

# Dropper Type Regulator with Output On/Off Control SI-3001S

## Features

- Output current of 1.0A
- 5-terminal type <output on/off control, variable output voltage (rise only)>
- Voltage accuracy of  $\pm 2\%$
- Low dropout voltage  $\leq 1V$  at  $I_O \leq 1.0A$ ,  $\leq 0.5V$  at  $I_O \leq 0.4A$
- Built-in overcurrent, overvoltage and thermal protection circuits
- Withstands external electromagnetic noises
- TO-220 equivalent full-mold package

## Absolute Maximum Ratings

(Ta = 25°C)

Parameter	Symbol	Ratings	Unit	Conditions
DC Input Voltage	V <sub>IN</sub>	35	V	
Output Control Terminal Voltage	V <sub>C</sub>	V <sub>IN</sub>	V	
Output Current	I <sub>O</sub>	1.0 *1	A	
Power Dissipation	P <sub>D1</sub>	18	W	With infinite heatsink
	P <sub>D2</sub>	1.5	W	Stand-alone without heatsink
Junction Temperature	T <sub>J</sub>	-40 to +125	°C	
Operating Temperature	T <sub>OP</sub>	-40 to +100	°C	
Storage Temperature	T <sub>stg</sub>	-40 to +125	°C	
Junction to Case Thermal Resistance	$\theta_{j-c}$	5.5	°C/W	
Junction to Ambient-Air Thermal Resistance	$\theta_{j-a}$	66.7	°C/W	Stand-alone without heatsink

## Electrical Characteristics

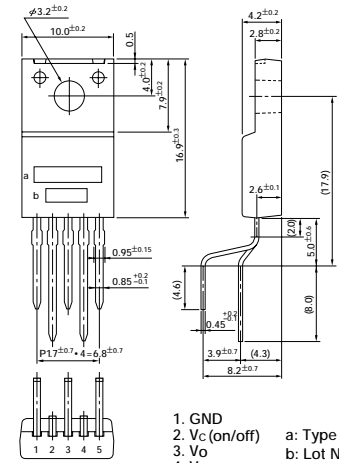
(Ta = 25°C, V<sub>IN</sub> = 14V unless otherwise specified)

Parameter	Symbol	Ratings			Unit	Conditions	
		min	typ	max			
Input Voltage	V <sub>IN</sub>	6 *2		30 *1	V		
Output Voltage	V <sub>O</sub>	4.90	5.00	5.10	V	V <sub>IN</sub> = 12 to 16V, I <sub>O</sub> = 0.4A	
Dropout Voltage	V <sub>DIF</sub>			0.5	V	I <sub>O</sub> $\leq$ 0.4A	
				1.0	V	I <sub>O</sub> $\leq$ 1.0A	
Line Regulation	$\Delta V_{O LINE}$			30	mV	I <sub>O</sub> = 0.4A, V <sub>IN</sub> = 6 to 16V	
Load Regulation	$\Delta V_{O LOAD}$			100	mV	I <sub>O</sub> = 0 to 0.4A	
Output Voltage Temperature Coefficient	$\Delta V_{O}/\Delta T$		$\pm 0.5$		mV/°C	I <sub>O</sub> = 5mA, Ta = -10 to +100°C	
Ripple Rejection	R <sub>REJ</sub>		54		dB	f = 100 to 120Hz	
Quiescent Circuit Current	I <sub>q</sub>		3	10	mA	I <sub>O</sub> = 0A	
Overcurrent Protection Starting Current	I <sub>S1</sub>	1.2 *3			A		
V <sub>C</sub> Terminal	Control Voltage	Output ON	V <sub>C, IH</sub>	2.0 *4	V		
		Output OFF	V <sub>C, IL</sub>		0.8	V	
	Control Current	Output ON	I <sub>C, IH</sub>		20	μA	V <sub>C</sub> = 2.7V
		Output OFF	I <sub>C, IL</sub>		-0.3	mA	V <sub>C</sub> = 0.4V

