

Features

- Non-Isolation LED driver
- SOP8 package
- Integrate 600V of High voltage MOSFET
- High Power Factor by One Cycle Control
- Lower THD Performance
- Accuracy Constant Current
- 45k of fixed Frequency Control
- LED Open Protection (OVP) with auto recovery
- LED Short Protection (SCP) with auto recovery
- Over Current Protection (OCP) with auto recovery
- Internal OTP Protection with auto recovery

Application

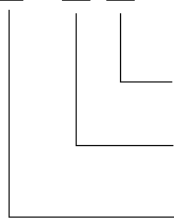
- E26/27, T8 LED Tube
- Others LED Lighting Applications

Description

The ZA8706B/C integrates a non-isolation LED buck controller and 600V of high voltage MOSFET into SOP8 package. It provides a simple circuit to get higher power factor, higher efficiency and accuracy constant current; hence ZA8706B/C can meet LED lighting requirements and reduce the cost of LED power supply. The ZA8706B/C has a 45kHz fixed frequency oscillator, an internal 200mV precision reference, and a PWM comparator with latching logic. The accurate output LED current is achieved by an averaging current feedback loop. The ZA8706B/C also has multiple features to protect the controller from fault conditions, including Under Voltage Lockout (UVLO), Over Current Protection (OCP), and Over Voltage Protection (OVP). Additionally, to ensure the system reliability, the ZA8706B/C is built with the thermal protection function (OTP).

Ordering information

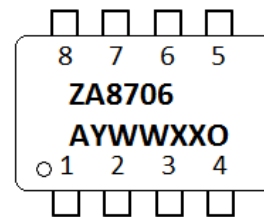
ZA8706 □ - □ □



Pin count
8: 8 pin
 Package type
P: SOP type
 Version
B: MOS Rds(on)= 4 ohm
C: MOS Rds(on)= 2 ohm

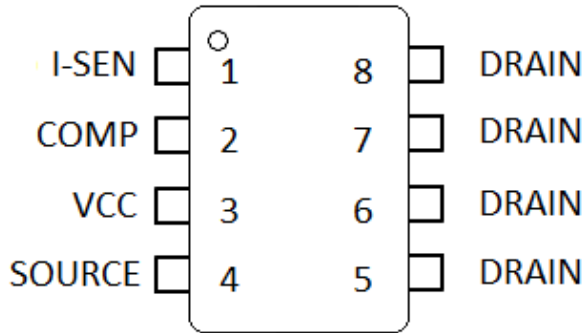
Marking Information

SOP-8



Line1 : ZA8706: Device name
Line2 : AYWWXXO: tracking number

Pin Configuration (Top View)



Absolute Maximum Ratings

Parameter	Value
Supply Voltage VCC	30V
COMP ,SOURCE, I-SEN	-0.3 to 7V
Junction Temperature	150°C
Operating Ambient Temperature	-20°C~85°C
Storage Temperature Range	-65°C~150 °C
SOP8 Package Thermal Resistance (junction to ambient)	160°C/W
Power Dissipation (SOP8, at ambient temperature = 85°C)	400mW
Lead Temperature (All Pb free packages, soldering, 10 sec)	260°C
ESD voltage protection, machine model	200V
ESD voltage protection, human body model	2KV

Pin Description

Pin No.	Name	Function
1	I-SEN	Current Sense Pin, Connect to Sense
2	COMP	MOSFET Current Feedback Compensation Network
3	VCC	Power Supply Pin
4	SOURCE	Source Pin of internal HV MOSFET and GND PIN
5,6,7,8	DRAIN	Drain Pin of internal HV MOSFET

Recommended Operating Condition

Symbol	Parameter	Min/Max	Unit
VCC	VCC Supply Voltage	12 to 25	V
TA	Operating Ambient Temperature	-20 to 85	°C

Recommended Application Wattage

Part number	V _{in} = 90V ~132V	V _{in} = 180V ~264V	Unit
ZA8706B	13	16	w
ZA8706C	16	23	w

Electrical Characteristics (VCC = 15.0V & TA = +25°C, unless otherwise specified.)

Parameters	Pin	Min.	Typ.	Max.	Unit
SUPPLY VOLTAGE					
Startup Current (VCC=UVLO on -1V)	3		20	30	uA
Operating Current (with 1nF load on OUT pin),	3		2	3	mA
Operating Current (with 1nF load on OUT pin), The protection is triggered	3		1	1.5	mA
UVLO(off)	3		9		V
UVLO(on)	3		19		V
OVP Level in VCC Pin	3	27	28	29	V
VOLTAGE FEEDBACK					
Output Sink Current	2		30		uA
Output Source Current	2		30		uA
Maximum output voltage	2			6	V
Minimum output voltage	2			0.1	V
CURRENT SENSING					
Feedback Reference Voltage	1	0.196	0.2	0.204	V
Over Current Protection Threshold	1	0.7	0.8	0.9	V
Leading-Edge Blanking Time	1		410		nS
Delay to Output	1		100	220	nS
SWITCHING FREQUENCY					
Switching Frequency	-	42	45	48	KHz
Maximum Duty	-	80	90		%
Frequency Jitter Range			+/-5		%
Temp. Stability (-40°C ~ 125°C)	-			6	%
Voltage Stability (VCC = 11V~25V)	-			5	%
OTP SECTION					
OTP Trip Point	-		150		°C
Release temperature			70		°C
OTP De-bounce Time	-		40		uS
MOSFET SECTION					
V _{BR(dss)} , Drain-source Breakdown voltage VGS = 0V, ID = 250μA		600			V
R _{ds(on)} , Static Drain-Source On-Resistance VGS=10V, ID=1/2A (ZA8706B)			4		Ω
R _{ds(on)} , Static Drain-Source On-Resistance VGS=10V, ID=1A (ZA8706C)			2		Ω

Application Information

Start-up

When the power supply is first powered from the mains outlet, the start-up current begins to charge up the VCC capacitor. When the voltage on this VCC capacitor reaches the $UVLO_{(ON)}$ level (typically 19V), IC starts to control the internal power MOS that transfers the power to turn on LED. At this time, the VCC capacitor only supplies the controller before VCC collapses below $UVLO_{(OFF)}$. The biasing current from LED must establish before VCC goes below UVLO off, otherwise LED won't turn on in required time.

