

General Description

SDC608 is a high-performance current mode control IC designed for AC/DC convertor, which supplies about continuous 3.8W output power at the universal AC input range from 85V to 265V.

Features

- Built-in oscillator
- Built-in high voltage power transistor of 700V
- Cycle-by-cycle current limit
- Very low power consumption under no load
- Internal slope compensation and feedback compensation
- Over load protection
- Built-in high precise current limit with temperature compensation
- Over temperature protection
- Low startup and operating current
- VCC over-voltage clamp
- 3.8W output power at the universal AC input range, 4.5W output power at AC input 220V
- Package: SOP-7

Applications

- Offline AC/DC flyback converter
- Adaptor/Chargers for cell and other portable apparatus

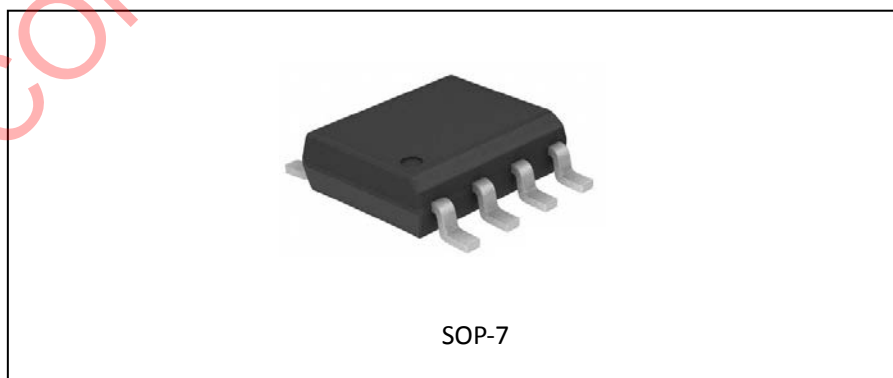


Figure 1. Package Type

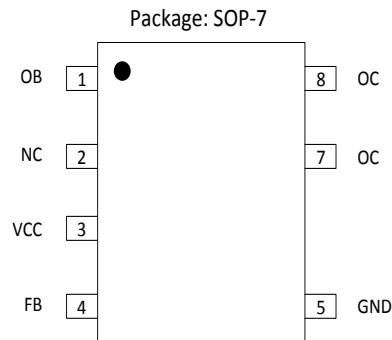
Pin Configuration


Figure 2. Pin Configuration

Pin Number	Pin Name	Function
1	OB	Start up current input, connecting to start-up resistor
2	NC	NC
3	VCC	Supply voltage pin
4	FB	Feedback pin
5	GND	Ground
7,8	OC	Output of HV transistor, connecting to primary wind of transformer

Table 1. Pin Configuration

Functional Block Diagram

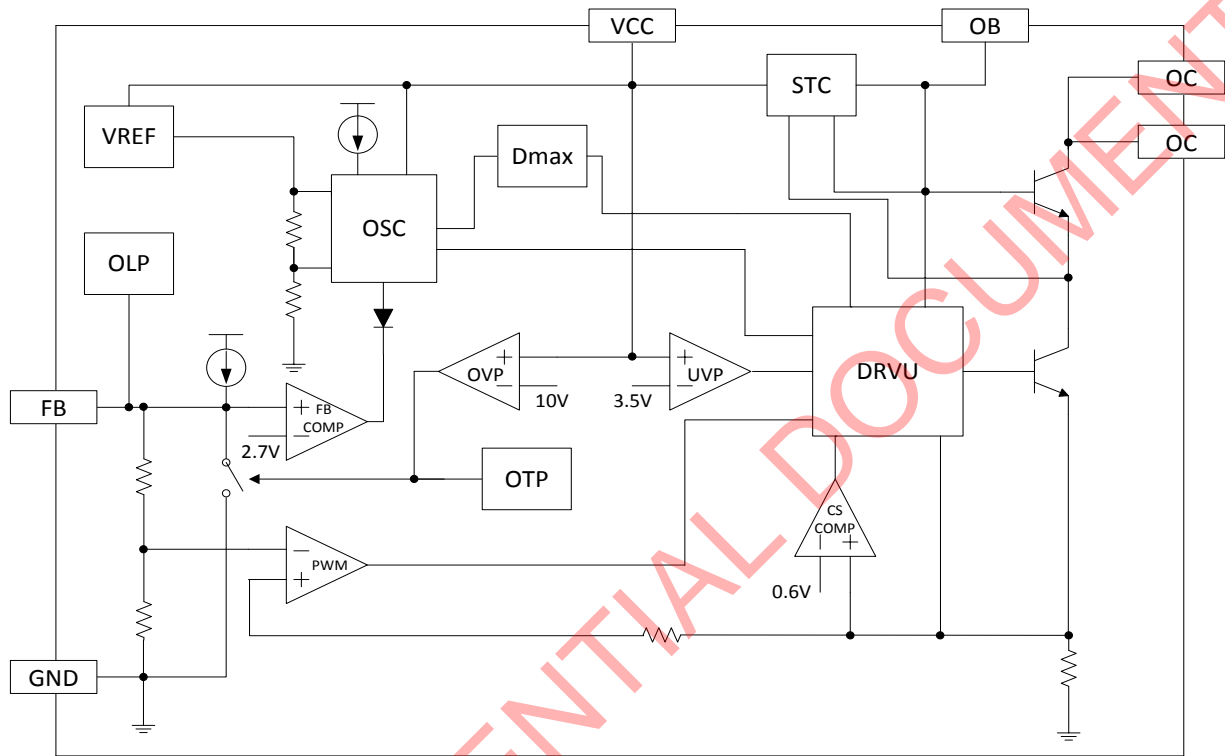
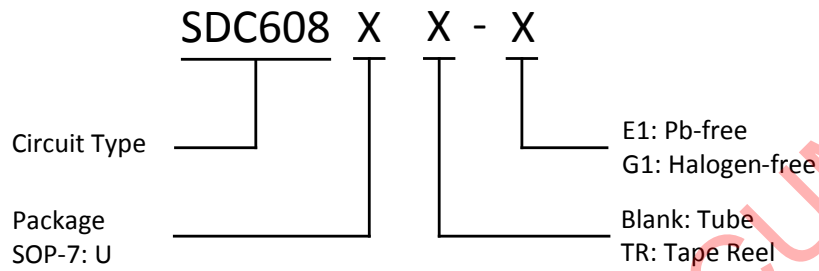


