Dropper Type Regulator with Reset Function SI-3011S

Features

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

Absolute Maximum Ratings

(Ta=25ºC)

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	Tj	–40 to +150	ºC	
Operating temperature	T_{OP}	–40 to +105	ºC	
Storage temperature	Tstg	–40 to +150	ºC	
Junction to case thermal resistance	$\theta_{j\text{-}c}$	5.5	ºC/W	
Junction to ambient-air thermal resistance	$\theta_{j\text{-}a}$	66.7	ºC/W	Stand-alone without heatsink

Electrical Characteristics

(Tj=25ºC, V_{IN}=14V, I_O=0.3A unless otherwise specified)

Parameter		Symbol	Ratings min	Ratings typ	Ratings max	Unit	Conditions
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		Iq		8.5	12	mA	I_O=0A
Overcurrent protection starting current		I_S	0.71*3			A	
DLY terminal	Threshold voltage	V_{DLY}th	2.7	2.9	3.1	V	DLY terminal open
	Source current	I_{DLY}	25	35	45	μA	
Reset threshold voltage level		$V_O$thL*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	$\Delta V_O th = V_O thH^{*5} - V_O thL$
V_{RST} terminal *6	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 Ta—P_D curve to compute the corresponding values.

*2. Refer to the dropout voltage.

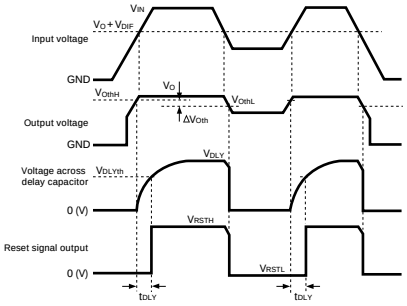
*3. I_S rating shall be the point at which the output voltage V_O (V_{IN} = 14V, Io = 0.3A) drops to –5%.

*4. $V_O$thL is the Vo threshold voltage at which the V_{RST} terminal turns from high to low.

*5. $V_O$thH is the Vo threshold voltage at which the V_{RST} terminal turns from low to high. VothH may be given by $V_O$thL plus ΔV_Oth.

*6. Reset signal output terminal V_{RST} is pulled up in the IC [pull-up resistance 3kΩ (typ)], allowing direct connection with a logic circuit.

Reset Signal Output Timing Chart



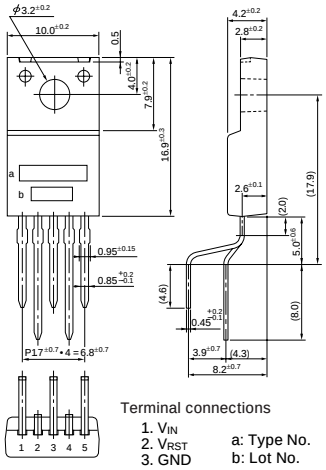
[Calculating t_{DLY}]

Reset signal delay time tDLY is calculated from the following formula:

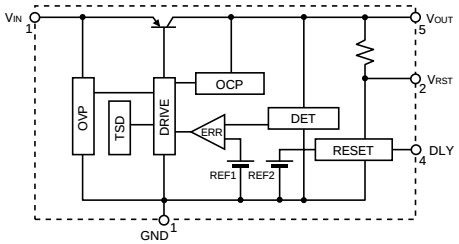
$$t_{DLY} = \frac{V_{DLYth} + 0.2}{I_{DLY}} \cdot C_{DLY}$$

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

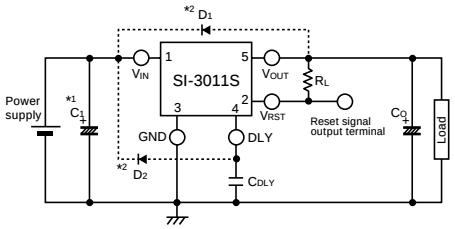
External Dimensions (unit: mm)



