

Dropper Type Regulator with Reset Function SI-3011S

Features

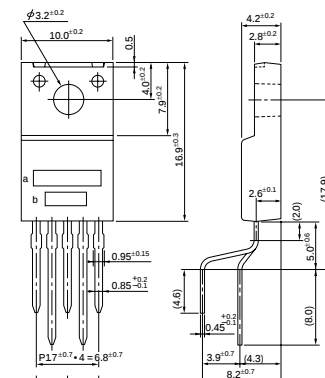
- 5-terminal IC regulator with reset function; 0.7A output current
- Voltage accuracy of $\pm 2\%$
- Low Dropout voltage $\leq 0.5V$ at $I_O \leq 0.3A$
- Built-in constant current type overcurrent, overvoltage and thermal protection circuits
- TO-220 equivalent full-mold miniature package

Absolute Maximum Ratings

($T_a = 25^\circ C$)

Parameter	Symbol	Ratings	Unit	Conditions
DC input voltage	V_{IN}	35	V	
Output current	I_O	0.7 *1	A	
Power Dissipation	P_{D1}	22	W	With infinite heatsink
	P_{D2}	1.8	W	Stand-alone without heatsink
Junction temperature	T_J	-40 to +150	$^\circ C$	
Operating temperature	T_{OP}	-40 to +105	$^\circ C$	
Storage temperature	T_{stg}	-40 to +150	$^\circ C$	
Junction to case thermal resistance	θ_{J-C}	5.5	$^\circ C/W$	
Junction to ambient-air thermal resistance	θ_{J-A}	66.7	$^\circ C/W$	Stand-alone without heatsink

External Dimensions (unit: mm)



Terminal connections

1. V_{IN}
2. V_{RST}
3. GND
4. DLY
5. V_{OUT}

a: Type No.
b: Lot No.

(Forming No. 1101)

Electrical Characteristics

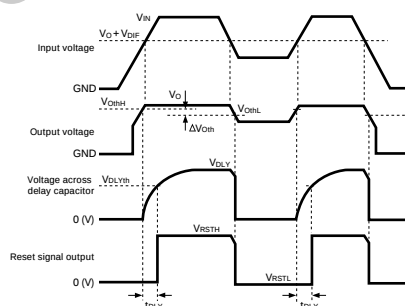
($T_J = 25^\circ C$, $V_{IN} = 14V$, $I_O = 0.3A$ unless otherwise specified)

Parameter		Symbol	Ratings			Unit	Conditions
			min	typ	max		
Input voltage		V _{IN}	6 ^{*2}		30 ^{*1}	V	
Output voltage		V _O	4.90	5.00	5.10	V	
Dropout voltage		V _{DIF}			0.5	V	
Ripple rejection		R _{REJ}		54		dB	f=100 to 120Hz
Quiescent circuit current		I _q		8.5	12	mA	I _O =0A
Overcurrent protection starting current		I _S	0.71 ^{*3}			A	
DLY terminal	Threshold voltage	V _{DLYth}	2.7	2.9	3.1	V	DLY terminal open
	Source current	I _{DLY}	25	35	45	μA	
Reset threshold voltage level		V _{OthL} ^{*4}	V _O •0.90	V _O •0.92	V _O •0.94	V	V _O =5.0V (typ)
Reset threshold voltage hysteresis		ΔV _{Oth}	50	100	150	mV	ΔV _{Oth} =V _{OthH} ^{*5} -V _{OthL}
V _{RST} terminal	H-level output voltage	V _{RSTH}	V _O -0.1			V	V _O =5.0V (typ), R _L =510Ω
	L-level output voltage	V _{RSTL}			0.5	V	V _O =5.0V (typ), R _L =510Ω
	Source current when H-level	I _{RSTH}	1.3			mA	V _O =5.0V (typ), shorted across V _{RST} and GND
	Sink current when L-level	I _{RSTL}			-10	mA	V _{RST} =0.5V

Notes:

- *1. Since $P_{D(max)} = (V_{IN} - V_O) \cdot I_O = 22(W)$, $V_{IN(max)}$ and $I_{O(max)}$ 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_S rating shall be the point at which the output voltage V_O ($V_{IN} = 14V$, $I_O = 0.3A$) drops to -5% .
- *4. V_{OthL} is the V_O threshold voltage at which the V_{RST} terminal turns from high to low.
- *5. V_{OthH} is the V_O threshold voltage at which the V_{RST} terminal turns from low to high. V_{OthH} may be given by V_{OthL} plus ΔV_{Oth} .
- *6. Reset signal output terminal V_{RST} is pulled up in the IC [pull-up resistance $3k\Omega$ (typ)], allowing direct connection with a logic circuit.

