

General Description

SDC603 is a high-performance current mode control IC designed for AC/DC convertor, which supplies about continuous 12W output power at the universal AC input range from 85V to 265V.

Features

- Built-in high voltage power transistor of 700V
- High voltage start-up
- Very low start-up and operating current
- Low standby power consumption
- Protections: OVP, UVLO, SCP, OLP and OTP
- Built-in high precise current limit with temperature compensation
- 12W and peak 15W output power at the universal AC input range
- 15W and peak 18W output power at AC input 220V
- Very few external components
- Package: DIP-8

Applications

- Offline AC/DC flyback converter
- Adaptor/Charger for cell and other Portable Apparatus
- Open Frame (for example, DVD, DVB)



Figure 1. Package Type

December, 2013 Rev. 1.2

Datasheet

SDC603



Current Mode PWM Controller

Pin Configuration

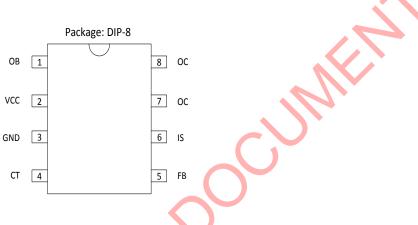


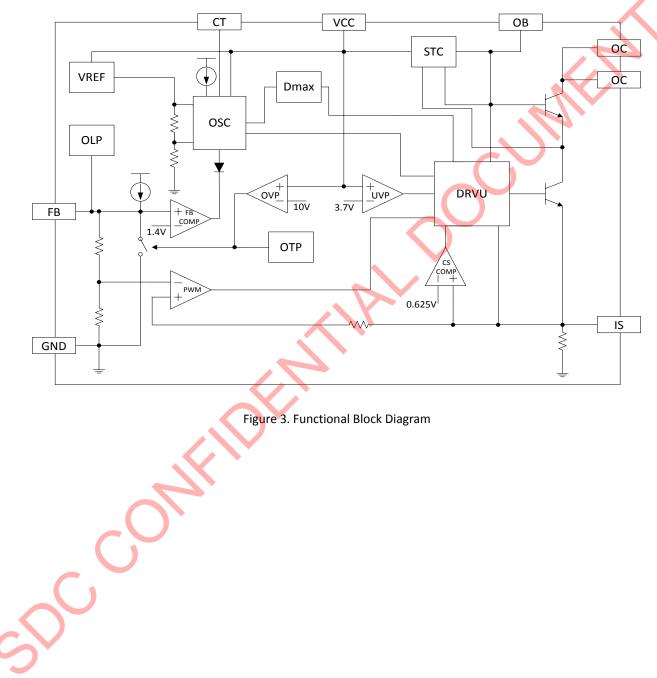
Figure 2. Pin Configuration

Pin Number	Pin Name	Function		
1	ОВ	Startup current input, connecting to startup resistor		
2	VCC	Supply voltage pin		
3	GND	Ground		
4	СТ	Oscillate capacitor pin		
5	FB	Feedback pin		
6	IS	Cycle-by-cycle current limit, connecting a resistor to GND		
7,8	OC	Output of HV transistor, connecting to primary wind of transformer		

Table 1. Pin Description



Functional Block Diagram



Datasheet

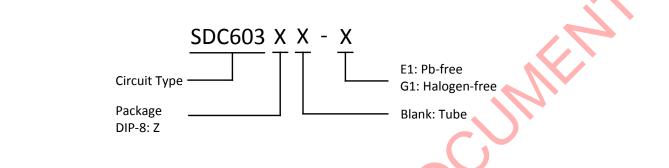
SDC603



Datasheet

SDC603

Ordering Information



Daskaga Tamparatura		Part Number		Mark	Decking Type		
Package	Temperature	Pb-free	Halogen-free	Pb-free	Halogen-free	Packing Type	
DIP-8	-40℃~85℃	SDC603Z -E1	SDC603Z -G1	SDC603	SDC603G	Tube	



Datasheet

SDC603

Absolute Maximum Ratings (NOTE: Stresses greater than those listed under Absolute Maximum Ratings may cause permanent damage to the device.)

