

SI-8000S Series Full-Mold, Separate Excitation Step-down Switching Mode

Features

- Compact full-mold package (equivalent to TO220)
- Output current: 3.0A
- High efficiency: 79 to 91%
- Requires only 4 discrete components
- Internally-adjusted phase correction and output voltage
- Built-in reference oscillator (60kHz)
- Built-in overcurrent and thermal protection circuits
- Built-in soft start circuit (Output ON/OFF available)

Lineup

Part Number	SI-8033S	SI-8050S	SI-8090S	SI-8120S	SI-8150S
Vo(V)	3.3	5.0	9.0	12.0	15.0
Io(A)	3.0				

Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
DC Input Voltage	V _{IN}	43*	V
Power Dissipation	P _{D1}	18(With infinite heatsink)	W
	P _{D2}	1.5(Without heatsink, stand-alone operation)	W
Junction Temperature	T _j	+125	°C
Storage Temperature	T _{stg}	-40 to +125	°C
SW Terminal Applied Reverse Voltage	V _{SW}	-1	V
Thermal Resistance(junction to case)	θ _{J-C}	5.5	°C/W

*35V for SI-8033S

Applications

- Power supplies for telecommunication equipment
- Onboard local power supplies

Recommended Operating Conditions

Parameter	Symbol	Ratings					Unit
		SI-8033S	SI-8050S	SI-8090S	SI-8120S	SI-8150S	
DC Input Voltage Range	V _{IN}	5.5 to 28	7 to 40	12 to 40	15 to 40	18 to 40	V
Output Current Range	I _o	0 to 3.0					A
Operating Junction Temperature Range	T _{JP}	-30 to +125					°C

Electrical Characteristics

(T_a=25°C)

Parameter	Symbol	Ratings															Unit
		SI-8033S			SI-8050S			SI-8090S			SI-8120S			SI-8150S			
		min.	typ.	max.	min.	typ.	max.	min.	typ.	max.	min.	typ.	max.	min.	typ.	max.	
Output Voltage	SI-8000S*1	3.17	3.30	3.43	4.80	5.00	5.20	8.55	9.00	9.45	11.50	12.00	12.50	14.25	15.00	15.75	V
	SI-8000SS	3.234	3.30	3.366	4.90	5.00	5.10										
Efficiency	Conditions	V _{IN} =15V, I _o =1.0A			V _{IN} =20V, I _o =1.0A			V _{IN} =21V, I _o =1.0A			V _{IN} =24V, I _o =1.0A			V _{IN} =25V, I _o =1.0A			%
	η	79			84			88			90			91			
Oscillation Frequency	Conditions	V _{IN} =15V, I _o =1.0A			V _{IN} =20V, I _o =1.0A			V _{IN} =21V, I _o =1.0A			V _{IN} =24V, I _o =1.0A			V _{IN} =25V, I _o =1.0A			kHz
	f	60			60			60			60			60			
Line Regulation	Conditions	V _{IN} =8 to 28V, I _o =1.0A			V _{IN} =10 to 30V, I _o =1.0A			V _{IN} =15 to 30V, I _o =1.0A			V _{IN} =18 to 30V, I _o =1.0A			V _{IN} =21 to 30V, I _o =1.0A			mV
	ΔV _{OLINE}	25 80			40 100			50 120			60 130			60 130			
Load Regulation	Conditions	V _{IN} =15V, I _o =0.5 to 1.5A			V _{IN} =20V, I _o =0.5 to 1.5A			V _{IN} =21V, I _o =0.5 to 1.5A			V _{IN} =24V, I _o =0.5 to 1.5A			V _{IN} =25V, I _o =0.5 to 1.5A			mV
	ΔV _{OLOAD}	10 30			10 40			10 40			10 40			10 40			
Temperature Coefficient of Output Voltage	ΔVo/ΔTa	±0.5			±0.5			±1.0			±1.0			±1.0			mV/°C
Overcurrent Protection Starting Current	Conditions	V _{IN} =15V			V _{IN} =20V			V _{IN} =21V			V _{IN} =24V			V _{IN} =25V			A
	I _{st}	3.1			3.1			3.1			3.1			3.1			
Soft Start Pin*2	Low-Level Voltage	V _{SSL}			0.2			0.2			0.2			0.2			V
	Outflow Current at Low Voltage	I _{SSL}			15 25 35			15 25 35			15 25 35			15 25 35			μA
Conditions		V _{SSL} =0.2V															

*1: "S" may be printed to the right of the marking (except SI-8090S, SI-8120S, SI-8150S).

