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Product Specification

XBLW UC3842

Current Mode Pulse-width Controller

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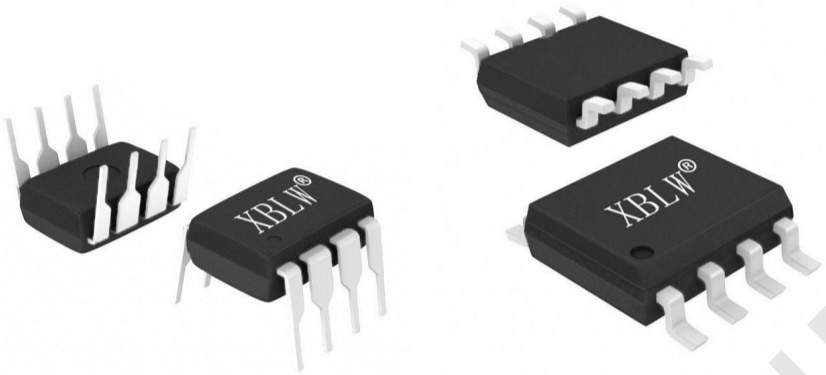
Descriptions

The UC3842 is a fixed frequency current mode PWM controllers. It is specifically designed for Off−Line and DC−DC converter applications. This integrated circuits feature a temperature compensated reference, high gain error amplifier, current sense comparator, and a high Push–pull output ideally suited for driving a power MOSFET.Also included are protective features consisting of input and reference undervoltage lockouts each with hysteresis,allowing deadtimes to be programmed,and a latch for single pulse metering.This device is available in SOP8 package and DIP8 package.



DIP−8　　SOP-8

Feature

- Automatic Feed Forward Compensation
- Low Startup and Operating Current（< 0 . 5 mA ）
- Undervoltage Lockout with Hysteresis
- Maximum Duty Ratio Control
- Operating Frequency: 500kHz

