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SI-3000ZD Series Surface-Mount, Low Dropout Voltage

■Features

- Compact surface-mount package (TO263-5)
- Output current: 3.0A
- Low dropout voltage: V_{DIF} ≤ 0.6V (at I_O = 3.0A)
- Low circuit current at output OFF: Iq (OFF) ≤ 1μA
- Built-in overcurrent and thermal protection circuits

■Applications

- Secondary stabilized power supply (local power supply)

■Absolute Maximum Ratings

(T_a=25°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	°C
Operating Ambient Temperature	T_{op}	–30 to +85	°C
Storage Temperature	T_{stg}	–40 to +125	°C
Thermal Resistance (Junction to Ambient Air)	$\theta_{j\text{-}a}$	33.3	°C/W
Thermal Resistance (Junction to Case)	$\theta_{j\text{-}c}$	3	°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	°C	
Operating Junction Temperature	$T_{op\,(j)}$	–20 to +100	°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

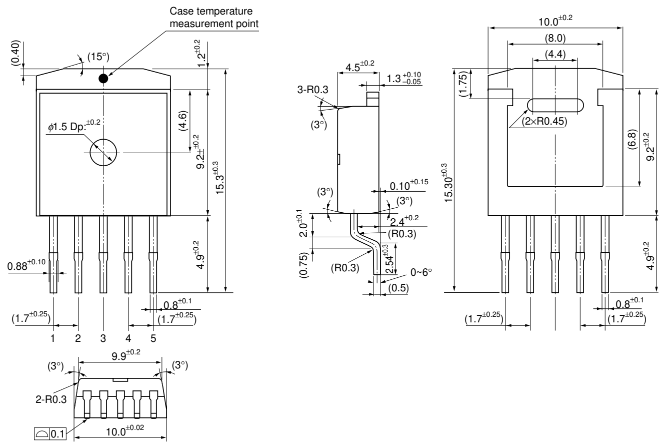
(T_a=25°C, V_C=2V, unless otherwise specified)

Parameter		Symbol	SI-3011ZD (Variable type) min.	SI-3011ZD (Variable type) typ.	SI-3011ZD (Variable type) max.	SI-3033ZD min.	SI-3033ZD typ.	SI-3033ZD max.	Unit
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		$\Delta V_O/\Delta T_a$		±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 *4		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)

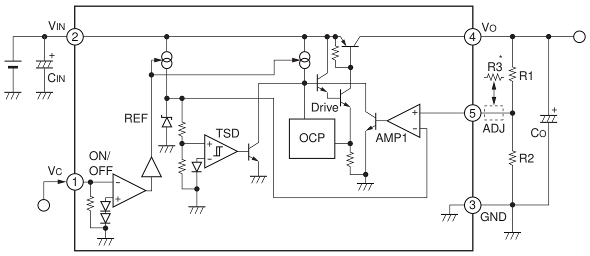


Pin Assignment
① V_C
② V_{IN}
③ GND (Common to the rear side of product)
④ V_O
⑤ Sense
(ADJ for SI-3011ZD)

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

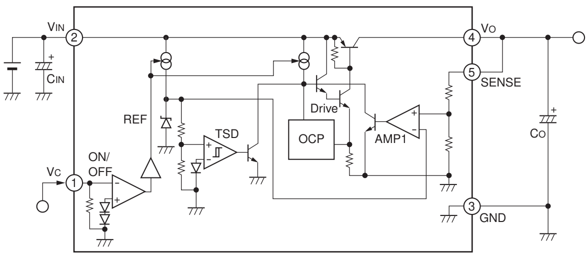
■Block Diagram

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



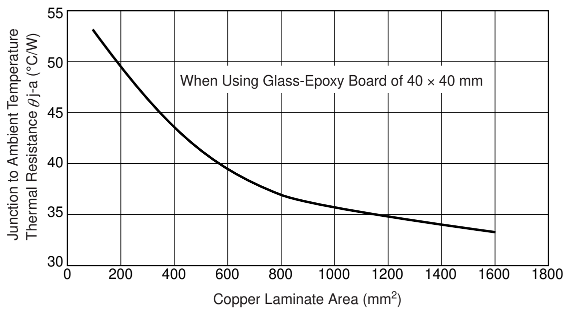
R1, R2: Output voltage setting resistors
The output voltage can be set by connecting R1 and R2 as shown at left.
The recommended value for R2 is 10kΩ or 11kΩ.

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

*: Insert R3 in case of setting V_O to $V_O \leq 1.8$V. 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.

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