

# Small household appliances adjustable BUCK switching power supply

## PRODUCT OVERVIEW

DK503 is a wide output voltage non-isolated low-power AC/DC converter chip. The chip is designed in high integrated CMOS circuit, and has the protection functions of output short circuit, over temperature, over voltage and so on. Built-in high-voltage start-up and self-power module, can real-time monitoring and response to load conditions.

## MAIN FEATURES

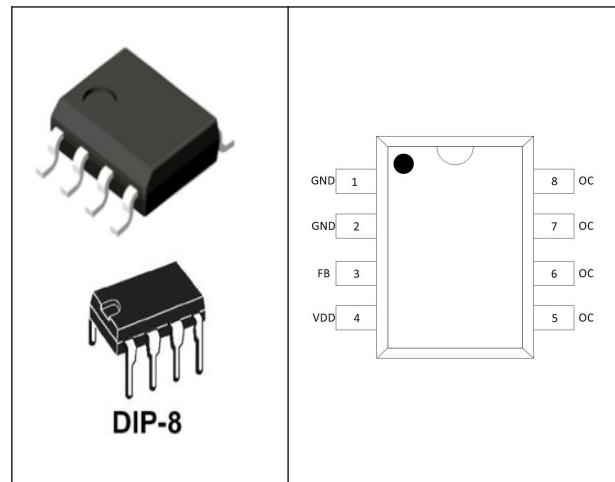
- Full voltage input 85V-265V
- Built-in 700V high voltage power tube
- High voltage constant current starting circuit is integrated inside, no external starting resistance is needed
- Patented self-powered technology, no external auxiliary winding power supply
- Built-in peak current adjustment function, according to the load real-time adjustment peak current, stable working frequency
- The output voltage can be adjusted by FB resistance

- Over-temperature, over-voltage, overload, output short circuit protection functions
- 4 KV ESD anti-static test

