

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_{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	°C
Storage Temperature	T_{stg}	−40 to +125	°C
Thermal Resistance (Junction to Ambient Air)	θ_{JA}	130	°C/W
Thermal resistance (Junction to Lead (pin 7))	θ_{JL}	22	°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

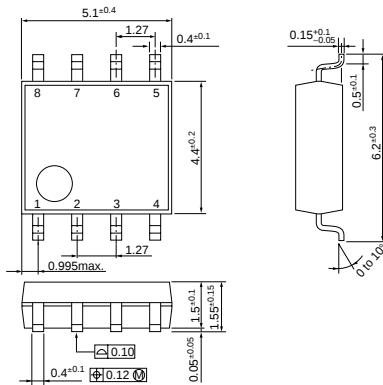
($T_a=25^\circ\text{C}$, $V_c=2 \text{ V}$, unless otherwise specified)

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 _{ADJ})	1.24	1.28	1.32	2.45	2.50	2.55	3.234	3.300	3.366	V
		Conditions	V _{IN} =3.3V, I _O =10mA			V _{IN} =3.3V, I _O =10mA			V _{IN} =5V, I _O =10mA			
Dropout Voltage		V _{DIF}			0.3			0.4			0.4	V
		Conditions	I _O =0.5A (V _O =2.5V)			I _O =0.5A			I _O =0.5A			
					0.6			0.6			0.6	
		Conditions	I _O =1A (V _O =2.5V)			I _O =1A			I _O =1A			
Line Regulation		ΔV _{OLINE}			10			10			15	mV
		Conditions	V _{IN} =3.3 to 8V, I _O =10mA (V _O =2.5V)			V _{IN} =3.3 to 8V, I _O =10mA			V _{IN} =5 to 10V, I _O =10mA			
Load Regulation		ΔV _{OLOAD}			40			40			50	mV
		Conditions	V _{IN} =3.3V, I _O =0 to 1A (V _O =2.5V)			V _{IN} =3.3V, I _O =0 to 1A			V _{IN} =5V, I _O =0 to 1A			
Quiescent Circuit Current		I _q			350			350			350	μA
		Conditions	V _{IN} =3.3V, I _O =0A, V _C =2V, R ₂ =24kΩ			V _{IN} =3.3V, I _O =0A, V _C =2V			V _{IN} =5V, I _O =0A, V _C =2V			
Circuit Current at Output OFF		I _q (OFF)			1			1			1	μA
		Conditions	V _{IN} =3.3V, V _C =0V			V _{IN} =3.3V, V _C =0V			V _{IN} =5V, V _C =0V			
Temperature Coefficient of Output Voltage		ΔV _O /ΔT _a		±0.3			±0.3			±0.3		mV/°C
		Conditions	T _J =0 to 100°C (V _O =2.5V)			T _J =0 to 100°C			T _J =0 to 100°C			
Ripple Rejection		R _{REJ}		55			55			55		dB
		Conditions	V _{IN} =3.3V, f=100 to 120Hz (V _O =2.5V)			V _{IN} =3.3V, f=100 to 120Hz			V _{IN} =5V, f=100 to 120Hz			
Overcurrent Protection Starting Current ²		I _{SL}	1.2			1.2			1.2			A
		Conditions	V _{IN} =3.3V (V _O =2.5V)			V _{IN} =3.3V			V _{IN} =5V			
V _C Terminal	Control Voltage (Output ON) ³	V _C , I _H	2.0			2.0			2.0			V
	Control Voltage (Output OFF)	V _C , I _L			0.8			0.8			0.8	
	Control Current (Output ON)	I _C , I _H			40			40			40	μA
	Conditions	V _C =2V										
	Control Current (Output OFF)	I _C , I _L	−5	0		−5	0		−5	0		μA
Conditions	V _C =0V											

*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 V_c
- ② V_{IN}
- ③ V_O
- ④ Sense (ADJ for SI-3012KS)
- ⑤ GND
- ⑥ GND
- ⑦ GND
- ⑧ GND

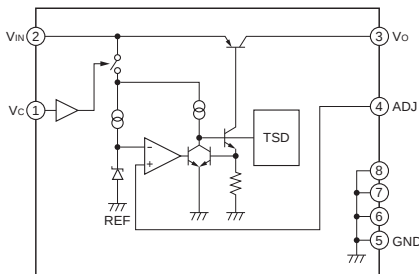
Plastic Mold Package Type

Flammability: UL 94V-0

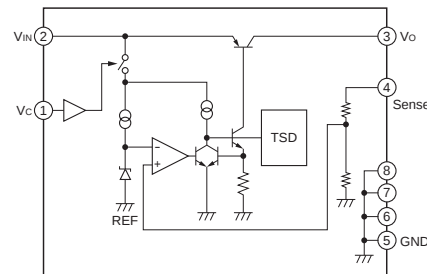
Product Mass: Approx. 0.1 g

Block Diagram

●SI-3012KS

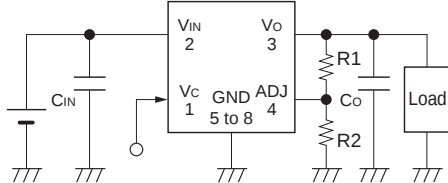


●SI-3025KS, SI-3033KS



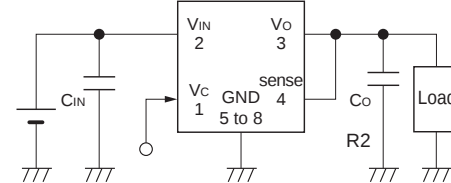
Typical Connection Diagram

●SI-3012KS

R₁, R₂: Output voltage setting resistorsThe output voltage can be set by connecting R₁ and R₂ as shown above.The recommended value of R₂ is 24 kΩ.

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

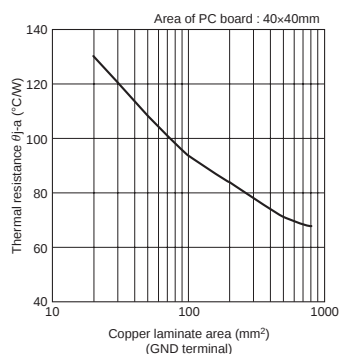
●SI-3025KS, SI-3033KS

C_{IN}: Input capacitor (22 μF or larger)C_O: Output capacitor (22 μF or larger)For SI-3000KS series, C_O has to be a low ESR capacitor.

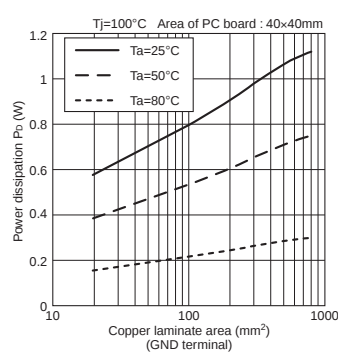
When using the electrolytic capacitor, the SI-3000KS series may oscillate at a low temperature.

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.

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