Function overview

GP8891XS is a self-powered constant voltage, constant current primary side feedback control chip, suitable for chargers and adapters.

GP8891XS adopts special output line loss compensation technology, which can effectively compensate the loss voltage drop of output current on the output line.

GP8891XS built-in start circuit, no need for peripheral start resistance, built-in FB lower bias resistance and CS sampling resistance, the periphery is more concise.

GP8891XS built-in loop compensation circuit, no peripheral compensation circuit, the system has good stability.

GP8891XS can achieve good constant voltage, constant current characteristics, to meet the standby power consumption less than 75mW.

GP8891XS has multiple protection functions, including open circuit protection, overvoltage protection, output short circuit protection, secondary Schottky short circuit and other functions.

GP8891XS uses a unique single-cycle maximum current turn-off mechanism to avoid various failures caused by triode overcurrent.

The GP8891XS is packaged in SOP7.

Features

◆ Self-powered original side feedback control

Constant voltage, constant current high precision

◆≦75mW standby power consumption

◆ Adjustable output line loss compensation technology

◆ Open circuit protection, short circuit protection, over voltage protection, under voltage protection

Over temperature protection

◆ Suitable for double winding and three winding two working modes

Applications

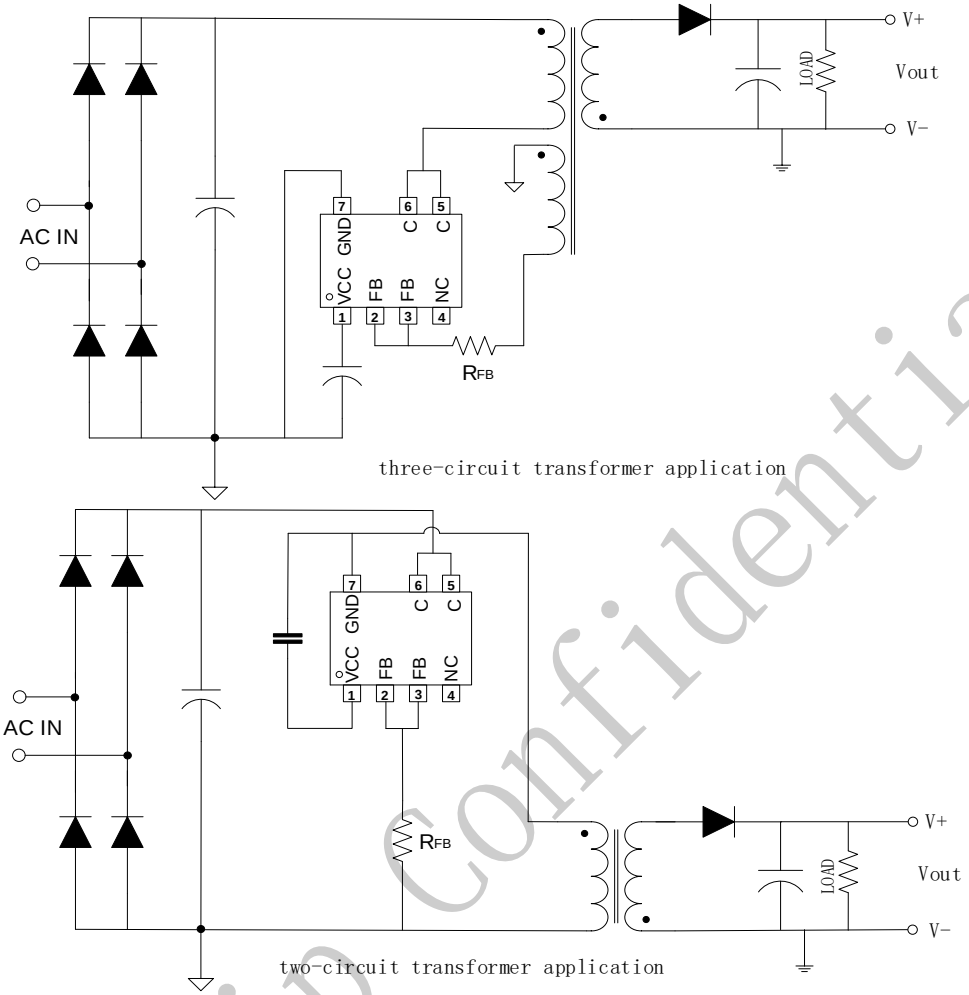
◆ Adapters and chargers for mobile phones, cordless phones, PDAs, MP3s and other portable devices

