# STR9000 Series

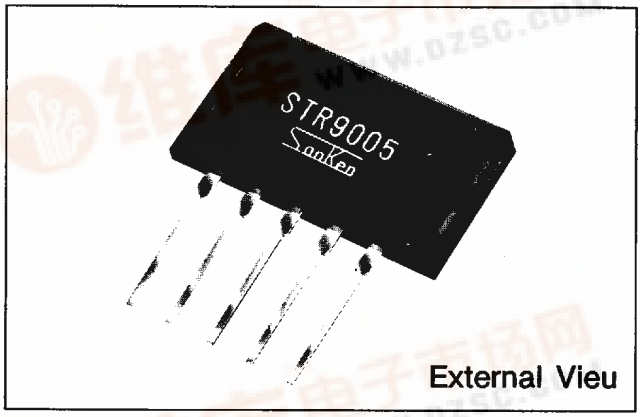
## Dropper Type — Low-Dropout Voltage Type

### Features

- Input/output voltage difference of less than 1V during operation
- Reduces power loss for electronic equipment
- Small size with 4 A output
- An easy-to-use 5-pin plastic-mold regulator
- Capable of remote ON/OFF
- Capable of fine adjustment of output voltage
- Built-in foldback current protection circuit
- High reliability due to use of SANKEN's semiconductor elements

### Applications

- For battery- operated VTR cameras, 8 mm cameras and automotive appliances
- For various types of electronic equipment including micro computers, personal computers, floppy disk drives, CATV sets, VTRs, video disks, and printers
- For stabilization of secondary side of multi-output switching regulators



External Vieu

### ■Absolute maximum Ratings (Ta = 25°C)

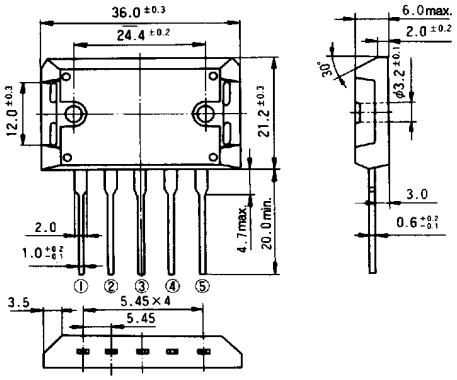
| Description | Symbol | Ratings | | | Unit |
|---|---|---|---|---|---|
| | | STR9005 | STR9012 | STR9015 | |
| DC Input Voltage | $V_{IN}$ | 25 | 30 | 30 | V |
| DC Output Current | $I_O$ | 4.0 | | | A |
| Power Dissipation | $P_D$ | 75($T_C$ = 25°C) | | | W |
| | | 3.2 (no fin) | | | |
| Junction Temperature | Tj | −30 to +125 | | | °C |
| Operating Case Temperature | Tc | −20 to +100 | | | °C |
| Storage Temperature | Tstg | −30 to +125 | | | °C |
| Thermal Resistance (between junction and case) | Rth(j-c) | 1.25 max. | | | °C/W |