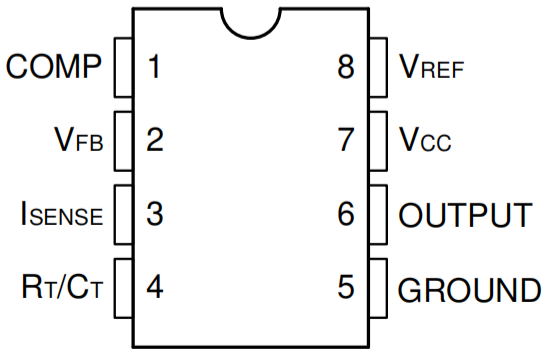
Applications

- Switching regulators of any polarity
- Transformer-coupled DC-DC converters

Ordering Information

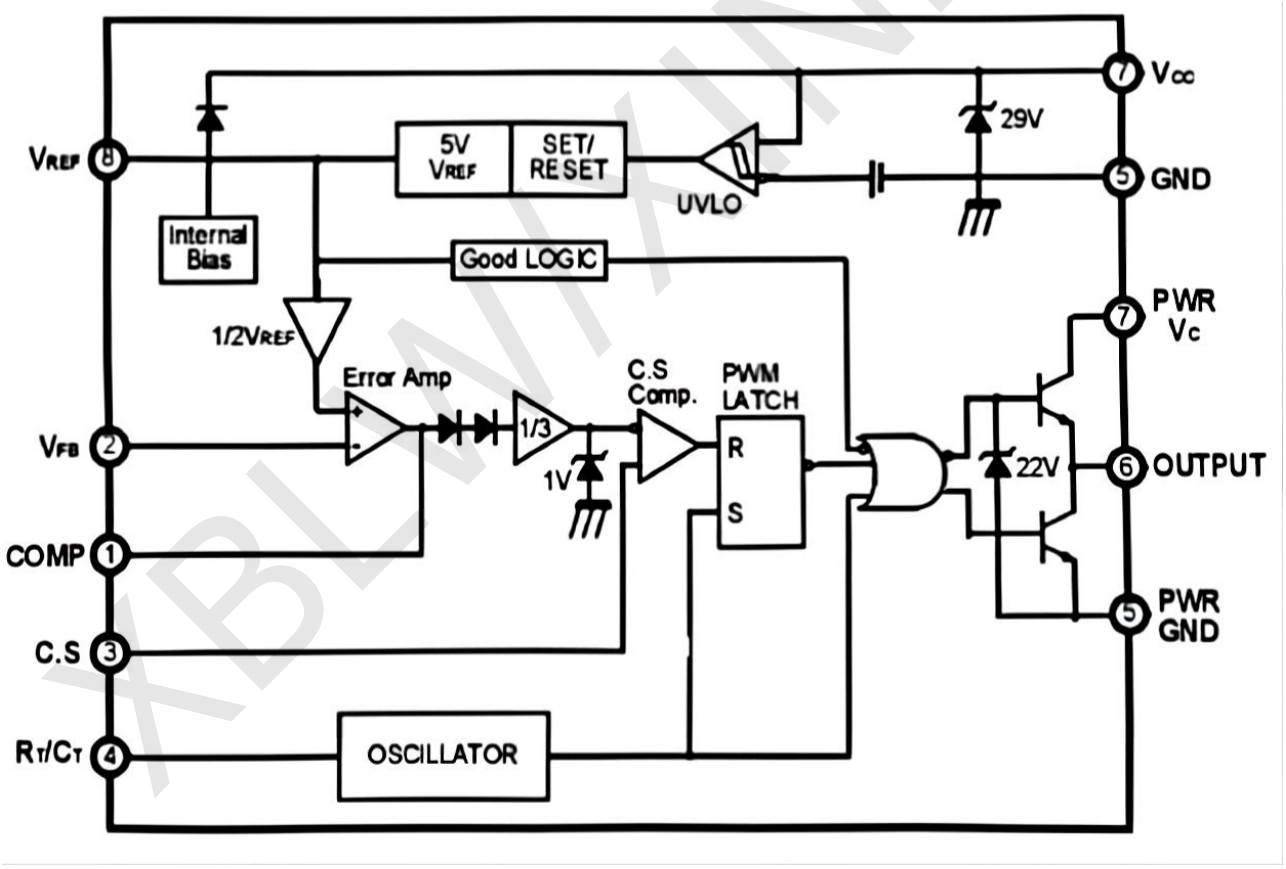
Product Model	Package Type	Marking	Packing	Packing Qty
XBLW UC3842AN	DIP-8	UC3842AN	Tube	2000pcs/Box
XBLW UC3842BDTR	SOP-8	UC3842B	Tape	2500pcs/Reel

PINS DESCRIPTION



No.	Name	Symbol	Description
1	Compensation	COMP	Error amplifier compensation pin. Connect external compensation components to this pin to modify the error amplifier output.
2	Voltage Feedback	V_{FB}	Inverting input to the internal error amplifier. VFB is used to control the power converter voltage-feedback loop for stability
3	Current Sense	I_{SENSE}	Primary-side current sense pin. Connect to current sensing resistor. The PWM uses this signal to terminate the OUTPUT switch conduction.
4	Oscillator	R_T / C_T	Connect timing resistor, RRT, to VREF and timing capacitor, CCT, to GROUND from this pin to set the switching frequency and maximum output ratio. Maximum frequency can up to 500kHz .
5	Ground	GND	Ground
6	Output	OUTPUT	OUTPUT is the gate drive for the external MOSFET.Peak currents of up to 1 A are sourced and sunk by this pin.
7	Power Supply	V_{CC}	provides power to the device.
8	Reference Voltage	V_{REF}	VREF is used to provide charging current to the oscillator timing capacitor through the timing resistor.

Function Diagram



Absolute Maximum Ratings

Extreme Ratings （ Tamb =2 5 ℃ ,unless otherwise noted)

Parameter	Symbol	Value		Unit
		Min.	Max.	
Power voltage	V_{CC}		30	V
Output Current	I_O	- 1	1	A
Output Energy	W		5	μJ
Error Amp Output Sink Current	I_O		10	mA
Current Sense and Voltage Feedback Inputs	V_{in}	-0 .3	5 .5	V
Operating Junction Temperature	T_j		150	℃
Power Dissipation	P_D		1	W
Operating Ambient Temperature	T_{amb}	0	70	℃
Storage Temperature Range	T_{stg}	-55	150	℃

