_T to ground.
5	GROUND	This pin is the combined control circuitry and power ground.
6	OUTPUT	This output directly drives the gate of a power MOSFET. Peak currents up to 1A are sourced and sink by this pin.
7	V_{CC}	This pin is the positive supply of the integrated circuit.
8	V_{ref}	This is the reference output. It provides charging current for capacitor C_T through resistor R_T .

APPLICATION INFORMATION

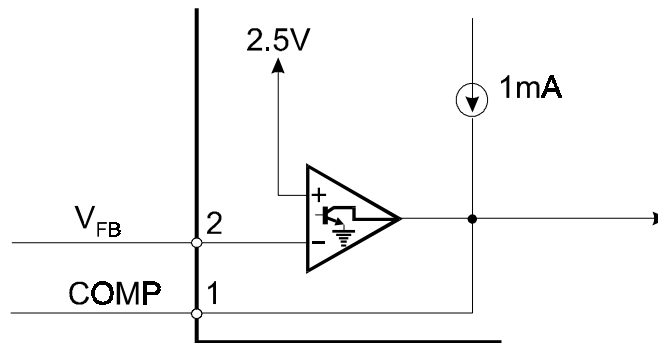


Figure 1. Error Amp Configuration

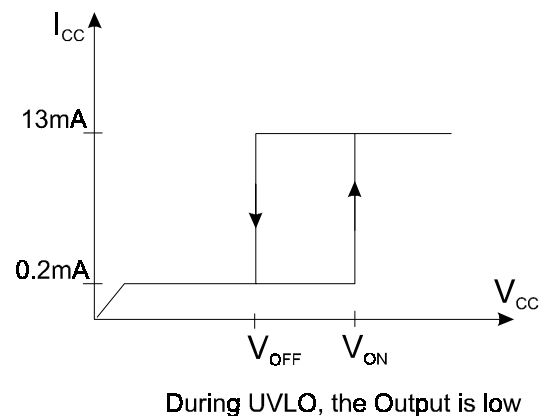
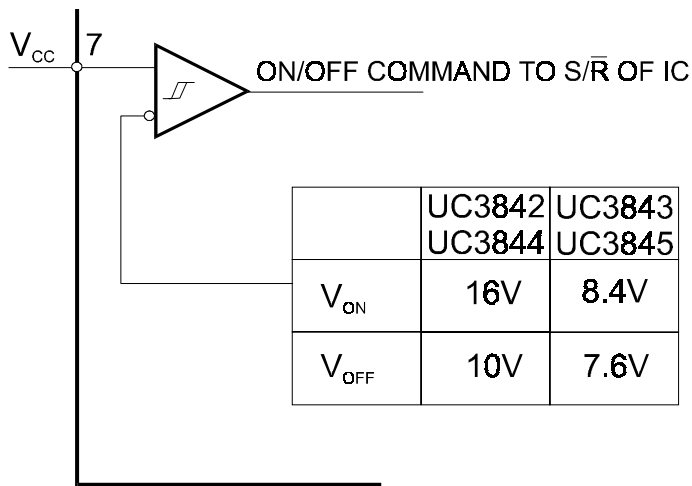


Figure 2. Undervoltage Lockout

