



Bay Linear

Inspire the Linear Power

Current Mode PWM Controller

B3842/43/44/45A&A1

Description

The Bay Linear B3842/43/44/45 are fixed frequency current-mode PWM controller. These devices are designed for Off-Line and DC-to-DC converter applications with minimum external components. The B3842 family Feature a trimmed oscillator for precise duty cycle control, a temperature compensated reference, high gain error amplifier, current sensing comparator, and a high current totempole output. Ideally suited for driving a power N-Channel MOSFET's. It is low when is on off stage. Protection circuitry includes built in under-voltage lockout and current limiting.

Major differences between members of these series are the UVLO thresholds and maximum duty-cycle ranges. Typical UVLO thresholds of 16V (on) and 10V (off) on the B3842 and B3844 devices make them ideally suited to off-line applications. These corresponding typical thresholds for the B3842 and B3845 devcies are 8.4V (on) and 7.6V (off). The B3842 and B3843 devcies can operate to duty cycles approaching 100%. A duty-Cycle range of 0 to 50% is obtained by the B3844 and B3845 by the addition of an internal toggle flip-flop, which blanks the output off every other clock cycle. It id available in 8 pin DIP and SOIC packages.

Features

- Low Start-Up and Operating Current
- Maximum Duty Cycle
- Operating Frequency Up to 500KHz
- Under voltage Lockout with Hysteresis
- Available in 8 pin SOIC
- Similar to industry Standard UC3842

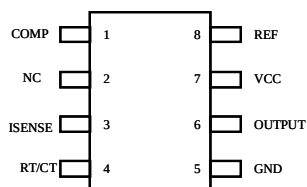
Applications

- Switching Power Supply
- Monitor

Pin Connection



8-Pin Surface Mount



Top View

Ordering Information

Devices	Package	Temp.
B384X(Z)M	SO-8	0 °C to 70 °C
B384X(Z)P	8-DIP	0 °C to 70 °C

Z=A ON Semi Z=A1 Fairchild & Samsung

Absolute Maximum Rating

Parameter	Symbol	Value	Unit
Supply Voltage	V_{CC}	30	V
Output Current	I_O	± 1	A
Analog Input (pin 2,3)	$V_{(ANA)}$	-0.3 to 6.3	V
Error Amp Output Sink Current	$I_{SINK (E.A)}$	10	mA
Power Dissipation	P_D	1	W
Storage Temperature Range	T	-65 to 150	°C
Lead Temperature (Soldering 10 Sec.)	T_L	260	°C

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

Parameter	Symbol	Conditions	MIN	TYP	MAX	UNIT
REFERENCE SECTION						
Reference Voltage	V_{REF}	T _J = 25 °C, I _{REF} = 1mA	4.90	5.00	5.10	V
Line Regulation	REG _(line)	12V ≤ V _{CC} ≤ 25V	-	6	20	mA
Load Regulation	REG _(LOAD)	1mA ≤ I _{REF} ≤ 20mA T = 25 °C	-	6	25	
Short Circuit Output Current	I_{SC}	T = 25 °C	-	-100	-180	mA
OSCILLATOR SECTION						
Oscillator Frequency	f	T = 25 °C	47	52	57	KHz
Frequency Change with Voltage	$\Delta f / \Delta V_{CC}$	12V ≤ V _{CC} ≤ 25V	-	0.05	1	%
Oscillator Amplitude	V_{OSC}		-	1.6	-	V _{p-p}
ERROR AMPLIFIER SECTION						
Input Bias Current	I_{BIAS}		-	-0.1	-2	μA
Input Voltage	$V_{(E>A)}$	V ₁ = 2.5V	2.42	2.50	2.58	V
Open Loop Voltage Gain	G_{VO}	2V ≤ V _O ≤ 4V	65	90	-	dB
Power Supply Rejection Ratio	PSRR	12V ≤ V _{CC} ≤ 25V	60	70	-	dB
Output Sink Current	I_{SINK}	V ₂ = 2.7V, V ₁ = 1.1V	2	7	-	mA
Output Source Current	I_{SOURCE}	V ₂ = 2.3, V ₁ = 5V	-0.6	-1.0	-	mA
High Output Voltage	V_{OH}	V ₂ = 2.3, R _L = 15Ω to GND	5	6	-	V
Low Output Voltage	V_{OL}	V ₂ = 2.7, R _L = 15Ω to pin 8	-	0.8	1.1	V
OUTPUT SECTION						
Low Output Voltage	V_{OL}	I _{SINK} = 20mA	-	0.08	0.4	V
		I _{SINK} = 200mA		1.4	2.2	
High Output Voltage	V_{OH}	S _{source} = 20mA	13	13.5	-	V
		S _{source} = 200mA	12	13.0	-	
Rise Time	t _R	T _J = 25 °C, C _L = 1nF (note3)	-	45	150	ns
Fall Time	t _F	T _J = 25 °C, C _L = 1nF (note3)	-	35	150	ns

