

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

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

Parameter	Symbol	Ratings	Unit	Conditions
DC Input Voltage	V_{IN}	35	V	
Output Control Terminal Voltage	V_C	V_{IN}	V	
Output Current	I_o	1.0 *1	A	
Power Dissipation	P_{D1}	18	W	With infinite heatsink
	P_{D2}	1.5	W	Stand-alone without heatsink
Junction Temperature	T_j	-40 to +125	$^\circ\text{C}$	
Operating Temperature	T_{OP}	-40 to +100	$^\circ\text{C}$	
Storage Temperature	T_{stg}	-40 to +125	$^\circ\text{C}$	
Junction to Case Thermal Resistance	θ_{j-c}	5.5	$^\circ\text{C}/\text{W}$	
Junction to Ambient-Air Thermal Resistance	θ_{j-a}	66.7	$^\circ\text{C}/\text{W}$	Stand-alone without heatsink

Electrical Characteristics

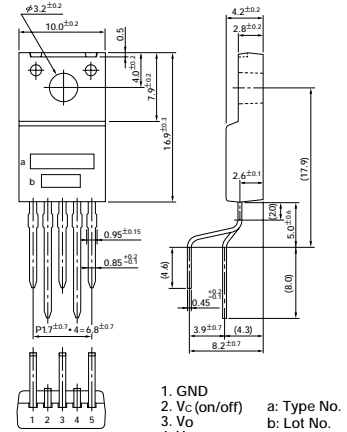
($T_a = 25^\circ\text{C}$, $V_{IN} = 14V$ unless otherwise specified)

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

Notes:

- *1. Since $P_{D(max)} = (V_{IN} - V_o) \cdot I_o = 18(W)$, $V_{IN(max)}$ and $I_o(max)$ may be limited depending on operating conditions. Refer to the T_a - P_D curve to compute the corresponding values.
- *2. Refer to the dropout voltage.
- *3. I_{S1} rating shall be the point at which the output voltage V_o ($V_{IN} = 14V$, $I_o = 0.4A$) drops to -5%.
- *4. The output control terminal V_C 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.

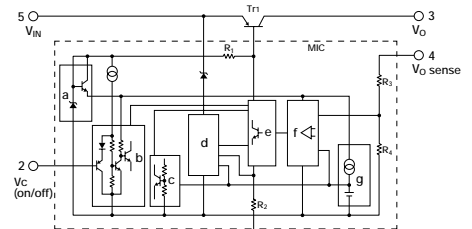
External Dimensions (unit: mm)



1. GND
 2. V_C (on/off)
 3. V_o
 4. Vosense
 5. V_{IN}
- a: Type No.
b: Lot No.

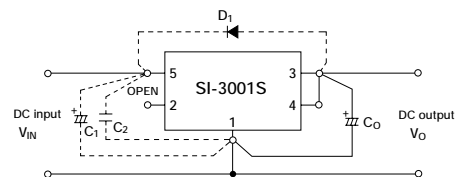
(Forming No. 1101)

Equivalent Circuit Diagram



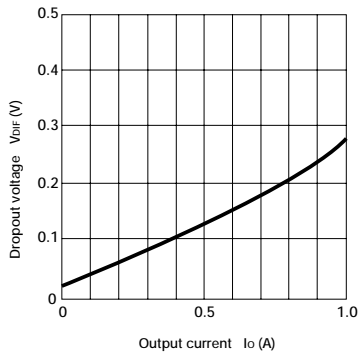
- Pre-regulator
- Output ON/OFF control
- Thermal protection
- Over-input and overcurrent protection
- Drive circuit
- Error amplifier
- Reference voltage

Standard Circuit Diagram

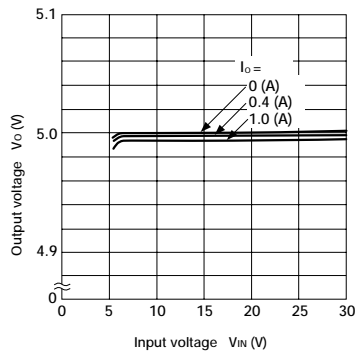


- C_o : Output capacitor (47 to 100 μF , 50V)
 C_1, C_2 : Anti-oscillation capacitors (C_1 : approx. 47 μF , C_2 : approx. 0.33 μF). These are required for inductive input lines or long wiring. Tantalum capacitors are recommended for C_1 and C_2 , especially at low temperatures.
 D_1 : Protection diode. Required as protection against reverse biasing between input and output.
 (Recommended diode: Sanken EU2Z.)

