芯伯乐®
XINBOLE

Product Specification

XBLW UC2843

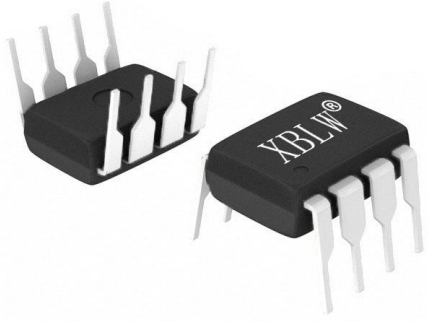
Current Mode Pulse-width Controller

WEB | www.xinboleic.com

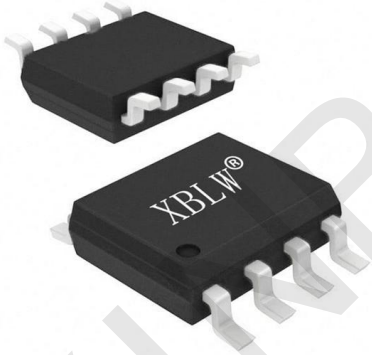
Descriptions

The UC2843 is a high-performance fixed frequency current mode controller. They are designed specifically for offline converters and DC-DC converter applications, providing designers with low-cost solutions with minimal external components. These integrated circuits have fine tuned oscillators with precise duty cycle control, temperature compensated reference power supplies, high gain error amplifiers, current detection comparators, and high current totem pole outputs that are highly suitable for driving power MOSFETs. It also includes protection functions, including input and undervoltage locking, cycle by cycle current limiting, programmable output dead time, and latches for single pulse metering.

This device is available in SOP-8 package and DIP-8 package.



DIP-8



SOP-8

Feature

- Stable internal bandgap reference voltage source
- Enhanced load response characteristics
- Pulse by pulse current limitation
- Automatic negative feedback compensation circuit
- High current totem pole output (driving current up to 1A)
- Undervoltage lockout circuit
- Low Startup and Operating Current（ < 0.13mA ）
- The working frequency can reach 500kHz

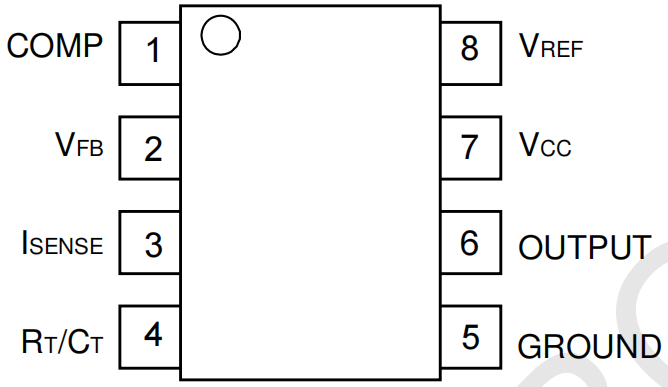
Applications

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

Ordering Information

Product Model	Package Type	Marking	Packing	Packing Qty
XBLW UC2843AN	DIP-8	UC2843AN	Tube	2000pcs/Box
XBLW UC2843BDTR	SOP-8	UC2843B	Tape	2500pcs/Reel

