

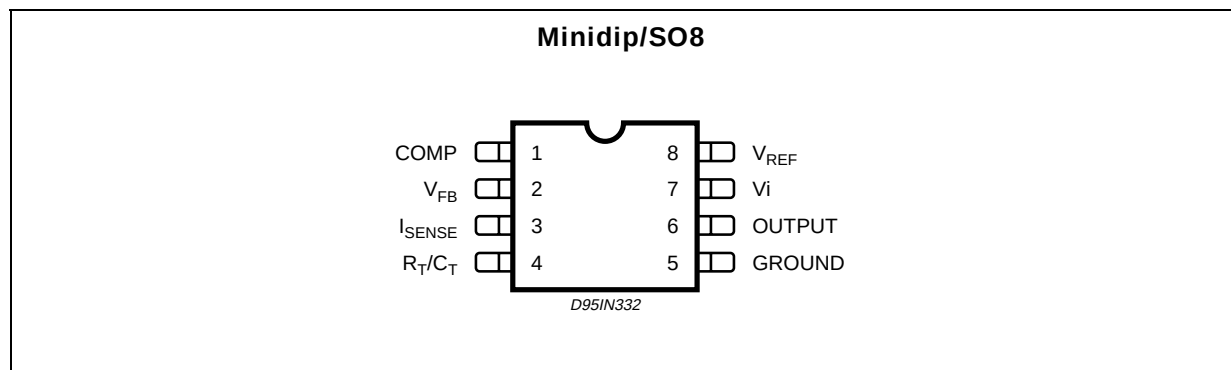
UC2842B/3B/4B/5B - UC3842B/3B/4B/5B

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_i	Supply Voltage (low impedance source)	30	V
V_i	Supply Voltage ($I_i < 30\text{mA}$)	Self Limiting	
I_o	Output Current	± 1	A
E_o	Output Energy (capacitive load)	5	μJ
	Analog Inputs (pins 2, 3)	-0.3 to 5.5	V
	Error Amplifier Output Sink Current	10	mA
P_{tot}	Power Dissipation at $T_{amb} \leq 25^\circ\text{C}$ (Minidip)	1.25	W
P_{tot}	Power Dissipation at $T_{amb} \leq 25^\circ\text{C}$ (SO8)	800	mW
T_{stg}	Storage Temperature Range	-65 to 150	$^\circ\text{C}$
T_j	Junction Operating Temperature	-40 to 150	$^\circ\text{C}$
T_L	Lead Temperature (soldering 10s)	300	$^\circ\text{C}$

* All voltages are with respect to pin 5, all currents are positive into the specified terminal.

PIN CONNECTION (top view)



PIN FUNCTIONS

No	Function	Description
1	COMP	This pin is the Error Amplifier output and is made available 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. Operation to 500kHz is possible.
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 sunk by this pin.
7	V_{CC}	This pin is the positive supply of the control IC.
8	V_{ref}	This is the reference output. It provides charging current for capacitor C_T through resistor R_T .

ORDERING NUMBERS

SO8	Minidip
UC2842BD1; UC3842BD1 UC2843BD1; UC3843BD1 UC2844BD1; UC3844BD1 UC2845BD1; UC3845BD1	UC2842BN; UC3842BN UC2843BN; UC3843BN UC2844BN; UC3844BN UC2845BN; UC3845BN

THERMAL DATA

Symbol	Description	Minidip	SO8	Unit
$R_{th\ j-amb}$	Thermal Resistance Junction-ambient. max.	100	150	°C/W

ELECTRICAL CHARACTERISTICS ([note 1] Unless otherwise stated, these specifications apply for $-25 \leq T_{amb} \leq 85^{\circ}\text{C}$ for UC284XB; $0 \leq T_{amb} \leq 70^{\circ}\text{C}$ for UC384XB; $V_i = 15\text{V}$ (note 5); $R_T = 10\text{K}$; $C_T = 3.3\text{nF}$)

Symbol	Parameter	Test Conditions	UC284XB			UC384XB			Unit
			Min.	Typ.	Max.	Min.	Typ.	Max.	
REFERENCE SECTION									
V _{REF}	Output Voltage	T _j = 25°C I _o = 1mA	4.95	5.00	5.05	4.90	5.00	5.10	V
ΔV _{REF}	Line Regulation	12V ≤ V _i ≤ 25V		2	20		2	20	mV
ΔV _{REF}	Load Regulation	1 ≤ I _o ≤ 20mA		3	25		3	25	mV
ΔV _{REF} /ΔT	Temperature Stability	(Note 2)		0.2			0.2		mV/°C
	Total Output Variation	Line, Load, Temperature	4.9		5.1	4.82		5.18	V
e _N	Output Noise Voltage	10Hz ≤ f ≤ 10KHz T _j = 25°C (note 2)		50			50		μV
	Long Term Stability	T _{amb} = 125°C, 1000Hrs (note 2)		5	25		5	25	mV
I _{SC}	Output Short Circuit		-30	-100	-180	-30	-100	-180	mA
OSCILLATOR SECTION									
f _{OSC}	Frequency	T _j = 25°C T _A = T _{low} to T _{high} T _J = 25°C (R _T = 6.2k, C _T = 1nF)	49 48 225	52 – 250	55 56 275	49 48 225	52 – 250	55 56 275	KHz KHz KHz
Δf _{OSC} /ΔV	Frequency Change with Volt.	V _{CC} = 12V to 25V	–	0.2	1	–	0.2	1	%
Δf _{OSC} /ΔT	Frequency Change with Temp.	T _A = T _{low} to T _{high}	–	1	–	–	0.5	–	%
V _{OSC}	Oscillator Voltage Swing	(peak to peak)	–	1.6	–	–	1.6	–	V
I _{dischg}	Discharge Current (V _{OSC} =2V)	T _J = 25°C T _A = T _{low} to T _{high}	7.8 7.5	8.3 –	8.8 8.8	7.8 7.6	8.3 –	8.8 8.8	mA mA
ERROR AMP SECTION									
V ₂	Input Voltage	V _{PIN1} = 2.5V	2.45	2.50	2.55	2.42	2.50	2.58	V
I _b	Input Bias Current	V _{FB} = 5V		-0.1	-1		-0.1	-2	μA
	A _{VOL}	2V ≤ V _o ≤ 4V	65	90		65	90		dB
BW	Unity Gain Bandwidth	T _J = 25°C	0.7	1		0.7	1		MHz
PSRR	Power Supply Rejec. Ratio	12V ≤ V _i ≤ 25V	60	70		60	70		dB
I _o	Output Sink Current	V _{PIN2} = 2.7V V _{PIN1} = 1.1V	2	12		2	12		mA
I _o	Output Source Current	V _{PIN2} = 2.3V V _{PIN1} = 5V	-0.5	-1		-0.5	-1		mA
	V _{OUT} High	V _{PIN2} = 2.3V; R _L = 15KΩ to Ground	5	6.2		5	6.2		V
	V _{OUT} Low	V _{PIN2} = 2.7V; R _L = 15KΩ to Pin 8		0.8	1.1		0.8	1.1	V
CURRENT SENSE SECTION									
G _V	Gain	(note 3 & 4)	2.85	3	3.15	2.85	3	3.15	V/V
V ₃	Maximum Input Signal	V _{PIN1} = 5V (note 3)	0.9	1	1.1	0.9	1	1.1	V
SVR	Supply Voltage Rejection	12 ≤ V _i ≤ 25V (note 3)		70			70		dB
I _b	Input Bias Current			-2	-10		-2	-10	μA
	Delay to Output			150	300		150	300	ns

