

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 _o (V)	3.3	5.0
I _o (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				
		min.	typ.	max.	min.	typ.	max.		
Output Voltage	V _o	3.17	3.3	3.43	4.8	5.0	5.2	V	
	Conditions	V _{IN} =15V, I _o =1A			V _{IN} =20V, I _o =1A				
Efficiency	η	79			84			%	
	Conditions	V _{IN} =15V, I _o =1A			V _{IN} =20V, I _o =1A				
Oscillation Frequency	f	60			60			kHz	
	Conditions	V _{IN} =15V, I _o =1A			V _{IN} =20V, I _o =1A				
Line Regulation	ΔV _{OLINE}	25			40			mV	
	Conditions	V _{IN} =8 to 28V, I _o =1A			V _{IN} =10 to 30V, I _o =1A				
Load Regulation	ΔV _{OLOAD}	10			10			mV	
	Conditions	V _{IN} =15V, I _o =0.5 to 1.5A			V _{IN} =20V, I _o =0.5 to 1.5A				
Temperature Coefficient of Output Voltage	ΔV _o /ΔT _a	±0.5			±0.5			mV/°C	
Overcurrent Protection Starting Current	I _{s1}	3.1			3.1			A	
	Conditions	V _{IN} =15V			V _{IN} =20V				
Soft Start Pin*	Low-Level Voltage	V _{SSL}	0.2			0.2			V
	Outflow Current at Low Voltage	I _{SSL}	20	30	40	20	30	40	
		Conditions	V _{SSL} =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.

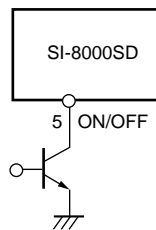
The output is stopped by setting the voltage of this pin to V_{SSL} or lower.

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

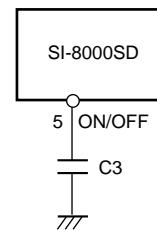
When using both the soft-start and ON/OFF functions together, the discharge current from C₃ flows into the ON/OFF control transistor. Therefore, limit the current securely to protect the transistor if C₃ capacitance is large.

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

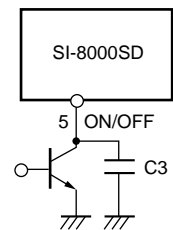
If this pin is not used, leave it open.



