



Product Specification

XBLW UC3843

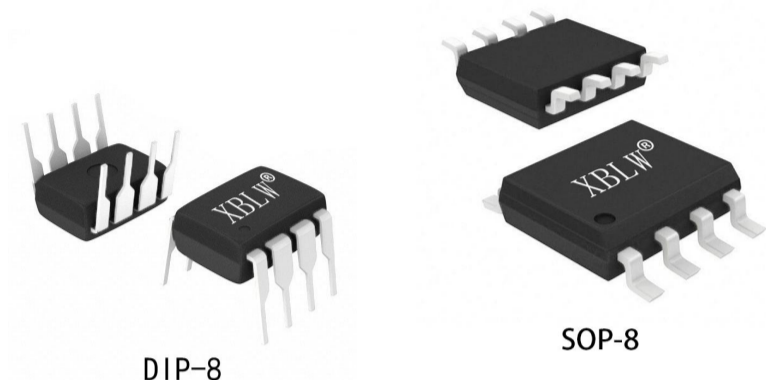
Current Mode Pulse-width Controller

WEB | www.xinboleic.com



Descriptions

The UC3843 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.



Feature

- Automatic Feed Forward Compensation
- Low Startup and Operating Current (<0.5mA)
- Undervoltage Lockout with Hysteresis
- Maximum Duty Cycle Control
- Operating Frequency: 500kHz

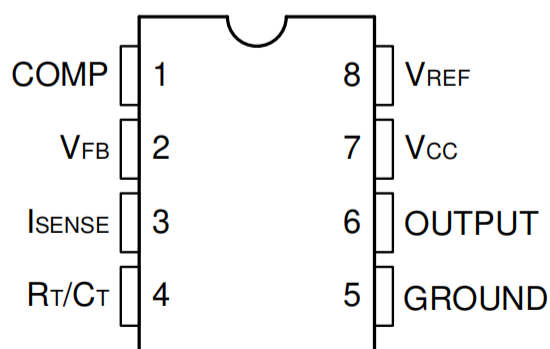
Applications

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

Ordering Information

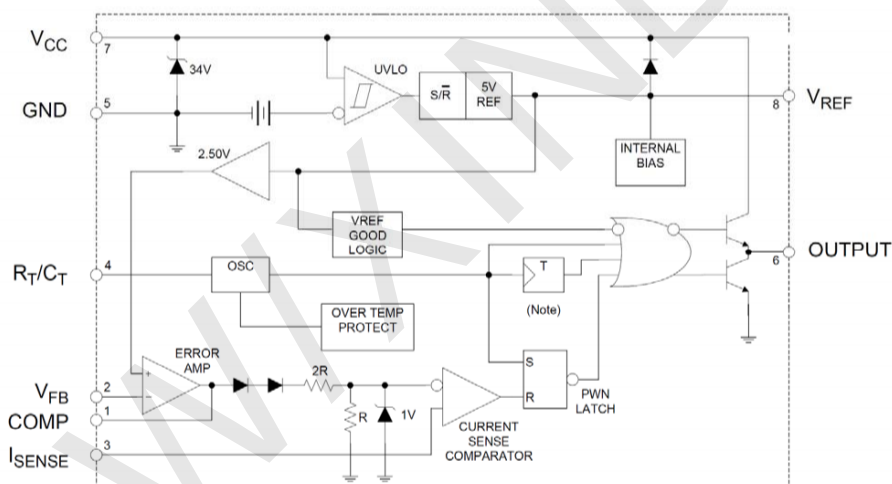
Product Model	Package Type	Marking	Packing	Packing Qty
XBLW UC3843AN	DIP-8	UC3843AN	Tube	2000pcs/Box
XBLW UC3843BDTR	SOP-8	UC3843B	Tape	2500pcs/Reel

Pins Description



No.	Name	Symbol	Description
1	Compensation	C _{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	S _{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 (T_{amb} = 25 °C , unless otherwise noted)

