

# 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
V <sub>o</sub> (V)	3.3	5.0
I <sub>o</sub> (A)	3	

## Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit	Conditions
DC Input Voltage	V <sub>IN</sub>	43*1	V	
Power Dissipation*2	P <sub>D</sub>	3	W	When mounted on glass-epoxy board 40 × 40 mm (copper area: 100%)
Junction Temperature	T <sub>j</sub>	+125	°C	
Storage Temperature	T <sub>stg</sub>	-40 to +125	°C	
Thermal Resistance (Junction to Case)	θ <sub>J-C</sub>	3	°C/W	
Thermal Resistance (Junction to Ambient Air)	θ <sub>J-A</sub>	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 <sub>IN1</sub>	5.5 to 28	7 to 40	V
Output Current Range*	I <sub>o</sub>	0 to 3.0		A
Operating Junction Temperature Range	T <sub>jop</sub>	-30 to +125		°C
Operating Temperature Range*	T <sub>op</sub>	-30 to +125		°C

\*: Limited by Ta-Pd characteristics.

## Electrical Characteristics

(T<sub>a</sub>=25°C)

Parameter	Symbol	Ratings						Unit
		SI-8033SD			SI-8050SD			
		min.	typ.	max.	min.	typ.	max.	
Output Voltage	V <sub>o</sub>	3.17	3.3	3.43	4.8	5.0	5.2	V
	Conditions	V <sub>IN</sub> =15V, I <sub>o</sub> =1A			V <sub>IN</sub> =20V, I <sub>o</sub> =1A			
Efficiency	η	79			84			%
	Conditions	V <sub>IN</sub> =15V, I <sub>o</sub> =1A			V <sub>IN</sub> =20V, I <sub>o</sub> =1A			
Oscillation Frequency	f	60			60			kHz
	Conditions	V <sub>IN</sub> =15V, I <sub>o</sub> =1A			V <sub>IN</sub> =20V, I <sub>o</sub> =1A			
Line Regulation	ΔV <sub>OLINE</sub>	25			40			mV
	Conditions	V <sub>IN</sub> =8 to 28V, I <sub>o</sub> =1A			V <sub>IN</sub> =10 to 30V, I <sub>o</sub> =1A			
Load Regulation	ΔV <sub>OLOAD</sub>	10			10			mV
	Conditions	V <sub>IN</sub> =15V, I <sub>o</sub> =0.5 to 1.5A			V <sub>IN</sub> =20V, I <sub>o</sub> =0.5 to 1.5A			
Temperature Coefficient of Output Voltage	ΔV <sub>o</sub> /ΔT <sub>a</sub>	±0.5			±0.5			mV/°C
Overcurrent Protection Starting Current	I <sub>s1</sub>	3.1			3.1			A
	Conditions	V <sub>IN</sub> =15V			V <sub>IN</sub> =20V			
Soft Start Pin*	Low-Level Voltage	V <sub>SSL</sub>			0.2			V
	Outflow Current at Low Voltage	I <sub>SSL</sub>			20			
					V <sub>SSL</sub> =0.2V			μA

\* 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.

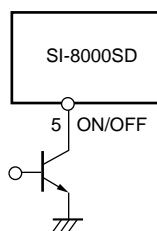
The output is stopped by setting the voltage of this pin to V<sub>SSL</sub> or lower.

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

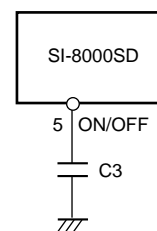
When using both the soft-start and ON/OFF functions together, the discharge current from C<sub>3</sub> flows into the ON/OFF control transistor. Therefore, limit the current securely to protect the transistor if C<sub>3</sub> capacitance is large.

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

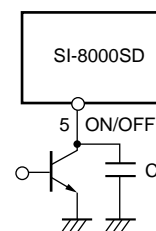
If this pin is not used, leave it open.