Reset Signal Output Timing Chart

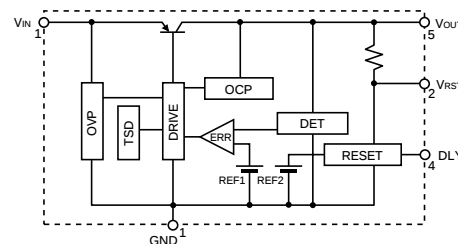


[Calculating t_{DLY}]

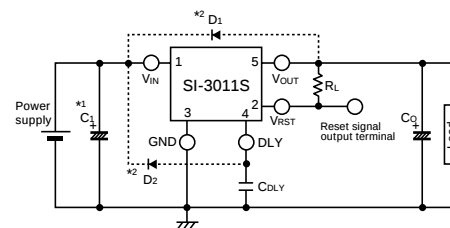
Reset signal delay time t_{DLY} is calculated from the following formula:

$$t_{DLY} = \frac{V_{DLYth} + 0.2}{I_{DLY}} \cdot C_{DLY} \quad * I_{DLY} \text{ is the current flowing from DLY terminal shown in the Standard Circuit Diagram.}$$

Equivalent Circuit Diagram



Standard Circuit Diagram



C_0 : Output capacitor (47 to $100\mu F$, 50V)

*1 C_1 : Anti-oscillation capacitors (C_1 : approx. $47\mu F$).

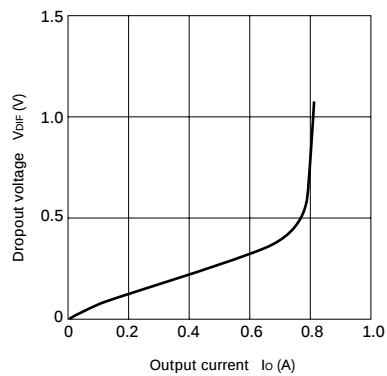
This must be connected to terminals 1 (V_{IN}) and 3 (GND) via the shortest possible routing. An approximately $0.33\mu F$ capacitor with good high frequency characteristics must be connected in parallel in case of inductive input lines or long-distance wiring. Tantalum capacitors are recommended for C_1 and C_0 , especially at low temperatures.

*2 D_1, D_2 : Protection diode.

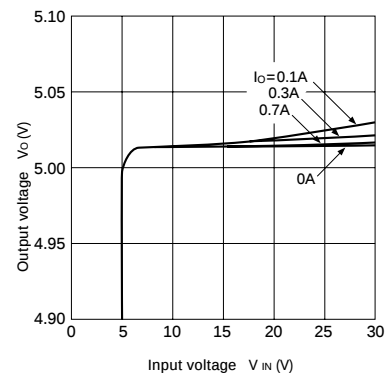
Required as protection against reverse biasing between input and output.

(Recommended diode: Sanken EU2Z.)

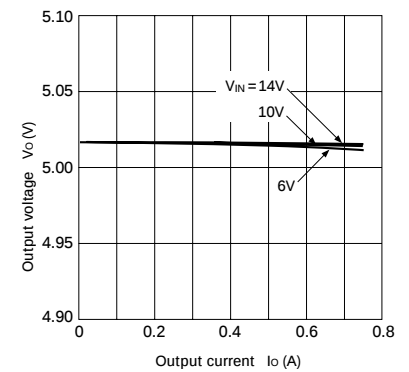
■ I_O vs V_{DIF} Characteristics



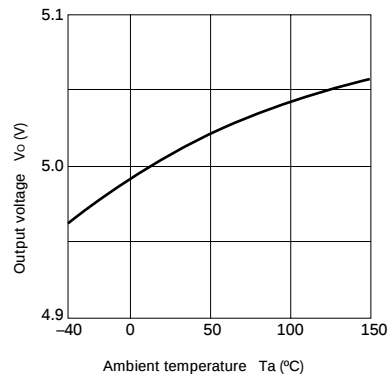
■ Line Regulation



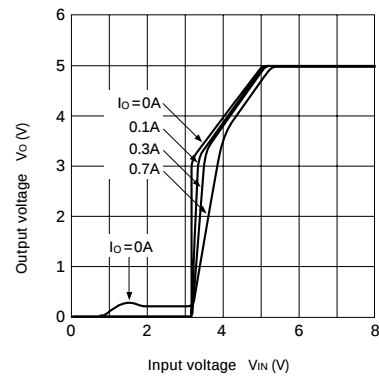
■ Load Regulation



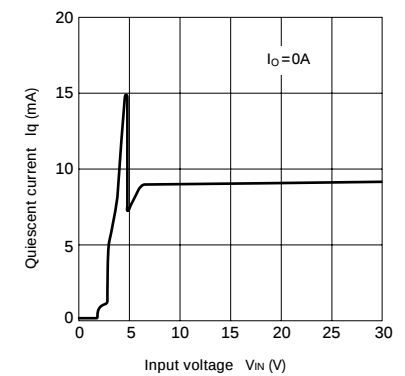
■ Output Voltage Temperature Characteristics



