

SI-8000SD Series**Surface Mount, Separate Excitation Step-down Switching Mode Regulator ICs****■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

■Lineup

Part Number	SI-8033SD	SI-8050SD
Vo (V)	3.3	5.0
Io (A)		3

■Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit	Conditions
DC Input Voltage	V _{IN}	43 ^{*1}	V	
Power Dissipation ^{*2}	P _D	3	W	When mounted on glass-epoxy board 40 × 40 mm (copper area: 100%)
Junction Temperature	T _j	+125	°C	
Storage Temperature	T _{stg}	-40 to +125	°C	
Thermal Resistance (Junction to Case)	θ _{j-c}	3	°C/W	
Thermal Resistance (Junction to Ambient Air)	θ _{j-a}	33.3	°C/W	When mounted on glass-epoxy board 40 × 40 mm (copper area: 100%)

^{*1}: 35V for SI-8033SD^{*2}: Limited by thermal protection circuit.**■Applications**

- Power supplies for telecommunication equipment
- Onboard local power supplies

■Recommended Operating Conditions

Parameter	Symbol	Ratings			Unit
		SI-8033SD	SI-8050SD		
DC Input Voltage Range	V _{IN1}	5.5 to 28	7 to 40		V
Output Current Range*	I _O		0 to 3.0		A
Operating Junction Temperature Range	T _{jop}		-30 to +125		°C
Operating Temperature Range*	T _{op}		-30 to +125		°C

*: Limited by Ta-Pd characteristics.

■Electrical Characteristics(T_a=25°C)

Parameter	Symbol	Ratings						Unit
		SI-8033SD			SI-8050SD			
Output Voltage	V _O	3.17	3.3	3.43	4.8	5.0	5.2	V
Efficiency	Conditions	V _{IN} =15V, I _O =1A			V _{IN} =20V, I _O =1A			%
Oscillation Frequency	f	79			84			
Line Regulation	ΔV _{OLINE}	60			60			kHz
Load Regulation	ΔV _{OLOAD}	25	80		40	100		mV
Temperature Coefficient of Output Voltage	ΔV _{O/ΔT_a}	V _{IN} =8 to 28V, I _O =1A			V _{IN} =10 to 30V, I _O =1A			mV
Overcurrent Protection	I _{S1}	10	30		10	40		mV
Starting Current	Conditions	V _{IN} =15V			V _{IN} =20V			A
Soft Start Pin*	V _{SSL}	0.2			0.2			V
Outflow Current at Low Voltage	I _{SSL}	20	30	40	20	30	40	μA
	Conditions	V _{SSL} =0.2V						

* 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.

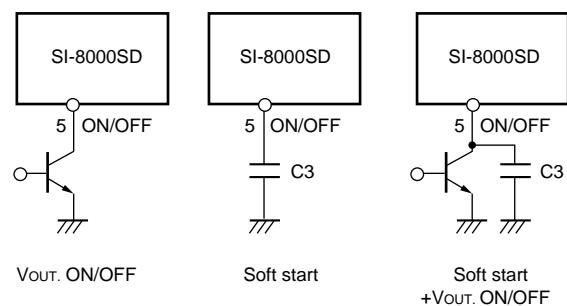
The output is stopped by setting the voltage of this pin to V_{SSL} or lower.

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.

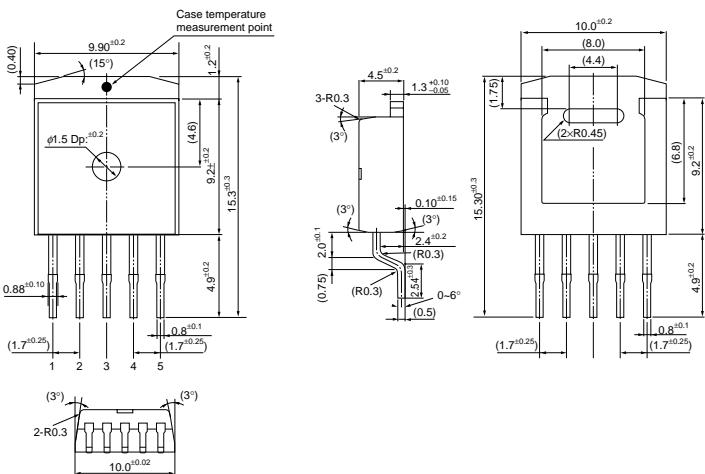
The ON/OFF pin is pulled up to the power supply in the IC, so applying the external voltage is prohibited.

If this pin is not used, leave it open.