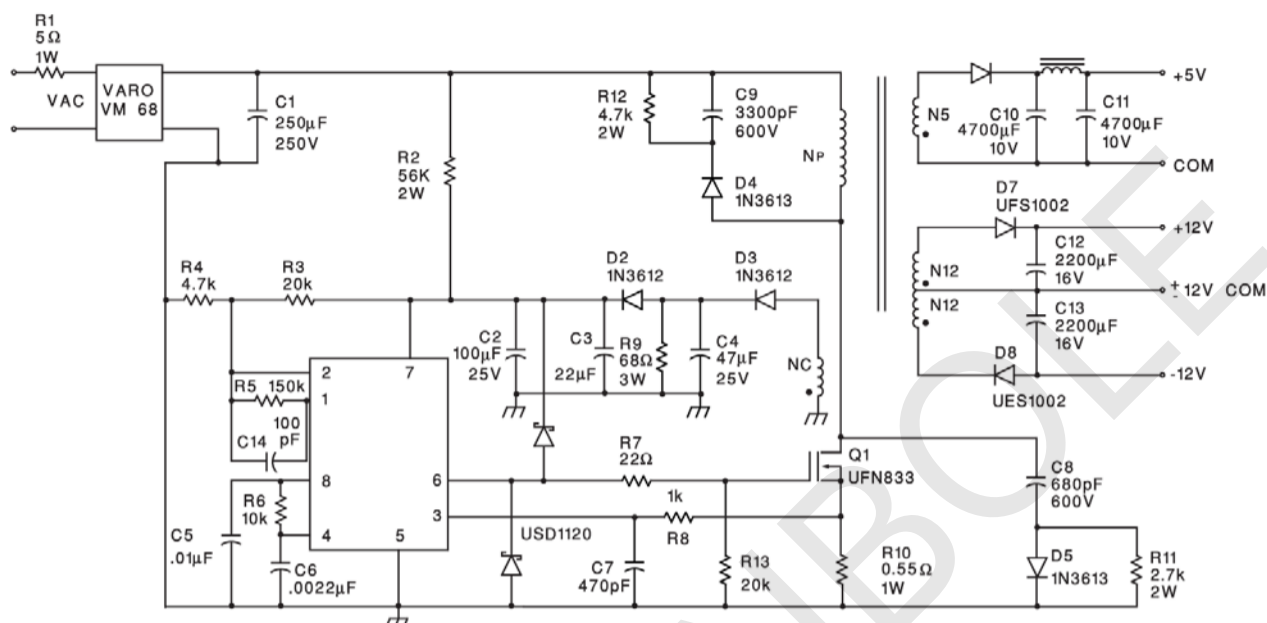
Rating	Symbol	Value		Unit
		Min.	Max.	
Power voltage	V _{CC}		30	V
Output Current	I _O	- 1	1	A
Output Energy	W		5	J
Error Amp Output Sink Current	I _O		10	mA
Current Sense and Voltage Feedback Inputs	V _{in}	- 0.3	5.5	V
Operating Junction Temperature	T _j		150	°C
Power Dissipation	P _D		1	W
Operating Ambient Temperature	T _{amb}	0	70	°C
Storage Temperature Range	T _{stg}	- 55	150	°C

Electrical Characteristics

($V_{CC} = 15V$, $T_a = 0 \sim 70^\circ C$, $R_T = 10K$, $C_T = 3.3nF$, unless otherwise noted)

