

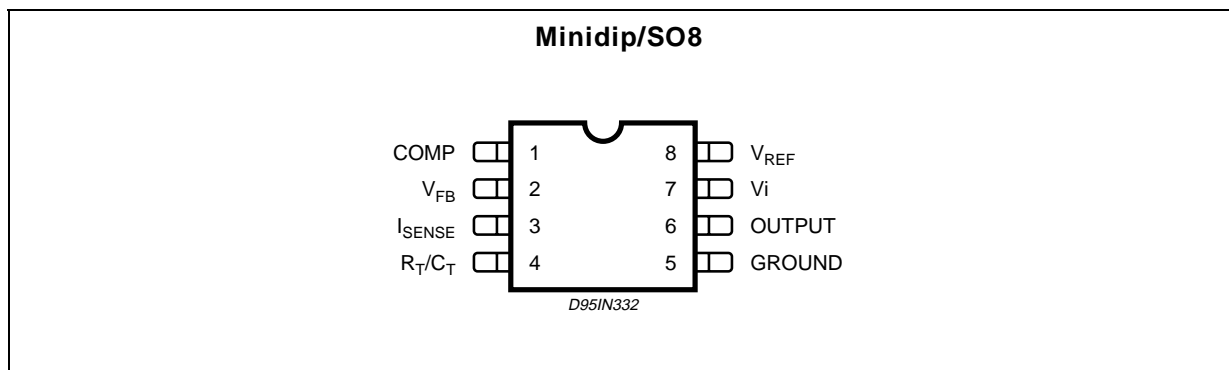
## UC2842B/3B/4B/5B - UC3842B/3B/4B/5B

### 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	$\pm 1$	A
$E_o$	Output Energy (capacitive load)	5	$\mu\text{J}$
	Analog Inputs (pins 2, 3)	$-0.3$ to $5.5$	V
	Error Amplifier Output Sink Current	10	mA
$P_{\text{tot}}$	Power Dissipation at $T_{\text{amb}} \leq 25^\circ\text{C}$ (Minidip)	1.25	W
$P_{\text{tot}}$	Power Dissipation at $T_{\text{amb}} \leq 25^\circ\text{C}$ (SO8)	800	mW
$T_{\text{stg}}$	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	$V_{\text{FB}}$	This is the inverting input of the Error Amplifier. It is normally connected to the switching power supply output through a resistor divider.
3	$I_{\text{SENSE}}$	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 $V_{\text{ref}}$ 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	$V_{\text{CC}}$	This pin is the positive supply of the control IC.
8	$V_{\text{ref}}$	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 <sub>REF</sub>	Output Voltage	T <sub>j</sub> = 25°C I <sub>o</sub> = 1mA	4.95	5.00	5.05	4.90	5.00	5.10	V
ΔV <sub>REF</sub>	Line Regulation	12V ≤ V <sub>i</sub> ≤ 25V		2	20		2	20	mV
ΔV <sub>REF</sub>	Load Regulation	1 ≤ I <sub>o</sub> ≤ 20mA		3	25		3	25	mV
ΔV <sub>REF</sub> /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 <sub>N</sub>	Output Noise Voltage	10Hz ≤ f ≤ 10KHz T <sub>j</sub> = 25°C (note 2)		50			50		μV
	Long Term Stability	T <sub>amb</sub> = 125°C, 1000Hrs (note 2)		5	25		5	25	mV
I <sub>SC</sub>	Output Short Circuit		-30	-100	-180	-30	-100	-180	mA
OSCILLATOR SECTION									
f <sub>OSC</sub>	Frequency	T <sub>j</sub> = 25°C T <sub>A</sub> = T <sub>low</sub> to T <sub>high</sub> T <sub>J</sub> = 25°C (R <sub>T</sub> = 6.2k, C <sub>T</sub> = 1nF)	49 48 225	52 – 250	55 56 275	49 48 225	52 – 250	55 56 275	KHz KHz KHz
Δf <sub>OSC</sub> /ΔV	Frequency Change with Volt.	V <sub>CC</sub> = 12V to 25V	–	0.2	1	–	0.2	1	%
Δf <sub>OSC</sub> /ΔT	Frequency Change with Temp.	T <sub>A</sub> = T <sub>low</sub> to T <sub>high</sub>	–	1	–	–	0.5	–	%
V <sub>OSC</sub>	Oscillator Voltage Swing	(peak to peak)	–	1.6	–	–	1.6	–	V
I <sub>dischg</sub>	Discharge Current (V <sub>OSC</sub> =2V)	T <sub>J</sub> = 25°C T <sub>A</sub> = T <sub>low</sub> to T <sub>high</sub>	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 <sub>2</sub>	Input Voltage	V <sub>PIN1</sub> = 2.5V	2.45	2.50	2.55	2.42	2.50	2.58	V
I <sub>b</sub>	Input Bias Current	V <sub>FB</sub> = 5V		-0.1	-1		-0.1	-2	μA
	A <sub>VOL</sub>	2V ≤ V <sub>o</sub> ≤ 4V	65	90		65	90		dB
BW	Unity Gain Bandwidth	T <sub>J</sub> = 25°C	0.7	1		0.7	1		MHz
PSRR	Power Supply Rejec. Ratio	12V ≤ V <sub>i</sub> ≤ 25V	60	70		60	70		dB
I <sub>o</sub>	Output Sink Current	V <sub>PIN2</sub> = 2.7V V <sub>PIN1</sub> = 1.1V	2	12		2	12		mA
I <sub>o</sub>	Output Source Current	V <sub>PIN2</sub> = 2.3V V <sub>PIN1</sub> = 5V	-0.5	-1		-0.5	-1		mA
	V <sub>OUT</sub> High	V <sub>PIN2</sub> = 2.3V; R <sub>L</sub> = 15KΩ to Ground	5	6.2		5	6.2		V
	V <sub>OUT</sub> Low	V <sub>PIN2</sub> = 2.7V; R <sub>L</sub> = 15KΩ to Pin 8		0.8	1.1		0.8	1.1	V
CURRENT SENSE SECTION									
G <sub>V</sub>	Gain	(note 3 & 4)	2.85	3	3.15	2.85	3	3.15	V/V
V <sub>3</sub>	Maximum Input Signal	V <sub>PIN1</sub> = 5V (note 3)	0.9	1	1.1	0.9	1	1.1	V
SVR	Supply Voltage Rejection	12 ≤ V <sub>i</sub> ≤ 25V (note 3)		70			70		dB
I <sub>b</sub>	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 <sub>OL</sub>	Output Low Level	I <sub>SINK</sub> = 20mA		0.1	0.4		0.1	0.4	V
		I <sub>SINK</sub> = 200mA		1.6	2.2		1.6	2.2	V
V <sub>OH</sub>	Output High Level	I <sub>SOURCE</sub> = 20mA	13	13.5		13	13.5		V
		I <sub>SOURCE</sub> = 200mA	12	13.5		12	13.5		V
V <sub>OLS</sub>	UVLO Saturation	V <sub>CC</sub> = 6V; I <sub>SINK</sub> = 1mA		0.1	1.1		0.1	1.1	V
t <sub>r</sub>	Rise Time	T <sub>J</sub> = 25°C C <sub>L</sub> = 1nF (2)		50	150		50	150	ns
t <sub>f</sub>	Fall Time	T <sub>J</sub> = 25°C C <sub>L</sub> = 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 <sub>st</sub>	Start-up Current	V <sub>i</sub> = 6.5V for UCX843B/45B		0.3	0.5		0.3	0.5	mA
		V <sub>i</sub> = 14V for UCX842B/44B		0.3	0.5		0.3	0.5	mA
I <sub>i</sub>	Operating Supply Current	V <sub>PIN2</sub> = V <sub>PIN3</sub> = 0V		12	17		12	17	mA
V <sub>iz</sub>	Zener Voltage	I <sub>i</sub> = 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<sub>j</sub> as close to T<sub>amb</sub> as possible.
  2. These parameters, although guaranteed, are not 100% tested in production.
  3. Parameter measured at trip point of latch with V<sub>PIN2</sub> = 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<sub>i</sub> above the start threshold before setting at 15 V.