Equivalent Circuit Diagram



Standard Circuit Diagram

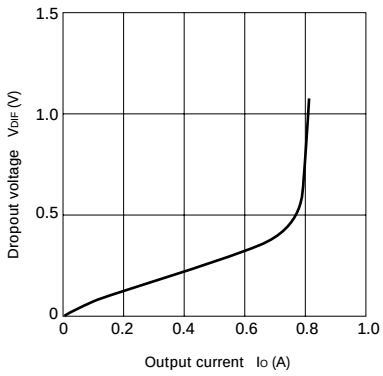


Co : Output capacitor (47 to 100μF, 50V)

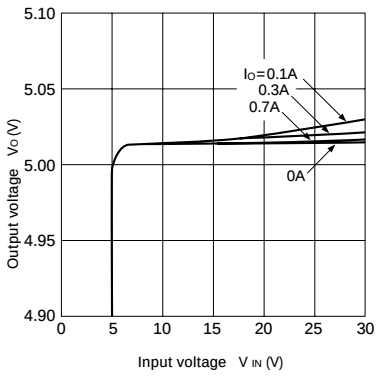
*1 C_1 : Anti-oscillation capacitors (C_1: approx. 47μF). This must be connected to terminals 1 (V_{IN}) and 3 (GND) via the shortest possible routing. An approximately 0.33μF capacitor with good high frequency characteristics must be connected in parallel in case of inductive input lines or long-distance 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.)

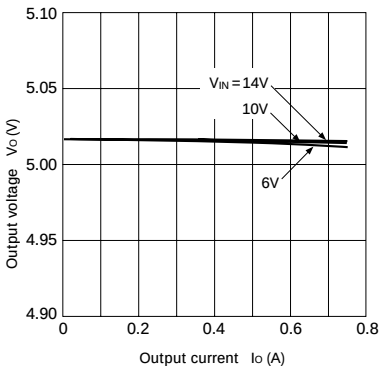
■ Io vs V_{DIF} Characteristics



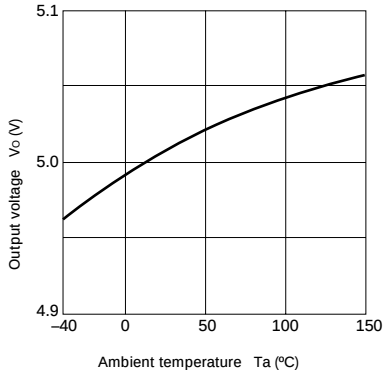
■ Line Regulation



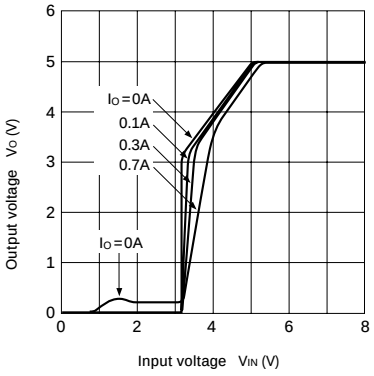
■ Load Regulation



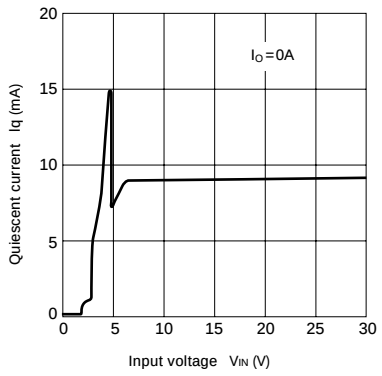
■ Output Voltage Temperature Characteristics



