# 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 Iq (OFF) ≤ 1μA ($V_C$ = 0 V)
- Low dropout voltage: $V_{DIF}$ ≤ 0.5 V (at $I_O$ = 250 mA)
- Output voltage range (1.5V to 15V)
- Built-in drooping-type-overcurrent and thermal protection circuits

## ■Absolute Maximum Ratings

($T_a$=25°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 | °C |
| Storage Temperature | $T_{stg}$*2 | –40 to +125 | °C |
| Thermal Resistance (Junction to Ambient Air) | $\theta_{j\text{-}a}$*1 | 146 | °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°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 | °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 Vin ≥ 2.4 V, and secure the minimum voltage as explained in "Setting DC Input Voltage" section in Linear Regulator Application Note.

## ■Electrical Characteristics

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

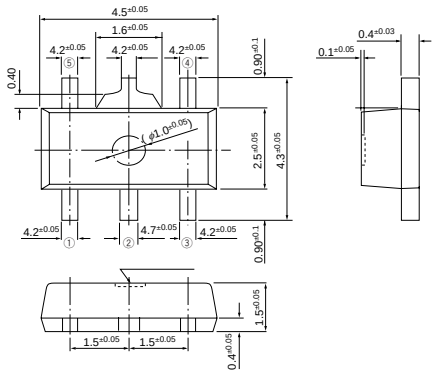
| Parameter | | Symbol | Ratings SI-3012LU(Variable) min. | typ. | max. | Unit |
|---|---|---|---|---|---|---|
| Reference Voltage | | $V_{ADJ}$ | 1.210 | 1.250 | 1.290 | V |
| | | Conditions | $V_{IN}$=$V_O$+1V, $I_O$=10mA | | | |
| Dropout Voltage | | $V_{DIF}$ | | | 0.3 | V |
| | | Conditions | $I_O$=100mA($V_O$=3.3V) | | | |
| | | | | | 0.5 | |
| | | Conditions | $I_O$=250mA($V_O$=3.3V) | | | |
| Line Regulation | | $\Delta V_{LINE}$ | | | 10 | mV |
| | | Conditions | $V_{IN}$=$V_O$+1 to $V_O$+5V, $I_O$=10mA( $V_O$=3.3V) | | | |
| Load Regulation | | $\Delta V_{LOAD}$ | | | 20 | mV |
| | | Conditions | $V_{IN}$=$V_O$+1V, $I_O$=1 to 250mA( $V_O$=3.3V) | | | |
| Temperature Coefficient of Reference Voltage | | $\Delta V_O/\Delta T_a$ | | ±0.3 | | mV/°C |
| | | Conditions | $T_j$=0 to 100°C | | | |
| Ripple Rejection | | $R_{REJ}$ | | 55 | | dB |
| | | Conditions | $V_{IN}$=$V_O$+1V, f=100 to 120Hz( $V_O$=3.3V) | | | |
| Quiescent Circuit Current | | $I_q$ | | | 150 | μA |
| | | Conditions | $V_{IN}$=$V_O$+1V, $I_O$=0mA $V_C$=2V, R2=100kΩ | | | |
| Circuit Current at Output OFF | | $I_q$(OFF) | | | 1 | μA |
| | | Conditions | $V_{IN}$=$V_O$+1V, $V_C$=0V | | | |
| Overcurrent Protection Starting Current*1 | | $I_{S1}$ | 260 | | | mA |
| | | Conditions | $V_{IN}$=$V_O$+1V | | | |
| $V_C$ Terminal | Control Voltage (Output ON)*2 | $V_C$, IH | 2.0 | | | V |
| | Control Voltage (Output OFF)*2 | $V_C$, IL | | | 0.8 | |
| | Control Current (Output ON) | $I_C$, IH | | | 40 | μA |
| | | Conditions | $V_C$=2V | | | |
| | Control Current (Output OFF) | $I_C$, IL | | 0 | –5 | μA |
| | | Conditions | $V_C$=0V | | | |

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

Not Recommended for New Designs

## ■External Dimensions (SOT89-5)

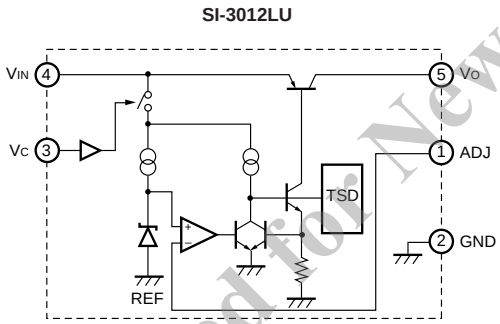
(Unit : mm)



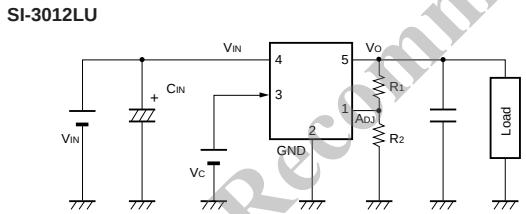
Pin Assignment
① ADJ
② GND
③ $V_C$
④ $V_{IN}$
⑤ $V_O$

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

## ■Block Diagram




## ■Typical Connection Diagram

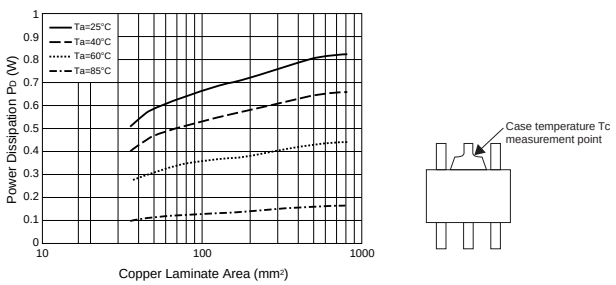



$C_O$: Output capacitor (10 $\mu$F or larger)
For SI-3000LU series, Co has to be a low ESR capacitor such as a ceramic capacitor.
$C_{IN}$: Input capacitor (10 $\mu$F approx.)

● 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 kΩ is recommended
$R1=(V_O-V_{ADJ})/(V_{ADJ}/R2)$

## ■Reference Data

**Copper Laminate Area vs Power Dissipation**
**$T_j$=100°C PCB size 40×40**




- 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 $T_C$ 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.

$$T_j=P_D\times\theta j\text{–}c+Tc \quad (\theta j\text{–}c=5°C/W)$$

Not Recommended for New Designs

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