

# Dropper Type Dual Output Regulator SI-3101S

## Features

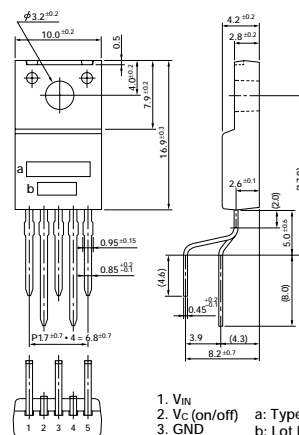
- Single input dual output <sub output (5V/0.07A), main output (5V/0.4A)>
- Main output can be externally turned ON/OFF (with ignition switch, etc.) <most suitable as memory backup power supply>
- Low standby current ( $\leq 0.8\text{mA}$ )
- Low dropout voltage  $\leq 1\text{V}$
- Built-in constant current type overcurrent, overvoltage and thermal protection circuits
- TO-220 equivalent 5-terminal full-mold package

## Absolute Maximum Ratings

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

| Parameter                                  | Symbol         | Ratings     | Unit               | Conditions                   |
|--|----------------|-------------|--------------------|------------------------------|
| DC input voltage                           | $V_{IN}$       | 40          | V                  |                              |
| Battery reverse connection                 | $V_{INB}$      | -13 *6      | V                  | One minute                   |
| Output control terminal voltage            | $V_C$          | $V_{IN}$    | V                  |                              |
| Output current                             | CH1            | $I_{O1}$    | 0.07 *1            | A                            |
|  | CH2            | $I_{O2}$    | 0.4 *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 +115 | $^\circ\text{C}$   |                              |
| Storage temperature                        | $T_{STG}$      | -40 to +125 | $^\circ\text{C}$   |                              |
| Junction to case thermal resistance        | $\theta_{J-C}$ | 5.5         | $^\circ\text{C/W}$ |                              |
| Junction to ambient-air thermal resistance | $\theta_{J-A}$ | 66.7        | $^\circ\text{C/W}$ | Stand-alone without heatsink |

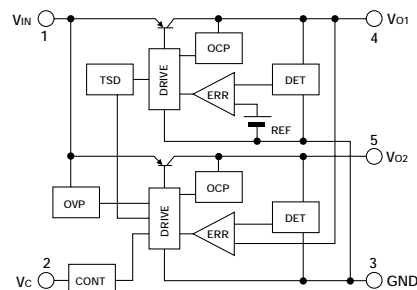
## External Dimensions (unit: mm)



1.  $V_{IN}$
  2.  $V_C$  (on/off)
  3. GND
  4.  $V_{O1}$
  5.  $V_{O2}$
- a: Type No.  
b: Lot No.

(Forming No. 1101)

## Equivalent Circuit Diagram



## Electrical Characteristics

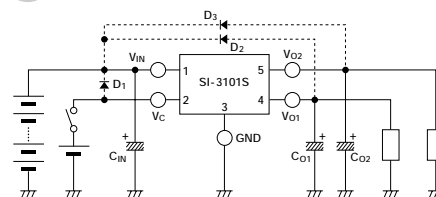
( $T_J = 25^\circ\text{C}$ ,  $V_{IN} = 14\text{V}$  unless otherwise specified)