### Notes:

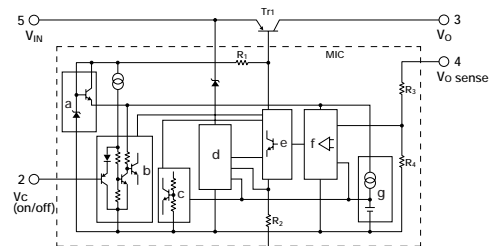
- \*1. Since  $P_{D(max)} = (V_{IN} - V_O) \cdot I_O = 18(W)$ , V<sub>IN(max)</sub> and I<sub>O(max)</sub> may be limited depending on operating conditions. Refer to the Ta-P<sub>D</sub> curve to compute the corresponding values.
- \*2. Refer to the dropout voltage.
- \*3. I<sub>S1</sub> rating shall be the point at which the output voltage V<sub>O</sub> (V<sub>IN</sub> = 14V, I<sub>O</sub> = 0.4A) drops to -5%.
- \*4. The output control terminal V<sub>C</sub> is pulled up inside the IC. Each input level can be directly driven with LS-TTL ICs. Thus, LS-TTL direct driving is also possible.

## External Dimensions (unit: mm)



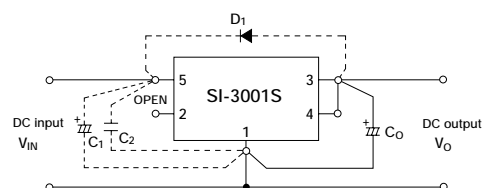
1. GND
  2. V<sub>C</sub> (on/off)
  3. V<sub>O</sub>
  4. V<sub>osense</sub>
  5. V<sub>IN</sub>
- a: Type No.  
b: Lot No.
- (Forming No. 1101)

## Equivalent Circuit Diagram



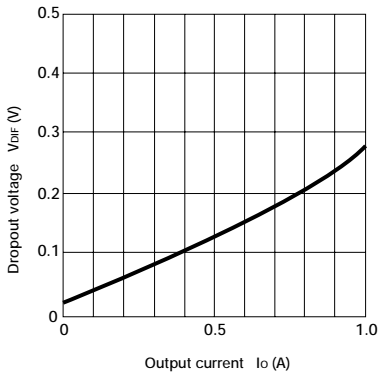
- a: Pre-regulator
- b: Output ON/OFF control
- c: Thermal protection
- d: Over-input and overcurrent protection
- e: Drive circuit
- f: Error amplifier
- g: Reference voltage

## Standard Circuit Diagram

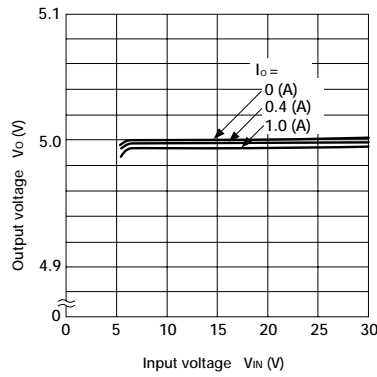


- Co: Output capacitor (47 to 100μF, 50V)
- C<sub>1</sub>, C<sub>2</sub>: Anti-oscillation capacitors (C<sub>1</sub>: approx. 47μF, C<sub>2</sub>: approx. 0.33μF). These are required for inductive input lines or long wiring. Tantalum capacitors are recommended for C<sub>1</sub> and Co, especially at low temperatures.
- D<sub>1</sub>: Protection diode. Required as protection against reverse biasing between input and output. (Recommended diode: Sanken EU2Z.)

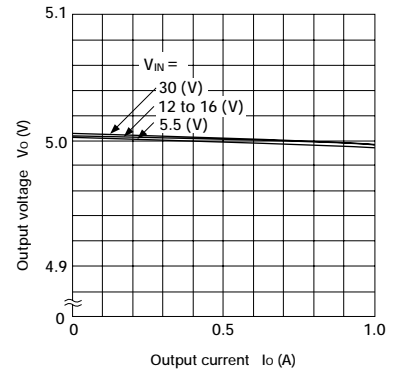
■  $I_o$  vs  $V_{DIF}$  Characteristics



