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 Iq ≤ 350 μA (I_O = 0 A, V_C = 2 V)
- Low current consumption Iq (OFF) ≤ 1 μA (V_C = 0 V)
- Low dropout voltage V_{DIF} ≤ 0.6 V (I_O = 1 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°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)	$\theta_{j\text{-}a}$	130	°C/W
Thermal resistance (Junction to Lead (pin 7))	$\theta_{j\text{-}L}$	22	°C/W

*1: V_{IN} (max) and I_O (max) are restricted by the relation PD = (V_{IN} - V_O) × 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^2 (copper laminate area 2%).

■Applications

- Local power supplies
- Battery-driven electronic equipment

■Electrical Characteristics

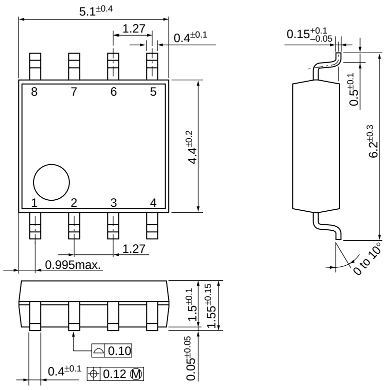
(T_a=25°C, V_c=2 V unless otherwise specified)

Parameter	Symbol	SI-3012KS (variable type) min.	SI-3012KS typ.	SI-3012KS max.	SI-3025KS min.	SI-3025KS typ.	SI-3025KS max.	SI-3033KS min.	SI-3033KS typ.	SI-3033KS max.	Unit
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, R2=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	$\Delta V_O/\Delta T_a$		±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_{S1}	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	$V_{C, IH}$	2.0			2.0			2.0			V
V_C Terminal: Control Voltage (Output OFF)	$V_{C, IL}$			0.8			0.8			0.8	V
V_C Terminal: Control Current (Output ON)	$I_{C, IH}$			40			40			40	μA
	Conditions	V_C=2V									
V_C Terminal: Control Current (Output OFF)	$I_{C, IL}$	–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_{IN} = V_O + 1 V, and I_O = 10 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)

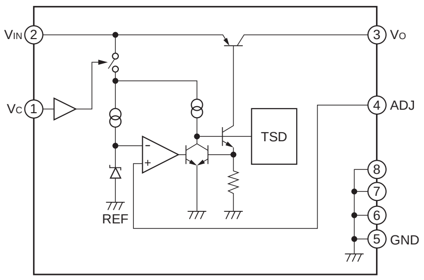


Pin Assignment
① VC
② VIN
③ VO
④ Sence (ADJ for SI-3012KS)
⑤ GND
⑥ GND
⑦ GND
⑧ GND

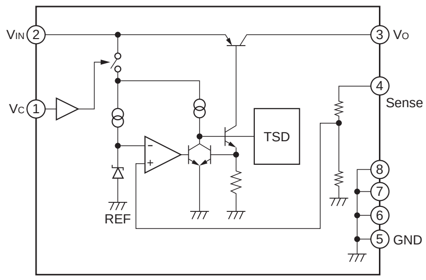
Plastic Mold Package Type
Flammability: UL 94V-0
Product Mass: Approx. 0.1 g

■Block Diagram

●SI-3012KS

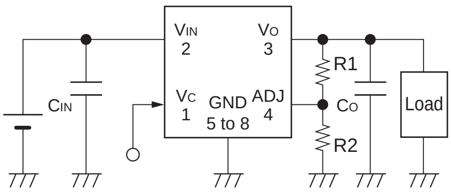


●SI-3025KS, SI-3033KS

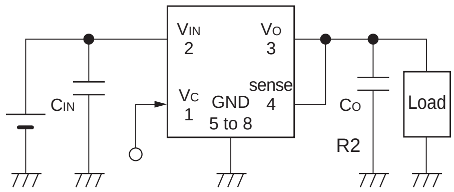


■Typical Connection Diagram

●SI-3012KS



●SI-3025KS, SI-3033KS



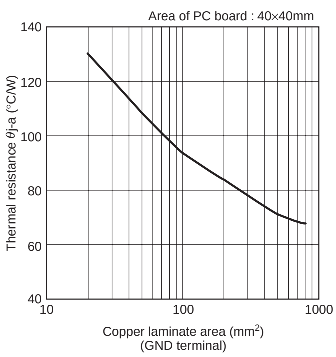
R_1, R_2: Output voltage setting resistors
The output voltage can be set by connecting R_1 and R_2 as shown above.
The recommended value of R_2 is 24 kΩ .

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

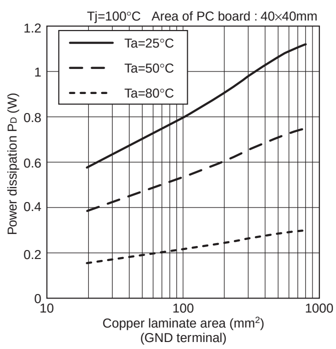
C_{IN}: Input capacitor (22 μF or larger)
C_O: Output capacitor (22 μF or larger)
For SI-3000KS series, Co has to be a low ESR capacitor.
When using the electrolytic capacitor, the SI-3000KS series may oscillate at a low temperature.

■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.

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