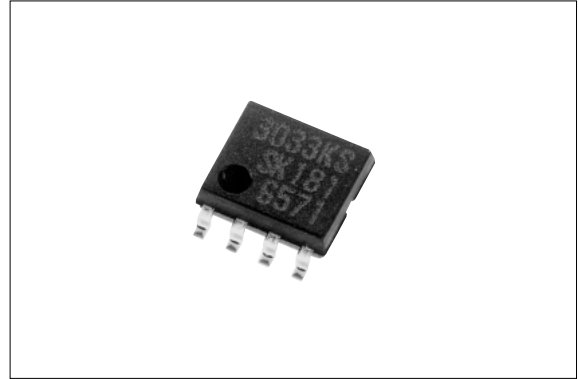


## SI-3000KS Series

# Surface-Mount, Low Current Consumption, Low Dropout Voltage Dropper Type

### ■Features

- Compact surface-mount package (SOP-8)
- Output current: 1.0 A
- Low-ESR capacitor can be used.
- Low current consumption  $I_q \leq 350 \mu\text{A}$  ( $I_o = 0 \text{ A}$ ,  $V_c = 2 \text{ V}$ )
- Low current consumption  $I_q (\text{OFF}) \leq 1 \mu\text{A}$  ( $V_c = 0 \text{ V}$ )
- Low dropout voltage  $V_{\text{DIF}} \leq 0.6 \text{ V}$  ( $I_o = 1 \text{ A}$ )
- 4 types of output voltages (1.8 V, 2.5 V, 3.3 V, and variable type) available
- Output ON/OFF control pin compatible with LS-TTL
- Built-in dropping type overcurrent, thermal protection circuits



### ■Applications

- Local power supplies
- Battery-driven electronic equipment

### ■Absolute Maximum Ratings

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

Parameter	Symbol	Ratings	Unit
DC Input Voltage	$V_{\text{IN}}^{*1}$	17	V
Output Control Pin Voltage	$V_c$	$V_{\text{IN}}$	V
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)	$R_{\text{th}(j-a)}^*$	130	$^\circ\text{C/W}$
Thermal resistance (Junction to Lead (pin 7))	$R_{\text{th}(j-l)}$	22	$^\circ\text{C/W}$

\*1:  $V_{\text{IN}}$  (max) and  $I_o$  (max) are restricted by the relationship  $P_D = (V_{\text{IN}} - V_o) \times I_o$ . Calculate these values referring to the power dissipation vs. copper area data shown in this document.