### ■Electrical Characteristics (Ta = 25°C)

| Description | Symbol | Ratings | | | | | | | | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | STR9005 | | | STR9012 | | | STR9015 | | | |
| | | min. | typ. | max. | min. | typ. | max. | min. | typ. | max. | |
| DC Input Voltage | $V_{IN}$ | 6 | | 15 | 13 | | 25 | 16 | | 25 | V |
| Output Voltage | $V_O$ | 4.9 | 5.0 | 5.1 | 11.8 | 12.0 | 12.2 | 14.8 | 15.0 | 15.2 | V |
| | Condition | $V_{IN}$ = 8.0V, $I_O$ = 2.0A | | | $V_{IN}$ = 16V, $I_O$ = 2.0A | | | $V_{IN}$ = 20V, $I_O$ = 2.0A | | | |
| Dropout Voltage | $V_{DIF}$ | | | 0.5 | | | 0.5 | | | 0.5 | V |
| | Condition | $I_O$ = 2.0A | | | | | | | | | |
| | $V_{DIF}$ | | | 1.0 | | | 1.0 | | | 1.0 | V |
| | Condition | $I_O$ = 4.0A | | | | | | | | | |
| Line Regulation | $\Delta V_{LINE}$ | | 10 | 30 | | 30 | 80 | | 50 | 100 | mV |
| | Condition | $V_{IN}$ = 6 to 15V, $I_O$ = 2.0A | | | $V_{IN}$ = 13 to 25V, $I_O$ = 2.0A | | | $V_{IN}$ = 16 to 25V, $I_O$ = 2.0A | | | |
| Load Regulation | $\Delta V_{LOAD}$ | | 40 | 100 | | 80 | 200 | | 100 | 200 | mV |
| | Condition | $V_{IN}$ = 8.0V, $I_O$ = 0 to 3.0A | | | $V_{IN}$ = 16V, $I_O$ = 0 to 3.0A | | | $V_{IN}$ = 20V, $I_O$ = 0 to 3.0A | | | |
| Temperature Coefficient of Output Voltage | $\Delta V_O/\Delta T$ | | ±0.5 | | | ±1.5 | | | ±1.5 | | mV/°C |
| Ripple Rejection | $R_{REJ}$ | | 54 | | | 54 | | | 54 | | dB |
| | Condition | f = 100 to 120Hz | | | | | | | | | |
| Foldback Current | $I_{S1}$ | 4.1 | | | 4.1 | | | 4.1 | | | A |
| | Condition | $V_{IN}$ = 8.0V | | | $V_{IN}$ = 16V | | | $V_{IN}$ = 20V | | | |
| Output ON/OFF Control Vtg. * (Vtg. between pin No.3 and 5) | $V_{O(ON)}$ | | | 0.6 | | | 0.6 | | | 0.6 | V |
| | $V_{O(OFF)}$ | 2.0 | | | 2.0 | | | 2.0 | | | V |
| Voltage with output off | $V_O$ | | | 0.5 | | | 0.5 | | | 0.5 | V |
| | Condition | $V_{IN}$ = 8.0V, $I_O$ = 0A | | | $V_{IN}$ = 15V, $I_O$ = 0A | | | $V_{IN}$ = 20V, $I_O$ = 0A | | | |

* Output is turned on with voltage of less than 0.6 V between pin No.3 and 5, and turned off at more than 2.0 V.

## ■Outline Drawing/Pin Connections (unit : mm)



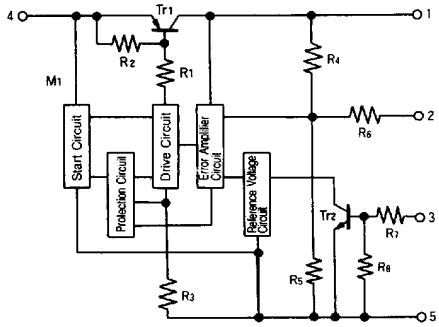

**Full Plastic Mold Package Type**
**Flammability : UL94V-O or equivalent**

**Pin Connections**

① Output (backside of case)
② Output Fine Adjustment
③ Output ON/OFF Control
④ Input
⑤ Ground

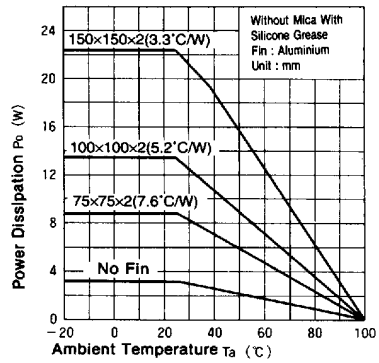
**Weight : Approx. 14.5g**

## ■Equivalent Circuit

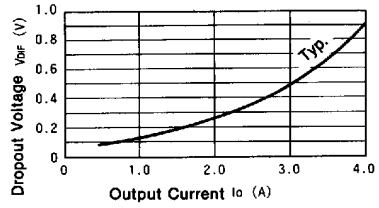



## ■Typical Operating Characteristics

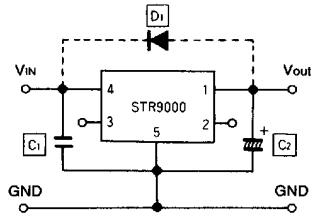
**Power Dissipation**




**Io vs. VDIF Characteristics**




## ■External Circuit




C1 : Oscillation Prevention Capacitor (approx. 0.33 μF)
Connection with pin No.4 shall be made as short as possible.

C2 : Output Capacitor (47 to 100 μF, 50 V)
Connection with pin No.1 shall be made as short as possible.

D1 : Protection Diode (RM1Z)
Required when between input and output is reverse biased. However, it is not required if the output capacitor is less than 100 μF.

**Note 1 : Prevention of oscillation at low temperature**
When an output capacitor with smaller tanδ is not used at low temperature, oscillation may happen. Be sure to connect tantalum capacitor (approx. 10 μF) in parallel with output capacitor $C_2$.

**Note 2 :** As an isolation type diode is provided between input ~ ground and output ~ ground, they may be destroyed when reverse biased. In that case, use a diode with low $V_F$ to prevent them.