*2: Pin 5 is a soft start pin. Soft start at power on can be performed with a capacitor connected to this pin.

The output can also be turned ON/OFF with this pin.

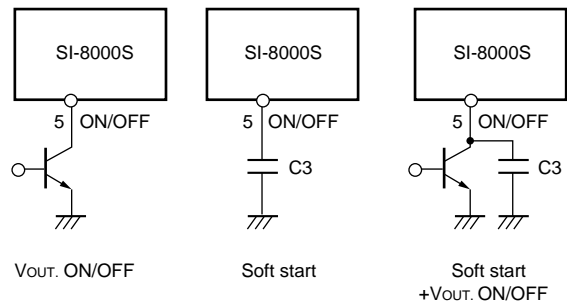
The output is stopped by setting the voltage of this pin to V_{SSL} or lower.

Soft-start pin voltage can be changed with an open-collector drive circuit of a transistor.

When using both the soft-start and ON/OFF functions together, the discharge current from C₃ flows into the ON/OFF control transistor. Therefore, limit the current securely to protect the transistor if C₃ capacitance is large.

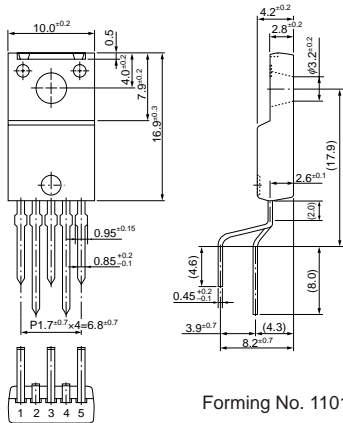
The ON/OFF pin is pulled up to the power supply in the IC, so applying the external voltage is prohibited.

If this pin is not used, leave it open.



External Dimensions (TO220F-5)

(Unit : mm)



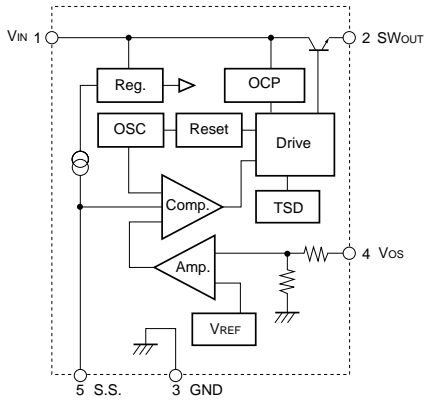
Forming No. 1101

Pin Assignment

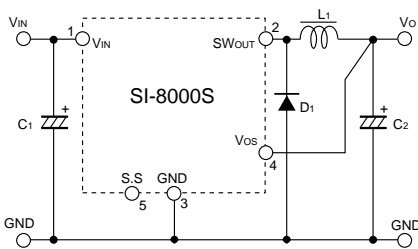
- ① VIN
- ② SWOut
- ③ GND
- ④ Vos
- ⑤ S.S

Plastic Mold Package Type
 Flammability: UL94V-0
 Product Mass: Approx. 2.3g

Block Diagram

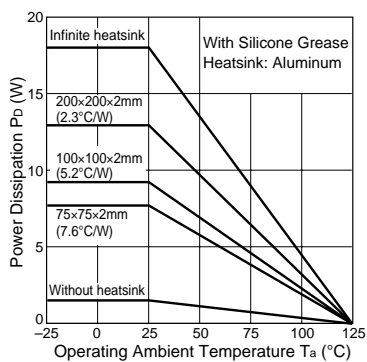


Typical Connection Diagram



- C_{1,2} : 1000μF
- L₁ : 150μH
- D₁ : RK46(Sanken)

T_a-P_d Characteristics



$$P_D = V_o \cdot I_o \left(\frac{100}{\eta \chi} - 1 \right) - V_F \cdot I_o \left(1 - \frac{V_o}{V_{IN}} \right)$$

The efficiency depends on the input voltage and the output current. Therefore, obtain the value from the efficiency graph and substitute the percentage in the formula above.

- V_o : Output voltage
- V_{IN} : Input voltage
- I_o : Output current
- ηχ : Efficiency (%)
- V_F : Diode D₁ forward voltage
0.5V(RK46)

Thermal design for D₁ must be considered separately.