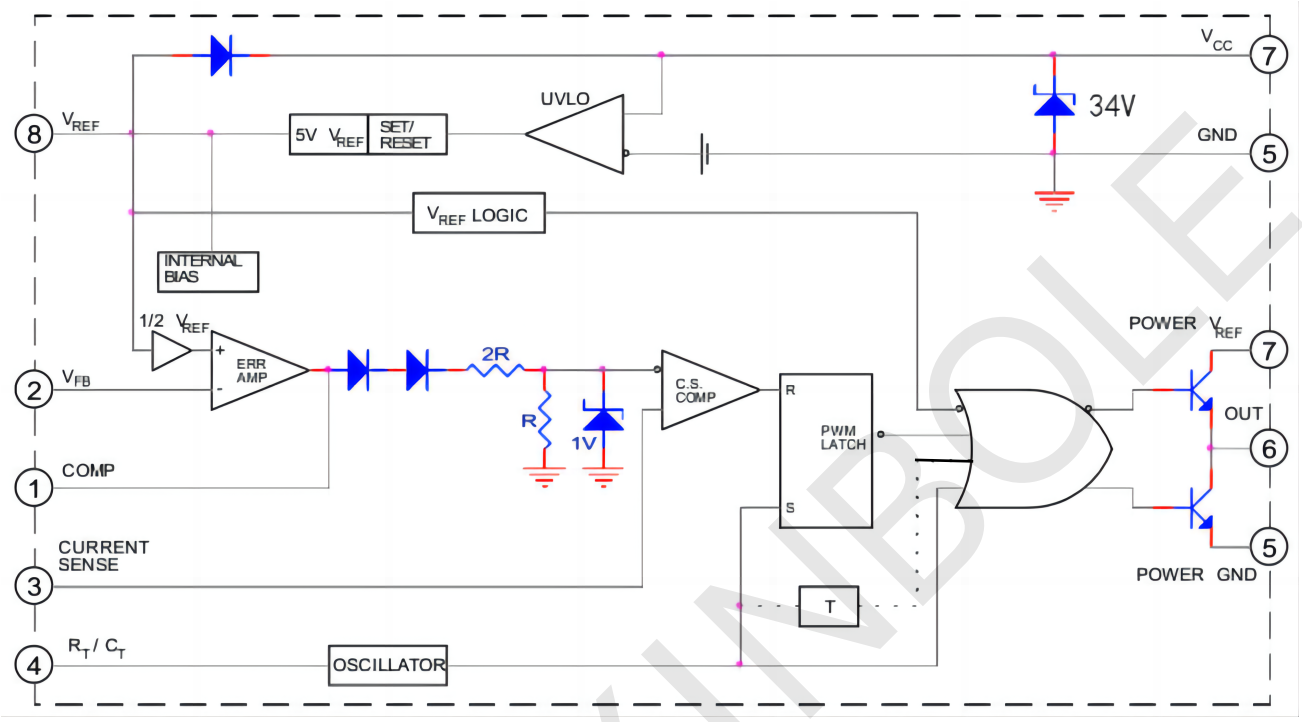
Pins Description



(Top view)

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.

Simplified Block Diagram



Absolute Maximum Ratings

（Tamb =2 5 ℃ ， 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	μJ
Error Amp Output Sink Current	I_O		10	mA
Current Sense and Voltage Feedback Inputs	V_{in}	-0.3	6.3	V
Operating Junction Temperature	T_j		150	℃
Power Dissipation	P_D		1	W
Operating Ambient Temperature	T_{amb}	-40	85	℃
Storage Temperature Range	T_{stg}	-55	150	℃

Electrical Characteristics

(Vcc=15V*Note 1, R_T =10kΩ, C_T =3.3nF, Tamb=-40℃~85℃,unless otherwise noted)