Note: Output Switch tests are performed under pulsed conditions to minimize power dissipation

Electrical Characteristics

($V_{CC} = 15V$; $R_T = 10\Omega$, $C_T = 3.3nF$, $T_A = 0^\circ C$ to $+70^\circ C$, unless otherwise specified)

Parameter	Symbol	Conditions	MIN	TYP	MAX	UNIT
CURRENT SENSE SECTION						
Gain	G _V	(Note 1 & 2)	2.85	3	3.15	V/V
Maximum input Signal	V _{I(MAX)}	V _I = 5V (Note 1)	0.9	1	1.1	V
Power Supply Rejection Ratio	PSRR	12V≤V _{CC} ≤25V		70	-	dB
Input Bias Current	I _{BIAS}			-3	-10	μA
UNDER-VOLTAGE LOCKOUT SECTION						
Start Threshold	V _{TH(ST)}	B3842/B3844	14.5	16	17.5	V
		B3843/B3845	7.8	8.4	9	
Min-Operating Voltage (after Turn On)	V _{OPR(MIN)}	B3842/B3844	8.5	10	11.5	V
		B3843/B3845	7.0	7.6	8.2	
PWM SECTION						
Max Duty Cycle	D(MAX)	B3842/B3844	95	97	100	%
		B3843/B3845	47	48	50	
Min Duty Cycle	D (MIN)		-	-	0	%
TOTAL STANDBY CURRENT						
Start-Up Current	I _{ST}	B3842A/43A/44A/45A	-	0.17	0.3	mA
		B3842A1/43A1/44A1/45A1		0.45	1	
Operating Supply Current	I _{CC(OPR)}	V ₃ =V ₂ =ON	-	14	17	mA
Zener Voltage	V _Z	I _{CC}	30	38	-	V