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

■Electrical Characteristics

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

Parameter	Symbol	Ratings												Unit
		SI-3012KS (variable type)			SI-3018KS			SI-3025KS			SI-3033KS			
		min.	typ.	max.	min.	typ.	max.	min.	typ.	max.	min.	typ.	max.	
Input Voltage	$V_{IN}$	2.4			*1			*1			*1			
Output Voltage (reference voltage for SI-3102KS)	$V_O$ ( $V_{REF}$ )	1.24	1.28	1.32	1.764	1.800	1.836	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	$V_{IN}=3.3\text{V}$ , $I_o=10\text{mA}$			$V_{IN}=2.5\text{V}$ , $I_o=10\text{mA}$			$V_{IN}=3.3\text{V}$ , $I_o=10\text{mA}$			$V_{IN}=5\text{V}$ , $I_o=10\text{mA}$			
	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	$\Delta V_{OLINE}$			10			10			10			15	mV
	Conditions	$V_{IN}=3.3$ to $8\text{V}$ , $I_o=10\text{mA}$ ( $V_o=2.5\text{V}$ )			$V_{IN}=2.5$ to $6\text{V}$ , $I_o=10\text{mA}$			$V_{IN}=3.3$ to $8\text{V}$ , $I_o=10\text{mA}$			$V_{IN}=5$ to $10\text{V}$ , $I_o=10\text{mA}$			
	Conditions	$I_o=0.5\text{A}$ ( $V_o=2.5\text{V}$ )			$I_o=1\text{A}$			$I_o=1\text{A}$			$I_o=1\text{A}$			
Load Regulation	$\Delta V_{OLOAD}$			40			40			40			50	mV
	Conditions	$V_{IN}=3.3\text{V}$ , $I_o=0$ to $1\text{A}$ ( $V_o=2.5\text{V}$ )			$V_{IN}=2.5\text{V}$ , $I_o=0$ to $1\text{A}$			$V_{IN}=3.3\text{V}$ , $I_o=0$ to $1\text{A}$			$V_{IN}=5\text{V}$ , $I_o=0$ to $1\text{A}$			
Quiescent Circuit Current	$I_q$			350			350			350			350	$\mu\text{A}$
	Conditions	$V_{IN}=3.3\text{V}$ , $I_o=0\text{A}$ , $V_c=2\text{V}$ , $R_2=24\text{k}\Omega$			$V_{IN}=2.5\text{V}$ , $I_o=0\text{A}$ , $V_c=2\text{V}$			$V_{IN}=3.3\text{V}$ , $I_o=0\text{A}$ , $V_c=2\text{V}$			$V_{IN}=5\text{V}$ , $I_o=0\text{A}$ , $V_c=2\text{V}$			
Off Circuit Current	$I_q(\text{OFF})$			1			1			1			1	$\mu\text{A}$
	Conditions	$V_{IN}=3.3\text{V}$ , $V_c=0\text{V}$			$V_{IN}=2.5\text{V}$ , $V_c=0\text{V}$			$V_{IN}=3.3\text{V}$ , $V_c=0\text{V}$			$V_{IN}=5\text{V}$ , $V_c=0\text{V}$			
Temperature Coefficient of Output Voltage	$\Delta V_o/\Delta T_a$		$\pm 0.3$			$\pm 0.3$			$\pm 0.3$			$\pm 0.3$		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 $100^\circ\text{C}$			$T_j=0$ to $100^\circ\text{C}$			
Ripple Rejection	$R_{REJ}$		55			55			55			55		dB
	Conditions	$V_{IN}=3.3\text{V}$ , $f=100$ to $120\text{Hz}$ ( $V_o=2.5\text{V}$ )			$V_{IN}=3.3\text{V}$ , $f=100$ to $120\text{Hz}$			$V_{IN}=3.3\text{V}$ , $f=100$ to $120\text{Hz}$			$V_{IN}=5\text{V}$ , $f=100$ to $120\text{Hz}$			
Overcurrent Protection Starting Current*2	$I_{S1}$	1.2			1.2			1.2			1.2			A
	Conditions	$V_{IN}=3.3\text{V}$ ( $V_o=2.5\text{V}$ )			$V_{IN}=2.5\text{V}$			$V_{IN}=3.3\text{V}$			$V_{IN}=5\text{V}$			
VC PIN	Control Voltage (Output ON)*3	$V_c$ , IH	2.0			2.0			2.0			2.0		V
	Control Voltage (Output OFF)	$V_c$ , IL			0.8			0.8			0.8		0.8	
	Control Current (Output ON)	$I_c$ , IH			40			40			40		40	$\mu\text{A}$
	Conditions	$V_c=2\text{V}$												
Control Current (Output OFF)	$I_c$ , IL	-5	0		-5	0		-5	0		-5	0		$\mu\text{A}$
	Conditions	$V_c=0\text{V}$												
Output OFF Voltage	$V_o(\text{OFF})$			0.5			0.5			0.5			0.5	V

