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Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



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

Features

- Compact full-mold package (equivalent to TO220)
- Output current: 5.5 A
- High efficiency: 83% typ. (at $V_o = 5\text{ V}$)
- Requires only 4 discrete components
- Built-in reference oscillator (150 kHz)
- Built-in drooping-type-overcurrent and thermal protection circuits
- Built-in soft start circuit (Output ON/OFF available)

Applications

- Onboard local power supplies
- OA equipment

Lineup

Part Number	SI-8008HFE	SI-8050HFE
V_o (V)	Variable (0.8 to 15)	5
I_o (A)		5.5

Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit	Conditions
DC Input Voltage	V_{IN}	43	V	
Power Dissipation	P_{D1-1}	25 (with infinite heatsink)	W	Limited by thermal protection, $T_{jmax}=150^\circ\text{C}$
	P_{D1-2}	20 (with infinite heatsink)		$T_{jmax}=125^\circ\text{C}$
	P_{D2-1}	2.15 (without heat sink, standalone operation)		Limited by thermal protection, $T_{jmax}=150^\circ\text{C}$
	P_{D2-2}	1.72 (without heatsink, standalone operation)		$T_{jmax}=125^\circ\text{C}$
Junction Temperature*	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	$^\circ\text{C/W}$	
Thermal Resistance (Junction to Ambient Air)	θ_{j-a}	58	$^\circ\text{C/W}$	

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

Recommended Operating Conditions

Parameter	Symbol	Ratings		Unit
		SI-8008HFE	SI-8050HFE	
Input Voltage Range	V_{IN}	V_o+3^{*1} to 40	8 to 40	V
Output Voltage Range	V_o	0.8 to 24	5.0	V
Output Current Range	I_o		0 to 5.5	A
Operating Junction Temperature Range	T_{jop}		-30 to +125	$^\circ\text{C}$
Operating Temperature Range	T_{op}		-30 to +85	$^\circ\text{C}$

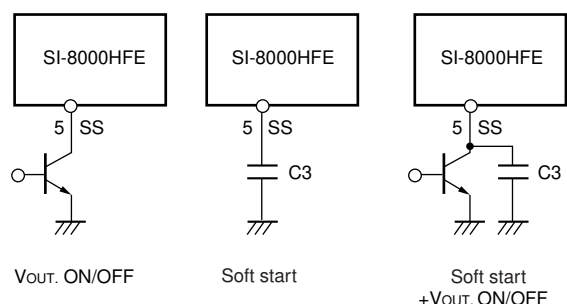
*1: The minimum value of an input voltage range is the higher of 4.5 V or $V_o + 3\text{ V}$.

Electrical Characteristics

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

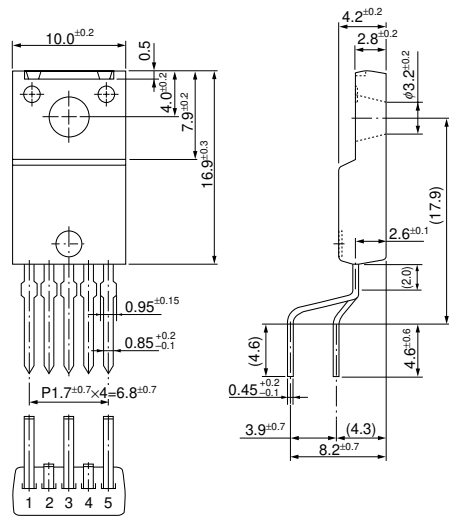
Parameter	Symbol	Ratings			Ratings			Unit	
		SI-8008HFE (at $V_o = 5\text{ V}$)			SI-8050HFE				
		min.	typ.	max.	min.	typ.	max.		
Output Voltage	V_o				4.90	5.00	5.10	V	
Reference Voltage	V_{ADJ}	0.784	0.800	0.816				V	
	Conditions	$V_{IN}=15\text{V}, I_o=1\text{A}$			$V_{IN}=15\text{V}, I_o=1\text{A}$				
Temperature Coefficient of Output Voltage	$\Delta V_o/\Delta T$					± 0.5		$\text{mV}/^\circ\text{C}$	
	Conditions	$V_{IN}=15\text{V}, I_o=1\text{A}, T_c=0$ to 100°C			$V_{IN}=15\text{V}, I_o=1\text{A}, T_c=0$ to 100°C				
Efficiency	η		83			83		%	
	Conditions	$V_{IN}=15\text{V}, I_o=3\text{A}$			$V_{IN}=15\text{V}, I_o=3\text{A}$				
Oscillation Frequency	f_o		150			150		kHz	
	Conditions	$V_{IN}=15\text{V}, I_o=3\text{A}$			$V_{IN}=15\text{V}, I_o=3\text{A}$				
Line Regulation	ΔV_{OLINE}		60	80		60	80	mV	
	Conditions	$V_{IN}=10$ to $30\text{V}, I_o=3\text{A}$			$V_{IN}=10$ to $30\text{V}, I_o=3\text{A}$				
Load Regulation	ΔV_{OLOAD}		20	50		20	50	mV	
	Conditions	$V_{IN}=15\text{V}, I_o=0.2$ to 5.5A			$V_{IN}=15\text{V}, I_o=0.2$ to 5.5A				
Overcurrent Protection Starting Current	I_s	5.6			5.6			A	
	Conditions	$V_{IN}=15\text{V}$			$V_{IN}=15\text{V}$				
ON/OFF Pin*	Low Level Voltage	V_{SSL}		0.5			0.5	V	
	Outflow Current at Low Voltage	I_{SSL}		10	30		10	30	μA
		Conditions	$V_{SSL}=0\text{V}$			$V_{SSL}=0\text{V}$			
Quiescent Circuit Current	I_q		6			6		mA	
	Conditions	$V_{IN}=15\text{V}, I_o=0\text{A}$			$V_{IN}=15\text{V}, I_o=0\text{A}$				
	$I_{q(OFF)}$		200	400		200	400	μA	
Conditions	$V_{IN}=15\text{V}, V_{SS}=0\text{V}$			$V_{IN}=15\text{V}, V_{SS}=0\text{V}$					

