

# STR9000 Series

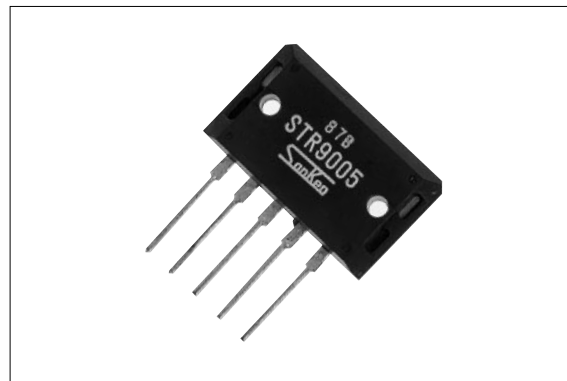
## 5-Terminal, Low Dropout Voltage Dropper Type

### Features

- 5-terminal regulator with two screw mount package
- Output current: 4.0A
- Low dropout voltage : $V_{DIF} \leq 1V$  (at  $I_o=4A$ )
- Fine adjustment of output voltage
- Output ON/OFF control
- Built-in foldback overcurrent protection circuits

### Applications

- For stabilization of the secondary stage of switching power supplies
- Electronic equipment



### Absolute Maximum Ratings

( $T_a=25^\circ C$ )

Parameter	Symbol	Ratings		Unit
		STR9005	STR9012/9015	
DC Input Voltage	$V_{IN}$	25	30	V
DC Output Current	$I_o$	4.0		V
Power Dissipation	$P_{D1}$	75( $T_c=25^\circ C$ )		W
	$P_{D2}$	3.2(Without heatsink, stand-alone operation)		W
Junction Temperature	$T_j$	-30 to +125		$^\circ C$
Ambient Operating Temperature	$T_{op}$	-20 to +100		$^\circ C$
Storage Temperature	$T_{stg}$	-30 to +125		$^\circ C$
Thermal Resistance (junction to case)	$R_{th(j-c)}$	1.25		$^\circ C/W$

### Electrical Characteristics

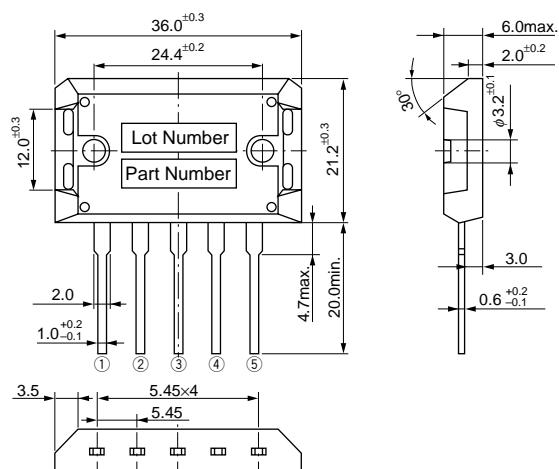
( $T_a=25^\circ C$ )

