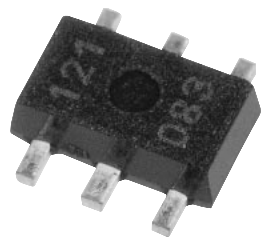
SI-3000LU Series

Surface-Mount, Low Current Consumption, Low Dropout Voltage Dropper Type

■Features
- Compact surface-mount package (SOT-89-5)
- 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)
- 5 types of output voltages (Adj, 1.8 V, 2.5 V, 3.3 V, 5.0 V) available
- Built-in dropping type overcurrent, thermal protection circuits



■Applications
- Auxiliary power supply for PC
- Battery-driven electronic equipment

■Absolute Maximum Ratings

(T_a=25°C)

Parameter	Symbol	Ratings	Unit
DC Input Voltage	V_{IN}	18	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_{op}*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		Unit
		min.	max.	
Input Voltage	V_{IN}	*2, *3	V_O+2*1	V
DC Output Current	I_O	0	250	mA
Ambient Operating Temperature	T_{op}	–20	85	°C

*1: V_{IN} (max) and I_O (max) are restricted by the relationship $P_D = (V_{IN} - V_O) \times I_O$.
Calculate these values referring to the reference data.
*2: Refer to the dropout voltage section.
*3: For the SI-3012LU, set the input voltage to at least 2.4 V, and secure the minimum voltage as explained in Setting DC Input Voltage, Dropper Type Application Note.

■Electrical Characteristics

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

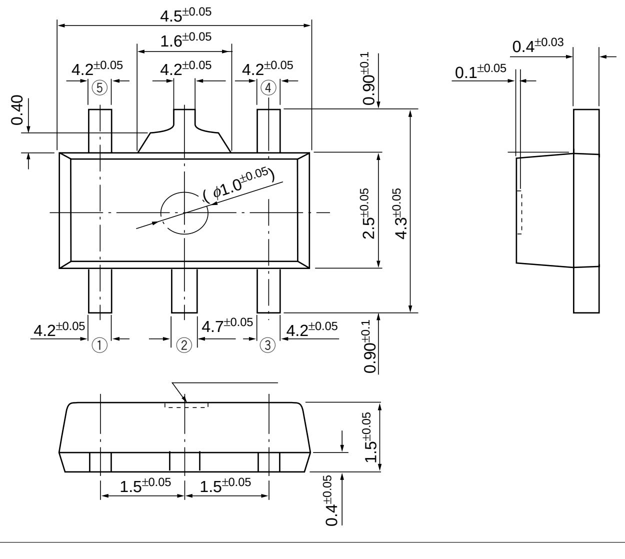
Parameter	Symbol	SI-3012LU min.	SI-3012LU typ.	SI-3012LU max.	SI-3018LU (Under development) min.	typ.	max.	SI-3025LU (Under development) min.	typ.	max.	SI-3033LU min.	typ.	max.	SI-3050LU (Under development) min.	typ.	max.	Unit
Output Voltage	V_O	1.210	1.250	1.290	1.764	1.800	1.836	2.450	2.500	2.550	3.234	3.300	3.366	4.900	5.000	5.100	V
	Conditions	V_{IN}=V_O+1V, I_O=10mA			V_{IN}=3.3V, I_O=10mA			V_{IN}=3.3V, I_O=10mA			V_{IN}=5V, I_O=10mA			V_{IN}=6V, I_O=10mA			
Dropout Voltage	V_{DIF}			0.3			0.5			0.3			0.3			0.3	V
	Conditions	I_O=100mA(V_O=3.3V)			I_O=100mA												
				0.5			0.5			0.5			0.5			0.5	
	Conditions	I_O=250mA(V_O=3.3V)			I_O=250mA												
Line Regulation	ΔV_{LINE}			10			10			10			10			15	mV
	Conditions	V_{IN}=V_O+1 to V_O+5V, I_O=10mA(V_O=3.3V)			V_{IN}=2.5 to 5V, I_O=10mA			V_{IN}=3.3 to 5V, I_O=10mA			V_{IN}=4.5 to 8V, I_O=10mA			V_{IN}=6 to 10V, I_O=10mA			
Load Regulation	ΔV_{LOAD}			20			20			40			40			40	mV
	Conditions	V_{IN}=V_O+1V, I_O=1 to 250mA(V_O=3.3V)			V_{IN}=3.3V, I_O=1 to 250mA			V_{IN}=3.3V, I_O=0 to 250mA			V_{IN}=5V, I_O=0 to 250mA			V_{IN}=6V, I_O=0 to 250mA			
Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T_a$		±0.3			±0.2			±0.25			±0.3			±0.3		mV/°C
	Conditions	T_j=0 to 100°C															
Ripple Rejection	R_{REJ}		55			55			55			55			55		dB
	Conditions	V_{IN}=V_O+1V, f=100 to 120Hz(V_O=3.3V)			V_{IN}=3.3V, f=100 to 120Hz			V_{IN}=3.3V, f=100 to 120Hz			V_{IN}=5V, f=100 to 120Hz			V_{IN}=6V, f=100 to 120Hz			
Quiescent Circuit Current	I_q			150			150			150			150			150	μA
	Conditions	V_{IN}=V_O+1V, I_O=0mA V_C=2V, R2=100kΩ			V_{IN}=3.3V, I_O=0mA V_C=2V			V_{IN}=3.3V, I_O=0mA, V_C=2V			V_{IN}=5V, I_O=0mA, V_C=2V			V_{IN}=6V, I_O=0mA, V_C=2V			
OFF Circuit Current	I_q(OFF)			1			1			1			1			1	μA
	Conditions	V_{IN}=V_O+1V, V_C=0V			V_{IN}=3.3V, V_C=0V			V_{IN}=3.3V, V_C=0V			V_{IN}=5V, V_C=0V			V_{IN}=6V, V_C=0V			
Overcurrent Protection Starting Current*1	I_{S1}	260			260			260			260			260			mA
	Conditions	V_{IN}=V_O+1V			V_{IN}=3.3V			V_{IN}=3.3V			V_{IN}=5V			V_{IN}=6V			
V_C Pin: Control Voltage (Output ON)*2	$V_{C,IH}$	2.0			2.0			2.0			2.0			2.0			V
V_C Pin: Control Voltage (Output OFF)*2	$V_{C,IL}$			0.8			0.8			0.8			0.8			0.8	V
V_C Pin: Control Current (Output ON)	$I_{C,IH}$			40			40			40			40			40	μA
	Conditions	V_C=2V															
V_C Pin: Control Current (Output OFF)	$I_{C,IL}$		0	–5		0	–5		0	–5		0	–5		0	–5	μA
	Conditions	V_C=0V															
Output OFF Voltage	V_O			0.5			0.5			0.5			0.5			0.5	V

