

## CURRENT MODE PWM CONTROLLER

### DESCRIPTION

The UC284x and UC384x 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 under voltage lockout and current limiting.

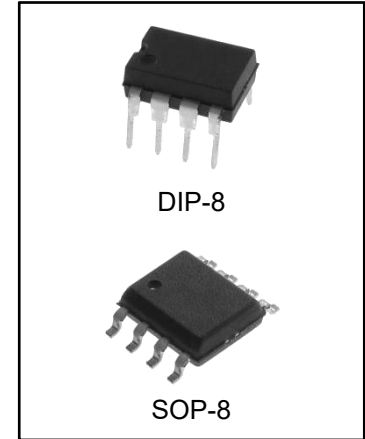
The UC2842/44, UC3842/44 have UVLO thresholds of 16 V (on) and 10 V (off). The corresponding thresholds for the UC2843/45, UC3843/45 are 8.4V (on) and 7.6V (off).

The UC2842/43, UC3842/43 can operate within 100% duty cycle.

The UC2844/45, UC3844/45 can operate within 50% duty cycle.

The UC2842/44/44/45 is characterized for operation from TA = -40°C to 85°C.

The UC3842/43/44/45 is characterized for operation from TA = 0°C to 70°C.



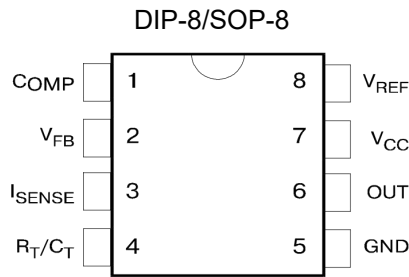
### FEATURES

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

### ORDERING INFORMATION

DEVICE	Package Type	MARKING	Packing	Packing Qty
UC2842PG	DIP-8	UC2842	TUBE	2000/box
UC2843PG	DIP-8	UC2843	TUBE	2000/box
UC2844PG	DIP-8	UC2844	TUBE	2000/box
UC2845PG	DIP-8	UC2845	TUBE	2000/box
UC2842DRG	SOP-8	UC2842	REEL	2500/reel
UC2843DRG	SOP-8	UC2843	REEL	2500/reel
UC2844DRG	SOP-8	UC2844	REEL	2500/reel
UC2845DRG	SOP-8	UC2845	REEL	2500/reel
UC3842PG	DIP-8	UC3842	TUBE	2000/box
UC3843PG	DIP-8	UC3843	TUBE	2000/box
UC3844PG	DIP-8	UC3844	TUBE	2000/box
UC3845PG	DIP-8	UC3845	TUBE	2000/box
UC3842DRG	SOP-8	UC3842	REEL	2500/reel
UC3843DRG	SOP-8	UC3843	REEL	2500/reel
UC3844DRG	SOP-8	UC3844	REEL	2500/reel
UC3845DRG	SOP-8	UC3845	REEL	2500/reel

## Pin CONNECTION

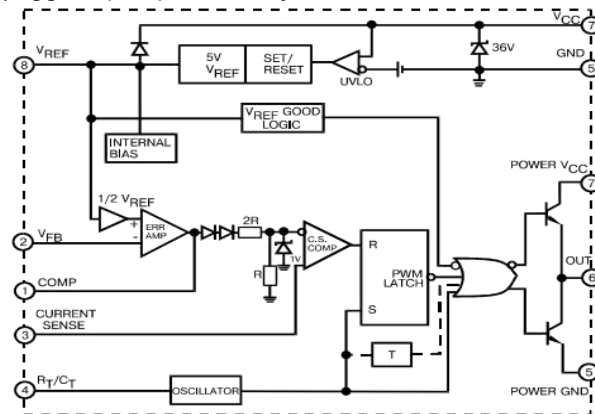


## PIN FUNCTION

N	FUNCTION	DESCRIPTION
1	COMP	This pin is the Error Amplifier output and is made for loop compensation.
2	V <sub>FB</sub>	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 <sub>SENSE</sub>	A voltage proportional to inductor current is connected to this input. The PWM uses this information to terminate the output switch conduction.
4	R <sub>T</sub> /C <sub>T</sub>	The oscillator frequency and maximum Output duty cycle are programmed by connecting resistor R <sub>T</sub> to V <sub>ref</sub> and capacitor C <sub>T</sub> 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 <sub>CC</sub>	This pin is the positive supply of the integrated circuit.
8	V <sub>ref</sub>	This is the reference output. It provides charging current for capacitor C <sub>T</sub> through resistor R <sub>T</sub> .

## BLOCK DIAGRAM

(toggle flip flop used only in UC2844/45, UC3844/45)



## Absolute Maximum Ratings

Characteristic	Symbol	Value	Unit
Supply Voltage (low impedance source)	V <sub>CC</sub>	30	V
Output Current	I <sub>o</sub>	1	A
Input Voltage (Analog Inputs pins 2,3)	V <sub>I</sub>	0.3 to 5.5	V
Error Amp Output Sink Current	I <sub>SINK (E.A)</sub>	10	mA
Power Dissipation (T <sub>A</sub> =25°C)	P <sub>o</sub>	1	W
Storage Temperature Range	T <sub>stg</sub>	-65 to 150	°C
Lead Temperature (Soldering, 10 seconds)	T <sub>L</sub>	245	°C

Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is intended to be functional, but specific performance is not ensured.