V_{OUT}. ON/OFF



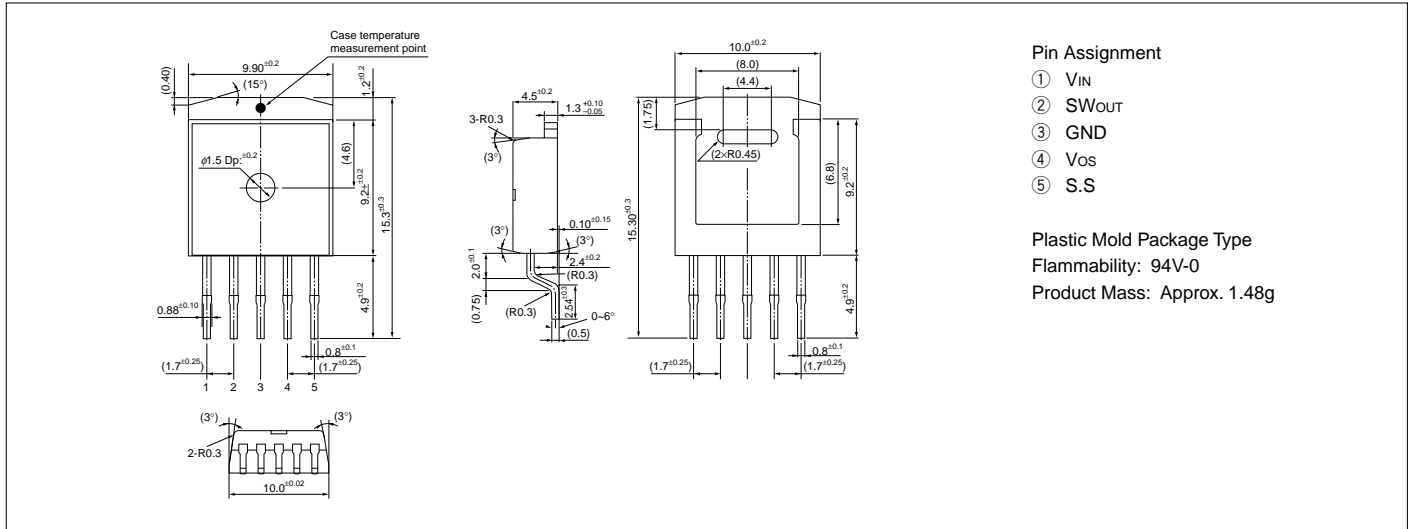
Soft start



Soft start + V_{OUT}. ON/OFF

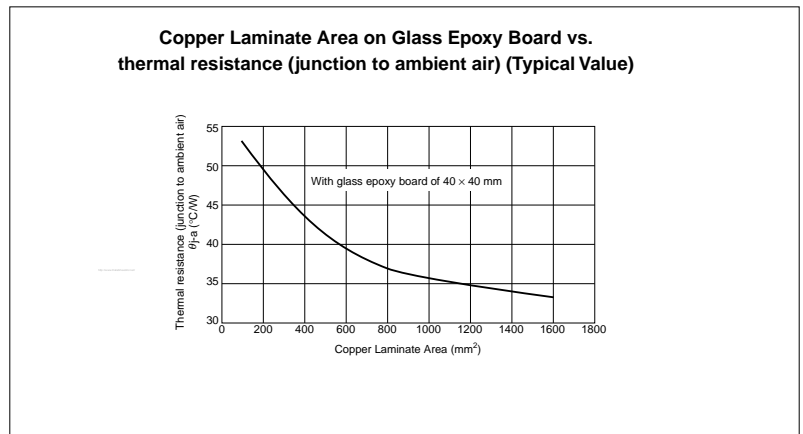
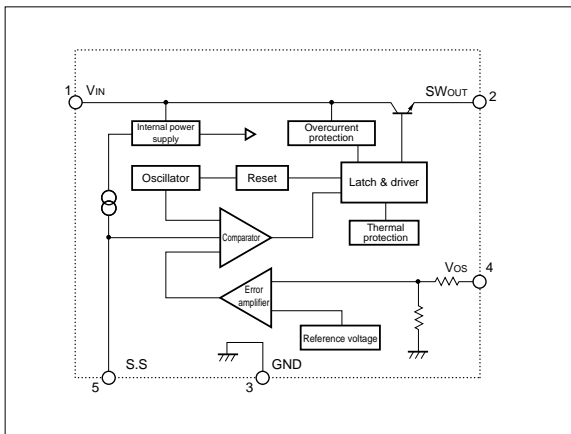
External Dimensions (TO263-5)

(Unit : mm)

