

HIGH PERFORMANCE CURRENT MODE PWM CONTROLLERS

■ DESCRIPTION

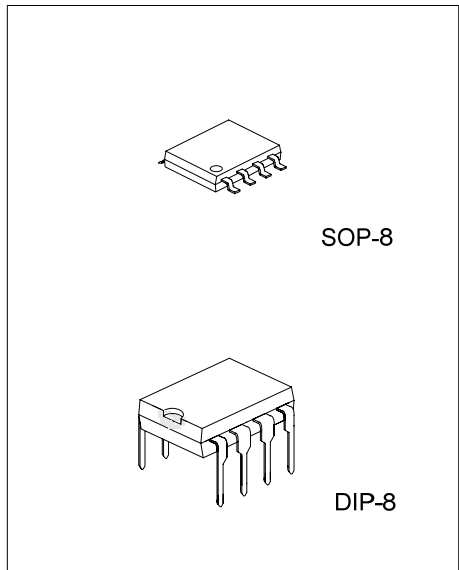
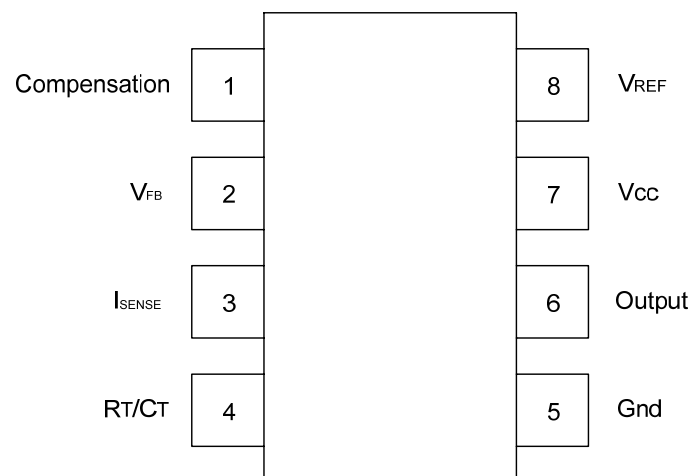
The HG UC3844/3845 are high performance fixed frequency current mode controllers that specifically designed for Off-Line and DC to DC converter applications with minimal external parts count.

The differences between **UC3844** and **UC3845** are the maximum duty cycle ranges and under-voltage lockout thresholds. The **UC3844** ideally suited to off-line applications with UVLO thresholds of $16V_{(ON)}$ and $10V_{(OFF)}$, and **UC3845** has UVLO thresholds of $8.5V_{(ON)}$ and $7.6V_{(OFF)}$ for lower voltage applications.

■ FEATURES

- * Operation output switching frequency up to 500 kHz
- * Output deadtime adjustable from 50% to 70%
- * Automatic feed forward compensation
- * Latching PWM for cycle-by-cycle current limiting
- * High current totem pole output
- * Internally trimmed reference with under voltage lockout
- * UVLO with hysteresis
- * Low startup and operating current