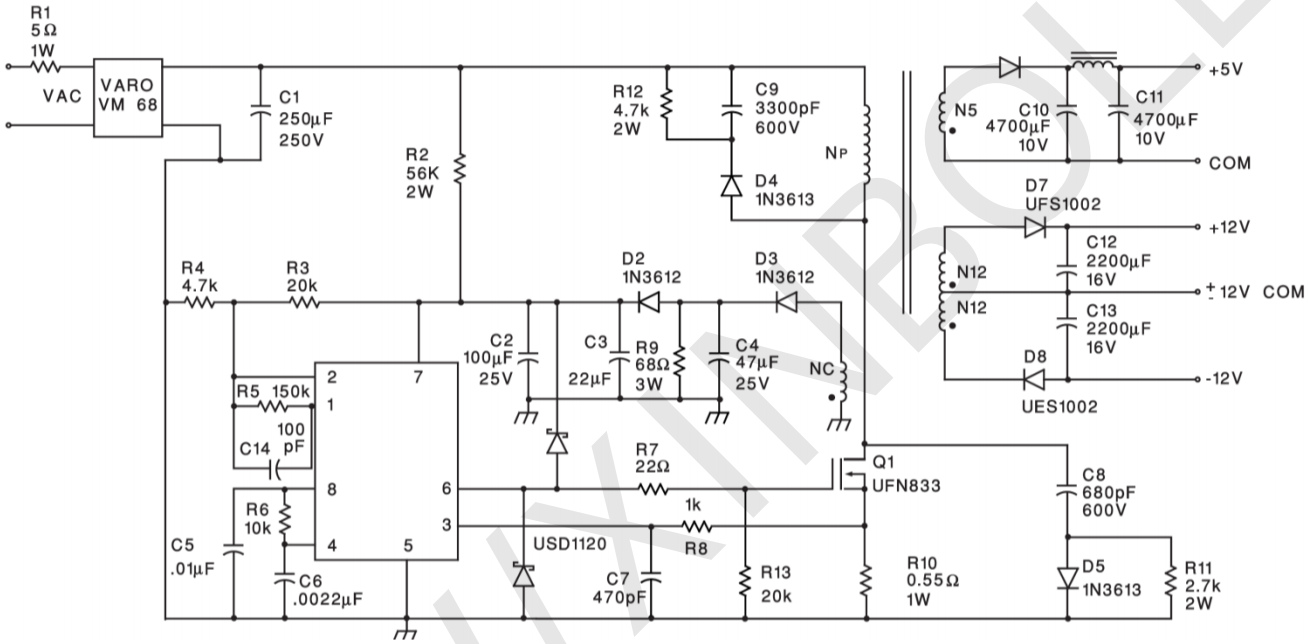
Electrical Characteristics

（V_{CC}= 15 V， Ta= 0 ~ 70 ℃， R_T = 1 0K， C_T = 3 . 3nF, unless otherwise noted ）

Characteristic	Test conditions	Symbol	Value			Unit
			Min.	Typ.	Max.	
Reference Section						
Reference Output Voltage	Tj=25℃ Io= 1mA	Vref	4.9	5	5.1	V
Line Regulation rate	12V ≤Vi≤25 V	⊿Vref		6	20	mV
Load Regulation	1mA ≤Vi ≤20mA	⊿Vref		6	25	mV
Output Noise Voltage	10Hz ≤f≤10kHz	en		50		μV
Output Short Circuit Current	Ta= 25℃	Isc	-30	-100	-180	mA
Oscillator Section						
Frequency	Tj=2 5 ℃	fosc	47	52	57	kHz
Frequency Change with Voltage	Vcc= 12V to 25V	⊿fosc/⊿V	-	0.2	1	%
Frequency Change with Temperature	Ta=Tlow to Thigh	⊿fosc/⊿T	-	5	-	%
Oscillator Voltage Swing	peak to peak	Vosc	-	1.6	-	V
Discharge Current	Tj=25℃	Idischg	7.8	8.3	8.8	mA
Error Amplifier Section						
Voltage Feedback Input	Vpin1= 2 . 5V	V_{fb}	2.42	2.5	2.58	V
Input Bias Current	Vfb=5V	I_{bias}		-0.1	-2	μA
Open Loop Voltage Gain	2V ≤Vo≤4V	G_{vol}	65	90		dB
Unity Gain Bandwidth	Tj=25 ℃	BW	0.7	1		MHz
Power Supply Rejection Ratio	12V ≤Vi≤25 V	PSRR	60	70		dB
Output Current－Sink	Vpin2= 2 . 7V， Vpin1= 1 . 1V	I_{sink}	2	12		mA
Output Current －Source	Vpin2= 2 . 3V， Vpin1= 5 V	I_{source}	-0.5	-1		mA
Output Voltage Swing (High State)	Vpin2= 2 . 3V， Rl= 15k Ω to Ground	V_{OH}	5	6.2		V
Output Voltage Swing (Low State)	Vpin2= 2 . 7V， Rl= 15k Ω to pin8	V_{OL}		0.8	1.1	V
Current Sense Section						
Current Sense Input Voltage Gain	【 Note 1&2】	Gv	2.85	3	3.15	V/V
Maximum Current Sense Input Threshold	Vpin 1= 5V【 Note 1 】	V3	0.9	1	1.1	V
Power Supply Rejection Ratio	12V ≤Vi≤25 V【 Note 1 】	SVR		70		dB
Input Bias Current		Ib		-2	-10	μA
Propagation Delay	Current Sense Input to Output	$T_{PLH\ (in/off)}$		150	300	ns
Output Section						
Output Voltage Low State	Isink=20 mA	V_{OL}		0.1	0.4	V
	Isink=200mA			1.6	2.2	V
Output Voltage High State	Isource= 20 mA	V_{OH}	13	13.5		V
	Isource= 200 mA		12	13.5		V
Output Voltage with UVLO Activated	Vcc= 6V， Isink= 1mA	Vols		0.7	1.2	V
Output Voltage Rise Time	Tj=25 ℃ Cl= 1nF【 Note 3】	tr		50	150	ns
Output Voltage Fall Time	Tj=25 ℃ Cl= 1nF【 Note 3】	tf		50	150	ns
Undervoltage Lockout Section						
Startup Threshold		Vth	14.5	16	17.5	V
Minimum Operating Voltage After Turn-On		Vcc(min)	8.5	10	11.5	V
PWM Section						
Duty Cycle Maximum		D(max)	94	96	100	%

