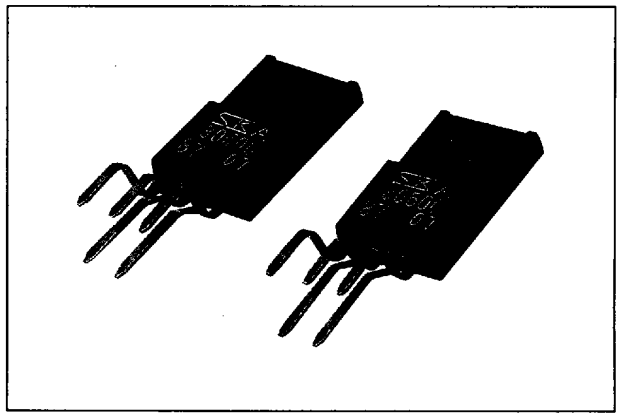
SI-3000C Series

T-58-11-13

Dropper Type - Low-Dropout Voltage Full -Mold Type

Features

- 5-pin type IC regulator
- Low-dropout voltage type with input/output voltage difference of 1 V
- Adjustable output voltage (increment only) may be used for remote sensing
- Output ON/OFF control pin is compatible with LS-TTL. It may be directly driven by LS-TTL or CMOS standard logic
- Capable of producing an output current of 1.5 A with TO-220 package
- Full -mold construction that does not require insulator (Mica)
- Built-in overcurrent, overvoltage and thermal protection circuits



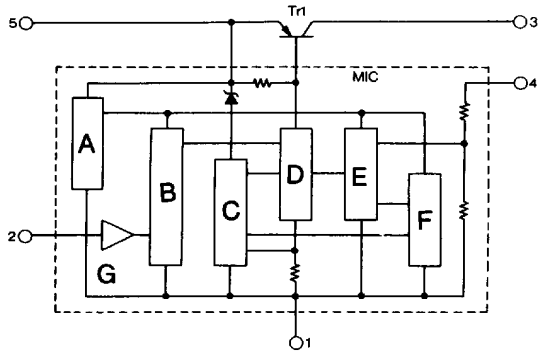
Applications

- For VTRs, automotive equipment, and office equipment

■Absolute Maximum Ratings (Ta=25°C)

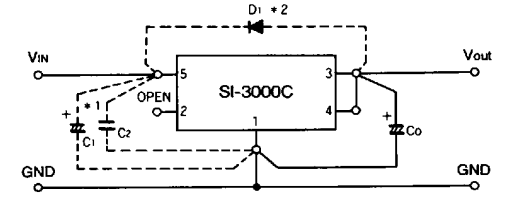
Description	Symbol	Ratings			Unit	Remarks
		SI-3050C/3090C	SI-3120C/3150C	SI-3240C		
DC Input Voltage	V_{IN}	35	35	45	V	
Voltage of output control Pin	V_C	35	35	45	V	
DC Output Current	I_O	1.5			A	
Power Dissipation	P_{D1}	18			W	With infinite-size Fin
	P_{D2}	1.5			W	Independent operation, no fin
Junction Temperature	Tj	−40 to +125			°C	
Operating Ambient Temperature	Top	−30 to +100			°C	
Storage Temperature	Tstg	−40 to +125			°C	
Thermal Resistance (between junction and case)	Rth(j-c)	5.5			°C/W	
Thermal Resistance (between junction and ambient air)	Rth(j-a)	66.7			°C/W	Independent operation, no fin

■Equivalent Circuit



A. Constant Voltage Circuit
B. Output ON/OFF Control Circuit
C. Protection Circuit
D. Drive Circuit
E. Error Amplifier Circuit
F. Reference Voltage Circuit
G. Equivalent to LS type TTL

■External Circuit



Co : Output Capacitor (47 to 100 μF, 50V)
*1 C1, C2 : Oscillation Prevention Capacitor (C1 : approx. 47 μF, C2 : approx. 0.33 μF)
Required when the input line includes inductance or when the wiring is long. Especially, when it is used at low temperature, using the tantalum capacitor for C1 and Co is recomended.
*2 D1 : Protection Diode
Required when between input and output is reverse biased (use of SANKEN EU2Z recommended).