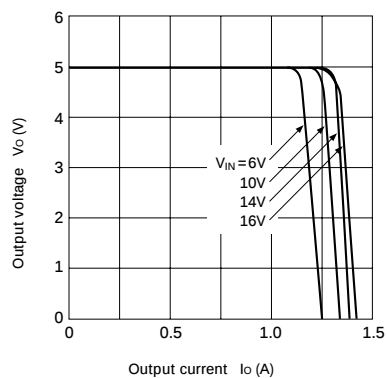
■ Rise Characteristics



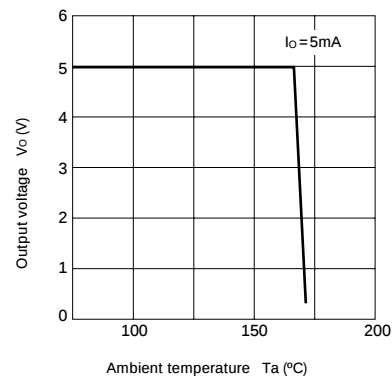
■ Quiescent Circuit Current



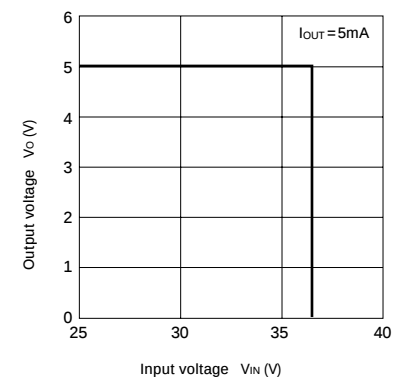
■ Overcurrent Protection Characteristics



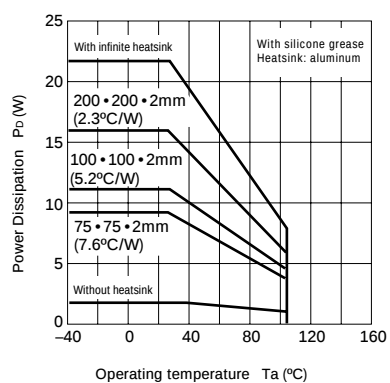
■ Thermal Protection Characteristics



■ Overvoltage Protection Characteristics



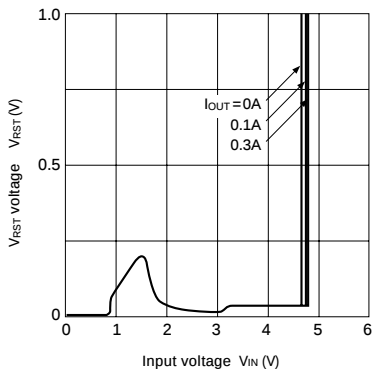
■ T_a — P_D Characteristics



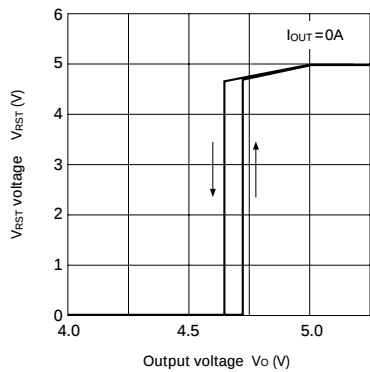
Note on Thermal Protection Characteristics:
The thermal protection circuit is intended for protection against heat during instantaneous short-circuiting. Its operation, including reliability, is not guaranteed for short-circuiting over an extended period of time.

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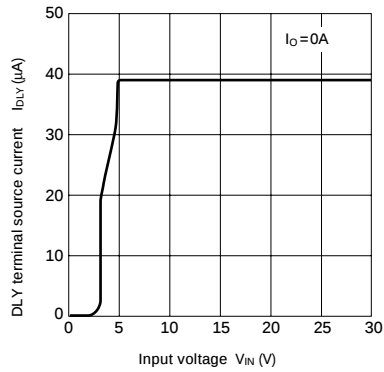
■ V_{RST} Terminal L-level Output Characteristics



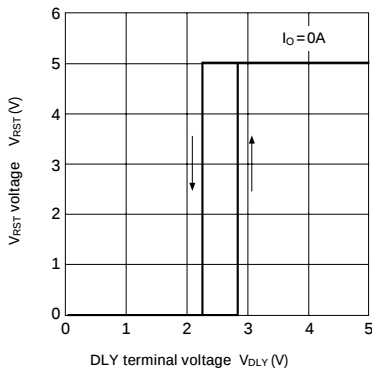
■ Reset Threshold Voltage Characteristics



■ DLY Terminal Source Current Characteristics



■ DLY Terminal Output Voltage Characteristics



■ Reset Signal Delay Characteristics

