



Description

The S2269SC is a highly integrated current mode PWM controller IC for those high output power of off line flyback convertor. The output power is up to 120W.

S2269SC is integrated start-up circuit that realizes low quiescent dissipation and overload compensation.

S2269SC has comprehensive protection feature to ensure reliability of application system. The packaging of S2269SC has SOP8 and DIP8.

Features

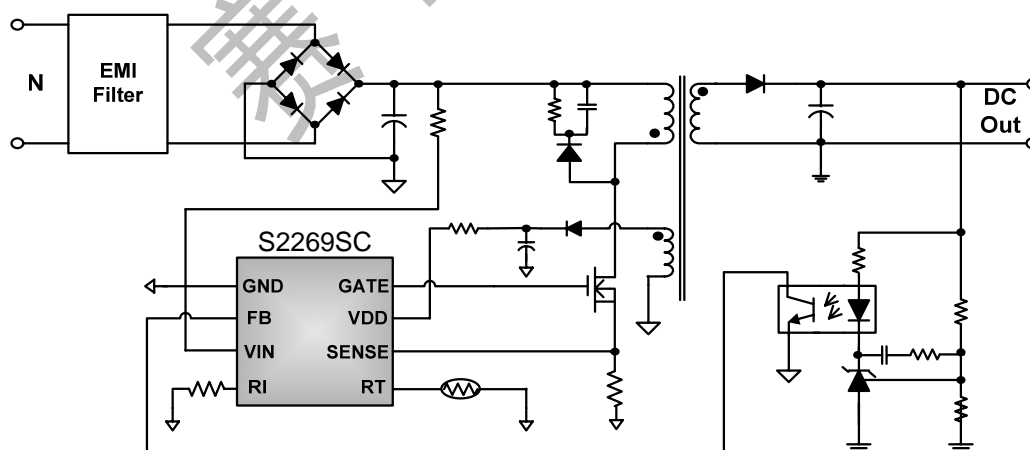
- Digit frequency shuffling technology to improve EMI performance.
- External programmable PWM switching frequency.
- Leading edge Blanking on current sense input.
- Internal synchronized slope compensation .
- Burst mode control to improve efficiency and optimize standby power consumption.

- Low start-up current and low operating current.
- Comprehensive protection functions
 - 1、 Under voltage locked with hysteresis (UVLO) on VDD
 - 2、 Over voltage protection (OVP) on VDD.
 - 3、 Cycle-by-Cycle current limitation
 - 4、 Over load protection (OLP)
 - 5、 Over temperature protection (OTP)
- Current limitation compensation to obtain the same output current in universal AC line input.
- 800mA Drive Capability

Applications

- Digital Cameras Charger
- Power adaptor
- Battery charger

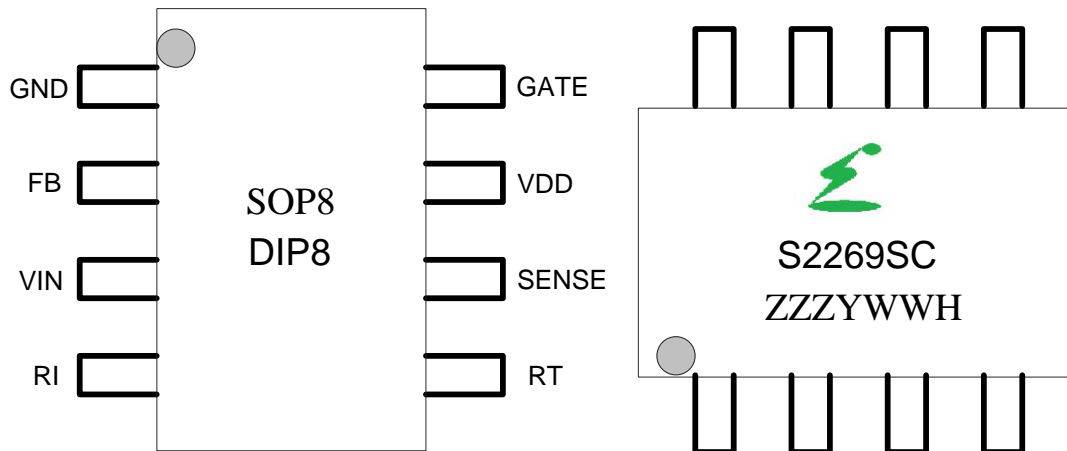
Application Circuit



Notice: To ensure the reliability of system, R1 resistance is recommended to be 33 ohms.



