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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

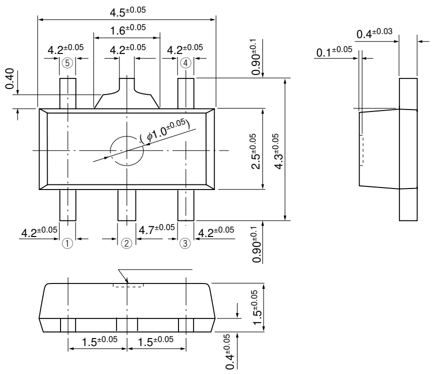
(T_a=25°C, V_C=2V, unless otherwise specified)

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	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	$\Delta V_O/\Delta T_a$		±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
V_C Terminal: Control Voltage (Output OFF)*2	$V_{C,IL}$			0.8	V
V_C Terminal: Control Current (Output ON)	$I_{C,IH}$			40	μA
	Conditions	V_C=2V			
V_C Terminal: 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.

■External Dimensions (SOT89-5)

(Unit : mm)

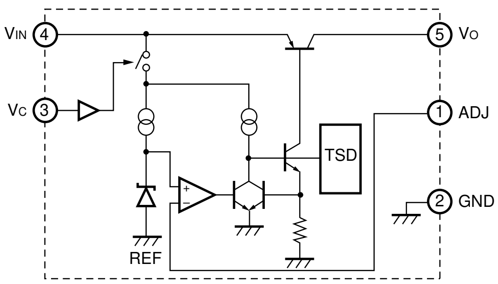


Pin Assignment
① ADJ
② GND
③ V_C
④ V_{IN}
⑤ V_O

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

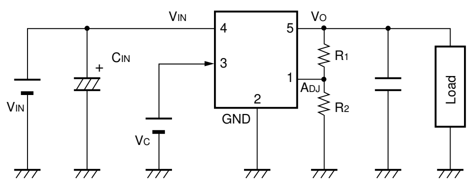
■Block Diagram

SI-3012LU



■Typical Connection Diagram

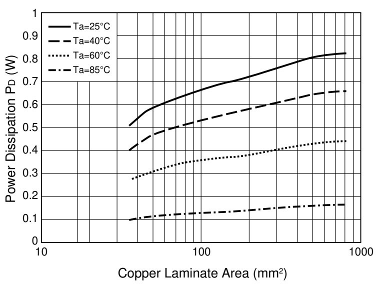
SI-3012LU

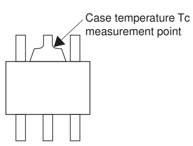


C_O: Output capacitor (10 μF or larger)
For SI-3000LU series, Co has to be a low ESR capacitor such as a ceramic capacitor.
C_{IN}: Input capacitor (10 μF approx.)
● Setting of SI-3012LU output voltage (recommended voltage: 1.5 V to 15 V)
R1 and R2: Resistors for output setting
The output voltage can 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





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