SI-3000LSA Series — Surface-Mount, Low Current Consumption, Low Dropout Voltage

■Features

- Compact surface-mount package (SOP8)
- Output current: 1 A
- Low circuit current at output OFF: Iq(OFF) ≤ 1 μA (Vc = 0 V)
- Low dropout voltage: V_{DIF}≤0.8 V (at Io = 1 A)

  V_{DIF} ≤1.2 V (Io = 1 A) for SI-3018LSA
- 4 types of output voltages (1.8 V, 2.5 V, 3.3 V, 5.0 V) available
- Output ON/OFF control terminal voltage compatible with LS-TTL
- Built-in foldback-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}	16	V
Output control terminal voltage	V_C	V_{IN}	V
DC Output Current	Io	1	A
Power Dissipation	P_{D1}[*1]	1.16	W
	P_{D2}[*2]	1.1	W
Junction Temperature	T_j[*3]	−30 to +150	°C
Operating Ambient Temperature	T_{op}	−30 to +150	°C
Storage Temperature	T_{stg}	−30 to +150	°C
Thermal Resistance (Junction to Lead (pin 8))	$\theta_{j\text{-}L}$	36	°C/W
Thermal Resistance (Junction to Ambient Air)	$\theta_{j\text{-}a}$[*2]	100	°C/W

*1: When mounted on glass-epoxy board 56.5 × 56.5 mm (copper laminate area 100%).
*2: When mounted on glass-epoxy board 40 × 40 mm (copper laminate area 100%).
*3: Thermal protection circuits may be activated if the junction temperature exceeds 135°C.

■Recommended Operating Conditions

Parameter	Symbol	Ratings				Unit
		SI-3018LSA	SI-3025LSA	SI-3033LSA	SI-3050LSA	
DC Input Voltage Range	V_{IN}	3.1 to 3.5[*1]	*2 to 3.5[*1]	*2 to 5.2[*1]	*2 to 8.0	V
DC Output Current Range	Io	0 to 1				A
Operating Junction Temperature	T_{jop}	−20 to +125				°C
Operating Ambient Temperature	T_{aop}	−30 to +85				°C

*1: V_{IN} (max) and Io (max) are restricted by the relation $P_D = (V_{IN} - V_O) \times I_O$.
　　Please calculate these values referring to the reference data on page 71.
*2: Refer to the Dropout Voltage parameter.

■Electrical Characteristics

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

Parameter	Symbol	SI-3018LSA			SI-3025LSA			SI-3033LSA			SI-3050LSA			Unit
		min.	typ.	max.	min.	typ.	max.	min.	typ.	max.	min.	typ.	max.	
Output Voltage	V_O	1.764	1.800	1.836	2.450	2.500	2.550	3.234	3.300	3.366	4.90	5.00	5.10	V
	Conditions													
Dropout Voltage	V_{DIF}		−				0.4			0.4			0.4	V
	Conditions			Io≤0.5A				Io≤0.5A			Io≤0.5A			
			0.6	1.2			0.8			0.8			0.8	
	Conditions													
Line Regulation	ΔV_{LINE}		2	10		2	10		3	10		3	15	mV
	Conditions													
Load Regulation	ΔV_{OLOAD}		10	20		10	20		10	20		10	30	mV
	Conditions													
Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T_a$		±0.3			±0.3			±0.3			±0.5		mV/°C
	Conditions													
Ripple Rejection	R_{REJ}		60			57			55			55		dB
	Conditions													
Quiescent Circuit Current	Iq		1.7	2.5		1.7	2.5		1.7	2.5		1.7	2.5	mA
	Conditions													
Circuit Current at Output OFF	Iq(OFF)			1			1			1			1	μA
	Conditions													
Overcurrent Protection Starting Current[*1,3]	I_{S1}	1.2			1.2			1.2			1.2			A
	Conditions	VIN=3.3V			VIN=3.3V			VIN=5V			VIN=6V			
Vc Terminal — Control Voltage (Output ON)[*2]	V_C, IH	2.0			2.0			2.0			2.0			V
Vc Terminal — Control Voltage (Output OFF)[*2]	V_C, IL			0.8			0.8			0.8			0.8	V
Vc Terminal — Control Current (Output ON)	I_C, IH		40	80		40	80		40	80		40	80	μA
	Conditions													
Vc Terminal — Control Current (Output OFF)	I_C, IL		0	−5		0	−5		0	−5		0	−5	μA
	Conditions													