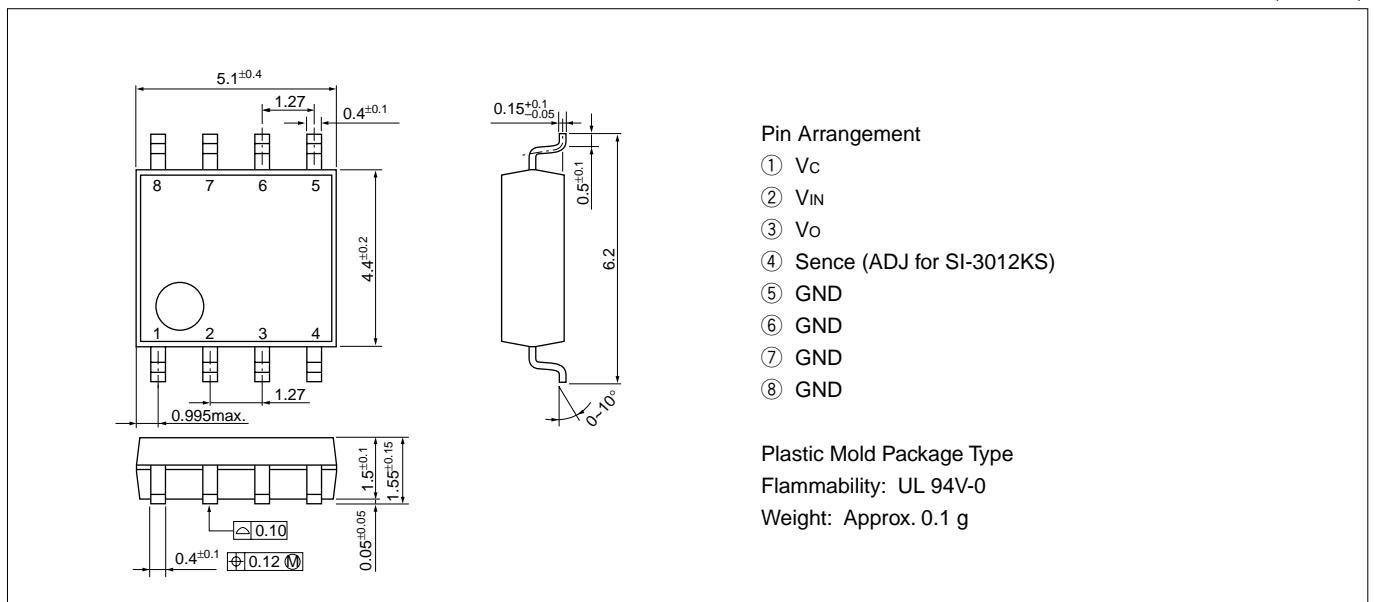
\*1: Refer to the description on the dropout voltage.

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

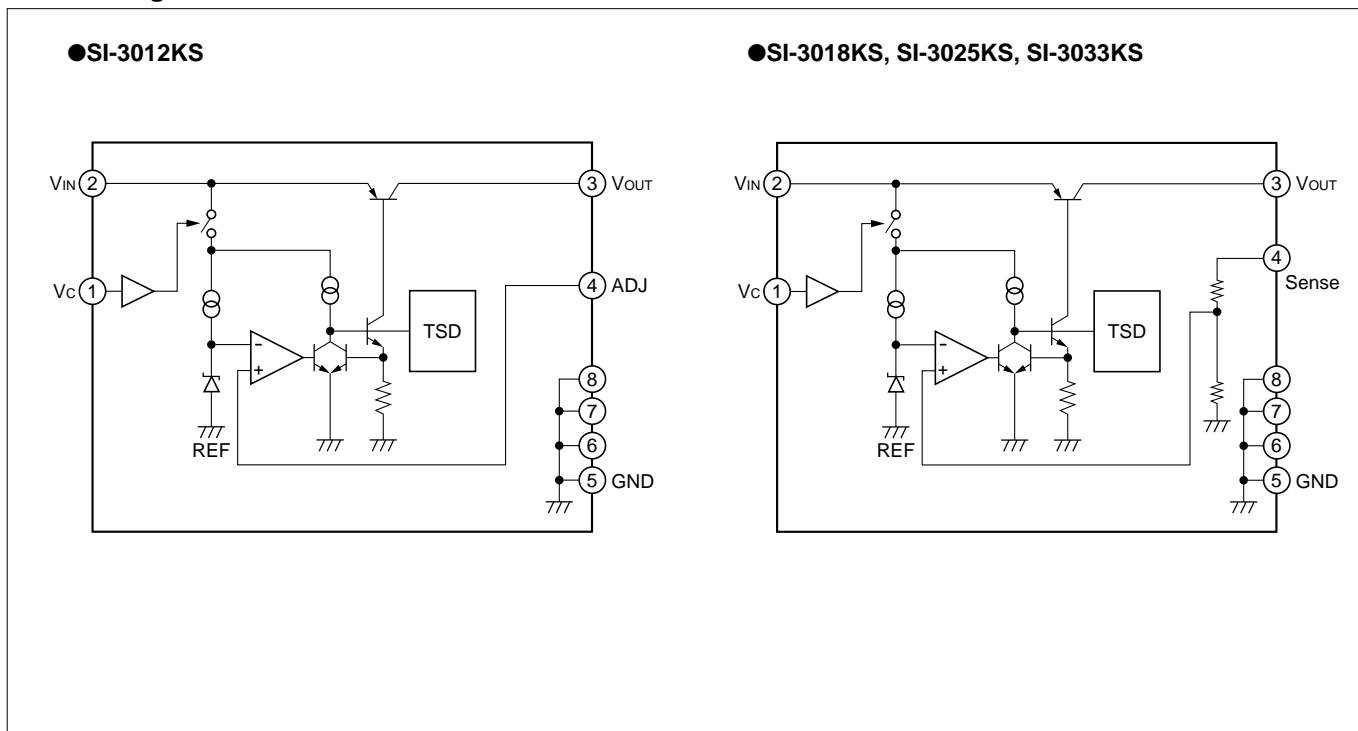
\*3: Output is OFF when the output control pin ( $V_c$  pin) is open. Each input level is equivalent to that for LS-TTL. Therefore, the device can be driven directly by an LS-TTL circuit.

