

# SI-3000KS Series Surface-Mount, Low Current Consumption, Low Dropout Voltage

## Features

- Compact surface-mount package (SOP8)
- Output current: 1.0 A
- Compatible with low ESR capacitor
- Low circuit current at output OFF  $I_q \leq 350 \mu\text{A}$  ( $I_o = 0 \text{ A}$ ,  $V_c = 2 \text{ V}$ )
- Low current consumption  $I_q (\text{OFF}) \leq 1 \mu\text{A}$  ( $V_c = 0 \text{ V}$ )
- Low dropout voltage  $V_{\text{DIF}} \leq 0.6 \text{ V}$  ( $I_o = 1 \text{ A}$ )
- 3 types of output voltages (2.5 V, 3.3 V, and variable type) available
- Output ON/OFF control terminal voltage compatible with LS-TTL
- Built-in drooping-type-overcurrent and thermal protection circuits

## Absolute Maximum Ratings

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

Parameter	Symbol	Ratings	Unit
DC Input Voltage	$V_{\text{IN}}^{*1}$	17	V
Output Control Terminal Voltage	$V_c$	$V_{\text{IN}}$	V
DC Output Current	$I_o^{*1}$	1.0	A
Power Dissipation	$P_D^{*1, *2}$	0.76	W
Junction Temperature	$T_j$	-40 to +125	$^\circ\text{C}$
Storage Temperature	$T_{\text{stg}}$	-40 to +125	$^\circ\text{C}$
Thermal Resistance (Junction to Ambient Air)	$\theta_{j-a}$	130	$^\circ\text{C/W}$
Thermal resistance (Junction to Lead (pin 7))	$\theta_{j-L}$	22	$^\circ\text{C/W}$

\*1:  $V_{\text{IN}}$  (max) and  $I_o$  (max) are restricted by the relation  $P_D = (V_{\text{IN}} - V_o) \times I_o$ . Please calculate these values referring to the Copper laminate area vs. Power dissipation data as shown hereinafter.

\*2: When mounted on a glass epoxy board of 1600 mm<sup>2</sup> (copper laminate area 2%).