Block Diagram

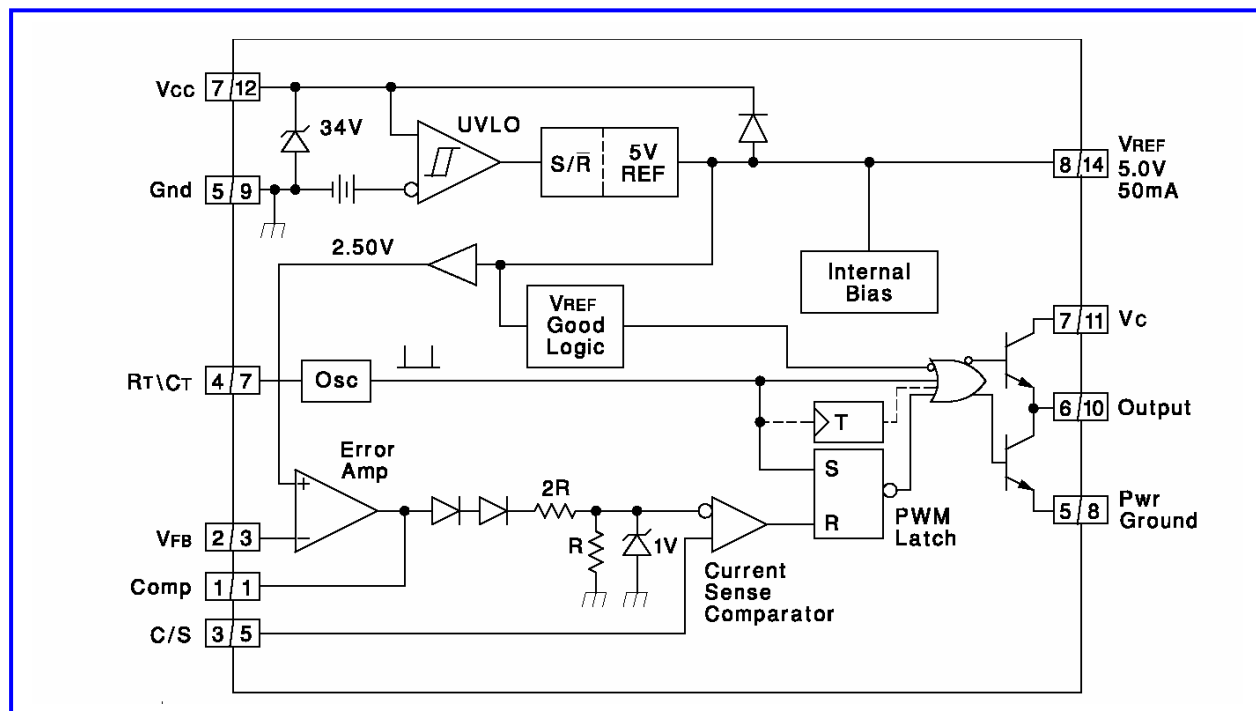


Figure 1: Error Amp Configuration

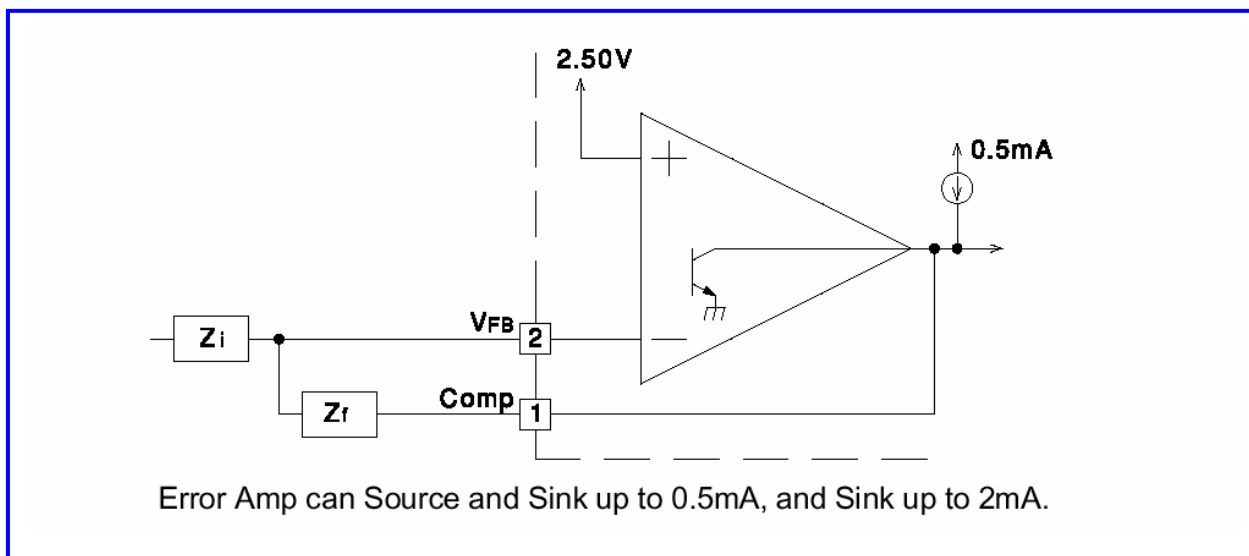


Figure 2: Under-Voltage Lockout

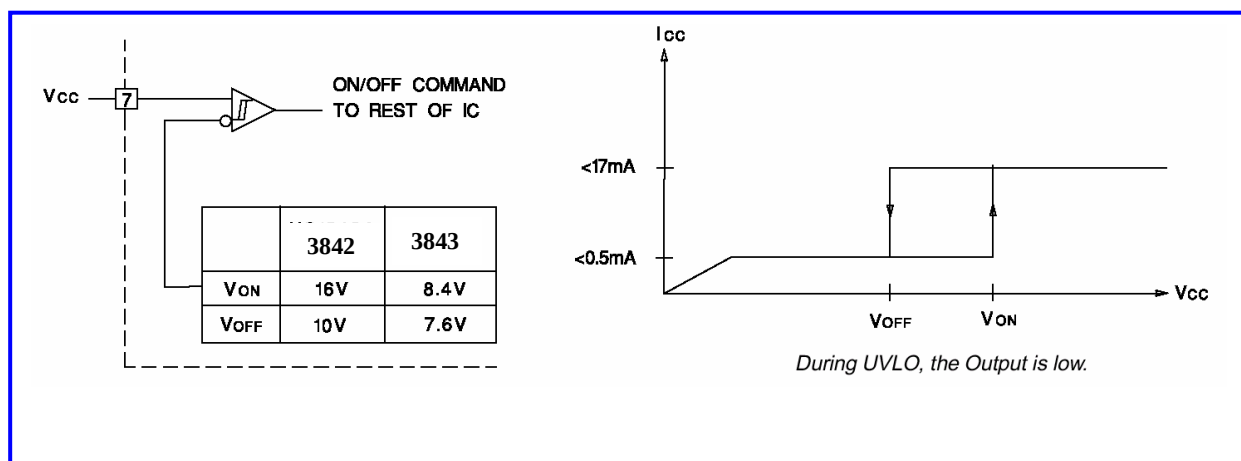
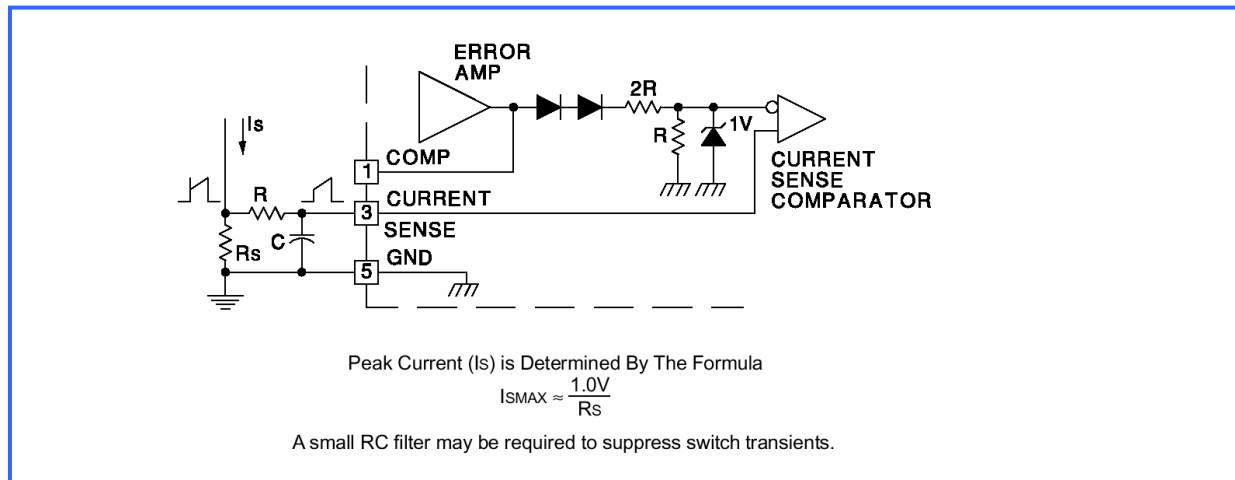