Characteristic	Test conditions	Symbol	Value			Unit
			Min.	Typ.	Max.	
Reference Section						
Reference Output Voltage	Tj=25 °C Io= 1mA	Vref	4.9	5	5.1	V
Line Regulation rate	12V ≤Vi≤25 V	ΔVref		6	20	mV
Load Regulation	1mA ≤Vi ≤20mA	ΔVref		6	25	mV
Output Noise Voltage	10Hz ≤f≤10kHz	Vn		50		μV
Output Short Circuit Current	Ta= 25 °C	Isc	-30	-100	-180	mA
Oscillator Section						
Frequency	Tj=25 °C	fosc	47	52	57	kHz
Frequency Change with Voltage	Vcc= 12V to 25V	Δfosc/ ΔV	-	0.2	1	%
Frequency Change with Temperature	Ta=Tlow to Thigh	Δfosc/ ΔT	-	5	-	%
Oscillator Voltage Swing	peak to peak	Vosc	-	1.6	-	V
Discharge Current	Tj=25 °C	Idischg	7.8	8.3	8.8	mA
Error Amplifier Section						
Voltage Feedback Input	Vpin1= 2.5V	Vfb	2.42	2.5	2.58	V
Input Bias Current	Vfb=5V	Ibias		-0.1	-2	μA
Open Loop Voltage Gain	2V ≤Vo≤4V	GvoI	65	90		dB
Unity Gain Bandwidth	Tj=25 °C	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	Isink	2	12		mA
Output Current –Source	Vpin2= 2.3V, Vpin1= 5V	Isource	-0.5	-1		mA
Output Voltage Swing (High State)	Vpin2= 2.3V, RI= 15k Ω to Ground	VOH	5	6.2		V
Output Voltage Swing (Low State)	Vpin2= 2.7V, RI= 15k Ω to pin8	VOL		0.8	1.1	V
Current Sense Section						
Current Sense Input Voltage Gain	【Note1 & 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	TPLH(in / off)		150	300	ns
Output Section						
Output Voltage Low State	Isink=20 mA	VOL		0.1	0.4	V
	Isink=200mA			1.6	2.2	V
Output Voltage High State	Isource= 20 mA	VOH	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 °C Cl= 1nF 【Note 3】	tr		50	150	ns
Output Voltage Fall Time	Tj=25 °C Cl= 1nF 【Note 3】	tf		50	150	ns
Undervoltage Lockout Section						
Startup Threshold		Vth	7.8	8.4	9	V
Minimum Operating Voltage After Turn-On		Vcc(min)	7.0	7.6	8.2	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	li		12	17	mA
Power Supply Zener Voltage	li=25mA	Viz	30	36		V

Application Circuit Diagram



Note :

1. Input Voltage : 95Vac ~ 130Vac (50Hz/60 Hz)
2. line dissipation : 3850V
3. switching frequency : 40kHz
4. efficiency : 70% full load
5. output voltage : A+5V 5% / - 5% : 1A ~ 4A load , pulse voltage : 50mVp - pmax
B+12V 3% / - 3% : 0.1A ~ 0.3A load , pulse voltage : 100mVp - p max
C-12V 3% / - 3% : 0.1A ~ 0.3A load , pulse voltage : 100mVp - p max

