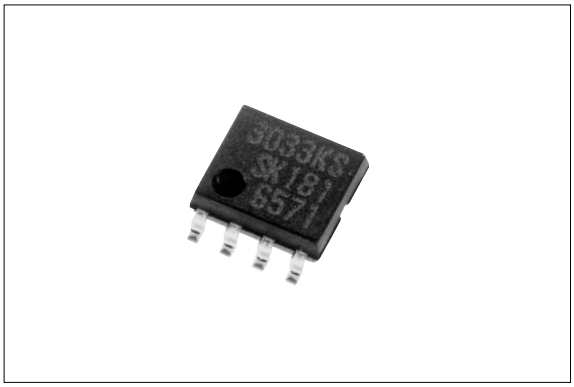
SI-3000KS Series

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 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)
- 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°C)

Parameter	Symbol	Ratings	Unit
DC Input Voltage	V_{IN}*1	17	V
Output Control Pin Voltage	V_C	V_{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	°C
Storage Temperature	T_{stg}	–40 to +125	°C
Thermal Resistance (Junction to Ambient Air)	$Rth_{(j-a)}$*	130	°C/W
Thermal resistance (Junction to Lead (pin 7))	$Rth_{(j-l)}$	22	°C/W

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

■Electrical Characteristics

(Unless otherwise specified, T_a = 25°C, V_c = 2 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	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
(reference voltage for SI-3102KS)	Conditions	V_{IN}=3.3V, I_O=10mA			V_{IN}=2.5V, 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			0.6	
	Conditions	I_O=1A (V_O=2.5V)			I_O=1A			I_O=1A			I_O=1A			
Line Regulation	ΔV_{OLINE}			10			10			10			15	mV
	Conditions	V_{IN}=3.3 to 8V, I_O=10mA (V_O=2.5V)			V_{IN}=2.5 to 6V, I_O=10mA			V_{IN}=3.3 to 8V, I_O=10mA			V_{IN}=5 to 10V, I_O=10mA			
Load Regulation	ΔV_{OLOAD}			40			40			40			50	mV
	Conditions	V_{IN}=3.3V, I_O=0 to 1A (V_O=2.5V)			V_{IN}=2.5V, I_O=0 to 1A			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			350	μA
	Conditions	V_{IN}=3.3V, I_O=0A, V_C=2V, R2=24kΩ			V_{IN}=2.5V, I_O=0A, V_C=2V			V_{IN}=3.3V, I_O=0A, V_C=2V			V_{IN}=5V, I_O=0A, V_C=2V			
Off Circuit Current	I_q(OFF)			1			1			1			1	μA
	Conditions	V_{IN}=3.3V, V_C=0V			V_{IN}=2.5V, 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			±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			T_j=0 to 100°C			
Ripple Rejection	R_{REJ}		55			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}=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			1.2			A
	Conditions	V_{IN}=3.3V (V_O=2.5V)			V_{IN}=2.5V			V_{IN}=3.3V			V_{IN}=5V			
VC PIN Control Voltage (Output ON)*3	V_C, IH	2.0			2.0			2.0			2.0			V
VC PIN Control Voltage (Output OFF)	V_C, IL			0.8			0.8			0.8			0.8	V
VC PIN Control Current (Output ON)	I_C, IH			40			40			40			40	μA
	Conditions	V_C=2V												
VC PIN Control Current (Output OFF)	I_C, IL	–5	0		–5	0		–5	0		–5	0		μA
	Conditions	V_C=0V												
Output OFF Voltage	V_O(OFF)			0.5			0.5			0.5			0.5	V

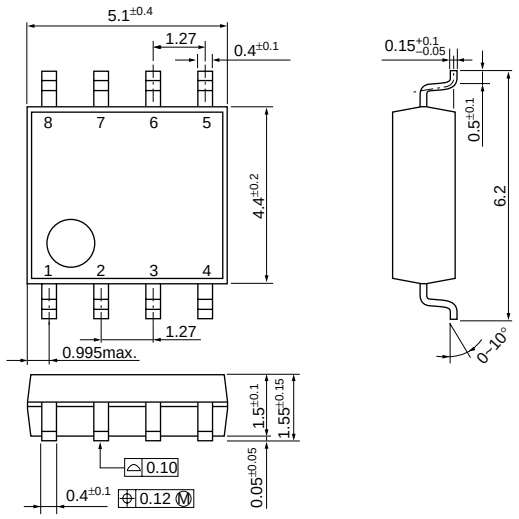
*1: Refer to the description on the dropout voltage.

