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 Vo = 5 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
- AV 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	$P_{D1\text{-}1}$	25 (with infinite heatsink)	W	Limited by thermal protection, T_{jmax}=150°C
	$P_{D1\text{-}2}$	20 (with infinite heatsink)		T_{jmax}=125°C
	$P_{D2\text{-}1}$	2.15 (without heat sink, standalone operation)		Limited by thermal protection, T_{jmax}=150°C
	$P_{D2\text{-}2}$	1.72 (without heatsink, standalone operation)		T_{jmax}=125°C
Junction Temperature*	T_j	+150	°C	
Storage Temperature	T_{stg}	–40 to +150	°C	
Thermal Resistance (Junction to Case)	$\theta_{j\text{-}c}$	5	°C/W	
Thermal Resistance (Junction to Ambient Air)	$\theta_{j\text{-}a}$	58	°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}	Vo+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		°C
Operating Temperature Range	T_{op}	–30 to +85		°C

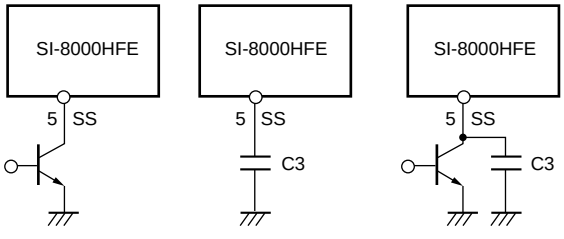
*1: The minimum value of an input voltage range is the higher of 4.5 V or V_O + 3 V.

■Electrical Characteristics

(Ta=25°C)

Parameter		Symbol		Ratings SI-8008HFE (at Vo = 5 V) min.	typ.	max.	Ratings SI-8050HFE min.	typ.	max.	Unit
Output Voltage (Reference Voltage)		Vo (V_{ADJ})					4.90	5.00	5.10	V
				0.784	0.800	0.816				
			Conditions	V_{IN}=15V, I_o=1A			V_{IN}=15V, I_o=1A			
Temperature Coefficient of Output Voltage (Temperature Coefficient of Reference Voltage)		ΔVo/ΔT ($\Delta V_{ADJ}/\Delta T$)						±0.5		mV/°C
					±0.1					
			Conditions	V_{IN}=15V, I_o=1A, T_c=0 to 100°C			V_{IN}=15V, I_o=1A, T_c=0 to 100°C			
Efficiency		η			83			83		%
			Conditions	V_{IN}=15V, I_o=3A			V_{IN}=15V, I_o=3A			
Oscillation Frequency		fo			150			150		kHz
			Conditions	V_{IN}=15V, I_o=3A			V_{IN}=15V, I_o=3A			
Line Regulation		ΔV_{OLINE}			60	80		60	80	mV
			Conditions	V_{IN}=10 to 30V, I_o=3A			V_{IN}=10 to 30V, I_o=3A			
Load Regulation		ΔV_{OLOAD}			20	50		20	50	mV
			Conditions	V_{IN}=15V, I_o=0.2 to 3A			V_{IN}=15V, I_o=0.2 to 3A			
Overcurrent Protection Starting Current		I_S		5.6			5.6			A
			Conditions	V_{IN}=15V			V_{IN}=15V			
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}=0V			V_{SSL}=0V			
Quiescent Circuit Current		I_q			6			6		mA
			Conditions	V_{IN}=15V, I_o=0A			V_{IN}=15V, I_o=0A			
		$I_{q(OFF)}$			200	400		200	400	µA
			Conditions	V_{IN}=15V, V_{SS}=0V			V_{IN}=15V, V_{SS}=0V			

*: 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 VSSL 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.

