

## 10W PSR AC/DC converter IC

### Product Overview

DK910C is a primary side regulation flyback AC-DC switching power supply control IC that integrates a 700V high-voltage switching power transistor and a primary peak current detection circuit. The IC also includes primary feedback constant current, constant voltage control, and self powered supply circuits, as well as output cable compensation function. The IC adopts a highly integrated CMOS circuit design, with very few peripheral components and a simple transformer design. The transformer that isolates the output circuit only requires two winding.

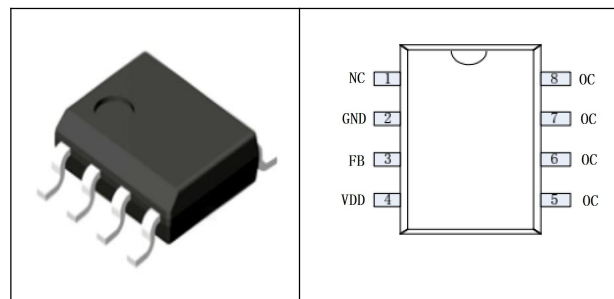
### Product Features

- Full voltage input 85V-264V
- Built-in 700V high voltage power transistor
- Built-in high-voltage constant-current start-up circuit, no need for external starting resistors
- The patented primary edge feedback control algorithm does not require auxiliary winding
- The patented self powered technology does not require external auxiliary winding power supply
- Built in PWM oscillation circuit and equipped with frequency jitter function, ensuring good EMC characteristics
- $\pm 2.5\%$  constant voltage accuracy,  $\pm 5\%$  constant current accuracy
- Over temperature, over current, over voltage, and output short circuit protection

### Typical Applications

- LED Power Supply
- Power adapter
- Small household appliances such as induction cookers, air conditioners, DVDs, set-top boxes, etc