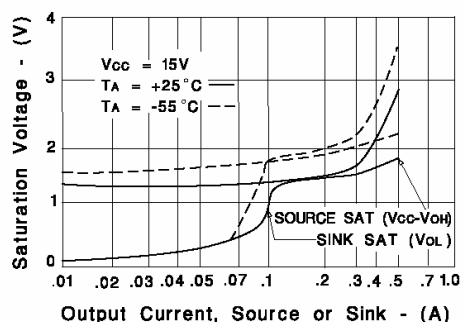


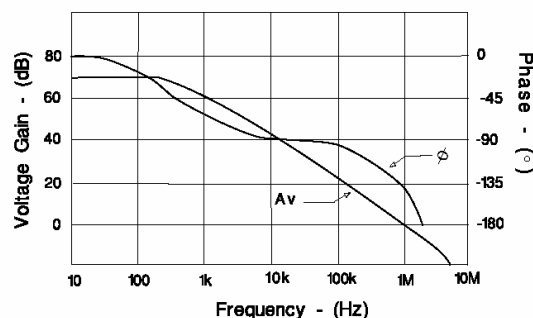
Figure 3: Current Sense Circuit



Output Saturation Characteristics



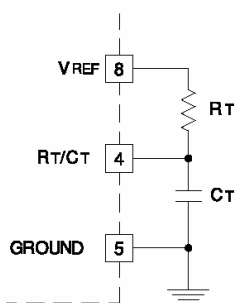
Error Amplifier Open-Loop Frequency Response



