SI-3000B Series 5-Terminal, Full-Mold, Low Dropout Voltage Linear Regulator ICs

■Features

- Compact full-mold package (equivalent to TO220)
- Output current: 0.27A
- Low dropout voltage: $V_{DIF} \leq 0.5V$ (at I_O=0.27A)
- Output ON/OFF control terminal is compatible with LS-TTL. (It can be driven directly by LS-TTL or standard CMOS logic.)
- Built-in foldback overcurrent and thermal protection circuits
- Accuracy of overcurrent protection starting current

  SI-3157B : 0.3 to 0.7A (V_{IN}=18V)
  SI-3025B : 0.3 to 0.7A
  (When V_{IN}=18V, at V_O=15.7V)
  0.3 to 0.75A
  (When V_{IN}=18V, at V_O=11.7V)
- Variable output voltage type (SI-3025B) also available

■Absolute Maximum Ratings

(T_a=25°C)

Parameter	Symbo	Ratings	Unit
DC Input Voltage	V_{IN}	35	V
Output Control Terminal Voltage	V_C	V_{IN}	V
DC Output Current	I_O	0.27*1	A
Power Dissipation	P_{D1}	14(With infinite heatsink)	W
	P_{D2}	1.5(Without heatsink, stand-alone operation)	W
Junction Temperature	T_j	–40 to +125	°C
Operating Ambient Temperature	T_{OP}	–30 to +100	°C
Storage Temperature	T_{stg}	–40 to +125	°C
Thermal Resistance (junction to case)	θ_{j-c}	7.0	°C/W
Thermal Resistance (junction to ambient air)	θ_{j-a}	66.7(Without heatsink, stand-alone operation)	°C/W

■Applications

- For BS and CS antenna power supplies
- Electronic equipment

■Electrical Characteristics

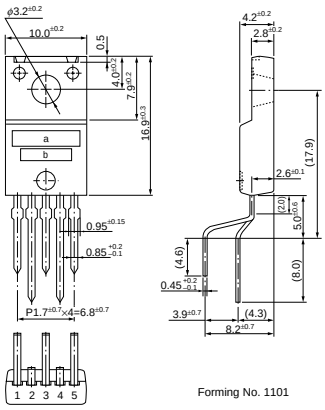
(T_a=25°C unless otherwise specified)

Parameter		Symbol	Ratings						Unit
			SI-3157B			SI-3025B			
			min.	typ.	max.	min.	typ.	max.	
Input Voltage		V_{IN}	*2		27*1	6*2,6		27*1	V
Output Voltage (Reference Voltage V_{ADJ} for SI-3025B)		V_O (V_{ADJ})	14.92	15.70	16.48	2.448	2.550	2.652	V
		Conditions	V_{IN}=18V, I_O=0.2A			V_{IN}=V_O+3V, I_O=0.2A			
Dropout Voltage		V_{DIF}			0.5			0.5	V
		Conditions	I_O≤0.27A			I_O≤0.27A			
Line Regulation		ΔV_{OLINE}		30	90			10	mV (SI-3025B:mV/V)
		Conditions	V_{IN}=17 to 27V, I_O=0.2A			V_{IN}=(V_O+1) to 27V, I_O=0.27A			
Load Regulation		ΔV_{OLOAD}		120	300			10	mV (SI-3025B:mV/V)
		Conditions	V_{IN}=18V, I_O=0 to 0.27A			V_{IN}=V_O+3V, I_O=0 to 0.27A			
Temperature Coefficient of Output Voltage (SI-3025B: Temperature Coefficient of Reference Voltage)		$\Delta V_O/\Delta T_a$ ($\Delta V_{ADJ}/\Delta T_a$)		±1.5			±0.5		mV/°C
		Conditions	V_{IN}=18V, I_O=5mA, T_j=0 to 100°C			V_{IN}=V_O+3V, I_O=5mA, T_j=0 to 100°C			
Ripple Rejection		R_{REJ}		54			54		dB
		Conditions	V_{IN}=18V, f=100 to 120Hz			V_{IN}=V_O+3V, f=100 to 120Hz			
Quiescent Circuit Current		I_q		3	10		3	10	mA
		Conditions	V_{IN}=18V, I_O=0A			V_{IN}=V_O+3V, I_O=0A			
Overcurrent Protection Starting Current*3,4		I_{S1}	0.3		0.7	0.3		0.75	A
		Conditions	V_{IN}=18V			V_{IN}=18V, at V_O=11.7V			
				———		0.3		0.7	
		Conditions				V_{IN}=18V, at V_O=15.7V			
V_C Terminal*5	Control Voltage (Output ON)	$V_{C.IH}$	2.0			2.0			V
	Control Voltage (Output OFF)	$V_{C.IL}$			0.8			0.8	
	Control Current (Output ON)	$I_{C.IH}$			20			20	μA
		Conditions	V_C=2.7V			V_C=2.7V			
	Control Current (Output OFF)	$I_{C.IL}$			–0.3			–0.3	mA
		Conditions	V_C=0.4V			V_C=0.4V			