*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 V, and I_O = 10 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)



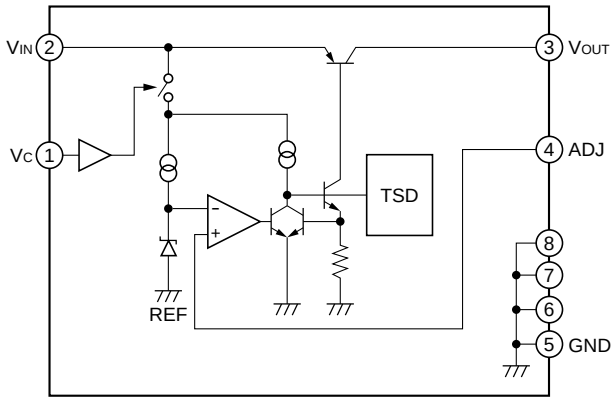
Pin Arrangement

① V_C
② V_{IN}
③ V_O
④ Sence (ADJ for SI-3012KS)
⑤ GND
⑥ GND
⑦ GND
⑧ GND

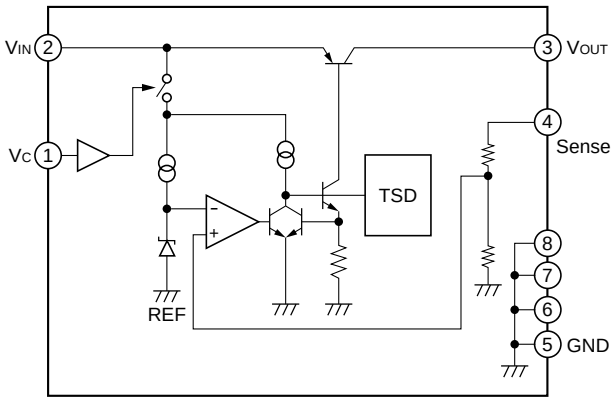
Plastic Mold Package Type
Flammability: UL 94V-0
Weight: Approx. 0.1 g

