

Switching Type Regulator SI-3201S

Features

- Output current of 3A ($T_a = 25^\circ\text{C}$, $V_{IN} = 8$ to 18V)
- High efficiency of 82% ($V_{IN} = 14\text{V}$, $I_o = 2\text{A}$)
- Requires 5 external components only
- Built-in reference oscillator (60kHz)
- Phase internally corrected
- Output voltage internally corrected
- Built-in overcurrent and thermal protection circuits
- Built-in soft start circuit

Absolute Maximum Ratings

($T_a = 25^\circ\text{C}$)

Parameter	Symbol	Ratings	Unit	Conditions
Input voltage	V_{IN}	35	V	
Output voltage	I_o	3	A	
SQ terminal voltage with respect to ground	$V_{O, SQ}$	-1	V	
Power Dissipation	P_{D1}	22	W	With infinite heatsink
	P_{D2}	1.8	W	Stand-alone
Junction temperature	T_j	-40 to +150	$^\circ\text{C}$	
Storage temperature	T_{stg}	-40 to +125	$^\circ\text{C}$	
Junction to case thermal resistance	θ_{j-c}	5.5	$^\circ\text{C/W}$	
Junction to ambient-air thermal resistance	θ_{j-a}	66.7	$^\circ\text{C/W}$	

Recommended Operating Conditions

Parameter	Symbol	Ratings			Unit	Conditions
		min	typ	max		
Input voltage	V_{IN}	8		18	V	
Output current	I_o	0.5		3	A	
Operating temperature	T_{op}	-40		+85	$^\circ\text{C}$	$T_a - P_D$ characteristics

Electrical Characteristics ($V_{IN} = 14\text{V}$, $I_{OUT} = 2\text{A}$, $T_j = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Ratings			Unit	Conditions	
		min	typ	max			
Output voltage	V_o	4.80	5.00	5.20	V		
Line regulation	$\Delta V_{O LINE}$			100	mV	$V_{IN} = 8$ to 18V	
Load regulation	$\Delta V_{O LOAD}$			50	mV	$I_o = 0.5$ to 3A	
Efficiency *1	η		82		%		
Oscillation frequency	f_{OSC}	50	60	70	kHz		
Quiescent circuit current	I_q		5	10	mA	$I_o = 0\text{A}$	
Overcurrent protection starting current	I_S	3.1			A	*2	
Soft *3 terminal	Low level voltage	V_{SSL}		0.2	V		
	Source current when low	I_{SSL}	15	25	35	μA	$V_{SSL} = 0.2\text{V}$
	Discharge resistance	R_{DIS}			4	$\text{k}\Omega$	

Notes:

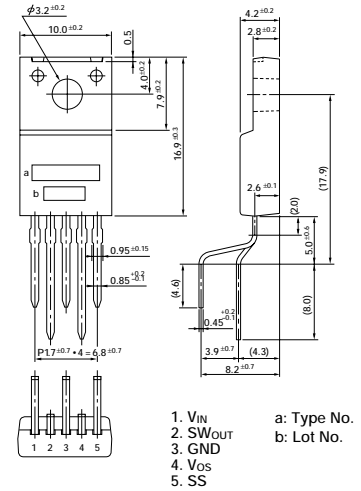
*1. Efficiency is calculated by the following equation:

$$\eta = \frac{V_o \cdot I_o}{V_{IN} \cdot I_{IN}} \cdot 100 (\%)$$

*2. A drooping-type overcurrent protection circuit is built in the IC.

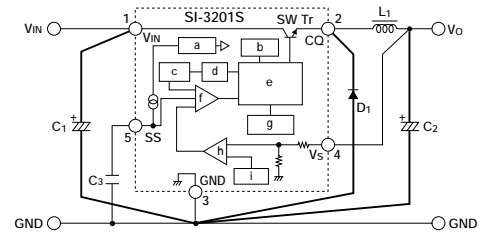
*3. An external voltage may not be applied to the soft start terminal. As shown in the diagram to the right, use this IC in the soft start mode with a capacitor or in the open-collector drive mode with a transistor. Leave the soft start terminal open when not using it since it is already pulled up in the IC.