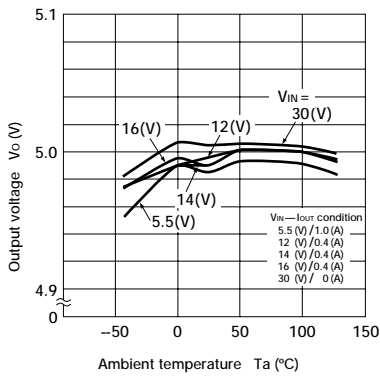
■ Line Regulation



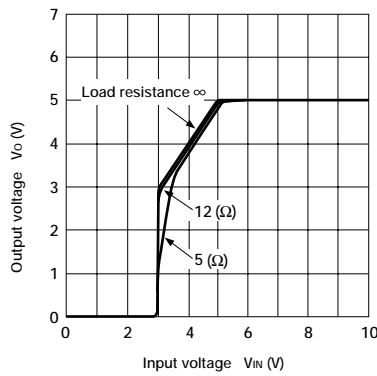
■ Load Regulation



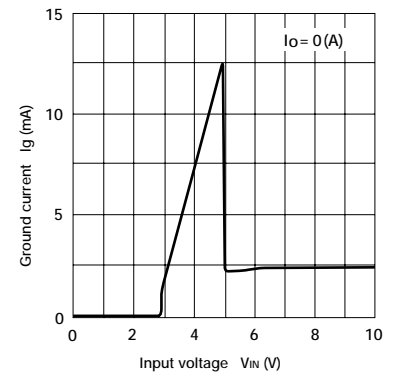
■ Output Voltage Temperature Characteristics



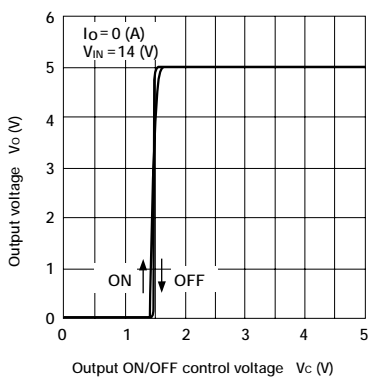
■ Rise Characteristics



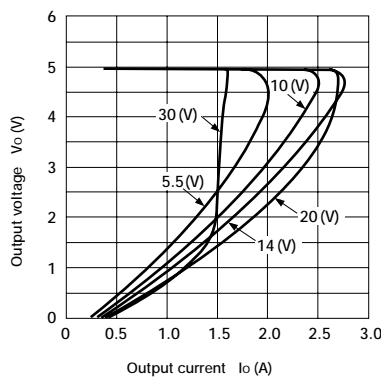
■ Circuit Current



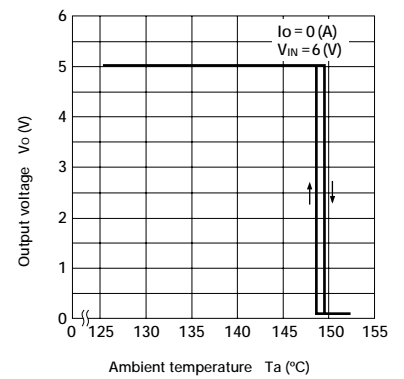
■ ON/OFF Control Characteristics



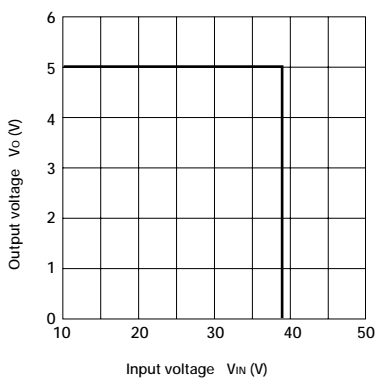
■ Overcurrent Protection Characteristics



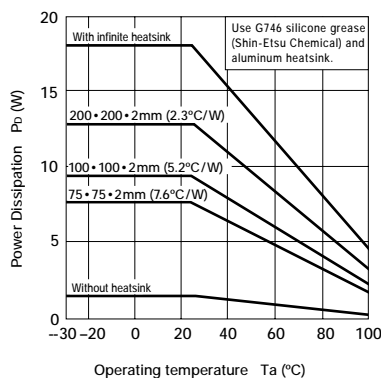
■ Thermal Protection Characteristics



■ Overvoltage Protection Characteristics



■  $T_a$ — $P_D$  Characteristics



Note on Thermal Protection Characteristics:  
The thermal protection circuit is intended for protection against heat during instantaneous short-circuiting. Its operation, including reliability, is not guaranteed for short-circuiting over an extended period of time.