Figure 4: Oscillator Discharge Current vs. Temperature.

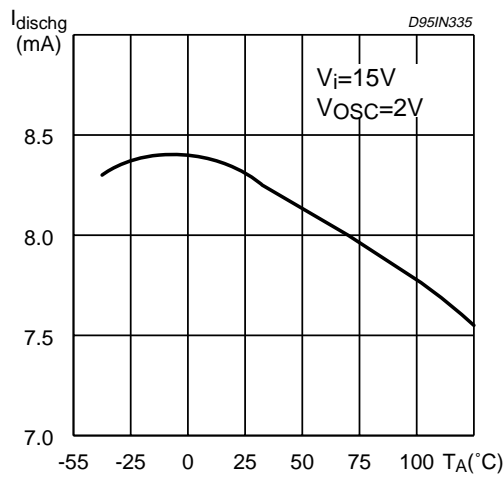


Figure 5: Maximum Output Duty Cycle vs. Timing Resistor.

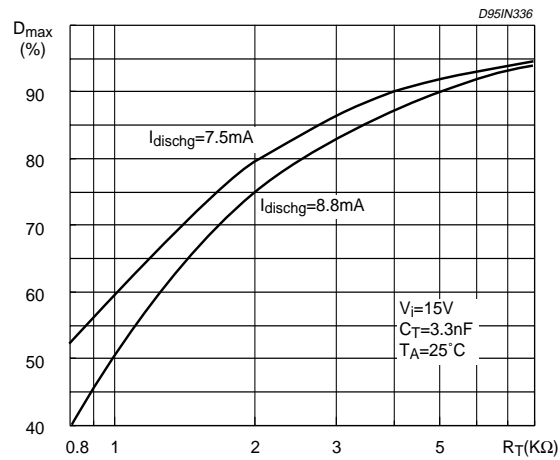


Figure 6: Error Amp Open-Loop Gain and Phase vs. Frequency.

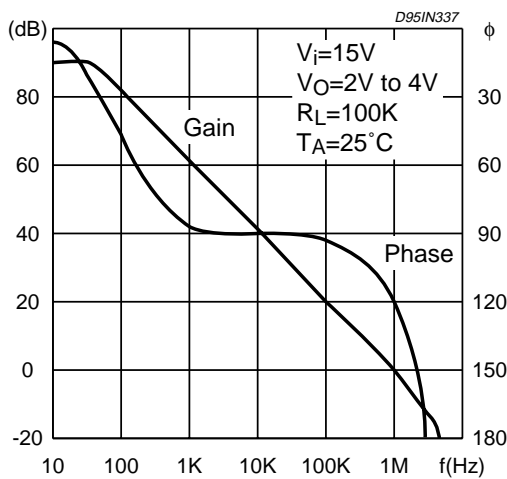


Figure 7: Current Sense Input Threshold vs. Error Amp Output Voltage.

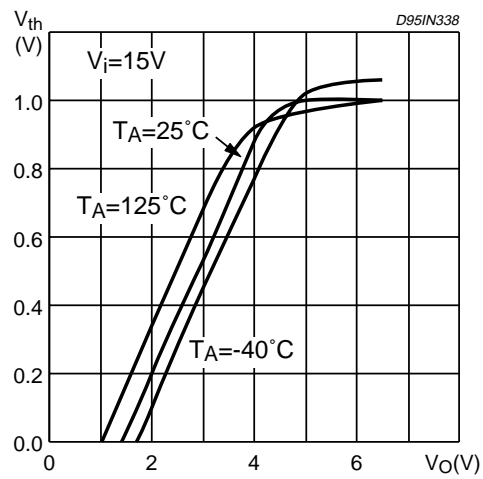


Figure 8: Reference Voltage Change vs. Source Current.

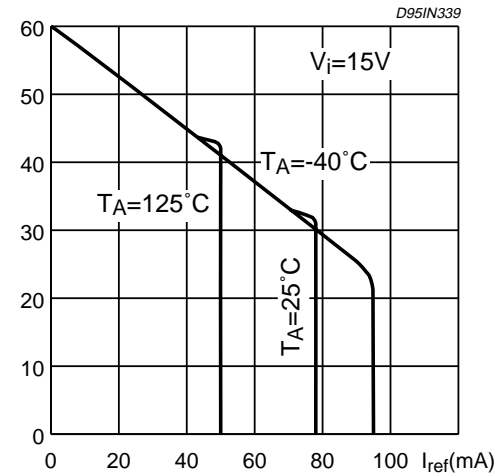
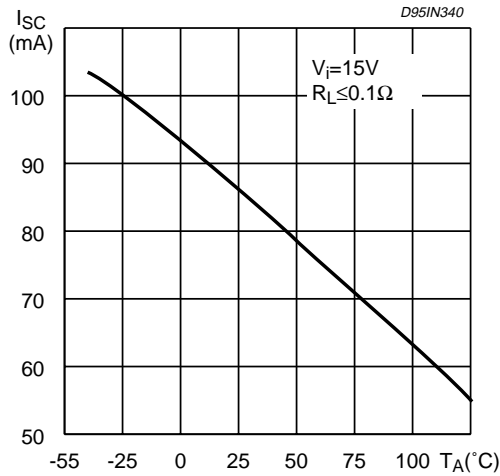
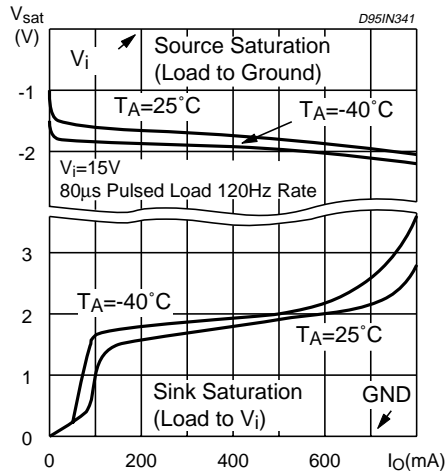