Characteristic	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Reference Section						
Reference Output Voltage	V_{REF}	Tj=25C,I_{REF}=1mA	4.9	5.00	5.1	V
Line Regulation rate	Reg_{line}	12V≤Vcc≤25V		6	20	mV
Load Regulation	Reg_{load}	1mA≤ I_{REF}≤ 20mA		6	25	mV
Output Short Circuit Current	Isc	Tamb=25℃	-30	-80	-180	mA
Oscillator Section						
Frequency	f_{OSC}	Tj=25℃	47	52	57	kHz
Frequency Change with Voltage	$\Delta f/\Delta V_{CC}$	12V≤Vcc≤25V		0.2	1	%
Oscillator Voltage Swing	$V_{(OSC)}$	PIN 4 peak to peak		1.6		Vpp
Error Amplifier Section （EA）						
Input Bias Current	I_{BIAS}	VFB=5.0V		-0.1	-2	μA
Voltage Feedback Input	$Vin_{(EA)}$	VFB=Vcomp	2.42	2.50	2.58	V
Open Loop Voltage Gai	G_{VO}	2V≤V_O≤4V	60	90		dB
Power Supply Rejection Ratio	PSRR	12V≤V_{CC}≤25V	60	70		dB
Output Current – Sink	I_{SINK}	V_{FB}=2.7V,V_{COMP}=1.1V	2	6.5		mA
Output Current –Source	I_{SOURCE}	V_{FB}=2.3V,V_{COMP}=5V	-0.5	-0.9		mA
Output Voltage Swing (High State)	V_{OH}	V_{FB}=2.3V,R_L=15kΩ to GND	5	6.4		V
Output Voltage Swing (Low State)	V_{OL}	V_{FB}=2.7V, R_L=15kΩ to Pin 8		0.87	1.1	V

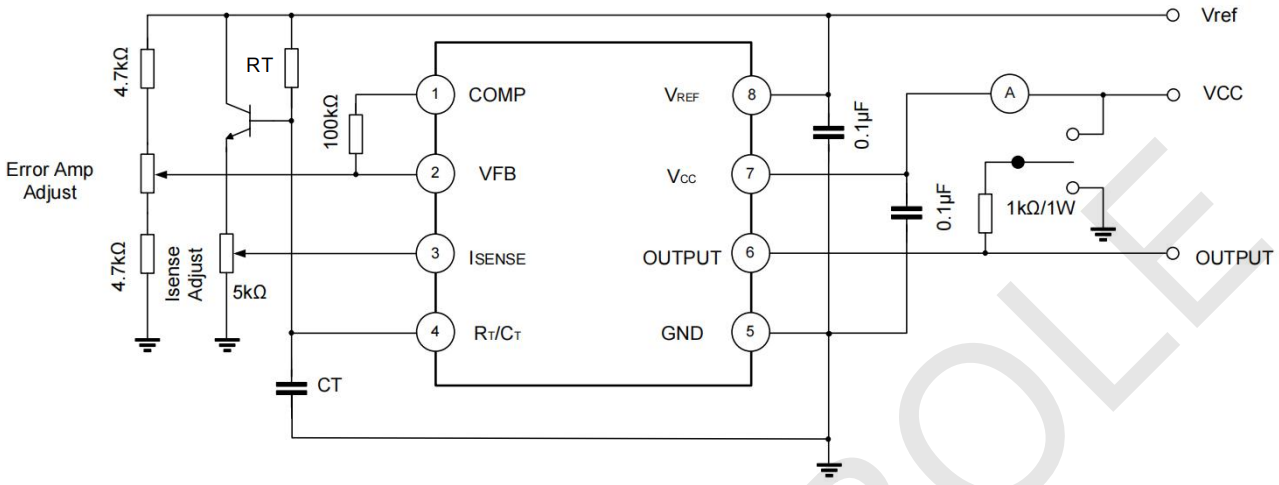
Electrical Characteristics

(Vcc=15V,R_T=10kΩ , C_T =3.3nF,Tamb=0℃ ~ 70℃, unless otherwise noted)

