

# SI-3000ZD Series Surface-Mount, Low Dropout Voltage Linear Regulator ICs

## ■Features

- Compact surface-mount package (TO263-5)
- Output current: 3.0A
- Low dropout voltage:  $V_{DIF} \leq 0.6V$  (at  $I_o = 3.0A$ )
- Low circuit current at output OFF:  $I_q (OFF) \leq 1\mu A$
- Built-in overcurrent and thermal protection circuits

## ■Applications

- Secondary stabilized power supply (local power supply)

## ■Absolute Maximum Ratings

( $T_a=25^\circ C$ )

Parameter	Symbol	Ratings	Unit
DC Input Voltage	$V_{IN}^{*1}$	10	V
Output Control Terminal Voltage	$V_C$	6	V
DC Output Current	$I_o^{*1}$	3.0	A
Power Dissipation	$P_D^{*3}$	3	W
Junction Temperature	$T_j$	-30 to +125	$^\circ C$
Operating Ambient Temperature	$T_{op}$	-30 to +85	$^\circ C$
Storage Temperature	$T_{sg}$	-40 to +125	$^\circ C$
Thermal Resistance (Junction to Ambient Air)	$\theta_{ja}$	33.3	$^\circ C/W$
Thermal Resistance (Junction to Case)	$\theta_{jc}$	3	$^\circ C/W$

## ■Recommended Operating Conditions

Parameter	Symbol	Ratings	Unit	Remarks
Input Voltage	$V_{IN}$	$^{*2}$ to $6^{*1}$	V	
Output Current	$I_o$	0 to 3	A	
Operating Ambient Temperature	$T_{op (a)}$	-20 to +85	$^\circ C$	
Operating Junction Temperature	$T_{op (j)}$	-20 to +100	$^\circ C$	
Output Voltage Variable Range	$V_{OAdj}$	1.2 to 5	V	Only for SI-3011ZD. Refer to the block diagram.

\*1:  $V_{IN}$  (max) and  $I_o$  (max) are restricted by the relation  $P_D = (V_{IN} - V_o) \times I_o$ .

\*2: Set the input voltage to 2.4V or higher when setting the output voltage to 2.0V or lower (SI-3011ZD).

\*3: When mounted on glass-epoxy board of 40 × 40mm (copper laminate area 100%).

## ■Electrical Characteristics

( $T_a=25^\circ C$ ,  $V_C=2V$  unless otherwise specified)

Parameter	Symbol	Ratings						Unit	
		SI-3011ZD (Variable type)			SI-3033ZD				
		min.	typ.	max.	min.	typ.	max.		
Output Voltage (Reference Voltage $V_{ADJ}$ for SI-3011ZD)	$V_O (V_{ADJ})$	1.078	1.100	1.122	3.234	3.300	3.366	V	
	Conditions	$V_{IN}=V_O+1V, I_o=10mA$			$V_{IN}=5V, I_o=10mA$				
Line Regulation	$\Delta V_{OLINE}$			10			10	mV	
	Conditions	$V_{IN}=3.3$ to $5V, I_o=10mA (V_o=2.5V)$			$V_{IN}=4.5$ to $5.5V, I_o=10mA$				
Load Regulation	$\Delta V_{LOAD}$			40			40	mV	
	Conditions	$V_{IN}=3.3V, I_o=0$ to $3A (V_o=2.5V)$			$V_{IN}=5V, I_o=0$ to $3A$				
Dropout Voltage	$V_{DIF}$			0.6			0.6	V	
	Conditions	$I_o=3A (V_o=2.5V)$			$I_o=3A$				
Quiescent Circuit Current	$I_q$		1	1.5		1	1.5	mA	
	Conditions	$V_{IN}=V_O+1V, I_o=0A, V_C=2V$			$V_{IN}=5V, I_o=0A, V_C=2V$				
Circuit Current at Output OFF	$I_q (OFF)$			1			1	$\mu A$	
	Conditions	$V_{IN}=V_O+1V, V_C=0V$			$V_{IN}=5V, V_C=0V$				
Temperature Coefficient of Output Voltage	$\Delta V_o/\Delta T_a$		$\pm 0.3$			$\pm 0.3$		mV/ $^\circ C$	
	Conditions	$T_j=0$ to $100^\circ C$			$T_j=0$ to $100^\circ C$				
Ripple Rejection	$R_{REJ}$		60			60		dB	
	Conditions	$V_{IN}=V_O+1V, f=100$ to $120Hz, I_o=0.1A$			$V_{IN}=5V, f=100$ to $120Hz, I_o=0.1A$				
Overcurrent Protection Starting Current <sup>*2</sup>	$I_{S1}$	3.2			3.2			A	
	Conditions	$V_{IN}=V_O+1V$			$V_{IN}=5V$				
Vc Terminal	Control Voltage (Output ON) <sup>*3</sup>	$V_C, IH$	2		2			V	
	Control Voltage (Output OFF) <sup>*3</sup>	$V_C, IL$					0.8		
	Control Current (Output ON)	$I_C, IH$			100			100	$\mu A$
		Conditions	$V_C=2.7V$			$V_C=2.7V$			
	Control Current (Output OFF)	$I_C, IL$	-5	0		-5	0		$\mu A$
	Conditions	$V_C=0V$			$V_C=0V$				

\*1: Set the input voltage to 2.4V or higher when setting the output voltage to 2.0V or lower.

