DIO83468

High-Efficiency, AC / DC Power Converter

Features

- Built-in 650 V HV VDMOS
- PWM-mode (60 kHz PWM)
- Green-mode (Dynamic PFM)
- Burst-mode (Intermittent operation mode)
- Built in frequency modulation technology
- No-load standby power consumption: < 50 mW @ 230 V_{AC}
- Built in soft start circuit
- Built in HV JFET starting circuit
- Built in line voltage compensation
- Built in slope compensation for good loop stability
- Full protection function
  - ✧ Overload protection (OLP)
  - ✧ Over current protection (OCP)
  - ✧ Over voltage protection (OVP)
  - ✧ Under voltage protection (UVLO)
  - ✧ Over temperature protection (OTP)

Applications

- Switching power adapter
- White appliances, computers and other auxiliary power supplies

Descriptions

The DIO83468 is a high-performance AC/DC power converter with an integrated PWM controller and a 650 V high-voltage VDMOS. It is suitable for smart meters, chargers and adapter applications. Due to SSR control, the DIO83468 can provide accurate constant voltage (CV) regulation and excellent load response performance.

The DIO83468 realizes low standby power consumption and high efficiency in the full voltage range through the multiple mode switching technology of PWM mode under heavy load conditions, green mode under light load conditions and burst mode under no-load conditions. Excellent EMI performance is achieved with frequency modulation.

The DIO83468 also provides comprehensive system protection functions, including overload protection (OLP), over current protection (OCP), over voltage protection (OVP), under voltage protection, over temperature protection (OTP), and soft start function.

The DIO83468 provides an advanced implementation platform for a cost-effective flyback switching power supply system requiring ultra-low standby power consumption, which is very suitable for the application of smart meters and energy star.

Ordering Information

Ordering Part No.	Top Marking	MSL	RoHS	T_A	Package	
DIO83468CS8	DIOHCD6H	3	Green	-40 to 125°C	SOIC-8	Tape & Reel, 2500

Pin Assignment

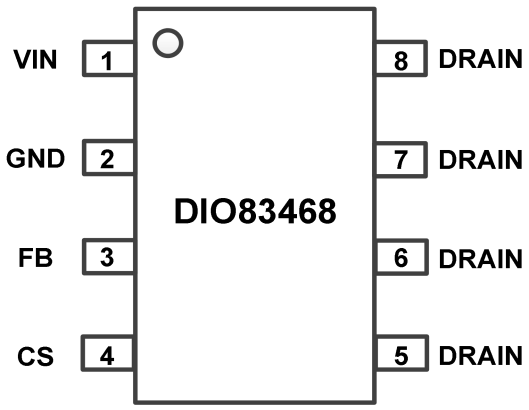


Figure 1. SOIC-8 (Top view)

Pin Descriptions

Pin Number	Pin Name	Description
1	VIN	Power Supply voltage input
2	GND	Ground
3	FB	Load Feedback Pin，The current signal is received from the output of the optocoupler to ensure loop stability.
4	CS	Current sense pin . It is connected with the source of the primary side switch to adjust the peak current of the primary side.
5	DRAIN	HV MOSFET drain pin. Connected to the primary transformer.
6		
7		
8		