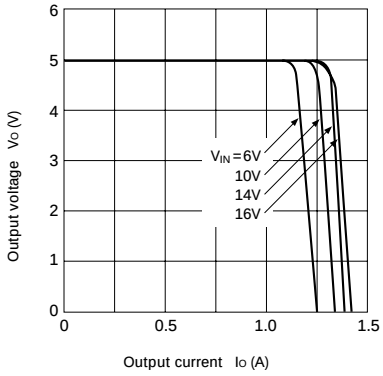
■ Rise Characteristics



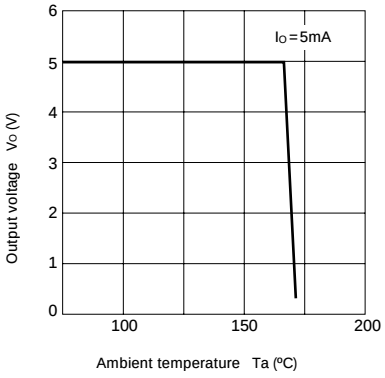
■ Quiescent Circuit Current



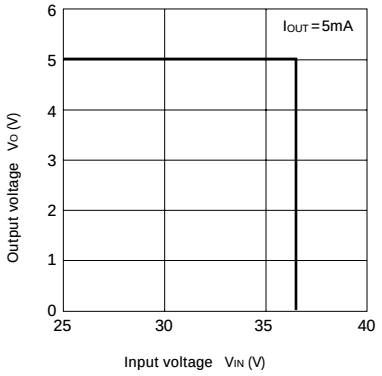
■ Overcurrent Protection Characteristics



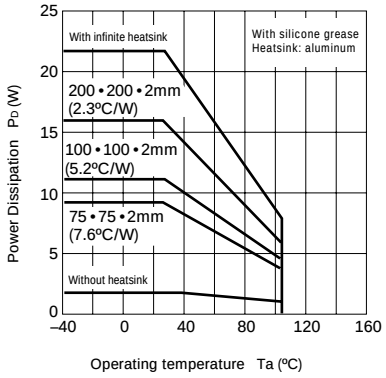
■ Thermal Protection Characteristics



■ Overvoltage Protection Characteristics

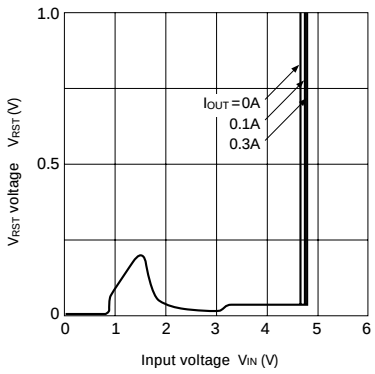


■ Ta—P_D Characteristics

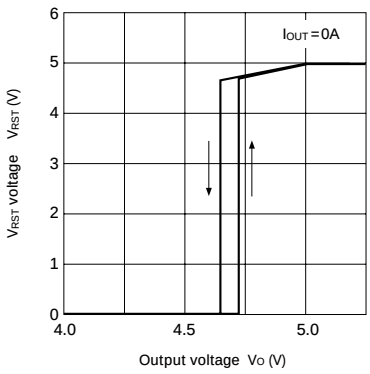


Note on Thermal Protection Characteristics:
The thermal protection circuit is intended for protection against heat during instantaneous short-circuiting. Its operation, including reliability, is not guaranteed for short-circuiting over an extended period of time.

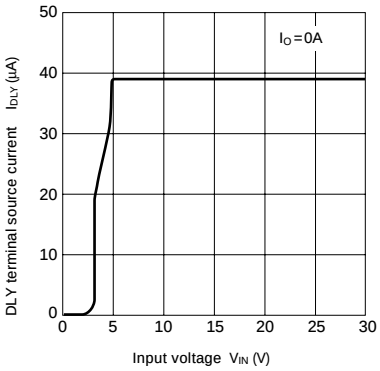
■ V_{RST} Terminal L-level Output Characteristics



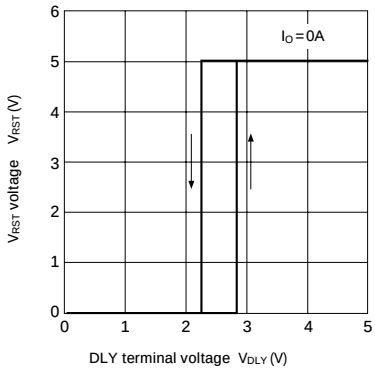
■ Reset Threshold Voltage Characteristics



■ DLY Terminal Source Current Characteristics



■ DLY Terminal Output Voltage Characteristics



■ Reset Signal Delay Characteristics