■Block Diagram

●SI-3012KS

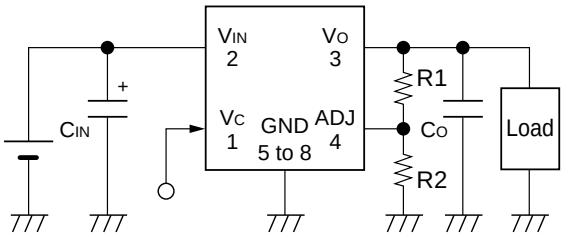


●SI-3018KS, SI-3025KS, SI-3033KS

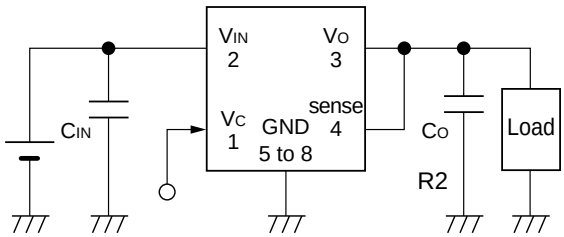


■Standard Circuit Connection Diagram

●SI-3012KS



●SI-3018KS, SI-3025KS, SI-3033KS



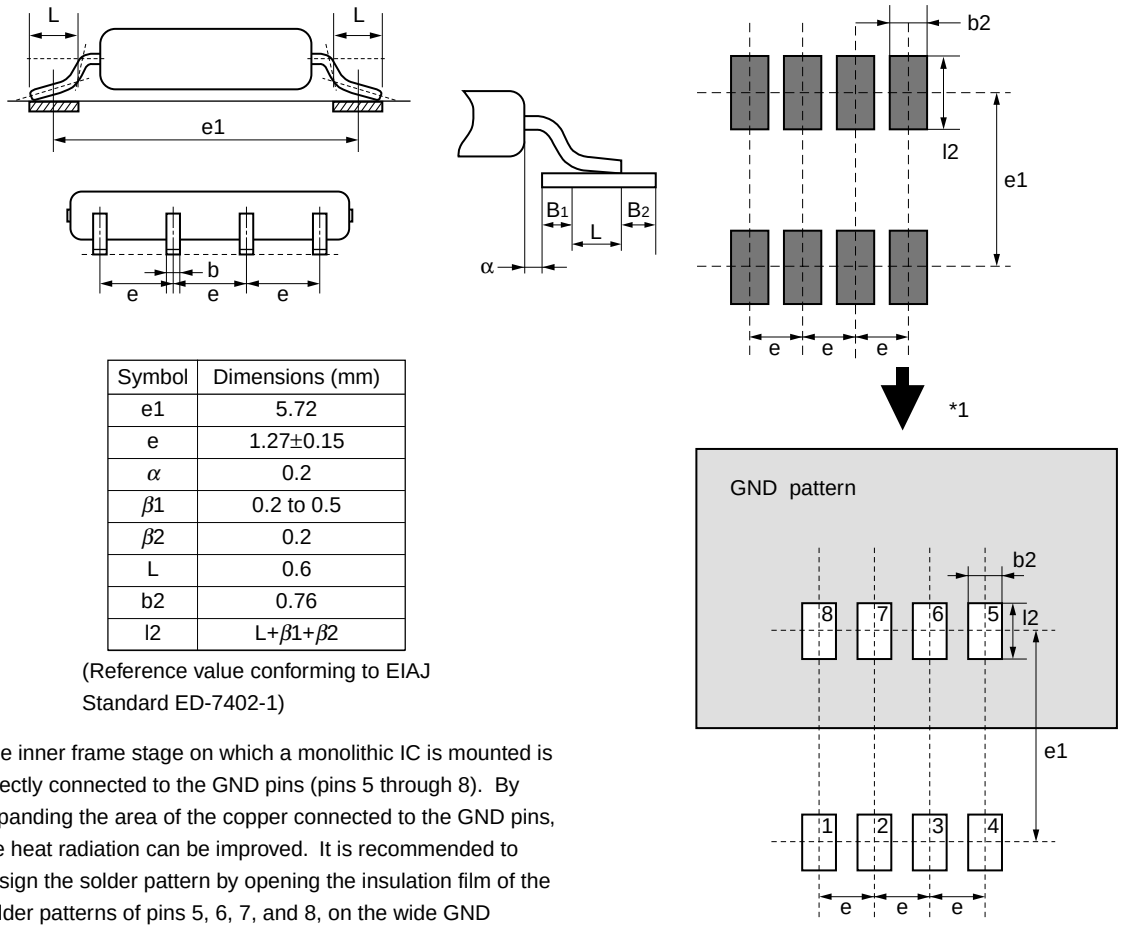
R_1, R_2: Output voltage setting resistors
The output voltage can be set by connecting R_1 and R_2 as shown above.
The recommended value of R_2 is 24 kΩ.

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

C_{IN} : Input capacitor (22 μF or larger)
This capacitor is necessary if an inductance is included in the input line or if the wiring length is long.

C_O : 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

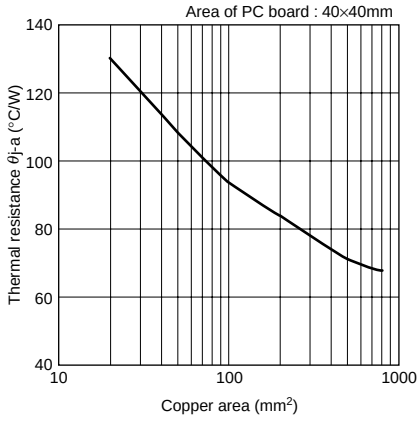
(Reference value conforming to EIAJ Standard ED-7402-1)

*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.

