SPECIFICATION

1. DESCRIPTION

The DK1203 is a secondary side flyback type AC-DC Switch Mode Power Controlling IC. With integrated 700V high voltage power transistor, patented self-power supply circuit and integrated MOS circuit design, lots of external components are saved, transformer design is simple, only two windings is needed for the transformer in isolated output circuit.

2. APPLICATIONS

·AC/DC power adapters
·Air conditioner power supply
·DVB power supply
·TV/Monitor power supply
·DVD/VCD power supply
· Electromagnetic oven power supply
· LED driver applications

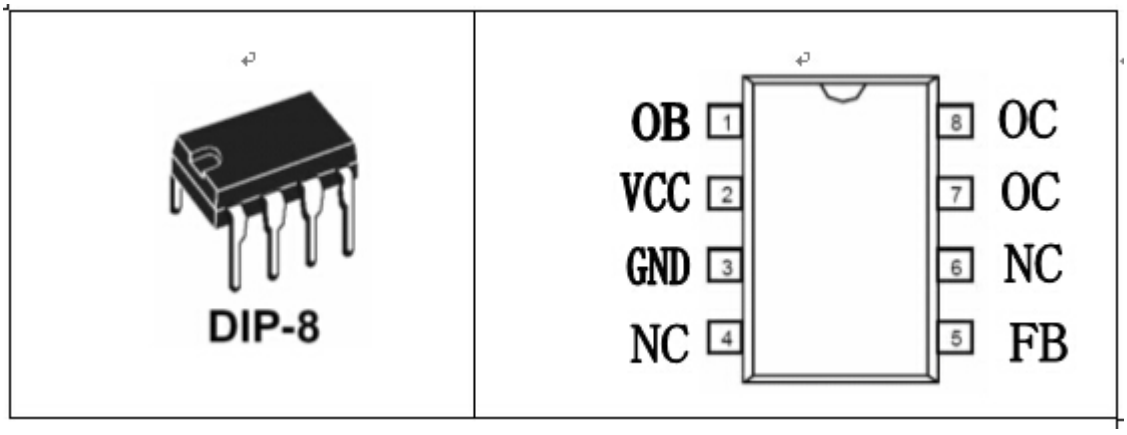
3. MAIN FEATURES

· 85V—265V wide range AC power input.
· Build-in 700V power transistor.
· Internal integrated high voltage starting circuit, no need for additional resistance.
· Integrated self-start circuit.
· Pulse-Width Modulation (PWM) controlled system.
· VCC operating voltage range: 4-6V.
· 65kHz switching frequency.
· Automatically turn to skip cycle mode under light load condition.
· Over current, Over loading, Over temperature and Over voltage Protection.
· Standby power consumption lower then 0.3W.
· Internal frequency modulation circuit to reduce EMI filter cost.

4. POWER RANGE

Input Voltage	85-265V AC	85-145V AC	180-265V AC
MAX. output power	12W	12W	18W

5. CONNECTION DIAGRAM (DIP-8)



PIN FUNCTION

Pin NO.	Pin Name	Function
1	OB	Startup pin. Internal startup circuit to contact with OC pin.
2	VCC	Power supply of control circuits, contacted with an external grounded capacitor of 10uF~100uF
3	GND	Ground reference
4	NC	Empty pin without internal connection.
5	FB	Feedback control pin， connected with 1nF ～ 10nF grounded capacitor, coupler grounded to control output.
6	NC	Empty pin without internal connection.
7,8	OC	Output pin. Connected with internal high voltage Collector point and switch mode transformer.