Electrical characteristics (\*VCC=15V, RT=10k , CT=3.3nF, TA=0°C to +70°C, unless otherwise specified)

Characteristics	Symbol	Test Condition	Min	Typ	Max	Unit
<b>Reference Section</b>						
Reference Output Voltage	VREF	T <sub>J</sub> = 25°C, I <sub>REF</sub> = 1 mA	4.9	5.0	5.1	V
Line Regulation	ΔVREF	12V ≤ V <sub>CC</sub> ≤ 25 V		6.0	20	mV
Load Regulation	ΔVREF	1 mA ≤ I <sub>REF</sub> ≤ 20mA		6.0	25	
Short Circuit Output Current	ISC	T <sub>A</sub> = 25°C		-100	-180	mA
<b>Oscillator Section</b>						
Oscillation Frequency	f	T <sub>J</sub> = 25°C	47	52	57	KHz
Frequency Change with Voltage	Δf/ΔV <sub>CC</sub>	12V ≤ V <sub>CC</sub> ≤ 25 V		0.05	1.0	%
Oscillator Amplitude	V(OSC)	(peak to peak)		1.6		V
<b>Error Amplifier Section</b>						
Input Bias Current	I <sub>BIAS</sub>	V <sub>FB</sub> =3V		-0.1	-2	μA
Input Voltage	V <sub>I(E.A)</sub>	V <sub>pin1</sub> = 2.5V	2.42	2.5	2.58	V
Open Loop Voltage Gain	A <sub>VOL</sub>	2V ≤ V <sub>o</sub> ≤ 4V	65	90		dB
Unity Gain Bandwidth	UGBW	T <sub>J</sub> =25°C, Note 3	0.5	0.6		MHz
Power Supply Rejection Ratio	PSRR	12V ≤ V <sub>CC</sub> ≤ 25 V	60	70		dB
Output Sink Current	I <sub>SINK</sub>	V <sub>pin2</sub> = 2.7V, V <sub>pin1</sub> = 1.1V	2	7		mA
Output Source Current	I <sub>SOURCE</sub>	V <sub>pin2</sub> = 2.3V, V <sub>pin1</sub> = 5V	-0.5	-1.0		mA
High Output Voltage	V <sub>OH</sub>	V <sub>pin2</sub> = 2.3V, R <sub>L</sub> = 15KΩ to GND	5.0	6.0		V
Low Output Voltage	V <sub>VOL</sub>	V <sub>pin2</sub> = 2.7V, R <sub>L</sub> = 15KΩ to PIN 8		0.8	1.1	
<b>Current Sense Section</b>						
Gain	G <sub>v</sub>	(Note 1 & 2)	2.85	3.0	3.15	V/V
Maximum Input Signal	V <sub>I(MAX)</sub>	V <sub>pin1</sub> = 5V (Note1)	0.9	1.0	1.1	V
Supply Voltage Rejection	SVR	12V ≤ V <sub>CC</sub> ≤ 25 V (Note 1)		70		dB
Input Bias Current	I <sub>BIAS</sub>	V <sub>pin3</sub> = 3V		-3.0	-10	μA
<b>Output Section</b>						
Low Output Voltage	V <sub>VOL</sub>	I <sub>SINK</sub> = 20 mA		0.08	0.4	V
		I <sub>SINK</sub> = 200 mA		1.4	2.2	
High Output Voltage	V <sub>VOH</sub>	I <sub>SINK</sub> = 20 mA	13	13.5		
		I <sub>SINK</sub> = 200 mA	12	13.0		
Rise Time	t <sub>R</sub>	T <sub>J</sub> = 25°C, C <sub>L</sub> = 1nF (Note 3)		45	150	nS
Fall Time	t <sub>F</sub>	T <sub>J</sub> = 25°C, C <sub>L</sub> = 1nF (Note 3)		35	150	
<b>Undervoltage Lockout Section</b>						
Start Theshold	V <sub>TH(ST)</sub>	UC2842/44,UC3842/44	14.5	16.0	17.5	V
		UC2843/45,UC3843/45	7.8	8.4	9.0	
Min. Operating Voltage (After Turn On)	V <sub>OPR(min)</sub>	UC2842/44,UC3842/44	8.5	10	11.5	V
		UC2843/45,UC3843/45	7.0	7.6	8.2	
<b>PWM Section</b>						
Max. Duty Cycle	D(MAX)	UC2842/43,UC3842/43	95	97	100	%
		UC2844/45,UC3844/45	47	48	50	
Min. Duty Cycle	D(MAX)			0		
<b>Total Standby Current</b>						
Start Up Current	I <sub>ST</sub>	UC3842/43/44/45		0.17	0.3	mA
Operating Supply Current	I <sub>CC (OPR)</sub>	V <sub>pin3</sub> = V <sub>pin2</sub> = 0V		13	17	
Zener Voltage	V <sub>Z</sub>	I <sub>CC</sub> =25 mA	30	38		V

\* Adjust VCC above the start threshold before setting it to 15V.

Note 1: Parameter measured at trip point of latch with V<sub>pin2</sub>=0.

Note 2: Gain defined as A=ΔV<sub>pin1</sub>/ΔV<sub>pin3</sub> ; 0 ≤ V<sub>pin3</sub> ≤ 0.8V.