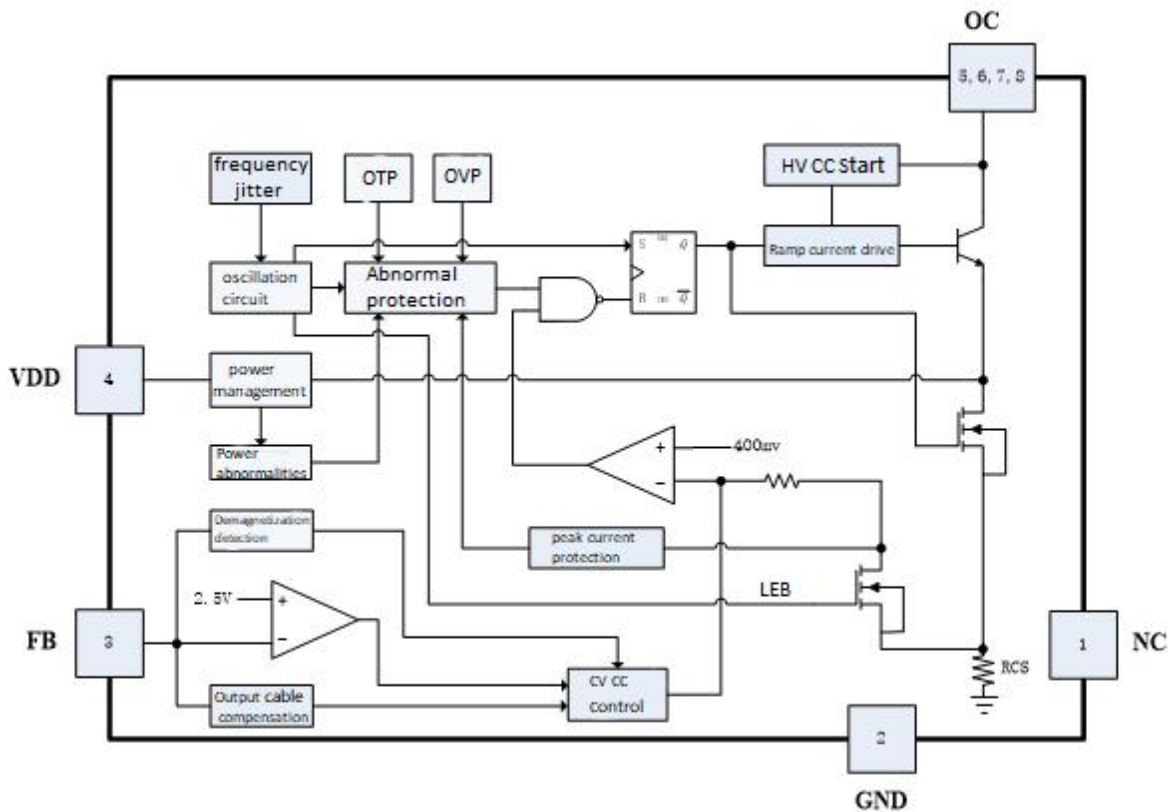
### PINS CONFIGURATION



**Pins function**

Pin No.	Pin Name	Description
1	NC	Suspended
2	GND	Reference ground
3	FB	Primary feedback pin
4	VDD	The positive pin of the operating power supply, externally connected a 10uF-47uF capacitor (ESR less than 1 Ω ) to ground
5,6,7,8	OC	The drain of the built-in high-voltage power transistor

**Functional Structure Diagram**



**ABSOLUTE MAXIMUM RATINGS (TA=25°C Unless otherwise noted)**

Parameter	Symbol	Min	Typ	Max	Unit
Supply voltage VDD	$U_S(vdd)$	-0.3		8	V
Supply current VDD	$I_S(vdd)$		100		mA
FB Voltage	$U_{PV}$	-0.3		VDD+0.3	V
OC voltage	$U_{PP}$	-0.3		730	V
Total power dissipation	$P_{TOT}$		600		mW
Operating temperature range	$T_R$	-25		135	°C
Storage temperature range	$T_{STG}$	-55		150	°C
Welding temperature	$T_W$		280/5S		°C

**ELECTRIC CHARACTERISTICS (TA=25°C Unless otherwise noted)**

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
VDD operating voltage	$V_{dd(no)}$	AC input 85V-----265V	4.3	4.8	5.3	V
VDD start-up voltage	$V_{dd(start)}$	AC input 85V-----265V	4.5	5.0	5.5	V
VDD restart voltage	$V_{dd(reset)}$	AC input 85V-----265V	3.4	3.8	4.2	V
VDD protection voltage	$V_{dd(ovp)}$	AC input 85V-----265V	5.0	5.5	6.1	V
Power transistor withstand voltage	$V_{oc(bv)}$	$I_{oc}=1mA$	700			V
Built in IP current	$I_p$	VDD=5V	663	680	697	mA
CV reference voltage	$V_{fb(cv)}$	VDD=5V	2.45	2.5	2.55	V
Cable compensation current	$I_{comp}$	VDD=5V		15		uA
Operating frequency	$F_{pwm}$	VDD=5V	0.15		80	KHz
Short circuit protection threshold	$V_{fb(olp)}$	VDD=5V detect FB voltage		1.5		V
Open circuit protection voltage	$V_{fb(ovp)}$	VDD=5V detect FB voltage		3.5		V
Temperature protection	$T_{SD}$	VDD=5V		135		°C
Minimum turn-on time	$t_{on(min)}$	VDD=5V		400		ns

## Operation Principle

### 1. Peak current and maximum output power

DK910C is mainly used for 10W primary feedback adapters and chargers. The IC has built-in CS sampling and limits the maximum output power by setting the transformer turns ratio.

$$P_{\text{omax}} = I_o * V_{\text{out}} = 0.25 * N * I_p * V_{\text{out}}$$

### 2. Power on and start

The IC is equipped with a high-voltage startup current source, which charges the external VDD energy storage capacitor with the startup current after power on. When the VDD voltage reaches 5.0V, the power on startup process ends and the IC enters the soft startup phase.

### 3. Soft start

After power on, the IC starts working in constant current mode; When the output establishment detection  $FB > V_{\text{fb}}(\text{olp})$ , the soft start ends.

### 4. FB detection and feedback control

In the flyback stage, the output voltage is mapped to the FB pin through the coupling relationship between the primary or auxiliary winding; The IC indirectly detects and stabilizes the output voltage or current by detecting the FB port voltage.

### 5. Constant current mode

The maximum peak current  $I_p$  of the primary coil is set inside the IC, and when the load exceeds the maximum output power, the IC operates in constant current mode.

$$\text{Output current: } I_o = \frac{1}{4} * I_p * \frac{N_p}{N_s}$$

### 6. Constant voltage mode

The IC indirectly detects the output voltage  $V_o$  by detecting the FB voltage during the flyback stage. The FB voltage and internal  $V_{\text{fb}}(\text{cv})$  reference are used for error amplification, and the error amplifier output controls the PWM switching frequency according to the load condition to stabilize the output voltage  $V_o$ .

$$V_o = 2.5v * \frac{N_s}{N_A} * \left(1 + \frac{R_{\text{FB2}}}{R_{\text{FB1}}}\right) - V_d$$
  $V_d$  is the voltage of the secondary rectifier diode, other parameters

can refer to typical applications.