Parameter	Symbol	Value	Unit
Power supply voltage VCC	V _{cc}	18	V
Endurance voltage of OC collector	V _{CB}	-0.3~700	V
Peak value of switching current	۱ _p	1000	mA
Total dissipation power	PD	1000	MW mW
Collector current	Ι _c	1.8	А
Operating temperature	TJ	-40~150	°C
Storage temperature range	T _{STG}	-55~150	°C
Lead temperature (soldering, 10sec)	T _{LEAD}	260	°C
Latch-up test per JEDEC 78	-	200	mA
ESD, HBM model per Mil-Std-883, Method 3015	нвм	2000	V
ESD,MM model per JEDEC EIA/JESD22-A115	ММ	200	V

Table 2. Absolute Maximum Ratings

Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Power supply voltage, VCC	V _{cc}	4.8	9.0	V
Oscillating frequency	f _{osc}	55	68	kHz
Operating temperature	Та	-40	85	°C

Table 3. Recommended Operating Conditions



Datasheet

SDC603

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Para	ameter	Symbol	Conditions	Min	Тур	Max	Unit
		Output Sec	tion				7.
On-state saturation vo	oltage drop	V_{SAT}	I _{oc} =600mA -		-	1	v
Output rise time		Tr	C _L =1nF -		-	75	ns
Output fall time		$T_{\rm f}$	C _L =1nF	-		75	ns
HV start-up current		I _{STC}	- 1			2.6	mA
		Oscillator Se	ection				
Oscillating frequency		f_{OSC}	С _т =680pF 55		61	68	kHz
Temperature Stability		$\triangle F_v$	V _{cc} =4.8V~9V	-	-	1	%
Temperature Stability		ΔF _T	Ta=0°C~85°C	-	-	1	%
Peak to peak value of	oscillator	V _{P-P}		-	2.5	-	V
Fall time of oscillator		Tf	С _т =680рF	-	800	-	ns
		Feedback Se	ection		1		
	Pull-up current	I _{FB}	$V_{FB} = 2.5V$	0.35	0.45	0.70	mA
Input impedance	Pull-down resistance	R _{FB}	-	10	15	20	kΩ
PSRR		-	V _{cc} =4.8V~9V	-	60	70	dB
	Cu	rrent Samplir	g Section	L			
Over current threshold	d voltage	$V_{\text{TH_OC}}$	-	0.60	0.625	0.65	V
IS-GND resistance		I TH_OC	_	15	20	25	Ω
PSRR		_	-	-	60	70	dB
Over current detection	n and control delay	T _D	-	-	150	250	ns
C		PWM Sect	tion	L			
Maximum duty cycle		D_{MAX}	V _{FB} =4.0V	52	57	62	%
Minimum duty cycle		D_{min}	_	-	1.5	_	%
9	Р	ower Current	Section		1		
Startup leakage current		I _{ST}	-	-	15	50	uA
Static operation current		I _{OP}	V _{FB} =0V, V _{CC} =8V	2.0	2.8	4.0	mA
Startup threshold volt	age	V _{st}	-	8.6	9.0	9.4	V

Electrical Characteristics (Ta=25°C, V_{CC} =7.0V, C_T =680pF, R_{IS} =1 Ω , unless otherwise specified)

December, 2013 Rev. 1.2



SPONT

Datasheet

SDC603

Parameter	Symbol	Conditions	Min	Тур	Max	Unit
Restart voltage	V _{RST}	-	1.7	2.0	2.4	V
Over voltage protection	Vov	-	9.6	10.0	10.6	v
	OTP Sect	ion			$\langle \rangle$	
Thermal shutdown temperature	T _{OTP}	-	-	150		°C
	Mosft Sec	tion				
Collector cutoff current	I cbo	V _{CB} =700V, I _E =0			0.1	mA
Collector-emitter cutoff current	I ceo	V _{CE} =450V, I _B =0		-	0.1	mA
Collector-base cutoff current	I _{EBO}	V _{EB} =9V, I _C =0) -	-	0.1	mA
Collector-base breakdown voltage	V _{CBO}	I _c =0.1mA	700	-	-	V
Collector-emitter sustain voltage	V _{CEO}	I _C =1mA	450	-	-	V
Collector-base sustain voltage	V _{EBO}	I _E =0.1mA	9	-	-	V
DC current gain	h _{FE}	V _{CE} =5V, I _C =0.5A	15	-	50	-
Collector-emitter saturation voltage	V _{CE_STA}	I _C =1A, I _B =0.25A		0.3	0.8	V
Base-emitter saturation voltage	V BE_STA	I _C =1A, I _B =0.25A		0.8	1.2	V

Table 4. Electrical Characteristics







Function Description

Startup control

During Startup phase, reference voltage, the oscillator and all protection circuits are OFF. Startup current of SDC603 is designed to be very low so that VCC could be charged up above UVLO threshold level and device starts up quickly. A large startup resistor can therefore be used to minimize the power loss yet achieve a reliable startup in application.

PWM control

The peak current (sensed on the IS pin) is set by the voltage on FB pin. By comparing the voltage on FB pin and the IS ramp voltage, the duty-cycle of the PWM modulator is thus adjusted to provide the necessary load current at the desired output voltage. FB can be controlled by internal control circuit and external feedback circuit.