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

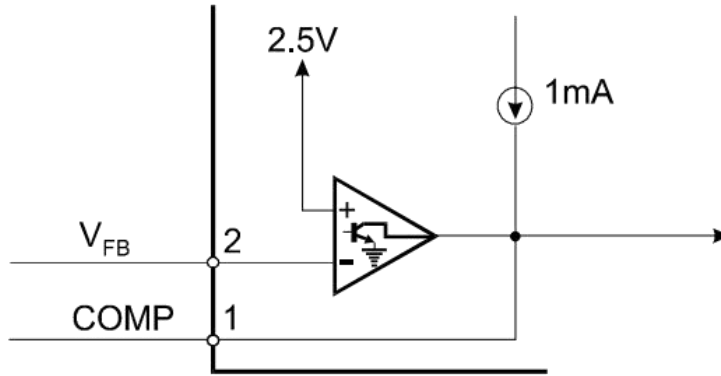
**APPLICATION INFORMATION**


Figure 1. Error Amp Configuration

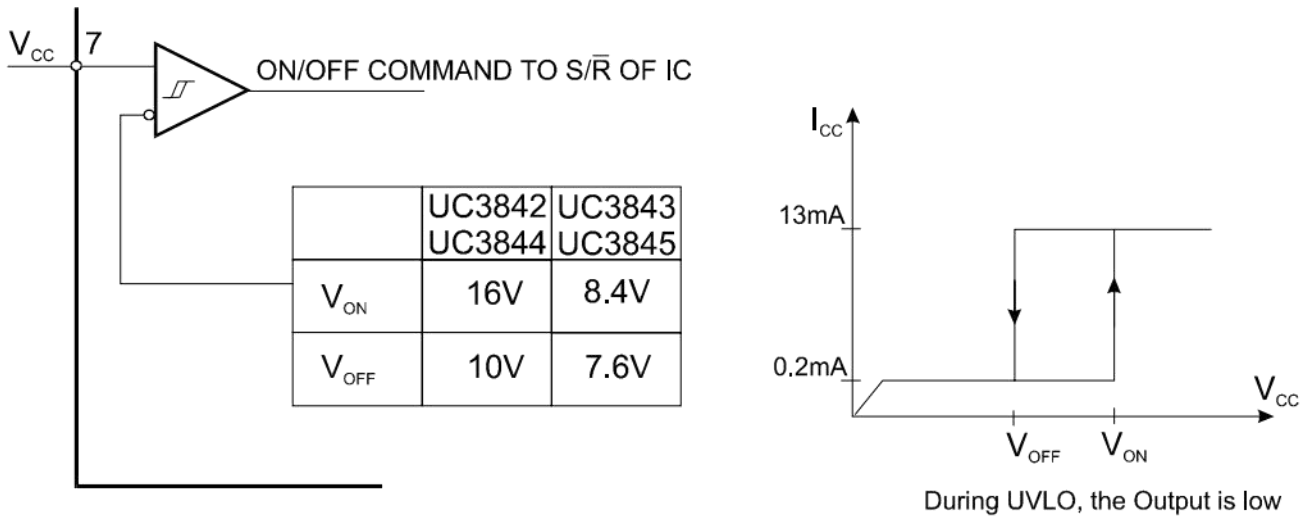
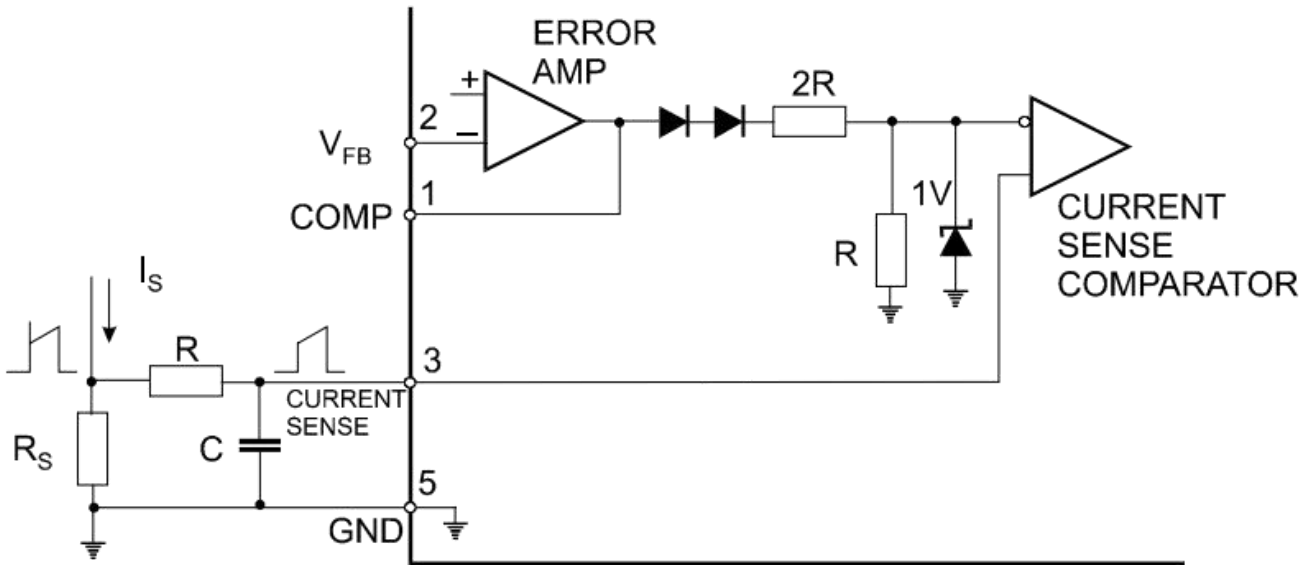