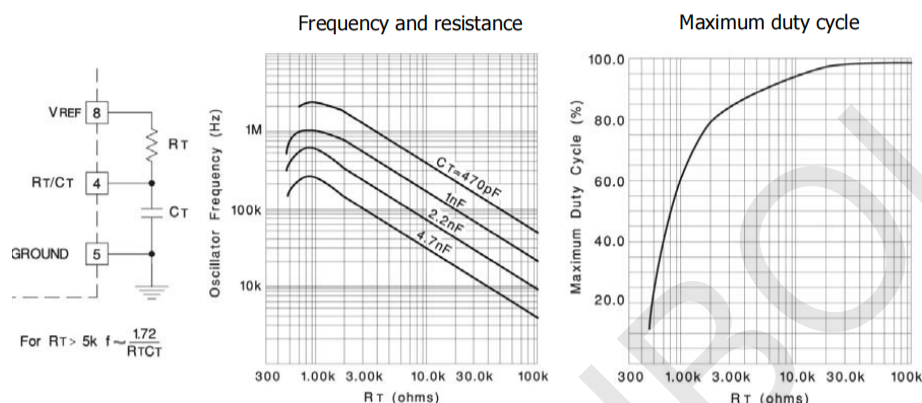
Usage Instruction

Oscillator Section

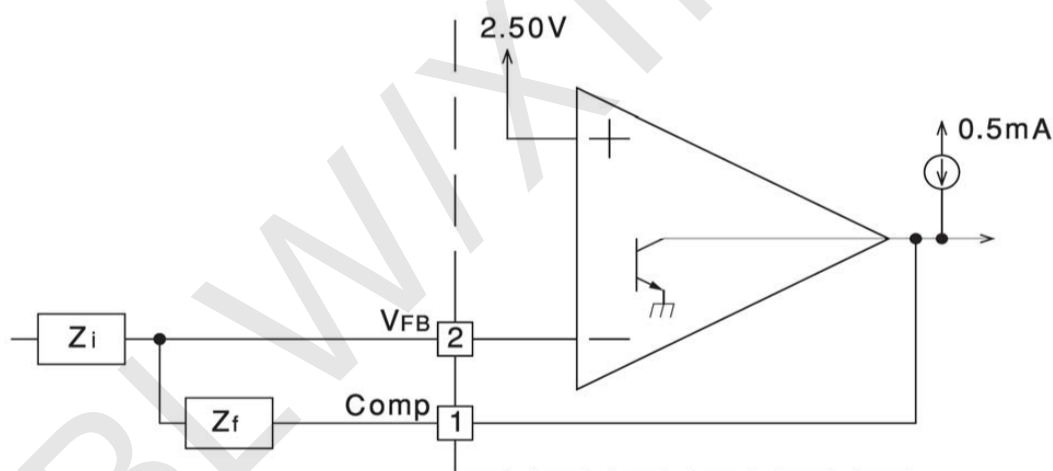
The oscillating frequency and maximum duty cycle is programmed by the timing components R_T and C_T . The following diagram shows the charging and discharging time.

Charging time : $t_c = 0.55 R_T * C_T$

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

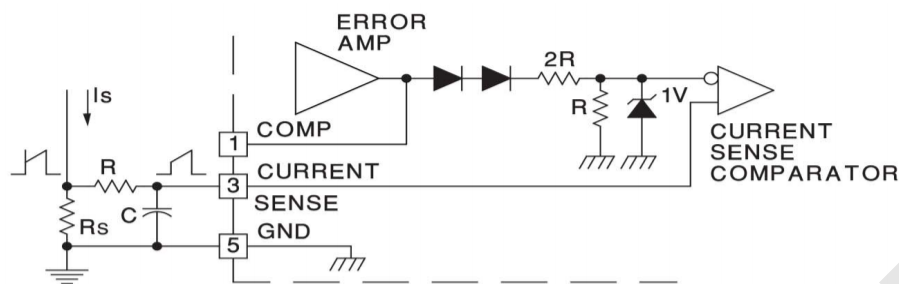


Error amplifier



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. 2.5V 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 R_1 and R_2 . The closed-loop gain can be adjusted by the negative feedback resistance R_f .