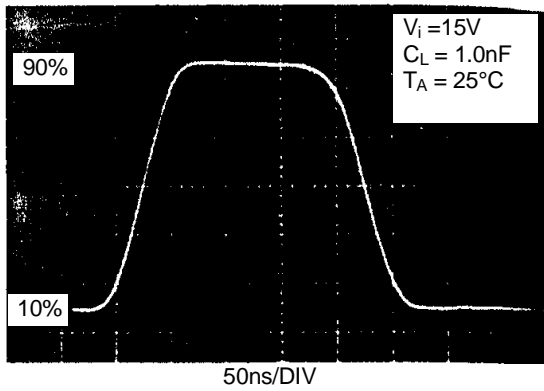
Figure 9: Reference Short Circuit Current vs. Temperature.



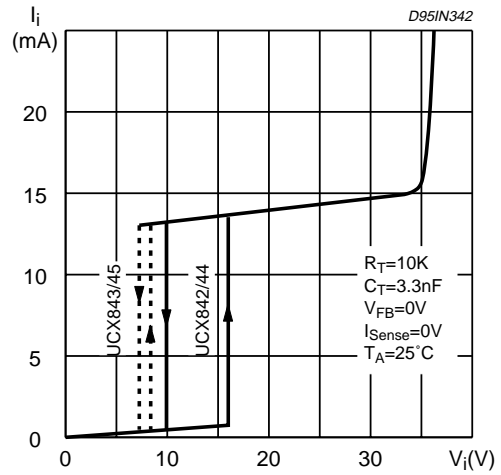
**Figure 10:** Output Saturation Voltages vs. Load Current.



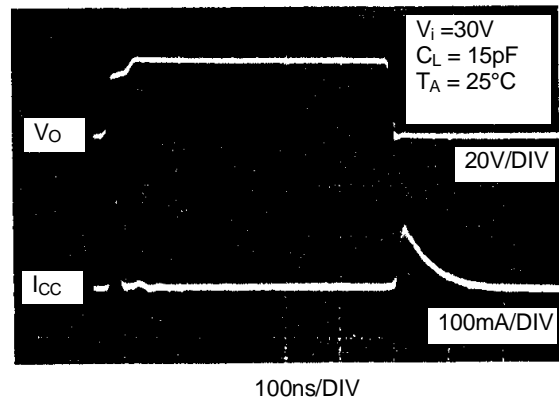
**Figure 12:** Output Waveform.



**Figure 11:** Supply Current vs. Supply Voltage.



**Figure 13:** Output Cross Conduction



**Figure 14:** Oscillator and Output Waveforms.

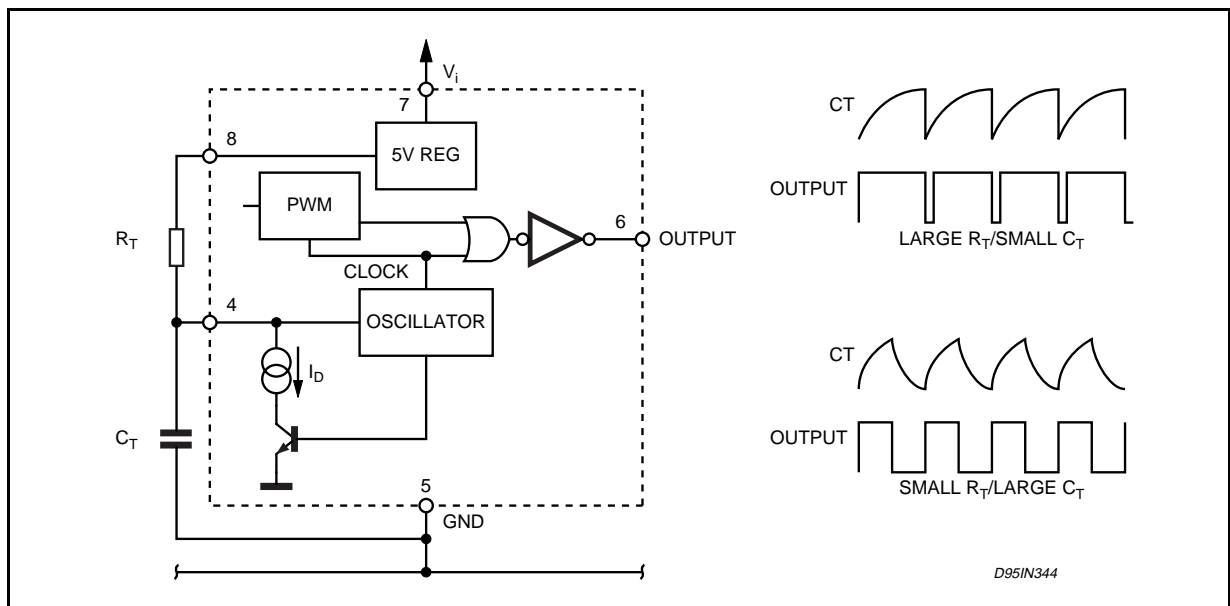


Figure 15 : Error Amp Configuration.

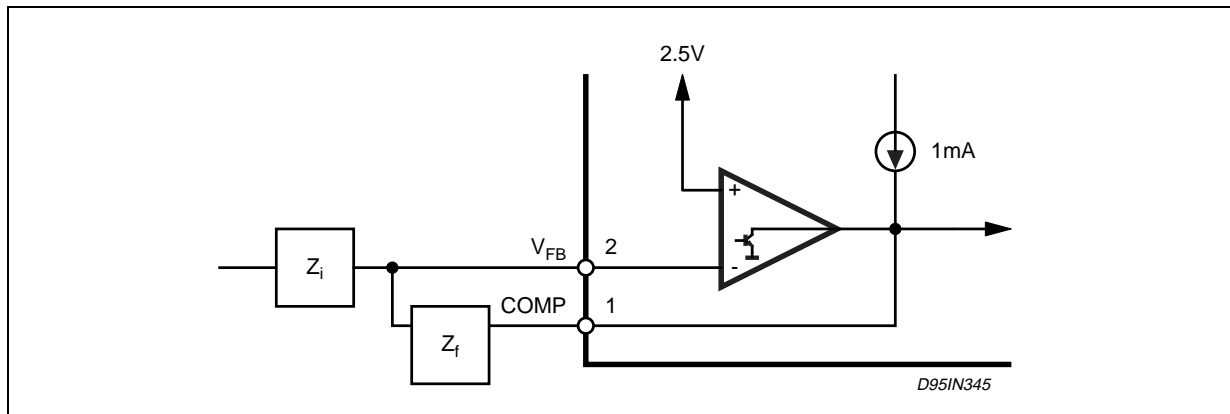


Figure 16 : Under Voltage Lockout.

