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) $\leq 1\mu A$ (Vc = 0 V)
- Low dropout voltage: $V_{DIF} \leq 0.5$ V (at Io = 250 mA)
- Output voltage range (1.5V to 15V)
- Built-in drooping-type-overcurrent and thermal protection circuits

■Applications

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

■Absolute Maximum Ratings

(Ta=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	Io	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.

■Recommended Operating Conditions

Parameter	Symbol	Ratings min.	Ratings max.	Unit
Input Voltage	V_{IN}	[*2, *3]	Vo+2[*1]	V
DC Output Current	Io	0	250	mA
Operating Ambient Temperature	T_{op}	−20	85	°C

*1: V_{IN} (max) and Io (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

(Ta=25°C, Vc=2V, unless otherwise specified)

Parameter	Symbol	SI-3012LU(Variable) min.	SI-3012LU(Variable) typ.	SI-3012LU(Variable) max.	Unit
Reference Voltage	V_{ADJ}	1.210	1.250	1.290	V
	Conditions		V_{IN}=Vo+1V, Io =10mA		
Dropout Voltage	V_{DIF}			0.3	V
	Conditions		Io=100mA(Vo =3.3V)		
				0.5	
	Conditions		Io=250mA(Vo =3.3V)		
Line Regulation	ΔV_{LINE}			10	mV
	Conditions		V_{IN}=Vo+1 to Vo+5V, Io=10mA(Vo=3.3V)		
Load Regulation	ΔV_{LOAD}			20	mV
	Conditions		V_{IN}=Vo+1V, Io=1 to 250mA (Vo=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}=Vo+1V, f=100 to 120Hz(Vo=3.3V)		
Quiescent Circuit Current	Iq			150	μA
	Conditions		V_{IN}=Vo+1V, Io=0mA Vc=2V, R2=100kΩ		
Circuit Current at Output OFF	Iq(OFF)			1	μA
	Conditions		V_{IN}=Vo+1V, Vc=0V		
Overcurrent Protection Starting Current[*1]	Is1	260			mA
	Conditions		V_{IN}=Vo +1V		
Vc Terminal — Control Voltage (Output ON)[*2]	Vc, IH	2.0			V
Vc Terminal — Control Voltage (Output OFF)[*2]	Vc, IL			0.8	V
Vc Terminal — Control Current (Output ON)	Ic, IH			40	μA
	Conditions		Vc=2V		
Vc Terminal — Control Current (Output OFF)	Ic, IL	0		−5	μA
	Conditions		Vc=0V		

*1: Is1 is specified at the 5% drop point of output voltage Vo on the condition that V_{IN} = 3.3 V, and Io = 10 mA.
*2: 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.

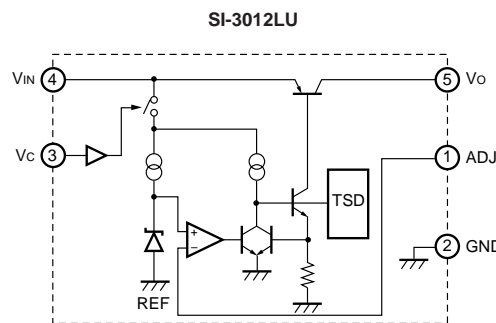## ■External Dimensions (SOT89-5)

(Unit : mm)
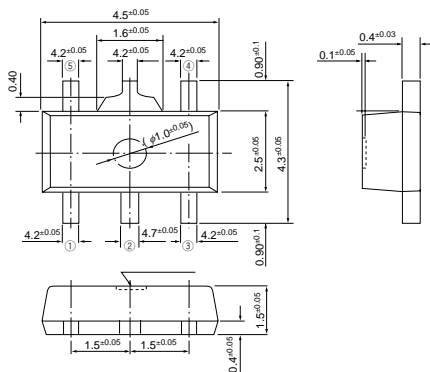
Pin Assignment
① ADJ
② GND
③ Vc
④ VIN
⑤ Vo

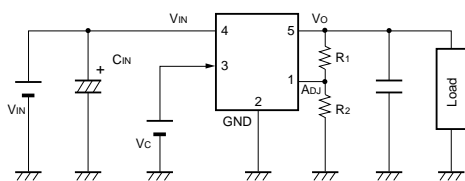Plastic Mold Package Type
Flammability: UL94V-0
Product Mass: Approx. 0.05g

■Block Diagram

SI-3012LU

■Typical Connection Diagram

SI-3012LU

Co: Output capacitor (10 μF or larger)
For SI-3000LU series, Co has to be a low ESR capacitor such as a ceramic capacitor.
CIN: Input capacitor (10 μF approx.)
● Setting of SI-3012LU output voltage (recommended voltage: 1.5 V to 15 V)
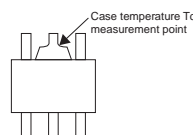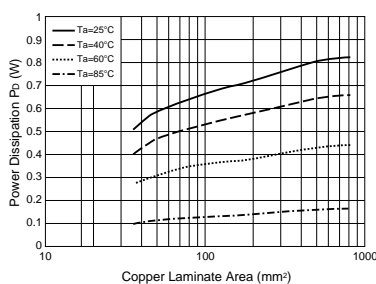R1 and R2: Resistors for output setting
The output voltage can be set by connecting R1 and R2 as shown in the diagram on the left.
R2: 100 kΩ is recommended
$R1=(V_O–V_{ADJ})/(V_{ADJ}/R2)$

■Reference Data

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

Power Dissipation P_D (W)
— Ta=25°C
-- Ta=40°C
···· Ta=60°C
-·-· Ta=85°C

Copper Laminate Area (mm²)

Case temperature Tc
measurement point

• 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.

$$T_j=P_D×\theta_{j–c}+T_c \quad (\theta_{j–c}=5°C/W)$$