6. ABSOLUTE MAXIMUM RATINGS

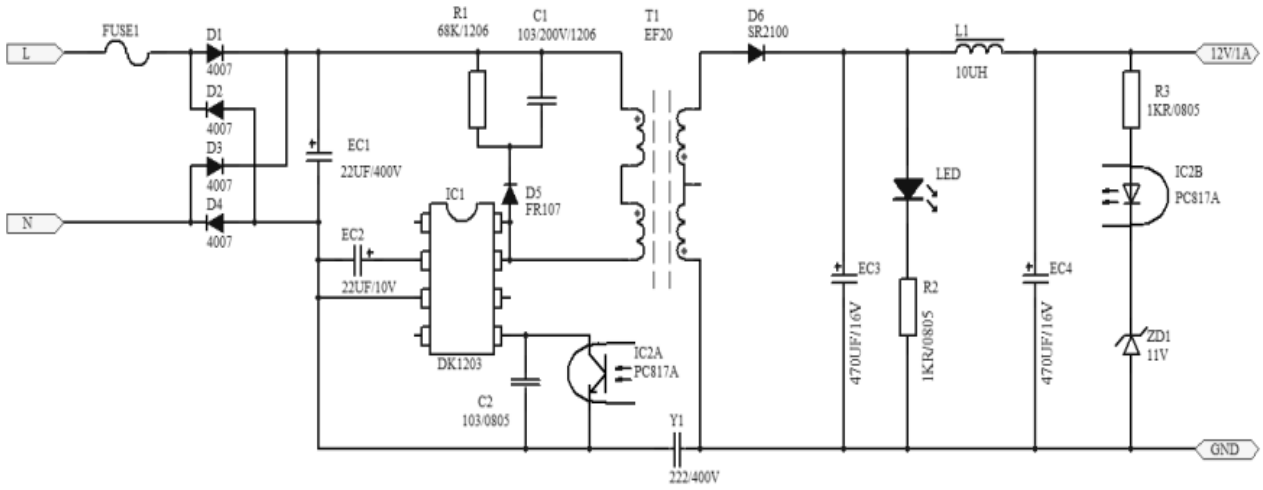
Symbol	Parameter	Value	Unit
Vcc	Supply voltage	-0.3V--8	V
Ivcc	Current of supply voltage	100	mA
Vpin	Pin voltage	-0.3--Vcc+0.3	V
Vcol	Collector to GND voltage	-0.3--730	V
Ip	Peak current	0.8	A
Pd	Dissipation power	1000	mW
Tc	Case operating temperature	-20--+125	℃
Tstg	Storage temperature	-55--+150	℃
Tsol	Soldering temperature	+280	℃/5S

7. ELECTRICAL CHARACTERISTIC

Parameter	Condition	Value			Unit
		Min.	Typ.	Max.	
Vcc (Work Power Supply)	AC input: 85V-265V	4	5	6	V
Start threshold Voltage	AC input: 85V-265V	4.8	5.0	5.2	V
Restart Voltage	AC input: 85V-265V	3.6	4.0	4.2	V
Protect Voltage of VCC	AC input: 85V-265V	6.25	6.55	6.85	V
Current of Vcc	Vcc=5V, Fb=2.2V	10	20	30	mA
Start time	AC input: 85V	--	--	500	mS
BJT Voc Breakdown voltage	Ioc=1mA	700	--	--	V
OC Protection Voltage	L=1.2mH	460	480	500	V
Peak Current Protection	Vcc=5V, Fb=1.6V---3.6V	650	720	800	mA
PWM Output frequency	Vcc=5V, Fb=1.6V---2.8V	50	65	70	Khz
	Vcc=4.6V, Fb=2.8V---3.6V	0.05	---	65	Khz
Stepped Frequency	Vcc=4.6V, Fb=1.6V---2.8V	0.8	1	1.2	Khz
Temperature protection	Vcc=4.6V, Fb=1.6V---3.6V	120	125	130	℃
Duty cycle of PWM	Vcc=4.6V, Fb=1.6V---3.6V	5	--	75	%
Control voltage Fb	AC input: 85V-265V	1.6		3.6	V

8. TYPICAL APPLICATION SAMPLE

(12V1A OUTPUT FLYBACK TYPE SWITCH MODE POWER SUPPLY)



8.1 Components list

NO.	NAME	SPEC. / MODEL NO.	POSITION	USED QTY	REMARK
1	Fuse	F2A/AC250V	F1	1	
2	Diode	IN4007	D1~D4	4	
3	Diode	FR107	D5	1	

4	Diode	SR2100	D6	1	
5	Zener Diode	11V/0.5W	ZD1	1	
6	Electrolytic capacitor	22uF/400V	EC1	1	
7	Electrolytic capacitor	22uF/10V	EC2	1	
8	Electrolytic capacitor	470uF/16V	EC3,4	2	
9	Ceramic capacitor	103/200V	C1	1	
10	Ceramic capacitor	103/25V	C2	1	
11	IC	DK1203	IC1	1	
12	Y capacitor	222/400V	Y1	1	
13	I-shape inductance	10uH	L1	1	
14	LED	red	LED	1	
15	Photo-coupler	PC817	IC2	1	
16	Transformer	EF20	T1	1	
17	Resistance	100K/0.25W	R1	1	
18	Resistance	1K/0.125W	R2,3	2	

8.2 TRANSFORMER DESIGN (for reference only)

8.2.1 Parameter confirmation: confirm the below parameter before transformer design

(1) Input voltage range: AC85V-265V

(2) Output Voltage and current: DC12V 1A

(3) Switch frequency: 65Khz

(4) MAX. duty cycle: D=0.5

8.2.2 Core selecting

(1) Input power calculation

P=Pout/η (η is the efficiency of the power supply, take it 0.8 for example), Pout=Vout*Iout=12V*1A=12W, so P =12/0.8=15W.