◆LED drive power supply

◆ Linear power supply and RCC switching power supply upgrade

Other auxiliary power supply

Typical application



Pin package

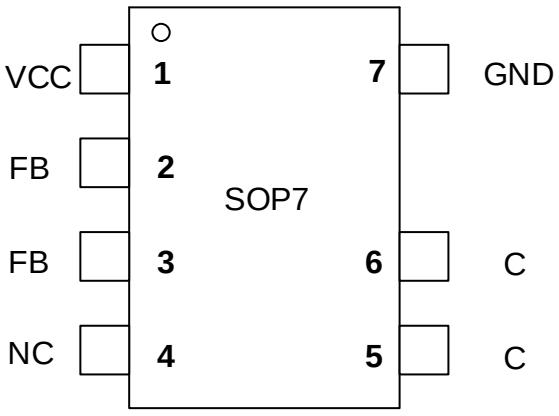
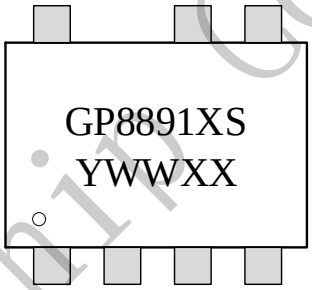


Figure 2 Pin package diagram

Pin description

Pin number	Pin name	Description
1	VCC	Chip power supply with nearby bypass capacitor
2	FB	Feedback voltage input
3	FB	Feedback voltage input
4	NC	Not connect
5,6	C	Collector C with built-in power BJT
7	GND	Chip Ground

Package Marking



Y:year（A-Z）
WW:week(01-52)
XX:Random code

Ordering information

Version	Package	Packaging form	Marking
GP8891XS	SOP7	Tape 4000 Pieces/Roll	GP8891XS YWWXX

Absolute Maximum Ratings

Symbols	Description	Parameters Range	Units
VCC	Power supply voltage	0.3 ~ 5	V
FB	Feedback voltage input end	0.3 ~ 6	V
θ_{JA}	Thermal resistance of the PN junction to the environment	120	℃/W
θ_{JC}	Thermal resistance of PN junction to tube shell	60	℃/W
T_J	Operating junction temperature range	-40 to 150	℃
T_{SZG}	Storage temperature range	-55 to 150	℃
Tlead (soldering 10s)	Maximum soldering temperature time	260	℃
	ESD (Note 2)	3	KV

Note 1: The maximum limit value means that outside this operating range, the chip may be damaged. The recommended operating range means that within this range, the device functions normally, but it is not fully guaranteed to meet individual performance indicators. Electrical parameters define the specifications for the DC and AC parameters of the device within the operating range and under test conditions that guarantee specific performance indicators. For parameters for which upper and lower limits are not given, the specification does not guarantee their accuracy, but their typical values reasonably reflect the device performance.

Note 2: For human body models, a 100pF capacitor is discharged through a 1.5KΩ resistor.

Recommended range of application

Model number	Vin: 85~265VAC, 50/60Hz
GP8891BS	3.5W (5V/700mA)
GP8891CS	5W (5V/1000mA)

Note 3: Chip surface limit temperature cannot exceed 135 ° C.

Electrical parameters (Note 4, 5)