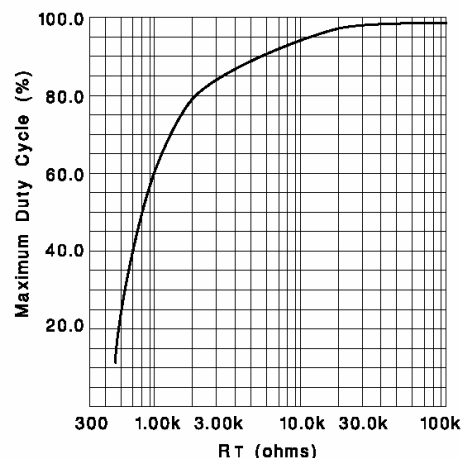
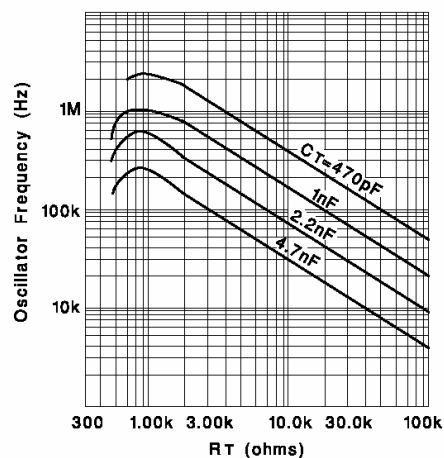
Oscillator Section

Oscillator Frequency vs Timing Resistance

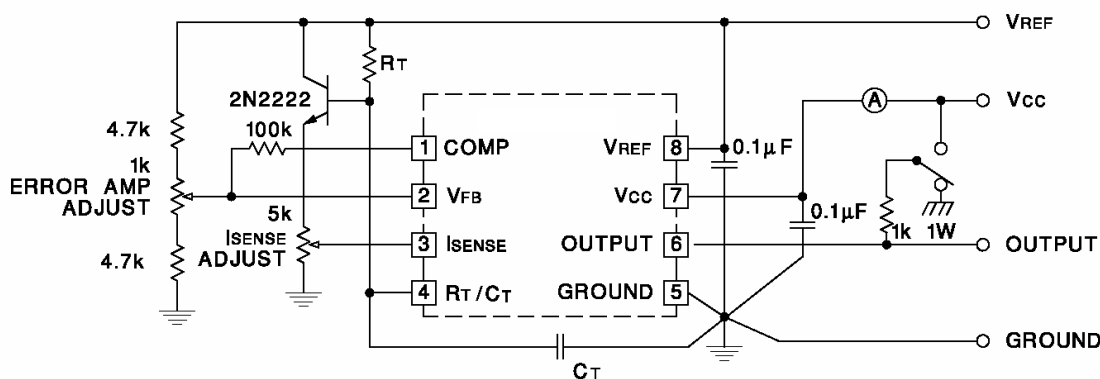
Maximum Duty Cycle vs Timing Resistor



$$\text{For } R_T > 5k \text{ } f \sim \frac{1.72}{R_T C_T}$$



Open-Loop Laboratory Test Fixture



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 5k potentiometer are used to sample the oscillator waveform and apply an adjustable ramp to pin 3.

