

Dropper Type Regulator with Reset Function SI-3011S

Features

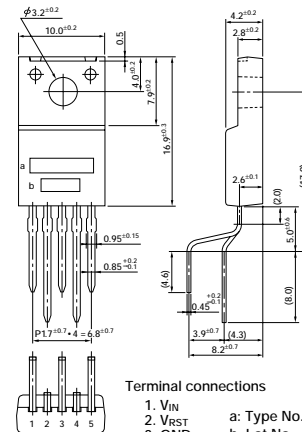
- 5-terminal IC regulator with reset function; 0.7A output current
- Voltage accuracy of $\pm 2\%$
- Low Dropout voltage $\leq 0.5V$ at $I_O \leq 0.3A$
- Built-in constant current type overcurrent, overvoltage and thermal protection circuits
- TO-220 equivalent full-mold miniature package

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

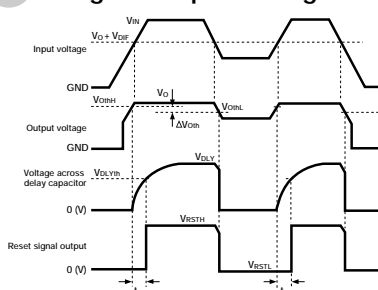
($T_J = 25^\circ C$, $V_{IN} = 14V$, $I_O = 0.3A$ unless otherwise specified)

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	$\Delta V_{Oth} = V_{OthH} - V_{OthL}$
	H-level output voltage	V_{RSTH}	$V_O - 0.1$			V	$V_O = 5.0V$ (typ), $R_L = 510\Omega$
V_{RST} terminal	L-level output voltage	V_{RSTL}		0.5	V	$V_O = 5.0V$ (typ), $R_L = 510\Omega$	
	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 Ω (typ)], allowing direct connection with a logic circuit.

Reset Signal Output Timing Chart



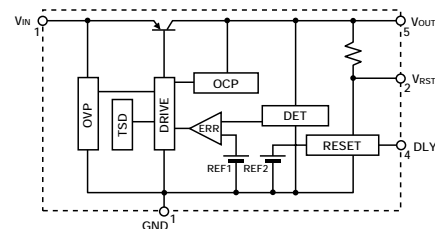
[Calculating t_{DLY}]

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

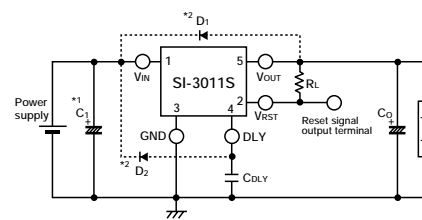
$$t_{DLY} = \frac{V_{DLYth} + 0.2}{I_{DLY}} \cdot C_{DLY}$$

* I_{DLY} is the current flowing from DLY terminal shown in the Standard Circuit Diagram.

Equivalent Circuit Diagram



Standard Circuit Diagram



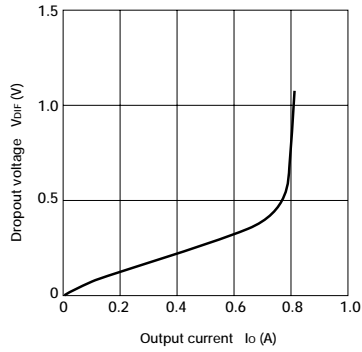
C_O : Output capacitor (47 to 100 μF , 50V)

*1 C_1 : Anti-oscillation capacitors (C_1 : approx. 47 μF). This must be connected to terminals 1 (V_{IN}) and 3 (GND) via the shortest possible routing. An approximately 0.33 μF 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_O , especially at low temperatures.

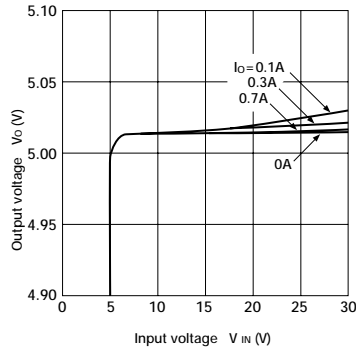
*2 D_1, D_2 : Protection diode.

Required as protection against reverse biasing between input and output.
(Recommended diode: Sanken EU2Z.)