Figure 2. Under voltage Lockout



Peak current is determined by  $I_{S \max} \approx \frac{1.0V}{R_S}$

Figure 3. Current Sense Circuit

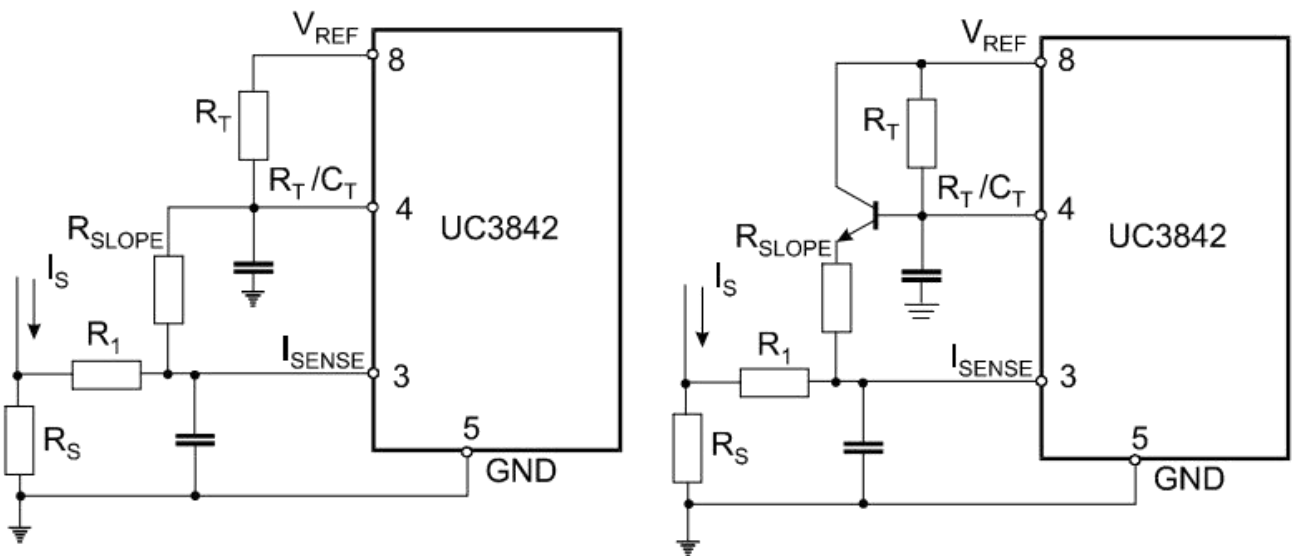
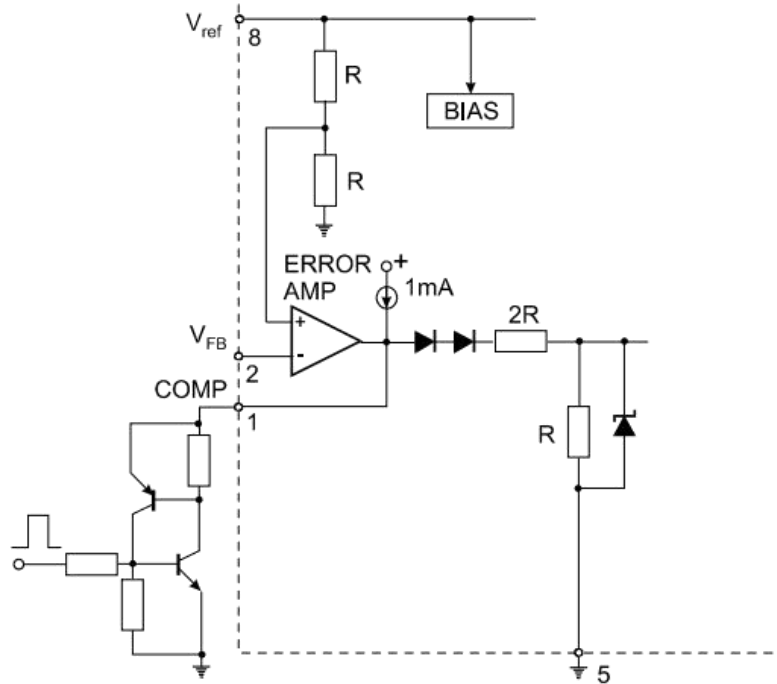
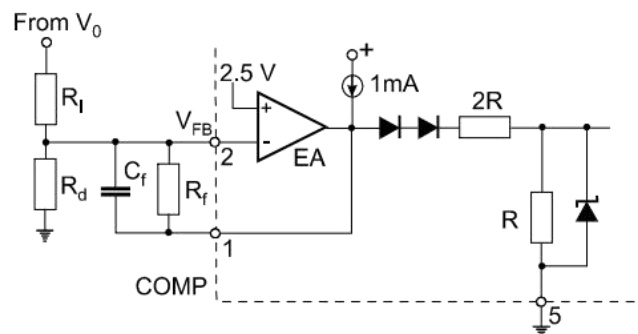


Figure 4. Slope Compensation Techniques

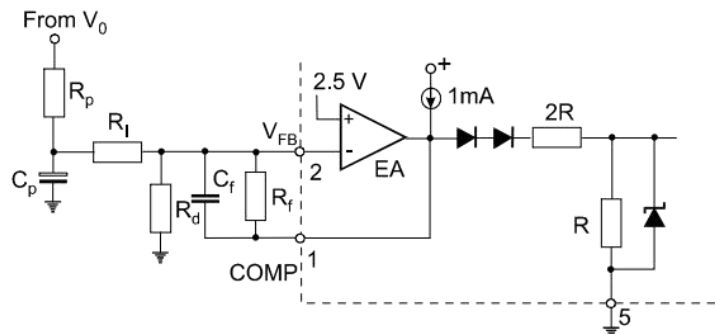


SCR must be selected for a holding current of less than 0.5mA.  
 The simple two transistor circuit can be used in place of the SCR as shown.

