



**THE DATASHEET OF  
SI-3012LU-TL**



# SI-3000LU Series Surface-Mount, Low Current Consumption, Low Dropout Voltage

## ■ Features

- Compact surface-mount package (SOT89-5)
- Output current: 250 mA
- Low current consumption  $I_q$  (OFF)  $\leq 1\mu\text{A}$  ( $V_c = 0\text{V}$ )
- Low dropout voltage:  $V_{DIF} \leq 0.5\text{V}$  (at  $I_o = 250\text{mA}$ )
- Output voltage range (1.5V to 15V)
- Built-in drooping-type-overcurrent and thermal protection circuits

## ■ Absolute Maximum Ratings

( $T_a=25^\circ\text{C}$ )

Parameter	Symbol	Ratings	Unit
DC Input Voltage	$V_{IN}$	18	V
Output control terminal voltage	$V_c$	$V_{IN}$	V
DC Output Current	$I_o$	250	mA
Power Dissipation	$P_D^{*1}$	0.75	W
Junction Temperature	$T_j^{*2}$	-40 to +135	$^\circ\text{C}$
Storage Temperature	$T_{stg}^{*2}$	-40 to +125	$^\circ\text{C}$
Thermal Resistance (Junction to Ambient Air)	$\theta_{ja}^{*1}$	146	$^\circ\text{C/W}$

\*1: When mounted on glass-epoxy board 40 × 40 mm (copper laminate area 2%).

\*2: Thermal protection circuits may operate if the junction temperature exceeds 135 $^\circ\text{C}$ .

## ■ Applications

- Auxiliary power supplies for PC
- Battery-driven electronic equipment

## ■ Recommended Operating Conditions

Parameter	Symbol	Ratings		Unit
		min.	max.	
Input Voltage	$V_{IN}$	*2, *3	$V_o+2^{*1}$	V
DC Output Current	$I_o$	0	250	mA
Operating Ambient Temperature	$T_{op}$	-20	85	$^\circ\text{C}$

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

Calculate these values referring to the reference data on page 69.

\*2: Refer to the Dropout Voltage parameter.

\*3: For the SI-3012LU, set the input voltage to  $V_{in} \geq 2.4\text{V}$ , and secure the minimum voltage as explained in "Setting DC Input Voltage" section in Linear Regulator Application Note.

## ■ Electrical Characteristics

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

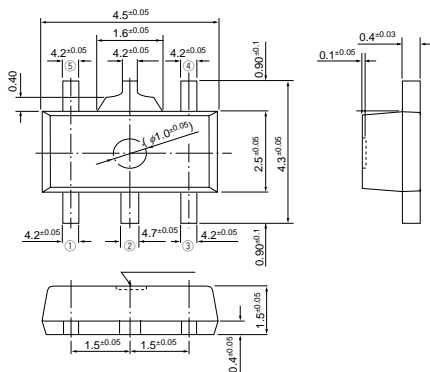
Parameter	Symbol	Ratings			Unit	
		SI-3012LU(Variable)				
		min.	typ.	max.		
Reference Voltage	$V_{ADJ}$	1.210	1.250	1.290	V	
	Conditions	$V_{IN}=V_o+1\text{V}$ , $I_o=10\text{mA}$				
Dropout Voltage	$V_{DIF}$			0.3	V	
	Conditions	$I_o=100\text{mA}(V_o=3.3\text{V})$				
	Conditions	$I_o=250\text{mA}(V_o=3.3\text{V})$				
Line Regulation	$\Delta V_{LINE}$			10	mV	
	Conditions	$V_{IN}=V_o+1\text{ to }V_o+5\text{V}$ , $I_o=10\text{mA}(V_o=3.3\text{V})$				
Load Regulation	$\Delta V_{LOAD}$			20	mV	
	Conditions	$V_{IN}=V_o+1\text{V}$ , $I_o=1\text{ to }250\text{mA}(V_o=3.3\text{V})$				
Temperature Coefficient of Reference Voltage	$\Delta V_o/\Delta T_a$			$\pm 0.3$	mV/ $^\circ\text{C}$	
	Conditions	$T_j=0\text{ to }100^\circ\text{C}$				
Ripple Rejection	$R_{REJ}$			55	dB	
	Conditions	$V_{IN}=V_o+1\text{V}$ , $f=100\text{ to }120\text{Hz}(V_o=3.3\text{V})$				
Quiescent Circuit Current	$I_q$			150	$\mu\text{A}$	
	Conditions	$V_{IN}=V_o+1\text{V}$ , $I_o=0\text{mA}$ , $V_c=2\text{V}$ , $R_2=100\text{k}\Omega$				
Circuit Current at Output OFF	$I_q(\text{OFF})$			1	$\mu\text{A}$	
	Conditions	$V_{IN}=V_o+1\text{V}$ , $V_c=0\text{V}$				
Overcurrent Protection Starting Current <sup>*1</sup>	$I_{S1}$	260			mA	
	Conditions	$V_{IN}=V_o+1\text{V}$				
$V_c$ Terminal	Control Voltage (Output ON) <sup>*2</sup>	$V_c, I_H$	2.0		V	
	Control Voltage (Output OFF) <sup>*2</sup>	$V_c, I_L$		0.8		
	Control Current (Output ON)	$I_c, I_H$			40	$\mu\text{A}$
	Control Current (Output OFF)	$I_c, I_L$		0	-5	
Conditions	$V_c=0\text{V}$					

