1.Description

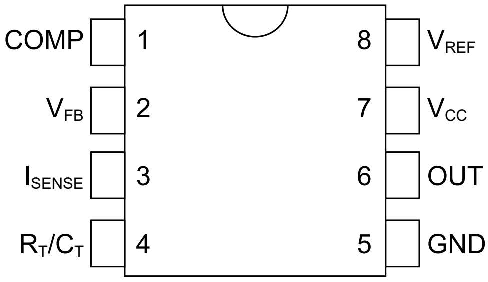
The 3842/43/44/45 are fixed frequency current mode PWM controller. They are specially designed for OFF -Line and DC to DC converter applications with a minimal external components. Internally implemented circuits include a trimmed oscillator for precise duty cycle control, a temperature compensated reference, high gain error amplifier, current sensing comparator, and a high current totempole output ideally suited for driving a power MOSFET. Protection circuitry includes built undervoltage lockout and current limiting. The 3842 and 3844 have UVLO thresholds of 16 V (on) and 10 V (off). The corresponding thresholds for the 3843/45 are 8.4V (on) and 7.6V (off). The 3842) and 3843 can operate within 100% duty cycle. The 3844 and 3845 can operate within 50% duty cycle.

The 384X has Start-Up Current 0.5mA (typ).

2.Features

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

3.Pinning Information

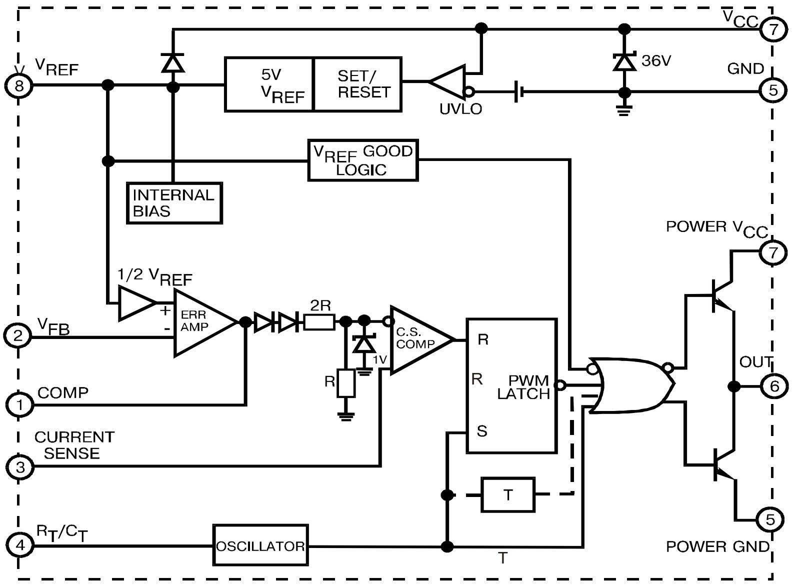


SOP-8

Pin Descriptions

Pin Number	Function	Description
1	COMP	This pin is the Error Amplifier output and is made 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.
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_{CC}	This pin is the positive supply of the integrated circuit.
8	V_{ref}	This is the reference output. It provides charging current for capacitor C_T through resistor R_T.

4.Block Diagram



(toggle flip flop used only in 3844, 3845)

5.Absolute Maximum Ratings

Parameter	Symbol	Maximum	Units
Supply Voltage (low impedance source)	V_{CC}	30	V
Output Current	I_O	±1	A
Input Voltage (Analog Inputs pins 2,3)	V_I	-0.3 to 5.5	V
Error Amp Output Sink Current	$I_{SINK\ (E.A)}$	10	mA
Power Dissipation (T_A=25°C)	P_D	1	W
Storage Temperature Range	T_{STG}	-65 to 150	°C
Lead Temperature (soldering 5 sec.)	T_L	260	°C
Operating Ambient Temperature	T_A	0 to 70	°C