Duty Cycle Minimum		D(min)		0		%
Total Device						
Power Supply Current (Startup)	Vi= 14V	Ist		0.12	0.3	mA
Power Supply Current(Operating)	Vpin 2= Vpin3= 0V	Ii		12	17	mA
Power Supply Zener Voltage	Ii=25mA	Viz	30	36		V

Application Circuit Diagram



Note：

1 .Input Voltage： 95Vac～130Vac （50Hz/60Hz）

2 . line dissipation： 385V

3 .switching frequency： 40kHz

4 . efficiency : 70% full load

5 . output voltage : A +5V 5 %/ - 5 %： 1A ~ 4 A load， pulse voltage： 50mVp -p max

B +12V 3 % / - 3 % : 0 . 1 A ~ 0 . 3A load， pulse voltage : 100mVp -pmax

C -12 V 3 %/ - 3 % : 0 . 1A ~ 0 . 3A load， pulse voltage : 100mVp -pmax

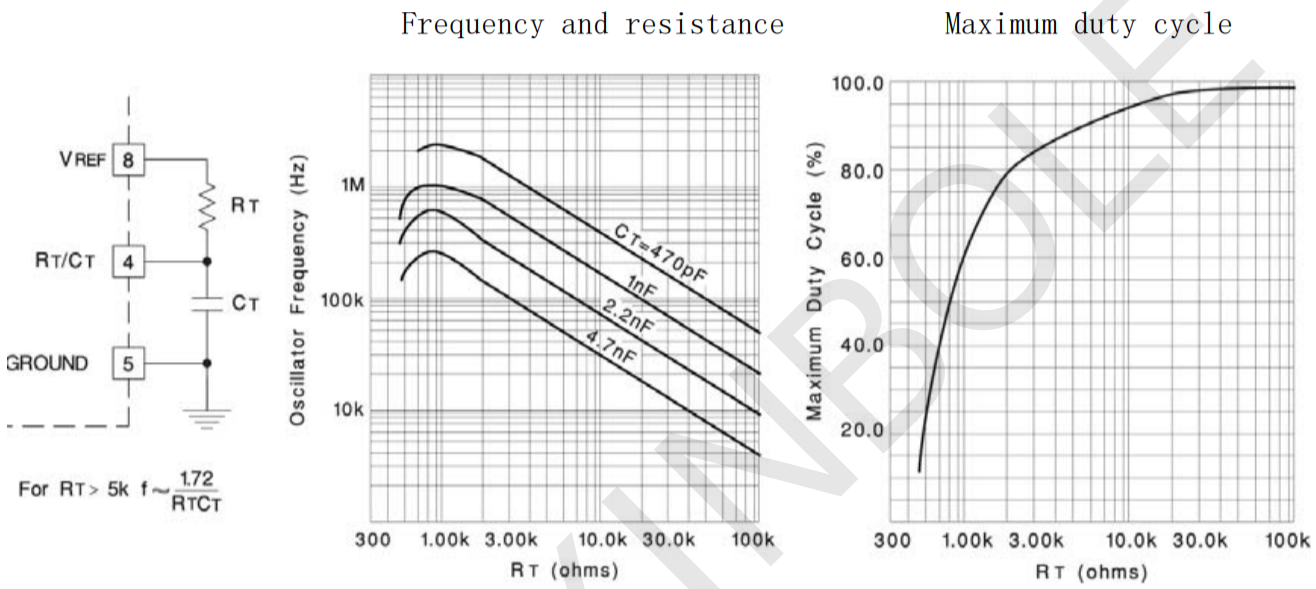
Usage Instruction

Oscillatior Section

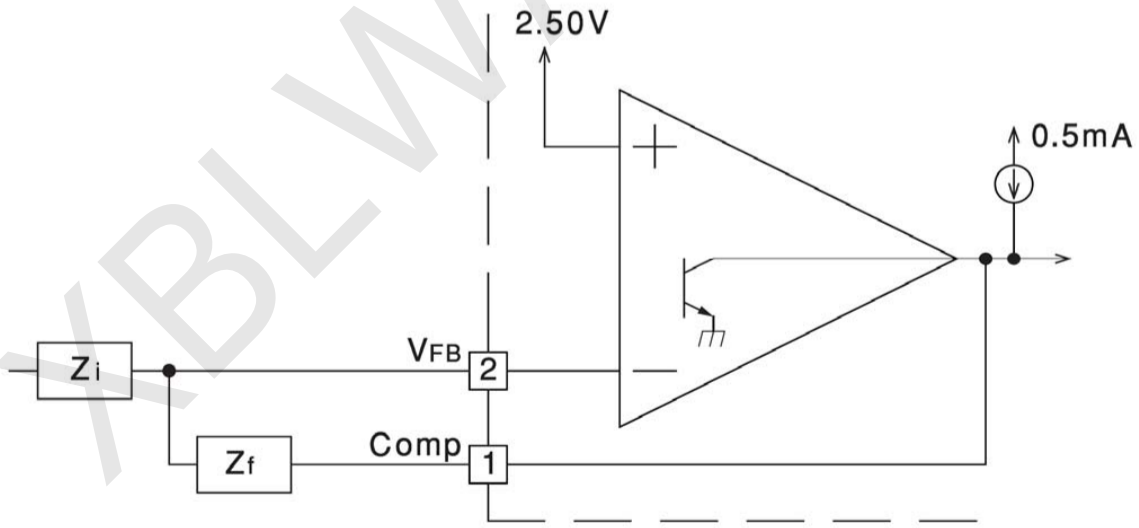