Figure 4: Slope Compensation Techigues

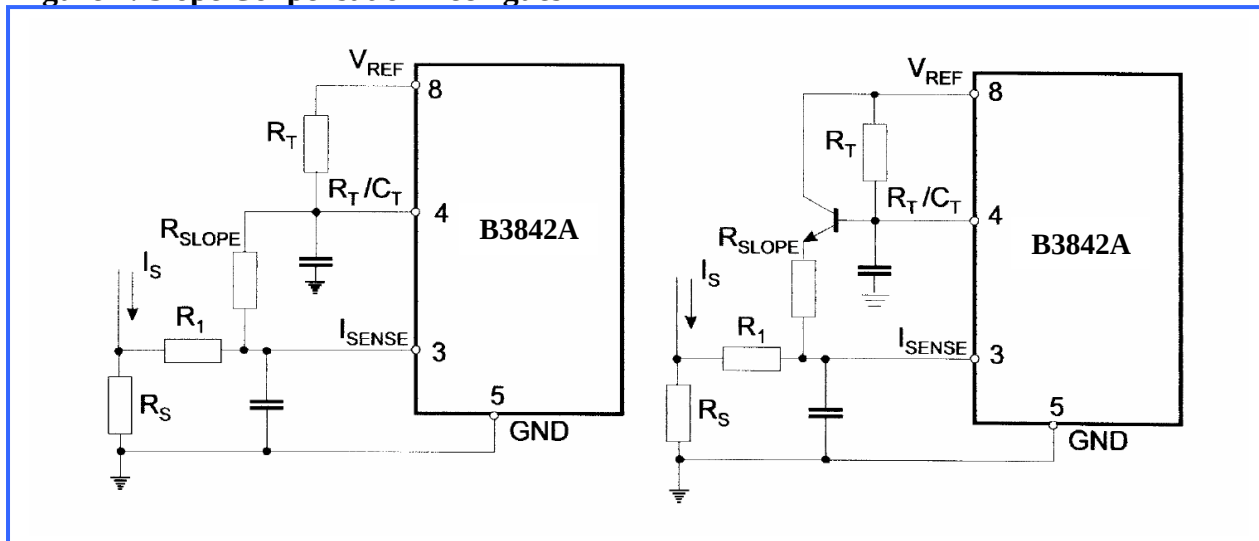
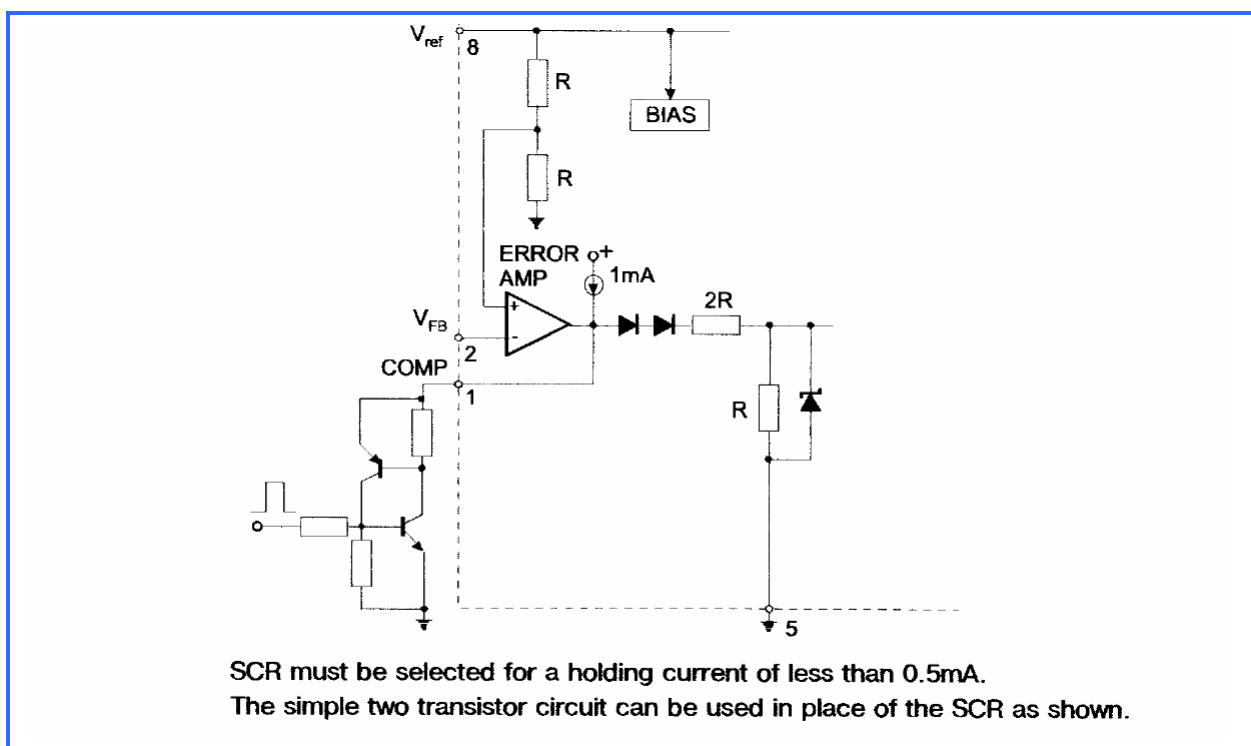