6. Electrical Characteristics

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Reference Sectio						
Reference Output Voltage	V_{REF}	T_J=25°C, I_{REF}=1mA	4.9	5	5.1	V
Line Regulation	ΔV_{REF}	12V≤V_{CC}≤25V		6	20	mV
Load Regulation	ΔV_{REF}	1mA≤I_{REF}≤20mA		6	25	mV
Short Circuit Output Current	I_{SC}	T_A=25°C		-100	-180	mA
Oscillator Section						
Oscillation Frequency	f	T_J=25°C 384X	47	52	57	KHz
Frequency Change with Voltage	$\Delta f/\Delta V_{CC}$	12V≤V_{CC}≤25V		0.05	1	%
Oscillator Amplitude	$V_{(OSC)}$	(peak to peak)		1.6		V
Error Amplifier Section						
Input Bias Current	I_{BIAS}	V_{FB}=3V		-0.1	-2	μA
Input Voltage	$V_{I(E.A)}$	V_{PIN1}=2.5V	2.42	2.5	2.58	V
Open Loop Voltage Gain	A_{VOL}	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_{PIN2}=2.7V, V_{PIN1}=1.1V	2	7		mA
Output Source Current	I_{SOURCE}	V_{PIN2}=2.3V, V_{PIN1}=5V	-0.5	-1		mA
High Output Voltage	V_{OH}	V_{PIN2}=2.3V, R_L=15KΩ to GND	5	6		V
Low Output Voltage	V_{OL}	V_{PIN2}=2.7V, R_L=15KΩ to PIN 8		0.8	1.1	V
Current Sense Section						
Gain	G_V	(Note 1 & 2)	2.85	3	3.15	V/V
Maximum input Signal	$V_{I(MAX)}$	V_{PIN1}=5V (Note1)	0.9	1	1.1	V
Supply Voltage Rejection	SVR	12V≤V_{CC}≤25V (Note1)		70		dB
Input Bias Current	I_{BIAS}	V_{PIN3}=3V		-3	-10	μA

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Output Section						
Low Output Voltage	V_{OL}	I_{SINK}=20mA		0.08	0.4	V
		I_{SINK}=200mA		1.4	2.2	V
High Output Voltage	V_{OH}	I_{SINK}=20mA	13	13.5		V
		I_{SINK}=200mA	12	13		V
Rise Time	t_R	T_J=25°C, C_L=1nF (Note 3)		45	150	nS
Fall Time	t_F	T_J=25°C, C_L=1nF (Note 3)		35	150	nS
Undervoltage Lockout Section						
Start Theshold	$V_{TH(ST)}$	3842/44	14.5	16	17.5	V
		3843/45	7.8	8.4	9	V
Min. Operating Voltage (After Turn On)	$V_{OPR(min)}$	3842/44	8.5	10	11.5	V
		3843/45	7	7.6	8.2	V
PWM Section						
Max. Duty Cycle	$D_{(MAX)}$	3842/43	95	97	100	%
		3844/45	47	48	50	%
Min. Duty Cycle	$D_{(MAX)}$				0	%
Total Standby Current						
Start-Up Curent	I_{ST}	384X		0.5		mA
Operating Supply Current	$I_{CC\ (OPR)}$	V_{PIN3}=V_{PIN2}=0V		13	17	mA
Zener Voltage	V_Z	I_{CC}=25mA	30	38		V

* - Adjust V_{CC} above the start threshold before setting it to 15V.

Note 1: Parameter measured at trip point of latch with V_{PIN2}=0.

Note 2: Gain defined as $A=\Delta V_{PIN1}/\Delta V_{PIN3}$; $0 \le V_{PIN3} \le 0.8V$.