Figure 3. Functional Block Diagram

Ordering Information


Package	Temperature	Part Number		Marking ID		Packing Type
		Pb-free	Halogen-free	Pb-free	Halogen-free	
SOP-7	-40°C~85°C	SDC608U-E1	SDC608U-G1	SDC608	SDC608G	Tube
		SDC608UTR-E1	SDC608UTR-G1	SDC608	SDC608G	Tape Reel

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
Collector current	I _C	1.5	A
Endurance voltage of OC collector	V _{CB}	-0.3~700	V
Peak value of switching current	I _p	330	mA
Total dissipation power	P _D	460	mW
Operating Junction Temperature	T _J	-40~150	°C
Storage temperature range	T _{STG}	-55~150	°C
Lead temperature (soldering, 10sec)	T _{LEAD}	260,10s	°C
Latch-up test per JEDEC 78	-	200	mA
ESD, HBM model per Mil-Std-883, Method 3015	HBM	2000	V
ESD, MM model per JEDEC EIA/JESD22-A115	MM	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
Operating temperature	T _a	-40	85	°C

Table 3. Recommended Operating Conditions

Electrical Characteristics (Ta=25°C, V_{CC} =7.0V, unless otherwise specified)

Parameter		Symbol	Conditions	Min	Typ	Max	Unit
Output Section							
On-state saturation voltage drop		V _{SAT}	I _{OC} =290mA	-	-	1	V
Output rise time		T _r	C _L =1nF	-	-	75	ns
Output fall time		T _f	C _L =1nF	-	-	75	ns
HV start-up current		I _{STC}	-	1	-	2.6	mA
Oscillator Section							
Oscillation frequency		f _{OSC}	-	55	61	68	kHz
Temperature Stability		ΔF _V	V _{CC} =4.8V~9V	-	-	1	%
Temperature Stability		ΔF _T	Ta=0°C~85°C	-	-	1	%
Feedback Section							
Input impedance	Pull-up current	I _{FB}	V _{FB} =2.5V	0.40	0.55	0.70	mA
	Pull-down resistance	R _{FB}	-	10	15	20	kΩ
PSRR		-	V _{CC} =4.8V~9V	-	60	70	dB
Current Sampling Section							
Over current threshold voltage		V _{TH,OC}	-	0.55	0.60	0.65	V
Current limit		I _{TH,OC}	-	0.27	0.29	0.31	A
PSRR		-	-	-	60	70	dB
Over current detection and control delay		T _D	-	-	150	250	ns
PWM Section							
Maximum duty cycle		D _{MAX}	V _{FB} =4.0V	52	57	62	%
Minimum duty cycle		D _{MIN}	-	-	1.5	-	%
Power Current Section							
Startup leakage current		I _{ST}	-	-	15	50	μA
Static operation current		I _{OP}	V _{FB} =0V, V _{CC} =8V	2.0	2.8	4.0	mA
Startup threshold voltage		V _{ST}	-	8.6	9.0	9.4	V
Minimal operating voltage		V _{UV}	-	3.2	3.5	3.8	V
Restart voltage		V _{RST}	-	1.7	2.0	2.4	V
Over voltage protection		V _{OV}	-	9.6	10	10.6	V