### 7. Self powered technology

The IC uses patented self powered technology to control the voltage of VDD at around VDD (no), providing the IC's own current consumption without the need for external auxiliary winding.

### 8. Cable compensation

Built in cable compensation circuit, the IC has  $I_{comp}$  pull-down current for the FB pin during operation, reducing output voltage errors caused by cable impedance under different loads.

### 9. Power abnormalities

When the VDD voltage is higher than VDD (ovp) due to some external abnormality, the IC enters VDD over-voltage protection.

### 10. FB port detection abnormal protection

When the secondary circuit is open, the Vor voltage will continuously increase; When the IC detects that the FB voltage exceeds Vfb (ovp), it enters abnormal protection. FB resistor open circuit protection: When powered on, the IC detects a FB resistor open circuit and enters abnormal protection.

### 11. Short circuit protection

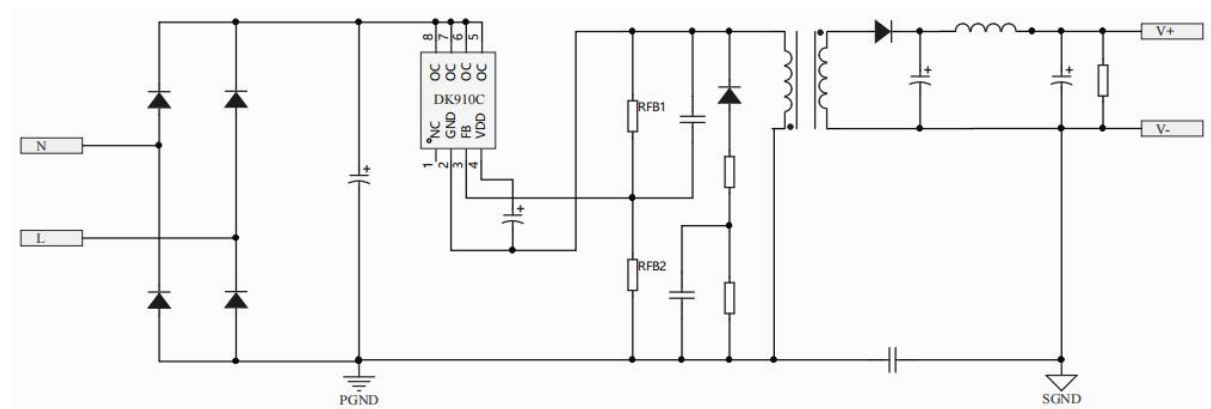
To prevent secondary short circuits, the IC samples and detects that the FB voltage is lower than Vfb (olp) and lasts for more than 48ms, entering short-circuit protection.