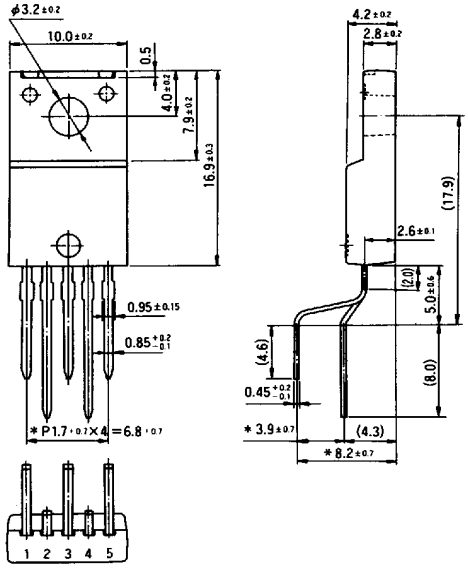
■ Electrical Characteristics (Ta = 25°C)

Description		Symbol	SI-3050C min.	SI-3050C typ.	SI-3050C max.	SI-3090C min.	SI-3090C typ.	SI-3090C max.	SI-3120C min.	SI-3120C typ.	SI-3120C max.	SI-3150C min.	SI-3150C typ.	SI-3150C max.	SI-3240C min.	SI-3240C typ.	SI-3240C max.	Unit
DC Input Voltage		V_{IN}	6.0*3		30*2	10*3		30*2	13*3		30*2	16*3		30*2	25*3		40*2	V
Output Voltage	SI-3000C*1	V_O	4.80	5.00	5.20	8.64	9.00	9.36	11.52	12.00	12.48	14.40	15.00	15.60	23.04	24.00	24.96	V
	SI-3000CA		4.90	5.00	5.10	8.82	9.00	9.18	11.76	12.00	12.24	14.70	15.00	15.30	23.52	24.00	24.48	
	Condition		V_{IN} = 8V, I_O = 1A			V_{IN} = 12V, I_O = 1A			V_{IN} = 15V, I_O = 1A			V_{IN} = 18V, I_O = 1A			V_{IN} = 27V, I_O = 1A			
Dropout Voltage		V_{DIF}			0.5			0.5			0.5			0.5			0.5	V
	Condition		$I_O \leqq$ 1A															
					1.0			1.0			1.0			1.0			1.0	
	Condition		$I_O \leqq$ 1.5A															
Line Regulation		ΔV_{LINE}		10	30		18	48		24	64		30	90		48	128	mV
	Condition		V_{IN} = 6 to 15A, I_O = 1A			V_{IN} = 10 to 20V, I_O = 1A			V_{IN} = 13 to 25V, I_O = 1A			V_{IN} = 16 to 25V, I_O = 1A			V_{IN} = 25 to 38V, I_O = 1A			
Load Regulation		ΔV_{LOAD}		40	100		70	180		93	240		120	300		120	300	
	Condition		V_{IN} = 8V, I_O = 0 to 1.5A			V_{IN} = 12V, I_O = 0 to 1.5A			V_{IN} = 15V, I_O = 0 to 1.5A			V_{IN} = 18V, I_O = 0 to 1.5A			V_{IN} = 27V, I_O = 0 to 1.5A			
Temperature Coefficient of Output Voltage		Kt		±0.5			±1.0			±1.5			±1.5			±2.5		mV/°C
	Condition		V_{IN} = 8V, I_O = 5mA, Tj = 0 to 100°C			V_{IN} = 12V, I_O = 5mA Tj = 0 to 100°C			V_{IN} = 15V, I_O = 5mA Tj = 0 to 100°C			V_{IN} = 18V, I_O = 5mA Tj = 0 to 100°C			V_{IN} = 27V, I_O = 5mA Tj = 0 to 100°C			
Ripple Rejection		R_{REJ}		54			54			54			54			54		dB
	Condition		V_{IN} = 8V, f = 100 to 120Hz			V_{IN} = 12V, f = 100 to 120Hz			V_{IN} = 15V, f = 100 to 120Hz			V_{IN} = 18V, f = 100 to 120Hz			V_{IN} = 27V, f = 100 to 120Hz			
Circuit Current (at Off-State)		Iq		5	10		5	10		5	10		5	10		5	10	mA
	Condition		V_{IN} = 8V, I_O = 0			V_{IN} = 12V, I_O = 0			V_{IN} = 15V, I_O = 0			V_{IN} = 18V, I_O = 0			V_{IN} = 27V, I_O = 0			
Foldback Current		I_{S1}	1.6*4			1.6*4			1.6*4			1.6*4			1.6*4			A
	Condition		V_{IN} = 8V			V_{IN} = 12V			V_{IN} = 15V			V_{IN} = 18V			V_{IN} = 27V			
Control Pin Voltage	Output On	$V_{C,IH}$	2.0*5			2.0*5			2.0*5			2.0*5			2.0*5			V
	Output Off	$V_{C,IL}$			0.8			0.8			0.8			0.8			0.8	
Control Pin Current	Output On	$I_{C,IH}$			20			20			20			20			20	μA
	Condition		V_C = 2.7V															
	Output Off	$I_{C,IL}$			−0.3			−0.3			−0.3			−0.3			−0.3	mA
	Condition		V_C = 0.4V															