The oscillating frequency and maximum duty cycle is programmed by the timing components RT and CT. The following diagram shows the charging and discharging time.

Charging time： $tc=0.55R_T*C_T$

Discharging time： $ta \approx R_T*C_T*\ln\{(0.0063RT-2.7)/(0.0063RT-4)\}$

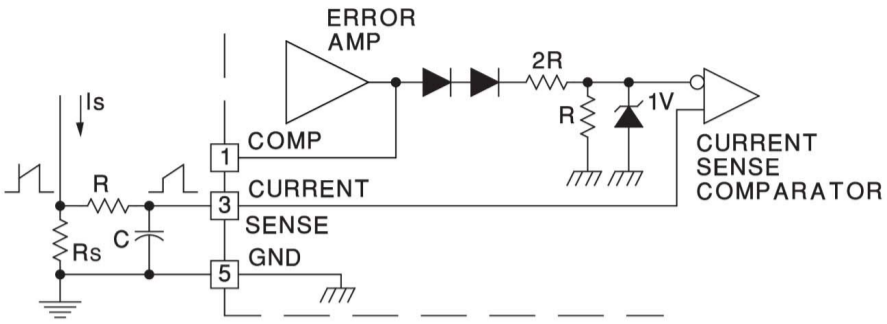


Error amplifier



The open-loop gain of this Amp.can reach 80dB. Under open-loop condition,frequency features show as upper diagram. It provides 2.5V reference voltage. 2. 5 V internal reference voltage is added to the positive end of the amplifier. The sample voltage is input into the negative end of the amplifier and divided by the R1 and R2.The clos loop gain can be adjusted by The negative feedback resistance Rf.