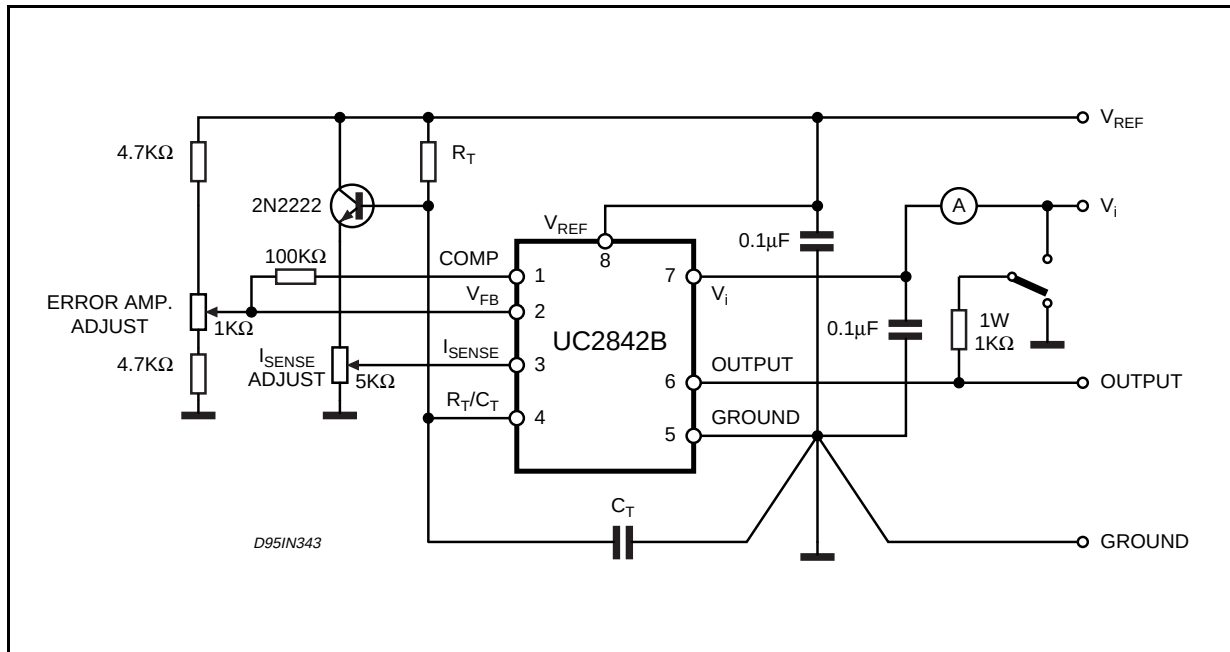
UC2842B/3B/4B/5B - UC3842B/3B/4B/5B

ELECTRICAL CHARACTERISTICS (continued)

Symbol	Parameter	Test Conditions	UC284XB			UC384XB			Unit
			Min.	Typ.	Max.	Min.	Typ.	Max.	
OUTPUT SECTION									
V _{OL}	Output Low Level	I _{SINK} = 20mA		0.1	0.4		0.1	0.4	V
		I _{SINK} = 200mA		1.6	2.2		1.6	2.2	V
V _{OH}	Output High Level	I _{SOURCE} = 20mA	13	13.5		13	13.5		V
		I _{SOURCE} = 200mA	12	13.5		12	13.5		V
V _{OLS}	UVLO Saturation	V _{CC} = 6V; I _{SINK} = 1mA		0.1	1.1		0.1	1.1	V
t _r	Rise Time	T _J = 25°C C _L = 1nF (2)		50	150		50	150	ns
t _f	Fall Time	T _J = 25°C C _L = 1nF (2)		50	150		50	150	ns
UNDER-VOLTAGE LOCKOUT SECTION									
	Start Threshold	X842B/4B	15	16	17	14.5	16	17.5	V
		X843B/5B	7.8	8.4	9.0	7.8	8.4	9.0	V
	Min Operating Voltage After Turn-on	X842B/4B	9	10	11	8.5	10	11.5	V
		X843B/5B	7.0	7.6	8.2	7.0	7.6	8.2	V
PWM SECTION									
	Maximum Duty Cycle	X842B/3B	94	96	100	94	96	100	%
		X844B/5B	47	48	50	47	48	50	%
	Minimum Duty Cycle				0			0	%
TOTAL STANDBY CURRENT									
I _{st}	Start-up Current	V _I = 6.5V for UCX843B/45B		0.3	0.5		0.3	0.5	mA
		V _I = 14V for UCX842B/44B		0.3	0.5		0.3	0.5	mA
I _i	Operating Supply Current	V _{PIN2} = V _{PIN3} = 0V		12	17		12	17	mA
V _{Iz}	Zener Voltage	I _I = 25mA	30	36		30	36		V

- Notes :**
1. Max package power dissipation limits must be respected; low duty cycle pulse techniques are used during test maintain T_j as close to T_{amb} as possible.
 2. These parameters, although guaranteed, are not 100% tested in production.
 3. Parameter measured at trip point of latch with V_{PIN2} = 0.
 4. Gain defined as :

$$A = \frac{\Delta V_{PIN1}}{\Delta V_{PIN3}} ; 0 \leq V_{PIN3} \leq 0.8 \text{ V}$$
 5. Adjust V_i above the start threshold before setting at 15 V.

Figure 1: Open Loop Test Circuit.

High peak currents associated with capacitive loads necessitate careful grounding techniques. Timing and bypass capacitors should be connected close

to pin 5 in a single point ground. The transistor and 5 KΩ potentiometer are used to sample the oscillator waveform and apply an adjustable ramp to pin 3.

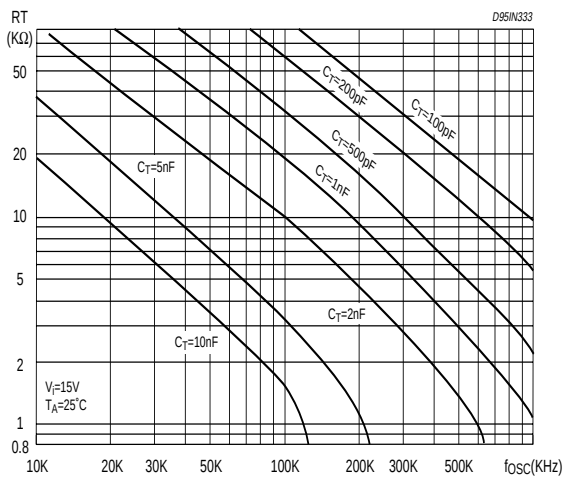
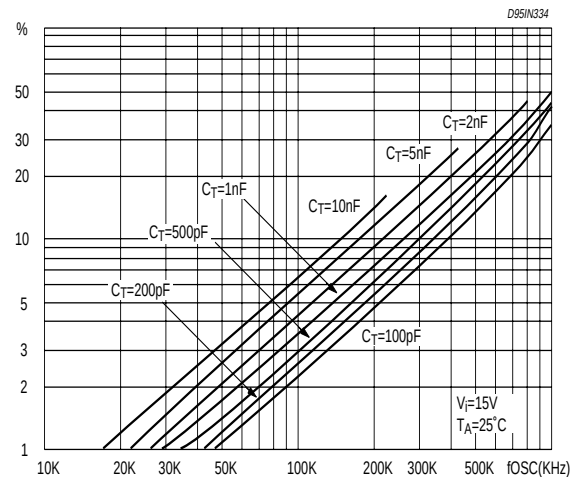
Figure 2: Timing Resistor vs. Oscillator Frequency**Figure 3:** Output Dead-Time vs. Oscillator Frequency

Figure 4: Oscillator Discharge Current vs. Temperature.

