## SI-8000SD Series

## Surface Mount, Separate Excitation Step-down Switching Mode

SI-8033SD

3.3

#### **■**Features

- Surface-mount package (TO263-5)
- Output current: 3.0A
- High efficiency: 79% typ. (SI-8033SD), 84% typ. (SI-8050SD)
- Requires only 4 discrete external components
- Internally-adjusted phase correction and output voltage
- Built-in reference oscillator (60kHz)
- Built-in overcurrent and thermal protection circuits
- Output ON/OFF available
- Soft start available by S.S pin

# ■Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit	Conditions
DC Input Voltage	Vin	43* <sup>1</sup>	V	
Power Dissipation*2	Po	3	W	When mounted on glass-epoxy board 40 × 40 mm (copper area: 100%)
Junction Temperature	Tj	+125	°C	
Storage Temperature	Tstg	-40 to +125	°C	
Thermal Resistance (Junction to Case)	<i>Ө</i> j-с	3	°C/W	
Thermal Resistance (Junction to Ambient Air)	θj-a	33.3	°C/W	When mounted on glass-epoxy board 40 × 40 mm (copper area: 100%)

SI-8050SD

5.0

■Lineup

Part Numbe

Vo(V)

lo (A)

#### ■Applications

- Power supplies for telecommunication equipment
- Onboard local power supplies

#### **■**Recommended Operating Conditions

Parameter	Symbol	Ra		
		SI-8033SD	SI-8050SD	Unit
DC Input Voltage Range	V <sub>IN1</sub>	5.5 to 28	7 to 40	V
Output Current Range*	lo	0 1	A	
Operating Junction Temperature Range	Tjop	-30	°C	
Operating Temperature Range*	Тор	-30	°C	

<sup>\*:</sup> Limited by Ta-PD characteristics.

#### **■**Electrical Characteristics

(Ta=25°C)

		Symbol	Ratings						
Parameter	SI-8033SD			SI-8050SD			Unit		
	min.		typ.	max.	min.	typ.	max.		
Output Vallana	Vo	3.17	3.3	3.43	4.8	5.0	5.2		
Output Voltage		Conditions		VIN=15V, Io=1A		Vin=20V, Io=1A			V
	η		79			84			
Efficiency		Conditions	Vin=15V, Io=1A			Vin=20V, Io=1A			%
	f		60			60			
Oscillation Frequency		Conditions	VIN=15V, Io=1A			VIN=20V, Io=1A			kHz
I. B. I.:	ΔVOLINE		25	80		40	100		
Line Regulation		Conditions		Vin=8 to 28V, Io=1A		V <sub>IN</sub> =10 to 30V, Io=1A			mV
Load Regulation		ΔVOLOAD		10	30		10	40	
		Conditions	V <sub>IN</sub> =15V, lo=0.5 to 1.5A			V <sub>IN</sub> =20V, Io=0.5 to 1.5A			mV
Temperature Coefficient of Output Voltage		ΔVο/ΔΤα		±0.5			±0.5		mV/°C
Overcurrent Protection Starting Current		ls <sub>1</sub>	3.1			3.1			
		Conditions	Vin=15V			Vin=20V			A
Soft Start Pin*	Low-Level Voltage	VssL		0.2			0.2		V
	Outflow Current at Low Voltage	IssL	20	30	40	20	30	40	
		Conditions	Vsst=0.2V					μΑ	

<sup>\*</sup> 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.

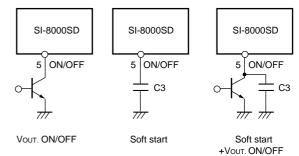
The output is stopped by setting the voltage of this pin to VssL or lower.

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  $C_3$  flows into the ON/OFF control transistor. Therefore, limit the current securely to protect the transistor if  $C_3$  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.

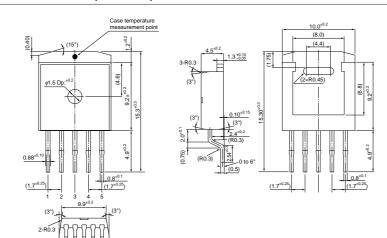


<sup>\*1: 35</sup>V for SI-8033SD

<sup>\*2:</sup> Limited by thermal protection circuit.

#### **■**External Dimensions (TO263-5)

(Unit: mm)



Pin Assignment

- ① VIN
- ② SWout
- 3 GND
- 4 Vos5 S.S

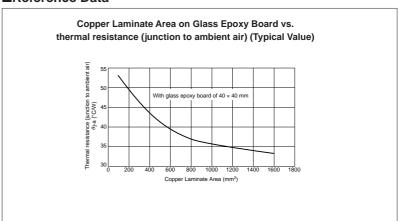
Plastic Mold Package Type Flammability: 94V-0

Product Mass: Approx. 1.48g

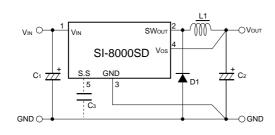
#### **■Block Diagram**

# 

#### **■**Reference Data



#### **■**Typical Connection Diagram



C<sub>1</sub>:  $50V/1000\mu$ F C<sub>2</sub>:  $50V/1000\mu$ F C<sub>3</sub>:  $0.01\mu$ F

(only when soft start function is used)

L<sub>1</sub> : 150μH

D<sub>1</sub>: SPB-G56 (Sanken)

#### Diode D<sub>1</sub>

 $\bullet$  Be sure to use Schottky-barrier diode as D1.

If other diodes like fast recovery diodes are used, ICs may be destroyed because of the reverse voltage generated by the recovery voltage or ON voltage.

#### Choke coil L<sub>1</sub>

- If the winding resistance of the choke coil is too high, the efficiency may drop below the rated value.
- As the overcurrent protection starting current is about 3.5 A, take care concerning heat radiation from the choke coil caused by magnetic saturation due to overload or short-circuited load.

Capacitors C1, C2, and C3

- ullet As large ripple currents flow through C<sub>1</sub> and C<sub>2</sub>, use high-frequency and low-impedance capacitors aiming for switching-mode-power-supply use. Especially when the impedance of C<sub>2</sub> is high, the switching waveform may become abnormal at low temperatures.
  - For C2, do not use a capacitor with an extremely low equivalent series resistance (ESR) such as an OS capacitor or a tantalum capacitor, which may cause an abnormal oscillation.
- C<sub>3</sub> is a capacitor for soft start. Leave pin 5 open if the soft start function is not used. This pin is pulled up with a pull-up resistor inside the ICs.
- @To create the optimum operating conditions, place the components as close as possible to each other.