Current sensing comparator

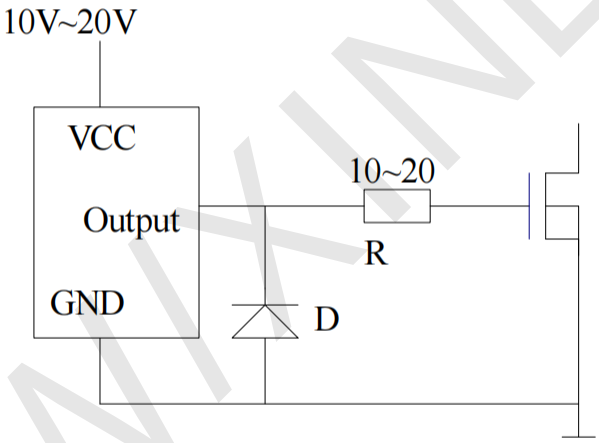


Peak Current (Is) is Determined By The Formula

$$I_{SMAX} \approx \frac{1.0V}{RS}$$

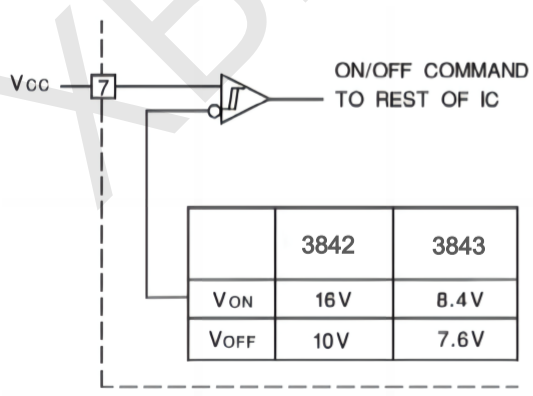
The sampling voltage is amplified by the error amplifier and sent to the current sense comparator to convert into current mode to control the pulse-width. In addition, the current sense comparator plays the role of over-current protection.Imax= (N * 1V) /Rs, N is the ratio of the primary turns of the transformer.

Push– pull output

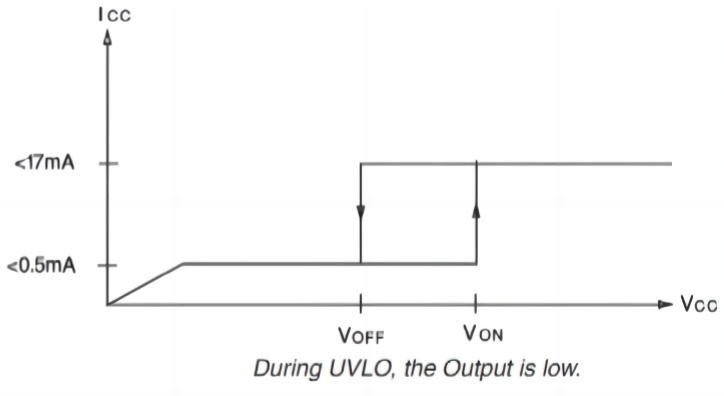


The UC3842 Pulse square waveform can drive field tube directly and has ±1A drive current in peak.