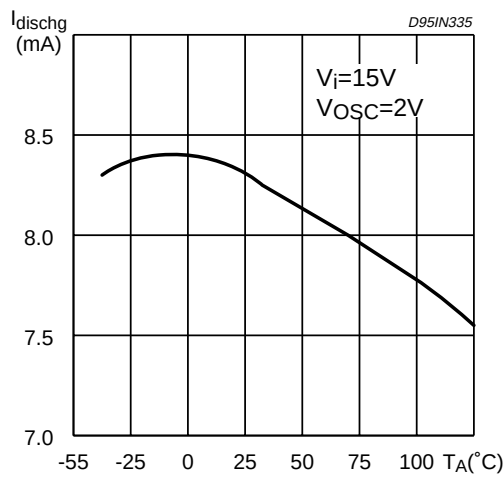


Figure 5: Maximum Output Duty Cycle vs. Timing Resistor.

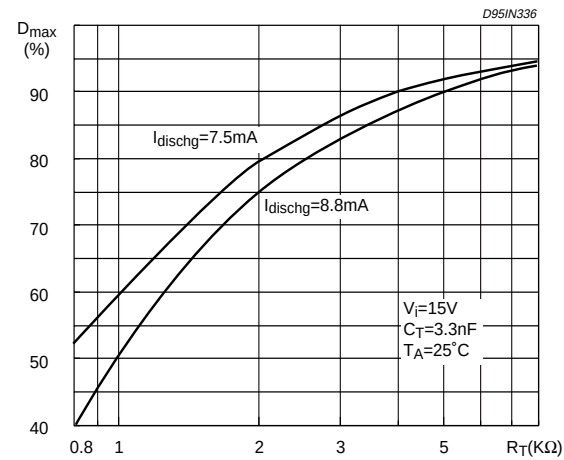


Figure 6: Error Amp Open-Loop Gain and Phase vs. Frequency.

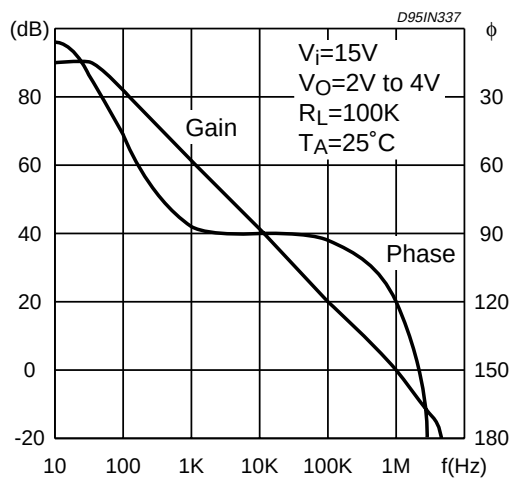


Figure 7: Current Sense Input Threshold vs. Error Amp Output Voltage.

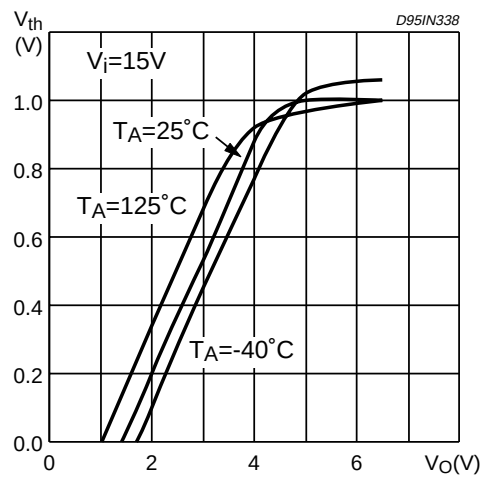


Figure 8: Reference Voltage Change vs. Source Current.

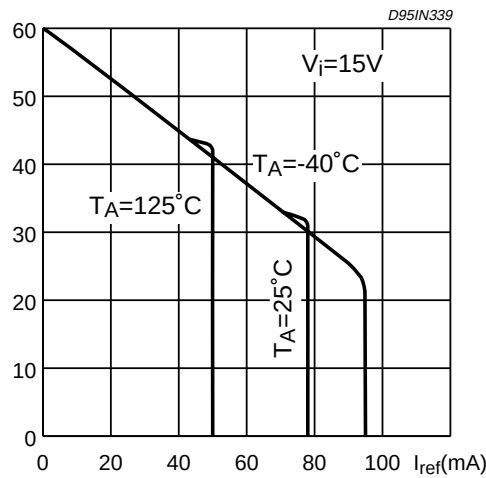


Figure 9: Reference Short Circuit Current vs. Temperature.

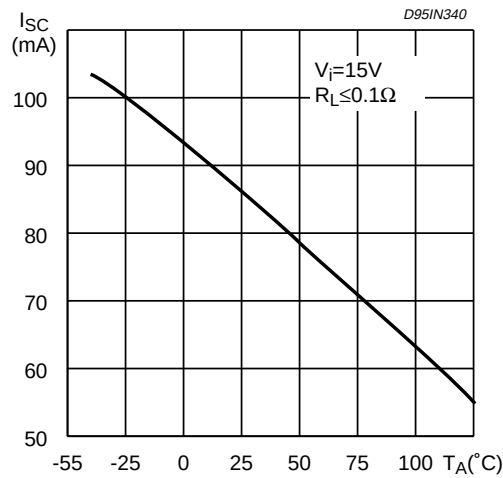


Figure 10: Output Saturation Voltages. Load Current.

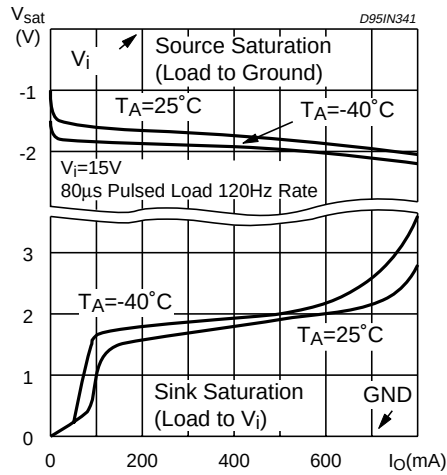


Figure 12: Output Waveform.

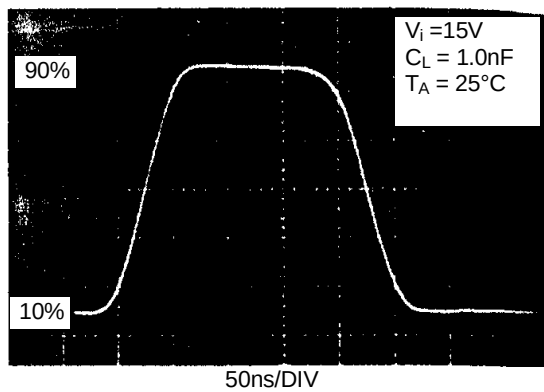


Figure 14: Oscillator and Output Waveforms.

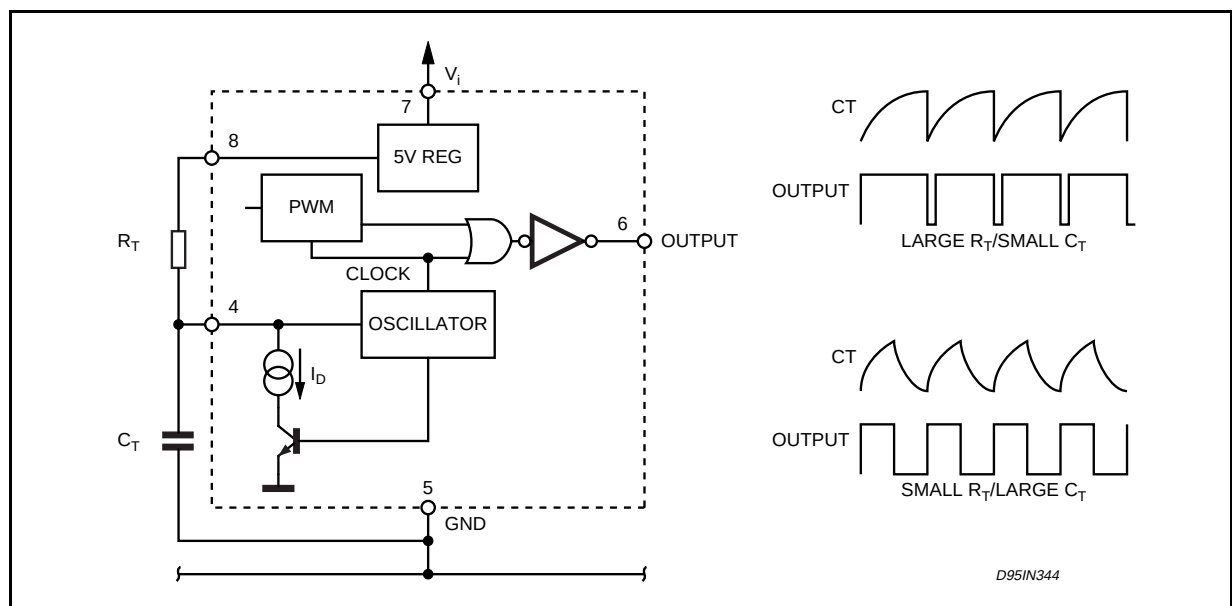


Figure 11: Supply Current vs. Supply Voltage.