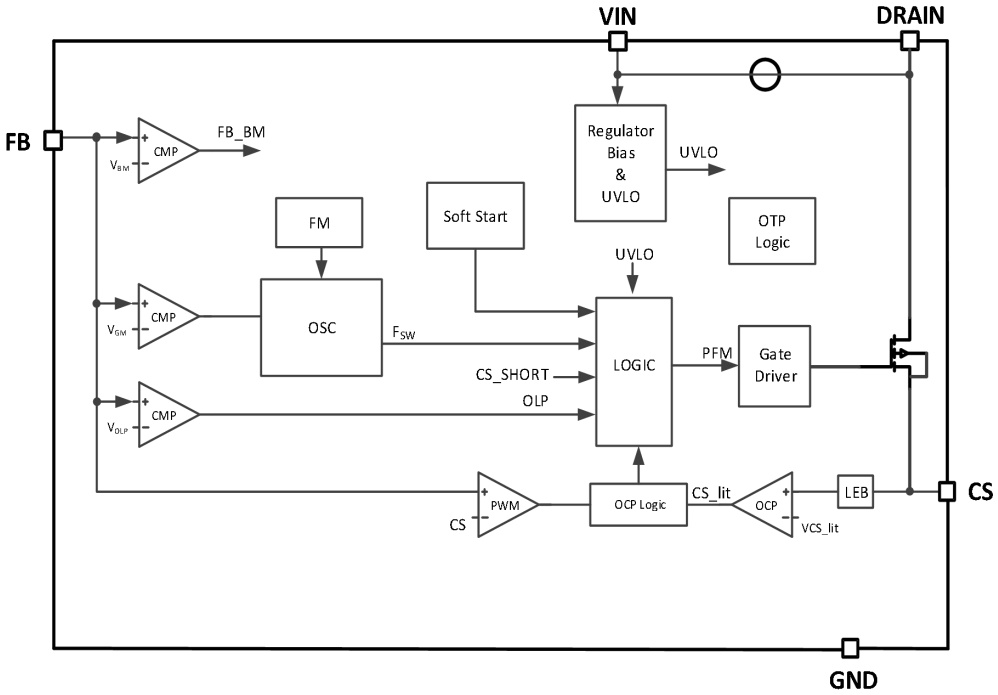
Typical Power

Product Model	Input Voltage	Open Type
DIO83468CS8	85-265 V_{AC}	30 W

Note:

(1) The typical power is tested at 40°C and the adapter is sealed.

Typical Circuit



Absolute Maximum Ratings

Stresses beyond those listed under “Absolute Maximum Rating” may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other condition beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maxim rating conditions for extended periods may affect device reliability.

Symbol	Parameter	Rating	Unit
V_{IN}	VIN voltage	-0.3 ~ 30	V
V_{DRAIN}	DRAIN voltage	650	V
I_{DRAIN}	DRAIN pulse current	11	A
	FB, CS voltage	-0.3 ~ 5.5	V
P_D	Power dissipation (SOIC-8, T_A = 25°C)	1	W
θ_{JA}	Package thermal resistance (SOIC-8)	100	°C/W
θ_{JC}		50	°C/W
T_J	Junction temperature range	-40 ~ 140	°C
T_{STG}	Storage temperature range	-55 ~ 150	°C
T_L	Lead temperature	260	°C

Electrical Characteristics

V_{DD} = 14 V, T_A = 25°C, unless otherwise specified.

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Supply voltage (VIN) section						
I_{CH}	VIN charge current	V_{DRAIN} = 120V, V_{FB} = GND, V_{VIN} = 12V		2		mA
V_{VIN}	Operating voltage range		10		25	V
V_{VIN_OVP}	VIN over voltage threshold	V_{CS} = 0V , V_{FB} = 3V	25	26	27	V
V_{VIN_CLP}	VIN clamping voltage threshold	I_{VIN} = 25mA	27	28	29	V
V_{VIN_OFF}	VIN OFF voltage threshold			9		V
V_{VIN_ON}	VIN ON voltage threshold			15		V
Operating current section						
I_{VIN}	Normal operation	V_{VIN} = 15 V, f_{DRAIN} = 60 kHz		1		mA
I_{VIN_FAULT}	Protection status			200		μA
I_{VIN_OFF}	Undervoltage state	V_{VIN} = 7 V		100		μA
Feedback (FB) section						
V_{FB_OPEN}	Open loop voltage			4.6		V
V_{FB_OLP}	Overload protection threshold			3.8		V
V_{FB_GM}	Green mode threshold	Voltage falling when frequency decrease		1.95		V
V_{FB_BM}	Burst mode threshold	Voltage falling		1.2		V
$V_{FB\_BM\_hys}$	Intermittent mode hysteresis threshold	Voltage rising		1.3		V
I_{FB}	FB short-circuit current	V_{FB} = GND		-210		μA
t_{D_OLP}	Overload detection time			64		ms
Avcs	Gain			3.3		V/V
Current detection section						
t_{SS}	Soft start time			8		ms
t_{ON_MIN}	Minimum on time			450		ns
t_D	Off delay time			150		ns
t_{LEB}	Leading edge blanking time			330		ns
V_{OCP}	Current limiting protection threshold			0.45		V
V_{OCP_CLP}	Current limiting clamping threshold			0.55		V

Oscillator section						
f_{SW}	Switching frequency	V_{VIN} = 15 V, V_{FB} = 3 V	54	60	66	kHz
f_D	Frequency jitter range			±4		kHz
f_M	Modulation frequency			250		Hz
D_{MAX}	Maximum duty cycle		75		85	%
f_{BM}	Burst mode frequency		21	25		kHz
VDMOS section						
V_{BV}	Off breakdown voltage	I_{DS} = 250 μA, T_J = 25℃	650			V
I_{DSS}	Off state leakage current	V_{DS} = 650V, V_{FB} = GND			1	μA
R_{DSON}	On resistance	I_{DS} = 1A, V_{FB} = 3V, T_J = 25℃			0.8	Ω
OTP section						
T_{SD}	OTP temperature			150		℃
T_{HYST}	OTP temperature hysteresis			30		℃

Notes:

(1) Specifications subject to change without notice.