## TYPICAL APPLICATIONS

- DC motor and so on
- Induction Cooker, Air Conditioner, DVD power supply

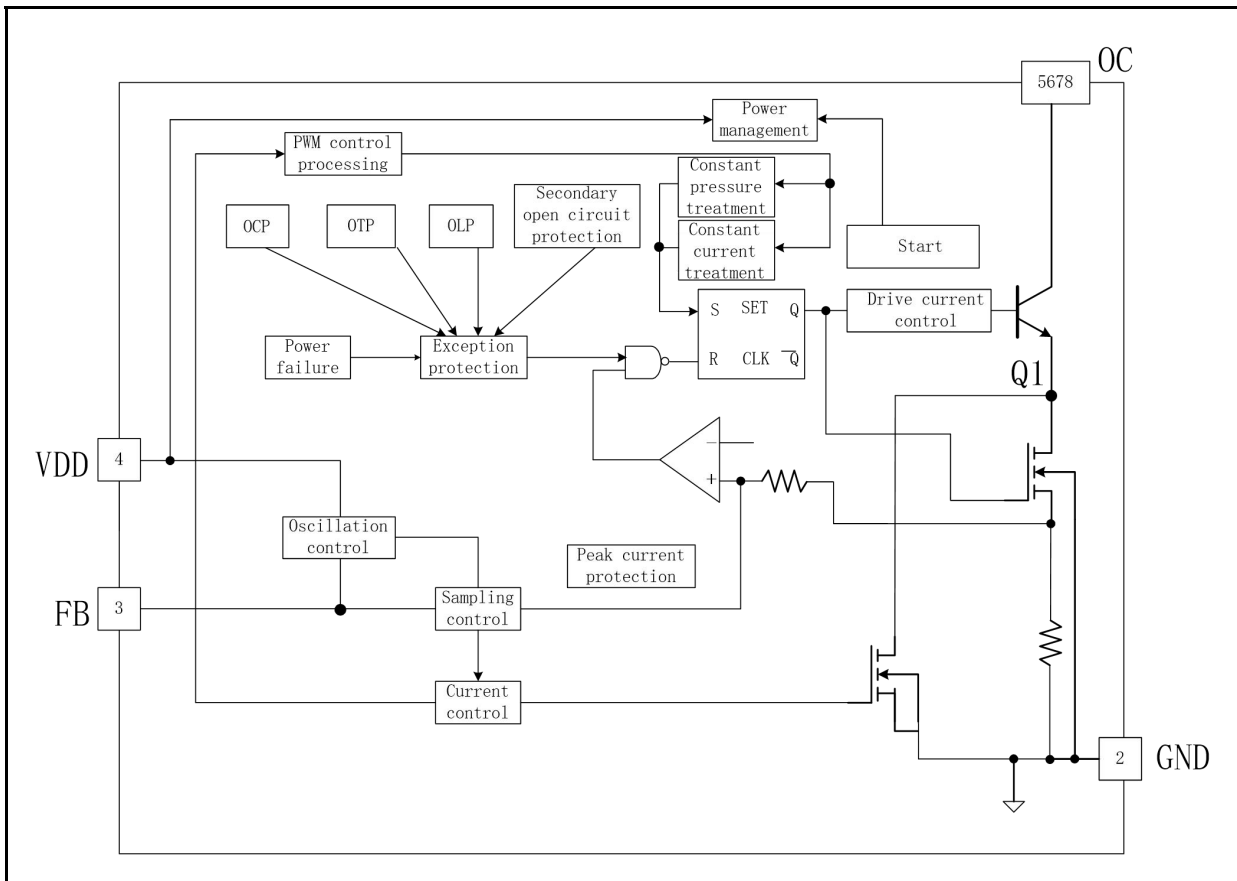
## LEAD END ARRANGEMENT



**LEAD END FUNCTION**

Pin Number	Pin Name	Description
1	GND	Chip power pin
2	GND	Chip power pin
3	FB	Feedback foot
4	VDD	Power supply pin
5,6,7,8	OC	Input Pin, external rectified DC input voltage

**FUNCTIONAL BLOCK DIAGRAM**



**EXTREME WORKING RANGE**

Project	Symbols	Min	Typ	Max	Unit
Supply voltage VDD	US	-0.3		7	V
PIN voltage	UPV	-0.3		VDD+0.3	V
Breakdown Voltage	UPP	-0.3		700	V
Peak current	IPEAK			700	mA
Total dissipation power	PTOT		800		mW
Operating temperature range	TR	-25		125	°C
Storage temperature range	TSTG	-55		150	°C
Welding temperature	TW		280/55		°C

**ELECTRICAL CHARACTERISTICS** (T<sub>A</sub> = 25°C Unless otherwise stated)

Description	Test conditions	Min	Typ	Max	Unit
VDD operating voltage	AC input 85V-----265V		4.7		V
VDD startup voltage	AC input 85V-----265V		4.95		V
VDD restart voltage	AC input 85V-----265V		3.4		V
VDD protection voltage	AC input 85V-----265V		6.3		V
Power tube withstand voltage	I <sub>oc</sub> =1mA	700			V
Peak current protection	VCC=4.7V	240		700	mA
PWM output frequency	VCC=4.7V (typical 5V)	0.4		40	KHz
Temperature protection			140		°C
Leading Edge vanishing time	VCC=4.7V		250		ns
Minimum opening time	VCC=4.7V		400		ns
Standby power consumption	Typical 5V			100	mW

**FUNCTION DESCRIPTION**

**start**

The chip has a built-in high-voltage start-up current source; the start-up current after power-on charges the VDD energy storage capacitor. When the VDD voltage reaches 4.95 V, the start-up process ends and the chip control circuit starts to work.

**Constant voltage operation mode**

The chip samples the output voltage through the FB pin. When the FB voltage is below the internal reference voltage, the chip turns on the integrated high-voltage power tube to charge the energy-storing inductor. When the inductor current reaches the internal reference current IPEAK, the chip turns off the integrated high-voltage power tube, which is fed by the system diode to the energy-storing inductor.