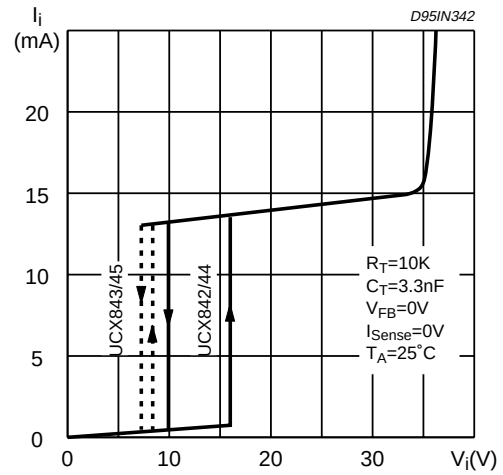


Figure 13: Output Cross Conduction

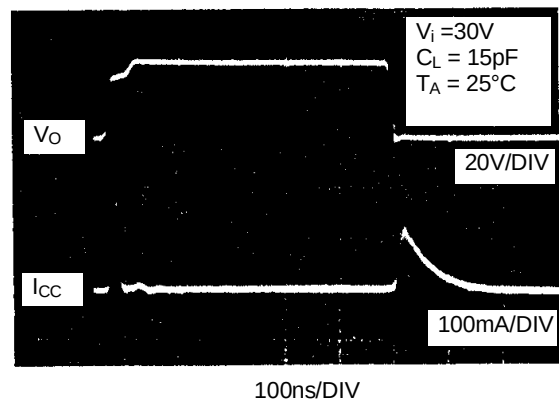


Figure 15 : Error Amp Configuration.

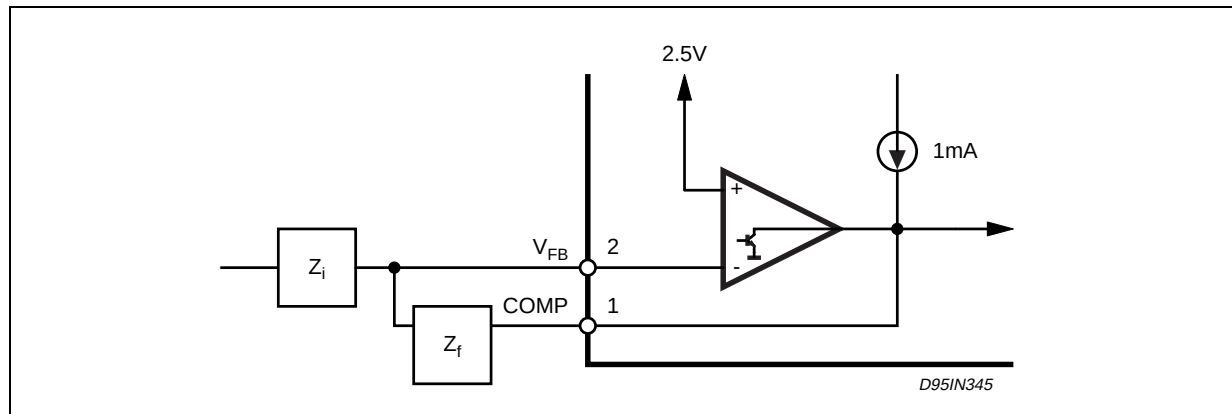


Figure 16 : Under Voltage Lockout.

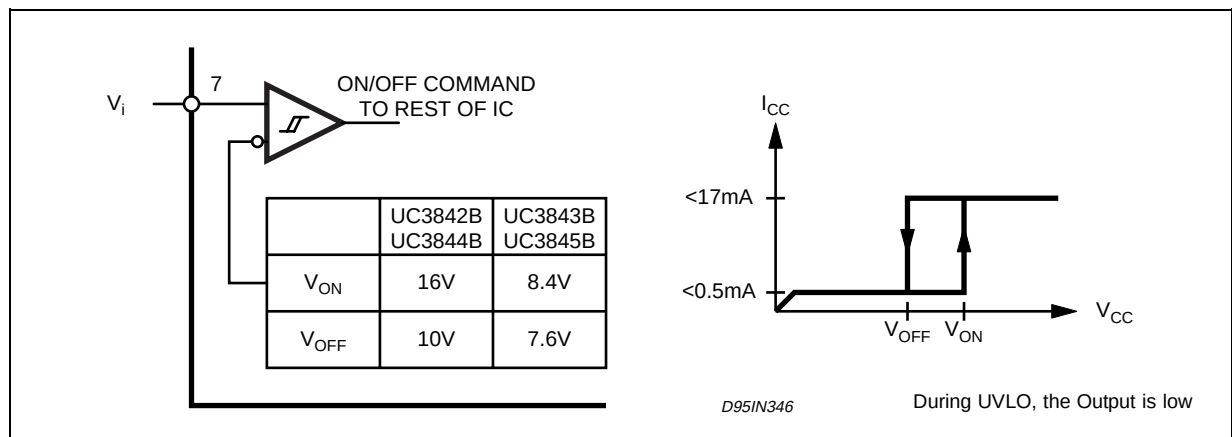
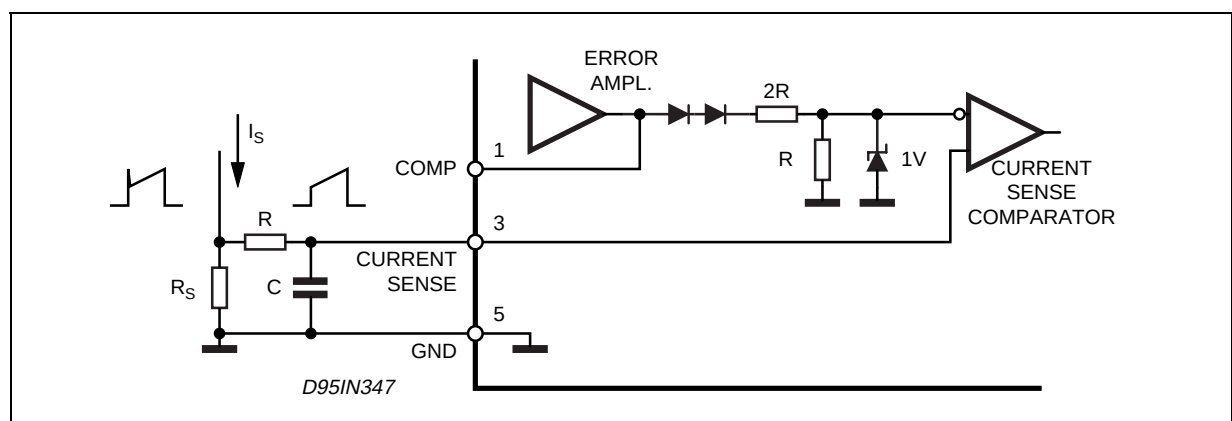


Figure 17 : Current Sense Circuit .