*1: $V_{IN(max)}$ and $I_{O(max)}$ are restricted by the relation $P_{D(max)}$=(V_{IN}-V_O)•I_O=14(W).
*2: Refer to the Dropout Voltage parameter. (Refer to Setting DC Input Voltage on page 9.)
*3: I_{S1} is specified at the 5% drop point of output voltage V_O on the condition that V_{IN}=V_O+3V, I_O=0.2A.
*4: These products cannot be used in the following applications because the built-in foldback-type overcurrent protection may cause errors during start-up stage.
(1) Constant current load (2) Positive and negative power supply (3) Series-connected power supply (4) V_O adjustment by raising ground voltage
*5: Output is ON even when output control terminal V_C is open. Each input level is equivalent to LS-TTL level. Therefore, the device can be driven directly by LS-TTLs.
*6: When setting output voltage to 5V or lower, input voltage needs to be set to 6V or higher to operate stably.

■External Dimensions (TO220F-5)

(Unit : mm)



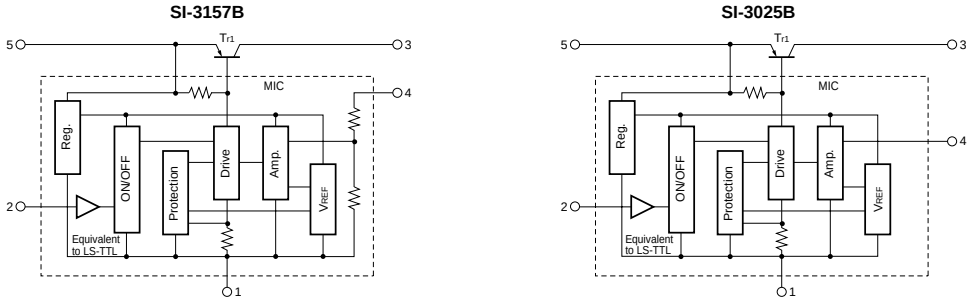
a. Part Number
b. Lot Number

Pin Assignment

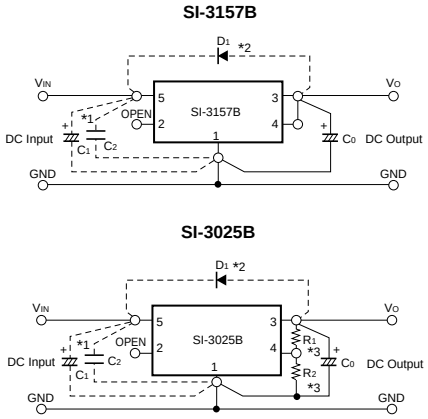
SI-3157B	SI-3025B
① GND	① GND
② VC	② VC
③ VO	③ VO
④ Sense	④ ADJ
⑤ VIN	⑤ VIN

Plastic Mold Package Type
Flammability: UL94V-0
Product Mass: Approx. 2.3g

■Block Diagram



■Typical Connection Diagram

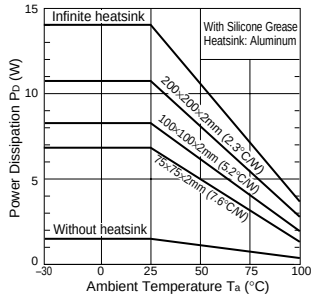


C0 : Output capacitor (47 to 100μF)
*1 C1, C2 : Oscillation prevention capacitor (Approx. C1: 47μF, C2: 0.33μF)
These capacitors are required if the input line contains inductance or the wiring is long. Especially at low temperatures, tantalum capacitors are recommended for C1 and C0.
*2 D1 : Protection diode
This diode is required for protection against reverse biasing of the input and output. Sanken EU2Z is recommended.
*3 R1, R2 : External resistor for setting output voltage
The relation between output voltage VO and external resistors R1 and R2 is as follows.

$$V_O = V_{ADJ} \cdot \left(1 + \frac{R_1}{R_2}\right) \quad (V_{ADJ}=2.55V(typ.))$$

R2 must be 2.55kΩ for stable operation.