Pin Assignment & Marking Information



S/D:SOP8/DIP8
ZZZ:LOT CODE
X:year code (2020=A,2021=B...)
WW:week code (01-52)
H:FAB CODE

Ordering Information

| Part number | Package | MOQ |
|-------------|---------|---------|
| S2269SC | SOP-8 | 4000pcs |
| S2269DC | DIP-8 | 2000pcs |

Pin Description

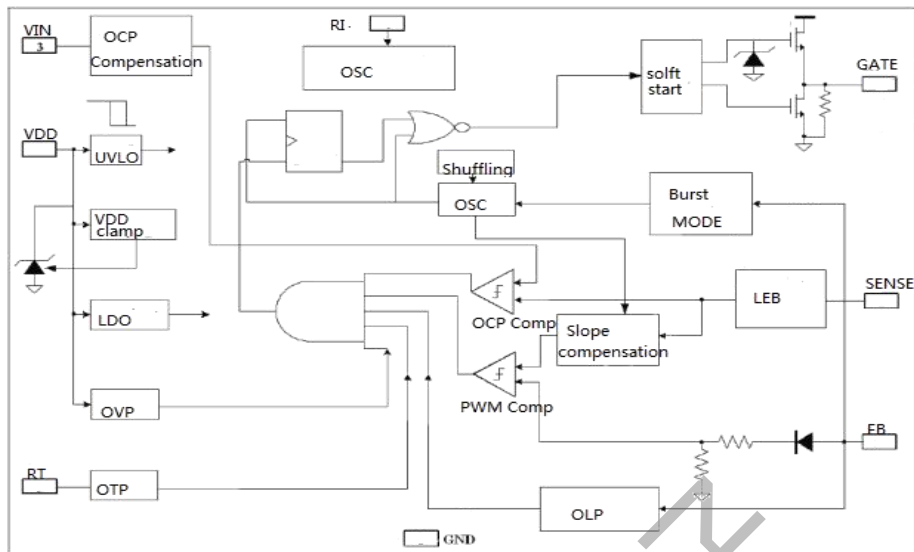
| Pin Number | Symbol | Type | Description |
|------------|--------|------|---|
| 1 | GND | P | Ground. |
| 2 | FB | I | Feedback input pin. |
| 3 | VIN | I | Start-up and overload compensation current input pin |
| 4 | RI | I/O | Internal oscillator frequency setting pin. |
| 5 | RT | I/O | Temperature sensing input pin,connected through a NTC resistor to |
| 6 | SENSE | I | Current sense input pin. |
| 7 | VDD | P | Chip DC power supply pin. |
| 8 | GATE | O | Totem-pole gate diver. |

Recommended Out Power

| Product | Input:230VAC±15% | Input:85-264VAC |
|---------|------------------|-----------------|
| | Adapter | Adapter |
| S2269SC | 120W | 90W |



Block Diagram



Absolute Maximum Rating

| Parameter | Value | Unit |
|--|------------|------|
| VIN Input voltage | VDD+2 | V |
| VDD clamp voltage | 29 | V |
| VDD clamp continuous current | 10 | mA |
| FB input voltage | -0.3 to 7 | V |
| SENSE input voltage | -0.3 to 7 | V |
| RT input voltage | -0.3 to 7 | V |
| RI input voltage | -0.3 to 7 | V |
| Operating ambient temperature | -20 to 85 | °C |
| Min/Max operating junction temperature | -55 to 150 | °C |
| Thermal resistance,Junction to shell SOP8 | 190 | °C/W |
| Thermal resistance,Junction to ambient shell | 170 | °C/W |

Note: Stresses above absolute maximum ratings may cause permanent damage to the device. Exposure to absolutely maximum-rated conditions for extended periods may affect device reliability.

Recommended Operating Conditions

| Symbol | Parameter | Min. | Max. | Unit |
|----------------|-------------------------------|------|------|------|
| VDD | Supply Voltage | 8 | 26 | V |
| T _A | Operating Ambient Temperature | -20 | 85 | °C |

ESD Information

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|--------|------------------------------|-----------------|------|------|------|------|
| HBM | Human body model on all pins | JEDEC-STD | | 2 | | KV |
| MM | Machine model on all pins | JEDEC-STD | | 250 | | V |