Peak current (i_s) is determined by the formula

$$I_{S \max} \approx \frac{1.0 \text{ V}}{R_s}$$

A small RC filter may be required to suppress switch transients.

Figure 18 : Slope Compensation Techniques.

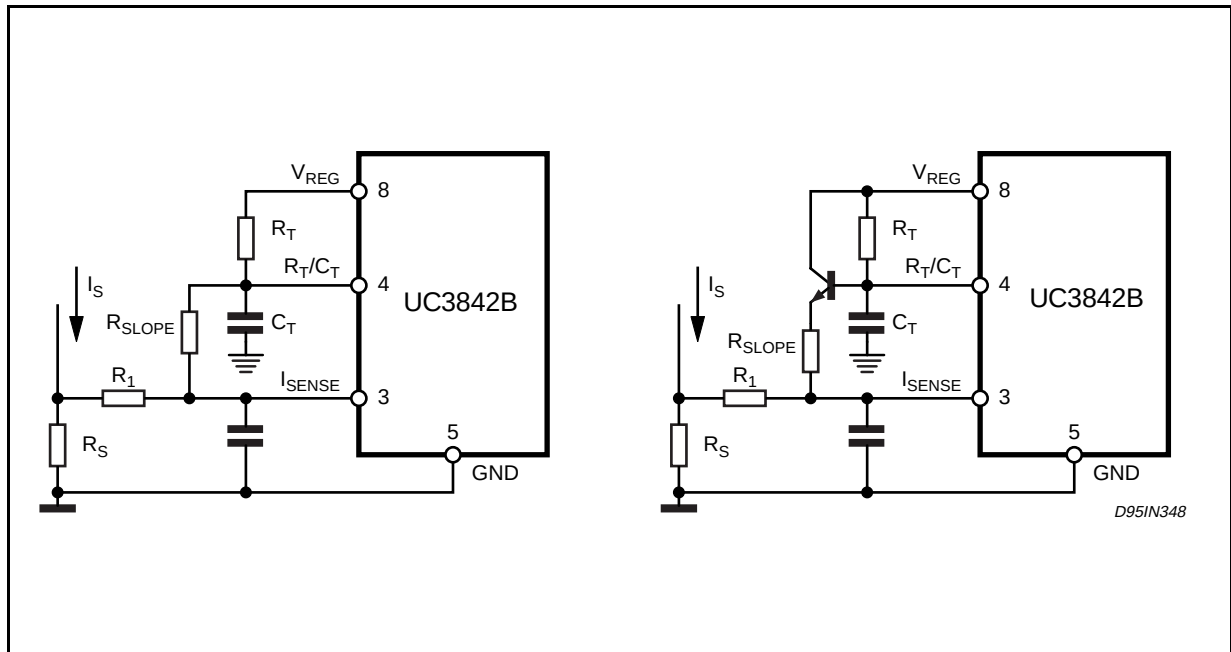


Figure 19 : Isolated MOSFET Drive and Current Transformer Sensing.

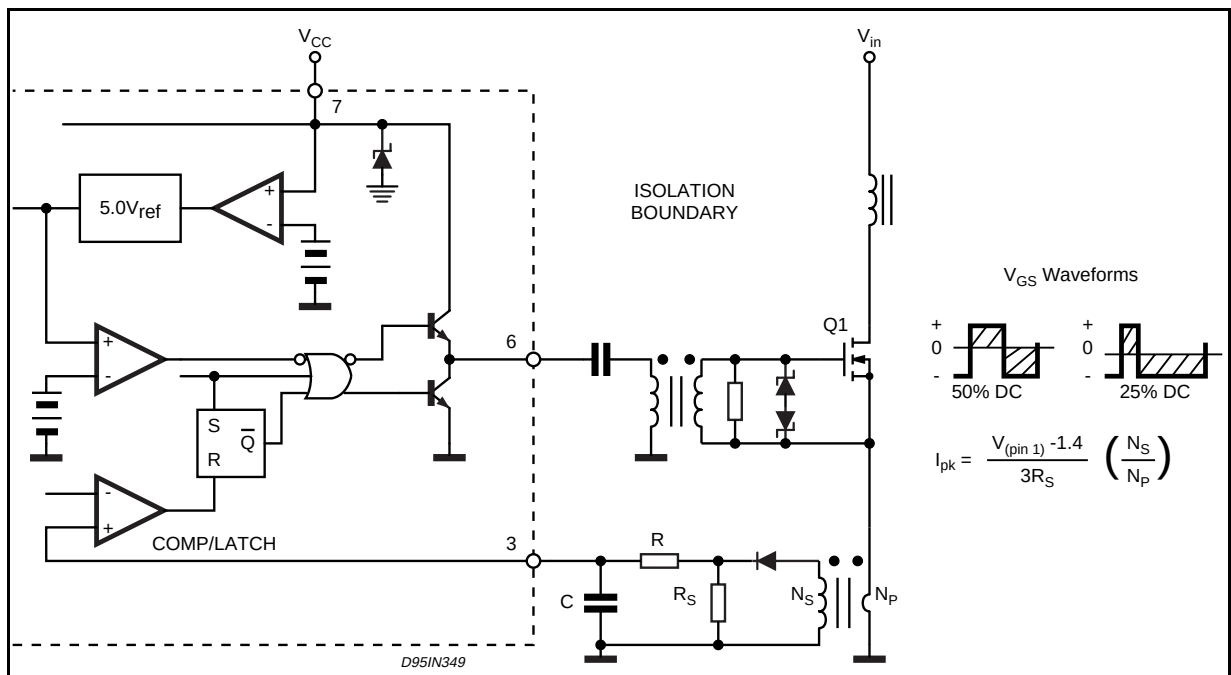


Figure 20 : Latched Shutdown.