## Applications

- Local power supplies
- Battery-driven electronic equipment

## Electrical Characteristics

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

Parameter	Symbol	Ratings									Unit
		SI-3012KS (variable type)			SI-3025KS			SI-3033KS			
		min.	typ.	max.	min.	typ.	max.	min.	typ.	max.	
Input Voltage	$V_{\text{IN}}$	2.4			*1			*1			V
Output Voltage (Reference voltage $V_{\text{ADJ}}$ for SI-3012KS)	$V_o (V_{\text{ADJ}})$	1.24	1.28	1.32	2.45	2.50	2.55	3.234	3.300	3.366	V
Dropout Voltage	$V_{\text{DIF}}$			0.3			0.4			0.4	V
	Conditions	$V_{\text{IN}}=3.3\text{V}$ , $I_o=10\text{mA}$			$V_{\text{IN}}=3.3\text{V}$ , $I_o=10\text{mA}$			$V_{\text{IN}}=5\text{V}$ , $I_o=10\text{mA}$			
	Conditions	$I_o=0.5\text{A}$ ( $V_c=2.5\text{V}$ )			$I_o=0.5\text{A}$			$I_o=0.5\text{A}$			
Line Regulation	$\Delta V_{\text{OVLIN}}$			10			10			15	mV
	Conditions	$V_{\text{IN}}=3.3$ to $8\text{V}$ , $I_o=10\text{mA}$ ( $V_c=2.5\text{V}$ )			$V_{\text{IN}}=3.3$ to $8\text{V}$ , $I_o=10\text{mA}$			$V_{\text{IN}}=5$ to $10\text{V}$ , $I_o=10\text{mA}$			
Load Regulation	$\Delta V_{\text{OLOAD}}$			40			40			50	mV
	Conditions	$V_{\text{IN}}=3.3\text{V}$ , $I_o=0$ to $1\text{A}$ ( $V_c=2.5\text{V}$ )			$V_{\text{IN}}=3.3\text{V}$ , $I_o=0$ to $1\text{A}$			$V_{\text{IN}}=5\text{V}$ , $I_o=0$ to $1\text{A}$			
Quiescent Circuit Current	$I_q$			350			350			350	$\mu\text{A}$
	Conditions	$V_{\text{IN}}=3.3\text{V}$ , $I_o=0\text{A}$ , $V_c=2\text{V}$ , $R_2=24\text{k}\Omega$			$V_{\text{IN}}=3.3\text{V}$ , $I_o=0\text{A}$ , $V_c=2\text{V}$			$V_{\text{IN}}=5\text{V}$ , $I_o=0\text{A}$ , $V_c=2\text{V}$			
Circuit Current at Output OFF	$I_q (\text{OFF})$			1			1			1	$\mu\text{A}$
	Conditions	$V_{\text{IN}}=3.3\text{V}$ , $V_c=0\text{V}$			$V_{\text{IN}}=3.3\text{V}$ , $V_c=0\text{V}$			$V_{\text{IN}}=5\text{V}$ , $V_c=0\text{V}$			
Temperature Coefficient of Output Voltage	$\Delta V_o/\Delta T_a$		$\pm 0.3$			$\pm 0.3$			$\pm 0.3$		mV/ $^\circ\text{C}$
	Conditions	$T_j=0$ to $100^\circ\text{C}$ ( $V_o=2.5\text{V}$ )			$T_j=0$ to $100^\circ\text{C}$			$T_j=0$ to $100^\circ\text{C}$			
Ripple Rejection	$R_{\text{REJ}}$		55			55			55		dB
	Conditions	$V_{\text{IN}}=3.3\text{V}$ , $f=100$ to $120\text{Hz}$ ( $V_c=2.5\text{V}$ )			$V_{\text{IN}}=3.3\text{V}$ , $f=100$ to $120\text{Hz}$			$V_{\text{IN}}=5\text{V}$ , $f=100$ to $120\text{Hz}$			
Overcurrent Protection Starting Current <sup>2</sup>	$I_{\text{S1}}$	1.2			1.2			1.2			A
	Conditions	$V_{\text{IN}}=3.3\text{V}$ ( $V_c=2.5\text{V}$ )			$V_{\text{IN}}=3.3\text{V}$			$V_{\text{IN}}=5\text{V}$			
$V_c$ Terminal	Control Voltage (Output ON) <sup>3</sup>	$V_c, \text{IH}$	2.0		2.0			2.0			V
	Control Voltage (Output OFF)	$V_c, \text{IL}$			0.8		0.8			0.8	
	Control Current (Output ON)	$I_c, \text{IH}$			40		40			40	$\mu\text{A}$
	Control Current (Output OFF)	$I_c, \text{IL}$	-5	0		-5	0		-5	0	
	Conditions	$V_c=0\text{V}$									

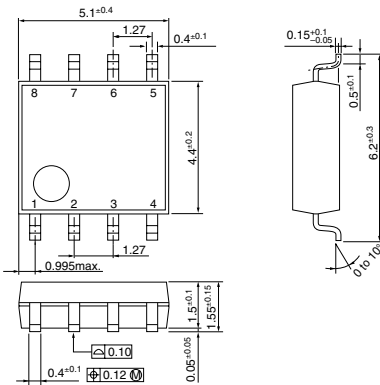
\*1: Refer to the Dropout Voltage parameter.

\*2: The  $I_{\text{S1}}$  is specified at the 5% drop point of output voltage  $V_o$  on the condition that  $V_{\text{IN}} = V_o + 1 \text{ V}$ , and  $I_o = 10 \text{ mA}$ .

\*3: Output is OFF when the output control terminal  $V_c$  is open. Each input level is equivalent to LS-TTL level. Therefore, the device can be driven directly by LS-TTLs.