■External Dimensions

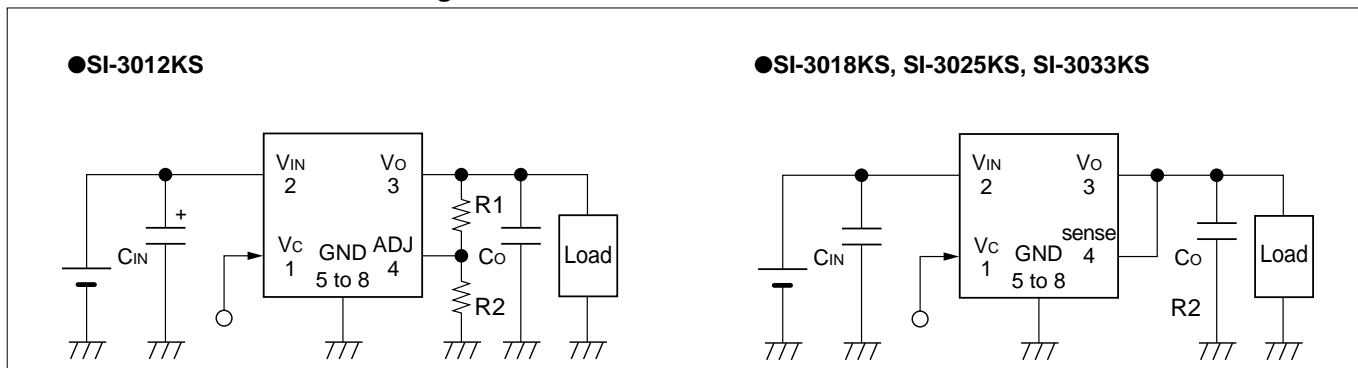
(Unit : mm)



■Block Diagram



■Standard Circuit Connection Diagram



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.

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

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

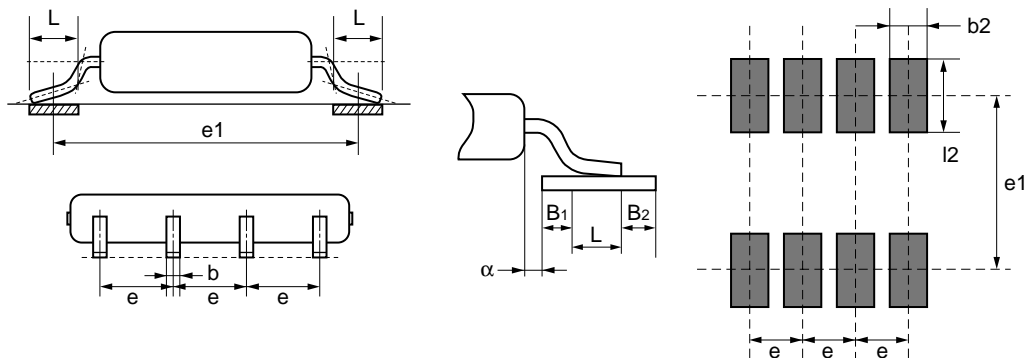
This capacitor is necessary if an inductance is included in the input line or if the wiring length is long.

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

The SI-3000KS series designed for use with very low-ESR ceramics output capacitor.

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

■Example of Solder Pattern Design



Symbol	Dimensions (mm)
e1	5.72
e	1.27±0.15
α	0.2
β1	0.2 to 0.5
β2	0.2
L	0.6
b2	0.76
l2	L+β1+β2

(Reference value conforming to EIAJ Standard ED-7402-1)

\*1 The inner frame stage on which a monolithic IC is mounted is directly connected to the GND pins (pins 5 through 8). By expanding the area of the copper connected to the GND pins, the heat radiation can be improved. It is recommended to design the solder pattern by opening the insulation film of the solder patterns of pins 5, 6, 7, and 8, on the wide GND pattern as shown in Figure 1.