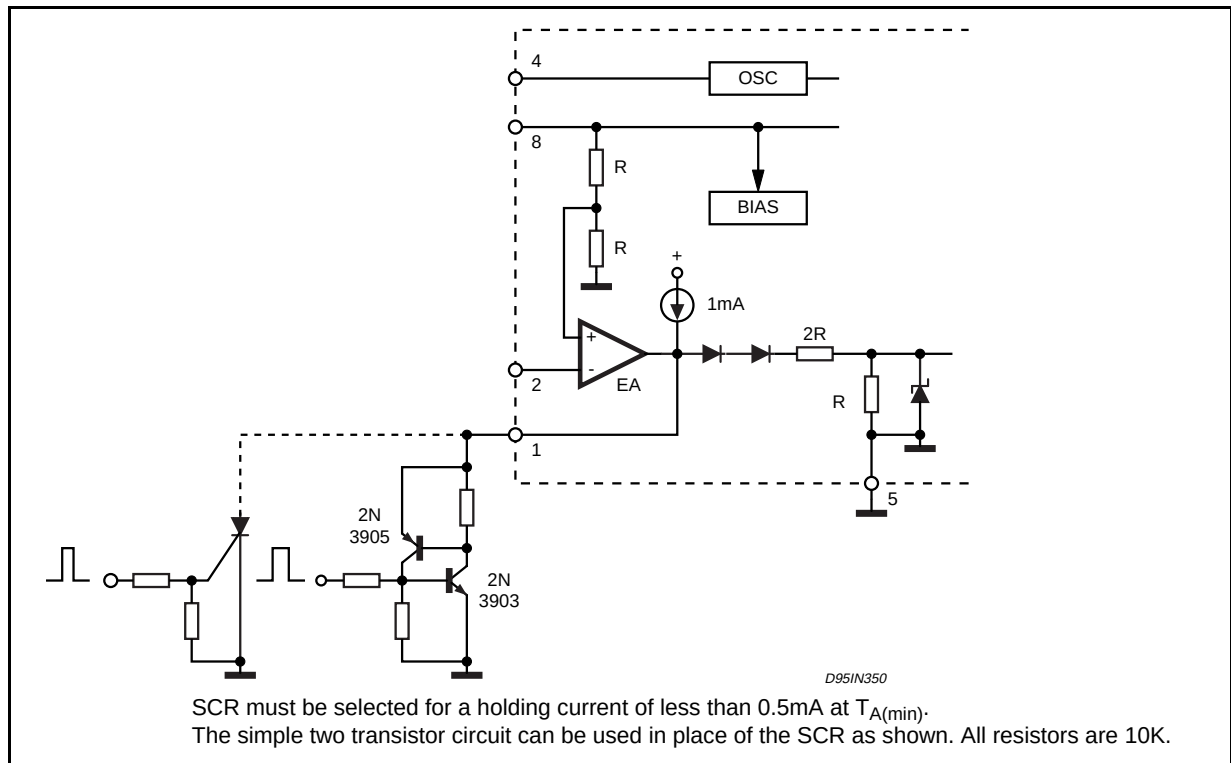


Figure 21: Error Amplifier Compensation

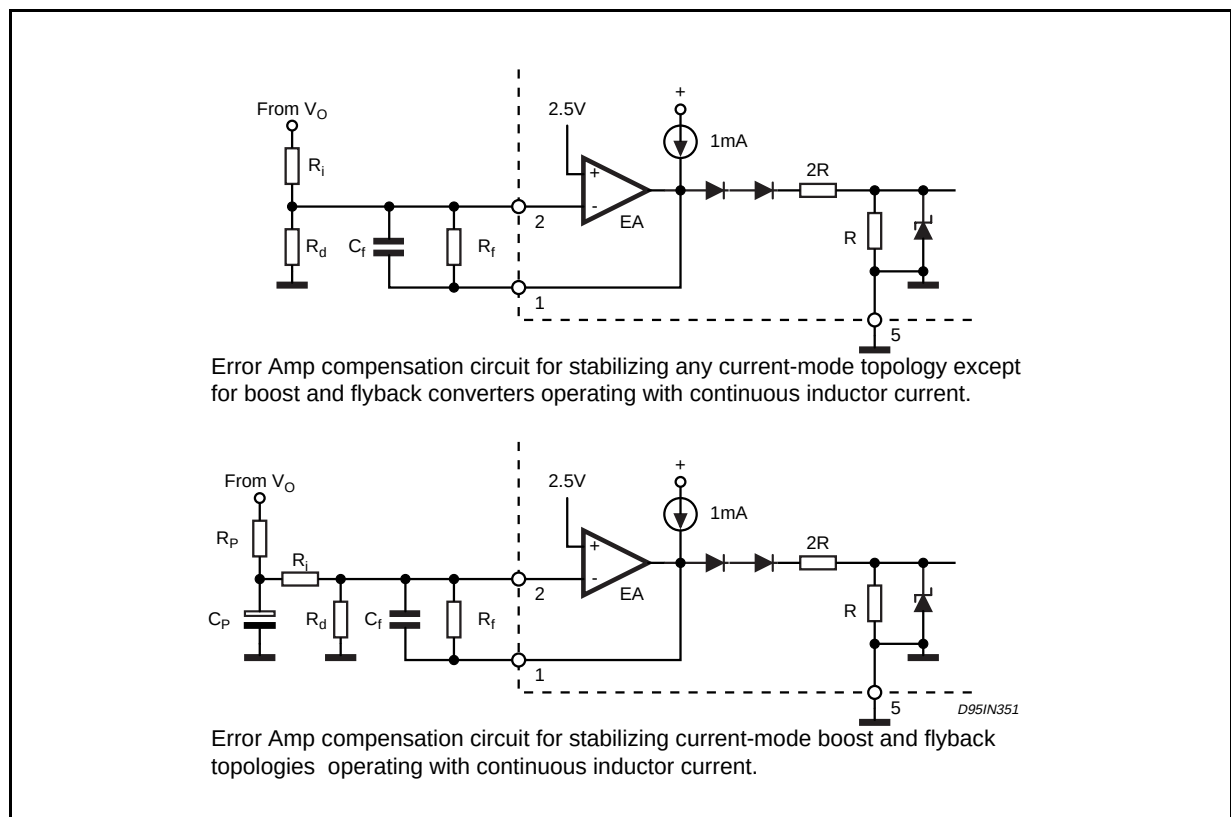
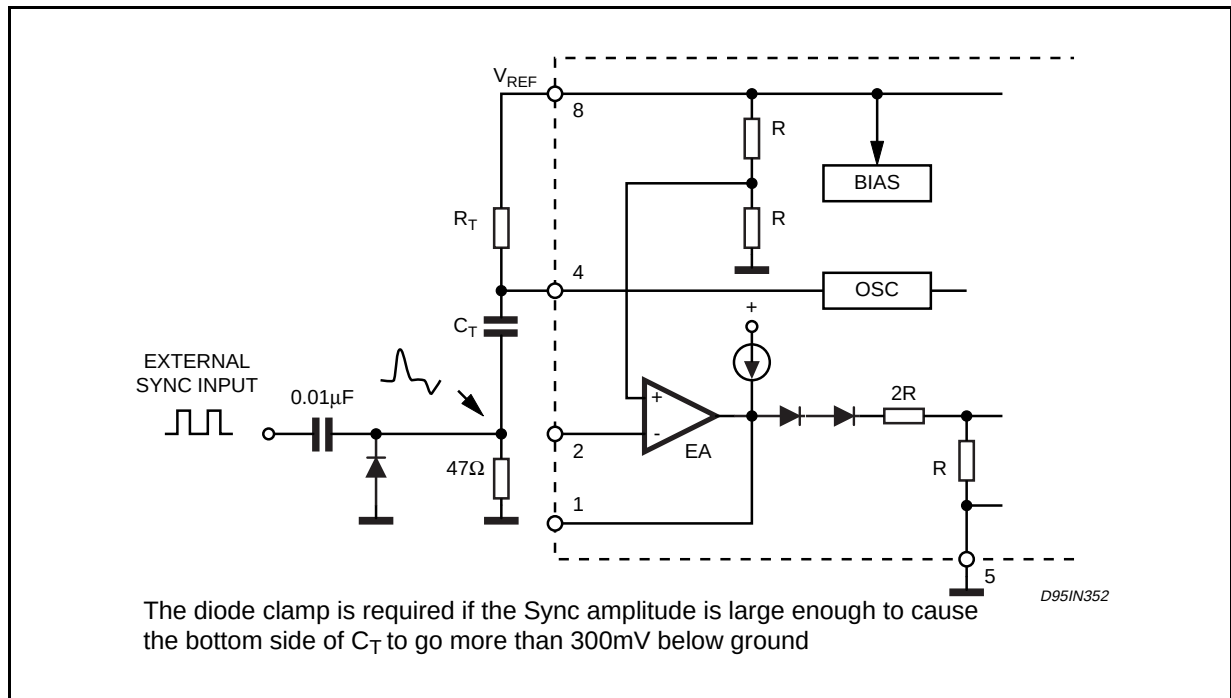
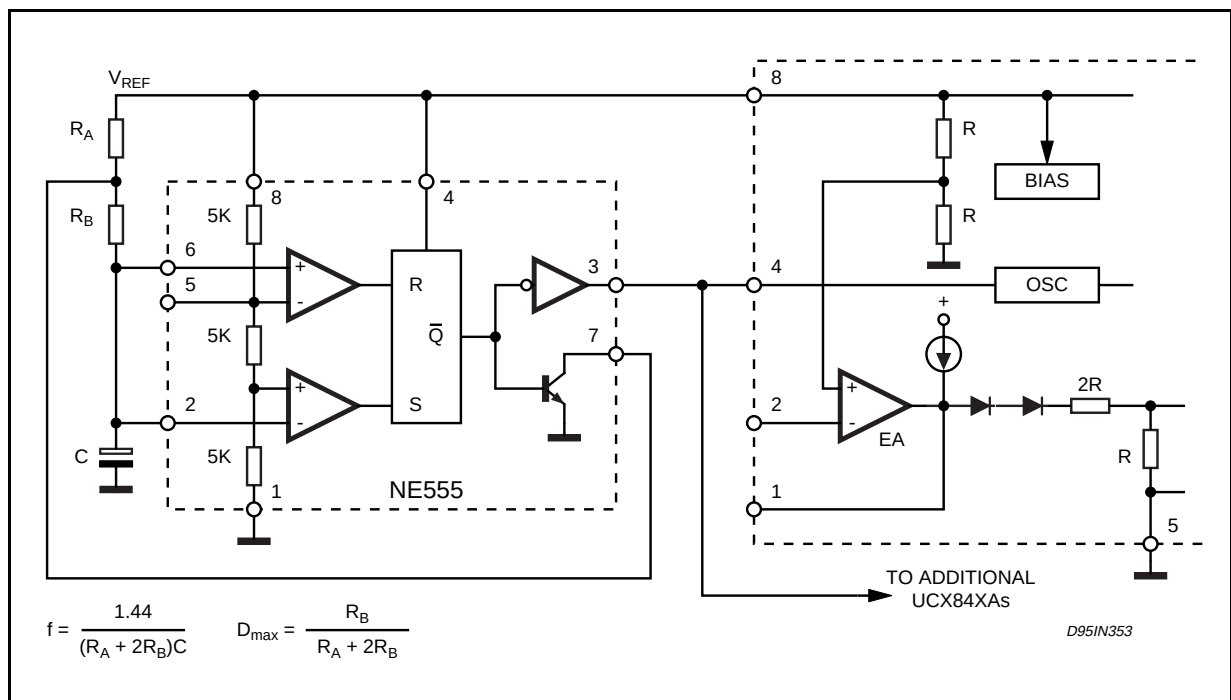