■External Dimensions (TO263-5)

(Unit : mm)

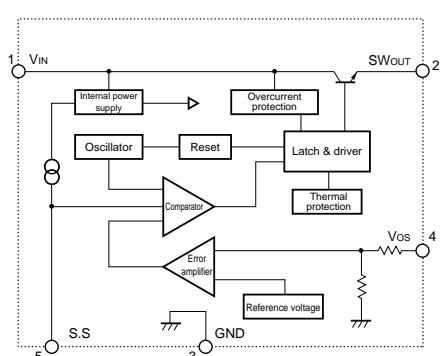


Pin Assignment

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

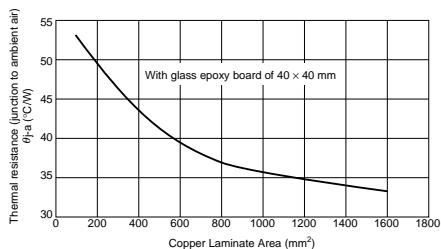
Plastic Mold Package Type
Flammability: 94V-0
Product Mass: Approx. 1.48g

■Block Diagram

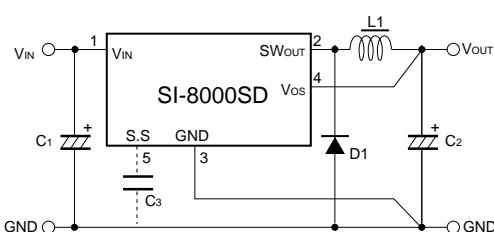


■Reference Data

Copper Laminate Area on Glass Epoxy Board vs.
thermal resistance (junction to ambient air) (Typical Value)



■Typical Connection Diagram



C₁ : 50V/1000μF
C₂ : 50V/1000μF
C₃ : 0.01μF
(only when soft start function is used)
L₁ : 150μH
D₁ : SPB-G56 (Sanken)

Diode D₁

- 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.

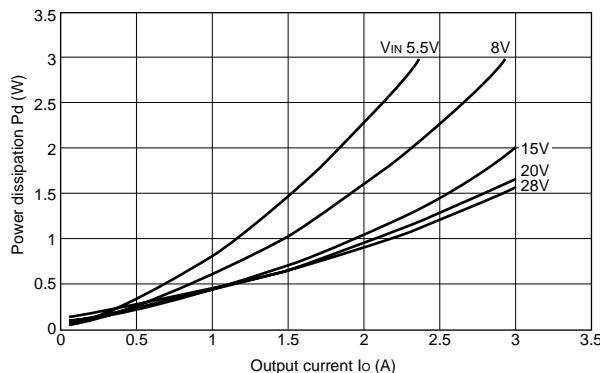
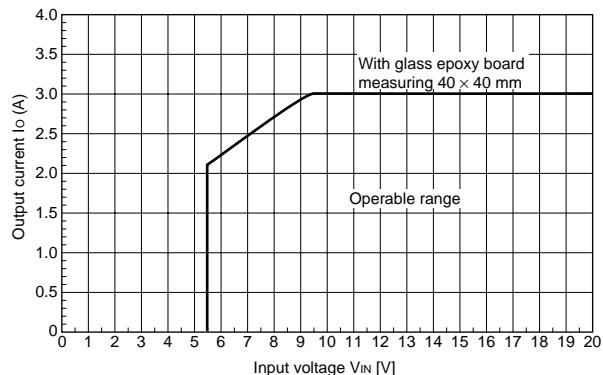
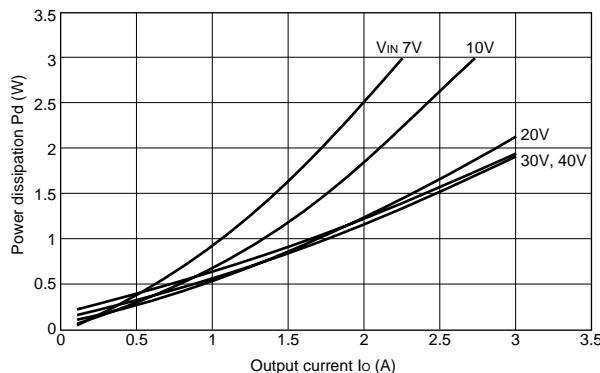
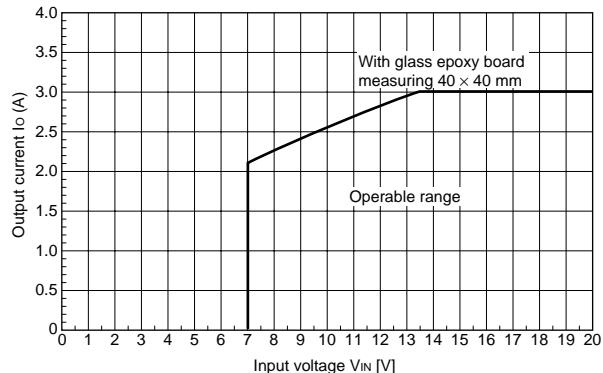
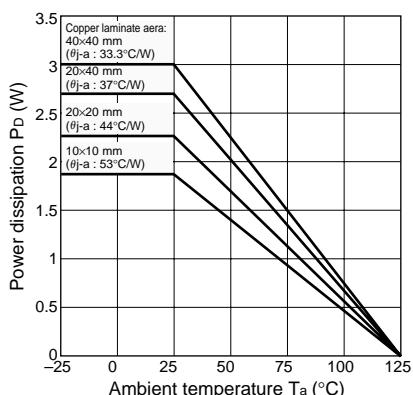
Choke coil L₁

- 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

- As large ripple currents flow through C₁ and C₂, use high-frequency and low-impedance capacitors aiming for switching-mode-power-supply use. Especially when the impedance of C₂ 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.
- C₃ 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.