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

7.Application Information

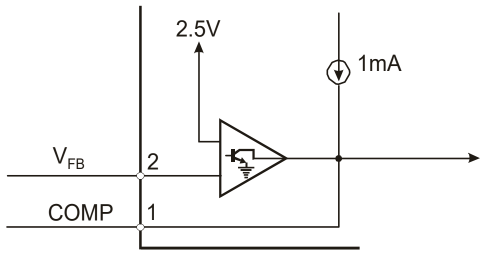


Figure 1. Error Amp Configuration

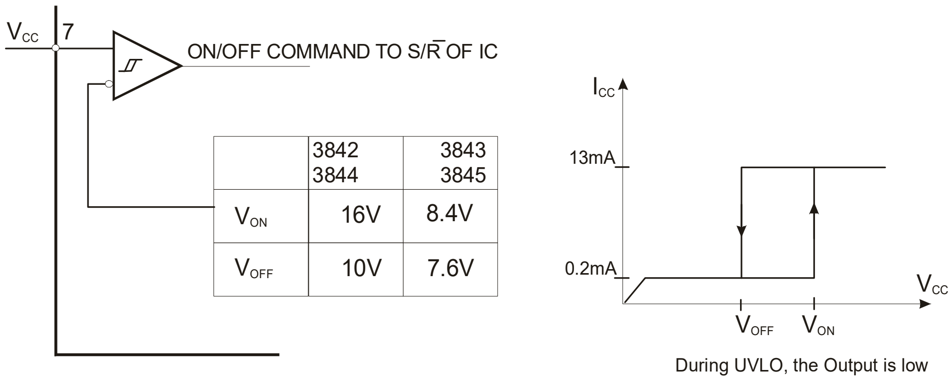
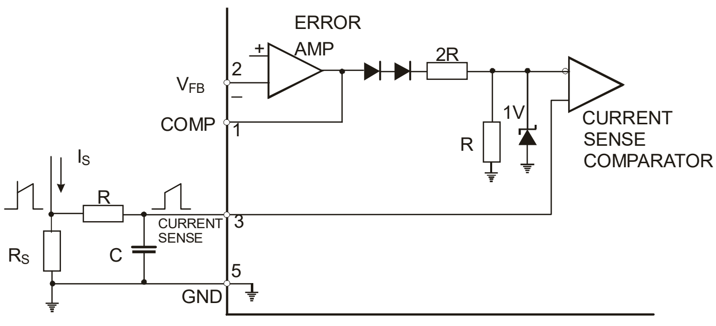


Figure 2. Undervoltage Lockout



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

Figure 3. Current Sense Circuit

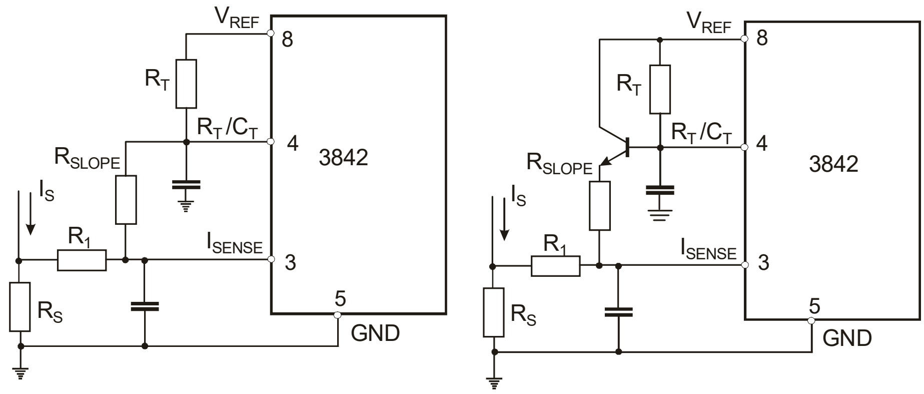
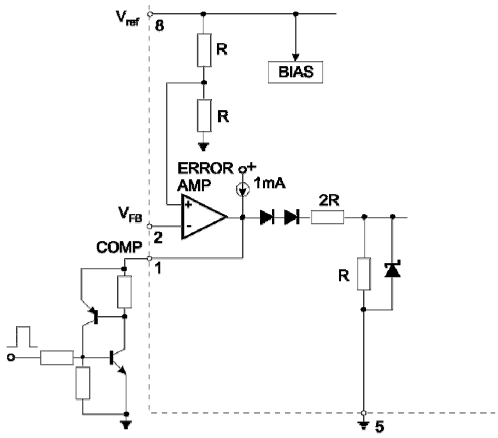


