

SI-8000FFE Series Full-Mold, Separate Excitation Step-down Switching Mode

Features

- Compact full-mold package (equivalent to TO220)
- Output current: 3.5 A
- High efficiency: 83% ($V_o = 5\text{ V}$, $V_{IN} = 15\text{ V}$, $I_o = 2\text{ A}$)
- Requires only 6 discrete components
- Built-in reference oscillator (300 kHz)
- Built-in drooping-type overcurrent and thermal protection circuits
- Built-in soft start circuit (Output ON/OFF available)

Applications

- DVD recorder, FPD-TV
- OA equipment, such as printers
- Onboard local power supplies

Lineup

Part Number	SI-8001FFE
V_o (V)	Variable (0.8 to 24)
I_o (A)	3.5
Function	Soft start

Absolute Maximum Ratings

Parameter	Symbol	Ratings		Unit	Conditions
		SI-8001FFE			
Input Voltage	V_{IN}	43		V	
Power Dissipation (With infinite heatsink)	P_{D1-1}	22.7		W	Limited by thermal protection circuit, $T_j=150^\circ\text{C}$ $T_j=125^\circ\text{C}$
	P_{D1-2}	18.2			
Power Dissipation (Without heatsink)	P_{D2-1}	2.15		W	Limited by thermal protection circuit, $T_{jmax}=150^\circ\text{C}$ $T_j=125^\circ\text{C}$
	P_{D2-2}	1.72			
Junction Temperature ¹⁾	T_j	+150		$^\circ\text{C}$	
Storage Temperature	T_{stg}	-40 to +150		$^\circ\text{C}$	
Thermal Resistance (Junction to Case)	θ_{j-c}	5.5		$^\circ\text{C/W}$	
Thermal Resistance (Junction to Ambient Air)	θ_{j-a}	58		$^\circ\text{C/W}$	

*: This product has built-in thermal protection circuits that may activate when the junction temperature exceeds 130°C . The recommended design for the junction temperature during IC operation is below 125°C .

Recommended Operating Conditions

Parameter	Symbol	Ratings		Unit
		SI-8001FFE		
Input Voltage Range	V_{IN}	V_o+3^{*1} to 40		V
Output Voltage Range	V_o	0.8 to 24		V
Output Current Range	I_o	0 to 3.5		A
Operating Junction Temperature Range	T_{jop}	-30 to +125		$^\circ\text{C}$
Operating Temperature Range	T_{op}	-30 to +85		$^\circ\text{C}$

*: The minimum value of the input voltage range is 4.5 V or $V_o + 3\text{ V}$, whichever is higher.

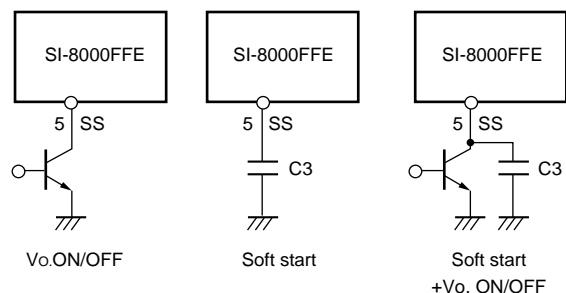
Electrical Characteristics

($R_1=4.2\text{k}\Omega$, $R_2=0.8\text{k}\Omega$ when $T_a=25^\circ\text{C}$ and $V_o=5\text{V}$)

Parameter	Symbol	Ratings			Unit
		SI-8001FFE			
		min.	typ.	max.	
Reference Voltage	V_{ADJ}	0.784	0.800	0.816	V
	Conditions	$V_{IN}=15\text{V}$, $I_o=0.2\text{A}$			
Temperature Coefficient of Reference Voltage	$\Delta V_{ADJ}/\Delta T$		± 0.1		mV/ $^\circ\text{C}$
	Conditions	$V_{IN}=15\text{V}$, $I_o=0.2\text{A}$, $T_c=0$ to 100°C			
Efficiency	η		83		%
	Conditions	$V_{IN}=15\text{V}$, $I_o=2\text{A}$			
Oscillation Frequency	f_o	270	300	330	kHz
	Conditions	$V_{IN}=15\text{V}$, $I_o=2\text{A}$			
Line Regulation	ΔV_{OLINE}		55	80	mV
	Conditions	$V_{IN}=10$ to 30V , $I_o=2\text{A}$			
Load Regulation	ΔV_{OLOAD}		15	50	mV
	Conditions	$V_{IN}=15\text{V}$, $I_o=0.2$ to 3.5A			
Overcurrent Protection Starting Current	I_s	3.6			A
	Conditions	$V_{IN}=15\text{V}$			
SS Pin	Low Level Voltage	V_{SSL}		0.5	V
	Outflow Current at Low Voltage	I_{SSL}		6	
Conditions		$V_{IN}=15\text{V}$, $V_{SS}=0\text{V}$			
Quiescent Circuit Current	I_q		6		mA
		Conditions	$V_{IN}=15\text{V}$, $I_o=0\text{A}$		
	$I_{q(OFF)}$		200	600	μA
		Conditions	$V_{IN}=15\text{V}$, $V_{SS}=0\text{V}$		

