

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) $\leq 1\mu A$ ($V_c = 0\text{ V}$)
- 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

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

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	$^{\circ}C$
Storage Temperature	T_{stg}^{*2}	-40 to +125	$^{\circ}C$
Thermal Resistance (Junction to Ambient Air)	θ_{JA}^{*1}	146	$^{\circ}C/W$

*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	$^{\circ}C$

*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

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

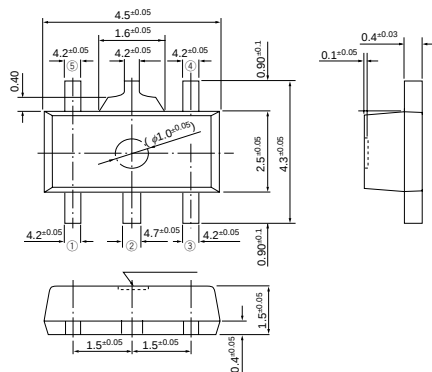
Parameter		Symbol	Ratings			Unit
			SI-3012LU(Variable)			
			min.	typ.	max.	
Reference Voltage		V _{ADJ}	1.210	1.250	1.290	V
		Conditions	V _{IN} =V _O +1V, I _O =10mA			
Dropout Voltage		V _{DIF}			0.3	V
		Conditions	I _O =100mA(V _O =3.3V)			
					0.5	
		Conditions	I _O =250mA(V _O =3.3V)			
Line Regulation		ΔV _{LINE}			10	mV
		Conditions	V _{IN} =V _O +1 to V _O +5V, I _O =10mA(V _O =3.3V)			
Load Regulation		ΔV _{LOAD}			20	mV
		Conditions	V _{IN} =V _O +1V, I _O =1 to 250mA(V _O =3.3V)			
Temperature Coefficient of Reference Voltage		ΔV _O /ΔT _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, R ₂ =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 $V_{IN} = 3.3\text{ V}$, 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

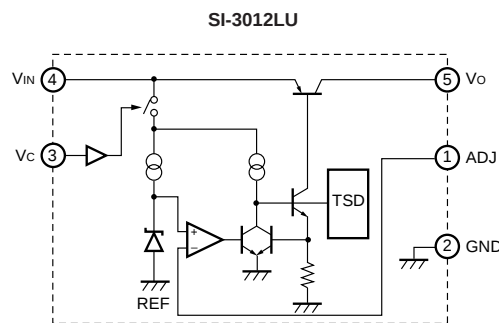
- ① ADJ
- ② GND
- ③ V_c
- ④ V_{IN}
- ⑤ V_O

Plastic Mold Package Type

Flammability: UL94V-0

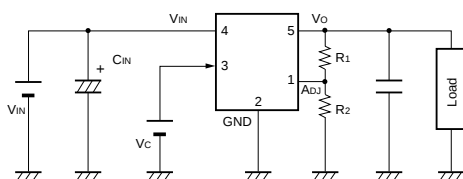
Product Mass: Approx. 0.05g

Block Diagram



Typical Connection Diagram

SI-3012LU

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

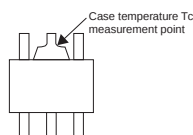
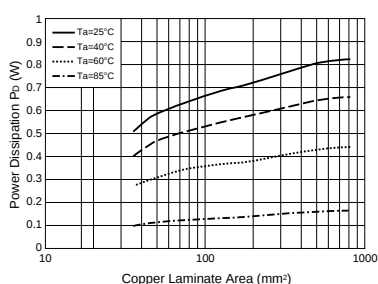
- Setting of SI-3012LU output voltage (recommended voltage: 1.5 V to 15 V)

R₁ and R₂: Resistors for output settingThe output voltage can be set by connecting R₁ and R₂ as shown in the diagram on the left.R₂: 100 k Ω is recommended

$$R_1 = (V_O - V_{ADJ}) / (V_{ADJ} / R_2)$$

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.

$$T_J = P_D \times \theta_{j-c} + T_c \quad (\theta_{j-c} = 5^\circ\text{C/W})$$