Parameter	Symbol	Ratings									Unit
		STR9005			STR9012			STR9015			
		min.	typ.	max.	min.	typ.	max.	min.	typ.	max.	
Input Voltage	V <sub>IN</sub>	6		15	13		25	16		25	V
Output Voltage	V <sub>O</sub>	4.9	5.0	5.1	11.8	12.0	12.2	14.8	15.0	15.2	V
	Conditions	V <sub>IN</sub> =8V, I <sub>O</sub> =2.0A			V <sub>IN</sub> =16V, I <sub>O</sub> =2.0A			V <sub>IN</sub> =20V, I <sub>O</sub> =2.0A			
Dropout Voltage	V <sub>DIF</sub>			0.5			0.5			0.5	V
	Conditions	I <sub>O</sub> =2.0A									
				1.0			1.0			1.0	
	Conditions	I <sub>O</sub> =4.0A									
Line Regulation	ΔV <sub>OLINE</sub>		10	30		30	80		50	100	mV
	Conditions	V <sub>IN</sub> =6 to 15V, I <sub>O</sub> =2.0A			V <sub>IN</sub> =13 to 25V, I <sub>O</sub> =2.0A			V <sub>IN</sub> =16 to 25V, I <sub>O</sub> =2.0A			
Load Regulation	ΔV <sub>OLOAD</sub>		40	100		80	200		100	200	mV
	Conditions	V <sub>IN</sub> =8V, I <sub>O</sub> =0 to 3.0A			V <sub>IN</sub> =16V, I <sub>O</sub> =0 to 3.0A			V <sub>IN</sub> =20V, I <sub>O</sub> =0 to 3.0A			
Temperature Coefficient of Output Voltage	ΔV <sub>O</sub> /ΔT <sub>a</sub>		±0.5			±1.5			±1.5		mV/°C
Ripple Rejection	R <sub>REJ</sub>		54			54			54		dB
	Conditions	f=100 to 120Hz									
Overcurrent Protection Starting Current	I <sub>S1</sub>	4.1			4.1			4.1			A
	Conditions	V <sub>IN</sub> =8V			V <sub>IN</sub> =16V			V <sub>IN</sub> =20V			
Output ON/OFF Control Voltage (Voltage between terminal No.3 and 5)	V <sub>O</sub> (ON)			0.6			0.6			0.6	V
	V <sub>O</sub> (OFF)	2.0			2.0			2.0			V
Voltage with Output Off	V <sub>O</sub>			0.5			0.5			0.5	V
	Conditions	V <sub>IN</sub> =8V, I <sub>O</sub> =0A			V <sub>IN</sub> =15V, I <sub>O</sub> =0A			V <sub>IN</sub> =20V, I <sub>O</sub> =0A			

\*Output is turned on when voltage between terminal No.3 and 5 is less than 0.6V, and turned off if more than 2.0V.

## ■Outline Drawing

(unit:mm)



Plastic Mold Package Type

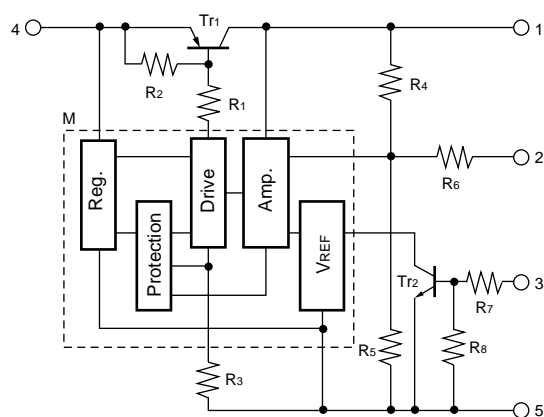
Flammability: UL94V-0

Weight: Approx. 14.5g

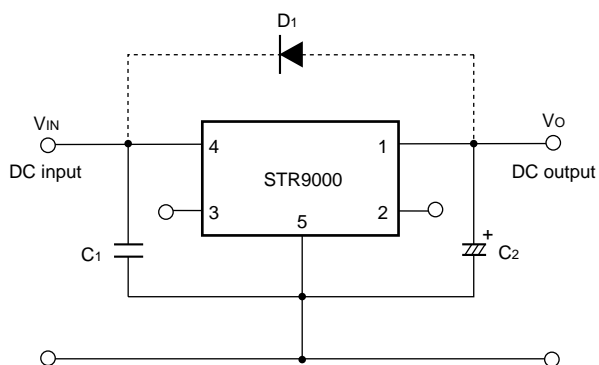
### Terminal Connections

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

## ■Block Diagram



## ■Standard External Circuit



C1: Oscillation prevention capacitor (approx. 0.33 $\mu$ F)

Connection to terminal No.4 must be made as short as possible.

C2: Output capacitor (47 to 100 $\mu$ F)

Connection to terminal No.1 must be made as short as possible.