*: 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 to the power supply in the IC, so applying the external voltage is prohibited. If the pin is not used, leave it open.



External Dimensions (TO220F-5)

(Unit : mm)

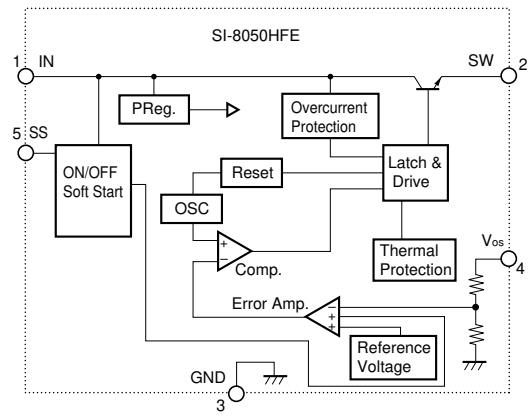
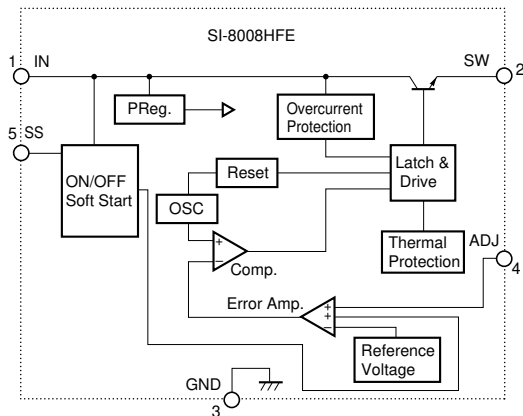


Pin Assignment

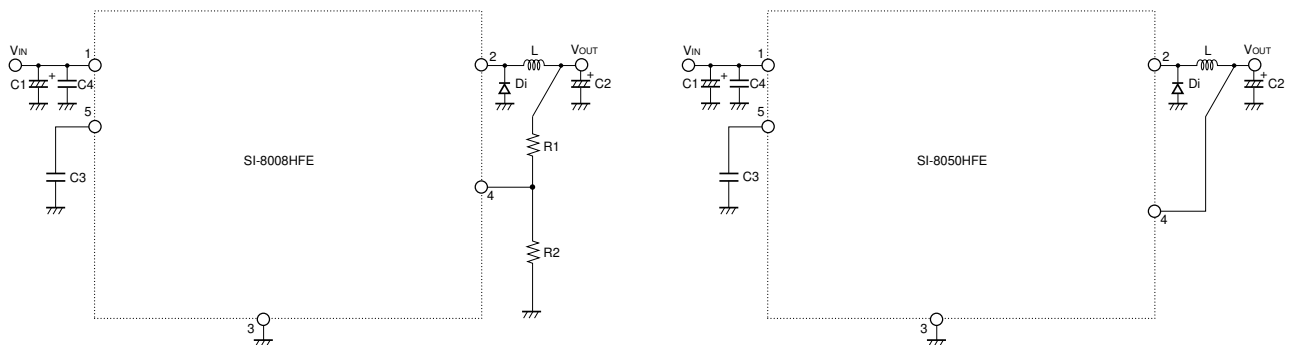
- ① VIN
- ② SW
- ③ GND
- ④ ADJ (Vos for SI-8050HFE)
- ⑤ SS

Plastic Mold Package Type
 Flammability: UL94V-0
 Product Mass: Approx. 2.3g

Block Diagram



Typical Connection Diagram



- C1 : 1500 μ F
- C2 : 1000 μ F
- C3 : 1 μ F (Only when using soft-start function)
- C4 : 4.7 μ F (RPER11H475K5 (Murata Manufacturing) recommended)
- L1 : 100 μ H
- Di : FMB-G16L (Sanken)