Test environment VCC =5 V,Tmp =25℃						
Symbols	Description	Conditions	Minimum	Typical value	Maximum value	Units
Power supply voltage						
V_{CC_st}	V_{CC} Starting voltage	V_{CC} rise		4.2		V
V_{CC_UVLO}	V_{CC} Undervoltage protection threshold	V_{CC} Drop		2.8		V
V_{CC_CLAMP}	V_{CC} Overvoltage protection value	V_{CC} Rises		5.1		V
I_{SZ}	V_{CC} Starting current	V_{CC}= V_{CC_st}- 1V	0	1	3	uA
I_{cc}	V_{CC} Operating current			250		uA
Current sampling						
I_{PK}	Peak current	GP8891BS		220		mA
		GP8891CS		320		mA
T_{LEB}	Leading edge blanking time			500		ns
$I_{\_duty}$	Constant secondary current duty cycle			55%		
FB feedback						
V_{ref}	FB feedback reference voltage			1.1		V
T_{min_off}	Minimum turn-off time			2.5		us
T_{max_off}	Maximum shutdown time			5		ms
$R_{\_fbl}$	FB lower bias resistance			12		K Ω
Output line compensation						
V_{COMP_LINE}/Vout	Maximum output line fill ratio			2		%
Protection function						
V_{FB_UVP}	FB undervoltage protection voltage			0.3		V
$T_{\_UVP}$	Short circuit effective time			28		ms

T_{ON_MAX}	Maximum turn-on time			25		us
OTP	Overtemperature protection			155		℃
	Overtemperature recovery			123		℃
Built-in power triode						
V_{CBO}	C, B withstand pressure	GP8891BS I_C=0.1mA	800			V
		GP8891CS I_C=0.1mA	850			V
V_{CEO}	C and E withstand pressure	GP8891BS I_C=0.1mA	450			V
		GP8891CS I_C=0.1mA	450			V
Maximum operating frequency						
Fmax	Maximum operating frequency			70		Khz

Note 4: The typical parameter value is the standard parameter measured at 25℃.

Note 5: The minimum and maximum specification ranges of the specification are guaranteed by testing, and the typical values are guaranteed by design, testing or statistical analysis.