Undervoltage lockout circuit



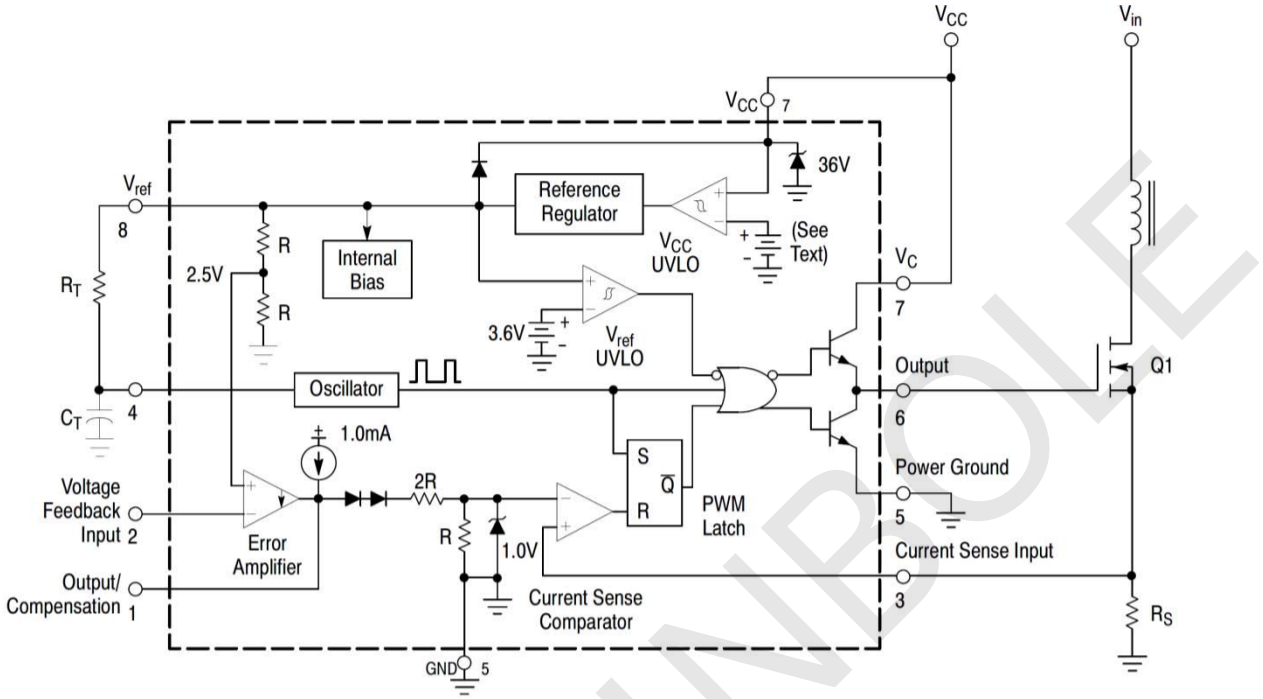
	3842	3843
VON	16V	8.4V
VOFF	10V	7.6V



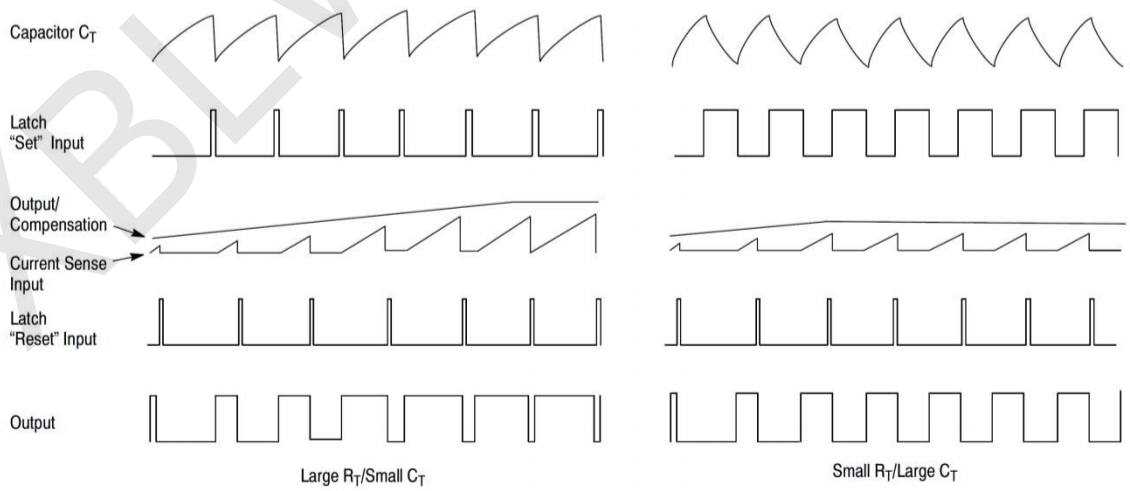
During UVLO, the Output is low.

This device has undervoltage lockout circuit (UVL). Start-up voltage is over 16V and shutdown voltage is less than 10V, which can make the open and close power source work stable and not affected by the impact of electric network wave. In addition, the outer parts use 5V energy gap base power supply, which is very accurate and stable.