D1: Protection diode (RM1Z)

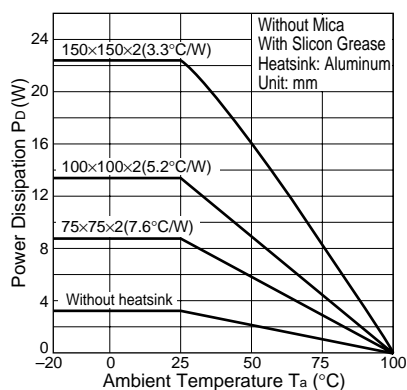
Required for protection against reverse biasing of input and output.

Note 1: Prevention of oscillation at low temperatures

At low temperatures, oscillation may occur unless an output capacitor with good  $\tan\delta$  is used. Be sure to connect a tantalum capacitor (approx. 10 $\mu$ F) in parallel with output capacitor C2.

Note 2: An isolation type diode is provided from input to ground and also from output to ground. These may be destroyed if the device is reverse biased. In this case, use a diode with low  $V_F$  to protect them.

## ■ $T_a$ - $P_D$ Characteristics

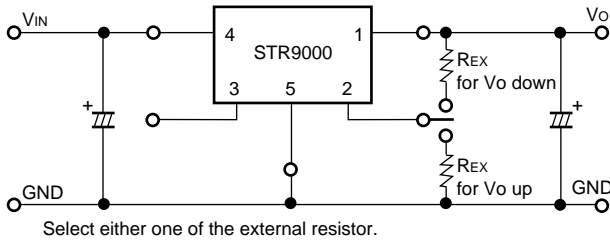


## External Variable Output Voltage Circuit

### 1. Variable output voltage with a single external resistor

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

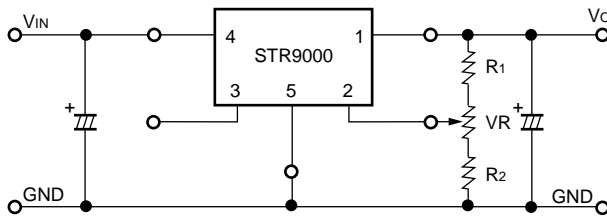
#### <Standard External Circuit>



### 2. Fine adjustment of output voltage

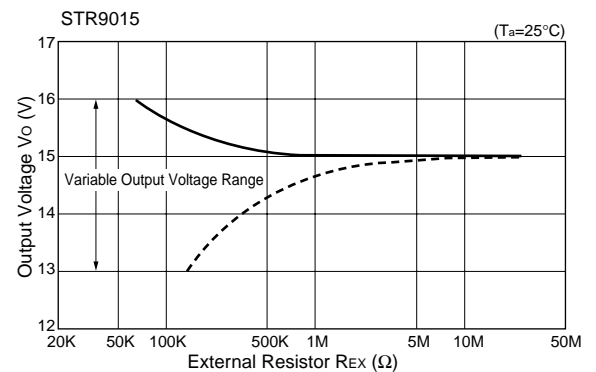
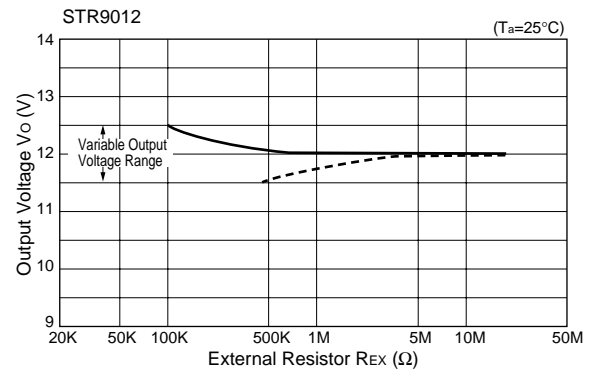
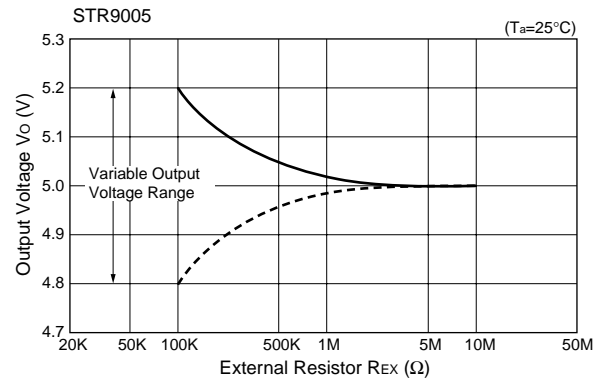
The output voltage may be finely adjusted by using terminals No.1, No.2 and No. 5 as shown in the following connections.