Current sensing comparator

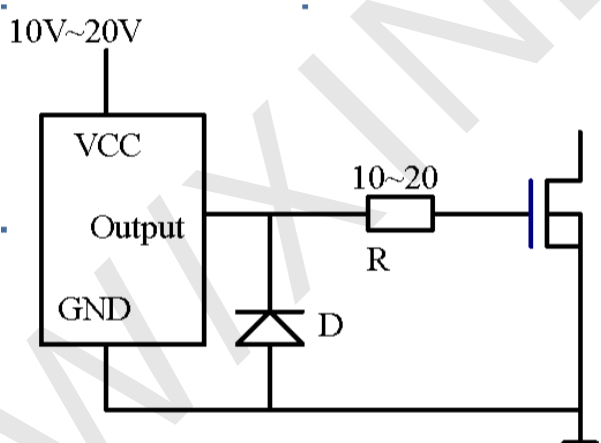


Peak Current (I_s) is Determined By The Formula

$$I_{S\text{MAX}} = \frac{1.0V}{RS}$$

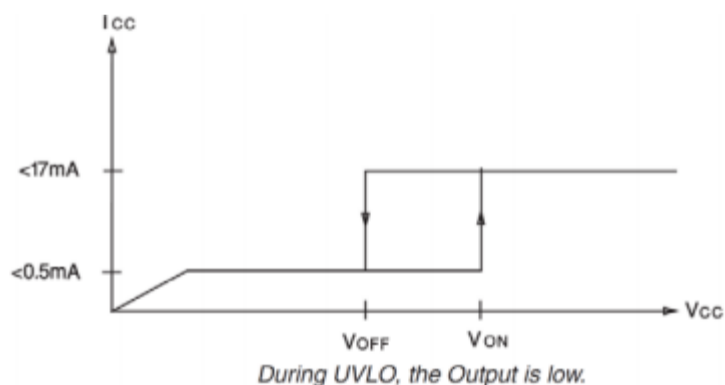
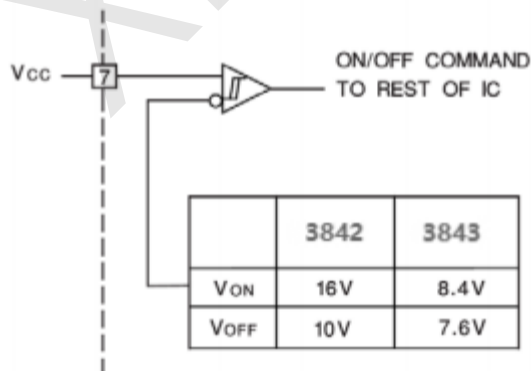
The sampling voltage is amplified by the error amplifier and sent to the current sense comparator to convert into current mode to control the pulse-width. In addition, the current sense comparator plays the role of over-current protection. $I_{\text{max}} = (N * 1V) / R_s$, N is the ratio of the primary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

Push- pull output



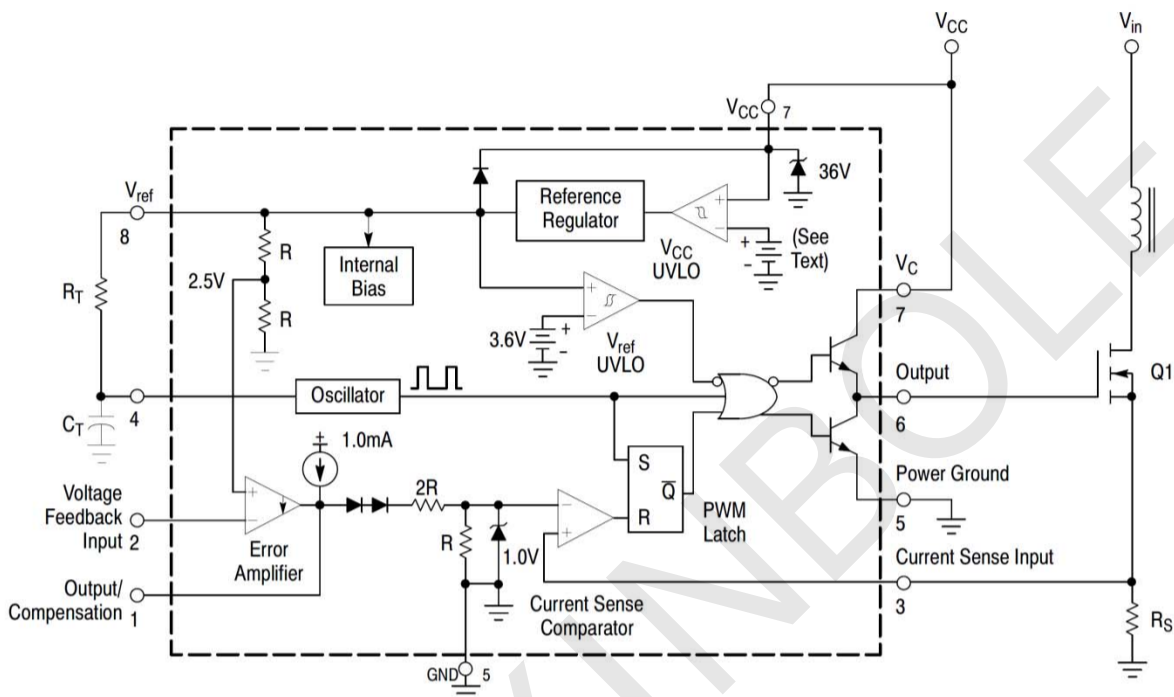
The UC3843 Pulse square waveform can drive field tube directly and has $\pm 1A$ drive current in peak.