External Dimensions (SOP8)

(Unit : mm)



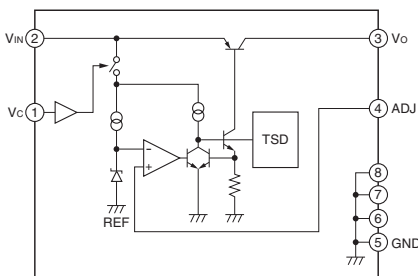
Pin Assignment

- ① V<sub>c</sub>
- ② V<sub>IN</sub>
- ③ V<sub>o</sub>
- ④ Sense (ADJ for SI-3012KS)
- ⑤ GND
- ⑥ GND
- ⑦ GND
- ⑧ GND

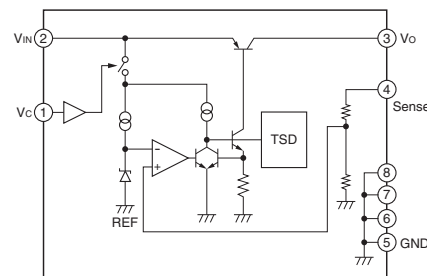
Plastic Mold Package Type  
 Flammability: UL 94V-0  
 Product Mass: Approx. 0.1 g

Block Diagram

SI-3012KS

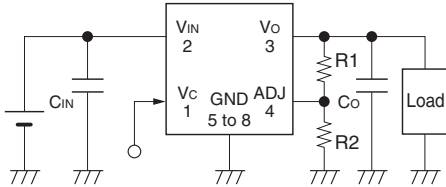


SI-3025KS, SI-3033KS



Typical Connection Diagram

SI-3012KS

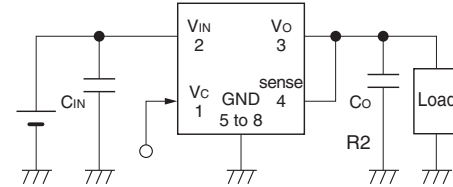


R<sub>1</sub>, R<sub>2</sub>: Output voltage setting resistors  
 The output voltage can be set by connecting R<sub>1</sub> and R<sub>2</sub> as shown above.

The recommended value of R<sub>2</sub> is 24 kΩ.

$$R_1 = (V_o - V_{ADJ}) \div (V_{ADJ} / R_2)$$

SI-3025KS, SI-3033KS



C<sub>IN</sub>: Input capacitor (22 μF or larger)

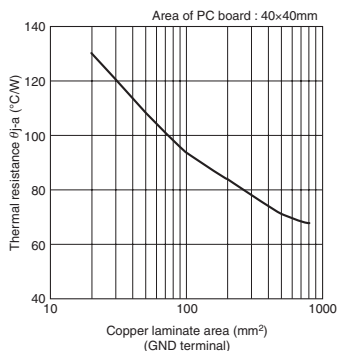
C<sub>o</sub>: Output capacitor (22 μF or larger)

For SI-3000KS series, C<sub>o</sub> has to be a low ESR capacitor.

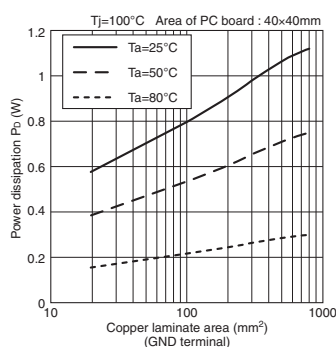
When using the electrolytic capacitor, the SI-3000KS series may oscillate at a low temperature.

Reference Data

Copper Laminate Area vs. Thermal Resistance



Copper Laminate Area vs. Power Dissipation



- Obtaining the junction temperature  
 Measure the temperature T<sub>L</sub> at the lead part of the GND pin (pin 7) with a thermocouple, etc. Then, substitute this value in the following formula to obtain the junction temperature.

$$T_J = P_D \times \theta_{j-L} + T_L \quad (\theta_{j-L} = 22^\circ \text{C/W})$$