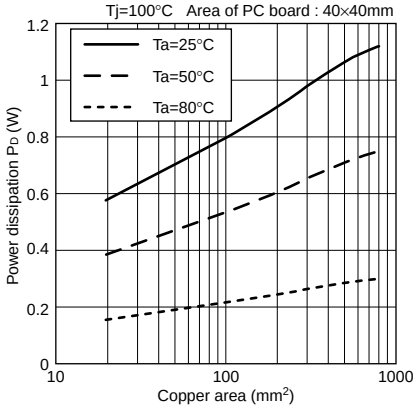
Figure 1

■Reference Data

Thermal resistance vs. Copper area



Power dissipation vs. Copper area

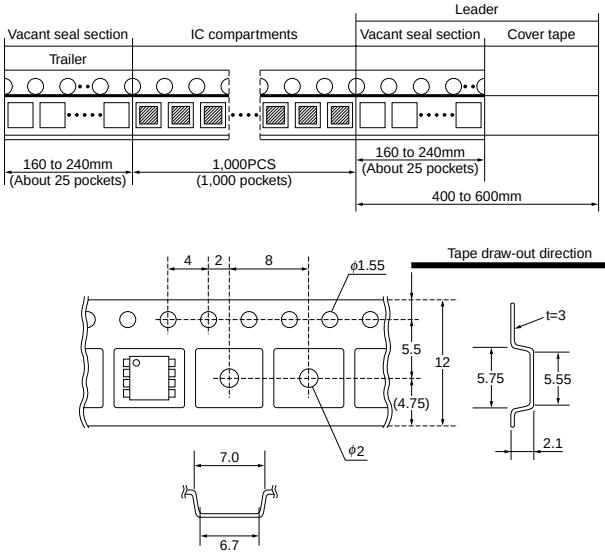


- Calculating junction temperature
  Measure the temperature TL of the lead of the GND pin (pin 7) by using a thermocouple, and substitute the measured value into the following expression to calculate the junction temperature.

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

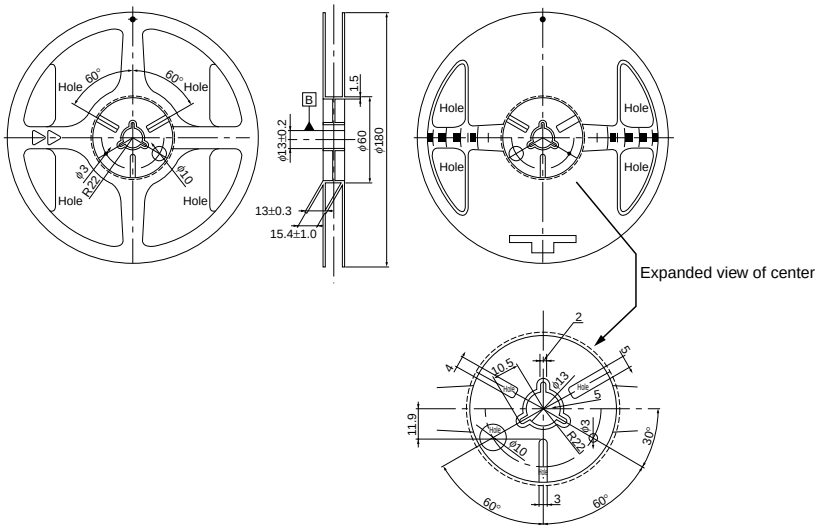
■Taping Specifications

Carrier tape
Surface resistance of embossed tape: 100 kΩ maximum (among 10 pockets)



(Unit : mm)

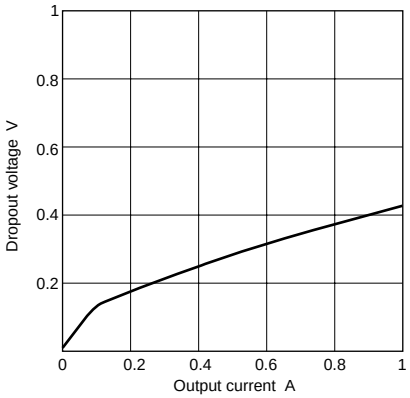
Reel: Number of packed products: 1000



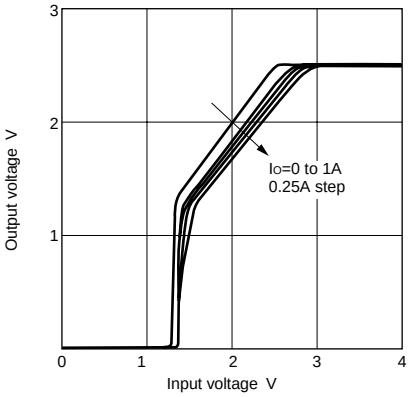
■Typical Characteristics Examples of SI-3012KS and SI-3025KS

(T_a=25°C) *V_{out}=2.5 V for SI-3012KS (RS=24 kΩ)