Figure 22: External Clock Synchronization.**Figure 23:** External Duty Cycle Clamp and Multi Unit Synchronization.

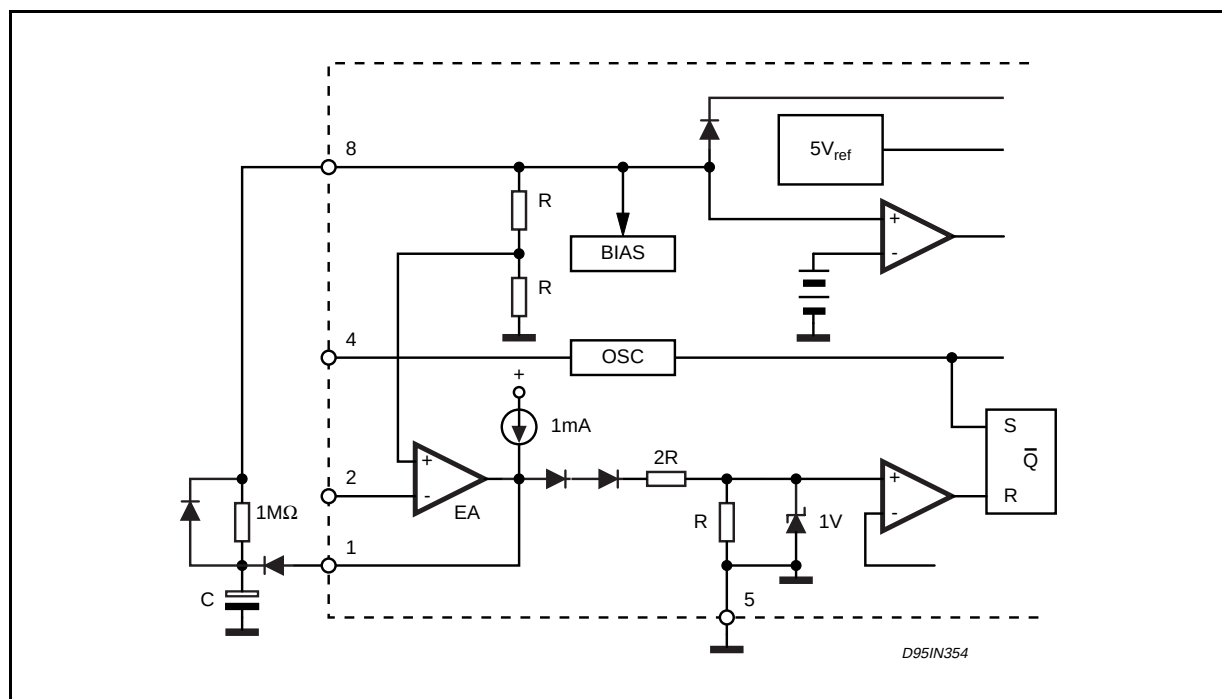
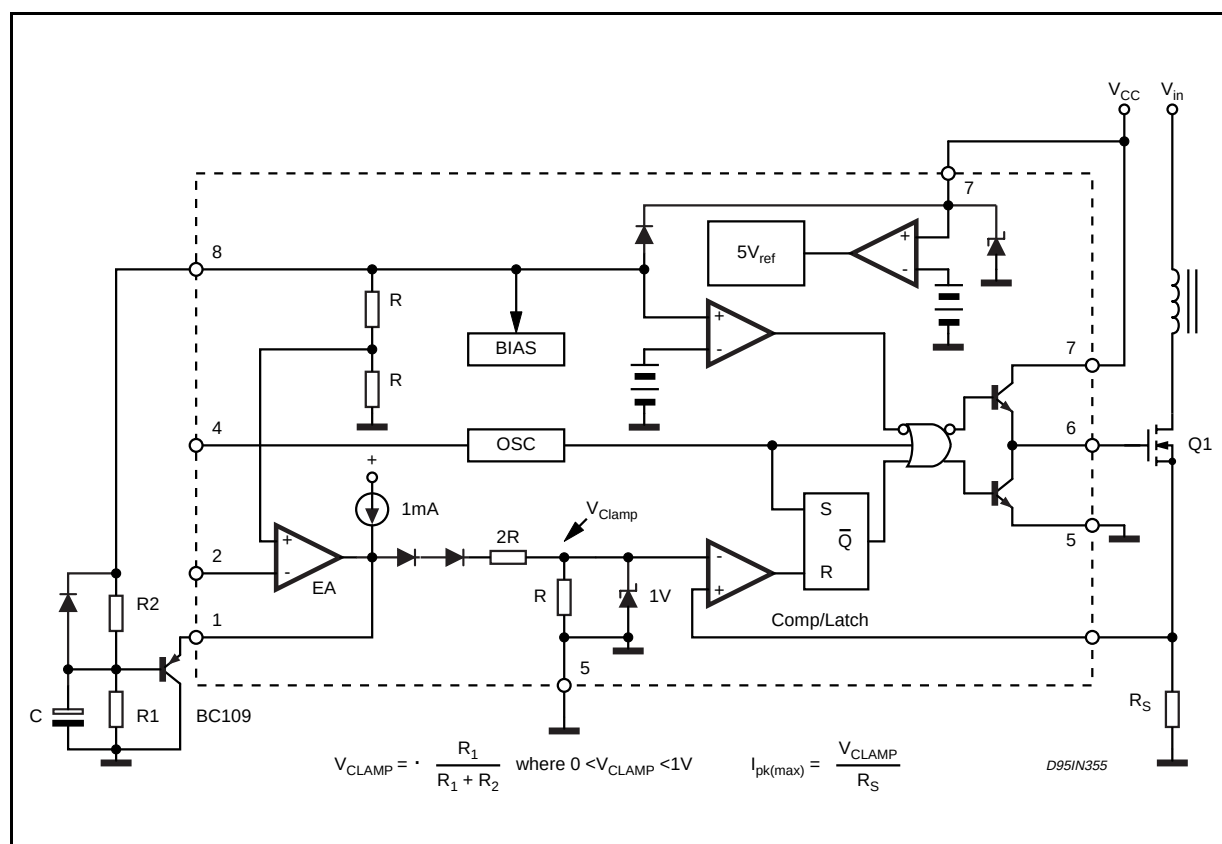


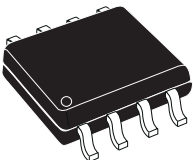
Figure 25: Soft-Start and Error Amplifier Output Duty Cycle Clamp.