\*1:  $I_{S1}$  is specified at the 5% drop point of output voltage  $V_o$  on the condition that  $V_{IN} = 3.3\text{V}$ , and  $I_o = 10\text{mA}$ .

\*2: 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.

External Dimensions (SOT89-5)

(Unit : mm)

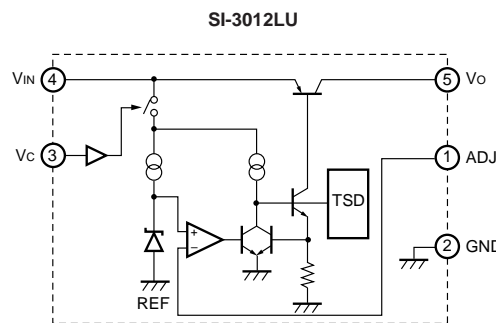


Pin Assignment

- ① ADJ
- ② GND
- ③ Vc
- ④ VIN
- ⑤ Vo

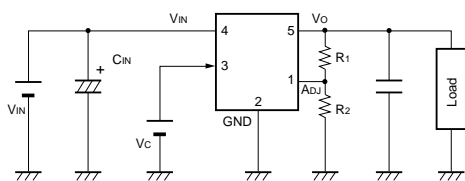
Plastic Mold Package Type  
 Flammability: UL94V-0  
 Product Mass: Approx. 0.05g

Block Diagram



Typical Connection Diagram

SI-3012LU



Co: Output capacitor (10  $\mu$ F or larger)

For SI-3000LU series, Co has to be a low ESR capacitor such as a ceramic capacitor.

CIN: Input capacitor (10  $\mu$ F approx.)

● Setting of SI-3012LU output voltage (recommended voltage: 1.5 V to 15 V)

R1 and R2: Resistors for output setting

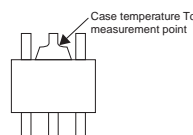
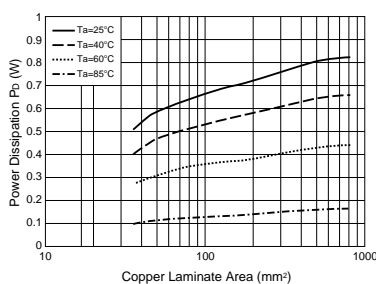
The output voltage can be set by connecting R1 and R2 as shown in the diagram on the left.

R2: 100 k $\Omega$  is recommended

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

Reference Data

Copper Laminate Area vs Power Dissipation  
 Tj=100°C PCB size 40x40





- A monolithic ICs mounts an inner frame stage that is connected to the GND pin (pin 2). Therefore, enlarging the copper laminate area connected to the GND pin improves heat radiation effect.

- Obtaining the junction temperature  
 Measure the temperature Tc at the lead part of the GND pin (pin 2) with a thermocouple, etc. Then, substitute this value in the following formula to obtain the junction temperature.

$$Tj = Pd \times \theta_j - c + Tc \quad (\theta_j - c = 5^\circ C/W)$$

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