V<sub>OUT</sub>. ON/OFF



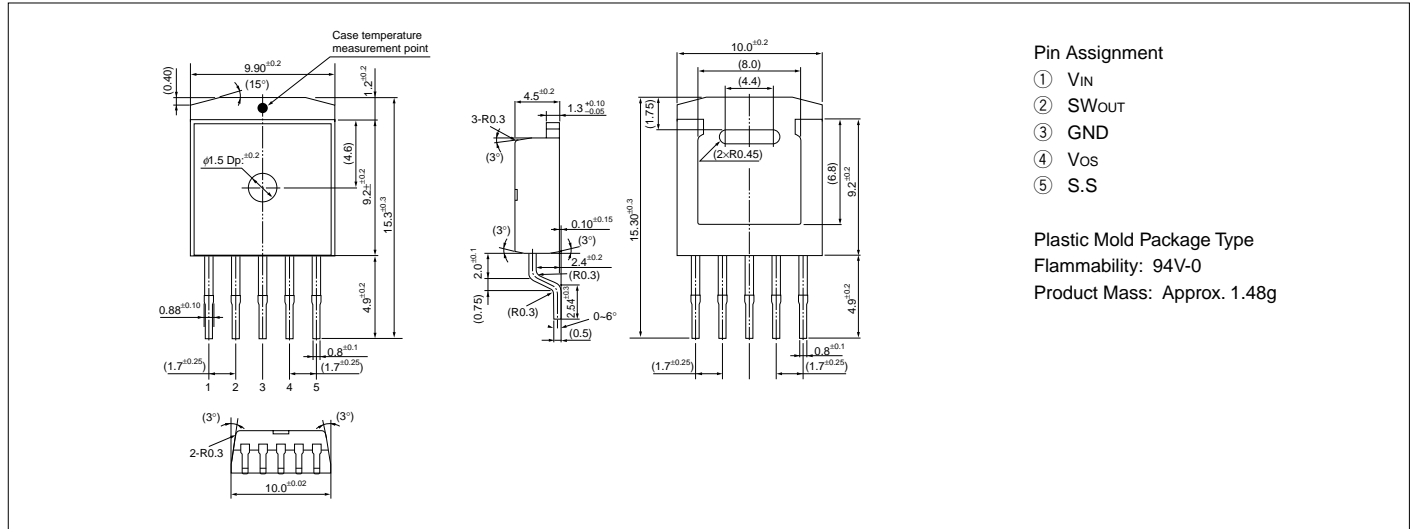
Soft start



Soft start + V<sub>OUT</sub>. ON/OFF

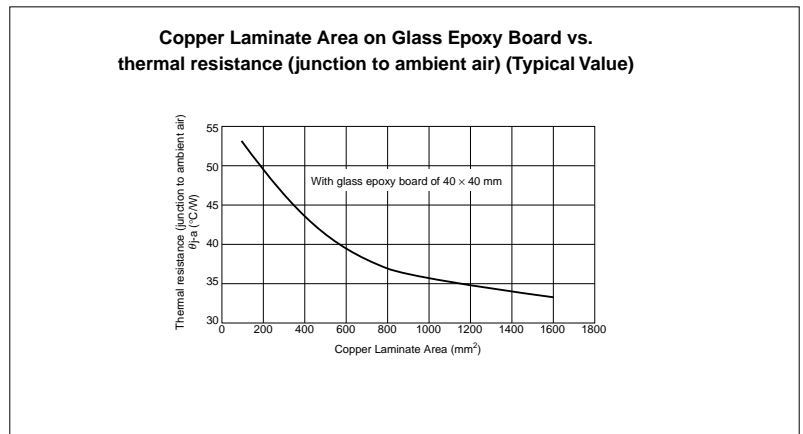
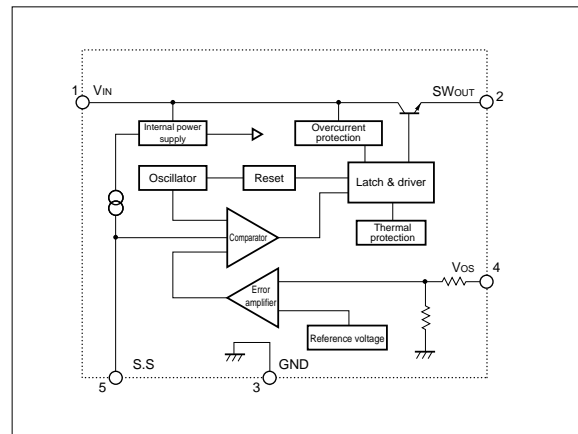
External Dimensions (TO263-5)