Current Sense Section						
Current Sense Input Voltage Gain	G_V	*Note 2 and *Note 3	2.85	3	3.15	V/V
Maximum Current Sense Input Threshold	$V_{I(MAX)}$	V_{COMP}=5V *Note 2	0.9	1	1.1	V
Power Supply Rejection Ratio	PSRR	12V≤V_{CC}≤25V *Note 2	-	70	-	dB
Input Bias Current	I_{BIAS}		-	-2	-10	μA
Output Section						
Output Voltage Low State	V_{OL}	I_{SINK}=20mA	-	0.1	0.4	V
		I_{SINK}=200mA	-	1.5	2.2	V
Output Voltage High State	V_{OH}	I_{SOURCE}=20mA	13	13.5	-	V
		I_{SOURCE}=200mA	12	13.0	-	V
Output Voltage Rise Time	tr	C_L=1nF	-	50	150	ns
Output Voltage Fall Time	tf	C_L=1nF	-	50	150	ns
Undervoltage Lockout Section						
Startup Threshold	$V_{TH(ST)}$		7.8	8.3	9.0	V
Minimum Operating Voltage After Turn-On	$V_{OPR(MIN)}$		7.0	7.6	8.2	V
PWM Section						
Duty Cycle Maximum	$DC_{(MAX)}$		90	94	-	%
Duty Cycle Minimum	$DC_{(MIN)}$		-	-	0	%
Total Device						
Power Supply Current (Startup)	I_{ST}		-	0.13	0.5	mA
Power Supply Current(Operating)	$I_{CC(OPR)}$	V_{SENSE}=V_{FB}=0V	-	11	17	mA
Power Supply Zener Voltage	V_Z	Icc=25mA	-	34	-	V

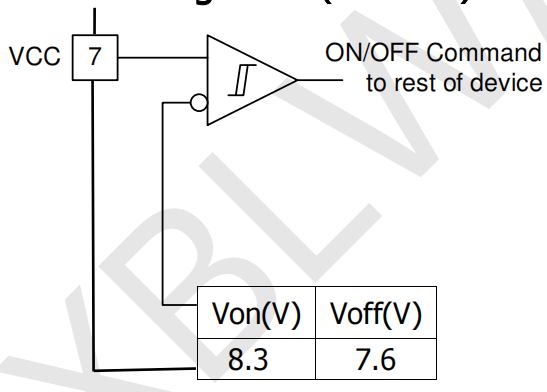
Note:
1. Adjust VCC to 15V after circuit startup
2. Parameters measured at the latch transition point
3. Gain is defined as AV=Δ Vcomp/Δ Vsense; 0≤Vsense≤0.8V

Basic Test Circuit Diagram

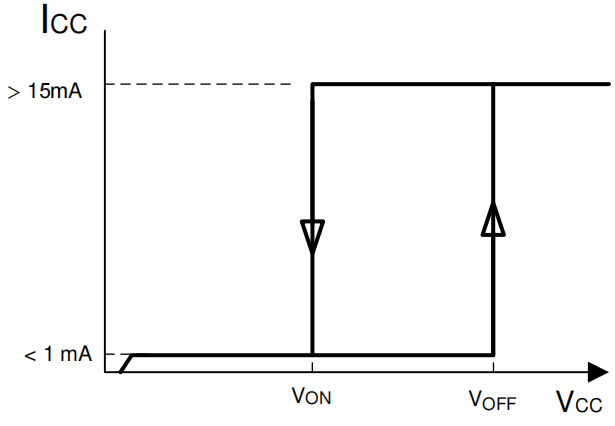


Grounding techniques should be carefully considered when there are high peak cu rrents associated with capacitive loads. The timing and bypass capacitors must be installed next to the PIN5 and single-point grounded. Transistors and 5kΩ potentiometers are used to sample waveforms and send waveforms with adjustable slopes to PIN3.

Undervoltage off (UVLO)