### 12. Over temperature protection

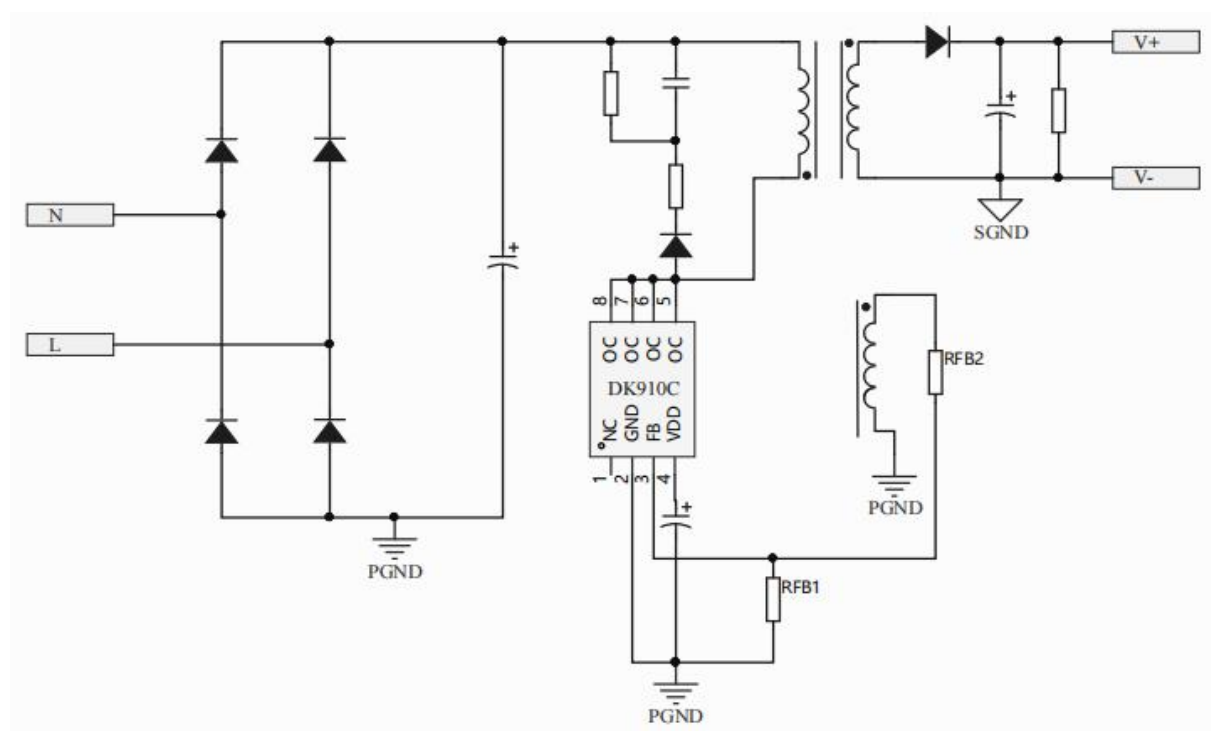
Whenever the IC temperature exceeds  $T_{SD}$ , immediately activate the over temperature protection and stop outputting pulses until the over temperature condition is resolved.

**Typical Application Circuit Diagram**

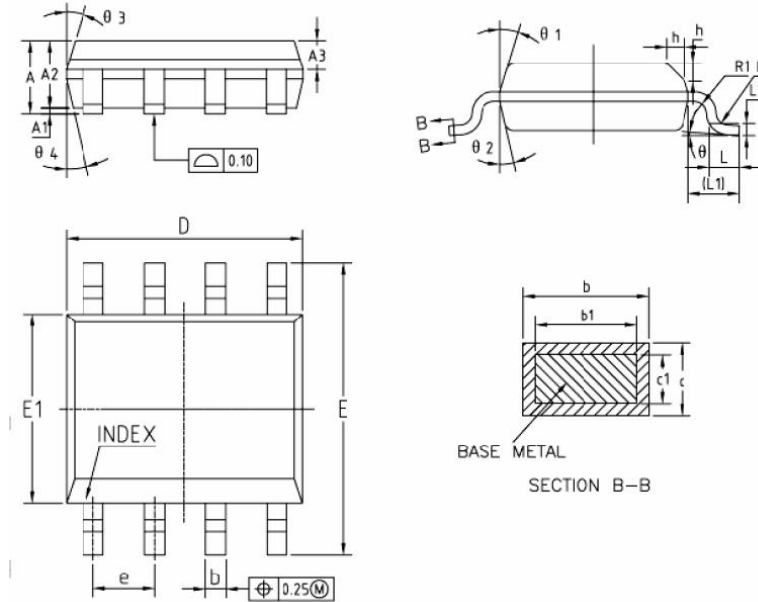
Two winding application:



Three winding application:

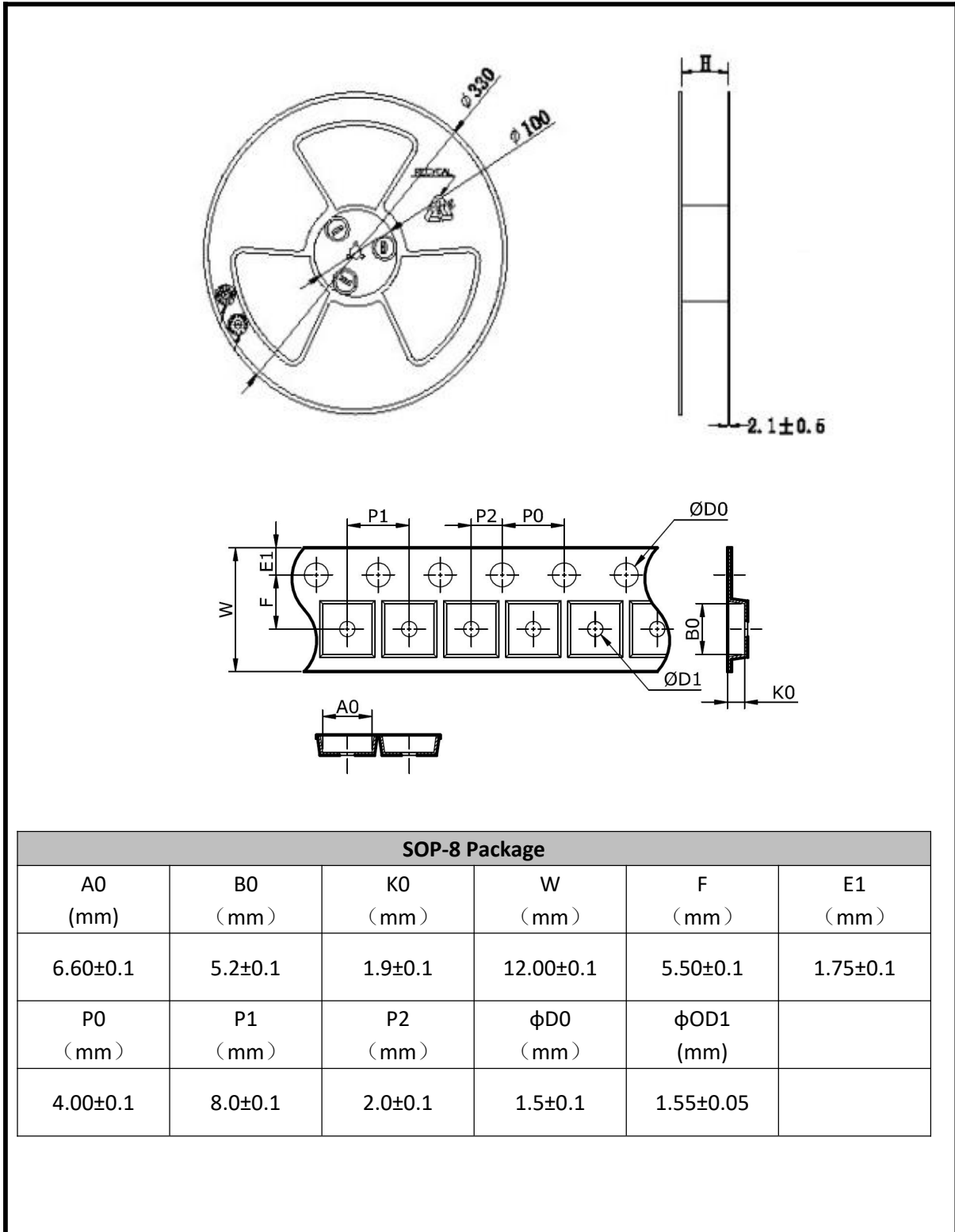


**Package and Packing Information**



Symbol	Dimensions In Millimeters	
	Min	Max
A	1.35	1.75
A1	0.10	0.25
A2	1.25	1.65
A3	0.50	0.70
b	0.38	0.51
b1	0.37	0.47
c	0.17	0.25
c1	0.17	0.23
D	4.70	5.10
E	5.80	6.20
E1	3.80	4.00
L	0.45	0.80
L1	1.04REF	
L2	0.25BSC	
e	1.270(BSC)	
theta	0°	8°

**Packaging specification:**





**Caution: This product is a static sensitive component, please pay a attention to protect! The scope of ESD damage can be extended from minor performance to equipment failure. Precision IC may be damaged, which may result in component parameters not meeting the published specifications.**

- Thanks for using our products. We recommend that you read the specifications carefully before using.
- Dongke Semiconductor Co., Ltd reserves the right of change specifications without prior notice.
- Dongke Semiconductor Co., Ltd assumes no liability for any use of its products for special purposes.
- Dongke Semiconductor Co., Ltd has no obligation to support the use and application of products for special purposes.
- Dongke Semiconductor Co., Ltd will not transfer its patents and any other relevant licensing rights.
- Any semiconductor product may fail or break down under certain conditions. The buyer is responsible to abide by safety standards and take safety measures when designing and manufacturing applications using products of Dongke Semiconductor Co., Ltd to avoid potential failure risk which may cause personal injury or property loss.