(Unit : mm)

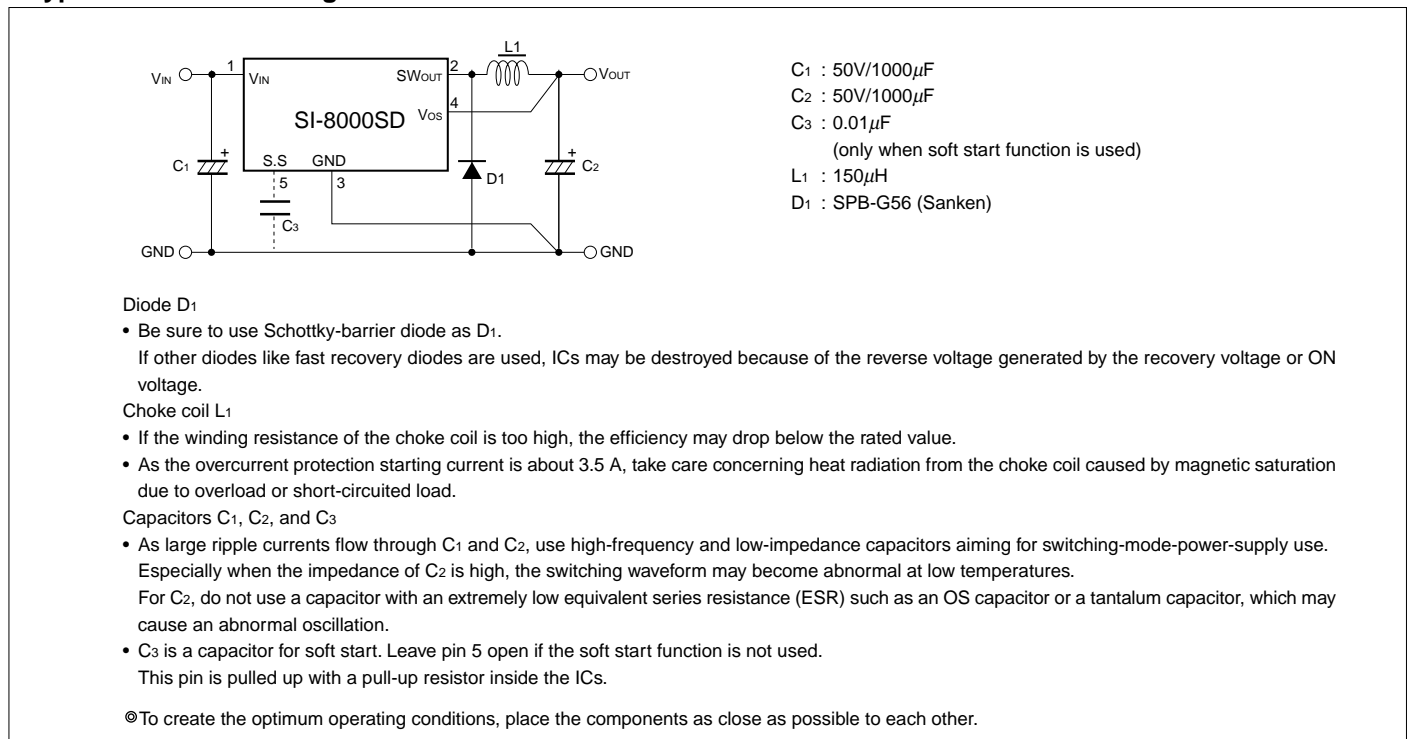


Block Diagram

Reference Data

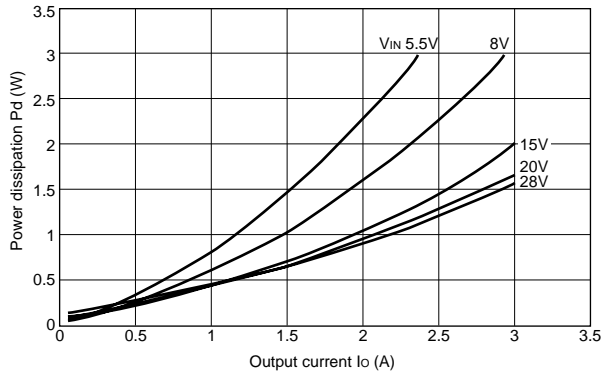


Typical Connection Diagram

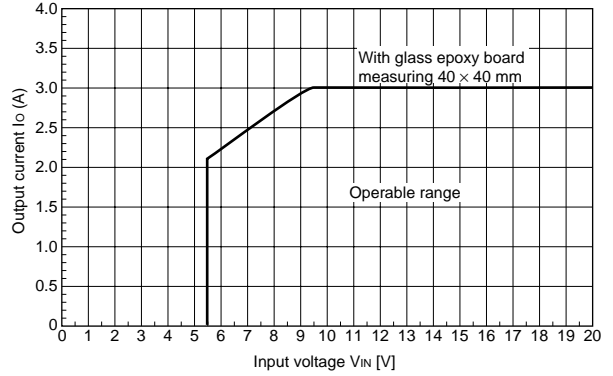


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Power dissipation vs. Output current (typical value)

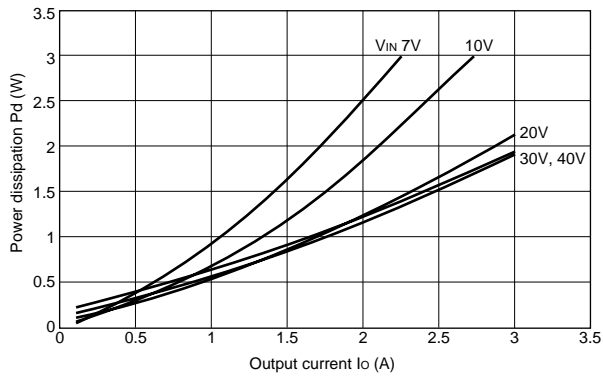


Output current vs. Input voltage (typical value)

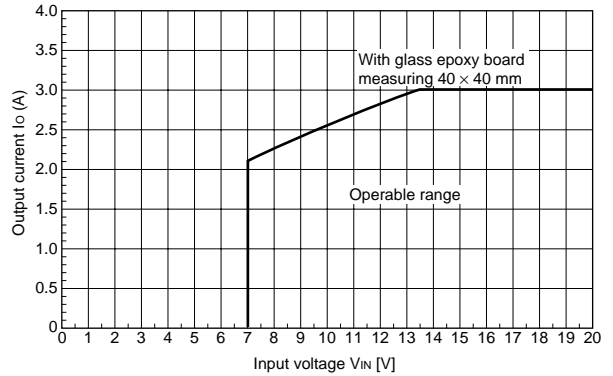


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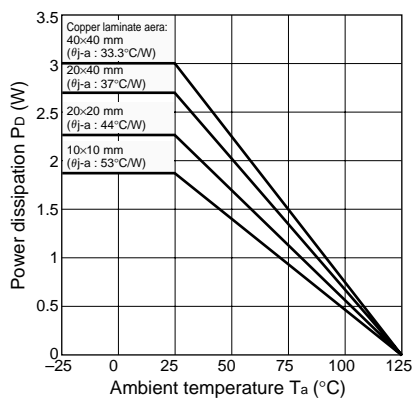
Power dissipation vs. Output current (typical value)



Output current vs. Input voltage (typical value)



PD-Ta Characteristics



When mounted on glass epoxy board measuring 40 x 40 mm

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

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
- $\eta\chi$ : Efficiency
- V<sub>F</sub> : Forward voltage of D<sub>1</sub>  
0.4V (Io=2A) ... SPB-G56S (Sanken)