Figure 4. Slope Compensation Techniques



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

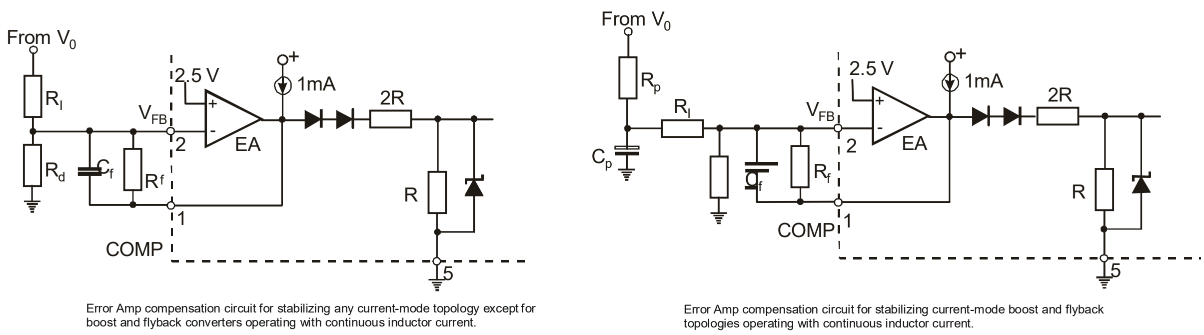


Figure 6. Error Amplifier Compensation

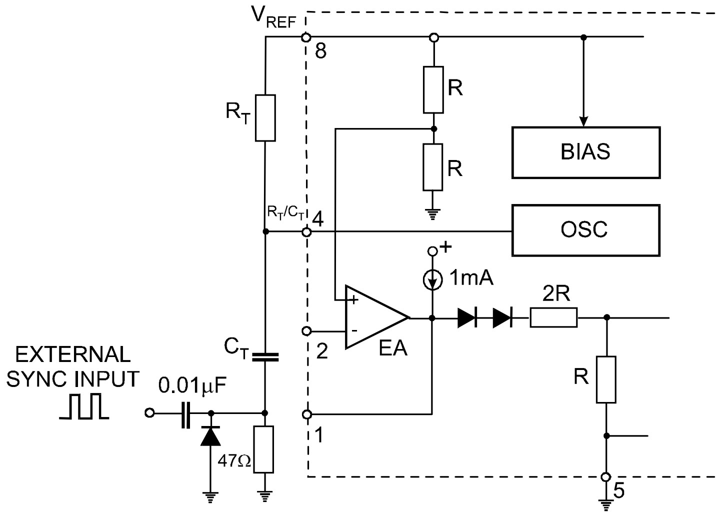


Figure 7. External Clock Synchronization

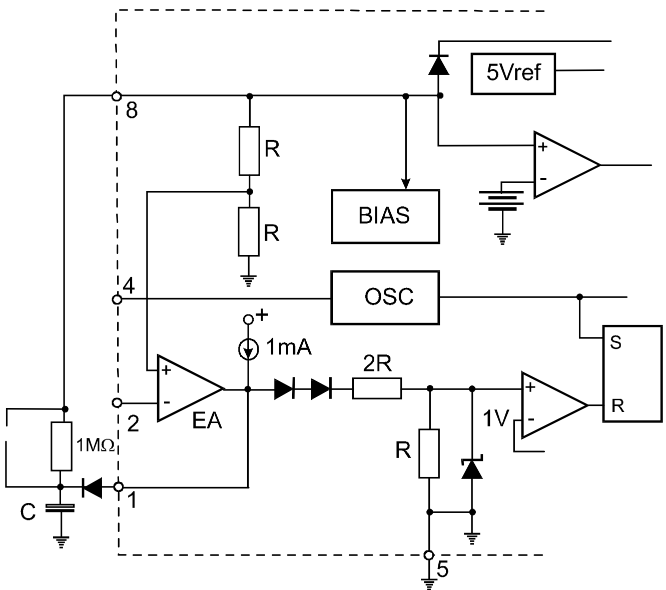


Figure 8. Soft-Start Circuit