Figure 5. Latched Shutdown



Error Amp compensation circuit for stabilizing any current-mode topology except for boost and flyback converters operating with continuous inductor current.



Error Amp compensation circuit for stabilizing current-mode boost and flyback topologies operating with continuous inductor current.

Figure 6. Error Amplifier Compensation

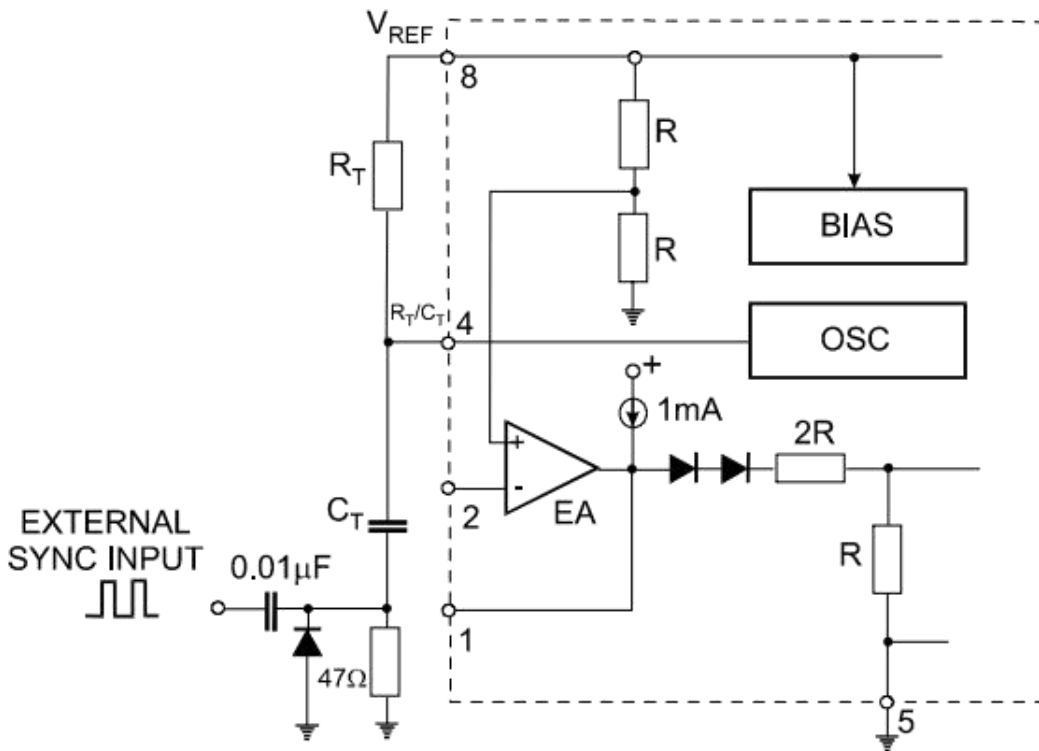


Figure 7. External Clock Synchronization

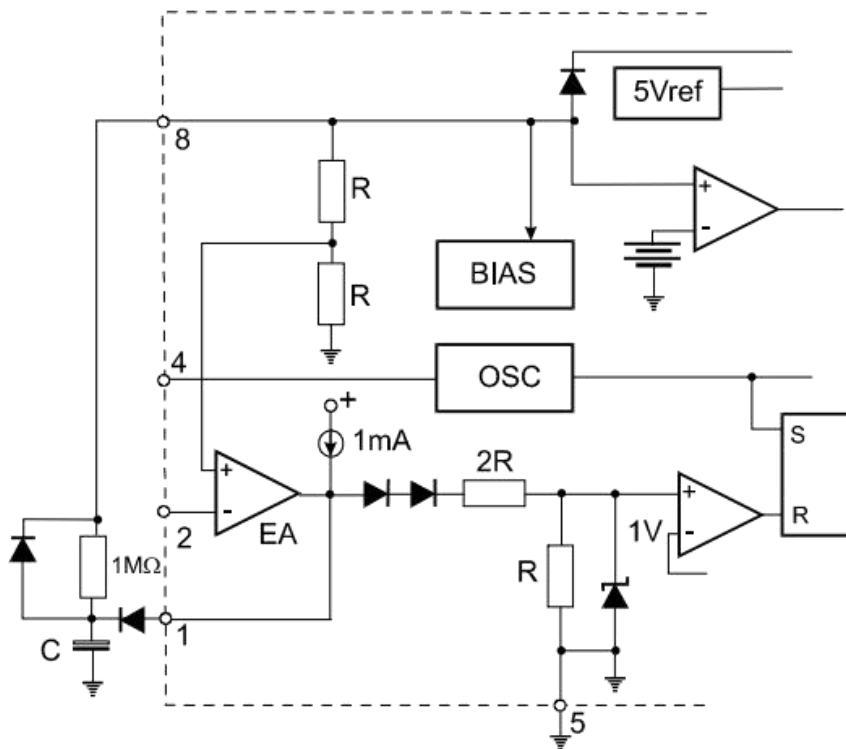


Figure 8. Soft-Start Circuit

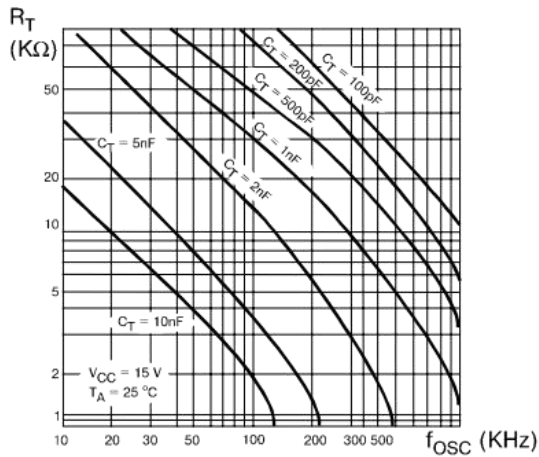
**TYPICAL PERFORMANCE CHARACTERISTICS**


Figure 1. Timing Resistor vs. Oscillator Frequency

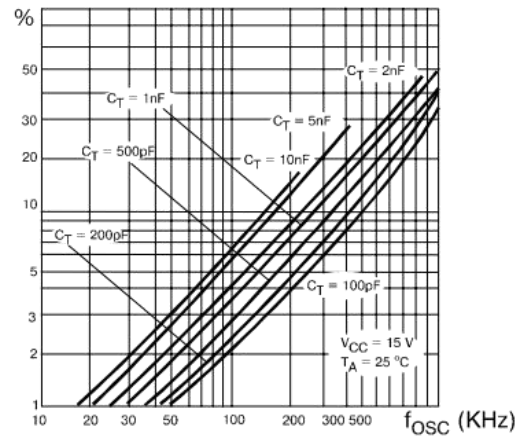


Figure 2. Output Dead-Time vs. Oscillator Frequency

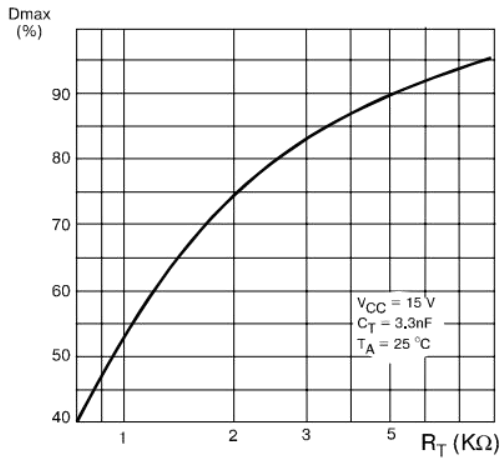


Figure 3. Maximum Output Duty Cycle vs. Timing Resistor (UC3842/43)