VCC over voltage protection

VCC over voltage protection circuit is integrated into IC. When VCC voltage reaches 9.8V(TYP), FB voltage is pulled down via internal control circuit, then the PWM switching is shut off. When VCC voltage goes down below 9.8V(TYP), the switching is reactivated. The VCC over voltage protection ensures IC to operate reliably.

Current limit

The output is shut off to limit the power when voltage of IS Pin exceeds Current sense threshold voltage.

Green mode control

Under no-load and light-load condition, the switching frequency internally decreases to lower the switching power loss and improve the conversion efficiency. If FB is less than 1.4V(Typ), the cycle of the oscillator will increase

with it, the less FB is, the wider the cycle of the oscillator is, until the oscillation stop.

Power transistor Drive

During the ON cycle, OB pin supplies base current for the power transistor, OE pulls down the emitter of the power transistor to IS, and OB is adaptive to the IS current, if the current of IS exceeds the specified current of FB, SDC603 will turn into the OFF cycle. During the OFF cycle, OB is pulled down, the power transistor will shut off.

Over temperature Protection

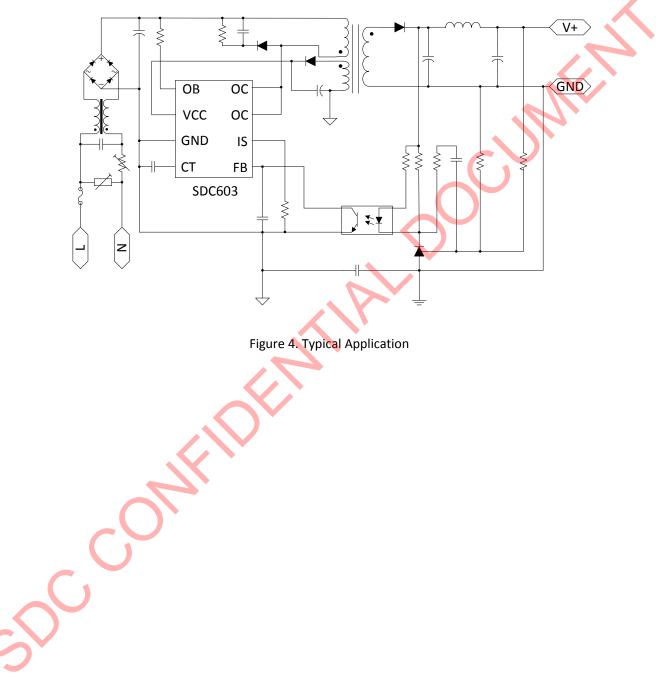
When IC's internal temperature reaches 150°C, FB voltage will be pulled down by internal control circuit, the switching frequency decreases or shut off. This protection protects the IC from over temperature.

Cooling Requirements

Layout is important for all switching regulators. To achieve high efficiency, good regulation, and stability, a well designed printed circuit board layout is required. The main power loss inside IC is produced by the internal transistor, an extra copper plane at the pin7 and pin8 help dissipate the heat generated by losses in transistor. For a typical application (AC input from 85V to 265V, 12W output), and 200mm² copper plane is necessary.



Typical Application



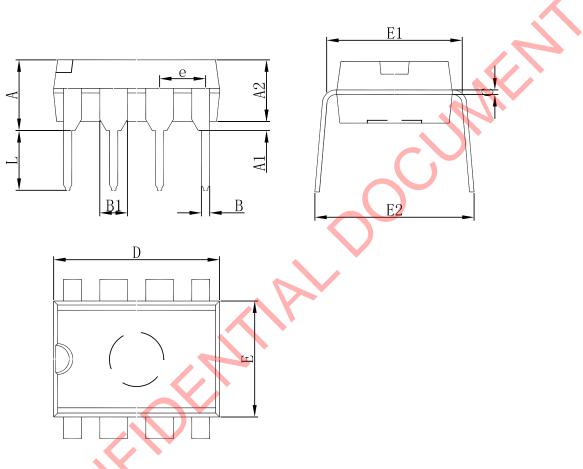
Datasheet

SDC603



Package Dimension

DIP-8



Symbol	Dimensions In Millimeters		Dimensions In Inches		
	Min	Max	Min	Max	
А	3.710	4.310	0.146	0.170	
A1	0.510		0.020		
A2	3.200	3.600	0.126	0.142	
В	0.380	0.570	0.015	0.022	
B1	1.524(BSC)		0.060(BSC)		
С	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	
е	2.540(BSC)		0.100	(BSC)	
L	3.000	3.600	0.118	0.142	
E2	8.400	9.000	0.331	0.354	

SDC603



Datasheet

SDC603



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