For quickly startup the LED driver, the start-up resistor should be chosen smaller resistor value to match with the startup capacitor, but it leads to bigger power loss in start-up resistor. Once the power supply has started, the VCC shall be constrained below 26V, which is the maximum rating on VCC pin.

Oscillator

The operating frequency of ZA8706B/C is fixed at 45kHz and the maximum duty-cycle is up to 90%. It has a wide output voltage range for LED lighting application.

Soft Driving

In order to reduce EMI interference, ZA8706B/C is built in soft driving function. It helps designer save EMI components and cost.

LEB (Leading-Edge Blanking)

A 410ns leading-edge blanking (LEB) time is included in I-SEN pin to prevent the false-trigger from the current spike. Hence, RC filter can be omitted. The current limit comparator is disabled and cannot turn off the internal 600V MOSFET during the blanking period.

Over Current Protection

Cycle-by-Cycle current limiting is offered in ZA8706B/C PWM controller. The switch current is detected by a sense resistor into the sense pin. When the current is larger than an OCP level, the internal power MOS will be turned off. When VCC is lower than $UVLO$ off level, the controller resets again. This OCP protection mode is auto-recovery type.

Over Voltage Protection

The ZA8706B/C is implemented an OVP function on VCC Pin to protect LED power system.

When the VCC voltage exceeds 28V due to abnormal conditions, PWM pulses are disabled until the VCC voltage drops below the $UVLO$ threshold, then start again. This protection mode is auto-recovery. Over-voltage condition is usually caused by open feedback loops.

Over Temperature Protection Function

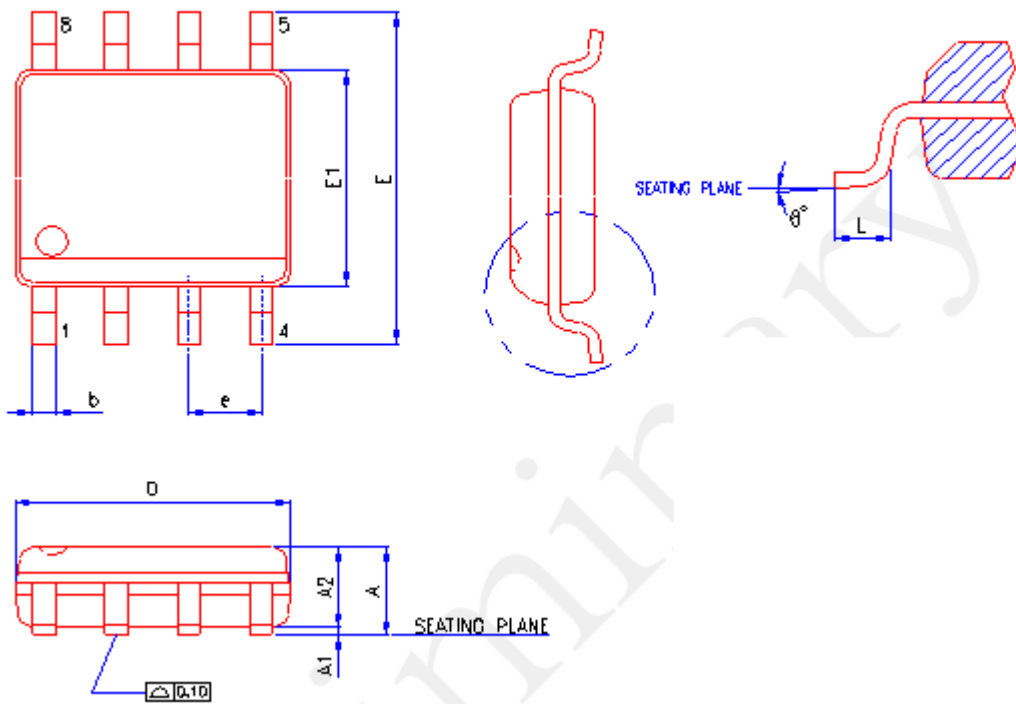
When the junction temperature of the IC exceeds approximately 150°C , the switching cycle is turned off until the junction temperature drops to or below approximately 110°C . ZA8706B/C will re-start again.

HV MOSFET Section

The ZA8706B/C is integrated 600V of high voltage MOSFET, it helps to simplify the circuit and reduce the size of PCB. $R_{DS(ON)}$ of the internal MOSFET are 4 ohm and 2 ohm, respectively. Thermal Resistance (junction to ambient) of SOP8 Package is about $160^{\circ}\text{C}/\text{W}$, so the suggestions of the operating wattage and output voltage are shown in page 2.

Package Information

SOP8 PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters	
	Min	Max
A	-	1.75
A1	0.10	0.25
A2	1.25	
b	0.31	0.51
D	4.90 BSC	
E	6.00 BSC	
E1	3.90 BSC	
e	1.27 BSC	
L	0.4	1.27
θ	0°	8°