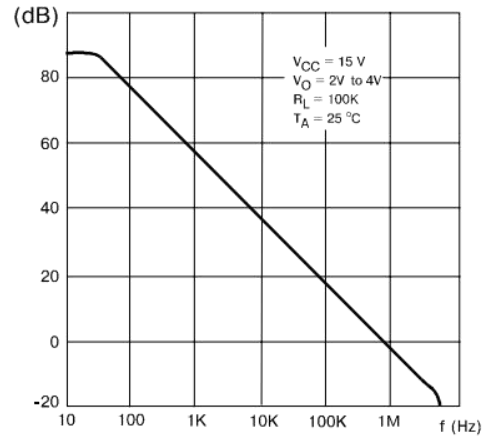


Figure 4. Error Amp Open-Loop Gain vs. Frequency

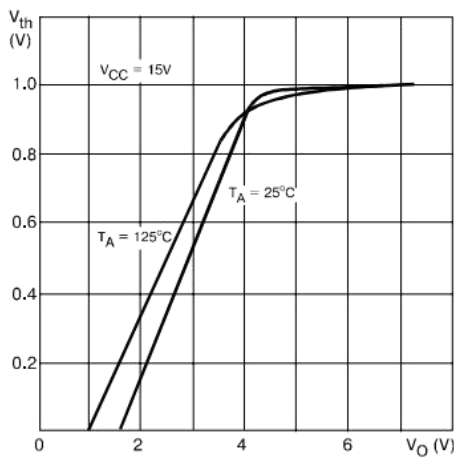


Figure 5. Current Sense Input Threshold vs. Error Amp Output Voltage

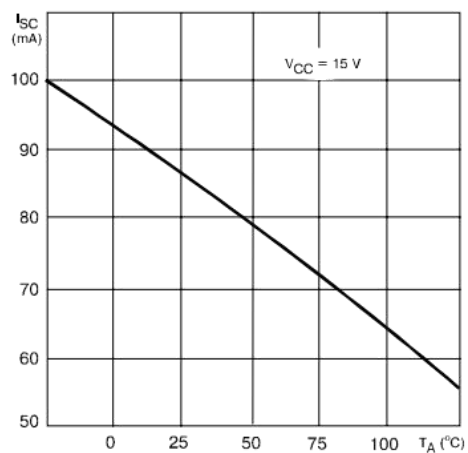


Figure 6. Reference Short Circuit Current vs. Temperature



