

SI-3000KS Series Surface-Mount, Low Current Consumption, Low Dropout Voltage Linear Regulator ICs

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_{IN}^{*1}	17	V
Output Control Terminal Voltage	V_c	V_{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_{stg}	-40 to +125	$^\circ\text{C}$
Thermal Resistance (Junction to Ambient Air)	θ_{j-a}	130	$^\circ\text{C/W}$
Thermal resistance (Junction to Lead (pin 7))	θ_{j-L}	22	$^\circ\text{C/W}$

*1: V_{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 mm² (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_{IN}	2.4			*1			*1			V
Output Voltage (Reference voltage V_{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_{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	$I_o=0.5\text{A}$ ($V_o=2.5\text{V}$)			$I_o=0.5\text{A}$			$I_o=0.5\text{A}$			
Line Regulation	ΔV_{OLINE}			10			10			15	mV
	Conditions	$V_{\text{IN}}=3.3$ to 8V , $I_o=10\text{mA}$ ($V_o=2.5\text{V}$)			$V_{\text{IN}}=3.3$ to 8V , $I_o=10\text{mA}$			$V_{\text{IN}}=5$ to 10V , $I_o=10\text{mA}$			
Load Regulation	ΔV_{OLOAD}			40			40			50	mV
	Conditions	$V_{\text{IN}}=3.3\text{V}$, $I_o=0$ to 1A ($V_o=2.5\text{V}$)			$V_{\text{IN}}=3.3\text{V}$, $I_o=0$ to 1A			$V_{\text{IN}}=5\text{V}$, $I_o=0$ to 1A			
Quiescent Circuit Current	I_q			350			350			350	μA
	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	μA
	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	$\Delta V_o/\Delta T_a$		± 0.3			± 0.3			± 0.3		$\text{mV}/^\circ\text{C}$
	Conditions	$T_j=0$ to 100°C ($V_o=2.5\text{V}$)			$T_j=0$ to 100°C			$T_j=0$ to 100°C			
Ripple Rejection	R_{REJ}		55			55			55		dB
	Conditions	$V_{\text{IN}}=3.3\text{V}$, $f=100$ to 120Hz ($V_o=2.5\text{V}$)			$V_{\text{IN}}=3.3\text{V}$, $f=100$ to 120Hz			$V_{\text{IN}}=5\text{V}$, $f=100$ to 120Hz			
Overcurrent Protection Starting Current ^{*2}	I_{S1}	1.2			1.2			1.2			A
	Conditions	$V_{\text{IN}}=3.3\text{V}$ ($V_o=2.5\text{V}$)			$V_{\text{IN}}=3.3\text{V}$			$V_{\text{IN}}=5\text{V}$			
V_c Terminal	Control Voltage (Output ON) ^{*3}	V_c, IH	2.0			2.0			2.0		V
	Control Voltage (Output OFF)	V_c, IL			0.8			0.8		0.8	
	Control Current (Output ON)	I_c, IH			40			40		40	μA
	Conditions	$V_c=2\text{V}$									
	Control Current (Output OFF)	I_c, IL	-5	0		-5	0		-5	0	
Conditions	$V_c=0\text{V}$										

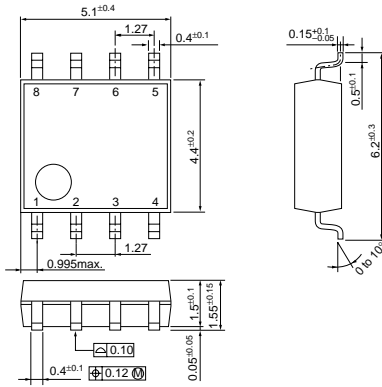
*1: Refer to the Dropout Voltage parameter.

*2: The I_{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)



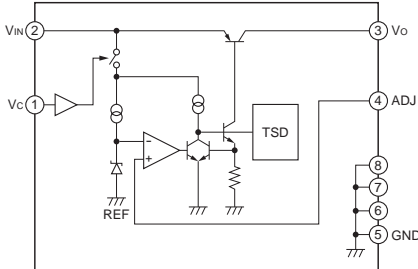
Pin Assignment

- ① Vc
- ② VIN
- ③ Vo
- ④ Sence (ADJ for SI-3012KS)
- ⑤ GND
- ⑥ GND
- ⑦ GND
- ⑧ GND

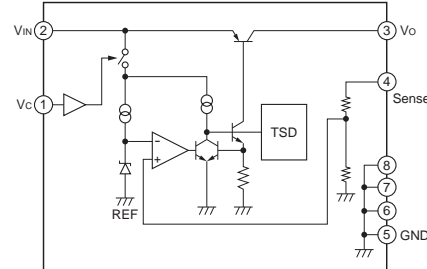
Plastic Mold Package Type
 Flammability: UL 94V-0
 Product Mass: Approx. 0.1 g

Block Diagram

SI-3012KS

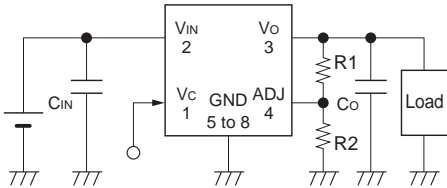


SI-3025KS, SI-3033KS



Typical Connection Diagram

SI-3012KS

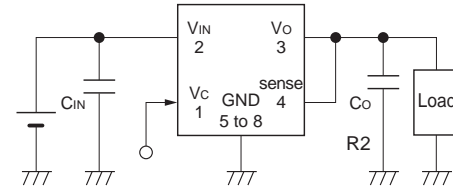


R1, R2: Output voltage setting resistors
 The output voltage can be set by connecting R1 and R2 as shown above.

The recommended value of R2 is 24 kΩ.

$$R1 = (Vo - V_{ADJ}) \div (V_{ADJ} / R2)$$

SI-3025KS, SI-3033KS



CIN: Input capacitor (22 μF or larger)

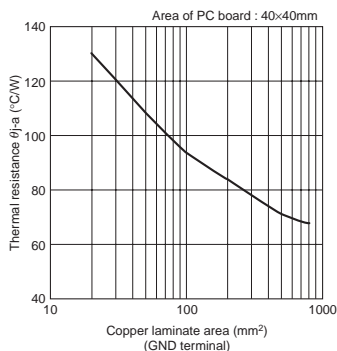
Co: Output capacitor (22 μF or larger)

For SI-3000KS series, Co has to be a low ESR capacitor.

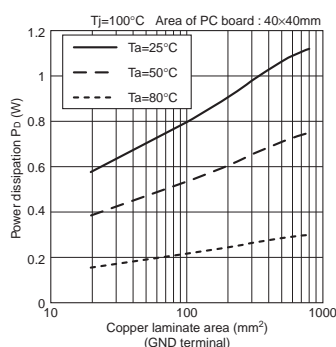
When using the electrolytic capacitor, the SI-3000KS series may oscillate at a low temperature.

Reference Data

Copper Laminate Area vs. Thermal Resistance



Copper Laminate Area vs. Power Dissipation



- Obtaining the junction temperature
 Measure the temperature T_L 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.

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