Electrical Characteristics ($T_A = 25\text{ }^\circ\text{C}$ without special notation)

| Symbol | Parameter | Conditions | Value | | | Unit |
|----------------------------------|--------------------------------------|---|-------|------|------|------|
| | | | Min. | Typ. | Max | |
| Supply Voltage (VDD Pin) | | | | | | |
| I _{dd_start-up} | VDD start-up current | VDD=12.5V, RI=24K | | 6 | 10 | uA |
| I _{dd} | VDD operating current | VDD=18V, RI=24KΩ, FB=3.0V | | 2.3 | | mA |
| UVLO (enter) | VDD under voltage lockout enter | | 7.5 | 8.3 | 9 | V |
| UVLO(exit) | VDD under voltage lockout exit | | 13 | 15 | 16 | V |
| OVP(enter) | VDD over voltage protection enter | | 26 | 31 | | V |
| VDD_clamp | VDD clamp voltage | I _{dd} = 10mA | 28 | 33 | | V |
| Voltage Feedback (FB Pin) | | | | | | |
| AVCS | PWM input gain | $\Delta V_{FB} / \Delta V_{SENSE}$ | | 2.8 | | V/V |
| VFB_open | open loop voltage | | | 5.7 | | V |
| VFB_burst | Burst mode voltage | | | 1.1 | | V |
| IFB_short | FB pin short current | Short FB pin to GND and measure current | 0.7 | 0.85 | 1 | mA |
| VTH_PL | Power limiting FB threshold voltage | | | 3.7 | | V |
| TD_PL | Power limiting delay time | | | 40 | | mS |
| Current Sense (CS Pin) | | | | | | |
| T _{blanking} | Leading-edge blanking time | | 150 | 250 | 750 | nS |
| ZSENSE_IN | Input impedance | | | 30 | | KΩ |
| VTH | Current limitation threshold voltage | I(VIN)= 0 uA duty=0 | 0.89 | 0.96 | 1.03 | V |
| VTH | Current limitation threshold voltage | I(VIN)= 150 uA duty=0 | 0.77 | 0.84 | 0.91 | V |
| Oscillator (RI Pin) | | | | | | |
| Fosc | Normal oscillation frequency | RI=24KΩ | 59 | 65 | 71 | Khz |



| | | | | | | |
|---|--|--|-----|-----|-----|------------|
| Δf_{temp} | Frequency temperature stability | TA -20°C to 100°C VDD=16V, RI=24K Ω | | 5 | | % |
| Δf_{VDD} | Frequency voltage stability | VDD=16.5V to 25V RI=24K Ω | | 5 | | % |
| RI_range | Operating resistor range | | 12 | 24 | 60 | K Ω |
| VRI | Voltage of RI to GND | RI=24K Ω | | 2 | | V |
| Fosc_BM | Burst mode base frequency | | 19 | 25 | 40 | Khz |
| DC_MAX | Maximum duty cycle | VDD=18V, FB=3V SENSE=0V | | 80 | | % |
| Δf_{OSC} | Frequency modulation range /Base frequency | | -5 | | +5 | % |
| Gate Drive Output (GATE Pin) | | | | | | |
| VOL | Output low level | VDD=18V, IO=-20mA | | | 0.3 | V |
| VOH | Output high level | VDD=18V, IO=20mA | 11 | | | V |
| V_Clamp | output clamp voltage level | | | 16 | | V |
| T_r | Output rising time | VDD=18V, CL=1nF | | 110 | | nS |
| T_f | Output falling time | VDD=18V, CL=1nF | | 40 | | nS |
| Over Temperature Protection (RT pin) | | | | | | |
| I_RT | Output current of RT pin | | 50 | 70 | 100 | μ A |
| V_OTP | OTP threshold voltage | | 0.8 | | 1.2 | V |
| Start up and Current limitation compensation (VIN pin) | | | | | | |
| G_VIN | Current limitation compensation gain | $\Delta IVIN / \Delta VCS$ | | 2 | | mS |



Application Information

The S2269SC is a highly integrated current mode PWM controller IC for those high output power of off line flyback convertor. The output power is up to 120W. Its main features are optimized for S2269SC in driving capability, quiescent dissipation, current limitation compensation and low cost and reliability.

Start-up Current and Start-up Control

S2269SC has very low start-up current that is less than 10uA. Therefore, the voltage of VDD could be charged up above UVLO(exit) threshold level quickly. A large value resistor can be used in the start-up circuit to minimize quiescent dissipation. The typical resistance value of resistor is 2M Ohms in start-up circuit of S2269SC. The start-up resistor can be connected with the VIN pin or the capacitor of VDD to provide start-up current.