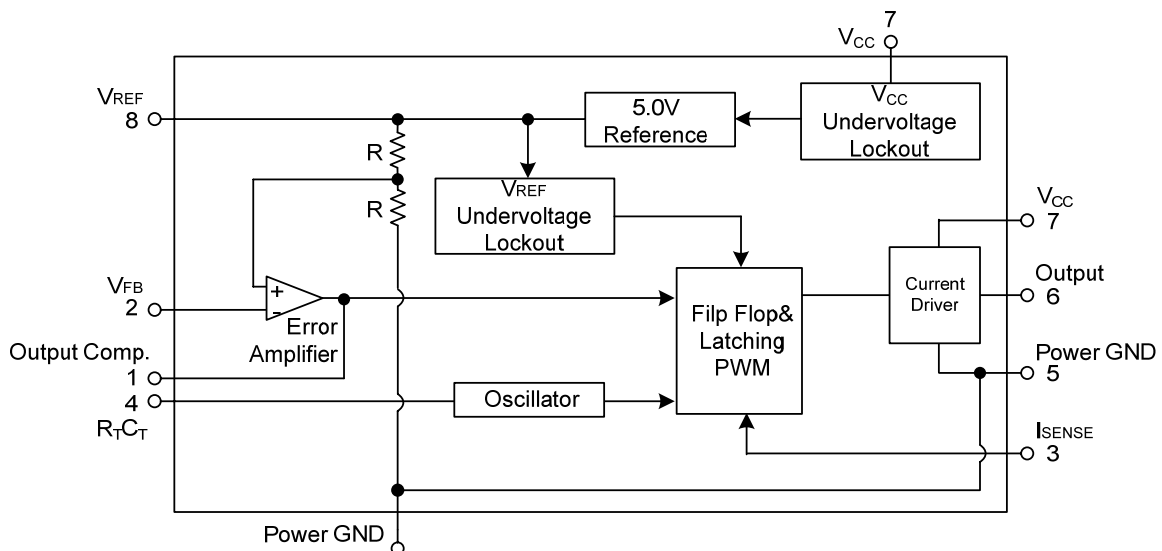
■ PIN CONFIGURATION



■ PIN DESCRIPTION

PIN NO	PIN NAME	FUNCTION
1	Compensation	Error amplifier output, this pin is made available for loop compensation.
2	V_{FB}	Voltage Feedback, 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. Operation to 1 MHz is possible.
5	GND	Power ground.
6	Output	This output directly drives the gate of a power MOSFET. Peak currents up to 1A are sourced and sunk by this pin. The output switches at one-half the oscillator frequency.
7	V_{CC}	Positive supply.
8	V_{REF}	Reference output, provides charging current for capacitor C_T though resistor R_T .

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

PARAMETER		SYMBOL	RATINGS	UNIT
Total Power Supply and Zener Current		(I _{CC} +I _Z)	30	mA
Output Current, Source or Sink (Note 2)		I _{OUT}	1.0	A
Output Energy (Capacitive Load per cycle)		W	5.0	μJ
Current Sense and Voltage feedback Inputs		V _{IN}	-0.3 ~ +5.5	V
Error Amp Output Sink Current		I _{SINK}	10	mA
Power Dissipation	SOP-8	P _D	862	mW
	DIP-8		1250	mW
Junction Temperature		T _J	+150	°C
Operation Temperature Range		T _{OPR}	0 ~ 70	°C
Storage Temperature Range		T _{STG}	-65 ~ +150	°C

Note:1.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.

2.Maximum package power dissipation limits must be observed.

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Thermal Resistance(Junction-to-Air)	SOP-8	θ _{JA}	145	°C/W
	DIP-8		100	°C/W

■ ELECTRICAL CHARACTERISTICS

(Ta=25°C, V_{CC}=15V, R_T=10k, C_T=3.3nF, 0°C ≤ T_A ≤ 70°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
REFERENCE SECTION						
Reference Output Voltage	V _{REF}	I _{OUT} =1.0mA, T _J =25°C	4.9	5.0	5.1	V
Line Regulation	ΔV _{OUT}	V _{CC} =12V ~ 25V		2.0	20	mV
Load Regulation	ΔV _{OUT}	I _{OUT} =1.0mA ~ 20mA		3.0	25	mV
Temperature Stability	t _s			0.2		mV/°C
Total Output Variation over Line, Load, Temperature	V _{REF}		4.82		5.18	V
Output Noise Voltage	e _N	f=10Hz ~ kHz, T _J =25°C		50		μV
Long Term Stability	S	T _A =125°C for 1000 Hours		5		mV
Output Short Circuit Current	I _{SC}		-30	-85	-180	mA
OSCILLATOR SECTION						
Oscillator Voltage Swing	V _{OSC}			1.6		V
Discharge Current	I _{DSG}	V _{OSC} =2.0V, T _J =25°C		10.8		mA
Frequency	f _{OSC}	T _J =25°C,	47	52	57	kHz
		0°C ≤ T _A ≤ 70°C	46		60	
Frequency Change with Voltage	Δf _{OSC} /ΔV	V _{CC} =12V ~ 25V		0.2	1.0	%
Frequency Change with Temperature	Δf _{OSC} /ΔT	0°C ≤ T _A ≤ 70°C		5.0		%
ERROR AMPLIFIER SECTION						
Voltage Feedback Input	V _{FB}	V _{OUT} =2.5V	2.42	2.50	2.58	V
Output Voltage Swing	High	V _{OH}	5.0	6.2		V
	Low	V _{OL}		0.8	1.1	
Output Current	Sink	I _{SINK}	2.0	12		mA
	Source	I _{SOURCE}	-0.5	-1.0		
Input Bias Current	I _{I(BIAS)}	V _{FB} =2.7V		-0.1	-2.0	μA
Open Loop Voltage Gain	G _{VO}	V _{OUT} =2.0V ~ 4.0V	65	90		dB
Power Supply Rejection Ratio	PSRR	V _{CC} =12V ~ 25V	60	70		dB
Unity Gain Bandwidth	GB _W	T _J =25°C	0.7	1.0		MHz