External Dimensions (unit: mm)



(Forming No. 1101)

Standard Circuit Diagram



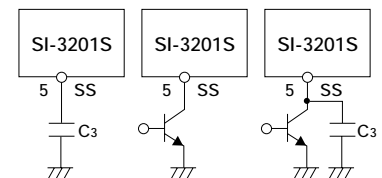
C1: 1000 μF
C2: 1000 μF

L1: 250 μH
D1: RK46 (Sanken)

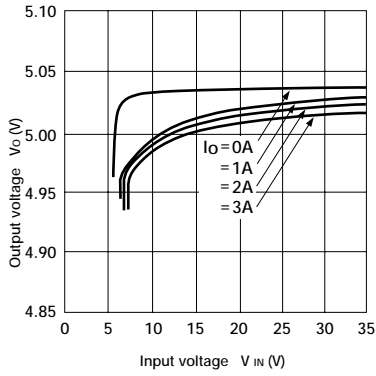
a: Internal power supply
b: Thermal protection
c: Reference oscillator
d: Reset
e: Latch & driver
f: Comparator
g: Overcurrent protection
h: Error amplifier
i: Reference voltage

Cautions:

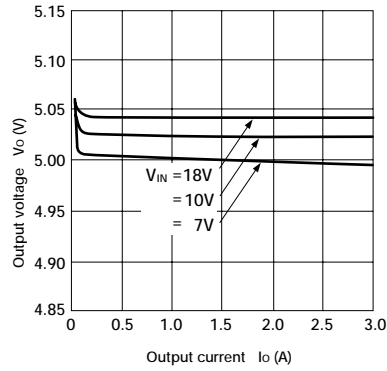
- (1) A high-ripple current flows through C_1 and C_2 . Use high-ripple type 1000 μF or higher capacitors with low internal resistance. Refer to the respective data books for more information on reliability and electrical characteristics of the capacitor.
- (2) C_3 is a capacitor used for soft start.
- (3) L_1 should be a choke coil with a low core loss for switching power supplies.
- (4) Use a Schottky barrier diode for D_1 and make sure that the reverse voltage applied to the 2nd terminal (SQ terminal) is within the maximum ratings (-1V). If you use a fast-recovery diode, the recovery voltage and the ON forward voltage may cause a reversed-bias voltage exceeding the maximum ratings to be applied to the 2nd terminal (SQ terminal). Applying a reversed-bias voltage exceeding the maximum rating to the 2nd terminal (SQ terminal) may damage the IC.
- (5) The 4th terminal (V_S) is an output voltage detection terminal. Since this terminal has a high impedance, connect it to the positive (+) terminal of C_2 via the shortest possible route.
- (6) Leave the 5th terminal (soft start terminal) open when not using it. It is pulled up internally.
- (7) To ensure optimum operating environment, connect the high-frequency current line with minimum wiring length.



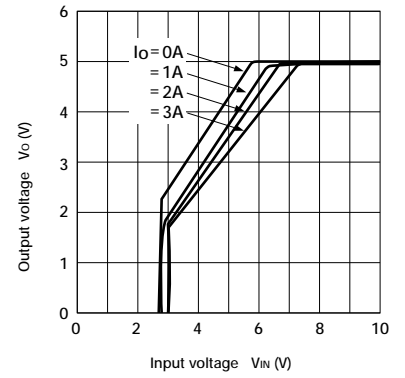
■ Line Regulation



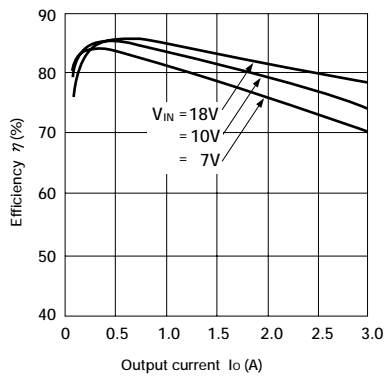
■ Load Regulation



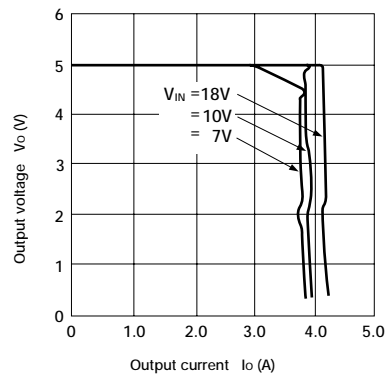
■ Rise Characteristics



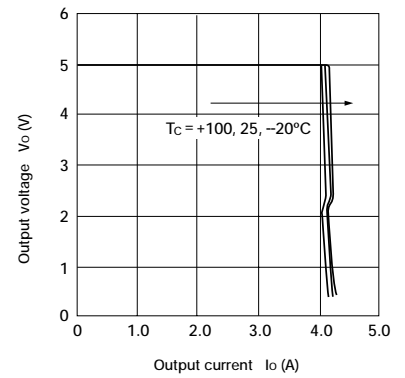
■ Efficiency Curve



■ Overcurrent Protection Characteristics



■ Overcurrent Protection Temperature Characteristics



■ $T_a - P_D$ Characteristics