According to the typical application diagram, the output voltage can be adjusted by FB voltage divider. In practical application, the output voltage sampling of FB is affected by isolation diode, so it needs to be fine-tuned. The approximate formula is as follows:

$$V_{out} = 2.5V(R2 + R1) / R2$$

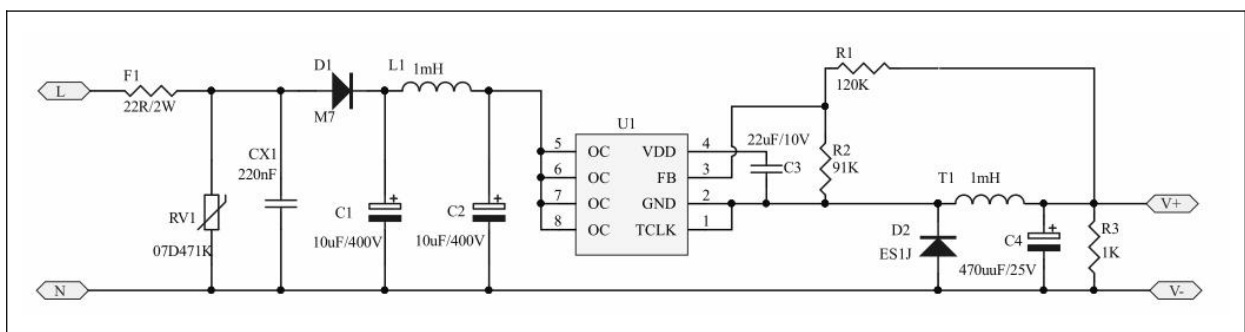
**frequency modulation**

As the load becomes lighter, the peak inductance current decreases to a minimum, then becomes fixed and the switching cycle becomes larger.

**Exception protection**

Chip integrated a variety of protection functions, including output open or short circuit, VDD over-voltage or under-voltage, over-temperature protection.