■Ta-PD Characteristics

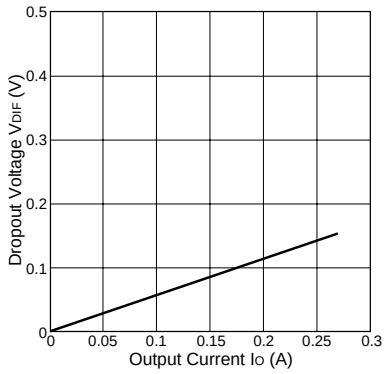


$P_D = I_O \cdot [V_{IN}(mean) - V_O]$

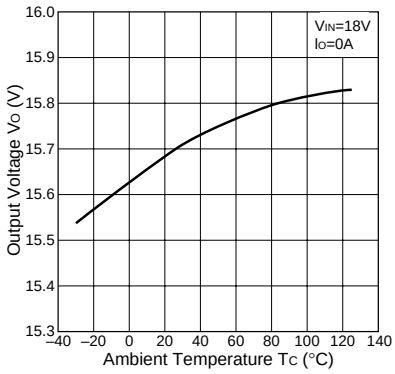
■Typical Characteristics (at V_O=15.7V for SI3025B)

(T_a=25°C)

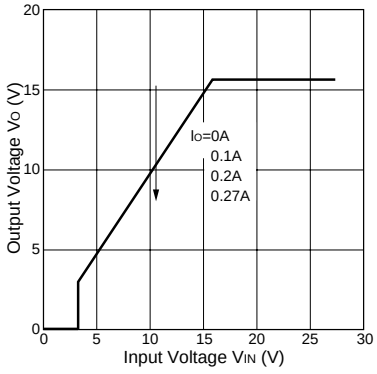
I_O vs. V_{DIF} Characteristics



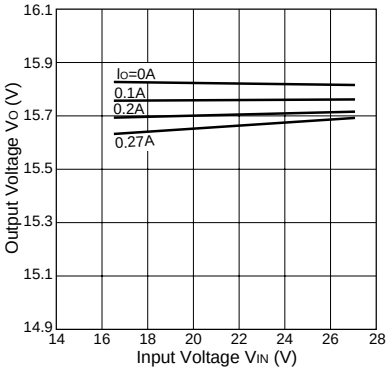
Temperature Coefficient of Output Voltage(SI-3157B)



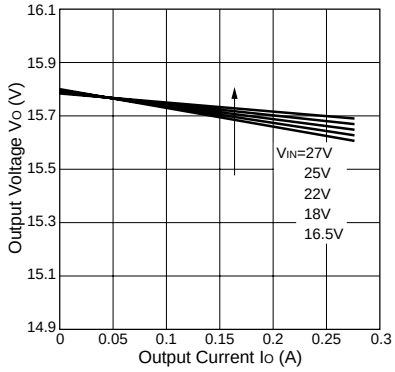
Output Voltage(SI-3157B)



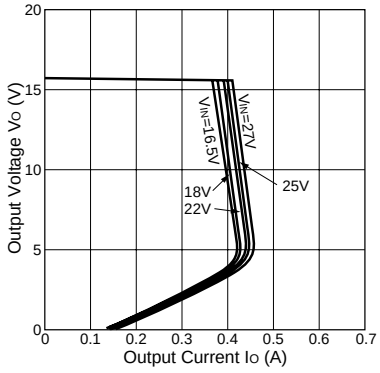
Line Regulation



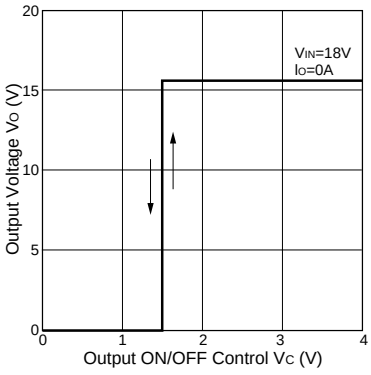
Load Regulation



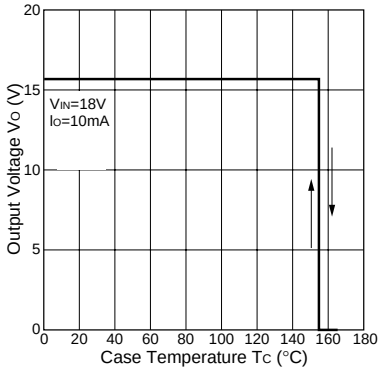
Overcurrent Protection Characteristics(SI-3157B)



Output ON/OFF Control



Thermal Protection Characteristics



Note on Thermal Protection:

The thermal protection circuit is intended for protection against heat during instantaneous short-circuiting. Its operation is not guaranteed for continuous heating condition such as short-circuiting over extended periods of time.