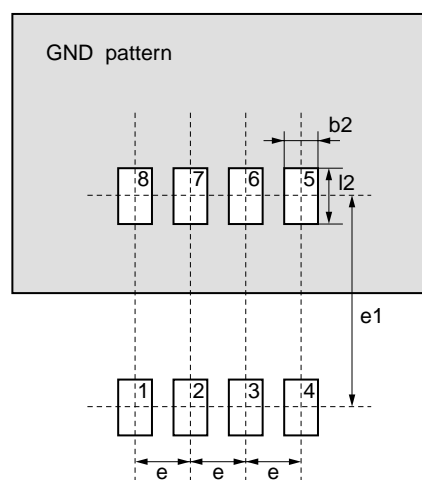
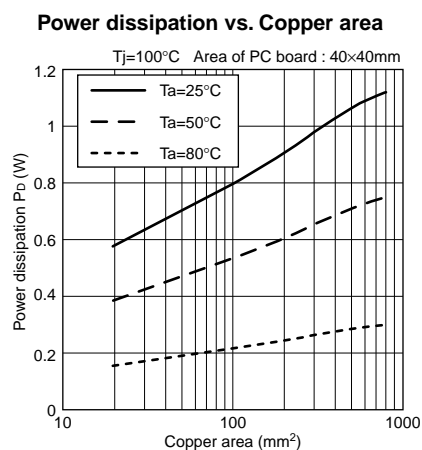
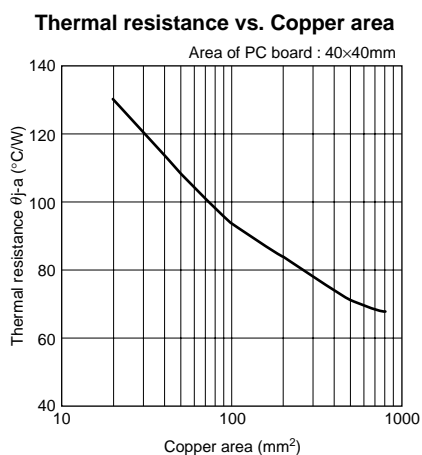


Figure 1

■Reference Data



- Calculating junction temperature  
Measure the temperature  $T_L$  of the lead of the GND pin (pin 7) by using a thermocouple, and substitute the measured value into the following expression to calculate the junction temperature.

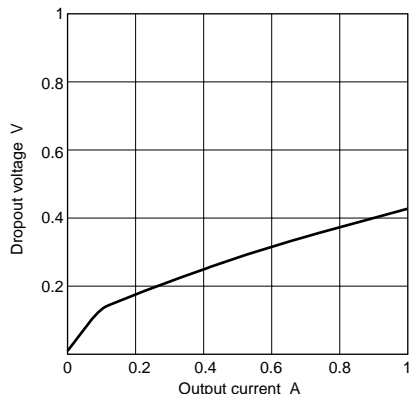
$$T_j = P_D \times \theta_{j-L} + T_L \quad (\theta_{j-L} = 22^\circ \text{C/W})$$



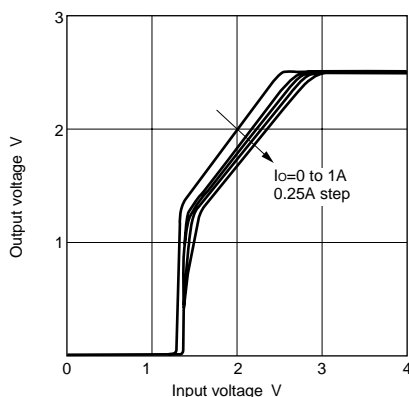
■Typical Characteristics Examples of SI-3012KS and SI-3025KS

( $T_a=25^\circ\text{C}$ ) \* $V_{out}=2.5\text{ V}$  for SI-3012KS ( $R_S=24\text{ k}\Omega$ )