#### <Standard External Circuit>



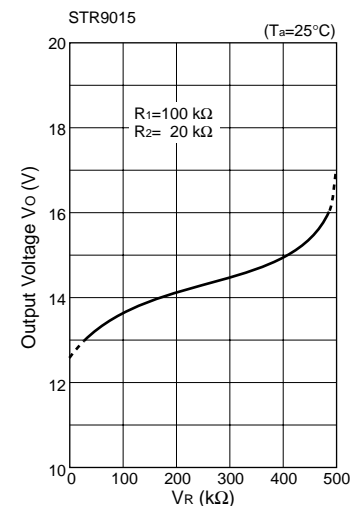
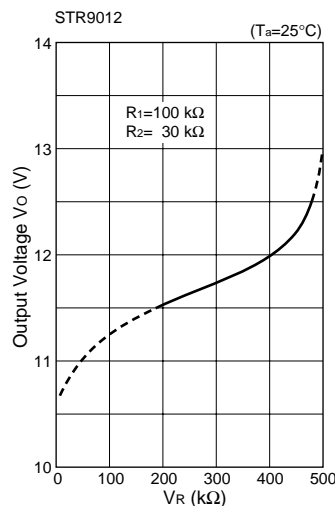
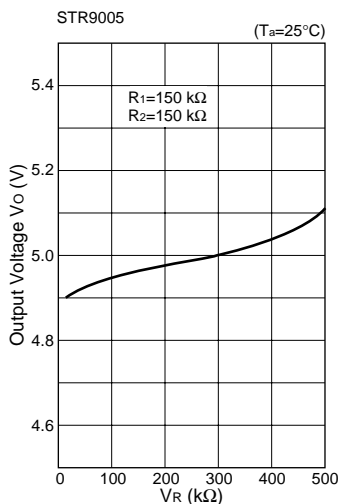
Note: The fine adjustment range of output voltage for the STR9000 series is  $\pm 0.5V$  max for STR9012 and  $+1.0V/-2.0V$  max for STR9015. Adjustment exceeding these values may cause start-up errors.

## ① Typical Characteristics of Variable Output Voltage



— : Insertion of resistor between terminals No. 2 and No. 5  
 - - - : Insertion of resistor between terminals No. 2 and No. 1

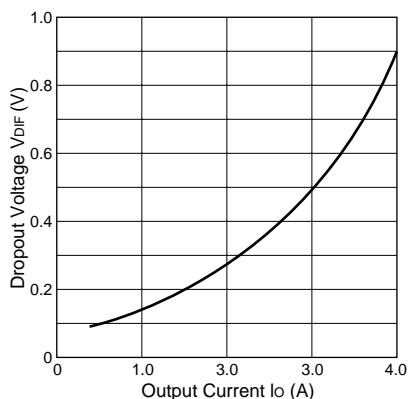
## ② Typical Characteristics of Fine Output Voltage Adjustment