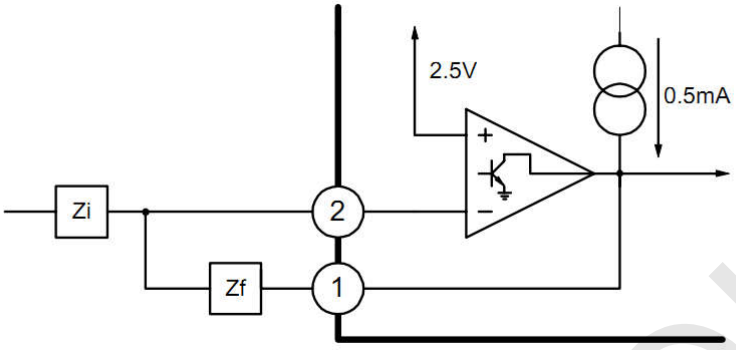


Von(V)	Voff(V)
8.3	7.6



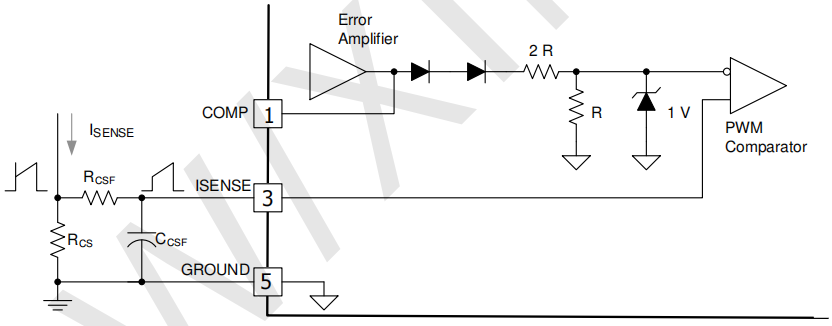
The output driver is placed in a high impedance state when entering an undervoltage shutdown. The sixth pin must be grounded with a leakage resistance to prevent leakage current from pushing the power switch

Error amplifier connection



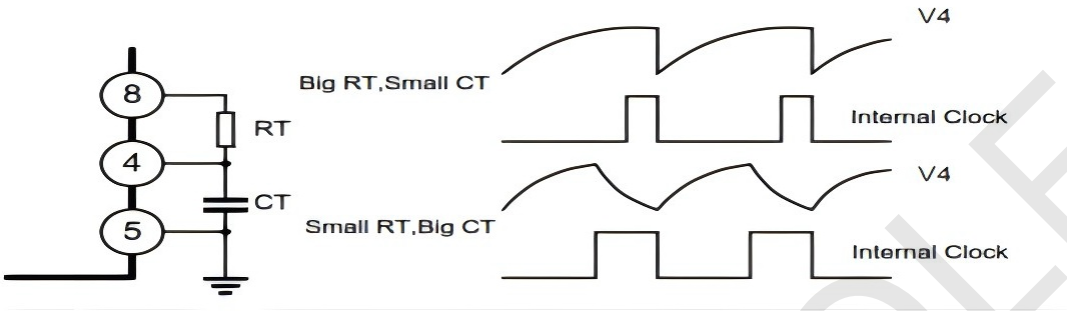
Error amplifier can push-pull output 0.5 ma current

Current detection circuit



Peak current (IS) is defined as: $I_{S(MAX)} \approx 1.0\ V/R_S$ requires a small RC filter network to suppress the transient response of the switch.

Oscillator waveform and maximum duty cycle, period



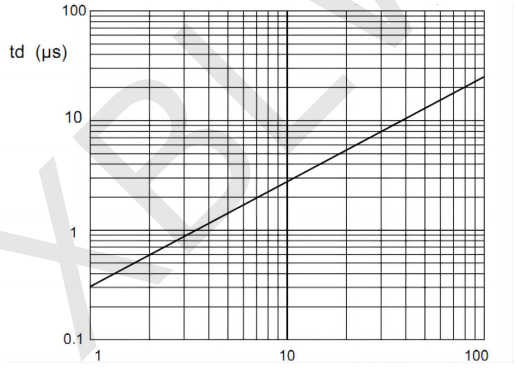
The oscillating time capacitor CT is charged by VREF via RT and discharged by an internal current source. The internal clock signal drives the output to a low level during discharge. The oscillation period and the maximum duty cycle can be determined by selecting RT and CT simultaneously. The time of charge and discharge is determined by the following formula:

$$t_c \approx 0.55 R_T * C_T$$

$$t_d \approx R_T * C_T * \ln\left(\frac{0.063R_T - 2.7}{0.063R_T - 4}\right)$$

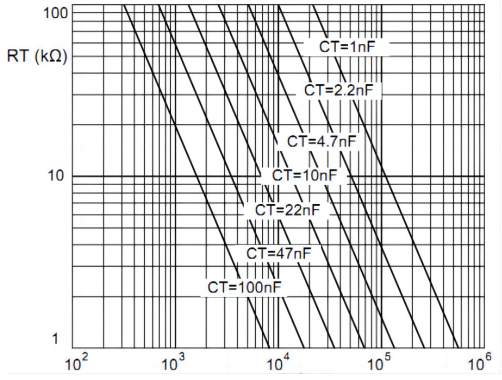
The frequency is: $f=(tc+td)^{-1}$

When: $R_T > 5K\Omega$, $f \approx \frac{1.8}{R_T * C_T}$



Electrical time capacitance (nF)

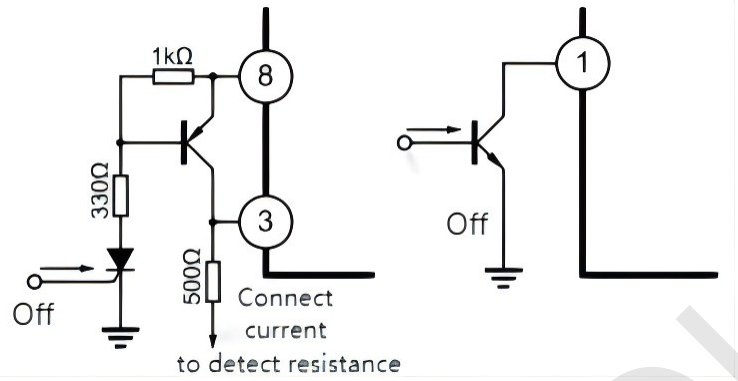
Relationship between oscillation dead time and capacitance CT



Frequency (Hz)

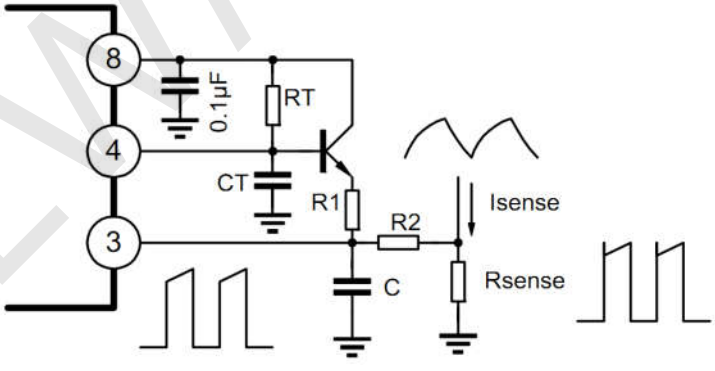
Relationship between frequency and timing resistance

Off technology

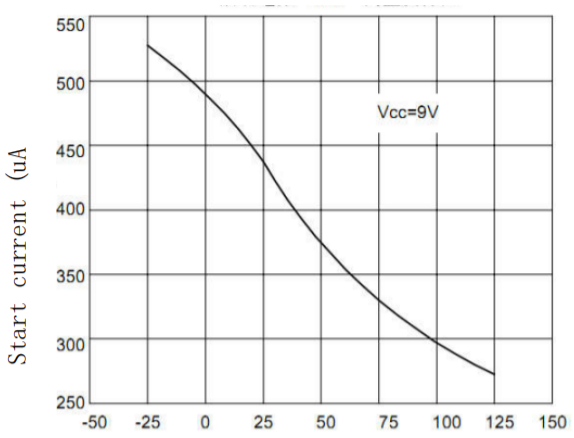


The shutdown of UC2843 can be accomplished in two ways: by raising the No. 3 pin voltage above 1V or by lowering the No. 1 pin voltage to within the forward voltage drop of the two diodes at the ground level, both methods make the output of the PWM comparator high (see internal block diagram) . The PWM latch trigger is preferentially reset so that the output is kept at a low level until the next clock cycle after the off signal of Pin 1 or Pin 3 is removed. An example of an external latch-off is achieved by adding a one-way SCR, which resets when the supply voltage VCC is below the UVLO threshold. At this point, the SCR is allowed to reset when the reference voltage is turned off.