Operating Current

The Operating current of S2269SC is less than 2.3mA. Therefore, S2269SC can have good efficiency. **Frequency shuffling for EMI improvement**

The frequency Shuffling is implemented in S2269SC. The oscillation frequency is modulated with a random source so that the harmonic energy is spread out. The spread spectrum minimizes the conduction EMI and therefore reduces system design challenge.

Burst Mode Operation

At zero load or light load condition, the main power dissipation in a switching mode power supply is from switching on the MOSFET, the core of transformer and the snubber circuit. The magnitude of power dissipation is proportional to the number of switching frequency within certain period. Less switching frequency can reduce the power dissipation. S2269SC adjusts the switching frequency according to the loading condition. From light load to no load, the FB voltage drops. While the FB voltage is less than 1.1V, the gate pin output is disabled and kept low, while the FB voltage is higher than 1.2V, the gate output recovers to normal working mode. To reduce audio noise, the switching frequency will be kept higher than 20KHz in burst mode.

Oscillator Operation

The oscillating frequency of S2269SC is set by the externally resistor between the RI pin and the GND pin. It is recommended that the range of oscillation frequency is in between 20KHz and 100KHz. The relationship between the resistor and the oscillation frequency follows below equation.

$$F_{osc} = \frac{1625}{RI(K\Omega) + 1} \text{ (KHz)}$$

Current Sensing and Leading-Edge Blanking

Cycle-by-Cycle current limitation is offered in S2269SC. The switching current is detected by a resistor into the



SENSE pin. An internal leading-edge blanking circuit chops off the SENSE voltage spike at initial so that the external RC filtering on SENSE pin is no longer required. The current limiting comparator is disabled and thus cannot turn off the external MOSFET during the blanking period. PWM duty cycle is determined by the voltage in the SENSE pin and the FB pin

Internal Synchronized Slope Compensation

Built-in slope compensation circuit adds voltage ramp onto the current sense input voltage for PWM generation. This greatly improves the close loop stability at CCM and prevents the sub-harmonic oscillation and thus reduces the output ripple voltage.

Over Temperature Protection

S2269SC is specially optimized for the high output power system. If the temperature from the environment or the component is too high, it results in the system damage. S2269SC provides the function of temperature sensing and the function of over temperature protection. The voltage on the RT pin is determined by resistor between the RT pin and the GND pin. The resistor is usually a NTC resistor. With the Fixed internal current flowing through the resistor, the voltage on the RT pin varies with the resistance value of NTC resistor. When the voltage on the RT pin is less than 0.65V, S2269SC is shut down and recovers when the voltage on the RT pin is higher than 0.8V.

Gate Drive

S2269SC Gate pin is used to drive Gate of the external MOSFET. S2269SC has 800mA of sinking and sourcing current that can minimize the switching dissipation of the MOSFET. Therefore, higher efficiency can be obtained. The internally totem pole circuit of the GATE pin can control the MOSFET to be turned on slowly and turned off faster. There is very good compromise between high efficiency and low radiation EMI.

Protection Controls

S2269SC has comprehensive protection functions, including Cycle-by- Cycle current limitation (OCP), Over Load Protection (OLP) and over voltage clamp, Under Voltage Lockout on VDD (UVLO), Over Temperature Protection (OTP).

Current limitation compensation

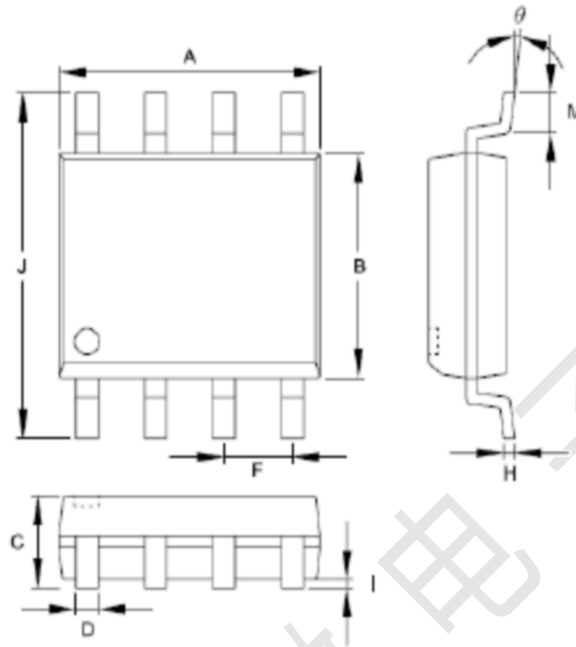
To obtain the same output current capability in the universal AC line voltage range, S2269SC has current limitation compensation. To obtain good current limitation compensation, the start-up