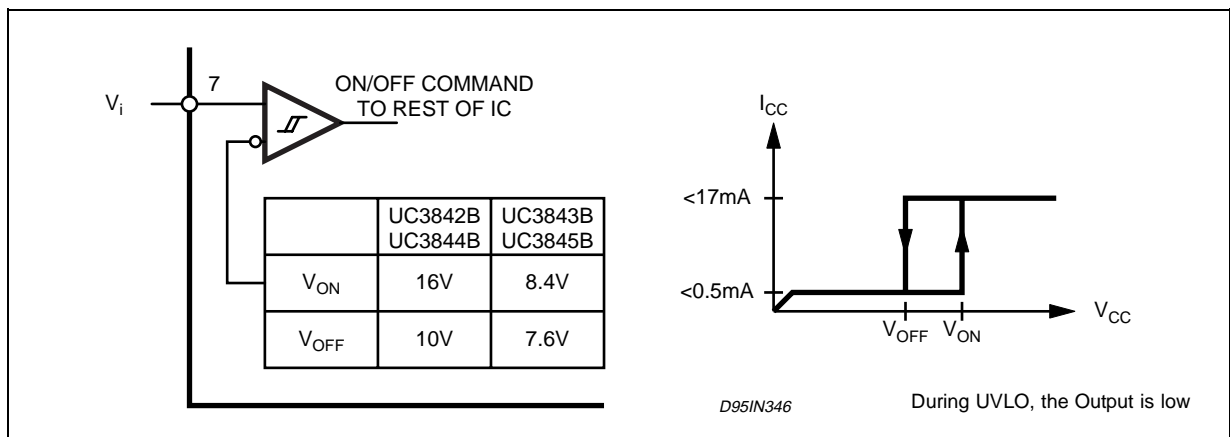
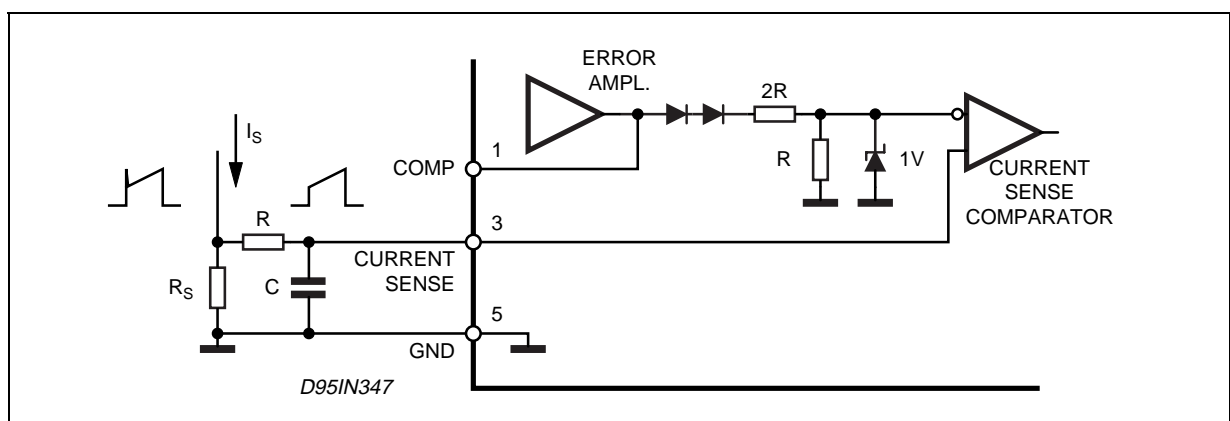


Figure 17 : Current Sense Circuit .