Undervoltage lockout circuit

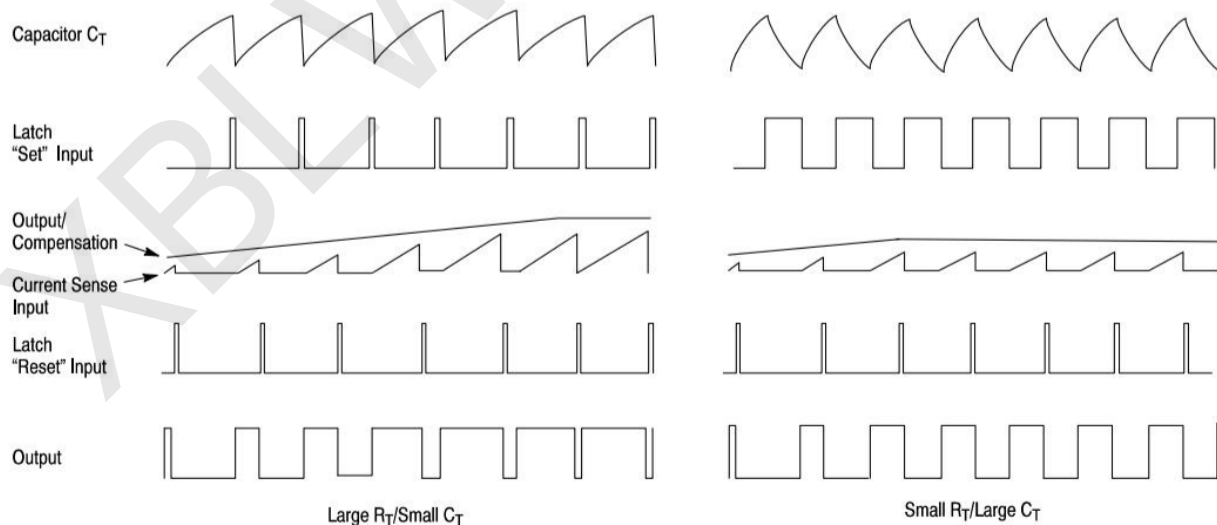


UC3843 has under-voltage lock-in circuit (UVLO), start-up voltage and turn-off voltage less than 10V, which can make the switching power supply work stably and not be affected by the fluctuation of the power grid, very precise and stable.