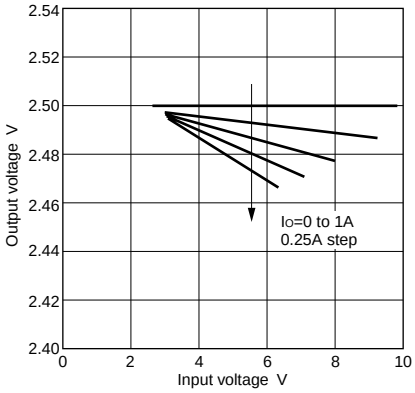
Dropout voltage



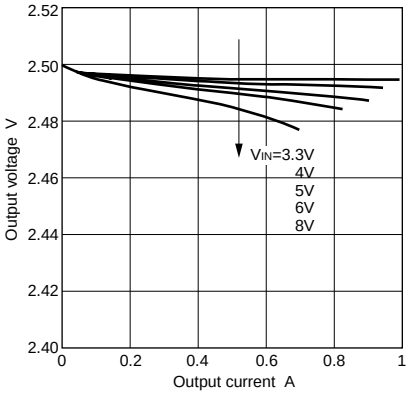
Rise characteristics



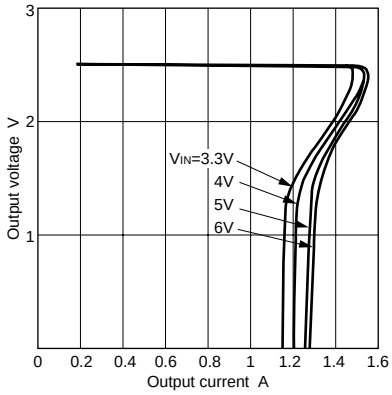
Line regulation



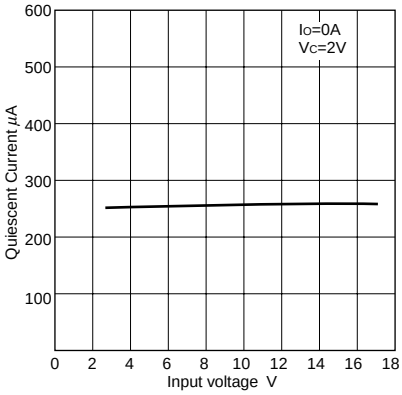
Load regulation



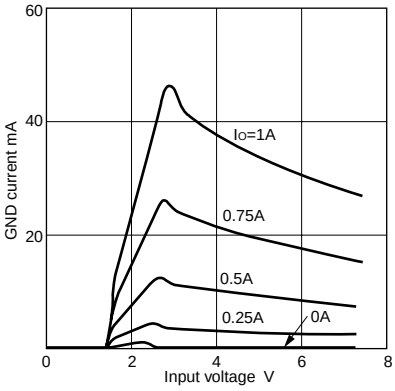
Overcurrent protection characteristics



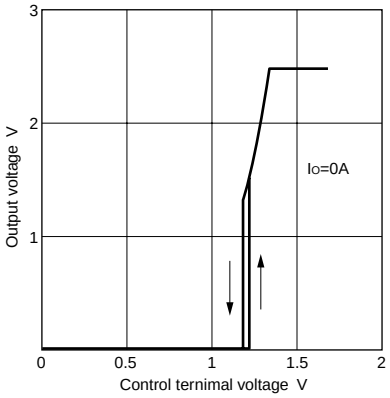
Input voltage vs. Quiescent current



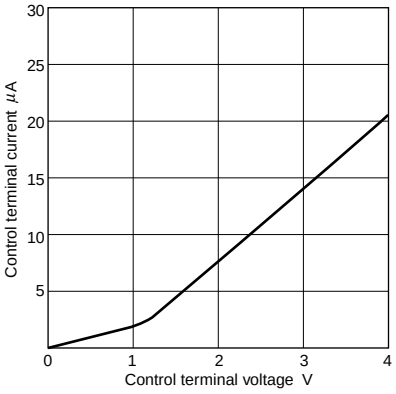
Circuit current



Control terminal voltage vs. Output voltage



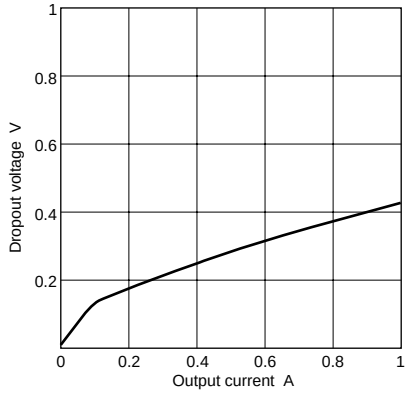
Control terminal voltage vs. Control terminal current



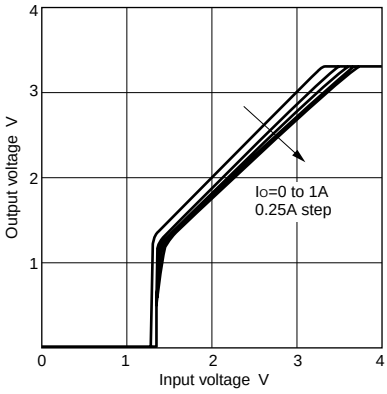
■Typical Characteristics Examples of SI-3033KS

