

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_{stg}	-40 to +125	$^{\circ}C$
Thermal Resistance (Junction to Ambient Air)	θ_{j-a}	33.3	$^{\circ}C/W$
Thermal Resistance (Junction to Case)	θ_{j-c}	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

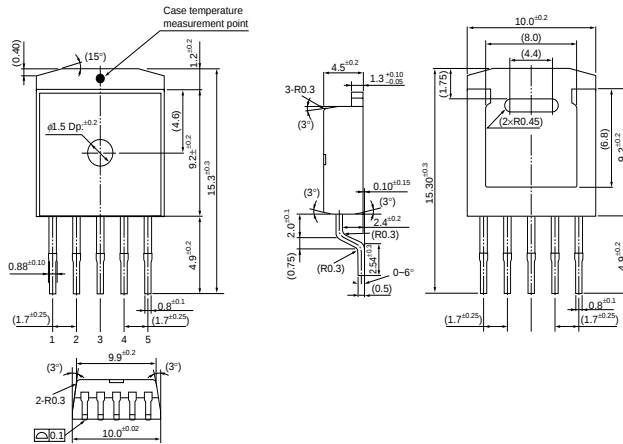
($T_a=25^{\circ}C$, $V_c=2V$ unless otherwise specified)

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		ΔV _{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		ΔV _{OLOAD}			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	μA
		Conditions	V _{IN} =V _O +1V, V _C =0V			V _{IN} =5V, V _C =0V			
Temperature Coefficient of Output Voltage		ΔV _O /ΔT _a		±0.3			±0.3		mV/°C
		Conditions	T _J =0 to 100°C			T _J =0 to 100°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 ^{*2}		I _{S1}	3.2			3.2			A
		Conditions	V _{IN} =V _O +1V			V _{IN} =5V			
V _C Terminal	Control Voltage (Output ON) ^{*3}	V _C , IH	2			2			V
	Control Voltage (Output OFF) ^{*3}	V _C , IL			0.8			0.8	
	Control Current(Output ON)	I _C , IH			100			100	μA
	Conditions	V _C =2.7V			V _C =2.7V				
	Control Current(Output OFF)	I _C , IL	-5	0		-5	0		μA
	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 (V_c 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)



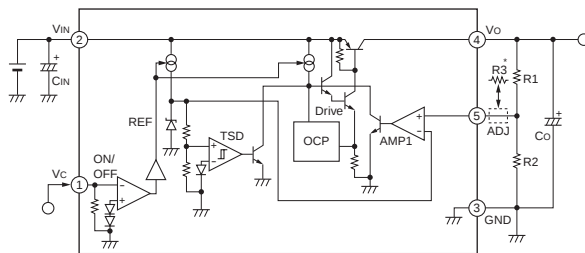
Pin Assignment

- ① V_c
 - ② V_{IN}
 - ③ GND (Common to the rear side of product)
 - ④ V_O
 - ⑤ Sense
- (ADJ for SI-3011ZD)

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

Block Diagram

SI-3011ZD

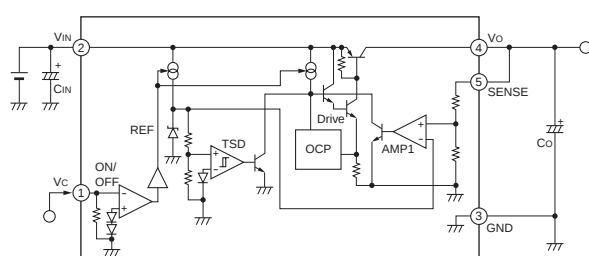


C_{IN}: Input capacitor (Approx. 10μF)

C_O: 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.

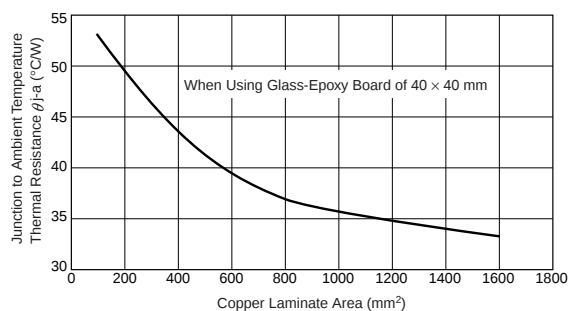
$$R1 = (V_O - V_{ADJ}) / (V_{ADJ} / R2)$$

*: Insert R3 in case of setting V_O to V_O ≤ 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 T_c with a thermocouple, etc. Then substitute this value in the following formula to obtain the junction temperature.

$$T_J = P_D \times \theta_J - C + T_C \quad P_D = (V_{IN} - V_O) \times I_{OUT}$$