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
OTP Section						
Thermal shutdown temperature	T_{OTP}	-	-	150	-	$^{\circ}C$
BJT Section						
Collector cutoff current	I_{CBO}	$V_{CB}=700V, I_E=0$	-	-	0.1	mA
Collector-emitter cutoff current	I_{CEO}	$V_{CE}=400V, I_B=0$	-	-	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}	$I_C=1mA$	400	-	-	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	-	30	-
Collector-emitter saturation voltage	V_{CE_STA}	$I_C=1A, I_B=0.25A$		0.3	0.9	V
Base-emitter saturation voltage	V_{BE_STA}	$I_C=1A, I_B=0.25A$		0.9	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 SDC608 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

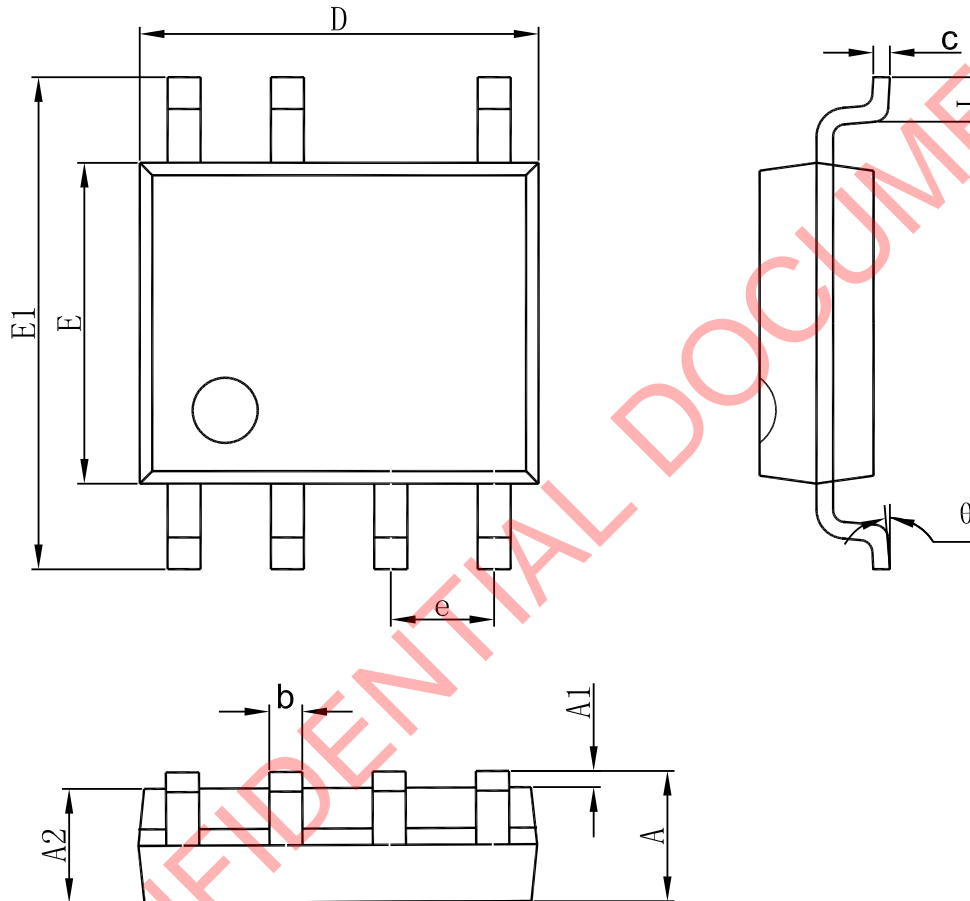
Under no-load and light-load condition, the switching frequency internally decreases to lower the switching power loss and improve the conversion efficiency. If FB is less than 2.7V(Typ), the cycle of the oscillator will increase with it, the less FB is, the wider the cycle of the oscillator is, until 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, SDC608 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.

Package Dimension
SOP-7


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.007	0.010
D	4.700	5.100	0.185	0.201
e	1.270 (BSC)		0.050 (BSC)	
E	5.800	6.200	0.228	0.244
E1	3.800	4.000	0.150	0.157
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°



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Contact us:

Headquarters of Shaoxing
Address: Tian Mu Road, No13,
Shaoxing city, Zhejiang province, China
Zip code: 312000
Tel: (86) 0575-8861 6750
Fax: (86) 0575-8862 2882

Shenzhen Branch
Address: 22A, Shangbu building, Nan Yuan Road, No.68,
Futian District, Shenzhen city, Guangdong province, China
Zip code: 518031
Tel: (86) 0755-8366 1155
Fax: (86) 0755-8301 8528