(T_a=25°C)

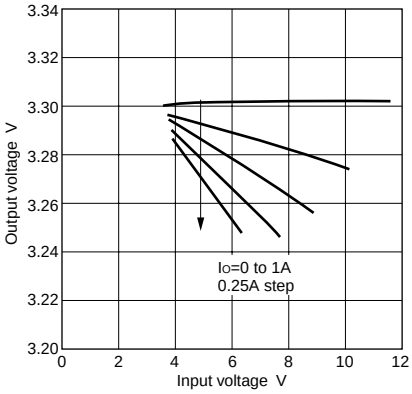
Dropout voltage



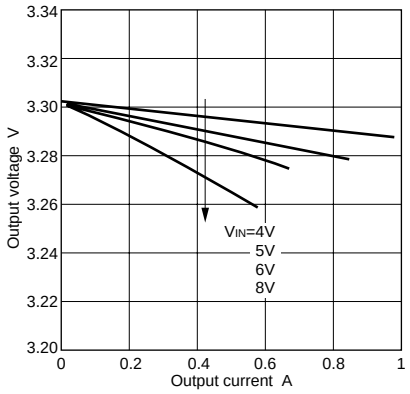
Rise characteristics



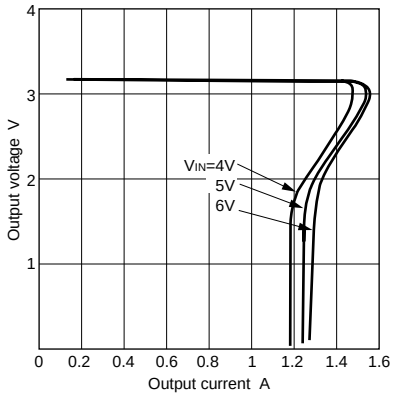
Line regulation



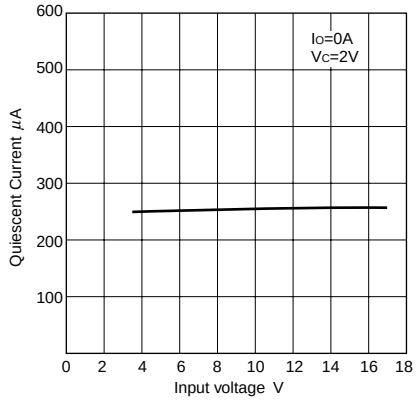
Load regulation



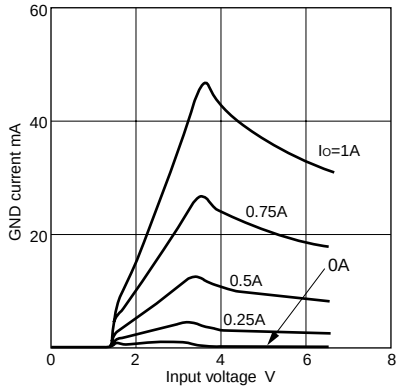
Overcurrent protection characteristics



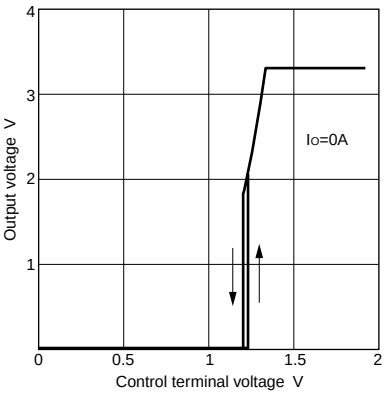
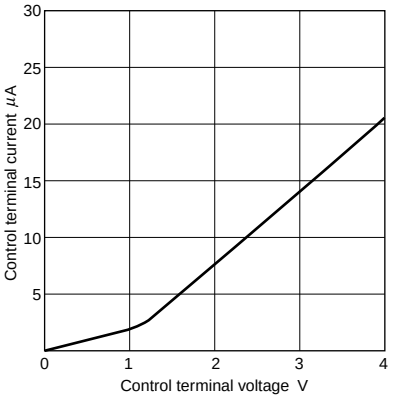
Input voltage vs. Quiescent current



Circuit current



Control terminal voltage vs. Output voltage



Control terminal voltage vs. Control terminal current