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

■Features

- Compact full-mold package (equivalent to TO220)
- Output current: 1.5A
- High efficiency: 67 to 88%
- Requires only 4 discrete components
- Internally-adjusted phase correction and output voltage
- Capable of downsize a choke-coil due to IC's high switching frequency (125kHz). (Compared with conventional Sanken devices)
- Built-in foldback-overcurrent and thermal protection circuits
- Output ON/OFF available (circuit current at output OFF: 200μA max.)
- Soft start available by ON/OFF pin

■Applications

- Power supplies for telecommunication equipment
- Onboard local power supplies

■Lineup

Part Number	SI-8015JF	SI-8033JF	SI-8050JF	SI-8120JF
V_O (V)*	1.59	3.3	5.0	12.0
I_O (A)	1.5			

* V_{REF}(V) for SI-8015JF

■Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
DC Input Voltage	V_{IN}	43	V
Power Dissipation	P_{D1}	16.6 (with infinite heatsink)	W
	P_{D2}	1.5 (without heatsink, standalone operation)	W
Junction Temperature	T_j	+125	°C
Storage Temperature	T_{stg}	–40 to +125	°C
Thermal Resistance (Junction to Case)	$\theta_{j\text{-}c}$	6.0	°C/W

■Recommended Operating Conditions

Parameter	Symbol	Ratings				Unit	Conditions
		SI-8015JF*	SI-8033JF	SI-8050JF	SI-8120JF		
DC Input Voltage Range	$V_{IN}1$	V_O+2 to 40	5.3 to 40	7 to 40	14 to 40	V	I_O=0 to 1A
	$V_{IN}2$	V_O+3 to 40	6.3 to 40	8 to 40	15 to 40	V	I_O=0 to 1.5A
Output Current Range	I_O	0 to 1.5				A	V_{IN}≥V_O+3V
Operating Junction Temperature Range	T_{jop}	–30 to +125				°C	

* SI-8015JF is a variable output voltage type. The variable output voltage range is from 2.5 V to 24 V.

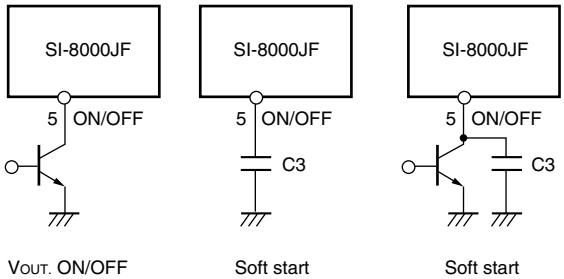
■Electrical Characteristics

(T_a=25°C)

Parameter	Symbol	Ratings												Unit
		SI-8015JF			SI-8033JF			SI-8050JF			SI-8120JF			
		min.	typ.	max.	min.	typ.	max.	min.	typ.	max.	min.	typ.	max.	
Output Voltage*1	V_O*2	1.558	1.59	1.622	3.234	3.30	3.366	4.90	5.00	5.10	11.76	12.00	12.24	V
	Conditions	V_{IN}=12V, I_O=0.5A			V_{IN}=15V, I_O=0.5A			V_{IN}=20V, I_O=0.5A			V_{IN}=24V, I_O=0.5A			
Efficiency	η		67			77			82			88		%
	Conditions	V_{IN}=12V, I_O=0.5A			V_{IN}=15V, I_O=0.5A			V_{IN}=20V, I_O=0.5A			V_{IN}=24V, I_O=0.5A			
Oscillation Frequency	f		125			125			125			125		kHz
	Conditions	V_{IN}=12V, I_O=0.5A			V_{IN}=15V, I_O=0.5A			V_{IN}=20V, I_O=0.5A			V_{IN}=24V, I_O=0.5A			
Line Regulation	ΔV_{OLINE}		25	80		25	80		40	100		60	130	mV
	Conditions	V_{IN}=8 to 30V, I_O=0.5A			V_{IN}=8 to 30V, I_O=1.0A			V_{IN}=10 to 30V, I_O=1.0A			V_{IN}=18 to 30V, I_O=1.0A			
Load Regulation	ΔV_{OLOAD}		10	30		10	30		10	40		10	40	mV
	Conditions	V_{IN}=12V, I_O=0.2 to 0.8A			V_{IN}=15V, I_O=0.5 to1.5A			V_{IN}=20V, I_O=0.5 to 1.5A			V_{IN}=24V, I_O=0.5 to 1.5A			
Temperature Coefficient of Output Voltage*3	$\Delta V_O/\Delta T_a$*4		±0.5			±0.5			±0.5			±1.0		mV/°C
Overcurrent Protection Starting Current	I_{S1}	1.6			1.6			1.6			1.6			A
	Conditions	V_{IN}=12V			V_{IN}=15V			V_{IN}=20V			V_{IN}=24V			
ON/OFF*5 Terminal Low Level Voltage	V_{SSL}			0.5			0.5			0.5			0.5	V
ON/OFF*5 Terminal Outflow Current at Low Voltage	I_{SSL}			100			100			100			100	μA
	Conditions	V_{SSL}=0V			V_{SSL}=0V			V_{SSL}=0V			V_{SSL}=0V			
Quiescent Circuit Current	I_q		7			7			7			7		mA
	Conditions	V_{IN}=12V, I_O=0A			V_{IN}=15V, I_O=0A			V_{IN}=20V, I_O=0A			V_{IN}=24V, I_O=0A			
	$I_{q(OFF)}$			200			200			200			200	μA
	Conditions	V_{IN}=12V, $V_{ON/OFF}$=0.3V			V_{IN}=15V, $V_{ON/OFF}$=0.3V			V_{IN}=20V, $V_{ON/OFF}$=0.3V			V_{IN}=24V, $V_{ON/OFF}$=0.3V			

