

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

## 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)	$\theta_{j-c}$	5	$^\circ\text{C/W}$	
Thermal Resistance (Junction to Ambient Air)	$\theta_{j-a}$	58	$^\circ\text{C/W}$	

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

## Recommended Operating Conditions

Parameter	Symbol	Ratings		Unit
		SI-8008HFE	SI-8050HFE	
Input Voltage Range	$V_{IN}$	$V_o+3^{11}$ 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	$^\circ\text{C}$

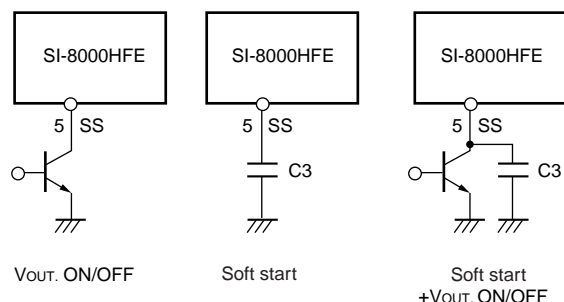
\*1: The minimum value of an input voltage range is the higher of 4.5 V or  $V_o + 3\text{ V}$ .

## Electrical Characteristics

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

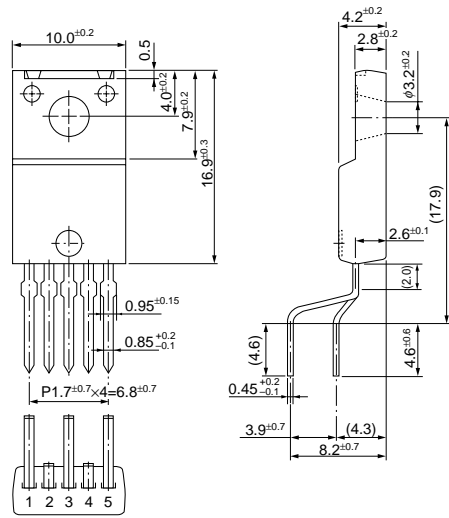
Parameter	Symbol	Ratings			Ratings			Unit
		SI-8008HFE (at $V_o = 5\text{ V}$ )			SI-8050HFE			
		min.	typ.	max.	min.	typ.	max.	
Output Voltage (Reference Voltage)	$V_o$ ( $V_{ADJ}$ )	0.784	0.800	0.816	4.90	5.00	5.10	V
	Conditions	$V_{IN}=15\text{ V}, I_o=1\text{ A}$			$V_{IN}=15\text{ V}, I_o=1\text{ A}$			
Temperature Coefficient of Output Voltage (Temperature Coefficient of Reference Voltage)	$\Delta V_o/\Delta T$ ( $\Delta V_{ADJ}/\Delta T$ )		$\pm 0.1$			$\pm 0.5$		$\text{mV}/^\circ\text{C}$
	Conditions	$V_{IN}=15\text{ V}, I_o=1\text{ A}, T_c=0$ to $100^\circ\text{C}$			$V_{IN}=15\text{ V}, I_o=1\text{ A}, T_c=0$ to $100^\circ\text{C}$			
Efficiency	$\eta$		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	$\Delta V_{OLINE}$		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	$\Delta V_{OLOAD}$		20	50		20	50	mV
	Conditions	$V_{IN}=15\text{ V}, I_o=0.2$ to $3\text{ A}$			$V_{IN}=15\text{ V}, I_o=0.2$ to $3\text{ A}$			
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		10	30	
		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	$\mu\text{A}$
	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)

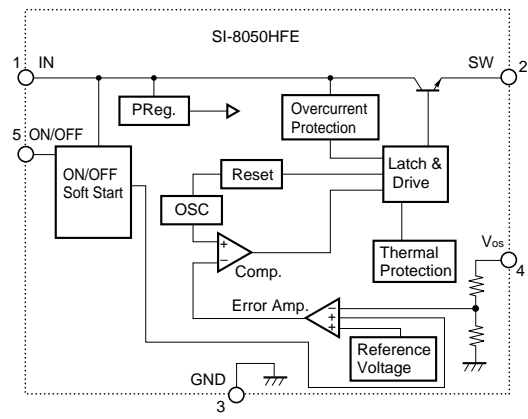
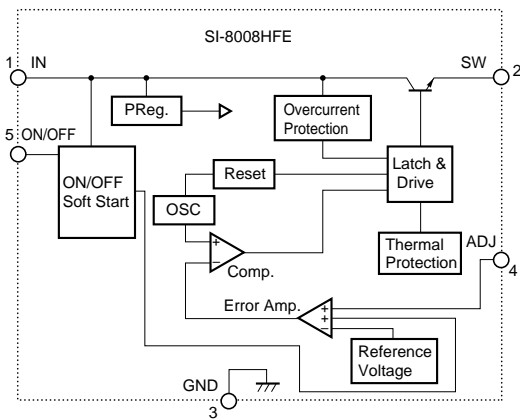


Pin Assignment

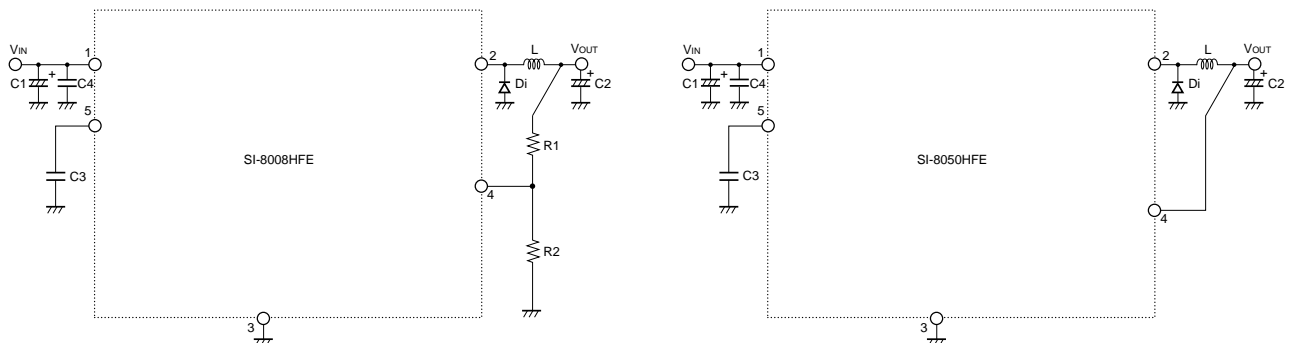
- ① VIN
- ② SW
- ③ GND
- ④ ADJ (Vos for SI-8050HFE)
- ⑤ SS

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

Block Diagram



Typical Connection Diagram



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