(2) Choose the core:

Checking via supplier or the correlative chart can know that EE25 or EF20 core is suitable for 15W power supply. Now we choose EE25 for below calculation.

8.2.3 Original input voltage

V_s =85*1.3=110V

8.2.4 PMW conducting time

T_{on} =(1/F)*D=(1/65)*0.5=7.7uS

8.2.5 Number of the original(input) turns (Np)

$$N_p = \frac{V_s \times T_{on}}{\Delta B_{ac} \times A_e} = \frac{110 \times 7.7}{0.2 \times 50} \approx 85\text{匝}$$

8.2.6 Number of the output turns (Ns)

$$N_s = \frac{V_{out} \times N_p}{V_{or}} = \frac{13 \times 85}{100} = 11\text{匝}$$

8.2.7 The primary inductance

$$L_p = \frac{V_s \times T_{on}}{I_p} = \frac{110 \times 7.7}{720} \approx 1.2mH$$

8.2.8 Leakage inductance of a transformer

It is suggested to use P/S/P way to wind the transformer so that to reduce the leakage inductance.

Important notice:

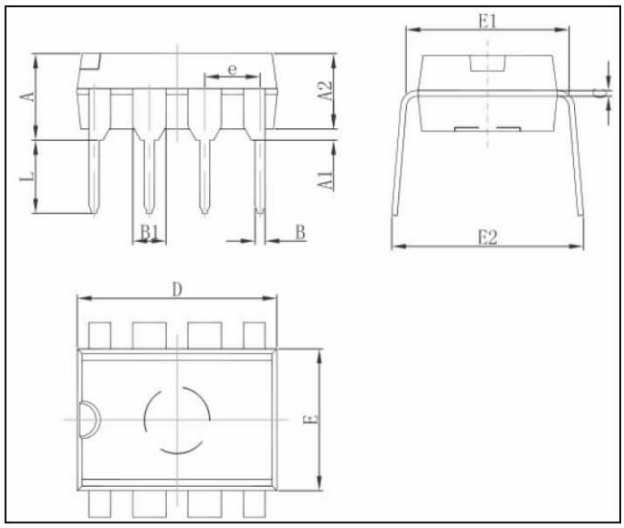
9. SPECIAL NOTICE FOR PBC LAYOUT DESIGN

9.1 Heat dissipation: A good estimate is that the controller will dissipate the output power. So enough cooper area connected to the 7, 8 COLLECTED pins and tin-plating are necessary to provide the controller heat sink.

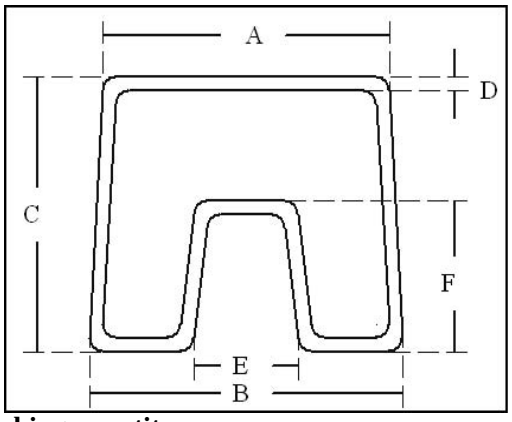
9.2 The 7, 8 COLLECTED pins is high voltage part of the IC, peak voltage is as high as 600V, so it should be at least 1.5mm far away from the low voltage part in the PCB as to avoid circuit breakdown and discharging.

10. MECHANICAL AND PACKING INFORMATION

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	9.000	0.331	0.354



· Antistatic pipe packing:



signal	MIN. (mm)	RATED (mm)	MAX. (mm)
A	11	11.5	12
B	11.5	12	12.5
C	10	10.5	11
D	0.4	0.5	0.6
E	3.5	4	4.5
F	5	5.5	6

· Packing quantity

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