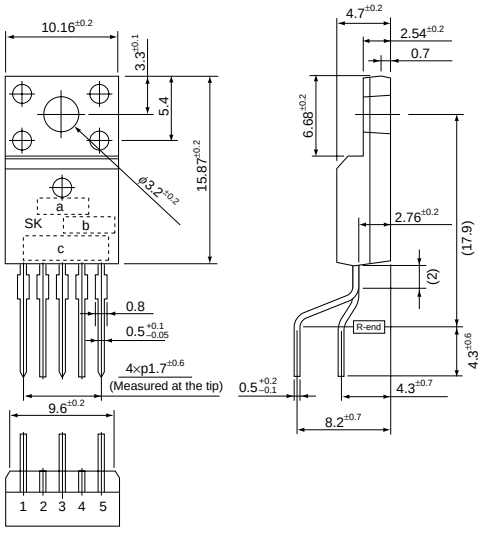


$V_{OUT.}$ ON/OFF | Soft start | Soft start +$V_{OUT.}$ ON/OFF

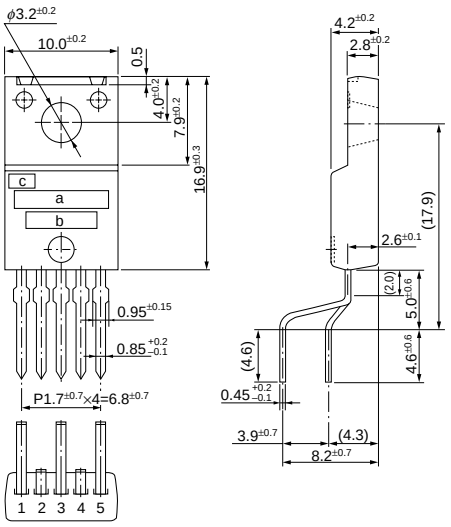
■External Dimensions (TO220F-5)

(Unit : mm)

Type A



Type B



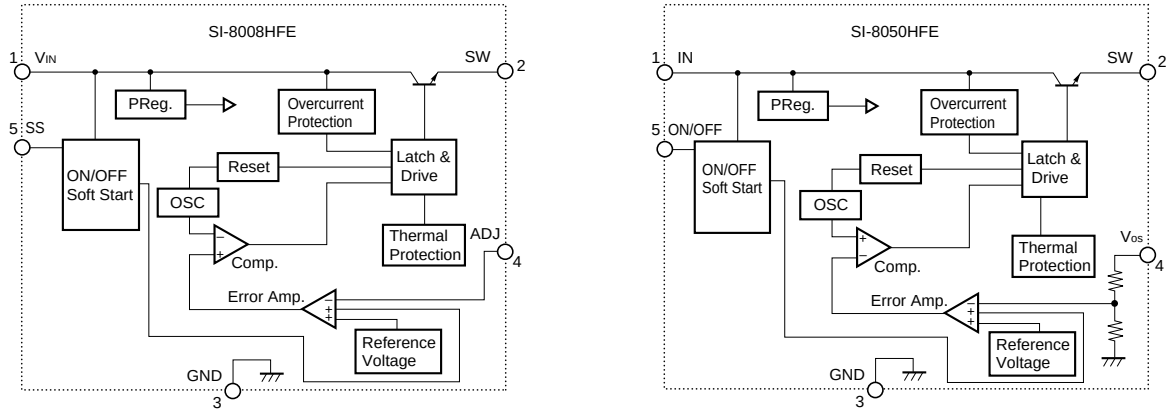
a. Part Number
b. Lot Number
c. Administer Number

Pin Assignment
① V_{IN}
② SW
③ GND
④ ADJ (V_{OS} for SI-8050HFE)
⑤ SS

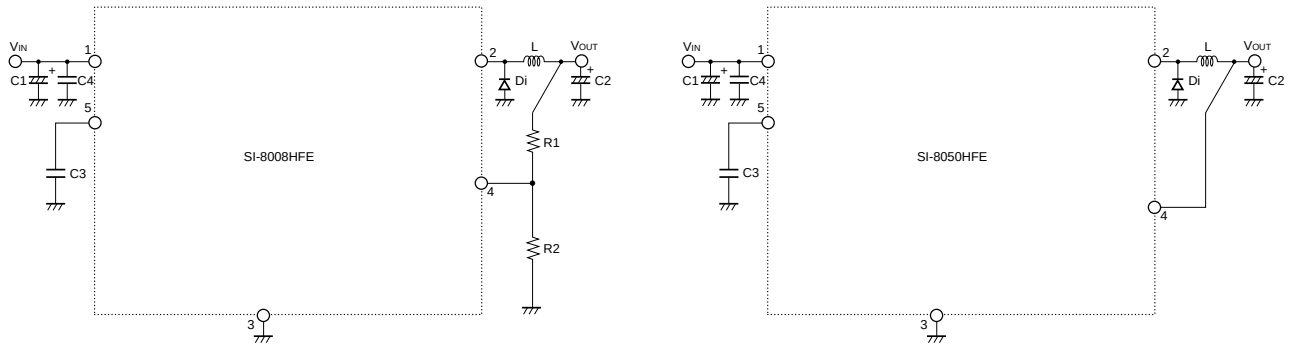
Plastic Mold Package Type
Flammability: UL94V-0
Product Mass: Approx. 2.3g

The external dimension shall be either A or B.

■Block Diagram



■Typical Connection Diagram



C_1 : 1500μF
C_2 : 1000μF
C_3 :1μF (Only when using soft-start function)
C_4 :4.7μF (RPER11H475K5 (Murata Manufacturing) recommended)
L_1 :100μH
Di : FMB-G16L (Sanken)