Figure 5:Latched Shutdown



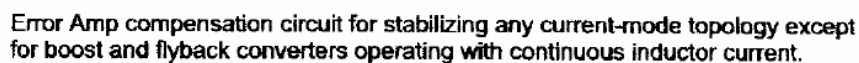


Figure 6. Error Amplifier Compensation

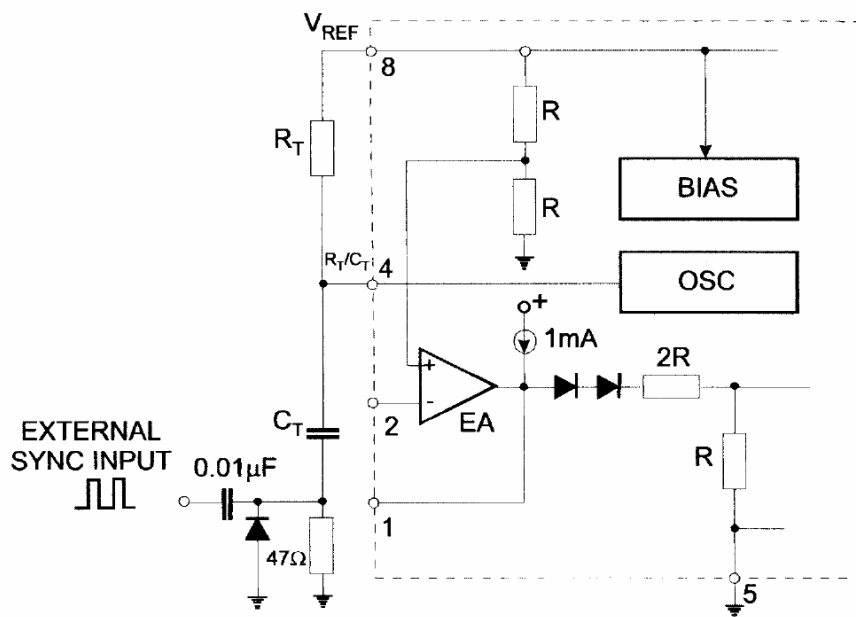


Figure 7. External Clock Synchronization

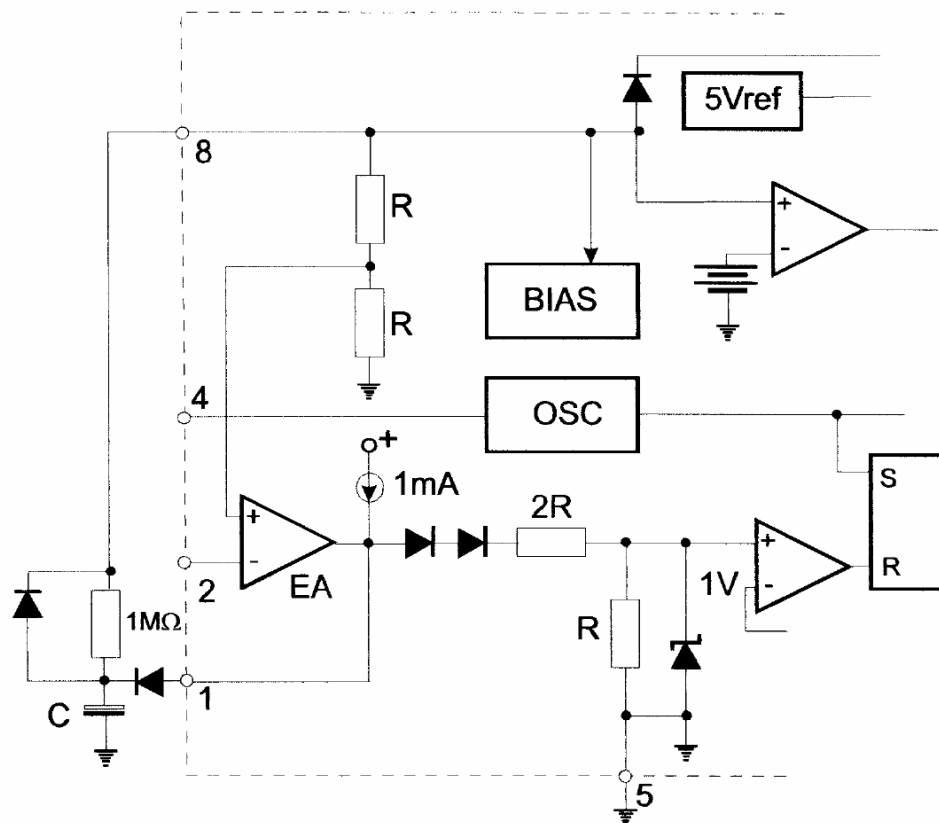


Figure 8. Soft-Start Circuit

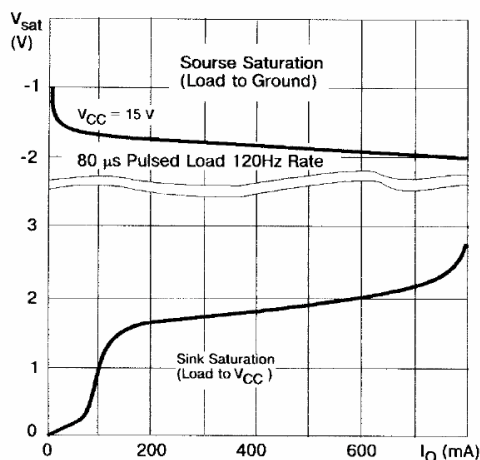


Figure 7. Output Saturation Voltage vs. Load Current
 $T_A = 25^\circ\text{C}$

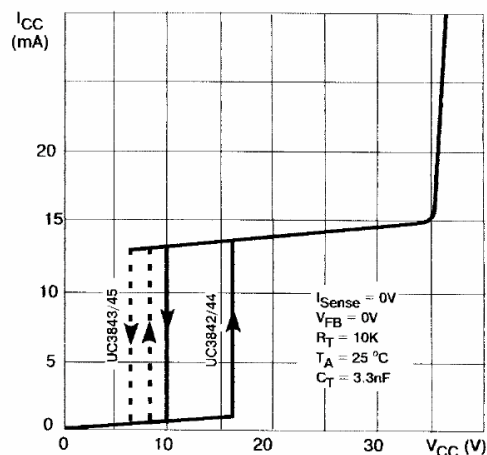


Figure 8. Supply Current vs. Supply Voltage

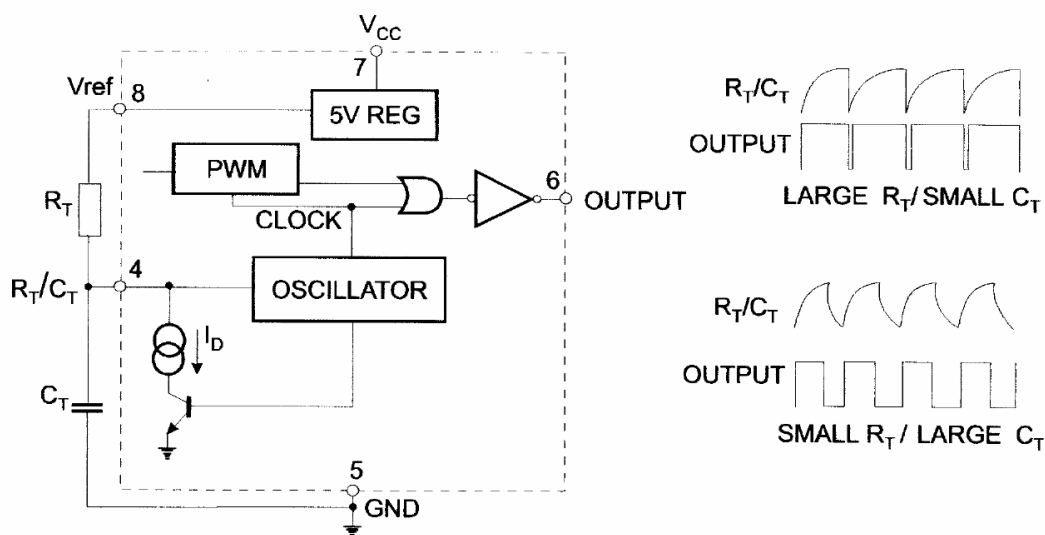


Figure 9. Oscillator and Output Waveforms

Advance Information- These data sheets contain descriptions of products that are in development. The specifications are based on the engineering calculations, computer simulations and/ or initial prototype evaluation.

Preliminary Information- These data sheets contain minimum and maximum specifications that are based on the initial device characterizations. These limits are subject to change upon the completion of the full characterization over the specified temperature and supply voltage ranges.

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