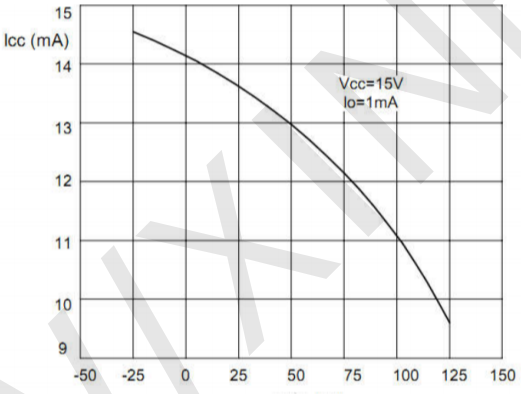
Slope Compensation



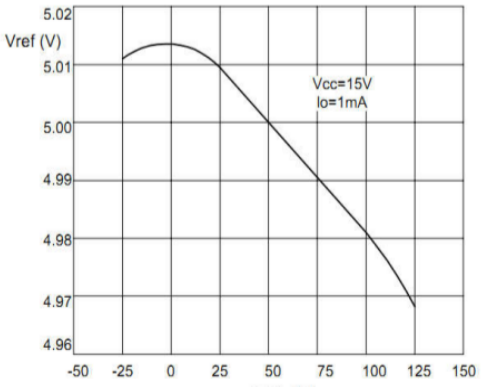
A fraction of the oscillator ramp can be summed resistively with the current-sense signal to provide slope compensation for converters requiring duty cycles over 50% . Note that capacitor CCSFforms a filter with RCSF to suppress the leading-edge switch spikes.



Start current IST temperaturecharacteristics



Temperature characteristics of power dissipation current ICC

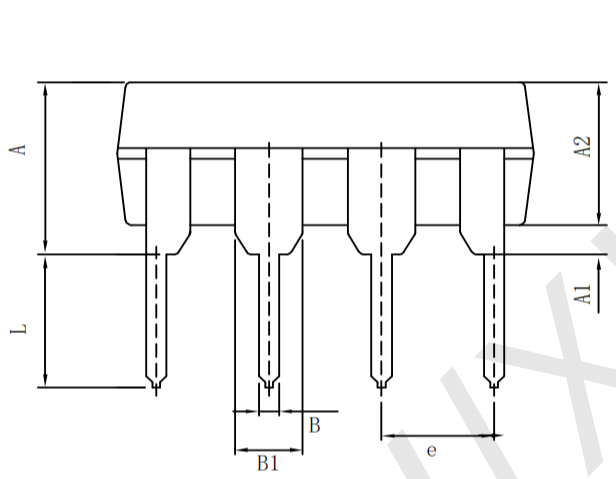


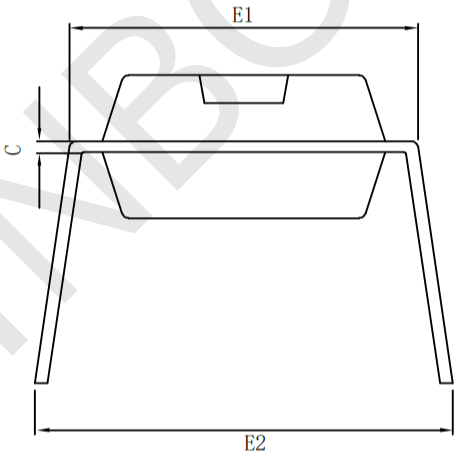
Refer to the temperature characteristics of the voltage source Vref