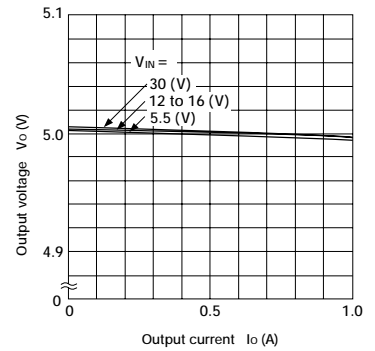
■ I_o vs V_{DIF} Characteristics



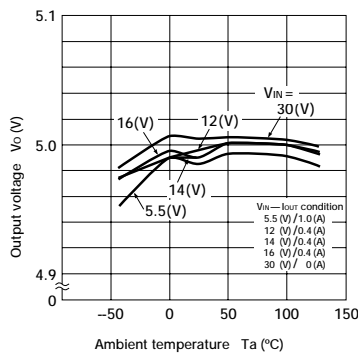
■ Line Regulation



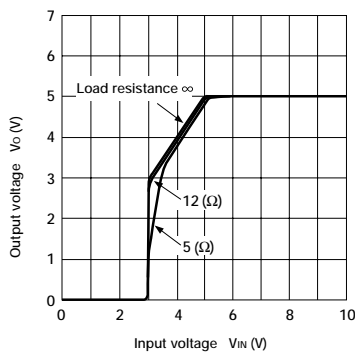
■ Load Regulation



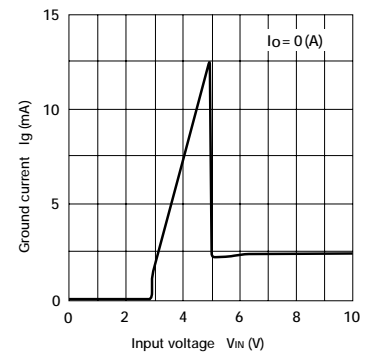
■ Output Voltage Temperature Characteristics



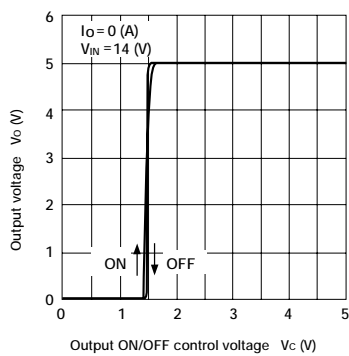
■ Rise Characteristics



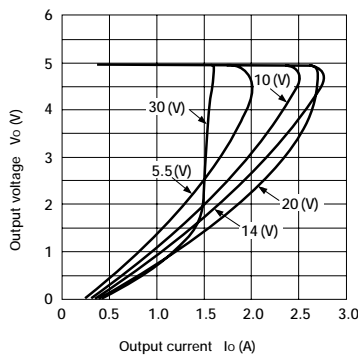
■ Circuit Current



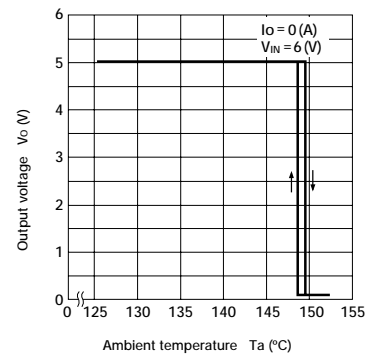
■ ON/OFF Control Characteristics



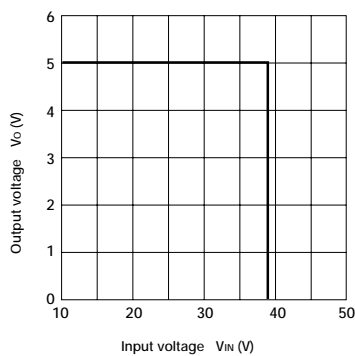
■ Overcurrent Protection Characteristics



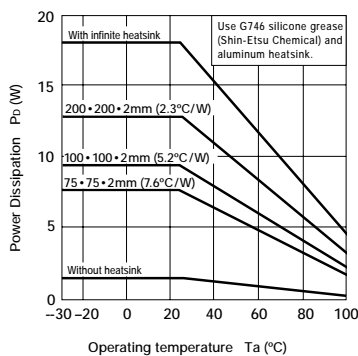
■ Thermal Protection Characteristics



■ Overvoltage Protection Characteristics



■ T_a — P_o 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.