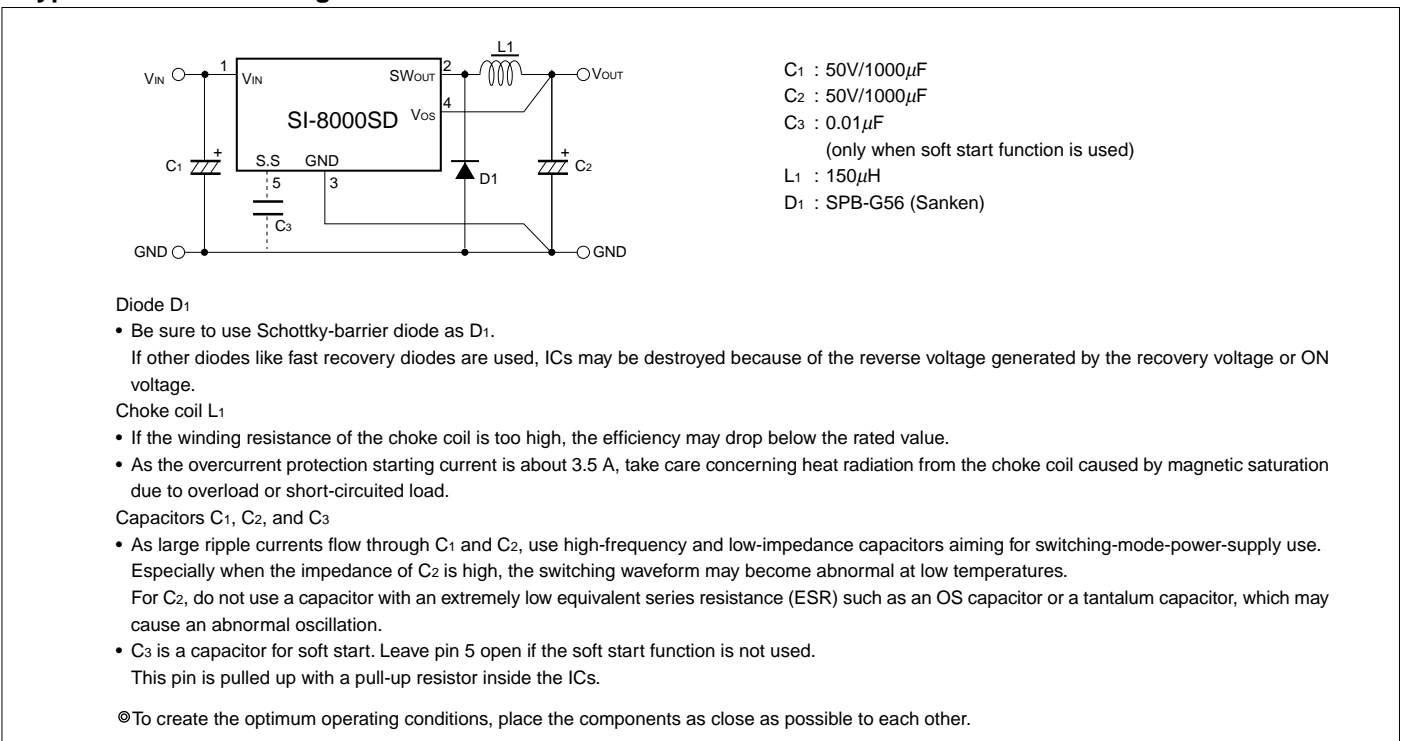


Block Diagram

Reference Data

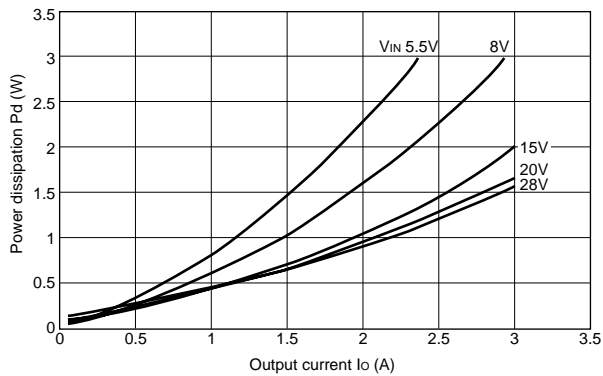


Typical Connection Diagram

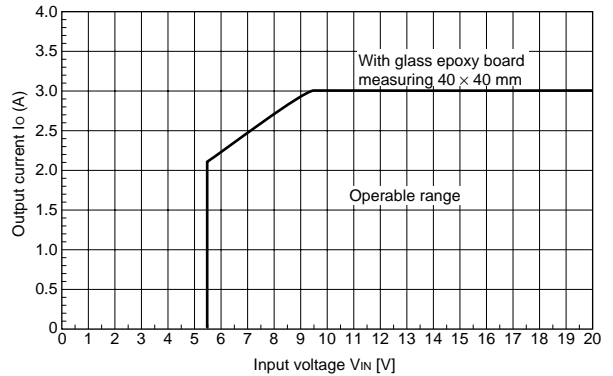


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Power dissipation vs. Output current (typical value)

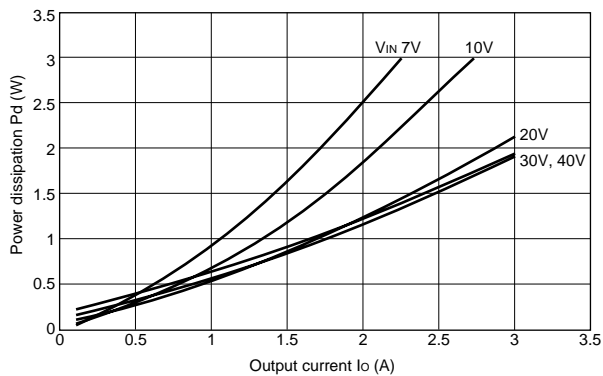


Output current vs. Input voltage (typical value)

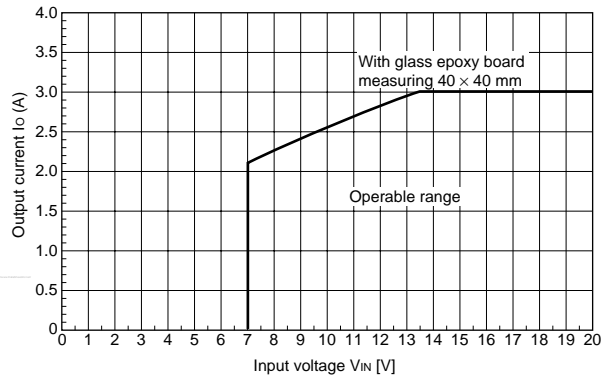


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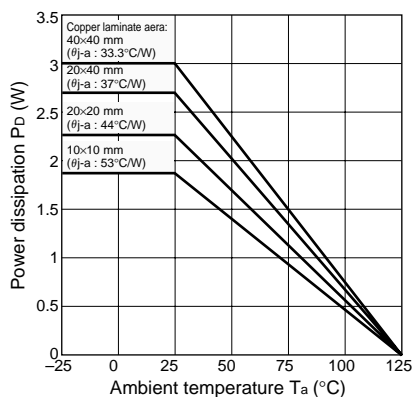
Power dissipation vs. Output current (typical value)