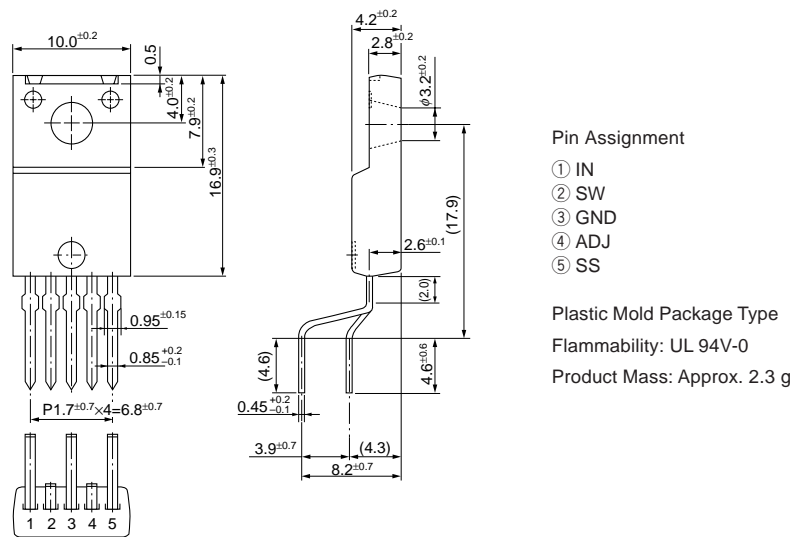
*: Pin 5 is the SS pin. Soft start at power on can be performed with a capacitor connected to this pin. The output can also be turned ON/OFF with this pin.

The output is stopped by setting the voltage of this pin to V_{SSL} or lower. SS-pin voltage can be changed with an open-collector drive circuit of a transistor. When using both the soft-start and ON/OFF functions together, the discharge current from C3 flows into the ON/OFF control transistor. Therefore, limit the current securely to protect the transistor if C3 capacitance is large. The SS pin is pulled up (3.7 V typ.) to the power supply in the IC, so applying the external voltage is prohibited. If this pin is not used, leave it open.

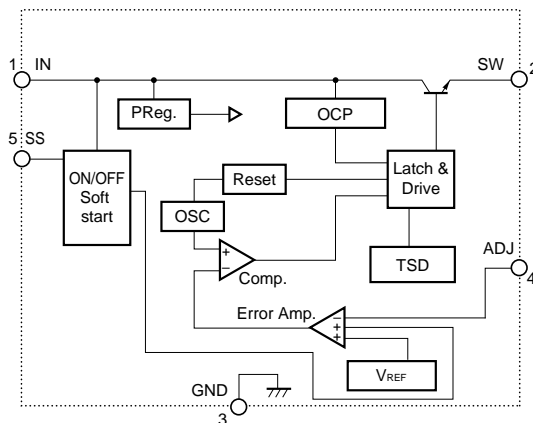


External Dimensions (TO220F-5)

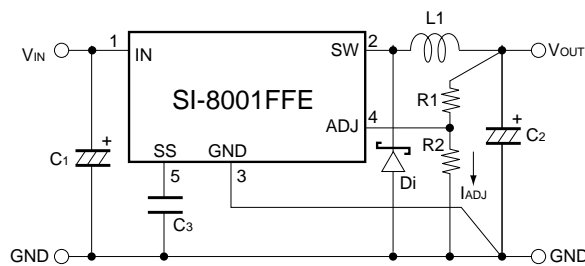
(Unit : mm)



Block Diagram



Typical Connection Diagram



- C1 :470 μ F
- C2 :680 μ F
- C3 :0.1 μ F(Only when using soft-start function)
- L1 :47 μ H
- D1 :RK46(Sanken)