

SI-8000JD Series

Surface-Mount, Separate Excitation Step-down Switching Mode

Features

- Surface-mount package (TO263-5)
- Output current: 1.5A
- High efficiency: 77 to 88%
- Requires only 4 discrete components
- Internally-adjusted phase correction and output voltage
- Capable of downsizing a choke-coil due to IC's high switching frequency (125 kHz). (Compared with conventional Sanken devices)
- Built-in foldback-overcurrent and thermal protection circuits
- Output ON/OFF available (Circuit current at output OFF: 200μA max)
- Soft start available by ON/OFF pin Conditions

Lineup

Part Number	SI-8033JD	SI-8050JD	SI-8090JD	SI-8120JD
Vo(V)	3.3	5.0	9.0	12.0
Io(A)	1.5			

Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit	Conditions
DC Input Voltage	VIN	43	V	
Output Current	Io	1.5	A	
Power Dissipation*	Pd	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)	θj-c	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%)

*: Limited by thermal protection circuit

Applications

- Power supplies for telecommunication equipment
- Onboard local power supplies, etc.

Recommended Operating Conditions

Parameter	Symbol	Ratings				Unit	Conditions
		SI-8033JD	SI-8050JD	SI-8090JD	SI-8120JD		
DC Input Voltage Range	VIN1	5.3 to 40	7 to 40	11 to 40	14 to 40	V	Io=0 to 1A
	VIN2	6.3 to 40	8 to 40	12 to 40	15 to 40		Io=0 to 1.5A
DC Output Current Range*	Io	0 to 1.5				A	VIN=Vo+3V
Operating Junction Temperature Range	Tjop	−30 to +125				°C	
Operating Temperature Range*	Top	−30 to +125				°C	

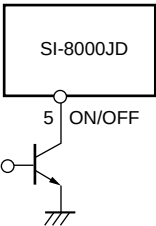
*: Limited by Ta–Pd characteristics

Electrical Characteristics

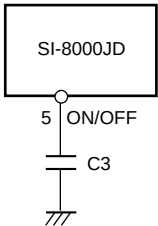
(Ta=25°C)

Parameter	Symbol	Ratings												Unit
		SI-8033JD			SI-8050JD			SI-8090JD			SI-8120JD			
		min.	typ.	max.	min.	typ.	max.	min.	typ.	max.	min.	typ.	max.	
Output Voltage	V _O	3.234	3.30	3.366	4.90	5.00	5.10	8.82	9.00	9.18	11.76	12.00	12.24	V
	Conditions	V _{IN} =15V, I _O =0.5A			V _{IN} =20V, I _O =0.5A			V _{IN} =21V, I _O =0.5A			V _{IN} =24V, I _O =0.5A			
Efficiency	η		77			82			86			88		%
	Conditions	V _{IN} =15V, I _O =0.5A			V _{IN} =20V, I _O =0.5A			V _{IN} =21V, I _O =0.5A			V _{IN} =24V, I _O =0.5A			
Oscillation Frequency	f		125			125			125			125		kHz
	Conditions	V _{IN} =15V, I _O =0.5A			V _{IN} =20V, I _O =0.5A			V _{IN} =21V, I _O =0.5A			V _{IN} =24V, I _O =0.5A			
Line Regulation	ΔV _{OLINE}		25	80		40	100		50	120		60	130	mV
	Conditions	V _{IN} =8 to 30V, I _O =0.5A			V _{IN} =10 to 30V, I _O =0.5A			V _{IN} =15 to 30V, I _O =0.5A			V _{IN} =18 to 30V, I _O =0.5A			
Load Regulation	ΔV _{LOAD}		10	30		10	40		10	40		10	40	mV
	Conditions	V _{IN} =15V, I _O =0.2 to 0.8A			V _{IN} =20V, I _O =0.2 to 0.8A			V _{IN} =21V, I _O =0.2 to 0.8A			V _{IN} =24V, I _O =0.2 to 0.8A			
Temperature Coefficient of Output Voltage	ΔV _O /ΔT _a		±0.5			±0.5			±1.0			±1.0		mV/°C
Overcurrent Protection Starting Current	I _{S1}	1.6			1.6			1.6			1.6			A
	Conditions	V _{IN} =15V			V _{IN} =20V			V _{IN} =21V			V _{IN} =24V			
ON/OFF* Pin	Low Level Voltage	V _{SSL}		0.5			0.5			0.5			0.5	V
	Outflow Current at Low Voltage	I _{SSL}		100			100			100			100	μA
	Conditions	V _{SSL} =0V												
Quiescent Circuit Current	I _q		7			7			7			7		mA
	Conditions	V _{IN} =15V, I _O =0A			V _{IN} =20V, I _O =0A			V _{IN} =21V, I _O =0A			V _{IN} =24V, I _O =0A			
	I _q (OFF)			200			200			200			200	μA
	Conditions	V _{IN} =15V, V _{ON/OFF} =0.3V			V _{IN} =20V, V _{ON/OFF} =0.3V			V _{IN} =21V, V _{ON/OFF} =0.3V			V _{IN} =24V, V _{ON/OFF} =0.3V			

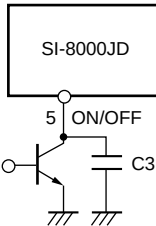
*: Pin 5 is the ON/OFF pin. Soft start at power on can be performed with a capacitor connected to this pin.
The output can also be turned ON/OFF with this pin.
The output is stopped by setting the voltage of this pin to VSSL or lower.
ON/OFF-pin voltage can be changed with an open-collector drive circuit 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.