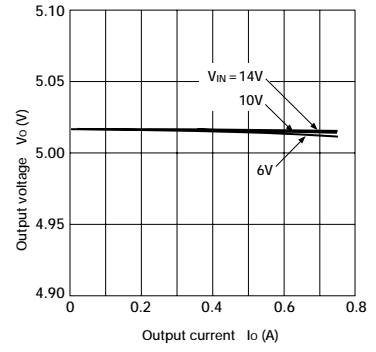
■ I_o vs V_{DIF} Characteristics



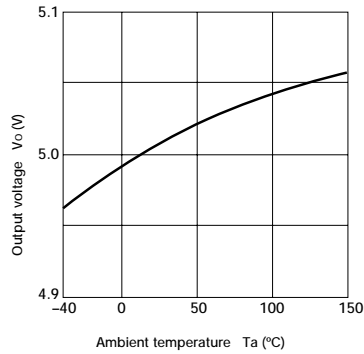
■ Line Regulation



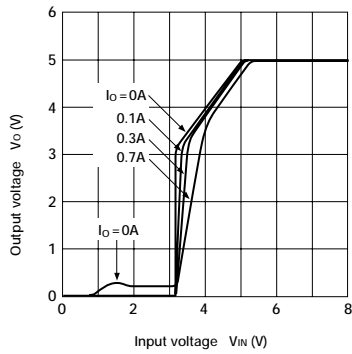
■ Load Regulation



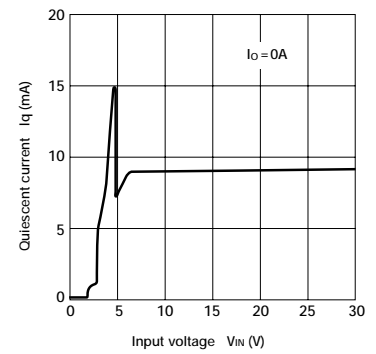
■ Output Voltage Temperature Characteristics



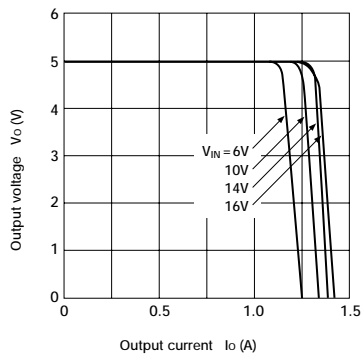
■ Rise Characteristics



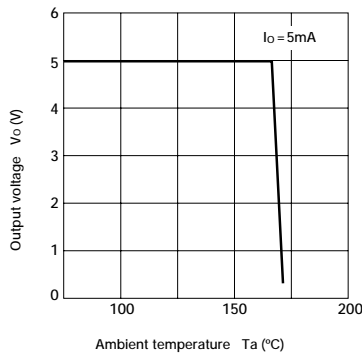
■ Quiescent Circuit Current



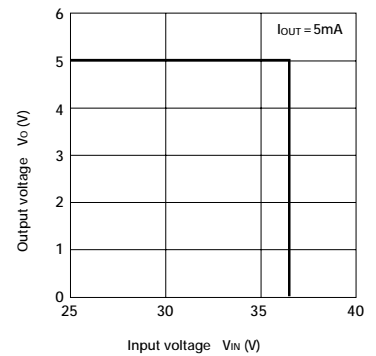
■ Overcurrent Protection Characteristics



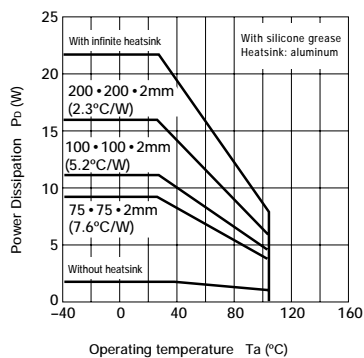
■ Thermal Protection Characteristics



■ Overvoltage Protection Characteristics



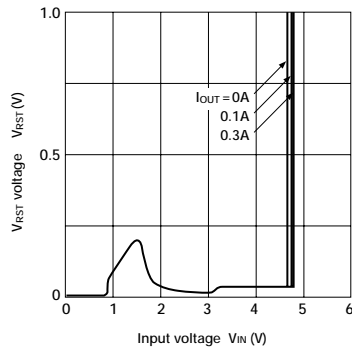
■ T_a — P_D Characteristics



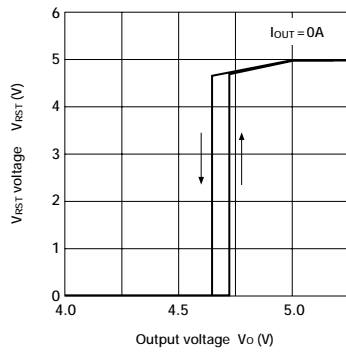
Note on Thermal Protection Characteristics:
The thermal protection circuit is intended for protection against heat during instantaneous short-circuiting. Its operation, including reliability, is not guaranteed for short-circuiting over an extended period of time.

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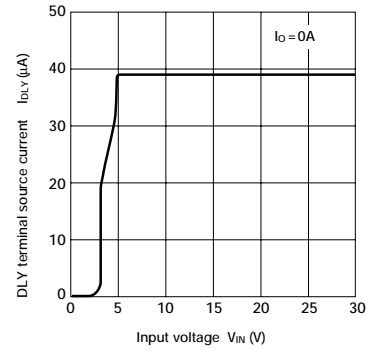
■ V_{RST} Terminal L-level Output Characteristics



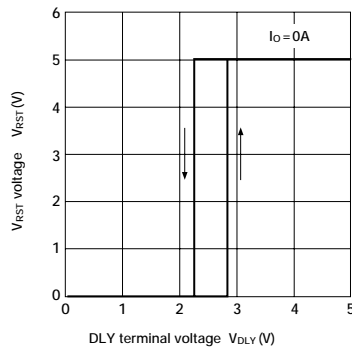
■ Reset Threshold Voltage Characteristics



■ DLY Terminal Source Current Characteristics



■ DLY Terminal Output Voltage Characteristics



■ Reset Signal Delay Characteristics