(Notes)
*1 : "A" may be marked on the right side of SANKEN mark.
*2 : Vo(max.) and Io(max.) may be restricted depending on the conditions of use, as equation $P_D(max.) = (V_{IN}-V_O) \cdot I_O = 18$ (W) is always applied.
Caluculate each value refering to power dissipation characteristics.
*3 : Refer to the description of dropout voltage.
*4 : I_{S1} is specified at −5 (%) drop point of output voltage Vo on condition of $V_{IN} = V_O + 3V$, I_O = 1A.
*5 : Output control pin Vc has already been pulled up within IC. Each in put level may be driven directly by LS-TTL.

■Outline Drawing/Pin Connections (unit : mm)

Plastic Package (Full-mold package) Type
Flammability : UL94V-O or equivalent



* indicates the size of lead end

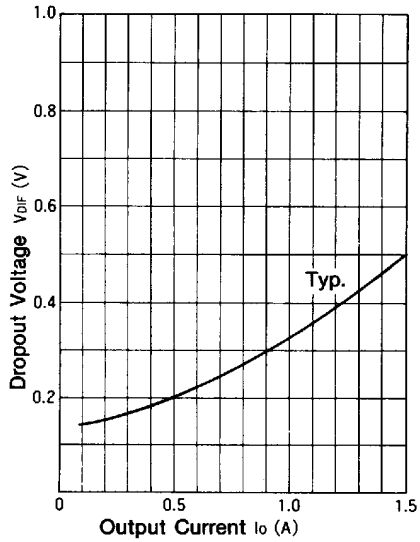
Weight : Approx. 2.3g

Pin Connections

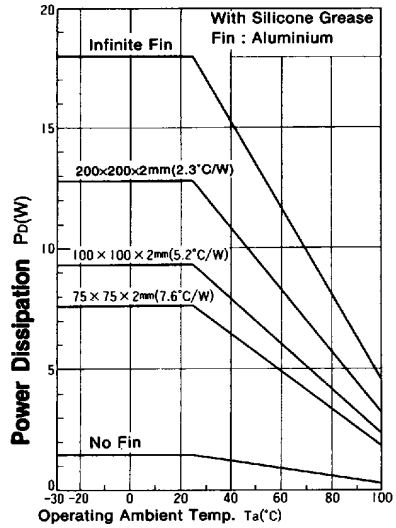
① Ground
② Output ON/OFF Control
③ Output
④ Remote Sensing
⑤ Input