*1: I_{S1} is specified at the 5% drop point of output voltage V_O on the condition that V_{IN} = 3.3 V (5 V for SI-3033LSA), and Io = 0.5 A.
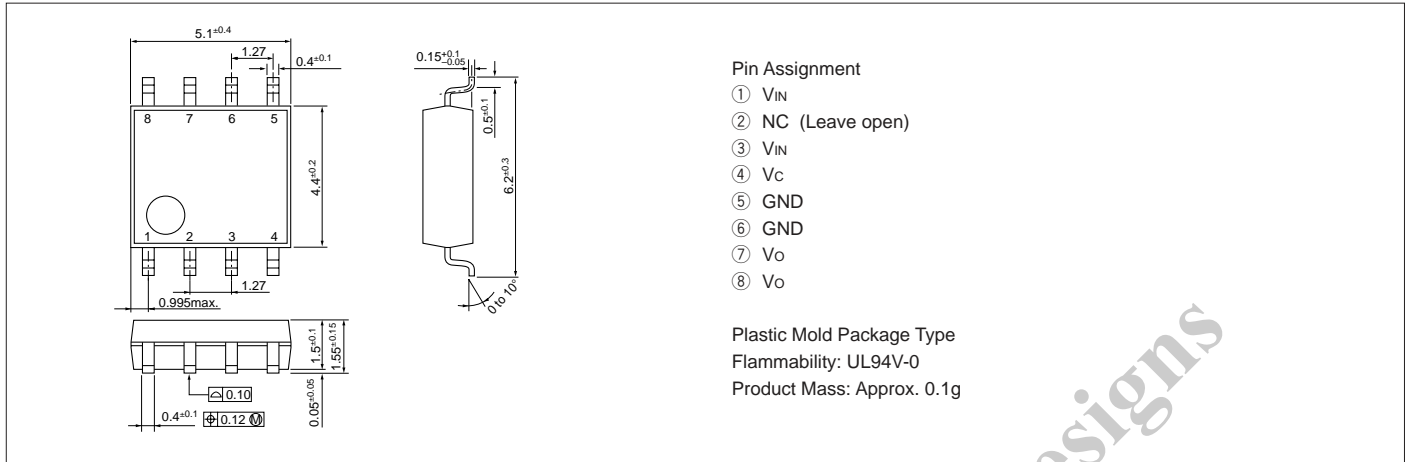*2: Output is OFF when the output control terminal VC is open. Each input level is equivalent to LS-TTL level. Therefore, the device can be driven directly by LS-TTLs.
*3: These products cannot be used in the following applications. Because these applications require a certain current at start-up and so the built-in foldback-type overcurrent protection may cause errors during start-up stage.
　　(1) Constant current load (2) Positive and negative power supply (3) Series-connected power supply (4) V_O adjustment by raising ground voltage
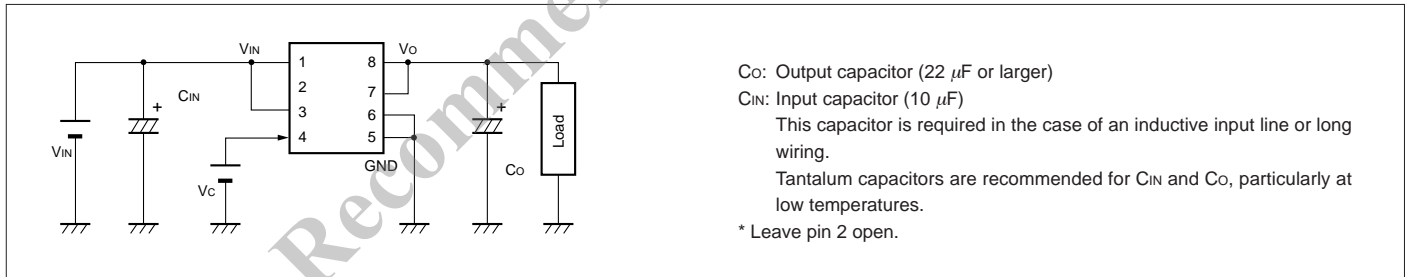
■External Dimensions (SOP8)

(Unit : mm)

Pin Assignment
① V_{IN}
② NC (Leave open)
③ V_{IN}
④ V_C
⑤ GND
⑥ GND
⑦ V_O
⑧ V_O

Plastic Mold Package Type
Flammability: UL94V-0
Product Mass: Approx. 0.1g

■Block Diagram

■Typical Connection Diagram

C_O: Output capacitor (22 μF or larger)
C_{IN}: Input capacitor (10 μF)
This capacitor is required in the case of an inductive input line or long wiring.
Tantalum capacitors are recommended for C_{IN} and C_O, particularly at low temperatures.
* Leave pin 2 open.

■Reference Data

PCB Copper Laminate Area vs. Junction to Ambient Air Thermal Resistance

PCB (glass-epoxy, 40· 40mm)
160mm (40· 40) mm

$\theta_{j\text{-}a}$ (°C/W) vs Copper Laminate Area (mm²)

**Allowable Output Current
(vs. V_{IN}-V_{OUT} Voltage Difference)
V_{IN}-I_O max**

T_j = 120°C (20% derating of 150°C)

$\theta_{j\text{-}a}$=100°C/W

T_a=25°C

T_a=85°C

I_{out} (max) (A) vs V_{IN}-V_{OUT} Voltage Difference (V)

The inner frame stage, on which the PTr is mounted, is directly connected to the V_{OUT} pin.
Therefore, enlarging the copper laminate area around the V_{OUT} pin is really effective for a heat radiation.