Block Diagram



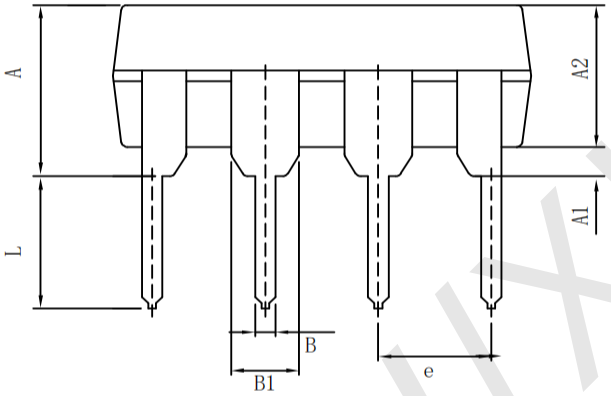
Timing Diagram

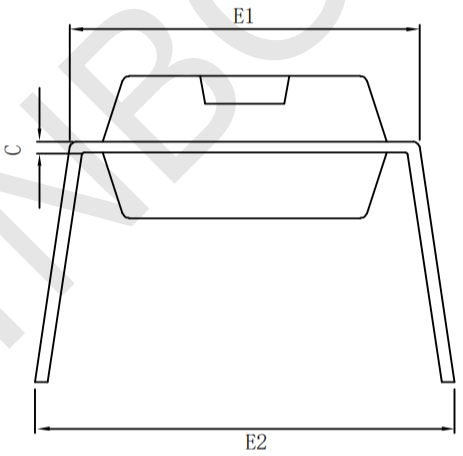


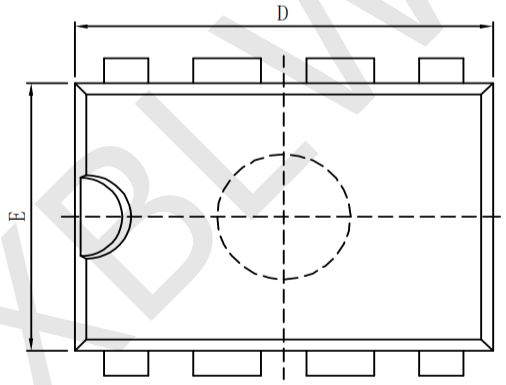
Package Information

- DIP-8

Symbol \ Size	Dimensions In Millimeters		Symbol \ Size	Dimensions In Inches	
	Min(mm)	Max(mm)		Min(in)	Max(in)
A	3.710	4.310	A	0.146	0.170
A1	0.510		A1	0.020	
A2	3.200	3.600	A2	0.126	0.142
B	0.380	0.570	B	0.015	0.022
B1	1.524(BSC)		B1	0.060(BSC)	
C	0.204	0.360	C	0.008	0.014
D	9.000	9.400	D	0.354	0.370
E	6.200	6.600	E	0.244	0.260
E1	7.320	7.920	E1	0.288	0.312
e	2.540(BSC)		e	0.100(BSC)	
L	3.000	3.600	L	0.118	0.142
E2	8.400	9.000	E2	0.331	0.354

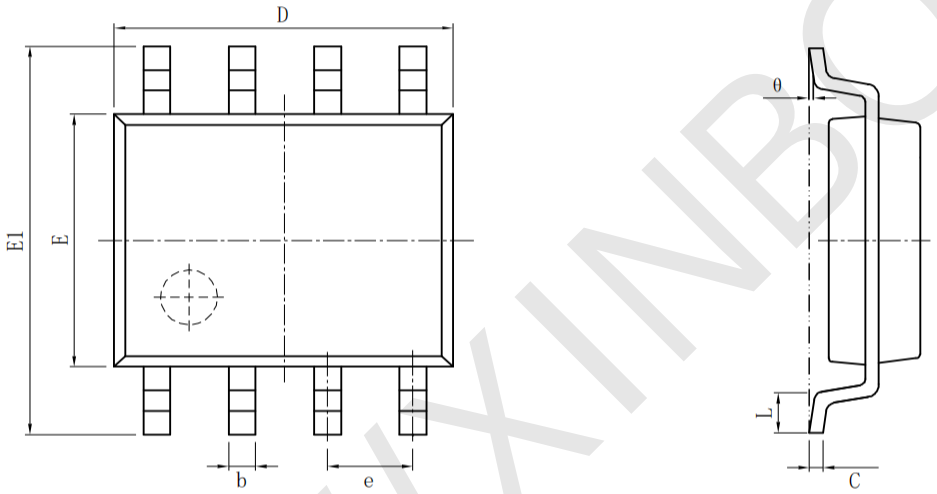


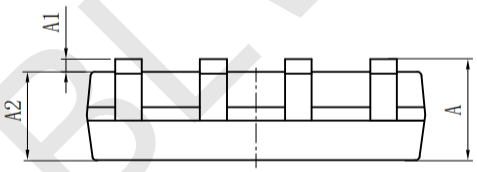




- SOP-8

Size / Symbol	Dimensions In Millimeters		Size / Symbol	Dimensions In Inches	
	Min(mm)	Max(mm)		Min(in)	Max(in)
A	1.350	1.750	A	0.053	0.069
A1	0.100	0.250	A1	0.004	0.010
A2	1.350	1.550	A2	0.053	0.061
b	0.330	0.510	b	0.013	0.020
c	0.170	0.250	c	0.006	0.010
D	4.700	5.100	D	0.185	0.200
E	3.800	4.000	E	0.150	0.157
E1	5.800	6.200	E1	0.228	0.224
e	1.270(BSC)		e	0.050(BSC)	
L	0.400	1.270	L	0.016	0.050
θ	0°	8°	θ	0°	8°





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