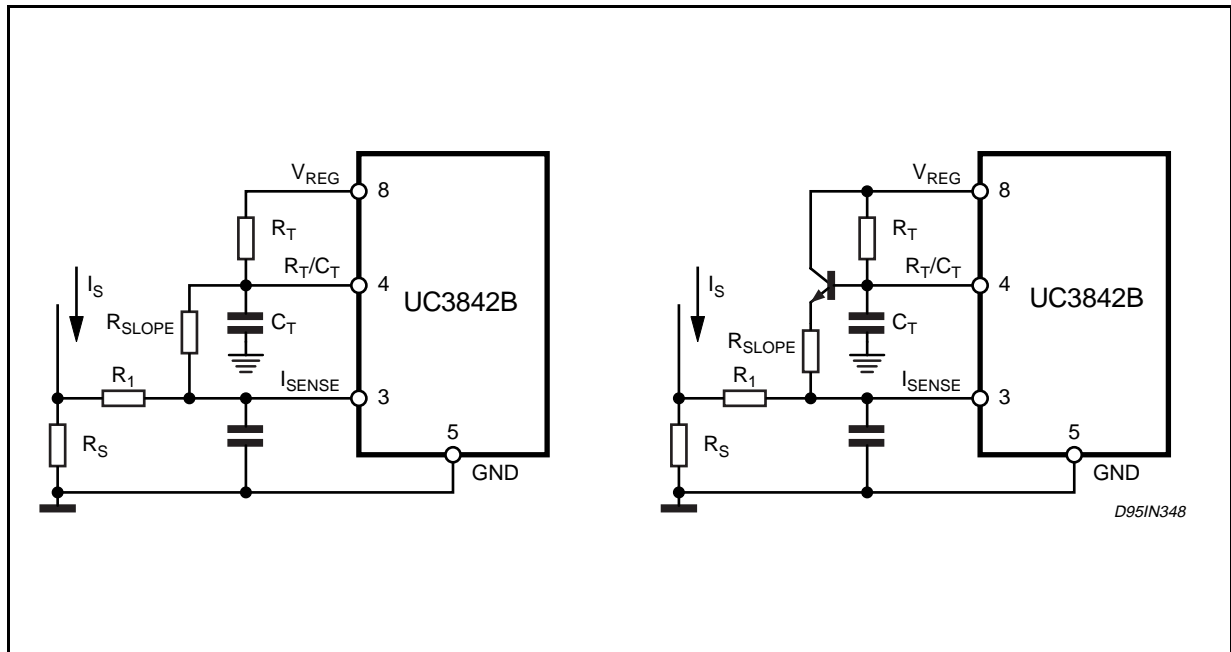


Peak current ( $i_s$ ) is determined by the formula

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

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.**

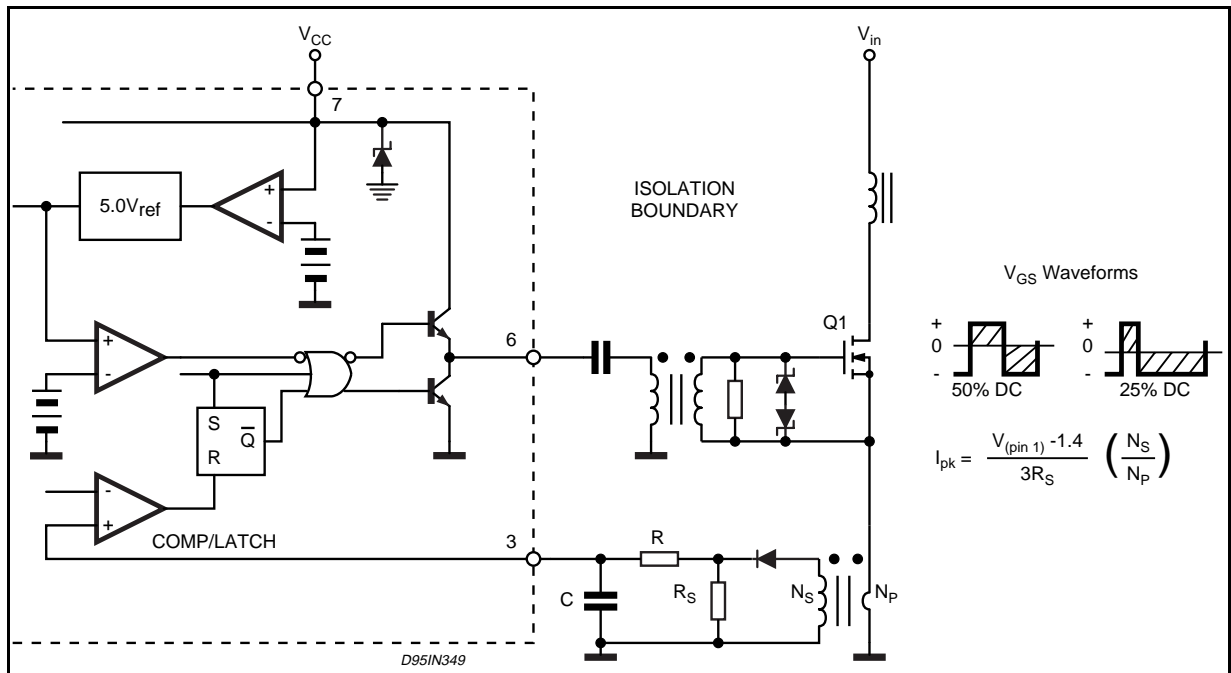




Figure 20 : Latched Shutdown.

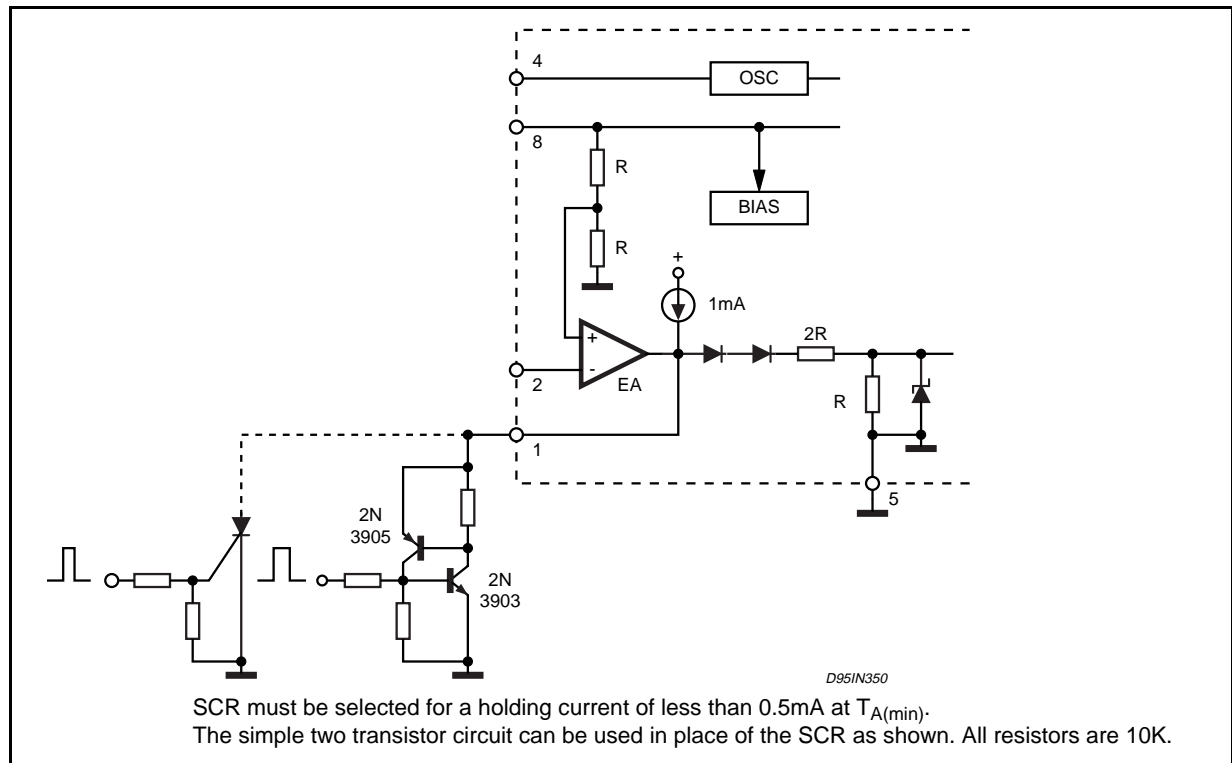
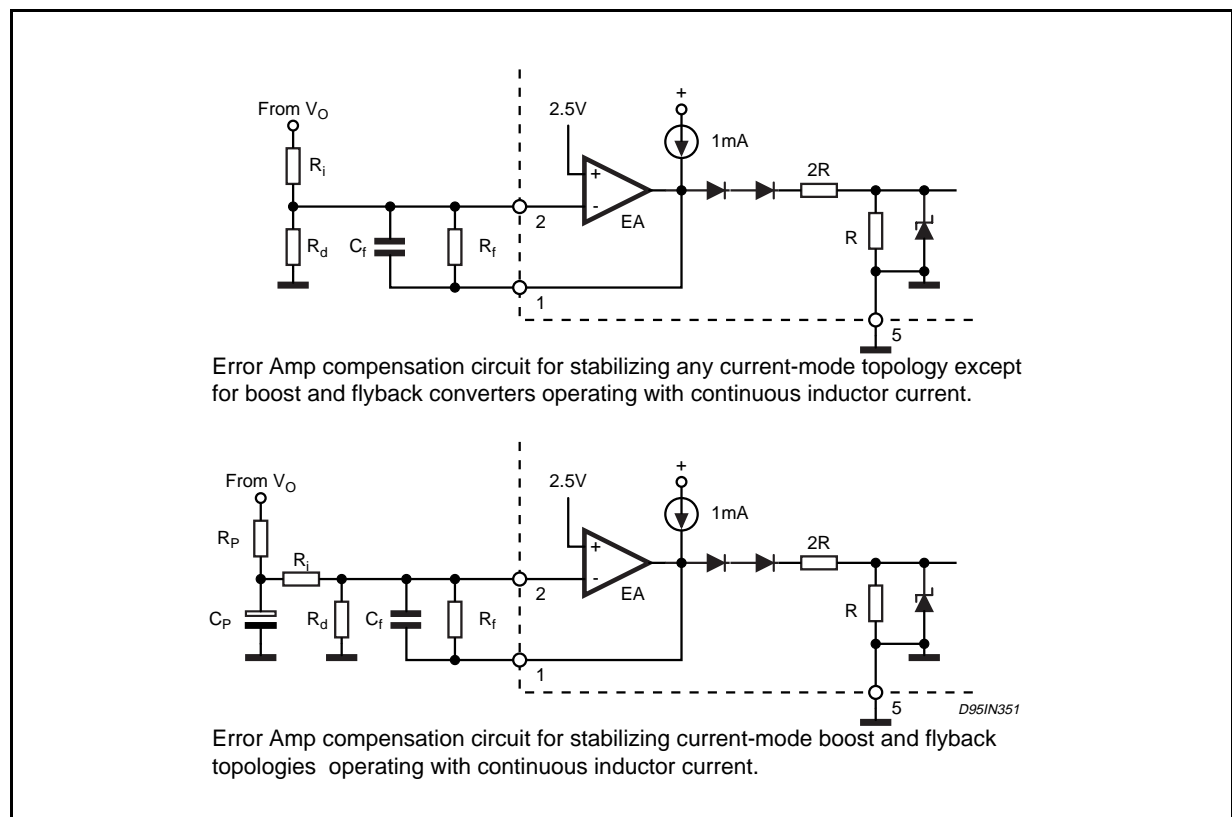