Typical Application

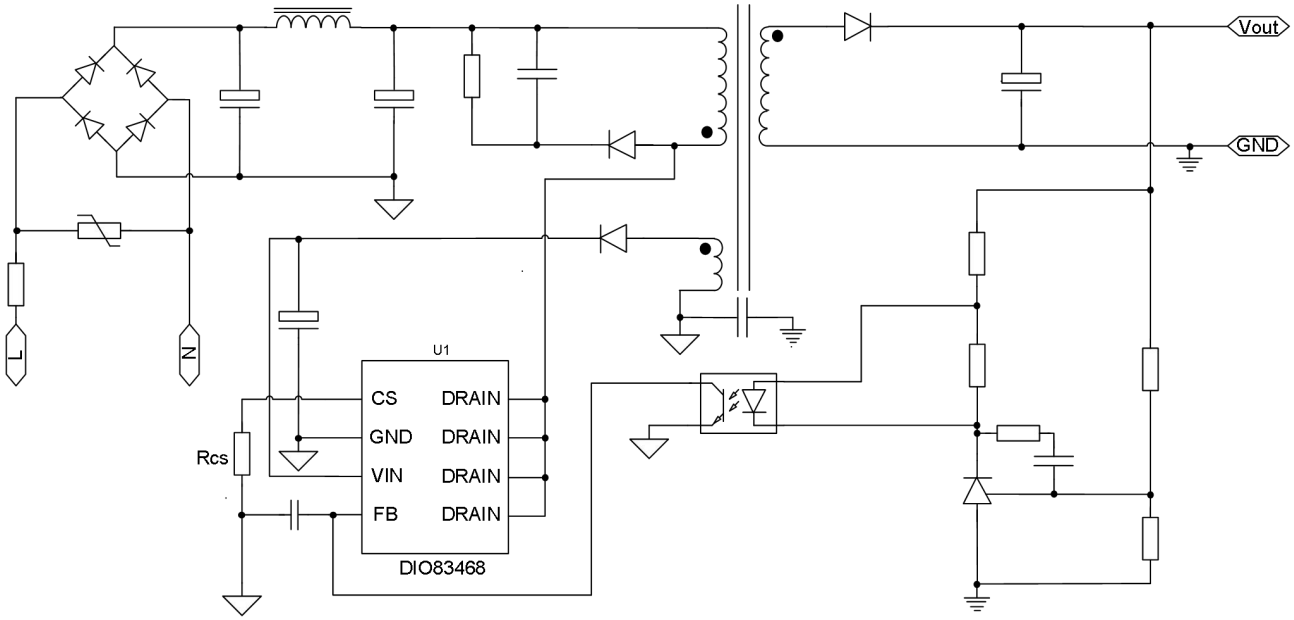


Figure 2. DIO83468 typical application

Function Description

Start up

During the start-up phase, the internal HV starting tube provides charging current to charge the external V_{DD} capacitor. The chip starts working When V_{IN} voltage reaches 15 V. The HV starting tube stops charging the V_{DD} capacitor. After the start-up process, the auxiliary winding of the transformer provides energy to the V_{IN} capacitor.

Soft start

During the start-up phase, the maximum peak current limit of the drain increases gradually. It can reduce the stress of the device and prevent the transformer from saturation. The typical value of soft start time is 8 ms.

Output drive

The DIO83468 adopts unique driving technology. The driving capacity is too weak to cause higher switching losses, and too much driving is prone to EMI worsening. The DIO83468 adopts optimized totem pole structure, and obtains better EMI characteristics and low loss through reasonable output driving ability and dead time.

Oscillation

The oscillation frequency is fixed at 60 kHz, and no external circuit is needed. Built in frequency jitter technology can optimize EMI performance.

Frequency reduction operation mode

The DIO83468 provides frequency reduction operation mode, by detecting voltage of FB pin voltage, reducing switching frequency under light load and no load conditions to improve light load efficiency. When FB pin voltage is less than V_{FB_GM} (typical 1.95 V), the device enters the down frequency working mode, and the switching frequency decreases with the decrease of load until the minimum frequency is 21 kHz.

Intermittent operation mode

The DIO83468 enters gap operation mode to reduce standby power consumption. When the load is reduced, the feedback voltage decreases; When FB pin voltage is less than V_{FB_BM} (typical 1.2 V), the chip enters the intermittent working mode, and the power tube is turned off. When FB pin exceeds V_{FB_BM} 100 mV, the switch tube can be turned on again. This frequency control can eliminate audio noise under arbitrary load conditions.

Feedback control

The DIO83468 is a current mode conveter. The feedback voltage of FB pin is compared with the internal sawtooth wave to control the system duty cycle and then adjust the load capacity.