Internal structure block diagram

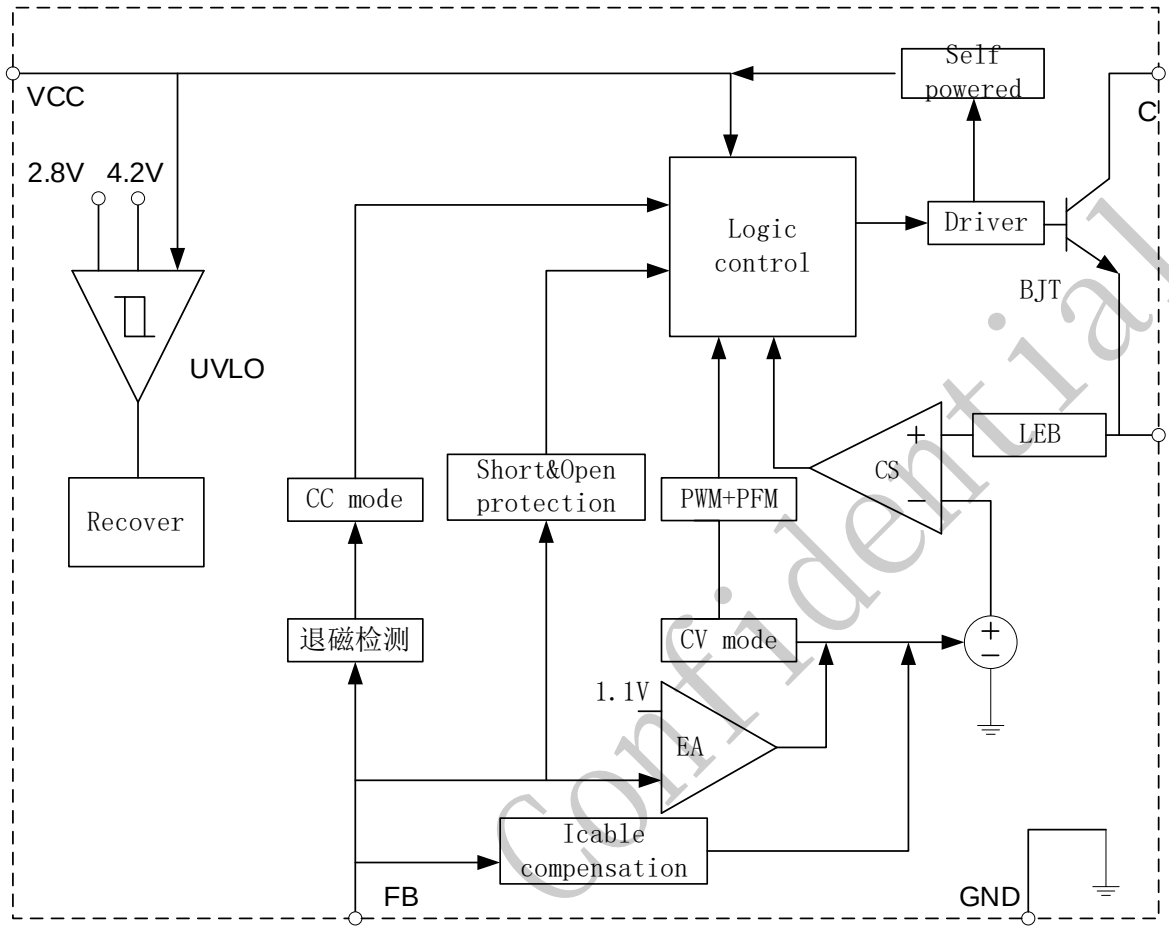


Figure 3 Internal block diagram of GP8891XS

Application information

GP8891XS is a constant voltage, constant current primary feedback control chip, the system works in intermittent mode, suitable for chargers and adapters and other auxiliary power supplies. GP8891XS adopts the unique output line loss compensation technology, which can effectively compensate the loss voltage drop of the output current in the output line. GP8891XS built-in loop compensation circuit, no peripheral compensation circuit, the system has good stability.

Booting

The chip only needs 1uA starting current. After the system is powered on, the capacitor of Vcc is charged through the built-in starting resistance. When the Vcc voltage reaches the chip opening threshold, the internal control circuit of the chip starts to work. After the system is started, the system supplies power to the Vcc capacitor through the bootstrap circuit.

Constant current control, output current setting

The chip detects the peak current of the inductor cycle by cycle, and the internal peak

current sampling is compared with the internal threshold voltage. When the detected voltage reaches the internal threshold, the power tube is turned off.

Output current calculation method:

$$I_O(mA) = \frac{2}{7} \times I_{P\_PK} \times \frac{N_P}{N_S}$$

Where, Np is the number of turns of the transformer main stage, Ns is the number of turns of the transformer secondary, is the peak current of the main stage side. I_{P_PK}

Constant voltage control, output voltage setting

GP8891XS keeps the output voltage Vout by sampling the platform voltage of the auxiliary winding or primary side winding and comparing the closed loop with the internal reference after voltage division.

Double winding application:

$$V_{out} = \frac{V_{ref} \times (12K + R_{FB})}{12K} \times \frac{N_s}{N_P} - V_{be}$$

Among them, is the resistance of the chip FB pin to GND, is the number of turns of the primary side winding, the number of turns of the secondary side winding, and the secondary diode voltage drop. $R_{FB} N_P N_s V_{be}$

Under the application of three winding:

$$V_{out} = \frac{V_{ref} \times (12K + R_{FB})}{12K} \times \frac{N_s}{N_{aux}} - V_{be}$$

Among them, is the resistance between FB foot and the auxiliary winding, is the number of turns of the auxiliary winding, the number of turns of the secondary side winding, secondary diode voltage drop. $R_{FB}\ N_{aux} N_s V_{be}$

Protection function

The GP8891XS has a variety of built-in protection functions, including output open/short circuit protection, V_{CC} undervoltage/overvoltage protection, etc.

PCB Design

The following guidelines need to be followed when designing a PCB for the GP8891XS:

① Bypass capacitor

The bypass capacitor of the Vcc needs to be close to the chip Vcc and GND pins.

②FB pins

The divider resistance connected to FB must be near the FB pin, and the node should be far from the moving point of the primary winding of the transformer.

③ Ground Wire

The power ground wire of the current sampling resistor should be as short as possible, and the ground wire of the chip and other small signals should be separately connected to the ground end of the bus capacitor.