**TYPICAL APPLICATION CIRCUIT DIAGRAM**

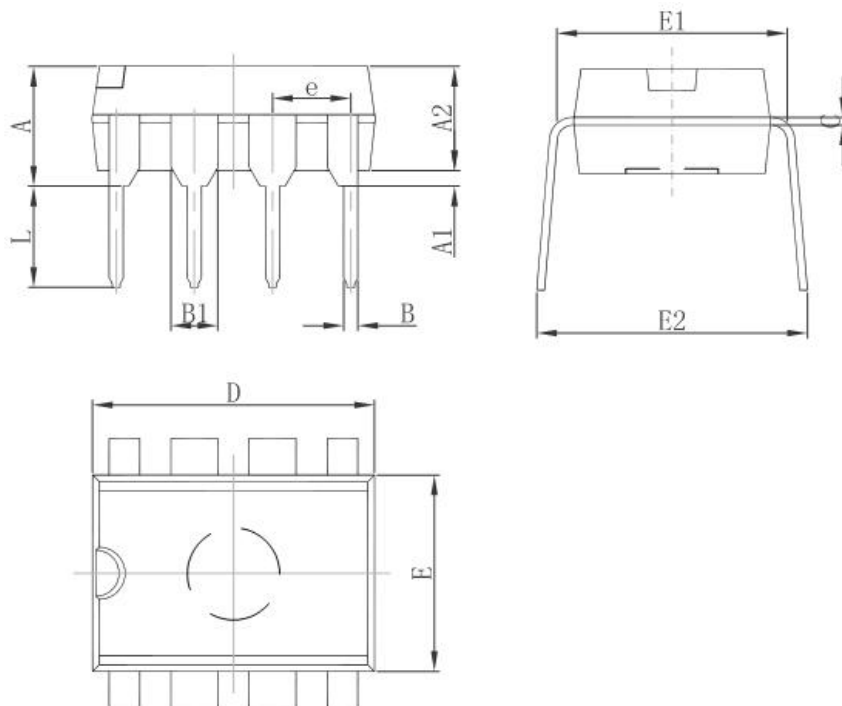


**Design Guide**

- 1、 Inductance T 1: when the inductance value is 5V, it is recommended to use 8 \* 10 i-type inductor with the inductance value  $\leq 680\mu\text{H}$ , when the inductance value is 12V, the inductance value  $\leq 560\mu\text{H}$ , so as to avoid full-load inductance saturation;
- 2、 VDD capacitance: C 3 recommends using 22 $\mu\text{F}/10\text{V}$ ; capacitor rated voltage must be  $\geq 10\text{V}$ , tolerance should be less than  $\pm 20\%$  ; for cryogenic applications, it is recommended to parallel a 1 $\mu\text{F}/10\text{V}$  chip capacitor (X5R/X7R) on the electrolytic capacitor;
- 3、 FB feedback resistance: recommended pull-up resistance r 1 value in 100K-200K, too large pull-up resistance value will affect the dynamic load response.

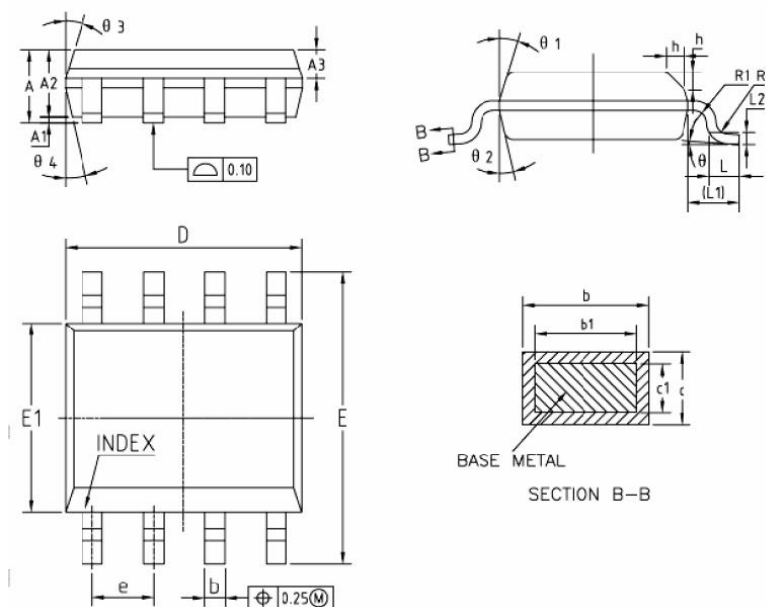
**PACKAGE OUTLINE AND DIMENSIONS**

**1. DIP-8**



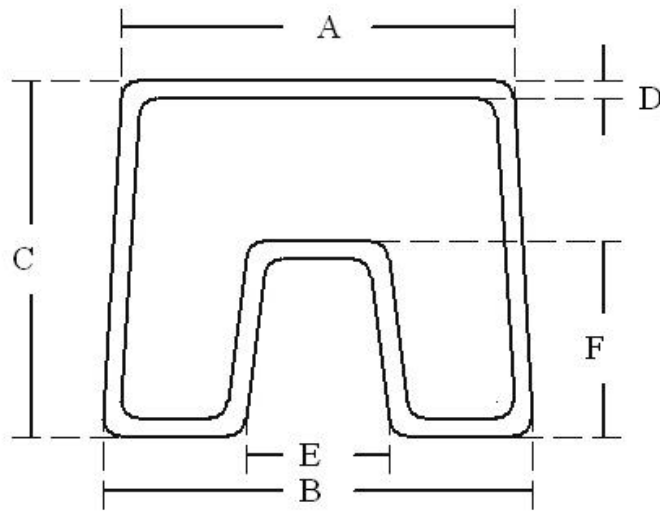
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	3.710	4.310	0.146	0.170
A1	0.510		0.020	
A2	3.200	3.600	0.126	0.142
B	0.380	0.570	0.015	0.022
B1	1.524(BSC)		0.060(BSC)	
C	0.204	0.360	0.008	0.014
D	9.000	9.400	0.354	0.370
E	6.200	6.600	0.244	0.260
E1	7.320	7.920	0.288	0.312
e	2.540(BSC)		0.100(BSC)	
L	3.000	3.600	0.118	0.142
E2	8.400	9.200	0.331	0.354