| Parameter  | Symbol       | Ratings              |        |       | Unit             | Conditions   |                         |
|--|--------------|----------------------|--------|-------|------------------|--|-------------------------|
|  |              | min                  | typ    | max   |                  |  |                         |
| Input voltage  | $V_{IN}$     | 6 *2                 |        | 35 *1 | V                |  |                         |
| Output voltage   | CH1          | $V_{O1}$             | 4.80   | 5.00  | 5.20             | V  | $I_{O1} = 0.05\text{A}$ |
|  | CH2          | $V_{O2}$             | 4.80   | 5.00  | 5.20             | V  | $I_{O2} = 0.3\text{A}$  |
| Channel-channel voltage difference ( $V_{O1} - V_{O2}$ ) | $\Delta V_O$ | -0.3                 |        | 5.30  | V                | $V_{IN} = 0$ to $40\text{V}$ , $I_{O1}$ and $I_{O2} = 0\text{A}$ up to load short-circuiting |                         |
| Dropout voltage  | CH1          | $V_{DIF1}$           |        | 1.0   | V                | $I_{O1} \leq 0.05\text{A}$   |                         |
|  | CH2          | $V_{DIF2}$           |        | 1.0   | V                | $I_{O2} \leq 0.4\text{A}$  |                         |
| Line regulation  | CH1          | $\Delta V_{O LINE1}$ | 10     | 30    | mV               | $V_{IN} = 6$ to $18\text{V}$ , $I_{O1} = 0.05\text{A}$                                       |                         |
|  | CH2          | $\Delta V_{O LINE2}$ | 10     | 30    | mV               | $V_{IN} = 6$ to $18\text{V}$ , $I_{O2} = 0.3\text{A}$  |                         |
| Load regulation  | CH1          | $\Delta V_{O LOAD1}$ | 30     | 70    | mV               | $I_{O1} = 0$ to $0.05\text{A}$   |                         |
|  | CH2          | $\Delta V_{O LOAD2}$ | 40     | 70    | mV               | $I_{O2} = 0$ to $0.3\text{A}$  |                         |
| Ripple rejection   | CH1          | $R_{REJ1}$           | 54     |       | dB               | $f = 100$ to $120\text{Hz}$  |                         |
|  | CH2          | $R_{REJ2}$           | 54     |       | dB               | $f = 100$ to $120\text{Hz}$  |                         |
| Quiescent circuit current                                | $I_q$        |                      |        | 0.8   | mA               | $I_{O1} = 0\text{A}$ , $V_C = 0\text{V}$   |                         |
| Overcurrent protection starting current                  | CH1          | $I_{(S)1}$           | 0.1 *3 |       | A                |  |                         |
|  | CH2          | $I_{(S)2}$           | 0.5 *3 |       | A                |  |                         |
| Output control voltage                                   | Output ON    | $V_{CH}$             | 4.2    | 4.5   | 4.8              | V  |                         |
|  | Output OFF   | $V_{CL}$             | 3.2    | 3.5   | 3.8              | V  |                         |
|  | Output ON    | $I_{CH}$             |        |       | 100              | $\mu\text{A}$  | $V_C = 4.8\text{V}$     |
| Output OFF   | $I_{CL}$     | -100                 |        |       | $\mu\text{A}$    | $V_C = 3.2\text{V}$  |                         |
| Overvoltage protection starting voltage                  | $V_{OVP}$    | 35 *4                |        |       | V                |  |                         |
| Thermal protection starting temperature                  | $T_{TSD}$    | 130 *5               |        |       | $^\circ\text{C}$ |  |                         |

### Notes:

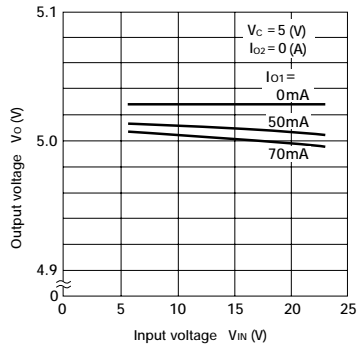
- \*1. Since  $P_{D(max)} = (V_{IN} - V_O) \cdot I_{O1} + (V_{IN} - V_{O2}) \cdot I_{O2} = 18\text{ (W)}$ ,  $V_{IN(max)}$ ,  $I_{O1(max)}$  and  $I_{O2(max)}$  may be limited depending on operating conditions. Refer to the  $T_a - P_D$  curve to compute the corresponding values.
- \*2. Refer to the dropout voltage.
- \*3.  $I_{S1}$  rating shall be the point at which the output voltage  $V_{O1}$  or  $V_{O2}$  ( $V_{IN} = 14\text{V}$ ,  $I_{O1} = 0.05\text{A}$  or  $I_{O2} = 0.3\text{A}$ ) drops to -5%.
- \*4. Overvoltage protection circuit is built only in CH2 ( $V_{O2}$  side).
- \*5. The indicated temperatures are junction temperatures.
- \*6. All terminals, except  $V_{IN}$  and GND, are open.

## Standard Circuit Diagram

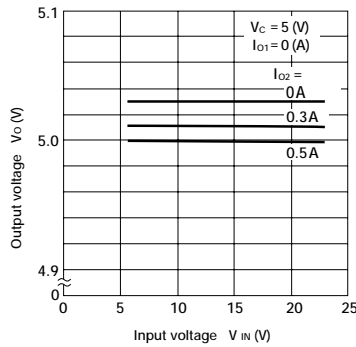


- $C_{O1}$ : Output capacitor (47 to 100 $\mu\text{F}$ , 50V)  
 $C_{O2}$ : Output capacitor (47 to 100 $\mu\text{F}$ , 50V)  
 \*1  $C_{IN}$ : Anti-oscillation capacitors (approx. 47 $\mu\text{F}$ ). Tantalum capacitors are recommended, especially at low temperatures.  
 \*2  $D_1, D_2, D_3$ : Protection diode. Required as protection against reverse biasing between input and output. (Recommended diode: Sanken EU2Z.)