8.1 Typical Characteristic

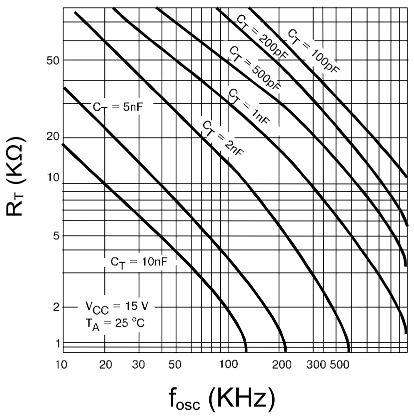


Figure 1: Timing Resistor vs. Oscillator Frequency

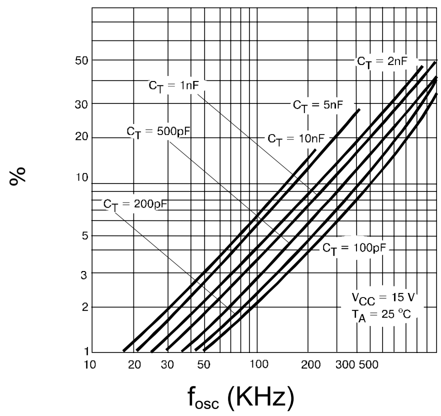


Figure 2: Output Dead-Time vs. Oscillator Frequency

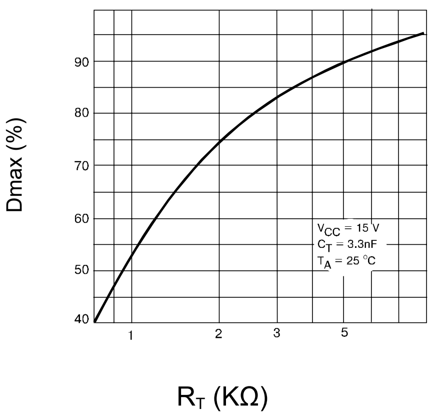


Figure 3: Maximum Output Duty Cycle vs. Timing Resistor (UC3842/43)