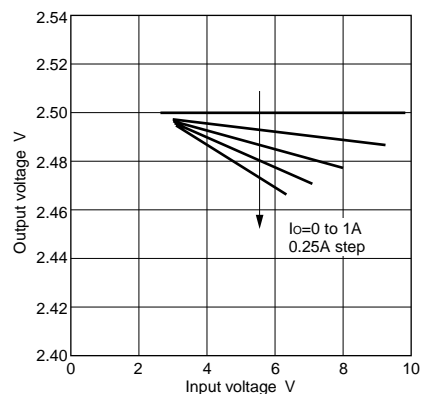
Dropout voltage



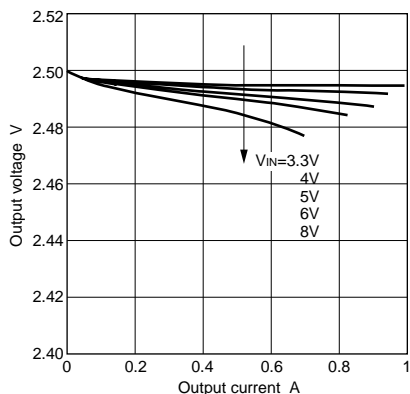
Rise characteristics



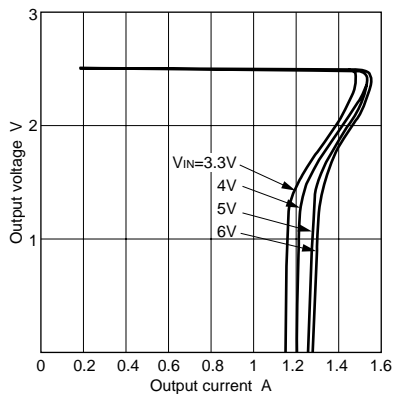
Line regulation



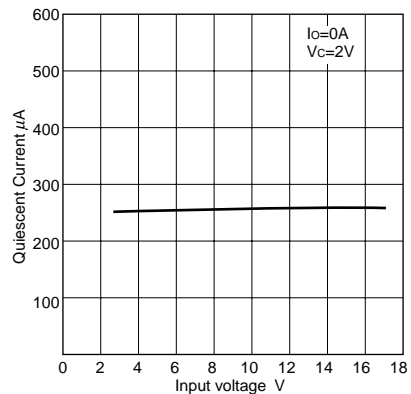
Load regulation



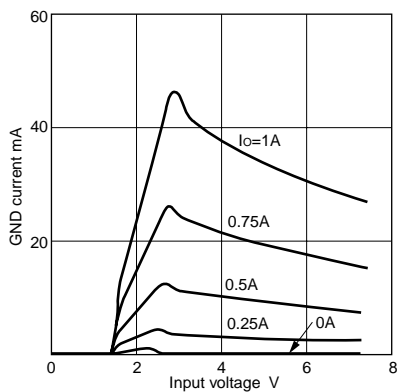
Overcurrent protection characteristics



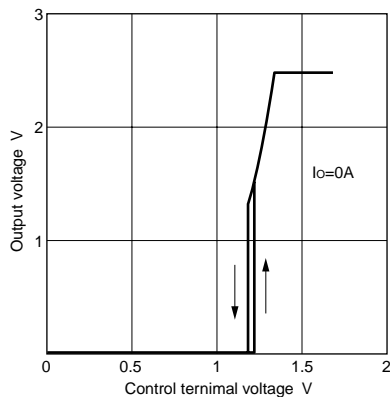
Input voltage vs. Quiescent current



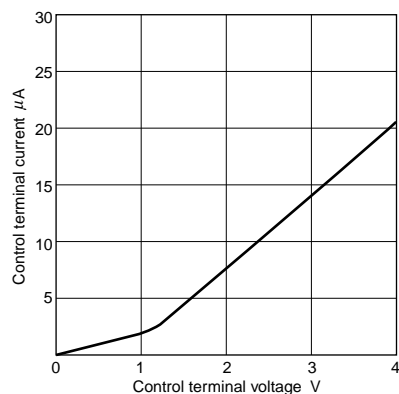
Circuit current



Control terminal voltage vs. Output voltage



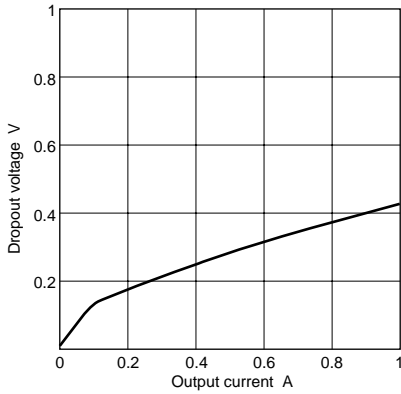
Control terminal voltage vs. Control terminal current