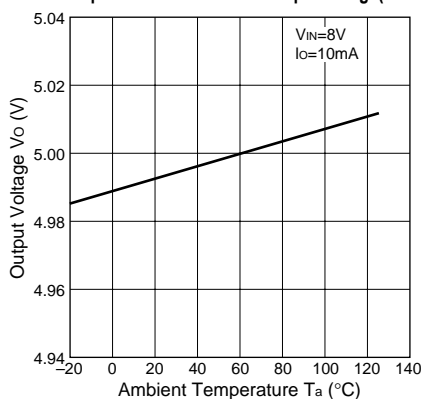
## ■Typical Characteristics

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

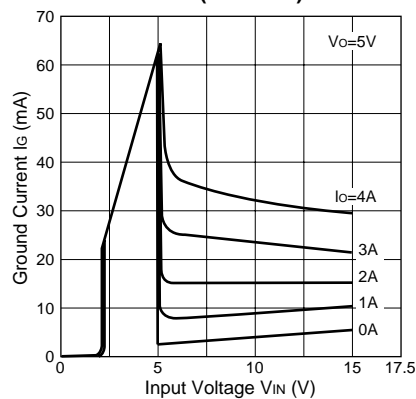
**$I_o$  vs.  $V_{DIF}$  Characteristics**



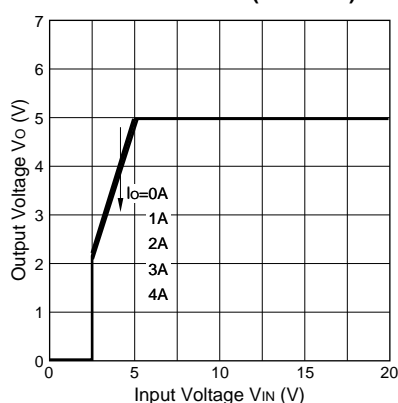
**Temperature Coefficient of Output Voltage(STR9005)**



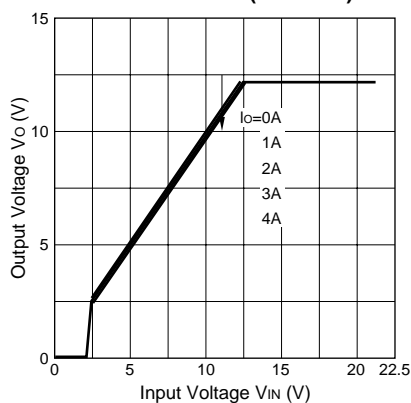
**Circuit Current(STR9005)**



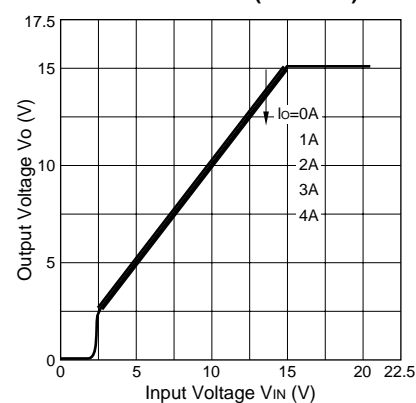
**Rise Characteristics(STR9005)**



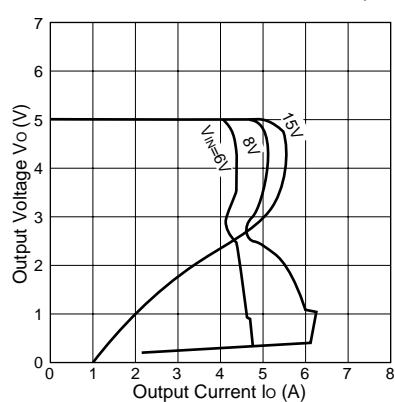
**Rise Characteristics(STR9012)**



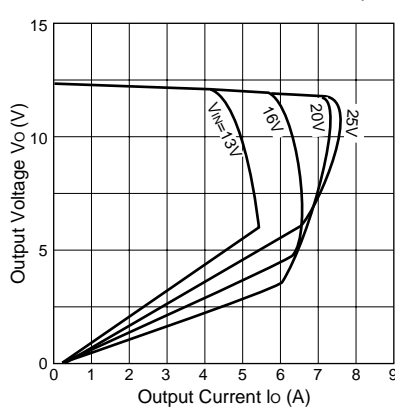
**Rise Characteristics(STR9015)**



**Overcurrent Protection Characteristics(STR9005)**



**Overcurrent Protection Characteristics(STR9012)**



**Overcurrent Protection Characteristics(STR9015)**