*1: Reference voltage for SI-8015JF
*2: V_{REF} for SI-8015JF
*3: Temperature Coefficient of Reference Voltage for SI-8015JF
*4: $\Delta V_{REF}/\Delta T_a$ for SI-8015JF

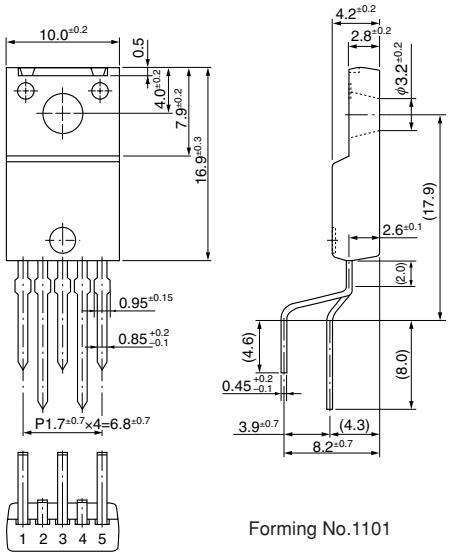
*5: Pin 5 is the ON/OFF pin. Soft start at power on can be performed with a capacitor connected to this pin.
The output can also be turned ON/OFF with this pin. The output is stopped by setting the voltage of this pin to V_{SSL} or lower. ON/OFF-pin voltage can be changed with an open-collector drive circuit of a transistor. When using both the soft-start and ON/OFF functions together, the discharge current from C_3 flows into the ON/OFF control transistor. Therefore, limit the current securely to protect the transistor if C_3 capacitance is large. The ON/OFF pin is pulled up to the power supply in the IC, so applying the external voltage is prohibited. If this 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)



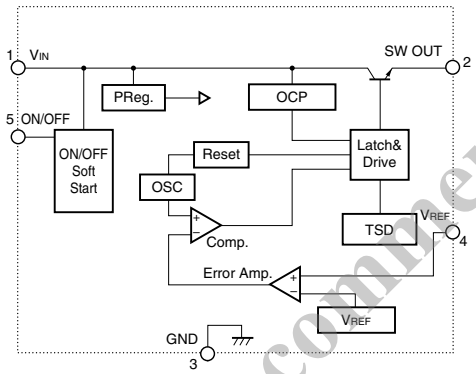
Forming No.1101

Pin Assignment
① V_{IN}
② SW_{OUT}
③ GND
④ V_{OS}
⑤ ON/OFF

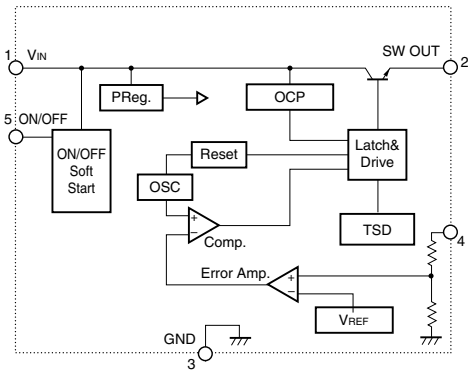
Plastic Mold Package Type
Flammability: UL94V-0
Product Mass: Approx. 2.3g

■Block Diagram

SI-8015JF

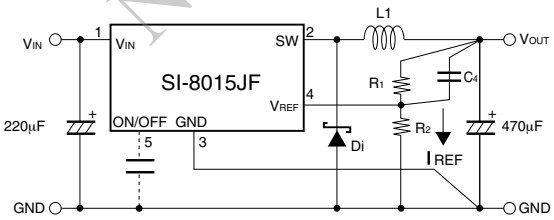


8033JF, 8050JF, 8120JF



■Typical Connection Diagram

SI-8015JF

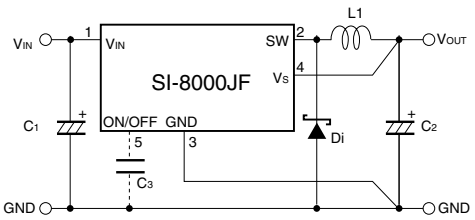


IREF shall be approx. 2mA.

C1 : 50V/220μF
C2 : 25V/470μF
C3 : 10V/0.47μF (Only when using soft-start function)
C4 : 6800pF
L1 : 100μH
Di : RK16 (Sanken)

$$V_{OUT}=\frac{V_{REF}\times(R_1+R_2)}{R_2}$$

8033JF, 8050JF, 8120JF



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