■SI-8033SD**Power dissipation vs. Output current (typical value)****Output current vs. Input voltage (typical value)****■SI-8050SD****Power dissipation vs. Output current (typical value)****Output current vs. Input voltage (typical value)****■PD-Ta Characteristics**

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

Find the efficiency from the efficiency curve and substitute in the percentage, because the efficiency varies depending on the input voltage and output current.

Vo : Output voltage
 Vin : Input voltage
 Io : Output current
 ηχ : Efficiency
 VF : Forward voltage of D1
 0.4V (Io=2A) ... SPB-G56S (Sanken)

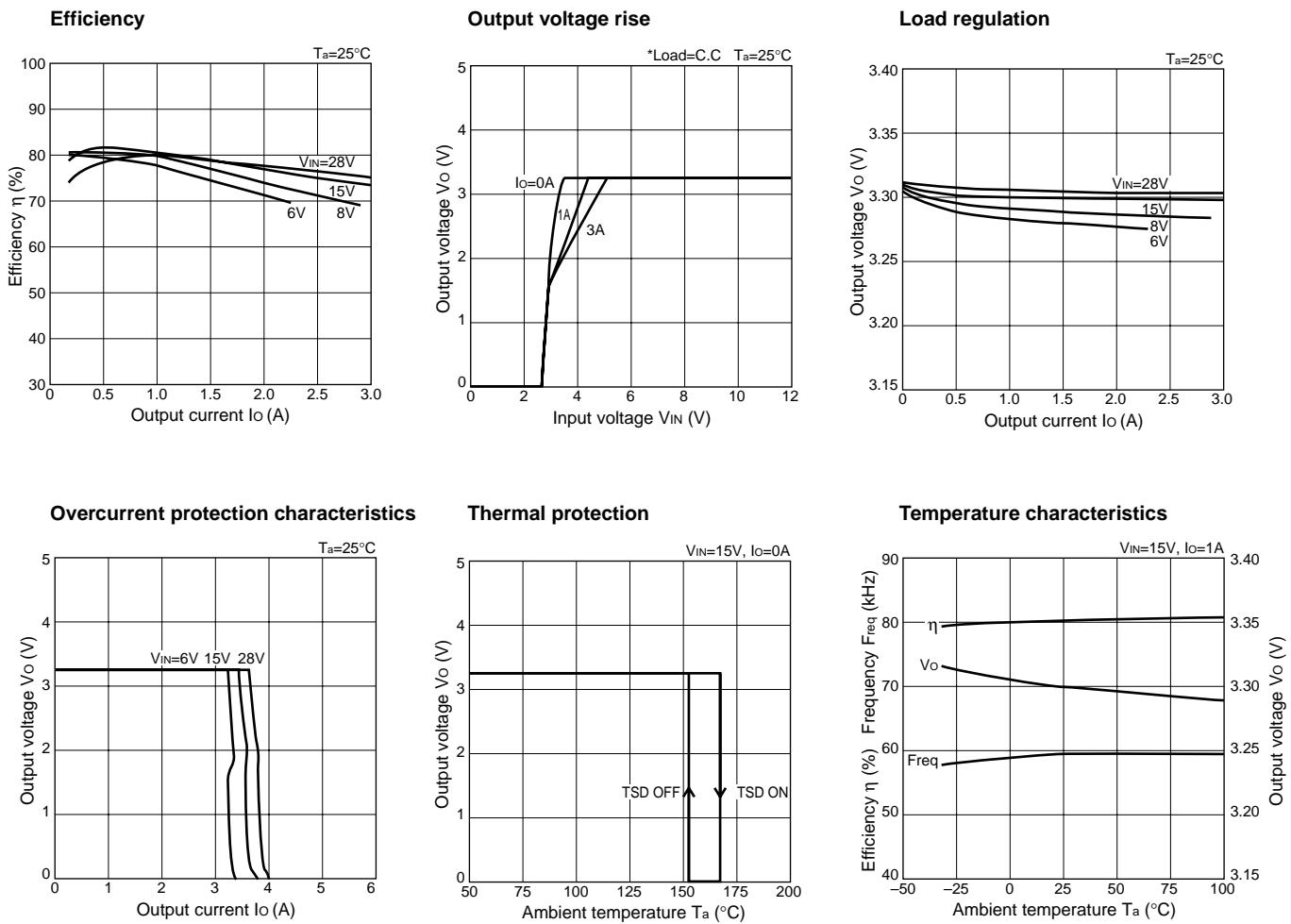
When mounted on glass epoxy board
measuring 40 × 40 mm

Thermal design for D1 must be performed separately.

Applications**Varying output voltage**

The output voltage can be varied in the same manner as SI-8000S. Refer to the catalog.

■Typical Characteristics Examples (SI-8033SD)



■Typical Characteristics Example (SI-8050SD)