Block Diagram



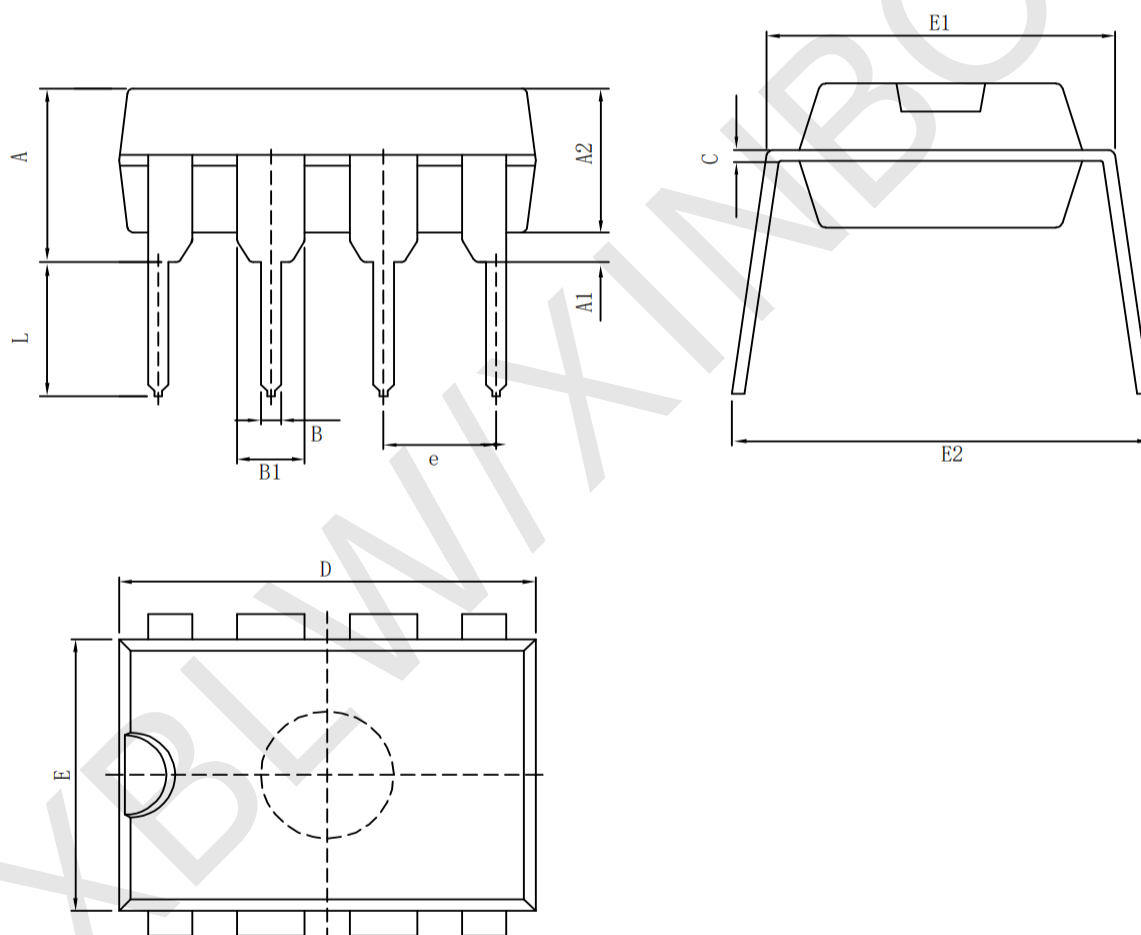
Timing Diagram



Package Information

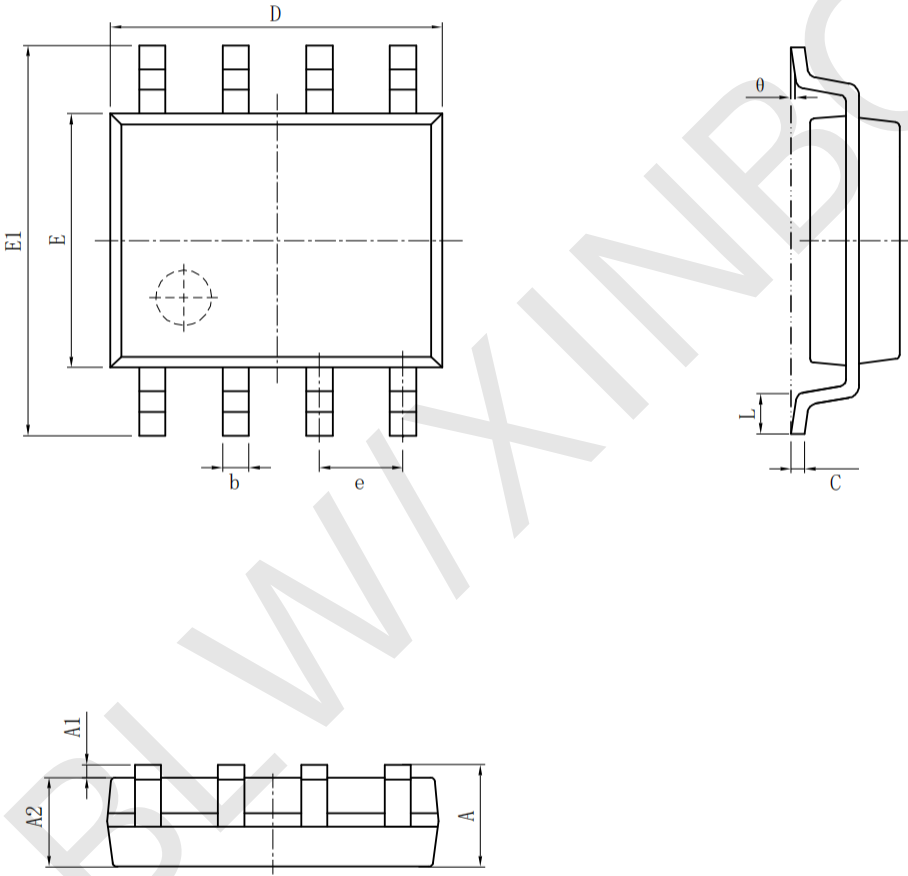
• DIP-8

Size Symbol	Dimensions In Millimeters		Size Symbol	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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