Figure 21: Error Amplifier Compensation



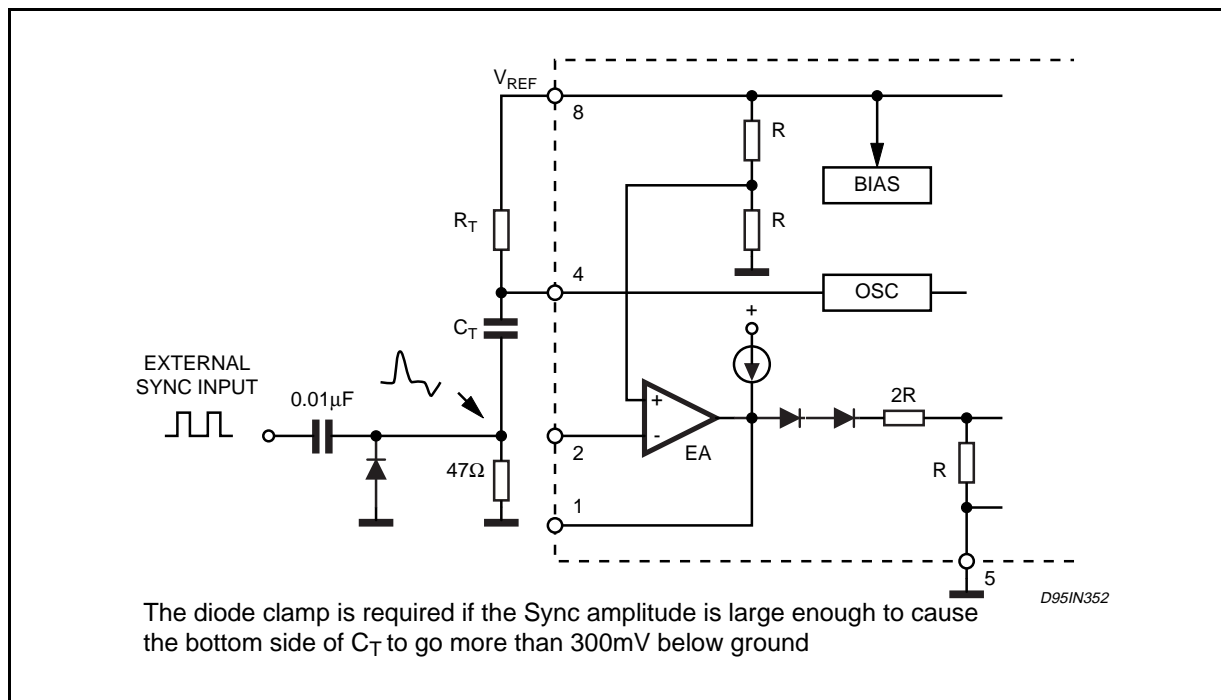
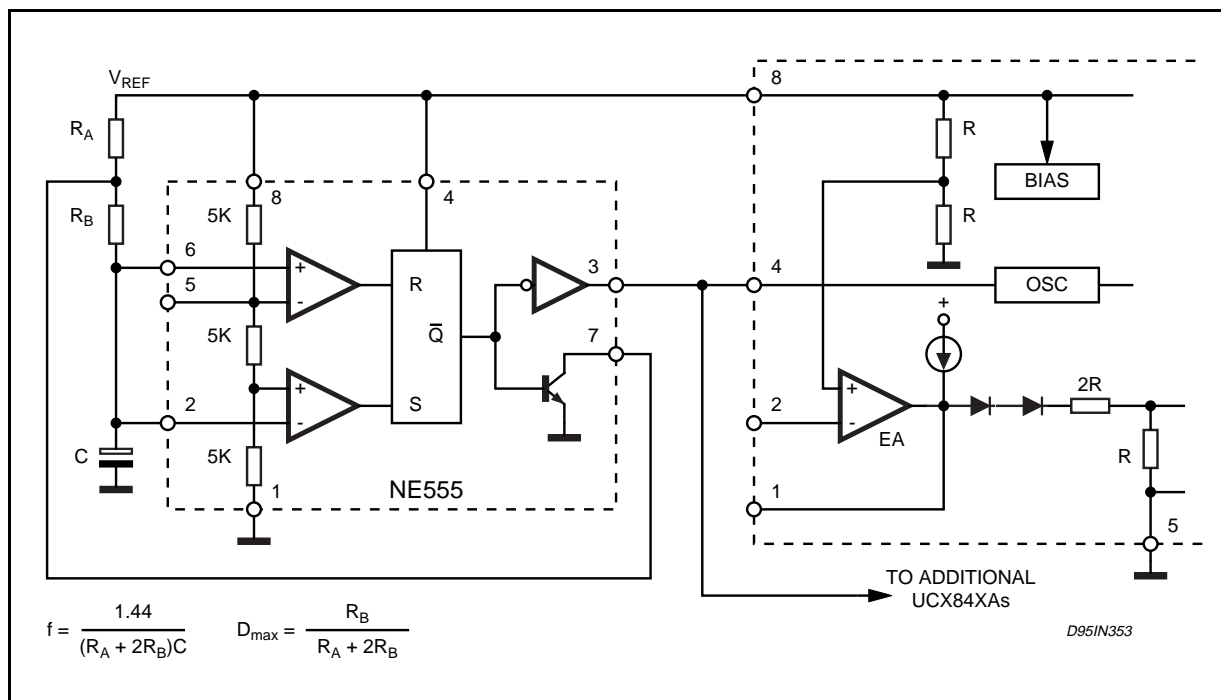
**Figure 22:** External Clock Synchronization.**Figure 23:** External Duty Cycle Clamp and Multi Unit Synchronization.