④ Area of the power loop

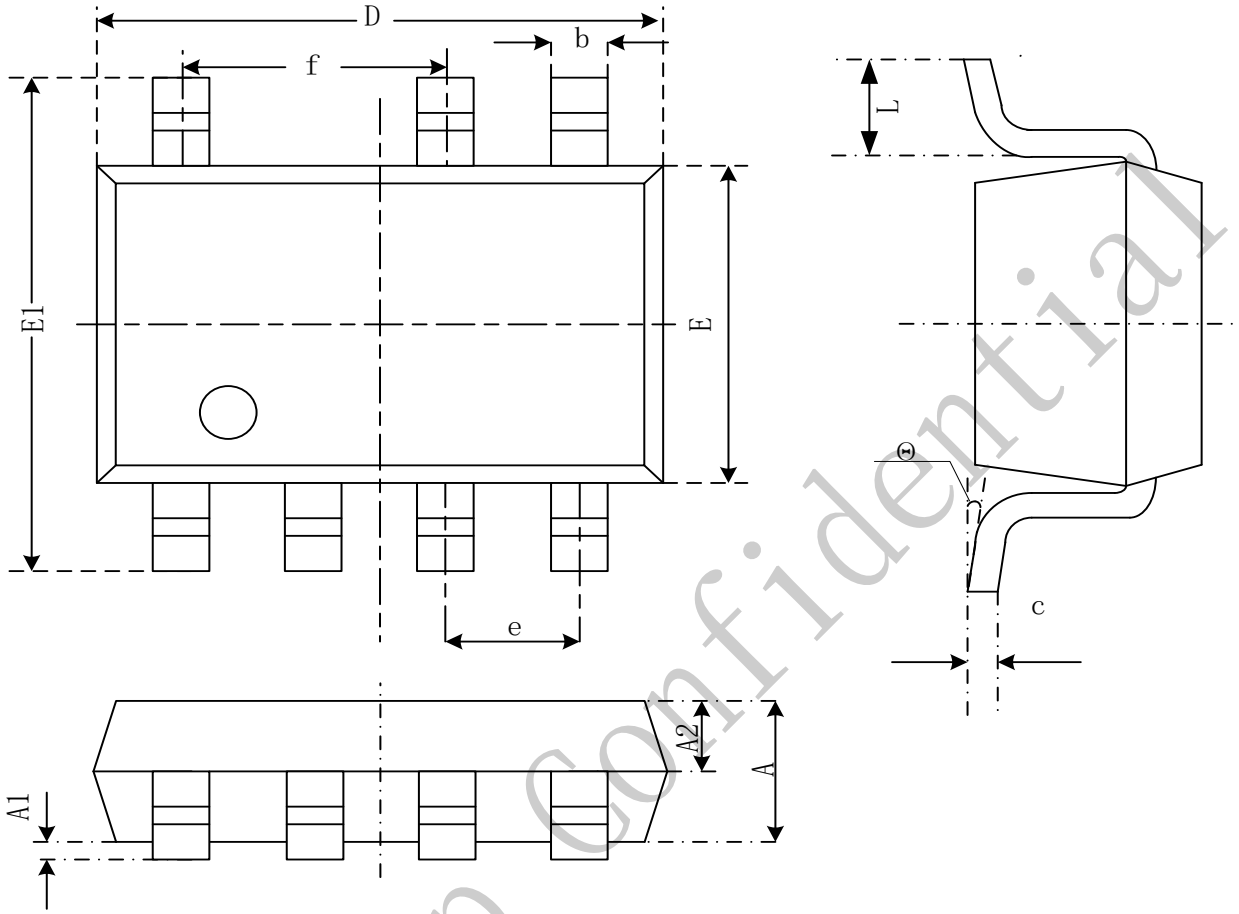
Reduce the area of the power loop, such as the primary side winding of the transformer, the power tube, the loop area of the busbar capacitor, and the loop area of the transformer secondary side winding, the rectifier diode, and the output capacitor to reduce EMI radiation.

⑤ Pin C

Increase the copper paving area of pin C to improve chip heat dissipation.

Package Information

SOP7 PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.000	0.120	0.002	0.010
A2	0.65	0.75	0.026	0.030
b	0.300	0.510	0.012	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.150	0.185	0.203
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270 (BSC)		0.050 (BSC)	
f	2.540 (BSC)		0.100 (BSC)	
L	0.400	1.270	0.016	0.050
Theta.	0 DHS	8 DHS	0 DHS	8 DHS

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