Package Information:

SOP-8

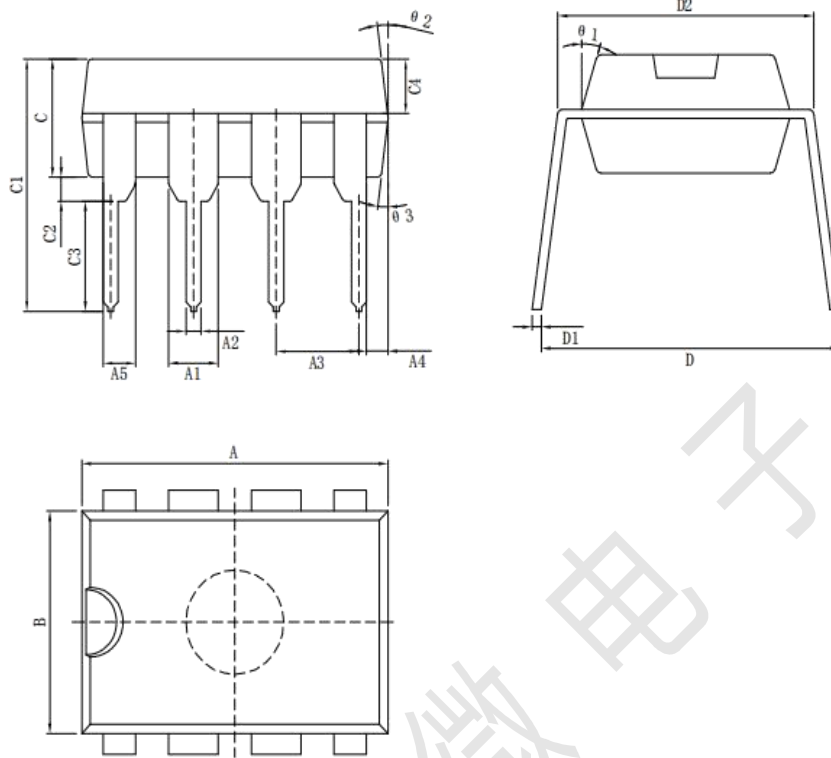
resistor must be connected with the VIN pin.



| Symbols | Dimensions in Millimeters | | Dimensions in Inch | |
|----------|---------------------------|-------|--------------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 4.801 | 5.004 | 0.189 | 0.197 |
| B | 3.810 | 3.988 | 0.150 | 0.157 |
| C | 1.346 | 1.753 | 0.053 | 0.069 |
| D | 0.330 | 0.508 | 0.013 | 0.020 |
| F | 1.194 | 1.346 | 0.047 | 0.053 |
| H | 0.178 | 0.229 | 0.007 | 0.009 |
| I | 0.102 | 0.254 | 0.004 | 0.010 |
| J | 5.791 | 6.198 | 0.228 | 0.244 |
| M | 0.406 | 1.270 | 0.016 | 0.050 |
| θ | 0° | 8° | 0° | 8° |



DIP-8



| Symbol | Size | MIN (mm) | MAX (mm) | Symbol | Size | MIN (mm) | MAX (mm) |
|--------|------|----------|----------|---------|------|----------|----------|
| A | | 9.00 | 9.20 | C2 | | 0.50TYP | |
| A1 | | 1.474 | 1.574 | C3 | | 3.20 | 3.40 |
| A2 | | 0.41 | 0.51 | C4 | | 1.47 | 1.57 |
| A3 | | 2.44 | 2.64 | D | | 8.20 | 8.80 |
| A4 | | 0.51TYP | | D1 | | 0.244 | 0.264 |
| A5 | | 0.99TYP | | D2 | | 7.62 | 7.87 |
| B | | 6.10 | 6.30 | theta 1 | | 17° TYP4 | |
| C | | 3.20 | 3.40 | theta 2 | | 10° TYP4 | |
| C1 | | 7.10 | 7.30 | theta 3 | | 8° TYP | |

Revision History

| Version | Update date | Version By | Revised content |
|---------|-------------|------------|-----------------|
| V0.9 | 2018-7-14 | Li Wen | |
| V0.91 | 2019-7-13 | Li Wen | OVP ,OCP |
| V0.92 | 2021-7-20 | Li Wen | |