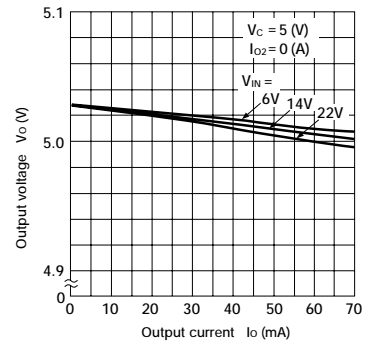
■ Line Regulation (1)



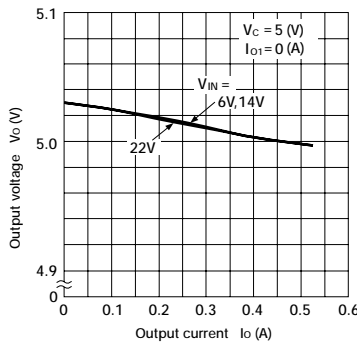
■ Line Regulation (2)



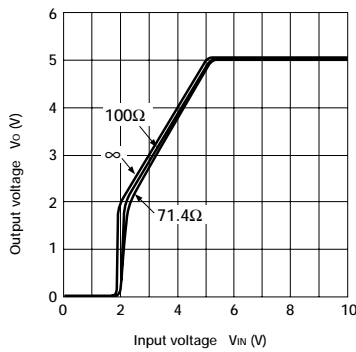
■ Load Regulation (1)



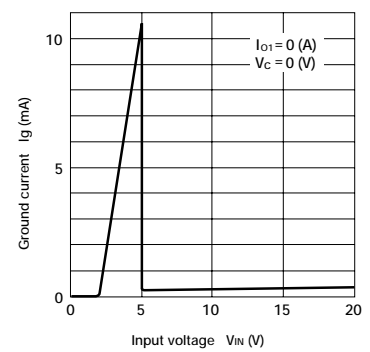
■ Load Regulation (2)



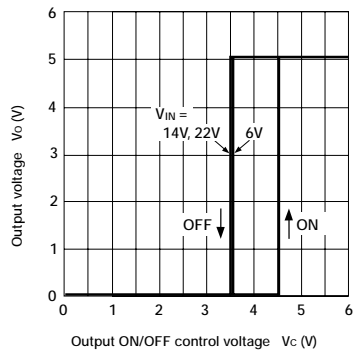
■ Rise Characteristics



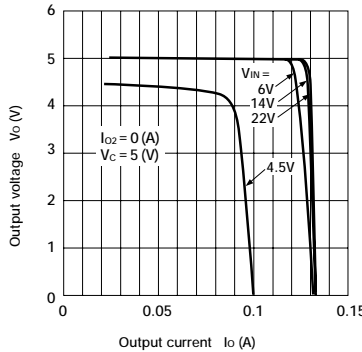
■ Circuit Current



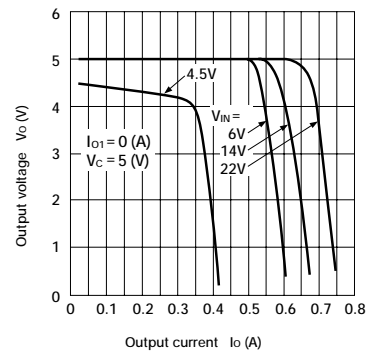
■ ON/OFF Control Characteristics



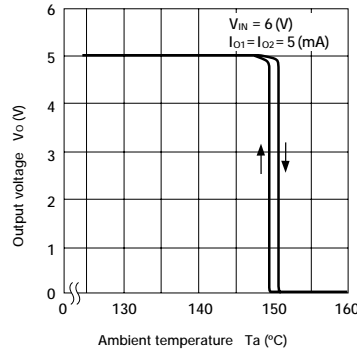
■ Overcurrent Protection Characteristics (1)



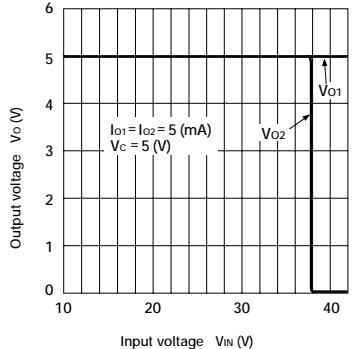
■ Overcurrent Protection Characteristics (2)



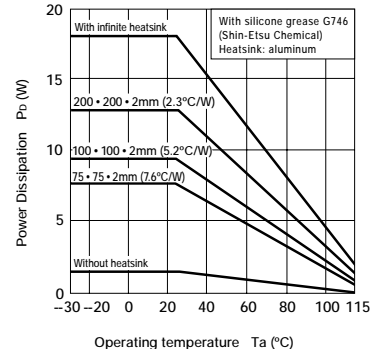
■ Thermal Protection Characteristics



■ 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.