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_F : Forward voltage of D₁
0.4V (Io=2A) ... SPB-G56S (Sanken)

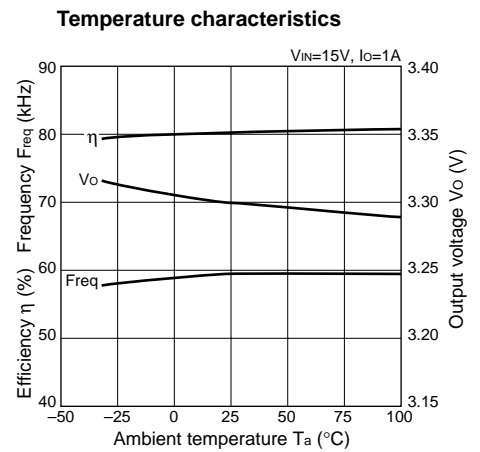
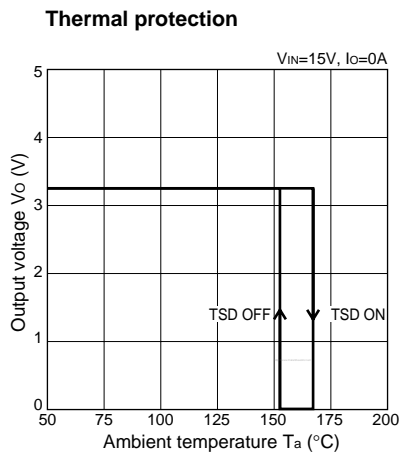
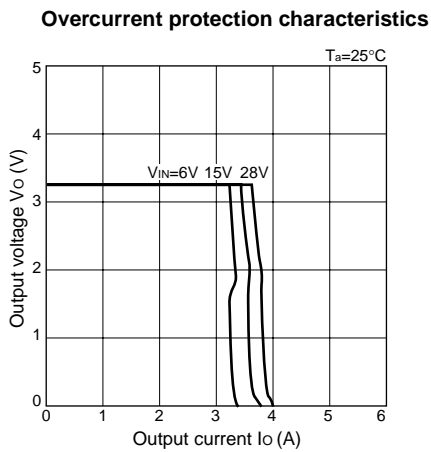
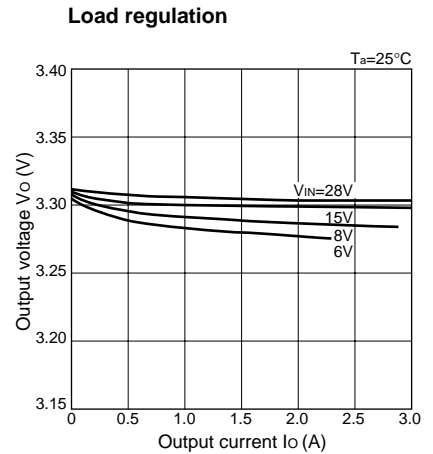
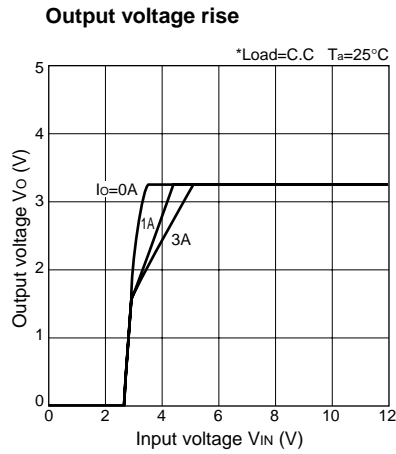
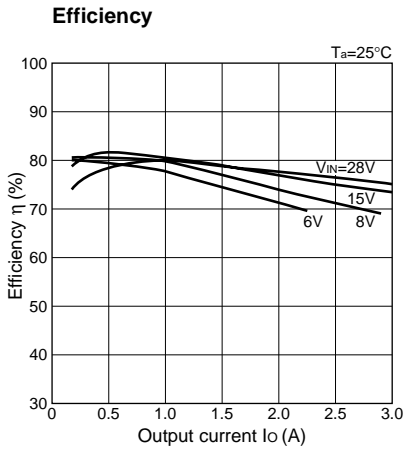
Thermal design for D₁ must be performed separately.

Applications

Varying output voltage

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

■Typical Characteristics Examples (SI-8033SD)



■Typical Characteristics Example (SI-8050SD)