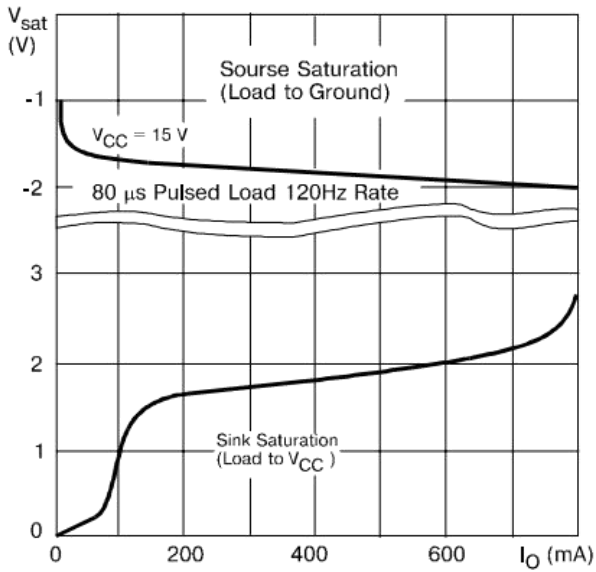


Figure 7. Output Saturation Voltage vs. Load Current  
 $T_A = 25^\circ\text{C}$

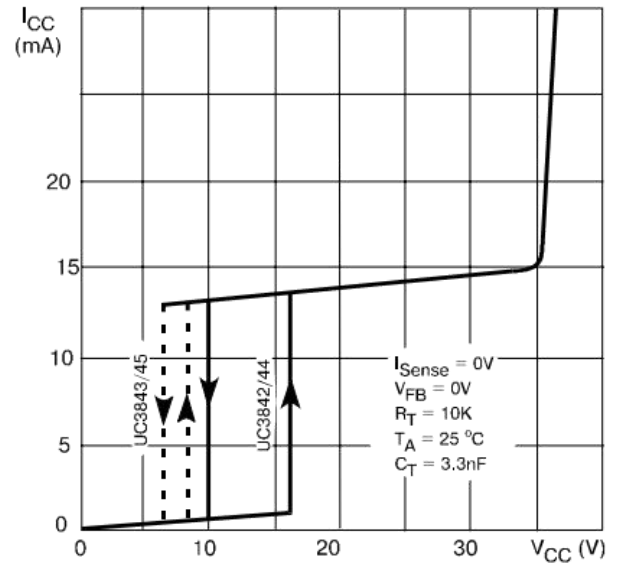


Figure 8. Supply Current vs. Supply Voltage

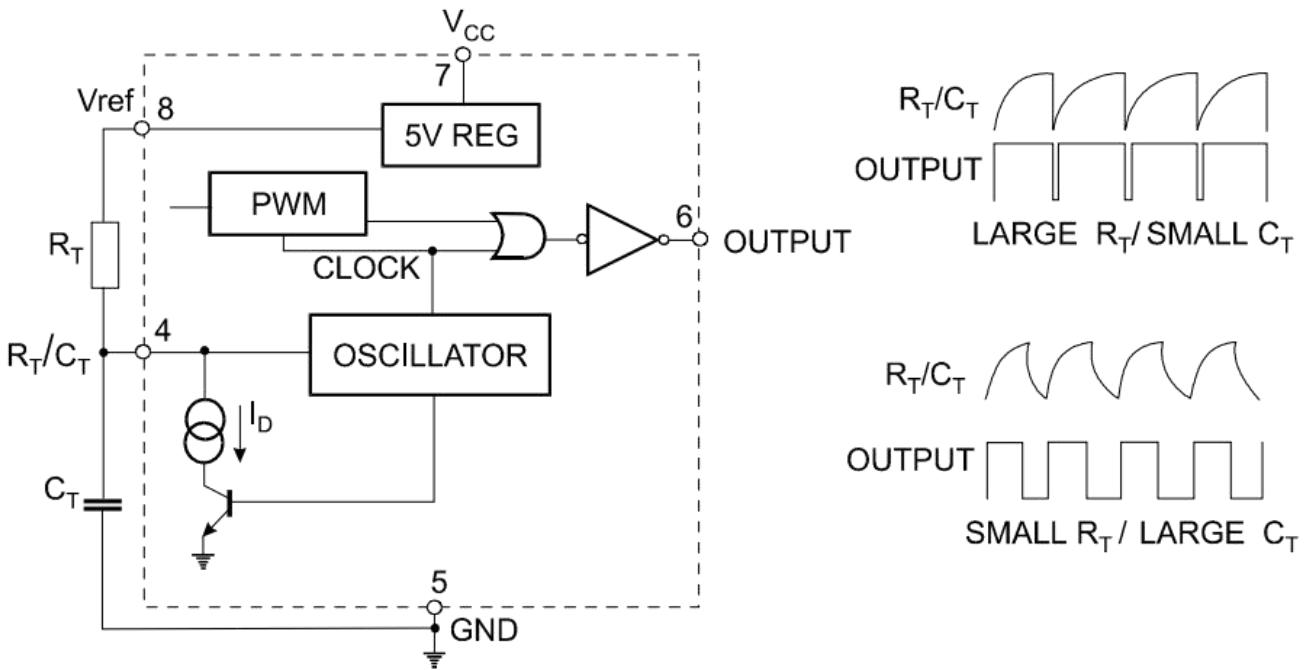
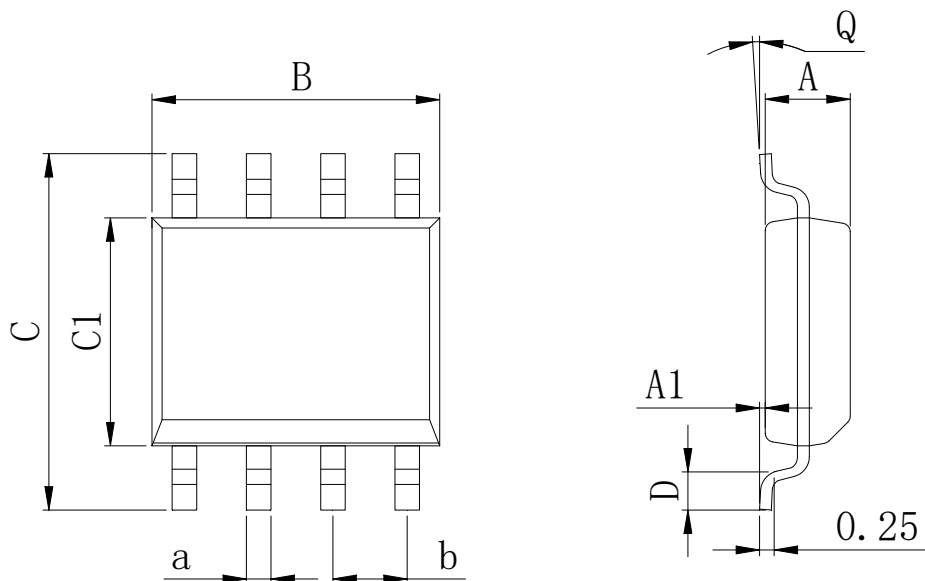