*1: I_{S1} is specified as the 5% drop point of output voltage V_O on the condition that V_{IN} = 3.3 V (5 V for SI-3033LU, 6 V for SI-3050LU), and I_O = 10 mA.

*2: Output is OFF when the output control pin (V_C pin) is open. Each input level is equivalent to that for LS-TTL. Therefore, the device can be driven directly by an LS-TTL circuit.

■External Dimensions

(Unit : mm)



Pin Arrangement

① ADJ
② GND
③ V_C
④ V_{IN}
⑤ V_O

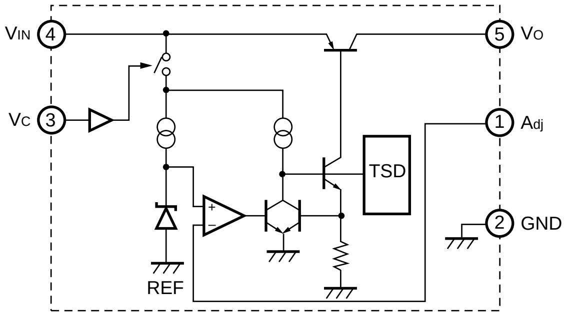
Plastic Mold Package Type

Flammability: UL94V-0

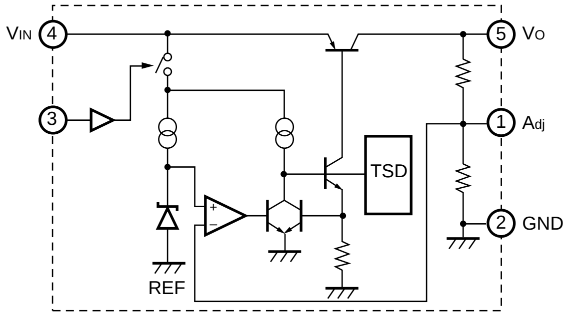
Weight: Approx. 0.05g

■Block Diagram

SI-3012LU

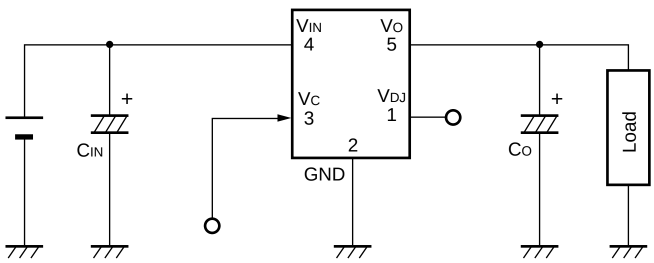


SI-3018LU, SI-3025LU, SI-3033LU, SI-3050LU

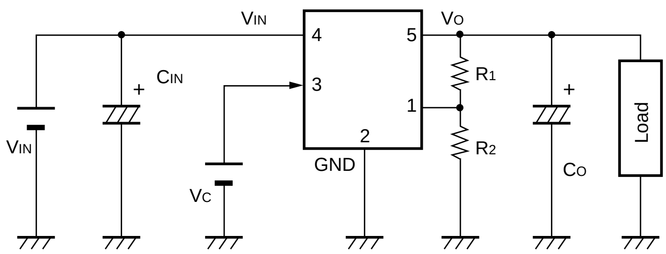


■Standard External Circuit

SI-3018LU, SI-3025LU, SI-3033LU, SI-3050LU



SI-3012LU



C_O : Output capacitor (10μF or larger)
The SI-3000LU series can be operated on the circuit even if a low ESR ceramic capacitor is used as the output capacitor.