■Typical Operating Characteristics

Io vs. VDIF Characteristics

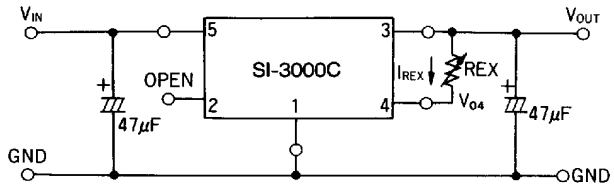


Power Dissipation



Output Voltage Adjustable Circuit

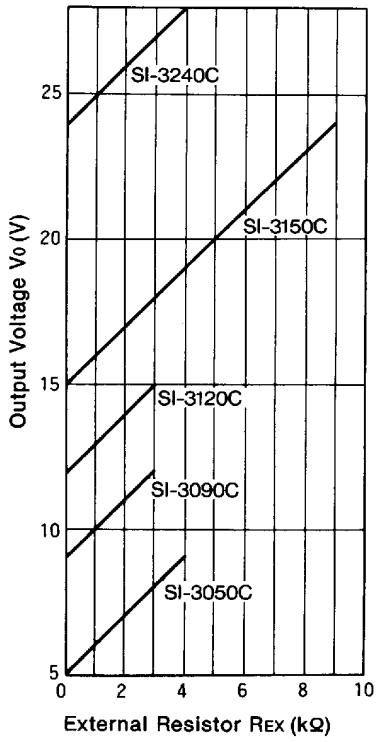
1. Adjustment of output voltage by a single external resistor



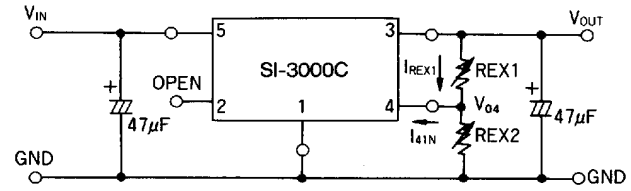
Output voltage may be adjusted upward only by inserting resistor **REX** between pin No.4 (remote sensing pin) and pin No.3 (output pin).
The following current **IREX** into pin No.4 is 1 mA typ, therefore fixed output voltage **VOUT** shall be

$$V_{OUT} = V_{04} + I_{REX} \cdot R_{EX}. \quad * V_{04}: \text{fixed output voltage of SI-3000C series}$$

However, the built-in resistor (between pin No.4 and 1) of **IC** is a semiconductor resistor, which has approximately +0.2%/°C of thermal characteristics.
It is important to keep thermal characteristics in mind when adjusting the output voltage.



2. Adjustment of output voltage by two external resistors



Output voltage may be adjusted upward only by inserting resistors **REX1** between pin No.4 (remote sensing pin) and pin No.3 (output pin), **REX2** between pin No.4 and pin No.1 (ground pin).
The flowing current **I4IN** into pin No.4 is 1 mA typ, so pin No.3 thermal characteristics may be improved by setting the external current **IREX1** at approximately 5 times the value of **I4IN** (stability coefficient **S** = 5) as compared to the method shown in (1).
The fixed output voltage **Vout** in this case shall be:

$$\begin{cases} V_{OUT} = V_{04} + R_{EX1} \cdot I_{REX1} \\ I_{REX1} = S \cdot I_{4IN} \end{cases}$$

The value of external resistors may be obtained as follows:

$$R_{EX1} = \frac{V_0 - V_{04}}{S \cdot I_{4IN}}, \quad R_{EX2} = \frac{V_{04}}{(S-1) I_{4IN}}$$

* V_{04}: Fixed output voltage of **SI-3000C** series
S: stability coefficient of I_{4IN} (set optionally)