Figure 9. Oscillator and Output Waveforms

## Physical Dimensions

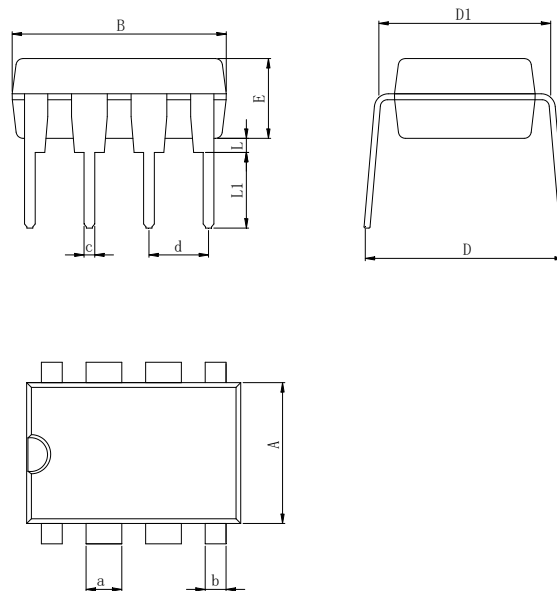
### SOP-8



Dimensions In Millimeters(SOP-8)

Symbol:	A	A1	B	C	C1	D	Q	a	b
Min:	1.35	0.05	4.90	5.80	3.80	0.40	0°	0.35	1.27 BSC
Max:	1.55	0.20	5.10	6.20	4.00	0.80	8°	0.45	

### DIP-8



Dimensions In Millimeters(DIP-8)

Symbol:	A	B	D	D1	E	L	L1	a	b	c	d
Min:	6.10	9.00	8.10	7.42	3.10	0.50	3.00	1.50	0.85	0.40	2.54 BSC
Max:	6.68	9.50	10.9	7.82	3.55	0.70	3.60	1.55	0.90	0.50	

## Revision History

DATE	REVISION	PAGE
2020-9-5	New	1-12
2023-9-14	Update encapsulation type、 Update Lead Temperature、 Updated DIP-8 dimension、 Add annotation for Maximum Ratings.	1、 2、 10

**IMPORTANT STATEMENT:**

Hanschip Semiconductor reserves the right to change its products and services without notice. Before ordering, the customer shall obtain the latest relevant information and verify whether the information is up to date and complete. Hanschip Semiconductor does not assume any responsibility or obligation for the altered documents.

Customers are responsible for complying with safety standards and taking safety measures when using Hanschip Semiconductor products for system design and machine manufacturing. You will bear all the following responsibilities: select the appropriate Hanschip Semiconductor products for your application; Design, validate and test your application; Ensure that your application meets the appropriate standards and any other safety, security or other requirements. To avoid the occurrence of potential risks that may lead to personal injury or property loss.

Hanschip Semiconductor products have not been approved for applications in life support, military, aerospace and other fields, and Hanschip Semiconductor will not bear the consequences caused by the application of products in these fields. All problems, responsibilities and losses arising from the user's use beyond the applicable area of the product shall be borne by the user and have nothing to do with Hanschip Semiconductor, and the user shall not claim any compensation liability against Hanschip Semiconductor by the terms of this Agreement.

The technical and reliability data (including data sheets), design resources (including reference designs), application or other design suggestions, network tools, safety information and other resources provided for the performance of semiconductor products produced by Hanschip Semiconductor are not guaranteed to be free from defects and no warranty, express or implied, is made. The use of testing and other quality control technologies is limited to the quality assurance scope of Hanschip Semiconductor. Not all parameters of each device need to be tested.

The documentation of Hanschip Semiconductor authorizes you to use these resources only for developing the application of the product described in this document. You have no right to use any other Hanschip Semiconductor intellectual property rights or any third party intellectual property rights. It is strictly forbidden to make other copies or displays of these resources. You should fully compensate Hanschip Semiconductor and its agents for any claims, damages, costs, losses and debts caused by the use of these resources. Hanschip Semiconductor accepts no liability for any loss or damage caused by infringement.

单击下面可查看定价，库存，交付和生命周期等信息

[>>HGC\(深圳汉芯\)](#)