Line voltage compensation

The DIO83468 provides overcurrent linear compensation to achieve constant output power limitation over the full voltage range.

Slope compensation

The DIO83468 provides slope compensation, which is used to improve the closed-loop stability of the system by superimposing the voltage sawtooth signal on the sampled current signal.

Overload protection

When the load current exceeds the preset value, the system will enter overload protection; Under abnormal conditions, the system can be protected. When the V_{FB} voltage exceeds 3.8 V, the switching mode stops after a fixed delay time of 64 ms.

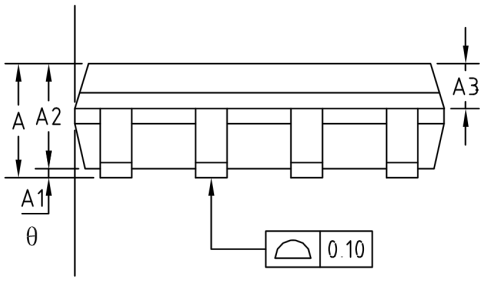
Overcurrent protection

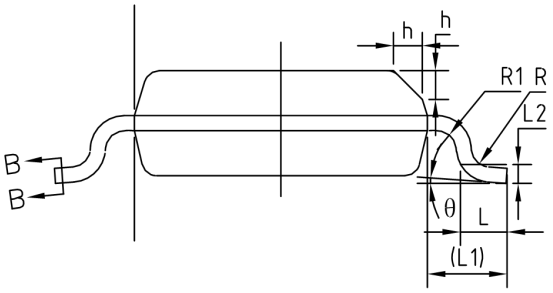
The DIO83468 has built-in overcurrent protection mechanism. The switching current can be detected by the current detection resistance, and the overcurrent protection point can be adjusted by setting the R_{CS} resistance.

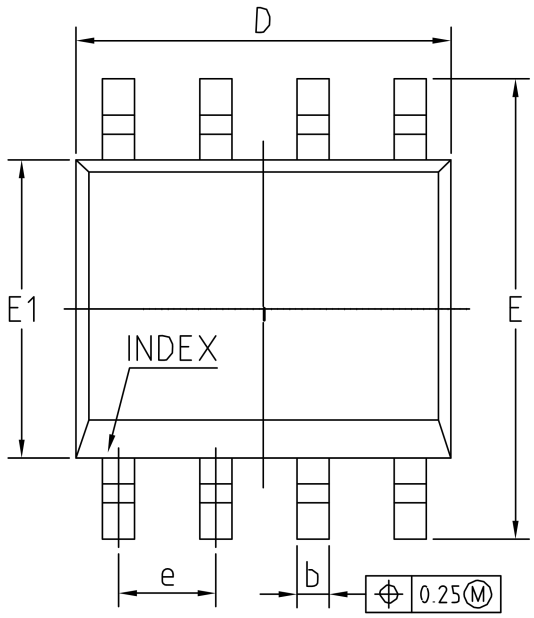
Over temperature protection

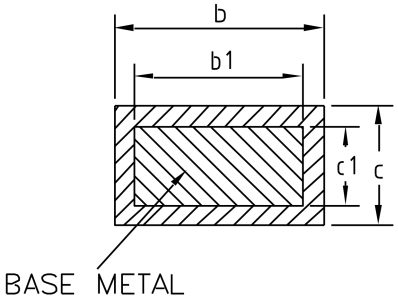
The power MOSFET is integrated with the control chip, making the control circuit easier to detect the temperature of MOSFET. When the temperature exceeds 150°C, the chip enters the over temperature protection state.

Physical Dimensions: SOIC-8









SECTION B–B

Common Dimensions (Units of measure = Millimeter)			
Symbol	**Min**	**Nom**	**Max**
A	1.35	1.55	1.75
A1	0.10	0.15	0.25
A2	1.25	1.40	1.65
A3	0.50	0.60	0.70
b	0.38	-	0.51
b1	0.37	0.42	0.47
c	0.17	-	0.25
c1	0.17	0.20	0.23
D	4.80	4.90	5.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.27 BSC		
L	0.45	0.60	0.80
L1	1.04 REF		
L2	0.25 BSC		
R	0.07	-	-
R1	0.07	-	-
h	0.30	0.40	0.50
Θ	0°	-	8°

CONTACT US

Dioo is a professional design and sales corporation for high-quality and performance analog semiconductors. The company focuses on industry markets, such as, cell phone, handheld products, laptop, and medical equipment and so on. Dioo's product families include analog signal processing and amplifying, LED drivers and charger IC. Go to http://www.dioo.com for a complete list of Dioo product families.

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