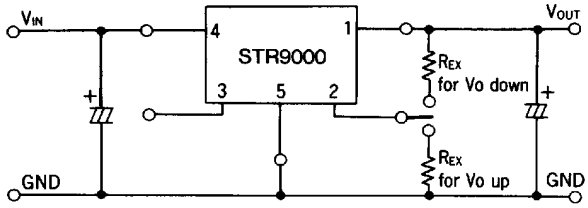
Refer to the 13th page for other precautions.

## Output Voltage Adjustable Circuit

**1. Adjustment of output voltage by single external resistor**

The output voltage of STR9000 series may be decreased by inserting a resistor between the pin No.1 (output pin) and the pin No.2 (output fine adjustment pin). On the other hand, the output voltage may be increased by inserting a resistor between the pin No.2 and 5 (ground pin).

**<External Circuit>**

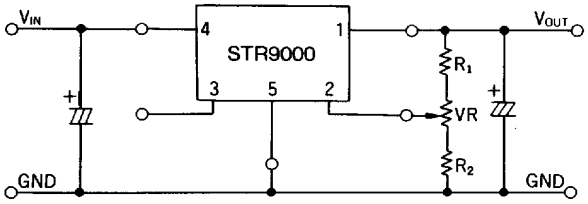



Select either one of the external resistors.

**2. Fine adjustment of output voltage**

The output voltage may be finely adjusted by using the pins 1, 2 and 5 as shown in the following connections.

**<External Circuit>**

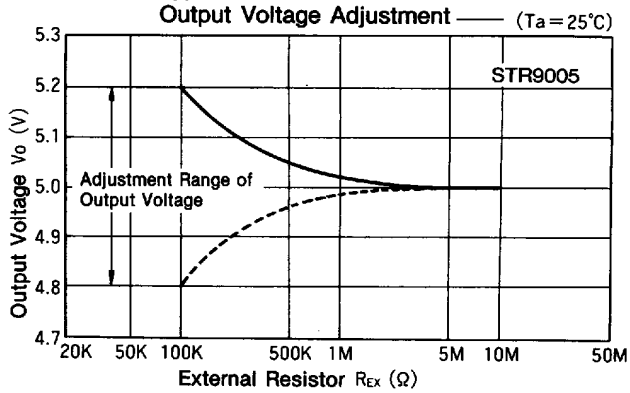


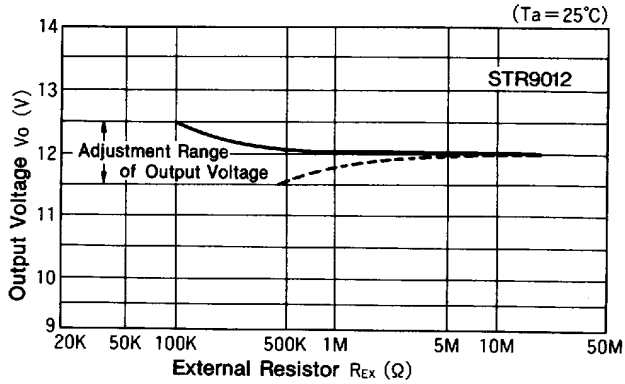

**Note: Fine adjustment of output voltage**

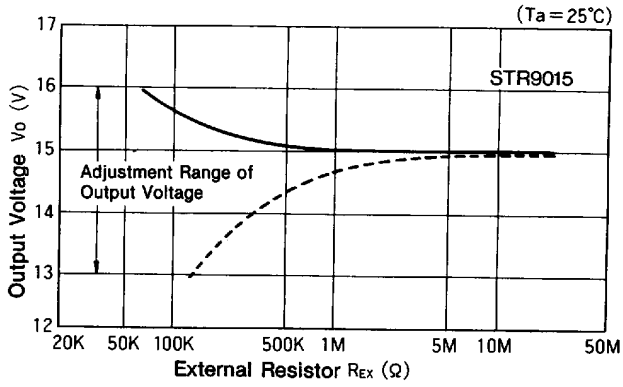
The fine adjustment range of output voltage for STR9000 series are max. ±0.2 V for STR9005, ±0.5 V for STR9012 and +1.0 V/−2.0 V for STR9015.

Adjustment exceeding these values may cause starting error.

① Typical Characteristics of Output Voltage Adjustment (Ta=25°C)




—— : Insertion of resistor between the pins 2 and 5
------ : Insertion of resistor between the pins 2 and 1

② Typical Characteristics of Output Voltage Fine Adjustment