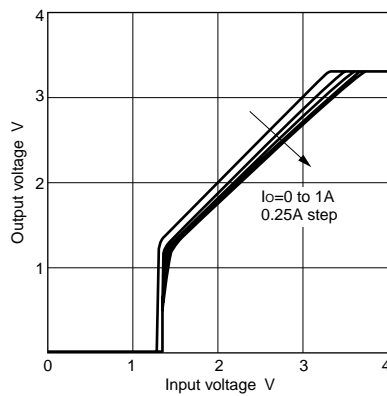
■Typical Characteristics Examples of SI-3033KS

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

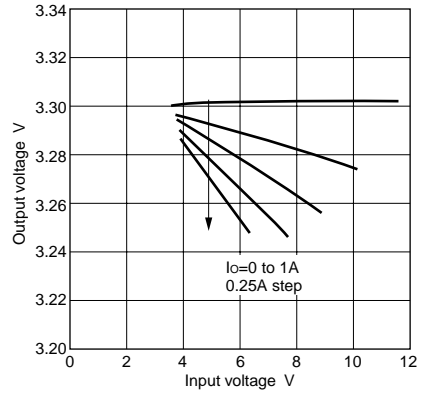
Dropout voltage



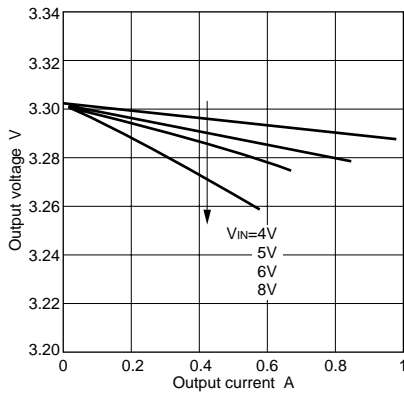
Rise characteristics



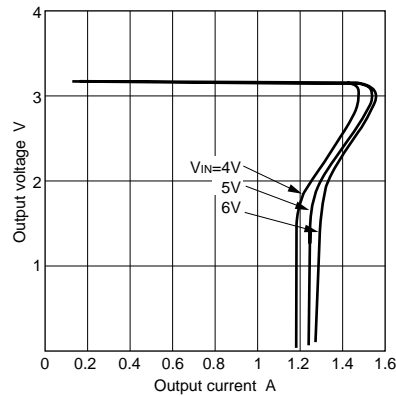
Line regulation



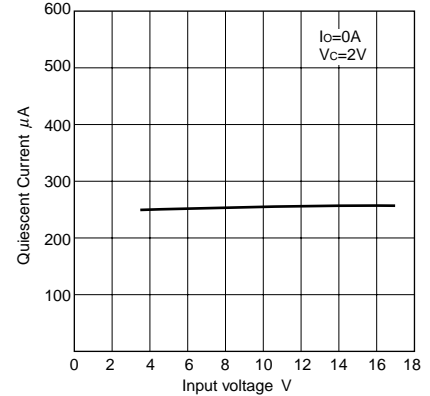
Load regulation



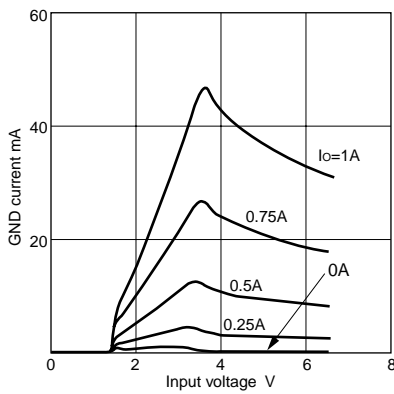
Overcurrent protection characteristics



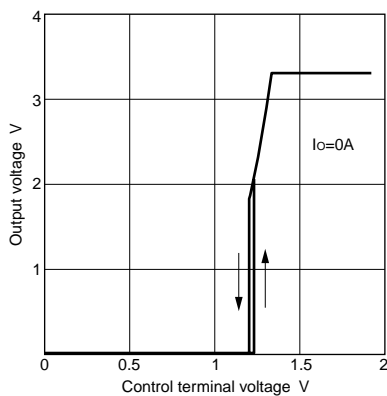
Input voltage vs. Quiescent current



Circuit current



Control terminal voltage vs. Output voltage



Control terminal voltage vs. Control terminal current