\*2:  $I_{S1}$  is specified at the -5% drop point of output voltage  $V_o$  under the condition of Output Voltage parameter.

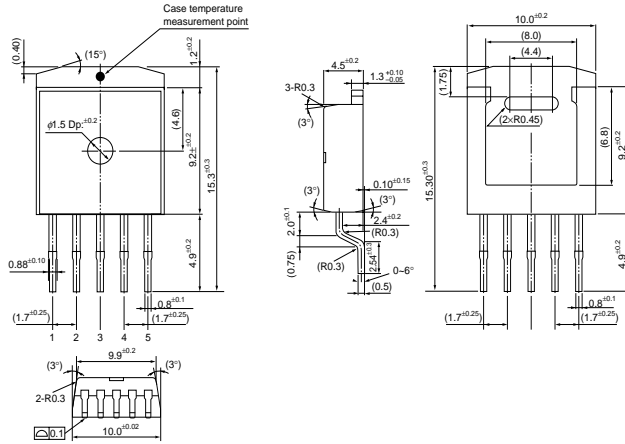
\*3: Output is OFF when the output control terminal (Vc terminal) is open. Each input level is equivalent to LS-TTL level. Therefore, the device can be driven directly by LS-TTLs.

\*4: These products cannot be used for the following applications because the built-in foldback-type overcurrent protection may cause errors during start-up stage.

- (1) Constant current load (2) Positive and negative power supply (3) Series-connected power supply (4)  $V_o$  adjustment by raising ground voltage

External Dimensions (TO263-5)

(Unit : mm)



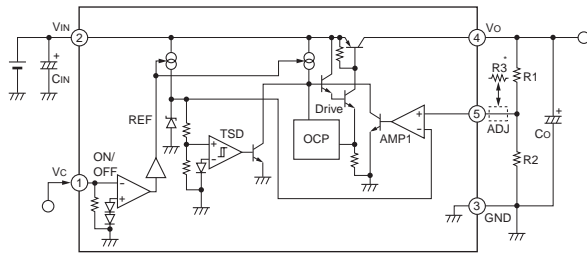
Pin Assignment

- ① Vc
  - ② VIN
  - ③ GND (Common to the rear side of product)
  - ④ Vo
  - ⑤ Sense
- (ADJ for SI-3011ZD)

Plastic Mold Package Type  
 Flammability: UL94V-0  
 Product Mass: Approx. 1.48g

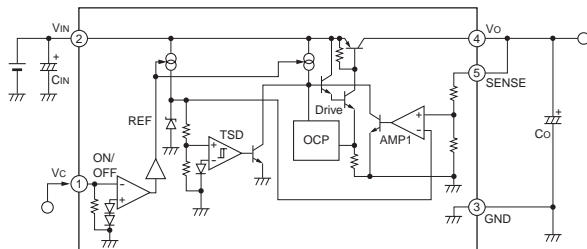
Block Diagram

SI-3011ZD



CIN: Input capacitor (Approx. 10μF)  
 Co: Output capacitor (47μF or larger)  
 The output voltage may oscillate if a low ESR type capacitor (such as a ceramic capacitor) is used for the output capacitor in the SI-3000ZD Series.

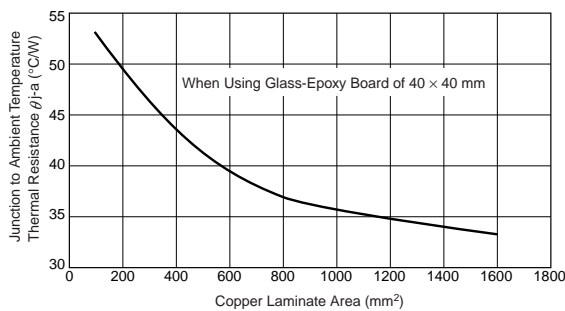
SI-3033ZD



R1, R2: Output voltage setting resistors  
 The output voltage can be set by connecting R1 and R2 as shown at left.  
 The recommended value for R2 is 10kΩ or 11kΩ.  
 $R1 = (Vo - V_{ADJ}) / (V_{ADJ} / R2)$   
 \*: Insert R3 in case of setting Vo to Vo ≤ 1.8V. The recommended value for R3 is 10kΩ.

Reference Data

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



- A higher heat radiation effect can be achieved by enlarging the copper laminate area connected to the inner frame to which a monolithic IC is mounted.
- Obtaining the junction temperature  
 Measure GND terminal temperature Tc with a thermocouple, etc. Then substitute this value in the following formula to obtain the junction temperature.

$$T_j = P_D \times \theta_{j-a} + T_c \quad P_D = (V_{IN} - V_O) \times I_{OUT}$$