C_{IN} : Input capacitor (0.1 to 10 μF)
This capacitor is required in the case of an inductive input line or long wiring.

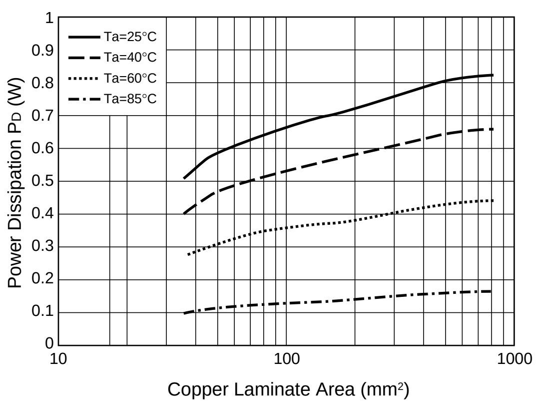
●Settings for SI-3012LU output voltage (recommended voltage: 1.5 V to 15 V)

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 PWB size 40×40



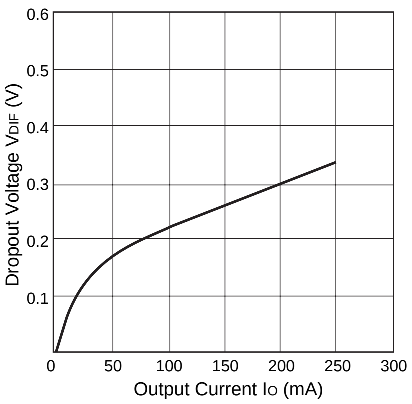
- A monolithic IC is mounted. The inner frame stage is connected to the GND pin (pin 2). Therefore, enlarging the copper laminate area leading to the GND pin achieves a heat radiation effect.
- How to calculate the junction temperature
Measure the temperature (T_C) of the GND pin (pin 2) lead section using a thermistor, etc. Substitute this value in the following formula and calculate the junction temperature.

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

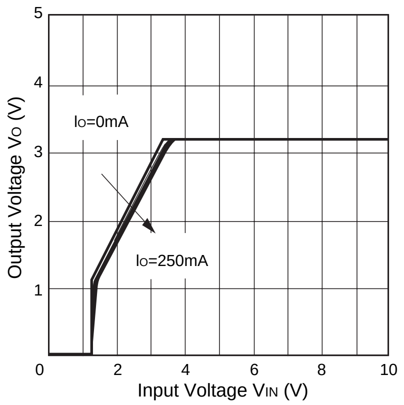
■Typical Characteristics of SI-3033LU

(T_a=25°C)

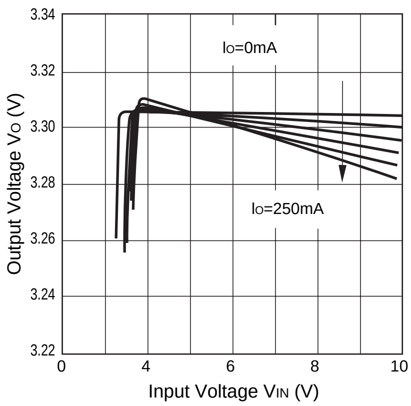
I_O vs. V_{DIF} Characteristics



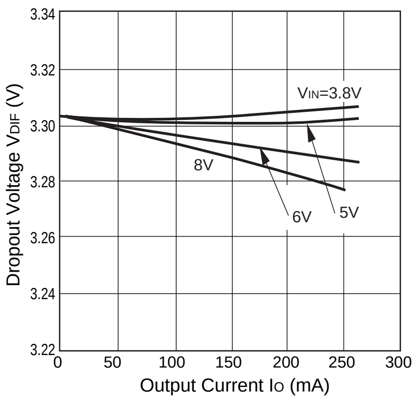
Output Voltage Characteristics



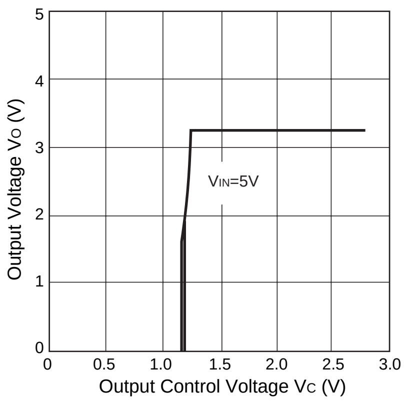
Line Regulation



Load Regulation



Output ON/OFF Control



Overcurrent Protection Characteristics