2. SOP-8



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)	
θ	0°	8°

**3. Packaging specifications: chip anti-static tube packaging (Dip-8) disc pack (Sop-8)**

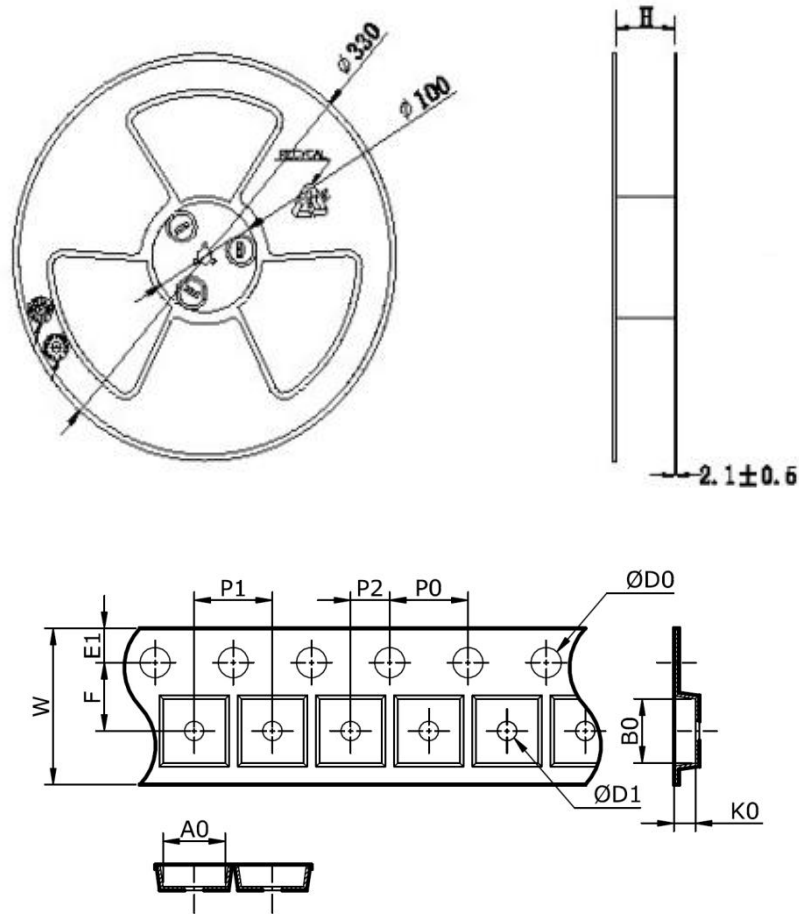


Symbol	Dimensions In Milimeters		
	Min	Rated Value	Max
A	11.00	11.50	12.00
B	11.50	12.00	12.50
C	10.00	10.50	11.00
D	0.40	0.50	0.60
E	3.50	4.00	4.50
F	5.00	5.50	5.10

QTY/tube	QTY/inner carton	QTY/master carton
50	2000	20000



PACKING SIZE:2.5K/disc



SOP-8 Package					
A0 (mm)	B0 (mm)	K0 (mm)	W (mm)	F (mm)	E1 (mm)
6.60±0.1	5.2±0.1	1.9±0.1	12.00±0.1	5.50±0.1	1.75±0.1
P0 (mm)	P1 (mm)	P2 (mm)	$\phi D0$ (mm)	$\phi OD1$ (mm)	
4.00±0.1	8.0±0.1	2.0±0.1	1.5±0.1	1.55±0.05	



**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.**

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