VOUT. ON/OFF



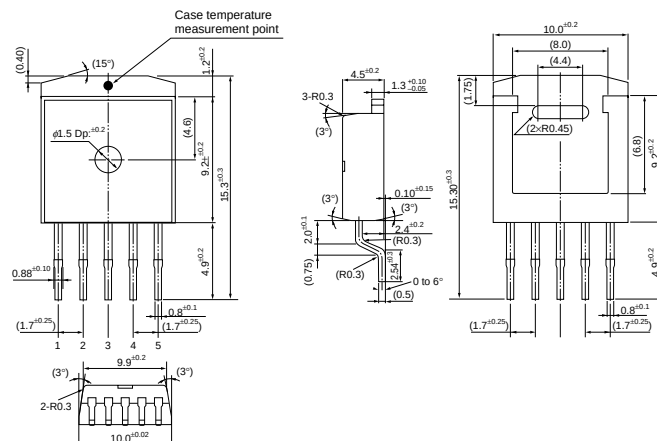
Soft Start



Soft Start
+VOUT. ON/OFF

External Dimensions (TO263-5)

(Unit : mm)

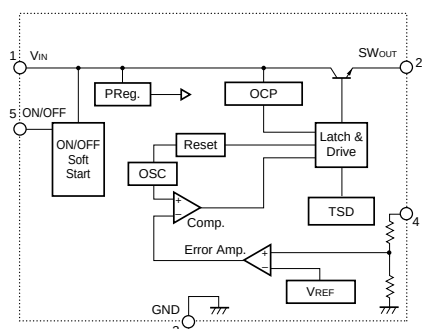


Pin Assignment

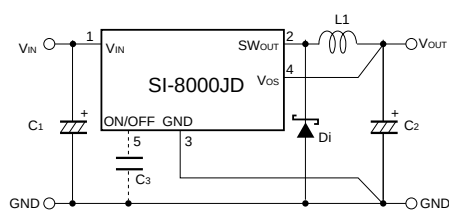
- ① VIN
- ② SWOUT
- ③ GND
- ④ Vos
- ⑤ ON/OFF

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

Block Diagram



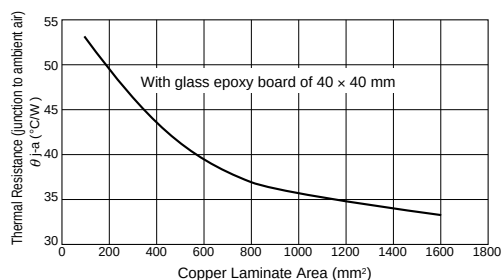
Typical Connection Diagram



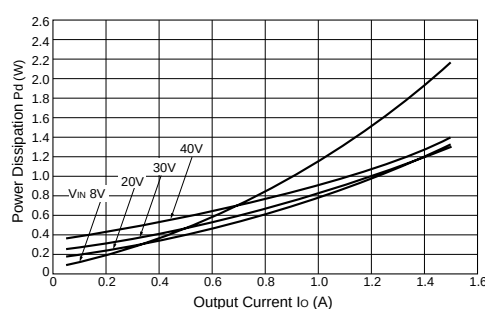
- C1 : 50V/220μF
- C2 : 25V/470μF
- C3 : 10V/0.47μF (Only when using soft-start function)
- L1 : 100μH
- Di : SJPB-H6 (Sanken)

Reference Data

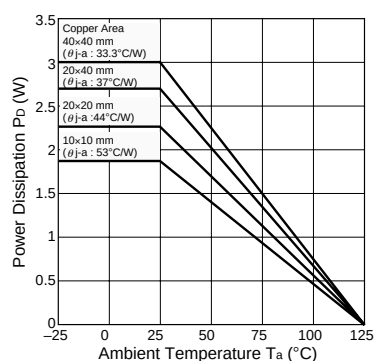
Copper Laminate Area on Glass Epoxy Board vs.
 Thermal Resistance (Junction to Ambient Air) (Typical Value)



Output Current vs. Power Dissipation (Typical)



Ta-Pd 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.

- Vo : Output Voltage
- VIN : Input Voltage
- Io : Output Current
- ηχ : Efficiency (%)
- VF : Di forward voltage
- 0.4V(Io=2A)(SJPB-H6)

Thermal design for D1 must be considered separately.