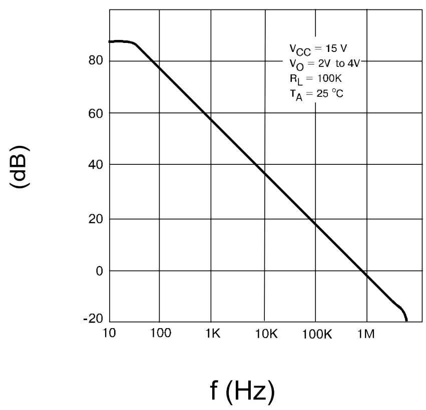


Figure 4: Error Amp Open-Loop Gain vs. Frequency

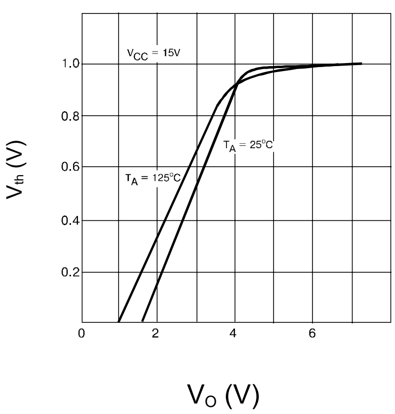


Figure 5: Current Sense Input Threshold vs. Error Amp Output Voltage

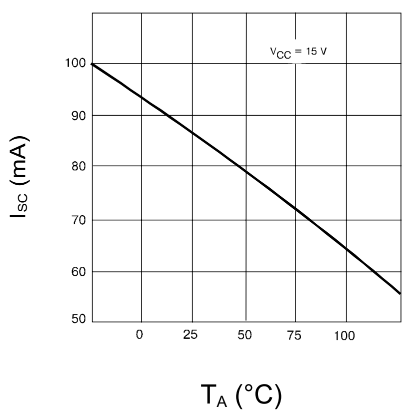


Figure 6: Reference Short Circuit Current vs. Temperature

8.2 Typical Characteristic

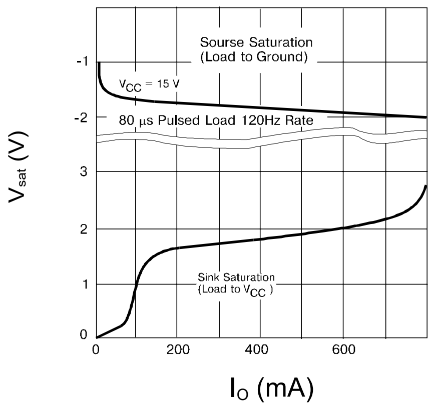


Figure 7: Output Saturation Voltage vs. Load Current T_A=25°C

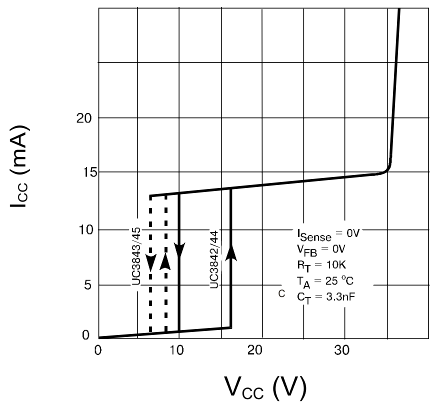


Figure 8: Supply Current vs. Supply Voltage

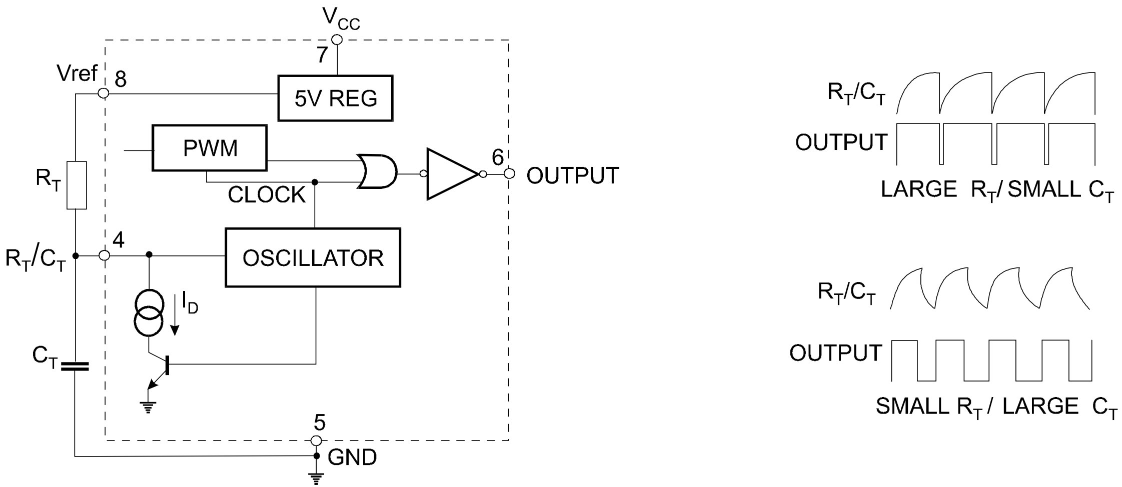
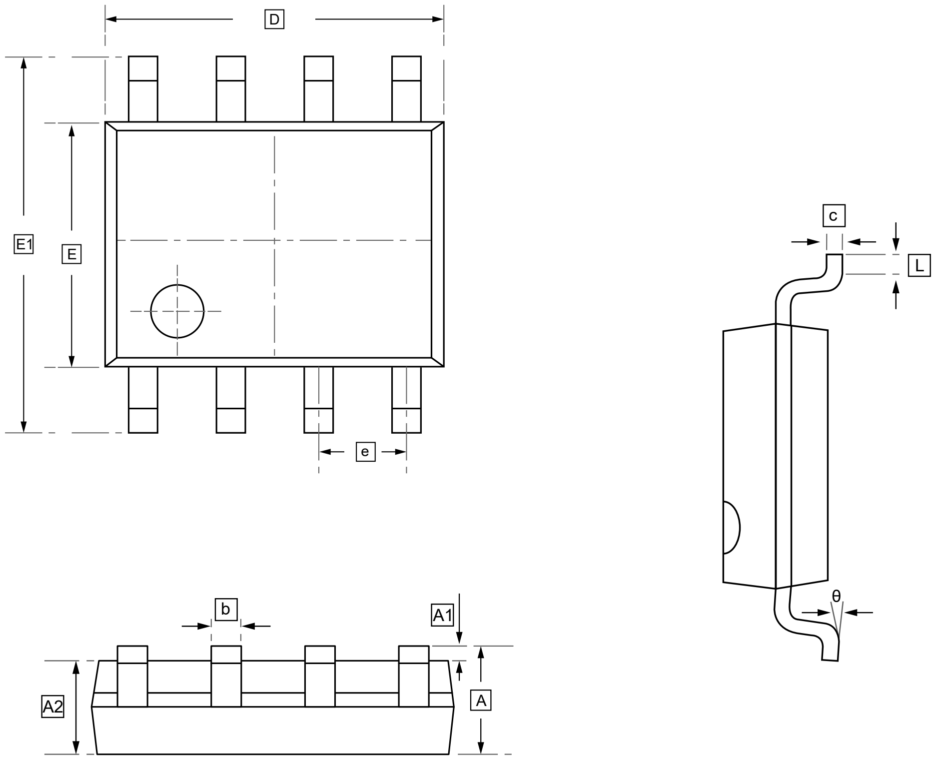


Figure 9. Oscillator and Output Waveforms

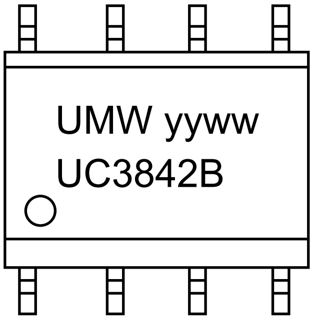
9.SOP-8 Package Outline Dimensions



DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	A2	b	c	D	E	E1	e	L	θ
Min	1.350	0.000	1.350	0.330	0.170	4.700	3.800	5.800	1.270	0.400	0°
Max	1.750	0.100	1.550	0.510	0.250	5.100	4.000	6.200	BSC	1.270	8°

10.Ordering Information



yy: Year Code
ww: Week Code

Order Code	Marking	Package	Base QTY	Delivery Mode
UMW UC3842B	UC3842B	SOP-8	2500	Tape and reel
UMW UC3843B	UC3843B	SOP-8	2500	Tape and reel
UMW UC3844B	UC3844B	SOP-8	2500	Tape and reel
UMW UC3845B	UC3845B	SOP-8	2500	Tape and reel

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