Figure 24: Soft-Start Circuit

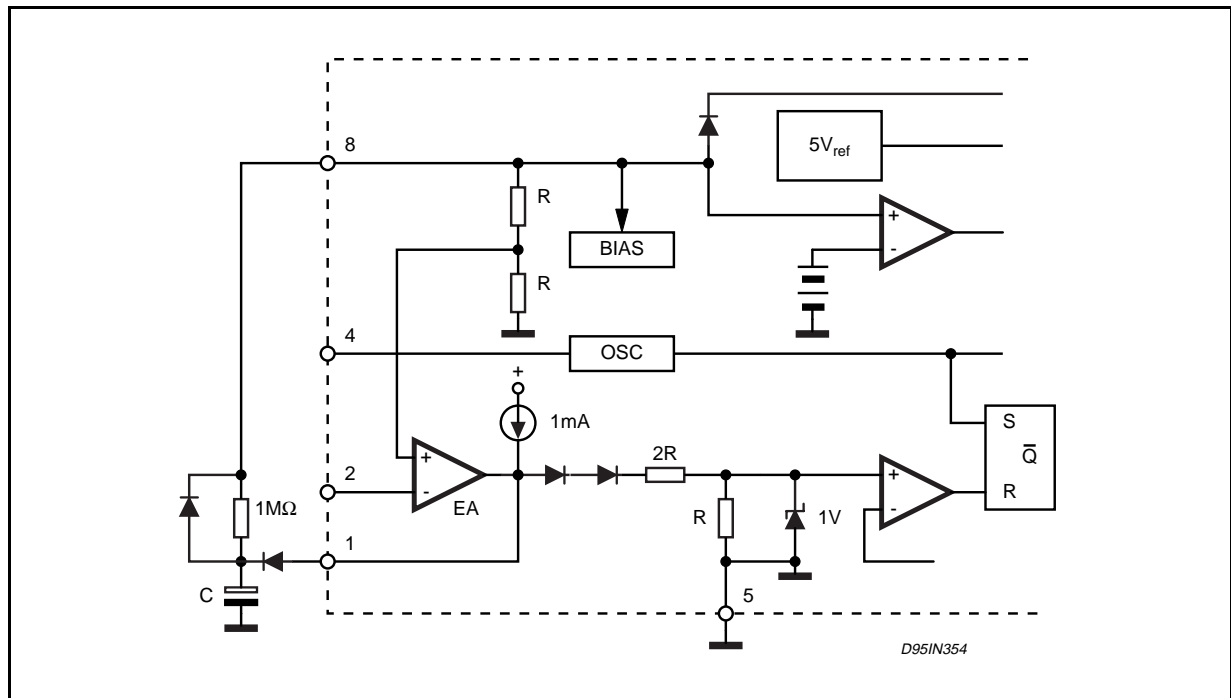
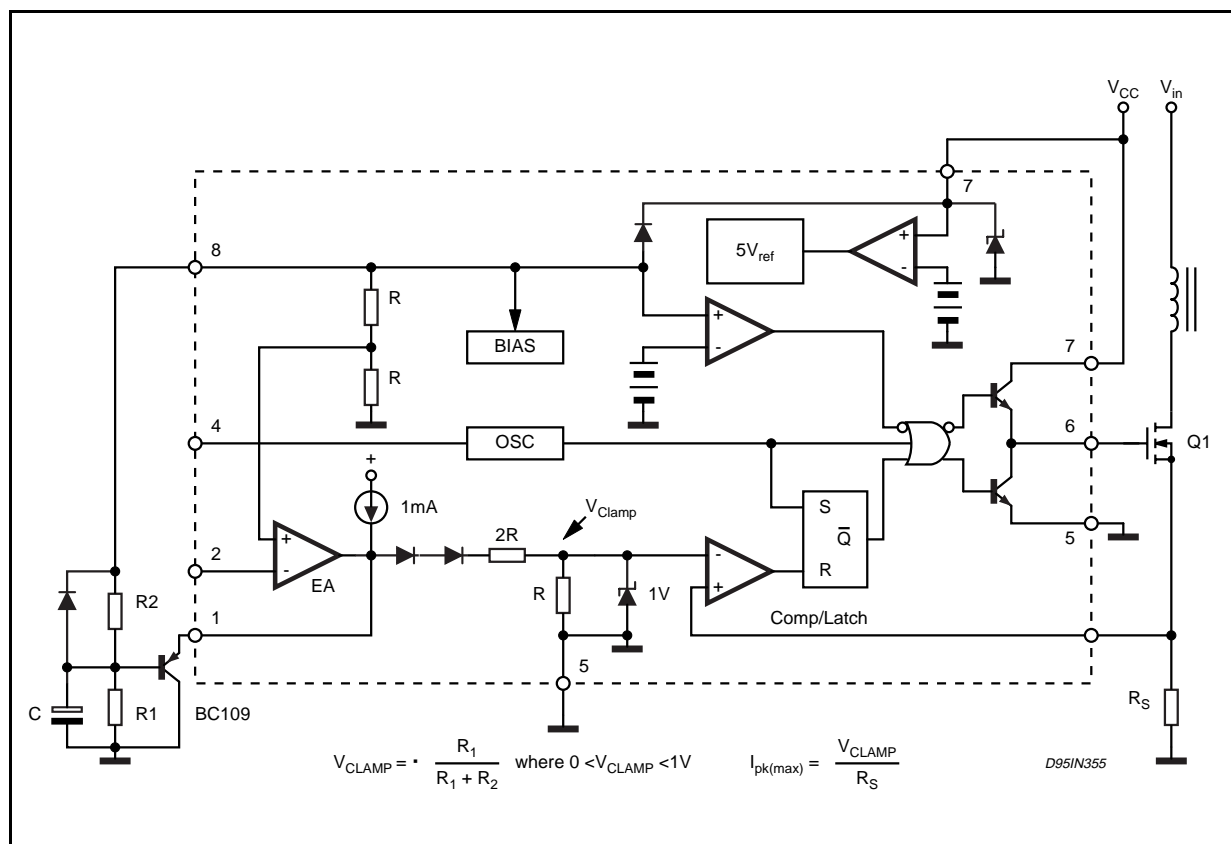


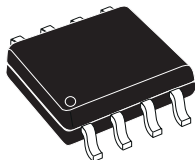
Figure 25: Soft-Start and Error Amplifier Output Duty Cycle Clamp.