■ ELECTRICAL CHARACTERISTICS(Cont.)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
CURRENT SENSE SECTION							
Current Sense Input Voltage Gain (Note 2 & 3)		G _V		2.85	3.0	3.15	V/V
Maximum Current Sense Input Threshold (Note 2)		V _{I(THR)}		0.9	1.0	1.1	V
Input Bias Current		I _{I(BIAS)}			-2.0	-10	μA
Power Supply Rejection Ratio		PSRR	V _{CC} =12V ~ 25V (Note4)		70		dB
Propagation Delay		t _{PLH(IN/OUT)}			150	300	ns
OUTPUT SECTION							
Output Voltage	Low	V _{OL}	I _{SINK} =20mA		0.1	0.4	V
			I _{SINK} =200mA		1.6	2.2	
	High	V _{OH}	I _{SINK} =20mA	13	13.5		V
			I _{SINK} =200mA	12	13.4		
Output Voltage with U _{VLO} Activated		V _{OL} (U _{VLO})	V _{CC} =6.0V, I _{SINK} =1.0mA		0.1	1.1	V
Output Voltage Rise Time		t _R	C _L =1.0nF, T _J =25°C		50	150	ns
Output Voltage Fall Time		t _F	C _L =1.0nF, T _J =25°C		50	150	ns
UNDERVOLTAGE LOCKOUT SECTION							
Startup Threshold	UC3844	V _{THR}		14.5	16.0	17.5	V
	UC3845			7.8	8.4	9.0	
Minimum Operating Voltage After Turn-On	UC3844	V _{CC(MIN)}		8.5	10.0	11.5	V
	UC3845			7.0	7.6	8.2	
PWM SECTION							
Duty Cycle	Max	DC _{MAX}		47	48	50	%
	Min	DC _{MIN}				0	%
TOTAL DEVICE							
Power Supply Zener Voltage		V _Z	I _{CC} =25mA	30	36	-	V
Power Supply Current (Note 4)	UC3845	I _{CC}	V _{CC} =6.5V		0.5	1.0	mA
	UC3844		V _{CC} =14V		12	17	

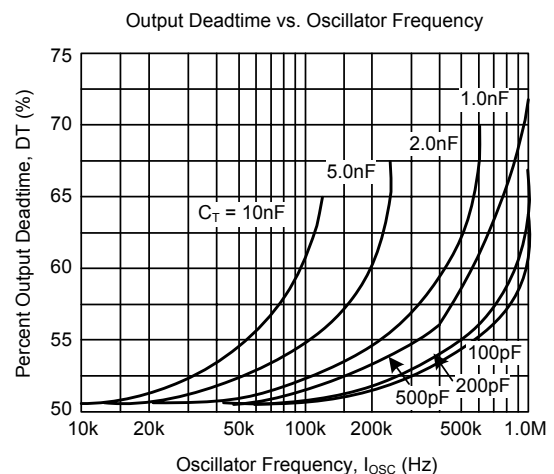
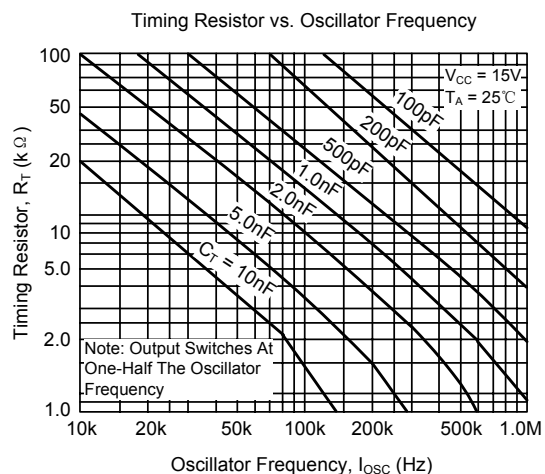
Note: 1. Low duty cycle pulse techniques are used during test to maintain junction temperature as close to ambient as possible.