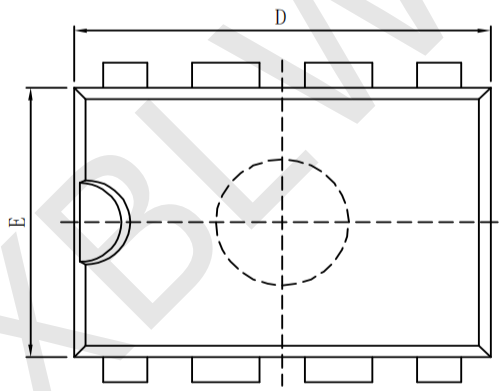
Package Information

- 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

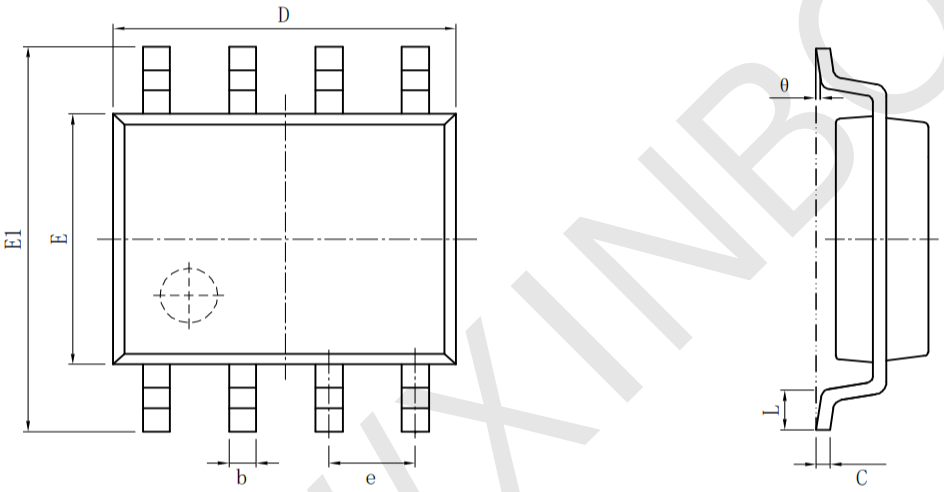


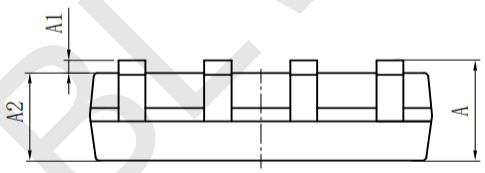




- SOP-8

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°





Statement:

- XBLW reserves the right to modify the product manual without prior notice! Before placing an order, customers need to confirm whether the obtained information is the latest version and verify the completeness of the relevant information.

- Any semi-guide product is subject to failure or malfunction under specified conditions. It is the buyer's responsibility to comply with safety standards when using XBLW products for system design and whole machine manufacturing. And take the appropriate safety measures to avoid the potential in the risk of loss of personal injury or loss of property situation!

- XBLW products have not been licensed for life support, military, and aerospace applications, and therefore XBLW is not responsible for any consequences arising from the use of this product in these areas.

- If any or all XBLW products (including technical data, services) described or contained in this document are subject to any applicable local export control laws and regulations, they may not be exported without an export license from the relevant authorities in accordance with such laws.

- The specifications of any and all XBLW products described or contained in this document specify the performance, characteristics, and functionality of said products in their standalone state, but do not guarantee the performance, characteristics, and functionality of said products installed in Customer's products or equipment. In order to verify symptoms and conditions that cannot be evaluated in a standalone device, the Customer should ultimately evaluate and test the device installed in the Customer's product device.

- XBLW documentation is only allowed to be copied without any alteration of the content and with the relevant authorization. XBLW assumes no responsibility or liability for altered documents.

- XBLW is committed to becoming the preferred semiconductor brand for customers, and XBLW will strive to provide customers with better performance and better quality products.

单击下面可查看定价，库存，交付和生命周期等信息

>>XBLW(芯伯乐)