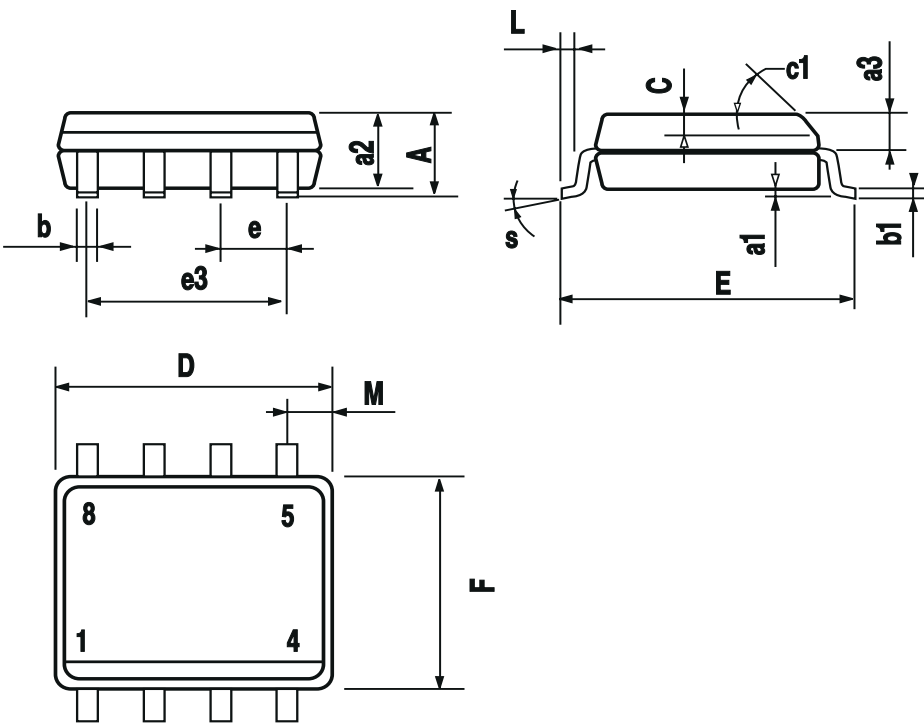
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			1.75			0.069
a1	0.1		0.25	0.004		0.010
a2			1.65			0.065
a3	0.65		0.85	0.026		0.033
b	0.35		0.48	0.014		0.019
b1	0.19		0.25	0.007		0.010
C	0.25		0.5	0.010		0.020
c1	45° (typ.)					
D (1)	4.8		5.0	0.189		0.197
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		3.81			0.150	
F (1)	3.8		4.0	0.15		0.157
L	0.4		1.27	0.016		0.050
M			0.6			0.024
S	8° (max.)					

(1) D and F do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.15mm (.006inch).

OUTLINE AND
MECHANICAL DATA



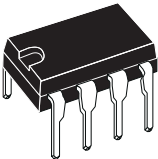
SO8



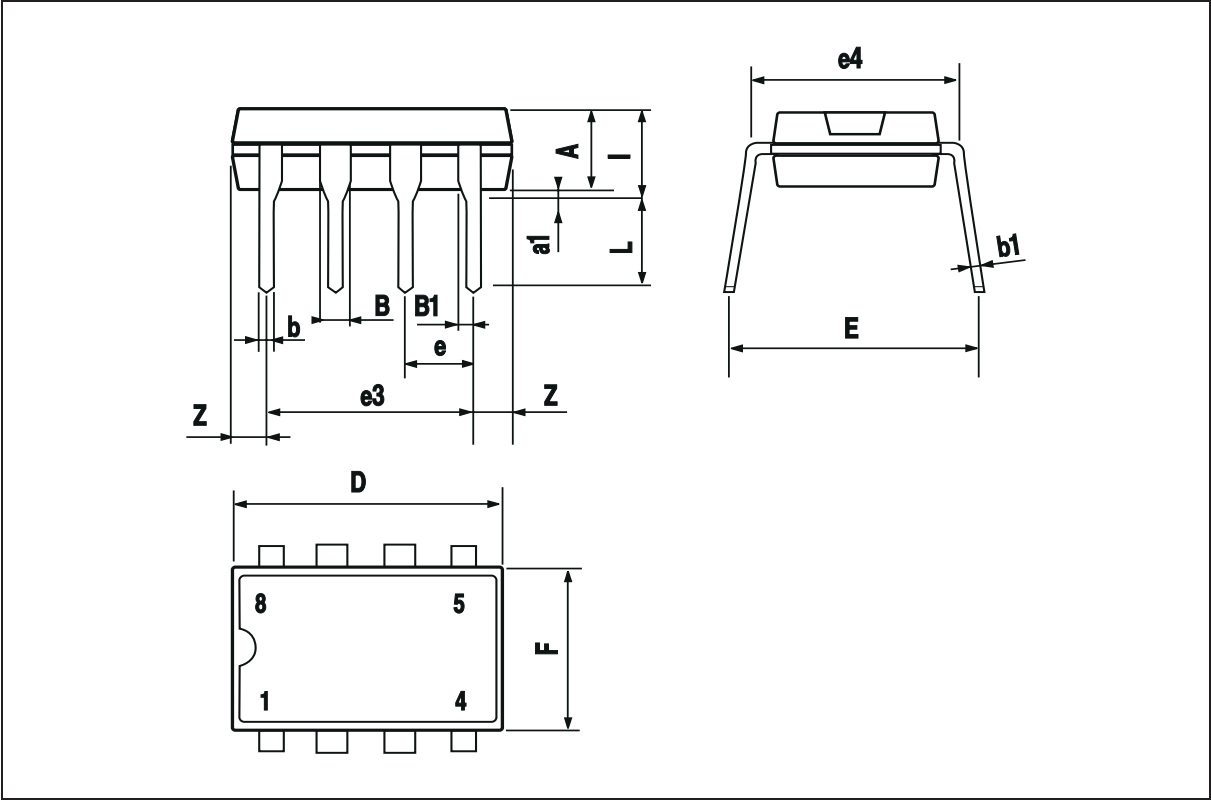
UC2842B/3B/4B/5B - UC3842B/3B/4B/5B

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A		3.32			0.131	
a1	0.51			0.020		
B	1.15		1.65	0.045		0.065
b	0.356		0.55	0.014		0.022
b1	0.204		0.304	0.008		0.012
D			10.92			0.430
E	7.95		9.75	0.313		0.384
e		2.54			0.100	
e3		7.62			0.300	
e4		7.62			0.300	
F			6.6			0.260
I			5.08			0.200
L	3.18		3.81	0.125		0.150
Z			1.52			0.060

OUTLINE AND MECHANICAL DATA



Minidip



Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specification mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

The ST logo is a registered trademark of STMicroelectronics
© 1999 STMicroelectronics – Printed in Italy – All Rights Reserved
STMicroelectronics GROUP OF COMPANIES

Australia - Brazil - Canada - China - France - Germany - Italy - Japan - Korea - Malaysia - Malta - Mexico - Morocco - The Netherlands -
Singapore - Spain - Sweden - Switzerland - Taiwan - Thailand - United Kingdom - U.S.A.

<http://www.st.com>