2. This parameter is measured at the latch trip point with $V_{FB}=0V$.

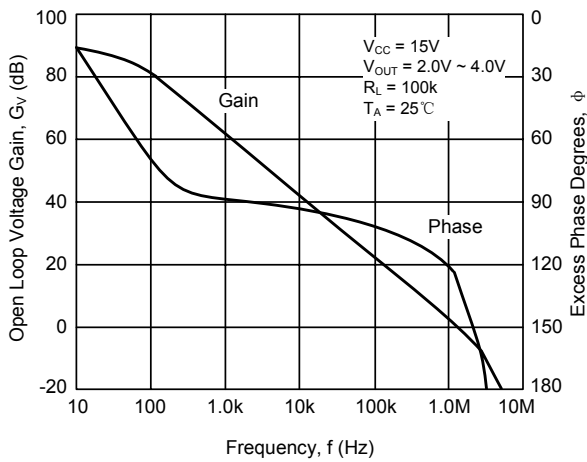
3. Comparator gain is defined as: $A_V = \frac{\Delta V \text{ Output Compensation}}{\Delta V \text{ Current Sense Input}}$

4. Adjust V_{CC} above the startup threshold before setting to 15V.

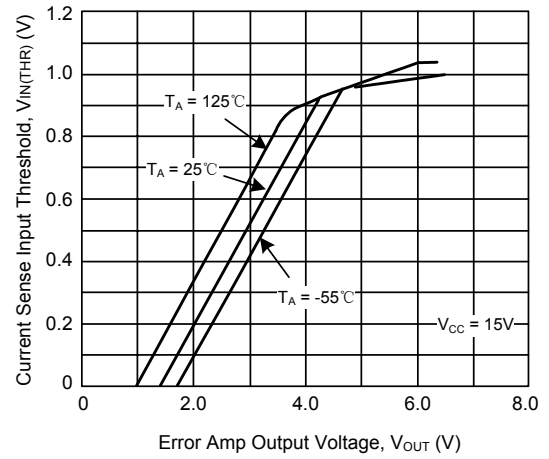
■ TYPICAL CHARACTERISTICS



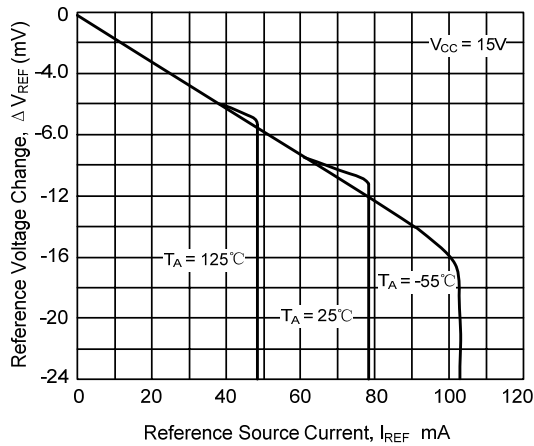
Error Amp Open Loop Gain Phase vs. Frequency



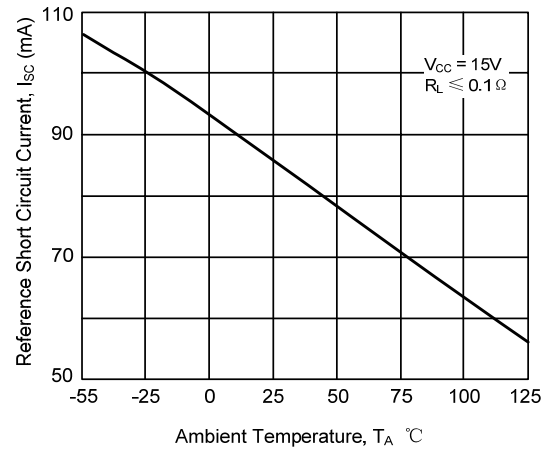
Current Sense Input Threshold vs. Error Amp Output Voltage



Reference Voltage Change vs. Reference Source Current

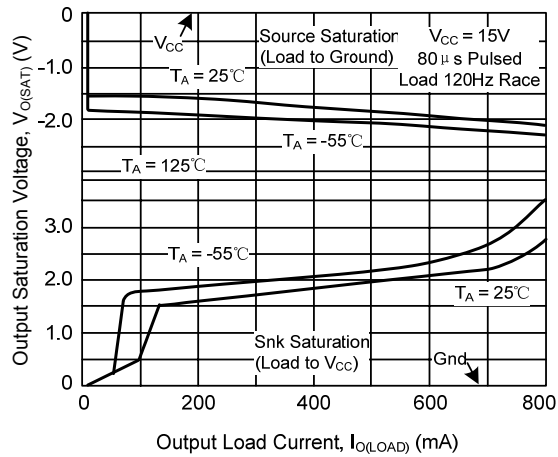


Reference Short Circuit Current vs. Ambient Temperature



■ TYPICAL CHARACTERISTICS(Cont.)

Output Saturation Voltage vs. Output Load Current



Supply Current vs. Supply Voltage