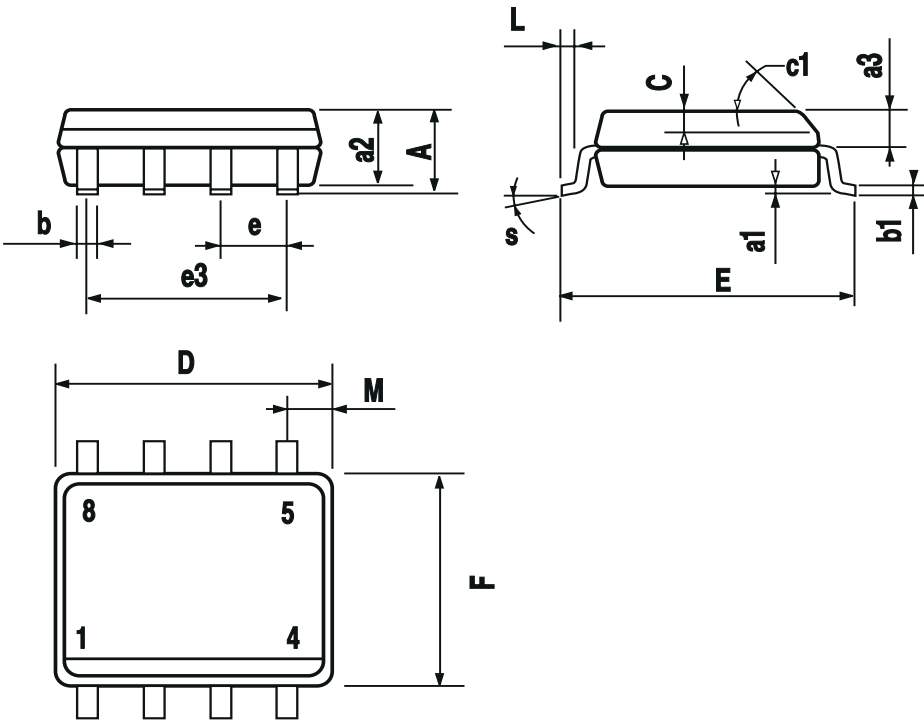
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			1.75			0.069
a1	0.1		0.25	0.004		0.010
a2			1.65			0.065
a3	0.65		0.85	0.026		0.033
b	0.35		0.48	0.014		0.019
b1	0.19		0.25	0.007		0.010
C	0.25		0.5	0.010		0.020
c1	45° (typ.)					
D (1)	4.8		5.0	0.189		0.197
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
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



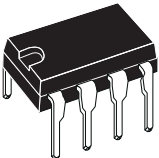
SO8



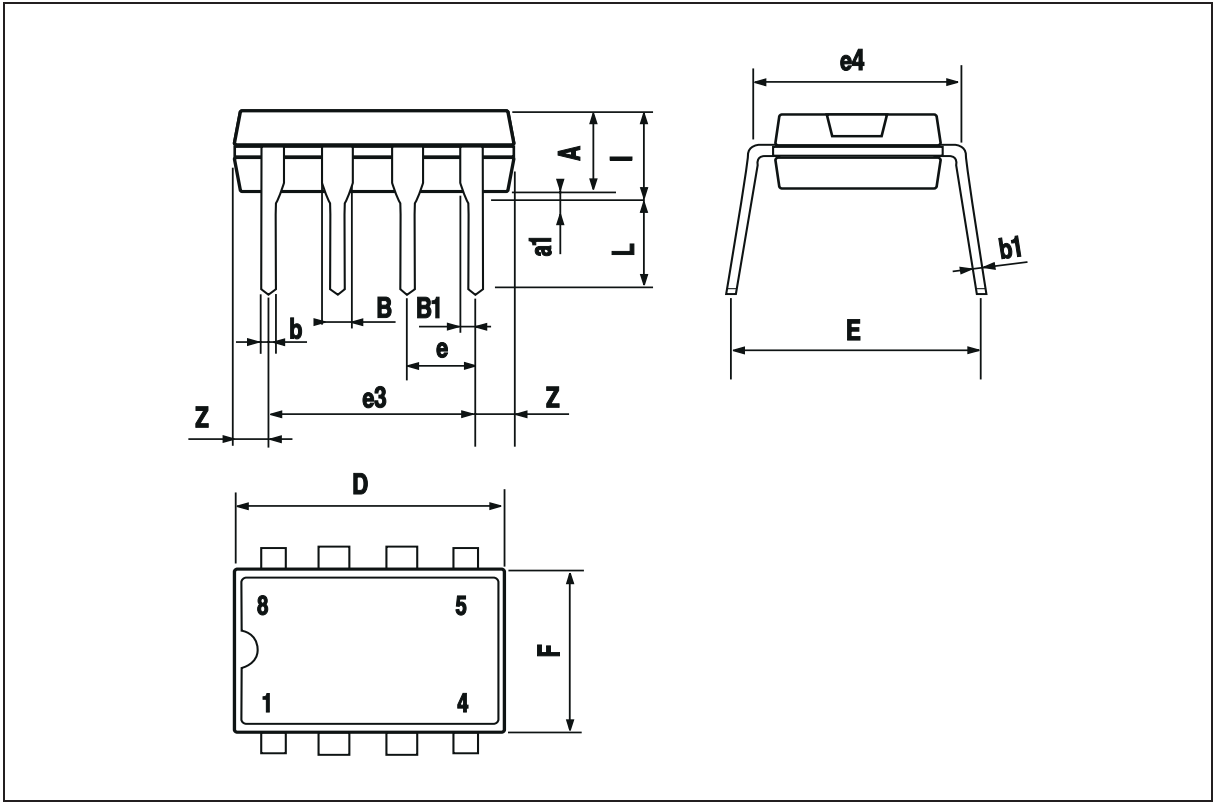
UC2842B/3B/4B/5B - UC3842B/3B/4B/5B

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



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