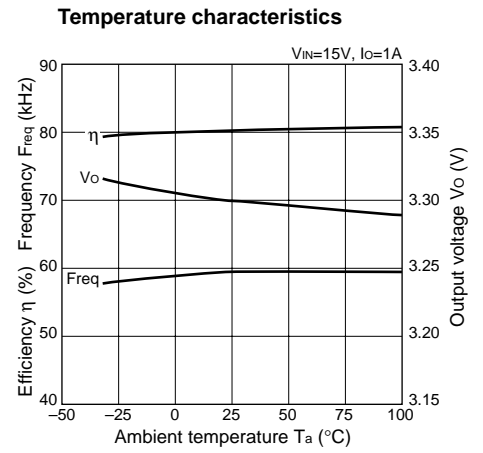
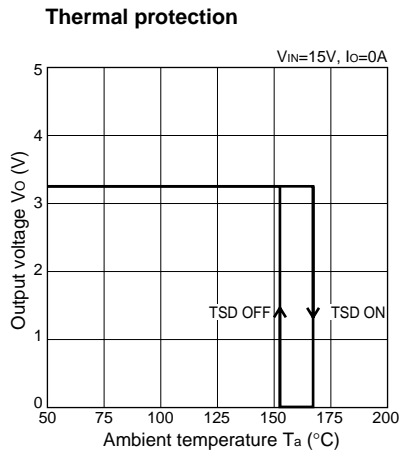
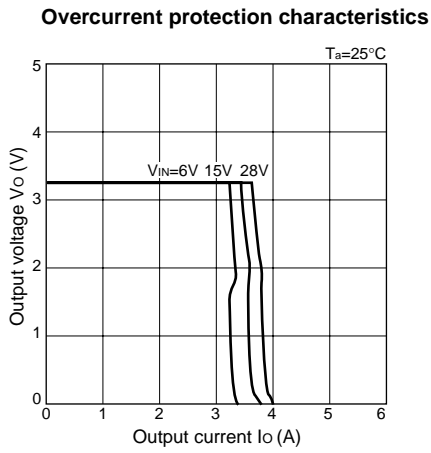
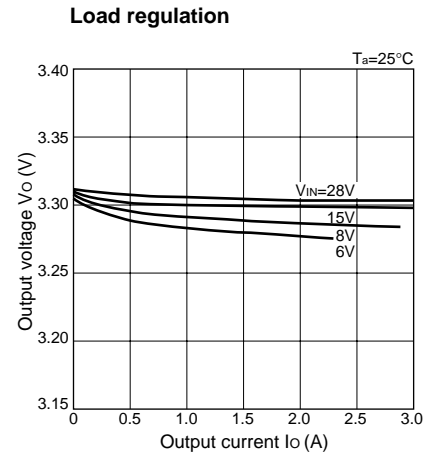
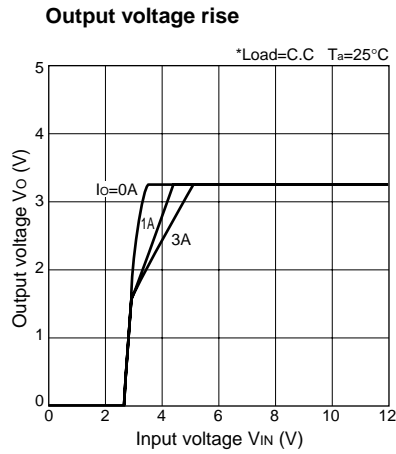
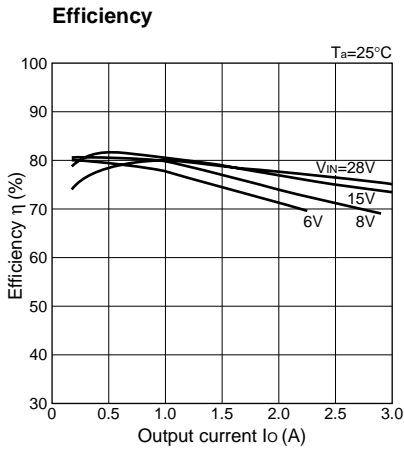
Thermal design for D<sub>1</sub> must be performed separately.

Applications

Varying output voltage

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

■Typical Characteristics Examples (SI-8033SD)



■Typical Characteristics Example (SI-8050SD)

